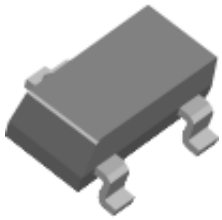
## N-Channel 20-V (D-S) MOSFET

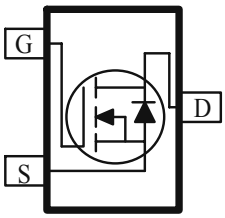
These miniature surface mount MOSFETs utilize High Cell Density process. Low $r_{DS(on)}$ assures minimal power loss and conserves energy, making this device ideal for use in power management circuitry. Typical applications are DC-DC converters, power management in portable and battery-powered products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

1.8 V Rated






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

| THERMAL RESISTANCE RATINGS | | | | |
|---|---|---|---|---|
| **Parameter** | | **Symbol** | **Maximum** | **Units** |
| Maximum Junction-to-Ambient[a] | t <= 5 sec | $R_{THJA}$ | 100 | °C/W |
| | Steady-State | | 166 | |

Notes

a. Surface Mounted on 1" x 1" FR4 Board.

b. Pulse width limited by maximum junction temperature

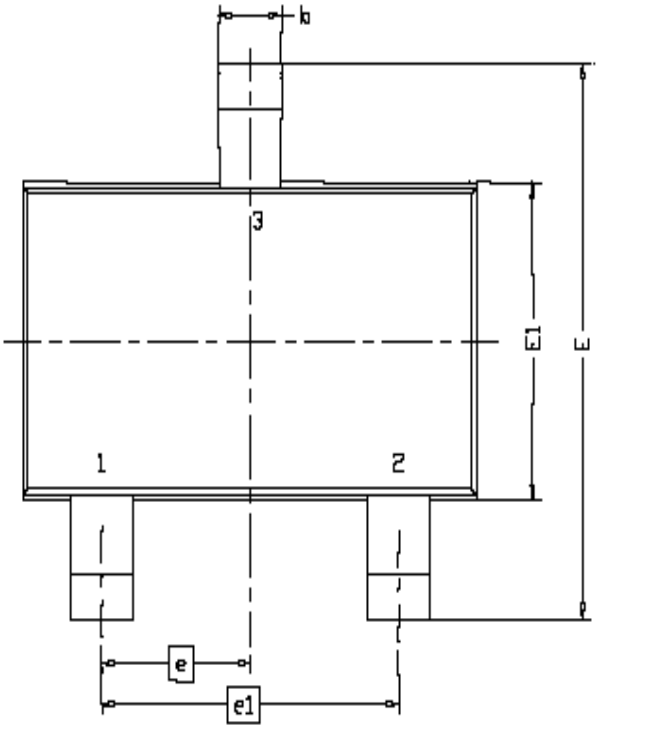
| SPECIFICATIONS ($T_A$ = 25°C UNLESS OTHERWISE NOTED) | | | | | | |
|---|---|---|---|---|---|---|
| **Parameter** | **Symbol** | **Test Conditions** | **Limits** | | | **Unit** |
| | | | **Min** | **Typ** | **Max** | |
| **Static** | | | | | | |
| Gate-Threshold Voltage | $V_{GS(th)}$ | $V_{DS}$ = $V_{GS}$, $I_D$ = 250 uA | 0.70 | | | |
| Gate-Body Leakage | $I_{GSS}$ | $V_{DS}$ = 0 V, $V_{GS}$ = 12 V | | | 1 | uA |
| Zero Gate Voltage Drain Current | $I_{DSS}$ | $V_{DS}$ = 16 V, $V_{GS}$ = 0 V | | | 0.1 | uA |
| | | $V_{DS}$ = 16 V, $V_{GS}$ = 0 V, $T_J$ = 55°C | | | 1 | |
| On-State Drain Current[A] | $I_{D(on)}$ | $V_{DS}$ = 5 V, $V_{GS}$ = 4.5 V | 5 | | | A |
| Drain-Source On-Resistance[A] | $r_{DS(on)}$ | $V_{GS}$ = 4.5 V, $I_D$ = 2.2 A | | | 70 | mΩ |
| | | $V_{GS}$ = 2.5 V, $I_D$ = 2.0 A | | | 80 | |
| | | $V_{GS}$ = 1.8 V, $I_D$ = 1.8 A | | | 120 | |
| Forward Tranconductance[A] | $g_{fs}$ | $V_{DS}$ = 5 V, $I_D$ = 2.0 A | | 11 | | S |
| Diode Forward Voltage | $V_{SD}$ | $I_S$ = 0.6 A, $V_{GS}$ = 0 V | | 0.60 | | V |
| **Dynamic[b]** | | | | | | |
| Total Gate Charge | $Q_g$ | $V_{DS}$ = 10 V, $V_{GS}$ = 4.5 V, $I_D$ = 2.0 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 V, $I_D$ = 1.0 A , $R_G$ = 6 Ω, $V_{GS}$ = 4.5 V | | 6 | | ns |
| Rise Time | $t_r$ | | | 6.5 | | |
| Turn-Off Delay Time | $t_{d(off)}$ | | | 14 | | |
| Fall-Time | $t_f$ | | | 2 | | |

Notes

a. Pulse test: PW <= 300us duty cycle <= 2%.

b. Guaranteed by design, not subject to production testing.

# 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 | --- | --- |
| θ | 0° | 4° | 8° |
| θ1 | 7°NOM | | |