Chipsmall Limited consists of a professional team with an average of over 10 year of expertise in the distribution of electronic components. Based in Hongkong, we have already established firm and mutual-benefit business relationships with customers from,Europe,America and south Asia,supplying obsolete and hard-to-find components to meet their specific needs.

With the principle of “Quality Parts,Customers Priority,Honest Operation,and Considerate Service”,our business mainly focus on the distribution of electronic components. Line cards we deal with include Microchip,ALPS,ROHM,Xilinx,Pulse,ON,Everlight and Freescale. Main products comprise IC,Modules,Potentiometer,IC Socket,Relay,Connector.Our parts cover such applications as commercial,industrial, and automotives areas.

We are looking forward to setting up business relationship with you and hope to provide you with the best service and solution. Let us make a better world for our industry!

Contact us

Tel: +86-755-8981 8866 Fax: +86-755-8427 6832
Email & Skype: info@chipsmall.com Web: www.chipsmall.com
Address: A1208, Overseas Decoration Building, #122 Zhenhua RD., Futian, Shenzhen, China

International
IOR Rectifier

Data Sheet No. PD 60069-H

IRSF3031 (NOTE: For new designs, we recommend IR's new products IPS021 and IPS021L)

FULLY PROTECTED POWER MOSFET SWITCH

Features

- Controlled slew rate reduces EMI
- Over temperature protection
- Over current protection
- Active drain-to-source clamp
- ESD protection
- Lead compatible with standard Power MOSFET
- Low operating input current
- Monolithic construction
- Dual set/reset threshold input

Description

The IRSF3031 is a three-terminal monolithic Smart Power MOSFET with built-in short circuit, over-temperature, ESD and over-voltage protections and dual set/reset input threshold .

The on-chip protection circuit latches off the Power MOSFET in case the drain current exceeds 4A (typical) or the junction temperature exceeds 165°C (typical) and keeps it off until the input is driven below the Reset Threshold voltage.

The drain to source voltage is actively clamped at 55V prior to the avalanche of the Power MOSFET, thus improving its performance during turn-off with inductive loads.

The input requirements are very low (100µA typical) which makes the IRSF3031 compatible with most existing designs based on standard power MOSFETs.

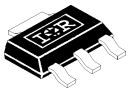
Product Summary

$V_{ds(clamp)}$	50 V
$R_{ds(on)}$	200 mΩ
$I_{ds(sd)}$	4 A
$T_{j(sd)}$	165°C
E_{AS}	200 mJ

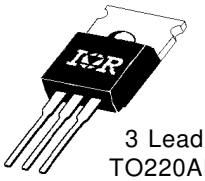
Applications

- Solenoid Driver
- DC Motor Driver
- Programmable Logic Controller

Packages

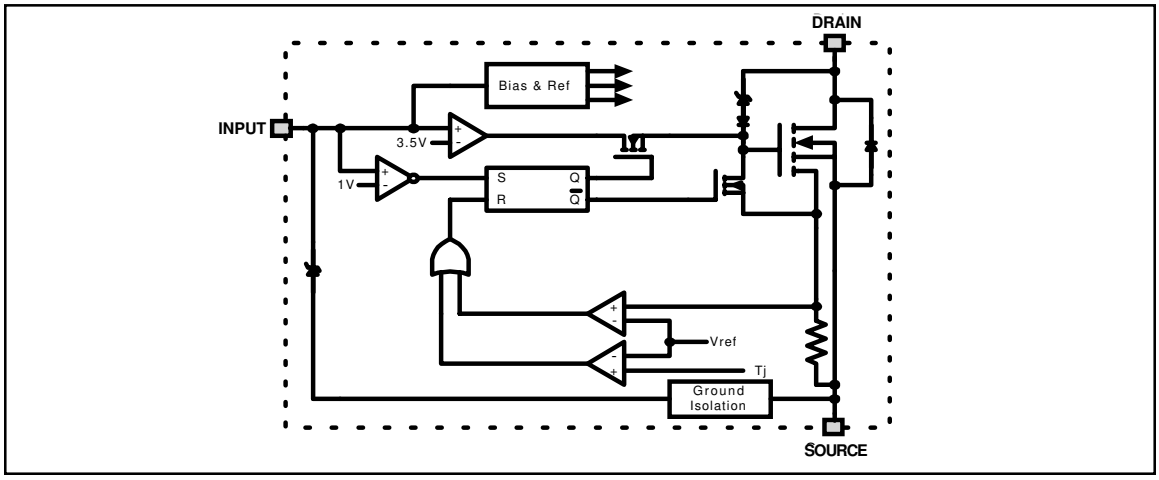


3 Lead
SOT-223



3 Lead
TO220AB

Block Diagram



Absolute Maximum Ratings

Absolute Maximum Ratings indicate sustained limits beyond which damage to the device may occur. (T_c = 25°C unless otherwise specified.)

Symbol	Parameter	Min.	Max.	Units	Test Conditions
$V_{ds,\ max}$	Continuous drain to source voltage	—	50	V	
$V_{in,\ max}$	Continuous input voltage	-0.3	10		
I_{ds}	Continuous drain current	—	self limited	A	
P_d	Power dissipation	—	30	W	$T_C \leq 25°C$, TO220
		—	3.0	W	$T_C \leq 25°C$, SOT223
EAS	Unclamped single pulse inductive energy②	—	200	mJ	
V_{esd1}	Electrostatic discharge voltage (Human Body Model)	—	4000	V	100pF. 1.5kΩ
V_{esd2}	Electrostatic discharge voltage (Machine Model)	—	1000		200pF, 0Ω
T_{Jop}	Operating junction temperature range	-55	150	°C	
T_{Stg}	Storage temperature range	-55	150		
T_L	Lead temperature (soldering, 10 seconds)	—	300		

Static Electrical Characteristics

(T_c = 25°C unless otherwise specified.)

Symbol	Parameter	Min.	Typ.	Max.	Units	Test Conditions
$V_{ds,clamp}$	Drain to source clamp voltage	50	56	65	V	I_{ds} = 2A
$R_{ds(on)}$	Drain to source on resistance	—	155	200	mΩ	V_{in} = 5V, I_{ds} = 2A
I_{dss}	Drain to source leakage current	—	—	250	µA	V_{ds} = 40V, V_{in} = 0V
V_{set}	Input threshold voltage	2.5	3.2	4.0	V	V_{ds} = 5V, I_{ds} > 10mA
V_{reset}	Input protection reset threshold voltage	0.5	1.0	1.5	V	V_{ds} = 5V, I_{ds} < 10µA
$I_{i,on}$	Input supply current (normal operation)	—	100	300	µA	V_{in} = 5V
$I_{i,off}$	Input supply current (protection mode)	—	120	400	µA	V_{in} = 5V
$V_{in,\ clamp}$	Input clamp voltage	9	10	—	V	I_{in} = 1mA
V_{sd}	Body-drain diode forward drop③	—	1.5	—	V	I_{ds} = -2A, R_{in} = 1kΩ

Thermal Characteristics

Symbol	Parameter	Min.	Typ.	Max.	Units	Test Conditions
R_{thjc}	Thermal resistance, junction-to-case	—	—	4	°C/W	TO-220AB
R_{thja}	Thermal resistance, junction-to-ambient	—	—	60		
R_{thjc}	Thermal resistance, junction-to-case	—	—	40	°C/W	SOT-223
R_{thja}	Thermal resistance, junction-to-PCB ①	—	—	60		

NOTES:

① When mounted on a 1" square PCB (FR-4 or G10 material). For recommended footprint and soldering techniques, refer to International Rectifier Application Note AN-994.

② E_{AS} is tested with a constant current source of 6A applied for 700µS with V_{in} = 0V and starting T_j = 25°C.

③ Input current must be limited to less than 5mA with a 1kΩ resistor in series with the input when the Body-Drain Diode is forward biased.

Switching ElectricalCharacteristics

(V_{CC} = 14V, resistive load (R_L) = 10Ω, R_{in}= 100Ω. Specifications measured at T_C= 25°C unless otherwise specified.)

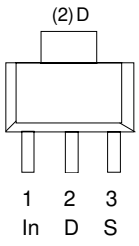
Symbol	Parameter	Min.	Typ.	Max.	Units	Test Conditions
t_{don}	Turn-on delay time	—	—	30	µs	V_{in} = 2V to 5V, 50% to 90%
t_r	Rise time	—	—	30		V_{in} = 2V to 5V, 90% to 10%
t_{doff}	Turn-off delay time	—	—	30		V_{in} = 5V to 2V, 50% to 10%
t_r	Fall time	—	—	30		V_{in} = 5V to 2V, 10% to 90%
SR	Output positive slew rate	-6	—	6	V/µs	V_{in} = 2V to 5V, +dVds/dt
SR	Output negative slew rate	-6	—	6		V_{in} = 5V to 2V, -dVds/dt

Protection Characteristics

(T_C= 25°C unless otherwise specified.

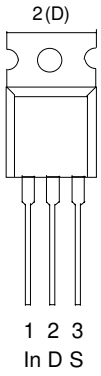
Symbol	Parameter	Min.	Typ.	Max.	Units	Test Conditions
$I_{ds(sd)}$	Current limit	1.8	4	6	A	Vin = 5V
$T_{j(sd)}$	Over temperature shutdown threshold	155	165	—	°C	Vin = 5V, Ids = 2A
$V_{protect}$	Min. input voltage for over-temp function	—	3	—	V	
t_{Iresp}	Over current response time	—	TBD	—	µs	
I_{peak}	Peak short circuit current	—	TBD	—	A	
t_{reset}	Protection reset time	—	TBD	—	µs	
t_{Tresp}	Over-temperature response time	—	TBD	—		

Lead Assignments



3 Lead - SOT223

IRSF3031L

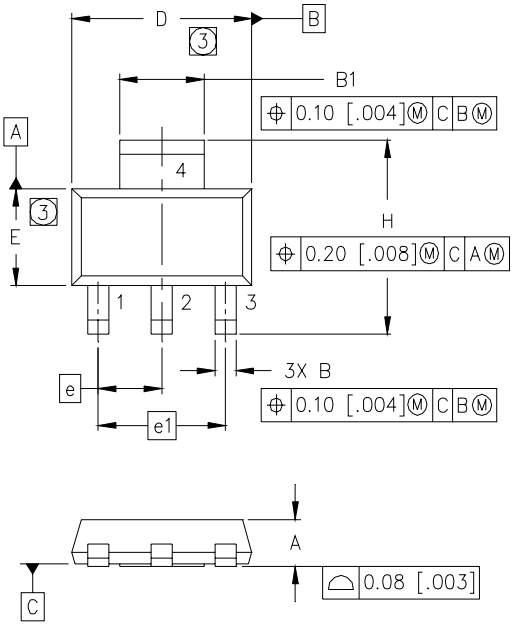


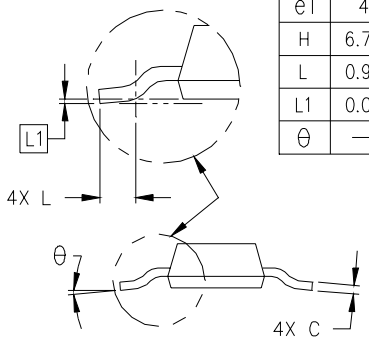
3 Lead - TO220

IRSF3031

Part Number

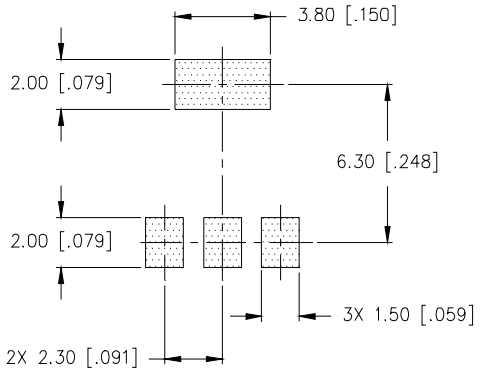
Case Outline - SOT-223





DIM	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	1.55	1.80	.061	.071
B	0.65	0.85	.026	.033
B1	2.95	3.15	.116	.124
C	0.25	0.35	.010	.014
D	6.30	6.70	.248	.264
E	3.30	3.70	.130	.146
e	2.30 BSC		.0905 BSC	
e1	4.60 BSC		.181 BSC	
H	6.71	7.29	.264	.287
L	0.91	—	.036	—
L1	0.061 BSC		.0024 BSC	
θ	—	10°	—	10°

MINIMUM RECOMMENDED FOOTPRINT



LEAD ASSIGNMENTS

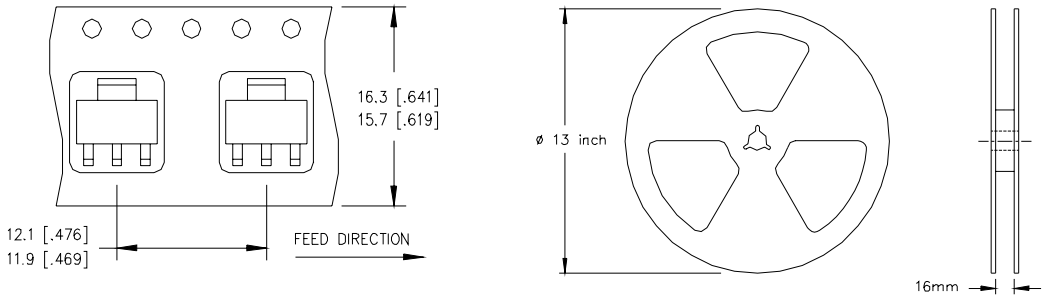
1 = GATE
2 = DRAIN
3 = SOURCE

NOTES:

1. DIMENSIONING & TOLERANCING PER ASME Y14.5M–1994.
2. CONTROLLING DIMENSION: INCH.
3. DIMENSIONS DO NOT INCLUDE MOLD FLASH.
4. OUTLINE CONFORMS TO JEDEC OUTLINE TO–261AA.
5. DIMENSIONS ARE SHOWN IN MILLIMETERS [INCHES].

(TO-261AA) 01-0022 05

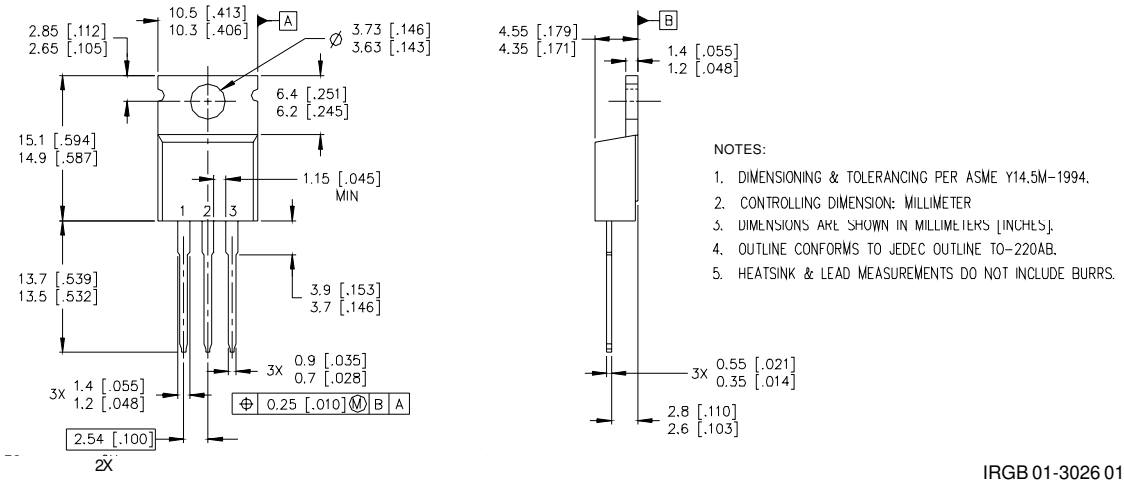
Tape & Reel - SOT223



NOTES:
1. CONTROLLING DIMENSION: MILLIMETER.
2. ALL DIMENSIONS ARE SHOWN IN MILLIMETERS [INCHES].
3. OUTLINE CONFORMS TO EIA-481 & EIA-541.
4. EACH ø 330.00 [ø 13.00] REEL CONTAINS 2,500 DEVICES.

01-0028 05 / 01-0008 02

Case Outline 3 Lead - TO220



NOTES:
1. DIMENSIONING & TOLERANCING PER ASME Y14.5M-1994.
2. CONTROLLING DIMENSION: MILLIMETER
3. DIMENSIONS ARE SHOWN IN MILLIMETERS [INCHES].
4. OUTLINE CONFORMS TO JEDEC OUTLINE TO-220AB.
5. HEATSINK & LEAD MEASUREMENTS DO NOT INCLUDE BURRS.

IRGB 01-3026 01

International
IOR Rectifier

IR WORLD HEADQUARTERS: 233 Kansas St., El Segundo, California 90245 Tel: (310) 252-7105
IR EUROPEAN REGIONAL CENTRE: 439/445 Godstone Rd, Whyteleafe, Surrey CR3 0BL, United Kingdom
Tel: ++44 (0) 20 8645 8000
IR JAPAN: K&H Bldg., 2F, 30-4 Nishi-Ikebukuro 3-Chome, Toshima-Ku, Tokyo, Japan 171-0021 Tel: 81 (0) 33 983 0086
IR HONG KONG: Unit 308, #F, New East Ocean Centre, No. 9 Science Museum Road, Tsimshatsui East, Kowloon, Hong Kong Tel: (852) 2803-7380

Data and specifications subject to change without notice. 4/11/2000

Note: For the most current drawings please refer to the IR website at:
http://www.irf.com/package/