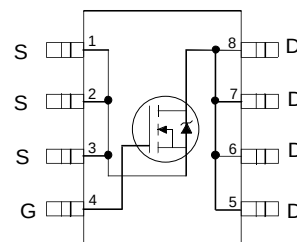


Benefits

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

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	± 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 Current①	85	
$P_D @ T_A = 25^\circ C$	Maximum Power Dissipation③	2.5	W
$P_D @ T_A = 70^\circ C$	Maximum Power Dissipation③	1.6	W
	Linear Derating Factor	0.02	W/°C
T_J, T_{STG}	Junction and Storage Temperature Range	-55 to + 150	°C

Thermal Resistance

Symbol	Parameter	Typ.	Max.	Units
$R_{\theta JL}$	Junction-to-Drain Lead		20	°C/W
$R_{\theta JA}$	Junction-to-Ambient ④		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 @ $T_J = 25^\circ\text{C}$ (unless otherwise specified)

	Parameter	Min.	Typ.	Max.	Units	Conditions
$V_{(BR)DSS}$	Drain-to-Source Breakdown Voltage	40			V	$V_{GS} = 0V, I_D = 250\mu A$
$\Delta V_{(BR)DSS}/\Delta T_J$	Breakdown Voltage Temp. Coefficient		0.04		V/ $^\circ\text{C}$	Reference to 25°C , $I_D = 1mA$
$R_{DS(on)}$	Static Drain-to-Source On-Resistance		9.0	13	$m\Omega$	$V_{GS} = 10V, I_D = 10A$ ④
			10	15		$V_{GS} = 4.5V, I_D = 8.0A$ ④
$V_{GS(th)}$	Gate Threshold Voltage	0.8		2.0	V	$V_{DS} = V_{GS}, I_D = 250\mu A$
I_{DSS}	Drain-to-Source Leakage Current			20	μA	$V_{DS} = 32V, V_{GS} = 0V$
				100		$V_{DS} = 32V, V_{GS} = 0V, T_J = 125^\circ\text{C}$
I_{GSS}	Gate-to-Source Forward Leakage			200	nA	$V_{GS} = 12V$
	Gate-to-Source Reverse Leakage			-200		$V_{GS} = -12V$

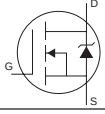
Dynamic @ $T_J = 25^\circ\text{C}$ (unless otherwise specified)

Symbol	Parameter	Min.	Typ.	Max.	Units	Conditions
g_{fs}	Forward Transconductance	27			S	$V_{DS} = 20V, I_D = 8.0A$
Q_g	Total Gate Charge		29	44	nC	$I_D = 8.0A$
Q_{gs}	Gate-to-Source Charge		7.9	12		$V_{DS} = 20V$
Q_{gd}	Gate-to-Drain ("Miller") Charge		8.0	12		$V_{GS} = 4.5V$ ③
Q_{oss}	Output Gate Charge		23	35		$V_{GS} = 0V, V_{DS} = 16V$
$t_{d(on)}$	Turn-On Delay Time		10		ns	$V_{DD} = 20V$
t_r	Rise Time		1.9			$I_D = 8.0A$
$t_{d(off)}$	Turn-Off Delay Time		21			$R_G = 1.8\Omega$
t_f	Fall Time		3.2			$V_{GS} = 4.5V$ ③
C_{iss}	Input Capacitance		3430		pF	$V_{GS} = 0V$
C_{oss}	Output Capacitance		690			$V_{DS} = 20V$
C_{rss}	Reverse Transfer Capacitance		41			$f = 1.0MHz$

Avalanche Characteristics

Symbol	Parameter	Typ.	Max.	Units
E_{AS}	Single Pulse Avalanche Energy②		300	mJ
I_{AR}	Avalanche Current①		8.0	A

Diode Characteristics

Symbol	Parameter	Min.	Typ.	Max.	Units	Conditions
I_S	Continuous Source Current (Body Diode)			2.3	A	MOSFET symbol showing the integral reverse p-n junction diode. 
I_{SM}	Pulsed Source Current (Body Diode) ①			85		
V_{SD}	Diode Forward Voltage		0.80	1.3	V	$T_J = 25^\circ\text{C}, I_S = 8.0A, V_{GS} = 0V$ ③
			0.65			$T_J = 125^\circ\text{C}, I_S = 8.0A, V_{GS} = 0V$
t_{rr}	Reverse Recovery Time		72	110	ns	$T_J = 25^\circ\text{C}, I_F = 8.0A, V_R = 20V$
Q_{rr}	Reverse Recovery Charge		130	200	nC	$di/dt = 100A/\mu s$ ③
t_{rr}	Reverse Recovery Time		76	110	ns	$T_J = 125^\circ\text{C}, I_F = 8.0A, V_R = 20V$
Q_{rr}	Reverse Recovery Charge		150	230	nC	$di/dt = 100A/\mu s$ ③

TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)

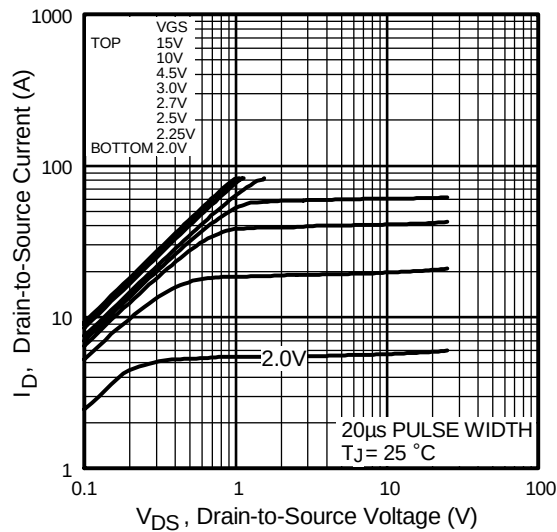


Fig 1. Typical Output Characteristics

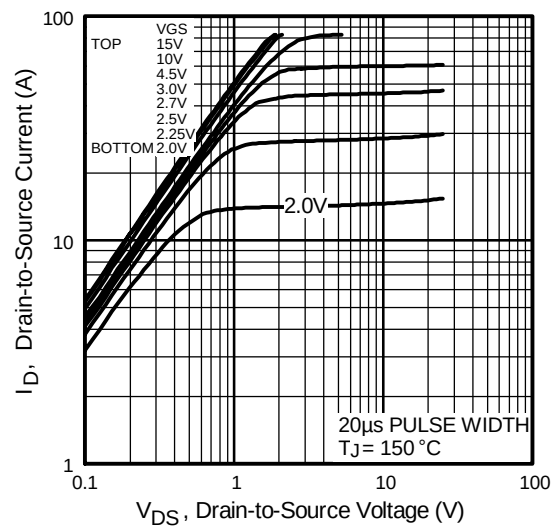


Fig 2. Typical Output Characteristics

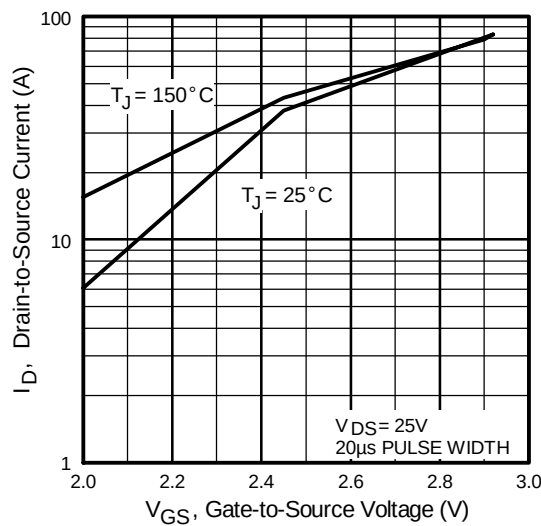


Fig 3. Typical Transfer Characteristics

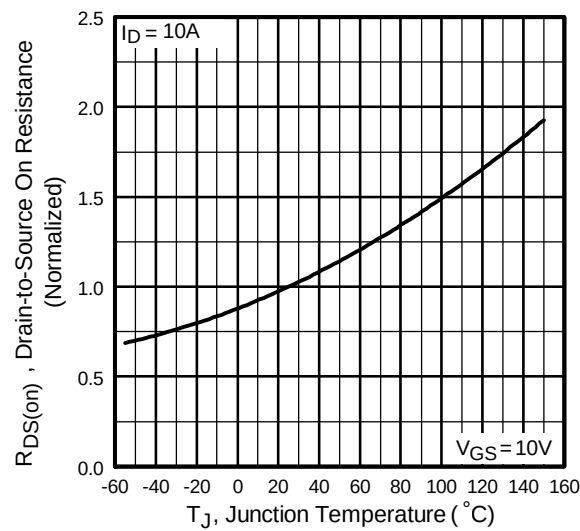


Fig 4. Normalized On-Resistance Vs. Temperature

TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)

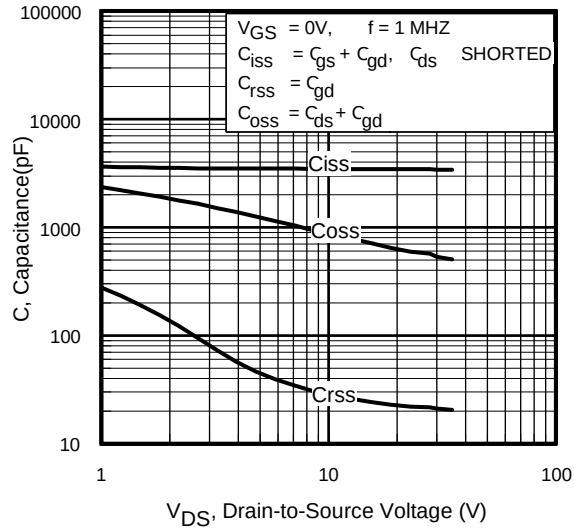


Fig 5. Typical Capacitance Vs. Drain-to-Source Voltage

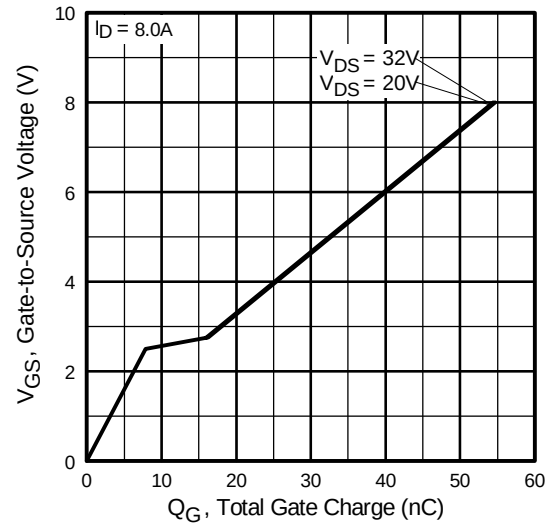


Fig 6. Typical Gate Charge Vs. Gate-to-Source Voltage

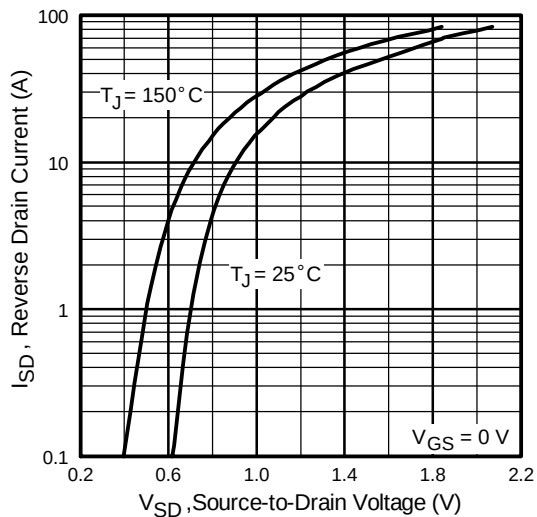


Fig 7. Typical Source-Drain Diode Forward Voltage

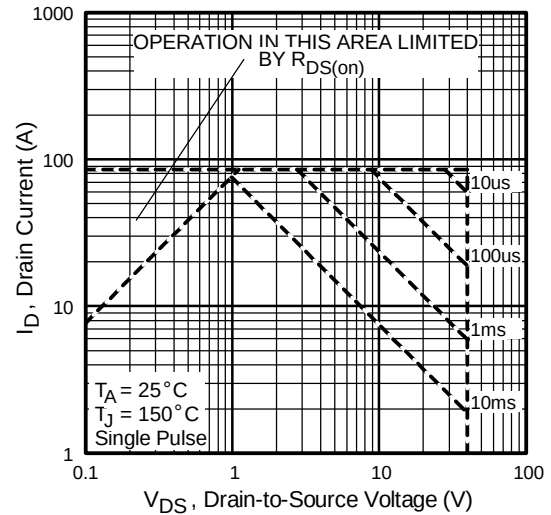


Fig 8. Maximum Safe Operating Area

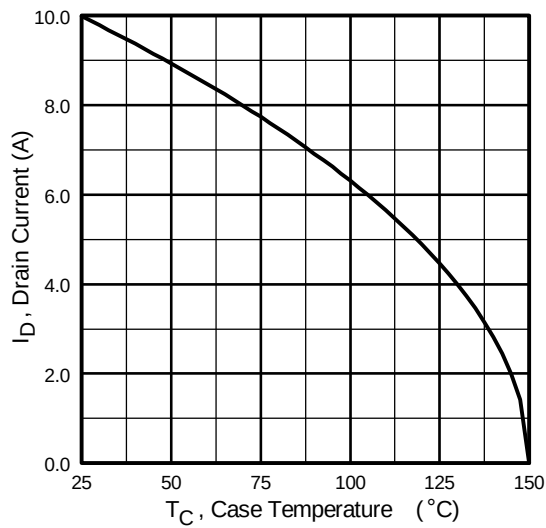


Fig 6. On-Resistance Vs. Drain Current

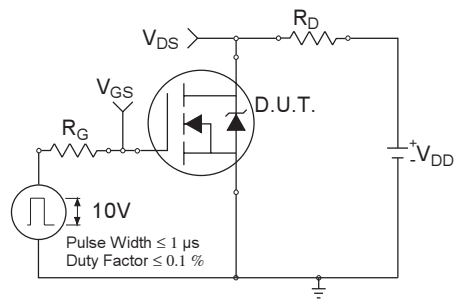


Fig 10a. Switching Time Test Circuit

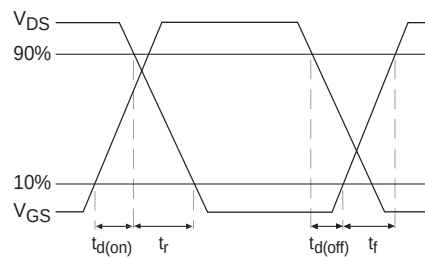


Fig 10b. Switching Time Waveforms

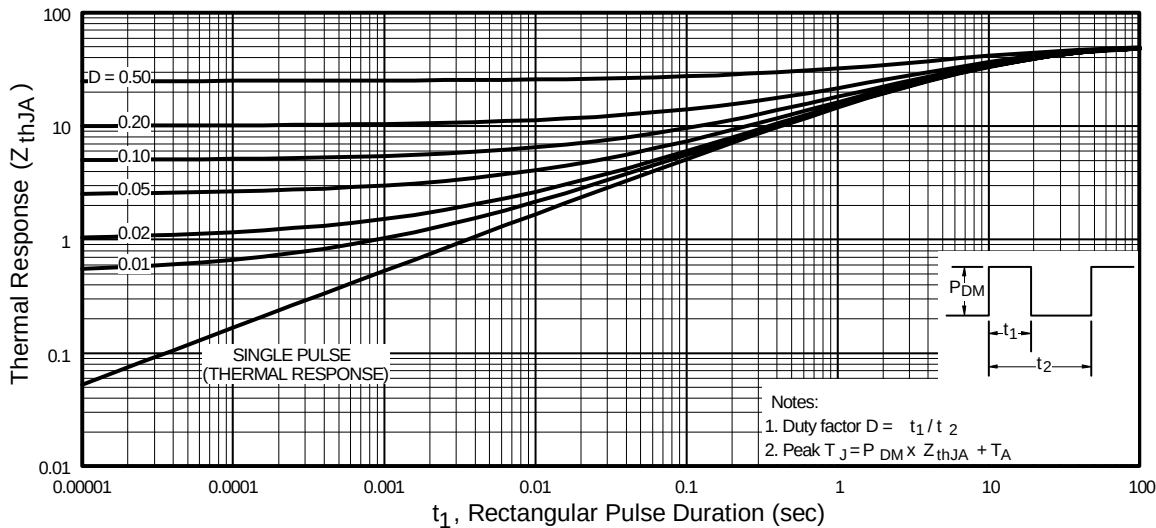


Fig 10. Maximum Effective Transient Thermal Impedance, Junction-to-Ambient

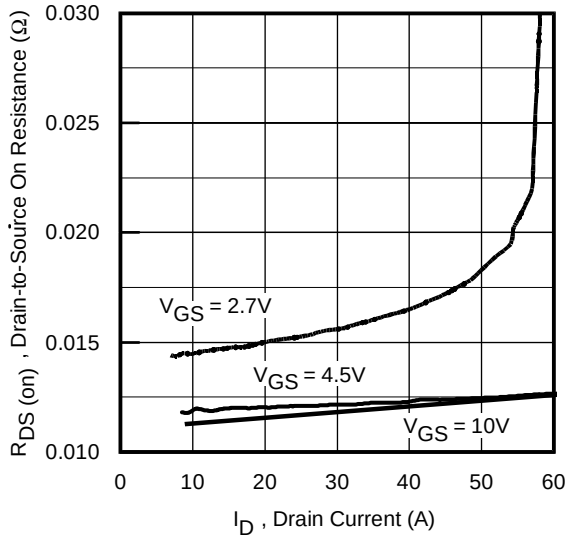


Fig 12. On-Resistance Vs. Drain Current

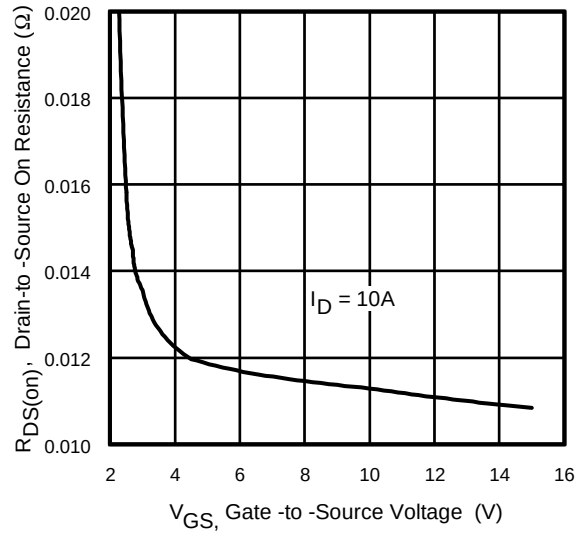


Fig 13. On-Resistance Vs. Gate Voltage

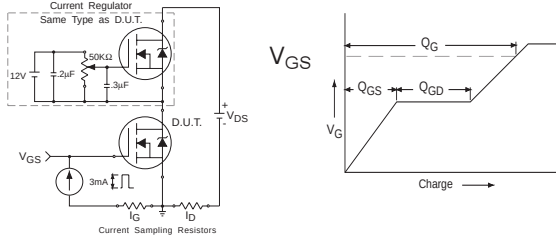


Fig 13a&b. Basic Gate Charge Test Circuit and Waveform

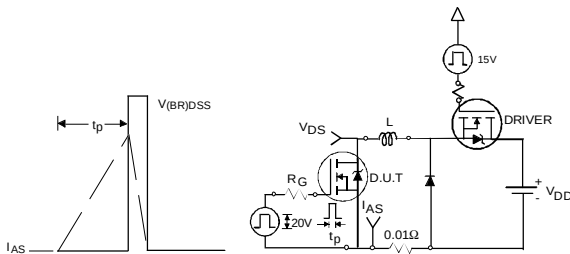


Fig 14a&b. Unclamped Inductive Test circuit and Waveforms

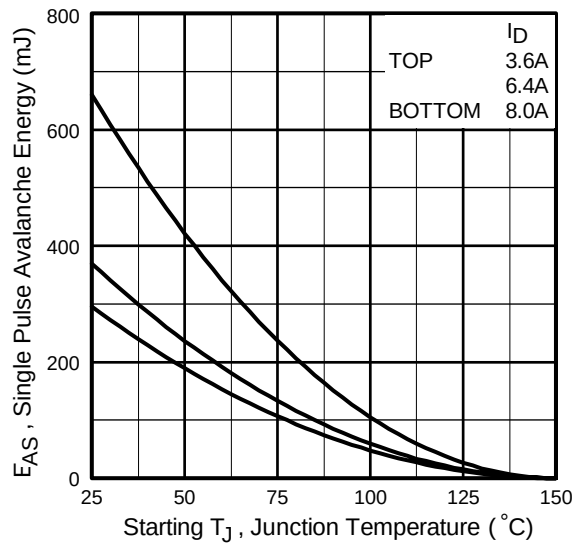
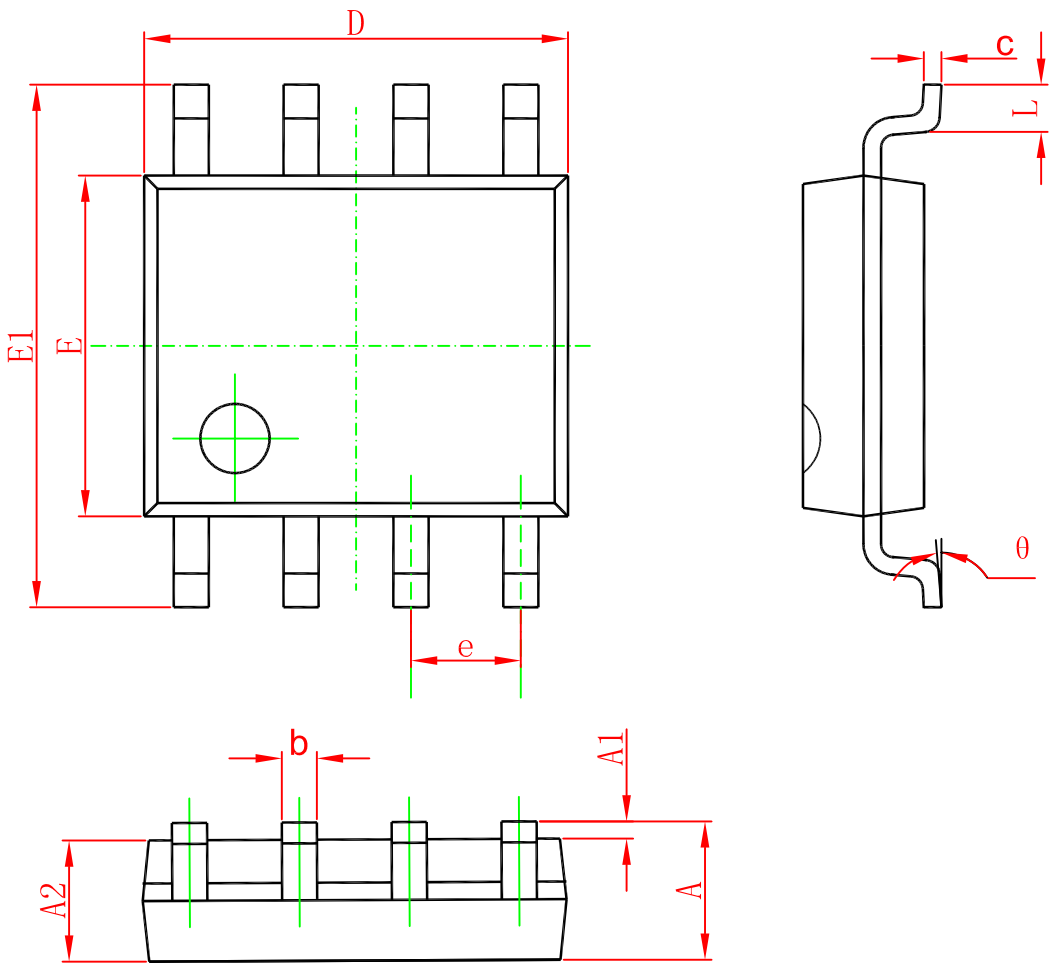


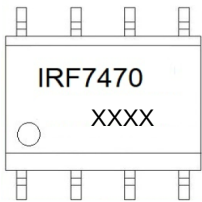
Fig 14c. Maximum Avalanche Energy Vs. Drain Current

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
IRF7470	SOP-8	3000	Tape and reel