

## EL5162, EL5163, EL5262, EL5263, EL5362

500MHz Low Power Current Feedback Amplifiers with Enable

FN7388  
Rev 1.00  
August 26, 2015

The EL5162, EL5163, EL5262, EL5263 and EL5362 are current feedback amplifiers with a bandwidth of 500MHz. This makes these amplifiers ideal for today's high speed video and monitor applications.

With a supply current of just 1.5mA per amplifier and the ability to run from a single supply voltage from 5V to 12V, these amplifiers are also ideal for handheld, portable or battery-powered equipment.

The EL5162, EL5262 and EL5362 also incorporate an enable and disable function to reduce the supply current to 14μA typical per amplifier. Allowing the CE pin to float or applying a low logic level enables the amplifier.

The EL5162 is available in 6 Ld SOT-23 and 8 Ld SOIC packages, the EL5163 in 5 Ld SOT-23 and SC-70 packages, the EL5262 in the 10 Ld MSOP package, the EL5263 in 8 Ld MSOP and SOIC packages, and the EL5362 in 16 Ld SOIC (0.150") and QSOP packages. All operate over the industrial temperature range of -40°C to +85°C.

## Features

- 500MHz -3dB bandwidth
- 4000V/μs slew rate (EL5162 and EL5163)
- 1.5mA supply current per amplifier
- Single and dual supply operation, from 5V to 12V supply span
- Fast enable/disable (EL5162, EL5262 and EL5362 only)
- Available in SOT-23 packages
- Pb-free (RoHS compliant)
- High speed, 1.4GHz product available (EL5166 and EL5167)
- High speed, 4mA, 600MHz product available (EL5164, EL5165 and EL5364)

## Applications

- Battery-powered equipment
- Handheld portable devices
- Video amplifiers
- Cable drivers
- RGB amplifiers
- Test equipment
- Instrumentation
- Current to voltage converters

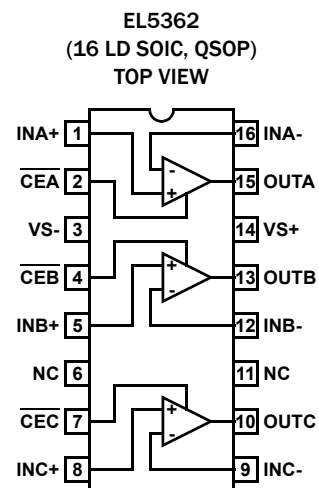
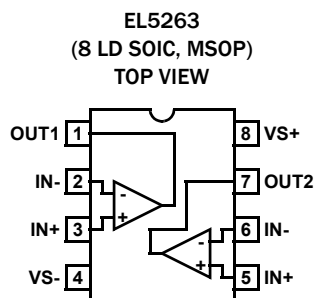
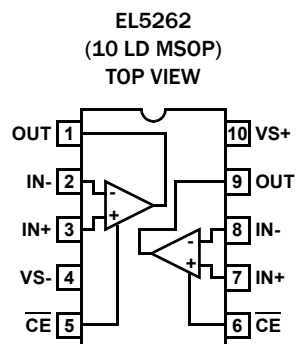
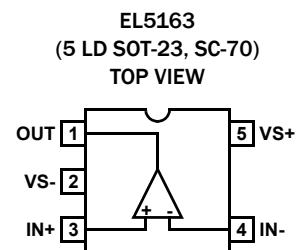
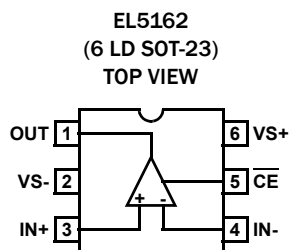
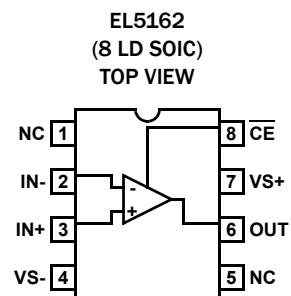
## Ordering Information

| PART NUMBER<br>(Notes 2, 3)                                                          | PART<br>MARKING | PACKAGE<br>(RoHS Compliant) | PKG.<br>DWG. # |
|--------------------------------------------------------------------------------------|-----------------|-----------------------------|----------------|
| EL5162ISZ                                                                            | 5162ISZ         | 8 Ld SOIC (150mil)          | M8.15E         |
| EL5162ISZ-T7 (Note 1)                                                                | 5162ISZ         | 8 Ld SOIC (150mil)          | M8.15E         |
| EL5162ISZ-T13 (Note 1)                                                               | 5162ISZ         | 8 Ld SOIC (150mil)          | M8.15E         |
| EL5162ISZ-T7A                                                                        | 5162ISZ         | 8 Ld SOIC (150mil)          | M8.15E         |
| EL5162IWZ-T7 (Note 1) (No longer available, recommended replacement: EL5163IWZ-T7)   | BAKA (Note 4)   | 6 Ld SOT-23                 | P6.064A        |
| EL5162IWZ-T7A (Note 1) (No longer available, recommended replacement: EL5163IWZ-T7A) | BAKA (Note 4)   | 6 Ld SOT-23                 | P6.064A        |
| EL5163IWZ-T7 (Note 1)                                                                | BALA (Note 4)   | 5 Ld SOT-23                 | P5.064A        |
| EL5163IWZ-T7A (Note 1)                                                               | BALA (Note 4)   | 5 Ld SOT-23                 | P5.064A        |
| EL5163ICZ-T7 (Note 1) (No longer available, recommended replacement: EL5163IWZ-T7)   | BDA (Note 4)    | 5 Ld SC-70 (1.25mm)         | P5.049         |
| EL5163ICZ-T7A (Note 1) (No longer available, recommended replacement: EL5163IWZ-T7)  | BDA (Note 4)    | 5 Ld SC-70 (1.25mm)         | P5.049         |
| EL5262IYZ                                                                            | BBTAA           | 10 Ld MSOP (3.0mm)          | M10.118A       |
| EL5262IYZ-T7 (Note 1)                                                                | BBTAA           | 10 Ld MSOP (3.0mm)          | M10.118A       |
| EL5262IYZ-T13 (Note 1)                                                               | BBTAA           | 10 Ld MSOP (3.0mm)          | M10.118A       |
| EL5263ISZ                                                                            | 5263ISZ         | 8 Ld SOIC (150mil)          | M8.15E         |
| EL5263ISZ-T7 (Note 1)                                                                | 5263ISZ         | 8 Ld SOIC (150mil)          | M8.15E         |
| EL5263ISZ-T13 (Note 1)                                                               | 5263ISZ         | 8 Ld SOIC (150mil)          | M8.15E         |
| EL5263IYZ                                                                            | BBBJA           | 8 Ld MSOP (3.0mm)           | M8.118A        |
| EL5263IYZ-T7 (Note 1)                                                                | BBBJA           | 8 Ld MSOP (3.0mm)           | M8.118A        |
| EL5263IYZ-T13 (Note 1)                                                               | BBBJA           | 8 Ld MSOP (3.0mm)           | M8.118A        |
| EL5362ISZ                                                                            | EL5362ISZ       | 16 Ld SOIC (150mil)         | MDP0027        |
| EL5362ISZ-T7 (Note 1)                                                                | EL5362ISZ       | 16 Ld SOIC (150mil)         | MDP0027        |
| EL5362ISZ-T13 (Note 1)                                                               | EL5362ISZ       | 16 Ld SOIC (150mil)         | MDP0027        |
| EL5362IUZ                                                                            | 5362IUZ         | 16 Ld QSOP                  | MDP0040        |
| EL5362IUZ-T7 (Note 1)                                                                | 5362IUZ         | 16 Ld QSOP                  | MDP0040        |
| EL5362IUZ-T13 (Note 1)                                                               | 5362IUZ         | 16 Ld QSOP                  | MDP0040        |

### NOTES:

1. Please refer to [TB347](#) for details on reel specifications.
2. These Intersil Pb-free plastic packaged products employ special Pb-free material sets, molding compounds/die attach materials, and 100% matte tin plate plus anneal (e3 termination finish, which is RoHS compliant and compatible with both SnPb and Pb-free soldering operations). Intersil Pb-free products are MSL classified at Pb-free peak reflow temperatures that meet or exceed the Pb-free requirements of IPC/JEDEC J STD-020.
3. For Moisture Sensitivity Level (MSL), please see product information page for [EL5162](#), [EL5163](#), [EL5262](#), [EL5263](#), [EL5362](#). For more information on MSL, please see tech brief [TB363](#).
4. The part marking is located on the bottom of the part.

## Pin Configurations



**Absolute Maximum Ratings** ( $T_A = +25^\circ\text{C}$ )

|                                                                       |                                          |
|-----------------------------------------------------------------------|------------------------------------------|
| Supply Voltage between $V_{S+}$ and $V_{S-}$ .....                    | 13.2V                                    |
| Maximum Continuous Output Current.....                                | 50mA                                     |
| Maximum Slew Rate of $V_{S+}$ to $V_{S-}$ .....                       | 1V/ $\mu\text{s}$                        |
| Maximum Voltage between $\text{IN}+$ and $\text{IN}-$ , disabled..... | $\pm 1.5\text{V}$                        |
| Current into $\text{IN}+$ , $\text{IN}-$ , CE.....                    | $\pm 5\text{mA}$                         |
| Pin Voltages.....                                                     | ( $V_{S-}$ ) -0.5V to ( $V_{S+}$ ) +0.5V |

**Thermal Information**

|                                              |                                             |
|----------------------------------------------|---------------------------------------------|
| Maximum Storage Temperature Range .....      | $-65^\circ\text{C}$ to $+150^\circ\text{C}$ |
| Ambient Operating Temperature Range .....    | $-40^\circ\text{C}$ to $+85^\circ\text{C}$  |
| Maximum Operating Junction Temperature ..... | $+125^\circ\text{C}$                        |
| Maximum Power Dissipation .....              | See Curves on <a href="#">page 8</a>        |
| Pb-free Reflow Profile .....                 | see <a href="#">TB493</a>                   |

CAUTION: Do not operate at or near the maximum ratings listed for extended periods of time. Exposure to such conditions may adversely impact product reliability and result in failures not covered by warranty.

**Electrical Specifications**  $V_{S+} = +5\text{V}$ ,  $V_{S-} = -5\text{V}$ ,  $R_F = 750\Omega$  for  $A_V = 1$ ,  $R_F = 400\Omega$  for  $A_V = 2$ ,  $R_L = 150\Omega$ ,  $\overline{\text{CE}} = 0\text{V}$ ,  $T_A = +25^\circ\text{C}$  unless otherwise specified. **Boldface limits apply across the operating temperature range,  $-40^\circ\text{C}$  to  $+85^\circ\text{C}$ .**

| PARAMETER                    | DESCRIPTION                                         | TEST CONDITIONS                                                                                     | MIN<br>( <a href="#">Note 6</a> ) | TYP       | MAX<br>( <a href="#">Note 6</a> ) | UNIT                         |
|------------------------------|-----------------------------------------------------|-----------------------------------------------------------------------------------------------------|-----------------------------------|-----------|-----------------------------------|------------------------------|
| <b>AC PERFORMANCE</b>        |                                                     |                                                                                                     |                                   |           |                                   |                              |
| BW                           | -3dB Bandwidth                                      | $A_V = +1$ , $R_L = 500\Omega$ , $R_F = 598\Omega$                                                  |                                   | 500       |                                   | MHz                          |
|                              |                                                     | $A_V = +2$ , $R_L = 150\Omega$ , $R_F = 422\Omega$                                                  |                                   | 233       |                                   | MHz                          |
| BW1                          | 0.1dB Bandwidth                                     |                                                                                                     |                                   | 30        |                                   | MHz                          |
| SR                           | Slew Rate                                           | $V_O = -2.5\text{V}$ to $+2.5\text{V}$ , $A_V = +2$ , $R_L = 100\Omega$<br>(EL5262, EL5263, EL5362) | <b>2000</b>                       | 2500      | <b>4000</b>                       | V/ $\mu\text{s}$             |
|                              |                                                     | $V_O = -2.5\text{V}$ to $+2.5\text{V}$ , $A_V = +2$ , $R_L = 100\Omega$<br>(EL5162, EL5163)         | <b>2800</b>                       | 4000      | <b>6000</b>                       | V/ $\mu\text{s}$             |
| $t_S$                        | 0.1% Settling Time                                  | $V_{OUT} = -2.5\text{V}$ to $+2.5\text{V}$ , $A_V = +1$                                             |                                   | 25        |                                   | ns                           |
| $e_N$                        | Input Voltage Noise                                 |                                                                                                     |                                   | 3         |                                   | nV/ $\sqrt{\text{Hz}}$       |
| $i_{N-}$                     | IN- Input Current Noise                             |                                                                                                     |                                   | 10        |                                   | pA/ $\sqrt{\text{Hz}}$       |
| $i_{N+}$                     | IN+ Input Current Noise                             |                                                                                                     |                                   | 6.5       |                                   | pA/ $\sqrt{\text{Hz}}$       |
| dG                           | Differential Gain Error ( <a href="#">Note 5</a> )  | $A_V = +2$                                                                                          |                                   | 0.05      |                                   | %                            |
| dP                           | Differential Phase Error ( <a href="#">Note 5</a> ) | $A_V = +2$                                                                                          |                                   | 0.15      |                                   | °                            |
| <b>DC PERFORMANCE</b>        |                                                     |                                                                                                     |                                   |           |                                   |                              |
| $V_{OS}$                     | Offset Voltage                                      |                                                                                                     | <b>-5</b>                         | 1.5       | <b>+5</b>                         | mV                           |
| $T_C V_{OS}$                 | Input Offset Voltage Temperature Coefficient        | Measured from $T_{MIN}$ to $T_{MAX}$                                                                |                                   | 6         |                                   | $\mu\text{V}/^\circ\text{C}$ |
| $R_{OL}$                     | Open Loop Transimpedance Gain                       |                                                                                                     | <b>500</b>                        | 1000      |                                   | k $\Omega$                   |
| <b>INPUT CHARACTERISTICS</b> |                                                     |                                                                                                     |                                   |           |                                   |                              |
| CMIR                         | Common Mode Input Range                             | Guaranteed by CMRR test                                                                             | <b><math>\pm 3</math></b>         | $\pm 3.3$ |                                   | V                            |
| CMRR                         | Common Mode Rejection Ratio                         | $V_{IN} = \pm 3\text{V}$                                                                            | <b>50</b>                         | 62        | <b>75</b>                         | dB                           |
| -ICMR                        | - Input Current Common Mode Rejection               |                                                                                                     | <b>-1</b>                         | 0.22      | <b>+1</b>                         | $\mu\text{A}/\text{V}$       |
| $+I_{IN}$                    | + Input Current                                     |                                                                                                     | <b>-8</b>                         | 0.5       | <b>+8</b>                         | $\mu\text{A}$                |
| $-I_{IN}$                    | - Input Current                                     |                                                                                                     | <b>-10</b>                        | 2         | <b>+10</b>                        | $\mu\text{A}$                |
| $R_{IN}$                     | Input Resistance                                    |                                                                                                     | <b>0.8</b>                        | 1.6       | <b>3</b>                          | M $\Omega$                   |
| $C_{IN}$                     | Input Capacitance                                   |                                                                                                     |                                   | 1         |                                   | pF                           |

**Electrical Specifications**  $V_{S+} = +5V$ ,  $V_{S-} = -5V$ ,  $R_F = 750\Omega$  for  $A_V = 1$ ,  $R_F = 400\Omega$  for  $A_V = 2$ ,  $R_L = 150\Omega$ ,  $\overline{CE} = 0V$ ,  $T_A = +25^\circ C$  unless otherwise specified. **Boldface limits apply across the operating temperature range,  $-40^\circ C$  to  $+85^\circ C$ . (Continued)**

| PARAMETER                                   | DESCRIPTION                                       | TEST CONDITIONS                                      | MIN<br>(Note 6)                  | TYP       | MAX<br>(Note 6)                  | UNIT      |
|---------------------------------------------|---------------------------------------------------|------------------------------------------------------|----------------------------------|-----------|----------------------------------|-----------|
| <b>OUTPUT CHARACTERISTICS</b>               |                                                   |                                                      |                                  |           |                                  |           |
| $V_O$                                       | Output Voltage Swing                              | $R_L = 150\Omega$ to GND                             | <b><math>\pm 3.35</math></b>     | $\pm 3.6$ | <b><math>\pm 3.75</math></b>     | V         |
|                                             |                                                   | $R_L = 1k\Omega$ to GND                              | <b><math>\pm 3.75</math></b>     | $\pm 3.9$ | <b><math>\pm 4.15</math></b>     | V         |
| $I_{OUT}$                                   | Output Current                                    | $R_L = 10\Omega$ to GND                              | <b>60</b>                        | 100       |                                  | mA        |
| <b>SUPPLY</b>                               |                                                   |                                                      |                                  |           |                                  |           |
| $I_{SON}$                                   | Supply Current - Enabled, per Amplifier           | No load, $V_{IN} = 0V$                               | <b>1.3</b>                       | 1.5       | <b>2.0</b>                       | mA        |
| $I_{SOFF-}$                                 | Supply Current - Disabled, per Amplifier          | No load, $V_{IN} = 0V$ (EL5162, EL5262, EL5362 Only) | <b>-25</b>                       | -14       | <b>0</b>                         | $\mu A$   |
| $I_{SOFF+}$                                 |                                                   |                                                      | <b>0</b>                         | 10        | <b>+25</b>                       | $\mu A$   |
| PSRR                                        | Power Supply Rejection Ratio                      | DC, $V_S = \pm 4.75V$ to $\pm 5.25V$                 | <b>65</b>                        | 76        |                                  | dB        |
| -IPSR                                       | - Input Current Power Supply Rejection            | DC, $V_S = \pm 4.75V$ to $\pm 5.25V$                 | <b>-0.5</b>                      | 0.1       | <b>+0.5</b>                      | $\mu A/V$ |
| <b>ENABLE (EL5162, EL5262, EL5362 ONLY)</b> |                                                   |                                                      |                                  |           |                                  |           |
| $t_{EN}$                                    | Enable Time                                       |                                                      |                                  | 380       |                                  | ns        |
| $t_{DIS}$                                   | Disable Time                                      |                                                      |                                  | 800       |                                  | ns        |
| $I_{IHCE}$                                  | $\overline{CE}$ Pin Input High Current            | $\overline{CE} = V_{S+}$                             | <b>1</b>                         | 5         | <b>25</b>                        | $\mu A$   |
| $I_{ILCE}$                                  | $\overline{CE}$ Pin Input Low Current             | $\overline{CE} = (V_{S+}) - 5V$                      | <b>-1</b>                        | 0         | <b>+1</b>                        | $\mu A$   |
| $V_{IHCE}$                                  | $\overline{CE}$ Input High Voltage for Power-down |                                                      | <b><math>(V_{S+}) - 1</math></b> |           |                                  | V         |
| $V_{ILCE}$                                  | $\overline{CE}$ Input Low Voltage for Power-up    |                                                      |                                  |           | <b><math>(V_{S+}) - 3</math></b> | V         |

## NOTES:

- Standard NTSC test, AC signal amplitude =  $286mV_{P-P}$ ,  $f = 3.58MHz$ .
- Compliance to datasheet limits is assured by one or more methods: production test, characterization and/or design.

## Typical Performance Curves

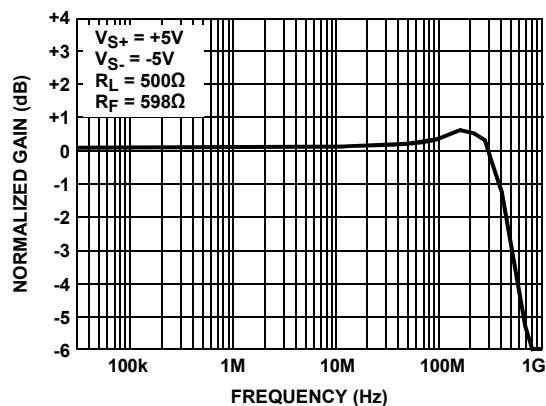


FIGURE 1. FREQUENCY RESPONSE FOR  $A_V = +1$

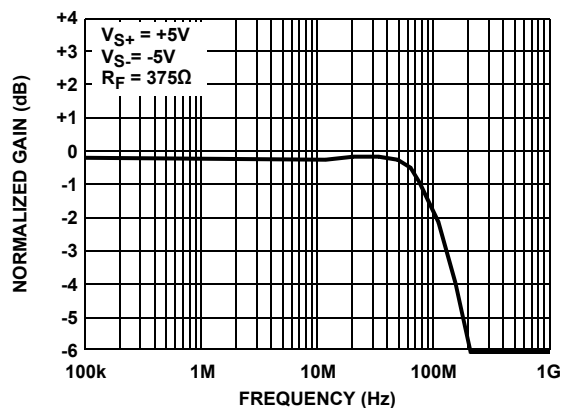


FIGURE 2. FREQUENCY RESPONSE FOR  $A_V = +4.6$

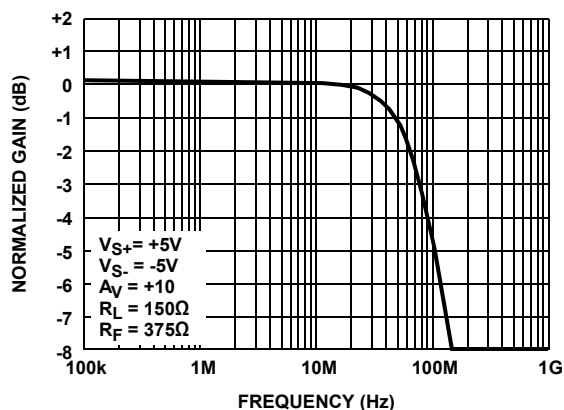


FIGURE 3. FREQUENCY RESPONSE FOR  $A_V = +10$

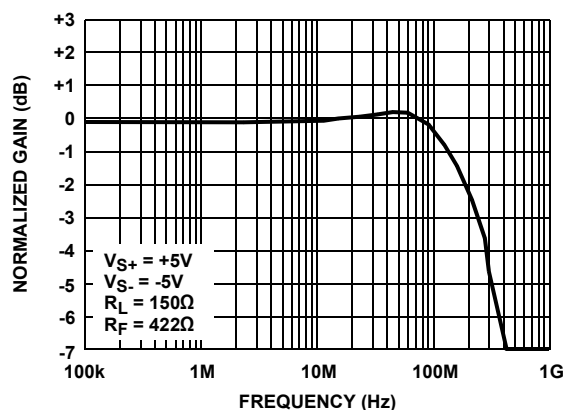


FIGURE 4. FREQUENCY RESPONSE FOR  $A_V = +2$

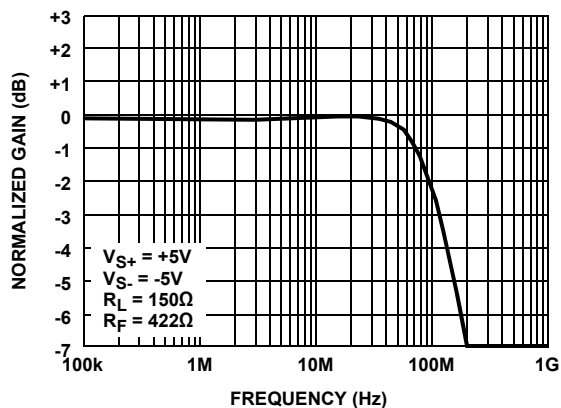


FIGURE 5. FREQUENCY RESPONSE FOR  $A_V = +4$

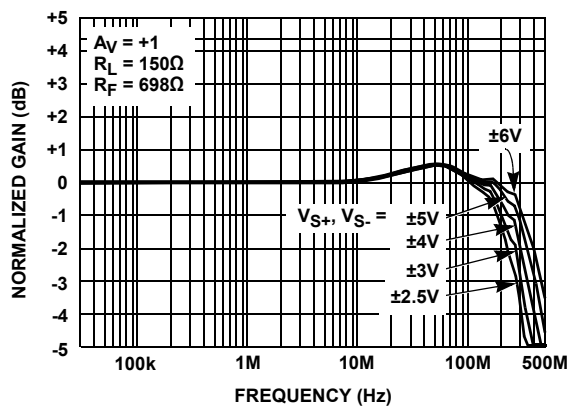


FIGURE 6. FREQUENCY RESPONSE FOR VARIOUS  $\pm V_S$

## Typical Performance Curves (Continued)

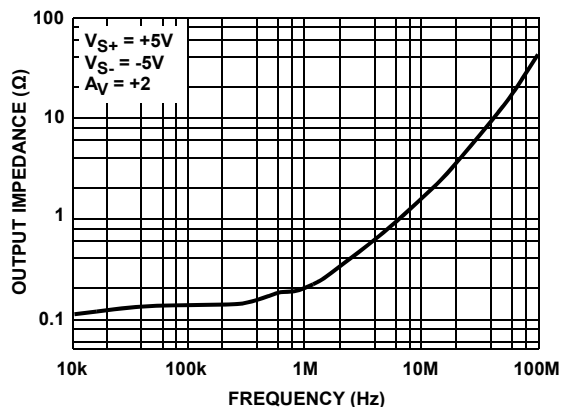


FIGURE 7. CLOSED LOOP OUTPUT IMPEDANCE vs FREQUENCY

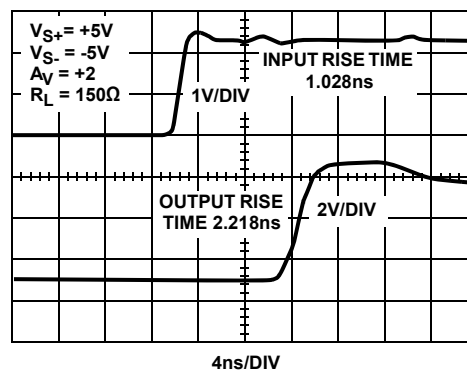


FIGURE 8. EL5262 OUTPUT RISE TIME

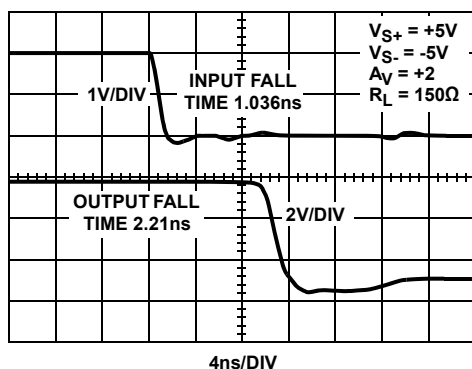


FIGURE 9. EL5262 OUTPUT FALL TIME

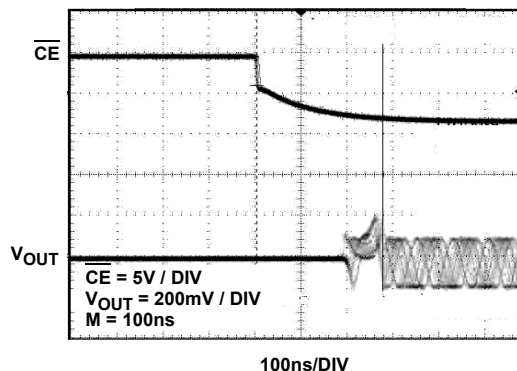


FIGURE 10. TURN ON TIME (EL5162, EL5262, EL5362)

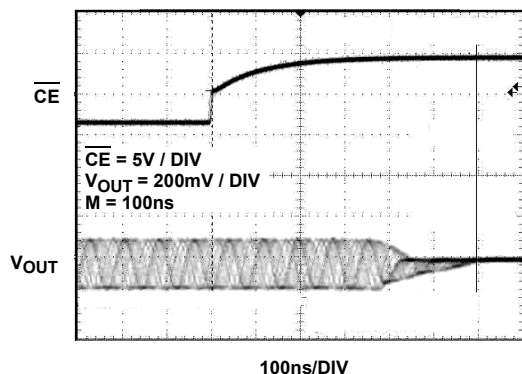


FIGURE 11. TURN OFF TIME (EL5162, EL5262, EL5362)

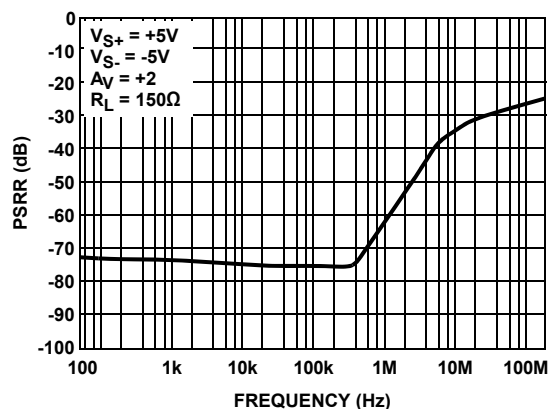


FIGURE 12. PSRR ( $V_{S+}$ ) vs FREQUENCY

## Typical Performance Curves (Continued)

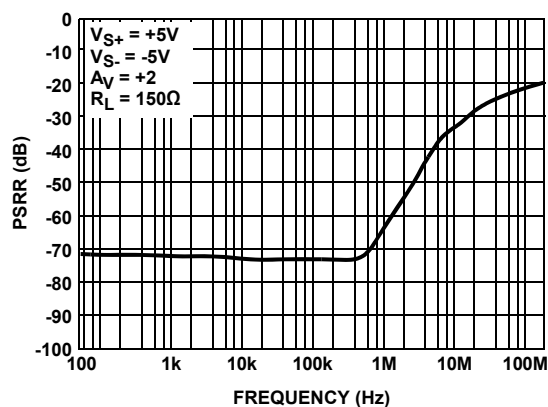
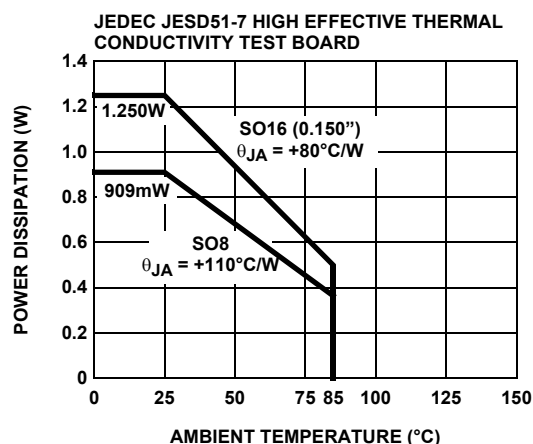
FIGURE 13. PSRR ( $V_{S-}$ ) vs FREQUENCY

FIGURE 14. PACKAGE POWER DISSIPATION vs AMBIENT TEMPERATURE

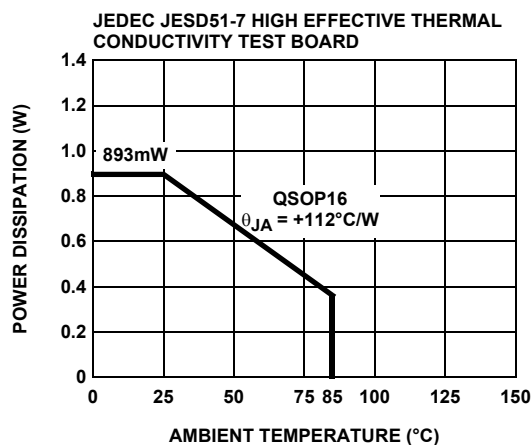


FIGURE 15. PACKAGE POWER DISSIPATION vs AMBIENT TEMPERATURE

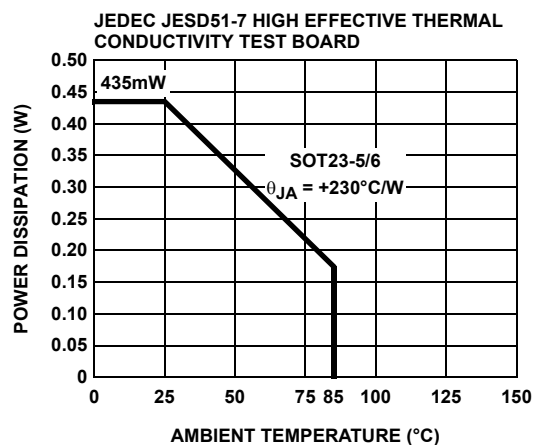


FIGURE 16. PACKAGE POWER DISSIPATION vs AMBIENT TEMPERATURE

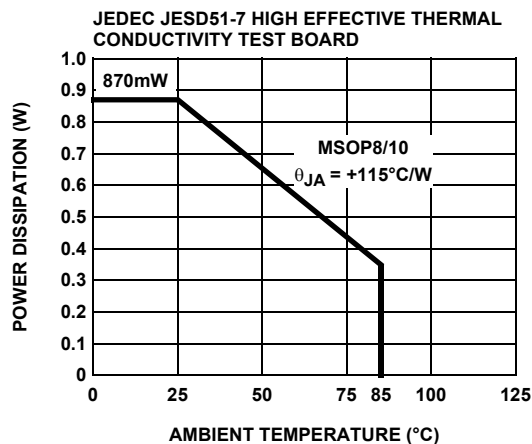


FIGURE 17. PACKAGE POWER DISSIPATION vs AMBIENT TEMPERATURE

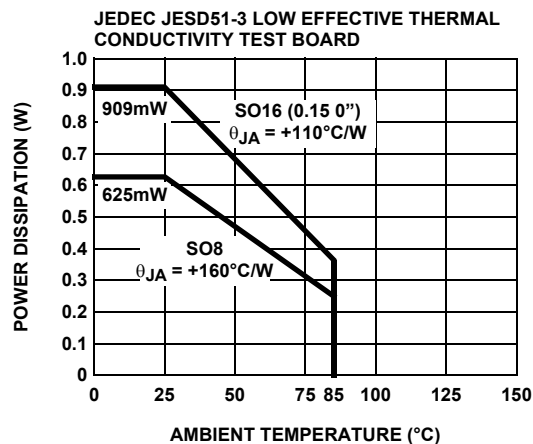


FIGURE 18. PACKAGE POWER DISSIPATION vs AMBIENT TEMPERATURE

# Typical Performance Curves (Continued)

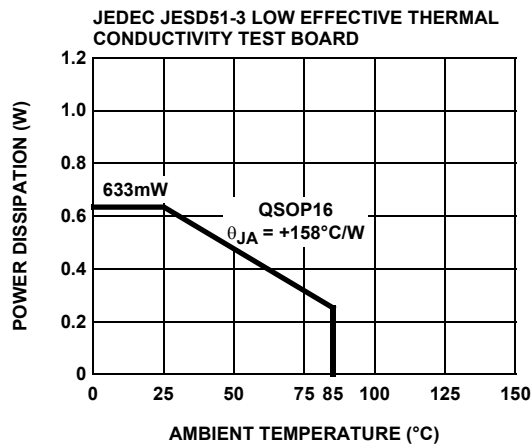


FIGURE 19. PACKAGE POWER DISSIPATION vs AMBIENT TEMPERATURE

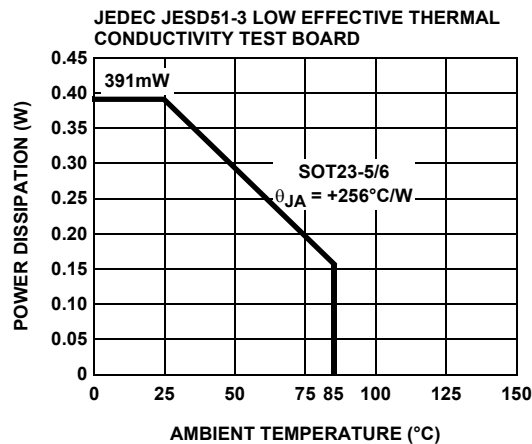


FIGURE 20. PACKAGE POWER DISSIPATION vs AMBIENT TEMPERATURE

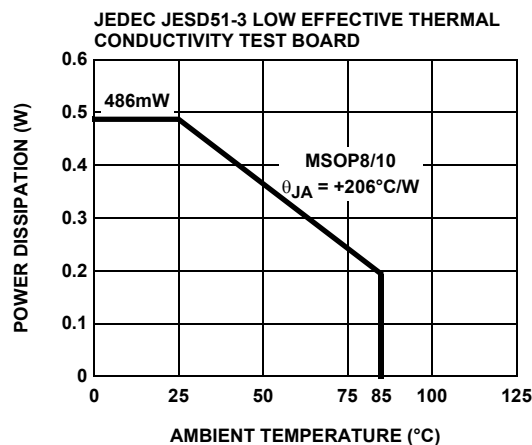


FIGURE 21. PACKAGE POWER DISSIPATION vs AMBIENT TEMPERATURE

## Revision History

The revision history provided is for informational purposes only and is believed to be accurate, but not warranted. Please go to the web to make sure that you have the latest revision.

| DATE            | REVISION  | CHANGE                                                                                                  |
|-----------------|-----------|---------------------------------------------------------------------------------------------------------|
| August 26, 2015 | FN7388.13 | Updated the Ordering Information table on page 2.                                                       |
| April 6, 2015   | FN7388.12 | Added Note 4 to the Ordering Information table on page 2.<br>Added Revision History and About Intersil. |

## About Intersil

Intersil Corporation is a leading provider of innovative power management and precision analog solutions. The company's products address some of the largest markets within the industrial and infrastructure, mobile computing and high-end consumer markets.

For the most updated datasheet, application notes, related documentation and related parts, please see the respective product information page found at [www.intersil.com](http://www.intersil.com).

You may report errors or suggestions for improving this datasheet by visiting [www.intersil.com/ask](http://www.intersil.com/ask).

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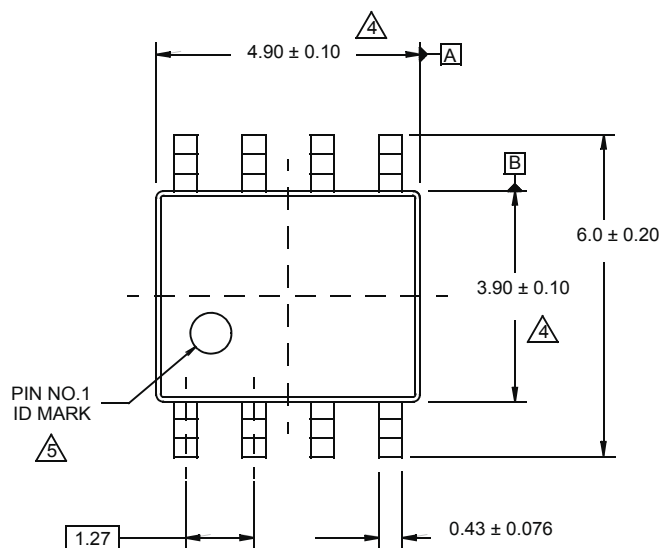
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# Package Outline Drawing

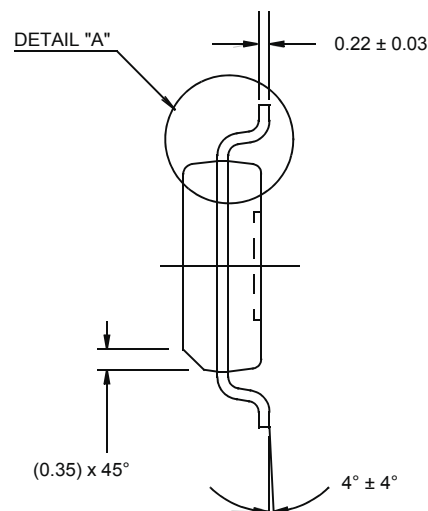
## M8.15E

8 LEAD NARROW BODY SMALL OUTLINE PLASTIC PACKAGE

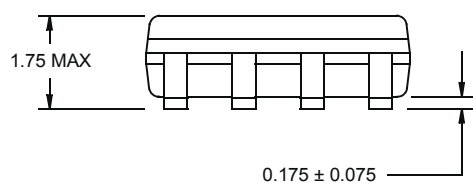
Rev 0, 08/09



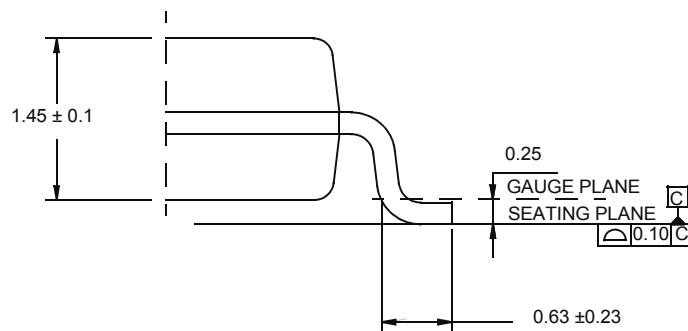
TOP VIEW



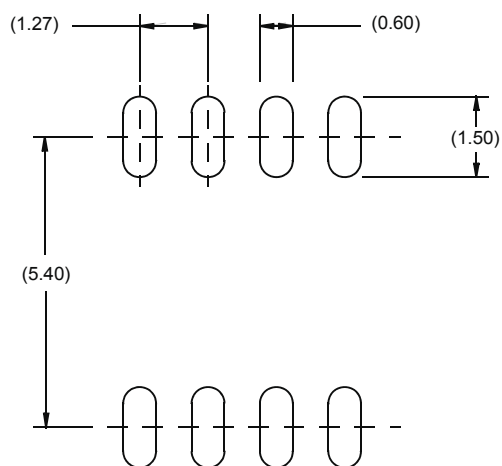
SIDE VIEW "B"



SIDE VIEW "A"



DETAIL "A"



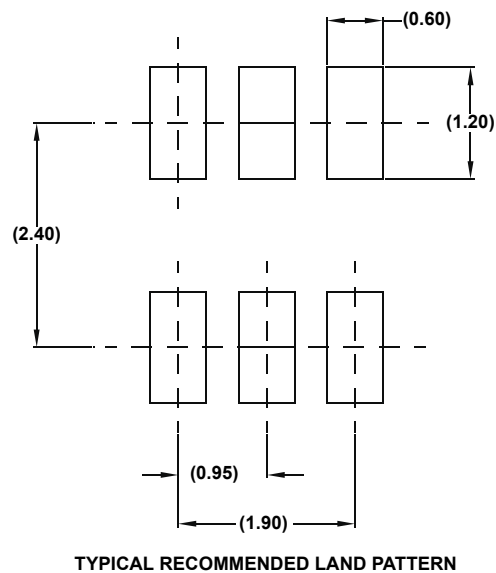
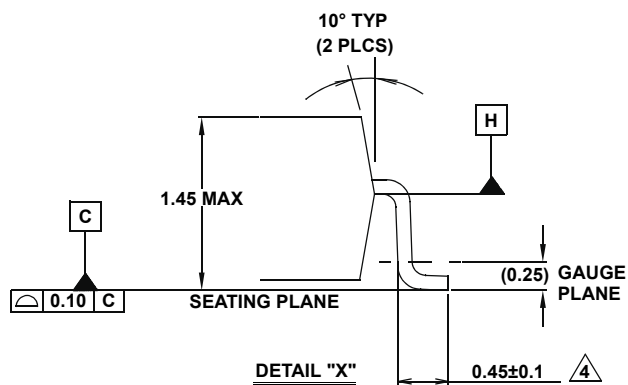
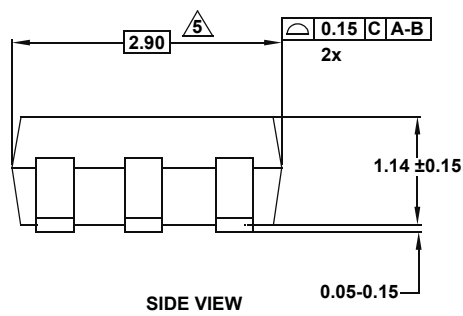
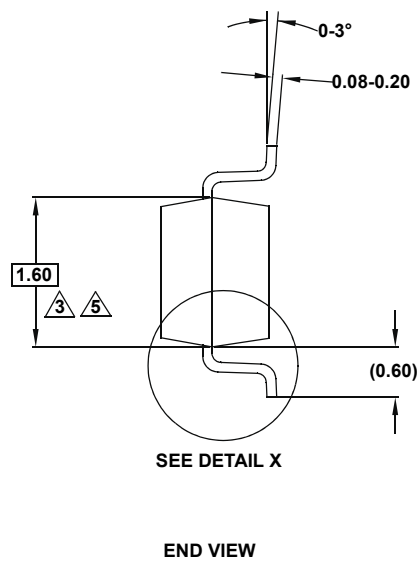
TYPICAL RECOMMENDED LAND PATTERN

### NOTES:

1. Dimensions are in millimeters.  
Dimensions in ( ) for Reference Only.
2. Dimensioning and tolerancing conform to AMSE Y14.5m-1994.
3. Unless otherwise specified, tolerance : Decimal  $\pm 0.05$
4. Dimension does not include interlead flash or protrusions.  
Interlead flash or protrusions shall not exceed 0.25mm per side.
5. The pin #1 identifier may be either a mold or mark feature.
6. Reference to JEDEC MS-012.

**P6.064A**

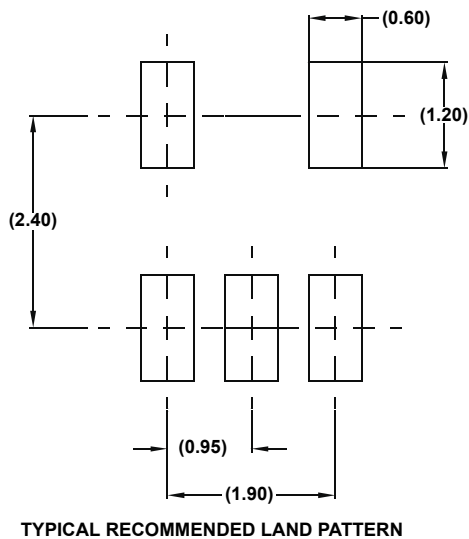
Rev 0, 2/10



1. **Dimensions are in millimeters.**  
**Dimensions in ( ) for Reference Only.**
2. **Dimensioning and tolerancing conform to ASME Y14.5M-1994.**
3. **Dimension is exclusive of mold flash, protrusions or gate burrs.**
4. **Foot length is measured at reference to gauge plane.**
5. **This dimension is measured at Datum “H”.**
6. **Package conforms to JEDEC MO-178AA.**

**P5.064A**

Rev 0, 2/10



1. Dimensions are in millimeters.  
Dimensions in ( ) for Reference Only.
2. Dimensioning and tolerancing conform to ASME Y14.5M-1994.
3. Dimension is exclusive of mold flash, protrusions or gate burrs.
4. Foot length is measured at reference to gauge plane.
5. This dimension is measured at Datum "H".
6. Package conforms to JEDEC MO-178AA.

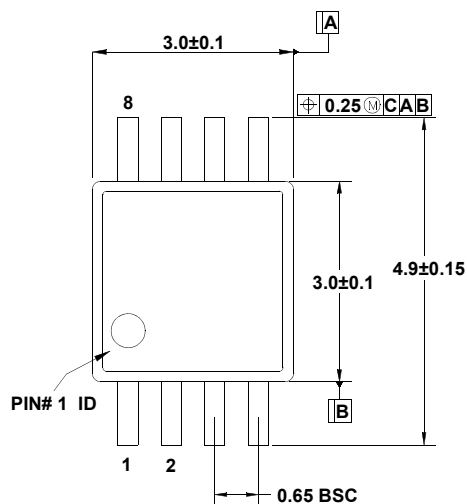


## Package Outline Drawing

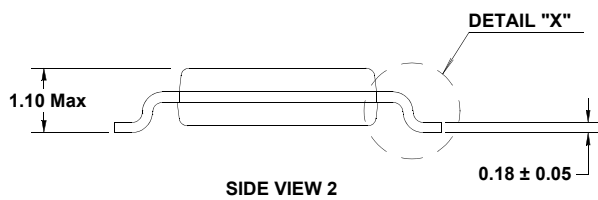
### M8.118A

8 LEAD MINI SMALL OUTLINE PLASTIC PACKAGE (MSOP)

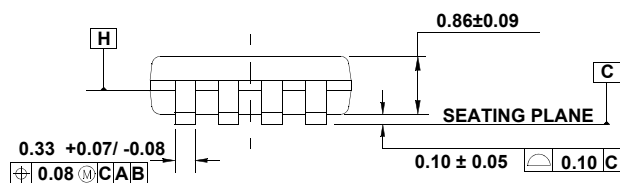
Rev 0, 9/09



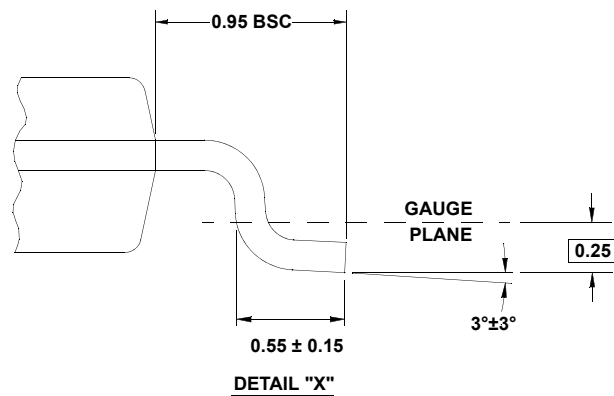
**TOP VIEW**



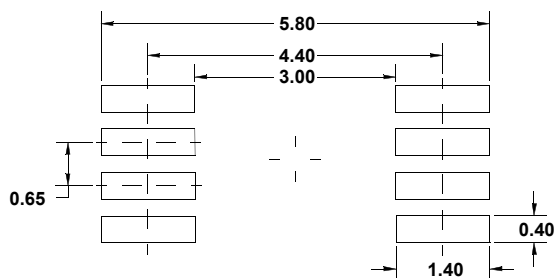
**SIDE VIEW 2**



**SIDE VIEW 1**



**DETAIL "X"**

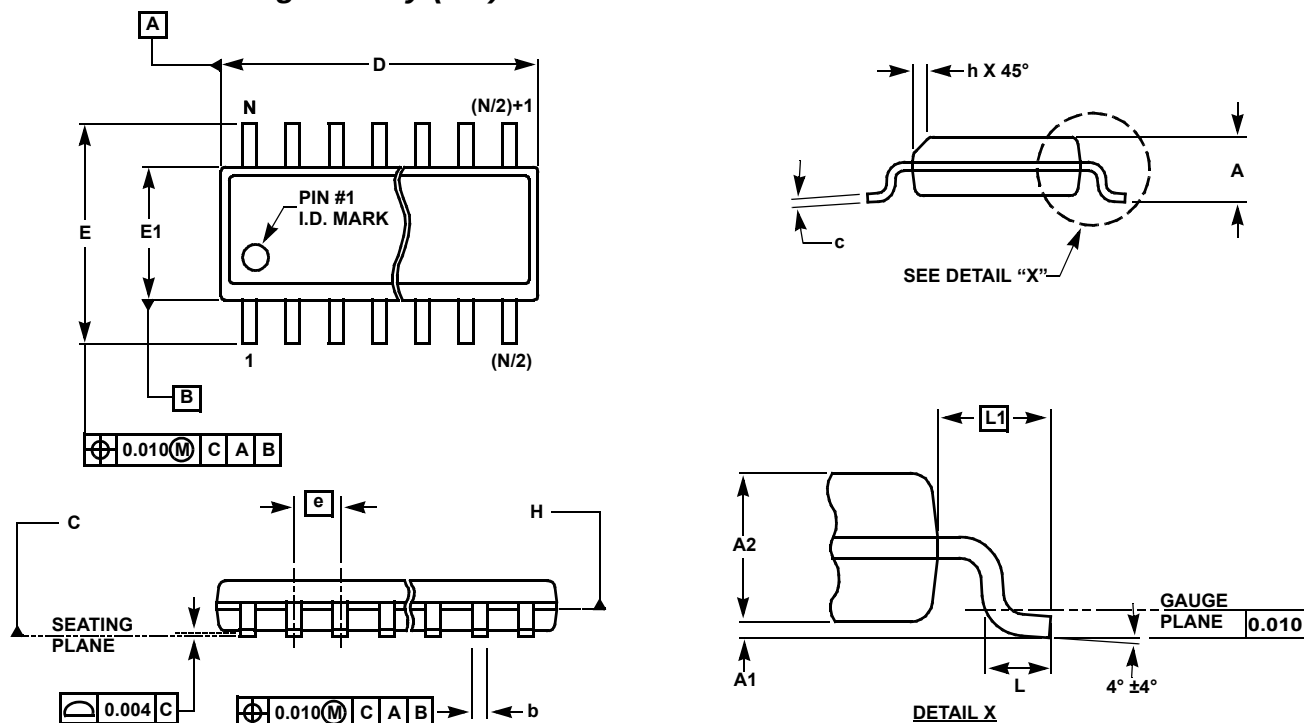


**TYPICAL RECOMMENDED LAND PATTERN**

#### NOTES:

1. Dimensions are in millimeters.
2. Dimensioning and tolerancing conform to JEDEC MO-187-AA and AMSE Y14.5m-1994.
3. Plastic or metal protrusions of 0.15mm max per side are not included.
4. Plastic interlead protrusions of 0.25mm max per side are not included.
5. Dimensions "D" and "E1" are measured at Datum Plane "H".
6. This replaces existing drawing # MDP0043 MSOP 8L.

## Small Outline Package Family (SO)



### MDP0027

#### SMALL OUTLINE PACKAGE FAMILY (SO)

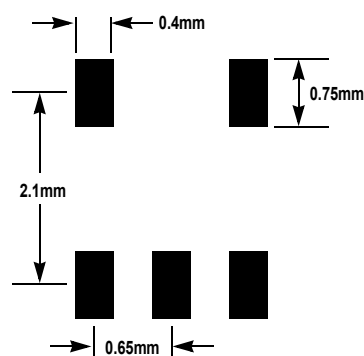
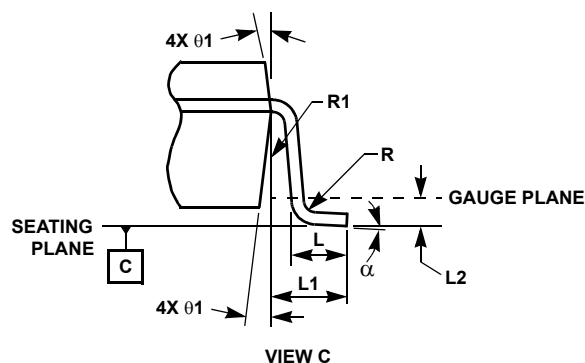
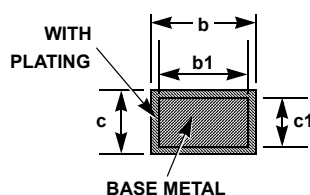
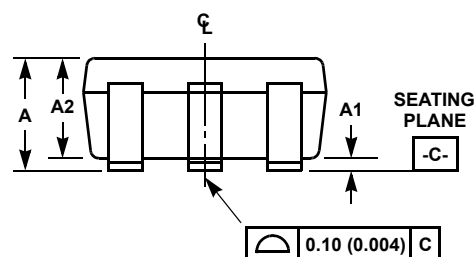
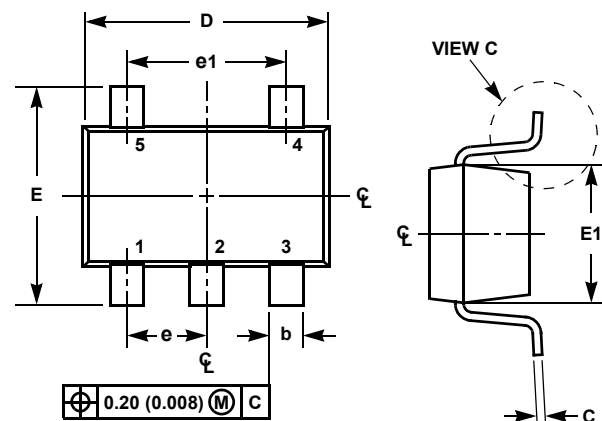
| SYMBOL | INCHES |       |                  |                           |                  |                  |                  | TOLERANCE | NOTES |
|--------|--------|-------|------------------|---------------------------|------------------|------------------|------------------|-----------|-------|
|        | SO-8   | SO-14 | SO16<br>(0.150") | SO16 (0.300")<br>(SOL-16) | SO20<br>(SOL-20) | SO24<br>(SOL-24) | SO28<br>(SOL-28) |           |       |
| A      | 0.068  | 0.068 | 0.068            | 0.104                     | 0.104            | 0.104            | 0.104            | MAX       | -     |
| A1     | 0.006  | 0.006 | 0.006            | 0.007                     | 0.007            | 0.007            | 0.007            | ±0.003    | -     |
| A2     | 0.057  | 0.057 | 0.057            | 0.092                     | 0.092            | 0.092            | 0.092            | ±0.002    | -     |
| b      | 0.017  | 0.017 | 0.017            | 0.017                     | 0.017            | 0.017            | 0.017            | ±0.003    | -     |
| c      | 0.009  | 0.009 | 0.009            | 0.011                     | 0.011            | 0.011            | 0.011            | ±0.001    | -     |
| D      | 0.193  | 0.341 | 0.390            | 0.406                     | 0.504            | 0.606            | 0.704            | ±0.004    | 1, 3  |
| E      | 0.236  | 0.236 | 0.236            | 0.406                     | 0.406            | 0.406            | 0.406            | ±0.008    | -     |
| E1     | 0.154  | 0.154 | 0.154            | 0.295                     | 0.295            | 0.295            | 0.295            | ±0.004    | 2, 3  |
| e      | 0.050  | 0.050 | 0.050            | 0.050                     | 0.050            | 0.050            | 0.050            | Basic     | -     |
| L      | 0.025  | 0.025 | 0.025            | 0.030                     | 0.030            | 0.030            | 0.030            | ±0.009    | -     |
| L1     | 0.041  | 0.041 | 0.041            | 0.056                     | 0.056            | 0.056            | 0.056            | Basic     | -     |
| h      | 0.013  | 0.013 | 0.013            | 0.020                     | 0.020            | 0.020            | 0.020            | Reference | -     |
| N      | 8      | 14    | 16               | 16                        | 20               | 24               | 28               | Reference | -     |

Rev. M 2/07

#### NOTES:

1. Plastic or metal protrusions of 0.006" maximum per side are not included.
2. Plastic interlead protrusions of 0.010" maximum per side are not included.
3. Dimensions "D" and "E1" are measured at Datum Plane "H".
4. Dimensioning and tolerancing per ASME Y14.5M-1994

## Small Outline Transistor Plastic Packages (SC70-5)



TYPICAL RECOMMENDED LAND PATTERN

### P5.049

#### 5 LEAD SMALL OUTLINE TRANSISTOR PLASTIC PACKAGE

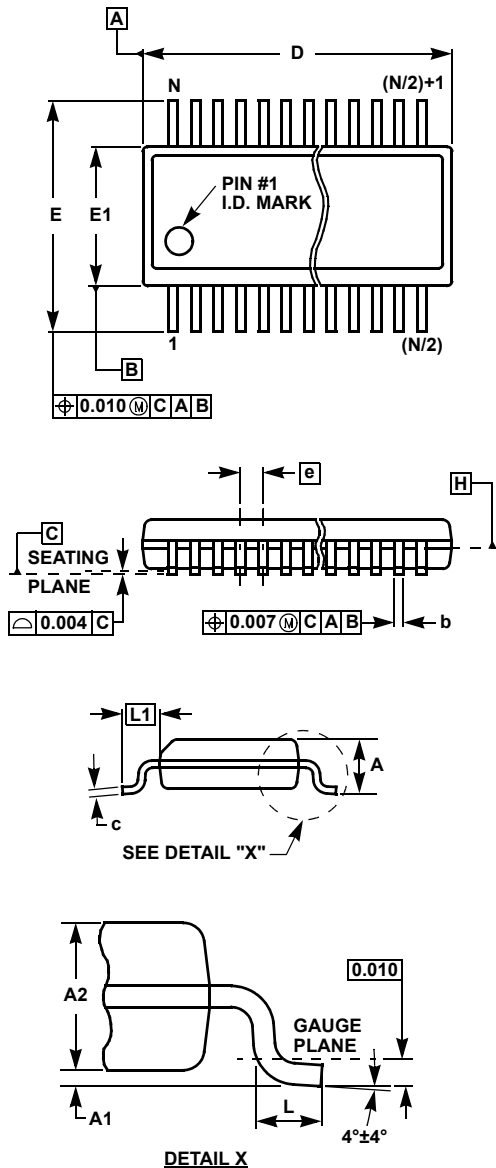
| SYMBOL   | INCHES     |       | MILLIMETERS |      | NOTES |
|----------|------------|-------|-------------|------|-------|
|          | MIN        | MAX   | MIN         | MAX  |       |
| A        | 0.031      | 0.043 | 0.80        | 1.10 | -     |
| A1       | 0.000      | 0.004 | 0.00        | 0.10 | -     |
| A2       | 0.031      | 0.039 | 0.80        | 1.00 | -     |
| b        | 0.006      | 0.012 | 0.15        | 0.30 | -     |
| b1       | 0.006      | 0.010 | 0.15        | 0.25 |       |
| c        | 0.003      | 0.009 | 0.08        | 0.22 | 6     |
| c1       | 0.003      | 0.009 | 0.08        | 0.20 | 6     |
| D        | 0.073      | 0.085 | 1.85        | 2.15 | 3     |
| E        | 0.071      | 0.094 | 1.80        | 2.40 | -     |
| E1       | 0.045      | 0.053 | 1.15        | 1.35 | 3     |
| e        | 0.0256 Ref |       | 0.65 Ref    |      | -     |
| e1       | 0.0512 Ref |       | 1.30 Ref    |      | -     |
| L        | 0.010      | 0.018 | 0.26        | 0.46 | 4     |
| L1       | 0.017 Ref. |       | 0.420 Ref.  |      | -     |
| L2       | 0.006 BSC  |       | 0.15 BSC    |      |       |
| $\alpha$ | 0°         | 8°    | 0°          | 8°   | -     |
| N        | 5          |       | 5           |      | 5     |
| R        | 0.004      | -     | 0.10        | -    |       |
| R1       | 0.004      | 0.010 | 0.15        | 0.25 |       |

Rev. 3 7/07

#### NOTES:

1. Dimensioning and tolerances per ASME Y14.5M-1994.
2. Package conforms to EIAJ SC70 and JEDEC MO-203AA.
3. Dimensions D and E1 are exclusive of mold flash, protrusions, or gate burrs.
4. Footlength L measured at reference to gauge plane.
5. "N" is the number of terminal positions.
6. These Dimensions apply to the flat section of the lead between 0.08mm and 0.15mm from the lead tip.
7. Controlling dimension: MILLIMETER. Converted inch dimensions are for reference only.

Quarter Size Outline Plastic Packages Family (QSOP)



MDP0040  
QUARTER SIZE OUTLINE PLASTIC PACKAGES FAMILY

| SYMBOL | INCHES |        |        | TOLERANCE | NOTES |
|--------|--------|--------|--------|-----------|-------|
|        | QSOP16 | QSOP24 | QSOP28 |           |       |
| A      | 0.068  | 0.068  | 0.068  | Max.      | -     |
| A1     | 0.006  | 0.006  | 0.006  | ±0.002    | -     |
| A2     | 0.056  | 0.056  | 0.056  | ±0.004    | -     |
| b      | 0.010  | 0.010  | 0.010  | ±0.002    | -     |
| c      | 0.008  | 0.008  | 0.008  | ±0.001    | -     |
| D      | 0.193  | 0.341  | 0.390  | ±0.004    | 1, 3  |
| E      | 0.236  | 0.236  | 0.236  | ±0.008    | -     |
| E1     | 0.154  | 0.154  | 0.154  | ±0.004    | 2, 3  |
| e      | 0.025  | 0.025  | 0.025  | Basic     | -     |
| L      | 0.025  | 0.025  | 0.025  | ±0.009    | -     |
| L1     | 0.041  | 0.041  | 0.041  | Basic     | -     |
| N      | 16     | 24     | 28     | Reference | -     |

Rev. F 2/07

- NOTES:
1. Plastic or metal protrusions of 0.006" maximum per side are not included.
  2. Plastic interlead protrusions of 0.010" maximum per side are not included.
  3. Dimensions "D" and "E1" are measured at Datum Plane "H".
  4. Dimensioning and tolerancing per ASME Y14.5M-1994.