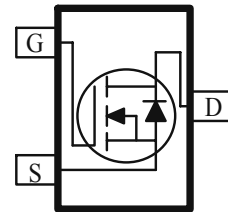
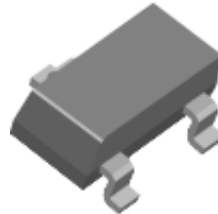


**N-Channel 20-V (D-S) MOSFET**

These miniature surface mount MOSFETs utilize High Cell Density process. Low  $r_{DS(on)}$  assures minimal power loss and conserves energy, making this device ideal for use in power management circuitry. Typical applications are DC-DC converters, power management in portable and battery-powered products such as computers, printers, PCMCIA cards, cellular and cordless telephones.

- Low  $r_{DS(on)}$  Provides Higher Efficiency and Extends Battery Life
- Miniature SOT-23 Surface Mount Package Saves Board Space

| PRODUCT SUMMARY |                         |           |
|-----------------|-------------------------|-----------|
| $V_{DS}$ (V)    | $r_{DS(on)}$ (Ω)        | $I_D$ (A) |
| 20              | 0.070 @ $V_{GS} = 4.5V$ | 2.2       |
|                 | 0.080 @ $V_{GS} = 2.5V$ | 2.0       |
|                 | 0.120 @ $V_{GS} = 1.8V$ | 1.8       |



| ABSOLUTE MAXIMUM RATINGS ( $T_A = 25^\circ C$ UNLESS OTHERWISE NOTED) |                    |                |            |            |
|---|--------------------|----------------|------------|------------|
| Parameter   |                    | Symbol         | Maximum    | Units      |
| Drain-Source Voltage  |                    | $V_{DS}$       | 20         | V          |
| Gate-Source Voltage   |                    | $V_{GS}$       | ±8         |            |
| Continuous Drain Current <sup>a</sup>                                 | $T_A = 25^\circ C$ | $I_D$          | 2.2        | A          |
|   | $T_A = 70^\circ C$ |                | 1.8        |            |
| Pulsed Drain Current <sup>b</sup>                                     |                    | $I_{DM}$       | 8          |            |
| Continuous Source Current (Diode Conduction) <sup>a</sup>             |                    | $I_S$          | 0.6        | A          |
| Power Dissipation <sup>a</sup>  | $T_A = 25^\circ C$ | $P_D$          | 1.25       | W          |
|   | $T_A = 70^\circ C$ |                | 0.8        |            |
| Operating Junction and Storage Temperature Range                      |                    | $T_J, T_{stg}$ | -55 to 150 | $^\circ C$ |

| THERMAL RESISTANCE RATINGS               |                |            |         |              |
|--|----------------|------------|---------|--------------|
| Parameter                                |                | Symbol     | Maximum | Units        |
| Maximum Junction-to-Ambient <sup>a</sup> | $t \leq 5$ sec | $R_{THJA}$ | 100     | $^\circ C/W$ |
|  | Steady-State   |            | 166     |              |

Notes

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

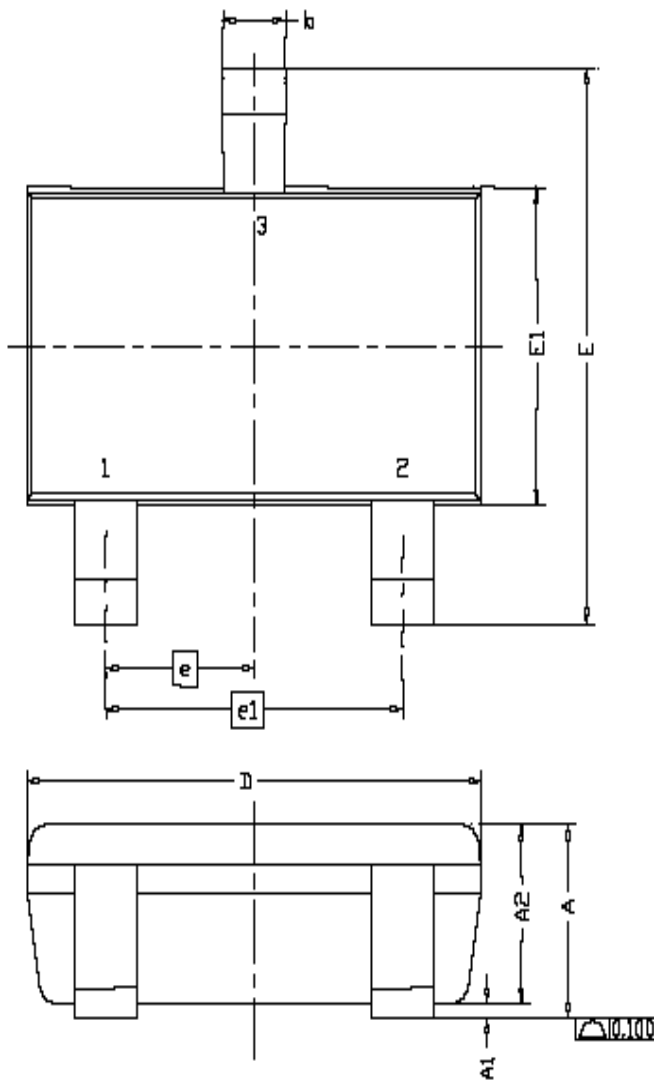
| SPECIFICATIONS ( $T_A = 25^\circ\text{C}$ UNLESS OTHERWISE NOTED) |              |   |        |      |     |               |
|---|--------------|---|--------|------|-----|---------------|
| Parameter   | Symbol       | Test Conditions   | Limits |      |     | Unit          |
|   |              |   | Min    | Typ  | Max |               |
| <b>Static</b>   |              |   |        |      |     |               |
| Gate-Threshold Voltage  | $V_{GS(th)}$ | $V_{DS} = V_{GS}, I_D = 250 \mu\text{A}$  | 0.70   |      |     |               |
| Gate-Body Leakage   | $I_{GSS}$    | $V_{DS} = 0 \text{ V}, V_{GS} = 12 \text{ V}$   |        |      | 1   | $\mu\text{A}$ |
| Zero Gate Voltage Drain Current                                   | $I_{DSS}$    | $V_{DS} = 16 \text{ V}, V_{GS} = 0 \text{ V}$   |        |      | 0.1 | $\mu\text{A}$ |
|   |              | $V_{DS} = 16 \text{ V}, V_{GS} = 0 \text{ V}, T_J = 55^\circ\text{C}$                     |        |      | 1   |               |
| On-State Drain Current <sup>A</sup>                               | $I_{D(on)}$  | $V_{DS} = 5 \text{ V}, V_{GS} = 4.5 \text{ V}$  | 5      |      |     | A             |
| Drain-Source On-Resistance <sup>A</sup>                           | $r_{DS(on)}$ | $V_{GS} = 4.5 \text{ V}, I_D = 2.2 \text{ A}$   |        |      | 70  | m $\Omega$    |
|   |              | $V_{GS} = 2.5 \text{ V}, I_D = 2.0 \text{ A}$   |        |      | 80  |               |
|   |              | $V_{GS} = 1.8 \text{ V}, I_D = 1.8 \text{ A}$   |        |      | 120 |               |
| Forward Transconductance <sup>A</sup>                             | $g_{fs}$     | $V_{DS} = 5 \text{ V}, I_D = 2.0 \text{ A}$   |        | 11   |     | S             |
| Diode Forward Voltage   | $V_{SD}$     | $I_S = 0.6 \text{ A}, V_{GS} = 0 \text{ V}$   |        | 0.60 |     | V             |
| <b>Dynamic<sup>b</sup></b>  |              |   |        |      |     |               |
| Total Gate Charge   | $Q_g$        | $V_{DS} = 10 \text{ V}, V_{GS} = 4.5 \text{ V},$<br>$I_D = 2.0 \text{ A}$                 |        | 4.5  |     | nC            |
| Gate-Source Charge  | $Q_{gs}$     |   |        | 0.89 |     |               |
| Gate-Drain Charge   | $Q_{gd}$     |   |        | 0.95 |     |               |
| Turn-On Delay Time  | $t_{d(on)}$  | $V_{DD} = 10 \text{ V}, I_D = 1.0 \text{ A}, R_G = 6 \Omega,$<br>$V_{GS} = 4.5 \text{ V}$ |        | 6    |     | ns            |
| Rise Time   | $t_r$        |   |        | 6.5  |     |               |
| Turn-Off Delay Time   | $t_{d(off)}$ |   |        | 14   |     |               |
| Fall-Time   | $t_f$        |   |        | 2    |     |               |

## Notes

- Pulse test:  $PW \leq 300\mu\text{s}$  duty cycle  $\leq 2\%$ .
- Guaranteed by design, not subject to production testing.

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# Package Information



| DIM.       | MILLIMETERS |      |       |
|------------|-------------|------|-------|
|            | MIN         | NOM  | MAX   |
| A          | 0.935       | 0.95 | 1.10  |
| A1         | 0.01        | ---  | 0.10  |
| A2         | 0.85        | 0.90 | 0.925 |
| b          | 0.30        | 0.40 | 0.50  |
| c          | 0.10        | 0.15 | 0.25  |
| D          | 2.70        | 2.90 | 3.10  |
| E          | 2.60        | 2.80 | 3.00  |
| E1         | 1.40        | 1.60 | 1.80  |
| e          | 0.95 BSC    |      |       |
| e1         | 1.90 BSC    |      |       |
| L          | 0.30        | 0.40 | 0.60  |
| L1         | 0.60REF     |      |       |
| L2         | 0.25BSC     |      |       |
| R          | 0.10        | ---  | ---   |
| $\theta$   | 0°          | 4°   | 8°    |
| $\theta_1$ | 7°NOM       |      |       |

