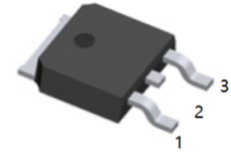


Features

- $V_{DS} (V) = 60V$
- $R_{DS(ON)} < 15.8m\Omega$ ($V_{GS} = 10V$)



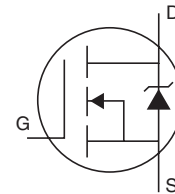
1.G 2.D 3.S
TO-252(DPAK) top view

Applications

- High Efficiency Synchronous Rectification in SMPS
- Uninterruptible Power Supply
- High Speed Power Switching
- Hard Switched and High Frequency Circuits

Benefits

- Improved Gate, Avalanche and Dynamic dv/dt Ruggedness
- Fully Characterized Capacitance and Avalanche SOA
- Enhanced body diode dV/dt and dI/dt Capability



Absolute Maximum Ratings

Symbol	Parameter	Max.	Units
$I_D @ T_C = 25^\circ C$	Continuous Drain Current, $V_{GS} @ 10V$	43	A
$I_D @ T_C = 100^\circ C$	Continuous Drain Current, $V_{GS} @ 10V$	31	
I_{DM}	Pulsed Drain Current ①	170	
$P_D @ T_C = 25^\circ C$	Maximum Power Dissipation	71	W
	Linear Derating Factor	0.47	W/°C
V_{GS}	Gate-to-Source Voltage	± 20	V
dv/dt	Peak Diode Recovery ③	24	V/ns
T_J	Operating Junction and Storage Temperature Range	-55 to + 175	°C
T_{STG}			
	Soldering Temperature, for 10 seconds (1.6mm from case)	300	

Avalanche Characteristics

E_{AS} (Thermally limited)	Single Pulse Avalanche Energy ②	73	mJ
I_{AR}	Avalanche Current ①	25	A
E_{AR}	Repetitive Avalanche Energy ④	7.1	mJ

Thermal Resistance

Symbol	Parameter	Typ.	Max.	Units
$R_{\theta JC}$	Junction-to-Case ⑧		2.12	°C/W
$R_{\theta CS}$	Case-to-Sink, Flat Greased Surface	0.50		
$R_{\theta JA}$	Junction-to-Ambient ⑦⑧		62	

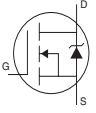
Static @ $T_J = 25^\circ\text{C}$ (unless otherwise specified)

Symbol	Parameter	Min.	Typ.	Max.	Units	Conditions
$V_{(BR)DSS}$	Drain-to-Source Breakdown Voltage	60			V	$V_{GS} = 0V, I_D = 250\mu A$
$\Delta V_{(BR)DSS}/\Delta T_J$	Breakdown Voltage Temp. Coefficient		0.075		V/ $^\circ\text{C}$	Reference to $25^\circ\text{C}, I_D = 5mA$ ①
$R_{DS(on)}$	Static Drain-to-Source On-Resistance		12.6	15.8	m Ω	$V_{GS} = 10V, I_D = 25A$ ④
$V_{GS(th)}$	Gate Threshold Voltage	2.0		4.0	V	$V_{DS} = V_{GS}, I_D = 50\mu A$
I_{DSS}	Drain-to-Source Leakage Current			20	μA	$V_{DS} = 60V, V_{GS} = 0V$
				250		$V_{DS} = 48V, V_{GS} = 0V, T_J = 125^\circ\text{C}$
I_{GSS}	Gate-to-Source Forward Leakage			100	nA	$V_{GS} = 20V$
	Gate-to-Source Reverse Leakage			-100		$V_{GS} = -20V$

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

Symbol	Parameter	Min.	Typ.	Max.	Units	Conditions
gfs	Forward Transconductance	41			S	$V_{DS} = 10V, I_D = 25A$
Q_g	Total Gate Charge		22	30	nC	$I_D = 25A$ $V_{DS} = 30V$ $V_{GS} = 10V$ ④ $I_D = 25A, V_{DS} = 0V, V_{GS} = 10V$
Q_{gs}	Gate-to-Source Charge		5.0			
Q_{gd}	Gate-to-Drain ("Miller") Charge		6.3			
Q_{sync}	Total Gate Charge Sync. ($Q_g - Q_{gd}$)		28.3			
$R_{G(int)}$	Internal Gate Resistance		0.79		Ω	
$t_{d(on)}$	Turn-On Delay Time		6.3		ns	$V_{DD} = 39V$ $I_D = 25A$ $R_G = 20\Omega$ $V_{GS} = 10V$ ④
t_r	Rise Time		40			
$t_{d(off)}$	Turn-Off Delay Time		49			
t_f	Fall Time		47			
C_{iss}	Input Capacitance		1150		pF	$V_{GS} = 0V$
C_{oss}	Output Capacitance		130			$V_{DS} = 50V$
C_{rss}	Reverse Transfer Capacitance		67			$f = 1.0MHz$
$C_{oss \text{ eff. (ER)}}$	Effective Output Capacitance (Energy Related) ⑥		190			$V_{GS} = 0V, V_{DS} = 0V \text{ to } 60V$ ⑥
$C_{oss \text{ eff. (TR)}}$	Effective Output Capacitance (Time Related) ⑤		230			$V_{GS} = 0V, V_{DS} = 0V \text{ to } 60V$ ⑤

Diode Characteristics

Symbol	Parameter	Min.	Typ.	Max.	Units	Conditions
I_S	Continuous Source Current (Body Diode)			43	A	MOSFET symbol showing the integral reverse p-n junction diode. 
I_{SM}	Pulsed Source Current (Body Diode) ①			170		
V_{SD}	Diode Forward Voltage			1.3	V	$T_J = 25^\circ\text{C}, I_S = 25A, V_{GS} = 0V$ ④
t_{rr}	Reverse Recovery Time		22	33	ns	$T_J = 25^\circ\text{C}$ $V_R = 51V,$
			26	39		$T_J = 125^\circ\text{C}$ $I_F = 25A$
Q_{rr}	Reverse Recovery Charge		17	26	nC	$T_J = 25^\circ\text{C}$ $di/dt = 100A/\mu s$ ④
			24	36		$T_J = 125^\circ\text{C}$
I_{RRM}	Reverse Recovery Current		1.4		A	$T_J = 25^\circ\text{C}$
t_{on}	Forward Turn-On Time	Intrinsic turn-on time is negligible (turn-on is dominated by LS+LD)				

Notes:

- ① Repetitive rating; pulse width limited by max. junction temperature.
- ② Limited by T_{Jmax} , starting $T_J = 25^\circ\text{C}, L = 0.23mH$
 $R_G = 25\Omega, I_{AS} = 25A, V_{GS} = 10V$. Part not recommended for use above this value.
- ③ $I_{SD} \leq 25A, di/dt \leq 1580A/\mu s, V_{DD} \leq V_{(BR)DSS}, T_J \leq 175^\circ\text{C}$.
- ④ Pulse width $\leq 400\mu s$; duty cycle $\leq 2\%$.
- ⑤ $C_{oss \text{ eff. (TR)}}$ 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 $C_{oss \text{ eff. (ER)}}$ is a fixed capacitance that gives the same energy as C_{oss} while V_{DS} is rising from 0 to 80% V_{DSS} .
- ⑦ When mounted on 1" square PCB (FR-4 or G-10 Material). For recommended footprint and soldering techniques refer to application note #AN-994.
- ⑧ R_θ is measured at T_J approximately 90°C .

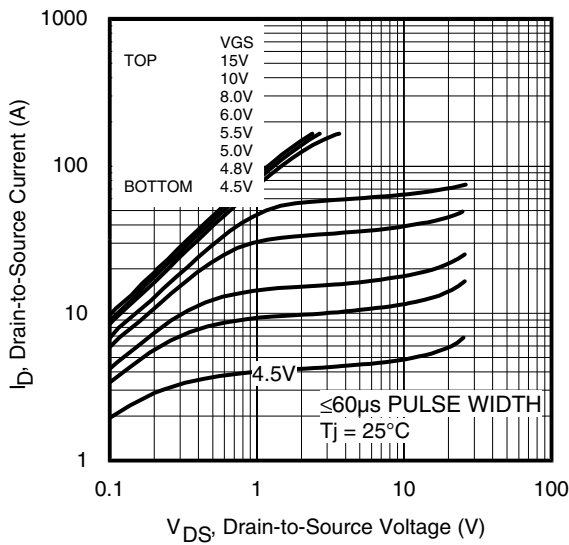


Fig 1. Typical Output Characteristics

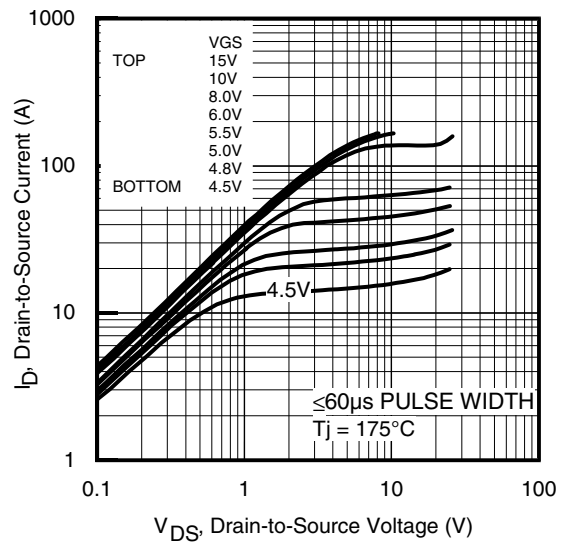


Fig 2. Typical Output Characteristics

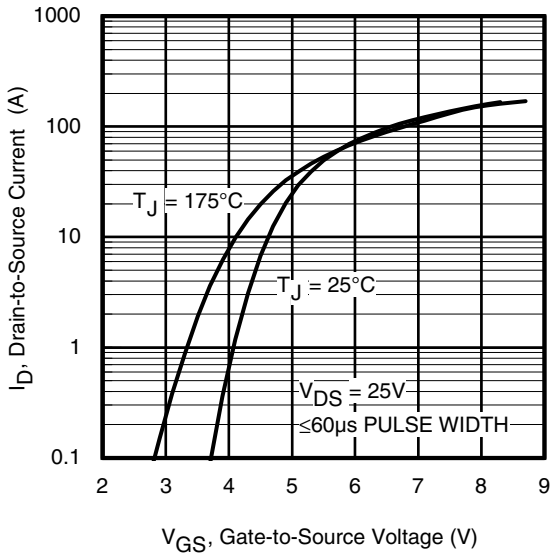


Fig 3. Typical Transfer Characteristics

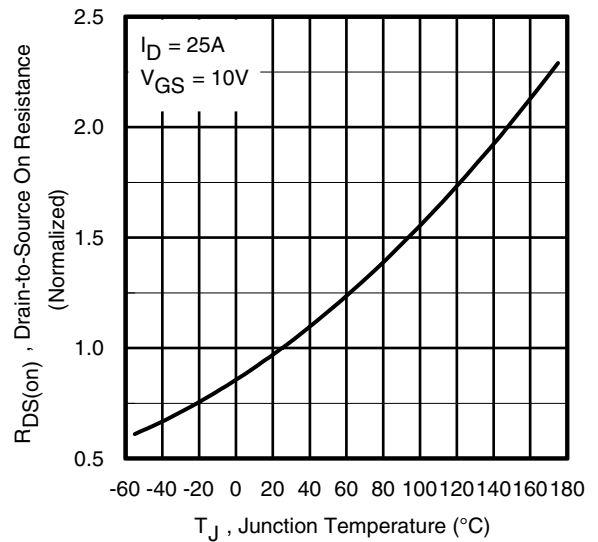


Fig 4. Normalized On-Resistance vs. Temperature

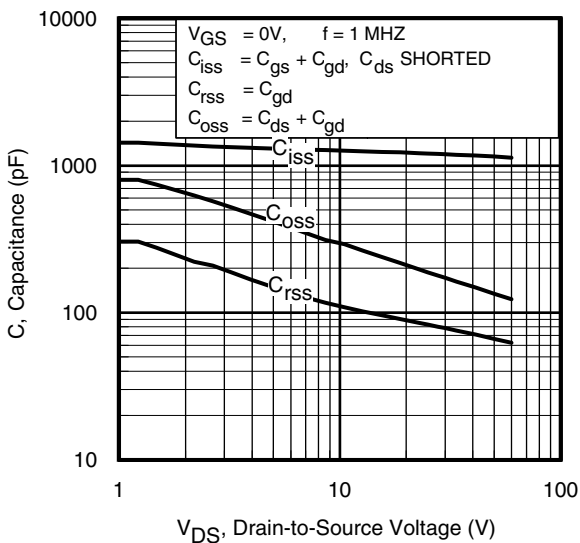


Fig 5. Typical Capacitance vs. Drain-to-Source Voltage

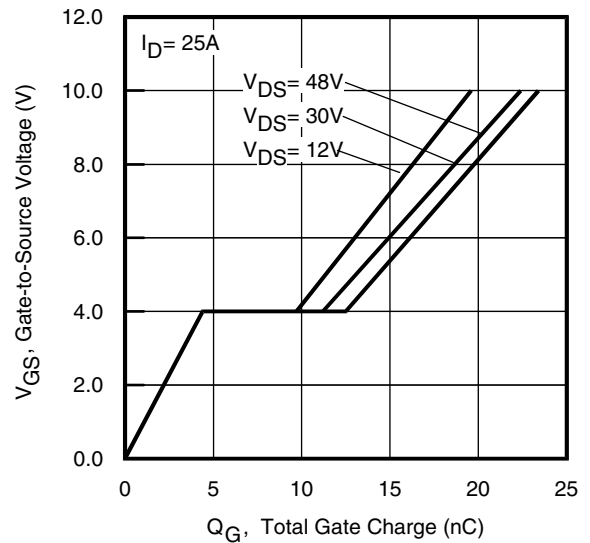


Fig 6. Typical Gate Charge vs. Gate-to-Source Voltage

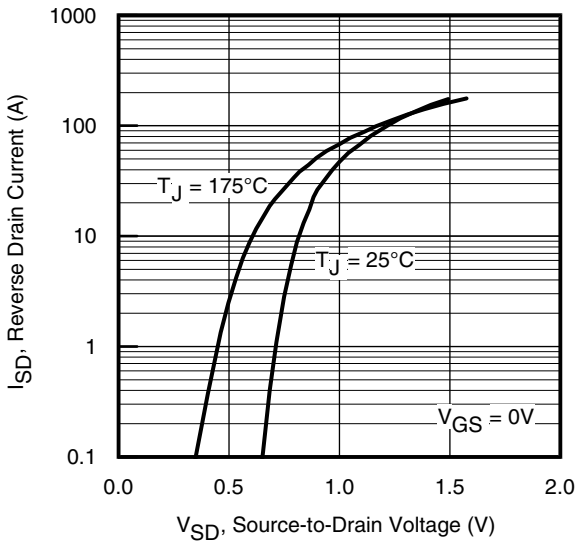


Fig 7. Typical Source-Drain Diode Forward Voltage

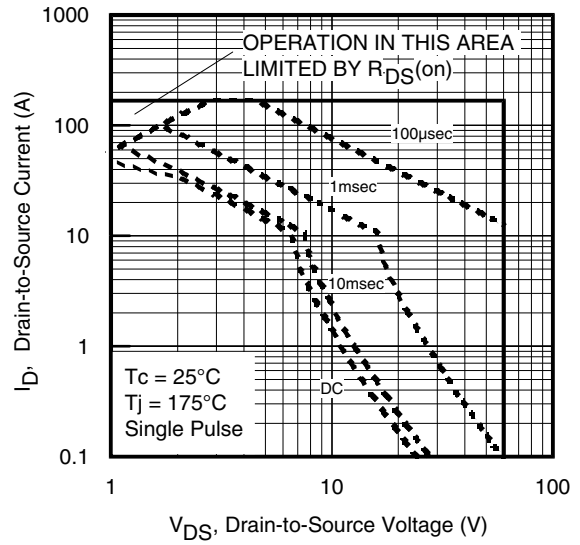


Fig 8. Maximum Safe Operating Area

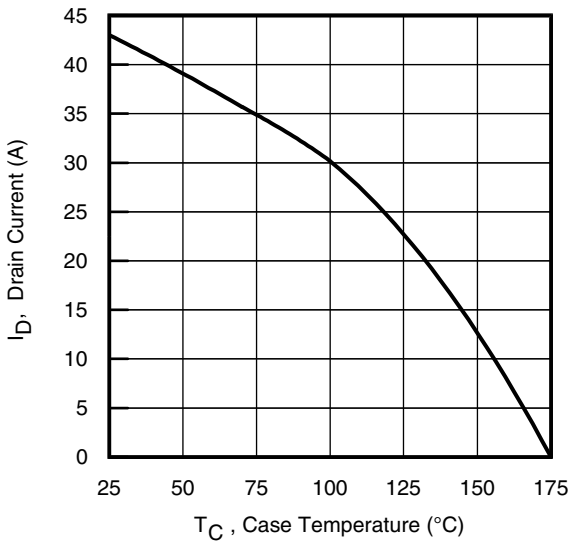


Fig 9. Maximum Drain Current vs. Case Temperature

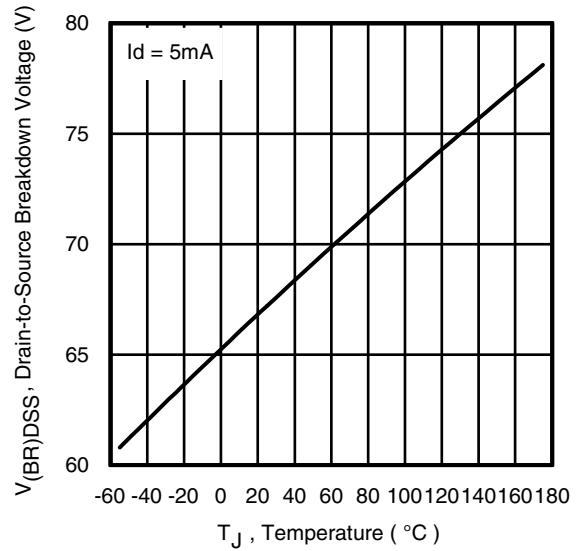


Fig 10. Drain-to-Source Breakdown Voltage

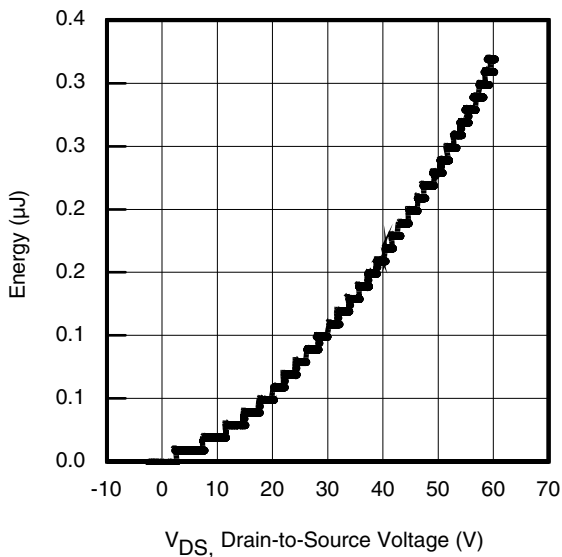


Fig 11. Typical C_{OSS} Stored Energy

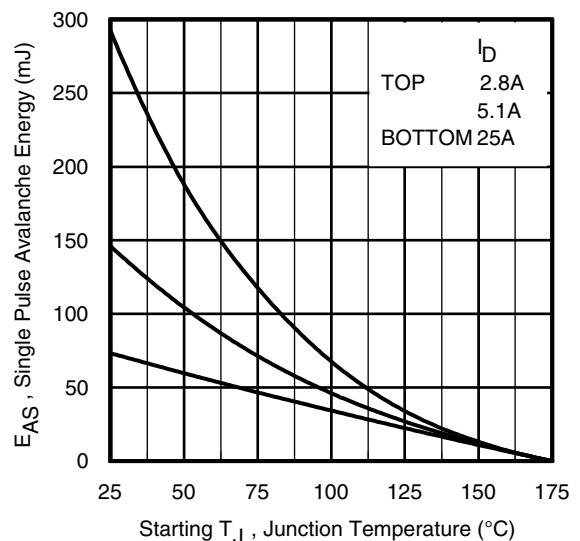


Fig 12. Maximum Avalanche Energy vs. Drain Current

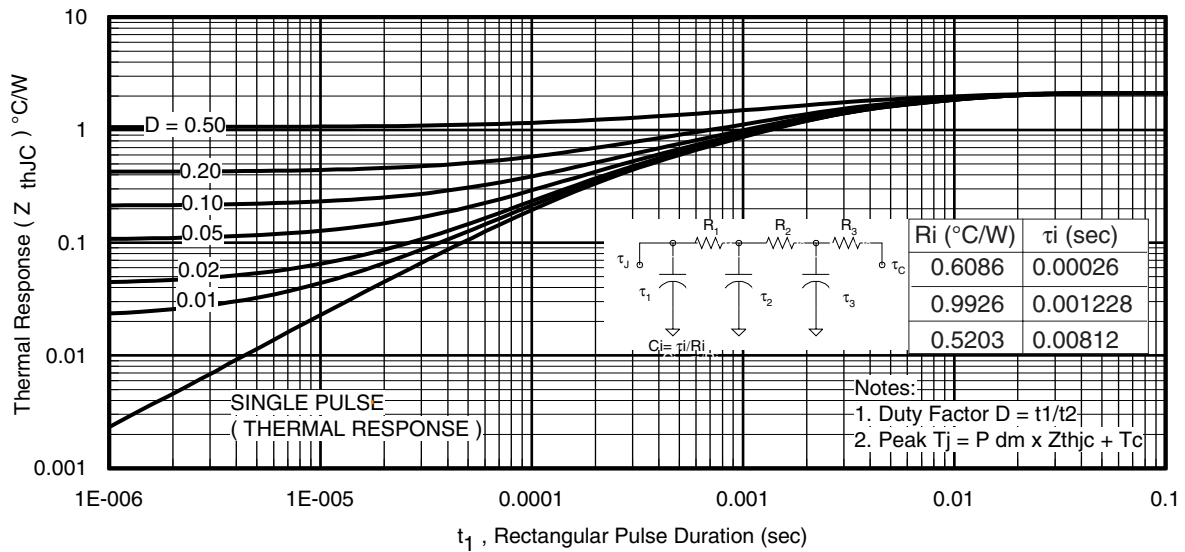


Fig 13. Maximum Effective Transient Thermal Impedance, Junction-to-Case

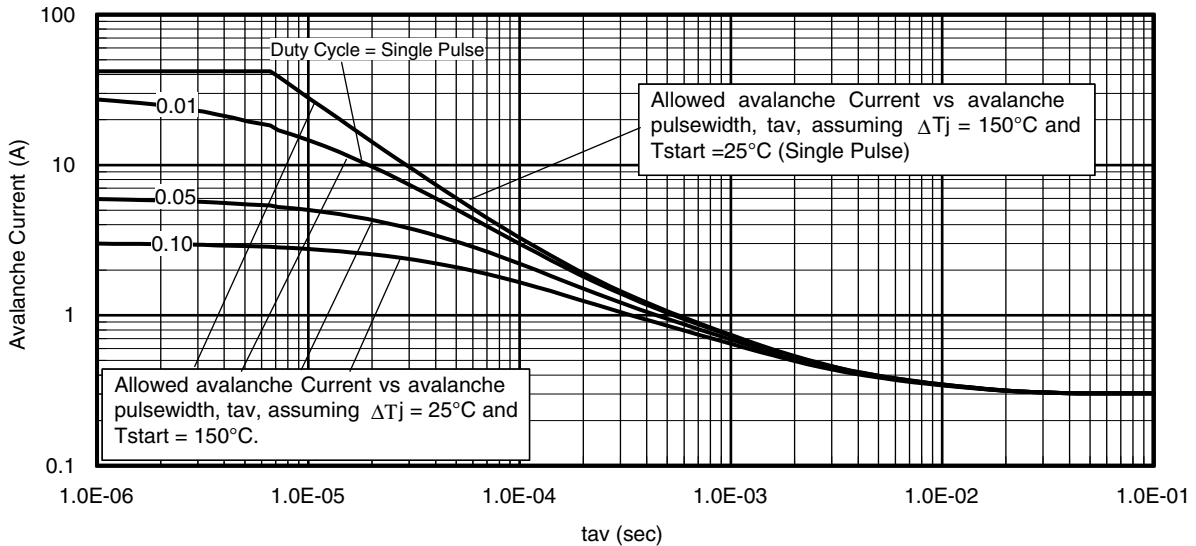
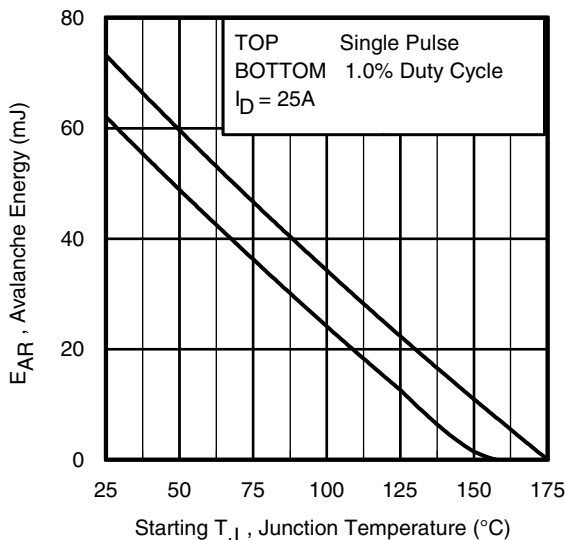


Fig 14. Typical Avalanche Current vs. Pulsewidth



Notes on Repetitive Avalanche Curves, Figures 14, 15:
(For further info, see AN-1005 at www.irf.com)

1. Avalanche failures assumption:
Purely a thermal phenomenon and failure occurs at a temperature far in excess of Tjmax. This is validated for every part type.
2. Safe operation in Avalanche is allowed as long as Tjmax is not exceeded.
3. Equation below based on circuit and waveforms shown in Figures 16a, 16b.
4. PD(ave) = Average power dissipation per single avalanche pulse.
5. BV = Rated breakdown voltage (1.3 factor accounts for voltage increase during avalanche).
6. Iav = Allowable avalanche current.
7. ΔT = Allowable rise in junction temperature, not to exceed Tjmax (assumed as 25°C in Figure 14, 15).
tav = Average time in avalanche.
D = Duty cycle in avalanche = tav · f
ZthJC(D, tav) = Transient thermal resistance, see Figures 13)

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

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

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

Fig 15. Maximum Avalanche Energy vs. Temperature

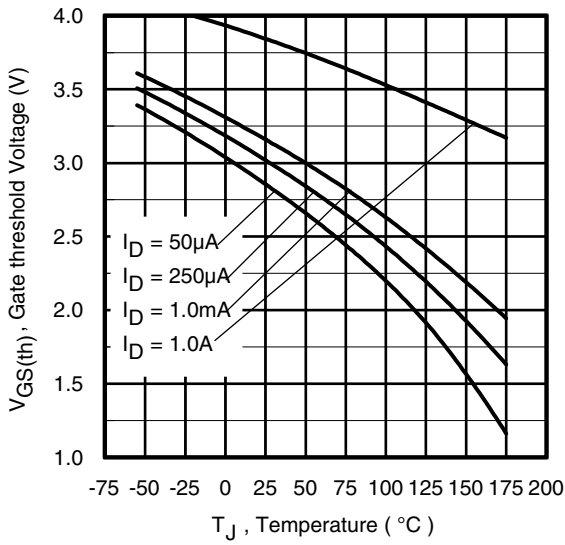


Fig. 16. Threshold Voltage vs. Temperature

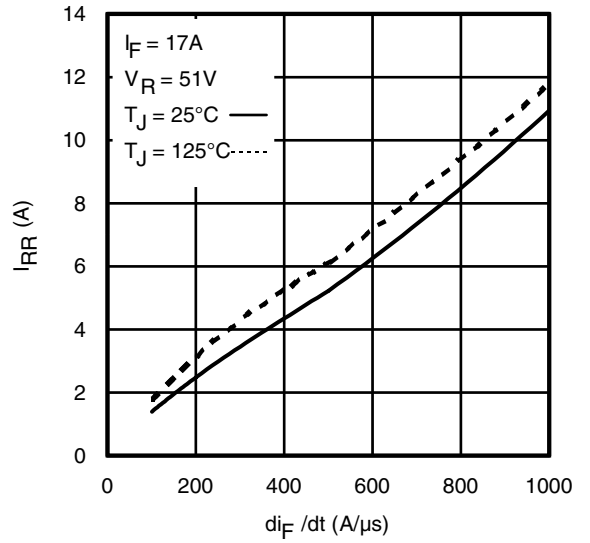


Fig. 17 - Typical Recovery Current vs. di_F/dt

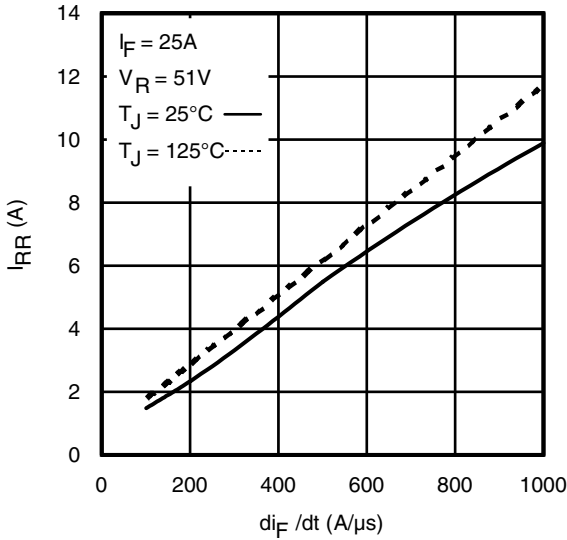


Fig. 18 - Typical Recovery Current vs. di_F/dt

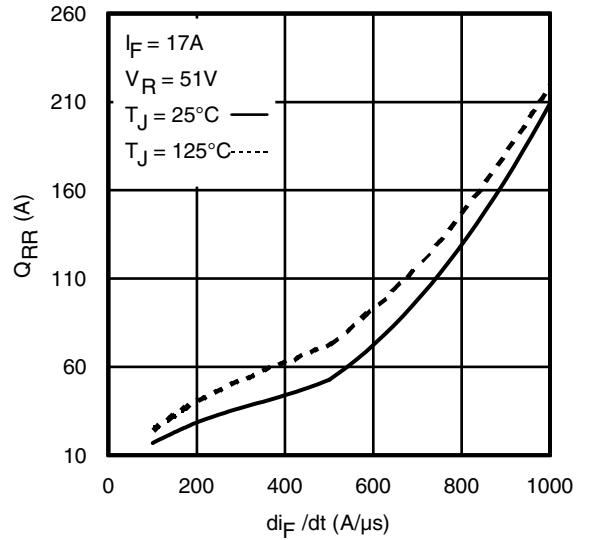


Fig. 19 - Typical Stored Charge vs. di_F/dt

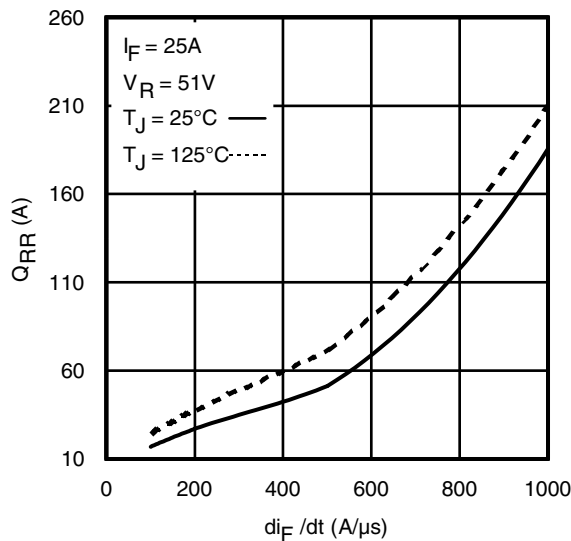
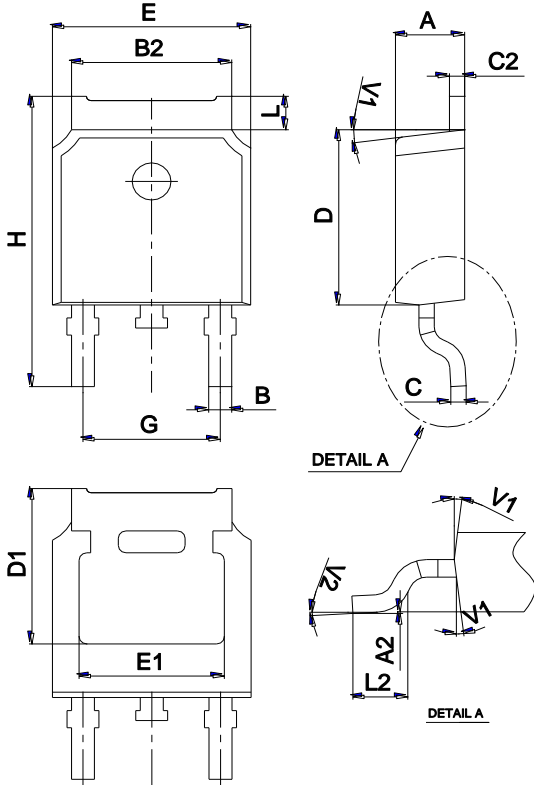


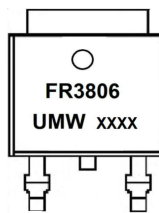
Fig. 20 - Typical Stored Charge vs. di_F/dt

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 IRFR3806TR	TO-252	2500	Tape and reel

单击下面可查看定价，库存，交付和生命周期等信息

[>>UMW\(友台半导体\)](#)