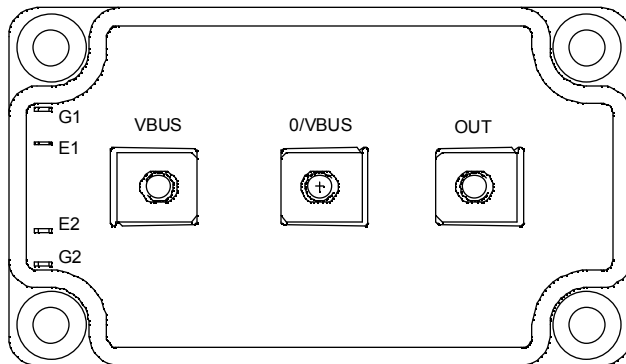
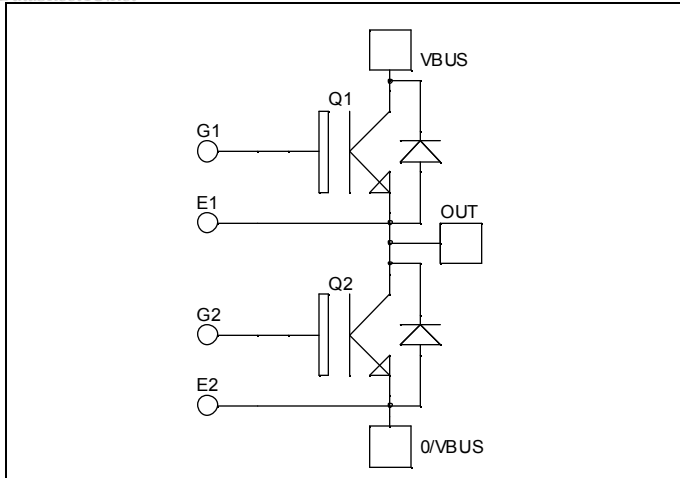


*Phase leg  
Fast Trench + Field Stop IGBT®  
Power Module*

**$V_{CES} = 1200V$   
 $I_C = 400A @ T_c = 80°C$**

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**Application**

- Welding converters
- Switched Mode Power Supplies
- Uninterruptible Power Supplies
- Motor control

**Features**

- Fast 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
- Very low stray inductance
  - Symmetrical design
  - M5 power connectors
- High level of integration

**Benefits**

- 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
- Low profile

**Absolute maximum ratings**

Symbol	Parameter	Max ratings	Unit
$V_{CES}$	Collector - Emitter Breakdown Voltage	1200	V
$I_C$	Continuous Collector Current	$T_c = 25°C$	560 *
		$T_c = 80°C$	400
$I_{CM}$	Pulsed Collector Current	$T_c = 25°C$	800
$V_{GE}$	Gate - Emitter Voltage	±20	V
$P_D$	Maximum Power Dissipation	$T_c = 25°C$	1785
RBSOA	Reverse Bias Safe Operating Area	$T_j = 125°C$	800A @ 1100V

\* Specification of IGBT device but output current must be limited to 500A to not exceed a delta of temperature greater than 100°C for the connectors.

**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
$I_{CES}$	Zero Gate Voltage Collector Current	$V_{GE} = 0\text{V}, V_{CE} = 1200\text{V}$			1.2	mA
$V_{CE(sat)}$	Collector Emitter Saturation Voltage	$V_{GE} = 15\text{V}$ $I_C = 400\text{A}$	$T_j = 25^\circ\text{C}$ $T_j = 125^\circ\text{C}$	1.4 2.0	1.7 2.1	V
$V_{GE(th)}$	Gate Threshold Voltage	$V_{GE} = V_{CE}, I_C = 4\text{mA}$	5.0	5.8	6.5	V
$I_{GES}$	Gate – Emitter Leakage Current	$V_{GE} = 20\text{V}, V_{CE} = 0\text{V}$			800	nA

## Dynamic Characteristics

Symbol	Characteristic	Test Conditions	Min	Typ	Max	Unit
$C_{ies}$	Input Capacitance	$V_{GE} = 0\text{V}$		28		nF
$C_{oes}$	Output Capacitance	$V_{CE} = 25\text{V}$		1.6		
$C_{res}$	Reverse Transfer Capacitance	$f = 1\text{MHz}$		1.2		
$T_{d(on)}$	Turn-on Delay Time	Inductive Switching ( $25^\circ\text{C}$ ) $V_{GE} = \pm 15\text{V}$ $V_{Bus} = 600\text{V}$ $I_C = 400\text{A}$ $R_G = 1.2\Omega$		260		ns
$T_r$	Rise Time			30		
$T_{d(off)}$	Turn-off Delay Time			420		
$T_f$	Fall Time			80		
$T_{d(on)}$	Turn-on Delay Time	Inductive Switching ( $125^\circ\text{C}$ ) $V_{GE} = \pm 15\text{V}$ $V_{Bus} = 600\text{V}$ $I_C = 300\text{A}$ $R_G = 1.2\Omega$		290		ns
$T_r$	Rise Time			50		
$T_{d(off)}$	Turn-off Delay Time			520		
$T_f$	Fall Time			100		
$E_{on}$	Turn on Energy				40	
$E_{off}$	Turn off Energy			40		

## Reverse diode ratings and characteristics

Symbol	Characteristic	Test Conditions	Min	Typ	Max	Unit
$V_{RRM}$	Maximum Peak Repetitive Reverse Voltage		1200			V
$I_{RM}$	Maximum Reverse Leakage Current	$V_R = 1200\text{V}$	$T_j = 25^\circ\text{C}$ $T_j = 125^\circ\text{C}$		750 1000	$\mu\text{A}$
$I_{F(AV)}$	Maximum Average Forward Current	50% duty cycle	$T_c = 80^\circ\text{C}$	400		A
$V_F$	Diode Forward Voltage	$I_F = 400\text{A}$ $V_{GE} = 0\text{V}$	$T_j = 25^\circ\text{C}$ $T_j = 125^\circ\text{C}$	1.6 1.6	2.1	V
$t_{rr}$	Reverse Recovery Time	$I_F = 400\text{A}$ $V_R = 600\text{V}$ $di/dt = 3500\text{A}/\mu\text{s}$	$T_j = 25^\circ\text{C}$ $T_j = 125^\circ\text{C}$	170 280		ns
$Q_{rr}$	Reverse Recovery Charge		$T_j = 25^\circ\text{C}$ $T_j = 125^\circ\text{C}$	36 72		$\mu\text{C}$

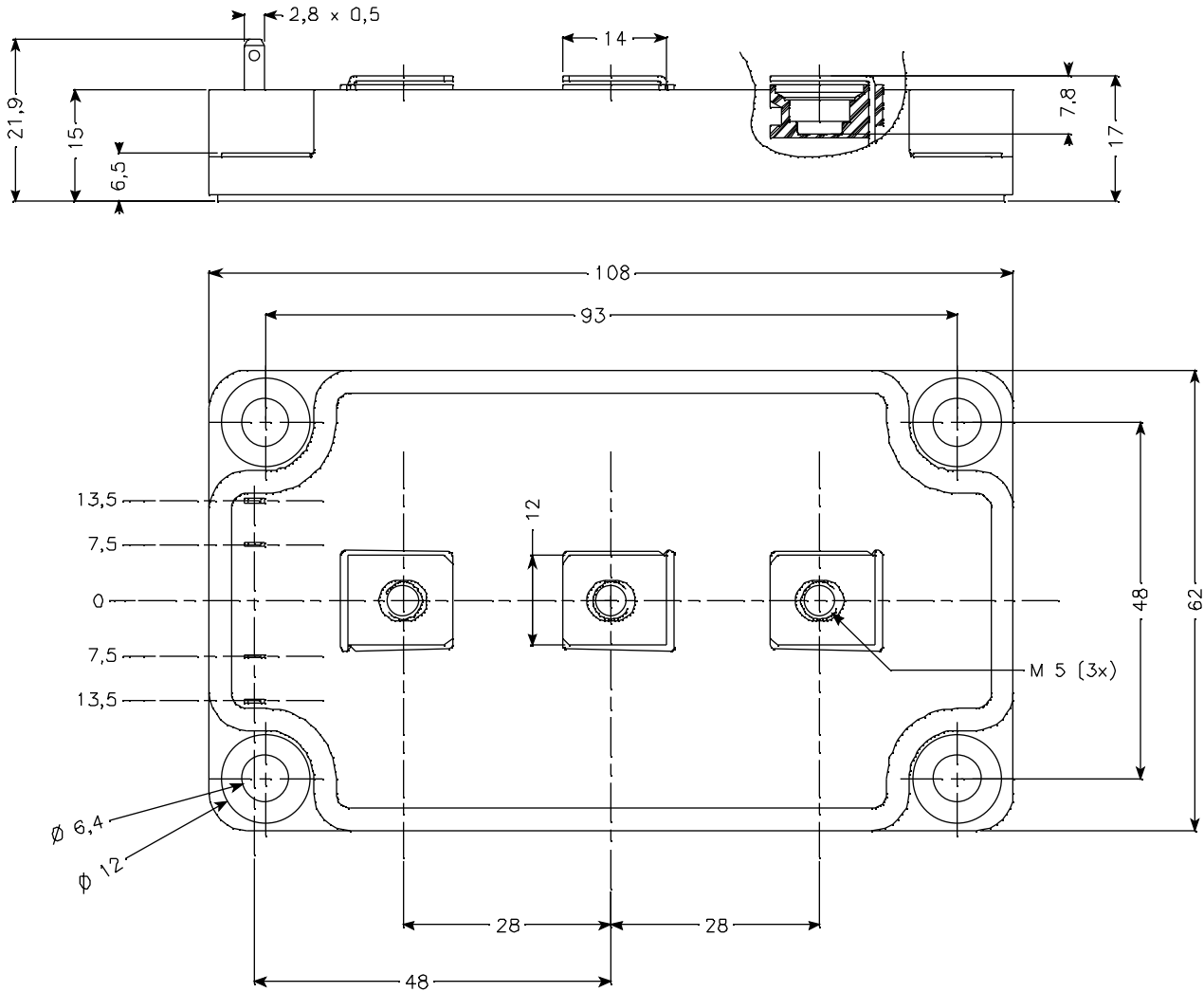
**Thermal and package characteristics**

*Symbol Characteristic*

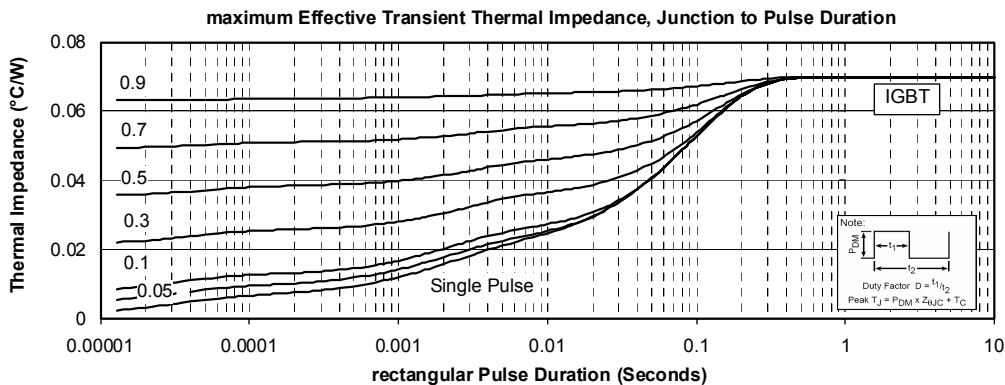
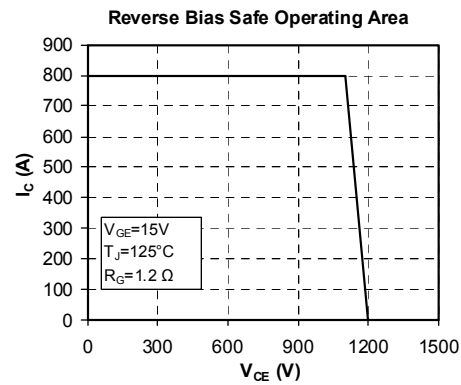
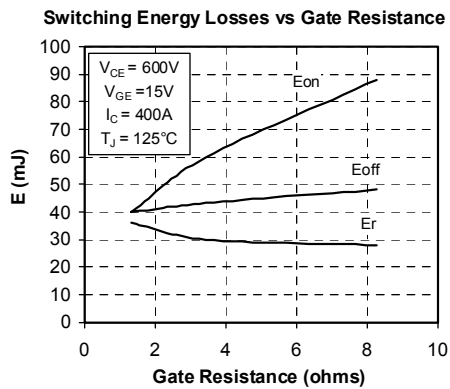
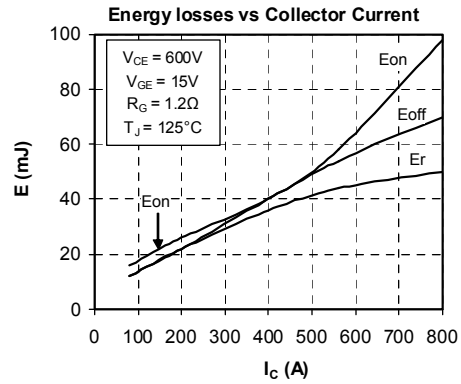
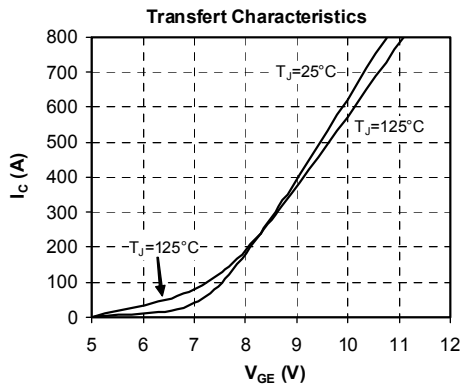
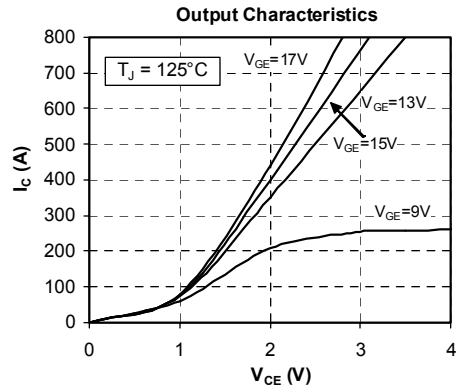
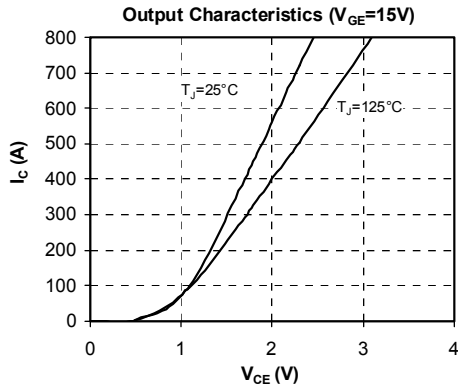
*Min Typ Max Unit*

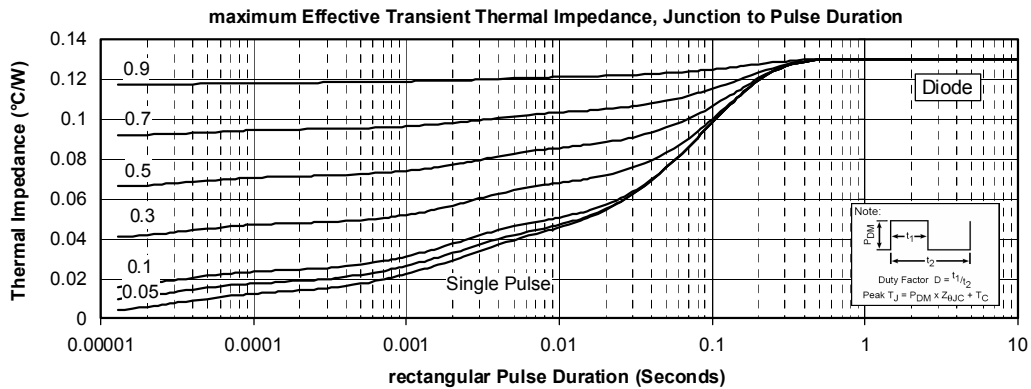
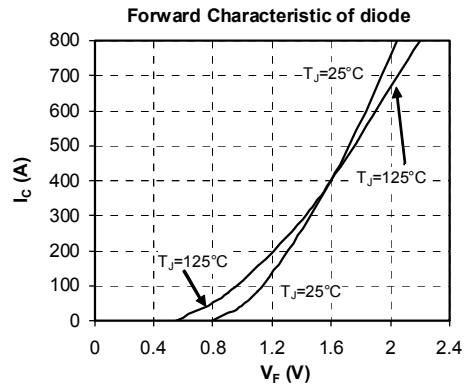
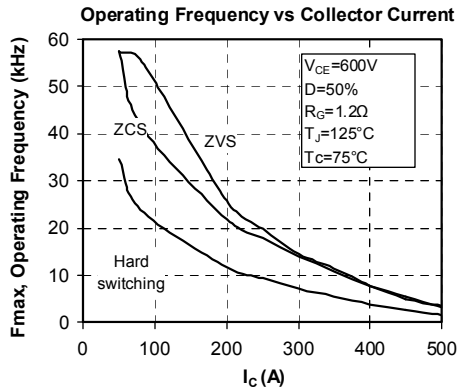
<i>Symbol</i>	<i>Characteristic</i>	<i>Min</i>	<i>Typ</i>	<i>Max</i>	<i>Unit</i>	
R <sub>thJC</sub>	Junction to Case	IGBT		0.07	°C/W	
		Diode		0.13		
V <sub>ISOL</sub>	RMS Isolation Voltage, any terminal to case t = 1 min, I <sub>isol</sub> < 1mA, 50/60Hz	2500			V	
T <sub>J</sub>	Operating junction temperature range	-40		150	°C	
T <sub>STG</sub>	Storage Temperature Range	-40		125		
T <sub>C</sub>	Operating Case Temperature	-40		100		
Torque	Mounting torque	To heatsink	M6	3	5	N.m
		For terminals	M5	2	3.5	
Wt	Package Weight			280	g	

**Package outline (dimensions in mm)**



## Typical Performance Curve





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.