



NT480T12D3M7

1200 V, 480 A Half Bridge IGBT Power Module

Rev. 1 — 12 June 2026

Product data sheet

1. General Description

The NT480T12D3M7 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

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	$T_c = 90\text{ °C}$	-	-	495	A
		$T_c = 100\text{ °C}$	-	-	464	A
$T_{vj(op)}$	operating junction temperature		- 40	-	175	°C

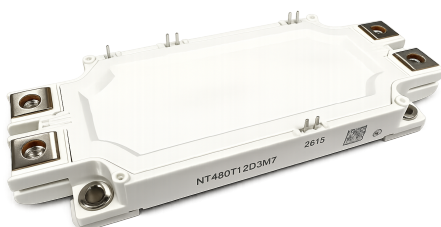


Fig. 1. Product Outline

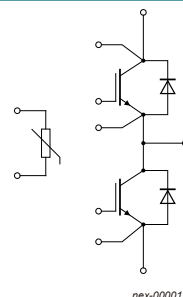


Fig. 2. Topology

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]	$T_c = 90\text{ }^{\circ}\text{C}$	-	495	A
		$T_c = 100\text{ }^{\circ}\text{C}$	-	464	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-c)}	thermal resistance from junction to case	per IGBT switch		-	-	0.081	K/W	
R _{th(c-h)}	thermal resistance from case to heatsink	per IGBT switch; λ _{grease} = 1 W/(m·K)		-	0.019	-	K/W	

5.2. Diode

Table 4. Maximum Limiting Values

Symbol	Parameter	Conditions	Min	Max	Unit
V _{RRM}	repetitive peak reverse voltage	$T_{vj} = 25\text{ }^{\circ}\text{C}$	-	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	$V_R = 0\text{ V}; t_p = 10\text{ ms}; T_{vj} = 175\text{ }^{\circ}\text{C}$	-	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 $T_{vj} = 25\text{ }^{\circ}\text{C}$, 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-c)}	thermal resistance from junction to case	per diode switch		-	-	0.1262	K/W
R _{th(c-h)}	thermal resistance from case to heatsink	per diode switch; λ _{grease} = 1 W/(m·K)		-	0.0215	-	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	$T_{NTC} = 25\text{ }^{\circ}\text{C}$	-	5	-	k Ω
$\Delta R/R$	deviation of R_{100}	$T_{NTC} = 100\text{ }^{\circ}\text{C}; R_{100} = 491$	- 5.5	-	5.5	%
P_{25}	power dissipation	$T_{NTC} = 25\text{ }^{\circ}\text{C}$	-	-	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	-	$^{\circ}\text{C}$
L_{sCE}	internal stray inductance		-	20	-	nH
$R_{CC'+EE'}$	lead resistance, terminal to chip	$T_c = 25\text{ }^{\circ}\text{C}$, per switch	-	0.5	-	m Ω
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		-40	-	125	$^{\circ}\text{C}$

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	-	-	-

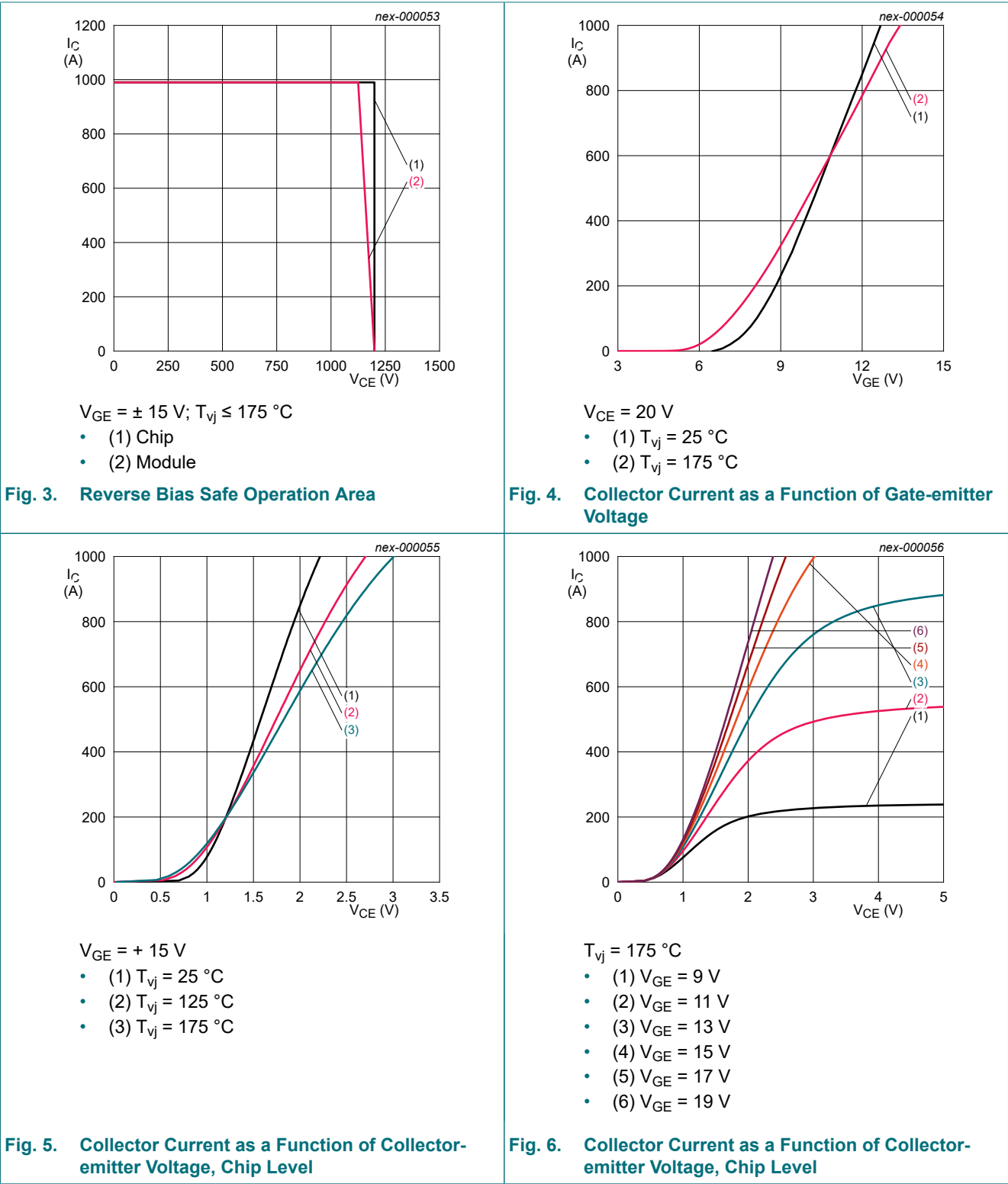
6. Ordering Information

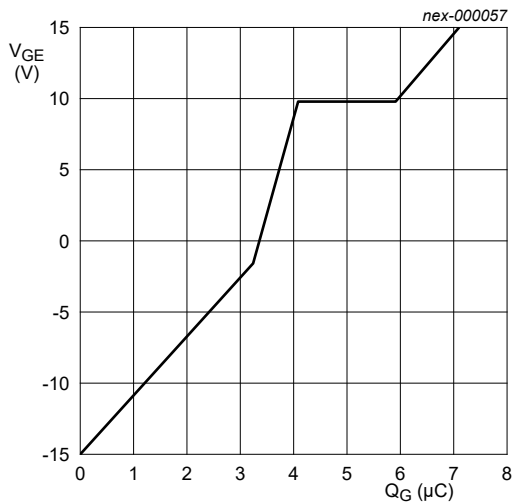
Table 9. Ordering information

Type number	Package		
	Name	Description	Version
NT480T12D3M7	ND3	IGBT power module with half-bridge circuit topology; Solderable auxiliary contacts; Outline dimension 152 mm × 62.5 mm × 20.8 mm	SOT8066-1

7. Characteristic Diagram

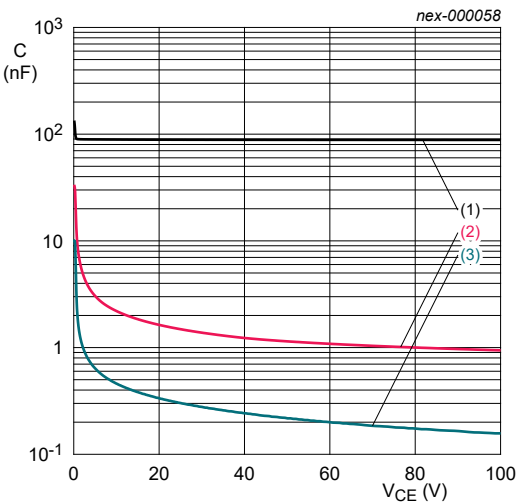
Table 10. Waveforms and Output Characteristics





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

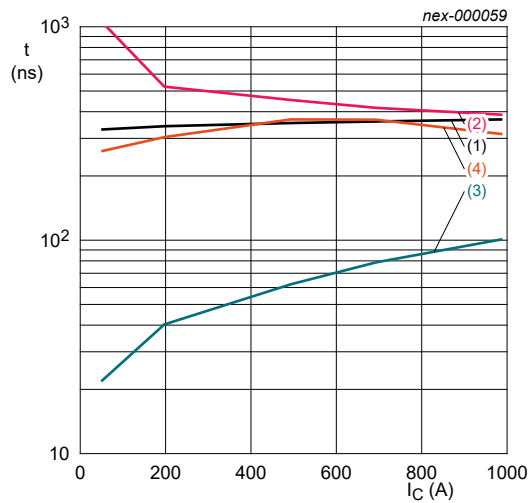
Fig. 7. Gate-emitter Voltage as a Function of Gate Charge



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

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

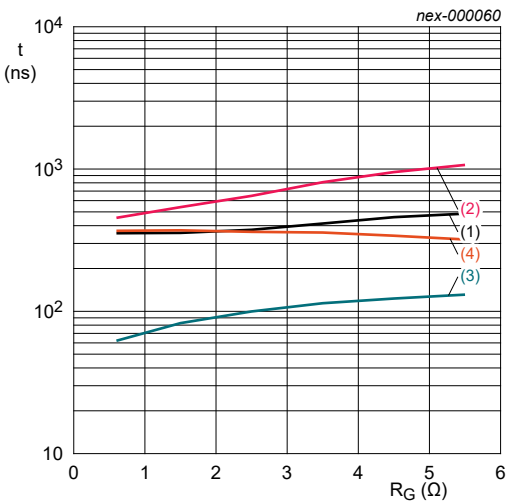
Fig. 8. Typical Capacitance as a Function of Collector-emitter Voltage



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

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

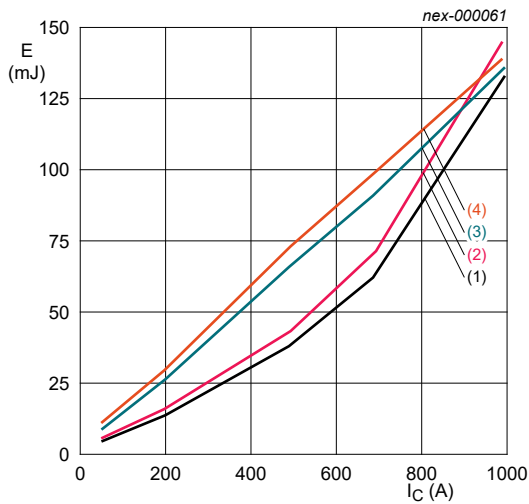
Fig. 9. Typical Switching Times as a Function of Collector Current



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

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

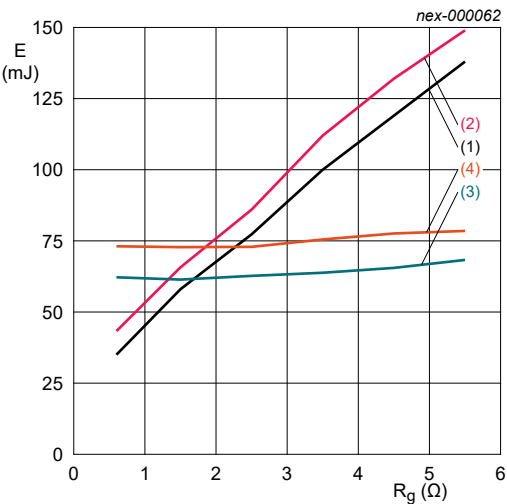
Fig. 10. Typical Switching Times as a Function of Gate Resistance



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

- (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} , $T_{vj} = 175 \text{ }^{\circ}\text{C}$

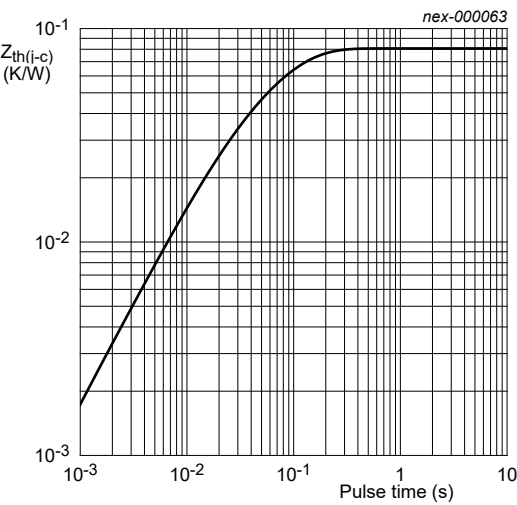
Fig. 11. Typical Switching Energy Losses as a Function of Collector Current



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

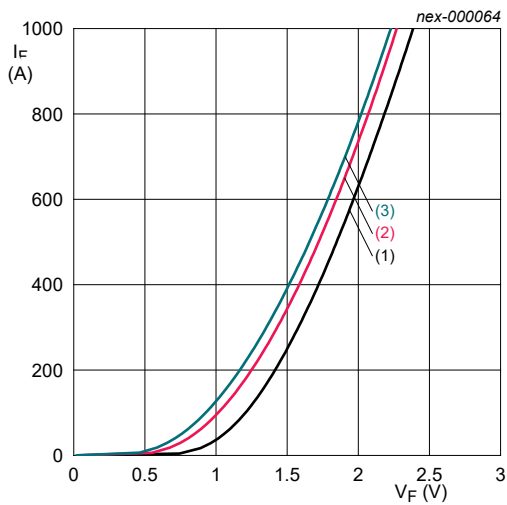
- (1) E_{on} , $T_{vj} = 125 \text{ }^{\circ}\text{C}$
- (2) E_{on} , $T_{vj} = 175 \text{ }^{\circ}\text{C}$
- (3) E_{off} , $T_{vj} = 125 \text{ }^{\circ}\text{C}$
- (4) E_{off} , $T_{vj} = 175 \text{ }^{\circ}\text{C}$

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



i	1	2	3	4
$r_i \text{ [K/W]}$	0.00020	0.00000	0.01452	0.06598
$T_i \text{ [s]}$	0.00104	0.00251	0.02014	0.07211

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

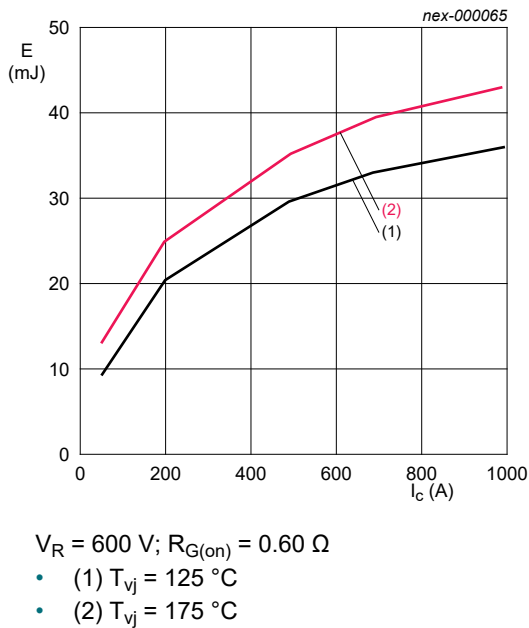


Fig. 15. Typical Reverse Recovery Current as a Function of Forward Current

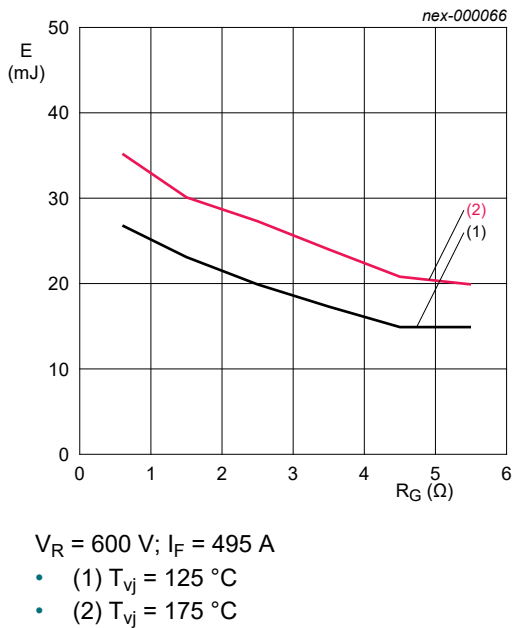
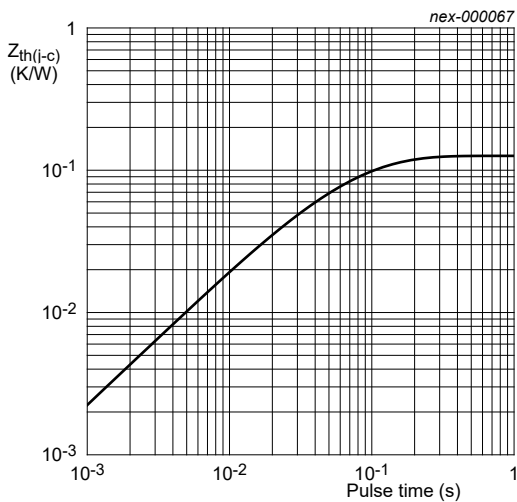


Fig. 16. Typical Reverse Recovery Current as a Function of Gate Resistance



i	1	2	3	4
$r_i \text{ [K/W]}$	0.00025	0.00000	0.04155	0.08438
$\tau_i \text{ [s]}$	0.00077	0.00214	0.04065	0.08001

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

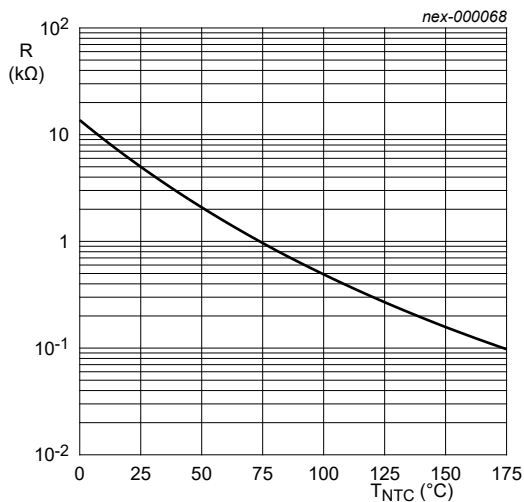


Fig. 18. NTC-thermistor Characteristics

8. Waveform Definition

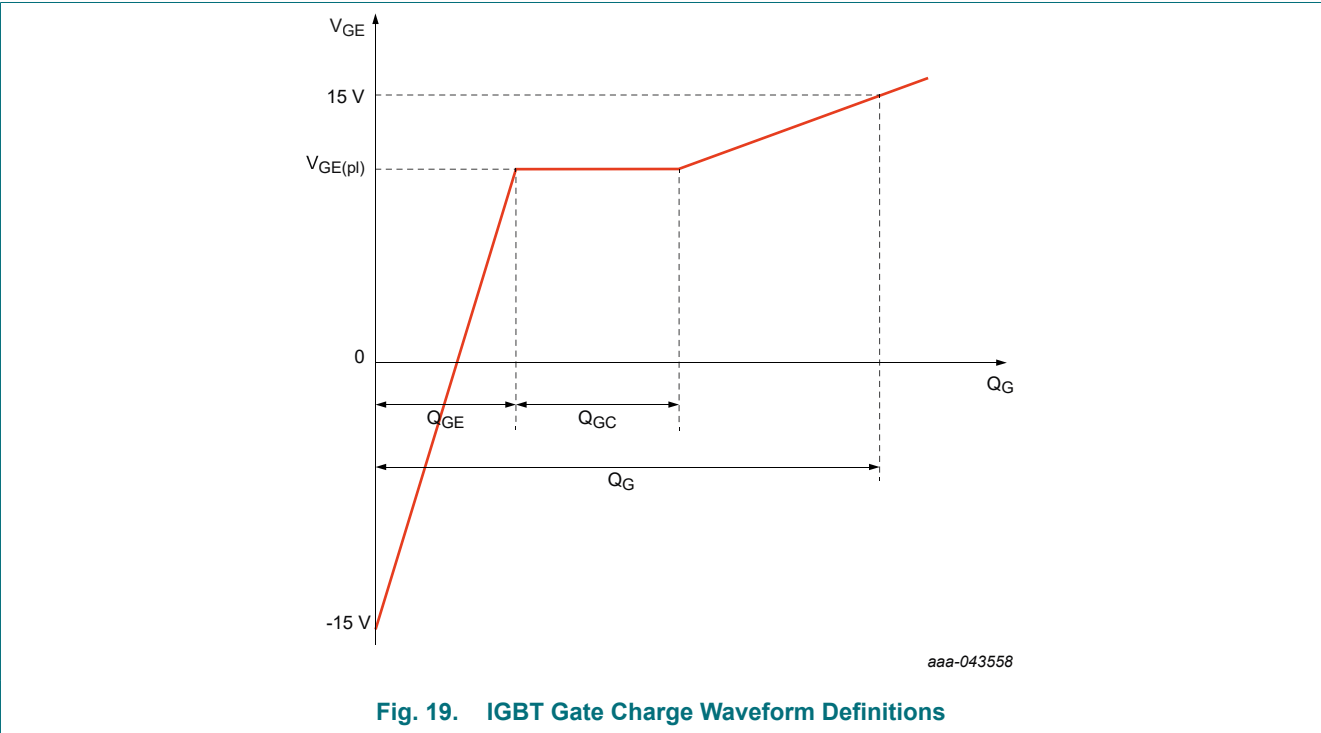


Fig. 19. IGBT Gate Charge Waveform Definitions

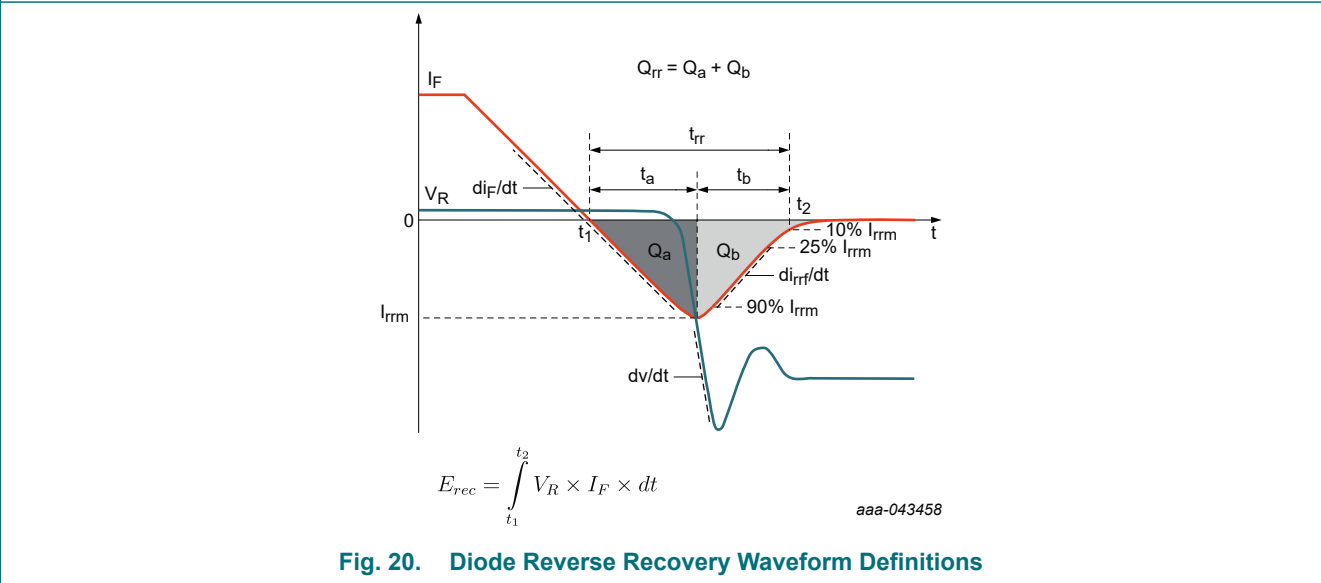
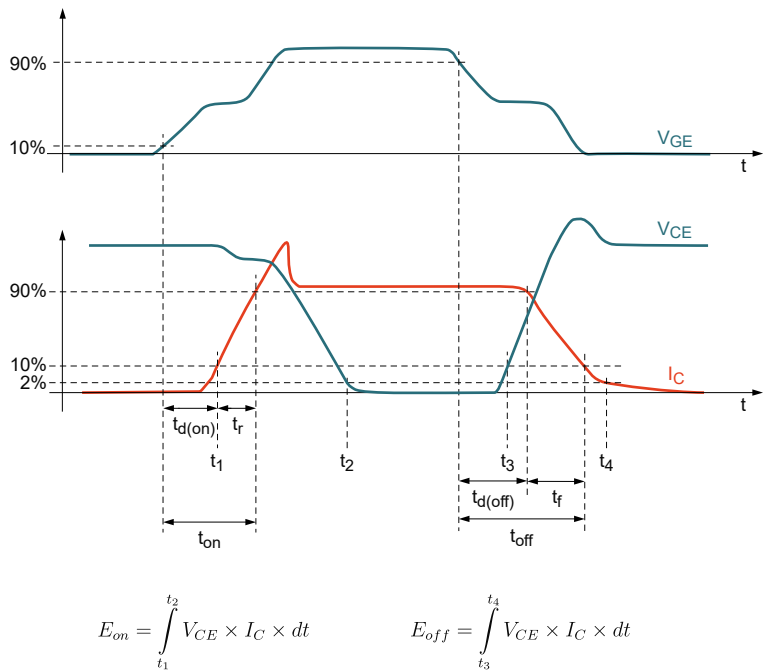


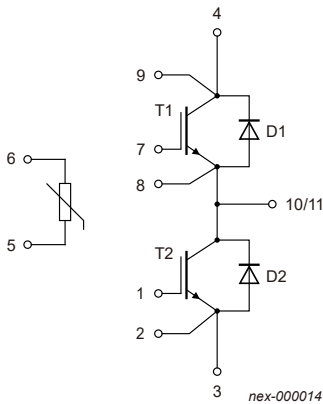
Fig. 20. Diode Reverse Recovery Waveform Definitions



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Fig. 21. IGBT Switching Times and Energy Loss Definitions

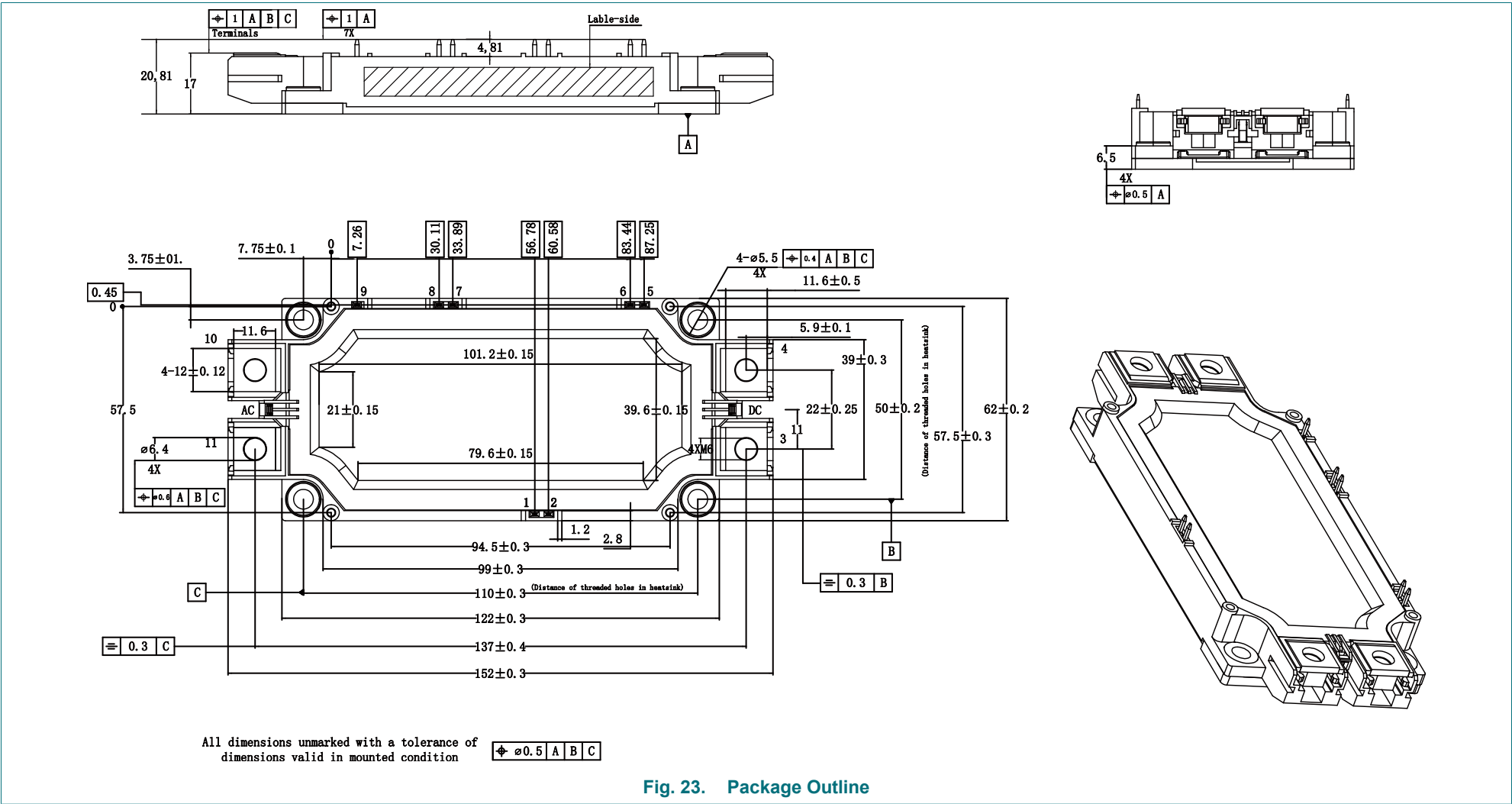
9. Circuit Diagram



nex-000014

Fig. 22. Circuit Diagram

10. Package Outline



11. Revision History

Table 11. Revision History

Document ID	Release Date	Data Sheet Status	Supersedes
NT480T12D3M7 v. 1	20260612	Product data sheet	-

12. 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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