

Product Summary

| $V_{(BR)DSS}$ | $R_{DS(ON)}$ | I_D $T_A = 25^\circ\text{C}$ |
|---------------|-------------------------------|-----------------------------------|
| 50V | 1.8Ω @ $V_{GS} = 10\text{V}$ | 500mA |
| | 2.0Ω @ $V_{GS} = 4.5\text{V}$ | 450mA |

Features and Benefits

- Low On-Resistance
- Low Input Capacitance
- Fast Switching Speed
- Low Input/Output Leakage
- Lead Free By Design/RoHS Compliant (Note 1)
- "Green" Device (Note 2)
- Qualified to AEC-Q101 Standards for High Reliability

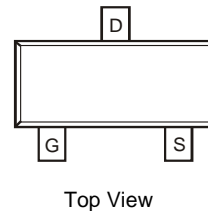
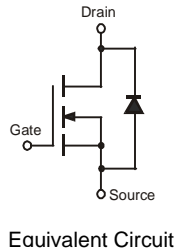
Description and Applications

This new generation MOSFET has been designed to minimize the on-state resistance ($R_{DS(on)}$) and yet maintain superior switching performance, making it ideal for high efficiency power management applications.

- Backlighting
- DC-DC Converters
- Power management functions

Mechanical Data

- Case: SOT23
- Case Material: Molded Plastic "Green" Molding Compound. UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminals: Matte Tin Finish annealed over Alloy 42 leadframe (Lead Free Plating). Solderable per MIL-STD-202, Method 208
- Terminal Connections: See Diagram
- Weight: 0.008 grams (approximate)

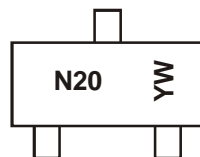


Ordering Information (Note 3)

| Part Number | Case | Packaging |
|-------------|-------|------------------|
| BSN20-7 | SOT23 | 3000/Tape & Reel |

- Notes:
1. No purposefully added lead.
 2. Diodes Inc.'s "Green" policy can be found on our website at <http://www.diodes.com>.
 3. For packaging details, go to our website at <http://www.diodes.com>

Marking Information



N20 = Product Type Marking Code
 YM = Date Code Marking
 Y = Year (ex: W = 2009)
 M = Month (ex: 9 = September)

Date Code Key

| Year | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 |
|------|------|------|------|------|------|------|------|
| Code | W | X | Y | Z | A | B | C |

| Month | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec |
|-------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| Code | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | O | N | D |

Maximum Ratings

| Characteristic | | | Symbol | Value | Units |
|--|-----------------|-----------------------------|-----------|----------|-------|
| Drain-Source Voltage | | | V_{DSS} | 50 | V |
| Gate-Source Voltage | | | V_{GSS} | ± 20 | V |
| Continuous Drain Current @ $T_{SP} = 25^{\circ}\text{C}$ (Note 4) | Steady State | $T_A = 25^{\circ}\text{C}$ | I_D | 500 | mA |
| | | $T_A = 100^{\circ}\text{C}$ | | 300 | |
| Pulsed Drain Current @ $T_{SP} = 25^{\circ}\text{C}$ (Notes 4 & 5) | | | I_{DM} | 1.2 | A |

Thermal Characteristics

| Characteristic | Symbol | Value | Units |
|---|------------------|-------------|-----------------------------|
| Power Dissipation, @ $T_A = 25^{\circ}\text{C}$ (Note 4) | P_D | 600 | mW |
| Thermal Resistance, Junction to Ambient @ $T_A = 25^{\circ}\text{C}$ (Note 4) | $R_{\theta JA}$ | 200 | $^{\circ}\text{C}/\text{W}$ |
| Power Dissipation, @ $T_{SP} = 25^{\circ}\text{C}$ (Note 4) | P_D | 920 | mW |
| Thermal Resistance, @ $T_{SP} = 25^{\circ}\text{C}$ (Note 4) | $R_{\theta JSP}$ | 136 | $^{\circ}\text{C}/\text{W}$ |
| Operating and Storage Temperature Range | T_J, T_{STG} | -55 to +150 | $^{\circ}\text{C}$ |

Electrical Characteristics @ $T_A = 25^{\circ}\text{C}$ unless otherwise specified

| Characteristic | Symbol | Min | Typ | Max | Unit | Test Condition |
|--|--------------|-----|------|-----------|---------------|---|
| OFF CHARACTERISTICS (Note 6) | | | | | | |
| Drain-Source Breakdown Voltage | BV_{DSS} | 50 | - | - | V | $V_{GS} = 0\text{V}, I_D = 250\mu\text{A}$ |
| Zero Gate Voltage Drain Current $T_J = 25^{\circ}\text{C}$ | I_{DSS} | - | - | 0.5 | μA | $V_{DS} = 50\text{V}, V_{GS} = 0\text{V}$ |
| Gate-Body Leakage | I_{GSS} | - | - | ± 100 | nA | $V_{GS} = \pm 20\text{V}, V_{DS} = 0\text{V}$ |
| ON CHARACTERISTICS (Note 6) | | | | | | |
| Gate Threshold Voltage | $V_{GS(th)}$ | 0.4 | 1.0 | 1.5 | V | $V_{DS} = V_{GS}, I_D = 250\mu\text{A}$ |
| Static Drain-Source On-Resistance | $R_{DS(on)}$ | - | 1.3 | 1.8 | Ω | $V_{GS} = 10\text{V}, I_D = 0.22\text{A}$ $V_{GS} = 4.5\text{V}, I_D = 0.1\text{A}$ |
| | | - | 1.6 | 2.0 | | |
| Forward Transfer Admittance | $ Y_{fs} $ | 40 | 320 | - | mS | $V_{DS} = 10\text{V}, I_D = 0.1\text{A}$ |
| Diode Forward Voltage | V_{SD} | - | 1.0 | 1.5 | V | $V_{GS} = 0\text{V}, I_S = 180\text{mA}$ |
| Source (diode forward) Current | I_S | - | - | 194 | mA | $T_{SP} = 25^{\circ}\text{C}$ |
| Peak Source (diode forward) Current | I_{SM} | - | - | 1.2 | A | $T_{SP} = 25^{\circ}\text{C}$ (Notes 3 & 4) |
| DYNAMIC CHARACTERISTICS (Note 7) | | | | | | |
| Input Capacitance | C_{iss} | - | 21.8 | 40 | pF | $V_{DS} = 10\text{V}, V_{GS} = 0\text{V}, f = 1.0\text{MHz}$ |
| Output Capacitance | C_{oss} | - | 5.6 | 15 | pF | |
| Reverse Transfer Capacitance | C_{riss} | - | 3.3 | 10 | pF | |
| Gate Resistance | R_g | - | 49 | - | Ω | $V_{DS} = 0\text{V}, V_{GS} = 0\text{V}, f = 1\text{MHz}$ |
| Total Gate Charge | Q_g | - | 800 | - | pC | $V_{GS} = 10\text{V}, V_{DD} = 25\text{V},$ $I_D = 250\text{mA}$ |
| Gate-Source Charge | Q_{gs} | - | 100 | - | pC | |
| Gate-Drain Charge | Q_{gd} | - | 100 | - | pC | |
| Turn-On Delay Time | $t_{D(on)}$ | - | 2.93 | - | ns | $V_{DD} = 30\text{V}, V_{GEN} = 10\text{V},$ $R_L = 150\Omega, R_{GEN} = 50\Omega,$ $I_D = 0.2\text{A}$ |
| Turn-On Rise Time | t_r | - | 2.99 | - | ns | |
| Turn-Off Delay Time | $t_{D(off)}$ | - | 9.45 | - | ns | |
| Turn-Off Fall Time | t_f | - | 8.3 | - | ns | |

- Notes:
- Device mounted on FR-4 PCB, with minimum recommended pad layout.
 - Repetitive rating, pulse width limited by junction temperature.
 - Short duration pulse test used to minimize self-heating effect.
 - Guaranteed by design. Not subject to production testing.

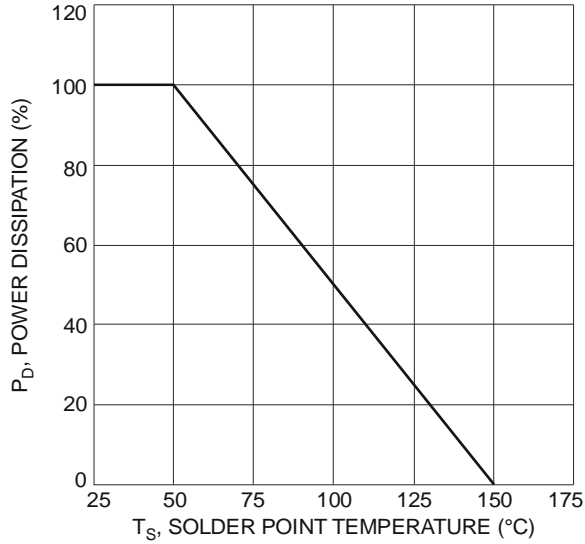


Fig 1. Normalized Total Power Dissipation as a Function of Solder Point Temperature

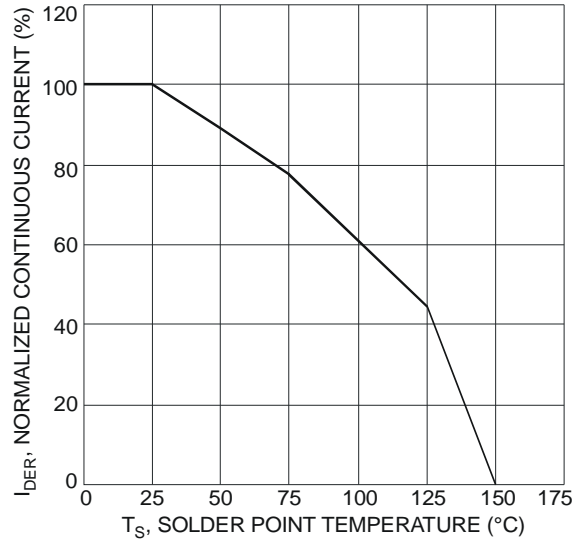


Fig 2. Normalized Continuous Current vs. Solder Point Temperature

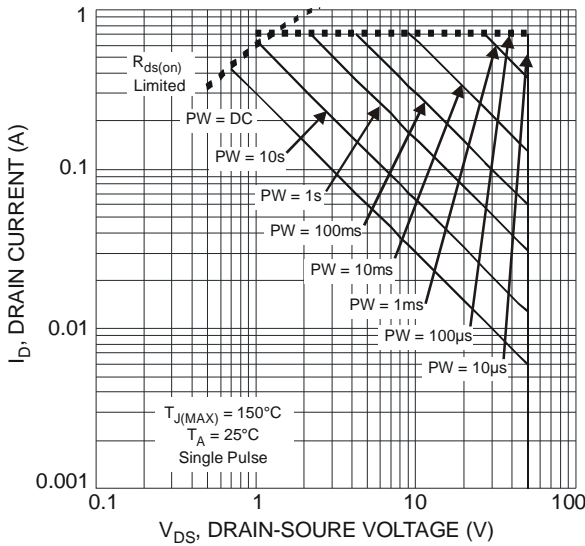


Fig 3 SOA, Safe Operation Area

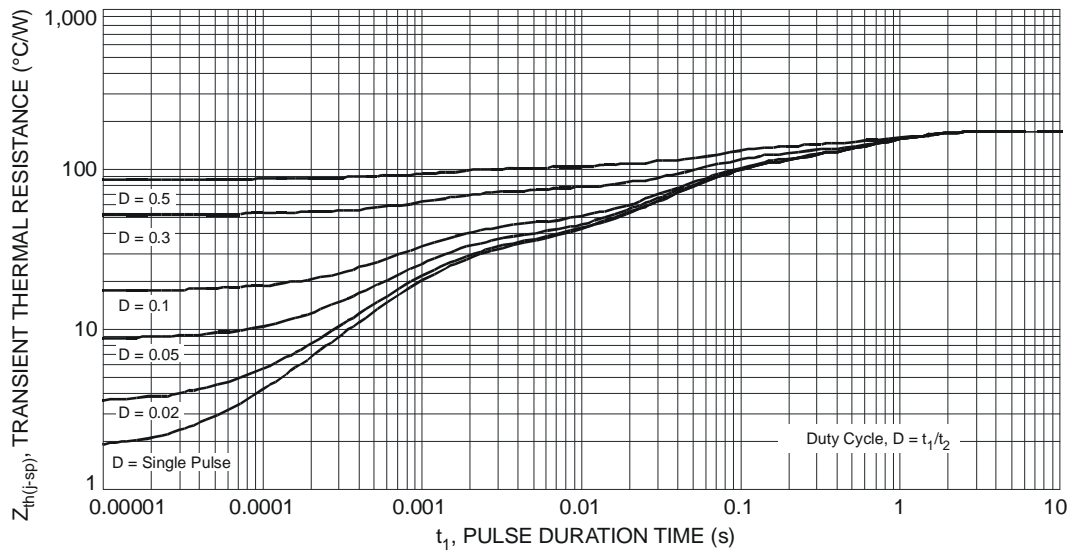


Fig. 4 Transient Thermal Response

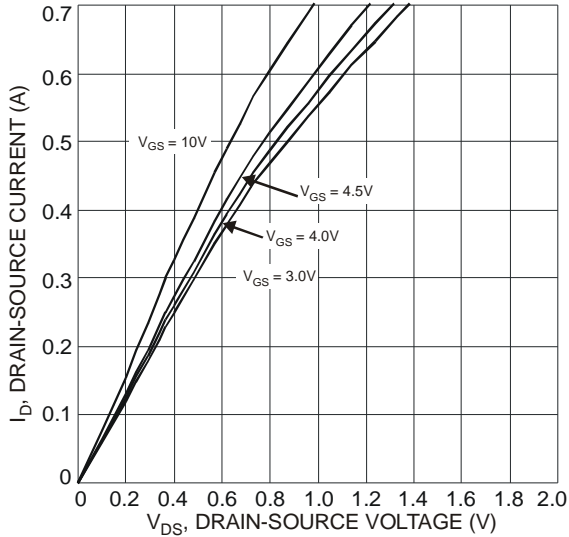


Fig. 5 Drain-Source Current vs. Drain-Source Voltage

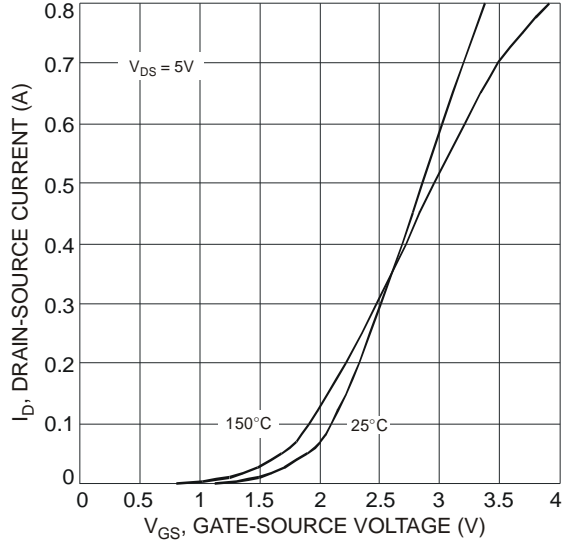


Fig. 6 Transfer Characteristics

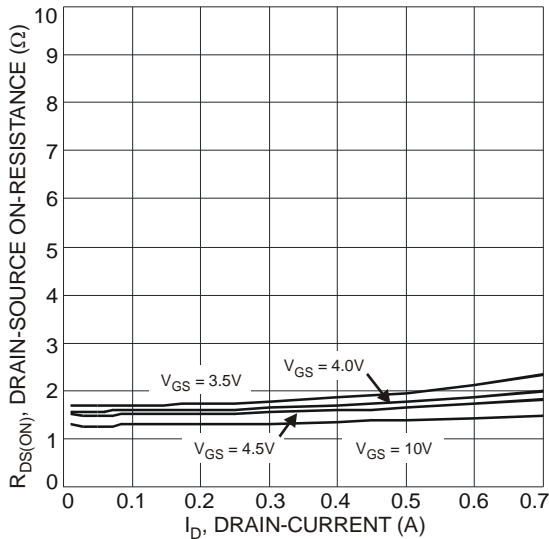


Fig. 7 Drain-Source On-Resistance vs. Drain-Current

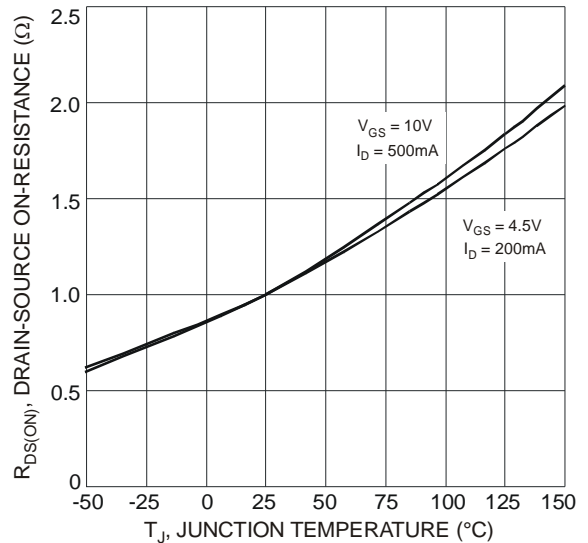


Fig. 8 Drain-Source On-Resistance vs. Junction Temperature

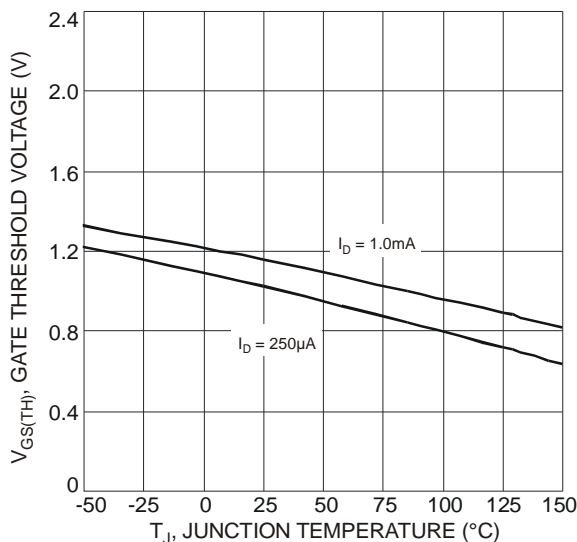


Fig. 9 Gate Threshold Voltage vs. Junction Temperature

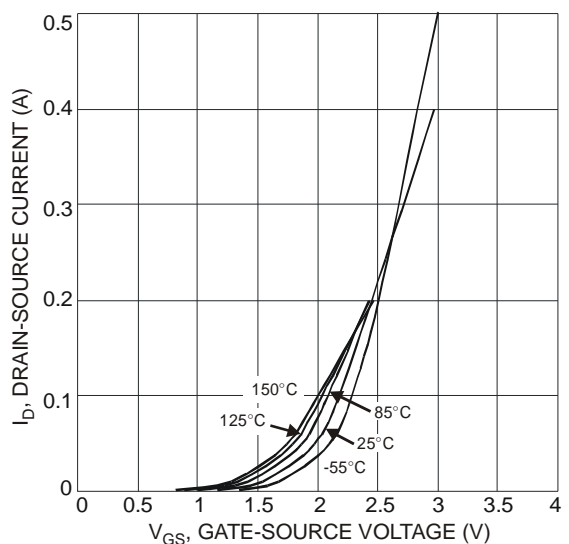


Fig. 10 Transfer Characteristics

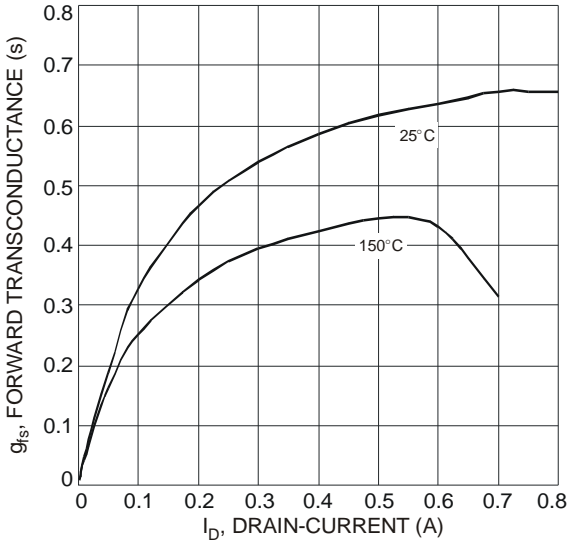


Fig. 11 Typical Transfer Characteristic

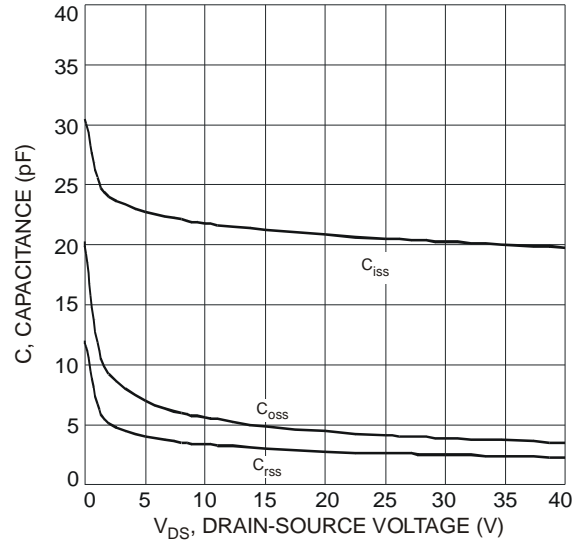


Fig. 12 Capacitance vs. Drain-Source Voltage

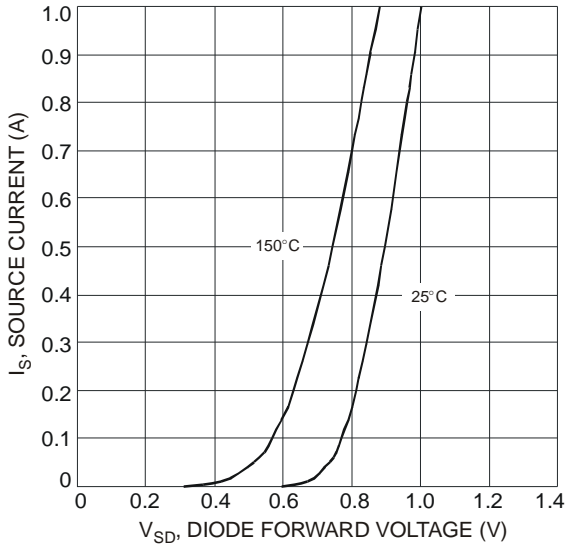
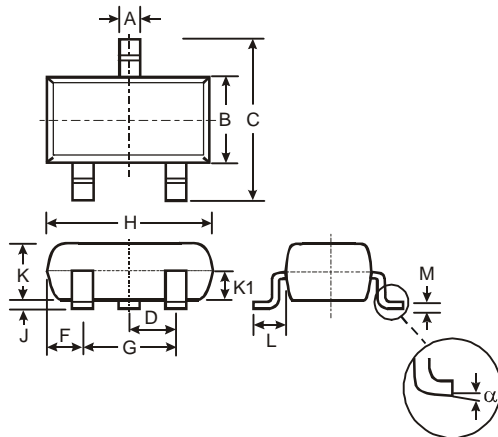


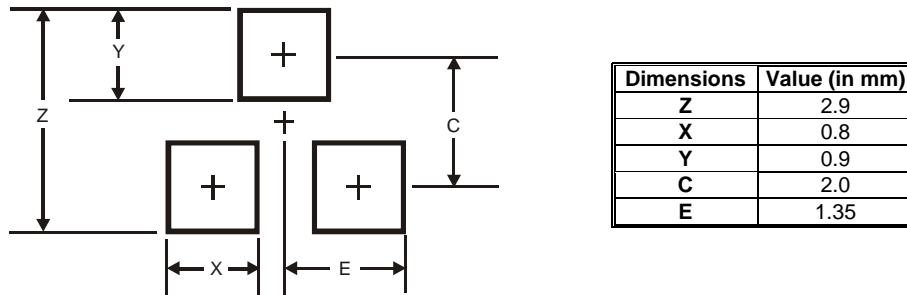
Fig. 13 Source Current vs. Diode Forward Voltage

Package Outline Dimensions



| SOT23 | | | |
|----------------------|-------|------|-------|
| Dim | Min | Max | Typ |
| A | 0.37 | 0.51 | 0.40 |
| B | 1.20 | 1.40 | 1.30 |
| C | 2.30 | 2.50 | 2.40 |
| D | 0.89 | 1.03 | 0.915 |
| F | 0.45 | 0.60 | 0.535 |
| G | 1.78 | 2.05 | 1.83 |
| H | 2.80 | 3.00 | 2.90 |
| J | 0.013 | 0.10 | 0.05 |
| K | 0.903 | 1.10 | 1.00 |
| K1 | - | - | 0.400 |
| L | 0.45 | 0.61 | 0.55 |
| M | 0.085 | 0.18 | 0.11 |
| α | 0° | 8° | - |
| All Dimensions in mm | | | |

Suggested Pad Layout



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