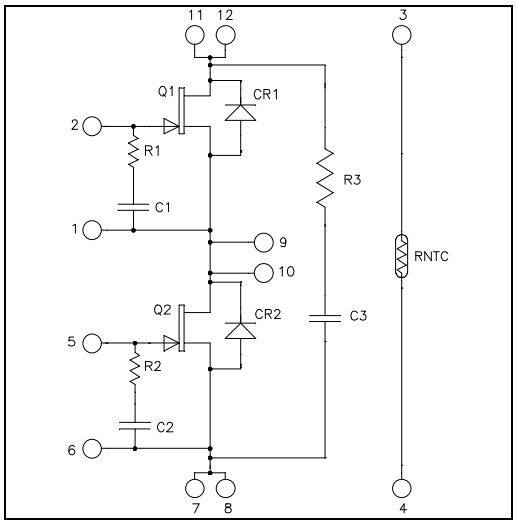
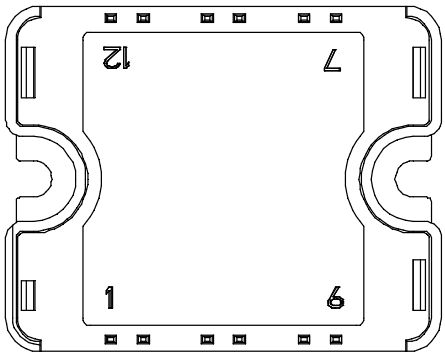
APTJC120AM13VCT1AG

Phase leg
SiC Power Module

V_{DSX} = 1200V
R_{DSon} = 13 mΩ max @ T_j = 25 °C
I_D = 100 A @ T_c = 50 °C





Pins 7/8; 9/10; 11/12 must be shorted together

Application

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

Features

- ***SiC JFET*** ❶***, Normally off*** (8 * SJEC120R100 in parallel per switch)
- ***SiC Schottky Diode*** ❶ (2 * SDC30S120 in parallel per switch)
  - Zero reverse recovery
  - Zero forward recovery
  - Temperature-independent switching behavior
  - Positive temperature coefficient on V_F
- Very low stray inductance
- Internal RC decoupling snubber
- High level of integration
- AlN substrate for improved thermal performance
- Internal thermistor for temperature monitoring
- Semisouth driver board (SGDR2500P2) recommended for this module)

Benefits

- Outstanding performance at high-frequency operation
- Direct mounting to heatsink (isolated package)
- Low junction-to-case thermal resistance
- Solderable terminals for both power and signal for easy PCB mounting
- Low profile
- RoHS Compliant

All ratings @ T_j = 25°C unless otherwise specified

CAUTION: These Devices are sensitive to Electrostatic Discharge. Proper Handling Procedures Should Be Followed. See application note APT0502 on www.microsemi.com

❶ *SiC JFET and SiC Schottky diode are from* SemiSouth

Electrical Characteristics

Symbol	Characteristic	Test Conditions	Min	Typ	Max	Unit
V_{DSX}	Drain-Source & Drain-Gate Blocking Voltage	$V_{GS} \leq 0V$, $I_D < I_{DSS}$	1200			V
I_{GL}	Total Gate-Source Leakage	$V_{GS} > -15$ V, $V_{DS} = 0$ V			2.4	mA
I_{DSS}	Off -State Drain Current	$V_{GS} \leq -5$ V, $V_{DS} = 1200$ V			1.6	mA
$R_{DS(on)}$	Drain-Source On-state Resistance	$V_{GS} = 2.5V$, $I_D = 40$ A			13	mΩ
R_G	Internal Gate Resistance (per JFET)	Drain-source shorted, f= 1MHz			1.5	Ω
V_{th}	Threshold Voltage	$V_{DS} = 1V$, $I_{DS} = 300$ mA	0.75	1.00	1.25	V
I_D	Continuous Drain Current	$T_c = 50°C$, $T_J=125°C$			100	A
		$T_c = 80°C$, $T_J=125°C$			75	
P_D	Maximum Power Dissipation				357	W

SiC diode ratings and characteristics

Symbol	Characteristic	Test Conditions		Min	Typ	Max	Unit
V_{RRM}	Maximum Peak Repetitive Reverse Voltage			1200			V
I_R	Reverse Leakage Current	$V_R = 1200$ V	$T_j = 25$ °C		60	600	μA
			$T_j = 175$ °C		1200		
$I_{F(AV)}$	Continuous Forward Current	$T_c < 145$ °C			60		A
V_F	Diode Forward Voltage	$I_F = 60$ A	$T_j = 25$ °C		1.6		V
			$T_j = 175$ °C		2.4	2.9	
Q_C	Total Capacitive Charge	$I_F = 60$ A, $V_R = 400$ V di/dt = 1000 A/μs			260		nC
C	Total Capacitance	f = 100 kHz, $V_R = 1$ V			7380		pF
		f = 100 kHz, $V_R = 300$ V			304		
		f = 100 kHz, $V_R = 600$ V			212		

Output resistance and capacitor characteristics

Symbol	Characteristic	Min	Typ	Max	Unit
R_3	Input impedance		4		Ω
R_{3tol}	Tolerance		5		%
P_{D3}	Power dissipation		5		W
C_3	Ceramic Capacitor value		4.7		nF
C_{3tol}	Tolerance		10		%
Ur_{dc3}	Rated DC voltage		1000		V

Input resistance and capacitor characteristics

Symbol	Characteristic		Min	Typ	Max	Unit
R_i	Input impedance	i=1, 2		1		Ω
R_{itol}	Tolerance			5		%
P_{Di}	Power dissipation			1		W
C_i	Ceramic Capacitor value	i=1, 2		33		nF
C_{itol}	Tolerance			10		%
Ur_{dci}	Rated DC voltage			50		V

Temperature sensor NTC

Symbol	*Characteristic*	*Min*	*Typ*	*Max*	*Unit*
R_{25}	Resistance @ 25 °C		22		kΩ
$\Delta R_{25}/R_{25}$	Resistance tolerance			5	%
$\Delta B/B$	Beta tolerance			3	
$B_{25/100}$	T_{25} = 298.16 K		3980		K

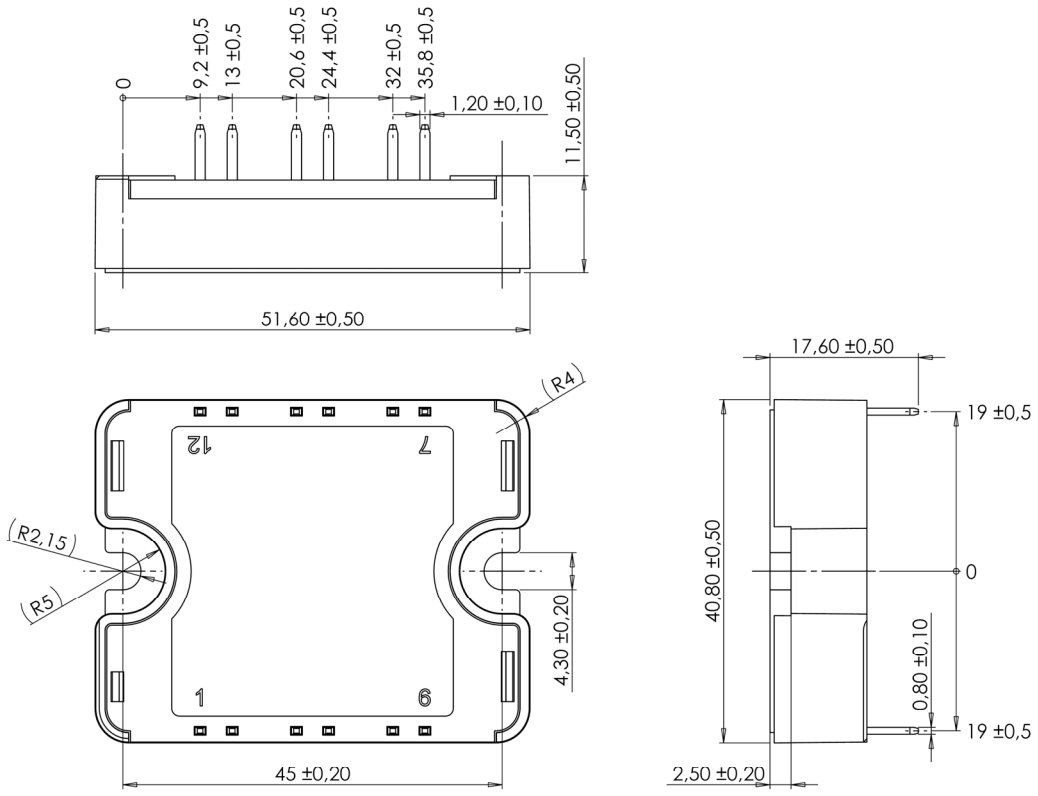
$$R_T = \frac{R_{25}}{\exp\left[B_{25/100}\left(\frac{1}{T_{25}} - \frac{1}{T}\right)\right]}$$

T: Thermistor temperature
R_T: Thermistor value at T

Thermal and package characteristics

Symbol	*Characteristic*			*Min*	*Typ*	*Max*	*Unit*
R_{thJC}	Junction to Case Thermal Resistance		JFET			0.35	°C/W
			Diode			0.72	
V_{ISOL}	RMS Isolation Voltage, any terminal to case t =1 min, 50/60 Hz			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 heat sink	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

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