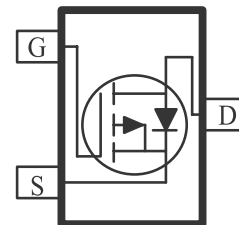
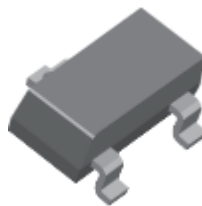


## P-Channel 20-V (D-S) MOSFET

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.

- Low  $r_{DS(on)}$  provides higher efficiency and extends battery life
- Low thermal impedance copper leadframe SOT-23 saves board space
- Fast switching speed
- High performance trench technology

| PRODUCT SUMMARY |                          |           |
|-----------------|--------------------------|-----------|
| $V_{DS}$ (V)    | $r_{DS(on)}$ (OHM)       | $I_D$ (A) |
| -20             | 0.055 @ $V_{GS} = -4.5V$ | -3.6      |
|                 | 0.089 @ $V_{GS} = -2.5V$ | -2.8      |
|                 | 0.20 @ $V_{GS} = -1.8V$  | -1.8      |



| ABSOLUTE MAXIMUM RATINGS ( $T_A = 25^\circ\text{C}$ UNLESS OTHERWISE NOTED) |                          |                |            |                  |
|-----------------------------------------------------------------------------|--------------------------|----------------|------------|------------------|
| Parameter                                                                   |                          | Symbol         | Ratings    | Units            |
| Drain-Source Voltage                                                        |                          | $V_{DS}$       | -20        | V                |
| Gate-Source Voltage                                                         |                          | $V_{GS}$       | $\pm 12$   |                  |
| Continuous Drain Current <sup>a</sup>                                       | $T_A = 25^\circ\text{C}$ | $I_D$          | -3.6       | A                |
|                                                                             | $T_A = 70^\circ\text{C}$ |                | -2.9       |                  |
| Pulsed Drain Current <sup>b</sup>                                           |                          | $I_{DM}$       | -10        |                  |
| Continuous Source Current (Diode Conduction) <sup>a</sup>                   |                          | $I_S$          | $\pm 0.46$ | A                |
| Power Dissipation <sup>a</sup>                                              | $T_A = 25^\circ\text{C}$ | $P_D$          | 1.25       | W                |
|                                                                             | $T_A = 70^\circ\text{C}$ |                | 0.8        |                  |
| 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> | $t \leq 5 \text{ sec}$ | $R_{THJA}$ | 100     | $^\circ\text{C/W}$ |
|                                          | Steady-State           |            | 166     |                    |

### Notes

- Surface Mounted on 1" x 1" FR4 Board.
- 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  |      |
| 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   |       |      |      |
| 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> = -3.6 A                                                  |        |       | 55   | mΩ   |
|                                         |                     | V <sub>GS</sub> = -2.5 V, I <sub>D</sub> = -2.8 A                                                  |        |       | 89   |      |
|                                         |                     | V <sub>GS</sub> = -1.8 V, I <sub>D</sub> = -1.8 A                                                  |        |       | 200  |      |
| Forward Tranconductance <sup>A</sup>    | g <sub>fs</sub>     | V <sub>DS</sub> = -5 V, I <sub>D</sub> = -3.6 A                                                    |        | 12    |      | S    |
| Diode Forward Voltage                   | V <sub>SD</sub>     | I <sub>S</sub> = -0.46 A, V <sub>GS</sub> = 0 V                                                    |        | -0.60 |      | V    |
| Dynamic <sup>b</sup>                    |                     |                                                                                                    |        |       |      |      |
| Total Gate Charge                       | Q <sub>g</sub>      | V <sub>DS</sub> = -5 V, V <sub>GS</sub> = -4.5 V,<br>I <sub>D</sub> = -3.6 A                       |        | 16.7  |      | nC   |
| Gate-Source Charge                      | Q <sub>gs</sub>     |                                                                                                    |        | 1.8   |      |      |
| Gate-Drain Charge                       | Q <sub>gd</sub>     |                                                                                                    |        | 1.9   |      |      |
| Turn-On Delay Time                      | t <sub>d(on)</sub>  | V <sub>DD</sub> = -10 V, I <sub>L</sub> = -1 A,<br>V <sub>GEN</sub> = -4.5 V, R <sub>G</sub> = 6 Ω |        | 9     |      | ns   |
| Rise Time                               | t <sub>r</sub>      |                                                                                                    |        | 4     |      |      |
| Turn-Off Delay Time                     | t <sub>d(off)</sub> |                                                                                                    |        | 25    |      |      |
| Fall-Time                               | t <sub>f</sub>      |                                                                                                    |        | 20    |      |      |

## Notes

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

## Typical Electrical Characteristics

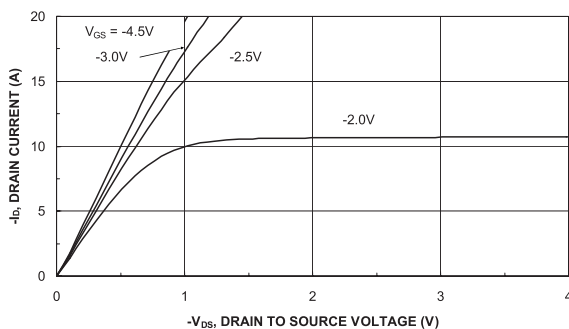


Figure 1. Output Characteristics

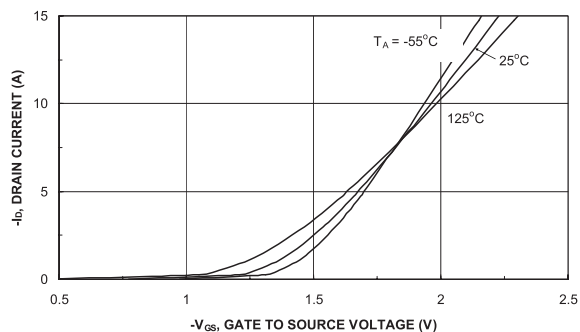


Figure 2. Transfer Characteristics

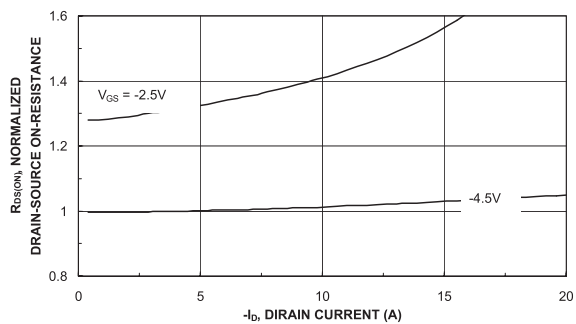


Figure 3. On-Resistance vs. Drain Current

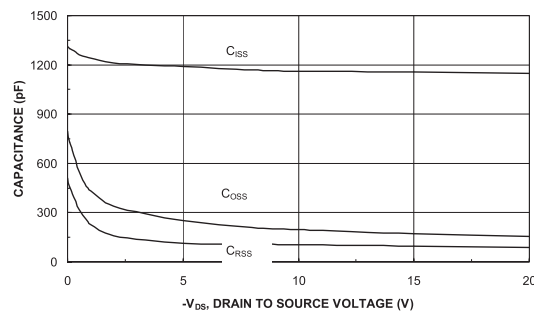


Figure 4. Capacitance

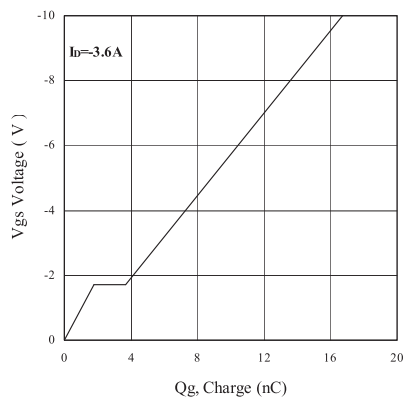


Figure 5. Gate Charge

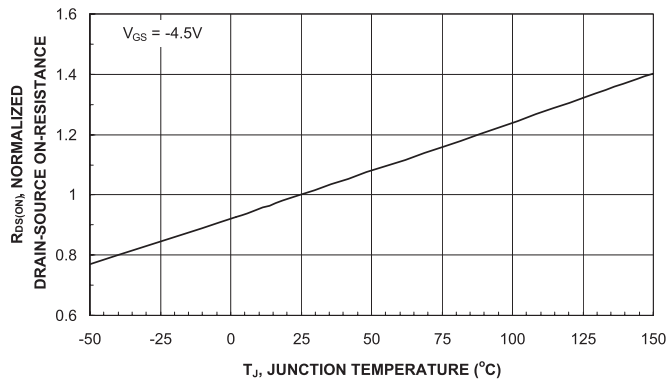


Figure 6. On-Resistance vs. Junction Temperature

## Typical Electrical Characteristics

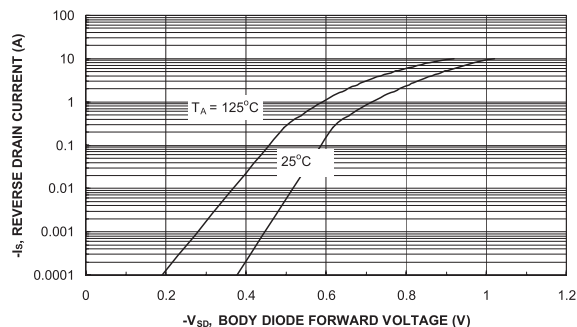


Figure 7. Source-Drain Diode Forward Voltage

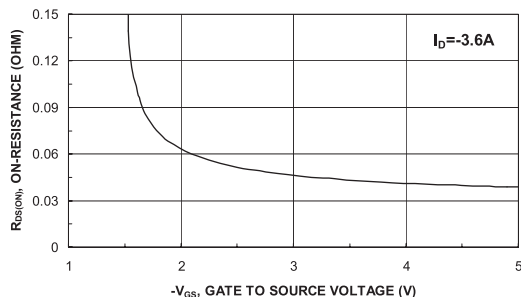


Figure 8. On-Resistance with Gate to Source Voltage

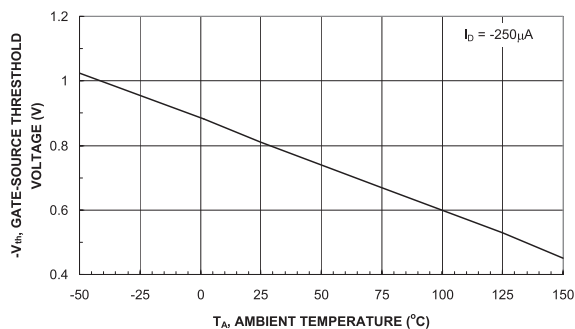


Figure 9. V<sub>th</sub> Gate to Source Voltage Vs Temperature

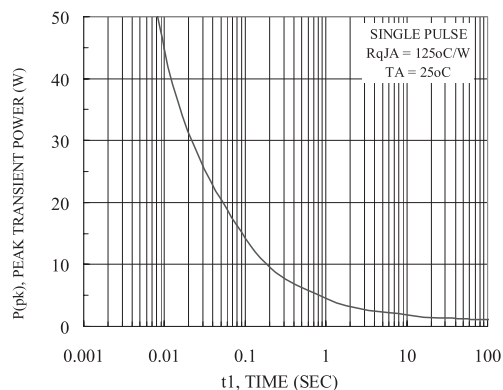


Figure 10. Single Pulse Maximum Power Dissipation

### Normalized Thermal Transient Junction to Ambient

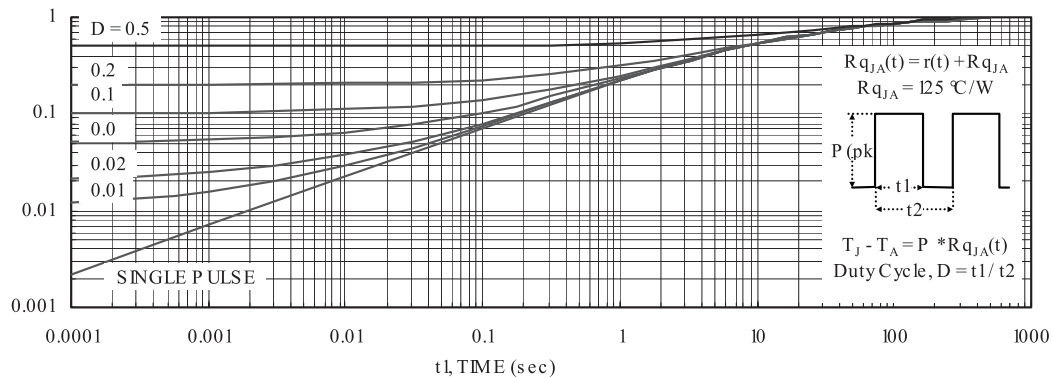
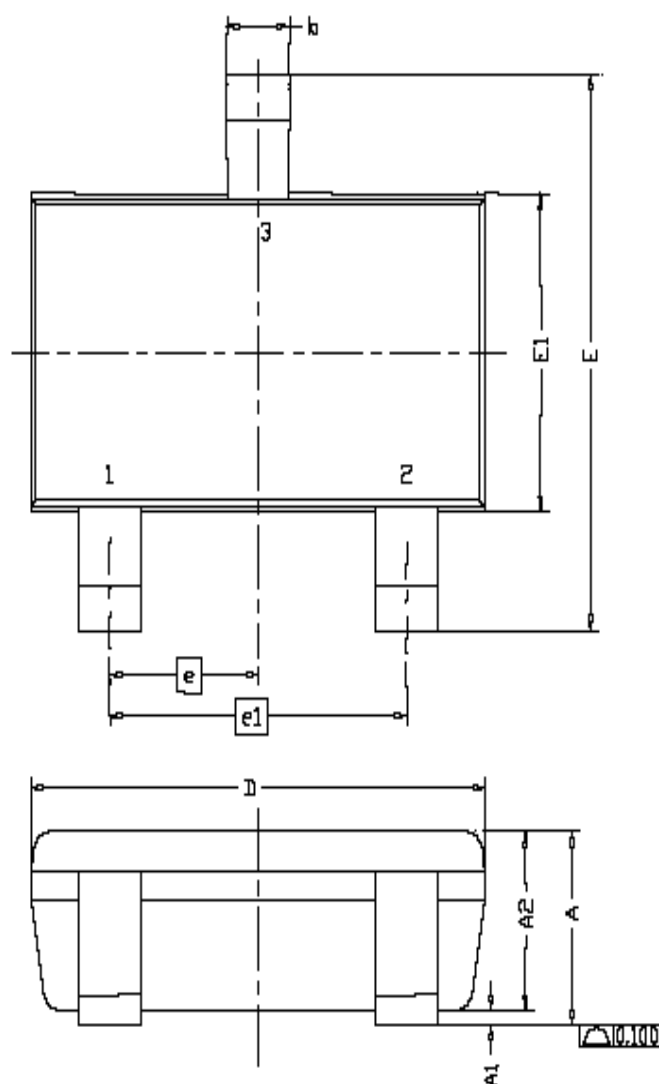


Figure 11. Transient Thermal Response Curve

# Ordering information

- AM2325P-T1-XX
  - A: Analog Power
  - M: MOSFET
  - 2325: Part number
  - P: P-Channel
  - T1: Tape & reel
  - XX: Blank: Standard  
PF: Lead-free

# 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°    |
| $\theta1$ | 7°NOM       |      |       |

