



GT300TT120A8H

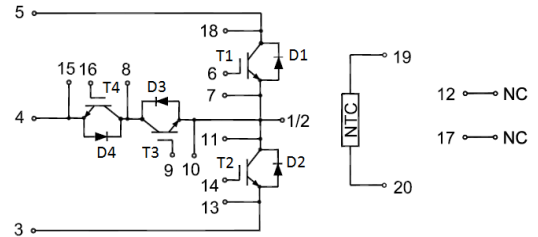
IGBT Module

Preliminary Datasheet

Features:

- Field Stop Trench Gate IGBT
- Short Circuit Rated > 10 μ s
- Low Saturation Voltage
- Low Switching Loss
- 100% RBSOA Tested (2 $\times$ I_C)
- Low Stray Inductance
- Mixed Voltage Component Topology
- Lead Free, Compliant with RoHS Requirement

Circuit Diagram



Applications:

- Solar Applications
- UPS Systems

IGBT, Buck Switch (T1/T2)

Maximum Rated Values (T_C=25°C unless otherwise specified)

V _{CES}	Collector-Emitter Blocking Voltage		1200	V
V _{GES}	Gate-Emitter Voltage		±20	V
I _C	Continuous Collector Current	T _C =100°C	300	A
		T _C =25°C	530	A
I _{CM}	Peak Collector Current Repetitive	t _p =1ms	600	A
P _D	Maximum Power Dissipation (IGBT)	T _C =25°C, T _{Jmax} =175°C	1910	W



Electrical Characteristics of IGBT ($T_C=25^{\circ}\text{C}$ unless otherwise specified)

Static Characteristics

Symbol	Description	Conditions	Min.	Typ.	Max.	Units
$V_{GE(th)}$	Gate-Emitter Threshold Voltage	$I_C=12\text{mA}$, $V_{CE}=V_{GE}$	5.0	5.8	6.5	V
$V_{CE(sat)}$	Collector-Emitter Saturation Voltage	$I_C=300\text{A}$, $V_{GE}=15\text{V}$	$T_J=25^{\circ}\text{C}$	1.80		V
			$T_J=125^{\circ}\text{C}$	2.20		V
			$T_J=150^{\circ}\text{C}$	2.30		V
I_{CES}	Collector-Emitter Leakage Current	$V_{GE}=0\text{V}$, $V_{CE}=V_{CES}$, $T_J=25^{\circ}\text{C}$			1	mA
I_{GES}	Gate-Emitter Leakage Current	$V_{GE}=20\text{V}$, $V_{CE}=0\text{V}$, $T_J=25^{\circ}\text{C}$			400	nA
C_{ies}	Input Capacitance	$V_{CE}=25\text{V}$, $V_{GE}=0\text{V}$, $f=100\text{kHz}$		34.1		nF
C_{oes}	Output Capacitance			1.7		nF
C_{res}	Reverse Transfer Capacitance			0.3		nF

Switching Characteristics

$t_{d(on)}$	Turn-on Delay Time	$V_{CC}=600V, I_C=300A,$ $R_{Gon}=2\Omega, V_{GE}=\pm 15V,$ Inductive Load	$T_J=25^{\circ}C$		154		ns
			$T_J=125^{\circ}C$		164		
			$T_J=150^{\circ}C$		166		
t_r	Rise Time		$T_J=25^{\circ}C$		74		ns
			$T_J=125^{\circ}C$		80		
			$T_J=150^{\circ}C$		84		
$t_{d(off)}$	Turn-off Delay Time		$T_J=25^{\circ}C$		382		ns
			$T_J=125^{\circ}C$		428		
			$T_J=150^{\circ}C$		436		
t_f	Fall Time	$T_J=25^{\circ}C$		144		ns	
		$T_J=125^{\circ}C$		234			
		$T_J=150^{\circ}C$		278			
E_{on}	Turn-on Switching Loss	$V_{CC}=600V, I_C=300A,$ $R_{Gon}=2\Omega, V_{GE}=\pm 15V,$ $di/dt=2966A/\mu s$ ($T_J=150^{\circ}C$) Inductive Load	$T_J=25^{\circ}C$		19.5		mJ
		$T_J=125^{\circ}C$		23.6			
		$T_J=150^{\circ}C$		26.3			



E _{off}	Turn-off Switching Loss	V _{CC} =600V, I _C =300A, R _{Goff} =2Ω, V _{GE} =±15V, du/dt=5400V/μs (T _J =150°C) Inductive Load	T _J =25°C		20.1		mJ
			T _J =125°C		31.2		
			T _J =150°C		32.3		
Q _g	Total Gate Charge	V _{GE} =+15V...-15V	T _J =25°C		2.79		μC
R _{G(int)}	Internal Gate Resistance		T _J =25°C		1.5		Ω
I _{sc}	V _{CC} =600V, V _{GE} =±15V, t _p =10μs, T _J =150°C				908		A
R _{θJC}	IGBT Thermal Resistance: Junction-to-Case (per IGBT)					0.079	°C/W

Buck Diode (D3/D4)

Maximum Rated Values (T_C=25°C unless otherwise specified)

V _{RRM}	Repetitive Peak Reverse Voltage	T _J =25°C	650	V
I _F	Diode Continuous Forward Current		300	A
I _{FM}	Peak Diode Current Repetitive	t _p =1ms	600	A

Electrical Characteristics of Diode (T_C=25°C unless otherwise specified)

Symbol	Description	Conditions		Min.	Typ.	Max.	Units
V _{FM}	Forward Voltage	I _F =300A	T _J =25°C		1.58		V
			T _J =125°C		1.60		
			T _J =150°C		1.60		
t _{rr}	Reverse Recovery Time	I _F =300A, -diF/dt=1217A/μs(T _J =150°C), V _R =300V, V _{GE} =-15V	T _J =25°C		238		ns
			T _J =125°C		240		
			T _J =150°C		250		
I _{rr}	Peak Reverse Recovery Current		T _J =25°C		140		A
			T _J =125°C		156		
			T _J =150°C		164		
Q _{rr}	Reverse Recovery Charge		T _J =25°C		16.3		μC
			T _J =125°C		20.5		
			T _J =150°C		23.2		



E _{rec}	Reverse Recovery Energy	I _F =300A, -diF/dt=1217μs(T _J =150℃), V _R =300V, V _{GE} =-15V	T _J =25℃		4.6		mJ
			T _J =125℃		5.8		
			T _J =150℃		6.6		
R _{θJC}	Diode Thermal Resistance: Junction-to-Case (per Diode)					0.179	℃/W

IGBT, Boost Switch (T3/T4)

Maximum Rated Values (T_C=25°C unless otherwise specified)

V _{CES}	Collector-Emitter Blocking Voltage		650	V
V _{GES}	Gate-Emitter Voltage		±20	V
I _C	Continuous Collector Current	T _C =100°C	300	A
		T _C =25°C	337	A
I _{CM}	Repetitive Peak Collector Current	tp=1ms	600	A
P _D	Maximum Power Dissipation per IGBT	T _C =25°C, T _{Jmax} =175°C	1113	W

Electrical Characteristics of IGBT (T_C=25°C unless otherwise specified)

Static Characteristics

Symbol	Description	Conditions	Min.	Typ.	Max.	Units
V _{GE(th)}	Gate-Emitter Threshold Voltage	I _C =4.8mA, V _{CE} =V _{GE}	4.0	4.8	6.0	V
V _{CE(sat)}	Collector-Emitter Saturation Voltage	I _C =300A, V _{GE} =15V	T _J =25°C	1.65		V
			T _J =125°C	1.95		V
			T _J =150°C	2.00		V
I _{CES}	Collector-Emitter Leakage Current	V _{GE} =0V, V _{CE} =V _{CES} , T _J =25°C			1	mA
I _{GES}	Gate-Emitter Leakage Current	V _{GE} =20V, V _{CE} =0V, T _J =25°C			400	nA
C _{ies}	Input Capacitance	V _{CE} =25V, V _{GE} =0V, f=100kHz		22.0		nF
C _{oes}	Output Capacitance			0.96		nF
C _{res}	Reverse Transfer Capacitance			0.44		nF



Switching Characteristics

t _{d(on)}	Turn-on Delay Time	V _{CC} =300V, I _C =300A, R _{Gon} =2.6Ω, V _{GE} =±15V, Inductive Load	T _J =25℃		132		ns	
			T _J =125℃		134			
			T _J =150℃		136			
t _r	Rise Time		T _J =25℃		120		ns	
			T _J =125℃		122			
			T _J =150℃		123			
t _{d(off)}	Turn-off Delay Time	V _{CC} =300V, I _C =300A, R _{Goff} =2.6Ω, V _{GE} =±15V, Inductive Load	T _J =25℃		370		ns	
			T _J =125℃		388			
			T _J =150℃		400			
t _f	Fall Time		T _J =25℃		88		ns	
			T _J =125℃		106			
			T _J =150℃		110			
E _{on}	Turn-on Switching Loss	V _{CC} =300V, I _C =300A, R _{Gon} =2.6Ω, V _{GE} =±15V, di/dt=1178A/μs (T _J =150℃) Inductive Load	T _J =25℃		1.4		mJ	
			T _J =125℃		2.4			
			T _J =150℃		3.0			
E _{off}	Turn-off Switching Loss		V _{CC} =300V, I _C =300A, R _{Goff} =2.6Ω, V _{GE} =±15V, du/dt=5518V/μs (T _J =150℃) Inductive Load	T _J =25℃		13.4		mJ
				T _J =125℃		15.2		
				T _J =150℃		16.0		
Q _g	Total Gate Charge	V _{GE} =+15V...-15V		T _J =25℃		2.84		uC
R _{G(int)}	Internal Gate Resistance			T _J =25℃		1.0		Ω
SCSOA	V _{CC} =300V, V _{GE} =±15V, R _G =6.8Ω, T _J =150℃			10			μs	
R _{θJC}	IGBT Thermal Resistance: Junction-to-Case (per IGBT)					0.132	℃/W	

Boost Diode (D1/D2)

Maximum Rated Values ($T_C=25^\circ C$ unless otherwise specified)

V_{RRM}	Repetitive Peak Reverse Voltage	$T_J=25^\circ C$	1200	V
I_F	Diode Continuous Forward Current		300	A
I_{FM}	Peak Diode Current Repetitive	$t_p=1ms$	600	A



Electrical Characteristics of Diode ($T_C=25^\circ\text{C}$ unless otherwise specified)

Symbol	Description	Conditions		Min.	Typ.	Max.	Units
V _{FM}	Forward Voltage	I _F =300A	T _J =25℃		1.80		V
			T _J =125℃		1.95		
			T _J =150℃		1.95		
t _{rr}	Reverse Recovery Time	I _F =300A, -diF/dt=3129A/μs(T _J =150℃), V _R =600V, V _{GE} =-15V	T _J =25℃		204		ns
			T _J =125℃		552		
			T _J =150℃		644		
I _{rr}	Peak Reverse Recovery Current		T _J =25℃		158		A
			T _J =125℃		162		
			T _J =150℃		173		
Q _{rr}	Reverse Recovery Charge		T _J =25℃		19.5		μC
			T _J =125℃		38.1		
			T _J =150℃		42.1		
E _{rec}	Reverse Recovery Energy		T _J =25℃		5.5		mJ
			T _J =125℃		11.4		
			T _J =150℃		12.6		
R _{θJC}	Diode Thermal Resistance: Junction-to-Case (per Diode)					0.163	℃/W

Internal NTC-Thermistor Characteristics

Symbol	Description	Min.	Typ.	Max.	Units
R_{25}	$T_C=25^\circ\text{C}$		5		$\text{k}\Omega$
$\Delta R/R$	$T_C=100^\circ\text{C}$, $R_{100}=465\Omega$	-5		+5	%
P_{25}	$T_C=25^\circ\text{C}$			10	mW
$B_{25/50}$	$R_2=R_{25} \exp[B_{25/50}(1/T_2-1/(298.15\text{K}))]$		3380		K
$B_{25/80}$	$R_2=R_{25} \exp[B_{25/80}(1/T_2-1/(298.15\text{K}))]$		3440		K
$B_{25/100}$	$R_2=R_{25} \exp[B_{25/100}(1/T_2-1/(298.15\text{K}))]$		3545		K



Module

Symbol	Description		Min.	Typ.	Max.	Units
V _{iso}	Isolation Voltage (All Terminals Shorted)	RMS, f=50Hz, 60s	2500			V
T _J	Maximum Junction Temperature				175	°C
T _{JOP}	Maximum Operating Junction Temperature Range		-40		+150	°C
T _{stg}	Storage Temperature		-40		+125	°C
CTI	Comparative Tracking Index		200			
R _{θCS}	Case-to-Sink Thermally (Conductive Grease Applied)				0.026	°C/W
M	Power Terminals Screw:M6		3.0		6.0	N·m
M	Mounting Screw:M5		3.0		6.0	N·m
G	Weight			390		g

Ordering Information Table

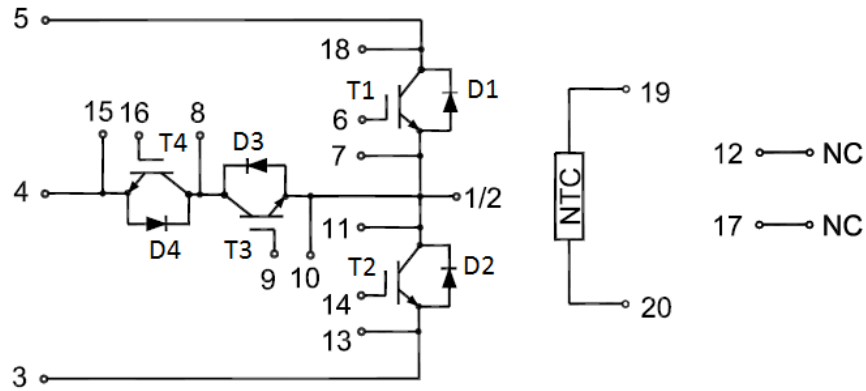
Device code

G	T	300	TT	120	A8	H
①	②	③	④	⑤	⑥	⑦

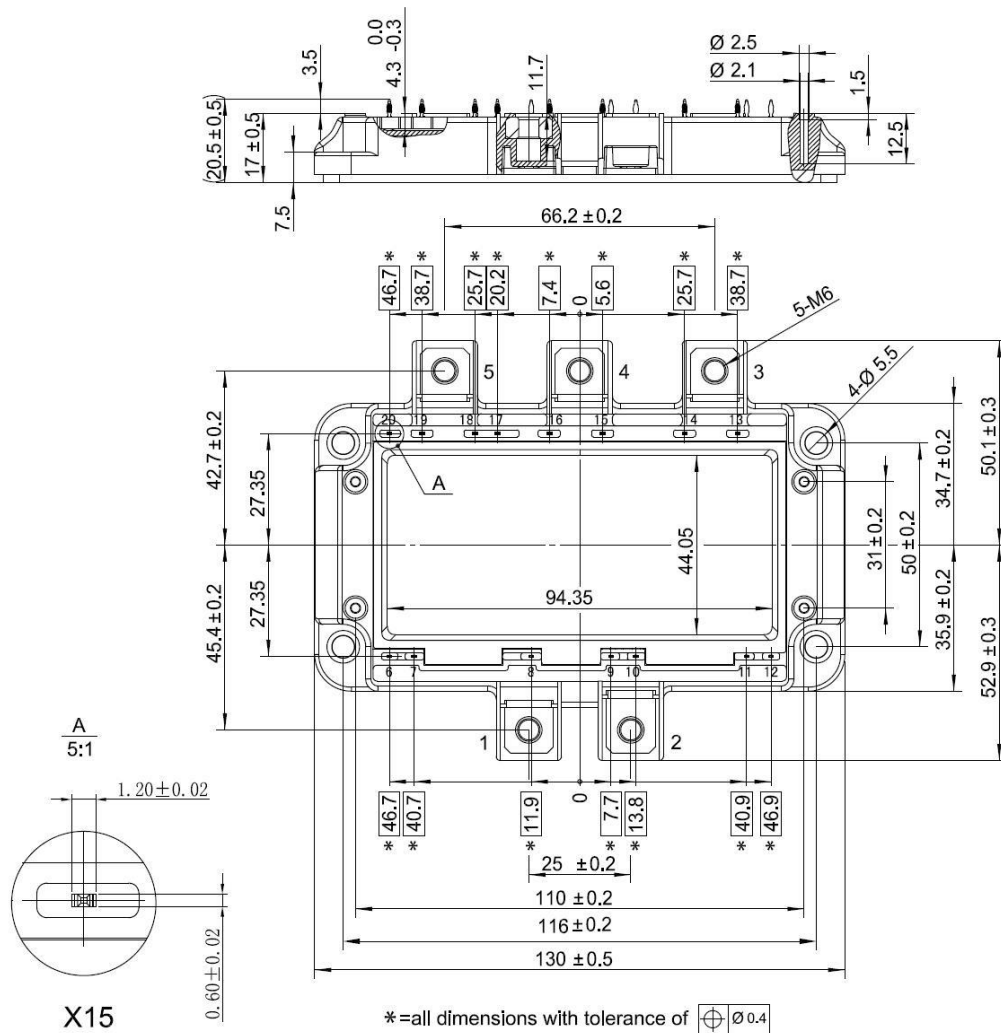
- ① - IGBT Module
- ② - Trench, Low Switching Losses IGBT
- ③ - Rated Current (300=300A)
- ④ - Circuit Configuration (Three Level, T Type)
- ⑤ - Rated Voltage (120=1200V)
- ⑥ - Package Type
- ⑦ - Test Level (Pass the Important Reliability Test-Industrial Grade)



Internal Circuit



Package Outline (Unit: mm):





Revision	Notes
01	Initial release

Announcement

Information in this document is believed to be accurate and reliable. However, NJSME does not give any representations or warranties, expressed or implied, as to the accuracy or completeness of such information and shall have no liability for the consequences of use of such information.

Right to Make Changes

NJSME reserves the right to make changes to information published in this document, including without limitation specifications and product descriptions, at any time and without notice. This document supersedes and replaces all information supplied prior to the publication hereof.

The datasheet with “REV.” + “Arabic numerals” is based on engineering data for initial reference purpose only.

The released datasheet would be issued with “REV.” + “alphabet characters”.