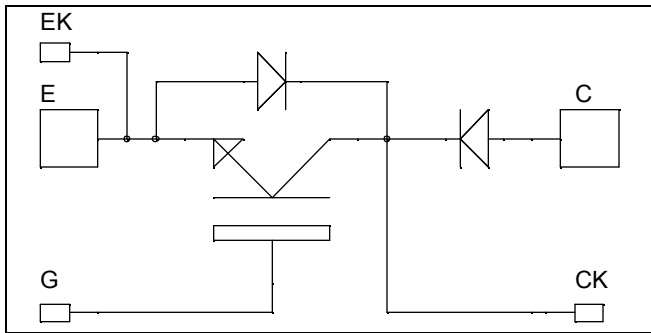


**Single Switch
with Series diodes
PT IGBT Power Module**

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



Application

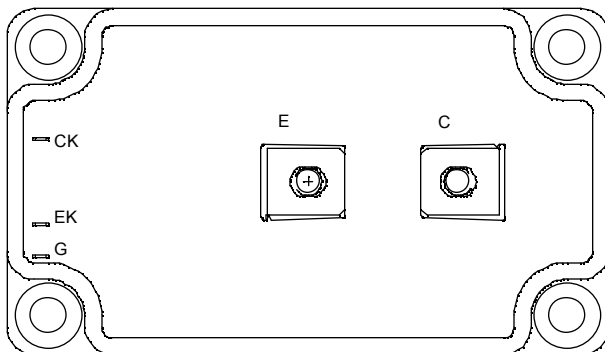
- Zero Current Switching resonant mode

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	A
		$T_c = 80^\circ C$	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	W
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
		$T_j = 25^\circ\text{C}$ $T_j = 125^\circ\text{C}$			7500	
$V_{CE(on)}$	Collector Emitter on Voltage	$V_{GE} = 15V$ $I_C = 180A$		3.3	3.9	V
		$T_j = 25^\circ\text{C}$ $T_j = 125^\circ\text{C}$		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 ❶			7.8		
E_{off}	Turn-off Switching Energy ❷			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 ❶			12.8		
E_{off}	Turn-off Switching Energy ❷			10.5		

❶ E_{on2} includes diode reverse recovery

❷ In accordance with JEDEC standard JESD24-1

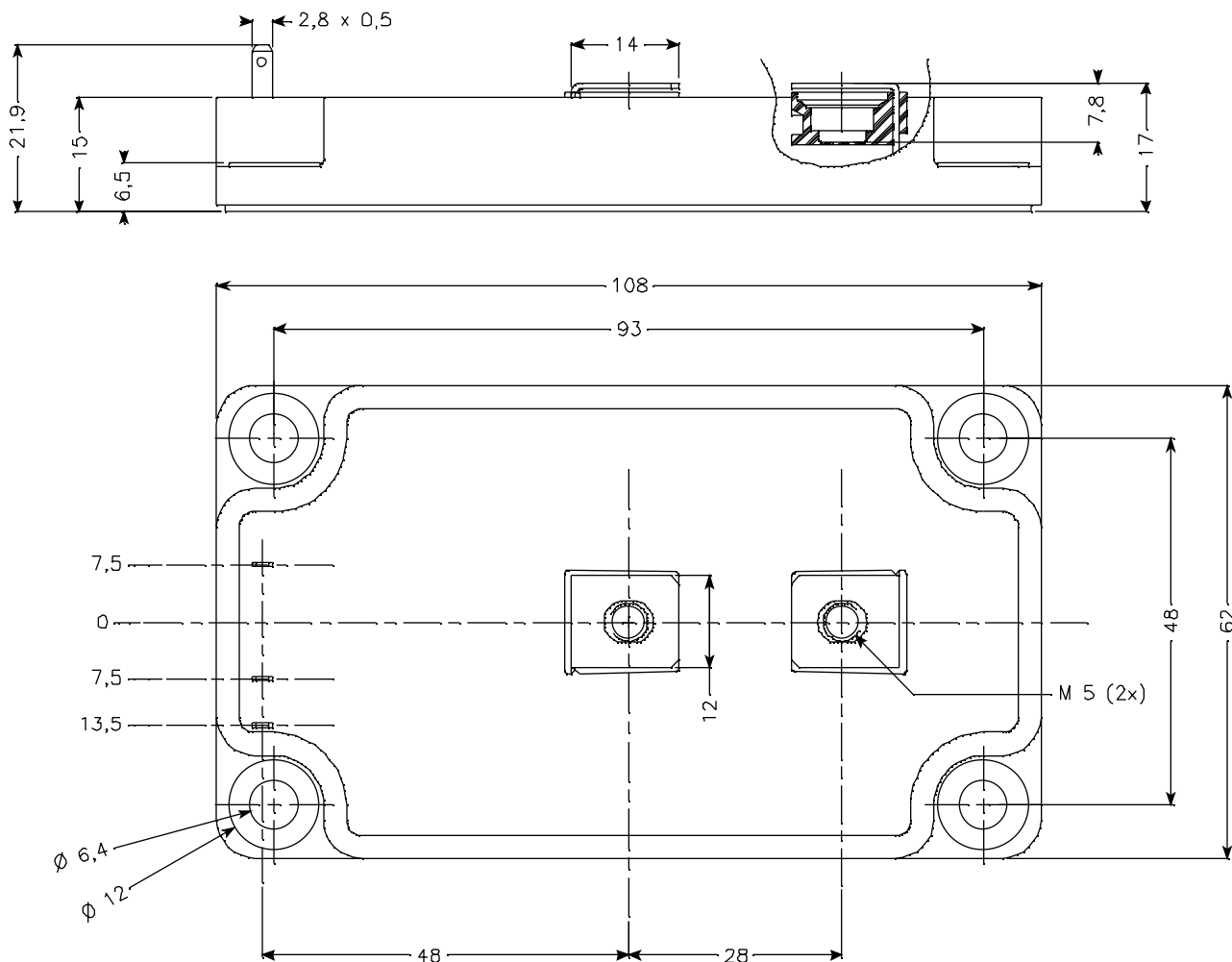
Series diode ratings and characteristics

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	$I_F = 200A$ $V_R = 800V$ $di/dt = 400A/\mu s$		420		ns
		$T_j = 25^\circ\text{C}$ $T_j = 125^\circ\text{C}$		580		
Q_{rr}	Reverse Recovery Charge	$I_F = 200A$ $V_R = 800V$ $di/dt = 400A/\mu s$		2.5		μC
		$T_j = 25^\circ\text{C}$ $T_j = 125^\circ\text{C}$		10.7		

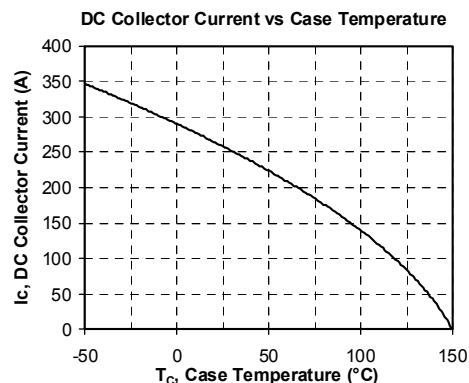
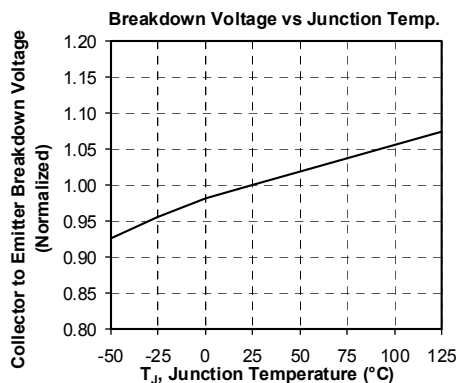
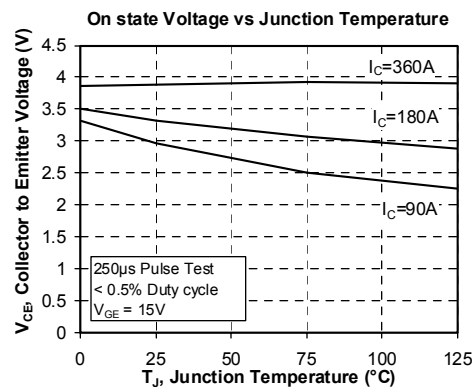
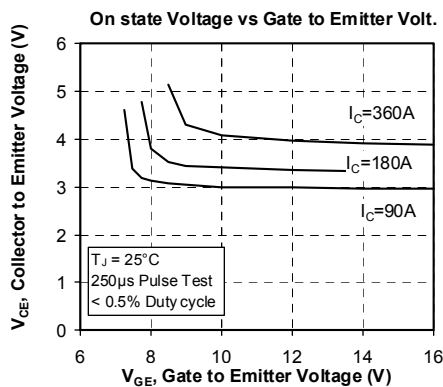
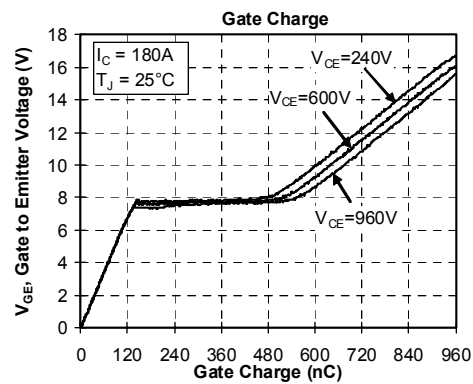
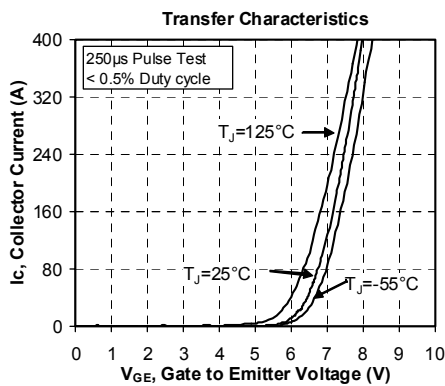
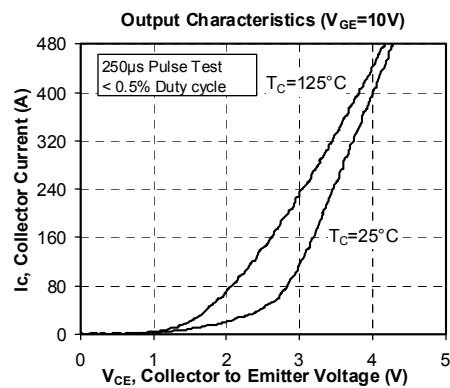
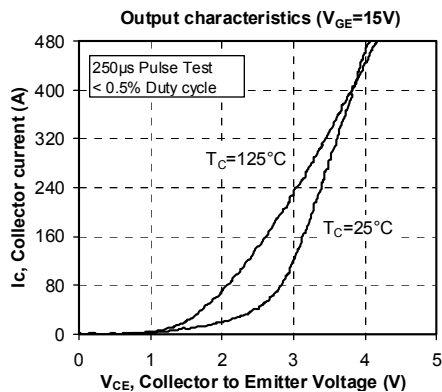
Thermal and package characteristics

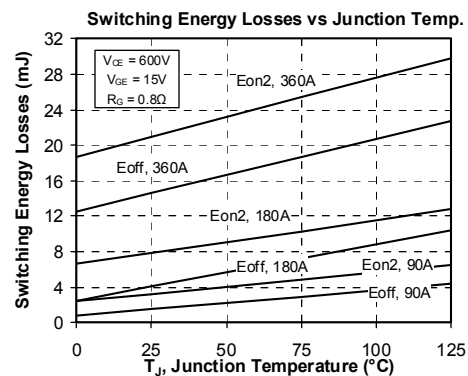
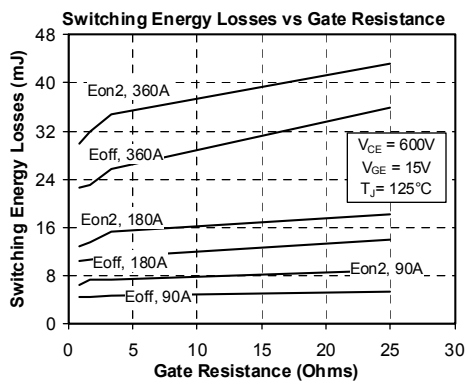
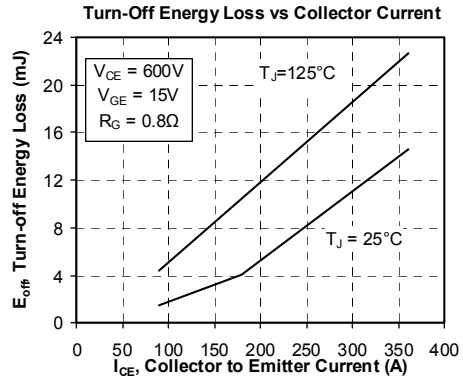
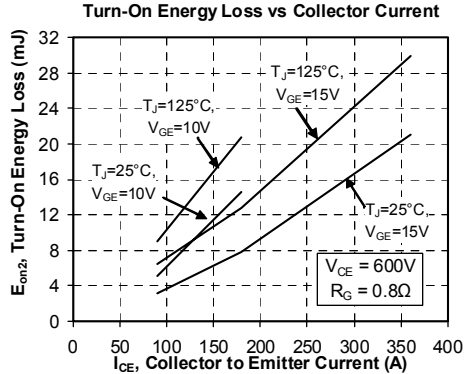
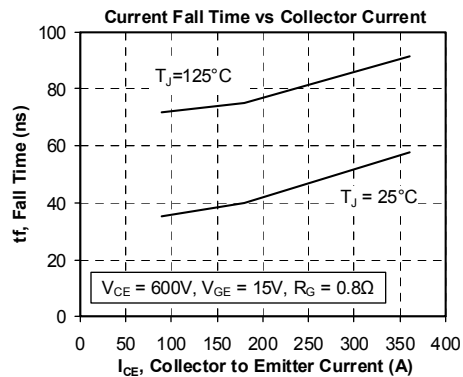
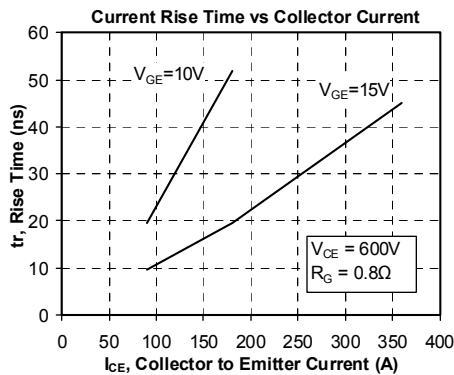
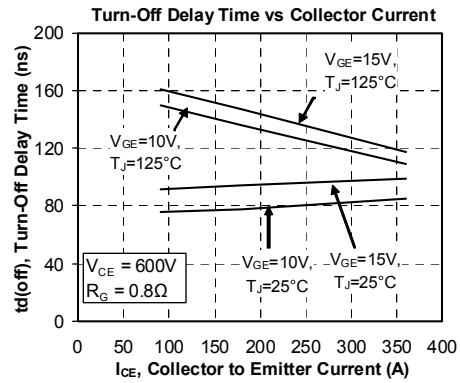
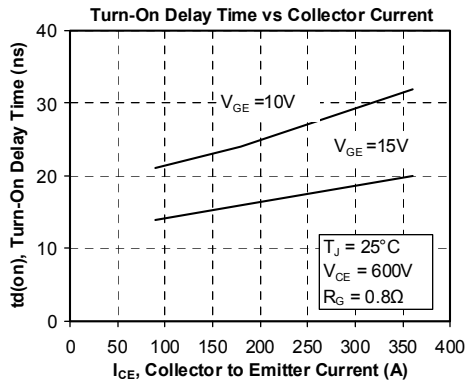
Symbol	Characteristic			Min	Typ	Max	Unit
R _{thJC}	Junction to Case			IGBT		0.12	°C/W
				Diode		0.32	
V _{ISOL}	RMS Isolation Voltage, any terminal to case t =1 min, I isol<1mA, 50/60Hz			2500			V
T _J	Operating junction temperature range			-40		150	°C
T _{STG}	Storage Temperature Range			-40		125	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

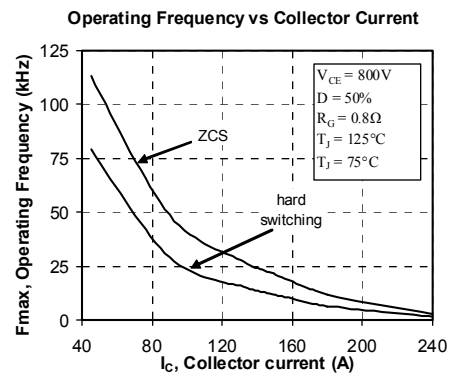
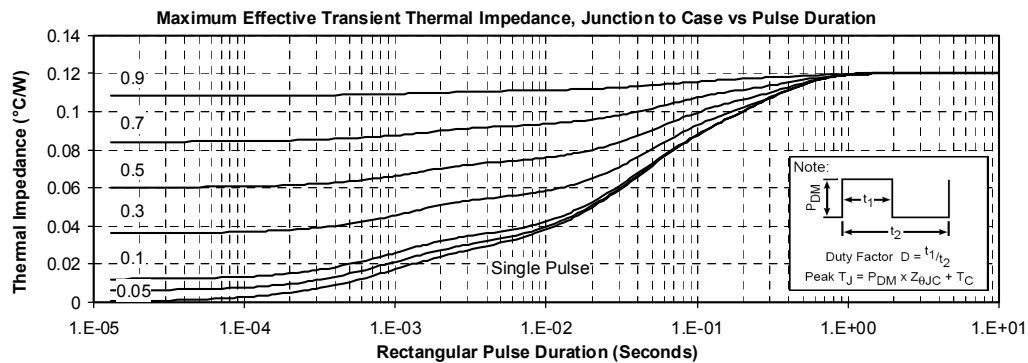
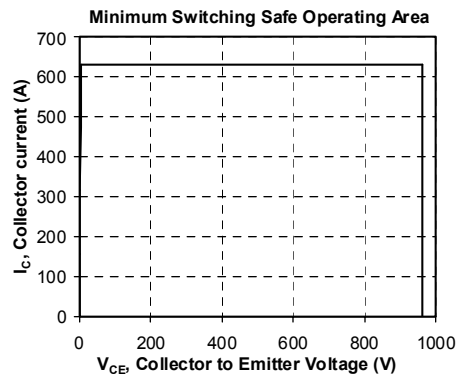
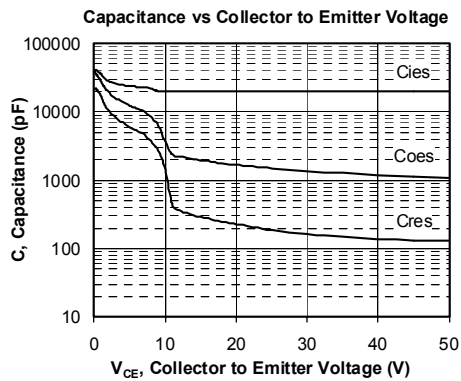
Package outline



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.