



# SGM3139B

## 6-Channel 1-Wire Dimming LED Driver with Ultra Low Dropout Current Source

### GENERAL DESCRIPTION

The SGM3139B is a 6-channel ultra low dropout constant source parallel LED driver. The SGM3139B uses an internal resistor to set the bias current for six LEDs, which are matched to  $\pm 3\%$ .

The SGM3139B incorporates a single wire interface to program the output current at 16 continuous steps. It has an internal deglitch circuit for filtering the noise of the EN input.

The SGM3139B requires only a 35mV dropout voltage at a 20mA load. The feature makes SGM3139B ideal for battery-operated systems, such as personal digital assistants.

The SGM3139B is available in Green TQFN-3×3-16L package and is specified over an ambient temperature range of  $-40^{\circ}\text{C}$  to  $+85^{\circ}\text{C}$ .

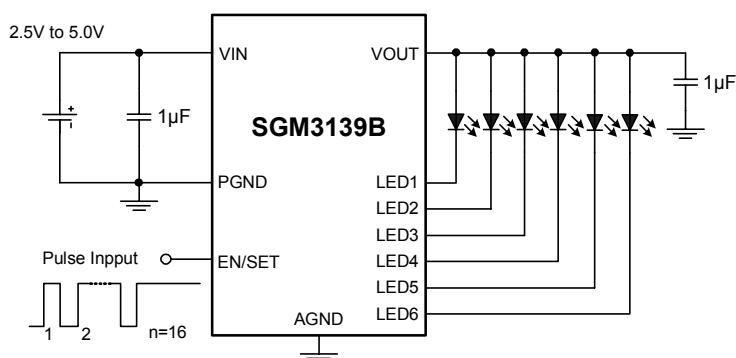
### APPLICATIONS

Wireless Handsets  
MP3, MP4, and PMP  
Cellular Phones  
Portable Communication Devices  
Digital Cameras, Camcorders  
PDAs, Palmtops, and Handy Terminals  
Battery-Powered Equipment

### FEATURES

- Ultra Low Dropout: 35mV/20mA
- Support up to 6 LEDs
- LED Sink Current 20mA
- $\pm 3\%$  LED Current Matching
- Deglitch Circuit
- Thermal Shutdown Protection
- 16-Step Brightness Control
- No EMI and Switch Noise
- Operating Temperature Range:  $-40^{\circ}\text{C}$  to  $+85^{\circ}\text{C}$
- Available in Green TQFN-3×3-16L Package

### TYPICAL APPLICATION



**PACKAGE/ORDERING INFORMATION**

MODEL	ORDER NUMBER	PACKAGE DESCRIPTION	SPECIFIED TEMPERATURE RANGE	MARKING INFORMATION	PACKAGE OPTION
SGM3139B	SGM3139BYTQ16G/TR	TQFN-3×3-16L	-40°C to +85°C	3139BQ	Tape and Reel, 3000

**ABSOLUTE MAXIMUM RATINGS**

V <sub>IN</sub> to GND.....	-0.3V to 6V
The Other Pins to GND .....	-0.3V to 6V
Power Dissipation, P <sub>D</sub> @ T <sub>A</sub> = 25°C	
TQFN-3×3-16L.....	1.47W
Storage Temperature Range.....	-40°C to +150°C
Junction Temperature.....	150°C
Operating Temperature Range.....	-40°C to +85°C
Lead Temperature Range (Soldering 10 sec)	
.....	260°C
ESD Susceptibility	
HBM.....	4000V
MM.....	400V

**NOTES:**

1. The thermal resistance figures are for general reference only. Actual thermal characteristics may vary with the PCB layout, size of metal trace, the thermal conduction path between metal layers and the environment of the system.

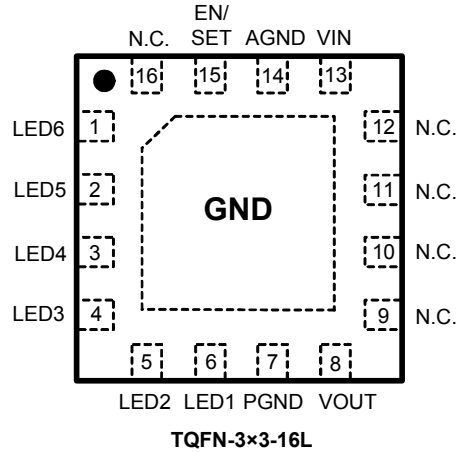
2. Stresses beyond those listed under “Absolute Maximum Ratings” may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated in the operational sections of the specifications is not implied. Exposure to absolute maximum rating conditions for extended periods may affect device reliability.

**CAUTION**

This integrated circuit can be damaged by ESD if you don't pay attention to ESD protection. SGMICRO recommends that all integrated circuits be handled with appropriate precautions. Failure to observe proper handling and installation procedures can cause damage. ESD damage can range from subtle performance degradation to complete device failure. Precision integrated circuits may be more susceptible to damage because very small parametric changes could cause the device not to meet its published specifications.

SGMICRO reserves the right to make any change in circuit design, specification or other related things if necessary without notice at any time. Please contact SGMICRO sales office to get the latest datasheet.

**PIN CONFIGURATION (TOP VIEW)**



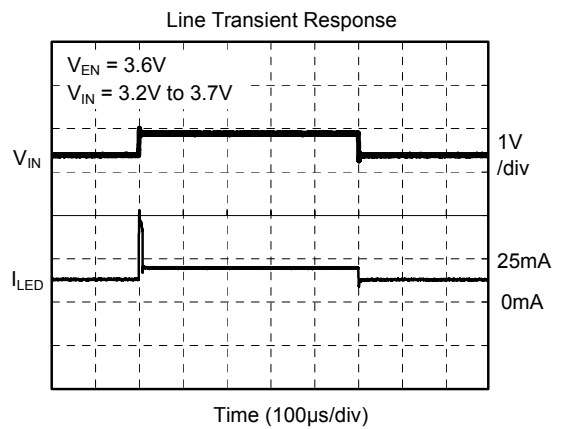
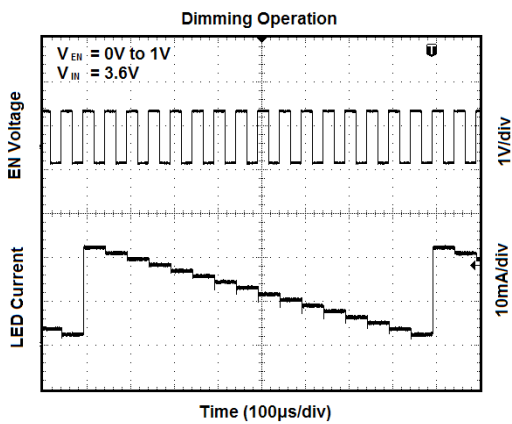
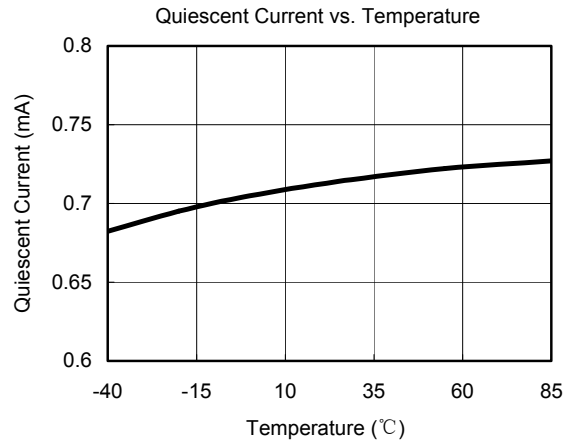
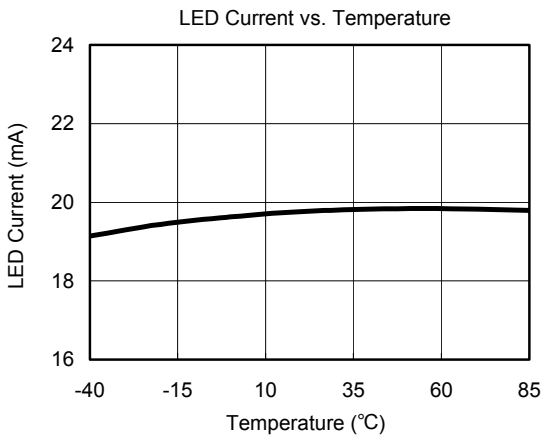
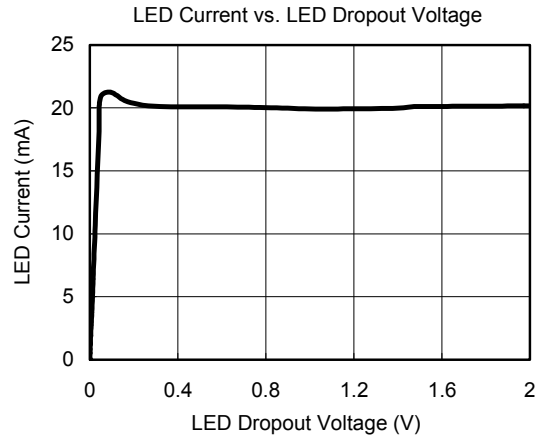
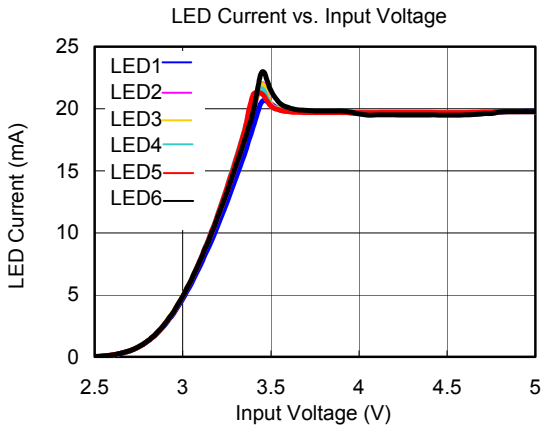
**PIN DESCRIPTION**

PIN NUMBER	PIN NAME	PIN FUNCTION
1	LED6	Current sink for LED6, connected to cathode of external white LED.
2	LED5	Current sink for LED5, connected to cathode of external white LED.
3	LED4	Current sink for LED4, connected to cathode of external white LED.
4	LED3	Current sink for LED3, connected to cathode of external white LED.
5	LED2	Current sink for LED2, connected to cathode of external white LED.
6	LED1	Current sink for LED1, connected to cathode of external white LED.
7	PGND	Power Ground.
8	VOUT	Connect the output capacitor and the anode of the LEDs to this pin.
13	VIN	Power Input Voltage.
14	AGND	Analog Ground.
15	EN/SET	Enable Input. Active high, one wire interface for LED Dimming, connects to GPIO pin of MCU.
9, 10, 11, 12, 16	N.C.	No Internal Connection.
Exposed Pad	GND	Exposed pad should be soldered to PCB board and connected to GND.

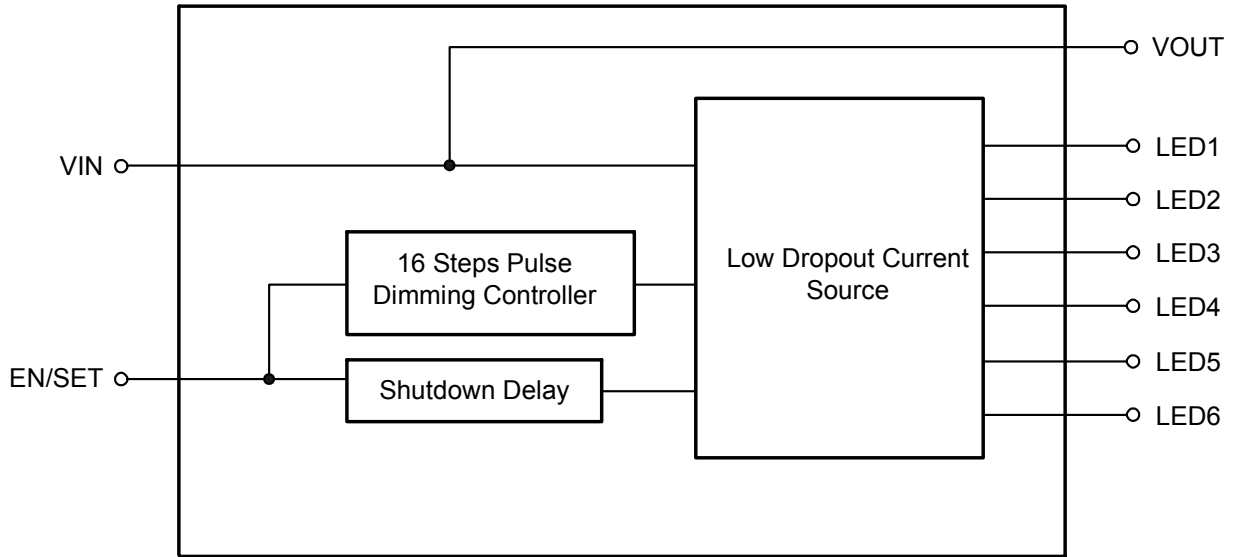
**ELECTRICAL CHARACTERISTICS**(V<sub>IN</sub> = 3.6V, C<sub>IN</sub> = 1μF, T<sub>A</sub> = +25°C, unless otherwise noted.)

PARAMETER		SYMBOL	CONDITIONS	MIN	TYP	MAX	UNITS
Operation Voltage Range		V <sub>IN</sub>		2.5		5.0	V
EN/SET Pull Low Current			V <sub>EN/SET</sub> = 1.8V		0.01		μA
Quiescent Power Supply Current		I <sub>Q</sub>	V <sub>IN</sub> = 5.0V, LED OFF		0.72		mA
Shutdown Current		I <sub>SHDN</sub>	V <sub>EN/SET</sub> = 0V, V <sub>IN</sub> = 5.0V		0.1	5	μA
I <sub>LEDx</sub> Accuracy		I <sub>LED-ERR</sub>		-10		+10	%
LED Current Deviation Matching		D <sub>LED</sub>		-3		+3	%
LED Dropout Voltage		V <sub>LED</sub>	I <sub>LEDx</sub> = 20mA, V <sub>LED</sub> @ I <sub>LEDx</sub> = 90% × I <sub>LED</sub>		35		mV
EN/SET Low Time for Shutdown		T <sub>SHDN</sub>			1.6		ms
EN/SET Low Time for Dimming		T <sub>LO</sub>		0.5		500	μs
EN/SET High Time for Dimming		T <sub>HI</sub>		0.5			μs
EN/SET Threshold	Logic-High Voltage	V <sub>IH</sub>	V <sub>EN</sub> > V <sub>IH</sub> for Enable IH	1.2			V
	Logic-Low Voltage	V <sub>IL</sub>	V <sub>EN</sub> < V <sub>IL</sub> for Disable IL			0.5	V
Thermal Shutdown Temperature					145		°C
Hysteresis Temperature					10		°C

TYPICAL PERFORMANCE CHARACTERISTICS



FUNCTION BLOCK DIAGRAM



APPLICATIONS INFORMATION

LED Connection

The SGM3139B supports up to 6 white LEDs. The six LEDs are connected from VIN to TQFN-3x3-16L package's pin 1, 2, 3, 4, 5 and 6 respectively. The LED pins can be left floating if the white LEDs are not used.

Brightness Control

The SGM3139B implements a pulse dimming method to control the brightness of white LEDs. Users can easily configure the LED current from 1.25mA to 20mA by a serial pulse. The dimming of white LEDs' current can be achieved by applying a pulse signal to the EN/SET pin. There are totally 16 steps of current that could be set by users. The detail operation of brightness dimming is showed in the Figure 1.

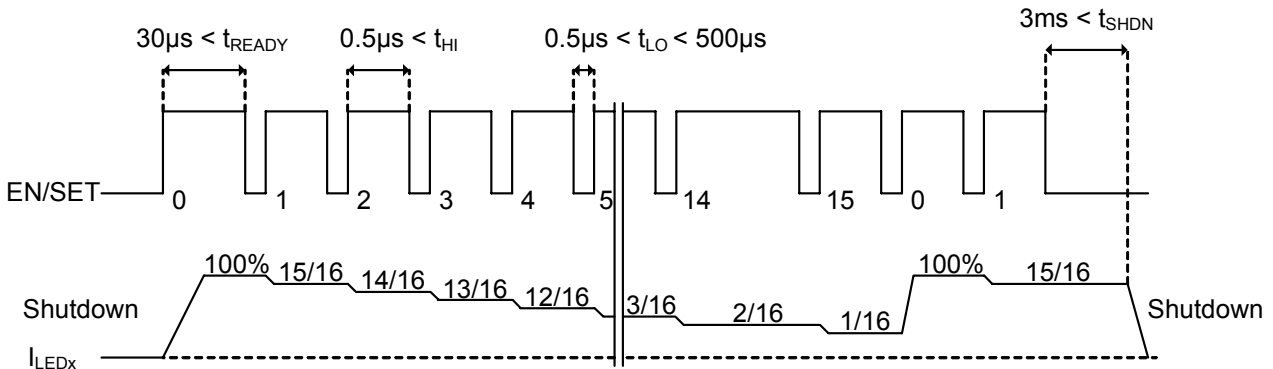
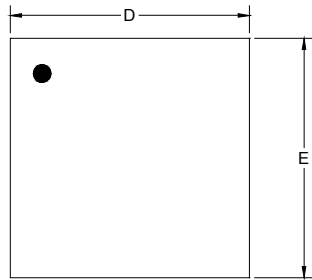


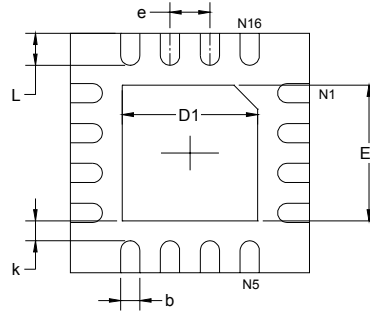
Figure 1. Brightness Control by Pulse Dimming

PACKAGE OUTLINE DIMENSIONS

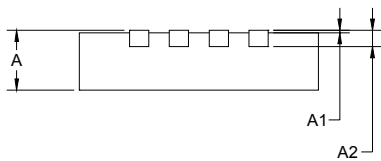
TQFN-3×3-16L



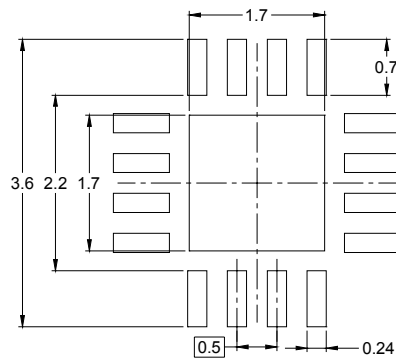
TOP VIEW



BOTTOM VIEW



SIDE VIEW



RECOMMENDED LAND PATTERN (Unit: mm)

Symbol	Dimensions In Millimeters		Dimensions In Inches	
	MIN	MAX	MIN	MAX
A	0.700	0.800	0.028	0.031
A1	0.000	0.050	0.000	0.002
A2	0.203 REF		0.008 REF	
D	2.900	3.100	0.114	0.122
D1	1.600	1.800	0.063	0.071
E	2.900	3.100	0.114	0.122
E1	1.600	1.800	0.063	0.071
k	0.200 MIN		0.008 MIN	
b	0.180	0.300	0.007	0.012
e	0.500 TYP		0.020 TYP	
L	0.300	0.500	0.012	0.020