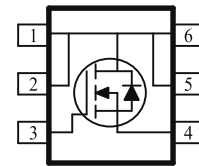
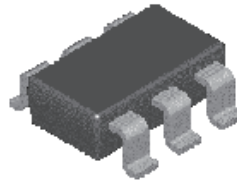


## N-Channel 20V (D-S) MOSFET

These miniature surface mount MOSFETs utilize a high cell density trench process to provide low  $r_{DS(on)}$  and to ensure minimal power loss and heat dissipation. Typical applications are DC-DC converters and power management in portable and battery-powered products such as computers, printers, PCMCIA cards, cellular and cordless telephones.

| PRODUCT SUMMARY |                        |           |
|-----------------|------------------------|-----------|
| $V_{DS}$ (V)    | $r_{DS(on)}$ (OHM)     | $I_D$ (A) |
| 20              | 0.032 @ $V_{GS}=4.5$ V | 6.0       |
|                 | 0.044 @ $V_{GS}=2.5$ V | 5.0       |

- Low  $r_{DS(on)}$  provides higher efficiency and extends battery life
- Low thermal impedance copper leadframe TSOP-6 saves board space
- Fast switching speed
- High performance trench technology



| ABSOLUTE MAXIMUM RATINGS ( $T_A = 25^\circ\text{C}$ UNLESS OTHERWISE NOTED) |                        |                |            |                  |
|-----------------------------------------------------------------------------|------------------------|----------------|------------|------------------|
| Parameter                                                                   |                        | Symbol         | Maximum    | Units            |
| Drain-Source Voltage                                                        |                        | $V_{DS}$       | 20         | V                |
| Gate-Source Voltage                                                         |                        | $V_{GS}$       | $\pm 12$   |                  |
| Continuous Drain Current <sup>a</sup>                                       | $T_A=25^\circ\text{C}$ | $I_D$          | 6.0        | A                |
|                                                                             | $T_A=70^\circ\text{C}$ |                | 4.6        |                  |
| Pulsed Drain Current <sup>b</sup>                                           |                        | $I_{DM}$       | $\pm 20$   |                  |
| Continuous Source Current (Diode Conduction) <sup>a</sup>                   |                        | $I_S$          | 1.6        | A                |
| Power Dissipation <sup>a</sup>                                              | $T_A=25^\circ\text{C}$ | $P_D$          | 2.0        | W                |
|                                                                             | $T_A=70^\circ\text{C}$ |                | 1.3        |                  |
| Operating Junction and Storage Temperature Range                            |                        | $T_J, T_{stg}$ | -55 to 150 | $^\circ\text{C}$ |

| THERMAL RESISTANCE RATINGS               |                |            |         |                    |
|------------------------------------------|----------------|------------|---------|--------------------|
| Parameter                                |                | Symbol     | Maximum | Units              |
| Maximum Junction-to-Ambient <sup>a</sup> | $t \leq 5$ sec | $R_{THJA}$ | 62.5    | $^\circ\text{C/W}$ |
|                                          | Steady-State   |            | 110     |                    |

### Notes

- Surface Mounted on 1" x 1" FR4 Board.
- Pulse width limited by maximum junction temperature

| SPECIFICATIONS (T <sub>A</sub> = 25°C UNLESS OTHERWISE NOTED) |                     |                                                                                                  |        |      |      |      |
|---------------------------------------------------------------|---------------------|--------------------------------------------------------------------------------------------------|--------|------|------|------|
| Parameter                                                     | Symbol              | Test Conditions                                                                                  | Limits |      |      | Unit |
|                                                               |                     |                                                                                                  | Min    | Typ  | Max  |      |
| Static                                                        |                     |                                                                                                  |        |      |      |      |
| Gate-Threshold Voltage                                        | V <sub>GS(th)</sub> | V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> = 250 uA                                      | 0.7    |      |      | V    |
| Gate-Body Leakage                                             | I <sub>GSS</sub>    | V <sub>DS</sub> = 0 V, V <sub>GS</sub> = ±8 V                                                    |        |      | ±100 | nA   |
| Zero Gate Voltage Drain Current                               | I <sub>DSS</sub>    | V <sub>DS</sub> = 16 V, V <sub>GS</sub> = 0 V                                                    |        |      | 1    | uA   |
|                                                               |                     | V <sub>DS</sub> = 16 V, V <sub>GS</sub> = 0 V, T <sub>J</sub> = 55°C                             |        |      | 10   |      |
| On-State Drain Current <sup>A</sup>                           | I <sub>D(on)</sub>  | V <sub>DS</sub> = 5 V, V <sub>GS</sub> = 4.5 V                                                   | 10     |      |      | A    |
| Drain-Source On-Resistance <sup>A</sup>                       | r <sub>DS(on)</sub> | V <sub>GS</sub> = 4.5 V, I <sub>D</sub> = 6.0 A                                                  |        |      | 32   | mOHM |
|                                                               |                     | V <sub>GS</sub> = 2.5 V, I <sub>D</sub> = 5.0 A                                                  |        |      | 44   |      |
| Forward Tranconductance <sup>A</sup>                          | g <sub>fs</sub>     | V <sub>DS</sub> = 10 V, I <sub>D</sub> = 4.0 A                                                   |        | 11.3 |      | S    |
| Diode Forward Voltage                                         | V <sub>SD</sub>     | I <sub>S</sub> = 1.6 A, V <sub>GS</sub> = 0 V                                                    |        | 0.75 |      | V    |
| Dynamic <sup>b</sup>                                          |                     |                                                                                                  |        |      |      |      |
| Total Gate Charge                                             | Q <sub>g</sub>      | V <sub>DS</sub> = 10 V, V <sub>GS</sub> = 4.5 V, I <sub>D</sub> = 4.0 A                          |        | 5.0  |      | nC   |
| Gate-Source Charge                                            | Q <sub>gs</sub>     |                                                                                                  |        | 1.2  |      |      |
| Gate-Drain Charge                                             | Q <sub>gd</sub>     |                                                                                                  |        | 2.0  |      |      |
| Turn-On Delay Time                                            | t <sub>d(on)</sub>  | V <sub>DD</sub> = 10 V, R <sub>L</sub> = 15 O, I <sub>D</sub> = 1 A,<br>V <sub>GEN</sub> = 4.5 V |        | 8    |      | ns   |
| Rise Time                                                     | t <sub>r</sub>      |                                                                                                  |        | 24   |      |      |
| Turn-Off Delay Time                                           | t <sub>d(off)</sub> |                                                                                                  |        | 35   |      |      |
| Fall-Time                                                     | t <sub>f</sub>      |                                                                                                  |        | 10   |      |      |

## Notes

- Pulse test: PW ≤ 300us duty cycle ≤ 2%.
- Guaranteed by design, not subject to production testing.

Typical Electrical Characteristics (N-Channel)

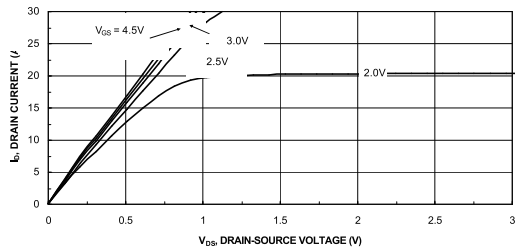


Figure 1. Output Characteristics

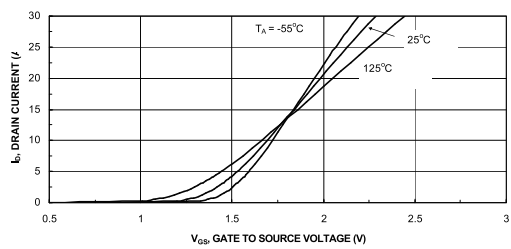


Figure 2. Transfer Characteristics

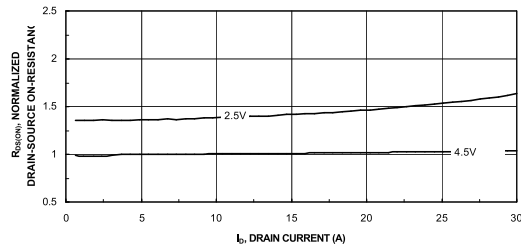


Figure 3. On-Resistance vs. Drain Current

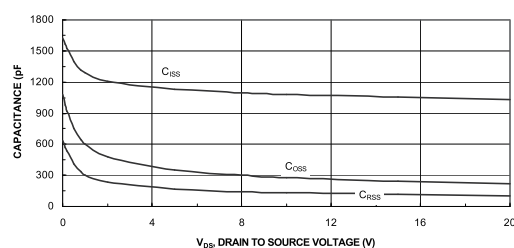


Figure 4. Capacitance

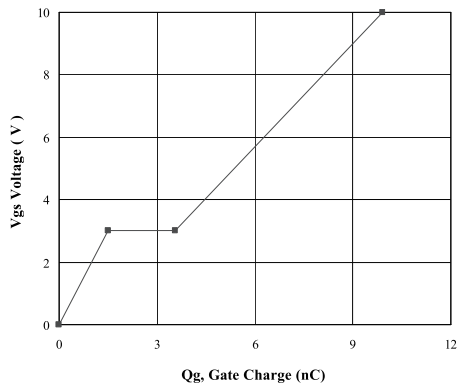


Figure 5. Gate Charge

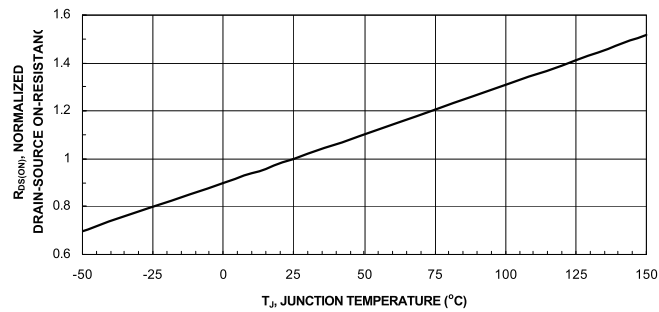


Figure 6. On-Resistance vs. Junction Temperature

## Typical Electrical Characteristics (N-Channel)

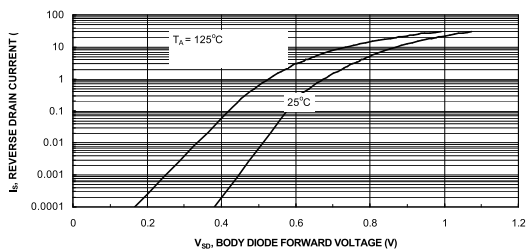


Figure 7. Source-Drain Diode Forward Voltage

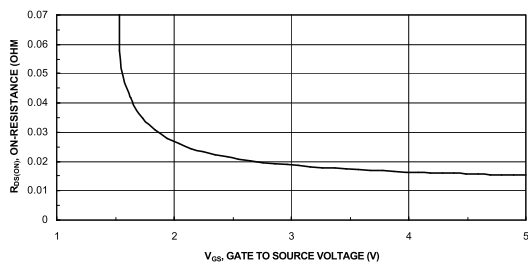


Figure 8. On-Resistance vs. Gate-to-Source Voltage

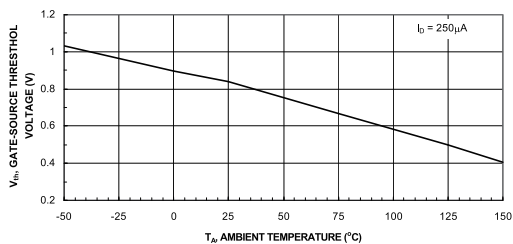


Figure 9. Threshold Voltage

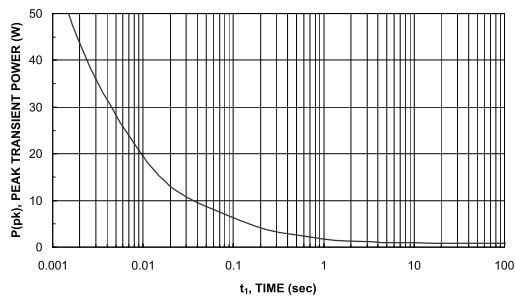


Figure 10. Single Pulse Power

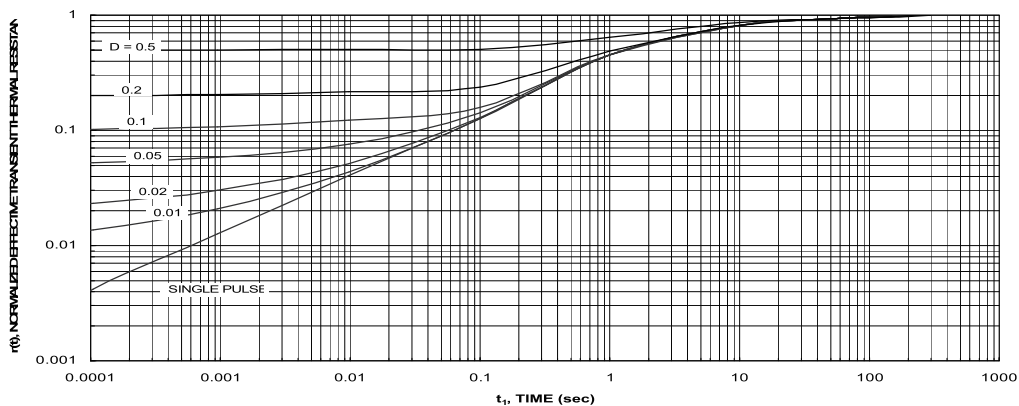
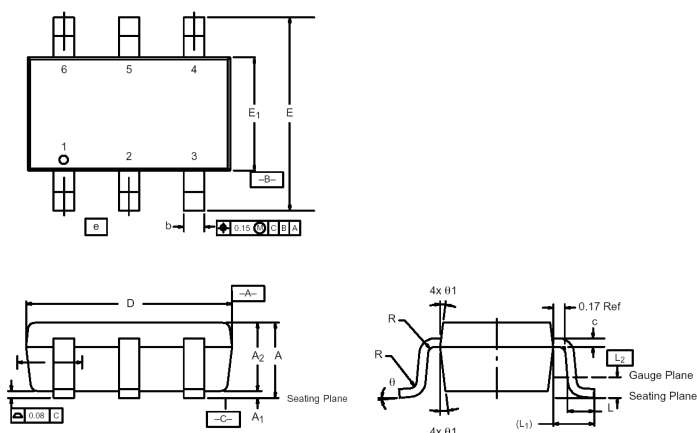


Figure 11. Normalized Thermal Transient Impedance, Junction-to-Ambient

Package Information

TSOP-6: 6LEAD



| Dim            | MILLIMETERS |      |      | INCHES     |       |       |
|----------------|-------------|------|------|------------|-------|-------|
|                | Min         | Nom  | Max  | Min        | Nom   | Max   |
| A              | 0.91        | —    | 1.10 | 0.036      | —     | 0.043 |
| A <sub>1</sub> | 0.01        | —    | 0.10 | 0.0004     | —     | 0.004 |
| A <sub>2</sub> | 0.84        | —    | 1.00 | 0.033      | 0.038 | 0.039 |
| b              | 0.30        | 0.32 | 0.45 | 0.012      | 0.013 | 0.018 |
| c              | 0.10        | 0.15 | 0.20 | 0.004      | 0.006 | 0.008 |
| D              | 2.95        | 3.05 | 3.10 | 0.116      | 0.120 | 0.122 |
| E              | 2.70        | 2.85 | 2.98 | 0.106      | 0.112 | 0.117 |
| E <sub>1</sub> | 1.55        | 1.65 | 1.70 | 0.061      | 0.065 | 0.067 |
| e              | 1.00 BSC    |      |      | 0.0394 BSC |       |       |
| L              | 0.35        | —    | 0.50 | 0.014      | —     | 0.020 |
| L <sub>1</sub> | 0.60 Ref    |      |      | 0.024 Ref  |       |       |
| L <sub>2</sub> | 0.25 BSC    |      |      | 0.010 BSC  |       |       |
| R              | 0.10        | —    | —    | 0.004      | —     | —     |
| θ              | 0°          | 4°   | 8°   | 0°         | 4°    | 8°    |
| θ <sub>1</sub> | 7° Nom      |      |      | 7° Nom     |       |       |

# Ordering information

- AM3446N-T1-XX
  - A: Analog Power
  - M: MOSFET
  - 3446: Part number
  - N: N-Channel
  - T1: Tape & reel
  - XX: Blank: Standard  
PF: Leadfree