



587 SERIES

**4020 Side View PLCC**  
**Addressable RGB LED**  
SMD LED + IC

MECHANICAL / SPECIFICATIONS

PART NUMBER:  
[587-1064-137F](#)

DIMENSIONS:  
4.00 x 2.00 x 1.60mm

LENS COLOR: Clear

LENS MATERIAL: Epoxy

# CONTROL WIRES: Single Wire

STANDARD PACKAGING:  
1500 pcs on 7 inch Reel

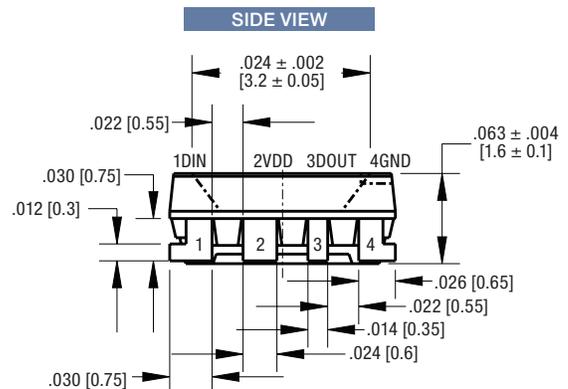
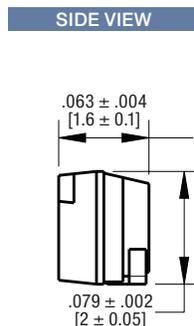
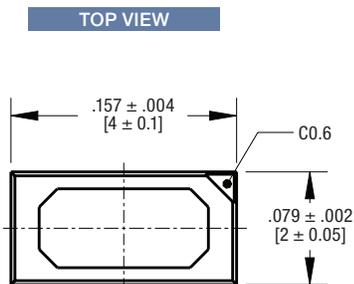
MOISTURE SENSITIVITY LEVEL: 5a

CERTIFICATIONS & RATINGS  
ROHS Compliant

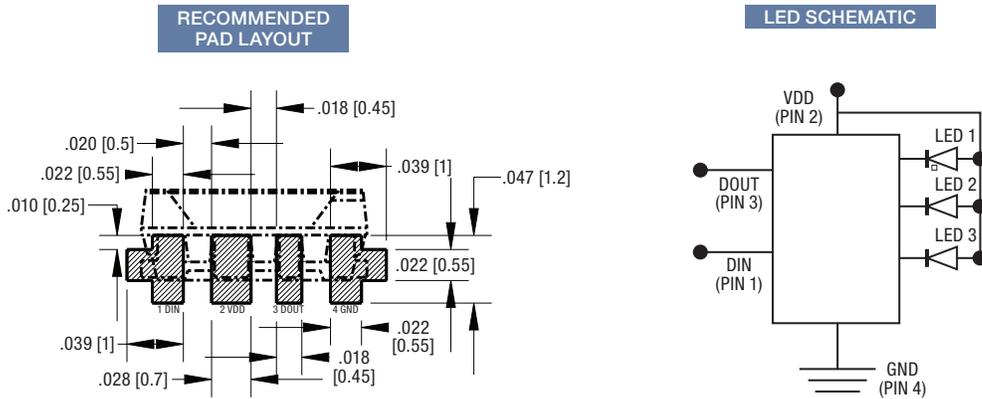
FEATURES & BENEFITS

- SMD LED integrates high-quality external control single-wire, serial cascade, constant current IC
- Uniform color temperature effect and more balanced color matching
- Built-in power-on reset and power-off reset circuit
- Grayscale adjustment circuit (256-level grayscale adjustable)
- Single-line data transmission, infinite cascade
- Shaping forwarding enhancement technology, the transmission distance between two points exceeds 10M.
- The data transmission frequency can reach 800Kbps, when the refresh rate is 30 frames/second, the number of cascades is not less than 1024 points

DIMENSIONS inches [mm]



DIMENSIONS inches [mm]



ELECTRICAL - OPTICAL CHARACTERISTICS (At 25°C Ambient) IC @5V, R/G/B @12 mA

Emitting Color	Material	Dominant Wavelength (nm)		Luminous Intensity (mcd)			Viewing Angle
		Min.	Max.	Min.	Typ.	Max.	
R	AlInGaP	620	630	240	-	450	120
G	InGaN	520	530	580	-	1050	120
B	InGaN	460	470	160	-	320	120

ABSOLUTE MAXIMUM RATINGS (Max., TA=25°C, VSS=0V)

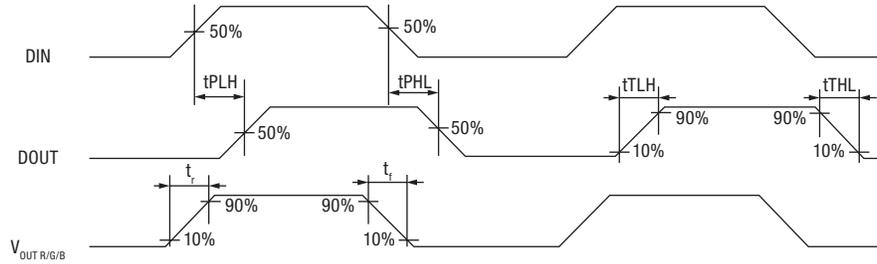
Symbol	Parameter	Rating	Units
V <sub>DD</sub>	Supply Voltage	+3.7~+5.5	V
V <sub>IN</sub>	Logic Input Voltage	-0.5~V <sub>DD</sub> +0.5	V
VR	Reverse Voltage	12	V
T <sub>opt</sub>	Working Temperature	-40°C~+85°C	°C
T <sub>stg</sub>	Storage Temperature	-40°C~+85°C	°C
V <sub>ESD</sub>	ESD Pressure (DM)	200	V
V <sub>ESD</sub>	ESD Pressure (HBM)	2 K	V

ELECTRICAL CHARACTERISTICS (TA=-20~+70°C, VDD=4.5~5.5V, VSS=0V)

Symbol	Parameter	Min.	Typ.	Max.	Units	Note
VDD	Supply Voltage	-	5.2	-	V	-
V <sub>IH</sub>	Input High "H" of DI	0.7*VDD	-	-	V	+VDD=5.0V
V <sub>IL</sub>	Input Low "L" of DI	-	-	0.3*VDD	V	
FPWM	The Frequency of PWM	-	1.0	-	KHz	-
I <sub>DD</sub>	Static Power Consumption	-	0.5	-	mA	-

SWITCHING CHARACTERISTICS (VCC=5V Ta=25°C)

Symbol	Parameter	Condition	Min.	Typ.	Max.	Units
fDIN	The speed of data transmission	The duty ratio of 67% (data 1)	-	800	-	KHZ
T <sub>PLH</sub>	Dout Transmission Delay	The earth load capacitance of the dout port is 30pf, and the signal transmission delay from DIN to dout	-	67	-	ns
T <sub>PHL</sub>			-	82	-	ns
T <sub>r</sub>	Out R/B conversion time	IOU <sub>T</sub> R/B=5mA, out R/B port connected with 200 Ω resistor to VDD in series, load capacitance to ground	-	22	-	ns
T <sub>f</sub>			-	75	-	ns
T <sub>r</sub>	IOU <sub>T</sub> Rise/Drop Time	IOU <sub>T</sub> g = 5mA, out g port is connected with 200 Ω resistor to VDD in series, and the load capacitance to ground is 30pf	-	18	-	ns
T <sub>f</sub>			-	110	-	ns

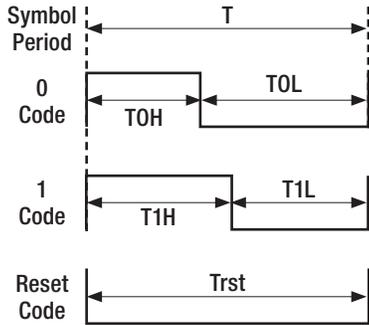


THE DATA TRANSMISSION TIME:

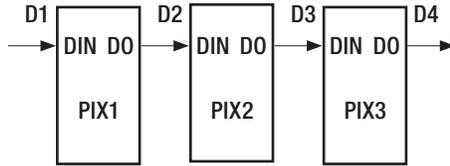
Item	Description	Min.	Standard value	Max.	Allowance
T	Code cycle	1.20	-	-	μs
T0H	0 yards, high level time	0.2	0.3	0.4	μs
T0L	0 yards, low level time	0.8	-	-	μs
T1H	1 yards, high level time	0.7	0.9	1.0	μs
T1L	0 yards, low level time	0.2	-	-	μs
Reset	reset yards, low level time	200	-	-	μs

1. The protocol uses an unipolar zeroing code. Each symbol must have a low level. Each symbol in this protocol starts with a high level. The high time width determines the “0” or “1” code.
2. When writing programs, the minimum symbol period is 1.2μs.
3. The high time of “0” code and “1” code should be in accordance with the stipulated range in the above table. The low time requirement of “0” code and “1” code is less than 20μs.

TIMING WAVEFORM (Ta=25°C)



CONNECTION METHOD



DATA TRANSMISSION METHOD (Ta=25°C)

D1	1st 24bits	2nd 24bits	3rd 24bits	4th 24bits	(200us) Trst	1st 24bits	2nd 24bits	3rd 24bits	4th 24bits
D2		2nd 24bits	3rd 24bits	4th 24bits			2nd 24bits	3rd 24bits	4th 24bits
D3			3rd 24bits	4th 24bits				3rd 24bits	4th 24bits
D4				4th 24bits					4th 24bits

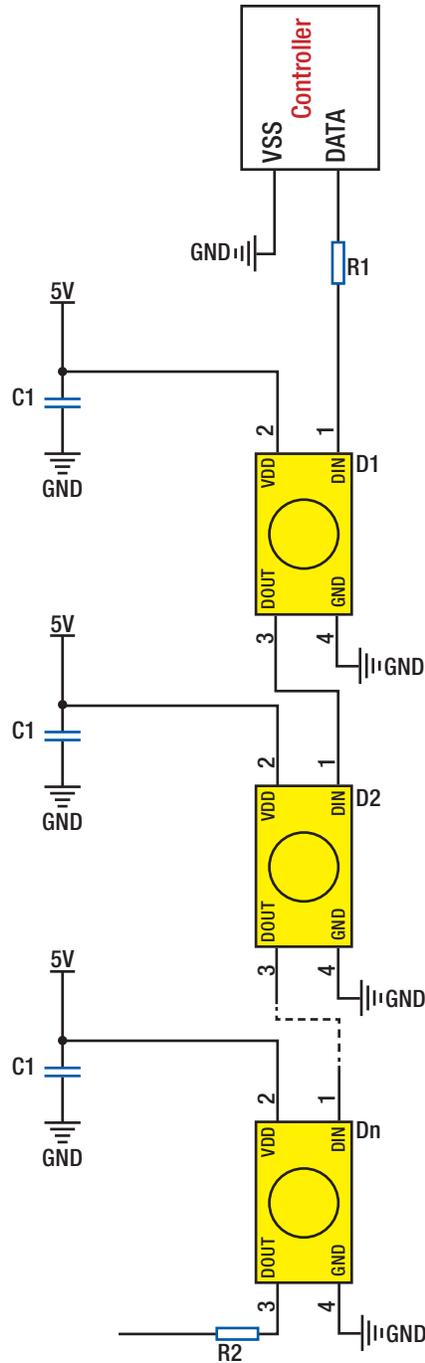
Note: where D1 is the data sent by the MCU end, D2, D3 and D4 are the data for automatic shaping and forwarding of the cascade circuit.

24 BIT DATA STRUCTURE (Ta=25°C)

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

Note: high start, send data in GRB order (G7 ≤ G6 ... .. B0)

TYPICAL APPLICATION CIRCUIT

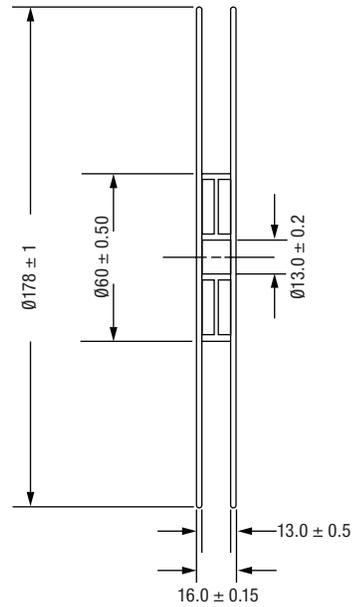
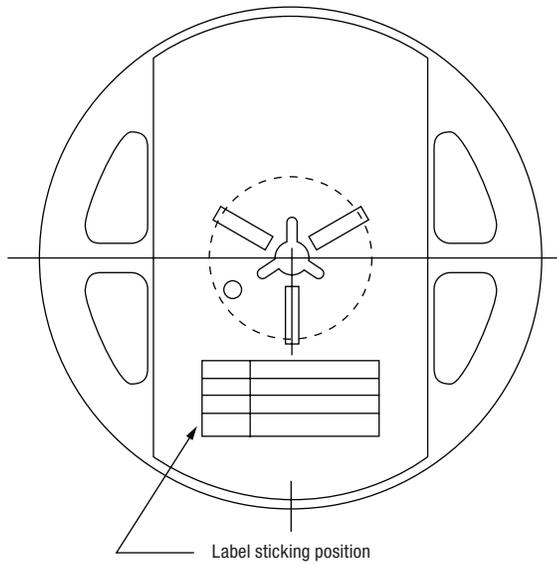
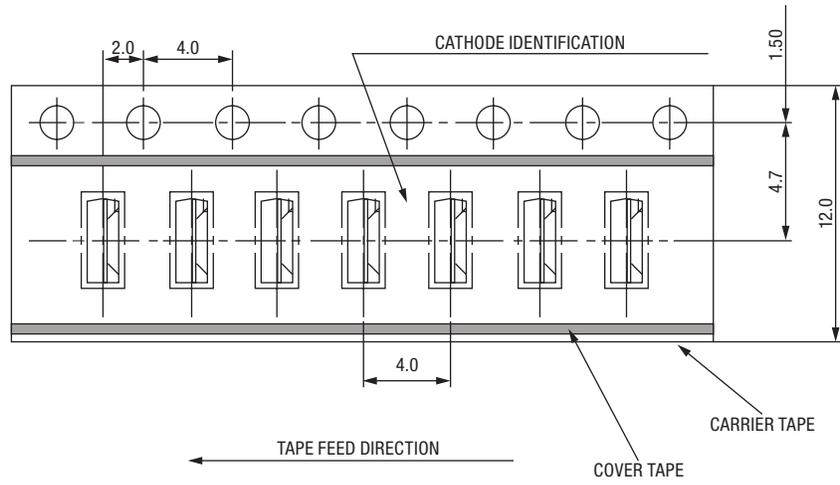


In the application circuit, in order to prevent the instantaneous high voltage caused by the hot plug of the product during the test from damaging the internal signal input and output pins of the IC, the protection resistor should be connected in series at the signal input and output terminals. In addition, in order to make the IC chips work more stably, the decoupling capacitance between the beads is essential;

Application 1: for flexible or rigid LED strip, the transmission distance between the lamp beads is short, it is recommended to connect the protection resistance at the input and output end in series, i.e.  $R1=R2$ , about 500 ohm.

Application: for module or general special-shaped products, lamp beads transmission distance is long, because of different wire and transmission distance, in the signal in time clock at both ends of the line on grounding protection resistance will be slightly different; to the actual use of fixed;

TAPE AND REEL SPECIFICATION

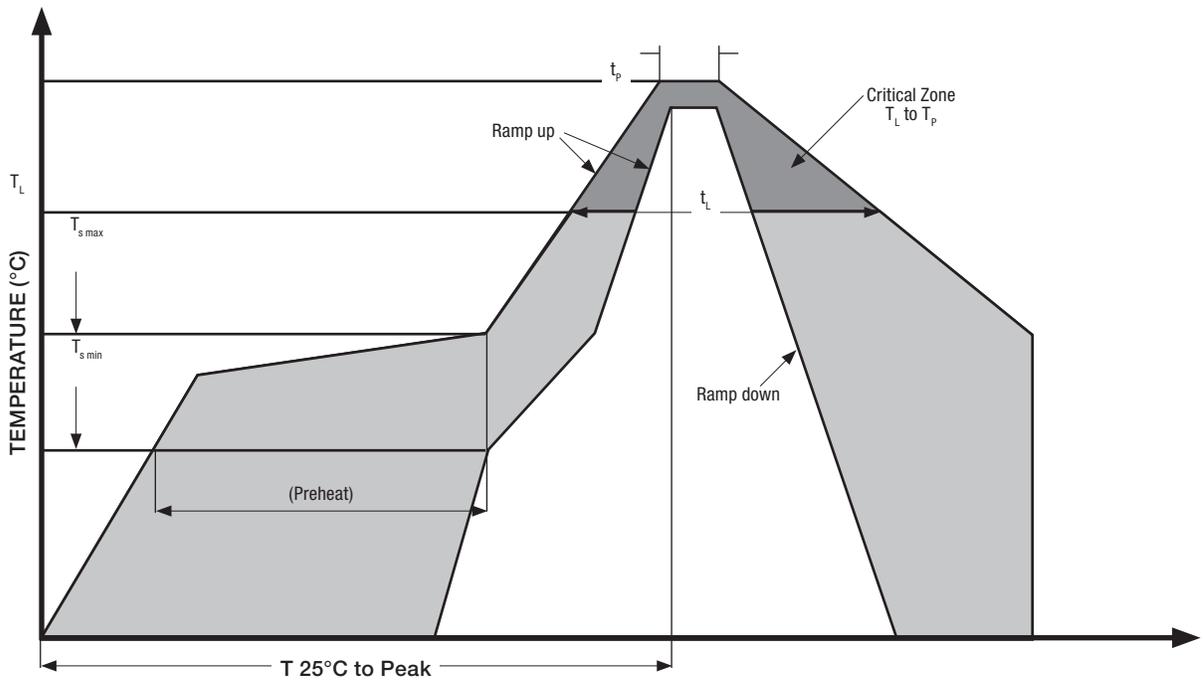


Unit: mm

REFLOW SOLDERING

1. Reflow soldering should not be done more than two times.
2. Never attempt next process until the component is cooled down to room temperature after reflow.
3. The recommended reflow soldering profile (measured on the surface of the LED terminal) is as following:

LEAD-FREE SOLDER PROFILE



Profile Feature	Lead-Containing Solder	Lead-Free Solder
Average heating rate (Ts max to Tp)	3°C/second max.	3°C/second max.
Preheat: Temperature Min (Ts min)	100°C	150°C
Preheat: Temperature Min (Ts max)	150°C	200°C
Preheat: Temperature Min (ts min to ts max)	60-120 seconds	60-180 seconds
Time Maintained Above: Temperature (T <sub>l</sub> )	183°C	217°C
Time Maintained Above: Time (T <sub>l</sub> )	60-150 seconds	60-150 seconds
Peak/classification temperature (T <sub>p</sub> )	215°C	240°C
Time at 5°C at the actual peak temperature (t <sub>p</sub> )	<10 seconds	<10 seconds
Ramp-Down Rate	6°C/second max.	6°C/second max.
Time at 25°C to Peak Temperature	<6 minutes max.	<6 minutes max.

Note: All temperatures refer to topside of the package, measured on the package body surface.



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