

Single Low Ron Load Switch With Soft Start

Features

- V_{BIAS} Operating Voltage: 2.7V to 5.5V.
- Support VIN Range: 0.95V to V_{BIAS} .
- Fast Turn On time
 $25\mu s$, $C_{SS}=0.1nF$, $CL=1\mu F$ @100mA
 $110\mu s$, $C_{SS}=0.5nF$, $CL=1\mu F$ @100mA
- Low $R_{DS(ON)}=20m\Omega$ @ $V_{BIAS}=5V$, $V_{IN}=1V$
- Logic level ON pin capable of supporting 0.95V CMOS Logic
- Discharged Resistor when OFF
- ADFN1.0x1.6- 8L package (2 fused pins for IN and 2 fused pins for OUT)

Applications

- Fast Turn ON/OFF power rail switching with big Capacitor loading.
- Frequent wake & sleep power cycle.
- Mobile device and portable devices.

General Description

The G5029 is a 20mΩ 2.5A Single-channel load switch with configurable slew rate control. The device can enable fast power rail turn on with big cap loading. Internal circuit limits max inrush current to prevent device damage.

In the G5029, a 150Ω on-chip load resistor is added for quick output discharge resistor when the switch is turned off. The rise time of the device is internally controlled in order to avoid in-rush current and can be adjusted using a ceramic capacitor on the SS pin.

The G5029 is available in ADFN1.0x1.6-8 package.

Ordering Information

| ORDER NUMBER | MARKING | TEMP. RANGE | PACKAGE (Green) |
|--------------|---------|---------------|-----------------|
| G5029AR1U | 59x | -40°C to 85°C | ADFN1.0X1.6-8 |

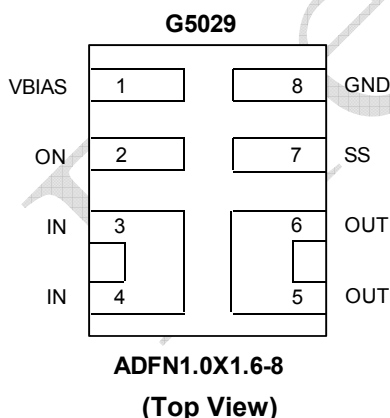
Note: AR: ADFN1.0X1.6-8

1: Bonding Code

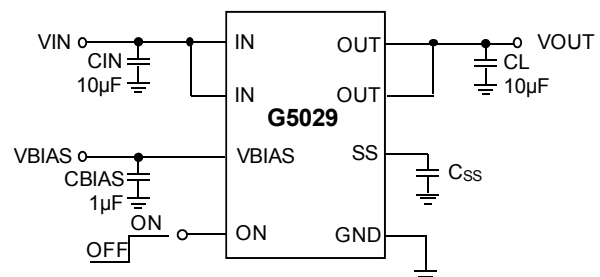
U: Tape & Reel

Green : Lead Free / Halogen Free

Pin configuration



Application circuit



Absolute Maximum Ratings

| | |
|---|--------------|
| VBIAS, EN, IN, OUT to GND | -0.3V to +6V |
| SS to IN | -0.3V to +6V |
| Continuous Switch Current (I _{MAX}) | 2.5A |
| Junction Temperature | 150°C |
| Thermal Resistance Junction to Ambient, (θ_{JA}) | |
| ADFN-1.0X1.6-8 | TBD°C/W |
| Continuous Power Dissipation (T _A =25°C) | |
| ADFN-1.0X1.6-8 | TBD W |

| | |
|--|----------------|
| Thermal Resistance of junction to case (θ_{JC}) | |
| ADFN-1.0X1.6-8 | TBD°C/W |
| Package Power Dissipation (W _{DIS}) | TBD W |
| Storage Temperature (T _S) | -65°C to 150°C |
| Reflow Temperature (soldering, 10sec) | 260°C |
| ESD (HBM) | 2KV |
| ESD (CDM) | 1KV |

Note: Stresses greater than those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. This is a stress rating only and functional operation of the device at these or any other conditions above those indicated in the operational sections of this specification is not implied. Exposure to absolute maximum rating conditions for extended periods may affect reliability.

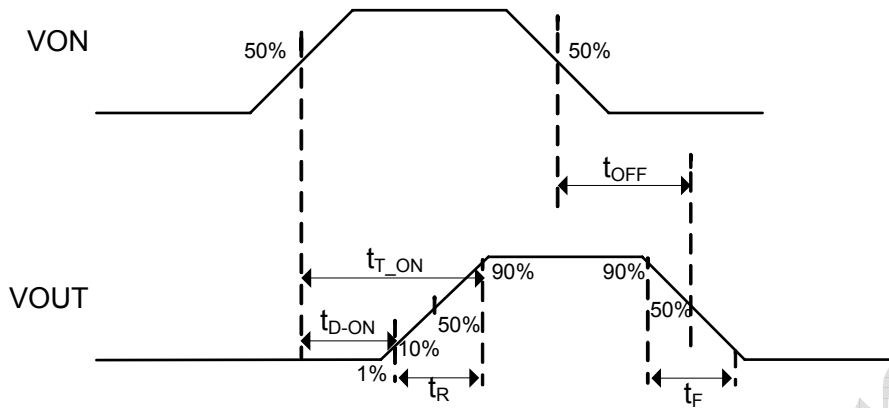
Electrical Characteristics

T_A =25°C (unless otherwise stated)

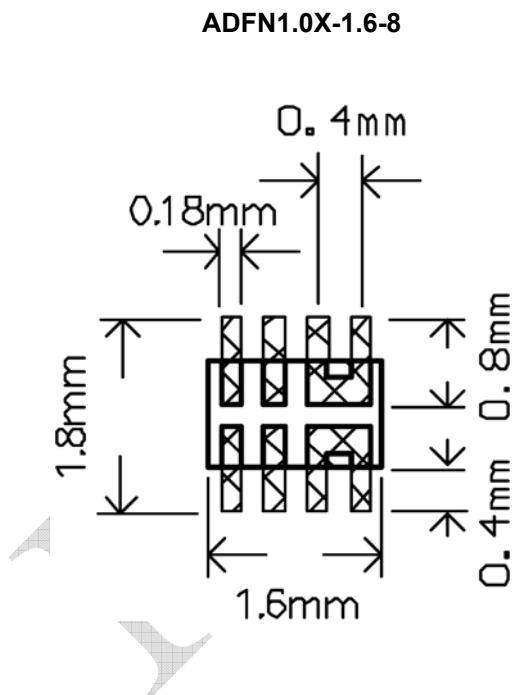
The device is not guaranteed to function outside its operating conditions. Parameters with MIN and/or MAX limits are 100% tested at +25°C, unless otherwise specified.

| DESCRIPTION | SYMBOL | CONDITIONS | MIN | TYP | MAX | UNITS |
|---------------------------------------|--------------------|---|------|-----|-------------------|-------|
| Power supply Voltage | V _{BIAS} | | 2.7 | --- | 5.5 | V |
| Power supply Current(PIN1) | I _{VBIAS} | When OFF | --- | --- | 1 | μA |
| | | When ON, No Load | --- | --- | 50 | μA |
| Static IN to OUT ON Resistance. | RDS _{ON} | V _{BIAS} =5V, V _{IN} =1.05V, RL=0.5Ω | --- | 20 | --- | mΩ |
| Operating Current | I _{VIN} | V _{IN} =1V to V _{BAIS} | --- | --- | 2.5 | A |
| Input Voltage Range | V _{IN} | | 0.95 | --- | V _{BAIS} | V |
| ON Delay Time Internal Logic Delay | t _{D_ON} | 50% ON to 10% V _{OUT} , V _{BIAS} =5V, V _{IN} =1.05V, C _{SS} =0.1nF | --- | 10 | --- | μs |
| | | 50% ON to 10% V _{OUT} , V _{BIAS} =5V, V _{IN} =1.05V, C _{SS} =0.5nF | --- | 32 | --- | μs |
| Total Turn On Time | t _{T_ON} | 50% ON to 90% V _{OUT} , V _{BIAS} =5V, V _{IN} =1.0V, CL=1μF, Load=100mA, C _{SS} =0.1nF | --- | 25 | --- | μs |
| | | 50% ON to 90% V _{OUT} , V _{BIAS} =5V, V _{IN} =1.0V, CL=10μF, Load=2.5A, C _{SS} =0.5nF | --- | 110 | --- | μs |
| High input Voltage on ON pin | ON V _{IH} | | 0.95 | --- | --- | V |
| Low input Voltage on ON pin | ON V _{IL} | | --- | --- | 0.3 | V |
| Discharge Resistance | RDIS | | --- | 150 | --- | Ω |
| Thermal protection Shutoff | THERM_OFF | Automatic shutoff temperature | --- | 145 | --- | °C |

Switching Characteristics

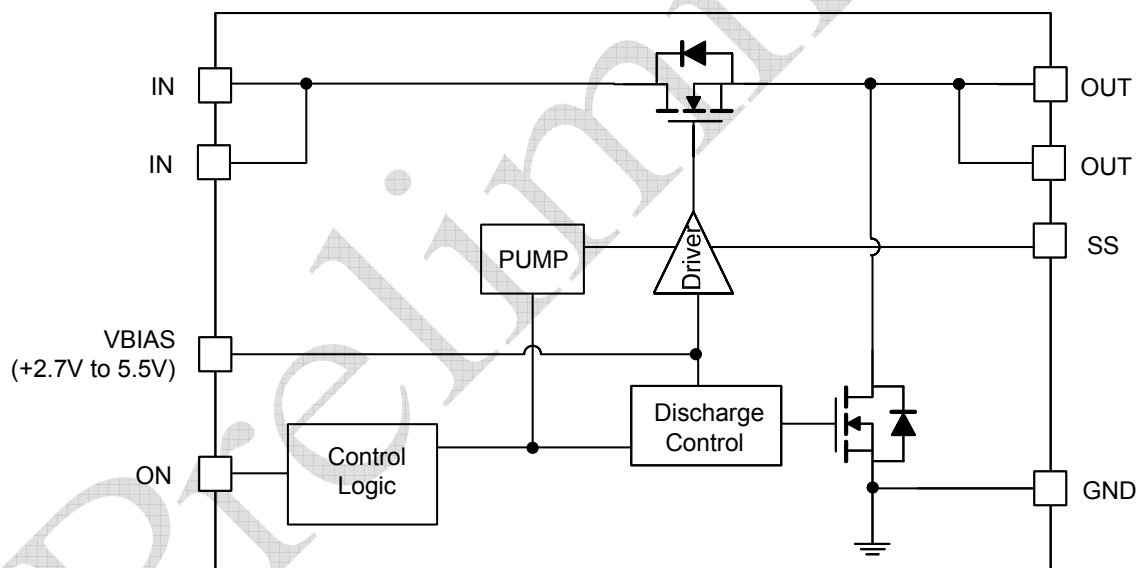


Minimum Footprint PCB Layout Section



Pin Description

| PIN | PIN NAME | TYPE | FUNCTION |
|-----|----------|--------|---|
| 1, | VBIAS | PWR | VBAIS power for load switch control(2.7V to 5.5V). |
| 2 | ON | Input | Turn MOSFET ON or OFF (4MΩ pull down resistor). CMOS input with ON_VIL<0.3V for OFF, ON_VIH>0.95V for ON |
| 3 | IN | MOSFET | Input terminal, Drain of Power MOSFET (fused with pin 4) |
| 4 | IN | MOSFET | Input terminal, Drain of Power MOSFET (fused with pin 3) |
| 5 | OUT | MOSFET | Output terminal, Source of Power MOSFET (fused with pin 6) |
| 6 | OUT | MOSFET | Output terminal, Source of Power MOSFET (fused with pin 5) |
| 7 | SS | CAP | Soft start cap, C _{SS} can set V _{OUT} ramp |
| 8 | GND | GND | Ground |

Block Diagram


Detailed Description

ON/OFF Control

The G5029 is enabled when the ON pin is on active high with 0.95V or above voltage. The device is disabled when the ON pin voltage is 0.3V or lower. The ON input is compatible with both TTL and CMOS logic.

VBIAS Voltage Range

For optimal $R_{DS(on)}$ performance, make sure $V_{IN} \leq V_{BIAS}$. The device will still be functional if $V_{IN} > V_{BIAS}$ but it will exhibit $R_{DS(on)}$ greater than what is listed in the Electrical characteristics table. Notice the increasing $R_{DS(on)}$ as V_{IN} exceeds V_{BIAS} voltage. Be sure to never exceed the maximum voltage rating for V_{IN} and V_{BIAS} .

Application Information

The basic G5029 application circuit is shown in the first page. Component selection is explained below.

Input Capacitor

A capacitor of 10 μ F or higher value is recommended to be placed close to the IN pins of G5029. 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 10 μ F or higher value is recommended to be placed 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.

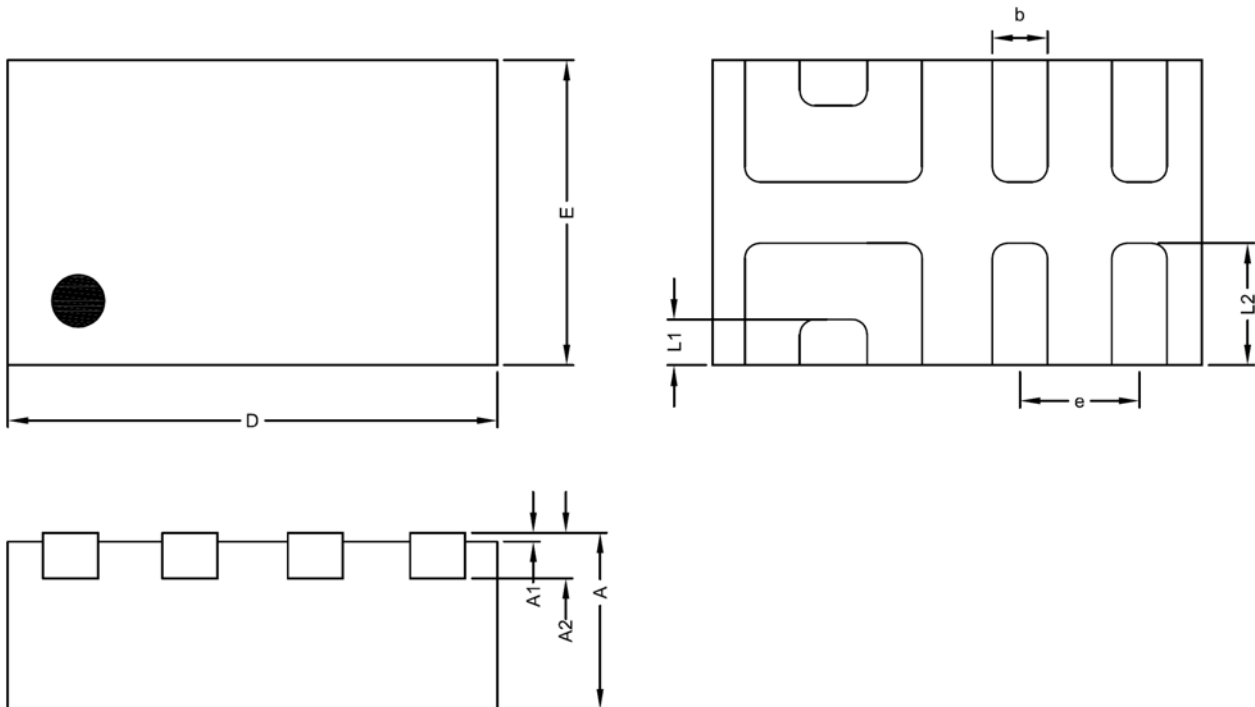
Thermal Considerations

To ensure proper operation, the maximum junction temperature of the G5029 should not exceed 145°C. Several factors attribute to the junction temperature rise: load current, MOSFET on-resistance, junction-to-ambient thermal resistance, and ambient temperature. The maximum load current can be determined by:

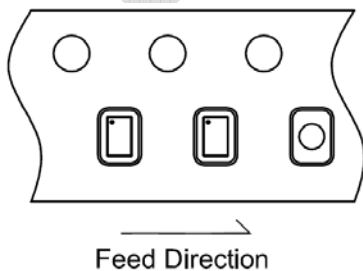
It is noted that the maximum continuous load current is 3A.

Layout Guidelines

Good PCB is important for improving the thermal performance of G5029. 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.

Package Information

ADFN1.0X1.6-8 Package

| Symbol | DIMENSION IN MM | | | DIMENSION IN INCH | | |
|--------|-----------------|------|------|-------------------|--------|--------|
| | MIN. | NOM. | MAX. | MIN. | NOM. | MAX. |
| A | 0.50 | 0.55 | 0.60 | 0.0197 | 0.0217 | 0.0236 |
| A1 | 0.00 | --- | 0.06 | 0.0000 | --- | 0.0024 |
| A2 | 0.15 REF | | | 0.0059 REF | | |
| D | 1.55 | 1.60 | 1.65 | 0.0610 | 0.0630 | 0.0650 |
| E | 0.95 | 1.00 | 1.05 | 0.0374 | 0.0394 | 0.0413 |
| b | 0.13 | 0.18 | 0.23 | 0.0051 | 0.0071 | 0.0091 |
| e | 0.40 BSC | | | 0.0157 BSC | | |
| L1 | 0.10 | 0.15 | 0.20 | 0.0039 | 0.0059 | 0.0079 |
| L2 | 0.35 | 0.40 | 0.45 | 0.0138 | 0.0157 | 0.0177 |

Taping Specification


| PACKAGE | Q'TY/BY REEL |
|---------------|--------------|
| ADFN1.0X1.6-8 | 3,000 ea |