

Features

- Proprietary α SiC MOSFET technology
- Low $R_{DS(ON)}$ increase with temperature
- Fast switching with low R_G and low capacitance
- Optimized gate drive voltage ($V_{GS} = 15V$)
- Ultra-fast and low reverse recovery diode (Q_{rr})

Applications

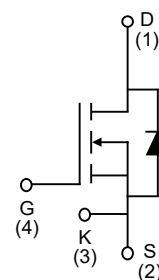
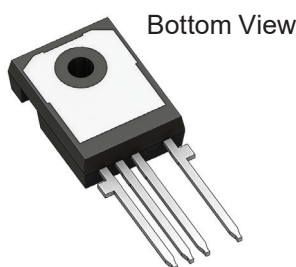
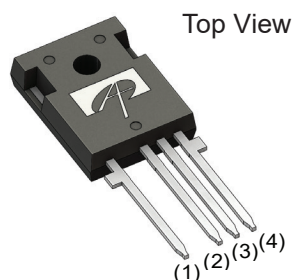
- Power Supplies
- EV Charging
- Solar Inverters
- Motor Drives
- Energy Storage
- UPS
- Industrial



Product Summary

$V_{DS} @ T_{J, max}$	650V
I_{DM}	200A
$R_{DS(ON), typ}$	15m Ω
Q_{rr}	211nC
$E_{OSS} @ 400V$	36 μ J
100% UIS Tested	

Pin Configuration



Ordering Part Number	Package Type	Form	Shipping Quantity
AOM015V65X2	TO-247-4L	Tube	30/Tube

Absolute Maximum Ratings

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

Symbol	Parameter		AOM015V65X2	Units
V_{DS}	Drain-Source Voltage		650	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	$T_C = 25^\circ C$	96	A
		$T_C = 100^\circ C$	67	
I_{DM}	Pulsed Drain Current ^(C)		200	
E_{AS}	Single Pulsed Avalanche Energy ^(D)		1.8	J
P_D	Power Dissipation ^(C)		312	W
T_J, T_{STG}	Junction and Storage Temperature Range		-55 to 175	$^\circ C$
T_L	Maximum lead temperature for soldering purpose, 1/8" from case for 5 seconds		300	$^\circ C$

Thermal Characteristics

Symbol	Parameter	AOM015V65X2	Units
$R_{\theta JA}$	Maximum Junction-to-Ambient ^(E,F)	40	°C/W
$R_{\theta JC}$	Maximum Junction-to-Case ^(G)	0.48	°C/W

Electrical Characteristics

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

Symbol	Parameter	Conditions	Min	Typ	Max	Units
STATIC						
BV_{DSS}	Drain-Source Breakdown Voltage	$I_D = 250\mu\text{A}$, $V_{GS} = 0\text{V}$, $T_J = 25^\circ\text{C}$	650			V
		$I_D = 250\mu\text{A}$, $V_{GS} = 0\text{V}$, $T_J = 150^\circ\text{C}$	650			V
I_{DSS}	Zero Gate Voltage Drain Current	$V_{DS} = 650\text{V}$, $V_{GS} = 0\text{V}$			100	μA
I_{GSS}	Gate-Body Leakage Current	$V_{DS} = 0\text{V}$, $V_{GS} = +15/-5\text{V}$			250	nA
$V_{GS(th)}$	Gate Threshold Voltage	$V_{DS} = V_{GS}$, $I_D = 24\text{mA}$	1.8	2.5	3.5	V
$R_{DS(ON)}$	Static Drain-Source On-Resistance	$V_{GS} = 15\text{V}$, $I_D = 24\text{A}$		15	22	m Ω
		$T_J = 175^\circ\text{C}$		23		m Ω
g_{FS}	Forward Transconductance	$V_{DS} = 20\text{V}$, $I_D = 24\text{V}$		23		S
V_{SD}	Diode Forward Voltage	$I_S = 24\text{A}$, $V_{GS} = -5\text{V}$		4	5	V
DYNAMIC						
C_{iss}	Input Capacitance	$V_{GS} = 0\text{V}$, $V_{DS} = 400\text{V}$, $f = 1\text{MHz}$		4880		pF
C_{oss}	Output Capacitance			371		pF
C_{rss}	Reverse Transfer Capacitance			25		pF
E_{oss}	Coss Stored Energy			36		μJ
R_G	Gate Resistance	$f = 1\text{MHz}$		1.1		Ω
SWITCHING						
Q_g	Total Gate Charge	$V_{GS} = -5/+15\text{V}$, $V_{DS} = 520\text{V}$, $I_D = 24\text{A}$		152		nC
Q_{gs}	Gate Source Charge			58		nC
Q_{gd}	Gate Drain Charge			20		nC
$t_{D(on)}$	Turn-On Delay Time	$V_{GS} = -5\text{V}/+15\text{V}$, $V_{DS} = 400\text{V}$, $I_D = 50\text{A}$, $R_{G,ON} = 2\Omega$, $R_{G,OFF} = 0\Omega$		11		ns
t_r	Turn-On Rise Time			13		ns
$t_{D(off)}$	Turn-Off Delay Time			16		ns
t_f	Turn-Off Fall Time			5		ns
E_{on}	Turn-On Energy			78		μJ
E_{off}	Turn-Off Energy	FWD: AOM015V65X2		27		μJ
E_{tot}	Total Switching Energy			105		μJ
t_{rr}	Body Diode Reverse Recovery Time	$I_F = 50\text{A}$, $dI/dt = 2500\text{A}/\mu\text{s}$, $V_{DS} = 400\text{V}$		17.5		ns
I_{rm}	Peak Reverse Recovery Current			20		A
Q_{rr}	Body Diode Reverse Recovery Charge			211		nC

Notes:

- $t_{ON} < 1\% \cdot (\text{Duty Cycle})/(\text{Frequency})$, $t < 25$ hrs over lifetime
- Device can be operated at $V_{GS} = 0/15\text{V}$. Actual operating VGS will depend on application specifics such as parasitic inductance and dV/dt but should not exceed maximum ratings.
- The power dissipation P_D is based on $T_{J(MAX)} = 175^\circ\text{C}$, using junction-to-case thermal resistance, and is more useful in setting the upper dissipation limit for cases where additional heatsinking is used.
- $L = 5\text{mH}$, $I_{AS} = 27\text{A}$, $R_G = 10\Omega$, Starting $T_J = 25^\circ\text{C}$.
- The value of $R_{\theta JA}$ is measured with the device in a still air environment

- with $T_A = 25^\circ\text{C}$.
- The $R_{\theta JA}$ is the sum of the thermal impedance from junction to case $R_{\theta JC}$ and case to ambient.
- The value of $R_{\theta JC}$ is measured with the device mounted to a large heatsink, assuming a maximum junction temperature of $T_{J(MAX)} = 175^\circ\text{C}$.
- The static characteristics in Figures 1 to 8 are obtained using $< 300\mu\text{s}$ pulses, duty cycle 0.5% max.
- These curves are based on $R_{\theta JC}$ which is measured with the device mounted to a large heatsink, assuming a maximum junction temperature of $T_{J(MAX)} = 175^\circ\text{C}$. The SOA curve provides a single pulse rating.

Typical Electrical and Thermal Characteristics

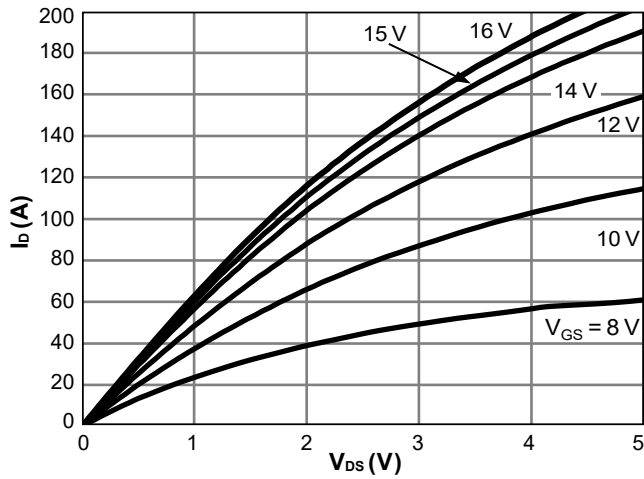


Figure 1. On-Region Characteristics $T_j = 25^\circ\text{C}$

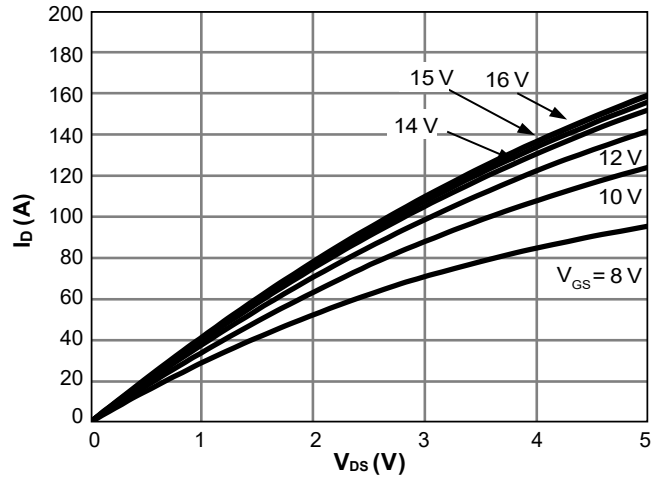


Figure 2. On-Region Characteristics $T_j = 175^\circ\text{C}$

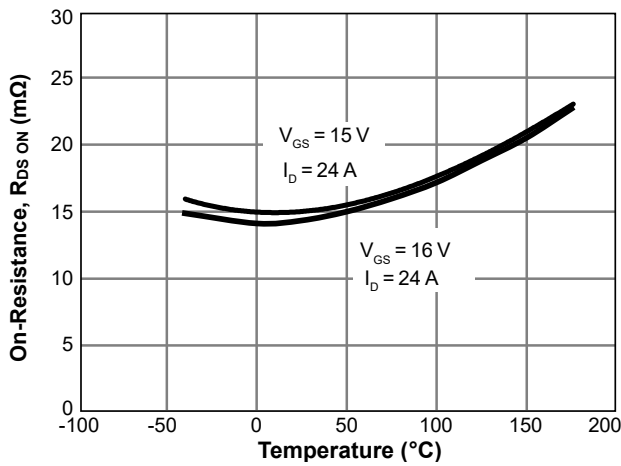


Figure 3. On-Resistance vs. Junction Temperature

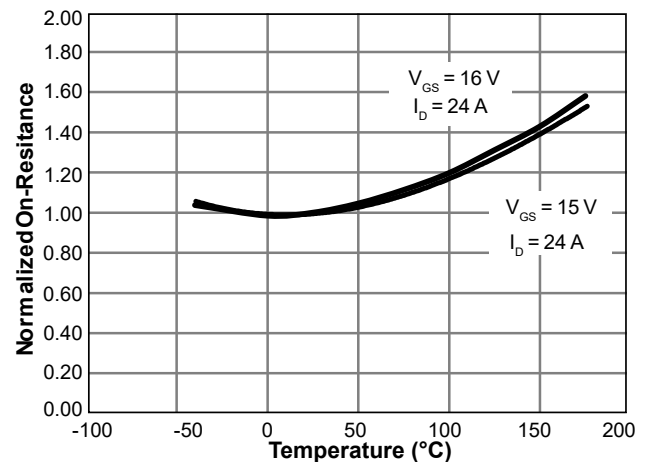


Figure 4. Normalized On-Resistance vs. Junction Temperature

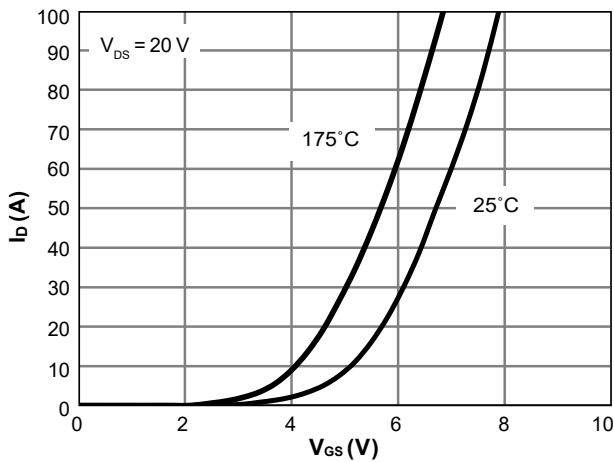


Figure 5. Transfer Characteristics

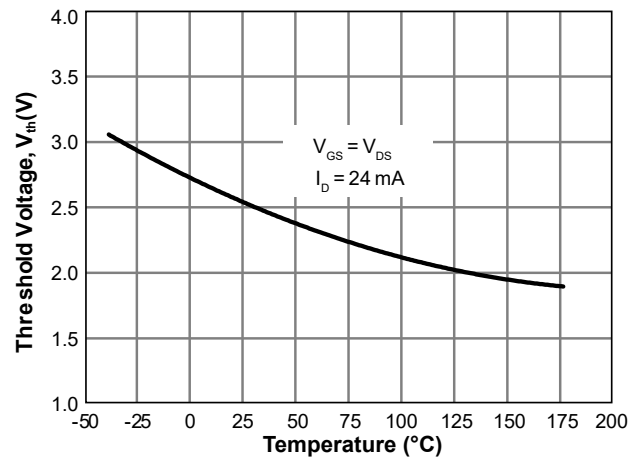


Figure 6. Threshold Voltage vs. Junction Temperature

Typical Electrical and Thermal Characteristics (Continued)

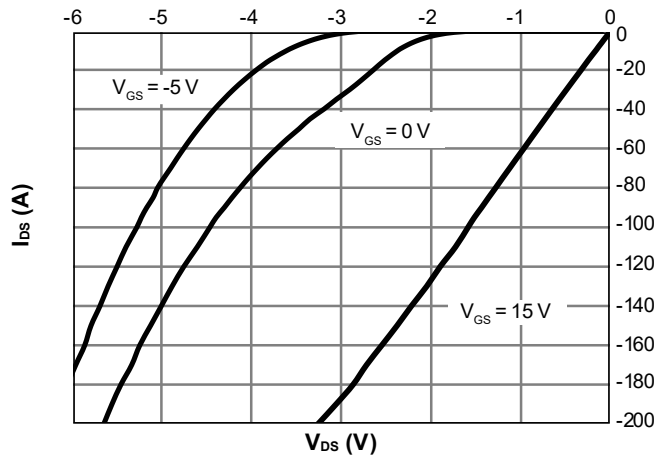


Figure 7. Body-Diode Characteristics at 25°C

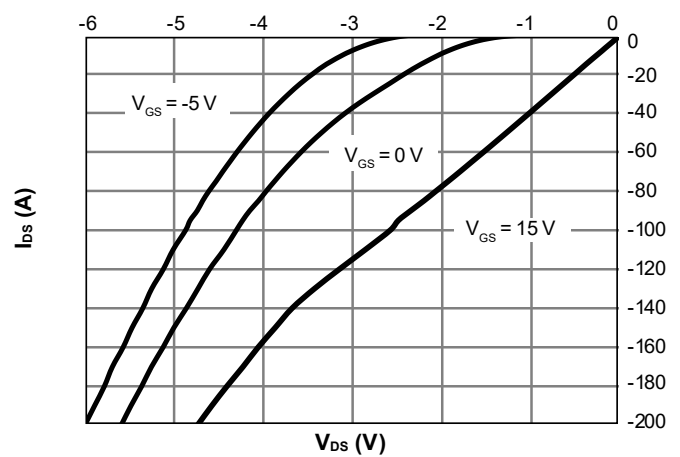


Figure 8. Body-Diode Characteristics at 175°C

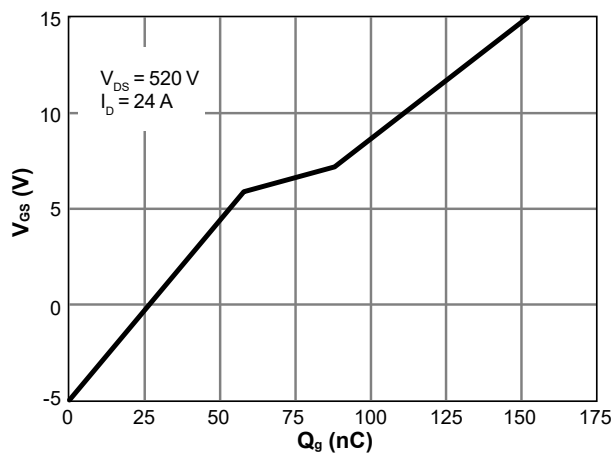


Figure 9. Gate-Charge Characteristics

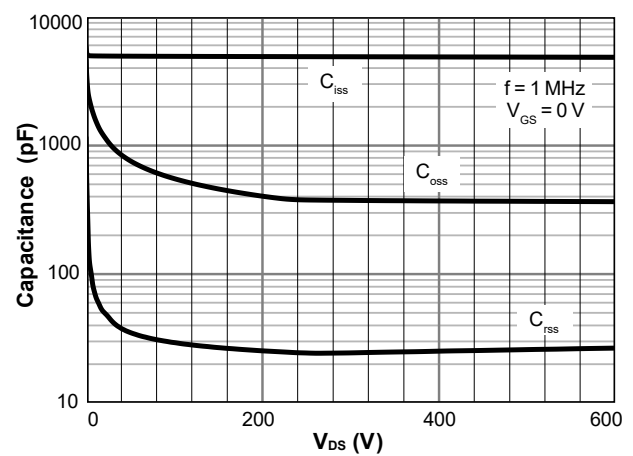


Figure 10. Capacitance Characteristics

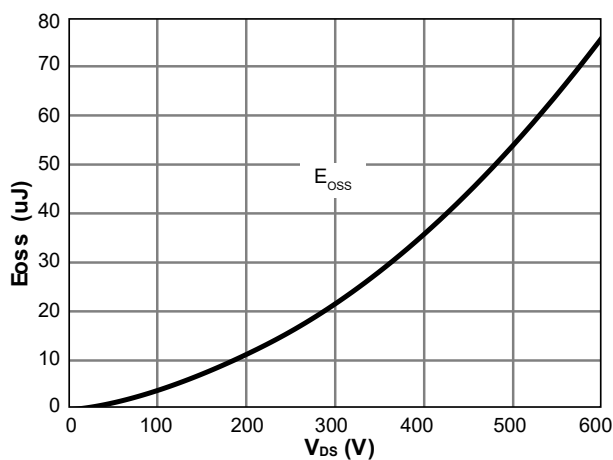


Figure 11. Coss stored Energy

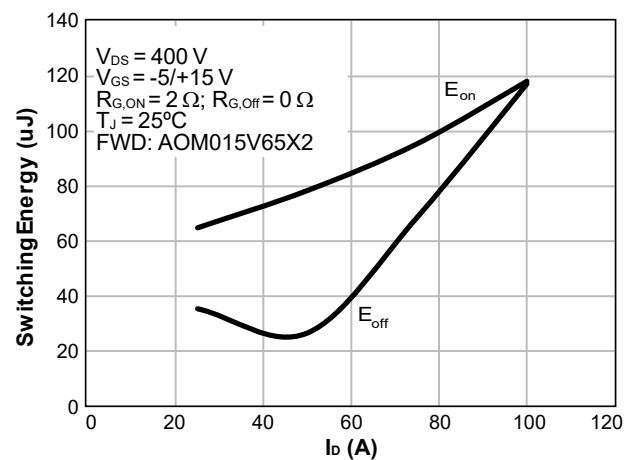


Figure 12. Switching Energy vs. Drain Current

Typical Electrical and Thermal Characteristics (Continued)

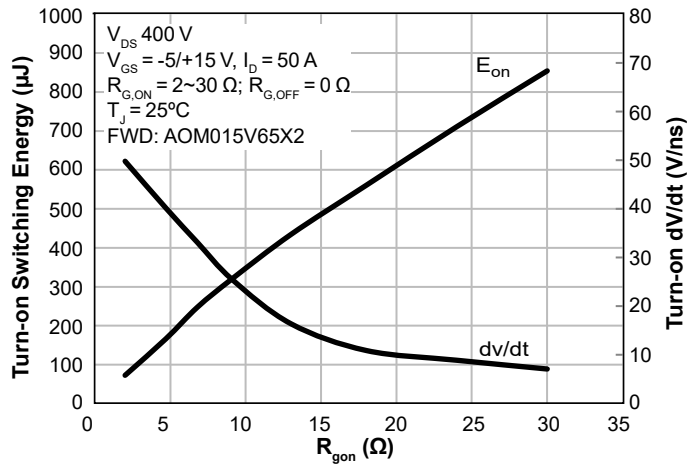


Figure 13. Turn-On Energy and dV/dt vs. External Gate Resistance

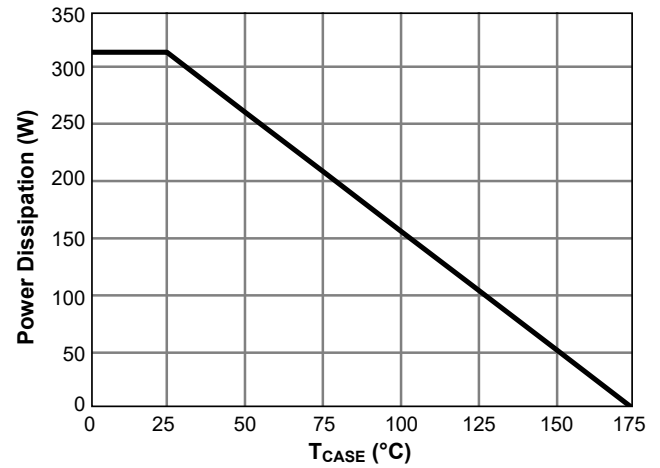


Figure 14. Power De-rating (Note I)

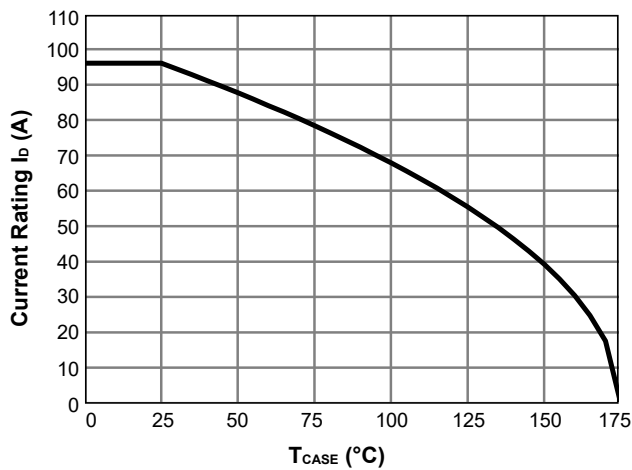


Figure 15. Current De-rating (Note I)

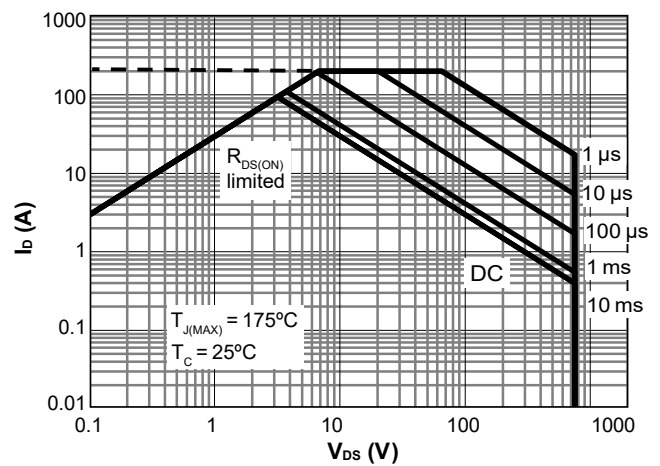


Figure 16. Maximum Forward Biased Safe Operating Area for AOM015V65X2 (Note I)

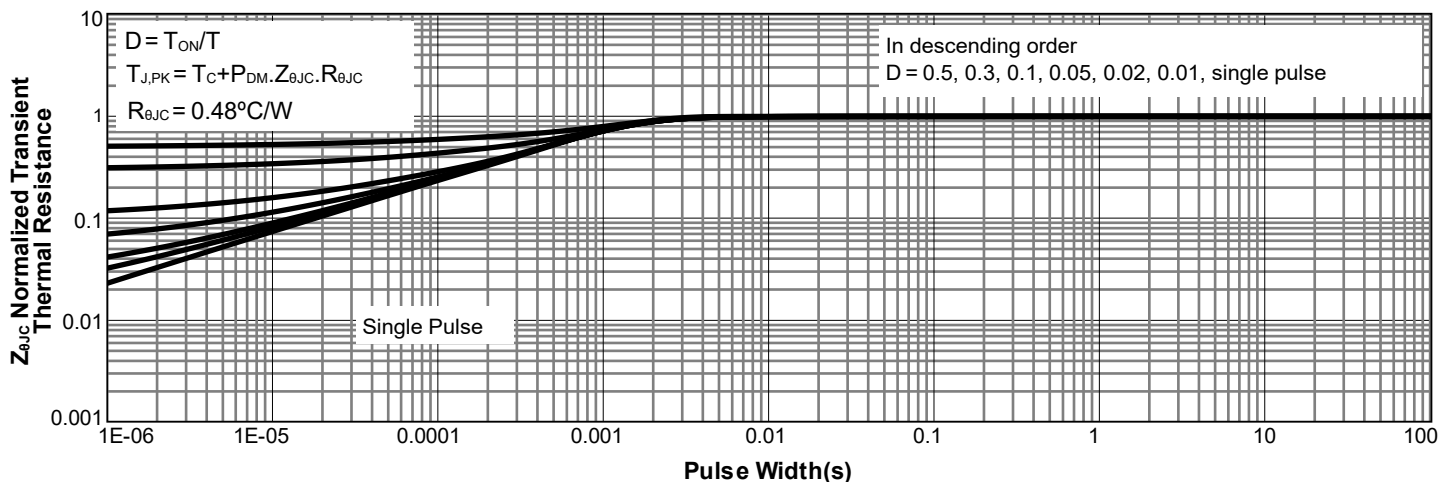


Figure 17. Normalized Maximum Transient Thermal Impedance for AOM015V65X2 (Note I)

Test Circuits and Waveforms

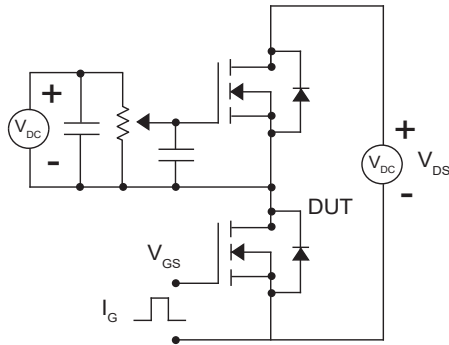


Figure 18. Gate Charge Test Circuits and Waveforms

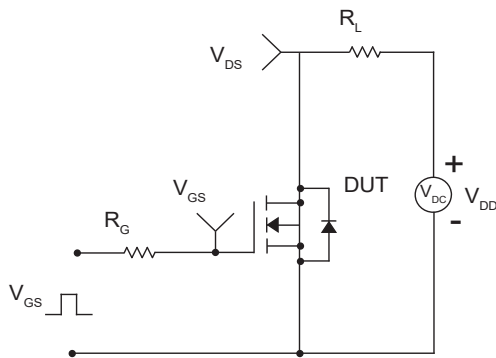
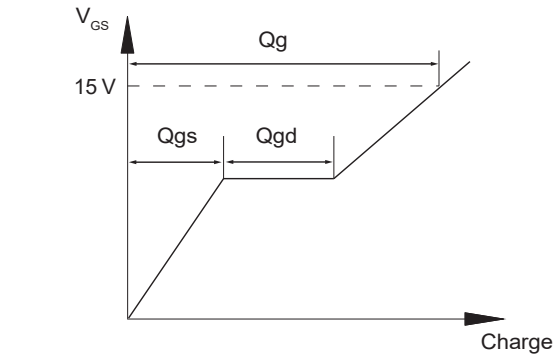


Figure 19. Resistive Switching Test Circuit and Waveforms

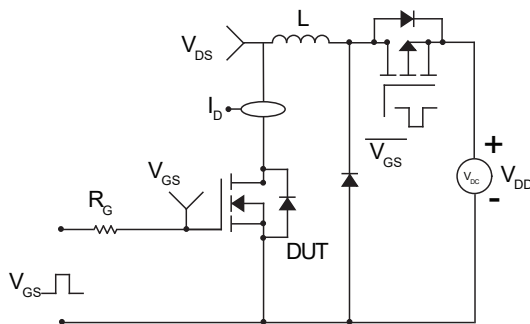
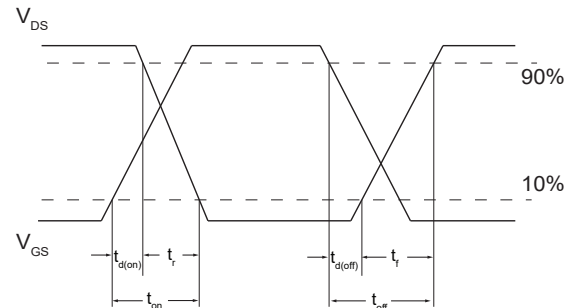


Figure 20. Unclamped Inductive Switching (UIS) Test Circuit and Waveforms

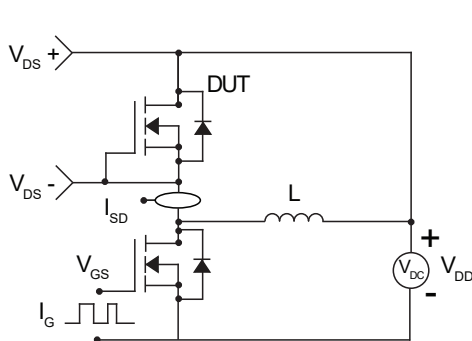
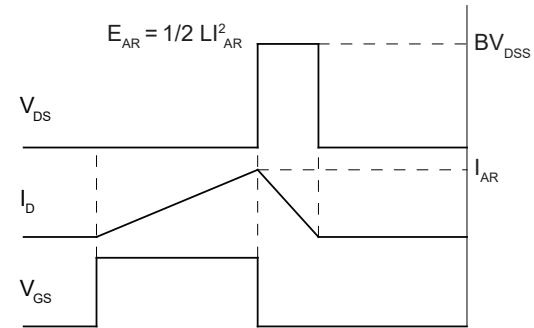
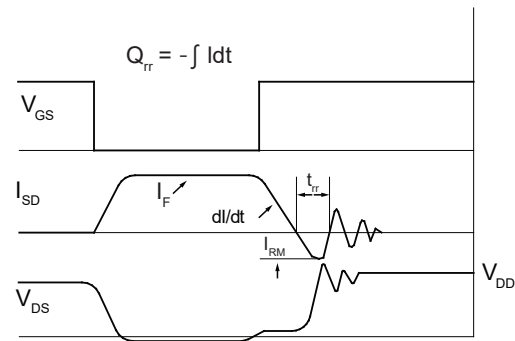
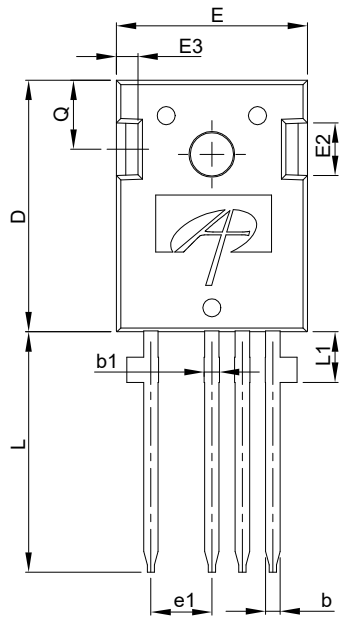


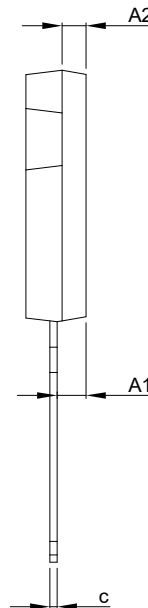
Figure 21. Diode Recovery Test Circuits and Waveforms



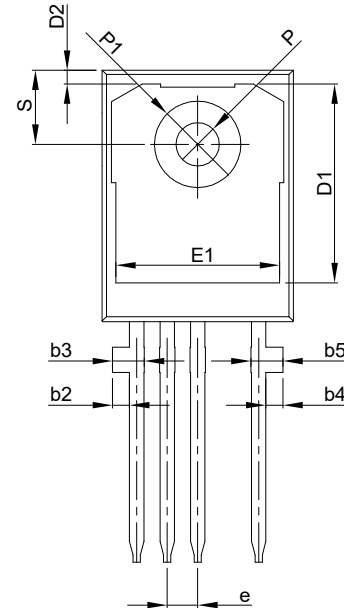
Package Dimensions, TO-247-4L



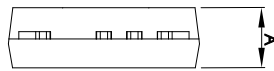
TOP VIEW



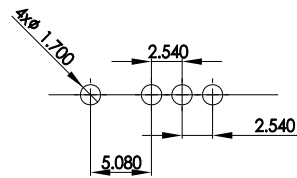
SIDE VIEW



BOTTOM VIEW



SIDE VIEW



RECOMMENDED THROUGH HOLES
FOR LAND PATTERN

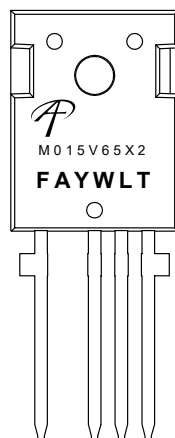
NOTE:

1. CONTROLLED DIMENSIONS ARE IN MILLIMETERS.

SYMBOLS	DIM. IN MM			DIM. IN INCH		
	MIN.	NOM.	MAX.	MIN.	NOM.	MAX.
A	4.90	5.00	5.10	0.193	0.197	0.201
A1	2.32	2.42	2.52	0.091	0.095	0.099
A2	1.90	2.00	2.10	0.075	0.079	0.083
b	1.17	1.22	1.27	0.046	0.048	0.050
b1	1.20	1.30	1.40	0.047	0.051	0.055
b2	1.31	1.41	1.51	0.052	0.056	0.059
b3	2.45	2.65	2.85	0.096	0.104	0.112
b4	1.31	1.41	1.51	0.052	0.056	0.059
b5	2.45	2.65	2.85	0.096	0.104	0.112
c	0.57	0.62	0.67	0.022	0.024	0.026
D	20.80	20.95	21.10	0.819	0.825	0.831
D1	16.25	16.55	16.85	0.640	0.652	0.663
D2	1.00	1.15	1.30	0.039	0.045	0.051
E	15.77	15.92	16.07	0.621	0.627	0.632
E1	13.43	13.63	13.83	0.529	0.536	0.544
E2	4.29	4.39	4.49	0.169	0.173	0.177
E3	1.70	1.80	1.90	0.067	0.071	0.075
e	2.54BSC			0.1000BSC		
e1	5.08BSC			0.2000BSC		
N	4			4		
L	19.82	20.02	20.22	0.780	0.788	0.796
L1	4.01	4.21	4.41	0.158	0.166	0.174
P	3.50	3.60	3.70	0.138	0.142	0.146
P1	7.00	7.20	7.40	0.276	0.283	0.291
Q	5.65	5.75	5.85	0.222	0.226	0.230
S	6.07	6.17	6.27	0.239	0.243	0.247

Part Marking

AOM015V65X2
TO-247-4L



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