# F7707-VB Datasheet

# P-Channel 20-V (G-S) MOSFET

| PRODUCT SUMMARY | | |
|---|---|---|
| $V_{DS}$ (V) | $R_{DS(on)}$ (Ω) | $I_D$ (A) |
| -20 | 0.010 at $V_{GS}$ = - 4.5 V | - 9.0 |
| | 0.012 at $V_{GS}$ = - 2.5 V | - 7.8 |
| | 0.016 at $V_{GS}$ = - 1.8 V | - 6.0 |

## FEATURES

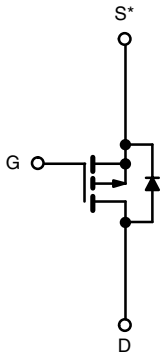
- **Halogen-free**
- Trench Power MOSFETs

Pb-free Available

RoHS* COMPLIANT

TSSOP-8


Top View




P-Channel MOSFET

* Source Pins 2, 3, 6 and 7 must be tied common.

| ABSOLUTE MAXIMUM RATINGS $T_A$ = 25 °C, unless otherwise noted | | | | | |
|---|---|---|---|---|---|
| **Parameter** | | **Symbol** | **10 s** | **Steady State** | **Unit** |
| Drain-Source Voltage | | $V_{DS}$ | -20 | | V |
| Gate-Source Voltage | | $V_{GS}$ | ± 12 | | |
| Continuous Drain Current ($T_J$ = 150 °C)[a] | $T_A$ = 25 °C | $I_D$ | - 9.0 | -7.8 | A |
| | $T_A$ = 70 °C | | - 6.8 | -5.8 | |
| Pulsed Drain Current (10 µs Pulse Width) | | $I_{DM}$ | - 30 | | |
| Continuous Source Current (Diode Conduction)[a] | | $I_S$ | - 1.35 | - 0.95 | |
| Maximum Power Dissipation[a] | $T_A$ = 25 °C | $P_D$ | 1.5 | 1.05 | W |
| | $T_A$ = 70 °C | | 1.0 | 0.67 | |
| Operating Junction and Storage Temperature Range | | $T_J$, $T_{stg}$ | - 55 to 150 | | °C |

| THERMAL RESISTANCE RATINGS | | | | | |
|---|---|---|---|---|---|
| **Parameter** | | **Symbol** | **Typical** | **Maximum** | **Unit** |
| Maximum Junction-to-Ambient[a] | t ≤ 10 s | $R_{thJA}$ | 65 | 83 | °C/W |
| | Steady State | | 100 | 120 | |
| Maximum Junction-to-Foot (Drain) | Steady State | $R_{thJF}$ | 43 | 52 | |

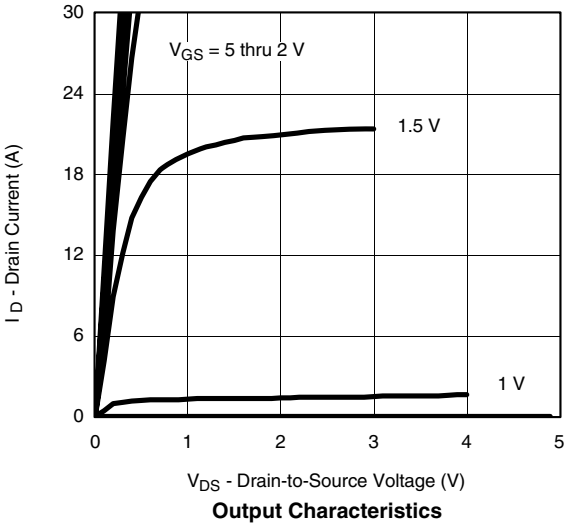
Notes:
a. Surface Mounted on 1" x 1" FR4 board.

| **SPECIFICATIONS** $T_J$ = 25 °C, unless otherwise noted | | | | | | |
|---|---|---|---|---|---|---|
| **Parameter** | **Symbol** | **Test Conditions** | **Min.** | **Typ.** | **Max.** | **Unit** |
| **Static** | | | | | | |
| Gate Threshold Voltage | $V_{GS(th)}$ | $V_{DS}$ = $V_{GS}$, $I_D$ = - 450 µA | - 0.45 | - | 1.0 | V |
| Gate-Body Leakage | $I_{GSS}$ | $V_{DS}$ = 0 V, $V_{GS}$ = ± 8 V | | | ± 100 | nA |
| Zero Gate Voltage Drain Current | $I_{DSS}$ | $V_{DS}$ = - 20 V, $V_{GS}$ = 0 V | | | - 1 | µA |
| | | $V_{DS}$ = -20V, $V_{GS}$ = 0 V, $T_J$ = 70 °C | | | - 25 | |
| On-State Drain Current[a] | $I_{D(on)}$ | $V_{DS}$ = - 5 V, $V_{GS}$ = - 4.5 V | - 20 | | | A |
| Drain-Source On-State Resistance[a] | $R_{DS(on)}$ | $V_{GS}$ = - 4.5 V, $I_D$ = - 8.0 A | | 0.010 | | Ω |
| | | $V_{GS}$ = - 2.5 V, $I_D$ = - 7.0 A | | 0.012 | | |
| | | $V_{GS}$ = - 1.8 V, $I_D$ = - 5.8 A | | 0.016 | | |
| Forward Transconductance[a] | $g_{fs}$ | $V_{DS}$ = - 5 V, $I_D$ = - 8.0 A | | 44 | | S |
| Diode Forward Voltage[a] | $V_{SD}$ | $I_S$ = - 1.5 A, $V_{GS}$ = 0 V | | - 0.56 | - 1.1 | V |
| **Dynamic[b]** | | | | | | |
| Total Gate Charge | $Q_g$ | $V_{DS}$ = - 10 V, $V_{GS}$ = - 4.5 V, $I_D$ = - 8.0 A | | 46 | 70 | nC |
| Gate-Source Charge | $Q_{gs}$ | | | 5 | | |
| Gate-Drain Charge | $Q_{gd}$ | | | 15.5 | | |
| Turn-On Delay Time | $t_{d(on)}$ | $V_{DD}$ = - 10 V, R= 6 Ω<br>$I_D$ ≅ - 1 A, $V_{GEN}$ = - 4.5 V, $R_g$ = 6 Ω | | 45 | 70 | ns |
| Rise Time | $t_r$ | | | 85 | 130 | |
| Turn-Off Delay Time | $t_{d(off)}$ | | | 220 | 400 | |
| Fall Time | $t_f$ | | | 155 | 235 | |
| Source-Drain Reverse Recovery Time | $t_{rr}$ | $I_F$ = - 1.5 A, di/dt = 100 A/µs | | 140 | 210 | |

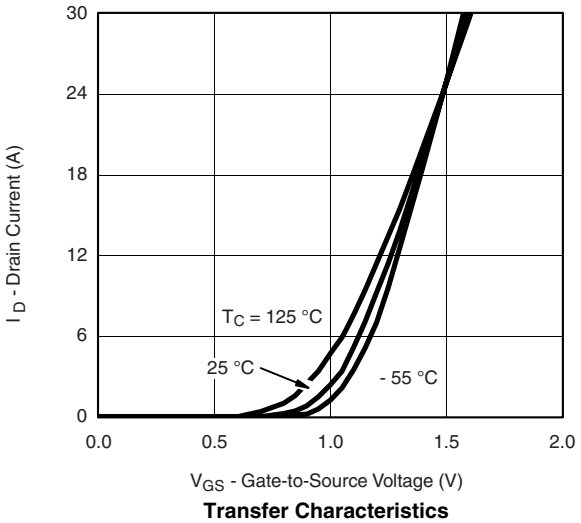
Notes:
a. Pulse test; pulse width ≤ 300 µs, duty cycle ≤ 2 %.
b. Guaranteed by design, not subject to production testing.

*Stresses beyond those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated in the operational sections of the specifications is not implied. Exposure to absolute maximum rating conditions for extended periods may affect device reliability.*

## **TYPICAL CHARACTERISTICS** 25 °C, unless otherwise noted

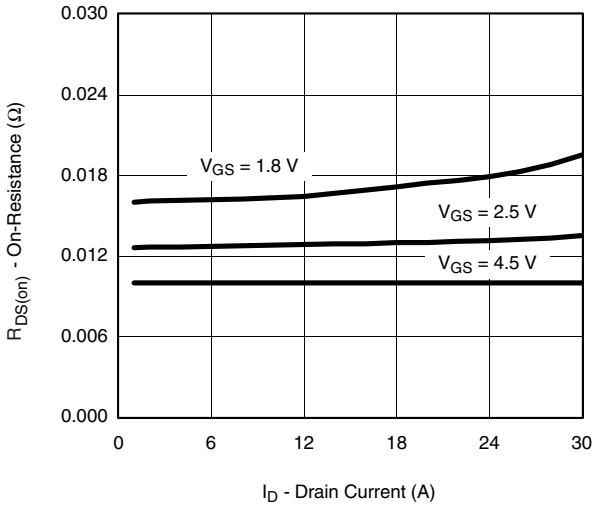



**Output Characteristics**

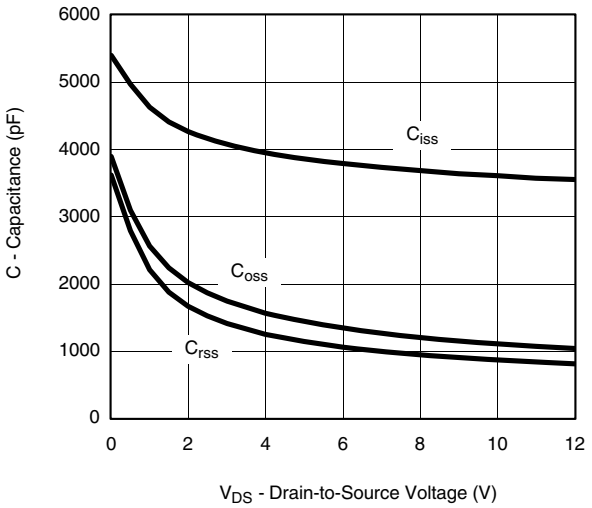



**Transfer Characteristics**

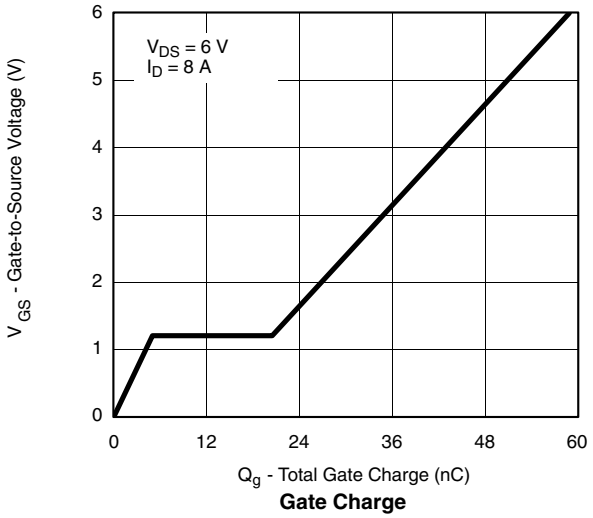
## TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted



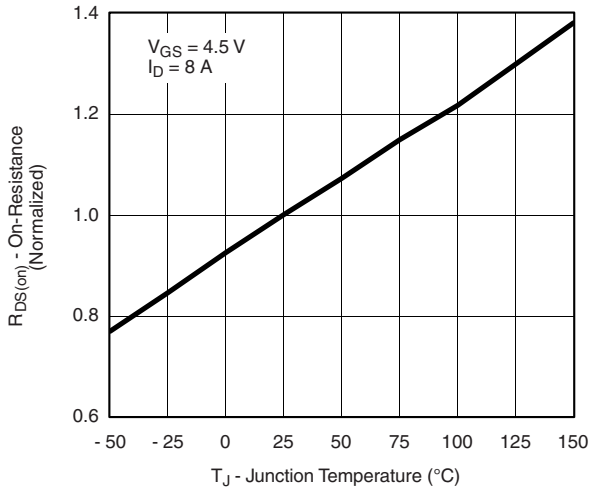

**On-Resistance vs. Drain Current**



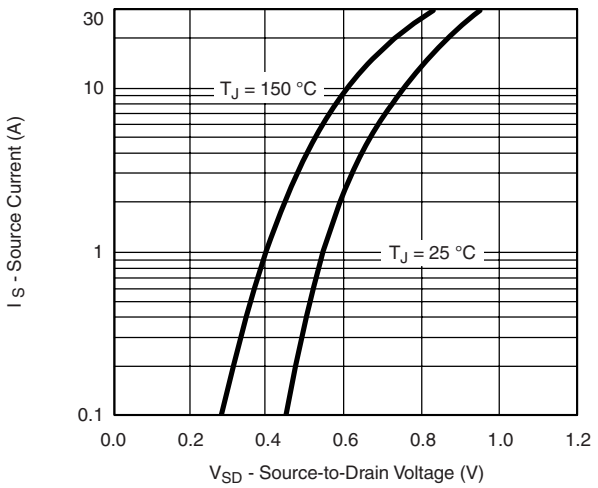

**Capacitance**



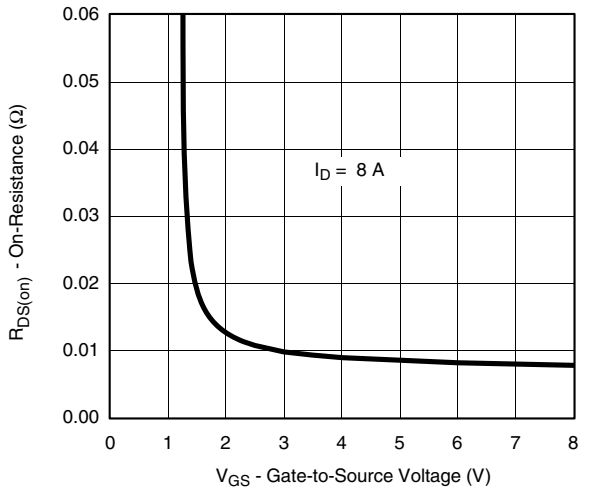

**Gate Charge**




**On-Resistance vs. Junction Temperature**

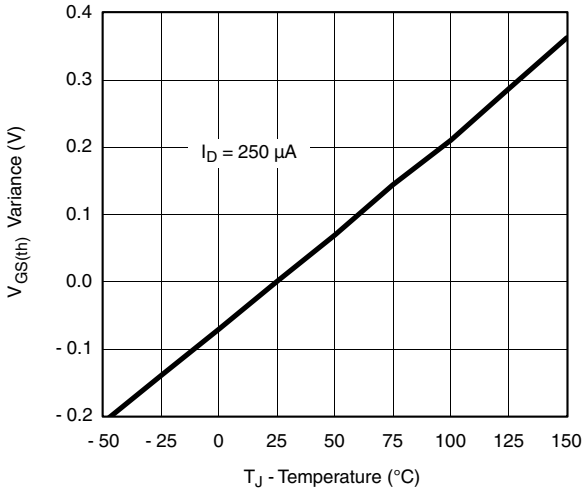



**Source-Drain Diode Forward Voltage**

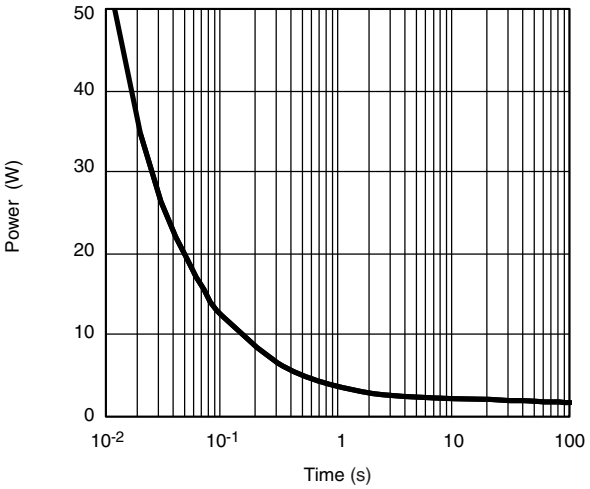



**On-Resistance vs. Gate-to-Source Voltage**

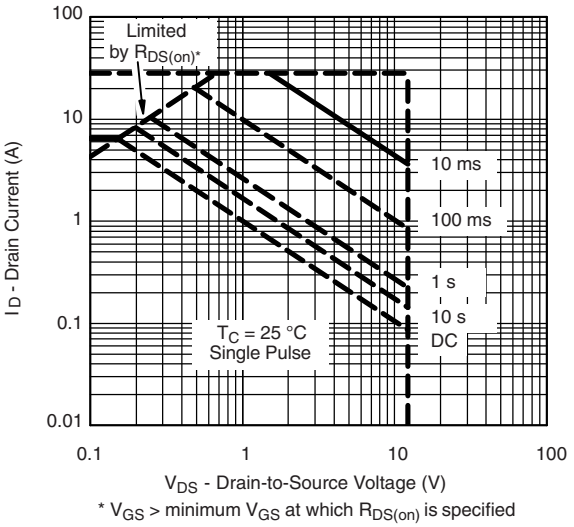
## TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted




**Threshold Voltage**

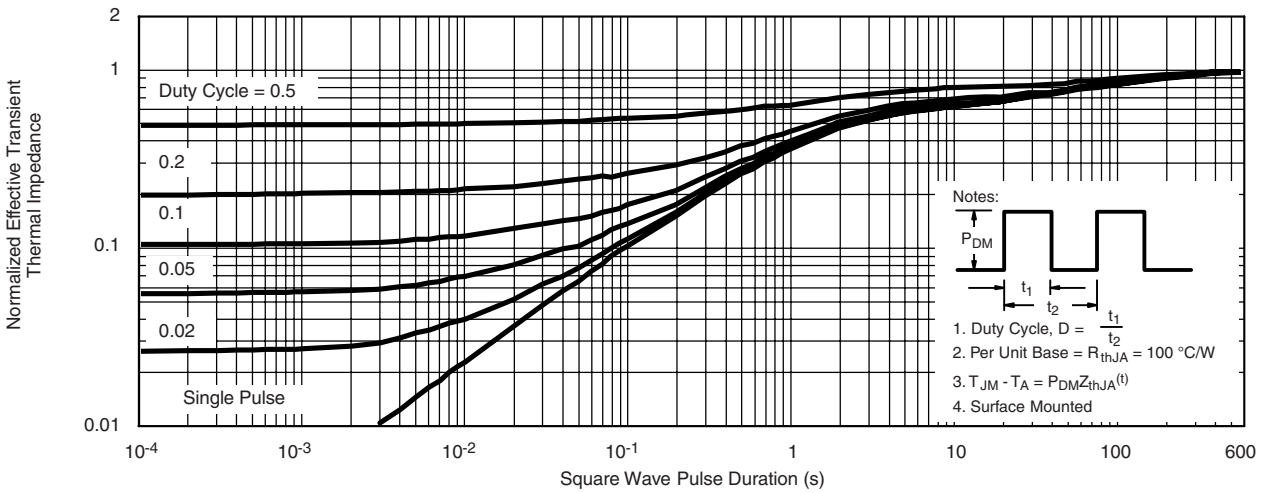



**Single Pulse Power, Junction-to-Ambient**



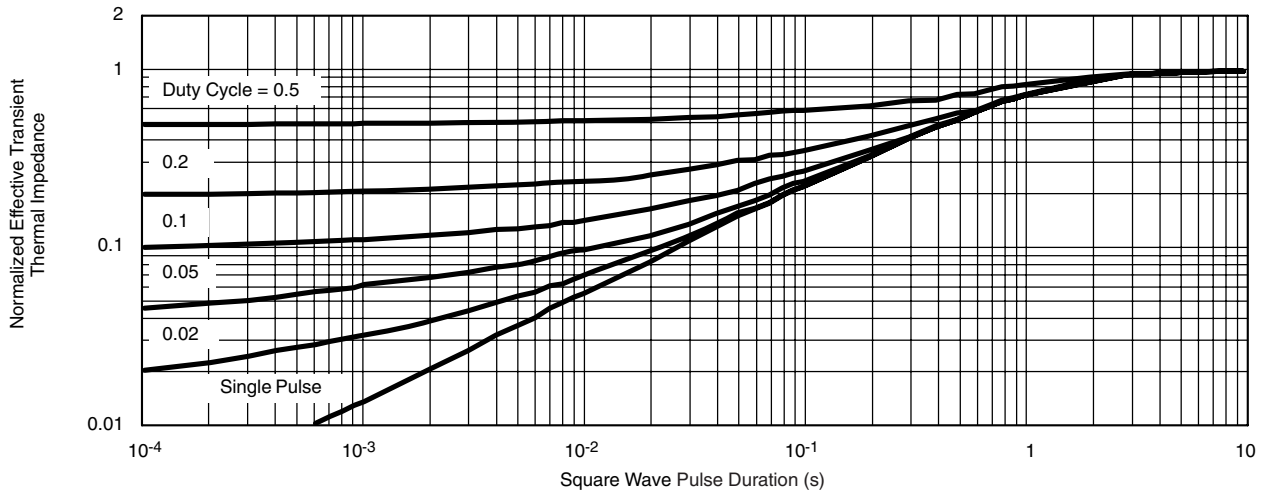

* $V_{GS}$ > minimum $V_{GS}$ at which $R_{DS(on)}$ is specified

**Safe Operating Area, Junction-to-Case**




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

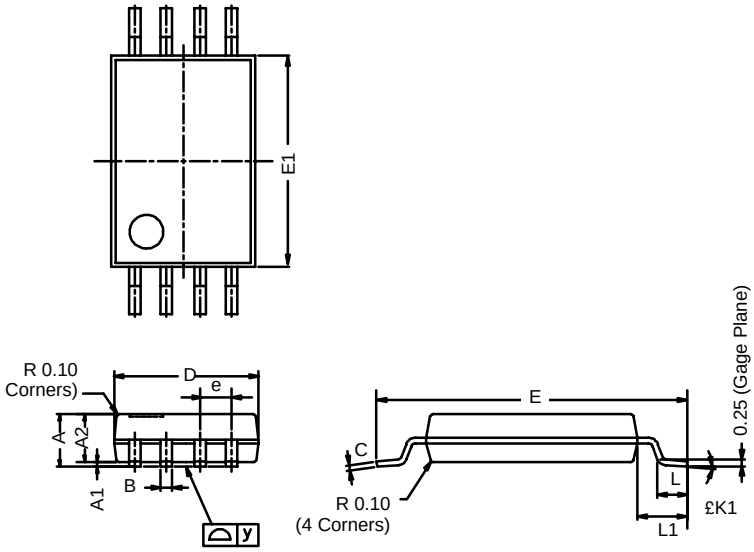
**TYPICAL CHARACTERISTICS** 25 °C, unless otherwise noted




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

## TSSOP: 8-LEAD

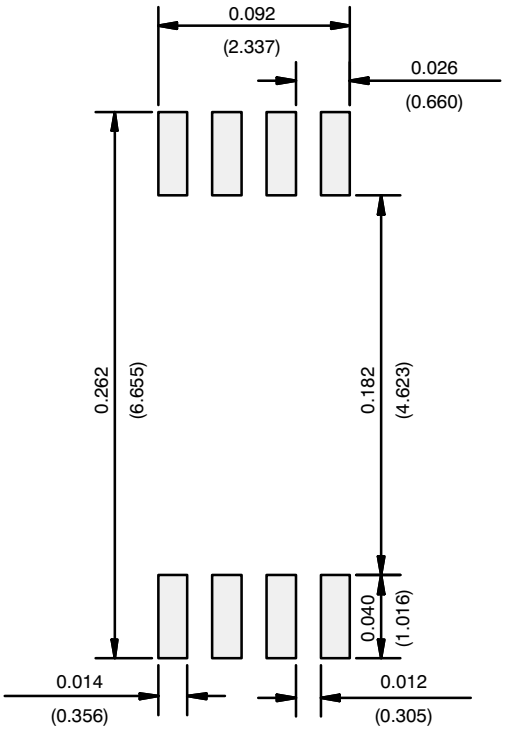
**JEDEC Part Number: MO-153**




| Dim | MILLIMETERS | | |
|---|---|---|---|
| | Min | Nom | Max |
| A | – | – | 1.20 |
| $A_1$ | 0.05 | 0.10 | 0.15 |
| $A_2$ | 0.80 | 1.00 | 1.05 |
| B | 0.19 | 0.28 | 0.30 |
| C | – | 0.127 | – |
| D | 2.90 | 3.00 | 3.10 |
| E | 6.20 | 6.40 | 6.60 |
| $E_1$ | 4.30 | 4.40 | 4.50 |
| e | – | 0.65 | – |
| L | 0.45 | 0.60 | 0.75 |
| $L_1$ | 0.90 | 1.00 | 1.10 |
| Y | – | – | 0.10 |
| £K1 | 0° | 3° | 6° |

ECN: S-03946—Rev. G, 09-Jul-01
DWG: 5844

## RECOMMENDED MINIMUM PADS FOR TSSOP-8




Recommended Minimum Pads
Dimensions in Inches/(mm)

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