

# IRF7835PbF

HEXFET® Power MOSFET

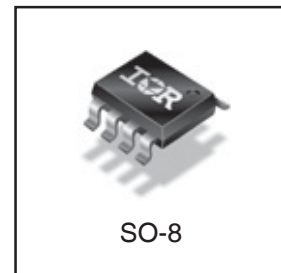
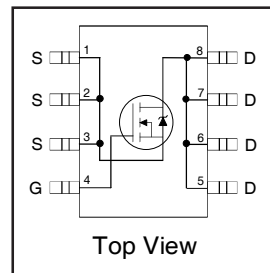
## Applications

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

## Benefits

- Very Low  $Q_{rr}$
- 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
- Lead-Free

$V_{DSS}$	$R_{DS(on)}$ max	Qg
30V	4.5mΩ @ $V_{GS} = 10V$	22nC



## Absolute Maximum Ratings

	Parameter	Max.	Units
$V_{DS}$	Drain-to-Source Voltage	30	V
$V_{GS}$	Gate-to-Source Voltage	± 20	
$I_D$ @ $T_A = 25^\circ C$	Continuous Drain Current, $V_{GS}$ @ 10V	19	A
$I_D$ @ $T_A = 70^\circ C$	Continuous Drain Current, $V_{GS}$ @ 10V	15	
$I_{DM}$	Pulsed Drain Current ①	150	
$P_D$ @ $T_A = 25^\circ C$	Power Dissipation	2.5	W
$P_D$ @ $T_A = 70^\circ C$	Power Dissipation	1.6	
	Linear Derating Factor	0.02	W/°C
$T_J$	Operating Junction and	-55 to + 155	°C
$T_{STG}$	Storage Temperature Range		

## Thermal Resistance

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

Notes ① through ⑤ are on page 9

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Static @  $T_J = 25^\circ\text{C}$  (unless otherwise specified)

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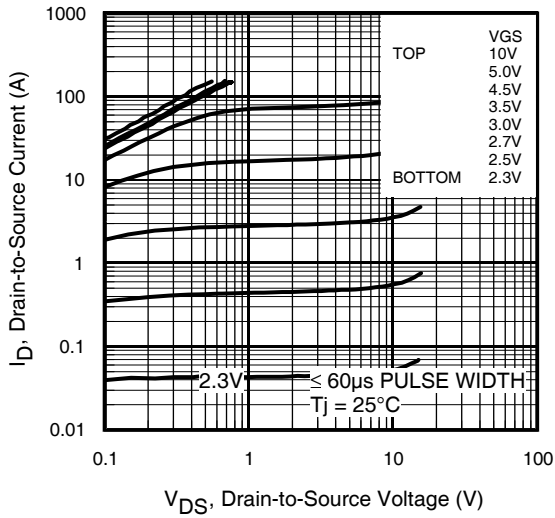
	Parameter	Min.	Typ.	Max.	Units	Conditions
$BV_{DSS}$	Drain-to-Source Breakdown Voltage	30	—	—	V	$V_{GS} = 0V, I_D = 250\mu A$
$\Delta BV_{DSS}/\Delta T_J$	Breakdown Voltage Temp. Coefficient	—	0.023	—	V/ $^\circ\text{C}$	Reference to $25^\circ\text{C}, I_D = 1\text{mA}$
$R_{DS(on)}$	Static Drain-to-Source On-Resistance	—	3.6	4.5	$m\Omega$	$V_{GS} = 10V, I_D = 19A$ ③
		—	4.5	5.7		$V_{GS} = 4.5V, I_D = 15A$ ③
$V_{GS(th)}$	Gate Threshold Voltage	1.35	1.8	2.35	V	$V_{DS} = V_{GS}, I_D = 50\mu A$
$\Delta V_{GS(th)}$	Gate Threshold Voltage Coefficient	—	-6.0	—	$mV/^\circ\text{C}$	
$I_{DSS}$	Drain-to-Source Leakage Current	—	—	1.0	$\mu A$	$V_{DS} = 24V, V_{GS} = 0V$
		—	—	150		$V_{DS} = 24V, V_{GS} = 0V, T_J = 125^\circ\text{C}$
$I_{GSS}$	Gate-to-Source Forward Leakage	—	—	100	$nA$	$V_{GS} = 20V$
	Gate-to-Source Reverse Leakage	—	—	-100		$V_{GS} = -20V$
$g_{fs}$	Forward Transconductance	81	—	—	S	$V_{DS} = 15V, I_D = 15A$
$Q_g$	Total Gate Charge	—	22	33	$nC$	$V_{DS} = 15V$ $V_{GS} = 4.5V$ $I_D = 15A$ See Fig. 16
$Q_{gs1}$	Pre-V <sub>th</sub> Gate-to-Source Charge	—	5.5	—		
$Q_{gs2}$	Post-V <sub>th</sub> Gate-to-Source Charge	—	2.1	—		
$Q_{gd}$	Gate-to-Drain Charge	—	7.2	—		
$Q_{godr}$	Gate Charge Overdrive	—	7.2	—		
$Q_{sw}$	Switch Charge ( $Q_{gs2} + Q_{gd}$ )	—	9.3	—		
$Q_{oss}$	Output Charge	—	14	—	$nC$	$V_{DS} = 16V, V_{GS} = 0V$
$R_G$	Gate Resistance	—	1.0	1.7	$\Omega$	
$t_{d(on)}$	Turn-On Delay Time	—	9.6	—	$ns$	$V_{DD} = 15V, V_{GS} = 4.5V$ $I_D = 15A$ Clamped Inductive Load
$t_r$	Rise Time	—	13	—		
$t_{d(off)}$	Turn-Off Delay Time	—	14	—		
$t_f$	Fall Time	—	4.6	—		
$C_{iss}$	Input Capacitance	—	2960	—	$pF$	$V_{GS} = 0V$ $V_{DS} = 15V$ $f = 1.0\text{MHz}$
$C_{oss}$	Output Capacitance	—	610	—		
$C_{riss}$	Reverse Transfer Capacitance	—	270	—		

## Avalanche Characteristics

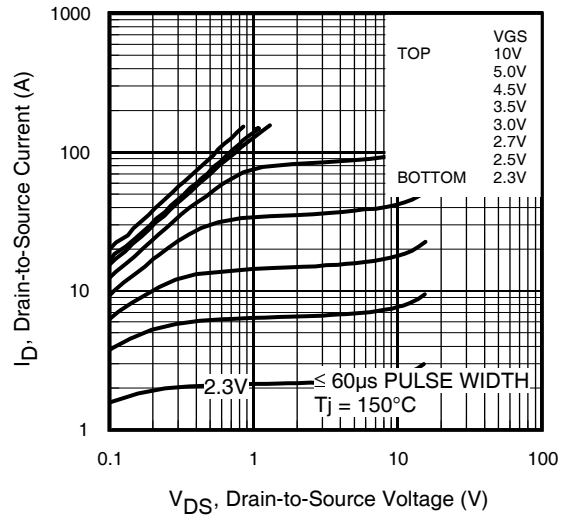
	Parameter	Typ.	Max.	Units
$E_{AS}$	Single Pulse Avalanche Energy ②	—	240	mJ
$I_{AR}$	Avalanche Current ①	—	15	A

## Diode Characteristics

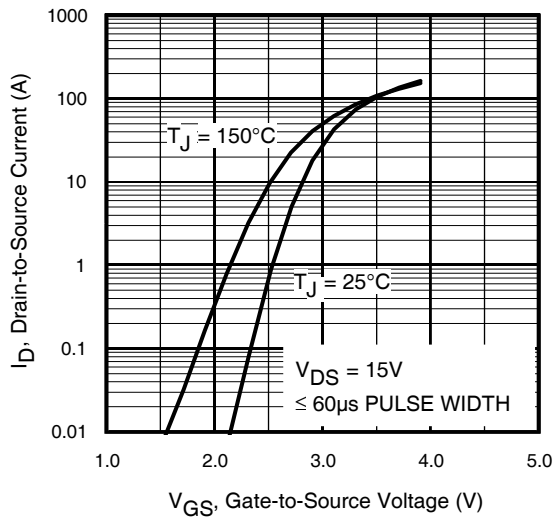
	Parameter	Min.	Typ.	Max.	Units	Conditions
$I_S$	Continuous Source Current (Body Diode)	—	—	3.1	A	MOSFET symbol showing the integral reverse p-n junction diode.
$I_{SM}$	Pulsed Source Current (Body Diode) ①	—	—	150		
$V_{SD}$	Diode Forward Voltage	—	—	1.0	V	$T_J = 25^\circ\text{C}, I_S = 15A, V_{GS} = 0V$ ③
$t_{rr}$	Reverse Recovery Time	—	16	24	ns	$T_J = 25^\circ\text{C}, I_F = 15A, V_{DD} = 15V$
$Q_{rr}$	Reverse Recovery Charge	—	21	32	nC	$di/dt = 320A/\mu s$ ③
$t_{on}$	Forward Turn-On Time	Intrinsic turn-on time is negligible (turn-on is dominated by LS+LD)				



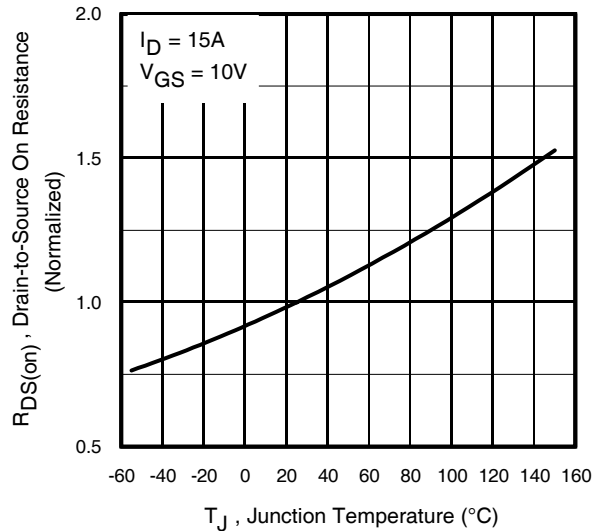
**Fig 1.** Typical Output Characteristics



**Fig 2.** Typical Output Characteristics



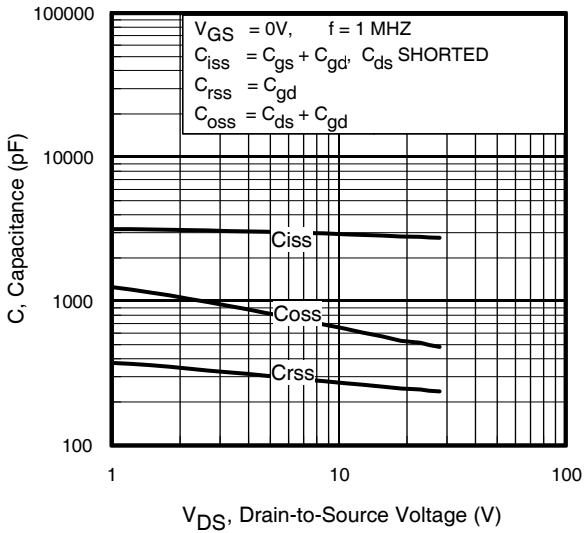
**Fig 3.** Typical Transfer Characteristics



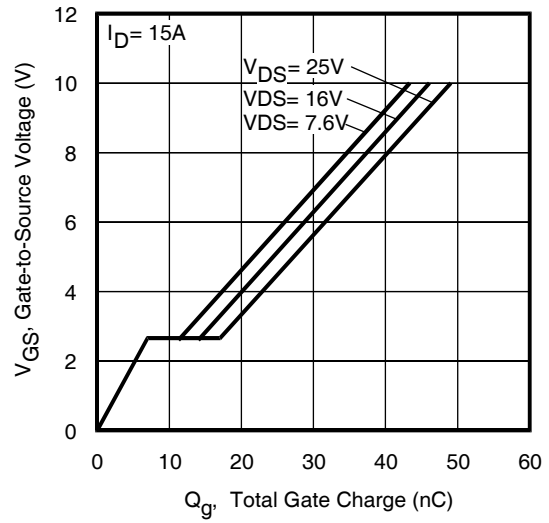
**Fig 4.** Normalized On-Resistance Vs. Temperature

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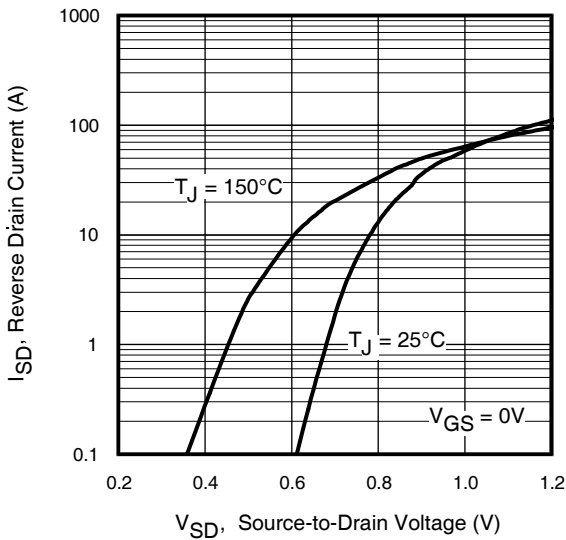
International  
**IR** Rectifier



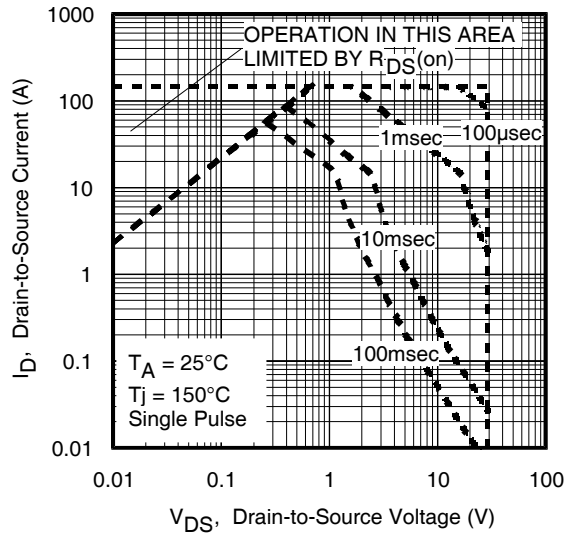
**Fig 5.** Typical Capacitance Vs. Drain-to-Source Voltage



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



**Fig 7.** Typical Source-Drain Diode Forward Voltage



**Fig 8.** Maximum Safe Operating Area

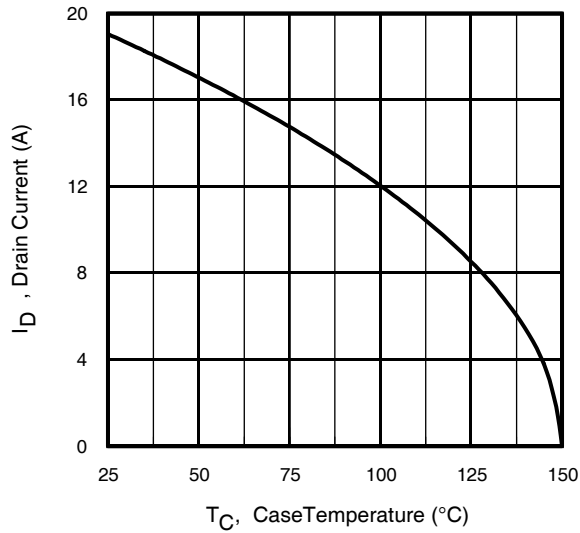


Fig 9. Maximum Drain Current Vs. Case Temperature

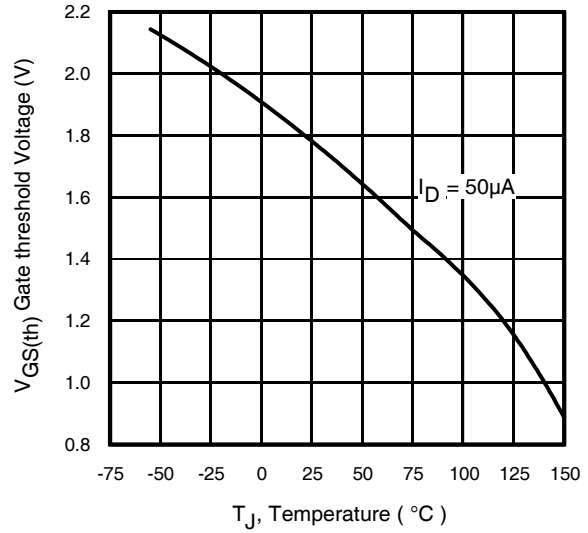


Fig 10. Threshold Voltage Vs. Temperature

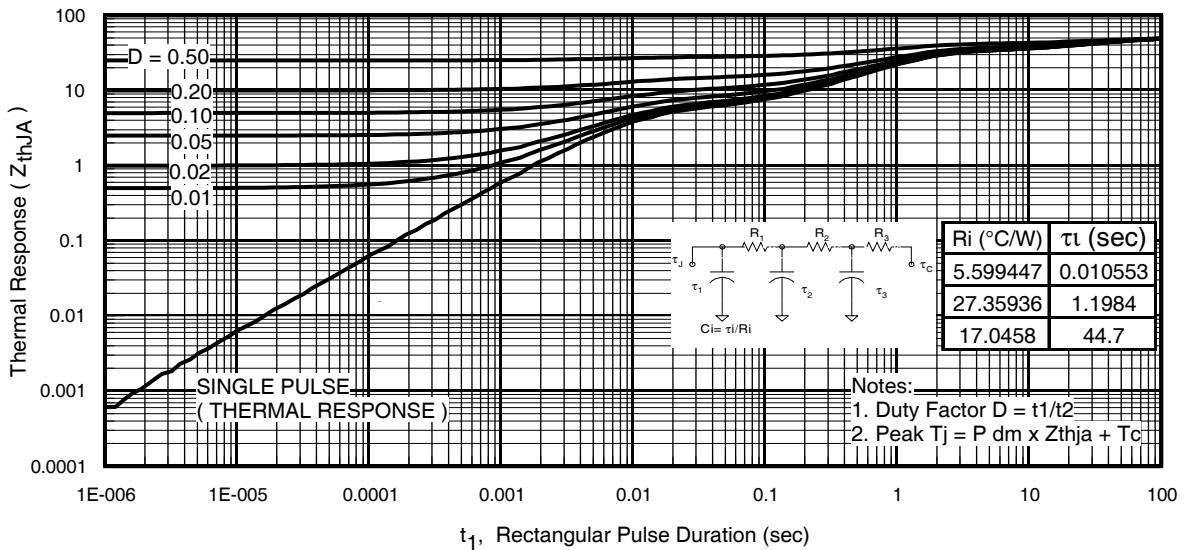
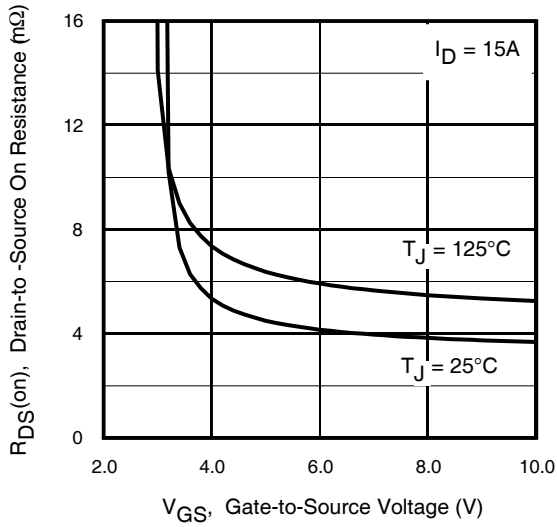


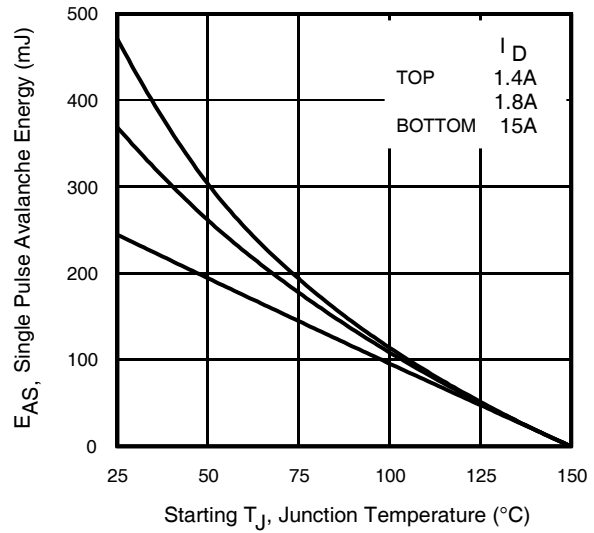
Fig 11. Maximum Effective Transient Thermal Impedance, Junction-to-Ambient

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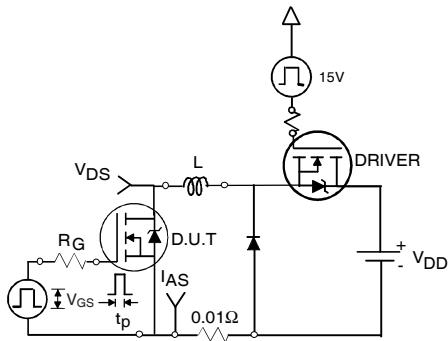
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**IR** Rectifier



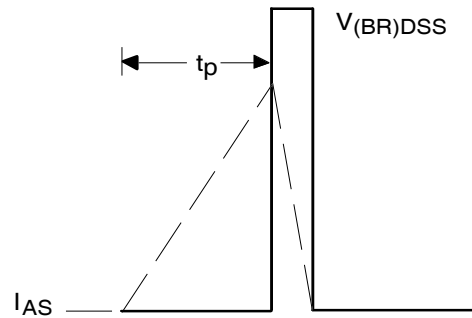
**Fig 12.** On-Resistance vs. Gate Voltage



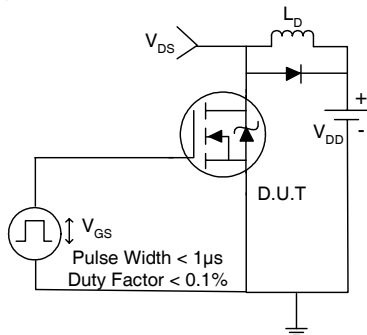
**Fig 13.** Maximum Avalanche Energy vs. Drain Current



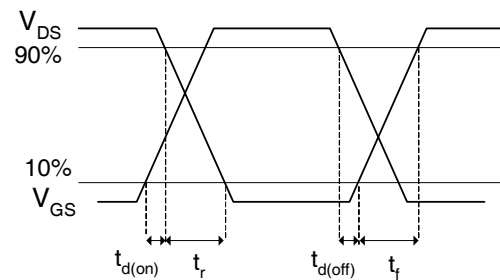
**Fig 14a.** Unclamped Inductive Test Circuit



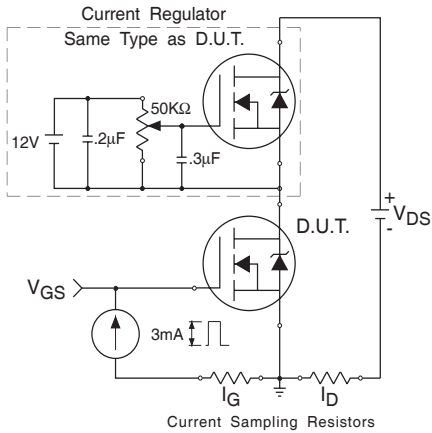
**Fig 14b.** Unclamped Inductive Waveforms



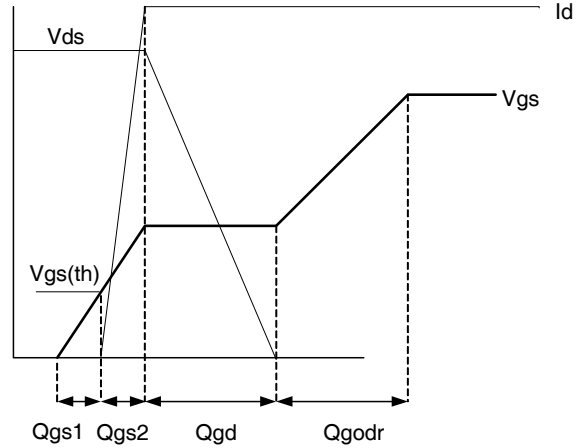
**Fig 15a.** Switching Time Test Circuit



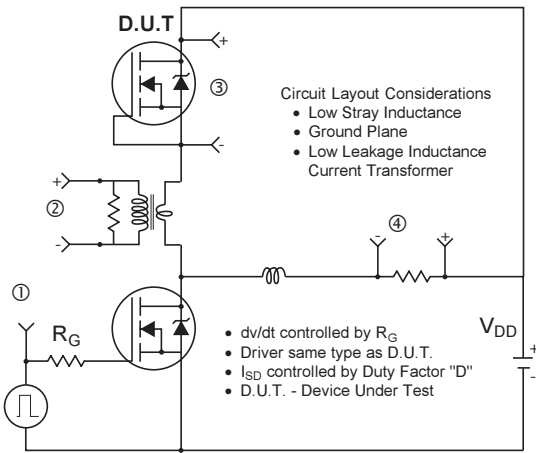
**Fig 15b.** Switching Time Waveforms



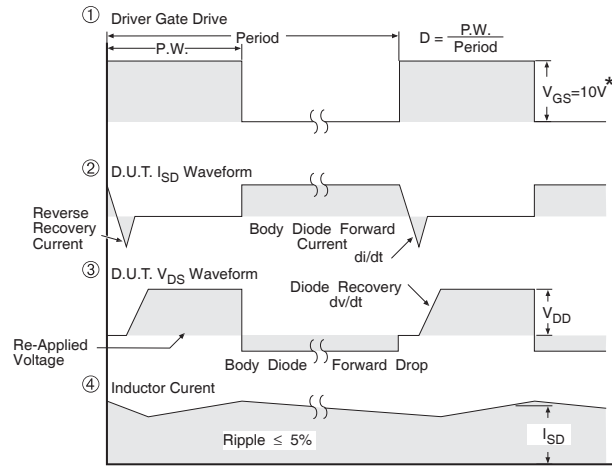
**Fig 16a.** Gate Charge Test Circuit



**Fig 16b.** Gate Charge Waveform



**Fig 17.** Peak Diode Recovery  $dv/dt$  Test Circuit for N-Channel HEXFET<sup>®</sup> Power MOSFETs

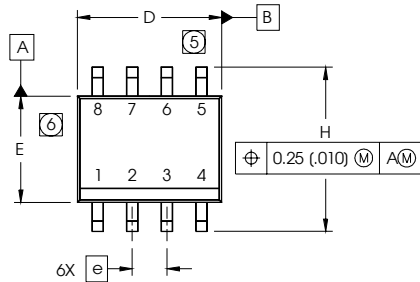


\*  $V_{GS} = 5V$  for Logic Level Devices

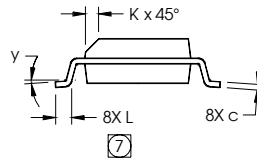
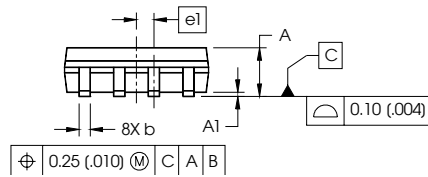
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## SO-8 Package Details



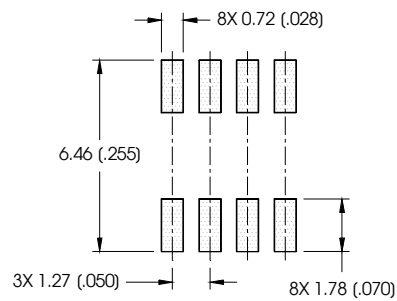
DIM	INCHES		MILLIMETERS	
	MIN	MAX	MIN	MAX
A	.0532	.0688	1.35	1.75
A1	.0040	.0098	0.10	0.25
b	.013	.020	0.33	0.51
c	.0075	.0098	0.19	0.25
D	.189	.1968	4.80	5.00
E	.1497	.1574	3.80	4.00
e	.050 BASIC		1.27 BASIC	
e1	.025 BASIC		0.635 BASIC	
H	.2284	.2440	5.80	6.20
K	.0099	.0196	0.25	0.50
L	.016	.050	0.40	1.27
y	0°	8°	0°	8°



### NOTES:

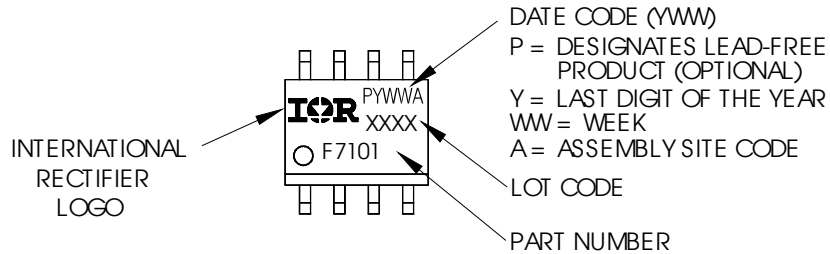
1. DIMENSIONING & TOLERANCING PER ASME Y14.5M-1994.
2. CONTROLLING DIMENSION: MILLIMETER
3. DIMENSIONS ARE SHOWN IN MILLIMETERS (INCHES).
4. OUTLINE CONFORMS TO JEDEC OUTLINE MS-012AA.
5. DIMENSION DOES NOT INCLUDE MOLD PROTRUSIONS. MOLD PROTRUSIONS NOT TO EXCEED 0.15 (.006).
6. DIMENSION DOES NOT INCLUDE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

### FOOTPRINT



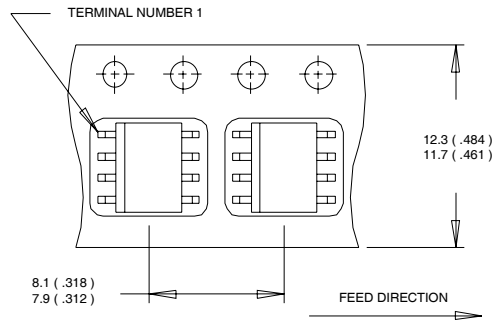
## SO-8 Part Marking

EXAMPLE: THIS IS AN IRF7101 (MOSFET)

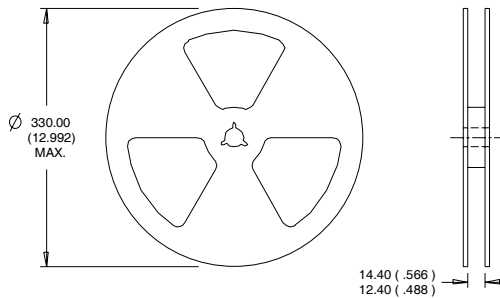




## SO-8 Tape and Reel



- 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.

**Notes:**

- ① Repetitive rating; pulse width limited by max. junction temperature.
- ② Starting  $T_J = 25^\circ\text{C}$ ,  $L = 2.1\text{mH}$ ,  $R_G = 25\Omega$ ,  $I_{AS} = 15\text{A}$ .
- ③ Pulse width  $\leq 400\mu\text{s}$ ; duty cycle  $\leq 2\%$ .
- ④ When mounted on 1 inch square copper board.
- ⑤  $R_{\theta}$  is measured at  $T_J$  of approximately  $90^\circ\text{C}$ .

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.