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

PRODUCT DATASHEET

ATTENTION
OBSERVE PRECAUTIONS FOR HANDLING ELECTROSTATIC SENSITIVE DEVICES

► PLCC Side View SMD with IC
► 4516ICSV 1.7t Series
► Red/Green/Blue

N0M50S20ICSV

4516 IC Intergrated

APPLICATIONS:

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

4516 IC-Integrated

RoHS Compliant

FEATURES:

- **Package:** PLCC Side View EIA STD Package with Integrated IC Type 104
- **Forward Current:** 12mA
- **Forward Voltage (typ.):** +4.4~+5.5V
- **Luminous Intensity (typ.):** 1500mcd mixed white
- **Colour:** Red/Green/Blue
- **Wavelength:** 622/527/467nm
- **Viewing angle:** 120°
- **Materials:**
  – Resin: Silicone (Water Diffused)
  – L/F Finish: Ag Plated
- **Operating Temperature:** -40~+85°C
- **Storage Temperature:** -40~+105°C
- **IC Feature:**
  One pixel contains R, G, and B colour each can achieve 256 level brightness greyscales, which form 16,777,216 combination colours. Serial data transmission signal by single wire. Internal clock frequency operates at 800kHz.
- **Soldering methods:** IR Reflow soldering
- **Preconditioning:** acc. to JEDEC Level 5
- **Packing:** 12mm tape with max.2000pcs/reel, ø180mm (7'')

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CHARACTERISTICS:

Absolute Maximum Characteristics (Ta=25°C)

Parameter	Symbol	Ratings	Unit
DC Forward Current	I_F	12	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
Soldering Temperature	T_{SD}	260	°C

Electrical & Optical Characteristics (Ta=25°C)

Parameter		Symbol	Values			Unit	Test Condition
			Min.	Typ.	Max.		
Luminous Intensity	R	I_V	---	300	---	mcd	I_F=12mA
	G		---	1000	---		
	B		---	190	---		
	W		1000	1500	3600		
Forward Voltage		V_F	4.5	---	5.5	V	I_F=12mA
Dominant Wavelength	R	λ_D	615	---	630	nm	I_F=12mA
	G		520	---	535		
	B		460	---	475		
Colour Coordinate	X	---	---	0.2420	---	---	I_F=12mA
	Y		---	0.2860	---	---	
Viewing Angle		$2\theta_{1/2}$	---	120	---	deg	I_F=12mA

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

Parameter	Symbol	Values			Unit	Test Condition
		Min.	Typ.	Max.		
Static Current	I_{DD}	---	0.5	---	mA	V_{DD}=4.5V I_{OUT}=OFF
Input Voltage Level	V_{IH}	$0.7V_{DD}$	---	---	V	D_{IN}, SET
	V_{IL}	---	---	$0.3V_{DD}$	V	D_{IN}, SET

Switching Characteristics (Ta=25°C)

Parameter	Symbol	Values			Unit	Test Condition
		Min.	Typ.	Max.		
Rate of Data Signal	F_{DIN}	---	800	---	KHz	---
Transfer Time	T_{PLH}	---	---	80	ns	D_{IN} -> D_{OUT}
	T_{PHL}	---	---	80	ns	
Conversion Time of I_{OUT} R/G/B	T_r	---	---	50	ns	I_{OUT} R/G/B=12mA RL=200Ω CL=15pF
	T_f	---	---	100	ns	

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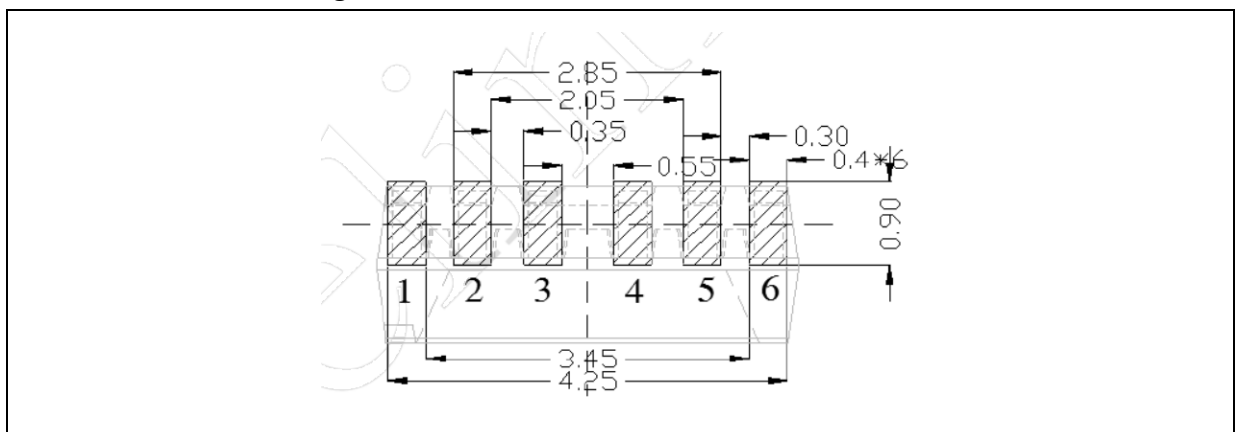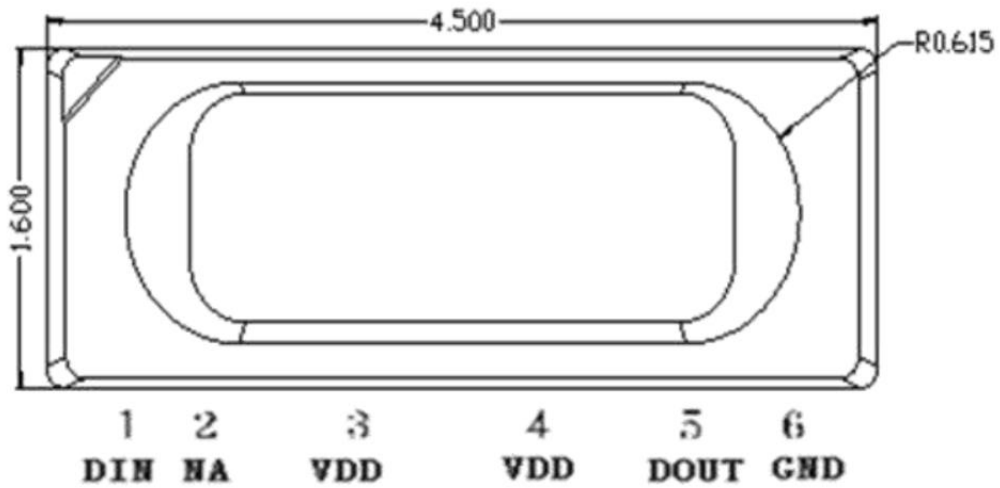
OUTLINE DIMENSION:

Package Dimension:
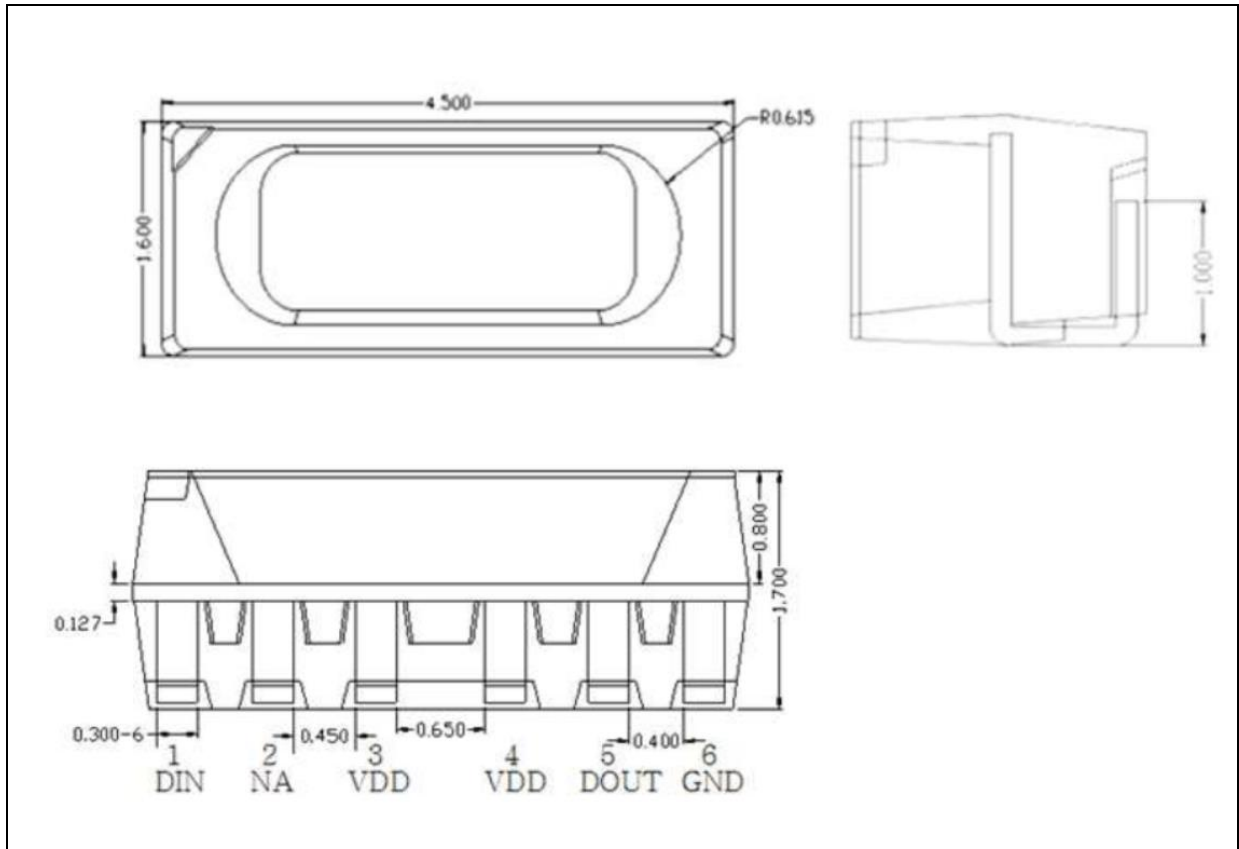
1. All dimensions are in millimetre (mm).
2. Tolerance ±0.2mm, unless otherwise noted.

Recommended Soldering Pad Dimension:

1. Dimensions are in millimetre (mm).
2. Tolerance ±0.1mm with angle tolerance ±0.5°.

PIN CONFIGURATION:

No.	Symbol	Function Description
1	DIN	Control Data Signal Input
2	NA	Insignificance
3	VDD	Power Supply Voltage
4		
5	DOUT	Control Data Signal Output
6	GND	Ground

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BINNING GROUPS:

Luminous Intensity Classifications (White) (I_F = 12mA, V_{DD}=5V):

Code	Min.	Max.	Unit
15	1000	1300	
16	1300	1700	
17	1700	2200	mcd
18	2200	2800	
19	2800	3600	

CIE CHROMATICITY DIAGRAM:
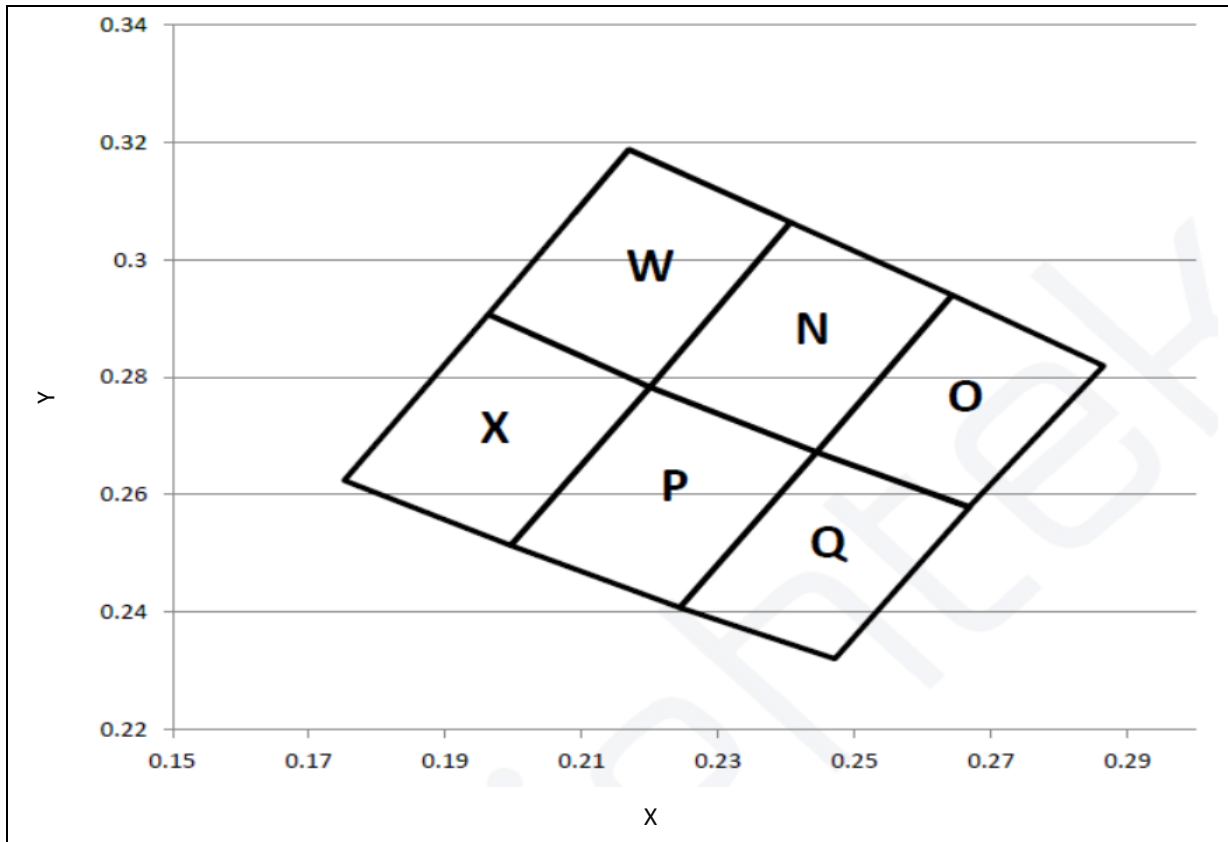
Chromaticity Coordinates Classifications (I_F = 12mA):

	1		2		3		4	
	X	Y	X	Y	X	Y	X	Y
W	0.1963	0.2907	0.2169	0.3188	0.2406	0.3064	0.2200	0.2783
N	0.2200	0.2783	0.2406	0.3064	0.2643	0.2940	0.2444	0.2672
O	0.2444	0.2672	0.2643	0.2940	0.2865	0.2819	0.2667	0.2578
X	0.1963	0.2907	0.1752	0.2624	0.1996	0.2513	0.2200	0.2783
P	0.22 00	0.2783	0.1996	0.2513	0.2244	0.2407	0.2444	0.2672
Q	0.2444	0.2672	0.2244	0.2407	0.2471	0.2320	0.2669	0.2579

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DATA TRANSFER TIME (TH+TL=1.2μs±600ns):

1. Timing Wave Form
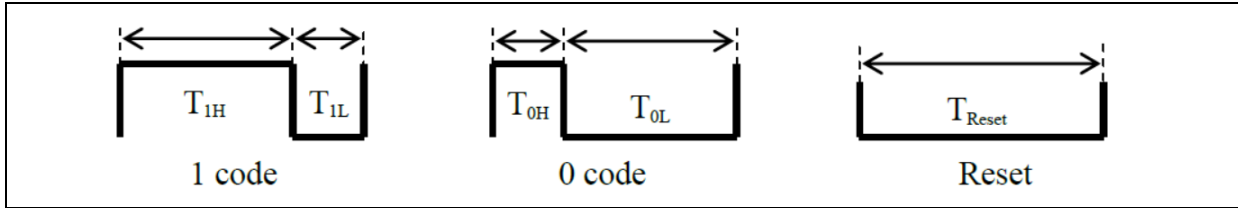
2. High Speed Mode

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

Note:
1. The signal received by ICLED 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 1 bit.
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. 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 24 Bits 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

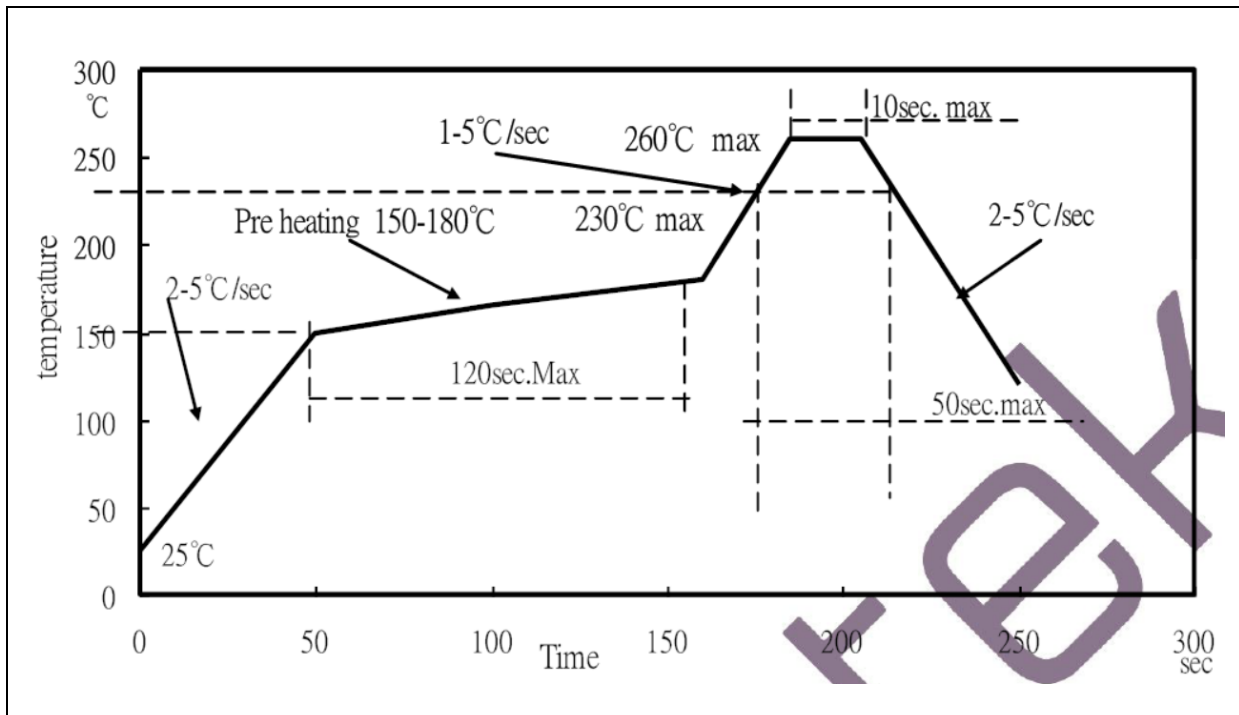bit23…………...…………………………………………………………….....………………………………………………….bit0

4. Data Transmission Method
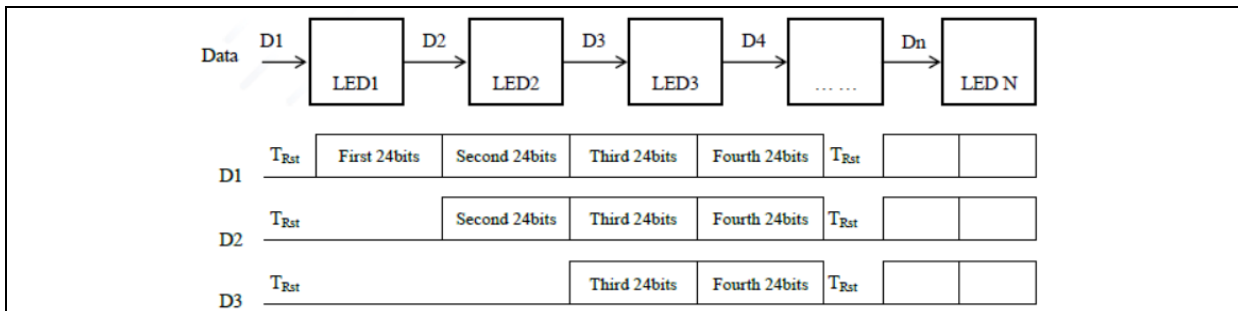
RECOMMENDED SOLDERING PROFILE:

Lead-free Solder IR Reflow:

Note:

1. We recommend the reflow temperature 240°C (±5°C). The maximum soldering temperature should be limited to 260°C.
2. Maximum reflow soldering: 1 time.
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.2000pcs/reel

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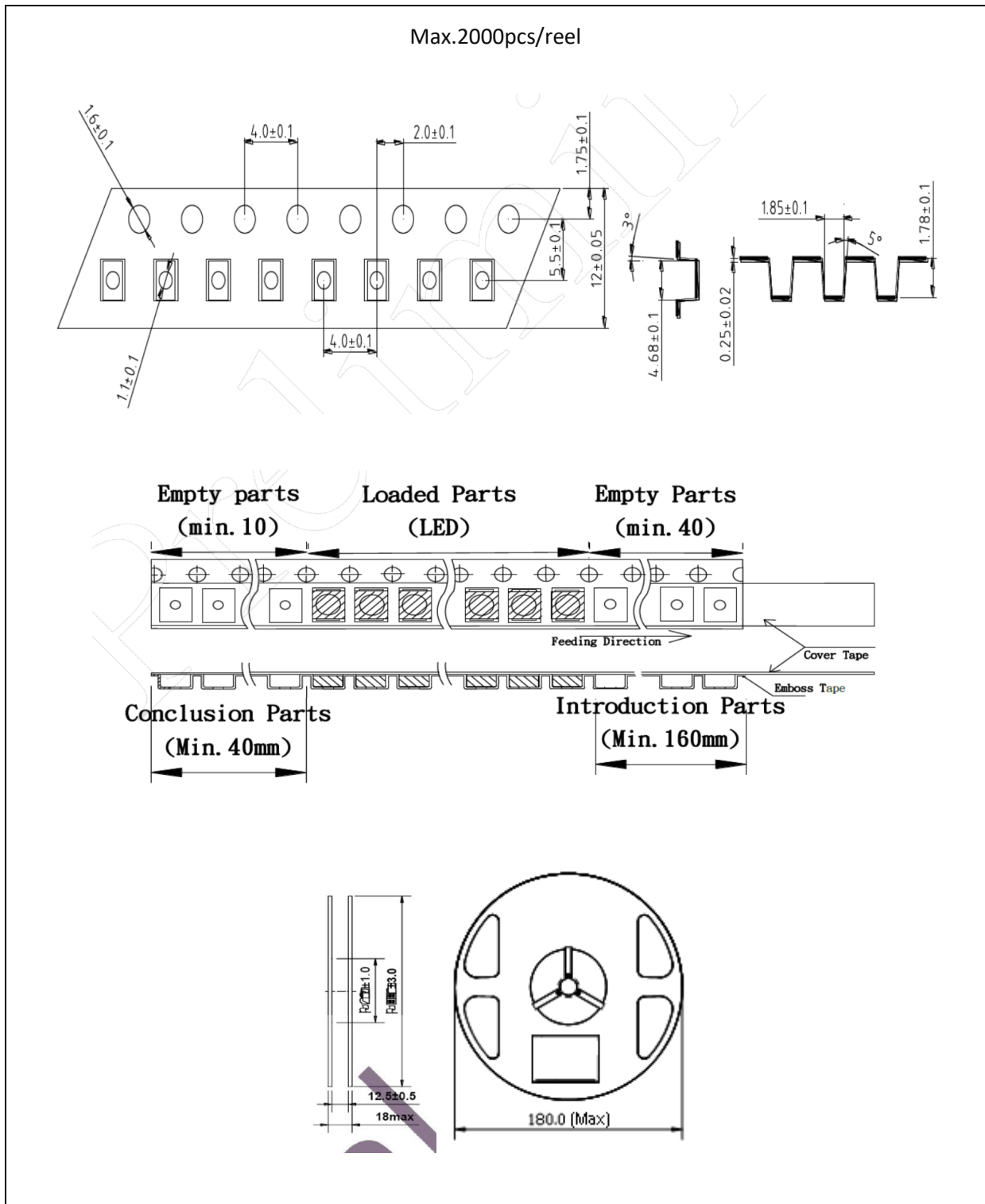
PRECAUTIONS OF USE:

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 72 hours. Otherwise, they should be kept in a damp-proof box with descanting agent <10% R.H. and apply baking.

Over-Current Proof:

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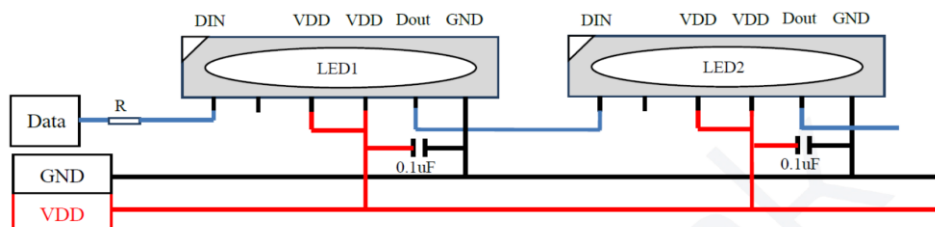
Baking:

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 LED.

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	20/11/2019	Datasheet set-up.
A1.1	08/09/2020	Revise IC setting.