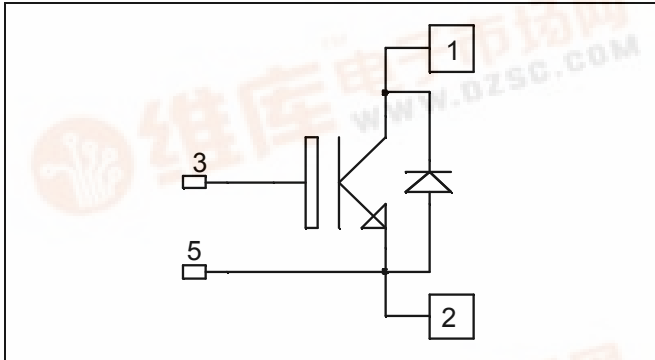


# APTGF500U60D4

## Single switch NPT IGBT Power Module

$V_{CES} = 600V$   
 $I_C = 500A @ T_c = 80^\circ C$

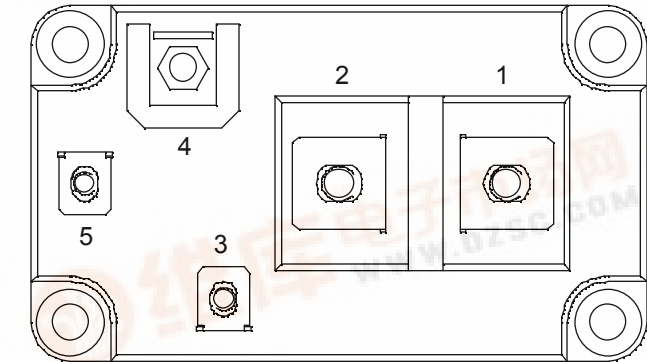


### Application

- 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 connectors for power
  - M4 connectors for signal
- 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	$T_C = 25^\circ C$	625
		$T_C = 80^\circ C$	500
$I_{CM}$	Pulsed Collector Current	$T_C = 25^\circ C$	900
$V_{GE}$	Gate - Emitter Voltage	$\pm 20$	V
$P_D$	Maximum Power Dissipation	$T_C = 25^\circ C$	2000
RBSOA	Reverse Bias Safe Operation Area	$T_j = 125^\circ C$	900A@520V

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

## Electrical Characteristics

Symbol	Characteristic	Test Conditions		Min	Typ	Max	Unit
$I_{CES}$	Zero Gate Voltage Collector Current	$V_{GE} = 0\text{V}$ $V_{CE} = 600\text{V}$	$T_j = 25^\circ\text{C}$		1	500	$\mu\text{A}$
			$T_j = 125^\circ\text{C}$		1		$\text{mA}$
$V_{CE(on)}$	Collector Emitter on Voltage	$V_{GE} = 15\text{V}$ $I_C = 500\text{A}$	$T_j = 25^\circ\text{C}$		1.95	2.45	V
			$T_j = 125^\circ\text{C}$		2.2		
$V_{GE(th)}$	Gate Threshold Voltage	$V_{GE} = V_{CE}, I_C = 6\text{mA}$		4.5	5.5	6.5	V
$I_{GES}$	Gate – Emitter Leakage Current	$V_{GE} = 20\text{V}, V_{CE} = 0\text{V}$				400	$\text{nA}$

## Dynamic Characteristics

Symbol	Characteristic	Test Conditions		Min	Typ	Max	Unit		
$C_{ies}$	Input Capacitance	$V_{GE} = 0\text{V}, V_{CE} = 25\text{V}$ $f = 1\text{MHz}$			26		$\text{nF}$		
$C_{res}$	Reverse Transfer Capacitance				2.4				
$T_{d(on)}$	Turn-on Delay Time	Inductive Switching ( $25^\circ\text{C}$ ) $V_{GE} = \pm 15\text{V}$ $V_{Bus} = 300\text{V}$ $I_C = 600\text{A}$ $R_G = 4.7\Omega$			174		ns		
$T_r$	Rise Time				80				
$T_{d(off)}$	Turn-off Delay Time				400				
$T_f$	Fall Time				70				
$T_{d(on)}$	Turn-on Delay Time				200				
$T_r$	Rise Time	Inductive Switching ( $125^\circ\text{C}$ ) $V_{GE} = \pm 15\text{V}$ $V_{Bus} = 300\text{V}$ $I_C = 600\text{A}$ $R_G = 4.7\Omega$			85		ns		
			$T_{d(off)}$	Turn-off Delay Time				420	
			$T_f$	Fall Time				80	
			$E_{on}$	Turn on Energy				11	
			$E_{off}$	Turn off Energy				22	

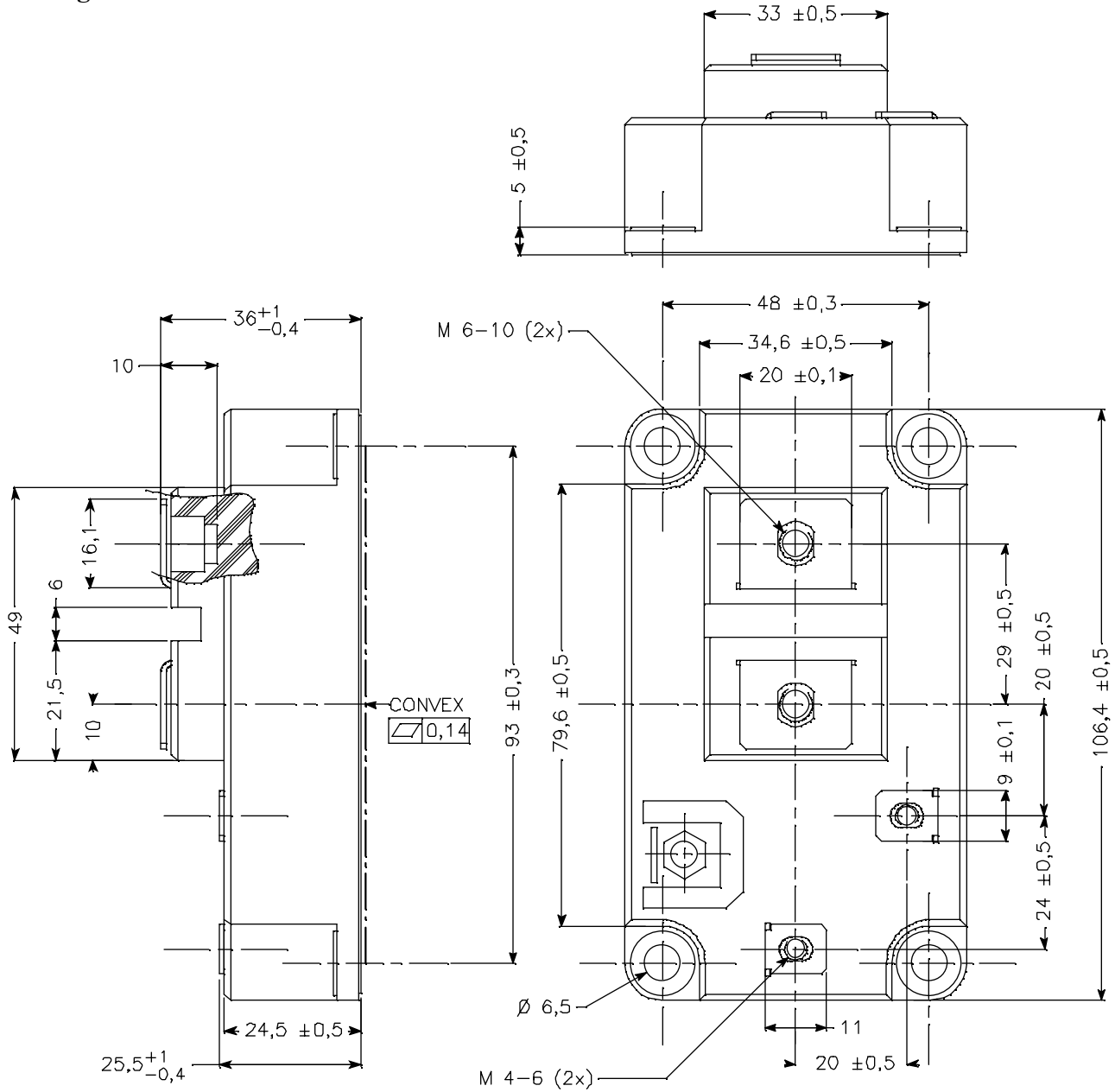
## Reverse diode ratings and characteristics

Symbol	Characteristic	Test Conditions		Min	Typ	Max	Unit
$V_F$	Diode Forward Voltage	$I_F = 600\text{A}$ $V_{GE} = 0\text{V}$	$T_j = 25^\circ\text{C}$		1.25	1.6	V
			$T_j = 125^\circ\text{C}$		1.2		
$Q_{rr}$	Reverse Recovery Charge	$I_F = 600\text{A}$ $V_R = 300\text{V}$ $di/dt = 5600\text{A}/\mu\text{s}$	$T_j = 25^\circ\text{C}$		40		$\mu\text{C}$
			$T_j = 125^\circ\text{C}$		66		

## Thermal and package characteristics

Symbol	Characteristic			Min	Typ	Max	Unit
$R_{thJC}$	Junction to Case	IGBT				0.06	$^\circ\text{C}/\text{W}$
		Diode				0.12	
$V_{ISOL}$	RMS Isolation Voltage, any terminal to case $t = 1\text{ min}, I_{isol} < 1\text{mA}, 50/60\text{Hz}$			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	M6		3		5	N.m
		M4		1		2	
Wt	Package Weight					420	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.