General Description

The HIRFB4321PBF use advanced SGT MOSFET technology to provide low RDS(ON), low gate charge, fast switching and excellent avalanche characteristics.

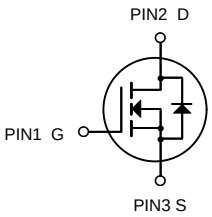
This device is specially designed to get better ruggedness and suitable to use in

TO-220

General Features

V_{DS} =150V I_D =120A

$R_{DS(ON)}$ < 11.5mΩ @ V_{GS}=10V



N-Channel MOSFET

Applications

Consumer electronic power supply Motor control

Synchronous-rectification Isolated DC

Synchronous-rectification applications

Package Marking and Ordering Information

Product ID	Pack	Brand	Qty(PCS)
HIRFB4321PBF	TO-220	HXY MOSFET	50

Absolute Maximum Ratings at T_j=25℃ unless otherwise noted

Parameter	Symbol	Value	Unit
Drain source voltage	VDS	150	V
Gate source voltage	VGS	±20	V
Continuous drain current[1)]	ID	120	A
Pulsed drain current[2)]	ID, pulse	352	A
Power dissipation[3)]	P_D	178.6	W
Single pulsed avalanche energy[5)]	EAS	204.8	mJ
Operation and storage temperature	Tstg，Tj	-55 to 150	℃
Thermal resistance, junction-case	RθJC	0.7	°C/W
Thermal resistance, junction-ambient[4)]	RθJA	52	°C/W

Electrical Characteristics（T_J = 25°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 = 250μA	150	-	-	V
Gate-body Leakage Current		I_{GSS}	V_{DS} = 0V, V_{GS} = ±20V	-	-	±100	nA
Zero Gate Voltage Drain Current	T_J=25°C	I_{DSS}	V_{DS} = 150V, V_{GS} = 0V	-	-	1	μA
	T_J=100°C			-	-	100	
Gate-Threshold Voltage		$V_{GS(th)}$	V_{DS} = V_{GS}, I_D = 250μA	2	3	4	V
Drain-Source On-Resistance[4]		$R_{DS(on)}$	V_{GS} = 10V, I_D = 20A	-	9.5	11.5	mΩ
Forward Transconductance[4]		g_{fs}	V_{DS} = 10V, I_D = 20A	-	69	-	S
Dynamic Characteristics[5]							
Input Capacitance		C_{iss}	V_{DS} = 75V, V_{GS} =0V, f =1MHz	-	3310	-	pF
Output Capacitance		C_{oss}		-	268	-	
Reverse Transfer Capacitance		C_{rss}		-	9.4	-	
Gate Resistance		R_g	f = 1MHz	-	3.2	-	Ω
Switching Characteristics[5]							
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 = 3Ω, 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/μs	-	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°C	I_S	-	-	-	120	A

Notes:

1. Repetitive rating, pulse width limited by junction temperature $T_{J(MAX)}$=150°C
2. The EAS data shows Max. rating . The test condition is V_{DD}=50V,V_{GS}=10V,L=0.4mH，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 ≤ 300us , duty cycle ≤ 2%.
5. This value is guaranteed by design hence it is not included in the production test.

Typical Characteristics

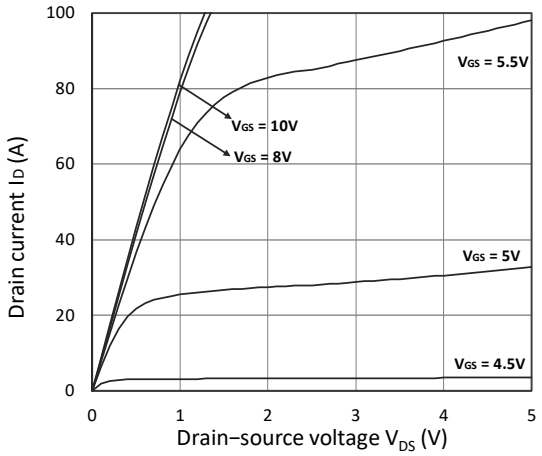


Figure 1. Output Characteristics

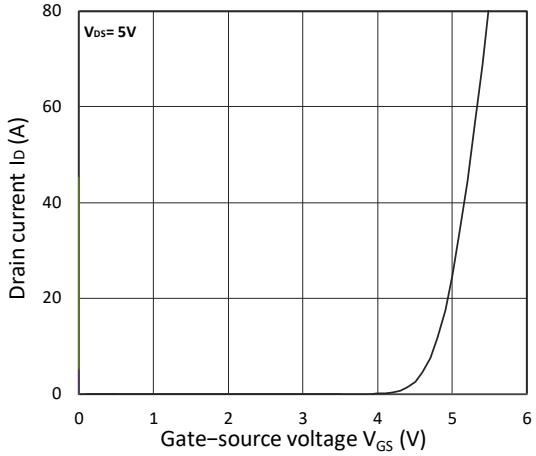


Figure 2. Transfer Characteristics

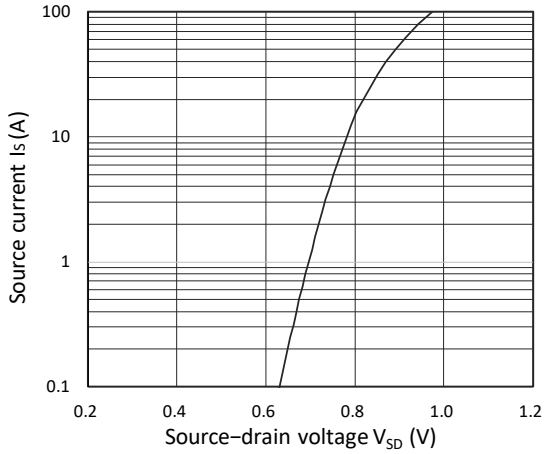


Figure 3. Forward Characteristics of Reverse

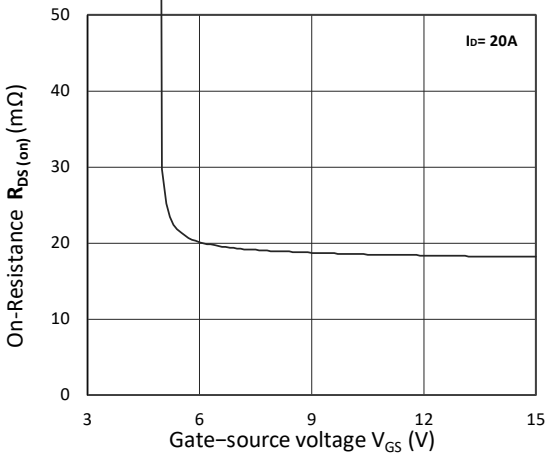


Figure 4. $R_{DS(ON)}$ vs. V_{GS}

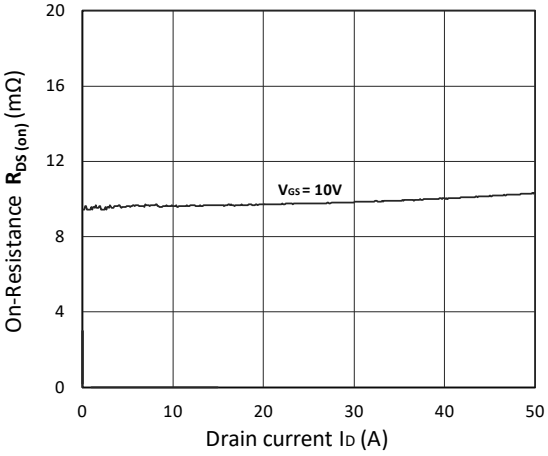


Figure 5. $R_{DS(ON)}$ vs. I_D

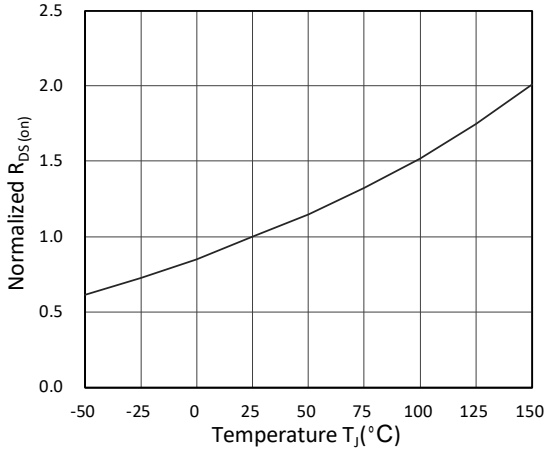


Figure 6. Normalized $R_{DS(on)}$ vs. Temperature

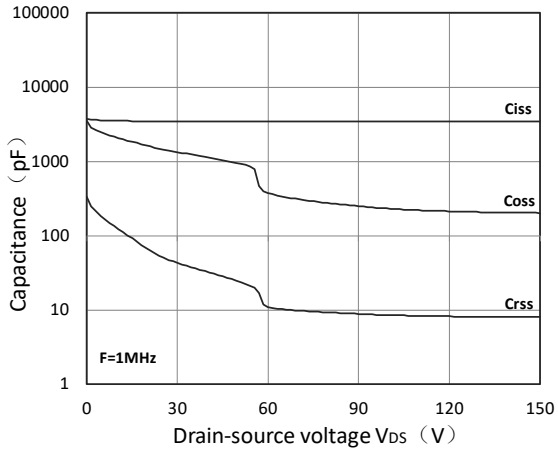


Figure 7. Capacitance Characteristics

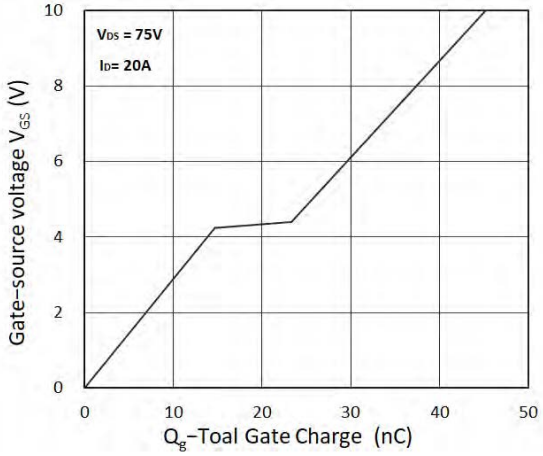


Figure 8. Gate Charge Characteristics

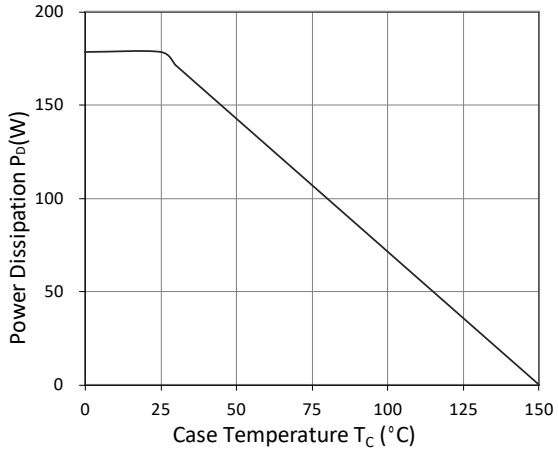


Figure 9. Power Dissipation

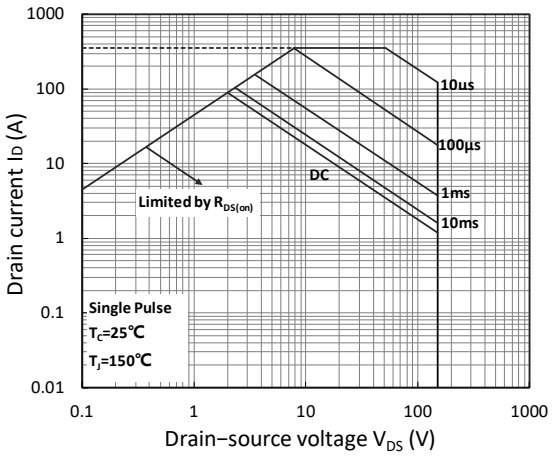


Figure10. Safe Operating Area

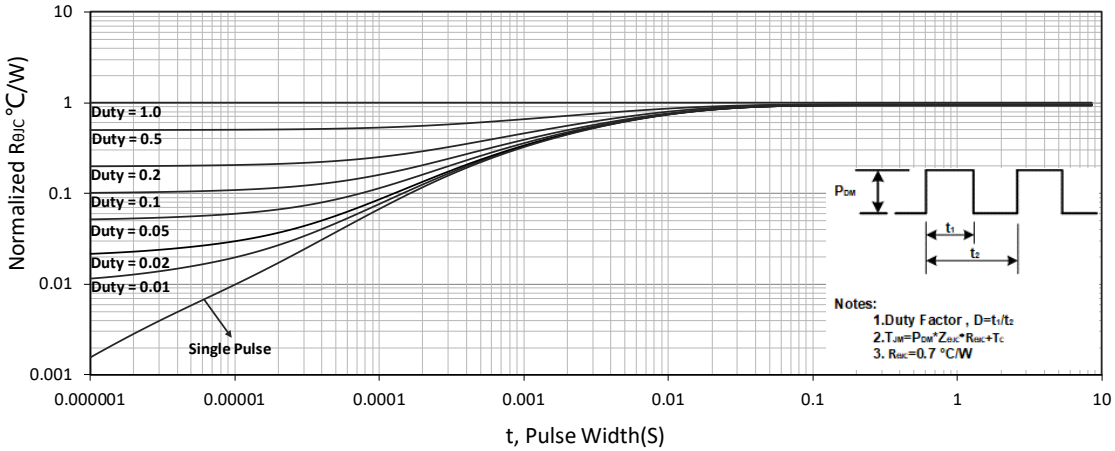


Figure 11. Normalized Maximum Transient Thermal Impedance

Test Circuit

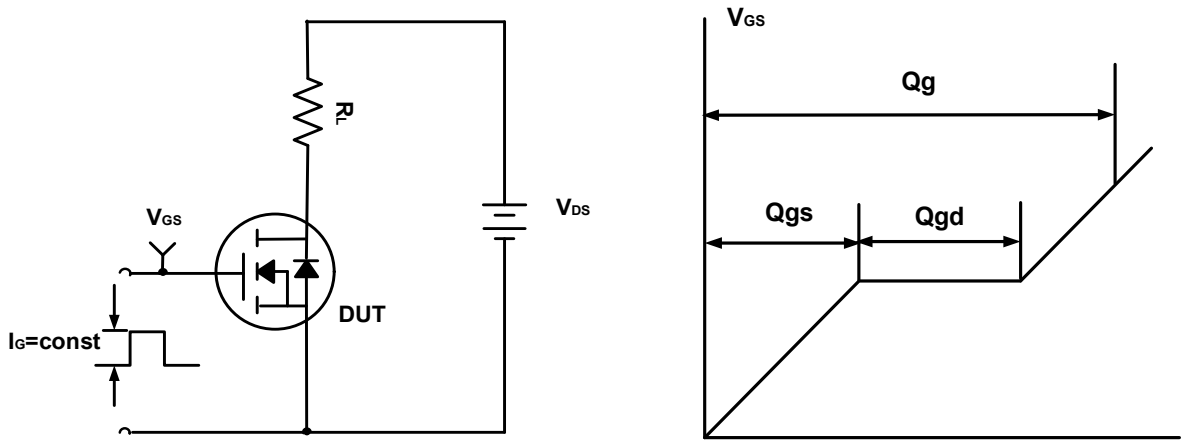


Figure A. Gate Charge Test Circuit & Waveforms

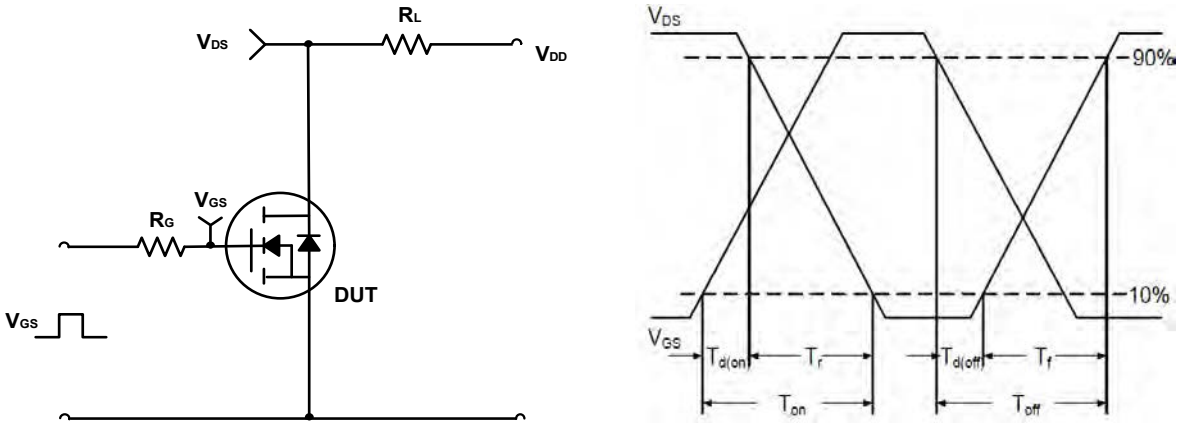


Figure B. Switching Test Circuit & Waveforms

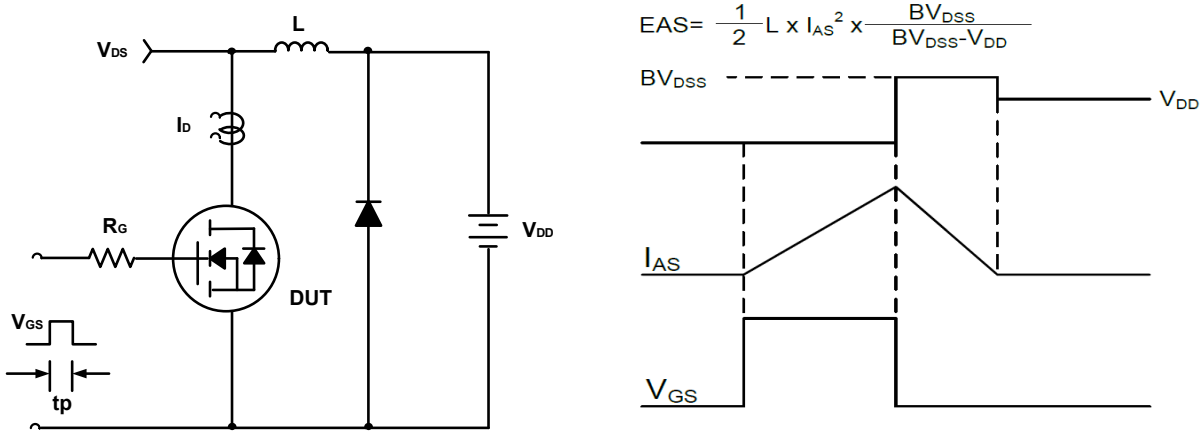
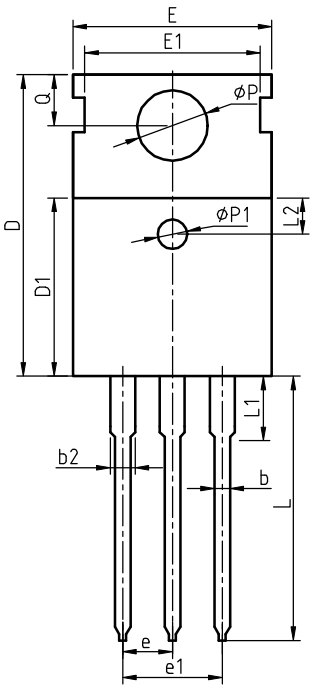
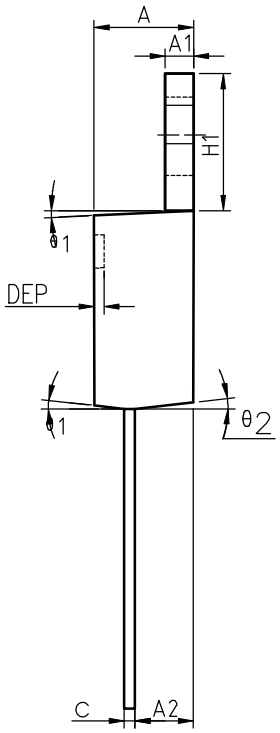


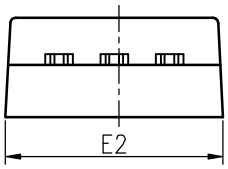
Figure C. Unclamped Inductive Switching Circuit & Waveforms

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
θ1	5°	7°	9°	5°	7°	9°
θ2	1°	3°	5°	1°	3°	5°
θ3	1°	3°	5°	1°	3°	5°

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