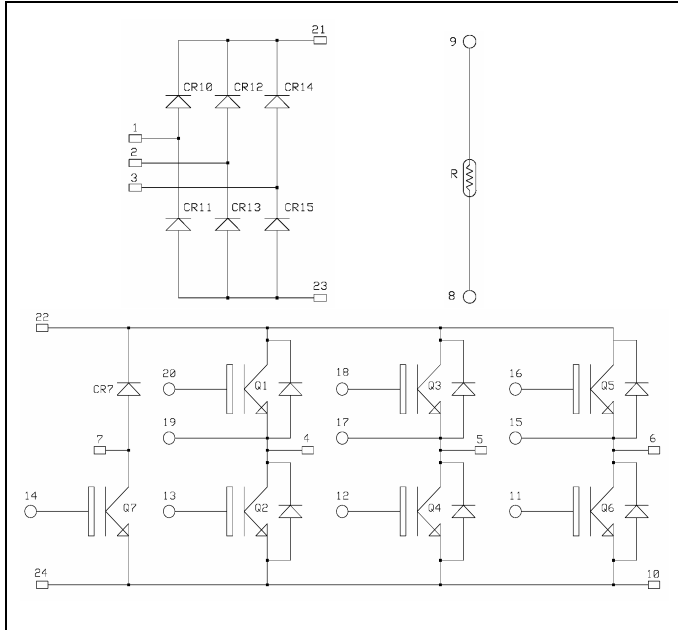


Input rectifier bridge + Brake + 3 Phase Bridge NPT IGBT Power Module

$$V_{CES} = 600V$$

$$I_C = 20A @ T_c = 80^{\circ}C$$



APTGF20X60RTP2: Without Brake (Pin 7 & 14 not connected)



Application

- AC Motor control

Features

- Non Punch Through (NPT) Fast IGBT®
 - Low voltage drop
 - Low tail current
 - Switching frequency up to 50 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	$T_c = 80^{\circ}C$ 20	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 APTGF20X60BTP2) Absolute maximum ratings

Symbol	Parameter	Max ratings	Unit
V _{CES}	Collector - Emitter Breakdown Voltage	600	V
I _C	Continuous Collector Current	T _C = 25°C	20
		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	80
I _F	DC Forward Current	T _C = 80°C	10

IGBT & Diode Inverter Absolute maximum ratings

Symbol	Parameter	Max ratings	Unit
V _{CES}	Collector - Emitter Breakdown Voltage	600	V
I _C	Continuous Collector Current	T _C = 25°C	35
		T _C = 80°C	20
I _{CM}	Pulsed Collector Current	T _C = 25°C	70
V _{GE}	Gate - Emitter Voltage	±20	V
P _D	Maximum Power Dissipation	T _C = 25°C	125
SCSOA	Short circuit Safe Operating Area	T _j = 125°C	80A @ 360V
I _F	DC Forward Current	T _C = 80°C	20
I _{FSM}	Surge Forward Current	t _p = 1ms T _C = 80°C	40

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		2		mA
V _F	Forward Voltage	I _F = 30A T _j = 25°C		1.3	1.5	V
		I _F = 20A T _j = 150°C		1	1.05	
R _{thJC}	Junction to Case				1	°C/W

IGBT Brake & Diode (only for APTGF20X60BTP2) Electrical Characteristics

Symbol	Characteristic	Test Conditions	Min	Typ	Max	Unit
I _{CES}	Zero Gate Voltage Collector Current	V _{GE} = 0V V _{CE} = 600V	T _j = 25°C	0.5	500	μA
			T _j = 125°C	0.8		mA
V _{CE(on)}	Collector Emitter on Voltage	V _{GE} = 15V I _C = 10A	T _j = 25°C	1.95	2.35	V
			T _j = 125°C	2.2		
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		800		pF
V _F	Forward Voltage	V _{GE} = 0V I _F = 20A	T _j = 25°C	1.25	1.75	V
			T _j = 125°C	1.2		
R _{thJC}	Junction to Case		IGBT		1.5	°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 = 500μA	600			V
I _{CES}	Zero Gate Voltage Collector Current	V _{GE} = 0V V _{CE} = 600V	T _j = 25°C	0.7	500	μA
			T _j = 125°C	1.0		mA
V _{CE(on)}	Collector Emitter on Voltage	V _{GE} = 15V I _C = 20A	T _j = 25°C	1.95	2.45	V
			T _j = 125°C	2.2		
V _{GE(th)}	Gate Threshold Voltage	V _{GE} = V _{CE} , I _C = 0.5 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		1100		pF
T _{d(on)}	Turn-on Delay Time	Inductive Switching (25°C) V _{GE} = ±15V V _{Bus} = 300V I _C = 20A R _G = 47Ω		50		ns
T _r	Rise Time			50		
T _{d(off)}	Turn-off Delay Time			250		
T _f	Fall Time			30		
T _{d(on)}	Turn-on Delay Time	Inductive Switching (125°C) V _{GE} = ±15V V _{Bus} = 300V I _C = 20A R _G = 47Ω		50		ns
T _r	Rise Time			50		
T _{d(off)}	Turn-off Delay Time			270		
T _f	Fall Time			40		
E _{off}	Turn off Energy			0.7		mJ
V _F	Forward Voltage	V _{GE} = 0V I _F = 20A	T _j = 25°C	1.25	1.7	V
			T _j = 125°C	1.2		
Q _{rr}	Reverse Recovery Charge	I _F = 20A V _R = 300V di/dt=700A/μs	T _j = 25°C	1.7		μC
			T _j = 125°C	2.7		
R _{thJC}	Junction to Case		IGBT		1	°C/W
			Diode		1.5	

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

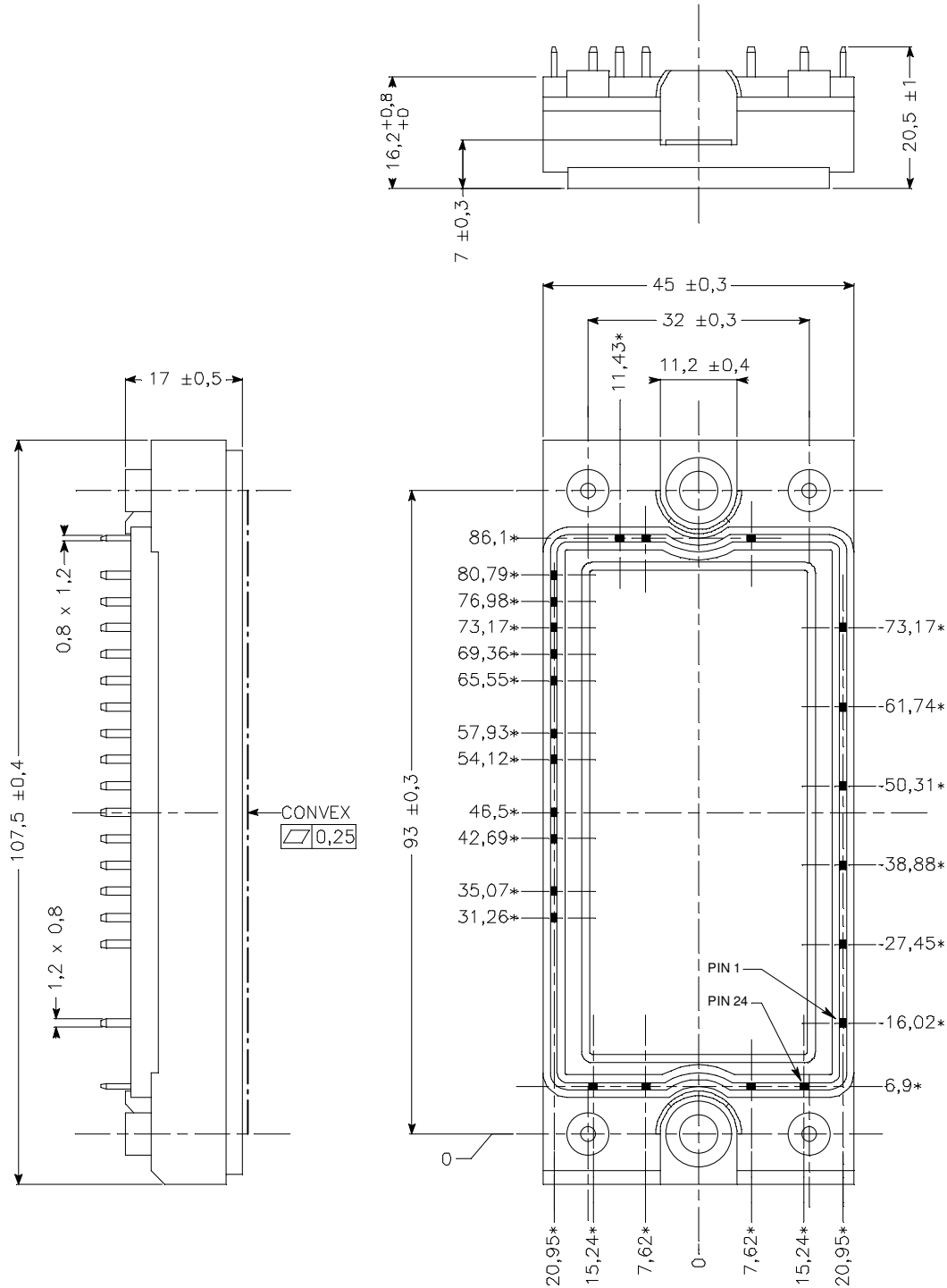
$$R_T = \frac{R_{25}}{\exp \left[B_{25/50} \left(\frac{1}{T_{25}} - \frac{1}{T} \right) \right]}$$

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

4. Package outline



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

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

APT's products are covered by one or more of U.S patents 4,895,810 5,045,903 5,089,434 5,182,234 5,019,522
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