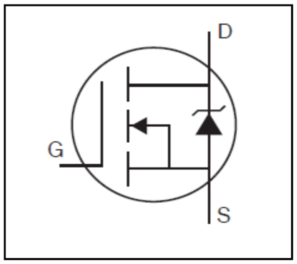
IRFI4227PbF

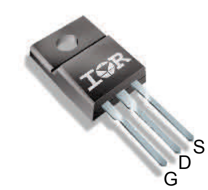
HEXFET® Power MOSFET

Features

- Advanced Process Technology
- Key Parameters Optimized for PDP Sustain, Energy Recovery and Pass Switch Applications
- Low E_{PULSE} Rating to Reduce Power Dissipation in PDP Sustain, Energy Recovery and Pass Switch Applications
- Low Q_G for Fast Response
- High Repetitive Peak Current Capability for Reliable Operation
- Short Fall & Rise Times for Fast Switching
- 150°C Operating Junction Temperature for Improved Ruggedness
- Repetitive Avalanche Capability for Robustness and Reliability

Key Parameters		
V_{DS} max	200	V
$V_{DS\ (Avalanche)}$ typ.	240	V
$R_{DS(ON)}$ typ. @ 10V	21	mΩ
I_{RP} max @ T_C= 100°C	47	A
T_J max	150	°C





TO-220 Full-Pak

G	D	S
Gate	Drain	Source

Description

This HEXFET® Power MOSFET is specifically designed for Sustain; Energy Recovery & Pass switch applications in Plasma Display Panels. This MOSFET utilizes the latest processing techniques to achieve low on-resistance per silicon area and low EPULSE rating. Additional features of this MOSFET are 150°C operating junction temperature and high repetitive peak current capability. These features combine to make this MOSFET a highly efficient, robust and reliable device for PDP driving applications

Base Part Number	Package Type	Standard Pack		Orderable Part Number
		Form	Quantity	
IRFI4227PbF	TO-220 Full-Pak	Tube	50	IRFI4227PbF

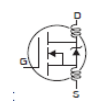
Absolute Maximum Ratings

Symbol	Parameter	Max.	Units
V_{GS}	Gate-to-Source Voltage	± 30	V
I_D @ T_C = 25°C	Continuous Drain Current, V_{GS} @ 10V	26	A
I_D @ T_C = 100°C	Continuous Drain Current, V_{GS} @ 10V	17	
I_{DM}	Pulsed Drain Current ①	100	
I_{RP} @ T_C = 100°C	Repetitive Peak Current ⑤	47	
P_D @T_C = 25°C	Maximum Power Dissipation	46	W
P_D @T_C = 100°C	Maximum Power Dissipation	18	
	Linear Derating Factor	0.37	W/°C
T_J T_{STG}	Operating Junction and Storage Temperature Range	-40 to + 150	°C
	Soldering Temperature, for 10 seconds (1.6mm from case)	300	
	Mounting torque, 6-32 or M3 screw	10 lbf•in (1.1N•m)	

Thermal Resistance

Symbol	Parameter	Typ.	Max.	Units
$R_{\theta JC}$	Junction-to-Case ④	——	2.73	°C/W
$R_{\theta JA}$	Junction-to-Ambient	——	65	

Electrical Characteristics @ $T_J = 25°C$ (unless otherwise specified)

	Parameter	Min.	Typ.	Max.	Units	Conditions
$V_{(BR)DSS}$	Drain-to-Source Breakdown Voltage	200	—	—	V	$V_{GS} = 0V$, $I_D = 250\mu A$
$\Delta V_{(BR)DSS}/\Delta T_J$	Breakdown Voltage Temp. Coefficient	—	240	—	mV/°C	Reference to 25°C, $I_D = 1mA$
$R_{DS(on)}$	Static Drain-to-Source On-Resistance	—	21	25	mΩ	$V_{GS} = 10V$, $I_D = 17A$
$V_{GS(th)}$	Gate Threshold Voltage	3.0	—	5.0	V	$V_{DS} = V_{GS}$, $I_D = 250\mu A$
$\Delta V_{GS(th)}/\Delta T_J$	Gate Threshold Voltage Temp. Coefficient	—	-11	—	mV/°C	
I_{DSS}	Drain-to-Source Leakage Current	—	—	20	µA	$V_{DS} = 200V$, $V_{GS} = 0V$
		—	—	1.0	mA	$V_{DS} = 200V$, $V_{GS} = 0V$, $T_J = 150°C$
I_{GSS}	Gate-to-Source Forward Leakage	—	—	100	nA	$V_{GS} = 20V$
	Gate-to-Source Reverse Leakage	—	—	-100		$V_{GS} = -20V$
gfs	Forward Trans conductance	47	—	—	S	$V_{DS} = 25V$, $I_D = 17A$
Q_g	Total Gate Charge	—	73	110	nC	$I_D = 17A$, $V_{DS} = 100V$
Q_{gd}	Gate-to-Drain Charge	—	21	—		$V_{GS} = 10V$
$t_{d(on)}$	Turn-On Delay Time	—	17	—	ns	$V_{DD} = 100V$, $V_{GS} = 10V$
t_r	Rise Time	—	19	—		$I_D = 17A$
$t_{d(off)}$	Turn-Off Delay Time	—	11	—		$R_G = 2.5\Omega$
t_f	Fall Time	—	29	—		See Fig. 22
t_{st}	Shoot Through Blocking Time	100	—	—	ns	$V_{DD} = 160V$, $V_{GS} = 15V$, $R_G = 4.7\Omega$
E_{PULSE}	Energy per Pulse	—	570	—	µJ	$L = 220nH$, $C = 0.4\mu F$, $V_{GS} = 15V$ $V_{DD} = 160V$, $R_G = 4.7\Omega$, $T_J = 25°C$
		—	910	—		$L = 220nH$, $C = 0.4\mu F$, $V_{GS} = 15V$ $V_{DD} = 160V$, $R_G = 4.7\Omega$, $T_J = 100°C$
C_{iss}	Input Capacitance	—	4600	—	pF	$V_{GS} = 0V$
C_{oss}	Output Capacitance	—	460	—		$V_{DS} = 25V$
C_{rss}	Reverse Transfer Capacitance	—	91	—		$f = 1.0MHz$
C_{oss} eff.	Effective Output Capacitance	—	360	—		$V_{GS} = 0V$, $V_{DS} = 20V$ to $160V$
L_D	Internal Drain Inductance	—	4.5	—	nH	Between lead, 6mm (0.25in.) from package and center of die contact 
L_S	Internal Source Inductance	—	7.5	—		

Avalanche Characteristics

	Parameter	Typ.	Max.	Units
E_{AS}	Single Pulse Avalanche Energy ②	—	54	mJ
E_{AR}	Repetitive Avalanche Energy ①	—	4.6	
$V_{DS(Avalanche)}$	Repetitive Avalanche Voltage ①	240	—	V
I_{AS}	Avalanche Current ②	—	16	A

Diode Characteristics

	Parameter	Min.	Typ.	Max.	Units	Conditions
I_S @ $T_C = 25°C$	Continuous Source Current (Body Diode)	—	—	26	A	MOSFET symbol showing the integral reverse p-n junction diode.
I_{SM}	Pulsed Source Current (Body Diode) ①	—	—	100		
V_{SD}	Diode Forward Voltage	—	—	1.3	V	$T_J = 25°C$, $I_S = 17A$, $V_{GS} = 0V$ ③
t_{rr}	Reverse Recovery Time	—	93	140	ns	$T_J = 25°C$, $I_F = 17A$, $V_{DD} = 50V$
Q_{rr}	Reverse Recovery Charge	—	350	520	nC	di/dt = 100A/µs ③

Notes:

① Repetitive rating; pulse width limited by max. junction temperature.
② starting $T_J = 25°C$, $L = 0.44mH$, $R_G = 25\Omega$, $I_{AS} = 16A$.
③ Pulse width $\leq$ 400µs; duty cycle $\leq$ 2%.
④ R_θ is measured at T_J of approximately 90°C.
⑤ Half sine wave with duty cycle = 0.25, ton=1µsec.

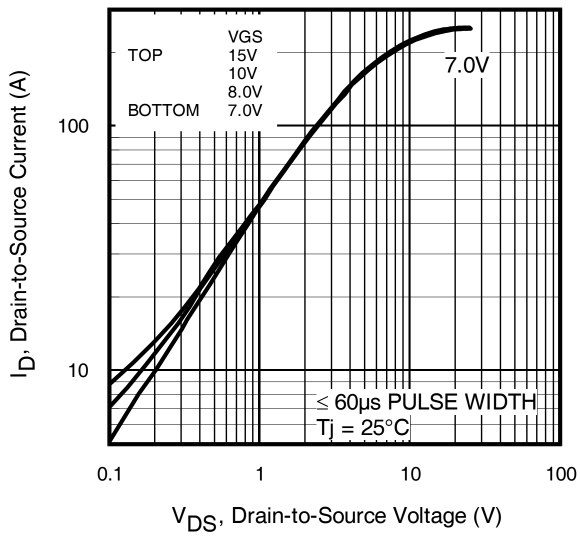


Fig. 1. Typical Output Characteristics

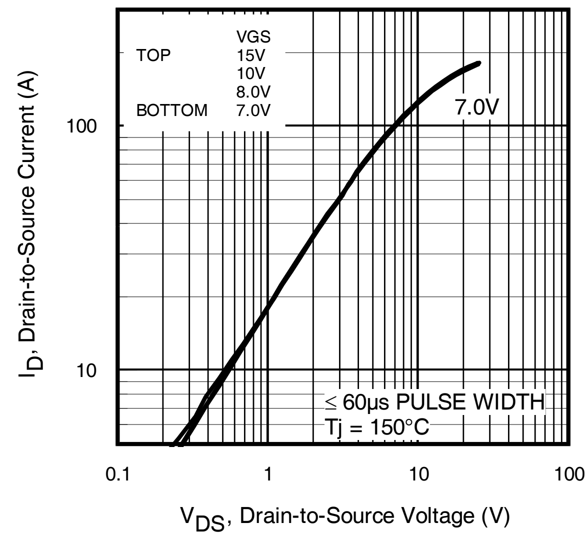


Fig. 2. Typical Output Characteristics

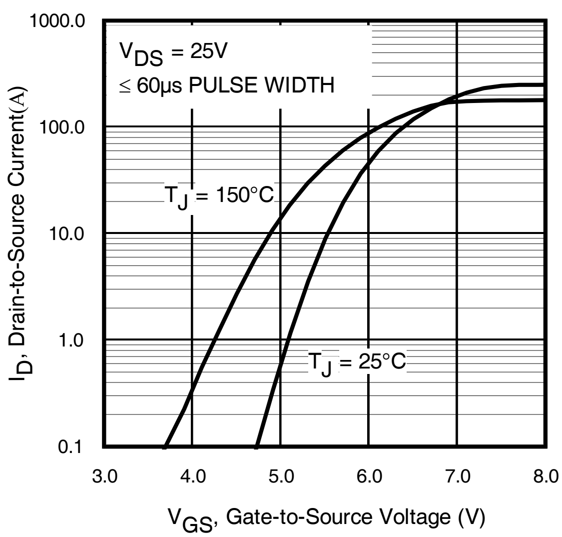


Fig. 3. Typical Transfer Characteristics

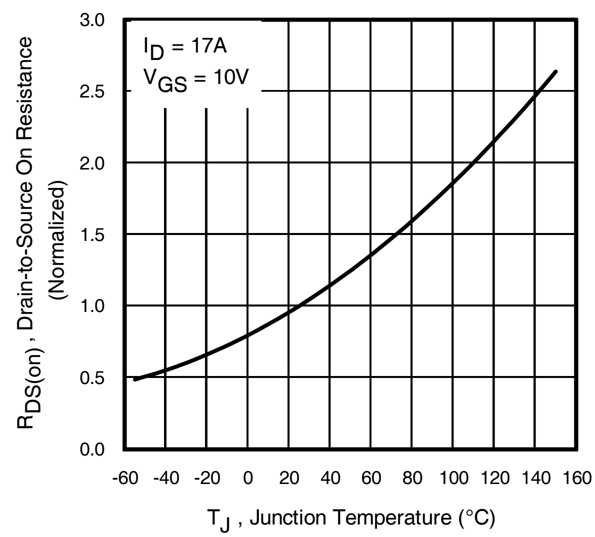


Fig. 4. Normalized On-Resistance vs. Temperature

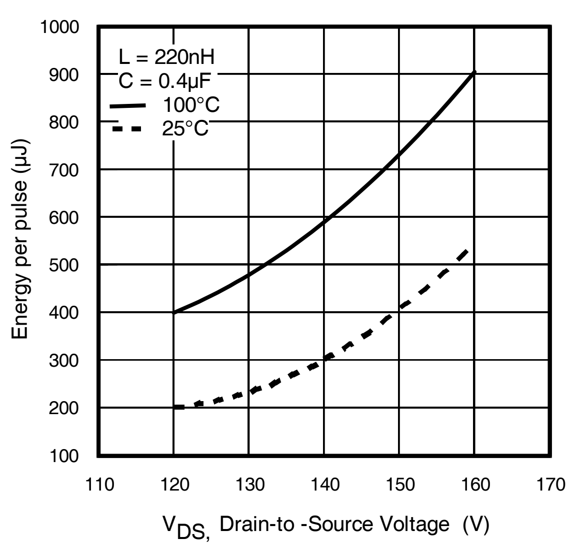


Fig 5. Typical E_{PULSE} vs. Drain-to-Source Voltage

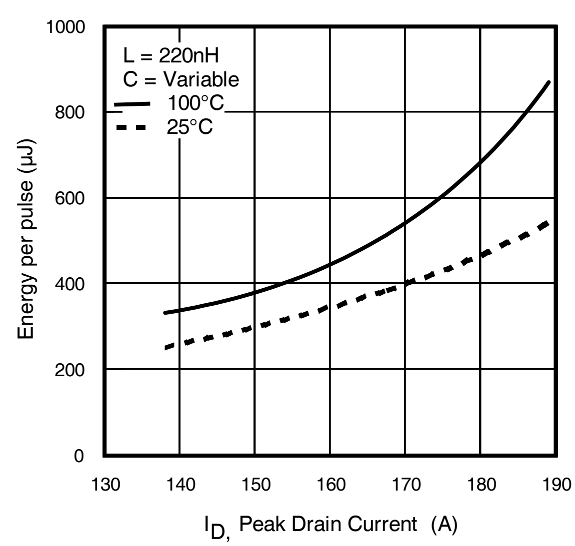


Fig 6. Typical E_{PULSE} vs. Drain Current

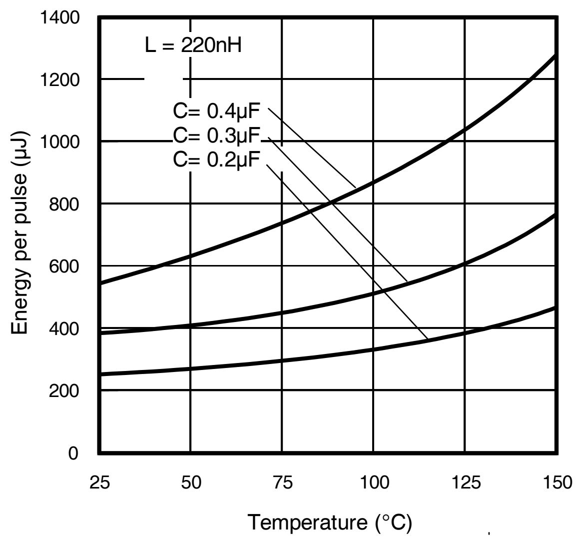


Fig. 7. Typical E_{PULSE} vs. Temperature

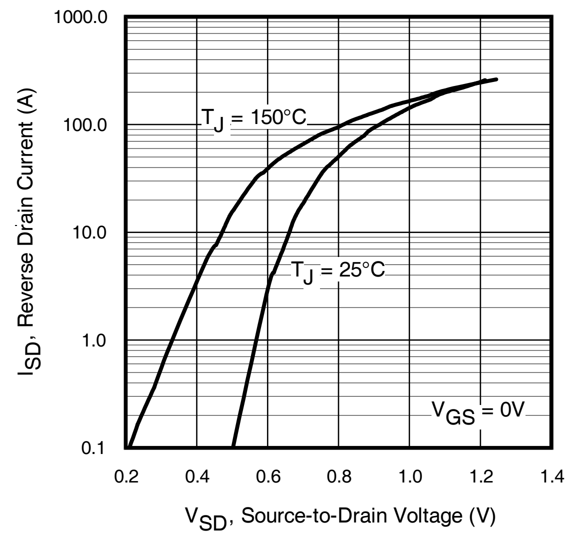


Fig 8. Typical Source-Drain Diode Forward Voltage

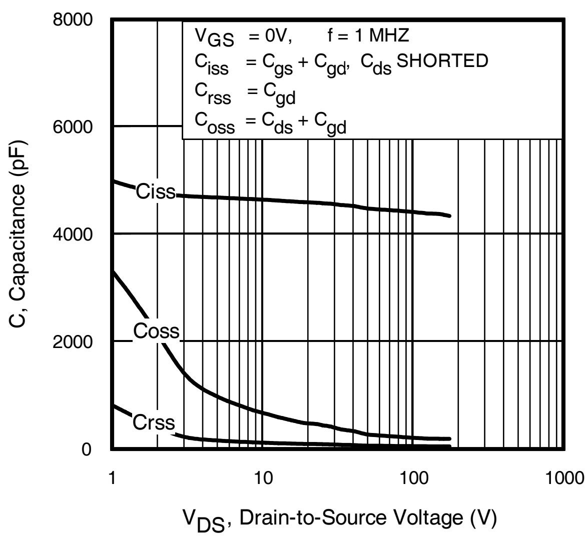


Fig 9. Typical Capacitance vs.Drain-to-Source Voltage

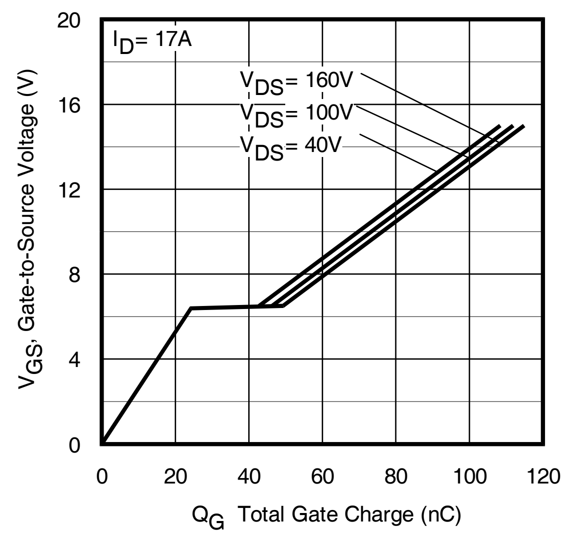


Fig 10. Typical Gate Charge vs. Gate-to-Source Voltage

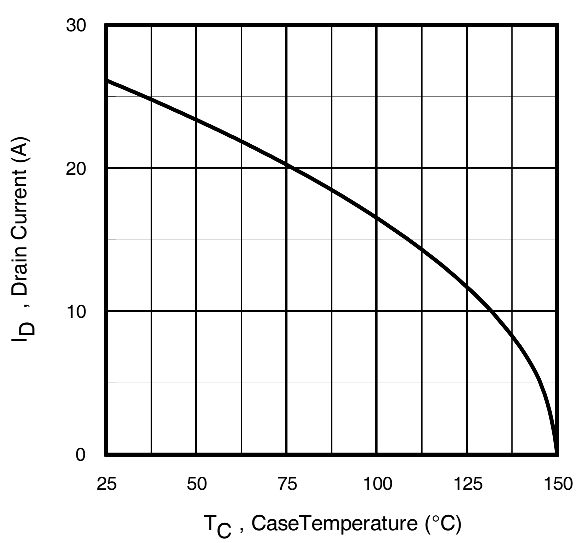


Fig 11. Maximum Drain Current vs. Case Temperature

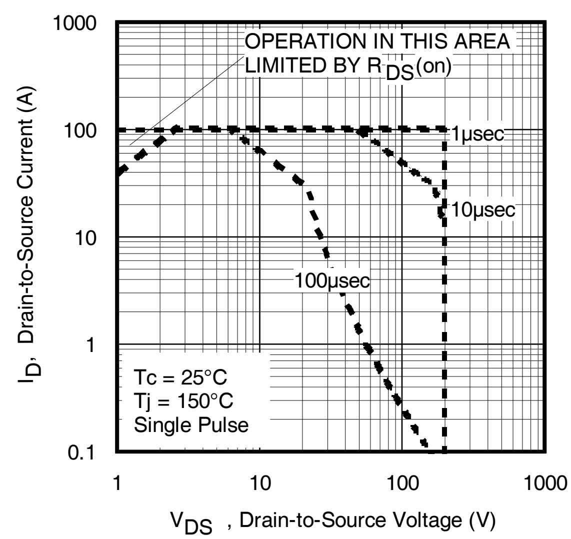


Fig 12. Maximum Safe Operating Area

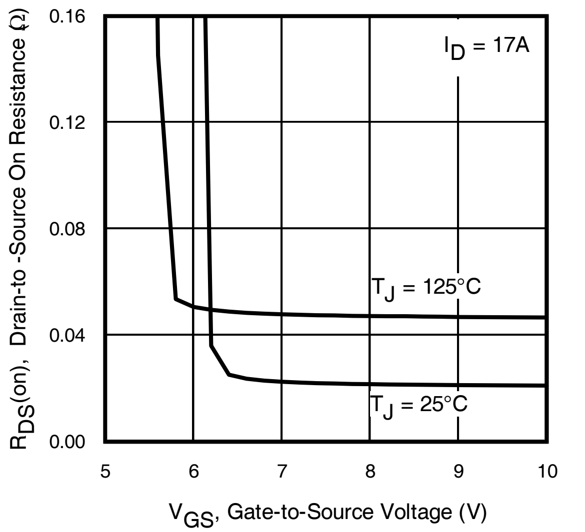


Fig. 13. On-Resistance Vs. Gate Voltage

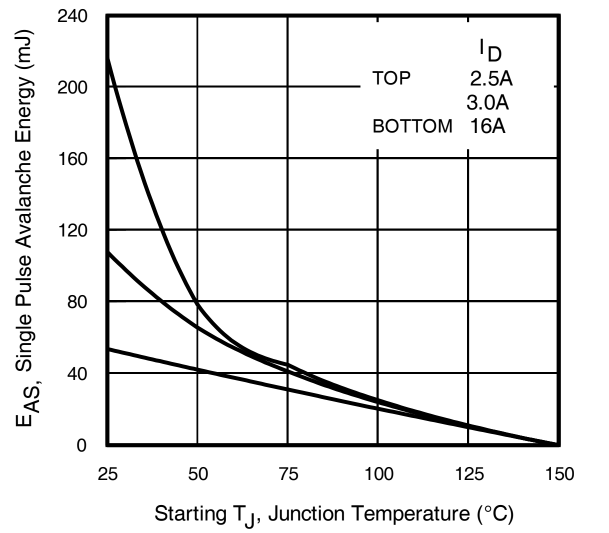


Fig. 14. Maximum Avalanche Energy Vs. Temperature

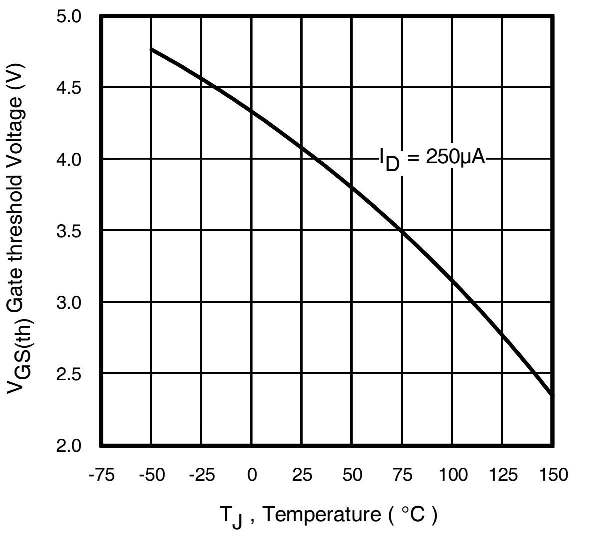


Fig. 15. Threshold Voltage vs. Temperature

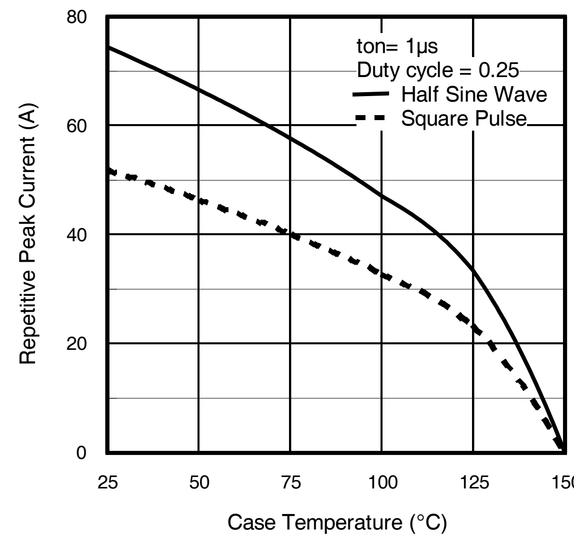
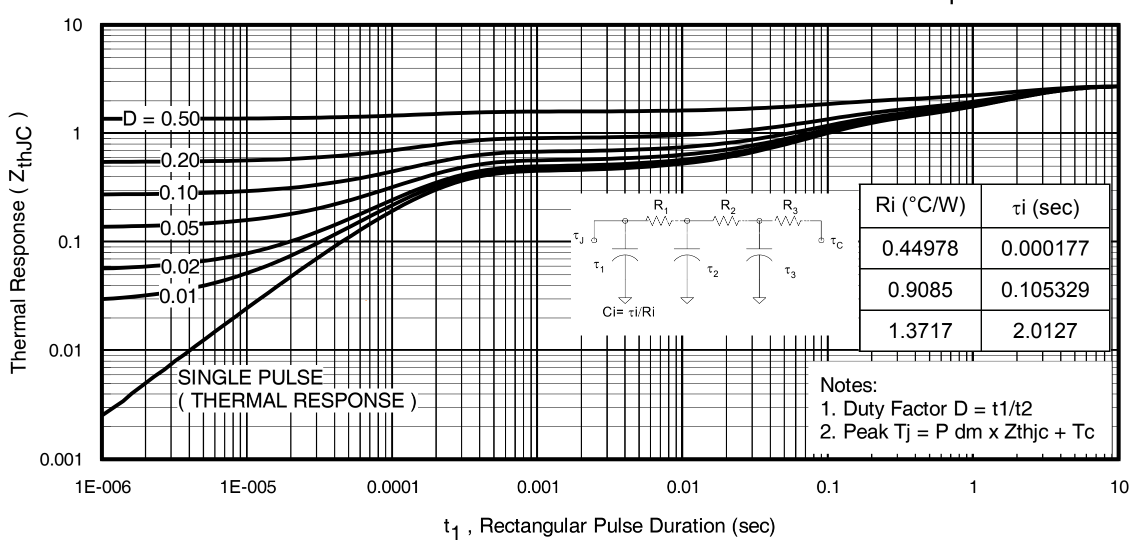


Fig. 16. Typical Repetitive peak Current vs. Case temperature



Ri (°C/W)	τi (sec)
0.44978	0.000177
0.9085	0.105329
1.3717	2.0127

Fig 17. Maximum Effective Transient Thermal Impedance, Junction-to-Case

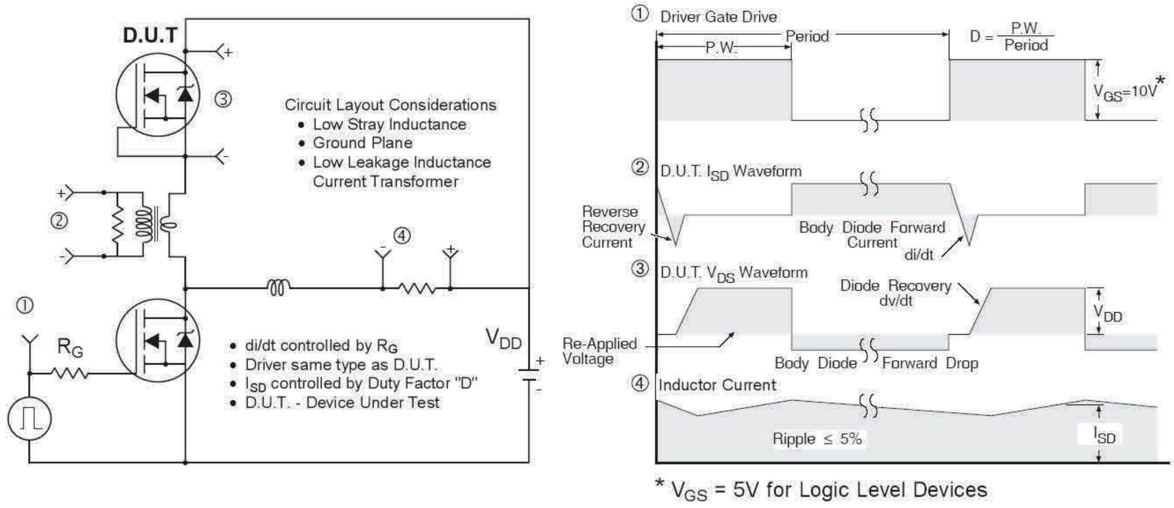


Fig 18. Diode Reverse Recovery Test Circuit for N-Channel HEXFET® Power MOSFETs

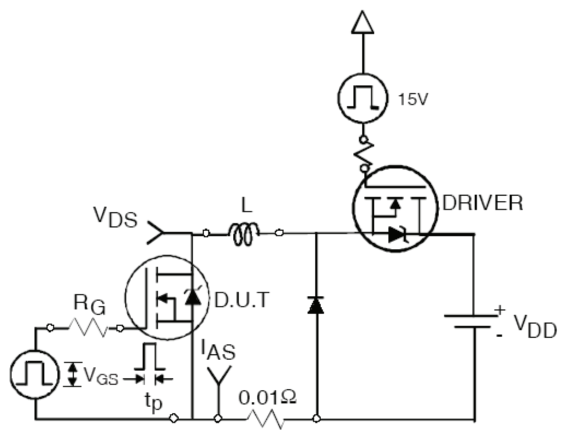


Fig 19a. Unclamped Inductive Test Circuit

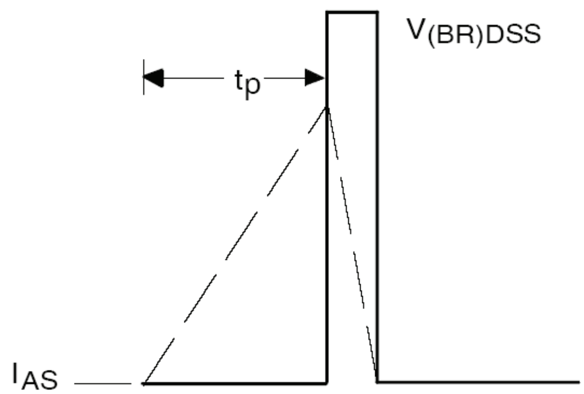
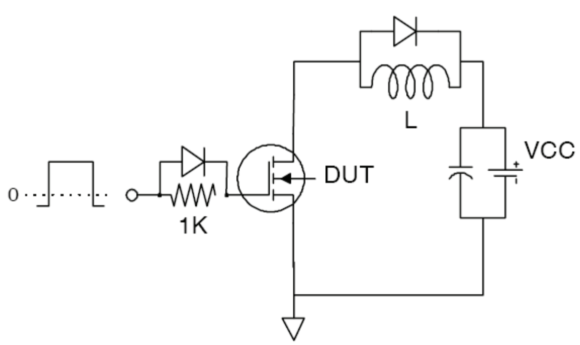


Fig 19b. Unclamped Inductive Waveforms



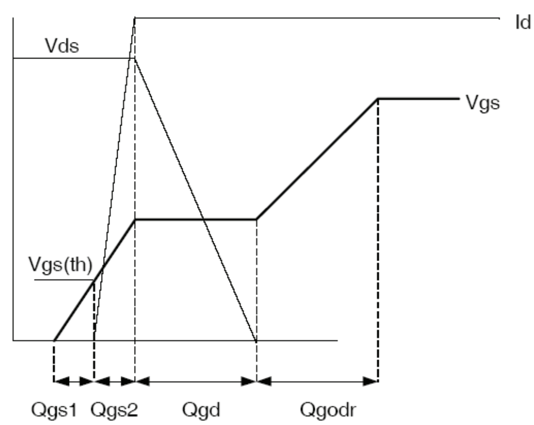


Fig 20a. Gate Charge Test Circuit

Fig 20b. Gate Charge Waveform

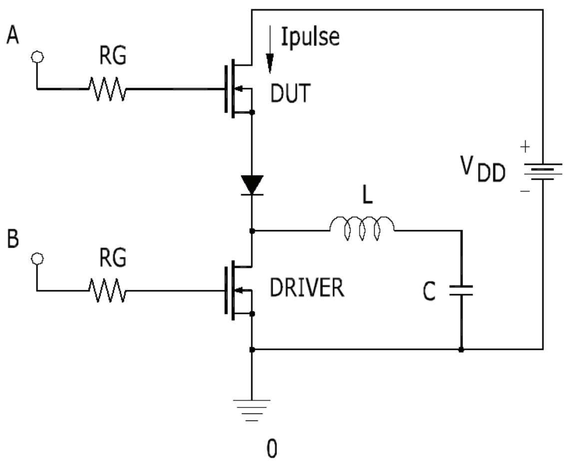


Fig 21a. t_{st} and E_{PULSE} Test Circuit

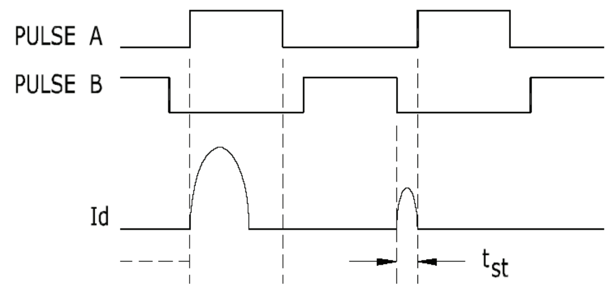


Fig 21b. t_{st} Test Waveforms

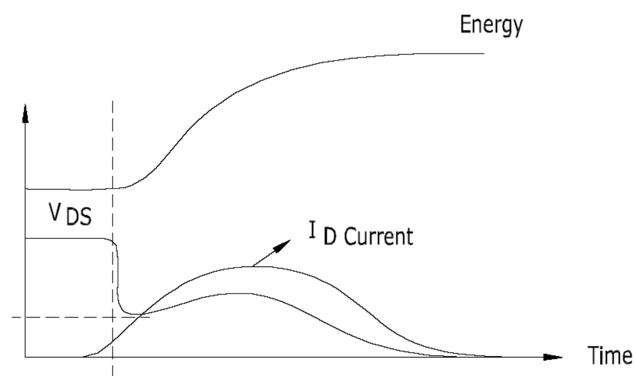


Fig 21c. E_{PULSE} Test Waveforms

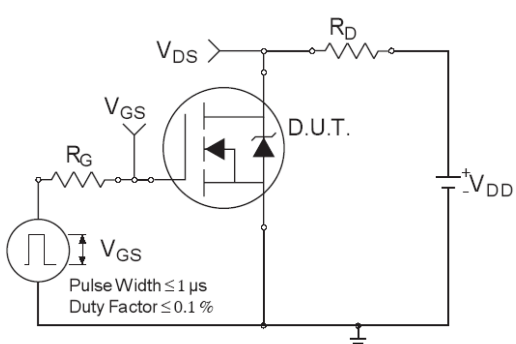


Fig 22a. Switching Time Test Circuit

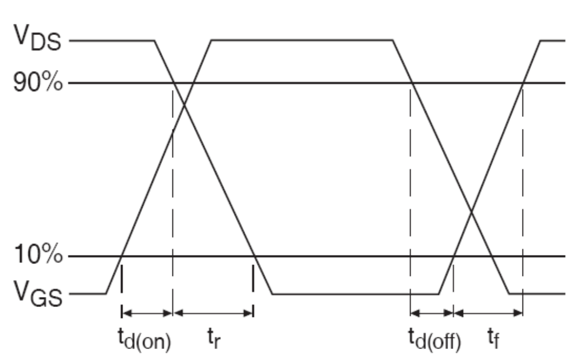
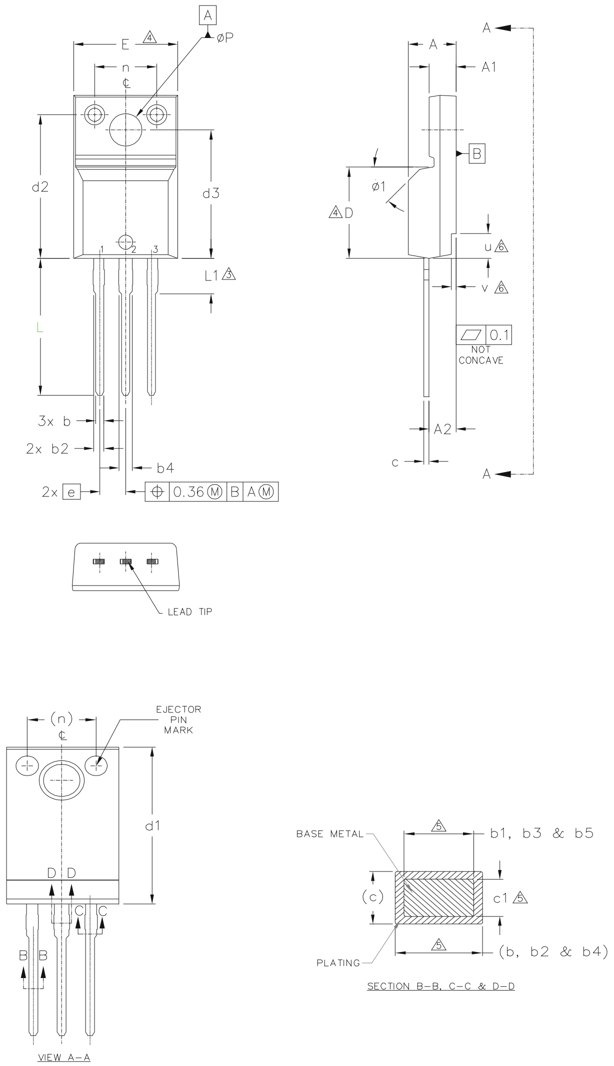


Fig 22b. Switching Time Waveforms

TO-220 Full-Pak Package Outline (Dimensions are shown in millimeters (inches))



NOTES:

1.0 DIMENSIONING AND TOLERANCING AS PER ASME Y14.5 M– 1994.

2.0 DIMENSIONS ARE SHOWN IN MILLIMETERS [INCHES].

3.0 LEAD DIMENSION AND FINISH UNCONTROLLED IN L1.

4.0 DIMENSION D & E DO NOT INCLUDE MOLD FLASH. MOLD FLASH SHALL NOT EXCEED .005" (0.127) PER SIDE. THESE DIMENSIONS ARE MEASURED AT THE OUTER MOST EXTREMES OF THE PLASTIC BODY.

5.0 DIMENSION b1, b3, b5 & c1 APPLY TO BASE METAL ONLY.

6.0 STEP OPTIONAL ON PLASTIC BODY DEFINED BY DIMENSIONS u & v.

7.0 CONTROLLING DIMENSION : INCHES.

SYMBOL	DIMENSIONS				NOTES
	MILLIMETERS		INCHES		
	MIN.	MAX.	MIN.	MAX.	
A	4.57	4.83	.180	.190	
A1	2.57	2.82	.101	.111	
A2	2.51	2.92	.099	.115	
b	0.61	0.94	.024	.037	
b1	0.61	0.89	.024	.035	5
b2	0.76	1.27	.030	.050	
b3	0.76	1.22	.030	.048	5
b4	1.02	1.52	.040	.060	
b5	1.02	1.47	.040	.058	5
c	0.33	0.63	.013	.025	
c1	0.33	0.58	.013	.023	5
D	8.66	9.80	.341	.386	4
d1	15.80	16.13	.622	.635	
d2	13.97	14.22	.550	.560	
d3	12.29	12.93	.484	.509	
E	9.63	10.74	.379	.423	4
e	2.54 BSC		.100 BSC		
L	13.21	13.72	.520	.540	
L1	3.10	3.68	.122	.145	3
n	6.05	6.60	.238	.260	
øP	3.05	3.45	.120	.136	
u	2.39	2.49	.094	.098	6
v	0.41	0.51	.016	.020	6
ø1	–	45°	–	45°	

LEAD ASSIGNMENTS

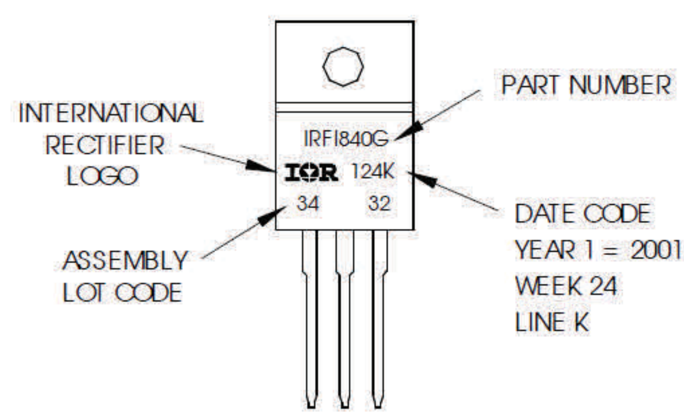
HEXFET
1.– GATE
2.– DRAIN
3.– SOURCE

IGBTs, CoPACK
1.– GATE
2.– COLLECTOR
3.– EMITTER

TO-220 Full-Pak Part Marking Information

EXAMPLE: THIS IS AN IRFI840G
WITH ASSEMBLY
LOT CODE 3432
ASSEMBLED ON WW 24, 2001
IN THE ASSEMBLY LINE "K"

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



TO-220AB Full-Pak packages are not recommended for Surface Mount Application.

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

Qualification Information

Qualification Level	Industrial (per JEDEC JESD47F) †	
Moisture Sensitivity Level	TO-220 Full-Pak	N/A
RoHS Compliant	Yes	

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

Revision History

Date	Comments
04/27/2017	• Changed datasheet with Infineon logo - all pages. • Corrected Package Outline on page 8. • Added disclaimer on last page.

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