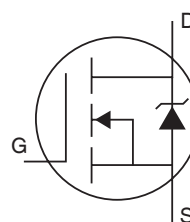
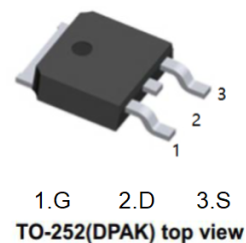


Applications

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

Benefits

- $V_{DS}(V) = 60V$
- $I_D = 47A$ ($V_{GS} = 10V$)
- $R_{DS(ON)} < 8.4m\Omega$ ($V_{GS} = 10V$)
- 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 (Silicon Limited)	79①	A
I_D @ $T_C = 100^\circ C$	Continuous Drain Current, V_{GS} @ 10V (Silicon Limited)	56①	
I_D @ $T_C = 25^\circ C$	Continuous Drain Current, V_{GS} @ 10V (Wire Bond Limited)	56	
I_{DM}	Pulsed Drain Current ②	315	
P_D @ $T_C = 25^\circ C$	Maximum Power Dissipation	110	W
	Linear Derating Factor	0.76	W/°C
V_{GS}	Gate-to-Source Voltage	± 20	V
dv/dt	Peak Diode Recovery ④	21	V/ns
T_J	Operating Junction and	-55 to + 175	°C
T_{STG}	Storage Temperature Range		
	Soldering Temperature, for 10 seconds (1.6mm from case)	300	

Avalanche Characteristics

E_{AS} (Thermally limited)	Single Pulse Avalanche Energy ③	88	mJ
I_{AR}	Avalanche Current ②	47	A
E_{AR}	Repetitive Avalanche Energy ⑤	11	mJ

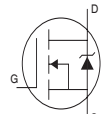
Thermal Resistance

Symbol	Parameter	Typ.	Max.	Units
$R_{\theta JC}$	Junction-to-Case ⑥		1.32	°C/W
$R_{\theta JA}$	Junction-to-Ambient (PCB Mount) ⑧⑨		50	
$R_{\theta JA}$	Junction-to-Ambient ⑨		110	

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		0.073		V/°C	Reference to 25°C, $I_D = 5mA$ ②
$R_{DS(on)}$	Static Drain-to-Source On-Resistance		7.1	8.4	mΩ	$V_{GS} = 10V, I_D = 47A$ ⑤
$V_{GS(th)}$	Gate Threshold Voltage	2.0		4.0	V	$V_{DS} = V_{GS}, I_D = 100\mu A$
I_{DSS}	Drain-to-Source Leakage Current			20	μA	$V_{DS} = 60V, V_{GS} = 0V$
				250		$V_{DS} = 48V, V_{GS} = 0V, T_J = 125^\circ C$
I_{GSS}	Gate-to-Source Forward Leakage			100	nA	$V_{GS} = 20V$
	Gate-to-Source Reverse Leakage			-100		$V_{GS} = -20V$
g_{fs}	Forward Transconductance	110			S	$V_{DS} = 50V, I_D = 47A$
Q_g	Total Gate Charge		46	69	nC	$I_D = 47A$
Q_{gs}	Gate-to-Source Charge		10			$V_{DS} = 30V$
Q_{gd}	Gate-to-Drain ("Miller") Charge		12			$V_{GS} = 10V$ ⑤
Q_{sync}	Total Gate Charge Sync. ($Q_g - Q_{gd}$)		34			$I_D = 47A, V_{DS} = 0V, V_{GS} = 10V$
$R_{G(int)}$	Internal Gate Resistance		0.73		Ω	
$t_{d(on)}$	Turn-On Delay Time		13		ns	$V_{DD} = 39V$
t_r	Rise Time		35			$I_D = 47A$
$t_{d(off)}$	Turn-Off Delay Time		55			$R_G = 10\Omega$
t_f	Fall Time		46			$V_{GS} = 10V$ ⑤
C_{iss}	Input Capacitance		2290		pF	$V_{GS} = 0V$
C_{oss}	Output Capacitance		270			$V_{DS} = 50V$
C_{rss}	Reverse Transfer Capacitance		130			$f = 1.0MHz$
$C_{oss \text{ eff. (ER)}}$	Effective Output Capacitance (Energy Related)⑥		390			$V_{GS} = 0V, V_{DS} = 0V \text{ to } 60V$ ⑦
$C_{oss \text{ eff. (TR)}}$	Effective Output Capacitance (Time Related)⑤		630			$V_{GS} = 0V, V_{DS} = 0V \text{ to } 60V$ ⑥
I_S	Continuous Source Current (Body Diode)		79①	A		MOSFET symbol showing the integral reverse p-n junction diode.
I_{SM}	Pulsed Source Current (Body Diode) ②			315		
V_{SD}	Diode Forward Voltage			1.3	V	$T_J = 25^\circ C, I_S = 47A, V_{GS} = 0V$ ⑤
t_{rr}	Reverse Recovery Time		26	39	ns	$T_J = 25^\circ C$ $V_R = 51V,$
			31	47		$T_J = 125^\circ C$ $I_F = 47A$
Q_{rr}	Reverse Recovery Charge		24	36	nC	$T_J = 25^\circ C$ $di/dt = 100A/\mu s$ ⑤
			35	53		$T_J = 125^\circ C$
I_{RRM}	Reverse Recovery Current		1.8		A	$T_J = 25^\circ C$
t_{on}	Forward Turn-On Time	Intrinsic turn-on time is negligible (turn-on is dominated by LS+LD)				

Notes:

- ① Calculated continuous current based on maximum allowable junction temperature. Bond wire current limit is 56A. Note that current limitations arising from heating of the device leads may occur with some lead mounting arrangements.
- ② Repetitive rating; pulse width limited by max. junction temperature.
- ③ Limited by T_{Jmax} , starting $T_J = 25^\circ C, L = 0.08mH$
 $R_G = 25\Omega, I_{AS} = 47A, V_{GS} = 10V$. Part not recommended for use above this value.
- ④ $I_{SD} \leq 47A, di/dt \leq 1668A/\mu s, V_{DD} \leq V_{(BR)DSS}, T_J \leq 175^\circ C$.
- ⑤ Pulse width $\leq 400\mu s$; duty cycle $\leq 2\%$.
- ⑥ $C_{oss \text{ eff. (TR)}}$ is a fixed capacitance that gives the same charging time as C_{oss} while V_{DS} is rising from 0 to 80% V_{DSS} .
- ⑦ $C_{oss \text{ eff. (ER)}}$ is a fixed capacitance that gives the same energy as C_{oss} while V_{DS} is rising from 0 to 80% V_{DSS} .
- ⑧ When mounted on 1" square PCB (FR-4 or G-10 Material). For recommended footprint and soldering techniques refer to application note #AN-994.
- ⑨ R_{θ} is measured at T_J approximately $90^\circ C$.



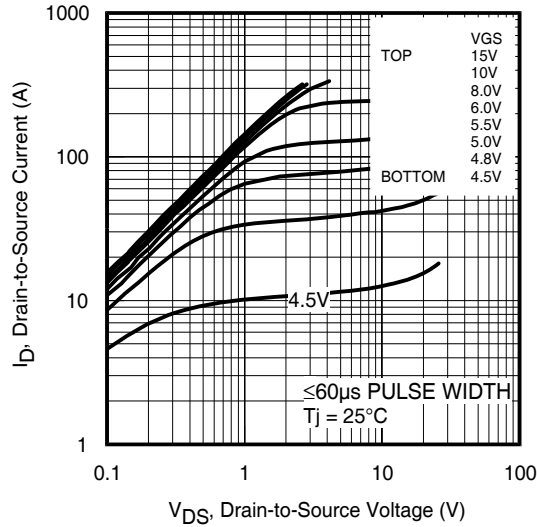


Fig 1. Typical Output Characteristics

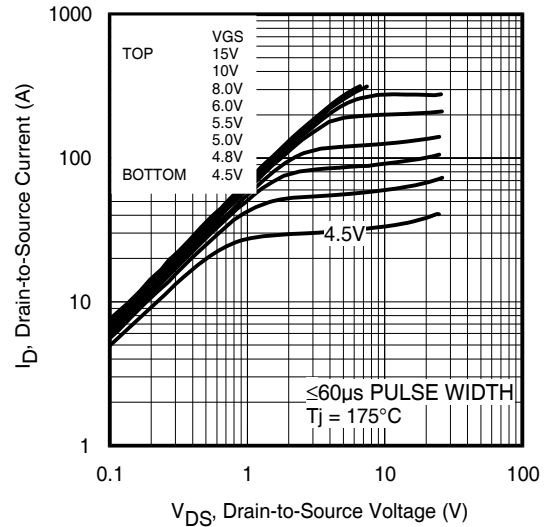


Fig 2. Typical Output Characteristics

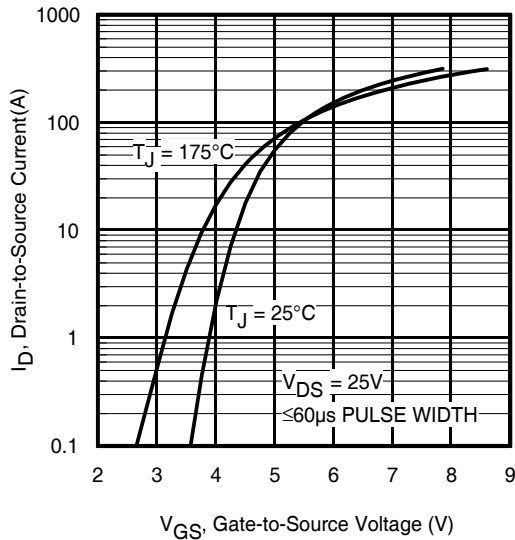


Fig 3. Typical Transfer Characteristics

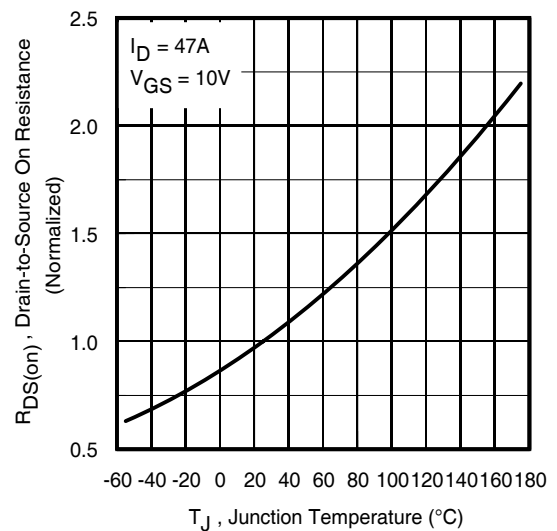


Fig 4. Normalized On-Resistance vs. Temperature

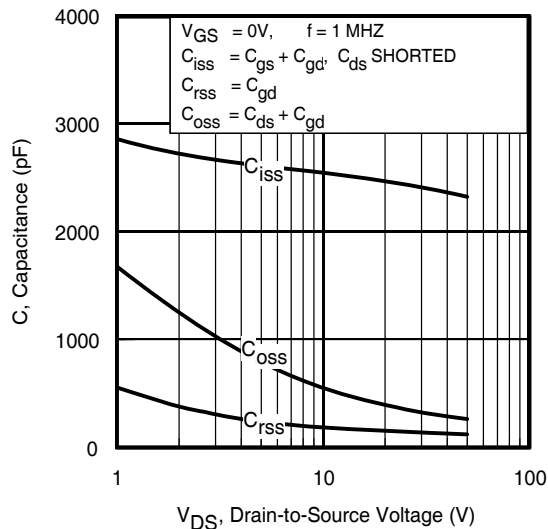


Fig 5. Typical Capacitance vs. Drain-to-Source Voltage

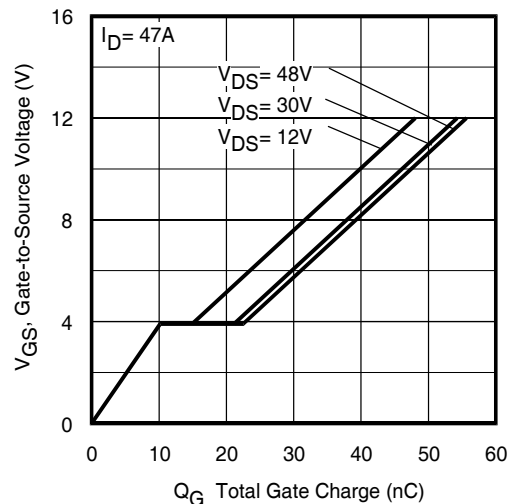


Fig 6. Typical Gate Charge vs. Gate-to-Source Voltage

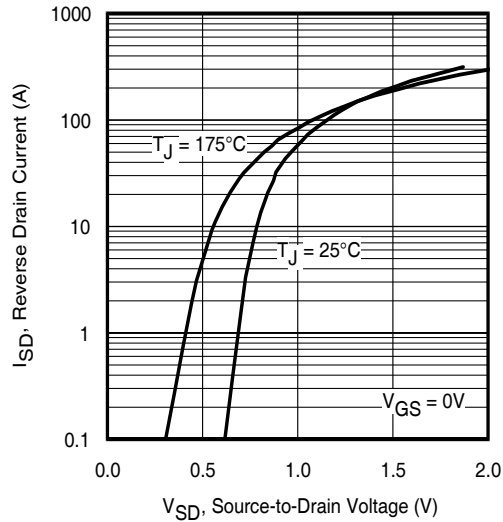


Fig 7. Typical Source-Drain Diode Forward Voltage

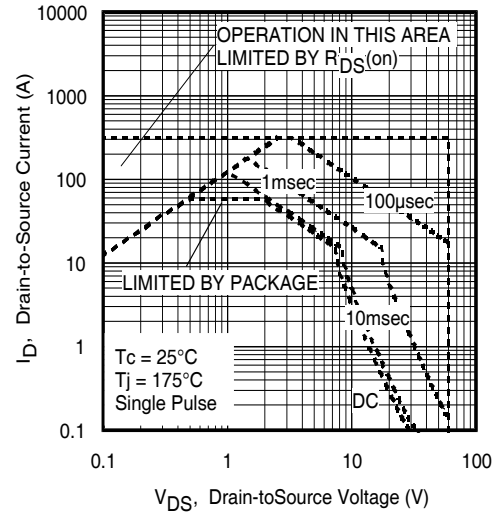


Fig 8. Maximum Safe Operating Area

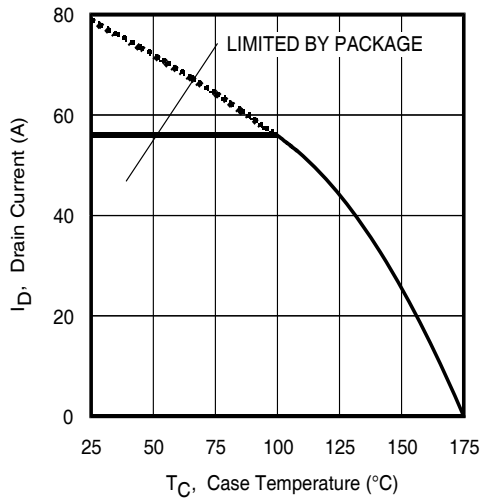


Fig 9. Maximum Drain Current vs. Case Temperature

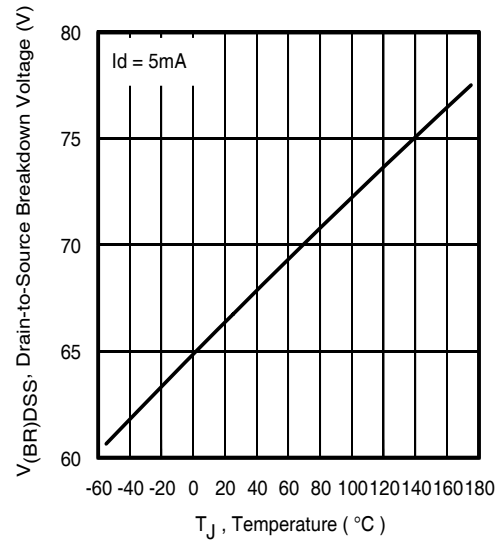


Fig 10. Drain-to-Source Breakdown Voltage

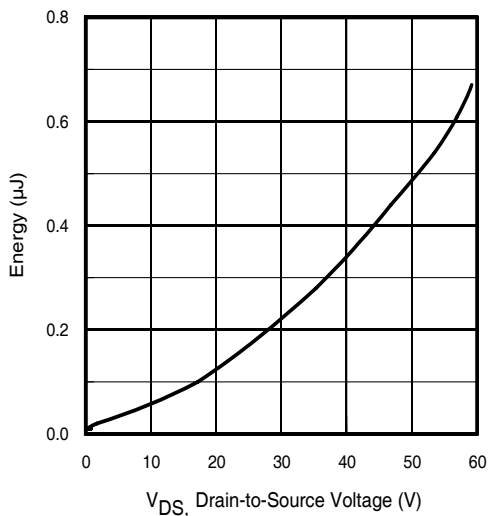


Fig 11. Typical C_{OSS} Stored Energy

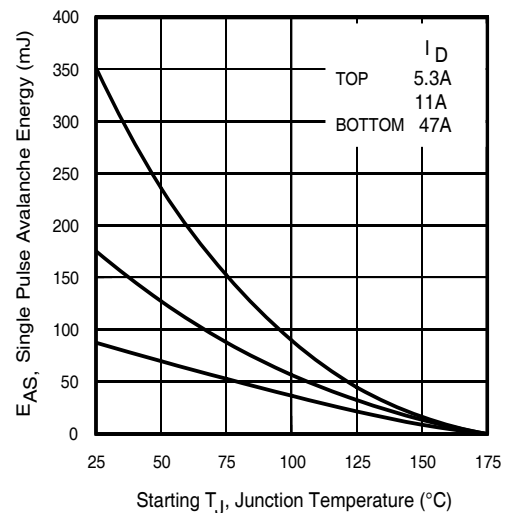


Fig 12. Maximum Avalanche Energy vs. DrainCurrent

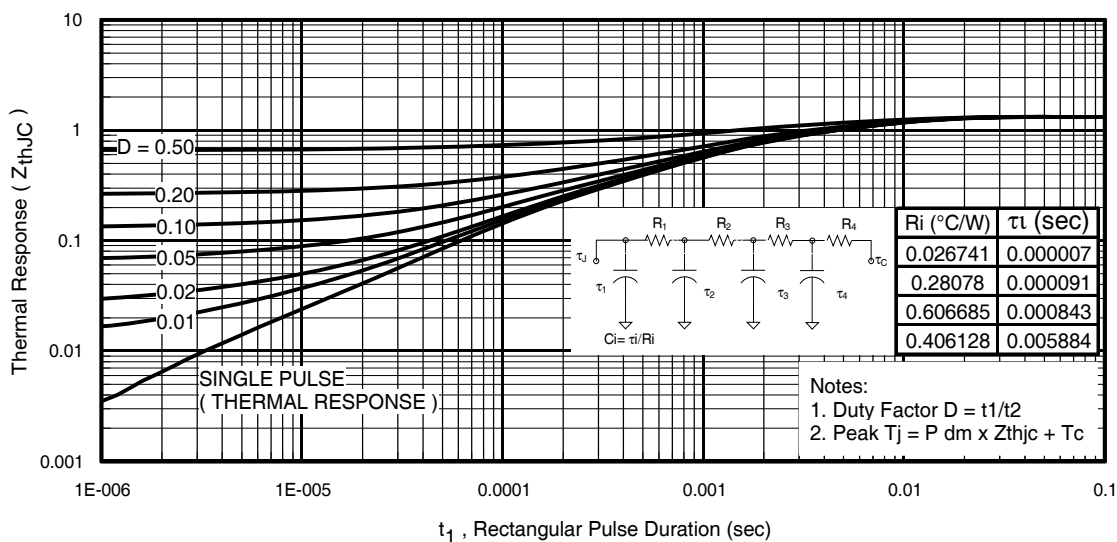


Fig 13. Maximum Effective Transient Thermal Impedance, Junction-to-Case

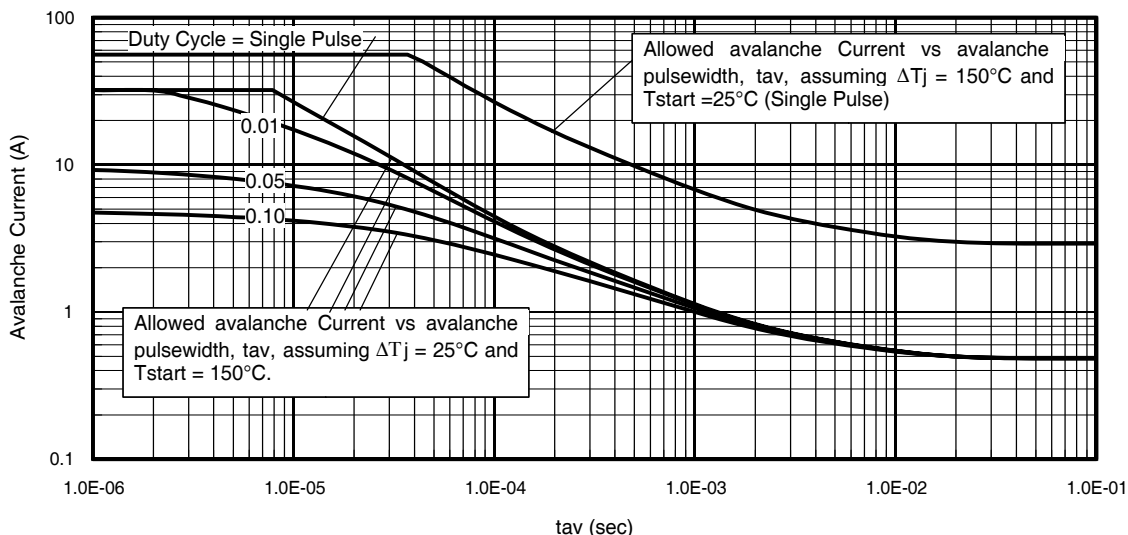


Fig 14. Typical Avalanche Current vs. Pulsewidth

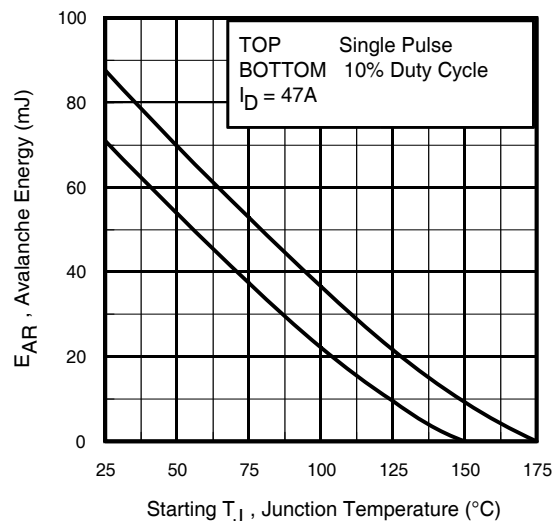


Fig 15. Maximum Avalanche Energy vs. Temperature

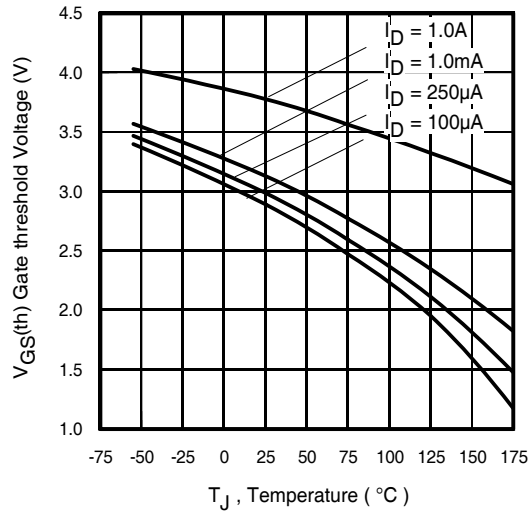


Fig 16. Threshold Voltage vs. Temperature Current vs. di/dt

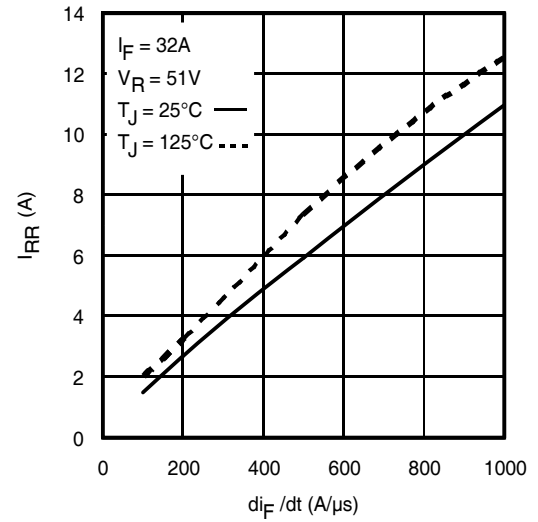


Fig 17. - Typical Recovery

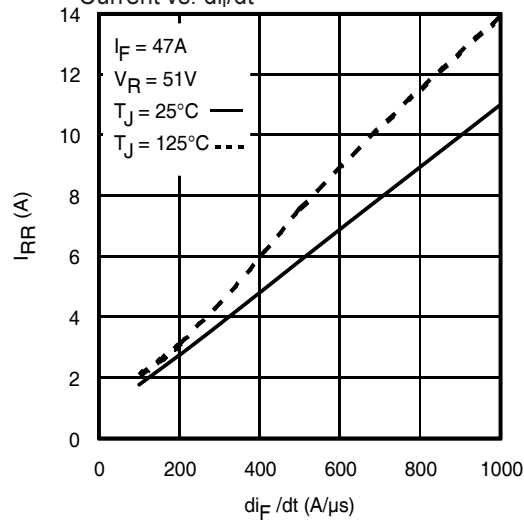


Fig 18. - Typical Recovery Current vs. di/dt

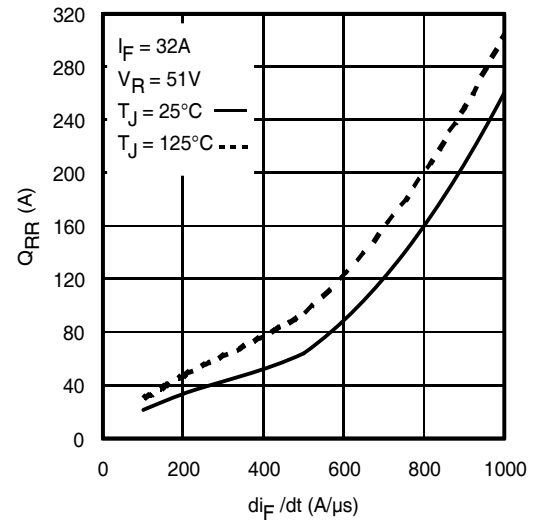


Fig 19.- Typical Stored Charge vs. di/dt

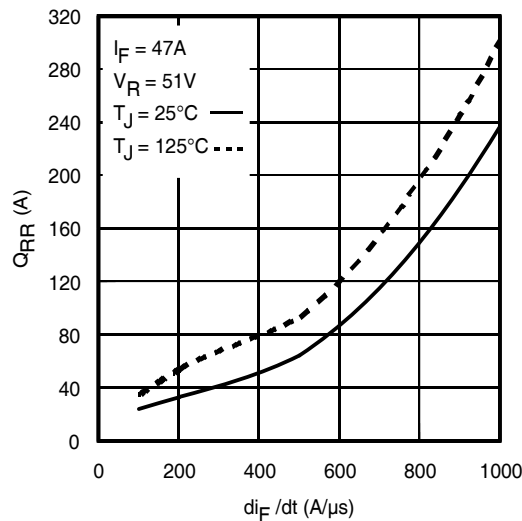
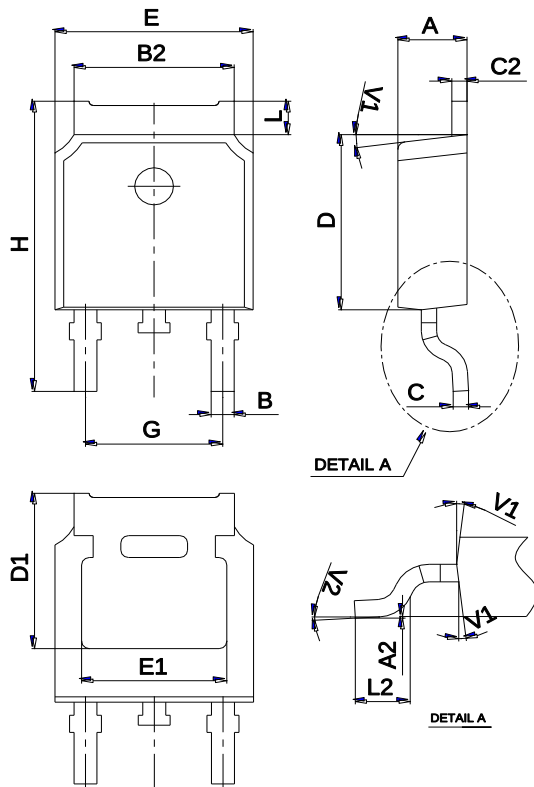
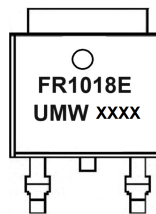


Fig 20. - Typical Stored Charge vs. di/dt

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°



Ordering information

Order code	Package	Baseqty	Deliverymode
UMW IRFR1018ETR	TO-252	2500	Tape and reel