DATA   SHEET

PART NO.: L-C19F1GRBWT-IC

REV: A / 1

CUSTOMER'S APPROVAL: _____   DCC: _____

DRAWING NO.: DS-77-19-0003G   DATE: 2020-1-7   PAGE   1 of 12

PARA-FOR-065

● PACKAGE OUTLINE DIMENSIONS

BACK VIEW   TOP VIEW   SIDE VIEW

Unit: mm
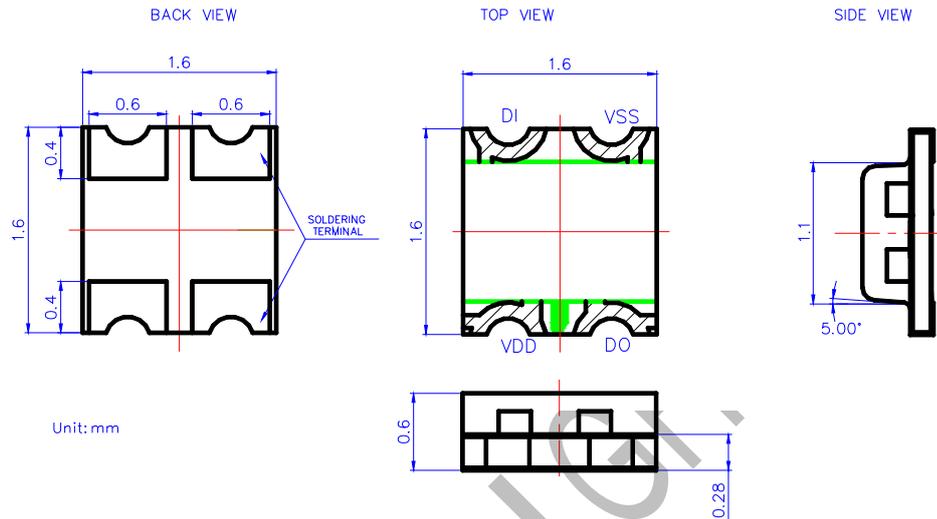
Notes:

1. All dimensions are in millimeters.

2. Tolerance is ± 0.1mm (.004") unless otherwise noted.

● Features

＊ Support signal reshaping to pass control waveforms to next adjacent driver

＊ Cascading port transmission by a single data line

＊ Built-in current regulator, three-way drive

＊ Optional maximal drive current: 5mA

＊ 256-step gray-scale output to allow 16,777,216 color display

＊ Built-in oscillator 20MHz

＊ LED driver port maximum withstand Voltage 6.5V

＊ Built-in power-on-reset (2.6V) (@VDD=5V)

＊ Operating voltage 4.5~5.5V

- **Applications**

  ∗ LED point light source, LED pixel screen.

  ∗ LED fantasy soft light bar, LED fantasy color hard light bar.

  ∗ LED Phantom running Horse Lamp, LED Phantom Color guardrail Tube.

  ∗ LED Phantom Module Lamp, LED Phantom Lamp string.

- **Chip Materials**

Light Color	Dice Material	Lens Color
R：Red	AlInGap	
G：Green	InGaN	
B：Blue	InGaN	Water Clear
IC	Si	

- **Pin diagram and functions:**
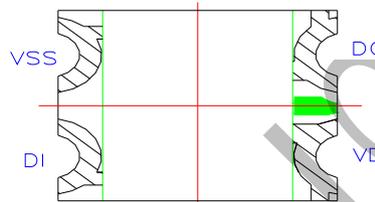
NO.	Symbol	Pin name	Functio　escription
1	VDD	Power	5V±10%
2	VSS	Ground	
3	DO	Data output	Built-in Pull down resistance @ inputmode
4	DI	Data input	Built-in Pull down resistance
/	R、G、B	Constant current output	

● Absolute Maximum Ratings (Ta= –20~70℃, VDD=5.0V , VSS=0V)

SYMBOL	PARAMETER	Rating	UNI
PD	Power Dissipatio	400	mW
VDD	Voltage	-0.5~6.0	V
VIn	Logic input voltage	-0.5~VDD+0.5	V
IO	R G B Output drive current	25	mA
ESD	Electrostatic Discharge Threshold (HBM)Note A	1000	V
Topr	Operating Temperature Range	-40 ~ +85	℃
Tstg	Storage Tempe　ature Range	-40 ~ +85	℃

Note A:

HBM: Human Body Model. Seller gives no other assurances regarding the ability of to withstand ESD

● Electrical Characteristics (Ta= -40~85℃, V_{DD}=4.5~5.5V , V_{SS}=0V）

Symbol	Parameter	Min.	Avg.	Max.	UNIT	Test conditions
V_{DD}	Chip internal supply voltage	4.5	5.0	5.5	V	
I_{DD}	Working current	-	-	2	mA	RGB non-loaded
V_{IH}	High level input voltage	2.7	-	VDD	V	Din
V_{IL}	Low level input voltage	0	-	1.0	V	Din
V_{OH}	High level output voltage	4.5	-	-	V	I_{OH}=4mA
V_{OL}	Low level output voltage	-	-	0.4	V	I_{OL}=4mA
R_{PD}	Pull down resistance	-	500K	-	Ω	DI、DO (VDD=5V)
I_{sink}	R G B Maximum Sink current	4.75	5.0	5.25	mA	Vo=VDD-3.0V (VDD=5V)
I_{off}	RGB leakage current (When closed)	-	-	1	uA	PWM off, R G B Port=5V

● RGB LED Photoelectric parameter

| Color	VF=5V	
	WD(nm)	IV(mcd)
Red	615-625	45-280
Green	525-535	112-450
Blue	465-475	18-112

Notes:

● Luminous intensity is measured with a light sensor and filter combination that proximities the CIE eye-response curve.

● θ 1/2 is the off-axis angle at which the luminous intensity is half the axial luminous intensity.

● The dominant wavelength λ d is derived from the CIE chromaticity diagram and represents the single wavelength which defines the color of the device.

● Caution in ESD :

Static Electricity and surge damages the LED. It is recommended use a wrist band or anti-electrostatic glove when handling the LED. All devices, equipment and machinery must be properly grounded.

● Major standard testing equipment by "Instrument System" Model : CAS140B Compact Array Spectrometer and "KEITHLEY" Source Meter Model : 2400.
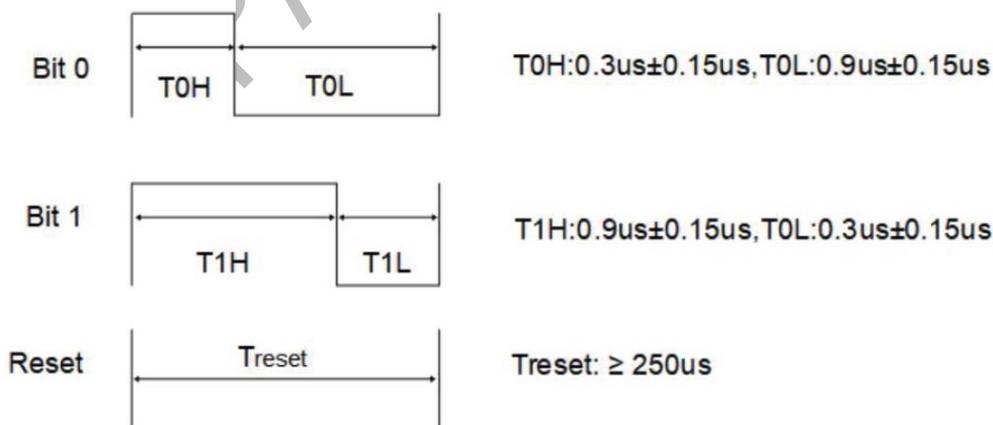
● Dynamic Parameter (Ta= 25℃, V_{DD}=5.0V , V_{SS}=0V）

| Symbol	Parameter	Min.	Avg.	Max.	UNIT	Test conditions
tPLZ	Propagation delay time			80	ns	Din → Dout, CL=30pF,
tPZL				80	ns	
tTHL	Rise time		15		ns	
tTLH	Falling time		15		ns	
tR	Rise time		50		ns	G、R、B=20mA,
tF	Falling time		50		ns	CL=30pF
F_{data}	Data transmission speed		800		KHz	
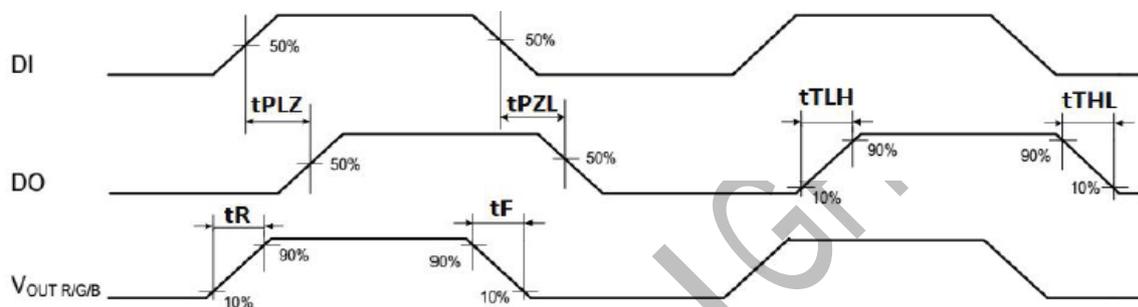
● Coding description

    Coding sequence: The data of the microprocessor communicate with the chip through the single wire bus interface. The communication protocol is carried out in the form of polarity to zero, and each word symbol must have a low level. The starting level of each character of this protocol is high, and the time width of the high level is determined by "0" or "1" code. Input code type:


Bit 0   T0H   T0L   T0H:0.3us±0.15us, T0L:0.9us±0.15us

Bit 1   T1H   T1L   T1H:0.9us±0.15us, T0L:0.3us±0.15us

Reset   Treset   Treset: ≥ 250us

- **Data Transfer Time (VDD=5.0V)**

Name	Description	Min.	Avg.	Max.	Admissible error	Unit
T0H	0 code, high level time		0.3		±0.15	us
T1H	1 code, high level time		0.9		±0.15	us
T0L	0 code, low level time		0.9		±0.15	us
T1L	1 code, low level time		0.3		±0.15	us
Trst	Reset code, low level time	250				us

- **Protocol data format:**
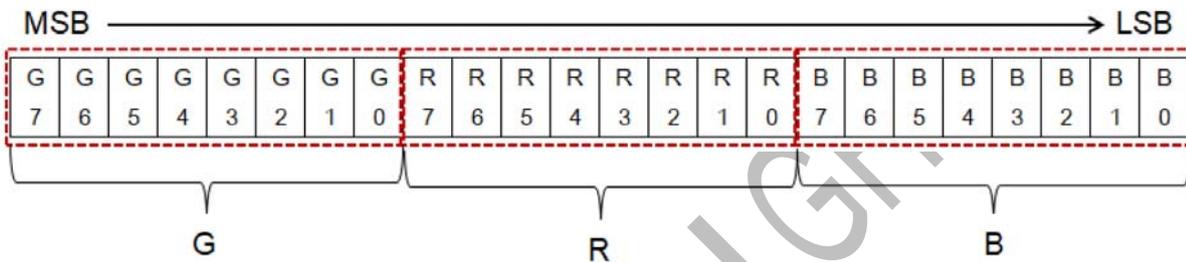
- **Input data stream for each chip (take 3 chips as an example)**
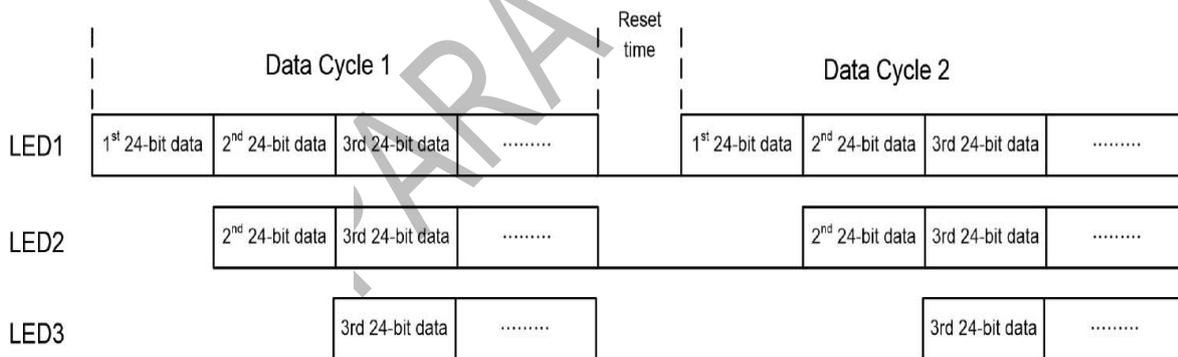
- **System topology graph:**
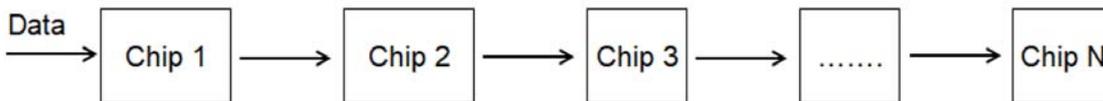
● Typical application circuit:

```
VDD 5V ─────●──────────────────●──────────────────●─────────────
            │                  │                  │
Din ────────┼──┌──────────┐────┼──┌──────────┐────┼──┌──────────┐────────
            │  │4.DI  1.DO│    │  │4.DI  1.DO│    │  │4.DI  1.DO│
            │  │ RGB LED  │    │  │ RGB LED  │    │  │ RGB LED  │
            │  │3.VDD 2.VSS│   │  │3.VDD 2.VSS│   │  │3.VDD 2.VSS│
            │  └──────────┘    │  └──────────┘    │  └──────────┘
           ═╪═ C1             ═╪═ C2             ═╪═ C3
GND ────────●──────────────────●──────────────────●─────────────
```
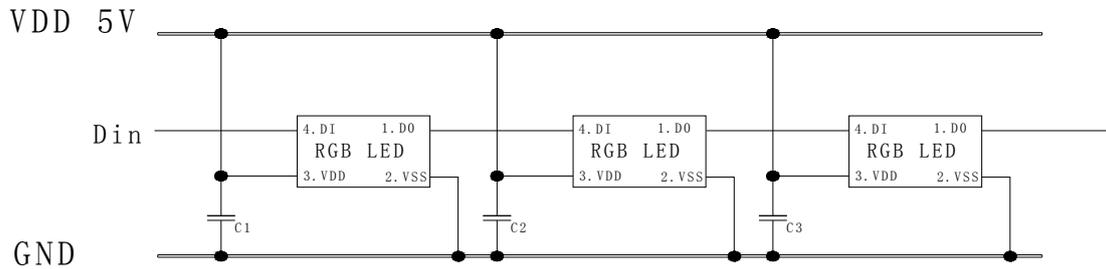
● Label Explanation

ITEM CODE:PARA LIGHT

PART NO: L-C19F1GRBWT-IC

   IV --- Luminous Intensity Code

LOT NO: EM   S   L   12   09   0110
          A   B   C   D   E   F

   A---EM: Emos Code

   B---S:SMD

   C---Local

   D---Year

   E---Month

   F---SPEC.

PACKING QUANTITY OF BAG :

   3000pcs for   150、170、110、155、115 series

   4000pcs for 191 series

   5000pcs for 192 series

DATE CODE：2012   09   10
              G   H   I

   G--- Year

   H--- Month

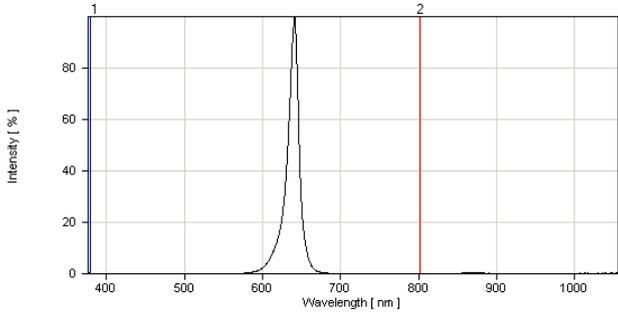   I --- Day

● Typical Electro-Optical Characteristics Curves

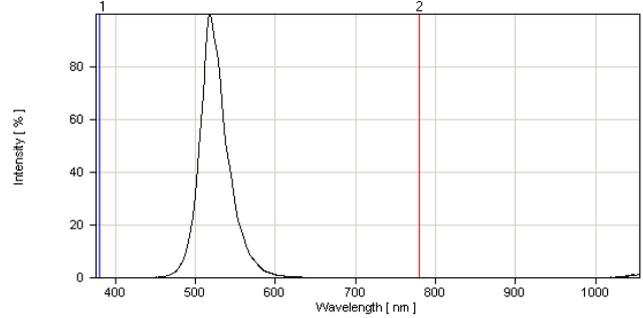
Fig.1 Red Relative Intensity vs. Wavelength

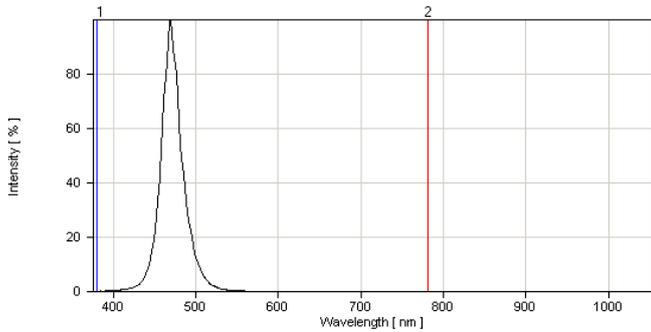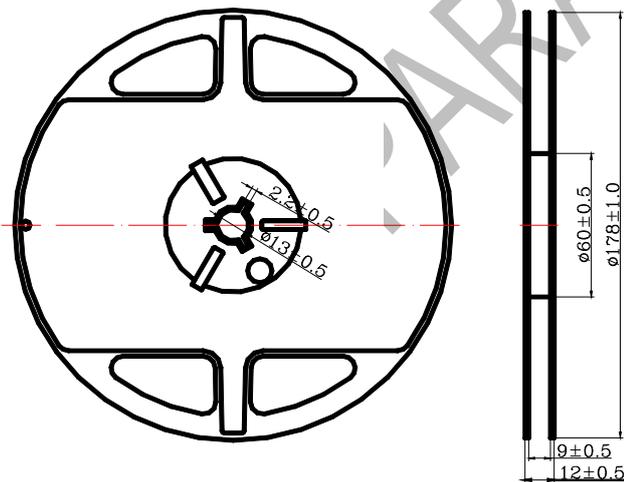Fig.1 Green Relative Intensity vs. Wavelength
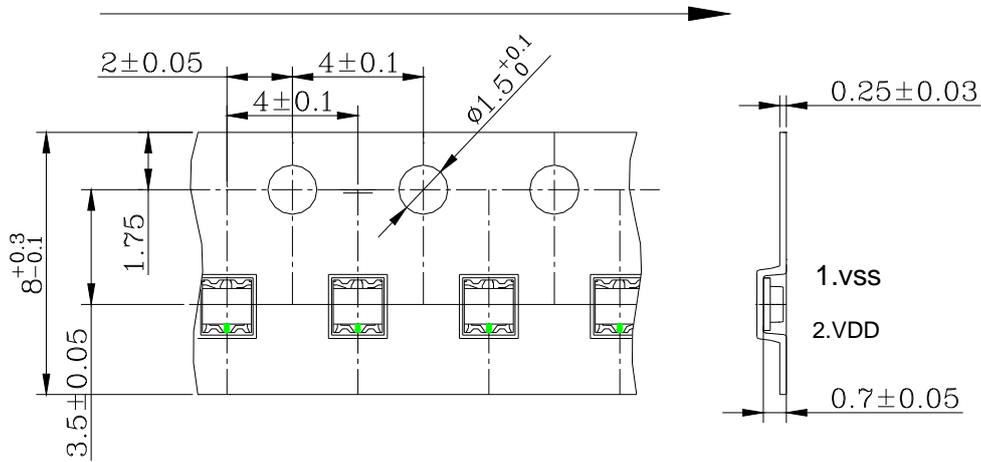

Fig.1 Blue Relative Intensity vs. Wavelength

● Reel Dimensions

Notes:

1. Taping Quantity: 3000pcs

2. The tolerances unless mentioned is ±0.1mm, Angle ±0.5°, Unit: mm.

● Package Dimensions Of Tape And Reel

Progressive direction

Notes: All dimensions are in millimeters.

●Cleaning

＊ If cleaning is required , use the following solutions for less than 1 minute and less than 40℃.

＊ Appropriate chemicals: Ethyl alcohol and isopropyl alcohol.

＊ Effect of ultrasonic cleaning on the LED resin body differs depending on such factors as the oscillator output, size of PCB and LED mounting method. The use of ultrasonic cleaning should be enforced at proper output after confirming there is no problem.
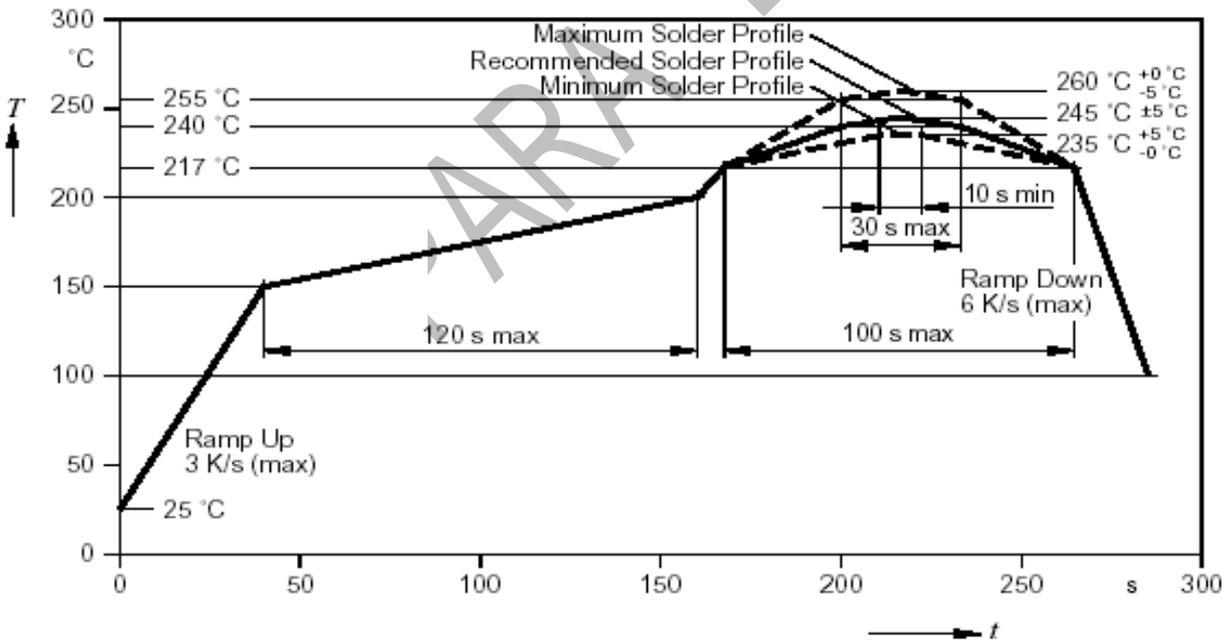
●Suggest Soldering Pad Dimensions
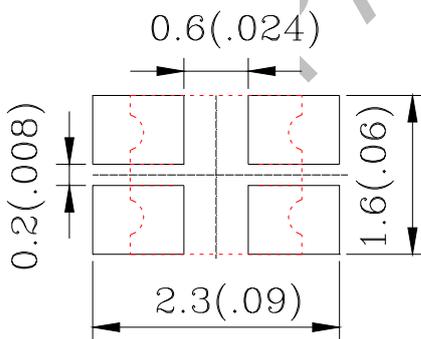
Direction of PWB camber

and go to reflow furnace

● Suggest Sn/Pb IR Reflow Soldering Profile Condition:
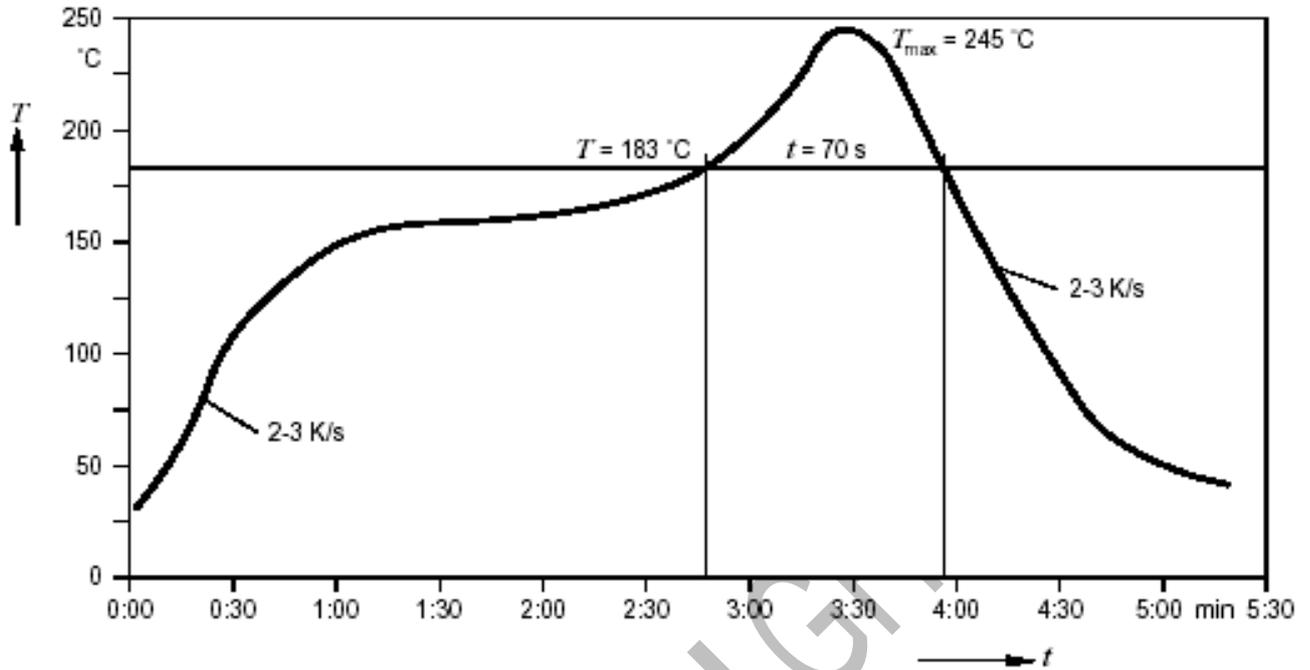
● Suggest Pb-Free IR Reflow Soldering Profile Condition:

CAUTIONS

1.Application Limitation:

The LED's described here are intended to be used for ordinary electronic equipment (such as office equipment, communication equipment and household application). Consult PARA's sales in advance for information on application in which exceptional quality and reliability are required, particularly when the failure or malfunction of the LED's may directly jeopardize life or health (such as airplanes, automobiles, traffic control equipment, life support system and safety devices).

2.Storage:

Do not open moisture proof bag before the products are ready to use.

Before opening the package: The LEDs should be kept at 30℃ or less and 90%RH or less.

After opening the package: The LED's floor life is 1 year under 30℃ or less and 60% RH or less. If unused LEDs remain, it should be stored in moisture proof packages.

If the moisture absorbent material (silica gel) has faded away or the LEDs have exceeded the storage time, baking treatment should be performed using the following conditions.

Baking treatment: 60±5℃ for 24 hours

3.Soldering

Do not apply any stress to the lead frame during soldering while the LED is at high temperature.

Recommended soldering condition.

Reflow Soldering:

Pre-heat 120~150°C, 120sec. MAX., Peak temperature : 240°C Max. Soldering time: 10 sec Max.

Soldering Iron: (Not recommended)

Temperature 300°C Max., Soldering time : 3 sec. Max.(one time only), power dissipation of iron : 20W Max. use SN60 solder of solder with silver content and don't to touch LED lens when soldering.

Wave soldering:

Pre-heat 100°C Max, Pre-heat time 60 sec. Max, Solder wave 260°C Max, Soldering time 5 sec. Max. preformed consecutively cooling process is required between 1st and 2nd soldering processes.

4. Lead-Free Soldering

For Reflow Soldering:

1、Pre-Heat Temp:150-180℃,120sec.Max.

2、Soldering Temp: Temperature Of Soldering Pot Over 230℃,40sec.Max.

3、Peak Temperature:260℃，5sec.

4、Reflow Repetition:2 Times Max.

5、Suggest Solder Paste Formula 93.3 Sn/3.1 Ag/3.1 Bi /0.5 Cu

For Soldering Iron (Not Recommended):

1、Iron Tip Temp:350℃ Max.

2、Soldering Iron:30w Max.
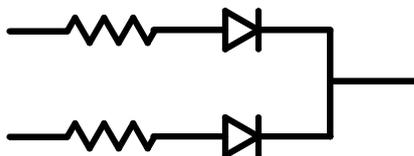
3、Soldering Time:3 Sec. Max. One Time.

For Dip Soldering:

1、Pre-Heat Temp:150℃ Max. 120 Sec. Max.
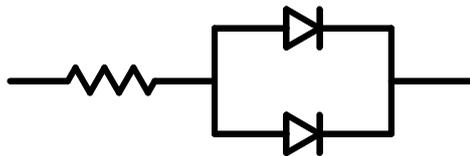
2、Bath Temp:265℃ Max.

3、Dip Time:5 Sec. Max.

5. Drive Method

Circuit model A   Circuit model B

(A)Recommended circuit.

(B)The difference of brightness between LED`s could be found due to the Vf-If characteristics of LED.