



## 587 SERIES

# 5050 Addressable RGB LED

SMD LED + IC

### MECHANICAL / SPECIFICATIONS

PART NUMBER:

[587-2056-147F](#)

DIMENSIONS:

5.0 x 5.0 x 1.60mm

LENS COLOR: Clear

LENS MATERIAL: Silicone

# CONTROL WIRES:

Single Wire

STANDARD PACKAGING:

1000 pcs on 7 inch Reel

MOISTURE SENSITIVITY LEVEL: 5a

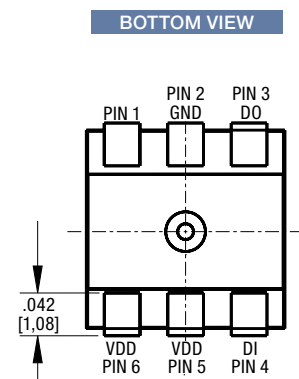
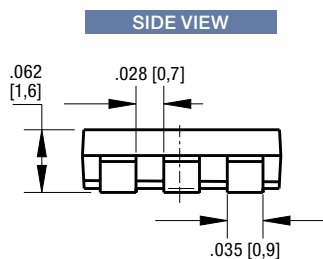
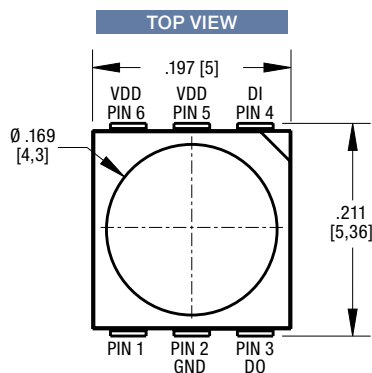
### CERTIFICATIONS & RATINGS

ROHS Compliant

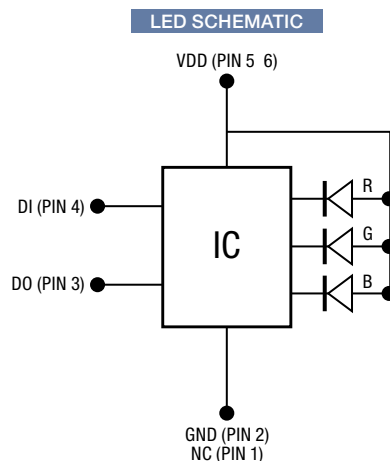
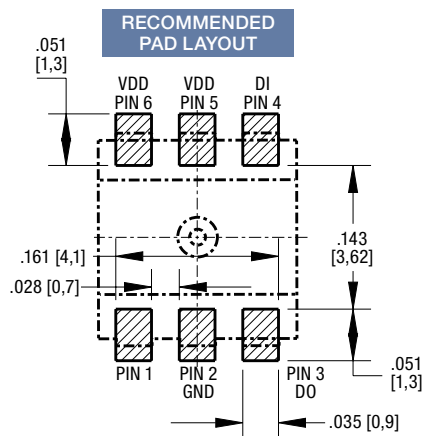
### FEATURES & BENEFITS

- 5050 package size, single wire, 24 bit data frame
- Support signal reshaping to pass control waveforms to next adjacent driver
- Cascading port transmission by a single data line
- Built in current regulator, three way drive
- Optional maximal drive current: 20mA
- 256 step gray scale output to allow 16,777,216 color display
- Built in oscillator 20MHz
- LED driver port maximum withstand Voltage 6.5V
- Built in power on reset (2.6V) (@VDD=5V)
- Operating Voltage Range: 3.3V ~ 5.5V

### DIMENSIONS inches [mm]



DIMENSIONS inches [mm]



ELECTRICAL - OPTICAL CHARACTERISTICS ( $T_{\text{Soldering}} 25^{\circ}\text{C}$ )

Test Condition: @5V/  $T_s = 25^{\circ}\text{C}$ ; Tolerance:  $\pm 10\%$

Emitting Color	Material	Dominant Wavelength (nm)		Luminous Intensity (mcd)			Viewing Angle
		Min.	Max.	Min.	Typ.	Max.	
R	AlInGaP	615	630	360	630	900	120
G	InGaN	515	535	560	1180	1800	120
B	InGaN	460	476	112	250	450	120

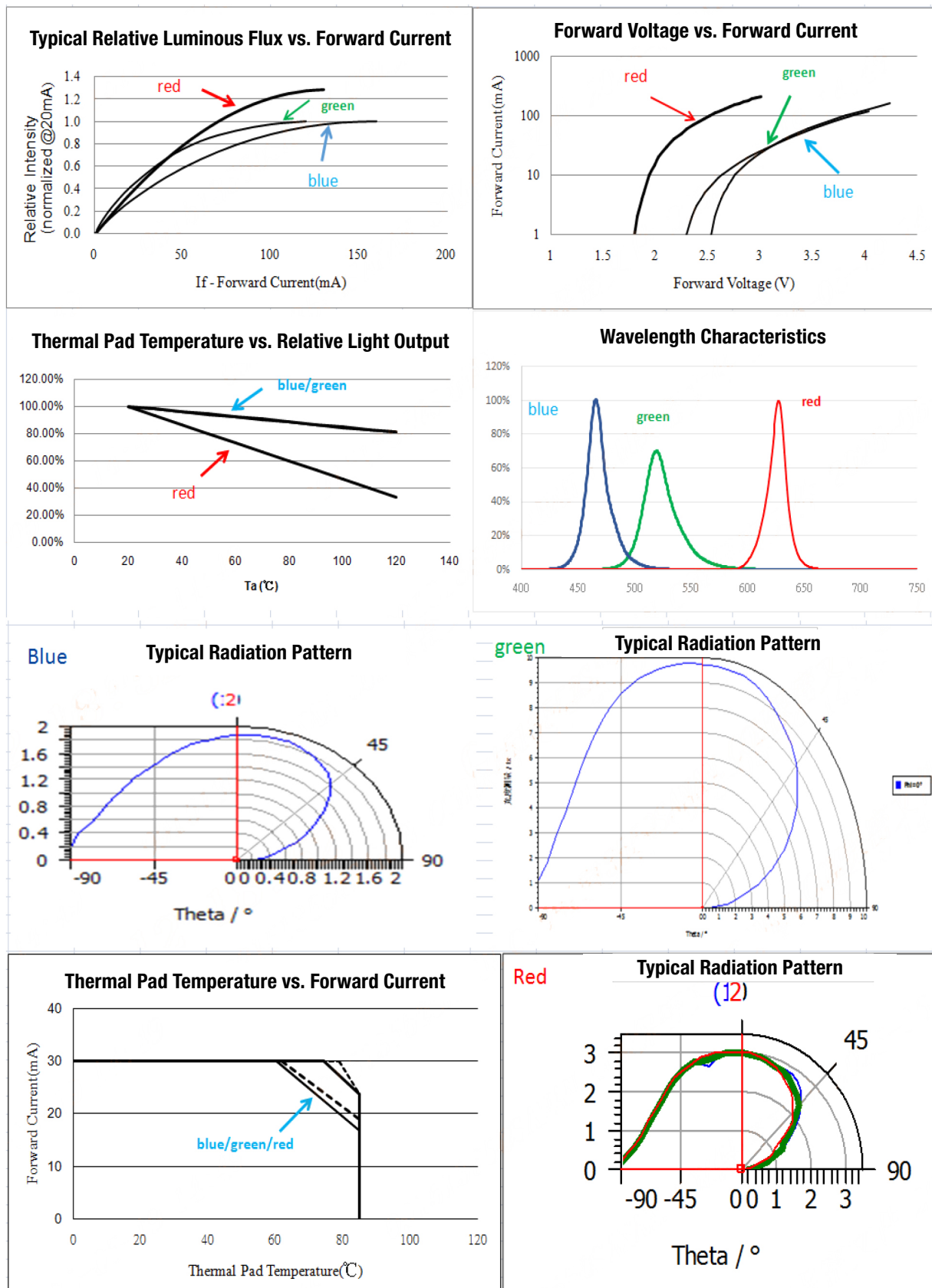
ABSOLUTE MAXIMUM RATINGS ( $T_A = 25^{\circ}\text{C}$ )

Symbol	Parameter	Range	Units
$V_{DD}$	Supply Voltage	6.5	V
$P_D$	Power Dissipation	<400	mW
$I_{LEDOUT}$	Total DC Current	17.25	mA
$T_M$	Welding Temperature	300(8S)	$^{\circ}\text{C}$
$T_{OPR}$	Operating Temperature Range	-45~85	$^{\circ}\text{C}$
$T_{STO}$	Storage Temperature Range	-45~85	$^{\circ}\text{C}$
$V_{ESD}$	ESD(HBM)	>2K	V

ELECTRICAL CHARACTERISTICS ( $T_A = 25^{\circ}\text{C}$   $V_{DD} = 5V$ )

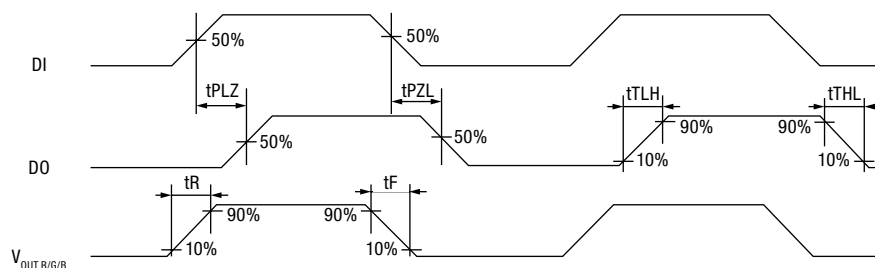
Symbol	Parameter	Min.	Typ.	Max.	Units	Note
$V_{DD}$	Supply Voltage	3.3	5.0	5.5	V	-
$I_{DD}$	Operation Current	-	1.5	2	mA	-
$V_{IH}$	Input High "H" of DI	$V_{DD} * 0.45 + 0.5$	-	$V_{DD}$	V	-
$V_{IL}$	Input Low "L" of DI	0	-	1.0	V	-
$R_{PD}$	Pull Down Resistance	-	500k	-	$\Omega$	DI, DO
$V_{OH}$	Output High "H" of DO	$V_{DD} - 0.5$	-	-	V	$I_{OH} = 4mA$
$V_{OL}$	Output Low "L" of DO	-	-	0.4	V	$I_{OL} = 4mA$
$I_{SINK}$	R, G, B Sink Current	19	20	21	mA	$V_O = V_{DD} - 3.0V @ V_{DD} = 5V$
$I_{LEAK}$	Input Leakage	-	-	1	$\mu A$	DI = VDD
$L_{OFF}$	R, G, B Off Leakage Current	-	-	1	$\mu A$	-

TYPICAL ELECTRICAL - OPTICAL CHARACTERISTICS

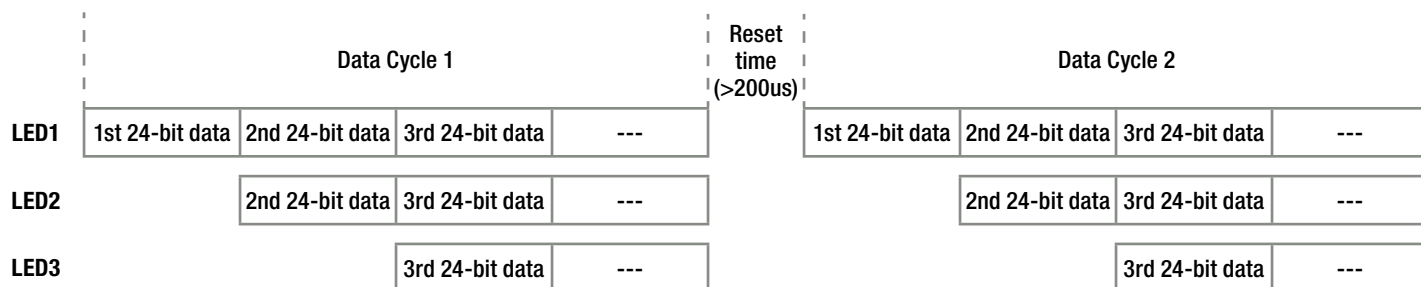


# DYNAMIC CHARACTERISTICS (TA=25°C)

Symbol	Parameter	Min.	Typ.	Max.	Units	Note
tPLZ	Propagation delay time	-	-	80	ns	DI→DO, CL=15pF, RL=10kΩ
tPZL		-	-	80	ns	
tTLH	Rising time	-	15		ns	R, G, B=20mA, CL=30pF
tTHZ	Falling time	-	15		ns	
tR	Rising time		50		ns	
tF	Falling time		50		ns	
F <sub>DATA</sub>	Data rate	-	800	-	KHZ	
FPWM	Output LED PWM		20		KHZ	



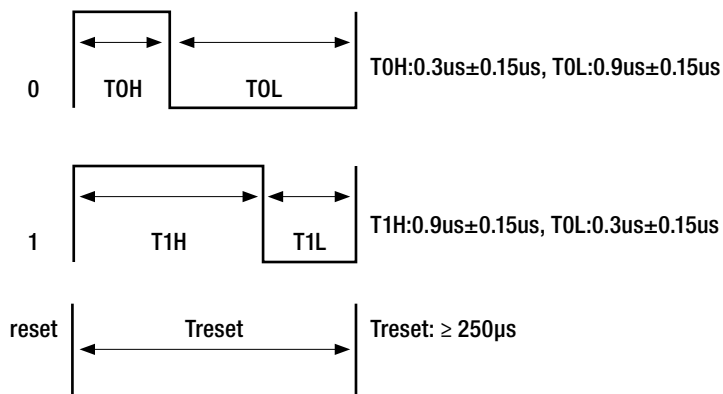
## CASCADING DATA STRUCTURE



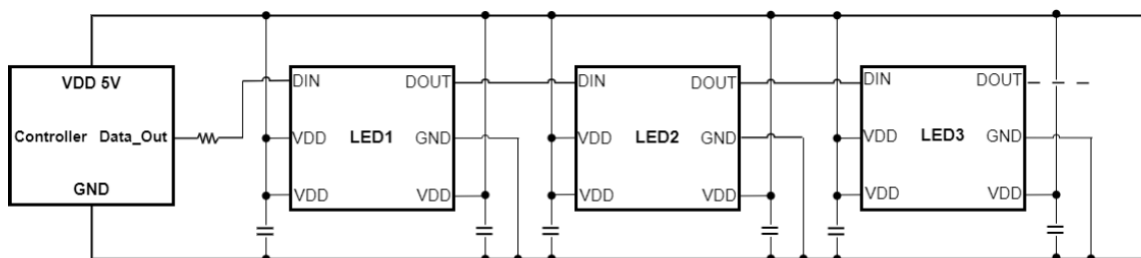
The single wire data transfer protocol supports 24-bit data for each LED RGB display data refresh. THE IC receives 24-bit data and passes the remaining data to next LED. The 24-bit data consist of red, green and blue data, each with 8-bit width, and are transferred with MSB first.

R7	R6	R5	R4	R3	R2	R1	R0	G7	G6	G5	G4	G3	G2	G1	G0	B7	B6	B5	B4	B3	B2	B1	B0
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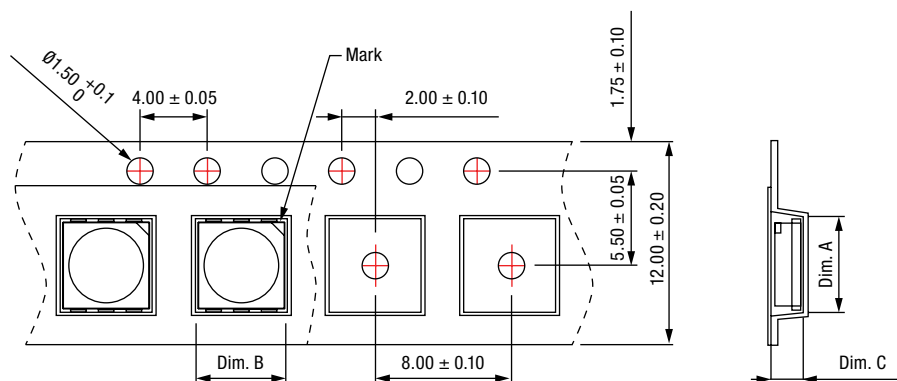
The transferred data are recognized based on the pulse widths received by THE IC. A low bit 0 is represented by a 0.3μs high pulse followed by a 0.9μs low pulse. A high bit 1 is represented by a 0.9μs high pulse followed by a 0.3μs low pulse. A low pulse ≥ 200μs is used to issue a reset command to THE IC to start a new cycle of serial commands.



## TYPICAL APPLICATION CIRCUIT

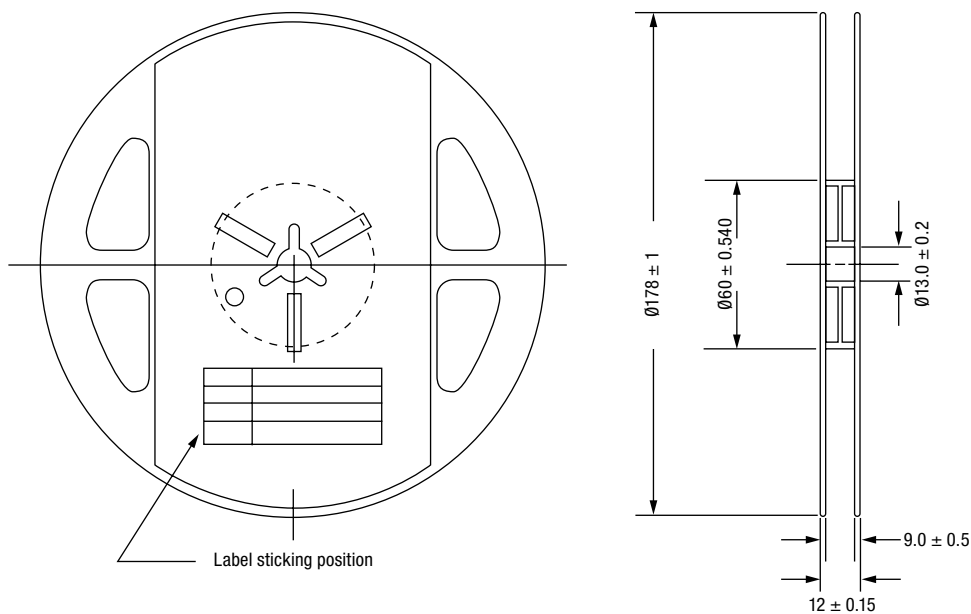


## TAPE AND REEL SPECIFICATION



Dim A	Dim B	Dim C	Quantity/Reel
5.70±0.10	5.30±0.10	1.80±0.10	1000

Unit: mm



Unit: mm

## REFLOW SOLDERING

Recommended soldering paste specifications:

1. Operating temp.: Above 217 °C, 60~150 sec.
2. Peak temp.: 260 °C max, 10 sec max
3. Reflow soldering should not be done more than two times.
4. Never attempt next process until the component is cooled down to room temperature after reflow.
5. The recommended reflow soldering profile (measured on the surface of the LED terminal) is as following:

## LEAD-FREE SOLDER PROFILE

