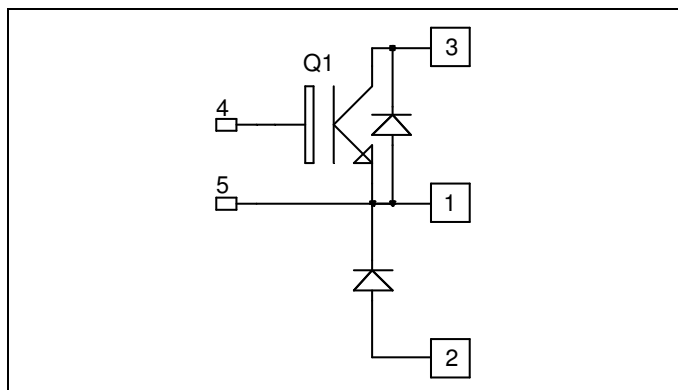


## *Buck Chopper Trench IGBT® Power Module*

**$V_{CES} = 1200V$   
 $I_C = 75A @ T_c = 80^\circ C$**

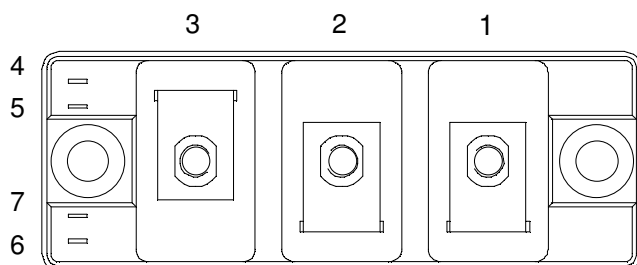


### Application

- AC and DC motor control
- Switched Mode Power Supplies

### 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
  - M5 power connectors
- High level of integration



### Benefits

- Outstanding performance at high frequency operation
- Stable temperature behavior
- Very rugged
- Direct mounting to heatsink (isolated package)
- Low junction to case thermal resistance
- Easy paralleling due to positive TC of  $V_{CEsat}$

### Absolute maximum ratings

| Symbol    | Parameter                             |                     | Max ratings | Unit |
|-----------|---------------------------------------|---------------------|-------------|------|
| $V_{CES}$ | Collector - Emitter Breakdown Voltage |                     | 1200        | V    |
| $I_C$     | Continuous Collector Current          | $T_C = 25^\circ C$  | 110         | A    |
|           |                                       | $T_C = 80^\circ C$  | 75          |      |
| $I_{CM}$  | Pulsed Collector Current              | $T_C = 25^\circ C$  | 175         |      |
| $V_{GE}$  | Gate - Emitter Voltage                |                     | $\pm 20$    | V    |
| $P_D$     | Maximum Power Dissipation             | $T_C = 25^\circ C$  | 357         | W    |
| SCSOA     | Short Circuit Safe Operating Area     | $T_j = 125^\circ C$ | 300A@900V   |      |



**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 | $V_{GE} = 0V, I_C = 3mA$      | 1200                      |     |     | V    |
| $I_{CES}$    | Zero Gate Voltage Collector Current   | $V_{GE} = 0V, V_{CE} = 1200V$ |                           |     | 4   | mA   |
| $V_{CE(on)}$ | Collector Emitter on Voltage          | $V_{GE} = 15V$<br>$I_C = 75A$ | $T_j = 25^\circ\text{C}$  | 1.7 | 2.1 | V    |
|              |                                       |                               | $T_j = 125^\circ\text{C}$ | 2.0 |     |      |
| $V_{GE(th)}$ | Gate Threshold Voltage                | $V_{GE} = V_{CE}, I_C = 3mA$  | 5.0                       | 5.8 | 6.5 | V    |
| $I_{GES}$    | Gate - Emitter Leakage Current        | $V_{GE} = 20V, V_{CE} = 0V$   |                           |     | 300 | nA   |

## Dynamic Characteristics

| Symbol       | Characteristic               | Test Conditions                                                                                                           | Min | Typ  | Max | Unit |
|--------------|------------------------------|---------------------------------------------------------------------------------------------------------------------------|-----|------|-----|------|
| $C_{ies}$    | Input Capacitance            | $V_{GE} = 0V$                                                                                                             |     | 5345 |     | nF   |
| $C_{oes}$    | Output Capacitance           | $V_{CE} = 25V$                                                                                                            |     | 280  |     |      |
| $C_{res}$    | Reverse Transfer Capacitance | $f = 1MHz$                                                                                                                |     | 242  |     |      |
| $T_{d(on)}$  | Turn-on Delay Time           | Inductive Switching ( $25^\circ\text{C}$ )<br>$V_{GE} = \pm 15V$<br>$V_{Bus} = 600V$<br>$I_C = 75A$<br>$R_G = 4.7\Omega$  |     | 280  |     | ns   |
| $T_r$        | Rise Time                    |                                                                                                                           |     | 90   |     |      |
| $T_{d(off)}$ | Turn-off Delay Time          |                                                                                                                           |     | 550  |     |      |
| $T_f$        | Fall Time                    |                                                                                                                           |     | 125  |     |      |
| $T_{d(on)}$  | Turn-on Delay Time           | Inductive Switching ( $125^\circ\text{C}$ )<br>$V_{GE} = \pm 15V$<br>$V_{Bus} = 600V$<br>$I_C = 75A$<br>$R_G = 4.7\Omega$ |     | 290  |     | ns   |
| $T_r$        | Rise Time                    |                                                                                                                           |     | 100  |     |      |
| $T_{d(off)}$ | Turn-off Delay Time          |                                                                                                                           |     | 650  |     |      |
| $T_f$        | Fall Time                    |                                                                                                                           |     | 180  |     |      |

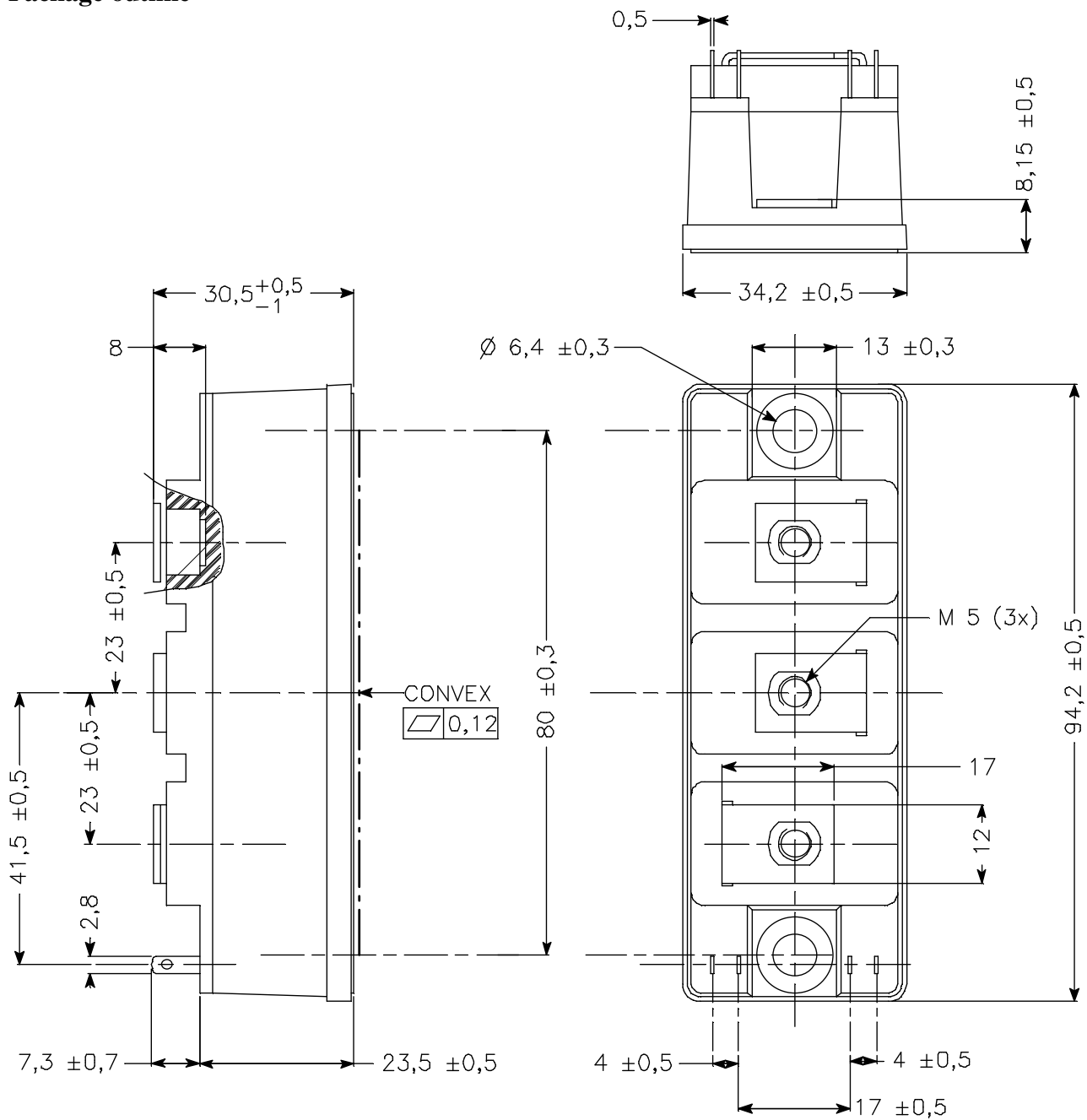
## Reverse diode ratings and characteristics

| Symbol    | Characteristic          | Test Conditions                                     | Min                       | Typ | Max | Unit    |
|-----------|-------------------------|-----------------------------------------------------|---------------------------|-----|-----|---------|
| $V_F$     | Diode Forward Voltage   | $I_F = 75A$<br>$V_{GE} = 0V$                        | $T_j = 25^\circ\text{C}$  | 1.6 | 2.1 | V       |
|           |                         |                                                     | $T_j = 125^\circ\text{C}$ | 1.6 |     |         |
| $E_{rec}$ | Reverse Recovery Energy | $I_F = 75A$<br>$V_R = 600V$<br>$di/dt = 600A/\mu s$ | $T_j = 125^\circ\text{C}$ | 6   |     | mJ      |
| $Q_{rr}$  | Reverse Recovery Charge | $I_F = 75A$<br>$V_R = 600V$<br>$di/dt = 600A/\mu s$ | $T_j = 25^\circ\text{C}$  | 7   |     | $\mu C$ |
|           |                         |                                                     | $T_j = 125^\circ\text{C}$ | 14  |     |         |

## Thermal and package characteristics

| Symbol     | Characteristic                                                                                  | Min           | Typ | Max  | Unit               |
|------------|-------------------------------------------------------------------------------------------------|---------------|-----|------|--------------------|
| $R_{thJC}$ | Junction to Case                                                                                | IGBT          |     | 0.35 | $^\circ\text{C/W}$ |
|            |                                                                                                 | Diode         |     | 0.58 |                    |
| $V_{ISOL}$ | 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                                                                                 | For terminals | M5  | 2    | N.m                |
|            |                                                                                                 | To Heatsink   | M6  | 3    |                    |
| 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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