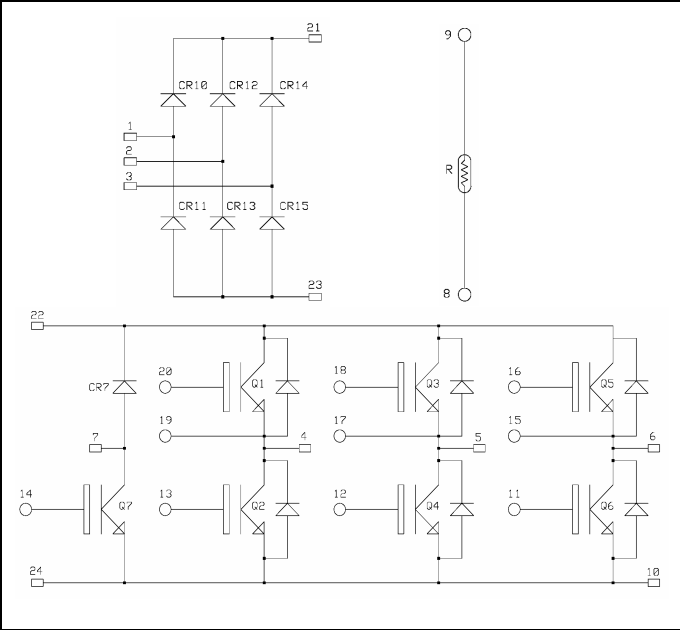
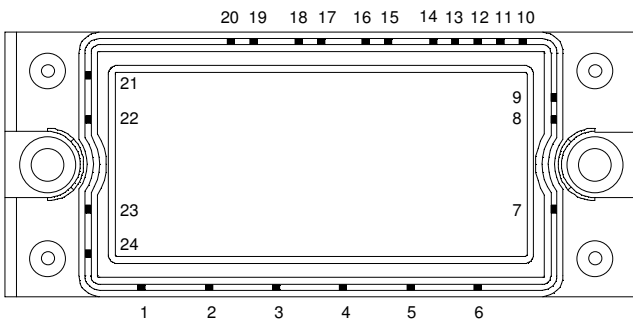


Input rectifier bridge +  
Brake + 3 Phase Bridge  
NPT IGBT Power Module

**$V_{CES} = 1200V$**   
 **$I_C = 15A @ T_c = 80^\circ C$**



APTGS15X120RTP2: 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	$T_c = 80^\circ C$ 15	A	
$I_{FSM}$	Surge Forward Current	$T_j = 25^\circ C$ $t_p = 10ms$		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 APTGS15X120BTP2) Absolute maximum ratings

Symbol	Parameter	Max ratings	Unit
V <sub>CES</sub>	Collector - Emitter Breakdown Voltage	1200	V
I <sub>C</sub>	Continuous Collector Current	T <sub>C</sub> = 25°C	20
		T <sub>C</sub> = 80°C	10
I <sub>CM</sub>	Pulsed Collector Current	T <sub>C</sub> = 25°C	25
V <sub>GE</sub>	Gate – Emitter Voltage	±20	V
P <sub>D</sub>	Maximum Power Dissipation	T <sub>C</sub> = 25°C	100
I <sub>F</sub>	DC Forward Current	T <sub>C</sub> = 80°C	10

### IGBT & Diode Inverter Absolute maximum ratings

Symbol	Parameter	Max ratings	Unit
V <sub>CES</sub>	Collector - Emitter Breakdown Voltage	1200	V
I <sub>C</sub>	Continuous Collector Current	T <sub>C</sub> = 25°C	35
		T <sub>C</sub> = 80°C	15
I <sub>CM</sub>	Pulsed Collector Current	T <sub>C</sub> = 25°C	37
V <sub>GE</sub>	Gate – Emitter Voltage	±20	V
P <sub>D</sub>	Maximum Power Dissipation	T <sub>C</sub> = 25°C	180
RBSOA	Reverse Bias Safe Operating Area	T <sub>j</sub> = 125°C	90A @ 720V
I <sub>F</sub>	DC Forward Current	T <sub>C</sub> = 80°C	15
I <sub>FSM</sub>	Surge Forward Current	t <sub>p</sub> = 1ms T <sub>C</sub> = 80°C	30

## 2. Electrical Characteristics

### Diodes Rectifier Electrical Characteristics

Symbol	Characteristic	Test Conditions	Min	Typ	Max	Unit
I <sub>R</sub>	Reverse Current	V <sub>R</sub> = 1600V T <sub>j</sub> = 150°C		2		mA
V <sub>F</sub>	Forward Voltage	I <sub>F</sub> = 30A T <sub>j</sub> = 25°C		1.3	1.5	V
		I <sub>F</sub> = 15A T <sub>j</sub> = 150°C		0.95	1	
R <sub>thJC</sub>	Junction to Case				1	°C/W

### IGBT Brake & Diode (only for APTGS15X120BTP2) Electrical Characteristics

Symbol	Characteristic	Test Conditions	Min	Typ	Max	Unit
I <sub>CES</sub>	Zero Gate Voltage Collector Current	V <sub>GE</sub> = 0V V <sub>CE</sub> = 1200V	T <sub>j</sub> = 25°C	0.5	500	μA
			T <sub>j</sub> = 125°C	0.8		mA
V <sub>CE(on)</sub>	Collector Emitter on Voltage	V <sub>GE</sub> = 15V I <sub>C</sub> = 12.5A	T <sub>j</sub> = 25°C	2.7	3.15	V
			T <sub>j</sub> = 125°C	3.1		
V <sub>GE(th)</sub>	Gate Threshold Voltage	V <sub>GE</sub> = V <sub>CE</sub> , I <sub>C</sub> = 0.35 mA	4.5	5.5	6.5	V
I <sub>GES</sub>	Gate – Emitter Leakage Current	V <sub>GE</sub> = 20V, V <sub>CE</sub> = 0V			300	nA
C <sub>ies</sub>	Input Capacitance	V <sub>GE</sub> = 0V, V <sub>CE</sub> = 25V f = 1MHz		600		pF
V <sub>F</sub>	Forward Voltage	V <sub>GE</sub> = 0V I <sub>F</sub> = 15A	T <sub>j</sub> = 25°C	1.75	2.1	V
			T <sub>j</sub> = 125°C	1.6		
R <sub>thJC</sub>	Junction to Case		IGBT		1.2	°C/W
			Diode		1.2	

### IGBT & Diode Inverter Electrical Characteristics

Symbol	Characteristic	Test Conditions	Min	Typ	Max	Unit
BV <sub>CES</sub>	Collector - Emitter Breakdown Voltage	V <sub>GE</sub> = 0V, I <sub>C</sub> = 500μA	1200			V
I <sub>CES</sub>	Zero Gate Voltage Collector Current	V <sub>GE</sub> = 0V V <sub>CE</sub> = 1200V	T <sub>j</sub> = 25°C	1	500	μA
			T <sub>j</sub> = 125°C	1.2		mA
V <sub>CE(on)</sub>	Collector Emitter on Voltage	V <sub>GE</sub> = 15V I <sub>C</sub> = 15A	T <sub>j</sub> = 25°C	2.2	2.55	V
			T <sub>j</sub> = 125°C	2.5		
V <sub>GE(th)</sub>	Gate Threshold Voltage	V <sub>GE</sub> = V <sub>CE</sub> , I <sub>C</sub> = 0.6 mA	4.5	5.5	6.5	V
I <sub>GES</sub>	Gate – Emitter Leakage Current	V <sub>GE</sub> = 20V, V <sub>CE</sub> = 0V			300	nA
C <sub>ies</sub>	Input Capacitance	V <sub>GE</sub> = 0V, V <sub>CE</sub> = 25V f = 1MHz		1000		pF
T <sub>d(on)</sub>	Turn-on Delay Time	Inductive Switching (25°C) V <sub>GE</sub> = ±15V V <sub>Bus</sub> = 600V I <sub>C</sub> = 15A R <sub>G</sub> = 47Ω		65		ns
T <sub>r</sub>	Rise Time			65		
T <sub>d(off)</sub>	Turn-off Delay Time			370		
T <sub>f</sub>	Fall Time			50		
T <sub>d(on)</sub>	Turn-on Delay Time	Inductive Switching (125°C) V <sub>GE</sub> = ±15V V <sub>Bus</sub> = 600V I <sub>C</sub> = 15A R <sub>G</sub> = 47Ω		66		ns
T <sub>r</sub>	Rise Time			55		
T <sub>d(off)</sub>	Turn-off Delay Time			410		
T <sub>f</sub>	Fall Time			55		
E <sub>off</sub>	Turn off Energy			1.7		mJ
V <sub>F</sub>	Forward Voltage	V <sub>GE</sub> = 0V I <sub>F</sub> = 15A	T <sub>j</sub> = 25°C	1.75	2.1	V
			T <sub>j</sub> = 125°C	1.6		
Q <sub>rr</sub>	Reverse Recovery Charge	I <sub>F</sub> = 15A V <sub>R</sub> = 600V di/dt=900A/μs	T <sub>j</sub> = 25°C	1.6		μC
			T <sub>j</sub> = 125°C	3.2		
R <sub>thJC</sub>	Junction to Case		IGBT		0.7	°C/W
			Diode		1.2	

### Temperature sensor NTC

Symbol	Characteristic	Min	Typ	Max	Unit
R <sub>25</sub>	Resistance @ 25°C		5		kΩ
B <sub>25/50</sub>	T <sub>25</sub> = 298.16 K		3375		K

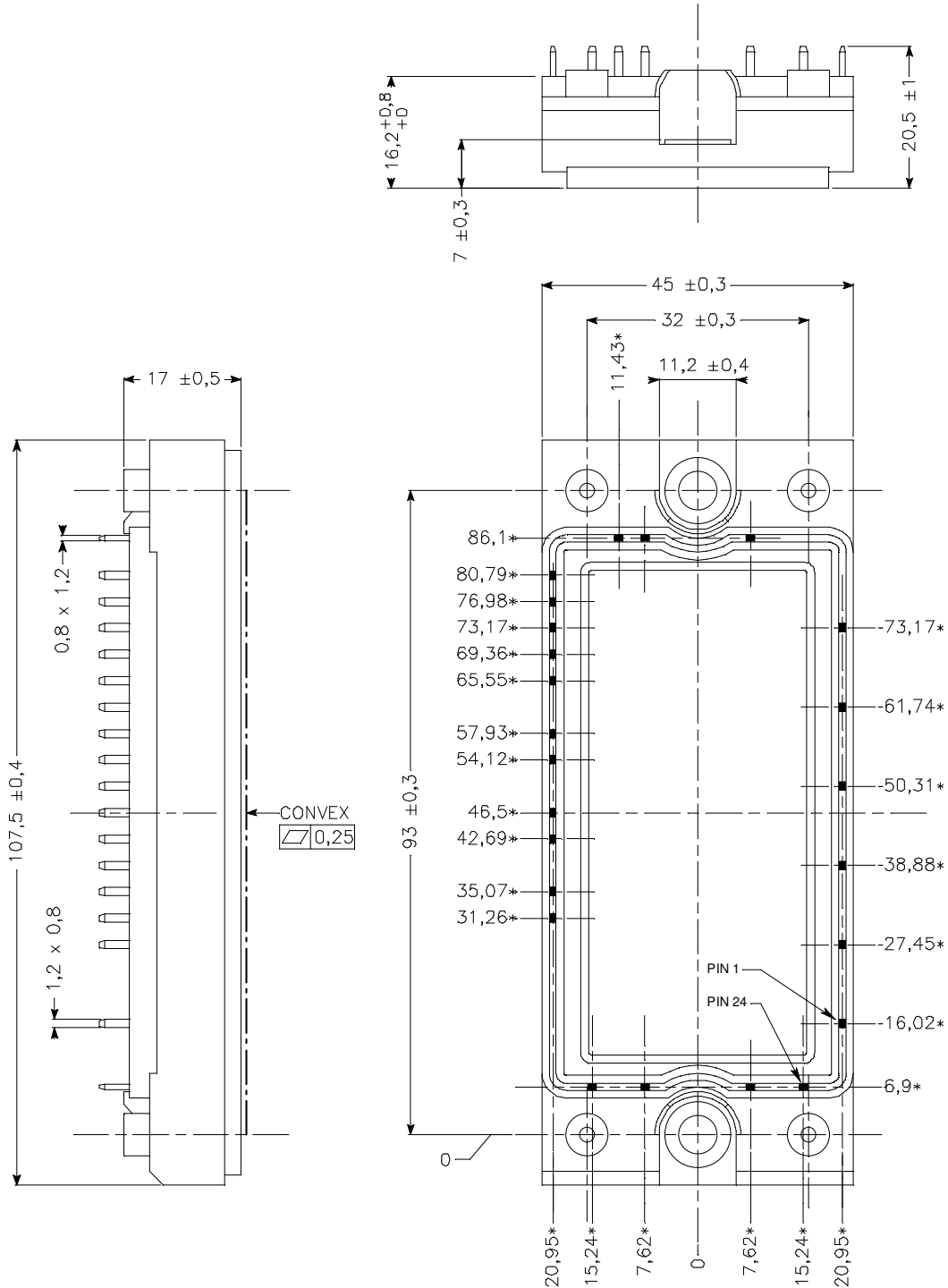
$$R_T = \frac{R_{25}}{\exp\left[B_{25/50}\left(\frac{1}{T_{25}} - \frac{1}{T}\right)\right]}$$

T: Thermistor temperature  
R<sub>T</sub>: Thermistor value at T

### 3. Thermal and package characteristics

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

**4. Package outline**



ALL DIMENSIONS MARKED "\*" ARE TOLERENCED AS:  $\pm 0,4$

**APT reserves the right to change, without notice, the specifications and information contained herein**

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