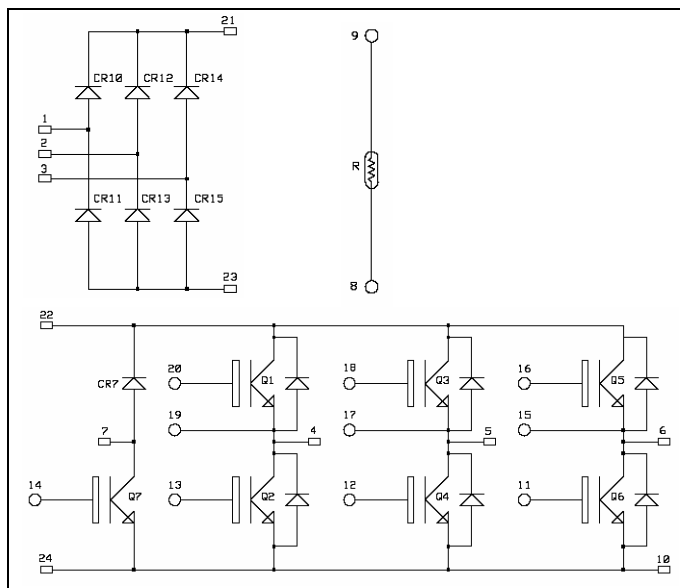


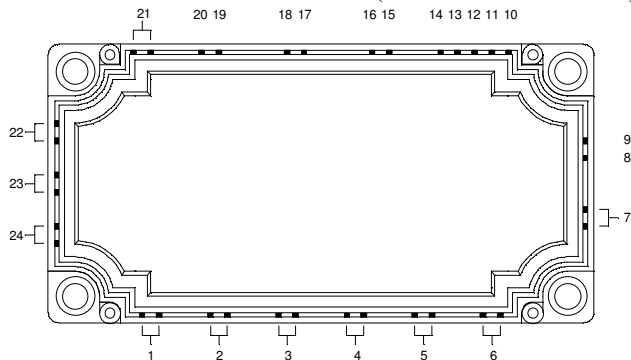
Input rectifier bridge + Brake + 3 Phase Bridge Trench IGBT® Power Module

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$V_{CES} = 1200V$
 $I_C = 35A @ T_c = 80^{\circ}C$



APTGT35X120RTP3: 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 @ $T_j = 25^{\circ}C$ 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	$T_j = 25^{\circ}C$ 320	
		$T_j = 150^{\circ}C$ 260	



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

IGBT & Diode Brake (only for APTGT35X120BTP3) Absolute maximum ratings

Symbol	Parameter	Max ratings	Unit
V_{CES}	Collector - Emitter Breakdown Voltage	1200	V
I_C	Continuous Collector Current	$T_C = 25^\circ\text{C}$	A
		$T_C = 80^\circ\text{C}$	
I_{CM}	Pulsed Collector Current	$T_C = 25^\circ\text{C}$	A
V_{GE}	Gate - Emitter Voltage	± 20	V
P_D	Maximum Power Dissipation	$T_C = 25^\circ\text{C}$	W
I_F	DC Forward Current	$T_C = 80^\circ\text{C}$	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	$T_C = 25^\circ\text{C}$	A
		$T_C = 80^\circ\text{C}$	
I_{CM}	Pulsed Collector Current	$T_C = 25^\circ\text{C}$	A
V_{GE}	Gate - Emitter Voltage	± 20	V
P_D	Maximum Power Dissipation	$T_C = 25^\circ\text{C}$	W
RBSOA	Reverse Bias Safe Operating Area	$T_j = 125^\circ\text{C}$	80A @ 1100V
I_F	DC Forward Current	$T_C = 80^\circ\text{C}$	A
I_{FRM}	Repetitive Peak Forward Current	$t_p = 1\text{ms}$	

2. Electrical Characteristics

Diodes Rectifier Electrical Characteristics

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

IGBT Brake & Diode (only for APTGT35X120BTP3) Electrical Characteristics

Symbol	Characteristic	Test Conditions	Min	Typ	Max	Unit
I_{CES}	Zero Gate Voltage Collector Current	$V_{GE} = 0\text{V}$, $V_{CE} = 1200\text{V}$			4	mA
$V_{CE(on)}$	Collector Emitter on Voltage	$V_{GE} = 15\text{V}$ $T_j = 25^\circ\text{C}$	1.4	1.7	2.1	V
		$I_C = 25\text{A}$ $T_j = 125^\circ\text{C}$		2.0		
$V_{GE(th)}$	Gate Threshold Voltage	$V_{GE} = V_{CE}$, $I_C = 1\text{mA}$	5.0	5.8	6.5	V
I_{GES}	Gate - Emitter Leakage Current	$V_{GE} = 20\text{V}$, $V_{CE} = 0\text{V}$			600	nA
C_{ies}	Input Capacitance	$V_{GE} = 0\text{V}$		1808		pF
C_{oes}	Output Capacitance	$V_{CE} = 25\text{V}$		95		
C_{res}	Reverse Transfer Capacitance	$f = 1\text{MHz}$		82		
V_F	Forward Voltage	$V_{GE} = 0\text{V}$ $T_j = 25^\circ\text{C}$		2.3	2.7	V
		$I_F = 35\text{A}$ $T_j = 125^\circ\text{C}$		2.5		
R_{thJC}	Junction to Case	IGBT			0.6	$^\circ\text{C/W}$
		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	$V_{GE} = 0V, V_{CE} = 1200V$			4	mA
$V_{CE(on)}$	Collector Emitter on Voltage	$V_{GE} = 15V$ $I_C = 50A$	$T_j = 25^\circ C$	1.8	2.2	V
			$T_j = 125^\circ C$	2.1		
$V_{GE(th)}$	Gate Threshold Voltage	$V_{GE} = V_{CE}, I_C = 2mA$	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	$V_{GE} = 0V$		2530		pF
C_{oss}	Output Capacitance	$V_{CE} = 25V$		132		
C_{rss}	Reverse Transfer Capacitance	$f = 1MHz$		115		
$T_{d(on)}$	Turn-on Delay Time	Inductive Switching ($25^\circ C$) $V_{GE} = \pm 15V$ $V_{Bus} = 600V$ $I_C = 40A$ $R_G = 27\Omega$		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 ($125^\circ C$) $V_{GE} = \pm 15V$ $V_{Bus} = 600V$ $I_C = 40A$ $R_G = 27\Omega$		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			4.2		
V_F	Forward Voltage	$V_{GE} = 0V$ $I_F = 40A$	$T_j = 25^\circ C$	2.1		V
			$T_j = 125^\circ C$	2.0		
Q_{rr}	Reverse Recovery Charge	$I_F = 25A$ $V_R = 600V$ $di/dt = 990A/\mu s$	$T_j = 25^\circ C$	2		μC
			$T_j = 125^\circ C$	5		
R_{thJC}	Junction to Case		IGBT		0.6	$^\circ C/W$
			Diode		0.95	

Temperature sensor NTC

Symbol	Characteristic	Min	Typ	Max	Unit
R_{25}	Resistance @ $25^\circ C$		5		$k\Omega$
$B_{25/50}$	$T_{25} = 298.16 K$		3375		K

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

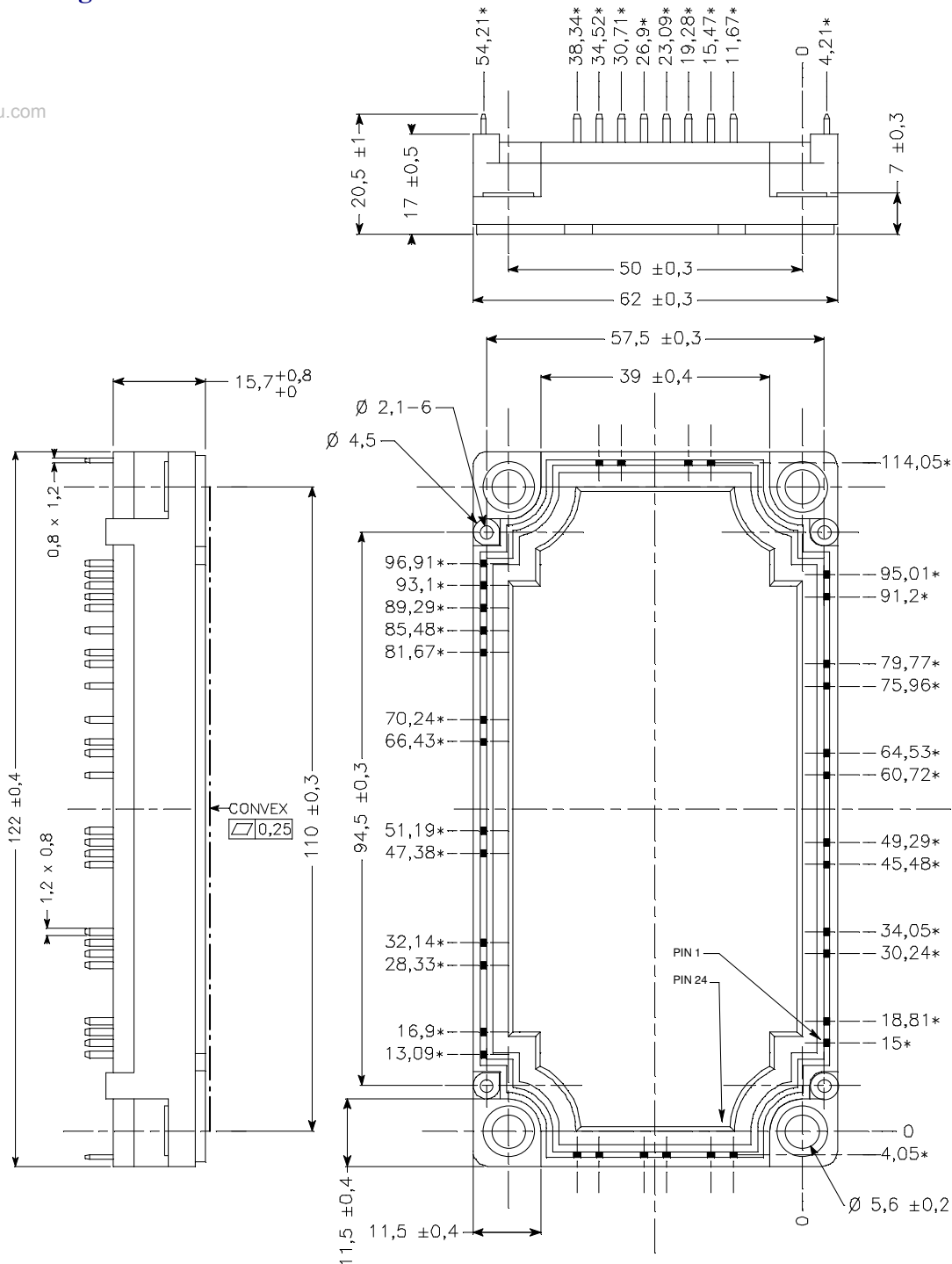
T: Thermistor temperature
R_T: Thermistor value at T

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	$^\circ C$
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

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