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_{BAIS}.**
- **Fast Turn On time**
  25μs, C_{SS}=0.1nF, CL=1μF @100mA
  110μs, C_{SS}=0.5nF, CL=1μF @100mA
- **Low RDS_{ON} =20mΩ @ V_{BAIS}=5V, VIN=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.

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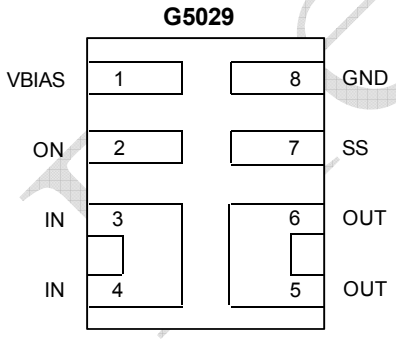
Ordering Information

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

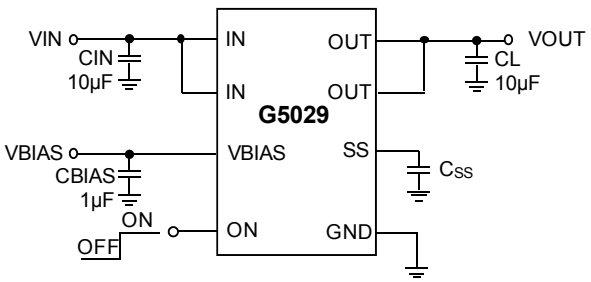
Pin configuration



ADFN1.0X1.6-8

(Top View)

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.

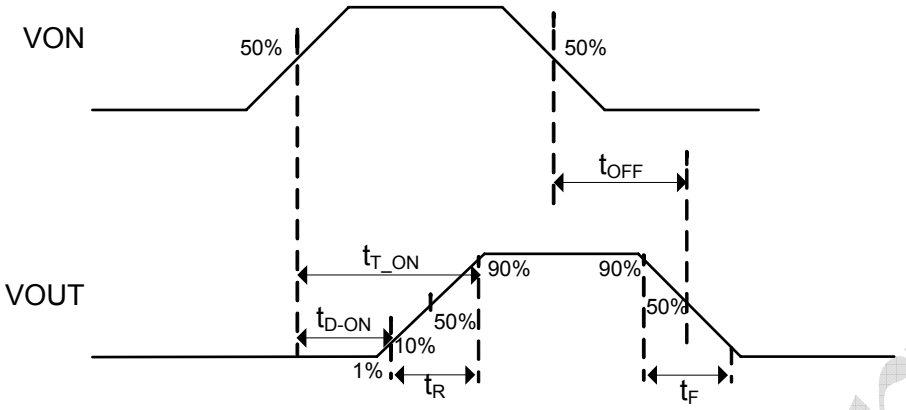
Electrical Characteristics

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.

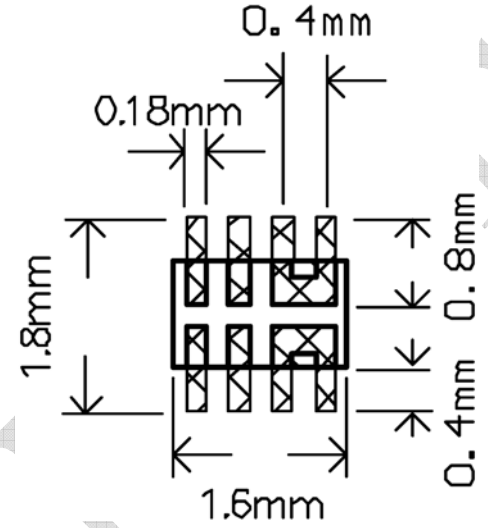
DESCRIPTION	SYMBOL	CONDITIONS	MIN	TYP	MAX	UNITS
Power supply Voltage	V_{BIAS}		2.7	---	5.5	V
Power supply Current(PIN1)	I_{VBIAS}	When OFF	---	---	1	μA
		When ON, No Load	---	---	50	μA
Static IN to OUT ON Resistance.	RDS_{ON}	V_{BIAS}=5V, V_{IN} =1.05V, RL=0.5Ω	---	20	---	mΩ
Operating Current	I_{VIN}	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

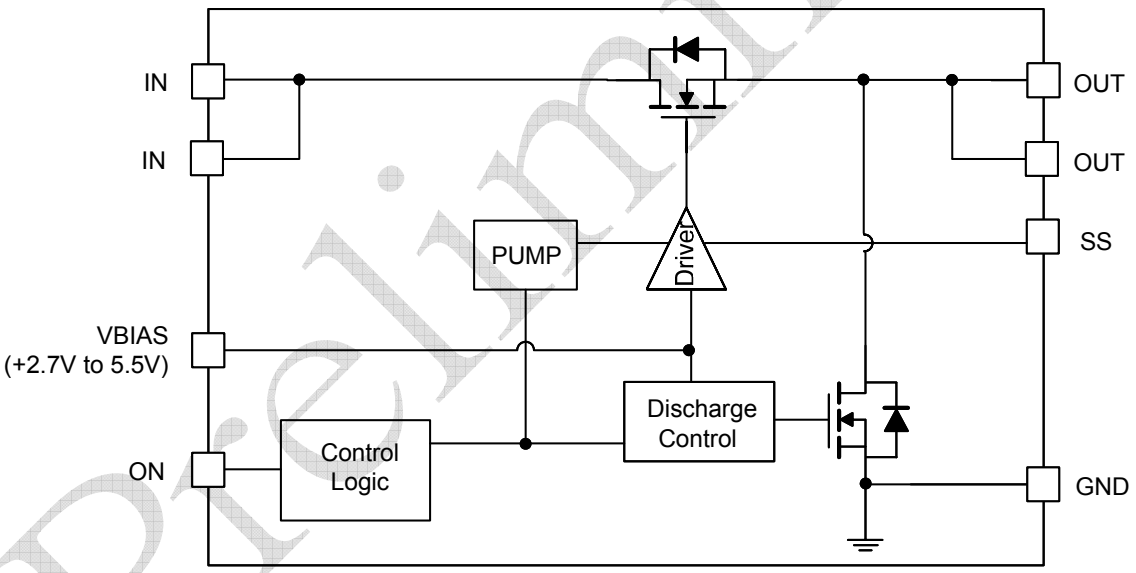
ADFN1.0X-1.6-8



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 VOUT 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 $V_{IN} \leqq V_{BIAS}$. 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 blew.

Input Capacitor

A capacitor of 10 μF or higher value is recommended to be place 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 10μF 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

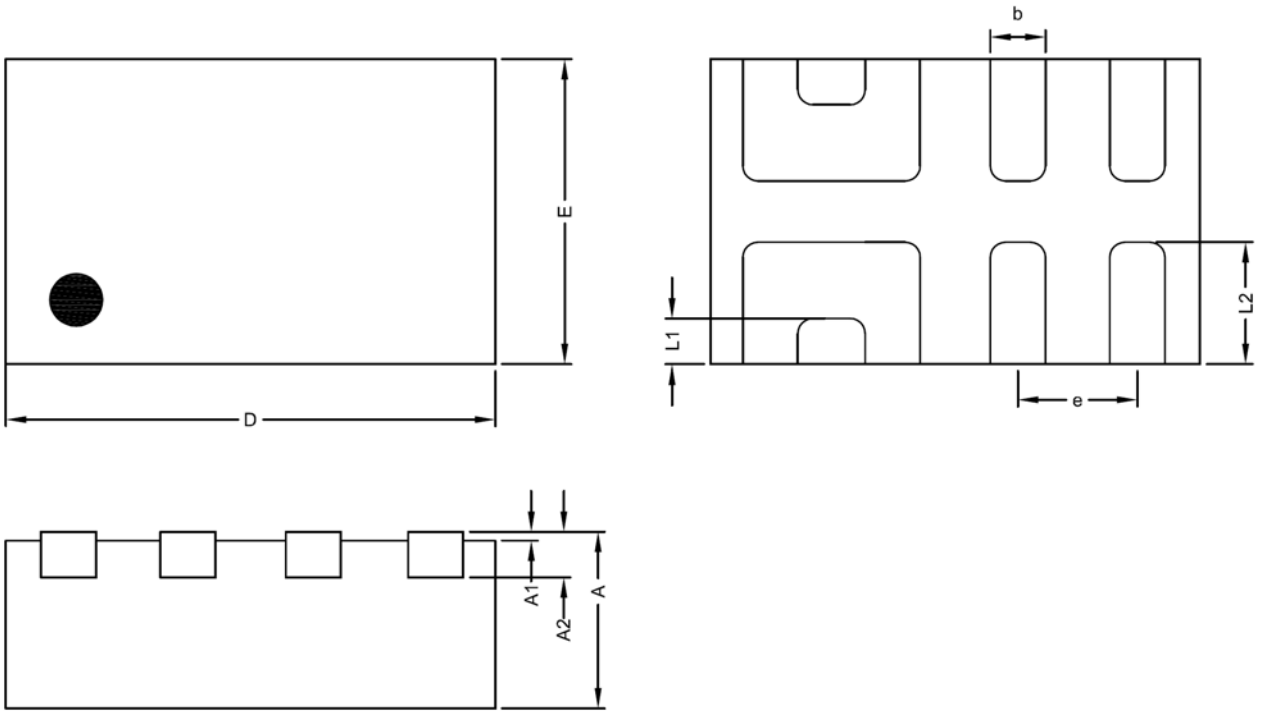
To ensure proper operation, the maximum junction temperature of the G5029 should not exceed 145°C. Several factors attribute to the junction temperate rise: load current MOSFET on-resistance, junction-to-ambient thermal resistance, and ambient temperature. The maximum load current can be determined by:

It is noted that the maximum continuous load current is 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.

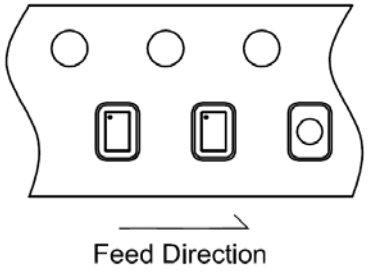
Package Information



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