



SGM2553E

Precision Adjustable Current Limited Power Distribution Switch

GENERAL DESCRIPTION

The SGM2553E is a single channel power distribution switch. The switch operates from a wide range of 2.5V to 5.5V supply voltage, and is controlled by the EN pin.

A 90mΩ low R_{ON} N-MOSFET is integrated. The small size and quiescent current make the device very suitable for space limited, battery-powered applications.

A number of protection features are provided in the device including soft-start, over-current protection, adjustable current limit and thermal shutdown. This device provides a programmable current limit threshold between 100mA and 200mA through the R_{LIM} . The internal reverse-voltage function will protect devices on the input side of the switch. Fault conditions are indicated by the nFAULT pin. The SGM2553E has quick output discharge function in disable status.

SGM2553E is available in a Green TDFN-2×2-6L package. It is rated over the -40°C to +85°C temperature range.

FEATURES

- **Input Voltage Range: 2.5V to 5.5V**
- **On-Resistance: 90mΩ (TYP)**
- **Continuous Current: 0.2A (MAX)**
- **Meets USB Current Limit Requirements**
- **Programmable Current Limit: 100mA to 200mA**
- **Protection Features**
 - ◆ **No Reverse Leakage Current of High-side MOSFET**
 - ◆ **Reverse Voltage Protection**
 - ◆ **Soft-Start**
 - ◆ **Thermal Shutdown**
- **Quick Output Discharge**
- **Evaluated to IEC 60950-1, Ed 2, Am1, Annex CC, Test Program 1 with CB Report**
- **Available in a Green TDFN-2×2-6L Package**

APPLICATIONS

USB Ports/Hubs
Digital TV
Set-Top Boxes
VOIP Phones

PACKAGE/ORDERING INFORMATION

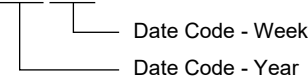
MODEL	PACKAGE DESCRIPTION	SPECIFIED TEMPERATURE RANGE	ORDERING NUMBER	PACKAGE MARKING	PACKING OPTION
SGM2553E	TDFN-2x2-6L	-40°C to +85°C	SGM2553EYTDI6G/TR	SJ6 XXXX	Tape and Reel, 3000

MARKING INFORMATION

NOTE: XXXX = Date Code.

YYY — Serial Number

XXXX



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

VIN, VOUT, EN, ILIM and nFAULT to GND..... -0.3V to 6V
 Continuous Output Current..... Internally Limited
 Continuous nFAULT Sink Current..... 25mA
 ILIM Source Current 1mA
 Package Thermal Resistance
 TDFN-2x2-6L, θ_{JA} 160°C/W
 Junction Temperature +150°C
 Storage Temperature Range..... -65°C to +150°C
 Lead Temperature (Soldering, 10s) +260°C
 ESD Susceptibility
 HBM..... 2000V
 MM..... 200V

RECOMMENDED OPERATING CONDITIONS

Input Voltage Range 2.5V to 5.5V
 Enable Voltage Range 0V to 5.5V
 Continuous Output Current Range 0A to 0.2A
 Current Limit Threshold Resistor Range..... 200k Ω to 390k Ω
 Continuous nFAULT Sink Current Range 0mA to 10mA
 Minimum Input Decoupling Capacitance 0.1 μ F
 Operating Temperature Range -40°C to +85°C

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.

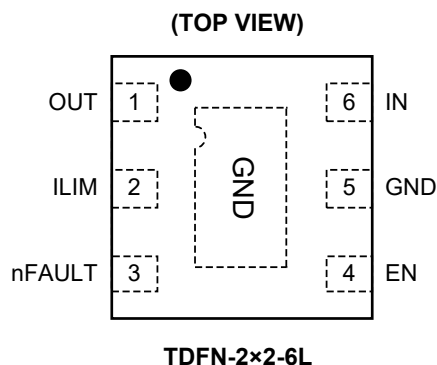
ESD SENSITIVITY CAUTION

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



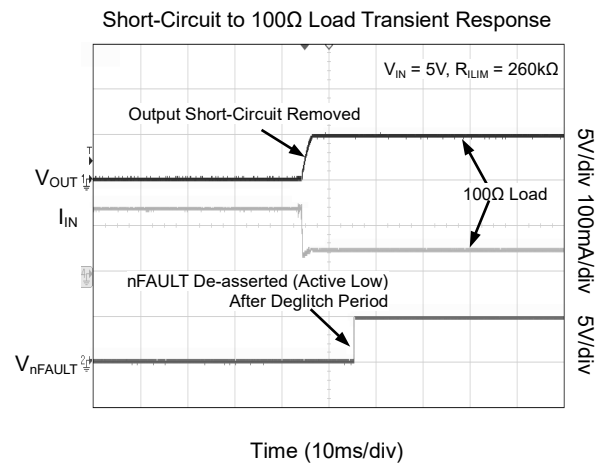
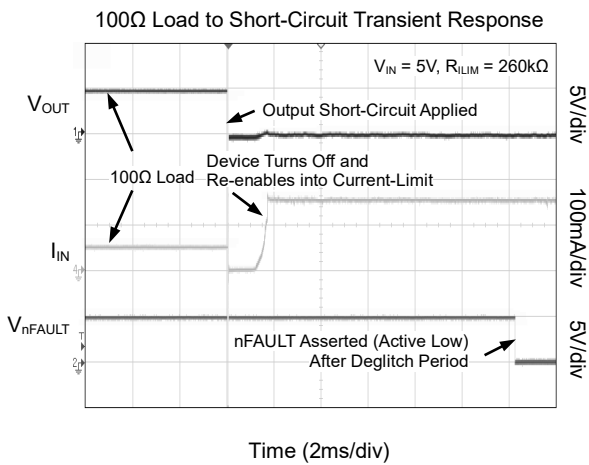
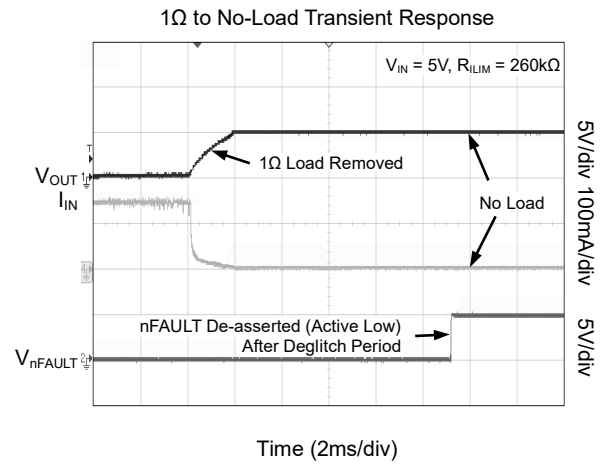
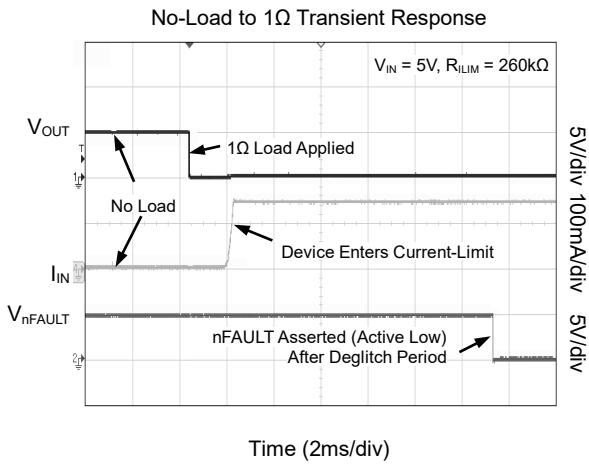
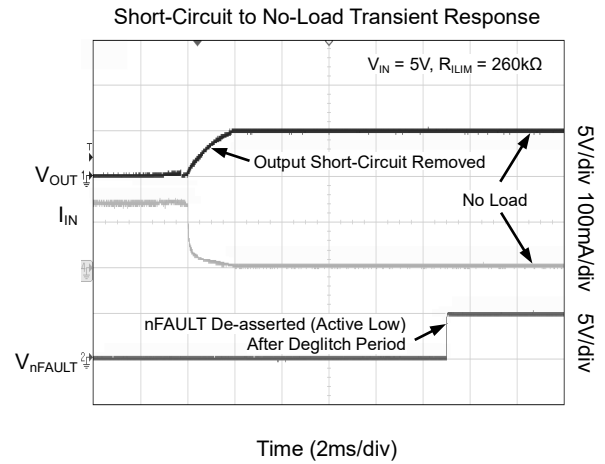
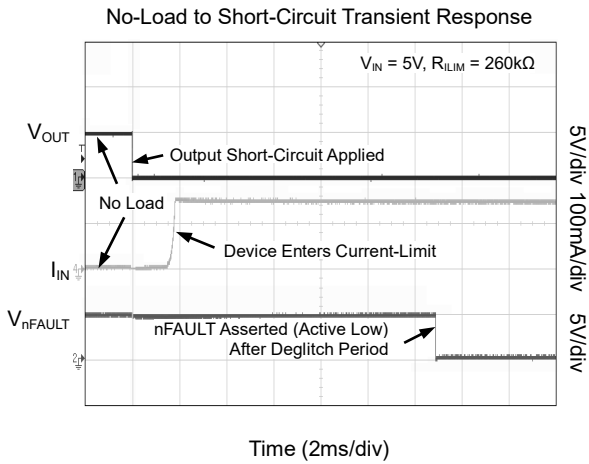
PIN DESCRIPTION

PIN	NAME	FUNCTION
1	OUT	Switch Output.
2	ILIM	Programmable Current Limit Pin. An external resistor ($200\text{k}\Omega \leq R_{\text{ILIM}} \leq 390\text{k}\Omega$) is used to set current limit threshold. $I_{\text{LIM}} = \frac{40}{R_{\text{ILIM}}} \text{ (A)}$ where R_{ILIM} is in $\text{k}\Omega$.
3	nFAULT	Alert Output Pin. Fault conditions (over-current, over-temperature, or reverse-voltage conditions) are indicated by the nFAULT pin.
4	EN	Enable Input. Logic high to enable the device.
5	GND	Ground.
6	IN	Switch Input. A $0.1\mu\text{F}$ or larger ceramic capacitor needs to be added between IN pin and GND.
Exposed Pad	GND	GND.

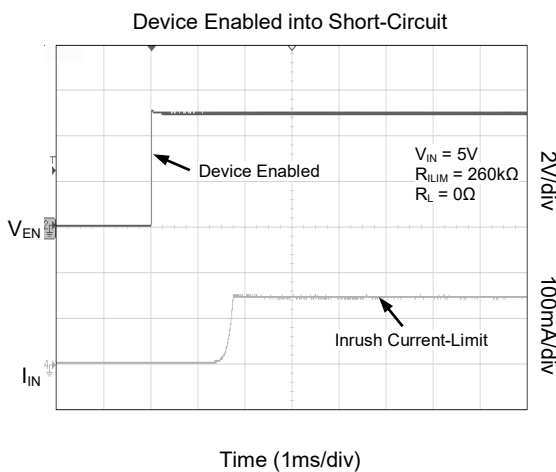
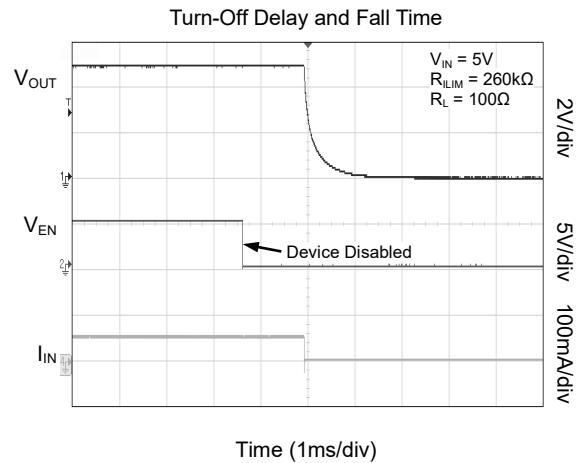
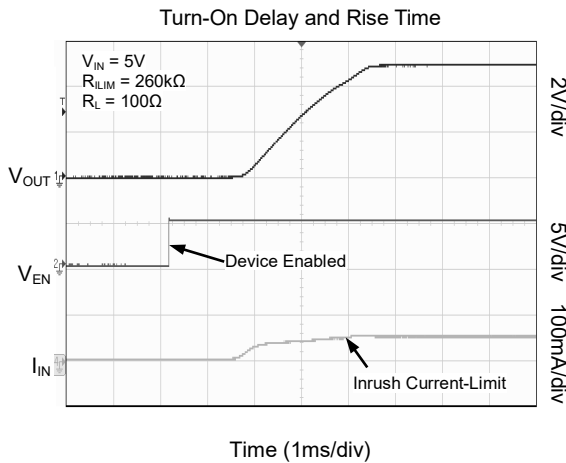
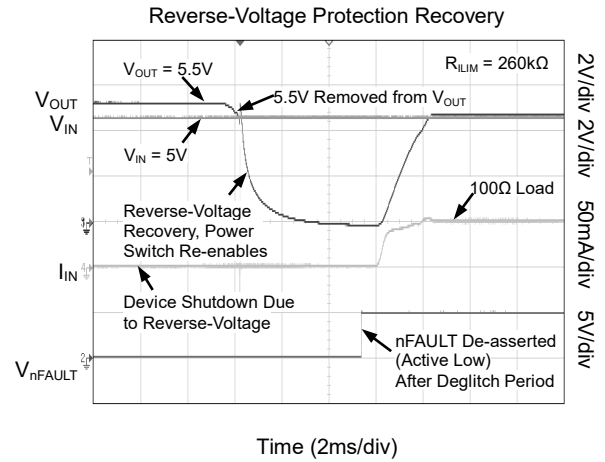
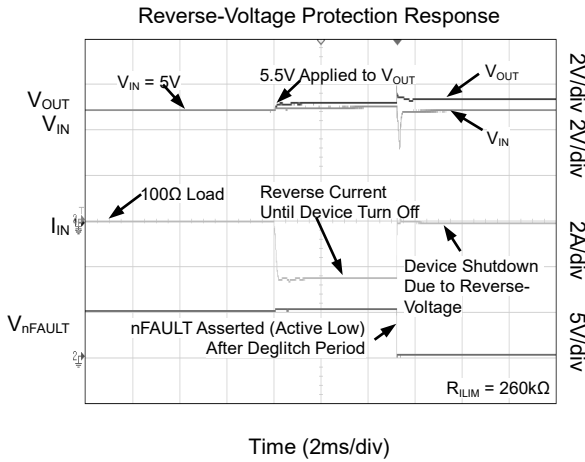
ELECTRICAL CHARACTERISTICS(V_{IN} = 5V, R_{nFAULT} = 10kΩ, T_A = +25°C, unless otherwise noted.)

PARAMETER	SYMBOL	CONDITIONS	MIN	TYP	MAX	UNITS
Power Switch						
High-side MOSFET On Resistance	R _{DS(ON)}			90	130	mΩ
Output Rise Time	t _R	V _{IN} = 5.5V	C _L = 1μF, R _L = 100Ω, Figure 2	1.8	3.5	ms
		V _{IN} = 2.5V		1.1	2.5	
Output Fall Time	t _F	V _{IN} = 5.5V		0.3	0.4	
		V _{IN} = 2.5V		0.3	0.4	
Enable Input						
Logic High of Enable Pin	V _{IH}		1.5			V
Logic Low of Enable Pin	V _{IL}				0.25	V
Input Current	I _{EN}	V _{EN} = 5.5V		0.01	1	μA
Turn-On Time	t _{ON}	C _L = 1μF, R _L = 100Ω, Figure 2		3	5	ms
Turn-Off Time	t _{OFF}			1.6	2.5	ms
Current Limit						
Current Limit Threshold (Maximum DC output current I _{OUT} delivered to load), OUT connected to GND through 4Ω.	I _{LIM}	V _{IN} = 3V, R _{LIM} = 260kΩ	125	155	185	mA
Reverse-Voltage Protection						
Reverse-Voltage Comparator Trip Point (V _{OUT} - V _{IN})			115	160	205	mV
Time from Reverse-Voltage Condition to MOSFET Turn-Off			3.5	5.5	7.5	ms
Supply Current						
Supply Current, Low-Level Output	I _{IN(OFF)}	V _{IN} = 5.5V, No load on OUT, V _{EN} = 0V		0.1	2.5	μA
Supply Current, High-Level Output	I _{IN(ON)}	R _{LIM} = 260kΩ, V _{IN} = 5.5V, No load on OUT		62	95	μA
Reverse Leakage Current	I _{REV}	V _{OUT} = 5.5V, V _{IN} = 0V		0.01	1	μA
Under-Voltage Lockout						
Under-Voltage Lockout Threshold	V _{UVLO}	V _{IN} Rising		2.36	2.47	V
Under-Voltage Lockout Threshold Hysteresis				140		mV
Quick Discharge Resistor						
Discharge Resistor	R _{Discharge}			45		Ω
nFAULT Flag						
nFAULT Output Low Voltage		I _{nFAULT} = 1mA		95	150	mV
Off-State Leakage		V _{nFAULT} = 5.5V		0.02	1	μA
nFAULT Deglitch		nFAULT assertion or de-assertion due to over-current condition.	6.5	10	14	ms
		nFAULT assertion or de-assertion due to reverse-voltage condition.	3.5	5.5	7.5	
Thermal Shutdown						
Thermal Shutdown Threshold				140		°C
Thermal Shutdown Threshold in Current Limit				115		°C
Thermal Shutdown Hysteresis				10		°C

TYPICAL PERFORMANCE CHARACTERISTICS



TYPICAL PERFORMANCE CHARACTERISTICS (continued)



REVISION HISTORY

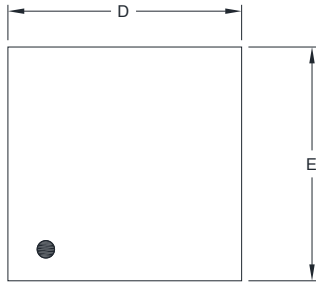
NOTE: Page numbers for previous revisions may differ from page numbers in the current version.

Changes from Original (APRIL 2018) to REV.A

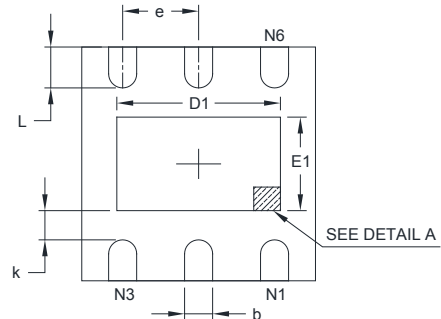
Changed from product preview to production data.....All

PACKAGE OUTLINE DIMENSIONS

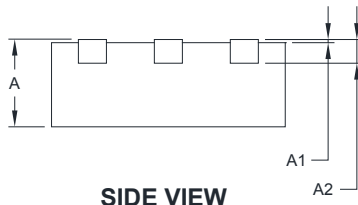
TDFN-2x2-6L



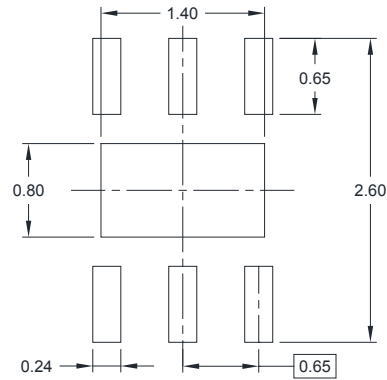
TOP VIEW



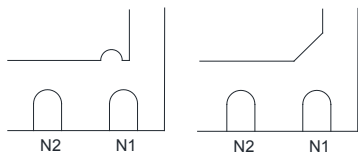
BOTTOM VIEW



SIDE VIEW



RECOMMENDED LAND PATTERN (Unit: mm)



DETAIL A

Pin #1 ID and Tie Bar Mark Options

NOTE: The configuration of the Pin #1 identifier is optional, but must be located within the zone indicated.

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	1.450	0.043	0.057
E	1.900	2.100	0.075	0.083
E1	0.600	0.850	0.024	0.034
k	0.200 MIN		0.008 MIN	
b	0.180	0.300	0.007	0.012
e	0.650 TYP		0.026 TYP	
L	0.250	0.450	0.010	0.018

PACKAGE INFORMATION

TAPE AND REEL INFORMATION

REEL DIMENSIONS



TAPE DIMENSIONS



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-2×2-6L	7"	9.5	2.30	2.30	1.10	4.0	4.0	2.0	8.0	Q1

000001

PACKAGE INFORMATION

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