IGBT
1200 V, 150 A
Half-Bridge IGBT Module
34MM
QX150HB12C2

The QX150HB12C2 is a 1200 V / 150 A IGBT half-bridge power module with low conduction loss, short-circuit ruggedness and an isolated copper baseplate using DBC technology.

Features

- Low $V_{CE(sat)}$ trench IGBT technology
- 10 µs short-circuit capability
- $V_{CE(sat)}$ with positive temperature coefficient
- Maximum junction temperature 175 °C
- Low-inductance case
- Isolated copper baseplate using DBC technology
- RoHS Compliant

Typical Applications

- Solar-energy applications
- Inverters for motor drives
- Uninterruptible power supplies
- Hybrid and electric vehicles

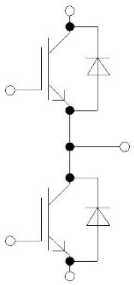


Figure 1. Schematic



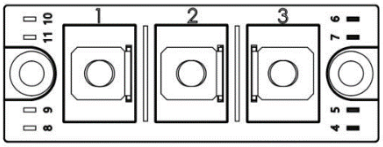
95.00 × 34.00 × 27.50

MARKING DIAGRAM



QX150HB12C2 = Device Code
XXXXXXX = Year, week and batch Code
XXXXX = Flow code

PIN ASSIGNMENTS



ORDERING INFORMATION

Device	Package
QX150HB12C2	34MM

PIN DESCRIPTION

Pin	Name	Description
1	OUT	Center Point of Half Bridge
2	DC−	DC Negative Bus Connection
3	DC+	DC Positive Bus Connection
4	G1	T1 Gate
5	S1	T1 Emitter
6	G2	T2 Gate
7	S2	T2 Emitter

ELECTRICAL CHARACTERISTICS

Absolute Maximum Ratings

Parameter	Test Conditions	Symbol	Maximum Ratings	Unit
Collector-emitter voltage	—	V_{CES}	1200	V
Gate-emitter voltage	—	V_{GES}	±20	V
Collector current	T_C = 25 °C	I_C	300	A
Collector current	T_C = 100 °C	I_C	150	A
Pulsed collector current	t_p = 1 ms	I_{CM}	300	A
Maximum power dissipation	T_j = 175 °C	P_D	730	W
Repetitive peak reverse voltage	—	V_{RRM}	1200	V
Diode continuous forward current	—	I_F	150	A
Diode maximum forward current	t_p = 1 ms	I_{FM}	300	A
Maximum junction temperature	—	T_{jmax}	175	°C
Operating junction temperature	—	T_{jop}	−40 to +150	°C
Storage temperature range	—	T_{stg}	−40 to +125	°C
Isolation voltage RMS	f = 50 Hz, t = 1 min	V_{ISO}	2500	V

IGBT ELECTRICAL CHARACTERISTICS

Characteristic	Test Conditions		Symbol	Min.	Typ.	Max.	Unit
Collector-emitter saturation voltage	I_C=150 A; V_{GE}=15 V	T_j=25 °C	$V_{CE(sat)}$	—	1.61	2.15	V
		T_j=125 °C		—	1.83	—	
		T_j=150 °C		—	1.89	—	
Gate-emitter threshold voltage	I_C=5.3 mA; V_{CE}=V_{GE}; T_j=25 °C		$V_{GE(th)}$	5.2	5.9	6.4	V
Collector cut-off current	V_{CE}=V_{CES}; V_{GE}=0 V; T_j=25 °C		I_{CES}	—	—	1	mA
Gate-emitter leakage current	V_{GE}=V_{GES}; V_{CE}=0 V; T_j=25 °C		I_{GES}	—	—	100	nA
Internal gate resistance	—		R_{Gint}	—	6.31	—	Ω
Input capacitance	V_{CE}=25 V; f=1 MHz; V_{GE}=0 V		C_{ies}	—	23.1	—	nF
Reverse transfer capacitance	V_{CE}=25 V; f=1 MHz; V_{GE}=0 V		C_{res}	—	0.27	—	nF
Gate charge	V_{GE}=−15 to +15 V		Q_G	—	1.76	—	µC

IGBT SWITCHING CHARACTERISTICS

Characteristic	Test Conditions		Symbol	Min.	Typ.	Max.	Unit
Turn-on delay time	V_{CC}=600 V; I_C=150 A; R_G=1.5 Ω; V_{GE}=±15 V; L_S=27 μH	T_j=25 °C	$t_{d(on)}$	—	172.5	—	ns
		T_j=125 °C		—	177.9	—	
		T_j=150 °C		—	187.5	—	
Rise time		T_j=25 °C	t_r	—	33.0	—	ns
		T_j=125 °C		—	38.4	—	
		T_j=150 °C		—	40.3	—	
Turn-off delay time		T_j=25 °C	$t_{d(off)}$	—	220.8	—	ns
		T_j=125 °C		—	251.2	—	
		T_j=150 °C		—	259.2	—	
Fall time		T_j=25 °C	t_f	—	191.0	—	ns
		T_j=125 °C		—	248.0	—	
		T_j=150 °C		—	269.8	—	
Turn-on switching loss		T_j=25 °C	E_{on}	—	5.6	—	mJ
		T_j=125 °C		—	9.8	—	
		T_j=150 °C		—	10.1	—	
Turn-off switching loss		T_j=25 °C	E_{off}	—	9.2	—	mJ
		T_j=125 °C		—	11.4	—	
		T_j=150 °C		—	12.5	—	
Short-circuit current	tp≤10 μs; V_{GE}=15 V; T_j=150 °C; V_{CC}=800 V; V_{CEM}≤1200 V		I_{SC}	—	1100	—	A

DIODE ELECTRICAL CHARACTERISTICS

Characteristic	Test Conditions		Symbol	Min.	Typ.	Max.	Unit
Diode forward voltage	I_F=150 A; V_{GE}=0 V	T_j=25 °C	V_F	—	1.96	2.20	V
		T_j=125 °C		—	1.76	—	
		T_j=150 °C		—	1.69	—	
Recovered charge	V_{CC}=600 V; I_F=150 A; L_S=27 µH; V_{GE}=−15 V	−di/dt=2240 A/µs; T_j=25 °C	Q_r	—	9.1	—	µC
		−di/dt=2010 A/µs; T_j=125 °C		—	22.1	—	
		−di/dt=2110 A/µs; T_j=150 °C		—	25.8	—	
Peak reverse recovery current		−di/dt=2240 A/µs; T_j=25 °C	I_{RM}	—	139.9	—	A
		−di/dt=2010 A/µs; T_j=125 °C		—	193.1	—	
		−di/dt=2110 A/µs; T_j=150 °C		—	199.1	—	
Reverse recovery energy		−di/dt=2240 A/µs; T_j=25 °C	E_{rec}	—	3.9	—	mJ
		−di/dt=2010 A/µs; T_j=125 °C		—	9.4	—	
		−di/dt=2110 A/µs; T_j=150 °C		—	10.7	—	

MODULE CHARACTERISTICS

Characteristic	Test Conditions	Symbol	Min.	Typ.	Max.	Unit
Stray inductance	—	L_{CE}	—	30	—	nH
Module lead resistance, terminal to chip	—	$R_{CC'+EE'}$	—	0.65	—	mΩ
Junction-to-case thermal resistance, per IGBT	—	R_{thJC}	—	—	0.205	K/W
Junction-to-case thermal resistance, per diode	—	R_{thJC}	—	—	0.300	K/W
Case-to-heatsink thermal resistance, per IGBT	—	R_{thCH}	—	0.178	—	K/W
Case-to-heatsink thermal resistance, per diode	—	R_{thCH}	—	0.196	—	K/W
Case-to-heatsink thermal resistance, per module	—	R_{thCH}	—	0.047	—	K/W
Terminal connection torque, screw M5	—	M	2.5	—	5.0	N·m
Mounting torque, screw M6	—	M	3.0	—	5.0	N·m
Weight of module	—	G	—	155	—	g

Typical Performance

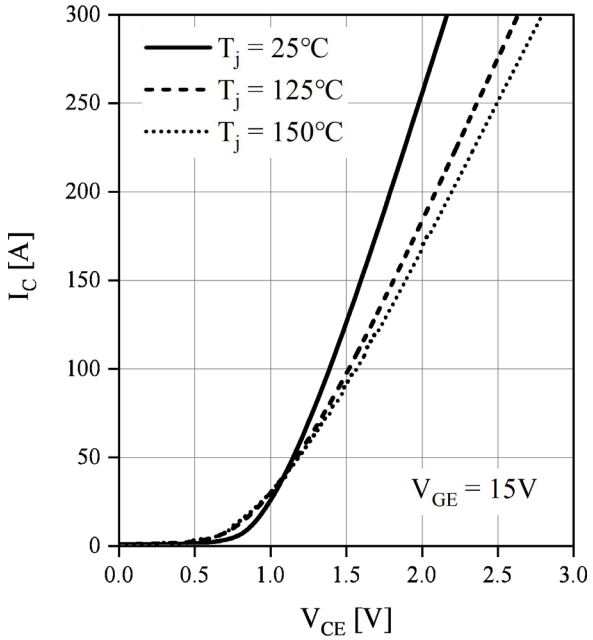


Figure 1. IGBT Output Characteristics

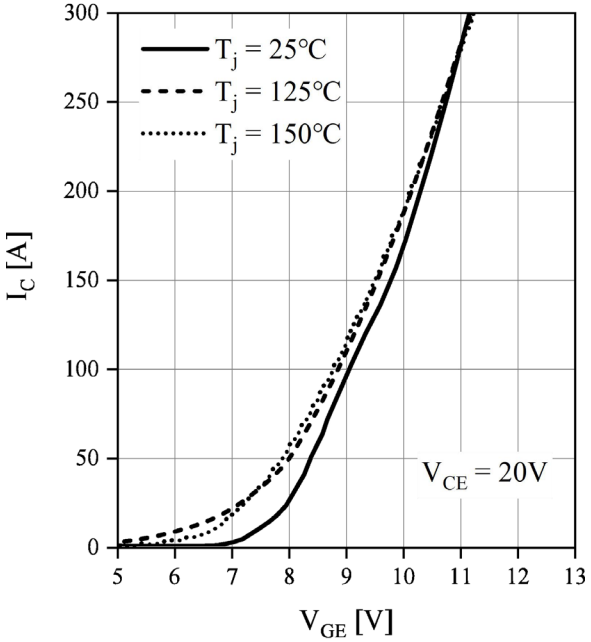


Figure 2. IGBT Transfer Characteristics

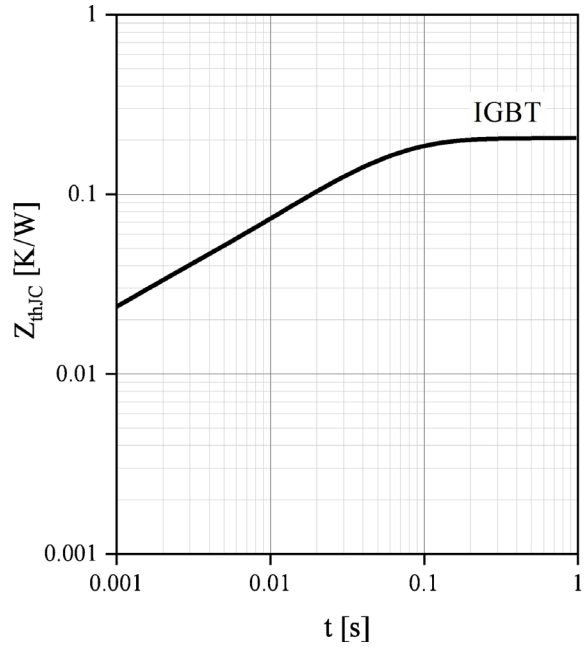


Figure 3. IGBT Transient Thermal Impedance

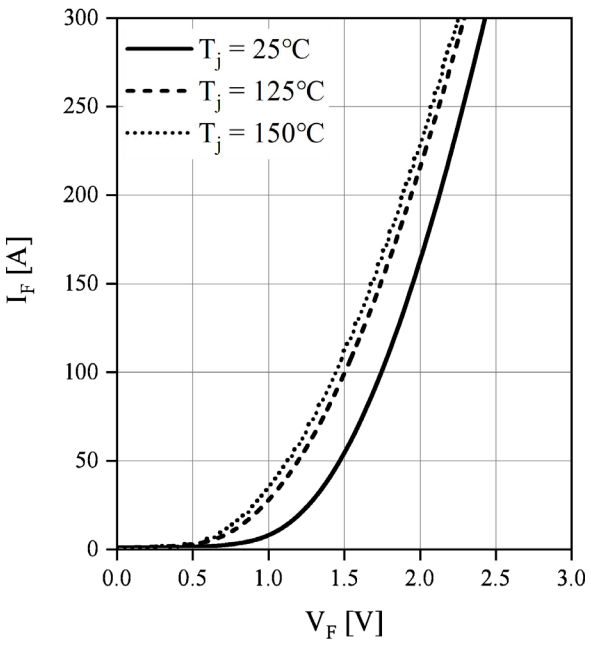


Figure 4. Diode Forward Characteristics

Typical Performance

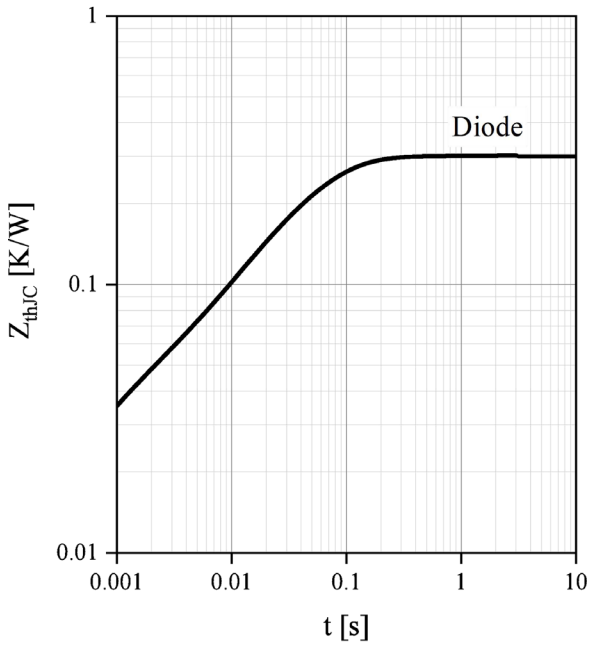


Figure 5. Diode Transient Thermal Impedance

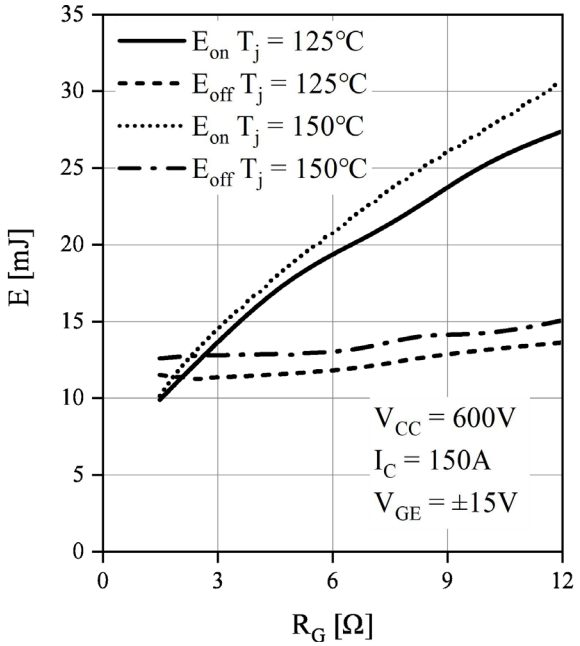


Figure 6. IGBT Switching Loss vs. R_G

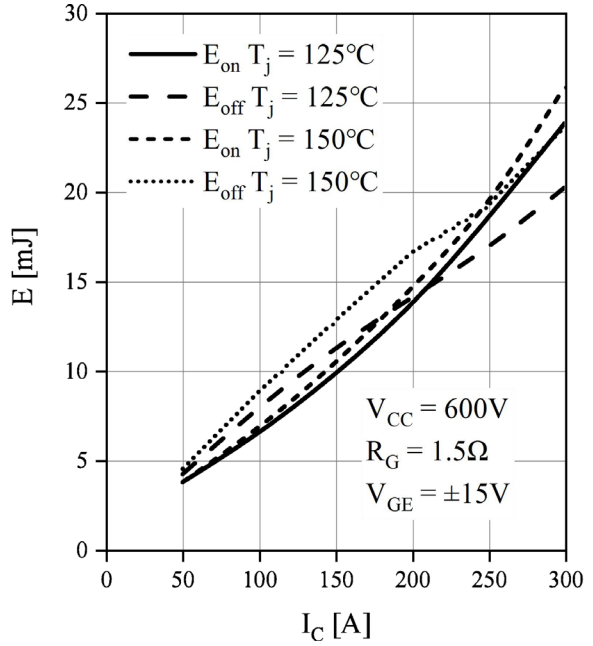


Figure 7. IGBT Switching Loss vs. I_C

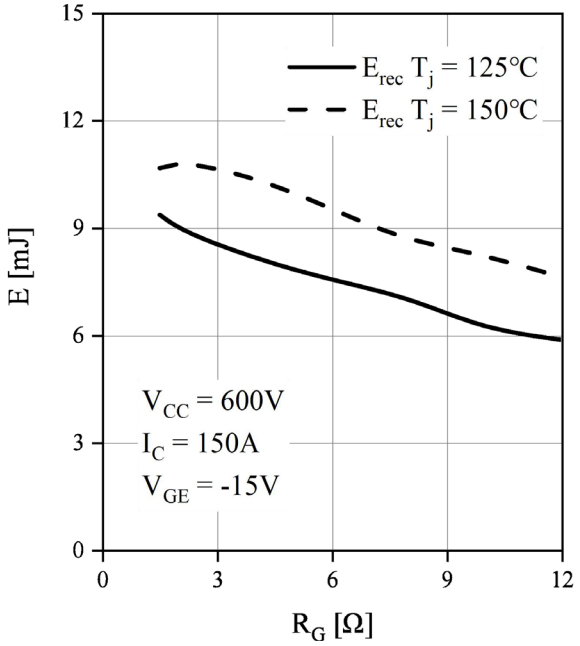


Figure 8. Diode Switching Loss vs. R_G

Typical Performance

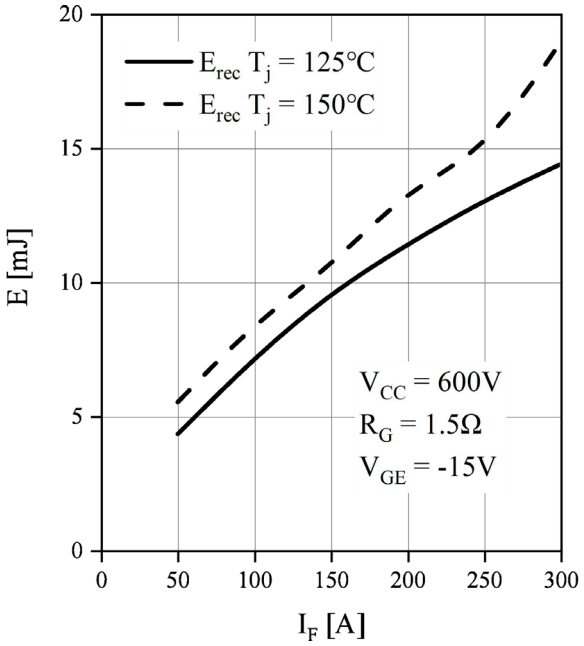
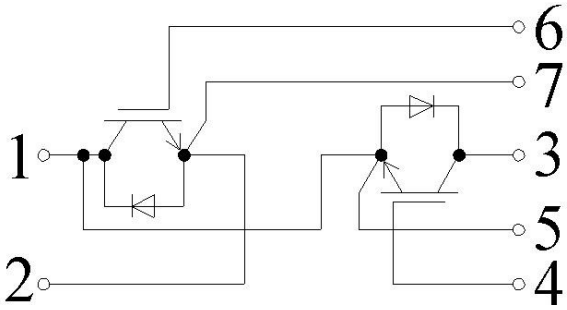
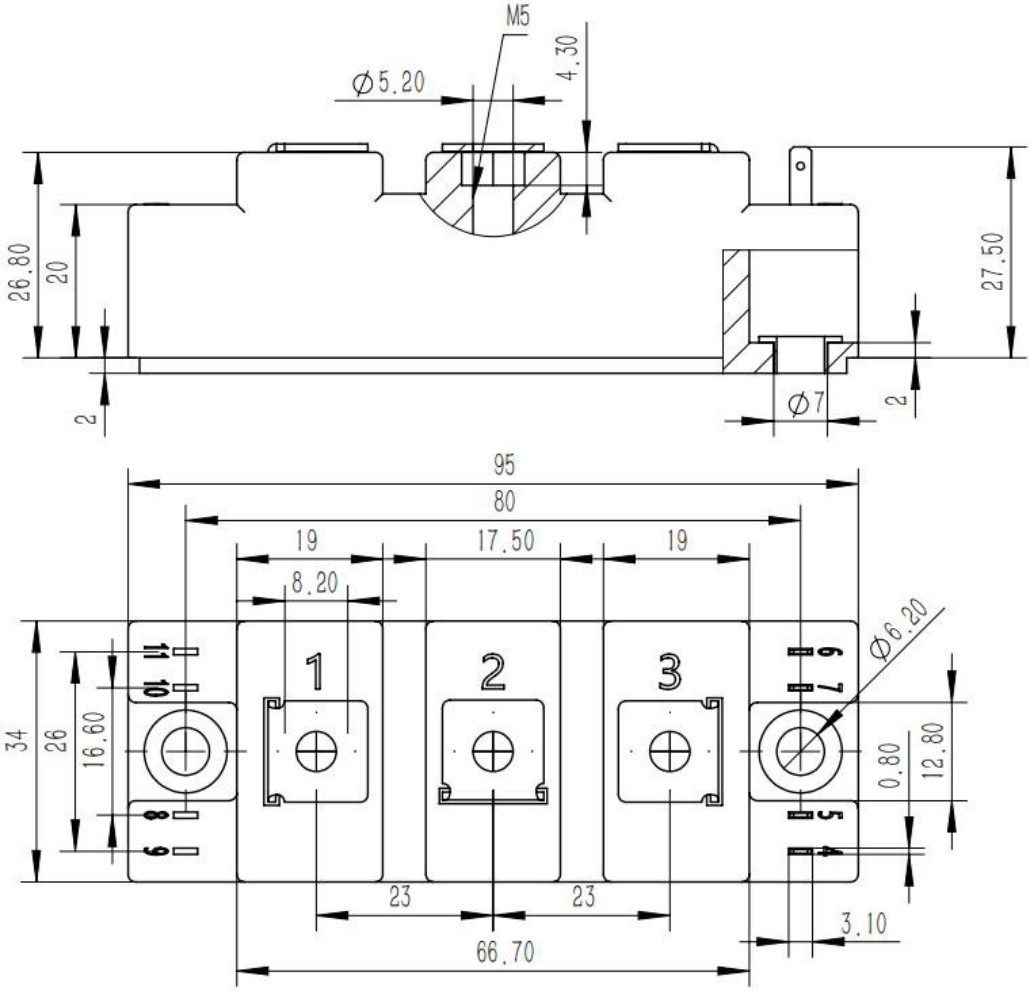


Figure 9. Diode Switching Loss vs. I_F

Circuit Schematic



Package Dimensions



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