G5027C

Single Channel Smart Load Switch

Features

- **0.7V to V_{BIAS}-1.5V input voltage range.**
- **Continuous Switch Current 6A**
- **Low $R_{DS(ON)}$ on internal NFETs**
  5.5mΩ at V_{BIAS}=5V, V_{IN}=1.05V, T_A=25°C
- **35μA low quiescent current**
- **10μs turn on rise time**
- **3.2V to 5.5V bias voltage**
- **Integrated quick output discharge resistor**
- **Thermally enhanced TDFN3X3-8 package**

Applications

- **Portable computers**
- **Ultrabooks**
- **Tablet PCs**
- **Set top boxes**
- **LCD TVs**
- **Telecom/Networking/Datacom equipment**
- **Consumer electronics**
- **SSD**

General Description

The G5027C is a single channel smart load switch with very low on-resistance in a small package. It contains an n-channel MOSFET for up to V_{BIAS} -1.5V input voltage operation and 6A current channel with 3.2V to 5.5V bias supply. The load switch is controlled by a low voltage control signal through ON pin.

The G5027C integrates an internal 220Ω load resistor for quick output discharge when load switch is off.

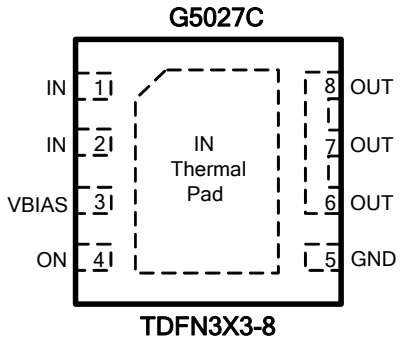
The G5027C is available is a TDFN3X3-8 package with bottom thermal pad and is rated over a -40°C to 85°C ambient temperature range.

Ordering Information

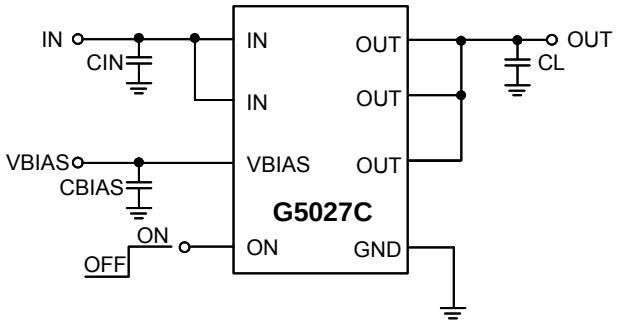
ORDER NUMBER	MARKING	TEMP. RANGE	PACKAGE (Green)
G5027CRD1D	5027	-40°C to 85°C	TDFN3X3-8

Note: RD: TDFN3X3-8
1: Bonding Code
D: Tape & Reel
Green : Lead Free / Halogen Free

Pin configuration



Typical Application Circuit



Absolute Maximum Ratings

IN,ON,VBIAS,OUT to GND . . . . . -0.3V to +6V
Junction Temperature(T_J) . . . . . 150°C
Storage Temperature(T_S) . . . . . .-65°C to 150°C
ESD Rating HBM/CDM 2kV/1kV

Recommend Operating Ratings

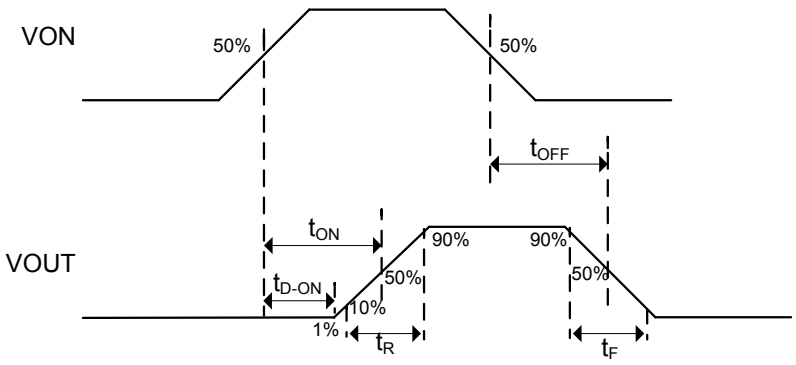
Supply Voltage(V_{IN}) . . . . . V_{BIAS}-1.5V
Ambient Temperature(T_A) . . . . . -40°C to 85°C
Thermal Resistance of junction to ambient (θ_{JA})
TDFN3X3-8 . . . . . .170°C/W
Thermal Resistance of junction to case (θ_{JC})
TDFN3X3-8 . . . . . 30°C/W

Electrical Characteristics

(V_{BIAS} = 5V, V_{IN} = 1.05V, T_A = 25°C, unless otherwise specifications in BOLD indicate a temperature range of -40°C to +85°C

PARAMETER	SYMBOL	Conditions	MIN	TYP	MAX	UNITS
Input Voltage Range	V_{IN}	V_{ON}=5V	0.7	1.05	V_{BIAS}-1.5	V
VBIAS supply Voltage	V_{BIAS}		3.2	5	5.5	V
Maximum Continuous Current	I_D	V_{ON}=5V	---	6	---	A
Maximum Pulsed Switch Current	I_{PLS}	V_{IN}= V_{ON} =5V Pulse <300µs, 2% Duty cycle	---	8	---	A
Quiescent Supply Current of V_{BIAS}	I_q	V_{ON}=5V,I_{OUT}=0A	---	50	---	µA
VBIAS Shutdown Supply Current	I_{OFF}	V_{ON}=0V,V_{OUT}=0V	---	---	2	µA
IN Shutdown Supply Current	I_{INOFF}	V_{ON}=0V,V_{OUT}=0V	---	---	2	µA
ON Leakage Current	I_{ON}	V_{ON}=5V	---	---	1	µA
ON High level Voltage	V_{ONH}		1.2	---	---	V
ON Low level Voltage	V_{ONL}		---	---	0.5	V
Switching ON Resistance						
Switch ON-State Resistance	R_{ON}	I_{OUT}=-200mA, V_{ON}=5V, V_{BIAS}=5V	---	5.5	---	mΩ
		I_{OUT}=-200mA, V_{ON}=5V, V_{BIAS}=3.3V	---	6.5	---	mΩ
Output Pull-Down Resistance	R_{PD}	I_{OUT}=-15mA, V_{ON}=0V,	---	220	300	Ω

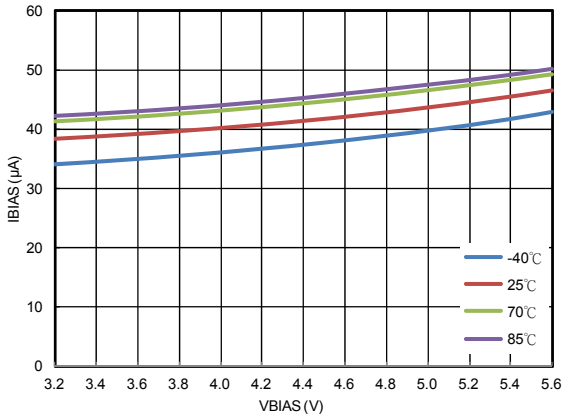
Switching Characteristics



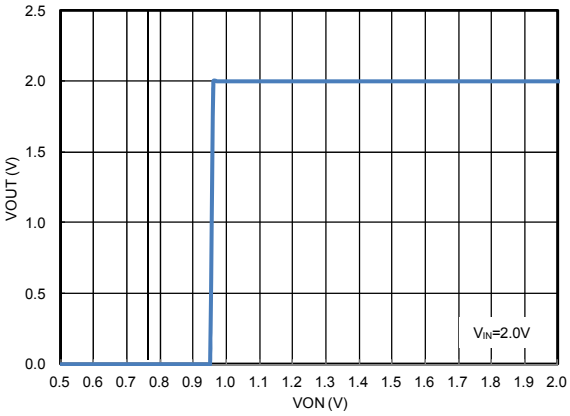
Typical Performance Characteristics

V_{IN}=1.05V, V_{BIAS}=V_{ON}=5V，T_A=25°C, unless otherwise noted.

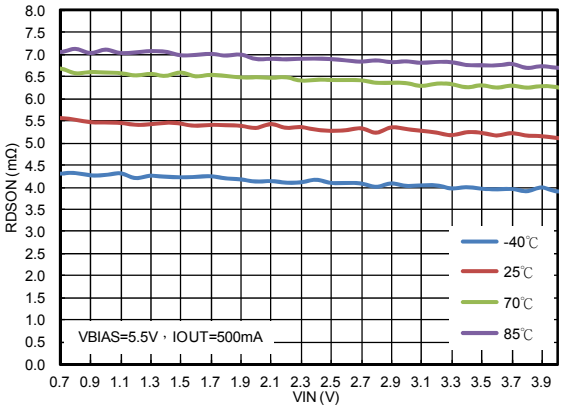
Quiescent Current vs. VBIAS



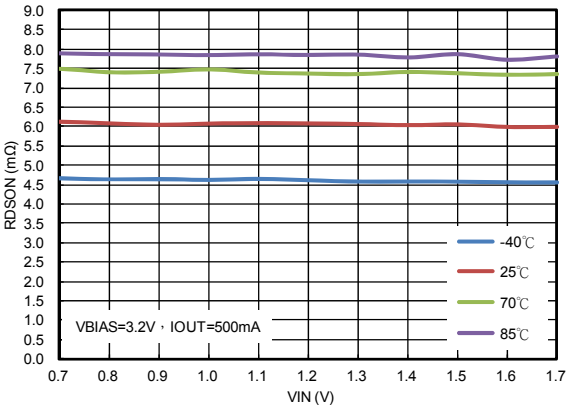
VOUT vs. VON



RDSON vs. VIN

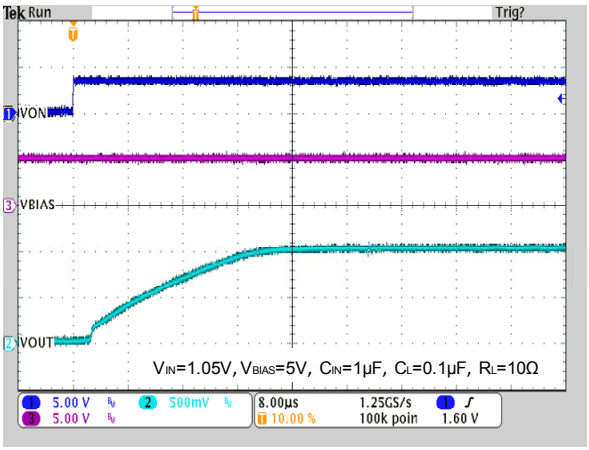


RDSON vs. VIN

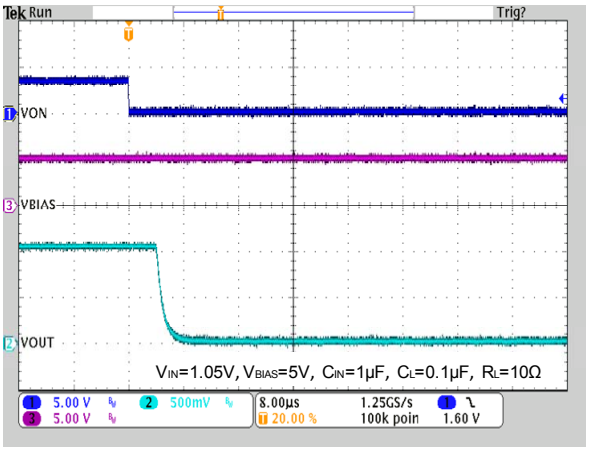


Typical Performance Characteristics (continued)

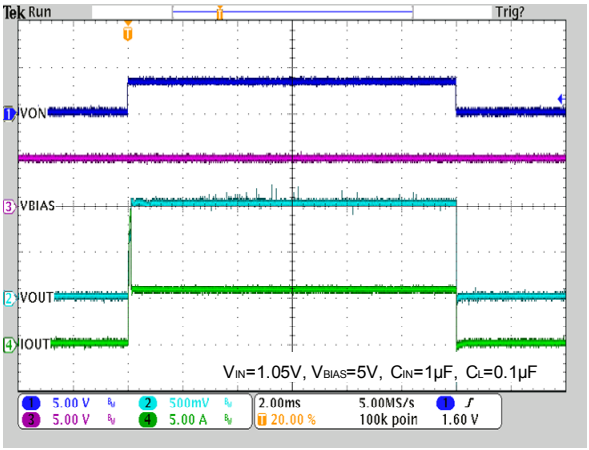
Turn-ON & Turn-ON Rise Times



Turn-OFF & Turn-OFF Fall Times



Turn-ON & Turn-OFF at I_{OUT}=6A



Test condition T_A=25°C ,CIN=1μF, CL=0.1μF, RL=10Ω , (unless otherwise specified)

SYMBOL	PARAMETER	MIN	TYP	MAX	UNITS
VIN=1.5V, VBIAS=VON=5V					
T_{ON}	Turn-ON Time	---	10	---	μS
T_{D-ON}	Turn-ON Delay Time	0.5	2.5	9	
T_R	Turn-ON Rise Time	11	23	40	
T_{OFF}	Turn-OFF Time	---	5	---	
T_F	Turn-OFF Fall Time	---	2	---	

Test condition T_A=25°C ,CIN=1μF, CL=0.1μF, RL=10Ω , (unless otherwise specified)

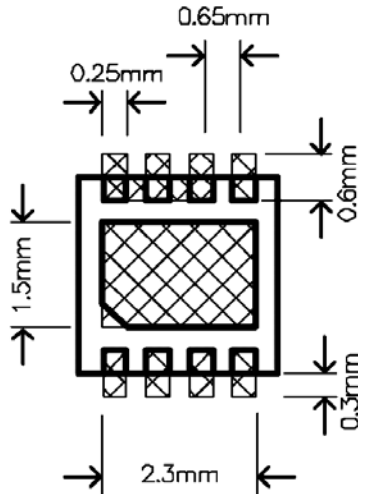
SYMBOL	PARAMETER	MIN	TYP	MAX	UNITS
VIN=1.05V, VBIAS=VON=5V					
T_{ON}	Turn-ON Time	---	10	---	μS
T_{D-ON}	Turn-ON Delay Time	0.5	2.5	9	
T_R	Turn-ON Rise Time	10	21	37	
T_{OFF}	Turn-OFF Time	---	5	---	
T_F	Turn-OFF Fall Time	---	2	---	

Test condition T_A=25°C ,CIN=1μF, CL=0.1μF, RL=10Ω , (unless otherwise specified)

SYMBOL	PARAMETER	MIN	TYP	MAX	UNITS
VIN=1.05V, VBIAS=VON=3.3V					
T_{ON}	Turn-ON Time	---	26	---	μS
T_{D-ON}	Turn-ON Delay Time	---	6	---	
T_R	Turn-ON Rise Time	---	43	---	
T_{OFF}	Turn-OFF Time	---	5	---	
T_F	Turn-OFF Fall Time	---	2.5	---	

Minimum Footprint PCB Layout Section (Fae Tel:13925219291)

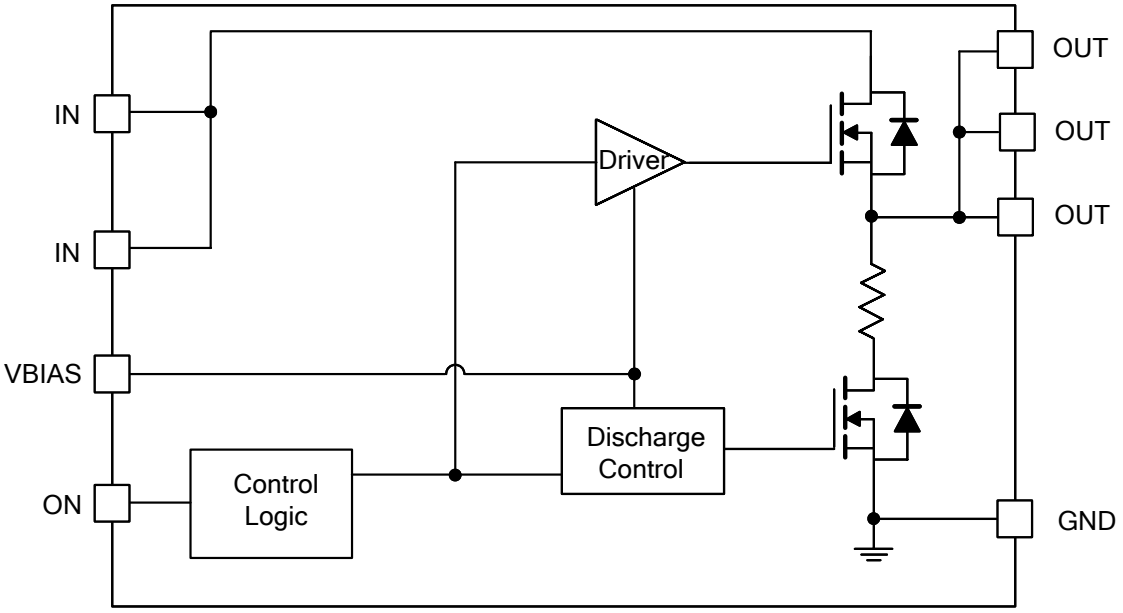
TDFN3X3-8



Pin Description

PIN	NAME	FUNCTION
1, 2, thermal pad	IN	Load Switch Input. Bypass capacitor is recommended to minimize input voltage dip. Recommended voltage range of this pin is 0.7V to V_{BIAS}-1.5V to obtain optimal R_{ON}.
3	VBIAS	Bias voltage. Power supply input for the device. Recommended voltage range is 3.2V to 5.5V.
4	ON	Enable Input. Load switch is on when ON is pulled high. Load switch is off when ON is pulled low. Do not leave floating.
5	GND	Ground.
6,7,8	OUT	Load switch output

Block Diagram



Detailed Description

ON/OFF control

The G5027C is enabled when the ON pin is on active high with 1.2V or above voltage. The device is disabled when the ON pin voltage is 0.5V or lower. The ON input is compatible with both TTL and CMOS logic.

VBIAS Voltage Range

For optimal on-resistance of load switch, make sure $V_{IN} \leq V_{BIAS}$-1.5V and V_{BIAS} is within the voltage range from 3.2V to 5.5V. On-resistance of load switch will be higher if V_{IN}+1.5V>V_{BIAS}. Resistance vs. V_{IN} curves of a typical sample device with different V_{BIAS}=5.5V or 3.2V at I_{OUT}=-500mA are shown as above.

Application Information

The basic G5027C application circuit is shown in the first page. Component selection is explained below.

Input Capacitor

A capacitor of 1μF or higher value is recommended to be place close to the IN pins of G5027C. This capacitor can reduce the voltage drop caused by the in-rush current during the turn-on transient of the load switch. A higher value capacitor can be used to further reduce the voltage drop during high-current application.

Output Capacitor

A capacitor of 0.1μF or higher value is recommended to be place between the OUT pins and GND. The switching times are affected by the capacitance. A large capacitor makes the initial turn-on transient smoother. This capacitor must be large enough to supply a fast transient load in order to prevent the output from dropping.

Thermal Considerations

To ensure proper operation, the maximum junction temperature of the G5027C should not exceed 150°C. Several factors attribute to the junction temperate rise: load current MOSFET on-resistance, junction-to-ambient thermal resistance, and ambient temperature. The maximum load current can be determined by:

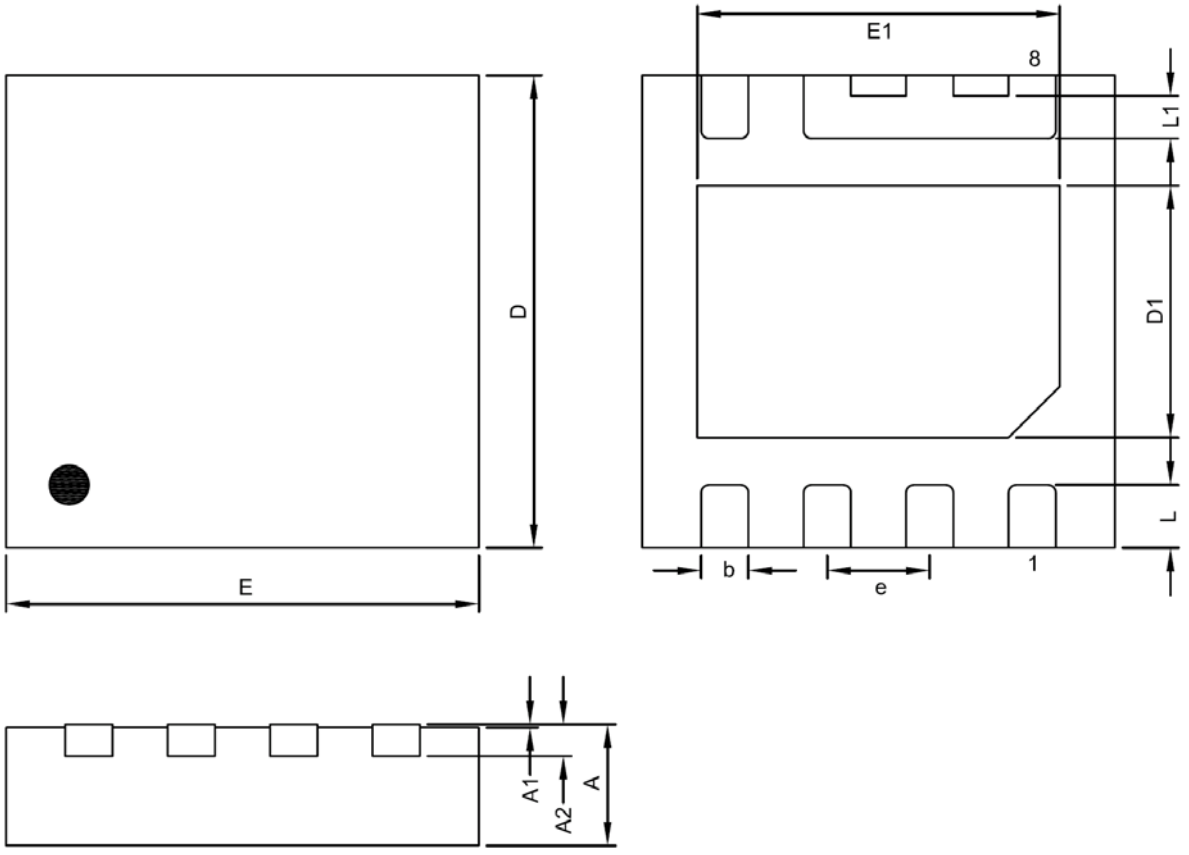
It is noted that the maximum continuous load current is 6A.

Layout Guidelines

Good PCB is important for improving the thermal performance of G5027C. Place the input and output bypass capacitors close to the IN and OUT pins. The input and output PCB traces should be as wide as possible for the given PCB space. Use a ground plane to enhance the power dissipation capability of the device.

Fae Tel:13925219291

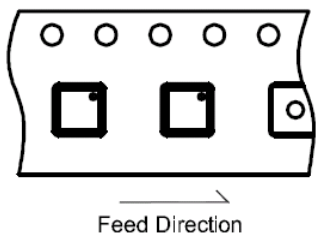
Package Information



TDFN3X3-8 Package

Symbol	DIMENSION IN MM			DIMENSION IN INCH		
	MIN.	NOM.	MAX.	MIN.	NOM.	MAX.
A	0.70	0.75	0.80	0.0276	0.0295	0.0315
A1	0.00	---	0.05	0.0000	---	0.0020
A2		0.20 REF			0.0079 REF	
D	2.95	3.00	3.05	0.1161	0.1181	0.1201
E	2.95	3.00	3.05	0.1161	0.1181	0.1201
D1	1.50	1.60	1.70	0.0591	0.0630	0.0670
E1	2.30	2.40	2.50	0.0906	0.0945	0.0984
b	0.25	0.30	0.35	0.0098	0.0118	0.0138
e		0.65 BSC			0.0256 BSC	
L	0.30	0.40	0.50	0.0118	0.0157	0.0197
L1		0.25 REF			0.0079 REF	

Taping Specification



PACKAGE	Q'TY/REEL
TDFN3X3-8	3,000 ea