



Description

The IRFHM9331PbF uses advanced trench technology and design to provide excellent $R_{DS(ON)}$ with low gate charge. This device is well suited for high current load applications.

Features

$V_{DS} = -30V, I_D = -35A$

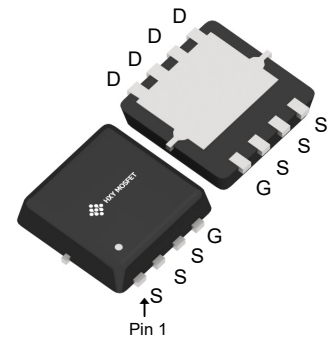
$R_{DS(ON)} < 15m\Omega @ V_{GS} = -10V$

$R_{DS(ON)} < 26m\Omega @ V_{GS} = -4.5V$

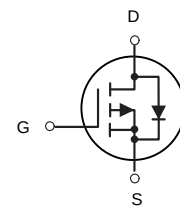
Application

High side switch for full bridge converter

DC/DC converter for LCD display



DFN3X3-8L



P-Channel MOSFET

Package Marking and Ordering Information

Product ID	Pack	Brand	Qty(PCS)
IRFHM9331PbF	DFN3X3-8L	HXY MOSFET	5000

Absolute Maximum Ratings@ $T_J = 25^\circ C$ (unless otherwise specified)

Symbol	Parameter	Rating	Units
V _{DS}	Drain-Source Voltage	-30	V
V _{GS}	Gate-Source Voltage	±20	V
I _D @T _A =25°C	Drain Current ³ , V _{GS} @ 10V	-35	A
I _D @T _A =70°C	Drain Current ³ , V _{GS} @ 10V	-25	A
I _{DM}	Pulsed Drain Current ¹	-120	A
P _D @T _A =25°C	Total Power Dissipation	15	W
T _{STG}	Storage Temperature Range	-55 to 150	°C
T _J	Operating Junction Temperature Range	-55 to 150	°C
R _{thj-c}	Maximum Thermal Resistance, Junction-case	6	°C/W
R _{thj-a}	Maximum Thermal Resistance, Junction-ambient ³	66	°C/W



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

Symbol	Parameter	Test Condition	Min.	Typ.	Max.	Units
$V_{(BR)DSS}$	Drain-Source Breakdown Voltage	$V_{GS}=0V, I_D = -250\mu A$	-30	-	-	V
I_{DSS}	Zero Gate Voltage Drain Current	$V_{DS} = -30V, V_{GS}=0V,$	-	-	-1	μA
I_{GSS}	Gate to Body Leakage Current	$V_{DS}=0V, V_{GS}= \pm 20V$	-	-	± 100	nA
$V_{GS(th)}$	Gate Threshold Voltage	$V_{DS}=V_{GS}, I_D = -250\mu A$	-1.0	-1.6	-2.5	V
$R_{DS(on)}$	Static Drain-Source on-Resistance Note3	$V_{GS}= -10V, I_D = -10A$	-	12	15	m Ω
		$V_{GS}= -4.5V, I_D = -5A$	-	18	26	
C_{iss}	Input Capacitance	$V_{DS}= -15V, V_{GS}=0V,$ $f=1.0MHz$	-	1330	-	pF
C_{oss}	Output Capacitance		-	183	-	pF
C_{rss}	Reverse Transfer Capacitance		-	156	-	pF
Q_g	Total Gate Charge	$V_{DS}= -15V, I_D = -5A,$ $V_{GS}= -10V$	-	22	-	nC
Q_{gs}	Gate-Source Charge		-	1.0	-	nC
Q_{gd}	Gate-Drain("Miller") Charge		-	1.8	-	nC
$t_{d(on)}$	Turn-on Delay Time	$V_{DD}= -15V, I_D = -10A,$ $V_{GS}=-10V, R_{GEN}=2.5\Omega$	-	9	-	ns
t_r	Turn-on Rise Time		-	13	-	ns
$t_{d(off)}$	Turn-off Delay Time		-	48	-	ns
t_f	Turn-off Fall Time		-	20	-	ns
I_S	Maximum Continuous Drain to Source Diode Forward Current		-	-	-35	A
I_{SM}	Maximum Pulsed Drain to Source Diode Forward Current		-	-	-90	A
V_{SD}	Drain to Source Diode Forward Voltage	$V_{GS}=0V, I_S = -15A$	-	-0.8	-1.2	V
t_{rr}	Reverse Recovery Time	$T_J=25^{\circ}\text{C},$	-	64	-	ns
Q_{rr}	Reverse Recovery Charge	$V_{DD}= -24V, I_F=-2.8A,$ $di/dt=-100A/\mu s$	-	25	-	nC

Notes:1. Repetitive Rating: Pulse Width Limited by Maximum Junction Temperature

2. EAS condition: $T_J=25^{\circ}\text{C}$, $V_{GS}=10V$, $R_G=25\Omega$, $L=0.5mH$, $I_{AS}=-12.7A$

3. Pulse Test: Pulse Width $\leq 300\mu s$, Duty Cycle $\leq 0.5\%$



Typical Performance Characteristics

Figure1: Output Characteristics

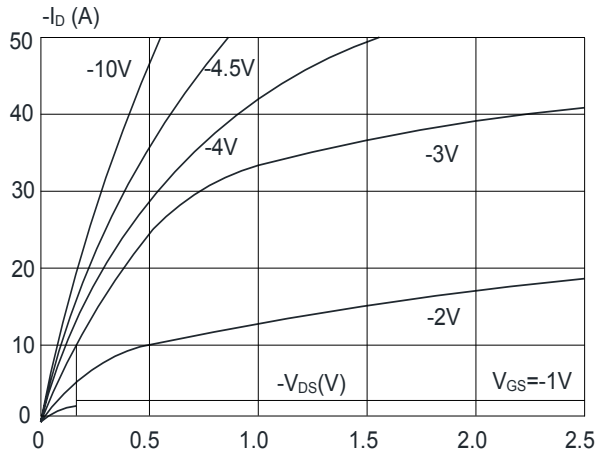


Figure 2: Typical Transfer Characteristics

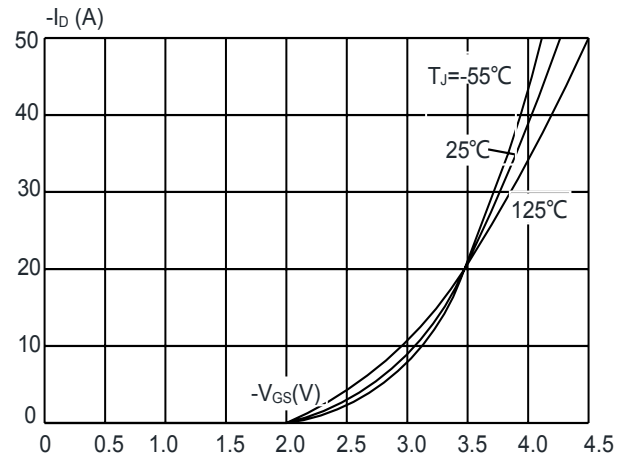


Figure 3: On-resistance vs. Drain Current

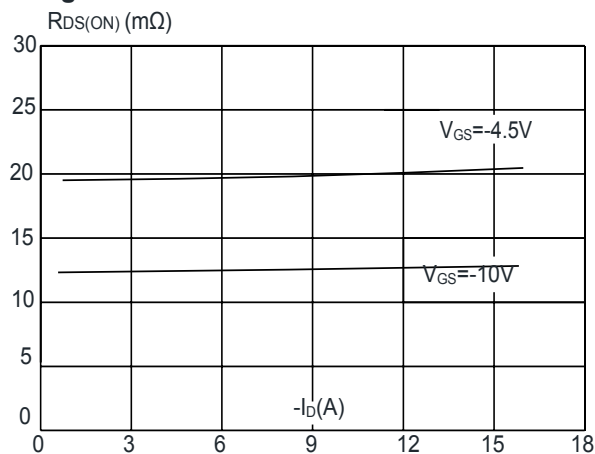


Figure 4: Body Diode Characteristics

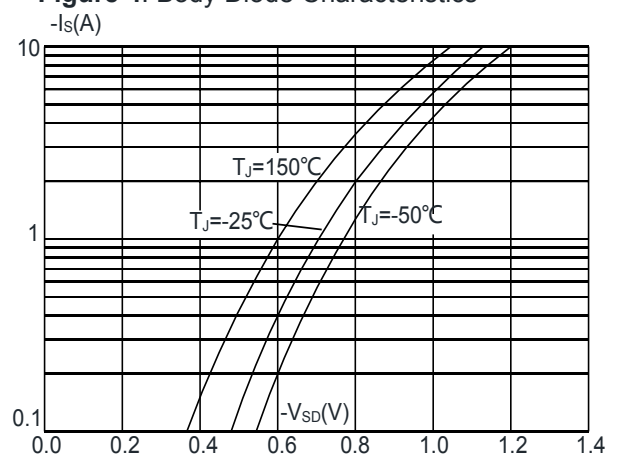


Figure 5: Gate Charge Characteristics

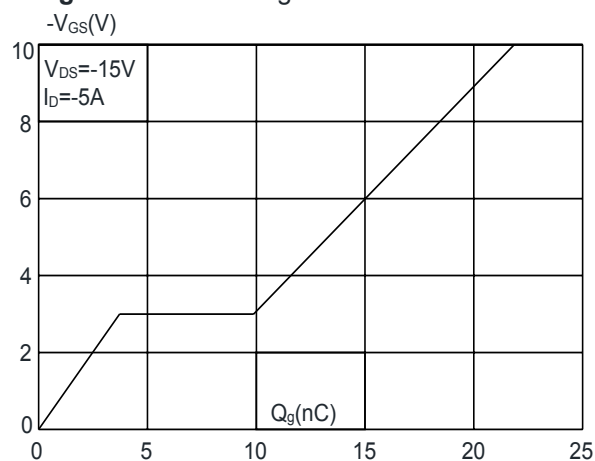


Figure 6: Capacitance Characteristics

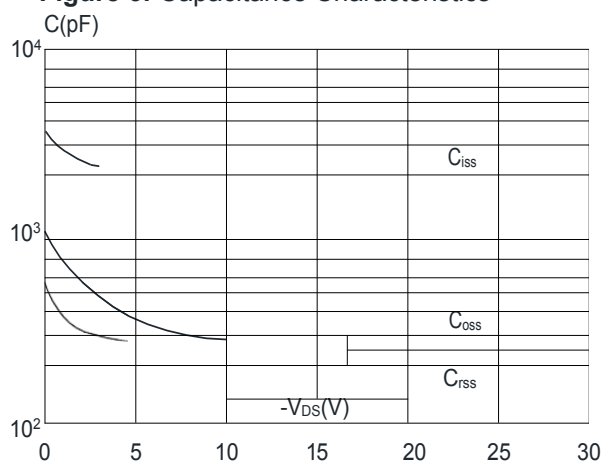




Figure 7: Normalized Breakdown Voltage vs. Junction Temperature

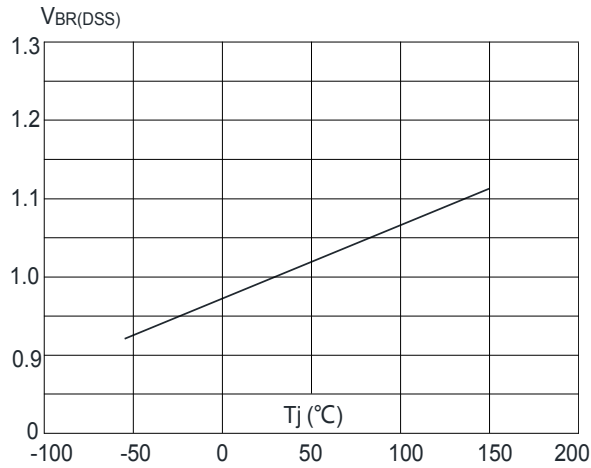


Figure 8: Normalized on Resistance vs. Junction Temperature

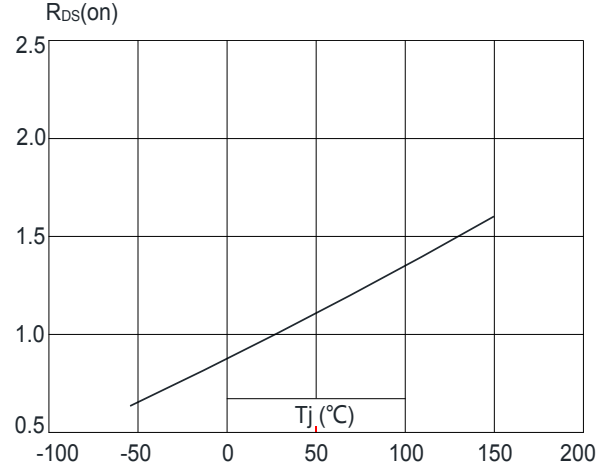


Figure 9: Maximum Safe Operating Area

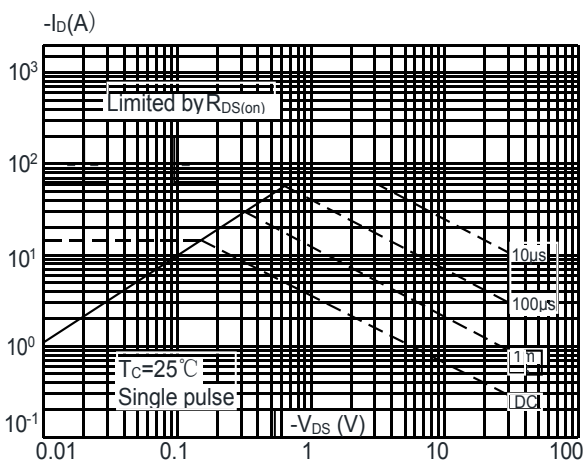


Figure 10: Maximum Continuous Drain Current vs. Ambient Temperature

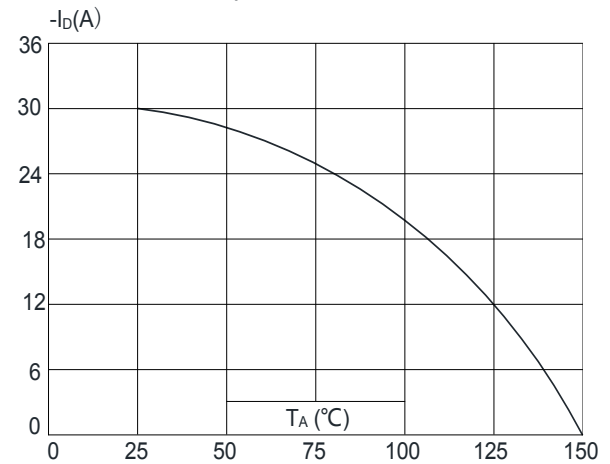
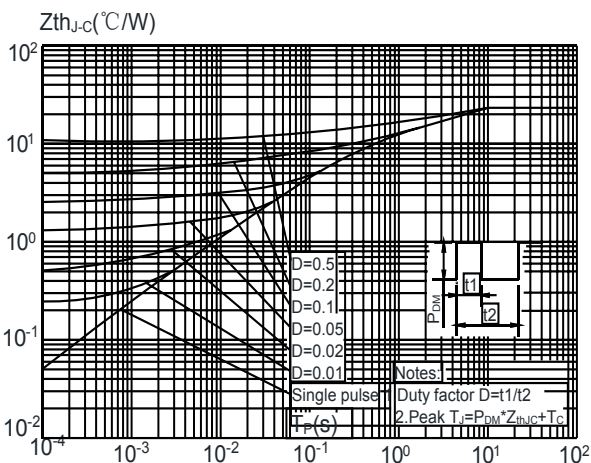


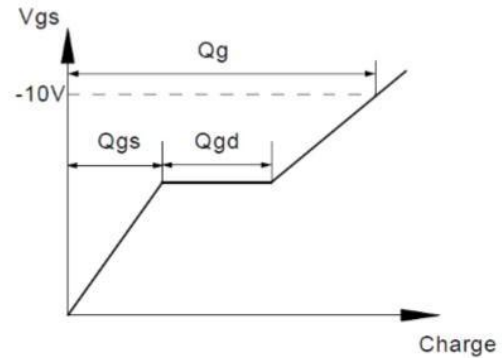
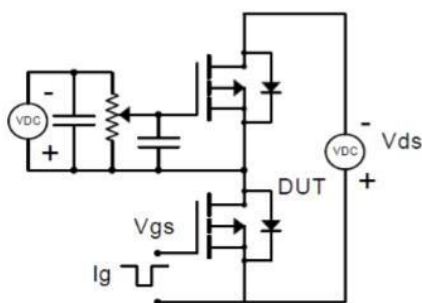
Figure.11: Maximum Effective Transient Thermal Impedance, Junction-to-Case



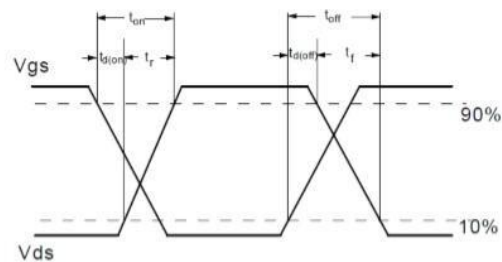
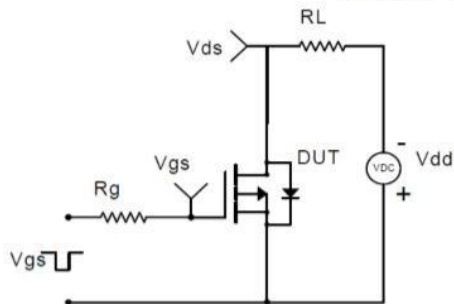


Test Circuit

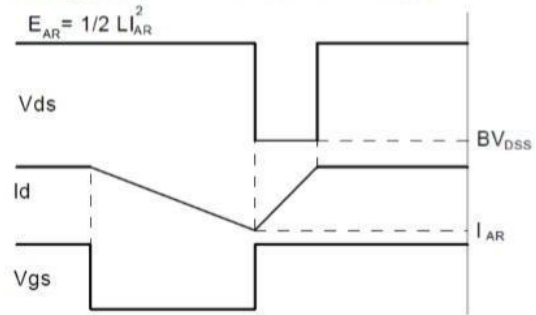
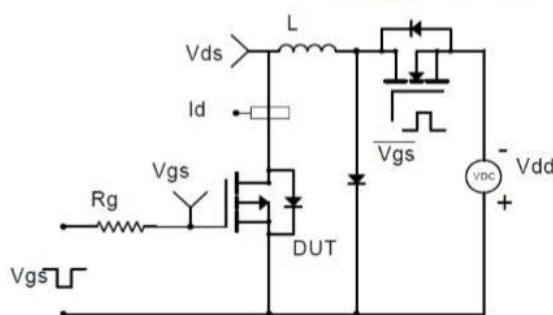
Gate Charge Test Circuit & Waveform



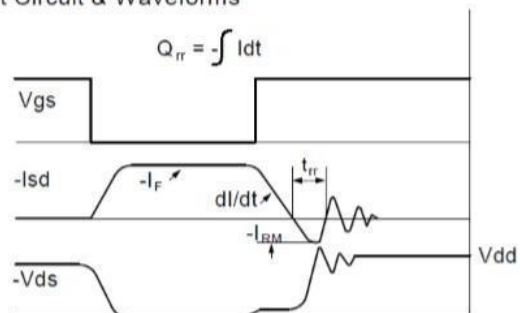
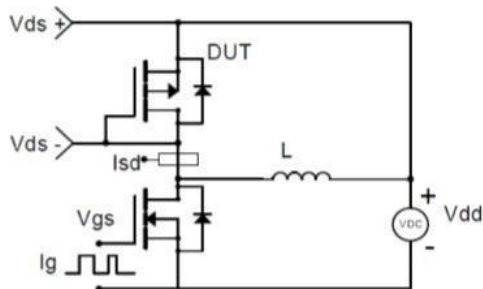
Resistive Switching Test Circuit & Waveforms



Unclamped Inductive Switching (UIS) Test Circuit & Waveforms

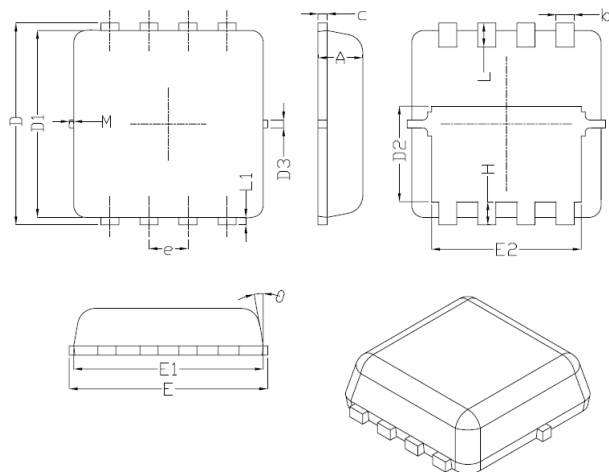


Diode Recovery Test Circuit & Waveforms





DFN3X3-8L Package Information



Symbol	Dimensions In Millimeters		
	Min.	Nom.	Max.
A	0.70	0.75	0.80
b	0.25	0.30	0.35
c	0.10	0.15	0.25
D	3.25	3.35	3.45
D1	3.00	3.10	3.20
D2	1.48	1.58	1.68
D3	-	0.13	-
E	3.20	3.30	3.40
E1	3.00	3.15	3.20
E2	2.39	2.49	2.59
e	0.65BSC		
H	0.30	0.39	0.50
L	0.30	0.40	0.50
L1	-	0.13	-
M	*	*	0.15
θ		10°	12°



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