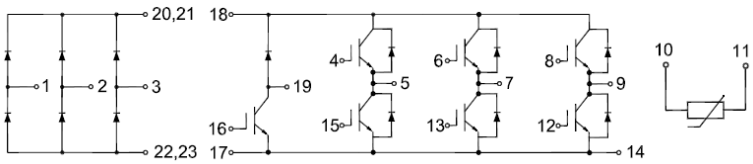
GT40PI120T5H-T4

Hybrid IGBT Module

Preliminary Data

Features：

- Trench & Field Stop IGBT
- Short Circuit Rated >10μs
- Low Saturation Voltage
- Low Switching Loss
- 100% RBSOA Tested(2×Ic)
- Low Stray Inductance
- Lead Free, Compliant with RoHS Requirement



Applications：

- Auxiliary Inverters
- Servo Drives
- Motor Drives

IGBT, Inverter

Maximum Rated Values (T_C=25℃ 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℃	40	A
		T_C=25℃	80	A
I_{CM}	Peak Collector Current Repetitive	t_p=1ms	80	A
P_D	Maximum Power Dissipation (IGBT)	T_C=25℃ T_{Jmax}=175℃	300	W

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

Static Characteristics

Symbol	Description	Conditions		Min.	Typ.	Max.	Units
$V_{GE(th)}$	Gate-Emitter Threshold Voltage	I_C=1.5mA, V_{CE}=V_{GE}, T_J=25℃		5.0	5.7	6.5	V
$V_{CE(sat)}$	Collector-Emitter Saturation Voltage	I_C=40A, V_{GE}=15V	T_J=25℃		1.90	2.30	V
			T_J=125℃		2.40		
			T_J=150℃		2.50		
I_{CES}	Collector-Emitter Leakage Current	V_{GE}=0V, V_{CE}=V_{CES}, T_J=25℃				1	mA
I_{GES}	Gate-Emitter Leakage Current	V_{GE}=20V, V_{CE}=0V, T_J=25℃				200	nA
C_{ies}	Input Capacitance	V_{CE}=25V, V_{GE}=0V, f=100kHz, T_J=25℃			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}=36Ω, V_{GE}=±15V, Inductive Load	T_J=25℃		29		ns
			T_J=125℃		32		
			T_J=150℃		33		
t_r	Rise Time		T_J=25℃		88		ns
			T_J=125℃		96		
			T_J=150℃		102		
$t_{d(off)}$	Turn-off Delay Time	V_{CC}=600V, I_C=40A, R_{Goff}=36Ω, V_{GE}=±15V, Inductive Load	T_J=25℃		338		ns
			T_J=125℃		362		
			T_J=150℃		364		
t_f	Fall Time		T_J=25℃		90		ns
			T_J=125℃		110		
			T_J=150℃		114		
E_{on}	Turn-on Switching Loss	V_{CC}=600V, I_C=40A, R_{Gon}=36Ω, V_{GE}=±15V, di/dt=1540A/μs(T_J=150℃), Inductive Load	T_J=25℃		0.9		mJ
			T_J=125℃		1.0		
			T_J=150℃		1.1		

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℃), Inductive Load	T_J=25℃		2.3		mJ
			T_J=125℃		2.5		
			T_J=150℃		2.9		
Q_g	Total Gate Charge	V_{GE}=-15V…+15V	T_J=25℃		457		nC
$R_{G(int)}$	Internal Gate Resistor		T_J=25℃		0		Ω
I_{SC}	V_{CC}=600V, V_{GE}=±15V, tp=10us, T_J=150℃				162		A
$R_{\theta JC}$	Thermal Resistance: Junction-to-Case (per IGBT)					0.50	℃/W

SiC SBD, Inverter

Maximum Rated Values (T_C=25℃ unless otherwise specified)

V_{RRM}	Repetitive Peak Reverse Voltage	T_J=25℃	1200	V
I_F	Diode Continuous Forward Current	T_C=150℃	40	A
I_{FRM}	Repetitive Peak Forward Surge Current	t_p=10ms	200	A
I_{FSM}	Non-Repetitive Peak Forward Surge Current	t_p=10ms	400	A

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

Symbol	Description	Conditions	Min.	Typ.	Max.	Units
V_{FM}	Forward Voltage	I_F=40A		1.50		V
I_R	Reverse Current	V_R=1200V		15		μA
Qc	Total Capacitive Charge	V_R=800V		147		nC
C	Total Capacitance	V_R=0V, f=1MHz		2.47		nF
		V_R=400V, f=1MHz		0.14		
		V_R=800V, f=1MHz		0.10		
Ec	Capacitance Stored Energy	V_R=800V		0.17		mJ
$R_{\theta JC}$	Thermal Resistance: Junction-to-Case (per Diode)				0.92	℃/W

IGBT, Brake-Chopper

Maximum Rated Values (T_C=25℃ 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℃	25	A
		T_C=25℃	50	A
I_{CM}	Repetitive Peak Collector Current	t_P=1ms	50	A
P_D	Maximum Power Dissipation per IGBT	T_C=25℃ T_{Jmax}=175℃	235	W

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

Static Characteristics

Symbol	Description	Conditions		Min.	Typ.	Max.	Units
$V_{GE(th)}$	Gate-Emitter Threshold Voltage	I_C=1mA, V_{CE}=V_{GE}		5.0	5.6	6.5	V
$V_{CE(sat)}$	Collector-Emitter Saturation Voltage	I_C=25A, V_{GE}=15V	T_J=25℃		1.75	2.10	V
			T_J=125℃		2.10		
			T_J=150℃		2.20		
I_{CES}	Collector-Emitter Leakage Current	V_{GE}=0V, V_{CE}=V_{CES}, T_J=25℃				1	mA
I_{GES}	Gate-Emitter Leakage Current	V_{GE}=20V, V_{CE}=0V, T_J=25℃				200	nA
C_{ies}	Input Capacitance	V_{CE}=25V, V_{GE}=0V, f=100kHz			1.64		nF
C_{oes}	Output Capacitance				0.44		
C_{res}	Reverse Transfer Capacitance				0.02		

Switching Characteristics

$t_{d(on)}$	Turn-on Delay Time	V_{CC}=600V, I_C=25A, R_{Gon}=20Ω, V_{GE}=±15V, Inductive Load	T_J=25℃		57		ns
			T_J=125℃		58		
			T_J=150℃		68		
t_r	Rise Time		T_J=25℃		55		ns
			T_J=125℃		58		
			T_J=150℃		60		

$t_{d(off)}$	Turn-off Delay Time	V_{CC}=600V, I_C=25A, R_{Goff}=20Ω, V_{GE}=±15V, Inductive Load	T_J=25℃		208		ns
			T_J=125℃		211		
			T_J=150℃		214		
t_f	Fall Time		T_J=25℃		76		ns
			T_J=125℃		223		
			T_J=150℃		225		
E_{on}	Turn-on Switching Loss	V_{CC}=600V, I_C=25A, R_{Gon}=20Ω, V_{GE}=±15V, di/dt=368A/μs (T_J=150℃) Inductive Load	T_J=25℃		3.1		mJ
			T_J=125℃		3.8		
			T_J=150℃		4.1		
E_{off}	Turn-off Switching Loss	V_{CC}=600V, I_C=25A, R_{Goff}=20Ω, V_{GE}=±15V, du/dt=4543V/μs (T_J=150℃) Inductive Load	T_J=25℃		2.1		mJ
			T_J=125℃		2.4		
			T_J=150℃		2.5		
Q_g	Total Gate Charge	V_{GE}=+15V…-15V	T_J=25℃		400		nC
$R_{G(int)}$	Internal Gate Resistor		T_J=25℃		0		Ω
I_{SC}	Vcc=600V, VGE=+/-15V, TJ=25℃				100		A
$R_{\theta JC}$	Thermal Resistance: Junction-to-Case (per IGBT)					0.63	℃/W

Diode, Brake-Chopper

Maximum Rated Values (T_C=25℃ unless otherwise specified)

V_{RRM}	Repetitive Peak Reverse Voltage	T_J=25℃	1200	V
I_F	Diode Continuous Forward Current	T_C=100℃	15	A
I_{FM}	Diode Maximum Forward Current	tp=1ms	30	A

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

Symbol	Description	Conditions		Min.	Typ.	Max.	Units
V_{FM}	Forward Voltage	I_F=15A	T_J=25℃		1.70		V
			T_J=125℃		1.80		
			T_J=150℃		1.80		

t_{rr}	Reverse Recovery Time	I_F=15A, -diF/dt=145A/μs(T_J=150℃), V_{rr}=600V, V_{GE}=-15V	T_J=25℃		262		ns
			T_J=125℃		472		
			T_J=150℃		491		
I_{rr}	Peak Reverse Recovery Current		T_J=25℃		15.4		A
			T_J=125℃		16.2		
			T_J=150℃		17.3		
Q_{rr}	Reverse Recovery Charge		T_J=25℃		2.0		μC
			T_J=125℃		3.4		
			T_J=150℃		3.5		
E_{rec}	Reverse Recovery Energy		T_J=25℃		0.6		mJ
			T_J=125℃		1.1		
			T_J=150℃		1.2		
$R_{\theta JC}$	Thermal Resistance: Junction-to-Case (per Diode)					1.54	℃/W

Diode, Rectifier
Maximum Rated Values (T_C=25℃unless otherwise specified)

V_{RRM}	Repetitive Peak Reverse Voltage	T_J=25℃	1800	V
I_{FRMSM}	Maximum RMS Forward Current per Chip	T_C=80℃	55	A
I_{RMSM}	Maximum RMS Current At Rectifier Output	T_C=80℃	80	A
I_{FSM}	Surge Current @t_p=10ms	T_J=25℃	630	A
		T_J=150℃	500	
I^2t	I^2t - value	T_J=25℃	1980	A^2s
		T_J=150℃	1250	

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

Symbol	Description	Conditions		Min.	Typ.	Max.	Units
V_F	Forward Voltage	I_F=40A	T_J=25℃		1.10		V
			T_J=125℃		1.05		
I_R	Reverse Current	V_R=1600V	T_J=25℃			1	mA
$R_{\theta JC}$	Thermal Resistance: Junction-to-Case (per Diode)					0.56	℃/W

Internal NTC-Thermistor Characteristics

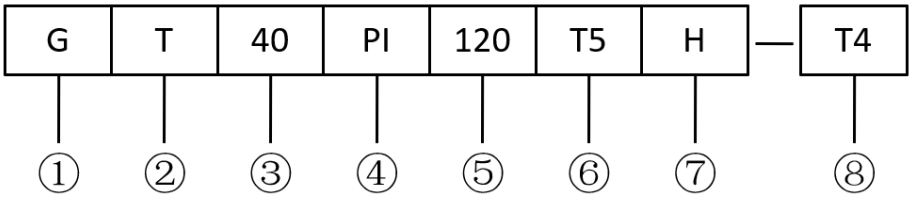
Symbol	Conditions	Min.	Typ.	Max.	Units
R_{25}	T_C=25℃		5		kΩ
△R/R	T_C=100℃, R_{100}=465Ω	-5		5	%
P_{25}	T_C=25℃			10	mW
$B_{25/50}$	$R_2=R_{25}\exp[B_{25/50}(1/T_2-1/(298.15K))]$		3380		K
$B_{25/80}$	$R_2=R_{25}\exp[B_{25/80}(1/T_2-1/(298.15K))]$		3440		K
$B_{25/100}$	$R_2=R_{25}\exp[B_{25/100}(1/T_2-1/(298.15K))]$		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		
$R_{\theta CS}$	Case-to-Sink Thermally (Conductive Grease Applied)				0.04	℃/W
T	Mounting Screw:M5		3.0		6.0	N·m
G	Weight			190		g

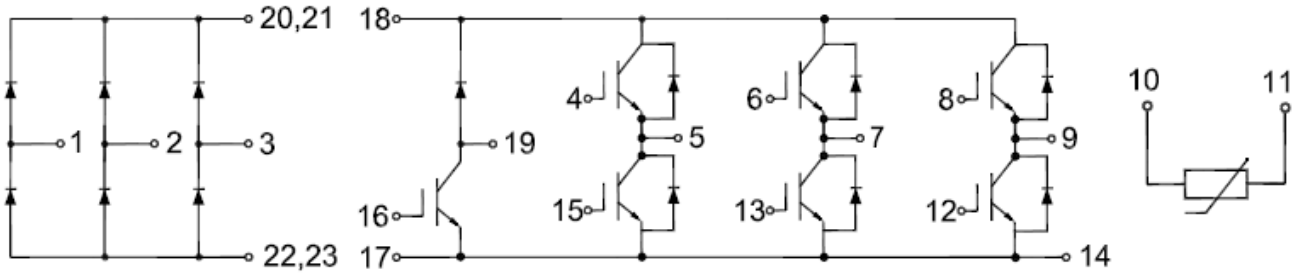
Ordering Information Table

Device code

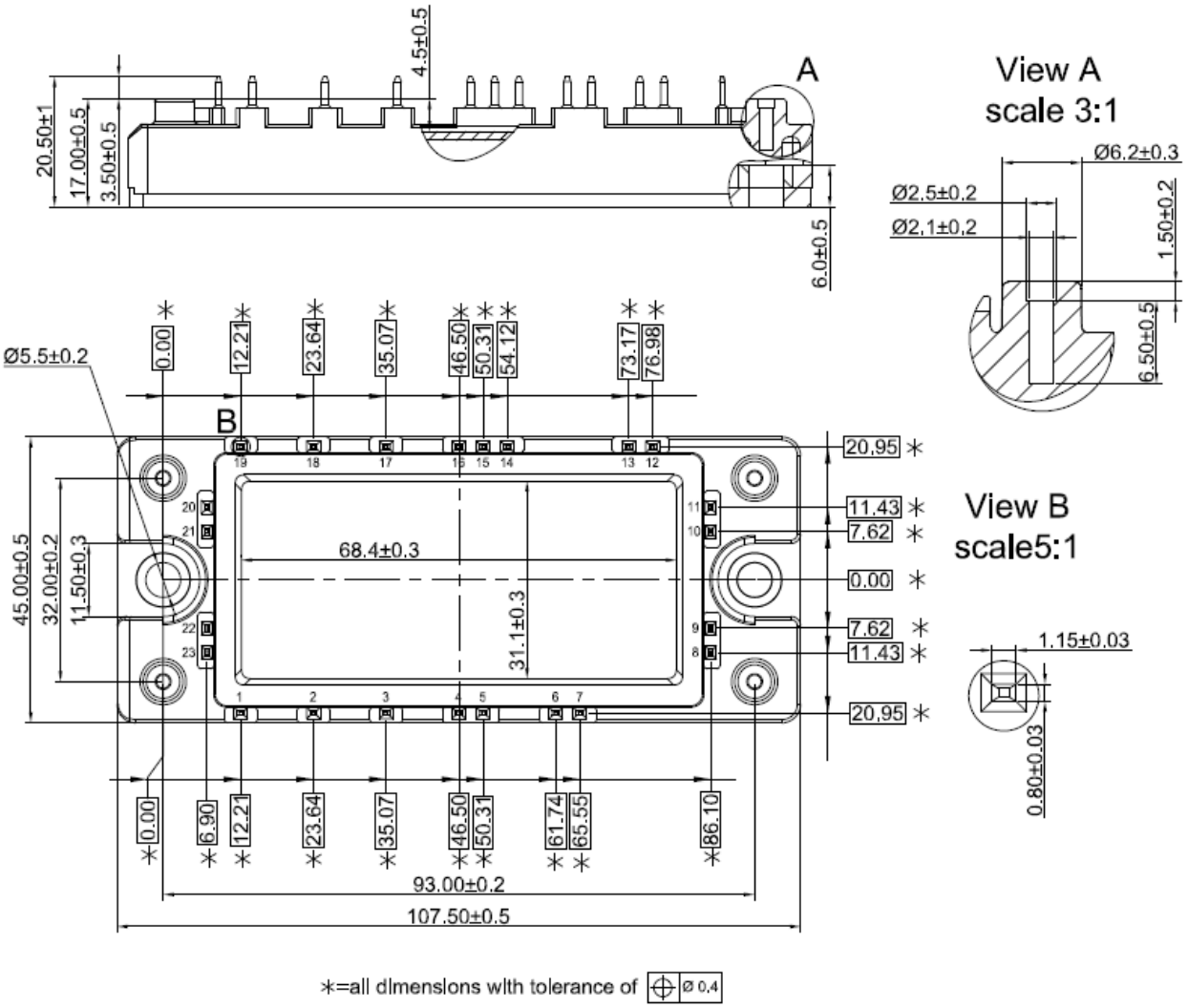


① - IGBT Module
② - Trench & Field Stop IGBT
③ - Rated Current (40=40A)
④ - Circuit Configuration (Power Integrated)
⑤ - Rated Voltage (120=1200V)
⑥ - Package Type
⑦ - Test Level (Pass the Important Reliability Test-Industrial Grade)
⑧ - Internal Control Code

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”.