



Description

The IRFP450 uses advanced trench technology to provide excellent $R_{DS(ON)}$, low gate charge and operation with gate voltages as low as 4.5V. This device is suitable for use as a Battery protection or in other Switching application.

General Features

$V_{DS} = 500V$ $I_D = 14A$

$R_{DS(ON)} < 0.5\Omega @ V_{GS}=10V$

Application

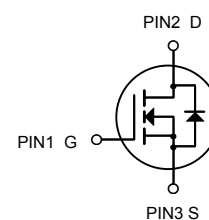
Battery protection

Load switch

Uninterruptible power supply



TO-247S
(TO-247AC-3)



N-Channel MOSFET

Package Marking and Ordering Information

Product ID	Pack	Marking	Qty(PCS)
IRFP450	TO-247S(TO-247AC-3)	IRFP450 XXXX	30

Absolute Maximum Ratings $T_c=25^\circ C$ unless otherwise noted

Symbol	Parameter	Rating	Units
V_{DS}	Drain-Source Voltage	500	V
V_{GS}	Gate-Source Voltage	± 20	V
$I_D @ T_c=25^\circ C$	Continuous Drain Current, $V_{GS} @ 10V^1$	14	A
$I_D @ T_c=100^\circ C$	Continuous Drain Current, $V_{GS} @ 10V^1$	8.7	A
I_{DM}	Pulsed Drain Current ²	56	A
EAS	Single Pulse Avalanche Energy ³	760	mJ
I_{AS}	Avalanche Current	8.7	A
$P_D @ T_c=25^\circ C$	Total Power Dissipation ⁴	190	W
T_{STG}	Storage Temperature Range	-55 to 150	$^\circ C$
T_J	Operating Junction Temperature Range	-55 to 150	$^\circ C$
R_{thJA}	Maximum Junction-to-Ambient	40	$^\circ C/W$
R_{thJC}	Maximum Junction-to-Case (Drain)	0.65	$^\circ C/W$



Electrical Characteristics (TA=25°C unless otherwise noted)

Parameter	Symbol	Test Conditions		Min.	Typ.	Max.	Unit
Static							
Drain-Source Breakdown Voltage	V _{DS}	V _{GS} = 0 V, I _D = 250 μA		500	-	-	V
V _{DS} Temperature Coefficient	ΔV _{DS} /T _J	Reference to 25 °C, I _D = 1 mA		-	0.63	-	V/°C
Gate-Source Threshold Voltage	V _{GS(th)}	V _{DS} = V _{GS} , I _D = 250 μA		2.0	-	4.0	V
Gate-Source Leakage	I _{GSS}	V _{GS} = ± 20 V		-	-	± 100	nA
Zero Gate Voltage Drain Current	I _{DSS}	V _{DS} = 500 V, V _{GS} = 0 V		-	-	25	μA
		V _{DS} = 400 V, V _{GS} = 0 V, T _J = 125 °C		-	-	250	
Drain-Source On-State Resistance	R _{DS(on)}	V _{GS} = 10 V	I _D = 8.4A ^b	-	0.43	0.5	Ω
Forward Transconductance	g _{fs}	V _{DS} = 50 V, I _D = 8.4 A ^b		9.3	-	-	S
Dynamic							
Input Capacitance	C _{iss}	V _{GS} = 0 V, V _{DS} = 25 V, f = 1.0 MHz, see fig. 5		-	2600	-	pF
Output Capacitance	C _{oss}			-	720	-	
Reverse Transfer Capacitance	C _{rss}			-	340	-	
Total Gate Charge	Q _g	V _{GS} = 10 V	I _D = 14 A, V _{DS} = 400 V, see fig. 6 and 13 ^b	-	-	150	nC
Gate-Source Charge	Q _{gs}			-	-	20	
Gate-Drain Charge	Q _{gd}			-	-	80	
Turn-On Delay Time	t _{d(on)}	V _{DD} = 250 V, I _D = 14 A, R _G = 6.2 Ω, R _D = 17 Ω, see fig. 10 ^b		-	17	-	ns
Rise Time	t _r			-	47	-	
Turn-Off Delay Time	t _{d(off)}			-	92	-	
Fall Time	t _f			-	44	-	
Internal Drain Inductance	L _D	Between lead, 6 mm (0.25") from package and center of die contact 		-	5.0	-	nH
Internal Source Inductance	L _S			-	13	-	
Drain-Source Body Diode Characteristics							
Continuous Source-Drain Diode Current	I _S	MOSFET symbol showing the integral reverse p - n junction diode 		-	-	14	A
Pulsed Diode Forward Current ^a	I _{SM}			-	-	56	
Body Diode Voltage	V _{SD}	T _J = 25 °C, I _S = 14 A, V _{GS} = 0 V ^b		-	-	1.4	V
Body Diode Reverse Recovery Time	t _{rr}	T _J = 25 °C, I _F = 14 A, dI/dt = 100 A/μs ^b		-	540	810	ns
Body Diode Reverse Recovery Charge	Q _{rr}			-	4.8	7.2	μC
Forward Turn-On Time	t _{on}	Intrinsic turn-on time is negligible (turn-on is dominated by L _S and L _D)					

Notes

- a. Repetitive rating; pulse width limited by maximum junction temperature (see fig. 11).
b. Pulse width $\leq 300\text{ }\mu\text{s}$; duty cycle $\leq 2\%$.



Typical Characteristics $T_a = 25^\circ\text{C}$, unless otherwise noted

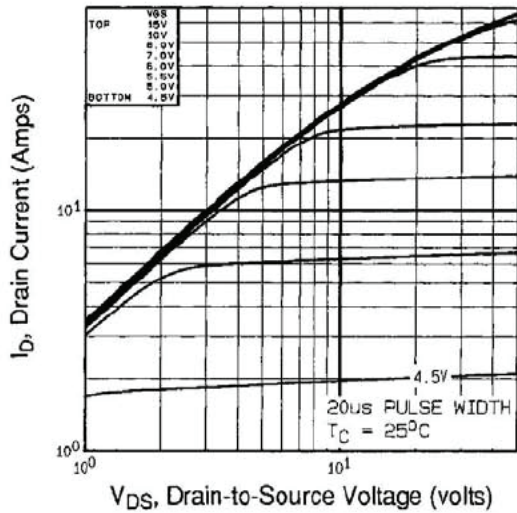


Fig. 1 - Typical Output Characteristics, $T_C = 25^\circ\text{C}$

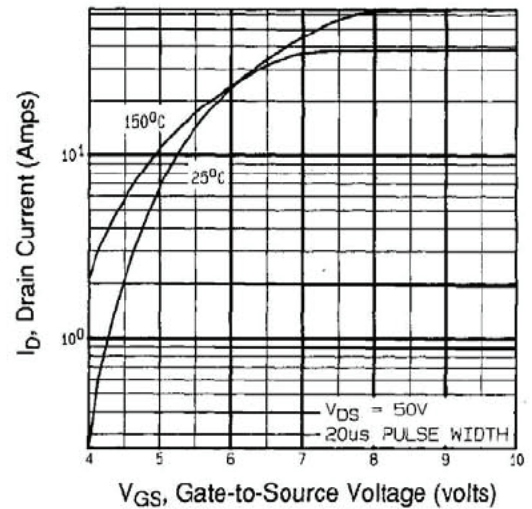


Fig. 3 - Typical Transfer Characteristics

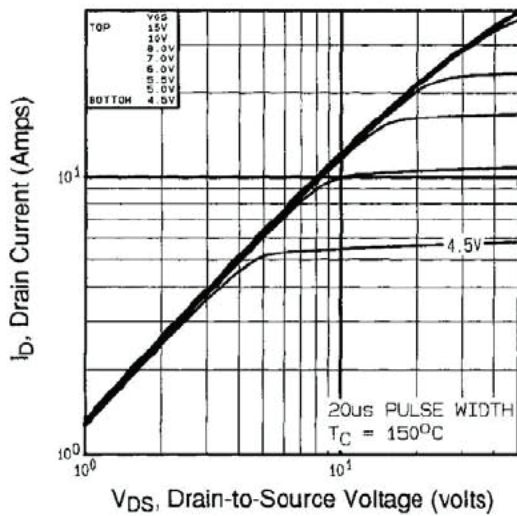


Fig. 2 - Typical Output Characteristics, $T_C = 150^\circ\text{C}$

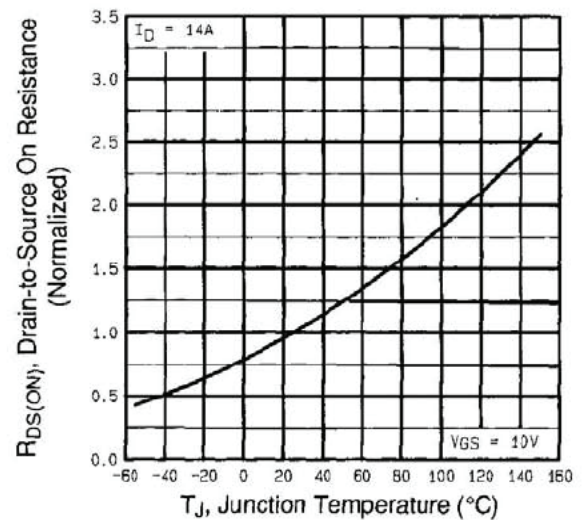


Fig. 4 - Normalized On-Resistance vs. Temperature

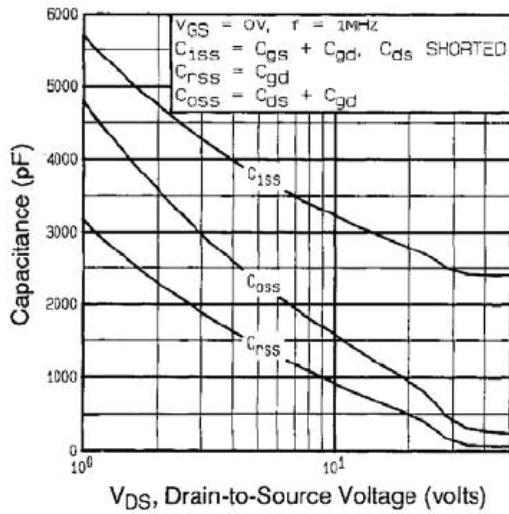


Fig. 5 - Typical Capacitance vs. Drain-to-Source Voltage

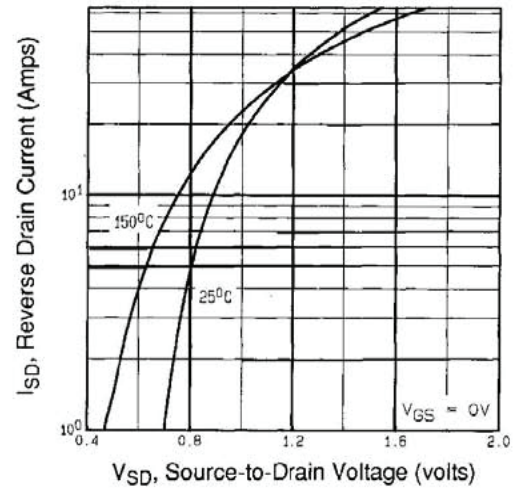


Fig. 7 - Typical Source-Drain Diode Forward Voltage

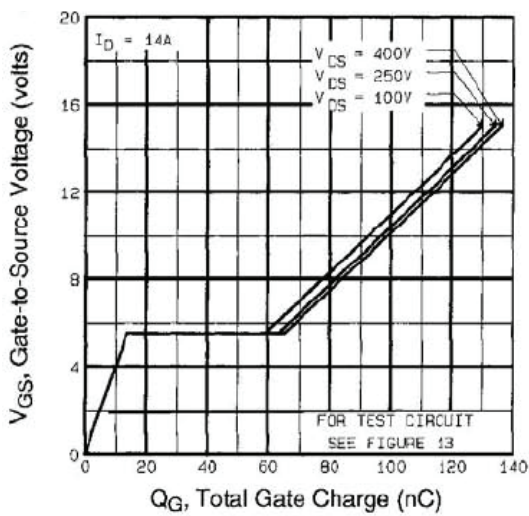


Fig. 6 - Typical Gate Charge vs. Gate-to-Source Voltage

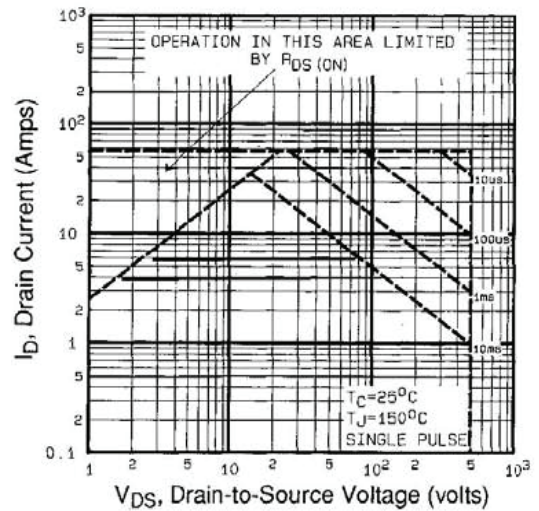


Fig. 8 - Maximum Safe Operating Area

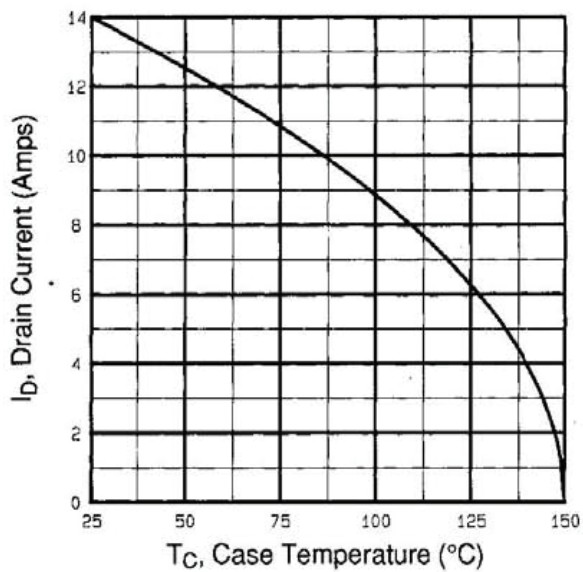


Fig. 9 - Maximum Drain Current vs. Case Temperature

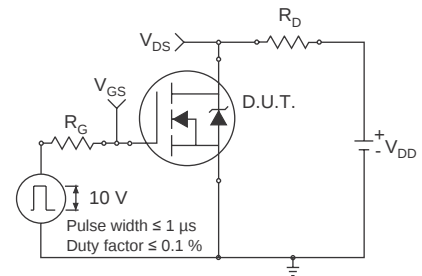


Fig. 10a - Switching Time Test Circuit

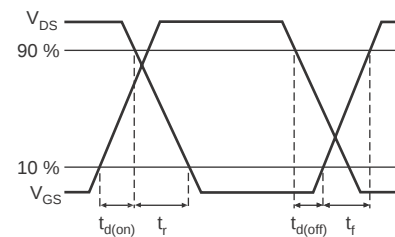


Fig. 10b - Switching Time Waveforms

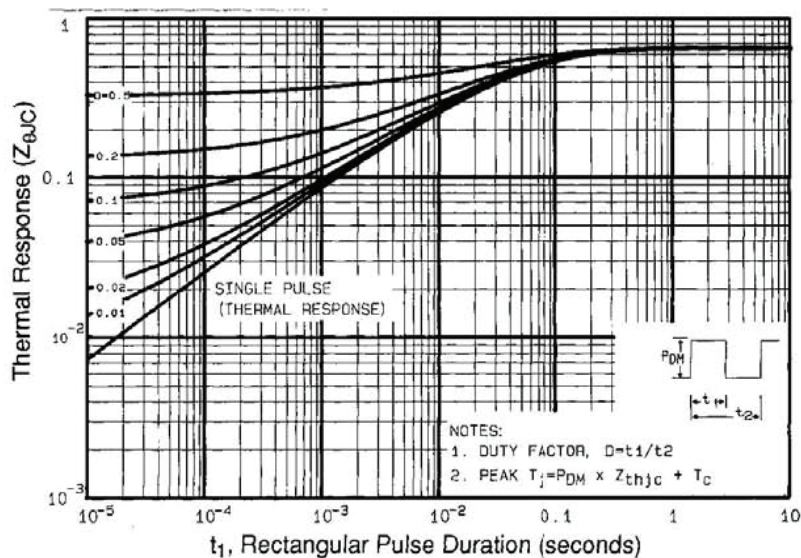


Fig. 11 - Maximum Effective Transient Thermal Impedance, Junction-to-Case

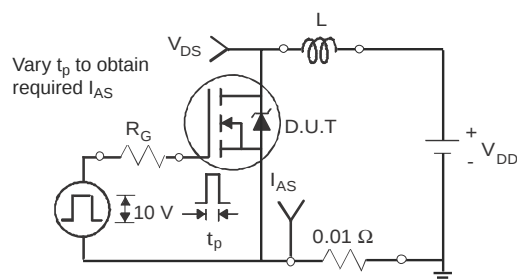


Fig. 12a - Unclamped Inductive Test Circuit

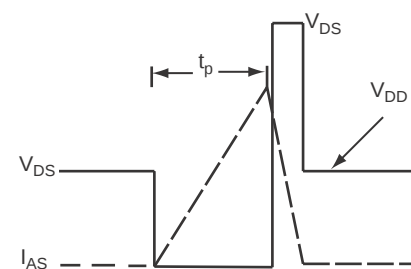


Fig. 12b - Unclamped Inductive Waveforms

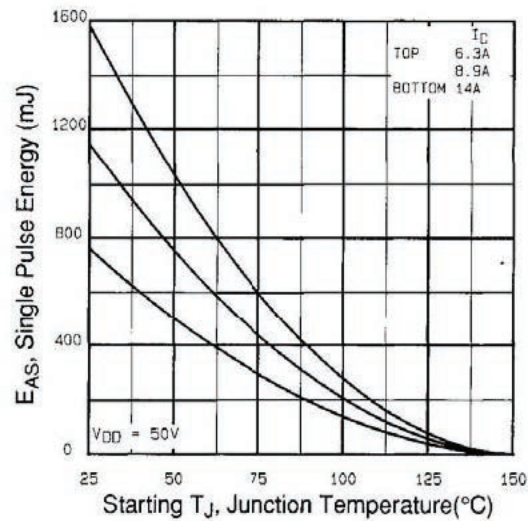


Fig. 12c - Maximum Avalanche Energy vs. Drain Current

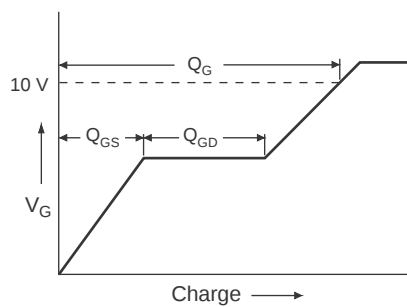


Fig. 13a - Basic Gate Charge Waveform

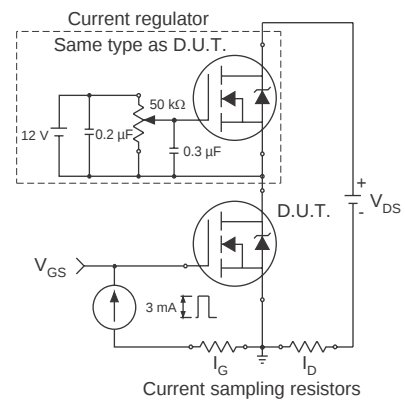
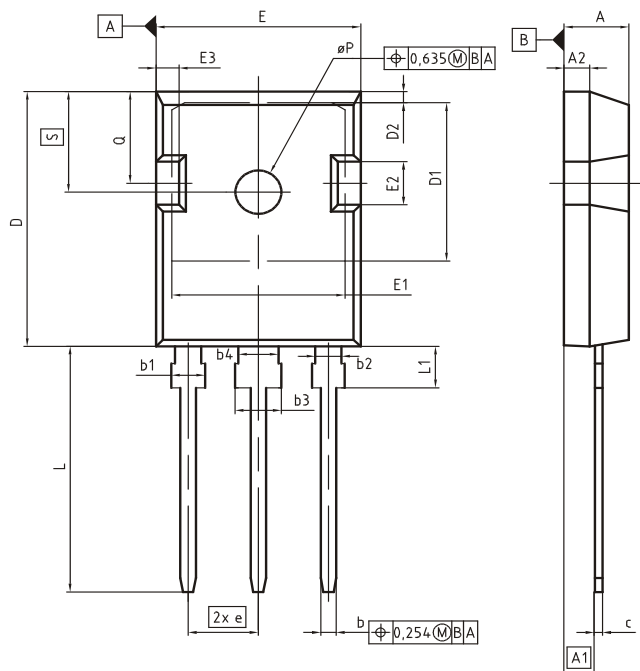


Fig. 13b - Gate Charge Test Circuit



TO-247S(TO-247AC-3) Package Information



DIM	MILLIMETERS	
	MIN	MAX
A	4.83	5.21
A1	2.27	2.54
A2	1.85	2.16
b	1.07	1.33
b1	1.90	2.41
b2	1.90	2.16
b3	2.87	3.38
b4	2.87	3.13
c	0.55	0.68
D	20.80	21.10
D1	16.25	17.65
D2	0.95	1.35
E	15.70	16.13
E1	13.10	14.15
E2	3.68	5.10
E3	1.00	2.60
e	5.44 (BSC)	
N	3	
L	19.80	20.32
L1	4.10	4.47
øP	3.50	3.70
Q	5.49	6.00
S	6.04	6.30



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