



NT480T12D3M7P

1200 V, 480 A Half Bridge IGBT Power Module

Rev. 1 — 25 June 2026

Product data sheet

1. General Description

The NT480T12D3M7P is an Insulated-Gate Bipolar Transistor (IGBT) power module that uses 7th-generation carrier stored trench-gate and field-stop (FS) technology. It is designed for high-voltage industrial power inverter and motor drive applications.

2. Features

- Half-bridge topology with NTC temperature sensor
- Rated voltage and current: 1200 V / 480 A
- Maximum junction temperature: 175 °C
- Short-circuit withstand time: 8 µs
- Solderable auxiliary contacts
- Optimized design for low parasitic inductance
- Low collector-emitter saturation voltage
- Low switching losses
- HV-H3TRB qualified
- Pre-applied thermal interface material (TIM)

3. Applications

- Motor drives
- Renewable energy systems
- Electric vehicle (EV) chargers
- High power converters and inverters

4. Quick Reference Data

Table 1. Quick Reference Data

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
V_{CES}	collector-emitter voltage	$T_{vj} = 25\text{ °C}$	-	-	1200	V
I_{CDC}	continuous DC collector current	$T_h = 45\text{ °C}$	-	-	608	A
		$T_h = 60\text{ °C}$	-	-	563	A
$T_{vj(op)}$	operating junction temperature		-40	-	175	°C



Fig. 1. Product Outline

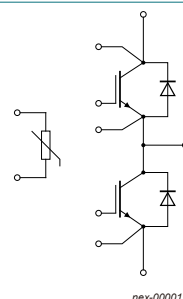


Fig. 2. Topology

5. Characteristic

5.1. IGBT

Table 2. Maximum Limiting Values

All values at $T_{vj} = 25\text{ }^{\circ}\text{C}$, unless otherwise specified.

Symbol	Parameter	Conditions	Min	Max	Unit
V_{CES}	collector-emitter voltage		-	1200	V
I_{CDC}	continuous DC collector current[1]	$T_h = 45\text{ }^{\circ}\text{C}$	-	608	A
		$T_h = 60\text{ }^{\circ}\text{C}$	-	563	A
I_{CRM}	repetitive peak collector current[2]		-	990	A
V_{GE}	gate-emitter voltage		-20	20	V
$T_{vj(op)}$	operating junction temperature		-40	175	$^{\circ}\text{C}$
t_{sc}	short-circuit withstand time[3]	$V_{GE} = \pm 15\text{ V}$; $V_{CC} = 800\text{ V}$; $T_{vj} \leq 150\text{ }^{\circ}\text{C}$	-	8	μs

[1] Value is give at chip level, and is limited by $T_{vj(max)}$.

[2] Time duration is limited by $T_{vj(max)}$.

[3] Short-circuit cycles ≤ 1000 . Time between tests $\geq 10\text{ s}$.

Table 3. Electrical Characteristics

All values at $T_{vj} = 25\text{ }^{\circ}\text{C}$, unless otherwise specified.

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
Static Characteristics						
$V_{CE(sat)}$	collector-emitter saturation voltage[1]	$V_{GE} = 15\text{ V}$; $I_C = 495\text{ A}$	-	1.57	1.89	V
		$V_{GE} = 15\text{ V}$; $I_C = 495\text{ A}$; $T_{vj} = 125\text{ }^{\circ}\text{C}$	-	1.74	-	V
		$V_{GE} = 15\text{ V}$; $I_C = 495\text{ A}$; $T_{vj} = 175\text{ }^{\circ}\text{C}$	-	1.82	-	V
$V_{GE(th)}$	gate-emitter threshold voltage	$I_C = 9.3\text{ mA}$; $V_{CE} = V_{GE}$	5.15	5.8	6.45	V
I_{CES}	zero gate voltage collector current	$V_{CE} = 1200\text{ V}$; $V_{GE} = 0\text{ V}$	-	-	100	μA
I_{GES}	gate-emitter leakage current	$V_{CE} = 0\text{ V}$; $V_{GE} = 20\text{ V}$	-	-	100	nA
r_g	internal gate resistor	$f = 100\text{ kHz}$	-	0.9	-	Ω
C_{ies}	input capacitance	$V_{CE} = 25\text{ V}$; $V_{GE} = 0\text{ V}$; $f = 100\text{ kHz}$	-	89	-	nF
C_{oes}	output capacitance		-	1.49	-	nF
C_{res}	reverse transfer capacitance		-	0.3	-	nF
Q_G	gate charge	$V_{CC} = 600\text{ V}$; $I_C = 495\text{ A}$; $V_{GE} = \pm 15\text{ V}$	-	7.1	-	μC

[1] Value is given at chip level.

Symbol	Parameter	Conditions	Min	Typ	Max	Unit	
Switching Characteristics							
t _{d(on)}	turn-on delay time	V _{GE} = ± 15 V; V _{CC} = 600 V; I _C = 495 A; R _{G(on)} = 0.6 Ω; R _{G(off)} = 0.6 Ω di/dt = 6900 A/μs (only at turn-on, T _{vj} = 175 °C) dv/dt = 3700 V/μs (only at turn-off, T _{vj} = 175 °C)	T _{vj} = 25 °C	-	330	-	ns
			T _{vj} = 125 °C	-	341	-	ns
			T _{vj} = 175 °C	-	354	-	ns
t _r	rise time		T _{vj} = 25 °C	-	53	-	ns
			T _{vj} = 125 °C	-	57	-	ns
			T _{vj} = 175 °C	-	62	-	ns
t _{d(off)}	turn-off delay time		T _{vj} = 25 °C	-	347	-	ns
			T _{vj} = 125 °C	-	421	-	ns
			T _{vj} = 175 °C	-	454	-	ns
t _f	fall time		T _{vj} = 25 °C	-	166	-	ns
			T _{vj} = 125 °C	-	275	-	ns
			T _{vj} = 175 °C	-	368	-	ns
E _{on}	turn-on switching energy loss	T _{vj} = 25 °C	-	27	-	mJ	
		T _{vj} = 125 °C	-	39	-	mJ	
		T _{vj} = 175 °C	-	44	-	mJ	
E _{off}	turn-off switching energy loss	T _{vj} = 25 °C	-	45.3	-	mJ	
		T _{vj} = 125 °C	-	67	-	mJ	
		T _{vj} = 175 °C	-	73	-	mJ	
I _{C(sc)}	short-circuit data	V _{GE} = ±15 V; V _{CC} = 800 V; V _{CEmax} = V _{CES} - L _{sCE} * di/dt	t _p ≤ 8 μs; T _{vj} = 150 °C	-	1760	-	A
		t _p ≤ 6 μs; T _{vj} = 175 °C	-	1680	-	A	
Thermal Resistance							
R _{th(j-h)}	thermal resistance from junction to heatsink	per IGBT switch with pre-applied thermal interface material		-	-	0.0920	K/W

5.2. Diode

Table 4. Maximum Limiting Values

Symbol	Parameter	Conditions	Min	Max	Unit
V _{RRM}	repetitive peak reverse voltage	T _{vj} = 25 °C	-	1200	V
I _F	continuous DC forward current[1]		-	495	A
I _{FRM}	repetitive peak forward current[2]		-	990	A
I ² t	I ² t value	V _R = 0 V; t _p = 10 ms; T _{vj} = 175 °C	-	15200	A ² s
T _{vj(op)}	operating junction temperature		-40	175	°C

[1] Value is given at chip level, and is limited by T_{vj(max)}.
[2] Time duration is limited by T_{vj(max)}.

Table 5. Electrical Characteristics

All values at $T_{vj} = 25\text{ °C}$, unless otherwise specified.

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
V _F	diode forward voltage[1]	V _{GE} = 15 V; I _F = 495 A	T _{vj} = 25 °C	-	1.84	2.21	V
			T _{vj} = 125 °C	-	1.71	-	V
			T _{vj} = 175 °C	-	1.65	-	V
t _{rr}	reverse recovery time	V _R = 600 V; I _F = 495 A; V _{GE} = 0 V di _F /dt = 7400 A/μs (only at T _{vj} = 175 °C)	T _{vj} = 25 °C	-	283	-	ns
			T _{vj} = 125 °C	-	384	-	ns
			T _{vj} = 175 °C	-	463	-	ns
Q _{rr}	reverse recovery charge		T _{vj} = 25 °C	-	28	-	nC
			T _{vj} = 125 °C	-	61	-	nC
			T _{vj} = 175 °C	-	79	-	nC
I _{rrm}	peak reverse recovery current		T _{vj} = 25 °C	-	226	-	A
			T _{vj} = 125 °C	-	359	-	A
			T _{vj} = 175 °C	-	385	-	A
E _{rec}	reverse recovery energy loss		T _{vj} = 25 °C	-	12	-	mJ
			T _{vj} = 125 °C	-	30	-	mJ
			T _{vj} = 175 °C	-	35	-	mJ
R _{th(j-h)}	thermal resistance from junction to heatsink	per diode switch with pre-applied thermal interface material		-	-	0.1392	K/W

[1] Value is given at chip level.

5.3. NTC Thermistor

Table 6. NTC Thermistor

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
R_{25}	rated resistance	$T_{NTC} = 25\text{ °C}$	-	5	-	kΩ
$\Delta R/R$	deviation of R_{100}	$T_{NTC} = 100\text{ °C}; R_{100} = 491$	-5.5	-	5.5	%
P_{25}	power dissipation	$T_{NTC} = 25\text{ °C}$	-	-	20	mW
$B_{25/50}$	B-value		-	3375	-	K
$B_{25/80}$	B-value		-	3425	-	K
$B_{25/100}$	B-value		-	3443	-	K

5.4. Package

Table 7. Mechanical Characteristics

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
RTI	relative thermal index	housing only	-	140	-	°C
L _{sCE}	internal stray inductance		-	20	-	nH
R _{CC'+EE'}	lead resistance, terminal to chip	T _c = 25 °C, per switch	-	0.5	-	mΩ
M	mounting torque for heatsink	M5 screw	3	-	6	Nm
	mounting torque for terminal	M6 screw	3	-	6	Nm
G	weight		-	354	-	g
T _{stg}	storage temperature[1]		-40	-	125	°C
T _{BP(max)}	Maximum baseplate operation temperature		-	-	150	°C

[1] Use the application note for special storage instructions when the product has pre-applied thermal interface material.

Table 8. Insulation

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
V _{ISOL}	isolation test voltage	RMS; f = 50 Hz; t = 1 min	-	3.4	-	kV
	material of baseplate		-	Cu	-	-
	material of substrate isolation		-	Al ₂ O ₃	-	-
	creepage distance	terminal to baseplate	-	15.0	-	mm
		terminal to terminal	-	19.3	-	mm
	clearance distance	terminal to baseplate	-	12.5	-	mm
		terminal to terminal	-	10.0	-	mm
CTI	comparative tracking index		200	-	-	-

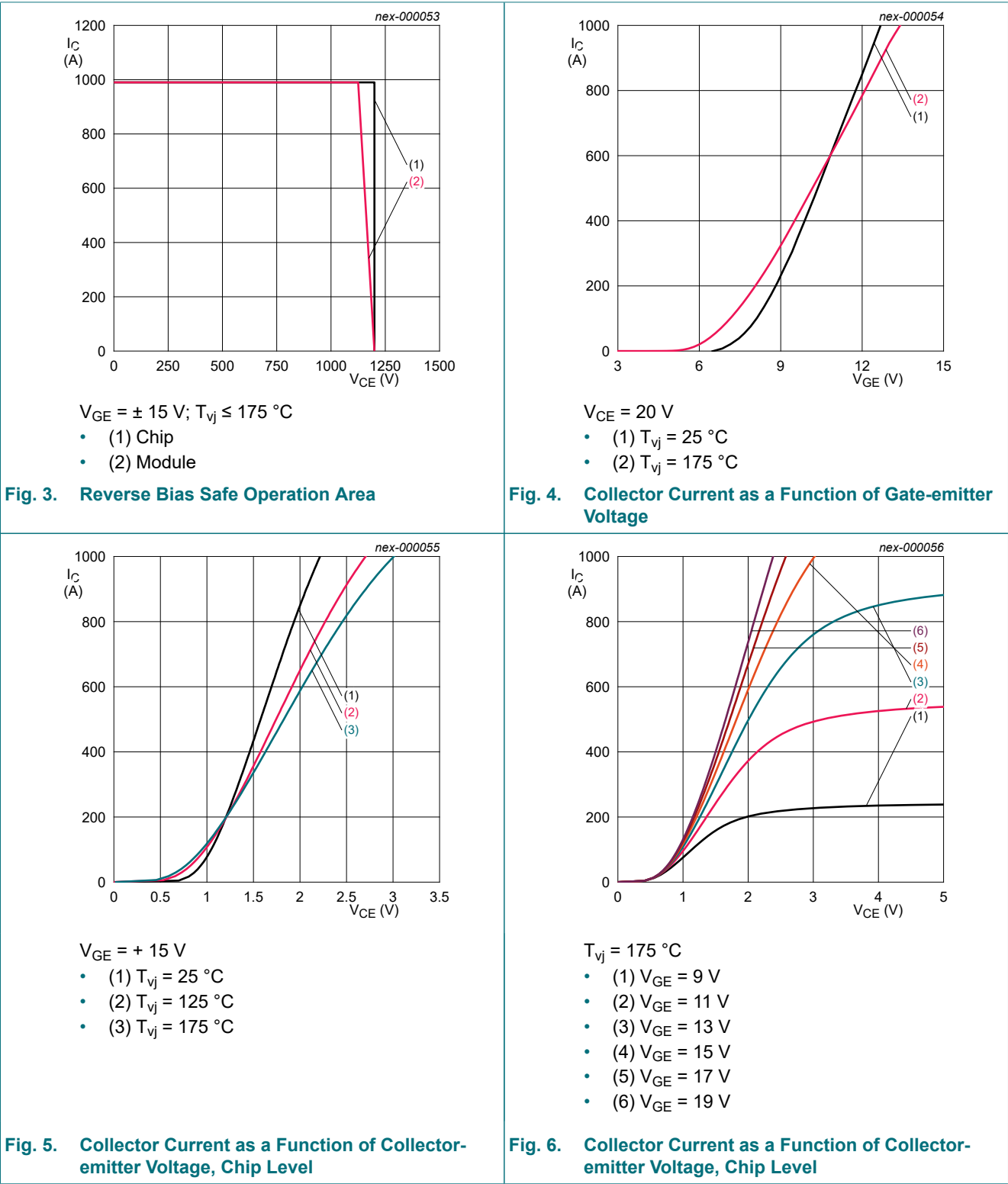
6. Ordering Information

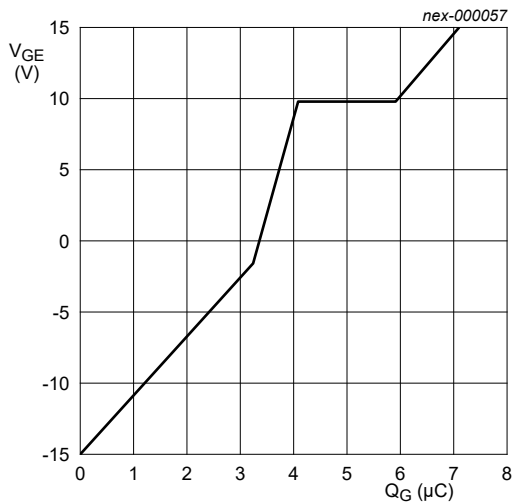
Table 9. Ordering information

Type number	Package		
	Name	Description	Version
NT480T12D3M7P	ND3	IGBT power module with half-bridge circuit topology; Solderable auxiliary contacts; Pre-applied thermal interface material; Outline dimension 152 mm × 62.5 mm × 20.8 mm	SOT8066-1

7. Characteristic Diagram

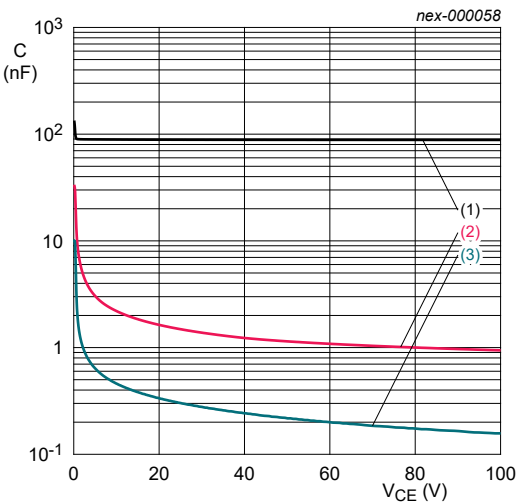
Table 10. Waveforms and Output Characteristics





$I_C = 495 \text{ A}$; $V_{CE} = 600 \text{ V}$

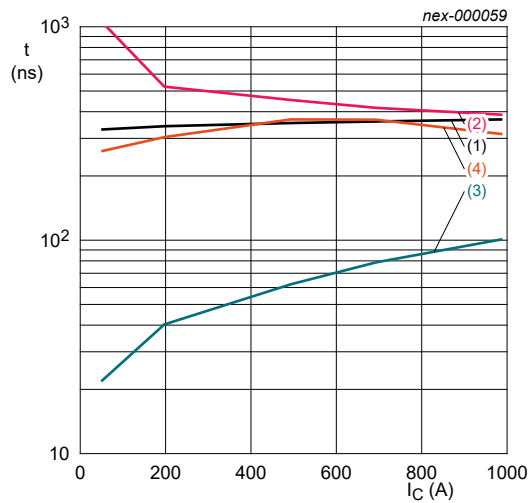
Fig. 7. Gate-emitter Voltage as a Function of Gate Charge



$V_{GE} = 0 \text{ V}$; $f = 100 \text{ kHz}$

- (1) C_{ies}
- (2) C_{oes}
- (3) C_{res}

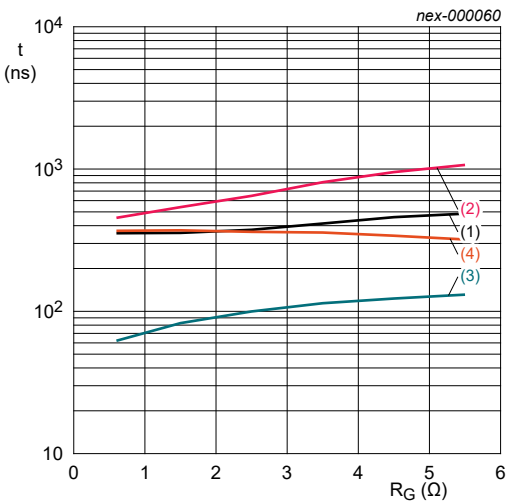
Fig. 8. Typical Capacitance as a Function of Collector-emitter Voltage



$V_{GE} = \pm 15 \text{ V}$; $V_{CC} = 600 \text{ V}$; $T_{vj} = 175 \text{ }^\circ\text{C}$;
 $R_{G(on)} = R_{G(off)} = 0.60 \Omega$

- (1) $t_{d(on)}$
- (2) $t_{d(off)}$
- (3) t_r
- (4) t_f

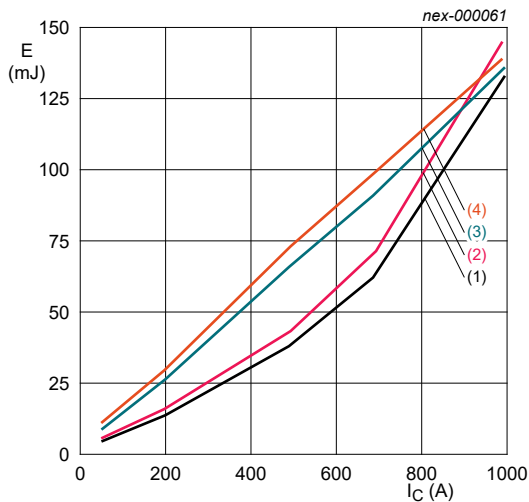
Fig. 9. Typical Switching Times as a Function of Collector Current



$V_{GE} = \pm 15 \text{ V}$; $V_{CC} = 600 \text{ V}$; $I_C = 495 \text{ A}$; $T_{vj} = 175 \text{ }^\circ\text{C}$

- (1) $t_{d(on)}$
- (2) $t_{d(off)}$
- (3) t_r
- (4) t_f

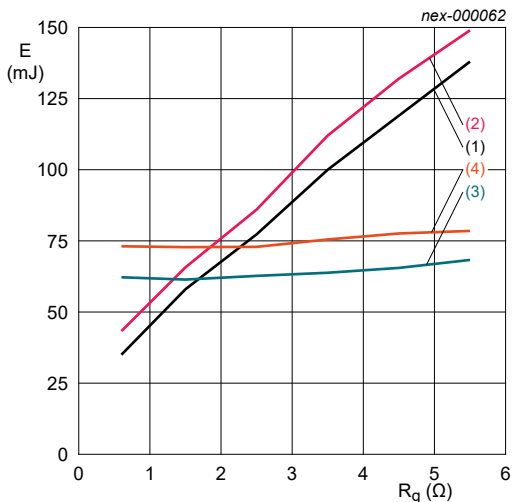
Fig. 10. Typical Switching Times as a Function of Gate Resistance



$V_{GE} = \pm 15 \text{ V}$; $V_{CC} = 600 \text{ V}$; $R_{G(on)} = R_{G(off)} = 0.60 \text{ }\Omega$

- (1) E_{on} , $T_{vj} = 125 \text{ }^{\circ}\text{C}$
- (2) E_{on} , $T_{vj} = 175 \text{ }^{\circ}\text{C}$
- (3) E_{off} , $T_{vj} = 125 \text{ }^{\circ}\text{C}$
- (4) E_{off} , $T_{vj} = 175 \text{ }^{\circ}\text{C}$

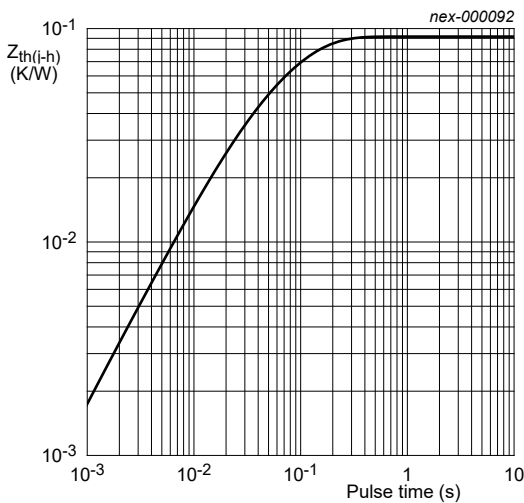
Fig. 11. Typical Switching Energy Losses as a Function of Collector Current



$V_{GE} = \pm 15 \text{ V}$; $V_{CC} = 600 \text{ V}$; $I_C = 495 \text{ A}$

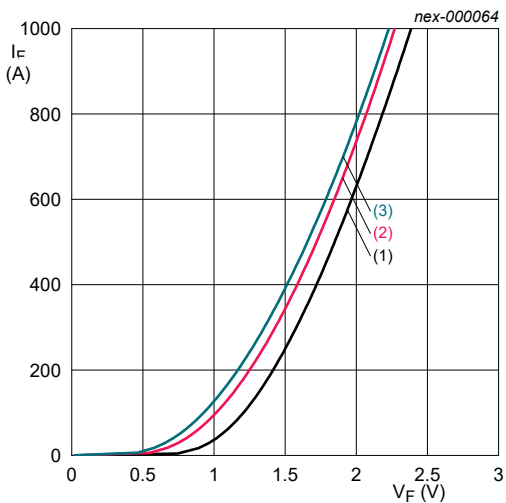
- (1) E_{on} , $T_{vj} = 125 \text{ }^{\circ}\text{C}$
- (2) E_{on} , $T_{vj} = 175 \text{ }^{\circ}\text{C}$
- (3) E_{off} , $T_{vj} = 125 \text{ }^{\circ}\text{C}$
- (4) E_{off} , $T_{vj} = 175 \text{ }^{\circ}\text{C}$

Fig. 12. Typical Switching Energy Losses as a Function of Gate Resistance



i	1	2	3	4
$r_i \text{ [K/W]}$	0.000223	0.00000	0.016501	0.074976
$\tau_i \text{ [s]}$	0.001177	0.002851	0.022882	0.081938

Fig. 13. Transient Thermal Impedance of IGBT as a Function of Single Pulse



- (1) $T_{vj} = 25 \text{ }^{\circ}\text{C}$
- (2) $T_{vj} = 125 \text{ }^{\circ}\text{C}$
- (3) $T_{vj} = 175 \text{ }^{\circ}\text{C}$

Fig. 14. Typical Diode Forward Current as a Function of Forward Voltage, Chip Level

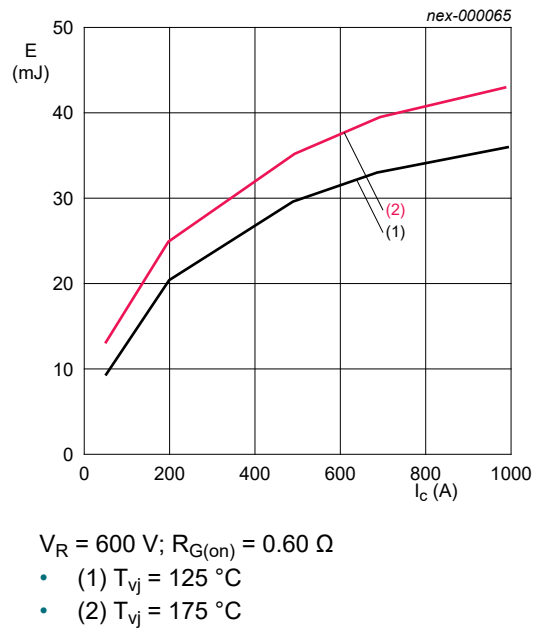


Fig. 15. Typical Reverse Recovery Current as a Function of Forward Current

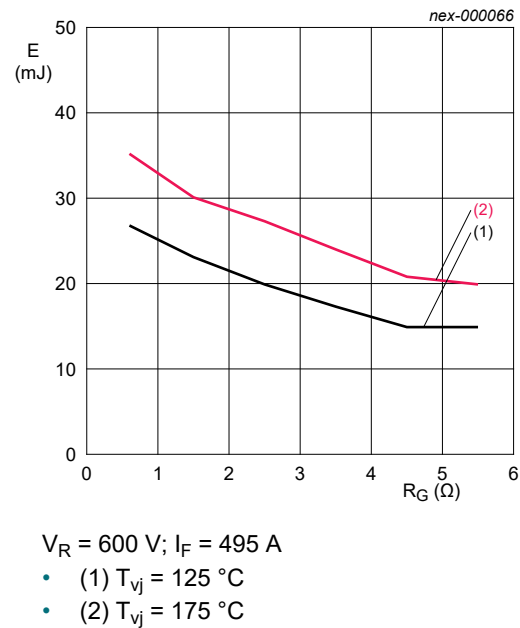
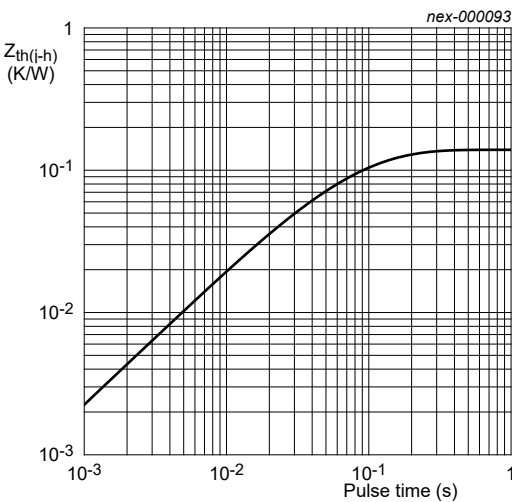


Fig. 16. Typical Reverse Recovery Current as a Function of Gate Resistance



i	1	2	3	4
r_i [K/W]	0.000272	0.00000	0.045832	0.093076
τ_i [s]	0.000846	0.002362	0.044833	0.088248

Fig. 17. Transient Thermal Impedance of Diode as a Function of Single Pulse

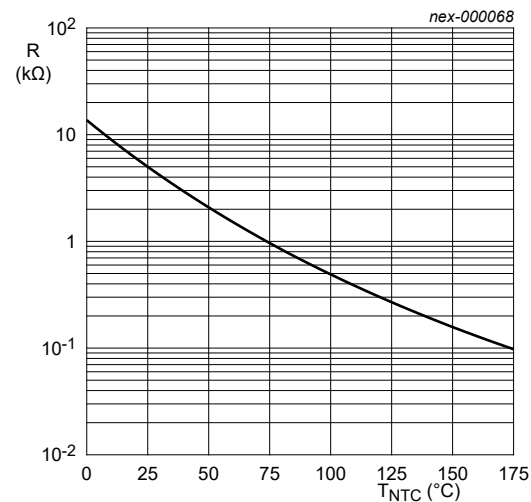


Fig. 18. NTC-thermistor Characteristics

8. Waveform Definition

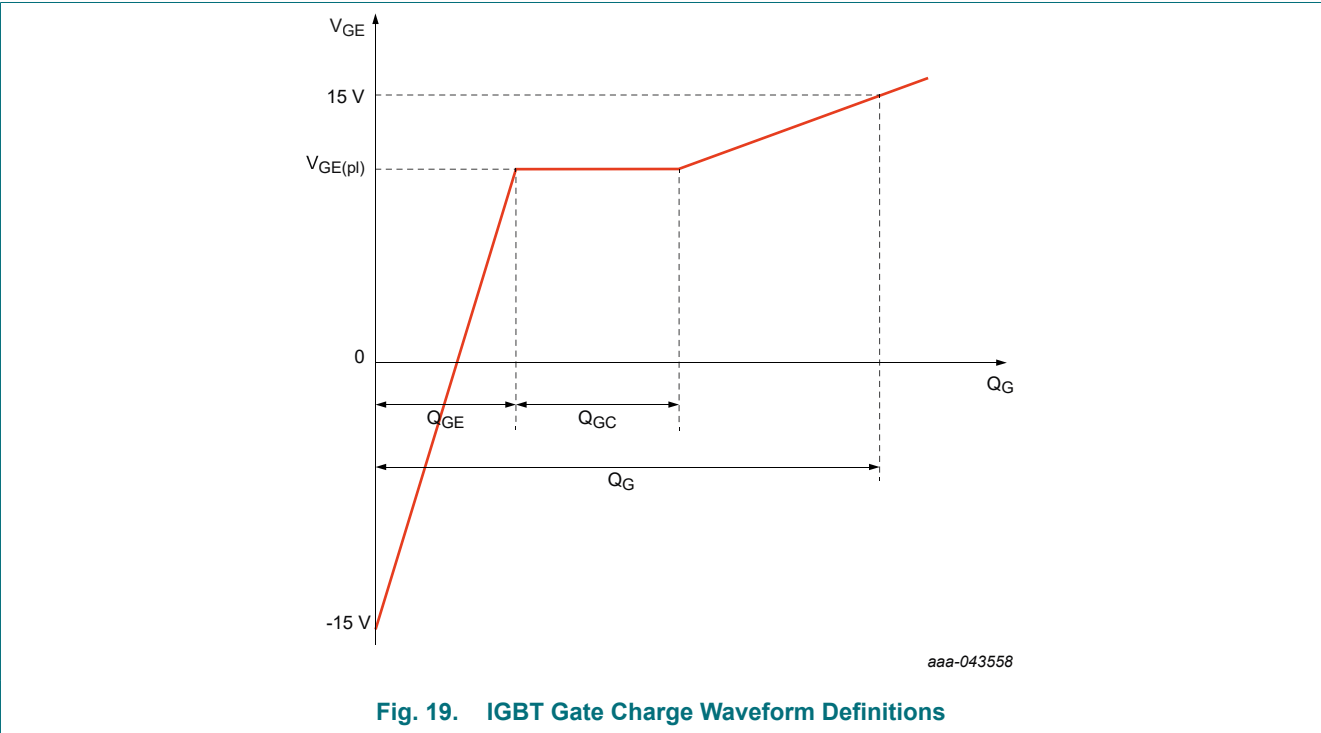


Fig. 19. IGBT Gate Charge Waveform Definitions

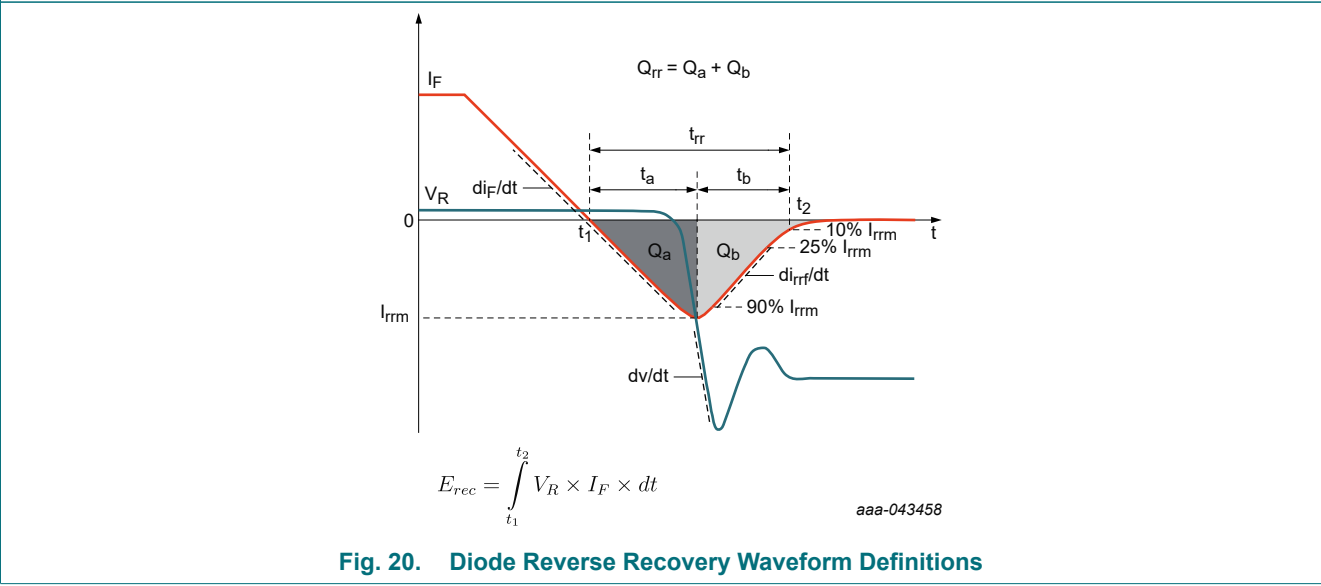
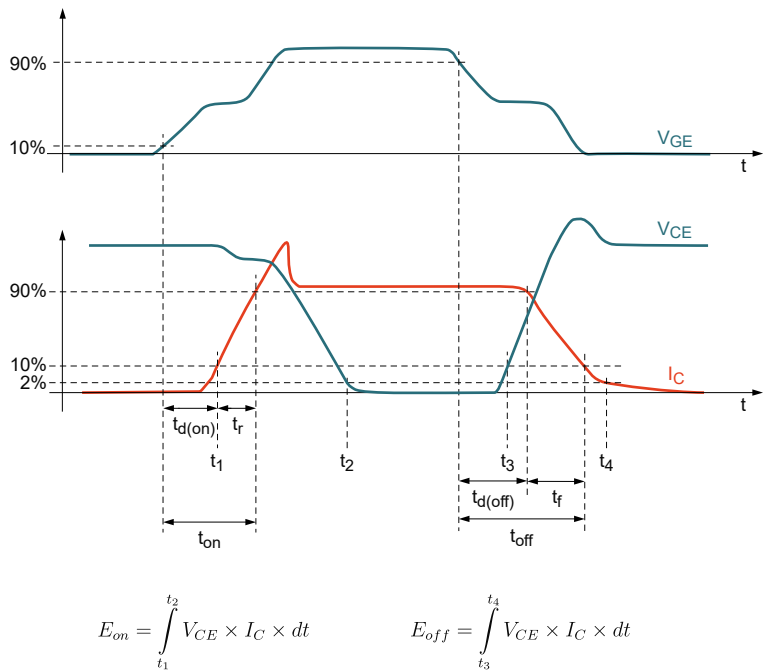


Fig. 20. Diode Reverse Recovery Waveform Definitions



aaa-043459

Fig. 21. IGBT Switching Times and Energy Loss Definitions

9. Circuit Diagram

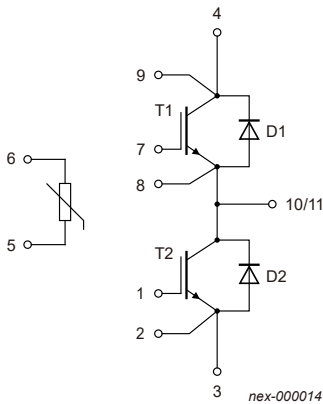
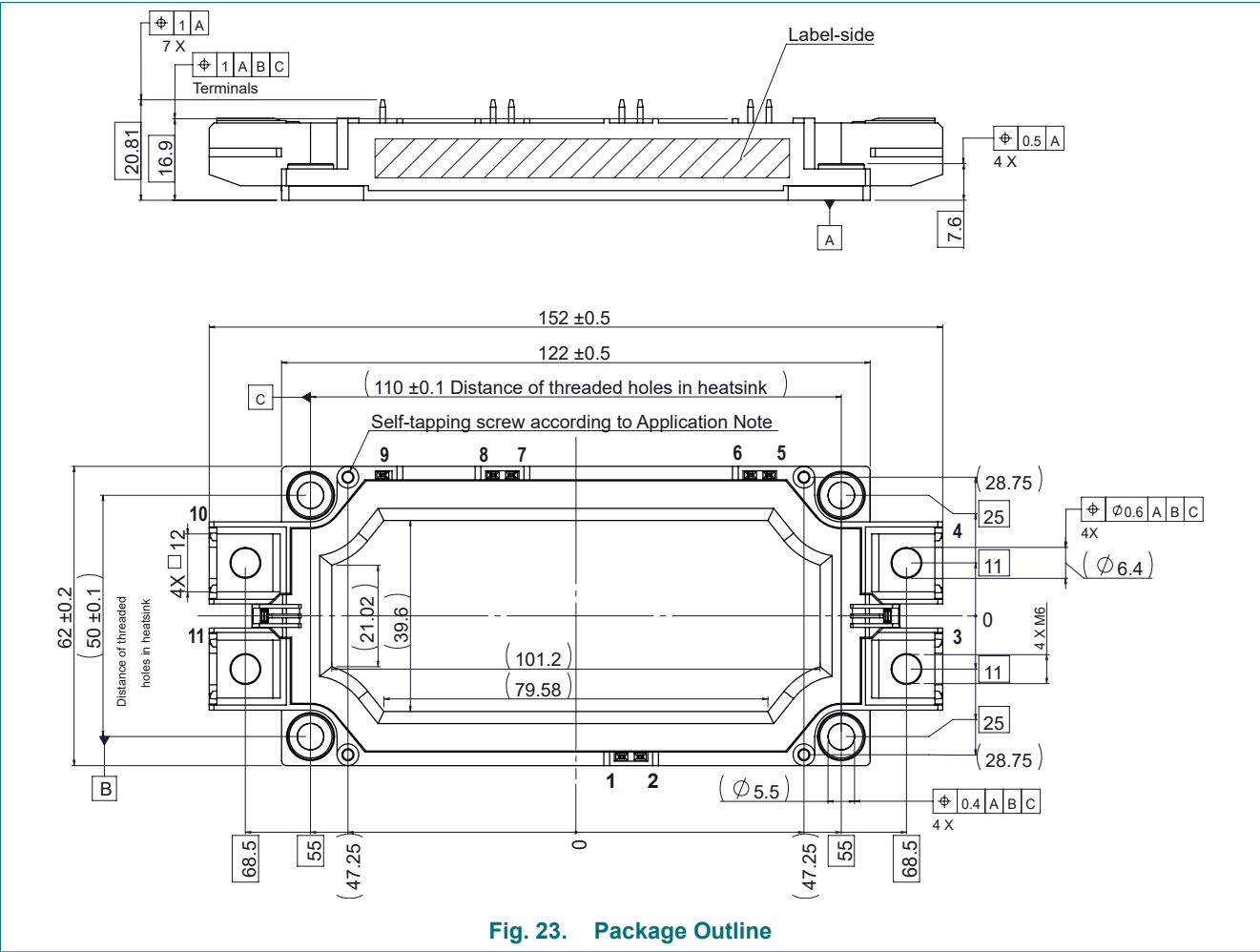
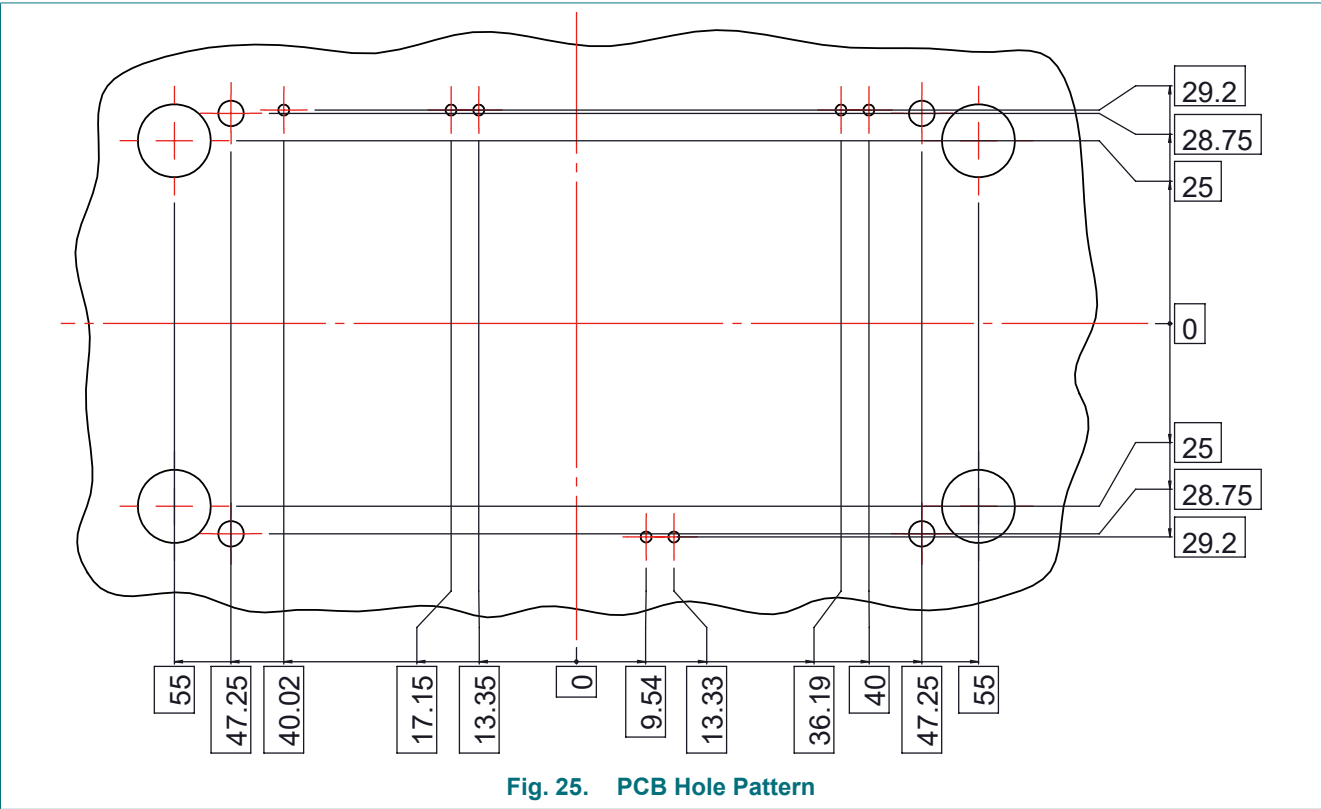
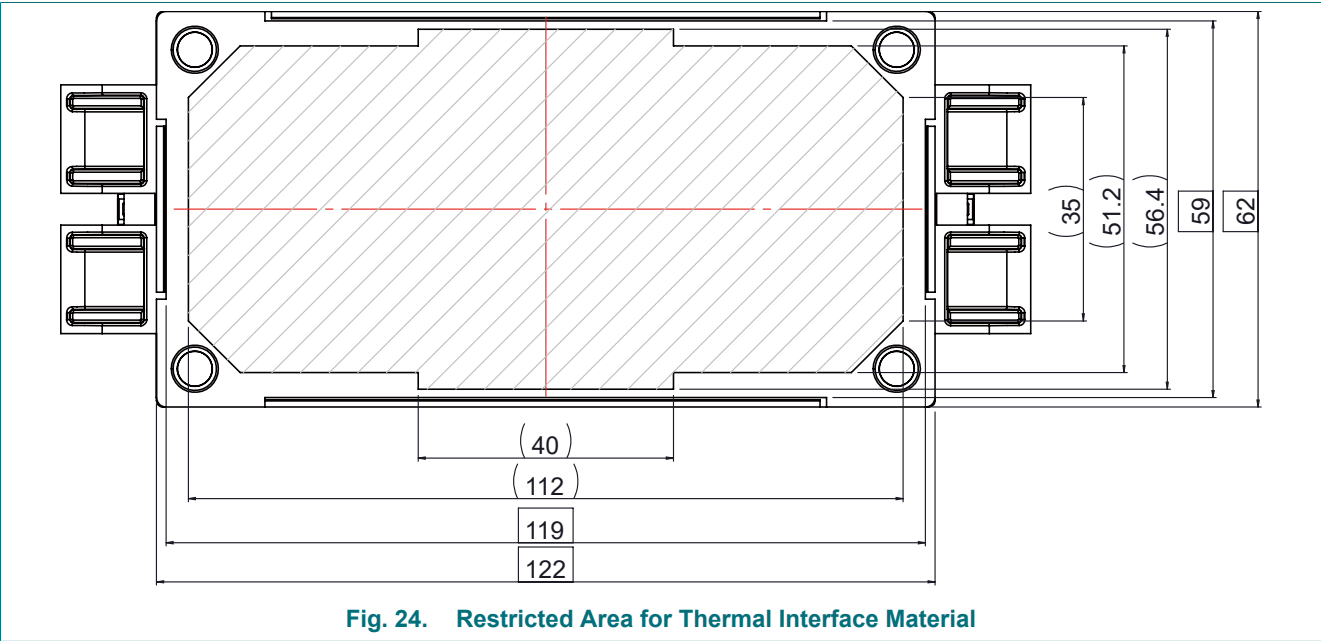


Fig. 22. Circuit Diagram

10. Package Outline



11. Restricted Area for Thermal Interface Material and PCB Reference



12. Revision History

Table 11. Revision History

Document ID	Release Date	Data Sheet Status	Supersedes
NT480T12D3M7P v. 1	20260625	Product data sheet	-

13. Legal information

Data sheet status

Document status [1][2]	Product status [3]	Definition
Objective [short] data sheet	Development	This document contains data from the objective specification for product development.
Preliminary [short] data sheet	Qualification	This document contains data from the preliminary specification.
Product [short] data sheet	Production	This document contains the product specification.

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- [2] The term 'short data sheet' is explained in section "Definitions".
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