BRIGHTEK
BRIGHTEK (EUROPE) LIMITED
Brighten Up The World With LED !

ISO/TS 16949:2009 | BS EN ISO 14001:2004 | QC 080000 IECQ HSPM

PRODUCT DATASHEET

⚠ **ATTENTION** OBSERVE PRECAUTIONS FOR HANDLING ELECTROSTATIC SENSITIVE DEVICES

► CHIP SMD with IC

► 0505 (1212) IC 0.75t

► Red/Green/Blue

N0M67S06IC

0 5 0 5   I C   I n t e g r a t e d

APPLICATIONS:

- Telecommunication
- Status Indicator
- Home Appliance
- Decoration Lighting
- Full Colour LED Strip
- Gaming Device

0505 IC-Integrated

RoHS Compliant | Pb

FEATURES:

- **Package:** CHIP EIA STD Package 4 Pins with Integrated IC
- **Output Current:** 5mA/Channel
- **LED Voltage:** 4.5~5.5V
- **Luminous Intensity (typ.):** 75/160/26mcd*
- **Colour:** Red/Green/Blue
- **Dominant Wavelength (typ.):** 633/527/457nm
- **Viewing Angle:** 120°
- **Materials:**
  - Resin: Epoxy (White Diffused)
- **Operating Temperature:** -40~+85°C
- **Storage Temperature:** -40~+105°C
- **IC Feature:** Serial data transmission signal by single wire. Internal clock frequency operates at 800kHz.
- **Pixel:** One pixel contains R, G, and B colour that each can achieve 256 level brightness grayscales, which forms 16,777,216 combination colours.
- **Soldering methods:** Reflow Soldering
- **MSL Level:** acc. to JEDEC Level 3
- **Packing:** 8mm tape with max.4000pcs/reel, ø180mm (7'')

* in order of Red/Green/Blue

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CHARACTERISTICS:

Absolute Maximum Characteristics (T_a=25°C)

Parameter	Symbol	Ratings	Unit
DC Forward Current	I_F	5/Channel	mA
IC Power Supply Voltage	V_{DD}	+4.5~+5.5	V
IC Input Voltage	V_I	-0.4~V_{DD}+0.4	V
Operating Temperature	T_{OPR}	-40~+85	°C
Storage Temperature	T_{STG}	-40~+105	°C
Electrostatic Discharge (HBM)	ESD	4000	V
Soldering Temperature	T_{SD}	260 for 5s max.	°C

Electrical & Optical Characteristics (T_a=25°C, V_{DD}=5V)

Parameter		Symbol	Values			Unit	Test Condition
			Min.	Typ.	Max.		
Forward Voltage		V_F	---	5.0	---	V	---
Luminous Intensity	R	I_V	---	75	---	mcd	I_F=5mA
	G		---	160	---		
	B		---	26	---		
Mixed White	W	I_V	160	---	320	mcd	I_F=15mA
Dominant Wavelength	R	λ_d	615	---	625	nm	I_F=5mA
	G		520	---	525		
	B		460	---	475		
Colour Coordinate	X	---	---	0.2576	---	---	I_F=15mA
	Y		---	0.3003	---		
Viewing Angle		$2\theta_{1/2}$	---	120	---	deg	I_F=15mA

1. The data in the above table is the data obtained under the condition of using the specific instruction W and R/G/B PWM value. Specific instruction W: [0x22 0x62 0xb2] *N 0x37 0x60 +100us Low level, N is the number of LEDs. R/G/B PWM value = 0x7fff.
2. Please refer to "Data composition structure" for the sending method of the above instructions.
3. We will amend the bin code to maintain bin code centralize and we get the luminous intensity is 1.3 times per bin.

Electrical Parameters (T$_a$=25°C, V$_{DD}$=5V)

Parameter	Symbol	Values			Unit	Test Condition
		Min.	Typ.	Max.		
Static Current	I$_{DD}$	---	0.3	---	mA	V$_{DD}$=4.5V, I$_{OUT}$="OFF"
Input Voltage Level	V$_{IH}$	0.7 V$_{DD}$	---	---	V	D$_{IN}$, SET
	V$_{IL}$	---	---	0.3 V$_{DD}$	V	D$_{IN}$, SET

Switching Characteristics (T$_a$=25°C, V$_{DD}$=5V)

| Parameter	Symbol	Values			Unit	Test Condition
		Min.	Typ.	Max.		
Rate of Data Signal	F$_{DIN}$	---	0.8	---	MHz	---
The Output Frequency	T$_{PLH}$	---	---	80	ns	D$_{IN}$ -> D$_{OUT}$
	T$_{PHL}$	---	---	80	ns	
Transmission Delay Time	T$_r$	---	---	50	ns	I$_{OUT}$ R/G/B=5mA R$_L$=400Ω CL=15pF
	T$_f$	---	---	100	ns	

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OUTLINE DIMENSION:

Package Dimension:
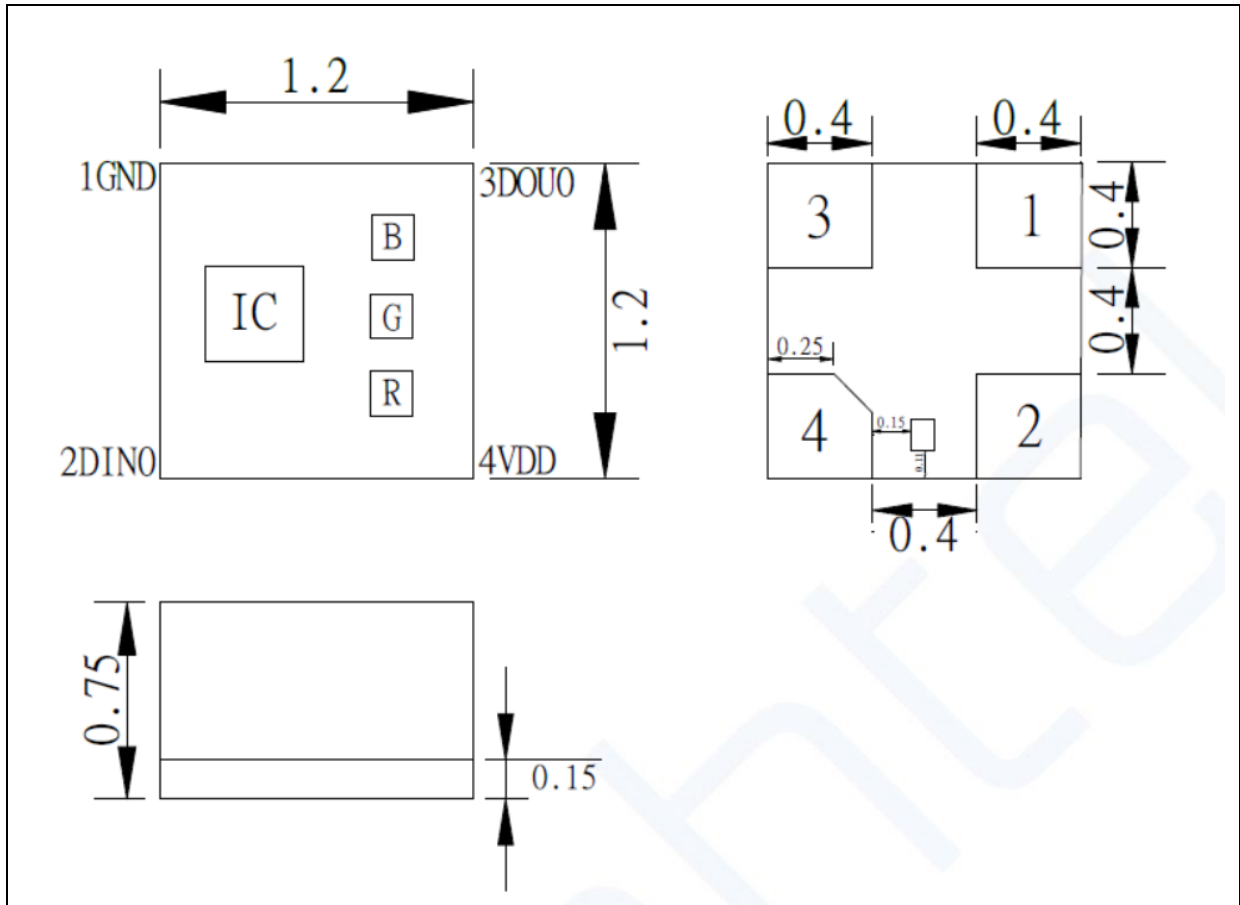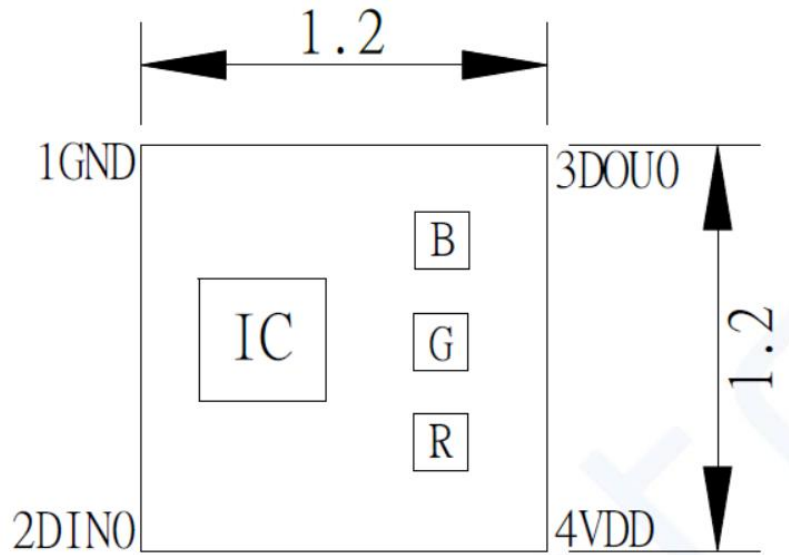

1. All dimensions are in millimetre (mm).
2. Tolerance ±0.1mm, unless otherwise noted.
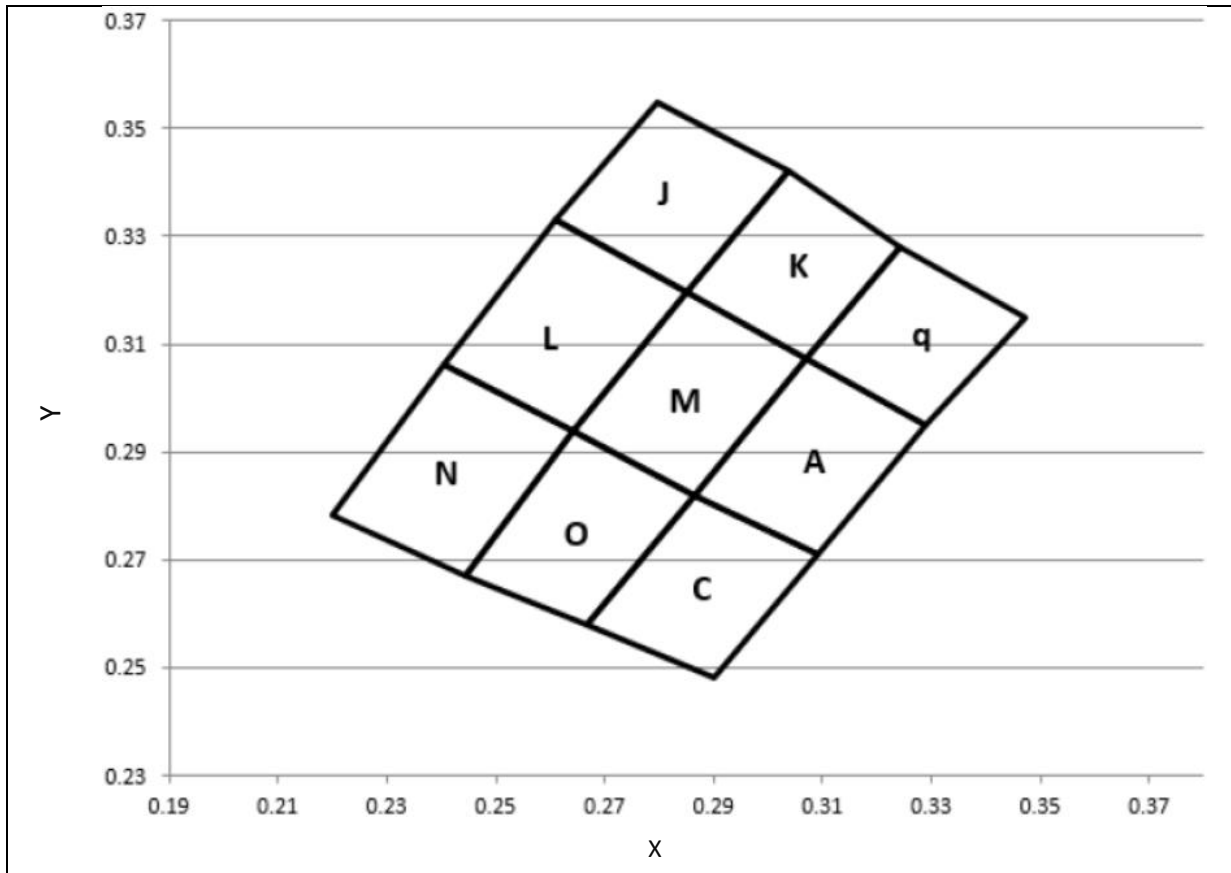
Recommended Soldering Pad Dimension:
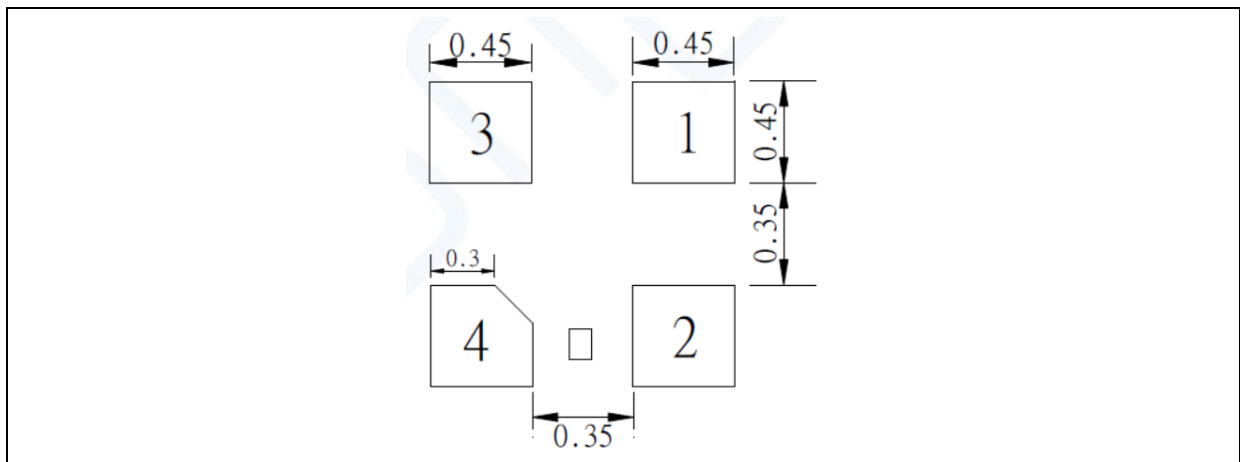
1. Dimensions are in millimetre (mm).
2. Tolerance ±0.1mm with angle tolerance ±0.5°.

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PIN CONFIGURATION:

No.	Symbol	Function Description
1	GND	Ground
2	DIN0	Data Input
3	DOU0	Data Output
4	VDD	Supply Voltage

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BINNING GROUPS:

Chromaticity Coordinate Classifications (V$_{DD}$=5V, I$_F$=20mA):

	1		2		3		4	
	X	Y	X	Y	X	Y	X	Y
L	0.2406	0.3064	0.2609	0.3332	0.2849	0.3196	0.2643	0.2940
M	0.2643	0.2940	0.2849	0.3196	0.3068	0.3072	0.2865	0.2819
A	0.3070	0.3072	0.3287	0.2948	0.3091	0.2712	0.2865	0.2819
J	0.2609	0.3332	0.2797	0.3550	0.3036	0.3420	0.2849	0.3196
K	0.2851	0.3196	0.3036	0.3420	0.3243	0.3280	0.3068	0.3072
q	0.3068	0.3072	0.3243	0.3280	0.3472	0.3150	0.3287	0.2948
c	0.2865	0.2819	0.3091	0.2712	0.2899	0.2482	0.2667	0.2578
O	0.2444	0.2672	0.2643	0.2940	0.2865	0.2819	0.2667	0.2578
N	0.2200	0.2783	0.2406	0.3064	0.2743	0.2940	0.2444	0.2672

ELECTRO-OPTICAL CHARACTERISTICS (Full PWM):

Relative Spectral Power v.s. Wavelength	Directive Radiation

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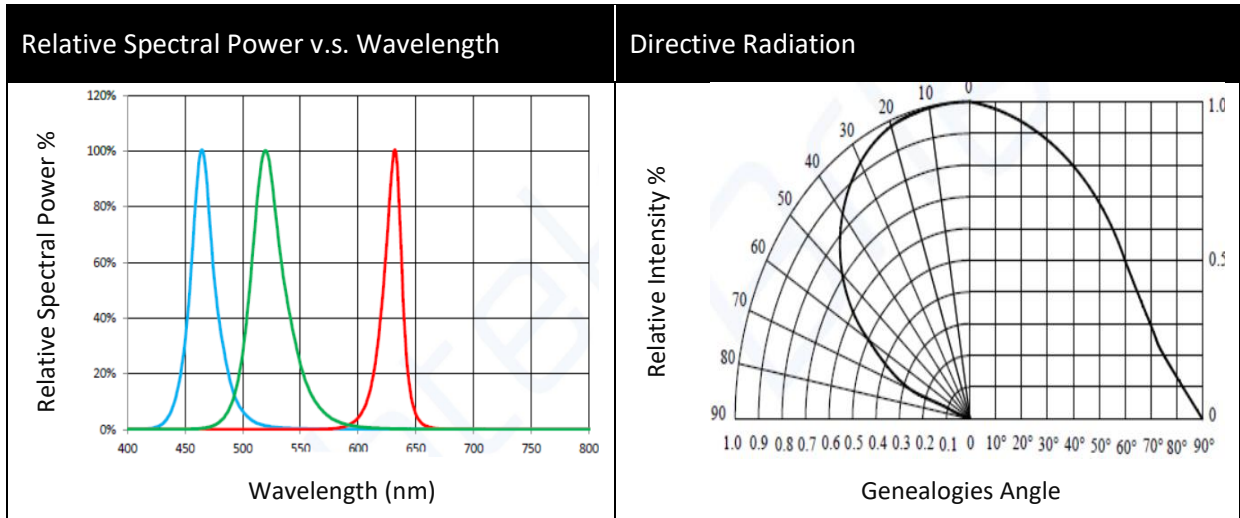
DATA TRANSFER TIME (TH+TL=1.2µs±300ns):

1. Timing Wave Form:
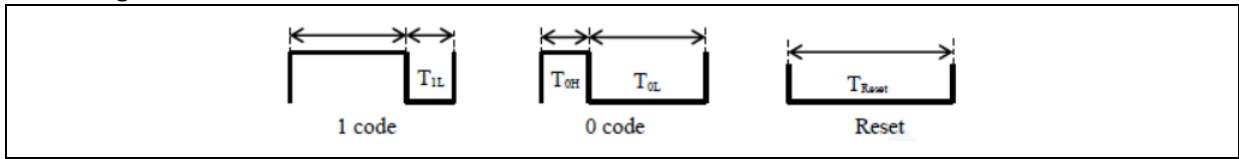
2. High Speed Mode:

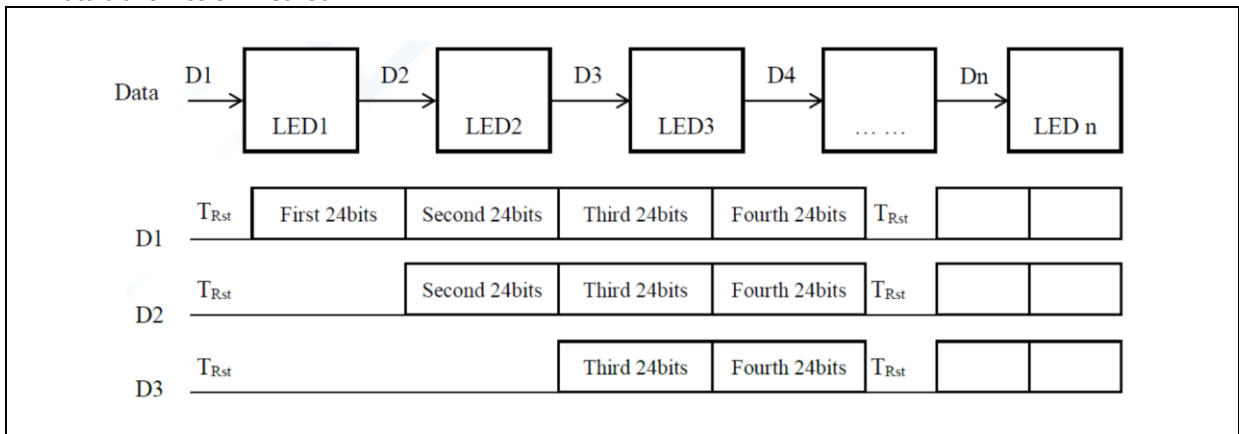| Item	Description	Typical	Allowance
T_{0H}	0 code, high voltage time	300ns	±150ns
T_{0L}	0 code, low voltage time	900ns	±150ns
T_{1H}	1 code, high voltage time	900ns	±150ns
T_{1L}	1 code, low voltage time	300ns	±150ns
T_{Reset}	Reset Time	>200µs	---

Notes:
1. The signal received by IC-LED is a return to zero code, which consists of "0" and "1" codes of high and low levels at different times.
2. The 24bit signal consists of different numbers of zeros and ones. The 24bit signal is the control signal of an LED.A "0" or "1" is 1bit.
3. The 1-code and 0-code defined in the table constitute a 24-bit signal. After input into IC, IC will be automatically converted into PWM signal to control RGB chip luminescence.
4. Controlling the LED at the limit of tolerance may occasionally cause instability. Please try to control with the specified typical values.

3. Composition of 24bit data::

G7	G6	G5	G4	G3	G2	G1	G0	R7	R6	R5	R4	R3	R2	R1	R0	B7	B6	B5	B4	B3	B2	B1	B0

bit23…….....………………………………………………………………………………………...………………………………….bit0
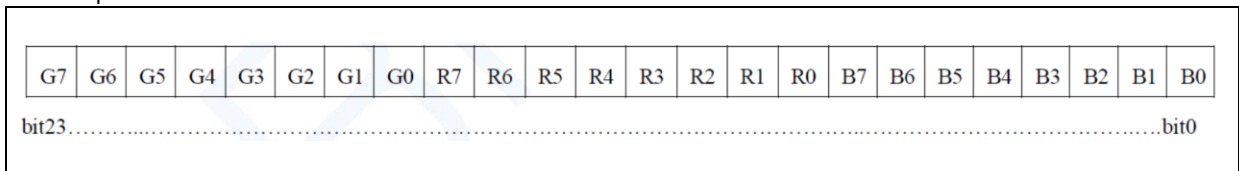
4. Data transmission method:

ECOMMENDED SOLDERING PROFILE:

Lead-free Solder IR Reflow:

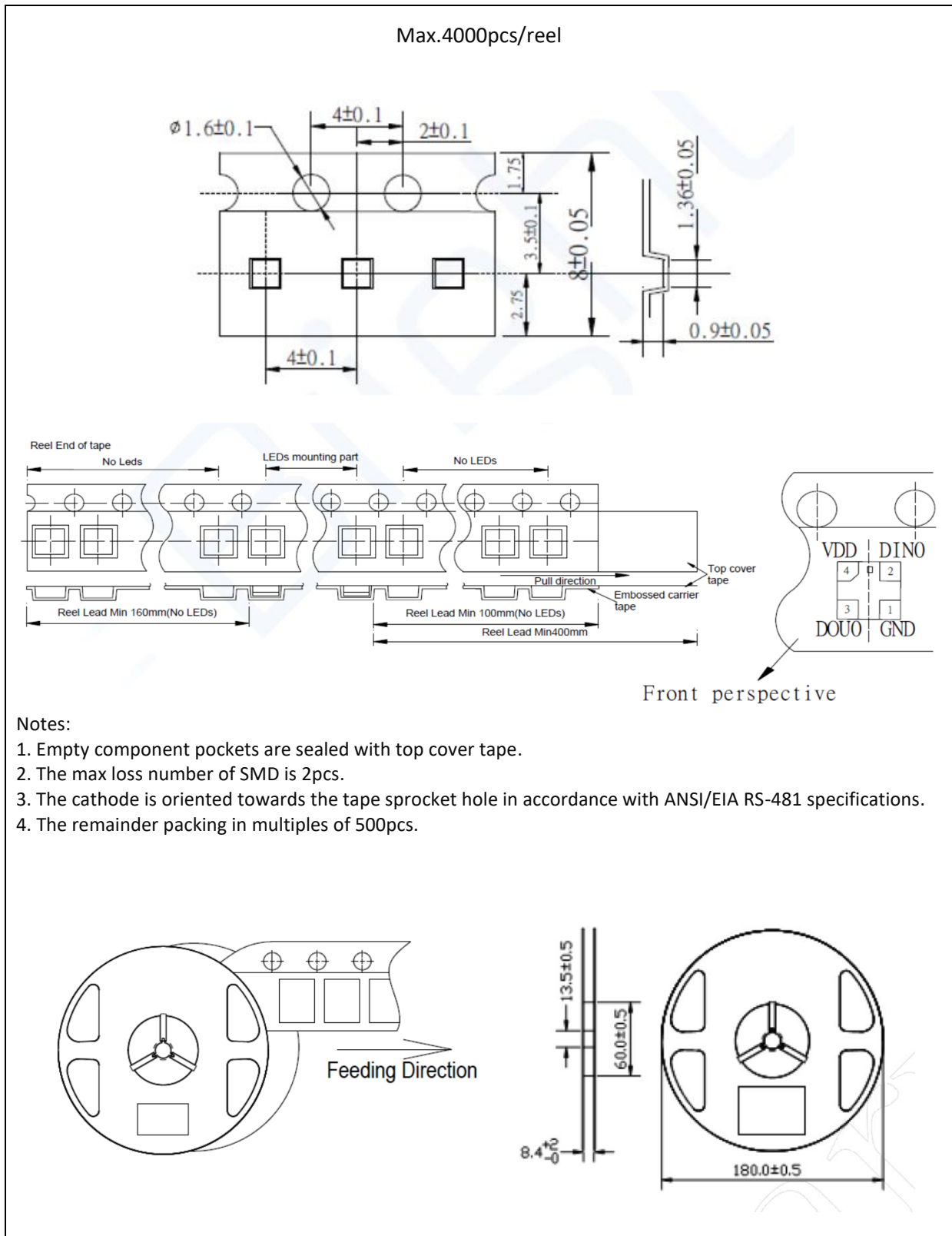| Profile Feature	Symbol	Pb-Free (SnAgCu) Assembly			Unit
		Min.	Recommendation	Max.	
Ramp-up rate to preheat (25°C to 150°C)	-	-	2	3	K/s
Time t_S ($T_{S\,min}$ to $T_{S\,max}$)	t_S	60	100	120	s
Ramp-up rate to peak ($T_{S\,max}$ to T_P)	-	-	2	3	K/s
Liquidus temperature	T_L	-	217	-	°C
Time above liquidus temperature	t_L	-	80	100	s
Peak temperature	T_P	-	245	260	°C
Time within 5 °C of the specified peak temperature T_P - 5 K	t_P	-	-	10	s
Ramp-down Rate (T_P to 100 °C)	-	-	3	4	K/s
Time 25 °C to T_P	-	-	-	480	s

Note:
1. We recommend the reflow temperature 240°C (±5°C). The maximum soldering temperature should be limited to 260°C.
2. Maxima reflow soldering: 3 times.
3. Before, during, and after soldering, should not apply stress on the components and PCB board.

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PACKING SPECIFICATION:

Reel Dimension:

Max.4000pcs/reel

Notes:

1. Empty component pockets are sealed with top cover tape.
2. The max loss number of SMD is 2pcs.
3. The cathode is oriented towards the tape sprocket hole in accordance with ANSI/EIA RS-481 specifications.
4. The remainder packing in multiples of 500pcs.

PRECAUTIONS OF USE:

Storage:

It is recommended to store the products in the following conditions:
- Humidity: 60% R.H. Max.
- Temperature: 5°C~30°C (41°F ~86°F).

Shelf life in sealed bag: 12 months at 5°C~30°C and <60% R.H.

Once the package is opened, the products should be used within 24 hours. Otherwise, they should be kept in a damp-proof box with descanting agent stored at R.H.<20% and apply baking before use.

Over-Current Proof:

Must apply resistors for protection otherwise slight voltage shift will cause big current change and burn-out will happen.
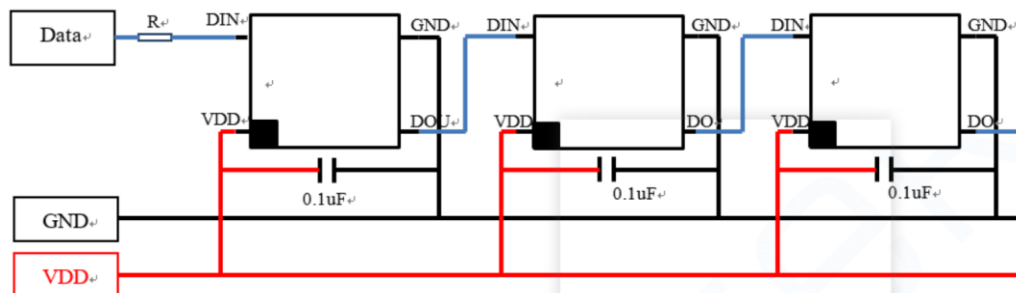
Baking:

It is recommended to bake the LED before soldering if the pack has been unsealed for longer than 24hrs. The suggested baking conditions are as followings:
- 60±3°C x 6hrs and <5%RH, taped / reel package.

It's normal to see slight color fading of carrier (light yellow) after baking in process.

Testing Circuit:

When the first LED is connected to the MCU, a resistance R is needed in series between its signal input line and the MCU. The size of R depends on the number of cascade beads. The more cascades, the smaller resistance R is used. It is generally recommended that the value be between 100-1K. Usually the recommended value is around 300 R. In order to make the LEDs work more stably, a parallel capacitor is needed between VDD and GND of each.

Cleaning:

Use alcohol-based cleaning solvents such as isopropyl alcohol to clean the LED carrier / package. Avoid putting any stress force directly on to the LED lens.

ESD (Electrostatic Discharge):

Static Electricity or power surge will damage the LED. Use of a conductive wrist band or anti-electrosatic glove is recommended when handing the LED all time. All devices, equipment, machinery, work tables, and storage racks must be properly grounded.

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REVISION RECORD:

Version	Date	Summary of Revision
A1.0	06/09/2024	Datasheet set-up.