

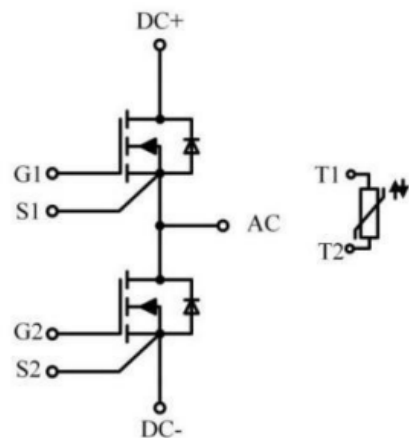
WMH002M330G1A SiC Power Module

V_{DS}	=	3300	V
$R_{DS(on)}$	=	1.5	mΩ
$I_D(T_F=65^{\circ}C)$	=	1000	A

Features

- Low $R_{DS(on)}$
- Low inductance module structure
- Temperature-Independent Switching
- Easy to Parallel and Simple to Drive
- Higher System Efficiency
- High Temperature Operation
- Integrated NTC sensor
- AlN ceramic substrate with low thermal resistance
- Increased System Switching Frequency

Package

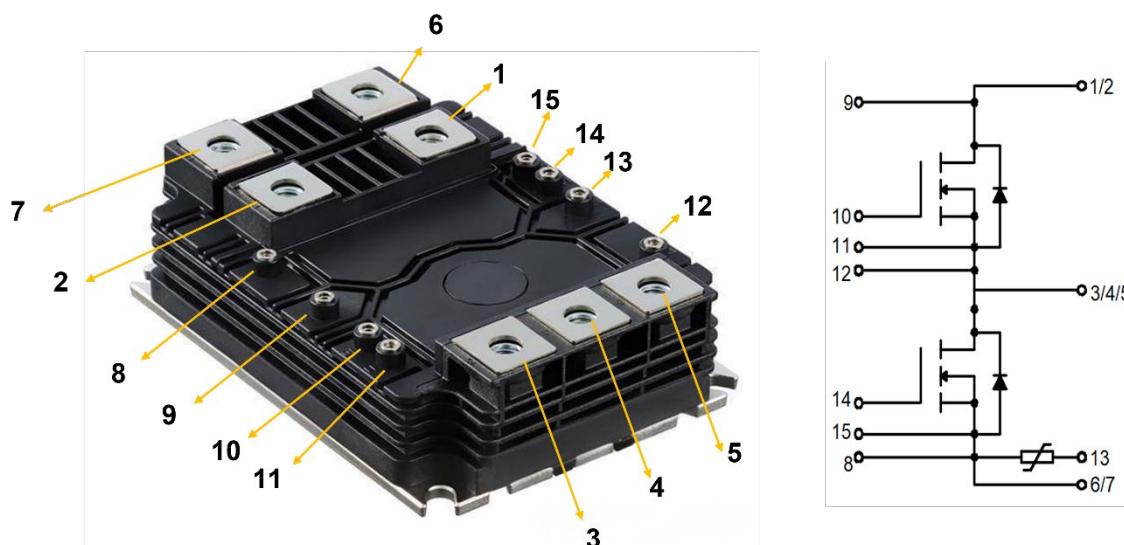


Applications

- Traction drives
- High-power converters
- High-frequency switching application

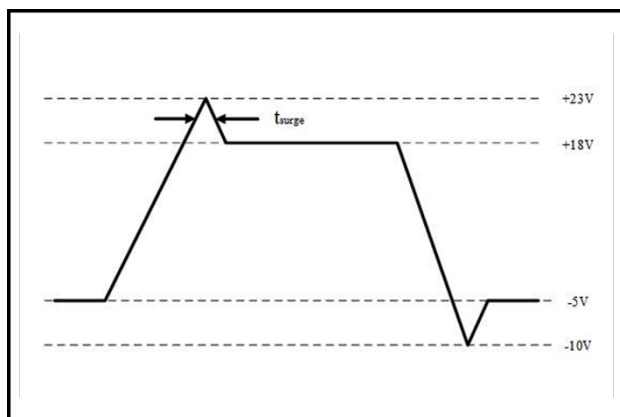
Part Number	Package
WMH002M330G1A	XHP

Circuit Diagram

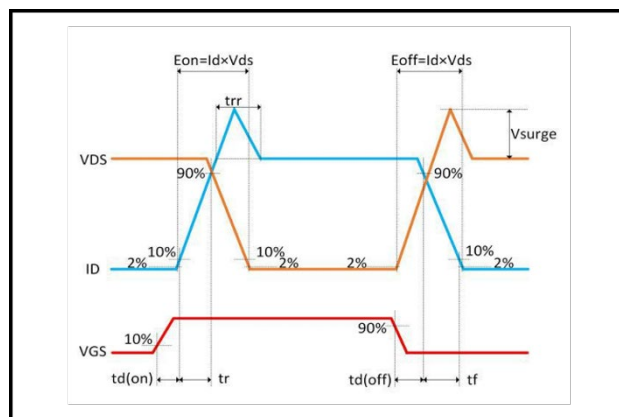


Absolute Maximum Ratings ($T_{vj}=25^{\circ}\text{C}$ unless otherwise specified)

Symbol	Parameter	Value	Unit	Test Conditions
V_{DSmax}	Drain-Source Voltage	3300	V	$V_{GS}=0V$, $I_D=100\mu A$
V_{GSmax}	Gate-Source Voltage	-10/+23	V	Absolute maximum values
V_{GSop}	Gate-Source Voltage	-5/+18	V	Recommended operational values
I_D	Continuous Drain Current	1000	A	$V_{GS}=18V$, $T_F=25^{\circ}\text{C}$, $T_J \leq 150^{\circ}\text{C}$
		2000		$V_{GS}=18V$, $T_F=65^{\circ}\text{C}$, $T_J \leq 150^{\circ}\text{C}$
$I_{D(pulse)}$	Pulsed Drain Current	1600	A	Pulse width t_p limited by T_{Jmax}
T_{vj} , T_{STG}	Operating Junction and Storage Temperature	-55 to +175	$^{\circ}\text{C}$	



Example of acceptable V_{GS} waveform



Wavelength for switching test

Module ($T_{vj}=25^{\circ}\text{C}$ unless otherwise specified)

Parameter	Symbol	Conditions	Value			Unit
			Min.	Typ.	Max.	
Isolation test voltage	V_{isol}	All terminals to baseplate AC 60Hz 1min	6500	/	/	V_{rms}
Stray inductance	L_s	Terminal P to terminal N	/	13	/	nH
Creepage distance	/	Terminal to heat sink	40.0	/	/	mm
		Terminal to terminal	34.0	/	/	
Clearance distance	/	Terminal to heat sink	31.0	/	/	mm
		Terminal to terminal	8.0	/	/	
Module flatness	/	Heatsink side	0	/	300	μm
Mounting torque	/	Mounting to heatsink with M6 screw	4	5	6.5	$\text{N} \cdot \text{m}$
Thermal resistance	R_{thJC}	Junction-to-Case Thermal Resistance for MOSFET	/	0.04	/	$^{\circ}\text{C}/\text{W}$

Electrical Characteristics ($T_{vj}=25^{\circ}\text{C}$ unless otherwise specified)

Symbol	Parameter	Value			Unit	Test Conditions
		Min.	Typ.	Max.		
$V_{(BR)DSS}$	Drain-Source Breakdown Voltage	3300	/	/	V	$V_{GS}=0\text{V}$, $I_D=100\mu\text{A}$
$V_{GS(th)}$	Gate Threshold Voltage	/	1.5	2	V	$V_{DS}=V_{GS}$, $I_D=480\text{mA}$
		/	4	/		$V_{DS}=V_{GS}$, $I_D=480\text{mA}$, $T_J=175^{\circ}\text{C}$
I_{DSS}	Zero Gate Voltage Drain Current	/	/	80	μA	$V_{DS}=3300\text{V}$, $V_{GS}=0\text{V}$
I_{GSS+}	Gate-Source Leakage Current	/	/	100	nA	$V_{DS}=0\text{V}$, $V_{GS}=23\text{V}$
I_{GSS-}	Gate-Source Leakage Current	/	/	100	nA	$V_{DS}=0\text{V}$, $V_{GS}=-10\text{V}$
$R_{DS(on)}$	Drain-Source On Resistance	/	2.5	3.5	$\text{m}\Omega$	$V_{GS}=18\text{V}$, $I_D=640\text{A}$
		/	5.6	/	$\text{m}\Omega$	$V_{GS}=18\text{V}$, $I_D=640\text{A}$, $T_J=175^{\circ}\text{C}$
C_{iss}	Input Capacitance	/	TBD	/	nF	$V_{GS}=0\text{V}$
C_{oss}	Output Capacitance	/	TBD	/		$V_{DS}=2000\text{V}$
C_{rss}	Reverse Transfer Capacitance	/	TBD	/		$f=1\text{MHz}$ $V_{AC}=25\text{mV}$
$R_{G(int)}$	Internal Gate Resistance	/	0.75	/	Ω	$f=1\text{MHz}$, $V_{AC}=25\text{mV}$
Q_{GS}	Gate to Source Charge	/	TBD	/	nC	$V_{DS}=2000\text{V}$
Q_{GD}	Gate to Drain Charge	/	TBD	/		$V_{GS}=-5\text{V}/18\text{V}$
Q_G	Total Gate Charge	/	TBD	/		$I_D=900\text{A}$
$t_{d(on)}$	Turn-on delay time $T_J=25^{\circ}\text{C}$ $T_J=125^{\circ}\text{C}$ $T_J=150^{\circ}\text{C}$ $T_J=175^{\circ}\text{C}$	/	TBD TBD TBD TBD	/	ns	$V_{DS}=2000\text{V}$, $V_{GS}=-5\text{V}/18\text{V}$, $I_D=1000\text{A}$, $R_{G(off)}=0\Omega$, $R_{G(on)}=2.4\Omega$
t_r	Rise time	/		/		

	T _J =25°C T _J =125°C T _J =150°C T _J =175°C		TBD TBD TBD TBD			
t _{d(off)}	Turn-off delay time T _J =25°C T _J =125°C T _J =150°C T _J =175°C	/	TBD TBD TBD TBD	/		
t _f	Fall time T _J =25°C T _J =125°C T _J =150°C T _J =175°C	/	TBD TBD TBD TBD	/		
E _{ON}	Turn-On Switching Energy T _J =25°C T _J =125°C T _J =150°C T _J =175°C	/	TBD TBD TBD TBD	/	mJ	
E _{OFF}	Turn-Off Switching Energy T _J =25°C T _J =125°C T _J =150°C T _J =175°C	/	TBD TBD TBD TBD	/		

Body Diode Characteristics(T_{vj} =25°C unless otherwise specified)

Symbol	Parameter	Value			Unit	Test Conditions
		Min.	Typ.	Max.		
V _{SD}	Diode Forward Voltage	/	TBD	/	V	V _{GS} =-5V, I _{SD} =1000A, T _J =25°C
		/	TBD	/		V _{GS} =-5V, I _{SD} =1000A, T _J =125°C
		/	TBD	/		V _{GS} =-5V, I _{SD} =1000A, T _J =150°C
		/	TBD	/		V _{GS} =-5V, I _{SD} =1000A, T _J =175°C
I _S	Continuous Diode Forward Current	/	850	/	A	T _F =25°C
I _{SM}	Pulsed Diode Forward Current		2000		A	Pulse width t _p limited by T _{Jmax}
t _{rr}	Reverse Recover Time T _J =25°C T _J =125°C T _J =150°C T _J =175°C	/	TBD TBD TBD TBD	/	ns	V _{GS} =-5V/+18V, I _{SD} =1000A, V _{DS} =2000V, R _{G(off)} =0 Ω, R _{G(on)} =2.4 Ω
Q _{rr}	Reverse Recovery Charge T _J =25°C T _J =125°C	/	TBD TBD	/	nC	

	T _J =150℃ T _J =175℃		TBD TBD			
I _{rrm}	Peak Reverse Recovery Current T _J =25℃ T _J =125℃ T _J =150℃ T _J =175℃	/	TBD TBD TBD TBD	/	A	
E _{rr}	Reverse Recovery Energy T _J =25℃ T _J =125℃ T _J =150℃ T _J =175℃		TBD TBD TBD TBD		mJ	

NTC Characteristics(T_{vj} =25℃ unless otherwise specified)

Symbol	Parameter	Value	Unit	Test Conditions
T _{NTC}	NTC operating temperature range	-40 ~ +180	℃	
R ₂₅	NTC R ₂₅ -value	5 ± 5%	kΩ	T _{NTC} = 25 ± 1%℃
B _{25/80}	B-value	3411± 1%	K	

Package outlines

unit: mm

