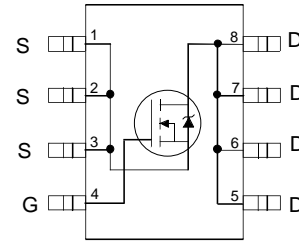


**Benefits**

- $V_{DS} (V) = 40V$
- $R_{DS(ON)} < 13m\Omega$  ( $V_{GS} = 10V$ )
- $R_{DS(ON)} < 15m\Omega$  ( $V_{GS} = 4.5V$ )

**Applications**

- High Frequency DC-DC Converters with Synchronous Rectification
- Lead-Free



Top View

**Absolute Maximum Ratings**

Symbol	Parameter	Max.	Units
$V_{DS}$	Drain-Source Voltage	40	V
$V_{GS}$	Gate-to-Source Voltage	$\pm 12$	V
$I_D @ T_A = 25^\circ C$	Continuous Drain Current, $V_{GS} @ 10V$	10	A
$I_D @ T_A = 70^\circ C$	Continuous Drain Current, $V_{GS} @ 10V$	8.5	
$I_{DM}$	Pulsed Drain Current <sup>①</sup>	85	
$P_D @ T_A = 25^\circ C$	Maximum Power Dissipation <sup>③</sup>	2.5	W
$P_D @ T_A = 70^\circ C$	Maximum Power Dissipation <sup>③</sup>	1.6	W
	Linear Derating Factor	0.02	W/ $^\circ C$
$T_J, T_{STG}$	Junction and Storage Temperature Range	-55 to + 150	$^\circ C$

**Thermal Resistance**

Symbol	Parameter	Typ.	Max.	Units
$R_{\theta JL}$	Junction-to-Drain Lead		20	$^\circ C/W$
$R_{\theta JA}$	Junction-to-Ambient <sup>④</sup>		50	

**Notes:**

- ① Repetitive rating; pulse width limited by max. junction temperature.
- ② Starting  $T_J = 25^\circ C$ ,  $L = 9.4mH$   
 $R_G = 25\Omega$ ,  $I_{AS} = 8.0A$ .
- ③ Pulse width  $\leq 400\mu s$ ; duty cycle  $\leq 2\%$ .
- ④ When mounted on 1 inch square copper board,  $t < 10$  sec

### Static @ T<sub>J</sub> = 25°C (unless otherwise specified)

	Parameter	Min.	Typ.	Max.	Units	Conditions
V <sub>(BR)DSS</sub>	Drain-to-Source Breakdown Voltage	40			V	V <sub>GS</sub> = 0V, I <sub>D</sub> = 250μA
ΔV <sub>(BR)DSS/ΔT<sub>J</sub></sub>	Breakdown Voltage Temp. Coefficient		0.04		V/°C	Reference to 25°C, I <sub>D</sub> = 1mA
R <sub>DS(on)</sub>	Static Drain-to-Source On-Resistance		9.0	13	mΩ	V <sub>GS</sub> = 10V, I <sub>D</sub> = 10A ④
			10	15		V <sub>GS</sub> = 4.5V, I <sub>D</sub> = 8.0A ④
V <sub>GS(th)</sub>	Gate Threshold Voltage	0.8		2.0	V	V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> = 250μA
I <sub>DSS</sub>	Drain-to-Source Leakage Current			20	μA	V <sub>DS</sub> = 32V, V <sub>GS</sub> = 0V
				100		V <sub>DS</sub> = 32V, V <sub>GS</sub> = 0V, T <sub>J</sub> = 125C
I <sub>GSS</sub>	Gate-to-Source Forward Leakage			200	nA	V <sub>GS</sub> = 12V
	Gate-to-Source Reverse Leakage			-200		V <sub>GS</sub> = -12V

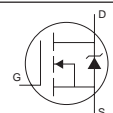
### Dynamic @ T<sub>J</sub> = 25°C (unless otherwise specified)

Symbol	Parameter	Min.	Typ.	Max.	Units	Conditions
g <sub>fs</sub>	Forward Transconductance	27			S	V <sub>DS</sub> = 20V, I <sub>D</sub> = 8.0A
Q <sub>g</sub>	Total Gate Charge		29	44	nC	I <sub>D</sub> = 8.0A
Q <sub>gs</sub>	Gate-to-Source Charge		7.9	12		V <sub>DS</sub> = 20V
Q <sub>gd</sub>	Gate-to-Drain ("Miller") Charge		8.0	12		V <sub>GS</sub> = 4.5V ③
Q <sub>oss</sub>	Output Gate Charge		23	35		V <sub>GS</sub> = 0V, V <sub>DS</sub> = 16V
t <sub>d(on)</sub>	Turn-On Delay Time		10		ns	V <sub>DD</sub> = 20V
t <sub>r</sub>	Rise Time		1.9			I <sub>D</sub> = 8.0A
t <sub>d(off)</sub>	Turn-Off Delay Time		21			R <sub>G</sub> = 1.8Ω
t <sub>f</sub>	Fall Time		3.2			V <sub>GS</sub> = 4.5V ③
C <sub>iss</sub>	Input Capacitance		3430		pF	V <sub>GS</sub> = 0V
C <sub>oss</sub>	Output Capacitance		690			V <sub>DS</sub> = 20V
C <sub>rss</sub>	Reverse Transfer Capacitance		41			f = 1.0MHz

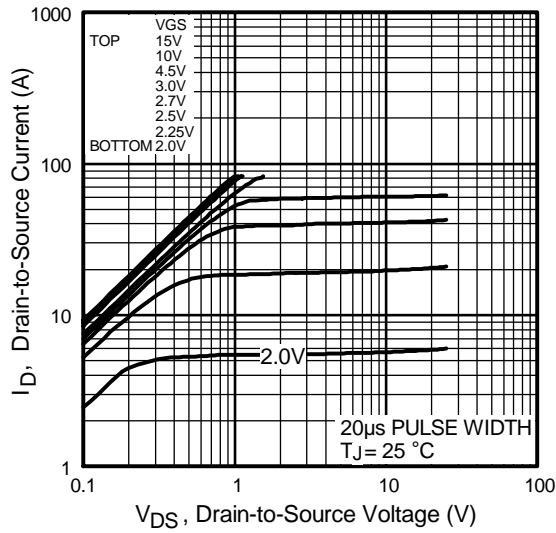
### Avalanche Characteristics

Symbol	Parameter	Typ.	Max.	Units
E <sub>AS</sub>	Single Pulse Avalanche Energy②		300	mJ
I <sub>AR</sub>	Avalanche Current②		8.0	A

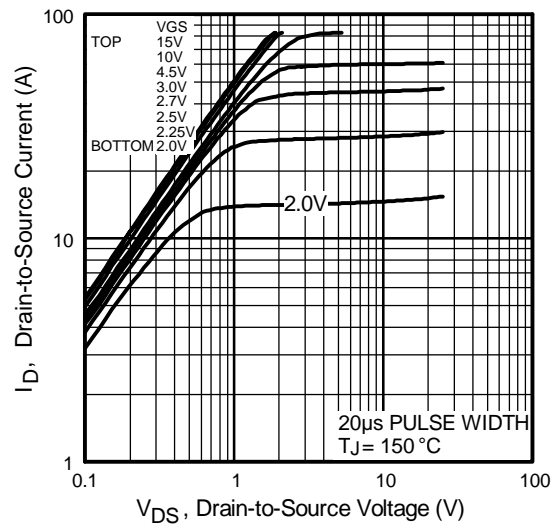
### Diode Characteristics

Symbol	Parameter	Min.	Typ.	Max.	Units	Conditions
I <sub>S</sub>	Continuous Source Current (Body Diode)			2.3	A	MOSFET symbol showing the integral reverse p-n junction diode. 
I <sub>SM</sub>	Pulsed Source Current (Body Diode) ①			85		
V <sub>SD</sub>	Diode Forward Voltage		0.80	1.3	V	T <sub>J</sub> = 25°C, I <sub>S</sub> = 8.0A, V <sub>GS</sub> = 0V ③
			0.65			T <sub>J</sub> = 125°C, I <sub>S</sub> = 8.0A, V <sub>GS</sub> = 0V
t <sub>rr</sub>	Reverse Recovery Time		72	110	ns	T <sub>J</sub> = 25°C, I <sub>F</sub> = 8.0A, V <sub>R</sub> = 20V
Q <sub>rr</sub>	Reverse Recovery Charge		130	200	nC	di/dt = 100A/μs ③
t <sub>rr</sub>	Reverse Recovery Time		76	110	ns	T <sub>J</sub> = 125°C, I <sub>F</sub> = 8.0A, V <sub>R</sub> = 20V
Q <sub>rr</sub>	Reverse Recovery Charge		150	230	nC	di/dt = 100A/μs ③

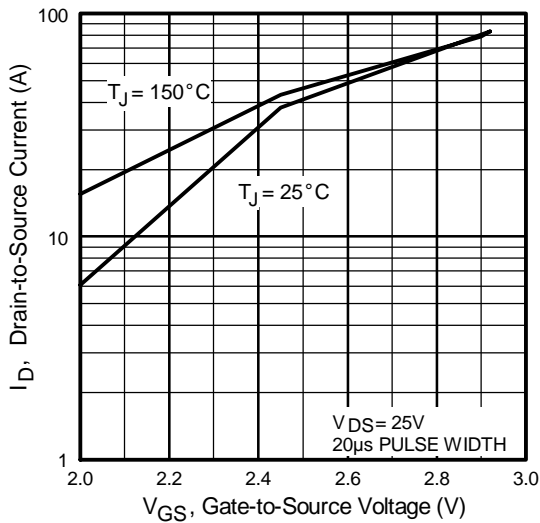
**TYPICAL CHARACTERISTICS** (25 °C, unless otherwise noted)



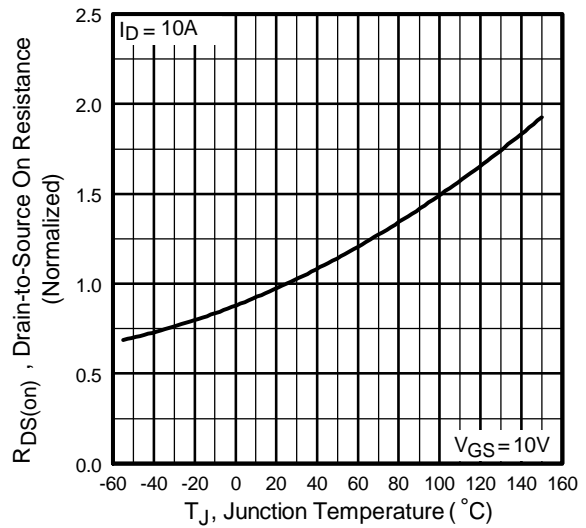
**Fig 1.** Typical Output Characteristics



**Fig 2.** Typical Output Characteristics

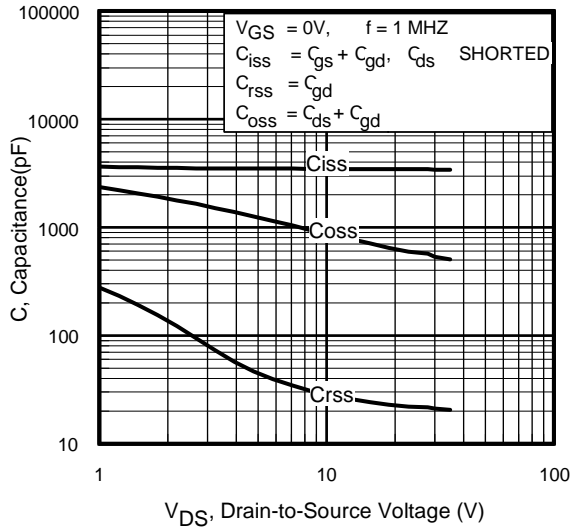


**Fig 3.** Typical Transfer Characteristics

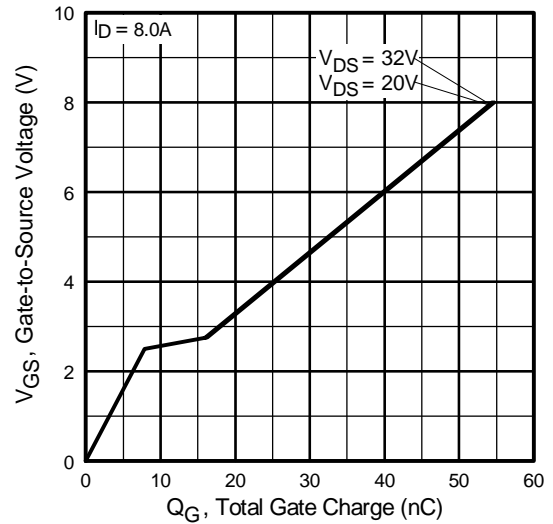


**Fig 4.** Normalized On-Resistance Vs. Temperature

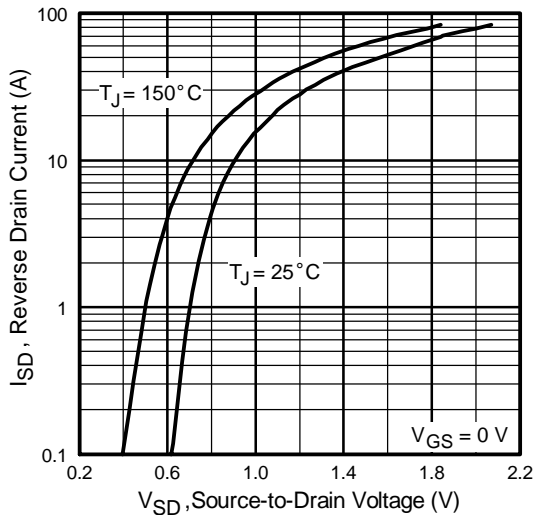
**TYPICAL CHARACTERISTICS** (25 °C, unless otherwise noted)



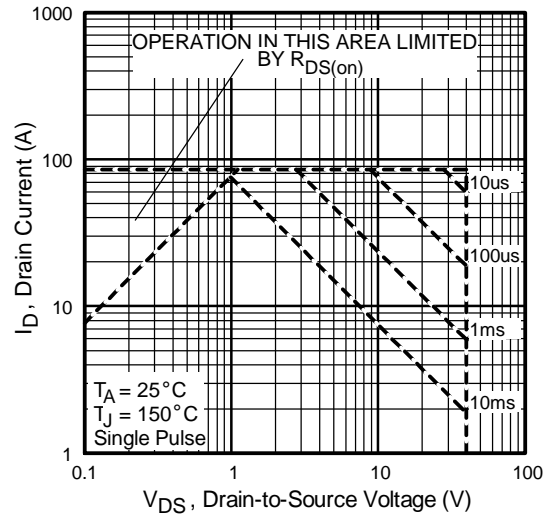
**Fig 5.** Typical Capacitance Vs. Drain-to-Source Voltage



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



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



**Fig 8.** Maximum Safe Operating Area

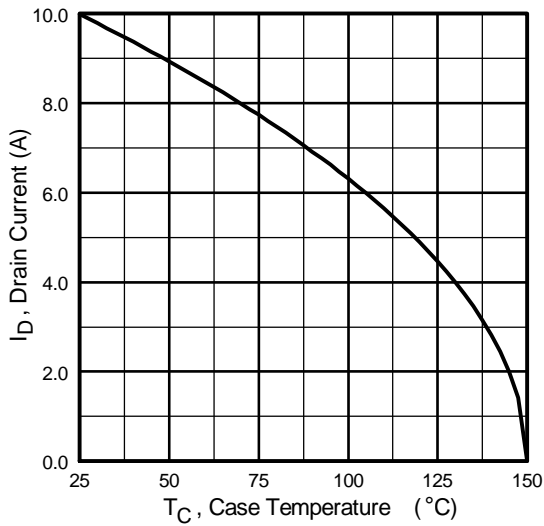


Fig 6. On-Resistance Vs. Drain Current

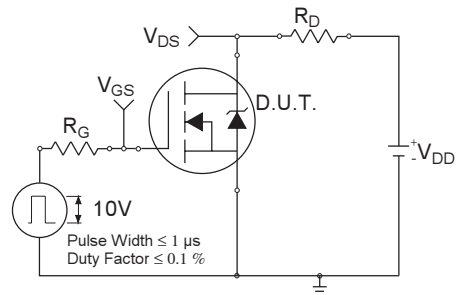


Fig 10a. Switching Time Test Circuit

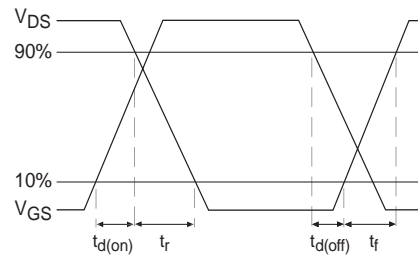


Fig 10b. Switching Time Waveforms

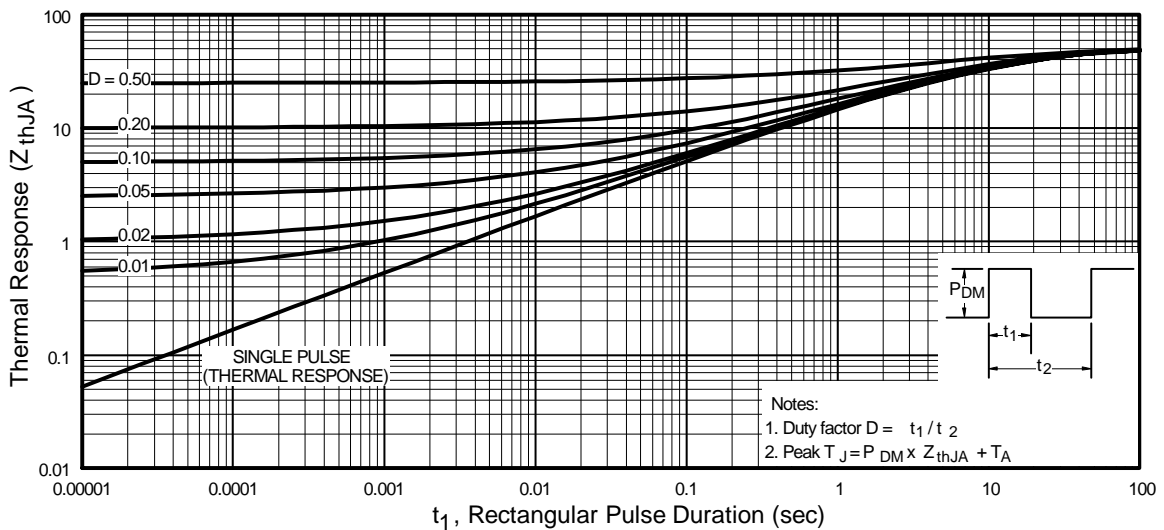


Fig 10. Maximum Effective Transient Thermal Impedance, Junction-to-Ambient

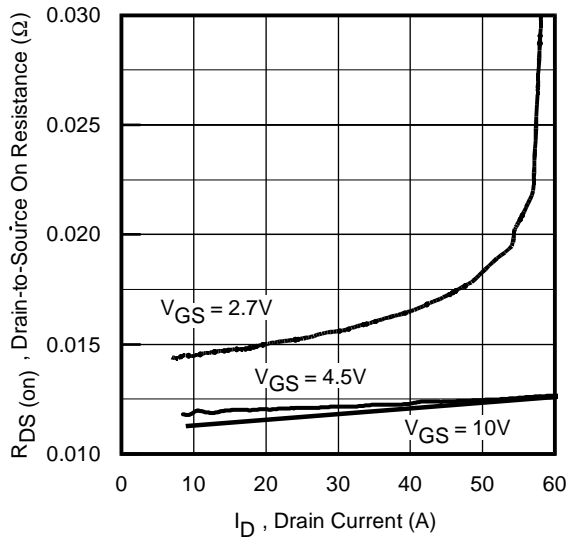


Fig 12. On-Resistance Vs. Drain Current

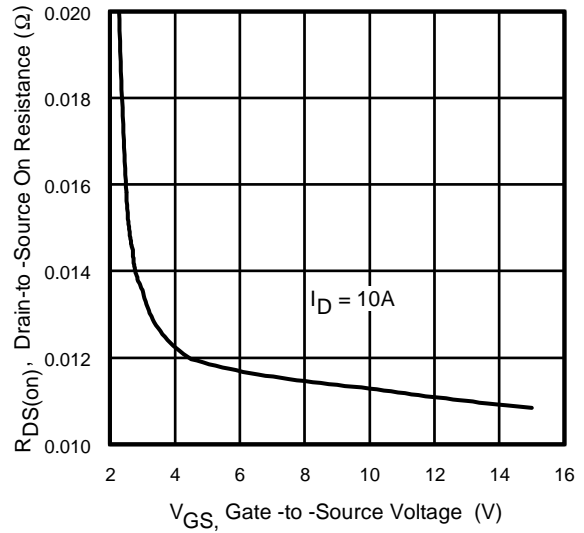


Fig 13. On-Resistance Vs. Gate Voltage

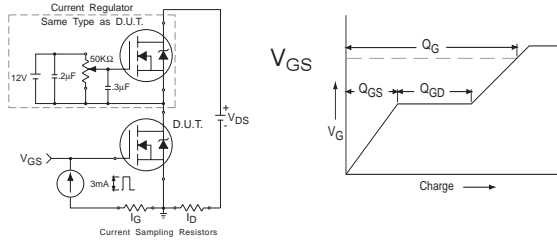


Fig 13a&b. Basic Gate Charge Test Circuit and Waveform

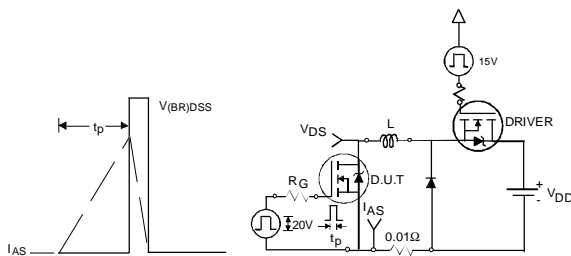


Fig 14a&b. Unclamped Inductive Test circuit and Waveforms

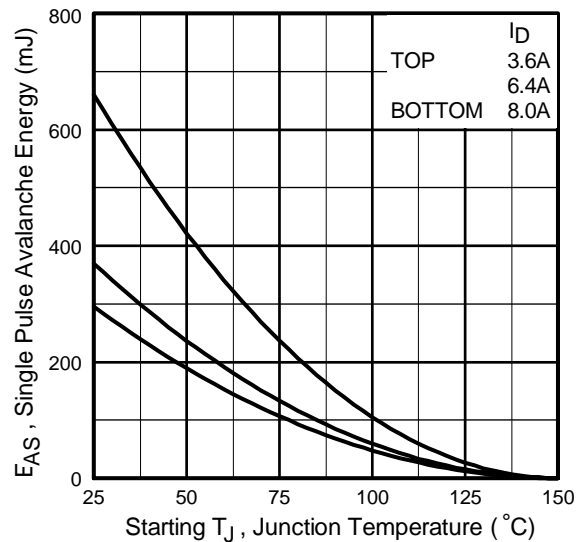
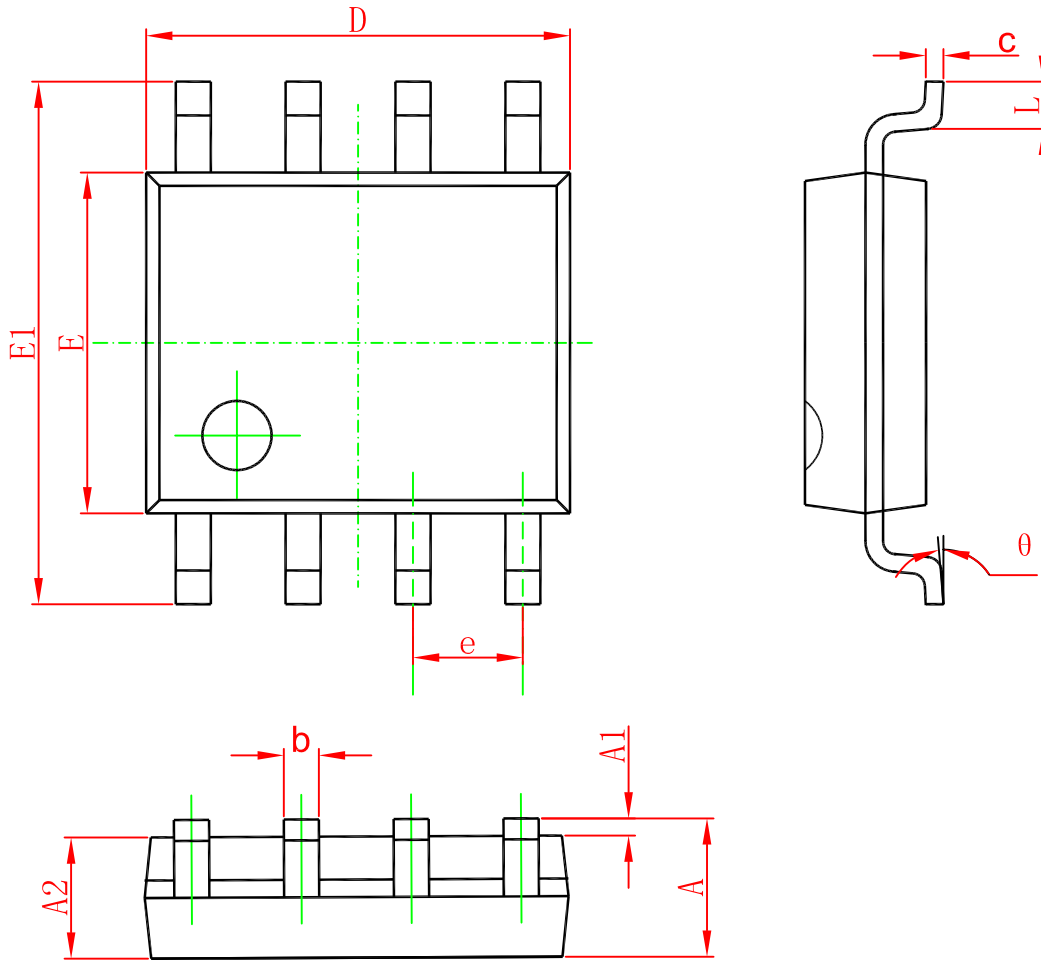


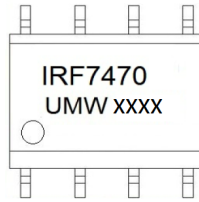
Fig 14c. Maximum Avalanche Energy Vs. Drain Current

SOP-8



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	1.350	1.750	0.053	0.069
A1	0.100	0.250	0.004	0.010
A2	1.350	1.550	0.053	0.061
b	0.330	0.510	0.013	0.020
c	0.170	0.250	0.006	0.010
D	4.700	5.100	0.185	0.200
E	3.800	4.000	0.150	0.157
E1	5.800	6.200	0.228	0.244
e	1.270(BSC)		0.050(BSC)	
L	0.400	1.270	0.016	0.050
θ	0°	8°	0°	8°

**Marking**



**Ordering information**

Order code	Package	Baseqty	Deliverymode
UMW IRF7470TR	SOP-8	3000	Tape and reel