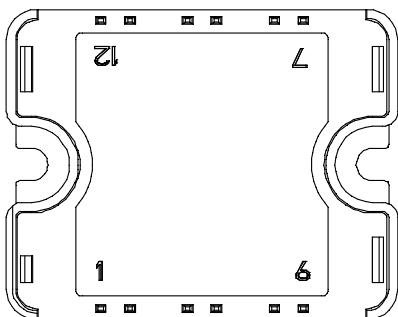
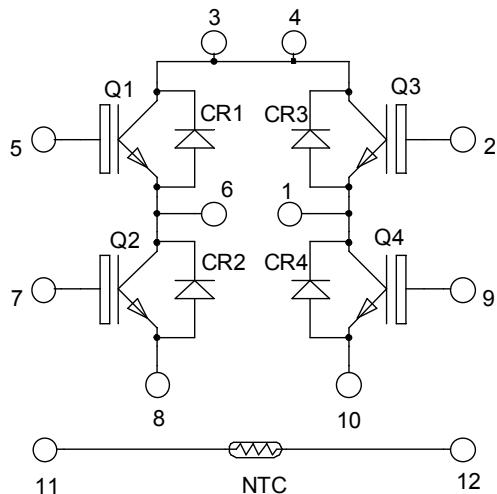


Full bridge Trench + Field Stop IGBT4 Power Module

$$V_{CES} = 1200V$$

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



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	± 20	V
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

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	μA
$V_{CE(\text{sat})}$	Collector Emitter saturation Voltage	$V_{GE} = 15\text{V}$	$T_j = 25^\circ\text{C}$		1.85	2.25	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	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	$V_{GE} = 0\text{V}$ $V_{CE} = 25\text{V}$ $f = 1\text{MHz}$			1950		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		μC
$T_{d(on)}$	Turn-on Delay Time	Inductive Switching (25°C) $V_{GE} = \pm 15\text{V}$ $V_{CE} = 600\text{V}$ $I_C = 35\text{A}$ $R_G = 12\Omega$			130		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°C) $V_{GE} = \pm 15\text{V}$ $V_{CE} = 600\text{V}$ $I_C = 35\text{A}$ $R_G = 12\Omega$			150		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		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		A

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	$V_R = 1200\text{V}$	$T_j = 25^\circ\text{C}$			100	μA	
			$T_j = 150^\circ\text{C}$			500		
I_F	DC Forward Current		$T_c = 80^\circ\text{C}$		30		A	
V_F	Diode Forward Voltage	$I_F = 30\text{A}$			2.6	3.1	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		ns	
			$T_j = 125^\circ\text{C}$		380			
Q_{rr}	Reverse Recovery Charge		$T_j = 25^\circ\text{C}$		360		nC	
			$T_j = 125^\circ\text{C}$		1700			

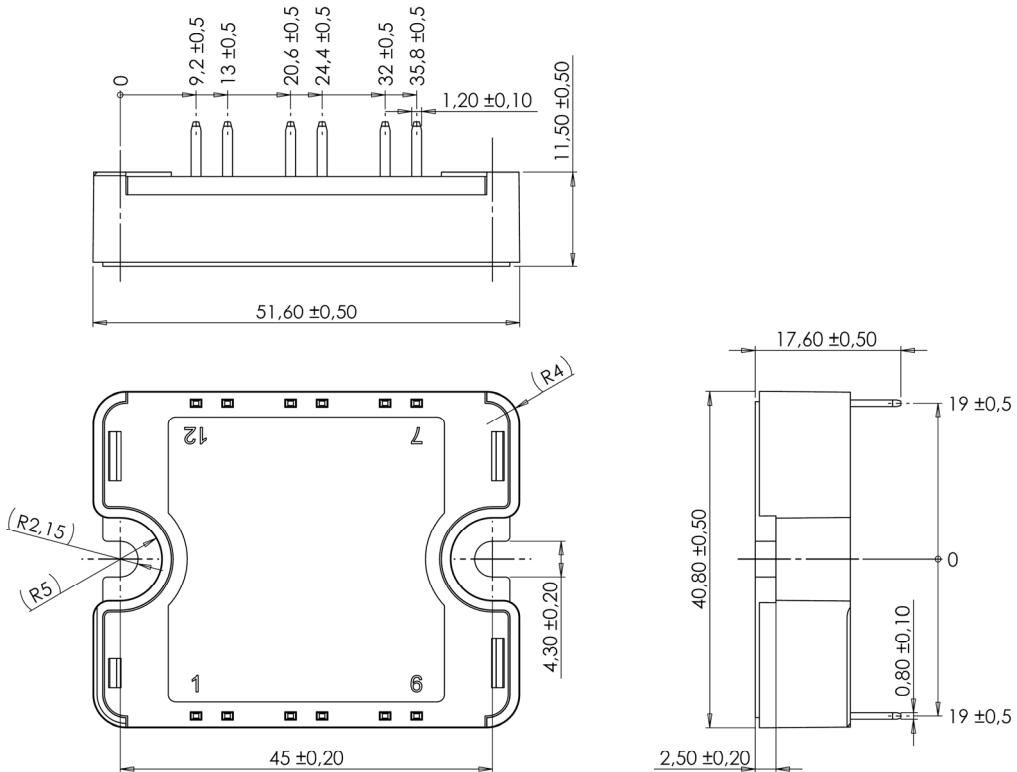
Temperature sensor NTC (see application note APT0406 on www.microsemi.com for more information).

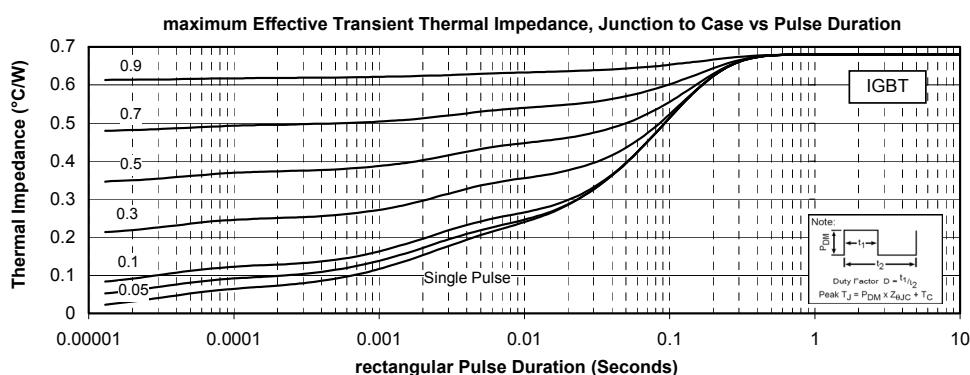
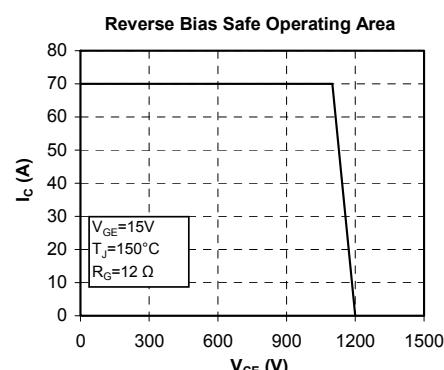
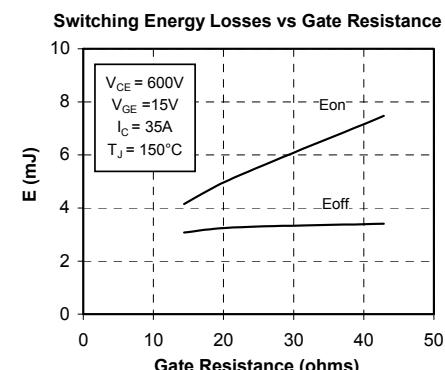
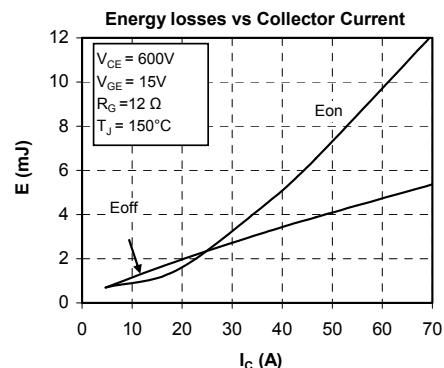
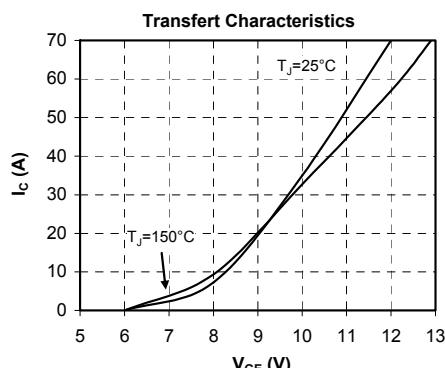
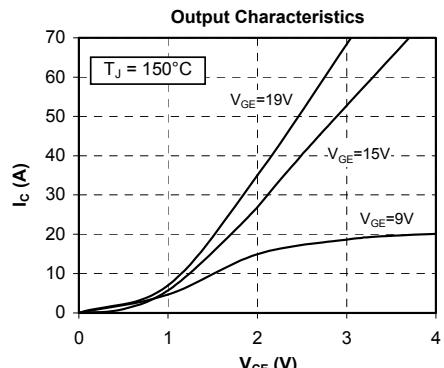
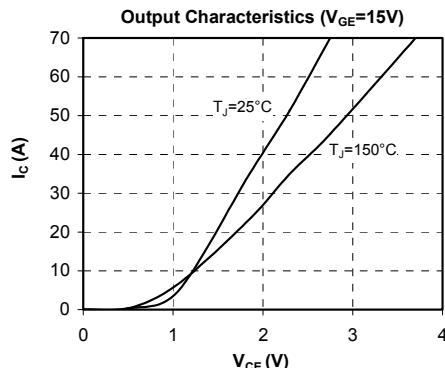
Symbol	Characteristic		Min	Typ	Max	Unit
R ₂₅	Resistance @ 25°C		50			kΩ
ΔR ₂₅ /R ₂₅			5			%
B _{25/85}	T ₂₅ = 298.15 K		3952			K
ΔB/B		T _C =100°C	4			%

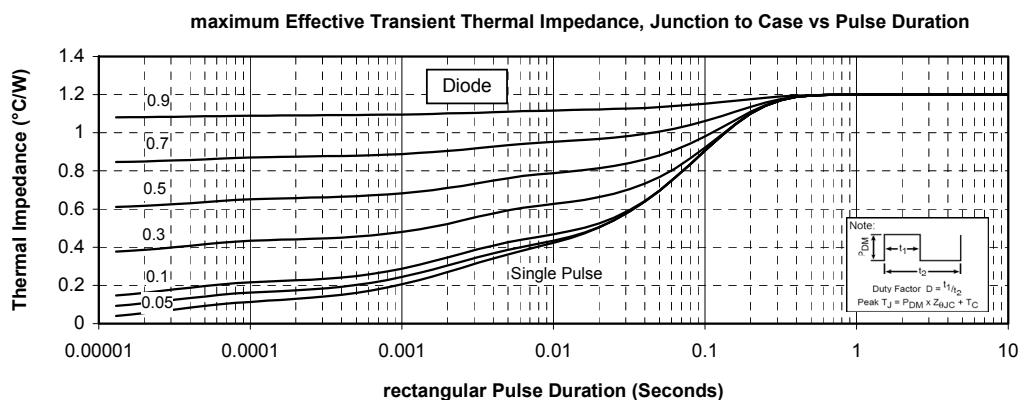
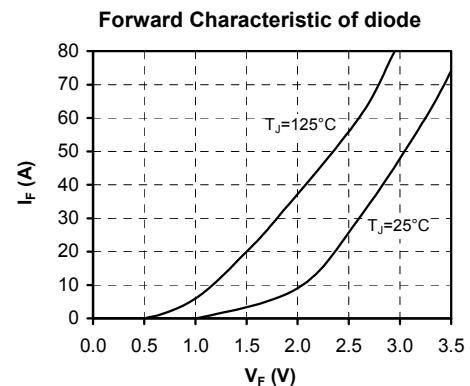
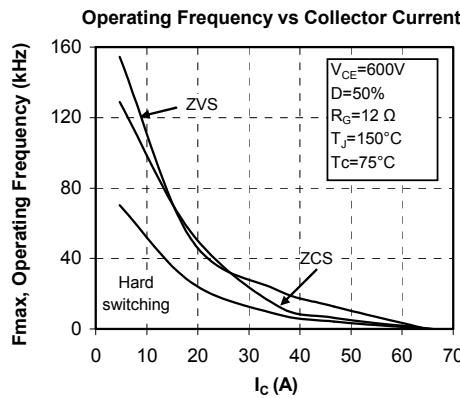
$$R_T = \frac{R_{25}}{\exp\left[B_{25/85}\left(\frac{1}{T_{25}} - \frac{1}{T}\right)\right]} \quad \begin{array}{l} T: \text{Thermistor temperature} \\ R_T: \text{Thermistor value at } T \end{array}$$

Thermal and package characteristics

Symbol	Characteristic		Min	Typ	Max	Unit
R _{thJC}	Junction to Case Thermal Resistance	IGBT			0.68	°C/W
		Diode			1.2	
V _{ISOL}	RMS Isolation Voltage, any terminal to case t=1 min, 50/60Hz		4000			V
T _J	Operating junction temperature range		-40		175	°C
T _{STG}	Storage Temperature Range		-40		125	
T _C	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

Typical Performance Curve




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