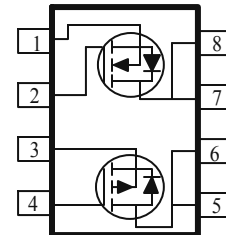


P & N-Channel 40-V (D-S) MOSFET

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(Ω) | I_D (A) |
| 40 | 27 @ $V_{GS} = 4.5V$ | 7.3 |
| | 22 @ $V_{GS} = 10V$ | 8.3 |
| -40 | 40 @ $V_{GS} = -4.5V$ | -6.2 |
| | 30 @ $V_{GS} = -10V$ | -7.6 |

- 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 ($T_A = 25^\circ C$ UNLESS OTHERWISE NOTED) | | | | | |
|---|----------------|------------------|-----------|------------|---|
| Parameter | Symbol | N-Channel | P-Channel | Units | |
| Drain-Source Voltage | V_{DS} | 40 | -40 | V | |
| Gate-Source Voltage | V_{GS} | 20 | -20 | | |
| Continuous Drain Current ^a | I_D | $T_A=25^\circ C$ | 8.3 | -7.6 | A |
| | | $T_A=70^\circ C$ | 6.8 | -6.3 | |
| Pulsed Drain Current ^b | I_{DM} | ± 50 | ± 50 | | |
| Continuous Source Current (Diode Conduction) ^a | I_S | 2.3 | -2.1 | A | |
| Power Dissipation ^a | P_D | $T_A=25^\circ C$ | 2.1 | 2.1 | W |
| | | $T_A=70^\circ C$ | 1.3 | 1.3 | |
| Operating Junction and Storage Temperature Range | T_J, T_{stg} | -55 to 150 | | $^\circ C$ | |

| THERMAL RESISTANCE RATINGS | | | |
|--|-----------------|---------|--------------|
| Parameter | Symbol | Maximum | Units |
| Maximum Junction-to-Ambient ^a | $t \leq 10$ sec | 62.5 | $^\circ C/W$ |
| | Steady-State | 110 | $^\circ C/W$ |

Notes

- a. Surface Mounted on 1" x 1" FR4 Board.
- b. Pulse width limited by maximum junction temperature

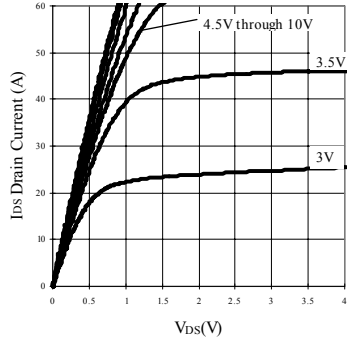
| SPECIFICATIONS (T _A = 25°C UNLESS OTHERWISE NOTED) | | | | | | | | |
|---|---------------------|--|--------|------|------|------|------|----|
| Parameter | Symbol | Test Conditions | Limits | | | | Unit | |
| | | | Ch | Min | Typ | Max | | |
| Static | | | | | | | | |
| Gate-Threshold Voltage | V _{GS(th)} | V _{GS} = V _{DS} , I _D = 250 uA | N | 1 | 1.5 | 3 | V | |
| | | V _{GS} = V _{DS} , I _D = -250 uA | P | -1 | -1.4 | -3 | | |
| Gate-Body Leakage | I _{GSS} | V _{GS} = -20 V, V _{DS} = 0 V | P | | 7 | ±100 | nA | |
| | | V _{GS} = 20 V, V _{DS} = 0 V | N | | 6 | ±100 | | |
| Zero Gate Voltage Drain Current | I _{DSS} | V _{DS} = -32 V, V _{GS} = 0 V | P | | 12nA | -1 | uA | |
| | | V _{DS} = 32 V, V _{GS} = 0 V | N | | 2nA | 1 | | |
| On-State Drain Current ^A | I _{D(on)} | V _{DS} = 5 V, V _{GS} = 10 V | N | 25 | | | A | |
| | | V _{DS} = -5 V, V _{GS} = -10 V | P | -50 | | | | |
| Drain-Source On-Resistance ^A | r _{DS(on)} | V _{GS} = 10 V, I _D = 8.3 A | N | | 14 | 22 | mΩ | |
| | | V _{GS} = 4.5 V, I _D = 7.3 A | | | 17 | 27 | | |
| | | V _{GS} = -10 V, I _D = -7.6 A | P | | 28 | 30 | | |
| | | V _{GS} = -4.5 V, I _D = -6.2 A | | | 35 | 40 | | |
| Forward Transconductance ^A | g _{fs} | V _{DS} = 15 V, I _D = 8.3 A | N | | 40 | | S | |
| | | V _{DS} = -15 V, I _D = -7.6 A | P | | 31 | | | |
| Dynamic | | | | | | | | |
| Total Gate Charge | Q _g | N-Channel V _{DS} =15V, V _{GS} =4.5V, I _D =8.3A P-Channel V _{DS} =-15V, V _{GS} =-4.5V, I _D =-7.6A | N | | 13 | 30 | nC | |
| Gate-Source Charge | Q _{gs} | | P | | 14 | 30 | | |
| | | | N | | 3.3 | 7 | | |
| Gate-Drain Charge | Q _{gd} | | P | | 5.8 | 12 | | |
| | | | N | | 4.5 | 10 | | |
| Input Capacitance | C _{iss} | | P | | 1317 | 3000 | | |
| | | N | | 1583 | 4000 | | | |
| Output Capacitance | C _{oss} | N | | 272 | 600 | pF | | |
| | | P | | 278 | 600 | | | |
| Reverse Transfer Capacitance | C _{rss} | N | | 169 | 400 | | | |
| | | P | | 183 | 400 | | | |
| Turn-On Delay Time | t _{d(on)} | N-Chaneel V _{DD} =15V, V _{GS} =10V, I _D =1A , R _{GEN} =25Ω, P-Channel V _{DD} =-15V, V _{GS} =-10V, I _D =-1A R _{GEN} =15Ω | N | | 20 | | 40 | nS |
| Rise Time | t _r | | P | | 15 | | 30 | |
| | | | N | | 9 | 20 | | |
| Turn-Off Delay Time | t _{d(off)} | | P | | 16 | 40 | | |
| | | | N | | 70 | 200 | | |
| Fall-Time | t _f | | P | | 62 | 200 | | |
| | | | N | | 20 | 40 | | |
| | | | P | | 46 | 100 | | |

Notes

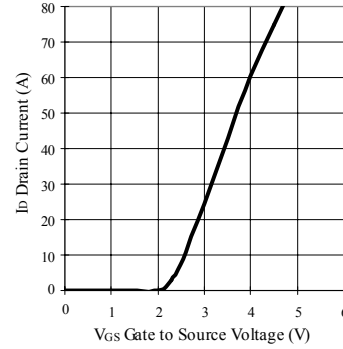
- a. Pulse test: PW ≤ 300us duty cycle ≤ 2%.
- b. Guaranteed by design, not subject to production testing.

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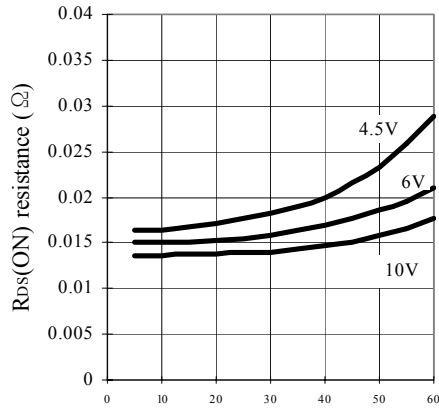
Typical Electrical Characteristics (N-Channel)



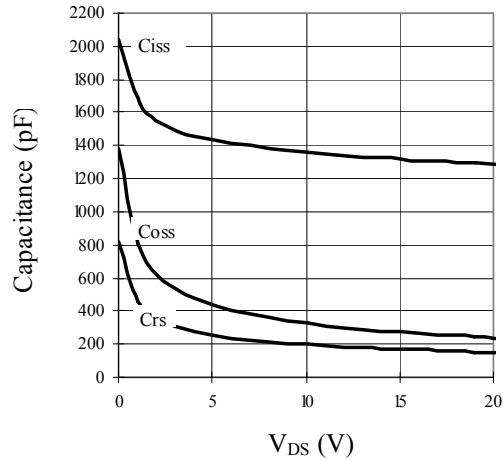
Output Characteristics



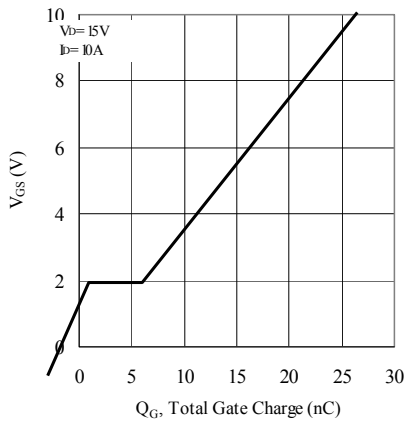
Transfer Characteristics



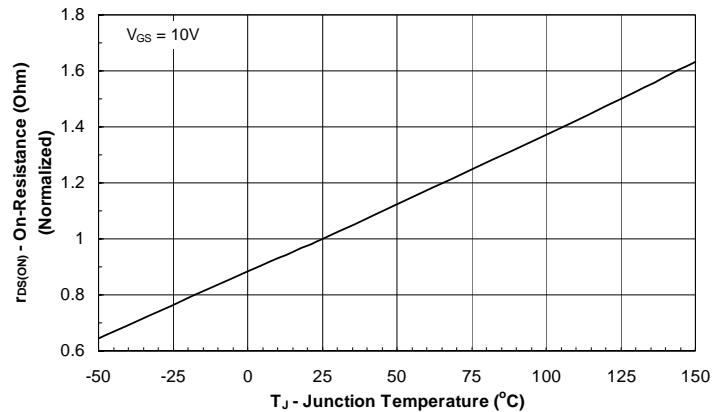
On Resistance vs. Drain Current



Capacitance

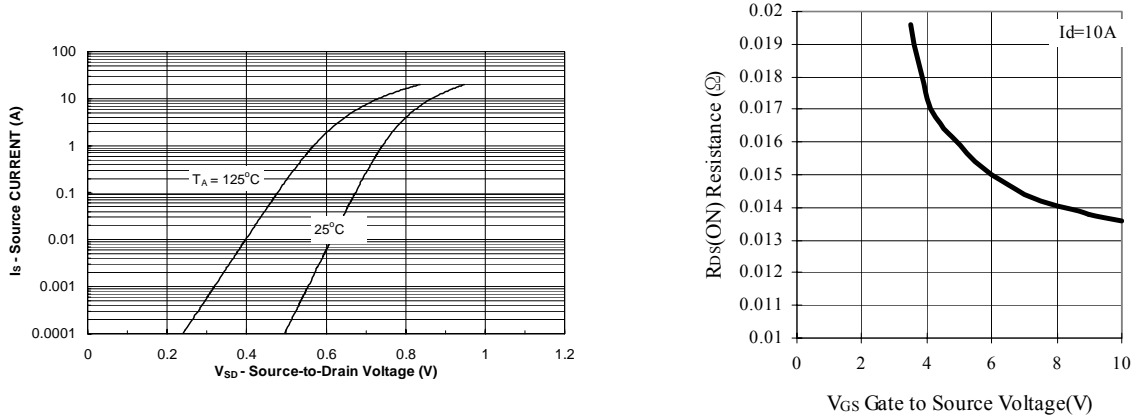


Gate Charge

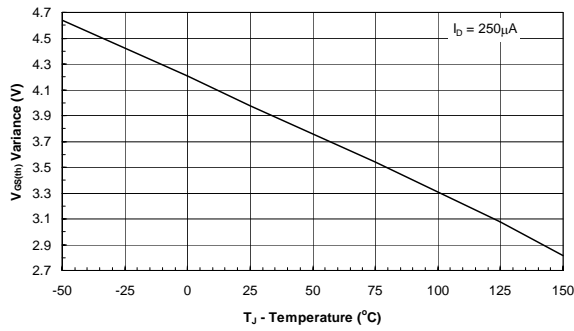


On-Resistance vs. Junction Temperature

Typical Electrical Characteristics (N-Channel)



Source-Drain Diode Forward Voltage



Threshold Voltage

On-Resistance vs. Gate-to-Source Voltage

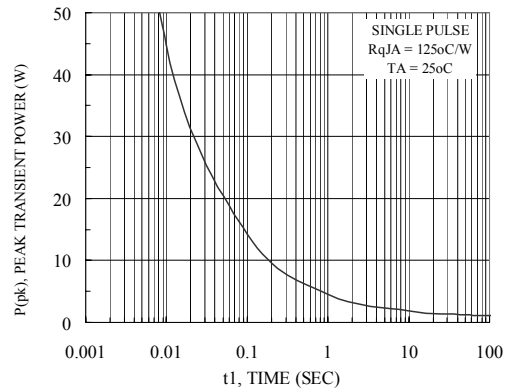


Figure 10. Single Pulse Maximum Power Dissipation

Normalized Thermal Transient Junction to Ambient

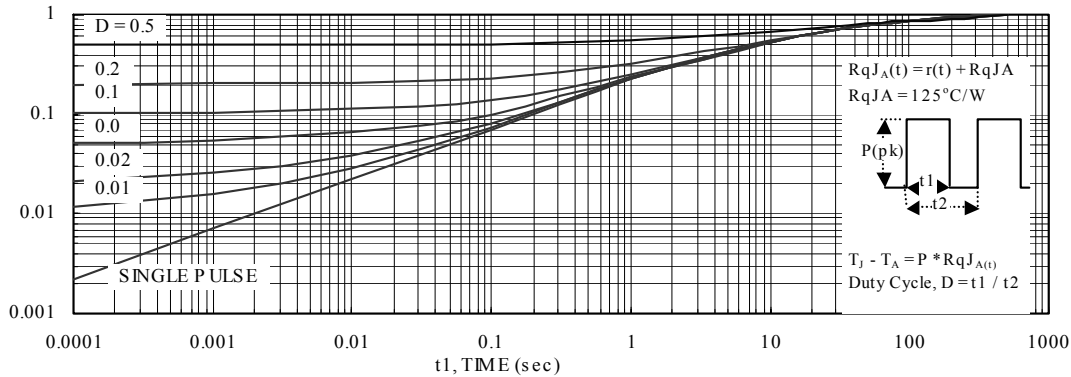
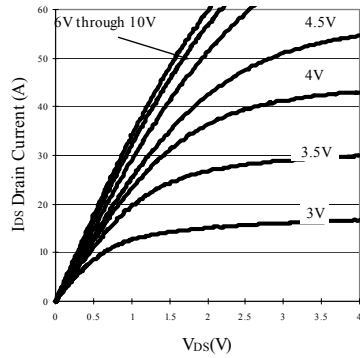
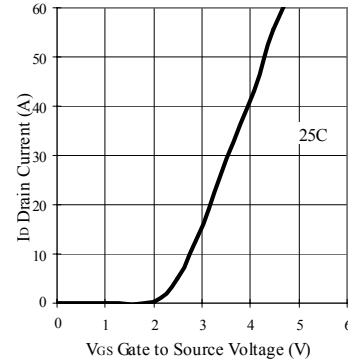


Figure 11. Transient Thermal Response Curve

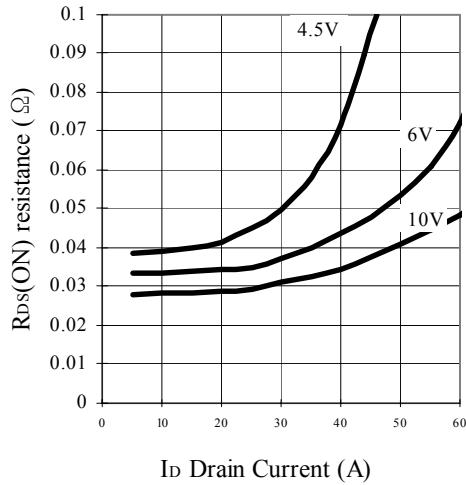
Typical Electrical Characteristics (P-Channel)



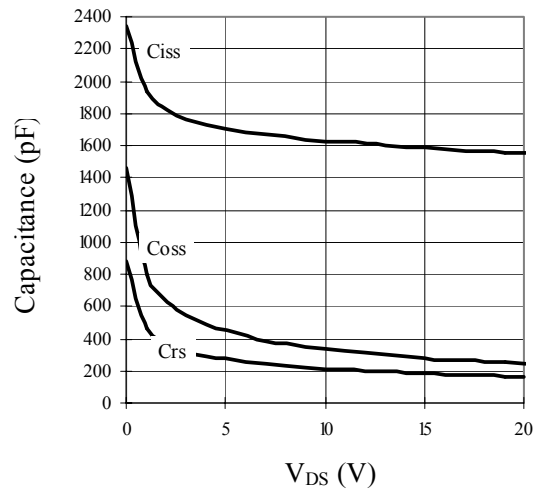
Output Characteristics



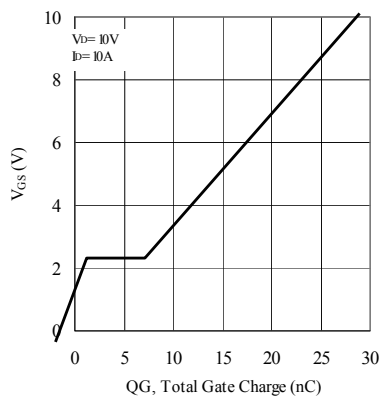
Transfer Characteristics



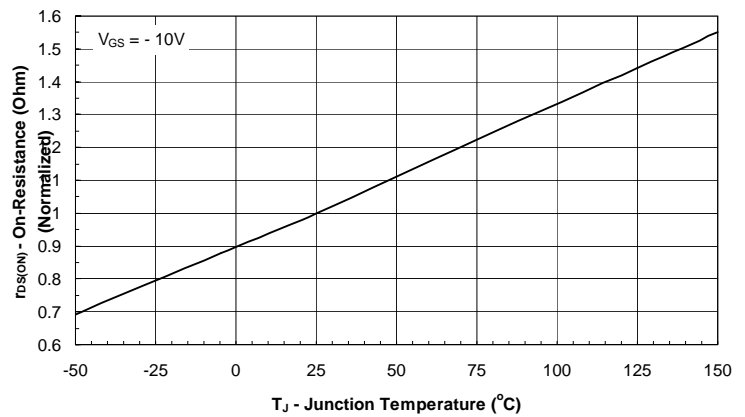
On Resistance Vs Vgs Voltage



Capacitance

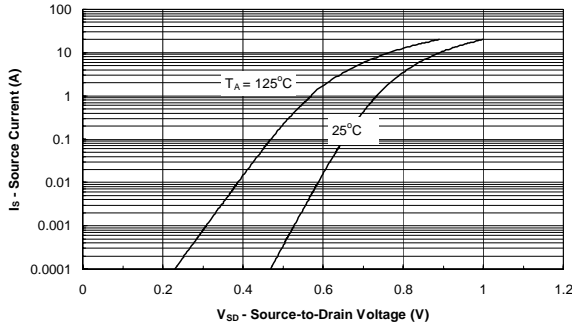


Gate Charge

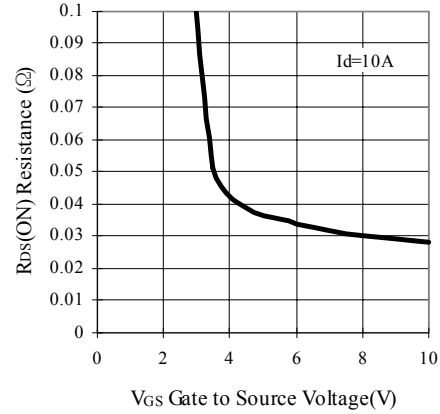


On-Resistance vs. Junction Temperature

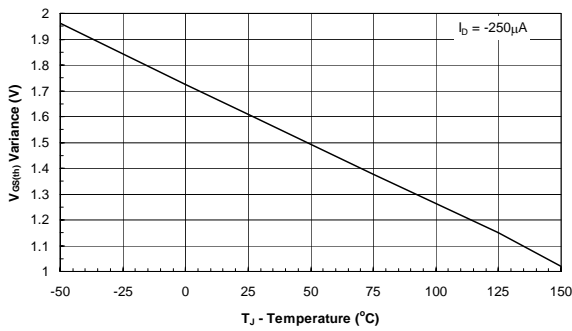
Typical Electrical Characteristics (P-Channel)



Source-Drain Diode Forward Voltage



On-Resistance with Gate to Source Voltage



Threshold Voltage

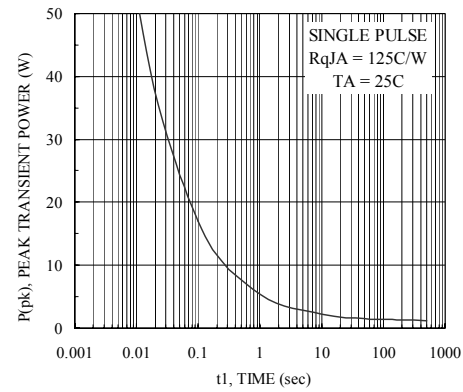


Figure 10. Single Pulse Maximum Power Dissipation

Normalized Thermal Transient Junction to Ambient

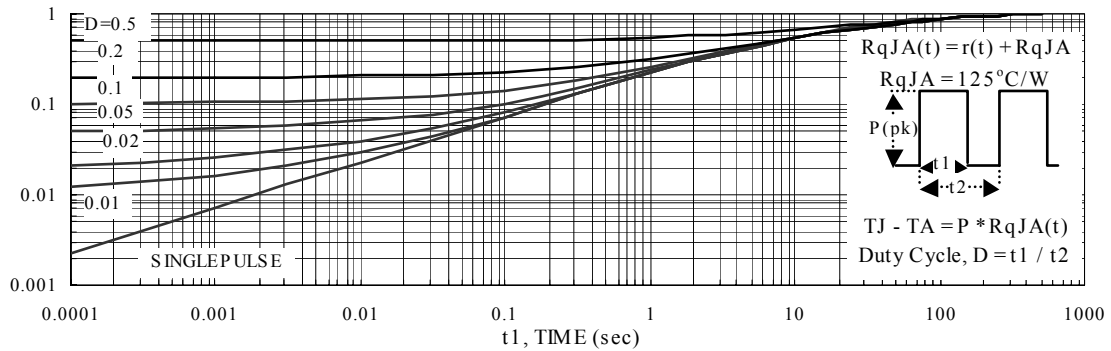
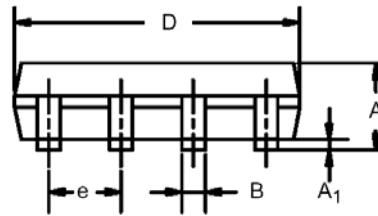
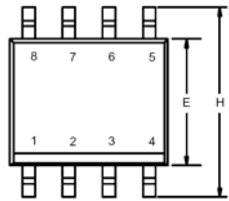


Figure 11. Transient Thermal Response Curve

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° |

