

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

■ Features

- Low $r_{DS(on)}$ Provides Higher Efficiency and Extends Battery Life
- Miniature SO-8 Surface Mount Package Saves Board Space
- High power and current handling capability
- Low side high current DC-DC Converter applications

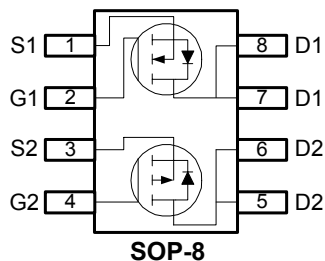
■ General Description

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 PWMDC-DC converters, power management in portable and battery-powered products such as computers, printers, battery charger, telecommunication power system, and telephones power system.

■ Product Summary

| V_{DS} (V) | $r_{DS(on)}$ (m Ω) | I_D (A) |
|--------------|----------------------------|-----------|
| 30 | 20@ $V_{GS}=4.5V$ | 8.4 |
| | 13.5@ $V_{GS}=10V$ | 10.0 |
| -30 | 30@ $V_{GS}=-4.5V$ | -6.8 |
| | 19@ $V_{GS}=-10V$ | -8.5 |

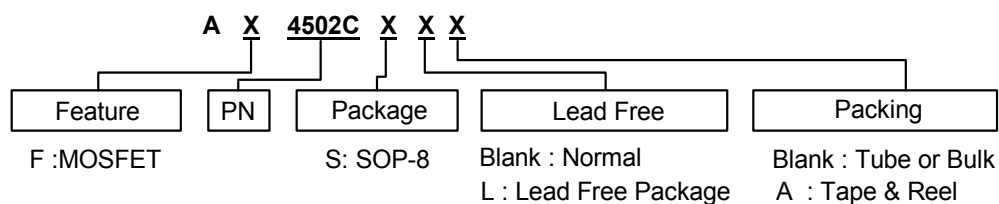
■ Pin Assignments



■ Pin Descriptions

| Pin Name | Description |
|----------|---------------|
| S1 | Source (NMOS) |
| G1 | Gate (NMOS) |
| D1 | Drain (NMOS) |
| S2 | Source (PMOS) |
| G2 | Gate (PMOS) |
| D2 | Drain (PMOS) |

■ Ordering information





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

■ Absolute Maximum Ratings ($T_A=25^\circ\text{C}$ unless otherwise noted)

| Symbol | Parameter | N-Channel | P-Channel | Units | |
|----------------|---|------------------------|------------|------------------|---|
| V_{DS} | Drain-Source Voltage | 30 | -30 | V | |
| V_{GS} | Gate-Source Voltage | 20 | -25 | | |
| I_D | Continuous Drain Current (Note 1) | $T_A=25^\circ\text{C}$ | 10 | -8.5 | A |
| | | $T_A=70^\circ\text{C}$ | 8.1 | -6.8 | |
| I_{DM} | Pulsed Drain Current (Note 2) | ± 50 | ± 50 | A | |
| I_S | Continuous Source Current (Diode Conduction) (Note 1) | 2.3 | -2.1 | A | |
| P_D | Power Dissipation (Note 1) | $T_A=25^\circ\text{C}$ | 2.1 | 2.1 | W |
| | | $T_A=70^\circ\text{C}$ | 1.3 | 1.3 | |
| T_J, T_{STG} | Operating Junction and Storage Temperature Range | - | -55 to 150 | $^\circ\text{C}$ | |

■ Thermal Resistance Ratings

| Symbol | Parameter | Maximum | Units |
|-----------------|--------------------------------------|---------|--------------------|
| $R_{\theta JC}$ | Maximum Junction-to-Case (Note 1) | 40 | $^\circ\text{C/W}$ |
| $R_{\theta JA}$ | Maximum Junction-to-Ambient (Note 1) | 60 | $^\circ\text{C/W}$ |

Note 1: surface Mounted on 1"x 1" FR4 Board.

Note 2: Pulse width limited by maximum junction temperature

■ Specifications ($T_A=25^\circ\text{C}$ unless otherwise noted)

| Symbol | Parameter | Test Conditions | Limits | | | | Unit |
|---------------|-------------------------------------|--------------------------------|--------|------|------|-----------|------------|
| | | | Ch | Min. | Typ. | Max. | |
| Static | | | | | | | |
| $V_{(BR)DSS}$ | Drain-Source breakdown Voltage | $V_{GS}=0V, I_D=250\mu A$ | N | 30 | - | - | V |
| | | $V_{GS}=0V, I_D=-250\mu A$ | P | -30 | - | - | |
| $V_{GS(th)}$ | Gate-Threshold Voltage | $V_{DS}=V_{GS}, I_D=250\mu A$ | N | 1 | 1.95 | 3 | V |
| | | $V_{DS}=V_{GS}, I_D=-250\mu A$ | P | -1.0 | -1.6 | -3 | |
| I_{GSS} | Gate-Body Leakage | $V_{GS}=20V, V_{DS}=0V$ | N | - | - | ± 100 | nA |
| | | $V_{GS}=-20V, V_{DS}=0V$ | P | - | - | ± 100 | |
| I_{DSS} | Zero Gate Voltage Drain Current | $V_{DS}=24V, V_{GS}=0V$ | N | - | - | 1 | μA |
| | | $V_{DS}=-24V, V_{GS}=0V$ | P | - | - | -1 | |
| $I_{D(on)}$ | On-State Drain Current (Note 3) | $V_{DS}=5V, V_{GS}=10V$ | N | 20 | - | - | A |
| | | $V_{DS}=-5V, V_{GS}=-10V$ | P | -50 | - | - | |
| $r_{DS(on)}$ | Drain-Source On-Resistance (Note 3) | $V_{GS}=10V, I_D=10A$ | N | - | 11 | 13.5 | m Ω |
| | | $V_{GS}=4.5V, I_D=8.4A$ | | - | 15 | 20 | |
| | | $V_{GS}=-10V, I_D=-8.5A$ | P | - | 16 | 19 | |
| | | $V_{GS}=-4.5V, I_D=-6.8A$ | | - | 26 | 30 | |
| g_{fs} | Forward Transconductance (Note 3) | $V_{DS}=15V, I_D=10A$ | N | - | 40 | - | S |
| | | $V_{DS}=-15V, I_D=-9.5A$ | P | - | 31 | - | |



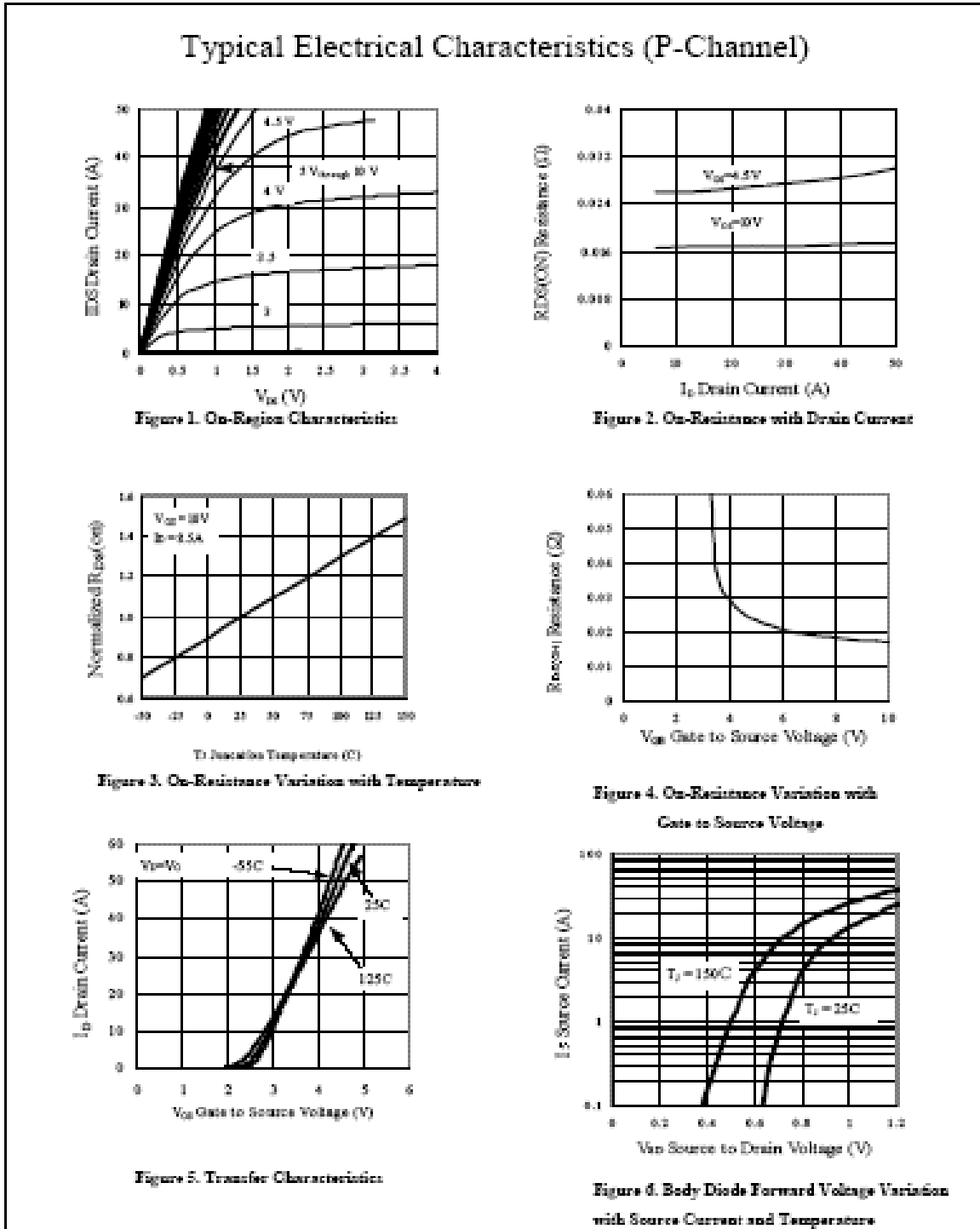
P & N-Channel 30-V (D-S) MOSFET

■ Specifications (T_A=25°C unless otherwise noted)

| Symbol | Parameter | Test Conditions | Limits | | | | Unit |
|---------------------|---------------------|--|--------|------|------|------|------|
| | | | Ch | Min. | Typ. | Max. | |
| Dynamic | | | | | | | |
| Q _g | Total Gate Charge | N-Channel V _{DS} =15V, V _{GS} =4.5V | N | - | 12 | 19 | nC |
| | | | P | - | 13 | 26 | |
| Q _{gs} | Gate-Source Charge | I _D =10A P-Channel | N | - | 3.3 | - | |
| | | | P | - | 5.8 | - | |
| Q _{gd} | Gate-Drain Charge | V _{DS} =-15V, V _{GS} =-4.5V I _D =-10A | N | - | 4.5 | - | |
| | | | P | - | 12 | - | |
| Switching | | | | | | | |
| t _{d(on)} | Turn-On Delay Time | N-Channel V _{DD} =15, V _{GS} =10V I _D =1A, R _{GEN} =25Ω | N | - | 20 | 30 | nS |
| | | | P | - | 15 | 26 | |
| t _r | Rise Time | P-Channel V _{DD} =-15, V _{GS} =-10V I _D =-1A, R _{GEN} =15Ω | N | - | 9 | 20 | |
| | | | P | - | 16 | 21 | |
| t _{d(off)} | Turn-Off Delay Time | | N | - | 70 | 102 | |
| | | | P | - | 62 | 108 | |
| t _f | Fall-Time | | N | - | 20 | 81 | |
| | | | P | - | 46 | 71 | |

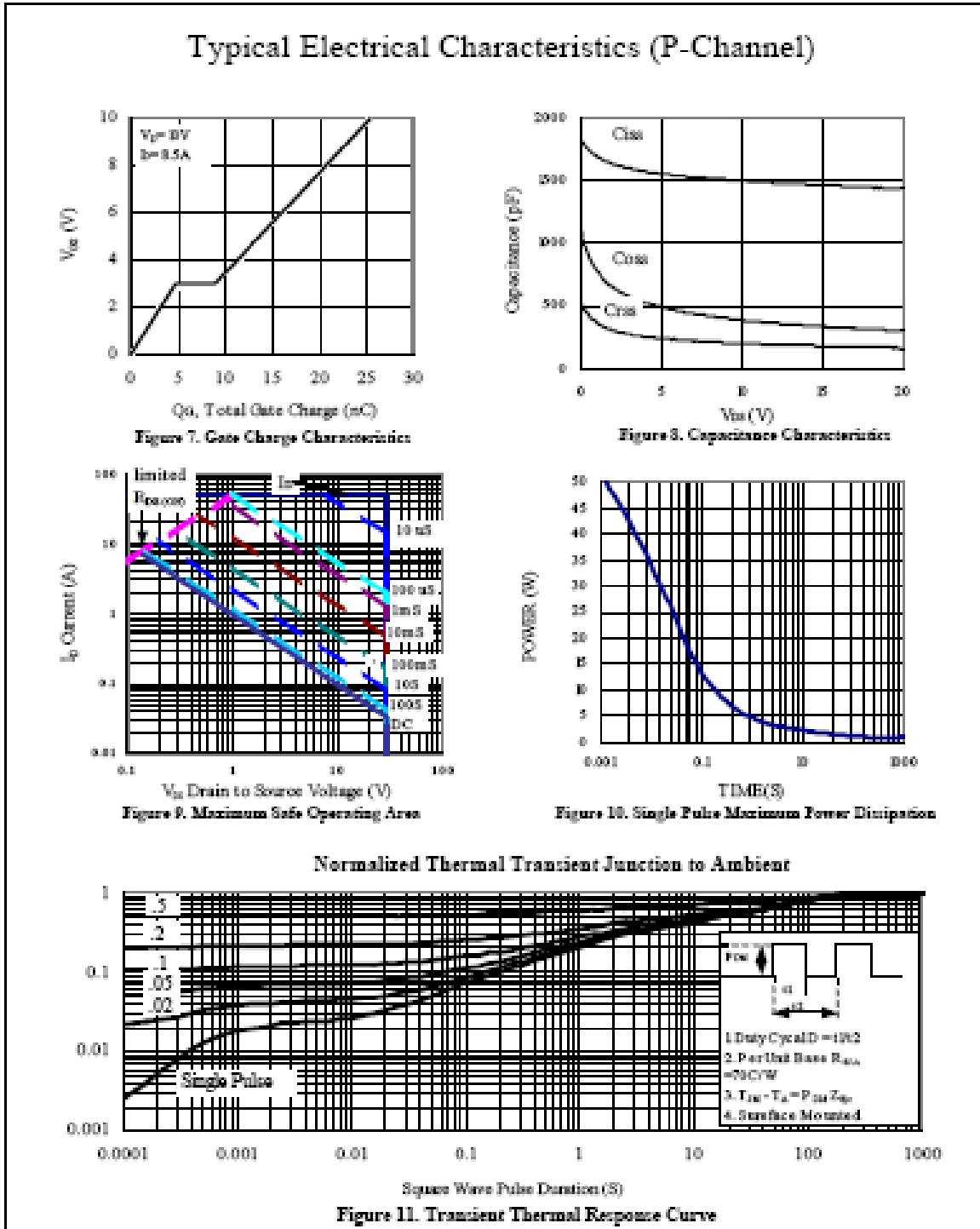
Note 3: Pulse test: PW ≤ 300us duty cycle ≤ 2%.

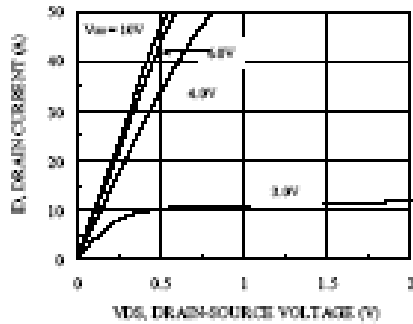
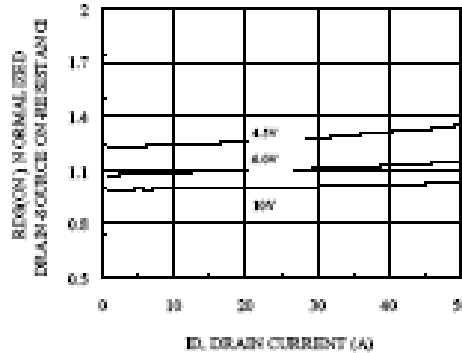
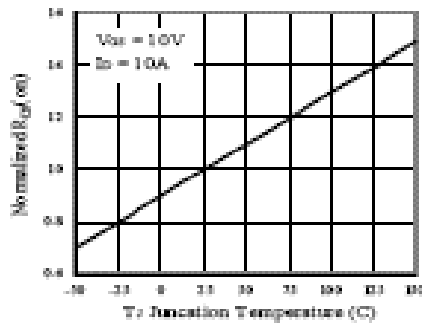
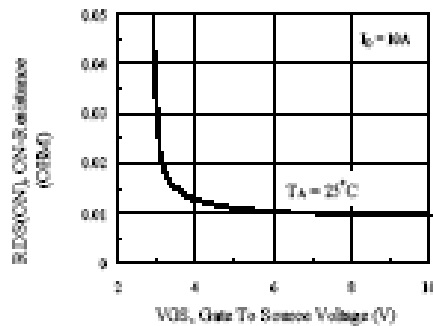
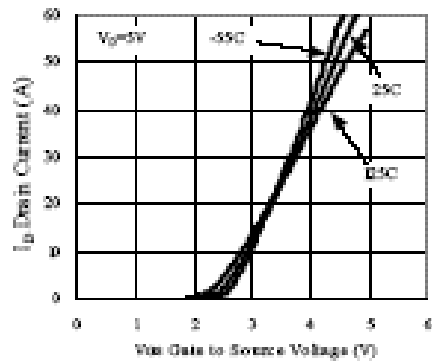
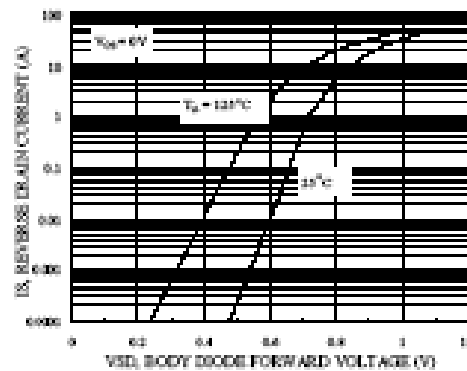
Note 4: Guaranteed by design, not subject to production testing.

P & N-Channel 30-V (D-S) MOSFET
■ Typical Performance Characteristics


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

■ Typical Performance Characteristics (Continued)



P & N-Channel 30-V (D-S) MOSFET
■ Typical Performance Characteristics (Continued)
Typical Electrical Characteristics (N-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

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

■ Typical Performance Characteristics (Continued)

Typical Electrical Characteristics (N-Channel)

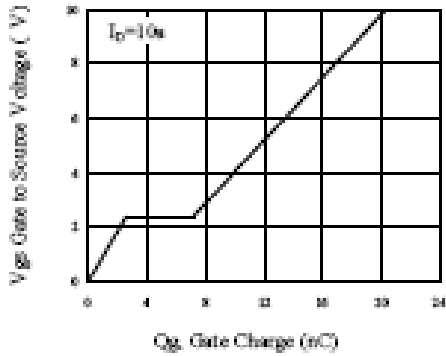


Figure 7. Gate Charge Characteristics

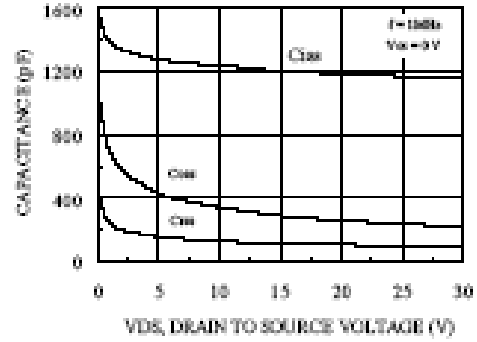


Figure 8. Capacitance Characteristics

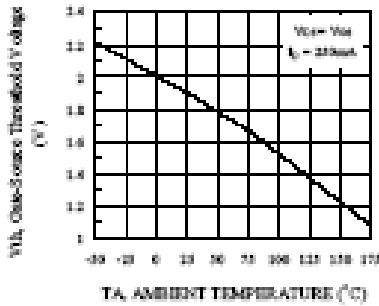


Figure 9. Threshold V_t vs Ambient Temperature

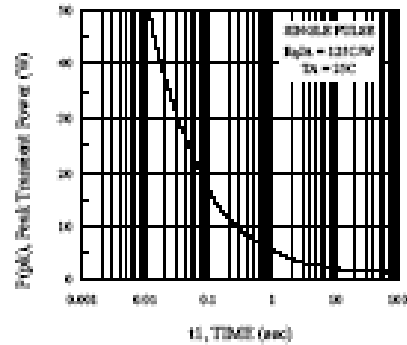


Figure 10. Single Pulse Maximum Power Dissipation

Normalized Thermal Transient Junction to Ambient

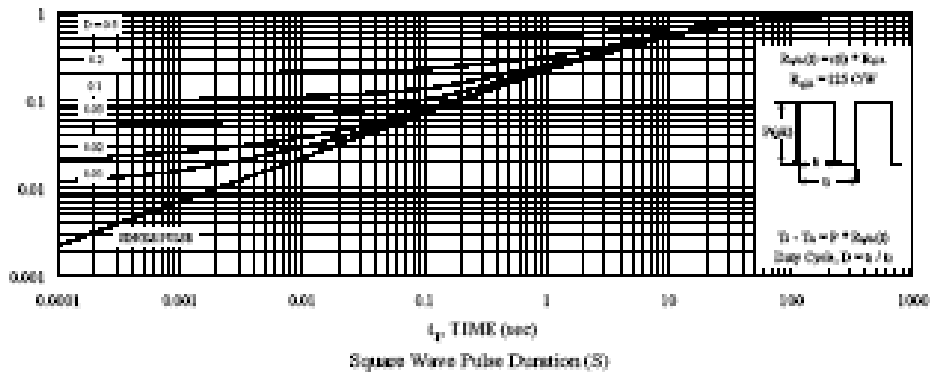
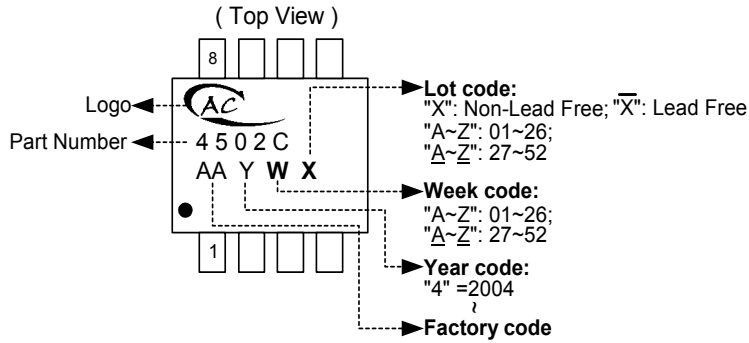


Figure 11. Transient Thermal Response Curve

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

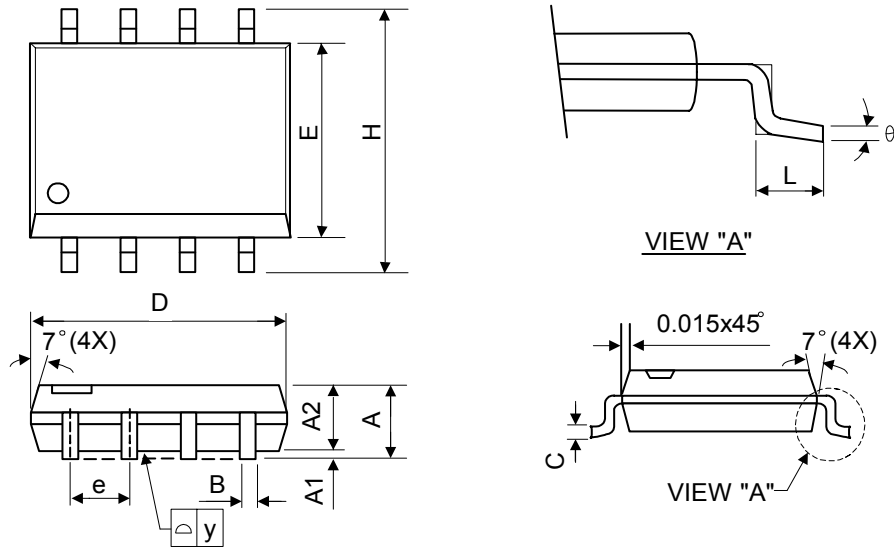
■ Marking Information

SOP-8L



■ Package Information

Package Type: SOP-8L



| Symbol | Dimensions In Millimeters | | | Dimensions In Inches | | |
|--------|---------------------------|------|------|----------------------|-------|-------|
| | Min. | Nom. | Max. | Min. | Nom. | Max. |
| A | 1.40 | 1.60 | 1.75 | 0.055 | 0.063 | 0.069 |
| A1 | 0.10 | - | 0.25 | 0.040 | - | 0.100 |
| A2 | 1.30 | 1.45 | 1.50 | 0.051 | 0.057 | 0.059 |
| B | 0.33 | 0.41 | 0.51 | 0.013 | 0.016 | 0.020 |
| C | 0.19 | 0.20 | 0.25 | 0.0075 | 0.008 | 0.010 |
| D | 4.80 | 5.05 | 5.30 | 0.189 | 0.199 | 0.209 |
| E | 3.70 | 3.90 | 4.10 | 0.146 | 0.154 | 0.161 |
| e | - | 1.27 | - | - | 0.050 | - |
| H | 5.79 | 5.99 | 6.20 | 0.228 | 0.236 | 0.244 |
| L | 0.38 | 0.71 | 1.27 | 0.015 | 0.028 | 0.050 |
| y | - | - | 0.10 | - | - | 0.004 |
| θ | 0° | - | 8° | 0° | - | 8° |