



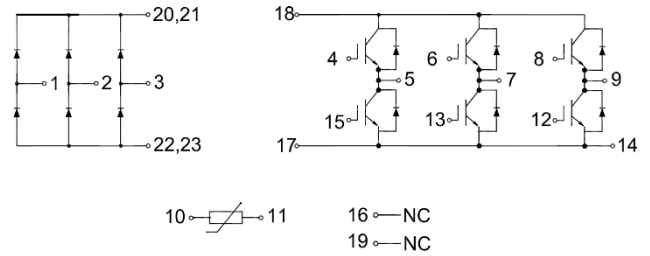
GT40RFF120T5H-T4

IGBT Module

Preliminary Data

Features:

- Trench & Field Stop IGBT
- Short Circuit Rated $>10\mu\text{s}$
- Low Saturation Voltage
- Low Switching Loss
- 100% RBSOA Tested($2\times I_c$)
- Low Stray Inductance
- Lead Free, Compliant with RoHS Requirement



Applications:

- Servo Drives
- Industrial Inverters

IGBT, Inverter

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

V_{CES}	Collector-Emitter Blocking Voltage		1200	V
V_{GES}	Gate-Emitter Voltage		± 20	V
I_c	Continuous Collector Current	$T_C=100^\circ\text{C}$	40	A
		$T_C=25^\circ\text{C}$	80	A
I_{CM}	Peak Collector Current Repetitive	$t_p=1\text{ms}$	80	A
P_D	Maximum Power Dissipation (IGBT)	$T_C=25^\circ\text{C}$ $T_{Jmax}=175^\circ\text{C}$	300	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	$I_C=1.5\text{mA}$, $V_{CE}=V_{GE}$, $T_J=25^{\circ}\text{C}$	5.0	5.7	6.5	V
$V_{CE(sat)}$	Collector-Emitter Saturation Voltage	$I_C=40\text{A}$, $V_{GE}=15\text{V}$	$T_J=25^{\circ}\text{C}$	1.90	2.30	V
			$T_J=125^{\circ}\text{C}$	2.40		
			$T_J=150^{\circ}\text{C}$	2.50		
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	$V_{GE}=20\text{V}$, $V_{CE}=0\text{V}$, $T_J=25^{\circ}\text{C}$			200	nA
C_{ies}	Input Capacitance	$V_{CE}=25\text{V}$, $V_{GE}=0\text{V}$, $f=100\text{kHz}$, $T_J=25^{\circ}\text{C}$		2.19		nF
C_{oes}	Output Capacitance			0.19		
C_{res}	Reverse Transfer Capacitance			0.04		

Switching Characteristics

$t_{d(on)}$	Turn-on Delay Time	$V_{CC}=600V, I_C=40A,$ $R_{Gon}=36\Omega, V_{GE}=\pm 15V,$ Inductive Load	$T_J=25^{\circ}C$		114		ns
			$T_J=125^{\circ}C$		126		
			$T_J=150^{\circ}C$		130		
t_r	Rise Time		$T_J=25^{\circ}C$		88		ns
			$T_J=125^{\circ}C$		96		
			$T_J=150^{\circ}C$		102		
$t_{d(off)}$	Turn-off Delay Time	$V_{CC}=600V, I_C=40A,$ $R_{Goff}=36\Omega, V_{GE}=\pm 15V,$ Inductive Load	$T_J=25^{\circ}C$		338		ns
			$T_J=125^{\circ}C$		362		
			$T_J=150^{\circ}C$		364		
t_f	Fall Time		$T_J=25^{\circ}C$		90		ns
			$T_J=125^{\circ}C$		110		
			$T_J=150^{\circ}C$		114		
E_{on}	Turn-on Switching Loss	$V_{CC}=600V, I_C=40A,$ $R_{Gon}=36\Omega, V_{GE}=\pm 15V,$ $di/dt=385A/\mu s(T_J=150^{\circ}C),$ Inductive Load	$T_J=25^{\circ}C$		3.7		mJ
			$T_J=125^{\circ}C$		4.1		
			$T_J=150^{\circ}C$		4.3		



E _{off}	Turn-off Switching Loss	V _{CC} =600V, I _C =40A, R _{Goff} =36Ω, V _{GE} =±15V, du/dt=3855V/μs(T _J =150°C), Inductive Load	T _J =25°C		2.3		mJ
			T _J =125°C		2.5		
			T _J =150°C		2.9		
Q _g	Total Gate Charge	V _{GE} =-15V...+15V	T _J =25°C		457		nC
R _{G(int)}	Internal Gate Resistor		T _J =25°C		0		Ω
I _{SC}	V _{CC} =600V, V _{GE} =±15V, t _p =10us, T _J =150°C				162		A
R _{θJC}	Thermal Resistance: Junction-to-Case (per IGBT)					0.50	°C/W

FWD, Inverter

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

V _{RRM}	Repetitive Peak Reverse Voltage	T _J =25°C	1200	V
I _F	Diode Continuous Forward Current		40	A
I _{FM}	Peak Diode Current Repetitive	t _p =1ms	80	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 =40A	T _J =25℃		1.70		V
			T _J =125℃		1.85		
			T _J =150℃		1.85		
I _{rr}	Peak Reverse Recovery Current	I _F =40A, di/dt=432A/μs(T _J =150℃), V _{rr} =600V, V _{GE} =-15V	T _J =25℃		24.3		A
			T _J =125℃		25.4		
			T _J =150℃		25.8		
t _{rr}	Reverse Recovery Time		T _J =25℃		174		ns
			T _J =125℃		190		
			T _J =150℃		208		
Q _{rr}	Reverse Recovery Charge		T _J =25℃		2.2		μC
			T _J =125℃		2.4		
			T _J =150℃		2.8		



E _{rec}	Reverse Recovery Energy	I _F =40A, di/dt=432A/μs(T _J =150°C), V _{rr} =600V, V _{GE} =-15V	T _J =25°C		0.17		mJ
			T _J =125°C		0.18		
			T _J =150°C		0.20		
R _{θJC}	Thermal Resistance: Junction-to-Case (per Diode)					0.79	°C/W

Diode, Rectifier

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

V _{RRM}	Repetitive Peak Reverse Voltage	T _J =25°C	1800	V
I _{FRMSM}	Maximum RMS Forward Current per Chip	T _C =80°C	55	A
I _{RMSM}	Maximum RMS Current At Rectifier Output	T _C =80°C	80	A
I _{FSM}	Surge Current @t _p =10ms	T _J =25°C	630	A
		T _J =150°C	500	
I ² t	I ² t - value	T _J =25°C	1980	A ² s
		T _J =150°C	1250	

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

Symbol	Description	Conditions		Min.	Typ.	Max.	Units
V _F	Forward Voltage	I _F =40A	T _J =25°C		1.10		V
			T _J =125°C		1.05		
I _R	Reverse Current	V _R =1600V	T _J =25°C			1	mA
R _{θJC}	Thermal Resistance: Junction-to-Case (per Diode)					0.56	°C/W



Internal NTC-Thermistor Characteristics

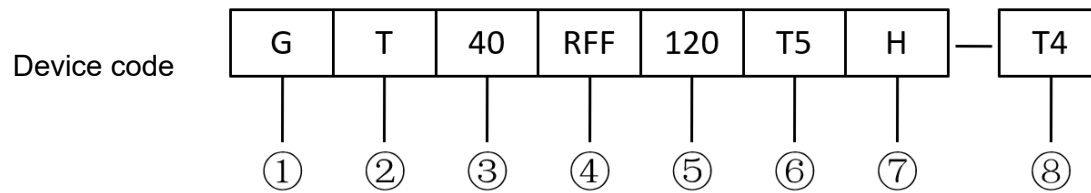
Symbol	Conditions	Min.	Typ.	Max.	Units
R ₂₅	T _C =25℃		5		kΩ
△R/R	T _C =100℃, R ₁₀₀ =465Ω	-5		5	%
P ₂₅	T _C =25℃			10	mW
B _{25/50}	$R_2=R_{25} \exp[B_{25/50}(1/T_2-1/(298.15K))]$		3380		K
B _{25/80}	$R_2=R_{25} \exp[B_{25/80}(1/T_2-1/(298.15K))]$		3440		K
B _{25/100}	$R_2=R_{25} \exp[B_{25/100}(1/T_2-1/(298.15K))]$		3545		K

Module

Symbol	Description		Min.	Typ.	Max.	Units
V _{iso}	Isolation Voltage (All Terminals Shorted)	f=50Hz, 1minute	2500			V
T _J	Maximum Junction Temperature				175	℃
T _{JOP}	Maximum Operating Junction Temperature Range		-40		+150	℃
T _{stg}	Storage Temperature		-40		+125	℃
CTI	Comparative Tracking Index		200			
R _{θCS}	Case-to-Sink Thermally (Conductive Grease Applied)				0.04	℃/W
T	Mounting Screw:M5		3.0		6.0	N·m
G	Weight			190		g



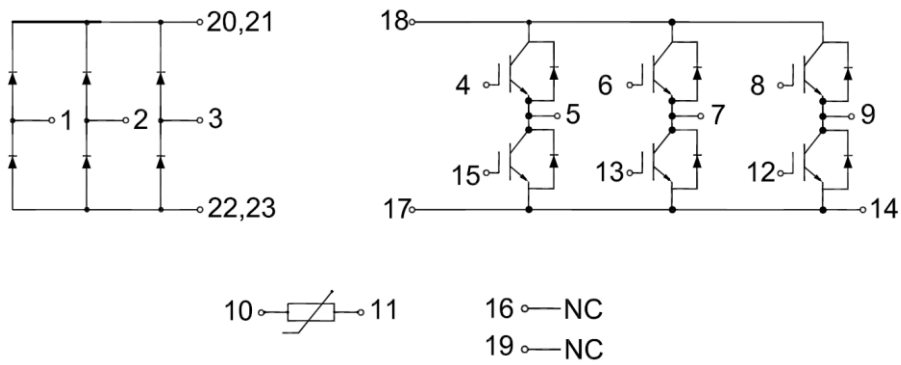
Ordering Information Table



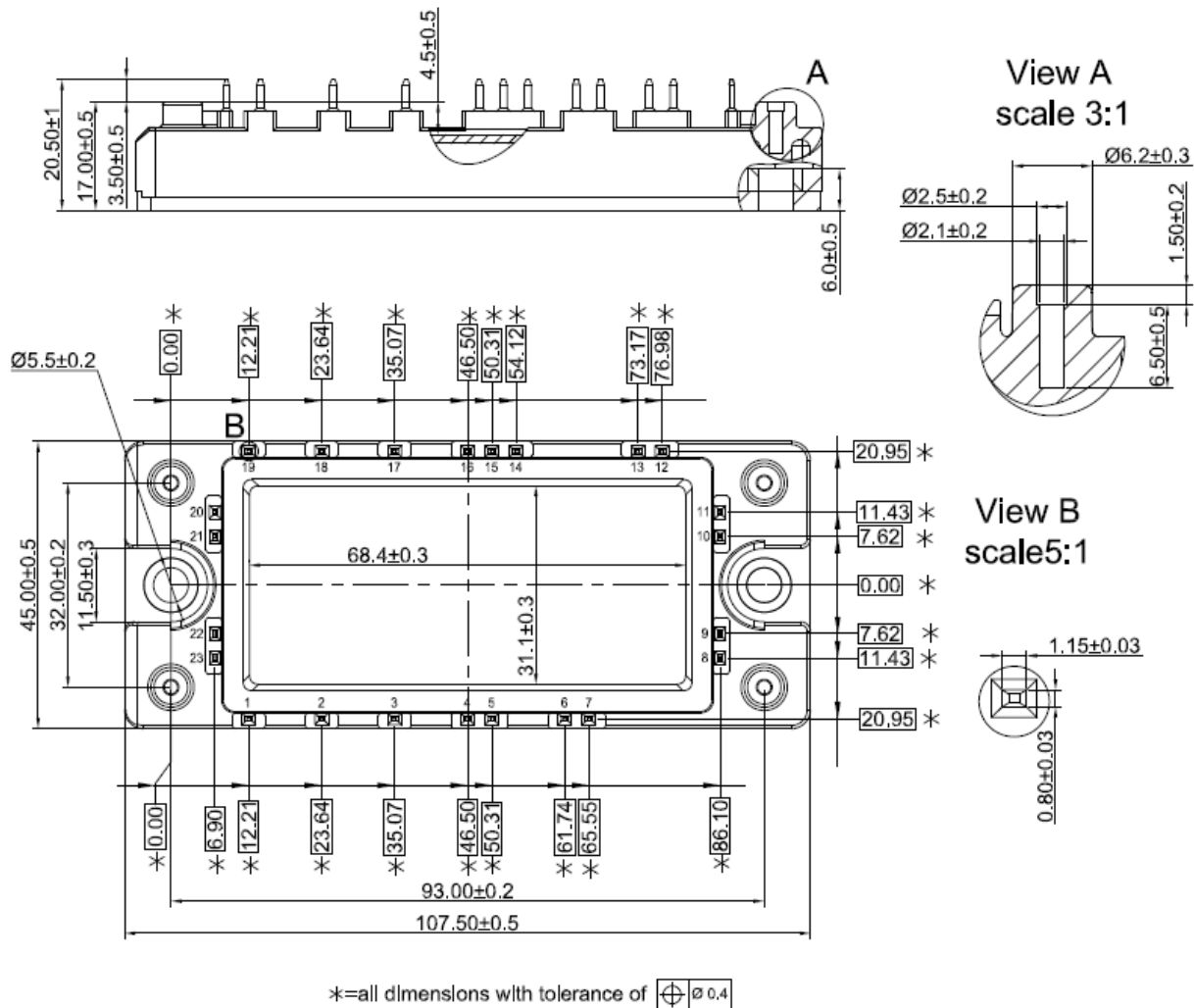
- ① - IGBT Module
- ② - Trench & Field Stop IGBT
- ③ - Rated Current (40=40A)
- ④ - Circuit Configuration (Rectifier +Full Bridge)
- ⑤ - Rated Voltage (120=1200V)
- ⑥ - Package Type
- ⑦ - Test Level (Pass the Important Reliability Test-Industrial Grade)
- ⑧ - Internal Control Code



Internal Circuit



Package Outline (Unit: mm):





Revision	Notes
01	Initial Release

Announcement

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