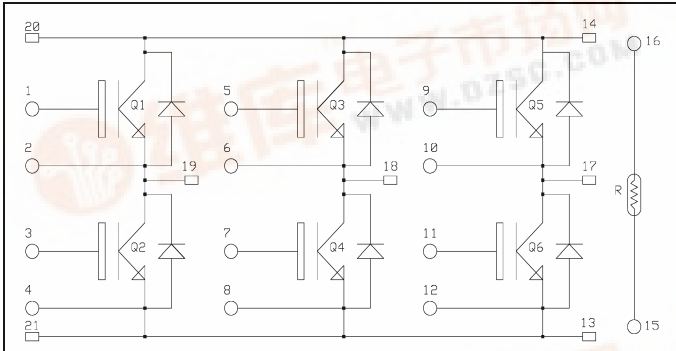




APTGF50X120TE3

3 Phase bridge NPT IGBT Power Module

$V_{CES} = 1200V$
 $I_C = 50A @ T_c = 80^\circ C$



Application

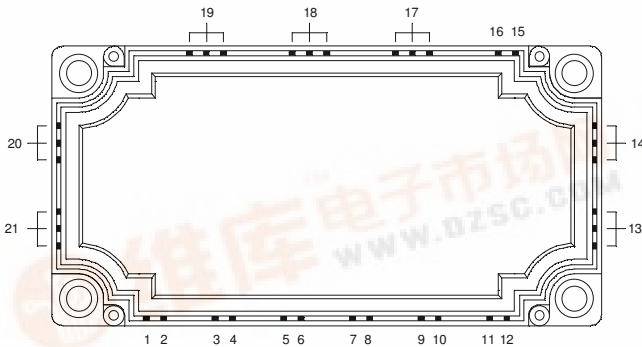
- AC Motor control

Features

- Non Punch Through (NPT) IGBT®
 - 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

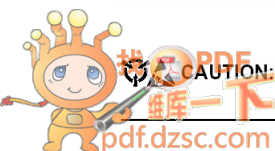
Benefits

- 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



Absolute maximum ratings

| Symbol | Parameter | Max ratings | Unit |
|-----------|---------------------------------------|---------------------|------------|
| V_{CES} | Collector - Emitter Breakdown Voltage | 1200 | V |
| I_C | Continuous Collector Current | $T_C = 25^\circ C$ | 78 |
| | | $T_C = 80^\circ C$ | 50 |
| I_{CM} | Pulsed Collector Current | $T_C = 25^\circ C$ | 150 |
| V_{GE} | Gate - Emitter Voltage | ± 20 | V |
| P_D | Maximum Power Dissipation | $T_C = 25^\circ C$ | 400 |
| SCSOA | Short Circuit Safe Operating Area | $T_j = 125^\circ C$ | 500A@1200V |



Electrical Characteristics

All ratings @ $T_j = 25^\circ\text{C}$ unless otherwise specified

| 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 | $V_{GE} = 0V$ $V_{CE} = 1200V$ | | 0.8 4 | 1 | mA |
| | | | | | | |
| $V_{CE(on)}$ | Collector Emitter on Voltage | $V_{GE} = 15V$ $I_C = 50A$ | | 2.0 3.1 | 2.5 3.7 | V |
| | | | | | | |
| $V_{GE(th)}$ | Gate Threshold Voltage | $V_{GE} = V_{CE}, I_C = 2mA$ | 4.5 | | 6.5 | V |
| I_{GES} | Gate - Emitter Leakage Current | $V_{GE} = 20V, V_{CE} = 0V$ | | | 200 | nA |

Dynamic Characteristics

| Symbol | Characteristic | Test Conditions | Min | Typ | Max | Unit |
|--------------|------------------------------|---|-----|------|-----|------|
| C_{ies} | Input Capacitance | $V_{GE} = 0V$ | | 3300 | | pF |
| C_{oes} | Output Capacitance | $V_{CE} = 25V$ | | 500 | | |
| C_{res} | Reverse Transfer Capacitance | $f = 1MHz$ | | 220 | | |
| $T_{d(on)}$ | Turn-on Delay Time | Inductive Switching (125°C) | | 44 | | ns |
| T_r | Rise Time | $V_{GE} = \pm 15V$ $V_{Bus} = 600V$ | | 56 | | |
| $T_{d(off)}$ | Turn-off Delay Time | $I_C = 50A$ | | 380 | | |
| T_f | Fall Time | $R_G = 22\Omega$ | | 70 | | |

Reverse diode ratings and characteristics

| Symbol | Characteristic | Test Conditions | Min | Typ | Max | Unit |
|----------|-------------------------|---|-----|------------|-----|---------|
| V_F | Diode Forward Voltage | $I_F = 50A$ $V_{GE} = 0V$ | | 2.3 1.8 | 2.8 | V |
| | | | | | | |
| t_{rr} | Reverse Recovery Time | $I_F = 50A$ $V_R = 600V$ $di/dt = 800A/\mu s$ | | 200 | | ns |
| Q_{rr} | Reverse Recovery Charge | $I_F = 50A$ $V_R = 600V$ $di/dt = 800A/\mu s$ | | 2.8 8 | | μC |
| | | | | | | |

Temperature sensor NTC

| Symbol | Characteristic | Min | Typ | Max | Unit |
|-------------|---------------------------------|-----|------|-----|------------|
| R_{25} | Resistance @ 25°C | | 5 | | k Ω |
| $B_{25/50}$ | $T_{25} = 298.16\text{ K}$ | | 3375 | | K |

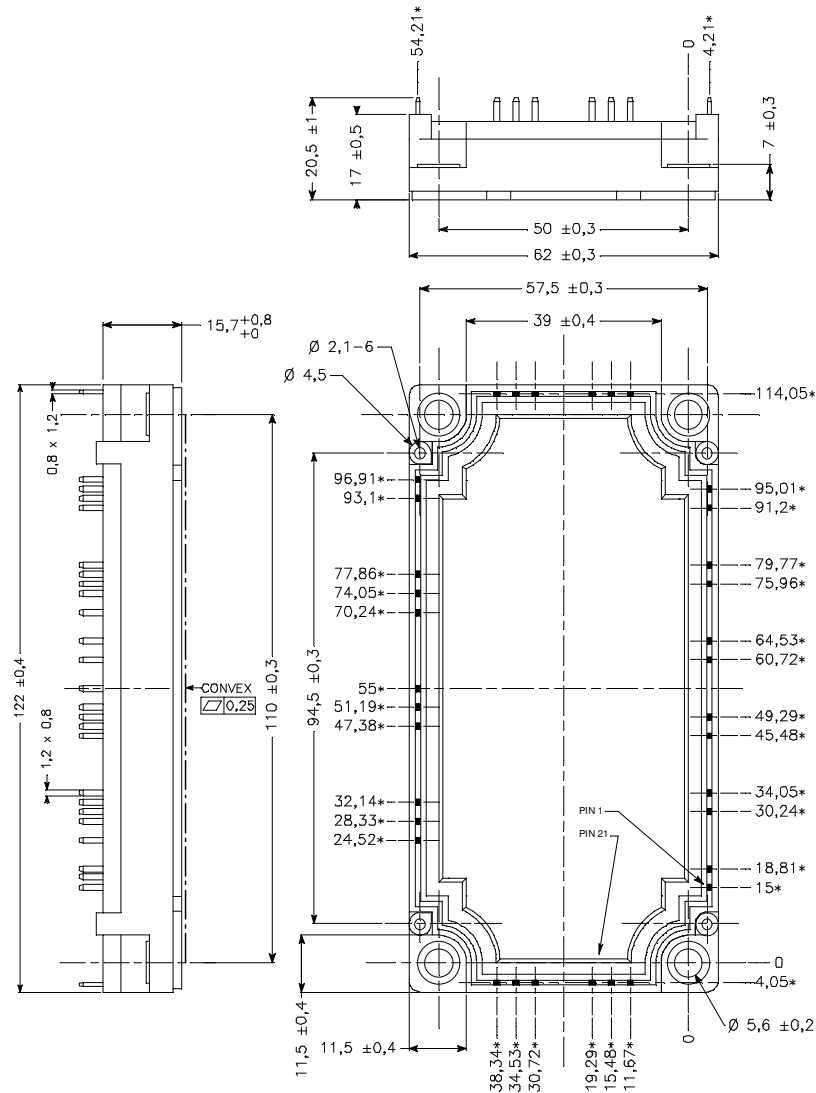
$$R_T = \frac{R_{25}}{\exp\left[B_{25/50}\left(\frac{1}{T_{25}} - \frac{1}{T}\right)\right]}$$

T: Thermistor temperature
R_T: Thermistor value at T

Thermal and package characteristics

| Symbol | Characteristic | Min | Typ | Max | Unit | |
|-------------------|---|-------------|-----|------|------|-----|
| R _{thJC} | Junction to Case | IGBT | | 0.35 | °C/W | |
| | | Diode | | 0.7 | | |
| 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 | 4.5 | N.m |
| Wt | Package Weight | | | 300 | | g |

Package outline



ALL DIMENSIONS MARKED * * * ARE TOLERENCED AS: $\text{M} \pm 0.4$

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