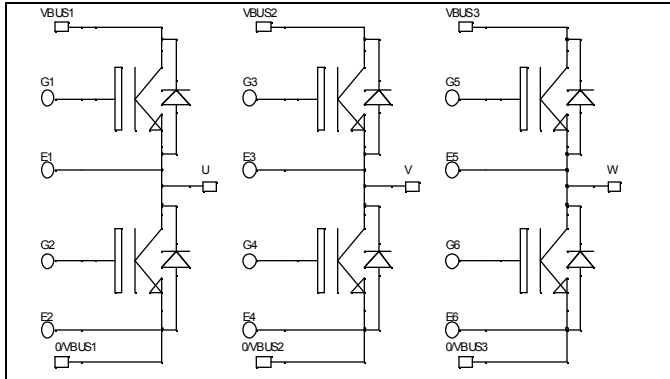


**Triple phase leg
NPT IGBT Power Module**

**$V_{CES} = 1200V$
 $I_C = 50A @ T_c = 80^\circ C$**



Application

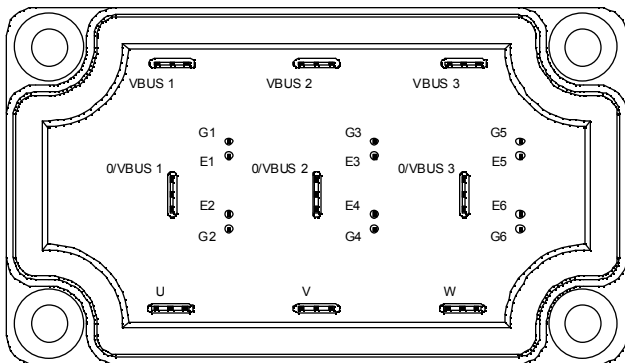
- Welding converters
- Switched Mode Power Supplies
- Uninterruptible Power Supplies
- Motor control

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
- Kelvin emitter for easy drive
- Very low stray inductance
 - Symmetrical design
 - Lead frames for power connections
- High level of integration

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
- Very low (12mm) profile
- Easy paralleling due to positive TC of VCEsat
- Each leg can be easily paralleled to achieve a phase leg of three times the current capability
- Module can be configured as a three phase bridge
- Module can be configured as a boost followed by a full bridge



Absolute maximum ratings

Symbol	Parameter	Max ratings	Unit
V_{CES}	Collector - Emitter Breakdown Voltage	1200	V
I_C	Continuous Collector Current	$T_c = 25^\circ C$	75
		$T_c = 80^\circ C$	50
I_{CM}	Pulsed Collector Current	$T_c = 25^\circ C$	150
V_{GE}	Gate - Emitter Voltage	± 20	V
P_D	Maximum Power Dissipation	$T_c = 25^\circ C$	312
RBSOA	Reverse Bias Safe Operating Area	$T_j = 150^\circ C$	150A @ 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
BV_{CES}	Collector - Emitter Breakdown Voltage	$V_{GE} = 0\text{V}, I_C = 500 \mu\text{A}$	1200			V
I_{CES}	Zero Gate Voltage Collector Current	$V_{GE} = 0\text{V}$			500	μA
		$V_{CE} = 1200\text{V}$			2500	
$V_{CE(on)}$	Collector Emitter on Voltage	$V_{GE} = 15\text{V}$		3.2	3.7	V
		$I_C = 50\text{A}$		4.0		
$V_{GE(th)}$	Gate Threshold Voltage	$V_{GE} = V_{CE}, I_C = 1 \text{ mA}$	4.5		6.5	V
I_{GES}	Gate - Emitter Leakage Current	$V_{GE} = \pm 20 \text{ V}, V_{CE} = 0\text{V}$			100	nA

Dynamic Characteristics

Symbol	Characteristic	Test Conditions	Min	Typ	Max	Unit	
C_{ies}	Input Capacitance	$V_{GE} = 0\text{V}$		3450		pF	
C_{oes}	Output Capacitance	$V_{CE} = 25\text{V}$		330			
C_{res}	Reverse Transfer Capacitance	$f = 1\text{MHz}$		220			
Q_g	Total gate Charge	$V_{GS} = 15\text{V}$		330		nC	
Q_{ge}	Gate - Emitter Charge	$V_{Bus} = 600\text{V}$		35			
Q_{gc}	Gate - Collector Charge	$I_C = 50\text{A}$		200			
$T_{d(on)}$	Turn-on Delay Time	Inductive Switching (25°C) $V_{GE} = 15\text{V}$ $V_{Bus} = 600\text{V}$ $I_C = 50\text{A}$ $R_G = 5\Omega$		35		ns	
T_r	Rise Time			65			
$T_{d(off)}$	Turn-off Delay Time			320			
T_f	Fall Time			30			
E_{on}	Turn-on Switching Energy ①				5.4		mJ
E_{off}	Turn-off Switching Energy ②				2.3		
$T_{d(on)}$	Turn-on Delay Time	Inductive Switching (125°C) $V_{GE} = 15\text{V}$ $V_{Bus} = 600\text{V}$ $I_C = 50\text{A}$ $R_G = 5\Omega$		35		ns	
T_r	Rise Time			65			
$T_{d(off)}$	Turn-off Delay Time			360			
T_f	Fall Time			40			
E_{on}	Turn-on Switching Energy ①				6.9		mJ
E_{off}	Turn-off Switching Energy ②				3.05		

① E_{on} includes diode reverse recovery

② In accordance with JEDEC standard JESD24-1

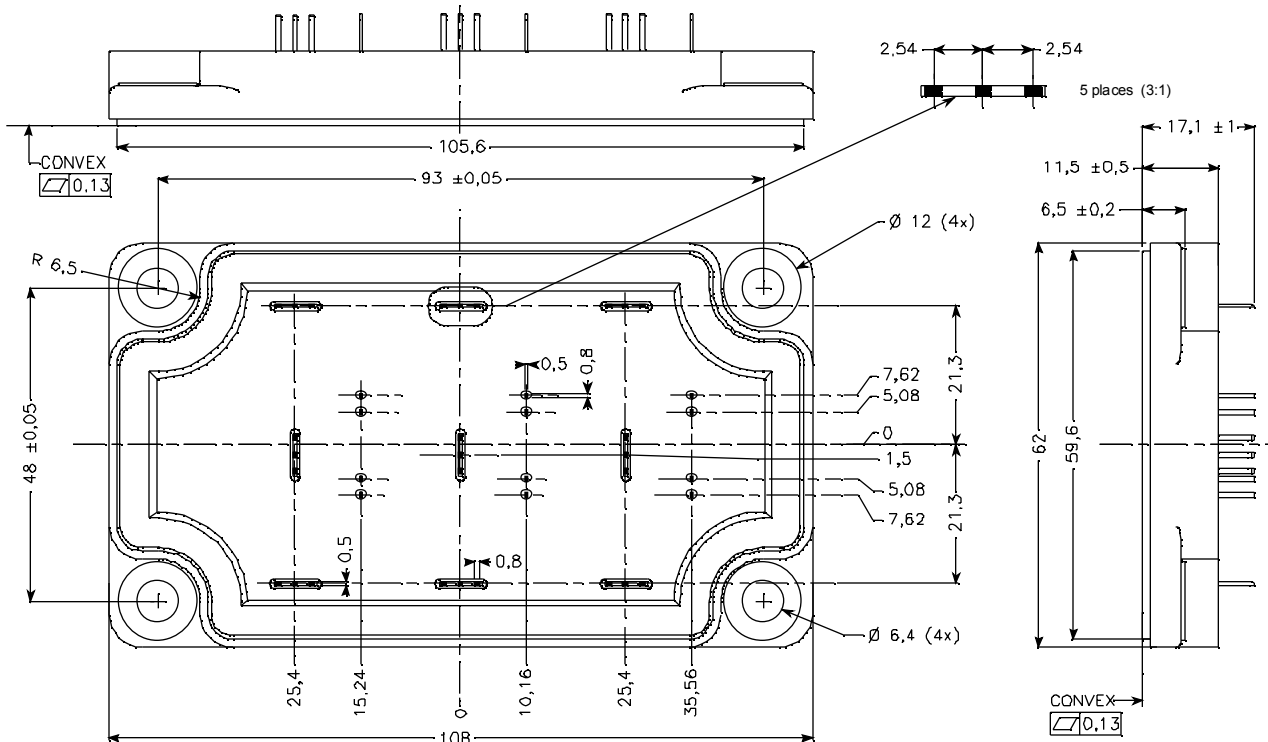
Reverse diode ratings and characteristics

Symbol	Characteristic	Test Conditions		Min	Typ	Max	Unit
V _{RRM}	Maximum Peak Repetitive Reverse Voltage			1200			V
I _{RM}	Maximum Reverse Leakage Current	V _R =1200V	T _j = 25°C			250	µA
			T _j = 125°C			500	
I _{F(AV)}	Maximum Average Forward Current	50% duty cycle	T _c = 70°C		60		A
V _F	Diode Forward Voltage	I _F = 60A			2	2.5	V
		I _F = 120A			2.3		
		I _F = 60A	T _j = 125°C		1.8		
t _{rr}	Reverse Recovery Time	I _F = 60A V _R = 800V di/dt = 200A/µs	T _j = 25°C		400		ns
			T _j = 125°C		470		
Q _{rr}	Reverse Recovery Charge		T _j = 25°C		1200		nC
			T _j = 125°C		4000		

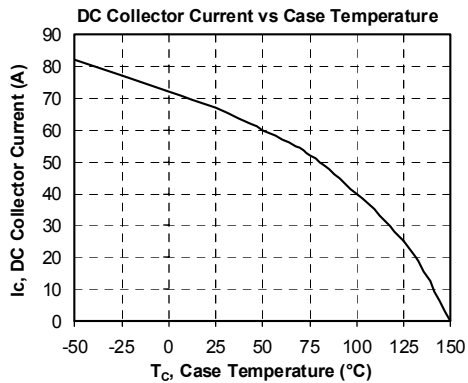
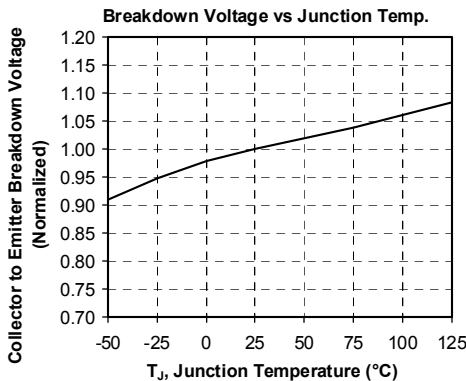
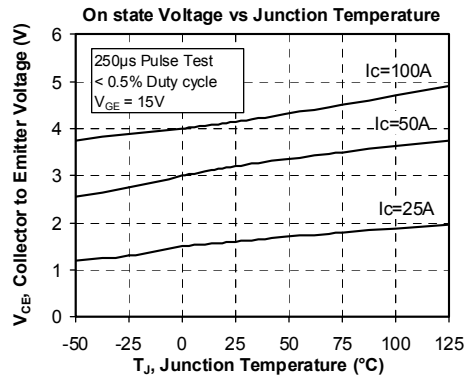
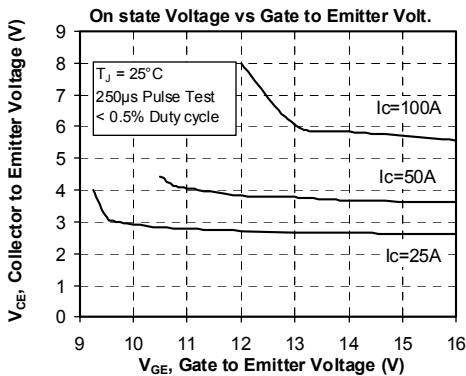
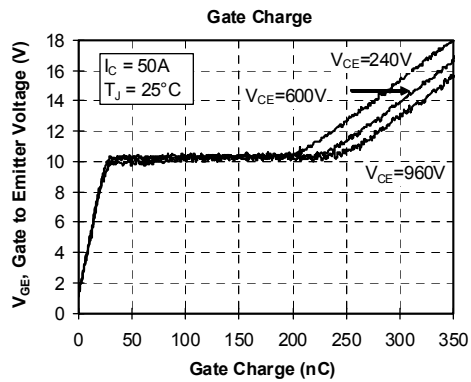
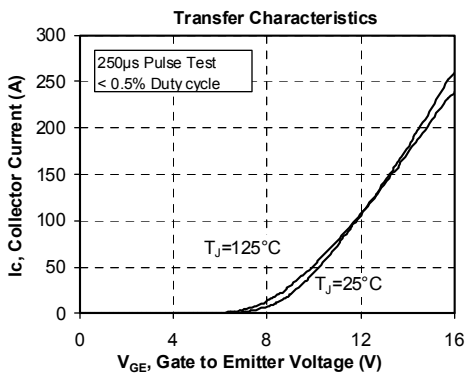
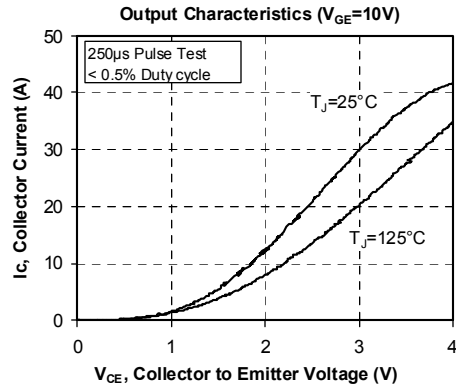
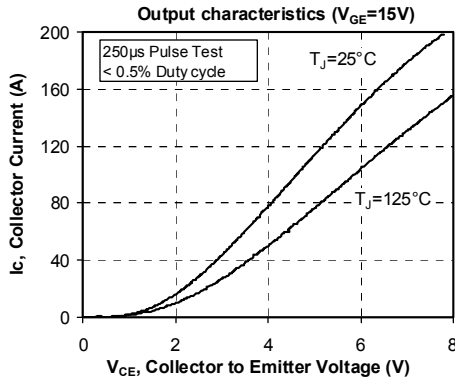
Thermal and package characteristics

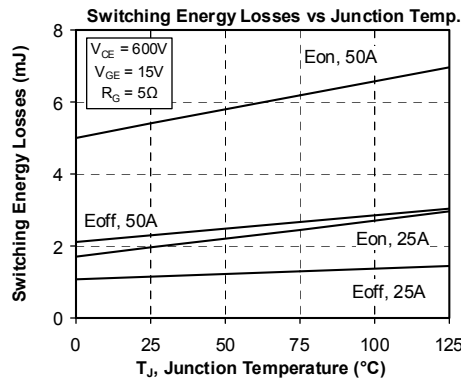
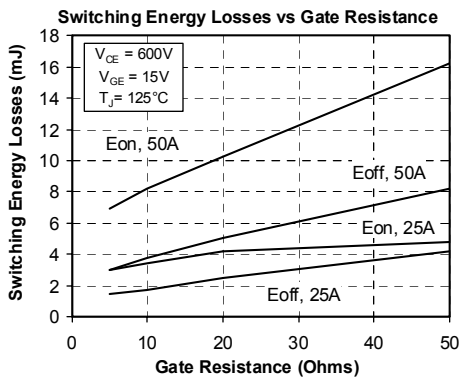
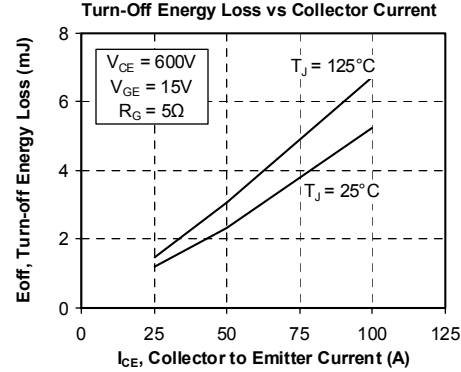
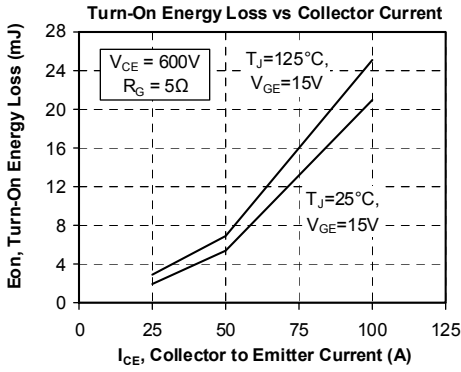
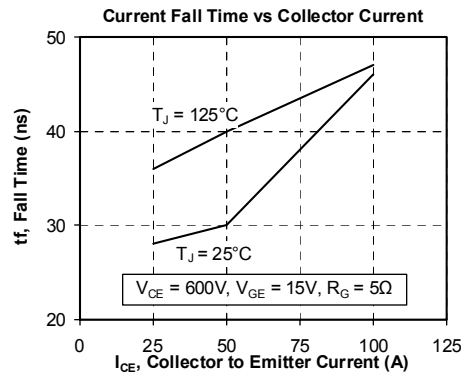
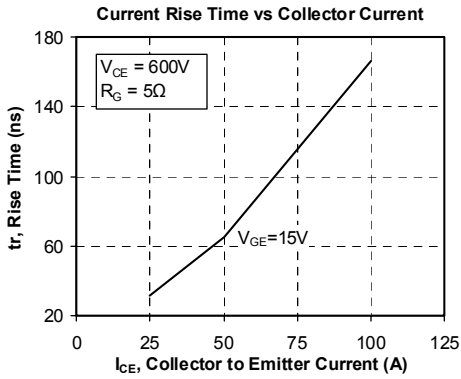
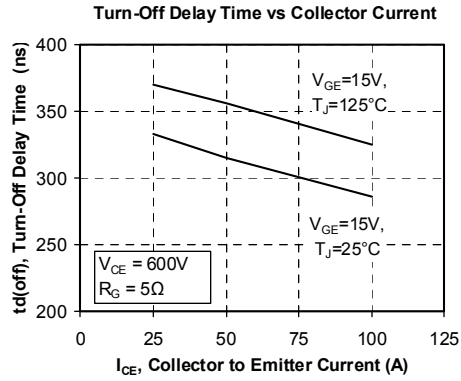
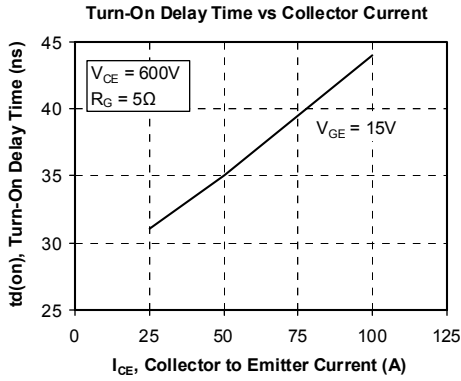
Symbol	Characteristic			Min	Typ	Max	Unit
R _{thJC}	Junction to Case	IGBT				0.4	°C/W
		Diode				0.9	
V _{ISOL}	RMS Isolation Voltage, any terminal to case t=1 min, I _{isol} <1mA, 50/60Hz			2500			V
T _J	Operating junction temperature range			-40		150	°C
T _{STG}	Storage Temperature Range			-40		125	
T _C	Operating Case Temperature			-40		100	
Torque	Mounting torque	To heatsink	M6	3		5	N.m
Wt	Package Weight					250	g

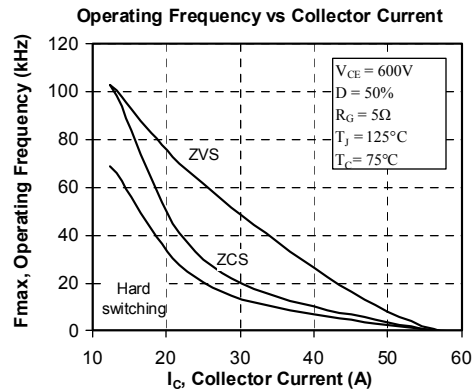
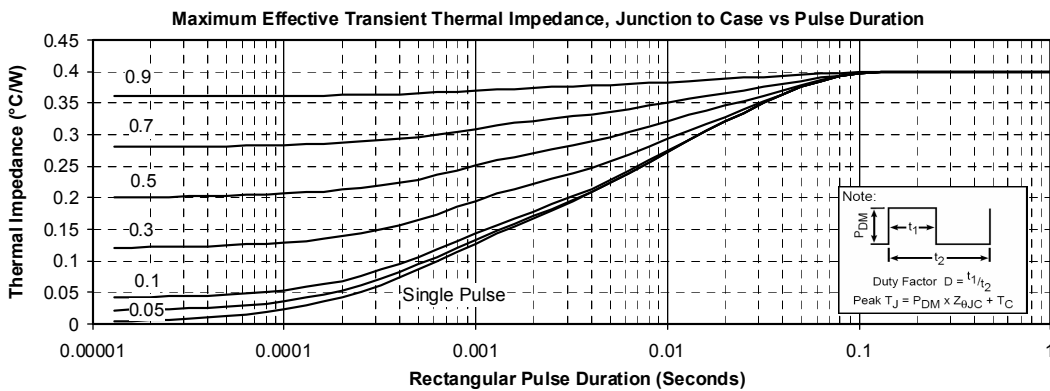
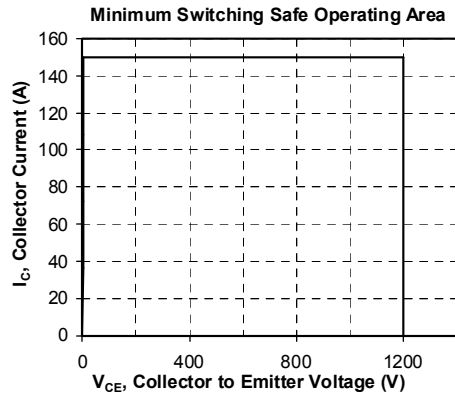
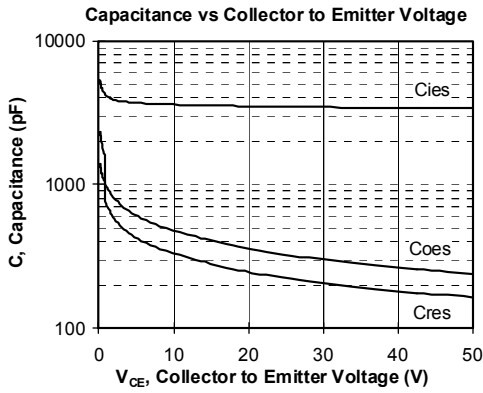
Package outline



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.