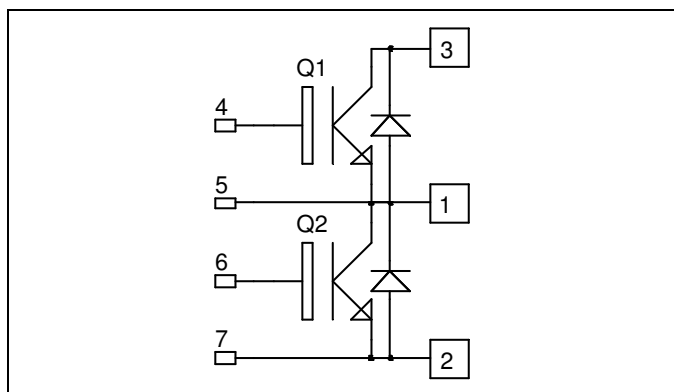


## Phase leg Trench IGBT® Power Module

**$V_{CES} = 1700V$**   
 **$I_C = 150A @ T_c = 80^\circ C$**



### Application

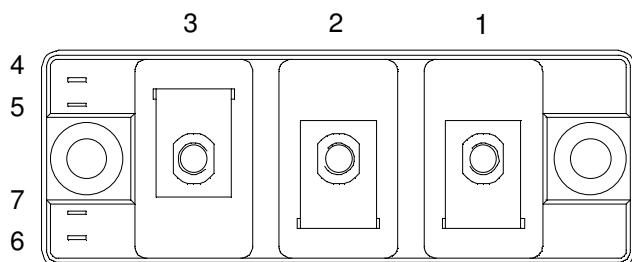
- Welding converters
- Switched Mode Power Supplies
- Uninterruptible Power Supplies
- Motor control

### 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
  - M5 power connectors

### Benefits

- Stable temperature behavior
- Very rugged
- Direct mounting to heatsink (isolated package)
- Low junction to case thermal resistance
- Easy paralleling due to positive TC of VCEsat



### Absolute maximum ratings

| Symbol    | Parameter                             | Max ratings         | Unit       |
|-----------|---------------------------------------|---------------------|------------|
| $V_{CES}$ | Collector - Emitter Breakdown Voltage | 1700                | V          |
| $I_C$     | Continuous Collector Current          | $T_C = 25^\circ C$  | A          |
|           |                                       | $T_C = 80^\circ C$  |            |
| $I_{CM}$  | Pulsed Collector Current              | $T_C = 25^\circ C$  | 300        |
| $V_{GE}$  | Gate - Emitter Voltage                | $\pm 20$            | V          |
| $P_D$     | Maximum Power Dissipation             | $T_C = 25^\circ C$  | 780        |
| RBSOA     | Reverse Bias Safe Operation Area      | $T_j = 125^\circ C$ | 300A@1600V |

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

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

## Electrical Characteristics

| Symbol       | Characteristic                        | Test Conditions                | Min  | Typ                                                   | Max        | Unit |
|--------------|---------------------------------------|--------------------------------|------|-------------------------------------------------------|------------|------|
| $BV_{CES}$   | Collector - Emitter Breakdown Voltage | $V_{GE} = 0V, I_C = 4mA$       | 1700 |                                                       |            | V    |
| $I_{CES}$    | Zero Gate Voltage Collector Current   | $V_{GE} = 0V, V_{CE} = 1700V$  |      |                                                       | 4          | mA   |
| $V_{CE(on)}$ | Collector Emitter on Voltage          | $V_{GE} = 15V$<br>$I_C = 150A$ |      | $T_j = 25^\circ\text{C}$<br>$T_j = 125^\circ\text{C}$ | 2.0<br>2.4 | V    |
| $V_{GE(th)}$ | Gate Threshold Voltage                | $V_{GE} = V_{CE}, I_C = 6mA$   | 5.2  | 5.8                                                   | 6.4        | 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            | $V_{GE} = 0V, V_{CE} = 25V$                 |     | 13   |     | nF   |
| $C_{res}$    | Reverse Transfer Capacitance | $f = 1MHz$                                  |     | 0.45 |     |      |
| $T_{d(on)}$  | Turn-on Delay Time           | Inductive Switching ( $25^\circ\text{C}$ )  |     | 280  |     | ns   |
| $T_r$        | Rise Time                    | $V_{GE} = \pm 15V$                          |     | 100  |     |      |
| $T_{d(off)}$ | Turn-off Delay Time          | $V_{Bus} = 900V$                            |     | 850  |     |      |
| $T_f$        | Fall Time                    | $I_C = 150A$<br>$R_G = 10\Omega$            |     | 120  |     |      |
| $T_{d(on)}$  | Turn-on Delay Time           | Inductive Switching ( $125^\circ\text{C}$ ) |     | 330  |     | ns   |
| $T_r$        | Rise Time                    | $V_{GE} = \pm 15V$                          |     | 100  |     |      |
| $T_{d(off)}$ | Turn-off Delay Time          | $V_{Bus} = 900V$                            |     | 1000 |     |      |
| $T_f$        | Fall Time                    | $I_C = 150A$<br>$R_G = 10\Omega$            |     | 200  |     |      |
| $E_{off}$    | Turn Off Energy              |                                             |     | 47   |     | mJ   |

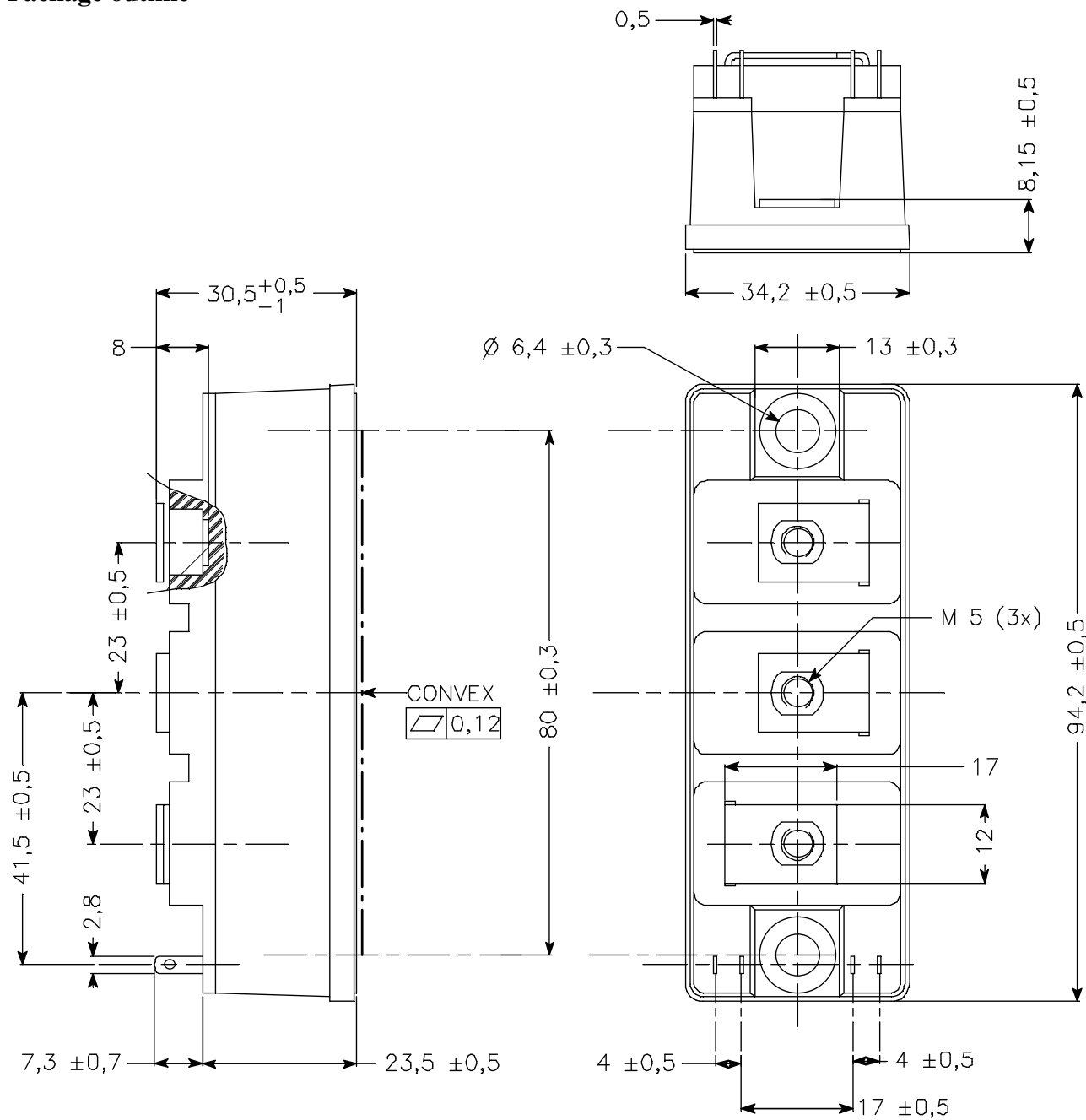
## Reverse diode ratings and characteristics

| Symbol   | Characteristic          | Test Conditions                                      | Min | Typ                                                   | Max          | Unit    |
|----------|-------------------------|------------------------------------------------------|-----|-------------------------------------------------------|--------------|---------|
| $V_F$    | Diode Forward Voltage   | $I_F = 150A$<br>$V_{GE} = 0V$                        |     | $T_j = 25^\circ\text{C}$<br>$T_j = 125^\circ\text{C}$ | 1.8<br>1.9   | V       |
| $E_r$    | Reverse Recovery Energy | $I_F = 150A$<br>$V_R = 900V$<br>$di/dt = 900A/\mu s$ |     | $T_j = 25^\circ\text{C}$<br>$T_j = 125^\circ\text{C}$ | 17.5<br>35   | mJ      |
| $Q_{rr}$ | Reverse Recovery Charge | $I_F = 150A$<br>$V_R = 900V$<br>$di/dt = 900A/\mu s$ |     | $T_j = 25^\circ\text{C}$<br>$T_j = 125^\circ\text{C}$ | 37.5<br>62.5 | $\mu C$ |

## Thermal and package characteristics

| Symbol            | Characteristic                                                            |               |       | Min  | Typ | Max  | Unit |
|-------------------|---------------------------------------------------------------------------|---------------|-------|------|-----|------|------|
| R <sub>thJC</sub> | Junction to Case                                                          |               | IGBT  |      |     | 0.16 | °C/W |
|                   |                                                                           |               | Diode |      |     | 0.25 |      |
| V <sub>ISOL</sub> | RMS Isolation Voltage, any terminal to case t =1 min, I isol<1mA, 50/60Hz |               |       | 3500 |     |      | V    |
| T <sub>J</sub>    | Operating junction temperature range                                      |               |       | -40  |     | 150  | °C   |
| T <sub>STG</sub>  | Storage Temperature Range                                                 |               |       | -40  |     | 125  |      |
| T <sub>C</sub>    | Operating Case Temperature                                                |               |       | -40  |     | 125  |      |
| Torque            | Mounting torque                                                           | For terminals | M5    | 2    |     | 3.5  | N.m  |
|                   |                                                                           | To Heatsink   | M6    | 3    |     | 5    |      |
| Wt                | Package Weight                                                            |               |       |      |     | 180  | g    |

## Package outline



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

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