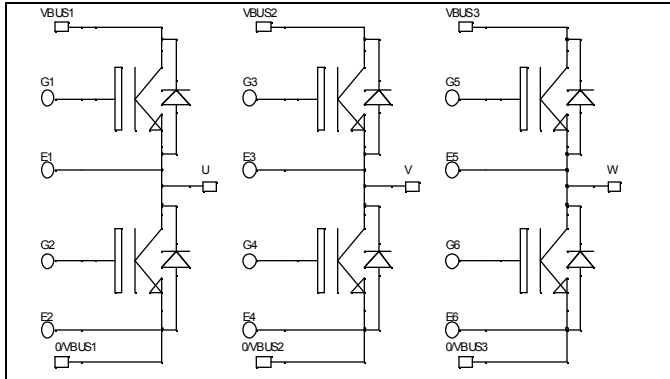


**Triple phase leg  
NPT IGBT Power Module**

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



**Application**

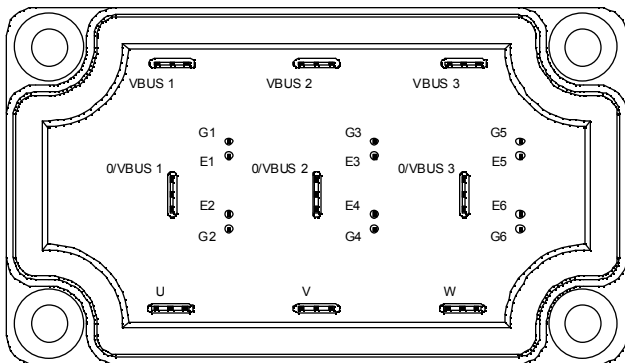
- Welding converters
- Switched Mode Power Supplies
- Uninterruptible Power Supplies
- Motor control

**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	$\pm 20$	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	$\mu\text{A}$
		$V_{CE} = 1200\text{V}$			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 ( $25^\circ\text{C}$ ) $V_{GE} = 15\text{V}$ $V_{Bus} = 600\text{V}$ $I_C = 50\text{A}$ $R_G = 5\Omega$		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 ( $125^\circ\text{C}$ ) $V_{GE} = 15\text{V}$ $V_{Bus} = 600\text{V}$ $I_C = 50\text{A}$ $R_G = 5\Omega$		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

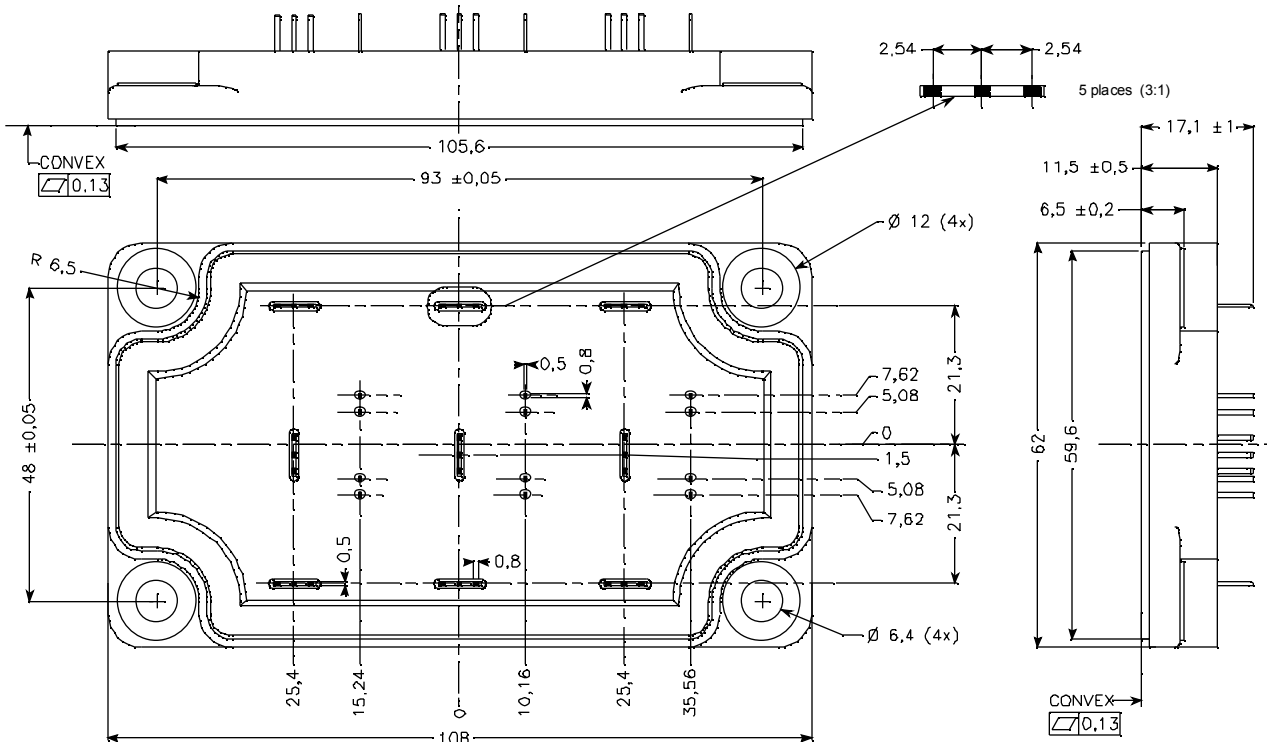
## Reverse diode ratings and characteristics

Symbol	Characteristic	Test Conditions		Min	Typ	Max	Unit
$V_{RRM}$	Maximum Peak Repetitive Reverse Voltage			1200			V
$I_{RM}$	Maximum Reverse Leakage Current	$V_R=1200V$	$T_j = 25^\circ C$			250	$\mu A$
			$T_j = 125^\circ C$			500	
$I_{F(AV)}$	Maximum Average Forward Current	50% duty cycle	$T_c = 70^\circ C$		60		A
$V_F$	Diode Forward Voltage	$I_F = 60A$			2	2.5	V
		$I_F = 120A$			2.3		
		$I_F = 60A$	$T_j = 125^\circ C$		1.8		
$t_{rr}$	Reverse Recovery Time	$I_F = 60A$ $V_R = 800V$ $di/dt = 200A/\mu s$	$T_j = 25^\circ C$		400		ns
			$T_j = 125^\circ C$		470		
$Q_{rr}$	Reverse Recovery Charge	$I_F = 60A$ $V_R = 800V$ $di/dt = 200A/\mu s$	$T_j = 25^\circ C$		1200		nC
			$T_j = 125^\circ C$		4000		

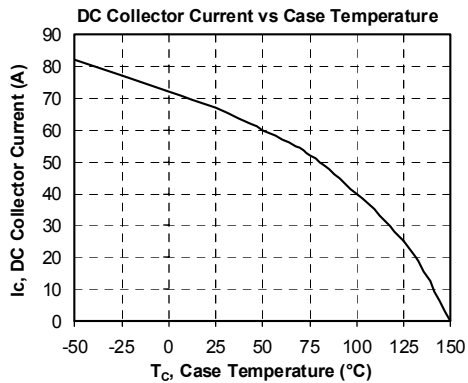
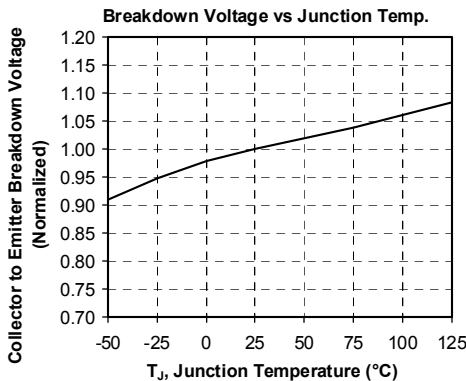
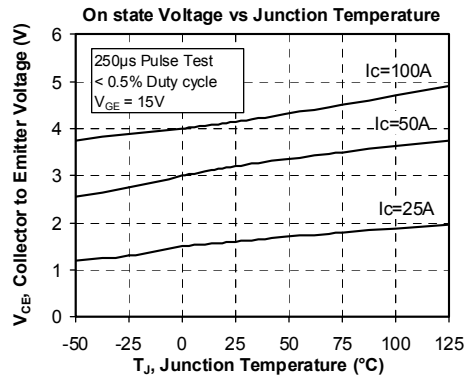
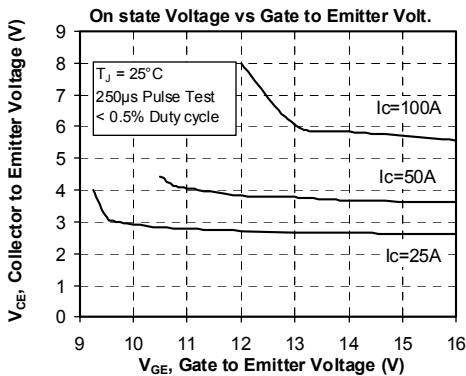
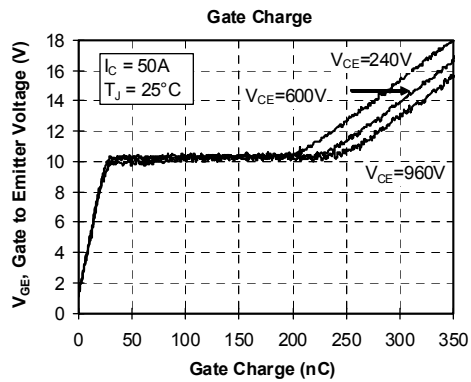
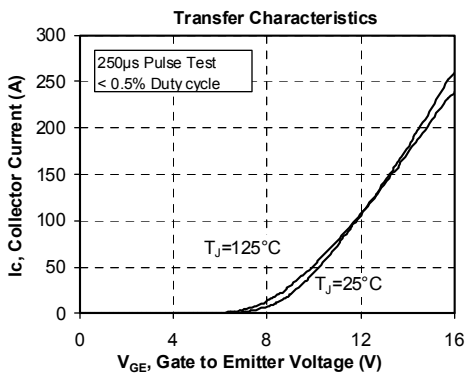
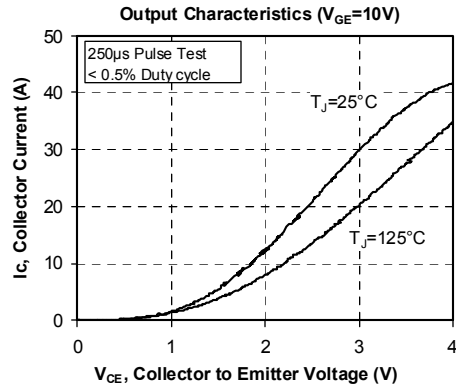
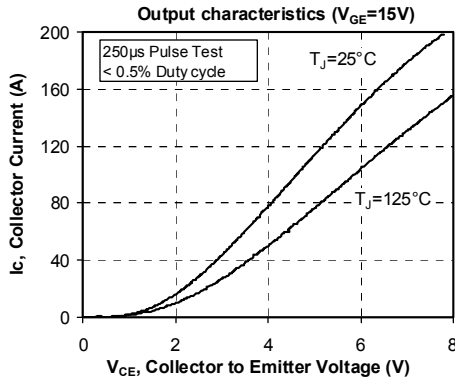
## Thermal and package characteristics

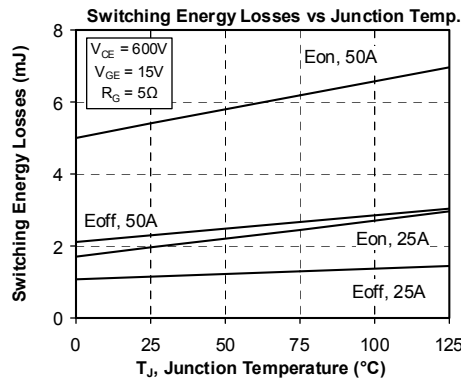
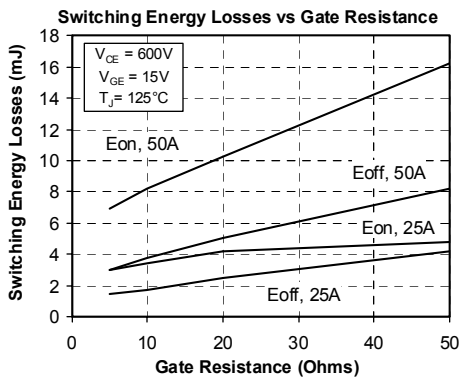
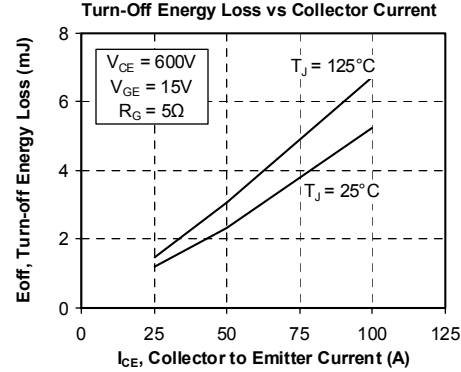
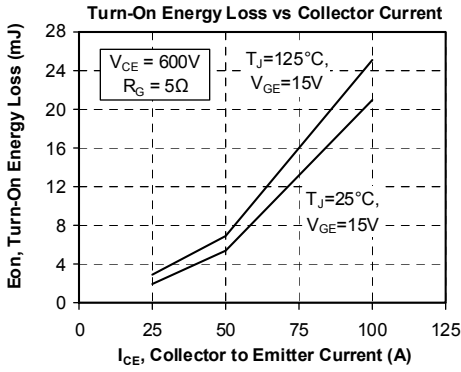
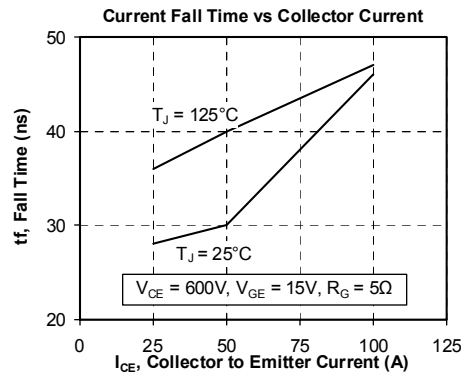
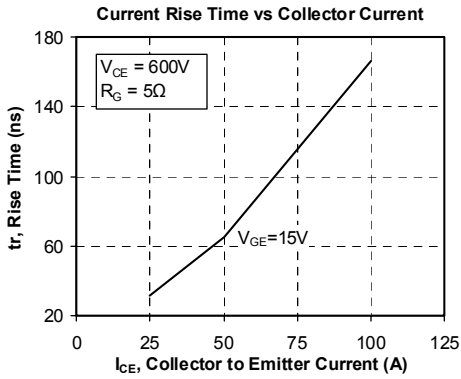
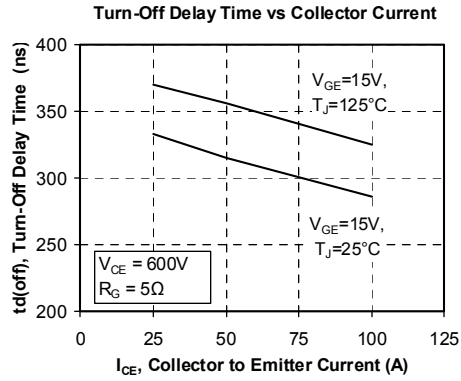
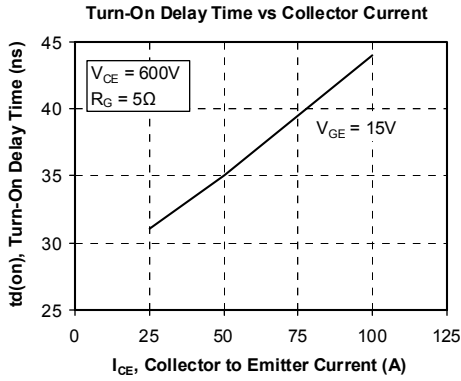
Symbol	Characteristic			Min	Typ	Max	Unit
$R_{thJC}$	Junction to Case	IGBT				0.4	$^\circ C/W$
		Diode				0.9	
$V_{ISOL}$	RMS Isolation Voltage, any terminal to case $t=1$ min, $I_{isol}<1mA$ , 50/60Hz			2500			V
$T_j$	Operating junction temperature range			-40		150	$^\circ C$
$T_{STG}$	Storage Temperature 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

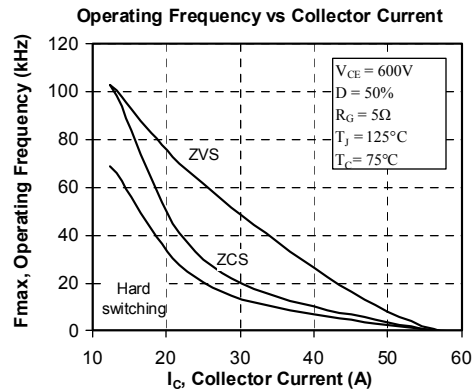
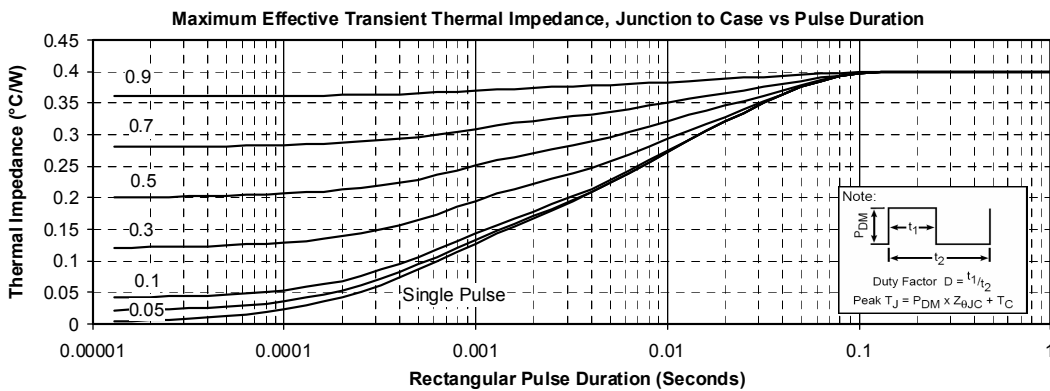
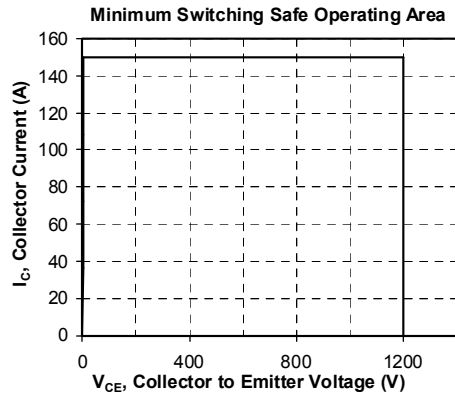
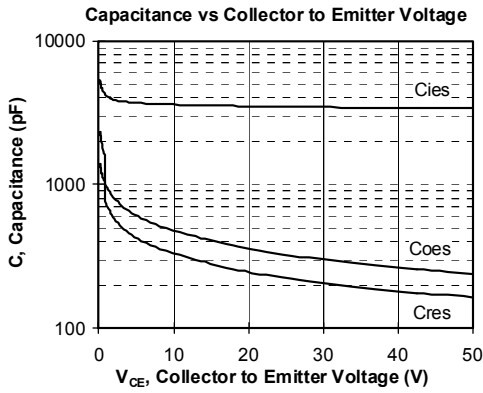
## Package outline



**Typical Performance Curve**







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