

1200 VOLT, 40 AMP MOSFET FULL-BRIDGE MODULE

Features

- Electrically isolated, base-less construction
- Light weight, low profile standard package
- Aluminum nitride substrate
- High temperature engineering plastic shell construction
- Enhanced die coating
- Die back metal change from Silver to Gold



ELECTRICAL CHARACTERISTICS PER MOSFET LEG

(T_J=25°C UNLESS OTHERWISE SPECIFIED)

SYMBOL	PARAMETER	MIN	TYP	MAX	UNIT
MOSFET SPECIFICATIONS					
BV _{DSS}	Drain to Source Breakdown Voltage I _D = 100 μA, V _{GS} = 0V	1200	-	-	V
I _D	Continuous Drain Current T _C = 25°C T _C = 100°C	-	-	60 40	A
I _{D(pulse)}	Pulsed Drain Current, 1ms	-	-	160	A
V _{GS}	Gate to Source Voltage	-	-	-10/+25	V
I _{GSS}	Gate-Source Leakage Current, V _{GS} = +20V	-	-	250	nA
V _{GS(th)}	Gate Threshold Voltage, I _D = 10mA, V _{DS} = V _{GS}	2.0 1.4	3.2 2.3	4.0 3.2	V
I _{DSS}	Zero Gate Voltage Drain Current V _{DS} = 1200 V, V _{GS} = 0V	-	1	100	μA
R _{DS(on)}	Drain-Source On-State Resistance I _D = 40A, V _{GS} = 20V	- -	45 89	57 115	mΩ
C _{iss}	Input Capacitance	-	1893	-	pF
C _{oss}	Output Capacitance	-	150	-	
C _{rss}	Reverse Transfer Cap. V _{DS} = 1000 V, V _{GS} = 0 V, f = 1 MHz, V _{AC} = 25 mV	-	10	-	
t _{D(on)}	Turn On Delay Time	-	15	-	ns
t _R	Rise Time	-	52	-	
t _{D(off)}	Turn Off Delay Time	-	26	-	
t _F	Fall Time V _{DS} = 800 V, I _D = 40A, V _{GS} = -5/+20V, R _G = 2.5Ω, R _L = 20Ω	-	34	-	
E _{AS}	Avalanche Energy, Single Pulse I _D = 40A, V _{DS} = 50V	-	2	-	J
E _{ON}	Turn on Energy Loss	-	1000	-	μJ
E _{OFF}	Turn off Energy Loss V _{DS} = 800 V, I _D = 40A, V _{GS} = -5/+20V, R _G = 2.5Ω, L = 80μH	-	400	-	
R _{G(int)}	Internal Gate Resistance f = 1MHz, V _{AC} = 25mV	-	1.8	-	Ω
Q _{GS}	Gate to Source Charge	-	29	-	nC
Q _{GD}	Gate to Drain Charge	-	45	-	
Q _G	Total Gate Charge V _{DS} = 800 V, I _D = 40A, V _{GS} = -5/+20V	-	131	-	

MOSFET BODY DIODE CHARACTERISTICS

(T_J=25°C UNLESS OTHERWISE SPECIFIED)

SYMBOL	PARAMETER	MIN	TYP	MAX	UNIT
DIODE SPECIFICATIONS					
V _{SD}	Diode Forward Voltage V _{GS} = -5V, I _{SD} = 20A		T _J = 25°C 4.2 T _J = 150°C 3.7	4.5 4.0	V
I _S	Continuous Forward Current, T _J = 25°C	-	-	60	A
t _{rr}	Reverse Recovery Time V _{GS} = -5V, I _{SD} = 40A, V _R = 800V, di/dt = 1406A/μs	-	63	-	ns
Q _{rr}	Reverse Recovery Charge V _{GS} = -5V, I _{SD} = 40A, V _R = 800V, di/dt = 1406A/μs	-	964	-	nC
I _{rrm}	Peak Reverse Recovery Current V _{GS} = -5V, I _{SD} = 40A, V _R = 800V, di/dt = 1406A/μs	-	18	-	A

REVERSE SiC DIODE CHARACTERISTICS

(T_J=25°C UNLESS OTHERWISE SPECIFIED)

SYMBOL	PARAMETER	MIN	TYP	MAX	UNIT
DIODE SPECIFICATIONS					
V _{SD}	Diode Forward Voltage I _F = 20A		T _J = 25°C 1.5 T _J = 150°C 2.2	1.8 3.0	V
I _F	Continuous Forward Current T _J = 150°C	-	-	20	A
I _{FRM}	Repetitive Peak Forward Surge Current t _p = 10ms, Half Sine Pulse T _J = 25°C T _J = 110°C			91 61	A
I _R	Reverse Current V _R = 1200V T _J = 25°C V _R = 1200V T _J = 150°C	-	35 65	200 400	μA
Q _C	Total Capacitive Charge V _R = 800V, I _F = 20A, di/dt = 200A/μs T _J = 25°C	-	99	-	nC
C	Total Capacitance V _R = 0V, T _J = 25°C, f = 1MHz V _R = 400V, T _J = 25°C, f = 1MHz V _R = 800V, T _J = 25°C, f = 1MHz	-	1500 93 67	-	pF

Note:

- Refer to Schematics for Reverse SiC Diode configuration for SPM1013A, SPM1013B and SPM1013C
- Production units are only tested at room temperature. Low/High temperature operation is guaranteed by design.

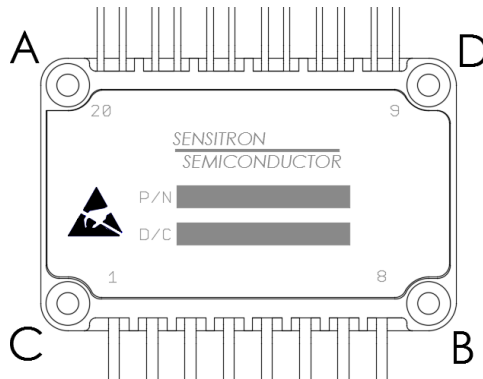
THERMAL AND MECHANICAL CHARACTERISTICS

SYMBOL	PARAMETER	MIN	TYP	MAX	UNIT
R _{θJB_M}	MOSFET Junction-to- Base Plate Thermal Resistance Per Leg	-	0.30	0.36	°C/W
R _{θJB_D}	Diode Junction-to-Base Plate Thermal Resistance Per Leg	-	0.66	0.79	°C/W
V _{iso}	Isolation to Base Plate	-	-	2500	VDC
T _J	Operating Junction Temperature	-55	-	150	°C
T _{STG}	Storage Temperature	-55	-	150	°C
	Mounting Torque for Module Mounting (see installation instructions) #4 Size Screw	3	-	4	in-lbs.
	Weight Module	-	15	20	g

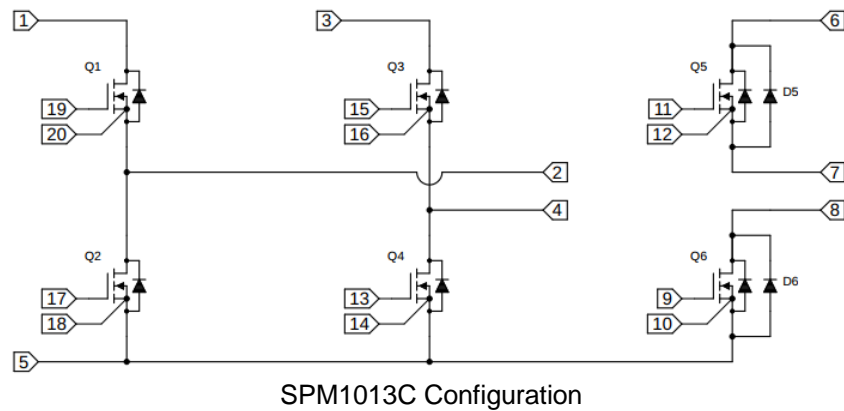
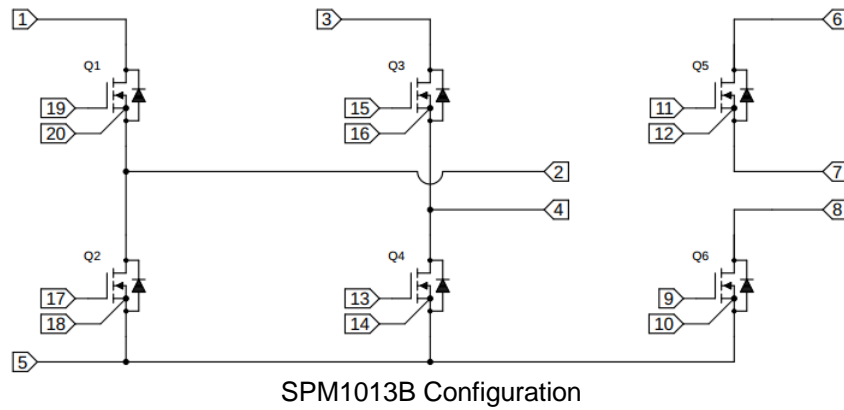
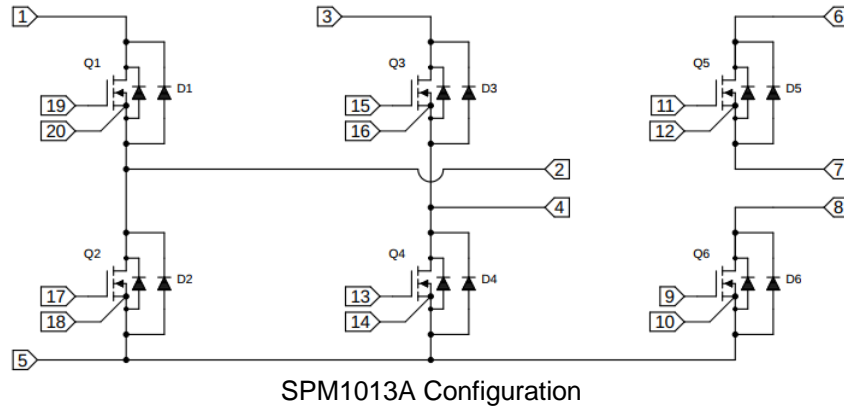
Installation instructions:

Recommended thermal interface material = Laird Tgon 805 (5 mil thick graphite pad)

1. Fasten screws to 1 to 2 in-lb. of torque in the following sequence: A, B, C, D.
2. Fasten screws to final torque in the same sequence: A, B, C, D

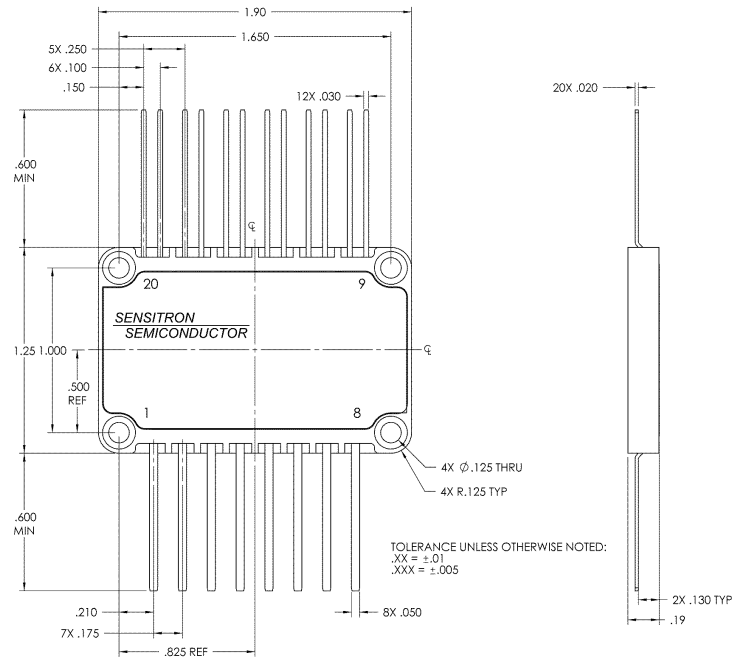


Schematic Diagram:

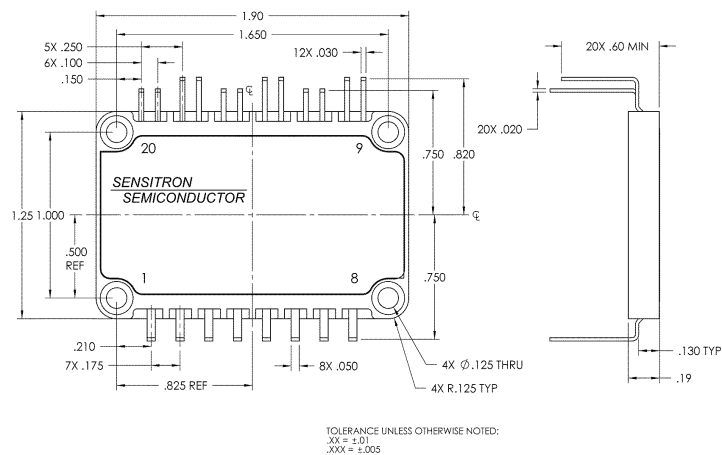


Mechanical Outline (inches):

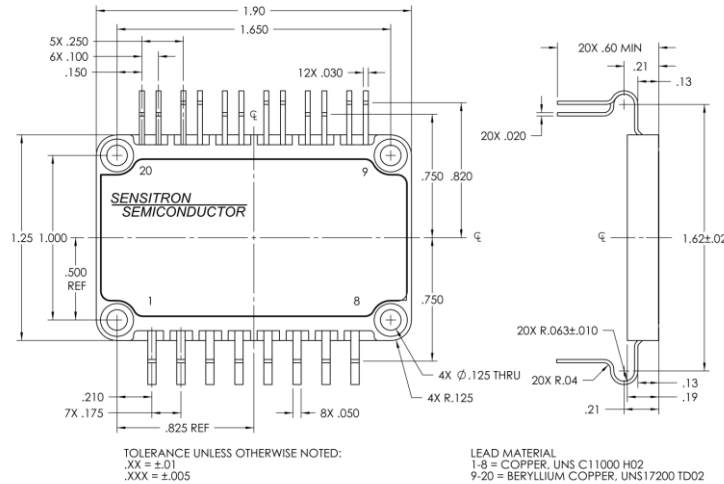
Part Number SPM1013X: Straight leads



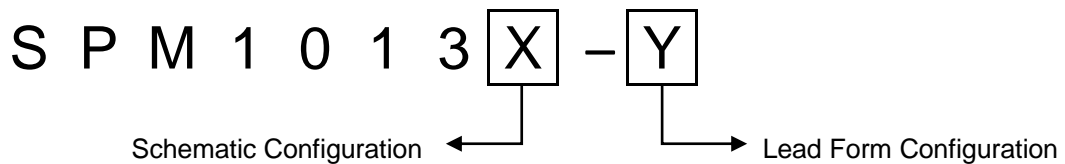
Part Number SPM1013X-1: Leads bent up in staggered configuration



Part Number SPM1013X-2: Leads bent up in staggered configuration with stress relief bend



Part Ordering Information



- “SPM1013X” : SPM1013A, SPM1013B, SPM1013C
- “SPM1013X-1” : SPM1013A-1, SPM1013B-1, SPM1013C-1
- “SPM1013X-2” : SPM1013A-2, SPM1013B-2, SPM1013C-2

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