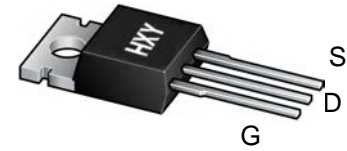




## Description

The IRF640NPBF uses advanced trench technology and design to provide excellent  $R_{DS(ON)}$  with low gate charge. It can be used in a wide variety of applications.



TO-220

## General Features

$V_{DS} = 200V, I_D = 18A$

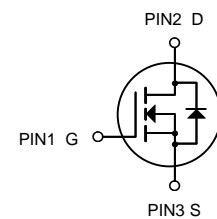
$R_{DS(ON)} < 145m\Omega @ V_{GS}=10V$

## Application

High efficiency switch mode power supplies

Power factor correction

Electronic lamp ballast



N-Channel MOSFET

## Package Marking and Ordering Information

Product ID	Pack	Marking	Units Tube
IRF640NPBF	TO-220	HXY IRF640N YYYY	50

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

Symbol	Parameter	Rating	Units
VDS	Drain-Source Voltage	200	V
VGS	Gate-Source Voltage	$\pm 20$	V
$I_D@T_C=25^\circ C$	Drain Current	18	A
IDM	Pulsed Drain Current <sup>1</sup>	72	A
$P_D@T_C=25^\circ C$	Total Power Dissipation	125	W
TSTG	Storage Temperature Range	-55 to 150	$^\circ C$
$T_J$	Operating Junction Temperature Range	-55 to 150	$^\circ C$



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

Parameter	Symbol	Condition	Min	Typ	Max	Unit
<b>Off Characteristics</b>						
Drain-Source Breakdown Voltage <sup>(Note 1)</sup>	$BV_{DSS}$	$V_{GS}=0V, I_D=250\mu A$	200	-	-	V
Zero Gate Voltage Drain Current	$I_{DSS}$	$V_{DS}=200V, V_{GS}=0V$	-	-	1	$\mu A$
Gate-Body Leakage Current	$I_{GSS}$	$V_{GS}=\pm 20V, V_{DS}=0V$	-	-	$\pm 100$	nA
<b>On Characteristics</b>						
Gate Threshold Voltage	$V_{GS(th)}$	$V_{DS}=V_{GS}, I_D=250\mu A$	2.0	-	4.0	V
Drain-Source On-State Resistance	$R_{DS(on)}$	$V_{GS}=10V, I_D=9A$	-	120	145	m $\Omega$
Forward Transconductance	$g_{FS}$	$V_{DS}=40V, I_D=5A$	8	-	-	S
<b>Dynamic Characteristics</b>						
Input Capacitance	$C_{iss}$	$V_{DS}=25V, V_{GS}=0V,$ $F=1.0\text{MHz}$	-	1100	-	PF
Output Capacitance	$C_{oss}$		-	180	-	PF
Reverse Transfer Capacitance	$C_{rss}$		-	30	-	PF
<b>Switching Characteristics</b>						
Turn-on Delay Time	$t_{d(on)}$	$V_{DD}=100V, I_D=18A$ $R_G=2.5\Omega, V_{GS}=10V$ <sup>(Note 2)</sup>	-	11	-	nS
Turn-on Rise Time	$t_r$		-	33	-	nS
Turn-Off Delay Time	$t_{d(off)}$		-	25	-	nS
Turn-Off Fall Time	$t_f$		-	7	-	nS
Total Gate Charge	$Q_g$	$V_{DS}=100V, I_D=18A,$ $V_{GS}=10V$ <sup>(Note 2)</sup>	-	25	-	nC
Gate-Source Charge	$Q_{gs}$		-	7.5	-	nC
Gate-Drain Charge	$Q_{gd}$		-	9.5	-	nC
<b>Drain-Source Diode Characteristics</b>						
Diode Forward Voltage	$V_{SD}$	$V_{GS}=0V, I_S=9A$	-	-	1.4	V
Diode Forward Current <sup>(Note 2)</sup>	$I_S$		-	-	18	A

#### Notes:

1. Repetitive Rating: Pulse width limited by maximum junction temperature.
2. Pulse Test: Pulse Width  $\leq 300\mu s$ , Duty Cycle  $\leq 2\%$ .



### Typical Electrical

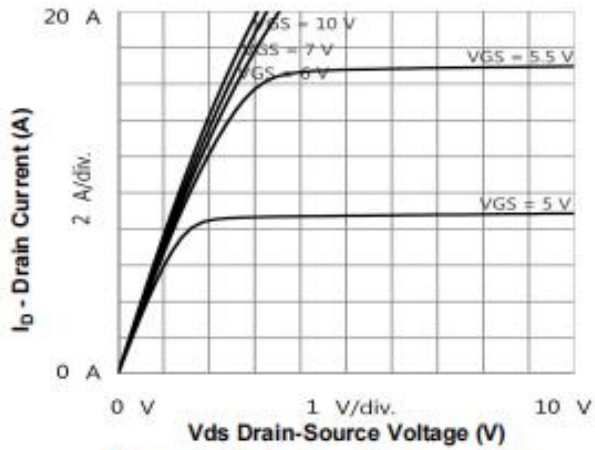


Figure 1. On-Region Characteristics

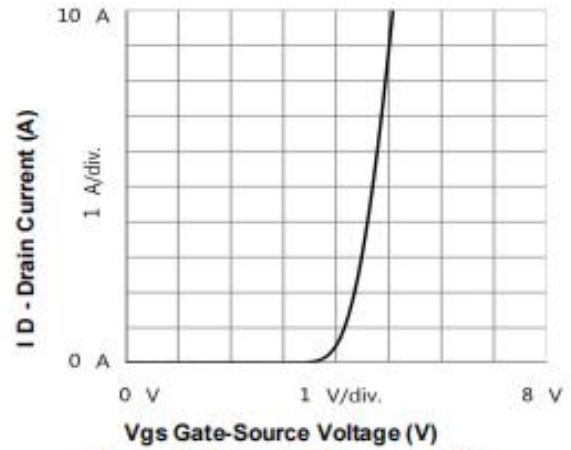


Figure 2. Transfer Characteristics

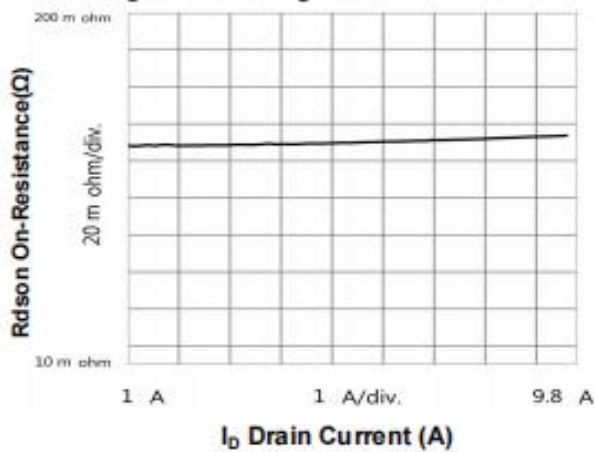


Figure 3. On-Resistance Variation vs Drain Current and Gate Voltage

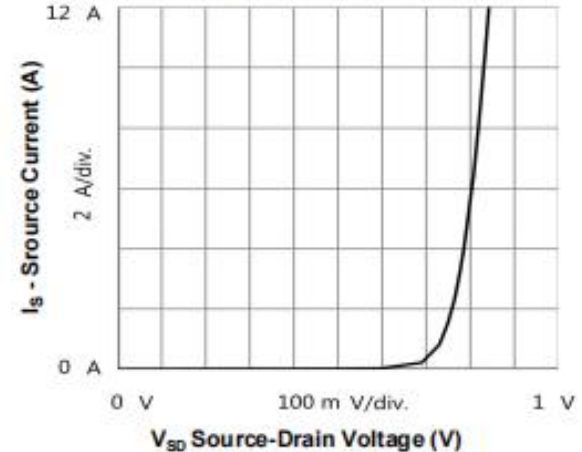


Figure 4. Source Current vs Source-Drain Voltage

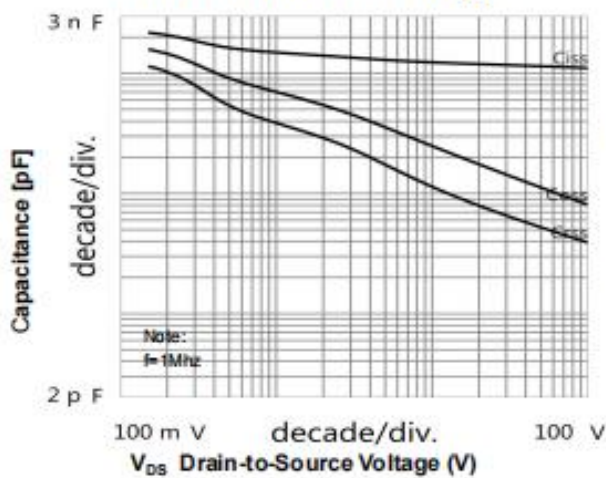


Figure 5.1 Capacitance Characteristics

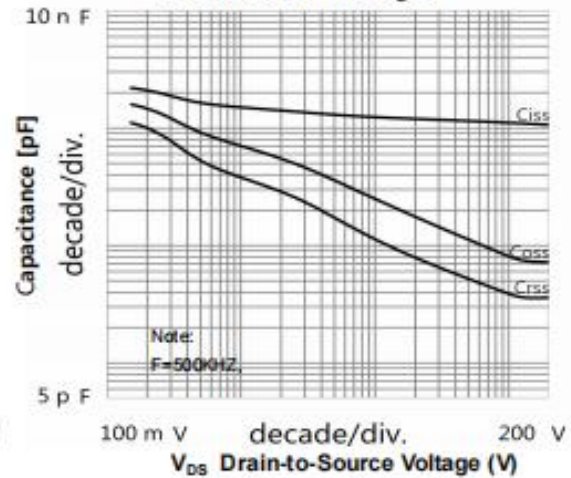


Figure 5.2 Capacitance Characteristics

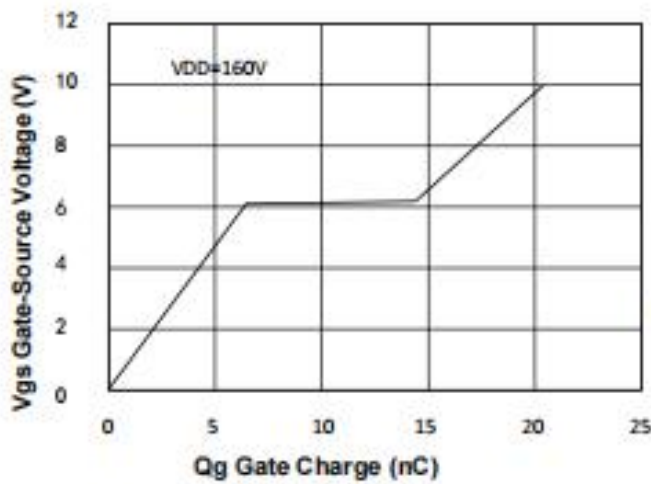


Figure 6. Gate Charge Characteristics

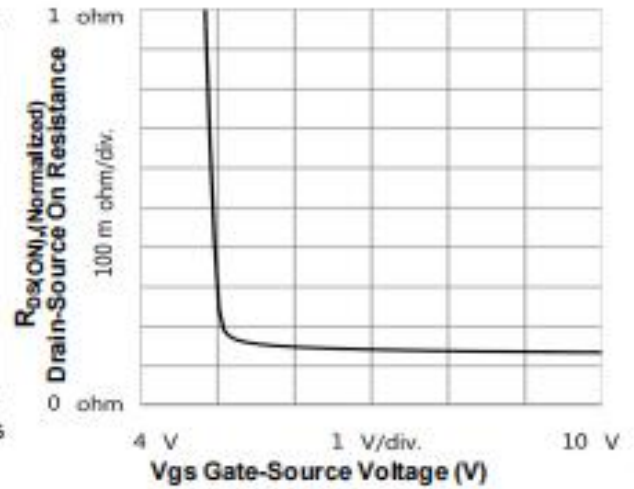


Figure 7. On-Resistance Variation vs Gate-Source Voltage

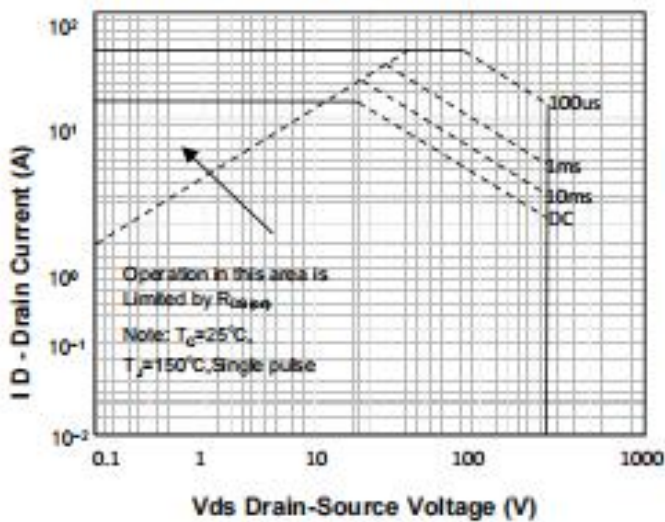


Figure 8. Maximum Safe Operating Area

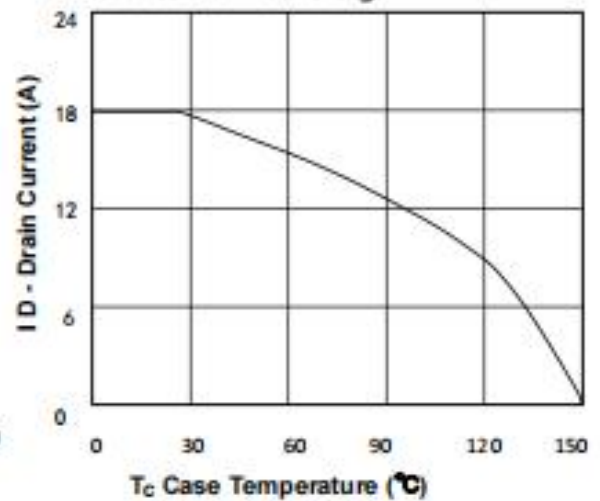


Figure 9. Maximum Drain Current vs Case Temperature

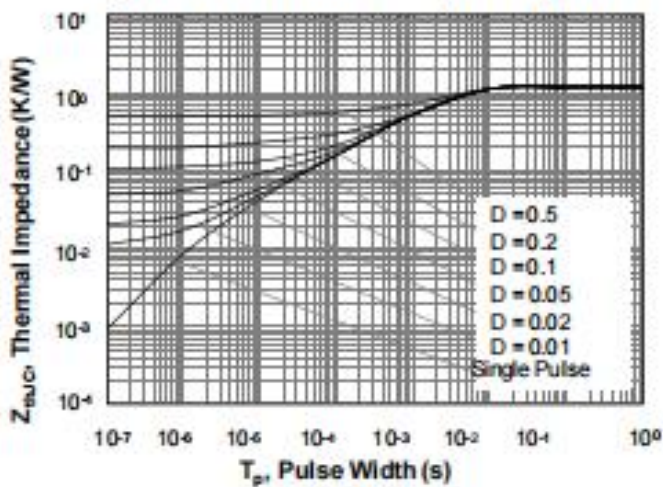
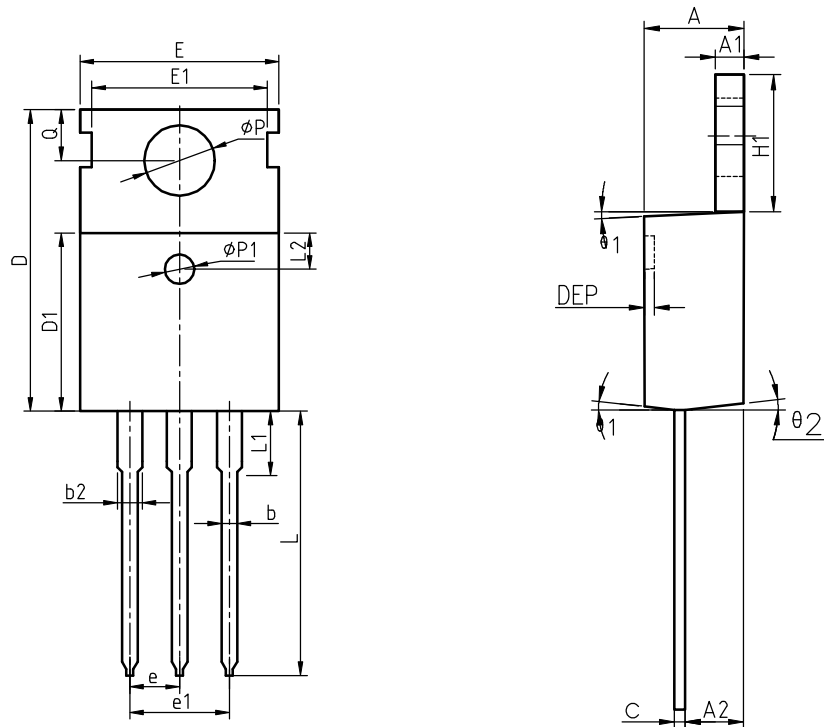


Figure 10. Transient Thermal Response Curve



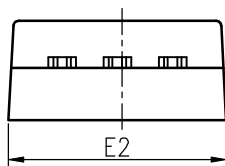
## Package Information

### 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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