FH3210B1

N-Channel Enhancement Mode MOSFET

Description

The FH3210B1 uses advanced trench technologyand design to provide excellent $R_{DS(ON)}$ with low gate charge. It can be used in a wide variety of applications.

Applications

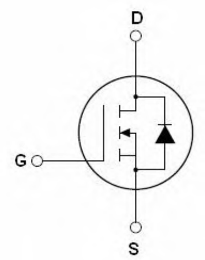
- Motor Driving in Power Tool, E-vehicle, Robotics
- Current Switching in DC/DC & AC/DC (SR) Sub-systems
- Power Management in Telecom., Industrial Automation, CE

Product Summary

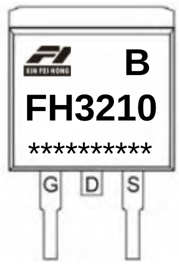
Parameter	Typ.	Unit
V_{DS}	100	V
$V_{GS(th)}$	3.0	V
I_D (@ V_{GS} = 10V)	120	A
$R_{DS(ON)}$ (@ V_{GS} = 10V)	4.3	mΩ (Typ)

- Ultra-low $R_{DS(ON)}$
- Low Gate Charge
- 100% UIS Tested, 100% R_g Tested
- Pb-free Lead Plating
- Halogen-free and RoHS-compliant

TO-263



Schematic diagram



Marking and pin Assignment

TO-263 Top View

Absolute Maximum Ratings (@ T_A = 25°C unless otherwise specified)

Parameter		Symbol	Value	Unit
Drain-to-Source Voltage		V_{DS}	100	V
Gate-to-Source Voltage		V_{GS}	±20	V
Continuous Drain Current (1)	T_C = 25°C	I_D	120	A
	T_C = 100°C		81	
Pulsed Drain Current (2)		I_{DM}	480	A
Avalanche Energy (3)		E_{AS}	486	mJ
Power Dissipation (4)	T_C = 25°C	P_D	178	W
	T_C = 100°C		71	
Junction & Storage Temperature Range		T_J, T_{STG}	-55 to 150	°C

Electrical Characteristics (@ T_J = 25°C unless otherwise specified)

Parameter	Symbol	Conditions		Min.	Typ.	Max.	Unit
STATIC PARAMETERS							
Drain-Source Breakdown Voltage	$V_{(BR)DSS}$	I_D = 250μA, V_{GS} = 0V		100			V
Zero Gate Voltage Drain Current	I_{DSS}	V_{DS} = 80V, V_{GS} = 0V				1.0	μA
			T_J = 55°C			5.0	
Gate-Body Leakage Current	I_{GSS}	V_{DS} = 0V, V_{GS} = ±20V				±100	nA
Gate Threshold Voltage	$V_{GS(th)}$	V_{DS} = V_{GS}, I_D = 250μA		2.0	3.0	4.0	V
Static Drain-Source ON-Resistance	$R_{DS(ON)}$	V_{GS} = 10V, I_D = 20A			4.3	5.6	mΩ
Forward Transconductance	g_{FS}	V_{DS} = 5V, I_D = 20A			35		S
Diode Forward Voltage	V_{SD}	I_S = 1A, V_{GS} = 0V			0.66	1.0	V
Diode Continuous Current	I_S	T_C = 25°C				120	A
DYNAMIC PARAMETERS (5)							
Input Capacitance	C_{iss}	V_{GS} = 0V, V_{DS} = 50V, f = 1MHz			4102		pF
Output Capacitance	C_{oss}				592		pF
Reverse Transfer Capacitance	C_{rss}				19		pF
Gate Resistance	R_g	V_{GS} = 0V, V_{DS}= 0V, f = 1MHz			1.6		Ω
SWITCHING PARAMETERS (5)							
Total Gate Charge (@ V_{GS} = 10V)	Q_g	V_{GS} = 0 to 10V V_{DS} = 50V, I_D = 20A			69		nC
Total Gate Charge (@ V_{GS} = 6.0V)	Q_g				44		nC
Gate Source Charge	Q_{gs}				24		nC
Gate Drain Charge	Q_{gd}				18.5		nC
Turn-On DelayTime	$t_{D(on)}$	V_{GS} = 10V, V_{DS} = 50V R_L = 2.5Ω, R_{GEN} = 3Ω			18.0		ns
Turn-On Rise Time	t_r				23		ns
Turn-Off DelayTime	$t_{D(off)}$				37		ns
Turn-Off Fall Time	t_f				15.7		ns
Body Diode Reverse Recovery Time	t_{rr}	I_F = 20A, dI_F/dt = 100A/μs			64		ns
Body Diode Reverse Recovery Charge	Q_{rr}	I_F = 20A, dI_F/dt = 100A/μs			126		nC

Thermal Performance

Parameter	Symbol	Typ.	Max.	Unit
Thermal Resistance, Junction-to-Ambient	$R_{\theta JA}$	46	56	°C/W
Thermal Resistance, Junction-to-Case	$R_{\theta JC}$	0.70	0.80	°C/W

Notes:

1. Computed continuous current assumes the condition of T_{J_Max} while the actual continuous current depends on the thermal & electro-mechanical application board design.
2. This single-pulse measurement was taken under T_{J_Max} = 150°C.
3. E_{AS} of 486 mJ is based on starting T_J = 25°C, L = 3.0mH, I_{AS} = 18A, V_{GS} = 10V, V_{DD} = 50V; 100% test at L = 0.1mH, I_{AS} = 67A.
4. The power dissipation P_D is based on T_{J_Max} = 150°C.
5. This value is guaranteed by design hence it is not included in the production test.

Typical Electrical & Thermal Characteristics

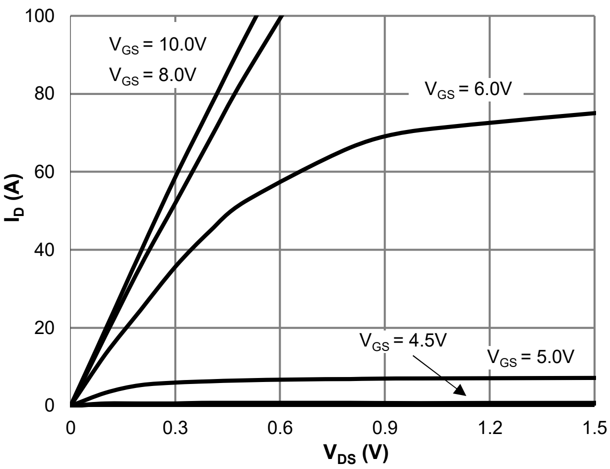


Figure 1: Saturation Characteristics

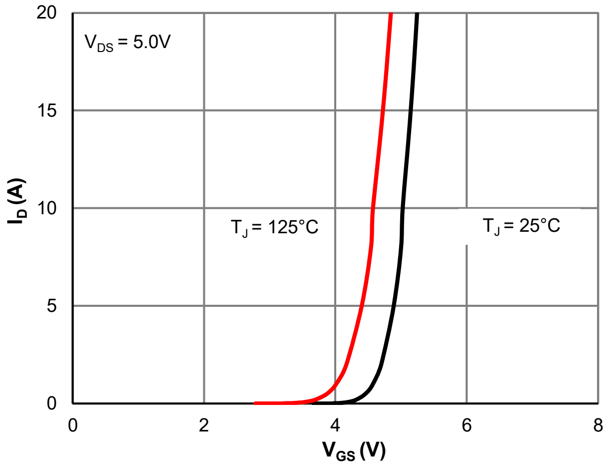


Figure 2: Transfer Characteristics

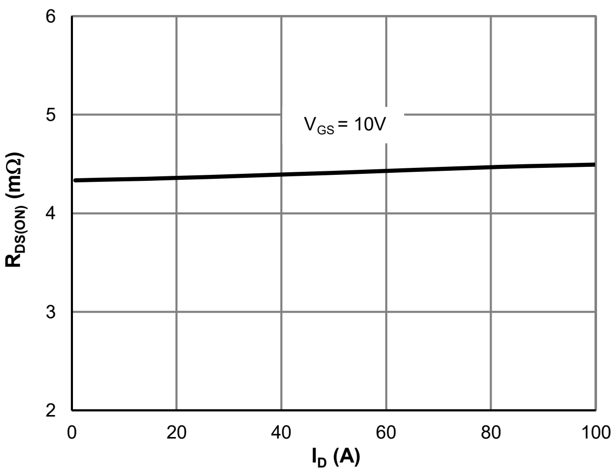


Figure 3: $R_{DS(ON)}$ vs. Drain Current

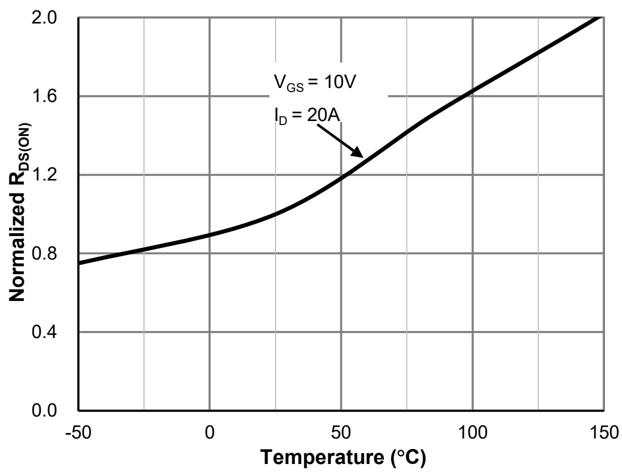


Figure 4: $R_{DS(ON)}$ vs. Junction Temperature

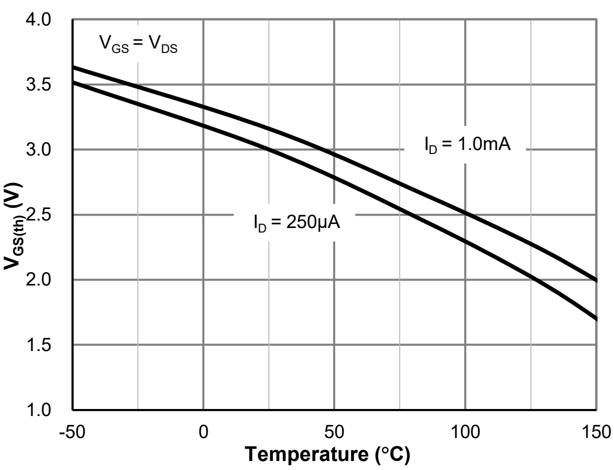


Figure 5: $V_{GS(th)}$ vs. Junction Temperature

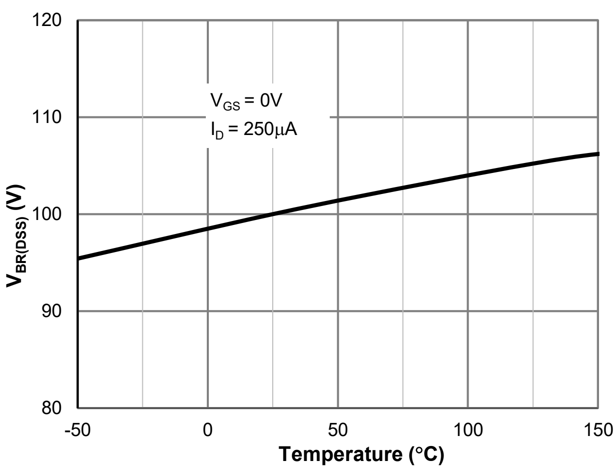


Figure 6: $V_{BR(DSS)}$ vs. Junction Temperature

Typical Electrical & Thermal Characteristics

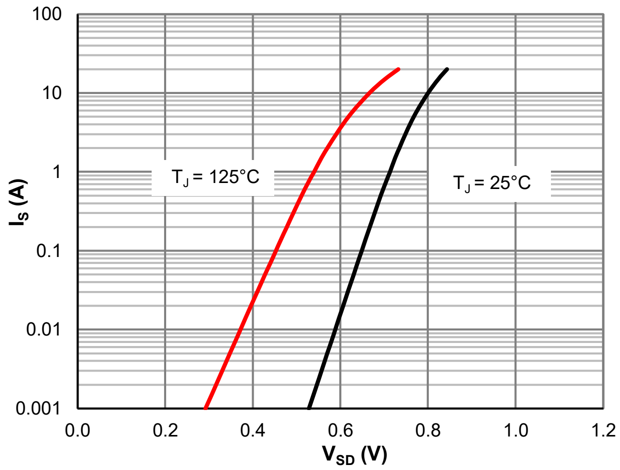


Figure 7: Body-Diode Characteristics

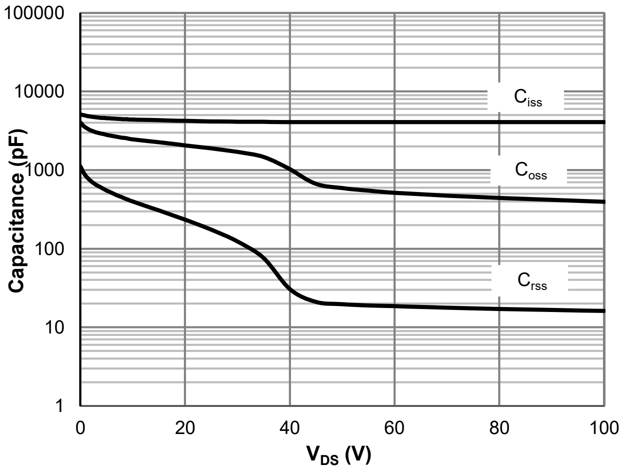


Figure 8: Capacitance Characteristics

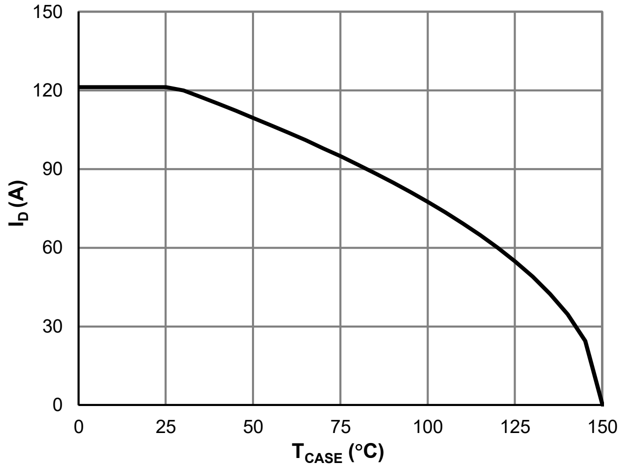


Figure 9: Current De-rating

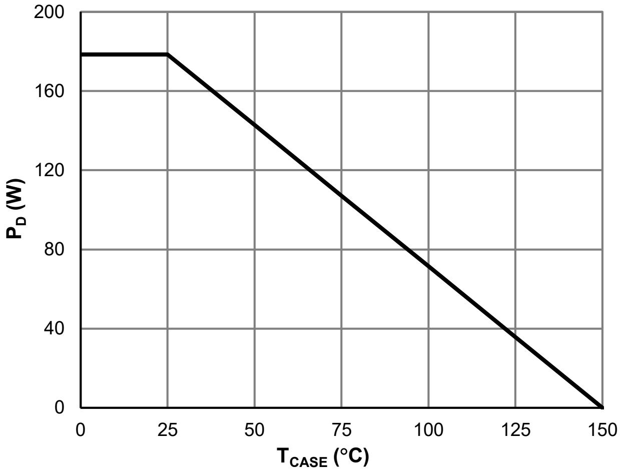


Figure 10: Power De-rating

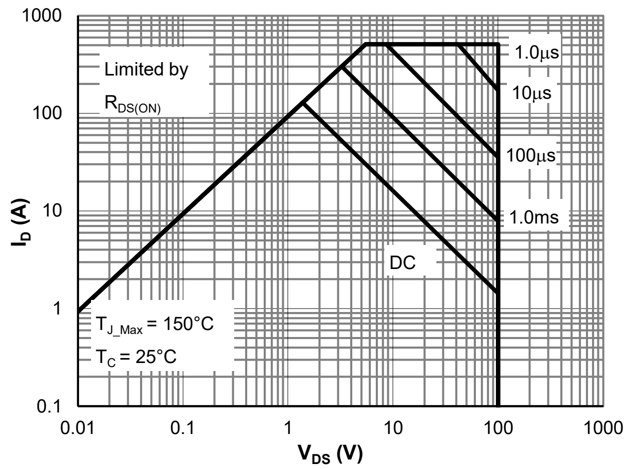


Figure 11: Maximum Safe Operating Area

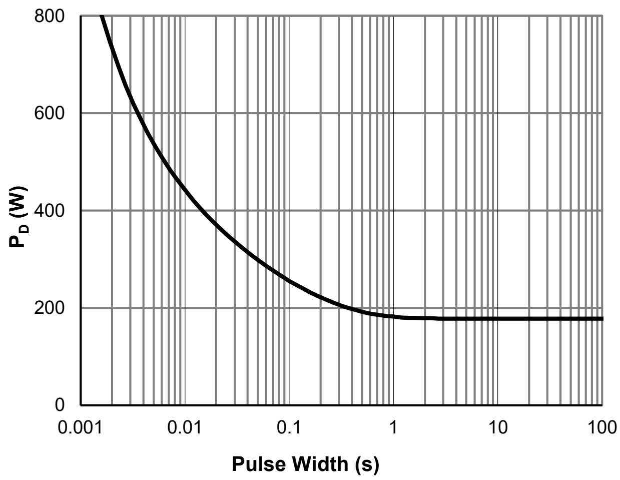
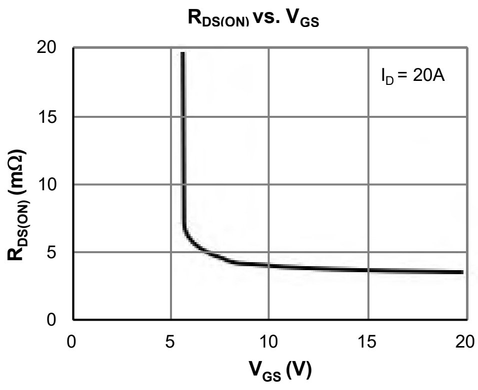
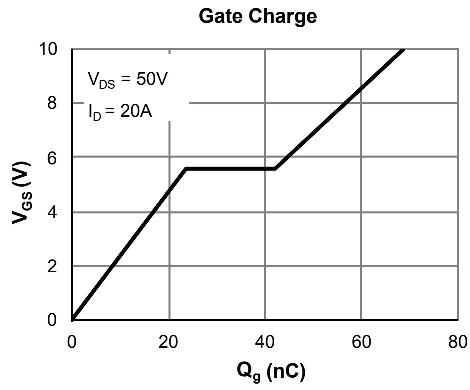


Figure 12: Single Pulse Power Rating, Junction-to-Case





Typical Electrical & Thermal Characteristics

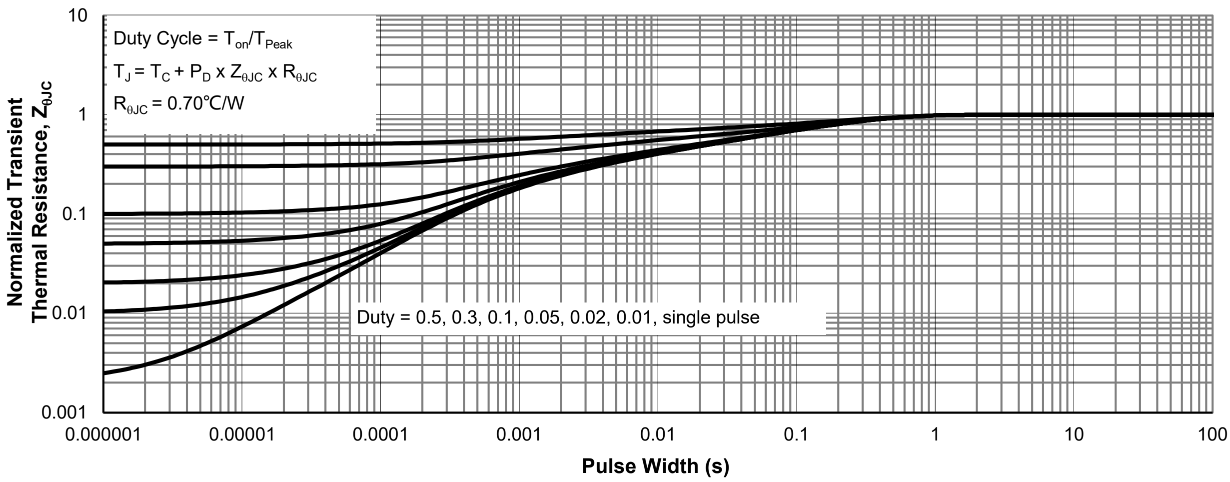
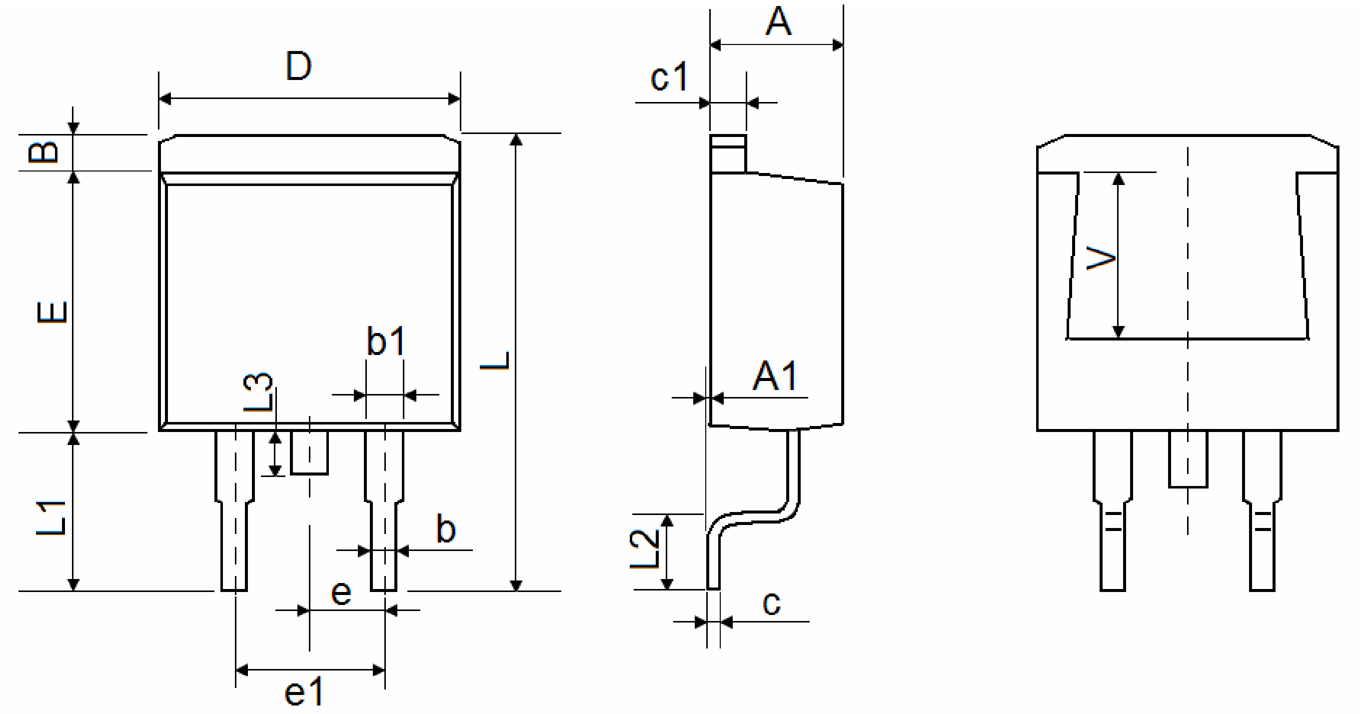


Figure 13: Normalized Maximum Transient Thermal Impedance

Package Information ：TO-263



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	4.470	4.670	0.176	0.184
A1	0.000	0.150	0.000	0.006
B	1.170	1.370	0.046	0.054
b	0.710	0.910	0.028	0.036
b1	1.170	1.370	0.046	0.054
c	0.310	0.530	0.012	0.021
c1	1.170	1.370	0.046	0.054
D	10.010	10.310	0.394	0.406
E	8.500	8.900	0.335	0.350
e	2.540 TYP.		0.100 TYP.	
e1	4.980	5.180	0.196	0.204
L	15.050	15.450	0.593	0.608
L1	5.080	5.480	0.200	0.216
L2	2.340	2.740	0.092	0.108
L3	1.300	1.700	0.051	0.067
V	5.600 REF		0.220 REF	