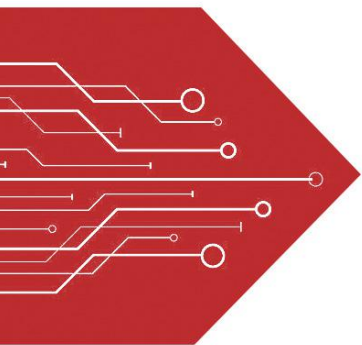


MSKSEMI

SEMICONDUCTOR



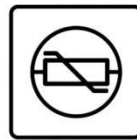
ESD



TVS



TSS



MOV



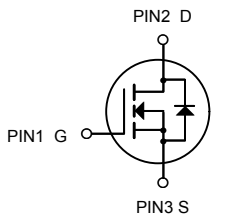
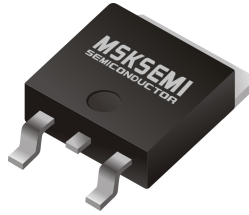
GDT



PLED

Product data sheet

www.msksemi.com



N-Channel MOSFET

TO-252

Description

The AOD478-MS is the highest performance trench N-ch MOSFETs with extreme high cell density, which provide excellent RDSON and gate charge for most of the synchronous buck converter applications .

The AOD478-MS meet the RoHS and Green Product requirement, 100% EAS guaranteed with full function reliability approved.

Product Summary

| BVDSS | RDSON | ID |
|-------|-------|-----|
| 100V | 70 mΩ | 20A |

Absolute Maximum Ratings

| Symbol | Parameter | Rating | Units |
|---------------------------|--|------------|------------|
| V_{DS} | Drain-Source Voltage | 100 | V |
| V_{GS} | Gate-Source Voltage | ± 20 | V |
| $I_D @ T_C = 25^\circ C$ | Continuous Drain Current, $V_{GS} @ 10V^1$ | 20 | A |
| $I_D @ T_C = 100^\circ C$ | Continuous Drain Current, $V_{GS} @ 10V^1$ | 10 | A |
| $I_D @ T_A = 25^\circ C$ | Continuous Drain Current, $V_{GS} @ 10V^1$ | 5 | A |
| $I_D @ T_A = 70^\circ C$ | Continuous Drain Current, $V_{GS} @ 10V^1$ | 3.4 | A |
| I_{DM} | Pulsed Drain Current ² | 30 | A |
| EAS | Single Pulse Avalanche Energy ³ | 6.1 | mJ |
| I_{AS} | Avalanche Current | 15 | A |
| $P_D @ T_C = 25^\circ C$ | Total Power Dissipation ³ | 34.7 | W |
| $P_D @ T_A = 25^\circ C$ | Total Power Dissipation ³ | 2 | W |
| T_{STG} | Storage Temperature Range | -55 to 150 | $^\circ C$ |
| T_J | Operating Junction Temperature Range | -55 to 150 | $^\circ C$ |

Thermal Data

| Symbol | Parameter | Typ. | Max. | Unit |
|-----------------|--|------|------|--------------|
| $R_{\theta JA}$ | Thermal Resistance Junction-ambient ¹ | --- | 62 | $^\circ C/W$ |
| $R_{\theta JC}$ | Thermal Resistance Junction-Case ¹ | --- | 3.6 | $^\circ C/W$ |

Electrical Characteristics (T_J=25 °C, unless otherwise noted)

| Symbol | Parameter | Conditions | Min. | Typ. | Max. | Unit |
|-------------------------------------|--|---|------|-------|------|-------|
| BV _{DSS} | Drain-Source Breakdown Voltage | V _{GS} =0V, I _D =250uA | 100 | --- | --- | V |
| ΔBV _{DSS} /ΔT _J | BVDSS Temperature Coefficient | Reference to 25°C, I _D =1mA | --- | 0.098 | --- | V/°C |
| R _{DS(ON)} | Static Drain-Source On-Resistance ² | V _{GS} =10V, I _D =10A | --- | 70 | 87 | mΩ |
| | | V _{GS} =4.5V, I _D =8A | --- | 85 | 90 | mΩ |
| V _{GS(th)} | Gate Threshold Voltage | V _{GS} =V _{DS} , I _D =250uA | 1.0 | --- | 2.5 | V |
| ΔV _{GS(th)} | V _{GS(th)} Temperature Coefficient | | --- | -4.57 | --- | mV/°C |
| I _{DSS} | Drain-Source Leakage Current | V _{DS} =80V, V _{GS} =0V, T _J =25°C | --- | --- | 1 | uA |
| | | V _{DS} =80V, V _{GS} =0V, T _J =55°C | --- | --- | 5 | |
| I _{GSS} | Gate-Source Leakage Current | V _{GS} =±20V, V _{DS} =0V | --- | --- | ±100 | nA |
| g _{fs} | Forward Transconductance | V _{DS} =5V, I _D =10A | --- | 13 | --- | S |
| R _g | Gate Resistance | V _{DS} =0V, V _{GS} =0V, f=1MHz | --- | 2 | --- | Ω |
| Q _g | Total Gate Charge (10V) | V _{DS} =80V, V _{GS} =10V, I _D =10A | --- | 26.2 | --- | nC |
| Q _{gs} | Gate-Source Charge | | --- | 4.6 | --- | |
| Q _{gd} | Gate-Drain Charge | | --- | 5.1 | --- | |
| T _{d(on)} | Turn-On Delay Time | V _{DD} =50V, V _{GS} =10V, R _G =3.3Ω I _D =10A | --- | 4.2 | --- | ns |
| T _r | Rise Time | | --- | 8.2 | --- | |
| T _{d(off)} | Turn-Off Delay Time | | --- | 35.6 | --- | |
| T _f | Fall Time | | --- | 9.6 | --- | |
| C _{iss} | Input Capacitance | V _{DS} =15V, V _{GS} =0V, f=1MHz | --- | 1535 | --- | pF |
| C _{oss} | Output Capacitance | | --- | 60 | --- | |
| C _{rss} | Reverse Transfer Capacitance | | --- | 37 | --- | |

Diode Characteristics

| Symbol | Parameter | Conditions | Min. | Typ. | Max. | Unit |
|-----------------|--|---|------|------|------|------|
| I _S | Continuous Source Current ^{1,5} | V _G =V _D =0V, Force Current | --- | --- | 20 | A |
| I _{SM} | Pulsed Source Current ^{2,5} | | --- | --- | 30 | A |
| V _{SD} | Diode Forward Voltage ² | V _{GS} =0V, I _S =1A, T _J =25°C | --- | --- | 1.2 | V |
| t _{rr} | Reverse Recovery Time | I _F =10A, dI/dt=100A/μs, T _J =25°C | --- | 37 | --- | nS |
| Q _{rr} | Reverse Recovery Charge | | --- | 27.3 | --- | nC |

Note :

- The data tested by surface mounted on a 1 inch² FR-4 board with 2OZ copper.
- The data tested by pulsed, pulse width ≤ 300us, duty cycle ≤ 2%
- The EAS data shows Max. rating. The test condition is V_{DD}=25V, V_{GS}=10V, L=0.1mH, I_{AS}=11A
- The power dissipation is limited by 150°C junction temperature
- The data is theoretically the same as I_D and I_{DM}, in real applications, should be limited by total power dissipation.

Typical Characteristics

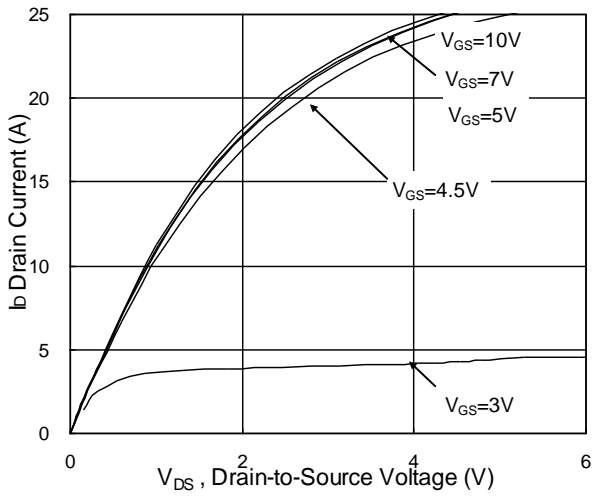


Fig.1 Typical Output Characteristics

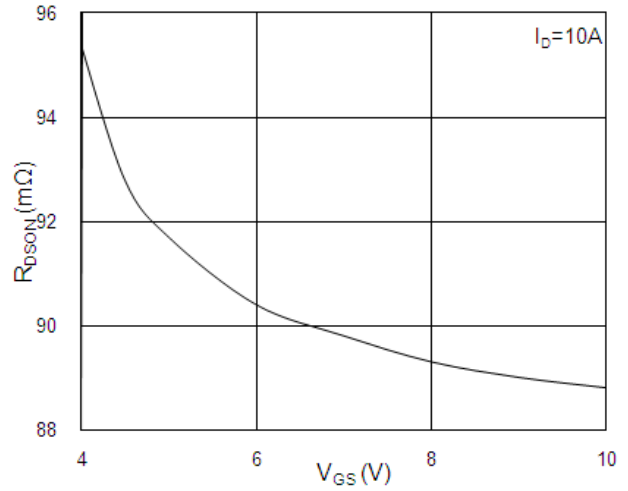


Fig.2 On-Resistance vs. Gate-Source

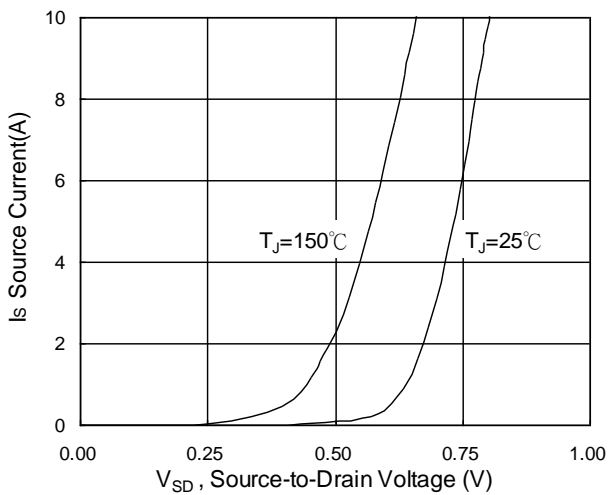


Fig.3 Forward Characteristics Of Reverse

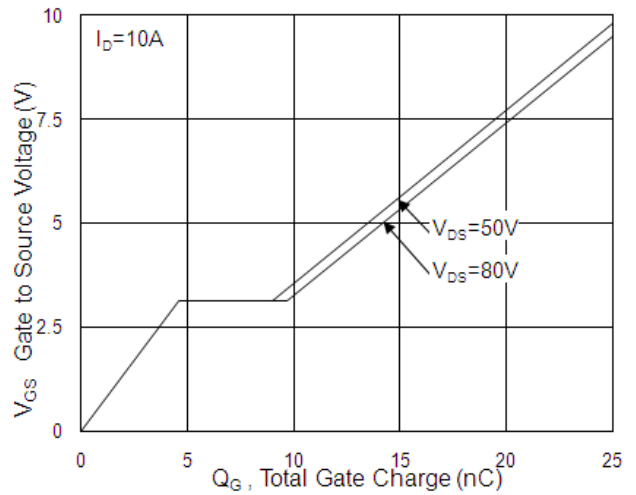


Fig.4 Gate-Charge Characteristics

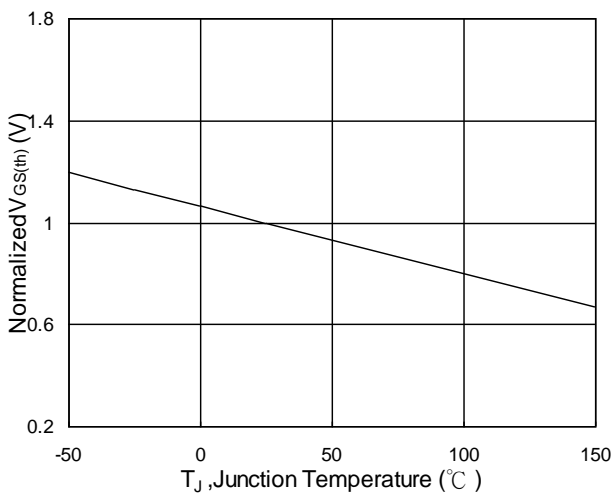


Fig.5 Normalized $V_{GS(th)}$ vs. T_J

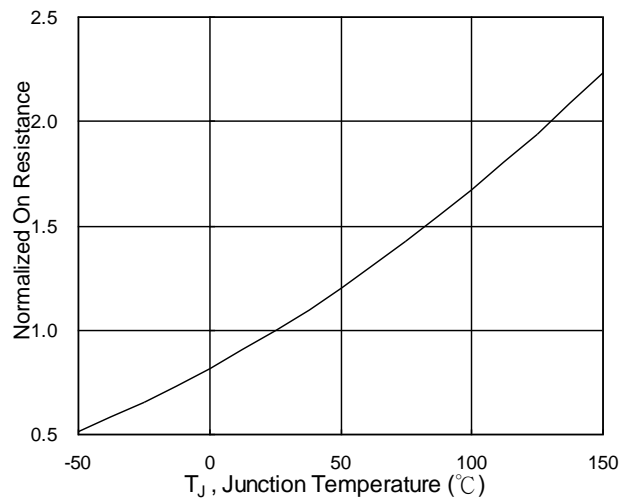


Fig.6 Normalized $R_{DS(on)}$ vs. T_J

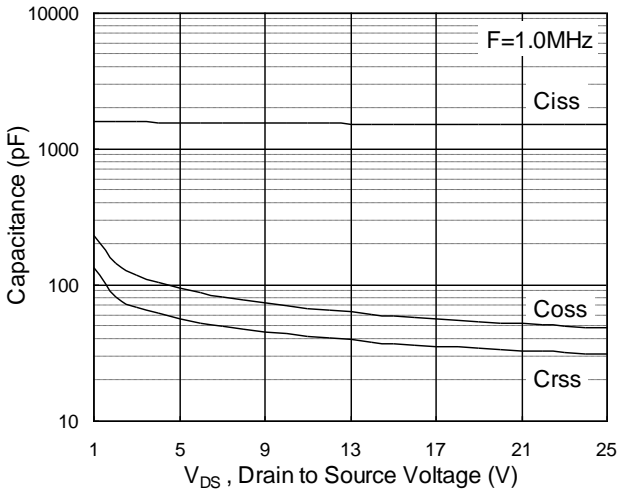


Fig.7 Capacitance

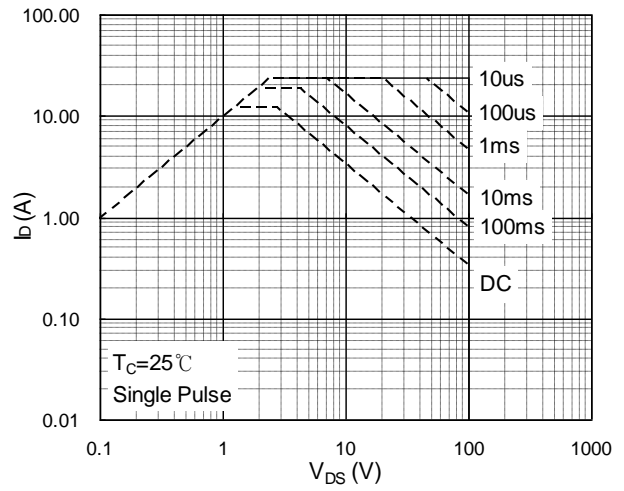


Fig.8 Safe Operating Area

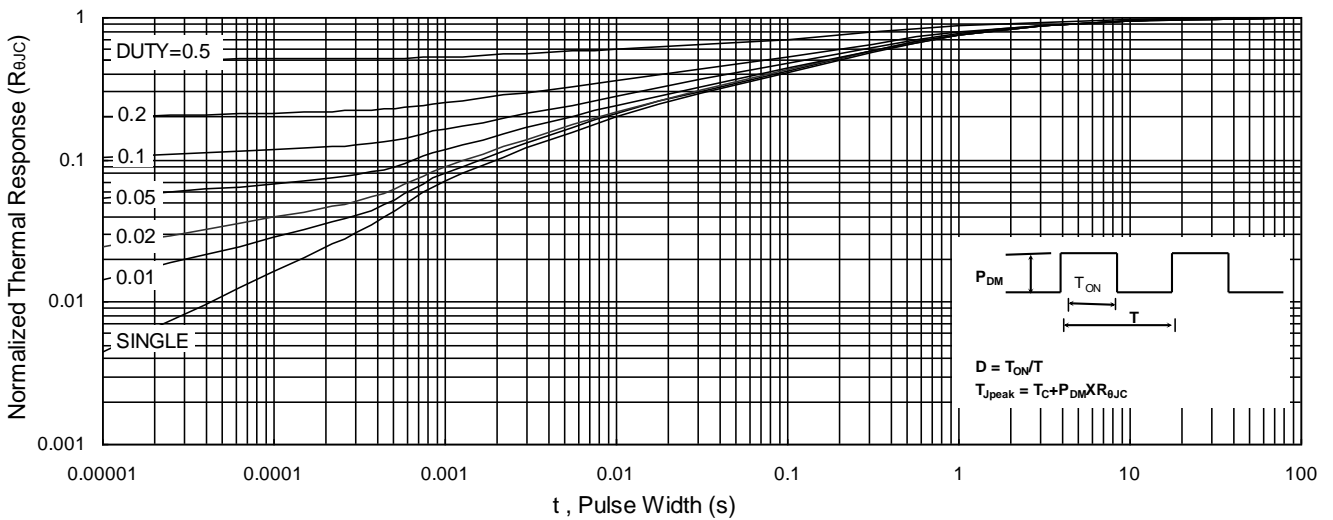


Fig.9 Normalized Maximum Transient Thermal Impedance

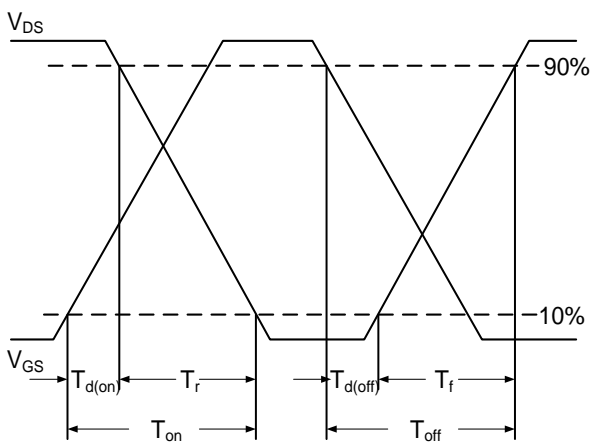


Fig.10 Switching Time Waveform

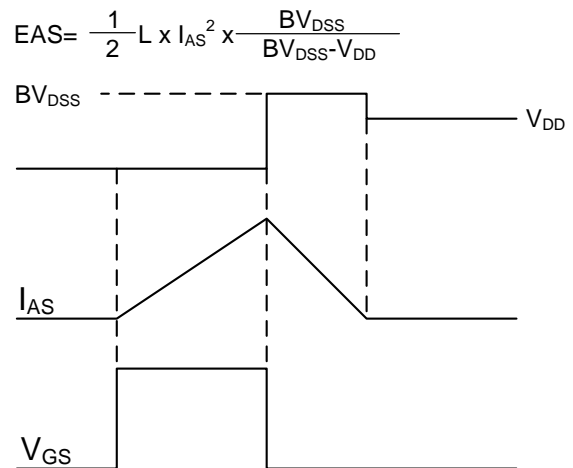
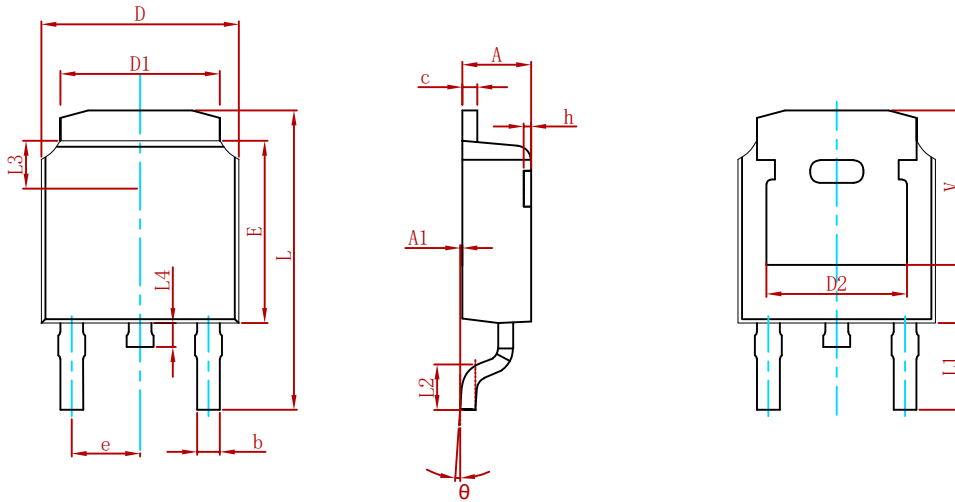


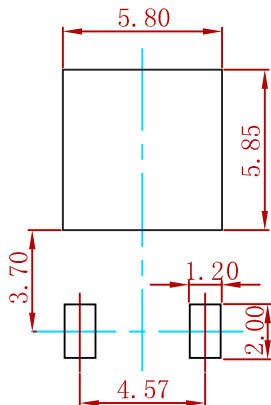
Fig.11 Unclamped Inductive Switching Waveform

PACKAGE MECHANICAL DATA



| Symbol | Dimensions In Millimeters | | Dimensions In Inches | |
|--------|---------------------------|--------|----------------------|-------|
| | Min. | Max. | Min. | Max. |
| A | 2.200 | 2.400 | 0.087 | 0.094 |
| A1 | 0.000 | 0.127 | 0.000 | 0.005 |
| b | 0.635 | 0.770 | 0.025 | 0.030 |
| c | 0.460 | 0.580 | 0.018 | 0.023 |
| D | 6.500 | 6.700 | 0.256 | 0.264 |
| D1 | 5.100 | 5.460 | 0.201 | 0.215 |
| D2 | 4.830 REF. | | 0.190 REF. | |
| E | 6.000 | 6.200 | 0.236 | 0.244 |
| e | 2.186 | 2.386 | 0.086 | 0.094 |
| L | 9.712 | 10.312 | 0.382 | 0.406 |
| L1 | 2.900 REF. | | 0.114 REF. | |
| L2 | 1.400 | 1.700 | 0.055 | 0.067 |
| L3 | 1.600 REF. | | 0.063 REF. | |
| L4 | 0.600 | 1.000 | 0.024 | 0.039 |
| theta | 0° | 8° | 0° | 8° |
| h | 0.000 | 0.300 | 0.000 | 0.012 |
| V | 5.250 REF. | | 0.207 REF. | |

Suggested Pad Layout



Note:
 1. Controlling dimension: in millimeters.
 2. General tolerance: ± 0.05mm.
 3. The pad layout is for reference purposes only.

REEL SPECIFICATION

| P/N | PKG | QTY |
|-----------|--------|------|
| AOD478-MS | TO-252 | 2500 |

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