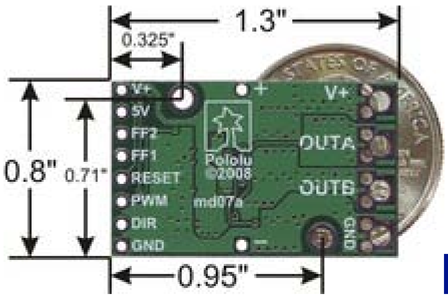
This discrete MOSFET H-bridge motor driver enables bidirectional control of one high-power DC brushed motor. The little 1.3×0.8-inch board supports a wide 5.5 to 30 V voltage range and is efficient enough to deliver a continuous 15 A without a heat sink.

Compare all products in Pololu High-Power Motor Drivers.

Description **Specifications (10)** **Pictures (4)** **Resources (3)** **FAQs (1)**

Overview



The Pololu high-power motor driver is a discrete MOSFET H-bridge designed to drive large DC brushed motors. The H-bridge is made up of one N-channel MOSFET per leg, and most of the board's performance is determined by these MOSFETs (the rest of the board contains the circuitry to take user inputs and control the MOSFETs). The MOSFET datasheet is available under the "Resources" tab. The MOSFETs have an absolute maximum voltage rating of 30 V, and higher voltages can permanently destroy the motor driver. Under normal operating conditions, ripple voltage on the supply line can raise the maximum voltage to more than the average or intended voltage, so a safe maximum voltage is approximately 24 V.

Note: batteries that are nominally 24 V can be much higher than that when fully charged; this product is therefore not recommended for use with 24 V batteries unless appropriate measures are taken to limit the peak voltage.

The versatility of this driver makes it suitable for a large range of currents and voltages: it can deliver up to 15 A of continuous current with a board size of only 1.3" by 0.8" and no required heat sink. With the addition of a heat sink, it can drive a motor with up to about 21 A of continuous current. The module offers a simple interface that requires as little as two I/O lines while allowing for both sign-magnitude and locked-antiphase operation. Integrated detection of various short-circuit conditions protects against common causes of catastrophic failure; however, please note that the board does not include reverse power protection or any over-current or over-temperature protection.

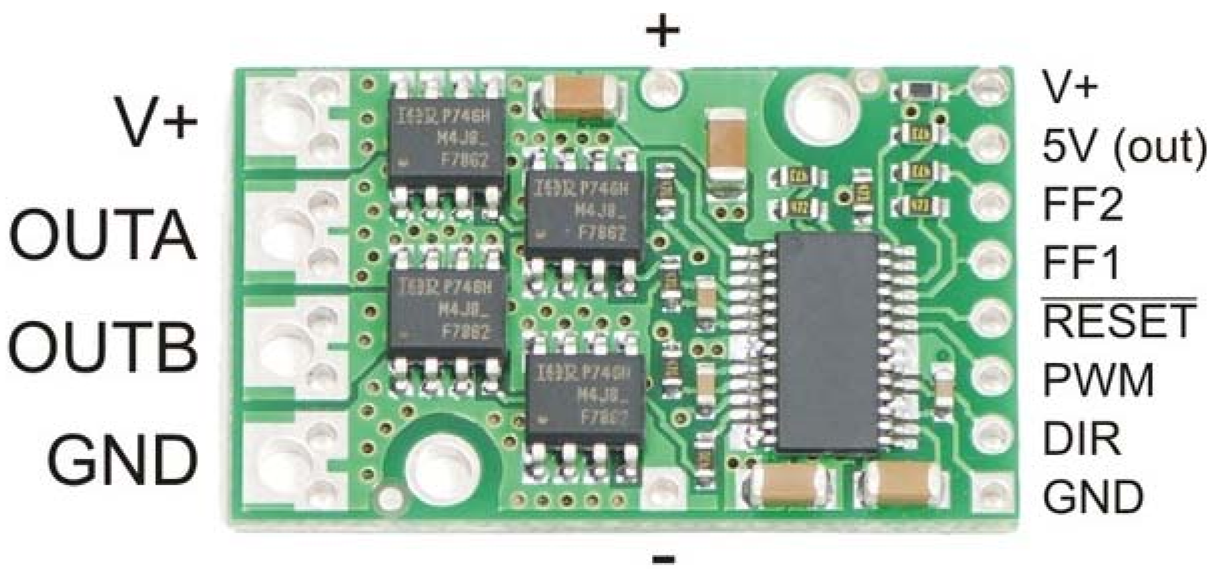
Using the Motor Driver

Connections

The motor and motor power connections are on one side of the board, and the control connections (5V logic) are on the other side. The motor supply should be capable of supplying high current, and a large capacitor should be installed close to the motor driver. The included axial capacitor can be installed directly on the board in the pins labeled '+' and '-' as shown below. Such installations are compact but might limit heat sinking options; also, depending on the power supply quality and motor characteristics, a larger capacitor might be required. There are two options for connecting to the high-power signals (V+, OUTA, OUTB, GND): large holes on 0.2" centers, which are compatible with the included terminal blocks, and pairs of 0.1"-spaced holes that can be used with perfboards, breadboards, and 0.1" connectors.

Warning: Take proper safety precautions when using high-power electronics. Make sure you know what you are doing when using high voltages or currents! During normal operation, this product can get **hot** enough to burn you. Take care when handling this product or other components connected to it.

The logic connections are designed to interface with 5V systems (5.5 V max); the minimum high input signal threshold is 3.5 V, so we do not recommend connecting this device directly to a 3.3 V controller. In a typical configuration, only PWM and DIR are required. The two fault flag pins (FF1 and FF2) can be monitored to detect problems (see the Fault Flag Table below for more details). The RESET pin, when held low, puts the driver into a low-power sleep mode and clears any latched fault flags. The V+ pin on the logic side of the board gives you access to monitor the motor's power supply (it should not be used for high current). The board also provides a regulated 5 V pin which can provide a few milliamps (this is typically insufficient for a whole control circuit but can be useful as a reference or for very low-power microcontrollers).



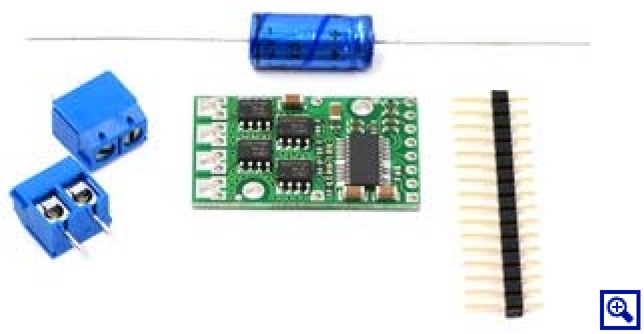
Pinout

PIN	Default State	Description
V+		This is the main 5.5 – 30 V motor power supply connection, which should typically be made to the larger V+ pad. The smaller V+ pad along the long side of the board is intended for a power supply capacitor, and the smaller V+ pad on the logic side of the board gives you access to monitor the motor's power supply (it should not be used for high current).
5V (out)		This regulated 5V **output** provides a few milliamps. This output should not be connected to other external power supply lines. **Be careful not to accidentally short this pin to the neighboring V+ pin while power is being supplied** as doing so will instantly destroy the board!
GND		Ground connection for logic and motor power supplies.
OUTA		A motor output pin.
OUTB		B motor output pin.
PWM	LOW	Pulse width modulation input: a PWM signal on this pin corresponds to a PWM output on the motor outputs.
DIR	FLOAT	Direction input: when DIR is high current will flow from OUTA to OUTB, when it is low current will flow from OUTB to OUTA.
RESET	HIGH	The reset pin, when pulled low, puts the board into a low-power sleep mode and clears any latched fault flags.
FF1	LOW	Fault flag 1 indicator: FF1 goes high when certain faults have occurred. See table below for details.

FF2	LOW	Fault flag 2 indicator: FF2 goes high when certain faults have occurred. See table below for details.

Included Hardware

A 16-pin straight breakaway male header, one 150 uF capacitor, and two 2-pin 5mm terminal blocks are included with each motor driver. (Note: The terminals blocks are only rated for 15 A; for higher power applications, use thick wires soldered directly to the board.) Connecting a large capacitor across the power supply is recommended; one way to do it is between the '+' and '-' holes, as shown below. The two mounting holes are intended to be used with #2 screws (not included).



Pololu high-power motor driver and included components.

Pololu high-power motor driver with included components soldered in.

Motor Control Options

With the PWM pin held low, both motor outputs will be held low (a brake operation). With PWM high, the motor outputs will be driven according to the DIR input. This allows two modes of operation: sign-magnitude, in which the PWM duty cycle controls the speed of the motor and DIR controls the direction, and locked-antiphase, in which a pulse-width-modulated signal is applied to the DIR pin with PWM held high.

In locked-antiphase operation, a low duty cycle drives the motor in one direction, and a high duty cycle drives the motor in the other direction; a 50% duty cycle turns the motor off. A successful locked-antiphase implementation depends on the motor inductance and switching frequency smoothing out the current (e.g. making the current zero in the 50% duty cycle case), so a high PWM frequency might be required.

Motor Driver Truth Table

PWM	DIR	OUTA	OUTB	Operation
H	L	L	H	Forward
H	H	H	L	Backward
L	X	L	L	Brake

PWM Frequency

The motor driver supports PWM frequencies as high as 40 kHz, though higher frequencies result in higher switching losses in the motor driver. Also, the driver has a dead time (when the outputs are not driven) of approximately 3 us per cycle, so high duty cycles become unavailable at high frequencies. For example, at 40 kHz, the period is 25 us; if 3 us of that is taken up by the dead time, the maximum available duty cycle is 22/25, or 88%. (100% is always available, so gradually ramping the PWM input from 0 to 100% will result in the output ramping from 0 to 88%, staying at 88% for inputs of 88% through 99%, and then switching to 100%.)

Real-World Power Dissipation Considerations

The motor driver has a peak current rating of 170 A. The peak ratings are for quick transients (e.g. when a motor is first turned on), and the continuous rating of 15 A is dependent on various conditions, such as the ambient temperature. The actual current you can deliver will depend on how well you can keep the motor driver cool. The driver's printed circuit board is designed to draw heat out of the MOSFETs, but performance can be improved by adding a heat sink. With a heat sink the motor driver can be run at up to 21 A of continuous current. For more information on power dissipation see the data sheet for the MOSFETs on the Resources tab.

Warning: This motor driver has no over-current or over-temperature shut-off. Either condition can cause **permanent damage** to the motor driver. You might consider using an external current sensor, such as our ACS714 ±30A bidirectional current sensor carrier to monitor your current draw.

Fault Conditions

The motor driver can detect three different fault states, which are reported on the FF1 and FF2 pins. The detectable faults are short circuits on the output, under-voltage, and over-temperature. A short-circuit fault is latched, meaning the outputs will stay off and the fault flag will stay high, until the board is reset ($\overline{\text{RESET}}$ brought low). The under-voltage fault disables outputs but is not latched. The over-temperature fault provides a weak indication of the board being too hot, but it does not directly indicate the temperature of the MOSFETs, which are usually the first components to overheat. The fault flag operation is summarized below.

Flag State		**Fault Description**	**Disable Outputs**	**Latched Until Reset**
FF1	**FF2**			
L	L	No fault	No	No
L	H	Short Circuit	Yes	Yes
H	L	Over Temperature	No	No
H	H	Under Voltage	Yes	No

Dimensions

Size:	1.3" x 0.8"
Weight:	2.8 g[1]

General specifications

Motor channels:	1
Minimum operating voltage:	5.5 V
Maximum operating voltage:	30 V
Continuous output current per channel:	15 A[2]
Maximum PWM frequency:	40 kHz[3]
Maximum logic voltage:	5.5 V
MOSFET on-resistance (max per leg):	3.5 mΩ
Reverse voltage protection?:	N

Notes:

1
: Without any connectors or through-hole capacitors.

2
: Typical results with 100% duty cycle at room temperature. Continuous current can be as high as 21 A if the MOSFETs are kept cool with air flow or a heat sink.

3
: Higher frequencies are possible, but duty cycle will be limited by dead time of approximately 3 μs per cycle.

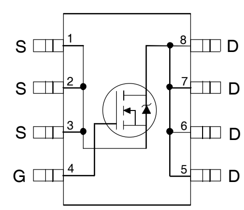
International
IOR Rectifier

PD - 96226

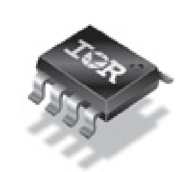
IRF8734PbF

HEXFET® Power MOSFET

V_{DSS}	$R_{DS(on)}$ max	Qg (typ.)
30V	3.5mΩ@V_{GS} = 10V	20nC



Top View



SO-8

Applications

- Synchronous MOSFET for Notebook Processor Power
- Synchronous Rectifier MOSFET for Isolated DC-DC Converters in Networking Systems

Benefits

- Very Low $R_{DS(on)}$ at 4.5V V_{GS}
- Low Gate Charge
- Fully Characterized Avalanche Voltage and Current
- 100% Tested for R_G
- Lead-Free

Absolute Maximum Ratings

	Parameter	Max.	Units
V_{DS}	Drain-to-Source Voltage	30	V
V_{GS}	Gate-to-Source Voltage	± 20	
I_D @ T_A = 25°C	Continuous Drain Current, V_{GS} @ 10V	21	A
I_D @ T_A = 70°C	Continuous Drain Current, V_{GS} @ 10V	17	
I_{DM}	Pulsed Drain Current ①	168	
P_D @T_A = 25°C	Power Dissipation ④	2.5	W
P_D @T_A = 70°C	Power Dissipation ④	1.6	
	Linear Derating Factor	0.02	W/°C
T_J T_{STG}	Operating Junction and Storage Temperature Range	-55 to + 150	°C

Thermal Resistance

	Parameter	Typ.	Max.	Units
$R_{\theta JL}$	Junction-to-Drain Lead ⑤	–––	20	°C/W
$R_{\theta JA}$	Junction-to-Ambient ④	–––	50	

Notes ① through ⑤ are on page 10

ORDERING INFORMATION:

See detailed ordering and shipping information on the last page of this data sheet.

2/12/09

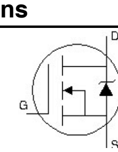
Static @ T_J = 25°C (unless otherwise specified)

	Parameter	Min.	Typ.	Max.	Units	Conditions
BV_{DSS}	Drain-to-Source Breakdown Voltage	30	–––	–––	V	V_{GS} = 0V, I_D = 250μA
$\Delta BV_{DSS}/\Delta T_J$	Breakdown Voltage Temp. Coefficient	–––	0.023	–––	V/°C	Reference to 25°C, I_D = 1mA
$R_{DS(on)}$	Static Drain-to-Source On-Resistance	–––	2.9	3.5	mΩ	V_{GS} = 10V, I_D = 21A ③
		–––	4.2	5.1		V_{GS} = 4.5V, I_D = 17A ③
$V_{GS(th)}$	Gate Threshold Voltage	1.35	1.80	2.35	V	V_{DS} = V_{GS}, I_D = 50μA
$\Delta V_{GS(th)}$	Gate Threshold Voltage Coefficient	–––	-6.5	–––	mV/°C	
I_{DSS}	Drain-to-Source Leakage Current	–––	–––	1.0	μA	V_{DS} = 24V, V_{GS} = 0V
		–––	–––	150		V_{DS} = 24V, V_{GS} = 0V, T_J = 125°C
I_{GSS}	Gate-to-Source Forward Leakage	–––	–––	100	nA	V_{GS} = 20V
	Gate-to-Source Reverse Leakage	–––	–––	-100		V_{GS} = -20V
gfs	Forward Transconductance	85	–––	–––	S	V_{DS} = 15V, I_D = 17A
Q_g	Total Gate Charge	–––	20	30	nC	
Q_{gs1}	Pre-Vth Gate-to-Source Charge	–––	5.2	–––		V_{DS} = 15V
Q_{gs2}	Post-Vth Gate-to-Source Charge	–––	2.3	–––		V_{GS} = 4.5V
Q_{gd}	Gate-to-Drain Charge	–––	6.9	–––		I_D = 17A
Q_{godr}	Gate Charge Overdrive	–––	5.4	–––		See Figs. 16a &16b
Q_{sw}	Switch Charge (Q_{gs2} + Q_{gd})	–––	9.2	–––		
Q_{oss}	Output Charge	–––	15	–––	nC	V_{DS} = 16V, V_{GS} = 0V
R_G	Gate Resistance	–––	1.7	3.1	Ω	
$t_{d(on)}$	Turn-On Delay Time	–––	13	–––	ns	V_{DD} = 15V, V_{GS} = 4.5V ③
t_r	Rise Time	–––	16	–––		I_D = 17A
$t_{d(off)}$	Turn-Off Delay Time	–––	15	–––		R_G = 1.8Ω
t_f	Fall Time	–––	8.0	–––		See Figs. 15a &15b
C_{iss}	Input Capacitance	–––	3175	–––	pF	V_{GS} = 0V
C_{oss}	Output Capacitance	–––	627	–––		V_{DS} = 15V
C_{rss}	Reverse Transfer Capacitance	–––	241	–––		f = 1.0MHz

Avalanche Characteristics

	Parameter	Typ.	Max.	Units
E_{AS}	Single Pulse Avalanche Energy ②	–––	216	mJ
I_{AR}	Avalanche Current ①	–––	17	A

Diode Characteristics

	Parameter	Min.	Typ.	Max.	Units	Conditions
I_S	Continuous Source Current (Body Diode)	–––	–––	3.1	A	MOSFET symbol showing the integral reverse p-n junction diode. 
I_{SM}	Pulsed Source Current (Body Diode) ①	–––	–––	168		
V_{SD}	Diode Forward Voltage	–––	–––	1.0	V	T_J = 25°C, I_S = 17A, V_{GS} = 0V ③
t_{rr}	Reverse Recovery Time	–––	20	30	ns	T_J = 25°C, I_F = 17A, V_{DD} = 15V
Q_{rr}	Reverse Recovery Charge	–––	25	38	nC	di/dt = 345A/μs ③

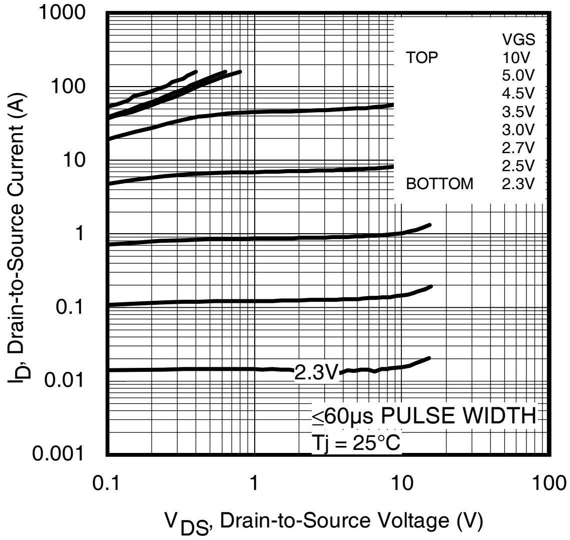


Fig 1. Typical Output Characteristics

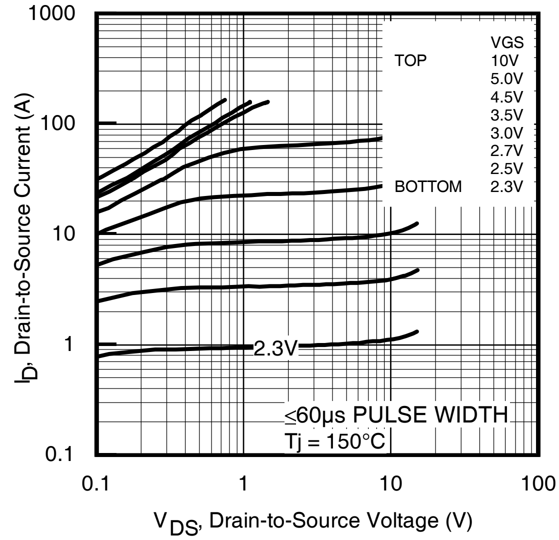


Fig 2. Typical Output Characteristics

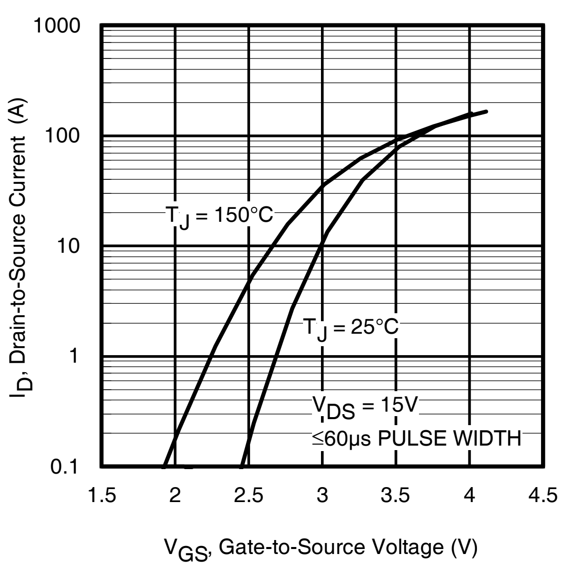


Fig 3. Typical Transfer Characteristics

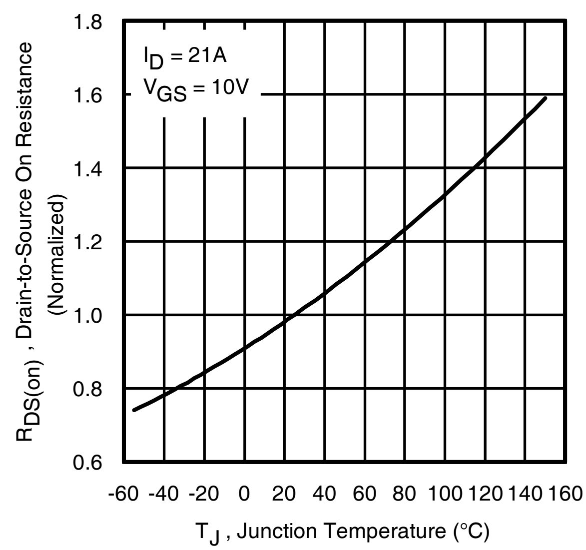


Fig 4. Normalized On-Resistance Vs. Temperature

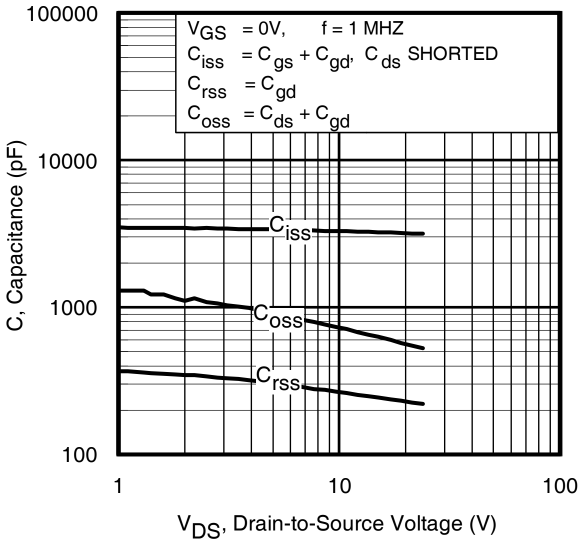


Fig 5. Typical Capacitance Vs. Drain-to-Source Voltage

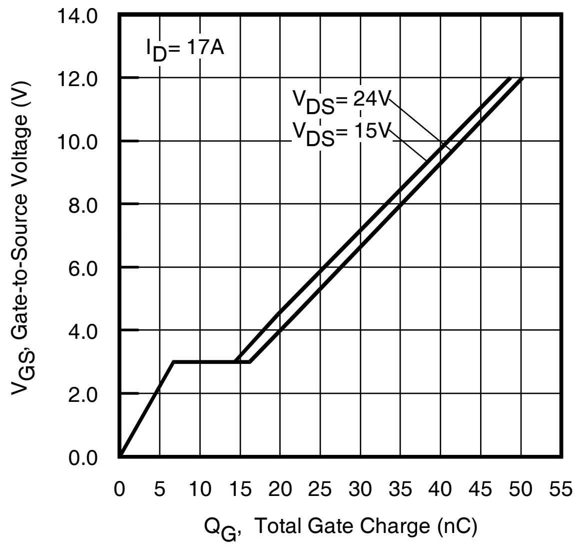


Fig 6. Typical Gate Charge Vs. Gate-to-Source Voltage

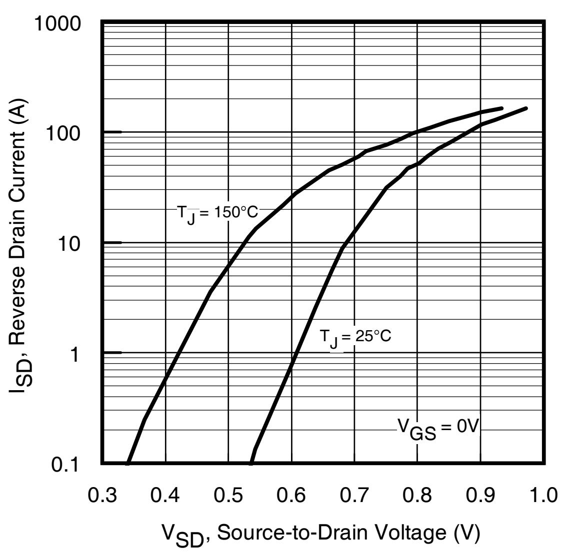


Fig 7. Typical Source-Drain Diode Forward Voltage

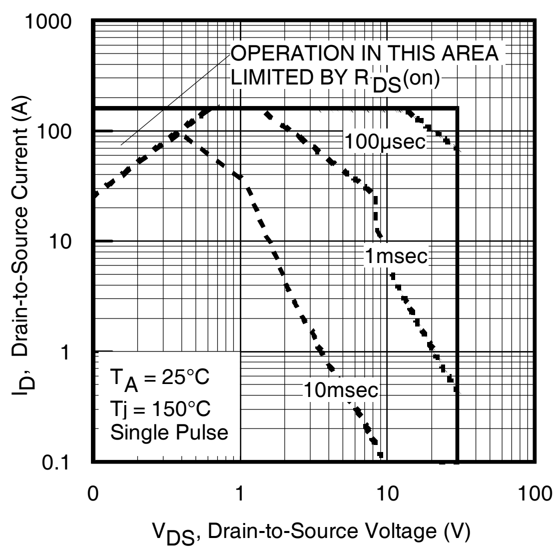


Fig 8. Maximum Safe Operating Area

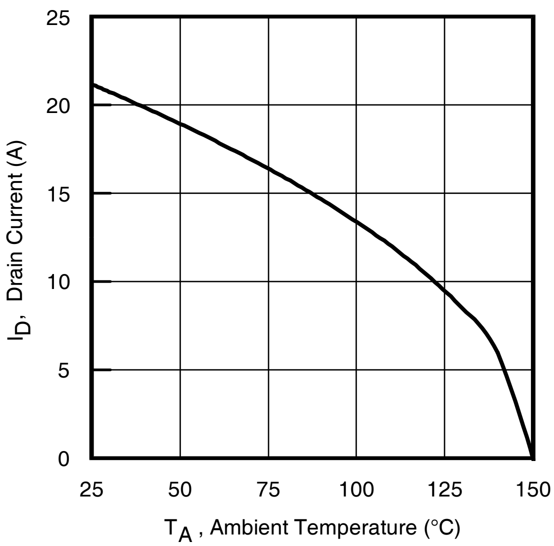


Fig 9. Maximum Drain Current Vs. Ambient Temperature

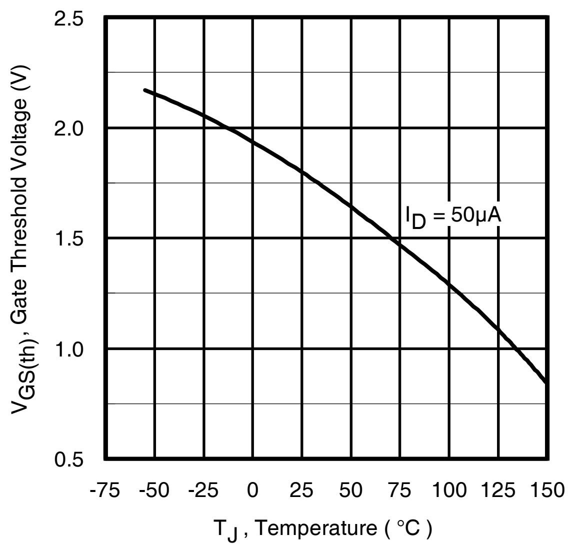
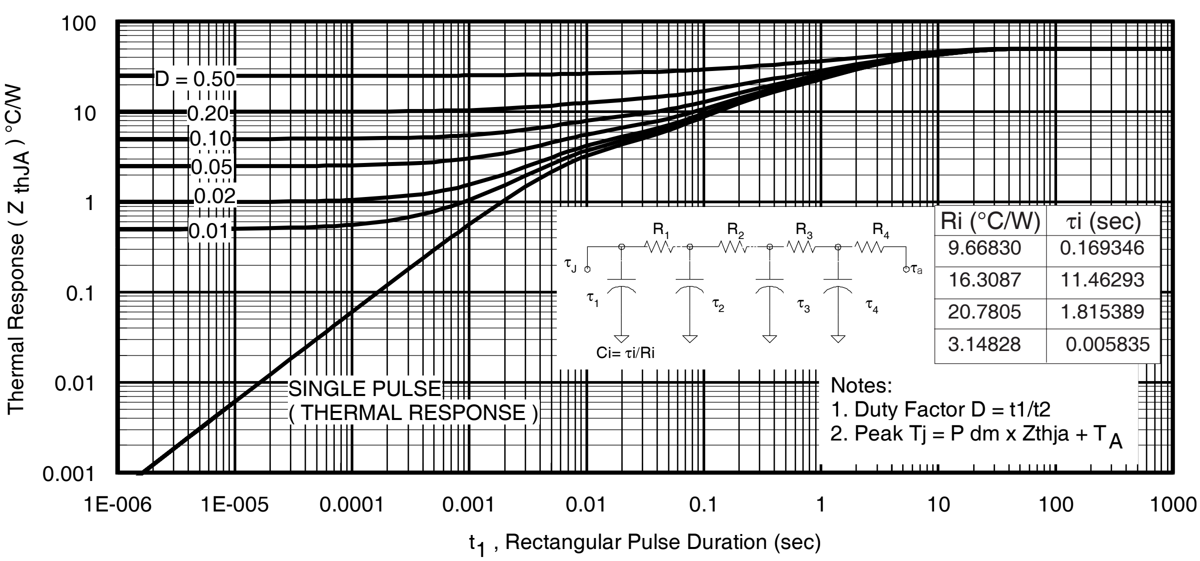


Fig 10. Threshold Voltage Vs. Temperature



Ri (°C/W)	τi (sec)
9.66830	0.169346
16.3087	11.46293
20.7805	1.815389
3.14828	0.005835

Fig 11. Maximum Effective Transient Thermal Impedance, Junction-to-Ambient

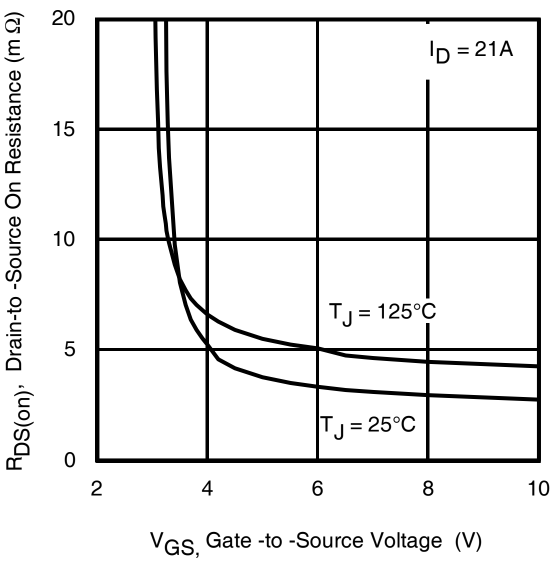


Fig 12. On-Resistance Vs. Gate Voltage

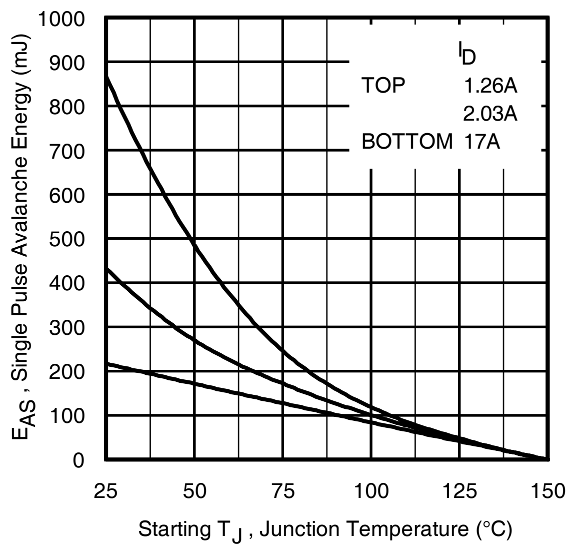


Fig 13c. Maximum Avalanche Energy Vs. Drain Current

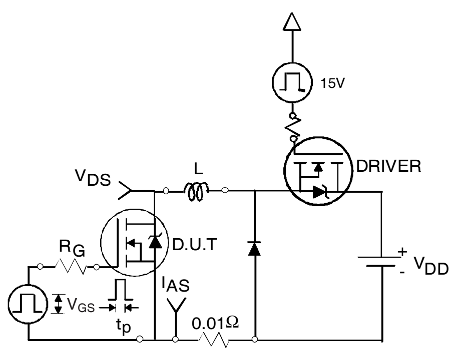


Fig 14a. Unclamped Inductive Test Circuit

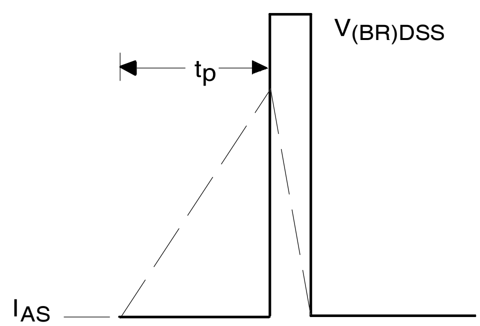


Fig 14b. Unclamped Inductive Waveforms

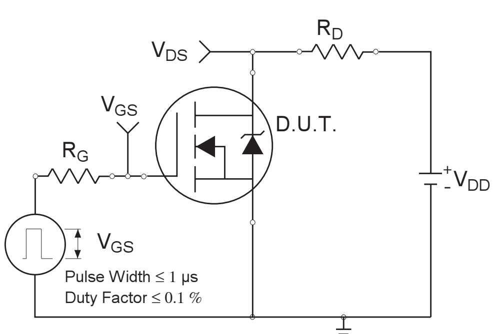


Fig 15a. Switching Time Test Circuit

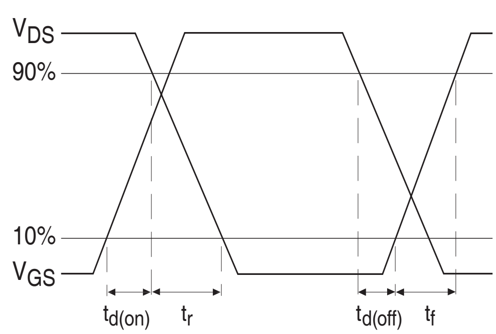


Fig 15b. Switching Time Waveforms

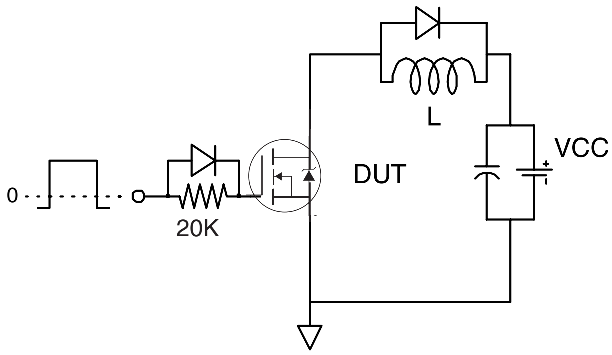


Fig 16a. Gate Charge Test Circuit

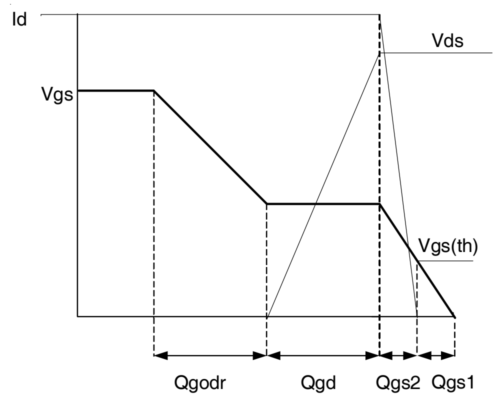
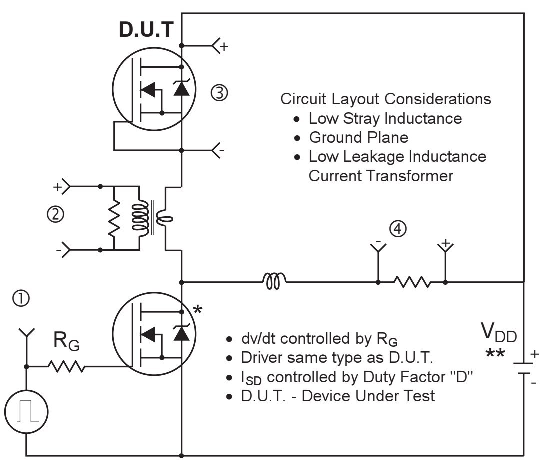
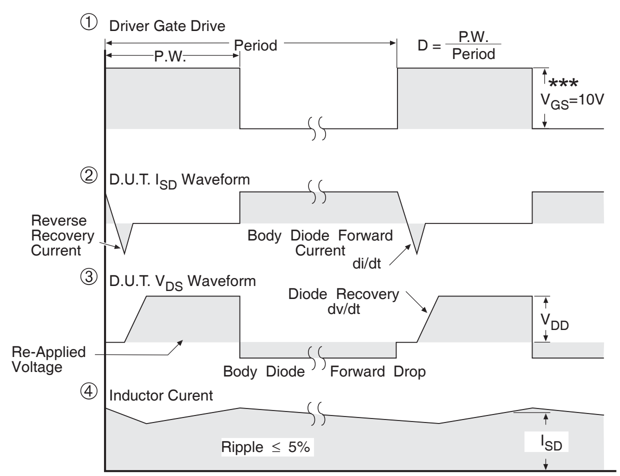


Fig 16b. Gate Charge Waveform



* Use P-Channel Driver for P-Channel Measurements
** Reverse Polarity for P-Channel

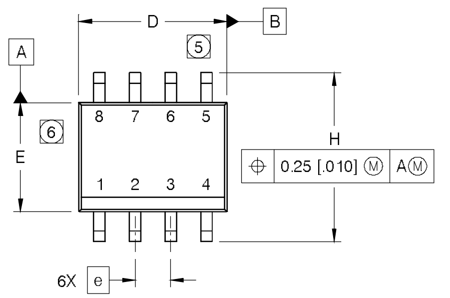


*** V_{GS} = 5V for Logic Level Devices

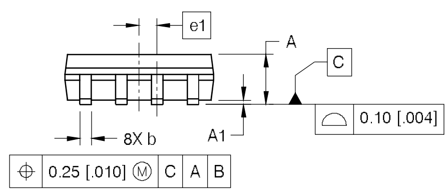
Fig 17. Diode Reverse Recovery Test Circuit for HEXFET® Power MOSFETs

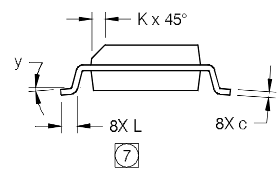
SO-8 Package Outline(Mosfet & Fetky)

Dimensions are shown in milimeters (inches)



DIM	INCHES		MILLIMETERS	
	MIN	MAX	MIN	MAX
A	.0532	.0688	1.35	1.75
A1	.0040	.0098	0.10	0.25
b	.013	.020	0.33	0.51
c	.0075	.0098	0.19	0.25
D	.189	.1968	4.80	5.00
E	.1497	.1574	3.80	4.00
e	.050 BASIC		1.27 BASIC	
e 1	.025 BASIC		0.635 BASIC	
H	.2284	.2440	5.80	6.20
K	.0099	.0196	0.25	0.50
L	.016	.050	0.40	1.27
y	0°	8°	0°	8°





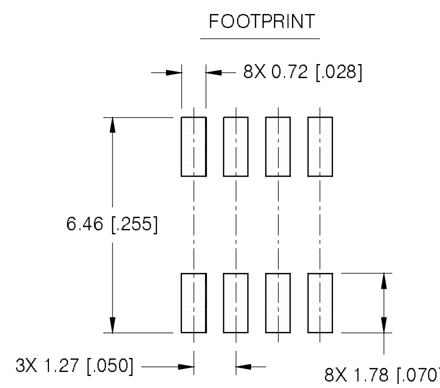
NOTES:

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 MS-012AA.

5 DIMENSION DOES NOT INCLUDE MOLD PROTRUSIONS. MOLD PROTRUSIONS NOT TO EXCEED 0.15 [.006].

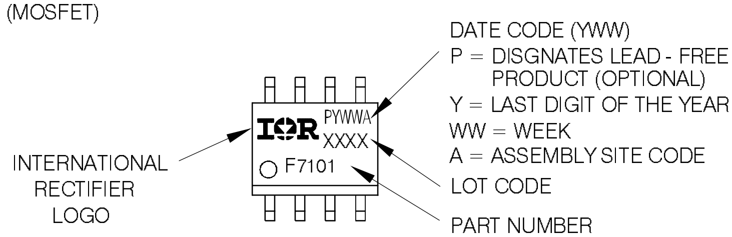
6 DIMENSION DOES NOT INCLUDE MOLD PROTRUSIONS. MOLD PROTRUSIONS NOT TO EXCEED 0.25 [.010].

7 DIMENSION IS THE LENGTH OF LEAD FOR SOLDERING TO A SUBSTRATE.



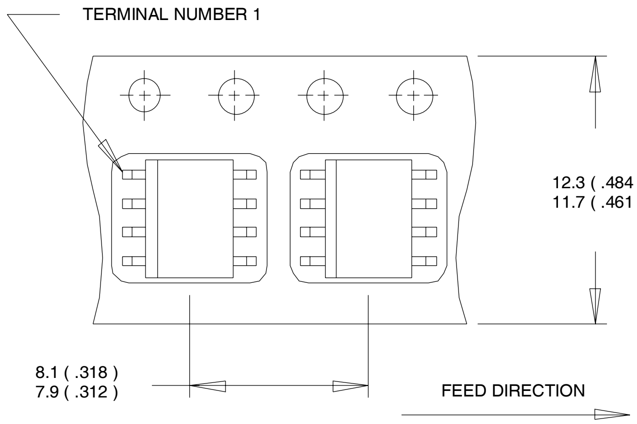
SO-8 Part Marking Information

EXAMPLE: THIS IS AN IRF7101 (MOSFET)

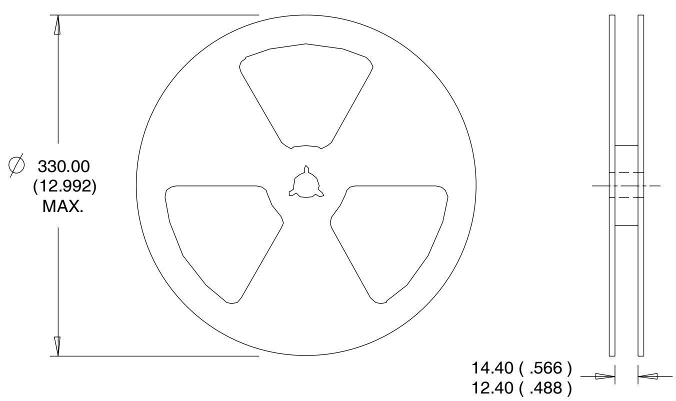


Note: For the most current drawing please refer to IR website at http://www.irf.com/package/

SO-8 Tape and Reel (Dimensions are shown in milimeters (inches))



NOTES:
1. CONTROLLING DIMENSION : MILLIMETER.
2. ALL DIMENSIONS ARE SHOWN IN MILLIMETERS(INCHES).
3. OUTLINE CONFORMS TO EIA-481 & EIA-541.



NOTES :
1. CONTROLLING DIMENSION : MILLIMETER.
2. OUTLINE CONFORMS TO EIA-481 & EIA-541.

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

Orderable part number	Package Type	Standard Pack		Note
		Form	Quantity	
IRF8734PbF	SO-8	Tube/Bulk	95	
IRF8734TRPbF	SO-8	Tape and Reel	4000	

Qualification Information†

Qualification level	Consumer ††	
	(per JEDEC JESD47F††† guidelines)	
Moisture Sensitivity Level	SO-8	MSL1 (per JEDEC J-STD-020D†††)
RoHS Compliant	Yes	

† Qualification standards can be found at International Rectifier's web site http://www.irf.com/product-info/reliability

†† Higher qualification ratings may be available should the user have such requirements. Please contact your International Rectifier sales representative for further information: http://www.irf.com/whoto-call/salesrep/

††† Applicable version of JEDEC standard at the time of product release.

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

Notes:
① Repetitive rating; pulse width limited by max. junction temperature.
② Starting $T_J = 25°C$, L = 1.69mH $R_G = 25\Omega$, $I_{AS} = 16A$.
③ Pulse width ≤ 400µs; duty cycle ≤ 2%.
④ When mounted on 1 inch square copper board
⑤ R_θ is measured at T_J of approximately 90°C.

Data and specifications subject to change without notice

International
IOR Rectifier

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TAC Fax: (310) 252-7903
Visit us at www.irf.com for sales contact information.02/2009

International
IOR Rectifier

PD - 97275A

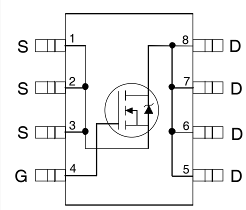
IRF7862PbF

HEXFET® Power MOSFET

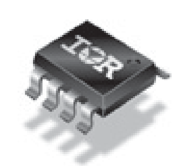
V_{DSS}	$R_{DS(on)}$ max	Qg
30V	3.7mΩ@V_{GS} = 10V	30nC

Applications

- Synchronous MOSFET for Notebook Processor Power
- Synchronous Rectifier MOSFET for Isolated DC-DC Converters



Top View


SO-8

Benefits

- Very Low $R_{DS(on)}$ at 4.5V V_{GS}
- Ultra-Low Gate Impedance
- Fully Characterized Avalanche Voltage and Current
- 20V V_{GS} Max. Gate Rating
- 100% tested for Rg
- Lead-Free

Absolute Maximum Ratings

	Parameter	Max.	Units
V_{DS}	Drain-to-Source Voltage	30	V
V_{GS}	Gate-to-Source Voltage	± 20	
I_D @ T_A = 25°C	Continuous Drain Current, V_{GS} @ 10V	21	A
I_D @ T_A = 70°C	Continuous Drain Current, V_{GS} @ 10V	17	
I_{DM}	Pulsed Drain Current ①	170	
P_D @T_A = 25°C	Power Dissipation	2.5	W
P_D @T_A = 70°C	Power Dissipation	1.6	
	Linear Derating Factor	0.02	W/°C
T_J T_{STG}	Operating Junction and Storage Temperature Range	-55 to + 150	°C

Thermal Resistance

	Parameter	Typ.	Max.	Units
$R_{\theta JL}$	Junction-to-Drain Lead ⑤	——	20	°C/W
$R_{\theta JA}$	Junction-to-Ambient ④⑤	——	50	

Notes ① through ⑤ are on page 9

08/29/07

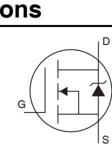
Static @ T_J = 25°C (unless otherwise specified)

	Parameter	Min.	Typ.	Max.	Units	Conditions
BV_{DSS}	Drain-to-Source Breakdown Voltage	30	—	—	V	V_{GS} = 0V, I_D = 250μA
$\Delta BV_{DSS}/\Delta T_J$	Breakdown Voltage Temp. Coefficient	—	0.023	—	V/°C	Reference to 25°C, I_D = 1mA
$R_{DS(on)}$	Static Drain-to-Source On-Resistance	—	3.0	3.7	mΩ	V_{GS} = 10V, I_D = 20A ③
		—	3.7	4.5		V_{GS} = 4.5V, I_D = 16A ③
$V_{GS(th)}$	Gate Threshold Voltage	1.35	—	2.35	V	V_{DS} = V_{GS}, I_D = 100μA
$\Delta V_{GS(th)}$	Gate Threshold Voltage Coefficient	—	-5.4	—	mV/°C	V_{DS} = V_{GS}, I_D = 250μA
I_{DSS}	Drain-to-Source Leakage Current	—	—	1.0	μA	V_{DS} = 24V, V_{GS} = 0V
		—	—	150		V_{DS} = 24V, V_{GS} = 0V, T_J = 125°C
I_{GSS}	Gate-to-Source Forward Leakage	—	—	100	nA	V_{GS} = 20V
	Gate-to-Source Reverse Leakage	—	—	-100		V_{GS} = -20V
gfs	Forward Transconductance	87	—	—	S	V_{DS} = 15V, I_D = 16A
Q_g	Total Gate Charge	—	30	45	nC	
Q_{gs1}	Pre-Vth Gate-to-Source Charge	—	7.5	—		V_{DS} = 15V
Q_{gs2}	Post-Vth Gate-to-Source Charge	—	3.1	—		V_{GS} = 4.5V
Q_{gd}	Gate-to-Drain Charge	—	9.8	—		I_D = 16A
Q_{godr}	Gate Charge Overdrive	—	9.6	—		See Figs. 15 & 16
Q_{sw}	Switch Charge (Q_{gs2} + Q_{gd})	—	12.9	—		
Q_{oss}	Output Charge	—	18	—	nC	V_{DS} = 16V, V_{GS} = 0V
R_g	Gate Resistance	—	1.0	1.6	Ω	
$t_{d(on)}$	Turn-On Delay Time	—	16	—	ns	V_{DD} = 15V, V_{GS} = 4.5V
t_r	Rise Time	—	19	—		I_D = 16A
$t_{d(off)}$	Turn-Off Delay Time	—	18	—		R_G = 1.8Ω
t_f	Fall Time	—	11	—		See Fig. 18
C_{iss}	Input Capacitance	—	4090	—	pF	V_{GS} = 0V
C_{oss}	Output Capacitance	—	810	—		V_{DS} = 15V
C_{rss}	Reverse Transfer Capacitance	—	390	—		ƒ = 1.0MHz

Avalanche Characteristics

	Parameter	Typ.	Max.	Units
E_{AS}	Single Pulse Avalanche Energy ②	—	350	mJ
I_{AR}	Avalanche Current ①	—	16	A

Diode Characteristics

	Parameter	Min.	Typ.	Max.	Units	Conditions
I_S	Continuous Source Current (Body Diode)	—	—	3.1	A	MOSFET symbol showing the integral reverse p-n junction diode. 
I_{SM}	Pulsed Source Current (Body Diode) ①	—	—	170		
V_{SD}	Diode Forward Voltage	—	—	1.0	V	T_J = 25°C, I_S = 16A, V_{GS} = 0V ③
t_{rr}	Reverse Recovery Time	—	17	26	ns	T_J = 25°C, I_F = 16A, V_{DD} = 15V
Q_{rr}	Reverse Recovery Charge	—	33	50	nC	di/dt = 430A/μs ③
t_{on}	Forward Turn-On Time	Intrinsic turn-on time is negligible (turn-on is dominated by LS+LD)				

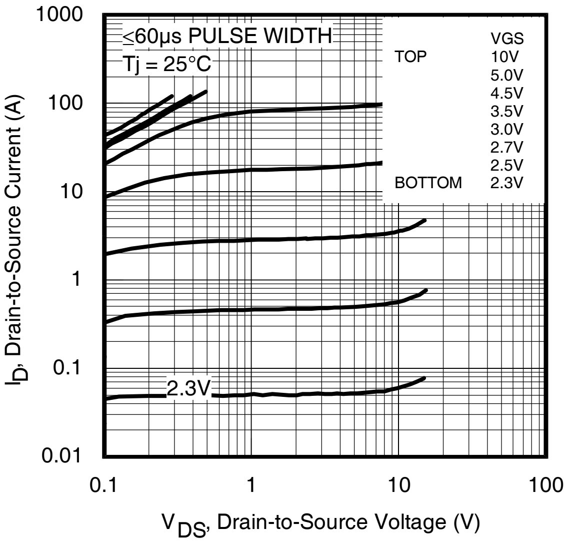


Fig 1. Typical Output Characteristics

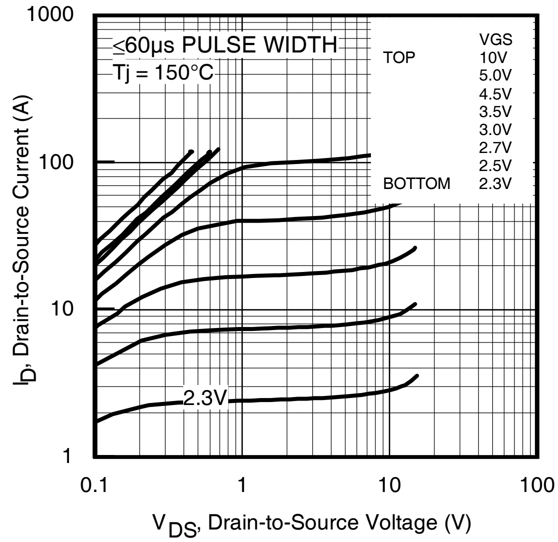


Fig 2. Typical Output Characteristics

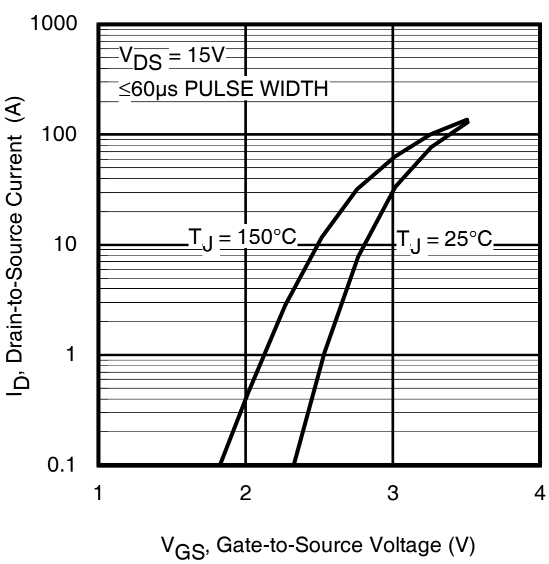


Fig 3. Typical Transfer Characteristics

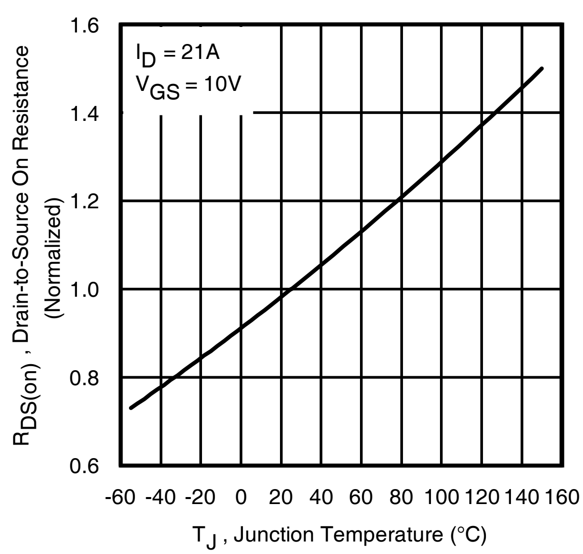


Fig 4. Normalized On-Resistance vs. Temperature

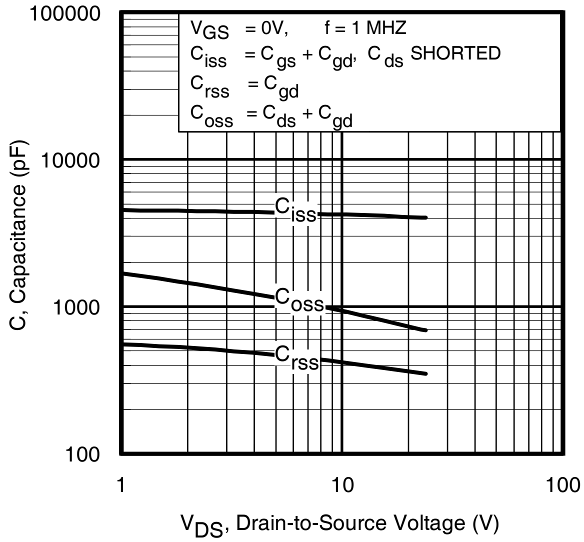


Fig 5. Typical Capacitance vs. Drain-to-Source Voltage

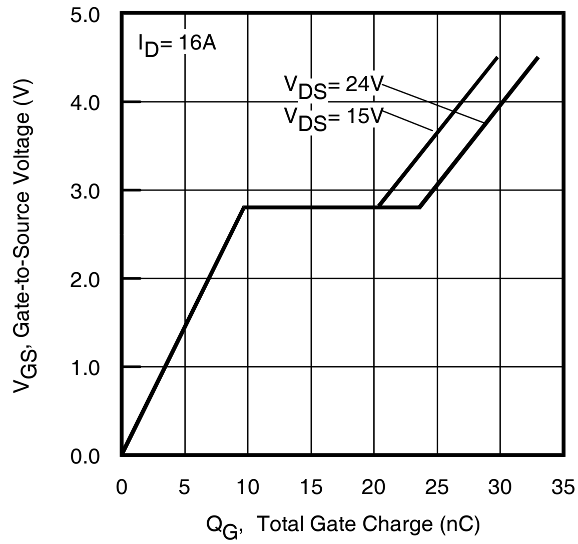


Fig 6. Typical Gate Charge Vs. Gate-to-Source Voltage

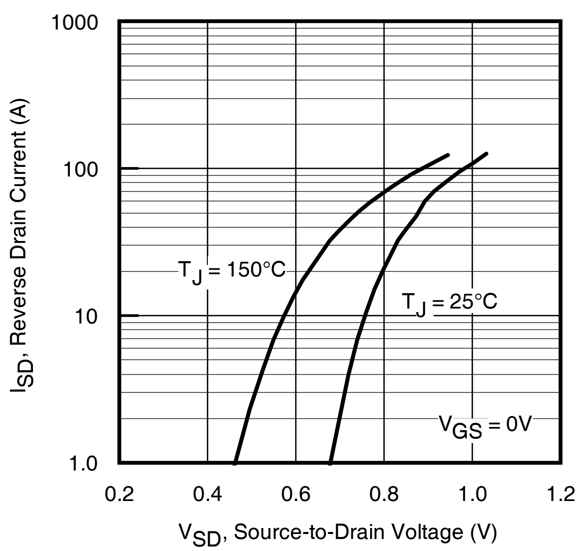


Fig 7. Typical Source-Drain Diode Forward Voltage

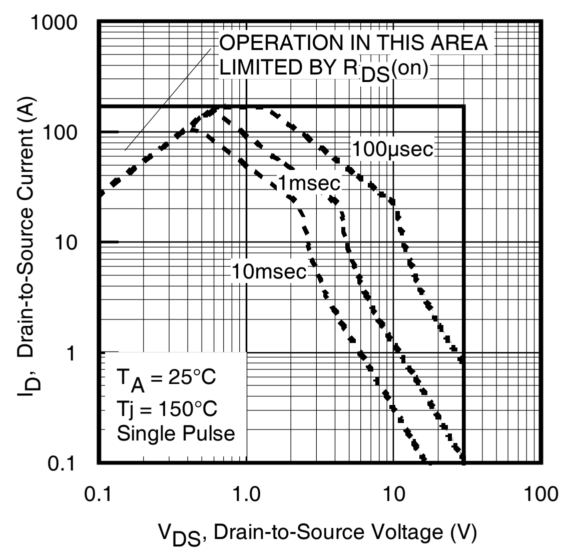


Fig 8. Maximum Safe Operating Area

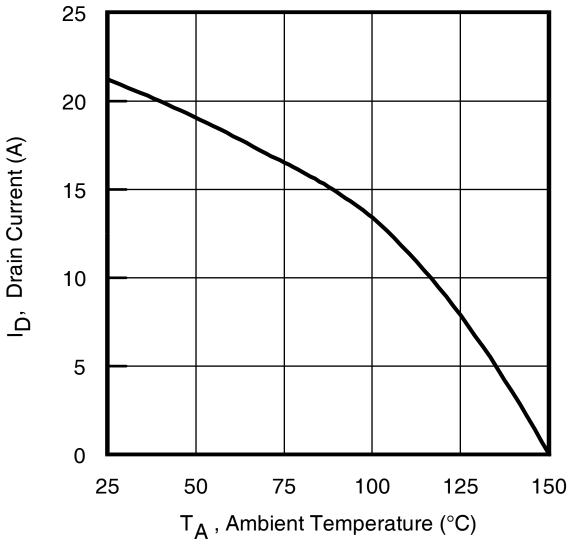


Fig 9. Maximum Drain Current vs. Ambient Temperature

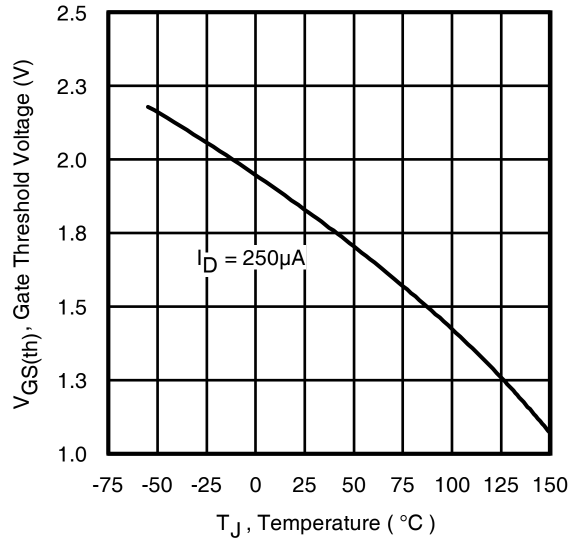


Fig 10. Threshold Voltage vs. Temperature

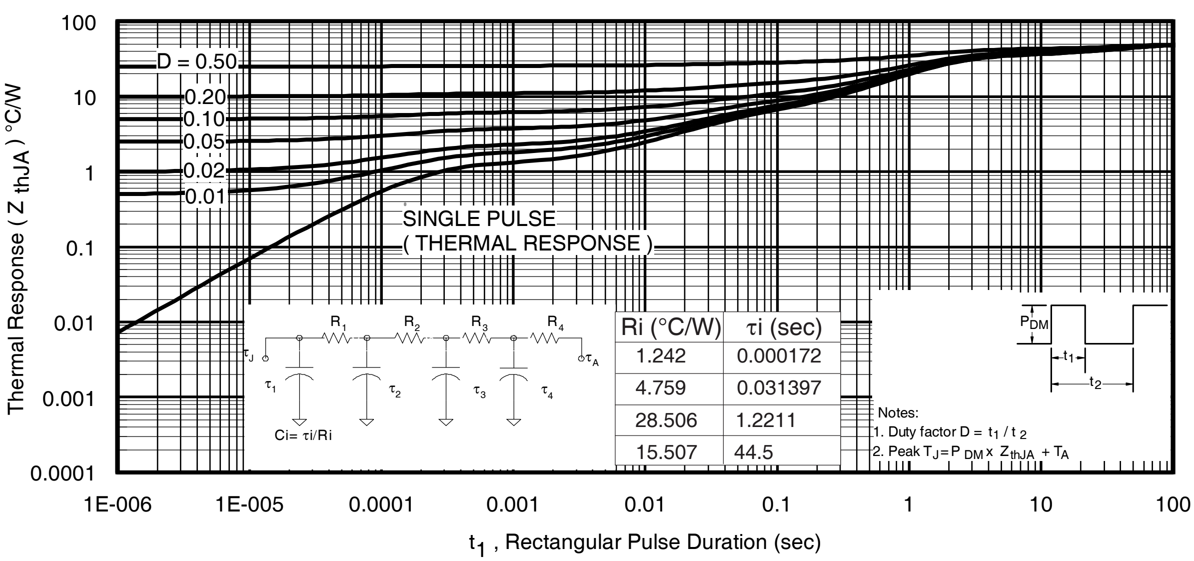


Fig 11. Maximum Effective Transient Thermal Impedance, Junction-to-Ambient

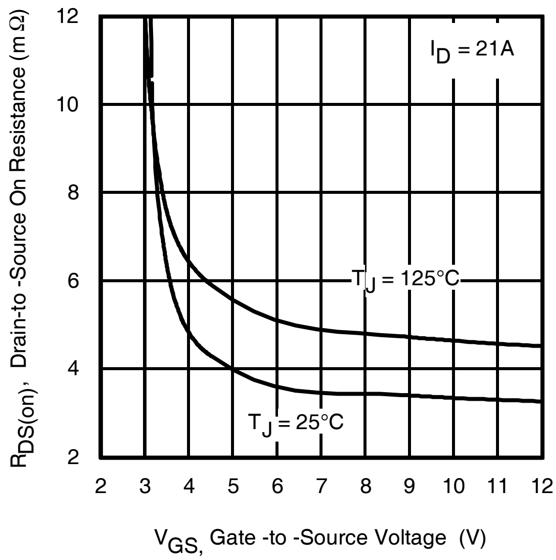


Fig 12. On-Resistance vs. Gate Voltage

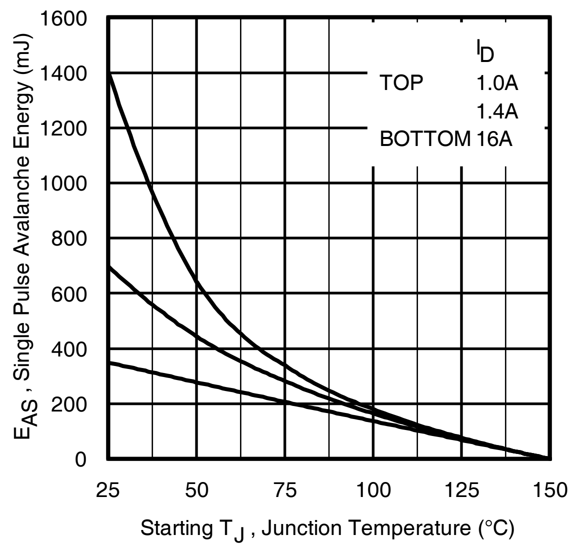


Fig 13. Maximum Avalanche Energy vs. Drain Current

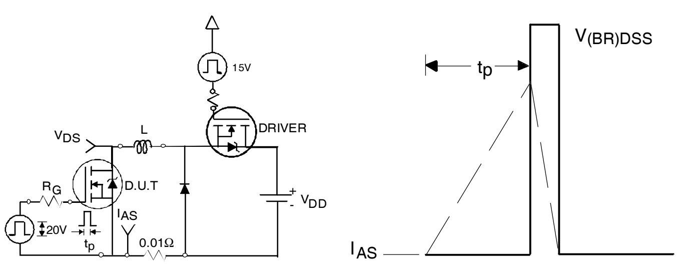


Fig 14. Unclamped Inductive Test Circuit and Waveform

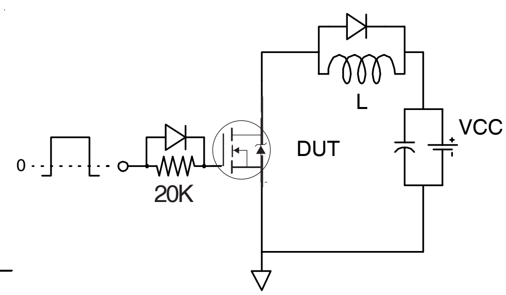


Fig 15. Gate Charge Test Circuit

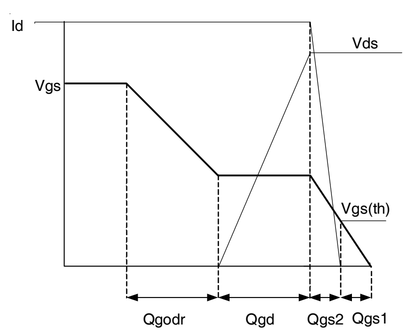


Fig 16. Gate Charge Waveform

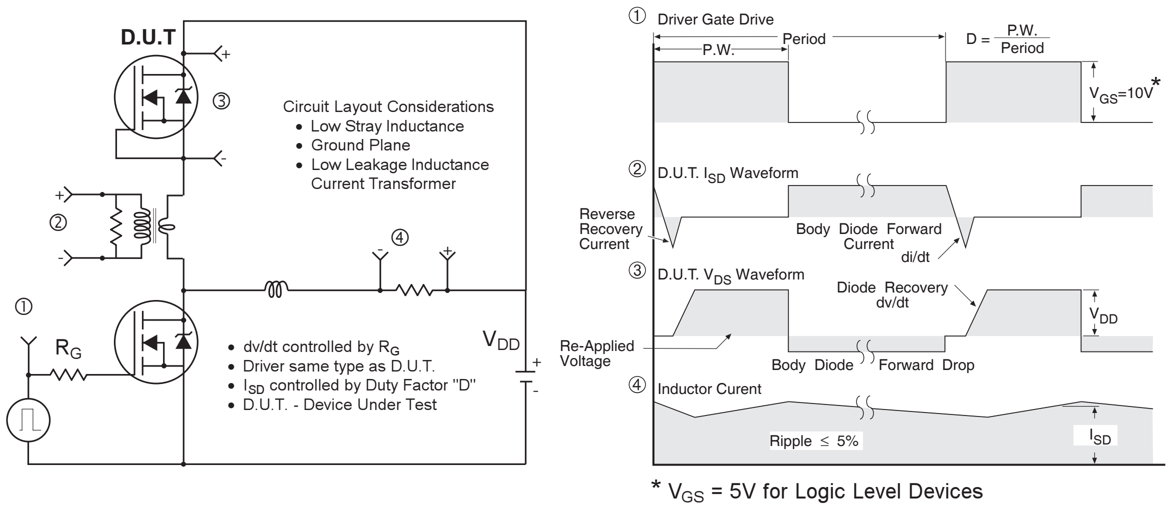


Fig 17. Peak Diode Recovery dv/dt Test Circuit for N-Channel HEXFET® Power MOSFETs

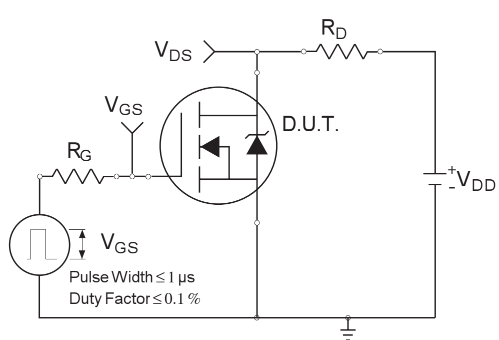


Fig 18a. Switching Time Test Circuit

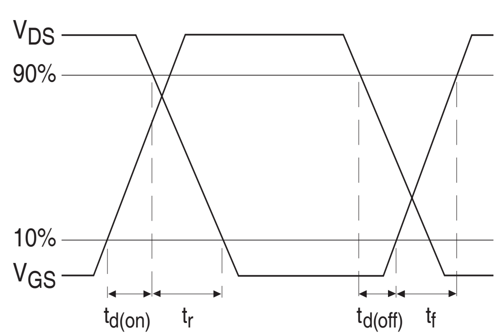
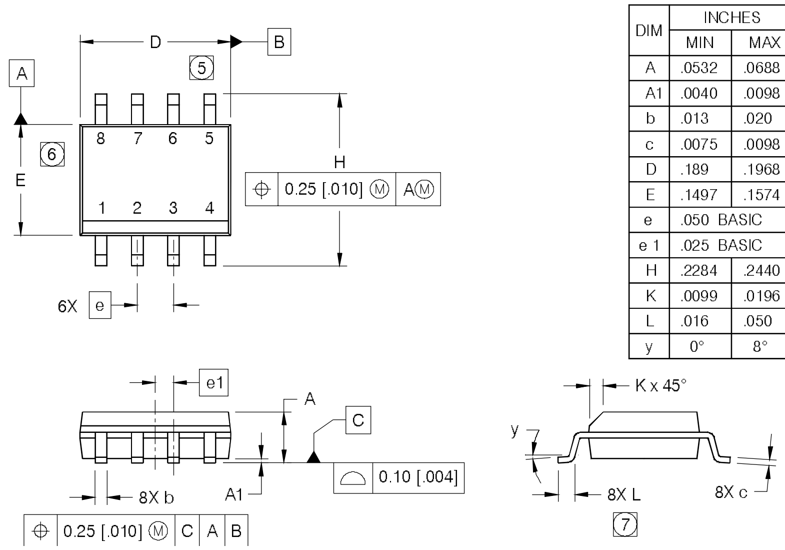


Fig 18b. Switching Time Waveforms

SO-8 Package Outline (Dimensions are shown in millimeters (inches))

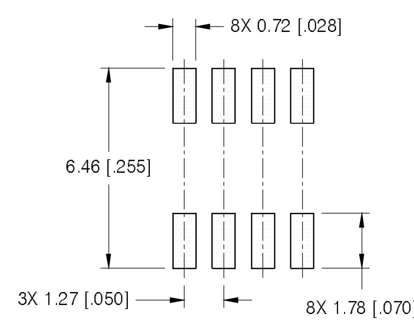


DIM	INCHES		MILLIMETERS	
	MIN	MAX	MIN	MAX
A	.0532	.0688	1.35	1.75
A1	.0040	.0098	0.10	0.25
b	.013	.020	0.33	0.51
c	.0075	.0098	0.19	0.25
D	.189	.1968	4.80	5.00
E	.1497	.1574	3.80	4.00
e	.050 BASIC		1.27 BASIC	
e 1	.025 BASIC		0.635 BASIC	
H	.2284	.2440	5.80	6.20
K	.0099	.0196	0.25	0.50
L	.016	.050	0.40	1.27
y	0°	8°	0°	8°

NOTES:

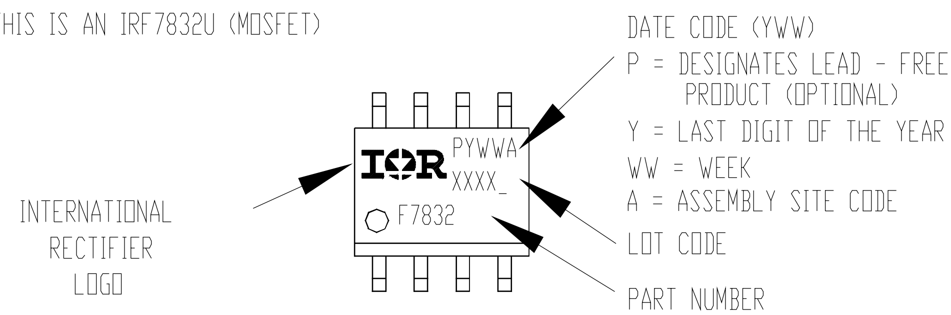
1. DIMENSIONING & TOLERANCING PER ASME Y14.5M-1994.
2. CONTROLLING DIMENSION: MILLIMETER
3. DIMENSIONS ARE SHOWN IN MILLIMETERS [INCHES].
4. OUTLINE CONFORMS TO JEDEC OUTLINE MS-012AA.
5. DIMENSION DOES NOT INCLUDE MOLD PROTRUSIONS. MOLD PROTRUSIONS NOT TO EXCEED 0.15 [.006].
6. DIMENSION DOES NOT INCLUDE MOLD PROTRUSIONS. MOLD PROTRUSIONS NOT TO EXCEED 0.25 [.010].
7. DIMENSION IS THE LENGTH OF LEAD FOR SOLDERING TO A SUBSTRATE.

FOOTPRINT



SO-8 Part Marking

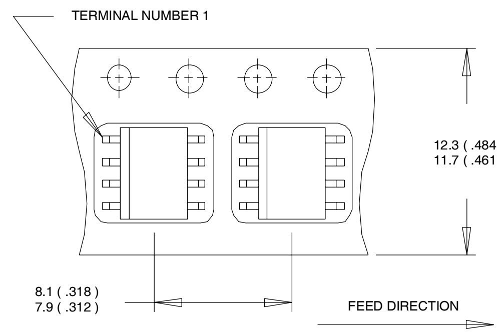
EXAMPLE: THIS IS AN IRF7832U (MOSFET)



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

SO-8 Tape and Reel

Dimensions are shown in millimeters (inches)



NOTES:
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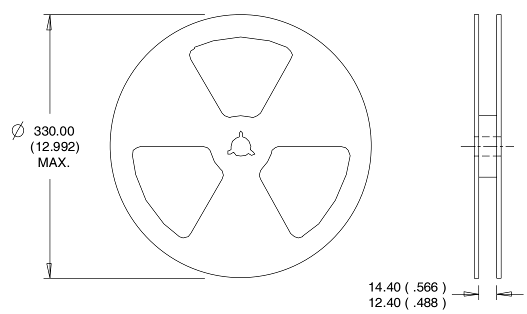
2. ALL DIMENSIONS ARE SHOWN IN MILLIMETERS(INCHES).
3. OUTLINE CONFORMS TO EIA-481 & EIA-541.



NOTES :
1. CONTROLLING DIMENSION : MILLIMETER.
2. OUTLINE CONFORMS TO EIA-481 & EIA-541.

Notes:

① Repetitive rating; pulse width limited by max. junction temperature.
② Starting T_J = 25°C, L = 2.7mH, R_G = 25Ω, I_{AS} = 16A.
③ Pulse width ≤ 400μs; duty cycle ≤ 2%.
④ When mounted on 1 inch square copper board.
⑤ R_θ is measured at T_J of approximately 90°C.

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Data and specifications subject to change without notice.
This product has been designed and qualified for the Consumer market.
Qualification Standards can be found on IR's Web site.

International
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