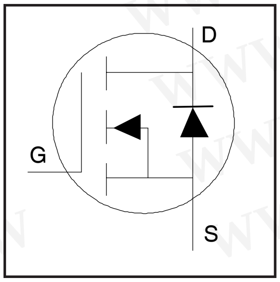
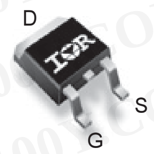
International
IOR Rectifier

IRLR6225PbF

HEXFET® Power MOSFET

V_{DS}	20	V
$R_{DS(on)}$ max (@V_{GS} = 4.5V)	4.0	mΩ
$R_{DS(on)}$ max (@V_{GS} = 2.5V)	5.2	mΩ
Q_g (typical)	48	nC
R_G (typical)	2.2	Ω
I_D	42⑥	A





D-Pak
IRLR6225PbF

G	D	S
Gate	Drain	Source

Applications

- Battery Protection Switch

Features and Benefits

Features		Benefits
Industry-Standard Pinout	results in ⇒	Multi-Vendor Compatibility
Compatible with Existing Surface Mount Techniques		Easier Manufacturing
RoHS Compliant Containing no Lead, no Bromide and no Halogen		Environmentally Friendlier
MSL1, Industrial Qualification		Increased Reliability

Orderable part number	Package Type	Standard Pack		Note
		Form	Quantity	
IRLR6225PbF	D-PAK	Tube/Bulk	75	
IRLR6225TRPbF	D-PAK	Tape and Reel	2000	

Absolute Maximum Ratings

	Parameter	Max.	Units
V_{DS}	Drain-to-Source Voltage	20	V
V_{GS}	Gate-to-Source Voltage	±12	
I_D @ T_C = 25°C	Continuous Drain Current, V_{GS} @ 10V	100⑥	A
I_D @ T_C = 100°C	Continuous Drain Current, V_{GS} @ 10V	63⑥	
I_{DM}	Pulsed Drain Current ①	400	
P_D @T_C = 25°C	Power Dissipation ⑤	63	W
P_D @ T_C = 100°C	Power Dissipation ⑤	25	
	Linear Derating Factor ⑤	0.5	W/°C
T_J T_{STG}	Operating Junction and Storage Temperature Range	-55 to + 150	°C
	Soldering Temperature, for 10 seconds	300 (1.6mm from case)	

Notes ① through ⑥ are on page 8

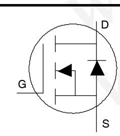
Static @ T_J = 25°C (unless otherwise specified)

	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	–––	6.6	–––	mV/°C	Reference to 25°C, I_D = 1mA
$R_{DS(on)}$	Static Drain-to-Source On-Resistance	–––	3.2	4.0	mΩ	V_{GS} = 4.5V, I_D = 21A ③
		–––	4.2	5.2		V_{GS} = 2.5V, I_D = 17A ③
$V_{GS(th)}$	Gate Threshold Voltage	0.5	0.8	1.1	V	V_{DS} = V_{GS}, I_D = 50μA
$\Delta V_{GS(th)}$	Gate Threshold Voltage Coefficient	–––	-4.0	–––	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	205	–––	–––	S	V_{DS} = 10V, I_D = 21A
Q_g	Total Gate Charge	–––	48	72	nC	
Q_{gs1}	Pre-Vth Gate-to-Source Charge	–––	2.6	–––		V_{DS} = 10V
Q_{gs2}	Post-Vth Gate-to-Source Charge	–––	3.6	–––		V_{GS} = 4.5V
Q_{gd}	Gate-to-Drain Charge	–––	19	–––		I_D = 17A
Q_{godr}	Gate Charge Overdrive	–––	23	–––		See Fig.17 & 18
Q_{sw}	Switch Charge (Q_{gs2} + Q_{gd})	–––	23	–––		
Q_{oss}	Output Charge	–––	21	–––	nC	V_{DS} = 16V, V_{GS} = 0V
R_G	Gate Resistance	–––	2.2	–––	Ω	
$t_{d(on)}$	Turn-On Delay Time	–––	9.7	–––	ns	V_{DD} = 10V, V_{GS} = 4.5V
t_r	Rise Time	–––	37	–––		I_D = 17A
$t_{d(off)}$	Turn-Off Delay Time	–––	63	–––		R_G=1.8Ω
t_f	Fall Time	–––	52	–––		See Fig.15
C_{iss}	Input Capacitance	–––	3770	–––	pF	V_{GS} = 0V
C_{oss}	Output Capacitance	–––	915	–––		V_{DS} = 10V
C_{rss}	Reverse Transfer Capacitance	–––	650	–––		*ƒ* = 1.0MHz

Avalanche Characteristics

	Parameter	Typ.	Max.	Units
E_{AS}	Single Pulse Avalanche Energy ②	–––	170	mJ
I_{AR}	Avalanche Current ①	–––	17	A
E_{AR}	Repetitive Avalanche Energy ①	–––	6.3	mJ

Diode Characteristics

	Parameter	Min.	Typ.	Max.	Units	Conditions
I_S	Continuous Source Current (Body Diode) ⑥	–––	–––	100⑥	A	MOSFET symbol showing the integral reverse p-n junction diode. 
I_{SM}	Pulsed Source Current (Body Diode) ①	–––	–––	400		
V_{SD}	Diode Forward Voltage	–––	–––	1.2	V	T_J = 25°C, I_S = 17A, V_{GS} = 0V ③
t_{rr}	Reverse Recovery Time	–––	35	53	ns	T_J = 25°C, I_F = 17A, V_{DD} = 10V
Q_{rr}	Reverse Recovery Charge	–––	57	86	nC	di/dt = 200A/μs ③
t_{on}	Forward Turn-On Time	Time is dominated by parasitic Inductance				

Thermal Resistance

	Parameter	Typ.	Max.	Units
$R_{\theta JC}$	Junction-to-Case ④	–––	2.0	°C/W
$R_{\theta JA}$	Junction-to-Ambient (PCB Mount) ⑤	–––	50	
$R_{\theta JA}$	Junction-to-Ambient ⑤	–––	110	

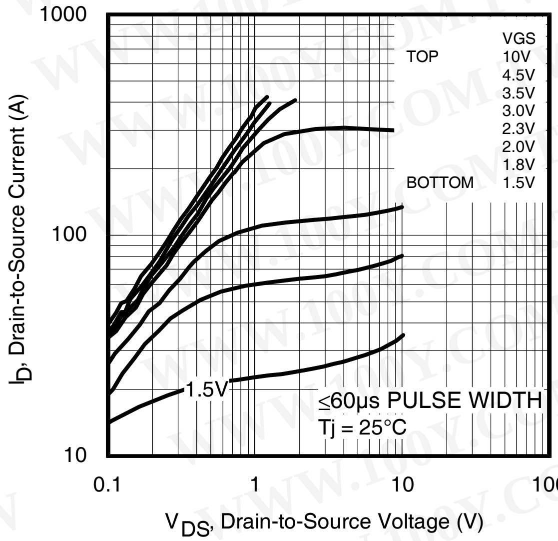


Fig 1. Typical Output Characteristics

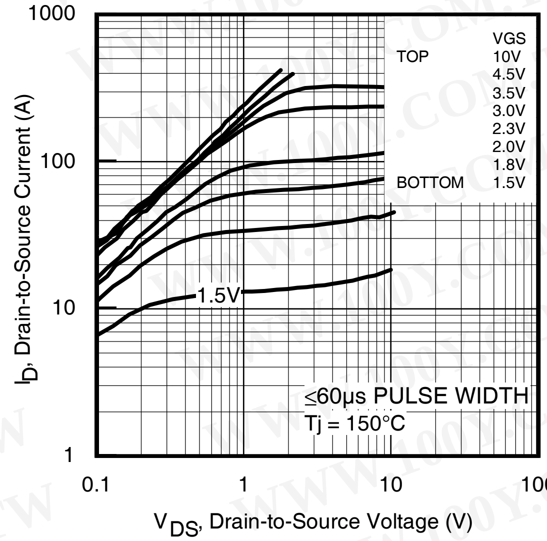


Fig 2. Typical Output Characteristics

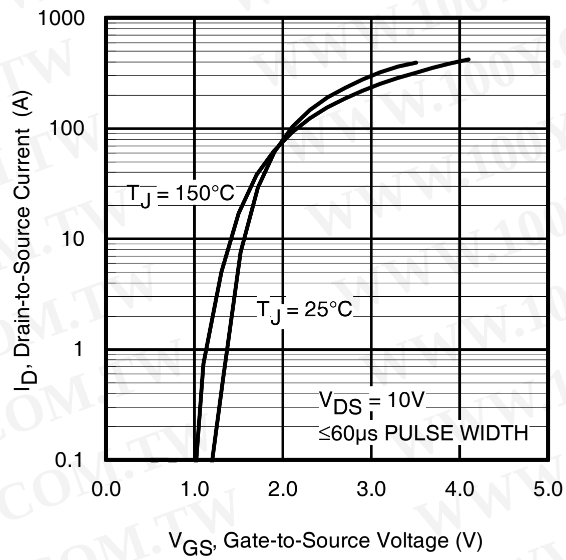


Fig 3. Typical Transfer Characteristics

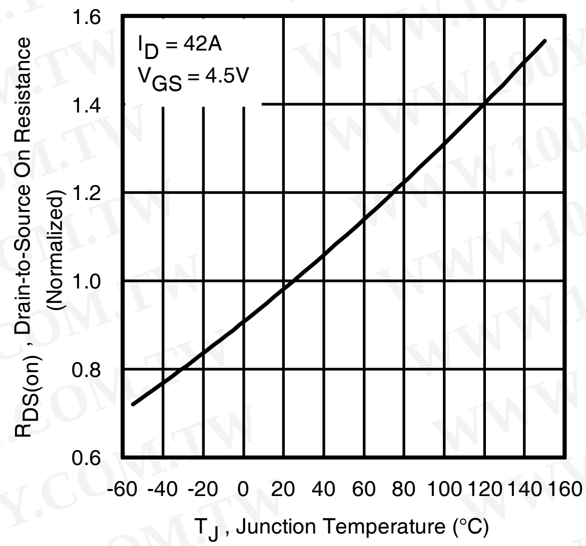


Fig 4. Normalized On-Resistance vs. Temperature

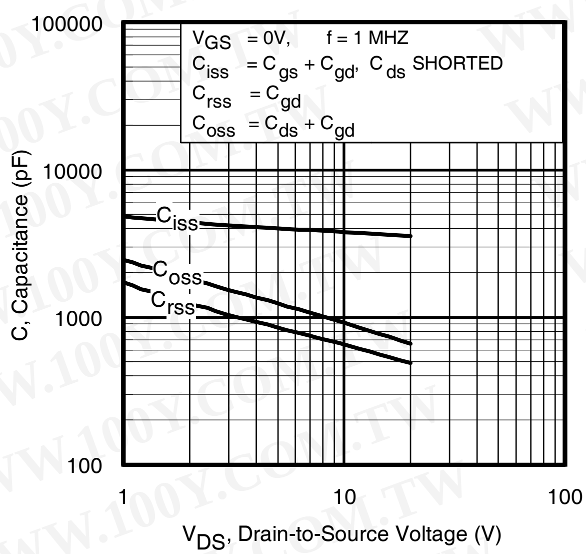


Fig 5. Typical Capacitance vs.Drain-to-Source Voltage

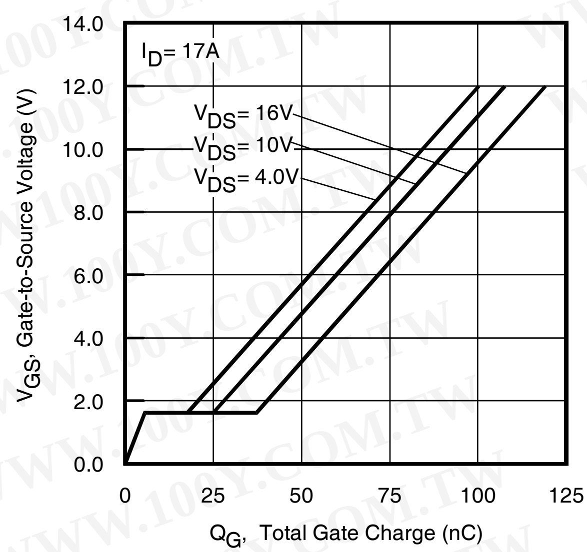


Fig 6. Typical Gate Charge vs.Gate-to-Source Voltage

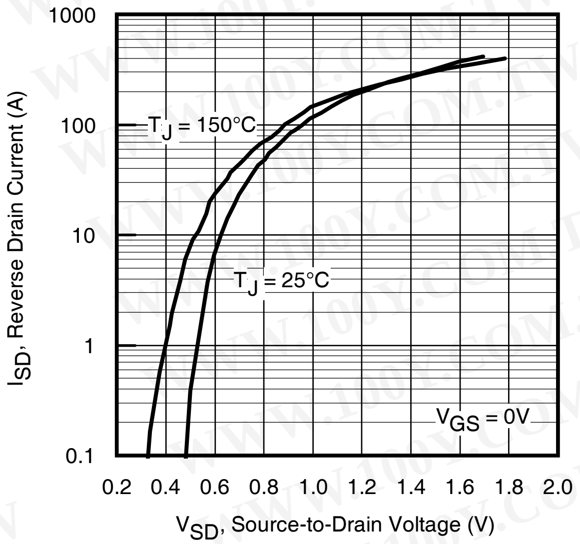


Fig 7. Typical Source-Drain Diode Forward Voltage

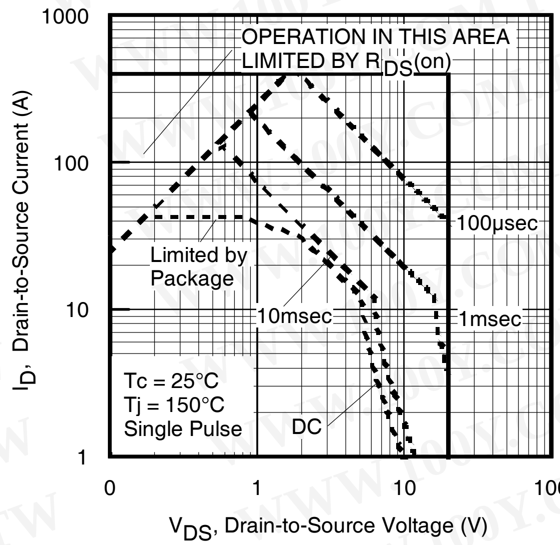


Fig 8. Maximum Safe Operating Area

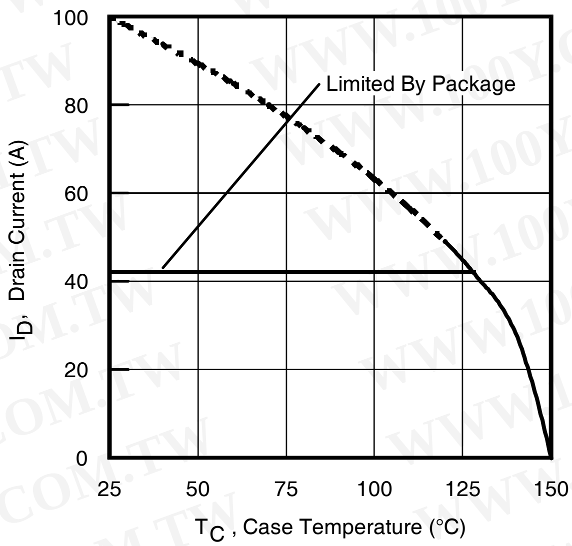


Fig 9. Maximum Drain Current vs.
Case (Bottom) Temperature

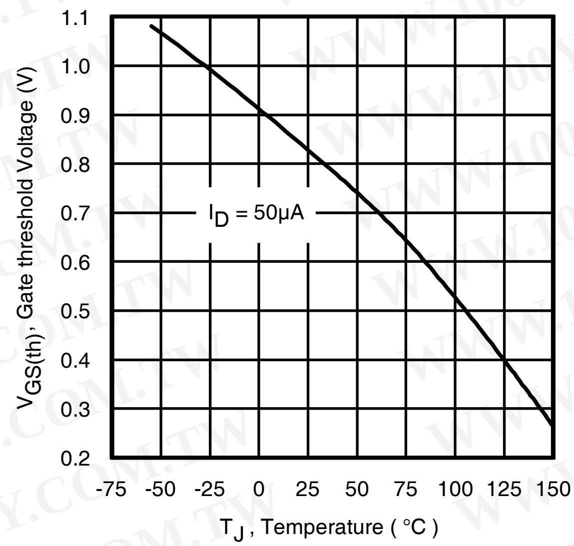


Fig 10. Threshold Voltage vs. Temperature

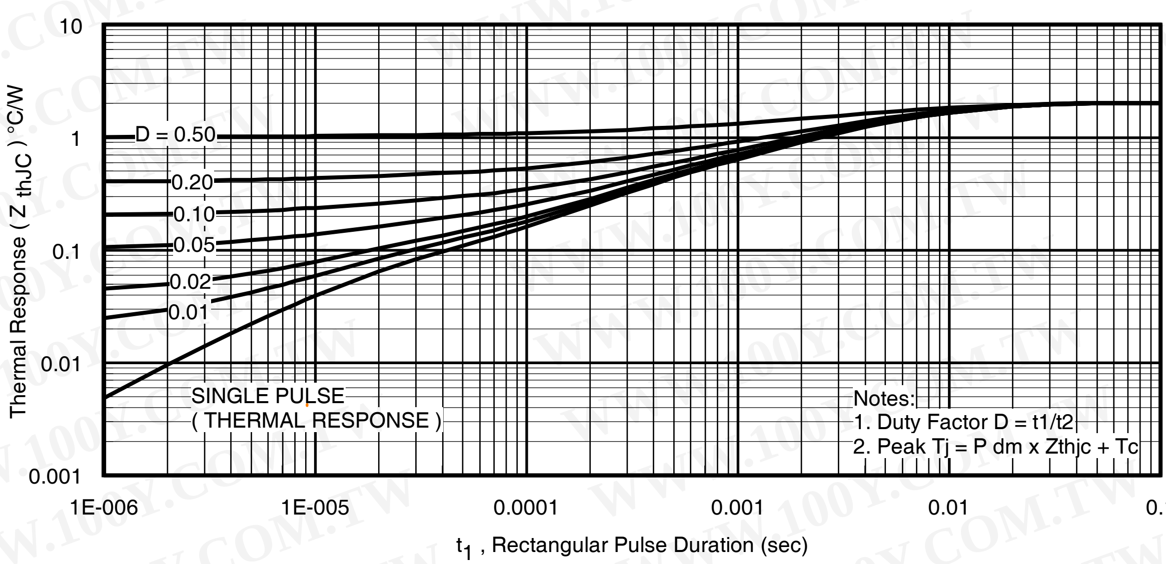


Fig 11. Maximum Effective Transient Thermal Impedance, Junction-to-Case (Bottom)

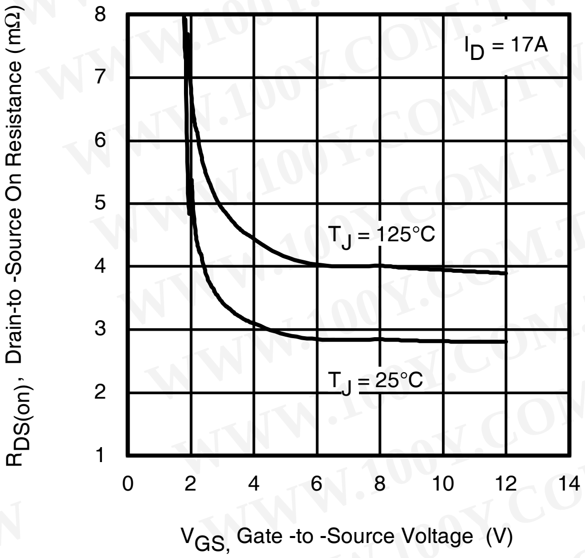


Fig 12. On-Resistance vs. Gate Voltage

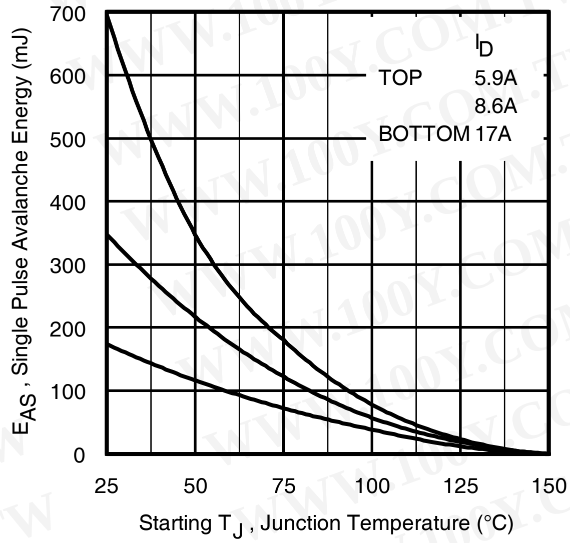


Fig 13. Maximum Avalanche Energy vs. Drain Current

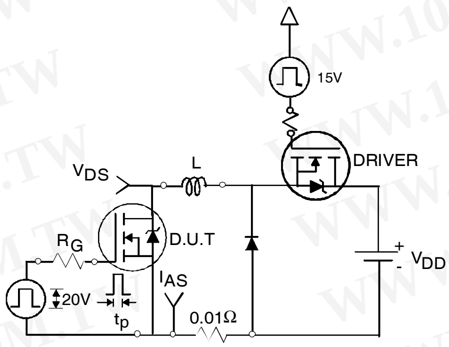


Fig 14a. Unclamped Inductive Test Circuit

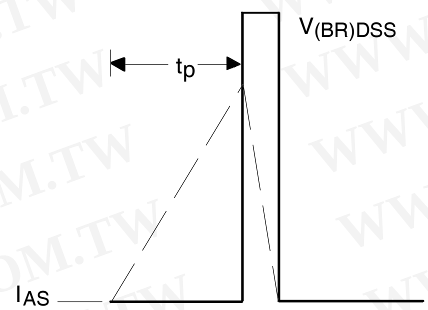


Fig 14b. Unclamped Inductive Waveforms

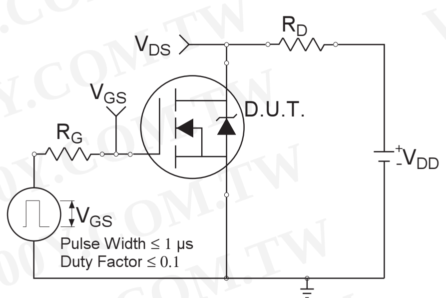


Fig 15a. Switching Time Test Circuit

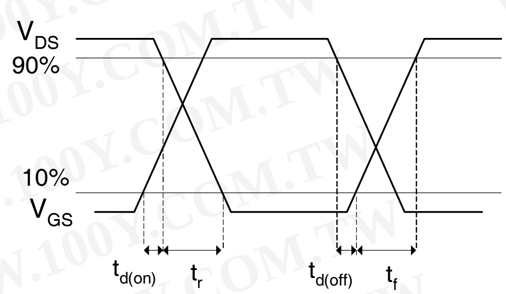


Fig 15b. Switching Time Waveforms

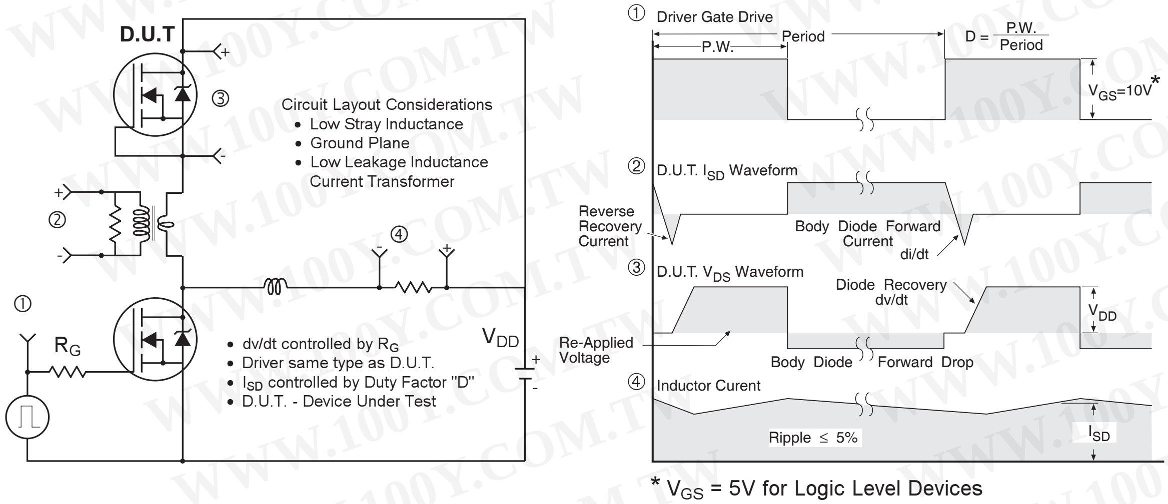


Fig 16. Peak Diode Recovery dv/dt Test Circuit for N-Channel HEXFET® Power MOSFETs

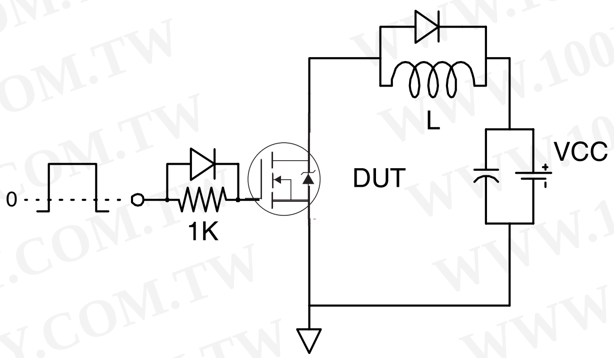


Fig 17. Gate Charge Test Circuit

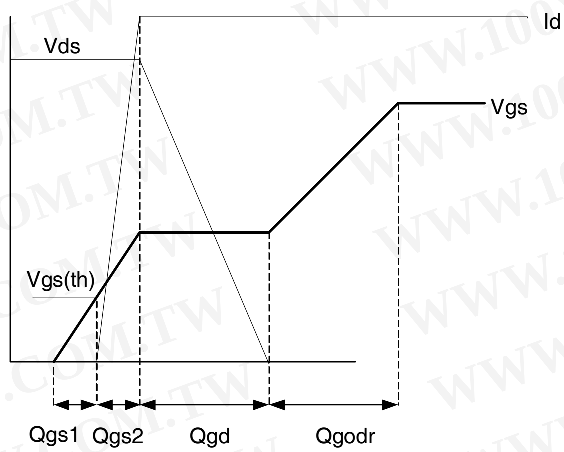
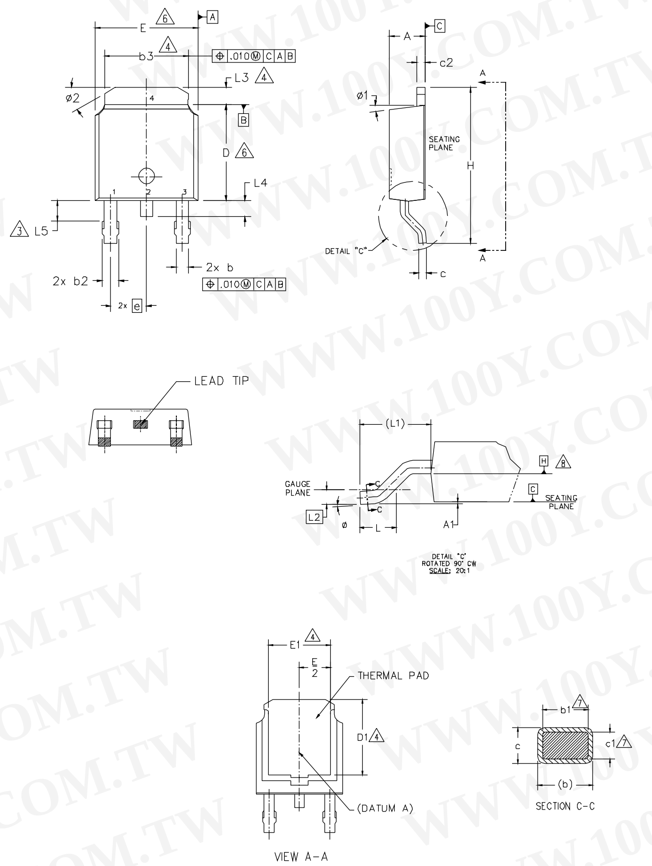


Fig 18. Gate Charge Waveform

D-Pak (TO-252AA) Package Outline

Dimensions are shown in millimeters (inches)



NOTES:

1.– DIMENSIONING AND TOLERANCING PER ASME Y14.5M–1994

2.– DIMENSION ARE SHOWN IN INCHES [MILLIMETERS].

3.– LEAD DIMENSION UNCONTROLLED IN L5.

4.– DIMENSION D1, E1, L3 & b3 ESTABLISH A MINIMUM MOUNTING SURFACE FOR THERMAL PAD.

5.– SECTION C–C DIMENSIONS APPLY TO THE FLAT SECTION OF THE LEAD BETWEEN .005 AND 0.10 [0.13 AND 0.25] FROM THE LEAD TIP.

6.– DIMENSION D & E DO NOT INCLUDE MOLD FLASH. MOLD FLASH SHALL NOT EXCEED .005 [0.13] PER SIDE. THESE DIMENSIONS ARE MEASURED AT THE OUTMOST EXTREMES OF THE PLASTIC BODY.

7.– DIMENSION b1 & c1 APPLIED TO BASE METAL ONLY.

8.– DATUM A & B TO BE DETERMINED AT DATUM PLANE H.

9.– OUTLINE CONFORMS TO JEDEC OUTLINE TO–252AA.

SYMBOL	DIMENSIONS				NOTES
	MILLIMETERS		INCHES		
	MIN.	MAX.	MIN.	MAX.	
A	2.18	2.39	.086	.094	
A1	–	0.13	–	.005	
b	0.64	0.89	.025	.035	
b1	0.65	0.79	.025	.031	7
b2	0.76	1.14	.030	.045	
b3	4.95	5.46	.195	.215	4
c	0.46	0.61	.018	.024	
c1	0.41	0.56	.016	.022	7
c2	0.46	0.89	.018	.035	
D	5.97	6.22	.235	.245	6
D1	5.21	–	.205	–	4
E	6.35	6.73	.250	.265	6
E1	4.32	–	.170	–	4
e	2.29 BSC		.090 BSC		
H	9.40	10.41	.370	.410	
L	1.40	1.78	.055	.070	
L1	2.74 BSC		.108 REF.		
L2	0.51 BSC		.020 BSC		
L3	0.89	1.27	.035	.050	4
L4	–	1.02	–	.040	
L5	1.14	1.52	.045	.060	3
ø	0°	10°	0°	10°	
ø1	0°	15°	0°	15°	
ø2	25°	35°	25°	35°	

LEAD ASSIGNMENTS

HEXFET

1.– GATE
2.– DRAIN
3.– SOURCE
4.– DRAIN

IGBT & CoPAK

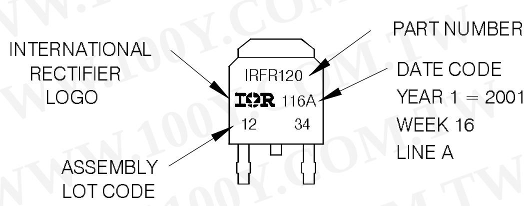
1.– GATE
2.– COLLECTOR
3.– EMITTER
4.– COLLECTOR

D-Pak (TO-252AA) Part Marking Information

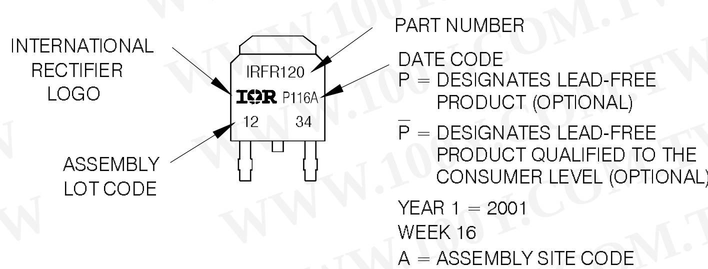
EXAMPLE: THIS IS AN IRFR120
WITH ASSEMBLY
LOT CODE 1234
ASSEMBLED ON WW 16, 2001
IN THE ASSEMBLY LINE "A"

Note: "P" in assembly line position indicates "Lead-Free"

"P̄" in assembly line position indicates "Lead-Free" qualification to the consumer-level



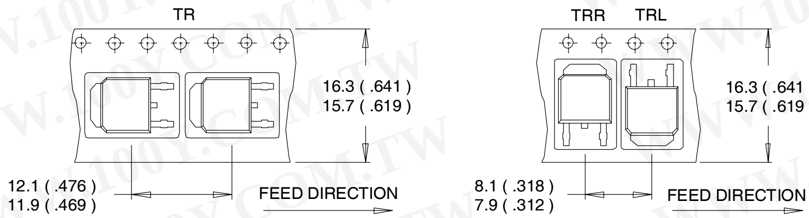
OR



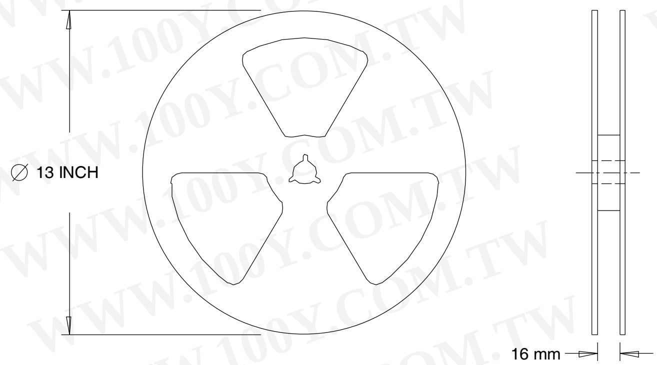
Note: For the most current drawing please refer to IR website at http://www.irf.com/package/

D-Pak (TO-252AA) Tape & Reel Information

Dimensions are shown in millimeters (inches)



NOTES :
1. CONTROLLING DIMENSION : MILLIMETER.
2. ALL DIMENSIONS ARE SHOWN IN MILLIMETERS (INCHES).
3. OUTLINE CONFORMS TO EIA-481 & EIA-541.



NOTES :
1. OUTLINE CONFORMS TO EIA-481.

Qualification information†

Qualification level	Industrial†† (per JEDEC JESD47F ††† guidelines)	
Moisture Sensitivity Level	D-PAK	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

†† Higher qualification ratings may be available should the user have such requirements. Please contact your International Rectifier sales representative for further information: http://www.irf.com/whoto-call/salesrep/

††† Applicable version of JEDEC standard at the time of product release.

Notes:

① Repetitive rating; pulse width limited by max. junction temperature.

② Starting T_J = 25°C, L = 1.2mH, R_G = 50Ω, I_{AS} = 17A.

③ Pulse width ≤ 400μs; duty cycle ≤ 2%.

④ R_θ is measured at T_J of approximately 90°C.

⑤ When mounted on 1 inch square 2 oz copper pad on 1.5x1.5 in. board of FR-4 material.

⑥ Calculated continouous current based on maximum allowable junction temperature. Package is limited to 42A by production test capability.

Data and specifications subject to change without notice.

International
IOR Rectifier
IR WORLD HEADQUARTERS: 233 Kansas St., El Segundo, California 90245, USA Tel: (310) 252-7105
TAC Fax: (310) 252-7903
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