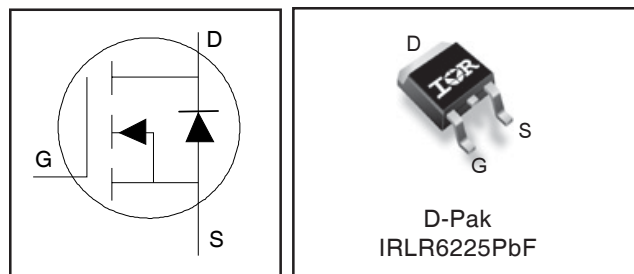


IRLR6225PbF

HEXFET® Power MOSFET

V_{DS}	20	V
$R_{DS(on) \max}$ (@ $V_{GS} = 4.5V$)	4.0	m Ω
$R_{DS(on) \max}$ (@ $V_{GS} = 2.5V$)	5.2	m Ω
Q_g (typical)	48	nC
R_G (typical)	2.2	Ω
I_D	42 ^⑥	A



G	D	S
Gate	Drain	Source

Applications

- Battery Protection Switch

Features and Benefits

Features

Industry-Standard Pinout
Compatible with Existing Surface Mount Techniques
RoHS Compliant Containing no Lead, no Bromide and no Halogen
MSL1, Industrial Qualification

results in
⇒

Benefits

Multi-Vendor Compatibility
Easier Manufacturing
Environmentally Friendlier
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 @ $T_C = 25^\circ C$	Continuous Drain Current, V_{GS} @ 10V	100 ^⑥	A
I_D @ $T_C = 100^\circ C$	Continuous Drain Current, V_{GS} @ 10V	63 ^⑥	
I_{DM}	Pulsed Drain Current ^①	400	
P_D @ $T_C = 25^\circ C$	Power Dissipation ^⑤	63	W
P_D @ $T_C = 100^\circ C$	Power Dissipation ^⑤	25	
	Linear Derating Factor ^⑤	0.5	
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 @ $T_J = 25^\circ\text{C}$ (unless otherwise specified)

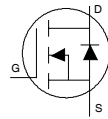
	Parameter	Min.	Typ.	Max.	Units	Conditions
BV_{DSS}	Drain-to-Source Breakdown Voltage	20	—	—	V	$V_{GS} = 0V, I_D = 250\mu A$
$\Delta BV_{DSS}/\Delta T_J$	Breakdown Voltage Temp. Coefficient	—	6.6	—	mV/ $^\circ\text{C}$	Reference to 25°C , $I_D = 1mA$
$R_{DS(on)}$	Static Drain-to-Source On-Resistance	—	3.2	4.0	m Ω	$V_{GS} = 4.5V, I_D = 21A$ 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	$V_{DS} = V_{GS}, I_D = 50\mu A$
$\Delta V_{GS(th)}$	Gate Threshold Voltage Coefficient	—	-4.0	—	mV/ $^\circ\text{C}$	
I_{DSS}	Drain-to-Source Leakage Current	—	—	1.0	μA	$V_{DS} = 16V, V_{GS} = 0V$
		—	—	150		$V_{DS} = 16V, V_{GS} = 0V, T_J = 125^\circ\text{C}$
I_{GSS}	Gate-to-Source Forward Leakage	—	—	100	nA	$V_{GS} = 12V$
	Gate-to-Source Reverse Leakage	—	—	-100		$V_{GS} = -12V$
g_{fs}	Forward Transconductance	205	—	—	S	$V_{DS} = 10V, I_D = 21A$
Q_g	Total Gate Charge	—	48	72	nC	$V_{DS} = 10V$ $V_{GS} = 4.5V$ $I_D = 17A$ See Fig.17 & 18
Q_{gs1}	Pre-Vth Gate-to-Source Charge	—	2.6	—		
Q_{gs2}	Post-Vth Gate-to-Source Charge	—	3.6	—		
Q_{gd}	Gate-to-Drain Charge	—	19	—		
Q_{godr}	Gate Charge Overdrive	—	23	—		
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	$V_{DD} = 10V, V_{GS} = 4.5V$ $I_D = 17A$ $R_G = 1.8\Omega$ See Fig.15
t_r	Rise Time	—	37	—		
$t_{d(off)}$	Turn-Off Delay Time	—	63	—		
t_f	Fall Time	—	52	—		
C_{iss}	Input Capacitance	—	3770	—	pF	$V_{GS} = 0V$
C_{oss}	Output Capacitance	—	915	—		$V_{DS} = 10V$
C_{rss}	Reverse Transfer Capacitance	—	650	—		$f = 1.0MHz$

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	$T_J = 25^\circ\text{C}, I_S = 17A, V_{GS} = 0V$ ③
t_{rr}	Reverse Recovery Time	—	35	53	ns	$T_J = 25^\circ\text{C}, I_F = 17A, V_{DD} = 10V$
Q_{rr}	Reverse Recovery Charge	—	57	86	nC	$di/dt = 200A/\mu s$ 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	$^\circ\text{C/W}$
$R_{\theta JA}$	Junction-to-Ambient (PCB Mount) ⑤	—	50	
$R_{\theta JA}$	Junction-to-Ambient ⑤	—	110	

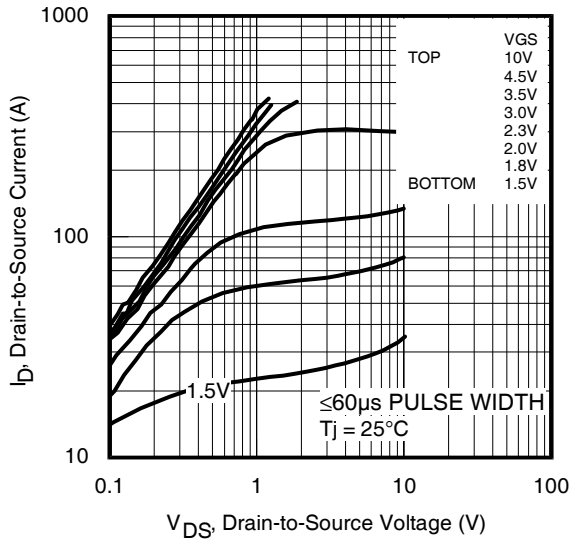


Fig 1. Typical Output Characteristics

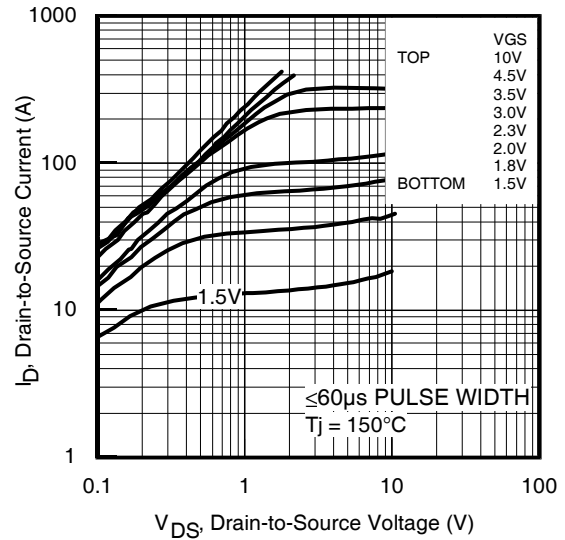


Fig 2. Typical Output Characteristics

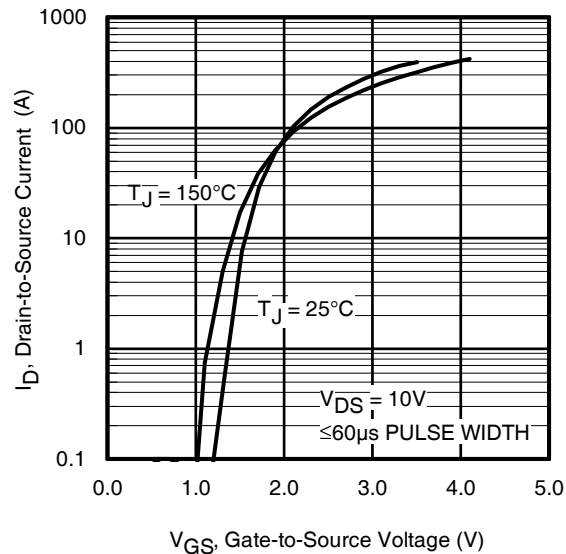


Fig 3. Typical Transfer Characteristics

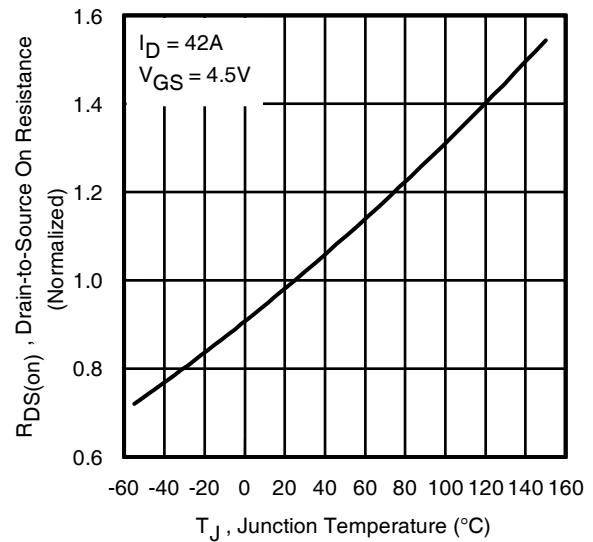


Fig 4. Normalized On-Resistance vs. Temperature

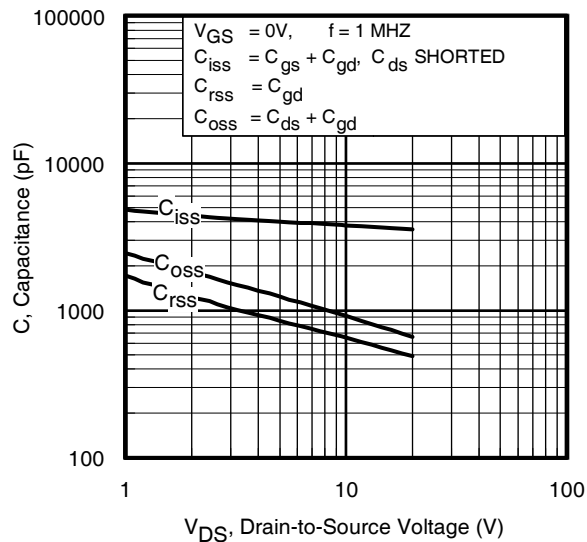


Fig 5. Typical Capacitance vs. Drain-to-Source Voltage
www.irf.com

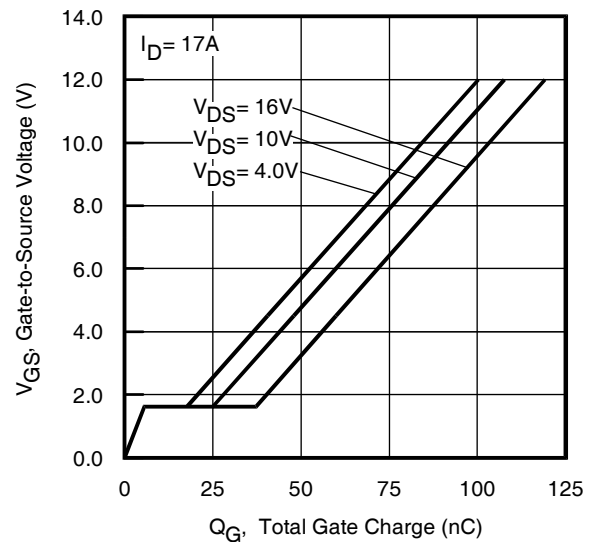


Fig 6. Typical Gate Charge vs. Gate-to-Source Voltage

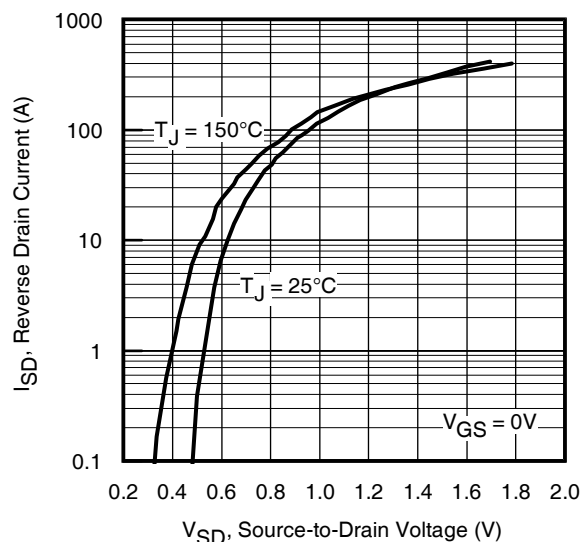


Fig 7. Typical Source-Drain Diode Forward Voltage

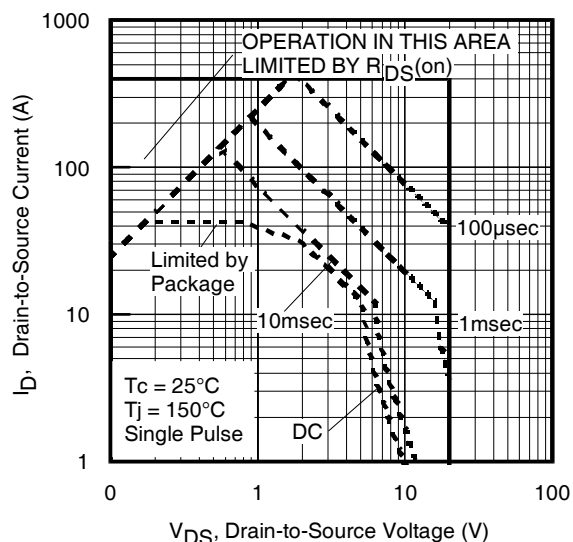


Fig 8. Maximum Safe Operating Area

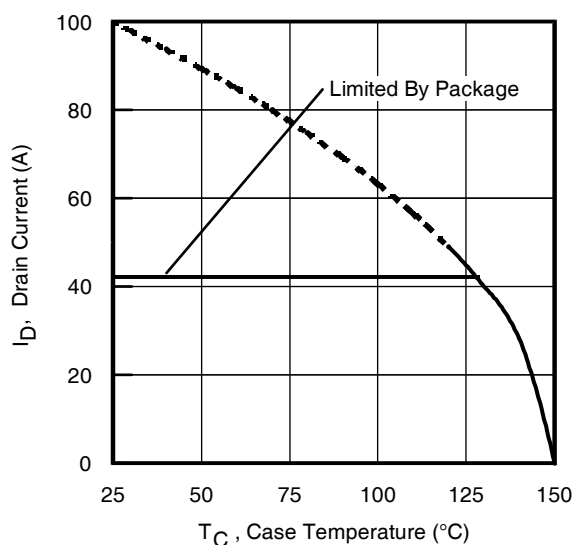


Fig 9. Maximum Drain Current vs. Case (Bottom) Temperature

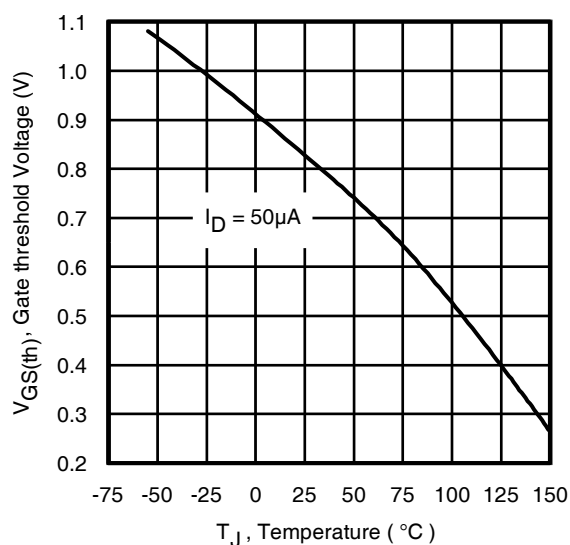


Fig 10. Threshold Voltage vs. Temperature

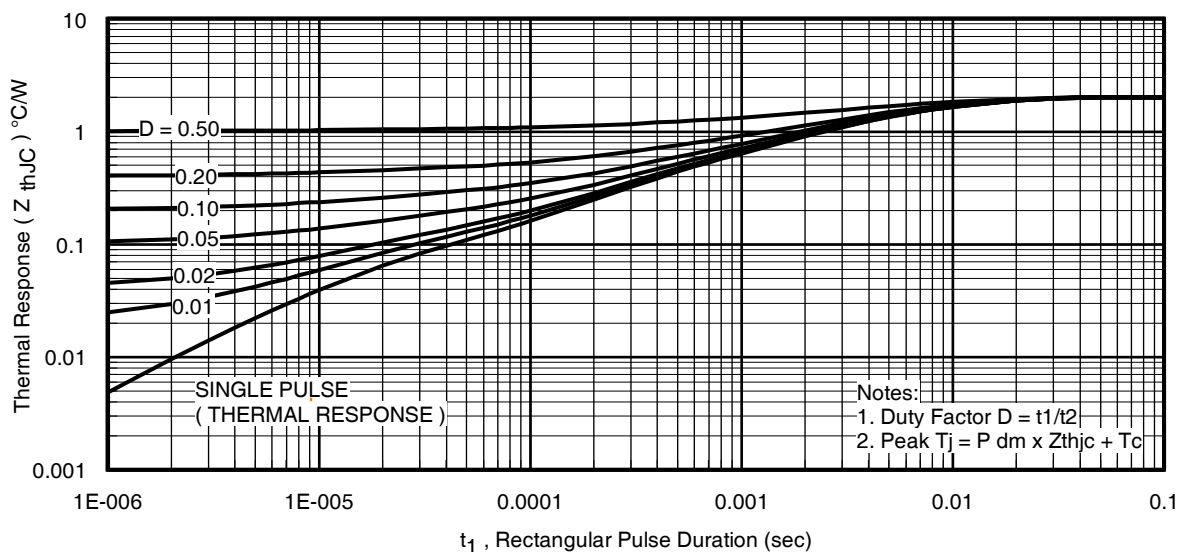


Fig 11. Maximum Effective Transient Thermal Impedance, Junction-to-Case (Bottom)

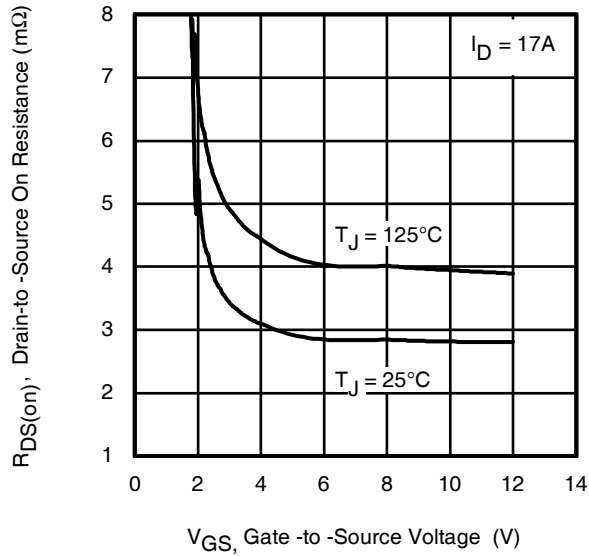


Fig 12. On-Resistance vs. Gate Voltage

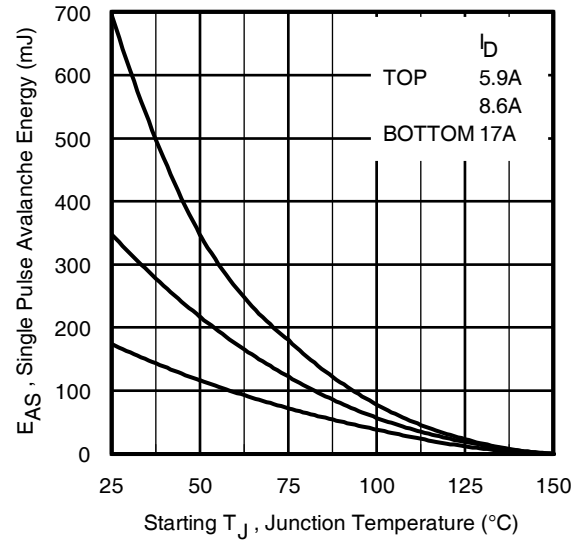


Fig 13. Maximum Avalanche Energy vs. Drain Current

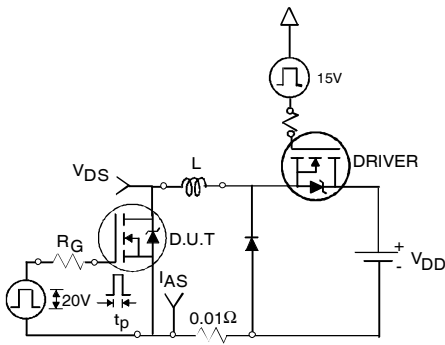


Fig 14a. Unclamped Inductive Test Circuit

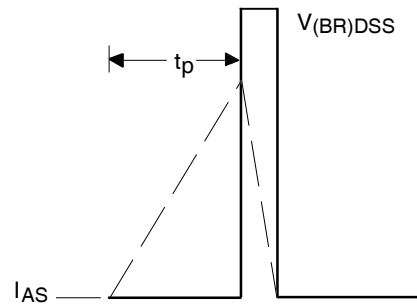


Fig 14b. Unclamped Inductive Waveforms

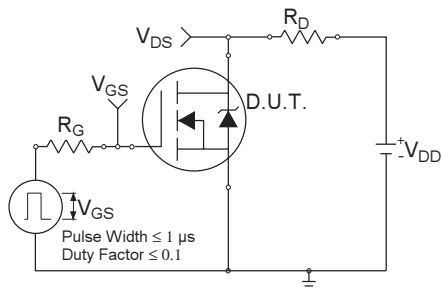


Fig 15a. Switching Time Test Circuit

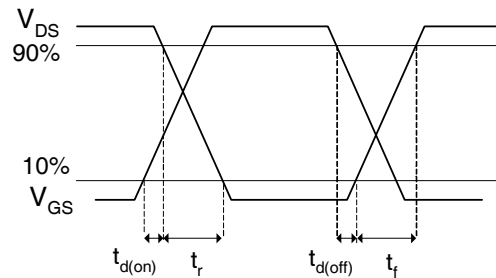


Fig 15b. Switching Time Waveforms

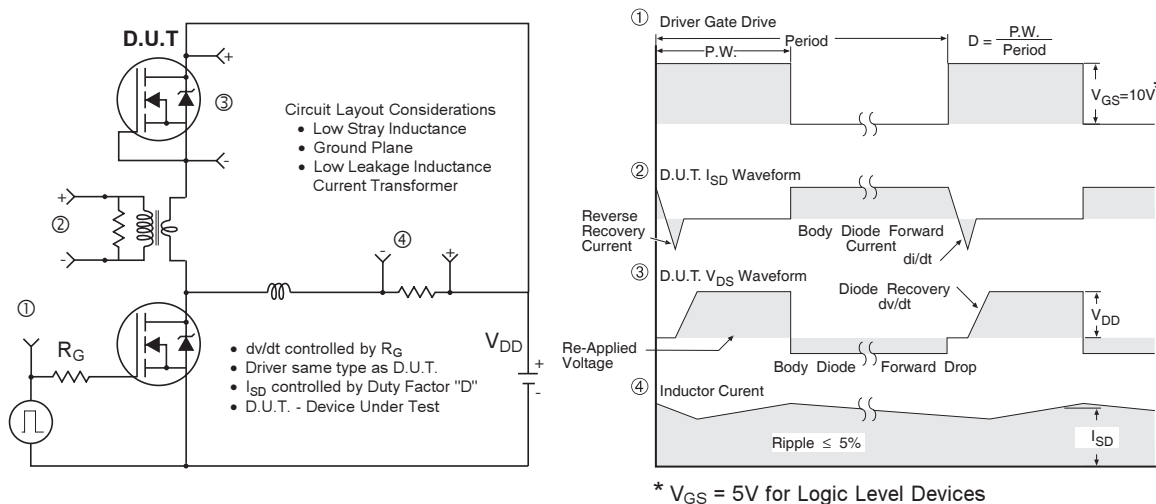


Fig 16. Peak Diode Recovery dv/dt Test Circuit for N-Channel HEXFET® Power MOSFETs

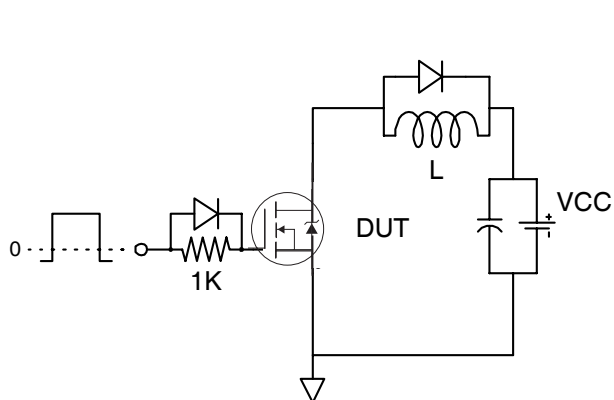


Fig 17. Gate Charge Test Circuit

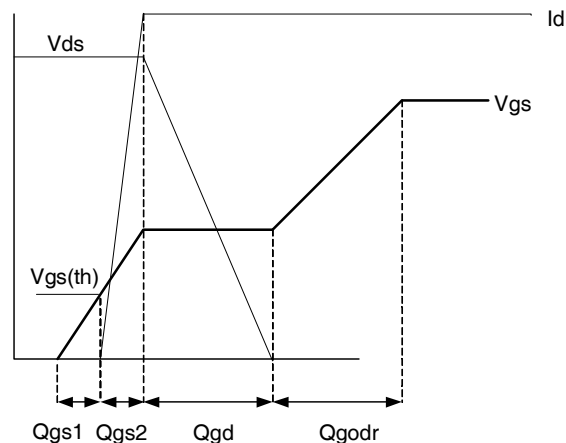
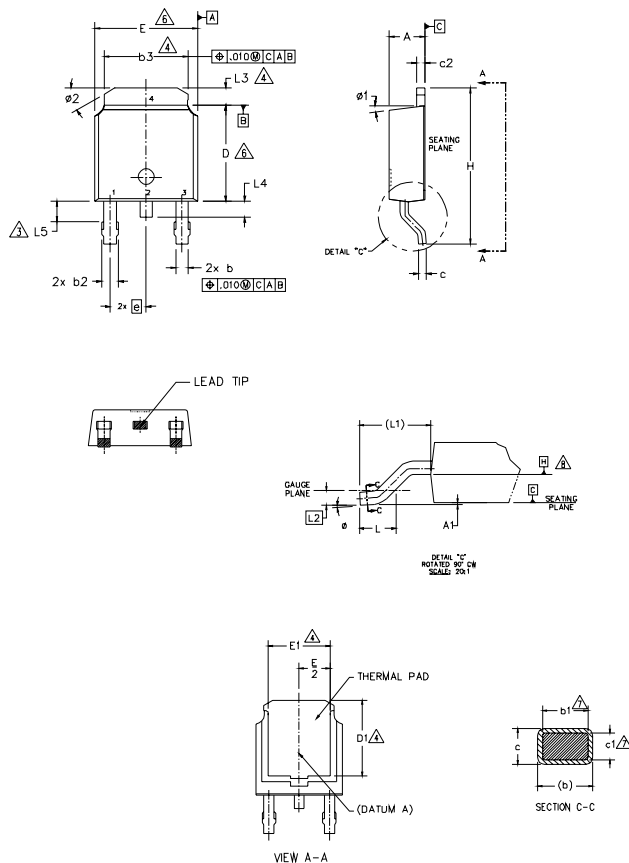


Fig 18. Gate Charge Waveform

D-Pak (TO-252AA) Package Outline

Dimensions are shown in millimeters (inches)



NOTES:

- 1.- DIMENSIONING AND TOLERANCING PER ASME Y14.5M-1994
- 2.- DIMENSIONS 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

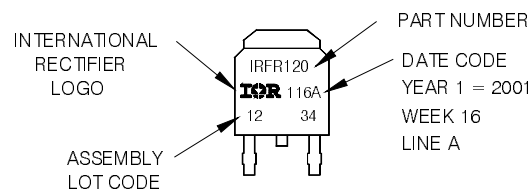
- 1.- GATE
- 2.- COLLECTOR
- 3.- EMITTER
- 4.- COLLECTOR

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

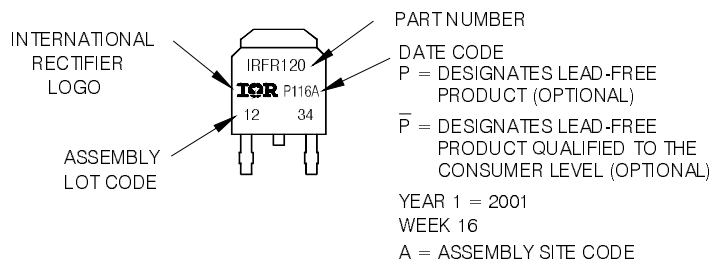
EXAMPLE: THIS IS AN IRFR120
WITH ASSEMBLY
LOT CODE 1234
ASSEMBLED ON WW 16, 2001
IN THE ASSEMBLY LINE "A"

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

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



OR

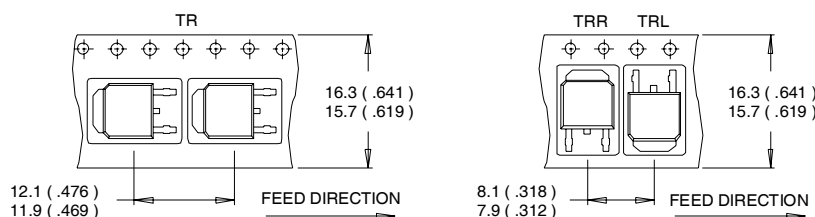


Note: For the most current drawing please refer to IR website at <http://www.irf.com/package/>

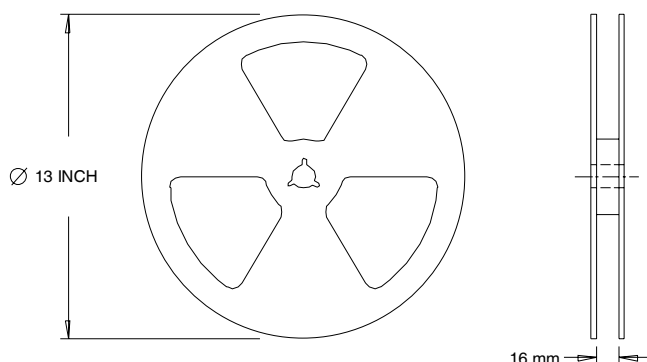
IRLR6225PbF

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 $T_J = 25^\circ\text{C}$, $L = 1.2\text{mH}$, $R_G = 50\Omega$, $I_{AS} = 17\text{A}$.
- ③ Pulse width $\leq 400\mu\text{s}$; duty cycle $\leq 2\%$.
- 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 continuous current based on maximum allowable junction temperature. Package is limited to 42A by production test capability.

Data and specifications subject to change without notice.

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