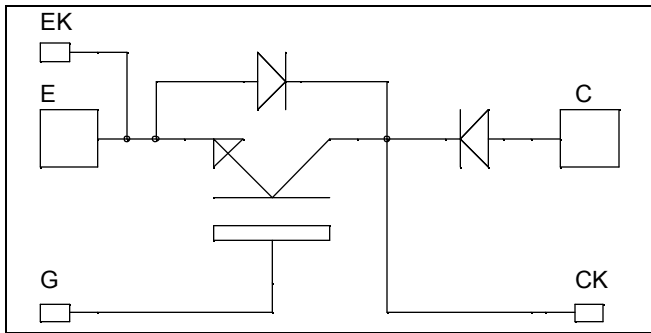


**Single Switch
with Series diodes
PT IGBT Power Module**

**$V_{CES} = 1200V$
 $I_C = 180A @ T_c = 80^\circ C$**

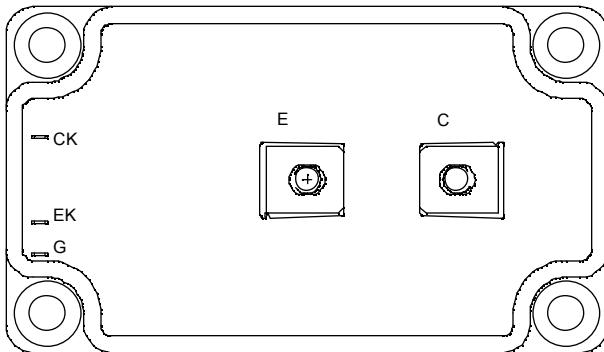


Application

- Zero Current Switching resonant mode

Features

- Power MOS 7[®] Punch Through (PT) IGBT
 - Low conduction loss
 - Ultra fast tail current shutoff
 - Low gate charge
 - Switching frequency capability in the 50kHz range
 - Soft recovery diodes
 - Low diode VF
- Kelvin emitter for easy drive
- Very low stray inductance
 - Symmetrical design
 - M5 power connectors
- High level of integration



Benefits

- Outstanding performance at high frequency operation
- Direct mounting to heatsink (isolated package)
- Low junction to case thermal resistance
- Low profile

Absolute maximum ratings

Symbol	Parameter	Max ratings	Unit
V_{CES}	Collector - Emitter Breakdown Voltage	1200	V
I_C	Continuous Collector Current	$T_c = 25^\circ C$	250
		$T_c = 80^\circ C$	180
I_{CM}	Pulsed Collector Current	$T_c = 25^\circ C$	630
V_{GE}	Gate - Emitter Voltage	± 20	V
P_D	Maximum Power Dissipation	$T_c = 25^\circ C$	1041
RBSOA	Reverse Bias Safe Operating Area	$T_j = 150^\circ C$	630A @ 960V

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
BV_{CES}	Collector - Emitter Breakdown Voltage	$V_{GE} = 0V, I_C = 750\mu A$	1200			V
I_{CES}	Zero Gate Voltage Collector Current	$V_{GE} = 0V$ $V_{CE} = 1200V$			750	μA
			$T_j = 25^\circ\text{C}$		7500	
$V_{CE(on)}$	Collector Emitter on Voltage	$V_{GE} = 15V$ $I_C = 180A$		3.3	3.9	V
			$T_j = 125^\circ\text{C}$	3.0		
$V_{GE(th)}$	Gate Threshold Voltage	$V_{GE} = V_{CE}, I_C = 6mA$	3		6	V
I_{GES}	Gate - Emitter Leakage Current	$V_{GE} = \pm 20V, V_{CE} = 0V$			± 250	nA

Dynamic Characteristics

Symbol	Characteristic	Test Conditions	Min	Typ	Max	Unit	
C_{ies}	Input Capacitance	$V_{GE} = 0V$		19.4		nF	
C_{oes}	Output Capacitance	$V_{CE} = 25V$		1.48			
C_{res}	Reverse Transfer Capacitance	$f = 1MHz$		0.18			
Q_g	Total gate Charge	$V_{GE} = 15V$		900		nC	
Q_{ge}	Gate - Emitter Charge	$V_{Bus} = 600V$		126			
Q_{gc}	Gate - Collector Charge	$I_C = 180A$		372			
$T_{d(on)}$	Turn-on Delay Time	Inductive Switching (25°C) $V_{GE} = 15V$ $V_{Bus} = 600V$ $I_C = 180A$ $R_G = 0.8\Omega$		16		ns	
T_r	Rise Time			20			
$T_{d(off)}$	Turn-off Delay Time			94			
T_f	Fall Time			40			
E_{on1}	Turn-on Switching Energy				4.5		mJ
E_{on2}	Turn-on Switching Energy ①				7.8		
E_{off}	Turn-off Switching Energy ②				4.08		
$T_{d(on)}$	Turn-on Delay Time		Inductive Switching (125°C) $V_{GE} = 15V$ $V_{Bus} = 600V$ $I_C = 180A$ $R_G = 0.8\Omega$		16		ns
T_r	Rise Time			20			
$T_{d(off)}$	Turn-off Delay Time			147			
T_f	Fall Time			75			
E_{on1}	Turn-on Switching Energy				4.5		mJ
E_{on2}	Turn-on Switching Energy ①				12.8		
E_{off}	Turn-off Switching Energy ②				10.5		

① E_{on2} includes diode reverse recovery

② In accordance with JEDEC standard JESD24-1

Series diode ratings and characteristics

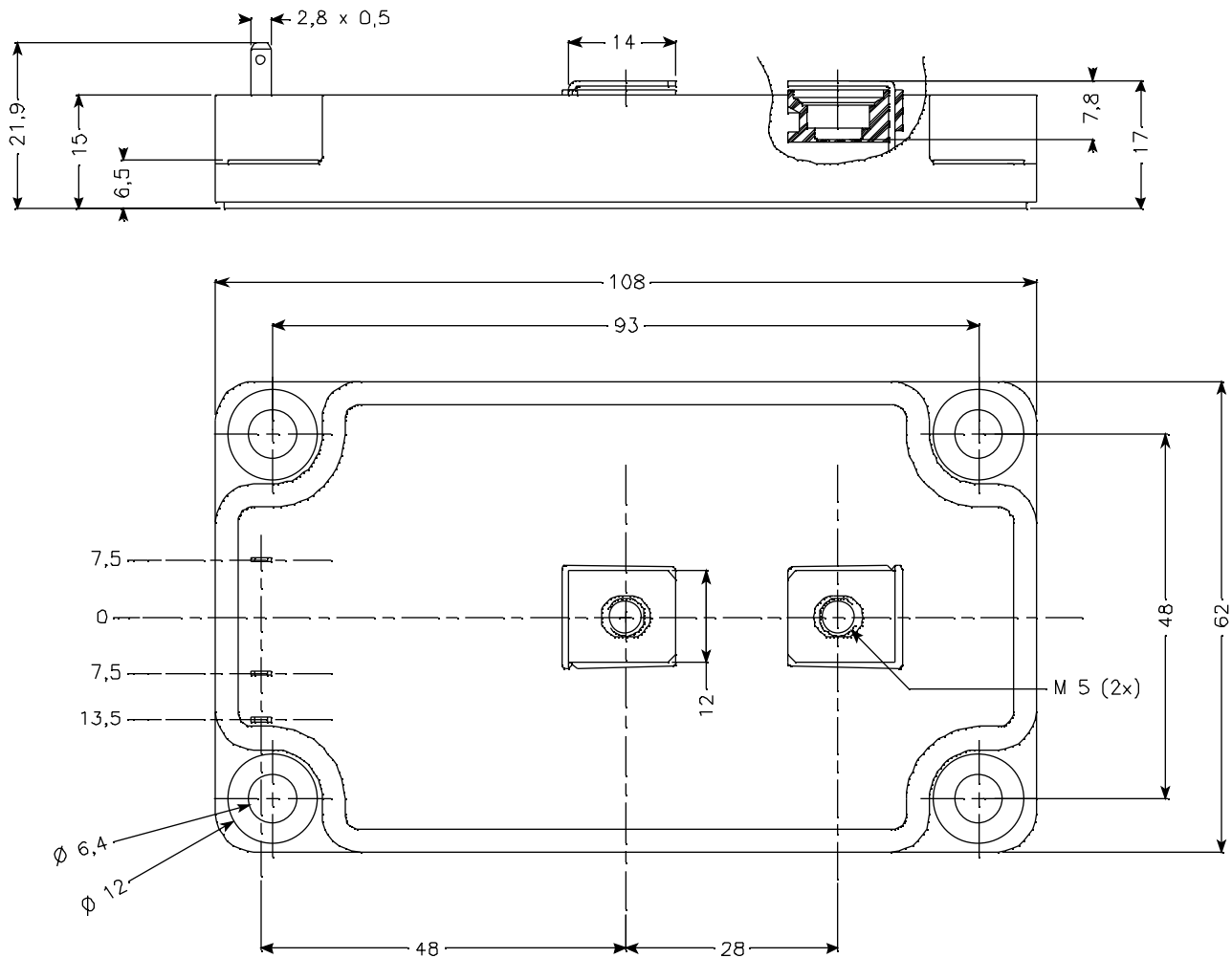
Symbol	Characteristic	Test Conditions	Min	Typ	Max	Unit
V_{RRM}	Maximum Repetitive Reverse Voltage		1200			
$I_{F(AV)}$	Maximum Average Forward Current	50% duty cycle $T_c = 70^\circ\text{C}$		200		A
V_F	Diode Forward Voltage	$I_F = 200A$		2	2.5	V
		$I_F = 400A$		2.3		
		$I_F = 200A$ $T_j = 125^\circ\text{C}$		1.8		
t_{rr}	Reverse Recovery Time	$I_F = 200A$ $V_R = 800V$ $di/dt = 400A/\mu s$	$T_j = 25^\circ\text{C}$	420		ns
			$T_j = 125^\circ\text{C}$	580		
Q_{rr}	Reverse Recovery Charge	$I_F = 200A$ $V_R = 800V$ $di/dt = 400A/\mu s$	$T_j = 25^\circ\text{C}$	2.5		μC
			$T_j = 125^\circ\text{C}$	10.7		

Thermal and package characteristics

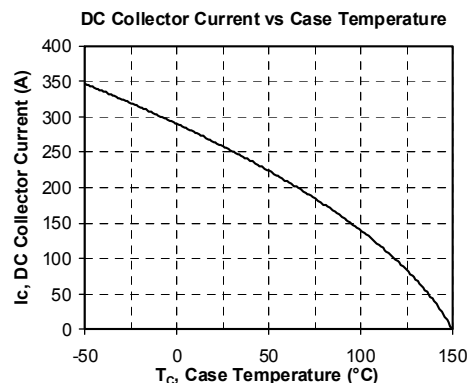
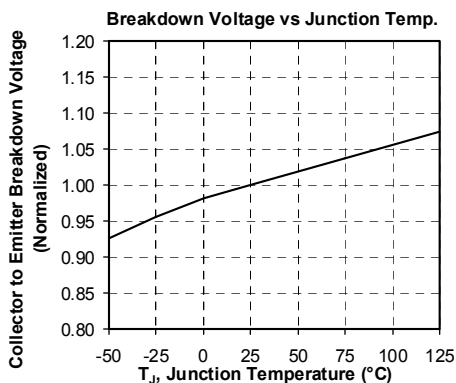
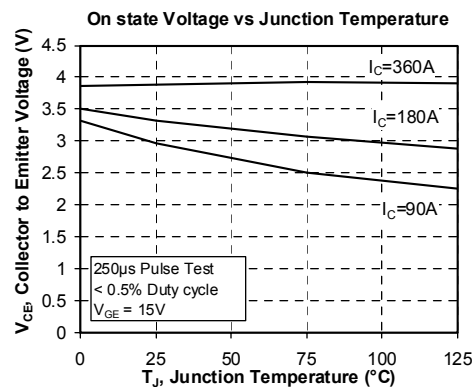
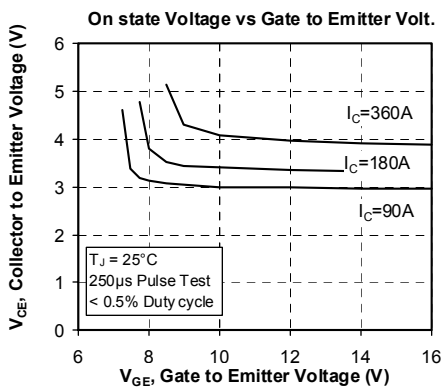
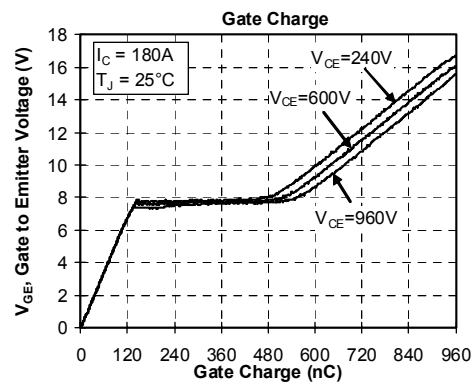
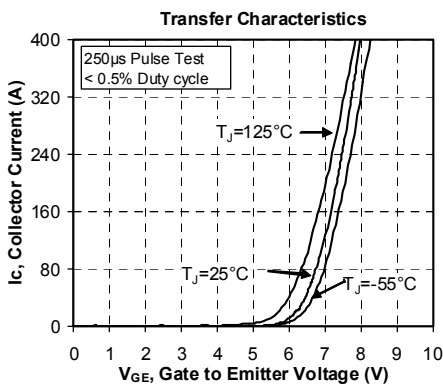
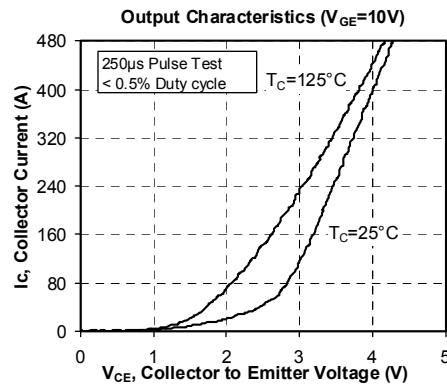
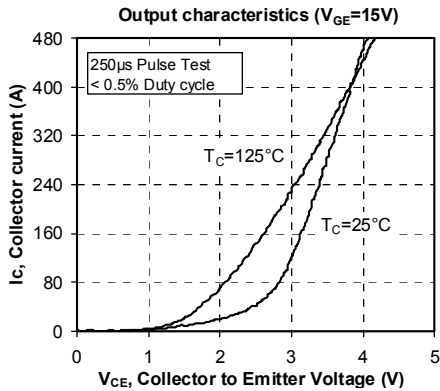
Symbol Characteristic

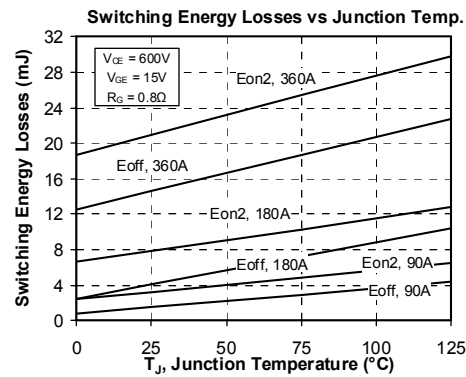
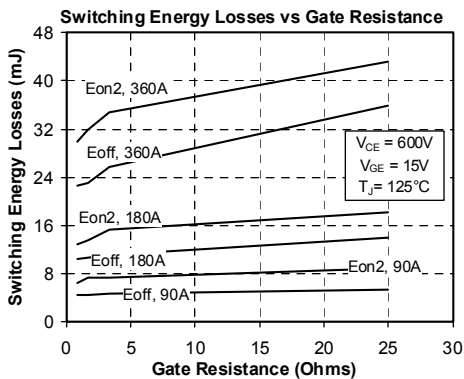
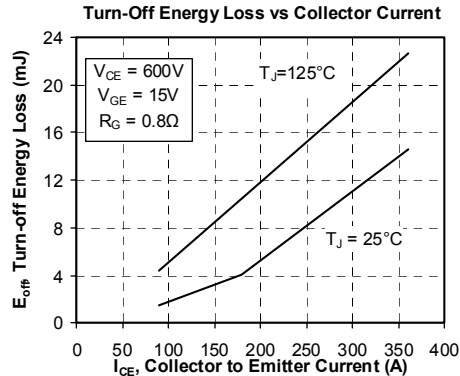
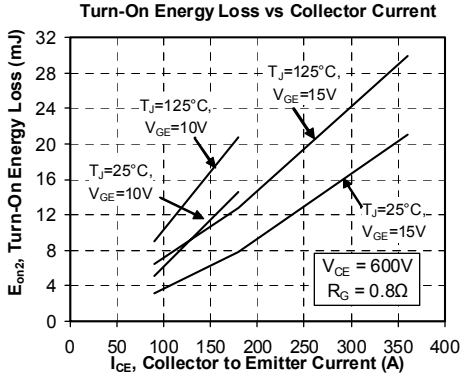
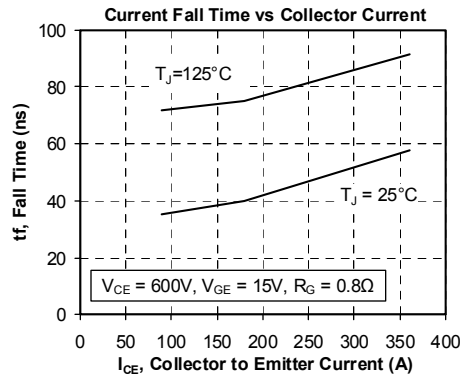
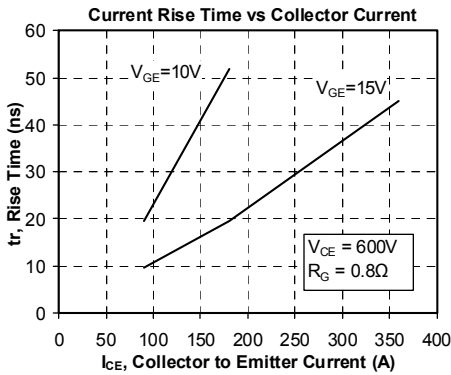
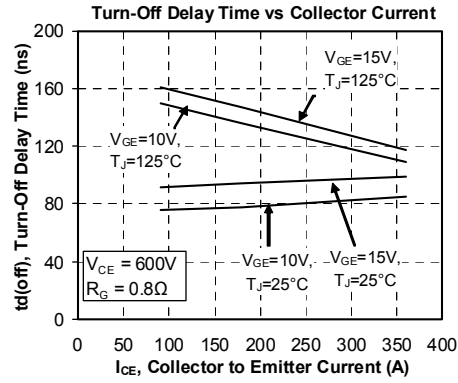
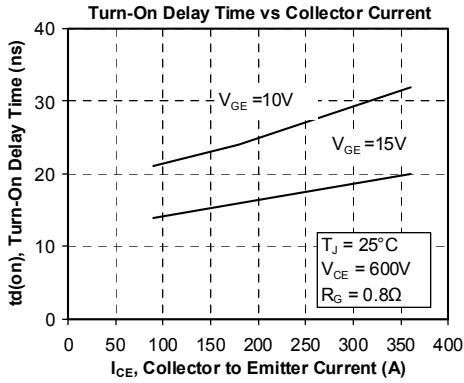
		<i>Min</i>	<i>Typ</i>	<i>Max</i>	<i>Unit</i>	
R _{thJC}	Junction to Case	IGBT		0.12	°C/W	
		Diode		0.32		
V _{ISOL}	RMS Isolation Voltage, any terminal to case t=1 min, I _{isol} <1mA, 50/60Hz	2500			V	
T _J	Operating junction temperature range	-40		150	°C	
T _{STG}	Storage Temperature Range	-40		125		
T _C	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	

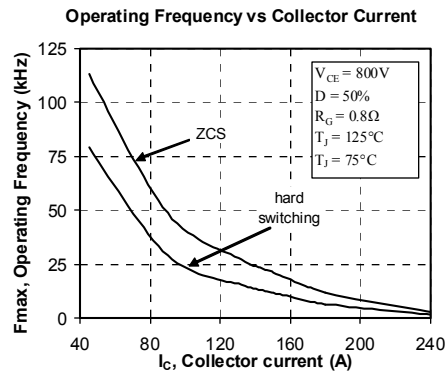
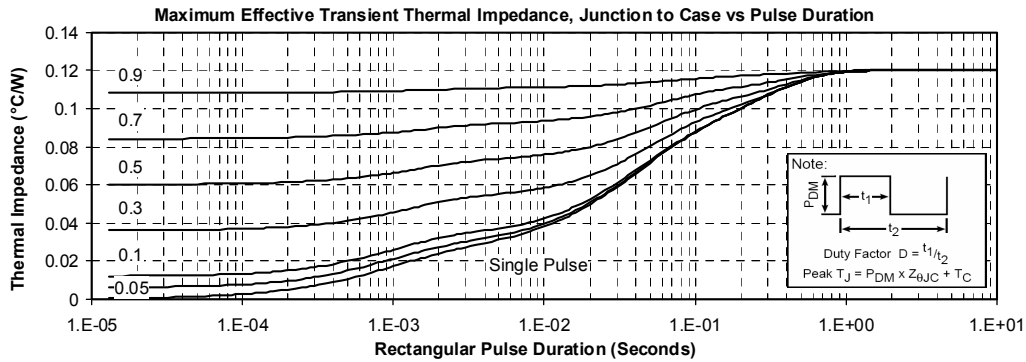
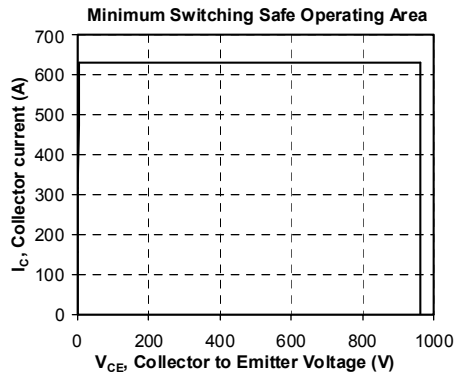
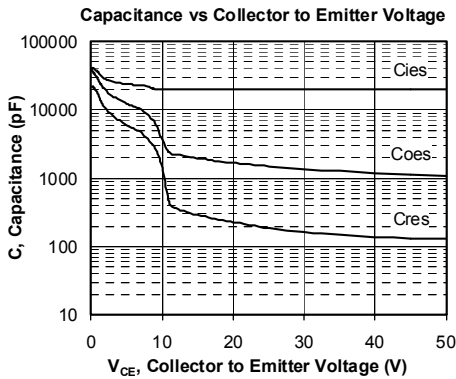
Package outline



Typical Performance Curve







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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.