

Features

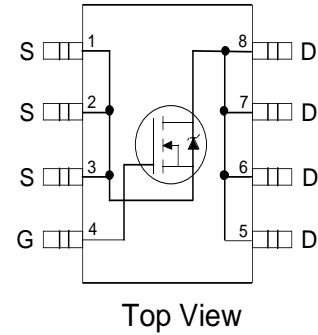
- $V_{DS} (V) = 60V$
- $R_{DS(ON)} < 26\ m\Omega$ ($V_{GS} = 10V$)
- $R_{DS(ON)} < 30\ m\Omega$ ($V_{GS} = 4.5V$)

Applications

- High frequency DC-DC converters
- Lead-Free

Benefits

- Low Gate to Drain Charge to Reduce Switching Losses
- Fully Characterized Avalanche Voltage and Current



Absolute Maximum Ratings

	Parameter	Max.	Units
$I_D @ T_A = 25^\circ C$	Continuous Drain Current, $V_{GS} @ 10V$	7.0	A
$I_D @ T_A = 70^\circ C$	Continuous Drain Current, $V_{GS} @ 10V$	5.6	
I_{DM}	Pulsed Drain Current ①	56	
$P_D @ T_A = 25^\circ C$	Power Dissipation②	2.5	W
	Linear Derating Factor	0.02	W/°C
V_{GS}	Gate-to-Source Voltage	± 20	V
dv/dt	Peak Diode Recovery dv/dt ③	3.7	V/ns
T_J	Operating Junction and	-55 to + 150	°C
T_{STG}	Storage Temperature Range		
	Soldering Temperature, for 10 seconds	300 (1.6mm from case)	

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 $T_J = 25^\circ C$, $L = 16mH$
 $R_G = 25\Omega$, $I_{AS} = 4.2A$.
- ③ Pulse width $\leq 400\mu s$; 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}
- ⑥ $I_{SD} \leq 4.2A$, $di/dt \leq 160A/\mu s$, $V_{DD} \leq V_{(BR)DSS}$,
 $T_J \leq 150^\circ C$

Static @ T_J = 25°C (unless otherwise specified)

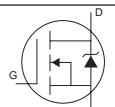
	Parameter	Min.	Typ.	Max.	Units	Conditions
V _{(BR)DSS}	Drain-to-Source Breakdown Voltage	60			V	V _{GS} = 0V, I _D = 250μA
ΔV _{(BR)DSS} /ΔT _J	Breakdown Voltage Temp. Coefficient		0.065		V/°C	Reference to 25°C, I _D = 1mA
R _{DS(on)}	Static Drain-to-Source On-Resistance		20 23	26 30	mΩ	V _{GS} = 10V, I _D = 4.2A ③ V _{GS} = 4.5V, I _D = 3.5A ③
V _{GS(th)}	Gate Threshold Voltage	1.0		3.0	V	V _{DS} = V _{GS} , I _D = 250μA
I _{DSS}	Drain-to-Source Leakage Current			20 100	μA	V _{DS} = 48V, V _{GS} = 0V V _{DS} = 48V, V _{GS} = 0V, T _J = 125°C
I _{GSS}	Gate-to-Source Forward Leakage			100	nA	V _{GS} = 20V
	Gate-to-Source Reverse Leakage			-100		V _{GS} = -20V

Dynamic @ T_J = 25°C (unless otherwise specified)

	Parameter	Min.	Typ.	Max.	Units	Conditions
g _{fs}	Forward Transconductance	17			S	V _{DS} = 50V, I _D = 4.2A
Q _g	Total Gate Charge		21	31	nC	I _D = 4.2A V _{DS} = 48V
Q _{gs}	Gate-to-Source Charge		4.3			V _{GS} = 4.5V
Q _{gd}	Gate-to-Drain ("Miller") Charge		9.6			
t _{d(on)}	Turn-On Delay Time		7.7		ns	V _{DD} = 30V I _D = 4.2A R _G = 6.2Ω V _{GS} = 10V ③
t _r	Rise Time		2.6			
t _{d(off)}	Turn-Off Delay Time		44			
t _f	Fall Time		13			
C _{iss}	Input Capacitance		1740		pF	V _{GS} = 0V V _{DS} = 25V f = 1.0MHz
C _{oss}	Output Capacitance		300			V _{GS} = 0V, V _{DS} = 1.0V, f = 1.0MHz
C _{rss}	Reverse Transfer Capacitance		37			V _{GS} = 0V, V _{DS} = 48V, f = 1.0MHz
C _{oss}	Output Capacitance		1590			V _{GS} = 0V, V _{DS} = 0V to 48V ③
C _{oss}	Output Capacitance		220			
C _{oss eff.}	Effective Output Capacitance		410			

Symbol	Parameter	Typ.	Max.	Units
E _{AS}	Single Pulse Avalanche Energy②		140	mJ
I _{AR}	Avalanche Current①		4.2	A

Diode Characteristics

	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			56		
V _{SD}	Diode Forward Voltage			1.3	V	T _J = 25°C, I _S = 4.2A, V _{GS} = 0V ③
t _{rr}	Reverse Recovery Time		52	78	ns	T _J = 25°C, I _F = 4.2A
Q _{rr}	Reverse Recovery Charge		100	150	nC	di/dt = 100A/μs ③

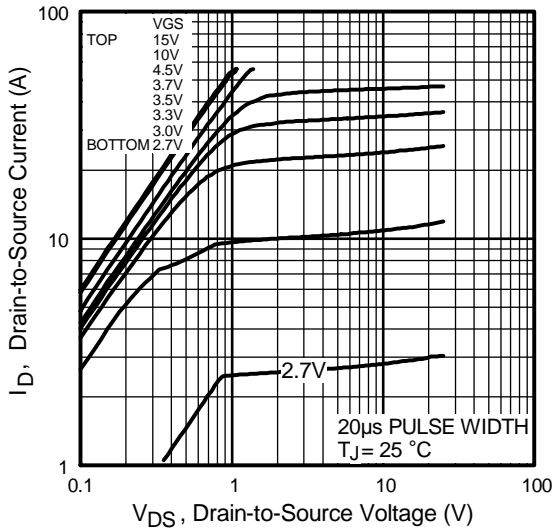


Fig 1. Typical Output Characteristics

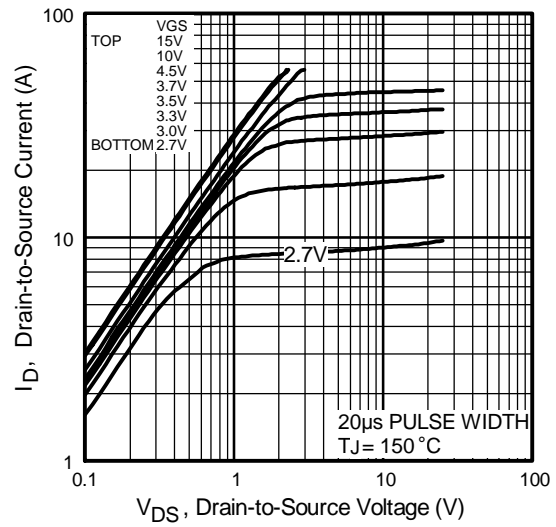


Fig 2. Typical Output Characteristics

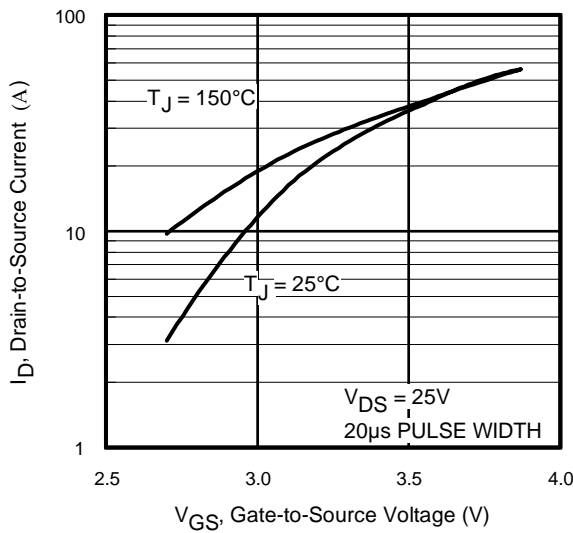


Fig 3. Typical Transfer Characteristics

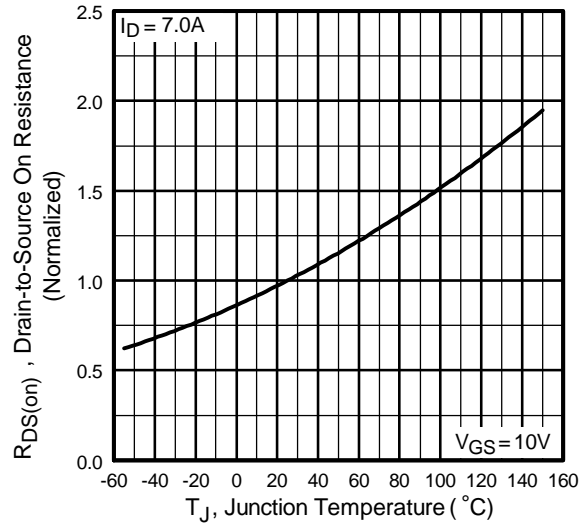


Fig 4. Normalized On-Resistance Vs. Temperature

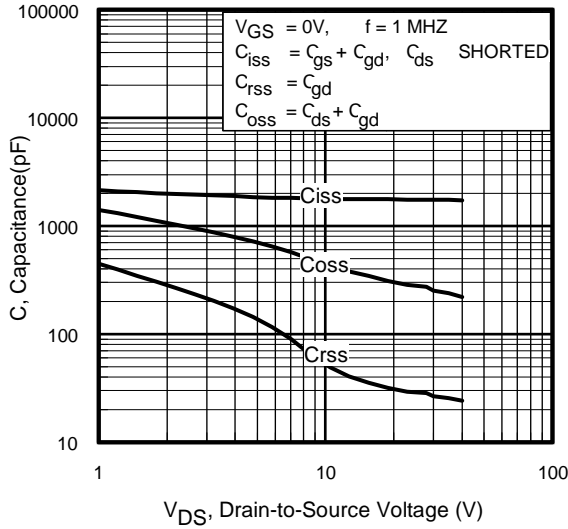


Fig 5. Typical Capacitance Vs. Drain-to-Source Voltage

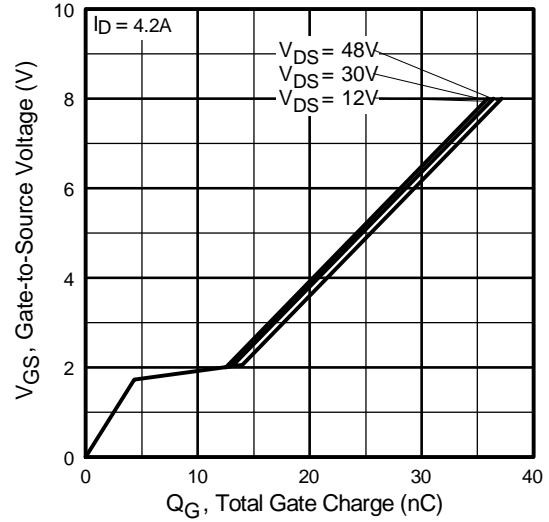


Fig 6. Typical Gate Charge Vs. Gate-to-Source Voltage

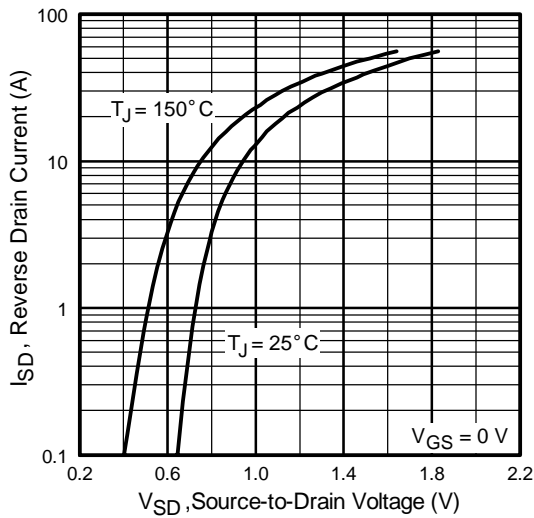


Fig 7. Typical Source-Drain Diode Forward Voltage

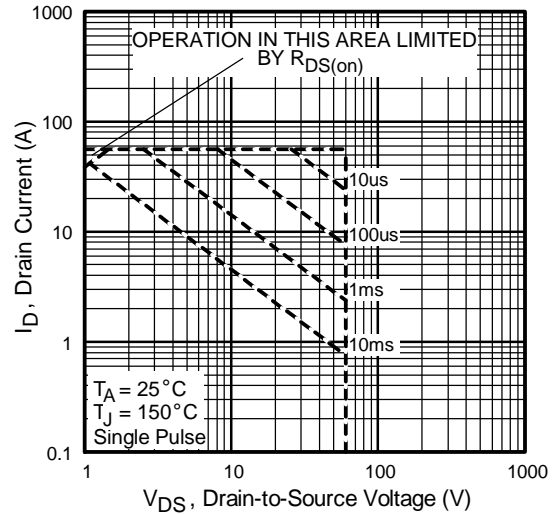


Fig 8. Maximum Safe Operating Area

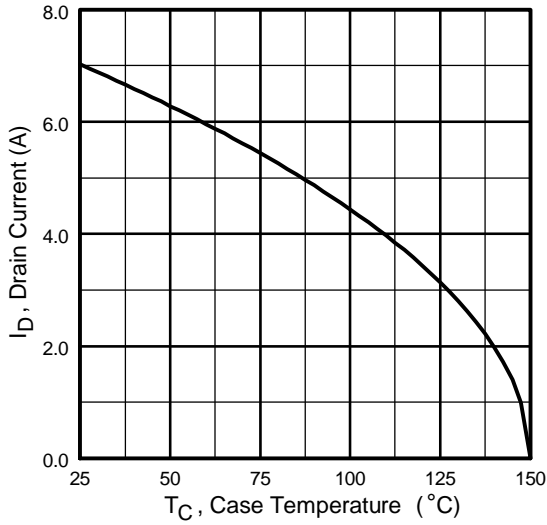


Fig 9. Maximum Drain Current Vs. Ambient Temperature

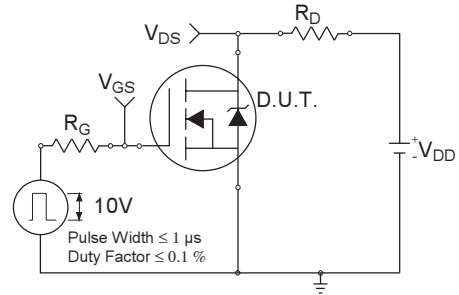


Fig 10a. Switching Time Test Circuit

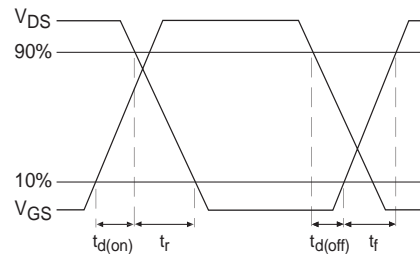


Fig 10b. Switching Time Waveforms

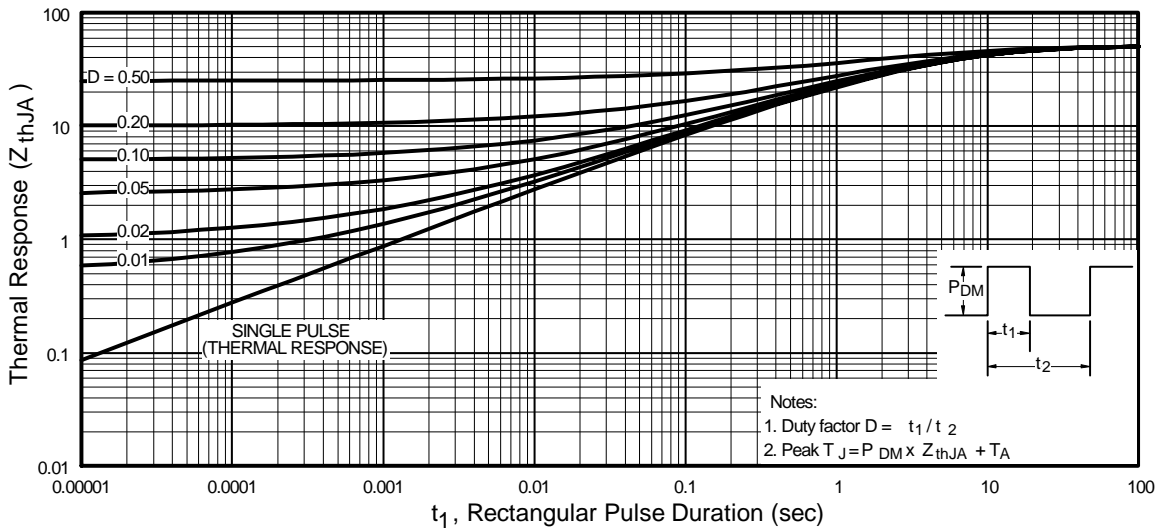


Fig 11. Maximum Effective Transient Thermal Impedance, Junction-to-Ambient

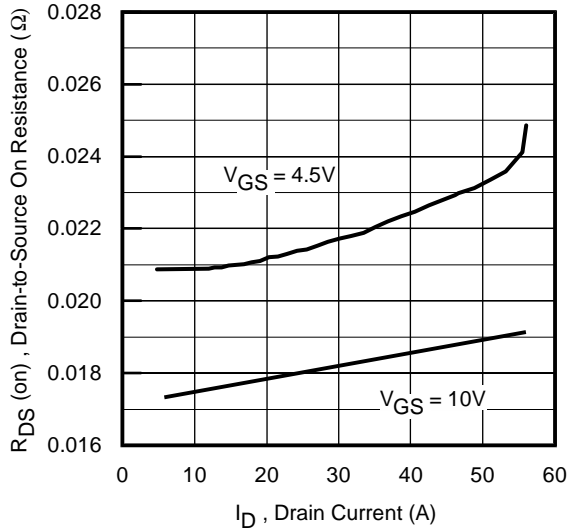


Fig 12. On-Resistance Vs. Drain Current

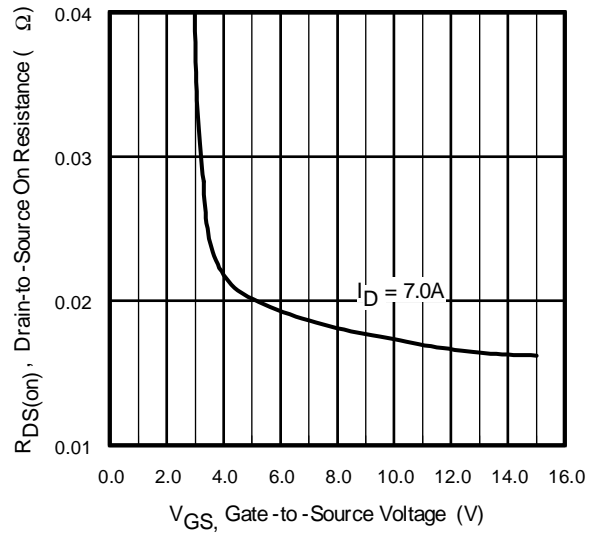


Fig 13. On-Resistance Vs. Gate Voltage

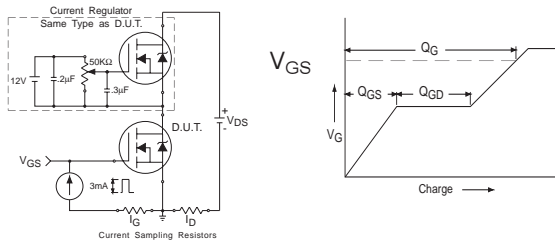


Fig 14a&b. Basic Gate Charge Test Circuit and Waveform

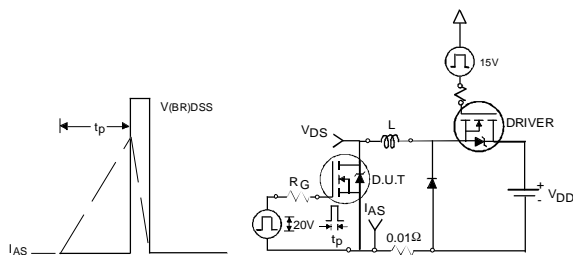


Fig 15a&b. Unclamped Inductive Test circuit and Waveforms

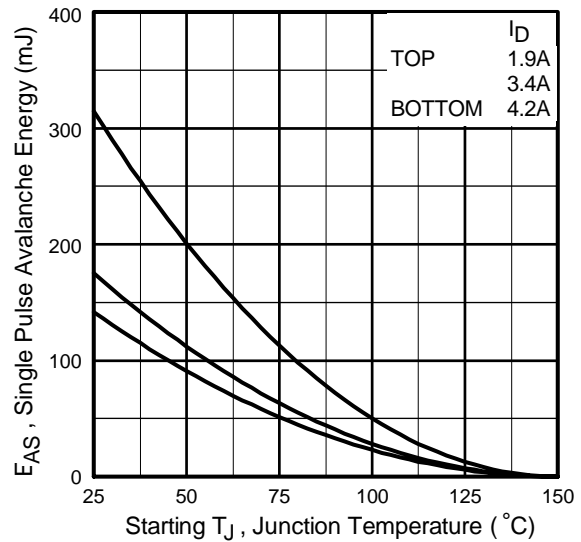
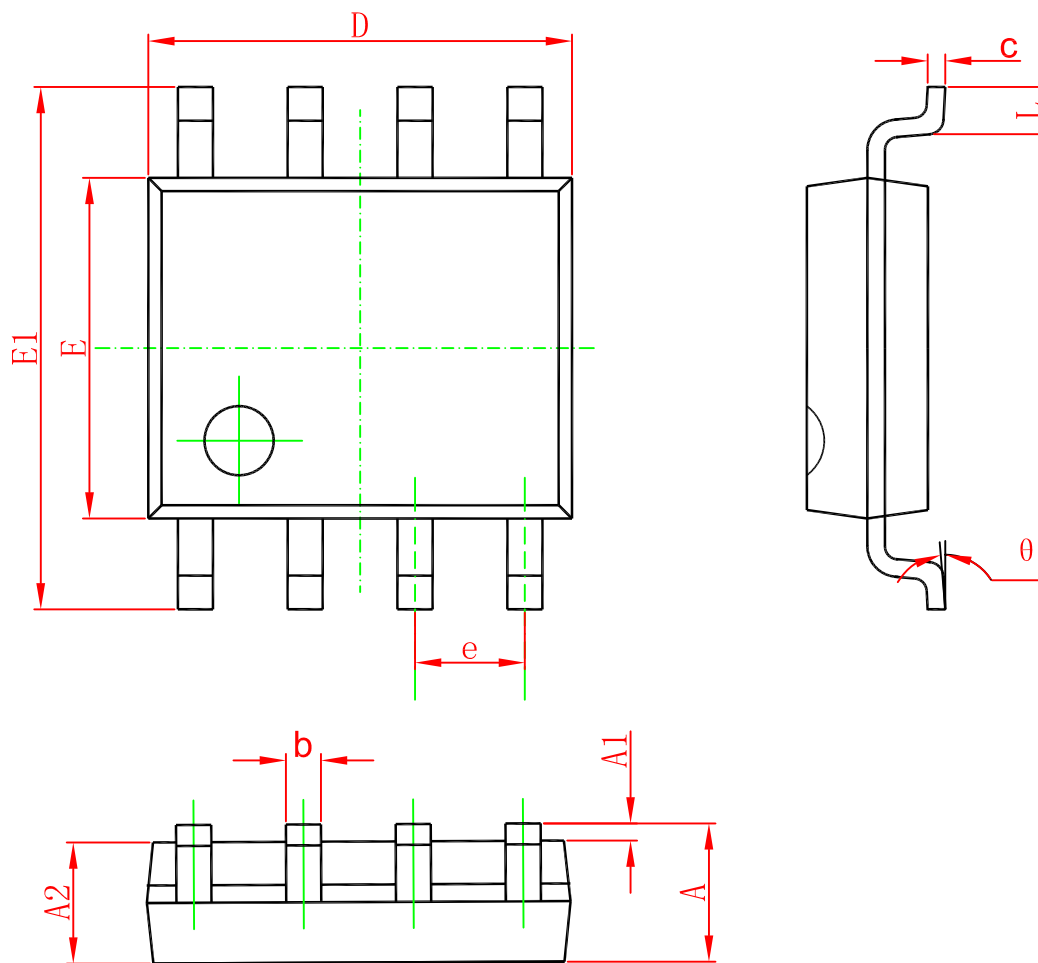


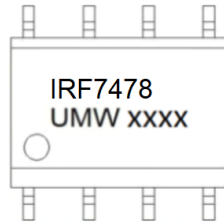
Fig 15c. Maximum Avalanche Energy Vs. Drain Current

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 IRF7478TR	SOP-8	3000	Tape and reel