

AP9971AGM-VB Datasheet

Dual N-Channel 60 V (D-S) 175 °C MOSFET

PRODUCT SUMMARY

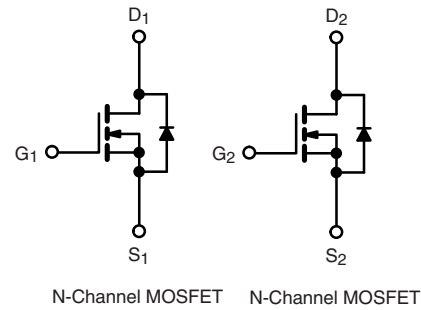
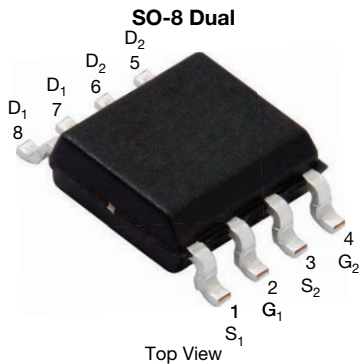
| | |
|---|-------|
| V_{DS} (V) | 60 |
| $R_{DS(on)}$ (Ω) at $V_{GS} = 10$ V | 0.028 |
| $R_{DS(on)}$ (Ω) at $V_{GS} = 4.5$ V | 0.030 |
| I_D (A) per leg | 7 |
| Configuration | Dual |

FEATURES

- TrenchFET® power MOSFET
- 100 % R_g and UIS tested



RoHS
COMPLIANT
HALOGEN
FREE



ABSOLUTE MAXIMUM RATINGS ($T_C = 25$ °C, unless otherwise noted)

| PARAMETER | SYMBOL | LIMIT | UNIT |
|---|----------------|----------------|------|
| Drain-Source Voltage | V_{DS} | 60 | V |
| Gate-Source Voltage | V_{GS} | ± 20 | |
| Continuous Drain Current | I_D | $T_C = 25$ °C | A |
| | | $T_C = 125$ °C | |
| Continuous Source Current (Diode Conduction) ^a | I_S | 3.6 | |
| Pulsed Drain Current ^b | I_{DM} | 28 | |
| Single Pulse Avalanche Current | I_{AS} | 18 | mJ |
| Single Pulse Avalanche Energy | E_{AS} | 16.2 | |
| Maximum Power Dissipation ^b | P_D | $T_C = 25$ °C | W |
| | | $T_C = 125$ °C | |
| Operating Junction and Storage Temperature Range | T_J, T_{stg} | -55 to +175 | °C |

THERMAL RESISTANCE RATINGS

| PARAMETER | SYMBOL | LIMIT | UNIT |
|--------------------------|------------|-------|------|
| Junction-to-Ambient | R_{thJA} | 110 | °C/W |
| Junction-to-Foot (Drain) | R_{thJF} | 34 | |

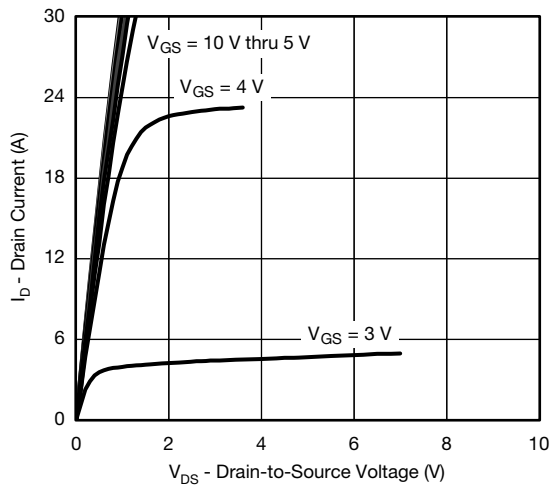
Notes

- Package limited.
- Pulse test; pulse width ≤ 300 μ s, duty cycle ≤ 2 %.
- When mounted on 1" square PCB (FR4 material).

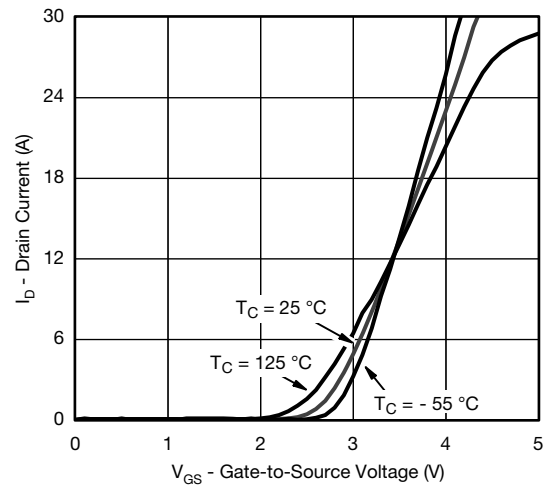
| SPECIFICATIONS (T _C = 25 °C, unless otherwise noted) | | | | | | | |
|---|---------------------|---|---|------|-------|-------|------|
| PARAMETER | SYMBOL | TEST CONDITIONS | | MIN. | TYP. | MAX. | UNIT |
| Static | | | | | | | |
| Drain-Source Breakdown Voltage | V _{DS} | V _{GS} = 0 V, I _D = 250 μA | | 60 | - | - | V |
| Gate-Source Threshold Voltage | V _{GS(th)} | V _{DS} = V _{GS} , I _D = 250 μA | | 1.5 | 2.0 | 2.5 | |
| Gate-Source Leakage | I _{GSS} | V _{DS} = 0 V, V _{GS} = ± 20 V | | - | - | ± 100 | nA |
| Zero Gate Voltage Drain Current | I _{DSS} | V _{GS} = 0 V | V _{DS} = 60 V | - | - | 1 | μA |
| | | V _{GS} = 0 V | V _{DS} = 60 V, T _J = 125 °C | - | - | 50 | |
| | | V _{GS} = 0 V | V _{DS} = 60 V, T _J = 175 °C | - | - | 150 | |
| On-State Drain Current ^a | I _{D(on)} | V _{GS} = 10 V | V _{DS} ≥ 5 V | 20 | - | - | A |
| Drain-Source On-State Resistance ^a | R _{DS(on)} | V _{GS} = 10 V | I _D = 4.5 A- | - | 0.028 | - | Ω |
| | | V _{GS} = 10 V | I _D = 4.5 A, T _J = 125 °C | - | 0.066 | - | |
| | | V _{GS} = 10 V | I _D = 4.5 A, T _J = 175 °C | - | 0.081 | - | |
| | | V _{GS} = 4.5 V | I _D = 4 A- | - | 0.030 | - | |
| Forward Transconductance ^f | g _{fs} | V _{DS} = 15 V, I _D = 4.5 A | | - | 15 | - | S |
| Dynamic ^b | | | | | | | |
| Input Capacitance | C _{iss} | V _{GS} = 0 V | V _{DS} = 25 V, f = 1 MHz | - | 600 | 750 | pF |
| Output Capacitance | C _{oss} | | | - | 110 | 140 | |
| Reverse Transfer Capacitance | C _{rss} | | | - | 50 | 62 | |
| Total Gate Charge ^c | Q _g | V _{GS} = 10 V | V _{DS} = 30 V, I _D = 5.3 A | - | 11.7 | 18 | nC |
| Gate-Source Charge ^c | Q _{gs} | | | - | 1.8 | 2.7 | |
| Gate-Drain Charge ^c | Q _{gd} | | | - | 2.8 | 4.2 | |
| Gate Resistance | R _g | f = 1 MHz | | 1.3 | - | 6 | Ω |
| Turn-On Delay Time ^c | t _{d(on)} | V _{DD} = 30 V, R _L = 6.8 Ω I _D ≅ 4.4 A, V _{GEN} = 10 V, R _g = 1 Ω | | - | 7 | 11 | ns |
| Rise Time ^c | t _r | | | - | 3.3 | 5 | |
| Turn-Off Delay Time ^c | t _{d(off)} | | | - | 22.4 | 33.5 | |
| Fall Time ^c | t _f | | | - | 2.1 | 3.2 | |
| Source-Drain Diode Ratings and Characteristics ^b | | | | | | | |
| Pulsed Current ^a | I _{SM} | | | - | - | 28 | A |
| Forward Voltage | V _{SD} | I _F = 2 A, V _{GS} = 0 V | | - | 0.75 | 1.1 | V |

Notes

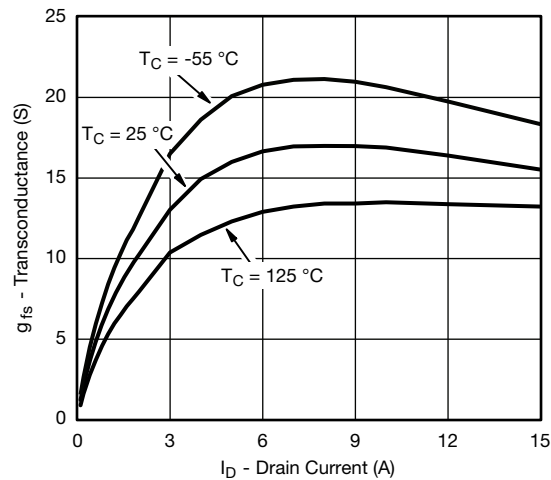
- a. Pulse test; pulse width $\leq 300\text{ }\mu\text{s}$, duty cycle $\leq 2\%$.
 b. Guaranteed by design, not subject to production testing.
 c. Independent of operating temperature.

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


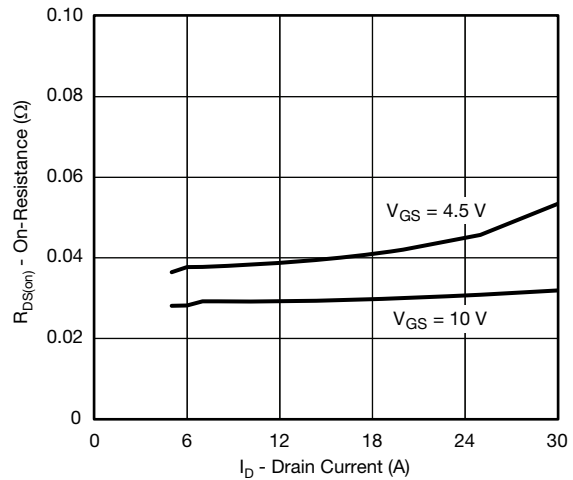
Output Characteristics



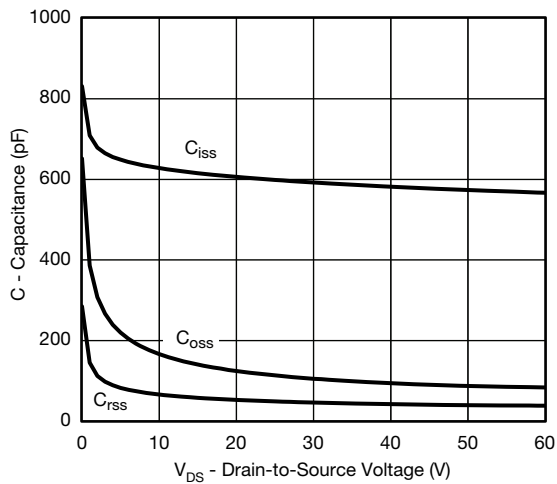
Transfer Characteristics



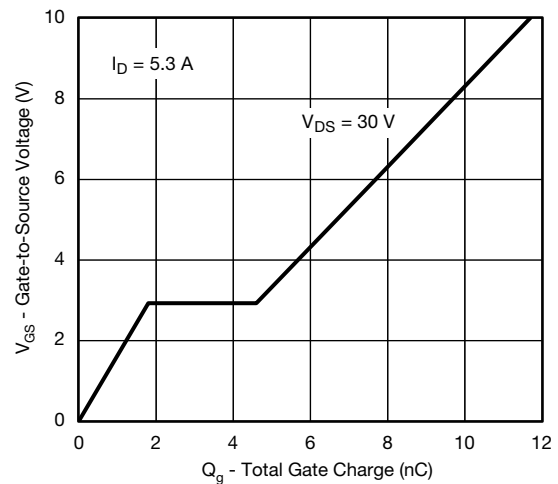
Transconductance



On-Resistance vs. Drain Current



Capacitance

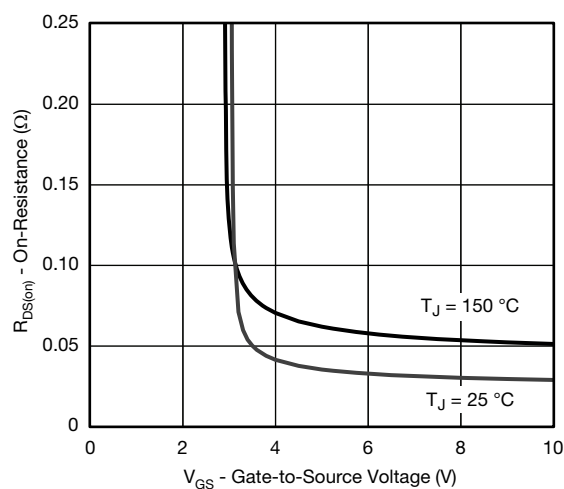


Gate Charge

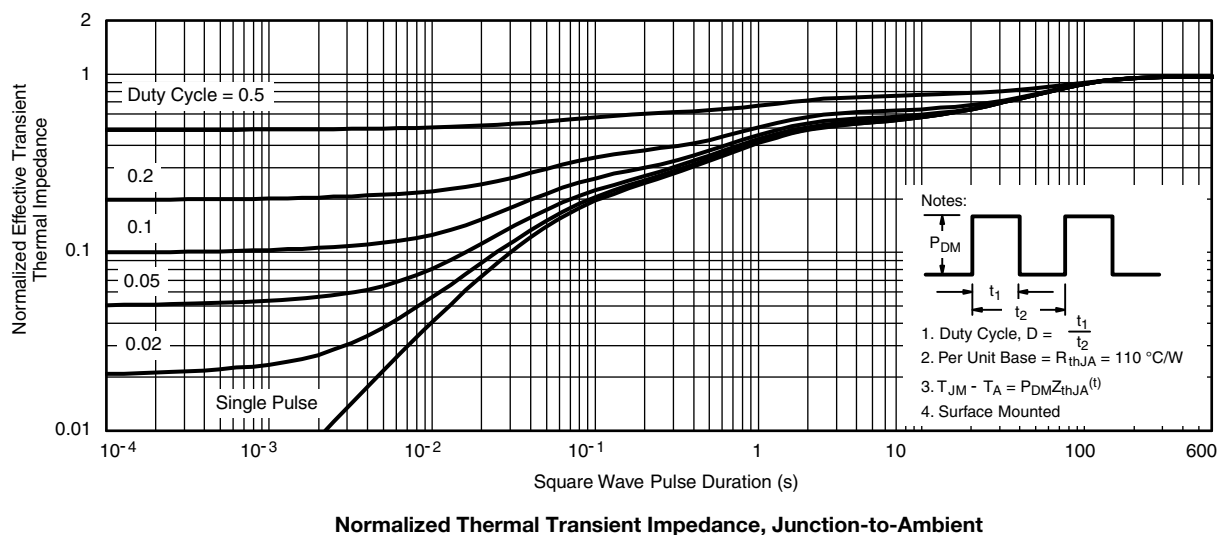
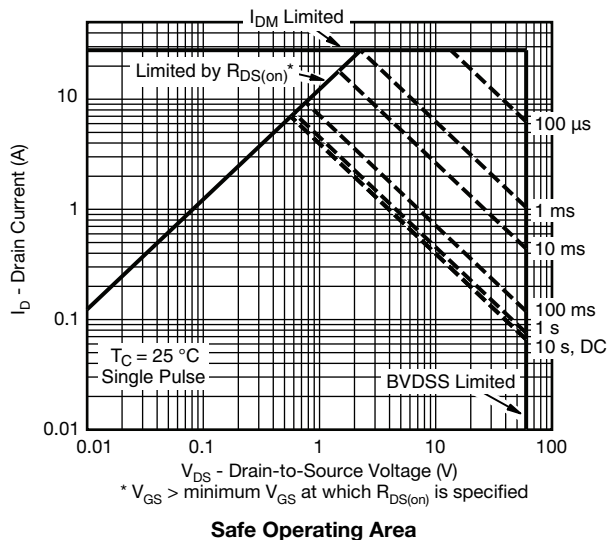
TYPICAL CHARACTERISTICS ($T_A = 25\text{ }^{\circ}\text{C}$, unless otherwise noted)

On-Resistance vs. Junction Temperature

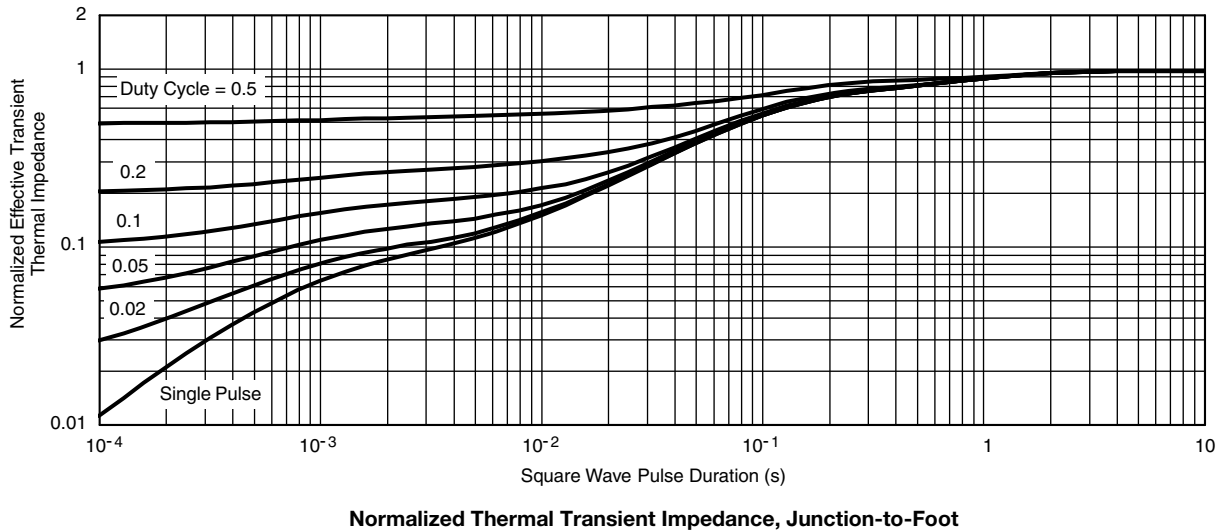
Drain Source Breakdown vs. Junction Temperature

Source Drain Diode Forward Voltage

On-Resistance vs. Gate-to-Source Voltage

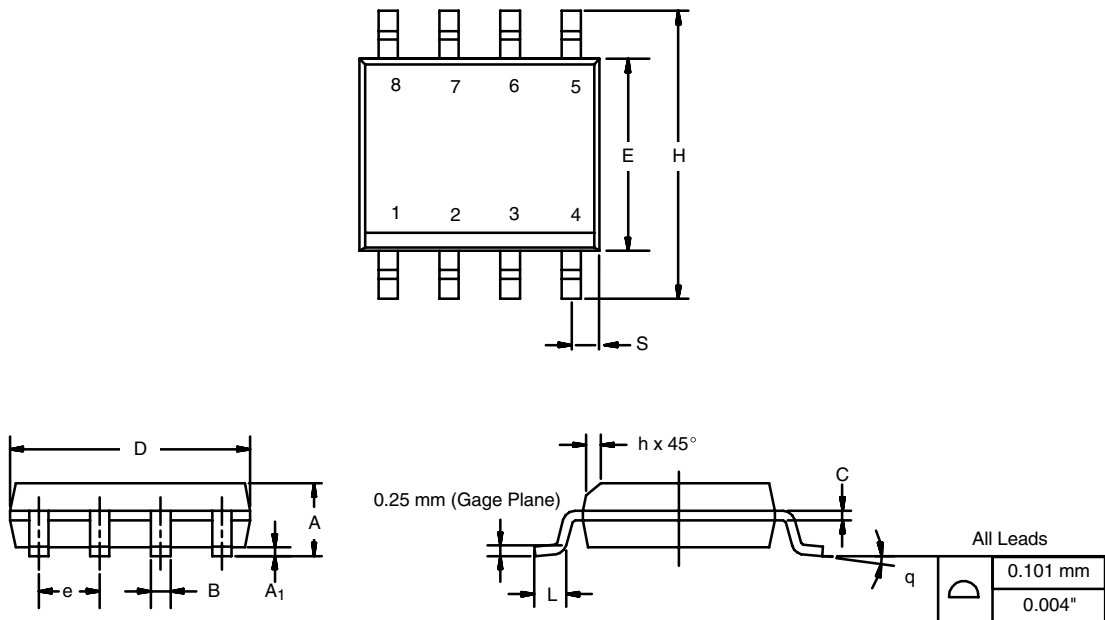
Threshold Voltage

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


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



SOIC (NARROW): 8-LEAD
JEDEC Part Number: MS-012



| DIM | MILLIMETERS | | INCHES | |
|--------------------------------|-------------|------|-----------|-------|
| | Min | Max | Min | Max |
| A | 1.35 | 1.75 | 0.053 | 0.069 |
| A ₁ | 0.10 | 0.20 | 0.004 | 0.008 |
| B | 0.35 | 0.51 | 0.014 | 0.020 |
| C | 0.19 | 0.25 | 0.0075 | 0.010 |
| D | 4.80 | 5.00 | 0.189 | 0.196 |
| E | 3.80 | 4.00 | 0.150 | 0.157 |
| e | 1.27 BSC | | 0.050 BSC | |
| H | 5.80 | 6.20 | 0.228 | 0.244 |
| h | 0.25 | 0.50 | 0.010 | 0.020 |
| L | 0.50 | 0.93 | 0.020 | 0.037 |
| q | 0° | 8° | 0° | 8° |
| S | 0.44 | 0.64 | 0.018 | 0.026 |
| ECN: C-06527-Rev. I, 11-Sep-06 | | | | |
| DWG: 5498 | | | | |

RECOMMENDED MINIMUM PADS FOR SO-8



Recommended Minimum Pads
Dimensions in Inches/(mm)

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