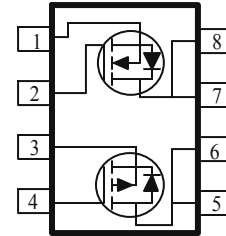


## P & N-Channel 30-V (D-S) MOSFET

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.

| PRODUCT SUMMARY |                            |           |
|-----------------|----------------------------|-----------|
| $V_{DS}$ (V)    | $r_{DS(on)}$ m( $\Omega$ ) | $I_D$ (A) |
| 30              | 31 @ $V_{GS} = 4.5V$       | 6.9       |
| -30             | 33 @ $V_{GS} = -4.5V$      | -6.8      |

- Low  $r_{DS(on)}$  provides higher efficiency and extends battery life
- Low thermal impedance copper leadframe SOIC-8 saves board space
- Fast switching speed
- High performance trench technology



| ABSOLUTE MAXIMUM RATINGS (T <sub>A</sub> = 25 °C UNLESS OTHERWISE NOTED) |                      |                                   |            |           |       |
|--------------------------------------------------------------------------|----------------------|-----------------------------------|------------|-----------|-------|
| Parameter                                                                |                      | Symbol                            | N-Channel  | P-Channel | Units |
| Drain-Source Voltage                                                     |                      | V <sub>DS</sub>                   | 30         | -30       | V     |
| Gate-Source Voltage                                                      |                      | V <sub>GS</sub>                   | ±12        | ±25       |       |
| Continuous Drain Current <sup>a</sup>                                    | T <sub>A</sub> =25°C | I <sub>D</sub>                    | 6.9        | -8.5      | A     |
|                                                                          | T <sub>A</sub> =70°C |                                   | 5.4        | -6.8      |       |
| Pulsed Drain Current <sup>b</sup>                                        |                      | I <sub>DM</sub>                   | 20         | -50       |       |
| Continuous Source Current (Diode Conduction) <sup>a</sup>                |                      | I <sub>S</sub>                    | 1.3        | -2.1      | A     |
| Power Dissipation <sup>a</sup>                                           | T <sub>A</sub> =25°C | P <sub>D</sub>                    | 2.1        | 2.1       | W     |
|                                                                          | T <sub>A</sub> =70°C |                                   | 1.3        | 1.3       |       |
| Operating Junction and Storage Temperature Range                         |                      | T <sub>J</sub> , T <sub>stg</sub> | -55 to 150 |           | °C    |

| THERMAL RESISTANCE RATINGS               |                         |                 |         |                    |
|------------------------------------------|-------------------------|-----------------|---------|--------------------|
| Parameter                                |                         | Symbol          | Maximum | Units              |
| Maximum Junction-to-Ambient <sup>a</sup> | $t \leq 10 \text{ sec}$ | $R_{\theta JA}$ | 62.5    | $^\circ\text{C/W}$ |
|                                          | Steady-State            |                 | 110     | $^\circ\text{C/W}$ |

### 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 |
|                                                                |                     |                                                                                                                                                                                                                    | Ch     | Min  | Typ  | Max  |      |
| Static                                                         |                     |                                                                                                                                                                                                                    |        |      |      |      |      |
| Gate-Threshold Voltage                                         | V <sub>GS(th)</sub> | V <sub>GS</sub> = V <sub>DS</sub> , I <sub>D</sub> = 250 uA                                                                                                                                                        | N      | 0.6  |      |      | V    |
|                                                                |                     | V <sub>GS</sub> = V <sub>DS</sub> , I <sub>D</sub> = -250 uA                                                                                                                                                       | P      | -1.0 |      |      |      |
| Gate-Body Leakage                                              | I <sub>GSS</sub>    | V <sub>GS</sub> = -20 V, V <sub>DS</sub> = 0 V                                                                                                                                                                     | P      |      |      | ±100 | nA   |
|                                                                |                     | V <sub>GS</sub> = 12 V, V <sub>DS</sub> = 0 V                                                                                                                                                                      | N      |      |      | ±100 |      |
| Zero Gate Voltage Drain Current                                | I <sub>DSS</sub>    | V <sub>DS</sub> = -24 V, V <sub>GS</sub> = 0 V                                                                                                                                                                     | P      |      |      | -1   | uA   |
|                                                                |                     | V <sub>DS</sub> = 24 V, V <sub>GS</sub> = 0 V                                                                                                                                                                      | N      |      |      | 1    |      |
| 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                                                                                                                                                                     | N      | 20   |      |      | A    |
|                                                                |                     | V <sub>DS</sub> = -5 V, V <sub>GS</sub> = -4.5 V                                                                                                                                                                   | P      | -20  |      |      |      |
| Drain-Source On-Resistance <sup>A</sup>                        | r <sub>DS(on)</sub> | V <sub>GS</sub> = 4.5 V, I <sub>D</sub> = 6.9 A                                                                                                                                                                    | N      |      |      | 31   | mΩ   |
|                                                                |                     | V <sub>GS</sub> = -4.5 V, I <sub>D</sub> = -68 A                                                                                                                                                                   | P      |      |      | 33   |      |
| Forward Tranconductance <sup>A</sup>                           | g <sub>fs</sub>     | V <sub>DS</sub> = 15 V, I <sub>D</sub> = 6.9 A                                                                                                                                                                     | N      |      | 25   |      | S    |
|                                                                |                     | V <sub>DS</sub> = -15 V, I <sub>D</sub> = -8.5 A                                                                                                                                                                   | P      |      | 10   |      |      |
| Pulsed Source Current (Body Diode) <sup>A</sup>                | I <sub>SM</sub>     |                                                                                                                                                                                                                    |        |      |      | 5    | A    |
| Dynamic                                                        |                     |                                                                                                                                                                                                                    |        |      |      |      |      |
| Total Gate Charge                                              | Q <sub>g</sub>      | N-Channel<br>V <sub>DS</sub> =15V, V <sub>GS</sub> =4.5V, I <sub>D</sub> =6.9A<br>P-Channel<br>V <sub>DS</sub> =-15V, V <sub>GS</sub> =-4.5V, I <sub>D</sub> =-8.5A                                                | N      |      | 6.0  |      | nC   |
| Gate-Source Charge                                             | Q <sub>gs</sub>     |                                                                                                                                                                                                                    | P      |      | 13   |      |      |
|                                                                |                     |                                                                                                                                                                                                                    | N      |      | 1.0  |      |      |
|                                                                |                     |                                                                                                                                                                                                                    | P      |      | 5.8  |      |      |
|                                                                |                     |                                                                                                                                                                                                                    | N      |      | 1.5  |      |      |
| Gate-Drain Charge                                              | Q <sub>gd</sub>     |                                                                                                                                                                                                                    | P      |      | 12.0 |      |      |
| Switching                                                      |                     |                                                                                                                                                                                                                    |        |      |      |      |      |
| Turn-On Delay Time                                             | t <sub>d(on)</sub>  | N-Chaneel<br>V <sub>DD</sub> =15V, V <sub>GS</sub> =4.5V, I <sub>D</sub> =1A ,<br>R <sub>GEN</sub> =6Ω,<br>P-Channel<br>V <sub>DD</sub> =-15V, V <sub>GS</sub> =-4.5V, I <sub>D</sub> =-1A<br>R <sub>GEN</sub> =6Ω | N      |      | 7.4  |      | nS   |
| Rise Time                                                      | t <sub>r</sub>      |                                                                                                                                                                                                                    | P      |      | 15   |      |      |
|                                                                |                     |                                                                                                                                                                                                                    | N      |      | 4    |      |      |
|                                                                |                     |                                                                                                                                                                                                                    | P      |      | 16   |      |      |
|                                                                |                     |                                                                                                                                                                                                                    | N      |      | 22.2 |      |      |
| Turn-Off Delay Time                                            | t <sub>d(off)</sub> |                                                                                                                                                                                                                    | P      |      | 62   |      |      |
| Fall-Time                                                      | t <sub>f</sub>      |                                                                                                                                                                                                                    | N      |      | 3.6  |      |      |
|                                                                |                     |                                                                                                                                                                                                                    | P      |      | 46   |      |      |

## 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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## Typical Electrical Characteristics (P-Channel)

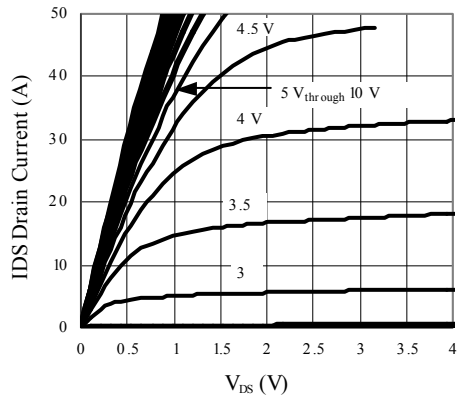


Figure 1. On-Region Characteristics

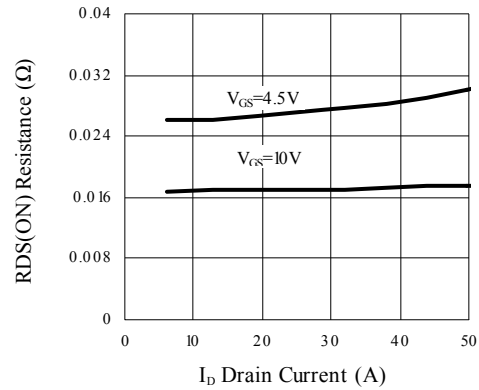


Figure 2. On-Resistance with Drain Current

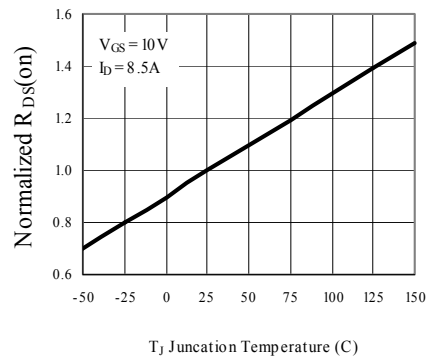


Figure 3. On-Resistance Variation with Temperature

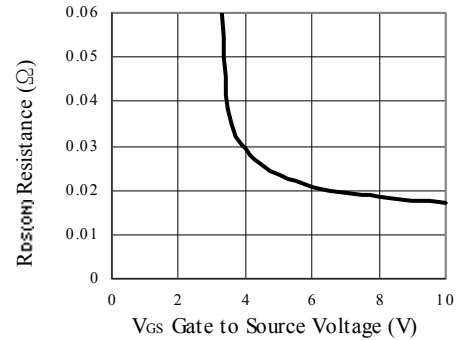


Figure 4. On-Resistance Variation with Gate to Source Voltage

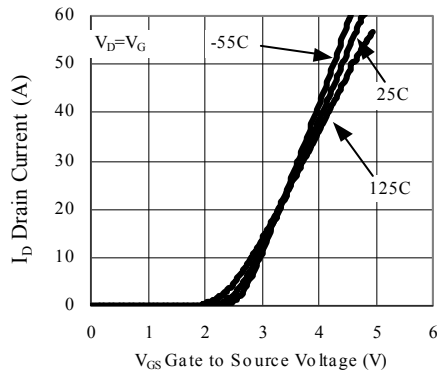


Figure 5. Transfer Characteristics

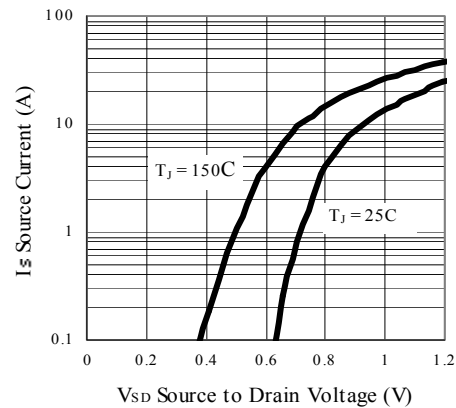


Figure 6. Body Diode Forward Voltage Variation with Source Current and Temperature

## Typical Electrical Characteristics (P-Channel)

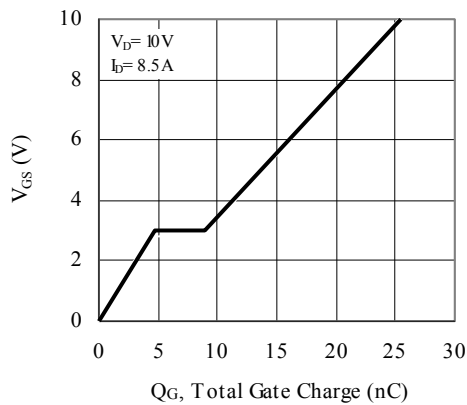


Figure 7. Gate Charge Characteristics

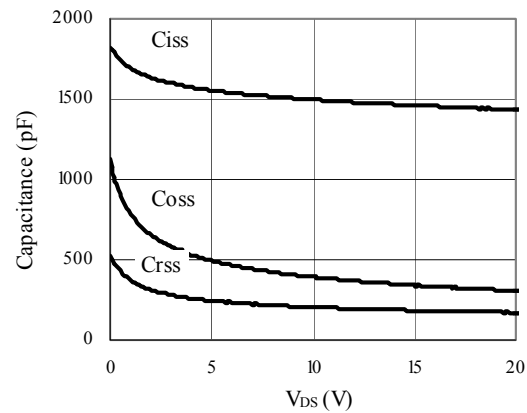


Figure 8. Capacitance Characteristics

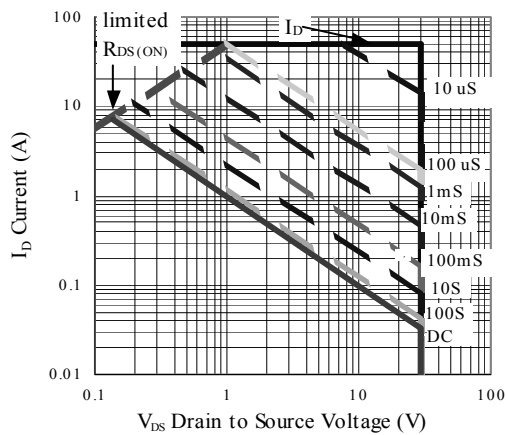


Figure 9. Maximum Safe Operating Area

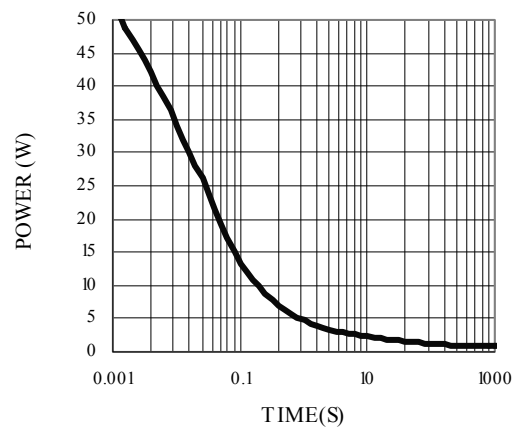


Figure 10. Single Pulse Maximum Power Dissipation

### Normalized Thermal Transient Junction to Ambient

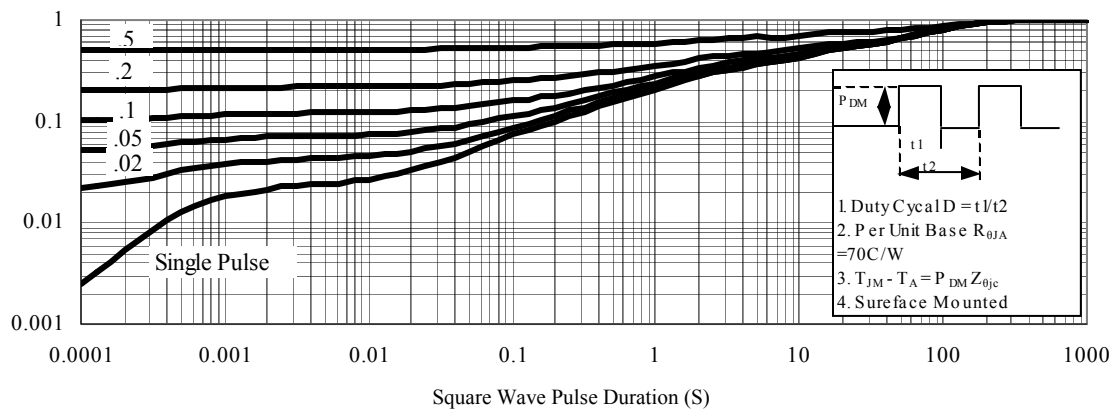
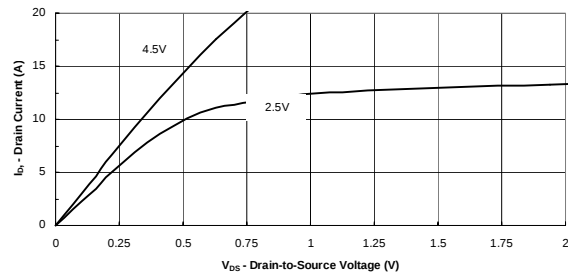
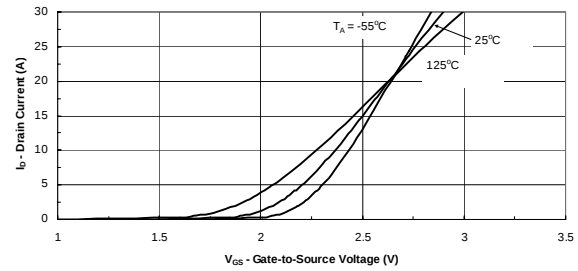


Figure 11. Transient Thermal Response Curve

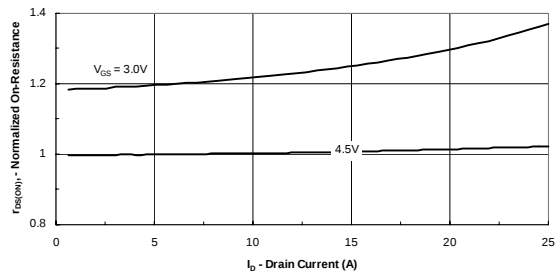
## Typical Electrical Characteristics (N-Channel)



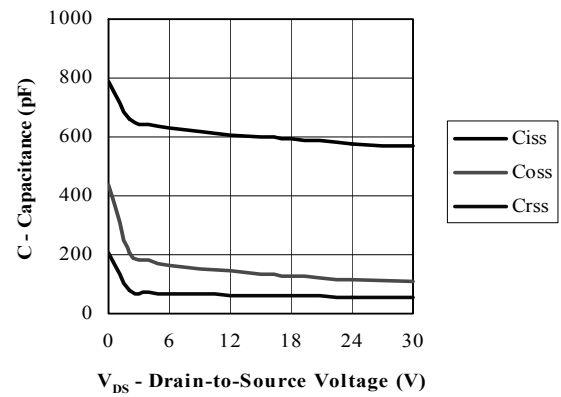
Output Characteristics



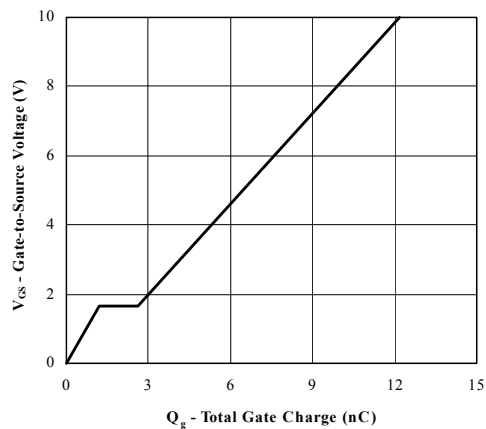
Transfer Characteristics



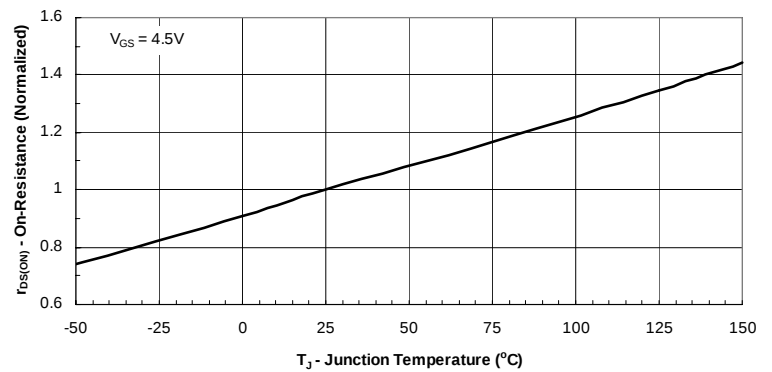
On-Resistance vs. Drain Current



Capacitance

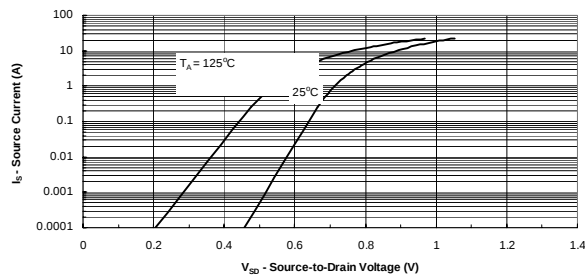


Gate Charge

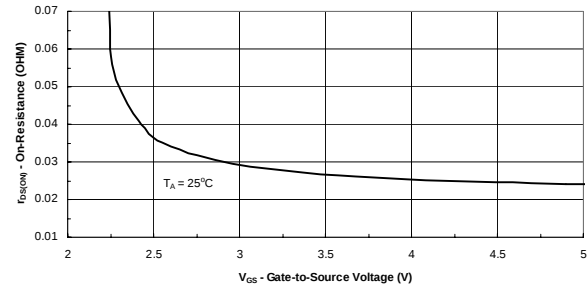


On-Resistance vs. Junction Temperature

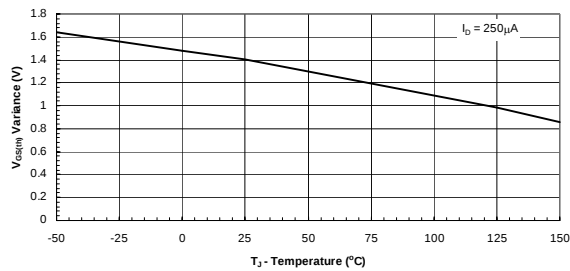
## Typical Electrical Characteristics (N-Channel)



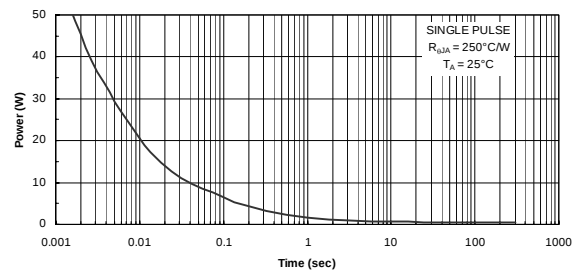
Source-Drain Diode Forward Voltage



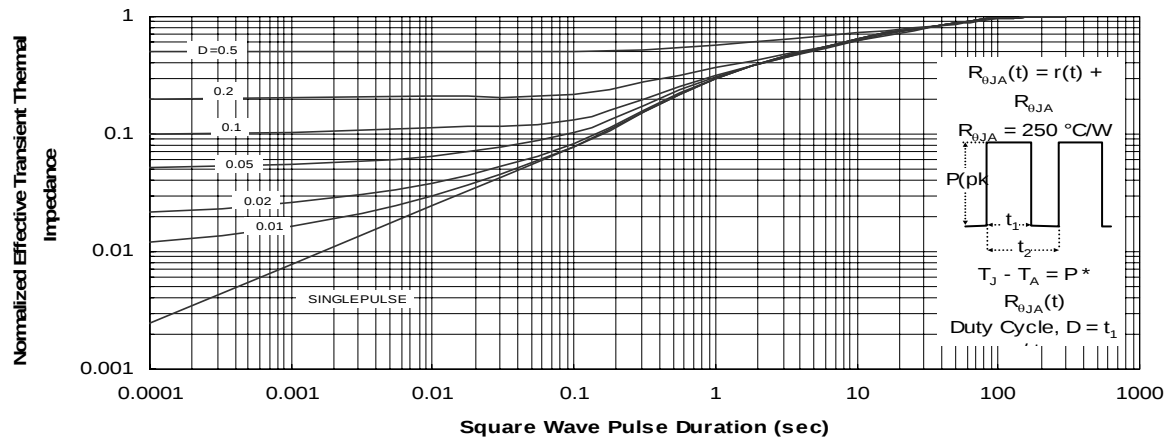
On-Resistance vs. Gate-to-Source Voltage



Threshold Voltage



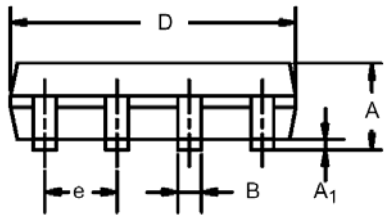
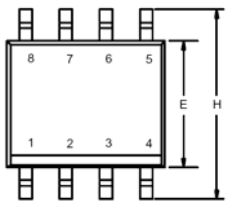
Single Pulse Power



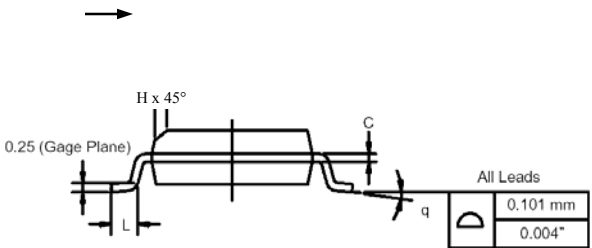
Normalized Thermal Transient Impedance, Junction-to-Ambient

Package Information

SO-8: 8LEAD



| Dim            | MILLIMETERS |      | INCHES    |       |
|----------------|-------------|------|-----------|-------|
|                | Min         | Max  | Min       | Max   |
| A              | 1.35        | 1.75 | 0.053     | 0.069 |
| A <sub>1</sub> | 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°    |



# Ordering information

- AM4502AC-T1-XX
  - A: Analog Power
  - M: MOSFET
  - 4502A: Part number
  - C: Complementary
  - T1: Tape & reel
  - XX: Blank: Standard  
PF: Leadfree