

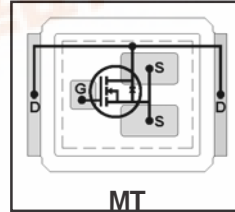
International
IR Rectifier

IRF6618/IRF6618TR1

HEXFET® Power MOSFET

- Application Specific MOSFETs
- Ideal for CPU Core DC-DC Converters
- Low Conduction Losses
- Low Switching Losses
- Low Profile (<0.7 mm)
- Dual Sided Cooling Compatible
- Compatible with existing Surface Mount Techniques

V _{DSS}	R _{DS(on)} max	Qg
30V	2.2mΩ @ V _{GS} = 10V	43 nC
	3.4mΩ @ V _{GS} = 4.5V	



Applicable DirectFET Package/Layout Pad (see p.8,9 for details)

SQ	SX	ST		MQ	MX	MT			
----	----	----	--	----	----	-----------	--	--	--

Description

The IRF6618 combines the latest HEXFET® Power MOSFET Silicon technology with the advanced DirectFET™ packaging to achieve the lowest on-state resistance in a package that has the footprint of an SO-8 and only 0.7 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%.

The IRF6618 balances both low resistance and low charge along with ultra low package inductance to reduce both conduction and switching losses. The reduced total losses make this product ideal for high efficiency DC-DC converters that power the latest generation of processors operating at higher frequencies. The IRF6618 has been optimized for parameters that are critical in synchronous buck converters including R_{ds(on)}, gate charge and C_{dv}/dt-induced turn on immunity. The IRF6618 offers particularly low R_{ds(on)} and high C_{dv}/dt immunity for synchronous FET applications.

Absolute Maximum Ratings

Parameter	Max.	Units
V _{DS}	30	V
V _{GS}	±20	
I _D @ T _C = 25°C	170	A
I _D @ T _A = 25°C	30	
I _D @ T _A = 70°C	24	
I _{DM}	240	
P _D @ T _A = 25°C	2.8	W
P _D @ T _A = 70°C	1.8	
P _D @ T _C = 25°C	89	
	0.022	W/°C
T _J	-40 to + 150	°C
T _{STG}		

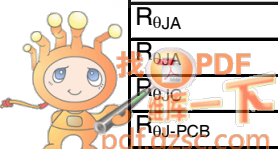
Avalanche Characteristics

Parameter	Typ.	Max.	Units
E _{AS}	—	210	mJ
I _{AR}	—	24	A

Thermal Resistance

Parameter	Typ.	Max.	Units
R _{θJA}	—	45	°C/W
R _{θJA}	12.5	—	
R _{θJA}	20	—	
R _{θJC}	—	1.4	
R _{θJ-PCB}	1.0	—	

Notes ① through ⑧ are on page 9



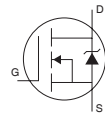
IRF6618/IRF6618TR1

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

	Parameter	Min.	Typ.	Max.	Units	Conditions
BV _{DSS}	Drain-to-Source Breakdown Voltage	30	—	—	V	V _{GS} = 0V, I _D = 250μA
ΔBV _{DSS} /ΔT _J	Breakdown Voltage Temp. Coefficient	—	23	—	mV/°C	Reference to 25°C, I _D = 1mA
R _{DS(on)}	Static Drain-to-Source On-Resistance	—	1.7	2.2	mΩ	V _{GS} = 10V, I _D = 30A ③
		—	—	3.4		V _{GS} = 4.5V, I _D = 24A ③
V _{GS(th)}	Gate Threshold Voltage	1.35	1.64	2.35	V	V _{DS} = V _{GS} , I _D = 250μA
ΔV _{GS(th)} /ΔT _J	Gate Threshold Voltage Coefficient	—	-5.7	—	mV/°C	
I _{DSS}	Drain-to-Source Leakage Current	—	—	5.0	μA	V _{DS} = 30V, V _{GS} = 0V
		—	—	1.0		V _{DS} = 24V, V _{GS} = 0V
		—	—	150		V _{DS} = 24V, V _{GS} = 0V, T _J = 150°C
I _{GSS}	Gate-to-Source Forward Leakage	—	—	100	nA	V _{GS} = 20V
	Gate-to-Source Reverse Leakage	—	—	-100		V _{GS} = -20V
gfs	Forward Transconductance	100	—	—	S	V _{DS} = 15V, I _D = 24A
Q _g	Total Gate Charge	—	43	65	nC	V _{DS} = 15V V _{GS} = 4.5V I _D = 24A See Fig. 16
Q _{gs1}	Pre-V _{th} Gate-to-Source Charge	—	12	—		
Q _{gs2}	Post-V _{th} Gate-to-Source Charge	—	4.0	—		
Q _{gd}	Gate-to-Drain Charge	—	15	23		
Q _{godr}	Gate Charge Overdrive	—	12	—		
Q _{sw}	Switch Charge (Q _{gs2} + Q _{gd})	—	19	—		
Q _{oss}	Output Charge	—	28	—	nC	V _{DS} = 15V, V _{GS} = 0V
R _G	Gate Resistance	—	1.0	2.2	Ω	
t _{d(on)}	Turn-On Delay Time	—	21	—	ns	V _{DD} = 15V, V _{GS} = 4.5V ③ I _D = 24A Clamped Inductive Load
t _r	Rise Time	—	71	—		
t _{d(off)}	Turn-Off Delay Time	—	27	—		
t _f	Fall Time	—	8.1	—		
C _{iss}	Input Capacitance	—	5640	—	pF	V _{GS} = 0V V _{DS} = 15V f = 1.0MHz
C _{oss}	Output Capacitance	—	1260	—		
C _{rss}	Reverse Transfer Capacitance	—	570	—		

Diode Characteristics

	Parameter	Min.	Typ.	Max.	Units	Conditions
I _S	Continuous Source Current (Body Diode)	—	—	30	A	MOSFET symbol showing the integral reverse p-n junction diode.
I _{SM}	Pulsed Source Current (Body Diode) ①	—	—	240		
V _{SD}	Diode Forward Voltage	—	0.78	1.2	V	T _J = 25°C, I _S = 24A, V _{GS} = 0V ③
t _{rr}	Reverse Recovery Time	—	43	65	ns	T _J = 25°C, I _F = 24A
Q _{rr}	Reverse Recovery Charge	—	46	69	nC	di/dt = 100A/μs ③



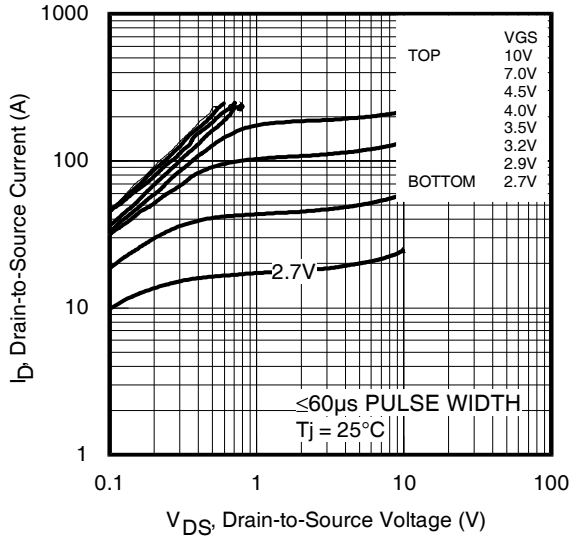


Fig 1. Typical Output Characteristics

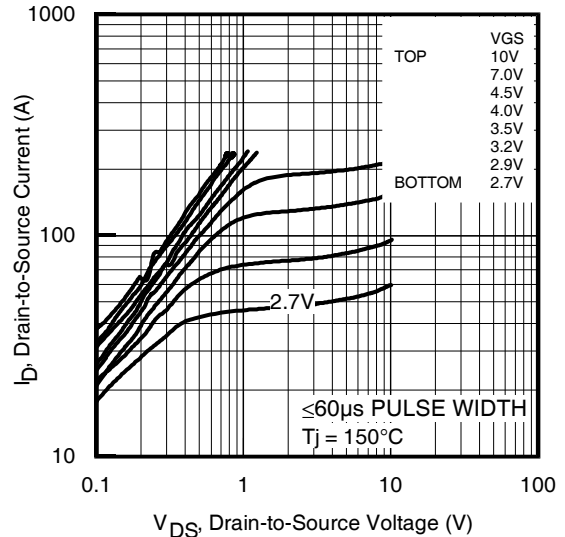


Fig 2. Typical Output Characteristics

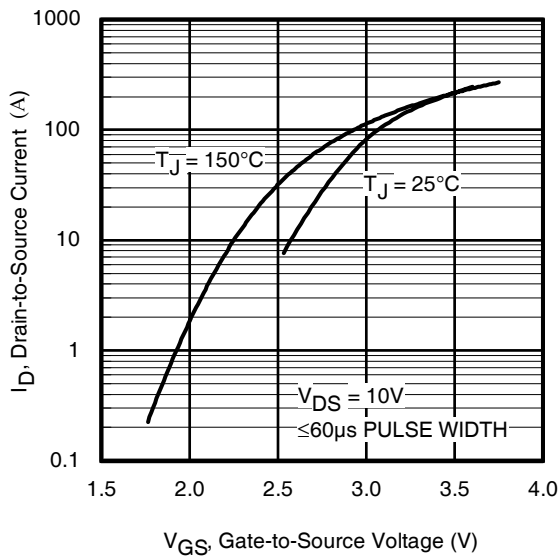


Fig 3. Typical Transfer Characteristics

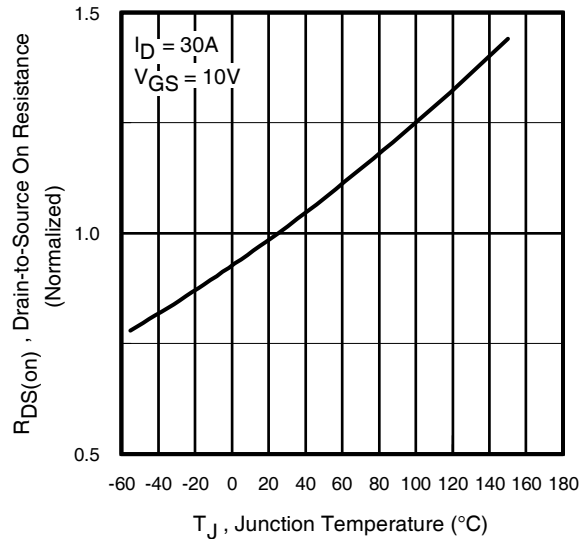


Fig 4. Normalized On-Resistance vs. Temperature

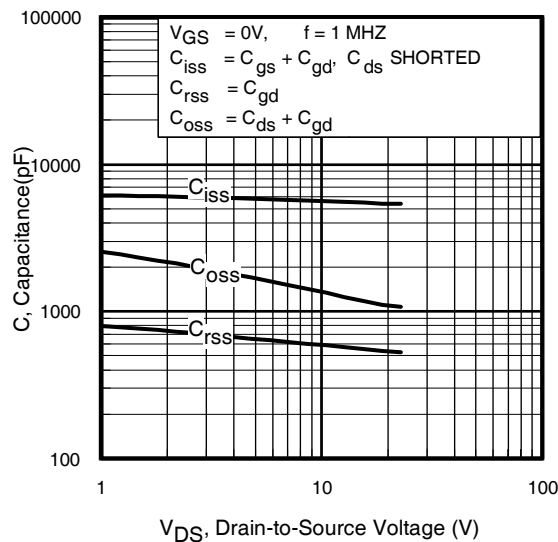


Fig 5. Typical Capacitance vs. Drain-to-Source Voltage

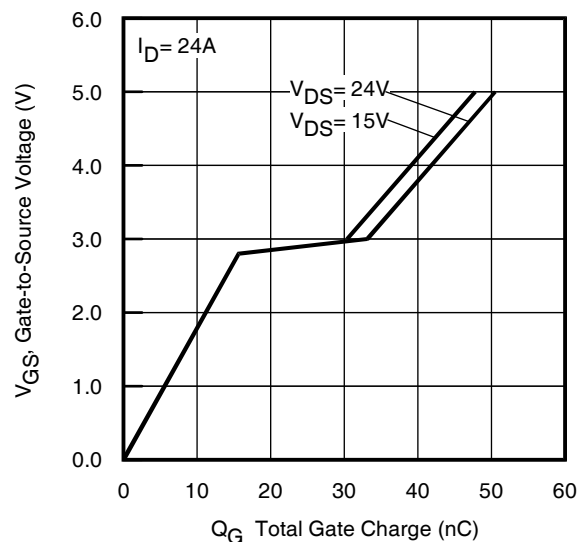


Fig 6. Typical Gate Charge vs. Gate-to-Source Voltage

IRF6618/IRF6618TR1

International
IR Rectifier

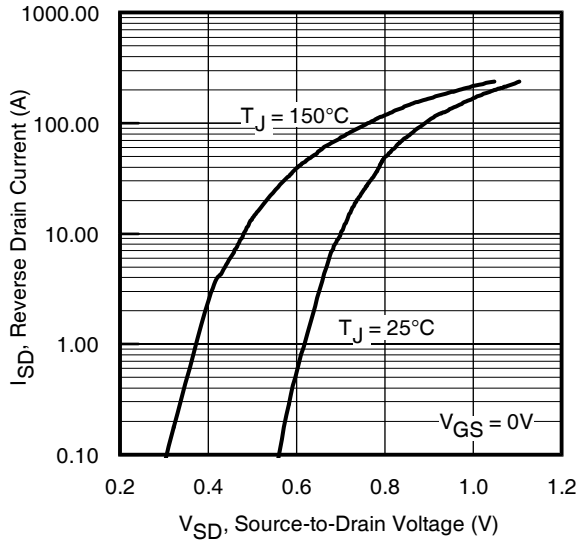


Fig 7. Typical Source-Drain Diode Forward Voltage

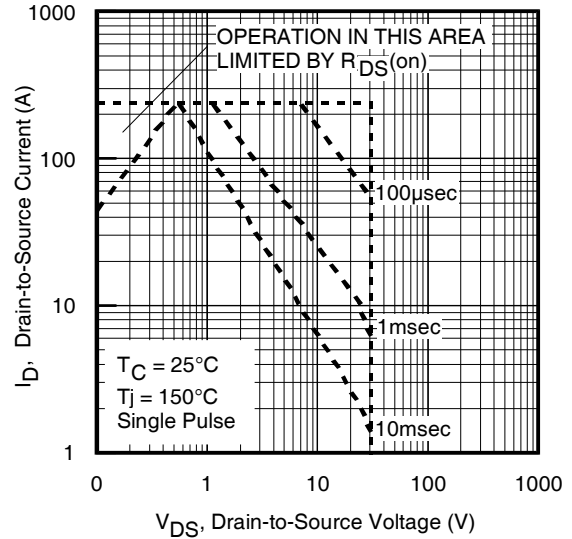


Fig 8. Maximum Safe Operating Area

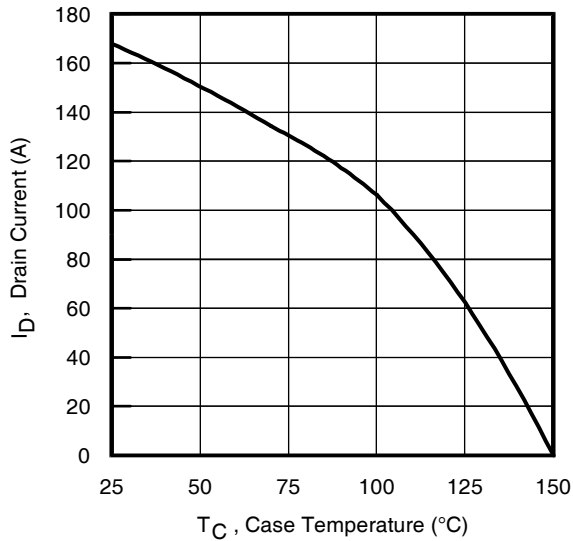


Fig 9. Maximum Drain Current vs. Case Temperature

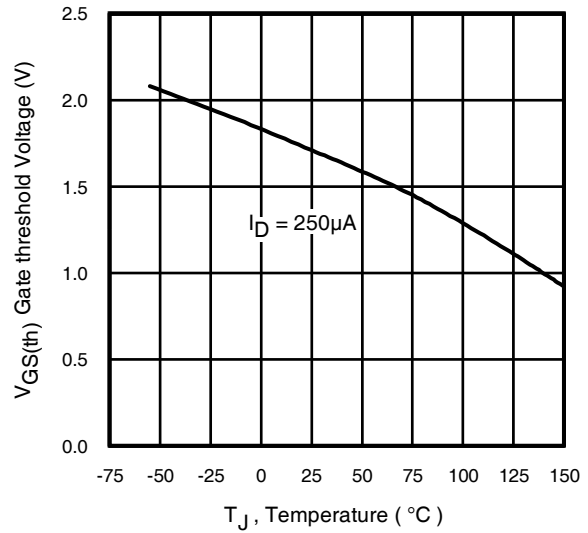


Fig 10. Threshold Voltage vs. Temperature

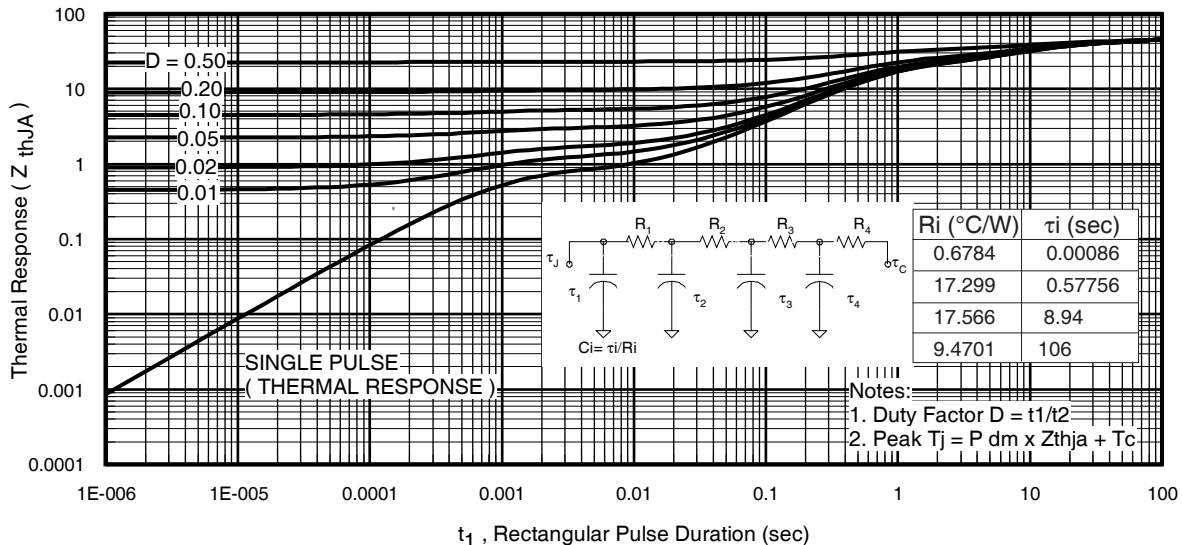


Fig 11. Maximum Effective Transient Thermal Impedance, Junction-to-Ambient

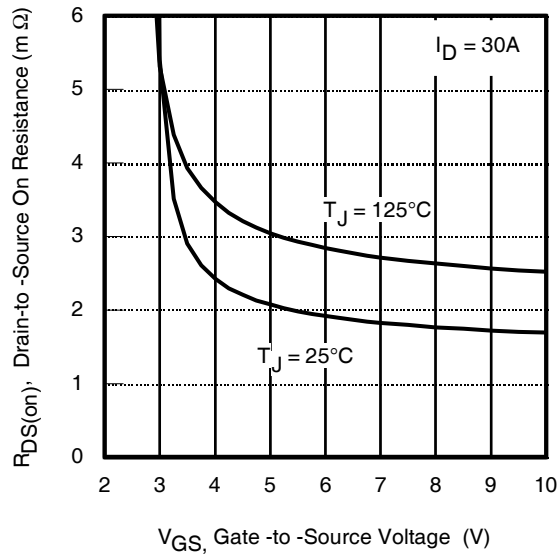


Fig 12. On-Resistance vs. Gate Voltage

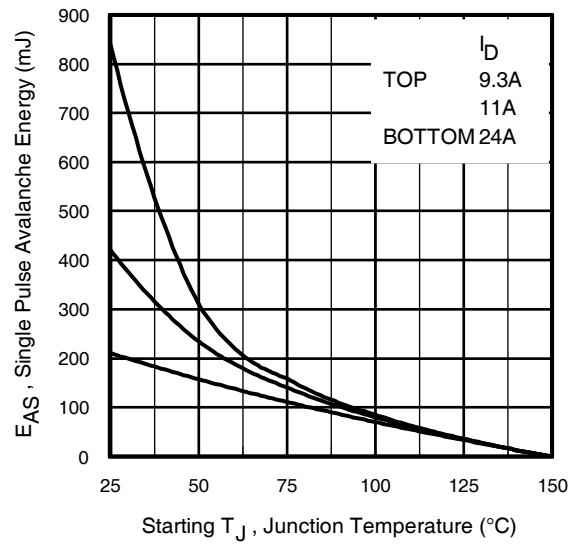


Fig 13. Maximum Avalanche Energy vs. Drain Current

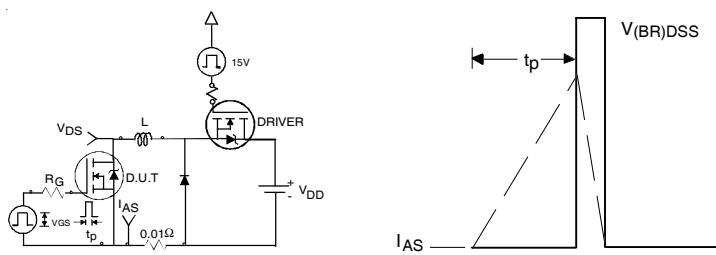


Fig 14. Unclamped Inductive Test Circuit and Waveform

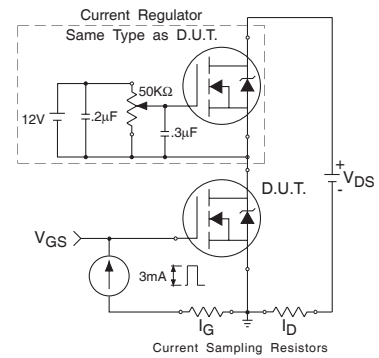


Fig 15. Gate Charge Test Circuit

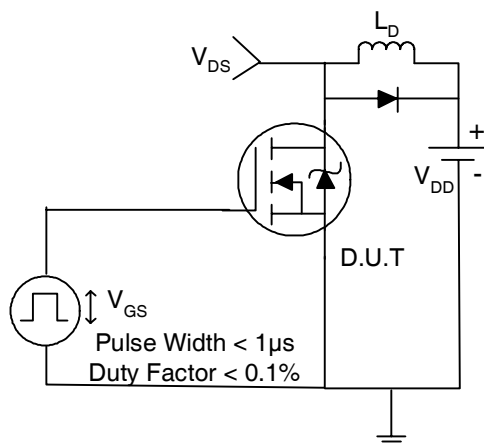


Fig 16. Switching Time Test Circuit

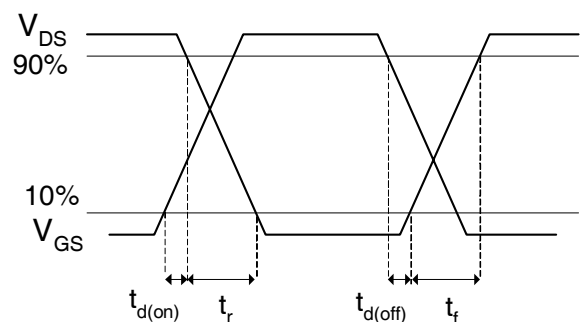


Fig 17. Switching Time Waveforms

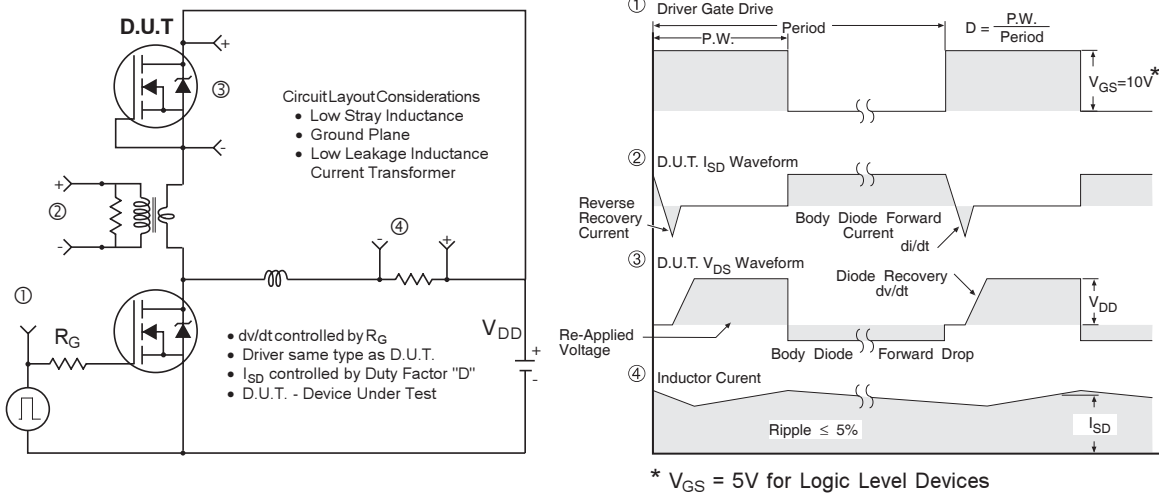


Fig 15. Peak Diode Recovery dv/dt Test Circuit for N-Channel HEXFET® Power MOSFETs

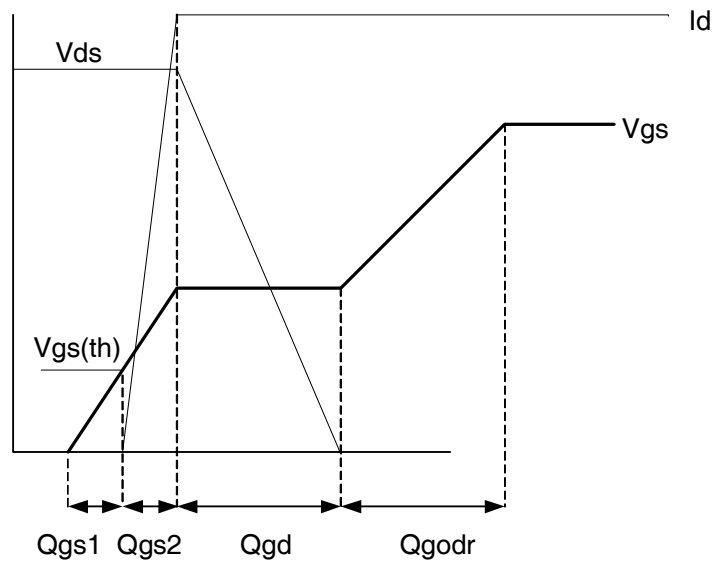
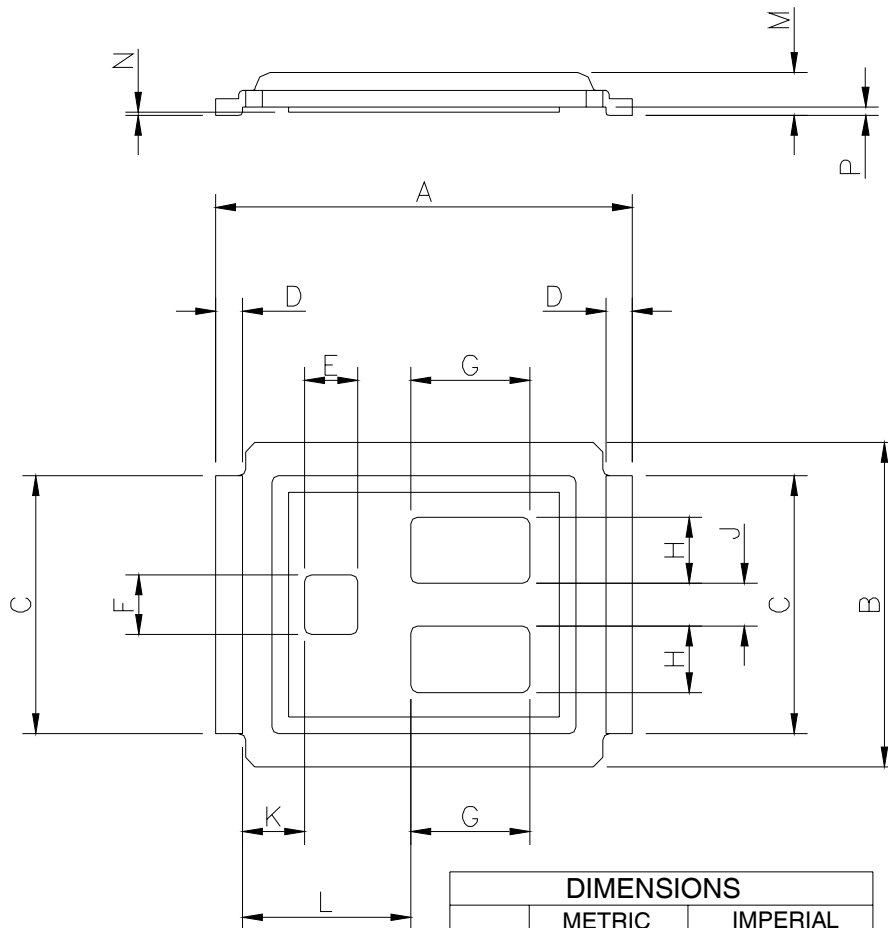


Fig 16. Gate Charge Waveform

DirectFET™ Outline Dimension, MT Outline (Medium Size Can, T-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.



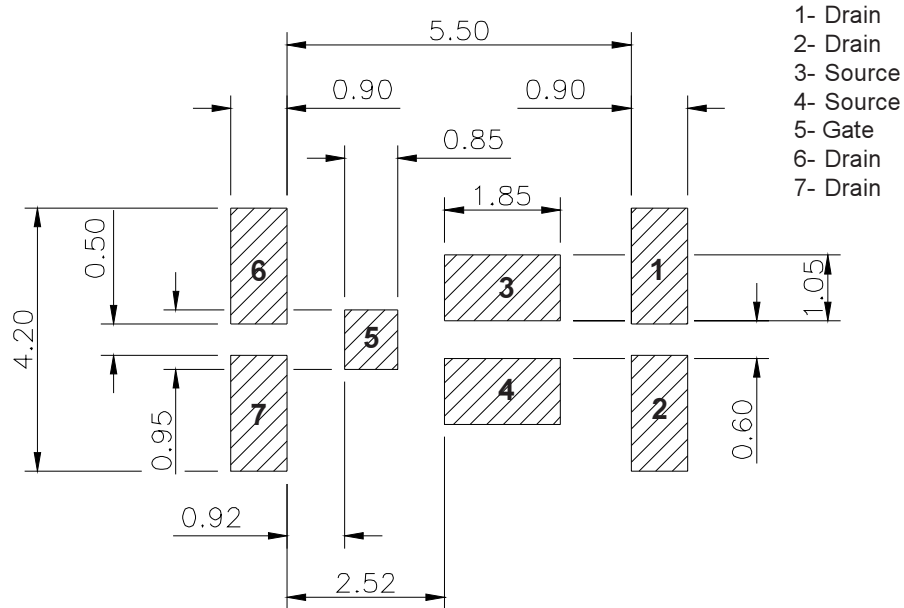
**NOTE: CONTROLLING
 DIMENSIONS ARE IN MM**

DIMENSIONS				
	METRIC		IMPERIAL	
CODE	MIN	MAX	MIN	MAX
A	6.25	6.35	0.246	0.250
B	4.80	5.05	0.189	0.199
C	3.85	3.95	0.152	0.156
D	0.35	0.45	0.014	0.018
E	0.78	0.82	0.031	0.032
F	0.88	0.92	0.035	0.036
G	1.78	1.82	0.070	0.072
H	0.98	1.02	0.039	0.040
J	0.63	0.67	0.025	0.026
K	0.88	1.01	0.035	0.039
L	2.46	2.63	0.097	0.104
M	0.59	0.70	0.023	0.028
N	0.03	0.08	0.001	0.003
P	0.08	0.17	0.003	0.007

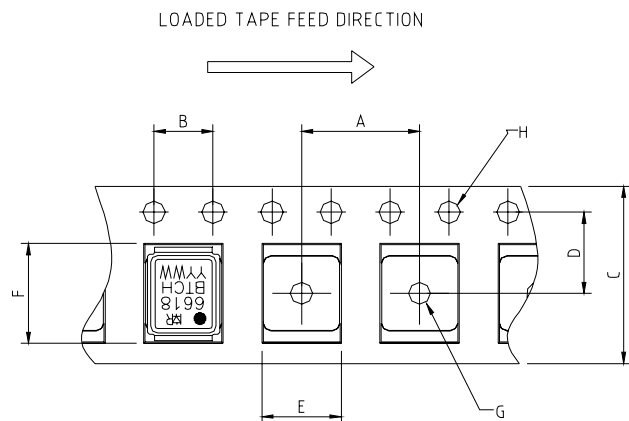
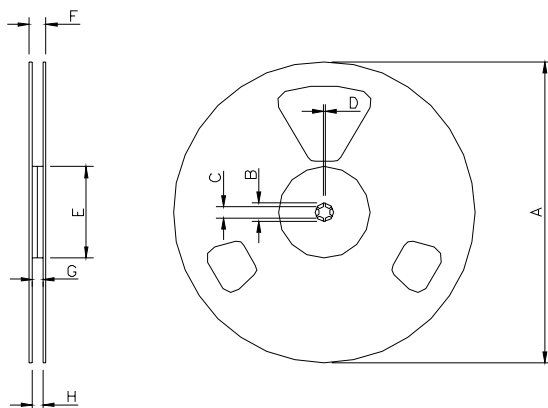
IRF6618/IRF6618TR1

DirectFET™ Board Footprint, MT Outline (Medium Size Can, T-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.



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



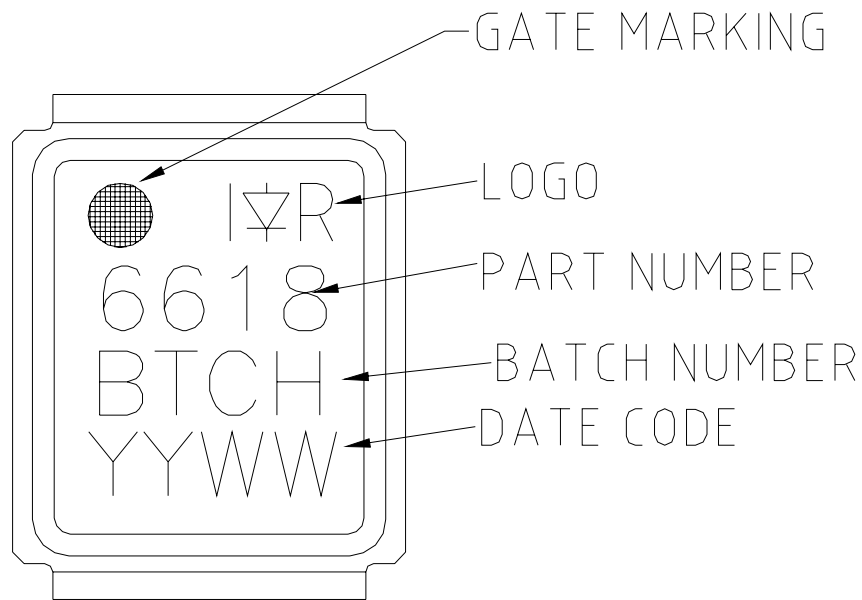
NOTE: Controlling dimensions in mm
Std reel quantity is 4800 parts. (ordered as IRF6618). For 1000 parts on 7" reel, order IRF6618TR1

REEL DIMENSIONS								
STANDARD OPTION (QTY 4800)				TR1 OPTION (QTY 1000)				
CODE	METRIC		IMPERIAL		METRIC		IMPERIAL	
	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

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

DirectFET™ Part Marking



Notes:

- ① Repetitive rating; pulse width limited by max. junction temperature.
- ② Starting $T_J = 25^\circ\text{C}$, $L = 0.75\text{mH}$, $R_G = 25\Omega$, $I_{AS} = 24\text{A}$.
- ③ Pulse width $\leq 400\mu\text{s}$; duty cycle $\leq 2\%$.
- ④ Surface mounted on 1 in. square Cu board.
- ⑤ Used double sided cooling , mounting pad.
- ⑥ Mounted on minimum footprint full size board with metalized back and with small clip heatsink.
- ⑦ T_C measured with thermal couple mounted to top (Drain) of part.
- ⑧ R_θ is measured at T_J of approximately 90°C .

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.