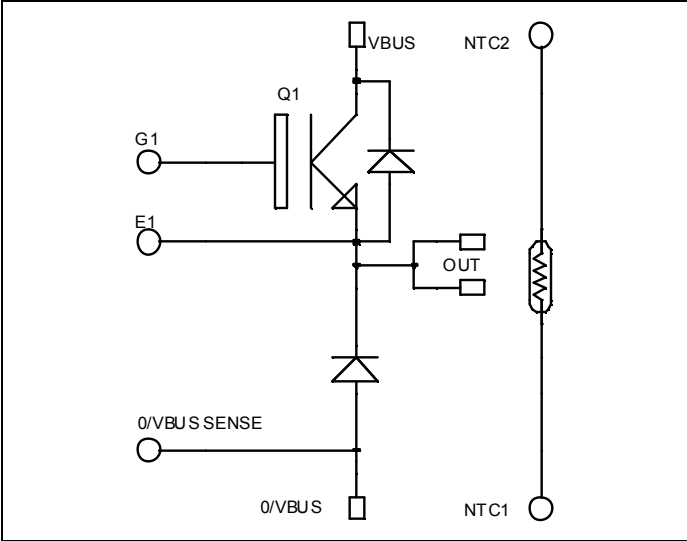


***Buck chopper  
NPT IGBT Power Module***

**$V_{CES} = 1200V$   
 $I_C = 150A @ T_c = 80^\circ C$**



**Application**

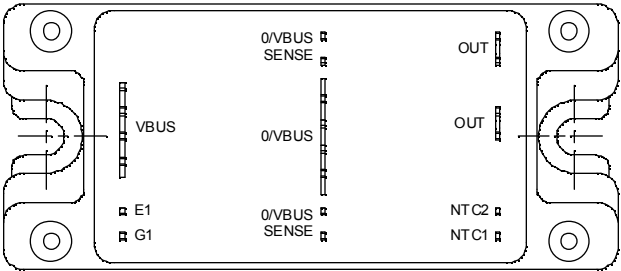
- AC and DC motor control
- Switched Mode Power Supplies

**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
  - Symmetrical design
  - Lead frames for power connections
- Internal thermistor for temperature monitoring
- 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
- Solderable terminals both for power and signal for easy PCB mounting
- 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	$T_c = 25^\circ C$	200
		$T_c = 80^\circ C$	150
$I_{CM}$	Pulsed Collector Current	$T_c = 25^\circ C$	300
$V_{GE}$	Gate - Emitter Voltage	$\pm 20$	V
$P_D$	Maximum Power Dissipation	$T_c = 25^\circ C$	961
RBSOA	Reverse Bias Safe Operating Area	$T_j = 150^\circ C$	300A @ 1200V

**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	$V_{GE} = 0\text{V}$ $V_{CE} = 1200\text{V}$	$T_j = 25^\circ\text{C}$	0.1	3	mA
			$T_j = 125^\circ\text{C}$	5		
$V_{CE(on)}$	Collector Emitter on Voltage	$V_{GE} = 15\text{V}$ $I_C = 150\text{A}$	$T_j = 25^\circ\text{C}$	3.2	3.7	V
			$T_j = 125^\circ\text{C}$	3.9		
$V_{GE(th)}$	Gate Threshold Voltage	$V_{GE} = V_{CE}, I_C = 5\text{ mA}$	4.5		6.5	V
$I_{GES}$	Gate – Emitter Leakage Current	$V_{GE} = \pm 20\text{V}, V_{CE} = 0\text{V}$			$\pm 500$	nA

### Dynamic Characteristics

Symbol	Characteristic	Test Conditions	Min	Typ	Max	Unit
$C_{ies}$	Input Capacitance	$V_{GE} = 0\text{V}$ $V_{CE} = 25\text{V}$ $f = 1\text{MHz}$		10.2		nF
$C_{oes}$	Output Capacitance			1.4		
$C_{res}$	Reverse Transfer Capacitance			0.75		
$T_{d(on)}$	Turn-on Delay Time	Inductive Switching ( $25^\circ\text{C}$ ) $V_{GE} = 15\text{V}$ $V_{Bus} = 600\text{V}$ $I_C = 150\text{A}$ $R_G = 5.6\Omega$		120		ns
$T_r$	Rise Time			50		
$T_{d(off)}$	Turn-off Delay Time			310		
$T_f$	Fall Time			20		
$T_{d(on)}$	Turn-on Delay Time	Inductive Switching ( $125^\circ\text{C}$ ) $V_{GE} = 15\text{V}$ $V_{Bus} = 600\text{V}$ $I_C = 150\text{A}$ $R_G = 5.6\Omega$		130		ns
$T_r$	Rise Time			60		
$T_{d(off)}$	Turn-off Delay Time			360		
$T_f$	Fall Time			30		
$E_{on}$	Turn-on Switching Energy			18		mJ
$E_{off}$	Turn-off Switching Energy			8		

### 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	$V_R = 1200\text{V}$	$T_j = 25^\circ\text{C}$		500	$\mu\text{A}$
			$T_j = 125^\circ\text{C}$		1000	
$I_{F(AV)}$	Maximum Average Forward Current	50% duty cycle $T_c = 70^\circ\text{C}$		200		A
$V_F$	Diode Forward Voltage	$I_F = 200\text{A}$		2	2.5	V
		$I_F = 400\text{A}$		2.3		
		$I_F = 200\text{A}$	$T_j = 125^\circ\text{C}$	1.8		
$t_{rr}$	Reverse Recovery Time	$I_F = 200\text{A}$ $V_R = 800\text{V}$ $di/dt = 400\text{A}/\mu\text{s}$	$T_j = 25^\circ\text{C}$	420		ns
			$T_j = 125^\circ\text{C}$	520		
$Q_{rr}$	Reverse Recovery Charge	$I_F = 200\text{A}$ $V_R = 800\text{V}$ $di/dt = 400\text{A}/\mu\text{s}$	$T_j = 25^\circ\text{C}$	2.5		$\mu\text{C}$
			$T_j = 125^\circ\text{C}$	10.7		

**Temperature sensor NTC**

*Symbol Characteristic*

		<i>Min</i>	<i>Typ</i>	<i>Max</i>	<i>Unit</i>
R <sub>25</sub>	Resistance @ 25°C		68		kΩ
B <sub>25/85</sub>	T <sub>25</sub> = 298.16 K		4080		K

$$R_T = \frac{R_{25}}{\exp\left[B_{25/85}\left(\frac{1}{T_{25}} - \frac{1}{T}\right)\right]}$$

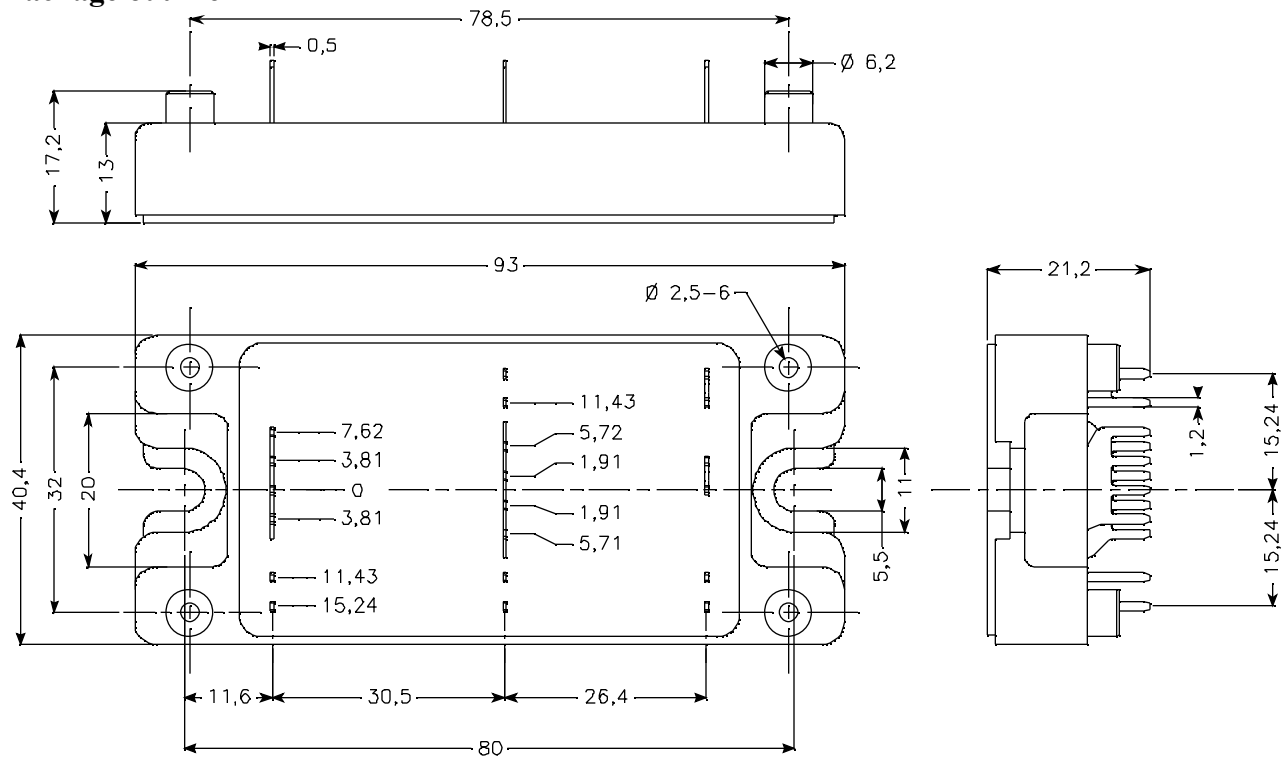
T: Thermistor temperature  
R<sub>T</sub>: Thermistor value at T

**Thermal and package characteristics**

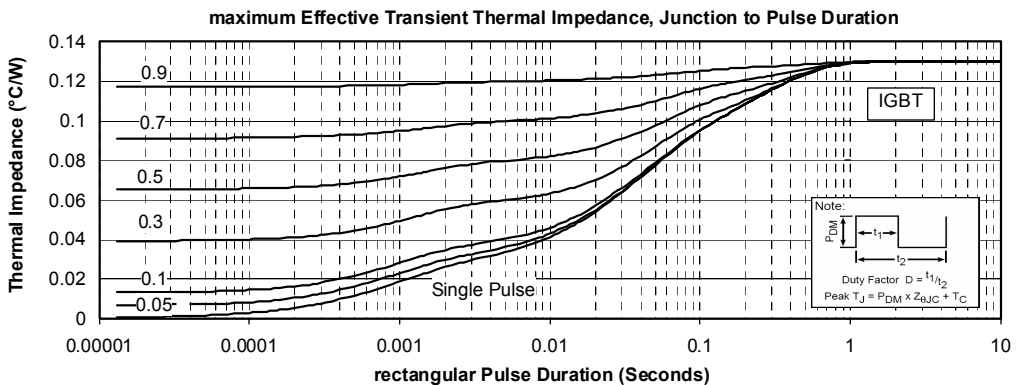
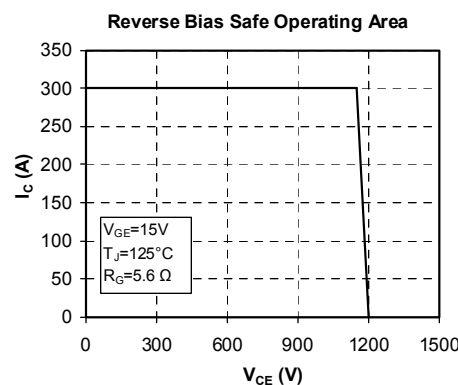
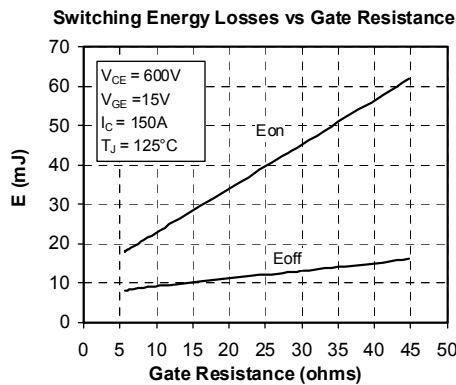
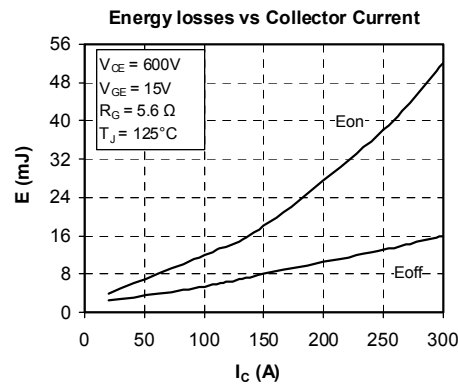
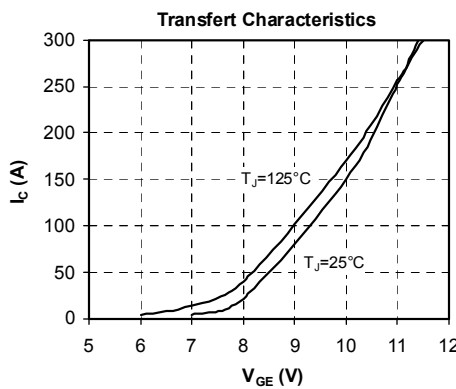
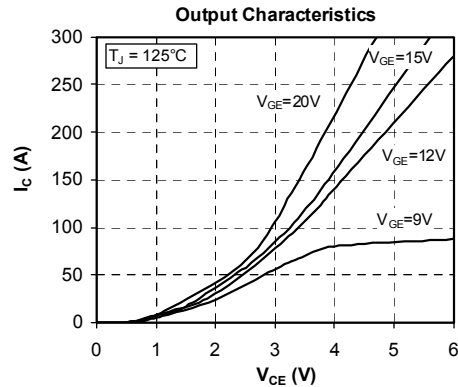
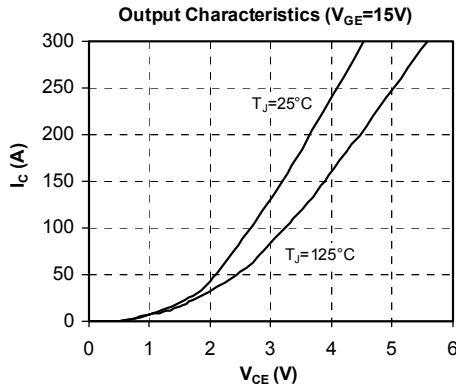
*Symbol Characteristic*

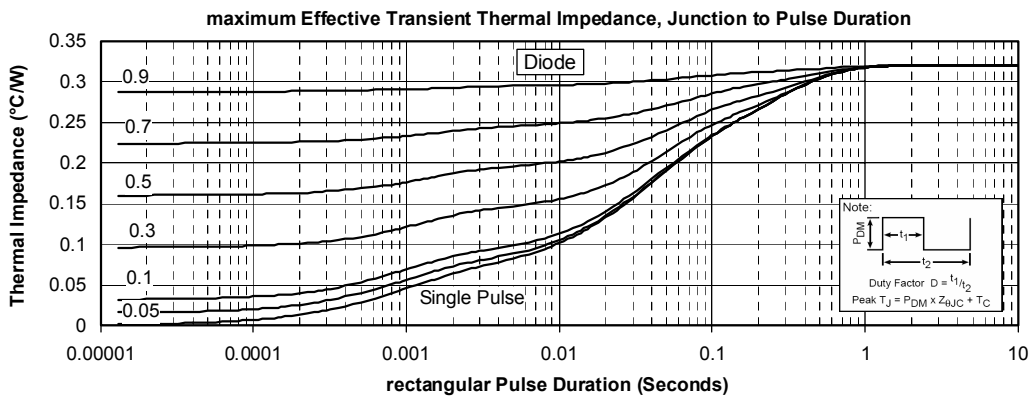
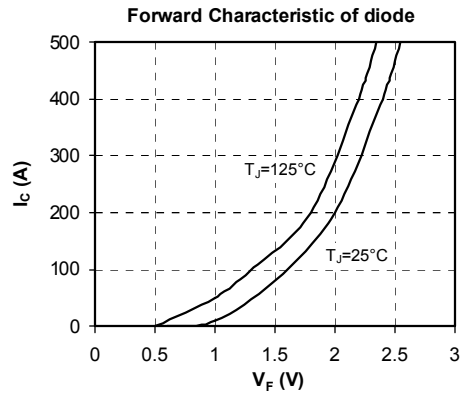
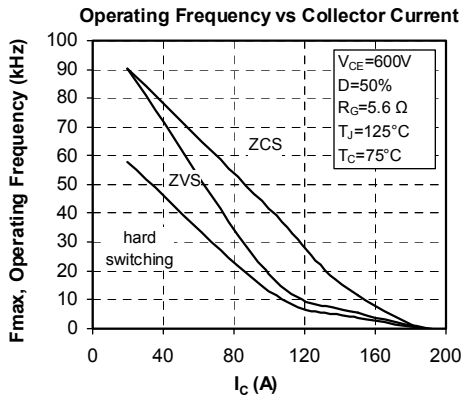
		<i>Min</i>	<i>Typ</i>	<i>Max</i>	<i>Unit</i>	
R <sub>thJC</sub>	Junction to Case	IGBT		0.13	°C/W	
		Diode		0.32		
V <sub>ISOL</sub>	RMS Isolation Voltage, any terminal to case t=1 min, I <sub>isol</sub> <1mA, 50/60Hz	2500			V	
T <sub>J</sub>	Operating junction temperature range	-40		150	°C	
T <sub>STG</sub>	Storage Temperature Range	-40		125		
T <sub>C</sub>	Operating Case Temperature	-40		100		
Torque	Mounting torque		To heatsink	M5	4.7	N.m
Wt	Package Weight				160	g

**Package outline**



**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.