

M2D-0650-0060

Silicon Carbide Power MOSFET Bare Die

N-Channel Enhancement Mode

Features

- High Blocking Voltage with Low On-Resistance
- High Speed Switching with Low Capacitances
- Easy to Parallel and Simple to Drive
- Avalanche Ruggedness
- Halogen Free, RoHS Compliant

Benefits

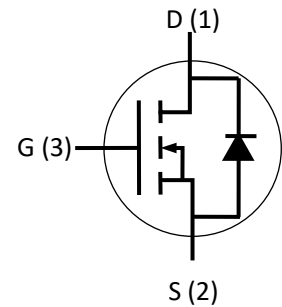
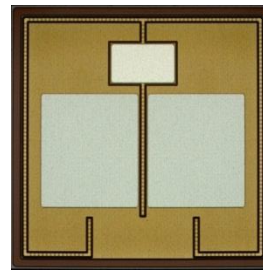
- Higher System Efficiency
- Reduced Cooling Requirements
- Increased Power Density
- Increased System Switching Frequency

Applications

- Solar Inverters
- Switch Mode Power Supplies
- High Voltage DC/DC Converters
- Battery Chargers
- Motor Drives

- Pulsed Power applications

Package



Part Number	Die Size(mm)
M2D-0650-0060	3.31*3.31

Maximum Ratings ($T_c = 25^\circ\text{C}$ unless otherwise specified)

Symbol	Parameter	Value	Unit	Test Conditions	Note
V_{DSmax}	Drain - Source Voltage	650	V	$V_{GS}=0V, I_D=100\mu A$	
V_{GSmax}	Gate - Source Voltage	-10/+25	V	Absolute maximum values	
V_{GSop}	Gate - Source Voltage	-5/+20	V	Recommended operational values	
I_D	Continuous Drain Current	30 22	A	$V_{GS}=20V, T_c=25^\circ\text{C}$ $V_{GS}=20V, T_c=100^\circ\text{C}$	
T_J, T_{stg}	Operating Junction and Storage Temperature	-55 to +150	$^\circ\text{C}$		

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Electrical Characteristics

Symbol	Parameter	Min.	Typ.	Max.	Unit	Test Conditions	Note
$V_{(BR)DSS}$	Drain-Source Breakdown Voltage	650			V	$V_{GS}=0V, I_D=100\mu A$	
$V_{GS(th)}$	Gate Threshold Voltage	2.0	2.40	4.0	V	$V_{GS}=V_{DS}, I_{DS}=5mA, T_C=25^\circ C$	
			1.8			$V_{GS}=V_{DS}, I_{DS}=5mA, T_C=175^\circ C$	
I_{DSS}	Zero Gate Voltage Drain Current		2	100	μA	$V_{DS}=650V, V_{GS}=0V$	
I_{GSS}	Gate-Source Leakage Current		50	200	nA	$V_{GS}=20V, V_{DS}=0V$	
$R_{DS(on)}$	Drain-Source on-state Resistance		60	80	m Ω	$V_{GS}=20V, I_D=20A, T_C=25^\circ C$	
			95			$V_{GS}=20V, I_D=20A, T_C=175^\circ C$	
g_{fs}	Transconductance		4.7		S	$V_{GS}=20V, I_D=20A, T_J=25^\circ C$	
			5.9			$V_{GS}=20V, I_D=20A, T_J=175^\circ C$	
C_{iss}	Input Capacitance		1700		pF	$V_{GS}=0V, V_{DS}=400V, f=1MHz$ $V_{AC}=25mV$	
C_{oss}	Output Capacitance		172				
C_{rss}	Reverse Transfer Capacitance		77				
E_{ON}	Turn-On Switching Energy		140		μJ	$V_{DS}=400V, V_{GS}=-5/20V, I_D=10A,$ $R_{G(ext)}=5\Omega, L=142\mu H$	
E_{OFF}	Turn-Off Switching Energy		32				
$t_{d(on)}$	Turn-On Delay Time		15		ns	$V_{DD}=400V, V_{GS}=-0/20V$ $I_D=10A, R_{G(ext)}=5\Omega,$ $R_L=40\Omega, \text{Timing relative to VDS}$	
t_r	Rise Time		45				
$t_{d(off)}$	Turn-Off Delay Time		13				
t_f	Fall Time		10				
$R_{G(int)}$	Internal Gate Resistance		2.0		Ω	$f=1MHz, V_{AC}=25mV$	
Q_{gs}	Gate to Source Charge		18		nC	$V_{DD}=400V, V_{GS}=-0/20V$ $I_D=10A$	
Q_{gd}	Gate to Drain Charge		19				
Q_g	Total Gate Charge		65				

Reverse Diode Characteristics

Symbol	Parameter	Typ.	Max.	Unit	Test Conditions	Note
V_{SD}	Diode Forward Voltage	3.5		V	$V_{GS}=-5V, I_{SD}=6.6A, T_J=25^\circ C$	
		3.3		V	$V_{GS}=-5V, I_{SD}=6.6A, T_J=175^\circ C$	
I_S	Continuous Diode Forward Current	20		A	$T_C=25^\circ C$	

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Mechanical Parameters

Parameter	Typ.	Unit
Die Size	3.31 x 3.31	mm
Souce Pad Size	1.40*1.20	mm
Gate Pad Size	0.78*0.47	mm
Thickness	180 ± 10%	μm
Wafer Size	150	mm
Top Side Metalization (Al)	4	μm
Bottom Side Metalization (Ni/Ag)	1.5	μm

