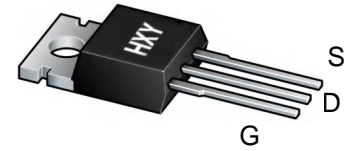




General Description

The IRFB4115PBF use advanced SGT MOSFET technology to provide low RDS(ON), low gate charge, fast switching and excellent avalanche characteristics.

This device is specially designed to get better ruggedness and suitable to use in



TO-220

General Features

$V_{DS} = 150V$ $I_D = 120A$

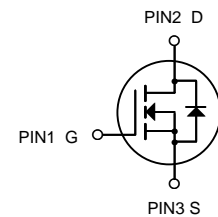
$R_{DS(ON)} < 11.5m\Omega @ V_{GS} = 10V$

Applications

Consumer electronic power supply Motor control

Synchronous-rectification Isolated DC

Synchronous-rectification applications



N-Channel MOSFET

Package Marking and Ordering Information

Product ID	Pack	Marking	Qty(PCS)
IRFB4115PBF	TO-220	120N15 XXX YYYY	50

Absolute Maximum Ratings at $T_j = 25^\circ C$ unless otherwise noted

Parameter	Symbol	Value	Unit
Drain source voltage	V _{DS}	150	V
Gate source voltage	V _{GS}	±20	V
Continuous drain current ¹⁾	I _D	120	A
Pulsed drain current ²⁾	I _{D, pulse}	352	A
Power dissipation ³⁾	P _D	178.6	W
Single pulsed avalanche energy ⁵⁾	E _{AS}	204.8	mJ
Operation and storage temperature	T _{stg} , T _j	-55 to 150	°C
Thermal resistance, junction-case	R _{θJC}	0.7	°C/W
Thermal resistance, junction-ambient ⁴⁾	R _{θJA}	52	°C/W



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

Parameter	Symbol	Test Conditions	Min.	Typ.	Max.	Unit
Static Characteristics						
Drain-Source Breakdown Voltage	$V_{(BR)DSS}$	$V_{GS} = 0V, I_D = 250\mu A$	150	-	-	V
Gate-body Leakage Current	I_{GSS}	$V_{DS} = 0V, V_{GS} = \pm 20V$	-	-	± 100	nA
Zero Gate Voltage Drain Current	$T_J=25^\circ\text{C}$	I_{DSS} $V_{DS} = 150V, V_{GS} = 0V$	-	-	1	μA
	$T_J=100^\circ\text{C}$		-	-	100	
Gate-Threshold Voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}, I_D = 250\mu A$	2	3	4	V
Drain-Source On-Resistance ⁴	$R_{DS(on)}$	$V_{GS} = 10V, I_D = 20A$	-	9.5	11.5	m Ω
Forward Transconductance ⁴	g_{fs}	$V_{DS} = 10V, I_D = 20A$	-	69	-	S
Dynamic Characteristics⁵						
Input Capacitance	C_{iss}	$V_{DS} = 75V, V_{GS} = 0V,$ $f = 1\text{MHz}$	-	3310	-	μF
Output Capacitance	C_{oss}		-	268	-	
Reverse Transfer Capacitance	C_{rss}		-	9.4	-	
Gate Resistance	R_g	$f = 1\text{MHz}$	-	3.2	-	Ω
Switching Characteristics⁵						
Total Gate Charge	Q_g	$V_{GS} = 10V, V_{DS} = 75V,$ $I_D = 20A$	-	45	-	nC
Gate-Source Charge	Q_{gs}		-	15	-	
Gate-Drain Charge	Q_{gd}		-	8.5	-	
Turn-On Delay Time	$t_{d(on)}$	$V_{GS} = 10V, V_{DD} = 75V,$ $R_G = 3\Omega, I_D = 20A$	-	16	-	ns
Rise Time	t_r		-	12	-	
Turn-Off Delay Time	$t_{d(off)}$		-	30	-	
Fall Time	t_f		-	18	-	
Body Diode Reverse Recovery Time	t_{rr}	$I_F = 20A, di/dt = 100A/\mu s$	-	76	-	ns
Body Diode Reverse Recovery Charge	Q_{rr}		-	182	-	nC
Drain-Source Body Diode Characteristics						
Diode Forward Voltage ⁴	V_{SD}	$I_S = 20A, V_{GS} = 0V$	-	-	1.2	V
Continuous Source Current	$T_C=25^\circ\text{C}$	I_S	-	-	120	A

Notes:

1. Repetitive rating, pulse width limited by junction temperature $T_{J(MAX)}=150^\circ\text{C}$
2. The EAS data shows Max. rating . The test condition is $V_{DD}=50V, V_{GS}=10V, L=0.4\text{mH}, I_{AS}=32A$.
3. The data tested by surface mounted on a 1 inch2 FR-4 board with 2OZ copper, The value in any given application depends on the user's specific board design.
4. The data tested by pulsed , pulse width $\leq 300\mu s$, duty cycle $\leq 2\%$.
5. This value is guaranteed by design hence it is not included in the production test.



Typical Characteristics

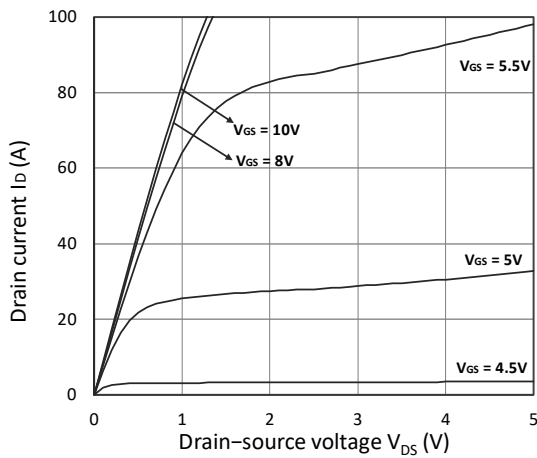


Figure 1. Output Characteristics

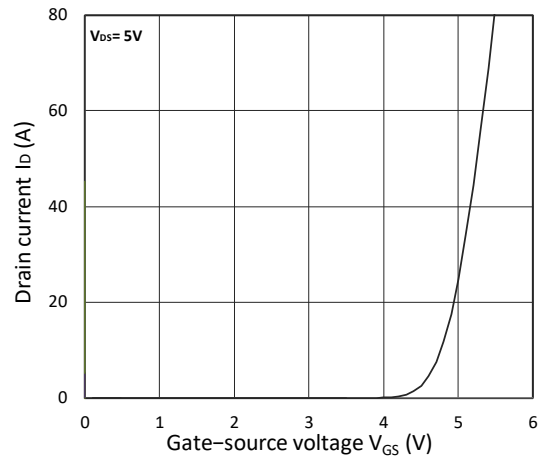


Figure 2. Transfer Characteristics

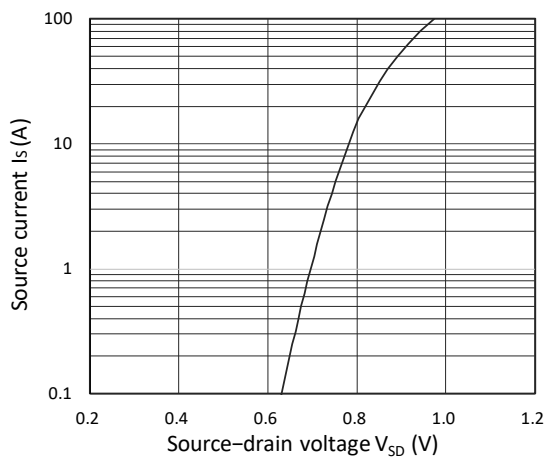


Figure 3. Forward Characteristics of Reverse

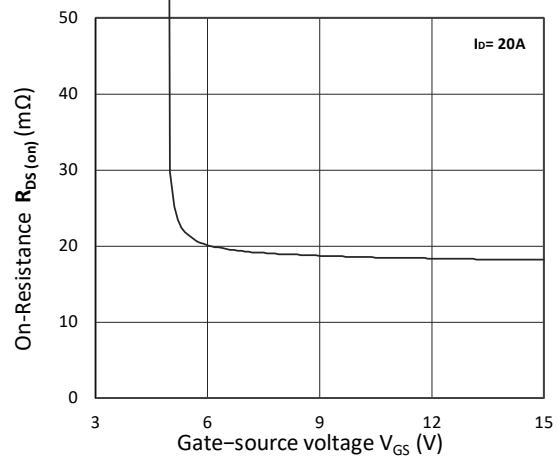


Figure 4. $R_{DS(on)}$ vs. V_{GS}

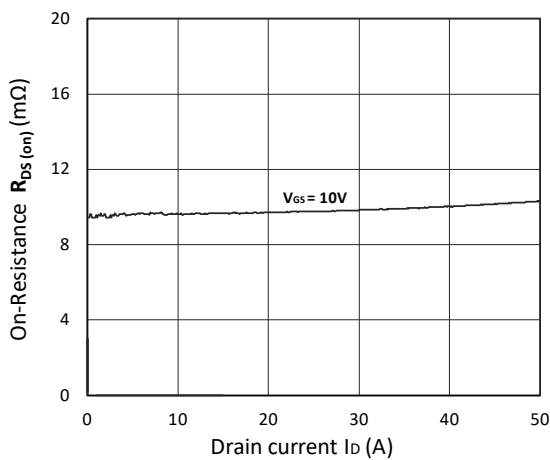


Figure 5. $R_{DS(on)}$ vs. I_D

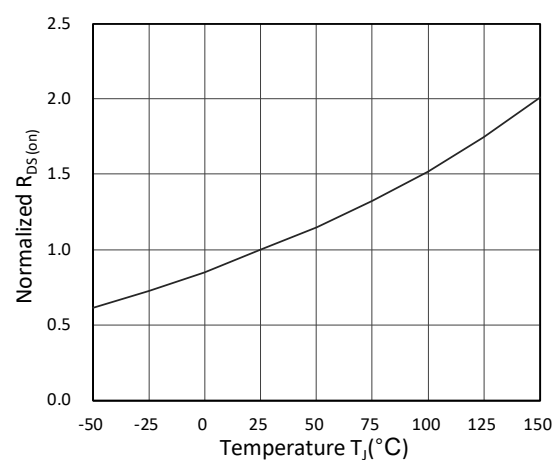


Figure 6. Normalized $R_{DS(on)}$ vs. Temperature

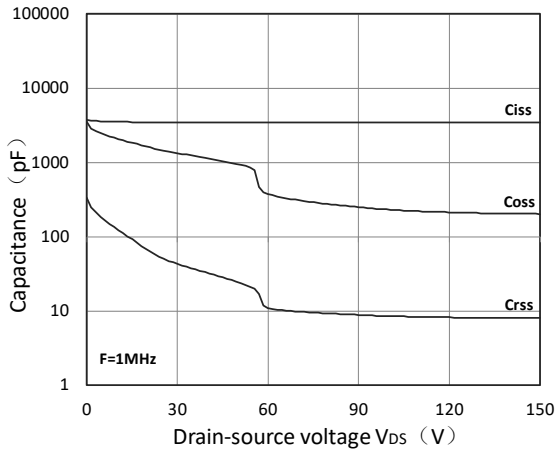


Figure 7. Capacitance Characteristics

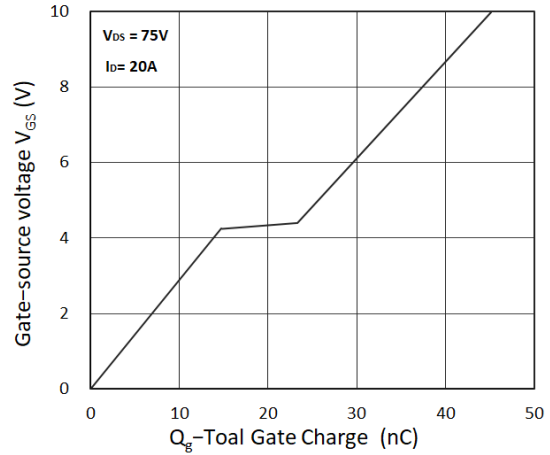


Figure 8. Gate Charge Characteristics

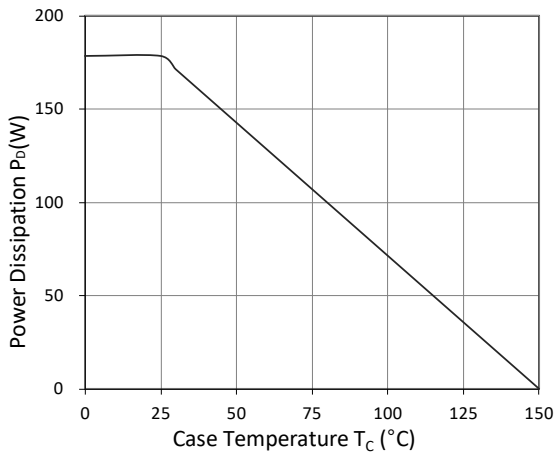


Figure 9. Power Dissipation

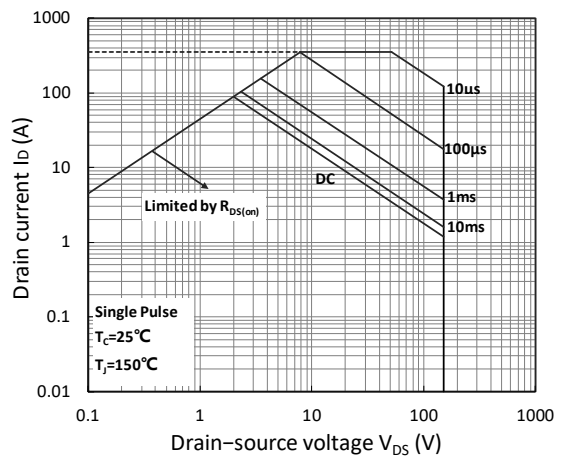


Figure 10. Safe Operating Area

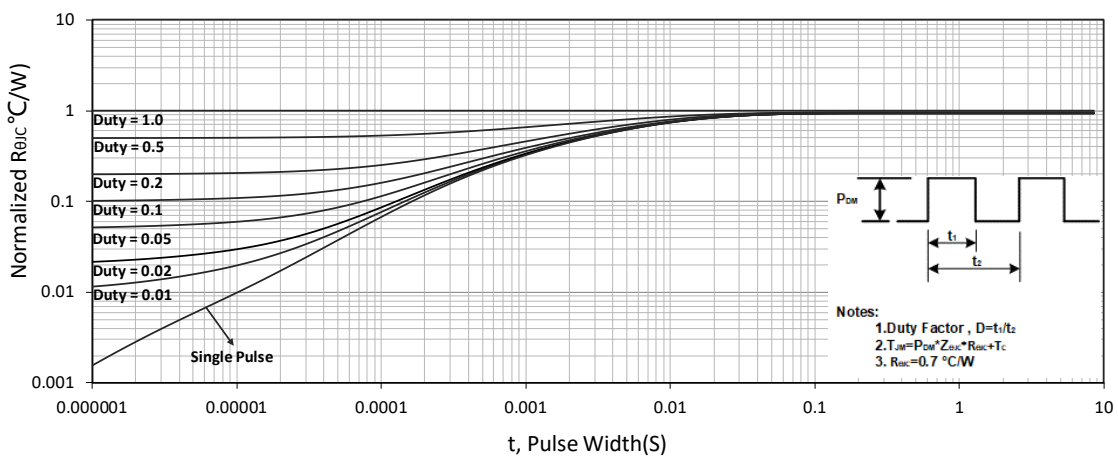


Figure 11. Normalized Maximum Transient Thermal Impedance



Test Circuit

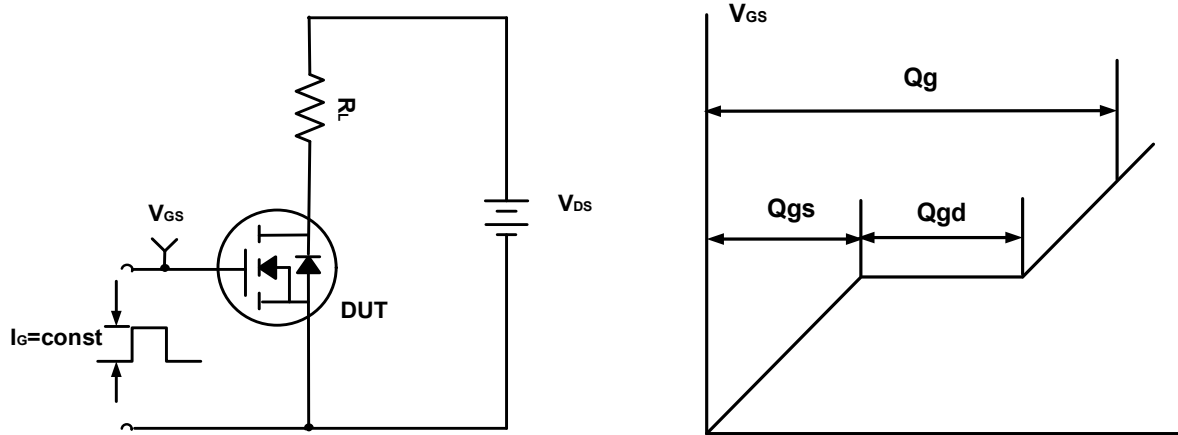


Figure A. Gate Charge Test Circuit & Waveforms

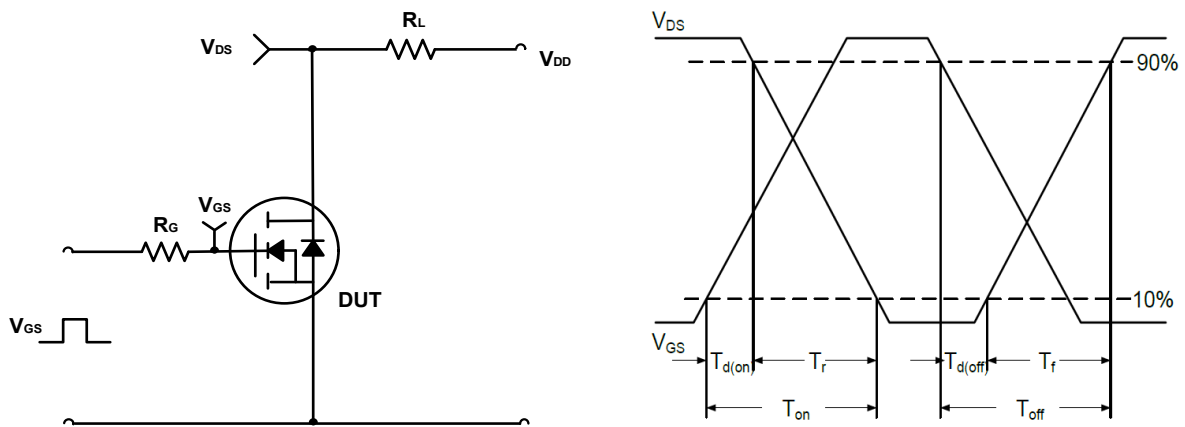


Figure B. Switching Test Circuit & Waveforms

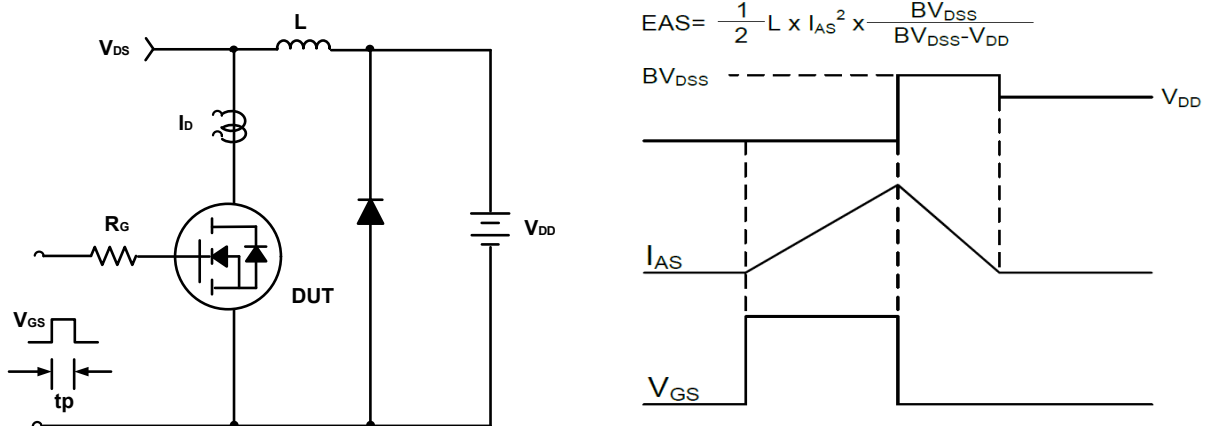
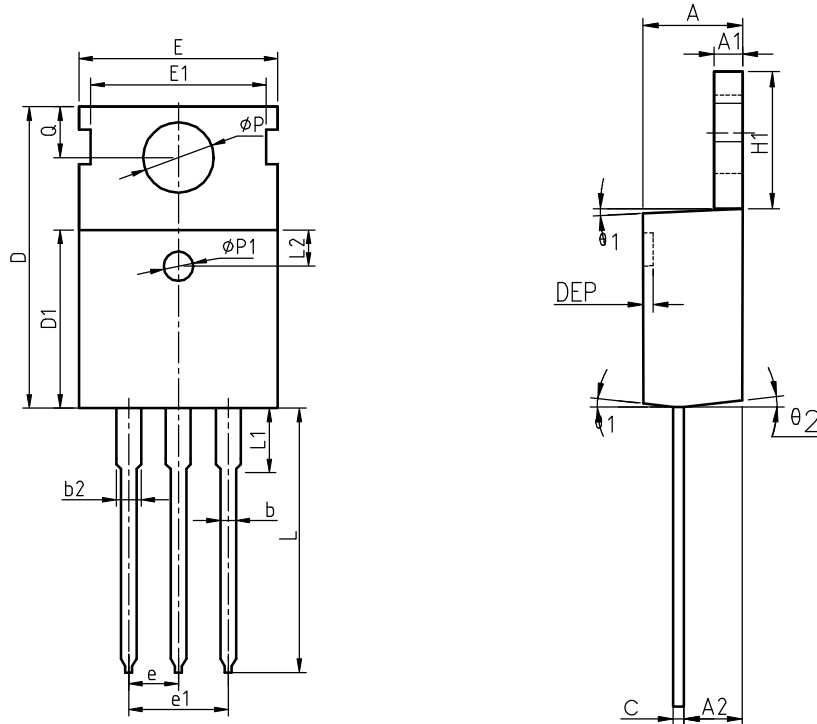


Figure C. Unclamped Inductive Switching Circuit & Waveforms



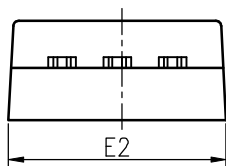
Package Information

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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