

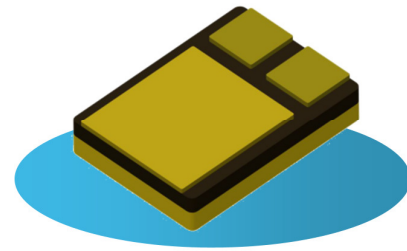
Power and Hybrid

SILICON CARBIDE N-CHANNEL POWER MOSFET



SML25SCM650N2B

- 650V SiC MOSFET In A Hermetic SMD1 (TO-276AB) Package
- Designed For High Temperature / Power Efficiency Applications



ABSOLUTE MAXIMUM RATINGS ($T_C = 25^\circ\text{C}$ unless otherwise stated)

V_{DS}	Drain - Source Voltage	650V
V_{GS}	Gate - Source Voltage	-6 to +22V
I_D	Continuous Drain Current ⁽¹⁾ $T_C = 25^\circ\text{C}$	25A
I_{DM}	Pulsed Drain Current ⁽²⁾	60A
P_D	Total Power Dissipation at $T_J = 25^\circ\text{C}$	90W
	Derate Above 25°C	0.45W/ $^\circ\text{C}$
T_J	Maximum Junction Temperature	225 $^\circ\text{C}$
T_{stg}	Storage Temperature Range	-55 to +225 $^\circ\text{C}$

THERMAL PROPERTIES

Symbols	Parameters	Max.	Units
$R_{\theta JC}$	Thermal Resistance, Junction To Case	2.2	$^\circ\text{C}/\text{W}$

Notes

- (1) Repetitive Rating: Pulse width limited by maximum junction temperature
- (2) Pulse Width $\leq 10 \mu\text{s}$, $\delta \leq 1\%$
- (3) Pulse Width $\leq 380 \mu\text{s}$, $\delta \leq 2\%$
- (4) Indicative by design, not a production test
- (5) Pulse Width $\leq 780 \mu\text{s}$, $\delta \leq 2\%$

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ELECTRICAL CHARACTERISTICS ($T_A = 25^\circ\text{C}$ unless otherwise stated)

Symbols	Parameters	Test Conditions	Min.	Typ.	Max.	Units
I_{GSS+}	Forward Gate - Source Leakage	$V_{GS} = +22\text{V}$ $V_{DS} = 0\text{V}$			100	nA
I_{GSS-}	Reverse Gate - Source Leakage	$V_{GS} = -6\text{V}$ $V_{DS} = 0\text{V}$			-100	nA
BV_{DSS}	Drain - Source Breakdown Voltage	$I_D = 1.0\text{mA}$ $V_{GS} = 0\text{V}$	650			V
I_{DSS}	Zero Gate Voltage Drain Current	$V_{DS} = 650\text{V}$ $V_{GS} = 0\text{V}$		1.0	10	μA
$V_{GS(th)}$	Gate Threshold Voltage	$I_D = 3.3\text{mA}$ $V_{DS} = V_{GS}$	1.6		4.0	V
$R_{DS(on)}$	Static Drain - Source On - State Resistance ⁽³⁾	$V_{GS} = 18\text{V}$ $I_D = 8\text{A}$		120	148	m Ω
		$T_J = 125^\circ\text{C}$		150		
g_{fs}	Forward Transconductance ⁽⁵⁾	$V_{DS} = 10\text{V}$ $I_{DS} = 8\text{A}$		2.3		S(O)

DYNAMIC CHARACTERISTICS

C_{iss}	Input Capacitance ⁽⁴⁾	$V_{DS} = 500\text{V}$ $V_{GS} = 0\text{V}$ $f = 1.0\text{MHz}$		1200		pF
C_{oss}	Output Capacitance ⁽⁴⁾			90		
C_{rss}	Reverse Transfer Capacitance ⁽⁴⁾			13		
$t_{d(on)}$	Turn-On Delay Time	$V_{DD} = 300\text{V}$ $I_D = 10\text{A}$ $V_{GS} = +18\text{V} / -3\text{V}$ $R_L = 30\Omega$ $R_G = 0\Omega$		23		ns
T_r	Rise Time			34		
$t_{d(off)}$	Turn-Off Delay Time			60		
t_f	Fall Time			42		
Q_g	Total Gate Charge ⁽⁴⁾	$V_{DD} = 300\text{V}$ $V_{GS} = 18\text{V}$	$I_D = 10\text{A}$ $R_L = 30\Omega$	53		nC
Q_{gs}	Gate-Source Charge ⁽⁴⁾			14		
Q_{gd}	Gate-Drain Charge ⁽⁴⁾			16		

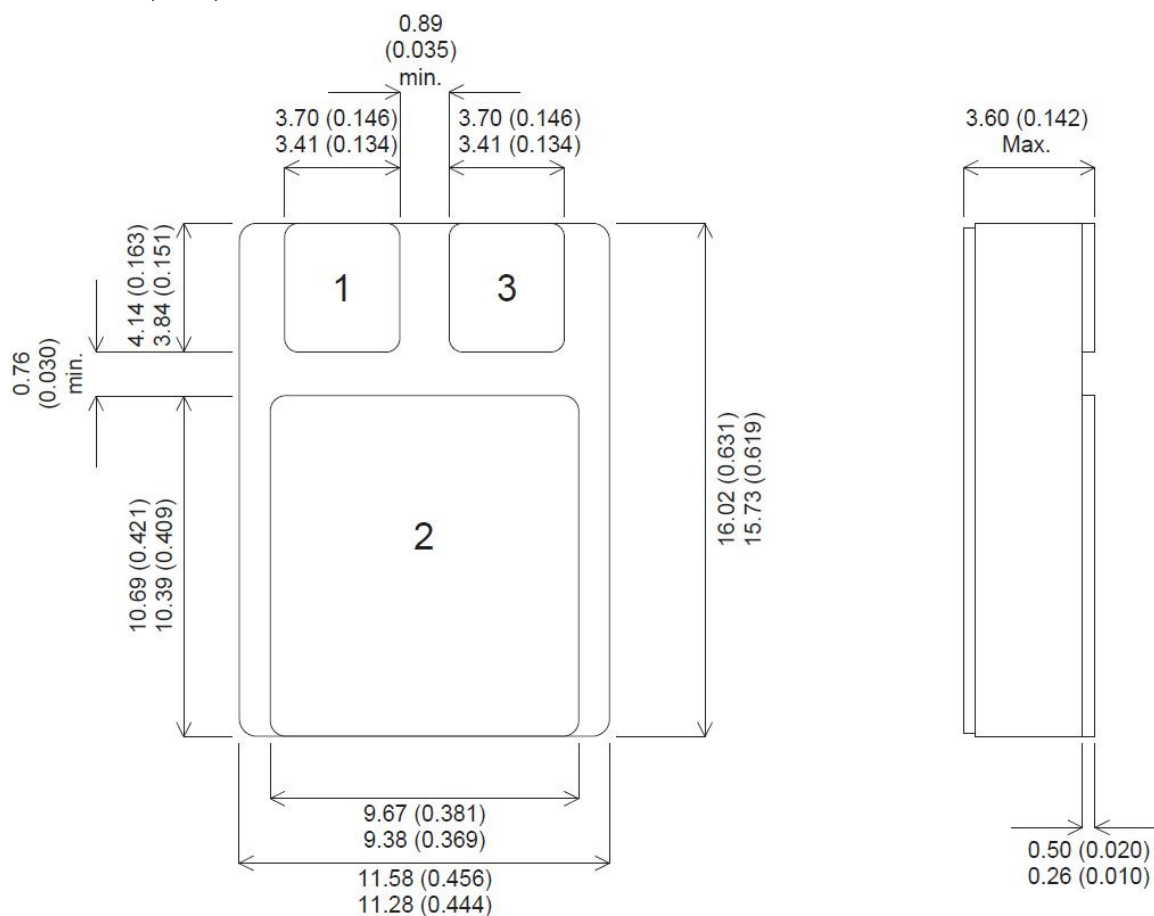
SOURCE-DRAIN DIODE CHARACTERISTICS

I_F	Continuous Source Current ⁽⁴⁾	$T_C = 25^\circ\text{C}$		25		A
V_{SD}	Diode Forward Voltage ⁽³⁾	$I_S = 8\text{A}$ $T_J = 25^\circ\text{C}$ $V_{GS} = 0$		5.0		V

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MECHANICAL DATA

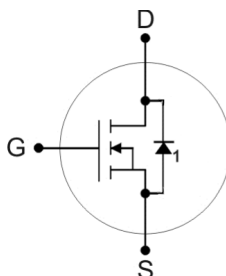
Dimensions in mm (inches)



**SMD1 (TO-276AB)
(Underside View)**

Pad 1 - Gate Pad 2 - Drain Pad 3 - Source

Pad Finish
Au



1- Body Diode