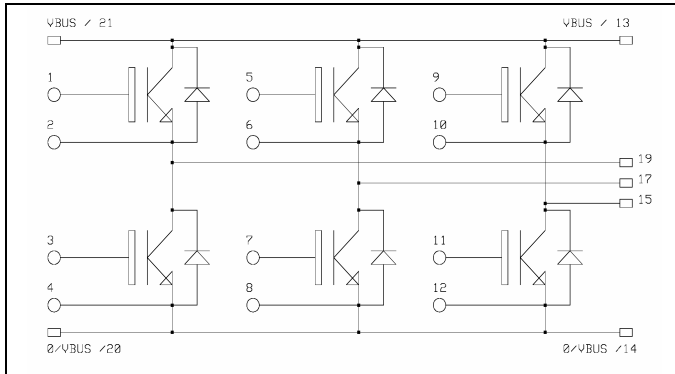


## 3 Phase bridge NPT IGBT Power Module

$V_{CES} = 600V$   
 $I_C = 150A @ T_c = 80^\circ C$



### Application

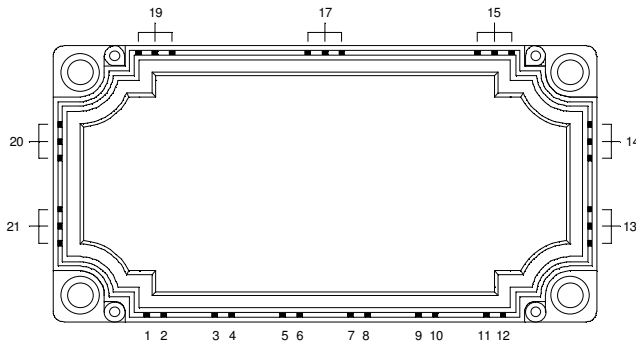
- AC Motor control

### 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
- Kelvin emitter for easy drive
- Very low stray inductance
- High level of integration


### Benefits

- Outstanding performance at high frequency operation
- 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 | 600                 | V         |
| $I_C$     | Continuous Collector Current          | $T_C = 25^\circ C$  | 225       |
|           |                                       | $T_C = 80^\circ C$  | 150       |
| $I_{CM}$  | Pulsed Collector Current              | $T_C = 25^\circ C$  | 450       |
| $V_{GE}$  | Gate - Emitter Voltage                | $\pm 20$            | V         |
| $P_D$     | Maximum Power Dissipation             | $T_C = 25^\circ C$  | 700       |
| RBSOA     | Reverse Bias Safe Operating Area      | $T_j = 125^\circ C$ | 400A@480V |

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

## 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 | $V_{GE} = 0V, I_C = 500\mu A$ | 600 |     |     | V       |
| $I_{CES}$    | Zero Gate Voltage Collector Current   | $V_{GE} = 0V$                 |     | 1   | 500 | $\mu A$ |
|              |                                       | $V_{CE} = 600V$               |     | 1   |     | mA      |
| $V_{CE(on)}$ | Collector Emitter on Voltage          | $V_{GE} = 15V$                | 1.7 | 2.0 | 2.5 | V       |
|              |                                       | $I_C = 200A$                  |     | 2.2 |     |         |
| $V_{GE(th)}$ | Gate Threshold Voltage                | $V_{GE} = V_{CE}, I_C = 4 mA$ | 4.5 |     | 6.5 | V       |
| $I_{GES}$    | Gate - Emitter Leakage Current        | $V_{GE} = 20V, V_{CE} = 0V$   |     |     | 400 | nA      |

## Dynamic Characteristics

| Symbol       | Characteristic               | Test Conditions  | Min | Typ  | Max | Unit |
|--------------|------------------------------|--|-----|------|-----|------|
| $C_{ies}$    | Input Capacitance            | $V_{GE} = 0V, V_{CE} = 25V$  |     | 9000 |     | pF   |
| $C_{res}$    | Reverse Transfer Capacitance | $f = 1MHz$   |     | 800  |     |      |
| $T_{d(on)}$  | Turn-on Delay Time           | Inductive Switching ( $25^\circ\text{C}$ )<br>$V_{GE} = \pm 15V$<br>$V_{Bus} = 300V$<br>$I_C = 200A$<br>$R_G = 1.5\Omega$  |     | 163  |     | ns   |
| $T_r$        | Rise Time                    |  |     | 43   |     |      |
| $T_{d(off)}$ | Turn-off Delay Time          |  |     | 253  |     |      |
| $T_f$        | Fall Time                    |  |     | 33   |     |      |
| $T_{d(on)}$  | Turn-on Delay Time           | Inductive Switching ( $125^\circ\text{C}$ )<br>$V_{GE} = \pm 15V$<br>$V_{Bus} = 300V$<br>$I_C = 200A$<br>$R_G = 1.5\Omega$ |     | 180  |     | ns   |
| $T_r$        | Rise Time                    |  |     | 49   |     |      |
| $T_{d(off)}$ | Turn-off Delay Time          |  |     | 285  |     |      |
| $T_f$        | Fall Time                    |  |     | 41   |     |      |
| $E_{off}$    | Turn off Energy              |  |     | 6.3  |     | mJ   |

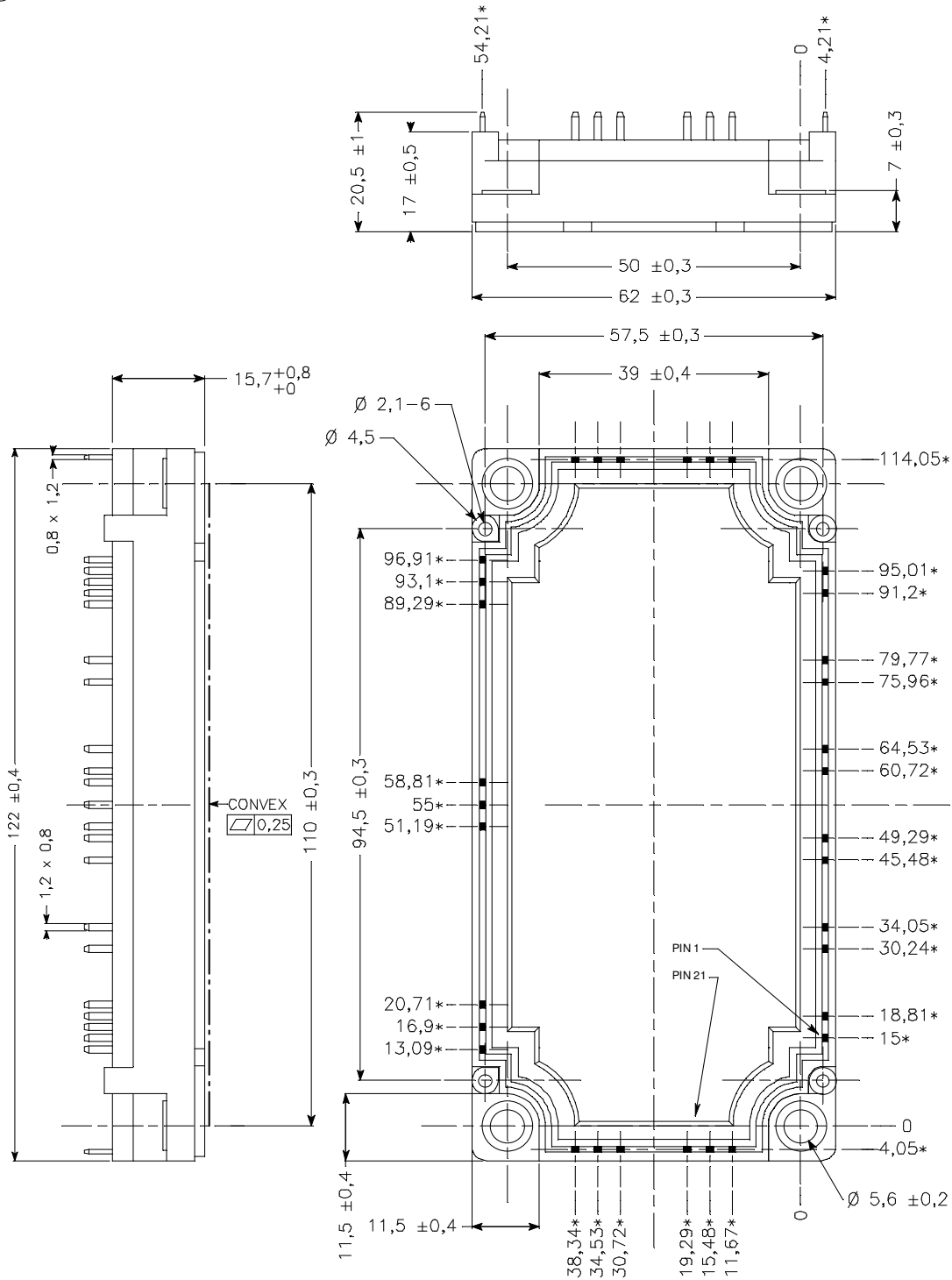
## Reverse diode ratings and characteristics

| Symbol   | Characteristic          | Test Conditions                                      | Min | Typ  | Max | Unit    |
|----------|-------------------------|--|-----|------|-----|---------|
| $V_F$    | Diode Forward Voltage   | $I_F = 200A$   |     | 1.25 | 1.6 | V       |
|          |                         | $V_{GE} = 0V$  |     | 1.2  |     |         |
| $E_r$    | Reverse Recovery Energy | $I_F = 200A$<br>$V_R = 300V$<br>$di/dt = 800A/\mu s$ |     | 4.1  |     | mJ      |
| $Q_{rr}$ | Reverse Recovery Charge | $I_F = 200A$   |     | 13   |     | $\mu C$ |
|          |                         | $V_R = 300V$<br>$di/dt = 800A/\mu s$                 |     | 20   |     |         |

## Thermal and package characteristics

| Symbol     | Characteristic   | Min         | Typ | Max  | Unit               |     |
|------------|--|-------------|-----|------|--------------------|-----|
| $R_{thJC}$ | Junction to Case   | IGBT        |     | 0.18 | $^\circ\text{C/W}$ |     |
|            |  | Diode       |     | 0.32 |                    |     |
| $V_{ISOL}$ | RMS Isolation Voltage, any terminal to case $t = 1 \text{ min}$ ,<br>$I_{isol} < 1mA, 50/60Hz$ | 2500        |     |      | V                  |     |
| $T_j$      | Operating junction temperature range   | -40         |     | 150  | $^\circ\text{C}$   |     |
| $T_{STG}$  | 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 :  $\varnothing 0,4$

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

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