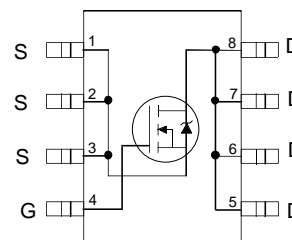


### Features

- $V_{DS} (V) = 40V$
- $R_{DS(ON)} < 7.5m\Omega$  ( $V_{GS} = 10V$ )
- $R_{DS(ON)} < 9 m\Omega$  ( $V_{GS} = 4.5V$ )

### Applications

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



Top View

### Benefits

- Ultra-Low Gate Impedance
- Very Low  $R_{DS(on)}$  at 4.5V  $V_{GS}$
- Fully Characterized Avalanche Voltage and Current

### Absolute Maximum Ratings

Symbol	Parameter	Max.	Units
$V_{DS}$	Drain-Source Voltage	30	V
$V_{GS}$	Gate-to-Source Voltage	$\pm 12$	V
$I_D @ T_A = 25^\circ C$	Continuous Drain Current, $V_{GS} @ 10V$	15	A
$I_D @ T_A = 70^\circ C$	Continuous Drain Current, $V_{GS} @ 10V$	12	
$I_{DM}$	Pulsed Drain Current <sup>①</sup>	120	
$P_D @ T_A = 25^\circ C$	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
$R_{\theta JA}$	Junction-to-Ambient <sup>④</sup>		50	$^\circ C/W$

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

	Parameter	Min.	Typ.	Max.	Units	Conditions
$V_{(BR)DSS}$	Drain-to-Source Breakdown Voltage	30			V	$V_{GS} = 0V, I_D = 250\mu A$
$\Delta V_{(BR)DSS}/\Delta T_J$	Breakdown Voltage Temp. Coefficient		0.029		V/ $^\circ\text{C}$	Reference to $25^\circ\text{C}, I_D = 1\text{mA}$
$R_{DS(on)}$	Static Drain-to-Source On-Resistance		6.0	7.5	m $\Omega$	$V_{GS} = 10V, I_D = 15A$ ④
			6.9	9		$V_{GS} = 4.5V, I_D = 12A$ ④
			10	2		$V_{GS} = 2.8V, I_D = 3.5A$ ④
$V_{GS(th)}$	Gate Threshold Voltage	0.6		2.0	V	$V_{DS} = V_{GS}, I_D = 250\mu A$
$I_{DSS}$	Drain-to-Source Leakage Current			20	$\mu A$	$V_{DS} = 24V, V_{GS} = 0V$
				100		$V_{DS} = 24V, V_{GS} = 0V, T_J = 125^\circ\text{C}$
$I_{GSS}$	Gate-to-Source Forward Leakage			200	nA	$V_{GS} = 12V$
	Gate-to-Source Reverse Leakage			-200		$V_{GS} = -12V$

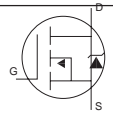
**Dynamic @  $T_J = 25^\circ\text{C}$  (unless otherwise specified)**

Symbol	Parameter	Min.	Typ.	Max.	Units	Conditions
$g_{fs}$	Forward Transconductance	44			S	$V_{DS} = 10V, I_D = 15A$
$Q_g$	Total Gate Charge		37	56	nC	$I_D = 15A$
$Q_{gs}$	Gate-to-Source Charge		8.9	13		$V_{DS} = 24V$
$Q_{gd}$	Gate-to-Drain ("Miller") Charge		13	20		$V_{GS} = 5.0V$ ③
$Q_{oss}$	Output Gate Charge		23	35		$V_{GS} = 0V, V_{DS} = 16V$
$t_{d(on)}$	Turn-On Delay Time		17		ns	$V_{DD} = 15V$
$t_r$	Rise Time		18			$I_D = 1.0A$
$t_{d(off)}$	Turn-Off Delay Time		51			$R_G = 6\Omega$
$t_f$	Fall Time		44			$V_{GS} = 4.5V$ ③
$C_{iss}$	Input Capacitance		3480		pF	$V_{GS} = 0V$
$C_{oss}$	Output Capacitance		870			$V_{DS} = 25V$
$C_{rss}$	Reverse Transfer Capacitance		100			$f = 1.0\text{MHz}$

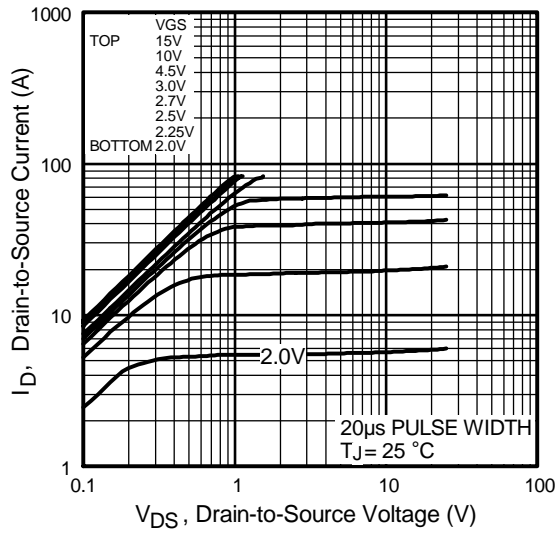
**Avalanche Characteristics**

Symbol	Parameter	Typ.	Max.	Units
$E_{AS}$	Single Pulse Avalanche Energy②		300	mJ
$I_{AR}$	Avalanche Current②		15	A

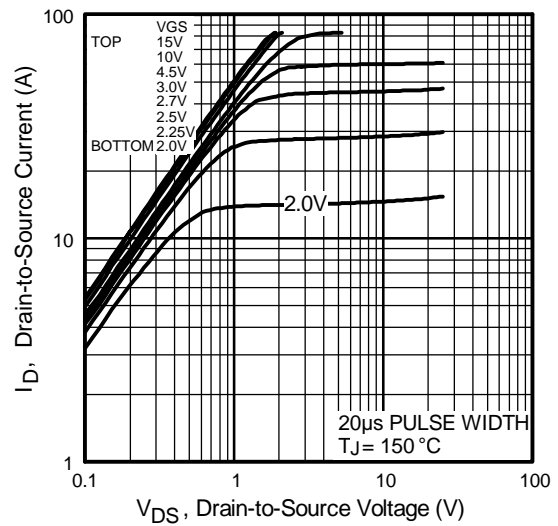
**Diode Characteristics**

Symbol	Parameter	Min.	Typ.	Max.	Units	Conditions
$I_S$	Continuous Source Current (Body Diode)			2.5	A	MOSFET symbol showing the integral reverse p-n junction diode. 
$I_{SM}$	Pulsed Source Current (Body Diode) ①			120		
$V_{SD}$	Diode Forward Voltage			1.2	V	$T_J = 25^\circ\text{C}, I_S = 2.5A, V_{GS} = 0V$ ③
$t_{rr}$	Reverse Recovery Time		64	96	ns	$T_J = 25^\circ\text{C}, I_F = 2.5A, V_R = 20V$
$Q_{rr}$	Reverse Recovery Charge		99	150	nC	$di/dt = 100A/\mu s$ ③

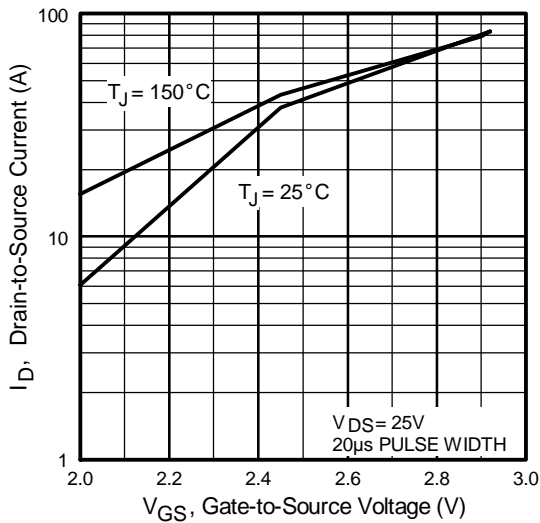
**TYPICAL CHARACTERISTICS** (25 °C, unless otherwise noted)



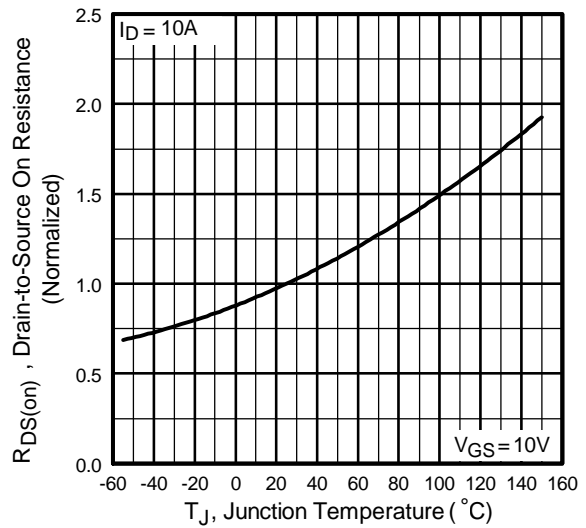
**Fig 1.** Typical Output Characteristics



**Fig 2.** Typical Output Characteristics

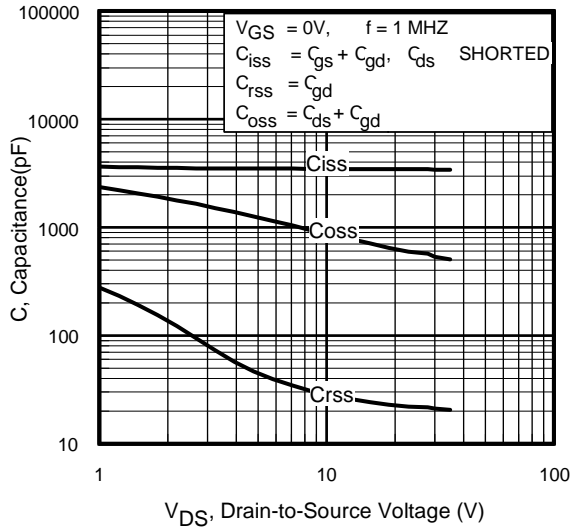


**Fig 3.** Typical Transfer Characteristics

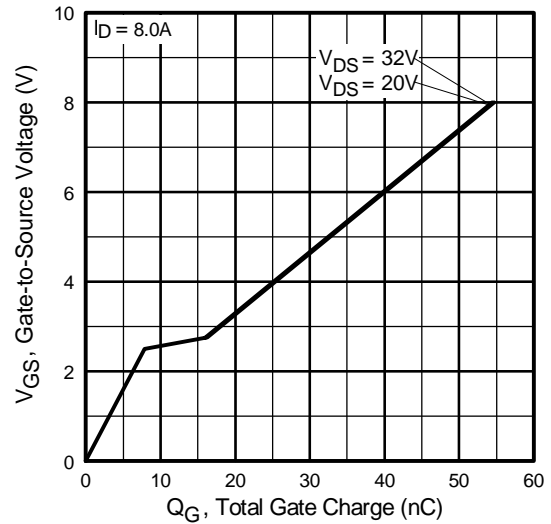


**Fig 4.** Normalized On-Resistance Vs. Temperature

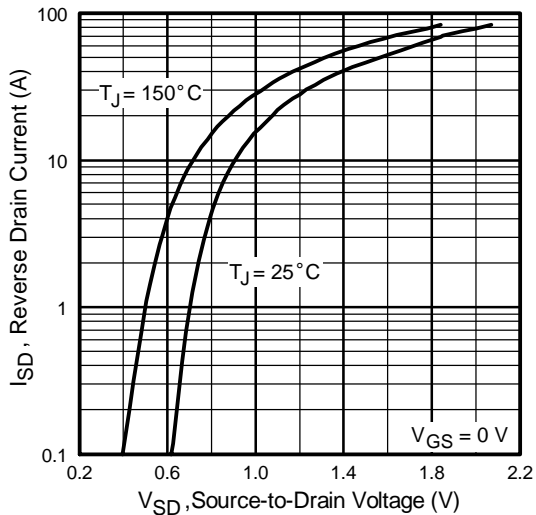
**TYPICAL CHARACTERISTICS** (25 °C, unless otherwise noted)



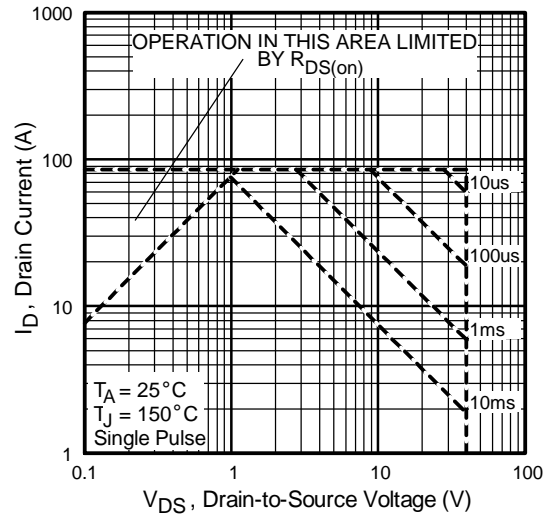
**Fig 5.** Typical Capacitance Vs. Drain-to-Source Voltage



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



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



**Fig 8.** Maximum Safe Operating Area

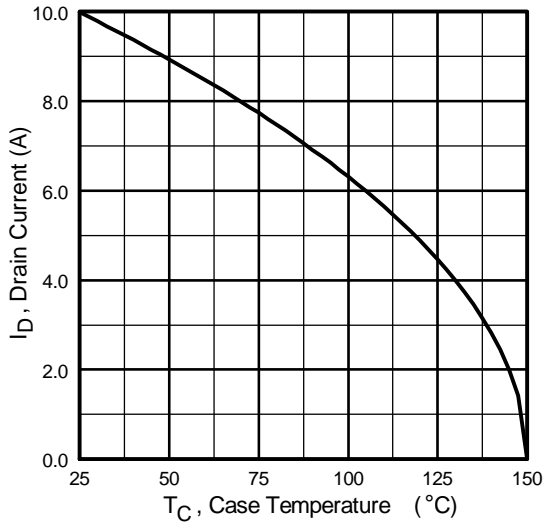


Fig 6. On-Resistance Vs. Drain Current

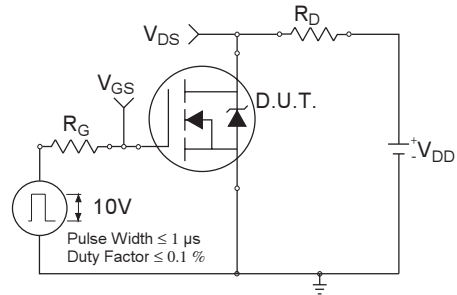


Fig 10a. Switching Time Test Circuit

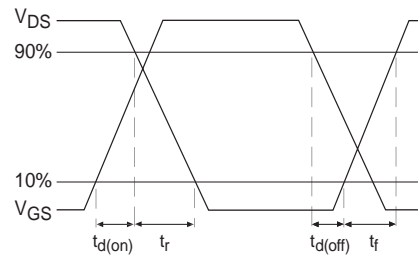


Fig 10b. Switching Time Waveforms

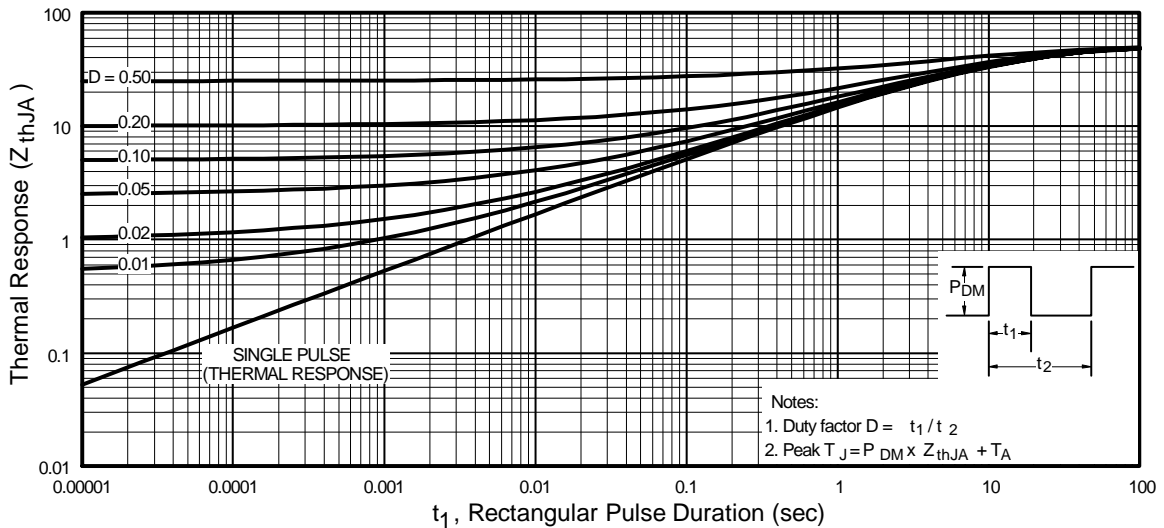


Fig 10. Maximum Effective Transient Thermal Impedance, Junction-to-Ambient

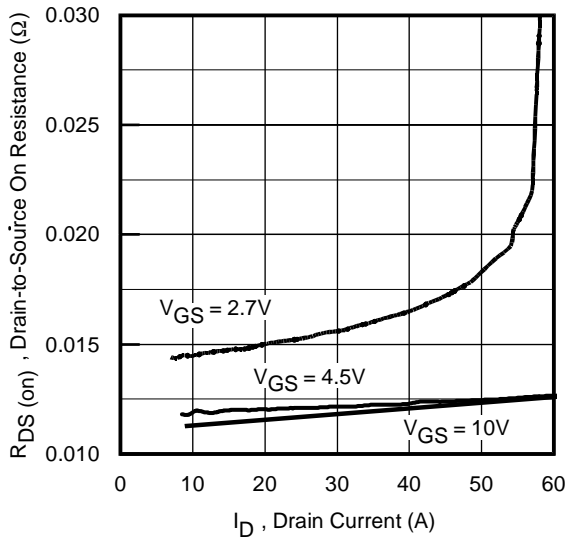


Fig 12. On-Resistance Vs. Drain Current

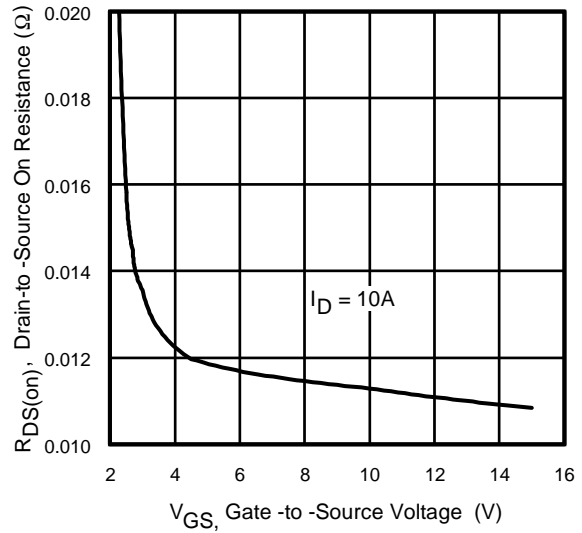


Fig 13. On-Resistance Vs. Gate Voltage

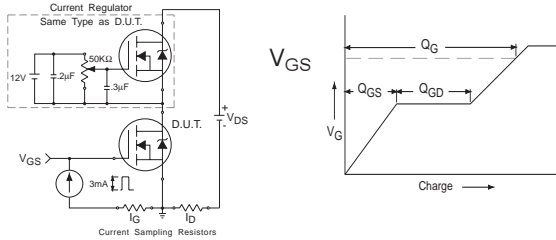


Fig 13a&b. Basic Gate Charge Test Circuit and Waveform

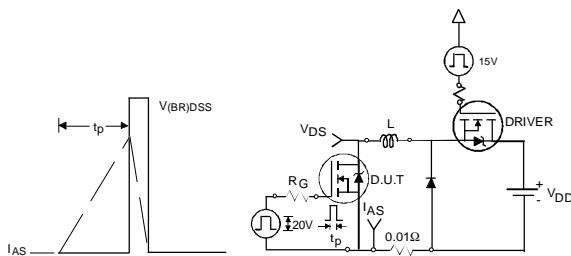


Fig 14a&b. Unclamped Inductive Test circuit and Waveforms

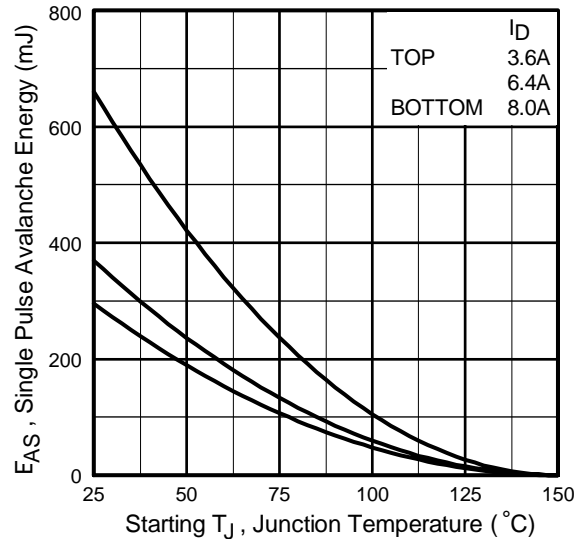
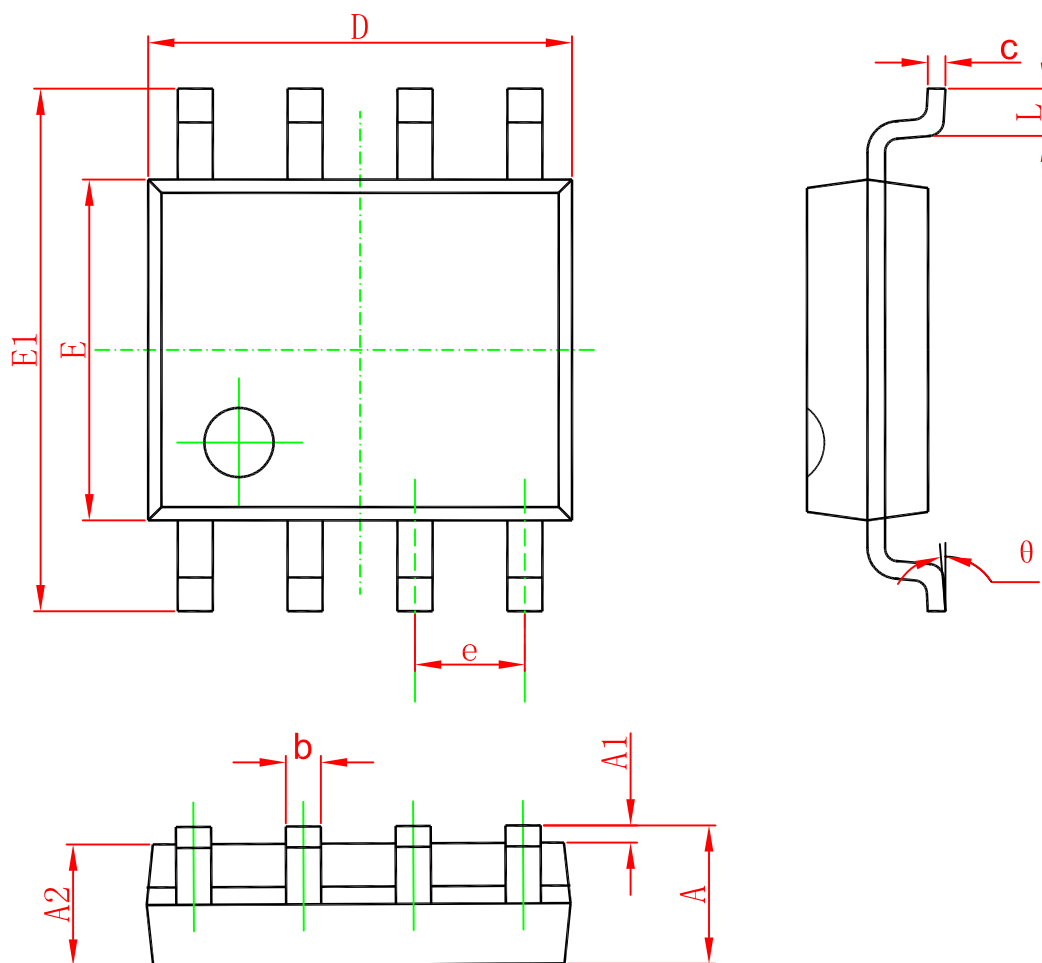


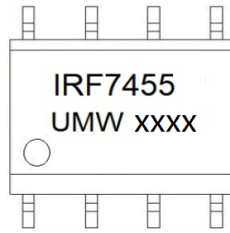
Fig 14c. Maximum Avalanche Energy Vs. Drain Current

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 IRF7455TR	SOP-8	3000	Tape and reel