SGM3727
High Efficiency, 38V Boost White LED Driver

GENERAL DESCRIPTION

The SGM3727 is a high efficiency current-regulated white LED driver with a boost DC/DC converter. With an internal 38V/1A power MOSFET, the SGM3727 supports up to 10 white LEDs in series and achieves uniform brightness. 32-step LED current can be set by a serial pulse signal into the EN/SET pin.

The SGM3727 includes a comprehensive set of protection features such as over-voltage protection, cycle-by-cycle current limit and thermal shutdown. Built-in soft-start circuitry avoids excessive inrush current during startup.

The SGM3727 is available in a Green TDFN-2×2-8L package. It operates over an ambient temperature range of -40°C to +85°C.

FEATURES

- **Integrated 38V/1A Switch with 0.5Ω On-Resistance**
- **High Efficiency Boost Bias Supply**
- **Support up to 10 LEDs in Series per String**
- **32-Step LED Brightness Control through One-Wire Interface**
- **Automatic Soft-Start for Reducing Inrush Current**
- **No Leakage from V_{IN} to GND through LED String**
- **Protection Features**
  - **Programmable Over-Voltage Protection**
  - **Cycle-by-Cycle Current Limit**
  - **Thermal Shutdown**
- **-40℃ to +85℃ Operating Temperature Range**
- **Available in a Green TDFN-2×2-8L Package**

APPLICATIONS

Smart Phones and Portable Media Players
TFT LCD Displays
GPS/PND

TYPICAL APPLICATION

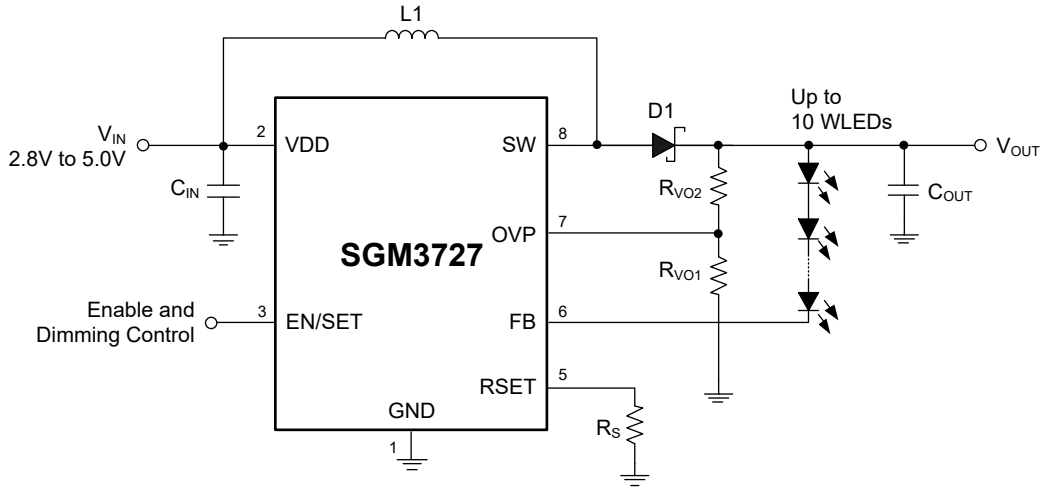


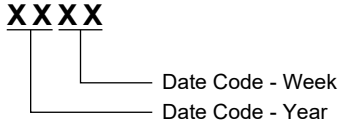
Figure 1. Typical Application

PACKAGE/ORDERING INFORMATION

MODEL	PACKAGE DESCRIPTION	SPECIFIED TEMPERATURE RANGE	ORDERING NUMBER	PACKAGE MARKING	PACKING OPTION
SGM3727	TDFN-2×2-8L	-40℃ to +85℃	SGM3727YDE8G/TR	3727 XXXX	Tape and Reel, 3000

MARKING INFORMATION

NOTE: XXXX = Date Code.



Green (RoHS & HSF): SG Micro Corp defines "Green" to mean Pb-Free (RoHS compatible) and free of halogen substances. If you have additional comments or questions, please contact your SGMICRO representative directly.

ABSOLUTE MAXIMUM RATINGS

SW, FB to GND ..... -0.3V to 40V
VDD, EN/SET to GND ..... -0.3V to 6V
RSET, OVP to GND ..... -0.3V to 6V
Continuous SW Current ..... Internally limited to 1A
Package Thermal Resistance
TDFN-2×2-8L, θ_{JA} ..... 75℃/W
Junction Temperature ..... +150℃
Storage Temperature Range ..... -65℃ to +150℃
Lead Temperature (Soldering, 10s) ..... +260℃
ESD Susceptibility
HBM 4000V
MM 200V

RECOMMENDED OPERATING CONDITIONS

Operating Temperature Range ..... -40℃ to +85℃

OVERSTRESS CAUTION

Stresses beyond those listed in Absolute Maximum Ratings may cause permanent damage to the device. Exposure to absolute maximum rating conditions for extended periods may affect reliability. Functional operation of the device at any conditions beyond those indicated in the Recommended Operating Conditions section is not implied.

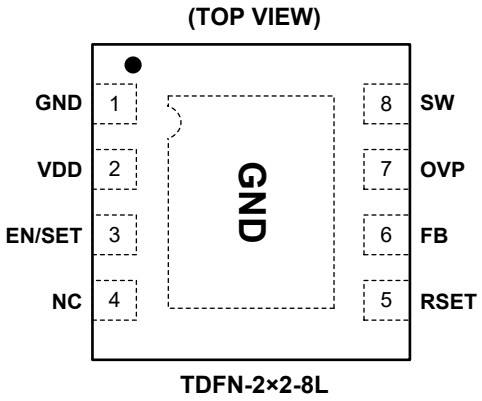
ESD SENSITIVITY CAUTION

This integrated circuit can be damaged if ESD protections are not considered carefully. 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 even small parametric changes could cause the device not to meet the published specifications.

DISCLAIMER

SG Micro Corp reserves the right to make any change in circuit design, or specifications without prior notice.

PIN CONFIGURATION



PIN DESCRIPTION

PIN	NAME	FUNCTION
1	GND	Ground Pin.
2	VDD	Input Supply Pin.
3	EN/SET	Enable Control and One-Wire Dimming Interface. Pull it high to enable the device. Apply a serial pulse signal to this pin for dimming control. This pin remains low for 3ms to shut down the device.
4	NC	No Connection.
5	RSET	Current Setting Pin. Connect an external resistor from this pin to ground to set the maximum LED current.
6	FB	Feedback Input for Current. Connect to the cathode of the white LED.
7	OVP	Over-Voltage Protection Input. Connect to an external resistor divider. Once V_{VOP} exceeds 1.24V, the device is automatically shut down.
8	SW	Boost Switching Node. Connect an inductor between the VDD and SW pins.
Exposed Pad	GND	Exposed Pad. It should be soldered to PCB board and connected to GND.

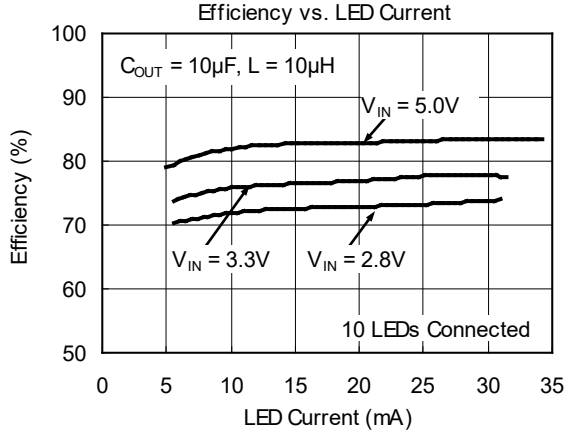
ELECTRICAL CHARACTERISTICS

(V_{IN} = 3.3V, V_{EN} = 2.8V, T_A = 25℃, unless otherwise specified.)

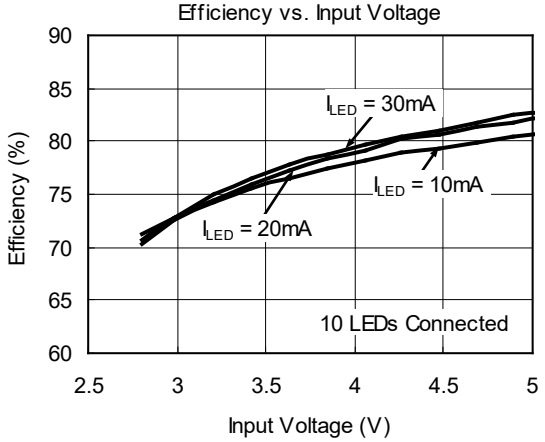
PARAMETER		SYMBOL	CONDITIONS	MIN	TYP	MAX	UNITS
Input Voltage		V_{IN}		2.8		5.0	V
Power Switch Voltage Rating						38	V
Under-Voltage Lockout Threshold		V_{UVLO}	V_{IN} Rising	2.1	2.2	2.45	V
Under-Voltage Lockout Hysteresis					70		mV
Supply Current			Not Switching		0.045	0.08	mA
			Switching		0.12	0.16	mA
Supply Current in Shutdown		I_{SHDN}	EN/SET = GND		0.2	1	μA
Maximum On Time		t_{ON}	V_{IN} = 3.5V	5	6.2	7.5	μs
Minimum Off Time		t_{OFF}		300	420	550	ns
RSET Voltage		V_{RSET}		300	314	330	mV
Switch Current Limit		I_{LIM}		750	1000	1250	mA
Switch On-Resistance		$R_{DS(ON)}$	V_{IN} = 3.3V		0.5	1	Ω
LED Switch On-Resistance			V_{IN} = 3.3V (from FB to RSET)		2.2		Ω
Switch Leakage Current			V_{SW} = 38V, EN/SET = GND		0.1		μA
Over-Voltage Protection Threshold			V_{OVP} Rising	1.1	1.24	1.31	V
OVP Input Current			V_{OVP} = 1.5V		1	300	nA
EN/SET Input Current			V_{EN} = 0V or 2.8V		0.1	1	μA
Thermal Shutdown Temperature					155		℃
Thermal Shutdown Hysteresis					25		℃
EN/SET Logic							
EN Low Time for Shutdown		t_{SHDN}		3			ms
EN Low Time for Dimming		t_{IL}		0.5		500	μs
EN High Time for Dimming		t_{IH}		0.5			μs
EN Threshold	Logic-High Voltage	V_{IH}		1.5			V
	Logic-Low Voltage	V_{IL}				0.5	V

TYPICAL PERFORMANCE CHARACTERISTICS

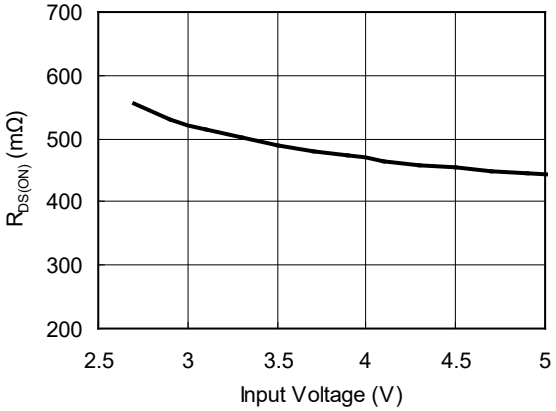
Efficiency vs. LED Current



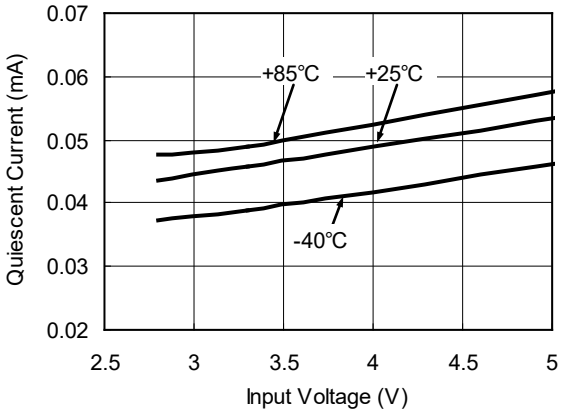
Efficiency vs. Input Voltage



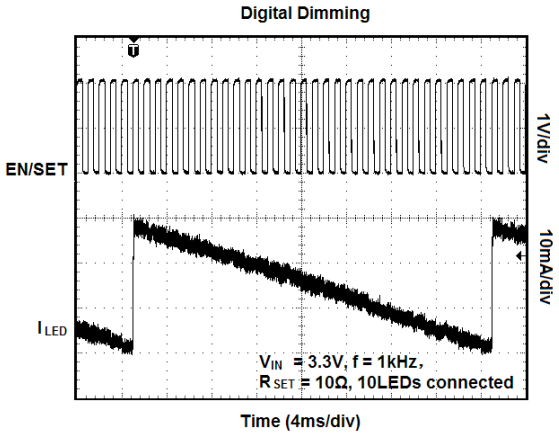
Main Switch $R_{DS(ON)}$ vs. Input Voltage



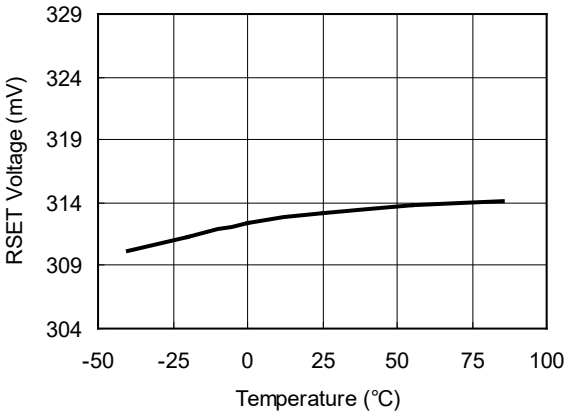
Quiescent Current vs. Input Voltage



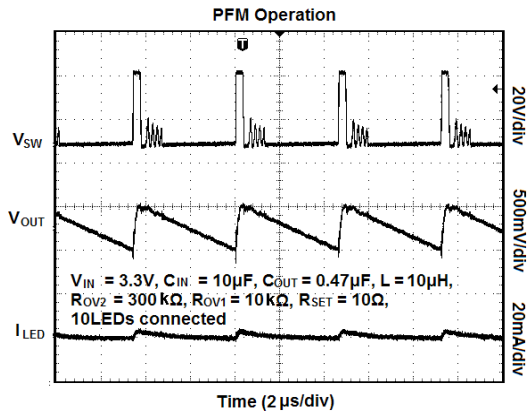
Digital Dimming

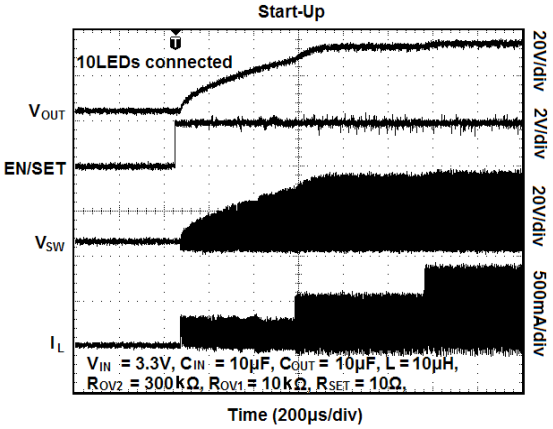


RSET Voltage vs. Temperature



TYPICAL PERFORMANCE CHARACTERISTICS (continued)





TYPICAL APPLICATION

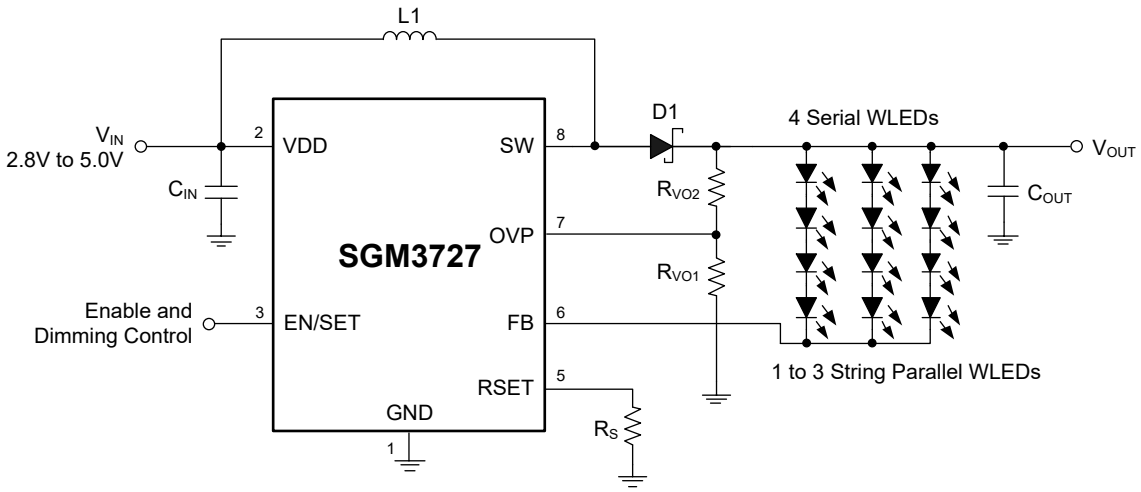


Figure 2. Application for Driving 3 × 4 WLEDs

REVISION HISTORY

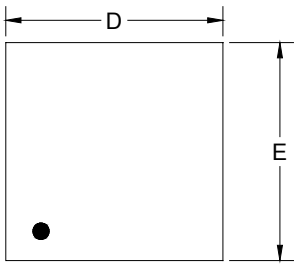
NOTE: Page numbers for previous revisions may differ from page numbers in the current version.

NOVEMBER 2013 – REV.A to REV.A.1	**Page**
Changed Absolute Maximum Ratings section	2

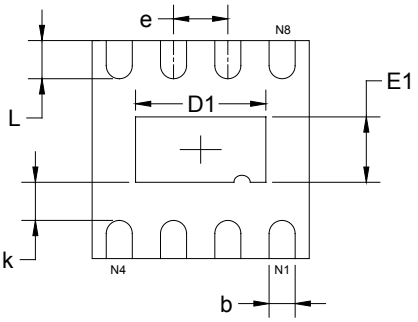
Changes from Original (AUGUST 2012) to REV.A	**Page**
Changed from product preview to production data	All

PACKAGE OUTLINE DIMENSIONS

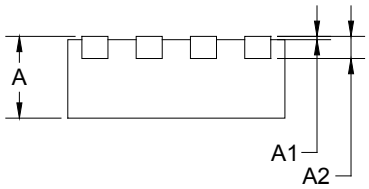
TDFN-2×2-8L



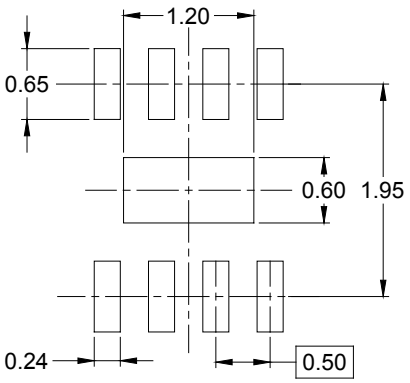
TOP VIEW



BOTTOM VIEW



SIDE VIEW

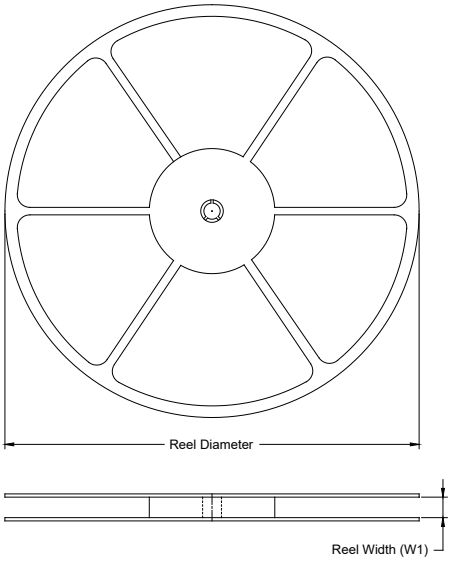


RECOMMENDED LAND PATTERN (Unit: mm)

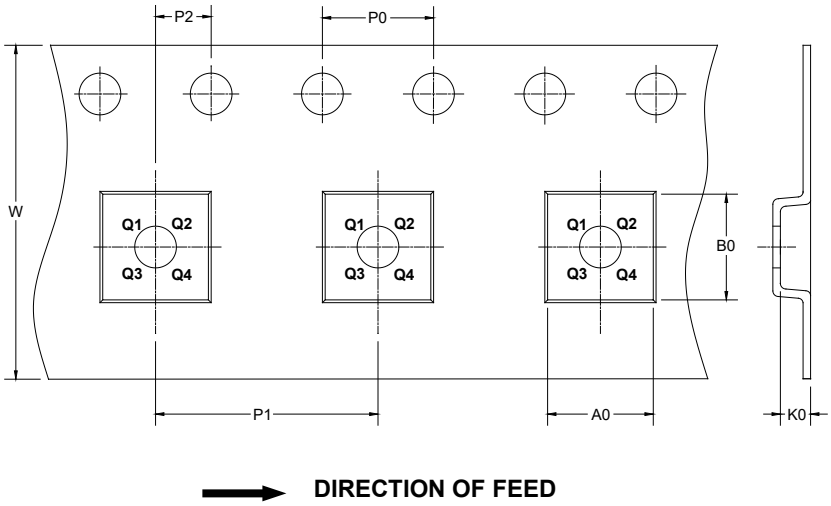
Symbol	Dimensions In Millimeters		Dimensions In Inches	
	MIN	MAX	MIN	MAX
A	0.700	0.800	0.028	0.031
A1	0.000	0.050	0.000	0.002
A2	0.203 REF		0.008 REF	
D	1.900	2.100	0.075	0.083
D1	1.100	1.300	0.043	0.051
E	1.900	2.100	0.075	0.083
E1	0.500	0.700	0.020	0.028
k	0.200 MIN		0.008 MIN	
b	0.180	0.300	0.007	0.012
e	0.500 TYP		0.020 TYP	
L	0.250	0.450	0.010	0.018

TAPE AND REEL INFORMATION

REEL DIMENSIONS



TAPE DIMENSIONS



DIRECTION OF FEED

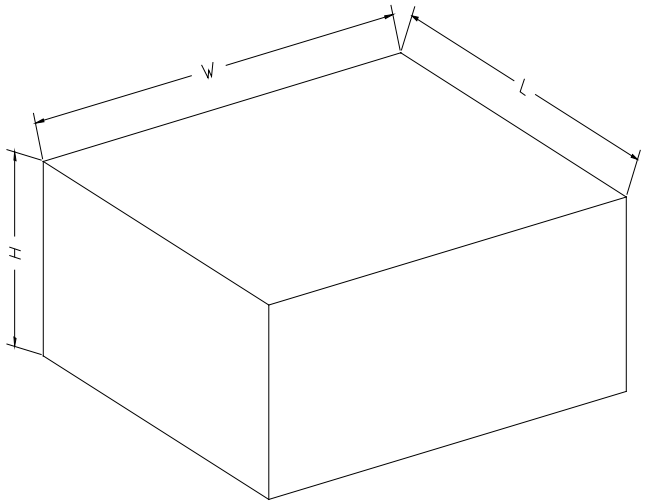
NOTE: The picture is only for reference. Please make the object as the standard.

KEY PARAMETER LIST OF TAPE AND REEL

Package Type	Reel Diameter	Reel Width W1 (mm)	A0 (mm)	B0 (mm)	K0 (mm)	P0 (mm)	P1 (mm)	P2 (mm)	W (mm)	Pin1 Quadrant
TDFN-2×2-8L	7″	9.5	2.30	2.30	1.10	4.0	4.0	2.0	8.0	Q1

DD0001

CARTON BOX DIMENSIONS



NOTE: The picture is only for reference. Please make the object as the standard.

KEY PARAMETER LIST OF CARTON BOX

Reel Type	Length (mm)	Width (mm)	Height (mm)	Pizza/Carton
7″ (Option)	368	227	224	8
7″	442	410	224	18

DD0002