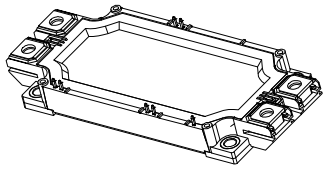
Half-Bridge IGBT Module, Qdual3

1200 V, 800 A

NXH800H120L7QDSG



PIM11, 152.00 x 62.15 x 20.80
CASE 180HT

General Description

The NXH800H120L7QDSG is a 1200 V 800 A rated half bridge IGBT power module. The integrated Field Stop Trench 7 IGBTs and Gen. 7 diodes provide lower conduction losses and switching losses, enabling designers to achieve high efficiency and superior reliability.

Features

- 1200 V, 800 A 2 in 1 Half Bridge Configuration IGBT Power Module
- Field Stop Trench 7 IGBTs & Gen.7 Diodes
- NTC Thermistor
- Isolated Base Plate
- Solderable Pins
- Low Inductive Layout
- This is a Pb−Free Device

Typical Applications

- Motor Drives
- Servo Drives
- Solar Drives
- Uninterruptible Power Supply Systems (UPS)

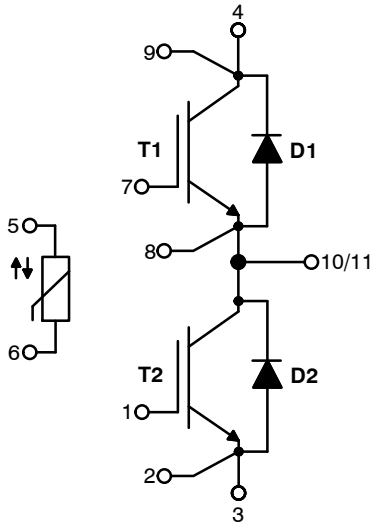
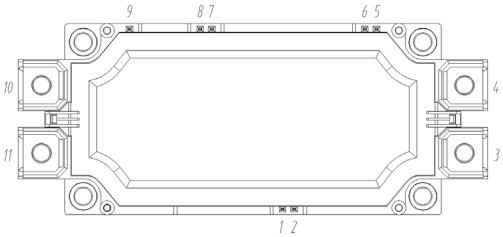


Figure 1. Schematic

MARKING DIAGRAM

NXH800H120L7QDSG = Device Code
AT = Assembly & Test Site Code
YYWW = Year and Work Week Code

PIN ASSIGNMENTS



ORDERING INFORMATION

Device	Package	Shipping
NXH800H120L7QDSG	PIM11 (Pb−Free)	8 Units / Blister Tray

PIN DESCRIPTION

Pin	Name	Description
1	G2	T2 Gate
2	E2	T2 Emitter
3	DC−	DC Negative Bus Connection
4	DC+	DC Positive Bus Connection
5	TH2	Thermistor Connection 2
6	TH1	Thermistor Connection 1
7	G1	T1 Gate
8	E1	T1 Emitter
9	CS1	T1 Collector Sensing
10	OUT	Center Point of Half Bridge
11	OUT	Center Point of Half Bridge

Table 1. ABSOLUTE MAXIMUM RATINGS (T_{vj} = 25°C unless otherwise specified)

Symbol	Parameter	Conditions	Value	Unit
IGBT // Diode				
V_{CES}	Collector−Emitter Voltage	Gate−emitter = 0 V	1200	V
V_{GES}	Gate−Emitter Voltage	Collector−emitter = 0 V	±20	V
I_C	Continuous Collector Current	T_C = 90°C	±800	A
I_{PULSE}	Repetitive Pulsed Collector Current	T_C = 25°C, t_p = 1 ms	±1600	A
T_{vjop}	Operating Junction Temperature		−40~175	°C
T_{SCWT}	Short Circuit Withstand Time, Non Repetitive	$V_{GE} \leq$ 15 V, VDC+ ≤ 800 V	8	μs
MODULE				
V_{ISO}	Isolation Voltage	RMS, f = 60 HZ, pins to base plate	3.4	kV
T_{STG}	Storage Temperature		−40~125	°C
M_T	Mounting torque to main terminals (Note 1)	M6 screw	6.0	N·m
M_H	Mounting torque to heat sink (Note 1)	M5 screw		

Stresses exceeding those listed in the Maximum Ratings table may damage the device. If any of these limits are exceeded, device functionality should not be assumed, damage may occur and reliability may be affected.

1. Recommendable value: 3.0 ~ 6.0 N·m

Table 2. THERMAL RESISTANCE CHARACTERISTICS

Symbol	Parameter	Condition	Min	Typ	Max	Unit
R_{thJCQ}	Junction to Case Thermal Resistance (Note 2)	Per IGBT	–	–	0.0498	°C/W
R_{thJCD}		Per diode	–	–	0.0889	
R_{thCHQ}	Case to Heat−Sink Thermal Resistance (Note 2)	Per IGBT, 1 W/(m·K) thermal grease	–	0.0282	–	
R_{thCHD}		Per diode, 1 W/(m·K) thermal grease	–	0.0342	–	

2. Data from characterization.

Table 3. THERMISTOR CHARACTERISTICS

Symbol	Parameter	Condition	Min	Typ	Max	Unit
R_{25}	Nominal Resistance	T_{NTC} = 25°C	–	5	–	kΩ
R_{100}		T_{NTC} = 100°C	–	493.3	–	Ω
ΔR/R	Deviation on R_{100}	T_{NTC} = 100°C	−5	–	5	%
P_D	Power Dissipation − Recommended Limit	0.15 mA, non−self−heating effect	–	0.1	–	mW
	Power Dissipation − Absolute Maximum	5 mA	–	–	34.2	mW
	Power Dissipation Constant		–	1.4	–	mW/°C
$B_{25/50}$	B−Value	B(25/50), tolerance ±2 %	–	3375	–	K
$B_{25/100}$	B−Value	B(25/100), tolerance ±2 %	–	3436	–	K

Table 4. ELECTRICAL CHARACTERISTICS (T_{vj} = 25°C unless otherwise specified)

Symbol	Parameter	Test Conditions		Min	Typ	Max	Unit
IGBT							
$V_{CE(SAT)}$ (Pin 8−9)	Collector−Emitter Saturation Voltage	V_{GE} = 15 V, I_C = 800 A	T_{vj} = 25°C	–	1.65	2.05	V
$V_{CE(SAT)}$ (Chip) (Note 3)			T_{vj} = 25°C	–	1.44	1.85	
			T_{vj} = 125°C	–	1.63	–	
			T_{vj} = 175°C	–	1.75	–	
$V_{GE(TH)}$	Gate−Emitter Threshold Voltage	V_{CE} = V_{GE}, I_C = 80 mA		4.5	5.5	6.5	V
Q_g	Gate Charge	V_{CE} = 600 V, V_{GE} = ±15 V, I_C = 800 A		–	5.6	–	μC
R_{gint}	Internal Gate Resistor			–	1.5	–	Ω
C_{ies}	Input Capacitance	V_{CE} = 25 V, V_{GE} = 0 V, f = 100 kHz, T_{vj} = 25°C		–	94.3	–	nF
C_{oes}	Output Capacitance			–	3.9	–	
C_{res}	Reverse Transfer Capacitance			–	0.58	–	
I_{CES}	Collector−Emitter Cut Off Current	V_{CE} = 1200 V, V_{GE} = 0 V		–	–	100	μA
I_{GES}	Gate−Emitter Leakage Current	V_{CE} = 0 V, V_{GE} = 20 V		–	–	80	nA
t_{don}	Turn−on Delay Time	V_{CE} = 600 V, V_{GE} = ±15 V, R_g = 0.5 Ω, I_C = 800 A, Inductive load	T_{vj} = 25°C	–	0.37	–	μs
			T_{vj} = 125°C	–	0.41	–	
			T_{vj} = 175°C	–	0.42	–	
t_r	Rise Time		T_{vj} = 25°C	–	0.14	–	μs
			T_{vj} = 125°C	–	0.15	–	
			T_{vj} = 175°C	–	0.15	–	
t_{doff}	Turn−off Delay Time		T_{vj} = 25°C	–	0.4	–	μs
			T_{vj} = 125°C	–	0.42	–	
			T_{vj} = 175°C	–	0.44	–	
t_f	Fall Time		T_{vj} = 25°C	–	0.1	–	μs
			T_{vj} = 125°C	–	0.17	–	
			T_{vj} = 175°C	–	0.21	–	
E_{on}	Turn−on Energy Loss per Pulse		T_{vj} = 25°C	–	87.4	–	mJ
			T_{vj} = 125°C	–	112	–	
			T_{vj} = 175°C	–	132.6	–	
E_{off}	Turn−off Energy Loss per Pulse		T_{vj} = 25°C	–	69.8	–	mJ
			T_{vj} = 125°C	–	90.1	–	
			T_{vj} = 175°C	–	102.0	–	

Table 4. ELECTRICAL CHARACTERISTICS (Tvj = 25°C unless otherwise specified) (continued)

Symbol	Parameter	Test Conditions		Min	Typ	Max	Unit
DIODE							
V_F (Pin 8–9)	Diode Forward Voltage	V_{GE} = 0 V, I_F = 800 A	T_{vj} = 25°C	–	1.86	2.25	V
V_F (Chip) (Note 3)			T_{vj} = 25°C	–	1.64	2.05	
			T_{vj} = 125°C	–	1.62	–	
			T_{vj} = 175°C	–	1.57	–	
I_{RRM}	Peak Reverse Recovery Current	V_{CE} = 600 V, V_{GE} = ±15 V, R_g = 0.5 Ω, I_C = 800 A Inductive load	T_{vj} = 25°C	–	229	–	A
			T_{vj} = 125°C	–	346	–	
			T_{vj} = 175°C	–	399	–	
Q_{rr}	Reverse Recovery Charge		T_{vj} = 25°C	–	37.6	–	μC
			T_{vj} = 125°C	–	90.5	–	
			T_{vj} = 175°C	–	126.6	–	
E_{rec}	Reverse Recovery Energy Loss per Pulse		T_{vj} = 25°C	–	14.0	–	mJ
			T_{vj} = 125°C	–	36.4	–	
			T_{vj} = 175°C	–	52.6	–	

Product parametric performance is indicated in the Electrical Characteristics for the listed test conditions, unless otherwise noted. Product performance may not be indicated by the Electrical Characteristics if operated under different conditions.

3. This parameter is only guaranteed by design.

Table 5. MODULE AND MECHANICAL CHARACTERISTICS

Symbol	Parameter	Condition	Min	Typ	Max	Unit
CTI	Comparative Tracking Index		>175	–	–	
D_{CR}	Creepage Distance	Terminal to terminal	–	13.0	–	mm
		Terminal to heatsink	–	15.0	–	mm
D_{CL}	Clearance Distance	Terminal to terminal	–	10.0	–	mm
		Terminal to heatsink	–	12.5	–	mm
M_{LS}	Module Stray Inductance		–	20	–	nH
M_W	Module Weight		–	330	–	g

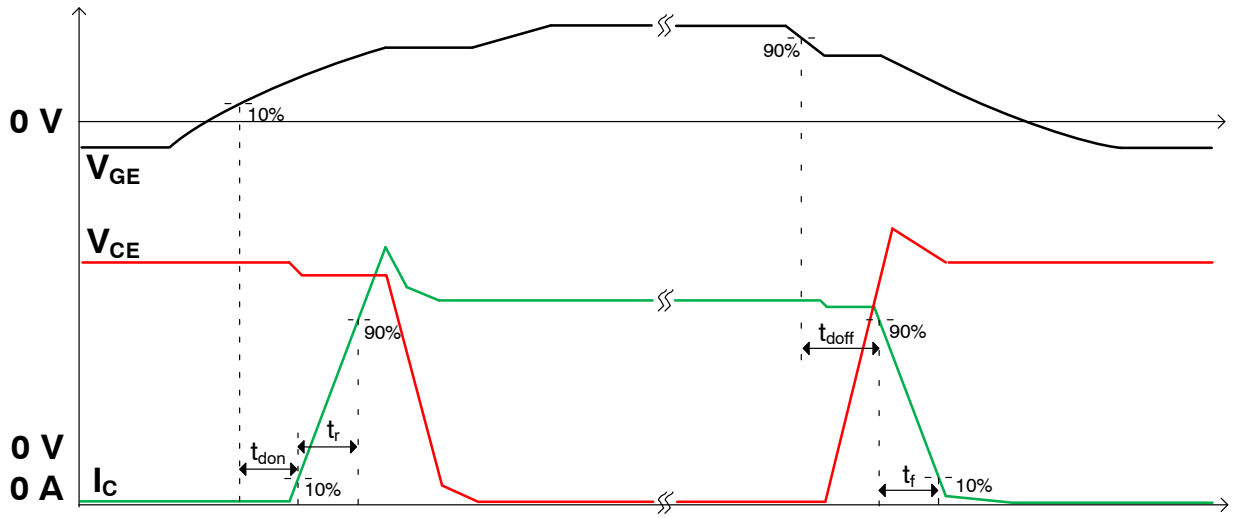


Figure 2. Switching Time Definition

TYPICAL CHARACTERISTICS

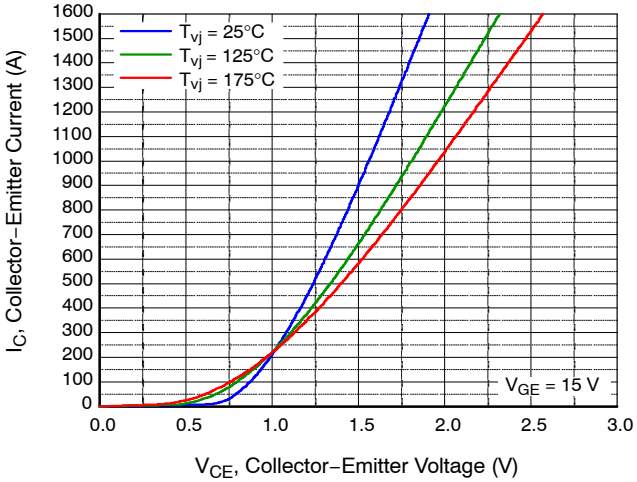


Figure 1. Output Characteristic, IGBT (Typ.)

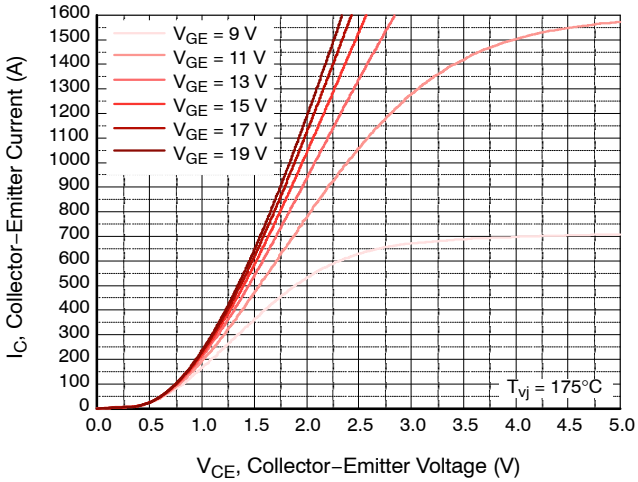


Figure 2. Output Characteristic, IGBT (Typ.)

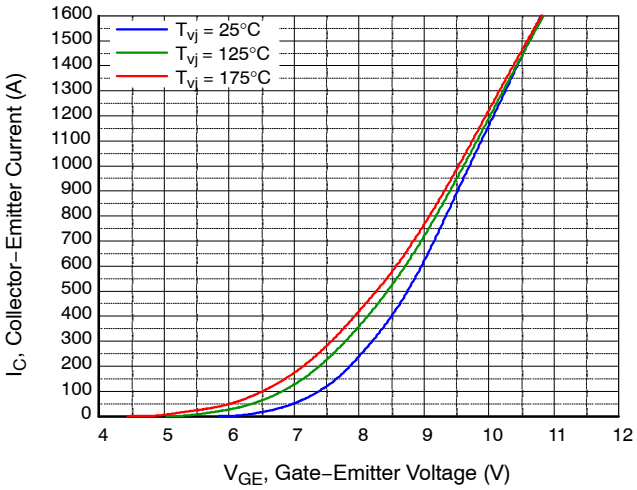


Figure 3. Transfer Characteristic, IGBT (Typ.)

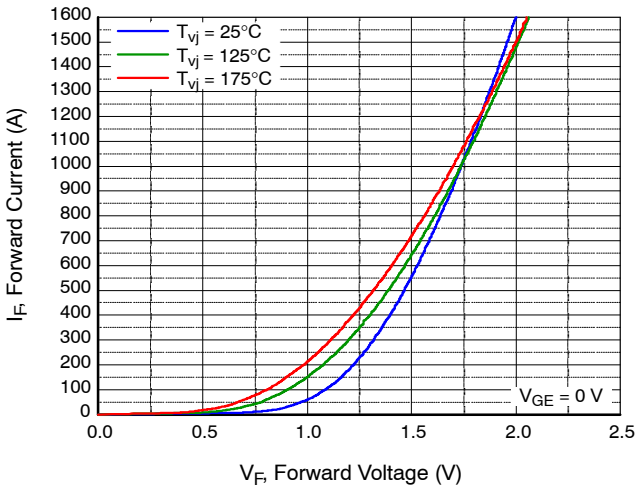


Figure 4. Forward Characteristic, Diode (Typ.)

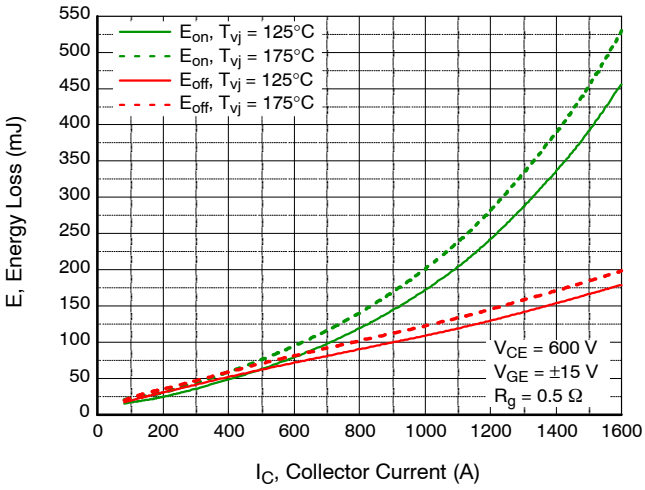


Figure 5. Switching Losses Characteristic, IGBT (Typ.)

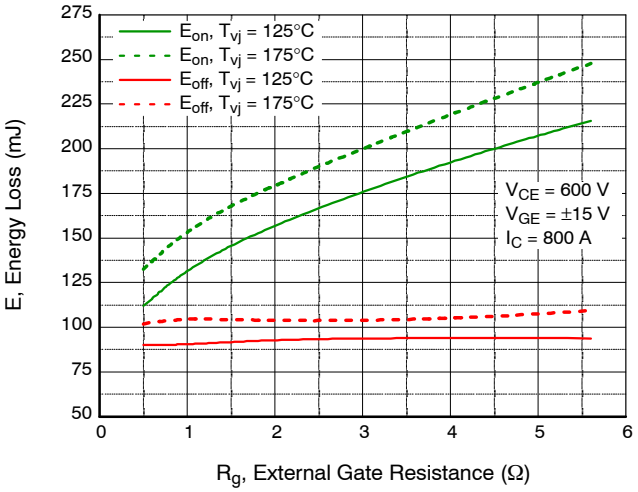


Figure 6. Switching Losses Characteristic, IGBT (Typ.)

TYPICAL CHARACTERISTICS (continued)

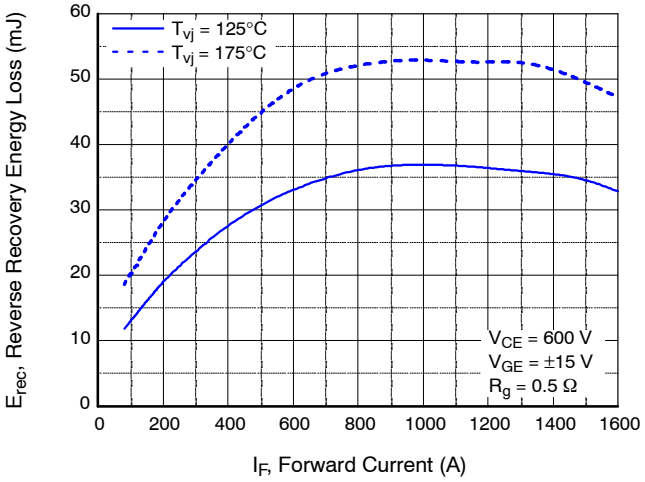


Figure 7. Switching Losses Characteristic, Diode (Typ.)

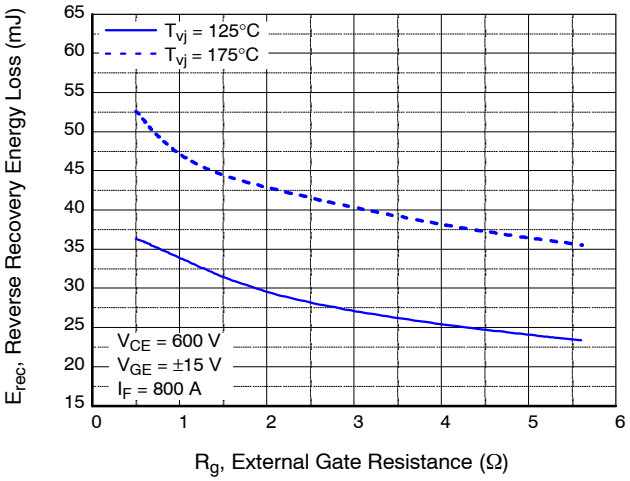


Figure 8. Switching Losses Characteristic, Diode (Typ.)

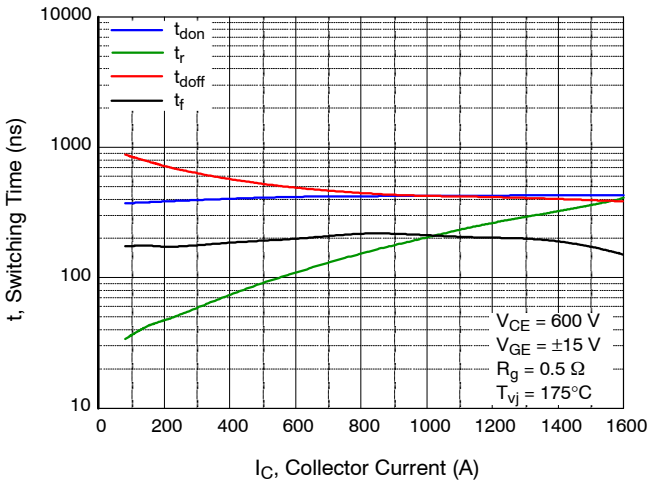


Figure 9. Switching Time Characteristic, IGBT (Typ.)

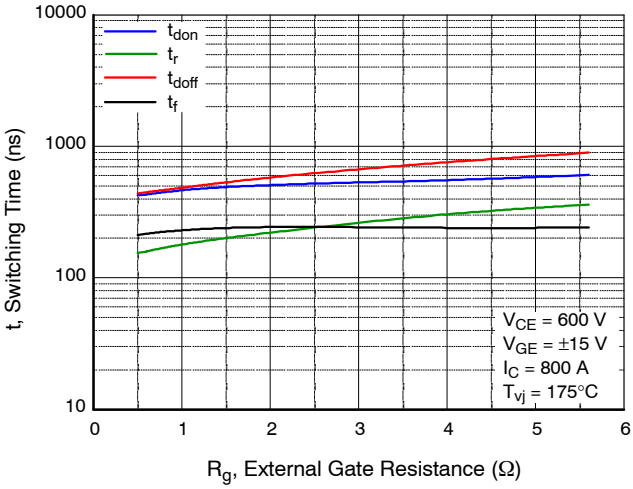


Figure 10. Switching Time Characteristic, IGBT (Typ.)

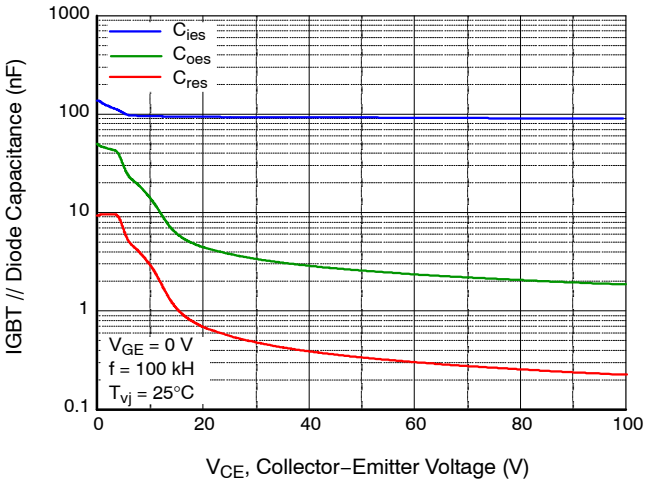


Figure 11. Capacity Characteristic, IGBT // Diode (Typ.)

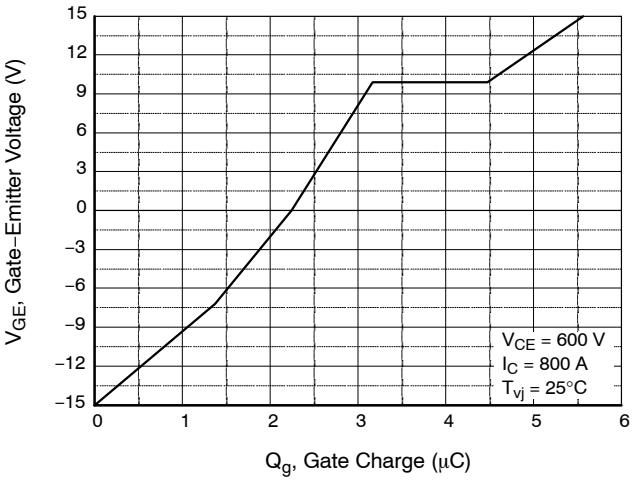


Figure 12. Gate Charge Characteristic, IGBT (Typ.)

TYPICAL CHARACTERISTICS (continued)

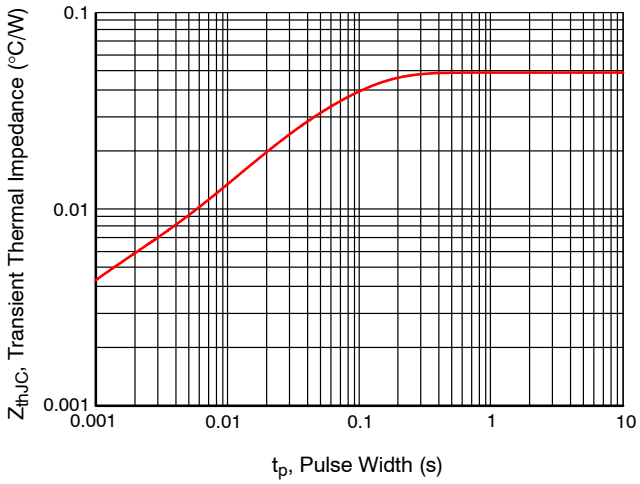


Figure 13. Transient Thermal Impedance, IGBT (Max.)

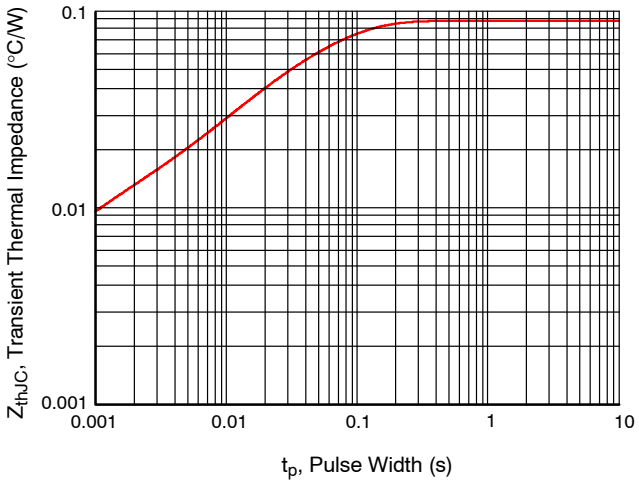


Figure 14. Transient Thermal Impedance, Diode (Max.)

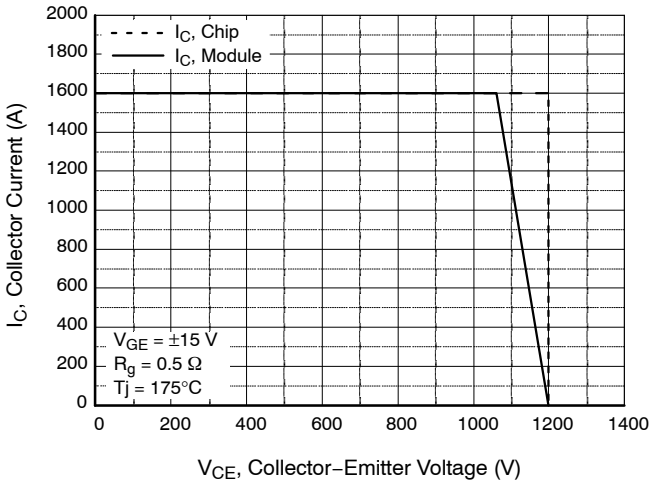


Figure 15. Reverse Bias Safe Operating Area, IGBT // Diode

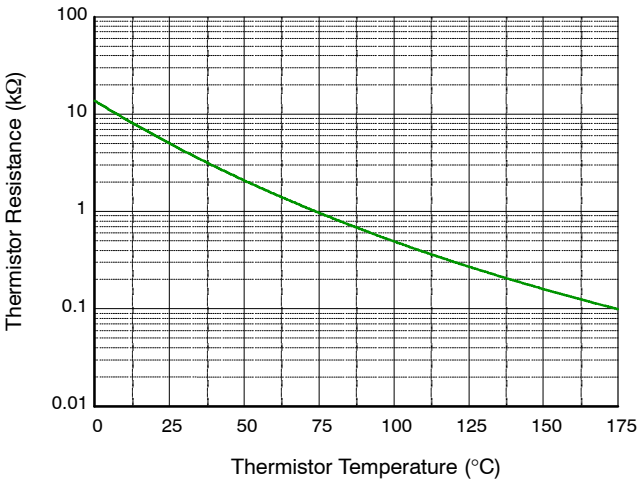
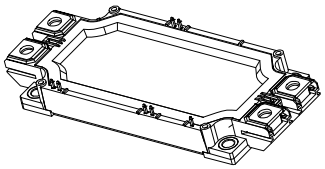


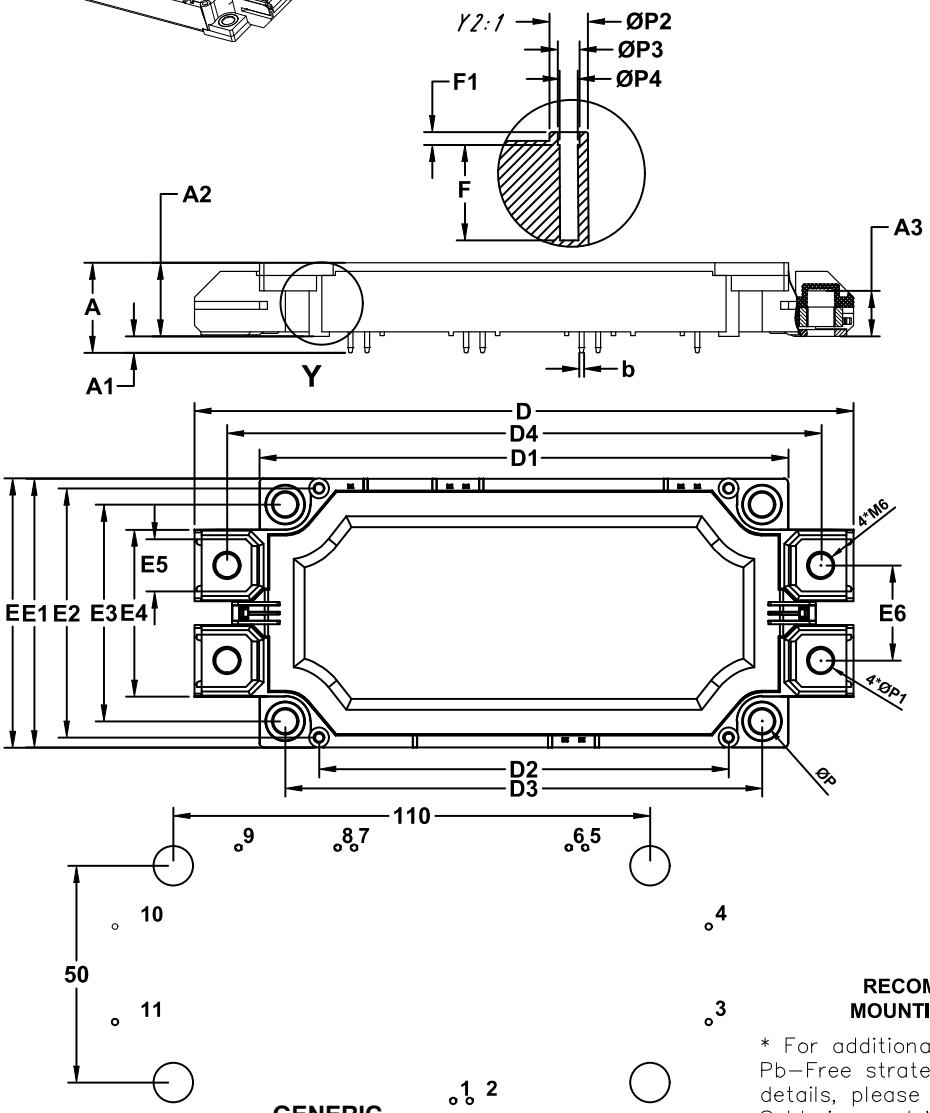
Figure 16. NTC Thermistor R−T Value (Typ.)

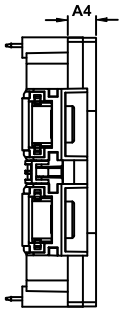
MECHANICAL CASE OUTLINE
PACKAGE DIMENSIONS



PIM11, 152.00x62.15x17.00
CASE 180HT
ISSUE D

DATE 26 APR 2024





NOTES:

1. DIMENSIONING AND TOLERANCING PER ASME Y14.5-2018.
2. CONTROLLING DIMENSION : MILLIMETERS
3. DIMENSIONS b AND b1 APPLY TO THE PLATED TERMINALS AND ARE MEASURED AT DIMENSION A1
4. PIN POSITION TOLERANCE IS ± 0.25 mm
5. PACKAGE MARKING IS LOCATED AS SHOWN ON THE SIDE OPPOSITE THE PACKAGE ORIENTATION FEATURES
6. SOLDER PIN

DIM	MILLIMETERS		
	MIN.	NOM.	MAX.
A	20.00	20.80	21.60
A1	3.50	3.80	4.10
A2	16.50	17.00	17.50
A3	10.00	10.5	11.00
A4	6.30	6.50	6.70
b	1.12	1.15	1.18
D	151.5	152.00	152.50
D1	121.50	122.00	122.50
D2	94.30	94.50	94.70
D3	109.80	110.00	110.20
E	61.95	62.15	62.35
E1	61.80	62.00	62.20
E2	57.30	57.50	57.70
E3	49.80	50.00	50.20
E4	38.40	38.60	38.80
E5	11.80	12.00	12.20
F	11.00	11.00	11.20
F1	1.40	1.45	1.50
P	5.20	5.50	5.60
P1	6.40	6.40	6.60
P2	4.45	4.65	4.85
P3	2.40	2.50	2.50
P4	2.05	2.10	2.10
D4	136.40	137.00	137.60
E6	21.60	22.00	22.40

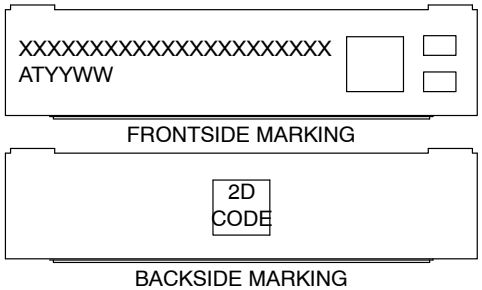
Pin table

Pin	X	Y	Function
1	9.52	-29.2	T2
2	13.33	-29.2	DC-
3	68.5	-11.0	DC-
4	68.5	11.0	DC+
5	40.0	29.2	TH2
6	36.19	29.2	TH1
7	-13.33	29.2	T1
8	-17.14	29.2	AC
9	-40.0	29.2	DC+
10	-68.5	11.0	AC
11	-68.5	-11.0	AC

RECOMMENDED MOUNTING PATTERN

* For additional Information on our Pb−Free strategy and soldering details, please download the Onsemi Soldering and Mounting Techniques Reference Manual, SOLDERRM/D.

GENERIC MARKING DIAGRAM*



XXXXX = Specific Device Code
AT = Assembly & Test Site Code
YYWW = Year and Work Week Code

*This information is generic. Please refer to device data sheet for actual part marking. Pb−Free indicator, “G” or microdot “▪”, may or may not be present. Some products may not follow the Generic Marking.

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DESCRIPTION:	**PIM11, 152.00x62.15x17.00**	**PAGE 1 OF 1**

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