

Kingbright

Application Notes

2005-2006

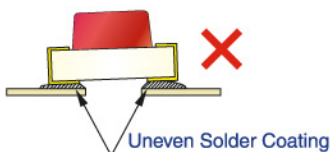
Soldering

General Notes

1. We recommend manual soldering operations only for repair and rework purposes. The soldering iron should not exceed 30W in power. 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 (425nm), and blue-green (525nm) LEDs, the maximum soldering iron temperature is 280 °C. Do not place the soldering iron on the component for more than 3 seconds.



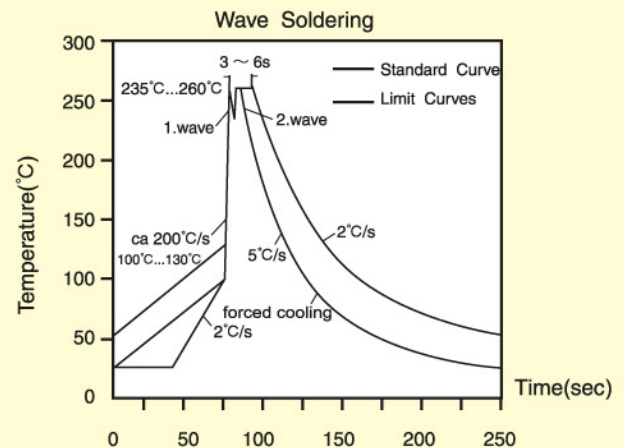
2. The tip of the soldering iron should never touch the lens epoxy.
3. Do not apply stress to the leads when the component is heated above 85 °C, otherwise internal wire bonds may be damaged.
4. SMD products must be mounted according to specified soldering pad patterns. Refer to the product datasheet for details. Solder paste must be evenly applied to each soldering pad to insure proper bonding and positioning of the component.



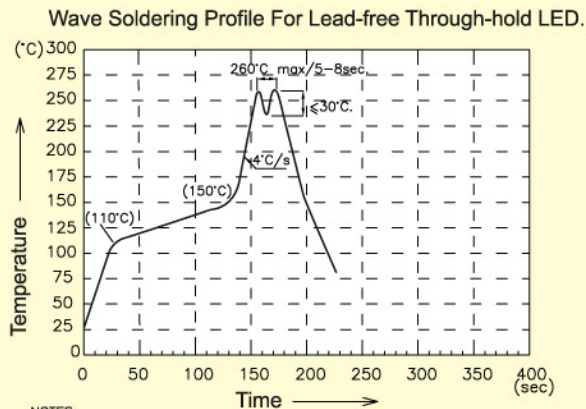
5. After soldering, allow at least three minutes for the component to cool to room temperature before further operations.

Recommended Wave Soldering Profiles For Kingbright Thru-Hole Products

1. Wave Soldering Profile With Pb-Sn Solder



2. Lead-Free Wave Soldering Profile



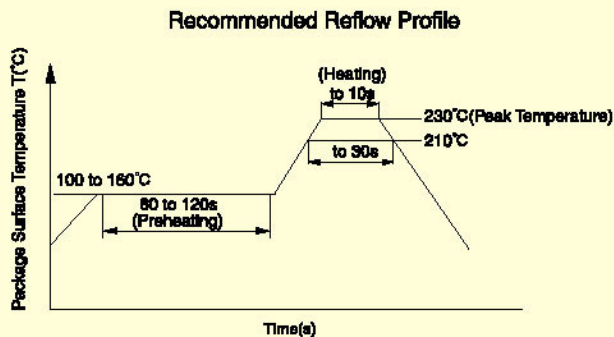
- NOTES:
1. Recommend the wave temperature 245°C~260°C. The maximum soldering temperature should be less than 260°C.
 2. Do not apply stress on epoxy resins when temperature is over 85 degree°C.
 3. The soldering profile apply to the lead free soldering (Sn/Cu/Ag alloy).
 4. No more than once.



Recommended Reflow Soldering Profiles For Kingbright SMD Products

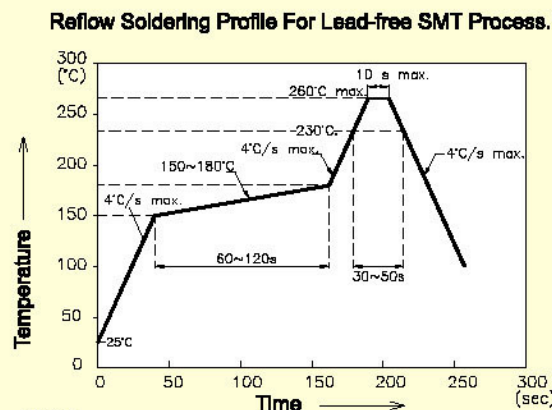
1. Reflow Soldering Profile With Pb-Sn Solder

No more than two soldering passes with the recommended profile.



2. Lead-Free Reflow Soldering Profile

No more than two soldering passes with the recommended profile.



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.

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.

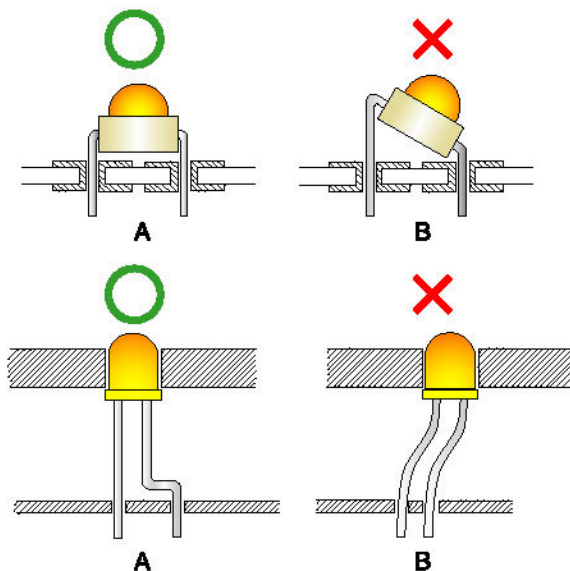
ESD Protection During Production

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:

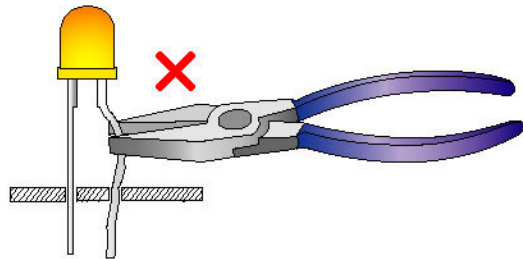
- a. Minimize friction between the product and surroundings to avoid static buildup.
- b. All production machinery and test instruments must be electrically grounded.
- c. Operators must wear anti-static bracelets.
- d. Wear anti-static suit when entering work areas with conductive machinery.
- e. Set up ESD protection areas using grounded metal plating for component handling.
- f. All workstations that handle IC and ESD-sensitive components must maintain an electrostatic potential of 150V or less.
- g. Maintain a humidity level of 50% or higher in production areas.
- h. Use anti-static packaging for transport and storage.
- i. All anti-static equipment and procedures should be periodically inspected and evaluated for proper functionality.

Lead Forming

1. Any lead forming or bending must be done before soldering, never during or after soldering.
2. Avoid placing stress the LED lens in order to prevent fracture in the lens epoxy and to prevent damage to the internal wire bonding.
3. 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.
4. There must be a minimum of 2mm clearance between the base of the LED lens and the lead bend.
5. Avoid bending the leads at the same point more than once.
6. Assembly Precautions
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 matching pitches between the leads and the mounting holes. Refer to figure below for proper lead forming procedures.



7. Avoid lead forming once the component has been mounted onto the PCB.

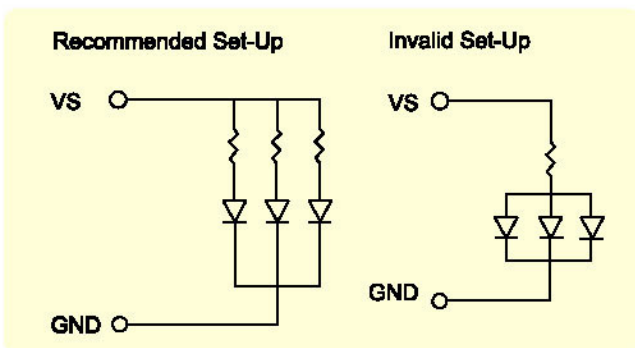


Cleaning

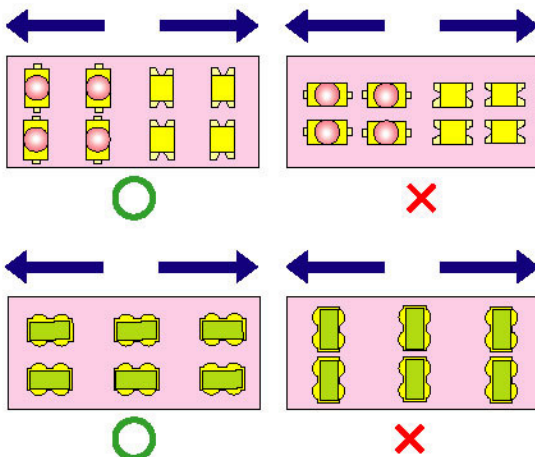
1. Do not use harsh organic solvents such as trichloroethylene, acetone, Chlorosen, and Diflon S3MC for cleaning because they may cloud or damage the LED lens.
2. Isopropyl alcohol or deionized water are recommended solvents for cleaning.
3. Special attention should be taken if other chemicals are used for cleaning because other solvents may damage the epoxy in the lens or housing.
4. The cleaning process should take place at room temperature and the devices should not be washed for more than one minute.
5. When water is used in the cleaning process, immediately remove excess moisture from the LED via forced-air drying afterwards.

Miscellaneous Design Notes

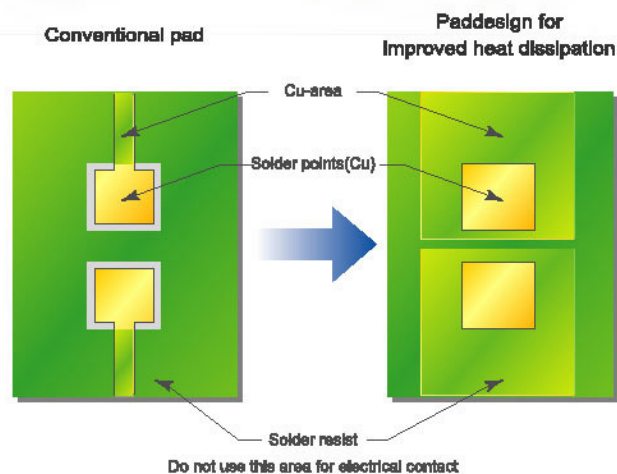
1. Protective current-limiting resistors may be necessary to operate the LEDs within the specified range.
2. LEDs mounted in parallel should each be placed in series with its own current-limiting resistor.



3. The driving circuit should be designed to avoid reverse voltages and transient voltage spikes when the circuit is powered up or shut down.
4. During soldering, SMD components should be mounted such that the leads are placed perpendicular to the direction of PCB travel to insure the solder on each lead melts simultaneously during reflow.



5. 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.

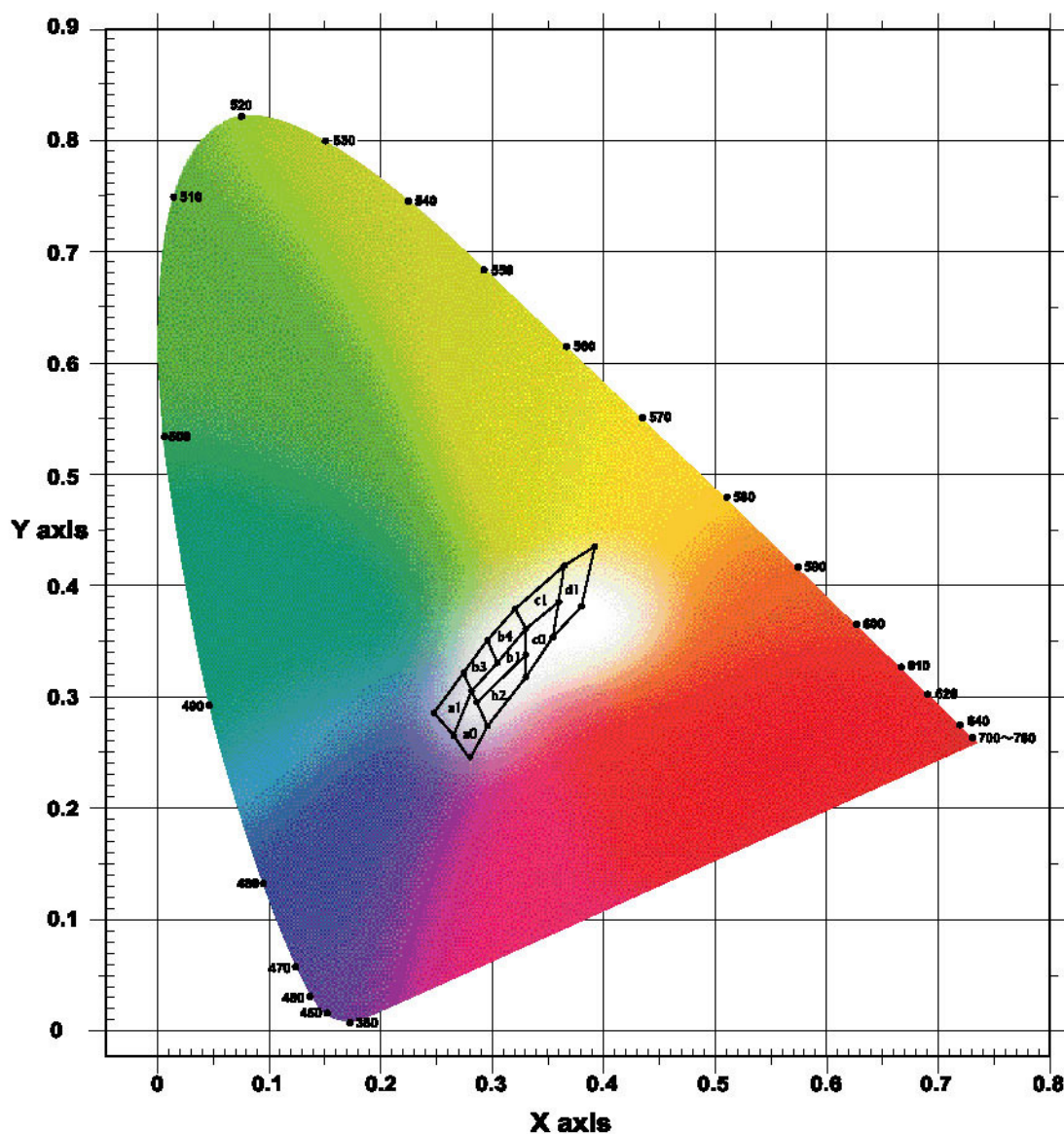


6. High temperatures can reduce device performance and reliability. Keep LED devices away from heat sources for best performance.

Restrictions on Product Use

1. The information contained within this document is subject to change without notice. Before referencing this document, please confirm that it is the most current version available.
2. Not all devices and product families are available in every country.
3. The light output from UV, blue, white, and other high-power LEDs may cause injury to the human eye when viewed directly.
4. 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.
5. 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.





● Color and color coordinates on this diagram are approximate.

a1				
X	0.248	0.275	0.283	0.264
Y	0.286	0.321	0.305	0.287
b1				
X	0.283	0.330	0.330	0.287
Y	0.305	0.360	0.339	0.295
c1				
X	0.321	0.366	0.361	0.330
Y	0.379	0.419	0.385	0.360

a0				
X	0.264	0.283	0.296	0.280
Y	0.267	0.305	0.276	0.248
b2				
X	0.287	0.330	0.330	0.296
Y	0.295	0.339	0.318	0.276
c0				
X	0.330	0.361	0.356	0.330
Y	0.360	0.385	0.351	0.318

b3				
X	0.275	0.298	0.306	0.283
Y	0.321	0.350	0.332	0.305
b4				
X	0.298	0.321	0.330	0.306
Y	0.350	0.379	0.360	0.332
d1				
X	0.366	0.391	0.380	0.356
Y	0.419	0.436	0.381	0.351

● Ta=25°C, If=20mA

● Measurement Uncertainty of the Color Coordinates: ± 0.01

SELECTION CODE FOR STANDARD LEDS

Group	Light intensity in mcd(10mA)		Group	Light intensity in mcd(10mA)	
	min.	max.		min.	max.
F	0.1	0.25	R	12	23
G	0.2	0.4	S	18	35
H	0.3	0.6	T	28	55
I	0.4	1	U	40	90
K	0.7	1.5	V	70	130
L	1	3	W	110	200
M	1.8	5	X	170	280
N	3	7	Y	230	350
P	5	12	Z	300	500
Q	8	17			

SELECTION CODE FOR DISPLAYS

Group	Light intensity in ucd(10mA)		Group	Light intensity in ucd(10mA)	
	min.	max.		min.	max.
C	60	160	P	12000	24000
D	120	280	Q	18000	36000
E	200	410	R	26000	60000
F	300	640	S	44000	101000
G	480	1040	T	75000	173000
H	800	1600	U	128000	293000
I	1200	2500	V	217000	498000
K	1900	4100	W	368000	846000
L	3000	6400	X	626000	1438000
M	4700	10500	Y	1063000	2445000
N	8000	16000	Z	1807000	4156000

SELECTION CODE FOR NPN PHOTOTRANSISTORS

Group	Photocurrent(mA)		Group	Photocurrent(mA)	
	min.	max.		min.	max.
F	0.1	0.25	L	1	3
G	0.2	0.4	M	1.8	5
H	0.3	0.6	N	3	7
I	0.4	1	P	5	12
K	0.7	1.5			

SELECTION CODE FOR SUPER BRIGHT LEDS

Group	Light intensity in mcd(20mA)		Group	Light intensity in mcd(20mA)	
	min.	max.		min.	max.
A	1.6	3.5	ZA	2800	3800
B	2.6	5.5	ZB	3300	4500
C	4	10	ZC	3800	5500
D	7	15	ZD	4700	6500
E	10	24	ZE	5700	7500
F	18	44	ZF	6700	8500
G	36	60	ZG	7500	10000
H	50	90	ZH	8000	12000
M	70	130	ZM	10000	16000
N	110	220	ZN	12000	20000
P	180	320	ZP	16000	24000
Q	280	420	ZQ	20000	32000
R	380	550	ZR	24000	40000
S	480	750	ZS	32000	50000
T	650	1100	ZT	40000	60000
U	900	1500	ZU	50000	80000
V	1200	1800	ZV	60000	100000
W	1500	2100	ZW	80000	120000
X	1800	2500	ZX	100000	160000
Y	2200	3000	ZY	120000	200000
Z	2500	3300	ZZ	160000	240000

SELECTION CODE FOR INFRARED EMITTING DIODES

Group	Radiant intensity in mW/sr(20mA)		Group	Radiant intensity in mW/sr(20mA)	
	min.	max.		min.	max.
AK	0.5	2	D	7	15
AL	0.8	3.2	E	10	24
A	1.6	3.5	F	18	44
B	2.6	5.5	G	36	60
C	4	10	H	50	90

COLOR CODE FOR BLUE LEDS + DISPLAYS					
Group	Dom. WaveLength (nm)		Group	Dom. WaveLength (nm)	
	min.	max.		min.	max.
1	443	452	3A	469	475
2	448	457	3B	471	477
3	453	462	4A	473	479
1A	458	465	4B	475	481
1B	461	468	5A	477	483
2A	464	471	5B	479	485
2B	467	473	5C	481	488

COLOR CODE FOR LEDS + DISPLAYS				
Group	Dom. WaveLength (nm)			
	Green		Yellow	
	min.	max.	min.	max.
0	556	559		
1	559	561	581	584
2	561	563	584	586
3	563	565	586	588
4	565	567	588	590
5	567	569	590	592
6	569	571	592	594
7	571	573	594	597
8	573	575	597	600

SOLDERING INSTRUCTIONS						
Types	Dip and wave soldering			Iron soldering (with 1.5mm iron tip)		
	Temperature of the soldering bath	Maximum soldering time	Distance from solder joint to package	Temperature of soldering iron	Maximum soldering time	Distance from solder joint to package
LEDS	<=260°C	3s	>=2mm	<=350°C	3s	>2mm
	<=260°C	5s	>=5mm	<=350°C	5s	>5mm
SMDS	/	/	/	<=230°C	10s	/
DISPLAYS	<=260°C	3s	>2mm	<=350°C	3s	>2mm
PHOTOCOUPLER	<=260°C	3s	>2mm	<=310°C	3s	/
	/	/	/	<=260°C	10s	/