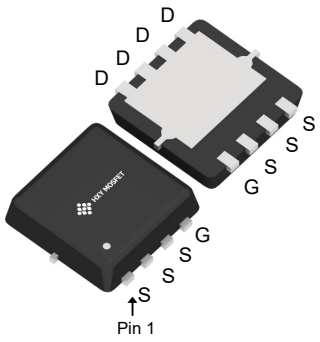
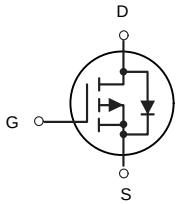
## Description

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.




DFN3X3-8L




P-Channel MOSFET

## Features

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

$R_{DS(ON)}$ <15mΩ @$V_{GS}$=-10V

$R_{DS(ON)}$ <26mΩ @ $V_{GS}$=-4.5V

## Application

High side switch for full bridge converter

DC/DC converter for LCD display

## Ordering Information

| Product ID | Pack | Brand | Qty(PCS) |
|---|---|---|---|
| IRFHM9331PBF | DFN3X3-8L | HXY MOSFET | 5000 |

## Absolute Maximum Ratings@$T_J$=25°C(unless otherwise specified)

| Symbol | Parameter | Rating | Units |
|---|---|---|---|
| VDS | Drain-Source Voltage | -30 | V |
| VGS | Gate-Source Voltage | ±20 | V |
| $I_D$@$T_A$=25℃ | Drain Current[3], $V_{GS}$ @ 10V | -35 | A |
| $I_D$@$T_A$=70℃ | Drain Current[3], $V_{GS}$ @ 10V | -25 | A |
| IDM | Pulsed Drain Current[1] | -120 | A |
| $P_D$@$T_A$=25℃ | Total Power Dissipation | 15 | W |
| TSTG | Storage Temperature Range | -55 to 150 | ℃ |
| $T_J$ | Operating Junction Temperature Range | -55 to 150 | ℃ |
| Rthj-c | Maximum Thermal Resistance, Junction-case | 6 | ℃/W |
| Rthj-a | Maximum Thermal Resistance, Junction-ambient[3] | 66 | ℃/W |

**Electrical Characteristics** ($T_J$=25℃ unless otherwise specified)

| Symbol | Parameter | Test Condition | Min. | Typ. | Max. | Units |
|---|---|---|---|---|---|---|
| $V_{(BR)DSS}$ | Drain-Source Breakdown Voltage | $V_{GS}$=0V, $I_D$= -250μA | -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, $V_{GS}$= ±20V | - | - | ±100 | nA |
| $V_{GS(th)}$ | Gate Threshold Voltage | $V_{DS}$=$V_{GS}$, $I_D$= -250μA | -1.0 | -1.6 | -2.5 | V |
| $R_{DS(on)}$ | Static Drain-Source on-Resistance Note3 | $V_{GS}$= -10V, $I_D$= -10A | - | 12 | 15 | mΩ |
| | | $V_{GS}$= -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, $R_{GEN}$=2.5Ω | - | 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 |
| trr | Reverse Recovery Time | $T_J$=25℃, $V_{DD}$= -24V,$I_F$=-2.8A, dI/dt=-100A/μs | - | 64 | - | ns |
| Qrr | Reverse Recovery Charge | | - | 25 | - | nC |

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

2. EAS condition: $T_J$=25℃, $V_{GS}$=10V, $R_G$=25Ω, L=0.5mH, $I_{AS}$=-12.7A

3. Pulse Test: Pulse Width≤300μs, Duty Cycle≤0.5%

## Typical Performance Characteristics

**Figure1:** Output Characteristics

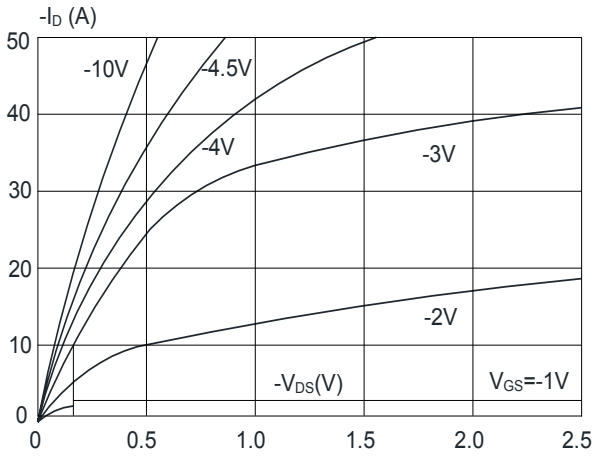



**Figure 2:** Typical Transfer Characteristics

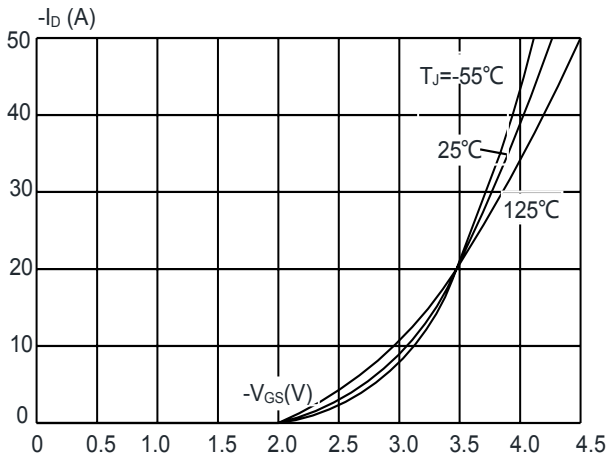



**Figure 3:**On-resistance vs. Drain Current

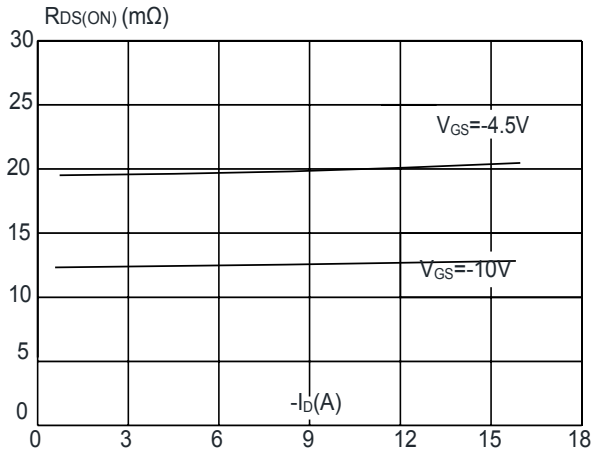



**Figure 4**: Body Diode Characteristics

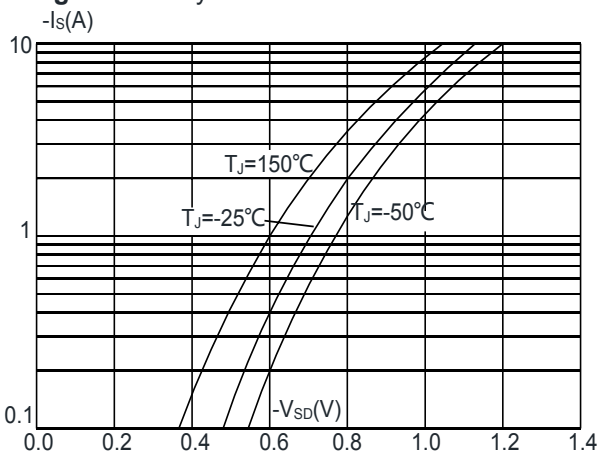



**Figure 5:** Gate Charge Characteristics

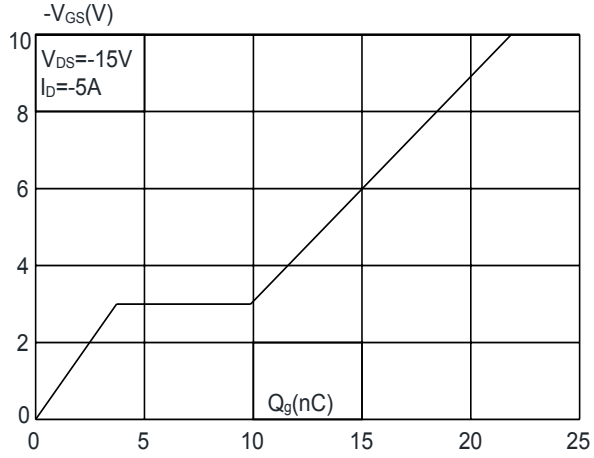



**Figure 6:** Capacitance Characteristics

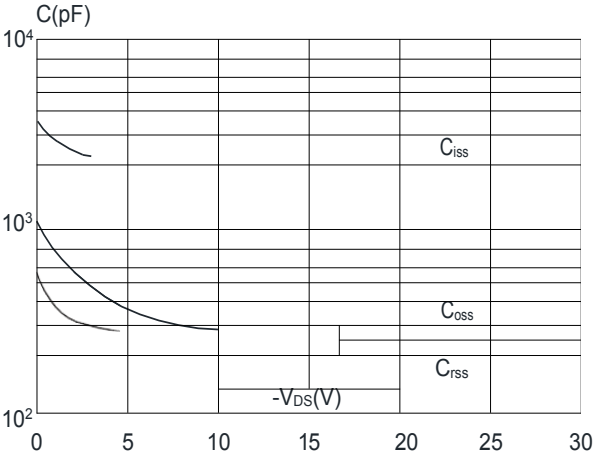


**Figure 7:** Normalized Breakdown Voltage vs. Junction Temperature

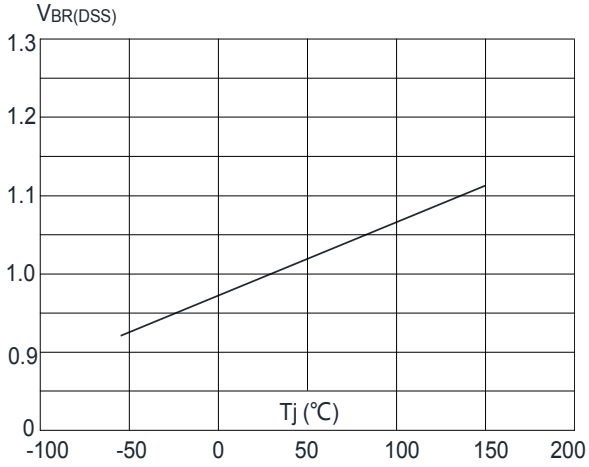



**Figure 8:** Normalized on Resistance vs. Junction Temperature

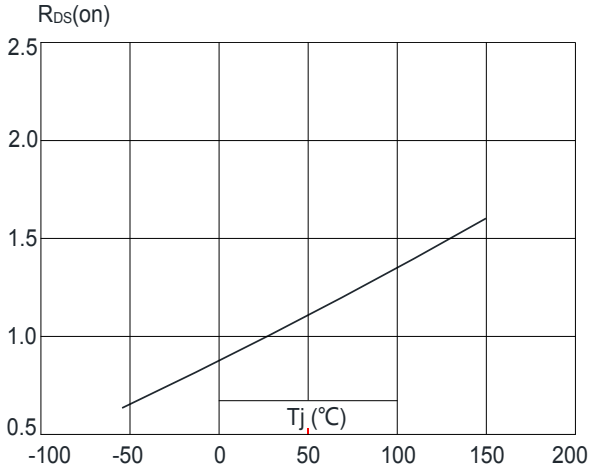



**Figure 9:** Maximum Safe Operating Area

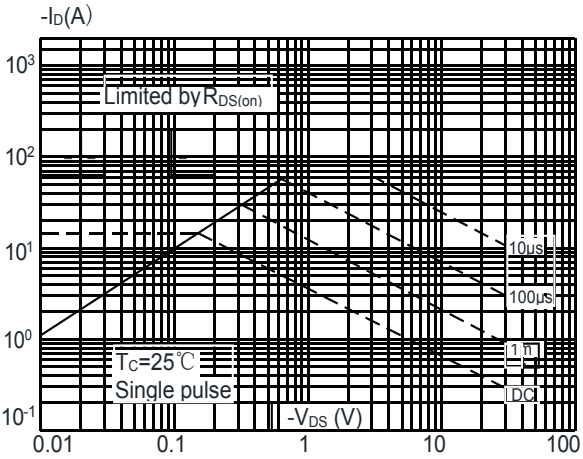



**Figure 10:** Maximum Continuous Drain Current vs. Ambient Temperature

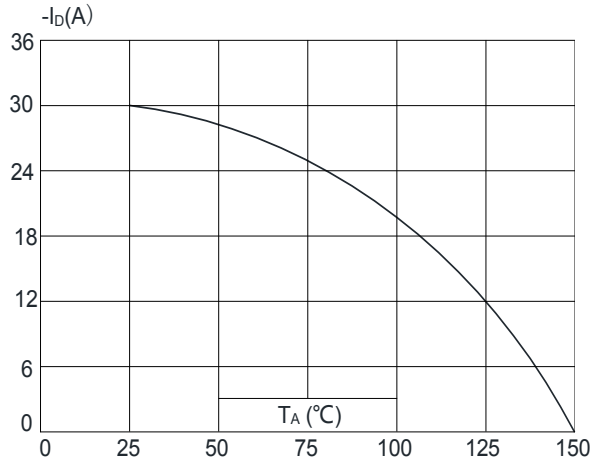
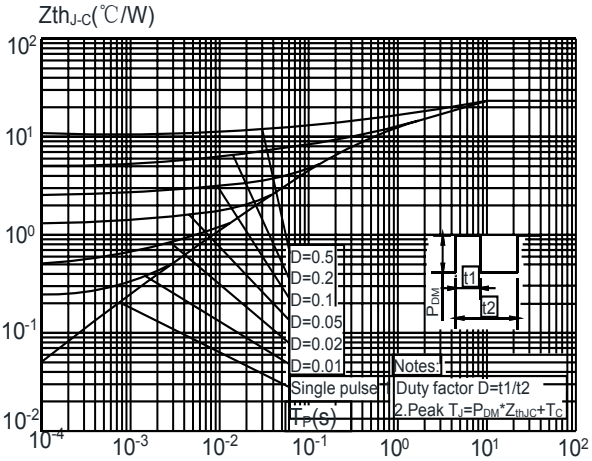
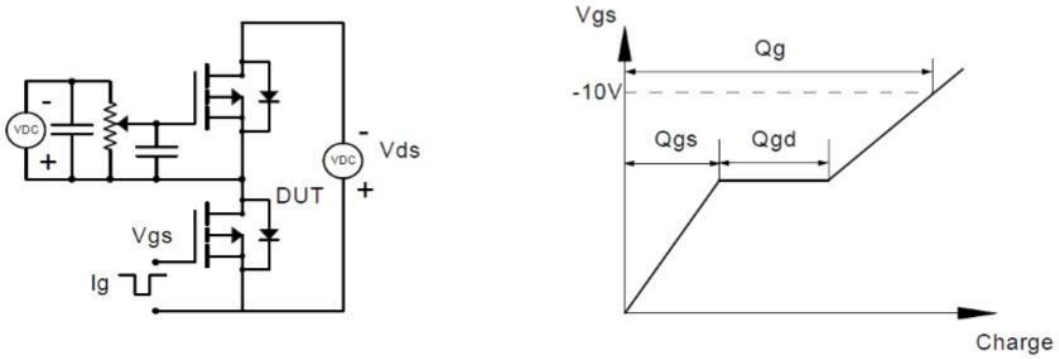



**Figure.11:** Maximum Effective Transient Thermal Impedance, Junction-to-Case

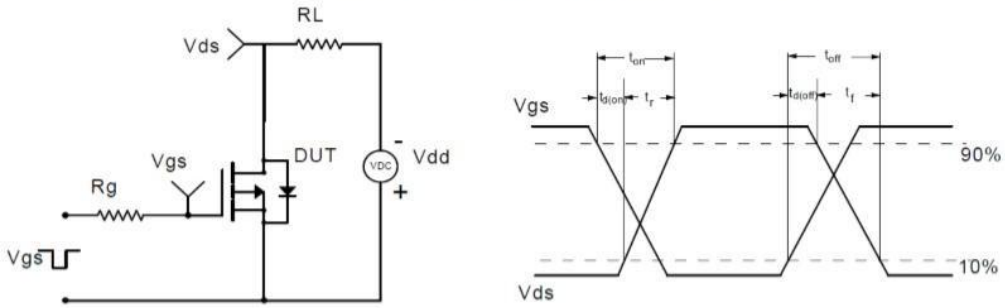


## Test Circuit

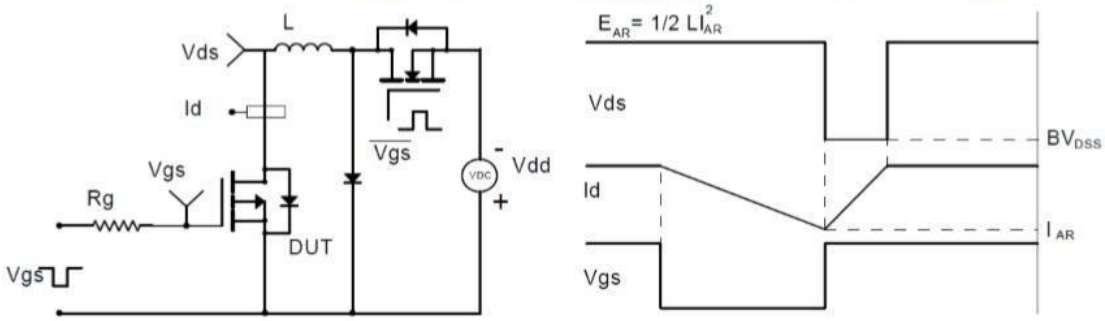
Gate Charge Test Circuit & Waveform



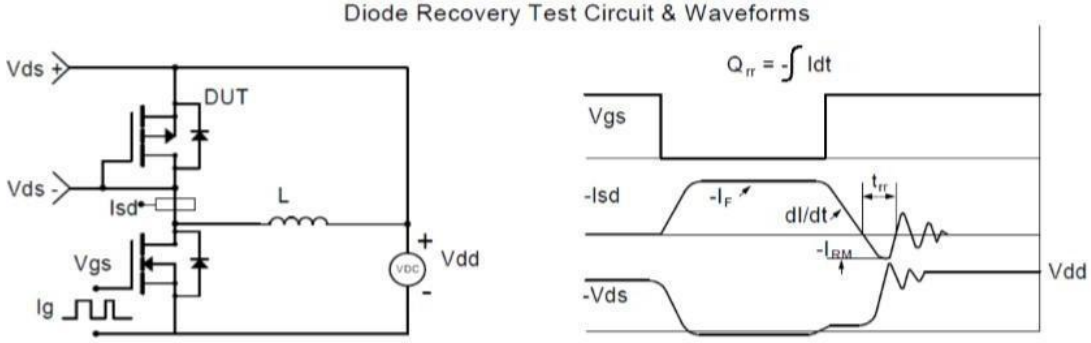

Resistive Switching Test Circuit & Waveforms



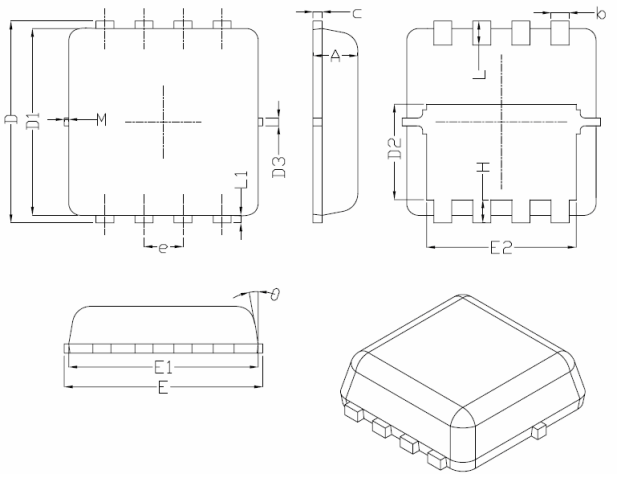

Unclamped Inductive Switching (UIS) Test Circuit & Waveforms




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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