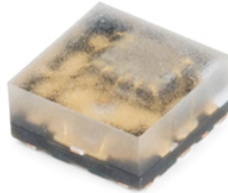


BB-2020BGR-TRB

Addressable, Dimmable, 2020 RGB LED



Features

BL-2020RGB LED is a tri-color RGB LED with a built-in IC. The IC uses CMOS process technology to regulate the current input and color mixing. It is harmonized with 256-level color set and 32-level brightness adjustment.

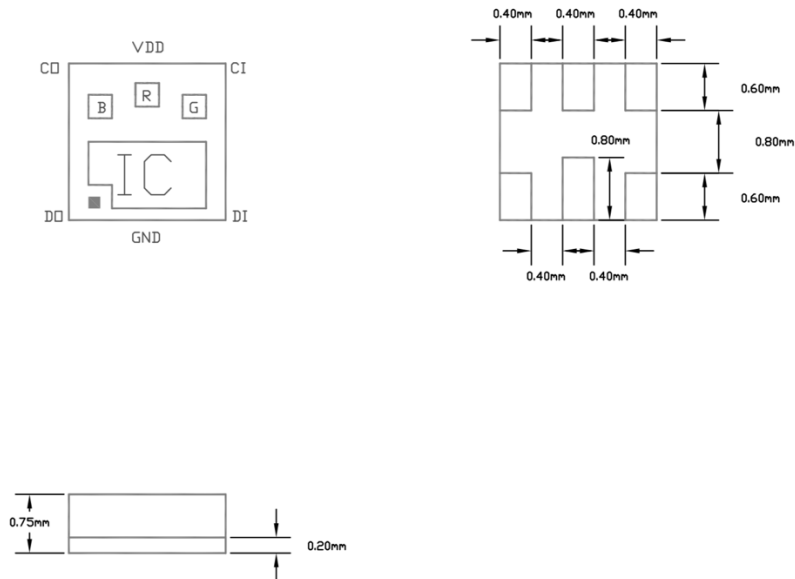
The IC with the built-in precision oscillating resistor ($\pm 1.0\%$) can achieve simultaneous flashing and random flashing. It is different from ordinary flash ICs in the market due to frequency fluctuation in the range of $\pm 20\%$. The recommended operating frequency is 11MHz and not to exceed 12MHz.

The IC has built-in constant current output circuit design. Compared with ordinary flash IC, the lamp string has high brightness and uniformity, color saturation, and the over temperature protection mechanism.

The 5V DC 2020 RGB LED can be connected in series and in parallel to meet the external DC5V/ DC12V/ DC24V/ DC48V and other voltage sources.

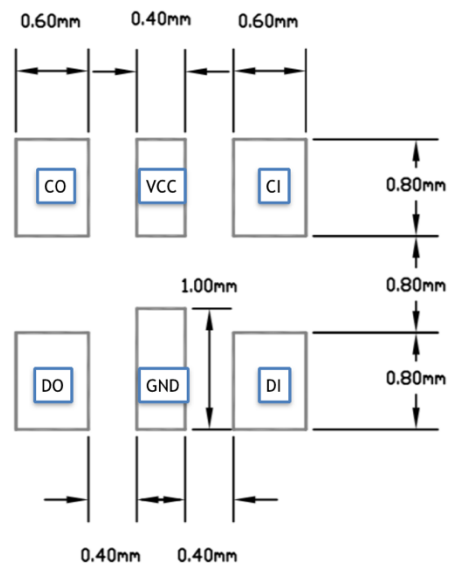
Pin Configuration and LED Chip bonding note

1. IC & Chip LED Pad Diagram and Dimensions:



2. LED Pad Diagram and Dimensions:

DI	Data input
DO	Data output
CI	Clock input
CO	Clock output
GND	-
VCC	+5V

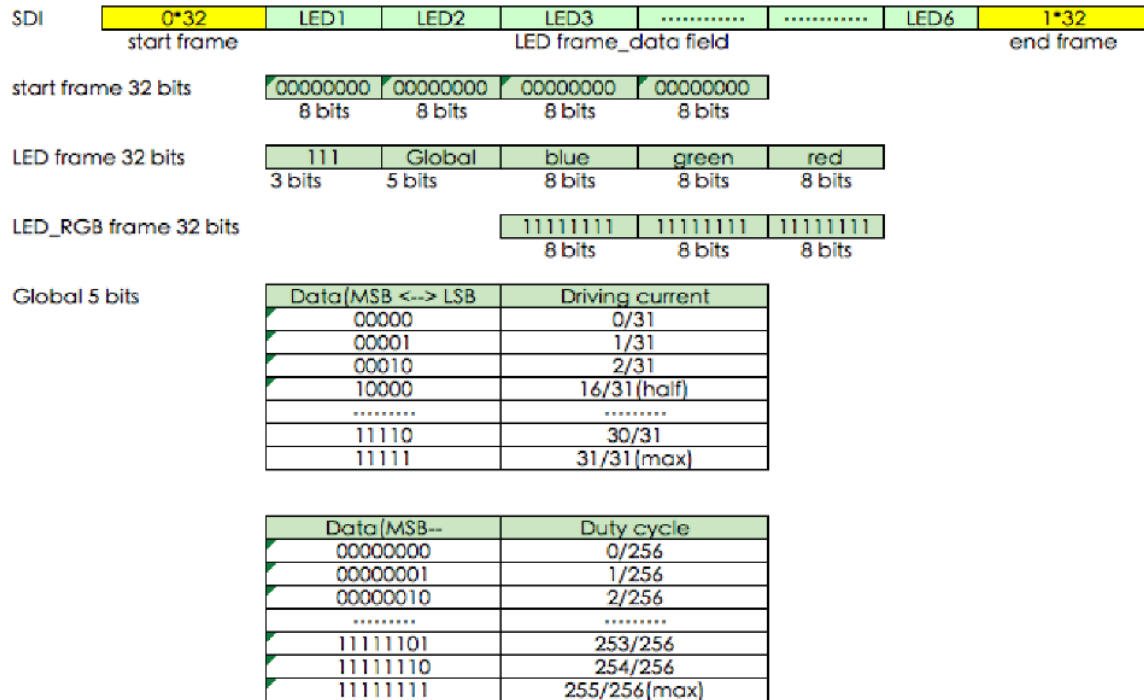


Product Specifications

Parameters	Value
Model name	BB-2020BGR-TRB
Color	RGB full color
Brightness	R: 300-330 mcd G: 420-460 mcd B 160-180 mcd
Applied voltage (per unit)	5V DC
Power consumption	0.1W~0.5W
Viewing angle	160 degree
Thermal resistance (Junction to slug)	50°C
Weight	~0.025 g
Dimension (mm)	2.0 X 2.0 X 0.9
Operating Temperature	-40°C~70°C
ESD@HBM	4KV
Allowable Reflow cycles	2 times
Storage Temperature	-40°C~85°C

Function Description

1. Cascading data structure:



Relations of PWM input and output signals



1. The first 32 bit "0" is the starting frame, and the CIN is on the rise time, and the timing DIN is preceded by CIN
2. It is marked as "1"
3. D4 D3 D2 D1 and D0 are 32 level brightness adjustment, D4 is the highest
4. The sequence of LEDs are B/G/R

2. Switching Characteristics (Ta=25°C)

Parameters	Symbol	Condition	Max.	Unit
Transfer time	TTHH	CL=30pF, RL=1KΩ	<15	ns
	TTHL		<15	ns
Signal delay time	Tpd	CL=30pF, RL=1KΩ	<15	ns
	Tco		<15	ns
Signal rise and fall time	TR	VDD=5V	<500	ns
	TF		<400	ns
Output minimum PWM opening width	TONMIN	IOUT= 20mA	200	ns
Output signal maximum opening and closing time	TON	IOUT= 20mA	<80	ns
	TOff		<80	ns

3. Absolute Maximum Ratings of IC-NL3C-BA

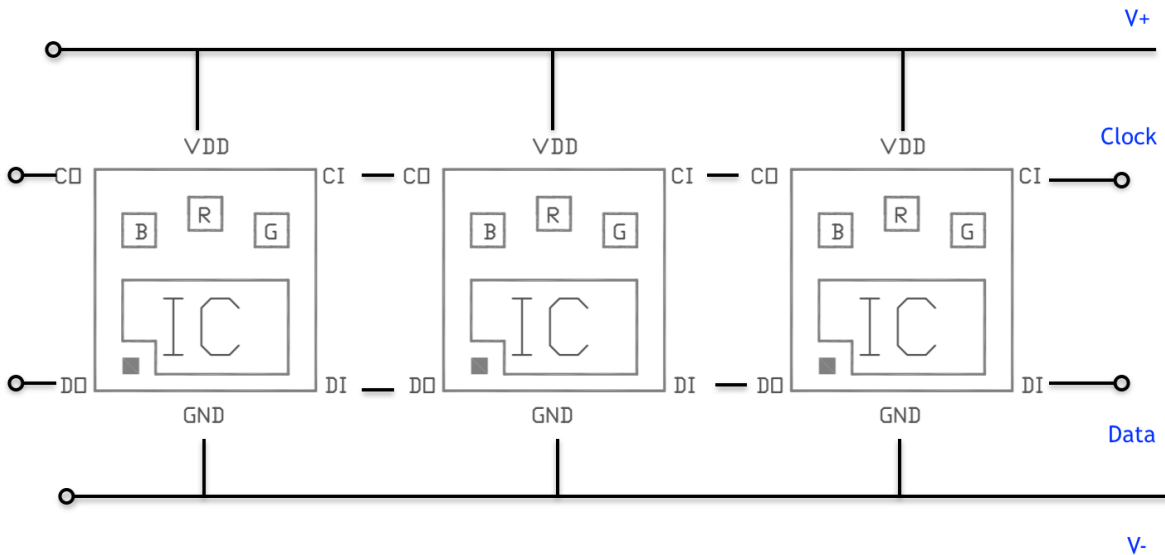
Parameter	Symbol	Value	Unit
Supply voltage	VDD	7	V
LED voltage	VLED	6.5	V
Rate of data signal	FCLK	15	MHZ
output current(maxi)	I _{max}	20	mA
Power dissipation	PD	<400	mW

4. Specifications of IC-NL3C-BA Electrical Characteristics

Parameter	Symbol	Value	Unit
Supply voltage	VDD	4.5~5.5	V
LED voltage	VLED	3~6	V
Output voltage	VO _{UT}	4.5	V
Rate of data signal	FCLK	<10	MHZ
Input voltage level(High)	V _{INH}	0.7VDD	V
Input voltage level(Low)	V _{INL}	0.3VDD	V
High level width	TCLKH	>30	ns
Low level width	TCLKL	>30	ns
Data set up time	TSETUP	>10	ns
Data hold time	THOLD	>5	ns

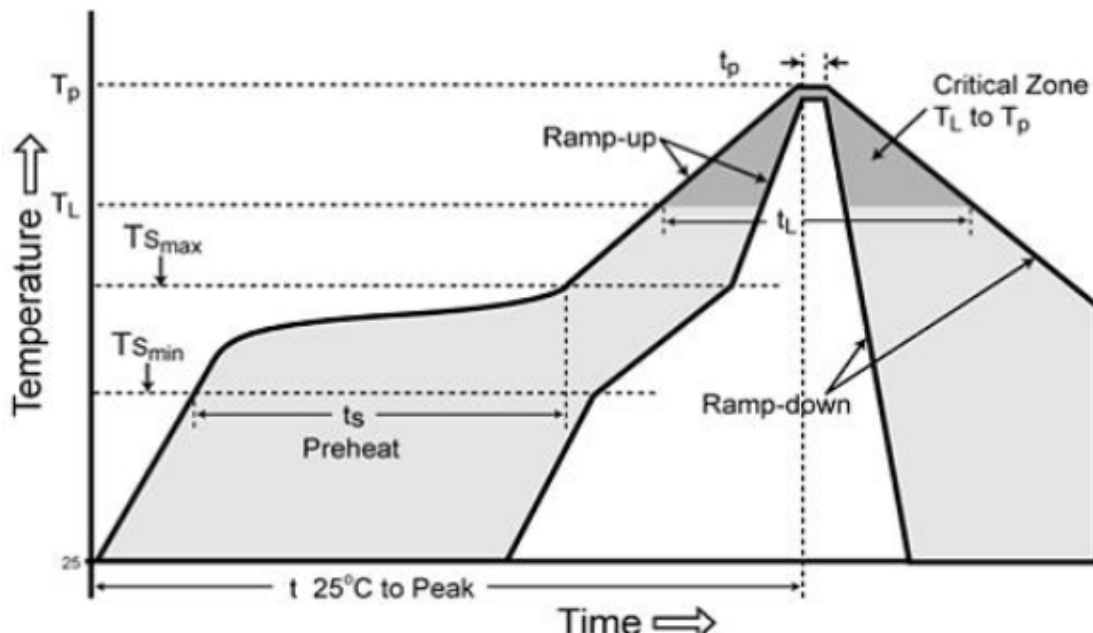
Application Circuit

For 5V strip applications, all RGB-LED units are connected in parallel and driven directly from a conventional 5V DC voltage source. (When using a 12V DC or 24V DC voltage source, each line should be connected in series with two or five RGB-LED units.)



Recommended Soldering Conditions:

BL-2020RGB series are compatible with IPC/JEDEC J-STD-020C, following the parameters listed below. American Bright recommends that users follow the recommended soldering profile as the general guideline.

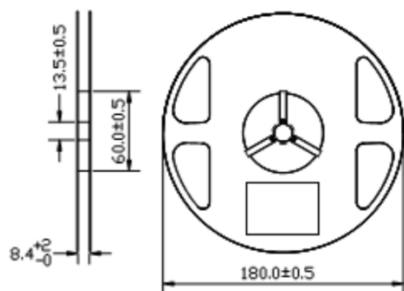


Profile Feature	Pb-Free Assembly
Average ramp-up rate (T_L to T_P)	3°C/second max.
Preheat	
Temperature Min ($T_{S_{min}}$)	150°C
Temperature Max ($T_{S_{max}}$)	200°C
Time (min to max) (t_s)	60-180 seconds
Time maintained above:	
Temperature (T_L)	217°C
Time (t_L)	60-150 seconds
Peak/Classification Temperature (T_p)	240°C
Time within 5°C of actual Peak Temperature (t_p)	20-40 seconds
Ramp-down Rate	6°C/second max.
Time 25°C to Peak Temperature	8 minutes max.

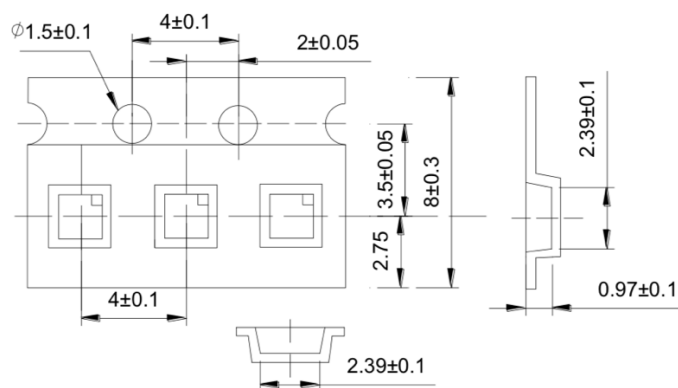
Packaging/ Reel size:

Tape and reel package

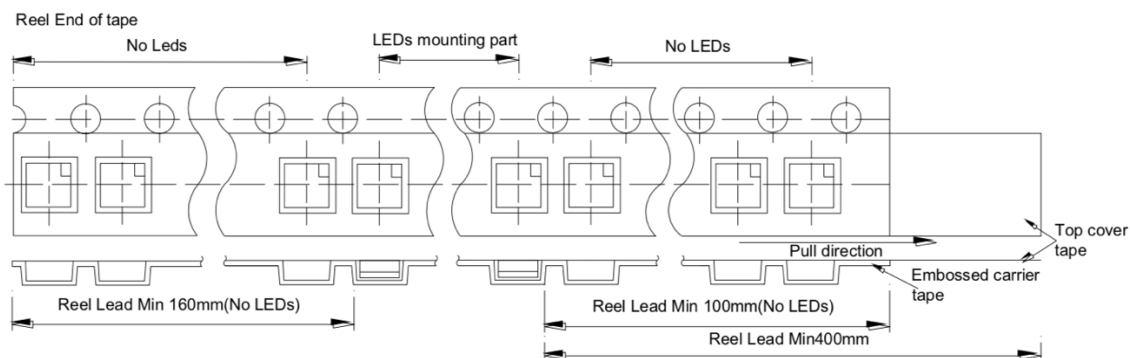
● Dimensions of Reel (Unit: mm)



● Dimensions of Tape (Unit: mm)



● Arrangement of Tape



1. Empty component pockets are sealed with top cover tape;
2. 4000pcs per reel