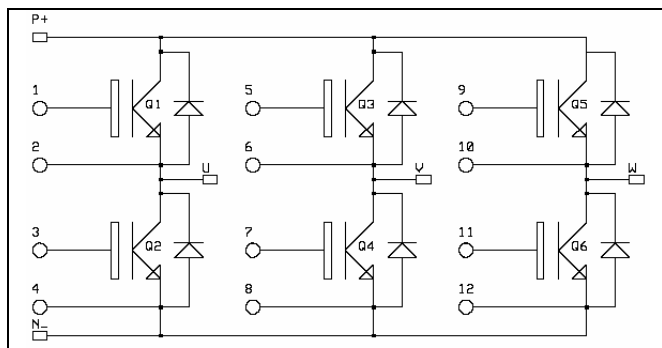


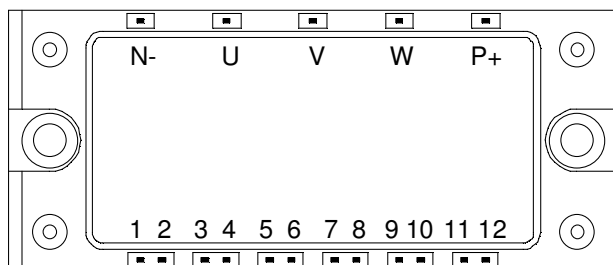
**3 Phase bridge  
NPT IGBT Power Module**

$$V_{CES} = 600V$$

$$I_C = 30A @ T_c = 80^{\circ}C$$



**Pin out: APTGF30X60E2 (Long pins)**



**Pin out: APTGF30X60P2 (Short pins)**



**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

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

**Absolute maximum ratings**

| Symbol    | Parameter                             | Max ratings          | Unit      |
|-----------|---------------------------------------|----------------------|-----------|
| $V_{CES}$ | Collector - Emitter Breakdown Voltage | 600                  | V         |
| $I_C$     | Continuous Collector Current          | $T_c = 25^{\circ}C$  | A         |
|           |                                       | $T_c = 80^{\circ}C$  |           |
| $I_{CM}$  | Pulsed Collector Current              | $T_c = 25^{\circ}C$  | 75        |
| $V_{GE}$  | Gate - Emitter Voltage                | $\pm 20$             | V         |
| $P_D$     | Maximum Power Dissipation             | $T_c = 25^{\circ}C$  | 138       |
| SCSOA     | Short Circuit Safe Operating Area     | $T_j = 125^{\circ}C$ | 135A@360V |

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

### Electrical Characteristics

| 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          | $V_{GE} = 15V$                  |     | 1.95 | 2.45 | V       |
|              |                                       | $I_C = 30A$                     |     | 2.2  |      |         |
| $V_{GE(th)}$ | Gate Threshold Voltage                | $V_{GE} = V_{CE}, I_C = 0.7 mA$ | 3   |      | 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            | $V_{GE} = 0V, V_{CE} = 25V$                                                                               |     | 1300 |     | pF   |
| $C_{res}$    | Reverse Transfer Capacitance | $f = 1MHz$                                                                                                |     | 100  |     |      |
| $T_{d(on)}$  | Turn-on Delay Time           | Inductive Switching (25°C)<br>$V_{GE} = \pm 15V$<br>$V_{Bus} = 300V$<br>$I_C = 30A$<br>$R_G = 6.8\Omega$  |     | 30   |     | ns   |
| $T_r$        | Rise Time                    |                                                                                                           |     | 6.5  |     |      |
| $T_{d(off)}$ | Turn-off Delay Time          |                                                                                                           |     | 75   |     |      |
| $T_f$        | Fall Time                    |                                                                                                           |     | 12   |     |      |
| $T_{d(on)}$  | Turn-on Delay Time           | Inductive Switching (125°C)<br>$V_{GE} = \pm 15V$<br>$V_{Bus} = 300V$<br>$I_C = 30A$<br>$R_G = 6.8\Omega$ |     | 32   |     | ns   |
| $T_r$        | Rise Time                    |                                                                                                           |     | 7    |     |      |
| $T_{d(off)}$ | Turn-off Delay Time          |                                                                                                           |     | 85   |     |      |
| $T_f$        | Fall Time                    |                                                                                                           |     | 18   |     |      |
| $E_{off}$    | Turn off Energy              |                                                                                                           |     | 0.8  |     | mJ   |

### Reverse diode ratings and characteristics

| Symbol   | Characteristic          | Test Conditions                                     | Min | Typ  | Max | Unit    |
|----------|-------------------------|-----------------------------------------------------|-----|------|-----|---------|
| $V_F$    | Diode Forward Voltage   | $I_F = 30A$                                         |     | 1.25 | 1.6 | V       |
|          |                         | $V_{GE} = 0V$                                       |     | 1.2  |     |         |
| $E_R$    | Reverse Recovery Energy | $I_F = 30A$<br>$V_R = 300V$<br>$di/dt = 800A/\mu s$ |     | 0.9  |     | mJ      |
| $Q_{rr}$ | Reverse Recovery Charge | $I_F = 30A$                                         |     | 2.1  |     | $\mu C$ |
|          |                         | $V_R = 300V$<br>$di/dt = 800A/\mu s$                |     | 3.3  |     |         |

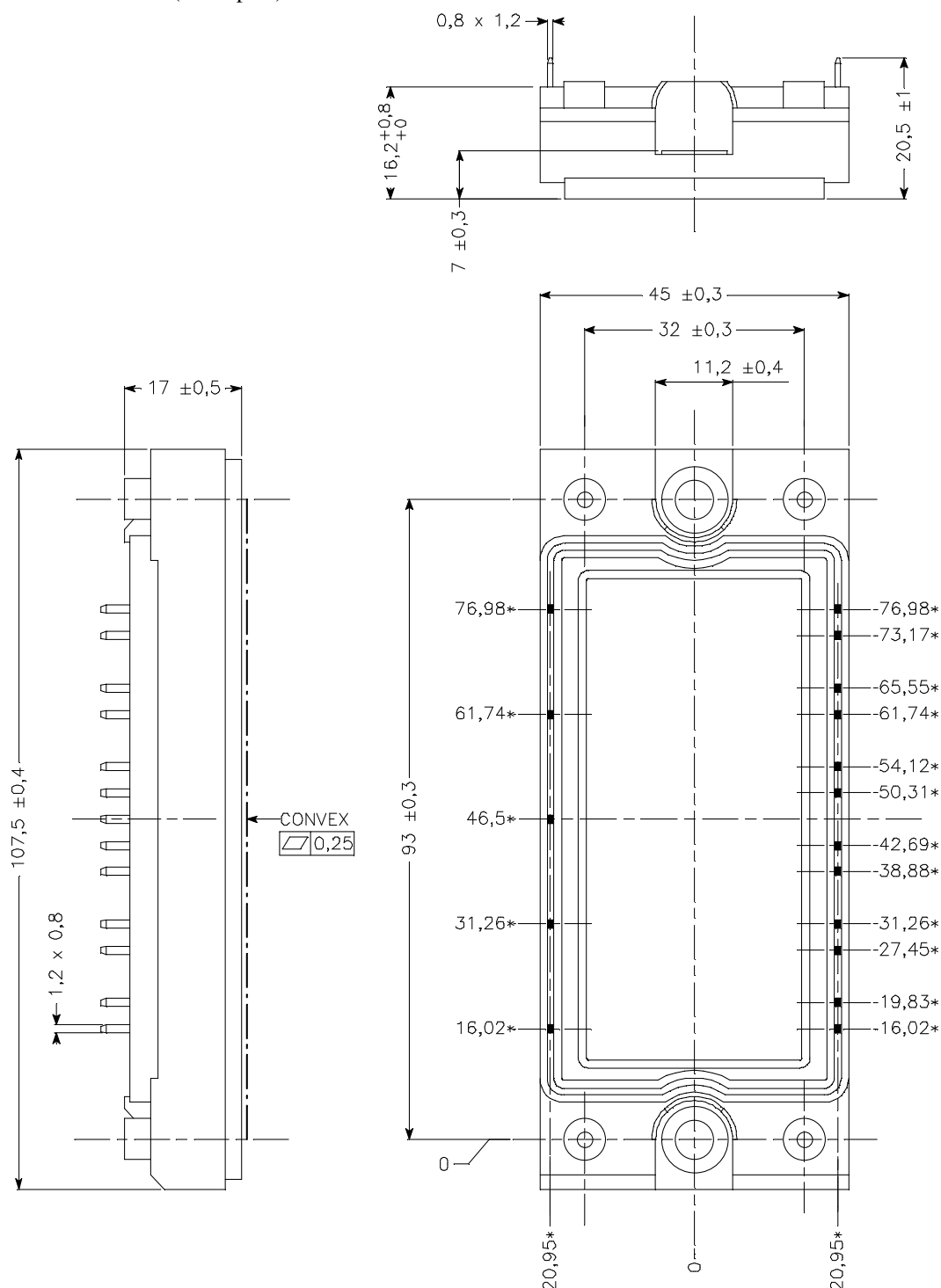
### Thermal and package characteristics

| Symbol            | Characteristic                                                            |             |       | Min  | Typ | Max | Unit |
|-------------------|---------------------------------------------------------------------------|-------------|-------|------|-----|-----|------|
| R <sub>thJC</sub> | Junction to Case                                                          |             | IGBT  |      |     | 0.9 | °C/W |
|                   |                                                                           |             | Diode |      |     | 1.4 |      |
| 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                                                           | To Heatsink | M5    | 2    |     | 3.5 | N.m  |
| Wt                | Package Weight                                                            |             |       |      |     | 185 | g    |



**Package outline**

**Pin out: APTGF30X60P2 (Short pins)**



ALL DIMENSIONS MARKED "\*" ARE TOLERENCED AS :  $\pm 0,4$

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

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