

IRFP450

N - CHANNEL 500V - 0.33Ω - 14A - TO-247 PowerMESH™ MOSFET

TYPE	V _{DSS}	R _{DS(on)}	I _D
IRFP450	500 V	< 0.4 Ω	14 A

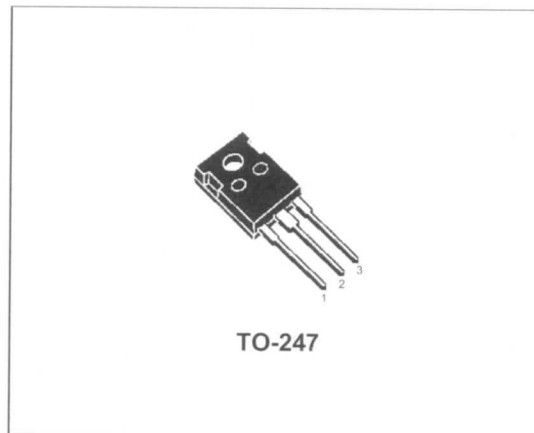
- TYPICAL R_{DS(on)} = 0.33 Ω
- EXTREMELY HIGH dv/dt CAPABILITY
- 100% AVALANCHE TESTED
- VERY LOW INTRINSIC CAPACITANCES
- GATE CHARGE MINIMIZED

DESCRIPTION

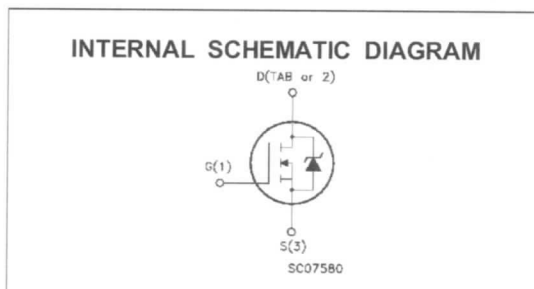
This power MOSFET is designed using the company's consolidated strip layout-based MESH OVERLAY™ process. This technology matches and improves the performances compared with standard parts from various sources.

APPLICATIONS

- HIGH CURRENT SWITCHING
- UNINTERRUPTIBLE POWER SUPPLY (UPS)
- DC/DC CONVERTERS FOR TELECOM, INDUSTRIAL, AND LIGHTING EQUIPMENT.



TO-247



ABSOLUTE MAXIMUM RATINGS

Symbol	Parameter	Value	Unit
V _{DS}	Drain-source Voltage (V _{GS} = 0)	500	V
V _{DGR}	Drain- gate Voltage (R _{GS} = 20 kΩ)	500	V
V _{GS}	Gate-source Voltage	± 20	V
I _D	Drain Current (continuous) at T _c = 25 °C	14	A
I _D	Drain Current (continuous) at T _c = 100 °C	8.7	A
I _{DM} (*)	Drain Current (pulsed)	56	A
P _{tot}	Total Dissipation at T _c = 25 °C	190	W
	Derating Factor	1.5	W/°C
dv/dt(1)	Peak Diode Recovery voltage slope	3.5	V/ns
T _{stg}	Storage Temperature	-65 to 150	°C
T _j	Max. Operating Junction Temperature	150	°C

(*) Pulse width limited by safe operating area

(1) I_{SD} ≤ 14 A, di/dt ≤ 130 A/μs, V_{DD} ≤ V_{IBR/DSS}, T_J ≤ T_{JMAX}

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IRFP450

THERMAL DATA

$R_{thj-case}$	Thermal Resistance Junction-case	Max	0.66	$^{\circ}C/W$
$R_{thj-amb}$	Thermal Resistance Junction-ambient	Max	30	$^{\circ}C/W$
$R_{thc-sink}$	Thermal Resistance Case-sink	Typ	0.1	$^{\circ}C/W$
T_l	Maximum Lead Temperature For Soldering Purpose		300	$^{\circ}C$

AVALANCHE CHARACTERISTICS

Symbol	Parameter	Max Value	Unit
I_{AR}	Avalanche Current, Repetitive or Not-Repetitive (pulse width limited by T_j max)	14	A
E_{AS}	Single Pulse Avalanche Energy (starting $T_j = 25^{\circ}C$, $I_D = I_{AR}$, $V_{DD} = 50$ V)	800	mJ

ELECTRICAL CHARACTERISTICS ($T_{case} = 25^{\circ}C$ unless otherwise specified)

OFF

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
$V_{(BR)DSS}$	Drain-source Breakdown Voltage	$I_D = 250 \mu A$ $V_{GS} = 0$	500			V
I_{DSS}	Zero Gate Voltage Drain Current ($V_{GS} = 0$)	$V_{DS} = \text{Max Rating}$ $V_{DS} = \text{Max Rating}$ $T_c = 125^{\circ}C$			1 50	μA μA
I_{GSS}	Gate-body Leakage Current ($V_{DS} = 0$)	$V_{GS} = \pm 20$ V			± 100	nA

ON (*)

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
$V_{GS(th)}$	Gate Threshold Voltage	$V_{DS} = V_{GS}$ $I_D = 250 \mu A$	2	3	4	V
$R_{DS(on)}$	Static Drain-source On Resistance	$V_{GS} = 10$ V $I_D = 8.4$ A		0.33	0.4	Ω
$I_{D(on)}$	On State Drain Current	$V_{DS} > I_{D(on)} \times R_{DS(on)max}$ $V_{GS} = 10$ V	14			A

DYNAMIC

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
$g_{fs} (*)$	Forward Transconductance	$V_{DS} > I_{D(on)} \times R_{DS(on)max}$ $I_D = 8.4$ A	9.3	13		S
C_{iss}	Input Capacitance	$V_{DS} = 25$ V $f = 1$ MHz $V_{GS} = 0$		2600		pF
C_{oss}	Output Capacitance			330		pF
C_{rss}	Reverse Transfer Capacitance			40		pF

ELECTRICAL CHARACTERISTICS (continued)

SWITCHING ON

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
$t_{d(on)}$	Turn-on Time	$V_{DD} = 250\text{ V}$ $I_D = 7\text{ A}$ $R_G = 4.7\ \Omega$ $V_{GS} = 10\text{ V}$ (see test circuit, figure 1)		24		ns
t_r	Rise Time			14		ns
Q_g	Total Gate Charge	$V_{DD} = 400\text{ V}$ $I_D = 14\text{ A}$ $V_{GS} = 10\text{ V}$		75		nC
Q_{gs}	Gate-Source Charge			13.5		nC
Q_{gd}	Gate-Drain Charge			27		nC

SWITCHING OFF

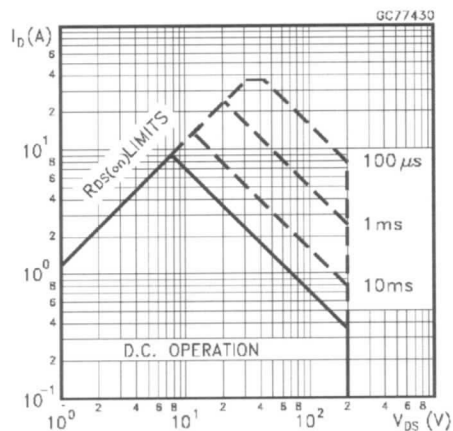
Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
$t_{r(Voff)}$	Off-voltage Rise Time	$V_{DD} = 400\text{ V}$ $I_D = 14\text{ A}$ $R_G = 4.7\ \Omega$ $V_{GS} = 10\text{ V}$ (see test circuit, figure 3)		15		ns
t_f	Fall Time			25		ns
t_c	Cross-over Time			35		ns

SOURCE DRAIN DIODE

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
I_{SD}	Source-drain Current				14	A
$I_{SDM}(\bullet)$	Source-drain Current (pulsed)				56	A
$V_{SD} (*)$	Forward On Voltage	$I_{SD} = 14\text{ A}$ $V_{GS} = 0$			1.4	V
t_{rr}	Reverse Recovery Time	$I_{SD} = 14\text{ A}$ $di/dt = 100\text{ A}/\mu\text{s}$ $V_{DD} = 100\text{ V}$ $T_J = 150\text{ }^\circ\text{C}$ (see test circuit, figure 3)		680		ns
Q_{rr}	Reverse Recovery Charge			9		μC
I_{RRM}	Reverse Recovery Current			26		A

(*) Pulsed: Pulse duration = 300 μs , duty cycle 1.5 %
 (•) Pulse width limited by safe operating area

Safe Operating Area



Thermal Impedance

