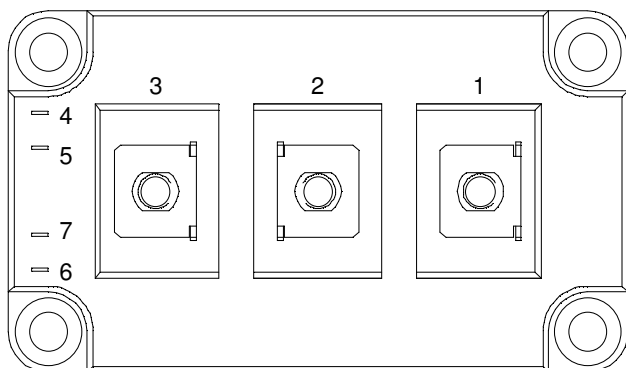
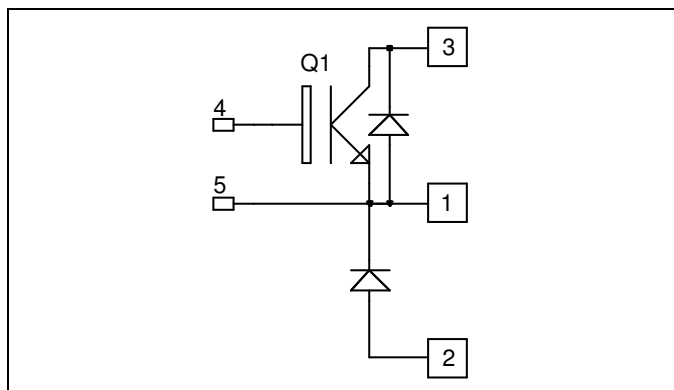


## Buck chopper Trench IGBT® Power Module

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**$V_{CES} = 1200V$**   
 **$I_C = 200A$  @  $T_c = 80^\circ C$**



### 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
  - M6 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          | $T_C = 25^\circ C$  | 300       |
|           |                                       | $T_C = 80^\circ C$  | 200       |
| $I_{CM}$  | Pulsed Collector Current              | $T_C = 25^\circ C$  | 400       |
| $V_{GE}$  | Gate - Emitter Voltage                | $\pm 20$            | V         |
| $P_D$     | Maximum Power Dissipation             | $T_C = 25^\circ C$  | 1040      |
| SCSOA     | Short Circuit Safe Operating Area     | $T_j = 125^\circ C$ | 800A@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 | $V_{GE} = 0V, I_C = 6mA$       | 1200                                                  |            |     | V    |
| $I_{CES}$    | Zero Gate Voltage Collector Current   | $V_{GE} = 0V, V_{CE} = 1200V$  |                                                       |            | 6   | mA   |
| $V_{CE(on)}$ | Collector Emitter on Voltage          | $V_{GE} = 15V$<br>$I_C = 200A$ | $T_j = 25^\circ\text{C}$<br>$T_j = 125^\circ\text{C}$ | 1.4<br>2.0 | 2.1 | V    |
| $V_{GE(th)}$ | Gate Threshold Voltage                | $V_{GE} = V_{CE}, I_C = 6mA$   | 5.0                                                   | 5.8        | 6.5 | V    |
| $I_{GES}$    | Gate - Emitter Leakage Current        | $V_{GE} = 20V, V_{CE} = 0V$    |                                                       |            | 600 | nA   |

## Dynamic Characteristics

| Symbol       | Characteristic               | Test Conditions                                                                                                            | Min | Typ  | Max | Unit |
|--------------|------------------------------|----------------------------------------------------------------------------------------------------------------------------|-----|------|-----|------|
| $C_{ies}$    | Input Capacitance            | $V_{GE} = 0V$                                                                                                              |     | 14   |     | nF   |
| $C_{oes}$    | Output Capacitance           | $V_{CE} = 25V$                                                                                                             |     | 0.8  |     |      |
| $C_{res}$    | Reverse Transfer Capacitance | $f = 1MHz$                                                                                                                 |     | 0.66 |     |      |
| $T_{d(on)}$  | Turn-on Delay Time           | Inductive Switching ( $25^\circ\text{C}$ )<br>$V_{GE} = \pm 15V$<br>$V_{Bus} = 600V$<br>$I_C = 200A$<br>$R_G = 3.6\Omega$  |     | 280  |     | ns   |
| $T_r$        | Rise Time                    |                                                                                                                            |     | 90   |     |      |
| $T_{d(off)}$ | Turn-off Delay Time          |                                                                                                                            |     | 550  |     |      |
| $T_f$        | Fall Time                    |                                                                                                                            |     | 130  |     |      |
| $T_{d(on)}$  | Turn-on Delay Time           | Inductive Switching ( $125^\circ\text{C}$ )<br>$V_{GE} = \pm 15V$<br>$V_{Bus} = 600V$<br>$I_C = 200A$<br>$R_G = 3.6\Omega$ |     | 300  |     | ns   |
| $T_r$        | Rise Time                    |                                                                                                                            |     | 100  |     |      |
| $T_{d(off)}$ | Turn-off Delay Time          |                                                                                                                            |     | 650  |     |      |
| $T_f$        | Fall Time                    |                                                                                                                            |     | 180  |     |      |

## Reverse diode ratings and characteristics

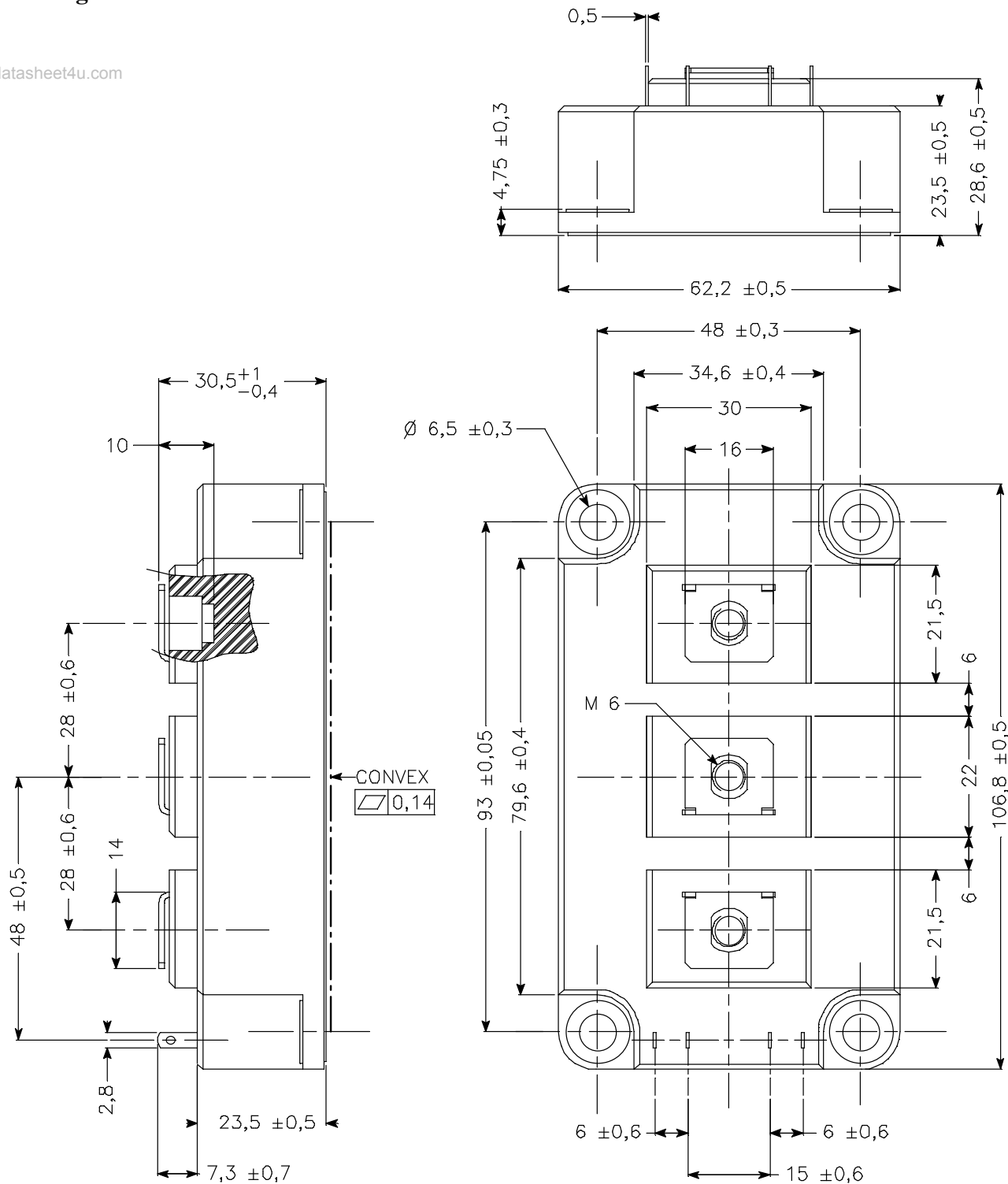
| Symbol    | Characteristic          | Test Conditions                                      | Min                                                   | Typ        | Max | Unit    |
|-----------|-------------------------|------------------------------------------------------|-------------------------------------------------------|------------|-----|---------|
| $V_F$     | Diode Forward Voltage   | $I_F = 200A$<br>$V_{GE} = 0V$                        | $T_j = 25^\circ\text{C}$<br>$T_j = 125^\circ\text{C}$ | 1.6<br>1.6 | 2.1 | V       |
| $E_{rec}$ | Reverse Recovery Energy | $I_F = 200A$<br>$V_R = 600V$<br>$di/dt = 900A/\mu s$ | $T_j = 125^\circ\text{C}$                             | 17         |     | mJ      |
| $Q_{rr}$  | Reverse Recovery Charge | $I_F = 200A$<br>$V_R = 600V$<br>$di/dt = 900A/\mu s$ | $T_j = 25^\circ\text{C}$<br>$T_j = 125^\circ\text{C}$ | 20<br>36   |     | $\mu C$ |

## Thermal and package characteristics

| Symbol            | Characteristic                                                            |               |       | Min  | Typ | Max  | Unit |
|-------------------|---------------------------------------------------------------------------|---------------|-------|------|-----|------|------|
| R <sub>thJC</sub> | Junction to Case                                                          |               | IGBT  |      |     | 0.12 | °C/W |
|                   |                                                                           |               | Diode |      |     | 0.20 |      |
| V <sub>ISOL</sub> | RMS Isolation Voltage, any terminal to case t =1 min, I isol<1mA, 50/60Hz |               |       | 2500 |     |      | 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 | M6    | 3    |     | 5    | N.m  |
|                   |                                                                           | To Heatsink   | M6    | 3    |     | 5    |      |
| Wt                | Package Weight                                                            |               |       |      |     | 380  | g    |

## Package outline

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