

INTELLIGENT HIGH SIDE MOSFET POWER SWITCH

Features

- Current limit for short circuit protection
- Over-temperature protection
- Active output negative clamp
- Reverse battery protection for logic circuit
- Broken ground protection
- Short to V_{CC} protection
- Low noise charge pump
- Sleep mode supply current
- 4kV ESD protection on all leads
- Logic ground isolated from power ground

General Description

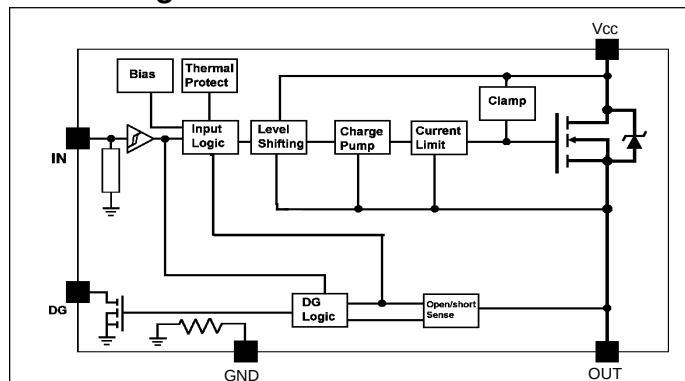
The IR6226 is a 5 terminal monolithic HIGH SIDE SWITCH with built in short circuit, over- temperature, ESD protections, inductive load turn off capability and diagnostic feedback.

The on-chip protection circuit limits the average current during short circuit if the drain current exceeds 20A. The protection circuit latches off the high side switch if the junction temperature exceeds 170°C and latches on after the junction temperature falls by 10°C. The V_{CC} (drain) to OUT (source) voltage is actively clamped at 55V, improving its performance during turn off with inductive loads.

The on-chip charge pump high side driver stage is floating and referenced to the source of the Power MOSFET. Thus the logic to power ground isolation can be as high as 50V. This allows operation with larger offset as well as controlling the switch during load energy recirculation or regeneration.

A diagnostic pin is provided for status feedback of short circuit, over temperature and open load detection.

Block Diagram



Product summary

$V_{CC(op)}$	5-50V
$R_{DS(on)}$	100mΩ
I_{lim}	20A
$T_{j(sd)}$	170°C
E_{av}	200mJ

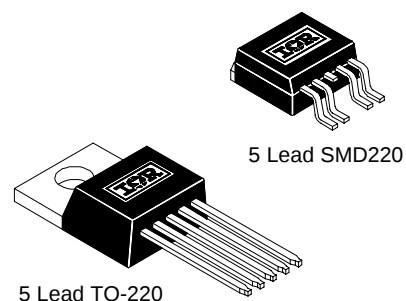
Applications

- Lamp driver
- Programmable logic controller

Truth Table

Condition	In	Out	Dg
Normal	H	H	H
Normal	L	L	L
Output Open	H	H	H
Output Open	L	H	H
Shorted Output	H	Current-Limiting Linear Mode	L
Shorted Output	L	L	L
Over-Temperature	H	L	L
Over-Temperature	L	L	L

Available Packages



Absolute Maximum Ratings

Absolute Maximum Ratings indicate sustained limits beyond which damage to the device may occur.
($T_C = 25^\circ\text{C}$ unless otherwise specified.)

Symbol	Parameter	Min.	Max.	Units	Test Conditions
V _{cc}	Supply voltage permanent	-0.3	50	V	For 10 seconds, (1)
	reverse	-16	—		
V _{offset}	Logic to power ground offset	V _{cc} -50	V _{cc} +0.3		
V _{in}	Input voltage	-0.3	30		
I _{in}	Input current	—	10	mA	
V _{out}	Output voltage	V _{cc} -50	V _{cc} +0.3	V	
I _{out}	Output current	—	self-limited	A	
V _{dg}	Diagnostic output voltage	-0.3	30	V	
I _{dg}	Diagnostic output current	—	10	mA	
E _{av}	Repetitive avalanche energy	—	200	mJ	I = 2A (2)
ESD1	Electrostatic discharge (Human Body Model)	—	4000	V	C = 100 pF, R = 1500Ω
ESD2	Electrostatic discharge (Machine Model)	—	1000	V	C = 200 pF, R = 0Ω
PD	Power dissipation	—	28	W	T _{case} = 25°C
T _{Jop}	Operating junction temperature range	-40	150	°C	
T _{Stg}	Storage temperature range	-40	150		
T _L	Lead temperature (soldering, 10 seconds)	—	300		

NOTES: (1) with 15kΩ resistors in input and diagnostic

(2) maximum frequency depends on heatsink (rectangular waveform)

Static Electrical Characteristics

($T_C = 25^\circ\text{C}$ unless otherwise specified.)

Symbol	Parameter	Min.	Typ.	Max.	Units	Test Conditions
V _{ccop}	Operating voltage range	5	—	35	V	
I _{ccoff}	Sleep mode supply current	—	40	—	μA	V _{cc} =24V, V _{in} = 0V
I _{ccon}	Supply current (average)	—	3	—	mA	V _{in} = 5V
I _{ccac}	Supply current (AC RMS)	—	20	—	μA	V _{in} = 5V
V _{ih}	High level input threshold voltage	—	2	2.5	V	
V _{il}	Low level input threshold voltage	1	1.8	—		
I _{ion}	On-state input current	10	—	70	μA	V _{in} = 3.5V
I _{ioff}	Off-state input current	1	—	30		V _{in} = 0.4V
I _{oh}	Output leakage current	—	20	—		V _{out} = 6V
I _{ol}	Output leakage current	0	—	10		V _{out} = 0V
V _{dgl}	Low level diagnostic output voltage	—	0.3	—	V	I _{dg} = 1.6mA
I _{dgh}	Diagnostic output leakage current	0	—	10	μA	V _{dg} = 5V
R _{DS(on)}	On-state resistance	—	80	100	mΩ	I _{out} = 1A
		—	120	—		V _{cc} = 5V, I _{out} = 1A

Switching Electrical Characteristics

($V_{CC} = 14V$, Resistive Load (R_L) = 12Ω , $T_C = 25^\circ C$.)

Symbol	Parameter	Min.	Typ.	Max.	Units	Test Conditions
t_{on}	Turn-on delay time to 90%	—	50	—	μs	
t_{off}	Turn-off delay time to 10%	—	60	—		
dv/dt_{on}	Slew rate on	—	3	—		
dv/dt_{off}	Slew rate off	—	5	—	$V/\mu s$	

Protection Characteristics

Symbol	Parameter	Min.	Typ.	Max.	Units	Test Conditions
I_{lim}	Internal current limit	—	20	—	A	
V_{sc}	Short circuit detection voltage	—	3.5	—		
V_{slh}	Open load detection voltage	—	3.5	—	V	
V_{cl1}	Output negative clamp	50	54	—		$I_{out} = 10mA$
V_{cl2}	Output negative clamp	—	56	62		$I_{out} = 2A$

Thermal Characteristics

Symbol	Parameter	Min.	Typ.	Max.	Units	Test Conditions
T_{jsd}	Thermal shutdown temperature	—	170	—	$^\circ C$	
T_{hys}	Thermal hysteresis	—	10	—		
R_{thjc}	Thermal resistance, junction to case	—	3.5	—	$^\circ C/W$	
R_{thja}	Thermal resistance, junction to ambient	—	50	—		

Lead Assignments

3 (Vcc) 1 2 3 4 5 5 Lead - TO-220	1 - Ground 2 - In 3 - Vcc 4 - DG 5 - Out	3 (Vcc) 1 2 3 4 5 5 Lead - D²PAK (SMD220)
IR6226		IR6226S
Part Number		

International
IOR Rectifier

Technical drawing of a JEDEC TS-001 package showing top and side views with dimensions in inches and millimeters.

Top View Dimensions:

- Overall width: 10.54 [.415]
- Distance from left edge to center: 9.91 [.390]
- Distance from center to right edge: 3.96 [.156]
- Distance from center to right edge (minimum): 3.53 [.139]
- Distance from top edge to center: 2.94 [.116]
- Distance from top edge to center (minimum): 2.54 [.100]
- Distance from center to bottom edge: 6.60 [.260]
- Distance from center to bottom edge (minimum): 6.00 [.236]
- Distance from left edge to pin 1: 15.87 [.625]
- Distance from left edge to pin 1 (minimum): 14.48 [.570]
- Distance from left edge to pin 5: 14.09 [.555]
- Distance from left edge to pin 5 (minimum): 13.59 [.535]
- Pin pitch: 1.70 [.067]
- Pin width: 5X
- Pin thickness: 1.01 [.040]
- Pin thickness (minimum): 0.51 [.020]
- Pin diameter: Φ 0.25 [.010]
- Pin material: B
- Pin finish: A
- Pin coating: C

Side View Dimensions:

- Overall height: 4.82 [.190]
- Distance from top edge to center: 4.19 [.165]
- Distance from top edge to center (minimum): 1.39 [.055]
- Distance from top edge to center (minimum): 0.89 [.035]
- Distance from bottom edge to center: 0.63 [.025]
- Distance from bottom edge to center (minimum): 0.31 [.012]
- Distance from bottom edge to center: 2.92 [.115]
- Distance from bottom edge to center (minimum): 2.16 [.085]

NOTES:

1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M-1994.
2. CONTROLLING DIMENSION: INCH.
3. ALL DIMENSIONS ARE SHOWN IN MILLIMETERS [INCHES].
4. OUTLINE SIMILAR TO JEDEC OUTLINE SERIES TS-001.

IRGB 01-3042 01

Technical drawing of a TRR (Thermally Resistant Resistor) showing top, side, and cross-sectional views with dimensions in millimeters and inches.

Top View:

- Overall width: 16.10 [.634]
- Overall height: 11.60 [.457]
- Distance from top edge to first hole center: 4.10 [.161]
- Distance from top edge to second hole center: 3.90 [.153]
- Distance from top edge to third hole center: 1.60 [.063]
- Distance from top edge to fourth hole center: 1.50 [.059]
- Distance from top edge to fifth hole center: 1.85 [.073]
- Distance from top edge to sixth hole center: 1.65 [.065]
- Distance from bottom edge to first hole center: 10.90 [.429]
- Distance from bottom edge to second hole center: 10.70 [.421]
- Distance from bottom edge to third hole center: 13.52 [.532]
- Distance from bottom edge to fourth hole center: 12.80 [.504]
- Distance from bottom edge to fifth hole center: 1.75 [.069]
- Distance from bottom edge to sixth hole center: 1.25 [.049]
- Feed direction: Indicated by an arrow pointing right.

Side View:

- Overall height: 24.30 [.957]
- Distance from top edge to first hole center: 0.368 [.0145]
- Distance from top edge to second hole center: 0.342 [.0135]
- Distance from top edge to third hole center: 15.42 [.609]
- Distance from top edge to fourth hole center: 15.22 [.601]
- Distance from top edge to fifth hole center: 23.90 [.941]
- Distance from top edge to sixth hole center: 23.90 [.941]
- Distance from top edge to seventh hole center: 4.72 [.186]
- Distance from top edge to eighth hole center: 4.52 [.178]

Cross-sectional View:

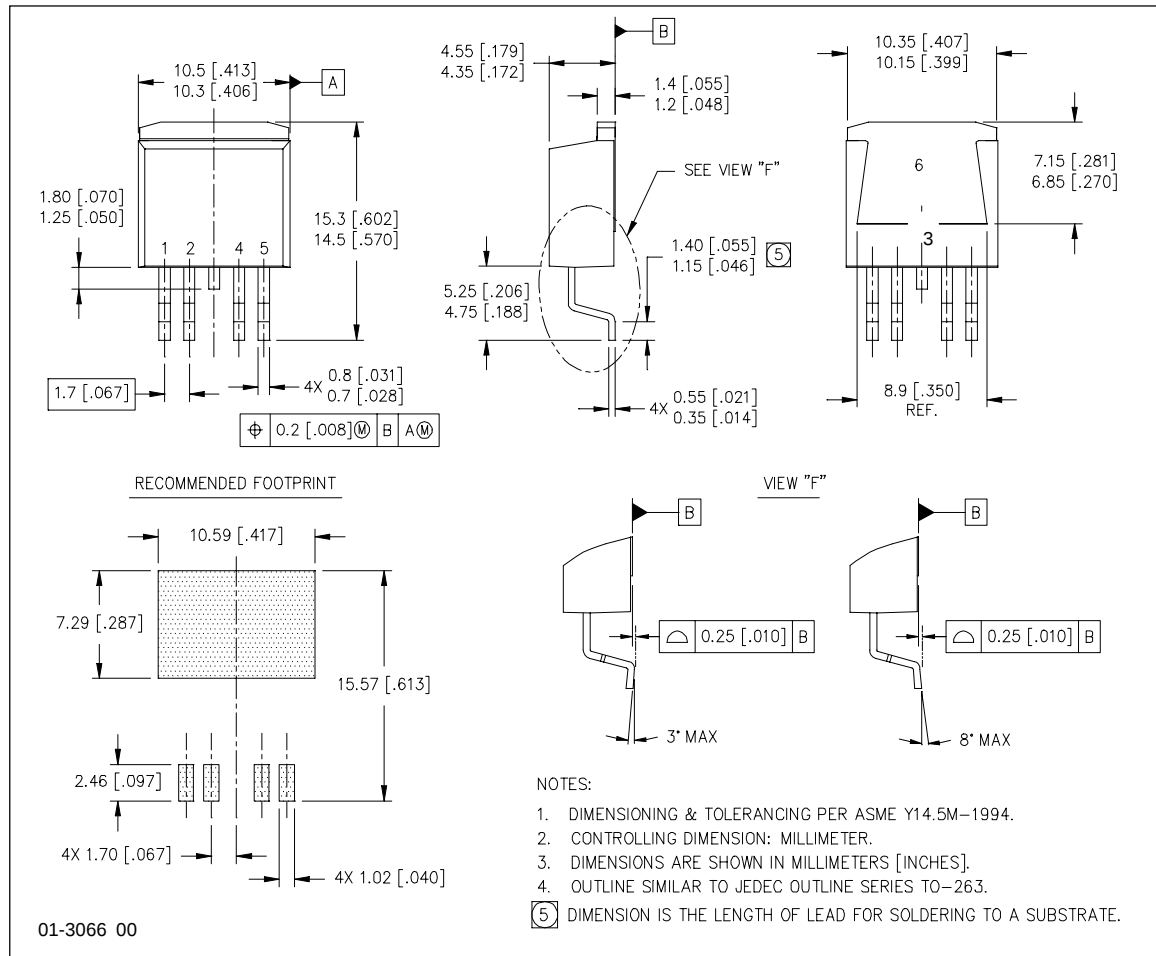
- Overall width: 26.40 [1.039]
- Distance from top edge to first hole center: 24.40 [.961]
- Distance from top edge to second hole center: 24.40 [.961]
- Distance from top edge to third hole center: 26.40 [1.039]
- Distance from top edge to fourth hole center: 24.40 [.961]
- Distance from top edge to fifth hole center: 24.40 [.961]
- Distance from top edge to sixth hole center: 26.40 [1.039]
- Distance from top edge to seventh hole center: 24.40 [.961]
- Distance from top edge to eighth hole center: 24.40 [.961]
- Distance from top edge to ninth hole center: 26.40 [1.039]
- Distance from top edge to tenth hole center: 24.40 [.961]
- Distance from top edge to eleventh hole center: 24.40 [.961]
- Distance from top edge to twelfth hole center: 26.40 [1.039]
- Distance from top edge to thirteenth hole center: 24.40 [.961]
- Distance from top edge to fourteenth hole center: 24.40 [.961]
- Distance from top edge to fifteenth hole center: 26.40 [1.039]
- Distance from top edge to sixteenth hole center: 24.40 [.961]
- Distance from top edge to seventeenth hole center: 24.40 [.961]
- Distance from top edge to eighteenth hole center: 26.40 [1.039]
- Distance from top edge to nineteenth hole center: 24.40 [.961]
- Distance from top edge to twentieth hole center: 24.40 [.961]
- Distance from top edge to twenty-first hole center: 26.40 [1.039]
- Distance from top edge to twenty-second hole center: 24.40 [.961]
- Distance from top edge to twenty-third hole center: 24.40 [.961]
- Distance from top edge to twenty-fourth hole center: 26.40 [1.039]
- Distance from top edge to twenty-fifth hole center: 24.40 [.961]
- Distance from top edge to twenty-sixth hole center: 24.40 [.961]
- Distance from top edge to twenty-seventh hole center: 26.40 [1.039]
- Distance from top edge to twenty-eighth hole center: 24.40 [.961]
- Distance from top edge to twenty-ninth hole center: 24.40 [.961]
- Distance from top edge to thirtieth hole center: 26.40 [1.039]
- Distance from top edge to thirty-first hole center: 24.40 [.961]
- Distance from top edge to thirty-second hole center: 24.40 [.961]
- Distance from top edge to thirty-third hole center: 26.40 [1.039]
- Distance from top edge to thirty-fourth hole center: 24.40 [.961]
- Distance from top edge to thirty-fifth hole center: 24.40 [.961]
- Distance from top edge to thirty-sixth hole center: 26.40 [1.039]
- Distance from top edge to thirty-seventh hole center: 24.40 [.961]
- Distance from top edge to thirty-eighth hole center: 24.40 [.961]
- Distance from top edge to thirty-ninth hole center: 26.40 [1.039]
- Distance from top edge to fortieth hole center: 24.40 [.961]
- Distance from top edge to forty-first hole center: 24.40 [.961]
- Distance from top edge to forty-second hole center: 26.40 [1.039]
- Distance from top edge to forty-third hole center: 24.40 [.961]
- Distance from top edge to forty-fourth hole center: 24.40 [.961]
- Distance from top edge to forty-fifth hole center: 26.40 [1.039]
- Distance from top edge to forty-sixth hole center: 24.40 [.961]
- Distance from top edge to forty-seventh hole center: 24.40 [.961]
- Distance from top edge to forty-eighth hole center: 26.40 [1.039]
- Distance from top edge to forty-ninth hole center: 24.40 [.961]
- Distance from top edge to fiftieth hole center: 24.40 [.961]
- Distance from top edge to fifty-first hole center: 26.40 [1.039]
- Distance from top edge to fifty-second hole center: 24.40 [.961]
- Distance from top edge to fifty-third hole center: 24.40 [.961]
- Distance from top edge to fifty-fourth hole center: 26.40 [1.039]
- Distance from top edge to fifty-fifth hole center: 24.40 [.961]
- Distance from top edge to fifty-sixth hole center: 24.40 [.961]
- Distance from top edge to fifty-seventh hole center: 26.40 [1.039]
- Distance from top edge to fifty-eighth hole center: 24.40 [.961]
- Distance from top edge to fifty-ninth hole center: 24.40 [.961]
- Distance from top edge to sixtieth hole center: 26.40 [1.039]
- Distance from top edge to sixty-first hole center: 24.40 [.961]
- Distance from top edge to sixty-second hole center: 24.40 [.961]
- Distance from top edge to sixty-third hole center: 26.40 [1.039]
- Distance from top edge to sixty-fourth hole center: 24.40 [.961]
- Distance from top edge to sixty-fifth hole center: 24.40 [.961]
- Distance from top edge to sixty-sixth hole center: 26.40 [1.039]
- Distance from top edge to sixty-seventh hole center: 24.40 [.961]
- Distance from top edge to sixty-eighth hole center: 24.40 [.961]
- Distance from top edge to sixty-ninth hole center: 26.40 [1.039]
- Distance from top edge to seventieth hole center: 24.40 [.961]
- Distance from top edge to seventy-first hole center: 24.40 [.961]
- Distance from top edge to seventy-second hole center: 26.40 [1.039]
- Distance from top edge to seventy-third hole center: 24.40 [.961]
- Distance from top edge to seventy-fourth hole center: 24.40 [.961]
- Distance from top edge to seventy-fifth hole center: 26.40 [1.039]
- Distance from top edge to seventy-sixth hole center: 24.40 [.961]
- Distance from top edge to seventy-seventh hole center: 24.40 [.961]
- Distance from top edge to seventy-eighth hole center: 26.40 [1.039]
- Distance from top edge to seventy-ninth hole center: 24.40 [.961]
- Distance from top edge to eightieth hole center: 24.40 [.961]
- Distance from top edge to eighty-first hole center: 26.40 [1.039]
- Distance from top edge to eighty-second hole center: 24.40 [.961]
- Distance from top edge to eighty-third hole center: 24.40 [.961]
- Distance from top edge to eighty-fourth hole center: 26.40 [1.039]
- Distance from top edge to eighty-fifth hole center: 24.40 [.961]
- Distance from top edge to eighty-sixth hole center: 24.40 [.961]
- Distance from top edge to eighty-seventh hole center: 26.40 [1.039]
- Distance from top edge to eighty-eighth hole center: 24.40 [.961]
- Distance from top edge to eighty-ninth hole center: 24.40 [.961]
- Distance from top edge to ninetieth hole center: 26.40 [1.039]
- Distance from top edge to ninety-first hole center: 24.40 [.961]
- Distance from top edge to ninety-second hole center: 24.40 [.961]
- Distance from top edge to ninety-third hole center: 26.40 [1.039]
- Distance from top edge to ninety-fourth hole center: 24.40 [.961]
- Distance from top edge to ninety-fifth hole center: 24.40 [.961]
- Distance from top edge to ninety-sixth hole center: 26.40 [1.039]
- Distance from top edge to ninety-seventh hole center: 24.40 [.961]
- Distance from top edge to ninety-eighth hole center: 24.40 [.961]
- Distance from top edge to ninety-ninth hole center: 26.40 [1.039]
- Distance from top edge to one hundred hole center: 24.40 [.961]

NOTES:

1. OUTLINE CONFORMS TO EIA-481 & EIA-541.
2. DIMENSIONS ARE SHOWN IN MILLIMETERS [INCHES].

01-3071 00 / 01-3072 00

Case Outline 5 Lead - SMD220 (D²PAK)



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Data and specifications subject to change without notice. 2/26/2000

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