SGM3132
4-Channel 1-wire Dimming LED Driver
with Ultra Low Dropout Current Source

GENERAL DESCRIPTION

The SGM3132 is a 4-channel ultra low dropout constant source parallel LED driver. The SGM3132 uses an internal resistor to set the bias current for four LEDs.

The SGM3132 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 SGM3132 requires only a 35mV dropout voltage at a 20mA load. The feature makes SGM3132 ideal for battery-operated systems, such as personal digital assistants.

The SGM3132 is available in Green TQFN3×3-16L, DFN2×2-8L and MSOP8 packages and is specified over an ambient temperature range of -40℃ to +85℃.

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 4 LEDs**
- **LED Sink Current 20mA**
- **Deglitch Circuit**
- **Thermal Shutdown Protection**
- **16-Step Brightness Control**
- **No EMI and Switch Noise**
- **Operating Temperature Range: -40℃ to +85℃**
- **Available in Green TQFN3×3-16L, DFN2×2-8L and MSOP8 Packages**

TYPICAL APPLICATION
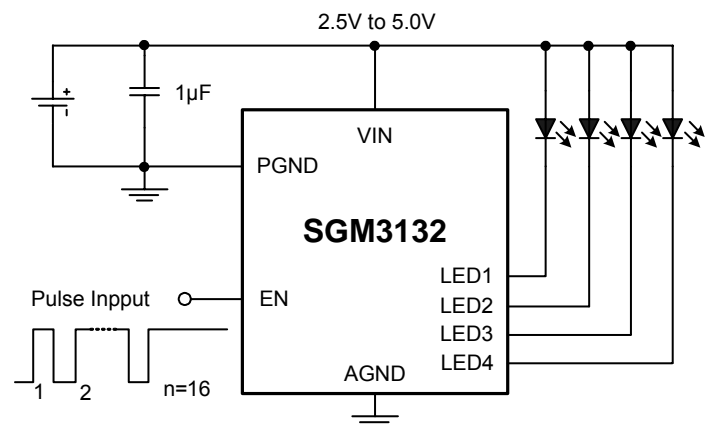
PACKAGE/ORDERING INFORMATION

MODEL	ORDER NUMBER	PACKAGE DESCRIPTION	SPECIFIED TEMPERATURE RANGE	PACKAGE OPTION	MARKING INFORMATION
SGM3132	SGM3132YTQ16G/TR	TQFN3×3-16L	-40°C to +85°C	Tape and Reel, 3000	3132TQ
	SGM3132YDE8G/TR	DFN2×2-8L	-40°C to +85°C	Tape and Reel, 3000	3132
	SGM3132YMS8G/TR	MSOP8	-40°C to +85°C	Tape and Reel, 3000	SGM3132YMS8

ABSOLUTE MAXIMUM RATINGS

V_{IN} to GND…………………….…….………..…………-0.3V to 6V
The Other Pins to GND……………….………….. -0.3V to 6V
Power Dissipation [1], P_D @ T_A = 25°C
TQFN3×3-16L………………….…………………….1.47W
DFN2×2-8L……………….………..…….……………0.61W
MSOP8……………….……..……….…..……………0.57W
Storage Temperature Range…………….…..-40°C to +150°C
Junction Temperature...………….….……………….. 125°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 above those listed under Absolute Maximum Ratings may cause permanent damage to the device. This is a stress rating only; functional operation of the device at these or any other conditions above those indicated in the operational section of this specification 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.

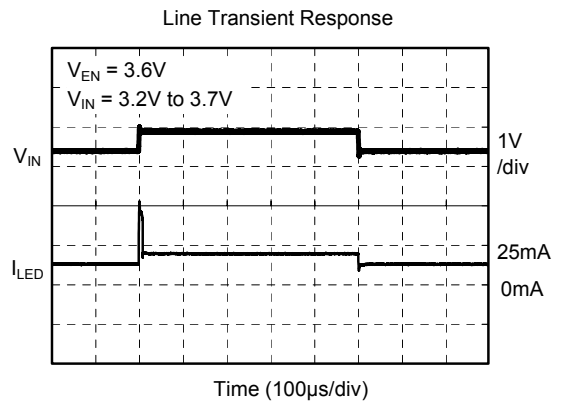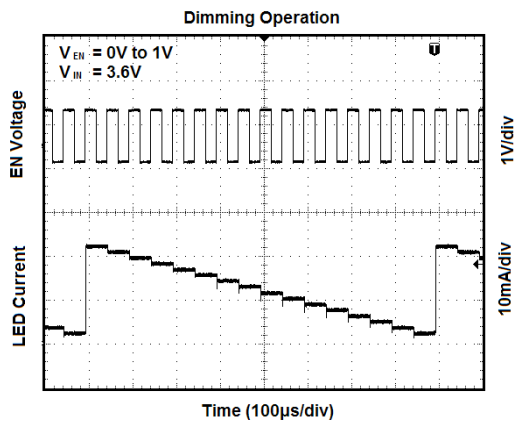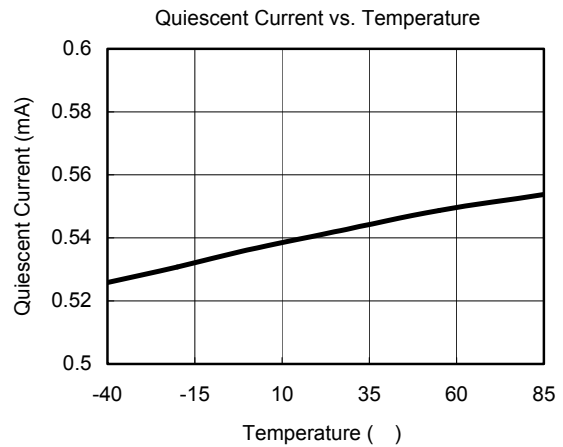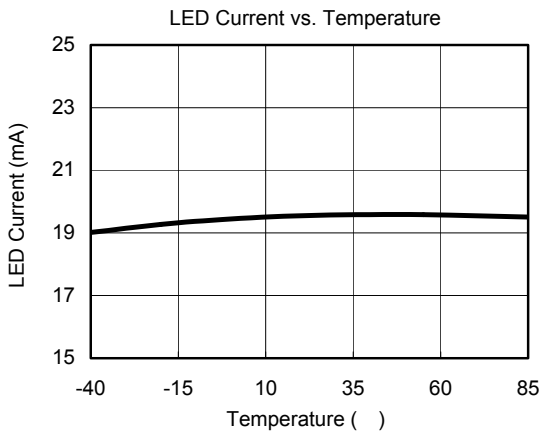## PIN CONFIGURATIONS (TOP VIEW)
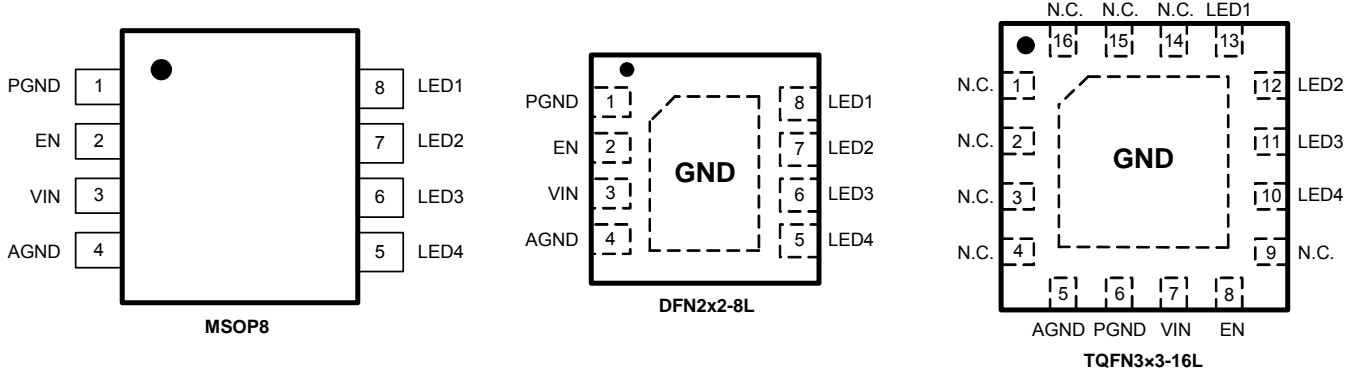
PIN DESCRIPTION

PIN NUMBER			PIN NAME	PIN FUNCTION
TQFN3×3-16L	DFN2×2-8L	MSOP8		
5	4	4	AGND	Analog Ground.
6	1	1	PGND	Power Ground.
7	3	3	VIN	Power Input Voltage.
8	2	2	EN	Enable Input. (Active High), and connects to GPIO pin of MCU.
10	5	5	LED4	Current Sink for LED4, connected to cathode of external White LED.
11	6	6	LED3	Current Sink for LED3, connected to cathode of external White LED.
12	7	7	LED2	Current Sink for LED2, connected to cathode of external White LED.
13	8	8	LED1	Current Sink for LED1, connected to cathode of external White LED.
1,2,3,4, 9,14,15,16	—	—	N.C.	No Internal Connection.
Exposed Pad	Exposed Pad	—	GND	Exposed pad should be soldered to PCB board and connected to GND.

ELECTRICAL CHARACTERISTICS

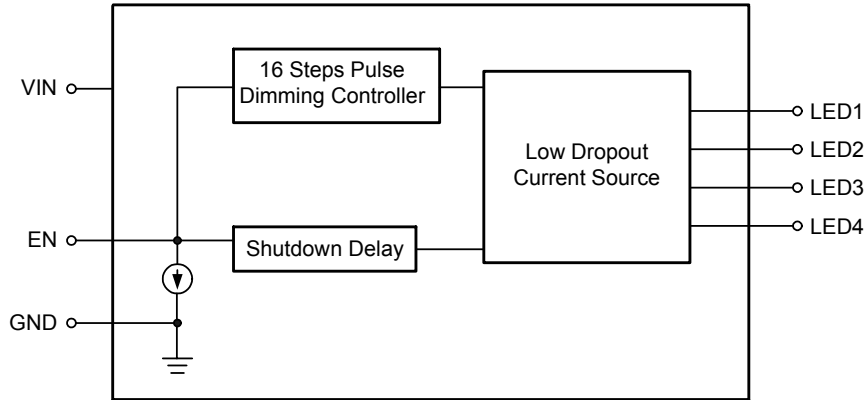(V_{IN} = 3.6V, C_{IN} = 1μF, T_A = +25℃, unless otherwise noted.)

PARAMETER		SYMBOL	CONDITIONS	MIN	TYP	MAX	UNITS
Operation Voltage Range		V_{IN}		2.5		5.0	V
EN Pull Low Current			V_{EN} = 1.8V		0.01		μA
Quiescent Power Supply Current		I_Q	V_{IN} = 5.0V, LED Off		0.55		mA
Shutdown Current		I_{SHDN}	V_{EN} = 0V, V_{IN} = 5.0V		0.1	5	μA
I_{LEDx} Accuracy		$I_{LED-ERR}$		-10		+10	%
LED Current Matching		$I_{LED-LED-ERR}$		-3		+3	%
LED Dropout Voltage		V_{LED}	I_{LEDx} = 20mA, V_{LED} @ I_{LEDx} = 90% × I_{LED}		35		mV
EN Low Time for Shutdown		T_{SHDN}			1.6		ms
EN Low Time for Dimming		T_{LO}		0.5		500	μs
EN High Time for Dimming		T_{HI}		0.5			μs
EN Threshold	Logic-High Voltage	V_{IH}	V_{EN} > V_{IH} for Enable IH	1.2			V
	Logic-Low Voltage	V_{IL}	V_{EN} < V_{IL} for Disable IL			0.5	V
Thermal Shutdown Temperature					150		℃
Hysteresis Temperature					10		℃

Specifications subject to changes without notice.

TYPICAL PERFORMANCE CHARACTERISTICS

LED Current vs. Input Voltage

LED Current vs. LED Dropout Voltage

LED Current vs. Temperature

Quiescent Current vs. Temperature

Dimming Operation

Line Transient Response
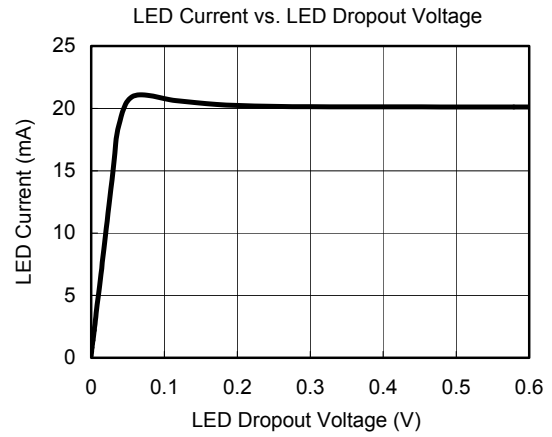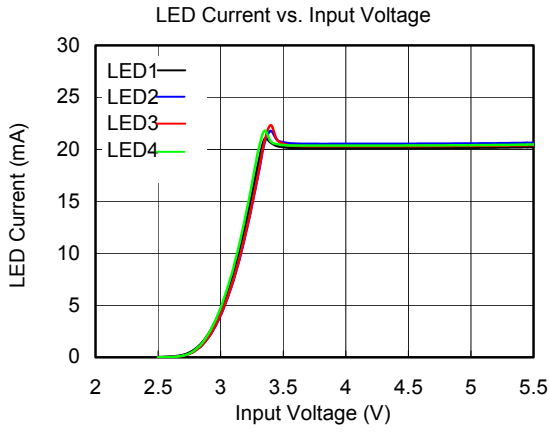
FUNCTION BLOCK DIAGRAM

APPLICATIONS INFORMATION

LED Connection

The SGM3132 supports up to 4 white LEDs. The four LEDs are connected from VIN to TQFN3×3-16L package's pin 10, 11, 12 and 13 respectively. For DFN2×2-8L and MSOP8 packages, Cathode of white LEDs are connected to pin 5, 6, 7 and 8 respectively.

Brightness Control

The SGM3132 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 pin. There are totally 16 steps of current could be set by users. The detail operation of brightness dimming is showed in the Figure 1.
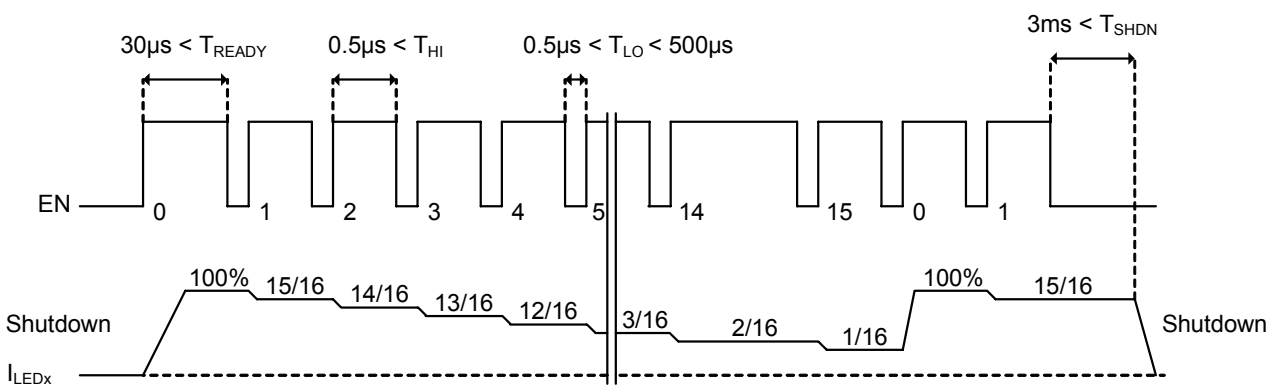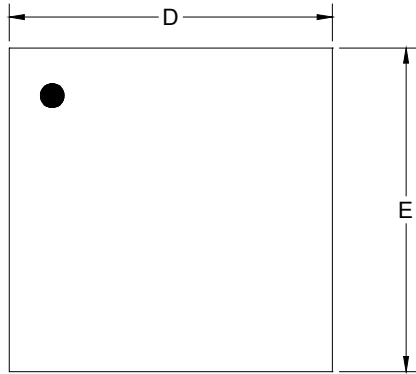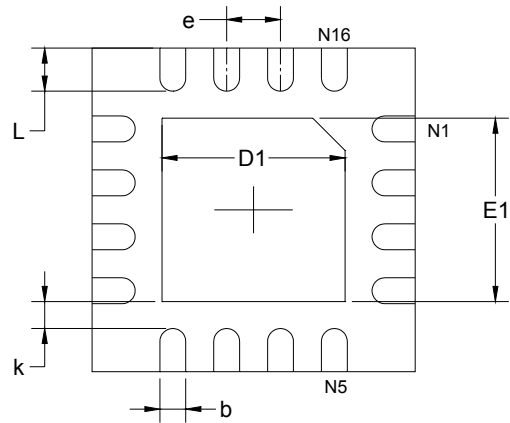

Figure 1. Brightness Control by Pulse Dimming

PACKAGE OUTLINE DIMENSIONS

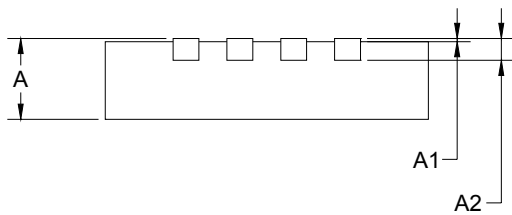## TQFN3×3-16L

TOP VIEW

BOTTOM VIEW

SIDE VIEW

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

PACKAGE OUTLINE DIMENSIONS

DFN2×2-8L
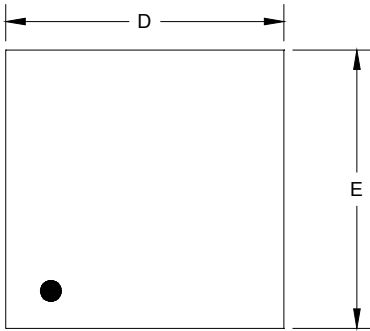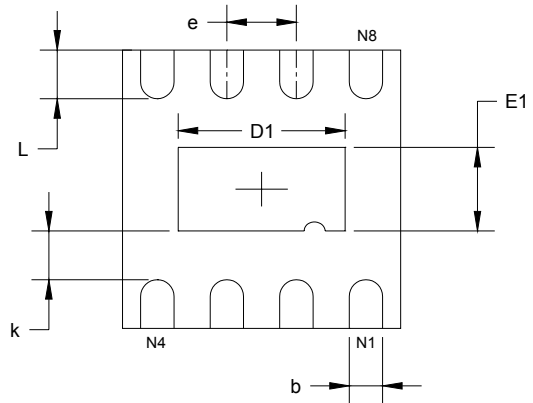
TOP VIEW

BOTTOM VIEW
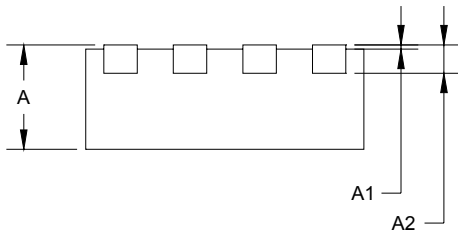
SIDE VIEW

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	1.900	2.100	0.075	0.083
D1	1.100	1.300	0.043	0.051
E	1.900	2.100	0.075	0.083
E1	0.500	0.700	0.020	0.028
k	0.200 MIN		0.008 MIN	
b	0.180	0.300	0.007	0.012
e	0.500 TYP		0.020 TYP	
L	0.250	0.450	0.010	0.018

PACKAGE OUTLINE DIMENSIONS

MSOP8
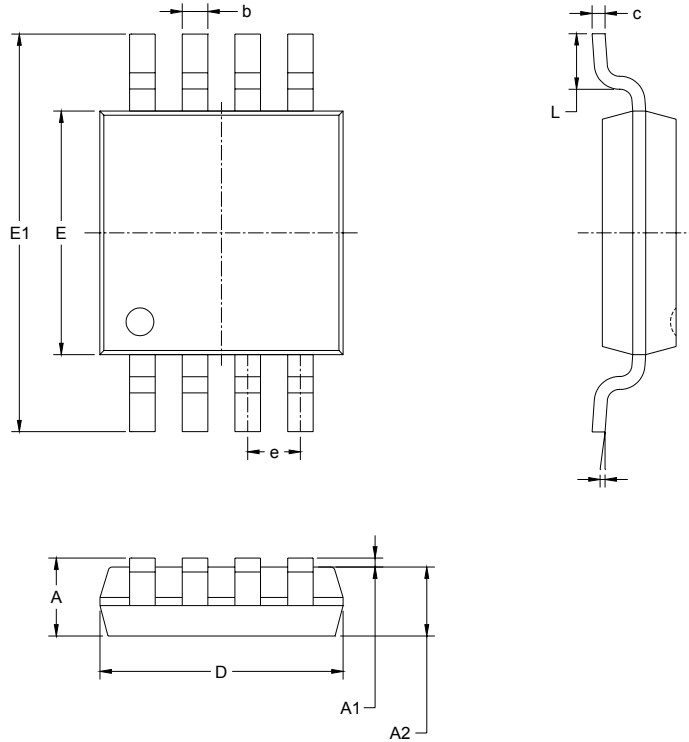
Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	**Max**	**Min**	**Max**
A	0.820	1.100	0.032	0.043
A1	0.020	0.150	0.001	0.006
A2	0.750	0.950	0.030	0.037
b	0.250	0.380	0.010	0.015
c	0.090	0.230	0.004	0.009
D	2.900	3.100	0.114	0.122
E	2.900	3.100	0.114	0.122
E1	4.750	5.050	0.187	0.199
e	0.650 BSC		0.026 BSC	
L	0.400	0.800	0.016	0.031
θ	0°	6°	0°	6°