International
IOR Rectifier

Provisional Data Sheet No. PD-9.1417

REPETITIVE AVALANCHE AND dv/dt RATED
HEXFET® TRANSISTOR

IRFN3710

N-CHANNEL

100 Volt, 0.028Ω, HEXFET

Generation 5 HEXFETs from International Rectifier utilize advanced processing techniques to achieve the lowest possible on-resistance per silicon area. This benefit, combined with the fast switching speed and ruggedized device design for which HEXFETs are well known, provides the designer with an extremely efficient device for use in a wide variety of applications.

The Surface Mount Device 1 (SMD-1) package represents anothther step in the continual evolution of surface mount technology. Designed to be a close replacement for the TO-3 package, the SMD-1 will give designers the extra flexibility they need to increase circuit board density. International Rectifier has engineered the SMD-1 package to meet the specific needs of the power market by increasing the size of the termination pads, thereby enhancing thermal and electical performance.

Product Summary

Part Number	BV_{DSS}	$R_{DS(on)}$	I_D
IRFN3710	100V	0.028Ω	45A

Features:

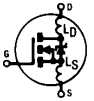
- Surface Mount
- Small Footprint
- Alternative to TO-3 Package
- Hermetically Sealed
- Avalanche Energy Rating
- Dynamic dv/dt Rating
- Simple Drive Requirements
- Lightweight

Absolute Maximum Ratings

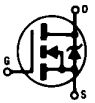
	Parameter	IRFN3710	Units
I_D @ V_{GS} = 10V, T_C = 25°C	Continuous Drain Current	45	A
I_D @ V_{GS} = 10V, T_C = 100°C	Continuous Drain Current	28	
I_{DM}	Pulsed Drain Current ①	180	
P_D @ T_C = 25°C	Max. Power Dissipation	125	W
	Linear Derating Factor	1.0	W/K ⑤
V_{GS}	Gate-to-Source Voltage	±20	V
E_{AS}	Single Pulse Avalanche Energy ②	690	mJ
I_{AR}	Avalanche Current ①	27	A
E_{AR}	Repetitive Avalanche Energy ①	12.5	mJ
dv/dt	Peak Diode Recovery dv/dt ③	5.0	V/ns
T_J	Operating Junction	-55 to 150	°C
T_{STG}	Storage Temperature Range		
	Package Mounting Surface Temperature	300 (for 5 sec.)	
	Weight	2.6 (typical)	g

IRFN3710 Device

Electrical Characteristics @ Tj = 25°C (Unless Otherwise Specified)

Parameter		Min.	Typ.	Max.	Units	Test Conditions
BV_{DSS}	Drain-to-Source Breakdown Voltage	100	—	—	V	V_{GS} = 0V, I_D = 1.0 mA
$\Delta BV_{DSS}/\Delta T_J$	Temp. Coefficient of Breakdown Voltage	—	0.120	—	V/°C	Reference to 25°C, I_D = 1.0 mA
$R_{DS(on)}$	Static Drain-to-Source	—	—	0.028	Ω	V_{GS} = 12V, I_D =28A ④
	On-State Resistance	—	—	0.032		V_{GS} = 12V, I_D = 45A
$V_{GS(th)}$	Gate Threshold Voltage	2.0	—	4.0	V	V_{DS} = V_{GS}, I_D = 250 mA
g_{fs}	Forward Transconductance	24	—	—	S (℧)	V_{DS} > 15V, I_{DS} = 28A ④
I_{DSS}	Zero Gate Voltage Drain Current	—	—	25	μA	V_{DS}=0.8 x Max Rating,V_{GS}=0V
		—	—	250		V_{DS} = 0.8 x Max Rating V_{GS} = 0V, T_J = 125°C
I_{GSS}	Gate-to-Source Leakage Forward	—	—	100	nA	V_{GS} = 20V
I_{GSS}	Gate-to-Source Leakage Reverse	—	—	-100		V_{GS} = -20V
Q_g	Total Gate Charge	—	—	190	nC	V_{GS} =10V, I_D =45 A V_{DS} = Max. Rating x 0.5
Q_{gs}	Gate-to-Source Charge	—	—	26		
Q_{gd}	Gate-to-Drain (“Miller”) Charge	—	—	82		
$t_{d(on)}$	Turn-On Delay Time	—	14	—	ns	V_{DD} = 50V, I_D =45A, R_G = 4.3Ω
t_r	Rise Time	—	59	—		
$t_{d(off)}$	Turn-Off Delay Time	—	58	—		
t_f	Fall Time	—	48	—		
L_D	Internal Drain Inductance	—	8.7	—	nH	Measured from the drain lead, 6mm (0.25 in.) from package to center of die.
L_S	Internal Source Inductance	—	8.7	—		Measured from the source lead, 6mm (0.25 in.) from package to source bonding pad.
						Modified MOSFET symbol showing the internal inductances. 
C_{iss}	Input Capacitance	—	3000	—	pF	V_{GS} = 0V, V_{DS} = 25V f = 1.0 MHz
C_{oss}	Output Capacitance	—	640	—		
C_{rss}	Reverse Transfer Capacitance	—	330	—		

Source-Drain Diode Ratings and Characteristics

	Parameter	Min.	Typ.	Max.	Units	Test Conditions
I_S	Continuous Source Current (Body Diode)	—	—	45	A	Modified MOSFET symbol showing the integral reverse p-n junction rectifier. 
I_{SM}	Pulse Source Current (Body Diode) ①	—	—	180		
V_{SD}	Diode Forward Voltage	—	—	1.3	V	T_j = 25°C, I_S = 45A, V_{GS} = 0V ④
t_{rr}	Reverse Recovery Time	—	—	210	ns	T_j = 25°C, I_F = 45A, di/dt ≤ 100A/µs
Q_{RR}	Reverse Recovery Charge	—	—	1.7	µC	V_{DD} ≤ 50V ④
t_{on}	Forward Turn-On Time	Intrinsic turn-on time is negligible. Turn-on speed is substantially controlled by L_S + L_D.				

Thermal Resistance

	Parameter	Min.	Typ.	Max.	Units	Test Conditions
R_{thJC}	Junction-to-Case	—	—	1.0	K/W ⑤	
$R_{thJ\text{-}PCB}$	Junction-to-PC Board	—	TBD	—		Soldered to a copper-clad PC board

① Repetitive Rating; Pulse width limited by maximum junction temperature. Refer to current HEXFET reliability report.

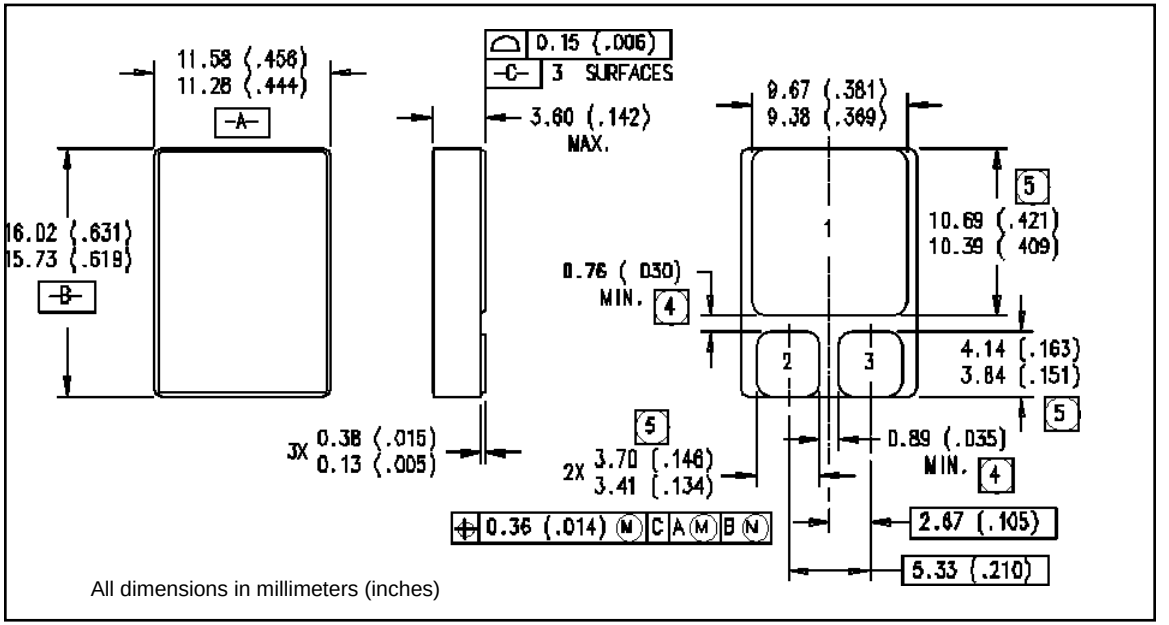
② @ V_{DD} = 25V, Starting T_J = 25°C, E_{AS} = [0.5 * L * (I_L^2) * [BV_{DSS}/(BV_{DSS}-V_{DD})] Peak I_L = 45A, V_{GS} = 10V, 25 ≤ R_G ≤ 200Ω

③ I_{SD} ≤ 45A, di/dt ≤ 460 A/µs, V_{DD} ≤ BV_{DSS}, T_J ≤ 150°C Suggested RG = 2.35Ω

④ Pulse width ≤ 300 µs; Duty Cycle ≤ 2%

⑤ K/W = °C/W W/K = W/°C

Case Outline and Dimensions — SMD-1



All dimensions in millimeters (inches)

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