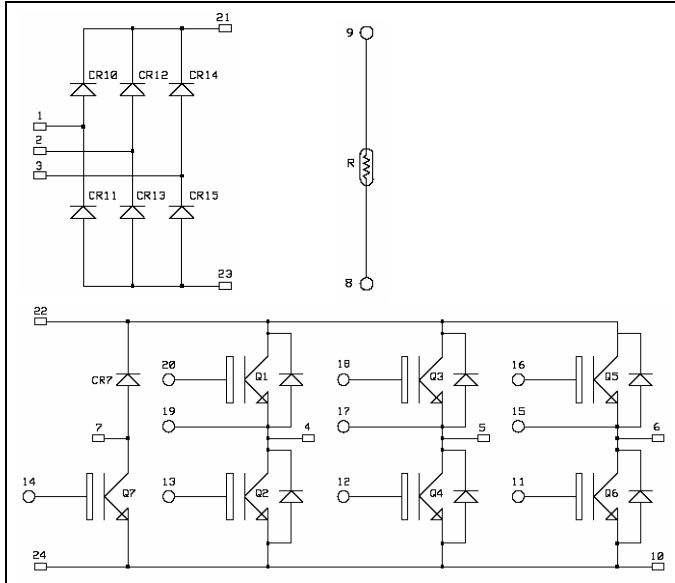
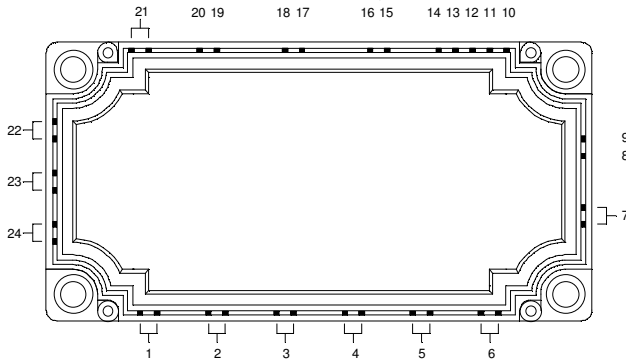


Input rectifier bridge + Brake + 3 Phase Bridge Trench IGBT® Power Module

$V_{CES} = 1700V$
 $I_C = 50A @ T_c = 80^\circ C$



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 @ $T_j = 25^\circ C$ 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	$T_c = 80^\circ C$ 80	A	
I_{FSM}	Surge Forward Current	$t_p = 10ms$ $T_j = 25^\circ C$		500
		$T_j = 150^\circ C$		400

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

IGBT & Diode Brake (only for APTGT50X170BTP3) Absolute maximum ratings

<i>Symbol</i>	<i>Parameter</i>		<i>Max ratings</i>	<i>Unit</i>
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

<i>Symbol</i>	<i>Parameter</i>		<i>Max ratings</i>	<i>Unit</i>
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 Safe 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

<i>Symbol</i>	<i>Characteristic</i>	<i>Test Conditions</i>		<i>Min</i>	<i>Typ</i>	<i>Max</i>	<i>Unit</i>
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

<i>Symbol</i>	<i>Characteristic</i>	<i>Test Conditions</i>		<i>Min</i>	<i>Typ</i>	<i>Max</i>	<i>Unit</i>
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					0.4	°C/W
				IGBT			

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

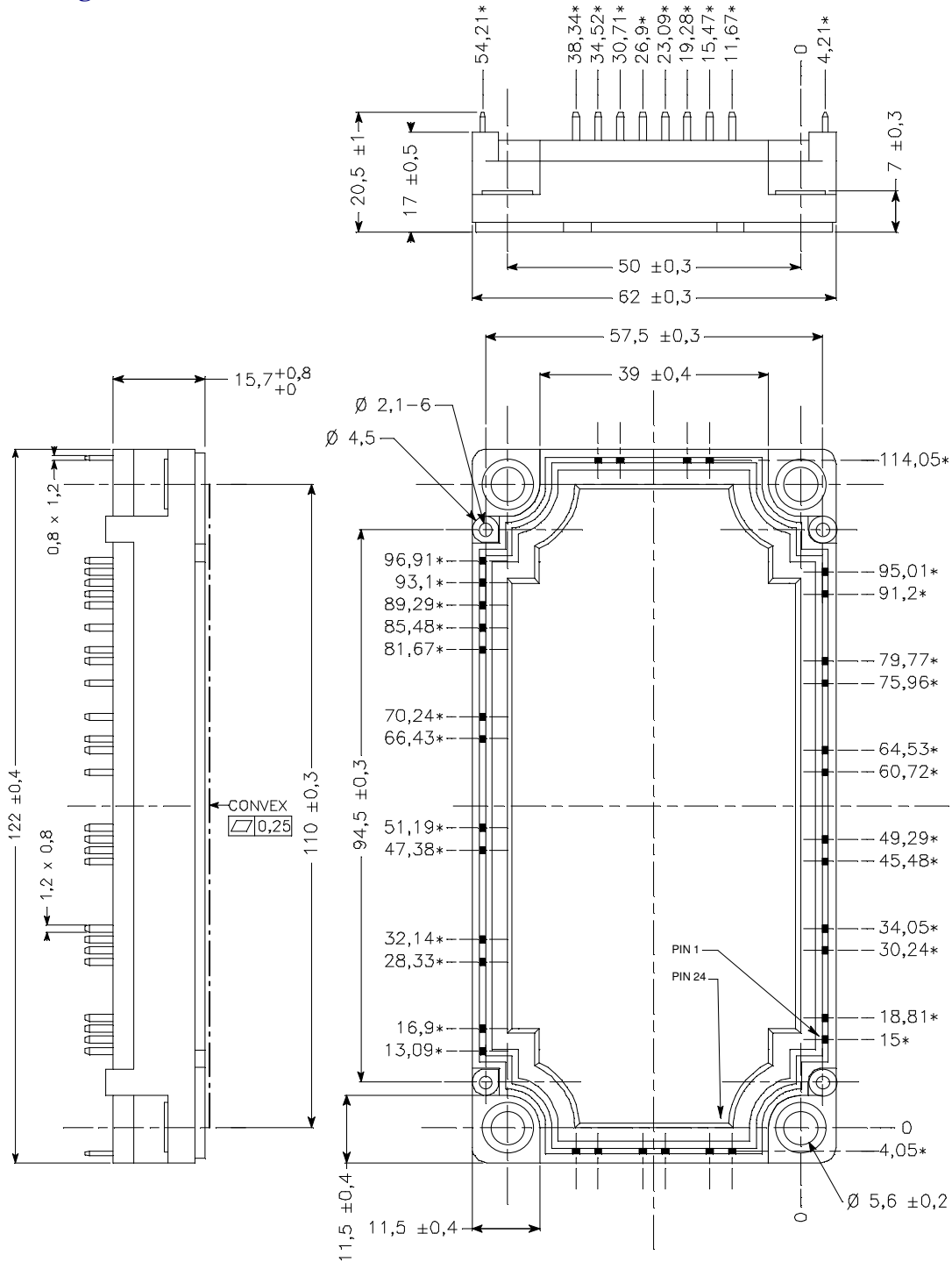
$$R_T = \frac{R_{25}}{\exp\left[B_{25/50}\left(\frac{1}{T_{25}} - \frac{1}{T}\right)\right]}$$

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 TOLERANCED AS: $\text{Ø} \pm 0.4$

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

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