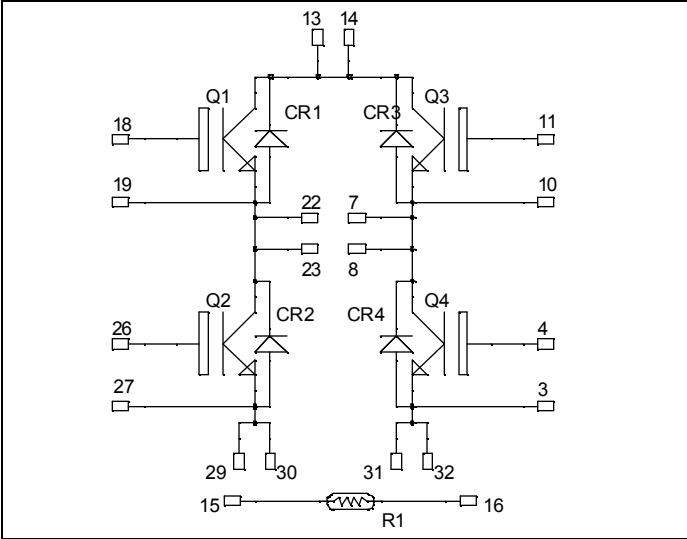


**Full - Bridge
NPT IGBT Power Module**

**$V_{CES} = 600V$
 $I_C = 30A @ T_c = 80^\circ C$**



Application

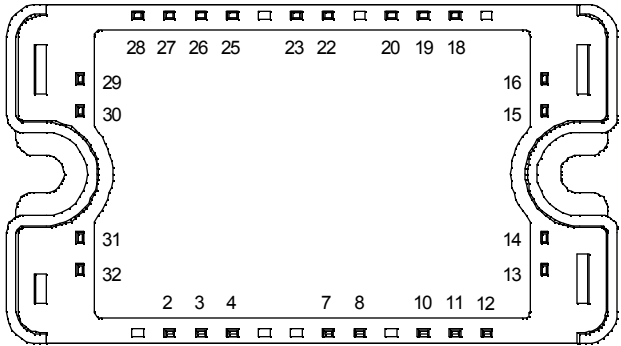
- Welding converters
- Switched Mode Power Supplies
- Uninterruptible Power Supplies
- Motor control

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
 - Symmetrical design
- Kelvin emitter for easy drive
- Very low stray inductance
- High level of integration
- Internal thermistor for temperature monitoring

Benefits

- Outstanding performance at high frequency operation
- Direct mounting to heatsink (isolated package)
- Low junction to case thermal resistance
- Solderable terminals both for power and signal for easy PCB mounting
- Low profile
- Easy paralleling due to positive TC of VCEsat
- Each leg can be easily paralleled to achieve a phase leg of twice the current capability



All multiple inputs and outputs must be shorted together
Example: 13/14 ; 29/30 ; 22/23 ...

Absolute maximum ratings

Symbol	Parameter	Max ratings	Unit
V_{CES}	Collector - Emitter Breakdown Voltage	600	V
I_C	Continuous Collector Current	$T_c = 25^\circ C$	42
		$T_c = 80^\circ C$	30
I_{CM}	Pulsed Collector Current	$T_c = 25^\circ C$	150
V_{GE}	Gate - Emitter Voltage	± 20	V
P_D	Maximum Power Dissipation	$T_c = 25^\circ C$	140
RBSOA	Reverse Bias Safe Operating Area	$T_j = 125^\circ C$	60A@500V

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	$V_{GE} = 0\text{V}, I_C = 500\mu\text{A}$	600			V
I_{CES}	Zero Gate Voltage Collector Current	$V_{GE} = 0\text{V}$		1	500	μA
		$V_{CE} = 600\text{V}$		1		mA
$V_{CE(on)}$	Collector Emitter on Voltage	$V_{GE} = 15\text{V}$	1.7	2.0	2.45	V
		$I_C = 30\text{A}$		2.2		
$V_{GE(th)}$	Gate Threshold Voltage	$V_{GE} = V_{CE}, I_C = 1\text{mA}$	4		6	V
I_{GES}	Gate - Emitter Leakage Current	$V_{GE} = 20\text{V}, V_{CE} = 0\text{V}$			400	nA

Dynamic Characteristics

Symbol	Characteristic	Test Conditions	Min	Typ	Max	Unit	
C_{ies}	Input Capacitance	$V_{GE} = 0\text{V}$		1350		pF	
C_{oes}	Output Capacitance	$V_{CE} = 25\text{V}$		193			
C_{res}	Reverse Transfer Capacitance	$f = 1\text{MHz}$		120			
Q_g	Total gate Charge	$V_{GE} = 15\text{V}$		99		nC	
Q_{ge}	Gate - Emitter Charge	$V_{Bus} = 300\text{V}$		10			
Q_{gc}	Gate - Collector Charge	$I_C = 30\text{A}$		60			
$T_{d(on)}$	Turn-on Delay Time	Inductive Switching (25°C) $V_{GE} = 15\text{V}$ $V_{Bus} = 400\text{V}$ $I_C = 30\text{A}$ $R_G = 6.8\Omega$		30		ns	
T_r	Rise Time			12			
$T_{d(off)}$	Turn-off Delay Time			80			
T_f	Fall Time			15			
$T_{d(on)}$	Turn-on Delay Time	Inductive Switching (125°C) $V_{GE} = 15\text{V}$ $V_{Bus} = 400\text{V}$ $I_C = 30\text{A}$ $R_G = 6.8\Omega$		32		ns	
T_r	Rise Time			12			
$T_{d(off)}$	Turn-off Delay Time			90			
T_f	Fall Time			21			
E_{on}	Turn-on Switching Energy ①				0.3		mJ
E_{off}	Turn-off Switching Energy ②				0.8		

① E_{on} includes diode reverse recovery

② In accordance with JEDEC standard JESD24-1

Reverse diode ratings and characteristics

Symbol	Characteristic	Test Conditions	Min	Typ	Max	Unit
V_{RRM}	Maximum Peak Repetitive Reverse Voltage		600			V
I_{RM}	Maximum Reverse Leakage Current	$V_R = 600\text{V}$			150	μA
			$T_j = 25^\circ\text{C}$		500	
$I_{F(AV)}$	Maximum Average Forward Current	50% duty cycle		15		A
V_F	Diode Forward Voltage	$I_F = 15\text{A}$			1.8	V
		$I_F = 30\text{A}$			1.6	
		$I_F = 15\text{A}$	$T_j = 150^\circ\text{C}$		1.6	
t_{rr}	Reverse Recovery Time	$I_F = 30\text{A}$ $V_R = 400\text{V}$	$T_j = 25^\circ\text{C}$	40		ns
			$T_j = 100^\circ\text{C}$	80		
Q_{rr}	Reverse Recovery Charge	$di/dt = 200\text{A}/\mu\text{s}$	$T_j = 25^\circ\text{C}$	50		nC
			$T_j = 100^\circ\text{C}$	120		

Temperature sensor NTC

Symbol Characteristic

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

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

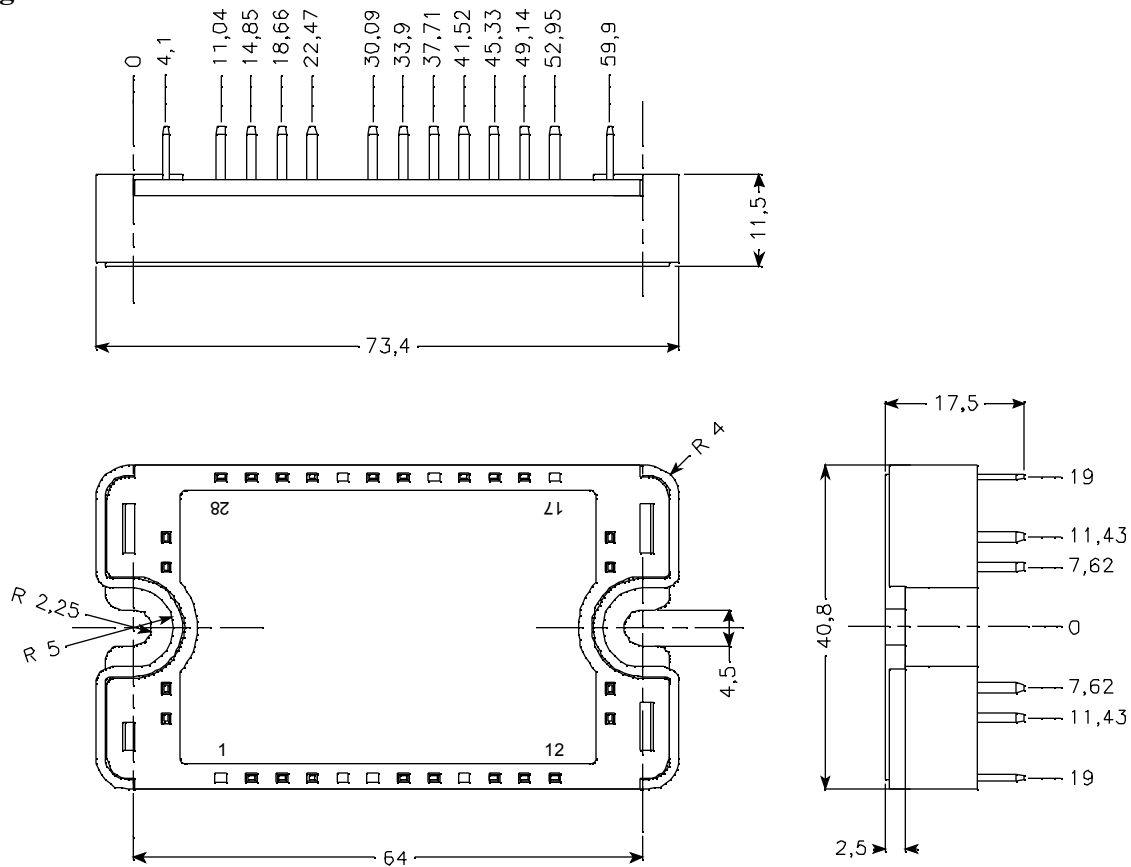
T: Thermistor temperature
R_T: Thermistor value at T

Thermal and package characteristics

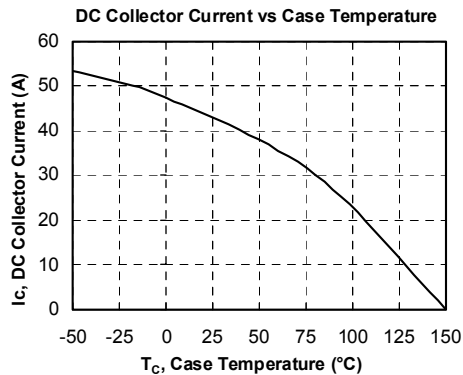
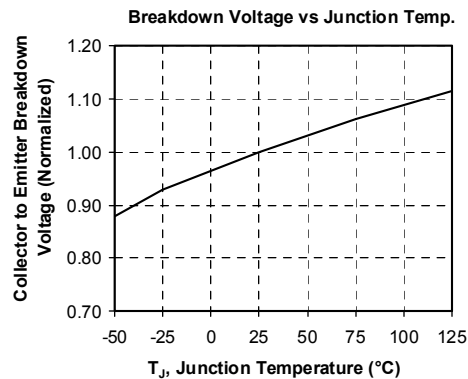
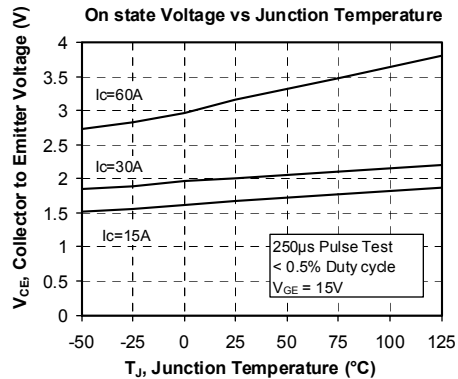
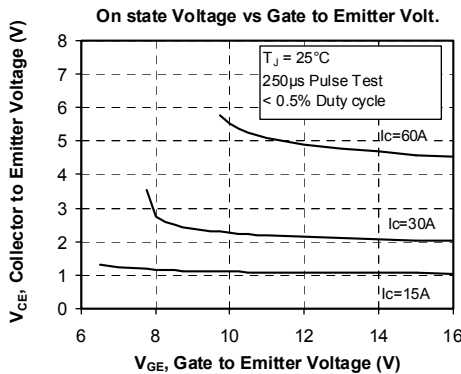
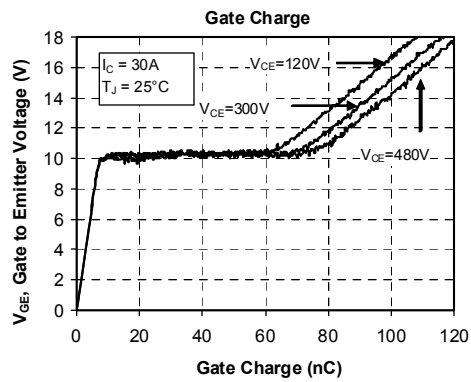
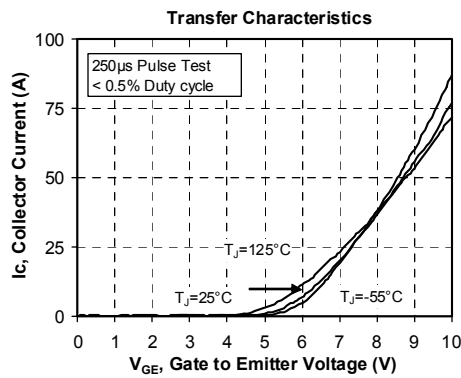
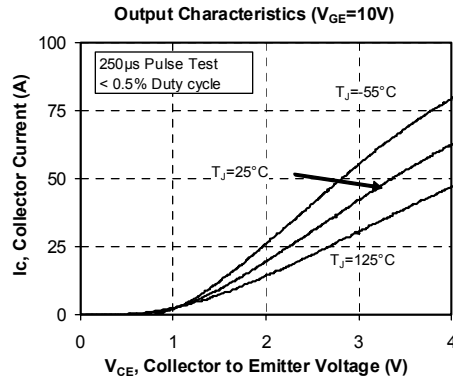
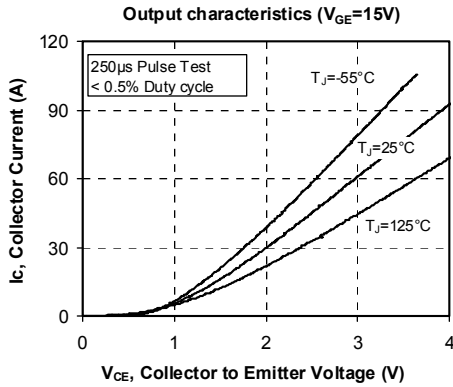
Symbol Characteristic

		<i>Min</i>	<i>Typ</i>	<i>Max</i>	<i>Unit</i>	
R _{thJC}	Junction to Case	IGBT		0.9	°C/W	
		Diode		2.0		
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	M4	4.7	N.m
Wt	Package Weight				110	g

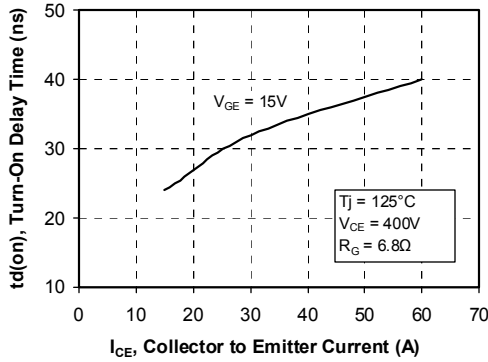
Package outline



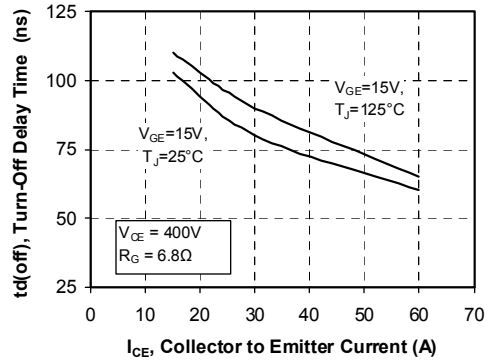
Typical Performance Curve



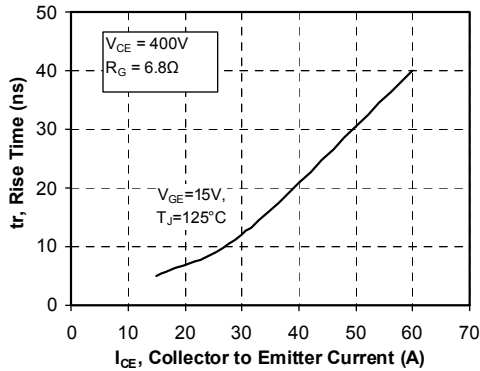
Turn-On Delay Time vs Collector Current



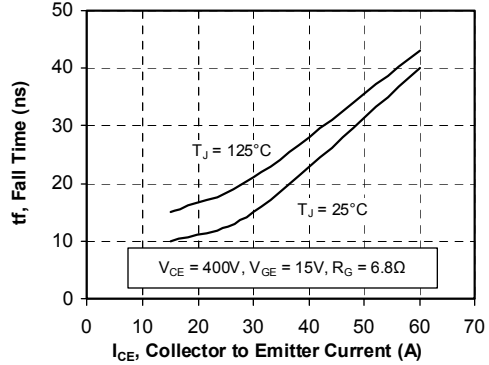
Turn-Off Delay Time vs Collector Current



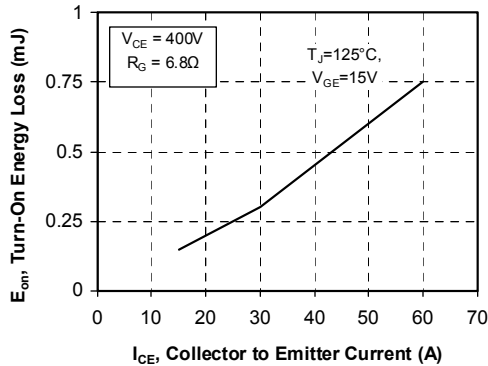
Current Rise Time vs Collector Current



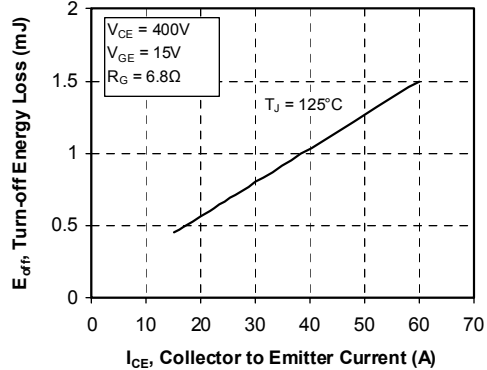
Current Fall Time vs Collector Current



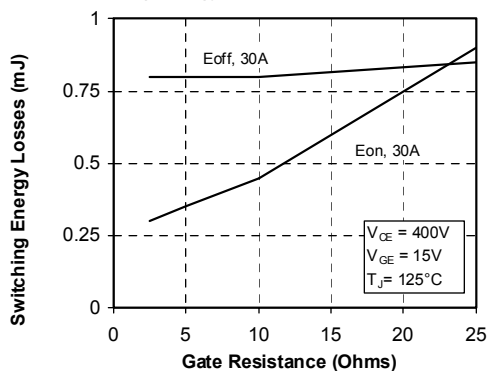
Turn-On Energy Loss vs Collector Current



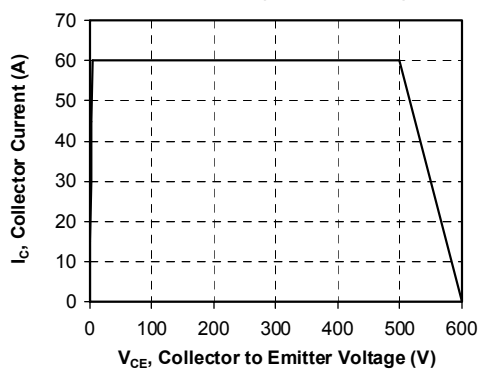
Turn-Off Energy Loss vs Collector Current

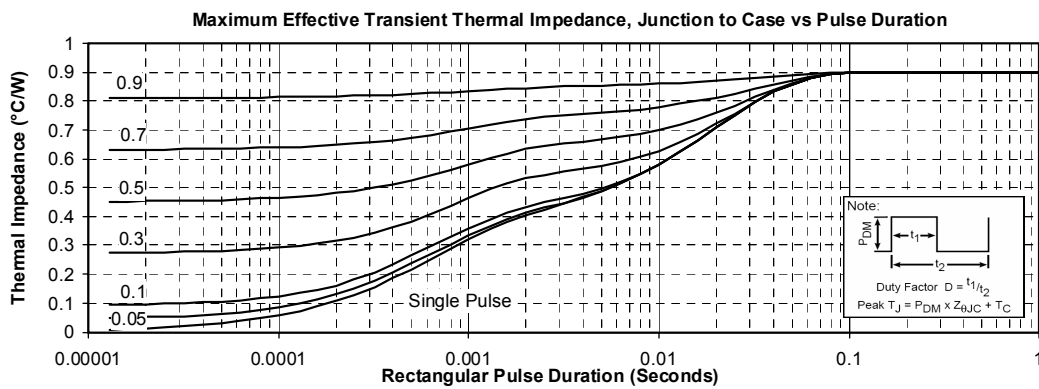
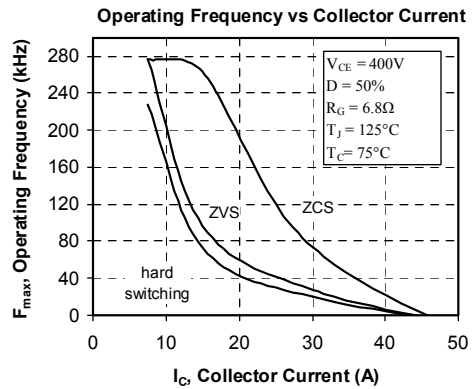
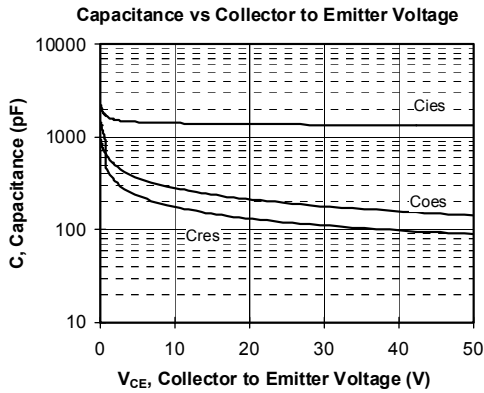


Switching Energy Losses vs Gate Resistance



Minimum Switching Safe Operating Area





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.