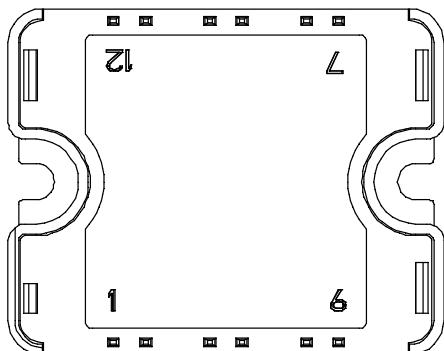
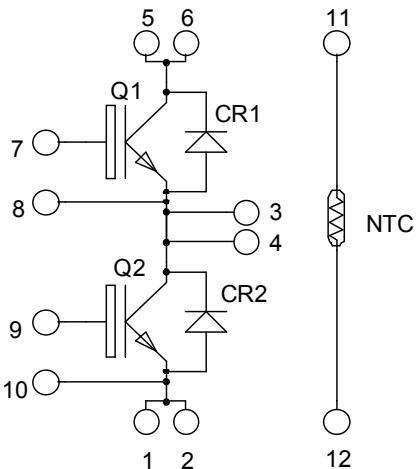


Phase leg
Trench + Field Stop IGBT3
Power Module

V_{CES} = 1700V
I_C = 50A @ T_c = 80°C



Pins 1/2 ; 3/4 ; 5/6 must be shorted together

Application

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

Features

- Trench + Field Stop IGBT3 Technology
 - Low voltage drop
 - Low tail current
 - Switching frequency up to 20 kHz
 - Soft recovery parallel diodes
 - Low diode VF
 - Low leakage current
 - RBSOA and SCSOA rated
- Very low stray inductance
 - Symmetrical design
- Internal thermistor for temperature monitoring
- 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
- Low profile
- RoHS Compliant

Absolute maximum ratings

Symbol	Parameter	Max ratings	Unit
V _{CES}	Collector - Emitter Breakdown Voltage	1700	V
I _C	Continuous Collector Current	T _C = 25°C	A
		T _C = 80°C	
I _{CM}	Pulsed Collector Current	T _C = 25°C	100
V _{GE}	Gate – Emitter Voltage	±20	V
P _D	Maximum Power Dissipation	T _C = 25°C	312
RBSOA	Reverse Bias Safe Operating Area	T _j = 125°C	100A @ 1600V

 **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	$V_{GE} = 0\text{V}$, $V_{CE} = 1700\text{V}$				250	μA
$V_{CE(\text{sat})}$	Collector Emitter Saturation Voltage	$V_{GE} = 15\text{V}$	$T_j = 25^\circ\text{C}$		2.0	2.4	V
		$I_C = 50\text{A}$	$T_j = 125^\circ\text{C}$		2.4		
$V_{GE(\text{th})}$	Gate Threshold Voltage	$V_{GE} = V_{CE}$, $I_C = 1\text{mA}$		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	$V_{GE} = 0\text{V}$ $V_{CE} = 25\text{V}$ $f = 1\text{MHz}$			4400		pF
C_{oes}	Output Capacitance				180		
C_{res}	Reverse Transfer Capacitance				150		
$T_{d(on)}$	Turn-on Delay Time	$V_{GE} = 15\text{V}$ $V_{Bus} = 900\text{V}$ $I_C = 50\text{A}$ $R_G = 10\Omega$	Inductive Switching (25°C)		370		ns
T_r	Rise Time				40		
$T_{d(off)}$	Turn-off Delay Time				650		
T_f	Fall Time				180		
$T_{d(on)}$	Turn-on Delay Time	$V_{GE} = 15\text{V}$ $V_{Bus} = 900\text{V}$ $I_C = 50\text{A}$ $R_G = 10\Omega$	Inductive Switching (125°C)		400		ns
T_r	Rise Time				50		
$T_{d(off)}$	Turn-off Delay Time				800		
T_f	Fall Time				300		
E_{on}	Turn-on Switching Energy	$V_{GE} = 15\text{V}$ $V_{Bus} = 900\text{V}$ $I_C = 50\text{A}$ $R_G = 10\Omega$	$T_j = 125^\circ\text{C}$		16		mJ
E_{off}	Turn-off Switching Energy		$T_j = 125^\circ\text{C}$		15		

Reverse diode ratings and characteristics

Symbol	Characteristic	Test Conditions		Min	Typ	Max	Unit	
V_{RRM}	Maximum Peak Repetitive Reverse Voltage			1700			V	
I_{RM}	Maximum Reverse Leakage Current	$V_R = 1700\text{V}$	$T_j = 25^\circ\text{C}$			250	μA	
			$T_j = 125^\circ\text{C}$			500		
I_F	DC Forward Current		$T_c = 80^\circ\text{C}$		50		A	
V_F	Diode Forward Voltage	$I_F = 50\text{A}$	$T_j = 25^\circ\text{C}$		1.8	2.2	V	
			$T_j = 125^\circ\text{C}$		1.9			
t_{rr}	Reverse Recovery Time	$I_F = 50\text{A}$ $V_R = 900\text{V}$ $di/dt = 800\text{A}/\mu\text{s}$	$T_j = 25^\circ\text{C}$		385		ns	
			$T_j = 125^\circ\text{C}$		490			
Q_{rr}	Reverse Recovery Charge		$T_j = 25^\circ\text{C}$		14		μC	
			$T_j = 125^\circ\text{C}$		23			
E_r	Reverse Recovery Energy		$T_j = 25^\circ\text{C}$		6		mJ	
			$T_j = 125^\circ\text{C}$		12			

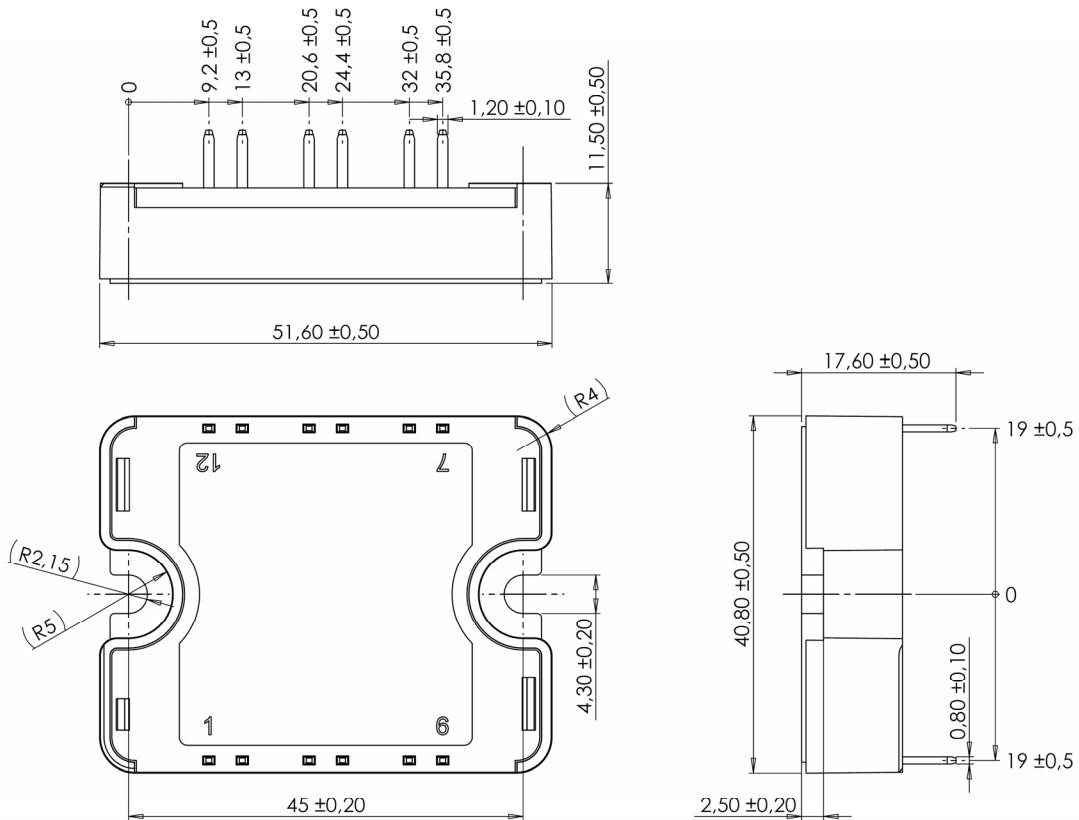
Thermal and package characteristics

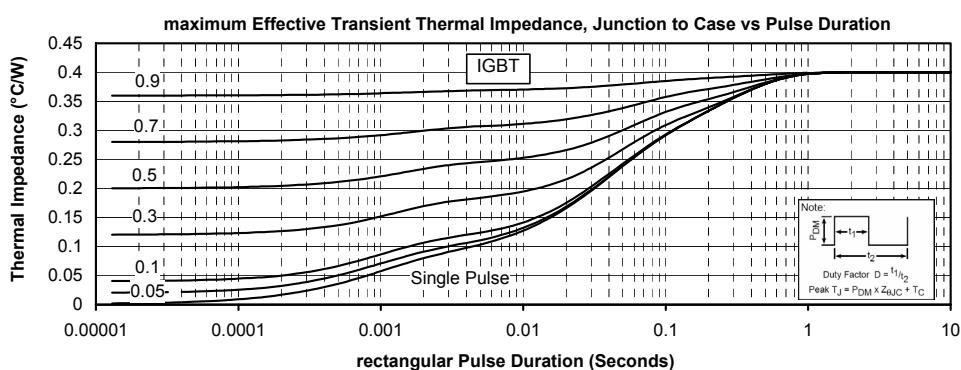
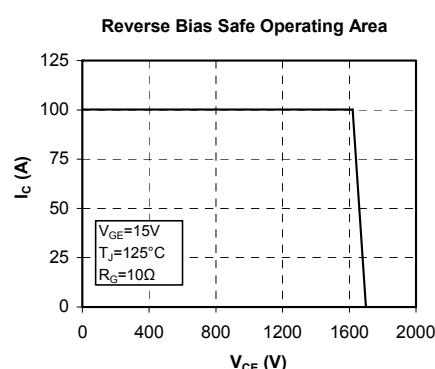
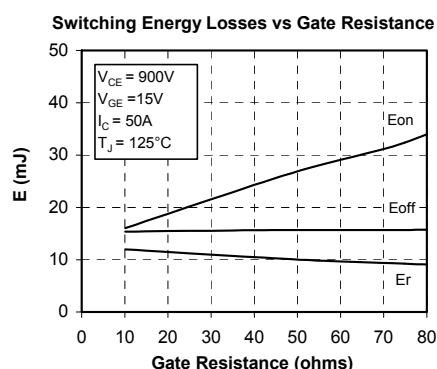
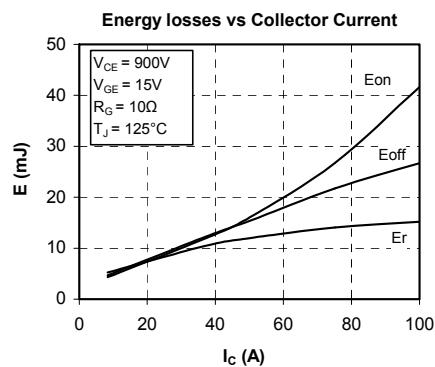
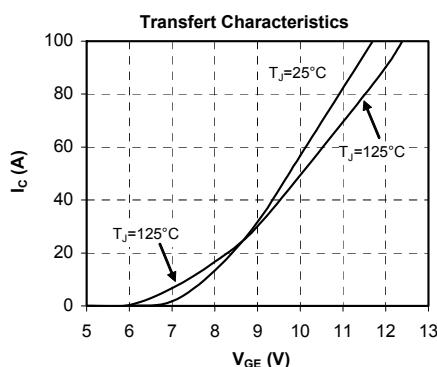
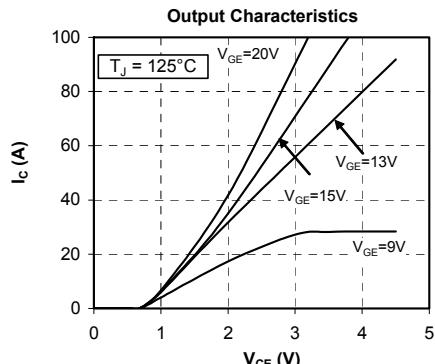
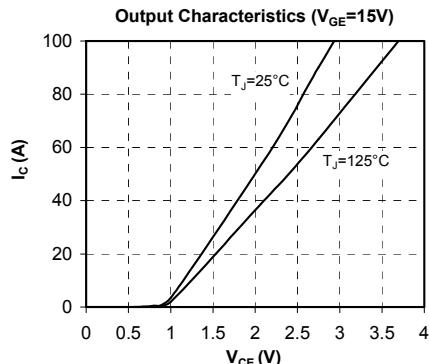
Symbol	Characteristic		Min	Typ	Max	Unit
R _{thJC}	Junction to Case Thermal Resistance	IGBT			0.40	°C/W
		Diode			0.70	
V _{ISOL}	RMS Isolation Voltage, any terminal to case t=1 min, 50/60Hz		4000			V
T _J	Operating junction temperature range		-40		150	°C
T _{STG}	Storage Temperature Range		-40		125	
T _C	Operating Case Temperature		-40		100	
Torque	Mounting torque	To heatsink	M4	2	3	N.m
Wt	Package Weight				80	g

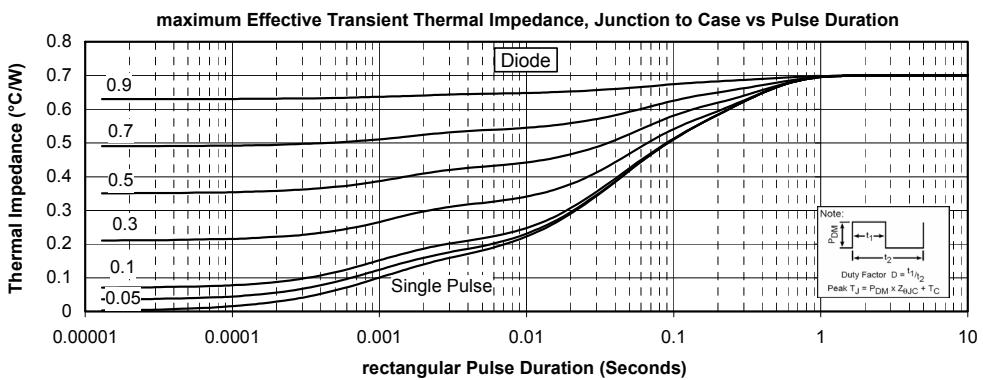
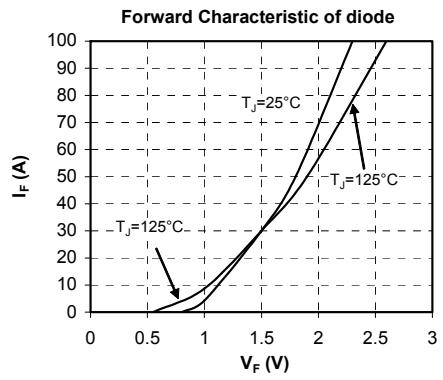
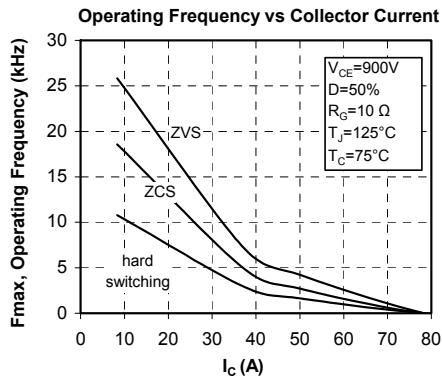
Temperature sensor NTC (see application note APT0406 on www.microsemi.com for more information).

Symbol	Characteristic		Min	Typ	Max	Unit
R ₂₅	Resistance @ 25°C			50		kΩ
B _{25/85}	T ₂₅ = 298.15 K			3952		K

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

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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