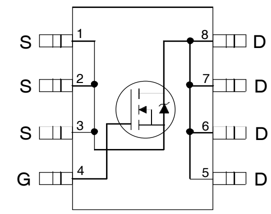
Applications

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



Top View

Benefits

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

Features

- $V_{DS\ (V)}$ =30V
- I_D= 16 A (V_{GS} = 10V)
- $R_{DS(ON)}$ < 6.5mΩ (V_{GS}=10V)
- $R_{DS(ON)}$ < 7.5 mΩ (V_{GS}=4.5V)

Absolute Maximum Ratings

Symbol	Parameter	Max.	Units
V_{DS}	Drain-Source Voltage	30	V
V_{GS}	Gate-to-Source Voltage	± 12	V
I_D @ T_A = 25°C	Continuous Drain Current, V_{GS} @ 10V	16	A
I_D @ T_A = 70°C	Continuous Drain Current, V_{GS} @ 10V	13	
I_{DM}	Pulsed Drain Current①	130	
P_D @T_A = 25°C	Maximum Power Dissipation③	2.5	W
P_D @T_A = 70°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

	Parameter	Max.	Units
$R_{\theta JA}$	Maximum Junction-to-Ambient④	50	°C/W

Static @ T_J = 25°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 = 250μA
$\Delta V_{(BR)DSS}/\Delta T_J$	Breakdown Voltage Temp. Coefficient		0.024		V/°C	Reference to 25°C, I_D = 1mA
$R_{DS(on)}$	Static Drain-to-Source On-Resistance		4.7	6.5	mΩ	V_{GS} = 10V, I_D = 16A ③
			5.7	7.5		V_{GS} = 4.5V, I_D = 13A ③
			11	20		V_{GS} = 2.8V, I_D = 3.5A ③
$V_{GS(th)}$	Gate Threshold Voltage	0.6		2.0	V	V_{DS} = V_{GS}, I_D = 250μA
I_{DSS}	Drain-to-Source Leakage Current			20	μA	V_{DS} = 16V, V_{GS} = 0V
				100		V_{DS} = 16V, V_{GS} = 0V, T_J = 125°C
I_{GSS}	Gate-to-Source Forward Leakage			200	nA	V_{GS} = 12V
	Gate-to-Source Reverse Leakage			-200		V_{GS} = -12V

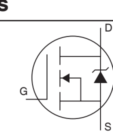
Dynamic @ T_J = 25°C (unless otherwise specified)

	Parameter	Min.	Typ.	Max.	Units	Conditions
g_{fs}	Forward Transconductance	44			S	V_{DS} = 10V, I_D = 16A
Q_g	Total Gate Charge		41	62	nC	I_D = 16A
Q_{gs}	Gate-to-Source Charge		9.7	15		V_{DS} = 16V
Q_{gd}	Gate-to-Drain ("Miller") Charge		18	27		V_{GS} = 5.0V, ③
$t_{d(on)}$	Turn-On Delay Time		20		ns	V_{DD} = 10V
t_r	Rise Time		25			I_D = 1.0A
$t_{d(off)}$	Turn-Off Delay Time		50			R_G = 6.0Ω
t_f	Fall Time		52			V_{GS} = 4.5V ③
C_{iss}	Input Capacitance		3640		pF	V_{GS} = 0V
C_{oss}	Output Capacitance		1570			V_{DS} = 15V
C_{rss}	Reverse Transfer Capacitance		330			f = 1.0MHz

Avalanche Characteristics

	Parameter	Typ.	Max.	Units
E_{AS}	Single Pulse Avalanche Energy②		250	mJ
I_{AR}	Avalanche Current①		16	A
E_{AR}	Repetitive Avalanche Energy①		0.25	mJ

Diode Characteristics

	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			130		
V_{SD}	Diode Forward Voltage			1.2	V	T_J = 25°C, I_S = 2.5A, V_{GS} = 0V ③
t_{rr}	Reverse Recovery Time		48	72	ns	T_J = 25°C, I_F = 2.5A
Q_{rr}	Reverse RecoveryCharge		74	110	nC	di/dt = 100A/μs ③

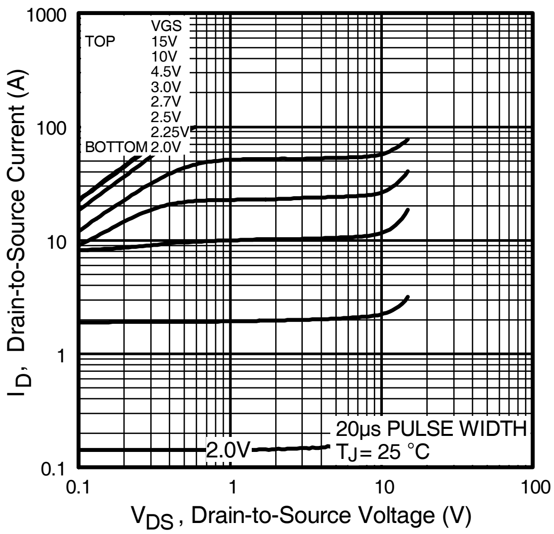


Fig 1. Typical Output Characteristics

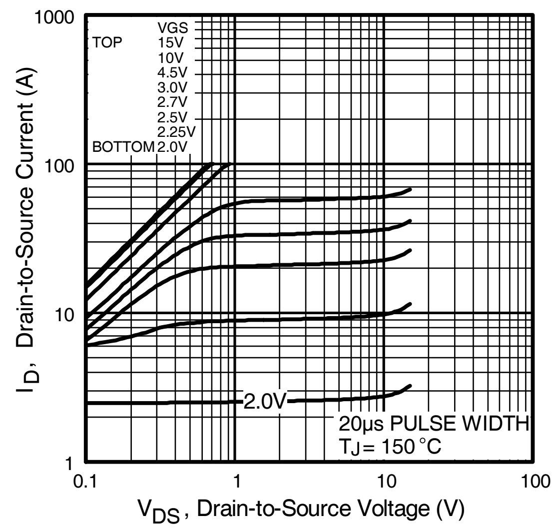


Fig 2. Typical Output Characteristics

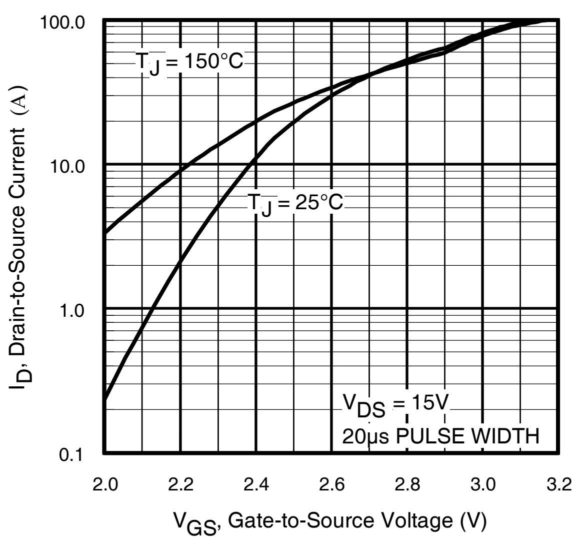


Fig 3. Typical Transfer Characteristics

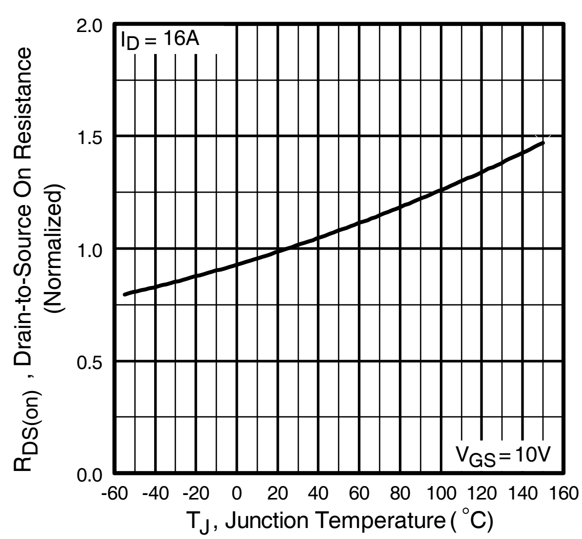


Fig 4. Normalized On-Resistance Vs. Temperature

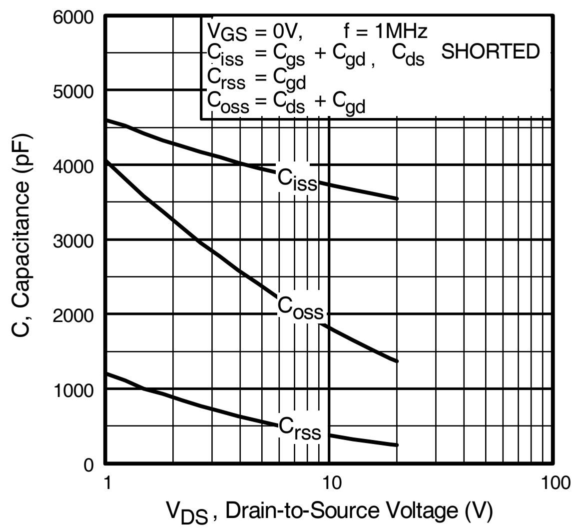


Fig 5. Typical Capacitance Vs. Drain-to-Source Voltage

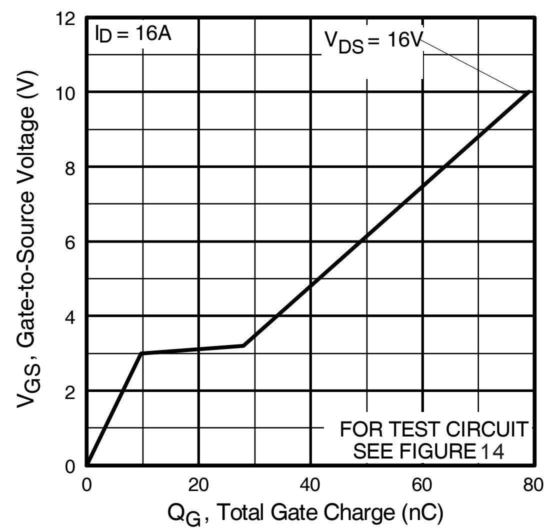


Fig 6. Typical Gate Charge Vs. Gate-to-Source Voltage

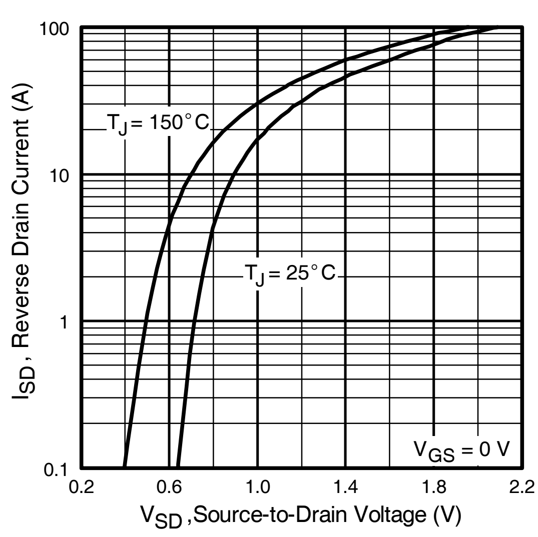


Fig 7. Typical Source-Drain Diode Forward Voltage

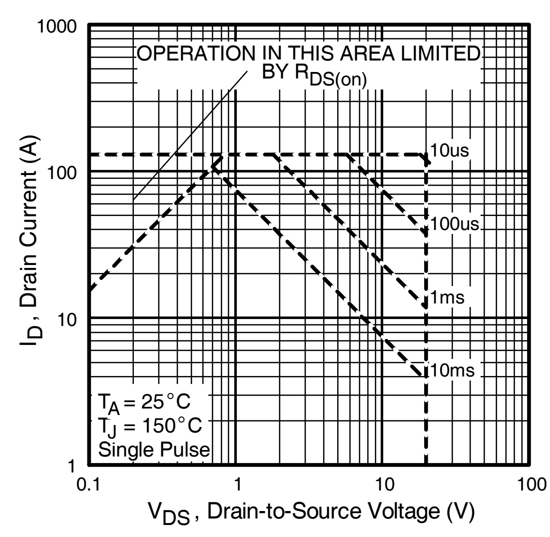


Fig 8. Maximum Safe Operating Area

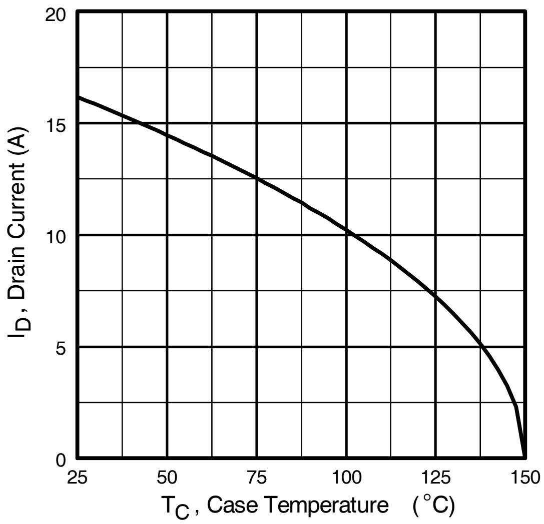


Fig 9. Maximum Drain Current Vs. Case Temperature

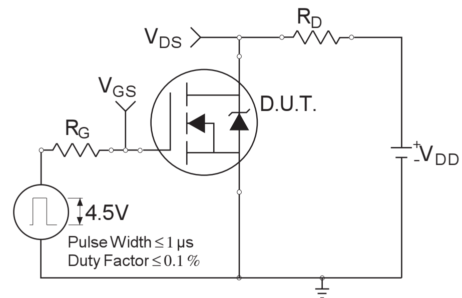


Fig 10a. Switching Time Test Circuit

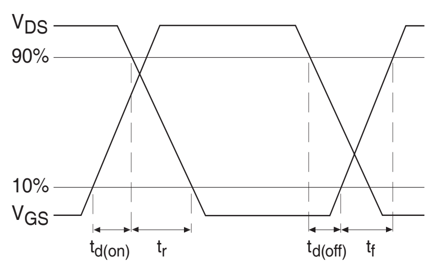


Fig 10b. Switching Time Waveforms

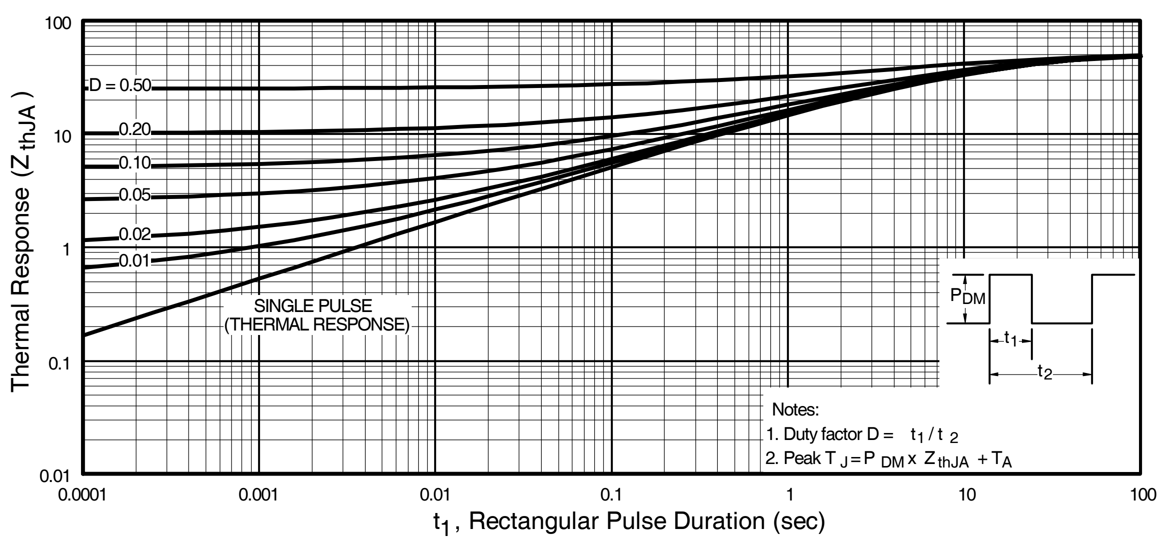


Fig 11. Maximum Effective Transient Thermal Impedance, Junction-to-Case

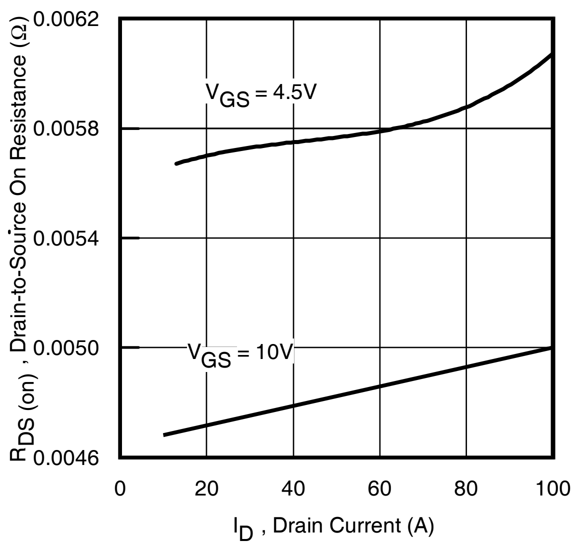


Fig 12. On-Resistance Vs. Drain Current

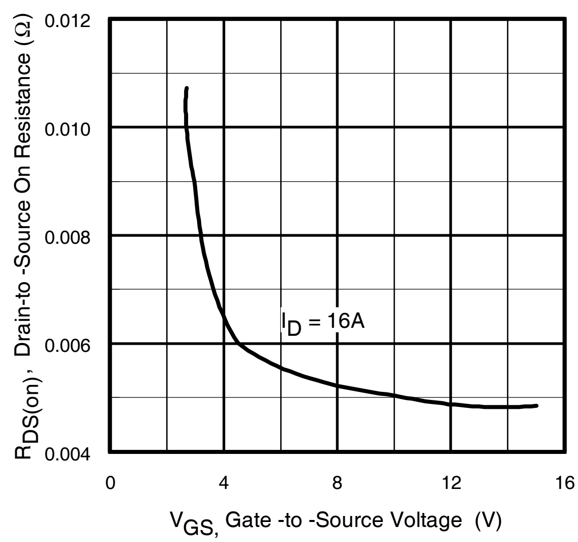


Fig 13. On-Resistance Vs. Gate Voltage

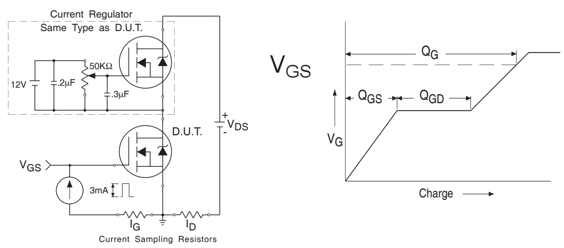
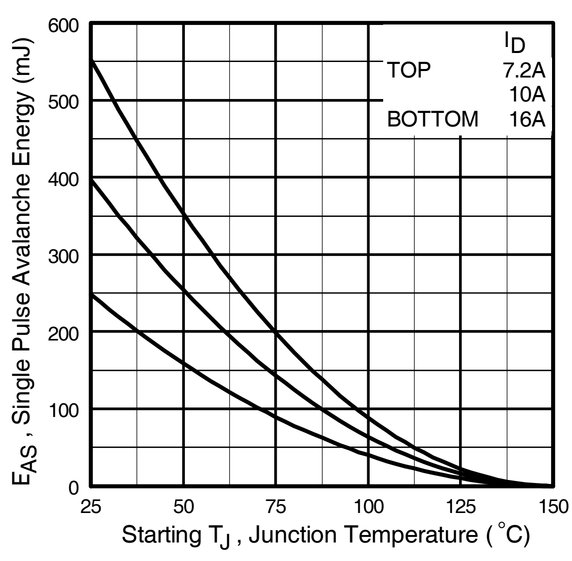


Fig 14a&b. Basic Gate Charge Test Circuit and Waveform



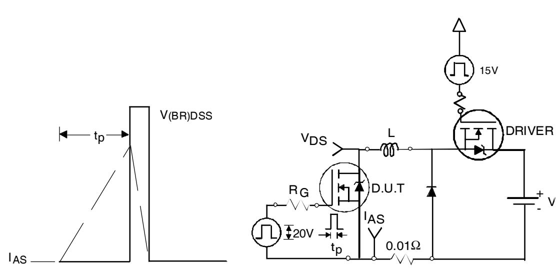
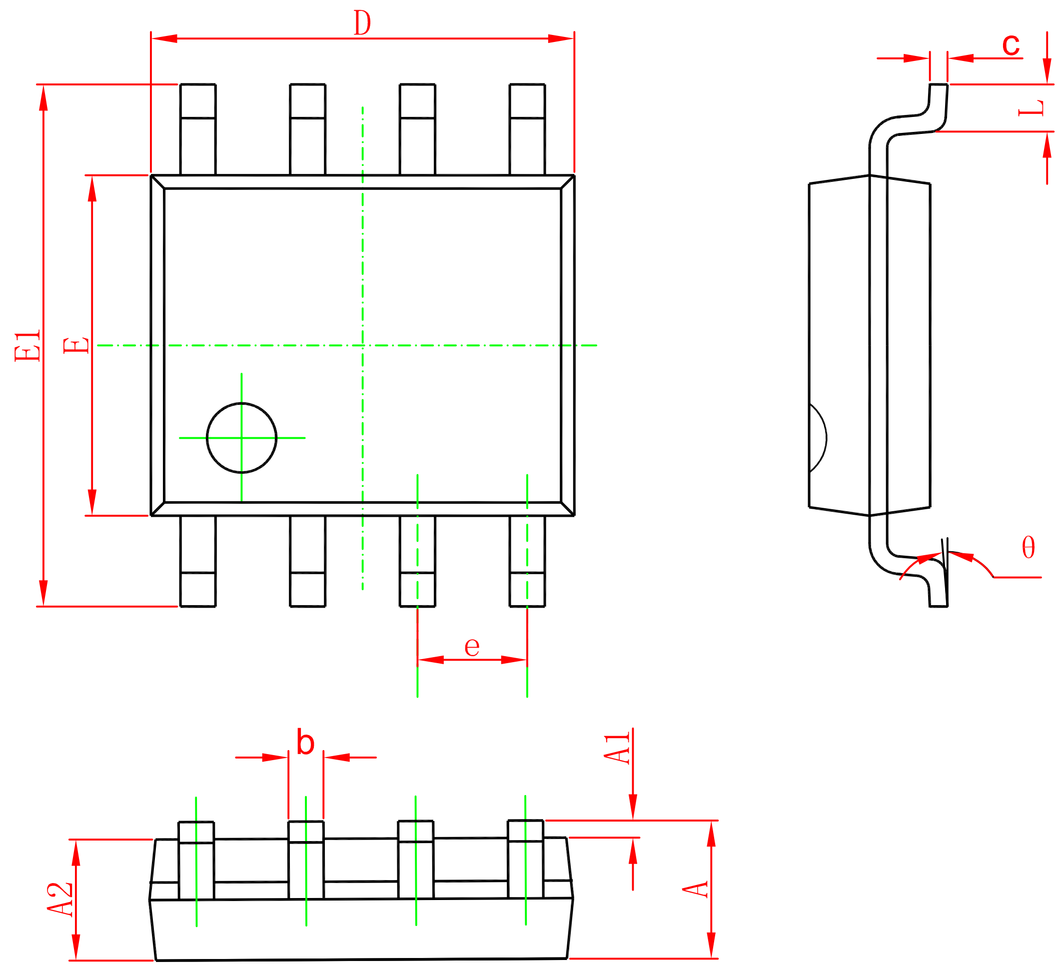


Fig 15a&b. Unclamped Inductive Test circuit and Waveforms

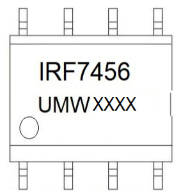
Fig 15c. Maximum Avalanche Energy Vs. Drain Current

Package Mechanical Data 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 IRF7456TR	SOP-8	3000	Tape and reel