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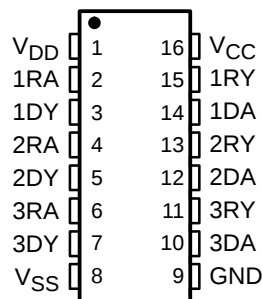
Jameco Part Number 1056313

# SN65C1406, SN75C1406 TRIPLE LOW-POWER DRIVERS/RECEIVERS

SLLS148E – MAY 1990 – REVISED OCTOBER 2001

- Meet or Exceed the Requirements of TIA/EIA-232-F and ITU Recommendation V.28
- Very Low Power Consumption . . . 5 mW Typ
- Wide Driver Supply Voltage Range . . .  $\pm 4.5$  V to  $\pm 15$  V
- Driver Output Slew Rate Limited to 30 V/ $\mu$ s Max
- Receiver Input Hysteresis . . . 1000 mV Typ
- Push-Pull Receiver Outputs
- On-Chip Receiver 1- $\mu$ s Noise Filter
- Functionally Interchangeable With Motorola MC145406 and Texas Instruments TL145406
- Package Options Include Plastic Small-Outline (D, DW, NS) Packages and DIPs (N)

SN65C1406 . . . D PACKAGE  
SN75C1406 . . . D, DW, N, OR NS PACKAGE  
(TOP VIEW)



## description

The SN65C1406 and SN75C1406 are low-power BiMOS devices containing three independent drivers and receivers that are used to interface data terminal equipment (DTE) with data circuit-terminating equipment (DCE). These devices are designed to conform to TIA/EIA-232-F. The drivers and receivers of the SN65C1406 and SN75C1406 are similar to those of the SN75C188 quadruple driver and SN75C189A quadruple receiver, respectively. The drivers have a controlled output slew rate that is limited to a maximum of 30 V/ $\mu$ s, and the receivers have filters that reject input noise pulses shorter than 1  $\mu$ s. Both these features eliminate the need for external components.

The SN65C1406 and SN75C1406 are designed using low-power techniques in a BiMOS technology. In most applications, the receivers contained in these devices interface to single inputs of peripheral devices such as ACEs, UARTs, or microprocessors. By using sampling, such peripheral devices are usually insensitive to the transition times of the input signals. If this is not the case, or for other uses, it is recommended that the SN65C1406 and SN75C1406 receiver outputs be buffered by single Schmitt input gates or single gates of the HCMOS, ALS, or 74F logic families.

The SN65C1406 is characterized for operation from  $-40^{\circ}\text{C}$  to  $85^{\circ}\text{C}$ . The SN75C1406 is characterized for operation from  $0^{\circ}\text{C}$  to  $70^{\circ}\text{C}$ .

## AVAILABLE OPTIONS

| T <sub>A</sub>                                | PACKAGED DEVICES  |                    |                 |                            |
|-----------------------------------------------|-------------------|--------------------|-----------------|----------------------------|
|                                               | SMALL OUTLINE (D) | SMALL OUTLINE (DW) | PLASTIC DIP (N) | PLASTIC SMALL OUTLINE (NS) |
| $-40^{\circ}\text{C}$ to $85^{\circ}\text{C}$ | SN65C1406D        | —                  | —               | —                          |
| $0^{\circ}\text{C}$ to $70^{\circ}\text{C}$   | SN75C1406D        | SN75C1406DW        | SN75C1406N      | SN75C1406NS                |

The D, DW, and PW packages are available taped and reeled. Add the suffix R to device type (e.g., SN75C1406DR).



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PRODUCTION DATA information is current as of publication date. Products conform to specifications per the terms of Texas Instruments standard warranty. Production processing does not necessarily include testing of all parameters.

**TEXAS  
INSTRUMENTS**

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# SN65C1406, SN75C1406

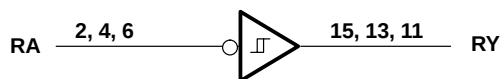
## TRIPLE LOW-POWER DRIVERS/RECEIVERS

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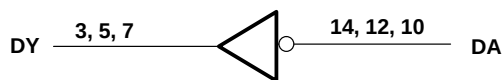
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### logic diagram (positive logic)

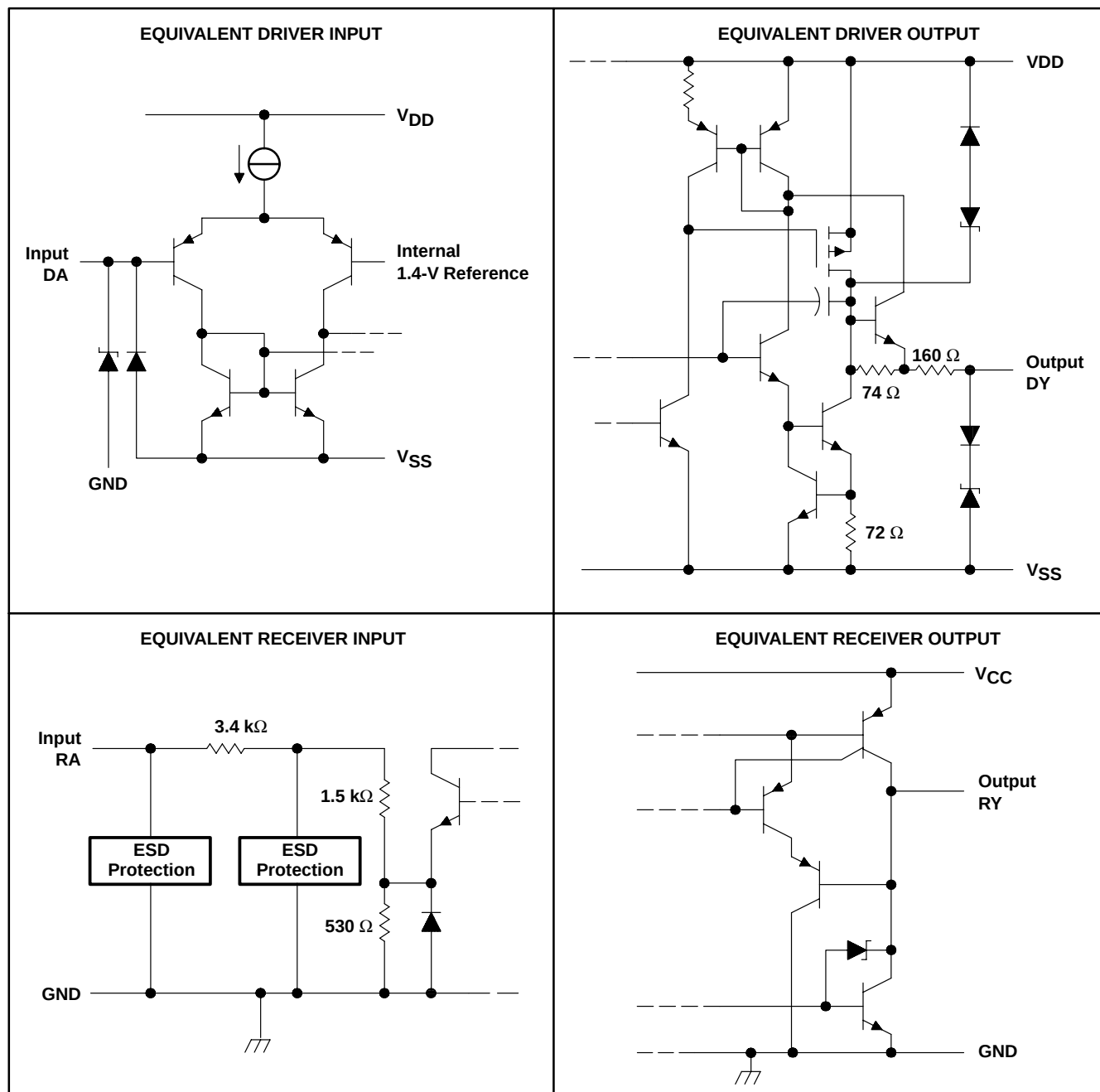
Typical of Each Receiver



Typical of Each Driver



## schematics of inputs and outputs



All resistor values shown are nominal.

# SN65C1406, SN75C1406

## TRIPLE LOW-POWER DRIVERS/RECEIVERS

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### absolute maximum ratings over operating free-air temperature range (unless otherwise noted)<sup>†</sup>

|                                                                  |                                                      |
|------------------------------------------------------------------|------------------------------------------------------|
| Supply voltage: $V_{DD}$ (see Note 1)                            | 15 V                                                 |
| $V_{SS}$                                                         | –15 V                                                |
| $V_{CC}$                                                         | 7 V                                                  |
| Input voltage range, $V_I$ : Driver                              | $V_{SS}$ to $V_{DD}$                                 |
| Receiver                                                         | –30 V to 30 V                                        |
| Output voltage range, $V_O$ : Driver                             | $(V_{SS} - 6 \text{ V})$ to $(V_{DD} + 6 \text{ V})$ |
| Receiver                                                         | –0.3 V to $(V_{CC} + 0.3 \text{ V})$                 |
| Package thermal impedance, $\theta_{JA}$ (see Note 2): D package | 73°C/W                                               |
| DW package                                                       | 57°C/W                                               |
| N package                                                        | 67°C/W                                               |
| NS package                                                       | 64°C/W                                               |
| Lead temperature 1,6 mm (1/16 inch) from case for 10 seconds     | 260°C                                                |
| Storage temperature range, $T_{stg}$                             | –65°C to 150 °C                                      |

<sup>†</sup> 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 under “recommended operating conditions” is not implied. Exposure to absolute-maximum-rated conditions for extended periods may affect device reliability.

NOTES: 1. All voltages are with respect to the network ground terminal.

2. The package thermal impedance is calculated in accordance with JESD 51-7.

### recommended operating conditions

|          |                                | MIN          | NOM      | MAX      | UNIT |
|----------|--------------------------------|--------------|----------|----------|------|
| $V_{DD}$ | Supply voltage                 | 4.5          | 12       | 15       | V    |
| $V_{SS}$ | Supply voltage                 | –4.5         | –12      | –15      | V    |
| $V_{CC}$ | Supply voltage                 | 4.5          | 5        | 6        | V    |
| $V_I$    | Input voltage                  | $V_{SS} + 2$ | $V_{DD}$ | $\pm 25$ | V    |
|          |                                |              |          |          |      |
| $V_{IH}$ | High-level input voltage       | 2            |          |          | V    |
| $V_{IL}$ | Low-level input voltage        |              |          | 0.8      | V    |
| $I_{OH}$ | High-level output current      |              |          | –1       | mA   |
| $I_{OL}$ | Low-level output current       |              |          | 3.2      | mA   |
| $T_A$    | Operating free-air temperature | SN65C1406    |          | –40      | 85   |
|          |                                | SN75C1406    |          | 0        | 70   |
|          |                                |              |          |          | °C   |



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## DRIVER SECTION

**electrical characteristics over operating free-air temperature range,  $V_{DD} = 12\text{ V}$ ,  $V_{SS} = -12\text{ V}$ ,  $V_{CC} = 5\text{ V} \pm 10\%$  (unless otherwise noted)**

| PARAMETER                                                        | TEST CONDITIONS                                                      | MIN                                              | TYP <sup>†</sup> | MAX   | UNIT          |
|------------------------------------------------------------------|----------------------------------------------------------------------|--------------------------------------------------|------------------|-------|---------------|
| $V_{OH}$ High-level output voltage                               | $V_{IH} = 0.8\text{ V}$ , $R_L = 3\text{ k}\Omega$ ,<br>See Figure 1 | $V_{DD} = 5\text{ V}$ , $V_{SS} = -5\text{ V}$   | 4                | 4.5   | V             |
|                                                                  |                                                                      | $V_{DD} = 12\text{ V}$ , $V_{SS} = -12\text{ V}$ | 10               | 10.8  |               |
| $V_{OL}$ Low-level output voltage<br>(see Note 3)                | $V_{IH} = 2\text{ V}$ , $R_L = 3\text{ k}\Omega$ ,<br>See Figure 1   | $V_{DD} = 5\text{ V}$ , $V_{SS} = -5\text{ V}$   | -4.4             | -4    | V             |
|                                                                  |                                                                      | $V_{DD} = 12\text{ V}$ , $V_{SS} = -12\text{ V}$ | -10.7            | -10   |               |
| $I_{IH}$ High-level input current                                | $V_I = 5\text{ V}$ , See Figure 2                                    |                                                  |                  | 1     | $\mu\text{A}$ |
| $I_{IL}$ Low-level input current                                 | $V_I = 0$ , See Figure 2                                             |                                                  |                  | -1    | $\mu\text{A}$ |
| $I_{OS(H)}$ High-level short-circuit output current <sup>‡</sup> | $V_I = 0.8\text{ V}$ , $V_O = 0$ or $V_{SS}$ , See Figure 1          | -7.5                                             | -12              | -19.5 | mA            |
| $I_{OS(L)}$ Low-level short-circuit output current <sup>‡</sup>  | $V_I = 2\text{ V}$ , $V_O = 0$ or $V_{DD}$ , See Figure 1            | 7.5                                              | 12               | 19.5  | mA            |
| $I_{DD}$ Supply current from $V_{DD}$                            | No load,<br>All inputs at 2 V or 0.8 V                               | $V_{DD} = 5\text{ V}$ , $V_{SS} = -5\text{ V}$   | 115              | 250   | $\mu\text{A}$ |
|                                                                  |                                                                      | $V_{DD} = 12\text{ V}$ , $V_{SS} = -12\text{ V}$ | 115              | 250   |               |
| $I_{SS}$ Supply current from $V_{SS}$                            | No load,<br>All inputs at 2 V or 0.8 V                               | $V_{DD} = 5\text{ V}$ , $V_{SS} = -5\text{ V}$   | -115             | -250  | $\mu\text{A}$ |
|                                                                  |                                                                      | $V_{DD} = 12\text{ V}$ , $V_{SS} = -12\text{ V}$ | -115             | -250  |               |
| $r_O$ Output resistance                                          | $V_{DD} = V_{SS} = V_{CC} = 0$ ,<br>See Note 4                       | $V_O = -2\text{ V}$ to $2\text{ V}$ ,            | 300              | 400   | $\Omega$      |

<sup>†</sup> All typical values are at  $T_A = 25^\circ\text{C}$ .

<sup>‡</sup> Not more than one output should be shorted at a time.

NOTES: 3. The algebraic convention, where the more positive (less negative) limit is designated as maximum, is used in this data sheet for logic levels only.

4. Test conditions are those specified by TIA/EIA-232-F.

**switching characteristics at  $T_A = 25^\circ\text{C}$ ,  $V_{DD} = 12\text{ V}$ ,  $V_{SS} = -12\text{ V}$ ,  $V_{CC} = 5\text{ V} \pm 10\%$**

| PARAMETER                                                                | TEST CONDITIONS                                                                           | MIN  | TYP | MAX | UNIT             |
|--------------------------------------------------------------------------|-------------------------------------------------------------------------------------------|------|-----|-----|------------------|
| $t_{PLH}$ Propagation delay time, low- to high-level output <sup>§</sup> | $R_L = 3\text{ k}\Omega$ to $7\text{ k}\Omega$ , $C_L = 15\text{ pF}$ ,<br>See Figure 3   |      | 1.2 | 3   | $\mu\text{s}$    |
| $t_{PHL}$ Propagation delay time, high- to low-level output <sup>§</sup> | $R_L = 3\text{ k}\Omega$ to $7\text{ k}\Omega$ , $C_L = 15\text{ pF}$ ,<br>See Figure 3   |      | 2.5 | 3.5 | $\mu\text{s}$    |
| $t_{TLH}$ Transition time, low- to high-level output <sup>¶</sup>        | $R_L = 3\text{ k}\Omega$ to $7\text{ k}\Omega$ , $C_L = 15\text{ pF}$ ,<br>See Figure 3   | 0.53 | 2   | 3.2 | $\mu\text{s}$    |
| $t_{THL}$ Transition time, high- to low-level output <sup>¶</sup>        | $R_L = 3\text{ k}\Omega$ to $7\text{ k}\Omega$ , $C_L = 15\text{ pF}$ ,<br>See Figure 3   | 0.53 | 2   | 3.2 | $\mu\text{s}$    |
| $t_{TLH}$ Transition time, low- to high-level output <sup>#</sup>        | $R_L = 3\text{ k}\Omega$ to $7\text{ k}\Omega$ , $C_L = 2500\text{ pF}$ ,<br>See Figure 3 |      | 1   | 2   | $\mu\text{s}$    |
| $t_{THL}$ Transition time, high- to low-level output <sup>#</sup>        | $R_L = 3\text{ k}\Omega$ to $7\text{ k}\Omega$ , $C_L = 2500\text{ pF}$ ,<br>See Figure 3 |      | 1   | 2   | $\mu\text{s}$    |
| SR Output slew rate                                                      | $R_L = 3\text{ k}\Omega$ to $7\text{ k}\Omega$ , $C_L = 15\text{ pF}$ ,<br>See Figure 3   | 4    | 10  | 30  | V/ $\mu\text{s}$ |

<sup>§</sup>  $t_{PHL}$  and  $t_{PLH}$  include the additional time due to on-chip slew rate and are measured at the 50% points.

<sup>¶</sup> Measured between 10% and 90% points of output waveform

<sup>#</sup> Measured between 3-V and -3-V points of output waveform (TIA/EIA-232-F conditions) with all unused inputs tied either high or low

# SN65C1406, SN75C1406

## TRIPLE LOW-POWER DRIVERS/RECEIVERS

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### RECEIVER SECTION

**electrical characteristics over operating free-air temperature range,  $V_{DD} = 12\text{ V}$ ,  $V_{SS} = -12\text{ V}$ ,  $V_{CC} = 5\text{ V} \pm 10\%$  (unless otherwise noted)**

| PARAMETER                                                  | TEST CONDITIONS                                                                     | MIN                                              | TYP <sup>†</sup> | MAX  | UNIT          |
|------------------------------------------------------------|-------------------------------------------------------------------------------------|--------------------------------------------------|------------------|------|---------------|
| $V_{IT+}$ Positive-going input threshold voltage           | See Figure 5                                                                        | 1.7                                              | 2                | 2.55 | V             |
| $V_{IT-}$ Negative-going input threshold voltage           | See Figure 5                                                                        | 0.65                                             | 1                | 1.25 | V             |
| $V_{hys}$ Input hysteresis voltage ( $V_{IT+} - V_{IT-}$ ) |                                                                                     | 600                                              | 1000             |      | mV            |
| $V_{OH}$ High-level output voltage                         | $V_I = 0.75\text{ V}$ , $I_{OH} = -20\text{ }\mu\text{A}$ , See Figure 5 and Note 5 | 3.5                                              |                  |      | V             |
|                                                            | $V_I = 0.75\text{ V}$ , $I_{OH} = -1\text{ mA}$ , $V_{CC} = 4.5\text{ V}$           | 2.8                                              | 4.4              |      |               |
|                                                            | $V_I = 0.75\text{ V}$ , $I_{OH} = -1\text{ mA}$ , $V_{CC} = 5\text{ V}$             | 3.8                                              | 4.9              |      |               |
|                                                            | $V_I = 0.75\text{ V}$ , $I_{OH} = -1\text{ mA}$ , $V_{CC} = 5.5\text{ V}$           | 4.3                                              | 5.4              |      |               |
| $V_{OL}$ Low-level output voltage                          | $V_I = 3\text{ V}$ , $I_{OL} = 3.2\text{ mA}$ , See Figure 5                        |                                                  | 0.17             | 0.4  | V             |
| $I_{IH}$ High-level input current                          | $V_I = 2.5\text{ V}$                                                                | 3.6                                              | 4.6              | 8.3  | mA            |
|                                                            | $V_I = 3\text{ V}$                                                                  | 0.43                                             | 0.55             | 1    |               |
| $I_{IL}$ Low-level input current                           | $V_I = -2.5\text{ V}$                                                               | -3.6                                             | -5               | -8.3 | mA            |
|                                                            | $V_I = -3\text{ V}$                                                                 | -0.43                                            | -0.55            | -1   |               |
| $I_{OS(H)}$ High-level short-circuit output current        | $V_I = 0.75\text{ V}$ , $V_O = 0$ , See Figure 4                                    |                                                  | -8               | -15  | mA            |
| $I_{OS(L)}$ Low-level short-circuit output current         | $V_I = V_{CC}$ , $V_O = V_{CC}$ , See Figure 4                                      |                                                  | 13               | 25   | mA            |
| $I_{CC}$ Supply current from $V_{CC}$                      | No load,<br>All inputs at 0 or 5 V                                                  | $V_{DD} = 5\text{ V}$ , $V_{SS} = -5\text{ V}$   | 320              | 450  | $\mu\text{A}$ |
|                                                            |                                                                                     | $V_{DD} = 12\text{ V}$ , $V_{SS} = -12\text{ V}$ | 320              | 450  |               |

<sup>†</sup> All typical values are at  $T_A = 25^\circ\text{C}$ .

NOTE 5: If the inputs are left unconnected, the receiver interprets this as an input low and the receiver outputs remain in the high state.

**switching characteristics at  $T_A = 25^\circ\text{C}$ ,  $V_{DD} = 12\text{ V}$ ,  $V_{SS} = -12\text{ V}$ ,  $V_{CC} = 5\text{ V} \pm 10\%$  (unless otherwise noted)**

| PARAMETER                                                           | TEST CONDITIONS                                                   | MIN | TYP | MAX | UNIT          |
|---------------------------------------------------------------------|-------------------------------------------------------------------|-----|-----|-----|---------------|
| $t_{PLH}$ Propagation delay time, low- to high-level output         | $C_L = 50\text{ pF}$ , $R_L = 5\text{ k}\Omega$ ,<br>See Figure 6 |     | 3   | 4   | $\mu\text{s}$ |
| $t_{PHL}$ Propagation delay time, high- to low-level output         | $C_L = 50\text{ pF}$ , $R_L = 5\text{ k}\Omega$ ,<br>See Figure 6 |     | 3   | 4   | $\mu\text{s}$ |
| $t_{TLH}$ Transition time, low- to high-level output <sup>‡</sup>   | $C_L = 50\text{ pF}$ , $R_L = 5\text{ k}\Omega$ ,<br>See Figure 6 |     | 300 | 450 | ns            |
| $t_{THL}$ Transition time, high- to low-level output <sup>‡</sup>   | $C_L = 50\text{ pF}$ , $R_L = 5\text{ k}\Omega$ ,<br>See Figure 6 |     | 100 | 300 | ns            |
| $t_{W(N)}$ Duration of longest pulse rejected as noise <sup>§</sup> | $C_L = 50\text{ pF}$ , $R_L = 5\text{ k}\Omega$                   | 1   |     | 4   | $\mu\text{s}$ |

<sup>‡</sup> Measured between 10% and 90% points of output waveform

<sup>§</sup> The receiver ignores any positive- or negative-going pulse that is less than the minimum value of  $t_{W(N)}$  and accepts any positive- or negative-going pulse greater than the maximum of  $t_{W(N)}$ .



PARAMETER MEASUREMENT INFORMATION

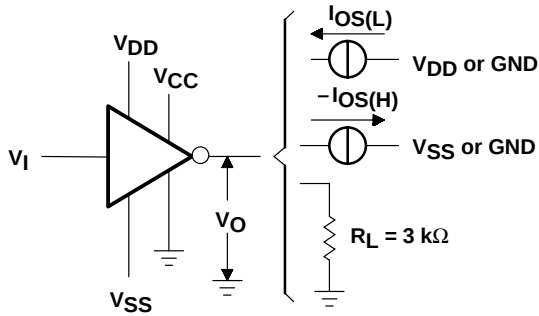


Figure 1. Driver Test Circuit  
 $V_{OH}$ ,  $V_{OL}$ ,  $I_{OS(L)}$ ,  $I_{OS(H)}$

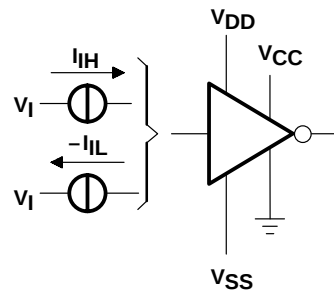
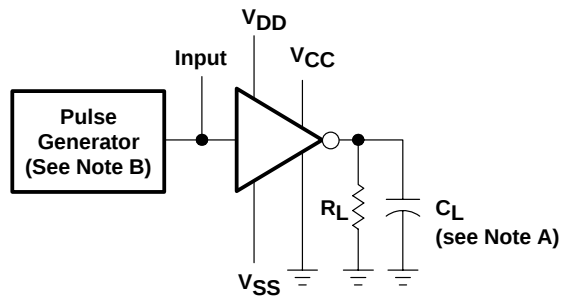
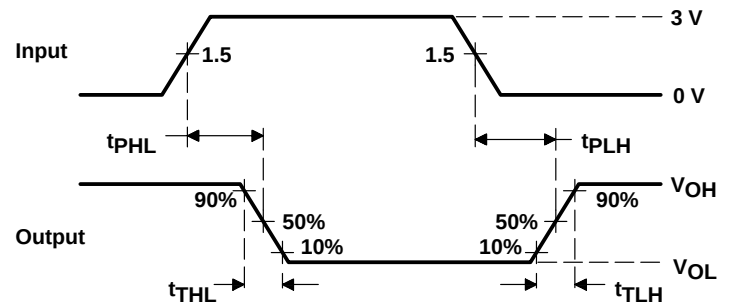


Figure 2. Driver Test Circuit,  $I_{IL}$ ,  $I_{IH}$



TEST CIRCUIT



VOLTAGE WAVEFORMS

NOTES: A.  $C_L$  includes probe and jig capacitance.

B. The pulse generator has the following characteristics:  $t_W = 25 \mu s$ ,  $PRR = 20 \text{ kHz}$ ,  $Z_O = 50 \Omega$ ,  $t_r = t_f < 50 \text{ ns}$ .

Figure 3. Driver Test Circuit and Voltage Waveforms

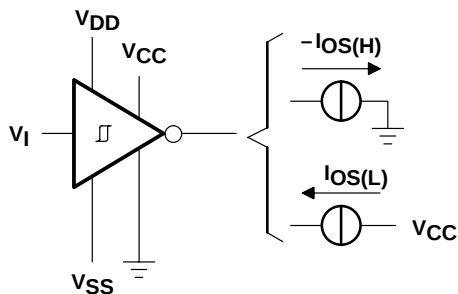


Figure 4. Receiver Test Circuit,  $I_{OS(H)}$ ,  $I_{OS(L)}$

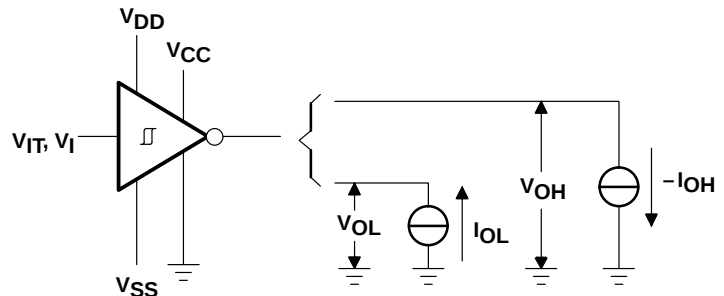
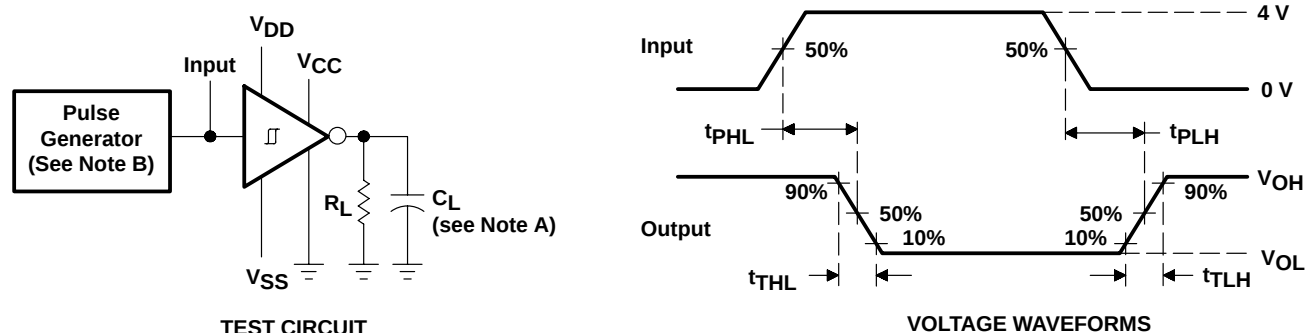


Figure 5. Receiver Test Circuit,  $V_{IT}$ ,  $V_{OL}$ ,  $V_{OH}$

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## PARAMETER MEASUREMENT INFORMATION



NOTES: C.  $C_L$  includes probe and jig capacitance.

D. The pulse generator has the following characteristics:  $t_W = 25 \mu s$ ,  $PRR = 20 \text{ kHz}$ ,  $Z_O = 50 \Omega$ ,  $t_r = t_f < 50 \text{ ns}$ .

**Figure 6. Receiver Test Circuit and Voltage Waveforms**

## APPLICATION INFORMATION

The TIA/EIA-232-F specification is for data interchange between a host computer and a peripheral at signaling rates up to 20 kbit/s. Many TIA/EIA-232-F devices will operate at higher data rates with lower capacitive loads (short cables). For reliable operation at greater than 20 kbit/s, the designer needs to have control of both ends of the cable. By mixing different types of TIA/EIA-232-F devices and cable lengths, errors can occur at higher frequencies (above 20 kbit/s). When operating within the TIA/EIA-232-F requirements of less than 20 kbit/s and with compliant line circuits, interoperability is assured. For applications operating above 20 kbit/s, the design engineer should consider devices and system designs that meet the TIA/EIA-232-F requirements.

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| Data Converters       | <a href="http://dataconverter.ti.com">dataconverter.ti.com</a>     |
| DSP                   | <a href="http://dsp.ti.com">dsp.ti.com</a>                         |
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**PACKAGING INFORMATION**

| Orderable Device | Status <sup>(1)</sup> | Package Type | Package Drawing | Pins | Package Qty | Eco Plan <sup>(2)</sup> | Lead/Ball Finish | MSL Peak Temp <sup>(3)</sup> |
|------------------|-----------------------|--------------|-----------------|------|-------------|-------------------------|------------------|------------------------------|
| SN65C1406D       | ACTIVE                | SOIC         | D               | 16   | 40          | Green (RoHS & no Sb/Br) | CU NIPDAU        | Level-1-260C-UNLIM           |
| SN65C1406DE4     | ACTIVE                | SOIC         | D               | 16   | 40          | Green (RoHS & no Sb/Br) | CU NIPDAU        | Level-1-260C-UNLIM           |
| SN65C1406DG4     | ACTIVE                | SOIC         | D               | 16   | 40          | Green (RoHS & no Sb/Br) | CU NIPDAU        | Level-1-260C-UNLIM           |
| SN65C1406DR      | ACTIVE                | SOIC         | D               | 16   | 2500        | Green (RoHS & no Sb/Br) | CU NIPDAU        | Level-1-260C-UNLIM           |
| SN65C1406DRE4    | ACTIVE                | SOIC         | D               | 16   | 2500        | Green (RoHS & no Sb/Br) | CU NIPDAU        | Level-1-260C-UNLIM           |
| SN65C1406DRG4    | ACTIVE                | SOIC         | D               | 16   | 2500        | Green (RoHS & no Sb/Br) | CU NIPDAU        | Level-1-260C-UNLIM           |
| SN65C1406N       | OBSOLETE              | PDIP         | N               | 16   |             | TBD                     | Call TI          | Call TI                      |
| SN75C1406D       | ACTIVE                | SOIC         | D               | 16   | 40          | Green (RoHS & no Sb/Br) | CU NIPDAU        | Level-1-260C-UNLIM           |
| SN75C1406DE4     | ACTIVE                | SOIC         | D               | 16   | 40          | Green (RoHS & no Sb/Br) | CU NIPDAU        | Level-1-260C-UNLIM           |
| SN75C1406DG4     | ACTIVE                | SOIC         | D               | 16   | 40          | Green (RoHS & no Sb/Br) | CU NIPDAU        | Level-1-260C-UNLIM           |
| SN75C1406DR      | ACTIVE                | SOIC         | D               | 16   | 2500        | Green (RoHS & no Sb/Br) | CU NIPDAU        | Level-1-260C-UNLIM           |
| SN75C1406DRE4    | ACTIVE                | SOIC         | D               | 16   | 2500        | Green (RoHS & no Sb/Br) | CU NIPDAU        | Level-1-260C-UNLIM           |
| SN75C1406DRG4    | ACTIVE                | SOIC         | D               | 16   | 2500        | Green (RoHS & no Sb/Br) | CU NIPDAU        | Level-1-260C-UNLIM           |
| SN75C1406DW      | ACTIVE                | SOIC         | DW              | 16   | 40          | Green (RoHS & no Sb/Br) | CU NIPDAU        | Level-1-260C-UNLIM           |
| SN75C1406DWE4    | ACTIVE                | SOIC         | DW              | 16   | 40          | Green (RoHS & no Sb/Br) | CU NIPDAU        | Level-1-260C-UNLIM           |
| SN75C1406DWG4    | ACTIVE                | SOIC         | DW              | 16   | 40          | Green (RoHS & no Sb/Br) | CU NIPDAU        | Level-1-260C-UNLIM           |
| SN75C1406DWR     | ACTIVE                | SOIC         | DW              | 16   | 2000        | Green (RoHS & no Sb/Br) | CU NIPDAU        | Level-1-260C-UNLIM           |
| SN75C1406DWRE4   | ACTIVE                | SOIC         | DW              | 16   | 2000        | Green (RoHS & no Sb/Br) | CU NIPDAU        | Level-1-260C-UNLIM           |
| SN75C1406DWRG4   | ACTIVE                | SOIC         | DW              | 16   | 2000        | Green (RoHS & no Sb/Br) | CU NIPDAU        | Level-1-260C-UNLIM           |
| SN75C1406N       | ACTIVE                | PDIP         | N               | 16   | 25          | Pb-Free (RoHS)          | CU NIPDAU        | N / A for Pkg Type           |
| SN75C1406NE4     | ACTIVE                | PDIP         | N               | 16   | 25          | Pb-Free (RoHS)          | CU NIPDAU        | N / A for Pkg Type           |
| SN75C1406NSR     | ACTIVE                | SO           | NS              | 16   | 2000        | Green (RoHS & no Sb/Br) | CU NIPDAU        | Level-1-260C-UNLIM           |
| SN75C1406NSRE4   | ACTIVE                | SO           | NS              | 16   | 2000        | Green (RoHS & no Sb/Br) | CU NIPDAU        | Level-1-260C-UNLIM           |
| SN75C1406NSRG4   | ACTIVE                | SO           | NS              | 16   | 2000        | Green (RoHS & no Sb/Br) | CU NIPDAU        | Level-1-260C-UNLIM           |

<sup>(1)</sup> The marketing status values are defined as follows:  
**ACTIVE:** Product device recommended for new designs.

**LIFEBUY:** TI has announced that the device will be discontinued, and a lifetime-buy period is in effect.

**NRND:** Not recommended for new designs. Device is in production to support existing customers, but TI does not recommend using this part in a new design.

**PREVIEW:** Device has been announced but is not in production. Samples may or may not be available.

**OBsolete:** TI has discontinued the production of the device.

<sup>(2)</sup> Eco Plan - The planned eco-friendly classification: Pb-Free (RoHS), Pb-Free (RoHS Exempt), or Green (RoHS & no Sb/Br) - please check <http://www.ti.com/productcontent> for the latest availability information and additional product content details.

**TBD:** The Pb-Free/Green conversion plan has not been defined.

**Pb-Free (RoHS):** TI's terms "Lead-Free" or "Pb-Free" mean semiconductor products that are compatible with the current RoHS requirements for all 6 substances, including the requirement that lead not exceed 0.1% by weight in homogeneous materials. Where designed to be soldered at high temperatures, TI Pb-Free products are suitable for use in specified lead-free processes.

**Pb-Free (RoHS Exempt):** This component has a RoHS exemption for either 1) lead-based flip-chip solder bumps used between the die and package, or 2) lead-based die adhesive used between the die and leadframe. The component is otherwise considered Pb-Free (RoHS compatible) as defined above.

**Green (RoHS & no Sb/Br):** TI defines "Green" to mean Pb-Free (RoHS compatible), and free of Bromine (Br) and Antimony (Sb) based flame retardants (Br or Sb do not exceed 0.1% by weight in homogeneous material)

<sup>(3)</sup> MSL, Peak Temp. -- The Moisture Sensitivity Level rating according to the JEDEC industry standard classifications, and peak solder temperature.

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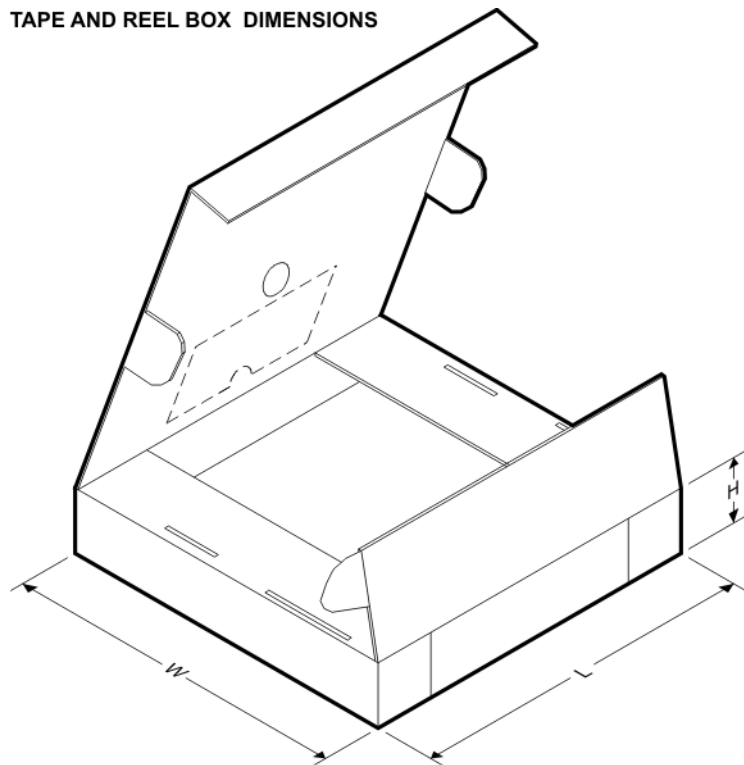
**TAPE AND REEL INFORMATION**



\*All dimensions are nominal

| Device       | Package Type | Package Drawing | Pins | SPQ  | Reel Diameter (mm) | Reel Width W1 (mm) | A0 (mm) | B0 (mm) | K0 (mm) | P1 (mm) | W (mm) | Pin1 Quadrant |
|--------------|--------------|-----------------|------|------|--------------------|--------------------|---------|---------|---------|---------|--------|---------------|
| SN65C1406DR  | SOIC         | D               | 16   | 2500 | 330.0              | 16.4               | 6.5     | 10.3    | 2.1     | 8.0     | 16.0   | Q1            |
| SN75C1406DR  | SOIC         | D               | 16   | 2500 | 330.0              | 16.4               | 6.5     | 10.3    | 2.1     | 8.0     | 16.0   | Q1            |
| SN75C1406DWR | SOIC         | DW              | 16   | 2000 | 330.0              | 16.4               | 10.75   | 10.7    | 2.7     | 12.0    | 16.0   | Q1            |
| SN75C1406NSR | SO           | NS              | 16   | 2000 | 330.0              | 16.4               | 8.2     | 10.5    | 2.5     | 12.0    | 16.0   | Q1            |

## TAPE AND REEL BOX DIMENSIONS



\*All dimensions are nominal

| Device       | Package Type | Package Drawing | Pins | SPQ  | Length (mm) | Width (mm) | Height (mm) |
|--------------|--------------|-----------------|------|------|-------------|------------|-------------|
| SN65C1406DR  | SOIC         | D               | 16   | 2500 | 333.2       | 345.9      | 28.6        |
| SN75C1406DR  | SOIC         | D               | 16   | 2500 | 333.2       | 345.9      | 28.6        |
| SN75C1406DWR | SOIC         | DW              | 16   | 2000 | 346.0       | 346.0      | 33.0        |
| SN75C1406NSR | SO           | NS              | 16   | 2000 | 346.0       | 346.0      | 33.0        |

# MECHANICAL DATA

NS (R-PDSO-G\*\*)

PLASTIC SMALL-OUTLINE PACKAGE

14-PINS SHOWN



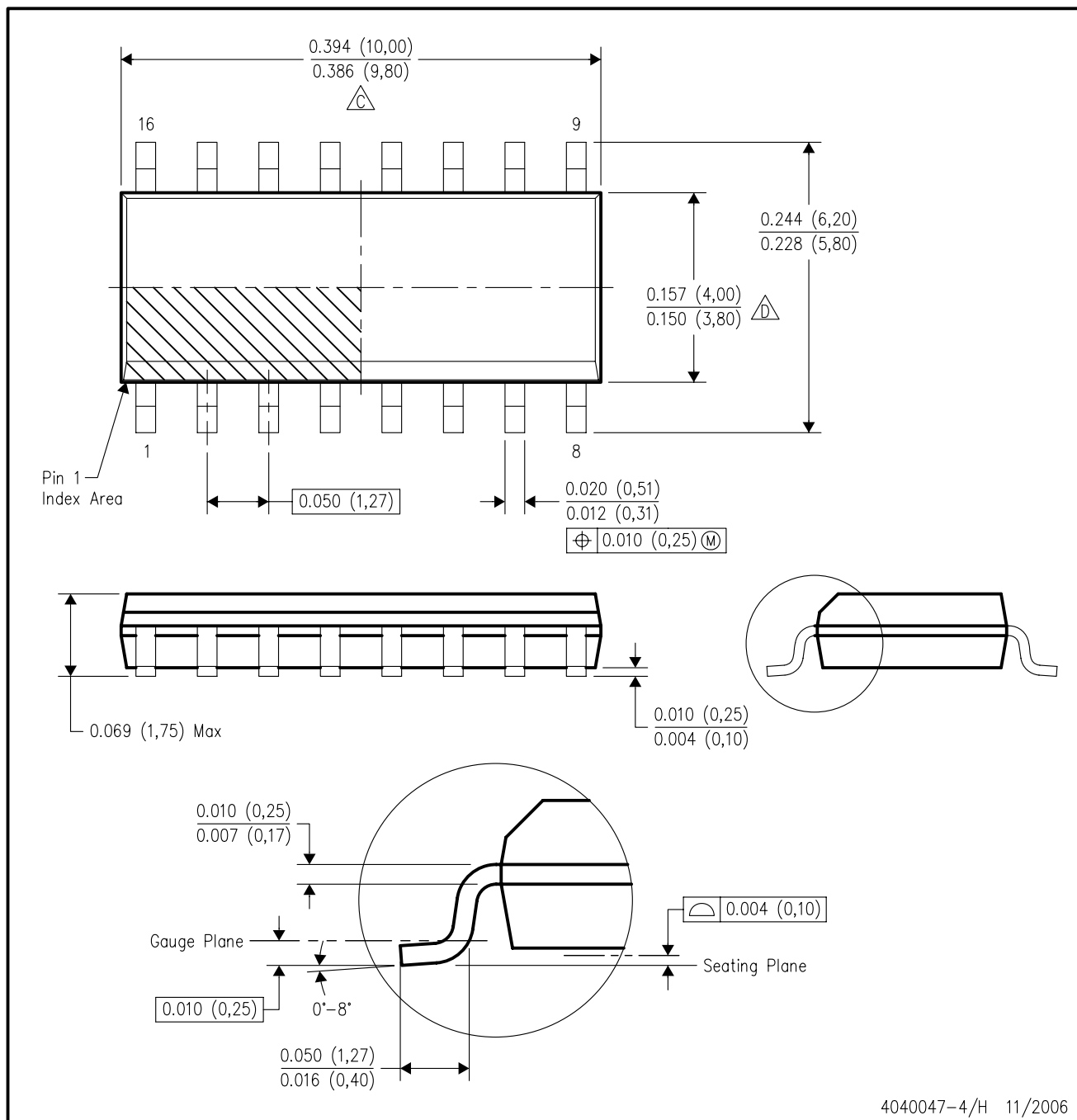
| DIM \ PINS ** | 14    | 16    | 20    | 24    |
|---------------|-------|-------|-------|-------|
| A MAX         | 10,50 | 10,50 | 12,90 | 15,30 |
| A MIN         | 9,90  | 9,90  | 12,30 | 14,70 |

4040062/C 03/03

- NOTES:
- A. All linear dimensions are in millimeters.
  - B. This drawing is subject to change without notice.
  - C. Body dimensions do not include mold flash or protrusion, not to exceed 0,15.

## D (R-PDSO-G16)

## PLASTIC SMALL-OUTLINE PACKAGE

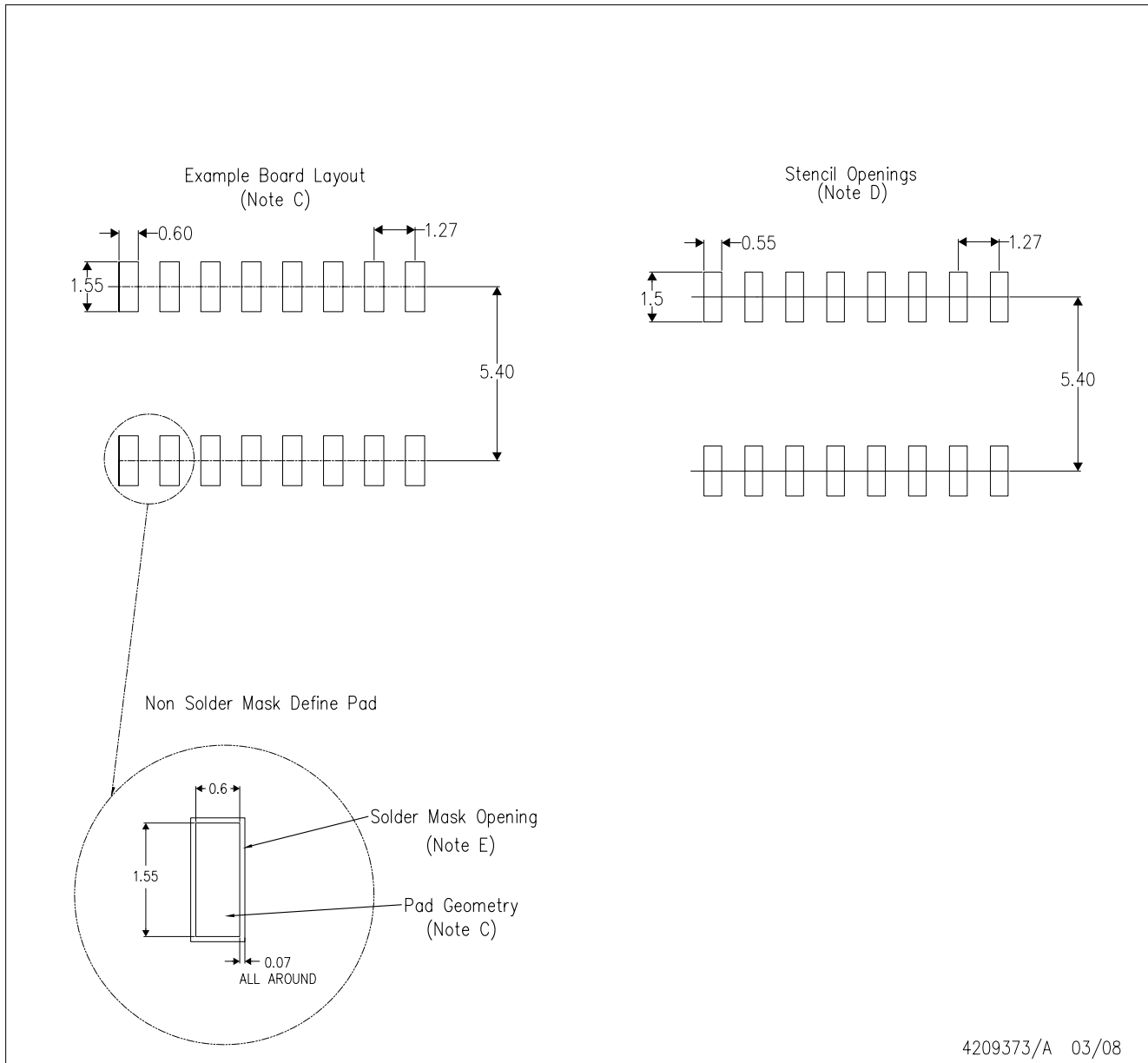


4040047-4/H 11/2006

## NOTES:

- A. All linear dimensions are in inches (millimeters).
- B. This drawing is subject to change without notice.
- C. Body length does not include mold flash, protrusions, or gate burrs. Mold flash, protrusions, or gate burrs shall not exceed .006 (0,15) per end.
- D. Body width does not include interlead flash. Interlead flash shall not exceed .017 (0,43) per side.
- E. Reference JEDEC MS-012 variation AC.

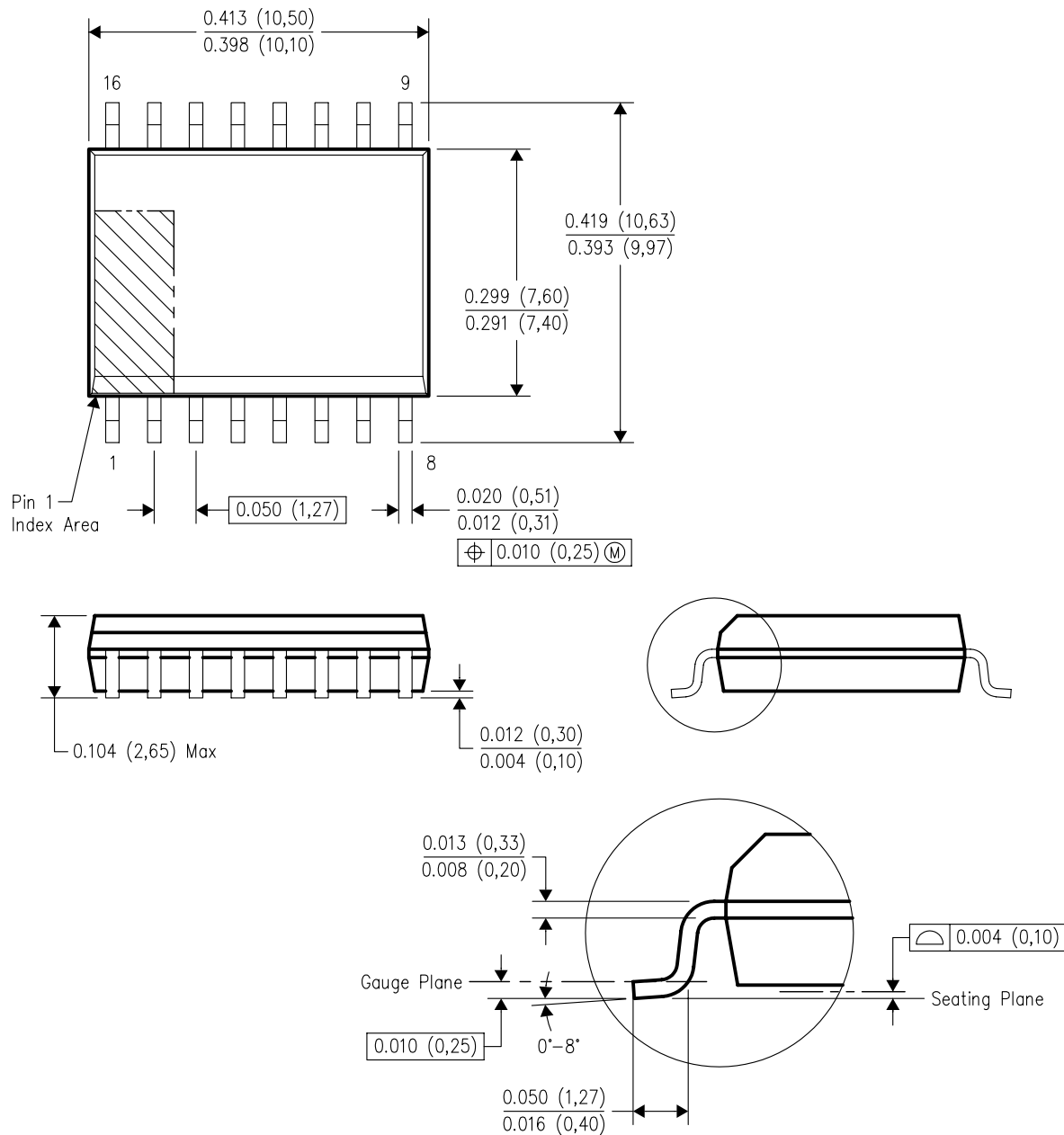
## D(R-PDSO-G16)



- NOTES:
- A. All linear dimensions are in millimeters.
  - B. This drawing is subject to change without notice.
  - C. Refer to IPC7351 for alternate board design.
  - D. Laser cutting apertures with trapezoidal walls and also rounding corners will offer better paste release. Customers should contact their board assembly site for stencil design recommendations. Refer to IPC-7525
  - E. Customers should contact their board fabrication site for solder mask tolerances between and around signal pads.

## DW (R-PDSO-G16)

## PLASTIC SMALL-OUTLINE PACKAGE



4040000-2/F 06/2004

- NOTES:
- A. All linear dimensions are in inches (millimeters).
  - B. This drawing is subject to change without notice.
  - C. Body dimensions do not include mold flash or protrusion not to exceed  $0.006 (0,15)$ .
  - D. Falls within JEDEC MS-013 variation AA.

## N (R-PDIP-T\*\*)

16 PINS SHOWN

## PLASTIC DUAL-IN-LINE PACKAGE



| PINS **             | 14               | 16               | 18               | 20               |
|---------------------|------------------|------------------|------------------|------------------|
| DIM                 |                  |                  |                  |                  |
| A MAX               | 0.775<br>(19,69) | 0.775<br>(19,69) | 0.920<br>(23,37) | 1.060<br>(26,92) |
| A MIN               | 0.745<br>(18,92) | 0.745<br>(18,92) | 0.850<br>(21,59) | 0.940<br>(23,88) |
| MS-001<br>VARIATION | AA               | BB               | AC               | AD               |



14/18 Pin Only  
20 Pin vendor option

4040049/E 12/2002

- NOTES:
- A. All linear dimensions are in inches (millimeters).
  - B. This drawing is subject to change without notice.
  - Falls within JEDEC MS-001, except 18 and 20 pin minimum body length (Dim A).
  - The 20 pin end lead shoulder width is a vendor option, either half or full width.

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