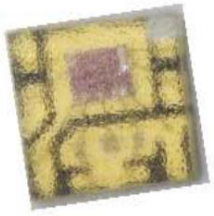
APA 102-2020-256-8A



◆Outline (L* W*H): 2.0*2.0*0.75mm

◆Good thermal dissipation & optical uniformity

Table of Contents

Features

- RoHS2.0 Compliant
- Packaged in 12mm tape on 7" diameter reels
- EIA STD package
- Compatible with automatic placement equipment and infrared reflow solder process
- Preconditioning: accelerate to JEDEC level 3
- Serial data transmission signal by（DATA CLK）two line

Applications

- Telecommunication, office automation, home appliances, industrial equipment
- Status indicator
- Signal and symbol luminaire
- Front panel backlighting
- Full-color strip.
- Indoor decorative lighting / curtain display

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① ② ③ ④ ⑤⑥

①	②	③	④	⑤
Brand Name	Model Number	Lead Frame Size	Gray Scale	Pin Number
Company Prefix	Model: 102	2020: 2.0*2.0mm	256 gray scales	8 Pins type led

■ Maximum Rating(Ta=25℃)

Parameter	Symbol	Rating	Unit
IC Power Supply Voltage	VDD	-0.4~+5.5	V
Logic input voltage	VI	-0.4~VDD +0.4	V
Rate of data signal	F_{CLK}	15	MHZ
ESD pressure	V_{ESD}	2000	V
The max led output Current	I_{OMAX}	18	mA
Soldering Temperature*1	T_{SD}	260	°C
Operating Temperature Range	-40 C to+85 C		
Storage Temperature Range	-40 C to+105 C		

Notes 1: The maximum of soldering time is 5 seconds in T_{SD}

■ Electrical Characteristics (Ta=25° CVDD=5V)

Characteristics	Symbol	Condition	Min.	Typ.	Max.	Unit
Supply voltage	V_{dd}			5.0	5.5	V
Rate of data signal	F_{CLK}			5	-	MHZ
Input high voltage	V_{IH}		0.7V_{DD}	-	-	V
Input low voltage	V_{IL}		-	-	0.3V_{DD}	V
The clock high level widch	T_{CLKH}		30	-	-	ns
The clock low level widch	T_{CLKL}		30	-	-	ns
Data set up time	T_{SETUP}		10	-	-	ns
Data hold time	T_{HOLD}		5	-	-	ns
The frequencyof PWM	FPWM			20		KHz
Static power consumpitor	IDD			0.7		mA

■ Optical Characteristics(Ta=25℃;VDD=5V)

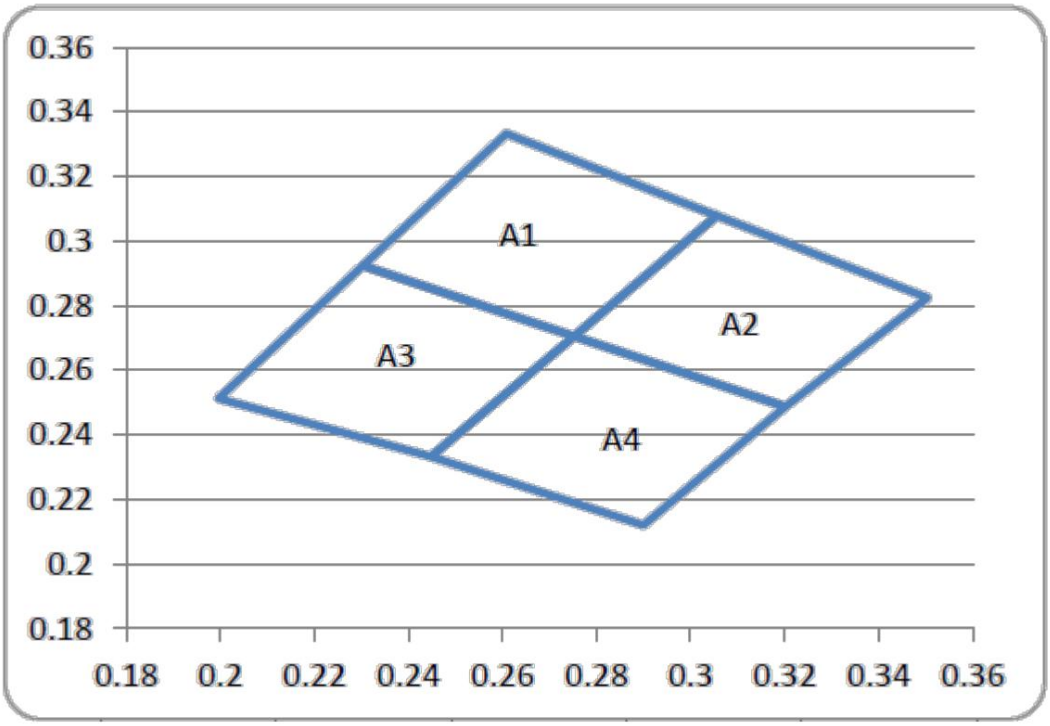
Characteristics	Symbol		Min.	Typ.	Max.	Unit	Test condition
Luminous Intensity	Iv	R	-	360	-	mcd	I_F=18mA
		G	-	510	-		
		B	-	100	-		
		W	400	800	-		
Dominant Wavelength	λd	R	615	-	630	nm	I_F=18mA
		G	520	-	535		
		B	460	-	475		
Color Coordinate	x			0.2752			I_F=18mA
	y			0.2705			
View Angle	$2\theta_{1/2}$		-	120	-	deg	I_F=18mA

■ Range of Bins

1) Luminous Intensity-White(I_F = 18mA)

Bin Code	Min. IV (mcd)	Max. IV (mcd)
P	400	500
Q	500	630
R	630	800
S	800	1000

■ Color Coordinate Comparison-White



Color Ranks

A1	0.2609	0.3332	0.3056	0.3078	0.2752	0.2705	0.2303	0.2923
A2	0.3056	0.3078	0.3504	0.2824	0.3202	0.2487	0.2752	0.2705
A3	0.2303	0.2923	0.2752	0.2705	0.2448	0.2332	0.1996	0.2513
A4	0.2752	0.2705	0.3202	0.2487	0.29	0.212	0.2448	0.2332

■ Function description

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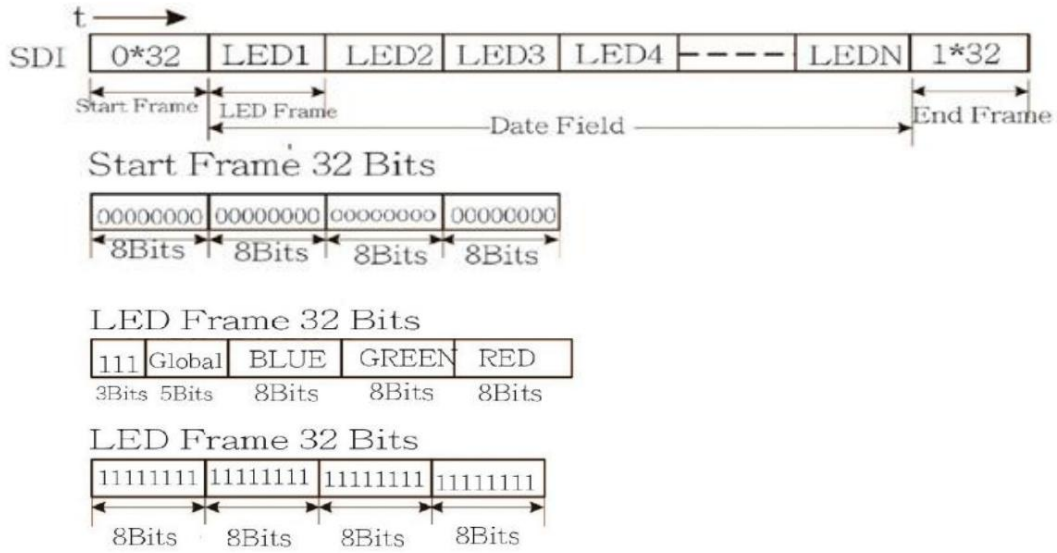
(1) Series data structure

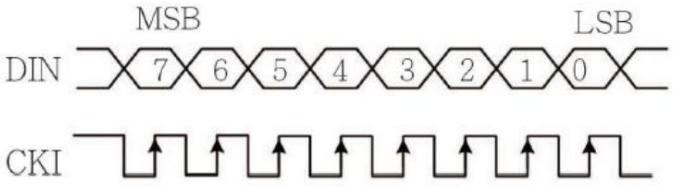
Tandem N-LED



(2) 5-Bit (level 32) brightness adjustment (simultaneous control of OUTR\OUTG\OUTB three port current)

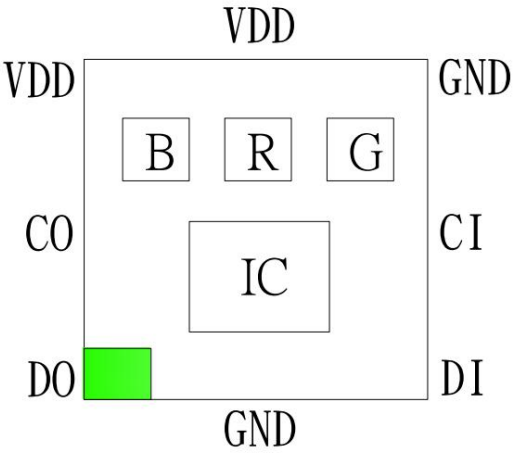
DATA MSB←→LSB	Driving Current
00000	0/31
00001	1/31
00010	2/31
...	
11110	30/31
11111	31/31(max)

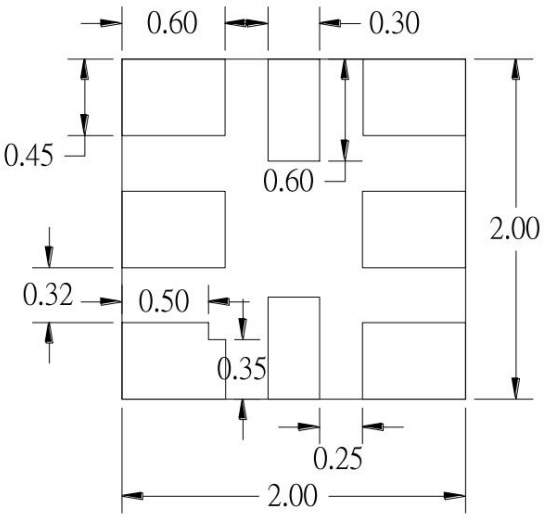
(3) PWM input/output signals relations

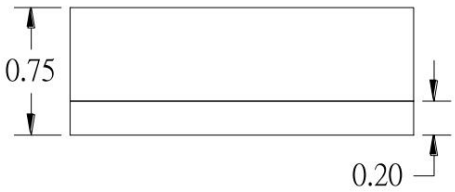


Data MSB—	Duty Cycle
00000000	0/256(min)
00000001	1/256
00000010	2/256
...	
11111101	253/256
11111110	254/256
11111111	255/256(max)

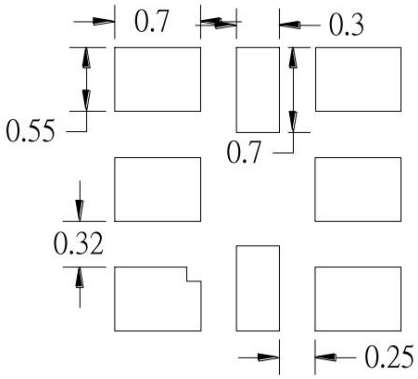
■ Dimensions





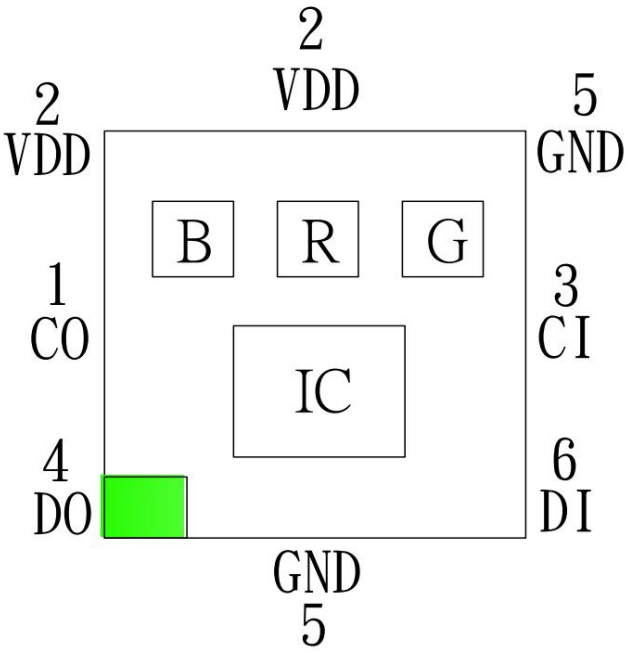


Recommend pad layout



- All dimensions are in millimeters.
- § Tolerance is ±0.1mm unless other specified
- § Specifications are subject to change without notice

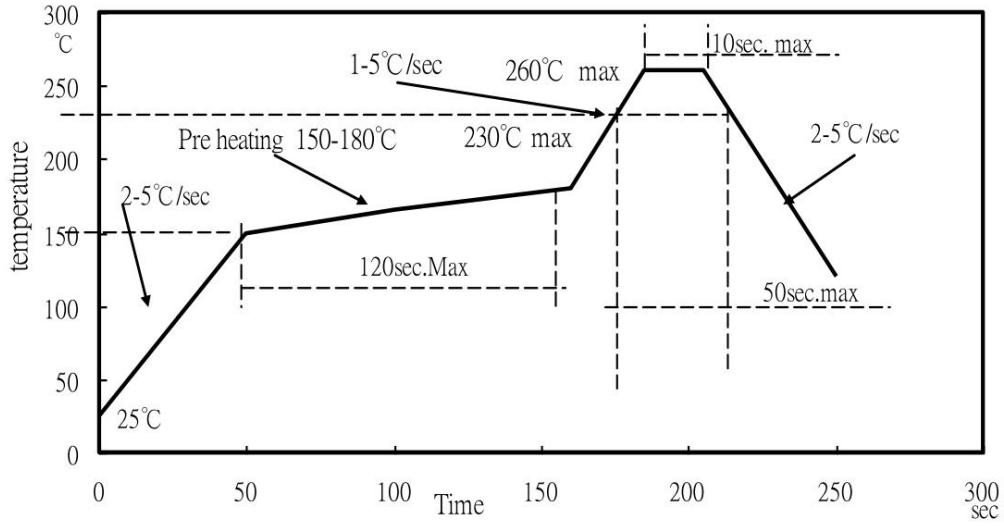
■ PIN Configuration



□o.	□ym□ol	□unction description
1	CO	Clock output
2	VDD	supply voltage
3	CI	Clock input
4	DO	Data output
5	GND	Ground
6	DI	Data input

■ Reflow Profile

1. I_R reflow soldering Profilefor Lead Free solder

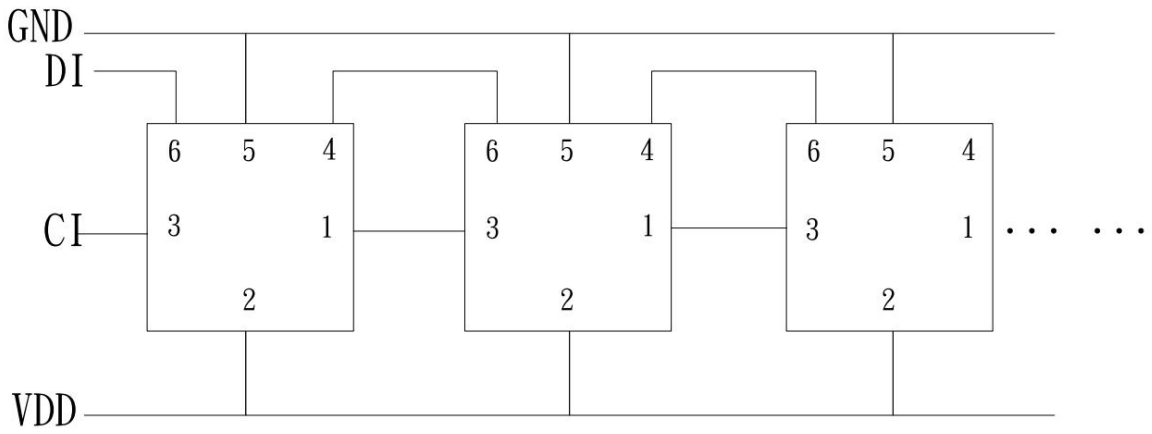


Notes:

1. We recommend the reflow temperature at 240(±5℃), and the maximum soldering temperature should be limited to 260℃.
2. Don't cause stress to the siliconeresin while it is exposed to high temperature.
3. Number of reflow process shall not be more than 1 time.

■ Test Circuit and Precautions for Use

1. Typical application circuit



2. r a r

2.1. Over-current-proof

Customer must apply resistors for protection; otherwise slight voltage shift will cause big current change (Burn-out will happen).

2.2. Storage

1). To store the products is recommended with following conditions:

Humidity: 60% R.H. Max.

Temperature: 5℃~30℃(41°F~86°F)

2). Shelf life in sealed bag: 12 month at ＜ 5℃~30℃ a nd ＜60% R.H. after the package is Opened, the products shoul d be used withi n 1 wee k or they shoul d be keeping to stored at ≦ 20%R.H. with zip-lock sealed.

2.3. Baking

If the package has been opened for more than 1 week, it is recommended to bake the products with the following instruction:

1). 60±3℃ X 6hrs and ＜5%RH, for reel

2). 125±3℃ X 2hrs, for single LED

It shall be normal to see slight color fading of carrier (light yellow) after baking in process

■ Precautions

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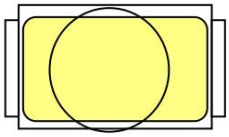
1. Abnormal situation caused by improper setting of collet

To choose the right collet is the key issue in improving the product's quality. LED is different from other electronic components, which is not only about electrical output but also for optical output. This charac made LED more fragile in the process of SMT. If the collet's lowering down height is not well set, it will bring damage to the gold wire at the time of collet's picking up and loading which will cause the LED fail to light up, light up now and then or other quality problems

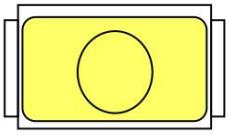
2. How to choose the collet

During SMT, please choose the collet that has larger outer diameter than the lighting area of lens, in c that improper position of collet will damage the gold wire inside the LED. Different collets fit for different products, please refer to the following pictures cross out

Outer diameter of collet should be larger than the lighting area



Picture 1(√)



Picture 2(X)

3. Other points for attention

A. No pressure should be exerted to the epoxy shell of the SMD under high temperature.

B. Do not scratch or wipe the lens since the lens and gold wire inside are rather fragile and cross ou easy to break.

C. LED should be used as soon as possible when being taken out of the original package, and should be stored in anti-moisture and anti-ESD package.

4. This usage and handling instruction is only for your reference

■ Test Items and Results of Reliability

Test Item	Test Conditions	Duration/ Cycle	Ac/Re	Number of Damage	Reference
Normal Temperature Life	Ta＝23℃(±5℃) I_F=10mA(5bit-level 15)	1008 hrs	0/1	0/22	JESD22 A-108
High Temperature Life	Ta＝85℃(±5℃) I_F=10mA(5bit-level 15)	1008 hrs	0/1	0/22	JESD22 A-108
High Humidity Heat Life	Ta＝85℃(±5℃) RH=85% I_F=10mA(5bit-level 15)	1008 hrs	0/1	0/22	JESD22 A-108
Thermal shock	-45℃/30min~105℃ /30min (±5℃)	1008 hrs	0/1	0/22	JESD22 A-104
Electrostatic Discharge (ESD) Test	According to the SPEC	3 cycles	0/1	0/22	AEC Q101-001
Low Temperature Storage	T_a=-40℃	1008 hrs	0/1	0/22	JESD22-A103D
High Temperature Storage	T_a=105℃	1008 hrs	0/1	0/22	JESD22-A103D

*Criteria for Judging

Item	Symbol	Condition	Criteria for Judgment of Pass	
			Min	Max
Luminous Intensity	Iv	I_F=10mA	LSL*2×0.7	-

[Note] LSL*2: Lower Specification Level