StrongIRFET™
IRL6283MTRPbF

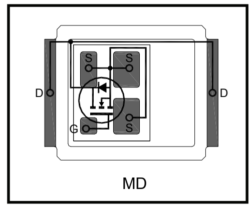
DirectFET® N-Channel Power MOSFET ②

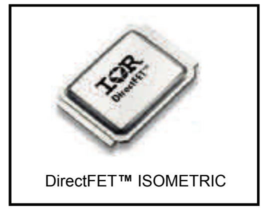
Applications

- ORing, eFuse, and high current load switch
- Load switch for battery application
- Inverter switches for DC motor application

Typical values (unless otherwise specified)

V_{DSS}	V_{GS}	$V_{gs(th)}$	$R_{DS(on)}$	$R_{DS(on)}$	$R_{DS(on)}$
20V max	±12V max	0.8V	0.50mΩ@10V	0.65mΩ@4.5V	1.1mΩ@2.5V





Features and Benefits

- Environmentally Friendly Product
- RoHs compliant containing no Lead, no Bromide and no Halogen
- Very Low $R_{DS(on)}$

Applicable DirectFET Outline and Substrate Outline (see p.7,8 for details) ①

SQ	SX	ST		MQ	**MD**	MT	MP	MC		

Description

The IRL6283MTRPbF combines the latest HEXFET® N-Channel Power MOSFET Silicon technology with the advanced DirectFET® packaging to achieve the lowest on-state resistance in a package that has the footprint of a SO-8 and only 0.6 mm profile. The DirectFET® package is compatible with existing layout geometries used in power applications, PCB assembly equipment and vapor phase, infra-red or convection soldering techniques, when application note AN-1035 is followed regarding the manufacturing methods and processes. The DirectFET package allows dual sided cooling to maximize thermal transfer in power systems, improving previous best thermal resistance by 80%.

Base part number	Package Type	Standard Pack		Orderable Part Number
		Form	Quantity	
IRL6283MTRPbF	DirectFET Medium Can	Tape and Reel	4800	IRL6283MTRPbF

Absolute Maximum Ratings

	Parameter	Max.	Units
V_{GS}	Gate-to-Source Voltage	±12	V
I_D @ T_A = 25°C	Continuous Drain Current, V_{GS} @ 4.5V ③	38	A
I_D @ T_A = 70°C	Continuous Drain Current, V_{GS} @ 4.5V ③	30	
I_D @ T_C = 25°C	Continuous Drain Current, V_{GS} @ 4.5V ④	211	
I_{DM}	Pulsed Drain Current ⑤	305	
E_{AS}	Single Pulse Avalanche Energy ⑥	406	mJ
I_{AR}	Avalanche Current ⑤	30	A

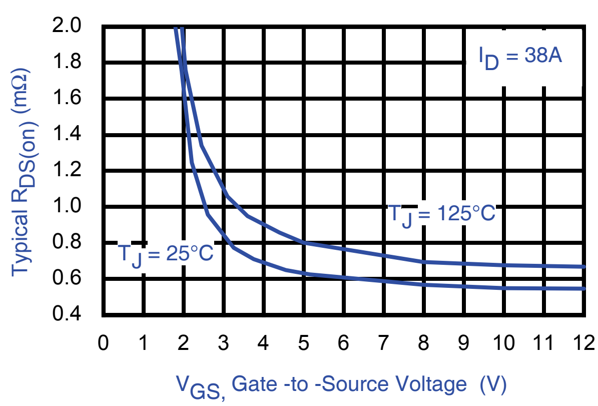


Fig 1. Typical On-Resistance vs. Gate Voltage

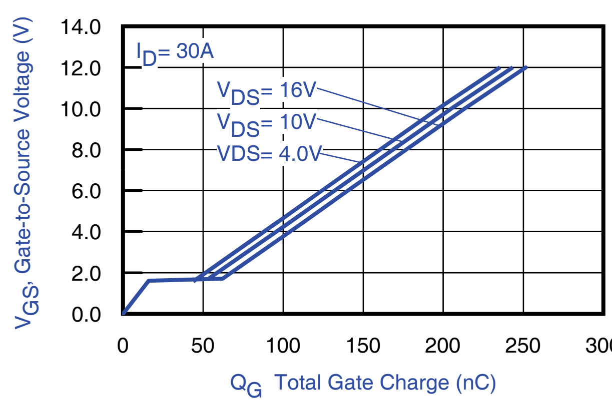


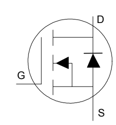
Fig 2. Typical Total Gate Charge vs Gate-to-Source Voltage

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 = 0.88mH, R_G = 50Ω, I_{AS} = 30A.

Static @ T_J = 25°C (unless otherwise specified)

	Parameter	Min.	Typ.	Max.	Units	Conditions
BV_{DSS}	Drain-to-Source Breakdown Voltage	20	——	——	V	V_{GS} = 0V, I_D = 250μA
$\Delta BV_{DSS}/\Delta T_J$	Breakdown Voltage Temp. Coefficient	——	4.8	——	mV/°C	Reference to 25°C, I_D = 1.0mA
$R_{DS(on)}$	Static Drain-to-Source On-Resistance	——	0.50	0.75	mΩ	V_{GS} = 10V, I_D = 50A ⑦
		——	0.65	0.87		V_{GS} = 4.5V, I_D = 50A ⑦
		——	1.1	1.5		V_{GS} = 2.5V, I_D = 50A ⑦
$V_{GS(th)}$	Gate Threshold Voltage	0.5	0.8	1.1	V	V_{DS} = V_{GS}, I_D = 100μA
$\Delta V_{GS(th)}$	Gate Threshold Voltage Coefficient	——	-3.9	——	mV/°C	
I_{DSS}	Drain-to-Source Leakage Current	——	——	1.0	μA	V_{DS} = 16V, V_{GS} = 0V
		——	——	150		V_{DS} = 16V, V_{GS} = 0V, T_J=125°C
I_{GSS}	Gate-to-Source Forward Leakage	——	——	100	nA	V_{GS} = 12V
	Gate-to-Source Reverse Leakage	——	——	-100		V_{GS} = -12V
gfs	Forward Transconductance	320	——	——	S	V_{DS} = 10V, I_D = 30A
Q_g	Total Gate Charge	——	105	158	nC	
Q_{gs1}	Pre-VthGate-to-Source Charge	——	9.7	——		V_{DS} = 10V
Q_{gs2}	Post-Vth Gate-to-Source Charge	——	8.9	——		V_{GS} = 4.5V
Q_{gd}	Gate-to-Drain Charge	——	35	——		I_D = 30A
Q_{odr}	Gate Charge Overdrive	——	51	——		
Q_{sw}	Switch Charge (Q_{gs2} + Q_{gd})	——	44	——		
Q_{oss}	Output Charge	——	50	——	nC	V_{DS} = 16V, V_{GS} = 0V
R_G	Gate Resistance	——	1.1	——	Ω	
$t_{d(on)}$	Turn-On Delay Time	——	23	——	ns	V_{DD} = 20V, V_{GS} = 4.5V ⑦
t_r	Rise Time	——	160	——		I_D = 30A
$t_{d(off)}$	Turn-Off Delay Time	——	116	——		R_G = 1.8Ω
t_f	Fall Time	——	192	——		
C_{iss}	Input Capacitance	——	8292	——	pF	V_{GS} = 0V
C_{oss}	Output Capacitance	——	2012	——		V_{DS} = 10V
C_{rss}	Reverse Transfer Capacitance	——	1526	——		f = 1.0MHz

Diode Characteristics

	Parameter	Min.	Typ.	Max.	Units	Conditions
I_S	Continuous Source Current (Body Diode)	——	——	211	A	MOSFET symbol showing the integral reverse p-n junction diode. 
I_{SM}	Pulsed Source Current (Body Diode) ⑤	——	——	305		
V_{SD}	Diode Forward Voltage	——	——	1.2	V	T_J = 25°C, I_S = 30A, V_{GS} = 0V ⑦
t_{rr}	Reverse Recovery Time	——	48	72	ns	T_J = 25°C, I_F = 30A,V_{DD} = 10V
Q_{rr}	Reverse Recovery Charge	——	84	126	nC	di/dt = 200A/μs ⑦

Notes:

⑤ Repetitive rating; pulse width limited by max. junction temperature.
⑦ Pulse width ≤ 400μs; duty cycle ≤ 2%.

Absolute Maximum Ratings

	Parameter	Max.	Units
P_D @T_A = 25°C	Power Dissipation ③	2.1	W
P_D @T_A = 70°C	Power Dissipation ③	1.3	
P_D @T_C = 25°C	Power Dissipation ④	63	
T_P	Peak Soldering Temperature	270	°C
T_J T_{STG}	Operating Junction and Storage Temperature Range	-40 to + 150	

Thermal Resistance

	Parameter	Typ.	Max.	Units
$R_{\theta JA}$	Junction-to-Ambient ③	—	60	°C/W
$R_{\theta JA}$	Junction-to-Ambient ⑧	12.5	—	
$R_{\theta JA}$	Junction-to-Ambient ⑨	20	—	
$R_{\theta JC}$	Junction-to-Case ④⑩	—	1.97	
$R_{\theta J\text{-}PCB}$	Junction-to-PCB Mounted	1.0	—	
	Linear Derating Factor ③	0.02		W/°C

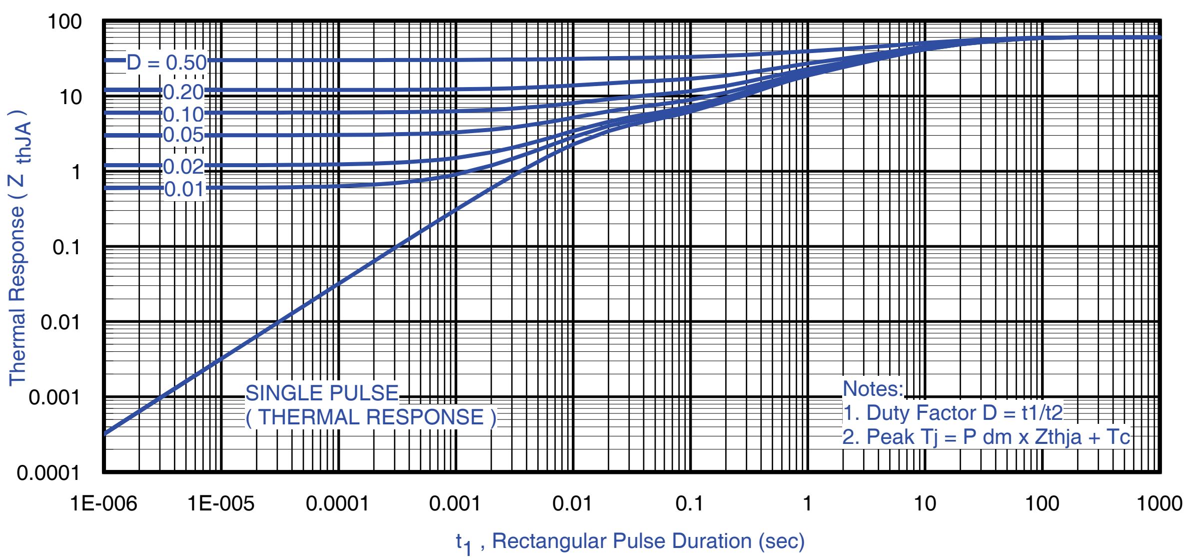
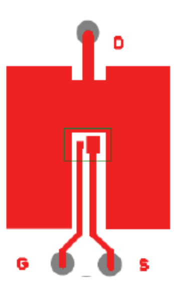
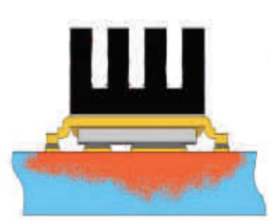
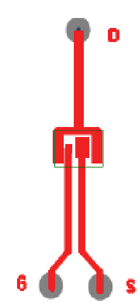


Fig 3. Maximum Effective Transient Thermal Impedance, Junction-to-Ambient ③







③ Surface mounted on 1 in. square Cu board, steady state.
④ T_C measured with thermocouple mounted to top (Drain) of part.
⑧ Used double sided cooling , mounting pad with large heat sink.
⑨ Mounted on minimum footprint full size board with metalized back and with small clip heat sink.
⑩ R_θ is measured at TJ of approximately 90°C.

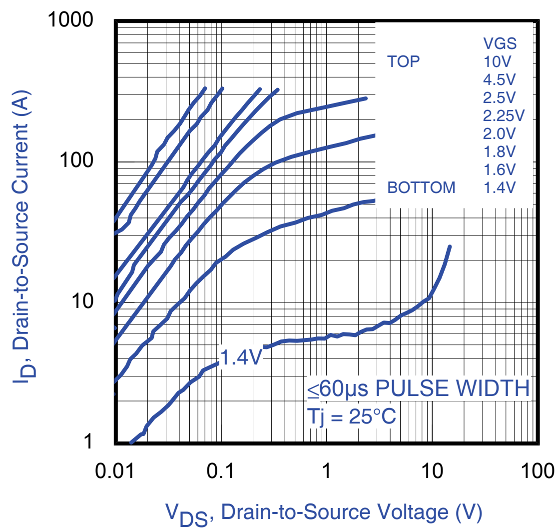


Fig 4. Typical Output Characteristics

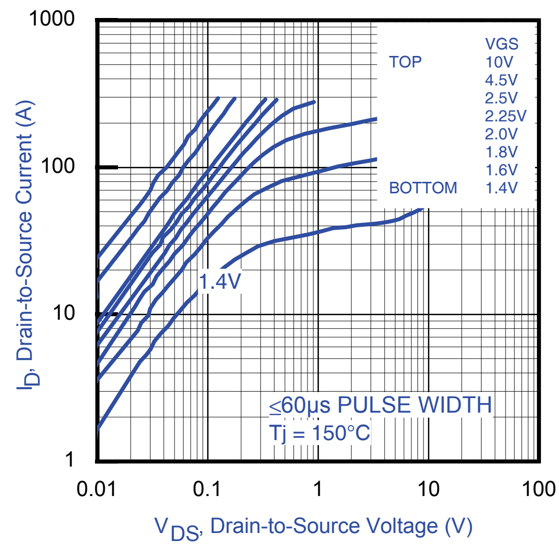


Fig 5. Typical Output Characteristics

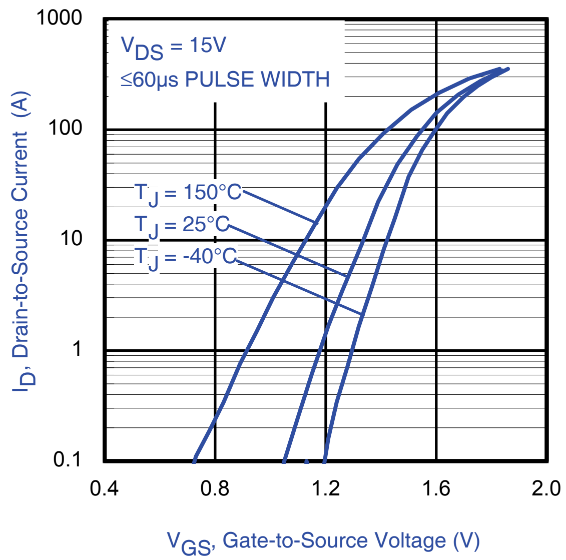


Fig 6. Typical Transfer Characteristics

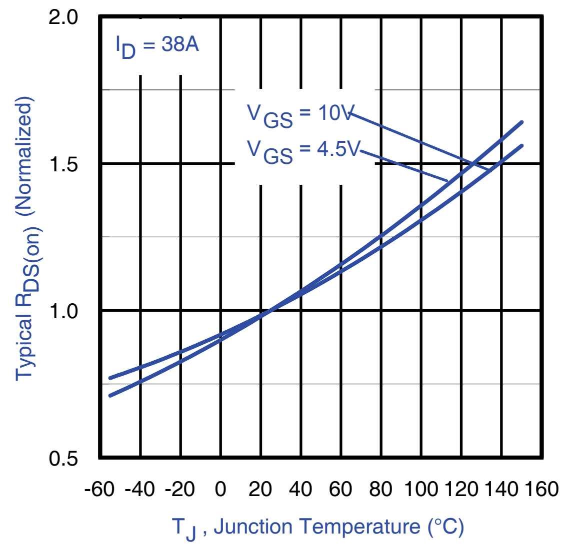


Fig 7. Normalized On-Resistance vs. Temperature

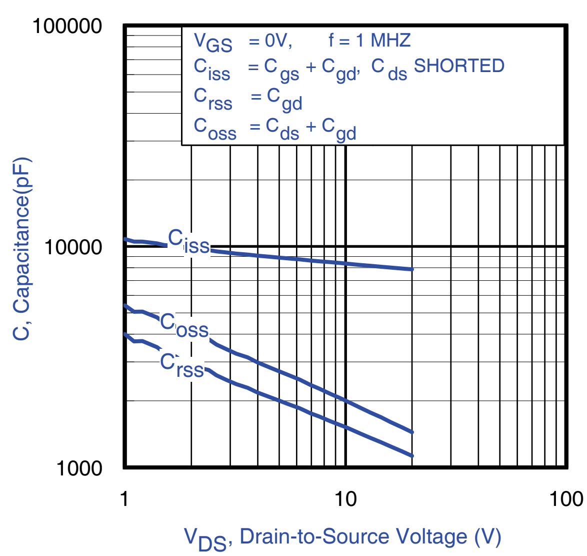


Fig 8. Typical Capacitance vs. Drain-to-Source Voltage

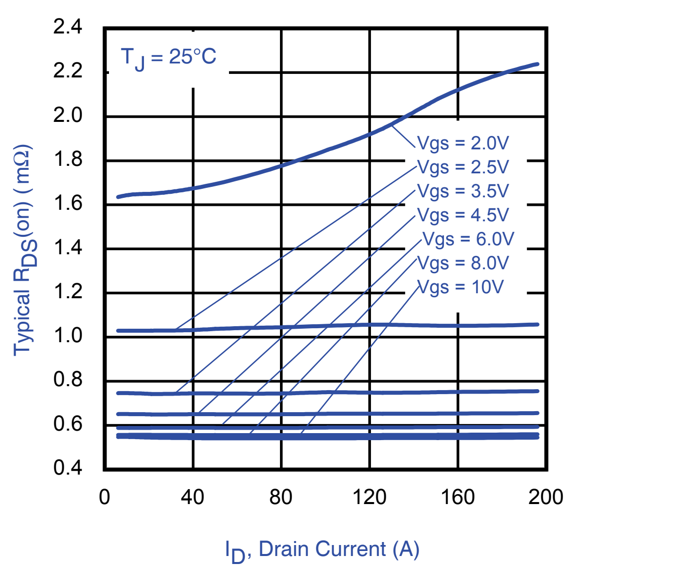


Fig 9. Typical On-Resistance vs. Drain Current and Voltage

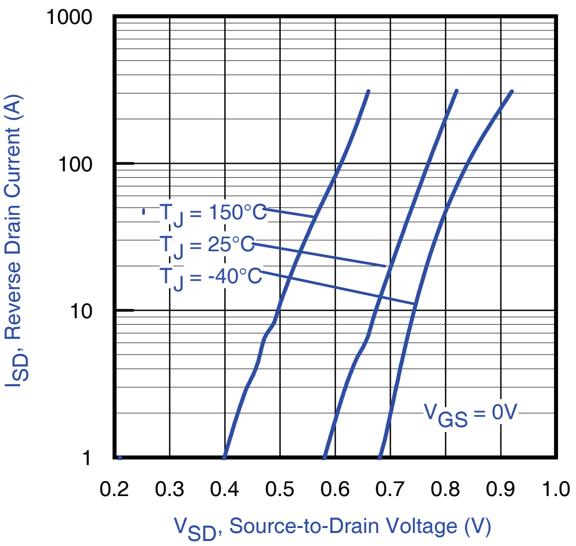


Fig 10. Typical Source-Drain Diode Forward Voltage

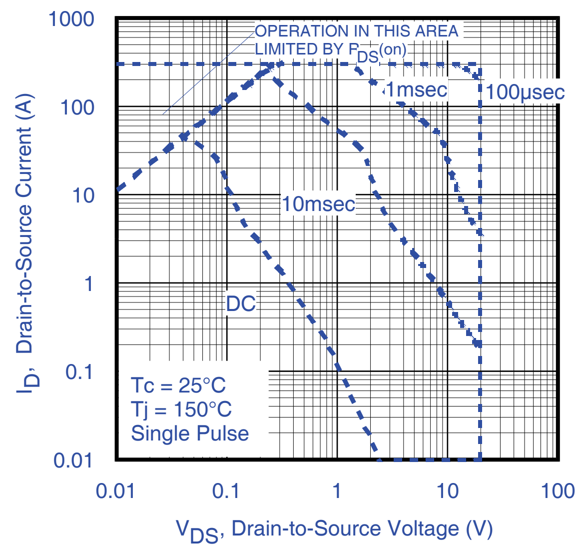


Fig 11. Maximum Safe Operating Area

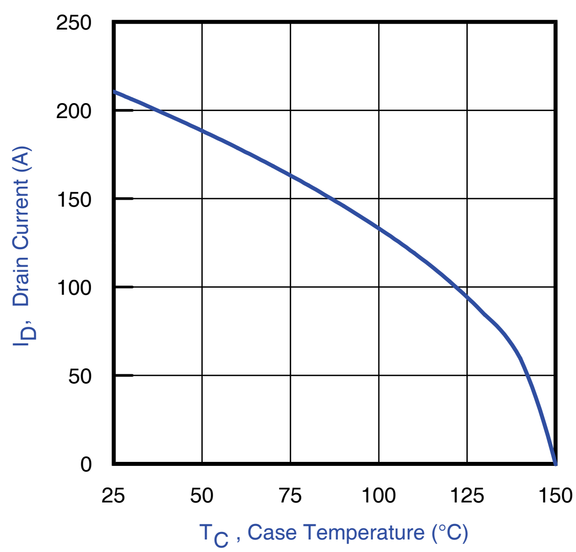


Fig 12. Maximum Drain Current vs. Case Temperature

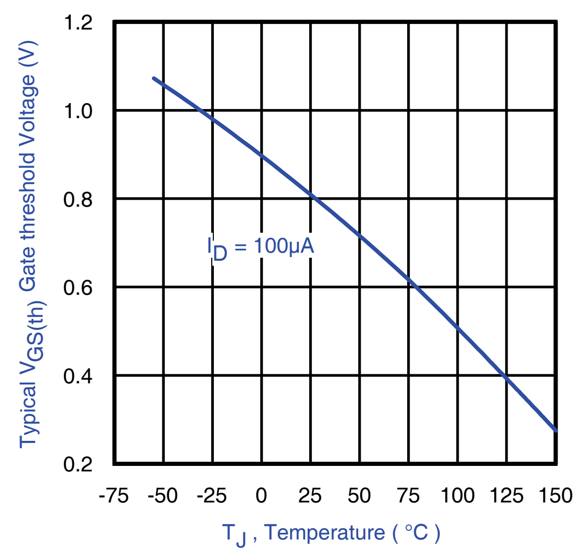


Fig 13. Typical Threshold Voltage vs. Junction Temperature

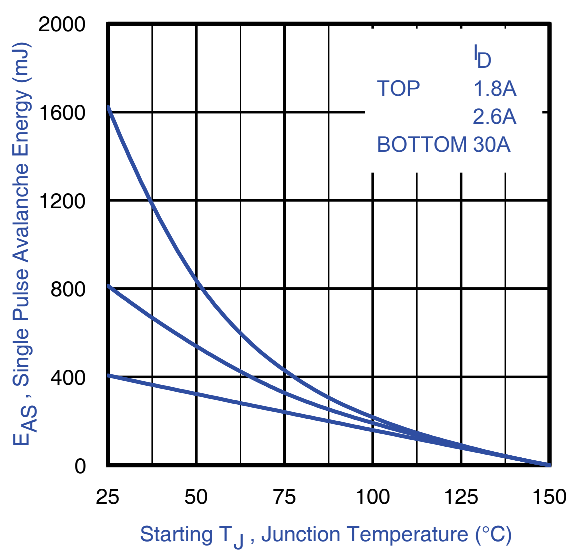


Fig 14. Maximum Avalanche Energy vs. Drain Current

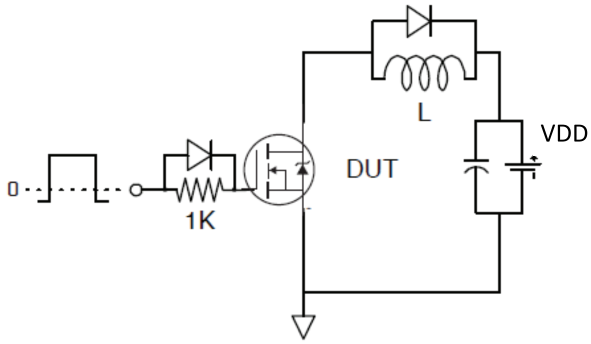


Fig 15a. Gate Charge Test Circuit

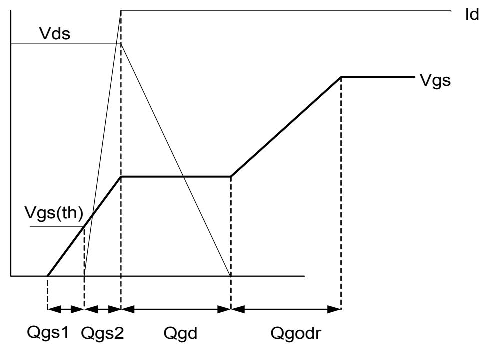


Fig 15b. Gate Charge Waveform

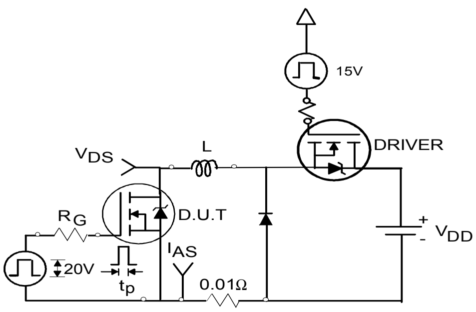


Fig 16a. Unclamped Inductive Test Circuit

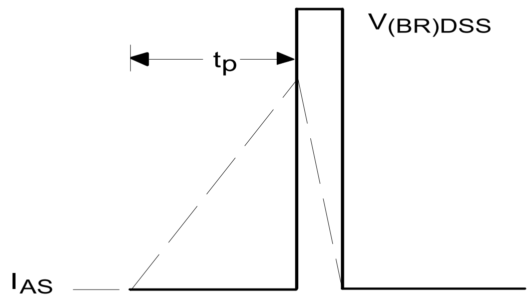


Fig 16b. Unclamped Inductive Waveforms

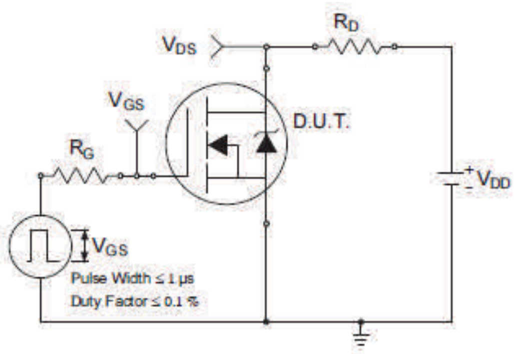


Fig 17a. Switching Time Test Circuit

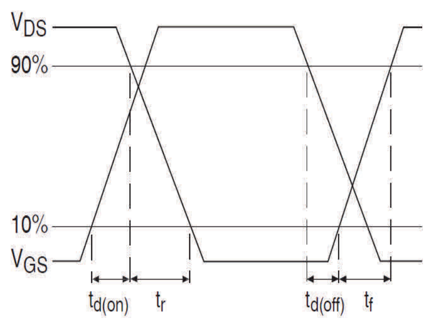


Fig 17b. Switching Time Waveforms

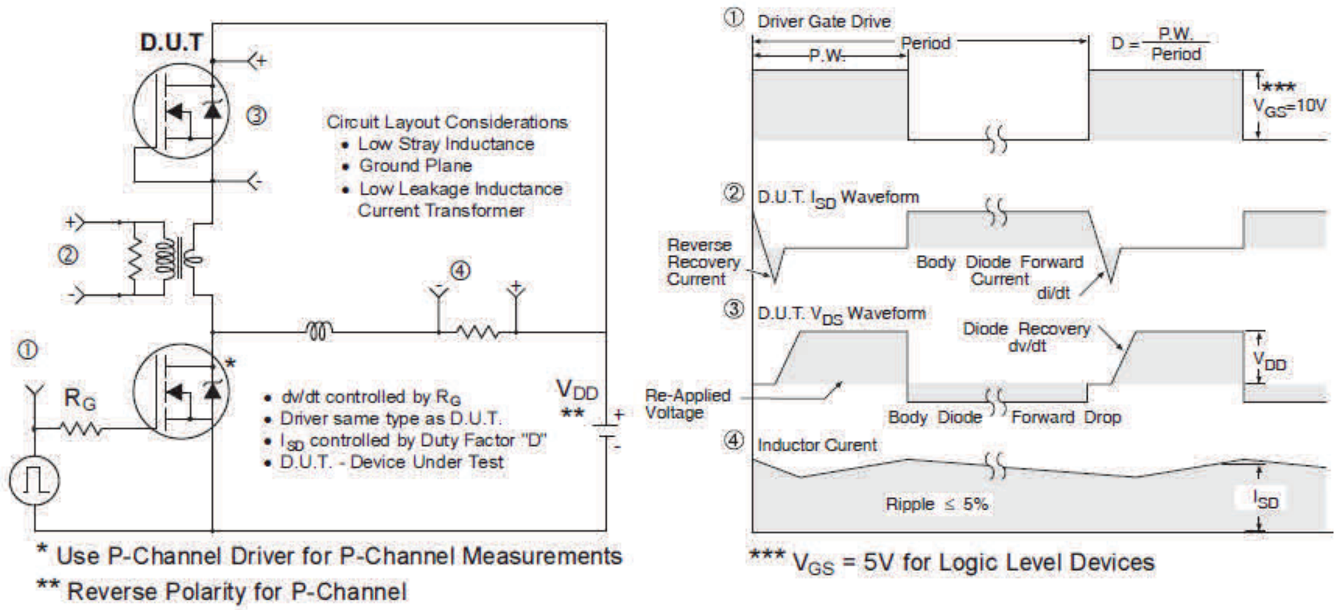
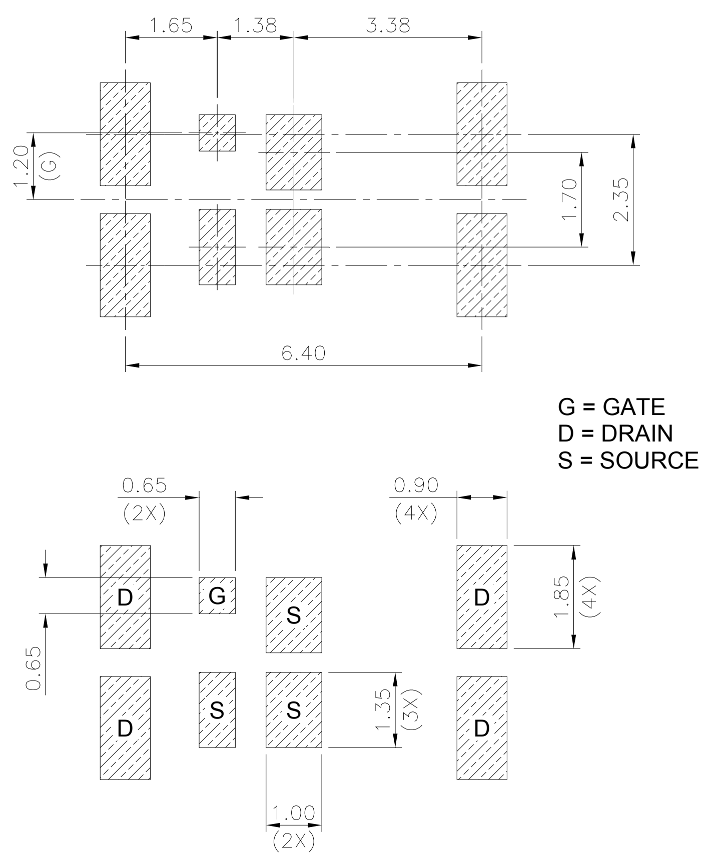


Fig 18. Peak Diode Recovery dv/dt Test Circuit for N-Channel HEXFET® Power MOSFETs

DirectFET® Board Footprint, MD Outline
(Medium Size Can, D-Designation).

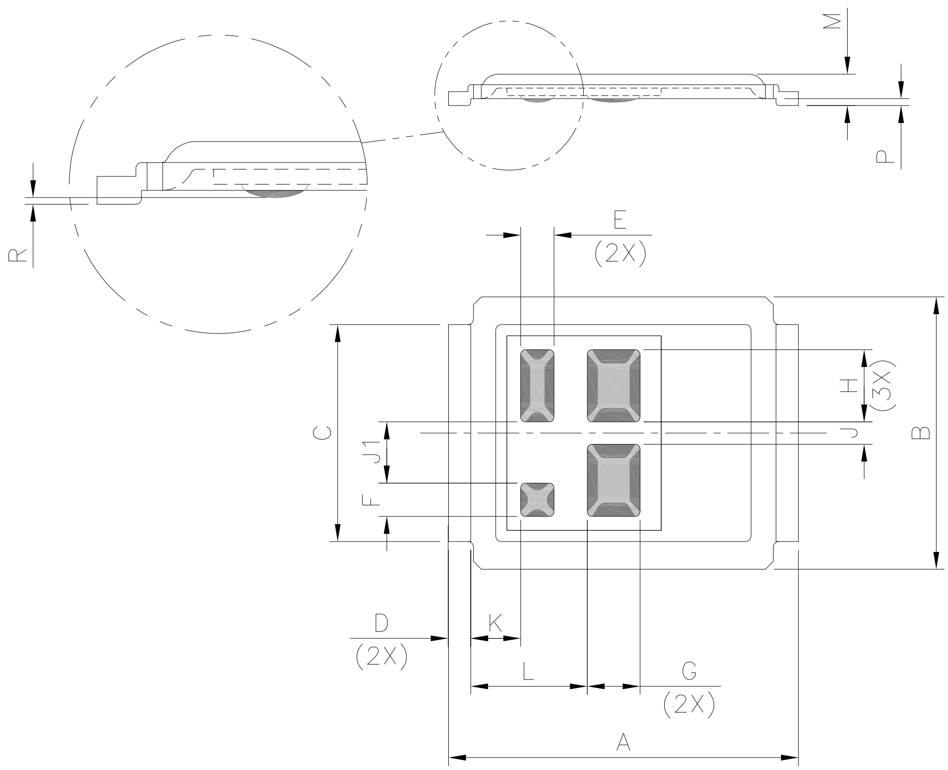
Please see DirectFET application note AN-1035 for all details regarding the assembly of DirectFET. This includes all recommendations for stencil and substrate designs.



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

DirectFET® Outline Dimension, MD Outline
(Medium Size Can, D-Designation).

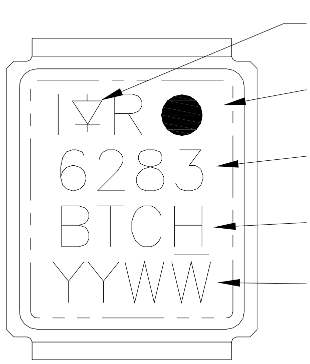
Please see DirectFET application note AN-1035 for all details regarding the assembly of DirectFET. This includes all recommendations for stencil and substrate designs.



DIMENSIONS				
	METRIC		IMPERIAL	
CODE	MIN	MAX	MIN	MAX
A	6.25	6.35	0.246	0.250
B	4.80	5.05	0.189	0.199
C	3.85	3.95	0.152	0.156
D	0.35	0.45	0.014	0.018
E	0.58	0.62	0.023	0.024
F	0.58	0.62	0.023	0.024
G	0.93	0.97	0.037	0.038
H	1.28	1.32	0.050	0.052
J	0.38	0.42	0.015	0.017
J1	1.08	1.12	0.043	0.044
K	0.88	0.92	0.035	0.036
L	2.08	2.12	0.082	0.083
M	0.535	0.595	0.021	0.023
R	0.02	0.08	0.0008	0.0031
P	0.08	0.17	0.003	0.007

Dimensions are shown in millimeters (inches)

DirectFET® Part Marking



LOGO

GATE MARKING

PART NUMBER

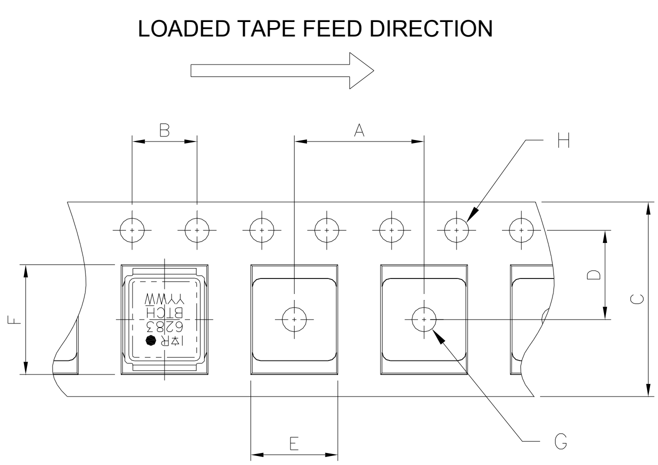
BATCH NUMBER

DATE CODE

Line above the last character of the date code indicates "Lead-Free"

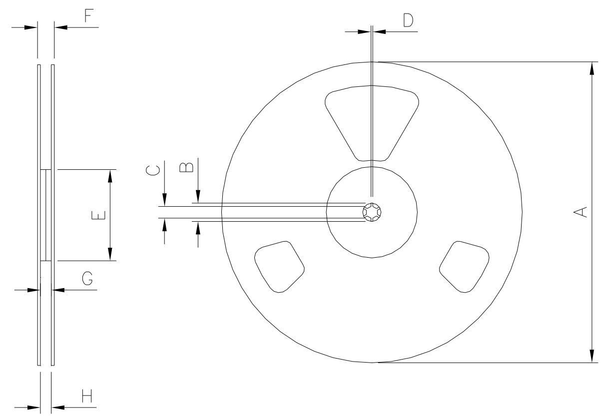
Note: For the most current drawing please refer to IR website at http://www.irf.com/package/

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



NOTE: CONTROLLING DIMENSIONS IN MM

DIMENSIONS				
	METRIC		IMPERIAL	
CODE	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



NOTE: Controlling dimensions in mm
Std reel quantity is 4800 parts. (ordered as IRL6283MTRPBF). For 1000 parts on 7" reel, order IRL6283MTR1PBF

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

Qualification Information†

Moisture Sensitivity Level	DirectFET	MSL1 (per JEDEC J-STD-020D††)
RoHS Compliant	Yes	

† Qualification standards can be found at International Rectifier's web site http://www.irf.com/product-info/reliability/
†† Applicable version of JEDEC standard at the time of product release.

Revision History

Date	Comments
2/4/2014	• Converted the data sheet to StrongIRFET template. • Updated the schematic drawing, on page 1.
9/24/2014	• Updated notes on page 2 & page 3

International Rectifier

IR WORLD HEADQUARTERS: 101 N. Sepulveda Blvd., El Segundo, California 90245, USA
To contact International Rectifier, please visit http://www.irf.com/whoto-call/