

Features

- Proprietary α SiC MOSFET technology
- 1200V/10m Ω Half-Bridge topology
- High-frequency & high-efficiency performance
- Integrated thermistor & press-fit pin features

Applications

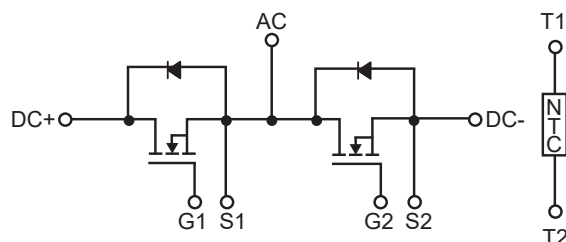
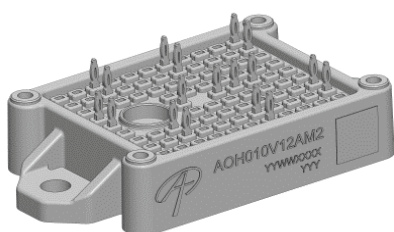
- Solar inverters
- EV charging stations
- Industrial motor drives
- Energy storage

Product Summary

$V_{DS} @ T_{J, max}$	1200V
I_{DM}	200A
$R_{DS(ON), TYP}$	10m Ω
Q_{rr}	246nC
$E_{OSS} @ 800V$	186 μ J



Pin Configuration



Ordering Part Number	Package Type	Configuration
AOH010V12AM2	AlphaModule™	Half-Bridge

Absolute Maximum Ratings

($T_A = 25^\circ\text{C}$, unless otherwise noted)

Symbol	Parameter		AOH010V12AM2	Units
V_{DS}	Drain-Source Voltage		1200	V
$V_{GS, MAX}$	Gate-Source Voltage	Maximum	-8/+18	V
$V_{GS, OP, TRANS}$		Max Transient ^(A)	-8/+20	
$V_{GS, OP}$		Recommended Operating ^(B)	-5/+15	
I_D	Continuous Drain Current	$T_{VJ} = 150^\circ\text{C}, T_H = 95^\circ\text{C}$	85	A
		$T_{VJ} = 175^\circ\text{C}, T_H = 95^\circ\text{C}$	98	
I_{DM}	Pulsed Drain Current ^(C)		200	
T_{VJM}	Virtual Junction Temperature (Maximum)		-55 to 175	$^\circ\text{C}$
T_{VJ}	Virtual Junction Temperature (Recommended Operating Range)		-55 to 150	$^\circ\text{C}$

Thermal Characteristics

Symbol	Parameter	Typ	Max	Units
$R_{\theta JC}$	Thermal Resistance Junction-to-Heat Sink	0.35	0.42	°C/W

Electrical Characteristics

($T_J = 25^\circ\text{C}$, unless otherwise noted)

Symbol	Parameter	Conditions	Min	Typ	Max	Units
STATIC PARAMETERS						
BV_{DSS}	Drain-Source Breakdown Voltage	$I_D = 250\ \mu\text{A}$, $V_{GS} = 0\text{V}$, $T_J = 25^\circ\text{C}$	1200			V
		$I_D = 250\ \mu\text{A}$, $V_{GS} = 0\text{V}$, $T_J = 175^\circ\text{C}$	1200			
I_{DSS}	Zero Gate Voltage Drain Current	$V_{DS} = 1200\text{V}$, $V_{GS} = 0\text{V}$			200	μA
I_{GSS}	Gate-Body Leakage Current	$V_{DS} = 0\text{V}$, $V_{GS} = +15/-5\text{V}$			± 200	nA
$V_{GS(th)}$	Gate Threshold Voltage	$V_{DS} = V_{GS}$, $I_D = 54\text{mA}$	1.8	2.8	3.5	V
$R_{DS(ON)}$	Static Drain-Source On-Resistance	$V_{GS} = 15\text{V}$, $I_D = 100\text{A}$		10	14	m Ω
		$T_J = 25^\circ\text{C}$				
		$T_J = 175^\circ\text{C}$		17		
V_{SD}	Diode Forward Voltage	$I_S = 54\text{A}$, $V_{GS} = -5\text{V}$		4.3	5	V
DYNAMIC PARAMETERS						
C_{iss}	Input Capacitance	$V_{GS} = 0\text{V}$, $V_{DS} = 800\text{V}$, $f = 1\text{MHz}$		9.78		nF
C_{oss}	Output Capacitance			418		pF
C_{rss}	Reverse Transfer Capacitance			21		pF
E_{oss}	C_{oss} Stored Energy			186		μJ
R_g	Gate Resistance	$f = 1\text{MHz}$		0.67		Ω
SWITCHING PARAMETERS						
Q_g	Total Gate Charge	$V_{GS} = -5/+15\text{V}$, $V_{DS} = 600\text{V}$, $I_D = 54\text{A}$		315		nC
Q_{gs}	Gate Source Charge			109		nC
Q_{gd}	Gate Drain Charge			66		nC
$t_{D(on)}$	Turn-On Delay Time	$V_{GS} = -5\text{V}/+15\text{V}$, $V_{DS} = 600\text{V}$, $I_D = 100\text{A}$, $R_G = 2\ \Omega$ $L_a = 30\ \mu\text{H}$		12		ns
t_r	Turn-On Rise Time			22		ns
$t_{D(off)}$	Turn-Off Delay Time			44		ns
t_f	Turn-Off Fall Time			10		ns
E_{on}	Turn-On Energy			923		μJ
E_{off}	Turn-Off Energy			134		μJ
E_{tot}	Total Switching Energy			1.1		mJ
t_{rr}	Body Diode Reverse Recovery Time			23		ns
I_{rm}	Peak Reverse Recovery Current			19		A
Q_{rr}	Body Diode Reverse Recovery Charge	$I_F = 100\text{A}$, $dI/dt = 1500\text{A}/\mu\text{s}$, $V_{GS} = 5\text{V}$, $V_{DS} = 600\text{V}$		248		nC

Electrical Characteristics

(T_J = 25°C, unless otherwise noted)

Symbol	Parameter	Conditions	Min	Typ	Max	Units
MODULE PHYSICAL PARAMETERS						
V _{ISO}	Isolation Voltage(All Terminals Shorted)	DC Test Voltage, t=3s	4.5			kV
C _{TI}	Comparative Tracking Index		200			
W	Weight			25		
M _S	Mounting Torque		1		1.2	nM
	Creepage Distance	Terminal to Heatsink		11.5		mm
		Terminal to Terminal		6.3		
	Clearance	Terminal to Heatsink		10		mm
		Terminal to Terminal		5		
NTC THERMISTOR CHARACTERISTICS						
R ₂₅	Rated Resistance	T _{NTC} =25°C		5		kΩ
ΔR/R	Deviation of Resistance	V _{GS} =0V, V _{DS} =600V, f=1MHz	-5		5	%
β _{25/50}	Beta Value	R ₂ =R ₂₅ exp[β _{25/50} (1/T ₂ -1/298)		3380		K
β _{25/80}		R ₂ =R ₂₅ exp[β _{25/80} (1/T ₂ -1/298)		3440		K
β _{25/100}		R ₂ =R ₂₅ exp[β _{25/100} (1/T ₂ -1/298)		3545		K
P _{MAX}	Maximum Power Dissipation	T _{NTC} =25°C			10	mW

Notes:

- t_{ON} < 1% *(Duty Cycle)/(Frequency), t < 25hrs over lifetime.
- Device can be operated at V_{GS} = 0/15V. Actual operating VGS will depend on application specifics such as parasitic inductance and dV/dt but should not exceed maximum ratings.
- The static characteristics in Figures 1 to 8 are obtained using <300μs pulses, duty cycle 0.5% max.
- These curves are based on R_{BJC} which is measured with the device mounted to a large heatsink, assuming a maximum junction temperature of T_{J(MAX)} = 150°C.

Typical Electrical and Thermal Characteristics

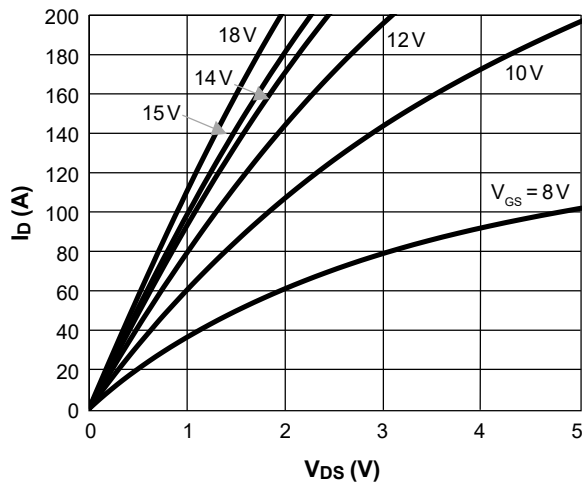


Figure 1. On-Region Characteristics $T_J = 25^\circ\text{C}$

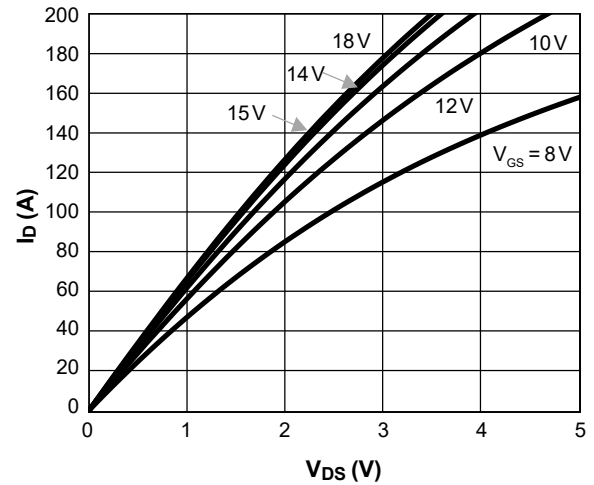


Figure 2. On-Region Characteristics $T_J = 150^\circ\text{C}$

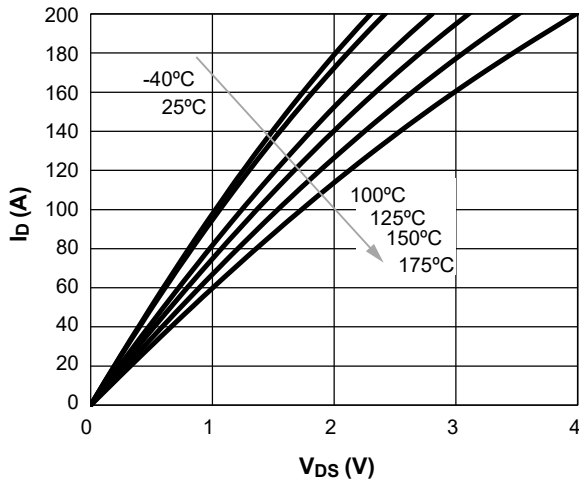


Figure 3. Output Characteristics for Various Junction Temperatures $V_{GS} = 15\text{V}$

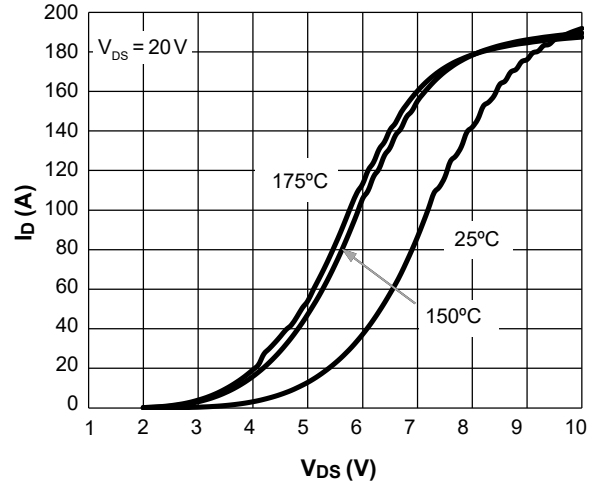


Figure 4. Transfer Characteristics

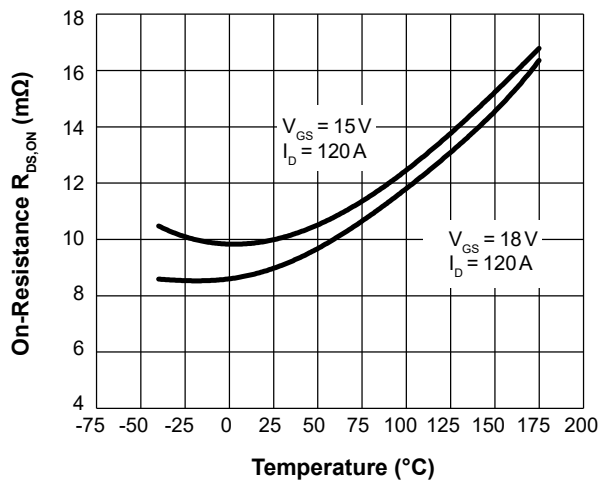


Figure 5. On-Resistance vs. Junction Temperature

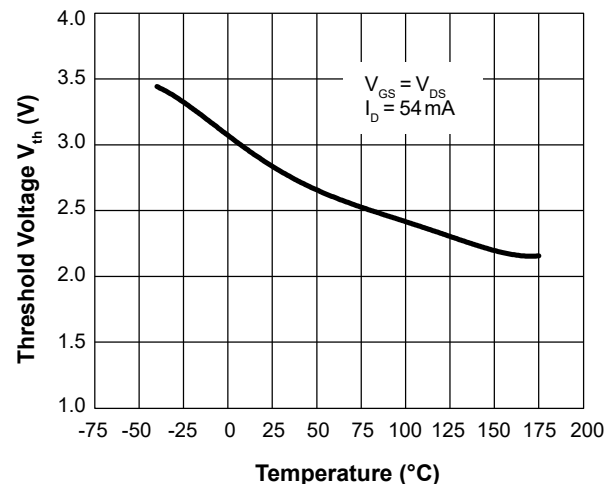


Figure 6. Threshold Voltage vs. Junction Temperature

Typical Electrical and Thermal Characteristics (Continued)

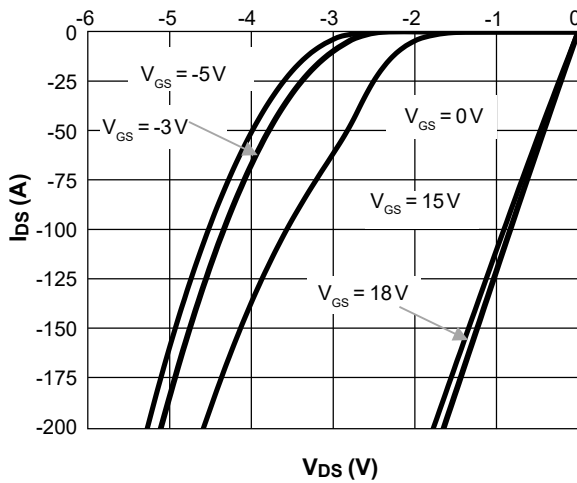


Figure 7. Body-Diode Characteristics at 25°C

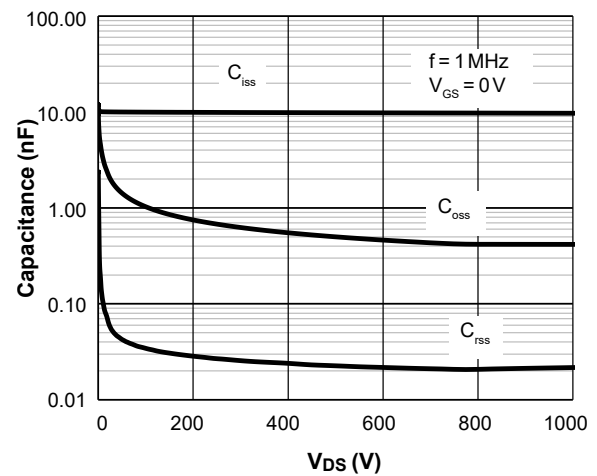


Figure 8. Capacitance Characteristics

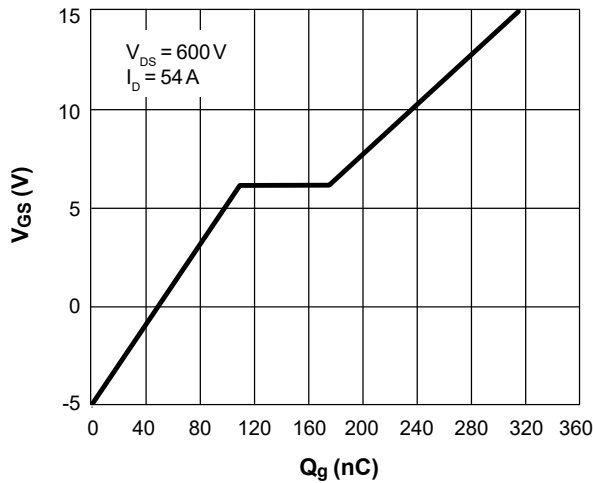


Figure 9. Gate-Charge Characteristics

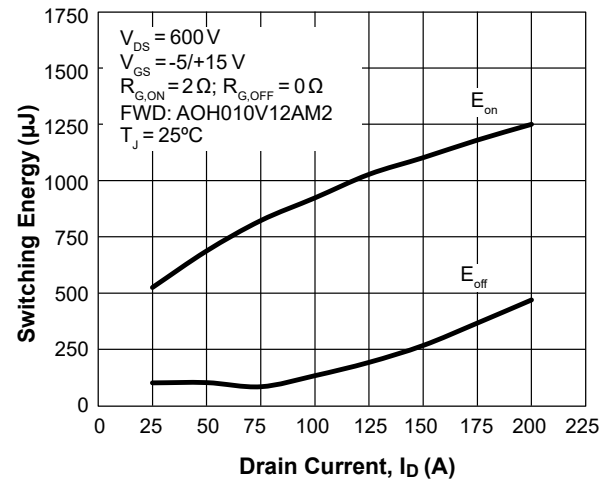


Figure 10. Switching Energy vs. Drain Current

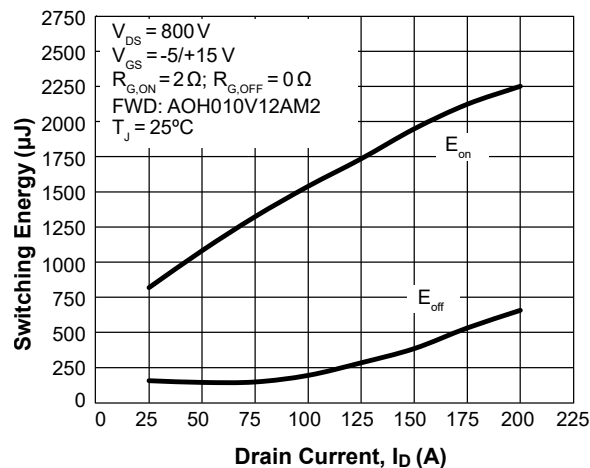


Figure 11. Switching Energy vs. Drain Current

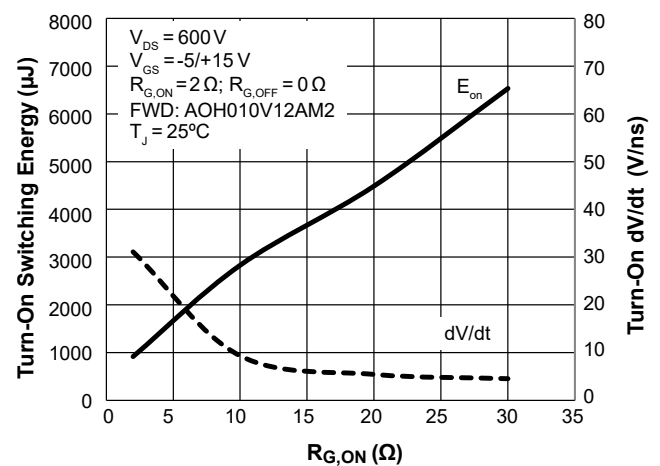


Figure 12. Turn-On Energy and dV/dt vs. External Gate Resistance

Typical Electrical and Thermal Characteristics (Continued)

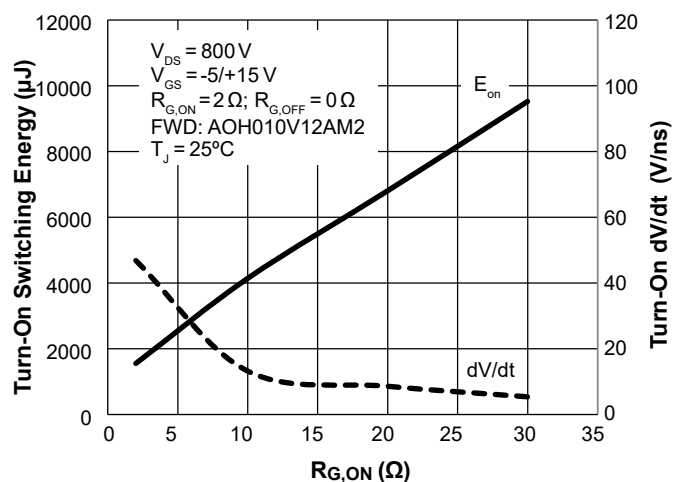


Figure 13. Turn-On Energy and dV/dt vs. External Gate Resistance

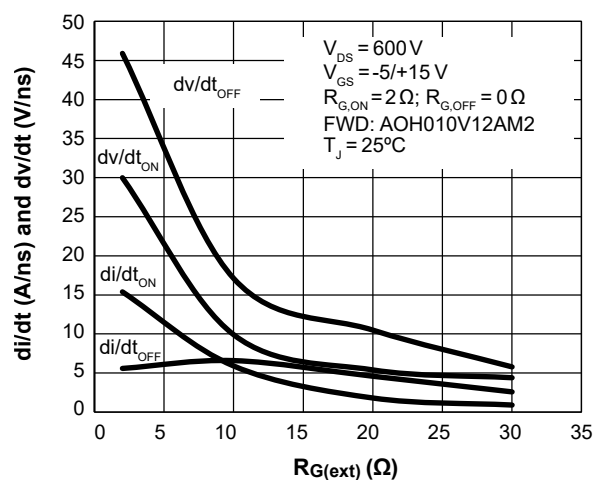


Figure 14. dv/dt and di/dt vs. External Gate Resistance

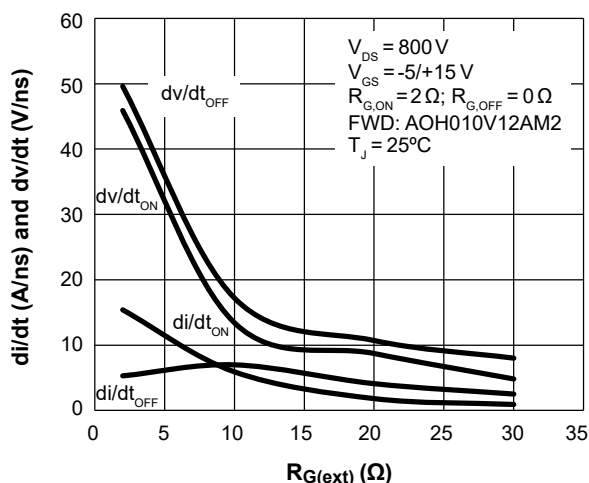


Figure 15. dv/dt and di/dt vs. External Gate Resistor

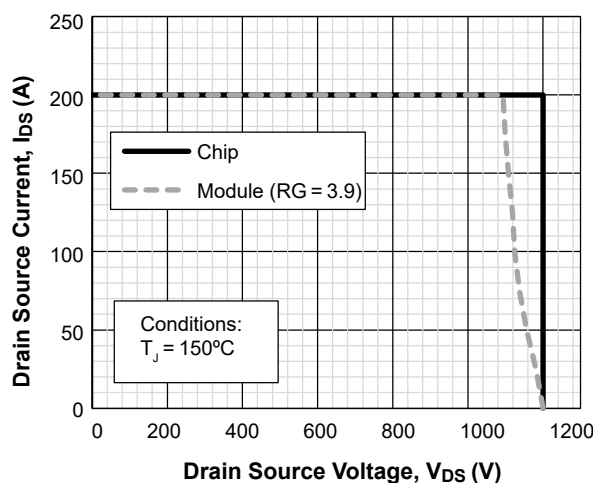


Figure 16. Reverse Bias Safe Operating Area

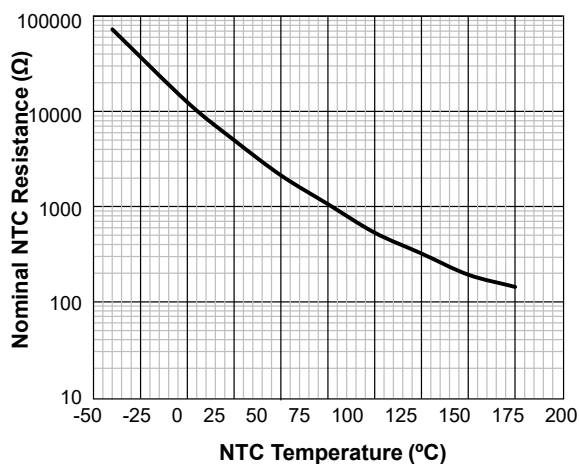


Figure 17. Nominal NTC Resistance vs. NTC Temperature

Typical Characteristics and Thermal Characteristics (Continued)

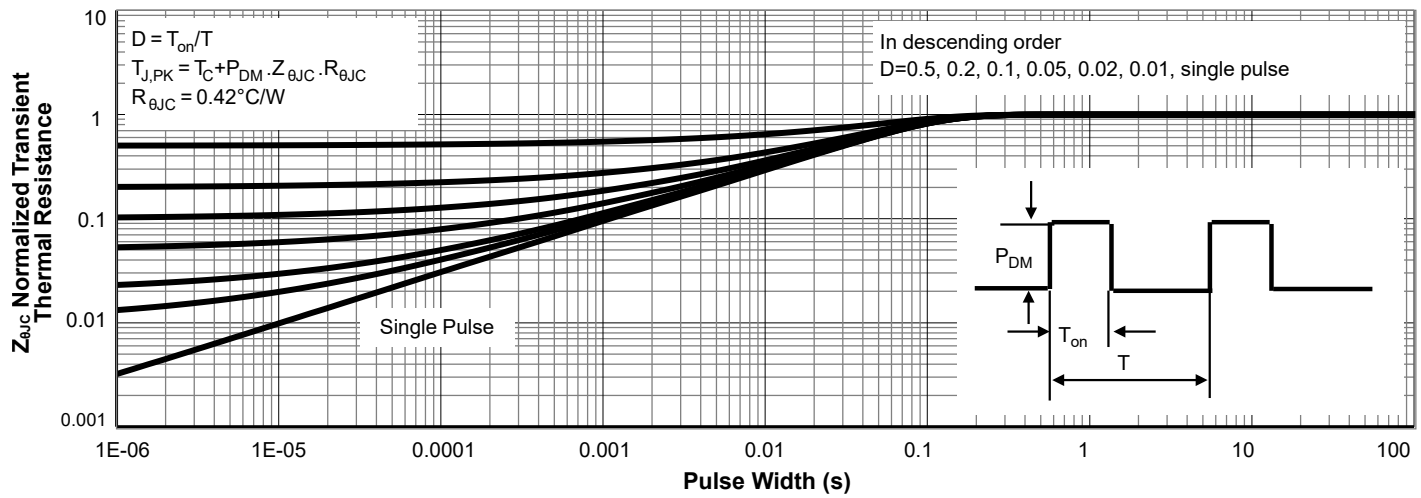


Figure 18. Normalized Maximum Transient Thermal Impedance for AOH010V12AM2 (Note D)

Test Circuits and Waveforms

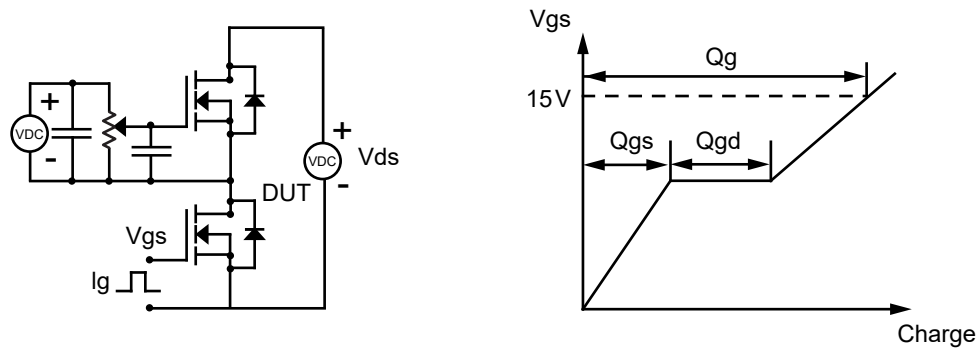


Figure 19. Gate Charge Test Circuits and Waveforms

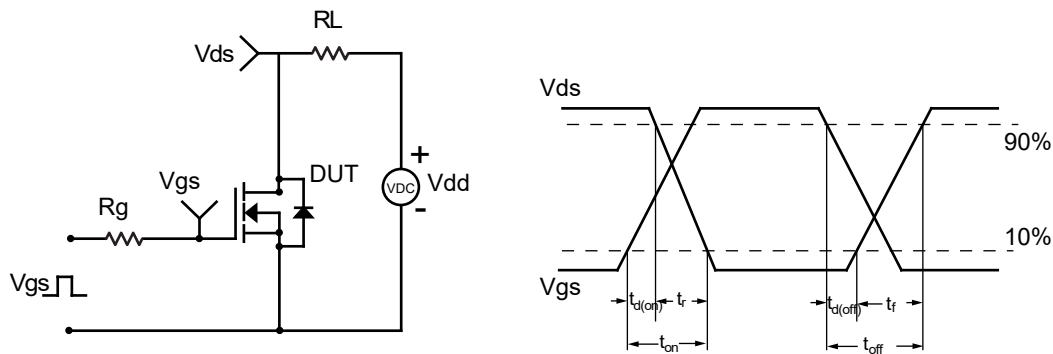


Figure 20. Resistive Switching Test Circuit & Waveforms

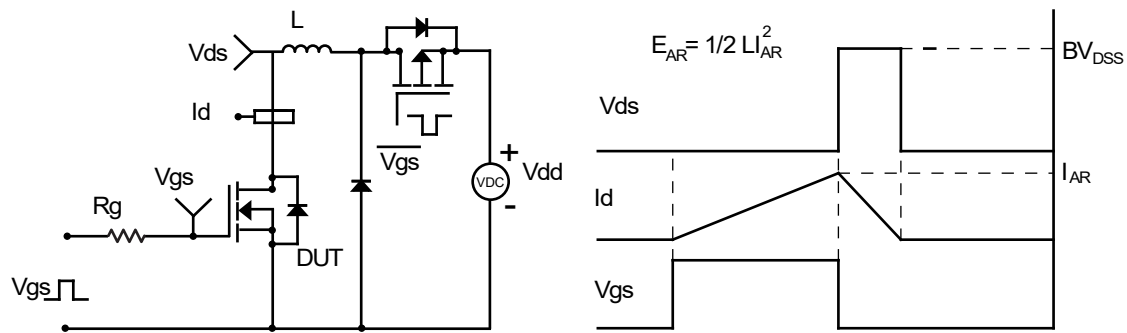


Figure 21. Unclamped Inductive Switching (UIS) Test Circuit & Waveforms

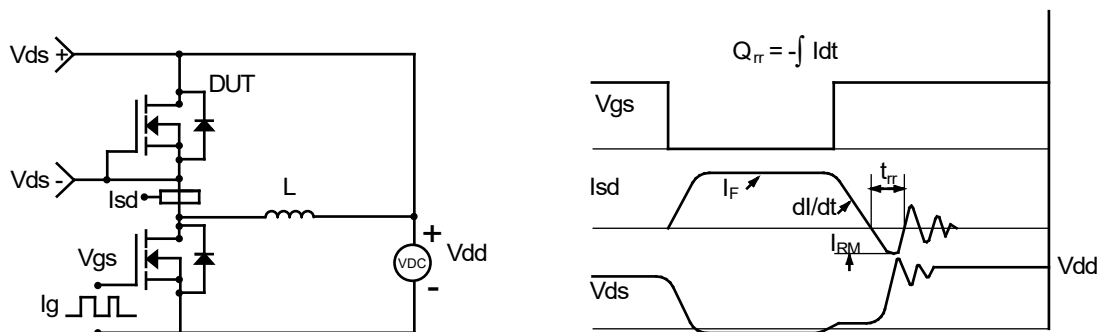
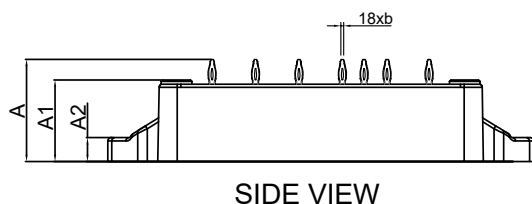
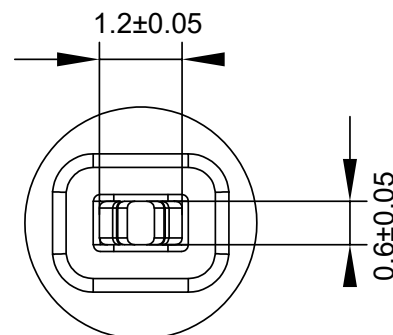
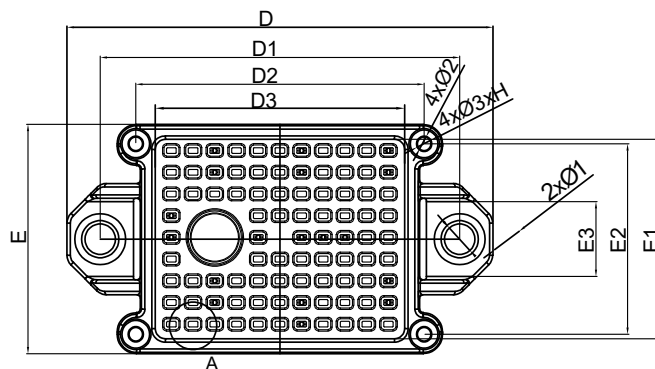
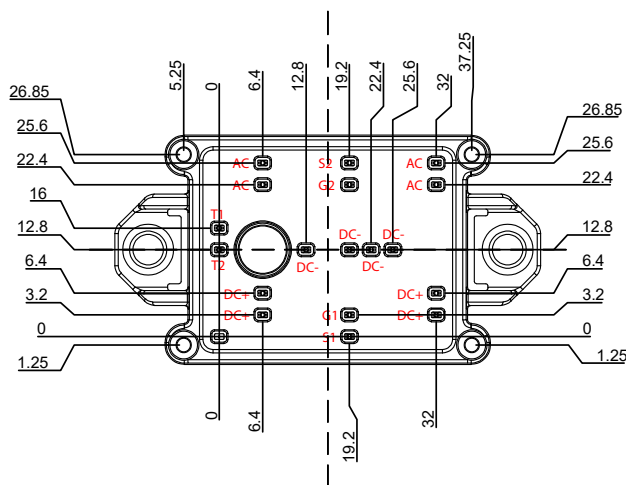


Figure 22. Diode Recovery Test Circuit & Waveforms

Package Dimensions, AlphaModule™



LAND PATTERN RECOMMENDATIONS



SYMBOLS	DIMENSION IN MILLIMETRES			DIMENSION IN INCHS		
	MIN.	NOM.	MAX.	MIN.	NOM.	MAX.
A	14.500	15.000	15.500	0.571	0.591	0.610
A1	11.700	12.000	12.300	0.461	0.472	0.484
A2	3.200	3.500	3.800	0.126	0.138	0.150
b	1.150	1.200	1.250	0.045	0.047	0.049
D	62.500	62.800	63.100	2.461	2.472	2.484
D1	52.800	53.000	53.200	2.079	2.087	2.094
D2	42.300	42.500	42.700	1.665	1.673	1.681
D3	36.500	36.800	37.100	1.437	1.449	1.461
E	33.300	33.800	34.300	1.311	1.331	1.350
E1	29.100	29.400	29.700	1.146	1.157	1.169
E2	28.300	28.600	28.900	1.114	1.126	1.138
E3	11.700	12.000	12.300	0.461	0.472	0.484
H	8.200	8.500	8.800	0.323	0.335	0.346
φ1	4.200	4.500	4.800	0.165	0.177	0.189
φ2	1.800	2.000	2.200	0.071	0.079	0.087
φ3	2.100	2.300	2.500	0.083	0.091	0.098

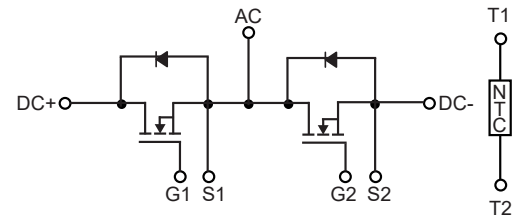
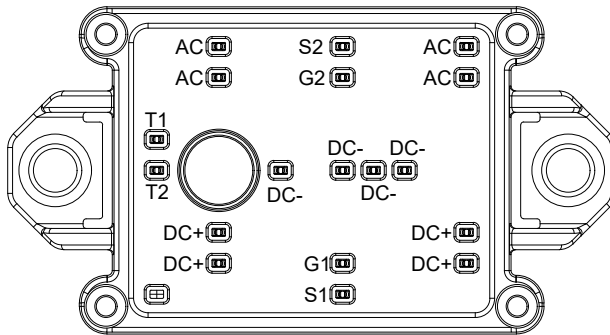
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NOTES:

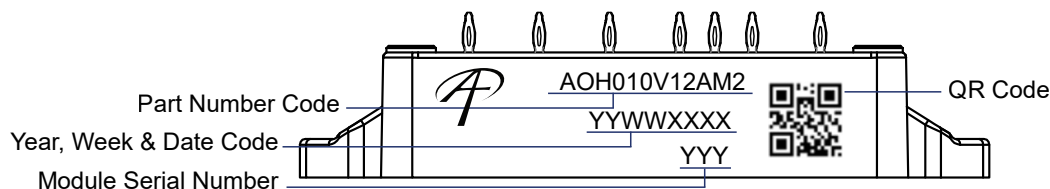
1. TOLERANCE 0.200 MILLIMETERS UNLESS OTHERWISE SPECIFIED.
2. CONTROLLING DIMENSION IS MILLIMETER, CONVERTED INCH DIMENSIONS ARE NOT NECESSARILY EXACT.
3. () IS REFERENCE.

Package Dimensions, AlphaModule™

SCHEMATIC AND PIN OUT



Part Marking



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2. A critical component in any component of a life support, device, or system whose failure to perform can be reasonably expected to cause the failure of the life support device or system, or to affect its safety or effectiveness.