

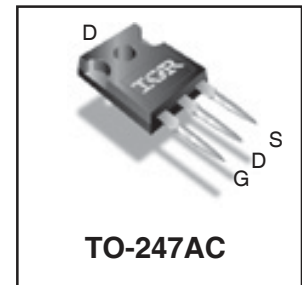
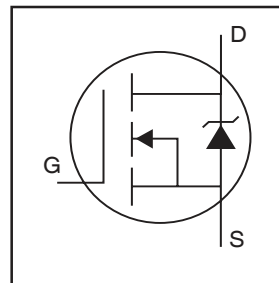
PDP MOSFET

IRFP4242PbF

Features

- Advanced process technology
- Key parameters optimized for PDP Sustain & Energy Recovery applications
- Low E_{PULSE} rating to reduce the power dissipation in Sustain & ER applications
- Low Q_G for fast response
- High repetitive peak current capability for reliable operation
- Short fall & rise times for fast switching
- 175°C operating junction temperature for improved ruggedness
- Repetitive avalanche capability for robustness and reliability

Key Parameters		
V_{DS} min	300	V
V_{DS} (Avalanche) typ.	360	V
$R_{DS(ON)}$ typ. @ 10V	49	mΩ
I_{RP} max @ $T_C = 100^\circ\text{C}$	93	A
T_J max	175	°C



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 E_{PULSE} rating. Additional features of this MOSFET are 175°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.

Absolute Maximum Ratings

	Parameter	Max.	Units
V_{GS}	Gate-to-Source Voltage	±30	V
I_D @ $T_C = 25^\circ\text{C}$	Continuous Drain Current, V_{GS} @ 10V	46	A
I_D @ $T_C = 100^\circ\text{C}$	Continuous Drain Current, V_{GS} @ 10V	33	
I_{DM}	Pulsed Drain Current ①	190	
I_{RP} @ $T_C = 100^\circ\text{C}$	Repetitive Peak Current ⑤	93	
P_D @ $T_C = 25^\circ\text{C}$	Power Dissipation	430	W
P_D @ $T_C = 100^\circ\text{C}$	Power Dissipation	210	
	Linear Derating Factor	2.9	W/°C
T_J T_{STG}	Operating Junction and Storage Temperature Range	-40 to + 175	°C
	Soldering Temperature for 10 seconds	300	
	Mounting Torque, 6-32 or M3 Screw	10lb·in (1.1N·m)	
			N

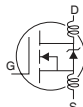
Thermal Resistance

	Parameter	Typ.	Max.	Units
$R_{\theta JC}$	Junction-to-Case ④	—	0.35	°C/W

Notes ① through ⑤ are on page 8

Electrical Characteristics @ $T_J = 25^\circ\text{C}$ (unless otherwise specified)

	Parameter	Min.	Typ.	Max.	Units	Conditions
BV_{DSS}	Drain-to-Source Breakdown Voltage	300	—	—	V	$V_{GS} = 0V, I_D = 250\mu A$
$\Delta BV_{DSS}/\Delta T_J$	Breakdown Voltage Temp. Coefficient	—	220	—	mV/°C	Reference to $25^\circ\text{C}, I_D = 1\text{mA}$
$R_{DS(on)}$	Static Drain-to-Source On-Resistance	—	49	59	mΩ	$V_{GS} = 10V, I_D = 33A$ ③
$V_{GS(th)}$	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 Coefficient	—	-15	—	mV/°C	
I_{DSS}	Drain-to-Source Leakage Current	—	—	5.0	μA	$V_{DS} = 240V, V_{GS} = 0V$
		—	—	150		$V_{DS} = 240V, V_{GS} = 0V, T_J = 125^\circ\text{C}$
I_{GSS}	Gate-to-Source Forward Leakage	—	—	100	nA	$V_{GS} = 20V$
	Gate-to-Source Reverse Leakage	—	—	-100		$V_{GS} = -20V$
g_{fs}	Forward Transconductance	78	—	—	S	$V_{DS} = 25V, I_D = 33A$
Q_g	Total Gate Charge	—	165	247	nC	$V_{DD} = 150V, I_D = 33A, V_{GS} = 10V$ ③
Q_{gd}	Gate-to-Drain Charge	—	61	—		
$t_{d(on)}$	Turn-On Delay Time	—	40	—	ns	$V_{DD} = 150V, V_{GS} = 10V$ ③ $I_D = 33A$ $R_G = 5.0\Omega$ See Fig. 22
t_r	Rise Time	—	71	—		
$t_{d(off)}$	Turn-Off Delay Time	—	72	—		
t_f	Fall Time	—	48	—		
t_{st}	Shoot Through Blocking Time	100	—	—	ns	$V_{DD} = 240V, V_{GS} = 15V, R_G = 5.1\Omega$
E_{PULSE}	Energy per Pulse	—	1960	—	μJ	$L = 220\text{nH}, C = 0.4\mu F, V_{GS} = 15V$ $V_{DS} = 240V, R_G = 4.7\Omega, T_J = 25^\circ\text{C}$
		—	3740	—		$L = 220\text{nH}, C = 0.4\mu F, V_{GS} = 15V$ $V_{DS} = 240V, R_G = 4.7\Omega, T_J = 100^\circ\text{C}$
C_{iss}	Input Capacitance	—	7370	—	pF	$V_{GS} = 0V$
C_{oss}	Output Capacitance	—	520	—		$V_{DS} = 25V$
C_{rss}	Reverse Transfer Capacitance	—	220	—		$f = 1.0\text{MHz}$, See Fig.9
$C_{oss\ eff.}$	Effective Output Capacitance	—	320	—		$V_{GS} = 0V, V_{DS} = 0V \text{ to } 240V$
L_D	Internal Drain Inductance	—	5.0	—	nH	Between lead, 6mm (0.25in.) from package and center of die contact
L_S	Internal Source Inductance	—	13	—		

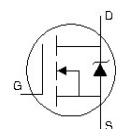


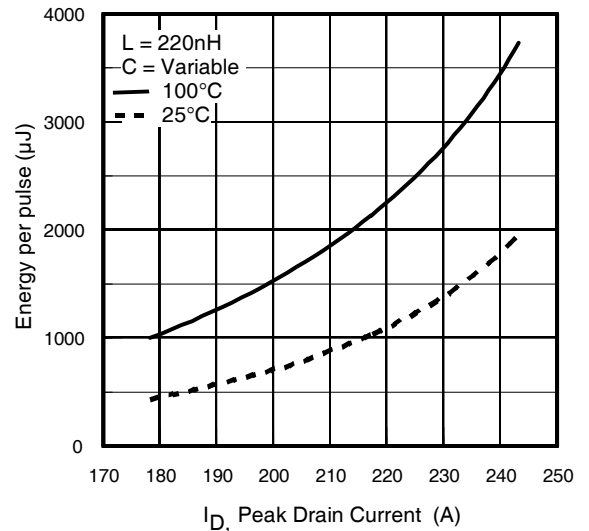
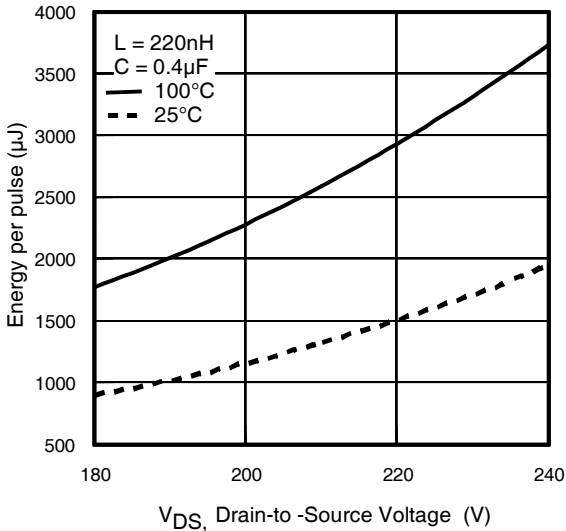
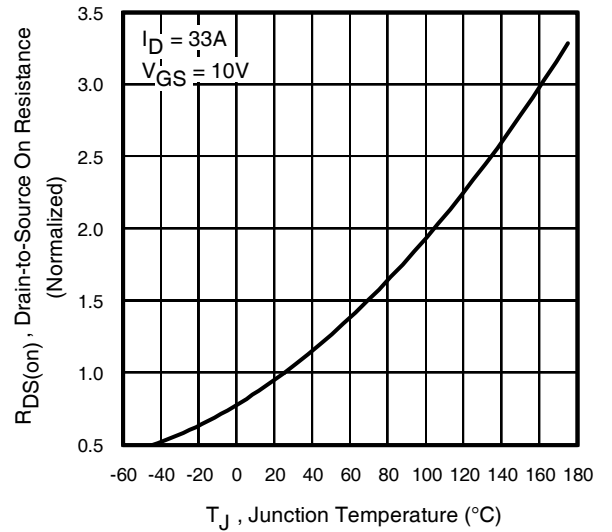
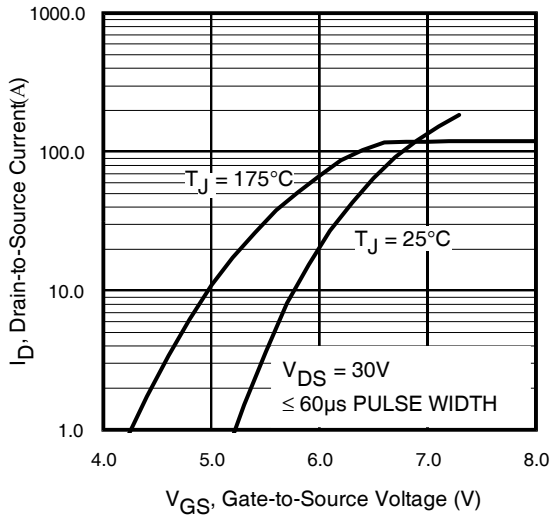
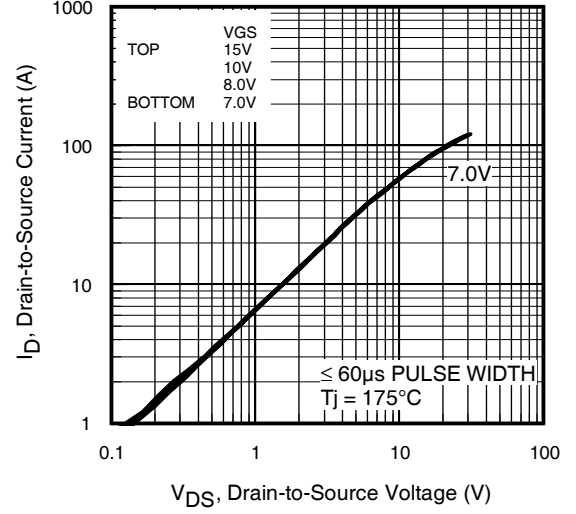
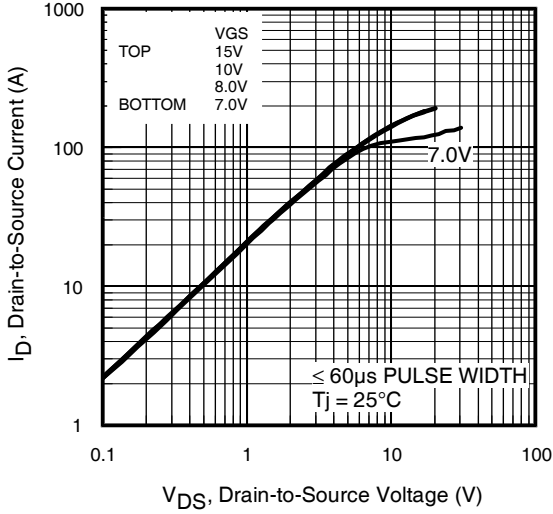
Avalanche Characteristics

	Parameter	Typ.	Max.	Units
E_{AS}	Single Pulse Avalanche Energy ②	—	700	mJ
E_{AR}	Repetitive Avalanche Energy ①	—	43	mJ
$V_{DS(Avalanche)}$	Repetitive Avalanche Voltage ①	360	—	V
I_{AS}	Avalanche Current ②	—	33	A

Diode Characteristics

	Parameter	Min.	Typ.	Max.	Units	Conditions
$I_S @ T_C = 25^\circ\text{C}$	Continuous Source Current (Body Diode)	—	—	46	A	MOSFET symbol showing the integral reverse p-n junction diode.
I_{SM}	Pulsed Source Current (Body Diode) ①	—	—	190		
V_{SD}	Diode Forward Voltage	—	—	1.0	V	$T_J = 25^\circ\text{C}, I_S = 33A, V_{GS} = 0V$ ③
t_{rr}	Reverse Recovery Time	—	300	450	ns	$T_J = 25^\circ\text{C}, I_F = 33A, V_{DD} = 50V$
Q_{rr}	Reverse Recovery Charge	—	2330	3500	nC	$di/dt = 100A/\mu s$ ③





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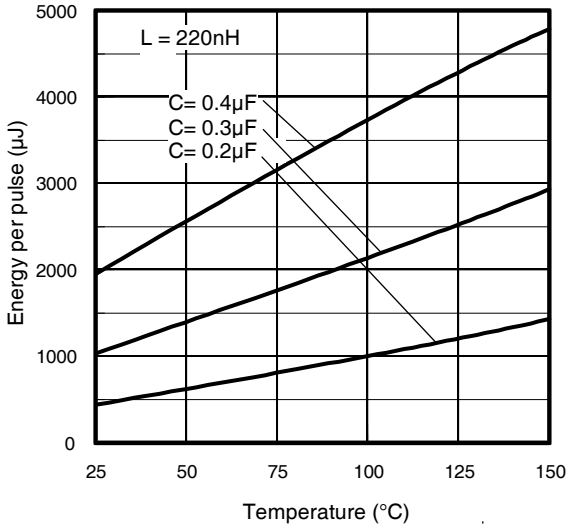


Fig 7. Typical E_{PULSE} vs. Temperature

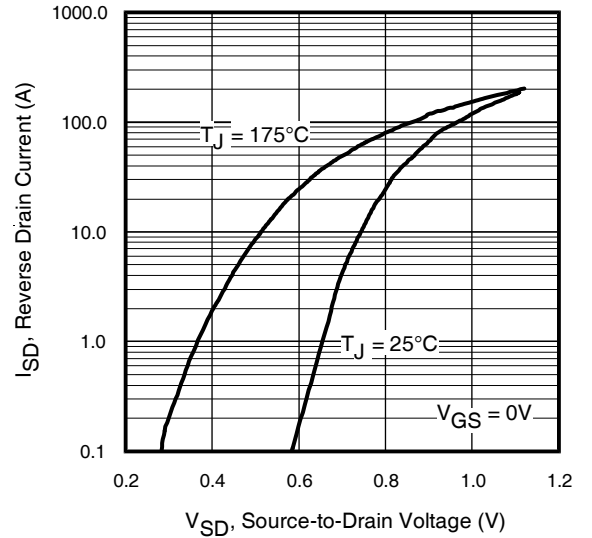


Fig 8. Typical Source-Drain Diode Forward Voltage

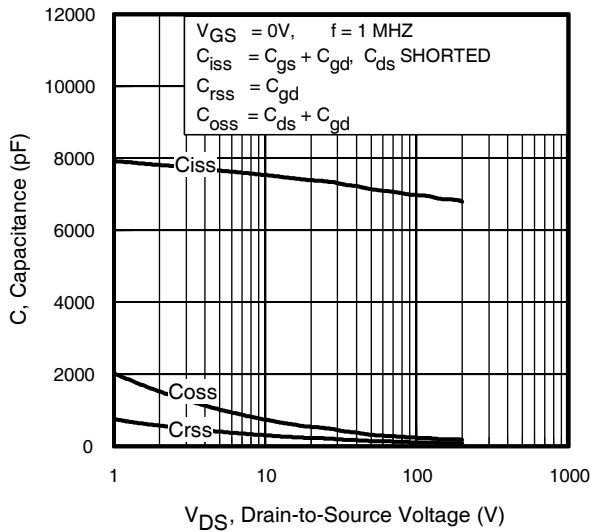


Fig 9. Typical Capacitance vs. Drain-to-Source Voltage

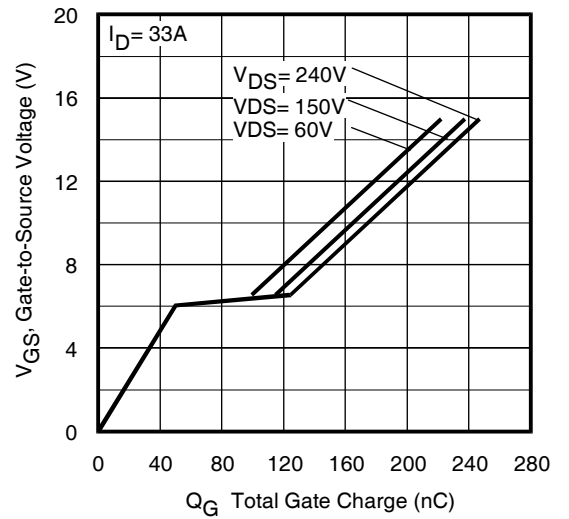


Fig 10. Typical Gate Charge vs. Gate-to-Source Voltage

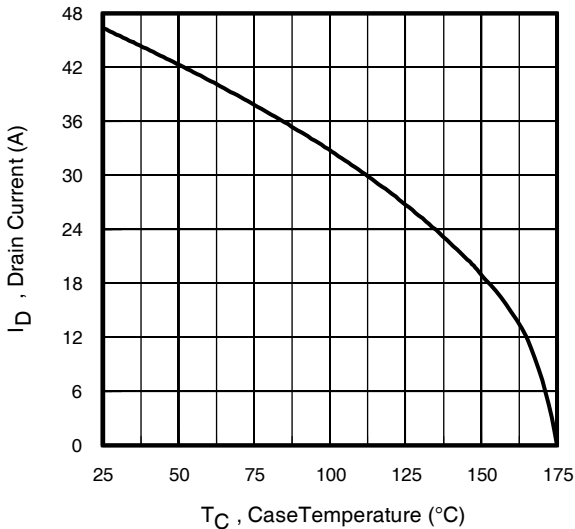


Fig 11. Maximum Drain Current vs. Case Temperature

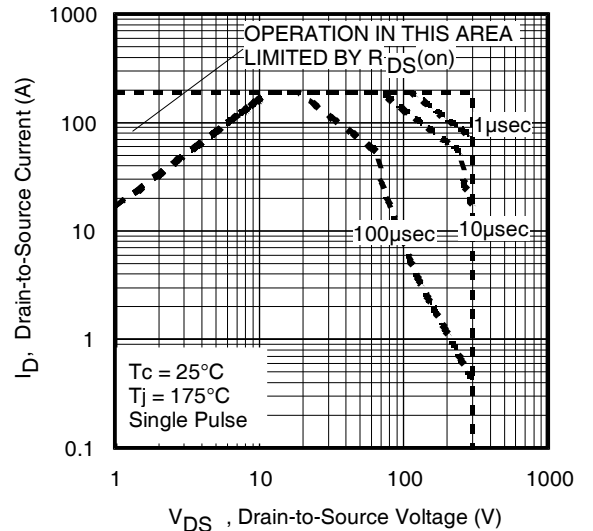


Fig 12. Maximum Safe Operating Area

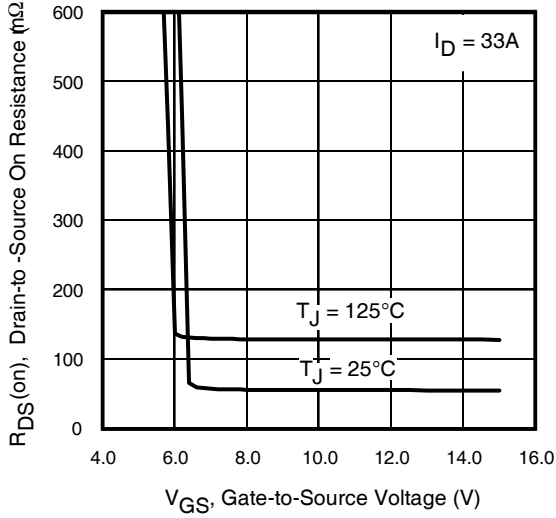


Fig 13. On-Resistance Vs. Gate Voltage

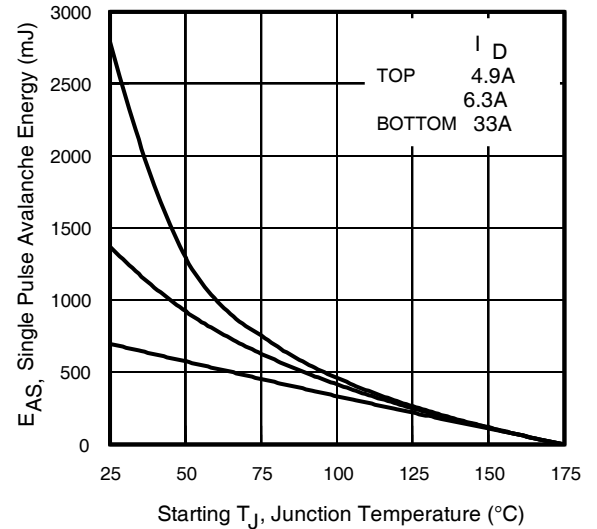


Fig 14. Maximum Avalanche Energy Vs. Temperature

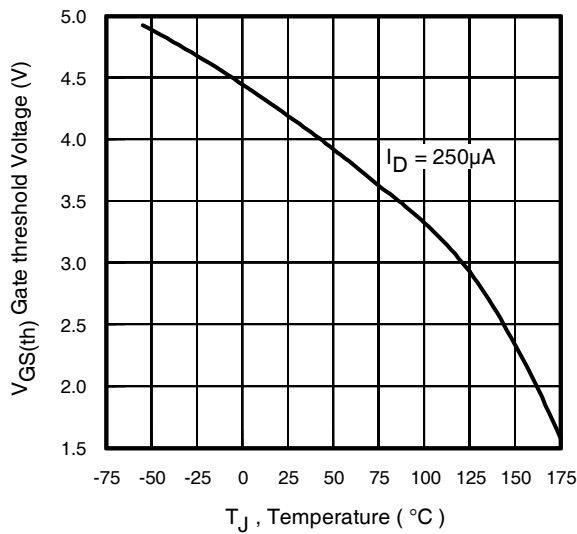


Fig 15. Threshold Voltage vs. Temperature

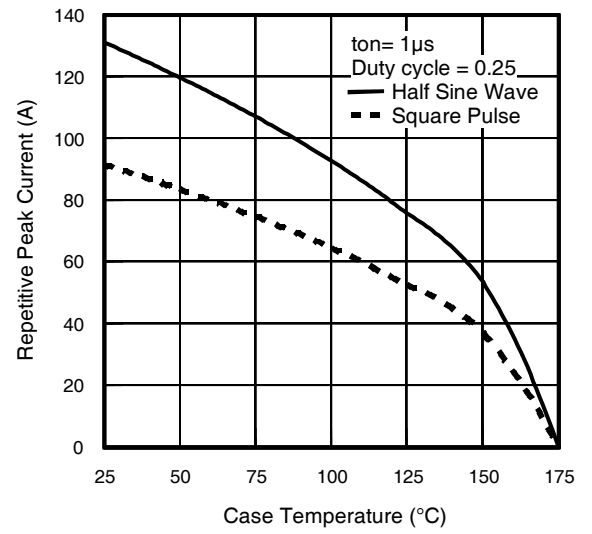


Fig 16. Typical Repetitive peak Current vs. Case temperature

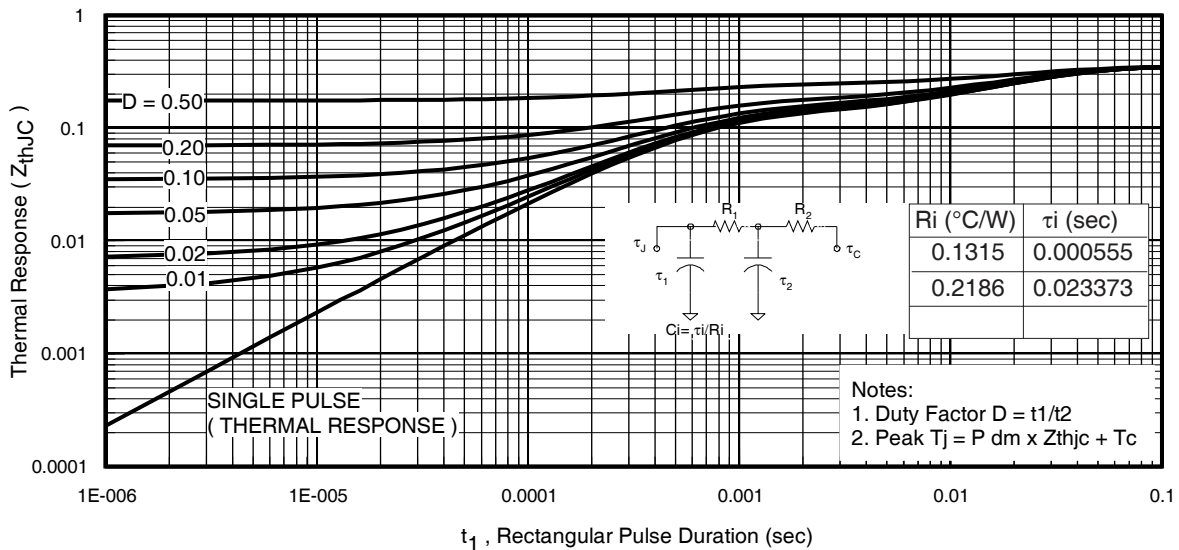


Fig 17. Maximum Effective Transient Thermal Impedance, Junction-to-Case

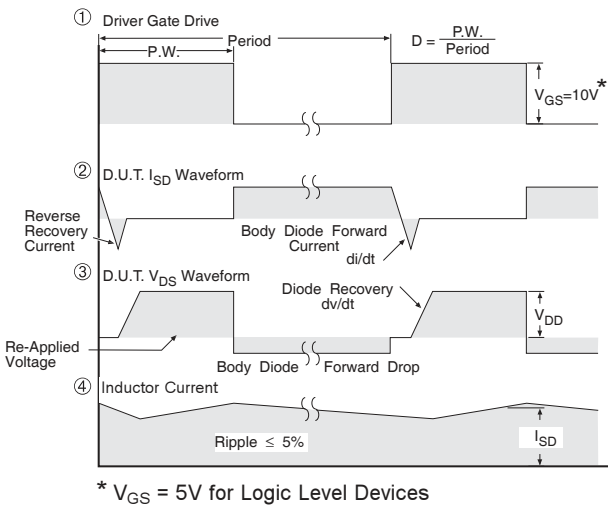
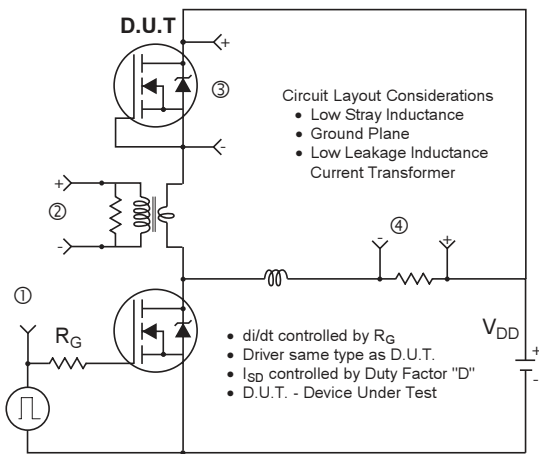


Fig 18. Diode Reverse Recovery Test Circuit for N-Channel HEXFET® Power MOSFETs

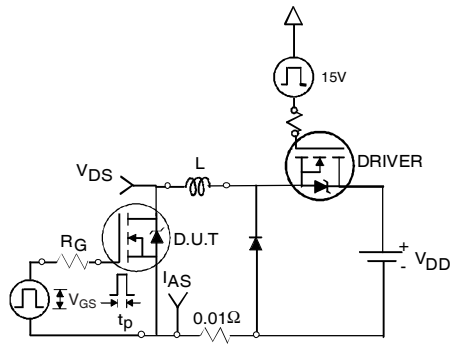


Fig 19a. Unclamped Inductive Test Circuit

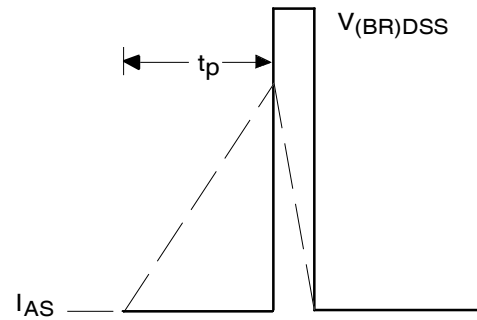


Fig 19b. Unclamped Inductive Waveforms

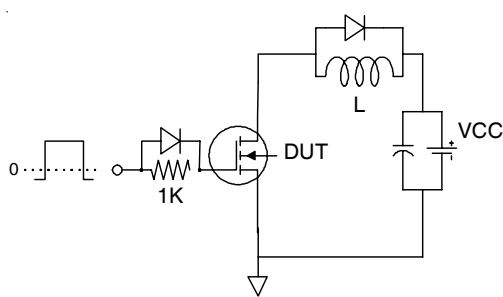


Fig 20a. Gate Charge Test Circuit

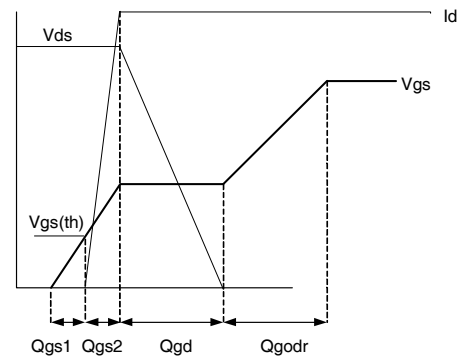


Fig 20b. Gate Charge Waveform

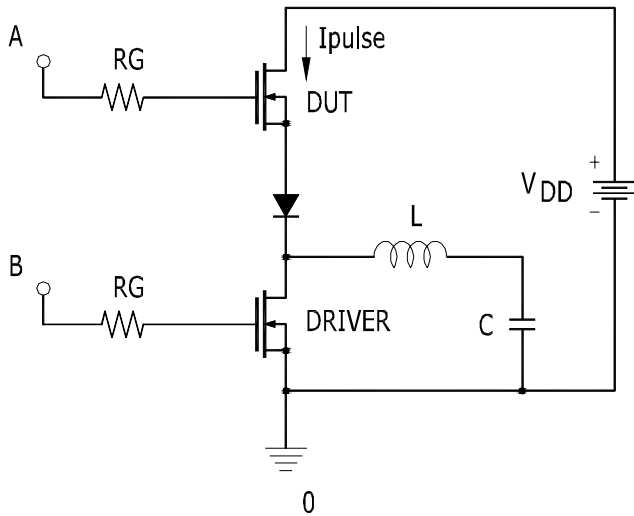


Fig 21a. t_{st} and E_{PULSE} Test Circuit

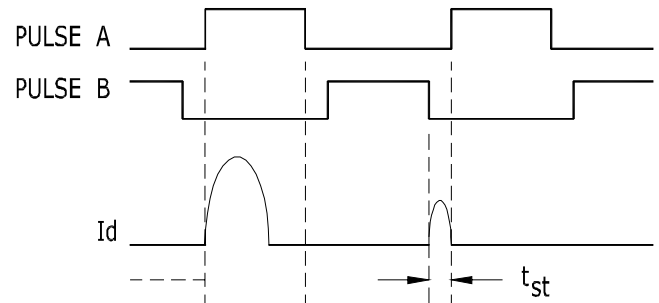


Fig 21b. t_{st} Test Waveforms

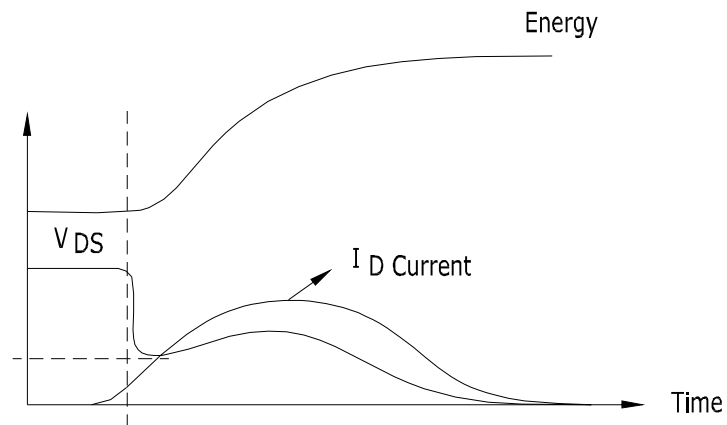


Fig 21c. E_{PULSE} Test Waveforms

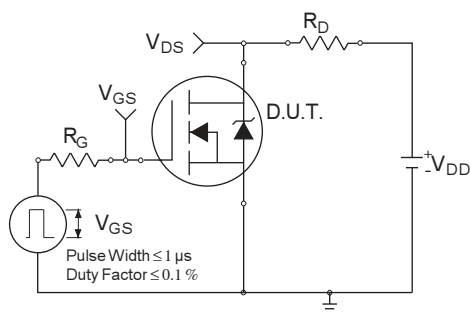


Fig 22a. Switching Time Test Circuit

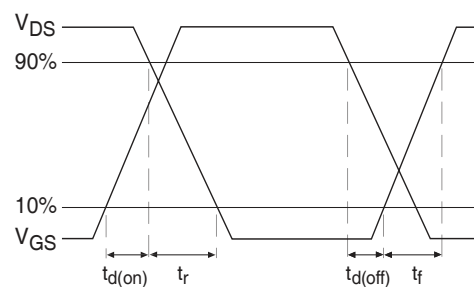


Fig 22b. Switching Time Waveforms

