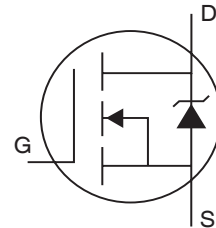
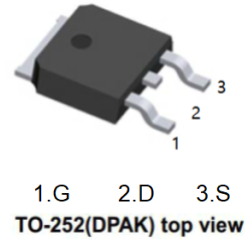


Features

- Advanced Process Technology
- Ultra Low On-Resistance
- 175°C Operating Temperature
- Fast Switching

- $V_{DS} = 55V$
- I_D (at $V_{GS}=10V$) = 30A
- $R_{DS(ON)}$ (at $V_{GS}=10V$) < 14mΩ



Absolute Maximum Ratings

	Parameter	Max.	Units
I_D @ $T_C = 25^\circ C$	Continuous Drain Current, V_{GS} @ 10V (Silicon limited)	61	A
I_D @ $T_C = 100^\circ C$	Continuous Drain Current, V_{GS} @ 10V (See Fig.9)	43	
I_D @ $T_C = 25^\circ C$	Continuous Drain Current, V_{GS} @ 10V (Package limited)	30	
I_{DM}	Pulsed Drain Current ①	240	
P_D @ $T_C = 25^\circ C$	Power Dissipation	120	W
	Linear Derating Factor	0.77	W/°C
V_{GS}	Gate-to-Source Voltage	± 16	V
E_{AS}	Single Pulse Avalanche Energy ②	200	mJ
E_{AS} (6 sigma)	Single Pulse Avalanche Energy Tested Value ③	600	
I_{AR}	Avalanche Current ④	See Fig.12a, 12b, 15, 16	A
E_{AR}	Repetitive Avalanche Energy ⑤		mJ
T_J	Operating Junction and	-55 to + 175	°C
T_{STG}	Storage Temperature Range		
	Soldering Temperature, for 10 seconds	300 (1.6mm from case)	

Thermal Resistance

	Parameter	Typ.	Max.	Units
$R_{\theta JC}$	Junction-to-Case		1.3	°C/W
$R_{\theta JA}$	Junction-to-Ambient (PCB mount) ⑥		50	
$R_{\theta JA}$	Junction-to-Ambient	110		

Electrical Characteristics @ T_J = 25°C (unless otherwise specified)

	Parameter	Min.	Typ.	Max.	Units	Conditions
V _{(BR)DSS}	Drain-to-Source Breakdown Voltage	55			V	V _{GS} = 0V, I _D = 250μA
ΔV _{(BR)DSS/ΔT_J}	Breakdown Voltage Temp. Coefficient		0.057		V/°C	Reference to 25°C, I _D = 1mA
R _{DS(on)}	Static Drain-to-Source On-Resistance		12	14	mΩ	V _{GS} = 10V, I _D = 30A ④
			14	17		V _{GS} = 5.0V, I _D = 26A ④
V _{GS(th)}	Gate Threshold Voltage	1.0	1.6	3.0	V	V _{DS} = 10V, I _D = 250μA
g _{fs}	Forward Transconductance	42			S	V _{DS} = 25V, I _D = 30A
I _{DSS}	Drain-to-Source Leakage Current			20	μA	V _{DS} = 55V, V _{GS} = 0V
				250		V _{DS} = 55V, V _{GS} = 0V, T _J = 125°C
I _{GSS}	Gate-to-Source Forward Leakage			200	nA	V _{GS} = 16V
	Gate-to-Source Reverse Leakage			-200		V _{GS} = -16V
Q _g	Total Gate Charge		61	92	nC	I _D = 30A
Q _{gs}	Gate-to-Source Charge		9.0	14		V _{DS} = 44V
Q _{gd}	Gate-to-Drain ("Miller") Charge		17	25		V _{GS} = 10V ④
t _{d(on)}	Turn-On Delay Time		7.4		ns	V _{DD} = 28V
t _r	Rise Time		51			I _D = 30A
t _{d(off)}	Turn-Off Delay Time		83			R _G = 8.5Ω
t _f	Fall Time		100			V _{GS} = 10V ④
L _D	Internal Drain Inductance		4.5		nH	Between lead, 6mm (0.25in.) from package and center of die contact
L _S	Internal Source Inductance		7.5			
C _{iss}	Input Capacitance		1870		pF	V _{GS} = 0V
C _{oss}	Output Capacitance		390			V _{DS} = 25V
C _{rss}	Reverse Transfer Capacitance		74			f = 1.0MHz, See Fig. 5
C _{oss}	Output Capacitance		2380			V _{GS} = 0V, V _{DS} = 1.0V, f = 1.0MHz
C _{oss}	Output Capacitance		290			V _{GS} = 0V, V _{DS} = 44V, f = 1.0MHz
C _{oss eff.}	Effective Output Capacitance ④		540			V _{GS} = 0V, V _{DS} = 0V to 44V

Source-Drain Ratings and Characteristics

	Parameter	Min.	Typ.	Max.	Units	Conditions
I _S	Continuous Source Current (Body Diode)			61	A	MOSFET symbol showing the integral reverse p-n junction diode.
I _{SM}	Pulsed Source Current (Body Diode) ①			240		
V _{SD}	Diode Forward Voltage			1.3	V	T _J = 25°C, I _S = 30A, V _{GS} = 0V ④
t _{rr}	Reverse Recovery Time		62	93	ns	T _J = 25°C, I _F = 30A, V _{DD} = 25xjkl V
Q _{rr}	Reverse Recovery Charge		110	170	nC	di/dt = 100A/μs ④
t _{on}	Forward Turn-On Time	Intrinsic turn-on time is negligible (turn-on is dominated by L _S +L _D)				

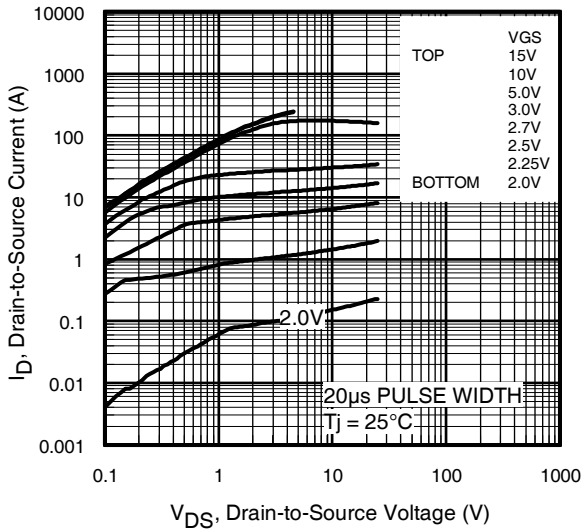


Fig 1. Typical Output Characteristics

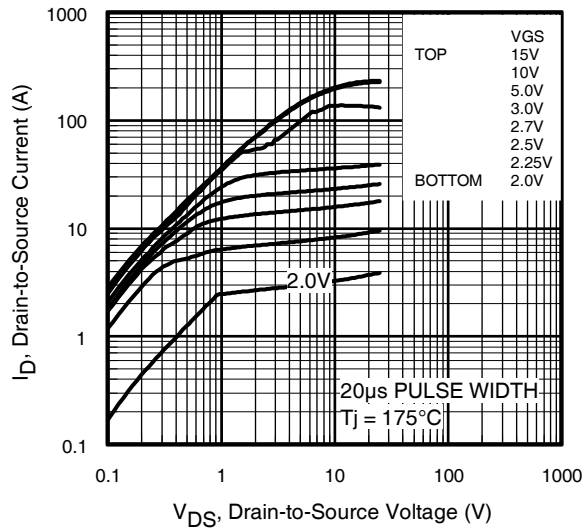


Fig 2. Typical Output Characteristics

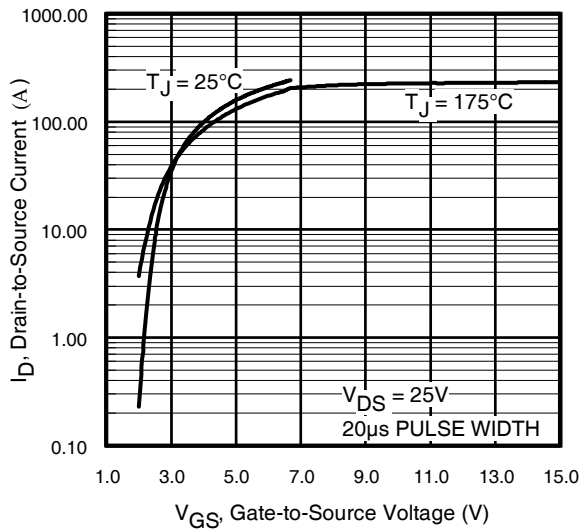


Fig 3. Typical Transfer Characteristics

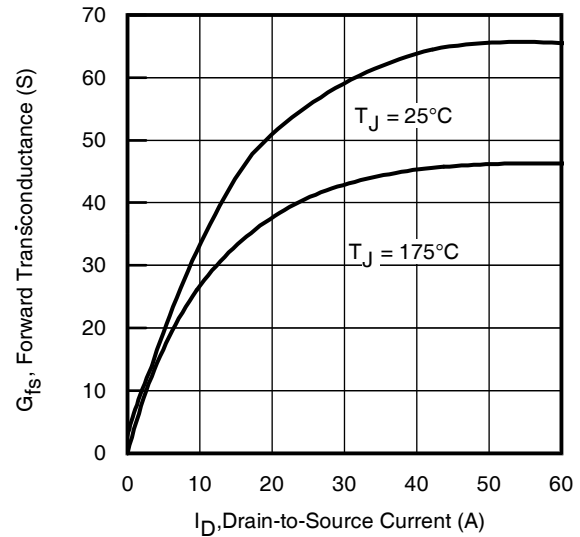


Fig 4. Typical Forward Transconductance vs. Drain Current

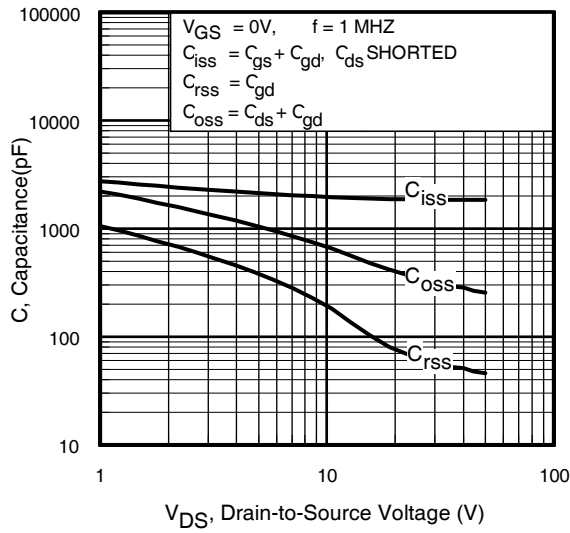


Fig 5. Typical Capacitance vs. Drain-to-Source Voltage

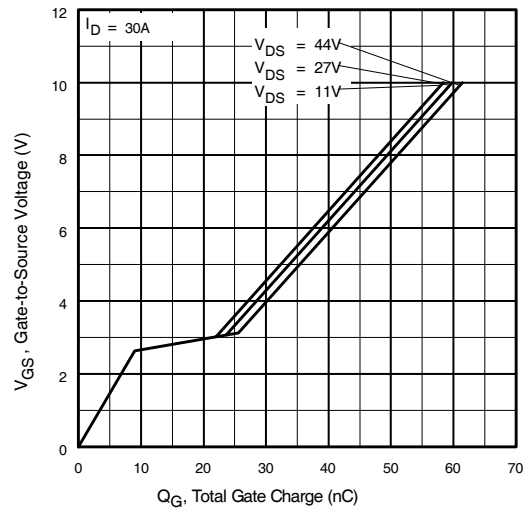


Fig 6. Typical Gate Charge vs. Gate-to-Source Voltage

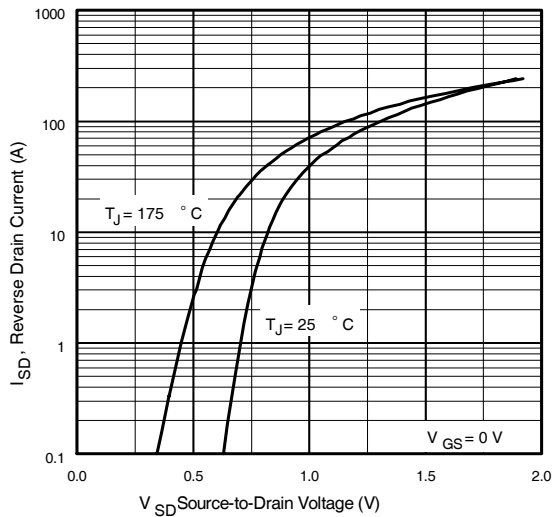


Fig 7. Typical Source-Drain Diode Forward Voltage

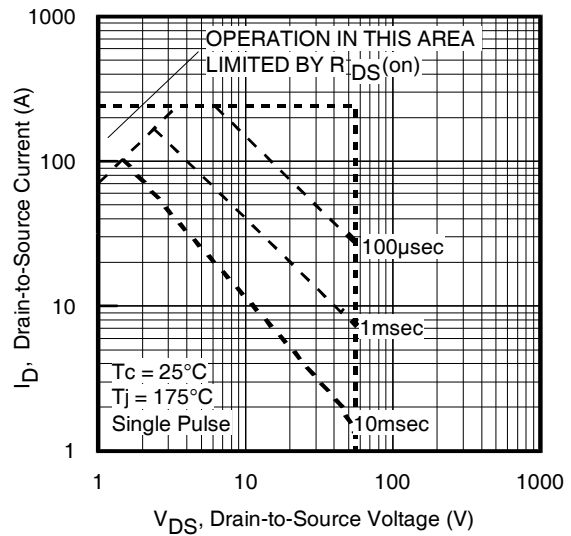


Fig 8. Maximum Safe Operating Area

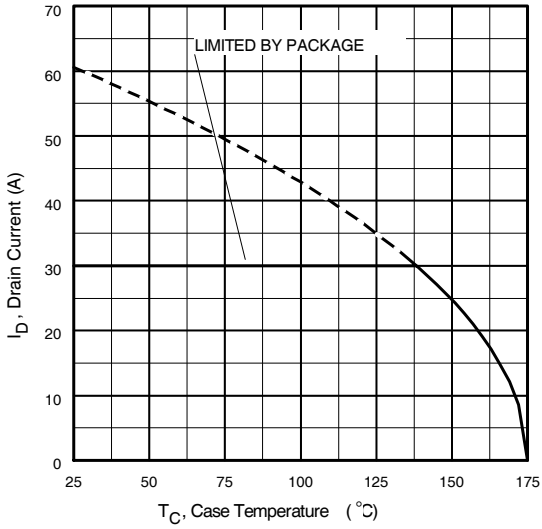


Fig 9. Maximum Drain Current vs. Case Temperature

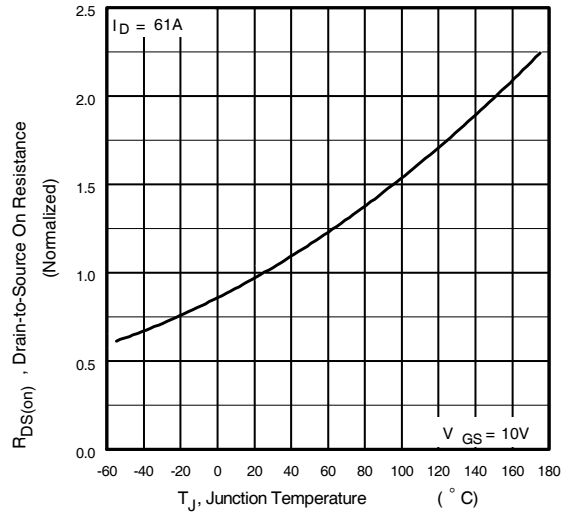


Fig 10. Normalized On-Resistance vs. Temperature

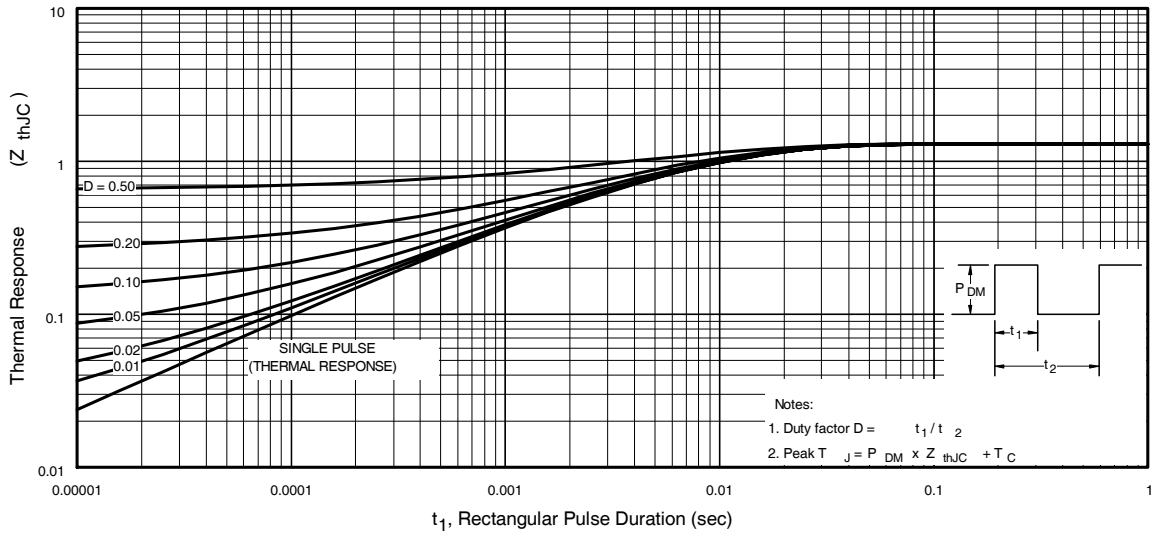


Fig 11. Maximum Effective Transient Thermal Impedance, Junction-to-Case

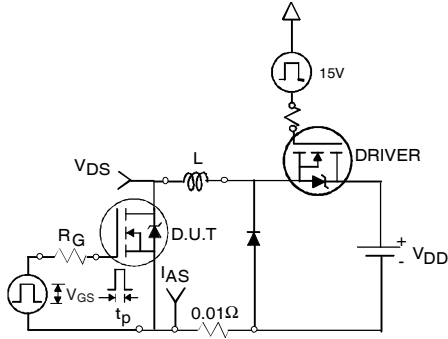


Fig 12a. Unclamped Inductive Test Circuit

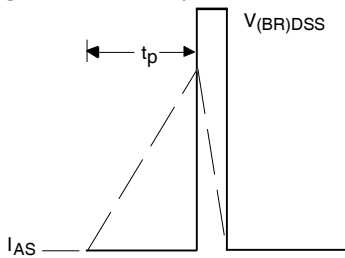


Fig 12b. Unclamped Inductive Waveforms

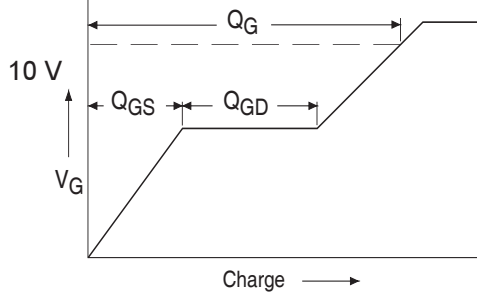


Fig 13a. Basic Gate Charge Waveform

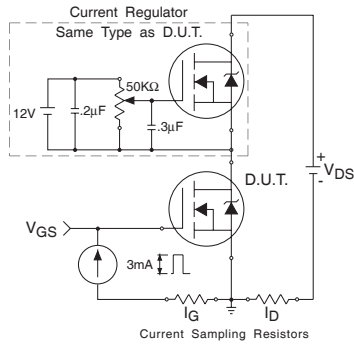


Fig 13b. Gate Charge Test Circuit

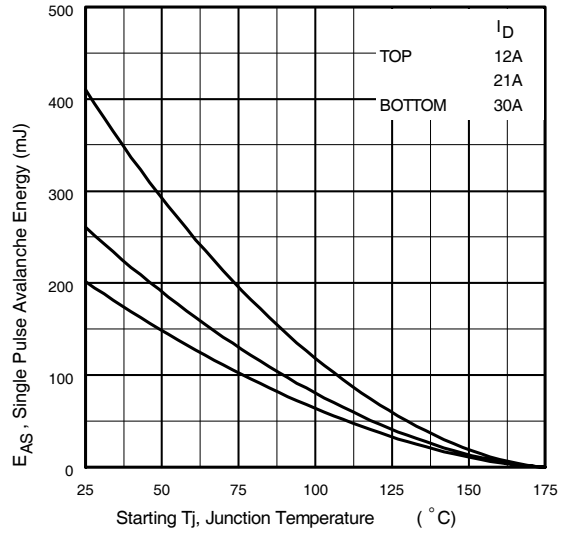


Fig 12c. Maximum Avalanche Energy vs. Drain Current

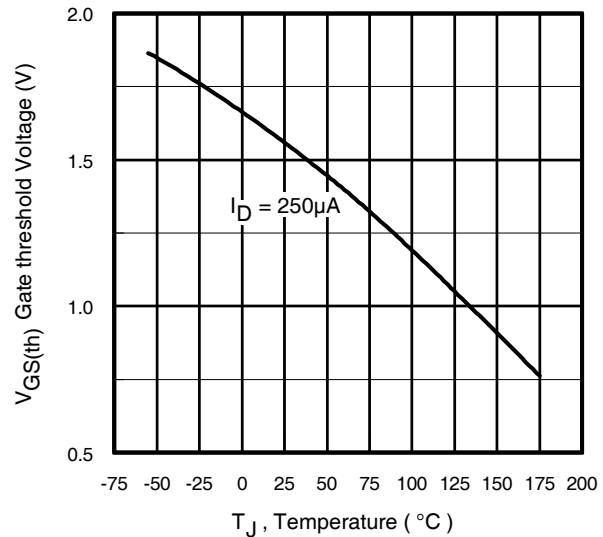


Fig 14. Threshold Voltage vs. Temperature

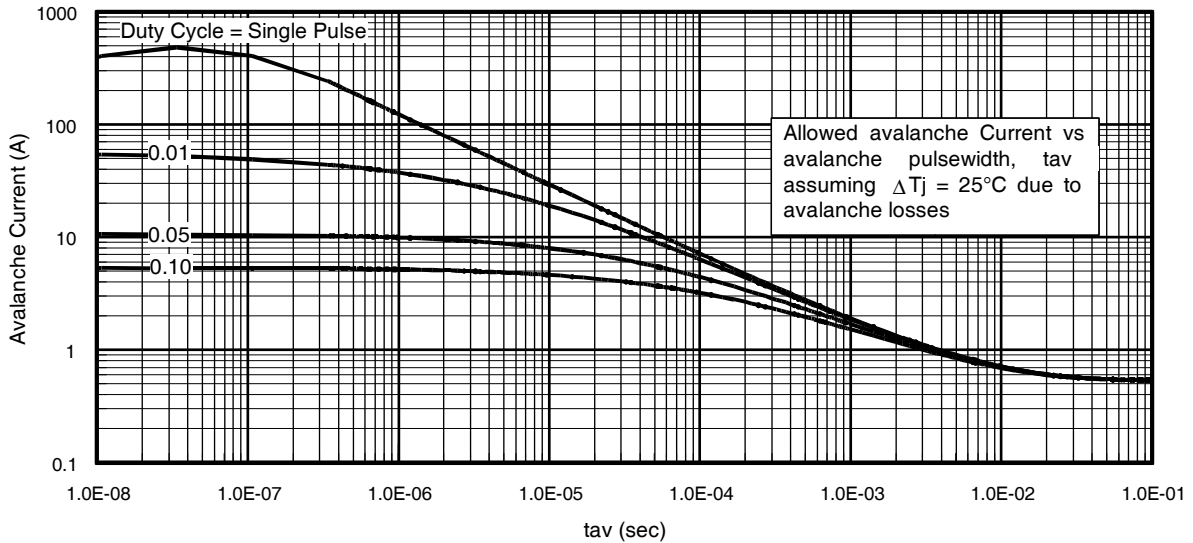


Fig 15. Typical Avalanche Current vs.Pulsewidth

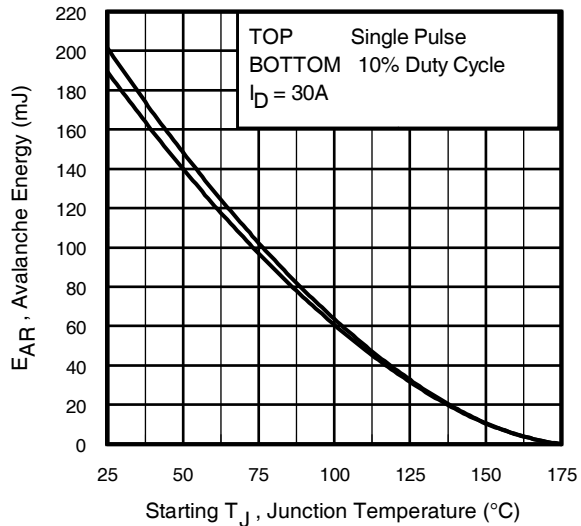


Fig 16. Maximum Avalanche Energy vs. Temperature

Notes on Repetitive Avalanche Curves , Figures 15, 16:

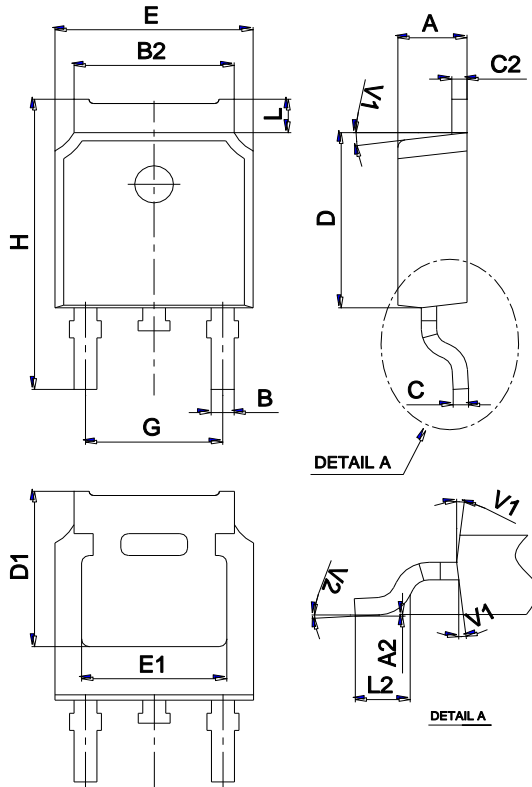
1. Avalanche failures assumption:
Purely a thermal phenomenon and failure occurs at a temperature far in excess of T_{jmax} . This is validated for every part type.
2. Safe operation in Avalanche is allowed as long as T_{jmax} is not exceeded.
3. Equation below based on circuit and waveforms shown in Figures 12a, 12b.
4. $P_{D(ave)}$ = Average power dissipation per single avalanche pulse.
5. BV = Rated breakdown voltage (1.3 factor accounts for voltage increase during avalanche).
6. I_{av} = Allowable avalanche current.
7. ΔT = Allowable rise in junction temperature, not to exceed T_{jmax} (assumed as 25°C in Figure 15, 16).
 t_{av} = Average time in avalanche.
 D = Duty cycle in avalanche = $t_{av} \cdot f$
 $Z_{thJC}(D, t_{av})$ = Transient thermal resistance, see figure 11)

$$P_{D(ave)} = 1/2 (1.3 \cdot BV \cdot I_{av}) = \Delta T / Z_{thJC}$$

$$I_{av} = 2\Delta T / [1.3 \cdot BV \cdot Z_{th}]$$

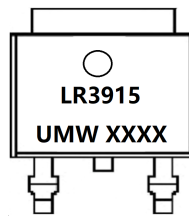
$$E_{AS(AR)} = P_{D(ave)} \cdot t_{av}$$

Package Mechanical Data TO-252



Ref.	Dimensions					
	Millimeters			Inches		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A	2.10		2.50	0.083		0.098
A2	0		0.10	0		0.004
B	0.66		0.86	0.026		0.034
B2	5.18		5.48	0.202		0.216
C	0.40		0.60	0.016		0.024
C2	0.44		0.58	0.017		0.023
D	5.90		6.30	0.232		0.248
D1	5.30REF			0.209REF		
E	6.40		6.80	0.252		0.268
E1	4.63			0.182		
G	4.47		4.67	0.176		0.184
H	9.50		10.70	0.374		0.421
L	1.09		1.21	0.043		0.048
L2	1.35		1.65	0.053		0.065
V1		7°			7°	
V2		0°	6°	0°		6°

Marking



Ordering information

Order code	Package	Baseqty	Deliverymode
UMW IRLR3915TR	TO-252	2500	Tape and reel