

1.Features

- $V_{DS(V)}=40V$
- $I_D=90A$
- $R_{DS(ON)}<2.4m\Omega(V_{GS}=10V)$

2.2Applications

- Half-bridge and full-bridge topologies
- Electronic ballast applications
- Synchronous rectifier applications

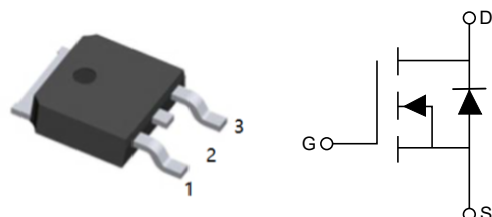
2.1Applications

- Brushed Motor drive applications
- BLDC Motor drive applications
- PWM Inverterized topologies
- Battery powered circuits
- Resonant mode power supplies
- OR-ing and redundant power switches
- DC/DC and AC/DC converters

3.Pinning information

Pin	Symbol	Description
1	G	GATE
3	S	SOURCE
2	D	DRAIN

TO-252(DPAK)
top view



4.Absolute Maximum Ratings

Parameter		Symbol	Rating	Units
Continuous Drain Current, V_{as} @ 10V(Silicon Limited)	$T_c=25^{\circ}C$	I_D	180 ①	A
Continuous Drain Current, V_{as} @ 10V (Silicon Limited)	$T_c=100^{\circ}C$		125 ①	A
Continuous Drain Current, V_{as} @ 10V (Wire Bond Limited)	$T_c=25^{\circ}C$		90	A
Pulsed Drain Current ②		I_{DM}	760	A
Maximum Power Dissipation	$T_c=25^{\circ}C$	P_D	140	W
Linear Derating Factor			0.95	W/°C
Gate-to-Source Voltage		V_{GS}	± 20	V
Peak Diode Recovery ④		dv/dt	4.4	V/ns
Operating Junction and Storage Temperature Range		T_J, T_{STG}	-55 to 175	°C



Soldering Temperature, for 10 seconds (1.6mm from case)		300	°C
Single Pulse Avalanche Energy ③	$E_{AS(Thermally\ limited)}$	160	mJ
Single Pulse Avalanche Energy ⑩	$E_{AS(Thermally\ limited)}$	376	mJ
Avalanche Current ②	I_{AR}	See Fig 15, 16, 23a, 23b	A
Repetitive Avalanche Energy ②	E_{AR}		mJ
Junction-to-Case ⑨	$R_{\theta JC}$	1.05	°C/W
Junction-to-Ambient (PCB Mount) ⑧	$R_{\theta JA}$	50	°C/W
Junction-to-Ambient ⑨	$R_{\theta JA}$	110	°C/W



5. Electrical Characteristics @ $T_J = 25^\circ\text{C}$ (unless otherwise specified)

Parameter	Symbol	Conditions	Min	Typ	Max	Units
Drain-to-Source Breakdown Voltage	$V_{(BR)DSS}$	$I_D=250\mu\text{A}$, $V_{GS}=0\text{V}$	40			V
Breakdown Voltage Temp. Coefficient	$\Delta V_{(BR)DSS}/\Delta T_J$	$I_D=1\text{mA}$, Reference to 25°C		28		mV/ $^\circ\text{C}$
Static Drain-to-Source On-Resistance	$R_{DS(ON)}$	$V_{GS}=10\text{V}$, $I_D=90\text{A}$ ⑤		1.9	2.4	m Ω
		$V_{GS}=6\text{V}$, $I_D=50\text{A}$ ⑤		2.8		m Ω
Gate Threshold Voltage	$V_{GS(th)}$	$V_{DS}=V_{GS}$, $I_D=100\mu\text{A}$	2.2	3	3.9	V
Drain-to-Source Leakage Current	I_{DSS}	$V_{DS}=40\text{V}$, $V_{GS}=0\text{V}$			1	μA
		$V_{DS}=40\text{V}$, $V_{GS}=0\text{V}$, $T_J=125^\circ\text{C}$			150	μA
Gate-to-Source Forward Leakage	I_{GSS}	$V_{GS}=20\text{V}$			100	nA
Gate-to-Source Reverse Leakage		$V_{GS}=-20\text{V}$			-100	nA
Internal Gate Resistance	R_g			2.6		Ω
Forward Transconductance	g_{FS}	$V_{DS}=10\text{V}$, $I_D=90\text{A}$	280			S
Total Gate Charge	Q_g	$I_D=90\text{A}$, $V_{DS}=20\text{V}$, $V_{GS}=10\text{V}$ ⑤		89	134	nC
Gate-to-Source Charge	Q_{gs}			26		nC
Gate-to-Drain ("Miller") Charge	Q_{gd}			26		nC
Total Gate Charge Sync. (Q_g-Q_{gd})	Q_{sync}	$I_D=90\text{A}$, $V_{DS}=0\text{V}$, $V_{GS}=10\text{V}$		63		nC
Turn-On Delay Time	$t_{D(on)}$	$V_{DD}=20\text{V}$, $I_D=30\text{A}$ $R_G=2.7\Omega$, $V_{GS}=10\text{V}$ ⑤		11		ns
Rise Time	t_r			39		ns
Turn-Off Delay Time	$t_{D(off)}$			51		ns
Fall Time	t_f			34		ns
Input Capacitance	C_{iss}	$V_{GS}=0\text{V}$, $V_{DS}=25\text{V}$ See Fig. 5, $f=1\text{MHz}$		4610		pF
Output Capacitance	C_{oss}			690		pF
Reverse Transfer Capacitance	C_{rss}			460		pF
Effective Output Capacitance (Energy Related)	$C_{oss\text{eff.}}(ER)$	$V_{GS}=0\text{V}$, $V_{DS}=0\text{V}$ to 32V ⑦ See Fig. 12		855		pF
Effective Output Capacitance (Time Related)	$C_{oss\text{eff.}}(TR)$	$V_{GS}=0\text{V}$, $V_{DS}=0\text{V}$ to 32V ⑥		1210		pF



Diode Characteristics						
Continuous Source Current (Body Diode)	I_S	MOSFET symbol showing the integral reverse p-n junction diode.			180 ^①	A
Pulsed Source Current (Body Diode) ^②	I_{SM}				760	A
Diode Forward Voltage	V_{SD}	$T_J=25^\circ\text{C}, I_S=90\text{A}, V_{GS}=0\text{V}$		0.9	1.3	V
Reverse Recovery Time	t_{rr}	$T_J=25^\circ\text{C}, V_R=34\text{V}$		34		ns
		$T_J=125^\circ\text{C}, I_F=90\text{A}$		35		ns
Reverse Recovery Charge	Q_{rr}	$T_J=25^\circ\text{C}, di/dt=100\text{A}/\mu\text{s}$ ^⑤		33		nC
		$T_J=125^\circ\text{C}$		34		nC
Reverse Recovery Current	I_{RRM}	$T_J=25^\circ\text{C}$		1.8		A

Notes:

- ① Calculated continuous current based on maximum allowable junction temperature. Bond wire current limit is 90A. 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 $T_J = 25^\circ\text{C}$, $L = 0.04\text{mH}$, $R_G = 50\Omega$, $I_{AS} = 90\text{A}$, $V_{GS} = 10\text{V}$.
- ④ $I_{SD} \leq 100\text{A}$, $di/dt \leq 1306\text{A}/\mu\text{s}$, $V_{DD} \leq V_{(BR)DSS}$, $T_J \leq 175^\circ\text{C}$.
- ⑤ Pulse width $\leq 400\mu\text{s}$; duty cycle $\leq 2\%$.
- ⑥ C_{oss} 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} 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).
- ⑨ R_θ is measured at T_J approximately 90°C .
- ⑩ Limited by T_{Jmax} starting $T_J = 25^\circ\text{C}$, $L = 1\text{mH}$, $R_G = 50\Omega$, $I_{AS} = 27\text{A}$, $V_{GS} = 10\text{V}$.



6.1 Typical Characteristics

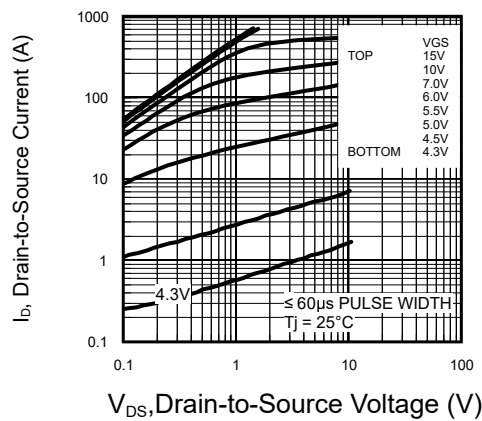


Figure 1: Typical Output Characteristics

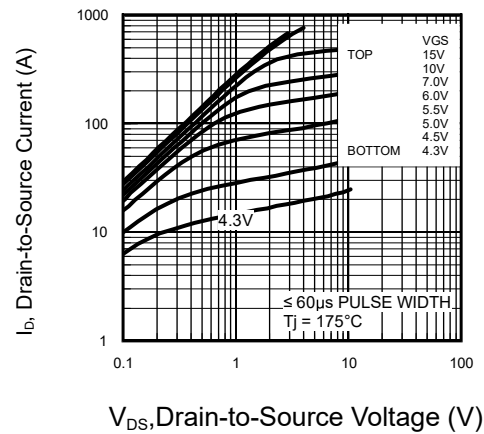


Figure 2: Typical Output Characteristics

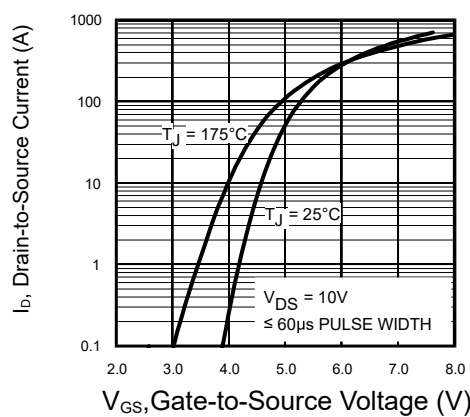


Figure 3: Typical Transfer Characteristics

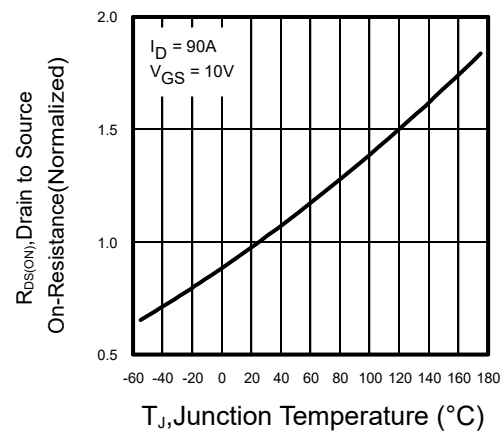


Figure 4: Normalized On-Resistance vs. Temperature

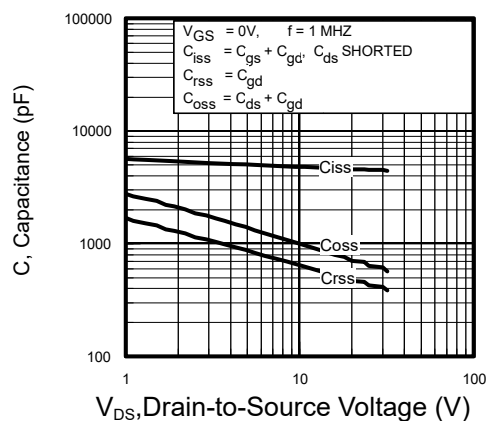


Figure 5: Typical Capacitance vs. Drain-to-Source Voltage

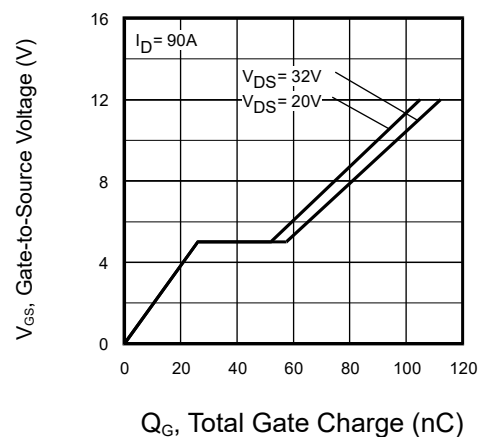


Figure 6: Typical Gate Charge vs. Gate-to-Source Voltage



6.2 Typical Characteristics

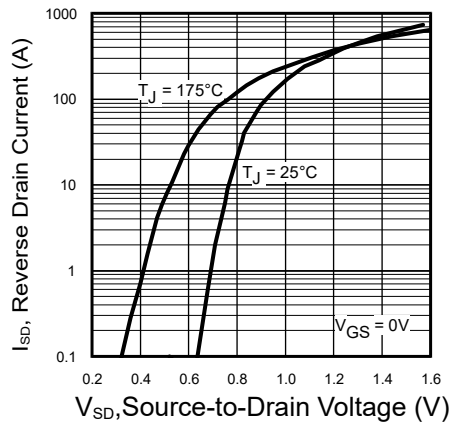


Figure 7: Typical Source-Drain Diode Forward Voltage

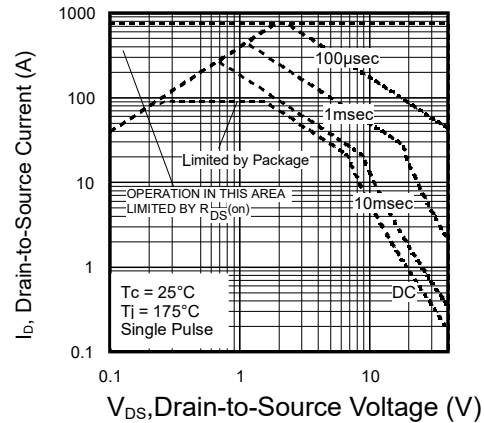


Figure 8: Maximum Safe Operating Area

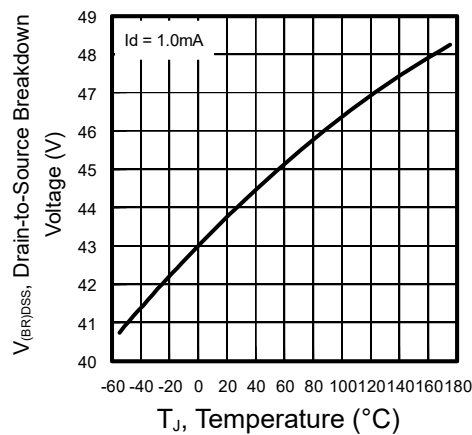


Figure 9: Drain-to-Source Breakdown Voltage

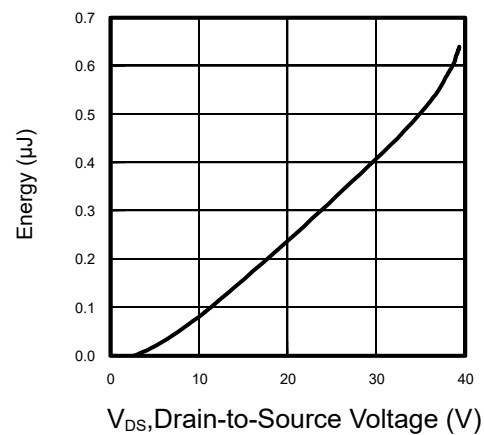


Figure 10: Typical C_{oss} Stored Energy

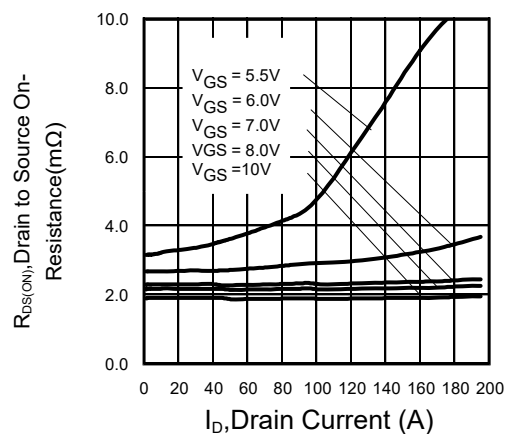


Figure 11: Typical On-Resistance vs. Drain Current



6.3 Typical Characteristics

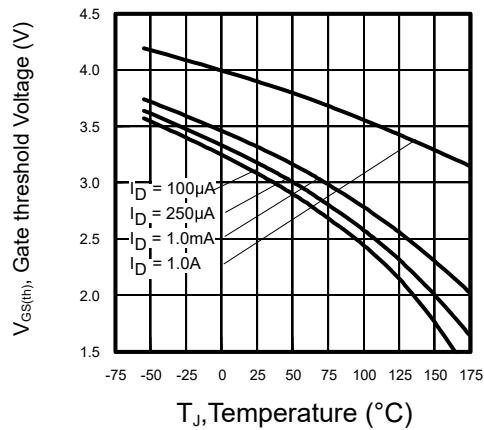


Figure 12: Threshold Voltage vs. Temperature

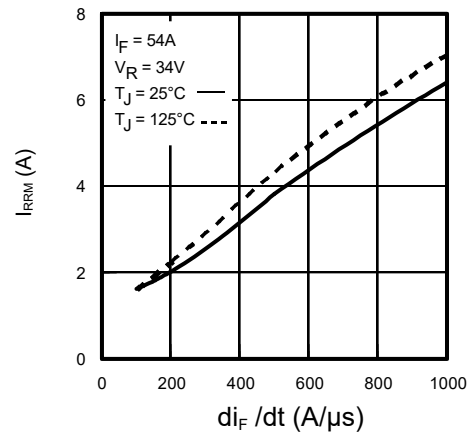
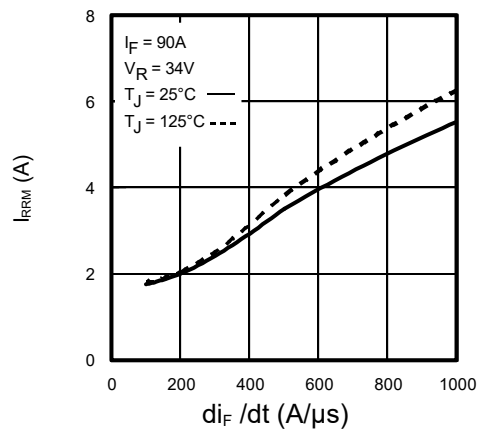
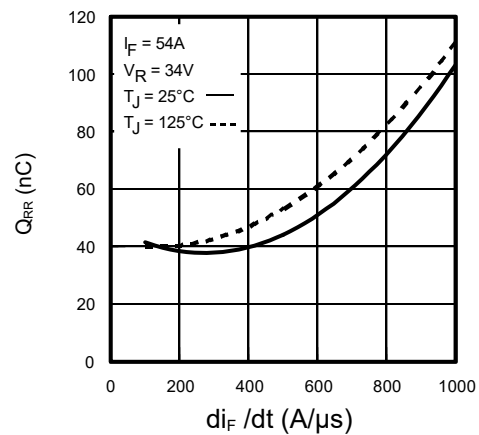
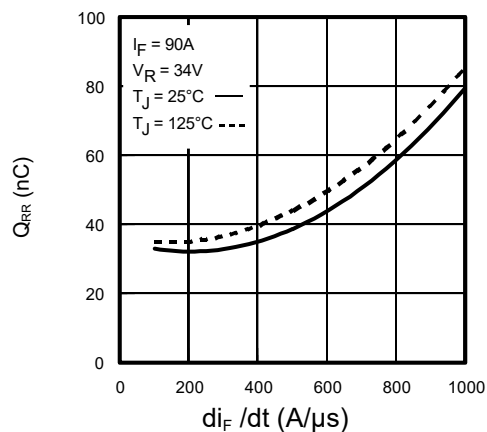
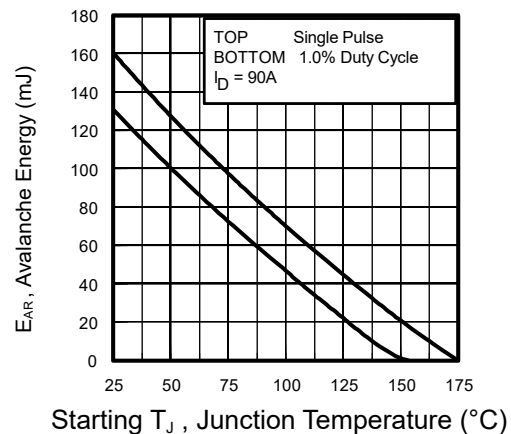
Figure 13: Typical RecOvery Current vs. d_iF/dt Figure 14: Typical Recovery Current vs. d_iF/dt Figure 15: Typical Stored Charge vs. d_iF/dt Figure 16: Typical Stored Charge vs. d_iF/dt 

Figure 17: Maximum Avalanche Energy vs. Temperature



6.4 Typical Characteristics

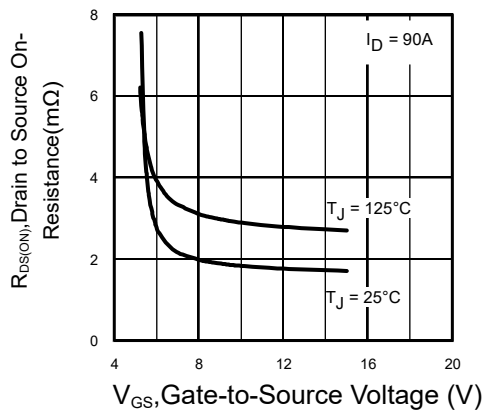


Figure 18: Typical On-Resistance vs. Gate Voltage

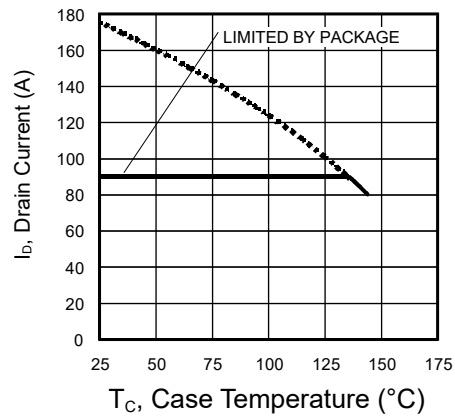


Figure 19: Maximum Drain Current vs. Case Temperature

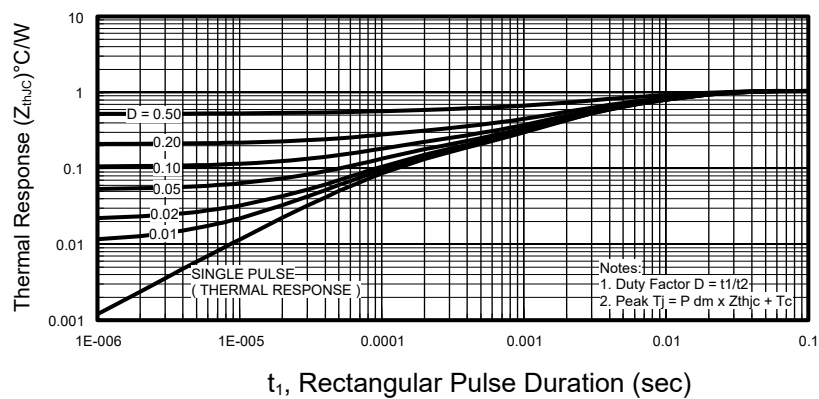


Figure 20: Maximum Effective Transient Thermal Impedance, Junction-to-Case

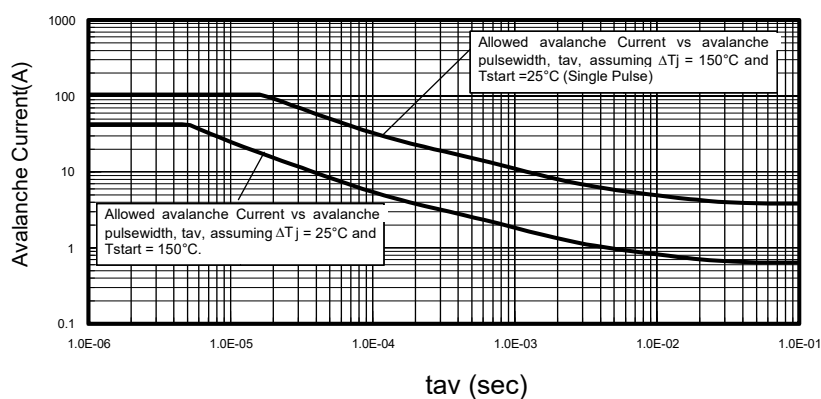
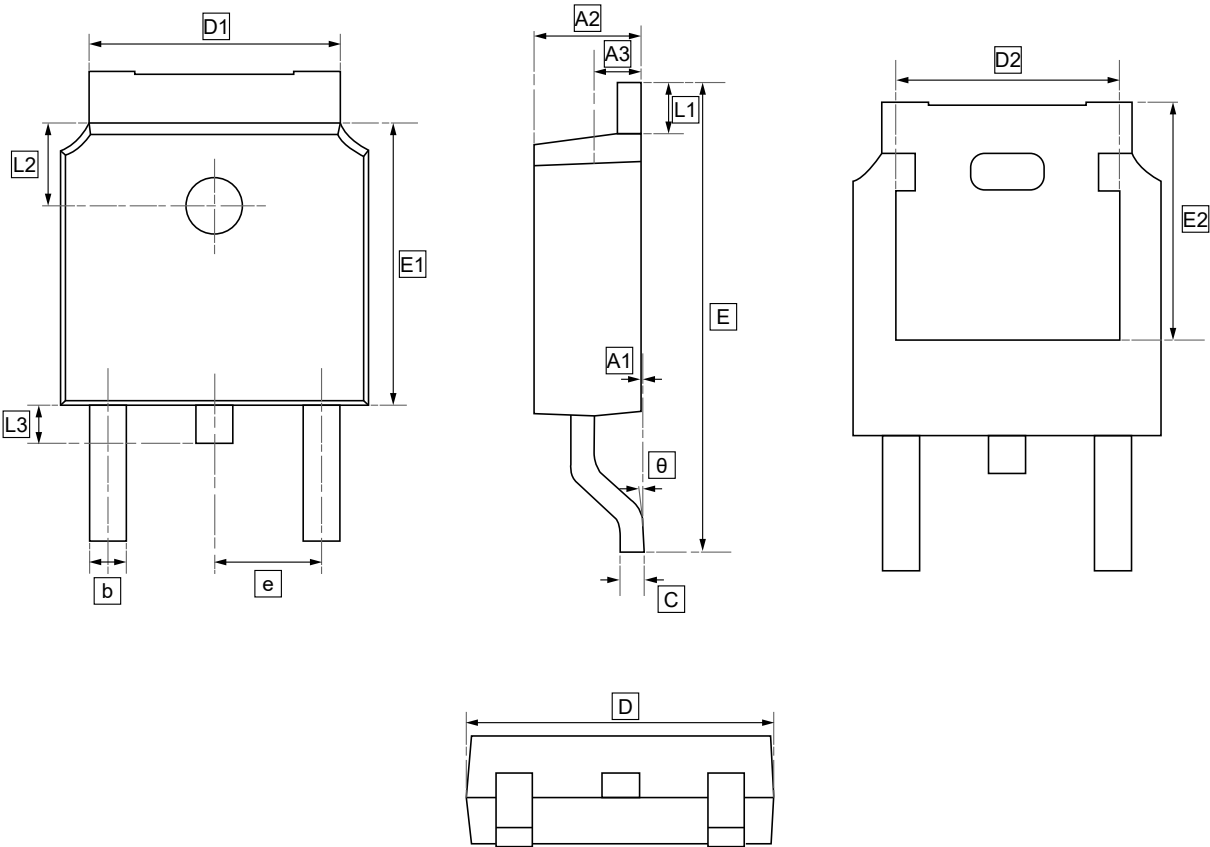


Figure 21: Typical Avalanche Current vs. Pulsewidth



7.TO-252 Package Outline Dimensions

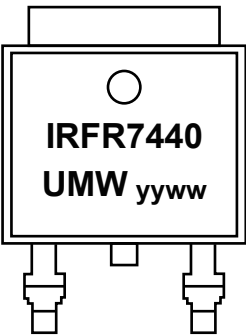


DIMENSIONS (mm are the original dimensions)

Symbol	A1	A2	A3	b	c	D	D1	D2	E	E1	E2	e	L1	L2	L3	θ
Min	0.00	2.18	0.90	0.65	0.46	6.35	4.95	4.32	9.40	5.97	5.21	2.286 BSC	0.89	1.70	0.60	0.00
Max	0.13	2.39	1.10	0.85	0.61	6.73	5.46	4.90	10.41	6.22	5.38		1.27	1.90	1.00	8.00



8.Ordering information



yy: Year Code
ww: Week Code

Order Code	Package	Base QTY	Delivery Mode
UMW IRFR7440TR	TO-252	2500	Tape and reel



9.Disclaimer

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