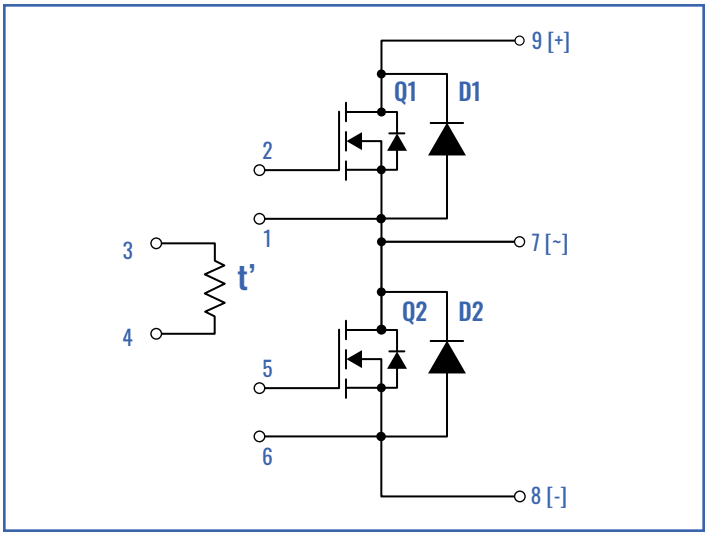
SD11906

SiC Half-Bridge Power Module - 1

V_{DS} = 1200V

R_{DSon} = 13mΩ

I_D = 105A @ T_C = 25°C



PIN CONNECTIONS

PIN	DESCRIPTION
1	S1
2	G1
3	Temp. Monitoring
4	Temp. Monitoring
5	G2
6	S2
7	AC
8	N
9	P

FEATURES & BENEFITS

- SUPERIOR SYSTEM EFFICIENCY DUE TO LOW SWITCHING AND CONDUCTIONS LOSSES OF SIC
- OUTSTANDING POWER CONVERSION EFFICIENCY AT HIGH FREQUENCY OPERATION
- HIGH SPEED SWITCHING W/ LOW CAPACITANCE
- REDUCED PARASITIC INDUCTANCE AND CAPACITANCE
- REAL KELVIN SOURCE CONNECTION FOR STABLE GATE DRIVE
- ISOLATED BACKSIDE FOR DIRECT MOUNT TO HEATSINK
- ALN SUBSTRATE AND CUMO BASEPLATE FOR THERMAL CONDUCTIVITY
- HIGH JUNCTION TEMPERATURE OPERATION
- LOW JUNCTION TO CASE THERMAL RESISTANCE
- REDUCED THERMAL REQUIREMENTS AND SYSTEM COST
- INTEGRATED NTC TEMPERATURE SENSOR
- RUGGED MOUNTING DUE TO INTEGRATED MOUNTING BUSHINGS
- LOW PROFILE COMPACT PACKAGE

Solitron DEVICES, INC.

SD11906
SiC Half-Bridge Power Module - 2

ABSOLUTE MAXIMUM RATINGS (T_C = 25°C)

SYMBOL	CHARACTERISTIC	TEST CONDITIONS	VALUE	UNIT
$V_{DS, max}$	Drain-Source Voltage	V_{GS} = 0V, I_D = 100µA	1200	V
$V_{GS, max}$	Gate-Source Voltage (dynamic)	Absolute maximum values	-8/+19	V
$V_{GS, op}$	Gate-Source Voltage	Recommended operational values	-4/+15	V
I_D	Continuous Drain Current	V_{GS} = 15V	105	A
$I_{D, pulse}$	Pulsed Drain Current	Pulse Width t_p Limited by T_{jmax}	420	A
P_D	Maximum Power Dissipation		265	W
T_J, T_{STG}	Junction Temperature, Operating and Storage		-55 to +175	°C

ELECTRICAL CHARACTERISTICS (T_C = 25°C)

SYMBOL	CHARACTERISTIC	TEST CONDITIONS	MIN.	TYP.	MAX.	UNIT
$V_{(BR)DSS}$	Drain-Source Breakdown Voltage	V_{GS} < 0V, I_D = 100µA	1200			V
$V_{GS(th)}$	Gate Threshold Voltage	V_{DS} = V_{GS}, I_{DS} = 26.5mA, Ta = -55°C		3.263		V
		V_{DS} = V_{GS}, I_{DS} = 26.5mA, Ta = 25°C	1.8	2.5	3.6	
		V_{DS} = V_{GS}, I_{DS} = 26.5mA, Ta = 175°C		2.0		
I_{DSS}	Off -State Drain Current	V_{GS} = 0V, V_{DS} = 1200V		1	40	µA
I_{GSS}	Gate-Source Leakage Current	V_{GS} = +15V, V_{DS} = 0V		10	250	nA
$R_{DS (on)}$	Drain-Source On-state Resistance	V_{GS} = 15V, I_D = 100A, T_J = 25°C	9.0	13	17	mΩ
		V_{GS} = 15V, I_D = 100A, T_J = 175°C		21		
g_{fs}	Transconductance	V_{DS} = 20V, I_{DS} = 100A, T_a = 25°C		71		S
		V_{DS} = 20V, I_{DS} = 100A, T_a = 175°C		72		
C_{iss} *	Input Capacitance	V_{GS} = 0V, V_{DS} = 1000V, f = 100kHz, Vac = 25mV		7560		pF
C_{oss} *	Output Capacitance			284		pF
C_{rss} *	Reverse Transfer Capacitance			18		pF

BODY DIODE RATINGS AND CHARACTERISTICS (T_c = 25°C)

SYMBOL	CHARACTERISTIC	TEST CONDITIONS	MIN.	TYP.	MAX.	UNIT
V_{SD}	Diode Forward Voltage	V_{GS} = 0V, I_{SD} = 40A, T_J = 25°C		2.4		V
		V_{GS} = 0V, I_{SD} = 40A, T_J = 175°C		2.2		V
t_{rr}	Reverse Recovery Time			43		nS
Q_{rr}	Reverse Recovery Charge			1800		nC
I_{rrm}	Peak Reverse Recovery Current			65		A

SiC DIODE RATINGS AND CHARACTERISTICS (T_a = 25°C)

SYMBOL	CHARACTERISTIC	TEST CONDITIONS	MIN.	TYP.	MAX.	UNIT
I_F	Continuous Forward Current	Limited by T_J			20	A
I_{FSM}	Surge No Repetitive Forward Current	PW < 8.3mS, Sinusoidal			82	A
V_R	Reverse Voltage	I_R = 0.4mA	1200			V
V_F	Diode Forward Voltage	I_F = 20A, T_J = 25°C		1.4		V
		I_F = 20A, T_J = 175°C		1.9		V
C	Total Capacitance	V_R = 1V, f = 1MHz		1060		nF
		V_R = 800V, f = 1MHz		85		nF
Q_C	Total Capacitive Charge	V_R = 800V, di/dt = 500A/µS		65		pF

TYPICAL PERFORMANCE

Fig 1: Output Characteristics T_J = -55°C

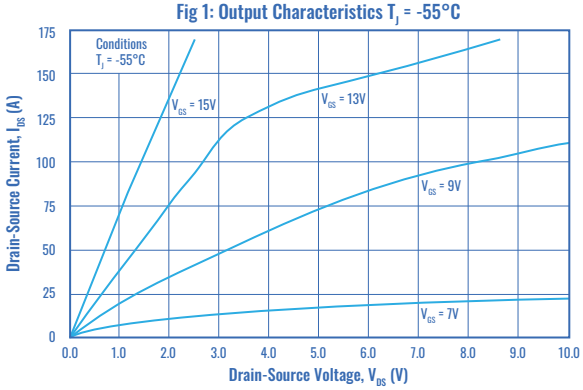


Fig 2: Output Characteristics T_J = +25°C

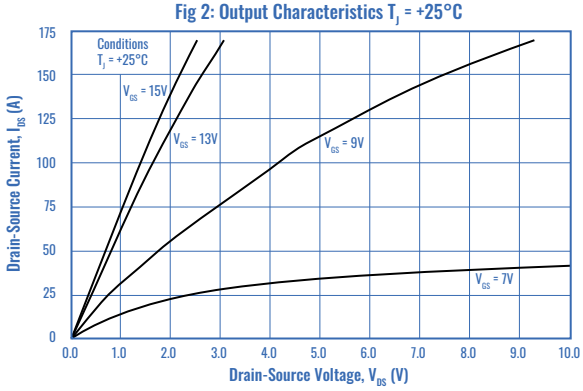


Fig 3: Output Characteristics T_J = +175°C

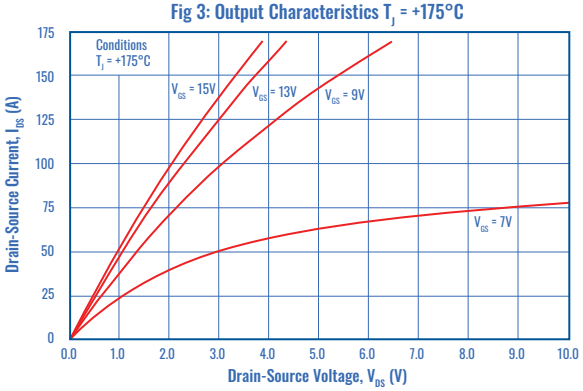


Fig 4:On-Resistance vs. Drain Current

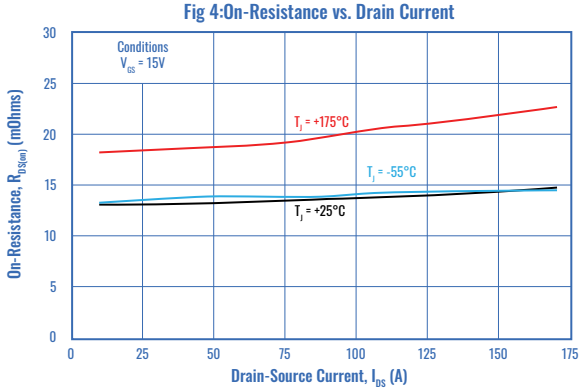


Fig 5: On-Resistance vs. Junction Temperature

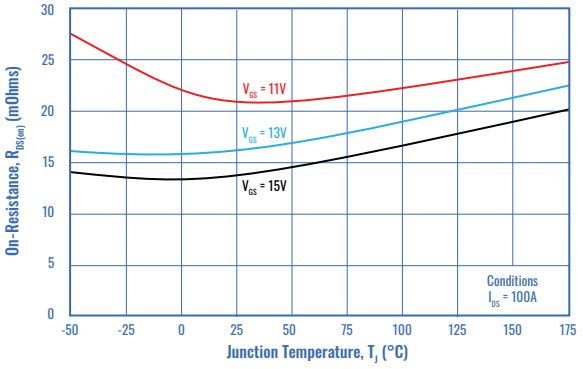


Fig 6: Transfer Characteristic

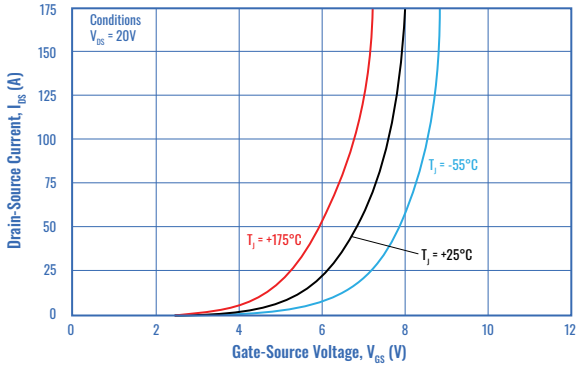


Fig 7: Body Diode Characteristic at Various Temperatures

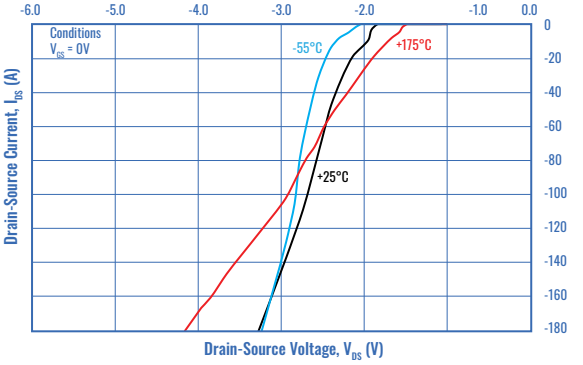
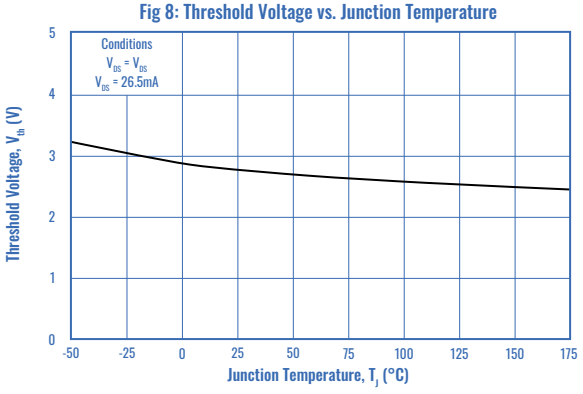


Fig 8: Threshold Voltage vs. Junction Temperature



TYPICAL PERFORMANCE (cont.)

Fig 9: Capacitance vs. Drain-Source Voltage

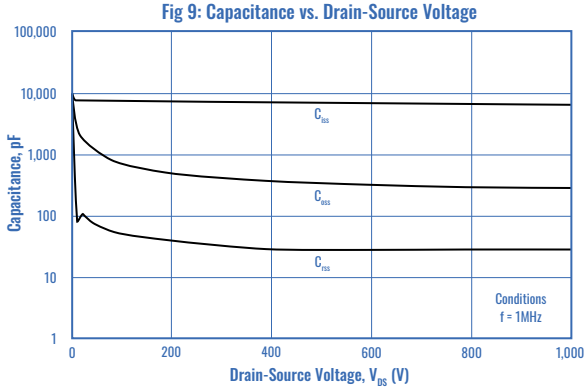


Fig 10: Continuous Drain Current vs. Case Temperature

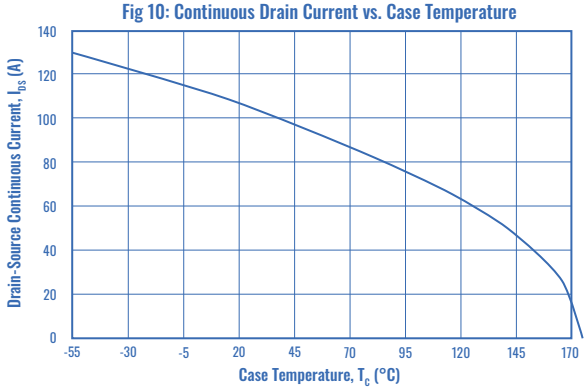


Fig 11: Max. Power Dissipation Rating vs. Case Temperature

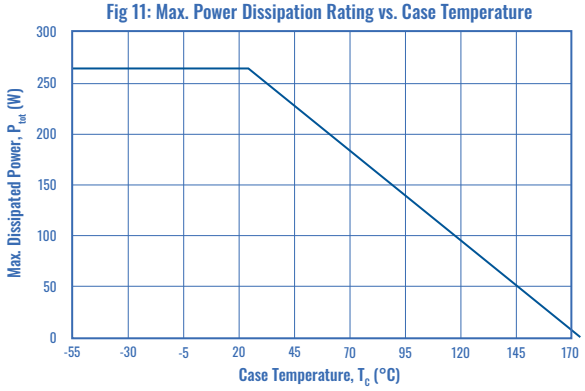


Fig 12: Nominal NTC Resistance vs. NTC Temperature

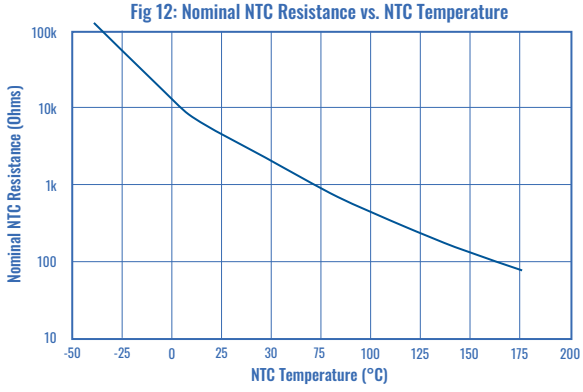


Fig 13: Switching Energy vs. Drain Current (V_{DS} = 600V)

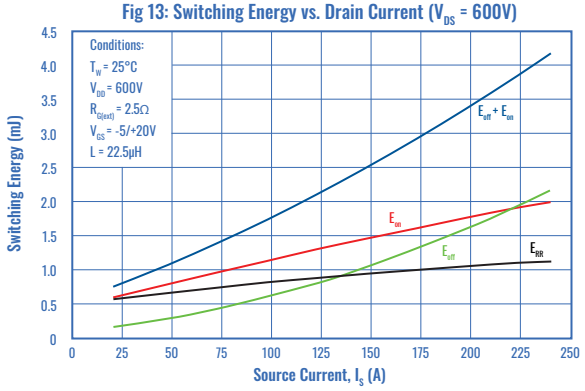


Fig 14: MOSFET Switching Energy vs. External Gate Resistance

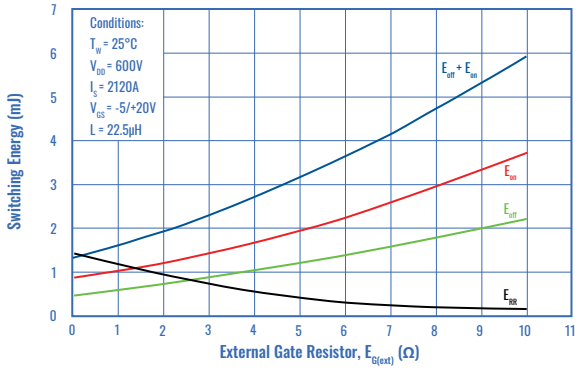


Fig 15: MOSFET Junction-Case Transient Thermal Impedance, Z_{th} J_C (°C/W)

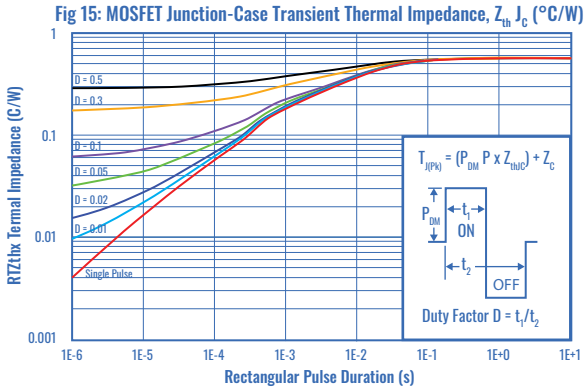
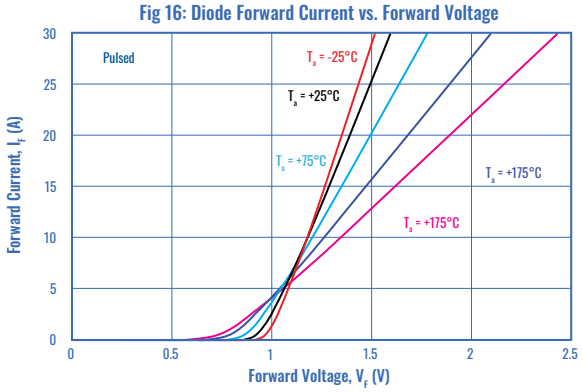
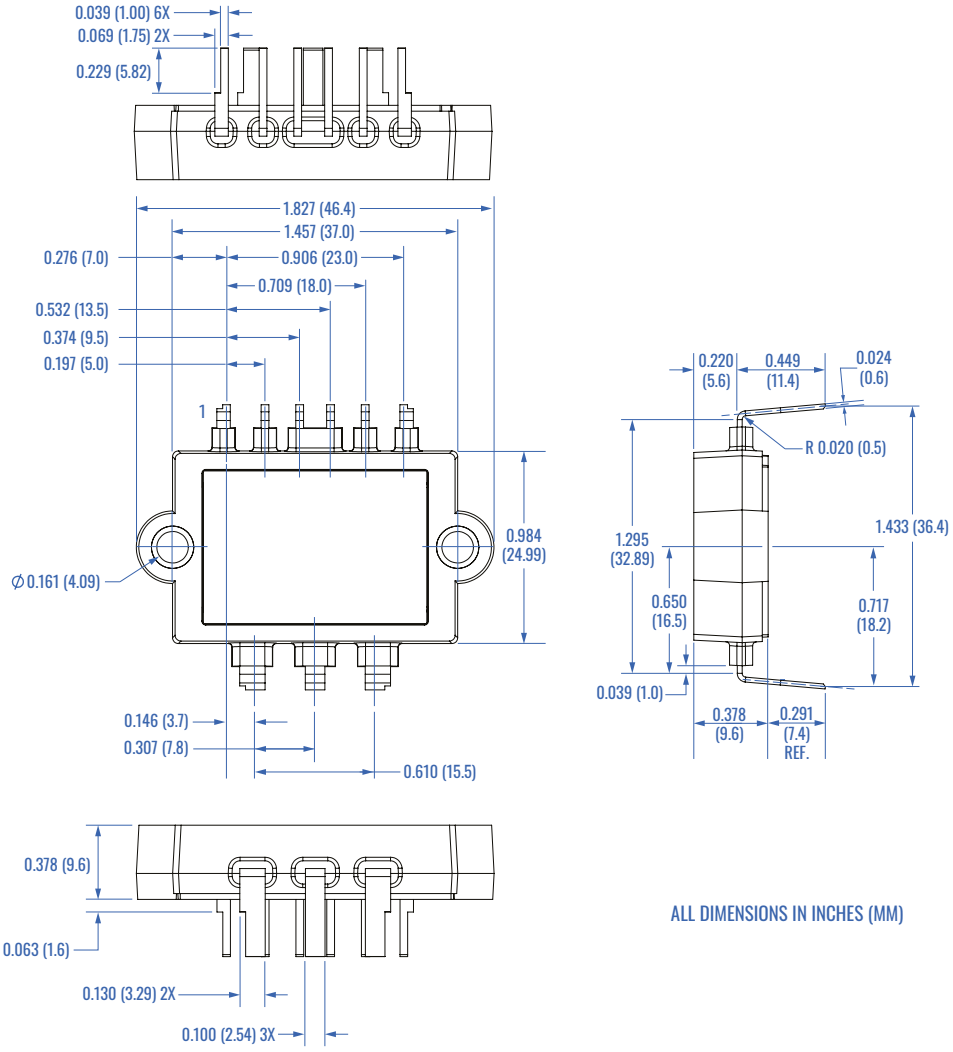


Fig 16: Diode Forward Current vs. Forward Voltage

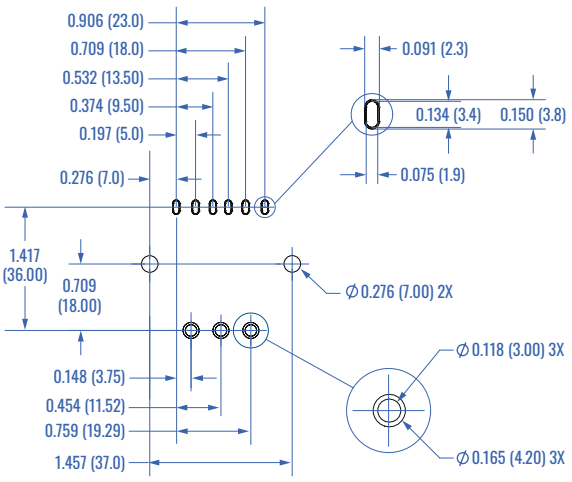


PACKAGE OUTLINE - dimensions in inches (mm)



ALL DIMENSIONS IN INCHES (MM)

PCB HOLE PATTERN



ALTERNATE PCB HOLE PATTERN