

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})

Applications

Renewable

- EV Charger
- Solar Inverters

Industrial

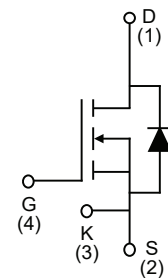
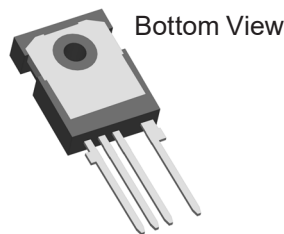
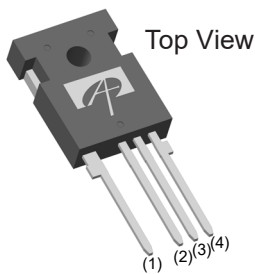
- UPS
- SMPS
- Motor Drives



Product Summary

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

Pin Configuration



| Ordering Part Number | Package Type | Form | Shipping Quantity |
|----------------------|--------------|------|-------------------|
| AOM040V120X2 | TO-247-4L | Tube | 30/Tube |

Absolute Maximum Ratings

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

| Symbol | Parameter | AOM040V120X2 | 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 |
| | | $T_C = 100^\circ C, V_{GS} = 18V$ | 35 |
| I_{DM} | Pulsed Drain Current ^(C) | 100 | A |
| 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 = 250 μA, V _{GS} = 0 V, T _J = 25°C | 1200 | | | V | |
| | | I _D = 250 μA, V _{GS} = 0 V, T _J = 150°C | 1200 | | | V | |
| I _{DSS} | Zero Gate Voltage Drain Current | V _{DS} = 1200 V, V _{GS} = 0 V, T _J = 25°C | | | 100 | μA | |
| I _{GSS} | Gate-Body Leakage Current | V _{DS} = 0 V, V _{GS} = +15/-5 V | | | ±200 | nA | |
| V _{GS(th)} | Gate Threshold Voltage | V _{DS} = V _{GS} , I _D = 13.2 mA | 1.8 | 2.8 | 3.5 | V | |
| R _{DS(on)} | Static Drain-Source On-Resistance | V _{GS} = 15 V, I _D = 13.2 A | T _J = 25°C | 45 | 59 | mΩ | |
| | | | T _J = 175°C | 71 | | mΩ | |
| | | V _{GS} = 18 V, I _D = 13.2 A | T _J = 25°C | 40 | 52 | mΩ | |
| | | | T _J = 175°C | 70 | | mΩ | |
| g _{FS} | Forward Transconductance | V _{DS} = 20 V, I _D = 13.2 A | | 10 | | S | |
| V _{SD} | Diode Forward Voltage | I _S = 13.2 A, V _{GS} = -5 V | | 4 | 5 | V | |
| DYNAMIC | | | | | | | |
| C _{iss} | Input Capacitance | V _{GS} = 0 V, V _{DS} = 800 V, f = 1 MHz | | 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 = 1 MHz | | 1.5 | | Ω | |
| SWITCHING | | | | | | | |
| Q _g | Total Gate Charge | V _{GS} = -5/+18 V, V _{DS} = 800 V, I _D = 13.2 A | | 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} = -5 V/+18 V, V _{DS} = 800 V, I _D = 13 A, R _G = 2 Ω L = 60 μH | | 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 | | FWD: AOM040V120X2 | | 35 | | μJ |
| E _{tot} | Total Switching Energy | | | | 178 | | μJ |
| t _{rr} | Body Diode Reverse Recovery Time | I _F = 13 A, di/dt = 1500 A/us, V _{GS} = -5 V V _{DS} = 800 V | | 18 | | ns | |
| I _{rm} | Peak Reverse Recovery Current | | | | 13 | | A |
| Q _{rr} | Body Diode Reverse Recovery Charge | | | | 143 | | nC |

Notes:

- t_{pulse} < 1 μs, f > 1 Hz
- Device can be operated at V_{GS} = 0/18 V. Actual operating V_{GS} 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°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 mH, I_{AS} = 16 A, R_G = 25 Ω, Starting T_J = 25°C.
- The value of R_{θJA} is measured with the device in a still air environment with T_A = 25°C.
- The R_{θJA} is the sum of the thermal impedance from junction to case R_{θJC} and case to ambient.
- 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)

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

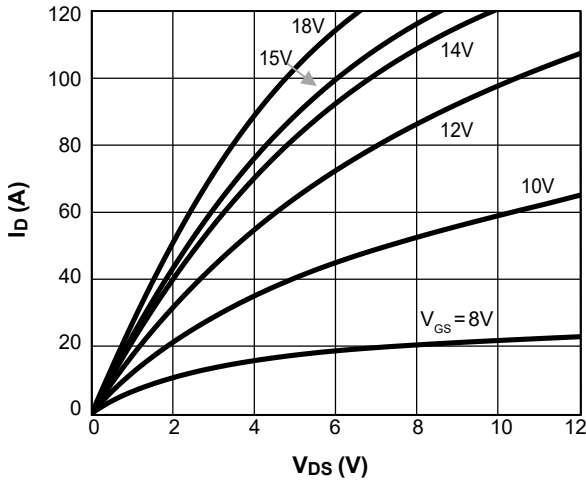


Figure 1. On-Region Characteristics $T_J = 25^\circ\text{C}$

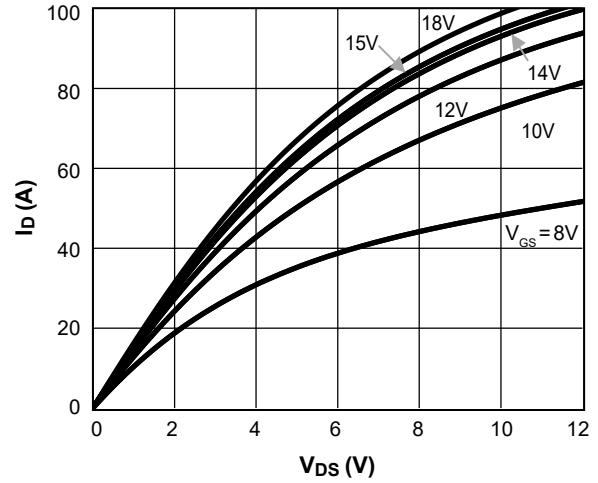


Figure 2. On-Region Characteristics $T_J = 175^\circ\text{C}$

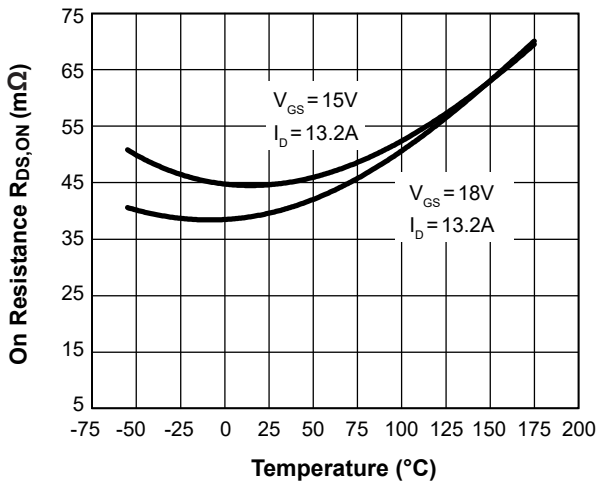


Figure 3. On Resistance vs. Junction Temperature

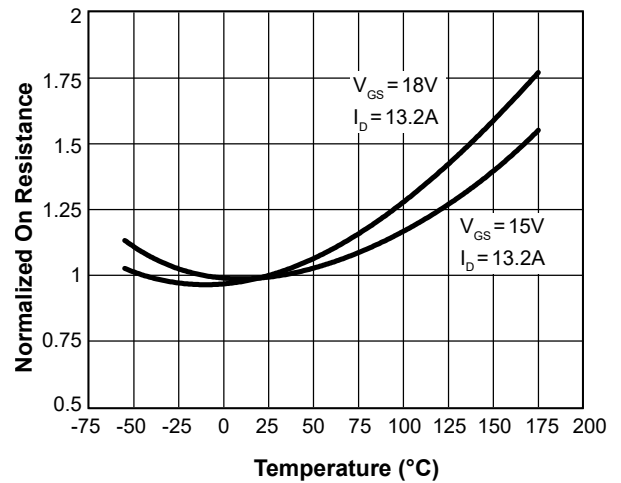


Figure 4. Normalized On Resistance vs. Junction Temperature

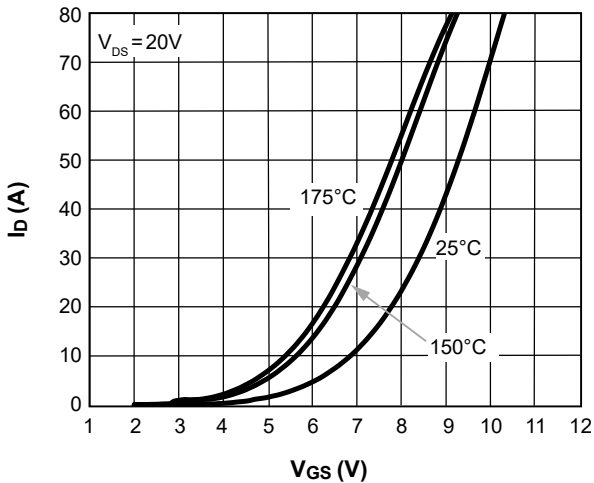


Figure 5. Transfer Characteristics

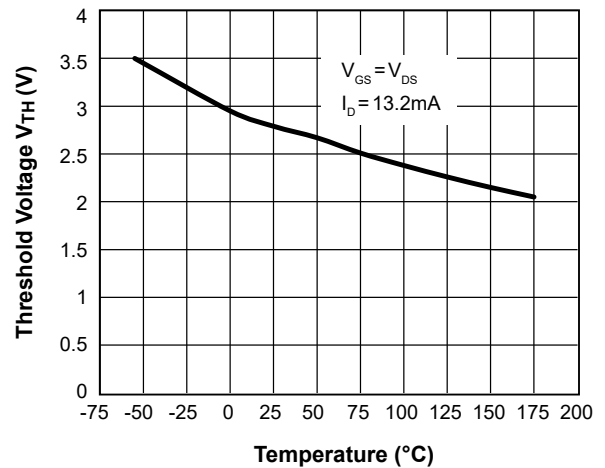


Figure 6. Threshold Voltage vs. Junction Temperature

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

T_A = 25 °C, unless otherwise specified.

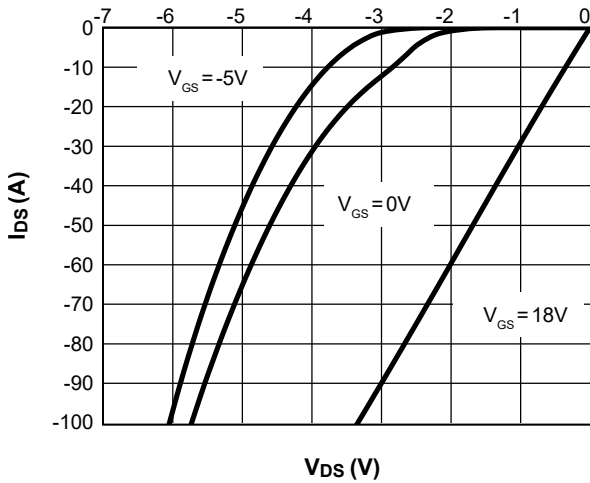


Figure 7. Body-diode Characteristics at 25°C

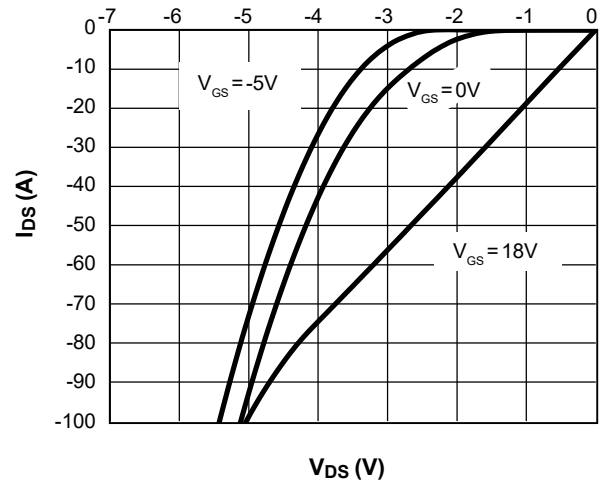


Figure 8. Body-diode Characteristics at 175°C

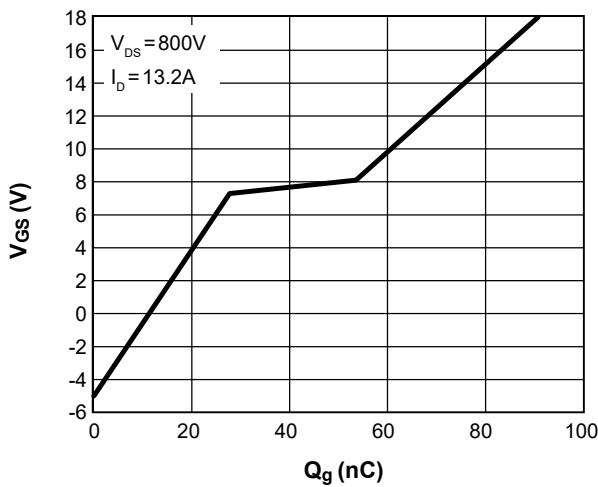


Figure 9. Gate-charge Characteristics

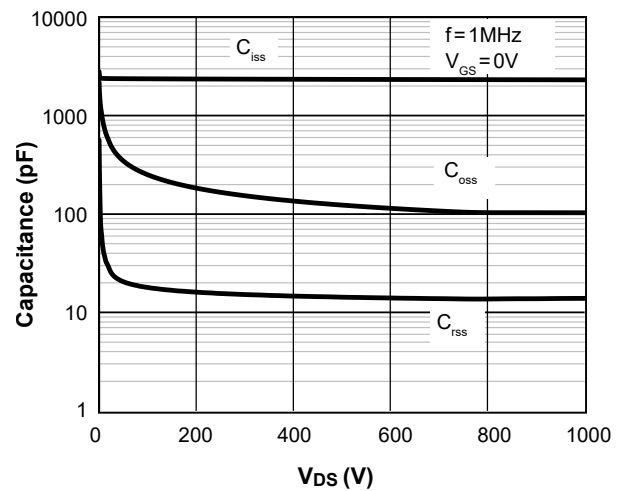


Figure 10. Capacitance Characteristics

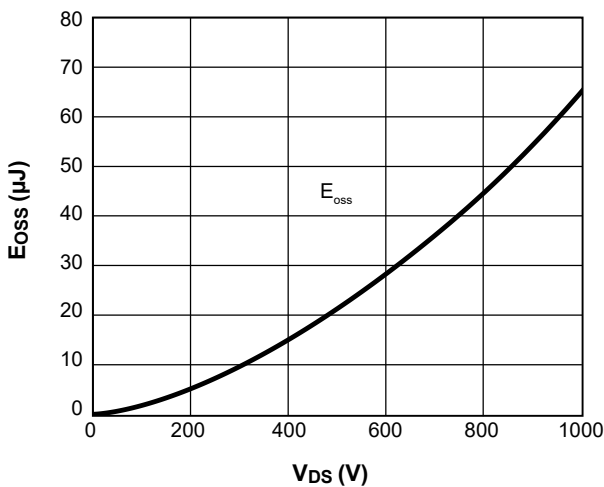


Figure 11. Coss Stored Energy

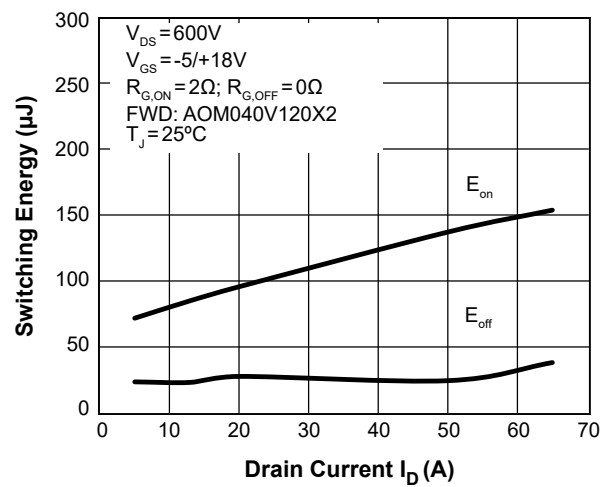


Figure 12. Switching Energy vs. Drain Current

Typical Electrical and Thermal Characteristics (Continued)

T_A = 25 °C, unless otherwise specified.

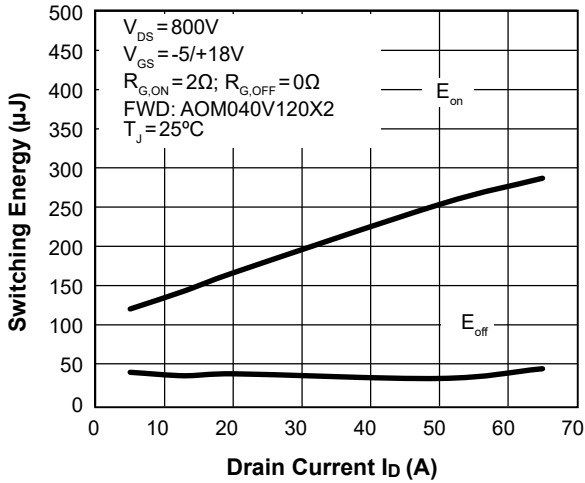


Figure 13. Switching Energy vs. Drain Current

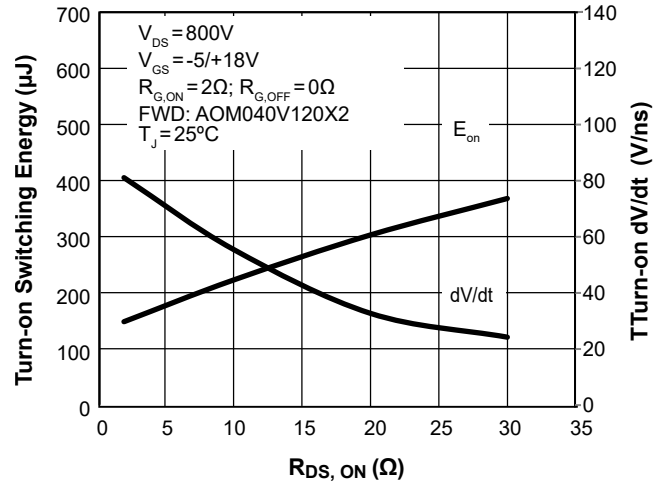


Figure 14. Turn-On Energy and dV/dt vs. External Gate Resistance

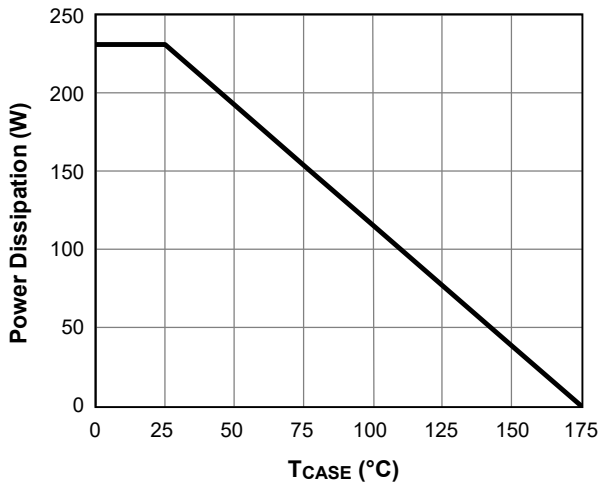


Figure 15. Power De-rating (Note I)

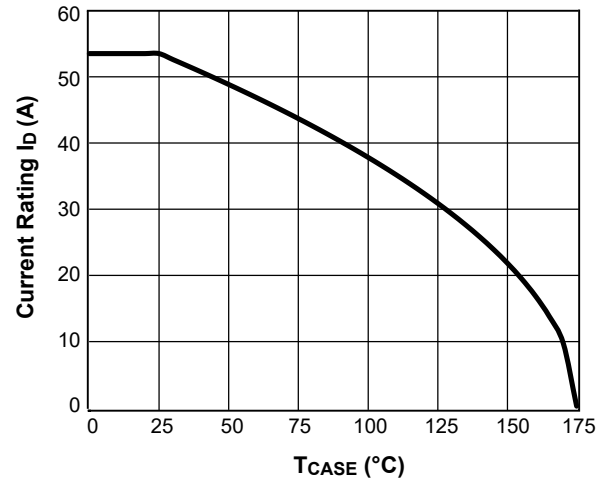


Figure 16. Current De-rating (Note I)

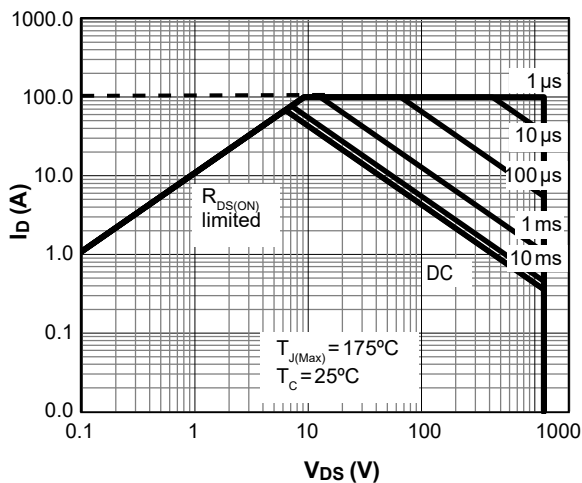


Figure 17. Maximum Forward Biased Safe Operating Area for AOM040V120X2 (Note I)

Typical Electrical and Thermal Characteristics (Continued)

T_A = 25 °C, unless otherwise specified.

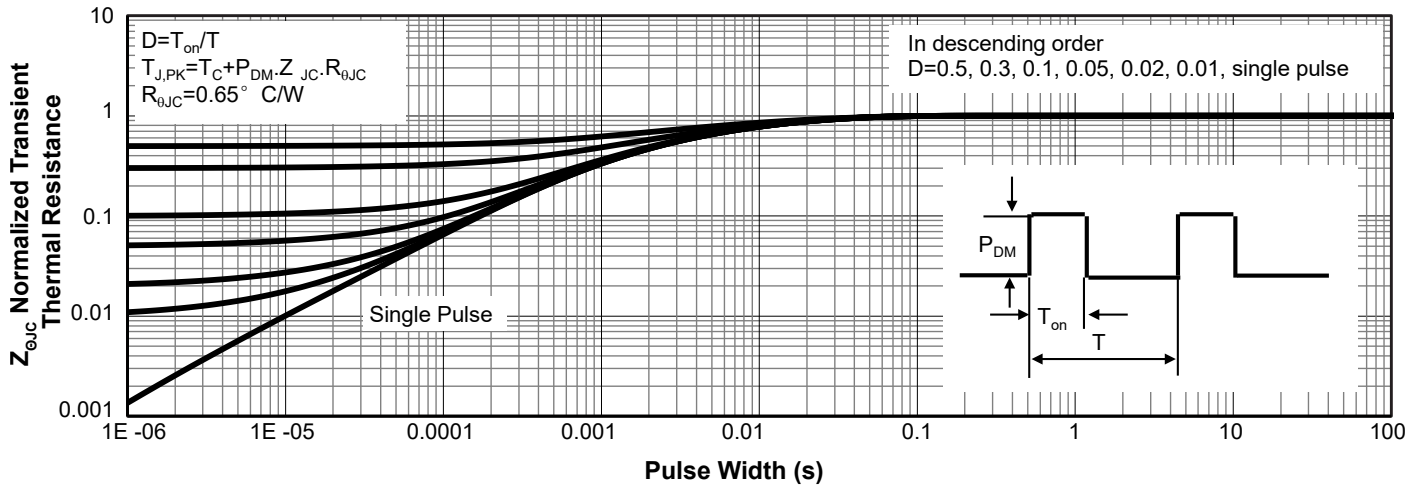


Figure 18. Normalized Maximum Transient Thermal Impedance for AOM040V120X2 (Note I)

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_{θJC} 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.

Test Circuits and Waveforms

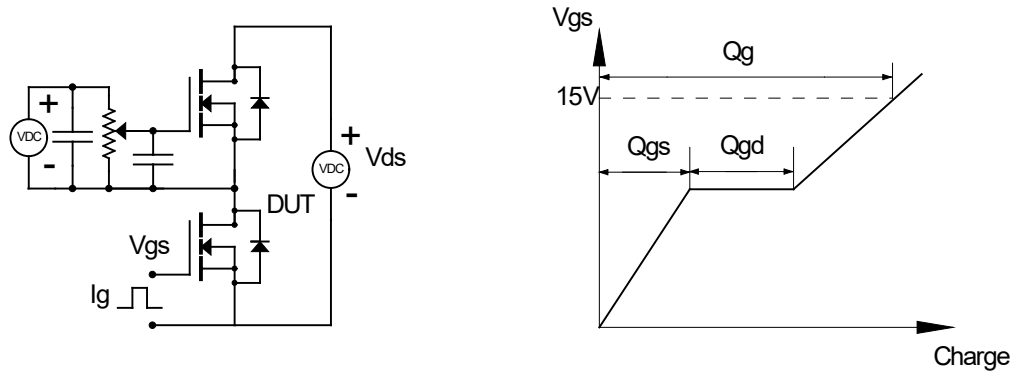


Figure 19. Gate Charge Test Circuits and Waveforms

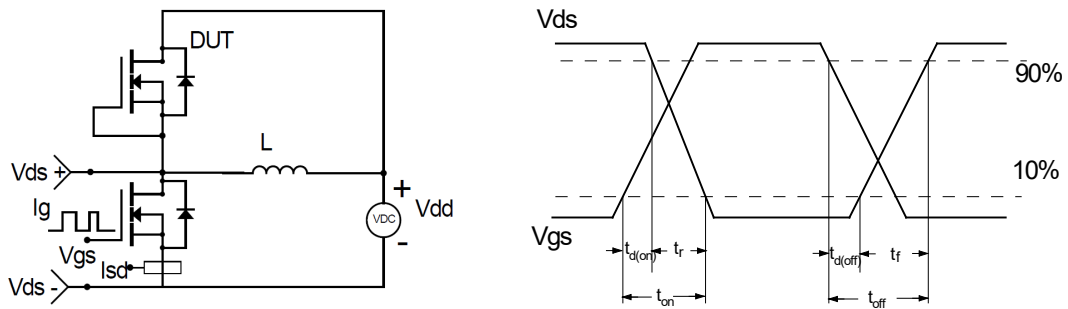


Figure 20. Inductive Switching Test Circuit and Waveforms

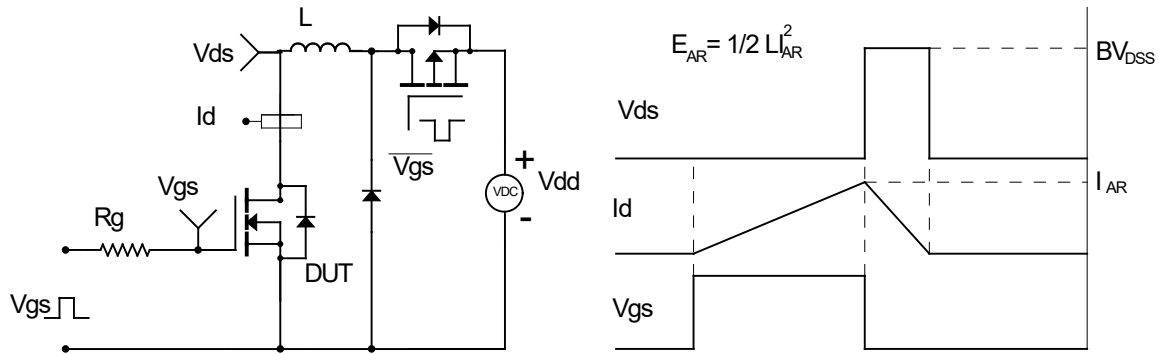


Figure 21. Unclamped Inductive Switching (UIS) Test Circuit and Waveforms

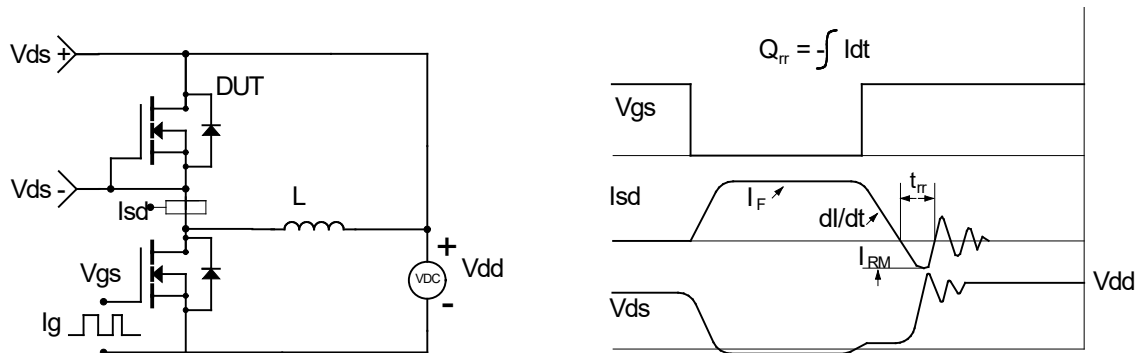
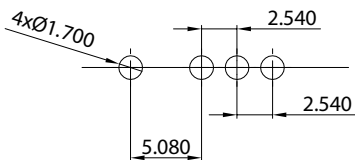
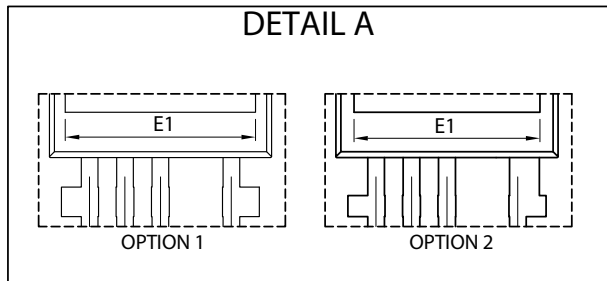
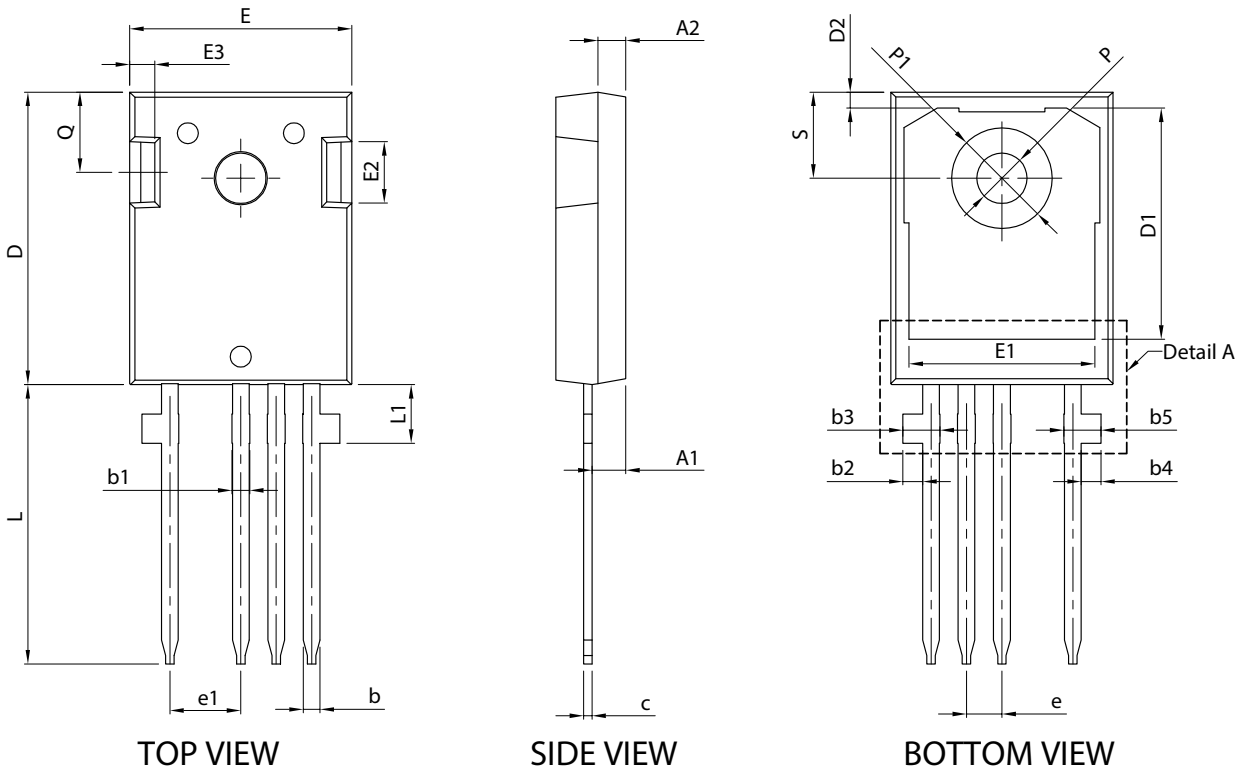


Figure 22. Diode Recovery Test Circuits and Waveforms

Package Dimensions, TO-247-4L



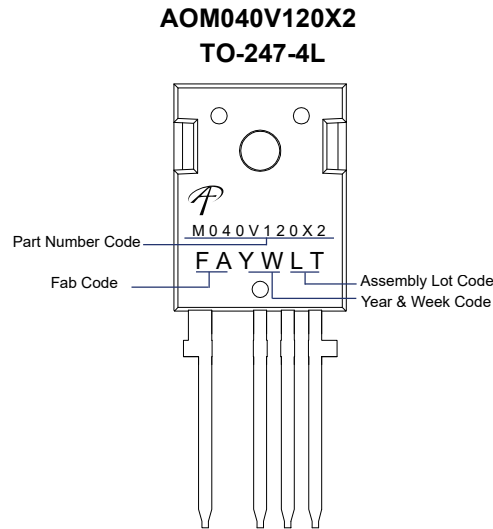
RECOMMENDED THROUGH HOLES FOR LAND PATTERN

NOTE:

- 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(Option1) | 13.43 | 13.63 | 13.83 | 0.529 | 0.537 | 0.544 |
| E1(Option2) | 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 |

Part Marking



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