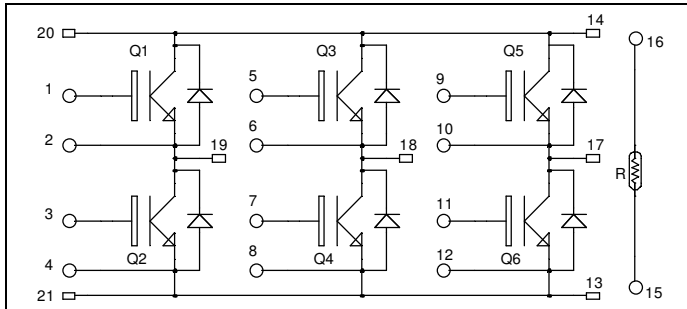


## 3 Phase bridge Trench IGBT® Power Module

**V<sub>CES</sub> = 1200V**  
**I<sub>C</sub> = 150A @ T<sub>c</sub> = 80°C**



### Application

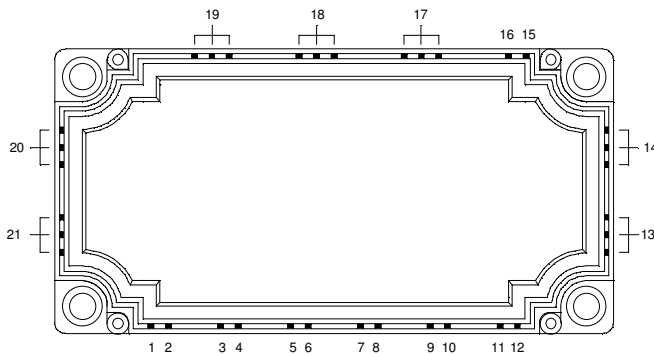
- AC Motor control

### Features

- Trench + Field Stop IGBT® Technology
  - Low voltage drop
  - Low tail current
  - Switching frequency up to 20 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
- High level of integration
- Internal thermistor for temperature monitoring

### Benefits

- Stable temperature behavior
- Very rugged
- Solderable terminals for easy PCB mounting
- Direct mounting to heatsink (isolated package)
- Low junction to case thermal resistance
- Easy paralleling due to positive TC of V<sub>CEsat</sub>
- Low profile



### Absolute maximum ratings

Symbol	Parameter	Max ratings	Unit
V <sub>CES</sub>	Collector - Emitter Breakdown Voltage	1200	V
I <sub>C</sub>	Continuous Collector Current	T <sub>C</sub> = 25°C	220
		T <sub>C</sub> = 80°C	150
I <sub>CM</sub>	Pulsed Collector Current	T <sub>C</sub> = 25°C	350
V <sub>GE</sub>	Gate - Emitter Voltage	±20	V
P <sub>D</sub>	Maximum Power Dissipation	T <sub>C</sub> = 25°C	700
SCSOA	Short Circuit Safe Operating Area	T <sub>j</sub> = 125°C	600A@900V

 **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	$V_{GE} = 0V, I_C = 6mA$	1200			V
$I_{CES}$	Zero Gate Voltage Collector Current	$V_{GE} = 0V, V_{CE} = 1200V$			4	mA
$V_{CE(on)}$	Collector Emitter on Voltage	$V_{GE} = 15V$ $I_C = 150A$		$T_j = 25^\circ\text{C}$ $T_j = 125^\circ\text{C}$	1.7 2.1	V
$V_{GE(th)}$	Gate Threshold Voltage	$V_{GE} = V_{CE}, I_C = 6mA$	5.0	5.8	6.5	V
$I_{GES}$	Gate - Emitter Leakage Current	$V_{GE} = 20V, V_{CE} = 0V$			600	nA

## Dynamic Characteristics

Symbol	Characteristic	Test Conditions	Min	Typ	Max	Unit
$C_{ies}$	Input Capacitance	$V_{GE} = 0V$		10.8		nF
$C_{oes}$	Output Capacitance	$V_{CE} = 25V$		0.56		
$C_{res}$	Reverse Transfer Capacitance	$f = 1MHz$		0.5		
$T_{d(on)}$	Turn-on Delay Time	Inductive Switching ( $25^\circ\text{C}$ )		250		ns
$T_r$	Rise Time	$V_{GE} = \pm 15V$		30		
$T_{d(off)}$	Turn-off Delay Time	$V_{Bus} = 600V$ $I_C = 150A$		420		
$T_f$	Fall Time	$R_G = 2.2\Omega$		70		
$T_{d(on)}$	Turn-on Delay Time	Inductive Switching ( $125^\circ\text{C}$ )		300		ns
$T_r$	Rise Time	$V_{GE} = \pm 15V$		50		
$T_{d(off)}$	Turn-off Delay Time	$V_{Bus} = 600V$ $I_C = 150A$		520		
$T_f$	Fall Time	$R_G = 2.2\Omega$		90		

## Reverse diode ratings and characteristics

Symbol	Characteristic	Test Conditions	Min	Typ	Max	Unit
$V_F$	Diode Forward Voltage	$I_F = 150A$ $V_{GE} = 0V$		$T_j = 25^\circ\text{C}$ $T_j = 125^\circ\text{C}$	1.6 1.6	2.1 V
$E_{rec}$	Reverse Recovery Energy	$I_F = 150A$ $V_R = 600V$ $di/dt = 900A/\mu s$		$T_j = 125^\circ\text{C}$	12	mJ
$Q_{rr}$	Reverse Recovery Charge	$I_F = 150A$ $V_R = 600V$ $di/dt = 900A/\mu s$		$T_j = 25^\circ\text{C}$ $T_j = 125^\circ\text{C}$	14 28	$\mu C$

## Temperature sensor NTC

Symbol	Characteristic	Min	Typ	Max	Unit
$R_{25}$	Resistance @ $25^\circ\text{C}$		5		k $\Omega$
$B_{25/50}$	$T_{25} = 298.16\text{ K}$		3375		K

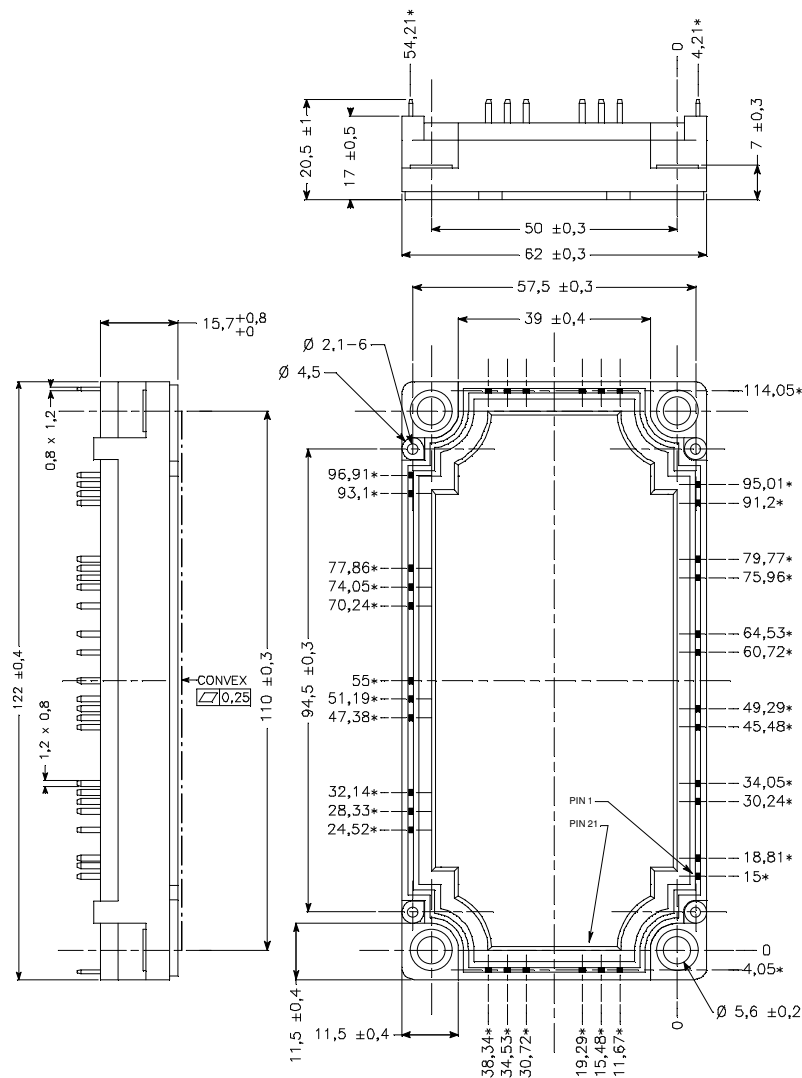
$$R_T = \frac{R_{25}}{\exp\left[B_{25/50}\left(\frac{1}{T_{25}} - \frac{1}{T}\right)\right]}$$

T: Thermistor temperature  
R<sub>T</sub>: Thermistor value at T

## Thermal and package characteristics

Symbol	Characteristic	Min	Typ	Max	Unit	
R <sub>thJC</sub>	Junction to Case	IGBT		0.18	°C/W	
		Diode		0.30		
V <sub>ISOL</sub>	RMS Isolation Voltage, any terminal to case t = 1 min, I <sub>isol</sub> < 1mA, 50/60Hz	2500			V	
T <sub>J</sub>	Operating junction temperature range	-40		150	°C	
T <sub>STG</sub>	Storage Temperature Range	-40		125		
T <sub>C</sub>	Operating Case Temperature	-40		125		
Torque	Mounting torque	To Heatsink	M5	3	4.5	N.m
Wt	Package Weight				300	g

## Package outline



ALL DIMENSIONS MARKED \* \* \* ARE TOLERANCED AS:  $\pm 0.4$

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