SGM2566A/SGM2566B
6A, 17mΩ On-Resistance Load Switches

GENERAL DESCRIPTION

The SGM2566A and SGM2566B are single channel load switches that provide configurable rise time to minimize inrush current. The load switch contains an N-MOSFET that can operate over an input voltage range of 0.8V to 5.3V (≤ V_{BIAS}) and can support a maximum continuous current of 6A. Each of switches is controlled by an on and off input (EN/nFAULT), which is capable of interfacing directly with low-voltage control signals. In the SGM2566A, a 265Ω on-chip load resistor is added for quick output discharge when switch is turned off.

The SGM2566A and SGM2566B are available in a Green TDFN-2×2-8L package. They are rated over the -40℃ to +105℃ temperature range.

FEATURES

- **Input Voltage Range: 0.8V to 5.3V**
- **Ultra-Low On-Resistance:**
  R_{DSON} = 17mΩ at V_{IN} = 3.3V (V_{BIAS} = 5V)
- **6A Maximum Continuous Switch Current**
- **Low Quiescent Current:**
  16μA (V_{BIAS} = 5V)
  10μA (V_{BIAS} = 2.5V)
- **Reverse Current Blocking Support**
- **Built-In Thermal Shutdown**
- **Short-Circuit Protection**
- **Soft-Start Function and Configurable Rise Time**
- **Enable Input or Alert Output (EN/nFAULT Pin)**
- **Low Control Input Threshold Enables Use of 1.2V, 1.8V, 2.5V and 3.3V Logic**
- **SGM2566A: Quick Output Discharge**
- **-40℃ to +105℃ Operating Temperature Range**
- **Available in a Green TDFN-2×2-8L Package**

APPLICATIONS

Ultrabook
Notebook and Netbook
Tablet PC

TYPICAL APPLICATION CIRCUIT

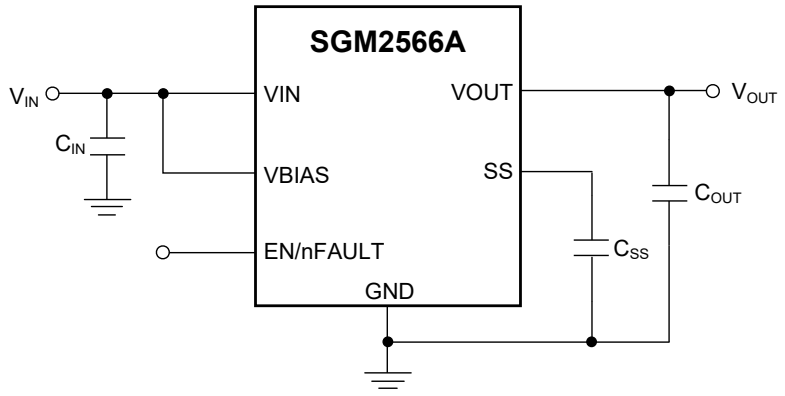


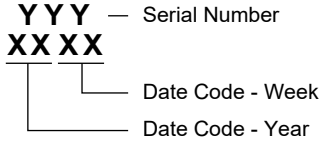
Figure 1. Typical Application Circuit

PACKAGE/ORDERING INFORMATION

MODEL	PACKAGE DESCRIPTION	SPECIFIED TEMPERATURE RANGE	ORDERING NUMBER	PACKAGE MARKING	PACKING OPTION
SGM2566A	TDFN-2×2-8L	-40℃ to +105℃	SGM2566AGTDE8G/TR	GP7 XXXX	Tape and Reel, 3000
SGM2566B	TDFN-2×2-8L	-40℃ to +105℃	SGM2566BGTDE8G/TR	GP8 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

Input Voltage, V_{IN} ..... -0.3V to 6V
Output Voltage, V_{OUT} ..... -0.3V to 6V
Bias Voltage, V_{BIAS} ..... -0.3V to 6V
EN/nFAULT Voltage, $V_{EN/nFAULT}$ ..... -0.3V to 6V
EN/nFAULT Sink Current 25mA
SS Pin Voltage ..... < V_{BIAS}
Maximum Continuous Switch Current, I_{MAX} ..... < 6A
Package Thermal Resistance
TDFN-2×2-8L, θ_{JA} ..... 85℃/W
Junction Temperature ..... +150℃
Storage Temperature Range ..... -65℃ to +150℃
Lead Temperature (Soldering, 10s) ..... +260℃
ESD Susceptibility
HBM 3000V
CDM 1500V

RECOMMENDED OPERATING CONDITIONS

Input Voltage, V_{IN} ..... 0.8V to 5.3V (≤ V_{BIAS} - 30mV)
Bias Voltage, V_{BIAS} ..... 2.5V to 5.5V
EN/nFAULT Voltage, $V_{EN/nFAULT}$ ..... 0V to 5.5V
Output Voltage, V_{OUT} ..... < V_{IN}
Input Capacitor, C_{IN} ..... > 1μF
Operating Junction Temperature Range, T_J .....
..... -40℃ to +125℃
Operating Ambient Temperature Range, T_A .....
..... -40℃ to +105℃

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

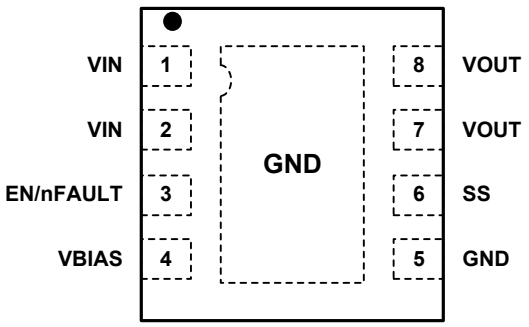
This integrated circuit can be damaged by ESD if you don't pay attention to ESD protection. SGMICRO recommends that all integrated circuits be handled with appropriate precautions. Failure to observe proper handling and installation procedures can cause damage. ESD damage can range from subtle performance 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.

DISCLAIMER

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

PIN CONFIGURATION

(TOP VIEW)



TDFN-2×2-8L

PIN DESCRIPTION

PIN	NAME	I/O	DESCRIPTION
1, 2	VIN	I	Switch Input. Input bypass capacitor recommended for minimizing V_{IN} dip. Pin 1 and pin 2 should be tied together.
3	EN/nFAULT	I/O	Enable Input or Alert Output ($V_{EN/nFAULT} \leq V_{BIAS}$). Asserting EN/nFAULT pin high enables the device. When any of over-temperature protection or short-circuit protection occurs, the device sinks current from EN/nFAULT, pulling the pin down to alert the host (pin as output port).
4	VBIAS	I	Bias Voltage. Power supply to the device. Recommended voltage range for this pin is 2.5V to 5.5V.
5	GND	G	Device Ground.
6	SS	O	Switch Slew Rate Control. Can be left floating.
7, 8	VOUT	O	Switch Output. Pin 7 and pin 8 should be tied together.
Exposed Pad	GND	G	Ground. Thermal pad (exposed center pad) to alleviate thermal stress. Tie to GND.

NOTE: I: Input, O: Output, I/O: Input or Output, G: Ground.

ELECTRICAL CHARACTERISTICS

(V_{BIAS} = 5V, T_J = +25℃, unless otherwise noted.)

PARAMETER	SYMBOL	CONDITIONS		MIN	TYP	MAX	UNITS
Power Supplies and Currents							
Bias Voltage Range	V_{BIAS}			2.5		5.5	V
Input Voltage Range	V_{IN}			0.8		5.3	V
VBIAS Quiescent Supply Current	I_{Q_BIAS}	I_{OUT} = 0mA, V_{IN} = $V_{EN/nFAULT}$ = V_{BIAS} = 5V, T_J = -40℃ to +105℃			16	27	μA
VBIAS Shutdown Supply Current	I_{SD_BIAS}	$V_{EN/nFAULT}$ = GND, T_J = -40℃ to +105℃			0.003	1.4	μA
VIN Shutdown Supply Current	I_{SD_IN}	$V_{EN/nFAULT}$ = GND	V_{IN} = 5V, T_J = -40℃ to +105℃		0.011	2.6	μA
			V_{IN} = 3.3V, T_J = -40℃ to +105℃		0.008	2.2	
			V_{IN} = 1.8V, T_J = -40℃ to +105℃		0.003	2	
			V_{IN} = 1.5V, T_J = -40℃ to +105℃		0.003	2	
			V_{IN} = 1.2V, T_J = -40℃ to +105℃		0.002	2	
			V_{IN} = 0.8V, T_J = -40℃ to +105℃		0.001	2	
Reverse Leakage Current	I_{REV}	V_{IN} = $V_{EN/nFAULT}$ = V_{BIAS} = 0V, V_{OUT} = 5V			0.5		μA
Logic Level Inputs							
EN/nFAULT Input Current	I_{EN}	$V_{EN/nFAULT}$ = 5.5V, T_J = -40℃ to +105℃			0.003	1	μA
EN/nFAULT Input Low Voltage	V_{IL}	T_J = -40℃ to +105℃				0.4	V
EN/nFAULT Input High Voltage	V_{IH}	T_J = -40℃ to +105℃		1.05			V
Resistance Characteristics							
On-State Switch Resistance	R_{DSON}	I_{OUT} = -0.2A, V_{BIAS} = 5V	V_{IN} = 5V, T_J = +25℃		17	23	mΩ
			V_{IN} = 5V, T_J = -40℃ to +85℃			29	
			V_{IN} = 5V, T_J = -40℃ to +105℃			30	
			V_{IN} = 3.3V, T_J = +25℃		17	22	mΩ
			V_{IN} = 3.3V, T_J = -40℃ to +85℃			28	
			V_{IN} = 3.3V, T_J = -40℃ to +105℃			29	
			V_{IN} = 1.8V, T_J = +25℃		17	22	mΩ
			V_{IN} = 1.8V, T_J = -40℃ to +85℃			28	
			V_{IN} = 1.8V, T_J = -40℃ to +105℃			29	
			V_{IN} = 1.5V, T_J = +25℃		17	22	mΩ
			V_{IN} = 1.5V, T_J = -40℃ to +85℃			28	
			V_{IN} = 1.5V, T_J = -40℃ to +105℃			29	
			V_{IN} = 1.2V, T_J = +25℃		17	22	mΩ
			V_{IN} = 1.2V, T_J = -40℃ to +85℃			28	
			V_{IN} = 1.2V, T_J = -40℃ to +105℃			29	
			V_{IN} = 0.8V, T_J = +25℃		17	22	mΩ
			V_{IN} = 0.8V, T_J = -40℃ to +85℃			28	
			V_{IN} = 0.8V, T_J = -40℃ to +105℃			29	
Quick Discharge Resistor (SGM2566A Only)							
Output Shutdown Discharge Resistance	R_{DIS}	V_{IN} = 5V, $V_{EN/nFAULT}$ = 0V, T_J = -40℃ to +105℃			265	360	Ω
Thermal Shutdown							
Thermal Shutdown Temperature		T_J increasing			160		℃
Thermal Shutdown Hysteresis					20		℃

ELECTRICAL CHARACTERISTICS (continued)

(V_{BIAS} = 2.5V, T_J = +25℃, unless otherwise noted.)

PARAMETER	SYMBOL	CONDITIONS		MIN	TYP	MAX	UNITS
Power Supplies and Currents							
VBIAS Quiescent Supply Current	I_{Q_BIAS}	I_{OUT} = 0mA, V_{IN} = $V_{EN/nFAULT}$ = V_{BIAS} = 2.5V, T_J = -40℃ to +105℃			10	17	μA
VBIAS Shutdown Supply Current	I_{SD_BIAS}	$V_{EN/nFAULT}$ = GND, T_J = -40℃ to +105℃			0.002	1	μA
VIN Shutdown Supply Current	I_{SD_IN}	$V_{EN/nFAULT}$ = GND	V_{IN} = 2.5V, T_J = -40℃ to +105℃		0.005	2.2	μA
			V_{IN} = 1.8V, T_J = -40℃ to +105℃		0.004	2	
			V_{IN} = 1.5V, T_J = -40℃ to +105℃		0.003	2	
			V_{IN} = 1.2V, T_J = -40℃ to +105℃		0.003	2	
			V_{IN} = 0.8V, T_J = -40℃ to +105℃		0.001	2	
Logic Level Inputs							
EN/nFAULT Input Current	$I_{EN/nFAULT}$	$V_{EN/nFAULT}$ = 5.5V, T_J = -40℃ to +105℃				1	μA
EN/nFAULT Input Low Voltage	V_{IL}	T_J = -40℃ to +105℃				0.4	V
EN/nFAULT Input High Voltage	V_{IH}	T_J = -40℃ to +105℃		1.05			V
Resistance Characteristics							
On-State Switch Resistance	R_{DSON}	I_{OUT} = -0.2A	V_{IN} = 2.5V, T_J = +25℃		23		mΩ
			V_{IN} = 1.8V, T_J = +25℃		19	25	mΩ
			V_{IN} = 1.8V, T_J = -40℃ to +85℃			31	
			V_{IN} = 1.8V, T_J = -40℃ to +105℃			33	
			V_{IN} = 1.5V, T_J = +25℃		18	23	mΩ
			V_{IN} = 1.5V, T_J = -40℃ to +85℃			29	
			V_{IN} = 1.5V, T_J = -40℃ to +105℃			31	
			V_{IN} = 1.2V, T_J = +25℃		18	23	mΩ
			V_{IN} = 1.2V, T_J = -40℃ to +85℃			29	
			V_{IN} = 1.2V, T_J = -40℃ to +105℃			30	
			V_{IN} = 0.8V, T_J = +25℃		17	22	mΩ
			V_{IN} = 0.8V, T_J = -40℃ to +85℃			27	
			V_{IN} = 0.8V, T_J = -40℃ to +105℃			29	
Quick Discharge Resistor (SGM2566A Only)							
Output Shutdown Discharge Resistance	R_{DIS}	V_{IN} = 2.5V, $V_{EN/nFAULT}$ = 0V, T_J = -40℃ to +105℃			275	375	Ω

SWITCHING CHARACTERISTICS

PARAMETER	SYMBOL	CONDITIONS	MIN	TYP	MAX	UNITS
V_{IN} = $V_{EN/nFAULT}$ = V_{BIAS} = 5V, T_J = +25℃, unless otherwise noted.						
Turn-On Time	t_{ON}	R_L = 10Ω, C_{OUT} = 0.1μF, C_{SS} = 1000pF		1620		μs
Turn-Off Time	t_{OFF}	R_L = 10Ω, C_{OUT} = 0.1μF, C_{SS} = 1000pF		30		
V_{OUT} Rise Time	t_R	R_L = 10Ω, C_{OUT} = 0.1μF, C_{SS} = 1000pF		2800		
V_{OUT} Fall Time	t_F	R_L = 10Ω, C_{OUT} = 0.1μF, C_{SS} = 1000pF		5		
On Delay Time	t_D	R_L = 10Ω, C_{OUT} = 0.1μF, C_{SS} = 1000pF		195		
V_{IN} = 2.5V, $V_{EN/nFAULT}$ = 5V, V_{BIAS} = 2.5V, T_J = +25℃, unless otherwise noted.						
Turn-On Time	t_{ON}	R_L = 10Ω, C_{OUT} = 0.1μF, C_{SS} = 1000pF		1880		μs
Turn-Off Time	t_{OFF}	R_L = 10Ω, C_{OUT} = 0.1μF, C_{SS} = 1000pF		30		
V_{OUT} Rise Time	t_R	R_L = 10Ω, C_{OUT} = 0.1μF, C_{SS} = 1000pF		3185		
V_{OUT} Fall Time	t_F	R_L = 10Ω, C_{OUT} = 0.1μF, C_{SS} = 1000pF		9		
On Delay Time	t_D	R_L = 10Ω, C_{OUT} = 0.1μF, C_{SS} = 1000pF		240		
V_{IN} = 0.8V, $V_{EN/nFAULT}$ = 5V, V_{BIAS} = 5V, T_J = +25℃, unless otherwise noted.						
Turn-On Time	t_{ON}	R_L = 10Ω, C_{OUT} = 0.1μF, C_{SS} = 1000pF		215		μs
Turn-Off Time	t_{OFF}	R_L = 10Ω, C_{OUT} = 0.1μF, C_{SS} = 1000pF		35		
V_{OUT} Rise Time	t_R	R_L = 10Ω, C_{OUT} = 0.1μF, C_{SS} = 1000pF		395		
V_{OUT} Fall Time	t_F	R_L = 10Ω, C_{OUT} = 0.1μF, C_{SS} = 1000pF		7		
On Delay Time	t_D	R_L = 10Ω, C_{OUT} = 0.1μF, C_{SS} = 1000pF		70		
V_{IN} = 0.8V, $V_{EN/nFAULT}$ = 5V, V_{BIAS} = 2.5V, T_J = +25℃, unless otherwise noted.						
Turn-On Time	t_{ON}	R_L = 10Ω, C_{OUT} = 0.1μF, C_{SS} = 1000pF		555		μs
Turn-Off Time	t_{OFF}	R_L = 10Ω, C_{OUT} = 0.1μF, C_{SS} = 1000pF		55		
V_{OUT} Rise Time	t_R	R_L = 10Ω, C_{OUT} = 0.1μF, C_{SS} = 1000pF		990		
V_{OUT} Fall Time	t_F	R_L = 10Ω, C_{OUT} = 0.1μF, C_{SS} = 1000pF		8		
On Delay Time	t_D	R_L = 10Ω, C_{OUT} = 0.1μF, C_{SS} = 1000pF		80		

PARAMETER MEASUREMENT INFORMATION

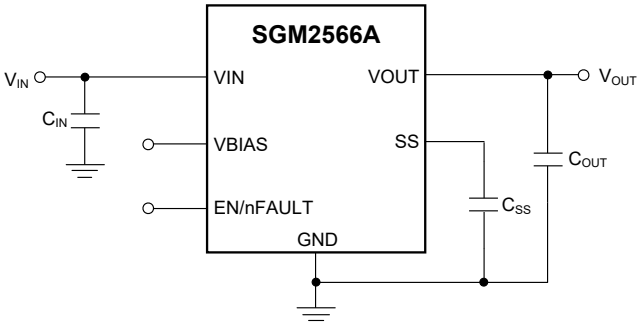


Figure 2. Test Circuit

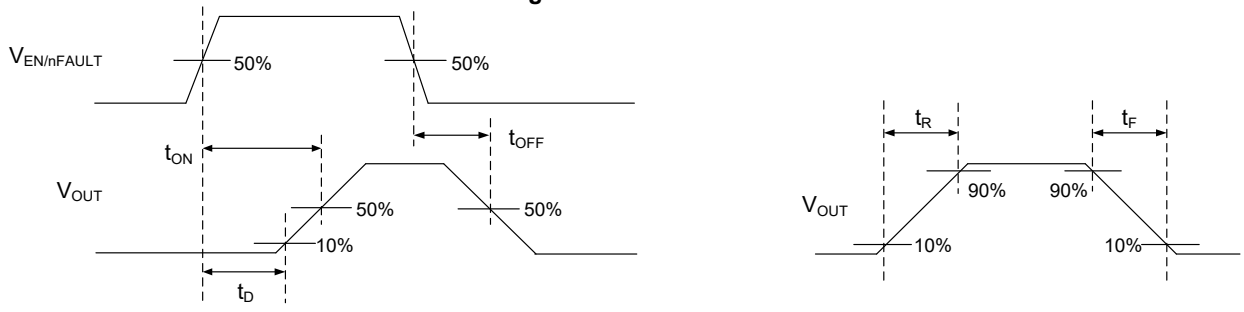
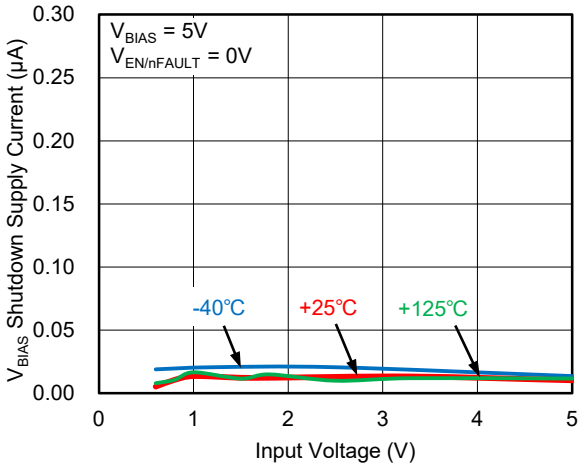


Figure 3. Turn-On and Turn-Off Waveforms

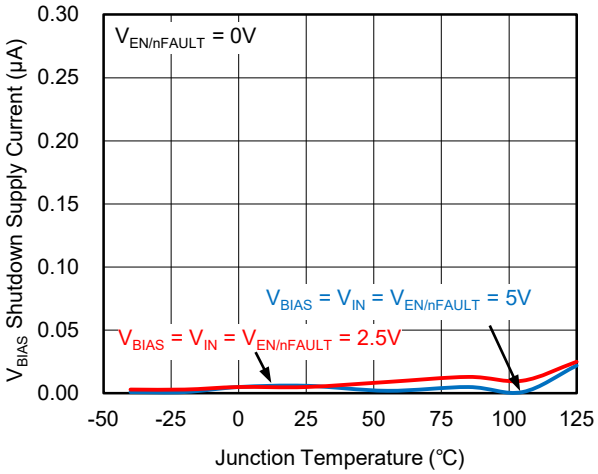
TYPICAL PERFORMANCE CHARACTERISTICS

T_J = +25℃, unless otherwise noted.

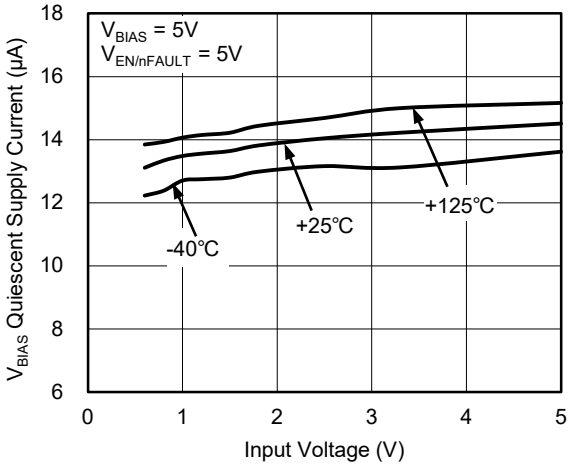
V_{BIAS} Shutdown Supply Current vs. Input Voltage



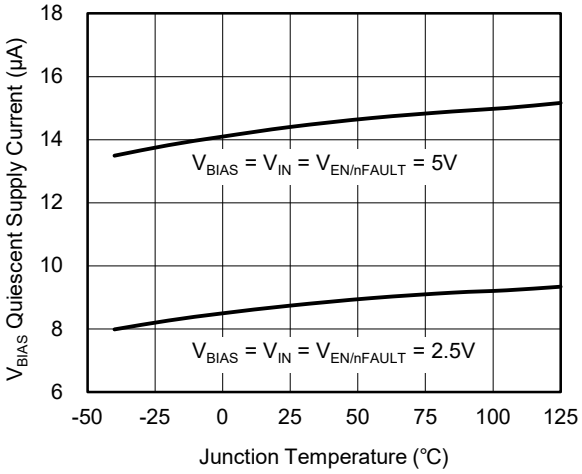
V_{BIAS} Shutdown Supply Current vs. Junction Temperature



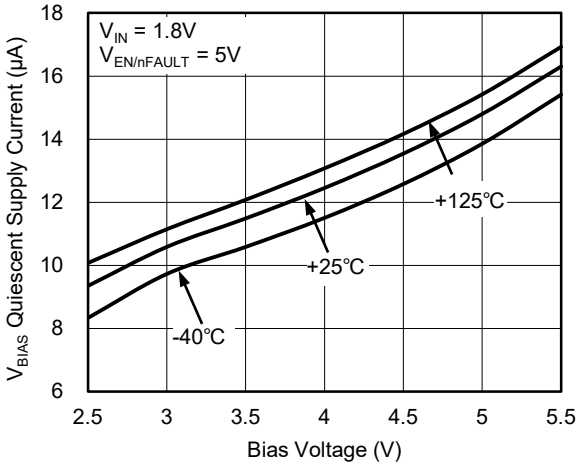
V_{BIAS} Quiescent Supply Current vs. Input Voltage



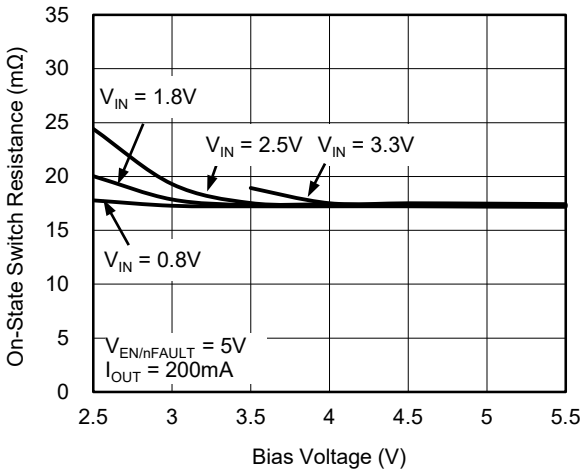
V_{BIAS} Quiescent Supply Current vs. Junction Temperature



V_{BIAS} Quiescent Supply Current vs. Bias Voltage



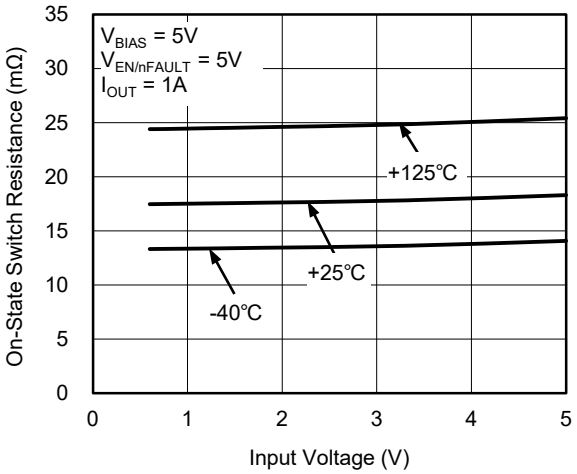
On-State Switch Resistance vs. Bias Voltage



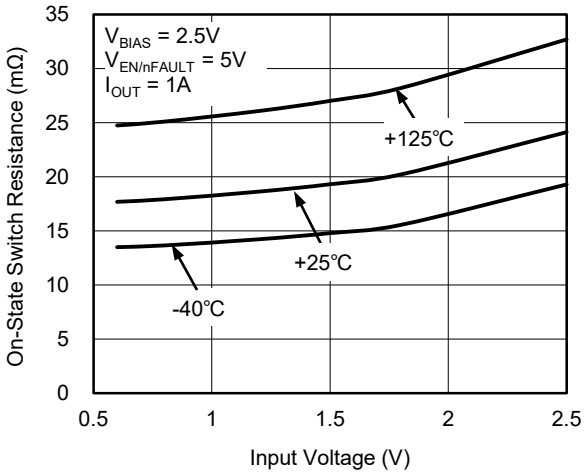
TYPICAL PERFORMANCE CHARACTERISTICS (continued)

T_J = +25℃, unless otherwise noted.

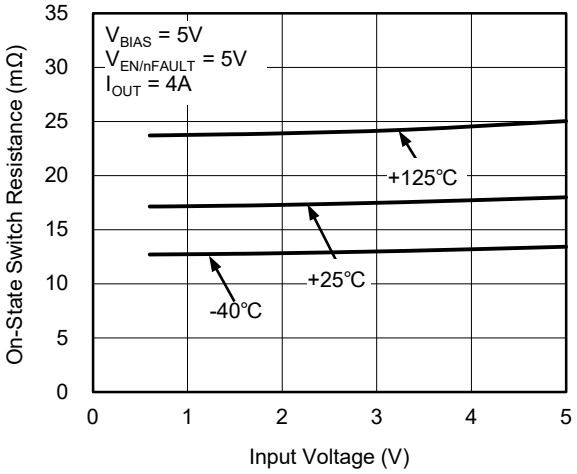
On-State Switch Resistance vs. Input Voltage



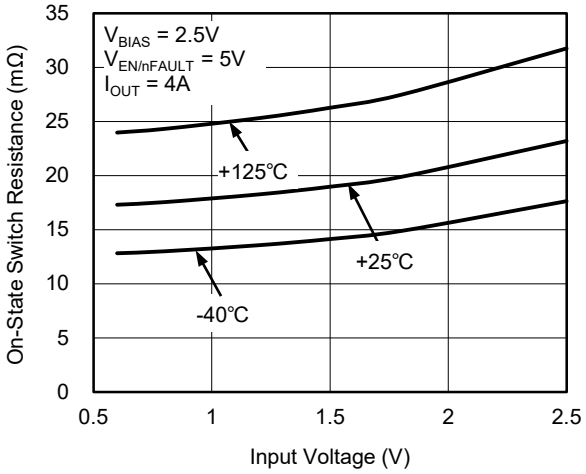
On-State Switch Resistance vs. Input Voltage



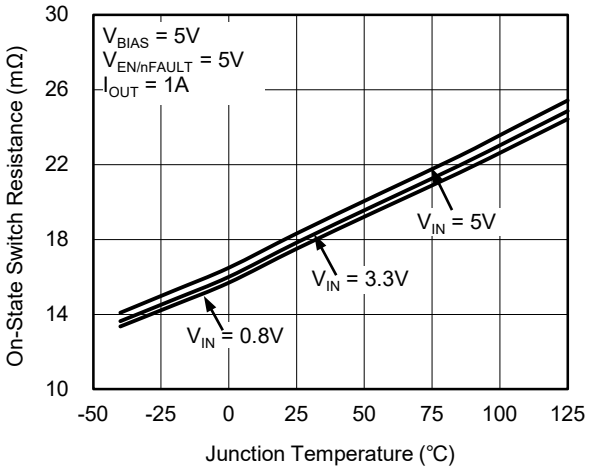
On-State Switch Resistance vs. Input Voltage



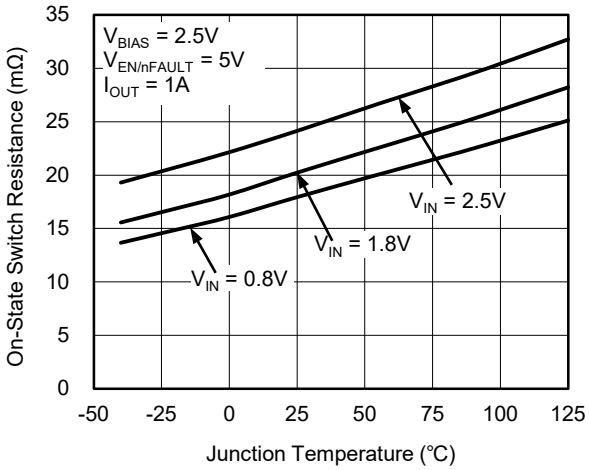
On-State Switch Resistance vs. Input Voltage



On-State Switch Resistance vs. Junction Temperature



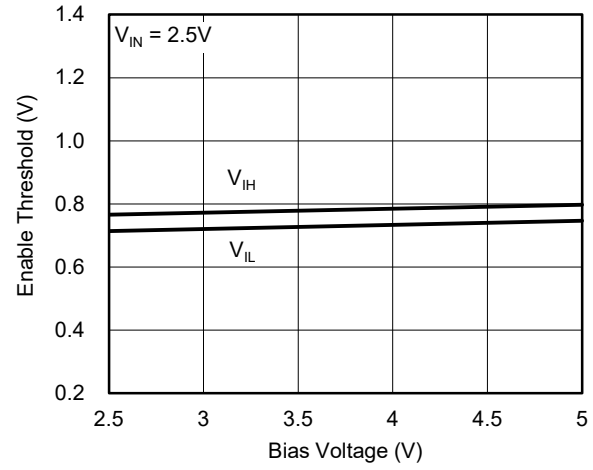
On-State Switch Resistance vs. Junction Temperature



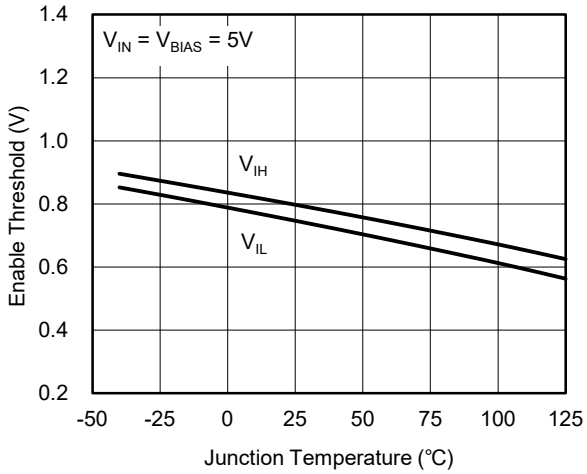
TYPICAL PERFORMANCE CHARACTERISTICS (continued)

T_J = +25℃, unless otherwise noted.

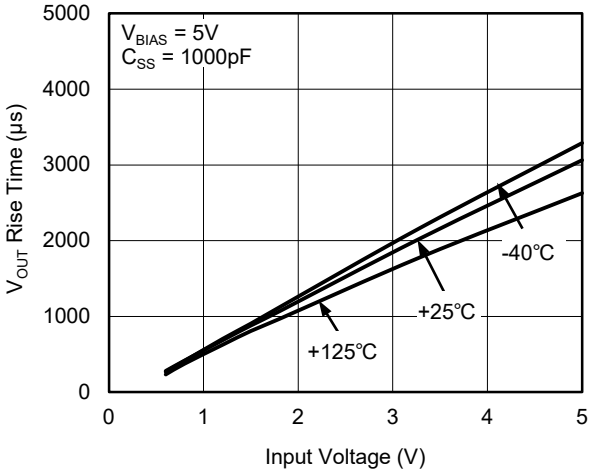
Enable Threshold vs. Bias Voltage



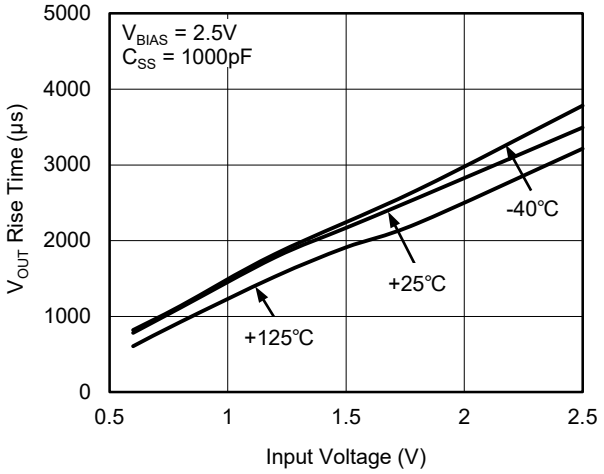
Enable Threshold vs. Junction Temperature



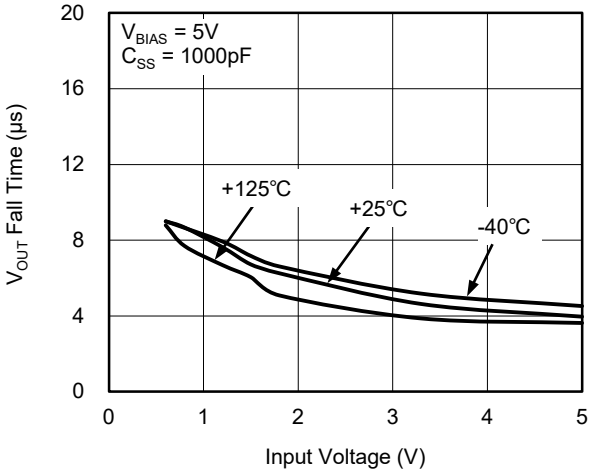
V_{OUT} Rise Time vs. Input Voltage



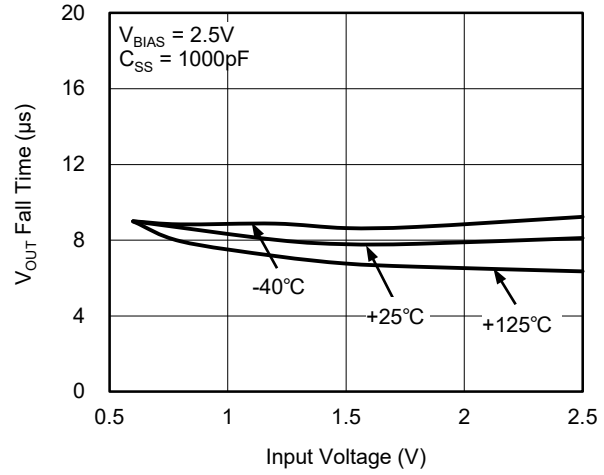
V_{OUT} Rise Time vs. Input Voltage



V_{OUT} Fall Time vs. Input Voltage



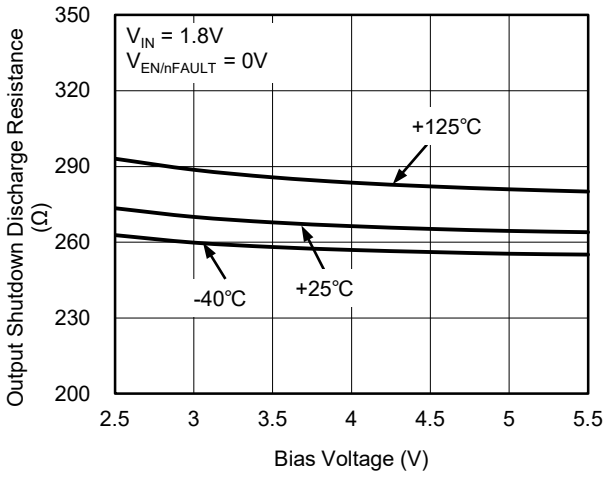
V_{OUT} Fall Time vs. Input Voltage



TYPICAL PERFORMANCE CHARACTERISTICS (continued)

T_J = +25℃, unless otherwise noted.

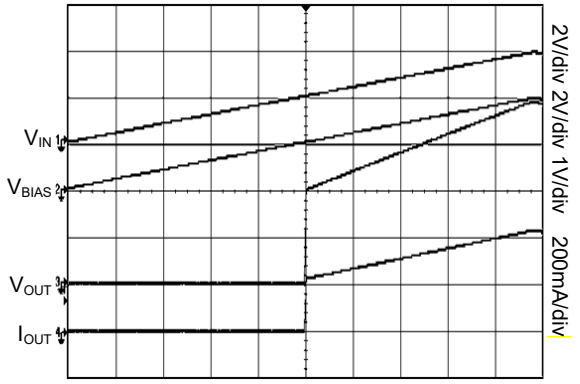
Output Shutdown Discharge Resistance vs. Bias Voltage
(SGM2566A)



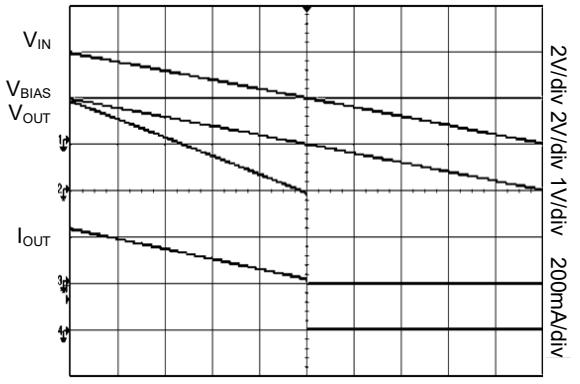
TYPICAL PERFORMANCE CHARACTERISTICS (continued)

T_J = +25℃, unless otherwise noted.

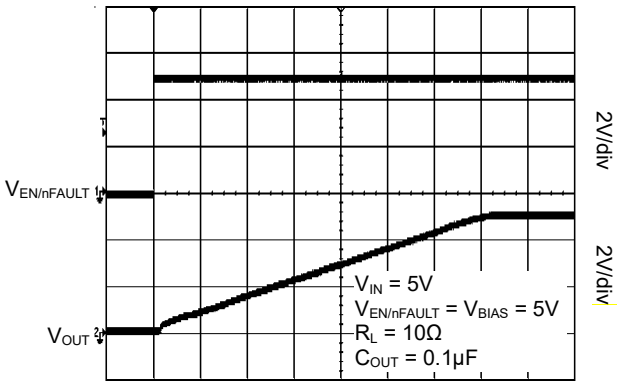
UVLO at Rising



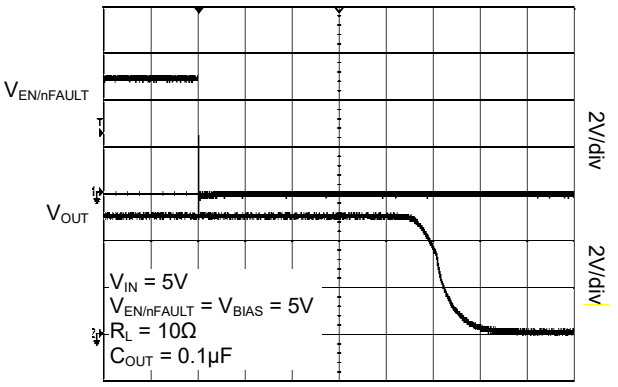
UVLO at Falling



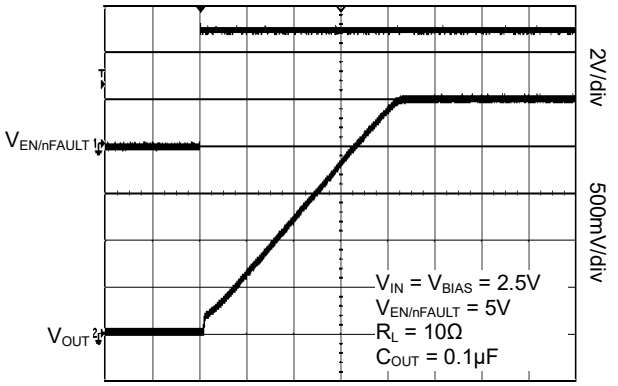
Turn-On Response



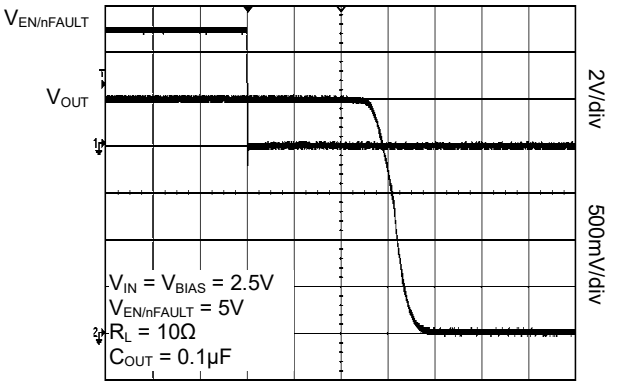
Turn-Off Response



Turn-On Response



Turn-Off Response



FUNCTIONAL BLOCK DIAGRAM

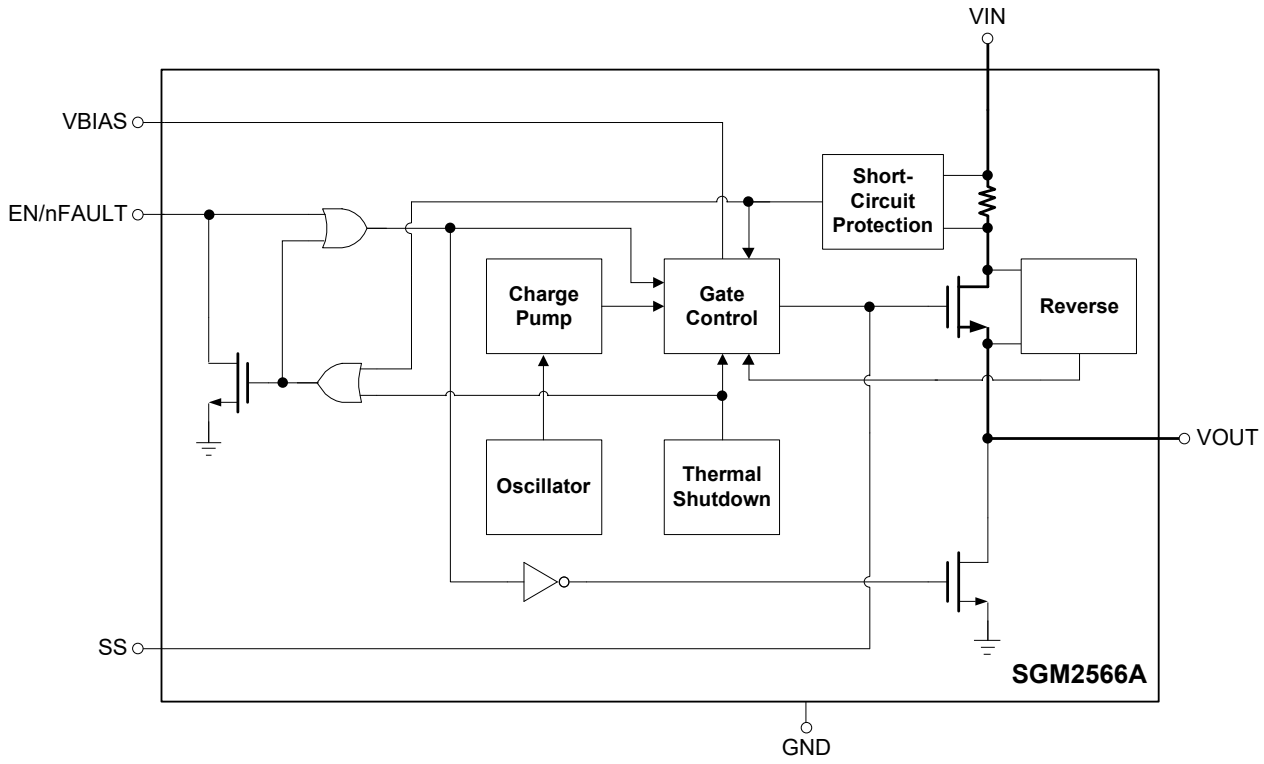


Figure 4. Block Diagram

DETAILED DESCRIPTION

Overview

The SGM2566A and SGM2566B devices are single channel, 6A load switches in a TDFN package. To reduce the voltage drop in high current rails, the device implements an ultra-low resistance N-MOSFET. The device has a programmable slew rate for applications that require specific rise time.

The device has very low leakage current during off state. This prevents downstream circuits from pulling high standby current from the supply. Integrated control logic, driver, power supply, and output discharge FET eliminate the need for any external components, which reduces solution size and bill of materials (BOM) count.

Short-Circuit Protection

When short-circuit occurs, the device shuts down and restarts after the hiccup time of 50ms. Figure 5 shows a test circuit for this function.

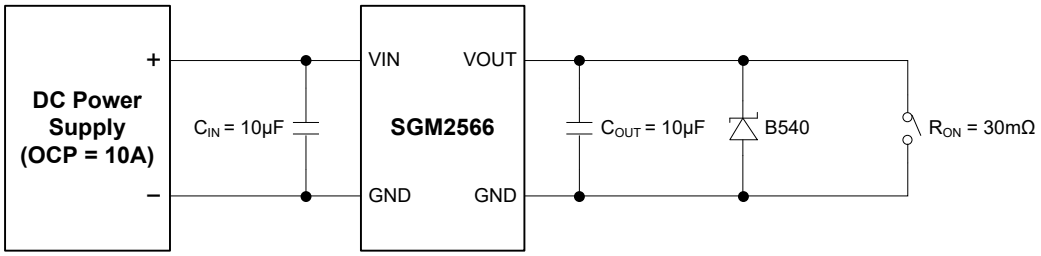


Figure 5. Test Setup of Short-Circuit Protection

DETAILED DESCRIPTION (continued)

Adjustable Rise Time

A capacitor to GND on the SS pin sets the slew rate. An approximate formula for the relationship between SS and slew rate when V_{BIAS} is set to 5V is shown in Equation 1. This equation accounts for 10% to 90% measurement on V_{OUT} and does not apply for C_{SS} = 0pF.

$$SR = 0.54 \times C_{SS} + 18 \quad (1)$$

where:

- SR is the slew rate (in μs/V).
- C_{SS} is the capacitance value on the SS pin (in pF).
- The unit for the constant 18 is μs/V. The unit for the constant 0.54 is μs/(V × pF).

Rise time can be calculated by multiplying the input voltage by the slew rate. Table 1 contains rise time values measured on a typical device. Rise times shown in Table 1 are only valid for the power-up sequence where V_{IN} and V_{BIAS} are already in steady state condition before the EN/nFAULT pin is asserted high.

Quick Output Discharge (QOD) (Optional)

The SGM2566A includes a QOD feature. When the switch is disabled, a discharge resistor is connected between VOUT and GND. This resistor has a typical value of 265Ω and prevents the output from floating while the switch is disabled.

Low Power Consumption During Off State

The V_{IN} shutdown supply current is 0.003μA (TYP) at 1.8V V_{IN}. Typically, the downstream loads must have a significantly higher off state leakage current. The load switch allows system standby power consumption to be reduced.

EN/nFAULT Pin

EN/nFAULT is a dual-function bi-directional input or output. Asserting EN/nFAULT pin high enables the device. When any of over-temperature protection or short-circuit protection occurs, the device sinks current from EN/nFAULT, pulling the pin down to alert the host (pin as output port). EN/nFAULT changes back to an input port, only after the device is released from a protection action.

Reverse-Voltage Protection

The reverse-voltage protection feature turns off the N-MOSFET switch whenever the output voltage exceeds the input voltage by 3mV (TYP).

Table 1. Rise Time (μs) vs. C_{SS} Capacitor

C_{SS} (pF)	V_{IN} = 5V	V_{IN} = 4.2V	V_{IN} = 3.3V	V_{IN} = 1.8V	V_{IN} = 1.5V	V_{IN} = 1.2V	V_{IN} = 1.05V	V_{IN} = 0.8V
0	201	185	171	134	125	110	110	94
220	570	468	358	180	145	110	110	98
470	1335	1116	859	433	351	273	233	166
1000	3011	2530	1966	1020	844	666	576	416
2200	6169	5213	4066	2155	1794	1423	1231	809
4700	14291	11826	9353	4904	4071	3231	2848	2083
10000	27772	23431	18219	9654	8035	6366	5550	4075

NOTE: T_J = +25℃, C_{OUT} = 0.1μF, C_{IN} = 10μF, R_L = 10Ω and V_{BIAS} = 5V.

TYPICAL APPLICATION

This application demonstrates how the SGM2566A and SGM2566B can be used to power downstream modules.

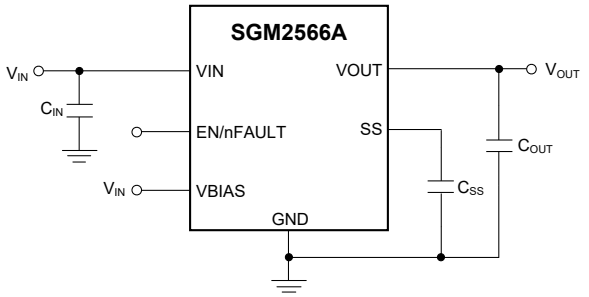


Figure 6. Powering a Downstream Module

Inrush Current

Table 2. Design Parameters Example

Design Parameter	Example Value
V_{IN}	3.3V
V_{BIAS}	5V
C_{OUT}	22μF
Maximum Acceptable Inrush Current	400mA

When the switch is enabled, the output capacitors must be charged up from 0V to the set value (3.3V in this example). This charge arrives in the form of inrush current. Inrush current can be calculated using Equation 2.

$$\text{Inrush Current} = C_{OUT} \times dV/dt \quad (2)$$

where:

- C_{OUT} is the output capacitance.
- dV/dt is desired output slew rate.

The SGM2566A and SGM2566B offer adjustable rise time for VOUT. This feature allows the user to control the inrush current during turn-on. The appropriate rise time can be calculated using the design requirements and the inrush current equation. See Equation 3 and Equation 4.

$$400mA = 22\mu F \times 3.3V/dt \quad (3)$$
$$dt = 181.5\mu s \quad (4)$$

To ensure an inrush current of less than 400mA, choose an SS capacitor value that yields a rise time of more than 181.5μs.

APPLICATION INFORMATION

Input Capacitor

To limit the voltage drop on the input supply caused by transient inrush currents when the switch turns on into a discharged load capacitor or short-circuit, a capacitor needs to be placed between VIN and GND. A 1μF ceramic capacitor, C_{IN}, placed close to the pins, is usually sufficient. Higher values of C_{IN} can be used to further reduce the voltage drop during high current applications.

Output Filter Capacitor

Between VOUT and GND, connect a low-ESR 10μF ceramic capacitor to meet the maximum drop requirement. Standard bypass methods should be used to minimize inductance and resistance between the bypass capacitor and the downstream connector. This will reduce EMI and improve the transient performance. If long cables are connected to the output terminals, an anti-parallel schottky diode such as BAT54 is suggested to be placed in parallel with the output terminals to absorb the negative ringing due to the cable inductance.

V_{IN} and V_{BIAS} Voltage Range

For optimal R_{DSON} performance, make sure $V_{IN} \le V_{BIAS}$ - 30mV.

Thermal Considerations

The maximum IC junction temperature must be restricted to +125℃ under normal operating conditions.

To calculate the maximum allowable dissipation, $P_{D(MAX)}$ for a given output current and ambient temperature, use Equation 5 as a guideline:

$$P_{D(MAX)} = \frac{T_{J(MAX)} - T_A}{\theta_{JA}} \quad (5)$$

where:

- $P_{D(MAX)}$ is the maximum allowable power dissipation.
- $T_{J(MAX)}$ is the maximum allowable junction temperature (+125℃ for the SGM2566A and SGM2566B).
- T_A is the ambient temperature of the device.
- θ_{JA} is junction to air thermal impedance. This parameter is highly dependent upon board layout. See layout recommendation.

Notice that the thermal vias are located under the exposed thermal pad of the device. This allows for thermal dissipation away from the device.

Power Supply Recommendations

The device is designed to operate from a V_{BIAS} range of 2.5V to 5.5V and a V_{IN} range of 0.8V to 5.3V (< V_{BIAS}).

Layout Guidelines

For best performance, all traces must be as short as possible. To be most effective, the input and output capacitors must be placed close to the device to minimize the effects that parasitic trace inductances may have on normal operation. Using wide traces for VIN, VOUT, and GND helps minimize the parasitic electrical effects along with minimizing the case to ambient thermal impedance. The SS trace must be as short as possible to avoid parasitic capacitance.

Layout Example

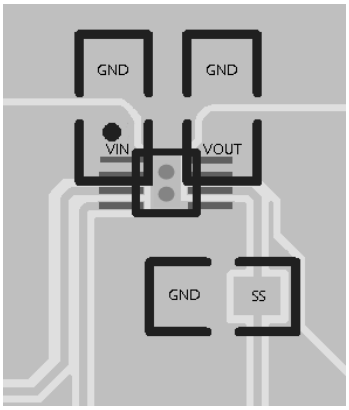


Figure 7. Layout Recommendation

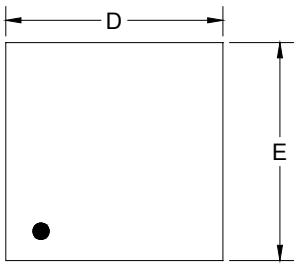
REVISION HISTORY

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

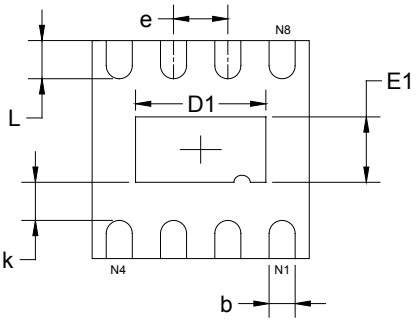
Changes from Original (JULY 2019) to REV.A	Page
Changed from product preview to production data	All

PACKAGE OUTLINE DIMENSIONS

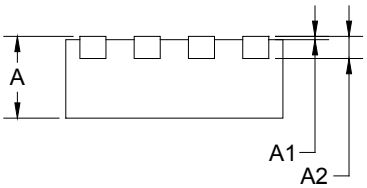
TDFN-2×2-8L



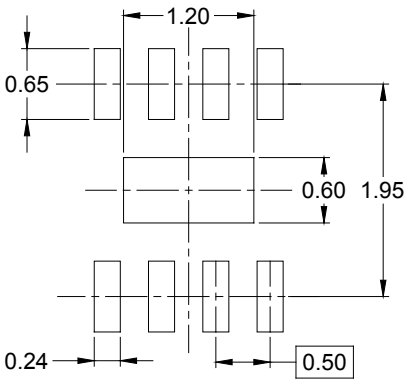
TOP VIEW



BOTTOM VIEW



SIDE VIEW

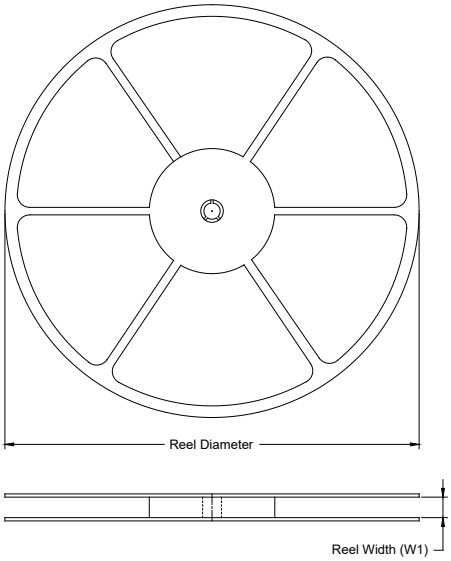


RECOMMENDED LAND PATTERN (Unit: mm)

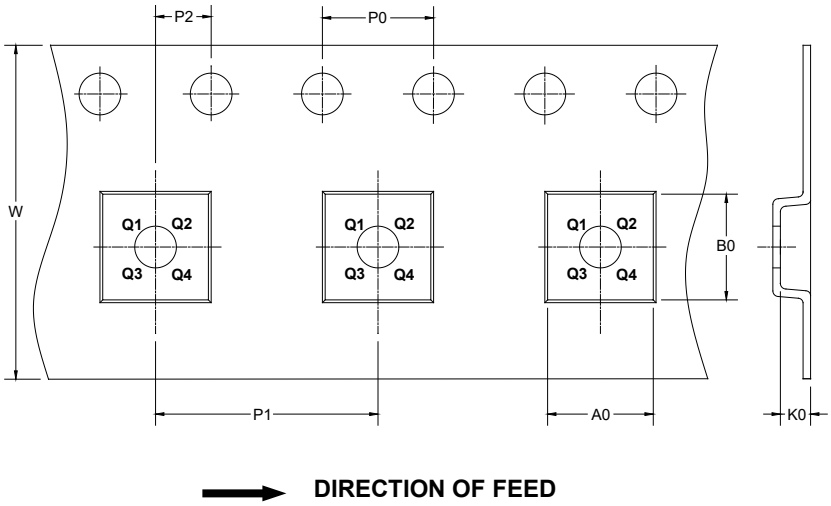
Symbol	Dimensions In Millimeters		Dimensions In Inches	
	MIN	MAX	MIN	MAX
A	0.700	0.800	0.028	0.031
A1	0.000	0.050	0.000	0.002
A2	0.203 REF		0.008 REF	
D	1.900	2.100	0.075	0.083
D1	1.100	1.300	0.043	0.051
E	1.900	2.100	0.075	0.083
E1	0.500	0.700	0.020	0.028
k	0.200 MIN		0.008 MIN	
b	0.180	0.300	0.007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

TAPE AND REEL INFORMATION

REEL DIMENSIONS



TAPE DIMENSIONS



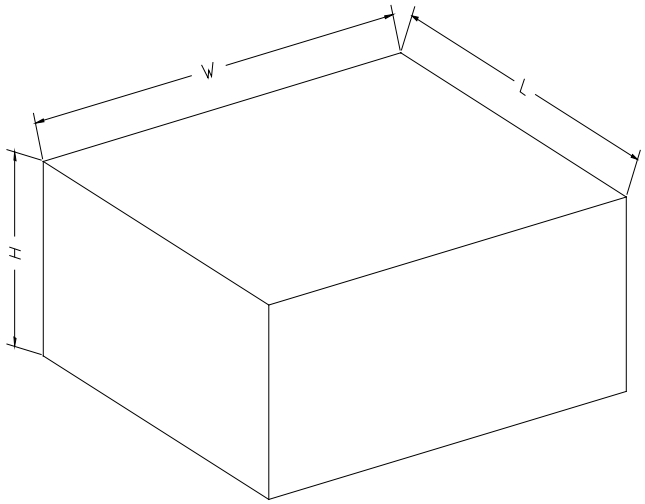
NOTE: The picture is only for reference. Please make the object as the standard.

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-2×2-8L	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