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ASMT-Ax3x

3W Power LED Light Source

Data Sheet

Lead (Pb) Free
RoHS 6 fully
compliant



Description

This 3W Power LED Light Source is a high performance energy efficient device which can handle high thermal and high driving current. The exposed pad design enables excellent heat transfer from the package to the motherboard. Option with electrically isolated metal slug is also available.

The White Power LED is available in the range of color temperature from 2700K to 10000K.

The low profile package design is suitable for a wide variety of applications especially where height is a constraint.

The package is compatible with reflow soldering process. This part has a foot print that is compatible to most of the high power LED in the market today.

Features

- Available in Red, Red Orange, Amber, Green, Blue, Royal Blue, Cool White, Neutral White and Warm White color
- Energy efficient
- Exposed metal slug for excellent heat transfer
- Compatible with reflow soldering process
- High current operation
- Long operation life
- Wide viewing angle at 140°
- Silicone encapsulation
- Non-ESD sensitive (threshold > 16 kV)
- MSL 2a products

Applications

- Architectural lighting
- Channel backlighting
- Contour lighting
- Retail Display lighting
- Decorative lighting
- Garden lighting
- Safety, exit and emergency signs lighting
- Specialty lighting
- Task lighting

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Package Dimensions

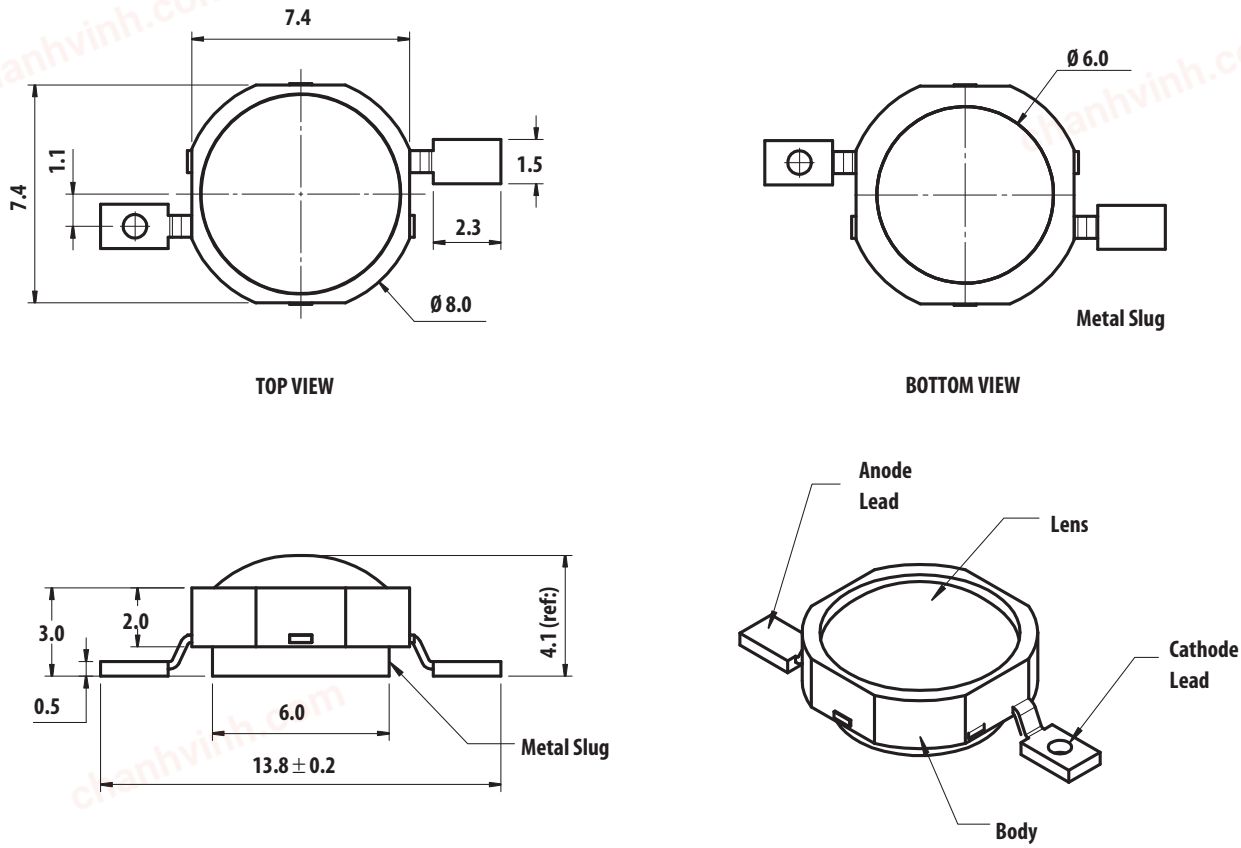


Figure 1. ASMT-Ax3x package outline drawing

Notes:
1. All dimensions in millimeters.
2. Metal slug is connected to anode for electrically non-isolated option.
3. Tolerance is ±0.1 mm unless otherwise specified.
4 . Terminal Finish: Ag plating

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Part Numbering System

ASMT – A x_1 3 x_2 – x_3 x_4 x_5 x_6 x_7

Packaging Option

Color Bin Selection

Maximum Flux Bin Selection

Minimum Flux Bin Selection

Dice Type
N – InGaN
A – AlInGaP

Heat Sink
0 – Electrically Non-isolated
1 – Electrically Isolated

Color
R – Red
H – Red Orange
A – Amber
G – Green
B – Blue
L – Royal Blue
W – Cool White
N – Neutral White
Y – Warm White

Note:
1. Please refer to Page 11 for selection details.

Device Selection Guide (T_j = 25 °C)

Part Number	Color	Luminous Flux (lm) / Radiometric Power (mW), Φ_V [1,2] Min.	Typ.	Max.	Test Current (mA)	Dice Technology	Electrically Isolated Metal Slug
ASMT-AR30-AST00	Red	51.7	60.0	87.4	350	AlInGaP	No [3]
ASMT-AH30-ARS00	Red Orange	39.8	50.0	67.2	350	AlInGaP	No [3]
ASMT-AA30-ARS00	Amber	39.8	50.0	67.2	350	AlInGaP	No [3]
ASMT-AG31-NTU00	Green	67.2	78.0	99.6	350	InGaN	Yes
ASMT-AG31-NUV00		87.4	105.0	113.6	350	InGaN	Yes
ASMT-AB31-NMP00	Blue	13.9	18.0	30.6	350	InGaN	Yes
ASMT-AB31-NNP00		18.1	23.0	30.6	350	InGaN	Yes
ASMT-AL31-NRS00	Royal Blue	515 mW	600 mW	685 mW	350	InGaN	Yes
ASMT-AW31-NVX00	Cool White	99.6	120.0	147.7	350	InGaN	Yes
ASMT-AN31-NWX00	Neutral White	113.6	120.0	147.7	350	InGaN	Yes
ASMT-AY31-NUW00	Warm White	87.4	95.0	129.5	350	InGaN	Yes

Notes:
1. ΦV is the total luminous flux / radiometric power output as measured with an integrating sphere at 25ms mono pulse condition.
2. Flux and power tolerance is ±10 %
3. Electrically isolated metal slug option is also available. Please contact your Avago sale representative.

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Absolute Maximum Ratings

Parameter	AlInGaP	InGaN	Units
DC Forward Current [1]	700	700	mA
Peak Pulsing Current	1500	2400	mA
Power Dissipation	1820	2730	mW
LED Junction Temperature	125	135	°C
Operating Metal Slug Temperature Range at 350 mA	-40 to +115	-40 to +120	°C
Operating Metal Slug Temperature Range at 700 mA	-40 to +100	-40 to +105	°C
Storage Temperature Range	-40 to +120	-40 to +120	°C
Soldering Temperature	Refer to Figure 26		
Reverse Voltage [2]	Not recommended		

Note:
1. Derate linearly based on Figure 10 for AlInGaP and Figure 22 for InGaN.
2. Not recommended for reverse bias operation.

Optical Characteristics at 350 mA (T_J = 25 °C)

		Peak Wavelength, λ_{PEAK} (nm)	Dominant Wavelength, λ_D [1] (nm)	Viewing Angle, $2\theta_{1/2}$ [2] (°)	Luminous Efficiency (lm/W)
Part Number	**Color**	**Typ.**	**Typ.**	**Typ.**	**Typ.**
ASMT-AR30-AST00	Red	635	625	140	82
ASMT-AH30-ARS00	Red Orange	625	615	140	68
ASMT-AA30-ARS00	Amber	598	590	140	68
ASMT-AG31-NTU00	Green	519	525	140	70
ASMT-AG31-NUV00		519	525	140	94
ASMT-AB31-NMP00	Blue	454	460	140	16
ASMT-AB31-NNP00		454	460	140	21
ASMT-AL31-NRS00	Royal Blue	450	455	140	Not applicable

		Correlated Color Temperature, CCT (Kelvin)		Viewing Angle, $2\theta_{1/2}$ [2] (°)	Luminous Efficiency (lm/W)
Part Number	**Color**	**Min.**	**Max.**	**Typ.**	**Typ.**
ASMT-AW31-NVX00	Cool White	4500	10000	140	107
ASMT-AN31-NWX00	Neutral White	3500	4500	140	107
ASMT-AY31-NUW00	Warm White	2700	3500	140	85

Notes:
1. The dominant wavelength, λ_D, is derived from the CIE Chromaticity Diagram and represents the color of the device.
2. $\theta_{1/2}$ is the off-axis angle where the luminous intensity is ½ the peak intensity.

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Electrical Characteristic at 350 mA (T_J = 25°C)

	Forward Voltage, V_F (Volts)			Thermal Resistance, $R\theta_{j\text{-}ms}$(°C/W) [1]
Dice Type	**Min.**	**Typ**	**Max.**	**Typ.**
AlInGaP	1.7	2.1	2.3	10
InGaN	2.8	3.2	3.5	10

Notes:
1. $R\theta_{j\text{-}ms}$ is Thermal Resistance from LED junction to metal slug.

Optical and Electrical Characteristic at 700 mA (T_J = 25°C)

		Luminous Flux (lm) / Radiometric Power (mW), Φ_V	Forward Voltage, V_F (Volts)
Part Number	**Color**	**Typ.**	**Typ.**
ASMT-AR30-AST00	Red	112.0	2.4
ASMT-AH30-ARS00	Red Orange	94.0	2.4
ASMT-AA30-ARS00	Amber	94.0	2.4
ASMT-AG31-NTU00	Green	125.0	3.6
ASMT-AG31-NUV00		168.0	3.6
ASMT-AB31-NMP00	Blue	30.0	3.6
ASMT-AB31-NNP00		39.0	3.6
ASMT-AL31-NRS00	Royal Blue	1022 mW	3.6
ASMT-AW31-NVX00	Cool White	205.0	3.6
ASMT-AN31-NWX00	Neutral White	205.0	3.6
ASMT-AY31-NUW00	Warm White	162.0	3.6

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AlInGaP

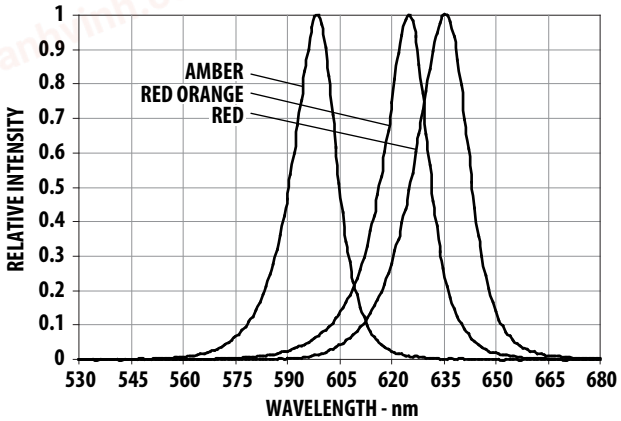


Figure 2. Relative Intensity vs. Wavelength for Red, Red Orange and Amber.

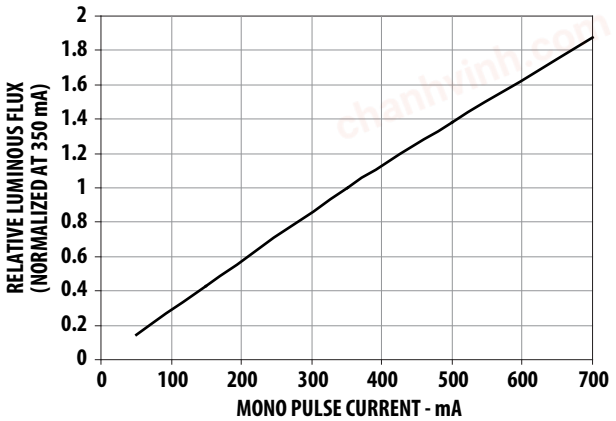


Figure 3. Relative Luminous Flux vs. Mono Pulse Current.

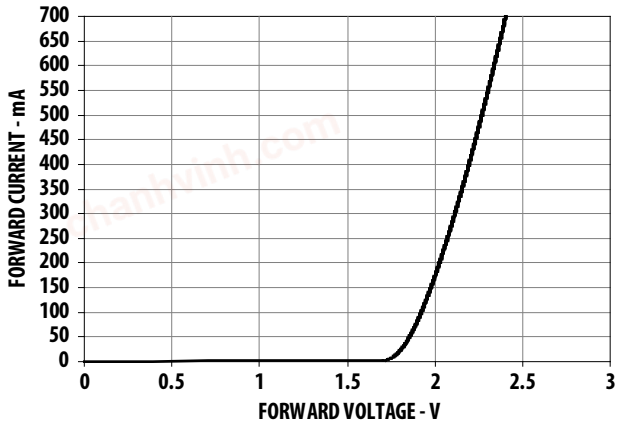


Figure 4. Forward Current vs. Forward Voltage.

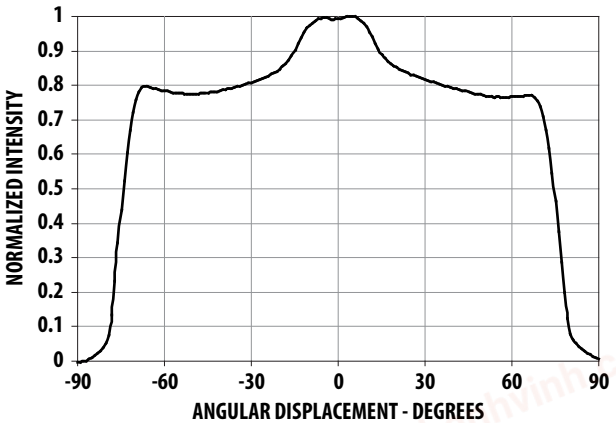


Figure 5. Radiation Pattern Red, Red Orange and Amber.

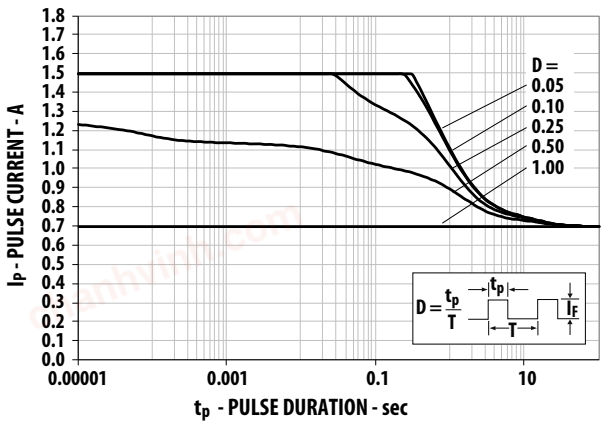


Figure 6. Maximum pulse current vs.pulse duration. Derated based on $T_A = 25°C$, $R\theta_{J-A} = 30°C/W$.

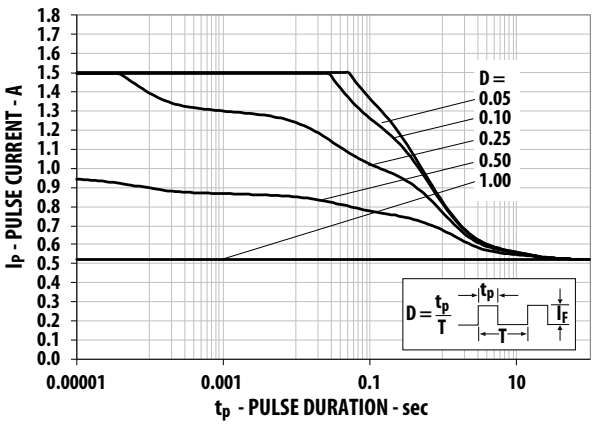


Figure 7. Maximum pulse current vs. pulse duration. Derated based on $T_A = 85°C$, $R\theta_{J-A} = 30°C/W$.

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AlInGaP

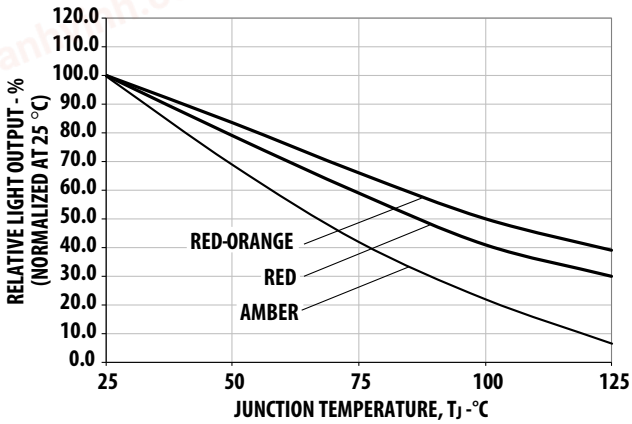


Figure 8. Relative Light Output vs. Junction Temperature.

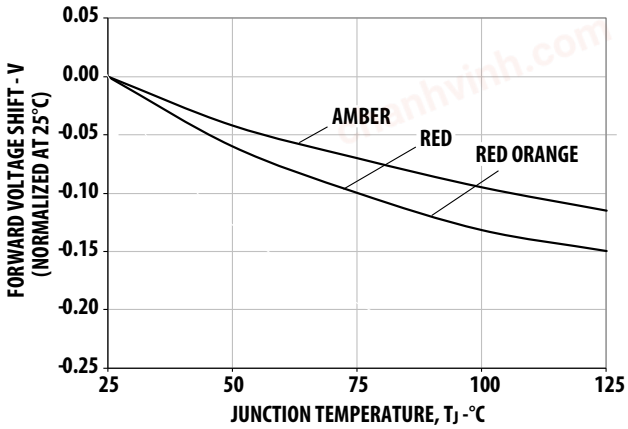


Figure 9. Forward Voltage Shift vs. Junction Temperature.

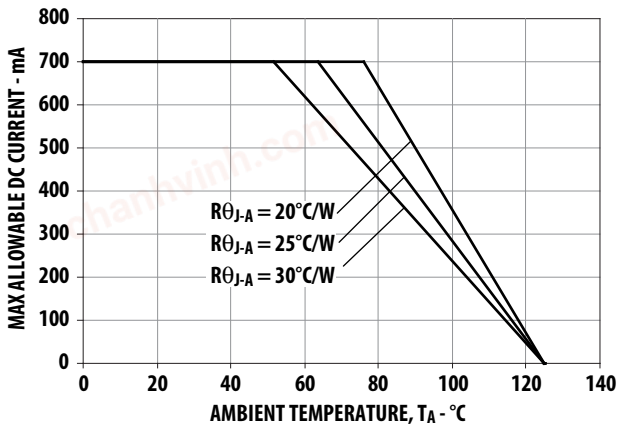


Figure 10. Maximum Forward Current vs. Ambient Temperature. Derated based on T_{JMAX} = 125°C, $R\theta_{J\text{-}A}$ = 20°C/W, 25°C/W and 30°C/W.

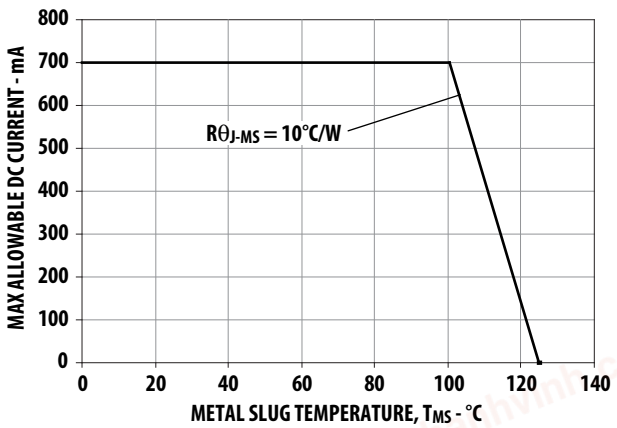


Figure 11. Maximum Forward Current vs. Metal Slug Temperature. Derated based on T_{JMAX} = 125°C, $R\theta_{J\text{-}MS}$ = 10°C/W.

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InGaN

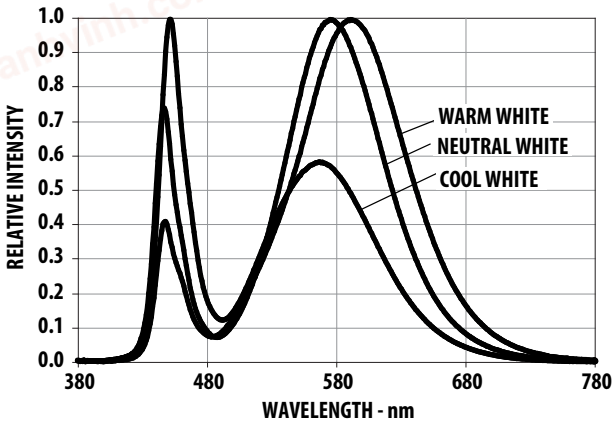


Figure 12. Relative Intensity vs. Wavelength for Warm White and Cool White.

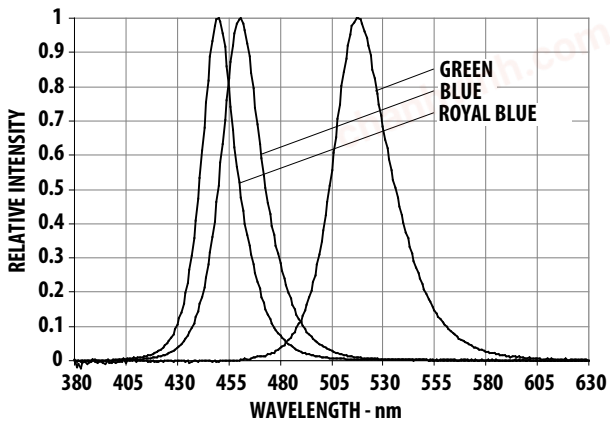


Figure 13. Relative Intensity vs. Wavelength for Blue, Royal Blue and Green.

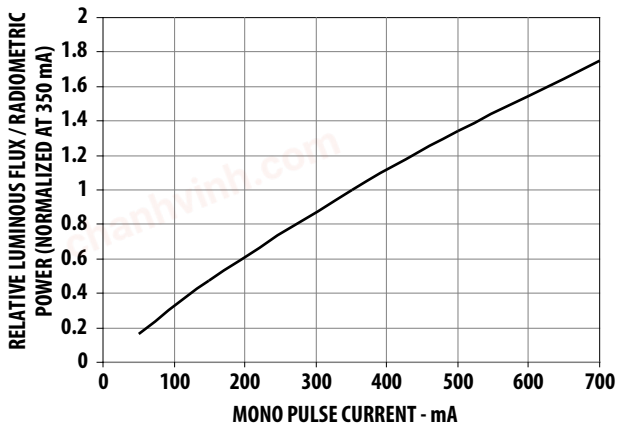


Figure 14. Relative Luminous Flux vs. Mono Pulse Current.

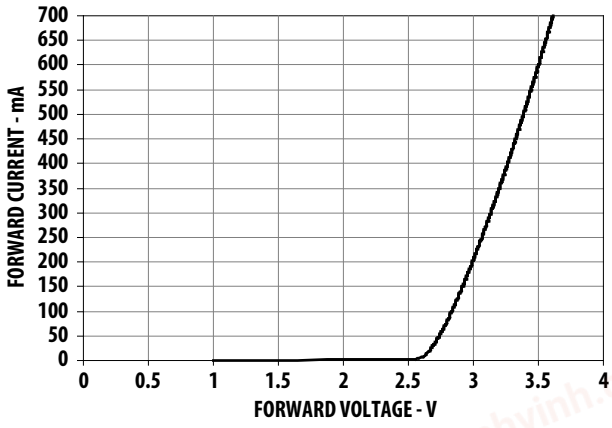


Figure 15. Forward Current vs. Forward Voltage.

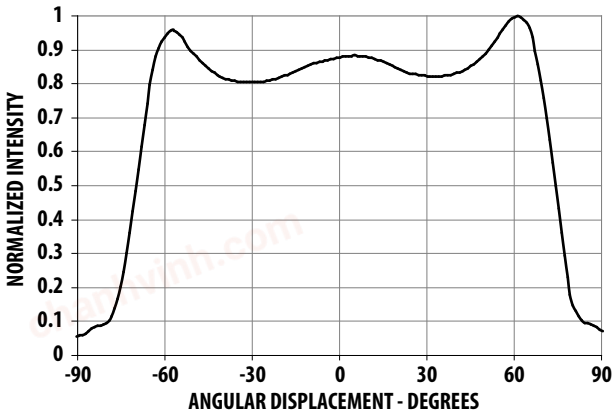


Figure 16. Radiation Pattern for Blue, Royal Blue and Green

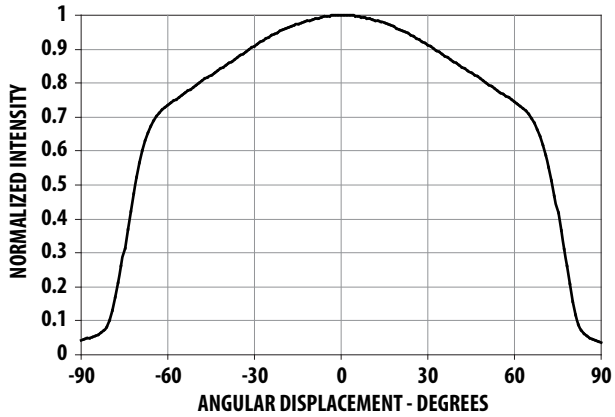


Figure 17. Radiation Pattern for Cool White, Neutral White and Warm White.

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InGaN

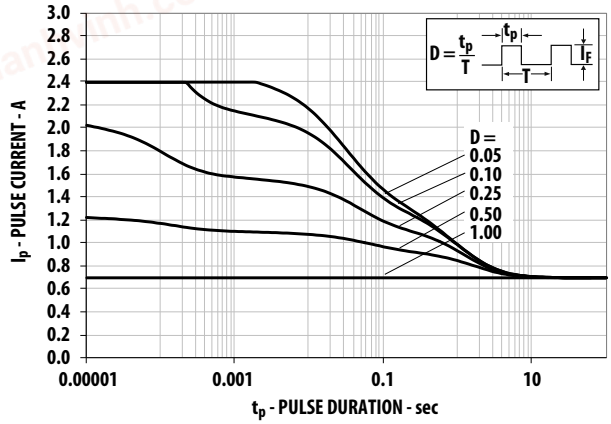


Figure 18. Maximum pulse current vs. pulse duration. Derated based on $T_A = 25°C$, $R\theta_{J-A} = 30°C/W$.

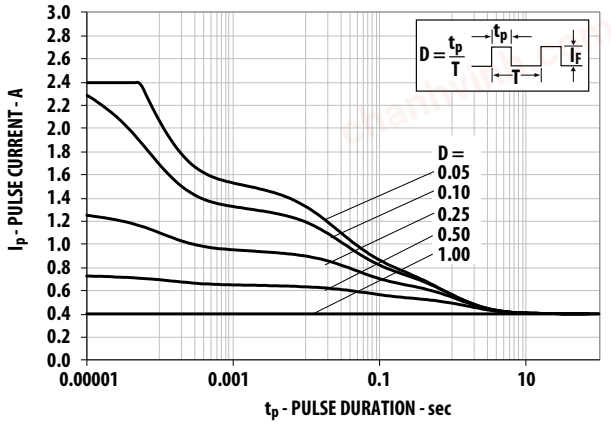


Figure 19. Maximum pulse current vs. pulse duration. Derated based on $T_A = 85°C$, $R\theta_{J-A} = 30°C/W$.

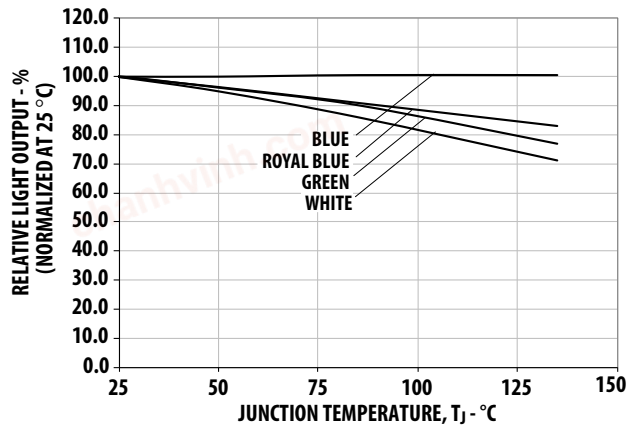


Figure 20. Relative Light Output vs. Junction Temperature.

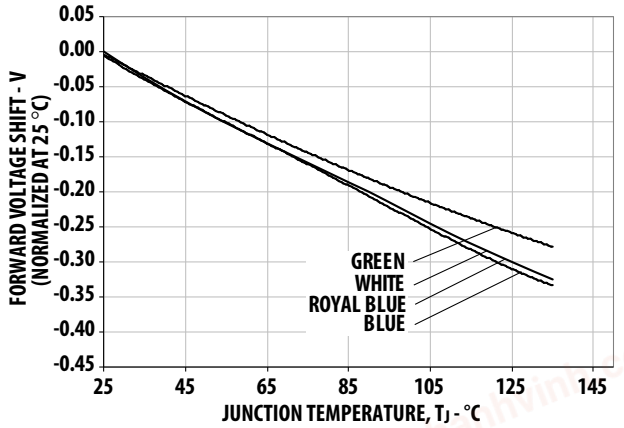


Figure 21. Forward Voltage Shift vs. Junction Temperature.

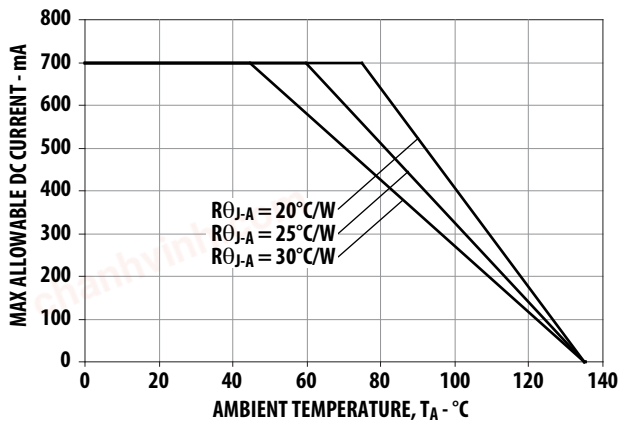


Figure 22. Maximum Forward Current vs. Ambient Temperature. Derated based on $T_{JMAX} = 135°C$, $R\theta_{J-A} = 20°C/W$, 25°C/W and 30°C/W.

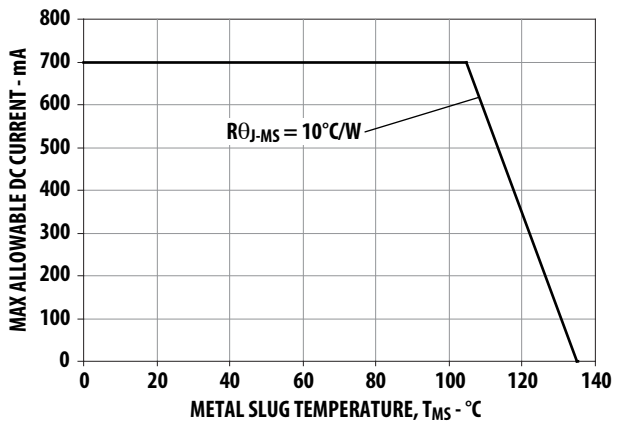


Figure 23. Maximum Forward Current vs. Metal Slug Temperature. Derated based on $T_{JMAX} = 135°C$, $R\theta_{J-MS} = 10°C/W$.

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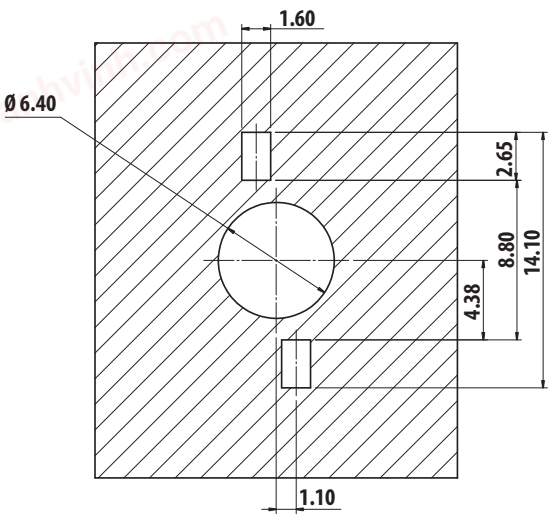


Figure 24. Recommended soldering land pattern.

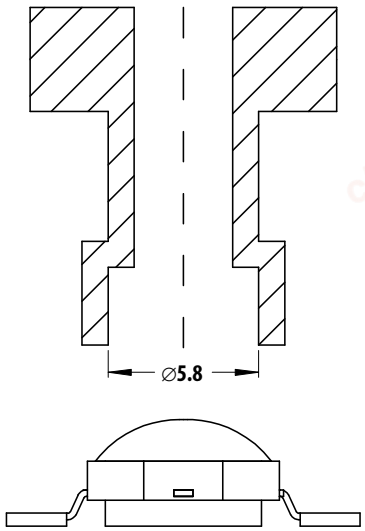


Figure 25. Recommended pick and place nozzle tip.
Inner diameter = 5.8 mm

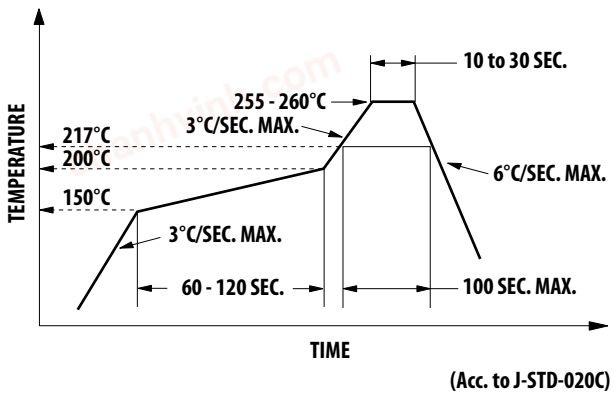


Figure 26. Recommended Reflow Soldering.

Note:
For detail information on reflow soldering of Avago surface mount LEDs, do refer to Avago Application Note AN1060 Surface Mounting SMT LED Indicator Components.

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Option Selection Details

ASMT-A $x_1$3 x_2 – x_3 x_4 x_5 x_6 x_7

x_4 – Minimum Flux Bin Selection
x_5 – Maximum Flux Bin Selection
x_6 – Color Bin Selection
x_7 – Packaging Option

Flux / Power Bin Limit [x_4, x_5]

		Luminous Flux (lm) / Radiometric Power (mW) at 350 mA	
Color	**Bin ID**	**Min.**	**Max.**
Blue	M	13.9	18.1
	N	18.1	23.5
	P	23.5	30.6
Other Colors	R	39.8	51.7
	S	51.7	67.2
	T	67.2	87.4
	U	87.4	99.6
	V	99.6	113.6
	W	113.6	129.5
	X	129.5	147.7
Royal Blue	P	355.0	435.0
	Q	435.0	515.0
	R	515.0	595.0
	S	595.0	685.0

Tolerance for each bin limits is ±10 %

Color Bin Selection [x_6]

Individual reel or tube will contain parts from one color bin selection only.

Cool White

Selection	Bin ID
0	Full Distribution
B	VN and V0
E	VM, UM, VN and UN
F	WM, VM, WN and VN
G	XM, WM, XN and WN
H	UN, VN, U0 and V0
J	WN, VN, W0 and V0
K	XN, WN, X0 and W0
L	V0, U0, VP and UP
M	W0, V0, WP, VP and WQ
N	X0, W0, XP, WP and WQ
P	Y0
Q	YA

Warm White

Selection	Bin ID
0	Full Distribution
A	M0 and MA
B	PA and P0
C	N1 and N0
E	NM, MM, N1 and M1
F	PM, NM, P1 and N1
G	QM, PM, Q1 and P1
H	M1, N1, M0 and N0
J	P1, N1, P0 and N0
K	Q1, P1, Q0 and P0
L	N0, M0, NA and MA
M	P0, N0, PA and NA
N	Q0, P0, QA and PA

Neutral White

Selection	Bin ID
0	Full Distribution
A	S1 and S0
B	S0 and R0
E	SM, RM, S1 and R1
F	TM, SM, TN and S1
G	S1, R1, S0 and R0
H	TN, S1, T0 and S0
J	S0, R0, SA and RA
K	T0, S0, TP and SA

Other Colors

Selection	Bin ID
0	Full Distribution
Z	A and B
Y	B and C
W	C and D
V	D and E
Q	A, B and C
P	B, C and D
N	C, D and E
M	D, E and F

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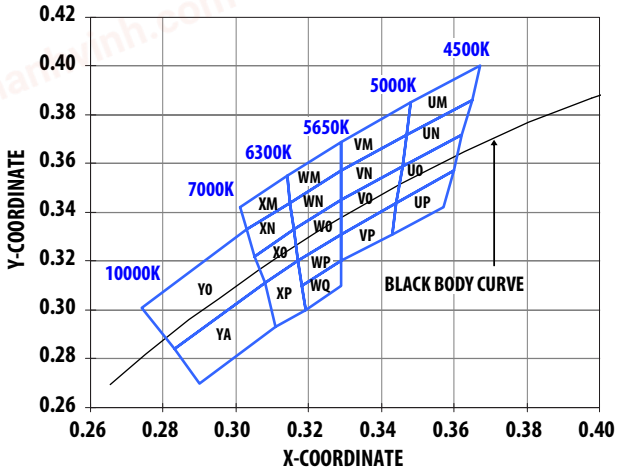


Figure 27. Color bin structure for Cool White.

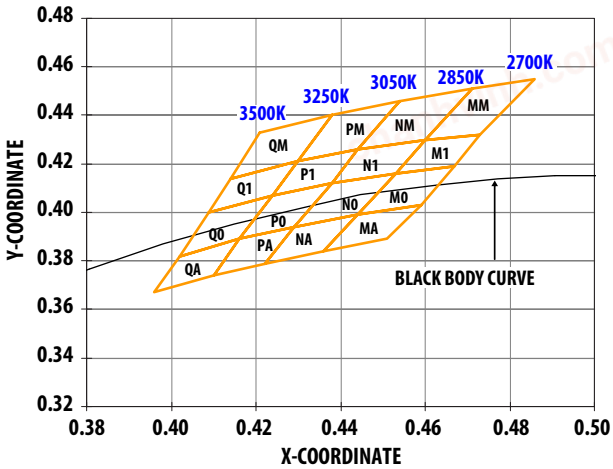


Figure 28. Color bin structure for Warm White.

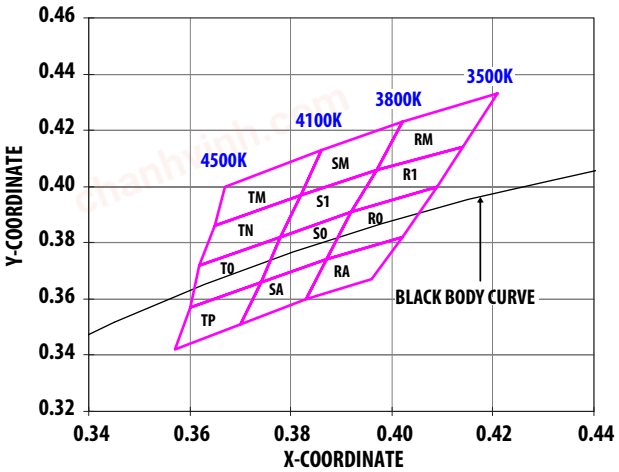


Figure 29. Color bin structure for Neutral White.

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Color Bin Limit

Cool White	Color Limits (Chromaticity Coordinates)				
Bin UM	x	0.365	0.367	0.348	0.347
	y	0.386	0.400	0.385	0.372
Bin UN	x	0.365	0.362	0.346	0.347
	y	0.386	0.372	0.359	0.372
Bin U0	x	0.362	0.360	0.344	0.346
	y	0.372	0.357	0.344	0.359
Bin UP	x	0.360	0.357	0.343	0.344
	y	0.357	0.342	0.311	0.344
Bin VM	x	0.329	0.329	0.348	0.347
	y	0.357	0.369	0.385	0.372
Bin VN	x	0.329	0.329	0.347	0.346
	y	0.345	0.357	0.372	0.359
Bin V0	x	0.329	0.329	0.346	0.344
	y	0.311	0.345	0.359	0.344
Bin VP	x	0.329	0.344	0.343	0.329
	y	0.331	0.344	0.331	0.320
Bin WM	x	0.329	0.329	0.315	0.314
	y	0.369	0.357	0.344	0.355
Bin WN	x	0.329	0.316	0.315	0.329
	y	0.345	0.333	0.344	0.357
Bin W0	x	0.329	0.329	0.317	0.316
	y	0.345	0.331	0.320	0.333
Bin WP	x	0.329	0.329	0.318	0.317
	y	0.331	0.320	0.310	0.320
Bin WQ	x	0.329	0.329	0.319	0.318
	y	0.320	0.310	0.300	0.310
Bin XM	x	0.301	0.314	0.315	0.303
	y	0.342	0.355	0.344	0.333
Bin XN	x	0.305	0.303	0.315	0.316
	y	0.322	0.333	0.344	0.333
Bin X0	x	0.308	0.305	0.316	0.317
	y	0.311	0.322	0.333	0.320
Bin XP	x	0.308	0.317	0.319	0.311
	y	0.311	0.320	0.300	0.293
Bin Y0	x	0.308	0.283	0.274	0.303
	y	0.311	0.284	0.301	0.333
Bin YA	x	0.308	0.311	0.290	0.283
	y	0.311	0.293	0.270	0.284

Tolerance: ± 0.01

Warm White	Color Limits (Chromaticity Coordinates)				
Bin MM	x	0.471	0.460	0.473	0.486
	y	0.451	0.430	0.432	0.455
Bin M1	x	0.460	0.453	0.467	0.473
	y	0.430	0.416	0.419	0.432
Bin M0	x	0.453	0.444	0.459	0.467
	y	0.416	0.399	0.403	0.419
Bin MA	x	0.459	0.444	0.436	0.451
	y	0.403	0.399	0.384	0.389
Bin NM	x	0.454	0.444	0.460	0.471
	y	0.446	0.426	0.430	0.451
Bin N1	x	0.444	0.438	0.453	0.460
	y	0.426	0.412	0.416	0.430
Bin N0	x	0.438	0.429	0.444	0.453
	y	0.412	0.394	0.399	0.416
Bin NA	x	0.444	0.429	0.422	0.436
	y	0.399	0.394	0.379	0.384
Bin PM	x	0.438	0.430	0.444	0.454
	y	0.440	0.421	0.426	0.446
Bin P1	x	0.430	0.424	0.438	0.444
	y	0.421	0.407	0.412	0.426
Bin P0	x	0.424	0.416	0.429	0.438
	y	0.407	0.389	0.394	0.412
Bin PA	x	0.429	0.416	0.410	0.422
	y	0.394	0.389	0.374	0.379
Bin QM	x	0.421	0.414	0.430	0.438
	y	0.433	0.414	0.421	0.440
Bin Q1	x	0.414	0.409	0.424	0.430
	y	0.414	0.400	0.407	0.421
Bin Q0	x	0.409	0.402	0.416	0.424
	y	0.400	0.382	0.389	0.407
Bin QA	x	0.416	0.402	0.396	0.410
	y	0.389	0.382	0.367	0.374

Tolerance: ± 0.01

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Neutral White	Color Limits (Chromaticity Coordinates)				
Bin RM	x	0.421	0.414	0.397	0.402
	y	0.433	0.414	0.406	0.423
Bin R1	x	0.414	0.409	0.392	0.397
	y	0.414	0.400	0.391	0.406
Bin R0	x	0.392	0.387	0.402	0.409
	y	0.391	0.374	0.382	0.400
Bin RA	x	0.387	0.383	0.396	0.402
	y	0.374	0.360	0.367	0.382
Bin SM	x	0.402	0.397	0.382	0.386
	y	0.423	0.406	0.397	0.413
Bin S1	x	0.397	0.392	0.378	0.382
	y	0.406	0.391	0.382	0.397
Bin S0	x	0.392	0.387	0.374	0.378
	y	0.391	0.374	0.366	0.382
Bin SA	x	0.387	0.383	0.370	0.374
	y	0.374	0.360	0.351	0.366
Bin TM	x	0.386	0.382	0.365	0.367
	y	0.413	0.397	0.386	0.400
Bin TN	x	0.382	0.378	0.362	0.365
	y	0.397	0.382	0.372	0.386
Bin T0	x	0.378	0.374	0.360	0.362
	y	0.382	0.366	0.357	0.372
Bin TP	x	0.374	0.370	0.357	0.360
	y	0.366	0.351	0.342	0.357

Tolerance: ± 0.01

		Dominant Wavelength (nm) at 350 mA	
Color	Bin ID	Min.	Max.
Red	–	620.0	635.0
Red Orange	–	610.0	620.0
Amber	B	587.0	589.5
	C	589.5	592.0
	D	592.0	594.5
	E	594.5	597.0
Green	A	515.0	520.0
	B	520.0	525.0
	C	525.0	530.0
	D	530.0	535.0
Blue	A	455.0	460.0
	B	460.0	465.0
	C	465.0	470.0
	D	470.0	475.0

Tolerance: ±1 nm

		Peak Wavelength (nm) at 350 mA	
Color	Bin ID	Min.	Max.
Royal Blue	C	440.0	445.0
	D	445.0	450.0
	E	450.0	455.0
	F	455.0	460.0

Tolerance: ±2 nm

Packaging Option [x_7]

Selection	Option
0	Tube
1	Tape and Reel

Example

ASMT-AW31-NUV00

ASMT-AW31-Nxxxx	–	Cool White, InGaN, Electrically isolated Heat Sink
x_4 = U	–	Minimum Flux Bin U
x_5 = V	–	Maximum Flux Bin V
x_6 = 0	–	Full Distribution
x_7 = 0	–	Tube Option

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Packing Tube – Option 0

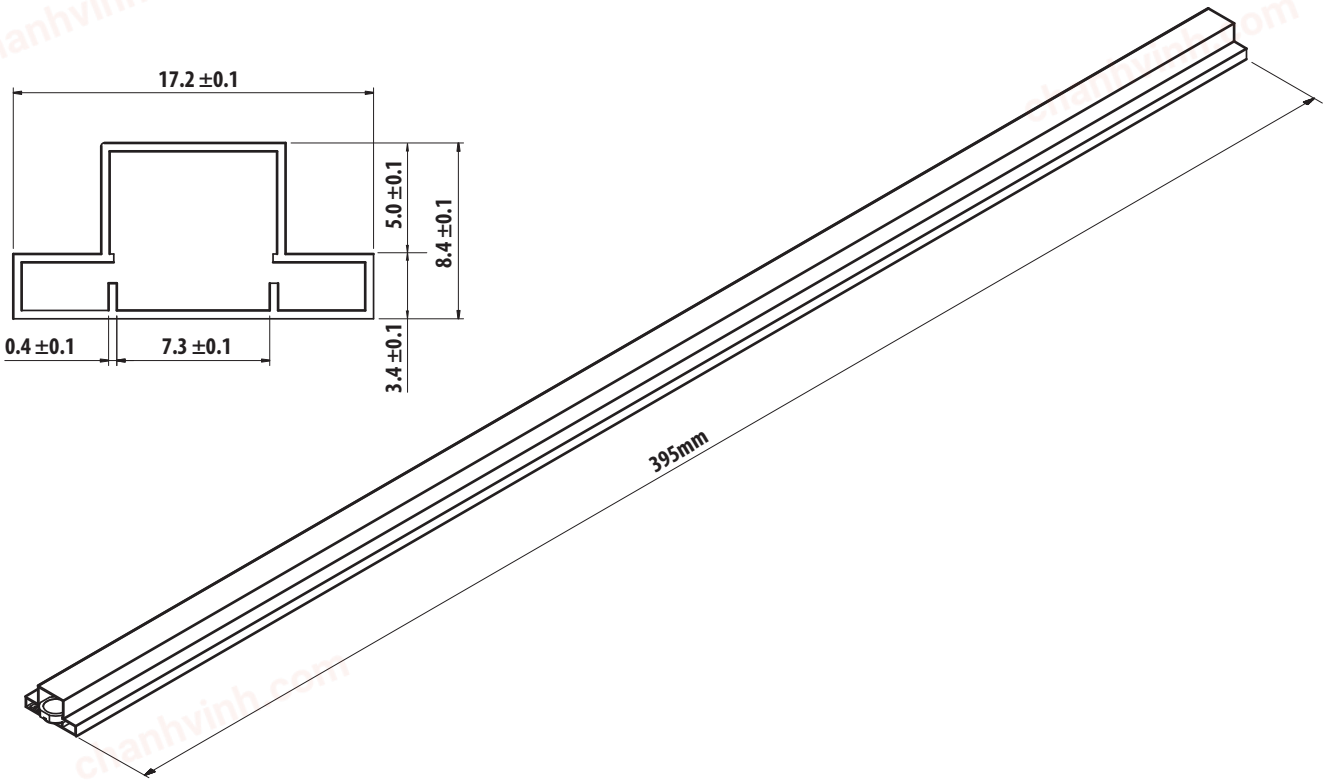


Figure 30. Package tube dimensions.

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Tape and Reel – Option 1

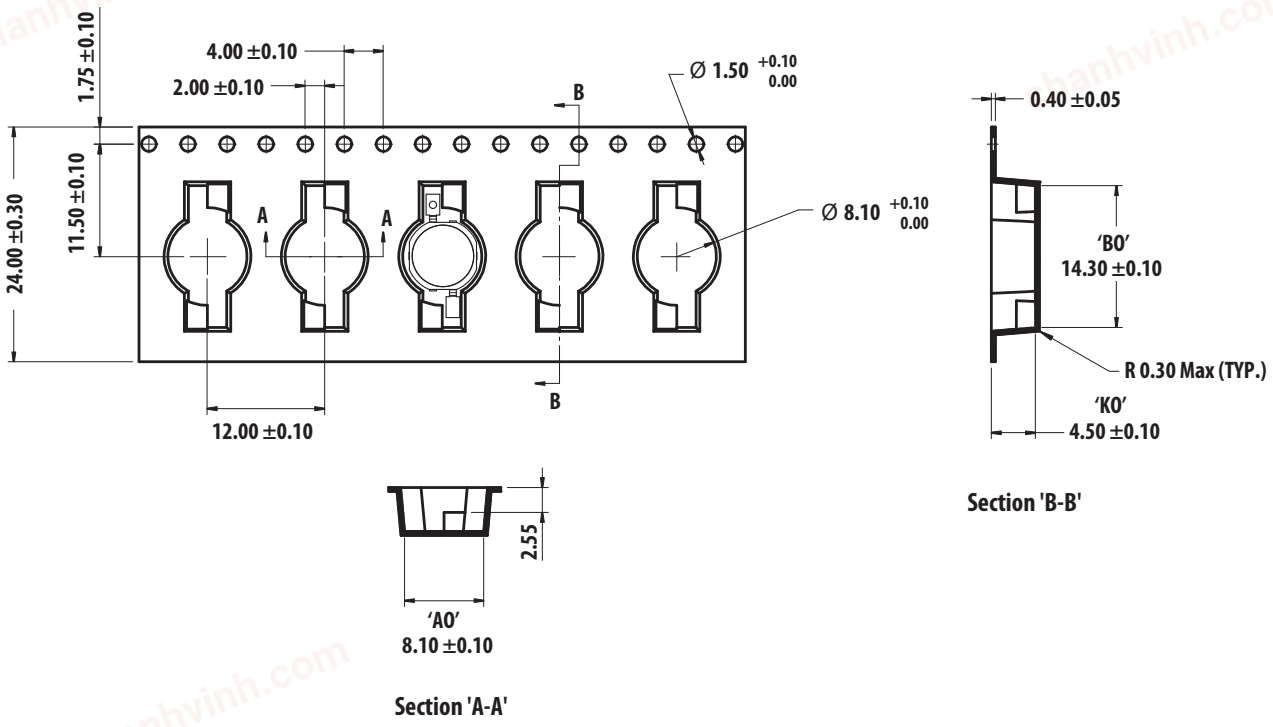


Figure 31. Carrier tape dimensions.

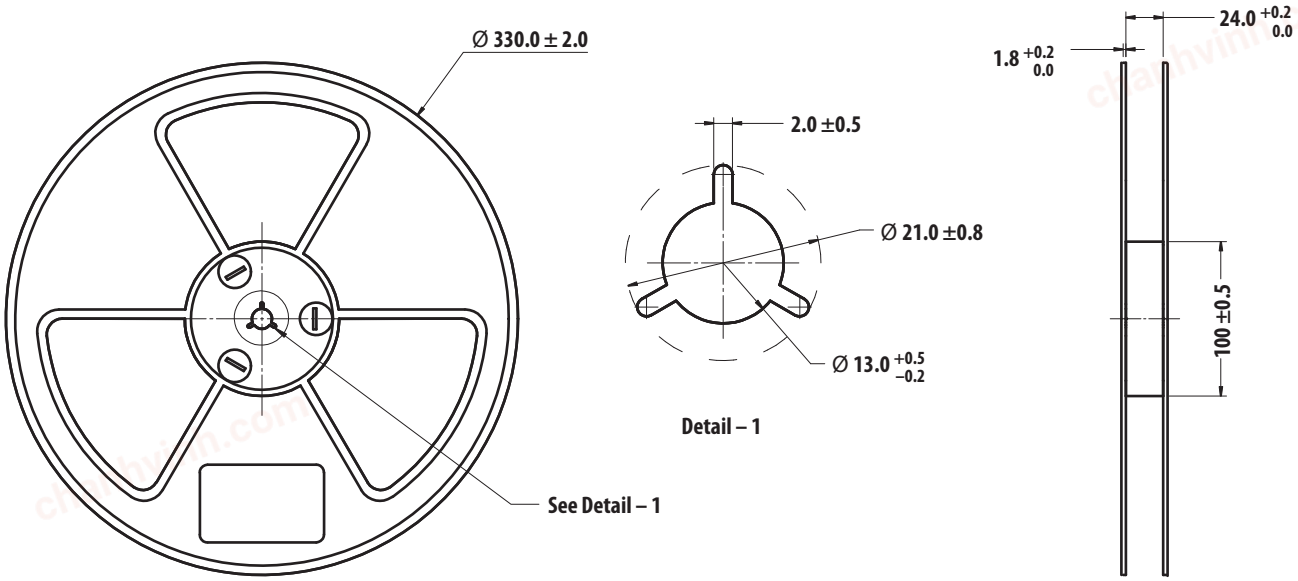


Figure 32. Reel dimensions.

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Handling Precaution

The encapsulation material of the product is made of silicone for better reliability of the product. As silicone is a soft material, please do not press on the silicone or poke a sharp object onto the silicone. These might damage the product and cause premature failure. During assembly of handling, the unit should be held on the body only. Please refer to Avago Application Note AN 5288 for detail information.

Moisture Sensitivity

This product is qualified as Moisture Sensitive Level 2a per Jedec J-STD-020. Precautions when handling this moisture sensitive product is important to ensure the reliability of the product. Do refer to Avago Application Note AN5305 Handling of Moisture Sensitive Surface Mount Devices for details.

A. Storage before use

- Unopen moisture barrier bag (MBB) can be stored at < 40°C/90%RH for 12 months. If the actual shelf life has exceeded 12 months and the humidity indicator card (HIC) indicates that baking is not required, then it is safe to reflow the LEDs per the original MSL rating.
- It is not recommended to open the MBB prior to assembly (e.g. for IQC).

B. Control after opening the MBB

- The humidity indicator card (HIC) shall be read immediately upon opening of MBB.
- The LEDs must be kept at < 30°C/60%RH at all time and all high temperature related process including soldering, curing or rework need to be completed within 672 hours.

C. Control for unfinished reel

- For any unused LEDs, they need to be stored in sealed MBB with desiccant or desiccator at < 5%RH.

D. Control of assembled boards

- If the PCB soldered with the LEDs is to be subjected to other high temperature processes, the PCB need to be stored in sealed MBB with desiccant or desiccator at < 5%RH to ensure no LEDs have exceeded their floor life of 672 hours.

E. Baking is required if:

- HIC "10%" indicator is NOT Brown and "5%" indicator is Azure.
- The LEDs are exposed to condition of > 30°C/60%RH at any time.
- The LED floor life exceeded 672 hrs.

Recommended baking condition: 60±5°C for 20 hrs.

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