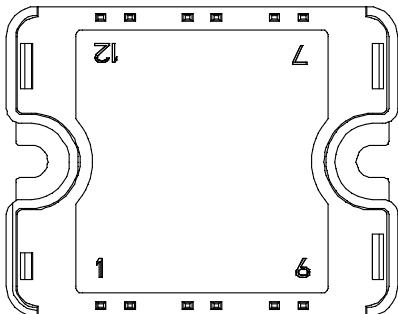
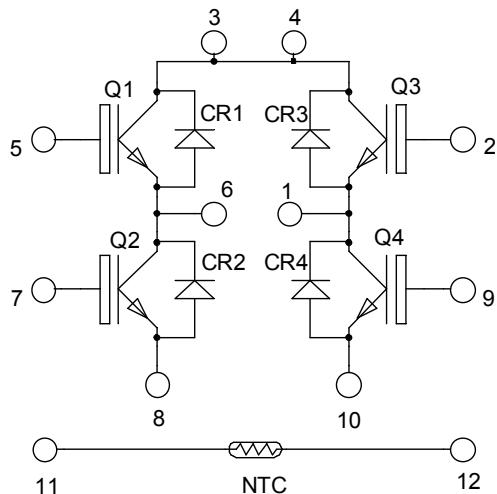


# *Full bridge Trench + Field Stop IGBT4 Power Module*

$$V_{CES} = 1200V$$

$$I_C = 40A @ T_c = 80^\circ C$$



Pins 3/4 must be shorted together

### Absolute maximum ratings

Symbol	Parameter	Max ratings	Unit
$V_{CES}$	Collector - Emitter Breakdown Voltage	1200	V
$I_C$	Continuous Collector Current	$T_C = 25^\circ\text{C}$	65
		$T_C = 80^\circ\text{C}$	40
$I_{CM}$	Pulsed Collector Current	$T_C = 25^\circ\text{C}$	70
$V_{GE}$	Gate – Emitter Voltage	$\pm 20$	
$P_D$	Maximum Power Dissipation	$T_C = 25^\circ\text{C}$	220
RBSOA	Reverse Bias Safe Operating Area	$T_j = 150^\circ\text{C}$	70A @ 1100V

 **CAUTION:** These Devices are sensitive to Electrostatic Discharge. Proper Handling Procedures Should Be Followed. See application note APT0502 on [www.microsemi.com](http://www.microsemi.com)

All ratings @  $T_j = 25^\circ\text{C}$  unless otherwise specified

**Electrical Characteristics**

Symbol	Characteristic	Test Conditions		Min	Typ	Max	Unit
$I_{CES}$	Zero Gate Voltage Collector Current	$V_{GE} = 0\text{V}$ , $V_{CE} = 1200\text{V}$				250	$\mu\text{A}$
$V_{CE(\text{sat})}$	Collector Emitter saturation Voltage	$V_{GE} = 15\text{V}$	$T_j = 25^\circ\text{C}$		1.85	2.25	$\text{V}$
		$I_C = 35\text{A}$	$T_j = 150^\circ\text{C}$		2.25		
$V_{GE(\text{th})}$	Gate Threshold Voltage	$V_{GE} = V_{CE}$ , $I_C = 1.2\text{mA}$		5.0	5.8	6.5	$\text{V}$
$I_{GES}$	Gate – Emitter Leakage Current	$V_{GE} = 20\text{V}$ , $V_{CE} = 0\text{V}$				400	$\text{nA}$

**Dynamic Characteristics**

Symbol	Characteristic	Test Conditions		Min	Typ	Max	Unit
$C_{ies}$	Input Capacitance	$V_{GE} = 0\text{V}$ $V_{CE} = 25\text{V}$ $f = 1\text{MHz}$			1950		$\text{pF}$
$C_{oes}$	Output Capacitance				155		
$C_{res}$	Reverse Transfer Capacitance				115		
$Q_G$	Gate charge	$V_{GE} = \pm 15\text{V}$ ; $V_{CE} = 600\text{V}$ $I_C = 35\text{A}$			0.27		$\mu\text{C}$
$T_{d(on)}$	Turn-on Delay Time	Inductive Switching ( $25^\circ\text{C}$ ) $V_{GE} = \pm 15\text{V}$ $V_{CE} = 600\text{V}$ $I_C = 35\text{A}$ $R_G = 12\Omega$			130		$\text{ns}$
$T_r$	Rise Time				20		
$T_{d(off)}$	Turn-off Delay Time				300		
$T_f$	Fall Time				45		
$T_{d(on)}$	Turn-on Delay Time	Inductive Switching ( $150^\circ\text{C}$ ) $V_{GE} = \pm 15\text{V}$ $V_{CE} = 600\text{V}$ $I_C = 35\text{A}$ $R_G = 12\Omega$			150		$\text{ns}$
$T_r$	Rise Time				35		
$T_{d(off)}$	Turn-off Delay Time				350		
$T_f$	Fall Time				80		
$E_{on}$	Turn-on Switching Energy	$V_{GE} = \pm 15\text{V}$ $V_{CE} = 600\text{V}$ $I_C = 35\text{A}$	$T_j = 25^\circ\text{C}$		2.6		$\text{mJ}$
$E_{off}$	Turn-off Switching Energy		$T_j = 150^\circ\text{C}$		4		
$I_{sc}$	Short Circuit data	$V_{GE} \leq 15\text{V}$ ; $V_{Bus} = 900\text{V}$ $t_p \leq 10\mu\text{s}$ ; $T_j = 150^\circ\text{C}$			140		$\text{A}$

**Reverse diode ratings and characteristics**

Symbol	Characteristic	Test Conditions		Min	Typ	Max	Unit	
$V_{RRM}$	Maximum Peak Repetitive Reverse Voltage			1200			$\text{V}$	
$I_{RM}$	Maximum Reverse Leakage Current	$V_R = 1200\text{V}$	$T_j = 25^\circ\text{C}$			100	$\mu\text{A}$	
			$T_j = 150^\circ\text{C}$			500		
$I_F$	DC Forward Current		$T_c = 80^\circ\text{C}$		30		$\text{A}$	
$V_F$	Diode Forward Voltage	$I_F = 30\text{A}$			2.6	3.1	$\text{V}$	
		$I_F = 60\text{A}$			3.2			
		$I_F = 30\text{A}$	$T_j = 125^\circ\text{C}$		1.8			
$t_{rr}$	Reverse Recovery Time	$I_F = 30\text{A}$ $V_R = 800\text{V}$ $di/dt = 200\text{A}/\mu\text{s}$	$T_j = 25^\circ\text{C}$		300		$\text{ns}$	
			$T_j = 125^\circ\text{C}$		380			
$Q_{rr}$	Reverse Recovery Charge		$T_j = 25^\circ\text{C}$		360		$\text{nC}$	
			$T_j = 125^\circ\text{C}$		1700			

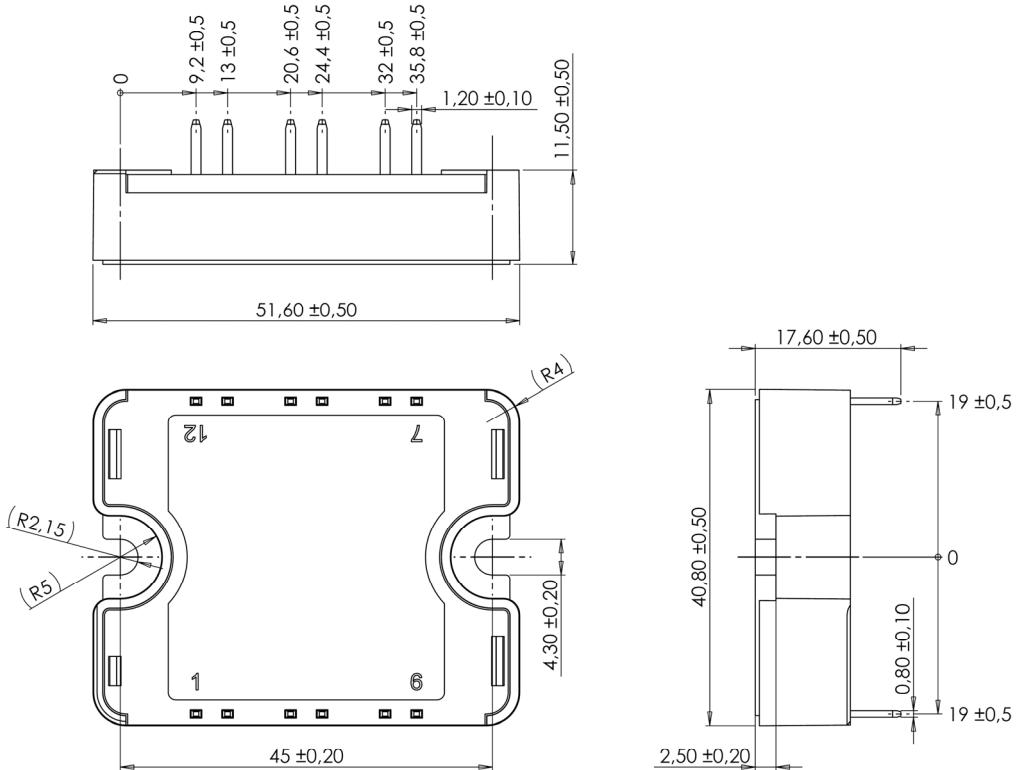
**Temperature sensor NTC** (see application note APT0406 on [www.microsemi.com](http://www.microsemi.com) for more information).

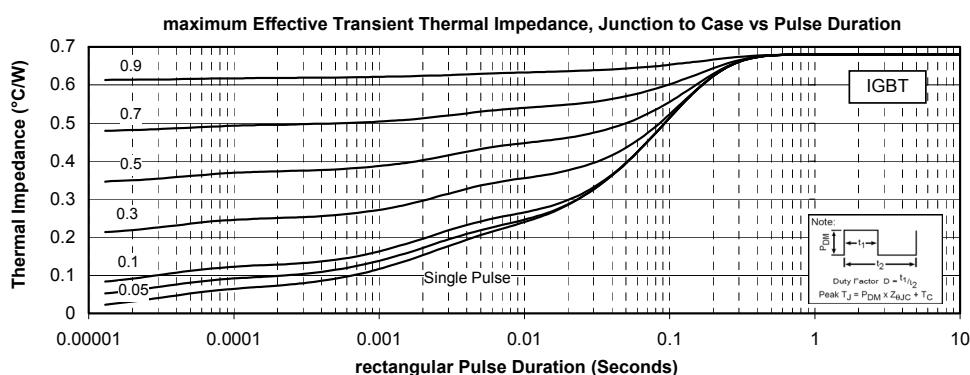
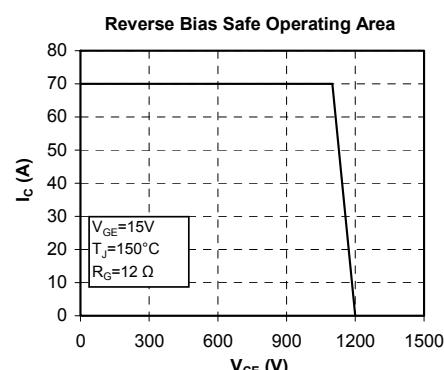
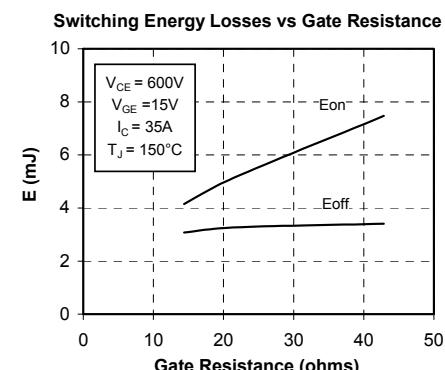
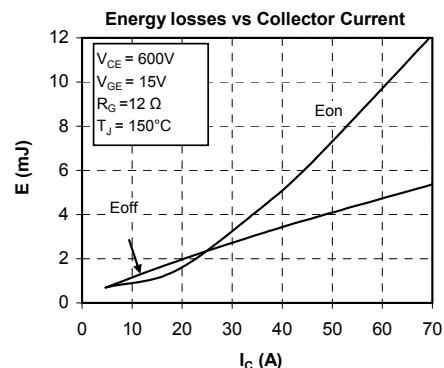
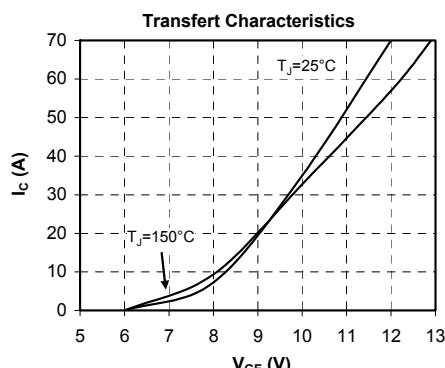
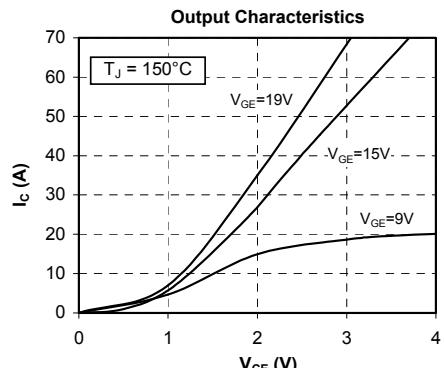
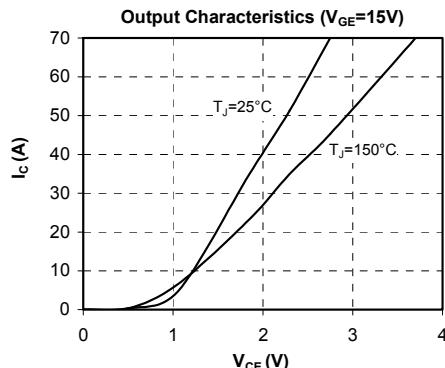
Symbol	Characteristic		Min	Typ	Max	Unit
R <sub>25</sub>	Resistance @ 25°C		50			kΩ
ΔR <sub>25</sub> /R <sub>25</sub>			5			%
B <sub>25/85</sub>	T <sub>25</sub> = 298.15 K		3952			K
ΔB/B		T <sub>C</sub> =100°C	4			%

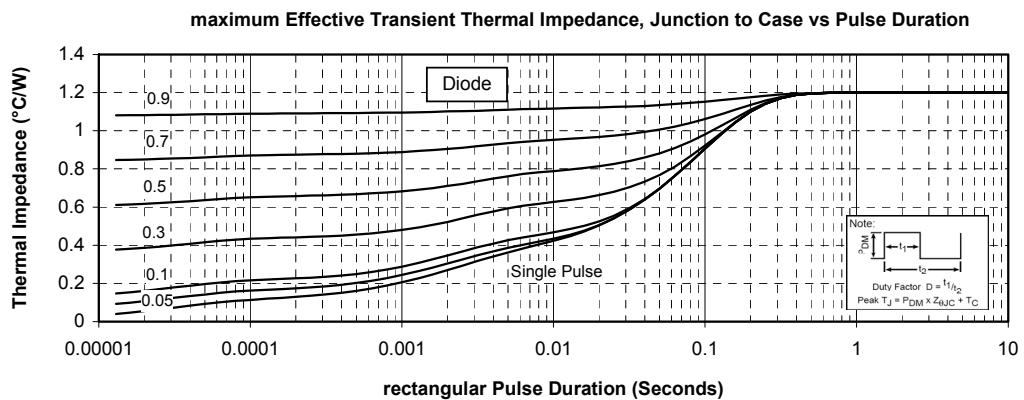
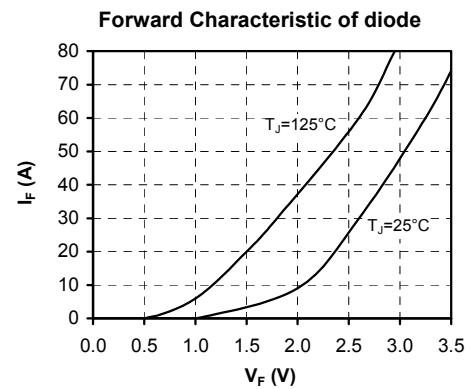
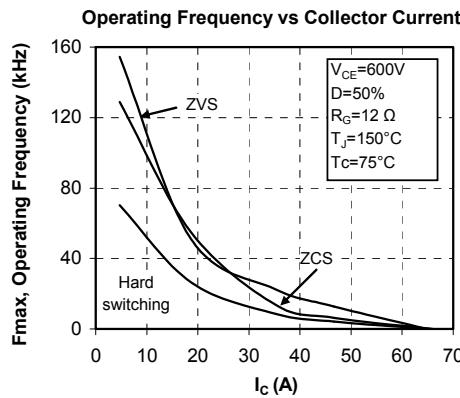
$$R_T = \frac{R_{25}}{\exp\left[B_{25/85}\left(\frac{1}{T_{25}} - \frac{1}{T}\right)\right]} \quad \begin{array}{l} T: \text{Thermistor temperature} \\ R_T: \text{Thermistor value at } T \end{array}$$

**Thermal and package characteristics**

Symbol	Characteristic		Min	Typ	Max	Unit
R <sub>thJC</sub>	Junction to Case Thermal Resistance	IGBT			0.68	°C/W
		Diode			1.2	
V <sub>ISOL</sub>	RMS Isolation Voltage, any terminal to case t=1 min, 50/60Hz		4000			V
T <sub>J</sub>	Operating junction temperature range		-40		175	°C
T <sub>STG</sub>	Storage Temperature Range		-40		125	
T <sub>C</sub>	Operating Case Temperature		-40		100	
Torque	Mounting torque	To heatsink	M4	2	3	N.m
Wt	Package Weight				80	g

**SP1 Package outline** (dimensions in mm)

 See application note 1904 - Mounting Instructions for SP1 Power Modules on [www.microsemi.com](http://www.microsemi.com)

**Typical Performance Curve**




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