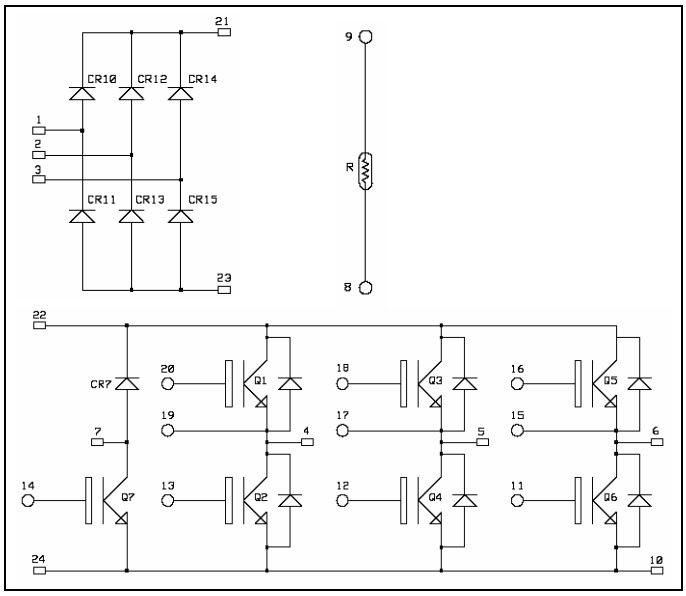
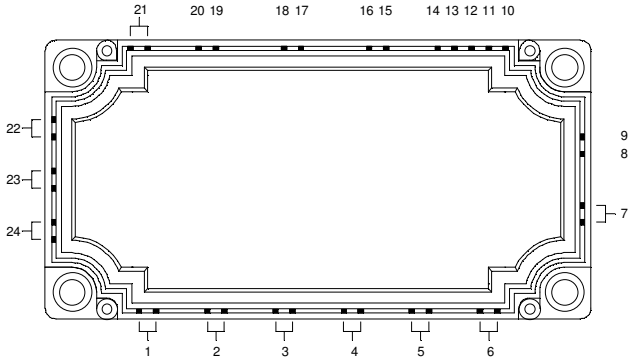
APTGT50X120RTP3
APTGT50X120BTP3

Input rectifier bridge + Brake + 3 Phase Bridge Trench IGBT® Power Module

V_{CES} = 1200V
I_C = 50A @ Tc = 80°C



APTGT50X120RTP3: Without Brake (Pin 7 & 14 not connected)



Application

- AC Motor control

Features

- Trench + Field Stop IGBT® Technology
  - 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
- Kelvin emitter for easy drive
- 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°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°C	80	A
I_{FSM}	Surge Forward Current	t_p = 10ms	T_j = 25°C	500	
			T_j = 150°C	400	

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

IGBT & Diode Brake (only for APTGT50X120BTP3) 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	55	A
		T_C = 80°C	35	
I_{CM}	Pulsed Collector Current	T_C = 25°C	80	
V_{GE}	Gate – Emitter Voltage		±20	V
P_D	Maximum Power Dissipation	T_C = 25°C	200	W
I_F	DC Forward Current	T_C = 80°C	15	A

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	75	A
		T_C = 80°C	50	
I_{CM}	Pulsed Collector Current	T_C = 25°C	100	
V_{GE}	Gate – Emitter Voltage		±20	V
P_D	Maximum Power Dissipation	T_C = 25°C	270	W
RBSOA	Reverse Bias Save Operating Area	T_j = 125°C	100A @ 1100V	
I_F	DC Forward Current	T_C = 80°C	50	A
I_{FRM}	Repetitive Peak Forward Current	t_p = 1ms	100	

2. Electrical Characteristics

Diodes Rectifier Electrical Characteristics

Symbol	*Characteristic*	*Test Conditions*		*Min*	*Typ*	*Max*	*Unit*
I_R	Reverse Current	V_R = 1600V	T_j = 150°C		3		mA
V_F	Forward Voltage	I_F = 50A	T_j = 150°C		1.0		V
R_{thJC}	Junction to Case					0.65	°C/W

IGBT Brake & Diode (only for APTGT50X120BTP3) Electrical Characteristics

Symbol	*Characteristic*	*Test Conditions*		*Min*	*Typ*	*Max*	*Unit*
I_{CES}	Zero Gate Voltage Collector Current	V_{GE} = 0V, V_{CE} = 1200V			4		mA
$V_{CE(on)}$	Collector Emitter on Voltage	V_{GE} = 15V, I_C = 35A	T_j = 25°C		1.8	2.2	V
			T_j = 125°C		2.2		
$V_{GE(th)}$	Gate Threshold Voltage	V_{GE} = V_{CE}, I_C = 1.5mA		5.0	5.8	6.5	V
I_{GES}	Gate – Emitter Leakage Current	V_{GE} = 20V, V_{CE} = 0V				500	nA
C_{ies}	Input Capacitance	V_{GE} = 0V, V_{CE} = 25V, f = 1MHz			2530		pF
C_{oes}	Output Capacitance				132		
C_{res}	Reverse Transfer Capacitance				115		
V_F	Forward Voltage	V_{GE} = 0V, I_F = 35A	T_j = 25°C		2.3	2.7	V
			T_j = 125°C		2.5		
R_{thJC}	Junction to Case		IGBT			0.6	°C/W
			Diode			1.5	

IGBT & Diode Inverter Electrical Characteristics

Symbol	Characteristic	Test Conditions		Min	Typ	Max	Unit
BV_{CES}	Collector - Emitter Breakdown Voltage	V_{GE} = 0V, I_C = 3mA		1200			V
I_{CES}	Zero Gate Voltage Collector Current	V_{GE} = 0V, V_{CE} = 1200V				5	mA
$V_{CE(on)}$	Collector Emitter on Voltage	V_{GE} =15V, I_C = 50A	T_j = 25°C	1.4	1.7	2.1	V
			T_j = 125°C		2.0		
$V_{GE(th)}$	Gate Threshold Voltage	V_{GE} = V_{CE} , I_C = 2 mA		5.0	5.8	6.5	V
I_{GES}	Gate – Emitter Leakage Current	V_{GE} = 20V, V_{CE} = 0V				500	nA
C_{ies}	Input Capacitance	V_{GE} = 0V V_{CE} = 25V f = 1MHz			3600		pF
C_{oss}	Output Capacitance				188		
C_{rss}	Reverse Transfer Capacitance				163		
$T_{d(on)}$	Turn-on Delay Time	Inductive Switching (25°C) V_{GE} = ±15V V_{Bus} = 600V I_C = 50A R_G = 18Ω			85		ns
T_r	Rise Time				30		
$T_{d(off)}$	Turn-off Delay Time				420		
T_f	Fall Time				65		
$T_{d(on)}$	Turn-on Delay Time	Inductive Switching (125°C) V_{GE} = ±15V V_{Bus} = 600V I_C = 50A R_G = 18Ω			90		ns
T_r	Rise Time				45		
$T_{d(off)}$	Turn-off Delay Time				520		
T_f	Fall Time				90		
E_{off}	Turn off Energy				5.8		mJ
V_F	Forward Voltage	V_{GE} = 0V, I_F = 50A	T_j = 25°C		1.6	2.2	V
			T_j = 125°C		1.6		
Q_{rr}	Reverse Recovery Charge	I_F = 50A V_R = 600V di/dt=990A/µs	T_j = 25°C		5.2		µC
			T_j = 125°C		9.4		
R_{thJC}	Junction to Case		IGBT			0.45	°C/W
			Diode			0.75	

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

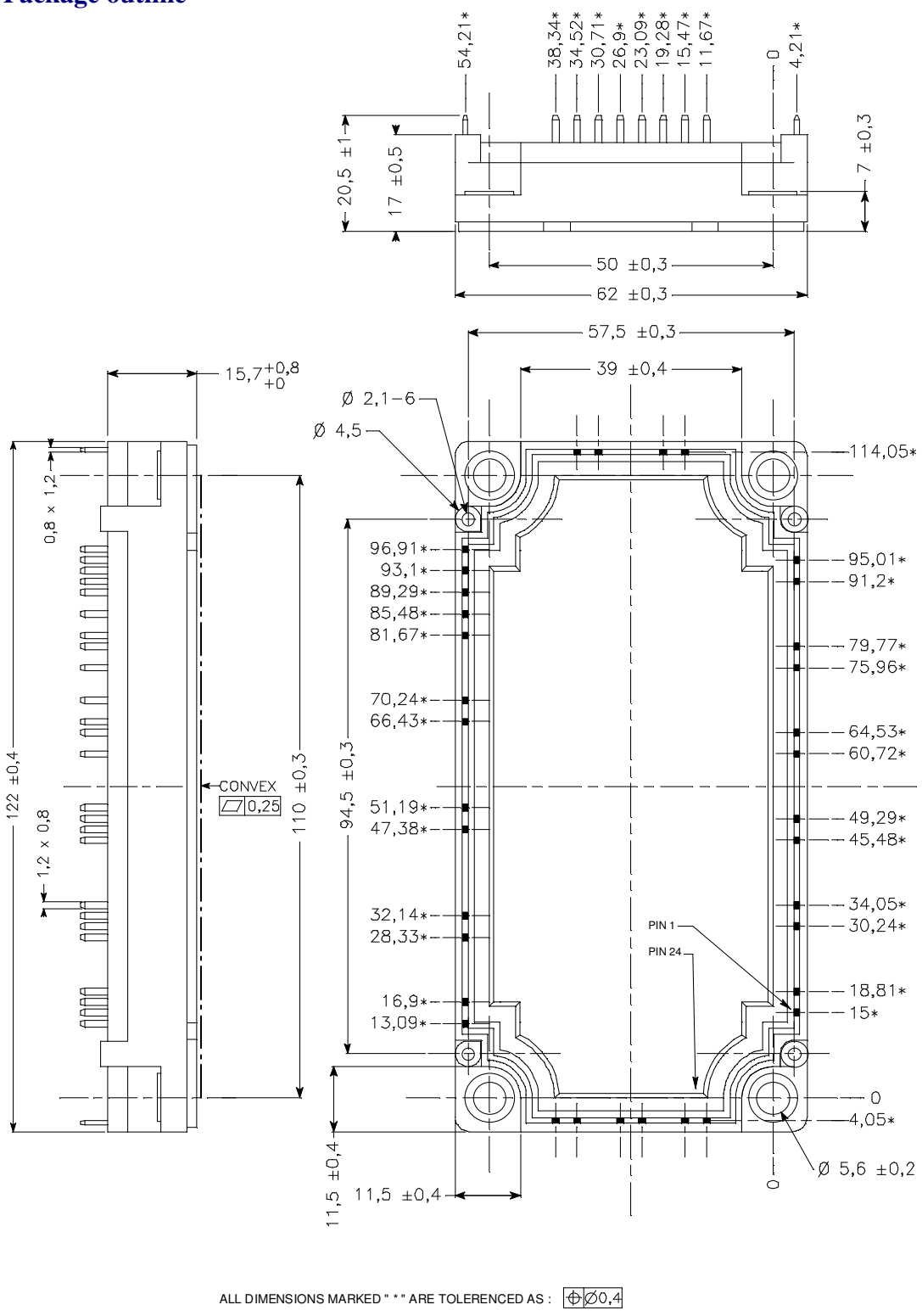
$$R_T = \frac{R_{25}}{\exp\left[B_{25/50}\left(\frac{1}{T_{25}} - \frac{1}{T}\right)\right]}$$

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					300	g

4. Package outline



ALL DIMENSIONS MARKED " * " ARE TOLERENCED AS : ⌖ Ø0,4