



YOUSHANG SEMICONDUCTOR

设计研发新型功率器件

各类小信号开关

中低压及高压大电流等场效应管

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企业微信二维码



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Product Summary

| BV _{DSS} | R _{DS(ON)} max | I _D max T _A = +25°C |
|-------------------|---------------------------------|--|
| -60V | 110mΩ @ V _{GS} = -10V | -4.5A |
| | 130mΩ @ V _{GS} = -4.5V | -4.2A |

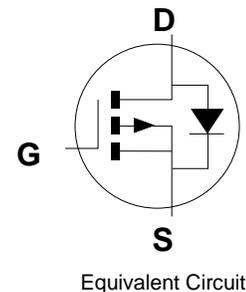
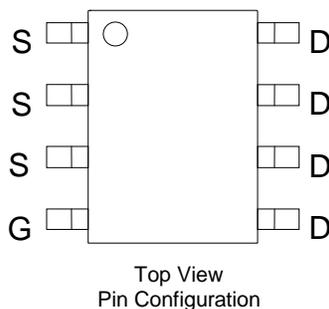
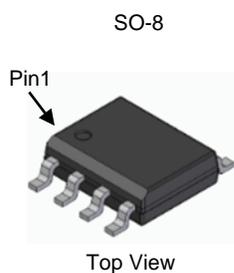
Features and Benefits

- 100% Unclamped Inductive Switch (UIS) Test in Production
- Low On-Resistance
- Low Gate Threshold Voltage
- Low Input Capacitance
- Fast Switching Speed
- Low Input/ Output Leakage

Description and Applications

This MOSFET is designed to meet the stringent requirements of automotive applications. It is qualified to AEC-Q101, supported by a PPAP and is ideal for use in:

- Backlighting
- Power-management functions
- DC-DC converters



Mechanical Data

- Package: SO-8
- Package Material: Molded Plastic, "Green" Molding Compound. UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminals Connections: See Diagram
- Terminals: Finish - Matte Tin Annealed over Copper Lead Frame. Solderable per MIL-STD-202, Method 208 Ⓔ
- Weight: 0.072g (Approximate)

Maximum Ratings (@T_A = +25°C, unless otherwise specified.)

| Characteristic | Symbol | Value | Unit |
|--|-----------------|--------------------------------|------|
| Drain-Source Voltage | V _{DS} | -60 | V |
| Gate-Source Voltage | V _{GS} | ±20 | V |
| Drain Current (Note 6) V _{GS} = -10V | I _D | T _A = +25°C -4.5 | A |
| t < 10s | | T _A = +70°C -3.6 | |
| Maximum Body Diode Forward Current (Note 6) | I _S | -2.1 | A |
| Pulsed Drain Current (10μs Pulse, Duty Cycle = 1%) | I _{DM} | -19 | A |
| Avalanche Current (Note 7) L = 0.1mH | I _{AS} | -17.6 | A |
| Avalanche Energy (Note 7) L = 0.1mH | E _{AS} | 15.4 | mJ |

Thermal Characteristics (@T_A = +25°C, unless otherwise specified.)

| Characteristic | Symbol | Value | Unit |
|--|-----------------------------------|--------------------|------|
| Total Power Dissipation (Note 5) | P _D | 1.5 | W |
| Thermal Resistance, Junction to Ambient (Note 5) | R _{θJA} | Steady State 80 | °C/W |
| | | t < 10s 48 | °C/W |
| Total Power Dissipation (Note 6) | P _D | 2.0 | W |
| Thermal Resistance, Junction to Ambient (Note 6) | R _{θJA} | Steady State 61 | °C/W |
| | | t < 10s 37 | °C/W |
| Thermal Resistance, Junction to Case | R _{θJC} | 6.4 | °C/W |
| Operating and Storage Temperature Range | T _J , T _{STG} | -55 to +150 | °C |

Electrical Characteristics (@T_A = +25°C, unless otherwise specified.)

| Characteristic | Symbol | Min | Typ | Max | Unit | Test Condition |
|---|---------------------|-----|-------|------|------|---|
| OFF CHARACTERISTICS (Note 8) | | | | | | |
| Drain-Source Breakdown Voltage | BV _{DS} | -60 | — | — | V | V _{GS} = 0V, I _D = -250μA |
| Zero Gate Voltage Drain Current | I _{DSS} | — | — | -1 | μA | V _{DS} = -48V, V _{GS} = 0V |
| Gate-Source Leakage | I _{GSS} | — | — | 100 | nA | V _{GS} = ±16V, V _{DS} = 0V |
| ON CHARACTERISTICS (Note 8) | | | | | | |
| Gate Threshold Voltage | V _{GS(TH)} | -1 | — | -3 | V | V _{DS} = V _{GS} , I _D = -250μA |
| Static Drain-Source On-Resistance | R _{DS(ON)} | — | 86 | 110 | mΩ | V _{GS} = -10V, I _D = -4.5A |
| | | — | 98 | 130 | | V _{GS} = -4.5V, I _D = -3.5A |
| Diode Forward Voltage | V _{SD} | — | -0.7 | -1.2 | V | V _{GS} = 0V, I _S = -1A |
| DYNAMIC CHARACTERISTICS (Note 9) | | | | | | |
| Input Capacitance | C _{iss} | — | 1030 | — | pF | V _{DS} = -30V, V _{GS} = 0V, f = 1.0MHz |
| Output Capacitance | C _{oss} | — | 49.1 | — | | |
| Reverse Transfer Capacitance | C _{rss} | — | 38.7 | — | | |
| Gate Resistance | R _G | — | 13.6 | — | Ω | V _{DS} = 0V, V _{GS} = 0V, f = 1.0MHz |
| Total Gate Charge (V _{GS} = -4.5V) | Q _g | — | 9.5 | — | nC | V _{DS} = -30V, I _D = -5A |
| Total Gate Charge (V _{GS} = -10V) | Q _g | — | 19.4 | — | | |
| Gate-Source Charge | Q _{gs} | — | 2.3 | — | | |
| Gate-Drain Charge | Q _{gd} | — | 3.6 | — | | |
| Turn-On Delay Time | t _{D(ON)} | — | 3.7 | — | ns | V _{GS} = -10V, V _{DS} = -30V, R _{GEN} = 6Ω, I _D = -5A |
| Turn-On Rise Time | t _R | — | 6.3 | — | | |
| Turn-Off Delay Time | t _{D(OFF)} | — | 58.7 | — | | |
| Turn-Off Fall Time | t _F | — | 26.1 | — | | |
| Body Diode Reverse Recovery Time | t _{RR} | — | 14.85 | — | ns | I _S = -5A, dI/dt = 100A/μs |
| Body Diode Reverse Recovery Charge | Q _{RR} | — | 8.8 | — | nC | I _S = -5A, dI/dt = 100A/μs |

- Notes:
- Device mounted on FR-4 substrate PC board, 2oz copper, with minimum recommended pad layout.
 - Device mounted on FR-4 substrate PC board, 2oz copper, with 1inch square copper plate.
 - UIS in production with L = 0.1mH, starting T_A = +25°C.
 - Short duration pulse test used to minimize self-heating effect.
 - Guaranteed by design. Not subject to product testing.

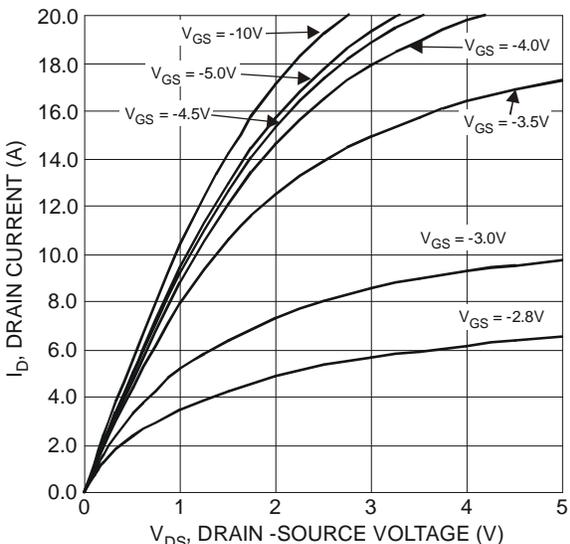


Figure 1 Typical Output Characteristics

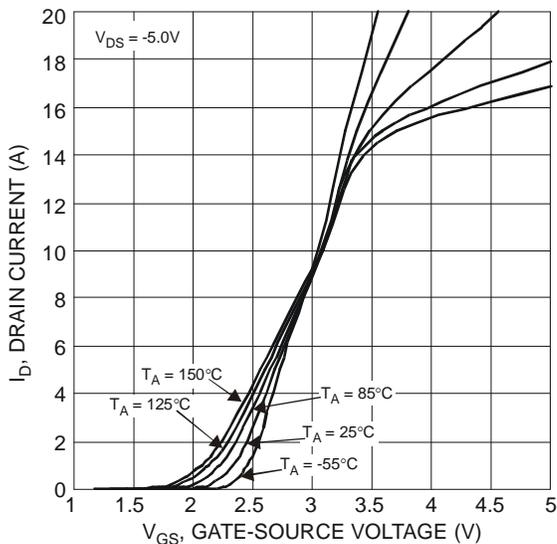


Figure 2 Typical Transfer Characteristics

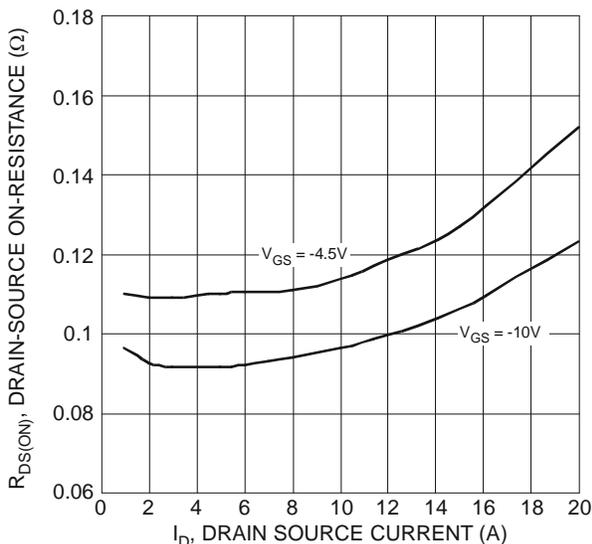


Figure 3 Typical On-Resistance vs. Drain Current and Gate Voltage

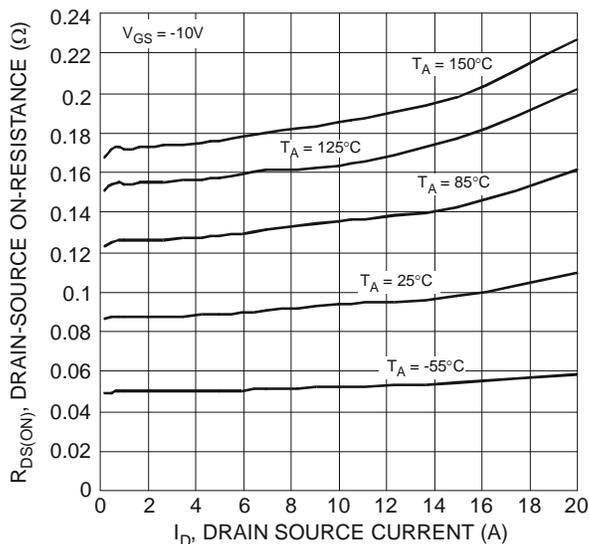


Figure 4 Typical On-Resistance vs. Drain Current and Temperature

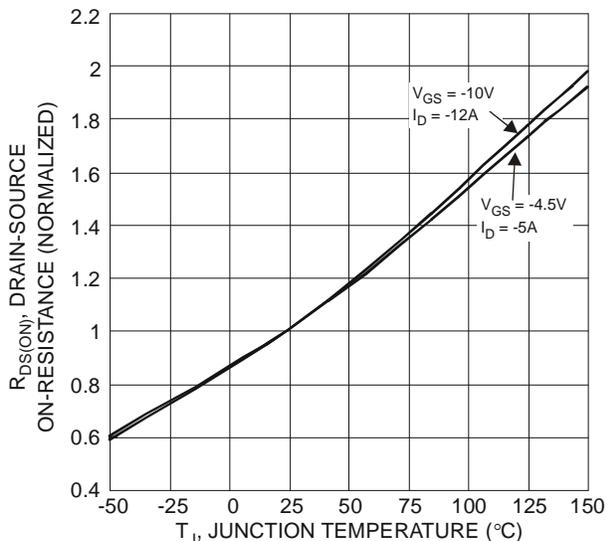


Figure 5 On-Resistance Variation with Temperature

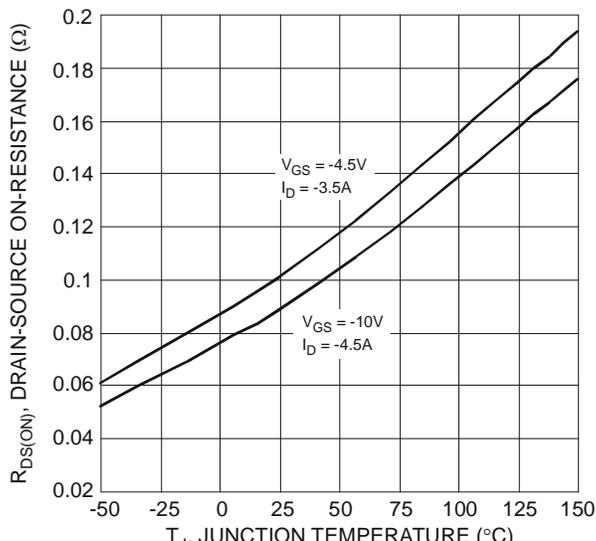


Figure 6 On-Resistance Variation with Temperature

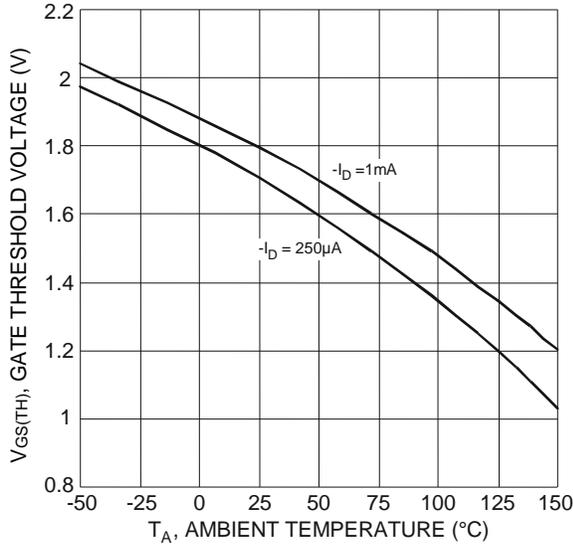


Figure 7 Gate Threshold Variation vs. Ambient Temperature

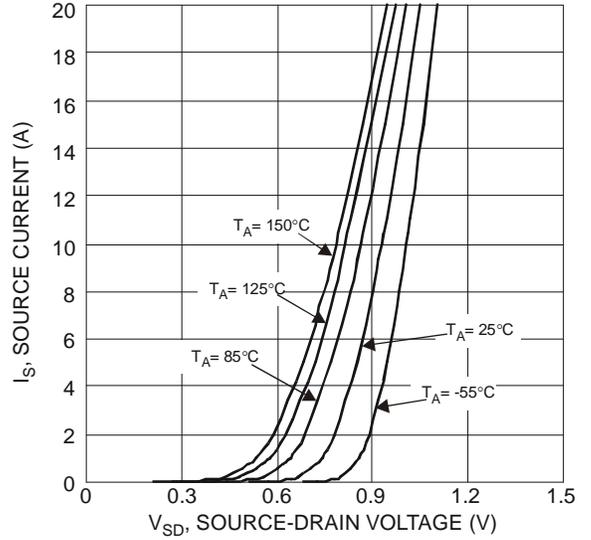


Figure 8 Diode Forward Voltage vs. Current

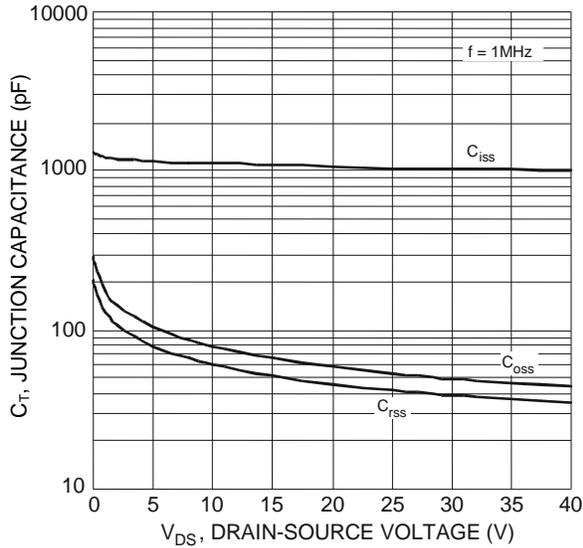


Figure 9 Typical Junction Capacitance

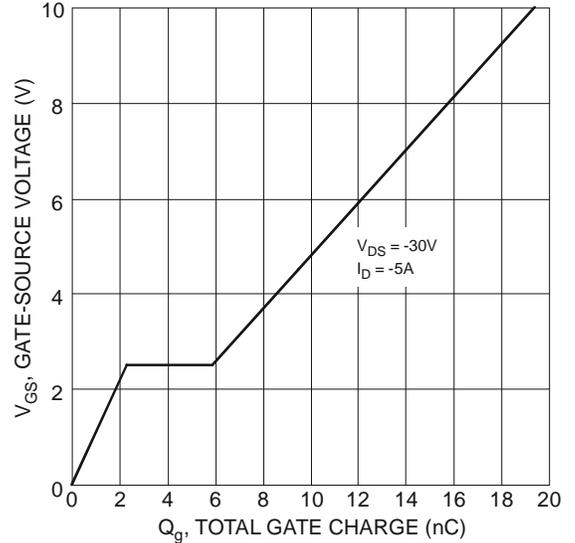


Figure 10 Gate-Charge Characteristics

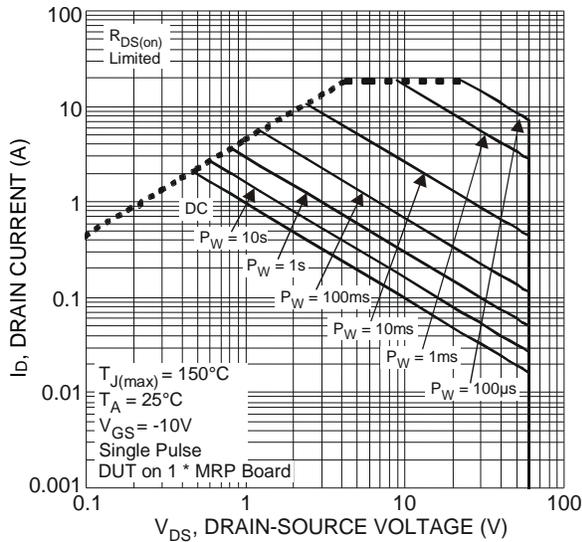
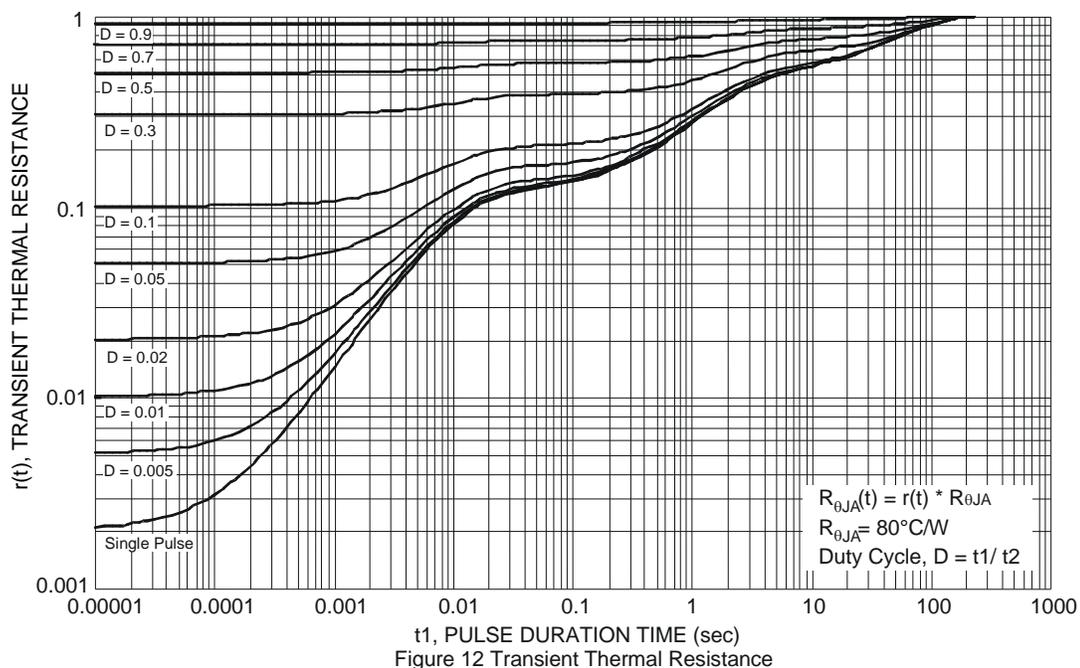
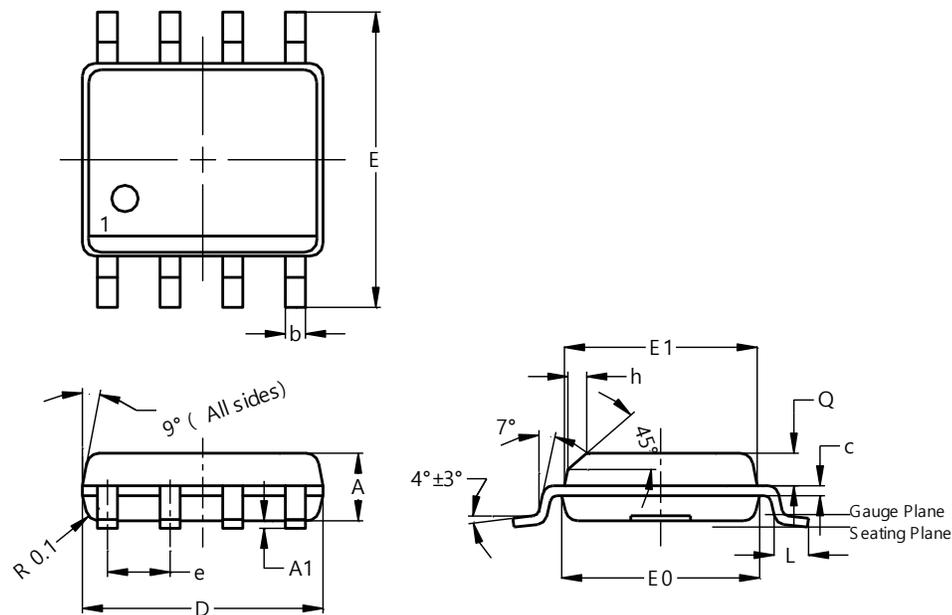


Figure 11 SOA, Safe Operation Area



Package Outline Dimensions

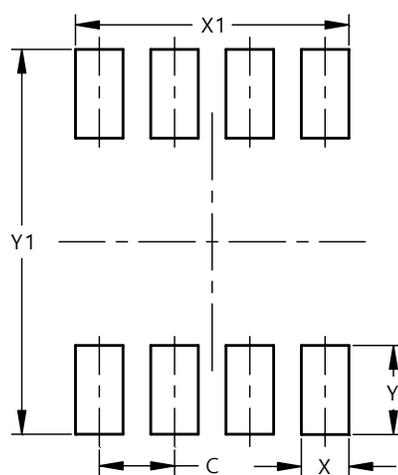
SO-8



| SO-8 | | | |
|----------------------|------|------|------|
| Dim | Min | Max | Typ |
| A | 1.40 | 1.50 | 1.45 |
| A1 | 0.10 | 0.20 | 0.15 |
| b | 0.30 | 0.50 | 0.40 |
| c | 0.15 | 0.25 | 0.20 |
| D | 4.85 | 4.95 | 4.90 |
| E | 5.90 | 6.10 | 6.00 |
| E1 | 3.80 | 3.90 | 3.85 |
| E0 | 3.85 | 3.95 | 3.90 |
| e | -- | -- | 1.27 |
| h | -- | -- | 0.35 |
| L | 0.62 | 0.82 | 0.72 |
| Q | 0.60 | 0.70 | 0.65 |
| All Dimensions in mm | | | |

Suggested Pad Layout

SO-8



| Dimensions | Value (in mm) |
|------------|---------------|
| C | 1.27 |
| X | 0.802 |
| X1 | 4.612 |
| Y | 1.505 |
| Y1 | 6.50 |