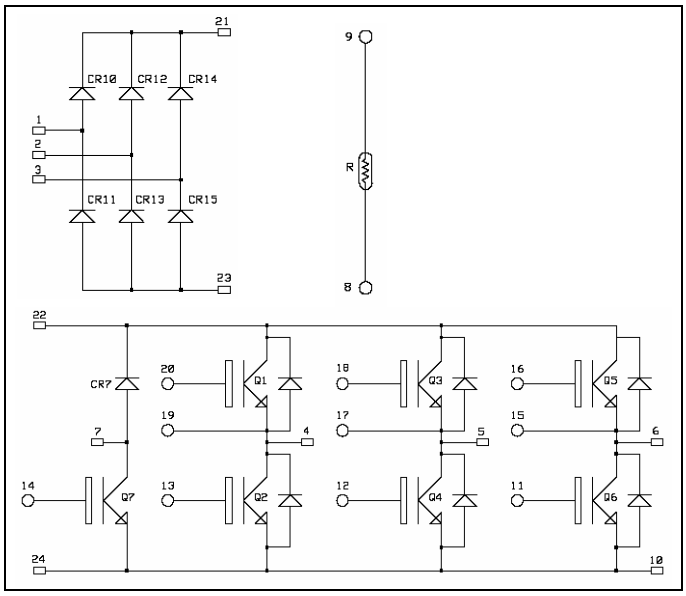
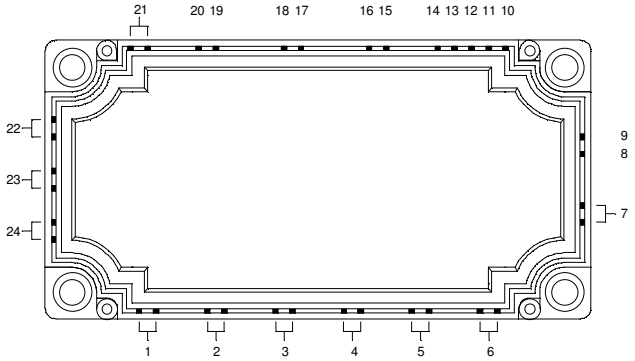
APTGT50X170RTP3
APTGT50X170BTP3

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

V_{CES} = 1700V
I_C = 50A @ Tc = 80°C



APTGT50X170RTP3: 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
- Low stray inductance
- High level of integration
- Kelvin emitter for easy drive
- Low stray inductance
- 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 APTGT50X170BTP3) Absolute maximum ratings

Symbol	*Parameter*		*Max ratings*	*Unit*
V_{CES}	Collector - Emitter Breakdown Voltage		1700	V
I_C	Continuous Collector Current	$T_C = 25°C$	70	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	$T_C = 25°C$	310	W
I_F	DC Forward Current	$T_C = 80°C$	50	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	$T_C = 25°C$	70	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	$T_C = 25°C$	310	W
RBSOA	Reverse Bias Save Operating Area	$T_j = 125°C$	100A @ 1700V	
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 APTGT50X170BTP3) Electrical Characteristics

Symbol	*Characteristic*	*Test Conditions*		*Min*	*Typ*	*Max*	*Unit*
I_{CES}	Zero Gate Voltage Collector Current	$V_{GE} = 0V, V_{CE} = 1700V$				6	mA
$V_{CE(on)}$	Collector Emitter on Voltage	$V_{GE} = 15V$ $I_C = 50A$	$T_j = 25°C$		2.0	2.4	V
			$T_j = 125°C$		2.4		
$V_{GE(th)}$	Gate Threshold Voltage	$V_{GE} = V_{CE}$, $I_C = 2.5mA$		5.0	5.8	6.5	V
I_{GES}	Gate – Emitter Leakage Current	$V_{GE} = 20V, V_{CE} = 0V$				600	nA
C_{ies}	Input Capacitance	$V_{GE} = 0V, V_{CE} = 25V$ f = 1MHz			4400		pF
C_{res}	Reverse Transfer Capacitance				150		
V_F	Forward Voltage	$V_{GE} = 0V$ $I_F = 50A$	$T_j = 25°C$		1.8	2.2	V
			$T_j = 125°C$		1.9		
R_{thJC}	Junction to Case		IGBT			0.4	°C/W
			Diode			0.7	

IGBT & Diode Inverter Electrical Characteristics

Symbol	Characteristic	Test Conditions		Min	Typ	Max	Unit
BV_{CES}	Collector - Emitter Breakdown Voltage	V_{GE} = 0V, I_C = 2.5mA		1700			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		2.0	2.4	V
			T_j = 125°C		2.4		
$V_{GE(th)}$	Gate Threshold Voltage	V_{GE} = V_{CE}, I_C = 2.5mA		5.0	5.8	6.5	V
I_{GES}	Gate – Emitter Leakage Current	V_{GE} = 20V, V_{CE} = 0V				600	nA
C_{ies}	Input Capacitance	V_{GE} = 0V ;V_{CE} = 25V f = 1MHz			4400		pF
C_{rss}	Reverse Transfer Capacitance				150		
$T_{d(on)}$	Turn-on Delay Time	Inductive Switching (25°C) V_{GE} = ±15V V_{Bus} = 900V I_C = 50A R_G = 22Ω			200		ns
T_r	Rise Time				90		
$T_{d(off)}$	Turn-off Delay Time				720		
T_f	Fall Time				90		
$T_{d(on)}$	Turn-on Delay Time	Inductive Switching (125°C) V_{GE} = ±15V V_{Bus} = 900V I_C = 50A R_G = 22Ω			220		ns
T_r	Rise Time				90		
$T_{d(off)}$	Turn-off Delay Time				820		
T_f	Fall Time				110		
E_{off}	Turn off Energy				22		mJ
V_F	Forward Voltage	V_{GE} = 0V, I_F = 50A	T_j = 25°C		1.8	2.2	V
			T_j = 125°C		1.9		
Q_{rr}	Reverse Recovery Charge	I_F = 50A V_R = 900V di/dt=990A/µs	T_j = 25°C		19		µC
			T_j = 125°C		30		
R_{thJC}	Junction to Case		IGBT			0.40	°C/W
			Diode			0.70	

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

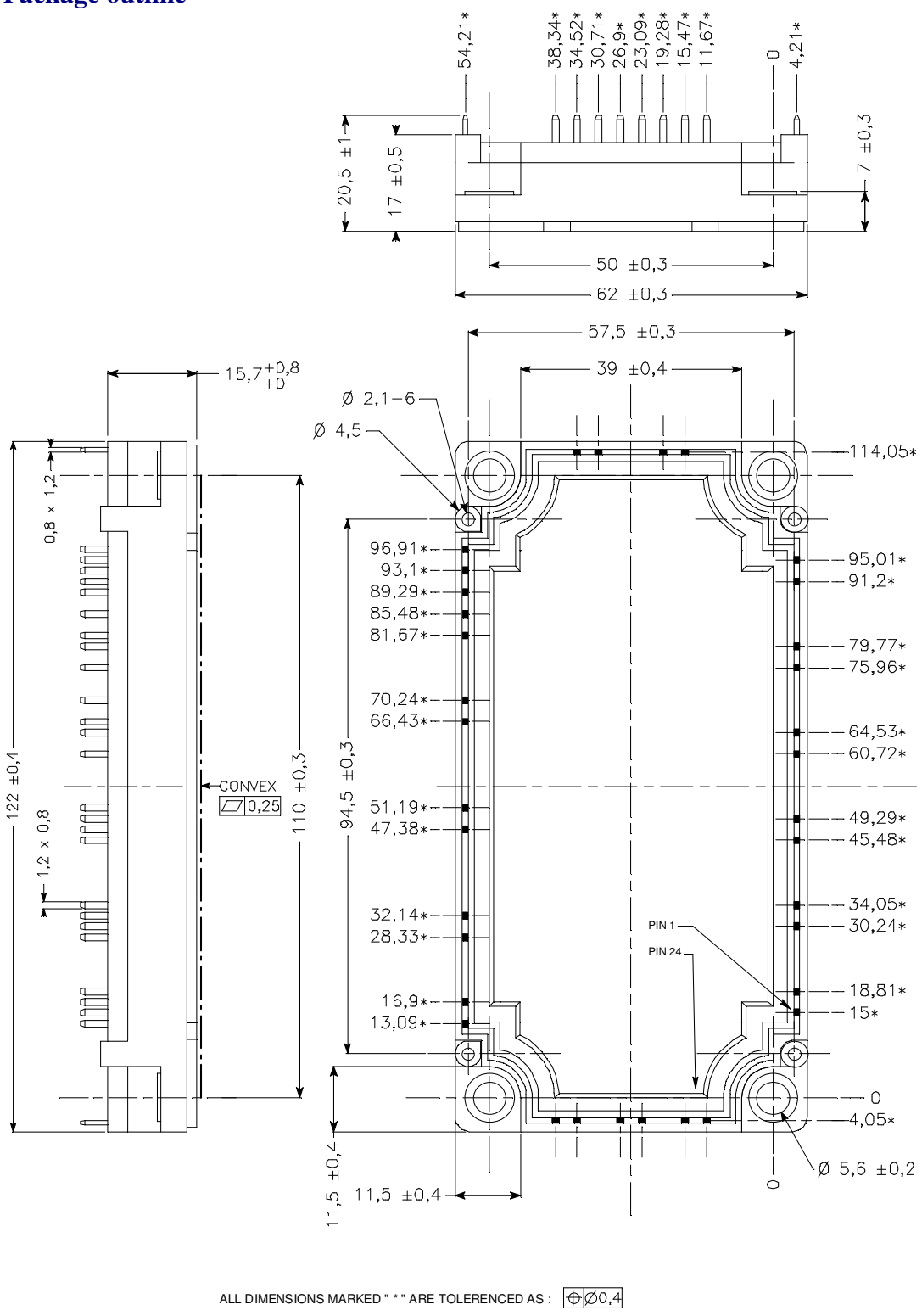
$$R_T = \frac{R_{25}}{\exp\left[B_{25/50}\left(\frac{1}{T_{25}} - \frac{1}{T}\right)\right]}$$

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

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