



Description

The IRF1407PBF uses advanced trench technology to provide excellent $R_{DS(ON)}$, low gate charge and operation with gate voltages as low as 4.5V. This device is suitable for use as a Battery protection or in other Switching application.

General Features

$V_{DS} = 120V$ $I_D = 120A$

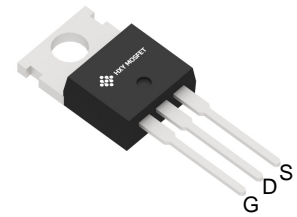
$R_{DS(ON)} < 7.5m\Omega @ V_{GS}=10V$

Application

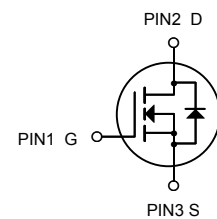
Battery protection

Load switch

Uninterruptible power supply



TO-220
(TO-220AB)



N-Channel MOSFET

Ordering Information

| Product ID | Pack | Brand | Qty(PCS) |
|------------|------------------|------------|----------|
| IRF1407PBF | TO-220(TO-220AB) | HXY MOSFET | 50 |

Absolute Maximum Ratings ($T_C=25^\circ C$ unless otherwise noted)

| Symbol | Parameter | Rating | Units |
|----------------------|--|------------|--------------|
| V_{DS} | Drain-Source Voltage | 120 | V |
| V_{GS} | Gate-Source Voltage | ± 20 | V |
| I_D | Continuous Drain Current $T_C=25^\circ C$ | 120 | A |
| I_{DM} | Puled Drain Current note 1 | 320 | A |
| EAS | Single Pulse Avalanche Energy ³ | 326 | mJ |
| $P_D@T_C=25^\circ C$ | Total Power Dissipation ⁴ | 119 | W |
| T_{STG} | Storage Temperature Range | -55 to 150 | $^\circ C$ |
| T_J | Operating Junction Temperature Range | -55 to 150 | $^\circ C$ |
| $R_{\theta JA}$ | Thermal Resistance Junction-Ambient ¹ | 52 | $^\circ C/W$ |
| $R_{\theta JC}$ | Thermal Resistance Junction-Ambient ¹ | 1.05 | $^\circ C/W$ |



Electrical Characteristics : ($T_C=25^\circ\text{C}$ unless otherwise noted)

| Symbol | Parameter | Test Conditions | Value | | | Units |
|--------------|-----------------------------------|---|-------|------|------|------------|
| | | | Min. | Typ. | Max. | |
| V_{DSS} | Drain to Source Breakdown Voltage | $V_{GS}=0V, I_D=250\mu A$ | 120 | -- | -- | V |
| I_{DSS} | Drain to Source Leakage Current | $V_{DS} = 120V, V_{GS}= 0V$ | -- | -- | 1 | μA |
| $I_{GSS(F)}$ | Gate to Source Forward Leakage | $V_{GS} =+20V$ | -- | -- | 100 | nA |
| $I_{GSS(R)}$ | Gate to Source Reverse Leakage | $V_{GS} =-20V$ | -- | -- | -100 | nA |
| $V_{GS(TH)}$ | Gate Threshold Voltage | $V_{DS}=V_{GS}, I_D = 250\mu A$ | 2.5 | 3 | 3.5 | V |
| $R_{DS(ON)}$ | Drain-to-Source On-Resistance | $V_{GS}=10V, I_D=20A$ | -- | 6 | 7.5 | m Ω |
| C_{iss} | Input Capacitance | $V_{GS} = 0V$ $V_{DS} = 60V$ $f = 1.0MHz$ | -- | 3614 | -- | pF |
| C_{oss} | Output Capacitance | | -- | 423 | -- | |
| C_{rss} | Reverse Transfer Capacitance | | -- | 12 | -- | |
| R_g | Gate resistance | | -- | 0.84 | -- | |
| $t_{d(ON)}$ | Turn-on Delay Time | $I_D =20A$ $V_{DS} = 60V$ $V_{GS} = 10V$ $R_G = 5\Omega$ | -- | 20 | -- | ns |
| t_r | Rise Time | | -- | 65 | -- | |
| $t_{d(OFF)}$ | Turn-Off Delay Time | | -- | 32 | -- | |
| t_f | Fall Time | | -- | 49 | -- | |
| Q_g | Total Gate Charge | $V_{GS} =0\sim 10V$ $V_{DS} = 60V$ $I_D =20A$ | -- | 60.8 | -- | nC |
| Q_{gs} | Gate Source Charge | | -- | 18.8 | -- | |
| Q_{gd} | Gate Drain Charge | | -- | 14.7 | -- | |
| I_S | Diode Forward Current | $T_C =25^\circ\text{C}$ | -- | -- | 120 | A |
| V_{SD} | Diode Forward Voltage | $I_S=20A, V_{GS}=0V$ | -- | 0.83 | 1.2 | V |
| t_{rr} | Reverse Recovery time | $I_S=40A,$ $dI/dt=100A/\mu s$ | -- | 60 | -- | ns |
| Q_{rr} | Reverse Recovery Charge | | -- | 109 | -- | nC |

a1: Repetitive rating; pulse width limited by maximum junction temperature

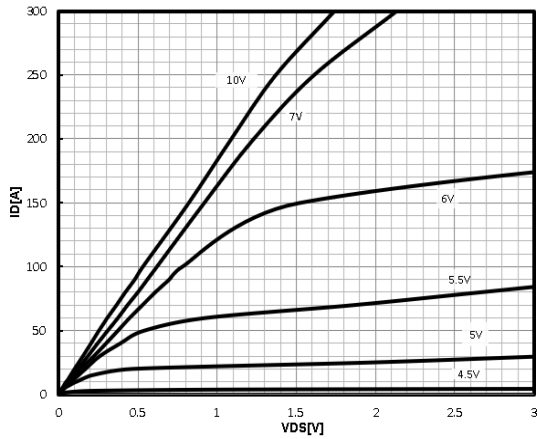
a2: $V_{DD}=60V, L=0.5mH, R_g=25\Omega, \text{Starting } T_J=25^\circ\text{C}$



Typical Characteristics : ($T_C=25^\circ\text{C}$ unless otherwise noted)

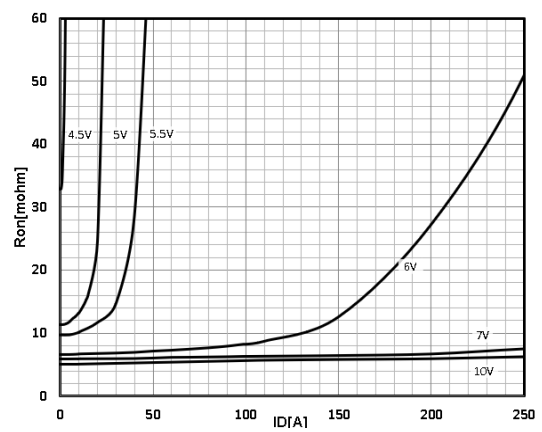
Typ. output characteristics

$$I_D=f(V_{DS})$$



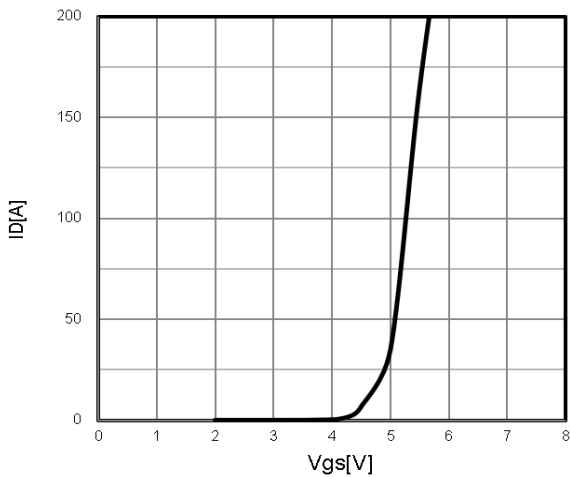
Typ. drain-source on resistance

$$R_{DS(on)}=f(I_D)$$



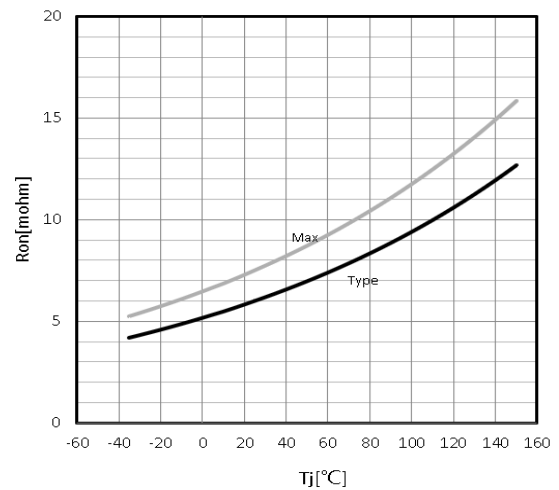
Typ. transfer characteristics

$$I_D=f(V_{GS})$$



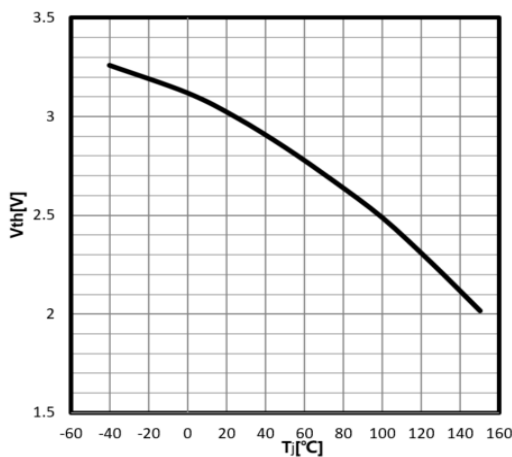
Drain-source on-state resistance

$$R_{DS(on)}=f(T_j); I_D=20A; V_{GS}=10V$$



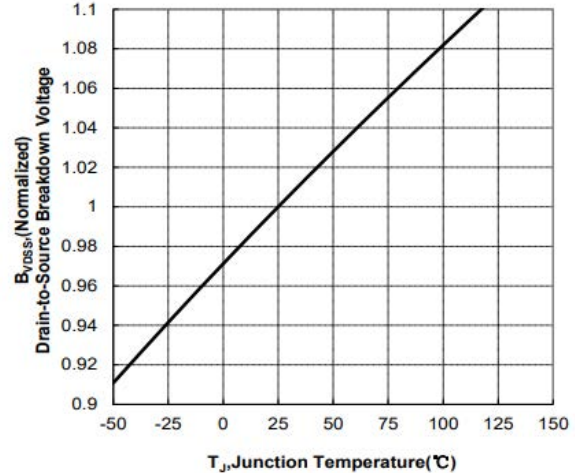
Gate Threshold Voltage

$$V_{TH}=f(T_j); I_D=250\mu A$$



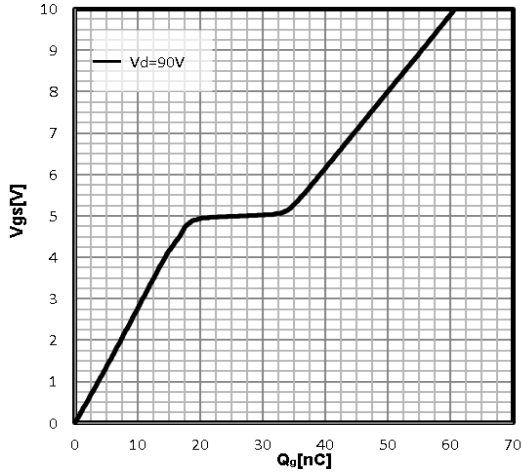
Drain-source breakdown voltage

$$V_{BR(DSS)}=f(T_j); I_D=250\mu A$$

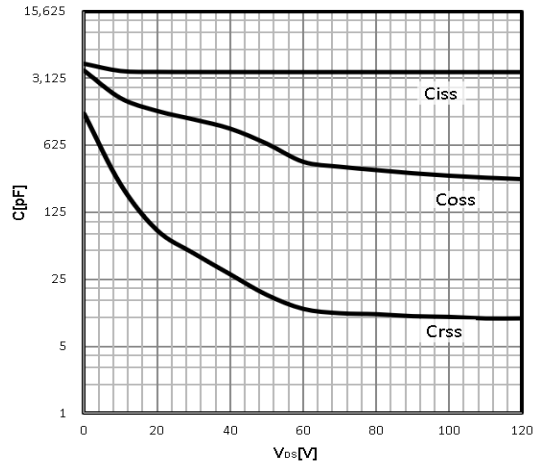




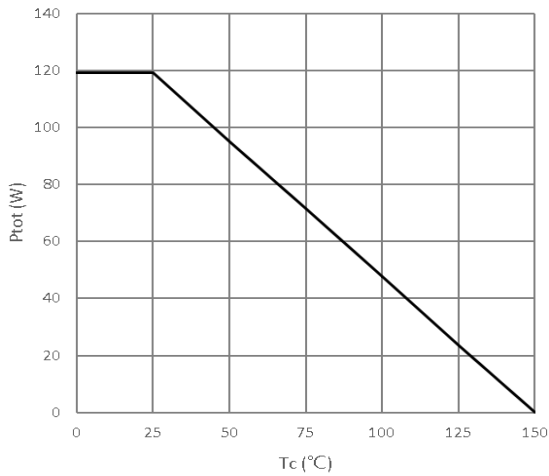
Typ. gate charge
 $V_{GS}=f(Q_{gate})$



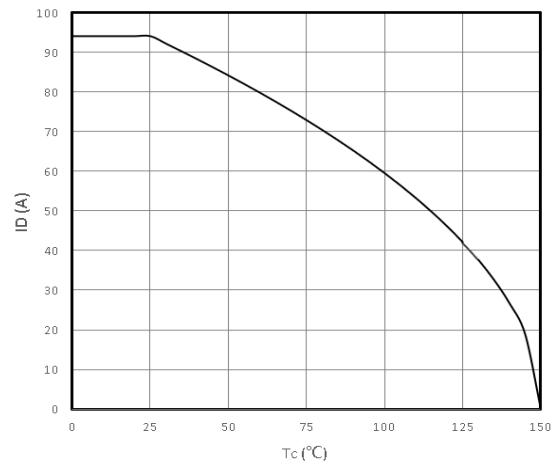
Typ. capacitances
 $C=f(V_{DS}); V_{GS}=0V; f=1MHz$



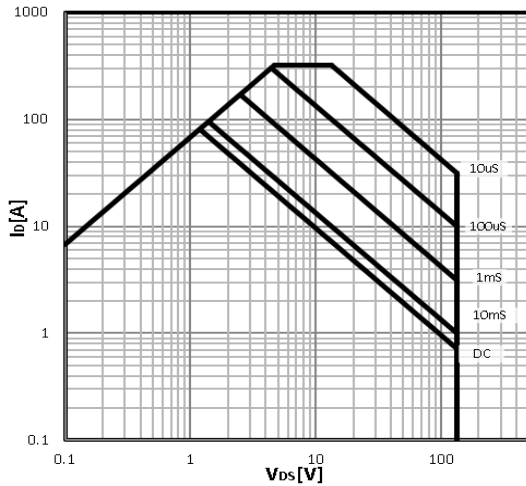
Power Dissipation
 $P_{tot}=f(T_j)$



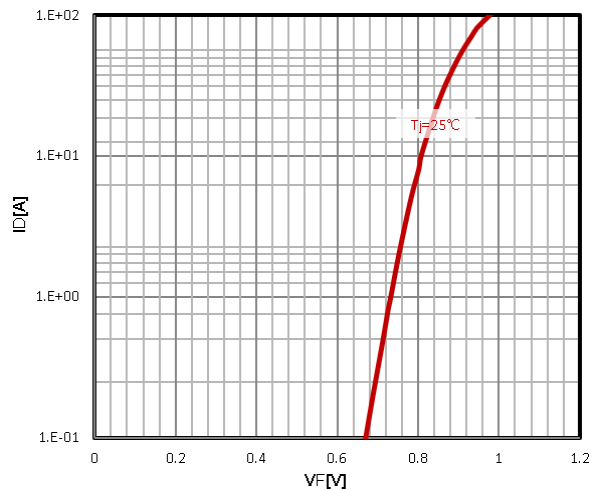
Maximum Drain Current
 $I_D=f(T_C)$



Safe operating area
 $I_D=f(V_{DS})$

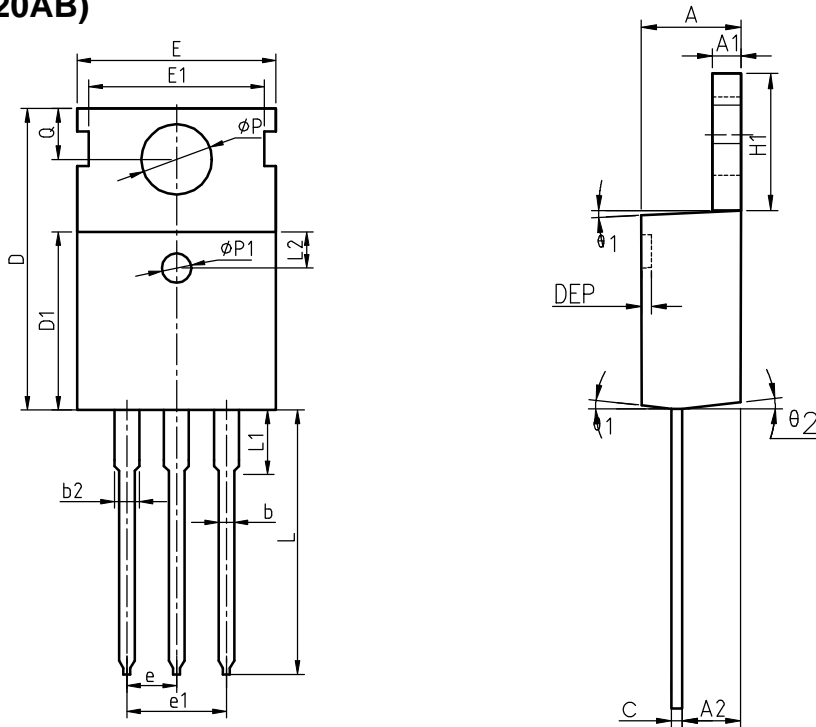


Body Diode Forward Voltage Variation
 $I_F=f(V_{GS})$



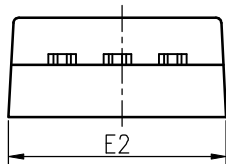


Package Information
TO-220(TO-220AB)



COMMON DIMENSIONS

| SYMBOL | MIN | NOM | MAX | MIN | NOM | MAX |
|---------|-------|-------|-------|-------|-------|-------|
| A | 4.40 | 4.57 | 4.70 | 0.173 | 0.180 | 0.185 |
| A1 | 1.27 | 1.30 | 1.33 | 0.050 | 0.051 | 0.052 |
| A2 | 2.35 | 2.40 | 2.50 | 0.093 | 0.094 | 0.098 |
| b | 0.77 | 0.80 | 0.90 | 0.030 | 0.031 | 0.035 |
| b2 | 1.17 | 1.27 | 1.36 | 0.046 | 0.050 | 0.054 |
| c | 0.48 | 0.50 | 0.56 | 0.019 | 0.020 | 0.022 |
| D | 15.40 | 15.60 | 15.80 | 0.606 | 0.614 | 0.622 |
| D1 | 9.00 | 9.10 | 9.20 | 0.354 | 0.358 | 0.362 |
| DEP | 0.05 | 0.10 | 0.20 | 0.002 | 0.004 | 0.008 |
| E | 9.80 | 10.00 | 10.20 | 0.386 | 0.394 | 0.402 |
| E1 | - | 8.70 | - | - | 0.343 | - |
| E2 | 9.80 | 10.00 | 10.20 | 0.386 | 0.394 | 0.402 |
| e | | 2.54 | BSC | | 0.100 | BSC |
| e1 | | 5.08 | BSC | | 0.200 | BSC |
| H1 | 6.40 | 6.50 | 6.60 | 0.252 | 0.256 | 0.260 |
| L | 12.75 | 13.50 | 13.65 | 0.502 | 0.531 | 0.537 |
| L1 | - | 3.10 | 3.30 | - | 0.122 | 0.130 |
| L2 | | 2.50 | REF | | 0.098 | REF |
| P | 3.50 | 3.60 | 3.63 | 0.138 | 0.142 | 0.143 |
| P1 | 3.50 | 3.60 | 3.63 | 0.138 | 0.142 | 0.143 |
| Q | 2.73 | 2.80 | 2.87 | 0.107 | 0.110 | 0.113 |
| theta 1 | 5° | 7° | 9° | 5° | 7° | 9° |
| theta 2 | 1° | 3° | 5° | 1° | 3° | 5° |
| theta 3 | 1° | 3° | 5° | 1° | 3° | 5° |





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