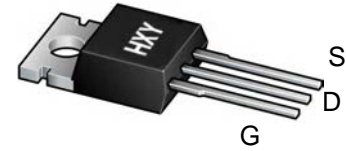




### Description

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.



TO-220

### General Features

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

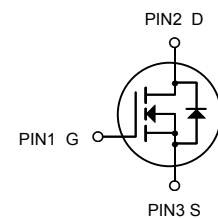
$R_{DS(ON)} < 7.5m\Omega @ V_{GS}=10V$

### Application

Battery protection

Load switch

Uninterruptible power supply



N-Channel MOSFET

### Package Marking and Ordering Information

Product ID	Pack	Brand	Qty(PCS)
IRF1407PBF	TO-220	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	$\pm 20$	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 <sup>3</sup>	326	mJ
$P_D@T_C=25^\circ C$	Total Power Dissipation <sup>4</sup>	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 <sup>1</sup>	52	$^\circ C/W$
$R_{\theta JC}$	Thermal Resistance Junction-Ambient <sup>1</sup>	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	$\mu A$
$I_{GSS(F)}$	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 $\Omega$
$C_{iss}$	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

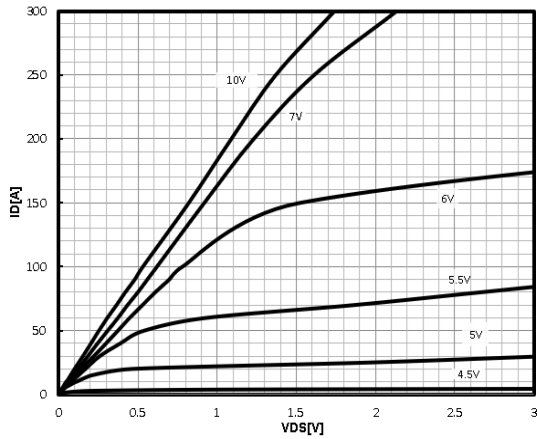
a2:  $V_{DD}=60V, L=0.5mH, R_g=25\Omega, \text{Starting } T_J=25^\circ\text{C}$



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

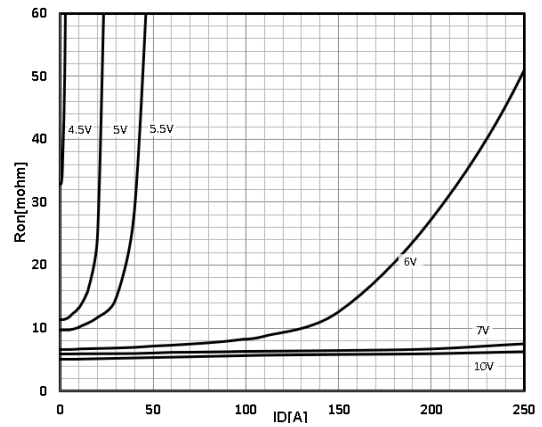
Typ. output characteristics

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



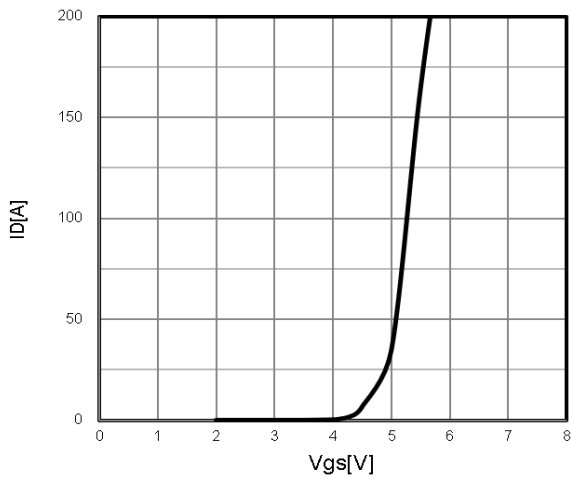
Typ. drain-source on resistance

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



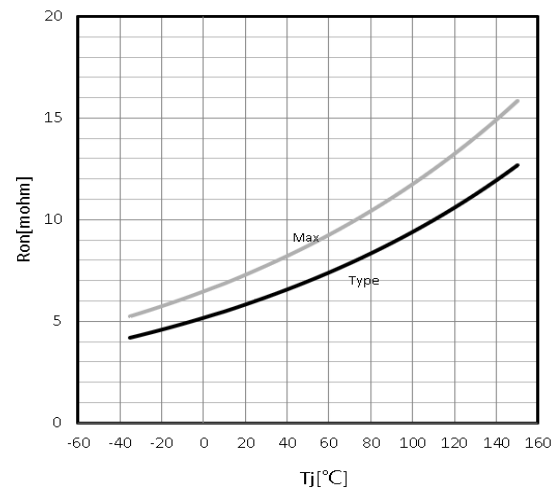
Typ. transfer characteristics

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



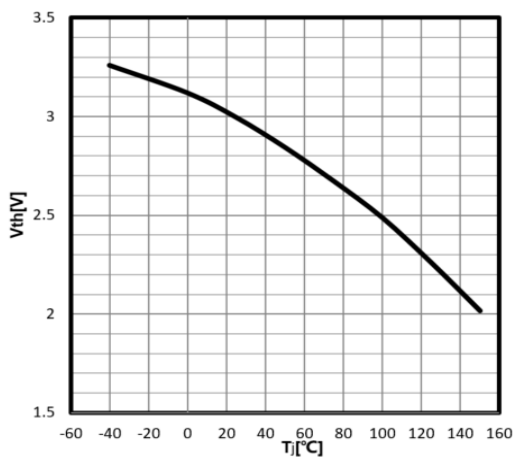
Drain-source on-state resistance

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



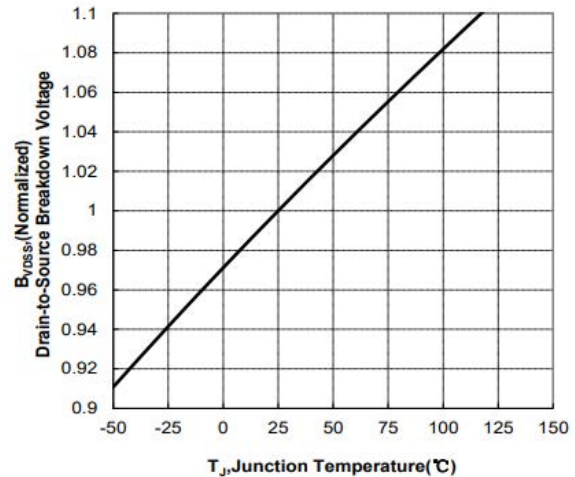
Gate Threshold Voltage

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



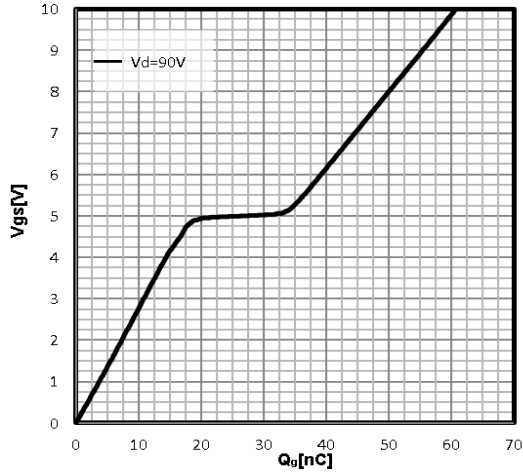
Drain-source breakdown voltage

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

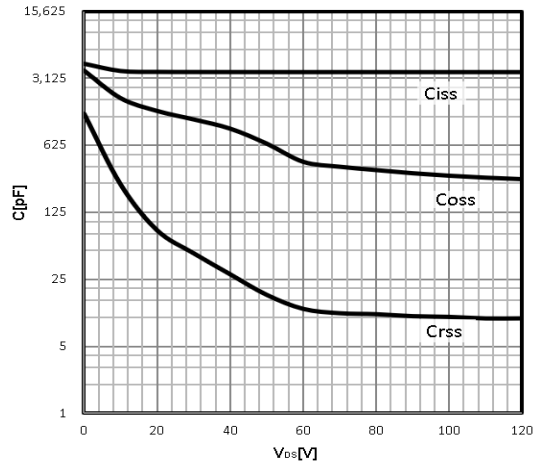




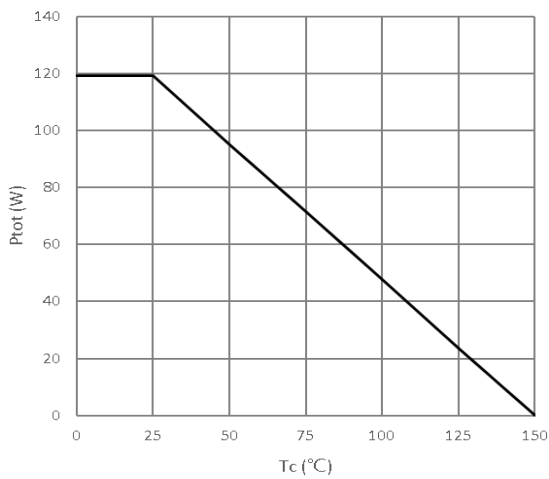
**Typ. gate charge**  
 $V_{GS}=f(Q_{gate})$



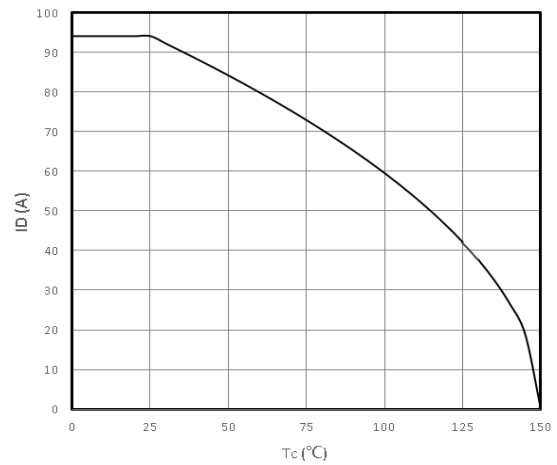
**Typ. capacitances**  
 $C=f(V_{DS}); V_{GS}=0V; f=1MHz$



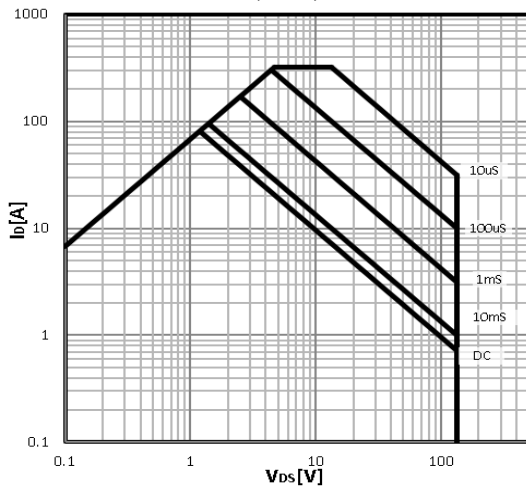
**Power Dissipation**  
 $P_{tot}=f(T_j)$



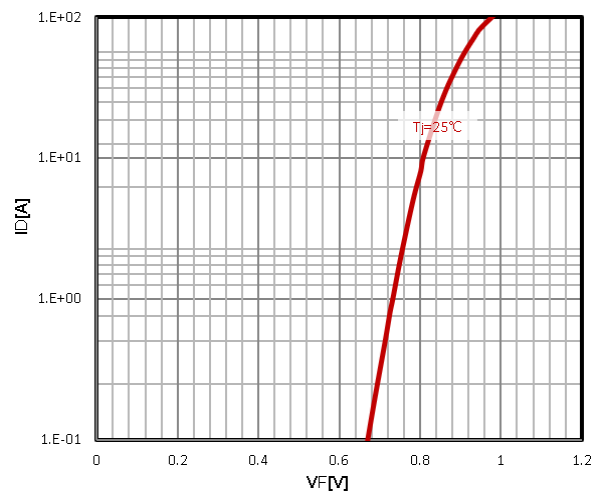
**Maximum Drain Current**  
 $I_D=f(T_c)$



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

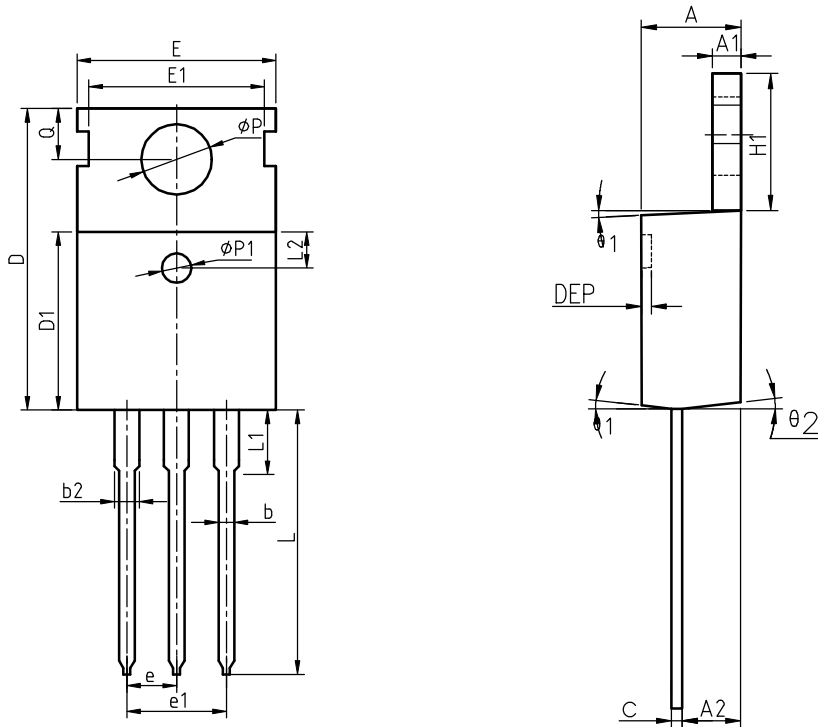


**Body Diode Forward Voltage Variation**  
 $I_F=f(V_{GS})$



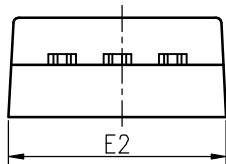


Package Information  
TO-220



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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