AOM033V120X2

1200 V αSiC Silicon Carbide Power MOSFET

Features

- Proprietary αSiC™ MOSFET technology
- Low loss, fast switching speeds with low R_G
- Optimized drive voltage (V_{GS} = 15V) for broad driver compatibility
- Robust body diode and low Qrr

Product Summary

V_{DS} @ $T_{J, max}$	1200V
I_{DM}	120A
$R_{DS(ON), typ}$	33mΩ
Q_{rr}	226nC
E_{OSS} @ 800V	63μJ

100% UIS Tested

RoHS Compliant

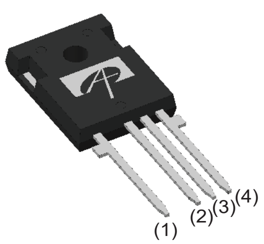
Applications

Renewable
- EV Charger
- Solar Inverters

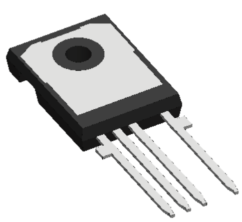
Industrial
- UPS
- SMPS
- Motor Drives

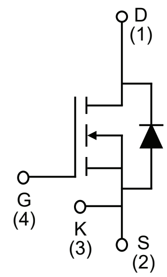
Pin Configuration

Top View



Bottom View





Ordering Part Number	Package Type	Form	Shipping Quantity
AOM033V120X2	TO-247-4L	Tube	30/Tube

Absolute Maximum Ratings

(T_A = 25°C, unless otherwise noted)

Symbol	Parameter		AOM033V120X2	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_C = 25°C	68	A
		T_C = 100°C	48	
I_{DM}	Pulsed Drain Current(C)		120	
E_{AS}	Single Pulsed Avalanche Energy(D)		1000	mJ
P_D	Power Dissipation(C)		300	W
T_J, T_{STG}	Junction and Storage Temperature Range		-55 to 175	°C
T_L	Maximum lead temperature for soldering purpose, 1/8" from case for 5 seconds		300	°C

Thermal Characteristics

Symbol	Parameter	AOM033V120X2	Units
$R_{\theta JA}$	Maximum Junction-to-Ambient(E,F)	40	°C/W
$R_{\theta JC}$	Maximum Junction-to-Case(G)	0.5	°C/W

Electrical Characteristics

(T_A = 25°C, unless otherwise noted)

Symbol	Parameter	Conditions		Min	Typ	Max	Units
STATIC PARAMETERS							
BV_{DSS}	Drain-Source Breakdown Voltage	I_D = 250µA, V_{GS} = 0V, T_J = 25°C		1200			V
		I_D = 250µA, V_{GS} = 0V, T_J = 150°C			1200		
I_{DSS}	Zero Gate Voltage Drain Current	V_{DS} = 1200V, V_{GS} = 0V, T_J = 25°C				100	µA
I_{GSS}	Gate-Body Leakage Current	V_{DS} = 0V, V_{GS} = +15/-5V				±100	nA
$V_{GS(th)}$	Gate Threshold Voltage	V_{DS} = V_{GS} , I_D = 17.5mA		2.3	2.8	3.5	V
$R_{DS(ON)}$	Static Drain-Source On-Resistance	V_{GS} = 15V, I_D = 20A	T_J = 25°C		33	43	mΩ
			T_J = 150°C		45		
g_{FS}	Forward Transconductance	V_{DS} = 20V, I_D = 20A			15	-	S
V_{SD}	Diode Forward Voltage	I_S = 17.5A, V_{GS} = -5V			4	5	V
DYNAMIC							
C_{iss}	Input Capacitance	V_{GS} = 0V, V_{DS} = 800V, f = 1MHz			2908		pF
C_{oss}	Output Capacitance				128		pF
C_{rss}	Reverse Transfer Capacitance				9.9		pF
E_{oss}	Coss Stored Energy				63		µJ
R_G	Gate Resistance	f = 1MHz			1.7		Ω
SWITCHING							
Q_g	Total Gate Charge	V_{GS} = 5/+15V, V_{DS} = 800V, I_D = 20A, I_{GS} = 50mA			104		nC
Q_{gs}	Gate Source Charge				37		nC
Q_{gd}	Gate Drain Charge				32		nC
$t_{d(on)}$	Turn-On Delay Time	V_{GS} = -5V/+15V, V_{DS} = 800V, I_D = 40A, R_G = 2Ω, L = 60µH, FWD: AOM033V120X2			13.3		ns
t_r	Turn-On Rise Time				15.4		ns
$t_{d(off)}$	Turn-Off Delay Time				15.3		ns
t_f	Turn-Off Fall Time				5.1		ns
E_{on}	Turn-On Energy				297		µJ
E_{off}	Turn-Off Energy				40		µJ
E_{tot}	Total Switching Energy				337		µJ
t_{rr}	Body Diode Reverse Recovery Time	I_F = 20A, dI/dt = 1500A/µs, V_{GS} = -5V, V_{DS} = 800V			48		ns
I_{rm}	Peak Reverse Recovery Current				13		A
Q_{rr}	Body Diode Reverse Recovery Charge				226		nC

Notes:

A. t_{pulse} < 1µs, f > 1Hz
B. 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.
C. The power dissipation P_D is based on $T_{J(MAX)}$ = 175°C, using junction-to-case thermal resistance, and is more useful in setting the upper dissipation limit for cases where additional heatsinking is used.
D. L = 5mH, I_{AS} = 20A, R_G = 25Ω, Starting T_J = 25°C.
E. The value of $R_{\theta JA}$ is measured with the device in a still air environment with T_A = 25°C.
F. The $R_{\theta JA}$ is the sum of the thermal impedance from junction to case $R_{\theta JC}$ and case to ambient.
G. 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°C.
H. The static characteristics in Figures 1 to 8 are obtained using < 300ms pulses, duty cycle 0.5% max.
I. 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°C. The SOA curve provides a single pulse rating.

Typical Electrical and Thermal Characteristics

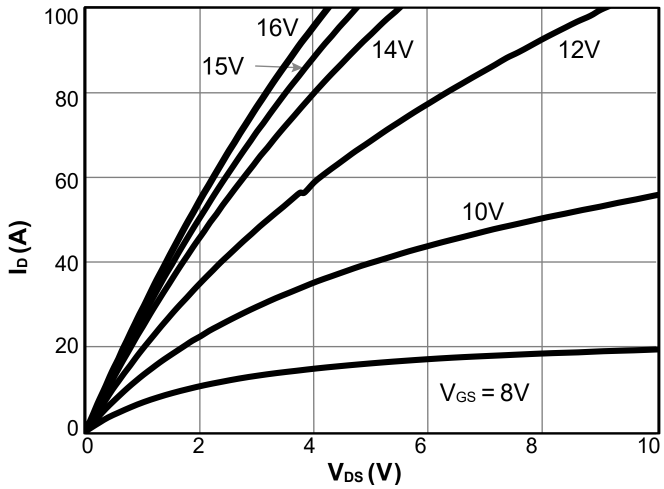


Figure 1. On-Region Characteristics T_J = 25°C

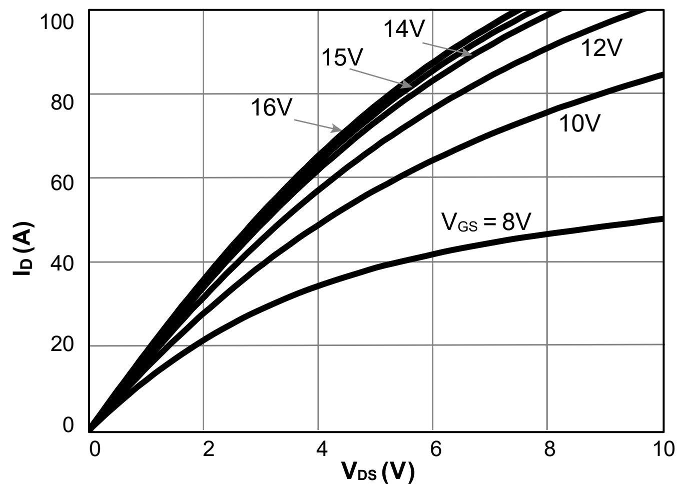


Figure 2. On-Region Characteristics T_J = 175°C

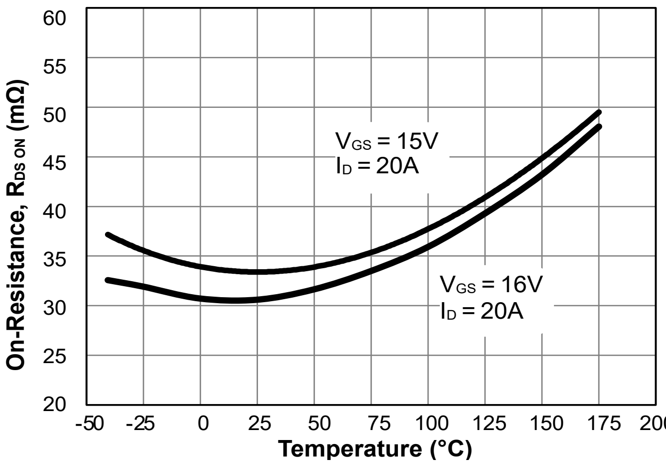


Figure 3. On-Resistance vs. Junction Temperature

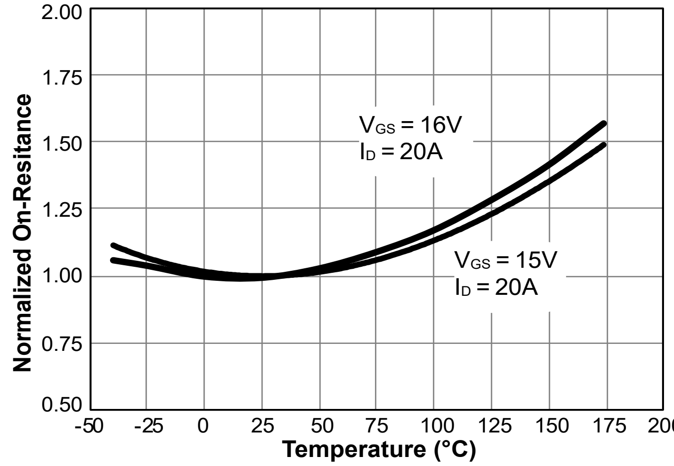


Figure 4. Normalized On-Resistance vs. Junction Temperature

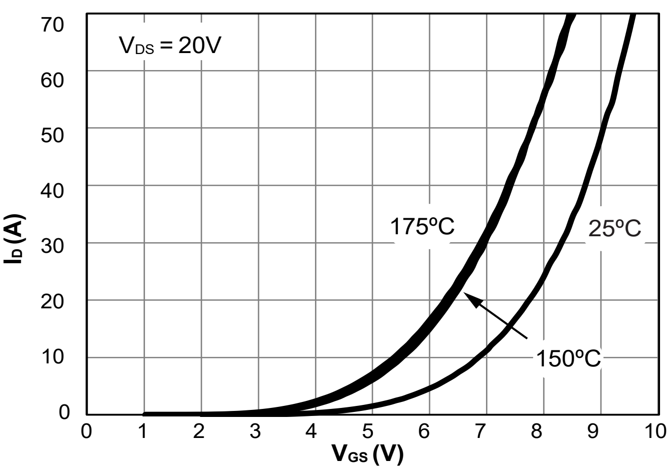


Figure 5. Transfer Characteristics

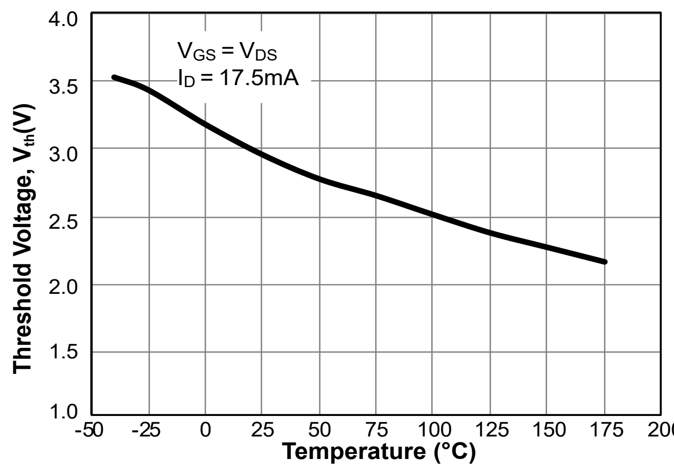


Figure 6. Threshold Voltage vs. Junction Temperature

Typical Electrical and Thermal Characteristics *(Continued)*

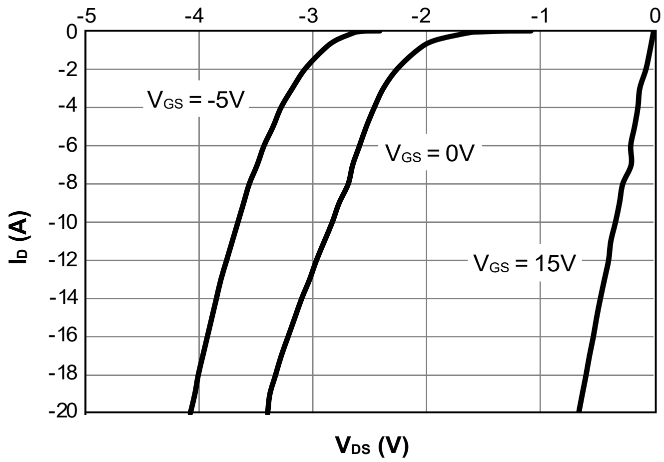


Figure 7. Body-Diode Characteristics at 25°C

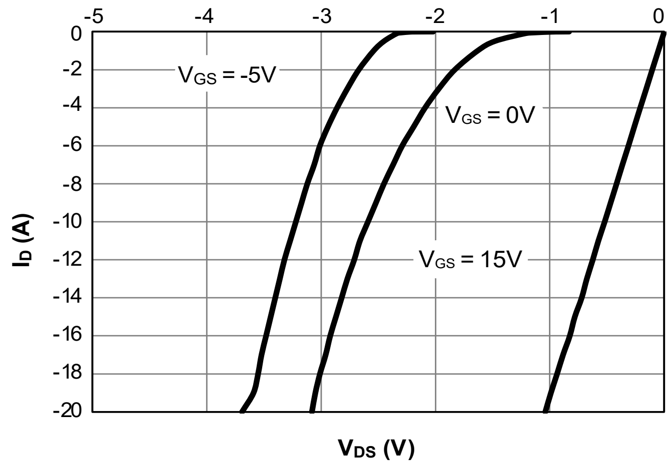


Figure 8. Body-Diode Characteristics at 175°C

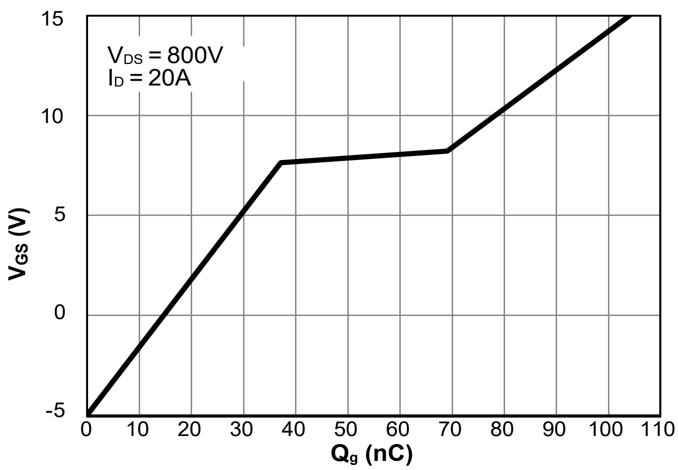


Figure 9. Gate-Charge Characteristics

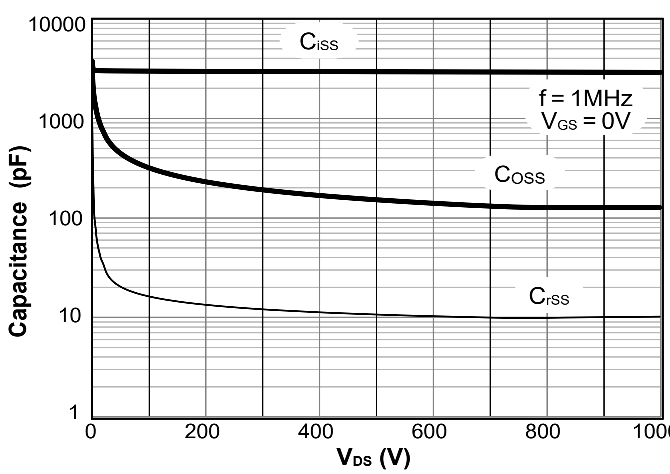


Figure 10. Capacitance Characteristics

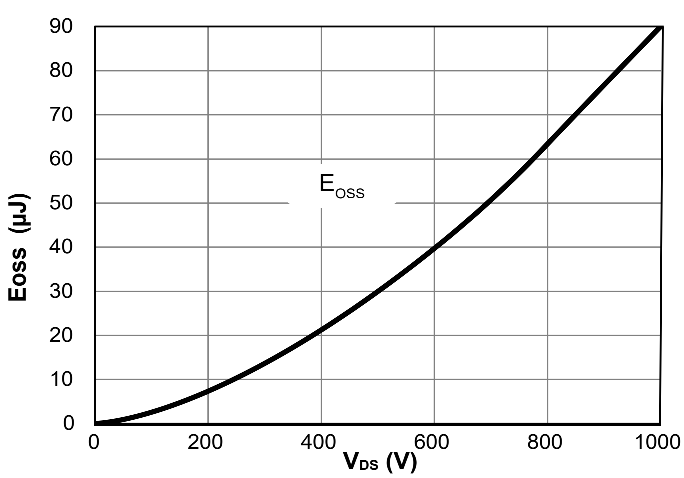


Figure 11. Coss Stored Energy

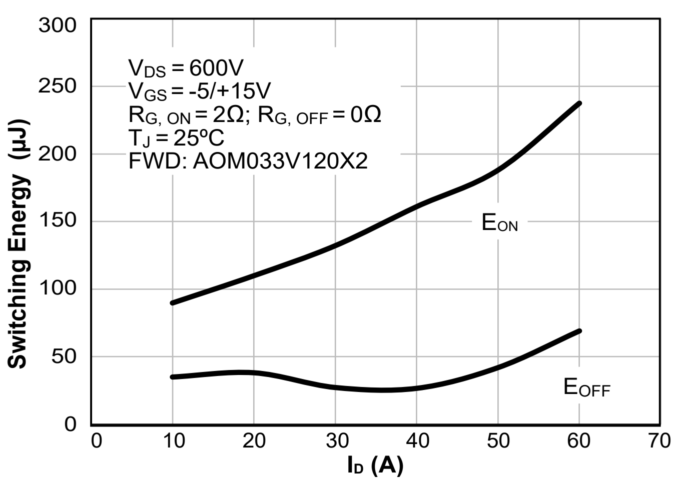


Figure 12. Switching Energy vs. Drain Current

Typical Electrical and Thermal Characteristics *(Continued)*

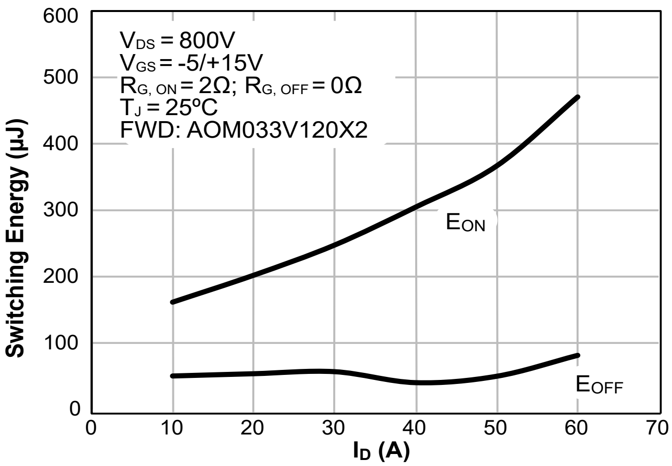


Figure 13. Switching Energy vs. Drain Current

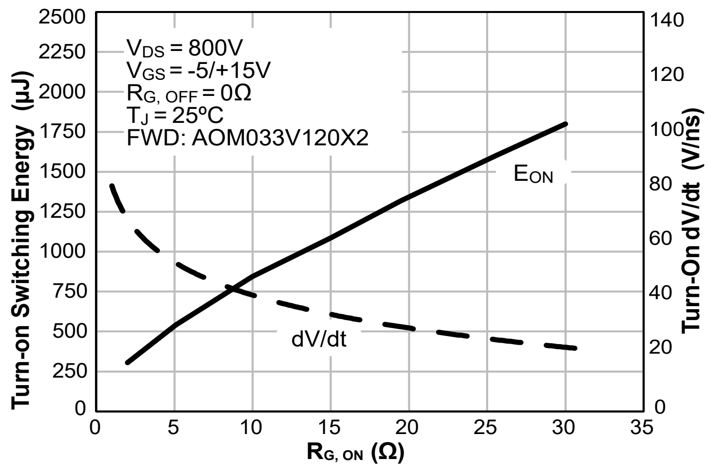


Figure 14. Turn-On Energy and dV/dt vs. External Gate Resistance

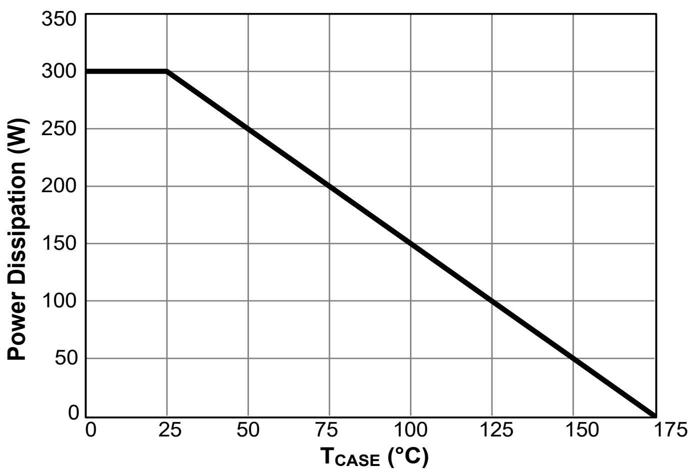


Figure 15. Power Derating vs. Case Temperature (Note I)

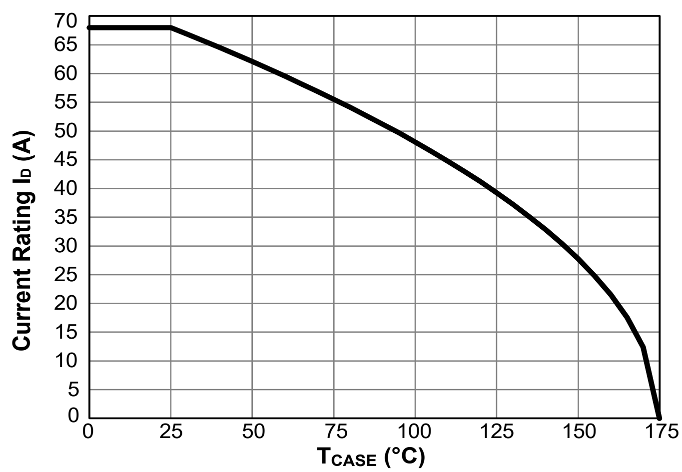


Figure 16. Current Derating vs. Case Temperature (Note I)

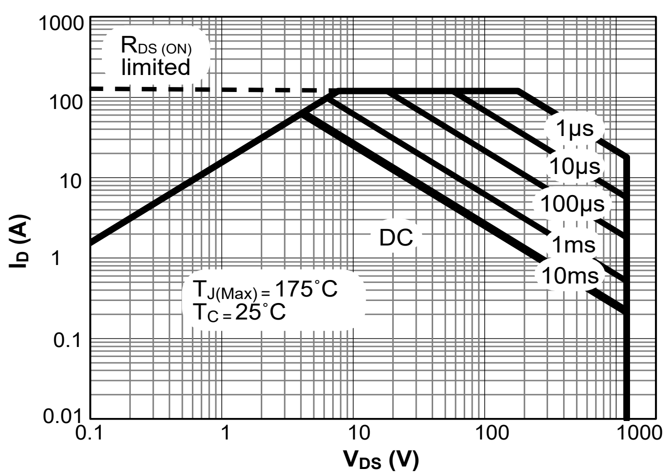


Figure 17. Maximum Forward Biased Safe Operating (Note I)

Typical Electrical and Thermal Characteristics *(Continued)*

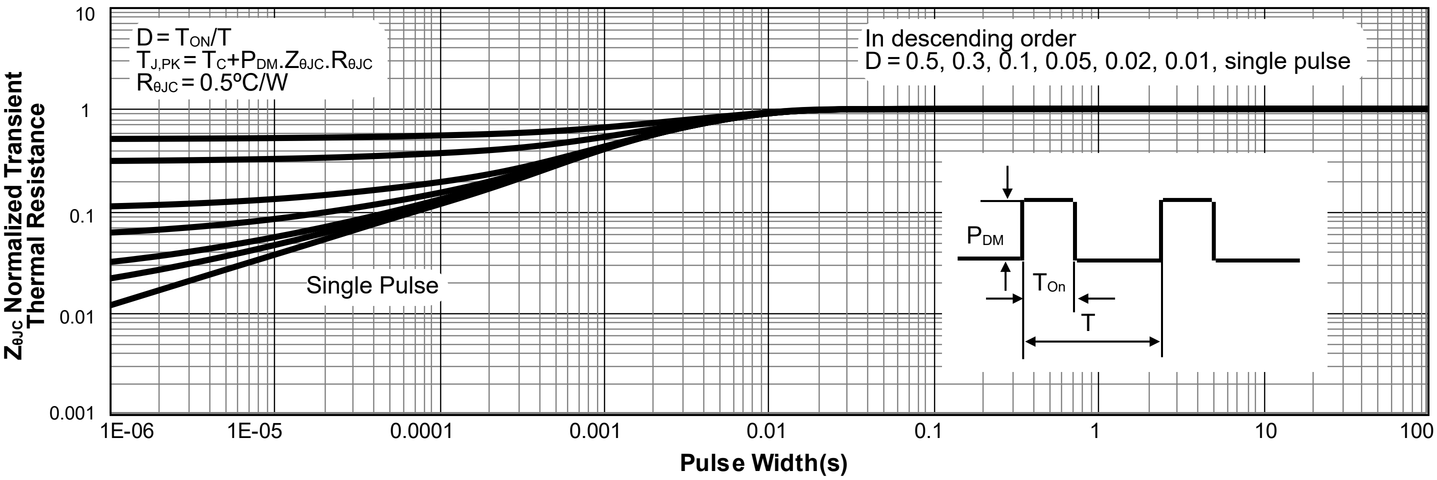


Figure 18. Normalized Maximum Transient Thermal Impedance for AOM033V120X2 (Note I)

Test Circuits and Waveforms

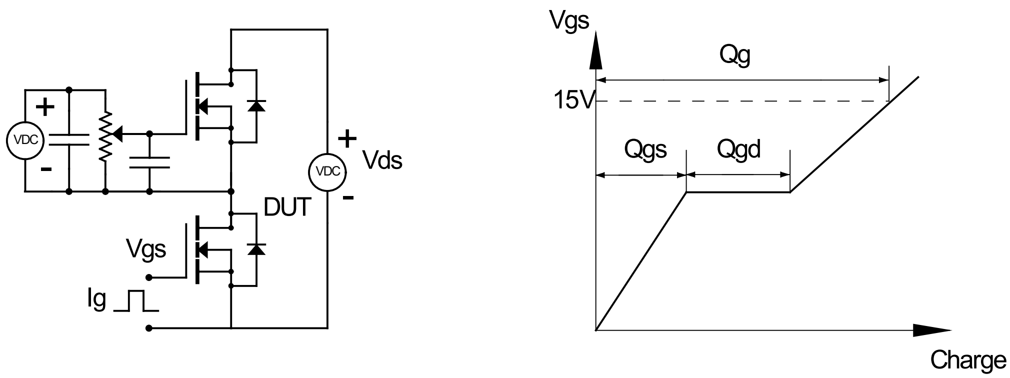


Figure 19. Gate Charge Test Circuits and Waveforms

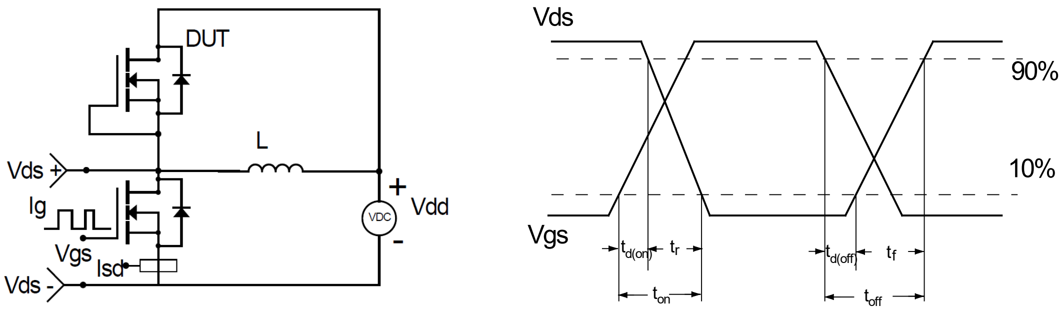


Figure 20. Inductive Switching Test Circuit and Waveforms

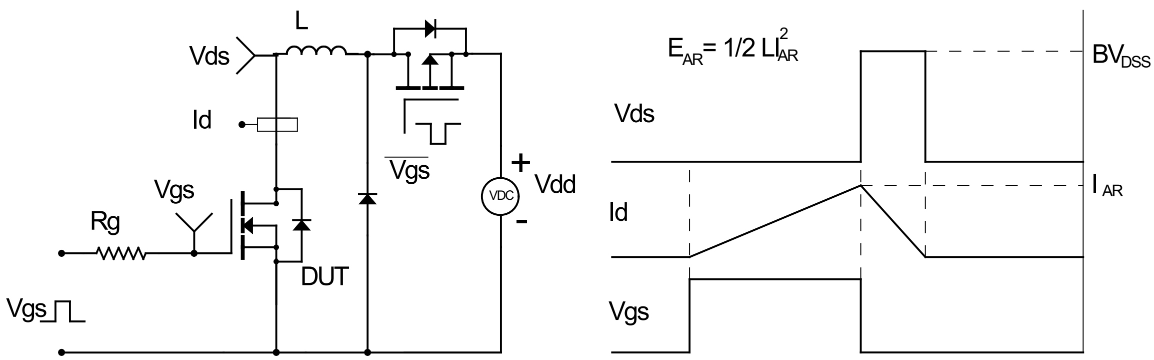


Figure 21. Unclamped Inductive Switching (UIS) Test Circuit and Waveforms

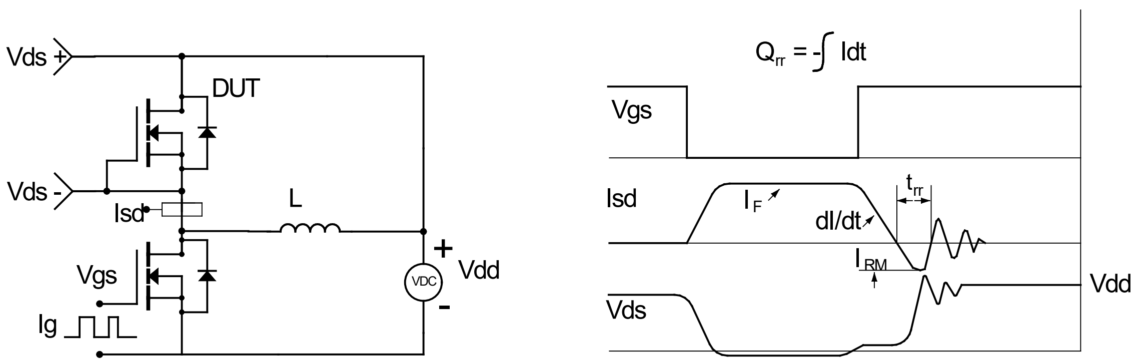
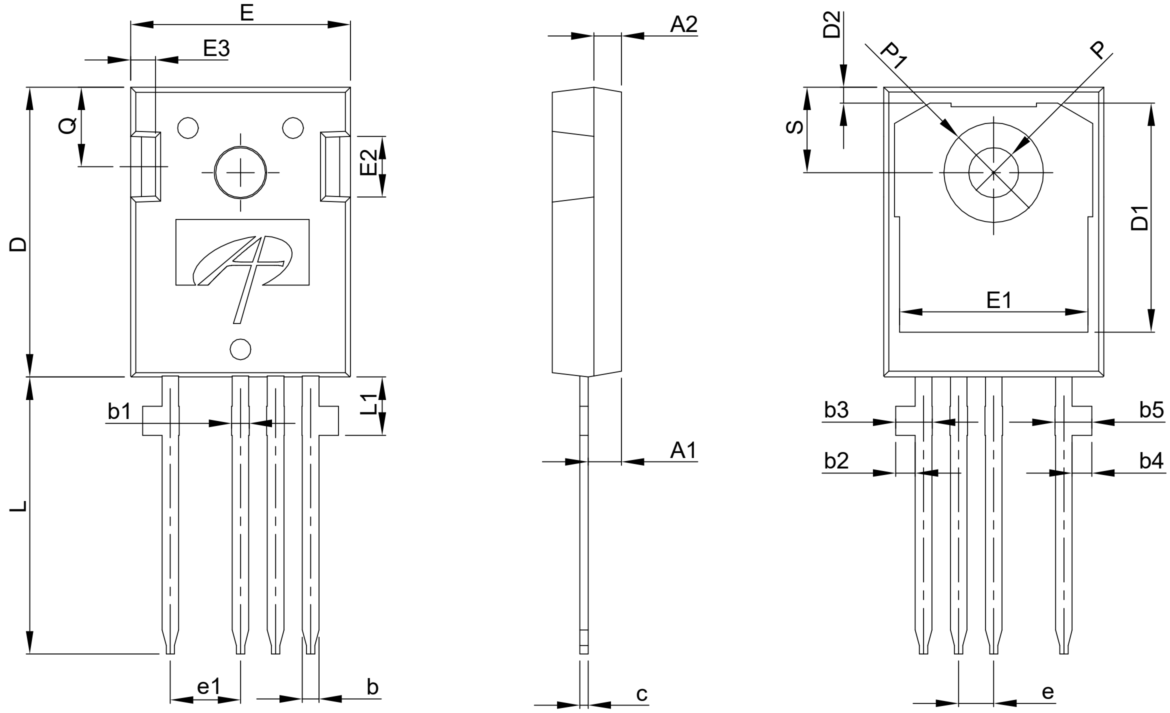
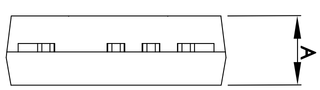


Figure 22. Diode Recovery Test Circuits and Waveforms

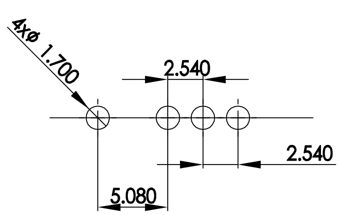
Package Dimensions, TO-247-4L



TOP VIEW SIDE VIEW BOTTOM VIEW



SIDE VIEW



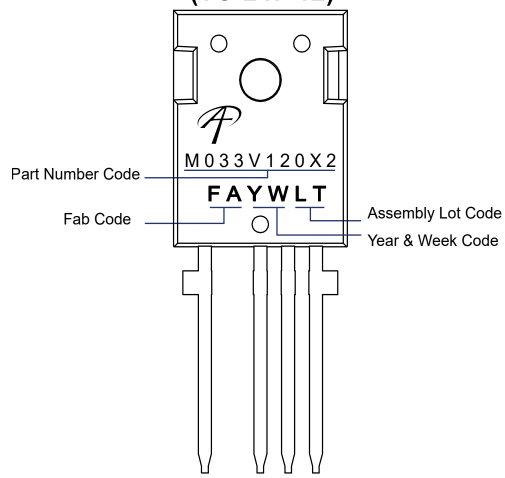
RECOMMENDED THROUGH HOLES
FOR LAND PATTERN

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

NOTE:

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

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.