

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 another 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 electrical performance.

Product Summary

Part Number	BV _{DSS}	R _{DS(on)}	I _D
IRFN3710	100V	0.028Ω	45A

Features:

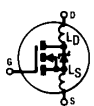
- Surface Mount
- Small Footprint
- Alternative to TO-3 Package
- Hermetically Sealed
- Avalanche Energy Rating
- Dynamic dv/dt Rating
- Simple Drive Requirements
- Lightweight

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
EAS	Single Pulse Avalanche Energy ②	690	mJ
I _{AR}	Avalanche Current ①	27	A
EAR	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)	

IRFN3710 Device

Electrical Characteristics @ $T_j = 25^\circ\text{C}$ (Unless Otherwise Specified)

Parameter		Min.	Typ.	Max.	Units	Test Conditions	
BV_{DSS}	Drain-to-Source Breakdown Voltage	100	—	—	V	$V_{GS} = 0V, I_D = 1.0\text{ mA}$	
$\Delta BV_{DSS}/\Delta T_J$	Temp. Coefficient of Breakdown Voltage	—	0.120	—	$V/^\circ\text{C}$	Reference to 25°C , $I_D = 1.0\text{ mA}$	
$R_{DS(on)}$	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	$V_{DS} = V_{GS}, I_D = 250\text{ mA}$	
g_{fs}	Forward Transconductance	24	—	—	$S (\tau_j)$	$V_{DS} > 15V, I_{DS} = 28A$ ④	
I_{DSS}	Zero Gate Voltage Drain Current	—	—	25	μA	$V_{DS} = 0.8 \times \text{Max Rating}, V_{GS} = 0V$	
		—	—	250		$V_{DS} = 0.8 \times \text{Max Rating}$ $V_{GS} = 0V, T_J = 125^\circ\text{C}$	
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	$V_{GS} = 10V, I_D = 45\text{ A}$	
Q_{gs}	Gate-to-Source Charge	—	—	26		$V_{DS} = \text{Max. Rating} \times 0.5$	
Q_{gd}	Gate-to-Drain ("Miller") Charge	—	—	82			
$t_{d(on)}$	Turn-On Delay Time	—	14	—	ns	$V_{DD} = 50V, I_D = 45A,$ $R_G = 4.3\Omega$	
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.	Modified MOSFET symbol showing the internal inductances. 
L_S	Internal Source Inductance	—	8.7	—		Measured from the source lead, 6mm (0.25 in.) from package to source bonding pad.	
C_{iss}	Input Capacitance	—	3000	—	pF	$V_{GS} = 0V, V_{DS} = 25V$ $f = 1.0\text{ MHz}$	
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 V _{DD} ≤ 50V ④
Q _{RR}	Reverse Recovery Charge	—	—	1.7	μC	
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	Soldered to a copper-clad PC board
R _{thJ-PCB}	Junction-to-PC Board	—	TBD	—		

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

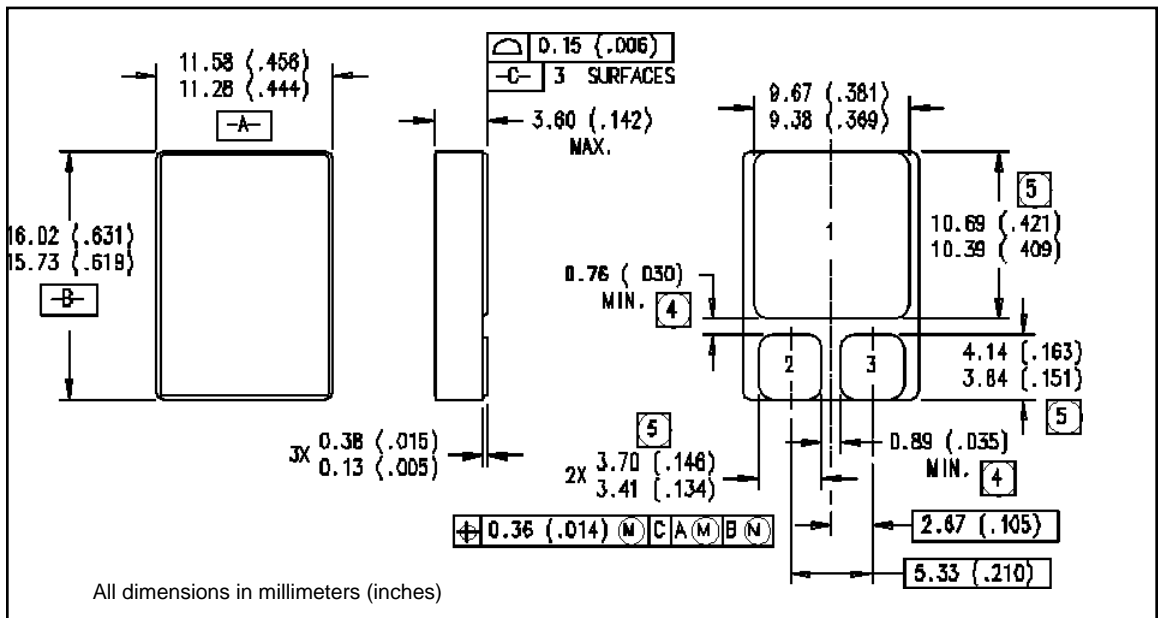
② @ V_{DD} = 25V, Starting T_J = 25°C,
EAS = [0.5 * L * (I_L²) * [BV_{DSS}/(BV_{DSS}-V_{DD})]
Peak I_L = 45A, V_{GS} = 10V, 25 ≤ R_G ≤ 200Ω

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



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