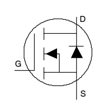
Static Characteristics @ T_J = 25°C (unless otherwise stated)

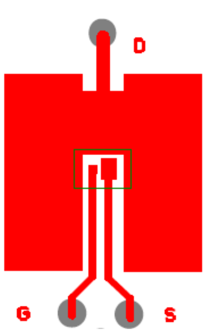
	Parameter	Min.	Typ.	Max.	Units	Conditions
$V_{(BR)DSS}$	Drain-to-Source Breakdown Voltage	40	——	——	V	V_{GS} = 0V, I_D = 250μA
$\Delta V_{(BR)DSS}/\Delta T_J$	Breakdown Voltage Temp. Coefficient	——	0.03	——	V/°C	Reference to 25°C, I_D = 1mA
$R_{DS(on)}$	Static Drain-to-Source On-Resistance	——	1.5	1.9	mΩ	V_{GS} = 10V, I_D = 94A ⑦
$V_{GS(th)}$	Gate Threshold Voltage	2.0	3.0	4.0	V	V_{DS} = V_{GS}, I_D = 150μA
$\Delta V_{GS(th)}/\Delta T_J$	Gate Threshold Voltage Coefficient	——	-10	——	mV/°C	
gfs	Forward Transconductance	100	——	——	S	V_{DS} = 10V, I_D = 94A
R_G	Gate Resistance	——	0.6	——	Ω	
I_{DSS}	Drain-to-Source Leakage Current	——	——	5	μA	V_{DS} = 40V, V_{GS} = 0V
		——	——	250		V_{DS} = 40V, V_{GS} = 0V, T_J = 125°C
I_{GSS}	Gate-to-Source Forward Leakage	——	——	100	nA	V_{GS} = 20V
	Gate-to-Source Reverse Leakage	——	——	-100		V_{GS} = -20V

Dynamic Characteristics @ T_J = 25°C (unless otherwise stated)

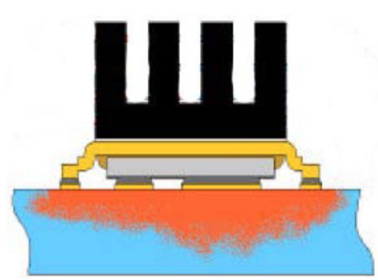
	Parameter	Min.	Typ.	Max.	Units	Conditions
Q_g	Total Gate Charge	——	89	134	nC	V_{DS} = 20V, V_{GS} = 10V
Q_{gs1}	Pre-Vth Gate-to-Source Charge	——	18	——		I_D = 94A
Q_{gs2}	Post-Vth Gate-to-Source Charge	——	8	——		See Fig.11
Q_{gd}	Gate-to-Drain ("Miller") Charge	——	34	——		
Q_{godr}	Gate Charge Overdrive	——	29	——		
Q_{sw}	Switch Charge (Q_{gs2} + Q_{gd})	——	42	——		
Q_{oss}	Output Charge	——	39	——	nC	V_{DS} = 16V, V_{GS} = 0V
$t_{d(on)}$	Turn-On Delay Time	——	12	——	ns	V_{DD} = 20V, V_{GS} = 10V ⑦
t_r	Rise Time	——	19	——		I_D = 94A
$t_{d(off)}$	Turn-Off Delay Time	——	22	——		R_G = 1.8Ω
t_f	Fall Time	——	14	——		
C_{iss}	Input Capacitance	——	5469	——	pF	V_{GS} = 0V
C_{oss}	Output Capacitance	——	1193	——		V_{DS} = 25V
C_{rss}	Reverse Transfer Capacitance	——	534	——		f = 1.0MHz
C_{oss}	Output Capacitance	——	4296	——		V_{GS} = 0V, V_{DS} = 1.0V, f=1.0MHz
C_{oss}	Output Capacitance	——	1066	——		V_{GS} = 0V, V_{DS} = 32V, f=1.0MHz
C_{oss} eff.	Effective Output Capacitance	——	1615	——		V_{GS} = 0V, V_{DS} = 0V to 32V

Diode Characteristics @ T_J = 25°C (unless otherwise stated)

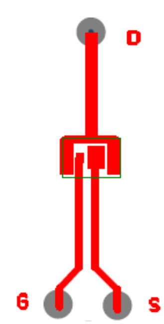
	Parameter	Min.	Typ.	Max.	Units	Conditions
I_S	Continuous Source Current (Body Diode)	——	——	156	A	MOSFET symbol showing the integral reverse p-n junction diode. 
I_{SM}	Pulsed Source Current (Body Diode) ⑤	——	——	624		
V_{SD}	Diode Forward Voltage	——	——	1.3	V	I_S = 94A, V_{GS} = 0V ⑦
t_{rr}	Reverse Recovery Time	——	35	53	ns	I_F = 94A, V_{DD} = 20V
Q_{rr}	Reverse Recovery Charge	——	32	48	nC	di/dt = 100A/μs ⑦



③ Surface mounted on 1 in. square Cu (still air).



⑨ Mounted to a PCB with small clip heatsink (still air)



⑨ Mounted on minimum footprint full size board with metalized back and with small clip heatsink (still air)

Notes ① through ⑩ are on page 10

Qualification Information†

Qualification Level		Automotive (per AEC-Q101) ††	
		Comments: This part number(s) passed Automotive qualification. IR's Industrial and Consumer qualification level is granted by extension of the higher Automotive level.	
Moisture Sensitivity Level		LARGE-CAN	MSL1
ESD	Machine Model	Class M4(+/-425V) (per AEC-Q101-002)	
	Human Body Model	Class H1C(+/-2000V) (per AEC-Q101-001)	
	Charged Device Model	N/A (per AEC-Q101-005)	
RoHS Compliant		Yes	

† Qualification standards can be found at International Rectifier's web site: http://www.irf.com

†† Exceptions to AEC-Q101 requirements are noted in the qualification report.

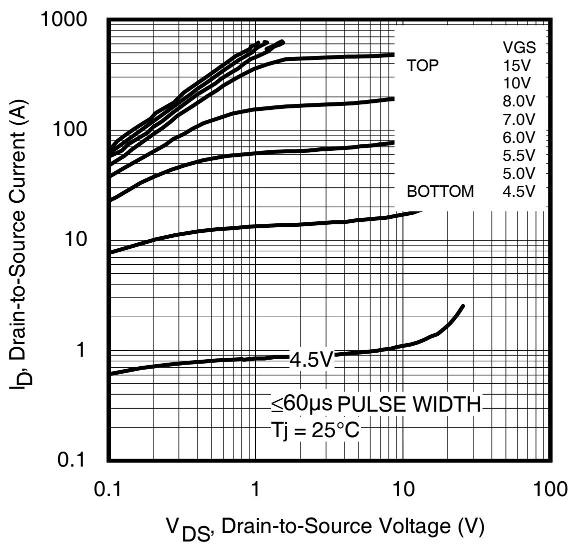


Fig 1. Typical Output Characteristics

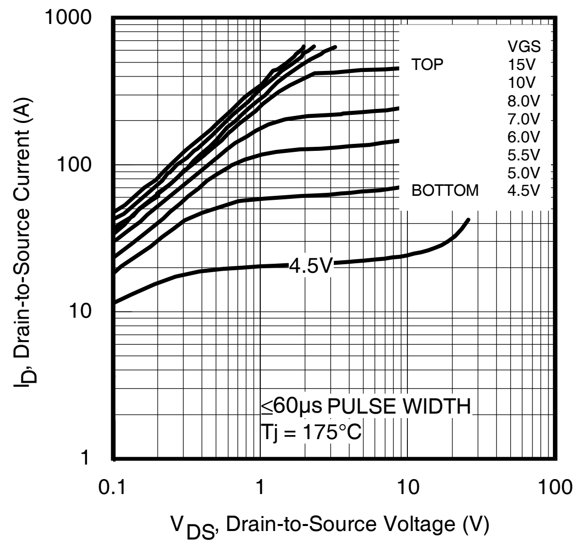


Fig 2. Typical Output Characteristics

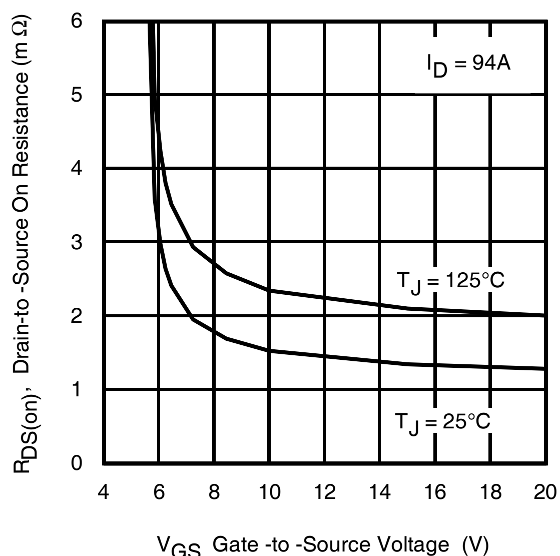


Fig 3. Typical On-Resistance vs. Gate Voltage

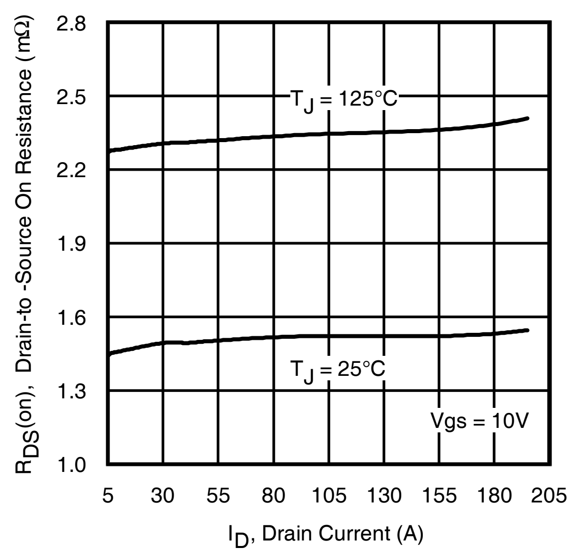


Fig 4. Typical On-Resistance vs. Drain Current

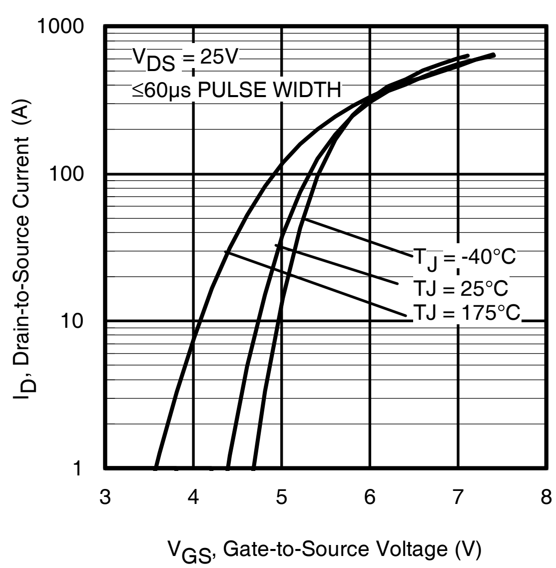


Fig 5. Typical Transfer Characteristics

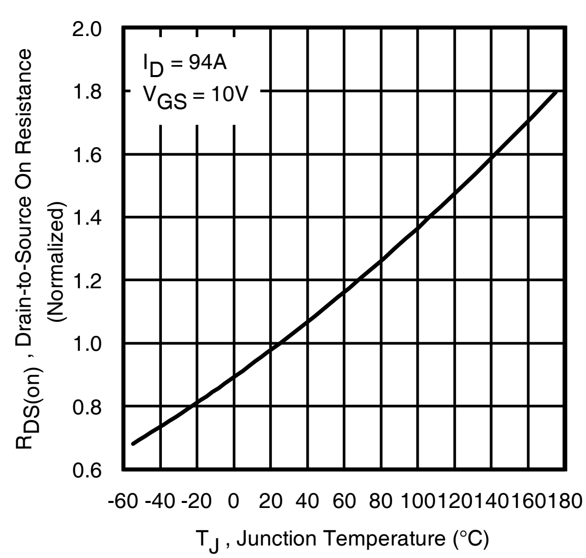


Fig 6. Normalized On-Resistance vs. Temperature

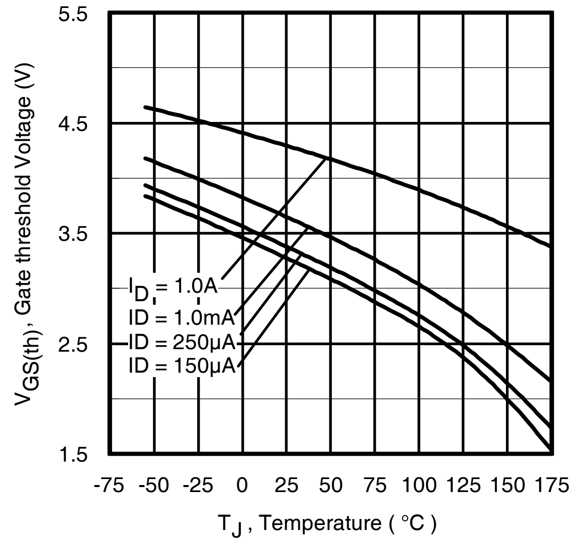


Fig 7. Typical Threshold Voltage vs. Junction Temperature

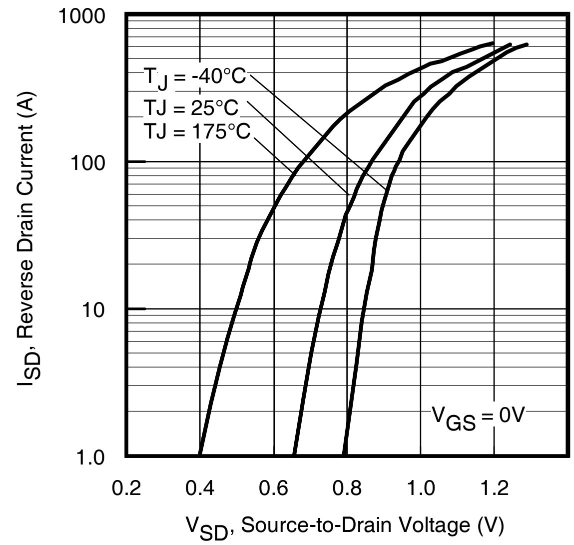


Fig 8. Typical Source-Drain Diode Forward Voltage

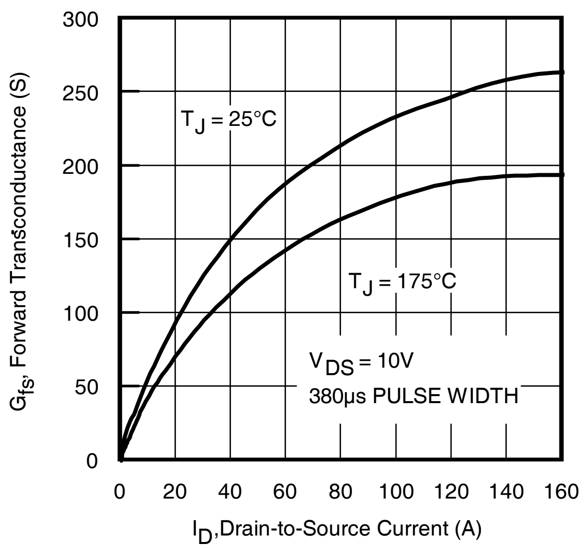


Fig 9. Typical Forward Transconductance Vs. Drain Current

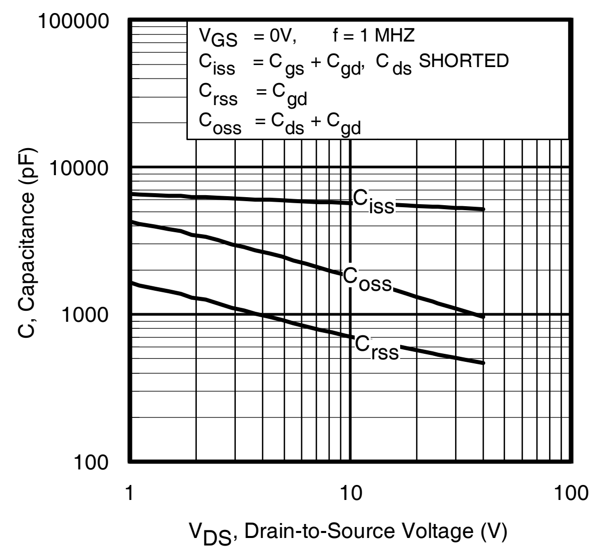


Fig 10. Typical Capacitance vs.Drain-to-Source Voltage

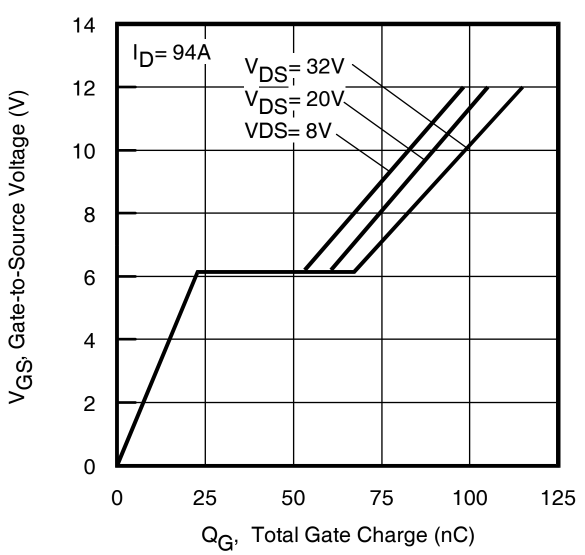


Fig.11 Typical Gate Charge vs.Gate-to-Source Voltage

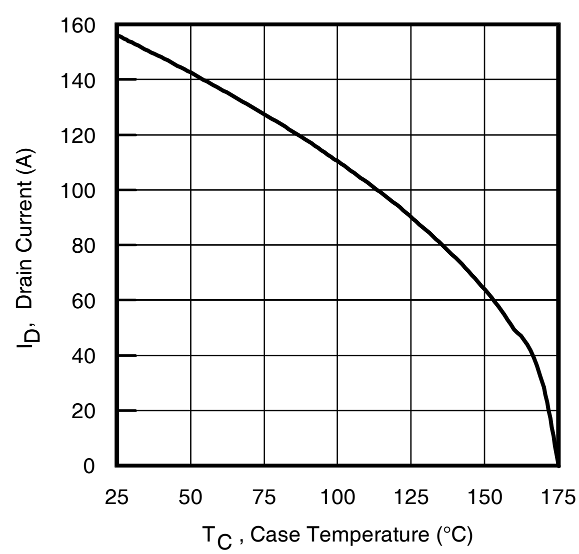


Fig 12. Maximum Drain Current vs. Case Temperature

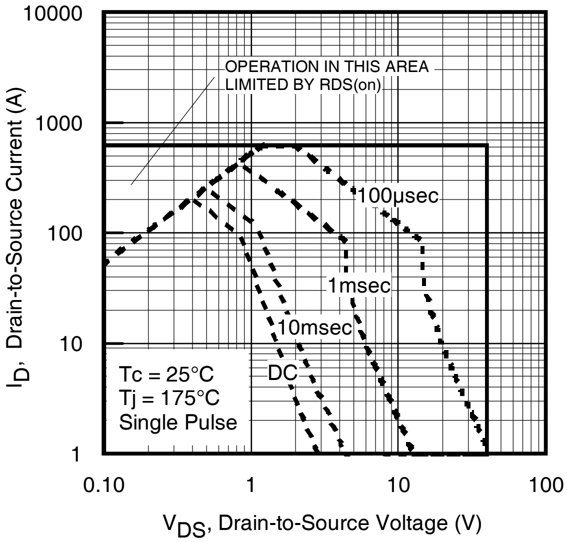


Fig 13. Maximum Safe Operating Area

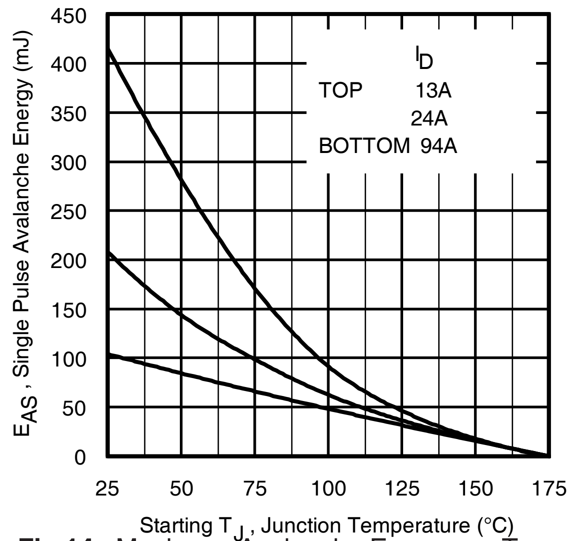


Fig 14. Maximum Avalanche Energy vs. Temperature

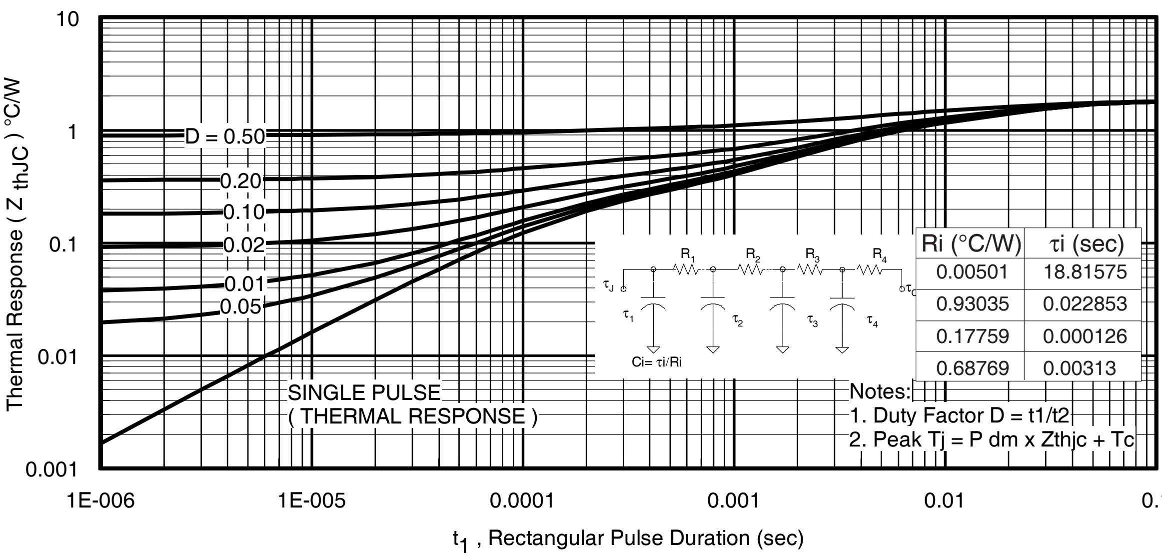


Fig 15. Maximum Effective Transient Thermal Impedance, Junction-to-Case

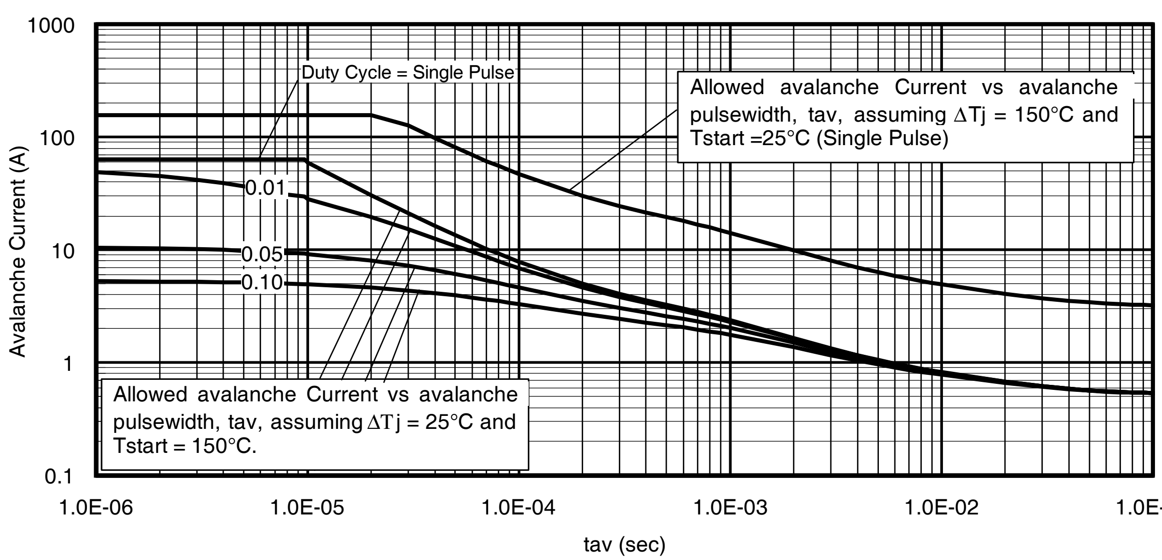


Fig 16. Typical Avalanche Current Vs.Pulsewidth

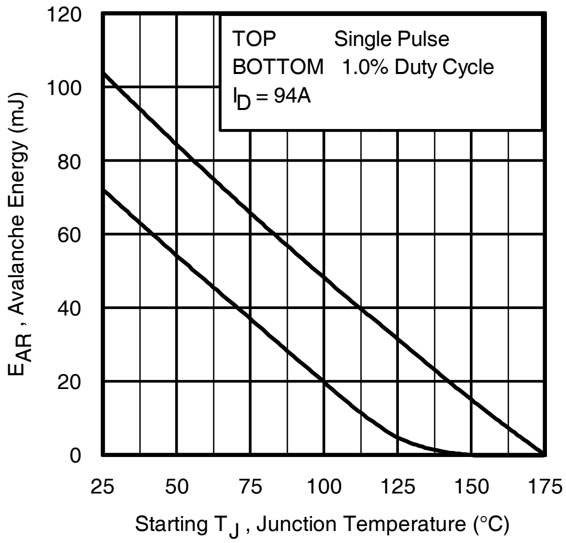


Fig 17. Maximum Avalanche Energy Vs. Temperature

Notes on Repetitive Avalanche Curves , Figures 16, 17:
(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 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 18a, 18b.
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 16, 17).
   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 15)

$$P_{D\ (ave)} = 1/2\ (1.3 \cdot BV \cdot I_{av}) = \Delta T / Z_{thJC}$$
$$I_{av} = 2\Delta T / [1.3 \cdot BV \cdot Z_{th}]$$
$$E_{AS\ (AR)} = P_{D\ (ave)} \cdot t_{av}$$

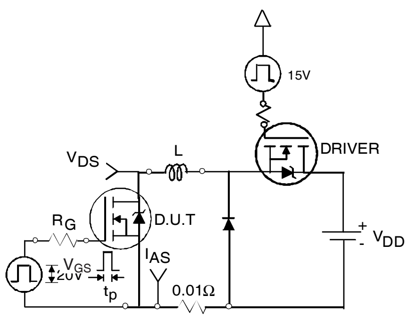


Fig 18a. Unclamped Inductive Test Circuit

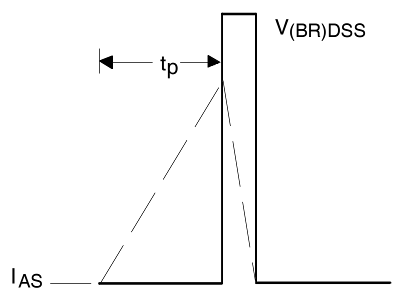


Fig 18b. Unclamped Inductive Waveforms

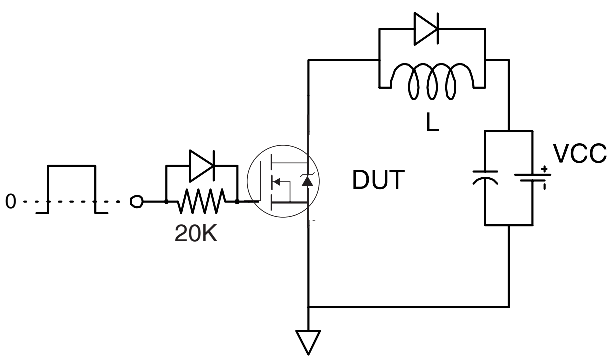


Fig 19a. Gate Charge Test Circuit

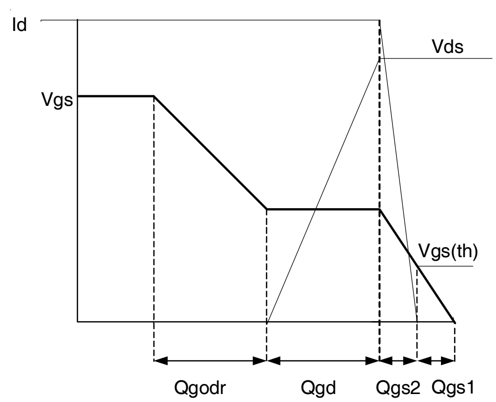


Fig 19b. Gate Charge Waveform

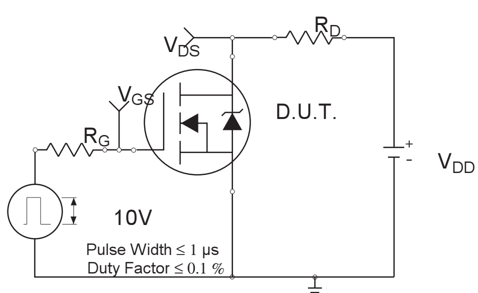


Fig 20a. Switching Time Test Circuit

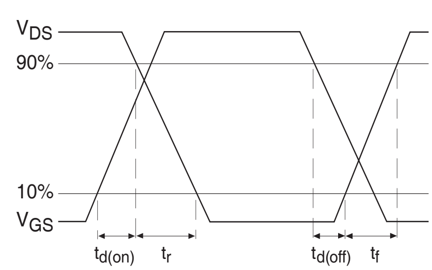
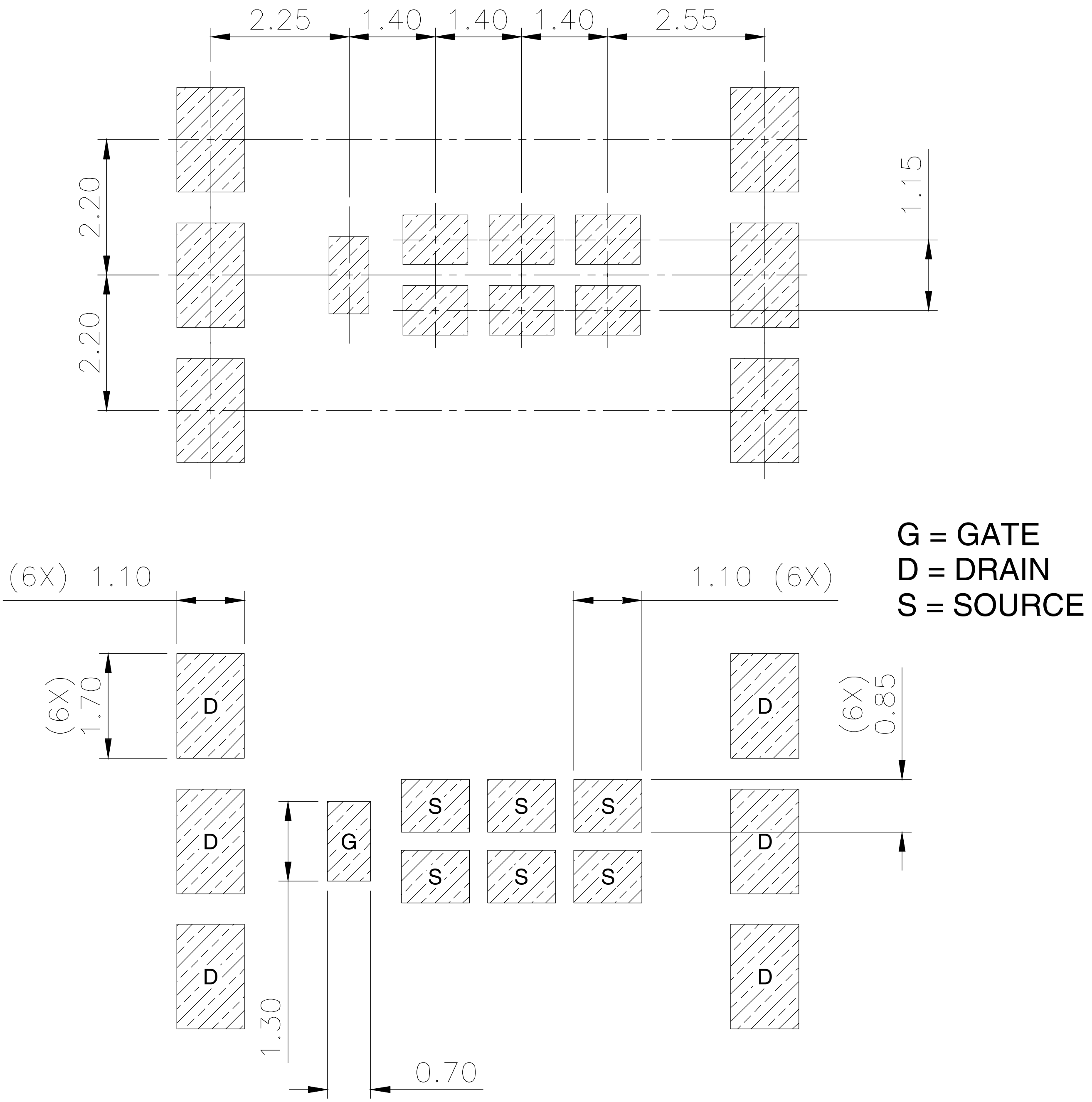


Fig 20b. Switching Time Waveforms

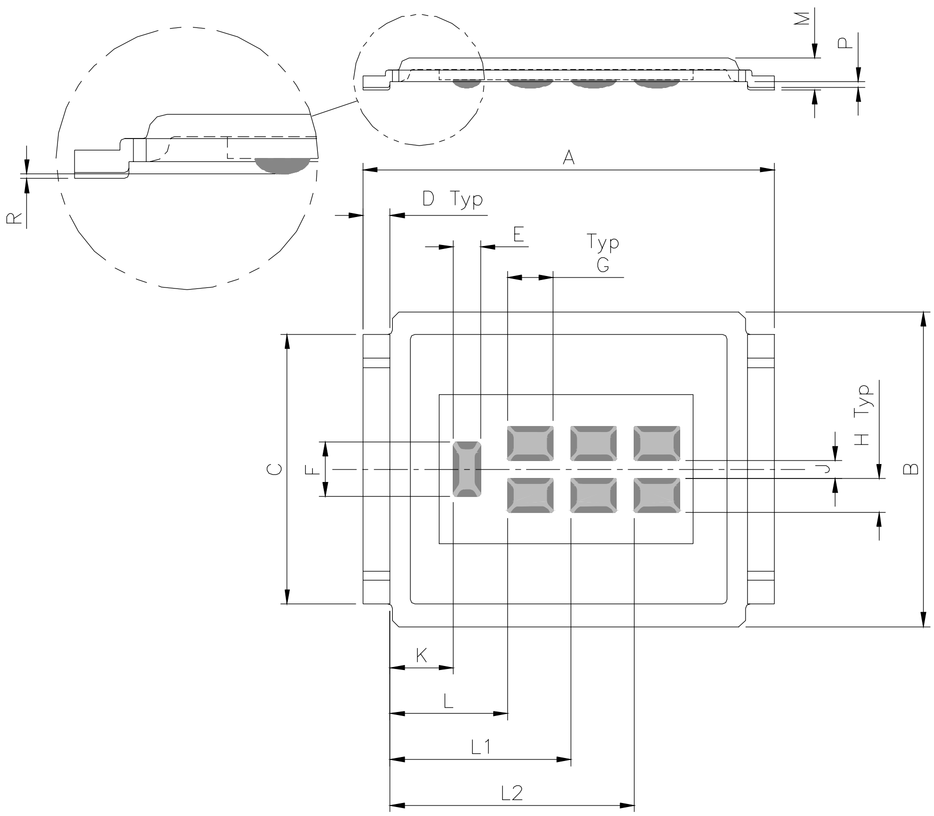
Automotive DirectFET® Board Footprint, L6 (Large Size Can).

Please see AN-1035 for DirectFET® assembly details and stencil and substrate design recommendations



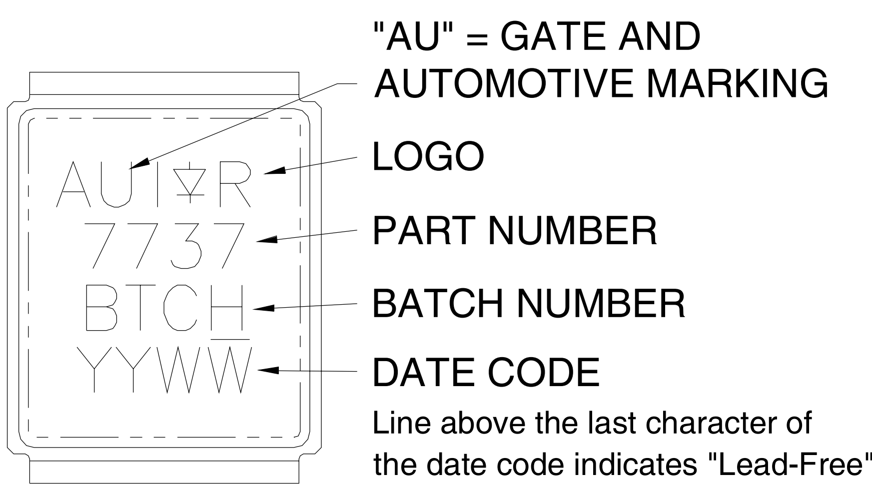
Automotive DirectFET® Outline Dimension, L6 Outline (LargeSize Can).

Please see AN-1035 for DirectFET® assembly details and stencil and substrate design recommendations



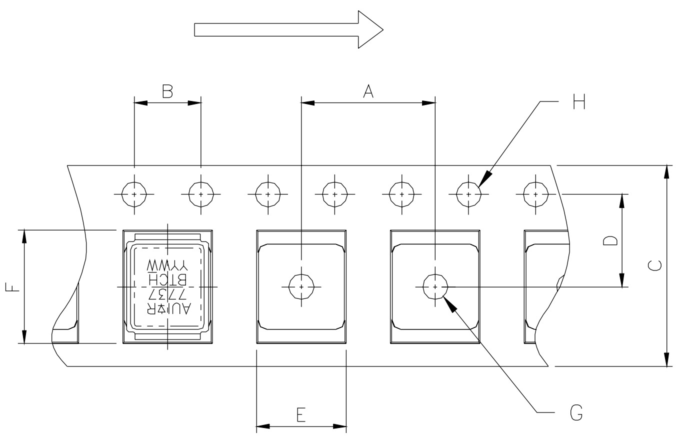
DIMENSIONS				
	METRIC		IMPERIAL	
CODE	MIN	MAX	MIN	MAX
A	9.05	9.15	0.356	0.360
B	6.85	7.10	0.270	0.280
C	5.90	6.00	0.232	0.236
D	0.55	0.65	0.022	0.026
E	0.58	0.62	0.023	0.024
F	1.18	1.22	0.046	0.048
G	0.98	1.02	0.039	0.040
H	0.73	0.77	0.029	0.030
J	0.38	0.42	0.015	0.017
K	1.35	1.45	0.053	0.057
L	2.55	2.65	0.100	0.104
L1	3.95	4.05	0.155	0.159
L2	5.35	5.45	0.210	0.214
M	0.68	0.74	0.027	0.029
P	0.09	0.17	0.003	0.007
R	0.02	0.08	0.001	0.003

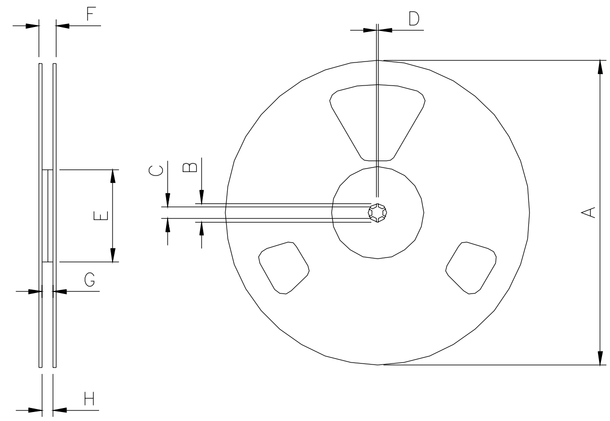
Automotive DirectFET® Part Marking



Note: For the most current drawing please refer to IR website at http://www.irf.com/package/

Automotive DirectFET® Tape & Reel Dimension (Showing component orientation).





NOTE: CONTROLLING DIMENSIONS IN MM

DIMENSIONS				
	METRIC		IMPERIAL	
CODE	MIN	MAX	MIN	MAX
A	11.90	12.10	4.69	0.476
B	3.90	4.10	0.154	0.161
C	15.90	16.30	0.623	0.642
D	7.40	7.60	0.291	0.299
E	7.20	7.40	0.283	0.291
F	9.90	10.10	0.390	0.398
G	1.50	N.C	0.059	N.C
H	1.50	1.60	0.059	0.063

NOTE: Controlling dimensions in mm
Std reel quantity is 4000 parts. (ordered as AUIRF7737L2TR). For 1000 parts on 7" reel, order AUIRF7737L2TR1

REEL DIMENSIONS								
	STANDARD OPTION **(QTY 4000)**				TR1 OPTION **(QTY 1000)**			
	METRIC		IMPERIAL		METRIC		IMPERIAL	
CODE	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX
A	330.00	N.C	12.992	N.C	177.80	N.C	7.000	N.C
B	20.20	N.C	0.795	N.C	20.20	N.C	0.795	N.C
C	12.80	13.20	0.504	0.520	12.98	13.50	0.331	0.50
D	1.50	N.C	0.059	N.C	1.50	2.50	0.059	N.C
E	99.00	100.00	3.900	3.940	62.48	N.C	2.460	N.C
F	N.C	22.40	N.C	0.880	N.C	N.C	N.C	0.53
G	16.40	18.40	0.650	0.720	N.C	N.C	N.C	N.C
H	15.90	19.40	0.630	0.760	16.00	N.C	0.630	N.C

Notes:

① Click on this section to link to the appropriate technical paper.
② Click on this section to link to the DirectFET® Website.
③ Surface mounted on 1 in. square Cu board, steady state.
④ T_C measured with thermocouple mounted to top (Drain) of part.
⑤ Repetitive rating; pulse width limited by max. junction temperature.
⑥ Starting T_J = 25°C, L = 0.024mH, R_G = 50Ω, I_{AS} = 94A.
⑦ Pulse width ≤ 400μs; duty cycle ≤ 2%.
⑧ Used double sided cooling, mounting pad with large heatsink.
⑨ Mounted on minimum footprint full size board with metalized back and with small clip heatsink.
⑩ R_θ is measured at T_J of approximately 90°C.

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http://www.irf.com/technical-info/

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