

# IRF7493

HEXFET® Power MOSFET

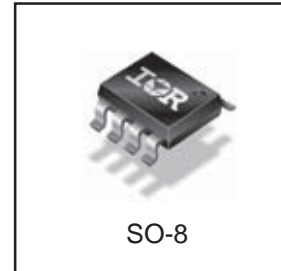
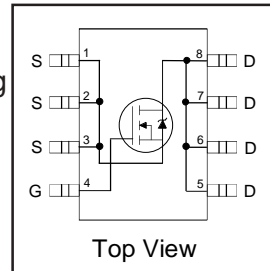
## Applications

- High frequency DC-DC converters

<b>V<sub>DSS</sub></b>	<b>R<sub>DS(on)</sub> max</b>	<b>Qg (typ.)</b>
<b>80V</b>	<b>15mΩ @ V<sub>GS</sub>=10V</b>	<b>35nC</b>

## Benefits

- Low Gate-to-Drain Charge to Reduce Switching Losses
- Fully Characterized Capacitance Including Effective C<sub>oss</sub> to Simplify Design, (See App. Note AN1001)
- Fully Characterized Avalanche Voltage and Current



## Absolute Maximum Ratings

	Parameter	Max.	Units
V <sub>DS</sub>	Drain-to-Source Voltage	80	V
V <sub>GS</sub>	Gate-to-Source Voltage	± 20	
I <sub>D</sub> @ T <sub>C</sub> = 25°C	Continuous Drain Current, V <sub>GS</sub> @ 10V	9.3	A
I <sub>D</sub> @ T <sub>C</sub> = 70°C	Continuous Drain Current, V <sub>GS</sub> @ 10V	7.4	
I <sub>DM</sub>	Pulsed Drain Current ①	74	
P <sub>D</sub> @ T <sub>C</sub> = 25°C	Maximum Power Dissipation ④	2.5	W
P <sub>D</sub> @ T <sub>C</sub> = 70°C	Maximum Power Dissipation ④	1.6	
	Linear Derating Factor	0.02	W/°C
T <sub>J</sub>	Operating Junction and	-55 to + 150	°C
T <sub>STG</sub>	Storage Temperature Range		

## Thermal Resistance

	Parameter	Typ.	Max.	Units
R <sub>θJC</sub>	Junction-to-Lead	—	20	
R <sub>θJA</sub>	Junction-to-Ambient ④	—	50	

Notes ① through ⑤ are on page 9

# IRF7493

International  
IR Rectifier

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

	Parameter	Min.	Typ.	Max.	Units	Conditions
$BV_{DSS}$	Drain-to-Source Breakdown Voltage	80	—	—	V	$V_{GS} = 0V, I_D = 250\mu A$
$\Delta BV_{DSS}/\Delta T_J$	Breakdown Voltage Temp. Coefficient	—	0.074	—	mV/°C	Reference to $25^\circ\text{C}, I_D = 1\text{mA}$
$R_{DS(on)}$	Static Drain-to-Source On-Resistance	—	11.5	15	m $\Omega$	$V_{GS} = 10V, I_D = 5.6A$ ③
$V_{GS(th)}$	Gate Threshold Voltage	2.0	—	4.0	V	$V_{DS} = V_{GS}, I_D = 250\mu A$
$I_{DSS}$	Drain-to-Source Leakage Current	—	—	20	$\mu A$	$V_{DS} = 80V, V_{GS} = 0V$
		—	—	250		$V_{DS} = 64V, V_{GS} = 0V, T_J = 125^\circ\text{C}$
$I_{GSS}$	Gate-to-Source Forward Leakage	—	—	200	nA	$V_{GS} = 20V$
	Gate-to-Source Reverse Leakage	—	—	-200		$V_{GS} = -20V$

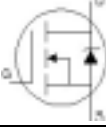
## Dynamic @ $T_J = 25^\circ\text{C}$ (unless otherwise specified)

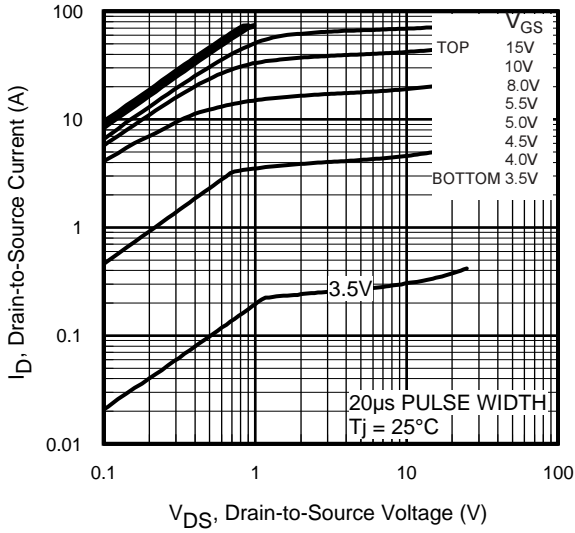
gfs	Forward Transconductance	13	—	—	S	$V_{DS} = 15V, I_D = 5.6A$
$Q_g$	Total Gate Charge	—	35	53	ns	$I_D = 5.6A$ $V_{DS} = 40V$ $V_{GS} = 10V$
$Q_{gs}$	Gate-to-Source Charge	—	5.7	—		
$Q_{gd}$	Gate-to-Drain Charge	—	12	—		
$t_{d(on)}$	Turn-On Delay Time	—	8.3	—		
$t_r$	Rise Time	—	7.5	—	ns	$V_{DD} = 40V, \text{ ③}$ $I_D = 5.6A$ $R_G = 6.2\Omega$ $V_{GS} = 10V$
$t_{d(off)}$	Turn-Off Delay Time	—	30	—		
$t_f$	Fall Time	—	12	—		
$C_{iss}$	Input Capacitance	—	1510	—	pF	$V_{GS} = 0V$
$C_{oss}$	Output Capacitance	—	320	—		$V_{DS} = 25V$
$C_{riss}$	Reverse Transfer Capacitance	—	130	—		$f = 1.0\text{MHz}$
$C_{oss}$	Output Capacitance	—	1130	—		$V_{GS} = 0V, V_{DS} = 1.0V, f = 1.0\text{MHz}$
$C_{oss}$	Output Capacitance	—	210	—		$V_{GS} = 0V, V_{DS} = 64V, f = 1.0\text{MHz}$
$C_{riss\ eff.}$	Effective Output Capacitance	—	320	—		$V_{GS} = 0V, V_{DS} = 0V \text{ to } 64V$ ⑤

## Avalanche Characteristics

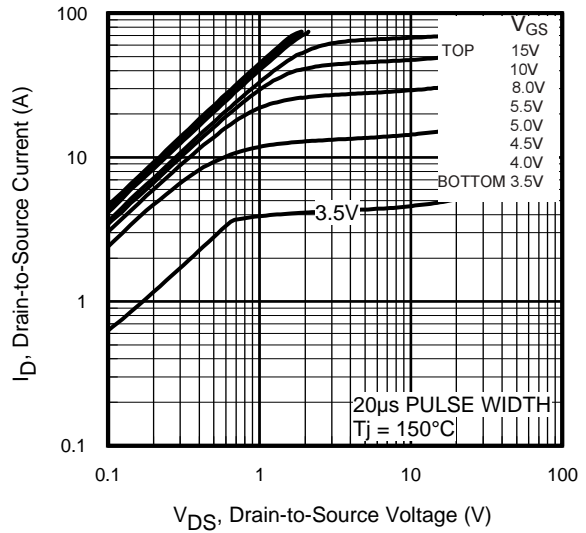
	Parameter	Typ.	Max.	Units
$E_{AS}$	Single Pulse Avalanche Energy②	—	180	mJ
$I_{AR}$	Avalanche Current ①	—	5.6	A

## Diode Characteristics

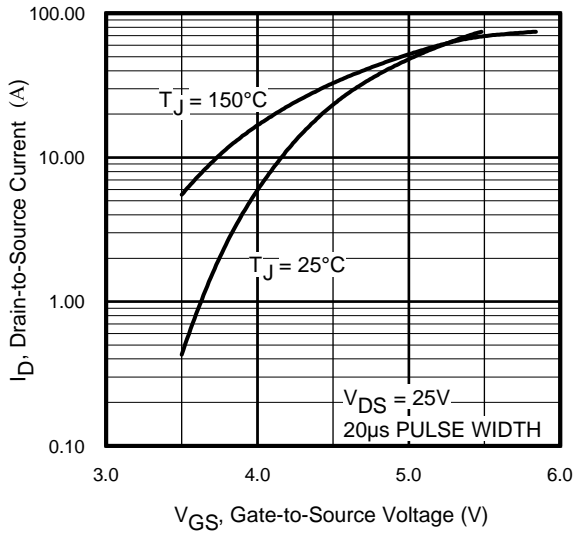
	Parameter	Min.	Typ.	Max.	Units	Conditions
$I_S$	Continuous Source Current (Body Diode)	—	—	9.3	A	MOSFET symbol showing the integral reverse p-n junction diode. 
$I_{SM}$	Pulsed Source Current (Body Diode) ①	—	—	74		
$V_{SD}$	Diode Forward Voltage	—	—	1.3	V	$T_J = 25^\circ\text{C}, I_S = 5.6A, V_{GS} = 0V$ ③
$t_{rr}$	Reverse Recovery Time	—	37	56	ns	$T_J = 25^\circ\text{C}, I_F = 5.6A, V_{DD} = 15V$
$Q_{rr}$	Reverse Recovery Charge	—	52	78	nC	$di/dt = 100A/\mu s$ ③



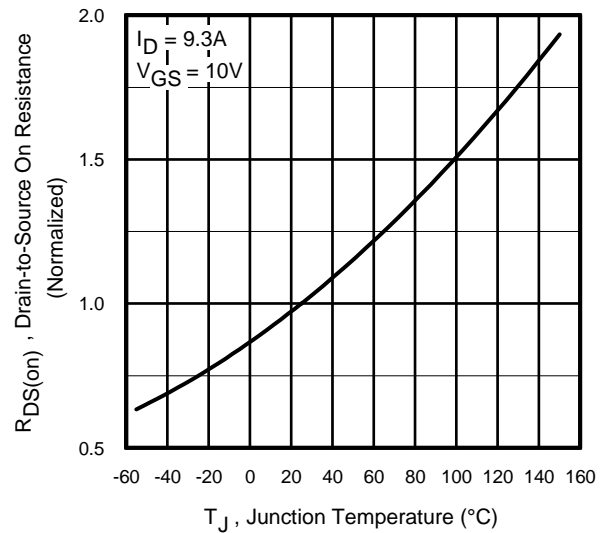
**Fig 1.** Typical Output Characteristics



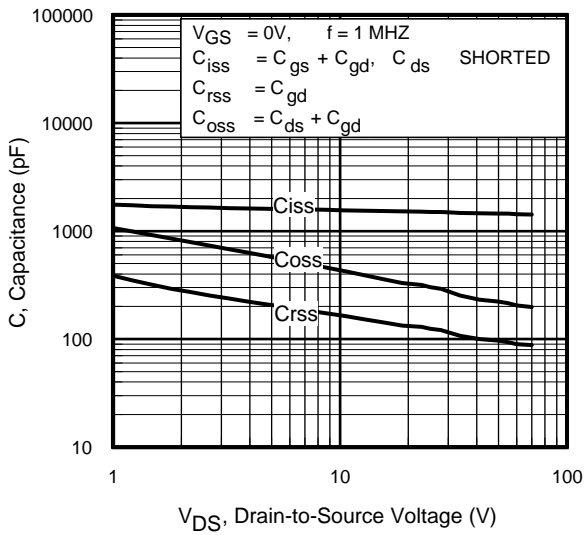
**Fig 2.** Typical Output Characteristics



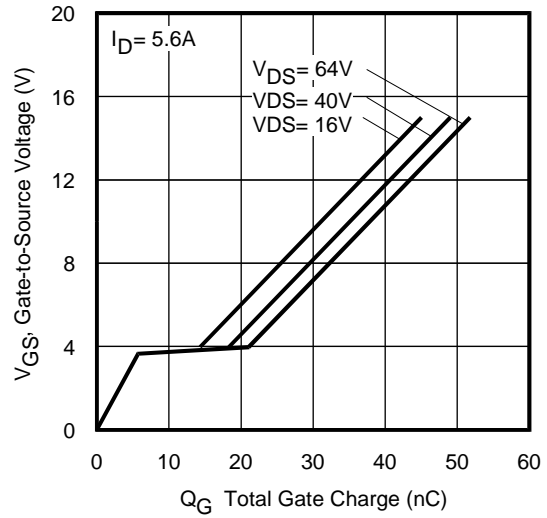
**Fig 3.** Typical Transfer Characteristics



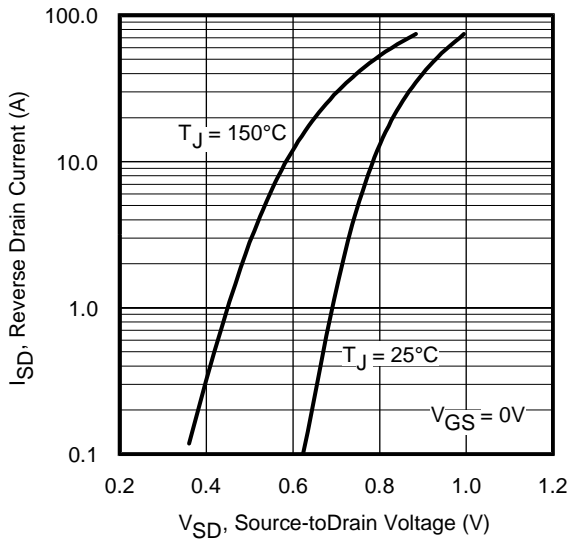
**Fig 4.** Normalized On-Resistance Vs. Temperature



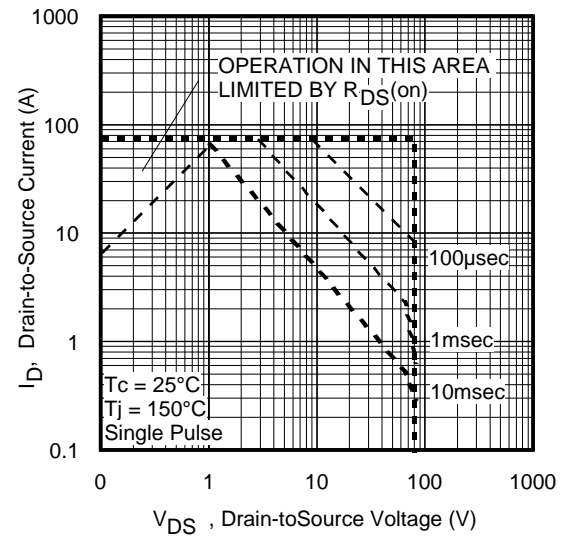
**Fig 5.** Typical Capacitance Vs. Drain-to-Source Voltage



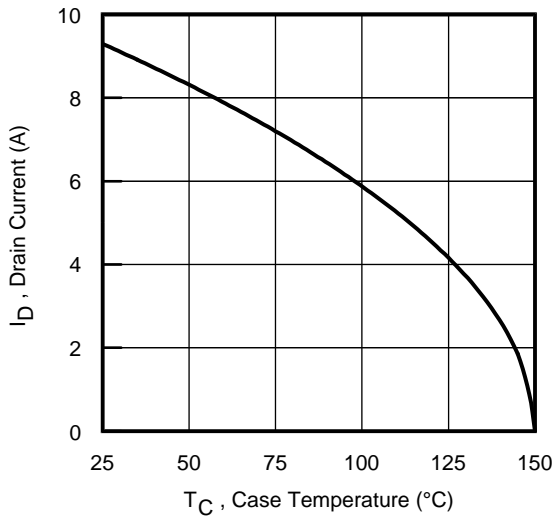
**Fig 6.** Typical Gate Charge Vs. Gate-to-Source Voltage



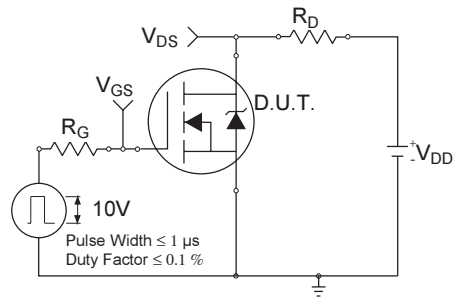
**Fig 7.** Typical Source-Drain Diode Forward Voltage



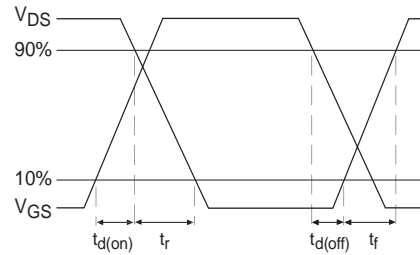
**Fig 8.** Maximum Safe Operating Area



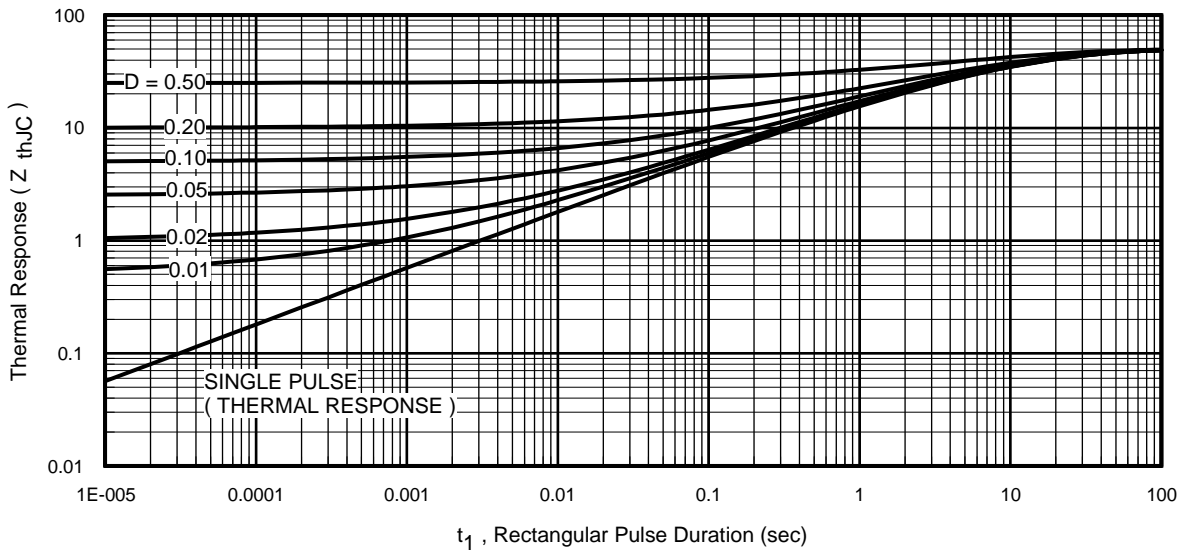
**Fig 9.** Maximum Drain Current Vs. Ambient Temperature



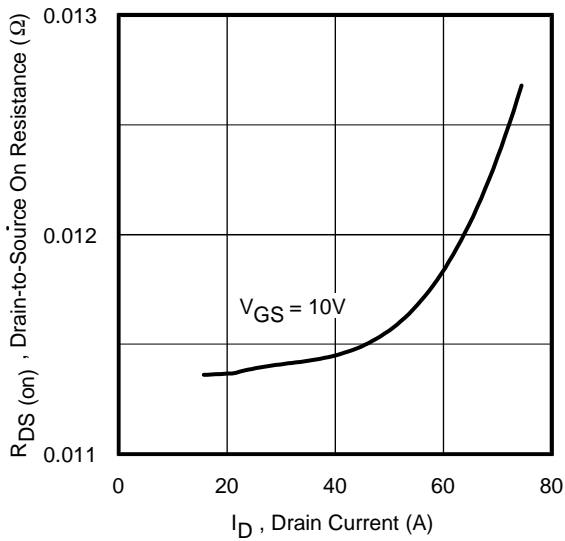
**Fig 10a.** Switching Time Test Circuit



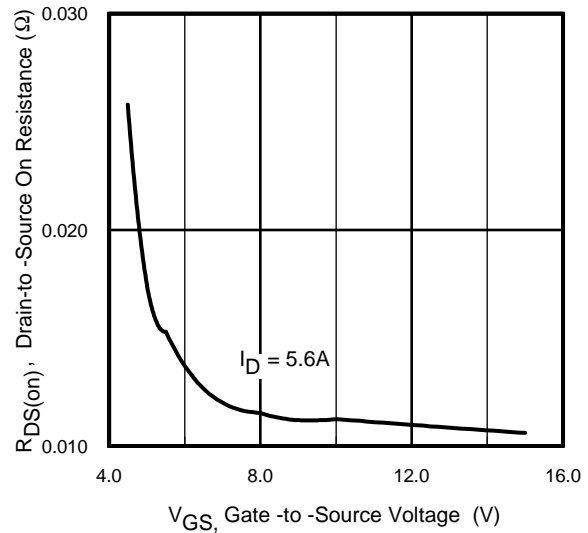
**Fig 10b.** Switching Time Waveforms



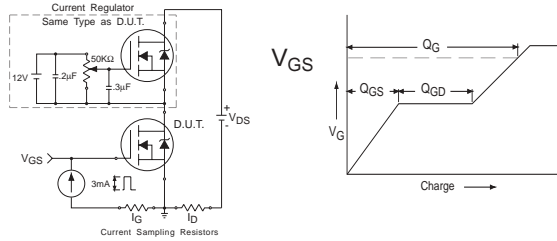
**Fig 11.** Maximum Effective Transient Thermal Impedance, Junction-to-Ambient



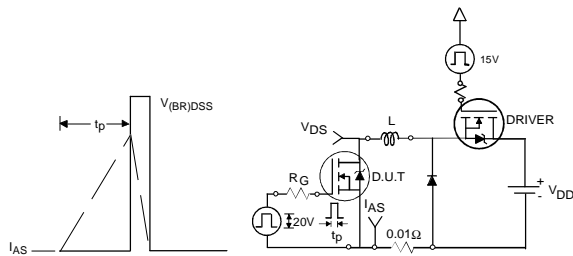
**Fig 12.** On-Resistance Vs. Drain Current



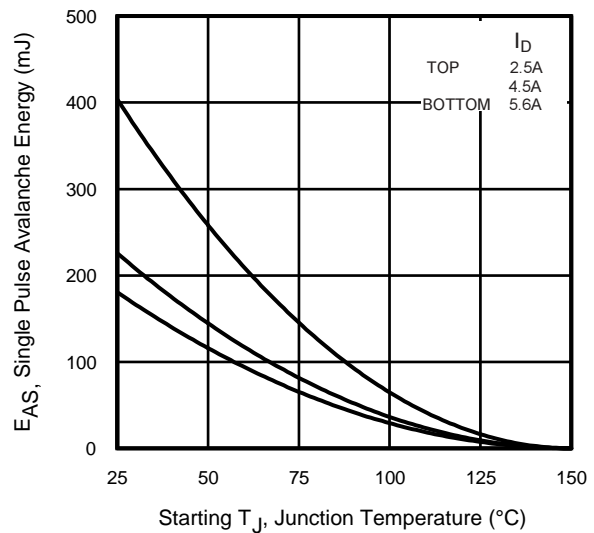
**Fig 13.** On-Resistance Vs. Gate Voltage



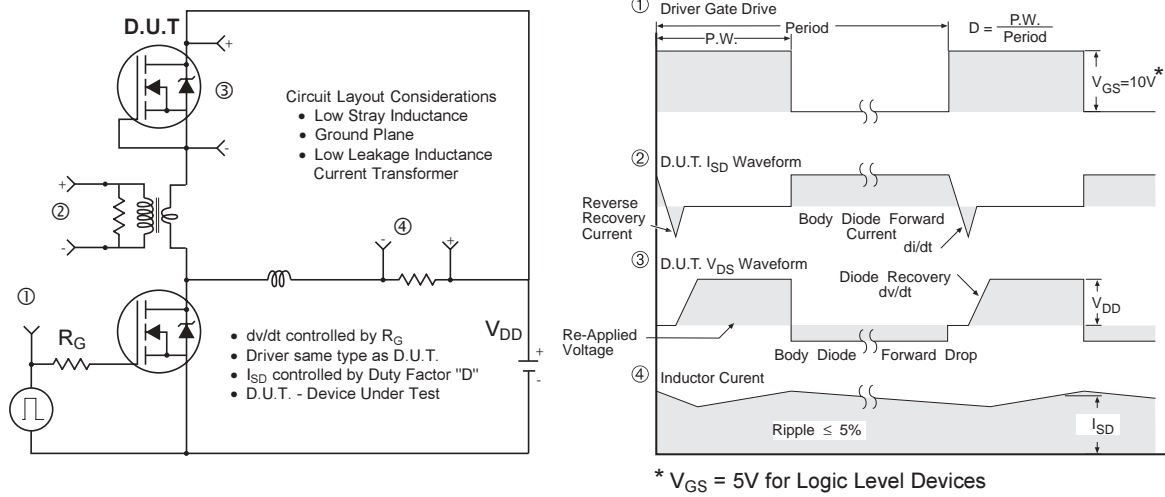
**Fig 14a&b.** Basic Gate Charge Test Circuit and Waveform



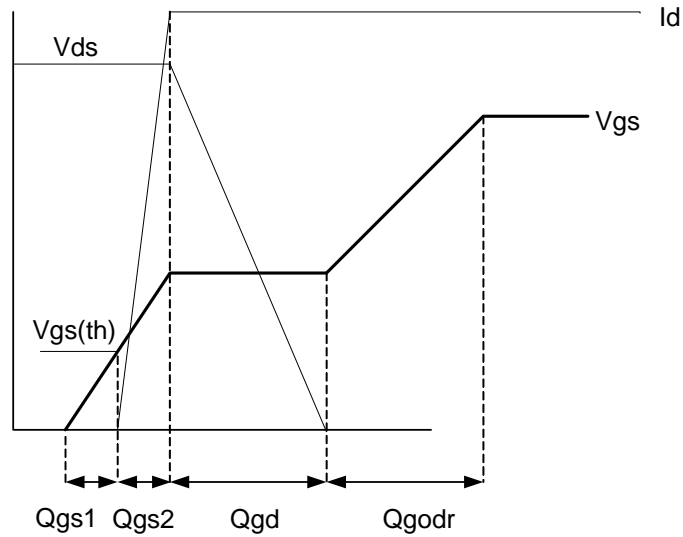
**Fig 15a&b.** Unclamped Inductive Test circuit and Waveforms



**Fig 15c.** Maximum Avalanche Energy Vs. Drain Current

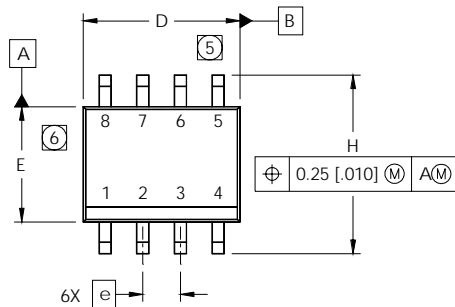


**Fig 16. Peak Diode Recovery  $dv/dt$  Test Circuit for N-Channel HEXFET<sup>®</sup> Power MOSFETs**

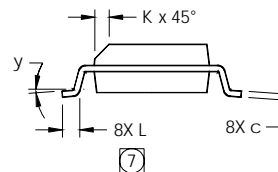
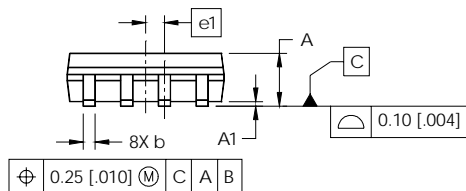


**Fig 17. Gate Charge Waveform**

## SO-8 Package Details



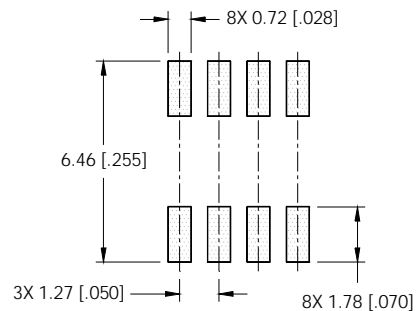
DIM	INCHES		MILLIMETERS	
	MIN	MAX	MIN	MAX
A	.0532	.0688	1.35	1.75
A1	.0040	.0098	0.10	0.25
b	.013	.020	0.33	0.51
c	.0075	.0098	0.19	0.25
D	.189	.1968	4.80	5.00
E	.1497	.1574	3.80	4.00
e	.050 BASIC		1.27 BASIC	
e1	.025 BASIC		0.635 BASIC	
H	.2284	.2440	5.80	6.20
K	.0099	.0196	0.25	0.50
L	.016	.050	0.40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



### NOTES:

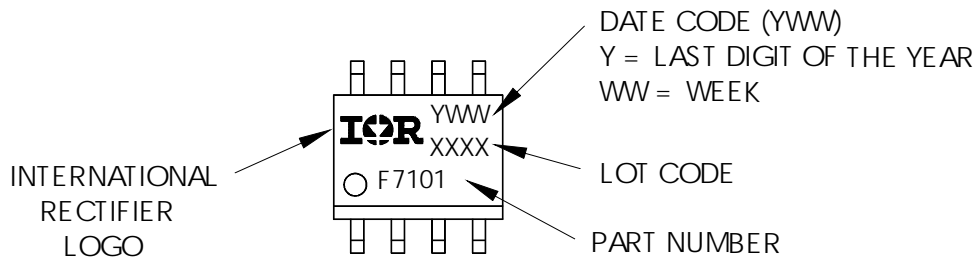
1. DIMENSIONING & TOLERANCING PER ASME Y14.5M-1994.
2. CONTROLLING DIMENSION: MILLIMETER
3. DIMENSIONS ARE SHOWN IN MILLIMETERS [INCHES].
4. OUTLINE CONFORMS TO JEDEC OUTLINE MS-012AA
- ⑤ DIMENSION DOES NOT INCLUDE MOLD PROTRUSIONS. MOLD PROTRUSIONS NOT TO EXCEED 0.15 [0.006].
- ⑥ DIMENSION DOES NOT INCLUDE MOLD PROTRUSIONS. MOLD PROTRUSIONS NOT TO EXCEED 0.25 [0.010].
- ⑦ DIMENSION IS THE LENGTH OF LEAD FOR SOLDERING TO A SUBSTRATE.

### FOOTPRINT



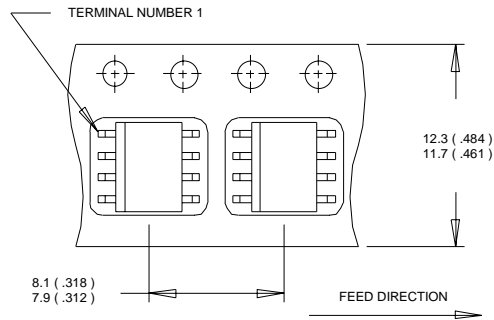
## SO-8 Part Marking

EXAMPLE: THIS IS AN IRF7101 (MOSFET)

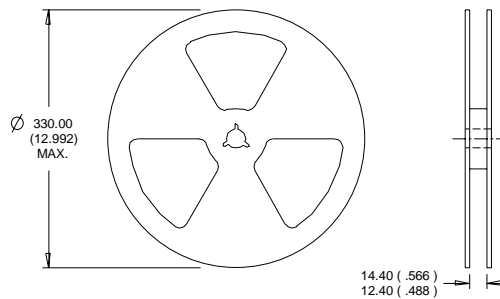




## SO-8 Tape and Reel



- 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  $T_J = 25^\circ\text{C}$ ,  $L = 12\text{mH}$   
 $R_G = 25\Omega$ ,  $I_{AS} = 5.6\text{A}$ .
- ③ Pulse width  $\leq 300\mu\text{s}$ ; duty cycle  $\leq 2\%$ .
- ④ When mounted on 1 inch square copper board
- ⑤  $C_{OSS}$  eff. is a fixed capacitance that gives the same charging time as  $C_{OSS}$  while  $V_{DS}$  is rising from 0 to 80%  $V_{DSS}$

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

International  
**IR** Rectifier

IR WORLD HEADQUARTERS: 233 Kansas St., El Segundo, California 90245, USA Tel: (310) 252-7105  
 TAC Fax: (310) 252-7903

Visit us at [www.irf.com](http://www.irf.com) for sales contact information.7/03