Kingbright

3.5x2.8mm SURFACE MOUNT LED LAMP

ATTENTION
OBSERVE PRECAUTIONS
FOR HANDLING
ELECTROSTATIC
DISCHARGE
SENSITIVE
DEVICES

Part Number: AAA3528QWDSURKS-AMT

White
Hyper Red

Features

- Industry standard PLCC-4 package.
- High reliability LED package.
- Wide viewing angle.
- Both chips can be controlled separately .
- Suitable for all smt assembly and solder process.
- Available on tape and reel.
- Package : 2000pcs / reel.
- Moisture sensitivity level : Level 3.
- RoHS compliant.

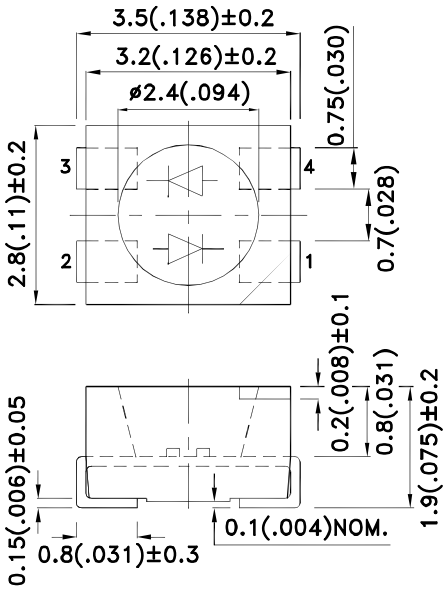
Descriptions

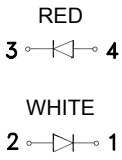
- The source color devices are made with InGaN Light Emitting Diode.
- The Hyper Red source color devices are made with AlGaInP on GaAs substrate Light Emitting Diode.
- Electrostatic discharge and power surge could damage the LEDs.
- It is recommended to use a wrist band or anti-electrostatic glove when handling the LEDs.
- All devices, equipments and machineries must be electrically grounded.

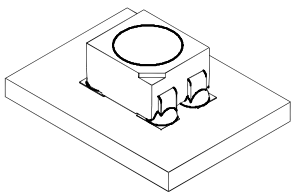
Applications

- Traffic signaling.
- Backlighting (illuminated advertising , general lighting).
- Interior and exterior automotive lighting.
- Substitution of micro incandescent lamps.
- Reading lamps.
- Signal and symbol luminaire for orientation.
- Marker lights (e.g. Steps, exit ways, etc).
- Decorative and entertainment lighting.
- Indoor and outdoor commercial and residential architectural lighting.

Package Dimensions





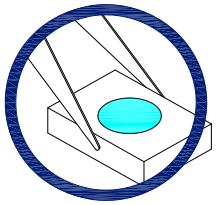


Notes:
1. All dimensions are in millimeters (inches).
2. Tolerance is ±0.25(0.01") unless otherwise noted.
3. The specifications, characteristics and technical data described in the datasheet are subject to change without prior notice.
4. The device has a single mounting surface. The device must be mounted according to the specifications.

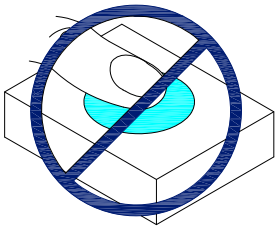
Handling Precautions

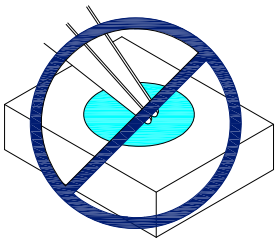
Compare to epoxy encapsulant that is hard and brittle, silicone is softer and flexible. Although its characteristic significantly reduces thermal stress, it is more susceptible to damage by external mechanical force.
As a result, special handling precautions need to be observed during assembly using silicone encapsulated LED products. Failure to comply might lead to damage and premature failure of the LED.

1. Handle the component along the side surfaces by using forceps or appropriate tools.

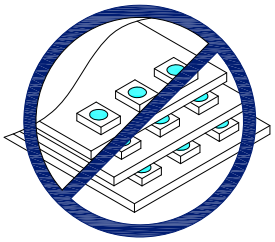


2. Do not directly touch or handle the silicone lens surface. It may damage the internal circuitry.

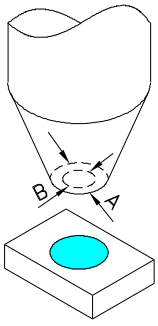




3. Do not stack together assembled PCBs containing exposed LEDs. Impact may scratch the silicone lens or damage the internal circuitry.



4.1. The inner diameter of the SMD pickup nozzle should not exceed the size of the LED to prevent air leaks.
4.2. A pliable material is suggested for the nozzle tip to avoid scratching or damaging the LED surface during pickup.
4.3. The dimensions of the component must be accurately programmed in the pick-and-place machine to insure precise pickup and avoid damage during production.



5. 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.

Selection Guide

Part No.	Dice	Lens Type	Iv (mcd) [2] @ 20mA			Viewing Angle [1]
			Code.	Min.	Max.	2θ1/2
AAA3528QWDSURKS-AMT	White (InGaN)	Water Clear	Q	300	400	120°
			R	400	500	
			S	500	700	
			T	700	1000	
			*Q	*300	*400	
			*R	*400	*500	
			*S	*500	*700	
			*T	*700	*1000	
	Hyper Red (AlGaInP)		P	200	300	
			Q	300	400	
			R	400	500	
			*H	*55	*80	
			*M	*80	*120	
			*N	*120	*200	

Notes:
1. θ1/2 is the angle from optical centerline where the luminous intensity is 1/2 of the optical peak value.
2. Luminous intensity/ luminous Flux: +/-15%.
* Luminous intensity value is traceable to the CIE127-2007 compliant national standards.

Absolute Maximum Ratings at TA=25°C

Parameter		Symbol	Value		Unit
			White	Hyper Red	
Power dissipation		P_D	80	75	mW
Operating Temperature		Top	-40 To+ 100		°C
Storage Temperature		Tstg	-40 To+ 110		°C
Junction temperature		T_J	115	115	°C
DC Forward Current (TA=25°C)		I_F	20	30	mA
Peak Forward Current [1] (TA=25°C)		I_{FM}	150	185	mA
Reverse Voltage (TA=25°C)		V_R	5	5	V
Electrostatic Discharge Threshold (HBM)			250	3000	V
Thermal resistance (Junction/ambient)	1chip on (typ.)	$R_{th\ j\text{-}a}$	470	360	°C/W
	2 chip on (typ.)	$R_{th\ j\text{-}a}$	560	490	
	1 chip on (max.)	$R_{th\ j\text{-}a}$ [2]	500	450	
	2 chip on (max.)	$R_{th\ j\text{-}a}$ [2]	600	550	

Note:
1.1/10 Duty Cycle, 0.1ms Pulse Width.
2.Rth(max) is based on statistic values.

Electrical / Optical Characteristics at TA=25°C (White)

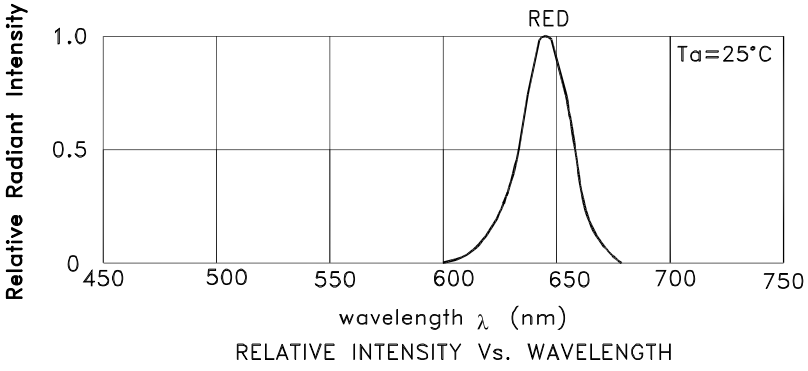
Parameter	Symbol	Value	Unit
Chromaticity coordinate x acc.to CIE1931 I_F=20mA [Typ.]	x [1]	0.31	
Chromaticity coordinate y acc.to CIE1931 I_F=20mA [Typ.]	y [1]	0.31	
Reverse Current (V_R = 5V) [Max.]	I_R	50	uA
Forward Voltage I_F=20mA [Min.]	V_F [2]	-	V
Forward Voltage I_F=20mA [Typ.]		3.3	
Forward Voltage I_F=20mA [Max.]		4.0	
Temperature coefficient of V_F I_F=20mA, -10° C≤ T≤100° C [Typ.]	TC_V	-2.5	mV/° C
Temperature coefficient of x I_F=20mA, -10° C≤ T≤100° C [Typ.]	TC_X	-0.1	10^{-3}/° C
Temperature coefficient of y I_F=20mA, -10° C≤ T≤100° C [Typ.]	TC_y	-0.2	10^{-3}/° C

Notes:
1.Measurement tolerance of the chromaticity coordinates is ±0.01.
2.Forward Voltage: +/-0.1V.
3.Excess driving current and/or operating temperature higher than recommended conditions may result in severe light degradation or premature failure.

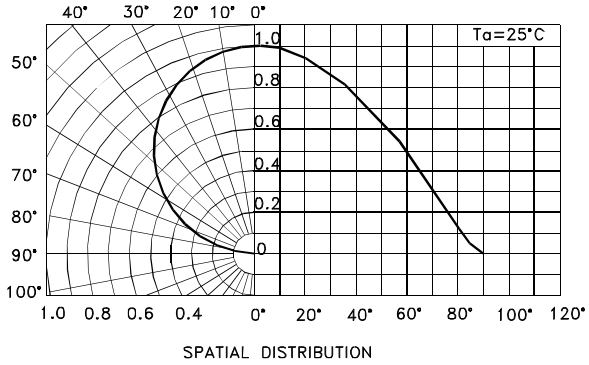
Electrical / Optical Characteristics at TA=25°C (Red)

Parameter	Symbol	Value			Unit
		Min.	Typ.	Max.	
Wavelength at peak emission I_F=20mA	λ peak		645		nm
Dominant Wavelength I_F=20mA	λ dom [1]	620		640	nm
Spectral bandwidth at 50%Φ REL MAX I_F=20mA	Δλ		28		nm
Forward Voltage I_F=20mA	V_F [2]		1.95	2.5	V
Reverse Current (V_R = 5V)	I_R			10	uA
Temperature coefficient of λ peak I_F=20mA, -10° C≤ T≤100° C	TC λ peak		0.14		nm/° C
Temperature coefficient of λ dom I_F=20mA, -10° C≤ T≤100° C	TC λ dom		0.08		nm/° C
Temperature coefficient of V_F I_F=20mA, -10° C≤ T≤100° C	TC_V		-2.2		mV/° C

Notes:
1.The dominant Wavelength (λ d) above is the setup value of the sorting machine. (Tolerance λ d : ±1nm.)
2.Forward Voltage: +/-0.1V.
3.Wavelength value is traceable to the CIE127-2007 compliant national standards.
4.Excess driving current and/or operating temperature higher than recommended conditions may result in severe light degradation or premature failure.

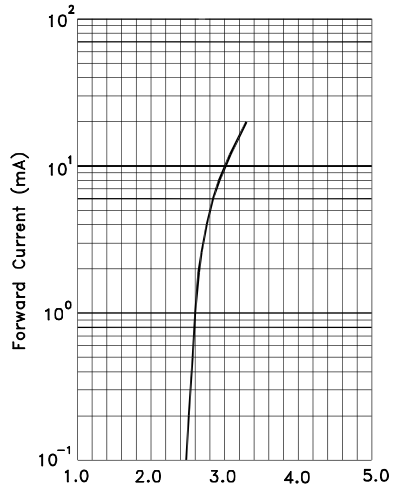


RELATIVE INTENSITY Vs. WAVELENGTH

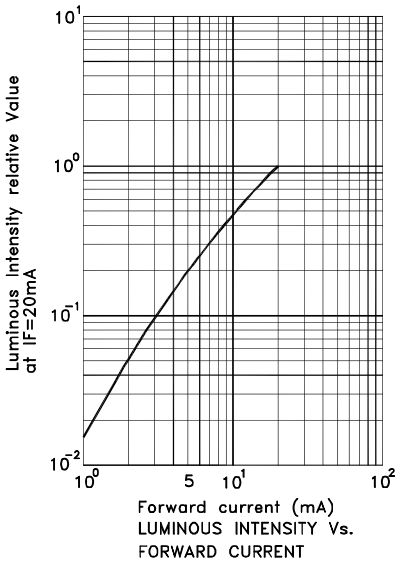


SPATIAL DISTRIBUTION

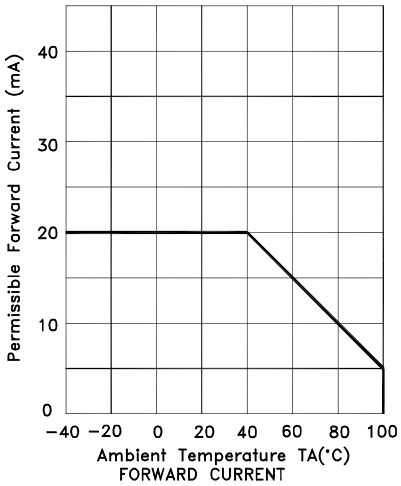
White **AAA3528QWDSURKS-AMT**



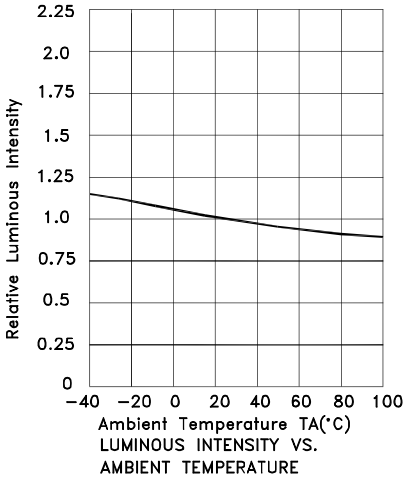
FORWARD CURRENT Vs.
FORWARD VOLTAGE



LUMINOUS INTENSITY Vs.
FORWARD CURRENT

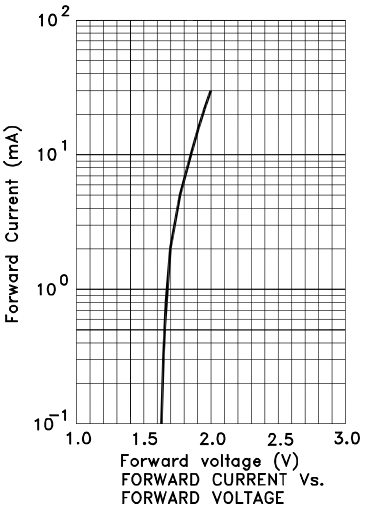


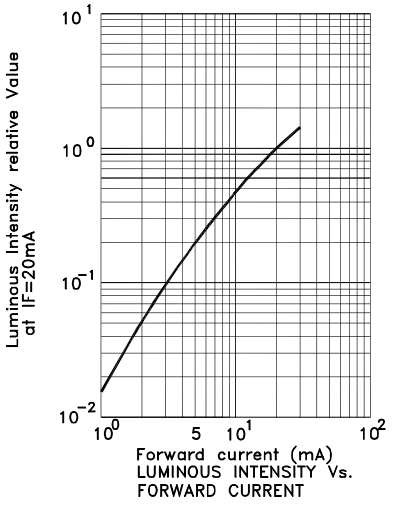
FORWARD CURRENT
DERATING CURVE

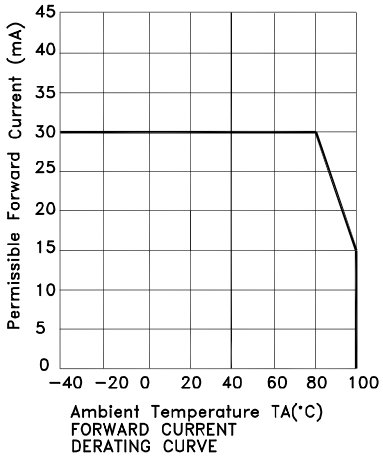


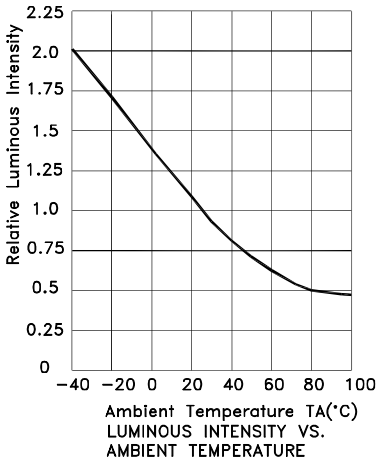
LUMINOUS INTENSITY VS.
AMBIENT TEMPERATURE

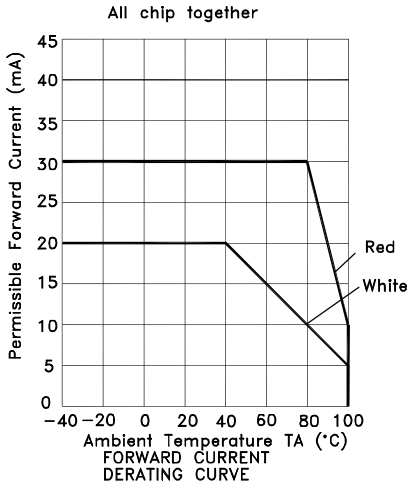
Hyper Red


Forward Current (mA)
10^2
10^1
10^0
10^{-1}
1.0 1.5 2.0 2.5 3.0
Forward voltage (V)
FORWARD CURRENT Vs.
FORWARD VOLTAGE


Luminous Intensity relative Value at IF=20mA
10^1
10^0
10^{-1}
10^{-2}
10^0 5 10^1 10^2
Forward current (mA)
LUMINOUS INTENSITY Vs.
FORWARD CURRENT

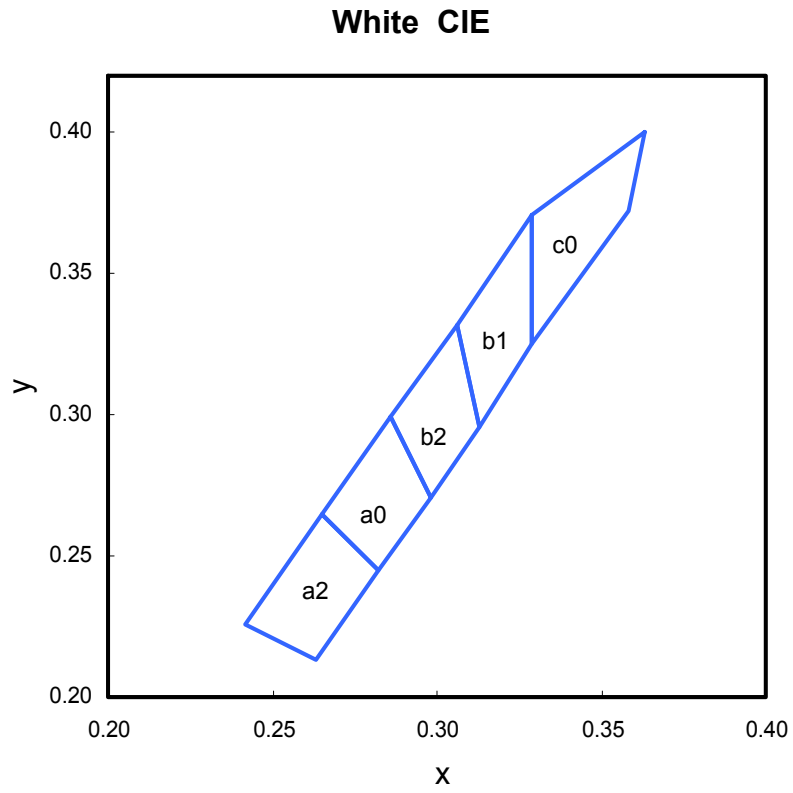

Permissible Forward Current (mA)
45 40 35 30 25 20 15 10 5 0
−40 −20 0 20 40 60 80 100
Ambient Temperature TA(°C)
FORWARD CURRENT
DERATING CURVE


Relative Luminous Intensity
2.25 2.0 1.75 1.5 1.25 1.0 0.75 0.5 0.25 0
−40 −20 0 20 40 60 80 100
Ambient Temperature TA(°C)
LUMINOUS INTENSITY VS.
AMBIENT TEMPERATURE


All chip together
Permissible Forward Current (mA)
45 40 35 30 25 20 15 10 5 0
Red
White
−40 −20 0 20 40 60 80 100
Ambient Temperature TA (°C)
FORWARD CURRENT
DERATING CURVE

Kingbright

White **AAA3528QWDSURKS-AMT**



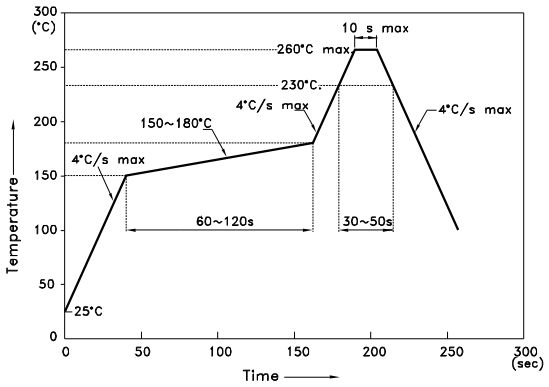
	x	y		x	y		x	y
a2	0.263	0.213	a0	0.282	0.245	b2	0.298	0.271
	0.282	0.245		0.298	0.271		0.313	0.296
	0.265	0.265		0.286	0.299		0.306	0.332
	0.242	0.226		0.265	0.265		0.286	0.299
b1	0.313	0.296	c0	0.329	0.325			
	0.329	0.325		0.358	0.372			
	0.329	0.371		0.363	0.400			
	0.306	0.332		0.329	0.371			

Notes:
Shipment may contain more than one chromaticity regions.
Orders for single chromaticity region are generally not accepted.
Measurement tolerance of the chromaticity coordinates is ±0.01.

AAA3528QWDSURKS-AMT

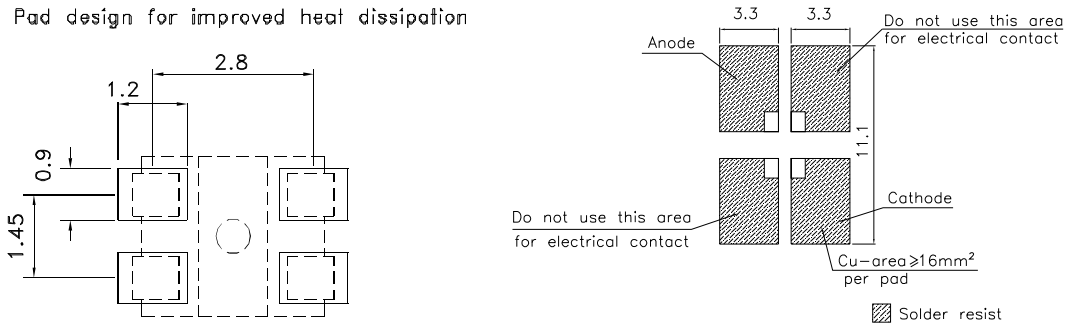
Reflow soldering is recommended and the soldering profile is shown below.
Other soldering methods are not recommended as they might cause damage to the product.

Reflow Soldering Profile For Lead-free SMT Process.



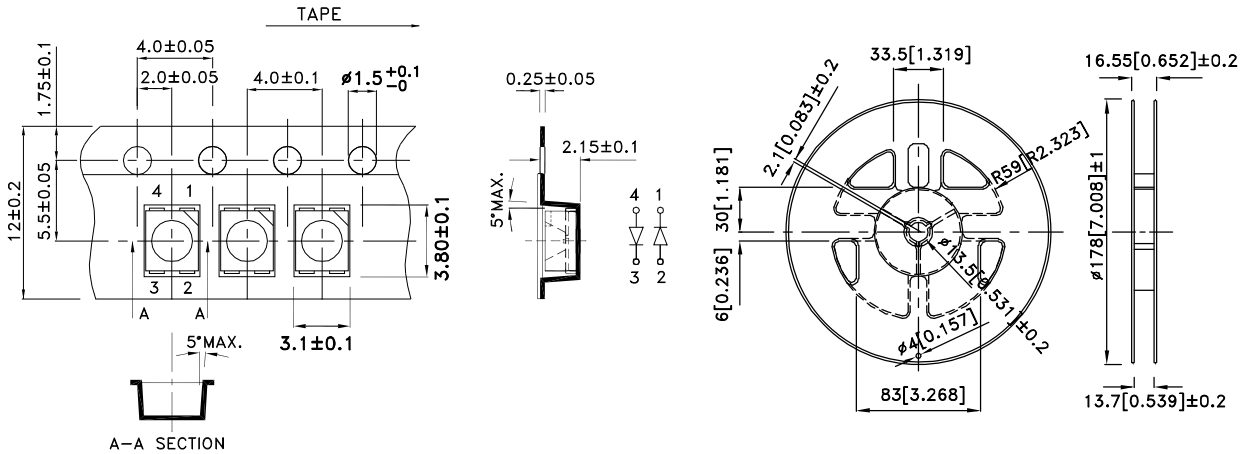
NOTES:
1. We recommend the reflow temperature 245°C(+/-5°C).The maximum soldering temperature should be limited to 260°C.
2. Don't cause stress to the epoxy resin while it is exposed to high temperature.
3. Number of reflow process shall be 2 times or less.

Recommended Soldering Pattern (Units : mm; Tolerance: ± 0.1)

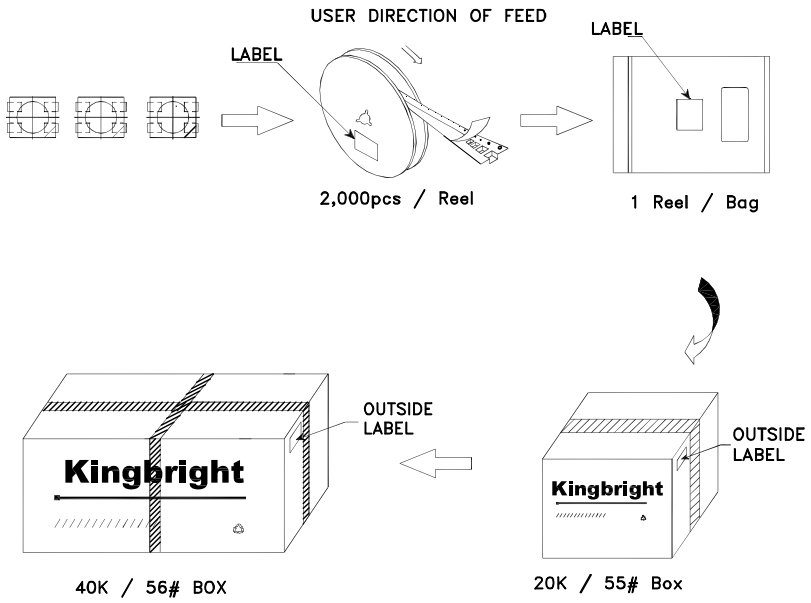


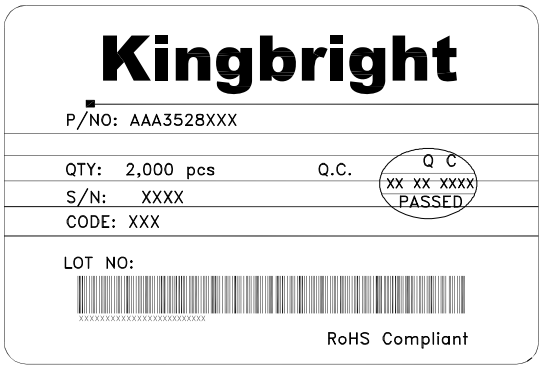
Tape Specifications (Units : mm)

Reel Dimension



PACKING & LABEL SPECIFICATIONS **AAA3528QWDSURKS-AMT**





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Reliability Test Items And Conditions

The reliability of products shall be satisfied with items listed below

Lot Tolerance Percent Defective (LTPD) : 10%

No.	Test Item	Standards	Test Condition	Test Times / Cycles	Number of Damaged
1	Continuous operating test	-	Ta =25°C ,IF = maximum rated current*	1,000 h	0 / 22
2	High Temp. operating test	EIAJ ED-4701/100(101)	Ta = 100°C IF =derated current at 100°C	1,000 h	0 / 22
3	Low Temp. operating test	-	Ta = -40°C, IF = maximum rated current*	1,000 h	0 / 22
4	High temp. storage test	EIAJ ED-4701/100(201)	Ta = maximum rated storage temperature	1,000 h	0 / 22
5	Low temp. storage test	EIAJ ED-4701/100(202)	Ta = -40°C	1,000 h	0 / 22
6	High temp. & humidity storage test	-	Ta = 60°C, RH = 90%	500 h	0 / 22
7	High temp. & humidity operating test	-	Ta = 60°C, RH = 90% IF = derated current at 60°C	500 h	0 / 22
8	Resistance to Soldering Heat	EIAJ ED-4701/100(301)	Moisture soak : 30°C,70% RH, 72h Preheat : 150~180°C(120s max.) Soldering temp : 260°C(10s)	2 times	0 / 18
9	Thermal shock operating test	-	Ta = -40°C(15min) ~ 100°C(15min) IF = derated current at 100°C	1,000 cycles	0 / 22
10	Thermal shock test	-	Ta = -40°C(15min) ~ 100°C(15min)	1,000 cycles	0 / 22
11	Electric Static Discharge (ESD)	EIAJ ED-4701/100(304)	C = 100pF , R2 = 1.5KΩ V = 250V (White) V= 3000V (Red)	Once each Polarity	0 / 22
12	Vibration test	-	a = 196m/s² , f = 100~2KHz , t = 48min for all xyz axes	4 times	0 / 22

＊ : Refer to forward current vs. derating curve diagram

Failure Criteria

Items	Symbols	Conditions	Failure Criteria
luminous Intensity	I_V	I_F = 20mA	Testing Min. Value <Spec.Min.Value x 0.5
Forward Voltage	V_F	I_F = 20mA	Testing Max. Value ≥Spec.Max.Value x 1.2
Reverse Current	I_R	V_R = Maximum Rated Reverse Voltage	Testing Max. Value ≥Spec.Max.Value x 2.5
High temp. storage test	-	-	Occurrence of notable decoloration, deformation and cracking