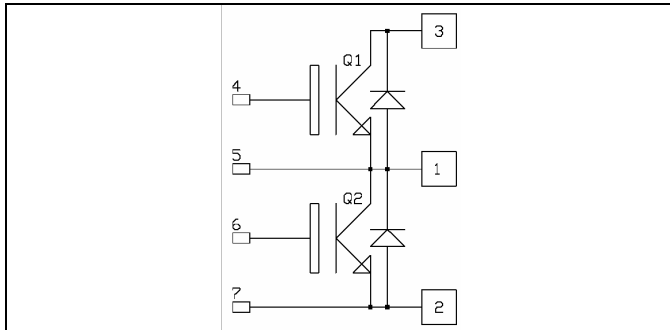


## Phase Leg NPT IGBT Power Module

**$V_{CES} = 600V$   
 $I_C = 330A @ T_c = 80^\circ C$**

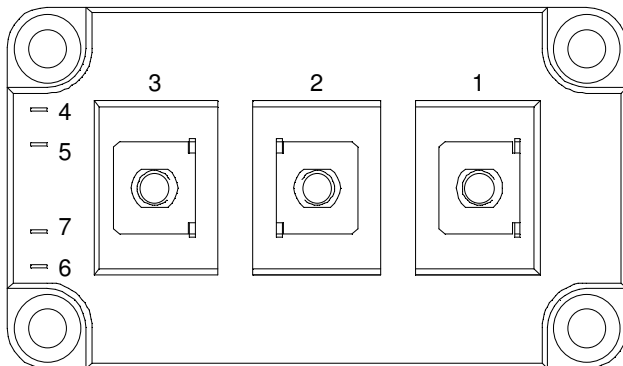


### Application

- Welding converters
- Switched Mode Power Supplies
- Uninterruptible Power Supplies
- 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
- 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 VCEsat

### Absolute maximum ratings

Symbol	Parameter	Max ratings	Unit
$V_{CES}$	Collector - Emitter Breakdown Voltage	600	V
$I_C$	Continuous Collector Current	$T_C = 25^\circ C$	460
		$T_C = 80^\circ C$	330
$I_{CM}$	Pulsed Collector Current	$T_C = 25^\circ C$	800
$V_{GE}$	Gate - Emitter Voltage	$\pm 20$	V
$P_D$	Maximum Power Dissipation	$T_C = 25^\circ C$	1400
RBSOA	Reverse Bias Safe Operation Area	$T_j = 125^\circ C$	800A@420V

 **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	$V_{GE} = 0V, I_C = 10\text{ mA}$	600			V
$I_{CES}$	Zero Gate Voltage Collector Current	$V_{GE} = 0V$		2	750	$\mu\text{A}$
		$V_{CE} = 600V$		1.5		$\text{mA}$
$V_{CE(on)}$	Collector Emitter on Voltage	$V_{GE} = 15V$		2.0	2.5	V
		$I_C = 400A$		2.2		
$V_{GE(th)}$	Gate Threshold Voltage	$V_{GE} = V_{CE}, I_C = 8\text{ mA}$	4.5		6.5	V
$I_{GES}$	Gate - Emitter Leakage Current	$V_{GE} = 20V, V_{CE} = 0V$			600	$\text{nA}$

## Dynamic Characteristics

Symbol	Characteristic	Test Conditions	Min	Typ	Max	Unit
$C_{ies}$	Input Capacitance	$V_{GE} = 0V, V_{CE} = 25V$		18		$\text{nF}$
$C_{res}$	Reverse Transfer Capacitance	$f = 1\text{ MHz}$		1.6		
$T_{d(on)}$	Turn-on Delay Time	Inductive Switching ( $25^\circ\text{C}$ ) $V_{GE} = \pm 15V$ $V_{Bus} = 300V$ $I_C = 400A$ $R_G = 0.82\Omega$		165		$\text{ns}$
$T_r$	Rise Time			40		
$T_{d(off)}$	Turn-off Delay Time			250		
$T_f$	Fall Time			35		
$T_{d(on)}$	Turn-on Delay Time	Inductive Switching ( $125^\circ\text{C}$ ) $V_{GE} = \pm 15V$ $V_{Bus} = 300V$ $I_C = 400A$ $R_G = 0.82\Omega$		180		$\text{ns}$
$T_r$	Rise Time			50		
$T_{d(off)}$	Turn-off Delay Time			285		
$T_f$	Fall Time			40		
$E_{off}$	Turn off energy			13		$\text{mJ}$

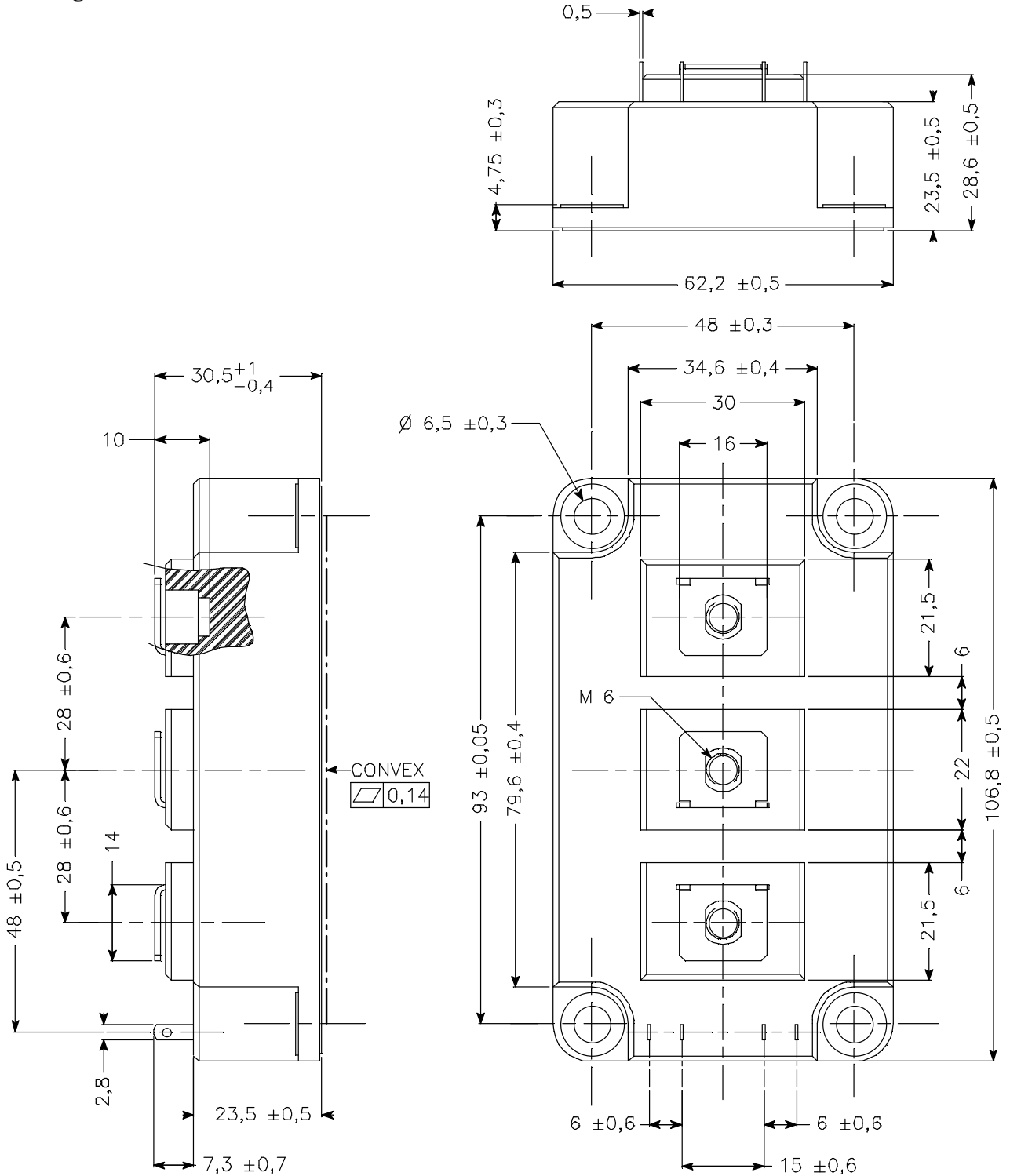
## Reverse diode ratings and characteristics

Symbol	Characteristic	Test Conditions	Min	Typ	Max	Unit	
$V_F$	Diode Forward Voltage	$I_F = 400A$	$T_j = 25^\circ\text{C}$		1.25	1.6	V
		$V_{GE} = 0V$	$T_j = 125^\circ\text{C}$		1.2		
$E_r$	Reverse Recovery Energy	$I_F = 400A$ $V_R = 300V$ $di/dt = 900A/\mu\text{s}$	$T_j = 125^\circ\text{C}$		8.2	$\text{mJ}$	
$Q_{rr}$	Reverse Recovery Charge	$I_F = 400A$ $V_R = 300V$ $di/dt = 900A/\mu\text{s}$	$T_j = 25^\circ\text{C}$		24	$\mu\text{C}$	
			$T_j = 125^\circ\text{C}$		40		

## Thermal and package characteristics

Symbol	Characteristic	Min	Typ	Max	Unit	
$R_{thJC}$	Junction to Case	IGBT			0.089	$^\circ\text{C/W}$
		Diode			0.15	
$V_{ISOL}$	RMS Isolation Voltage, any terminal to case $t = 1\text{ min}$ , $I_{isol} < 1\text{ mA}$ , 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	M6	3	5	$\text{N.m}$
		To Heatsink	M6	3	5	
Wt	Package Weight			380	g	

**Package outline**



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

APT's products are covered by one or more of U.S patents 4,895,810 5,045,903 5,089,434 5,182,234 5,019,522 5,262,336 6,503,786 5,256,583 4,748,103 5,283,202 5,231,474 5,434,095 5,528,058 and foreign patents. U.S and Foreign patents pending. All Rights Reserved.