

# Kingbright



Optoelectronic Components  
2024-2025

# About KINGBRIGHT

## An Innovative LED Solution Provider

Kingbright is a Taiwanese LED solution provider with global presences of sales offices and warehouses in the US, Europe and across Asia. We are also a leading LED manufacturer with over 40 years of expertise.

Our LEDs are known for high quality, reliability and energy efficiency. We offer a wide range of LED products in various colors, sizes and packages in both visible and invisible spectrums to meet various engineering needs in all industries for customers around the globe.

We are committed to technological innovation, continuous improvement of quality excellence and customer satisfaction for all customers around the world.





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# SMD LED

Kingbright SMD (Surface-Mount Device) LEDs are energy efficient with excellent intensity performances. We have a complete selection of SMDs in variety of sizes, viewing angles, color combinations and light outputs to fulfill all design needs.



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Low Current SMD LED

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High Temperature  
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Top-Emitting Chip  
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Top-Emitting PLCC  
SMD LED


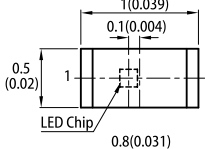
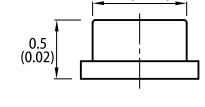
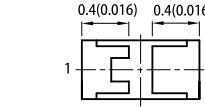

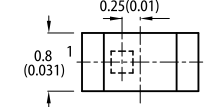
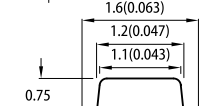
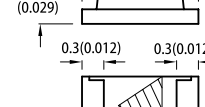

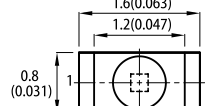
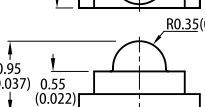
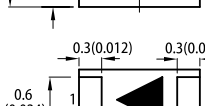

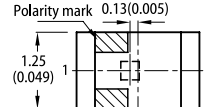
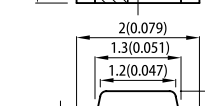
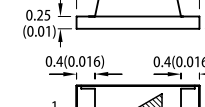
15 /  
Right Angel SMD LED

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Multi-Color SMD LED

22 /  
Subminiature SMD LED

23 /  
Reverse Mount SMD LED

LOW CURRENT SMD LED

Part Number	Material	λD (nm)	Lens Type	Iv (mcd) @2mA		Viewing Angle 2θ1/2	Dimensions	
				Min.	Typ.			
APHHS1005LSECK/J3-PF	AlGaInP	625	Water Clear	15	35	120°	<p>1.0mm x 0.5mm x 0.5mm (0402)</p>  <p>APHHS1005L</p>    <p>LED Chip</p> <p>APHHS1005LQBC/D-V</p> <p>APHHS1005LSECK/J3-PF APHHS1005LSECK/J4-PF</p> <p>Units: mm (inch) Tolerance: ± 0.1 (0.004)</p>	
APHHS1005LSECK/J4-PF	AlGaInP	605	Water Clear	20	40	120°		
APHHS1005LCGCK	AlGaInP	570	Water Clear	1.2	3.5	120°		
APHHS1005LQBC/D-V	InGaN	465	Water Clear	6	15	140°		
APT1608LSECK/J3-PRV	AlGaInP	625	Water Clear	20	40	120°		<p>1.6mm x 0.8mm x 0.75mm (0603)</p>  <p>APT1608L</p>    <p>APT1608LSECK/J3-PRV APT1608LSECK/J4-PRV APT1608LSYCK/J3-PRV</p> <p>Polarity mark</p> <p>Units: mm (inch) Tolerance: ± 0.1 (0.004)</p>
APT1608LSECK/J4-PRV	AlGaInP	605	Water Clear	30	50	120°		
APT1608LSYCK/J3-PRV	AlGaInP	590	Water Clear	15	25	120°		
APT1608LZGCK	InGaN	525	Water Clear	50	100	130°		
APT1608LVBC/D	InGaN	470	Water Clear	15	24	130°		
APTD1608LSURCK	AlGaInP	630	Water Clear	15	30	60°	<p>1.6mm x 0.8mm x 0.95mm (0603 Dome Lens)</p>  <p>APTD1608L</p>    <p>APTD1608LSECK/J3-PF APTD1608LSECK/J4-PF APTD1608LSYCK/J3-PF</p> <p>Polarity mark</p> <p>Units: mm (inch) Tolerance: ± 0.15 (0.006)</p>	
APTD1608LSECK/J3-PF	AlGaInP	625	Water Clear	50	120	60°		
APTD1608LSECK/J4-PF	AlGaInP	605	Water Clear	80	150	60°		
APTD1608LSYCK	AlGaInP	590	Water Clear	20	40	60°		
APTD1608LSYCK/J3-PF	AlGaInP	590	Water Clear	30	55	60°		
APTD1608LCGCK	AlGaInP	570	Water Clear	6	8	60°		
APTD1608LZGCK	InGaN	525	Water Clear	250	420	60°		
APTD1608LVBC/D	InGaN	470	Water Clear	30	65	40°		
APTD1608LQBC/D	InGaN	465	Water Clear	10	20	40°		
APT2012LSECK/J3-PRV	AlGaInP	625	Water Clear	20	40	140°	<p>2.0mm x 1.25mm x 0.75mm (0805)</p>  <p>APT2012L</p>    <p>APT2012LSECK/J3-PRV</p> <p>Polarity mark</p> <p>Units: mm (inch) Tolerance: ± 0.1 (0.004)</p>	
APT2012LZGCK	InGaN	525	Water Clear	50	100	140°		
APT2012LVBC/D	InGaN	470	Water Clear	15	24	140°		

AP series custom-made is available upon request



LOW CURRENT SMD LED

Part Number	Material	$\lambda_D$ (nm)	Lens Type	Iv (mcd) @2mA		Viewing Angle	Dimensions
				Min.	Typ.		
APTD2012LSURCK	AlGaInP	630	Water Clear	20	50	40°	<p>2.0mm x 1.25mm x 1.05mm (0805 Dome Lens)</p> <p>Units: mm (inch) Tolerance: ± 0.15 (0.006)</p>
APTD2012LSYCK	AlGaInP	590	Water Clear	30	90	40°	
APTD2012LCGCK	AlGaInP	570	Water Clear	20	40	40°	
APTD2012LZGCK	InGaN	525	Water Clear	320	550	30°	
APA2107LZGCK	InGaN	525	Water Clear	50	100	170°	<p>2.1mm x 1.0mm x 0.6mm (Right Angle)</p> <p>Units: mm (inch) Tolerance: ± 0.1 (0.004)</p>
APA2107LVBC/D	InGaN	470	Water Clear	10	20	170°	
APDA3020LSECK/J3-PF	AlGaInP	625	Water Clear	250	500	10°	<p>3.0mm x 2.8mm x 2.0mm (Right Angle)</p> <p>Units: mm (inch) Tolerance: ± 0.2 (0.008)</p>
APDA3020LZGCK	InGaN	525	Water Clear	700	1500	10°	
APT3216LSECK/J3-PRV	AlGaInP	625	Water Clear	20	40	140°	<p>3.2mm x 1.6mm x 0.75mm (1206)</p> <p>Units: mm (inch) Tolerance: ± 0.2 (0.008)</p>

LOW CURRENT SMD LED

Part Number	Material	λD (nm)	Lens Type	Iv (mcd) @2mA		Viewing Angle 2θ1/2	Dimensions
				Min.	Typ.		
APTD3216LSURCK	AlGaInP	630	Water Clear	20	50	40°	<p>3.2mm x 1.6mm x 1.8mm (1206 Dome Lens)</p> <p>Units: mm (inch) Tolerance: ± 0.2 (0.008)</p>
AA3528LSECKT/J3	AlGaInP	625	Water Clear	30	50	120°	<p>3.5mm x 2.8mm x 1.9mm</p> <p>Units: mm (inch) Tolerance: ± 0.25 (0.01)</p>
APHB1608LZGKSURKC	InGaN	525	Water Clear	50	80	130°	<p>1.6mm x 0.8mm x 0.5mm (0603 Bi-Color)</p> <p>Units: mm (inch) Tolerance: ± 0.15 (0.006)</p>
	AlGaInP	630		2	8		
APHBM2012LSURKZGKC	AlGaInP	630	Water Clear	6	15	120°	<p>2.0mm x 1.25mm x 0.45mm (0805 Super Thin, Bi-Color)</p> <p>Units: mm (inch) Tolerance: ± 0.1 (0.004)</p>
	InGaN	525		50	90		

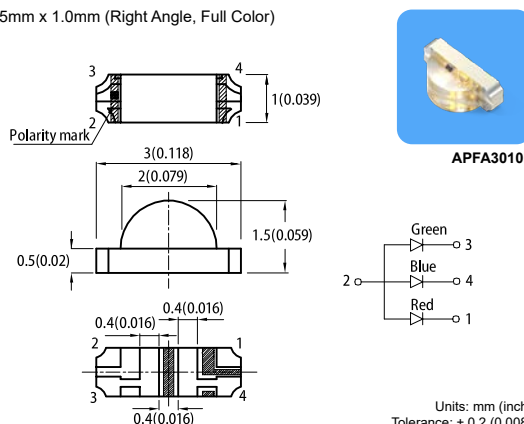
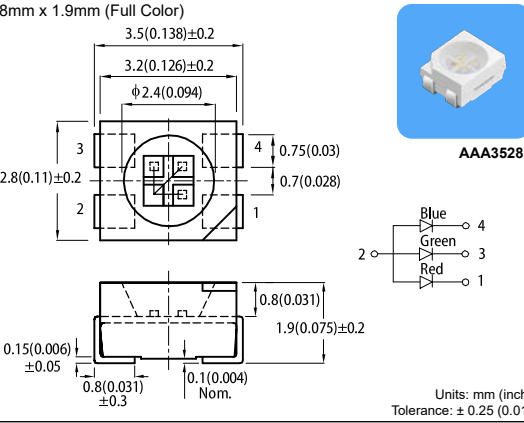
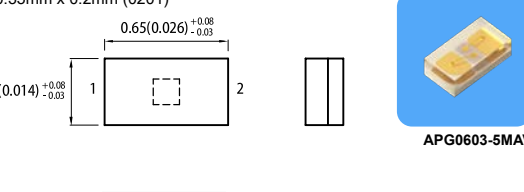
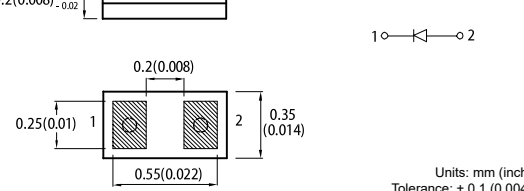
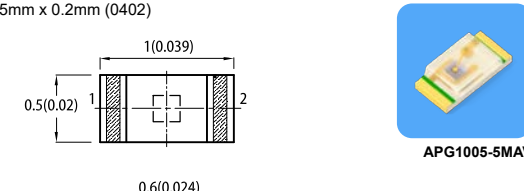
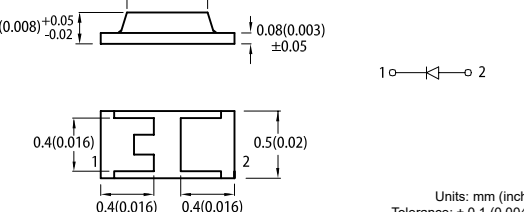
AP series custom-made is available upon request

LOW CURRENT SMD LED

Part Number	Material	$\lambda_D$ (nm)	Lens Type	Iv (mcd) @2mA		Viewing Angle 2 $\theta$ 1/2	Dimensions	
				Min.	Typ.			
APBD3224LSURKCGKC	AlGaInP	630	Water Clear	10	30	20°	<p>3.2mm x 2.4mm x 2.4mm (Dome Lens)</p> <p>Units: mm (inch) Tolerance: ± 0.1 (0.004)</p>	
	AlGaInP	570		10	30			
APBD3224LSURKZGKC	AlGaInP	630	Water Clear	10	30	20°		
	InGaIn	525		120	250			
APBD3224LQBDCGKC	InGaIn	465	Water Clear	12	30	20°		
	AlGaInP	570		10	30			
APHF1608LSEEQBDZGKC	AlGaInP	621	Water Clear	4	15	140°		<p>1.6mm x 0.8mm x 0.5mm (Full Color)</p> <p>Units: mm (inch) Tolerance: ± 0.15 (0.006)</p>
	InGaIn	465		4	10			
	InGaIn	525		50	90			
APTF1616LSEEZGKBKC	AlGaInP	621	Water Clear	6	15	130°		<p>1.6mm x 1.6mm x 0.7mm (Full Color)</p> <p>Units: mm (inch) Tolerance: ± 0.2 (0.008)</p>
	InGaIn	525		30	80			
	InGaIn	465		6	14			
APFA2507LQBDSEEZGKC	InGaIn	465	Water Clear	4	10	130°	<p>2.5mm x 1.0mm x 0.7mm (Right Angle, Full Color)</p> <p>Units: mm (inch) Tolerance: ± 0.15 (0.006)</p>	
	AlGaInP	621		6	10			
	InGaIn	525		50	90			



LOW CURRENT SMD LED

Part Number	Material	λD (nm)	Lens Type	Iv (mcd) @2mA*5mA		Viewing Angle 2θ1/2	Dimensions
				Min.	Typ.		
APFA3010LSEEZGKBK	AlGaInP	621	Water Clear	6	15	150°	3.0mm x 1.5mm x 1.0mm (Right Angle, Full Color) 
	InGaN	525		50	90		
	InGaN	465		4	10		
AAA3528LSEEZGKBKS	AlGaInP	621	Water Clear	10	20	120°	3.5mm x 2.8mm x 1.9mm (Full Color) 
	InGaN	525		80	180		
	InGaN	465		12	30		
APG0603ZGC-5MAV	InGaN	525	Water Clear	*180	*280	140°	0.65mm x 0.35mm x 0.2mm (0201) 
APG0603VBC-A1-5MAV	InGaN	468	Water Clear	*30	*60	140°	
APG1005ZGC-5MAV	InGaN	525	Water Clear	*120	*280	140°	1.0mm x 0.5mm x 0.2mm (0402) 
APG1005VBC-A1-5MAV	InGaN	468	Water Clear	*20	*60	140°	

AP series custom-made is available upon request


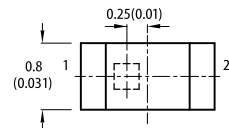
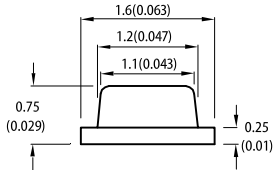
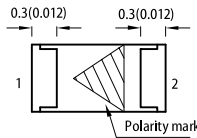
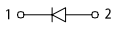
LOW CURRENT SMD LED

Part Number	Material	$\lambda_D$ (nm)	Lens Type	Iv (mcd) @5mA		Viewing Angle 2 $\theta$ 1/2	Dimensions	
				Min.	Typ.			
APGF0606SEEKSYKXC-TT	AlGaInP	624	Water Clear	30	80	140°	<p>0.65mm x 0.65mm x 0.2mm ( Bi-Color)</p> <p>APGF0606</p>	
	AlGaInP	589		10	17			
APGF0606SEEKCGKXC-TT	AlGaInP	624	Water Clear	30	80	140°		
	AlGaInP	571		4	8			
APGF0606SEEKCGKCTTC2	AlGaInP	624	Water Clear	30	80	140°		
	AlGaInP	571		4	8			
APGF0606SYKCGK-TT-C2	AlGaInP	589	Water Clear	10	17	140°		
	AlGaInP	571		4	8			
APGF1012GBRC-07	InGaN	525	Water Clear	80	220	150°		<p>1.0mm x 1.0mm x 0.25mm (Full Color)</p> <p>APGF1012</p>
	InGaN	465		10	23			
	AlGaInP	624		15	30			


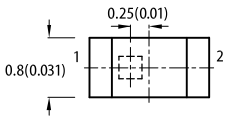
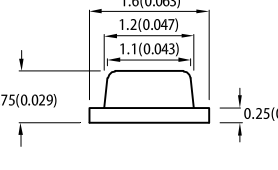
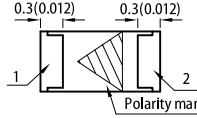
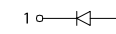
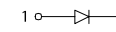

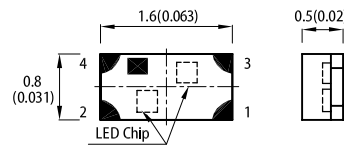

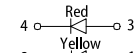
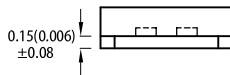
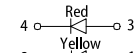
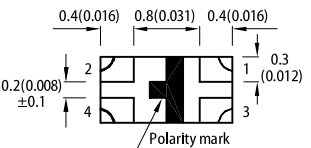
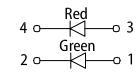
LOW CURRENT SMD LED

Part Number	Material	Chromaticity Coordinates	Lens Type	Iv (mcd) @5mA		Viewing Angle 2 $\theta$ 1/2	Dimensions
				Min.	Max.		
APHM1608VRBXF/A-5MAV	InGaN	x=0.20 y=0.15	Yellow Fluorescent	80	180	160°	<p>1.6mm x 0.8mm x 0.45mm (0603)</p> <p>APHM1608-5MAV</p>

LOW CURRENT SMD LED

Part Number	Material	Chromaticity Coordinates	Lens Type	Iv (mcd) @5mA		Viewing Angle 2θ1/2	Dimensions
				Min.	Max.		
APT1608VRCXF/A-5MAV	InGaN	x=0.23 y=0.41	Green Fluorescent	80	350	160°	<p>1.6mm x 0.8mm x 0.75mm (0603)</p>  <p><b>APT1608-5MAV</b></p>     <p>Units: mm (inch) Tolerance: ± 0.1 (0.004)</p>

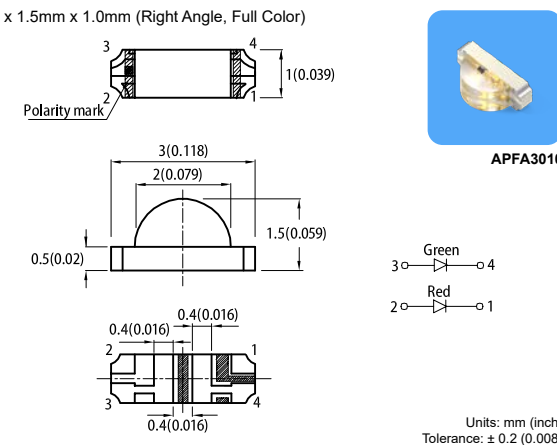
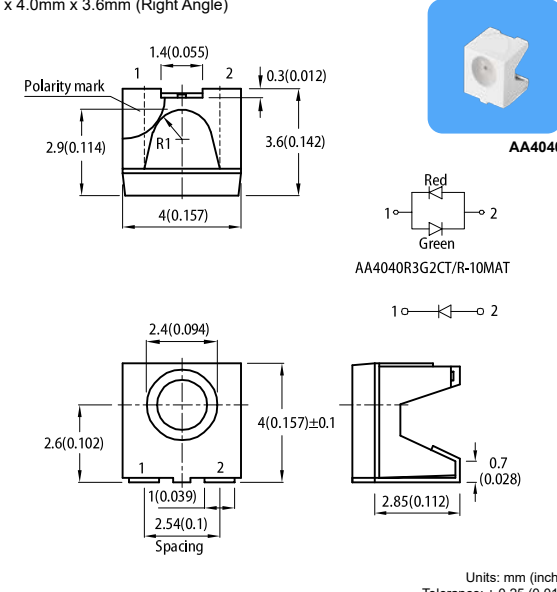
HIGH TEMPERATURE SMD LED

Part Number	Material	λD (nm)	Lens Type	Iv (mcd) @20mA*2mA		Viewing Angle 2θ1/2	Dimensions
				Min.	Max.		
APT1608SEC/J3-AMT	AlGaInP	625	Water Clear	200	500	120°	<p>1.6mm x 0.8mm x 0.75mm (0603)</p>  <p><b>APT1608</b></p>     <p>APT1608SEC/J3-AMT APT1608SYC/J3-AMT</p>  <p>Units: mm (inch) Tolerance: ± 0.1 (0.004)</p>
APT1608SECK-AMT	AlGaInP	605	Water Clear	80	300	120°	
APT1608SYC/J3-AMT	AlGaInP	590	Water Clear	300	1000	120°	
APT1608ZGC-AMT	InGaN	525	Water Clear	300	700	130°	
APHB1608Y2R2C-AMT	AlGaInP	590	Water Clear	80	300	130°	<p>1.6mm x 0.8mm x 0.5mm (0603 Bi-Color)</p>  <p><b>APHB1608</b></p>   
	AlGaInP	630		40	120		
APHB1608G2R2C-AMT	AlGaInP	570	Water Clear	20	80	130°	 
	AlGaInP	630		40	120		
APHB1608LG3R2C-AMT	InGaN	525	Water Clear	*50	*180	130°	 
	AlGaInP	630		*4	*15		

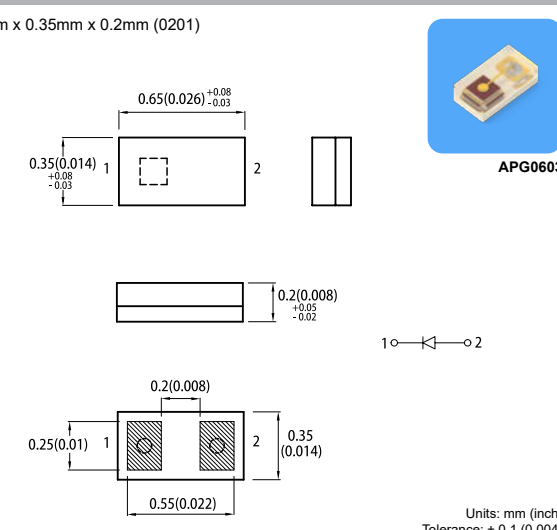
AP series custom-made is available upon request



HIGH TEMPERATURE SMD LED

Part Number	Material	$\lambda_D$ (nm)	Lens Type	Iv (mcd) @20mA*2mA**10mA		Viewing Angle 2 $\theta$ 1/2	Dimensions
				Min.	Max.		
APFA3010R2G2C-C6-AMT	AlGaInP	630	Water Clear	55	200	150°	3.0mm x 1.5mm x 1.0mm (Right Angle, Full Color)  Units: mm (inch) Tolerance: $\pm 0.2$ (0.008)
	AlGaInP	570		20	80		
AA4040SURCKT-AMT	AlGaInP	630	Water Clear	80	300	120°	4.0mm x 4.0mm x 3.6mm (Right Angle)  Units: mm (inch) Tolerance: $\pm 0.25$ (0.01)
AA4040LSURCKT-AMT	AlGaInP	630	Water Clear	*6	*20	120°	
AA4040R3G2CT/R-10MAT	AlGaInP	625	Water Clear	**250	**450	120°	
	AlGaInP	570		**15	**80		
AA4040SYCKT/J3-AMT	AlGaInP	590	Water Clear	400	1000	120°	
AA4040LSYCKT/J3-AMT	AlGaInP	590	Water Clear	*20	*80	120°	
AA4040LCGCK-AMT	AlGaInP	570	Water Clear	*6	*20	120°	
AA4040ZGCKT-AMT	InGaN	525	Water Clear	500	1300	120°	
AA4040LZGCKT-AMT	InGaN	525	Water Clear	*80	*320	120°	
AA4040QBS/D-AMT	InGaN	465	Water Clear	120	400	120°	
AA4040LQBS/D-AMT	InGaN	465	Water Clear	*15	*50	120°	

TOP-EMITTING CHIP SMD LED

Part Number	Material	$\lambda_D$ (nm)	Lens Type	Iv (mcd) @10mA		Viewing Angle 2 $\theta$ 1/2	Dimensions
				Min.	Typ.		
APG0603SURC-TT	AlGaInP	631	Water Clear	10	35	140°	0.65mm x 0.35mm x 0.2mm (0201)  Units: mm (inch) Tolerance: $\pm 0.1$ (0.004)
APG0603SEC-E-TT	AlGaInP	624	Water Clear	15	40	140°	
APG0603SEC-TT	AlGaInP	605	Water Clear	20	50	140°	
APG0603SYC-TT	AlGaInP	589	Water Clear	10	30	140°	
APG0603CGC-TT	AlGaInP	571	Water Clear	6	15	140°	

TOP-EMITTING CHIP SMD LED

Part Number	Material	λD (nm)	Lens Type	Iv (mcd) @20mA		Viewing Angle 2θ1/2	Dimensions
				Min.	Typ.		
APG1005SYC-T	AlGaInP	589	Water Clear	55	100	120°	1.0mm x 0.5mm x 0.2mm (0402) 
APG1005CGC-T	AlGaInP	571	Water Clear	12	35	120°	
APHHS1005SURCK	AlGaInP	630	Water Clear	40	70	120°	1.0mm x 0.5mm x 0.5mm (0402) 
APHHS1005SECK	AlGaInP	605	Water Clear	80	150	120°	
APHHS1005SYCK	AlGaInP	590	Water Clear	80	150	120°	
APHHS1005CGCK	AlGaInP	570	Water Clear	20	50	120°	
APHHS1005ZGCK	InGaN	525	Water Clear	400	550	140°	
APHHS1005QBC/D	InGaN	465	Water Clear	40	60	140°	
APG1608SURKC/T	AlGaInP	630	Water Clear	55	110	120°	1.6mm x 0.8mm x 0.25mm (0603) 
APG1608SEKC/T	AlGaInP	601	Water Clear	55	100	120°	
APG1608SYKC/T	AlGaInP	590	Water Clear	55	120	120°	
APG1608CGKC/T	AlGaInP	570	Water Clear	20	50	120°	
APG1608ZGCK	InGaN	525	Water Clear	300	400	130°	
APG1608QBC/D	InGaN	465	Water Clear	40	100	130°	
APT1608SURCK	AlGaInP	630	Water Clear	40	80	120°	1.6mm x 0.8mm x 0.75mm (0603) 
APT1608SECK/J3-PRV	AlGaInP	625	Water Clear	200	350	120°	
APT1608SECK/J4-PRV	AlGaInP	605	Water Clear	300	550	120°	
APT1608SECK	AlGaInP	605	Water Clear	80	180	120°	
APT1608SYCK	AlGaInP	590	Water Clear	80	150	120°	
APT1608SYCK/J3-PRV	AlGaInP	590	Water Clear	200	320	120°	
APT1608CGCK	AlGaInP	570	Water Clear	20	50	120°	
APT1608ZGCK	InGaN	525	Water Clear	300	550	130°	
APT1608VBC/D	InGaN	470	Water Clear	120	180	130°	
APT1608QBC/D	InGaN	465	Water Clear	40	100	130°	

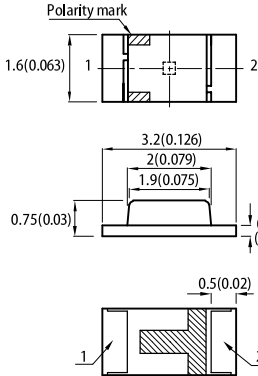

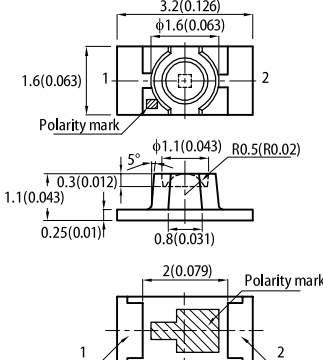

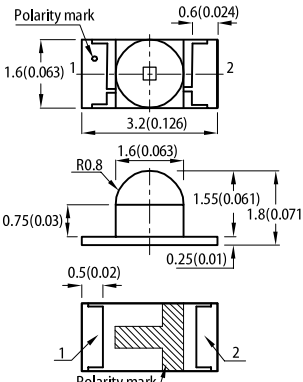

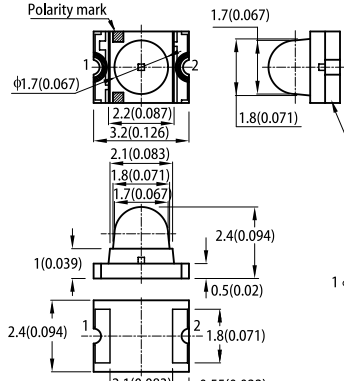

AP series custom-made is available upon request

TOP-EMITTING CHIP SMD LED

Part Number	Material	$\lambda_D$ (nm)	Lens Type	Iv (mcd) @20mA		Viewing Angle	Dimensions	
				Min.	Typ.			
APTD1608SURCK	AlGaInP	630	Water Clear	80	250	60°	<p>1.6mm x 0.8mm x 0.95mm (0603 Dome Lens)</p> <p><b>APTD1608</b></p> <p>APTD1608SEC/J3 APTD1608SECK/J3-PF APTD1608SECK/J4-PF APTD1608SYCK/J3-PF</p> <p>Units: mm (inch) Tolerance: ± 0.15 (0.006)</p>	
APTD1608SEC/J3	AlGaInP	625	Water Clear	500	900	60°		
APTD1608SECK/J3-PF	AlGaInP	625	Water Clear	500	900	60°		
APTD1608SECK/J4-PF	AlGaInP	605	Water Clear	1000	1600	60°		
APTD1608SECK	AlGaInP	605	Water Clear	200	500	60°		
APTD1608SYCK	AlGaInP	590	Water Clear	300	600	60°		
APTD1608SYCK/J3-PF	AlGaInP	590	Water Clear	500	850	60°		
APTD1608CGCK	AlGaInP	570	Water Clear	80	190	60°		
APTD1608ZGCK	InGaN	525	Water Clear	700	1200	60°		
APTD1608VBC/D	InGaN	470	Water Clear	200	350	40°		
APTD1608QBC/D	InGaN	465	Water Clear	80	200	40°		
APHCM2012SURCK-F01	AlGaInP	630	Water Clear	40	80	140°		<p>2.0mm x 1.25mm x 0.4mm (0805)</p> <p><b>APHCM2012</b></p> <p>Units: mm (inch) Tolerance: ± 0.1 (0.004)</p>
APHCM2012SECK-F01	AlGaInP	605	Water Clear	80	180	140°		
APHCM2012SYCK-F01	AlGaInP	590	Water Clear	80	150	140°		
APHCM2012CGCK-F01	AlGaInP	570	Water Clear	20	50	140°		
APHCM2012QBC/D-F01	InGaN	465	Water Clear	40	100	140°		
APT2012SURCK	AlGaInP	630	Water Clear	40	80	140°	<p>2.0mm x 1.25mm x 0.75mm (0805)</p> <p><b>APT2012</b></p> <p>APT2012SECK/J3-PRV APT2012SYCK/J3-PRV</p> <p>Units: mm (inch) Tolerance: ± 0.1 (0.004)</p>	
APT2012SECK/J3-PRV	AlGaInP	625	Water Clear	200	350	140°		
APT2012SECK	AlGaInP	605	Water Clear	80	180	140°		
APT2012SYCK	AlGaInP	590	Water Clear	80	150	140°		
APT2012SYCK/J3-PRV	AlGaInP	590	Water Clear	200	320	140°		
APT2012CGCK	AlGaInP	570	Water Clear	20	50	140°		
APT2012ZGCK	InGaN	525	Water Clear	300	550	140°		
APT2012VBC/D	InGaN	470	Water Clear	120	180	140°		
APT2012QBC/D	InGaN	465	Water Clear	40	100	140°		
APL3015SURCK-F01	AlGaInP	630	Water Clear	120	180	70°		<p>3.0mm x 1.5mm x 1.4mm</p> <p><b>APL3015</b></p> <p>Units: mm (inch) Tolerance: ± 0.2 (0.008)</p>
APL3015SECK-F01	AlGaInP	605	Water Clear	120	350	70°		
APL3015SYCK-F01	AlGaInP	590	Water Clear	200	350	70°		
APL3015CGCK-F01	AlGaInP	570	Water Clear	55	120	70°		
APL3015ZGC-F01	InGaN	525	Water Clear	1000	1500	50°		
APL3015QBC/D-F01	InGaN	465	Water Clear	120	200	50°		


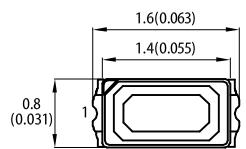
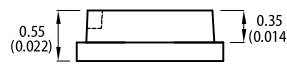
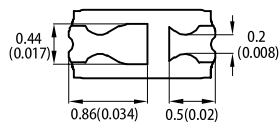
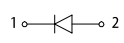

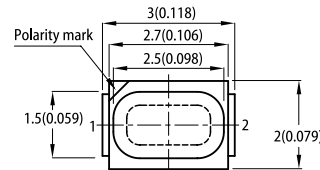

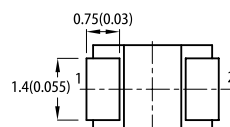
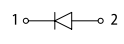

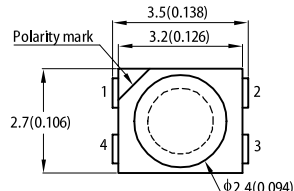
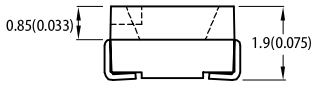
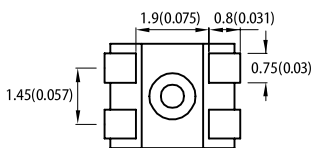
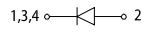
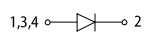


TOP-EMITTING CHIP SMD LED

Part Number	Material	λD (nm)	Lens Type	Iv (mcd) @20mA		Viewing Angle 2θ1/2	Dimensions
				Min.	Typ.		
APT3216SURCK	AlGaInP	630	Water Clear	40	80	140°	3.2mm x 1.6mm x 0.75mm (1206)   <p><b>APT3216</b></p>
APT3216SECK/J3-PRV	AlGaInP	625	Water Clear	200	350	140°	
APT3216SECK	AlGaInP	605	Water Clear	80	180	140°	
APT3216SYCK	AlGaInP	590	Water Clear	80	150	140°	
APT3216CGCK	AlGaInP	570	Water Clear	20	50	140°	
APT3216ZGC	InGaN	525	Water Clear	300	600	150°	
APT3216QBC/D	InGaN	465	Water Clear	40	100	150°	3.2mm x 1.6mm x 1.1mm (1206)   <p><b>APTL3216</b></p>
APTL3216SECK	AlGaInP	605	Water Clear	200	350	80°	
APTL3216SYCK	AlGaInP	590	Water Clear	200	350	80°	
APTL3216CGCK	AlGaInP	570	Water Clear	55	100	80°	
APTL3216ZGC	InGaN	525	Water Clear	700	1100	80°	
APTL3216QBC/D	InGaN	465	Water Clear	120	250	80°	
APTD3216SURCK	AlGaInP	630	Water Clear	300	800	40°	3.2mm x 1.6mm x 1.8mm (1206 Dome Lens)   <p><b>APTD3216</b></p>
APTD3216SECK	AlGaInP	605	Water Clear	500	1000	40°	
APTD3216SYCK	AlGaInP	590	Water Clear	700	800	40°	
APTD3216CGCK	AlGaInP	570	Water Clear	120	300	40°	
APTD3216ZGCK	InGaN	525	Water Clear	2700	4000	30°	
APTD3216QBC/D	InGaN	465	Water Clear	300	700	30°	
APD3224SURCK-F01	AlGaInP	630	Water Clear	1000	1300	20°	3.2mm x 2.4mm x 2.4mm (Dome Lens)   <p><b>APD3224</b></p>
APD3224SECK-F01	AlGaInP	605	Water Clear	1000	1600	20°	
APD3224SYCK-F01	AlGaInP	590	Water Clear	1300	1600	20°	
APD3224CGCK-F01	AlGaInP	570	Water Clear	500	900	20°	
APD3224ZGCK-F01	InGaN	525	Water Clear	3600	6800	20°	
APD3224QBC/D-F01	InGaN	465	Water Clear	500	900	20°	

AP series custom-made is available upon request

TOP-EMITTING PLCC SMD LED

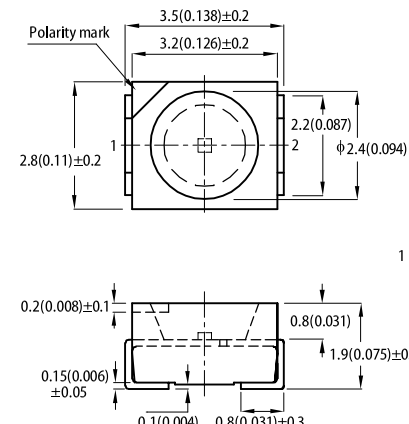
Part Number	Material	$\lambda_D$ (nm)	Lens Type	Iv (mcd) @20mA*10mA		Viewing Angle 2 $\theta$ /2	Dimensions
				Min.	Typ.		
AA1608SURSK	AlGaInP	630	Water Clear	40	160	120°	1.6mm x 0.8mm x 0.55mm (0603)     
AA1608SESK	AlGaInP	605	Water Clear	80	120	120°	
AA1608SYSK	AlGaInP	590	Water Clear	55	240	120°	
AA1608CGSK	AlGaInP	570	Water Clear	40	80	120°	
AA1608ZGSK-10MAV	InGaN	525	Water Clear	*450	*700	120°	
AA1608VBS/A1-10MAV	InGaN	468	Water Clear	*50	*160	120°	
AA1608QBS/D-10MAV	InGaN	465	Water Clear	*50	*120	120°	
AA3021SURSK	AlGaInP	630	Water Clear	40	90	120°	3.0mm x 2.0mm x 1.3mm     
AA3021SYSK	AlGaInP	590	Water Clear	120	200	120°	
AA3021CGSK	AlGaInP	570	Water Clear	40	80	120°	
AA3021QBS/D	InGaN	465	Water Clear	80	120	120°	
AA3527ASYSK/J3-50MAV	AlGaInP	590	Water Clear	1000	1500	120°	3.5mm x 2.7mm x 1.9mm      
AA3527AZGSK-30MAV	InGaN	525	Water Clear	*500	*700	120°	
AA3527AVBS/D-30MAV	InGaN	470	Water Clear	*300	*600	120°	

Units: mm (inch)  
Tolerance: ± 0.15 (0.006)

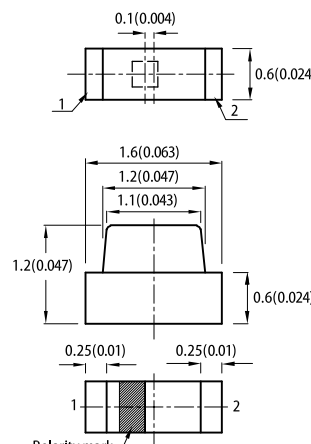
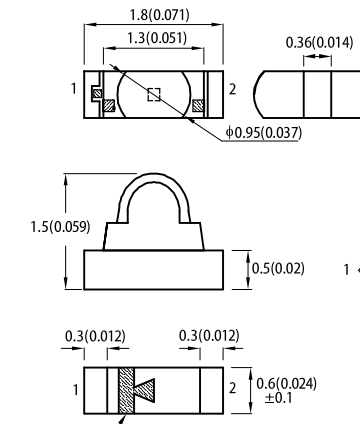
Units: mm (inch)  
Tolerance: ± 0.2 (0.008)

Units: mm (inch)  
Tolerance: ± 0.25 (0.01)

TOP-EMITTING PLCC SMD LED

Part Number	Material	$\lambda_D$ (nm)	Lens Type	Iv (mcd) @20mA		Viewing Angle 2 $\theta$ 1/2	Dimensions
				Min.	Typ.		
AA3528SURCK	AlGaInP	630	Water Clear	55	100	120°	<p>3.5mm x 2.8mm x 1.9mm</p>  <p>Units: mm (inch) Tolerance: ± 0.25 (0.01)</p>
AA3528SYCK	AlGaInP	590	Water Clear	120	250	120°	
AA3528CGCK	AlGaInP	570	Water Clear	40	100	120°	
AA3528ZGCK	InGaN	525	Water Clear	500	1000	120°	
AA3528VBS/D	InGaN	470	Water Clear	300	450	120°	
AA3528QBS/D	InGaN	465	Water Clear	80	150	120°	

RIGHT ANGLE SMD LED


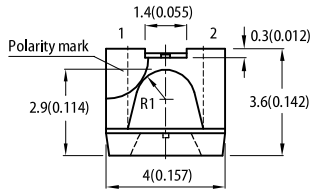
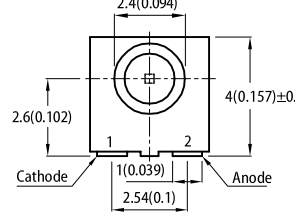
Part Number	Material	$\lambda_D$ (nm)	Lens Type	Iv (mcd) @20mA		Viewing Angle 2 $\theta$ 1/2	Dimensions
				Min.	Typ.		
APA1606SURCK	AlGaInP	630	Water Clear	40	80	110°	<p>1.6mm x 1.2mm x 0.6mm (Right Angle)</p>  <p>Units: mm (inch) Tolerance: ± 0.1 (0.004)</p>
APA1606SECK	AlGaInP	605	Water Clear	80	180	110°	
APA1606SYCK	AlGaInP	590	Water Clear	80	150	110°	
APA1606CGCK	AlGaInP	570	Water Clear	20	50	110°	
APA1606VBC/D	InGaN	470	Water Clear	120	200	110°	
APA1606QBC/D	InGaN	465	Water Clear	40	80	110°	
APDA1806SURCK	AlGaInP	630	Water Clear	500	1200	25°	<p>1.8mm x 1.5mm x 0.6 mm (Right Angle)</p>  <p>Units: mm (inch) Tolerance: ± 0.15 (0.006)</p>
APDA1806SECK/J3-PRV	AlGaInP	625	Water Clear	1300	2600	25°	
APDA1806SYCK	AlGaInP	590	Water Clear	500	1100	25°	
APDA1806CGCK	AlGaInP	570	Water Clear	120	400	25°	
APDA1806ZGCK	InGaN	525	Water Clear	1900	3200	25°	
APDA1806VBC/D	InGaN	470	Water Clear	400	800	25°	

AP series custom-made is available upon request


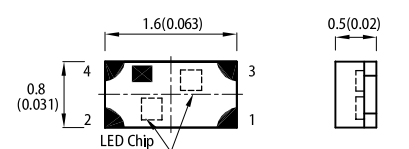
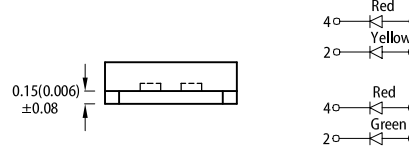
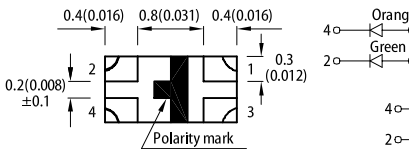

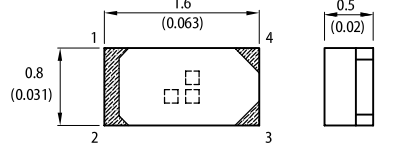

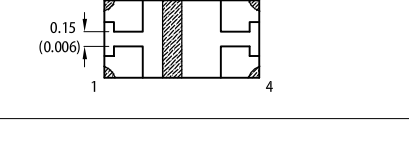
RIGHT ANGLE SMD LED

Part Number	Material	$\lambda_D$ (nm)	Lens Type	Iv (mcd) @20mA		Viewing Angle	Dimensions
				Min.	Typ.		
APA2107SURCK	AlGaInP	630	Water Clear	40	80	140°	<p>2.1mm x 1.0mm x 0.6mm (Right Angle)</p> <p>Units: mm (inch) Tolerance: ± 0.1 (0.004)</p>
APA2107SYCK	AlGaInP	590	Water Clear	80	150	140°	
APA2107CGCK	AlGaInP	570	Water Clear	20	50	140°	
AA2810ASURSK	AlGaInP	630	Water Clear	40	100	110°	<p>2.8mm x 1.2mm x 0.8mm (Right Angle)</p> <p>Units: mm (inch) Tolerance: ± 0.1 (0.004)</p>
AA2810ASESK/J3	AlGaInP	625	Water Clear	300	500	110°	
AA2810ASYSK	AlGaInP	590	Water Clear	120	200	110°	
AA2810ACGSK	AlGaInP	570	Water Clear	40	70	110°	
AA2810AVBS/D	InGaN	470	Water Clear	200	350	110°	
AA2810ASESK/J3	AlGaInP	625	Water Clear	300	500	110°	
APA3010SURCK-GX	AlGaInP	630	Water Clear	40	80	120°	<p>3.0mm x 2.0mm x 1.0mm (Right Angle)</p> <p>Units: mm (inch) Tolerance: ± 0.1 (0.004)</p>
APA3010SECK-GX	AlGaInP	605	Water Clear	80	180	120°	
APA3010SYCK-GX	AlGaInP	590	Water Clear	80	150	120°	
APA3010CGCK-GX	AlGaInP	570	Water Clear	20	50	120°	
APA3010QBC/D-GX	InGaN	465	Water Clear	40	80	120°	
APA3010SECK-GX	AlGaInP	605	Water Clear	80	180	120°	
APDA3020SECK/J3-PF	AlGaInP	625	Water Clear	2300	3800	10°	<p>3.0mm x 2.8mm x 2.0mm (Right Angle, Dome Lens)</p> <p>Units: mm (inch) Tolerance: ± 0.2 (0.008)</p>
APDA3020SYCK/J3-PF	AlGaInP	590	Water Clear	3600	7000	10°	
APDA3020VBC/D	InGaN	470	Water Clear	1300	2300	10°	

RIGHT ANGLE SMD LED

Part Number	Material	λD (nm)	Lens Type	Iv (mcd) @20mA		Viewing Angle 2θ1/2	Dimensions
				Min.	Typ.		
AA4040SURSK	AlGaInP	630	Water Clear	80	150	120°	4.0mm x 4.0mm x 3.6mm (Right Angle)  AA4040   Units: mm (inch) Tolerance: ± 0.25 (0.01)
AA4040SESK	AlGaInP	605	Water Clear	80	220	120°	
AA4040SYSK	AlGaInP	590	Water Clear	120	250	120°	
AA4040CGCK	AlGaInP	570	Water Clear	40	90	120°	
AA4040ZGS	InGaN	525	Water Clear	500	850	120°	
AA4040QBS/D	InGaN	465	Water Clear	80	220	120°	
AA4040QBS/G	InGaN	465	Water Clear	200	350	120°	

MULTI-COLOR SMD LED

Part Number	Material	λD (nm)	Lens Type	Iv (mcd) @20mA		Viewing Angle 2θ1/2	Dimensions
				Min.	Typ.		
APHB1608SYKSURKC	AlGaInP	590	Water Clear	80	150	130°	1.6mm x 0.8mm x 0.5mm (0603 Bi-Color)  APHB1608    Units: mm (inch) Tolerance: ± 0.15 (0.006)
	AlGaInP	630		40	90		
APHB1608CGKSURKC	AlGaInP	570	Water Clear	20	50	130°	
	AlGaInP	630		40	90		
APHB1608CGKSEKC	AlGaInP	570	Water Clear	20	50	130°	
	AlGaInP	605		80	200		
APHB1608CGKSYKC	AlGaInP	570	Water Clear	20	50	130°	
	AlGaInP	590		80	150		
APHB1608ZGKSURKC	InGaN	525	Water Clear	200	350	130°	
	AlGaInP	630		40	90		
APHB1608ZGKSYKC	InGaN	525	Water Clear	200	400	130°	
	AlGaInP	590		80	150		
APHB1608QBDSURKC	InGaN	465	Water Clear	40	70	130°	
	AlGaInP	630		40	90		
APHB1608QBDSYKC	InGaN	465	Water Clear	40	70	130°	
	AlGaInP	590		80	150		
APHB1608QBDCGKC	InGaN	465	Water Clear	40	70	130°	
	AlGaInP	570		20	50		
APHF1608SEEQBDZGKC	AlGaInP	621	Water Clear	40	120	140°	1.6mm x 0.8mm x 0.5mm (Full Color)  APHF1608    Units: mm (inch) Tolerance: ± 0.15 (0.006)
	InGaN	465		20	60		
	InGaN	525		200	480		



AP series custom-made is available upon request

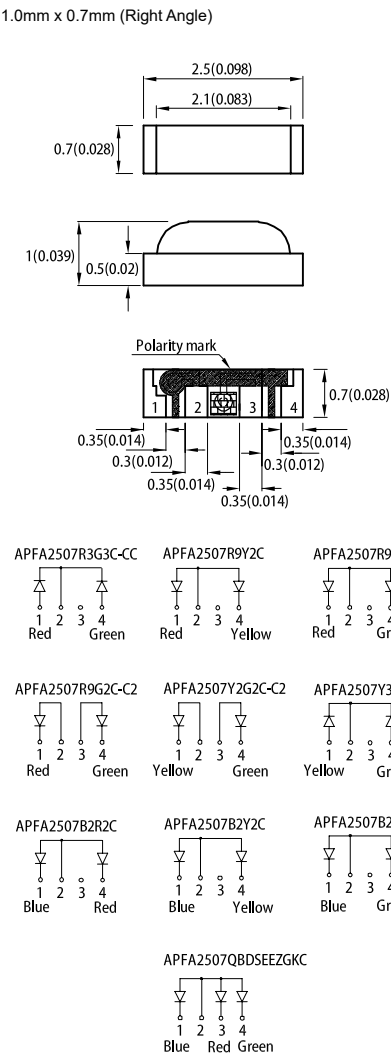


MULTI-COLOR SMD LED

Part Number	Material	$\lambda D$ (nm)	Lens Type	Iv (mcd) @20mA		Viewing Angle 2 $\theta$ /2	Dimensions
				Min.	Typ.		
APTB1612SURKCGKC-F01	AlGaInP	630	Water Clear	40	80	150°	1.6mm x 1.25mm x 0.65mm (Bi-Color) 
	AlGaInP	570		20	50		
APTB1612SURKQBDC-F01	AlGaInP	630	Water Clear	40	80	150°	
	InGaN	465		40	80		
APTB1612SYKCGKC-F01	AlGaInP	590	Water Clear	80	120	150°	
	AlGaInP	570		20	50		
APTB1615SURKCGKC-F01	AlGaInP	630	Water Clear	40	80	150°	1.6mm x 1.5mm x 0.7mm (Bi-Color) 
	AlGaInP	570		20	50		
APTB1615SYKCGKC-F01	AlGaInP	590	Water Clear	80	120	150°	
	AlGaInP	570		20	50		
APTF1616SURKCGKSYKC	AlGaInP	630	Water Clear	40	80	130°	1.6mm x 1.6mm x 0.7mm (Full Color) 
	AlGaInP	570		20	50		
	AlGaInP	590		80	120		
APTF1616SEEZQBDC	AlGaInP	621	Water Clear	55	110	130°	
	InGaN	525		300	400		
	InGaN	465		40	70		
APTF1616SEJ3ZGGVBDC	AlGaInP	625	Water Clear	200	360	130°	
	InGaN	525		500	750		
	InGaN	470		80	140		
APHBM2012SURKCGKC	AlGaInP	630	Water Clear	40	80	120°	2.0mm x 1.25mm x 0.45mm (0805 Super Thin, Bi-Color) 
AlGaInP	570	20		50			
APHBM2012SURKZGC	AlGaInP	630	Water Clear	40	80	120°	
	InGaN	525		300	500		
APHBM2012SURKZGKC	AlGaInP	630	Water Clear	40	80	120°	
	InGaN	525		300	450		
APHBM2012CGKSEKC	AlGaInP	570	Water Clear	20	50	120°	
	AlGaInP	605		80	180		
APHBM2012CGKSYKC	AlGaInP	570	Water Clear	20	50	120°	
	AlGaInP	590		80	120		
APHBM2012QBDSURKC	InGaN	465	Water Clear	40	80	120°	
	AlGaInP	630		40	80		

MULTI-COLOR SMD LED

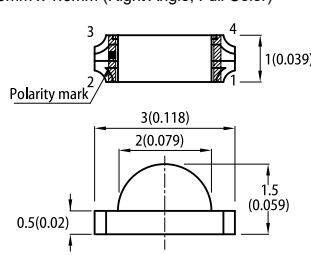
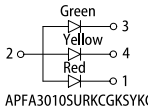
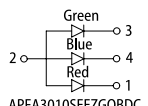
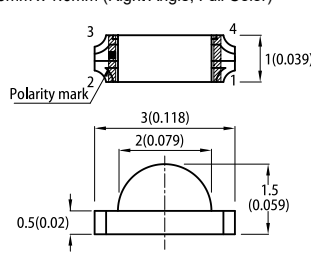
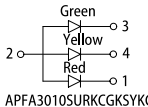
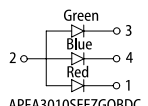
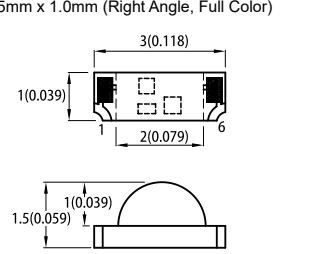
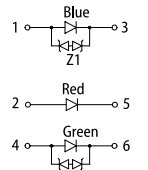
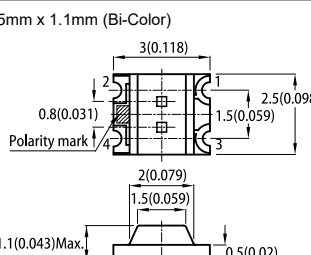
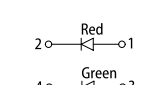
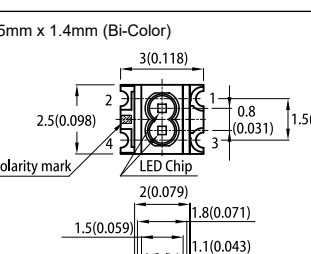
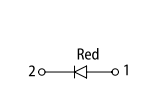
Part Number	Material	λD (nm)	Lens Type	Iv (mcd) @20mA		Viewing Angle 2θ1/2	Dimensions
				Min.	Typ.		
APFA2507R3G3C-CC	AlGaInP	625	Water Clear	200	400	130°	2.5mm x 1.0mm x 0.7mm (Right Angle)  APFA2507
	InGaN	525		300	500		
APFA2507R9Y2C	AlGaInP	621	Water Clear	20	40	130°	
	AlGaInP	590		80	130		
APFA2507R9G2C	AlGaInP	621	Water Clear	20	40	130°	
	AlGaInP	570		20	45		
APFA2507R9G2C-C2	AlGaInP	621	Water Clear	20	40	130°	
	AlGaInP	570		20	45		
APFA2507Y2G2C-C2	AlGaInP	590	Water Clear	80	130	130°	
	AlGaInP	570		20	45		
APFA2507Y3G3-CC	AlGaInP	590	Water Clear	120	300	130°	
	InGaN	525		400	550		
APFA2507B2R2C	InGaN	465	Water Clear	40	65	130°	
	AlGaInP	630		55	80		
APFA2507B2Y2C	InGaN	465	Water Clear	40	65	130°	
	AlGaInP	590		80	130		
APFA2507B2G2C	InGaN	465	Water Clear	40	65	130°	
	AlGaInP	570		20	45		
APFA2507QBDSEEZGKC	InGaN	465	Water Clear	40	65	130°	
	AlGaInP	621		80	110		
	InGaN	525		300	500		
APBA3010SURKCGKC-GX	AlGaInP	630	Water Clear	40	80	140°	3.0mm x 2.0mm x 1.0mm (Right Angle, Bi-Color)  APBA3010
	AlGaInP	570		40	70		
APBA3010SEKCGKC-GX	AlGaInP	605	Water Clear	80	150	140°	
	AlGaInP	570		40	70		
APBA3010SYKCGKC-GX	AlGaInP	590	Water Clear	80	120	140°	
	AlGaInP	570		40	70		



Units: mm (inch)  
Tolerance: ± 0.15 (0.006)

Units: mm (inch)  
Tolerance: ± 0.15 (0.006)

MULTI-COLOR SMD LED


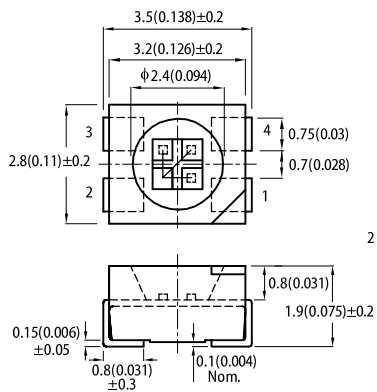
Part Number	Material	λD (nm)	Lens Type	Iv (mcd) @20mA		Viewing Angle 2θ1/2	Dimensions
				Min.	Typ.		
APFA3010SURKCGKSYKC	AlGaInP	630	Water Clear	55	80	150°	3.0mm x 1.5mm x 1.0mm (Right Angle, Full Color)  APFA3010  APFA3010SEEZGQBDC  Units: mm (inch) Tolerance: ± 0.2 (0.008)
	AlGaInP	570		20	45		
	AlGaInP	590		120	180		
APFA3010SEEZGQBDC	AlGaInP	621	Water Clear	80	140	150°	3.0mm x 1.5mm x 1.0mm (Right Angle, Full Color)  APFA3010  APFA3010SEEZGQBDC  Units: mm (inch) Tolerance: ± 0.2 (0.008)
	InGaN	525		300	500		
	InGaN	465		40	70		
APFA3011-AK13/F	InGaN	470	Water Clear	80	150	150°	3.0mm x 1.5mm x 1.0mm (Right Angle, Full Color)  APFA3011  Units: mm (inch) Tolerance: ± 0.2 (0.008)
	AlGaInP	625		200	410		
	InGaN	525		500	780		
APB3025SURKCGKC-F01	AlGaInP	630	Water Clear	40	70	160°	3.0mm x 2.5mm x 1.1mm (Bi-Color)  APB3025  Units: mm (inch) Tolerance: ± 0.2 (0.008)
	AlGaInP	570		20	60		
APBL3025SURKCGK-F01	AlGaInP	630	Water Clear	120	300	50°	3.0mm x 2.5mm x 1.4mm (Bi-Color)  APBL3025  Units: mm (inch) Tolerance: ± 0.2 (0.008)
	AlGaInP	570		80	150		

MULTI-COLOR SMD LED


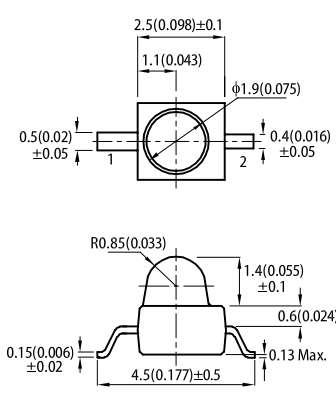

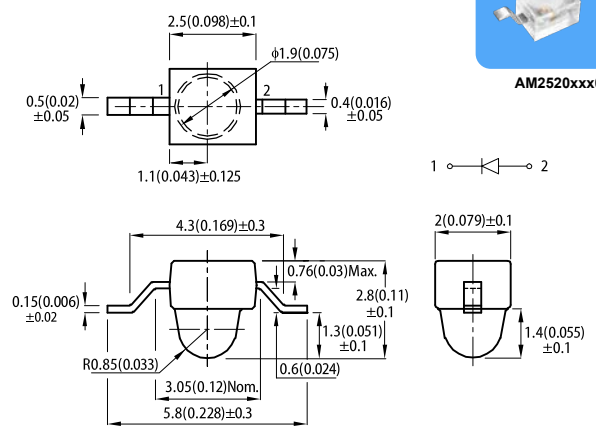
Part Number	Material	λD (nm)	Lens Type	Iv (mcd) @20mA		Viewing Angle	Dimensions
				Min.	Typ.		
APBDA3020SURKCGKC-GX	AlGaN <sub>P</sub>	630	Water Clear	120	300	15°	3.0mm x 2.8mm x 2.0mm (Right Angle, Dome Lens) 
	AlGaN <sub>P</sub>	570		120	300		
APBDA3020CGKSYKC-GX	AlGaN <sub>P</sub>	570	Water Clear	120	280	15°	
	AlGaN <sub>P</sub>	590		400	700		
APBD3224SURKCGKC-F01	AlGaN <sub>P</sub>	630	Water Clear	120	400	20°	3.2mm x 2.4mm x 2.4mm (Dome Lens) 
	AlGaN <sub>P</sub>	570		80	280		
APBD3224SYKCGKC-F01	AlGaN <sub>P</sub>	590	Water Clear	400	800	20°	
	AlGaN <sub>P</sub>	570		80	280		
APB3227SURKCGKC	AlGaN <sub>P</sub>	630	Water Clear	40	80	140°	3.2mm x 2.7mm x 1.1mm (Bi-Color) 
	AlGaN <sub>P</sub>	570		20	55		
APF3236SEEZQBDC	AlGaN <sub>P</sub>	621	Water Clear	80	140	150°	3.2mm x 3.6mm x 1.1mm (Full Color) 
	InGa <sub>N</sub>	525		300	450		
	InGa <sub>N</sub>	465		40	70		

AP series custom-made is available upon request

MULTI-COLOR SMD LED

Part Number	Material	$\lambda_D$ (nm)	Lens Type	Iv (mcd) @20mA		Viewing Angle 2 $\theta$ /2	Dimensions
				Min.	Typ.		
AAA3528SEEZGKBKS	AlGaInP	621	Water Clear	120	220	120°	3.5mm x 2.8mm x 1.9mm (Full Color)  <b>AAA3528</b>  Units: mm (inch) Tolerance: $\pm 0.25$ (0.01)
	InGaN	525		500	700		
	InGaN	465		55	100		

SUBMINIATURE SMD LED

Part Number	Material	$\lambda_D$ (nm)	Lens Type	Iv (mcd) @20mA		Viewing Angle 2 $\theta$ /2	Dimensions
				Min.	Typ.		
AM2520SURCK03	AlGaInP	630	Water Clear	700	1200	20°	Subminiature Solid State Lamps Gull Wing Lead  <b>AM2520xxx03</b>  Units: mm (inch) Tolerance: $\pm 0.25$ (0.01)
AM2520SYCK03	AlGaInP	590	Water Clear	1600	2700	20°	
AM2520CGCK03	AlGaInP	570	Water Clear	500	1000	20°	
AM2520QBC/D03	InGaN	465	Water Clear	500	1300	20°	
AM2520SURCK09	AlGaInP	630	Water Clear	700	1200	20°	
AM2520SECK09	AlGaInP	605	Water Clear	1900	3500	20°	Subminiature Solid State Lamps Z-Bend Lead  <b>AM2520xxx09</b>  Units: mm (inch) Tolerance: $\pm 0.25$ (0.01)
AM2520CGCK09	AlGaInP	570	Water Clear	500	1000	20°	
AM2520QBC/D09	InGaN	465	Water Clear	500	1300	20°	

REVERSE MOUNT SMD LED

Part Number	Material	λD (nm)	Lens Type	Iv (mcd) @20mA		Viewing Angle 2θ1/2	Dimensions
				Min.	Typ.		
APTR3216SURCK	AlGaInP	630	Water Clear	40	80	140°	3.2mm x 1.6mm x 1.05mm (1206 Reverse Mount)  APTR3216 Units: mm (inch) Tolerance: ± 0.2 (0.008)
APTR3216SECK	AlGaInP	605	Water Clear	80	180	140°	
APTR3216SYCK	AlGaInP	590	Water Clear	80	150	140°	
APTR3216CGCK	AlGaInP	570	Water Clear	20	50	140°	
APTR3216QBC/D	InGaN	465	Water Clear	40	100	140°	
APTL3216SURCK-01	AlGaInP	630	Water Clear	120	230	80°	3.2mm x 1.6mm x 1.1mm (1206 Reverse Mount)  APTL3216-01 Units: mm (inch) Tolerance: ± 0.1 (0.004)
APTL3216SECK-01	AlGaInP	605	Water Clear	200	350	80°	
APTL3216SYCK01	AlGaInP	590	Water Clear	200	350	80°	
APTL3216CGCK-01	AlGaInP	570	Water Clear	55	100	80°	
APTL3216QBC/D-01	InGaN	465	Water Clear	120	250	80°	
AA3528SURCKT09	AlGaInP	630	Water Clear	55	100	120°	3.2mm x 2.8mm x 1.9mm (Reverse Mount)  AA3528xx09 Units: mm (inch) Tolerance: ± 0.25 (0.01)
AA3528SECKT/J309	AlGaInP	625	Water Clear	500	700	120°	
AA3528SYCKT09	AlGaInP	590	Water Clear	120	250	120°	
AA3528ZGCKT09	InGaN	525	Water Clear	500	1000	120°	
AA3528QBS/D09	InGaN	465	Water Clear	80	150	120°	
AAA3528SURKCGKC09	AlGaInP	630	Water Clear	55	100	120°	3.2mm x 2.8mm x 1.9mm (Reverse mount, Multi-Color)  AAA3528xx09 AAA3528SURKCGKC09 Red 1, Green 4 AAA3528RBGS/08-09 Red 1, Blue 3, Green 4 Units: mm (inch) Tolerance: ± 0.2 (0.008)
	AlGaInP	570		40	80		
AAA3528RBGS/08-09	AlGaInP	630	Water Clear	55	110	120°	
	InGaN	465		55	100		
	InGaN	525		500	700		

AP series custom-made is available upon request



# Through-Hole LED

Kingbright through-hole LEDs are available with a variety of sizes, shapes, viewing angles, color combinations, lens types and brightness. Our extensive selection fulfills virtually any need in through-hole LED applications.



25 /  
Round LED

27 /  
Cylindrical LED


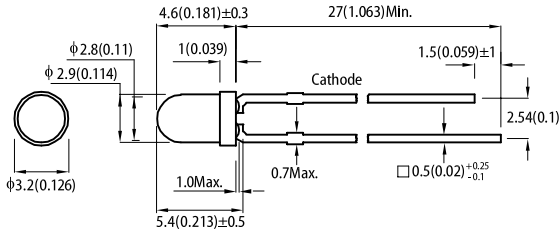

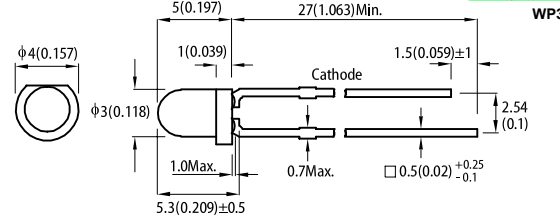

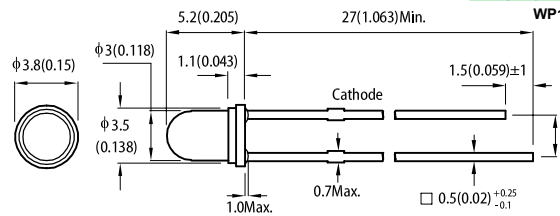
28 /  
Multi-Color LED

27 /  
Rectangular LED

28 /  
Light Bar


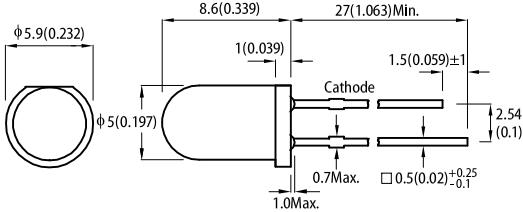

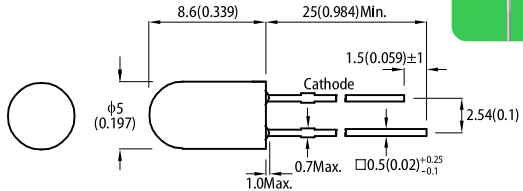

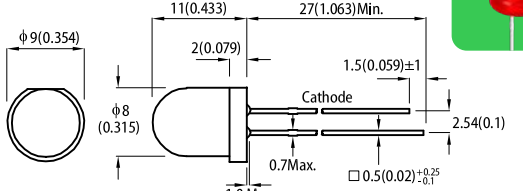

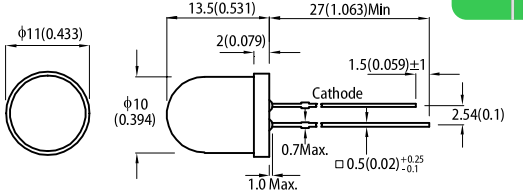
29 /  
Low Current LED

## ROUND LED


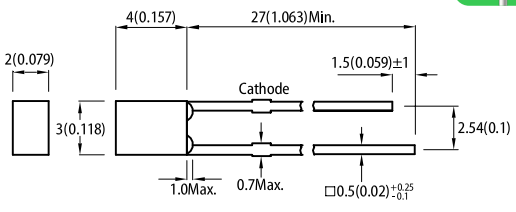

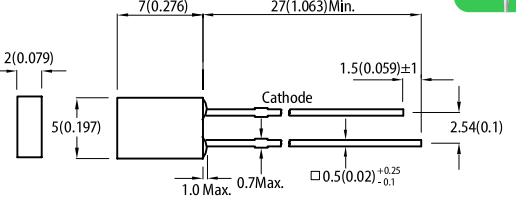
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				Min.	Typ.		
WP710A10SRC/J4	AlGaN/P	640	Water Clear	1000	1500	30°	T-1 (3mm) Round  <b>WP710A10</b> 
WP710A10SRD/J4	AlGaN/P	640	Red Diffused	400	800	50°	
WP710A10SURCK	AlGaN/P	630	Water Clear	400	900	30°	
WP710A10SURDK	AlGaN/P	630	Red Diffused	200	400	50°	
WP710A10SURTK	AlGaN/P	630	Red Transparent	400	900	30°	
WP710A10SURC/E	AlGaN/P	630	Water Clear	500	1100	30°	
WP710A10SECK/J3	AlGaN/P	625	Water Clear	2300	3600	30°	
WP710A10SECK/J4	AlGaN/P	605	Water Clear	3600	6000	30°	
WP710A10SED	AlGaN/P	605	Orange Diffused	300	650	50°	
WP710A10SECK	AlGaN/P	605	Water Clear	700	1400	30°	
WP710A10SEDK	AlGaN/P	605	Orange Diffused	250	600	50°	
WP710A10SYD	AlGaN/P	590	Yellow Diffused	480	900	50°	
WP710A10SYCK	AlGaN/P	590	Water Clear	700	1500	30°	
WP710A10SYDK	AlGaN/P	590	Yellow Diffused	400	800	50°	
WP710A10SYCK/J3	AlGaN/P	590	Water Clear	1900	3000	30°	
WP710A10CGCK	AlGaN/P	570	Water Clear	300	600	30°	
WP710A10CGDK	AlGaN/P	570	Green Diffused	80	250	50°	
WP710A10CGTK	AlGaN/P	570	Green Transparent	300	600	30°	
WP710A10ZGCK	InGaN	525	Water Clear	8000	14000	30°	
WP710A10ZGDK	InGaN	525	Green Diffused	900	1500	50°	
WP710A10ZGC/G	InGaN	525	Water Clear	10500	16500	30°	
WP710A10VBC/D	InGaN	470	Water Clear	3600	5000	30°	
WP710A10QBC/D	InGaN	465	Water Clear	1300	2300	30°	
WP710A10QBD/D	InGaN	465	Blue Diffused	1000	2000	50°	
WP3A10SURDK	AlGaN/P	630	Red Diffused	100	250	60°	T-1 (3mm) Round  <b>WP3A10</b> 
WP3A10SYDK	AlGaN/P	590	Yellow Diffused	300	500	60°	
WP3A10CGDK	AlGaN/P	570	Green Diffused	80	150	60°	
WP132XSURDK	AlGaN/P	630	Red Diffused	180	360	60°	T-1 (3mm) Round  <b>WP132X</b> 
WP132XSURTK	AlGaN/P	630	Red Transparent	230	430	50°	
WP132XSYPDK	AlGaN/P	590	Yellow Diffused	300	600	60°	
WP132XCXGDK	AlGaN/P	570	Green Diffused	60	140	60°	

All dimensions are in millimeters (inches). Tolerance is ± 0.25mm (0.01") unless otherwise noted.


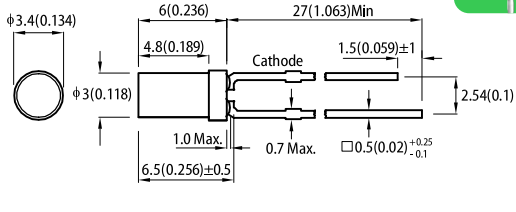

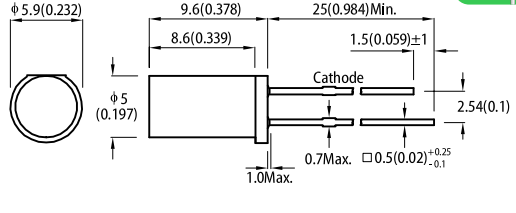
ROUND LED

Part Number	Material	λD (nm)	Lens Type	Iv (mcd) @20mA		Viewing Angle	Dimensions
				Min.	Typ.		
WP7113SRC/J4	AlGaInP	640	Water Clear	2300	3700	20°	T-1 3/4 (5mm) Round  WP7113 
WP7113SRD/J4	AlGaInP	640	Red Diffused	550	900	30°	
WP7113SURCK	AlGaInP	630	Water Clear	1000	1900	20°	
WP7113SURDK	AlGaInP	630	Red Diffused	400	750	30°	
WP7113SURC/E	AlGaInP	630	Water Clear	2300	3300	20°	
WP7113SECK/J3	AlGaInP	625	Water Clear	5000	8500	20°	
WP7113SED	AlGaInP	605	Orange Diffused	600	1000	30°	
WP7113SECK	AlGaInP	605	Water Clear	1300	2100	20°	
WP7113SYD	AlGaInP	590	Yellow Diffused	650	1200	30°	
WP7113SYCK	AlGaInP	590	Water Clear	1800	3000	20°	
WP7113SYDK	AlGaInP	590	Yellow Diffused	500	1000	30°	
WP7113SYCK/J3	AlGaInP	590	Water Clear	5000	7800	20°	
WP7113CGCK	AlGaInP	570	Water Clear	700	1400	20°	
WP7113CGDK	AlGaInP	570	Green Diffused	50	140	30°	
WP7113ZGCK	InGaIn	525	Water Clear	14000	26000	20°	
WP7113ZGDK	InGaIn	525	Green Diffused	700	1200	30°	
WP7113ZGC/G	InGaIn	525	Water Clear	18000	30000	20°	
WP7113VBC/D	InGaIn	470	Water Clear	4300	7000	20°	
WP7113QBC/D	InGaIn	465	Water Clear	3100	4500	20°	
WP7113QBD/D	InGaIn	465	Blue Diffused	700	1600	30°	
WP1503SRC/J4	AlGaInP	640	Water Clear	3100	5200	20°	T-1 3/4 (5mm) Round  WP1503 
WP1503SURDK	AlGaInP	630	Red Diffused	600	1000	30°	
WP1503CGDK	AlGaInP	570	Green Diffused	100	200	30°	
WP793SRD/J4	AlGaInP	640	Red Diffused	500	1000	30°	8mm Round  WP793 
WP813SRC/J4	AlGaInP	640	Water Clear	3600	7500	15°	
WP813SRD/J4	AlGaInP	640	Red Diffused	400	800	30°	10mm Round  WP813 
WP813CGDK	AlGaInP	570	Green Diffused	55	100	30°	

## RECTANGULAR LED

Part Number	Material	$\lambda_D$ (nm)	Lens Type	Iv (mcd) @20mA		Viewing Angle 2 $\theta$ 1/2	Dimensions
				Min.	Typ.		
WP914SURDK	AlGaN <sub>P</sub>	630	Red Diffused	25	60	140°	2mm x 3mm Rectangular  
WP113SURDKT	AlGaN <sub>P</sub>	630	Red Diffused	25	50	140°	2mm x 5mm Rectangular  
WP113SYDTK	AlGaN <sub>P</sub>	590	Yellow Diffused	70	120	140°	
WP113CGKDT	AlGaN <sub>P</sub>	570	Green Diffused	10	30	140°	

## CYLINDRICAL LED

Part Number	Material	$\lambda_D$ (nm)	Lens Type	Iv (mcd) @20mA		Viewing Angle 2 $\theta$ 1/2	Dimensions
				Min.	Typ.		
WP424SYDTK	AlGaN <sub>P</sub>	590	Yellow Diffused	55	120	140°	T-1 (3mm) Cylindrical  
WP483SURDKT	AlGaN <sub>P</sub>	630	Red Diffused	30	70	140°	T-1 3/4 (5mm) Cylindrical  

All dimensions are in millimeters (inches). Tolerance is  $\pm 0.25\text{mm}$  (0.01") unless otherwise noted.

## LIGHT BAR

Part Number	Material	$\lambda_D$ (nm)	Lens Type	Iv (mcd) @20mA		Viewing Angle	Dimensions
				Min.	Typ.		
WP1043SURDTK	AlGaInP	630	Red Diffused	30	60	140°	3.65mm x 6.15mm 
WP1043SYDTK	AlGaInP	590	Yellow Diffused	80	150	140°	
WP1043CGDTK	AlGaInP	570	Green Diffused	8	20	140°	

## MULTI-COLOR LED

Part Number	Material	$\lambda_D$ (nm)	Lens Type	Iv (mcd) @20mA		Viewing Angle	Dimensions
				Min.	Typ.		
WP937SURKCGKW	AlGaInP	630	White Diffused	55	110	60°	T-1 (3mm) Round 
	AlGaInP	570		40	80		
WP937CGKSYKW	AlGaInP	570	White Diffused	40	80	60°	
	AlGaInP	590		80	230		
WP3VSURKCGKW	AlGaInP	630	White Diffused	80	160	60°	T-1 (3mm) Round 
	AlGaInP	570		40	100		
WP3VCGKSYKW	AlGaInP	570	White Diffused	55	100	60°	
	AlGaInP	590		120	250		
WP57SURKCGKW	AlGaInP	630	White Diffused	80	150	30°	T-1 3/4 (5mm) Round 
	AlGaInP	570		60	120		
WP57CGKSYKW	AlGaInP	570	White Diffused	60	120	30°	
	AlGaInP	590		80	180		

## MULTI-COLOR LED

Part Number	Material	$\lambda D$ (nm)	Lens Type	Iv (mcd) @20mA		Viewing Angle 2 $\theta$ 1/2	Dimensions
				Min.	Typ.		
WP59SURKCGKW	AlGaInP	630	White Diffused	200	400	30°	T-1 3/4 (5mm) Round 
	AlGaInP	570		80	180		
WP59SURKCGKC	AlGaInP	630	Water Clear	700	1500	20°	T-1 3/4 (5mm) Round 
	AlGaInP	570		450	900		
WP154A4SUREQBFZGC	AlGaInP	630	Water Clear	200	400	50°	T-1 3/4 (5mm) Full color 
	InGaN	465		400	900		
	InGaN	525		1900	3600		
WP154A4SUREQBFZGW	AlGaInP	630	White Diffused	120	250	60°	T-1 3/4 (5mm) Full color 
	InGaN	465		300	500		
	InGaN	525		600	1300		
WP154A4SEJ3VBDZGW/CA	AlGaInP	625	White Diffused	900	1500	60°	T-1 3/4 (5mm) Full color 
	InGaN	470		200	400		
	InGaN	525		480	1100		

## LOW CURRENT LED

Part Number	Material	$\lambda D$ (nm)	Lens Type	Iv (mcd) @2mA		Viewing Angle 2 $\theta$ 1/2	Dimensions
				Min.	Typ.		
WP710A10LSURDK	AlGaInP	630	Red Diffused	10	20	50°	T-1 (3mm) Round 
WP710A10LSYCK/J3	AlGaInP	590	Water Clear	120	200	30°	
WP710A10LSYDK	AlGaInP	590	Yellow Diffused	25	50	50°	
WP710A10LCGDK	AlGaInP	570	Green Diffused	4	8	50°	
WP710A10LZGCK	InGaN	525	Water Clear	500	1100	30°	
WP710A10LVBC/D	InGaN	470	Water Clear	320	700	30°	
WP7113LSURDK	AlGaInP	630	Red Diffused	40	70	30°	T-1 3/4 (5mm) Round 
WP7113LSECK/J3	AlGaInP	625	Water Clear	400	1000	20°	
WP7113LSYCK/J3	AlGaInP	590	Water Clear	320	800	20°	
WP7113LSYDK	AlGaInP	590	Yellow Diffused	20	70	30°	
WP7113LCGDK	AlGaInP	570	Green Diffused	6	12	30°	
WP7113LZGCK	InGaN	525	Water Clear	1000	3000	20°	
WP7113LVBC/D	InGaN	470	Water Clear	550	1600	20°	

All dimensions are in millimeters (inches). Tolerance is  $\pm 0.25\text{mm}$  (0.01") unless otherwise noted.



# SMD DISPLAY


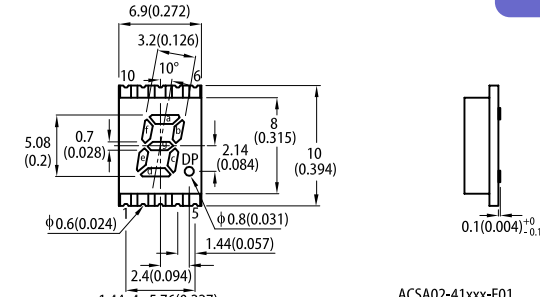
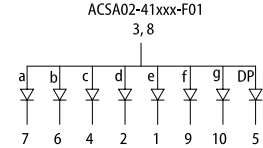
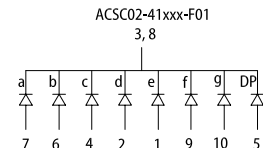
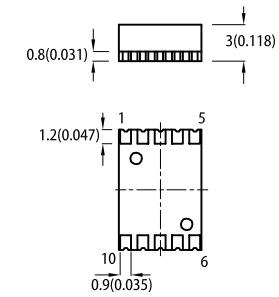
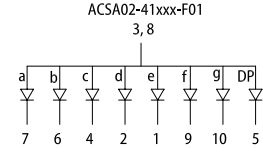
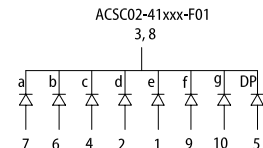
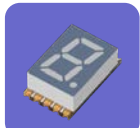
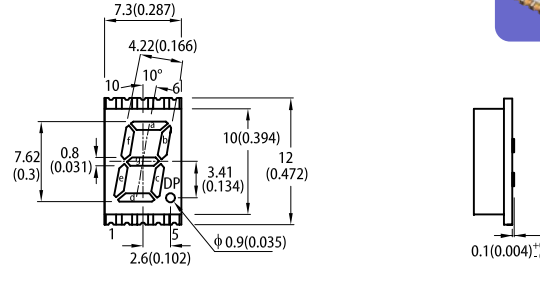
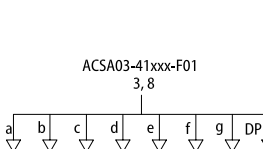
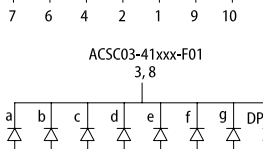
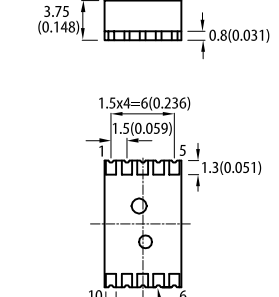
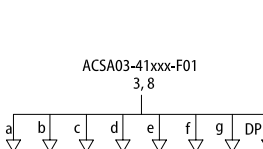
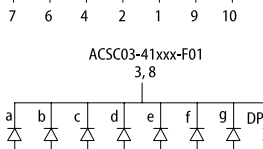
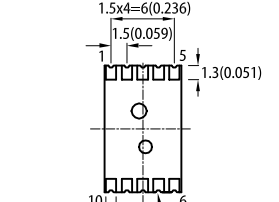
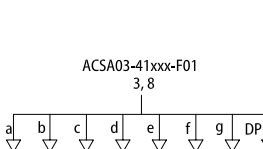
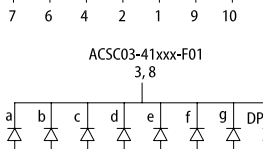
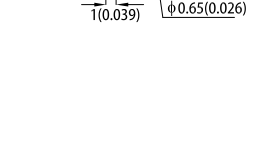
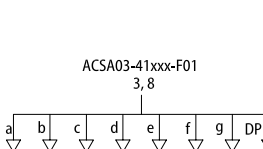
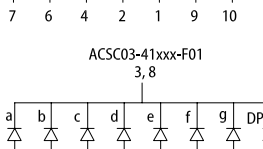
Kingbright SMD display products are available in both 7-segment and alphanumeric in various font sizes and colors. SMD Displays are commonly use in healthcare, consumer electronics, industrial and handheld electronic devices that require character and text displays.



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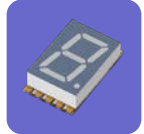
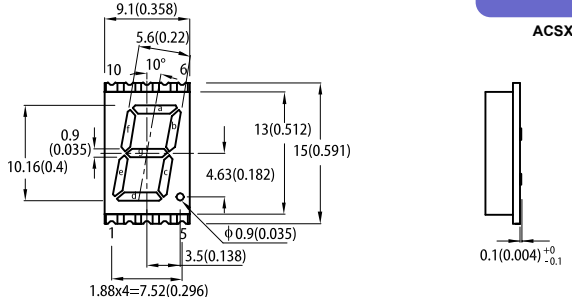

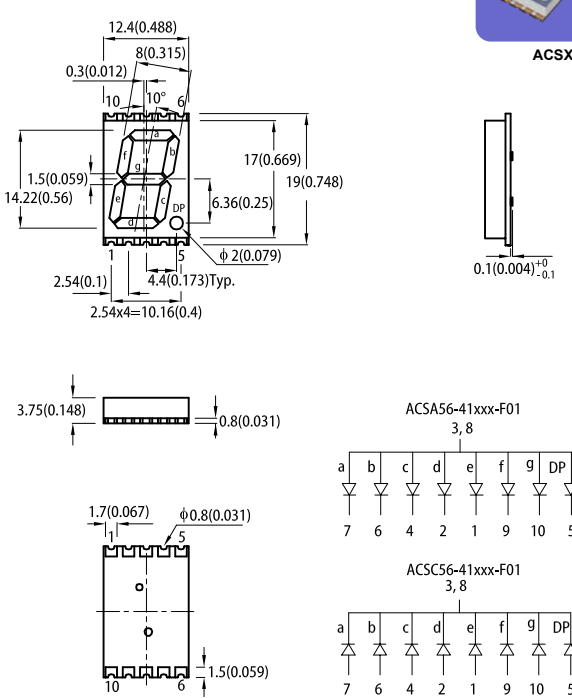
7-Segment SMD Display

7-SEGMENT SMD DISPLAY

Part Number		Material	λD (nm)	Iv (ucd) @10mA		Dimensions
Common Anode	Common Cathode			Min.	Typ.	
ACSA02-41SURKWA-F01	ACSC02-41SURKWA-F01	AlGaInP	630	3600	8100	0.2 inch (5.08mm), Gray Face, White Segment    
ACSA02-41CGKWA-F01	ACSC02-41CGKWA-F01	AlGaInP	570	2200	4300	  
ACSA03-41SURKWA-F01	ACSC03-41SURKWA-F01	AlGaInP	630	3600	6400	0.3 inch (7.62mm), Gray Face, White Segment    
ACSA03-41SEKWA-F01	ACSC03-41SEKWA-F01	AlGaInP	605	5600	11000	  
ACSA03-41SYKWA-F01	-	AlGaInP	590	5600	13000	  
ACSA03-41CGKWA-F01	ACSC03-41CGKWA-F01	AlGaInP	570	1400	3100	  

All dimensions are in millimeters (inches). Tolerance is ± 0.25mm (0.01") unless otherwise noted.

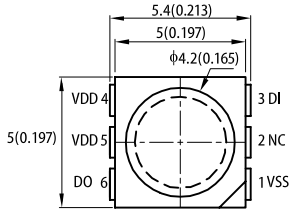
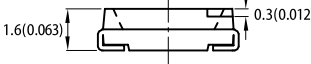
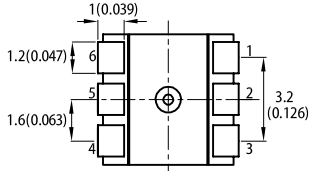
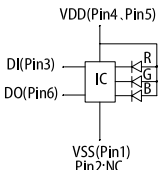
7-SEGMENT SMD DISPLAY

Part Number		Material	λD (nm)	Iv (ucd) @10mA		Dimensions
Common Anode	Common Cathode			Min.	Typ.	
ACSA04-41SURKWA-F01	ACSC04-41SURKWA-F01	AlGaInP	630	9000	20000	<p>0.4 inch (10.16mm), Gray Face, White Segment</p>  <p>ACSX04-41</p> 
ACSA04-41SEKWA-F01	ACSC04-41SEKWA-F01	AlGaInP	605	9000	15000	
ACSA04-41SYKWA-F01	-	AlGaInP	590	9000	23000	
ACSA04-41CGKWA-F01	ACSC04-41CGKWA-F01	AlGaInP	570	2200	4100	
ACSA56-41SURKWA-F01	ACSC56-41SURKWA-F01	AlGaInP	630	14000	29000	<p>0.56 inch (14.22mm), Gray Face, White Segment</p>  <p>ACSX56-41</p> 
ACSA56-41SEKWA-F01	ACSC56-41SEKWA-F01	AlGaInP	605	14000	23000	
ACSA56-41SYKWA-F01	ACSC56-41SYKWA-F01	AlGaInP	590	14000	29000	
ACSA56-41CGKWA-F01	ACSC56-41CGKWA-F01	AlGaInP	570	2200	4600	
ACSA56-41QBWA/D-F01	ACSC56-41QBWA/D-F01	InGaN	465	5600	15000	

# Chameleon RGB+IC

Kingbright's RGB+IC integrates the control circuit and RGB chip for complete control of pixel points. With each color being controlled individually, our RGB+IC SMD LED can achieve 256-level grayscale, which is ideal for decorative and entertainment lighting applications, commercial and residential architectural lighting, or signage applications.



Part Number	Material	$\lambda_D$ (nm)	Lens Type	Iv (mcd) @ V <sub>DD</sub> = 5V, Gray Scale Level = 255		Viewing Angle 2 $\theta$ 1/2	Dimensions
				Min.	Typ.		
AAAF5050-MC-K12	AlGaInP	625	Water Clear	200	360	120°	5.0mm x 5.0mm x 1.6mm (RGB+IC)     Units: mm (inch) Tolerance: $\pm 0.2$ (0.008)
	InGaN	525		400	600		
	InGaN	465		80	150		

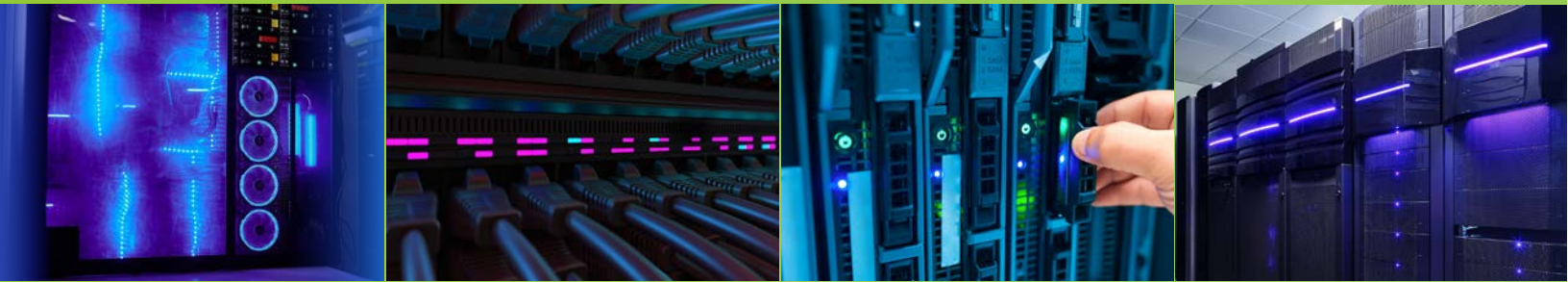
  

PIN FUNCTION		
No.	Symbol	Function Description
1	VSS	Ground
2	NC	/
3	DI	Control data signal input
4	VDD	Power supply LED
5	VDD	Power supply LED
6	DO	Control data signal output



# Circuit Board Indicator

Kingbright circuit board indicators comes in a variety of configurations and color combinations that meet the specifications of your design requirements. It's perfect for applications ranging from diagnostic, industrial equipment, and data storage applications.



35 /  
Single Level CBI

36 /  
Bi-Level CBI

37 /  
Tri-Level CBI

37 /  
Quad-Level CBI

## SINGLE-LEVEL CBI

Part Number	Material	$\lambda_D$ (nm)	Lens Type	Iv (mcd) @ 10mA*20mA		Viewing Angle	Dimensions
				Min.	Typ.		
WP934CB/ID	GaAsP/GaP	617	Red Diffused	12	30	50°	<p>T-1 (3mm) Right Angle</p> <p>4.6(0.181) 2.4(0.095)±0.3 6.35(0.25)</p> <p>7.3(0.287) 5(0.197) φ2.9(0.114)</p> <p>3.5(0.138)Min. Cathode □0.5(0.02)<sup>+0.25</sup><sub>-0.1</sub></p> <p>2.54(0.1) 4.4(0.173)±0.5</p> <p>WP934CB/ID</p>
WP934CB/YD	GaAsP/GaP	588	Yellow Diffused	8	15	50°	
WP934CB/GD	GaP	568	Green Diffused	10	25	50°	
WP934EW/ID	GaAsP/GaP	617	Red Diffused	12	30	50°	<p>T-1 (3mm) Right Angle</p> <p>4.32(0.17)Max. 2.54(0.1)±0.3 6.35(0.25)</p> <p>7.3(0.287) 5.08(0.2) φ2.9(0.114)</p> <p>3.68(0.145) □0.5(0.02)<sup>+0.25</sup><sub>-0.1</sub> 0.508(0.02)</p> <p>2.54(0.1) Cathode 0.508(0.02)</p> <p>4.4(0.173)±0.5 90°</p> <p>WP934EW/ID</p>
WP934EW/YD	GaAsP/GaP	588	Yellow Diffused	8	15	50°	
WP934EW/GD	GaP	568	Green Diffused	10	25	50°	
WP130WDT/EGW	GaAsP/GaP	617	White Diffused	*10	*24	60°	<p>T-1 (3mm) Right Angle</p> <p>7(0.276) 2.7(0.106)±0.3 6.35(0.25)</p> <p>4.96(0.195) 0.3(0.012) 2.42(0.095)</p> <p>3.5(0.138)Min. 0.7Max. 0.5(0.02)</p> <p>2.54(0.1) 2.54(0.1)</p> <p>1 2 3 1 2 3</p> <p>Red Green 3 Green Yellow 3</p> <p>WP130WDT/ID</p>
	GaP	568		*12	*30		
WP130WDT/GYW	GaP	568	White Diffused	*18	*40	60°	
	GaAsP/GaP	588		*10	*20		
WP1384AD/ID	GaAsP/GaP	617	Red Diffused	12	30	60°	<p>3.4mm Right Angle</p> <p>4(0.157) 3.8(0.15)±0.3 5.3(0.209)</p> <p>6.35(0.25) 3.17(0.125) φ3.4(0.134)</p> <p>3.5(0.138)Min. 0.7Max. Cathode □0.5(0.02)<sup>+0.25</sup><sub>-0.1</sub></p> <p>2.54(0.1) 4.08(0.161)±0.5</p> <p>WP1384AD/ID</p>
WP1384AD/YD	GaAsP/GaP	588	Yellow Diffused	8	15	60°	
WP1384AD/GD	GaP	568	Green Diffused	10	20	60°	
WP1533BQ/ID	GaAsP/GaP	617	Red Diffused	15	45	30°	<p>4.7mm Right Angle</p> <p>5.9(0.232) 4.7(0.185)±0.3 8.8(0.346)</p> <p>5.9(0.232) 2.95(0.116) φ4.7(0.185)</p> <p>3.5(0.138)Min. Cathode □0.5(0.02)<sup>+0.25</sup><sub>-0.1</sub></p> <p>2.54(0.1) 5.25(0.207)±0.5</p> <p>WP1533BQ/ID</p>
WP1533BQ/GD	GaP	568	Green Diffused	20	50	30°	

All dimensions are in millimeters (inches). Tolerance is ± 0.25mm (0.01") unless otherwise noted.



## SINGLE-LEVEL CBI

Part Number	Material	$\lambda D$ (nm)	Lens Type	Iv (mcd) @10mA*20mA		Viewing Angle 2 $\theta$ 1/2	Dimensions
				Min.	Typ.		
WP1503CB/ID	GaAsP/GaP	617	Red Diffused	30	70	30°	<p>T-1 3/4 (5mm) Right Angle</p> <p>WP1503CB/</p>
WP1503CB/YD	GaAsP/GaP	588	Yellow Diffused	15	30	30°	
WP1503CB/GD	GaP	568	Green Diffused	15	30	30°	
WP59BL/EGW	GaAsP/GaP	617	White Diffused	*20	*40	30°	<p>T-1 3/4 (5mm) Right Angle</p> <p>WP59BL/</p>
	GaP	568		*20	*60		
WP59BL/GYW	GaP	568	White Diffused	*50	*100	30°	
	GaAsP/GaP	588		*20	*40		
WP154A4AVSSUREQBFZGW	AlGaInP	630	White Diffused	*120	*250	60°	<p>T-1 3/4 (5mm) Right Angle</p> <p>WP154A4AVS/</p>
	InGaN	465		*300	*500		
	InGaN	525		*600	*1300		
WP154A4AVS/RGB-CA	AlGaInP	625	White Diffused	*900	*1500	60°	<p>WP154A4AVS/RGB-CA</p>
	InGaN	470		*200	*400		
	InGaN	525		*480	*1100		

## BI-LEVEL CBI

Part Number	Material	$\lambda D$ (nm)	Lens Type	Iv (mcd) @10mA		Viewing Angle 2 $\theta$ 1/2	Dimensions
				Min.	Typ.		
WP934EB/2ID	GaAsP/GaP	617	Red Diffused	12	30	50°	<p>T-1 (3mm) Bi-Level</p> <p>WP934EB/2</p>
WP934EB/2YD	GaAsP/GaP	588	Yellow Diffused	8	15	50°	
WP934EB/2GD	GaP	568	Green Diffused	10	25	50°	

## BI-LEVEL CBI

Part Number	Material	$\lambda_D$ (nm)	Lens Type	Iv (mcd) @10mA*20mA		Viewing Angle 2 $\theta$ 1/2	Dimensions
				Min.	Typ.		
WP934MD/2ID	GaAsP/GaP	617	Red Diffused	12	30	50°	<b>T-1 (3mm) Bi-Level</b> 
WP934MD/2YD	GaAsP/GaP	588	Yellow Diffused	8	15	50°	
WP934MD/2GD	GaP	568	Green Diffused	10	25	50°	
WP130WCP/2EGW	GaAsP/GaP	617	White Diffused	*10	*24	60°	<b>T-1(3mm) Bi-Level</b> 
	GaP	568		*12	*30		
WP130WCP/2GYW	GaP	568	White Diffused	*18	*40	60°	
	GaAsP/GaP	588		*10	*20		

## TRI-LEVEL CBI

Part Number	Material	$\lambda_D$ (nm)	Lens Type	Iv (mcd) @10mA		Viewing Angle 2 $\theta$ 1/2	Dimensions
				Min.	Typ.		
WP934SA/3ID	GaAsP/GaP	617	Red Diffused	12	30	50°	<b>T-1 (3mm) Tri-Level</b> 
WP934SA/3YD	GaAsP/GaP	588	Yellow Diffused	8	15	50°	
WP934SA/3GD	GaP	568	Green Diffused	10	25	50°	

## QUAD-LEVEL CBI

Part Number	Material	$\lambda_D$ (nm)	Lens Type	Iv (mcd) @10mA		Viewing Angle 2 $\theta$ 1/2	Dimensions
				Min.	Typ.		
WP934SB/4ID	GaAsP/GaP	617	Red Diffused	12	30	50°	<b>T-1 (3mm) Quad-Level</b> 
WP934SB/4YD	GaAsP/GaP	588	Yellow Diffused	8	15	50°	
WP934SB/4GD	GaP	568	Green Diffused	10	25	50°	

All dimensions are in millimeters (inches). Tolerance is  $\pm 0.25\text{mm}$  (0.01") unless otherwise noted.

# Infrared & Phototransistor

Kingbright's selection of infrared emitting diode products are suitable for consumer applications, home automation, computer peripherals and industrial applications. Selections are available in both SMD and through-hole packages.



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Infrared Emitting Diode

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Photodiode

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Phototransistor

INFRARED EMITTING DIODE

Part Number	Material	$\lambda_P$ (nm)	Lens Type	Po (mW/sr) @20mA		Viewing Angle 2 $\theta$ 1/2	Dimensions
				Min.	Typ.		
APA1606SF4C-P22	GaAlAs	880	Water Clear	0.8	1.5	110°	<p>1.6mm x 1.2mm x 0.6mm (Right Angle)</p> <p>Units: mm (inch) Tolerance: <math>\pm 0.1</math> (0.004)</p>
APT1608F3C	GaAs	940	Water Clear	0.8	2	150°	<p>1.6mm x 0.8mm x 0.75mm (0603)</p> <p>Units: mm (inch) Tolerance: <math>\pm 0.1</math> (0.004)</p>
APT2012F3C	GaAs	940	Water clear	0.8	2	160°	<p>2.0mm x 1.25mm x 0.75mm (0805)</p> <p>Units: mm (inch) Tolerance: <math>\pm 0.1</math> (0.004)</p>
AP2012SF4C	GaAlAs	880	Water Clear	0.8	1.5	160°	<p>2.0mm x 1.25mm x 1.1mm (0805)</p> <p>Units: mm (inch) Tolerance: <math>\pm 0.1</math> (0.004)</p>


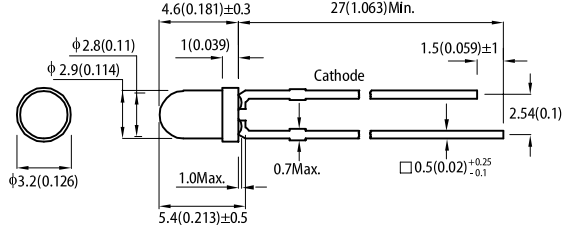

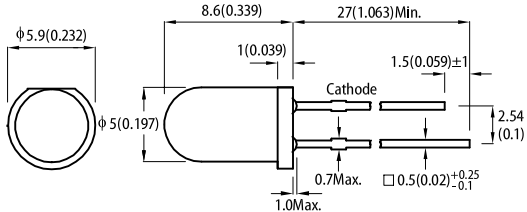
INFRARED EMITTING DIODE

Part Number	Material	$\lambda_P$ (nm)	Lens Type	Po (mW/sr) @20mA		Viewing Angle	Dimensions
				Min.	Typ.		
APA3010F3C-GX	GaAs	940	Water Clear	0.8	2	160°	<p>3.0mm x 2.0mm x 1.0mm (Right Angle)</p> <p><b>APA3010</b></p> <p>F3 1 <math>\circ</math> <math>\leftarrow</math> <math>\circ</math> 2</p> <p>SF4 1 <math>\circ</math> <math>\leftarrow</math> <math>\circ</math> 2</p> <p>Units: mm (inch) Tolerance: <math>\pm</math> 0.15 (0.006)</p>
APA3010SF4C	GaAlAs	880	Water Clear	0.8	1.5	160°	
APPA3010SF4C-P22	GaAlAs	880	Water Clear	1	2.5	30°	<p>3.0mm x 2.5mm x 1.0mm (Right Angle)</p> <p><b>APPA3010</b></p> <p>1 <math>\circ</math> <math>\leftarrow</math> <math>\circ</math> 2</p> <p>Units: mm (inch) Tolerance: <math>\pm</math> 0.15 (0.006)</p>
APDA3020F3C-P22	GaAs	940	Water Clear	3	6.5	10°	<p>3.0mm x 2.0mm x 2.8mm (Right Angle)</p> <p><b>APDA3020</b></p> <p>1 <math>\circ</math> <math>\leftarrow</math> <math>\circ</math> 2</p> <p>Units: mm (inch) Tolerance: <math>\pm</math> 0.2 (0.008)</p>
APTD3216F3C-P22	GaAs	940	Water Clear	2	5	40°	<p>3.2mm x 1.6mm x 1.8mm (1206 Dome Lens)</p> <p><b>APTD3216</b></p> <p>F3 1 <math>\circ</math> <math>\leftarrow</math> <math>\circ</math> 2</p> <p>SF4 1 <math>\circ</math> <math>\leftarrow</math> <math>\circ</math> 2</p> <p>Units: mm (inch) Tolerance: <math>\pm</math> 0.2 (0.008)</p>
APTD3216SF4C	GaAlAs	880	Water Clear	1.6	4	40°	

INFRARED EMITTING DIODE

Part Number	Material	λP (nm)	Lens Type	Po (mW/sr) @20mA *50mA **100mA		Viewing Angle 2θ1/2	Dimensions
				Min.	Typ.		
AA3528SF4S-R	GaAlAs	880	Water Clear	1.2	2	120°	<p>3.5mm x 2.8mm x 1.9mm</p> <p>Units: mm (inch) Tolerance: ± 0.25 (0.01)</p>
AA4040SF4BT-P22	GaAlAs	880	Blue Transparent	**8	**16	90°	<p>4.0mm x 4.0mm x 3.6mm (Right Angle)</p> <p>Units: mm (inch) Tolerance: ± 0.25 (0.01)</p>
AM2520F3C03-P22	GaAs	940	Water Clear	3	8	20°	<p>Subminiature Solid State Lamps Gull Wing Lead</p> <p>Units: mm (inch) Tolerance: ± 0.25 (0.01)</p>
				*8	*16		
AM4457F3C	GaAs	940	Water Clear	2	5	70°	<p>1.5mm (Side Look)</p> <p>Units: mm (inch) Tolerance: ± 0.25 (0.01)</p>

INFRARED EMITTING DIODE


Part Number	Material	λP (nm)	Lens Type	Po (mW/sr) @20mA*50mA		Viewing Angle 2θ1/2	Dimensions
				Min.	Typ.		
WP710A10F3C	GaAs	■ 940	Water Clear	3	8	30°	T-1 (3mm) Round  WP710A10
				*12	*25		
WP710A10F3BT	GaAs	■ 940	Blue Transparent	3	8	30°	
				*12	*25		
WP710A10SF4BT-P22	GaAlAs	■ 880	Blue Transparent	7	12	30°	
WP7113F3C	GaAs	■ 940	Water Clear	8	20	20°	T-1 3/4 (5mm) Round  WP7113
				*25	*50		
WP7113F3BT	GaAs	■ 940	Blue Transparent	8	20	20°	
				*25	*50		
WP7113SF4C	GaAlAs	■ 880	Water Clear	6	15	20°	
				*15	*40		
WP7113SF6C	GaAlAs	■ 860	Water Clear	18	40	20°	
				*55	*100		
WP7113SF7C	GaAlAs	■ 850	Water Clear	12	30	20°	
				*40	*90		

Units: mm (inch)  
Tolerance: ± 0.25 (0.01)

Units: mm (inch)  
Tolerance: ± 0.25 (0.01)

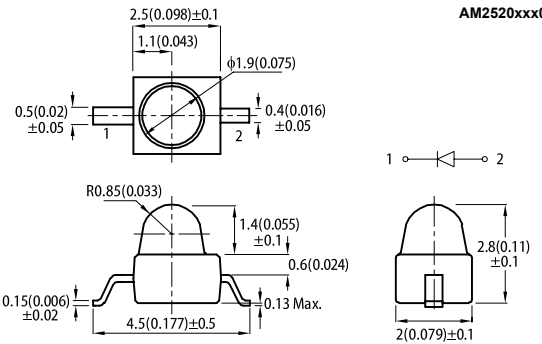


## PHOTODIODE

Part Number	Lens Type	Dimensions
AM2520PD1BT03	Black Diffused	Subminiature Solid State Lamps Gull Wing Lead  <b>AM2520xxx03</b>
WP3DPD1BT/BD	Black Diffused	
WP7113PD1BT/BD-P22	Black Diffused	

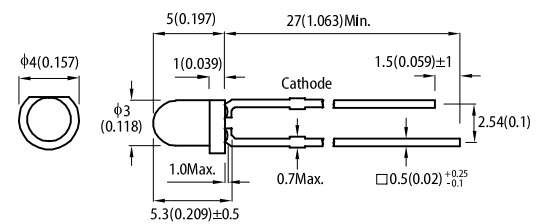
### Electrical and Optical Characteristics (Ta = 25°C)

Parameter	Symbol	Part Number	Min.	Typ.	Max.	Unit	Test Condition
Reverse Break down Voltage	$V_{(BR)R}$	-	33	170	-	V	$I_R = 100\mu A$ $H = 0mW/cm^2$
Reverse Dark Current	$I_{D(R)}$	-	-	-	10	nA	$V_R = 10V$ $H = 0mW/cm^2$
Open Circuit Voltage	$V_{OC}$	-	-	390	-	mV	$\lambda = 940nm$ $H = 5mW/cm^2$
Rise Time	$T_R$	-	-	6	-	ns	$V_R = 10V$ $\lambda = 940nm$ $R_L = 1000\Omega$
Fall Time	$T_F$	-	-	6	-	ns	
Light current	$I_s$	AM2520PD1BT03	0.7	1.5	-	$\mu A$	$V_R = 5V$ $E_e = 0.08mW/cm^2$ $\lambda = 940nm$
		WP3DPD1BT/BD	0.3	1.0	-		
		WP7113PD1BT/BD-P22	1.2	2.0	-		
Total Capacitance	$C_T$	-	-	5	-	pF	$V_R = 10V$ $F = 1MHz$ $H = 0mW/cm^2$
Range of spectral bandwidth	$\lambda_{0.1}$	-	670	-	1070	nm	-
Wavelength of peak sensitivity	$\lambda_p$	-	-	940	-	nm	-



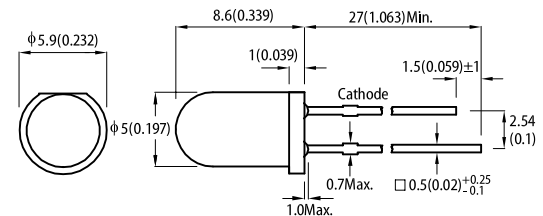
Units: mm (inch)  
Tolerance: ± 0.25 (0.01)

T-1 (3mm) Photodiode



Units: mm (inch)  
Tolerance: ± 0.25 (0.01)

T-1 3/4 (5mm) Photodiode



Units: mm (inch)  
Tolerance: ± 0.25 (0.01)

### Absolute Maximum Rating (Ta = 25°C)

Parameter	Maximum Ratings
Power Dissipation	150mW
Operating Temperature Range	-40°C~ +85°C
Storage Temperature Range	-40°C~ +85°C
WP3DPD1BT/BD WP7113PD1BT/BD-P22 Lead Soldering Temperature (>5mm)	260°C for 5 sec

## PHOTOTRANSISTOR

Part Number	Lens Type	Dimensions
AP1608P1C-P22	Water Clear	1.6mm x 0.8mm x 1.1mm (0603)
APT2012P3BT	Black Diffused	
AP2012P3C-P22	Water Clear	
APA3010P3BT-GX	Black Diffused	
APDA3020P3C-P22	Water Clear	



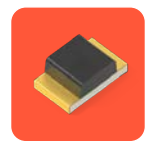
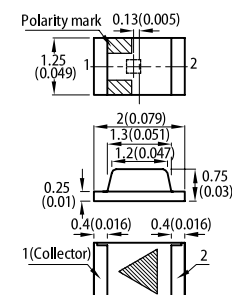
AP1608

Units: mm (inch)  
Tolerance: ± 0.1 (0.004)

### Electrical and Radiant Characteristics (Ta =25°C)

Parameter	Symbol	Part Number	Min.	Typ.	Max.	Unit	Test Condition
Collector-to-Emitter Breakdown Voltage	$V_{BR\ CE0}$	-	30	-	-	V	$I_C=100\mu A$ $E_e=0mW/cm^2$
Emitter-to-Collector Breakdown Voltage	$V_{BR\ EC0}$	-	5	-	-	V	$I_E=100\mu A$ $E_e=0mW/cm^2$
Collector-to-Emitter Saturation Voltage	$V_{CE(SAT)}$	-	-	-	0.8	V	$I_C=2mA$ $E_e=20mW/cm^2$
Collector Dark Current	$I_{CEO}$	-	-	-	100	nA	$V_{CE}=10V$ $E_e=0mW/cm^2$
Rise Time (10% to 90%)	$T_R$	-	-	15	-	$\mu s$	$V_{CE}=5V$ $I_C=1mA$ $R_L=1K\Omega$
Fall Time (90% to 10%)	$T_F$	-	-	15	-	$\mu s$	
On State Collector Current	$I_{(ON)}$	AP1608P1C-P22	0.1	0.3	-	mA	$V_{CE}=5V$ $E_e=1mW/cm^2$ $\lambda=940nm$
		APT2012P3BT	0.1	0.3	-		
		AP2012P3C-P22	0.2	0.4	-		
		APA3010P3BT-GX	0.1	0.3	-		
		APDA3020P3C-P22	0.35	0.8	-		

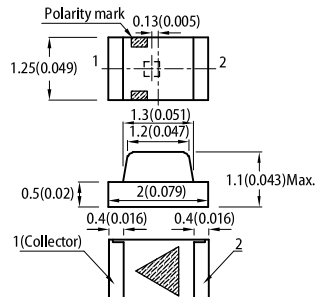
2.0mm x 1.25mm x 0.75mm (0805)



APT2012

Units: mm (inch)  
Tolerance: ± 0.1 (0.004)

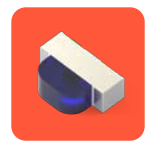
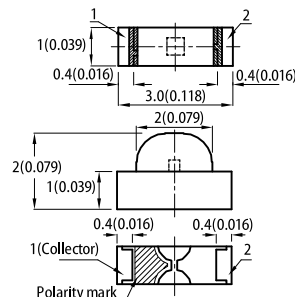
2.0mm x 1.25mm x 1.1mm (0805)



APT2012

Units: mm (inch)  
Tolerance: ± 0.1 (0.004)

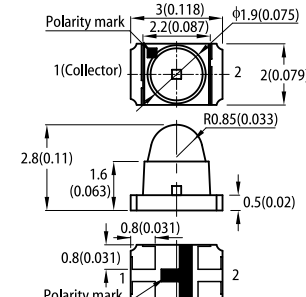
3.0mm x 2.0mm x 1.0mm (Right Angle)



APA3010

Units: mm (inch)  
Tolerance: ± 0.15 (0.006)

3.0mm x 2.8mm x 2.0mm (Right Angle)



APDA3020

Units: mm (inch)  
Tolerance: ± 0.2 (0.008)

### Absolute Maximum Rating (Ta =25°C)

Parameter	Maximum Ratings
Collector-to-Emitter Voltage	30V
Emitter-to-Collector Voltage	5V
Power Dissipation at (or below) 25°C Free Air Temperature	100mW
Operating Temperature Range	-40°C~ +85°C
Storage Temperature Range	-40°C~ +85°C

## PHOTOTRANSISTOR

Part Number	Lens Type	Dimensions
APTD3216P3C-P22	Water Clear	3.2mm x 1.6mm x 1.8mm (1206 Dome Lens)  Polarity mark 1.6(0.063) 1 2 0.6(0.024) 3.2(0.126) R0.8 1.6(0.063) 1.55(0.061) 1.8(0.071) 0.75(0.03) 0.25(0.01) 0.5(0.02) 1(Collector) 2 Polarity mark Units: mm (inch) Tolerance: ± 0.2 (0.008)
AA4040P3C-P22	Water Clear	
AM4457P3C-F-R	Water Clear	
WP3DP3BT	Blue Transparent	
WP3DP3BT/BD-P22	Black Diffused	
WP7113P3C	Water Clear	



APTD3216

### Electrical and Radiant Characteristics (Ta =25°C)

Parameter	Symbol	Part Number	Min.	Typ.	Max.	Unit	Test Condition
Collector-to-Emitter Breakdown Voltage	$V_{BR\ CE0}$	-	30	-	-	V	$I_C=100\mu A$ $E_e=0mW/cm^2$
Emitter-to-Collector Breakdown Voltage	$V_{BR\ EC0}$	-	5	-	-	V	$I_E=100\mu A$ $E_e=0mW/cm^2$
Collector-to-Emitter Saturation Voltage	$V_{CE(SAT)}$	-	-	-	0.8	V	$I_C=2mA$ $E_e=20mW/cm^2$
Collector Dark Current	$I_{CEO}$	-	-	-	100	nA	$V_{CE}=10V$ $E_e=0mW/cm^2$
Rise Time (10% to 90%)	$T_R$	-	-	15	-	$\mu s$	$V_{CE}=5V$ $I_C=1mA$ $R_L=1K\Omega$
Fall Time (90% to 10%)	$T_F$	-	-	15	-	$\mu s$	
On State Collector Current	$I_{(ON)}$	APTD3216P3C-P22	0.4	1	-	mA	$V_{CE}=5V$ $E_e=1mW/cm^2$ $\lambda=940nm$
		AA4040P3C-P22	0.35	0.6			
		AM4457P3C-F-R	0.35	0.8			
		WP3DP3BT	0.3	0.8			
		WP3DP3BT/BD-P22	0.3	0.8			
		WP7113P3C	0.5	2.5			

### Absolute Maximum Rating (Ta =25°C)

Parameter	Maximum Ratings
Collector-to-Emitter Voltage	30V
Emitter-to-Collector Voltage	5V
Power Dissipation at (or below) 25°C Free Air Temperature	100mW
Operating Temperature Range	-40°C~ +85°C
Storage Temperature Range	-40°C~ +85°C
WP3DP3BT WP3DP3BT/BD-P22 WP7113P3C Lead Soldering Temperature (>5mm For 5 sec)	260°C

4.0mm x 4.0mm x 3.6mm (Right Angle)

  
 Polarity mark  
 1.4(0.055) 2 0.3(0.012)  
 2.9(0.114) R1 3.6(0.142)  
 4(0.157) 2.4(0.094)  
 2.6(0.102) 4(0.157)±0.1  
 1(Collector) 2  
 1(0.039) 2.54(0.1) Spacing  
 2.85(0.112) 0.7(0.028)  
 Units: mm (inch)  
 Tolerance: ± 0.25 (0.01)


AA4040

1.5mm (Side Look)

  
 5.72(0.225)  
 2.22(0.087) 1.22(0.048)±0.1  
 Collector 0.5(0.02)  
 4.45(0.175) 40.7Max. 2.54(0.1)  
 13.5(0.531)Min. 1(0.039)Min.  
 1.55(0.061) φ1.5(0.059)  
 0.76(0.03)±0.1  
 Units: mm (inch)  
 Tolerance: ± 0.25 (0.01)


AM4457

T-1 (3mm) Phototransistor

  
 φ4(0.157) 5(0.197) 27(1.063)Min.  
 1(0.039) Collector 1.5(0.059)±1  
 φ3(0.118) 1.0Max. 0.7Max. □0.5(0.02)<sup>+0.25</sup><sub>-0.1</sub>  
 5.3(0.209)±0.5 2.54(0.1)  
 Units: mm (inch)  
 Tolerance: ± 0.25 (0.01)


WP3D

T-1 3/4 (5mm) Phototransistor

  
 φ5.9(0.232) 8.6(0.339) 27(1.063)Min.  
 1(0.039) Collector 1.5(0.059)±1  
 φ5(0.197) 1.0Max. 0.7Max. □0.5(0.02)<sup>+0.25</sup><sub>-0.1</sub>  
 2.54(0.1)  
 Units: mm (inch)  
 Tolerance: ± 0.25 (0.01)


WP7113

# OPTO-SENSOR

Kingbright opto-sensors can be used in many industries, including manufacturing, automation, robotic and automotive applications. Our opto-sensor offers accuracy, reliability and versatility in various size and packages.



47 /  
Light Sensor

47 /  
Photointerrupter

50 /  
Photocoupler

LIGHT SENSOR

Part Number	Lens Type		Dimensions	
APS3227SP1C-P22	Water Clear		3.2 mm x 2.7 mm x 1.1 mm (Ambient Light Sensor)	


  

**Electrical and Radiant Characteristics (Ta =25°C,Unless Otherwise Specified)**

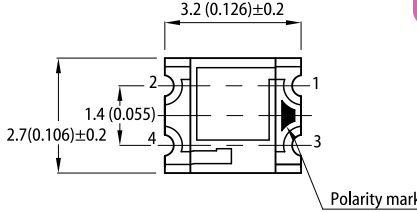
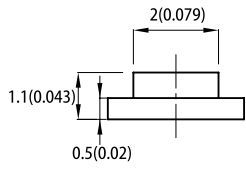
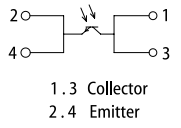
Parameter	Symbol	Min.	Typ.	Max.	Unit	Test Condition
Collector Emitter Breakdown Voltage	$B_{V_{CE0}}$	60	-	-	V	$I_{ce0}=100\mu A$
Emitter Collector Breakdown Voltage	$B_{V_{ec0}}$	4	-	-	V	$I_{eco}=100\mu A$
Collector dark current	$I_D$	-	10	100	nA	$V_{CE}=5V, E_v=0Lx$
Light Current (1)	$I_{PH1}$	-	6	-	$\mu A$	$V_{CE}=5V, E_v=100Lx^{(1)}$
Light Current (2)	$I_{PH2}$	-	130	-	$\mu A$	$V_{CE}=5V, E_v=1000Lx^{(1)}$
Light Current (3)	$I_{PH3}$	-	950	-	$\mu A$	$V_{CE}=5V, E_v=1000Lx^{(2)}$
Light Current (4)	$I_{PH4}$	-	420	-	$\mu A$	$V_{CE}=5V, E_v=1000Lx^{(3)}$
Saturation Output Voltage	$V_O$	4.5	4.7	-	V	$V_{CE}=5V, E_v=1000Lx^{(1)}$ $R_L=75K\Omega$
Wavelength of peak sensitivity	$\lambda_p$	-	580	-	nm	-
Response Wavelength	$\lambda$	390	-	700	nm	>10% Response
Collector Emitter Saturation Voltage	$V_{CE(sat)}$	-	-	0.4	V	$I_C=10mA$

Notes:  
 1. White Fluorescent light (Color Temperature = 6200K) is used as light source.  
 2. Illuminance by CIE standard illuminant-A/2856K, incandescent lamp.  
 3. Sunlight (Color Temperature = 4600K) is used as light source.

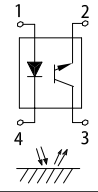
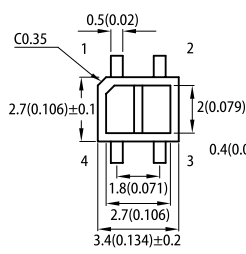
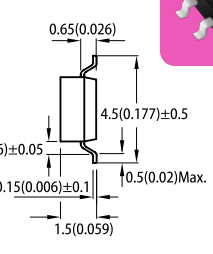
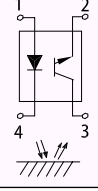
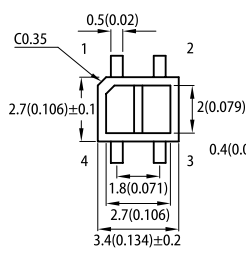
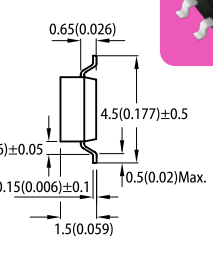
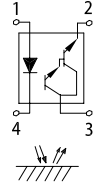
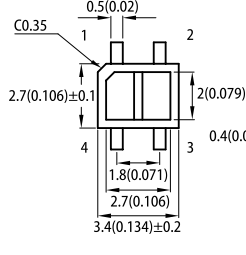
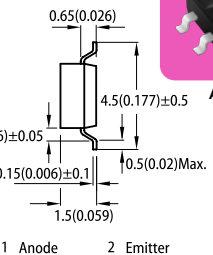


**APS3227**

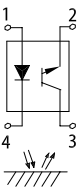

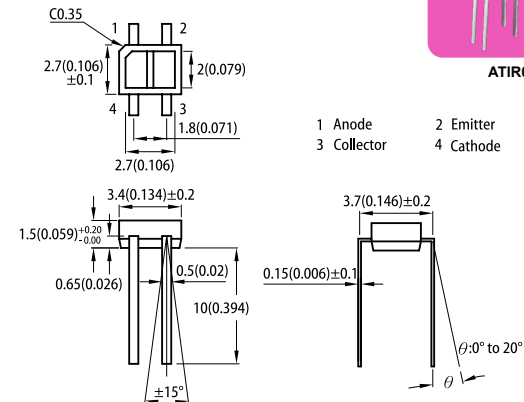
Units: mm (inch)  
Tolerance: ± 0.1 (0.004)

PHOTOINTERRUPTER – REFLECTIVE TYPE

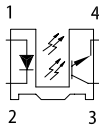

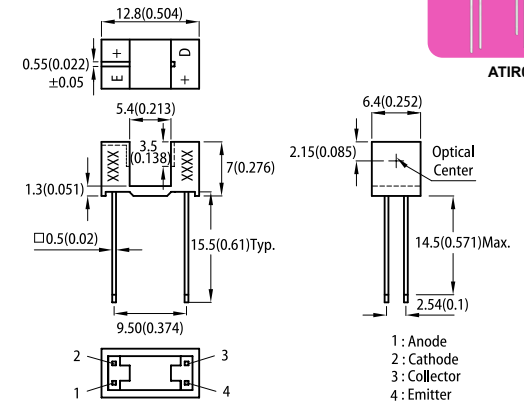
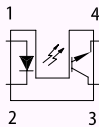

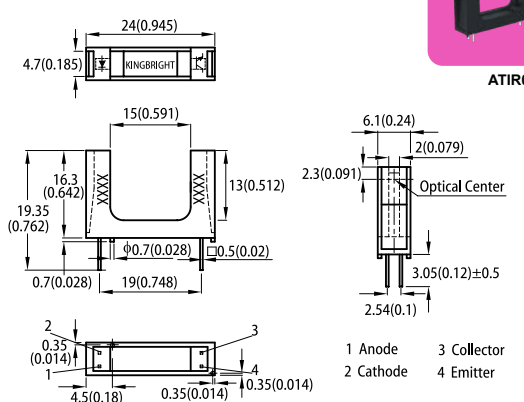
Part Number	IC (μA)				$V_{CE(sat)}$ (V)			Response Time(μs) Typ.			Pin Configuration	Dimensions
	Min.	Typ.	Max.	Test Condition	Typ.	Max.	Condition	$T_r$	$T_f$	Test Condition		
ATIR0711S	10	-	400	$I_F=4mA$ $V_{CE}=2V$	-	-	-	20	20	$V_{CE}=2V$ $I_C=100\mu A$ $R_L=1K\Omega$ $d=1mm$		  <p><b>ATIR0711S</b></p> <p>Units: mm (inch) Tolerance: ± 0.25 (0.01)</p>
ATIR0711S-F	100	-	250	$I_F=4mA$ $V_{CE}=2V$	-	-	-	20	20	$V_{CE}=2V$ $I_C=100\mu A$ $R_L=1K\Omega$ $d=1mm$		  <p><b>ATIR0711S-F</b></p> <p>Units: mm (inch) Tolerance: ± 0.25 (0.01)</p>
ATIR0721DS	-	10000	-	$I_F=4mA$ $V_{CE}=2V$	-	-	-	80	70	$V_{CE}=2V$ $I_C=10mA$ $R_L=100\Omega$ $d=1mm$		  <p><b>ATIR0721DS</b></p> <p>Units: mm (inch) Tolerance: ± 0.25 (0.01)</p>

All dimensions are in millimeters (inches)

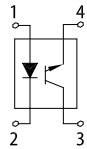

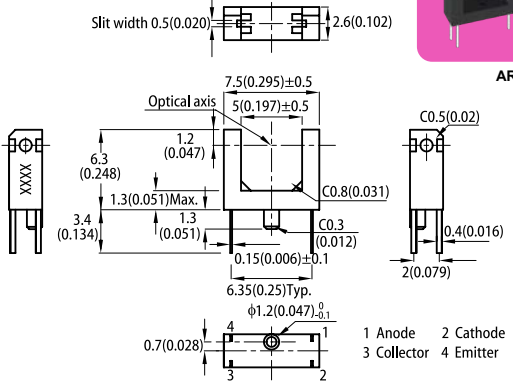
PHOTOINTERRUPTER – REFLECTIVE TYPE

Part Number	IC (μA)				V <sub>CE(sat)</sub> (V)			Response Time(μs) Typ.			Pin Configuration	Dimensions
	Min.	Typ.	Max.	Test Condition	Typ.	Max.	Condition	Tr	Tf	Test Condition		
ATIR0811S	10	-	400	I <sub>F</sub> =4mA V <sub>CE</sub> =2V	-	-	-	20	20	V <sub>CE</sub> =2V I <sub>C</sub> =100μA R <sub>L</sub> =1KΩ d=1mm		<p><b>ATIR0811S</b></p>  <p><b>ATIR0811S</b></p> <p>1 Anode      2 Emitter 3 Collector    4 Cathode</p>  <p>Units: mm (inch) Tolerance: ± 0.25 (0.01)</p>

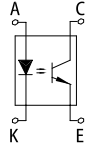

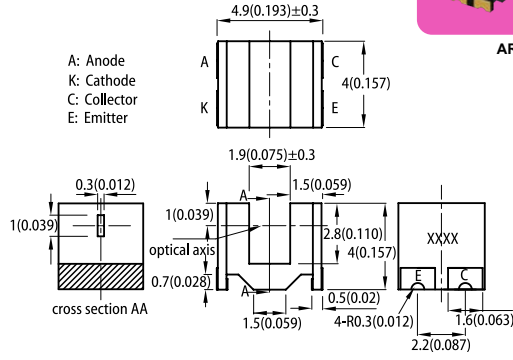
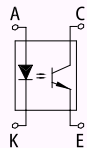

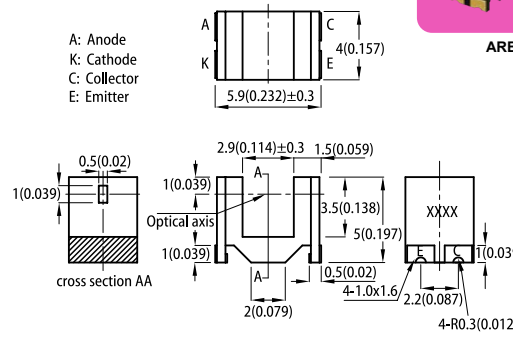
PHOTOINTERRUPTER - TRANSMISSIVE TYPE

Part Number	CTR(%)				V <sub>CE(sat)</sub> (V)			Response Time(μs) Typ.			Pin Configuration	Dimensions
	Min.	Typ.	Max.	Test Condition	Typ.	Max.	Condition	Tr	Tf	Test Condition		
ATIR0511S	-	10	-	I <sub>F</sub> =20mA V <sub>CE</sub> =5V	-	0.4	I <sub>C</sub> =1mA I <sub>F</sub> =40mA	5	4	V <sub>CE</sub> =2V I <sub>C</sub> =2mA R <sub>L</sub> =100Ω		<p><b>ATIR0511S</b></p>  <p><b>ATIR0511S</b></p> <p>1: Anode 2: Cathode 3: Collector 4: Emitter</p>  <p>Units: mm (inch) Tolerance: ± 0.25 (0.01)</p>
ATIR0911S	-	9.5	-	I <sub>F</sub> =20mA V <sub>CE</sub> =5V	-	0.4	I <sub>C</sub> =1mA I <sub>F</sub> =40mA	5	4	V <sub>CE</sub> =2V I <sub>C</sub> =2mA R <sub>L</sub> =100Ω		<p><b>ATIR0911S</b></p>  <p><b>ATIR0911S</b></p> <p>1 Anode      3 Collector 2 Cathode    4 Emitter</p>  <p>Units: mm (inch) Tolerance: ± 0.25 (0.01)</p>

PHOTOINTERRUPTER - TRANSMISSIVE TYPE

Part Number	CTR(%)				V <sub>CE(sat)</sub> (V)			Response Time(μs) Typ.			Pin Configuration	Dimensions
	Min.	Typ.	Max.	Test Condition	Typ.	Max.	Condition	Tr	Tf	Test Condition		
ARA021	2.5	-	50	I <sub>F</sub> =10mA V <sub>CE</sub> =2V	0.1	0.4	I <sub>C</sub> =0.25mA I <sub>F</sub> =20mA	15	15	V <sub>CE</sub> =5V R <sub>L</sub> =1KΩ I <sub>C</sub> =1mA		<p>ARA021</p>   <p>Units: mm (inch) Tolerance: ± 0.15 (0.006)</p>

PHOTOINTERRUPTER - TRANSMISSIVE TYPE

Part Number	I <sub>C</sub> (μA)				V <sub>CE(sat)</sub> (V)			Response Time(μs) Typ.			Pin Configuration	Dimensions
	Min.	Typ.	Max.	Test Condition	Typ.	Max.	Condition	Tr	Tf	Test Condition		
ARB011	50	650	-	I <sub>F</sub> =5mA V <sub>CE</sub> =5V	0.1	0.4	I <sub>C</sub> =50μA I <sub>F</sub> =20mA	8	10	V <sub>CE</sub> =5V R <sub>L</sub> =1KΩ I <sub>C</sub> =100μA		<p>ARB011</p>   <p>Units: mm (inch) Tolerance: ± 0.15 (0.006)</p>
ARB031A	50	150	500	I <sub>F</sub> =5mA V <sub>CE</sub> =5V	0.1	0.4	I <sub>C</sub> =50μA I <sub>F</sub> =20mA	8	10	V <sub>CE</sub> =5V R <sub>L</sub> =1KΩ I <sub>C</sub> =100μA		<p>ARB031A</p>   <p>Units: mm (inch) Tolerance: ± 0.15 (0.006)</p>

All dimensions are in millimeters (inches)



PHOTOCOUPLER

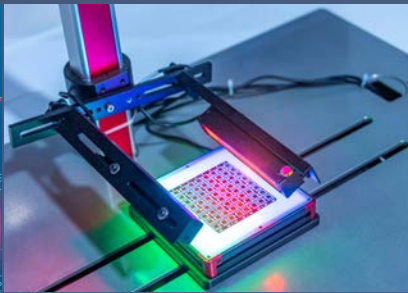
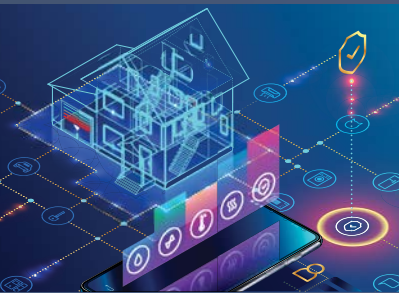
Part Number	CTR(%)				V <sub>CE(sat)</sub> (V)			Response Time(μs) Typ.			Pin Configuration	Dimensions
	Min.	Typ.	Max.	Test Condition	Typ.	Max.	Condition	Tr	Tf	Test Condition		
AB814B	120	-	300	I <sub>F</sub> =±1mA V <sub>CE</sub> =5V	0.1	0.2	I <sub>F</sub> =±20mA I <sub>C</sub> =1mA	4	3	V <sub>CE</sub> =2V I <sub>C</sub> =2mA R <sub>L</sub> =100Ω		<p>AB814B</p> <p>Units: mm (inch) Tolerance: ± 0.5 (0.02)</p>
AB814B-B	120	-	300	I <sub>F</sub> =±1mA V <sub>CE</sub> =5V	0.1	0.2	I <sub>F</sub> =±20mA I <sub>C</sub> =1mA	4	3	V <sub>CE</sub> =2V I <sub>C</sub> =2mA R <sub>L</sub> =100Ω		<p>AB814B-B</p> <p>Units: mm (inch) Tolerance: ± 0.5 (0.02)</p>
AB817A-B	80	-	160	I <sub>F</sub> =5mA V <sub>CE</sub> =5V	0.1	0.2	I <sub>F</sub> =20mA I <sub>C</sub> =1mA	4	3	V <sub>CE</sub> =2V I <sub>C</sub> =2mA R <sub>L</sub> =100Ω		<p>AB817A-B, AB817B-B, AB817D-B</p> <p>Units: mm (inch) Tolerance: ± 0.5 (0.02)</p>
AB817B-B	130	-	260	I <sub>F</sub> =5mA V <sub>CE</sub> =5V	0.1	0.2	I <sub>F</sub> =20mA I <sub>C</sub> =1mA	4	3	V <sub>CE</sub> =2V I <sub>C</sub> =2mA R <sub>L</sub> =100Ω		<p>AB817B-B</p> <p>Units: mm (inch) Tolerance: ± 0.5 (0.02)</p>
AB817D-B	300	-	600	I <sub>F</sub> =5mA V <sub>CE</sub> =5V	0.1	0.2	I <sub>F</sub> =20mA I <sub>C</sub> =1mA	4	3	V <sub>CE</sub> =2V I <sub>C</sub> =2mA R <sub>L</sub> =100Ω		<p>AB817D-B</p> <p>Units: mm (inch) Tolerance: ± 0.5 (0.02)</p>

PHOTOCOUPLER

Part Number	CTR(%)				V <sub>CE(sat)</sub> (V)			Response Time(μs) Typ.			Pin Configuration	Dimensions
	Min.	Typ.	Max.	Test Condition	Typ.	Max.	Condition	Tr	Tf	Test Condition		
AB356N2T	130	-	260	I <sub>F</sub> =5mA V <sub>CE</sub> =5V	0.1	0.2	I <sub>F</sub> =20mA I <sub>C</sub> =1mA	6	8	V <sub>CE</sub> =2V I <sub>C</sub> =2mA R <sub>L</sub> =100Ω		<p>AB356N2T,AB356N6T</p> <p><b>AB356NT</b></p> <p>1 Anode 3 Emitter 2 Cathode 4 Collector</p>
AB356N6T	130	-	400	I <sub>F</sub> =5mA V <sub>CE</sub> =5V	0.1	0.2	I <sub>F</sub> =20mA I <sub>C</sub> =1mA	6	8	V <sub>CE</sub> =2V I <sub>C</sub> =2mA R <sub>L</sub> =100Ω		
AB357NT	50	-	600	I <sub>F</sub> =5mA V <sub>CE</sub> =5V	-	0.2	I <sub>F</sub> =20mA I <sub>C</sub> =1mA	4	3	V <sub>CE</sub> =2V I <sub>C</sub> =2mA R <sub>L</sub> =100Ω		<p>AB357NT</p> <p><b>AB357NT</b></p> <p>1 Anode 3 Emitter 2 Cathode 4 Collector</p>
AB354NT	20	-	300	I <sub>F</sub> =±1mA V <sub>CE</sub> =5V	0.1	0.2	I <sub>F</sub> =±20mA I <sub>C</sub> =1mA	4	3	V <sub>CE</sub> =2V I <sub>C</sub> =2mA R <sub>L</sub> =100Ω		<p>AB354NT</p> <p><b>AB354NT</b></p> <p>1 Anode,Cathode 3 Emitter 2 Cathode,Anode 4 Collector</p>

All dimensions are in millimeters (inches)

# Technical Notes



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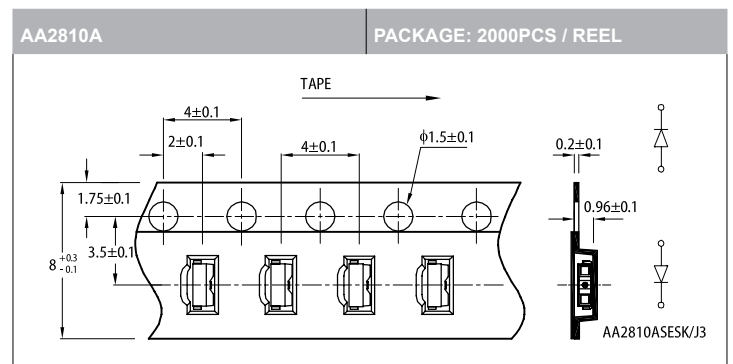
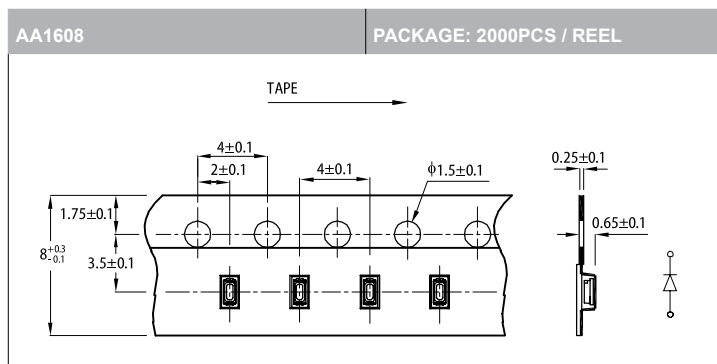
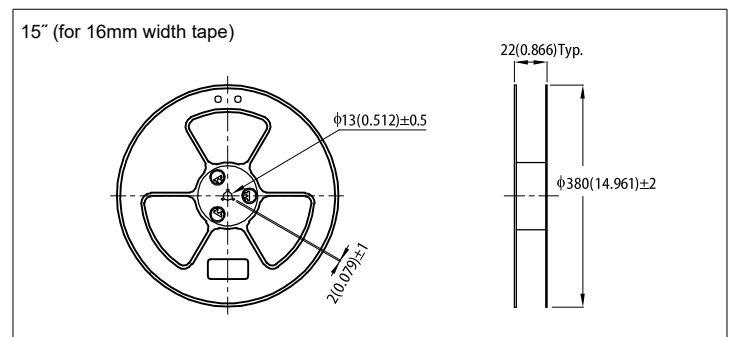
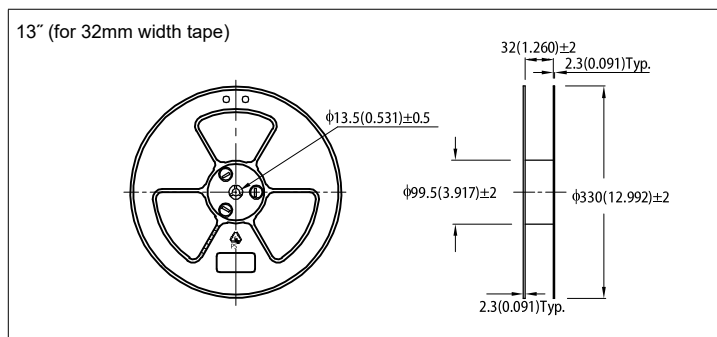
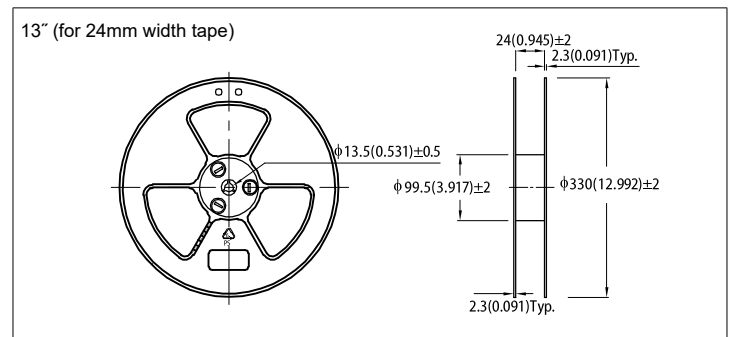
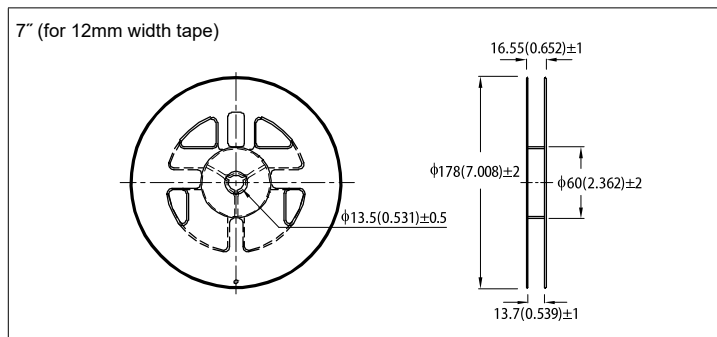
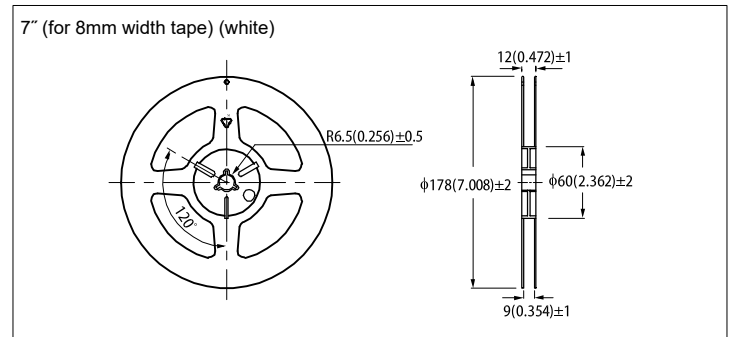
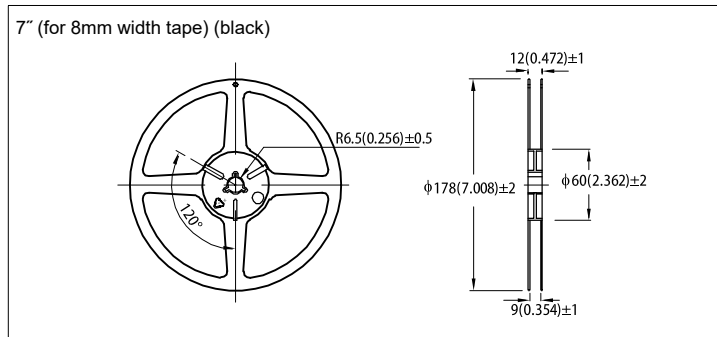
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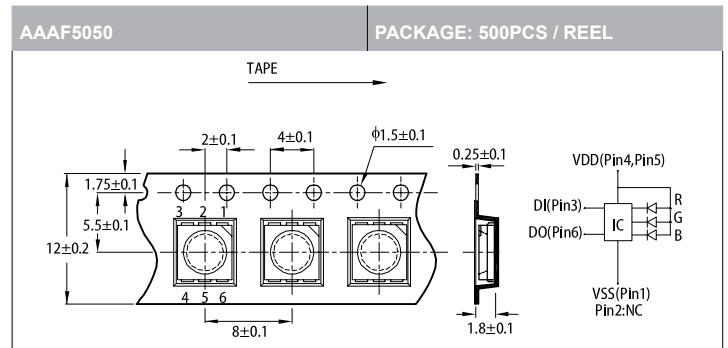
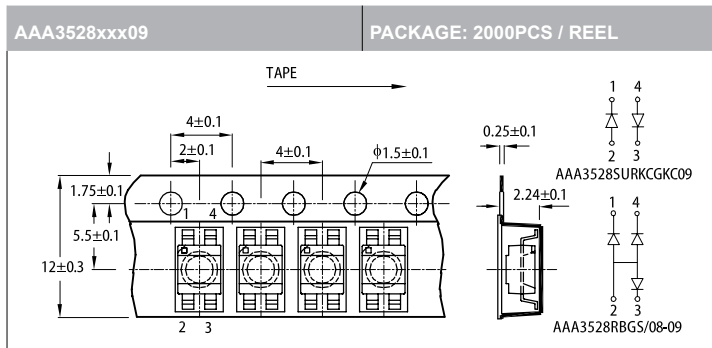
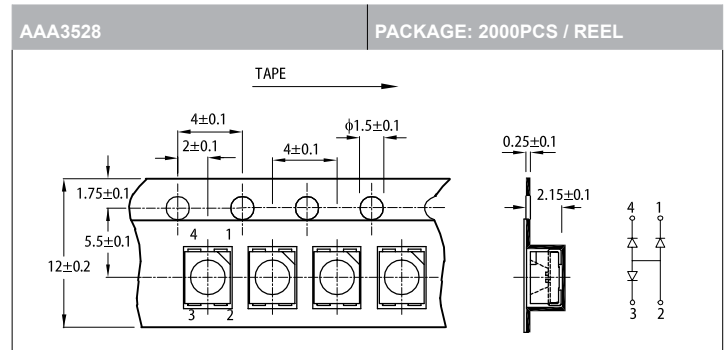
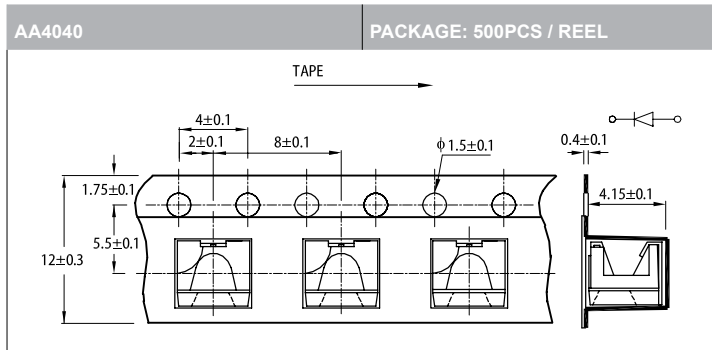
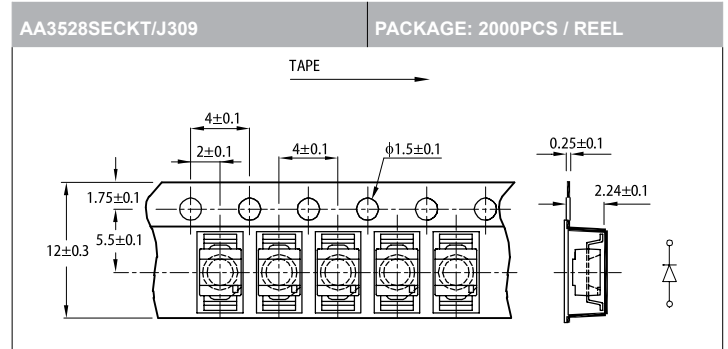
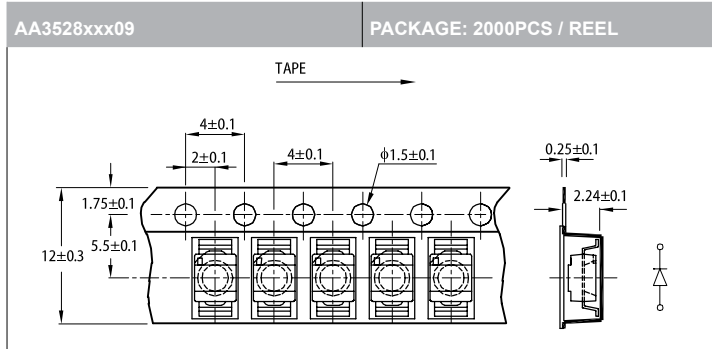
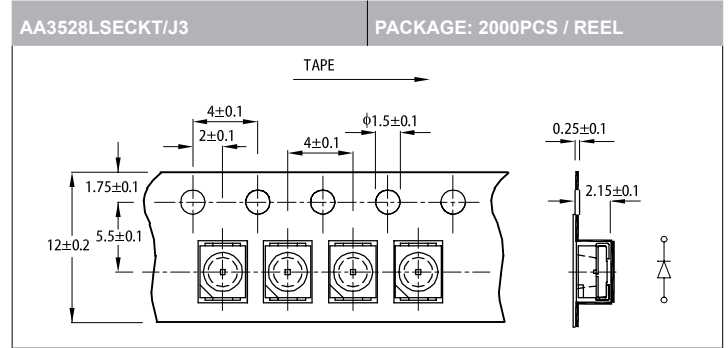
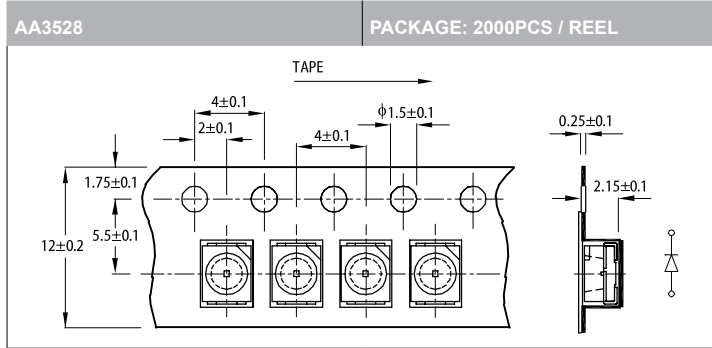
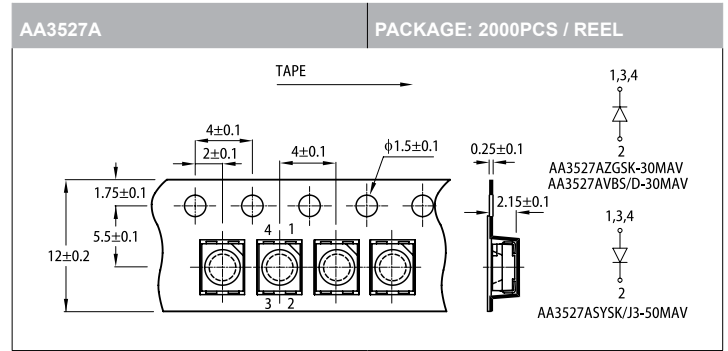
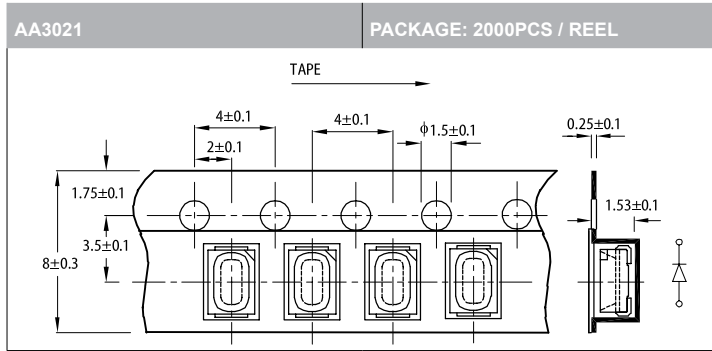
## SMD TAPE SPECIFICATIONS

Reel Dimensions / Part Number								
<b>7" (for 8mm width tape) (black)</b>			<b>7" (for 8mm width tape) (white)</b>					
AA1608	APGF1012	APT1608	AA2810A	APB3025	APD3224	APGF0606	APT2012	APTL3216
AP1608	APHB1608	APTB1612	AA3021	APB3227	APDA1806	APHBM2012	APT3216	APTL3216xxx01
APG0603	APHF1608	APTD1608	AP2012	APBA3010	APDA3020	APHCM2012	APTB1615	APTR3216
APG1005	APHHS1005		APA1606	APBD3224	APFA2507	APL3015	APTD2012	
APG1608	APHM1608		APA2107	APBDA3020	APFA3010	APPA3010	APTD3216	
			APA3010	APBL3025	APFA3011	APS3227	APTF1616	
<b>7" (for 12mm width tape)</b>			<b>13" (for 24mm width tape)</b>		<b>13" (for 32mm width tape)</b>		<b>15" (for 16mm width tape)</b>	
AA3527A	AAA3528	AM2520xxx09	AC SX02-41	AC SX04-41	AC SX56-41		AB354NT	AB817-B
AA3528	AAA3528xxx09	APF3236	AC SX03-41				AB356NT	ARB011
AA3528xxx09	AAAF5050	ATIR0711S					AB357NT	ARB031A
AA4040	AM2520xxx03	ATIR0721DS					AB814-B	

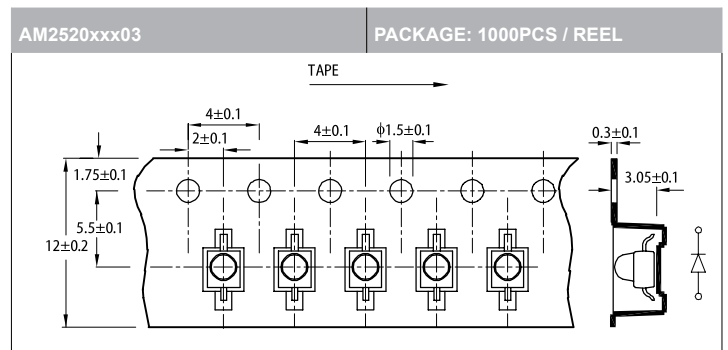
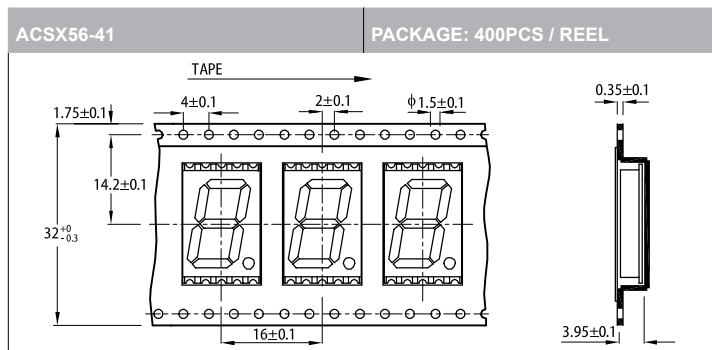
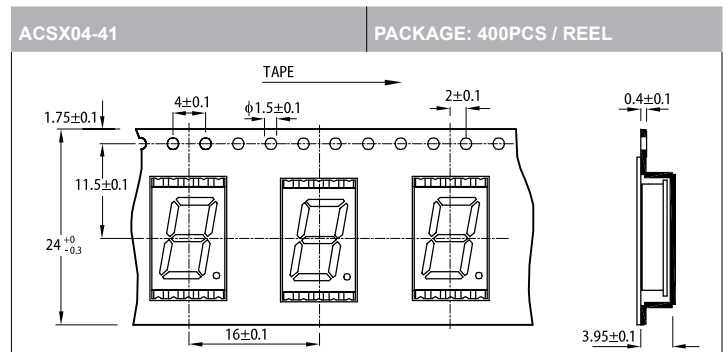
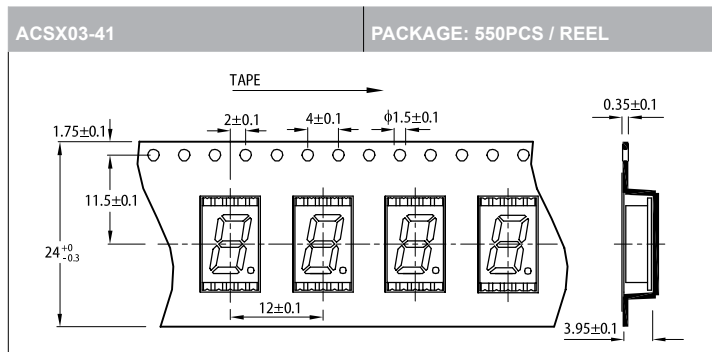
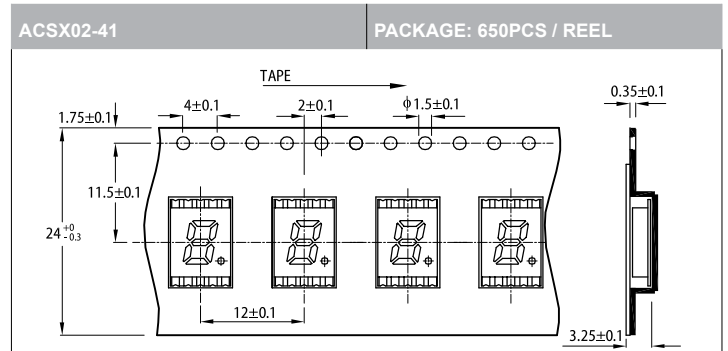
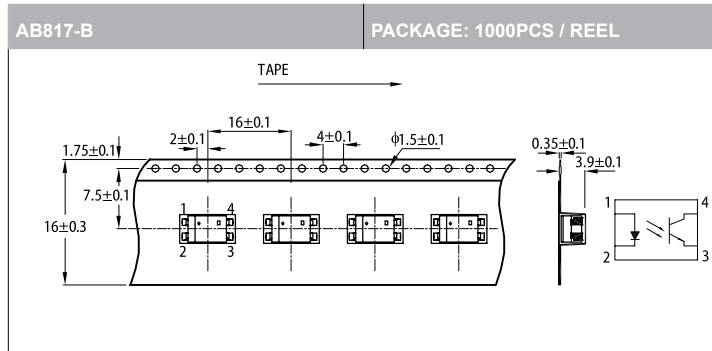
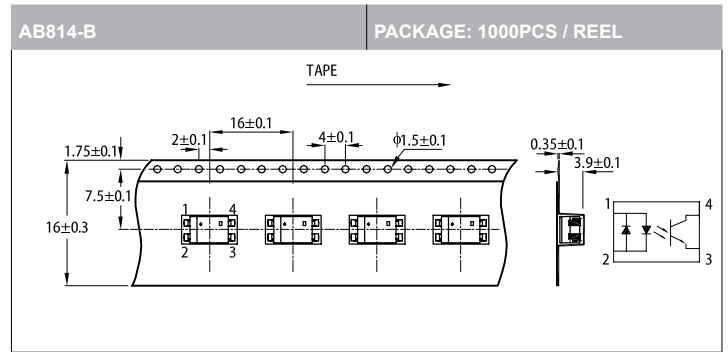
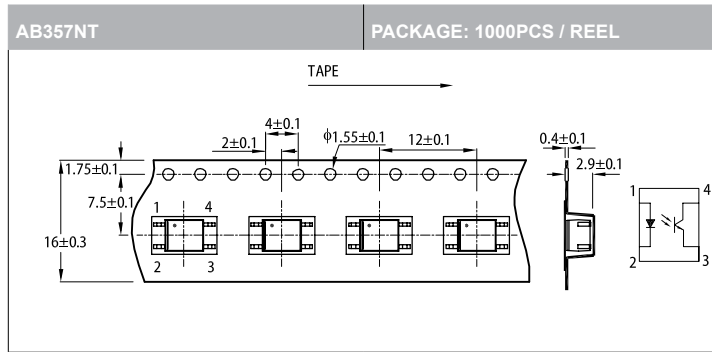
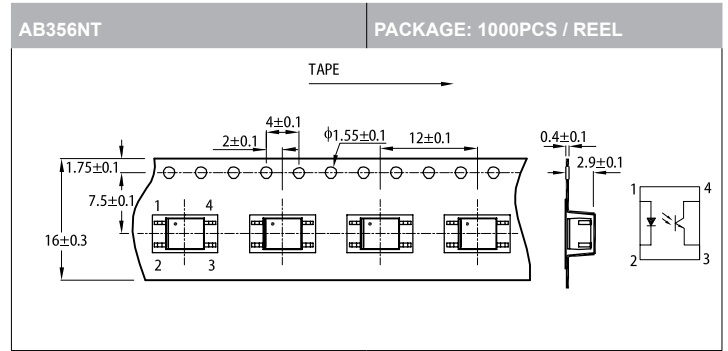
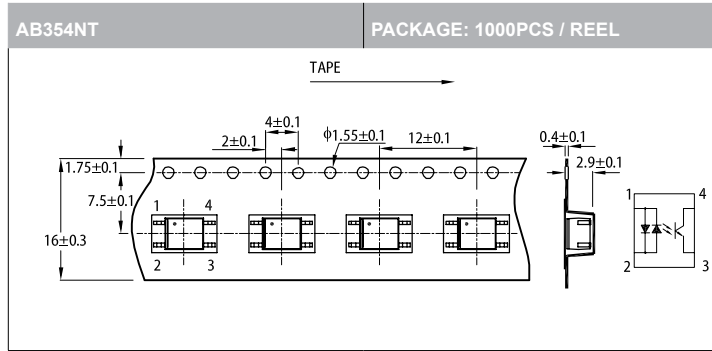


All dimensions are in millimeters

## SMD TAPE SPECIFICATIONS

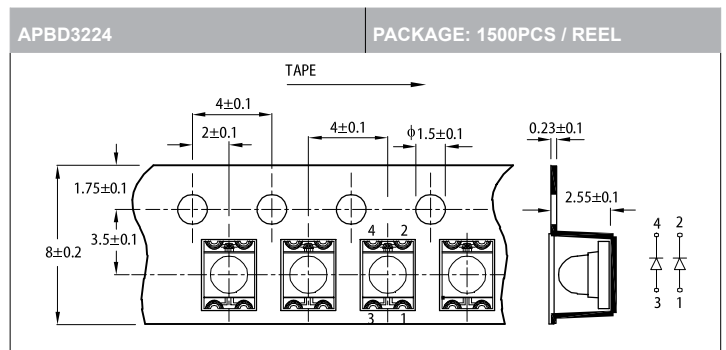
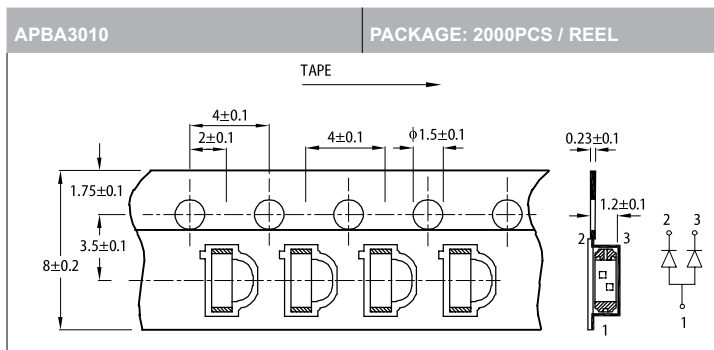
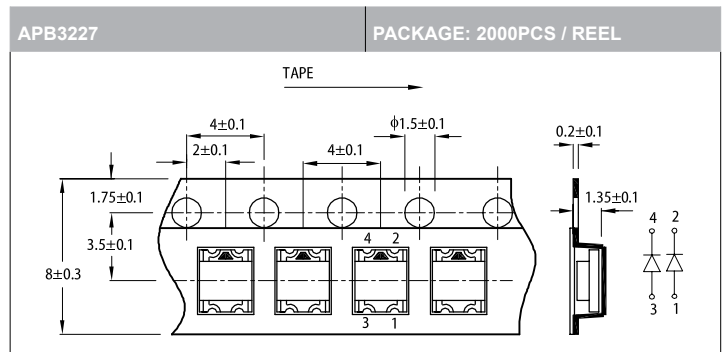
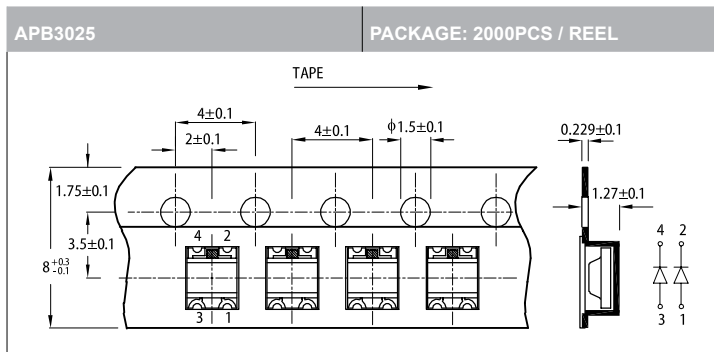
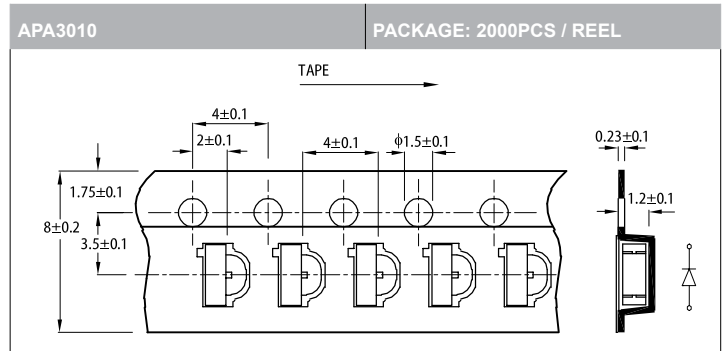
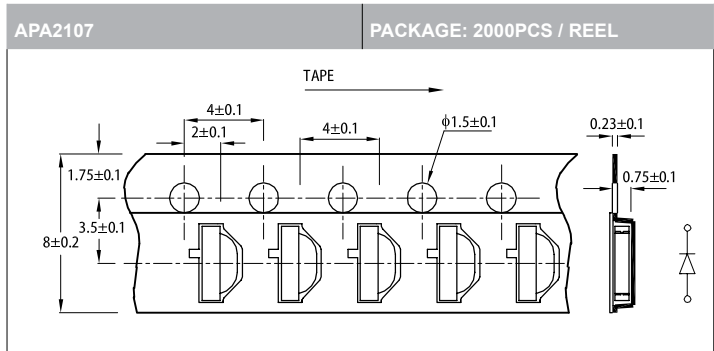
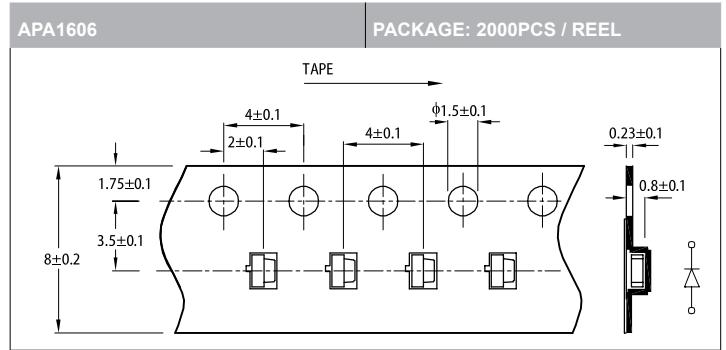
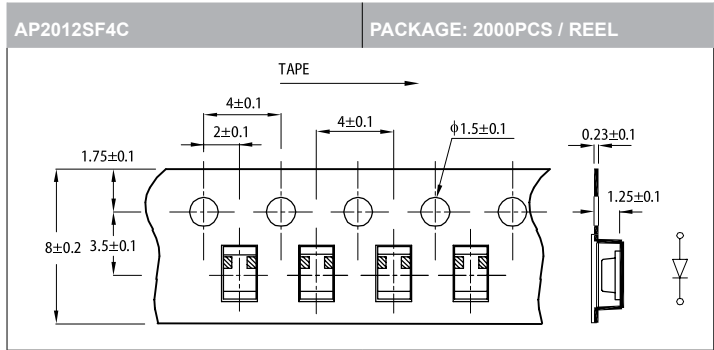
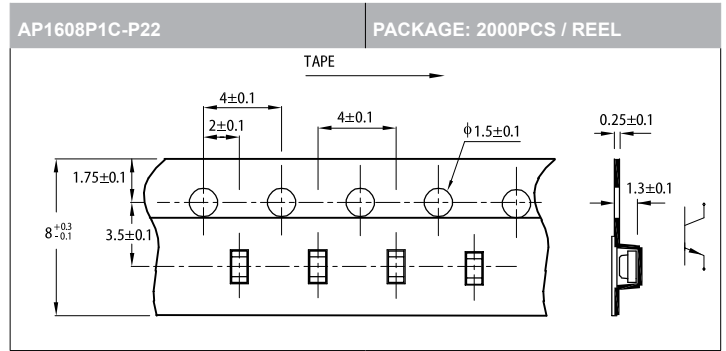
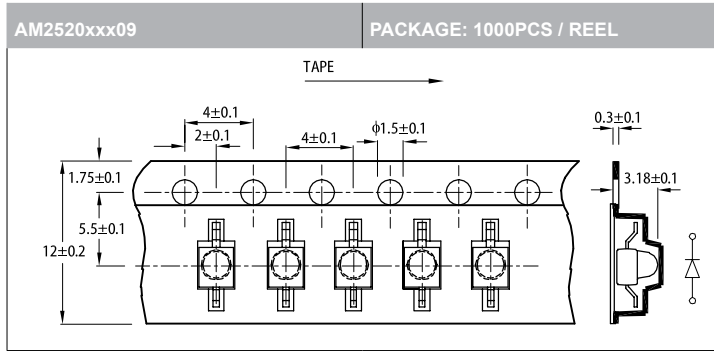


SMD TAPE SPECIFICATIONS



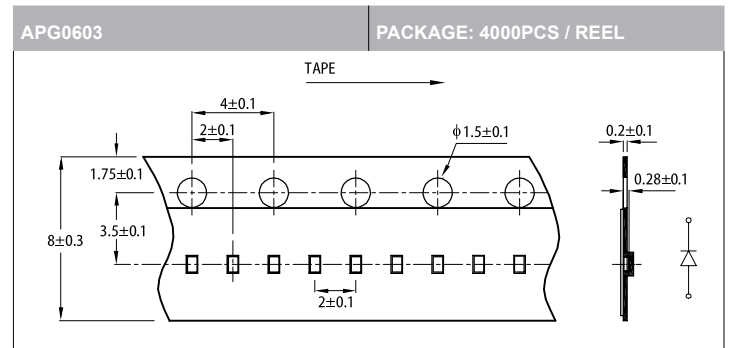
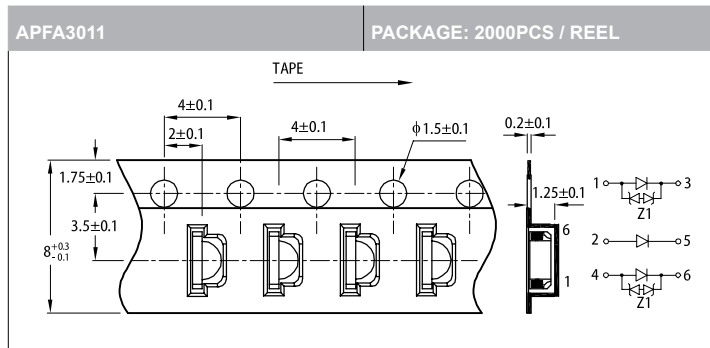
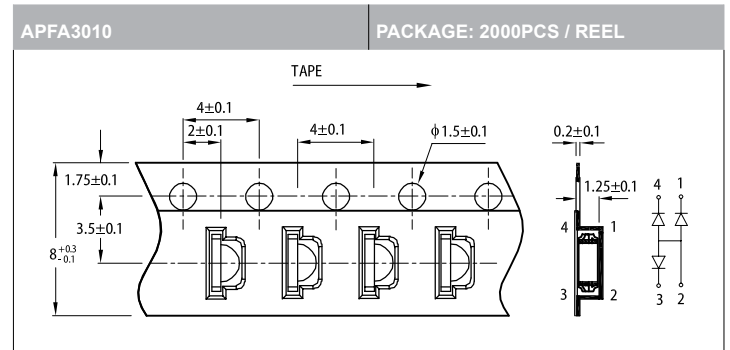
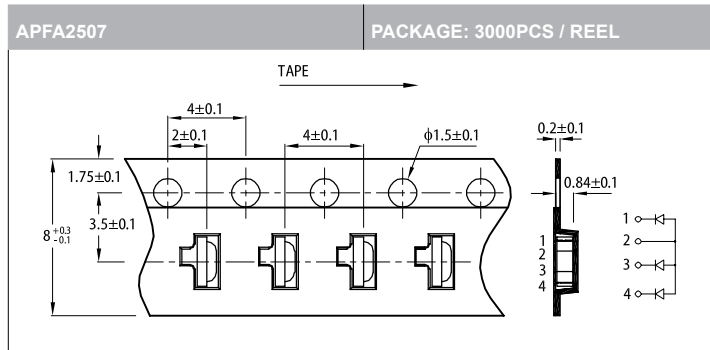
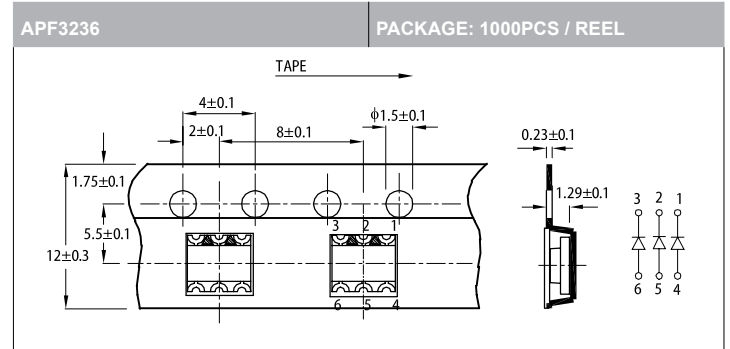
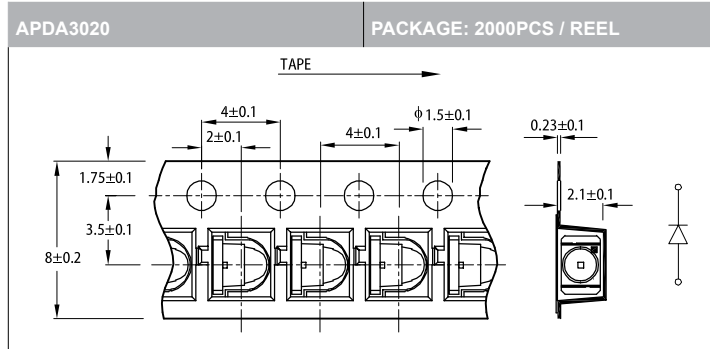
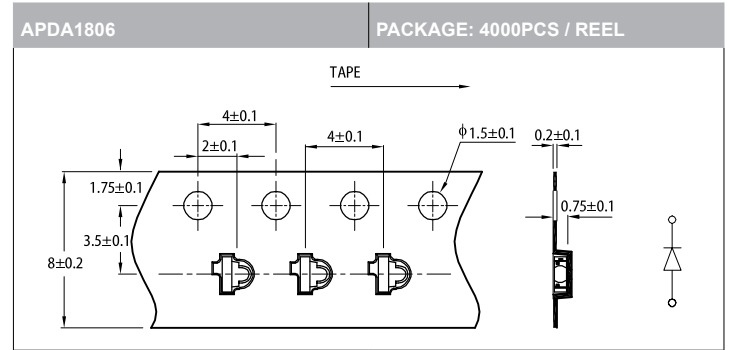
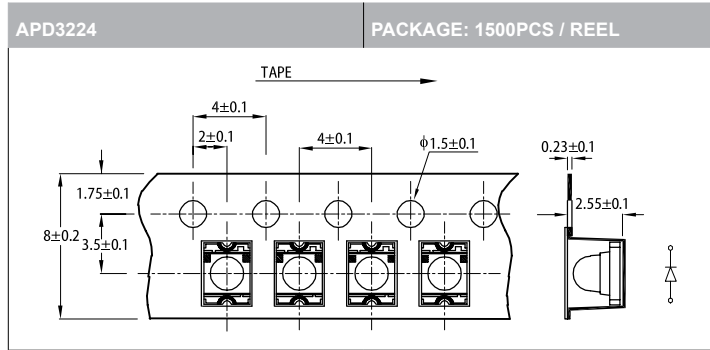
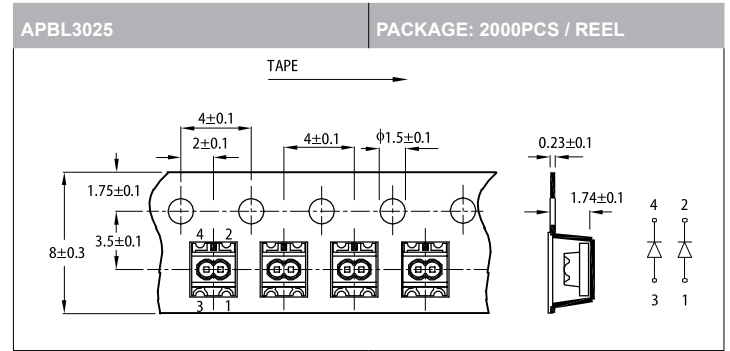
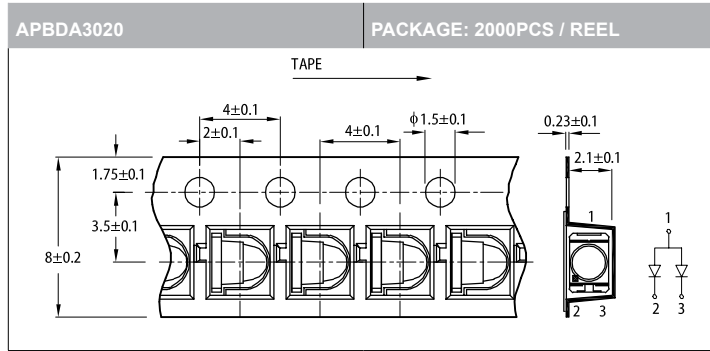
All dimensions are in millimeters

SMD TAPE SPECIFICATIONS



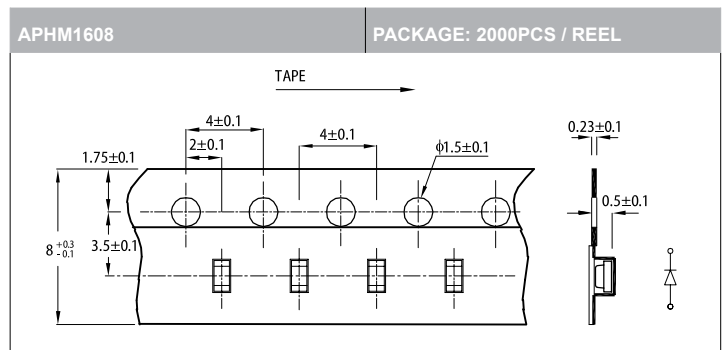
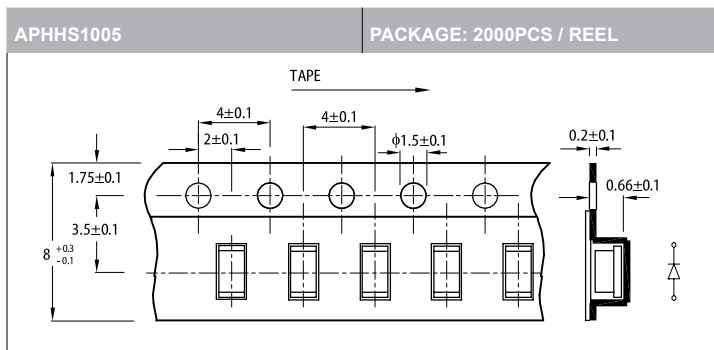
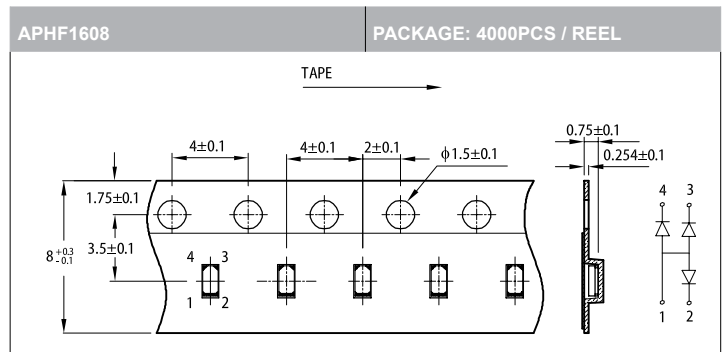
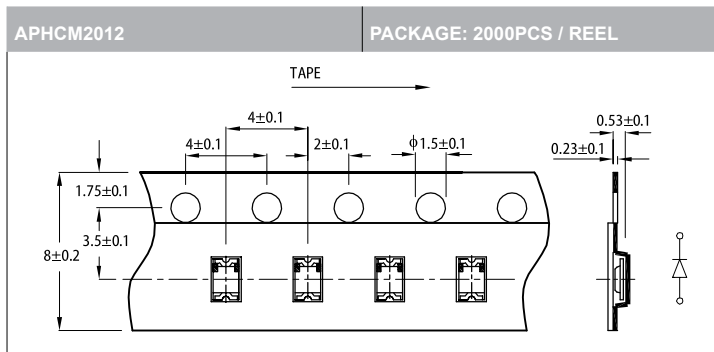
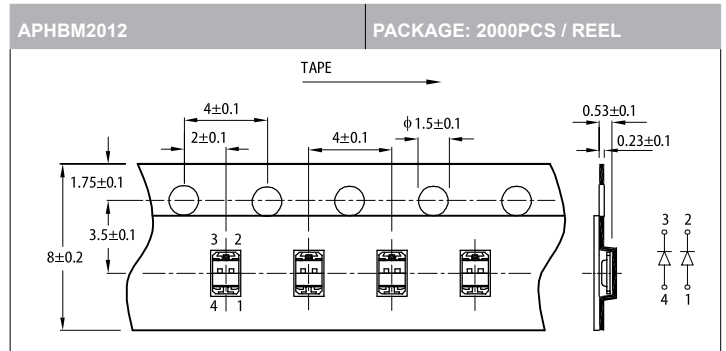
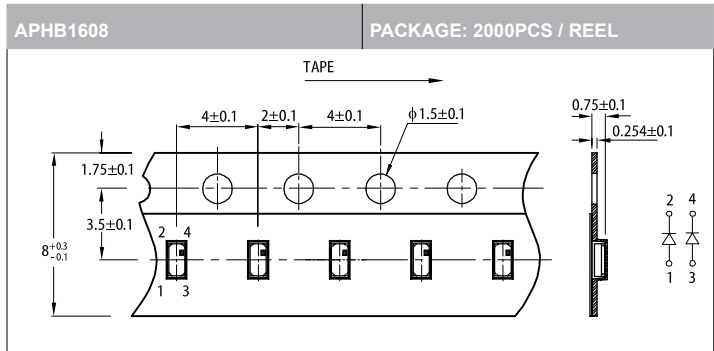
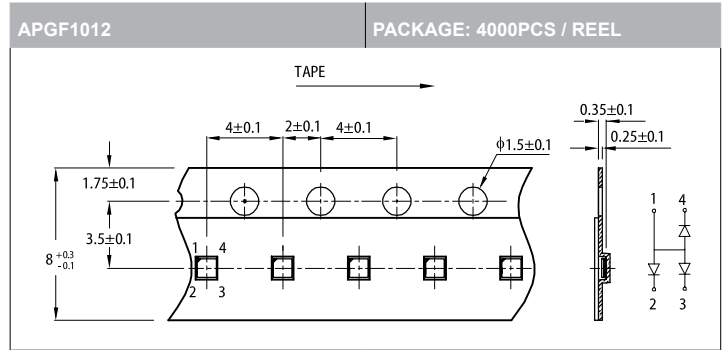
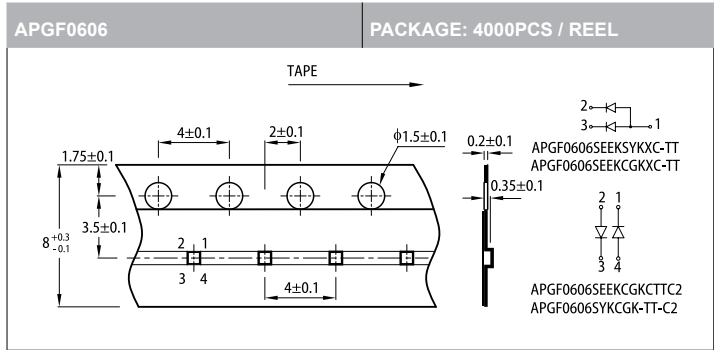
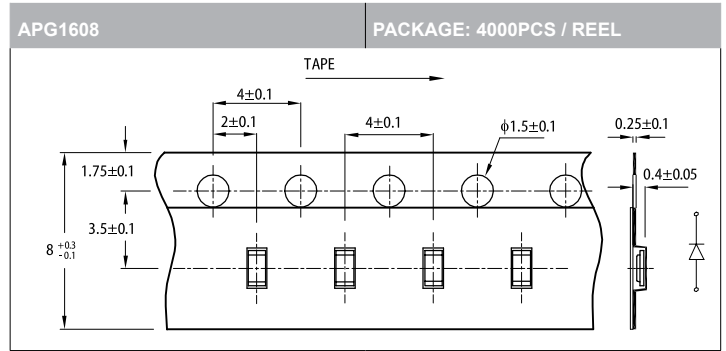
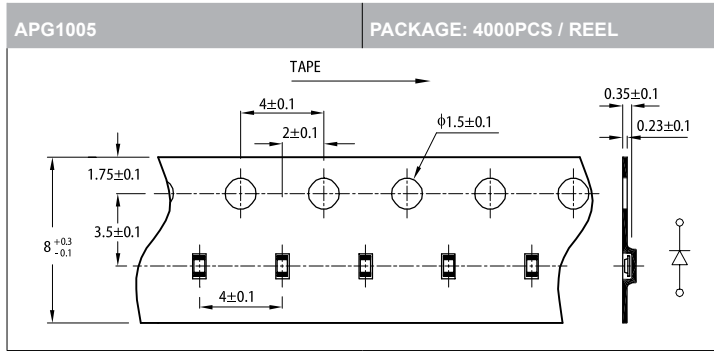


## SMD TAPE SPECIFICATIONS

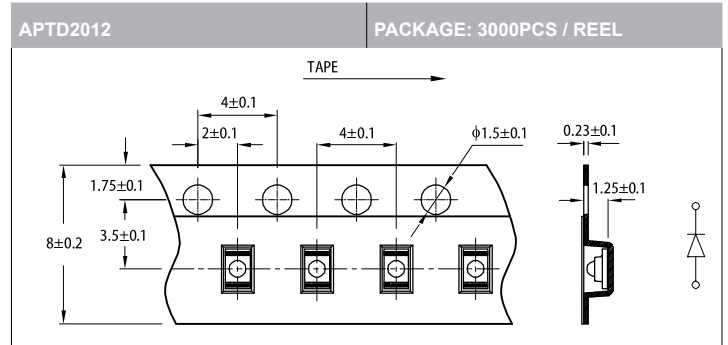
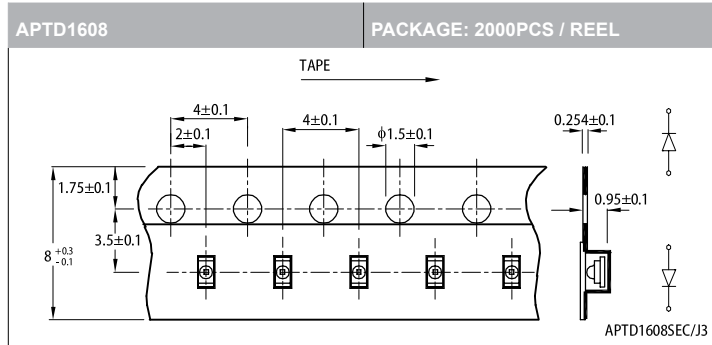
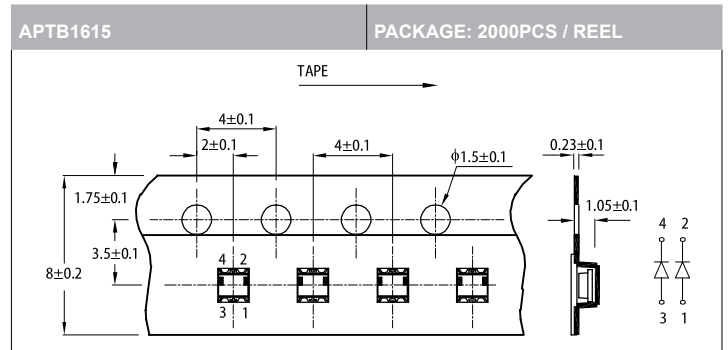
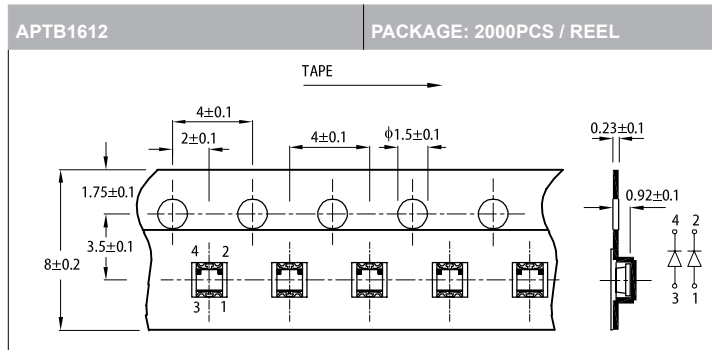
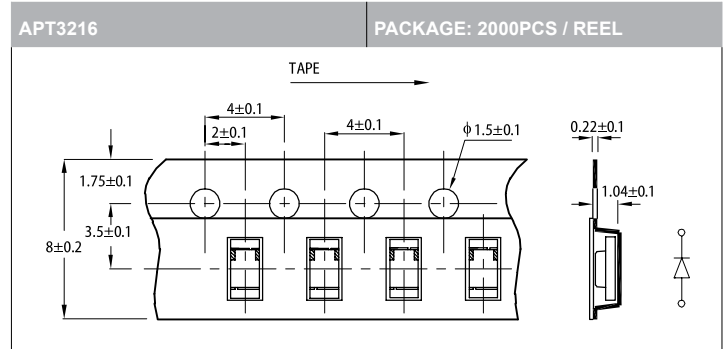
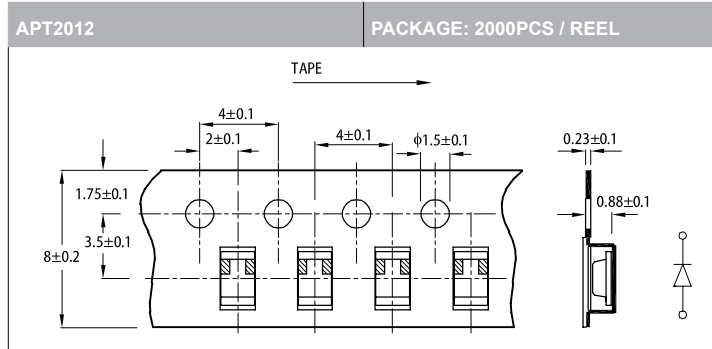
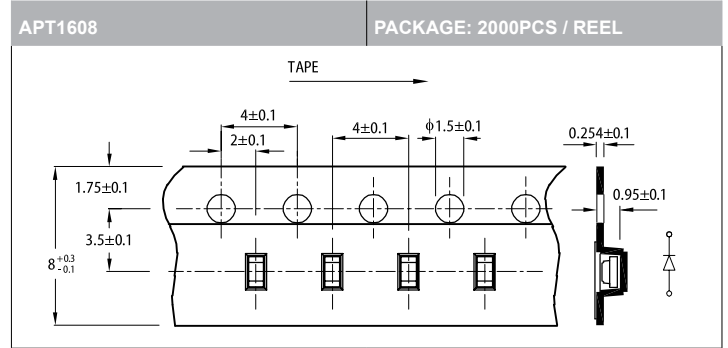
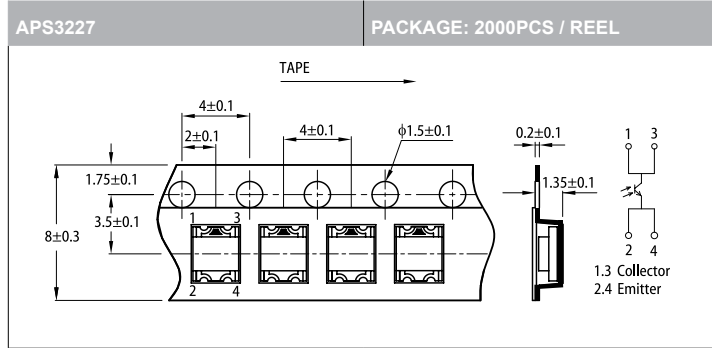
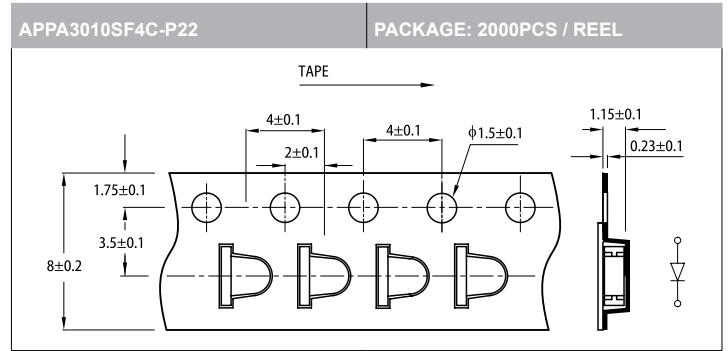
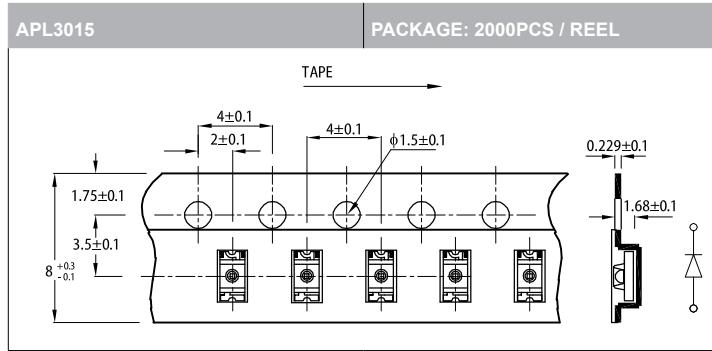


All dimensions are in millimeters

SMD TAPE SPECIFICATIONS

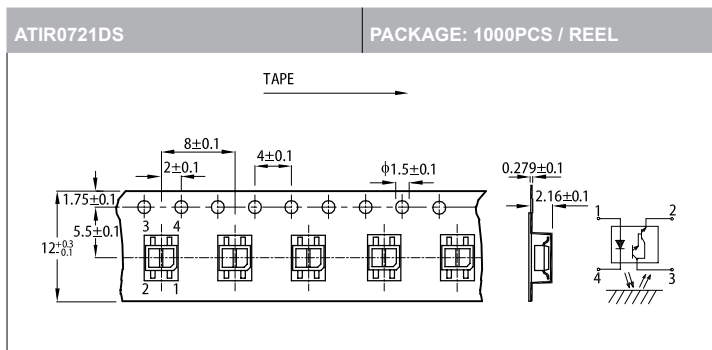
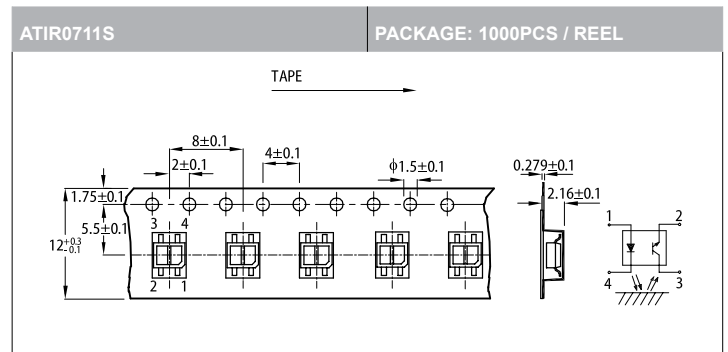
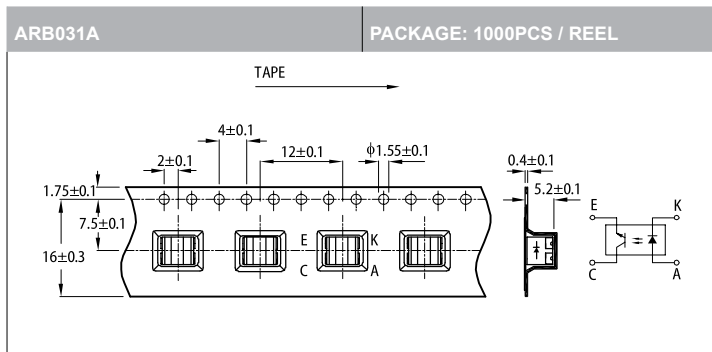
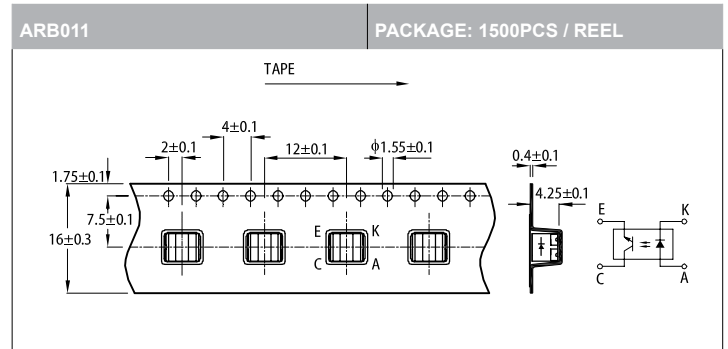
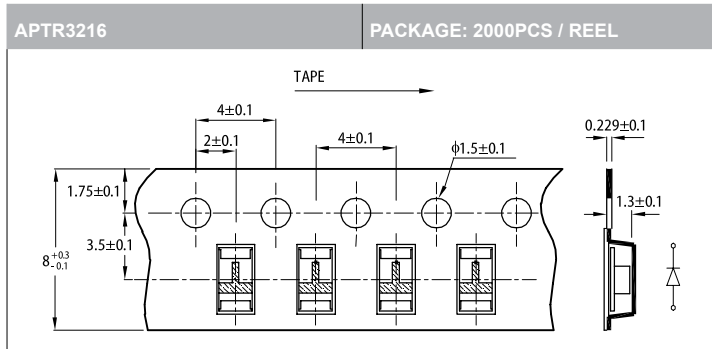
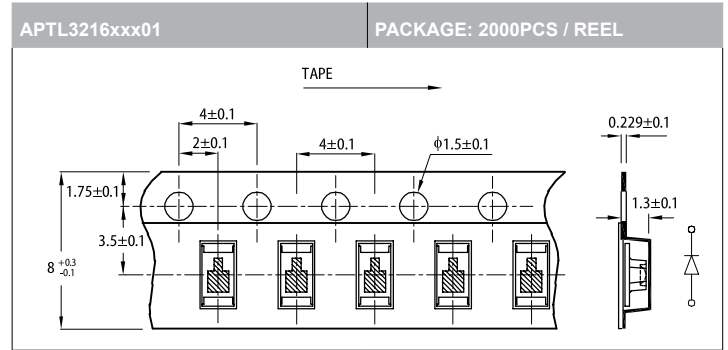
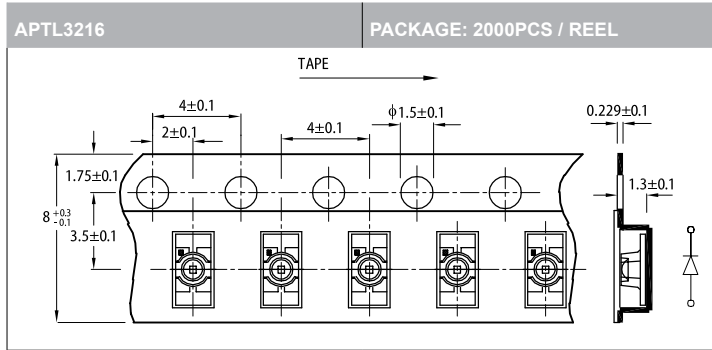
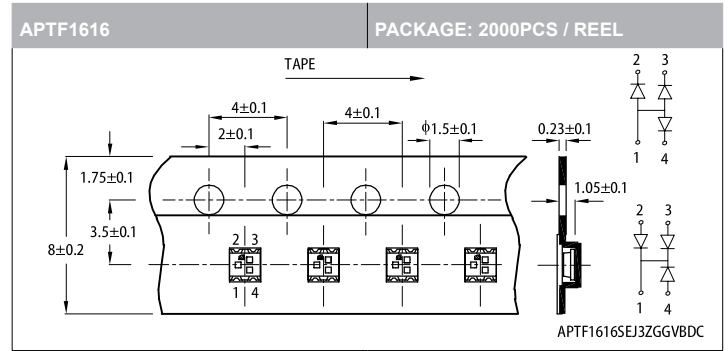
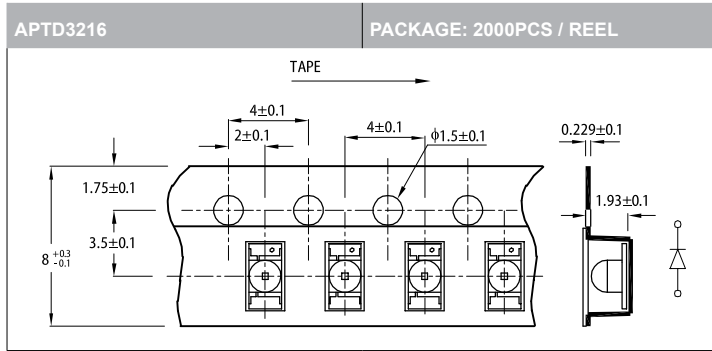


SMD TAPE SPECIFICATIONS



All dimensions are in millimeters

SMD TAPE SPECIFICATIONS



## RECOMMENDED SOLDERING PATTERN

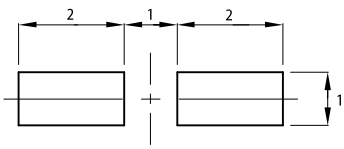
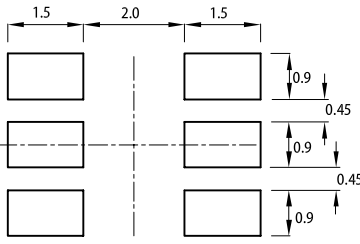
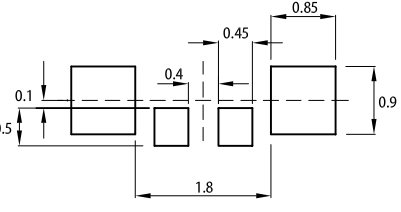
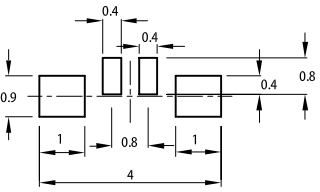
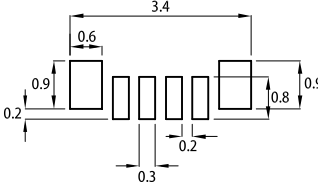
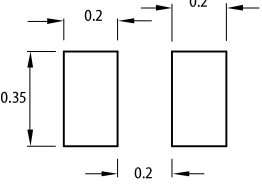
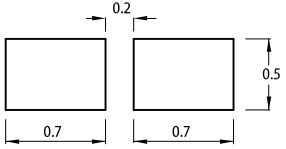
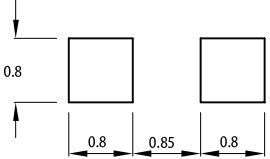
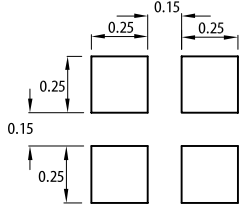
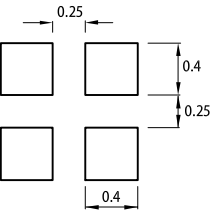
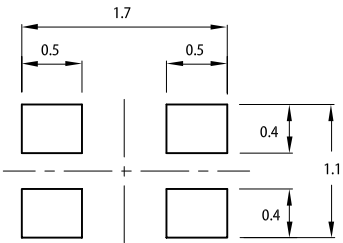
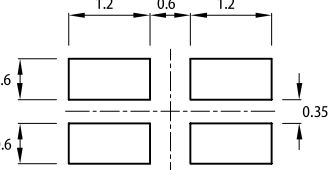
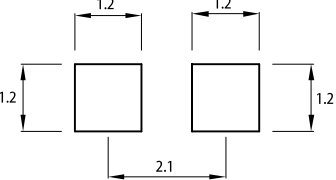
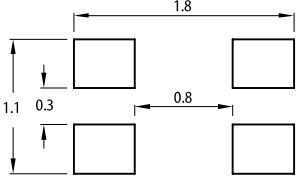
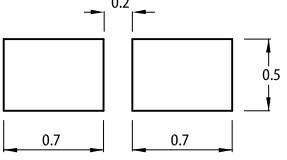
<p><b>AA1608</b></p>	<p><b>AA2810A</b></p>	<p><b>AA3021</b></p>
<p><b>AA3527A</b></p>	<p><b>AA3528</b></p>	<p><b>AA3528xxx09</b></p>
<p><b>AA4040</b></p>	<p><b>AAA3528</b></p>	<p><b>AAA3528xxx09</b></p>
<p><b>AAAF5050</b></p>	<p><b>AB354NT, AB356NT, AB357NT</b></p> <p style="text-align: right;">Tolerance: ± 0.15</p>	<p><b>AB814-B, AB817-B</b></p> <p style="text-align: right;">Tolerance: ± 0.15</p>
<p><b>ACSX02-41</b></p> <p style="text-align: right;">Tolerance: ± 0.15</p>	<p><b>ACSX03-41</b></p> <p style="text-align: right;">Tolerance: ± 0.15</p>	<p><b>ACSX04-41</b></p> <p style="text-align: right;">Tolerance: ± 0.15</p>

All dimensions are in millimeters. Tolerance is ± 0.1mm unless otherwise noted.

RECOMMENDED SOLDERING PATTERN

<p><b>ACSX56-41</b></p> <p>Tolerance: ± 0.15</p>	<p><b>AM2520xxx03</b></p>	<p><b>AM2520xxx09</b></p>
<p><b>AP1608, APHM1608, APT1608, APTD1608</b></p>	<p><b>AP2012, APT2012</b></p>	<p><b>APA1606</b></p>
<p><b>APA2107</b></p>	<p><b>APA3010, APBA3010</b></p>	<p><b>APB3025</b></p>
<p><b>APB3227</b></p>	<p><b>APBD3224</b></p>	<p><b>APBDA3020</b></p>
<p><b>APBL3025</b></p>	<p><b>APD3224</b></p>	<p><b>APDA1806</b></p>

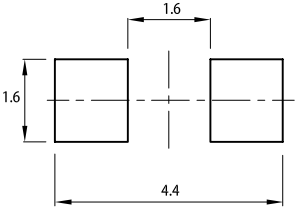
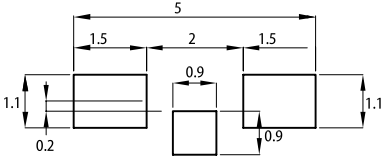
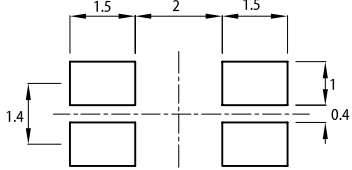
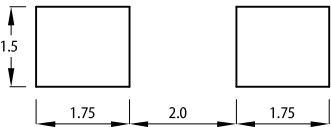
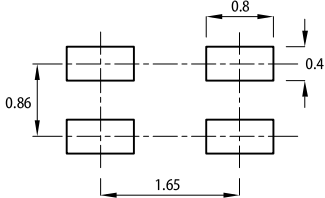
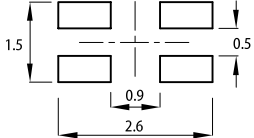
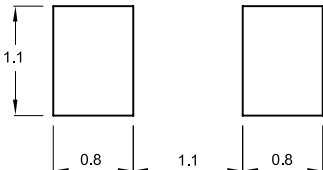
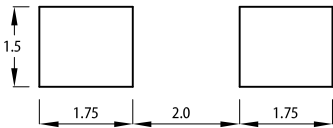
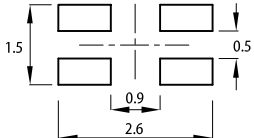
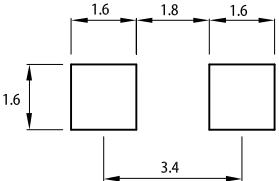
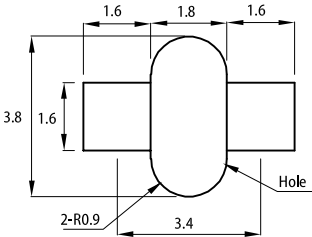
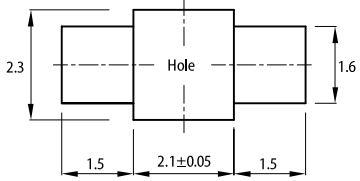
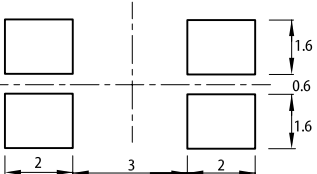
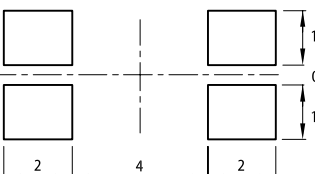
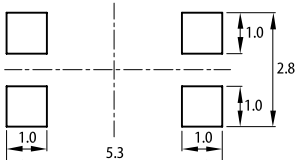
RECOMMENDED SOLDERING PATTERN

<p><b>APDA3020</b></p> 	<p><b>APF3236</b></p> 	<p><b>APFA2507</b></p> 
<p><b>APFA3010</b></p> 	<p><b>APFA3011</b></p> 	<p><b>APG0603</b></p>  <p>Mask open area ratio:80% Mask thickness:80~100um</p>
<p><b>APG1005</b></p>  <p>Mask open area ratio:80% Mask thickness:80~100um</p>	<p><b>APG1608</b></p>  <p>Mask open area ratio:80% Mask thickness:80~100um</p>	<p><b>APGF0606</b></p>  <p>Mask open area ratio:80% Mask thickness:80~100um</p>
<p><b>APGF1012</b></p>  <p>Mask open area ratio:80% Mask thickness:80~100um</p>	<p><b>APHB1608</b></p> 	<p><b>APHBM2012</b></p> 
<p><b>APHCM2012</b></p> 	<p><b>APHF1608</b></p> 	<p><b>APHHS1005</b></p> 

All dimensions are in millimeters. Tolerance is ± 0.1mm unless otherwise noted.



RECOMMENDED SOLDERING PATTERN

<p><b>APL3015</b></p> 	<p><b>APPA3010</b></p> 	<p><b>APS3227</b></p> 
<p><b>APT3216</b></p> 	<p><b>APTB1612</b></p> 	<p><b>APTB1615</b></p> 
<p><b>APTD2012</b></p> 	<p><b>APTD3216</b></p> 	<p><b>APTF1616</b></p> 
<p><b>APTL3216</b></p> 	<p><b>APTL3216xxx01</b></p> 	<p><b>APTR3216</b></p> 
<p><b>ARB011</b></p>  <p>Tolerance: ± 0.15</p>	<p><b>ARB031A</b></p>  <p>Tolerance: ± 0.15</p>	<p><b>ATIR0711S, ATIR0721DS</b></p> 

TECHNICAL DATA

Absolute maximum ratings (T <sub>A</sub> =25°C)		E Hi.Eff.Red (GaAsP/GaP)	I Hi.Eff.Red (GaAsP/GaP)	SR/J4 Super Bright Red (AlGaInP)	SURK Hyper Red (AlGaInP)	SURK/T Hyper Red (AlGaInP)	SUR/E Hyper Red (AlGaInP)	SEK/J3 Hyper Red (AlGaInP)	Unit
Reverse voltage	V <sub>R</sub>	5	5	5	5	5	5	5	V
Forward current	I <sub>F</sub>	30	30	30	30	30	30	30	mA
Forward current (Peak) 1/10 Duty Cycle, 0.1ms Pulse Width	I <sub>FP</sub>	160	160	150	185	150	200	150	mA
Power dissipation	P <sub>D</sub>	75	75	75	75	75	75	84	mW
<b>LED LAMPS:</b>									
Operating temperature	T <sub>A</sub>	-40~+85	-40~+85	-40~+85	-40~+85	-40~+85	-40~+85	-40~+85	°C
Storage temperature	T <sub>STG</sub>	-40~+85	-40~+85	-40~+85	-40~+85	-40~+85	-40~+85	-40~+85	°C
<b>LED DISPLAYS:</b>									
Operating temperature	T <sub>A</sub>	-40~+85	-40~+85	-40~+85	-40~+85	-40~+85	-40~+85	-40~+85	°C
Storage temperature	T <sub>STG</sub>	-40~+85	-40~+85	-40~+85	-40~+85	-40~+85	-40~+85	-40~+85	°C

Operating Characteristics		E Hi.Eff.Red (GaAsP/GaP)	I Hi.Eff.Red (GaAsP/GaP)	SR/J4 Super Bright Red (AlGaInP)	SURK Hyper Red (AlGaInP)	SURK/T Hyper Red (AlGaInP)	SUR/E Hyper Red (AlGaInP)	SEK/J3 Hyper Red (AlGaInP)	Unit
Forward voltage (typ.) I <sub>F</sub> =20mA	V <sub>F</sub>	2.0	2.0	2.1	1.95	2.0	1.9	2.2	V
I <sub>F</sub> =10mA		1.9	1.9	1.8	1.85	1.85	1.8	2.0	
I <sub>F</sub> =2mA		1.7	1.7	1.65	1.75	1.75	1.7	1.8	
Forward voltage (max.) I <sub>F</sub> =20mA	V <sub>F</sub>	2.5	2.5	2.5	2.5	2.5	2.5	2.8	V
I <sub>F</sub> =10mA		2.3	2.3	2.3	2.35	2.25	2.35	2.3	
I <sub>F</sub> =2mA		2.1	2.1	2.1	2.2	2.15	2.2	2.15	
Reverse current V <sub>R</sub> =5V	I <sub>R</sub>	10	10	10	10	10	10	10	µA
Peak Emission Wavelength I <sub>F</sub> =20mA, 10mA, 2mA	λ <sub>p</sub>	627	627	660	645	645	645	640	nm
Dominant Wavelength I <sub>F</sub> =20mA, 10mA, 2mA	λ <sub>D</sub>	617	617	640	630	630	630	625	nm
Spectral line half-width I <sub>F</sub> =20mA, 10mA, 2mA	Δλ <sub>1/2</sub>	45	45	20	28	20	25	20	nm
Capacitance V <sub>F</sub> =0V, f=1MHZ	C	15	15	45	35	35	45	27	pF

TECHNICAL DATA

Absolute maximum ratings (T <sub>A</sub> =25°C)		SE/J3 Hyper Red	SE/E Hyper Red	SEK/J4 Super Bright Orange	SEK Super Bright Orange	SEK/T Super Bright Orange	SE Super Bright Orange	G Green	Unit
		(AlGaInP)	(AlGaInP)	(AlGaInP)	(AlGaInP)	(AlGaInP)	(AlGaInP)	(GaP)	
Reverse voltage	V <sub>R</sub>	5	5	5	5	5	5	5	V
Forward current	I <sub>F</sub>	30	30	30	30	30	30	25	mA
Forward current (Peak) 1/10 Duty Cycle, 0.1ms Pulse Width	I <sub>FP</sub>	150	195	150	195	150	195	140	mA
Power dissipation	P <sub>D</sub>	84	75	84	75	75	75	62.5	mW
<b>LED LAMPS:</b>									
Operating temperature	T <sub>A</sub>	-40~+85	-40~+85	-40~+85	-40~+85	-40~+85	-40~+85	-40~+85	°C
Storage temperature	T <sub>STG</sub>	-40~+85	-40~+85	-40~+85	-40~+85	-40~+85	-40~+85	-40~+85	°C
<b>LED DISPLAYS:</b>									
Operating temperature	T <sub>A</sub>	-40~+85	-40~+85	-40~+85	-40~+85	-40~+85	-40~+85	-40~+85	°C
Storage temperature	T <sub>STG</sub>	-40~+85	-40~+85	-40~+85	-40~+85	-40~+85	-40~+85	-40~+85	°C

Operating Characteristics		SE/J3 Hyper Red	SE/E Hyper Red	SEK/J4 Super Bright Orange	SEK Super Bright Orange	SEK/T Super Bright Orange	SE Super Bright Orange	G Green	Unit
		(AlGaInP)	(AlGaInP)	(AlGaInP)	(AlGaInP)	(AlGaInP)	(AlGaInP)	(GaP)	
Forward voltage (typ.) I <sub>F</sub> =20mA	V <sub>F</sub>	2.2	2.0	2.2	2.1	2.05	2.0	2.2	V
I <sub>F</sub> =10mA		2.0	1.9	2.0	2.0	1.95	1.9	2.0	
I <sub>F</sub> =2mA		1.8	1.8	1.8	1.85	1.8	1.8	1.9	
Forward voltage (max.) I <sub>F</sub> =20mA	V <sub>F</sub>	2.8	2.5	2.8	2.5	2.5	2.5	2.5	V
I <sub>F</sub> =10mA		2.3	2.3	2.4	2.35	2.3	2.4	2.4	
I <sub>F</sub> =2mA		2.15	2.1	2.2	2.2	2.2	2.2	2.25	
Reverse current V <sub>R</sub> =5V	I <sub>R</sub>	10	10	10	10	10	10	10	µA
Peak Emission Wavelength I <sub>F</sub> =20mA, 10mA, 2mA	λ <sub>P</sub>	640	630	611	610	610	610	565	nm
Dominant Wavelength I <sub>F</sub> =20mA, 10mA, 2mA	λ <sub>D</sub>	625	621	605	605	601	605	568	nm
Spectral line half-width I <sub>F</sub> =20mA, 10mA, 2mA	Δλ <sub>1/2</sub>	25	20	17	29	17	29	30	nm
Capacitance V <sub>F</sub> =0V, f=1MHZ	C	27	25	27	15	15	30	15	pF

TECHNICAL DATA

Absolute maximum ratings (T <sub>A</sub> =25°C)		CGK/TT Green	CGK Green	CGK/T Green	ZGK Green	ZG Green	ZG/G Green	Y Yellow	Unit
		(AlGaInP)	(AlGaInP)	(AlGaInP)	(InGaN)	(InGaN)	(InGaN)	(GaAsP/GaP)	
Reverse voltage	V <sub>R</sub>	5	5	5	5	5	5	5	V
Forward current	I <sub>F</sub>	25	30	30	25	25	30	30	mA
Forward current (Peak) 1/10 Duty Cycle, 0.1ms Pulse Width	I <sub>FP</sub>	120	150	150	150	150	100	140	mA
Power dissipation	P <sub>D</sub>	60	75	78	102.5	102.5	120	75	mW
<b>LED LAMPS:</b>									
Operating temperature	T <sub>A</sub>	-40~+85	-40~+85	-40~+85	-40~+85	-40~+85	-40~+85	-40~+85	°C
Storage temperature	T <sub>STG</sub>	-40~+85	-40~+85	-40~+85	-40~+85	-40~+85	-40~+85	-40~+85	°C
<b>LED DISPLAYS:</b>									
Operating temperature	T <sub>A</sub>	-40~+85	-40~+85	-40~+85	-40~+85	-40~+85	-40~+85	-40~+85	°C
Storage temperature	T <sub>STG</sub>	-40~+85	-40~+85	-40~+85	-40~+85	-40~+85	-40~+85	-40~+85	°C

Operating Characteristics		CGK/TT Green	CGK Green	CGK/T Green	ZGK Green	ZG Green	ZG/G Green	Y Yellow	Unit
		(AlGaInP)	(AlGaInP)	(AlGaInP)	(InGaN)	(InGaN)	(InGaN)	(GaAsP/GaP)	
Forward voltage (typ.) I <sub>F</sub> =20mA	V <sub>F</sub>	2.0	2.1	2.1	3.3	3.3	3.2	2.1	V
I <sub>F</sub> =10mA		1.97	2.0	1.95	3.0	3.0	3.05	1.95	
I <sub>F</sub> =2mA		1.87	1.9	1.8	2.65	2.65	2.8	1.85	
Forward voltage (max.) I <sub>F</sub> =20mA	V <sub>F</sub>	2.4	2.5	2.6	4.1	4.1	4.0	2.5	V
I <sub>F</sub> =10mA		2.35	2.45	2.4	3.4	3.4	3.4	2.4	
I <sub>F</sub> =2mA		2.2	2.3	2.3	3.1	3.1	3.1	2.2	
Reverse current V <sub>R</sub> =5V	I <sub>R</sub>	10	10	10	50	50	50	10	µA
Peak Emission Wavelength I <sub>F</sub> =20mA, 10mA, 2mA	λ <sub>p</sub>	572	574	574	515	515	520	590	nm
Dominant Wavelength I <sub>F</sub> =20mA, 10mA, 2mA	λ <sub>D</sub>	571	570	570	525	525	525	588	nm
Spectral line half-width I <sub>F</sub> =20mA, 10mA, 2mA	Δλ1/2	20	20	15	35	30	35	35	nm
Capacitance V <sub>F</sub> =0V, f=1MHZ	C	15	15	15	45	45	100	20	pF

TECHNICAL DATA

Absolute maximum ratings (T <sub>A</sub> =25°C)		SYK Super Bright Yellow	SYK/T Super Bright Yellow	SY Super Bright Yellow	SY/J3 Super Bright Yellow	SYK/J3 Super Bright Yellow	QB/D Blue	VB/D Blue	Unit
		(AlGaInP)	(AlGaInP)	(AlGaInP)	(AlGaInP)	(AlGaInP)	(InGaN)	(InGaN)	
Reverse voltage	V <sub>R</sub>	5	5	5	5	5	5	5	V
Forward current	I <sub>F</sub>	30	30	30	30	30	30	30	mA
Forward current (Peak) 1/10 Duty Cycle, 0.1ms Pulse Width	I <sub>FP</sub>	175	150	150	140	140	150	100	mA
Power dissipation	P <sub>D</sub>	75	75	75	75	75	120	120	mW
<b>LED LAMPS:</b>									
Operating temperature	T <sub>A</sub>	-40~+85	-40~+85	-40~+85	-40~+85	-40~+85	-40~+85	-40~+85	°C
Storage temperature	T <sub>STG</sub>	-40~+85	-40~+85	-40~+85	-40~+85	-40~+85	-40~+85	-40~+85	°C
<b>LED DISPLAYS:</b>									
Operating temperature	T <sub>A</sub>	-40~+85	-40~+85	-40~+85	-40~+85	-40~+85	-40~+85	-40~+85	°C
Storage temperature	T <sub>STG</sub>	-40~+85	-40~+85	-40~+85	-40~+85	-40~+85	-40~+85	-40~+85	°C

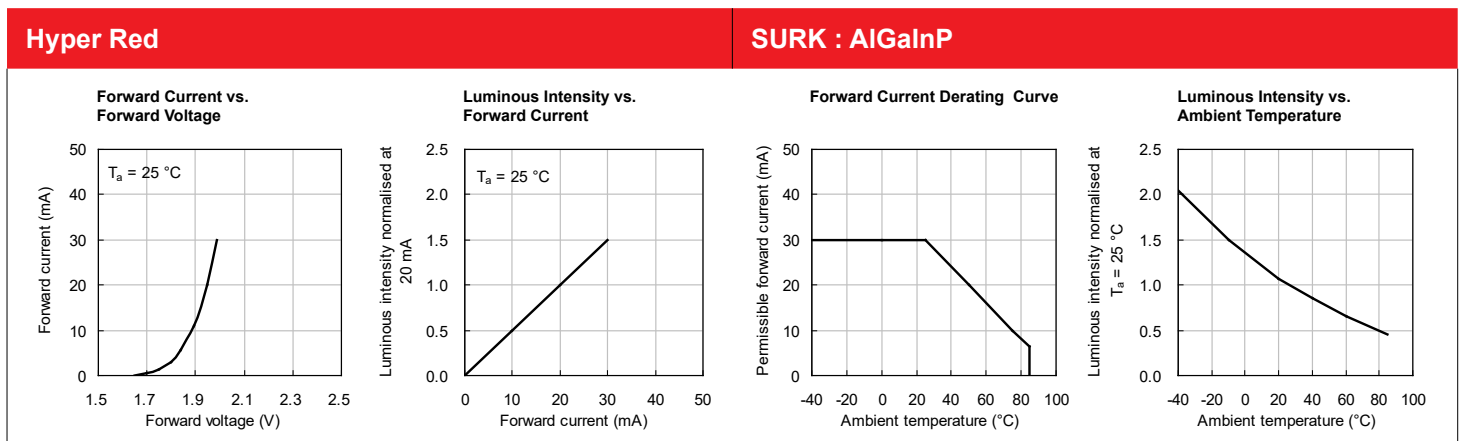
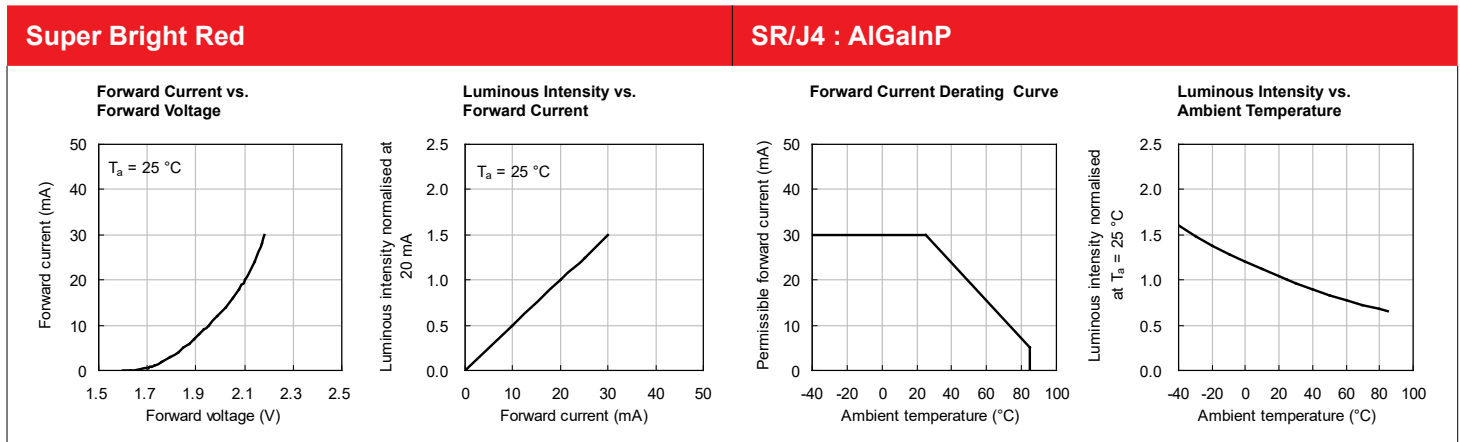
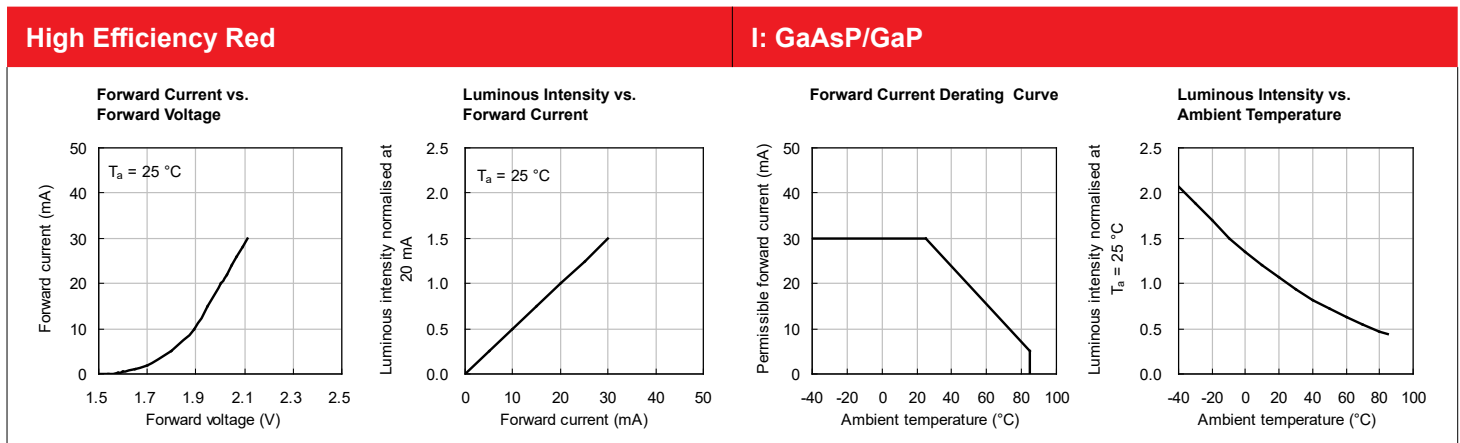
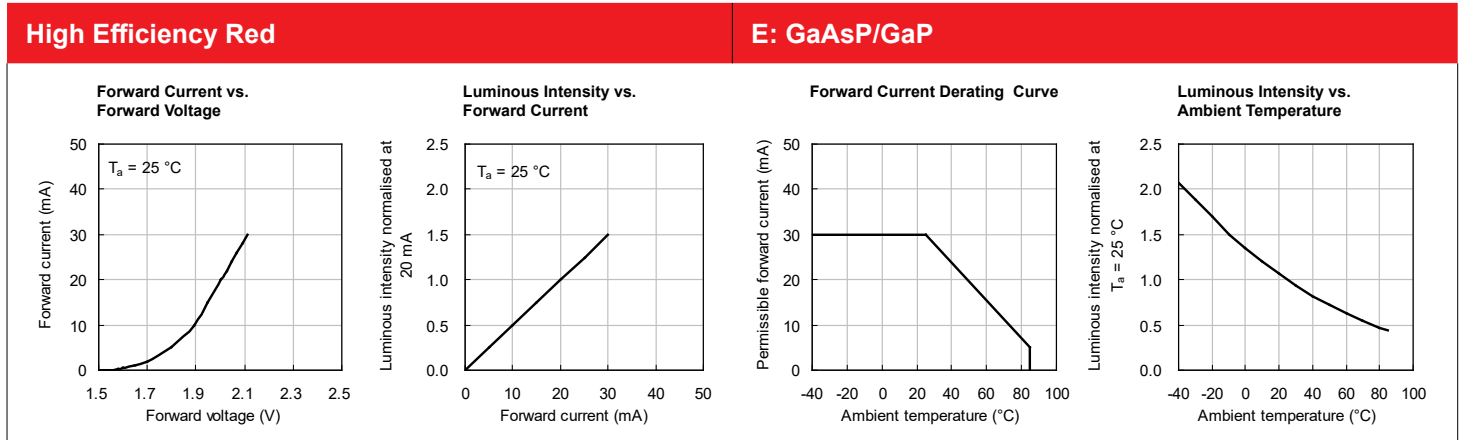
Operating Characteristics		SYK Super Bright Yellow	SYK/T Super Bright Yellow	SY Super Bright Yellow	SY/J3 Super Bright Yellow	SYK/J3 Super Bright Yellow	QB/D Blue	VB/D Blue	Unit
		(AlGaInP)	(AlGaInP)	(AlGaInP)	(AlGaInP)	(AlGaInP)	(InGaN)	(InGaN)	
Forward voltage (typ.) I <sub>F</sub> =20mA	V <sub>F</sub>	2.0	2.05	2.0	2.0	2.0	3.3	3.3	V
I <sub>F</sub> =10mA		1.95	1.95	1.95	1.95	1.95	3.0	3.0	
I <sub>F</sub> =2mA		1.85	1.8	1.8	1.85	1.85	2.65	2.65	
Forward voltage (max.) I <sub>F</sub> =20mA	V <sub>F</sub>	2.5	2.5	2.5	2.5	2.5	4.0	4.0	V
I <sub>F</sub> =10mA		2.35	2.3	2.35	2.4	2.4	3.5	3.4	
I <sub>F</sub> =2mA		2.2	2.2	2.2	2.2	2.2	3.1	3.1	
Reverse current V <sub>R</sub> =5V	I <sub>R</sub>	10	10	10	10	10	50	50	µA
Peak Emission Wavelength I <sub>F</sub> =20mA, 10mA, 2mA	λ <sub>P</sub>	590	590	590	590	590	460	465	nm
Dominant Wavelength I <sub>F</sub> =20mA, 10mA, 2mA	λ <sub>D</sub>	590	590	590	590	590	465	470	nm
Spectral line half-width I <sub>F</sub> =20mA, 10mA, 2mA	Δλ <sub>1/2</sub>	20	15	28	20	20	25	22	nm
Capacitance V <sub>F</sub> =0V, f=1MHZ	C	20	25	25	45	45	100	100	pF

TECHNICAL DATA FOR INFRARED

Absolute maximum ratings (T <sub>A</sub> =25°C)		F3	SF4	SF6	SF7	Unit
		(GaAs)	(GaAlAs)	(GaAlAs)	(GaAlAs)	
Reverse voltage	V <sub>R</sub>	5	5	5	5	V
Forward current	I <sub>F</sub>	50	50	50	50	mA
Forward current (Peak) 1/100 Duty Cycle, 10μs Pulse Width	I <sub>FP</sub>	1.2	1.2	1	1	mA
Power dissipation	P <sub>D</sub>	90	85	85	95	mW
<b>LED LAMPS:</b>						
Operating temperature	T <sub>A</sub>	-40~+85	-40~+85	-40~+85	-40~+85	°C
Storage temperature	T <sub>STG</sub>	-40~+85	-40~+85	-40~+85	-40~+85	°C
<b>LED DISPLAYS:</b>						
Operating temperature	T <sub>A</sub>	-40~+85	-40~+85	-40~+85	-40~+85	°C
Storage temperature	T <sub>STG</sub>	-40~+85	-40~+85	-40~+85	-40~+85	°C

Operating Characteristics		F3	SF4	SF6	SF7	Unit
		(GaAs)	(GaAlAs)	(GaAlAs)	(GaAlAs)	
Forward voltage (typ.) I <sub>F</sub> =20mA	V <sub>F</sub>	1.2	1.3	1.35	1.4	V
Forward voltage (max.) I <sub>F</sub> =20mA	V <sub>F</sub>	1.6	1.6	1.6	1.6	V
Reverse current V <sub>R</sub> =5V	I <sub>R</sub>	10	10	10	10	μA
Peak Emission Wavelength I <sub>F</sub> =20mA	λ <sub>p</sub>	940	880	860	850	nm
Spectral line half-width I <sub>F</sub> =20mA	Δλ1/2	50	50	50	50	nm
Capacitance V <sub>F</sub> =0V,f=1MHZ	C	90	90	30	30	pF

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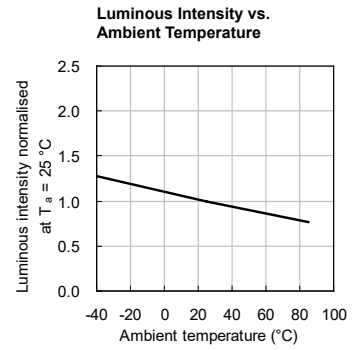
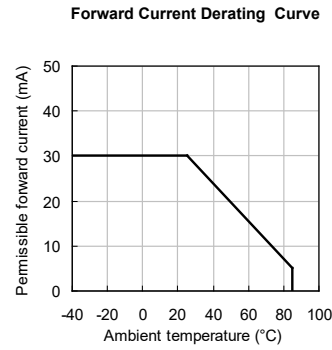
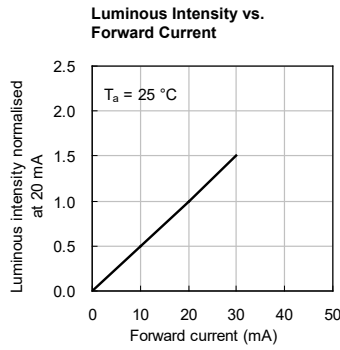
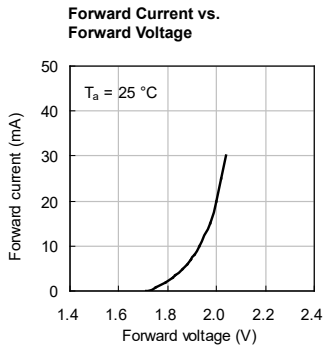




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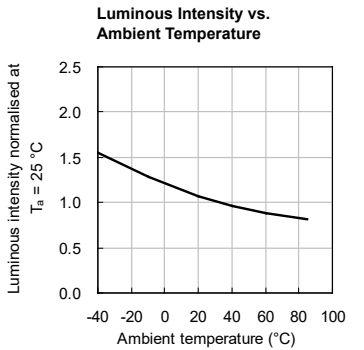
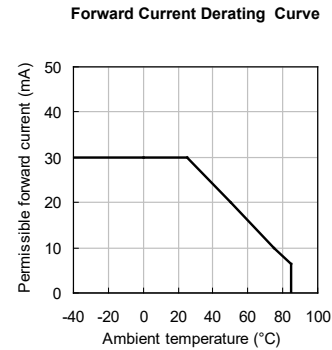
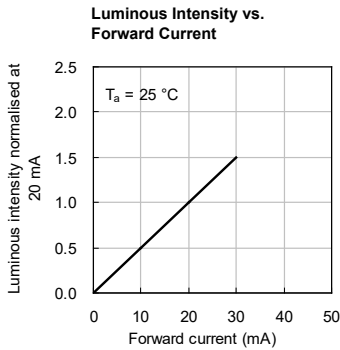
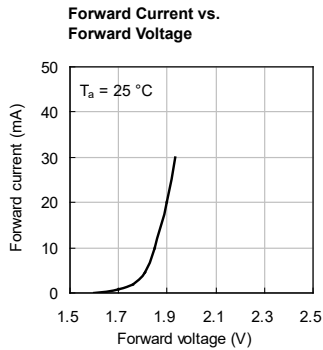
Hyper Red

SURK/T : AlGaInP



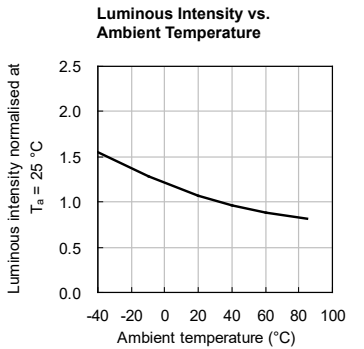
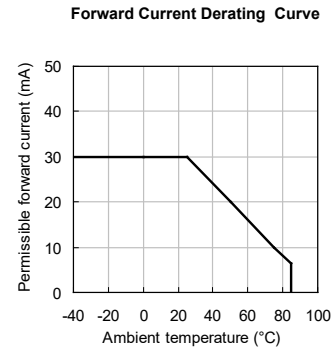
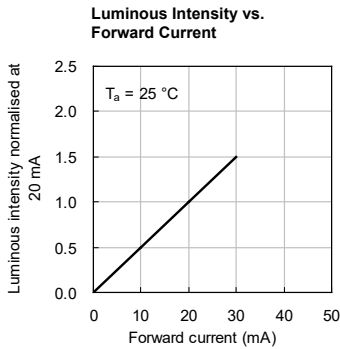
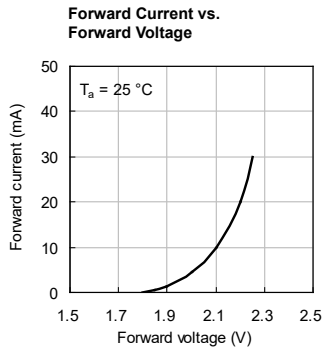
Hyper Red

SUR/E : AlGaInP



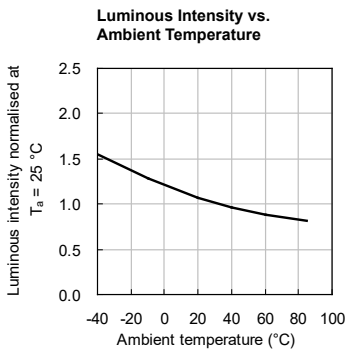
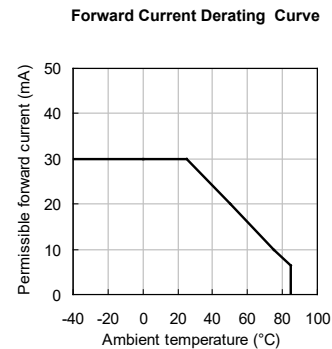
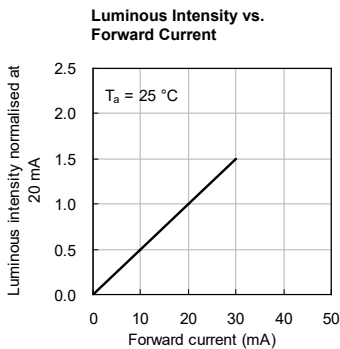
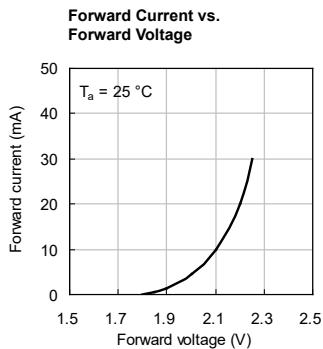
Hyper Red

SEK/J3 : AlGaInP

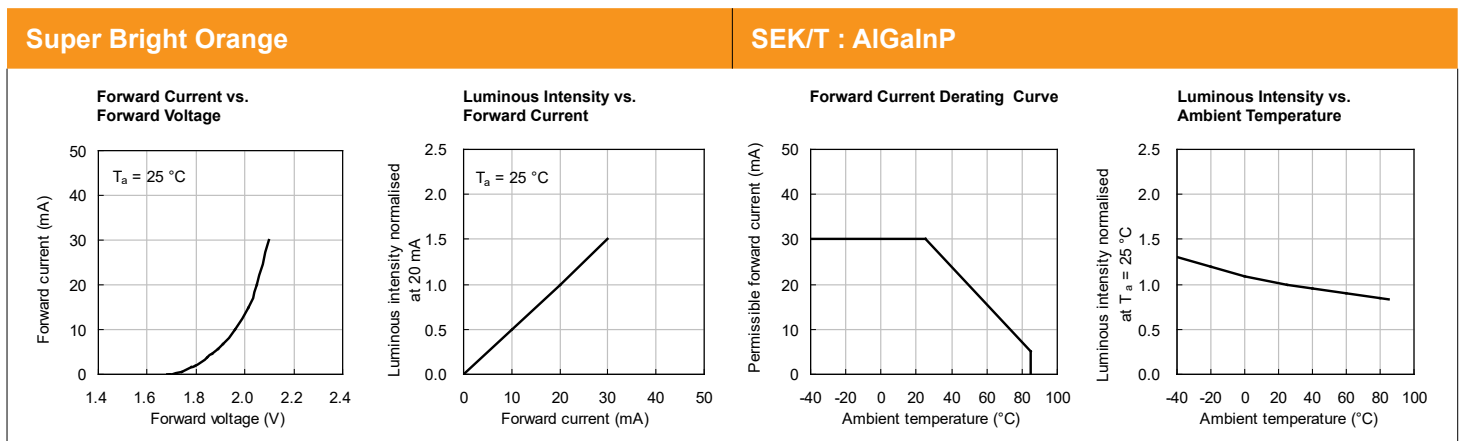
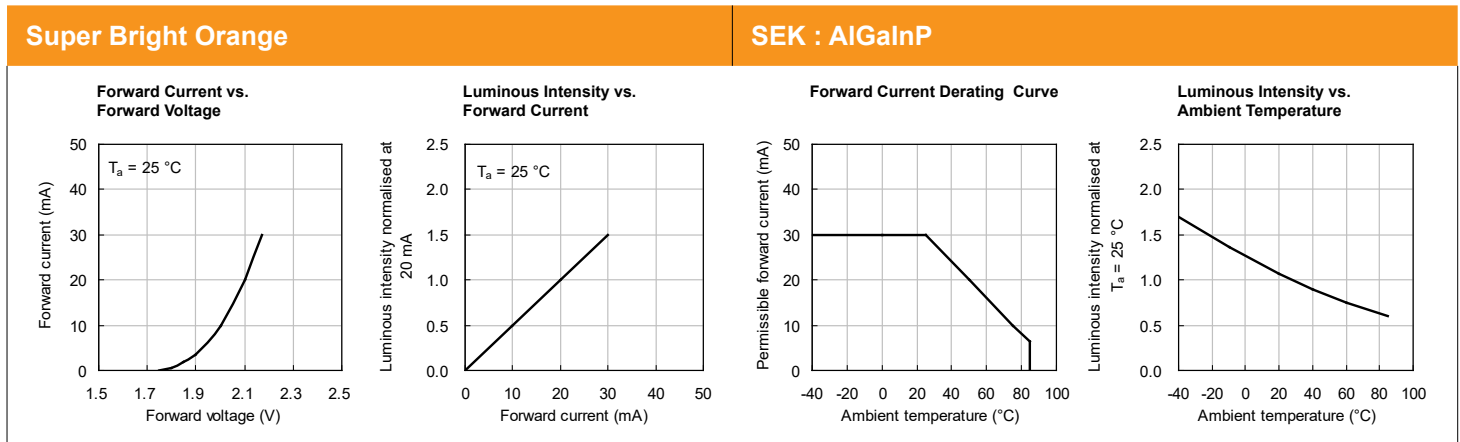
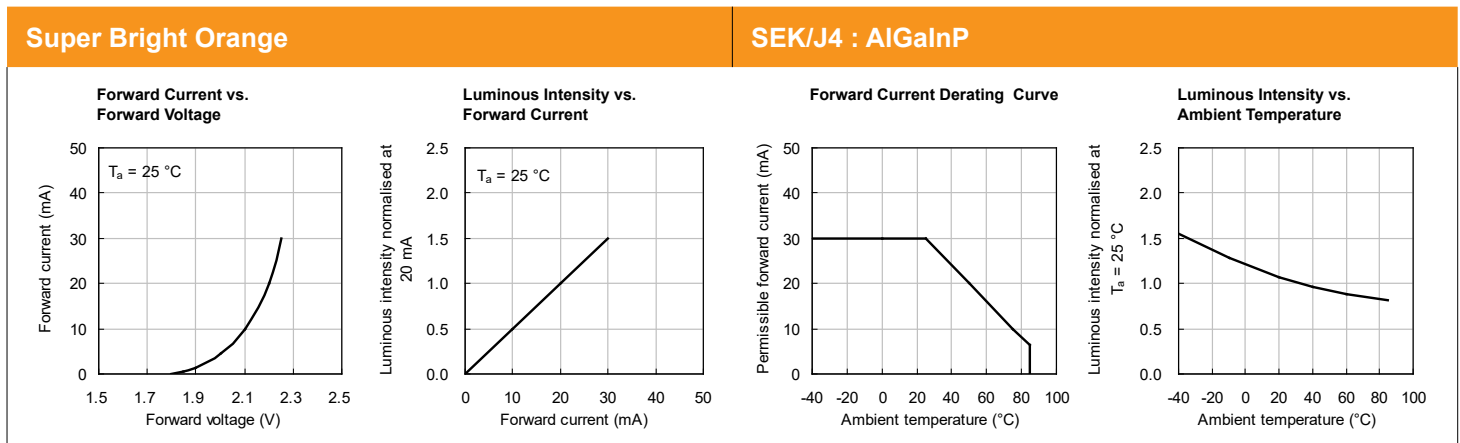
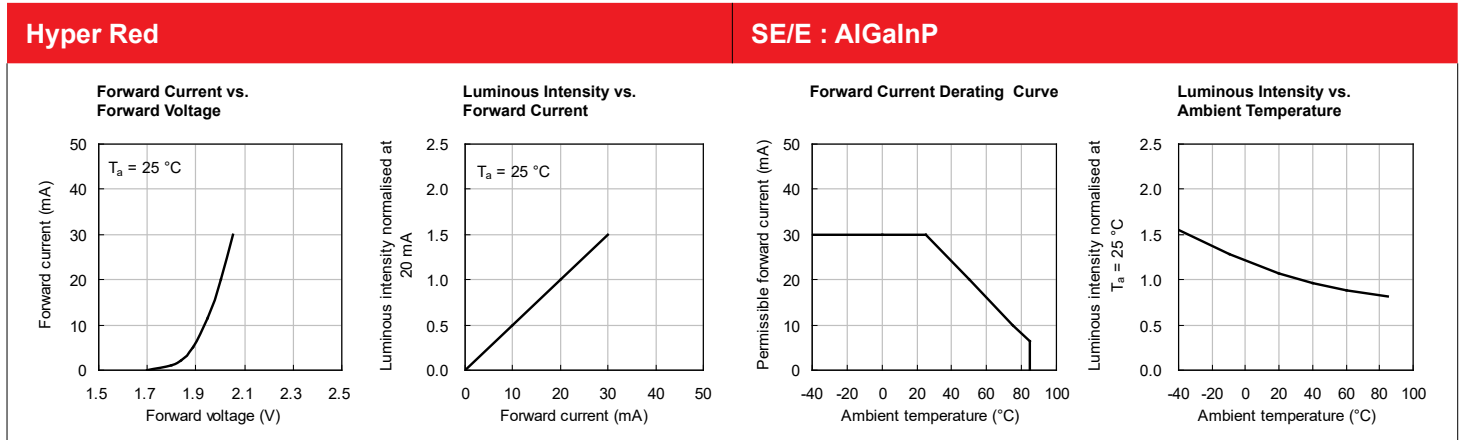


Hyper Red

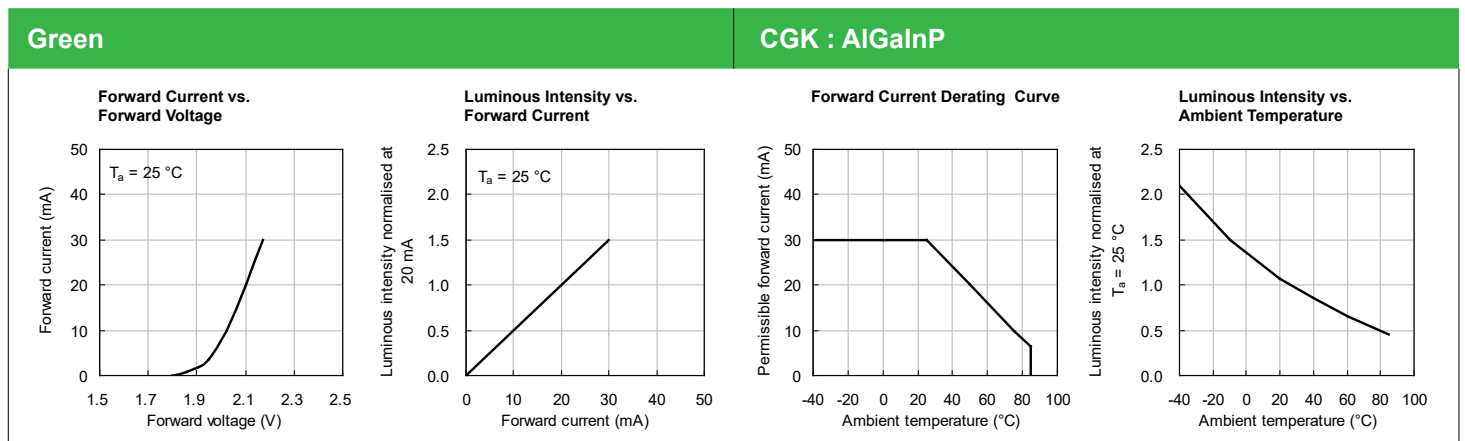
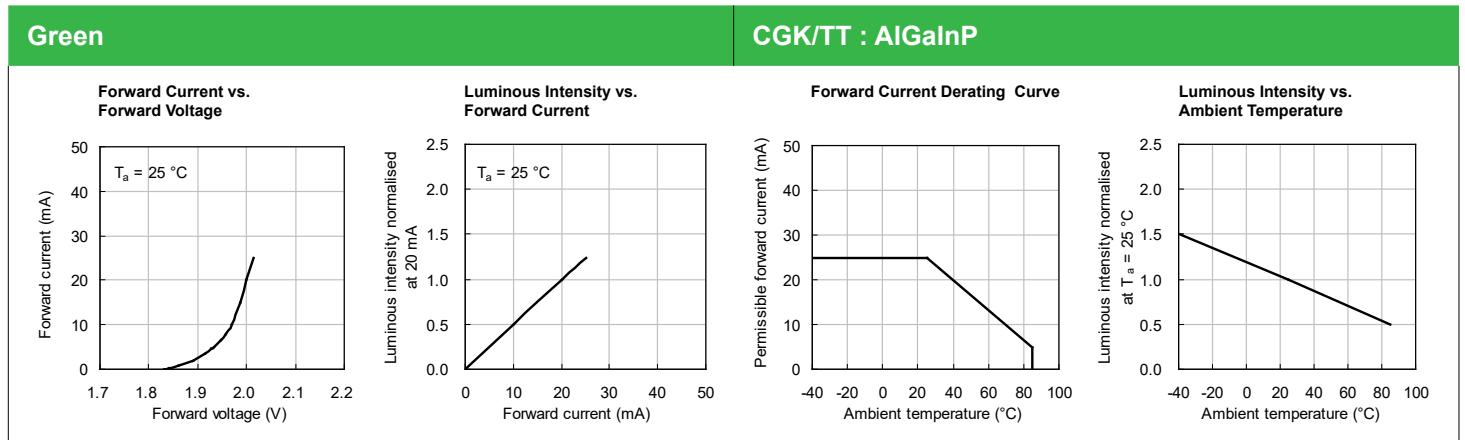
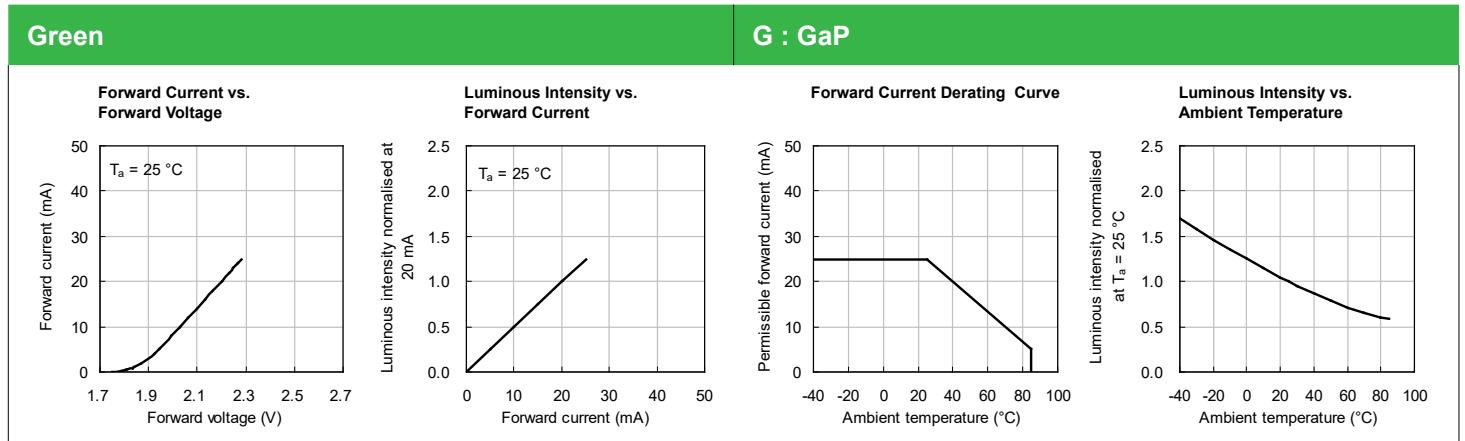
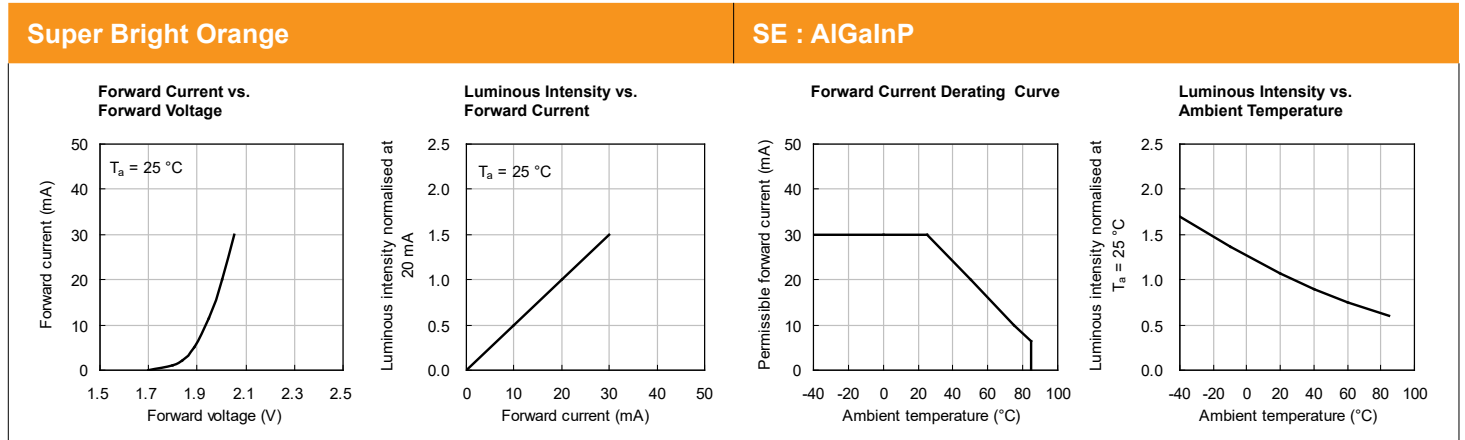
SE/J3 : AlGaInP



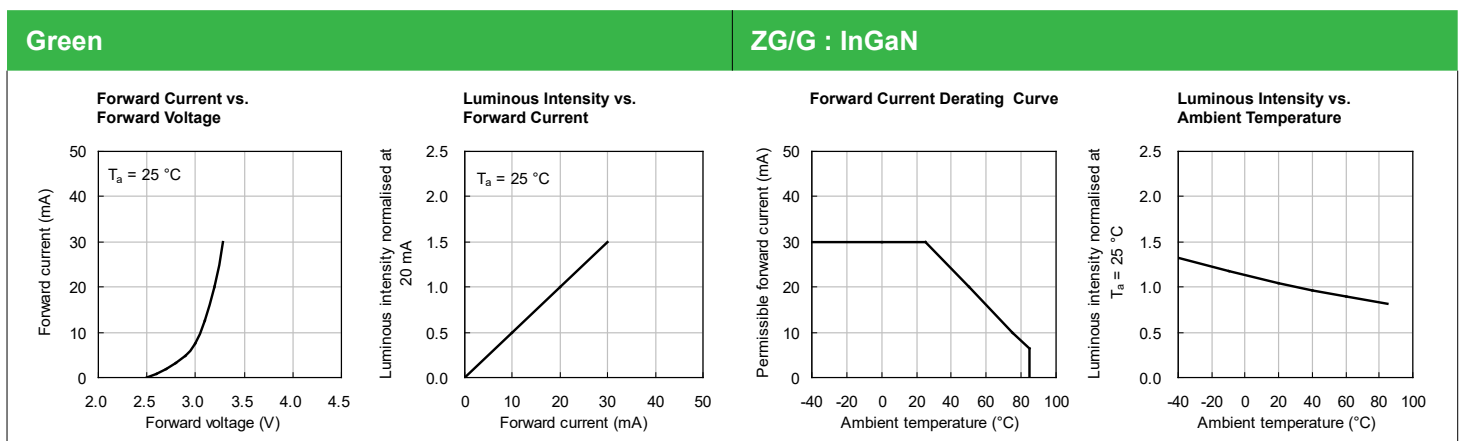
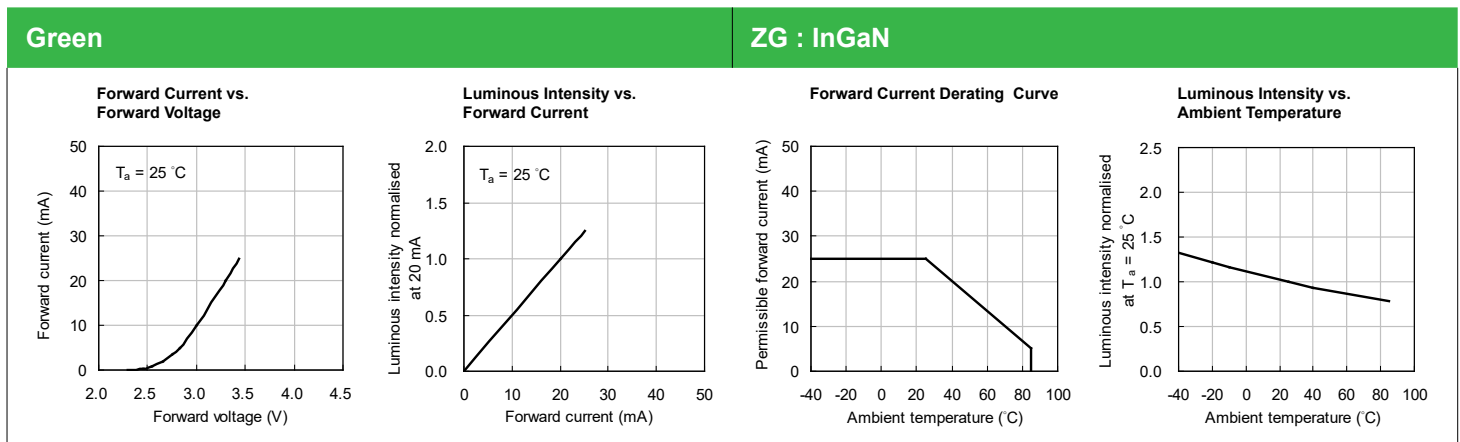
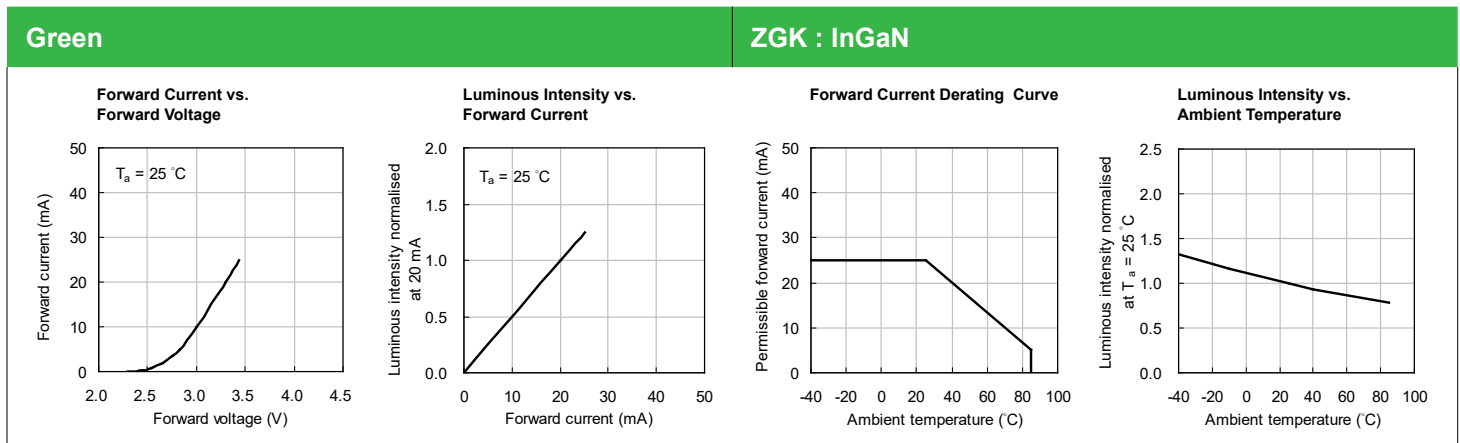
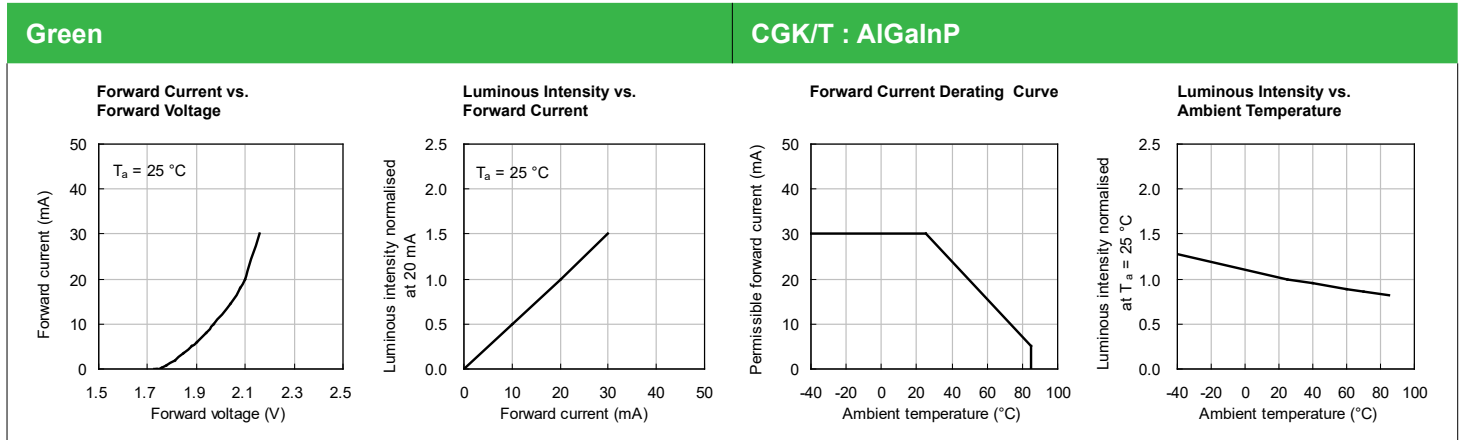
TECHNICAL DATA



TECHNICAL DATA



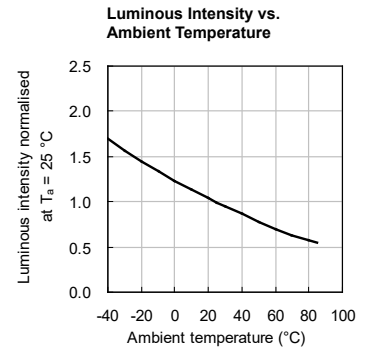
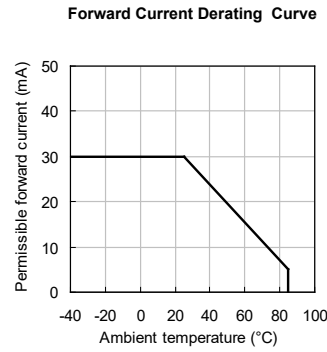
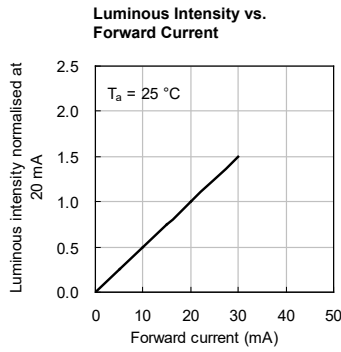
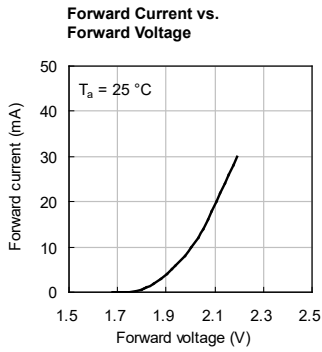
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TECHNICAL DATA

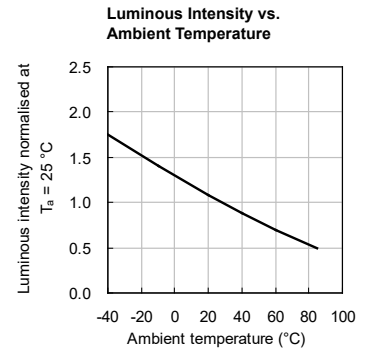
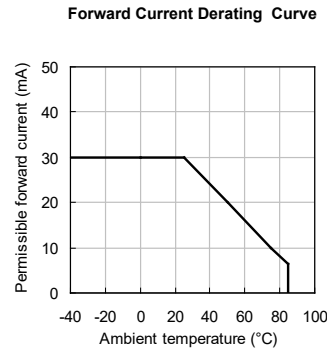
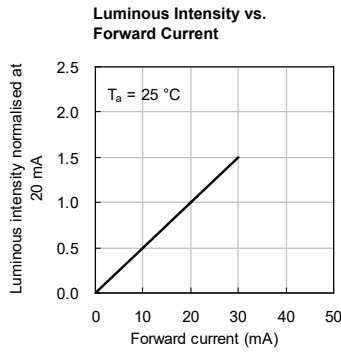
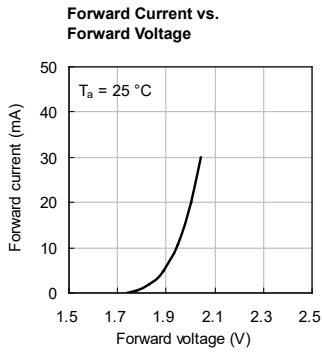
Yellow

Y : GaAsP/GaP



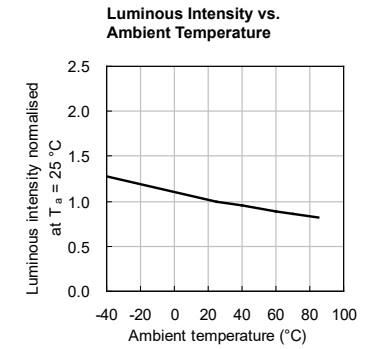
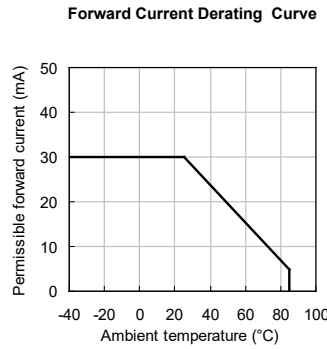
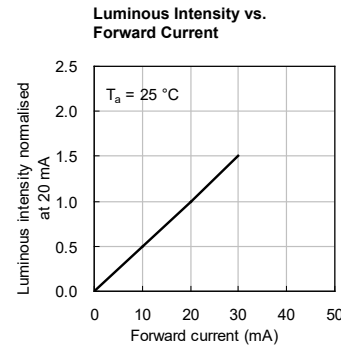
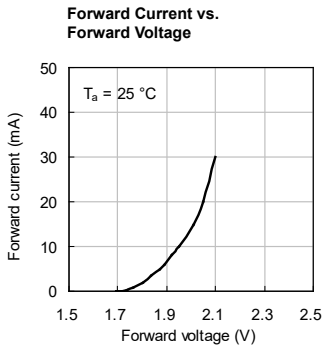
Super Bright Yellow

SYK : AlGaInP



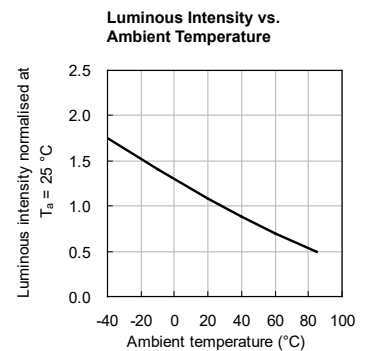
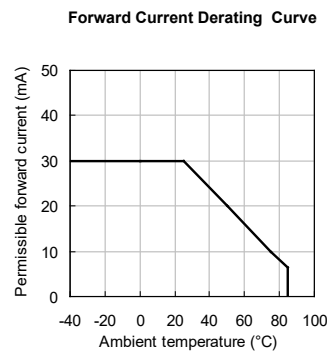
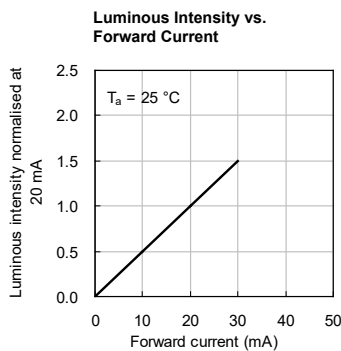
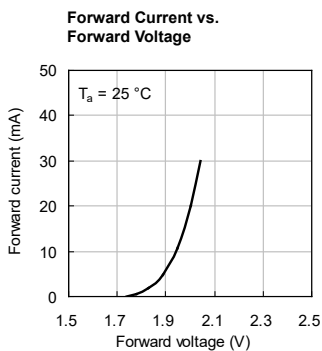
Super Bright Yellow

SYK/T : AlGaInP



Super Bright Yellow

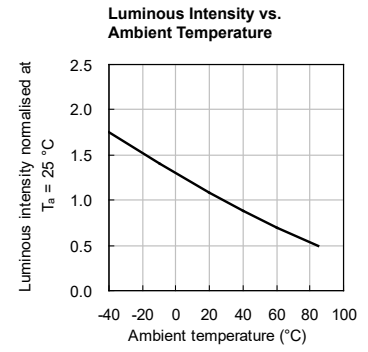
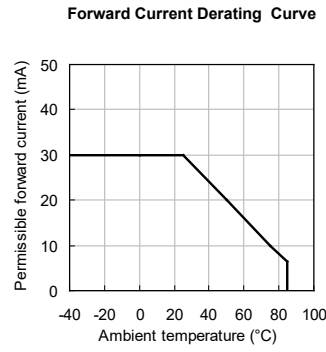
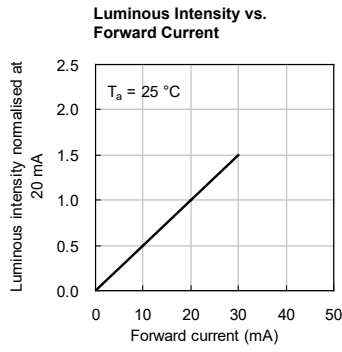
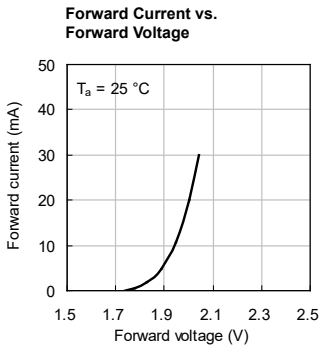
SY : AlGaInP



TECHNICAL DATA

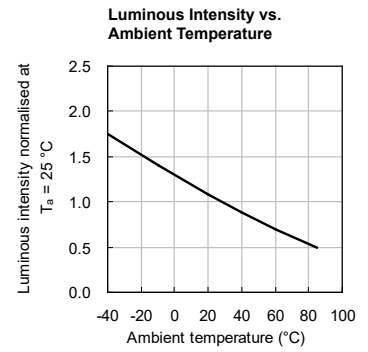
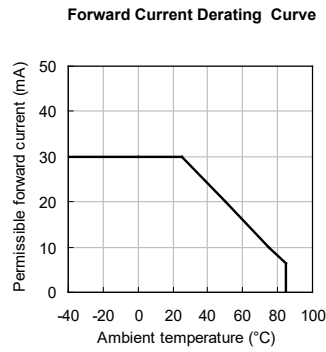
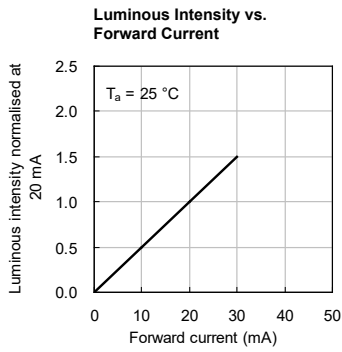
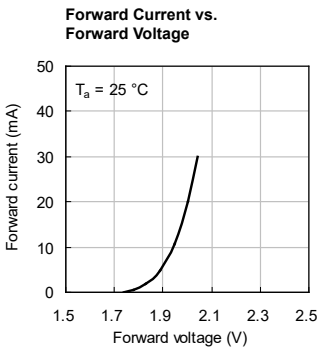
Super Bright Yellow

SY/J3 : AlGaInP



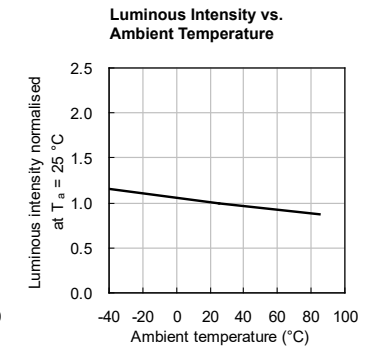
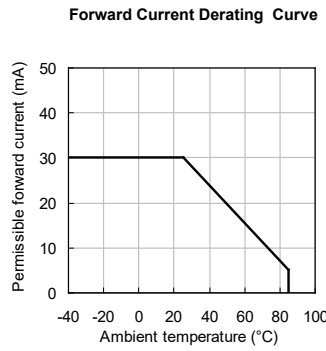
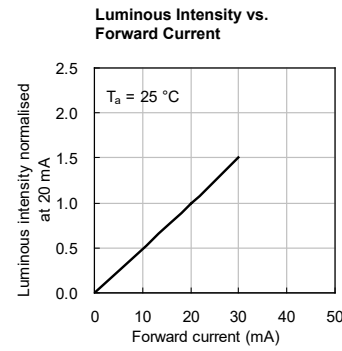
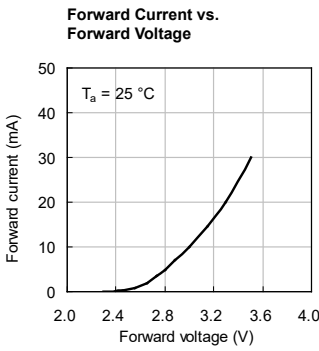
Super Bright Yellow

SYK/J3 : AlGaInP



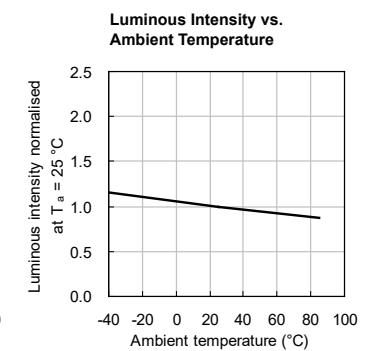
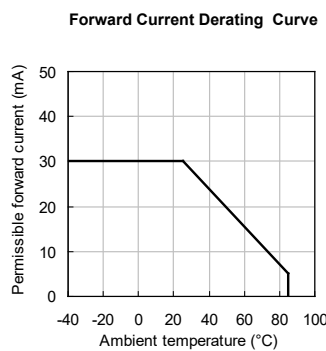
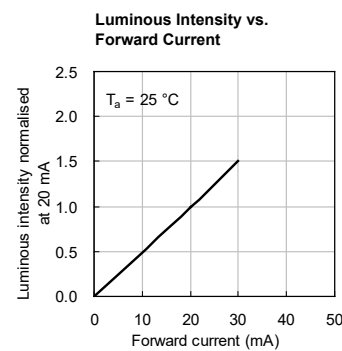
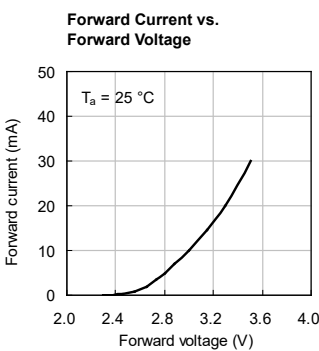
Blue

QB/D : InGaN

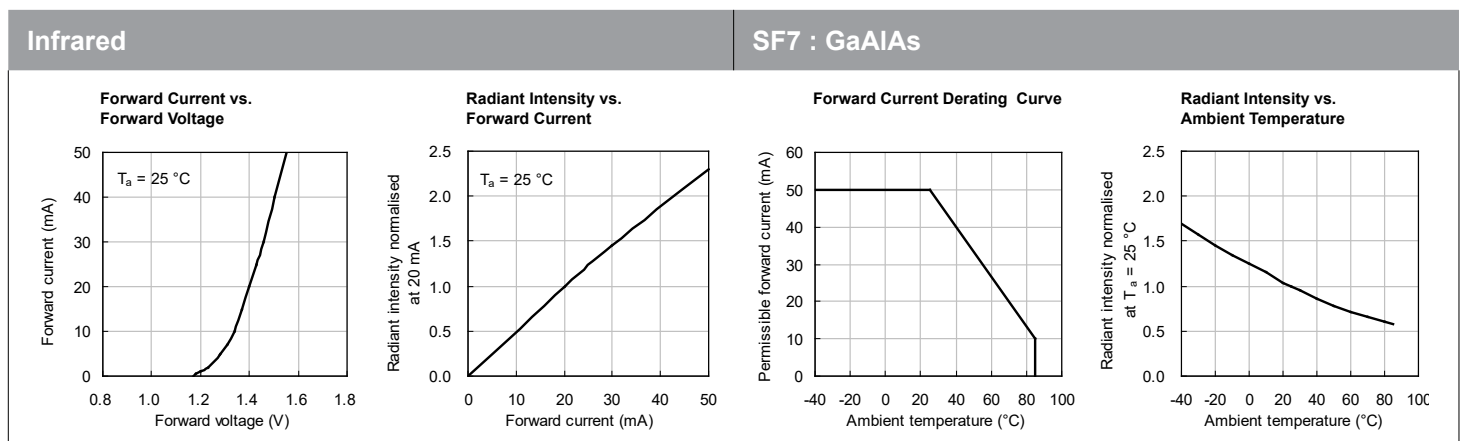
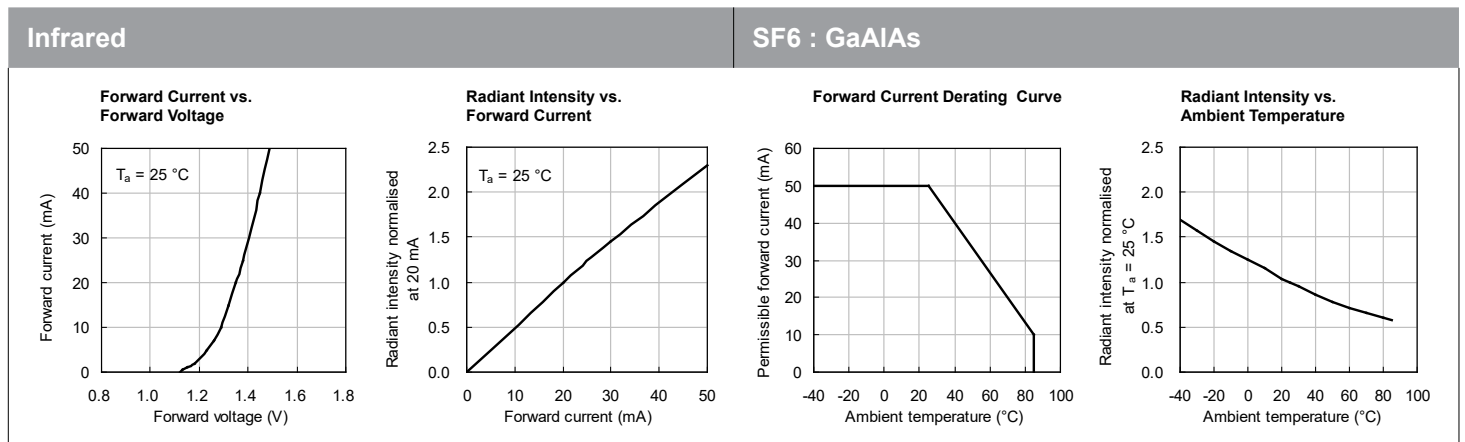
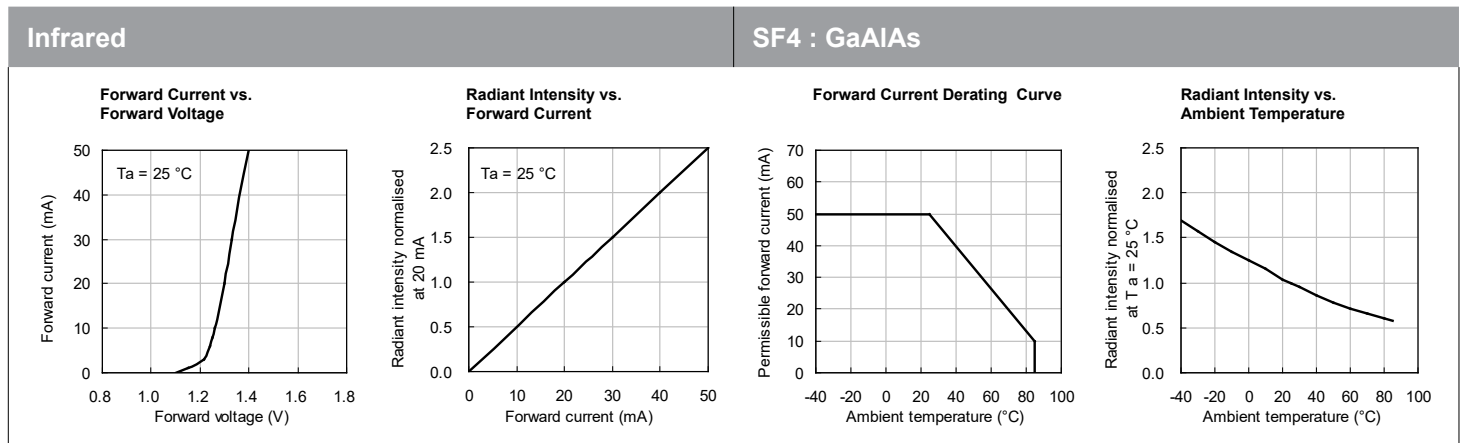
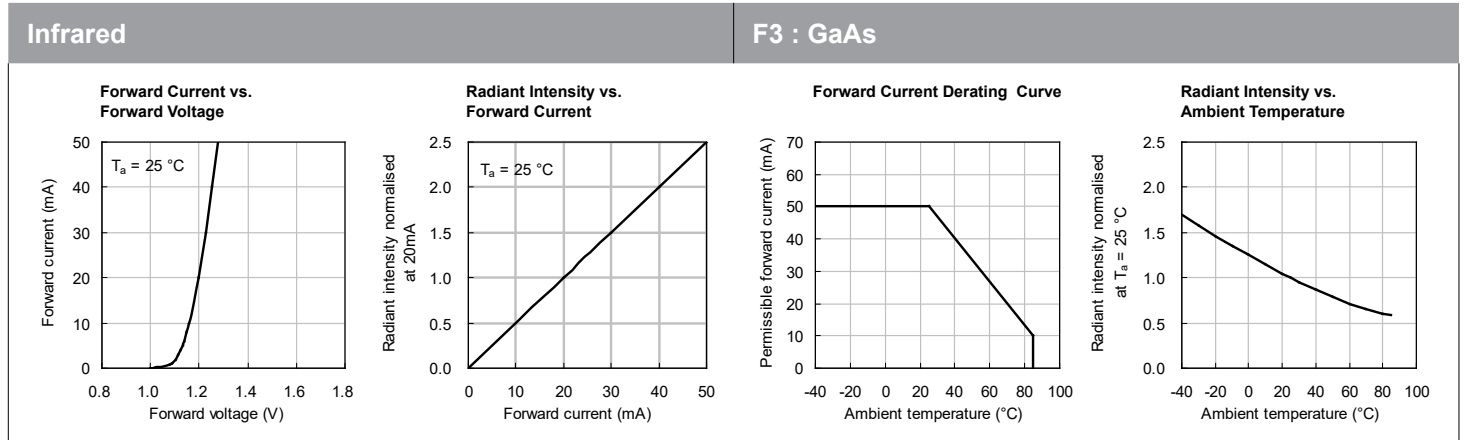


Blue

VB/D : InGaN



TECHNICAL DATA





**BIN CODE SYSTEMS**

**SELECTION CODE FOR STANDARD AND LOW CURRENT LEDS**

(T<sub>A</sub>=25°C Tolerance +/-15% IF<15mA)

Group	Light intensity in mcd		Group	Light intensity in mcd	
	Min.	Max.		Min.	Max.
F	0.1	0.2	W	120	180
G	0.2	0.35	X	180	250
H	0.35	0.5	Y	250	320
I	0.5	0.8	Z	320	450
K	0.8	1.2	ZA	450	550
L	1.2	2	ZB	550	700
M	2	4	ZC	700	1000
N	4	6	ZD	1000	1600
P	6	10	ZE	1600	2200
Q	10	15	ZF	2200	2800
R	15	20	ZG	2800	3400
S	20	30	ZH	3400	4300
T	30	50	ZM	4300	5200
U	50	80	ZN	5200	6300
V	80	120	ZP	6300	7400

**SELECTION CODE FOR NPN PHOTOTRANSISTORS**

(T<sub>A</sub>=25°C Tolerance +/-15%)

Group	Photocurrent(mA)		Group	Photocurrent(mA)	
	Min.	Max.		Min.	Max.
F	0.1	0.2	L	1.2	2
G	0.2	0.35	M	2	4
H	0.35	0.5	N	4	6
I	0.5	0.8	P	6	10
K	0.8	1.2	-	-	-

**SELECTION CODE FOR INFRARED EMITTING DIODES**

(T<sub>A</sub>=25°C Tolerance +/-15%)

Group	Radiant intensity in mW/sr		Group	Radiant intensity in mW/sr	
	Min.	Max.		Min.	Max.
AK	0.8	1.2	D	8	12
AL	1.2	2	E	12	20
A	2	3	F	20	40
B	3	5	G	40	55
C	5	8	H	55	80

**SELECTION CODE FOR SUPER BRIGHT LEDS**

(T<sub>A</sub>=25°C Tolerance +/-15% IF≥15mA)

Group	Light intensity in mcd		Group	Light intensity in mcd	
	Min.	Max.		Min.	Max.
A	2	3	ZA	3100	3600
B	3	5	ZB	3600	4200
C	5	8	ZC	4200	5000
D	8	12	ZD	5000	6000
E	12	20	ZE	6000	7000
F	20	40	ZF	7000	8000
G	40	55	ZG	8000	9000
H	55	80	ZH	9000	11000
M	80	120	ZM	11000	14000
N	120	200	ZN	14000	18000
P	200	300	ZP	18000	22000
Q	300	400	ZQ	22000	27000
R	400	500	ZR	27000	35000
S	500	700	ZS	35000	43000
T	700	1000	ZT	43000	55000
U	1000	1300	ZU	55000	75000
V	1300	1600	ZV	75000	130000
W	1600	1900	ZW	130000	200000
X	1900	2300	ZX	200000	320000
Y	2300	2700	ZY	320000	490000
Z	2700	3100	ZZ	490000	800000

**SELECTION CODE FOR DISPLAYS**

(T<sub>A</sub>=25°C Tolerance +/-15% IF≤10mA)

Group	Light intensity in ucd		Group	Light intensity in ucd	
	Min.	Max.		Min.	Max.
C	70	140	P	14000	21000
D	140	240	Q	21000	31000
E	240	360	R	31000	52000
F	360	560	S	52000	88000
G	560	900	T	88000	150000
H	900	1400	U	150000	255000
I	1400	2200	V	255000	433000
K	2200	3600	W	433000	736000
L	3600	5600	X	736000	1251000
M	5600	9000	Y	1251000	2126000
N	9000	14000	Z	2126000	3614000

## BIN CODE SYSTEMS

SELECTION CODE FOR LUMINOUS FLUX (T <sub>A</sub> =25°C; Tolerance: +/-15%)					
Group	Luminous Flux in lm		Group	Luminous Flux in lm	
	Min.	Max.		Min.	Max.
A1	0.5	0.6	B10	50	60
A2	0.6	0.7	B11	60	70
A3	0.7	0.8	B12	70	80
A4	0.8	1	B13	80	90
A5	1	1.2	B14	90	100
A6	1.2	1.4	C1	100	120
A7	1.4	1.7	C2	120	140
A8	1.7	2	C3	140	160
A9	2	2.4	C4	160	180
A10	2.4	2.9	C5	180	210
A11	2.9	3.5	C6	210	240
A12	3.5	4.2	C7	240	280
A13	4.2	5	C8	280	320
A14	5	6	C9	320	370
A15	6	7.2	C10	370	430
A16	7.2	8.6	C11	430	490
A17	8.6	10	C12	490	560
B1	10	12	C13	560	640
B2	12	14	C14	640	740
B3	14	17	C15	740	850
B4	17	20	C16	850	1000
B5	20	24	D1	1000	1200
B6	24	29	D2	1200	1400
B7	29	35	D3	1400	1600
B8	35	42	D4	1600	1800
B9	42	50	D5	1800	2100

COLOR CODE FOR GREEN LEDs + DISPLAYS (T <sub>A</sub> =25°C; Tolerance: +/-1nm)				
Group	Dom. Wavelength (nm)			
	Min.	Max.	Min.	Max.
0	556	559	-	-
1	559	561	515	520
2	561	563	520	525
3	563	565	525	530
4	565	567	530	535
5	567	569	535	540
6	569	571	-	-
7	571	573	-	-
8	573	575	-	-

COLOR CODE FOR BLUE LEDs + DISPLAYS (T <sub>A</sub> =25°C; Tolerance: +/-1nm)					
Group	Dom. Wavelength (nm)		Group	Dom. Wavelength (nm)	
	Min.	Max.		Min.	Max.
1	445	450	3A	471	473
2	450	455	3B	473	475
3	455	460	4A	475	477
1A	460	463	4B	477	479
1B	463	466	5A	479	481
2A	466	469	5B	481	483
2B	469	471	5C	483	486

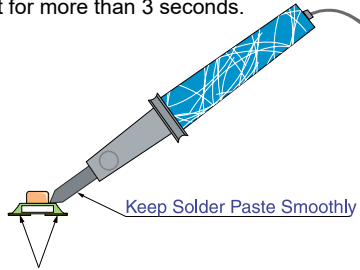
COLOR CODE FOR YELLOW LEDs + DISPLAYS (T <sub>A</sub> =25°C; Tolerance: +/-1nm)					
Group	Dom. Wavelength (nm)		Group	Dom. Wavelength (nm)	
	Min.	Max.		Min.	Max.
1	581	584	5	590	592
2	584	586	6	592	594
3	586	588	7	594	597
4	588	590	8	597	600

SOLDERING INSTRUCTIONS								
Types	Dip soldering / * wave soldering			Figure	Iron soldering (with 1.5mm iron tip)			Figure
	Temperature of the soldering bath	Maximum soldering time	Distance from solder joint to package (a)		Temperature of soldering iron	Maximum soldering time	Distance from solder joint to package (b)	
THROUGH-HOLE LED	<=260°C	3s	>=2mm		<=350°C	3s	>2mm	
	<=260°C	5s	>=5mm		<=350°C	5s	>5mm	
SMD	-	-	-	-	<=350°C	3s (one time only)	-	-
DISPLAY	*<=260°C	*3s	*>2mm		<=350°C	3s	>2mm	
PHOTOCOUPLER	<=260°C	3s	-	-	<=310°C	3s	-	-
	-	-	-		<=260°C	10s	-	

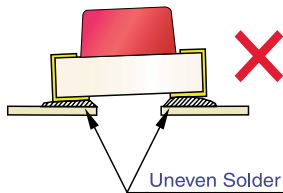
APPLICATION NOTES

General Notes

1. We recommend manual soldering operations only for repair and rework purposes. The soldering iron should be temperature-controlled to avoid damaging the component. The maximum soldering temperature is 300°C for Pb-Sn solder and 350°C for lead-free solder for normal lamps and displays. For blue (typ.:465nm), green (typ.:525nm), and all white LEDs, the maximum soldering iron temperature is 280°C. Do not place the soldering iron on the component for more than 3 seconds.



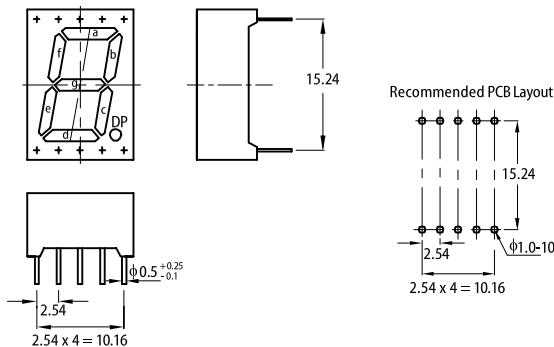
2. The tip of the soldering iron should never touch the epoxy lens.
3. Do not apply stress to the leads when the component is heated above 85°C, otherwise internal wire bonds may be damaged.
4. Through-Hole LEDs are incompatible with reflow soldering.
5. If the LED will undergo multiple soldering passes or face other processes where the part may be subjected to intense heat, please check with Kingbright for compatibility.
6. SMD products must be mounted according to specified soldering pad patterns. Refer to the product datasheet for details. Solder paste must be evenly applied to each soldering pad to insure proper bonding and positioning of the component.



7. After soldering, allow at least three minutes for the component to cool down to room temperature before further operations.
8. Recommended PCB pin hole diameters for display products are listed below :

Square pin type :  $\Phi 1\text{mm}$

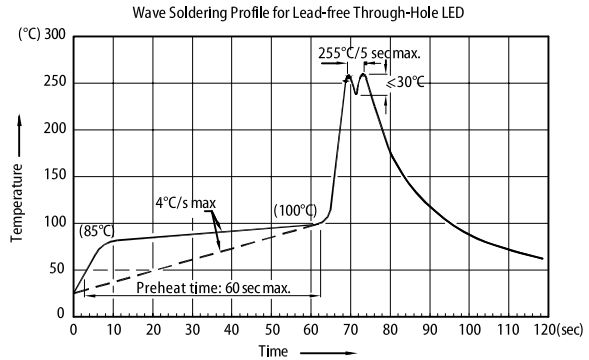
Round pin type : 2 x pin diameters



9. Data subject to change without notice. For additional detail of application notes, product information, and disclaimers, please visit our website at [www.KingbrightUSA.com/ApplicationNotes/](http://www.KingbrightUSA.com/ApplicationNotes/)

Recommended Wave Soldering Profiles For Kingbright Through-Hole Products

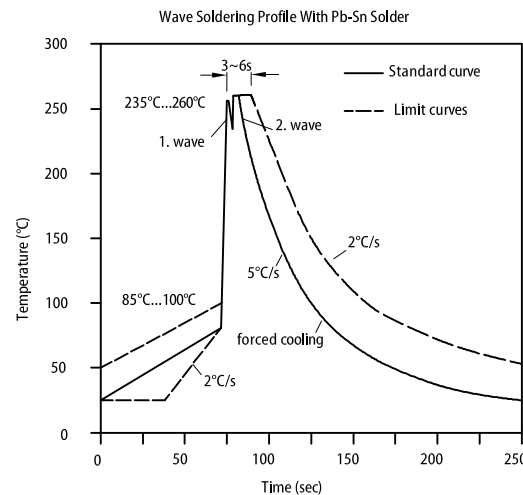
1. Lead-Free Wave Soldering Profile



Notes:

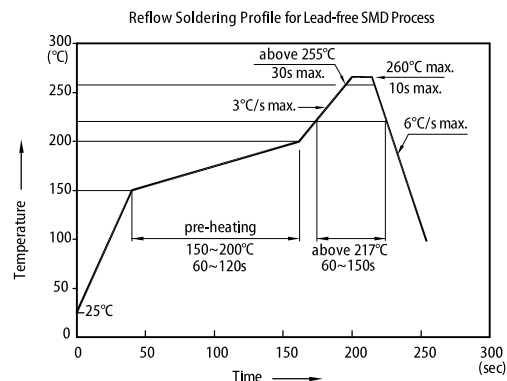
1. Recommend pre-heat temperature of 105°C or less (as measured with a thermocouple attached to the LED pins) prior to immersion in the solder wave with a maximum solder bath temperature of 260°C.
2. Peak wave soldering temperature between 245°C ~ 255°C for 3 sec (5 sec max).
3. Do not apply stress to the epoxy resin while the temperature is above 85°C.
4. Fixtures should not incur stress on the component when mounting and during soldering process.
5. SAC 305 solder alloy is recommended.
6. No more than one wave soldering pass.
7. During wave soldering, the PCB top-surface temperature should be kept below 105°C.

2. Wave Soldering Profile With Pb-Sn Solder



Recommended Reflow Soldering Profiles For Kingbright SMD Products

1. Lead-Free Reflow Soldering Profile

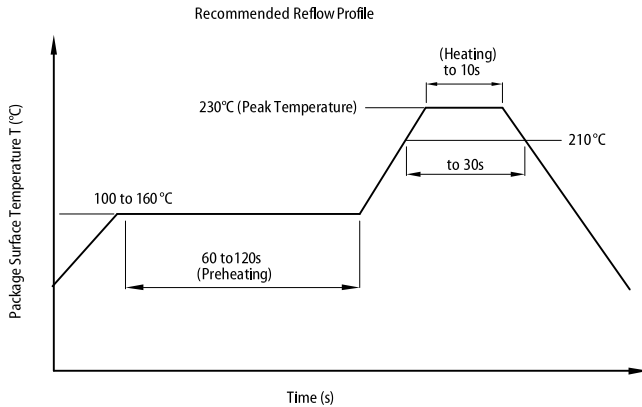


Notes:

1. Don't cause stress to the LEDs while it is exposed to high temperature.
2. The maximum number of reflow soldering passes is 2 times.

**2. Reflow Soldering Profiles With Pb-Sn Solder**

No more than two soldering passes with the recommended profile.



**Static Electricity and Voltage Spikes in InGaN/GaN Products**

InGaN/GaN products are sensitive to electrostatic discharge (ESD) and other transient voltage spikes. ESD and voltage spikes can affect the component's reliability, increase reverse current, and decrease forward voltage. This may result in reduced light intensity or cause component failure.

Kingbright InGaN/GaN products are stored in anti-static packaging for protection during transport and storage. Please note the anti-static measures below when handling Kingbright InGaN/GaN products.

**Design Precautions**

Products using InGaN/GaN components must incorporate protection circuitry to prevent ESD and voltage spikes from reaching the vulnerable component.

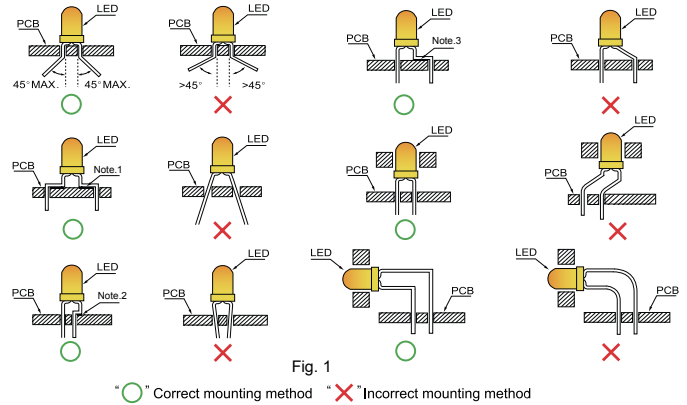
**ESD Protection During Production**

Static discharge can result when static-sensitive products come in contact with the operator or other conductors. The following procedures may decrease the possibility of ESD damage:

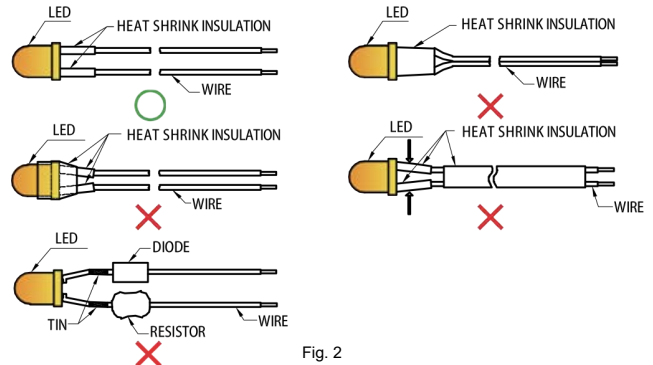
1. Minimize friction between the product and surroundings to avoid static buildup.
2. All manufacturing and testing equipment should be grounded.
3. All personnel in an ESD protected area should wear antistatic garments and wrist straps.
4. Set up ESD protection areas using grounded metal plating for component handling.
5. All workstations that handle IC and ESD-sensitive components must maintain an electrostatic potential of 150V or less.
6. Relative humidity levels maintained between 40% and 60% in production area are recommended to avoid the build-up of static electricity – Ref JEDEC/JESD625-A and JEDEC/J-STD-033.
7. Use anti-static packaging for transport and storage.
8. All anti-static equipment and procedures should be periodically inspected and evaluated for proper functionality.

**LED Mounting Method**

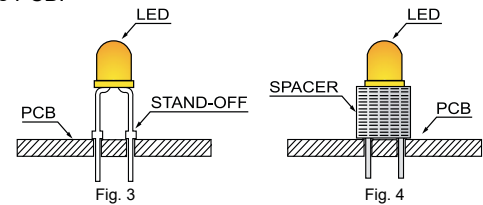
1. The lead pitch of the LED must match the pitch of the mounting holes on the PCB during component placement. Lead-forming may be required to insure the lead pitch matches the hole pitch. Refer to (Fig.1) for proper lead forming procedures.



2. When soldering wires to the LED, each wire joint should be separately insulated with heat-shrink tube to prevent short-circuit contact. Do not bundle both wires in one heat shrink tube to avoid pinching the LED leads. Pinching stress on the LED leads may damage the internal structures and cause failure. (Fig.2)



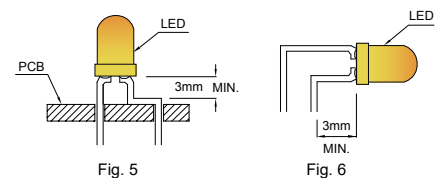
3. Use stand-offs (Fig.3) or spacers (Fig.4) to securely position the LED above the PCB.



4. Do not route PCB trace in the contact area between the leadframe and the PCB to prevent short-circuits.

**Lead Forming Procedures**

1. Maintain a minimum of 3mm clearance between the base of the LED lens and the first lead bend. (Fig. 5 and 6)



- Lead forming or bending must be performed before soldering, never during or after soldering.
- Do not stress the LED lens during lead-forming in order to prevent fractures in the epoxy lens and damage the internal structures.
- During soldering, component covers and holders should leave clearance to avoid placing damaging stress on the LED during soldering. (Fig. 7)

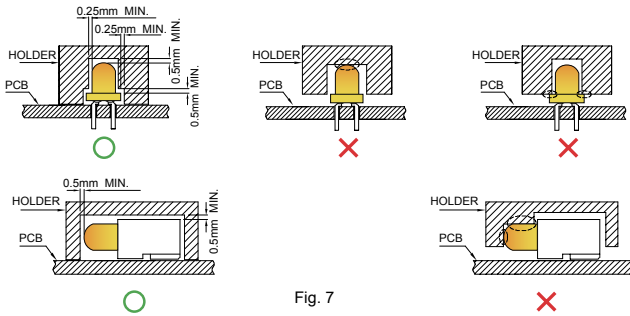


Fig. 7

- During lead forming, use tools or jigs to hold the leads securely so that the bending force will not be transmitted to the LED lens and its internal structures. Do not perform lead forming once the component has been mounted onto the PCB. (Fig. 8)

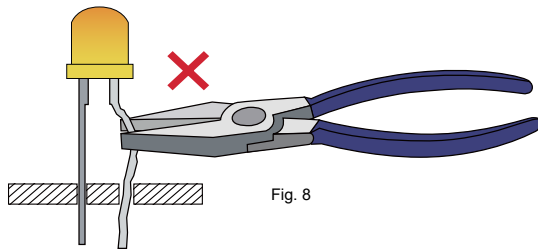


Fig. 8

- Do not bend the leads more than twice. (Fig. 9)

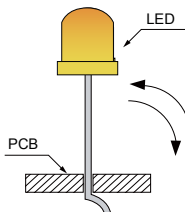


Fig. 9

- After soldering or other high-temperature assembly, allow the LED to cool down to 50°C before applying outside force. (Fig. 10)  
In general, avoid placing excess force on the LED to avoid damage. For any questions, please consult with Kingbright representative for proper handling procedures.

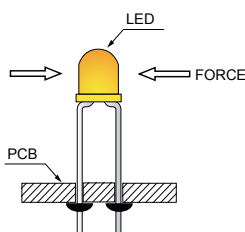


Fig. 10

Cleaning

For SMD and through-hole LEDs

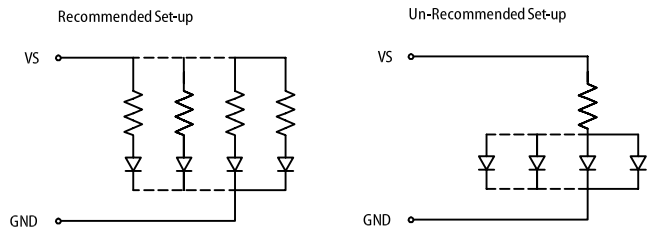
- Isopropyl alcohol or deionized water are recommended for cleaning. Do not use acidic solvents or unknown chemicals, as they might cause corrosion or damage to the component.
- Lightly wipe away any surface contaminants, and allow the component to dry under room temperature before further usage. Do not soak the component in solution.

For LED Displays

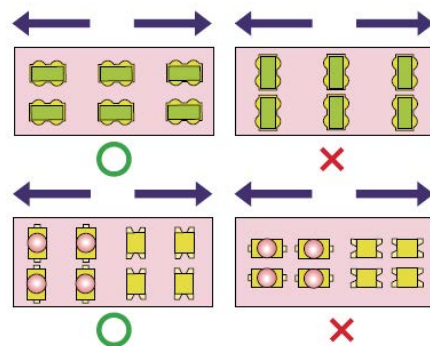
- The component should be washed with only water, and immediately dried by forced-air to remove excess moisture. Do not use harsh organic solvents because they might damage the plastic parts.
- The cleaning process should take place at room temperature and the component should not be washed for more than one minute.

Miscellaneous Design Notes

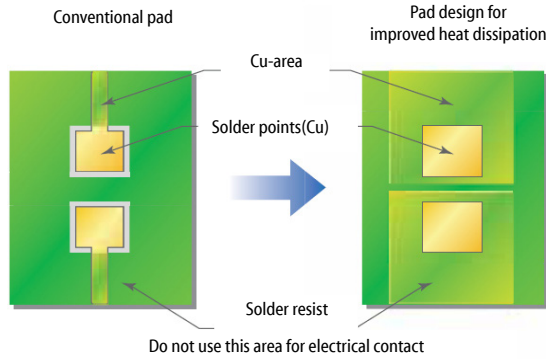
- Protective current-limiting resistors may be necessary to operate the LEDs within the specified range.
- LEDs mounted in parallel should each be placed in series with its own current-limiting resistor.



- The driving circuit should be designed to avoid reverse voltages and transient voltage spikes when the circuit is powered up or shut down.
- High temperatures can reduce device performance and reliability. Keep LED devices away from heat source for best performance.
- The safe operation current should be chosen after considering the maximum ambient temperature of the operating environment.
- During soldering, SMD components should be mounted such that the leads are placed perpendicular to the direction of PCB travel to ensure the solder on each lead melts simultaneously during reflow.

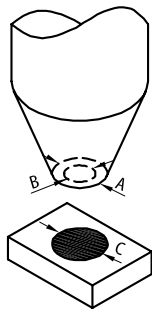


- Optimal usage of high-power LED devices requires careful design by the end-user to optimize heat dissipation, such as increasing the size of the metal backing around the soldering pad. Refer to the product datasheet for specific design recommendations regarding heat dissipation.



**Restrictions on Product Use**

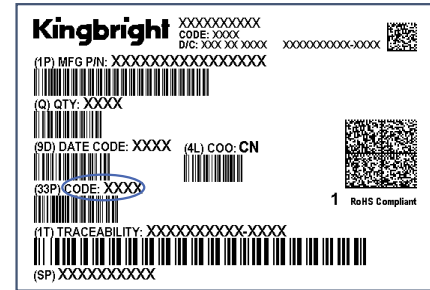
1. Not all devices and product families are available in every country.
2. The light output from UV, blue, white, and other high-power LEDs may cause injury to the human eye when viewed directly.
3. LED devices may contain gallium arsenide (GaAs) material. GaAs is harmful if ingested. GaAs dust and fumes are toxic. Do not break, cut, or pulverize LED devices. Do not dissolve LEDs in chemical solvents.
4. Semiconductor devices can fail or malfunction due to their sensitivity to electrical fluctuation and physical stress. It is the responsibility of the user to observe all safety standards when using Kingbright products, in order to avoid situations in which the malfunction or failure of a Kingbright product could cause injury, property damage, or the loss of human life. In developing designs, please insure that Kingbright products are used within specified operating conditions as set forth in the most recent product specification datasheet.
5. For LEDs with silicone encapsulation such as the AA series, the outer diameter of the pick-up nozzle must be longer than that of the LED's light emitting area. i. e.  $A > C$ , and B shall be shorter than the width of the LED.



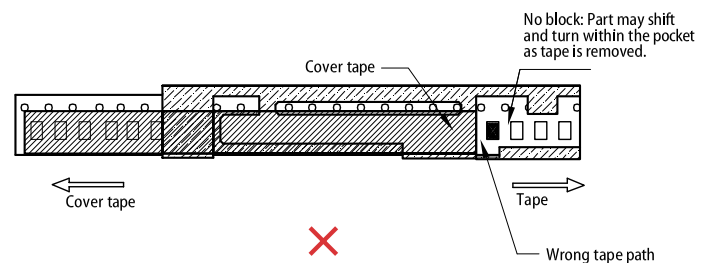
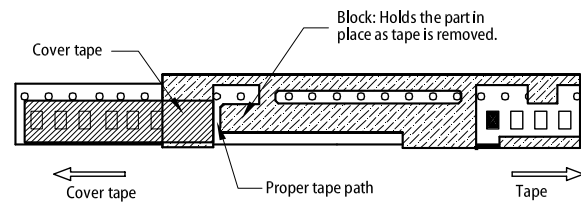
A is the outer diameter of the pick-up nozzle  
 B is the inner diameter of the pick-up nozzle  
 C is the diameter of lens

6. The size of the nozzle should be as large as possible if the tape is not involved.
7. The LEDs should not be exposed to an environment where high level of moisture or corrosive gases are present.
8. Prolonged reverse bias should be avoided, as it could cause metal migration, leading to an increase in leakage current or causing a short circuit.
9. Excess driving current and/or operating temperature higher than recommended conditions may result in severe light degradation or premature failure.

10. It is not recommended to assemble LEDs of different color or intensity bins together, as there may be perceivable color or intensity variation. Each bag contains parts from the same bin code. The bin code is printed on the bag's label as below.

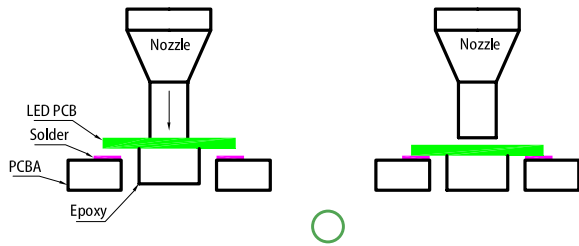


11. For the 0603, 1005 and 1608 series, an ESD ionizer should be used during SMT pick-and-place process to neutralize the charge and hence reduce electrostatic attraction.
12. Please do not apply stress directly to the LED during handling.
13. As silicone encapsulation is permeable to gases, some corrosive substances such as  $H_2S$  might corrode silver plating of leadframe. Special care should be taken if an LED with silicone encapsulation is to be used near such substances.
14. The LEDs should not be exposed to an environment where high level of moisture or corrosive gases are present.
15. For right angle SMD LEDs, the solder stencil should be at least 5mil in thickness, to prevent poor solder wetting due to insufficient solder paste.
16. Choosing the right feeder for small SMD components:
  - 16.1 When processing smaller SMD components (such as 0603, 1005, 1608, 1612, 1615, 2012), please use feeder with block to hold the part in place during cover tape removal, in order to prevent the component jumping or turning within the tape due to vibration or static cling.
  - 16.2 Feeder without block is more suitable for larger size components (such as 3216, 3528).
  - 16.3 Please insure the removed cover tape is properly threaded through the feeder as it is removed from the tape.

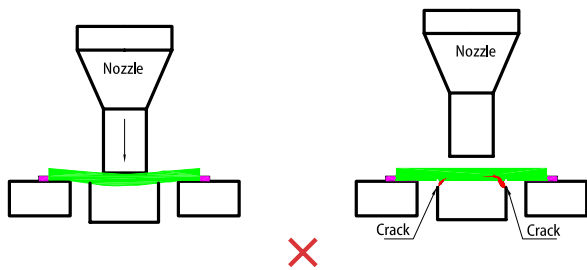




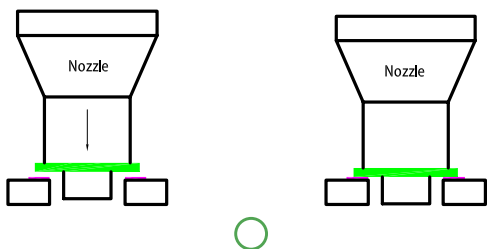
17. When placing reverse-mount LEDs, the nozzle must not place pressure on the part. Refer to the figures below, pressure on the LED will cause the LED to bend and potentially cause delamination or cracking between the component PCB and the epoxy lens. The damaged LED will be more prone to failure after undergoing high-temperature reflow soldering process.



Proper SMD placement. Nozzle does not press down on the LED.



Pressure from the nozzle can cause structural damage to the LED.



Consider using wider nozzles with diameter greater than the PCB hole opening. This will prevent pressure damage during placement.

**Storage Control For SMD Products**

1. Before a sealed moisture barrier bag (MBB) is opened, contained LEDs shall be kept in an environment with temperature below 40°C and humidity below 90% RH. MBB shall be kept sealed until LEDs contained in the bag are ready to be used. Once MBB is opened, it shall be stored in an environment with temperature range of 5°C~30°C and humidity below 60% RH.
2. After the MBB has been opened, the LEDs should be used according to the floor life specified in the table below.

**IPC/JEDEC J-STD-020 Moisture Sensitivity Levels**

Level	Floor Life	
	Time	Conditions
1	Unlimited	≤30°C / 85% RH
2	1 year	≤30°C / 60% RH
2a	4 weeks	≤30°C / 60% RH
3	168 hours	≤30°C / 60% RH
4	72 hours	≤30°C / 60% RH
5	48 hours	≤30°C / 60% RH
5a	24 hours	≤30°C / 60% RH
6	Time on Label (TOL)	≤30°C / 60% RH

3. If the Humidity Indicator Card (HIC)'s 10% mark has changed, or the LEDs have not been used within the floor life specified, they should be baked with the following conditions to reset the floor life:

Type	Temperature	Humidity	Bake Time
When still in carrier tape	60±3°C	<5%RH	100H
When out of carrier tape	110°C	/	10H

\* Not more than once

4. Do not store LEDs in an environment where high humidity or acidic/basic chemicals are present, as they will degrade the LED's metallic surfaces.
5. LED leadframe and soldering pads (cathode and anode) are plated with gold, tin, or other metals. Under long-term exposure to open air, the exposed pins and pads may become oxidized causing poor solderability. Therefore opened but unused parts must be stored in sealed containers. Suggest to store unused parts in the original moisture barrier bag.
6. Moisture control for components already mounted on PCB: If the PCB will not undergo additional reflow soldering or high-temperature processes, then no special treatment is required for the mounted moisture-sensitive SMD components. If the PCB will undergo multiple reflow soldering or other high-temperature processes, including rework, then the SMD component's cumulative exposure time until the final high-temperature process must be controlled to within the specified time limit.

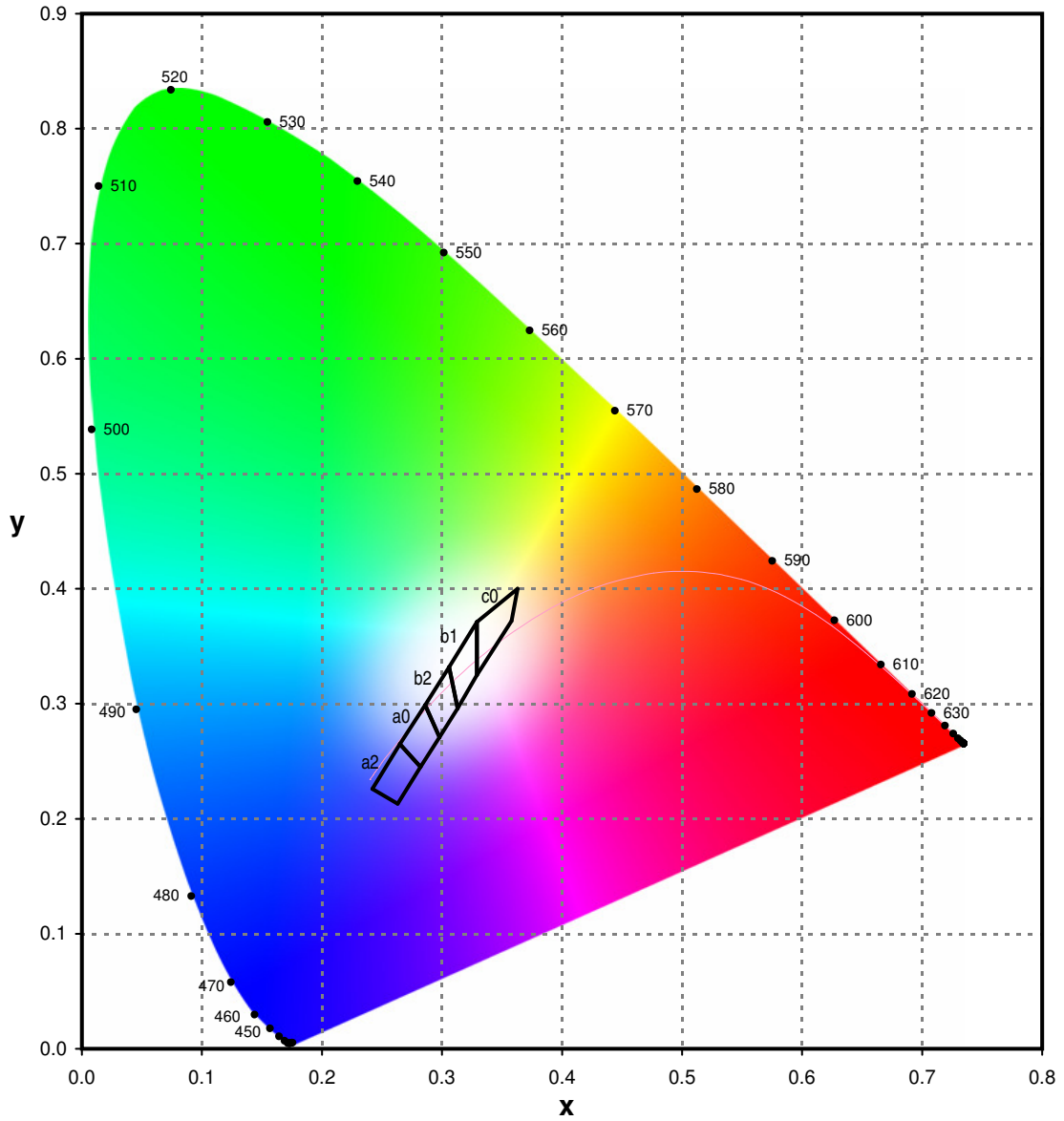
**For Through-Hole Products**

1. Avoid continued exposure to the condensing moisture environment and keep the product away from rapid transitions in ambient temperature.
2. LEDs should be stored with temperature ≤30°C and relative humidity < 60%.
3. Product in the original sealed package is recommended to be assembled within 72 hours of opening. Product in opened package for more than a week should be baked for 30 (+10/-0) hours at 85 ~ 100°C.
4. The LED leadframe surface is plated with tin. When the leadframe is stored under high-humidity environments, or exposed to certain chemical elements or gases, the surface may become discolored. Please maintain the cleanliness of the storage environment.
5. If the storage conditions do not meet specification standards, the component pins may become oxidized requiring re-plating and re-sorting before use. Suggest customers consume LEDs as soon as possible, and avoid long-term storage of large inventories.



CIE CHROMATICITY DIAGRAM

White Bin Code



Bin	x	y
a2	0.263	0.213
	0.282	0.245
	0.265	0.265
	0.242	0.226
CCT: 15000K~		

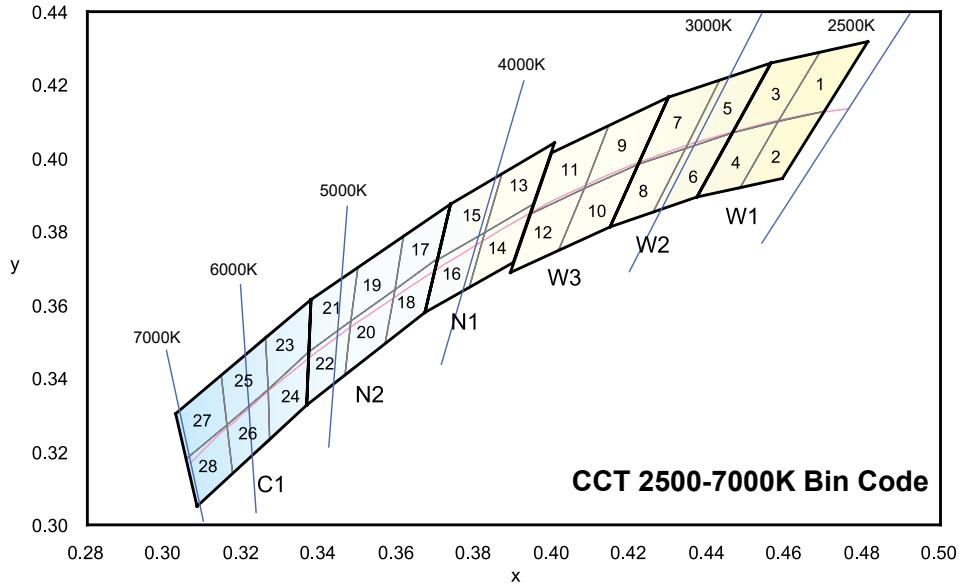
Bin	x	y
b2	0.298	0.271
	0.313	0.296
	0.306	0.332
	0.286	0.299
CCT: 6800~9000K		

Bin	x	y
c0	0.329	0.325
	0.358	0.372
	0.363	0.400
	0.329	0.371
CCT: 4600~5600K		

Bin	x	y
a0	0.282	0.245
	0.298	0.271
	0.286	0.299
	0.265	0.265
CCT: 9000~15000K		

Bin	x	y
b1	0.313	0.296
	0.329	0.325
	0.329	0.371
	0.306	0.332
CCT: 5600~6800K		

CIE CHROMATICITY DIAGRAM



Group	Chromaticity Regions	CCT (K)			Group	Chromaticity Regions	CCT (K)		
		Min.	Typ.	Max.			Min.	Typ.	Max.
W1	1, 2, 3, 4	2580	2700	2870	N1	13, 14, 15, 16	3710	4000	4260
W2	5, 6, 7, 8	2870	3000	3220	N2	17, 18, 19, 20, 21, 22	4260	4700	5310
W3	9, 10, 11, 12	3220	3500	3710	C1	23, 24, 25, 26, 27, 28	5310	6000	7040

	x	y		x	y		x	y		x	y
1	0.4582	0.4099	8	0.4147	0.3814	15	0.3702	0.3722	22	0.3481	0.3557
	0.4687	0.4289		0.4221	0.3984		0.3736	0.3874		0.3370	0.3472
	0.4813	0.4319		0.4342	0.4028		0.3869	0.3958		0.3364	0.3328
	0.4700	0.4126		0.4259	0.3853		0.3825	0.3798		0.3466	0.3411
2	0.4483	0.3919	9	0.4080	0.3916	16	0.3670	0.3578	23	0.3376	0.3616
	0.4582	0.4099		0.4146	0.4089		0.3702	0.3722		0.3260	0.3512
	0.4700	0.4126		0.4299	0.4165		0.3825	0.3798		0.3265	0.3371
	0.4593	0.3944		0.4221	0.3984		0.3783	0.3646		0.3370	0.3472
3	0.4465	0.4071	10	0.4017	0.3751	17	0.3736	0.3874	24	0.3370	0.3472
	0.4562	0.4260		0.4080	0.3916		0.3616	0.3788		0.3265	0.3371
	0.4687	0.4289		0.4221	0.3984		0.3592	0.3641		0.3270	0.3230
	0.4582	0.4099		0.4147	0.3814		0.3703	0.3726		0.3364	0.3328
4	0.4373	0.3893	11	0.3941	0.3848	18	0.3703	0.3726	25	0.3260	0.3512
	0.4465	0.4071		0.3996	0.4015		0.3592	0.3641		0.3144	0.3408
	0.4582	0.4099		0.4146	0.4089		0.3568	0.3495		0.3160	0.3274
	0.4483	0.3919		0.4080	0.3916		0.3670	0.3578		0.3265	0.3371
5	0.4342	0.4028	12	0.3889	0.3690	19	0.3616	0.3788	26	0.3265	0.3371
	0.4430	0.4212		0.3941	0.3848		0.3496	0.3702		0.3160	0.3274
	0.4562	0.4260		0.4080	0.3916		0.3481	0.3557		0.3175	0.3139
	0.4465	0.4071		0.4017	0.3751		0.3592	0.3641		0.3270	0.3230
6	0.4259	0.3853	13	0.3825	0.3798	20	0.3592	0.3641	27	0.3144	0.3408
	0.4342	0.4028		0.3869	0.3958		0.3481	0.3557		0.3028	0.3304
	0.4465	0.4071		0.4006	0.4044		0.3466	0.3411		0.3055	0.3177
	0.4373	0.3893		0.3950	0.3875		0.3568	0.3495		0.3160	0.3274
7	0.4221	0.3984	14	0.3783	0.3646	21	0.3496	0.3702	28	0.3160	0.3274
	0.4299	0.4165		0.3825	0.3798		0.3376	0.3616		0.3055	0.3177
	0.4430	0.4212		0.3950	0.3875		0.3370	0.3472		0.3081	0.3049
	0.4342	0.4028		0.3898	0.3716		0.3481	0.3557		0.3175	0.3139

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## Custom Assembly LEDs

Kingbright's excellent manufacturing capability and flexibility can manifest your next design innovation.



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For a complete product selection and more about Kingbright, please visit us at [www.KingbrightUSA.com](http://www.KingbrightUSA.com)



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