

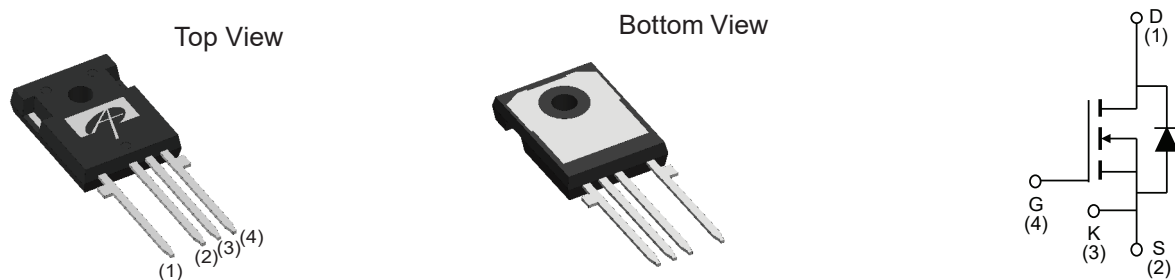
## Features

- Proprietary  $\alpha$ SiC MOSFET technology
- Low loss, with low  $R_{DS, ON}$
- Fast switching with low  $R_G$  and low capacitance
- Optimized gate drive voltage ( $V_{GS} = 15V$ )
- Low reverse recovery diode ( $Q_{rr}$ )
- AEC-Q101 Automotive Qualified

## Applications

- xEV Charger
- Electric Vehicle Supply Equipment (EVSE)
- Motor Drives
- Automotive Inverters

## Pin Configuration



## Product Summary

$V_{DS} @ T_{J, max}$	1200V
$I_{DM}$	85A
$R_{DS(ON), typ}$	65 m $\Omega$
$Q_{rr}$	142 nC
$E_{OSS} @ 800V$	30 $\mu$ J
100% UIS Tested	

Ordering Part Number	Package Type	Form	Shipping Quantity
AOM065V120X2Q	TO-247-4L	Tube	30/Tube

## Absolute Maximum Ratings

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

Symbol	Parameter	AOM065V120X2Q	Units
$V_{DS}$	Drain-Source Voltage	1200	V
$V_{GS, MAX}$	Gate-Source Voltage	Maximum	-8/+18
$V_{GS, OP, TRANS}$		Max Transient <sup>(A)</sup>	-8/+20
$V_{GS, OP}$		Recommended Operating <sup>(B)</sup>	-5/+15
$I_D$	Continuous Drain Current	$T_C = 25^\circ C$	40.3
		$T_C = 100^\circ C$	29.6
$I_{DM}$	Pulsed Drain Current <sup>(C)</sup>	85	A
$E_{AS}$	Single Pulsed Avalanche Energy <sup>(D)</sup>	250	mJ
$P_D$	Power Dissipation <sup>(C)</sup>	187.5	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	AOM065V120X2Q	Units
$R_{\theta JA}$	Maximum Junction-to-Ambient <sup>(E,F)</sup>	40	°C/W
$R_{\theta JC}$	Maximum Junction-to-Case <sup>(G)</sup>	0.8	°C/W

## Electrical Characteristics

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

Symbol	Parameter	Conditions	Min	Typ	Max	Units	
<b>STATIC</b>							
$V_{(BR)DSS}$	Drain-Source Breakdown Voltage	$I_D = 250\ \mu\text{A}, V_{GS} = 0\ \text{V}, T_J = 25^\circ\text{C}$	1200			V	
		$I_D = 250\ \mu\text{A}, V_{GS} = 0\ \text{V}, T_J = 150^\circ\text{C}$		1200		V	
$I_{DSS}$	Zero Gate Voltage Drain Current	$V_{DS} = 1200\ \text{V}, V_{GS} = 0\ \text{V}$			50	$\mu\text{A}$	
$I_{GSS}$	Gate-Source Leakage Current	$V_{DS} = 0\ \text{V}, V_{GS} = +15/-5\ \text{V}$			$\pm 100$	nA	
$V_{GS(th)}$	Gate Threshold Voltage	$V_{DS} = V_{GS}, I_D = 10\ \text{mA}$	1.8	2.8	3.5	V	
$R_{DS(ON)}$	Static Drain-Source On-Resistance	$V_{GS} = 15\ \text{V}, I_D = 10\ \text{A}$		65	85	$\text{m}\Omega$	
		$T_J = 150^\circ\text{C}$		90		$\text{m}\Omega$	
$g_{fs}$	Forward Transconductance	$V_{DS} = 20\ \text{V}, I_D = 20\ \text{V}$		12		S	
$V_{SD}$	Diode Forward Voltage	$I_S = 10\ \text{A}, V_{GS} = -5\ \text{V}$		4.1	5	V	
<b>DYNAMIC</b>							
$C_{iss}$	Input Capacitance	$V_{GS} = 0\ \text{V}, V_{DS} = 800\ \text{V}, f = 1\ \text{MHz}$		1716		pF	
$C_{oss}$	Output Capacitance			71		pF	
$C_{riss}$	Reverse Transfer Capacitance			5		pF	
$E_{oss}$	Coss Stored Energy			30		$\mu\text{J}$	
$R_G$	Gate Resistance	$f = 1\ \text{MHz}$		1.7		$\Omega$	
<b>SWITCHING</b>							
$Q_g$	Total Gate Charge	$V_{GS} = -5/+15\ \text{V}, V_{DS} = 800\ \text{V}, I_D = 20\ \text{A}$		62.3		nC	
$Q_{gs}$	Gate Source Charge			23.1		nC	
$Q_{gd}$	Gate Drain Charge			23.7		nC	
$t_{d(on)}$	Turn-On Delay Time	$V_{GS} = 0\ \text{V}/+15\ \text{V}, V_{DS} = 800\ \text{V}, I_D = 20\ \text{A}, R_G = 5\ \Omega$		7.9		ns	
$t_r$	Turn-On Rise Time			8.2		ns	
$t_{d(off)}$	Turn-Off Delay Time			13		ns	
$t_f$	Turn-Off Fall Time			7.9		ns	
$E_{on}$	Turn-On Energy		$L = 120\ \mu\text{H}$		109		$\mu\text{J}$
$E_{off}$	Turn-Off Energy	FWD: AOM065V120X2Q		42		$\mu\text{J}$	
$E_{tot}$	Total Switching Energy			151		$\mu\text{J}$	
$t_{rr}$	Body Diode Reverse Recovery Time	$I_F = 20\ \text{A}, dI/dt = 1560\ \text{A}/\mu\text{s}, V_{DS} = 800\ \text{V}$		31		ns	
$I_{rm}$	Peak Reverse Recovery Current				7.5		A
$Q_{rr}$	Body Diode Reverse Recovery Charge				142		nC

### Notes:

- < 1% duty cycle,  $f > 1\ \text{Hz}$
- 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.
- $L = 5\ \text{mH}, I_{AS} = 10\ \text{A}, R_G = 25\ \Omega$ , 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 ms 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

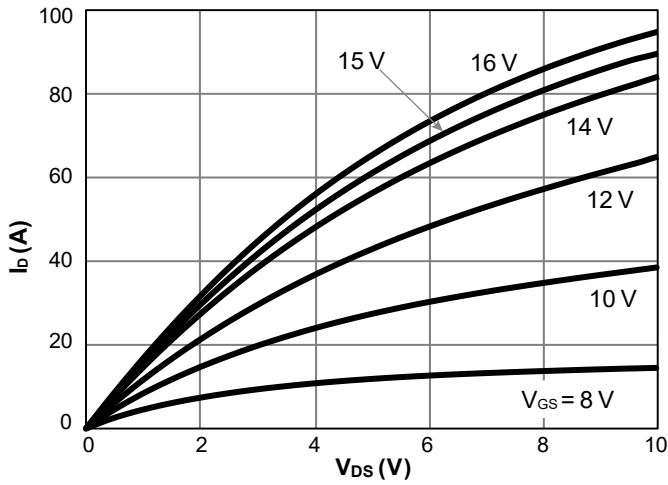


Figure 1. On-Region Characteristics  $T_J = 25^\circ\text{C}$

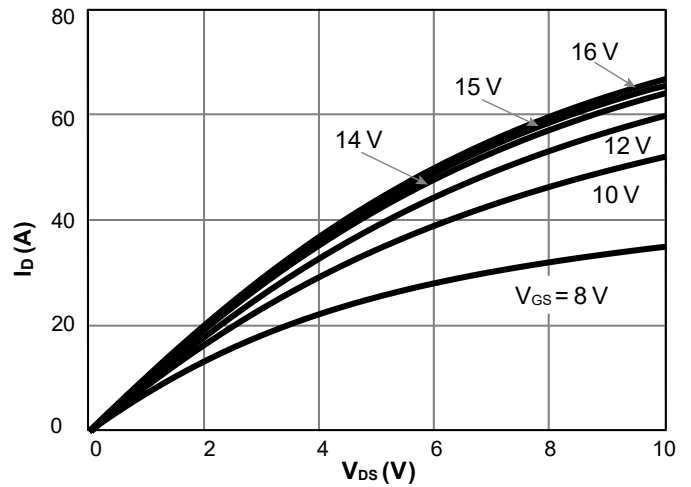


Figure 2. On-Region Characteristics  $T_J = 175^\circ\text{C}$

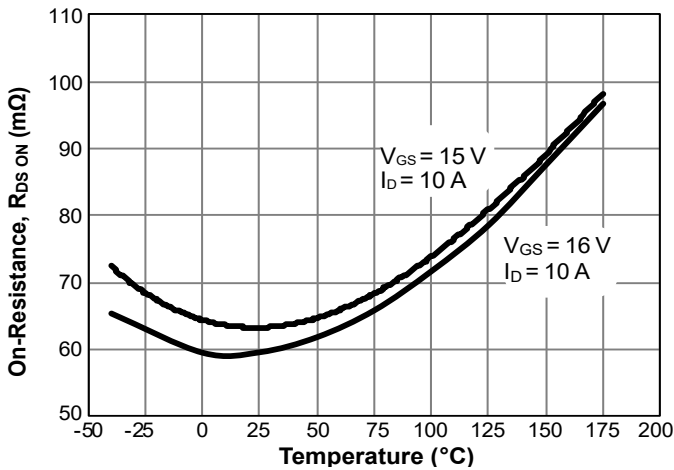


Figure 3. On-Resistance vs. Junction Temperature

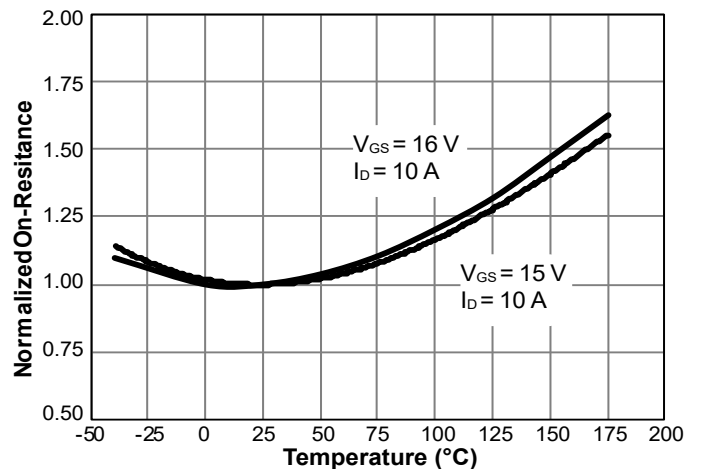


Figure 4. Normalized On-Resistance vs. Junction Temperature

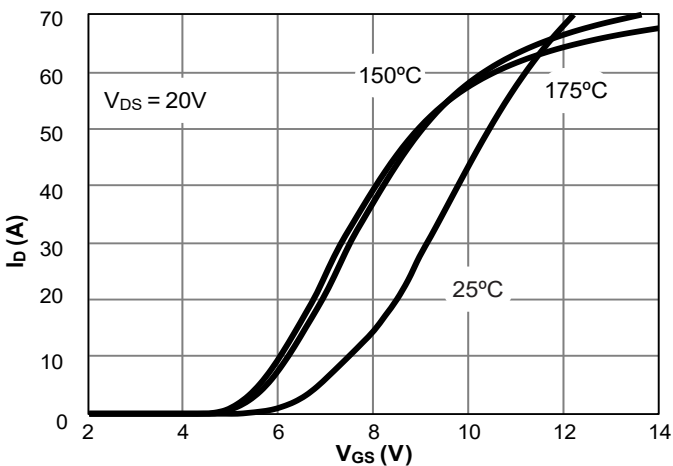


Figure 5. Transfer Characteristics

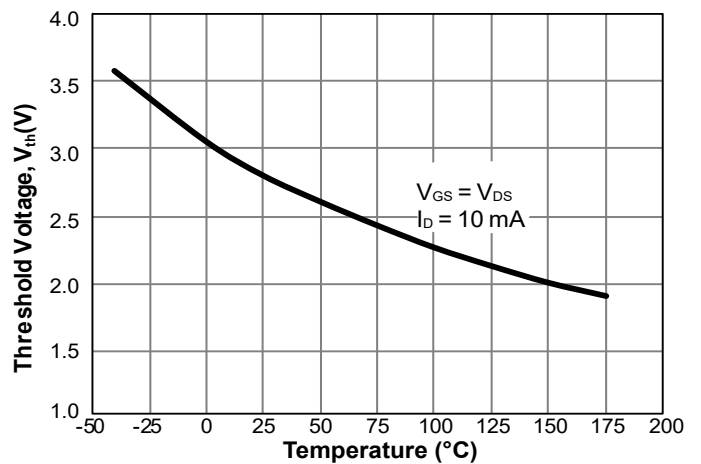


Figure 6. Threshold Voltage vs. Junction Temperature

Typical Electrical and Thermal Characteristics (Continued)

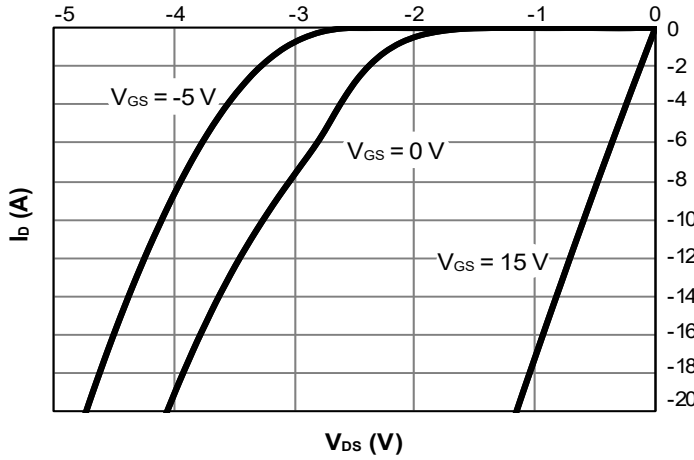


Figure 7. Body-Diode Characteristics at 25°C

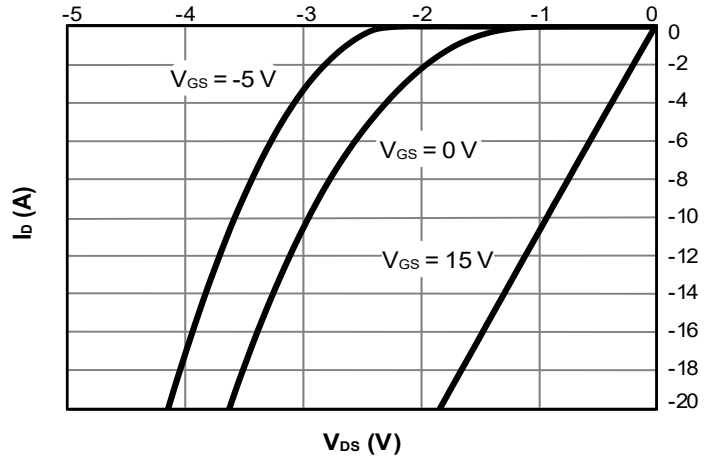


Figure 8. Body-Diode Characteristics at 175°C

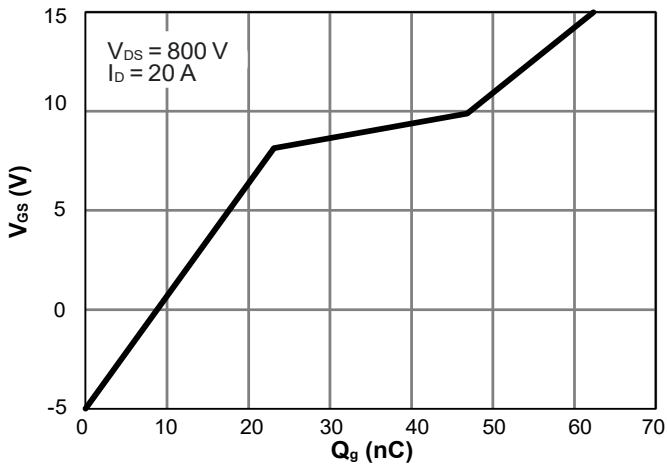


Figure 9. Gate-Charge Characteristics

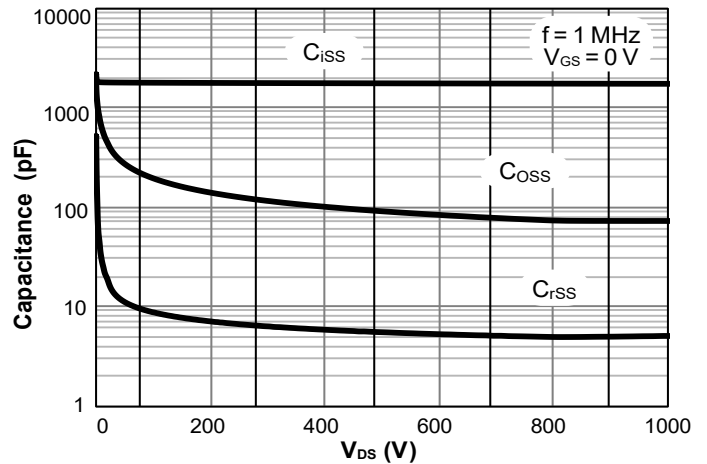


Figure 10. Capacitance Characteristics

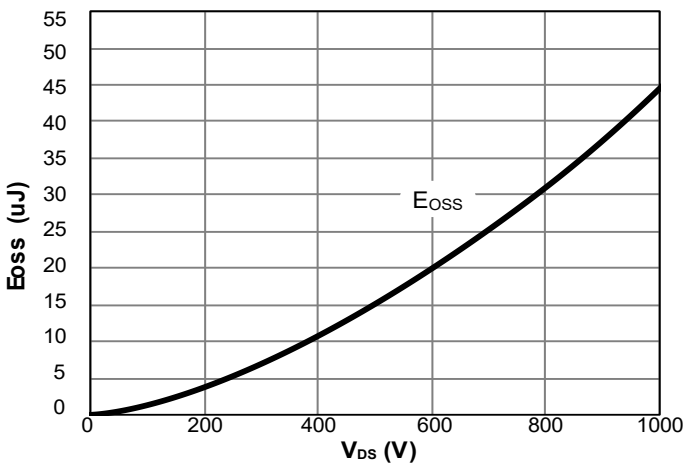


Figure 11. Coss stored Energy

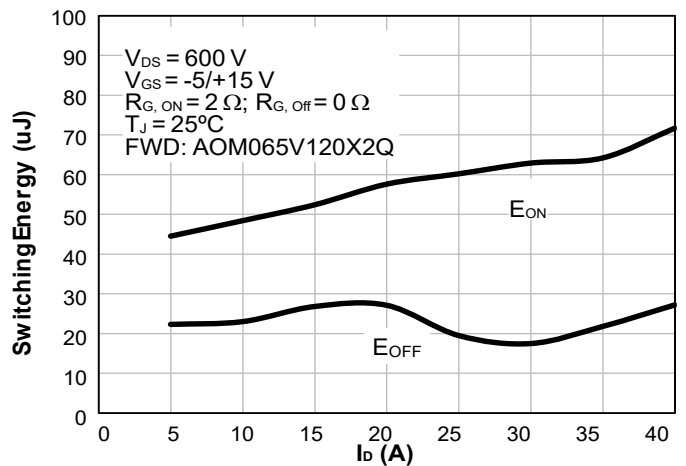


Figure 12. Switching Energy vs. Drain Current

Typical Electrical and Thermal Characteristics (Continued)

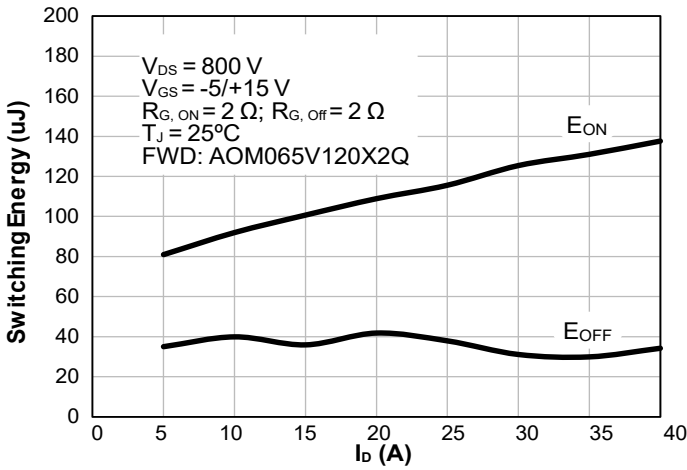


Figure 13. Switching Energy vs. Drain Current

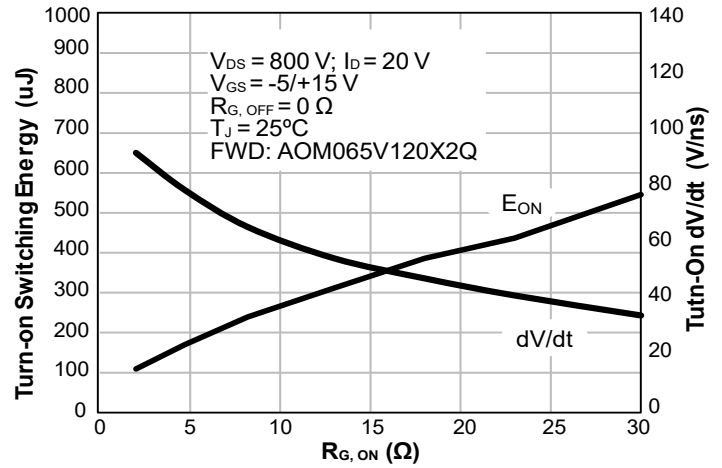


Figure 14. Turn-On Energy and dV/dt vs. External Gate Resistance

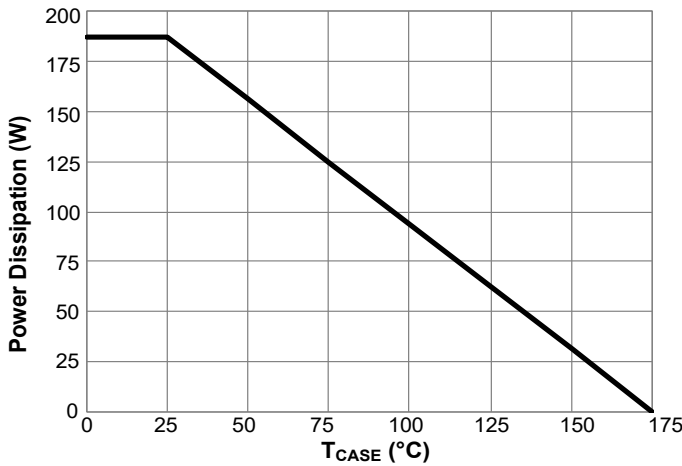


Figure 15. Power De-rating (Note I)

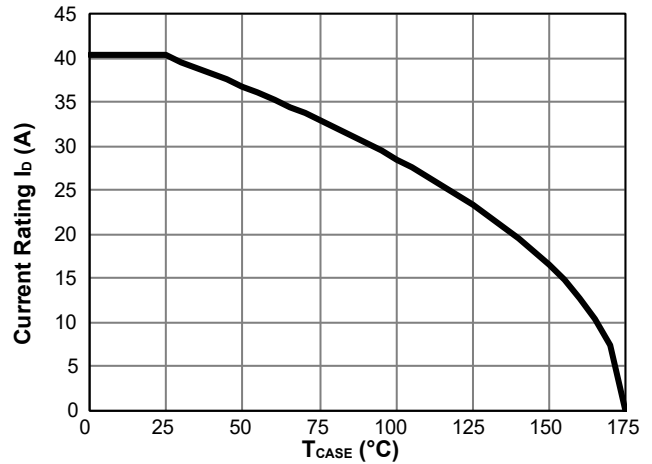


Figure 16. Current De-rating (Note I)

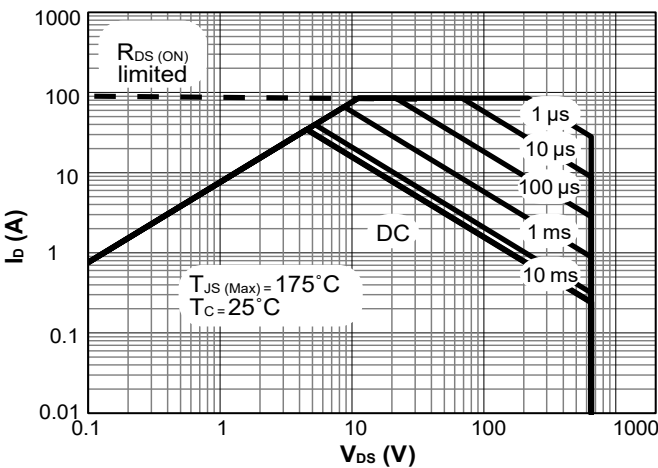


Figure 17. Maximum Forward Biased Safe Operating Area for AOM065V120X2Q (Note I)

Typical Electrical and Thermal Characteristics (Continued)

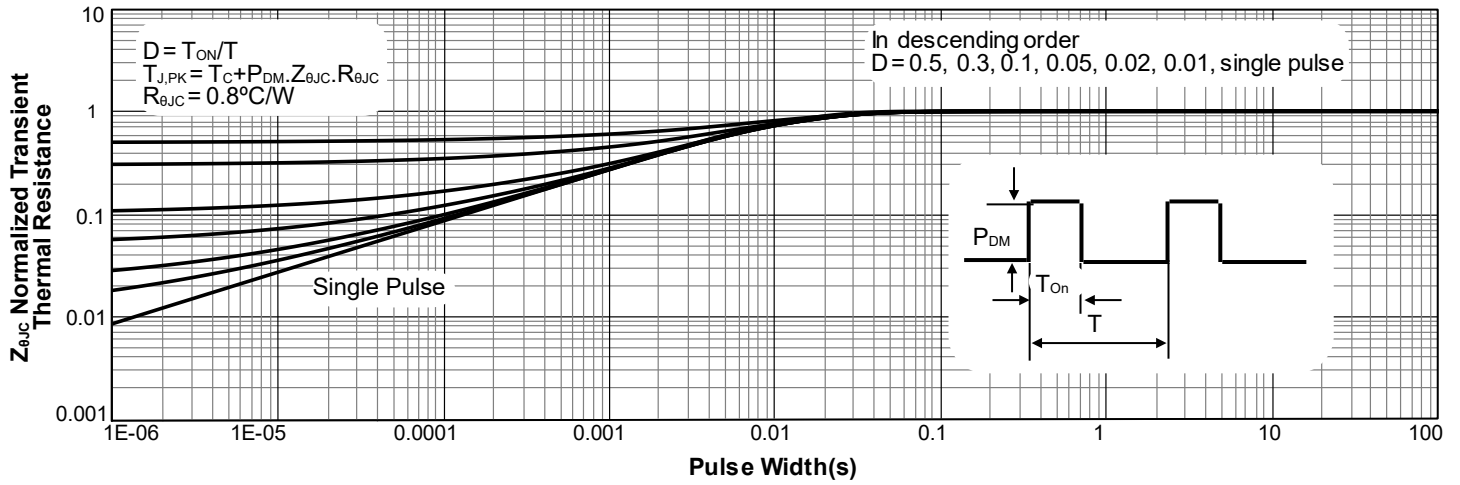


Figure 18. Normalized Maximum Transient Thermal Impedance for AOM065V120X2Q (Note I)

## Test Circuits and Waveforms

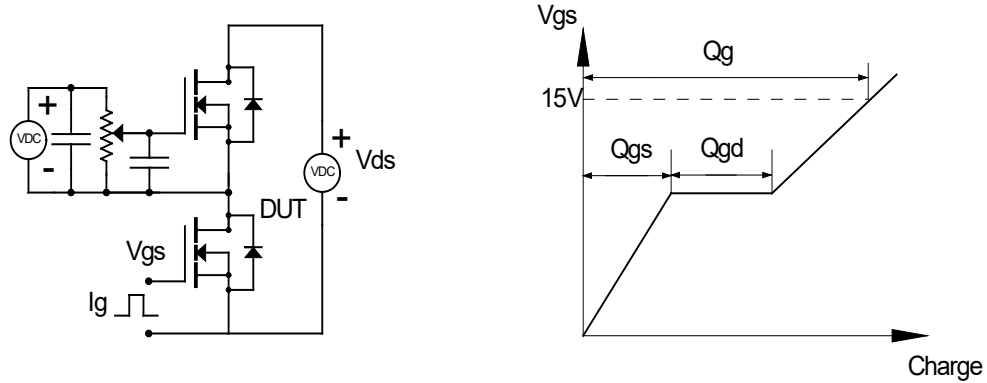


Figure 19. Gate Charge Test Circuits and Waveforms

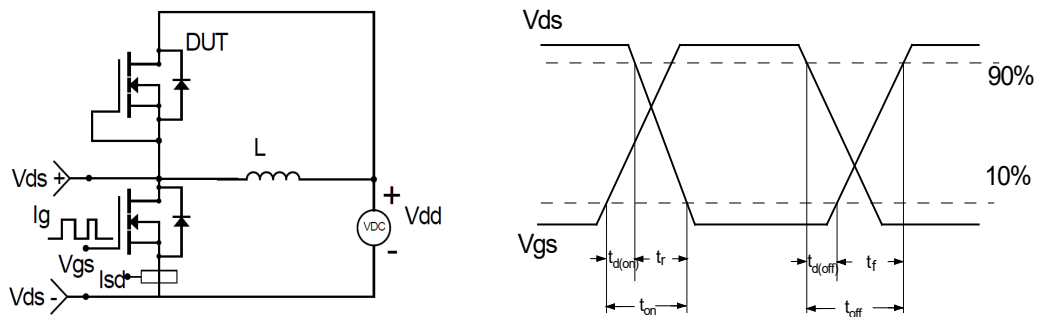


Figure 20. Inductive Switching Test Circuit and Waveforms

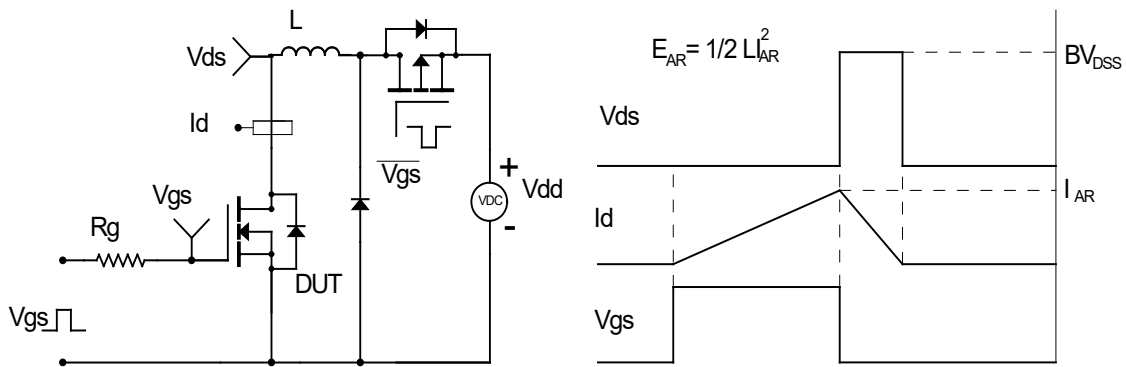


Figure 21. Unclamped Inductive Switching (UIS) Test Circuit and Waveforms

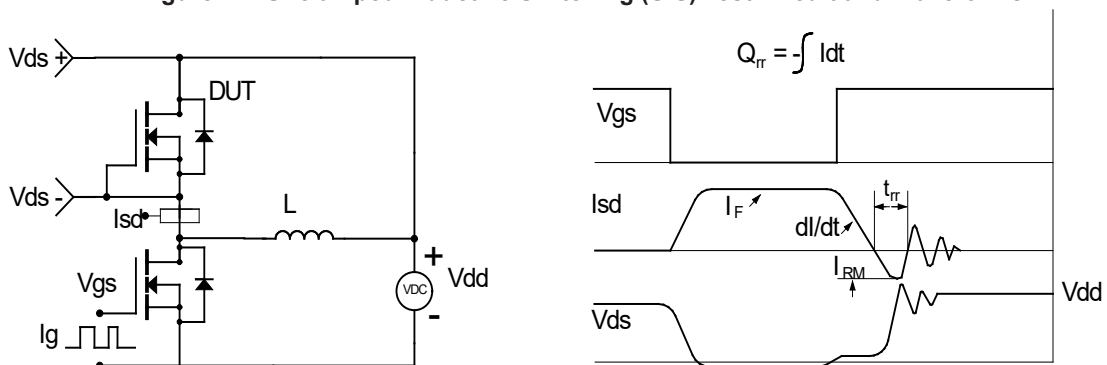
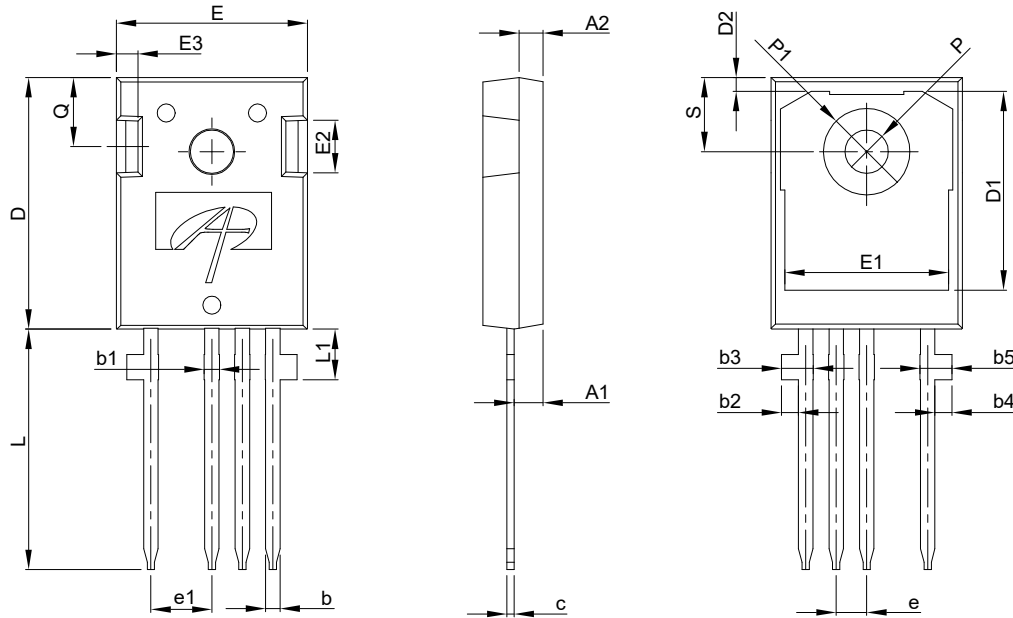


Figure 22. Diode Recovery Test Circuits and Waveforms

**Package Dimensions, TO-247-4L**



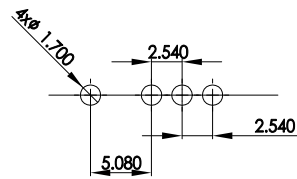
TOP VIEW

SIDE VIEW

BOTTOM VIEW



SIDE VIEW



RECOMMENDED THROUGH HOLES FOR LAND PATTERN

NOTE:

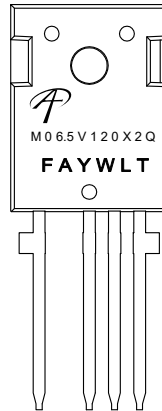
1. CONTROLLED DIMENSIONS ARE IN MILLIMETERS.
2. THIS IS AN ENGINEERING DRAFT FOR REVIEW. AOS CONFIDENTIAL.

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

**AOM065V120X2Q**  
**TO-247-4L**



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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.