

Features

- Proprietary α SiC MOSFET technology
- Low loss, with low $R_{DS, ON}$
- Fast switching with low R_G and low capacitance
- Flexible gate voltage range ($V_{GS} = 15$ to $18V$)
- Low reverse recovery diode (Q_{rr})
- AEC-Q101 Automotive Qualified

Product Summary

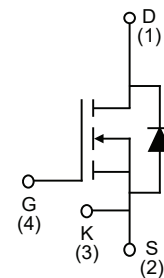
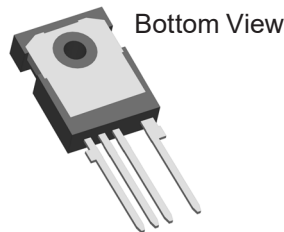
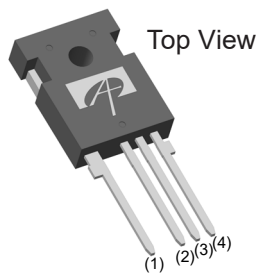
$V_{DS} @ T_{J, max}$	1200V
I_{DM}	100A
$R_{DS(ON), typ}$	40m Ω
Q_{rr}	143nC
$E_{OSS} @ 800V$	44 μ J
100% UIS Tested	

Applications

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



Pin Configuration



Ordering Part Number	Package Type	Form	Shipping Quantity
AOM040V120X2Q	TO-247-4L	Tube	30/Tube

Absolute Maximum Ratings

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

Symbol	Parameter		AOM040V120X2Q	Units
V_{DS}	Drain-Source Voltage		1200	V
$V_{GS, OP, TRANS}$	Gate Source Voltage	Max Transient ^(A)	-8/+22	
$V_{GS, OP}$		Recommended Operating Range ^(B)	-5/+18	
I_D	Continuous Drain Current	$T_C = 25^\circ C, V_{GS} = 18V$	50	A
		$T_C = 100^\circ C, V_{GS} = 18V$	35	
I_{DM}	Pulsed Drain Current ^(C)		100	
E_{AS}	Single Pulsed Avalanche Energy ^(D)		640	mJ
P_D	Power Dissipation ^(C)		230	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	Typ	Max	Units
R _{θJA}	Maximum Junction-to-Ambient ^(E,F)		40	°C/W
R _{θJC}	Maximum Junction-to-Case ^(G)	0.54	0.65	°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			V
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			±200	nA
V _{GS(th)}	Gate Threshold Voltage	V _{DS} = V _{GS} , I _D = 13.2mA	1.8	2.8	3.5	V
R _{DS(ON)}	Static Drain-Source On-Resistance	V _{GS} = 15V, I _D = 13.2A	T _J = 25°C	45	59	mΩ
				71		mΩ
		V _{GS} = 18V, I _D = 13.2A	T _J = 25°C	40	52	mΩ
			T _J = 175°C	70		mΩ
g _{FS}	Forward Transconductance	V _{DS} = 20V, I _D = 13.2A		10		S
V _{SD}	Diode Forward Voltage	I _S = 13.2A, V _{GS} = -5V		4	5	V
DYNAMIC						
C _{iss}	Input Capacitance	V _{GS} = 0V, V _{DS} = 800V, f = 1MHz		2316		pF
C _{oss}	Output Capacitance			103		pF
C _{rss}	Reverse Transfer Capacitance			14		pF
E _{oss}	Coss Stored Energy			44		μJ
R _G	Gate Resistance	f = 1MHz		1.5		Ω
SWITCHING						
Q _g	Total Gate Charge	V _{GS} = -5/+18V, V _{DS} = 800V, I _D = 13.2A		91		nC
Q _{gs}	Gate Source Charge			28		nC
Q _{gd}	Gate Drain Charge			26		nC
t _{d(on)}	Turn-On Delay Time	V _{GS} = -5V/+18V, V _{DS} = 800V, I _D = 13A, R _G = 2Ω L = 60μH FWD: AOM040V120X2Q		9		ns
t _r	Turn-On Rise Time			8		ns
t _{d(off)}	Turn-Off Delay Time			35		ns
t _f	Turn-Off Fall Time			18		ns
E _{on}	Turn-On Energy			143		μJ
E _{off}	Turn-Off Energy			35		μJ
E _{tot}	Total Switching Energy			178		μJ
t _{rr}	Body Diode Reverse Recovery Time	I _F = 13A, dI/dt = 1500A/us, V _{GS} = -5V V _{DS} = 800V		18		ns
I _{rm}	Peak Reverse Recovery Current			13		A
Q _{rr}	Body Diode Reverse Recovery Charge			143		nC

Notes:

A. t_{pulse} < 1 μs, f > 1Hz

B. Device can be operated at V_{GS} = 0/18V. Actual operating V_{GS} 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} = 16A, R_G = 25Ω, Starting T_J = 25°C.

E. The value of R_{θJA} is measured with the device in a still air environment with T_A = 25°C.

F. The R_{θJA} is the sum of the thermal impedance from junction to case R_{θJC} and case to ambient.

G. The value of R_{θJC} is measured with the device mounted to a large heat-sink, assuming a maximum junction temperature of T_{J(MAX)} = 175°C.

Typical Electrical and Thermal Characteristics^(H)

$T_A = 25^\circ\text{C}$, unless otherwise specified.

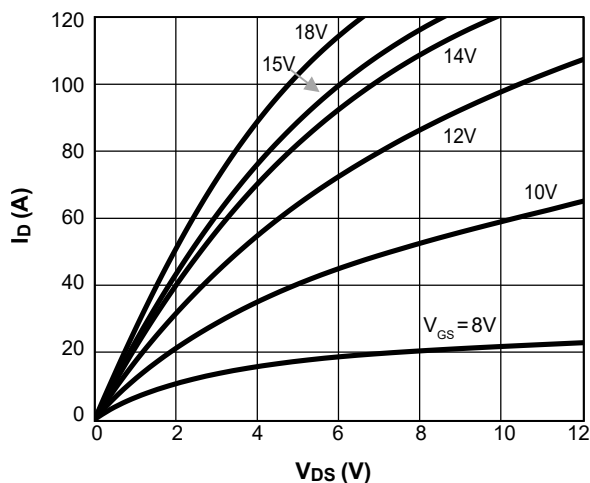


Figure 1. On-Region Characteristics $T_J = 25^\circ\text{C}$

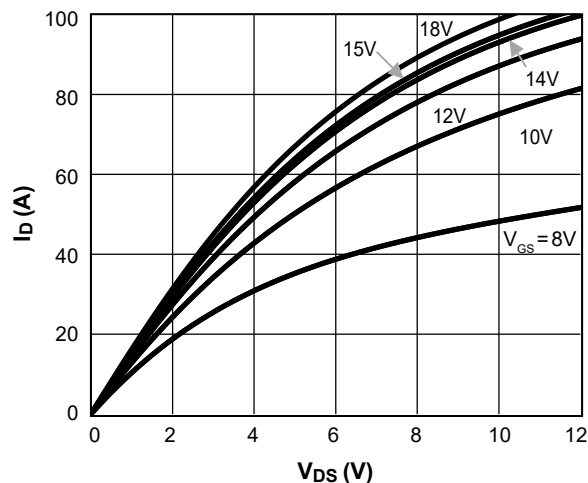


Figure 2. On-Region Characteristics $T_J = 175^\circ\text{C}$

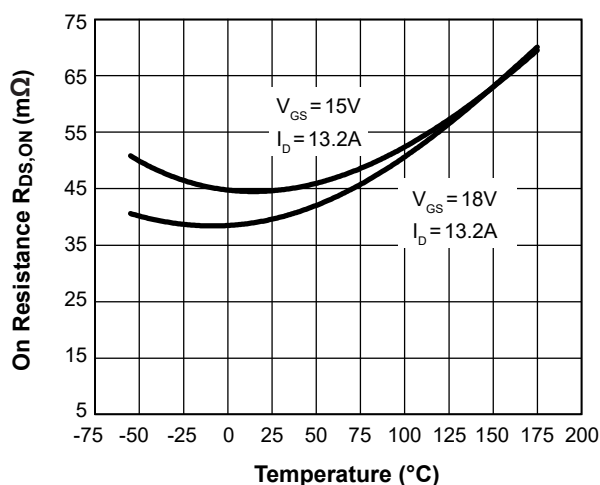


Figure 3. On Resistance vs. Junction Temperature

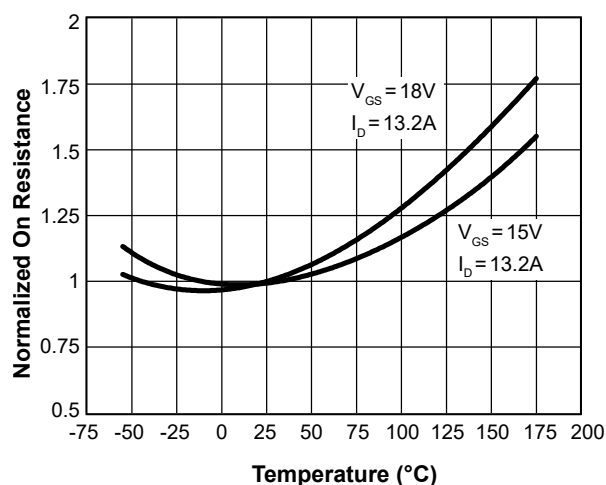


Figure 4. Normalized On Resistance vs. Junction Temperature

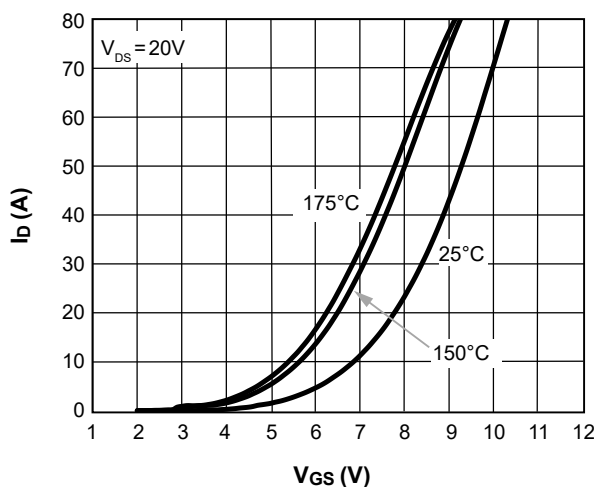


Figure 5. Transfer Characteristics

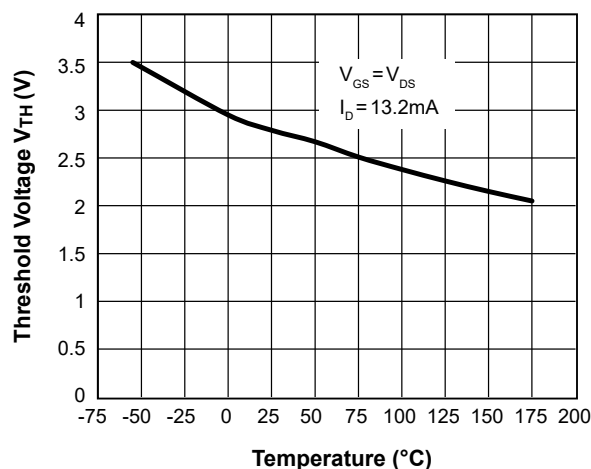


Figure 6. Threshold Voltage vs. Junction Temperature

Typical Electrical and Thermal Characteristics^(H) (Continued)

$T_A = 25^\circ\text{C}$, unless otherwise specified.

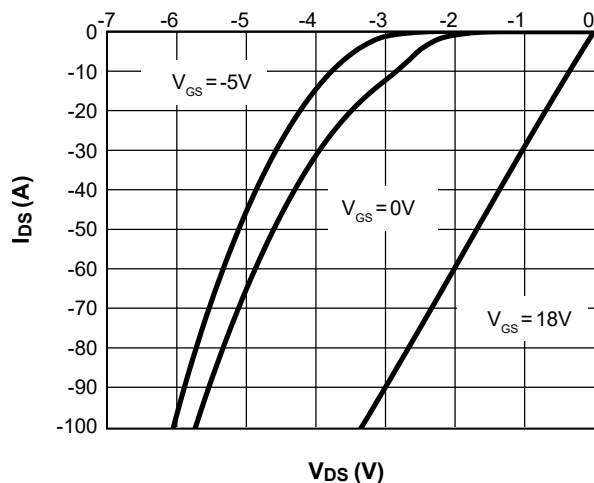


Figure 7. Body-diode Characteristics at 25°C

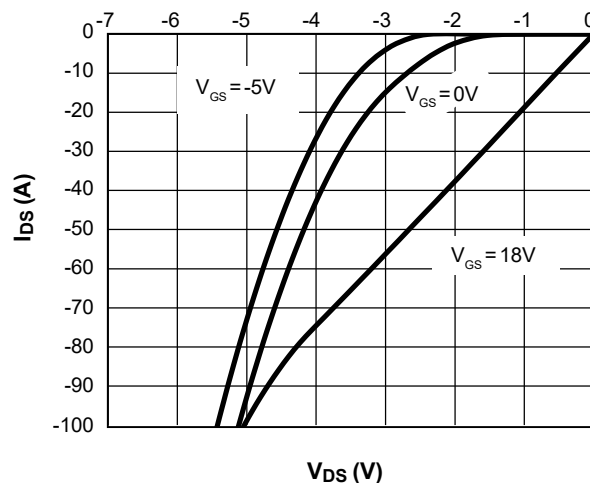


Figure 8. Body-diode Characteristics at 175°C

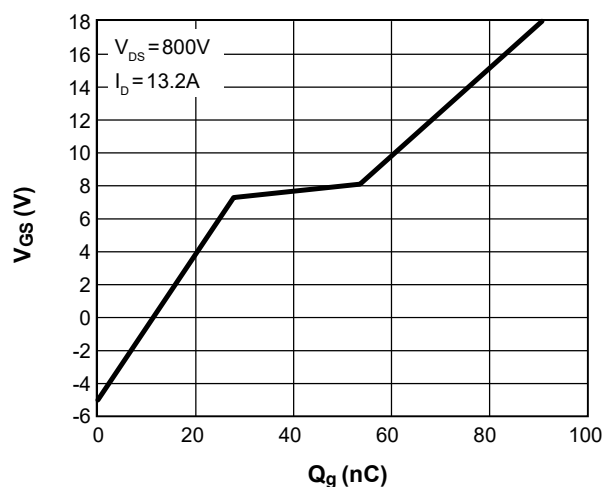


Figure 9. Gate-charge Characteristics

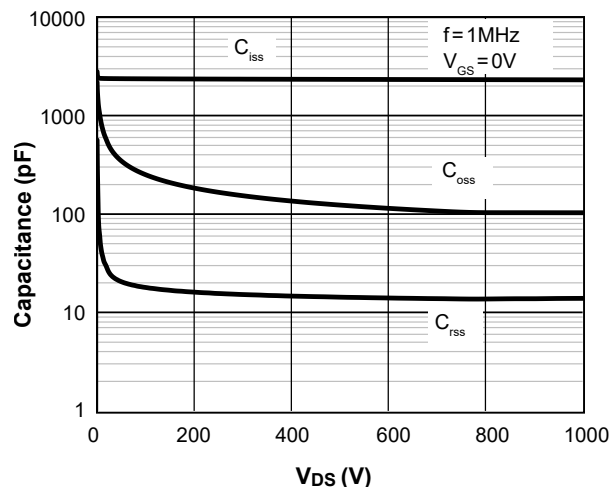


Figure 10. Capacitance Characteristics

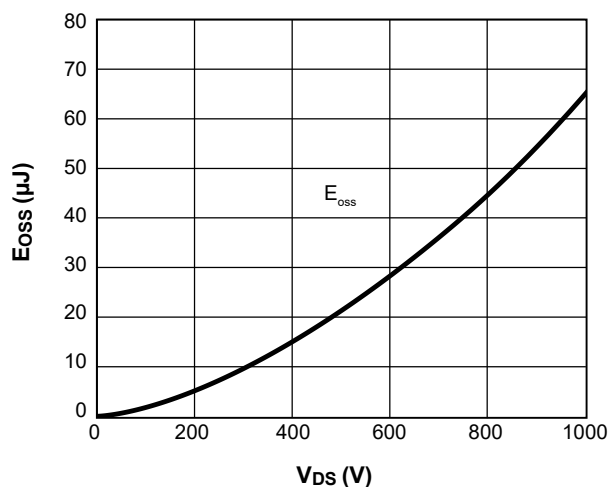


Figure 11. C_{oss} Stored Energy

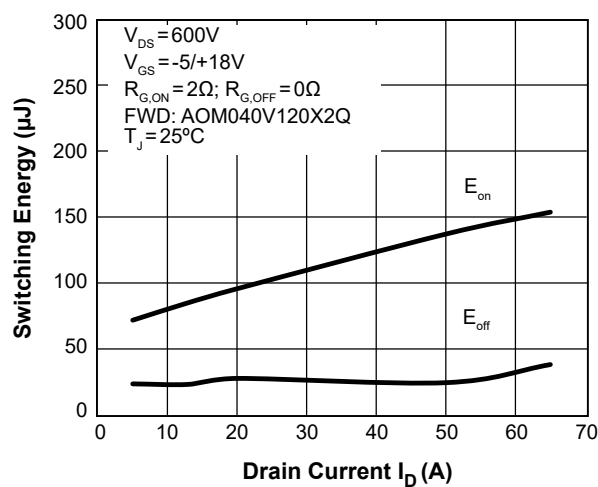


Figure 12. Switching Energy vs. Drain Current

Typical Electrical and Thermal Characteristics (Continued)

$T_A = 25^\circ\text{C}$, unless otherwise specified.

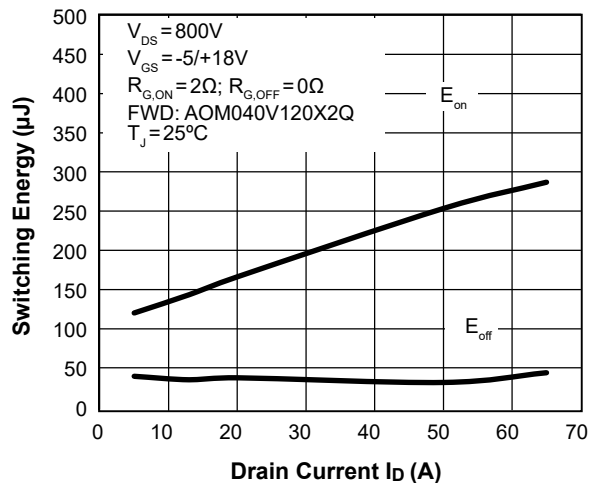


Figure 13. Switching Energy vs. Drain Current

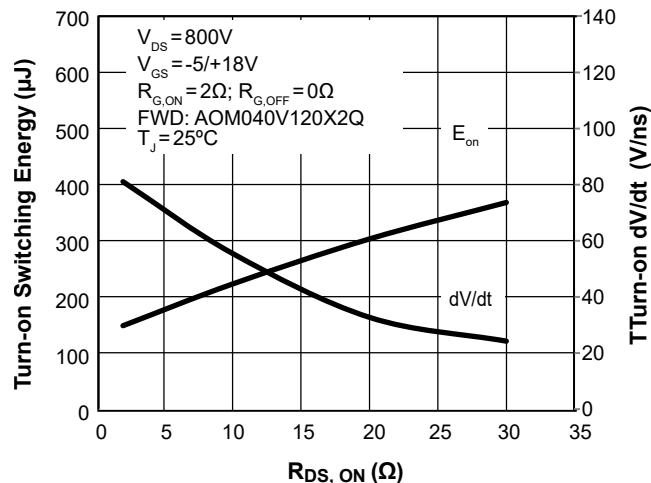


Figure 14. Turn-On Energy and dV/dt vs. External Gate Resistance

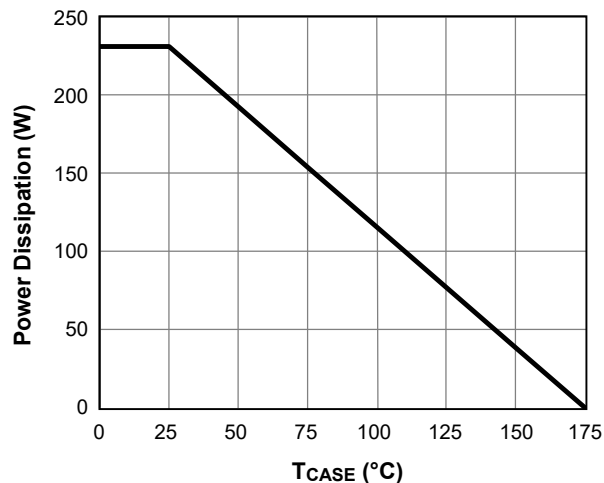


Figure 15. Power De-rating (Note I)

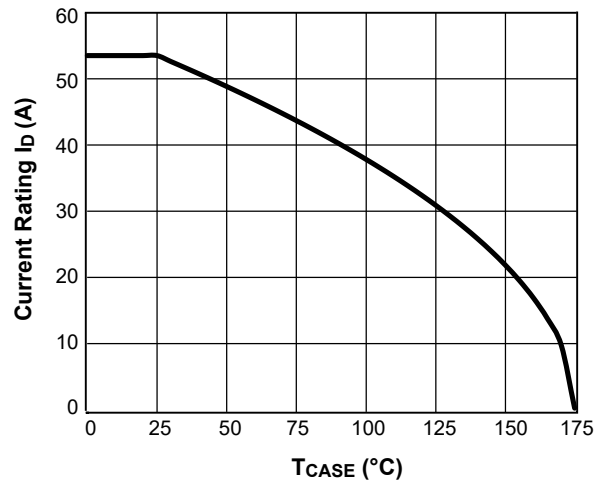


Figure 16. Current De-rating (Note I)

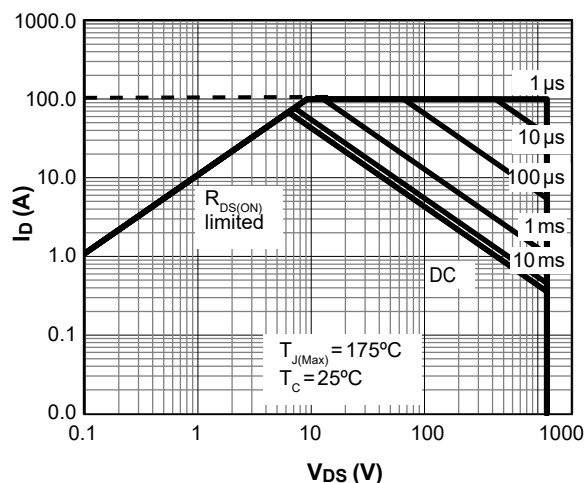


Figure 17. Maximum Forward Biased Safe Operating Area for AOM040V120X2Q (Note I)

Typical Electrical and Thermal Characteristics (Continued)

$T_A = 25^\circ\text{C}$, unless otherwise specified.

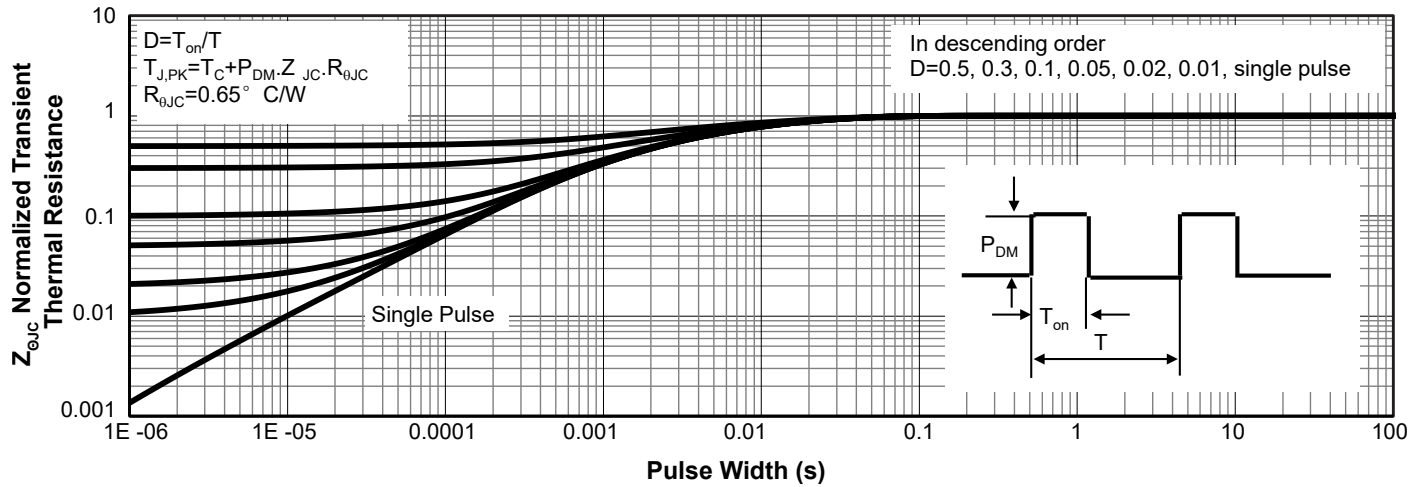


Figure 18. Normalized Maximum Transient Thermal Impedance for AOM040V120X2Q (Note I)

Notes:

- 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 $T_{J(MAX)} = 175^\circ\text{C}$. The SOA curve provides a single pulse rating.

Test Circuits and Waveforms

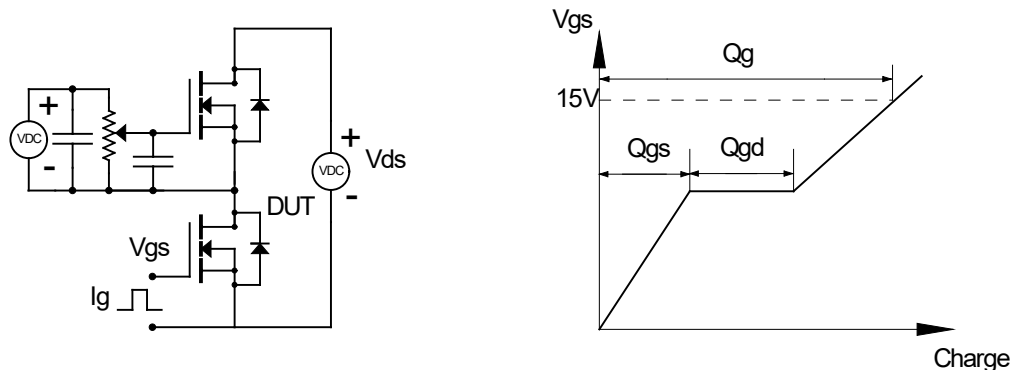


Figure 19. Gate Charge Test Circuits and Waveforms

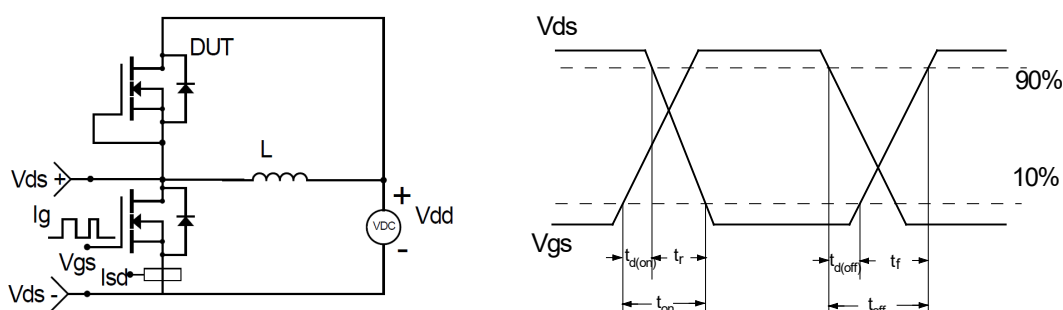


Figure 20. Inductive Switching Test Circuit and Waveforms

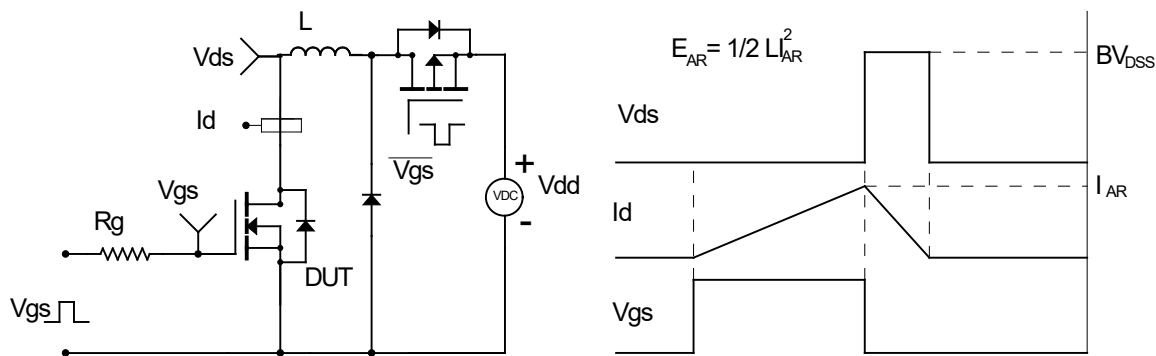


Figure 21. Unclamped Inductive Switching (UIS) Test Circuit and Waveforms

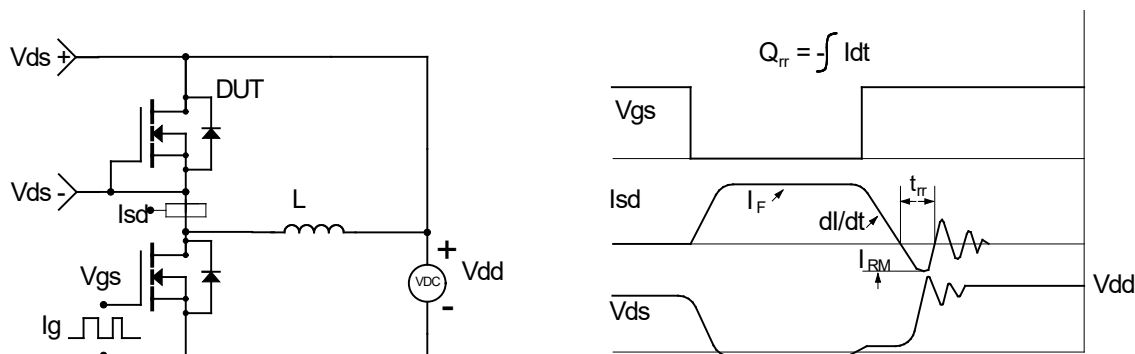
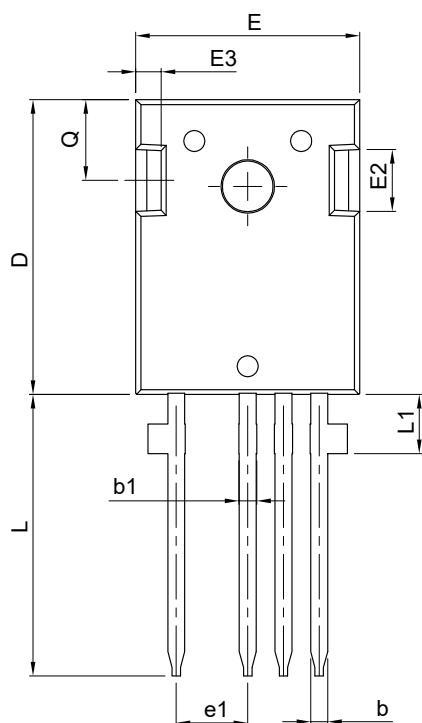
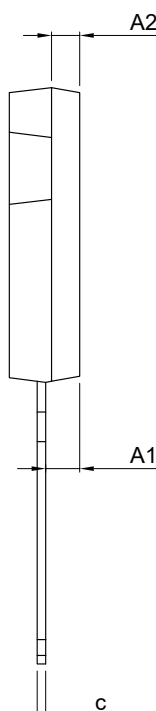


Figure 22. Diode Recovery Test Circuits and Waveforms

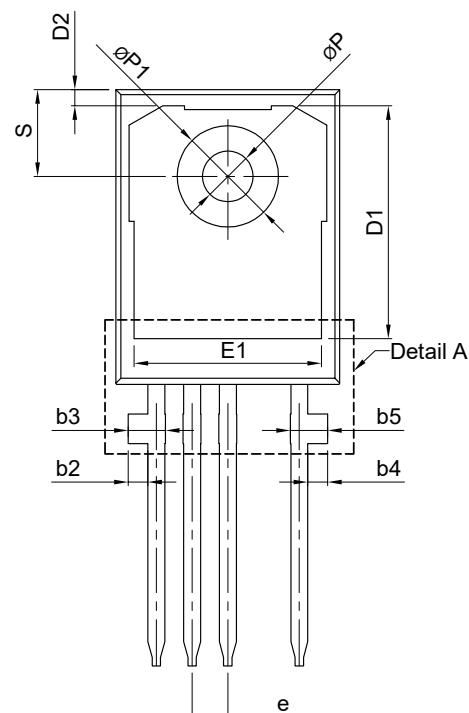
Package Dimensions, TO-247-4L



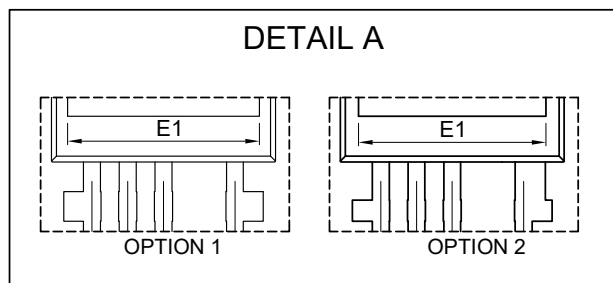
TOP VIEW



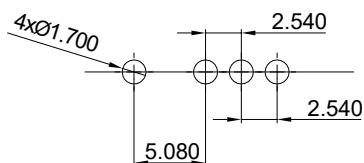
SIDE VIEW



BOTTOM VIEW



SIDE VIEW



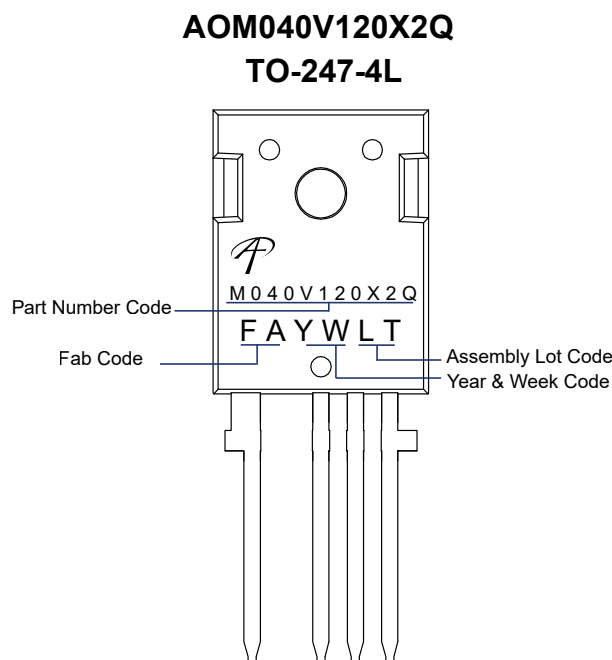
RECOMMENDED THROUGH HOLES
FOR LAND PATTERN

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	2.29	2.42	2.54	0.090	0.095	0.100
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(Optional1)	13.43	13.63	13.83	0.529	0.537	0.544
E1(Optional2)	13.18	13.33	13.48	0.519	0.525	0.531
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.

Part Marking



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