



GT100PI120T6H

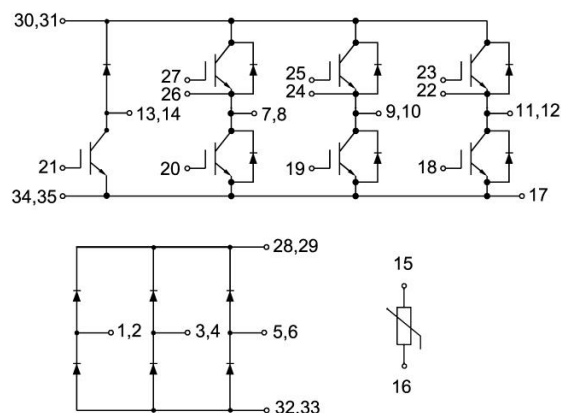
IGBT Module

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
- Lead Free, Compliant with RoHS Requirement

Circuit Diagram



Applications:

- Motor Drives
- Servo Drives
- Auxiliary Inverters

IGBT, Inverter

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	100	A
		T _C =25°C	200	A
I _{CM}	Peak Collector Current Repetitive	t _p =1ms	200	A
P _D	Maximum Power Dissipation (IGBT)	T _C =25°C T _{Jmax} =175°C	700	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	$I_C=4\text{mA}$, $V_{CE}=V_{GE}$	5.0		6.6	V
$V_{CE(sat)}$	Collector-Emitter Saturation Voltage	$I_C=100\text{A}$, $V_{GE}=15\text{V}$	$T_J=25^{\circ}\text{C}$	1.65		V
			$T_J=125^{\circ}\text{C}$	2.00		V
			$T_J=150^{\circ}\text{C}$	2.10		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	$V_{GE}=20\text{V}$, $V_{CE}=0\text{V}$, $T_J=25^{\circ}\text{C}$			200	nA
C_{ies}	Input Capacitance	$V_{CE}=25\text{V}$, $V_{GE}=0\text{V}$, $f=100\text{kHz}$		11.46		nF
C_{oes}	Output Capacitance			1.52		nF
C_{res}	Reveres Transfer Capacitance			0.74		nF

Switching Characteristics

Switching Characteristics							
$t_{d(on)}$	Turn-on Delay Time	$V_{CC}=600V, I_C=100A,$ $R_{Gon}=15\Omega, V_{GE}=\pm 15V,$ Inductive Load	$T_J=25^{\circ}C$		206		ns
			$T_J=125^{\circ}C$		212		
			$T_J=150^{\circ}C$		216		
t_r	Rise Time		$T_J=25^{\circ}C$		78		ns
			$T_J=125^{\circ}C$		91		
			$T_J=150^{\circ}C$		92		
$t_{d(off)}$	Turn-off Delay Time	$V_{CC}=600V, I_C=100A,$ $R_{Goff}=15\Omega, V_{GE}=\pm 15V,$ Inductive Load	$T_J=25^{\circ}C$		400		ns
			$T_J=125^{\circ}C$		434		
			$T_J=150^{\circ}C$		444		
t_f	Fall Time		$T_J=25^{\circ}C$		154		ns
			$T_J=125^{\circ}C$		232		
			$T_J=150^{\circ}C$		242		
E_{on}	Turn-on Switching Loss	$V_{CC}=600V, I_C=100A,$ $R_{Gon}=15\Omega, V_{GE}=\pm 15V,$ $di/dt=964A/\mu s(T_J=150^{\circ}C),$ Inductive Load	$T_J=25^{\circ}C$		10.9		mJ
			$T_J=125^{\circ}C$		15.7		
			$T_J=150^{\circ}C$		16.8		



E _{off}	Turn-off Switching Loss	V _{CC} =600V, I _C =100A, R _{Goff} =15Ω, V _{GE} =±15V, du/dt=5363V/μs(T _J =150°C), Inductive Load	T _J =25°C		7.9		mJ
			T _J =125°C		10.6		
			T _J =150°C		11.2		
Q _g	Total Gate Charge	V _{GE} =+15V...-15V	T _J =25°C		2856		nC
R _{G(int)}	Internal Gate Resistor		T _J =25°C		5.0		Ω
I _{SC}	V _{CC} =600V, V _{GE} =±15V, t _P =10μs, T _J =150°C				440		A
R _{θJC}	Thermal Resistance: Junction-to-Case (per IGBT)					0.21	°C/W

Diode, 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		100	A
I _{FM}	Repetitive Peak Forward Current	t _p =1ms	200	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 =100A	T _J =25℃		1.70		V
			T _J =125℃		1.80		
			T _J =150℃		1.80		
t _{rr}	Reverse Recovery Time	I _F =100A, -diF/dt=1153A/μs(T _J =150℃), V _R =600V, V _{GE} =-15V	T _J =25℃		232		ns
			T _J =125℃		443		
			T _J =150℃		456		
I _{rr}	Peak Reverse Recovery Current		T _J =25℃		76		A
			T _J =125℃		82		
			T _J =150℃		82		
Q _{rr}	Reverse Recovery Charge		T _J =25℃		8.4		μC
			T _J =125℃		15.4		
			T _J =150℃		16.4		



E _{rec}	Reverse Recovery Energy	I _F =100A, -diF/dt=1153A/μs(T _J =150℃), V _R =600V, V _{GE} =-15V	T _J =25℃		2.4		mJ
			T _J =125℃		5.1		
			T _J =150℃		5.4		
R _{θJC}	Thermal Resistance: Junction-to-Case (per Diode)					0.43	℃/W

IGBT, Brake-Chopper

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	50	A
		T _C =25°C	100	A
I _{CM}	Peak Collector Current Repetitive	t _p =1ms	100	A
P _D	Maximum Power Dissipation (IGBT)	T _C =25°C T _{Jmax} =175°C	391	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 =1.7mA, V _{CE} =V _{GE}		5.0		6.5	V
V _{CE(sat)}	Collector-Emitter Saturation Voltage	I _C =50A, V _{GE} =15V	T _J =25°C		1.75		V
			T _J =125°C		2.20		V
			T _J =150°C		2.30		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				200	nA
C _{ies}	Input Capacitance	V _{CE} =25V, V _{GE} =0V, f=100kHz			5.19		nF
C _{oes}	Output Capacitance				0.51		nF
C _{res}	Reveres Transfer Capacitance				0.06		nF



Switching Characteristics

t _{d(on)}	Turn-on Delay Time	V _{CC} =600V, I _C =50A, R _{Gon} =15Ω, V _{GE} =±15V, Inductive Load	T _J =25℃		58		ns	
			T _J =125℃		62			
			T _J =150℃		66			
t _r	Rise Time		T _J =25℃		36		ns	
			T _J =125℃		38			
			T _J =150℃		40			
t _{d(off)}	Turn-off Delay Time	V _{CC} =600V, I _C =50A, R _{Goff} =15Ω, V _{GE} =±15V, Inductive Load	T _J =25℃		262		ns	
			T _J =125℃		288			
			T _J =150℃		302			
t _f	Fall Time		T _J =25℃		170		ns	
			T _J =125℃		218			
			T _J =150℃		244			
E _{on}	Turn-on Switching Loss	V _{CC} =600V, I _C =50A, R _{Gon} =15Ω, V _{GE} =±15V, di/dt=1212A/μs(T _J =150℃), Inductive Load	T _J =25℃		2.7		mJ	
			T _J =125℃		3.8			
			T _J =150℃		3.9			
E _{off}	Turn-off Switching Loss		V _{CC} =600V, I _C =50A, R _{Goff} =15Ω, V _{GE} =±15V, du/dt=5557V/μs(T _J =150℃), Inductive Load	T _J =25℃		3.7		mJ
				T _J =125℃		5.1		
				T _J =150℃		5.3		
Q _g	Total Gate Charge	V _{GE} =+15V...-15V		T _J =25℃		2850		nC
R _{G(int)}	Internal Gate Resistor			T _J =25℃		3.0		Ω
I _{SC}	V _{CC} =600V, V _{GE} =+/- 15V, t _p =10μs, T _J =150℃				209		A	
R _{θJC}	Thermal Resistance: Junction-to-Case (per IGBT)					0.38	℃/W	

Diode, Brake-Chopper

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		25	A
I_{FM}	Peak Diode Current Repetitive	$t_P=1ms$	50	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 =25A	T _J =25℃		1.70		V
			T _J =125℃		1.85		
			T _J =150℃		1.85		
I _{rr}	Peak Reverse Recovery Current	I _F =25A, -diF/dt=346A/μs(T _J =150℃), V _R =600V, V _{GE} =-15V	T _J =25℃		13.6		A
			T _J =125℃		16.8		
			T _J =150℃		17.9		
t _{rr}	Reverse Recovery Time		T _J =25℃		350		ns
			T _J =125℃		403		
			T _J =150℃		430		
Q _{rr}	Reverse Recovery Charge		T _J =25℃		2.43		μC
			T _J =125℃		3.58		
			T _J =150℃		4.26		
E _{rec}	Reverse Recovery Energy		T _J =25℃		0.65		mJ
			T _J =125℃		1.32		
			T _J =150℃		1.46		
R _{θJC}	Thermal Resistance: Junction-to-Case (per Diode)					1.11	℃/W

Diode, Rectifier

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

V_{RRM}	Repetitive Peak Reverse Voltage	$T_J=25^{\circ}\text{C}$	1800	V
I_{FRMSM}	Maximum RMS Forward Current Per Chip	$T_C=80^{\circ}\text{C}$	118	A
I_{RMSM}	Maximum RMS Current At Rectifier Output	$T_C=80^{\circ}\text{C}$	150	A
I_{FSM}	Surge Current @ $t_p=10\text{ms}$	$T_J=25^{\circ}\text{C}$	1350	A
		$T_J=150^{\circ}\text{C}$	1030	
I^2t	I^2t - Value	$T_J=25^{\circ}\text{C}$	9110	A^2s
		$T_J=150^{\circ}\text{C}$	5300	



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

Symbol	Description	Conditions		Min.	Typ.	Max.	Units
V_F	Forward Voltage	$I_F=100\text{A}$	$T_J=25^{\circ}\text{C}$		1.15		V
			$T_J=125^{\circ}\text{C}$		1.10		
I_R	Reverse Current	$V_R=1600\text{V}$	$T_J=25^{\circ}\text{C}$			1	mA
$R_{\theta JC}$	Thermal Resistance: Junction-to-Case (per Diode)					0.31	$^{\circ}\text{C}/\text{W}$

Internal NTC-Thermistor Characteristics

Symbol	Description	Min.	Typ.	Max.	Units
R_{25}	$T_C=25^{\circ}\text{C}$		5		k Ω
$\Delta R/R$	$T_C=100^{\circ}\text{C}$, $R_{100}=465\Omega$	-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	Conditions	Min.	Typ.	Max.	Units
V_{iso}	Isolation Voltage (All Terminals Shorted)	$f=50\text{Hz}$, 1minute	2500			V
T_J	Maximum Junction Temperature				175	$^{\circ}\text{C}$
T_{JOP}	Maximum Operating Junction Temperature Range		-40		+150	$^{\circ}\text{C}$
T_{stg}	Storage Temperature		-40		+125	$^{\circ}\text{C}$
CTI	Comparative Tracking Index		200			
$R_{\theta CS}$	Case-to-Sink Thermally (Conductive Grease Applied)				0.03	$^{\circ}\text{C}/\text{W}$
T	Mounting Screw:M5		3.0		6.0	N·m
G	Weight			300		g



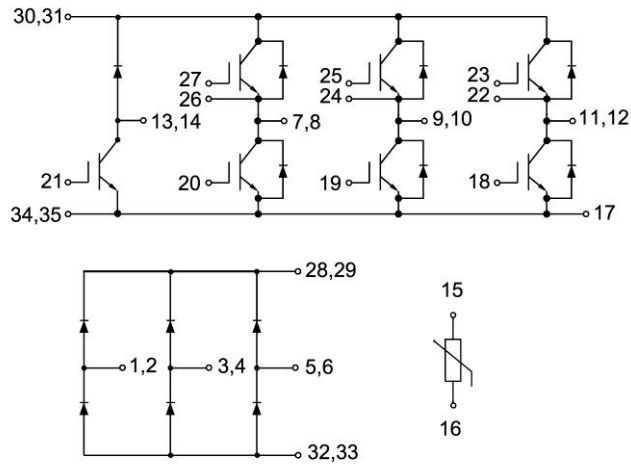
Ordering Information Table

Device code	G	T	100	PI	120	T6	H
	①	②	③	④	⑤	⑥	⑦

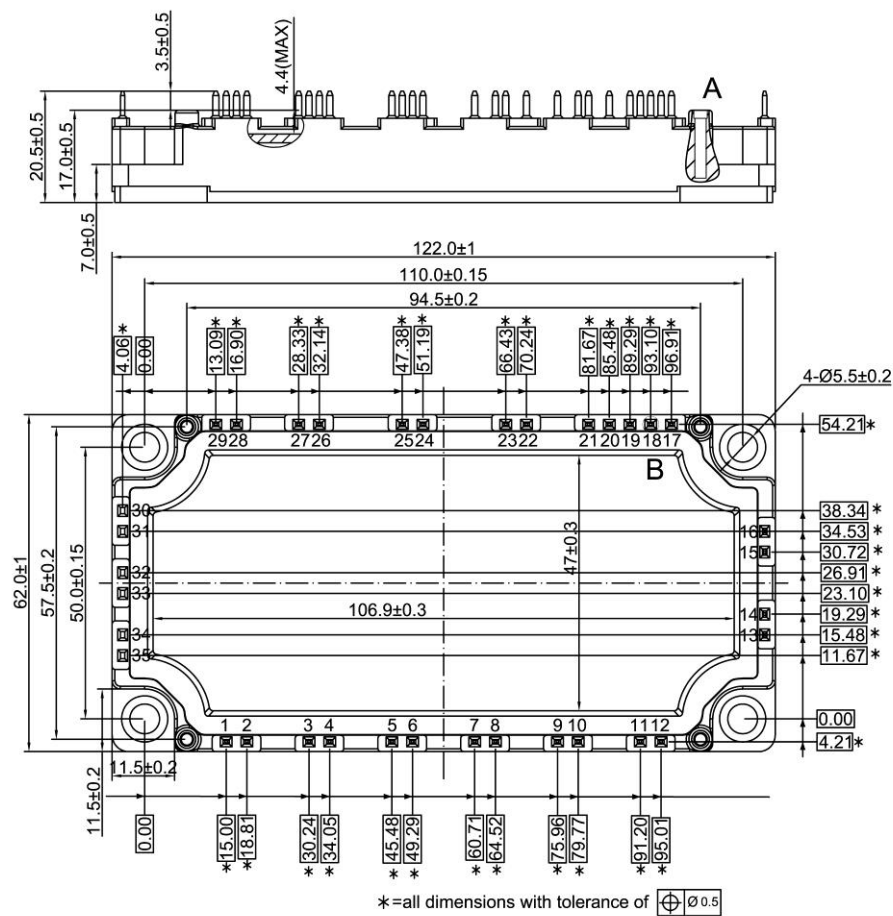
- ① - IGBT Module
- ② - Trench, Low Switching Losses IGBT
- ③ - Rated Current (100=100A)
- ④ - Circuit Configuration PI (Power Integrated)
- ⑤ - Rated Voltage (120=1200V)
- ⑥ - Package Type
- ⑦ - Test Level (Pass the Important Reliability Test-Industrial Grade)



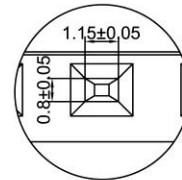
Internal Circuit:



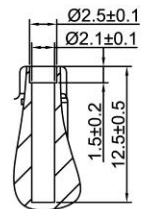
Package Outline (Unit: mm):



View B
scale 8:1



View A
scale 3:1





Revision	Notes
01	Initial Release

Announcement

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