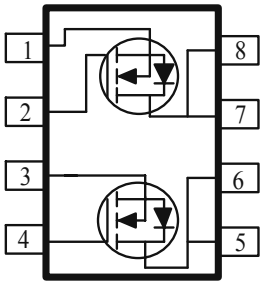
# SL9945

## 60V N+N-Channel Enhancement Mode 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(Ω) | $I_D$ (A) |
| 60 | 89 @ $V_{GS}$ = 10V | ±3.6 |
| | 104 @ $V_{GS}$ = 4.5V | ±3.4 |

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




| ABSOLUTE MAXIMUM RATINGS ($T_A$ = 25 °C UNLESS OTHERWISE NOTED) | | | | |
|---|---|---|---|---|
| **Parameter** | | **Symbol** | **Limit** | **Units** |
| Drain-Source Voltage | | $V_{DS}$ | 60 | V |
| Gate-Source Voltage | | $V_{GS}$ | ±20 | |
| Continuous Drain Current[a] | $T_A$=25°C | $I_D$ | ±3.6 | A |
| | $T_A$=70°C | | ±3.1 | |
| Pulsed Drain Current[b] | | $I_{DM}$ | ±25 | |
| Continuous Source Current (Diode Conduction)[a] | | $I_S$ | 2 | A |
| Power Dissipation[a] | $T_A$=25°C | $P_D$ | 2.1 | W |
| | $T_A$=70°C | | 1.3 | |
| 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 <= 10 sec | $R_{\theta JA}$ | 62.5 | °C/W |
| | t <= 5 sec | | 110 | °C/W |

Notes

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

b. Pulse width limited by maximum junction temperature

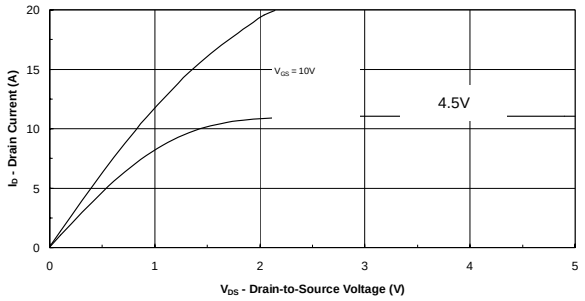
| SPECIFICATIONS ($T_A$ = 25°C UNLESS OTHERWISE NOTED) | | | | | | |
|---|---|---|---|---|---|---|
| **Parameter** | **Symbol** | **Test Conditions** | **Limits** | | | **Unit** |
| | | | **Min** | **Typ** | **Max** | |
| **Static** | | | | | | |
| Gate-Threshold Voltage | $V_{GS(th)}$ | $V_{DS}$ = $V_{GS}$, $I_D$ = 250 uA | 1 | | | |
| Gate-Body Leakage | $I_{GSS}$ | $V_{DS}$ = 0 V, $V_{GS}$ = 20 V | | | ±100 | nA |
| Zero Gate Voltage Drain Current | $I_{DSS}$ | $V_{DS}$ = 60 V, $V_{GS}$ = 0 V | | | 1 | uA |
| | | $V_{DS}$ = 60 V, $V_{GS}$ = 0 V, $T_J$ = 55°C | | | 10 | |
| On-State Drain Current[A] | $I_{D(on)}$ | $V_{DS}$ = 5 V, $V_{GS}$ = 10 V | 20 | | | A |
| Drain-Source On-Resistance[A] | $r_{DS(on)}$ | $V_{GS}$ = 10 V, $I_D$ = 3.6 A | | | 89 | mΩ |
| | | $V_{GS}$ = 4.5 V, $I_D$ = 3.4 A | | | 104 | |
| Forward Tranconductance[A] | $g_{fs}$ | $V_{DS}$ = 15 V, $I_D$ = 3.6 A | | 11 | | S |
| Diode Forward Voltage | $V_{SD}$ | $I_S$ = 2.0 A, $V_{GS}$ = 0 V | | 1.1 | | V |
| Pulsed Source Current (Body Diode)[A] | $I_{SM}$ | | | 3.5 | | A |
| **Dynamic**[b] | | | | | | |
| Total Gate Charge | $Q_g$ | $V_{DS}$ = 30 V, $V_{GS}$ = 4.5 V, $I_D$ = 3.6 A | | 3.6 | | nC |
| Gate-Source Charge | $Q_{gs}$ | | | 1.8 | | |
| Gate-Drain Charge | $Q_{gd}$ | | | 1.3 | | |
| **Switching** | | | | | | |
| Turn-On Delay Time | $t_{d(on)}$ | $V_{DD}$ = 30 V, $R_L$ = 30 Ω , $I_D$ = 1 A, $V_{GEN}$ = 10 V | | 9 | | nS |
| Rise Time | $t_r$ | | | 10 | | |
| Turn-Off Delay Time | $t_{d(off)}$ | | | 21 | | |
| Fall-Time | $t_f$ | | | 8 | | |

Notes

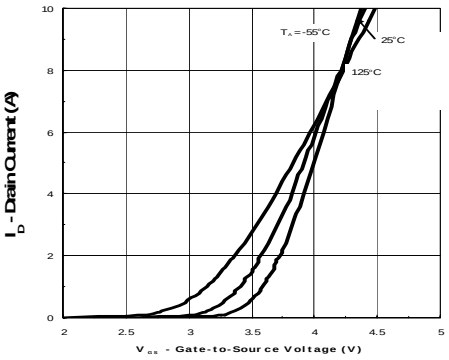
a. Pulse test: PW <= 300us duty cycle <= 2%.

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

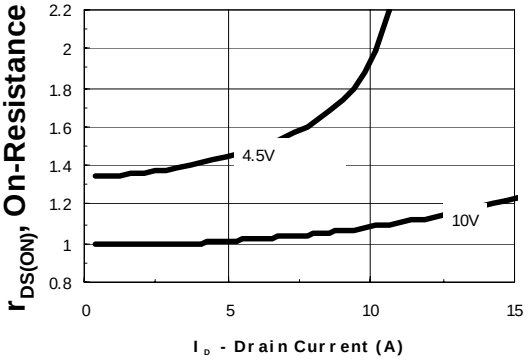
# Typical Electrical Characteristics



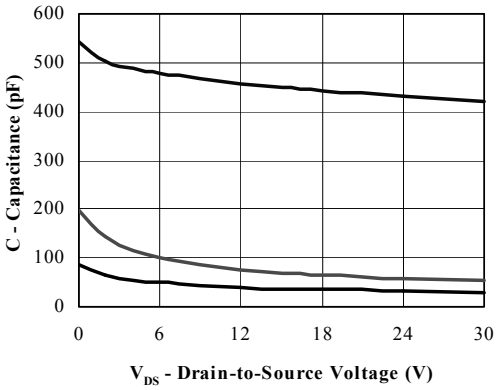

Output Characteristics



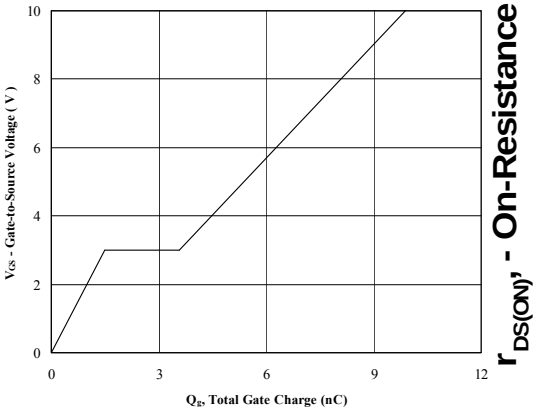

Transfer Characteristics



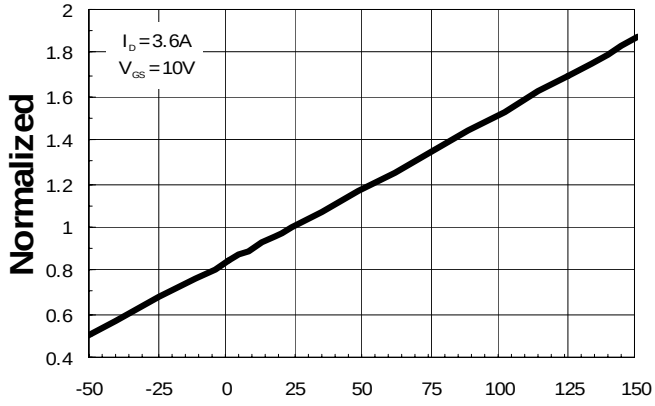

On-Resistance vs. Drain Current




Capacitance

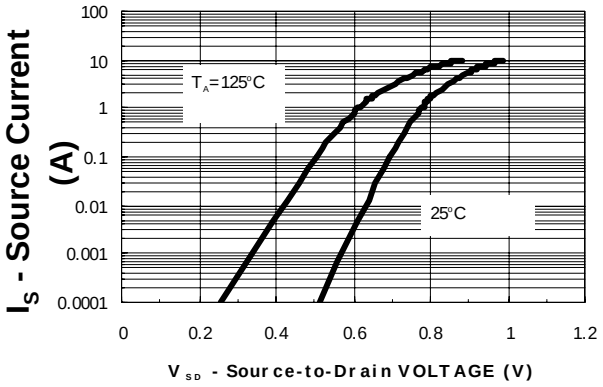



Gate Charge

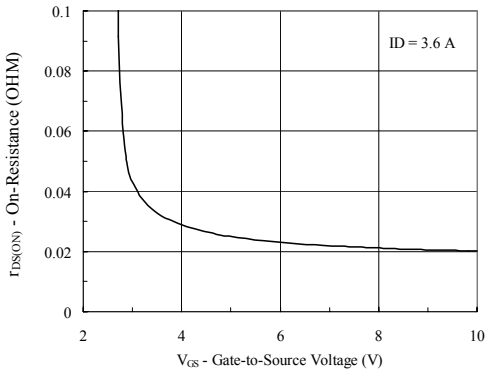



On-Resistance vs. Junction Temperature

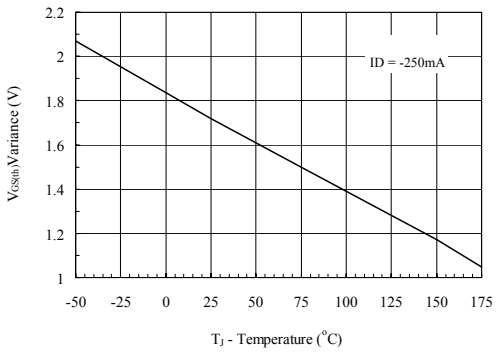
# Typical Electrical Characteristics



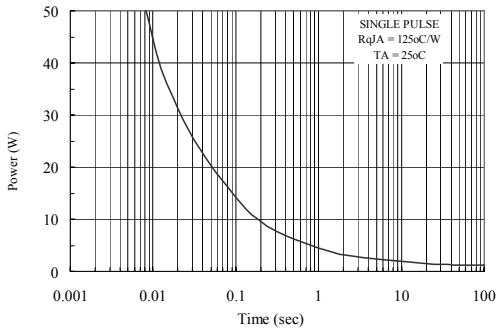

**Source-Drain Diode Forward Voltage**



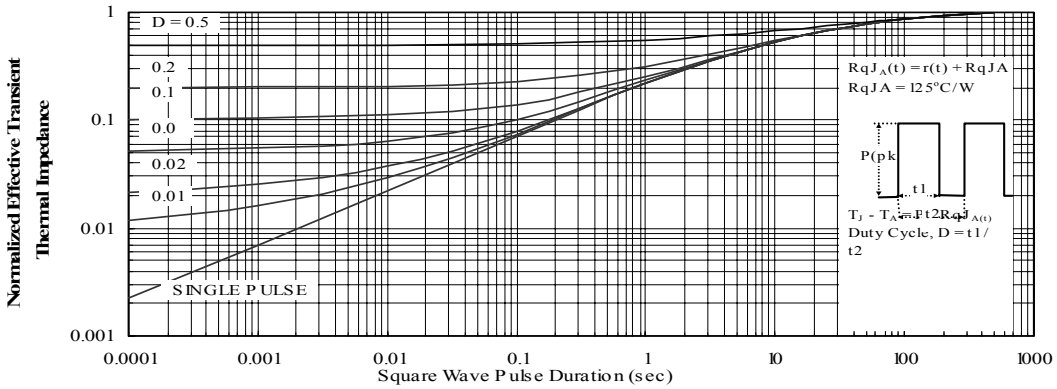

**On-Resistance vs. Gate-to-Source Voltage**




**Threshold Voltage**

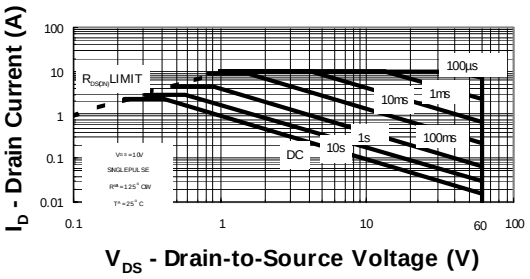



**Single Pulse Power**




**Normalized Thermal Transient Impedance, Junction-to-Ambient**

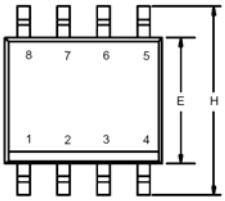
# Typical Electrical Characteristics

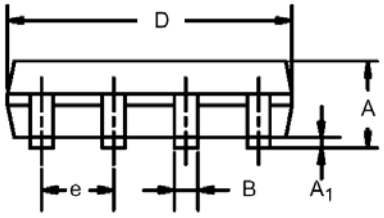



**Maximum Safe Operating Area**

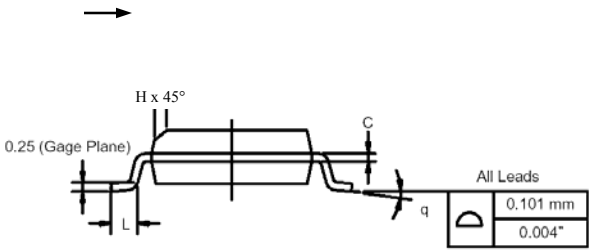
# Package Information

## SO-8: 8LEAD




| Dim | MILLIMETERS | | INCHES | |
|---|---|---|---|---|
| | Min | Max | Min | Max |
| A | 1.35 | 1.75 | 0.053 | 0.069 |
| $A_1$ | 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° |



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