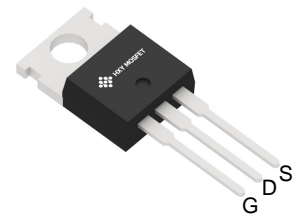




## Description

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.



## General Features

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

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

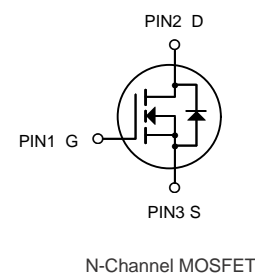
TO-220  
(TO-220AB)

## Application

High efficiency switch mode power supplies

Power factor correction

Electronic lamp ballast



## Package Marking and Ordering Information

Product ID	Pack	Marking	Units Tube
IRF640NPBF	TO-220(TO-220AB)	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
Off Characteristics						
Drain-Source Breakdown Voltage <sup>(Note 1)</sup>	BV <sub>DSS</sub>	V <sub>GS</sub> =0V I <sub>D</sub> =250μA	200	-	-	V
Zero Gate Voltage Drain Current	I <sub>DSS</sub>	V <sub>DS</sub> =200V, V <sub>GS</sub> =0V	-	-	1	μA
Gate-Body Leakage Current	I <sub>GSS</sub>	V <sub>GS</sub> =±20V, V <sub>DS</sub> =0V	-	-	±100	nA
On Characteristics						
Gate Threshold Voltage	V <sub>GS(th)</sub>	V <sub>DS</sub> =V <sub>GS</sub> , I <sub>D</sub> =250μA	2.0	-	4.0	V
Drain-Source On-State Resistance	R <sub>DS(ON)</sub>	V <sub>GS</sub> =10V, I <sub>D</sub> =9A	-	120	145	mΩ
Forward Transconductance	g <sub>FS</sub>	V <sub>DS</sub> =40V, I <sub>D</sub> =5A	8	-	-	S
Dynamic Characteristics						
Input Capacitance	C <sub>iss</sub>	V <sub>DS</sub> =25V, V <sub>GS</sub> =0V, F=1.0MHz	-	1100	-	PF
Output Capacitance	C <sub>oss</sub>		-	180	-	PF
Reverse Transfer Capacitance	C <sub>rss</sub>		-	30	-	PF
Switching Characteristics						
Turn-on Delay Time	t <sub>d(on)</sub>	V <sub>DD</sub> =100V, I <sub>D</sub> =18A R <sub>G</sub> =2.5Ω, V <sub>GS</sub> =10V <sup>(Note 2)</sup>	-	11	-	nS
Turn-on Rise Time	t <sub>r</sub>		-	33	-	nS
Turn-Off Delay Time	t <sub>d(off)</sub>		-	25	-	nS
Turn-Off Fall Time	t <sub>f</sub>		-	7	-	nS
Total Gate Charge	Q <sub>g</sub>	V <sub>DS</sub> =100V, I <sub>D</sub> =18A, V <sub>GS</sub> =10V <sup>(Note 2)</sup>	-	25	-	nC
Gate-Source Charge	Q <sub>gs</sub>		-	7.5	-	nC
Gate-Drain Charge	Q <sub>gd</sub>		-	9.5	-	nC
Drain-Source Diode Characteristics						
Diode Forward Voltage	V <sub>SD</sub>	V <sub>GS</sub> =0V, I <sub>S</sub> =9A	-		1.4	V
Diode Forward Current <sup>(Note 2)</sup>	I <sub>S</sub>		-	-	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

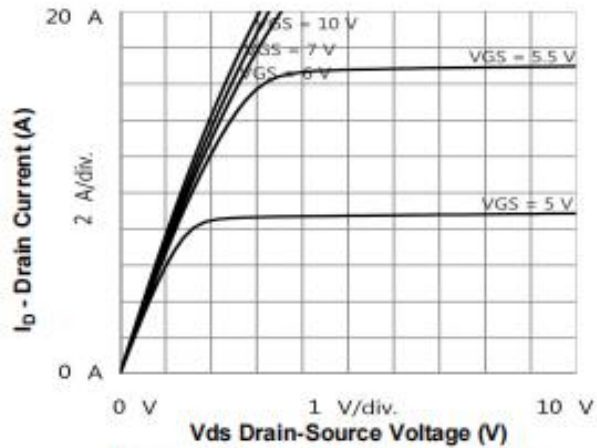


Figure 1. On-Region Characteristics

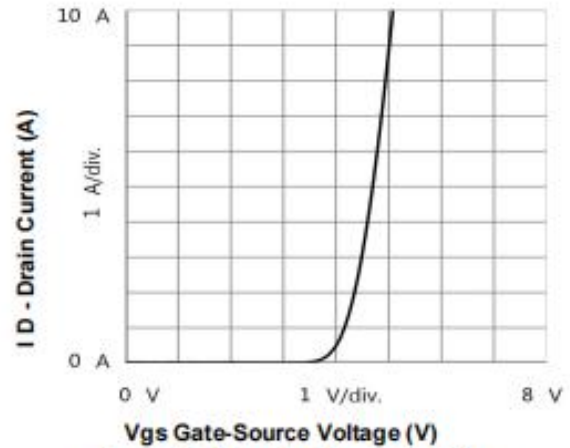


Figure 2. Transfer Characteristics

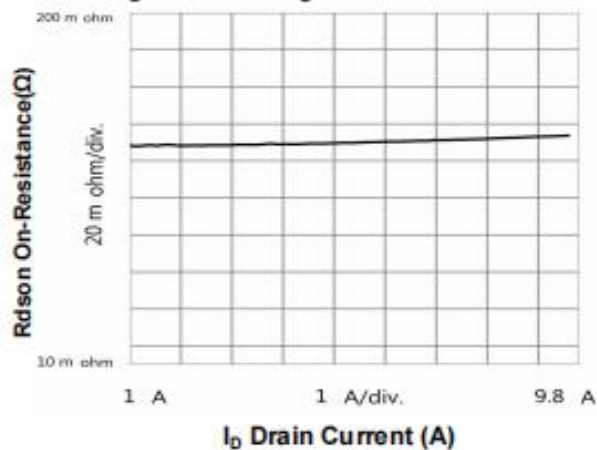


Figure 3. On-Resistance Variation vs Drain Current and Gate Voltage

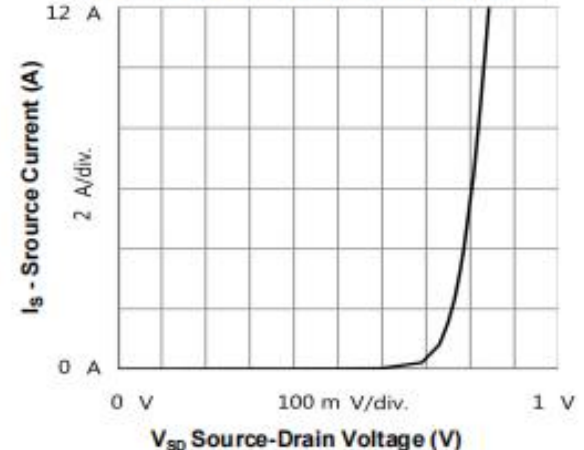


Figure 4. Source Current vs Source-Drain Voltage

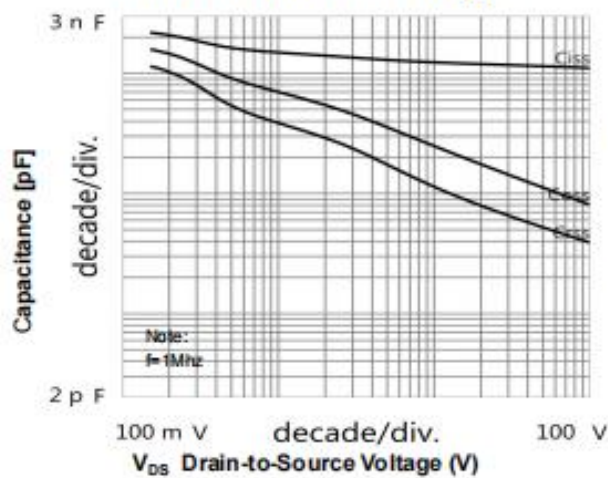


Figure 5.1 Capacitance Characteristics

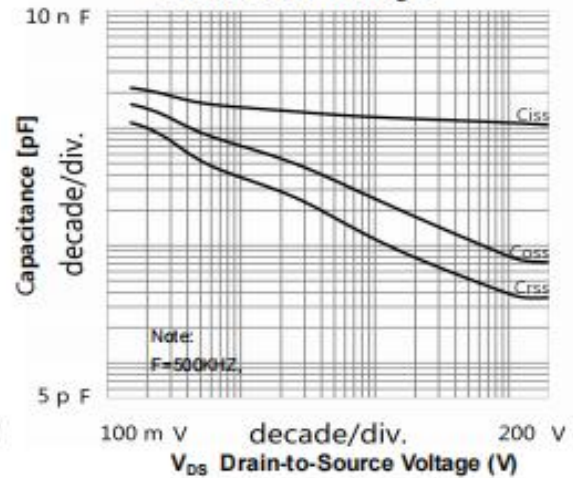


Figure 5.2 Capacitance Characteristics

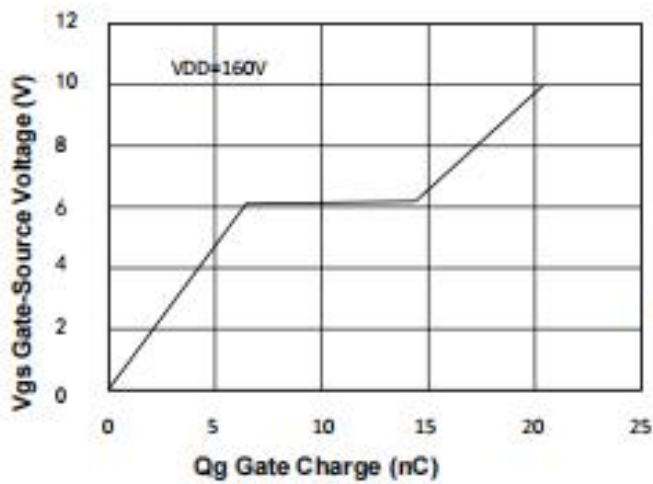


Figure 6. Gate Charge Characteristics

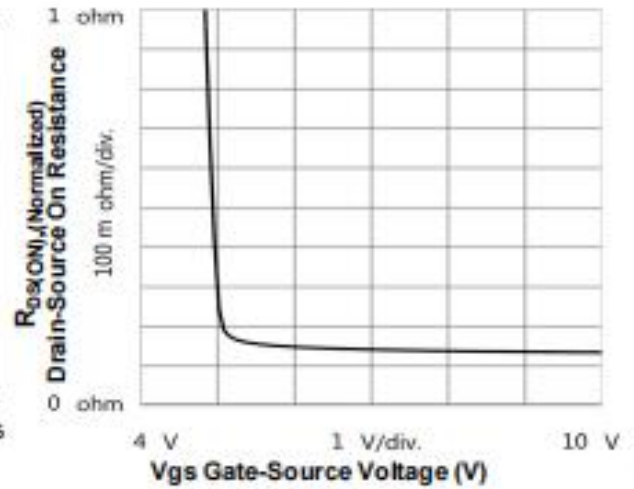


Figure 7. On-Resistance Variation vs Gate-Source Voltage

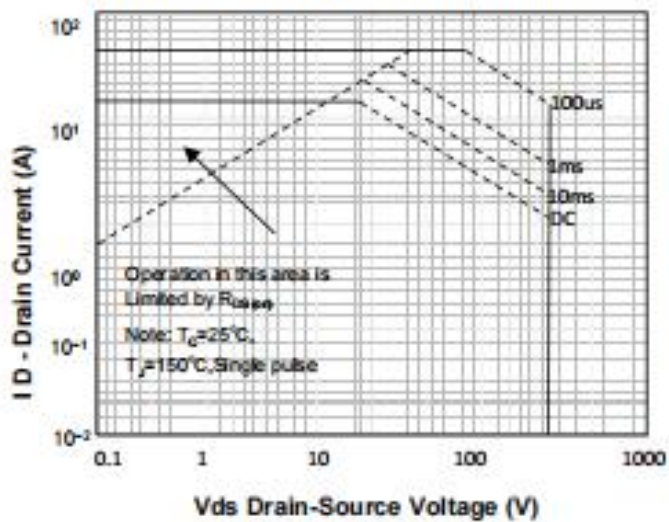


Figure 8. Maximum Safe Operating Area

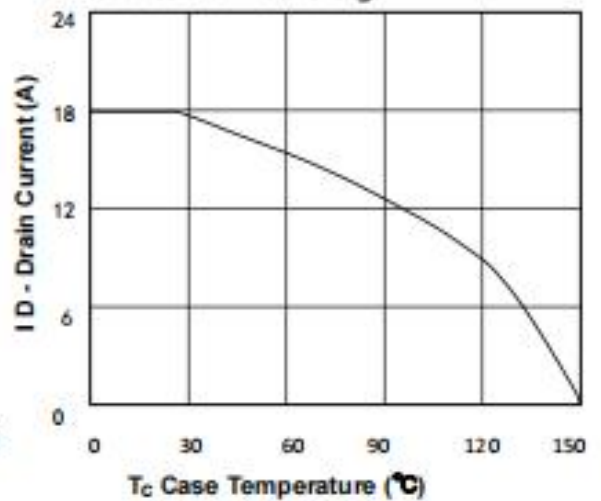


Figure 9. Maximum Drain Current vs Case Temperature

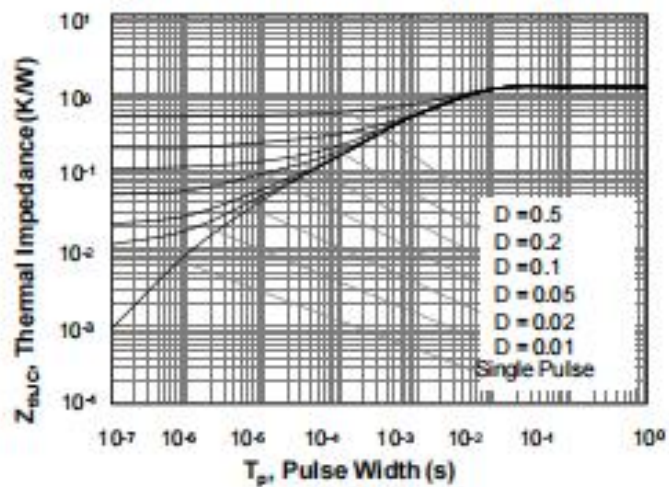
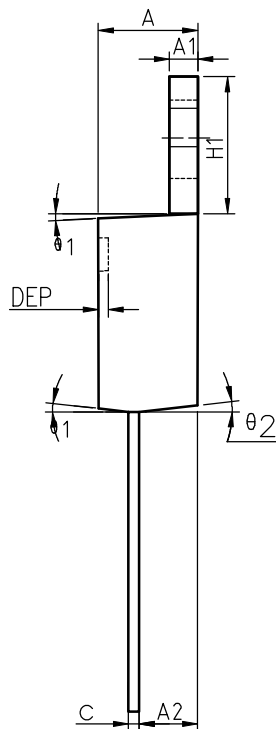
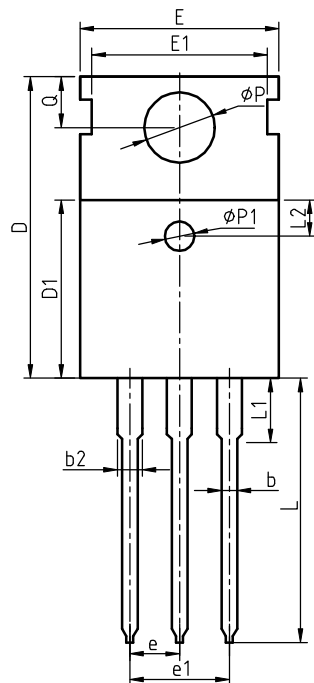


Figure 10. Transient Thermal Response Curve



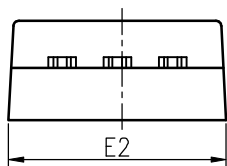
## Package Information

### TO-220(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
θ 1	5°	7°	9°	5°	7°	9°
θ 2	1°	3°	5°	1°	3°	5°
θ 3	1°	3°	5°	1°	3°	5°





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