

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

	Parameter	Min.	Typ.	Max.	Units	Conditions
BV_{DSS}	Drain-to-Source Breakdown Voltage	80	—	—	V	$V_{GS} = 0V, I_D = 250\mu A$
$\Delta BV_{DSS}/\Delta T_J$	Breakdown Voltage Temp. Coefficient	—	0.10	—	V/ $^\circ\text{C}$	Reference to 25°C , $I_D = 1\text{mA}$
$R_{DS(on)}$	Static Drain-to-Source On-Resistance	—	7.6	9.5	m Ω	$V_{GS} = 10V, I_D = 12A$ ①
$V_{GS(th)}$	Gate Threshold Voltage	3.0	—	4.9	V	$V_{DS} = V_{GS}, I_D = 150\mu A$
$\Delta V_{GS(th)}/\Delta T_J$	Gate Threshold Voltage Coefficient	—	-11	—	mV/ $^\circ\text{C}$	
I_{DSS}	Drain-to-Source Leakage Current	—	—	20	μA	$V_{DS} = 80V, V_{GS} = 0V$
		—	—	250		$V_{DS} = 64V, V_{GS} = 0V, T_J = 125^\circ\text{C}$
I_{GSS}	Gate-to-Source Forward Leakage	—	—	100	nA	$V_{GS} = 20V$
	Gate-to-Source Reverse Leakage	—	—	-100		$V_{GS} = -20V$
g_{fs}	Forward Transconductance	17	—	—	S	$V_{DS} = 10V, I_D = 7.2A$
Q_g	Total Gate Charge	—	36	50	nC	$V_{DS} = 40V$ $V_{GS} = 10V$ $I_D = 7.2A$ See Fig. 17
Q_{gs1}	Pre-Vth Gate-to-Source Charge	—	7.6	—		
Q_{gs2}	Post-Vth Gate-to-Source Charge	—	2.0	—		
Q_{gd}	Gate-to-Drain Charge	—	12	—		
Q_{godr}	Gate Charge Overdrive	—	14	—		
Q_{sw}	Switch Charge ($Q_{gs2} + Q_{gd}$)	—	14	—		
Q_{oss}	Output Charge	—	18	—	nC	$V_{DS} = 16V, V_{GS} = 0V$
R_G	Gate Resistance	—	1.0	—	Ω	
$t_{d(on)}$	Turn-On Delay Time	—	17	—	ns	$V_{DD} = 40V, V_{GS} = 10V$ ① $I_D = 7.2A$ $R_G = 6.2\Omega$
t_r	Rise Time	—	20	—		
$t_{d(off)}$	Turn-Off Delay Time	—	31	—		
t_f	Fall Time	—	12	—		
C_{iss}	Input Capacitance	—	2060	—	pF	$V_{GS} = 0V$
C_{oss}	Output Capacitance	—	480	—		$V_{DS} = 25V$
C_{rss}	Reverse Transfer Capacitance	—	120	—		$f = 1.0\text{MHz}$
C_{oss}	Output Capacitance	—	2180	—		$V_{GS} = 0V, V_{DS} = 1.0V, f = 1.0\text{MHz}$
C_{oss}	Output Capacitance	—	310	—		$V_{GS} = 0V, V_{DS} = 64V, f = 1.0\text{MHz}$

Diode Characteristics

	Parameter	Min.	Typ.	Max.	Units	Conditions
I_S	Continuous Source Current (Body Diode)	—	—	2.5③	A	MOSFET symbol showing the integral reverse p-n junction diode.
I_{SM}	Pulsed Source Current (Body Diode) ②	—	—	96		
V_{SD}	Diode Forward Voltage	—	—	1.3	V	$T_J = 25^\circ\text{C}, I_S = 7.2A, V_{GS} = 0V$ ①
t_{rr}	Reverse Recovery Time	—	36	54	ns	$T_J = 25^\circ\text{C}, I_F = 7.2A, V_{DD} = 40V$ $di/dt = 100A/\mu s$ ①
Q_{rr}	Reverse Recovery Charge	—	48	72	nC	

Notes:

- ① Pulse width $\leq 400\mu s$; duty cycle $\leq 2\%$.
 ② Repetitive rating; pulse width limited by max. junction temperature.
 ③ Thermally limited and used $R_{\theta ja}$ to calculate.

Absolute Maximum Ratings

Absolute Maximum Ratings			
	Parameter	Max.	Units
P _D @T _A = 25°C	Power Dissipation ①	2.8	W
P _D @T _A = 70°C	Power Dissipation ①	1.8	
P _D @T _C = 25°C	Power Dissipation ④	89	
T _P	Peak Soldering Temperature	270	°C
T _J	Operating Junction and	-40 to + 150	
T _{STG}	Storage Temperature Range		

Thermal Resistance

	Parameter	Typ.	Max.	Units
$R_{\theta JA}$	Junction-to-Ambient ①⑤	—	45	$^\circ\text{C/W}$
$R_{\theta JA}$	Junction-to-Ambient ②⑤	12.5	—	
$R_{\theta JA}$	Junction-to-Ambient ③⑤	20	—	
$R_{\theta JC}$	Junction-to-Case ④⑤	—	1.4	
$R_{\theta J-PCB}$	Junction-to-PCB Mounted	1.0	—	

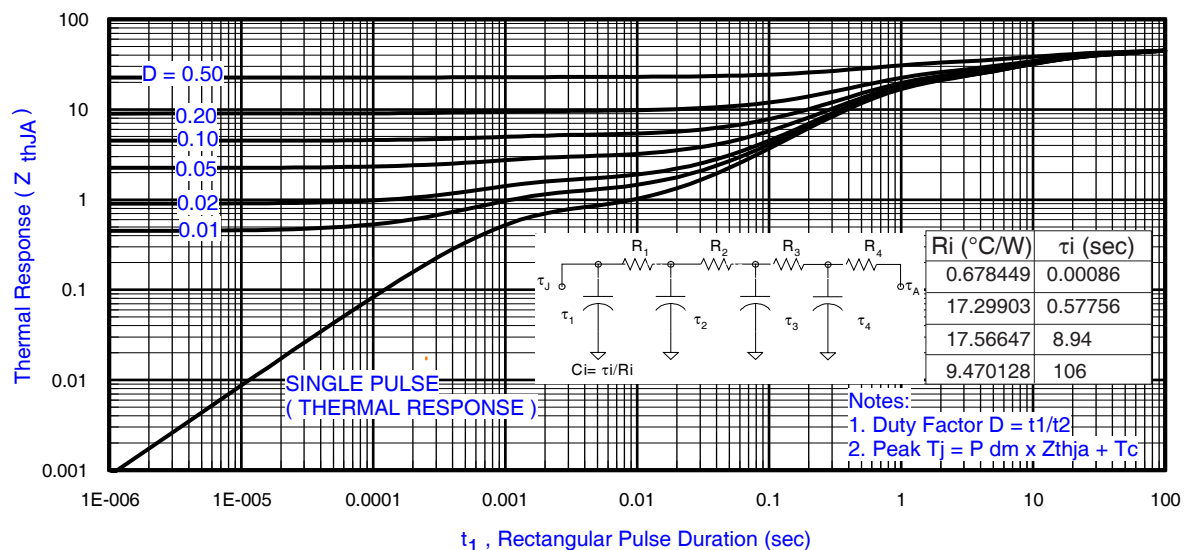


Fig 3. Maximum Effective Transient Thermal Impedance, Junction-to-Ambient ①

Notes:

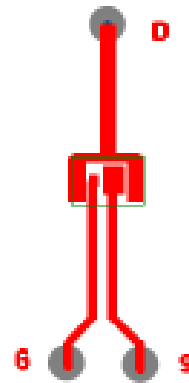
- ① Surface mounted on 1 in. square Cu board, steady state.
- ② Used double sided cooling, mounting pad.
- ③ Mounted on minimum footprint full size board with metalized back and with small clip heatsink.
- ④ T_C measured with thermocouple incontact with top (Drain) of part.
- ⑤ R_{θ} is measured at T_J of approximately 90°C .



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



③ Mounted to a PCB with small clip heatsink (still air)



③ Mounted on minimum footprint full size board with metalized back and with small clip heatsink (still air)

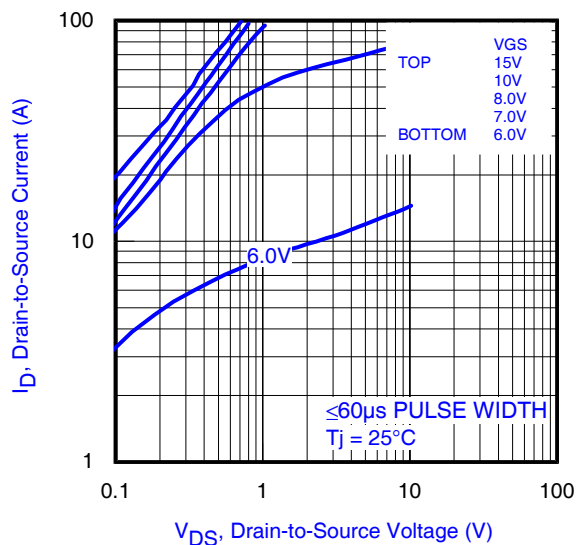


Fig 4. Typical Output Characteristics

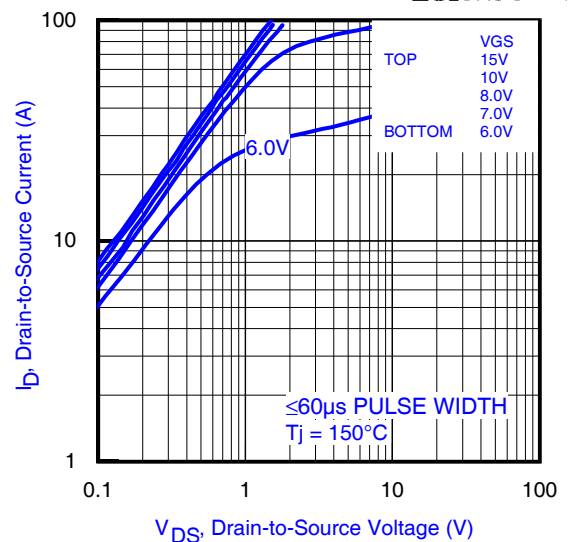


Fig 5. Typical Output Characteristics

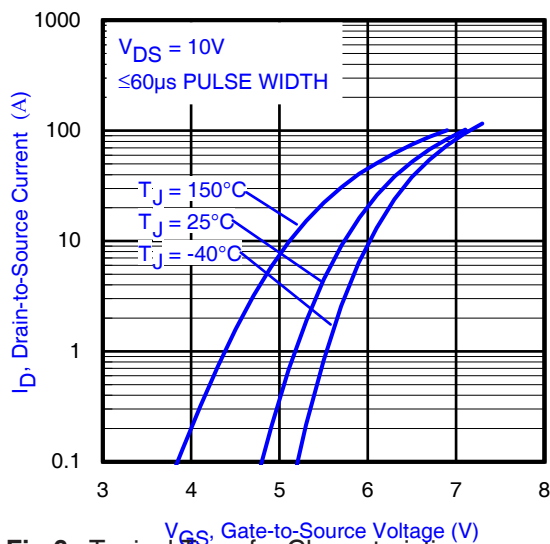


Fig 6. Typical Transfer Characteristics

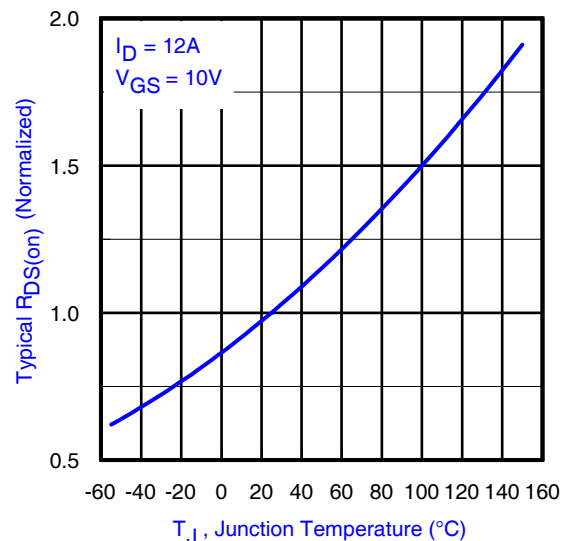


Fig 7. Normalized On-Resistance vs. Temperature

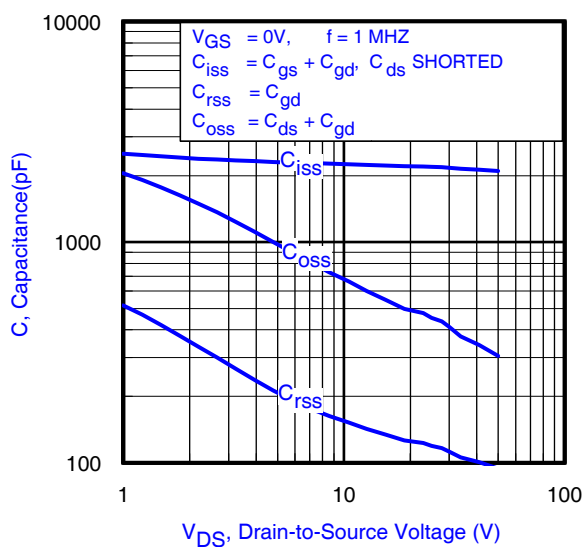


Fig 8. Typical Capacitance vs. Drain-to-Source Voltage

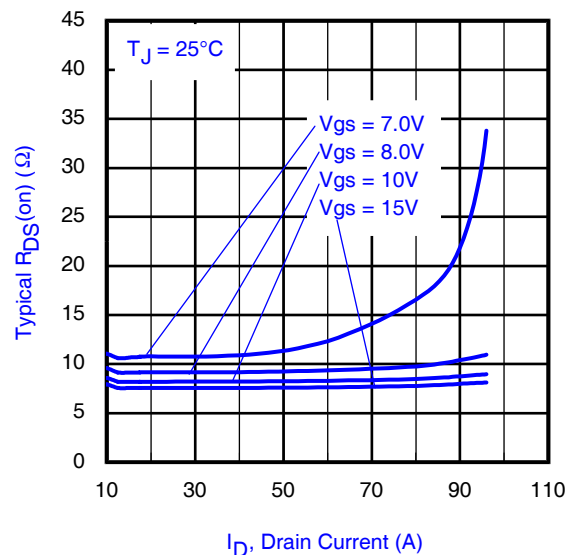


Fig 9. Typical On-Resistance vs. Drain Current

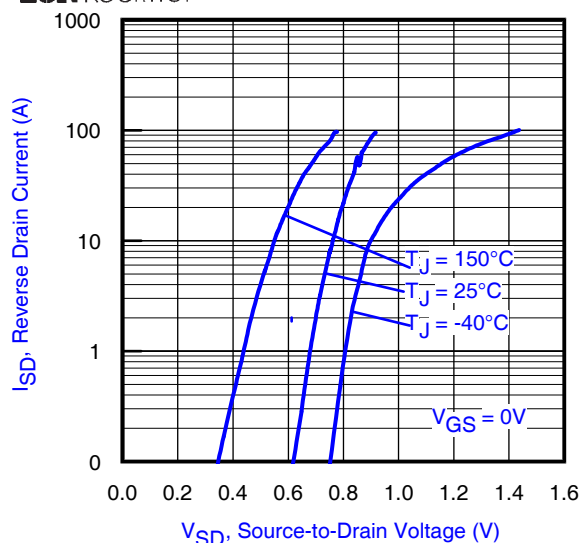


Fig 10. Typical Source-Drain Diode Forward Voltage

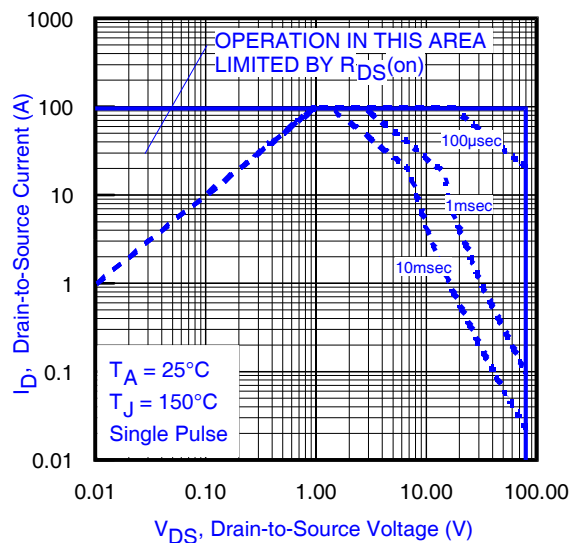


Fig 11. Maximum Safe Operating Area

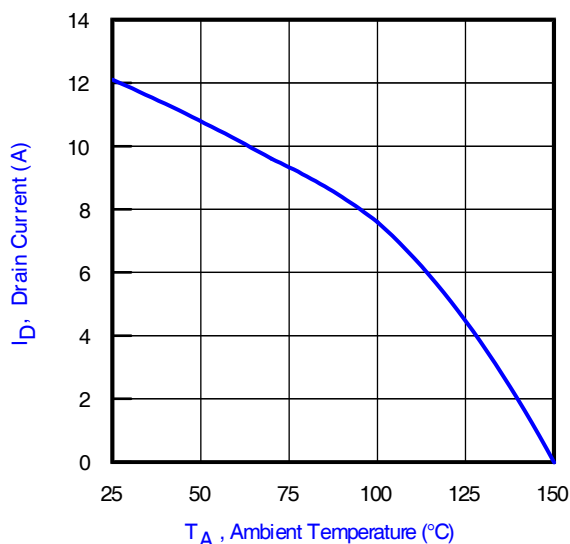


Fig 12. Maximum Drain Current vs. Ambient Temperature

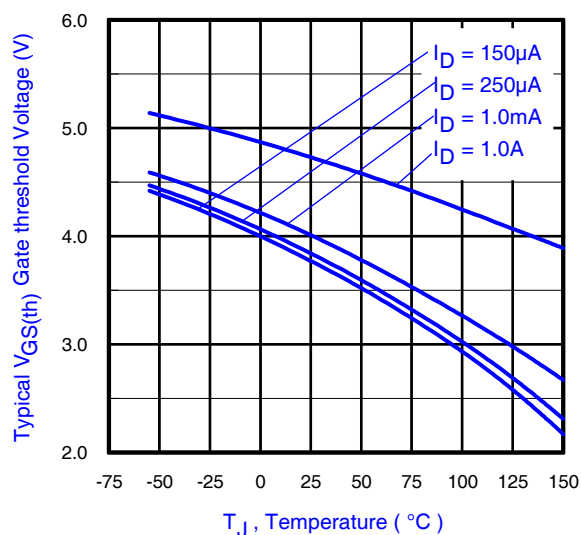


Fig 13. Typical Threshold Voltage vs. Junction Temperature

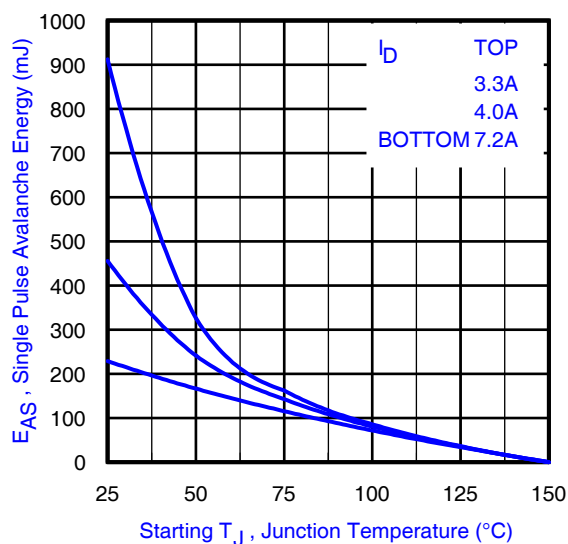


Fig 14. Maximum Avalanche Energy vs. Drain Current

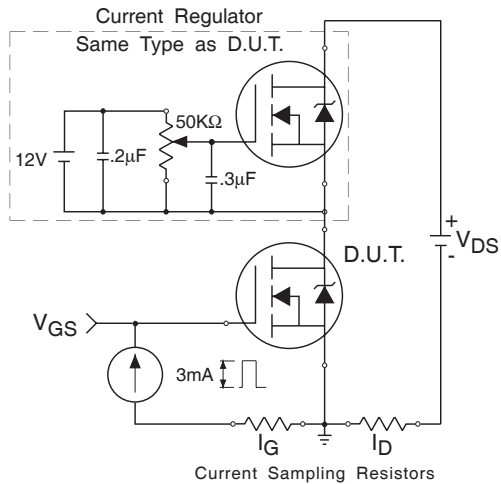


Fig 15a. Gate Charge Test Circuit

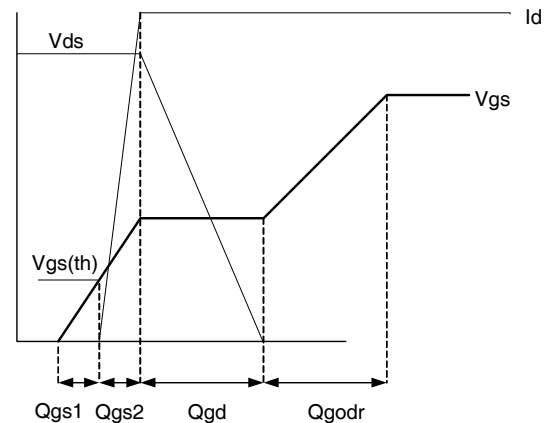


Fig 15b. Gate Charge Waveform

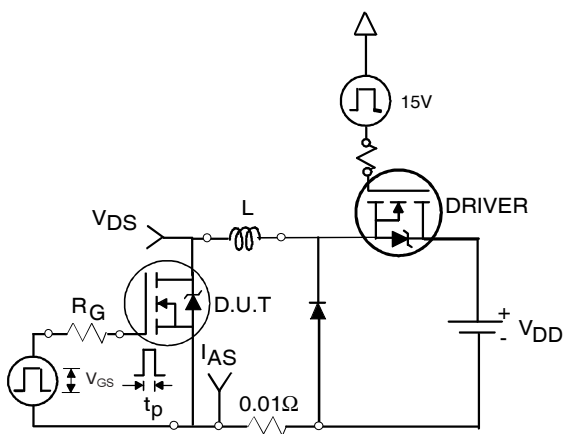


Fig 16a. Unclamped Inductive Test Circuit

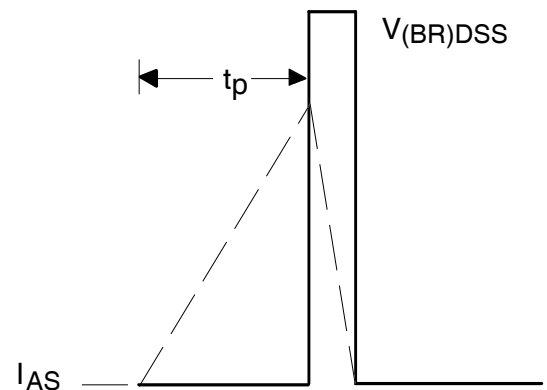


Fig 16b. Unclamped Inductive Waveforms

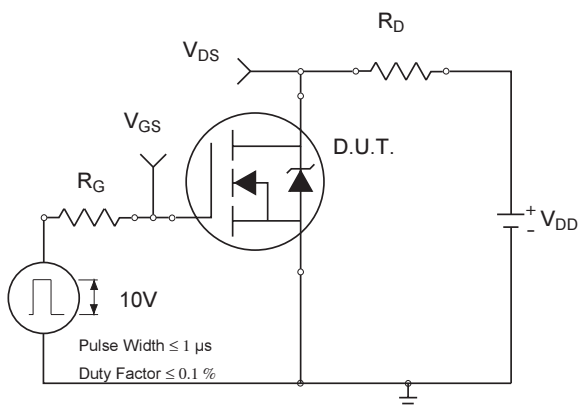


Fig 17a. Switching Time Test Circuit

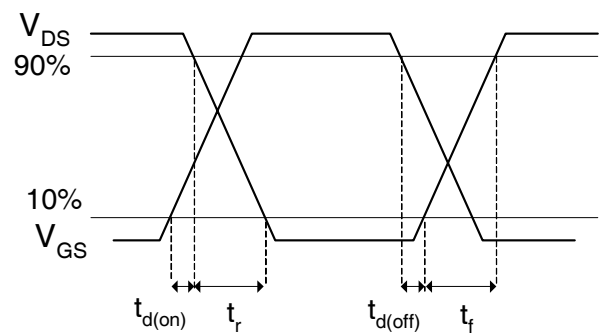


Fig 17b. Switching Time Waveforms

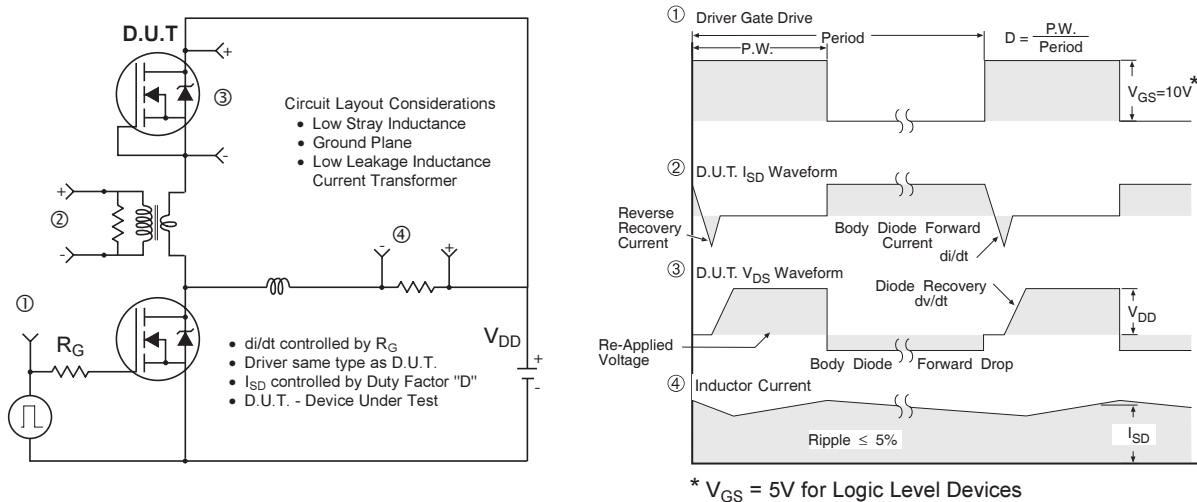
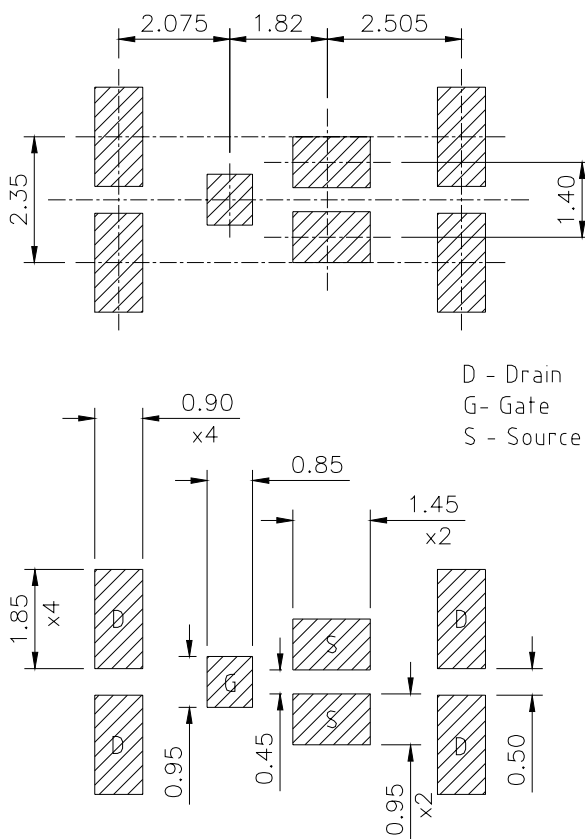


Fig 18. Diode Reverse Recovery Test Circuit for N-Channel HEXFET® Power MOSFETs

DirectFET™ Substrate and PCB Layout, MN Outline (Medium Size Can, N-Designation).

Please see DirectFET application note AN-1035 for all details regarding the assembly of DirectFET.

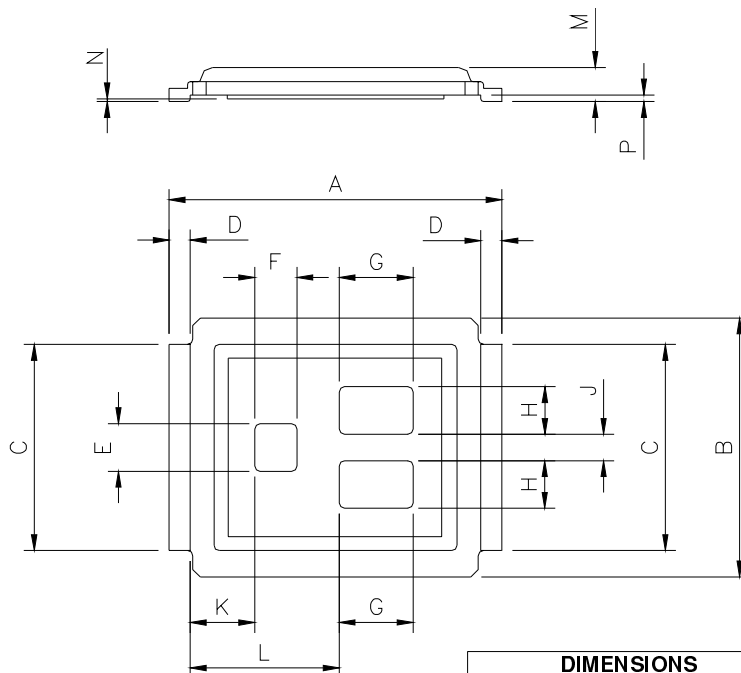
This includes all recommendations for stencil and substrate designs.



IRF6646

DirectFET™ Outline Dimension, MN Outline (Medium Size Can, N-Designation).

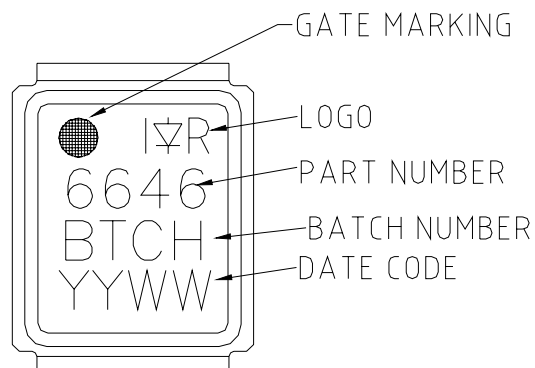
Please see DirectFET application note AN-1035 for all details regarding the assembly of DirectFET.
This includes all recommendations for stencil and substrate designs.



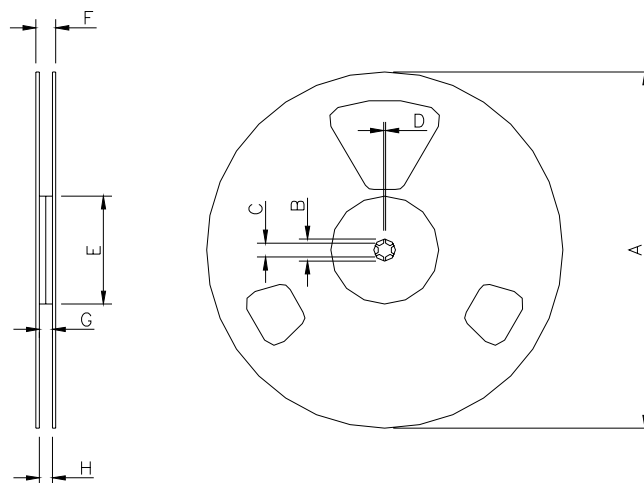
**NOTE: CONTROLLING
DIMENSIONS ARE IN MM**

DIMENSIONS				
	METRIC		IMPERIAL	
CODE	MIN	MAX	MIN	MAX
A	6.25	6.35	0.246	0.250
B	4.80	5.05	0.189	0.201
C	3.85	3.95	0.152	0.156
D	0.35	0.45	0.014	0.018
E	0.88	0.92	0.034	0.036
F	0.78	0.82	0.031	0.032
G	1.38	1.42	0.054	0.056
H	0.88	0.92	0.034	0.036
J	0.48	0.52	0.002	0.020
K	1.16	1.29	0.046	0.051
L	2.74	2.91	0.109	0.115
M	0.59	0.70	0.023	0.028
N	0.03	0.08	0.001	0.003
P	0.17	0.07	0.007	0.003

DirectFET™ Part Marking

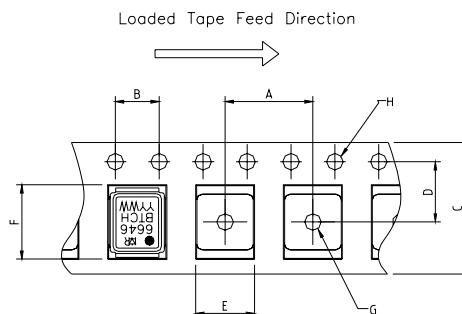


DirectFET™ Tape & Reel Dimension (Showing component orientation).



NOTE: Controlling dimensions in mm
Std reel quantity is 4800 parts. (ordered as IRF6646). For 1000 parts on 7" reel, order IRF6646TR1

REEL DIMENSIONS								
STANDARD OPTION (QTY 4800)					TR1 OPTION (QTY 1000)			
	METRIC		IMPERIAL		METRIC		IMPERIAL	
CODE	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX
A	330.0	N.C	12.992	N.C	177.77	N.C	6.9	N.C
B	20.2	N.C	0.795	N.C	19.06	N.C	0.75	N.C
C	12.8	13.2	0.504	0.520	13.5	12.8	0.53	0.50
D	1.5	N.C	0.059	N.C	1.5	N.C	0.059	N.C
E	100.0	N.C	3.937	N.C	58.72	N.C	2.31	N.C
F	N.C	18.4	N.C	0.724	N.C	13.50	N.C	0.53
G	12.4	14.4	0.488	0.567	11.9	12.01	0.47	N.C
H	11.9	15.4	0.469	0.606	11.9	12.01	0.47	N.C



NOTE: CONTROLLING DIMENSIONS IN MM

DIMENSIONS				
CODE	METRIC		IMPERIAL	
	MIN	MAX	MIN	MAX
A	7.90	8.10	0.311	0.319
B	3.90	4.10	0.154	0.161
C	11.90	12.30	0.469	0.484
D	5.45	5.55	0.215	0.219
E	5.10	5.30	0.201	0.209
F	6.50	6.70	0.256	0.264
G	1.50	N.C	0.059	N.C
H	1.50	1.60	0.059	0.063

Data and specifications subject to change without notice.
This product has been designed and qualified for the Consumer market.
Qualification Standards can be found on IR's Web site.

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