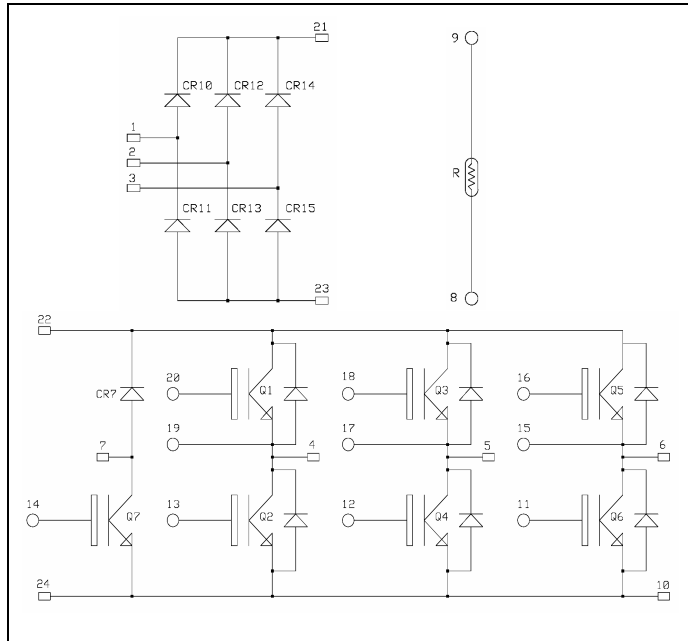


***Input rectifier bridge +
Brake + 3 Phase Bridge
NPT IGBT Power Module***

**$V_{CES} = 1200V$
 $I_C = 10A @ T_c = 80^\circ C$**



APTGS10X120RTP2: Without Brake (Pin 7 & 14 not connected)



Application

- AC Motor control

Features

- Non Punch Through (NPT) Low Loss IGBT®
 - Low voltage drop
 - Low tail current
 - Switching frequency up to 20 kHz
 - Soft recovery parallel diodes
 - Low diode VF
 - Low leakage current
 - Avalanche energy rated
 - RBSOA and SCSOA rated
- Very low stray inductance
- High level of integration
- Internal thermistor for temperature monitoring

Benefits

- Low conduction losses
- Stable temperature behavior
- Very rugged
- Solderable terminals for easy PCB mounting
- Direct mounting to heatsink (isolated package)
- Low junction to case thermal resistance
- Easy paralleling due to positive TC of VCEsat
- Low profile

All ratings @ $T_j = 25^\circ C$ unless otherwise specified

1. Absolute maximum ratings

Diode rectifier Absolute maximum ratings

Symbol	Parameter		Max ratings	Unit
V_{RRM}	Repetitive Peak Reverse Voltage		1600	V
I_D	DC Forward Current	$T_C = 80^\circ C$	10	A
I_{FSM}	Surge Forward Current	$T_j = 25^\circ C$	300	
		$T_j = 150^\circ C$	230	

CAUTION: These Devices are sensitive to Electrostatic Discharge. Proper Handling Procedures Should Be Followed.

IGBT & Diode Brake (only for APTGS10X120BTP2) Absolute maximum ratings

Symbol	Parameter	Max ratings	Unit
V_{CES}	Collector - Emitter Breakdown Voltage	1200	V
I_C	Continuous Collector Current	$T_C = 25^\circ\text{C}$	20
		$T_C = 80^\circ\text{C}$	10
I_{CM}	Pulsed Collector Current	$T_C = 25^\circ\text{C}$	20
V_{GE}	Gate – Emitter Voltage	± 20	V
P_D	Maximum Power Dissipation	$T_C = 25^\circ\text{C}$	100
I_F	DC Forward Current	$T_C = 80^\circ\text{C}$	10

IGBT & Diode Inverter Absolute maximum ratings

Symbol	Parameter			Max ratings	Unit
V _{CES}	Collector - Emitter Breakdown Voltage			1200	V
I _C	Continuous Collector Current	T _C = 25°C	20	A	
		T _C = 80°C	10		
I _{CM}	Pulsed Collector Current	T _C = 25°C	25		
V _{GE}	Gate – Emitter Voltage			±20	V
P _D	Maximum Power Dissipation	T _C = 25°C	100	W	
SCSOA	Short circuit Safe Operating Area	T _j = 125°C	45A @ 720V		
I _F	DC Forward Current	T _C = 80°C	10	A	
I _{FSM}	Surge Forward Current	t _p = 1ms	T _C = 80°C		20

2. Electrical Characteristics

Diodes Rectifier Electrical Characteristics

Symbol	Characteristic	Test Conditions	Min	Typ	Max	Unit
I_R	Reverse Current	$V_R = 1600\text{V}$ $T_j = 150^\circ\text{C}$		2		mA
V_F	Forward Voltage	$I_F = 30\text{A}$ $T_j = 25^\circ\text{C}$		1.3	1.5	V
		$I_F = 10\text{A}$ $T_j = 150^\circ\text{C}$		0.9	0.95	
R_{thJC}	Junction to Case				1	$^\circ\text{C/W}$

IGBT Brake & Diode (only for APTGS10X120BTP2) Electrical Characteristics

Symbol	Characteristic	Test Conditions	Min	Typ	Max	Unit
I_{CES}	Zero Gate Voltage Collector Current	$V_{GE} = 0\text{V}$ $T_j = 25^\circ\text{C}$		0.5	500	μA
		$V_{CE} = 1200\text{V}$ $T_j = 125^\circ\text{C}$		0.8		mA
$V_{CE(on)}$	Collector Emitter on Voltage	$V_{GE} = 15\text{V}$ $T_j = 25^\circ\text{C}$		2.4	2.85	V
		$I_C = 10\text{A}$ $T_j = 125^\circ\text{C}$		2.75		
$V_{GE(th)}$	Gate Threshold Voltage	$V_{GE} = V_{CE}$, $I_C = 0.35\text{mA}$	4.5	5.5	6.5	V
I_{GES}	Gate – Emitter Leakage Current	$V_{GE} = 20\text{V}$, $V_{CE} = 0\text{V}$			300	nA
C_{ies}	Input Capacitance	$V_{GE} = 0\text{V}$, $V_{CE} = 25\text{V}$ $f = 1\text{MHz}$		600		pF
V_F	Forward Voltage	$V_{GE} = 0\text{V}$ $T_j = 25^\circ\text{C}$		2.2	2.55	V
		$I_F = 10\text{A}$ $T_j = 125^\circ\text{C}$		2.1		
R_{thJC}	Junction to Case	IGBT			1.2	$^\circ\text{C/W}$
		Diode			2.3	

IGBT & Diode Inverter Electrical Characteristics

Symbol	Characteristic	Test Conditions	Min	Typ	Max	Unit
BV _{CES}	Collector - Emitter Breakdown Voltage	V _{GE} = 0V, I _C = 500μA	1200			V
I _{CES}	Zero Gate Voltage Collector Current	V _{GE} = 0V V _{CE} = 1200V		0.5	500	μA
		T _j = 25°C T _j = 125°C			0.8	mA
V _{CE(on)}	Collector Emitter on Voltage	V _{GE} = 15V I _C = 10A		2.4	2.85	V
		T _j = 25°C T _j = 125°C		2.75		
V _{GE(th)}	Gate Threshold Voltage	V _{GE} = V _{CE} , I _C = 0.35 mA	4.5	5.5	6.5	V
I _{GES}	Gate – Emitter Leakage Current	V _{GE} = 20V, V _{CE} = 0V			300	nA
C _{ies}	Input Capacitance	V _{GE} = 0V, V _{CE} = 25V f = 1MHz		600		pF
T _{d(on)}	Turn-on Delay Time	Inductive Switching (25°C) V _{GE} = ±15V V _{Bus} = 600V I _C = 10A R _G = 82Ω		40		ns
T _r	Rise Time			45		
T _{d(off)}	Turn-off Delay Time			255		
T _f	Fall Time			40		
T _{d(on)}	Turn-on Delay Time	Inductive Switching (125°C) V _{GE} = ±15V V _{Bus} = 600V I _C = 10A R _G = 82Ω		45		ns
T _r	Rise Time			40		
T _{d(off)}	Turn-off Delay Time			285		
T _f	Fall Time			60		
E _{off}	Turn off Energy			1.1		mJ
V _F	Forward Voltage	V _{GE} = 0V I _F = 10A		2.2	2.55	V
		T _j = 25°C T _j = 125°C		2.1		
Q _{rr}	Reverse Recovery Charge	I _F = 10A V _R = 600V di/dt=400A/μs		0.84		μC
		T _j = 25°C T _j = 125°C		1.5		
R _{thJC}	Junction to Case				1.2	°C/W
		IGBT Diode			2.3	

Temperature sensor NTC

Symbol	Characteristic	Min	Typ	Max	Unit
R ₂₅	Resistance @ 25°C		5		kΩ
B _{25/50}	T ₂₅ = 298.16 K		3375		K

$$R_T = \frac{R_{25}}{\exp \left[B_{25/50} \left(\frac{1}{T_{25}} - \frac{1}{T} \right) \right]}$$

T: Thermistor temperature
R_T: Thermistor value at T

3. Thermal and package characteristics

Symbol	Characteristic	Min	Typ	Max	Unit
V _{ISOL}	RMS Isolation Voltage, any terminal to case t =1 min, I _{isol} < 1mA, 50/60Hz	2500			V
T _J	Operating junction temperature range	-40		150	°C
T _{STG}	Storage Temperature Range	-40		125	
T _C	Operating Case Temperature	-40		125	
Torque	Mounting torque	To Heatsink	M5	3.3	N.m
Wt	Package Weight			185	g

Technical drawing of the 100-pin connector showing three views: side, top, and front views with dimensions in mm.

Side View Dimensions:

- Overall height: $107,5 \pm 0,4$
- Pin pitch (top): $0,8 \times 1,2$
- Pin pitch (bottom): $1,2 \times 0,8$
- Overall width: $17 \pm 0,5$
- Feature: CONVEX with a tolerance of $0,25$

Top View Dimensions:

- Overall width: $45 \pm 0,3$
- Pin pitch (top): $11,43^*$
- Pin pitch (bottom): $11,2 \pm 0,4$
- Pin pitch (left): $15,24^*$
- Pin pitch (right): $15,24^*$
- Pin pitch (center): $7,62^*$
- Pin pitch (bottom center): $7,62^*$
- Pin pitch (top center): $7,62^*$
- Pin pitch (left center): $15,24^*$
- Pin pitch (right center): $15,24^*$
- Pin pitch (bottom left): $20,95^*$
- Pin pitch (bottom right): $20,95^*$
- Pin pitch (top left): $20,95^*$
- Pin pitch (top right): $20,95^*$

Front View Dimensions:

- Overall width: $93 \pm 0,3$
- Pin pitch (top): $16,2^{+0,8}_{+0}$
- Pin pitch (bottom): $7 \pm 0,3$
- Pin pitch (left): $16,2^{+0,8}_{+0}$
- Pin pitch (right): $20,5 \pm 1$
- Pin pitch (center): $11,2 \pm 0,4$
- Pin pitch (bottom center): $11,43^*$
- Pin pitch (top center): $11,43^*$
- Pin pitch (left center): $15,24^*$
- Pin pitch (right center): $15,24^*$
- Pin pitch (bottom left): $20,95^*$
- Pin pitch (bottom right): $20,95^*$
- Pin pitch (top left): $20,95^*$
- Pin pitch (top right): $20,95^*$

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