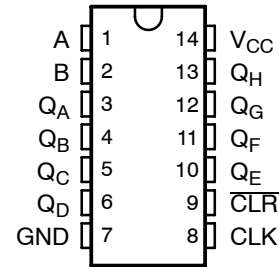


SN54HC164, SN74HC164 8-BIT PARALLEL-OUT SERIAL SHIFT REGISTERS

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- Wide Operating Voltage Range of 2 V to 6 V
- Outputs Can Drive Up To 10 LSTTL Loads
- Low Power Consumption, 80- μ A Max I_{CC}
- Typical $t_{pd} = 20$ ns
- ± 4 -mA Output Drive at 5 V
- Low Input Current of 1 μ A Max
- AND-Gated (Enable/Disable) Serial Inputs
- Fully Buffered Clock and Serial Inputs
- Direct Clear

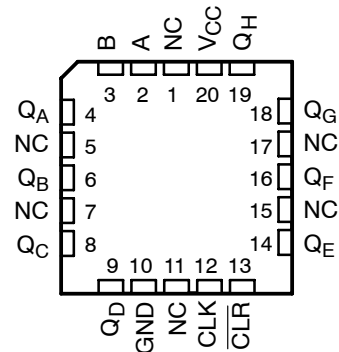
SN54HC164 . . . J OR W PACKAGE
SN74HC164 . . . D, N, NS, OR PW PACKAGE
(TOP VIEW)



description/ordering information

These 8-bit shift registers feature AND-gated serial inputs and an asynchronous clear (CLR) input. The gated serial (A and B) inputs permit complete control over incoming data; a low at either input inhibits entry of the new data and resets the first flip-flop to the low level at the next clock (CLK) pulse. A high-level input enables the other input, which then determines the state of the first flip-flop. Data at the serial inputs can be changed while CLK is high or low, provided the minimum setup time requirements are met. Clocking occurs on the low-to-high-level transition of CLK.

SN54HC164 . . . FK PACKAGE
(TOP VIEW)



NC – No internal connection

ORDERING INFORMATION

| T _A | PACKAGE† | | ORDERABLE PART NUMBER | TOP-SIDE MARKING |
|----------------|------------|--------------|--------------------------|---------------------|
| –40°C to 85°C | PDIP – N | Tube of 25 | SN74HC164N | SN74HC164N |
| | SOIC – D | Tube of 50 | SN74HC164D | HC164 |
| | | Reel of 2500 | SN74HC164DRG3 | |
| | | Reel of 250 | SN74HC164DT | |
| | SOP – NS | Reel of 2000 | SN74HC164NSR | HC164 |
| | TSSOP – PW | Tube of 90 | SN74HC164PW | HC164 |
| | | Reel of 2000 | SN74HC164PWR | |
| | | Reel of 250 | SN74HC164PWT | |
| –55°C to 125°C | CDIP – J | Tube of 25 | SNJ54HC164J | SNJ54HC164J |
| | CFP – W | Tube of 150 | SNJ54HC164W | SNJ54HC164W |
| | LCCC – FK | Tube of 55 | SNJ54HC164FK | SNJ54HC164FK |

† Package drawings, standard packing quantities, thermal data, symbolization, and PCB design guidelines are available at www.ti.com/sc/package.



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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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On products compliant to MIL-PRF-38535, all parameters are tested unless otherwise noted. On all other products, production processing does not necessarily include testing of all parameters.

SN54HC164, SN74HC164

8-BIT PARALLEL-OUT SERIAL SHIFT REGISTERS

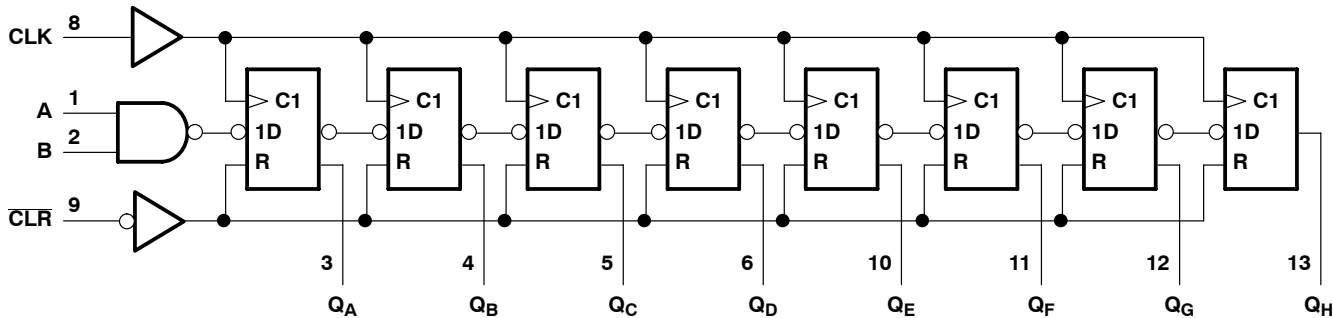
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FUNCTION TABLE

| INPUTS | | | | OUTPUTS | | |
|--------|-----|---|---|-----------------|-------------------------------------|-----------------|
| CLR | CLK | A | B | Q _A | Q _B . . . Q _H | |
| L | X | X | X | L | L | L |
| H | L | X | X | Q _{A0} | Q _{B0} | Q _{H0} |
| H | ↑ | H | H | H | Q _{An} | Q _{Gn} |
| H | ↑ | L | X | L | Q _{An} | Q _{Gn} |
| H | ↑ | X | L | L | Q _{An} | Q _{Gn} |

Q_{A0}, Q_{B0}, Q_{H0} = the level of Q_A, Q_B, or Q_H, respectively, before the indicated steady-state input conditions were established
Q_{An}, Q_{Gn} = the level of Q_A or Q_G before the most recent ↑ transition of CLK: indicates a 1-bit shift

logic diagram (positive logic)



Pin numbers shown are for the D, J, N, NS, PW, and W packages.

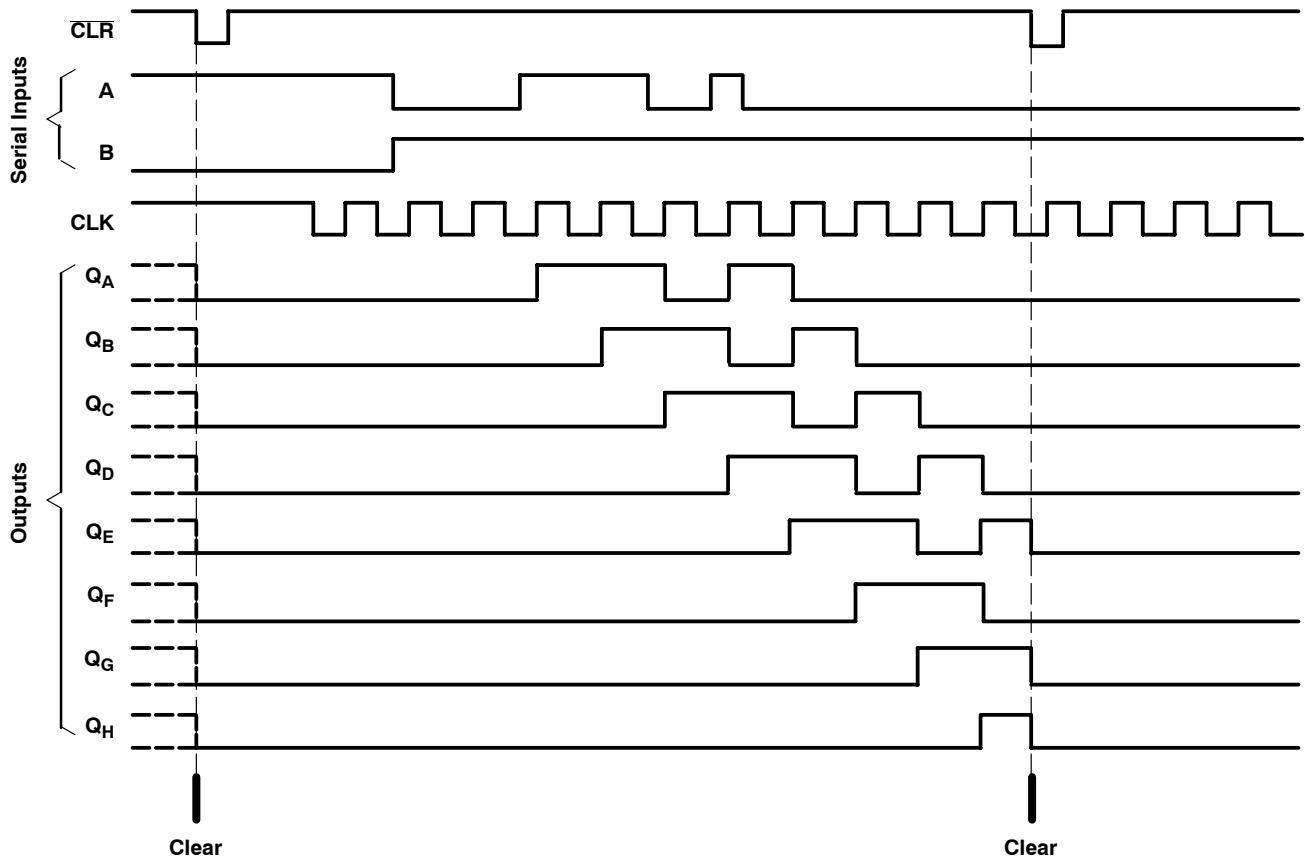


SN54HC164, SN74HC164

8-BIT PARALLEL-OUT SERIAL SHIFT REGISTERS

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typical clear, shift, and clear sequence



absolute maximum ratings over operating free-air temperature range (unless otherwise noted)[†]

| | |
|---|----------------|
| Supply voltage range, V_{CC} | –0.5 V to 7 V |
| Input clamp current, I_{IK} ($V_I < 0$ or $V_I > V_{CC}$) (see Note 1) | ±20 mA |
| Output clamp current, I_{OK} ($V_O < 0$ or $V_O > V_{CC}$) (see Note 1) | ±20 mA |
| Continuous output current, I_O ($V_O = 0$ to V_{CC}) | ±25 mA |
| Continuous current through V_{CC} or GND | ±50 mA |
| Package thermal impedance, θ_{JA} (see Note 2): | |
| D package | 86°C/W |
| N package | 80°C/W |
| NS package | 76°C/W |
| PW package | 113°C/W |
| Storage temperature range, T_{stg} | –65°C to 150°C |

[†] 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. The input and output voltage ratings may be exceeded if the input and output current ratings are observed.
2. The package thermal impedance is calculated in accordance with JESD 51-7.



SN54HC164, SN74HC164

8-BIT PARALLEL-OUT SERIAL SHIFT REGISTERS

SCLS115E – DECEMBER 1982 – REVISED NOVEMBER 2010

recommended operating conditions (see Note 3)

| | | | SN54HC164 | | | SN74HC164 | | | UNIT |
|-----------------|---------------------------------|-------------------------|-----------|-----------------|-----|-----------|-----------------|-----|------|
| | | | MIN | NOM | MAX | MIN | NOM | MAX | |
| V _{CC} | Supply voltage | | 2 | 5 | 6 | 2 | 5 | 6 | V |
| V _{IH} | High-level input voltage | V _{CC} = 2 V | 1.5 | | | 1.5 | | | V |
| | | V _{CC} = 4.5 V | 3.15 | | | 3.15 | | | |
| | | V _{CC} = 6 V | 4.2 | | | 4.2 | | | |
| V _{IL} | Low-level input voltage | V _{CC} = 2 V | 0.5 | | | 0.5 | | | V |
| | | V _{CC} = 4.5 V | 1.35 | | | 1.35 | | | |
| | | V _{CC} = 6 V | 1.8 | | | 1.8 | | | |
| V _I | Input voltage | | 0 | V _{CC} | | 0 | V _{CC} | | V |
| V _O | Output voltage | | 0 | V _{CC} | | 0 | V _{CC} | | V |
| Δt/Δv† | Input transition rise/fall time | V _{CC} = 2 V | 1000 | | | 1000 | | | ns |
| | | V _{CC} = 4.5 V | 500 | | | 500 | | | |
| | | V _{CC} = 6 V | 400 | | | 400 | | | |
| T _A | Operating free-air temperature | | −55 | 125 | | −40 | 85 | | °C |

NOTE 3: All unused inputs of the device must be held at V_{CC} or GND to ensure proper device operation. Refer to the TI application report, *Implications of Slow or Floating CMOS Inputs*, literature number SCBA004.

[†] If this device is used in the threshold region (from $V_{IL\text{max}} = 0.5\text{ V}$ to $V_{IH\text{min}} = 1.5\text{ V}$), there is a potential to go into the wrong state from induced grounding, causing double clocking. Operating with the inputs at $t_f = 1000\text{ ns}$ and $V_{CC} = 2\text{ V}$ does not damage the device; however, functionally, the CLK inputs are not ensured while in the shift, count, or toggle operating modes.

electrical characteristics over recommended operating free-air temperature range (unless otherwise noted)

| PARAMETER | TEST CONDITIONS | | V_{CC} | $T_A = 25^\circ\text{C}$ | | | SN54HC164 | | SN74HC164 | | UNIT |
|-----------|-------------------------------------|-----------------------------------|------------|--------------------------|-----------|-----------|-----------|------------|-----------|------------|---------------|
| | | | | MIN | TYP | MAX | MIN | MAX | MIN | MAX | |
| V_{OH} | $V_I = V_{IH}\text{ or }V_{IL}$ | $I_{OH} = -20\text{ }\mu\text{A}$ | 2 V | 1.9 | 1.998 | | 1.9 | | 1.9 | | V |
| | | | 4.5 V | 4.4 | 4.499 | | 4.4 | | 4.4 | | |
| | | | 6 V | 5.9 | 5.999 | | 5.9 | | 5.9 | | |
| | | $I_{OH} = -4\text{ mA}$ | 4.5 V | 3.98 | 4.3 | | 3.7 | | 3.84 | | |
| | | $I_{OH} = -5.2\text{ mA}$ | 6 V | 5.48 | 5.8 | | 5.2 | | 5.34 | | |
| V_{OL} | $V_I = V_{IH}\text{ or }V_{IL}$ | $I_{OL} = 20\text{ }\mu\text{A}$ | 2 V | | 0.002 | 0.1 | | 0.1 | | 0.1 | V |
| | | | 4.5 V | | 0.001 | 0.1 | | 0.1 | | 0.1 | |
| | | | 6 V | | 0.001 | 0.1 | | 0.1 | | 0.1 | |
| | | $I_{OL} = 4\text{ mA}$ | 4.5 V | | 0.17 | 0.26 | | 0.4 | | 0.33 | |
| | | $I_{OL} = 5.2\text{ mA}$ | 6 V | | 0.15 | 0.26 | | 0.4 | | 0.33 | |
| I_I | $V_I = V_{CC}\text{ or }0$ | | 6 V | | ± 0.1 | ± 100 | | ± 1000 | | ± 1000 | nA |
| I_{CC} | $V_I = V_{CC}\text{ or }0, I_O = 0$ | | 6 V | | | 8 | | 160 | | 80 | μA |
| C_i | | | 2 V to 6 V | | 3 | 10 | | 10 | | 10 | pF |



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SN54HC164, SN74HC164

8-BIT PARALLEL-OUT SERIAL SHIFT REGISTERS

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timing requirements over recommended operating free-air temperature range (unless otherwise noted)

| | | V_{CC} | $T_A = 25^\circ\text{C}$ | | SN54HC164 | | SN74HC164 | | UNIT |
|--------------------|--------------------------------------|----------|--------------------------|-----|-----------|-----|-----------|-----|------|
| | | | MIN | MAX | MIN | MAX | MIN | MAX | |
| f_{clock} | Clock frequency | 2 V | | 6 | | 4.2 | | 5 | MHz |
| | | 4.5 V | | 31 | | 21 | | 25 | |
| | | 6 V | | 36 | | 25 | | 28 | |
| t_w | $\overline{\text{CLR}}$ low | 2 V | 100 | | 150 | | 125 | | ns |
| | | 4.5 V | 20 | | 30 | | 25 | | |
| | | 6 V | 17 | | 25 | | 21 | | |
| | CLK high or low | 2 V | 80 | | 120 | | 100 | | |
| | | 4.5 V | 16 | | 24 | | 20 | | |
| | | 6 V | 14 | | 20 | | 18 | | |
| t_{su} | Data | 2 V | 100 | | 150 | | 125 | | ns |
| | | 4.5 V | 20 | | 30 | | 25 | | |
| | | 6 V | 17 | | 25 | | 21 | | |
| | $\overline{\text{CLR}}$ inactive | 2 V | 100 | | 150 | | 125 | | |
| | | 4.5 V | 20 | | 30 | | 25 | | |
| | | 6 V | 17 | | 25 | | 21 | | |
| t_h | Hold time, data after CLK \uparrow | 2 V | 5 | | 5 | | 5 | | ns |
| | | 4.5 V | 5 | | 5 | | 5 | | |
| | | 6 V | 5 | | 5 | | 5 | | |

switching characteristics over recommended operating free-air temperature range, $C_L = 50$ pF (unless otherwise noted) (see Figure 1)

| PARAMETER | FROM (INPUT) | TO (OUTPUT) | V_{CC} | $T_A = 25^\circ\text{C}$ | | | SN54HC164 | | SN74HC164 | | UNIT |
|------------------|-------------------------|-------------|----------|--------------------------|-----|-----|-----------|-----|-----------|-----|------|
| | | | | MIN | TYP | MAX | MIN | MAX | MIN | MAX | |
| f_{max} | | | 2 V | 6 | 10 | | 4.2 | | 5 | | MHz |
| | | | 4.5 V | 31 | 54 | | 21 | | 25 | | |
| | | | 6 V | 36 | 62 | | 25 | | 28 | | |
| t_{PHL} | $\overline{\text{CLR}}$ | Any Q | 2 V | | 140 | 205 | | 295 | | 255 | ns |
| | | | 4.5 V | | 28 | 41 | | 59 | | 51 | |
| | | | 6 V | | 24 | 35 | | 51 | | 46 | |
| t_{pd} | CLK | Any Q | 2 V | | 115 | 175 | | 265 | | 220 | |
| | | | 4.5 V | | 23 | 35 | | 53 | | 44 | |
| | | | 6 V | | 20 | 30 | | 45 | | 38 | |
| t_t | | | 2 V | | 38 | 75 | | 110 | | 95 | ns |
| | | | 4.5 V | | 8 | 15 | | 22 | | 19 | |
| | | | 6 V | | 6 | 13 | | 19 | | 16 | |

operating characteristics, $T_A = 25^\circ\text{C}$

| PARAMETER | TEST CONDITIONS | TYP | UNIT |
|---|-----------------|-----|------|
| C_{pd} Power dissipation capacitance | No load | 135 | pF |

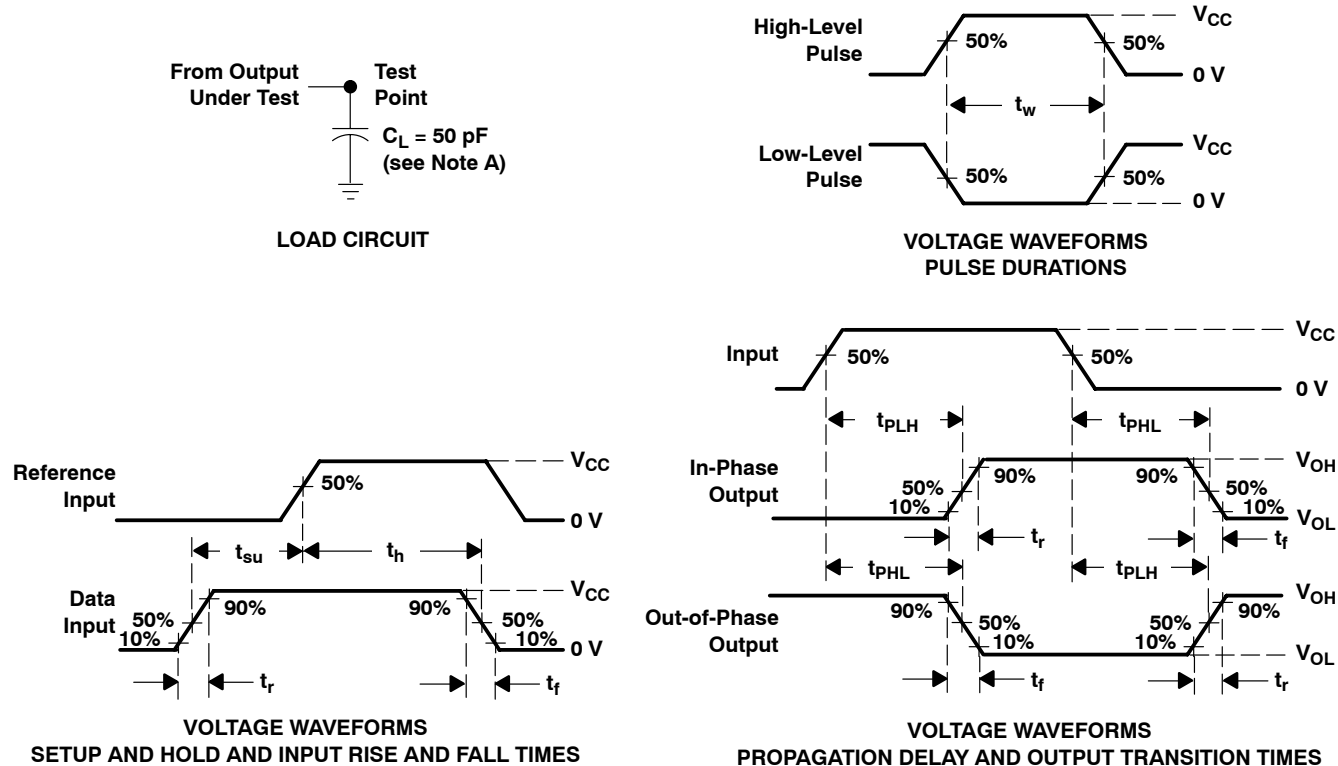


SN54HC164, SN74HC164

8-BIT PARALLEL-OUT SERIAL SHIFT REGISTERS

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PARAMETER MEASUREMENT INFORMATION



- NOTES:
- A. C_L includes probe and test-fixture capacitance.
 - B. Phase relationships between waveforms were chosen arbitrarily. All input pulses are supplied by generators having the following characteristics: $PRR \leq 1 \text{ MHz}$, $Z_O = 50 \Omega$, $t_r = 6 \text{ ns}$, $t_f = 6 \text{ ns}$.
 - C. For clock inputs, f_{max} is measured when the input duty cycle is 50%.
 - D. The outputs are measured one at a time with one input transition per measurement.
 - E. t_{PLH} and t_{PHL} are the same as t_{pd} .

Figure 1. Load Circuit and Voltage Waveforms

PACKAGING INFORMATION

| Orderable Device | Status ⁽¹⁾ | Package Type | Package Drawing | Pins | Package Qty | Eco Plan ⁽²⁾ | Lead/ Ball Finish | MSL Peak Temp ⁽³⁾ | Samples (Requires Login) |
|------------------|-----------------------|--------------|-----------------|------|-------------|----------------------------|----------------------|------------------------------|-----------------------------|
| 5962-8416201VCA | ACTIVE | CDIP | J | 14 | 1 | TBD | A42 | N / A for Pkg Type | |
| 5962-8416201VDA | ACTIVE | CFP | W | 14 | 1 | TBD | A42 | N / A for Pkg Type | |
| 84162012A | ACTIVE | LCCC | FK | 20 | 1 | TBD | Call TI | Call TI | |
| 8416201CA | ACTIVE | CDIP | J | 14 | 1 | TBD | Call TI | Call TI | |
| SN54HC164J | ACTIVE | CDIP | J | 14 | 1 | TBD | A42 | N / A for Pkg Type | |
| SN74HC164D | ACTIVE | SOIC | D | 14 | 50 | Green (RoHS & no Sb/Br) | CU NIPDAU | Level-1-260C-UNLIM | |
| SN74HC164DE4 | ACTIVE | SOIC | D | 14 | 50 | Green (RoHS & no Sb/Br) | CU NIPDAU | Level-1-260C-UNLIM | |
| SN74HC164DG4 | ACTIVE | SOIC | D | 14 | 50 | Green (RoHS & no Sb/Br) | CU NIPDAU | Level-1-260C-UNLIM | |
| SN74HC164DR | ACTIVE | SOIC | D | 14 | 2500 | Green (RoHS & no Sb/Br) | CU NIPDAU | Level-1-260C-UNLIM | |
| SN74HC164DRE4 | ACTIVE | SOIC | D | 14 | 2500 | Green (RoHS & no Sb/Br) | CU NIPDAU | Level-1-260C-UNLIM | |
| SN74HC164DRG3 | ACTIVE | SOIC | D | 14 | 2500 | Green (RoHS & no Sb/Br) | CU SN | Level-1-260C-UNLIM | |
| SN74HC164DRG4 | ACTIVE | SOIC | D | 14 | 2500 | Green (RoHS & no Sb/Br) | CU NIPDAU | Level-1-260C-UNLIM | |
| SN74HC164DT | ACTIVE | SOIC | D | 14 | 250 | Green (RoHS & no Sb/Br) | CU NIPDAU | Level-1-260C-UNLIM | |
| SN74HC164DTE4 | ACTIVE | SOIC | D | 14 | 250 | Green (RoHS & no Sb/Br) | CU NIPDAU | Level-1-260C-UNLIM | |
| SN74HC164DTG4 | ACTIVE | SOIC | D | 14 | 250 | Green (RoHS & no Sb/Br) | CU NIPDAU | Level-1-260C-UNLIM | |
| SN74HC164N | ACTIVE | PDIP | N | 14 | 25 | Pb-Free (RoHS) | CU NIPDAU | N / A for Pkg Type | |
| SN74HC164N3 | OBSOLETE | PDIP | N | 14 | | TBD | Call TI | Call TI | |
| SN74HC164NE4 | ACTIVE | PDIP | N | 14 | 25 | Pb-Free (RoHS) | CU NIPDAU | N / A for Pkg Type | |
| SN74HC164NSR | ACTIVE | SO | NS | 14 | 2000 | Green (RoHS & no Sb/Br) | CU NIPDAU | Level-1-260C-UNLIM | |
| SN74HC164NSRE4 | ACTIVE | SO | NS | 14 | 2000 | Green (RoHS & no Sb/Br) | CU NIPDAU | Level-1-260C-UNLIM | |

| Orderable Device | Status ⁽¹⁾ | Package Type | Package Drawing | Pins | Package Qty | Eco Plan ⁽²⁾ | Lead/ Ball Finish | MSL Peak Temp ⁽³⁾ | Samples (Requires Login) |
|------------------|-----------------------|--------------|-----------------|------|-------------|----------------------------|----------------------|------------------------------|-----------------------------|
| SN74HC164NSRG4 | ACTIVE | SO | NS | 14 | 2000 | Green (RoHS & no Sb/Br) | CU NIPDAU | Level-1-260C-UNLIM | |
| SN74HC164PW | ACTIVE | TSSOP | PW | 14 | 90 | Green (RoHS & no Sb/Br) | CU NIPDAU | Level-1-260C-UNLIM | |
| SN74HC164PWE4 | ACTIVE | TSSOP | PW | 14 | 90 | Green (RoHS & no Sb/Br) | CU NIPDAU | Level-1-260C-UNLIM | |
| SN74HC164PWG4 | ACTIVE | TSSOP | PW | 14 | 90 | Green (RoHS & no Sb/Br) | CU NIPDAU | Level-1-260C-UNLIM | |
| SN74HC164PWR | ACTIVE | TSSOP | PW | 14 | 2000 | Green (RoHS & no Sb/Br) | CU NIPDAU | Level-1-260C-UNLIM | |
| SN74HC164PWRE4 | ACTIVE | TSSOP | PW | 14 | 2000 | Green (RoHS & no Sb/Br) | CU NIPDAU | Level-1-260C-UNLIM | |
| SN74HC164PWRG4 | ACTIVE | TSSOP | PW | 14 | 2000 | Green (RoHS & no Sb/Br) | CU NIPDAU | Level-1-260C-UNLIM | |
| SN74HC164PWT | ACTIVE | TSSOP | PW | 14 | 250 | Green (RoHS & no Sb/Br) | CU NIPDAU | Level-1-260C-UNLIM | |
| SN74HC164PWTE4 | ACTIVE | TSSOP | PW | 14 | 250 | Green (RoHS & no Sb/Br) | CU NIPDAU | Level-1-260C-UNLIM | |
| SN74HC164PWTG4 | ACTIVE | TSSOP | PW | 14 | 250 | Green (RoHS & no Sb/Br) | CU NIPDAU | Level-1-260C-UNLIM | |
| SNJ54HC164FK | ACTIVE | LCCC | FK | 20 | 1 | TBD | POST-PLATE | N / A for Pkg Type | |
| SNJ54HC164J | ACTIVE | CDIP | J | 14 | 1 | TBD | A42 | N / A for Pkg Type | |
| SNJ54HC164W | ACTIVE | CFP | W | 14 | 1 | TBD | A42 | N / A for Pkg Type | |

⁽¹⁾ 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.

OBSELETE: TI has discontinued the production of the device.

⁽²⁾ 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)

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

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OTHER QUALIFIED VERSIONS OF SN54HC164, SN54HC164-SP, SN74HC164 :

- Catalog: [SN74HC164](#), [SN54HC164](#)
- Military: [SN54HC164](#)
- Space: [SN54HC164-SP](#)

NOTE: Qualified Version Definitions:

- Catalog - TI's standard catalog product
- Military - QML certified for Military and Defense Applications
- Space - Radiation tolerant, ceramic packaging and qualified for use in Space-based application

TAPE AND REEL INFORMATION
REEL DIMENSIONS

TAPE DIMENSIONS


| | |
|----|---|
| A0 | Dimension designed to accommodate the component width |
| B0 | Dimension designed to accommodate the component length |
| K0 | Dimension designed to accommodate the component thickness |
| W | Overall width of the carrier tape |
| P1 | Pitch between successive cavity centers |

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 |
|--------------|--------------|-----------------|------|------|--------------------|--------------------|---------|---------|---------|---------|--------|---------------|
| SN74HC164DT | SOIC | D | 14 | 250 | 330.0 | 16.4 | 6.5 | 9.0 | 2.1 | 8.0 | 16.0 | Q1 |
| SN74HC164NSR | SO | NS | 14 | 2000 | 330.0 | 16.4 | 8.2 | 10.5 | 2.5 | 12.0 | 16.0 | Q1 |
| SN74HC164PWR | TSSOP | PW | 14 | 2000 | 330.0 | 12.4 | 6.9 | 5.6 | 1.6 | 8.0 | 12.0 | Q1 |
| SN74HC164PWT | TSSOP | PW | 14 | 250 | 330.0 | 12.4 | 6.9 | 5.6 | 1.6 | 8.0 | 12.0 | Q1 |

TAPE AND REEL BOX DIMENSIONS



*All dimensions are nominal

| Device | Package Type | Package Drawing | Pins | SPQ | Length (mm) | Width (mm) | Height (mm) |
|--------------|--------------|-----------------|------|------|-------------|------------|-------------|
| SN74HC164DT | SOIC | D | 14 | 250 | 346.0 | 346.0 | 33.0 |
| SN74HC164NSR | SO | NS | 14 | 2000 | 346.0 | 346.0 | 33.0 |
| SN74HC164PWR | TSSOP | PW | 14 | 2000 | 346.0 | 346.0 | 29.0 |
| SN74HC164PWT | TSSOP | PW | 14 | 250 | 346.0 | 346.0 | 29.0 |

J (R-GDIP-T**)

14 LEADS SHOWN

CERAMIC DUAL IN-LINE PACKAGE



| PINS ** DIM | 14 | 16 | 18 | 20 |
|----------------|------------------------|------------------------|------------------------|------------------------|
| A | 0.300 (7,62) BSC | 0.300 (7,62) BSC | 0.300 (7,62) BSC | 0.300 (7,62) BSC |
| B MAX | 0.785 (19,94) | .840 (21,34) | 0.960 (24,38) | 1.060 (26,92) |
| B MIN | — | — | — | — |
| C MAX | 0.300 (7,62) | 0.300 (7,62) | 0.310 (7,87) | 0.300 (7,62) |
| C MIN | 0.245 (6,22) | 0.245 (6,22) | 0.220 (5,59) | 0.245 (6,22) |

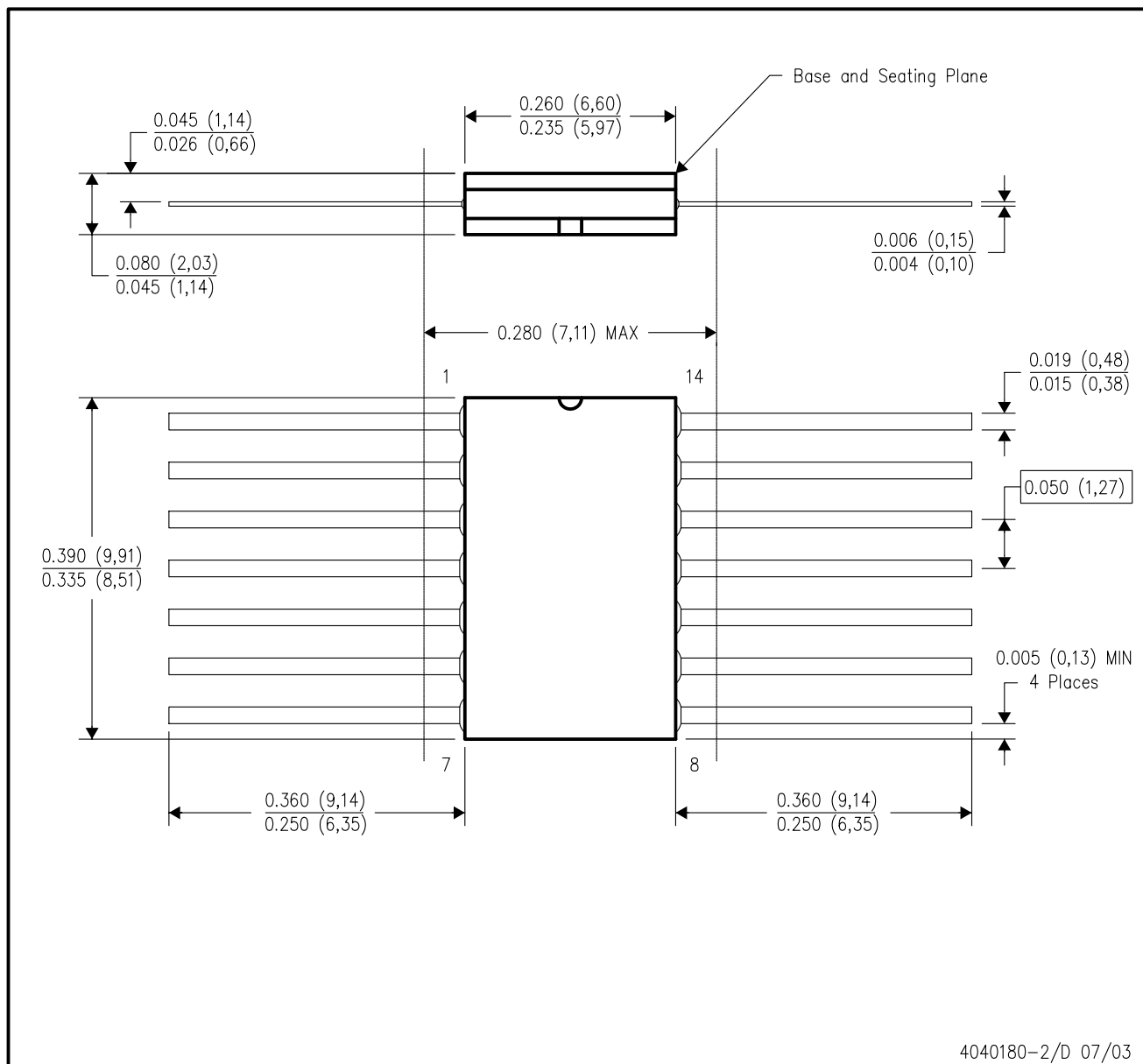


4040083/F 03/03

- NOTES:
- A. All linear dimensions are in inches (millimeters).
 - B. This drawing is subject to change without notice.
 - C. This package is hermetically sealed with a ceramic lid using glass frit.
 - D. Index point is provided on cap for terminal identification only on press ceramic glass frit seal only.
 - E. Falls within MIL STD 1835 GDIP1-T14, GDIP1-T16, GDIP1-T18 and GDIP1-T20.

W (R-GDFP-F14)

CERAMIC DUAL FLATPACK



- NOTES:
- A. All linear dimensions are in inches (millimeters).
 - B. This drawing is subject to change without notice.
 - C. This package can be hermetically sealed with a ceramic lid using glass frit.
 - D. Index point is provided on cap for terminal identification only.
 - E. Falls within MIL STD 1835 GDFP1-F14 and JEDEC MO-092AB

FK (S-CQCC-N**)

LEADLESS CERAMIC CHIP CARRIER

28 TERMINAL SHOWN



| NO. OF TERMINALS ** | A | | B | |
|---------------------------|------------------|------------------|------------------|------------------|
| | MIN | MAX | MIN | MAX |
| 20 | 0.342 (8,69) | 0.358 (9,09) | 0.307 (7,80) | 0.358 (9,09) |
| 28 | 0.442 (11,23) | 0.458 (11,63) | 0.406 (10,31) | 0.458 (11,63) |
| 44 | 0.640 (16,26) | 0.660 (16,76) | 0.495 (12,58) | 0.560 (14,22) |
| 52 | 0.740 (18,78) | 0.761 (19,32) | 0.495 (12,58) | 0.560 (14,22) |
| 68 | 0.938 (23,83) | 0.962 (24,43) | 0.850 (21,6) | 0.858 (21,8) |
| 84 | 1.141 (28,99) | 1.165 (29,59) | 1.047 (26,6) | 1.063 (27,0) |



4040140/D 01/11

- NOTES:
- All linear dimensions are in inches (millimeters).
 - This drawing is subject to change without notice.
 - This package can be hermetically sealed with a metal lid.
 - Falls within JEDEC MS-004

N (R-PDIP-T**)

16 PINS SHOWN

PLASTIC DUAL-IN-LINE PACKAGE



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



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.

D (R-PDSO-G14)

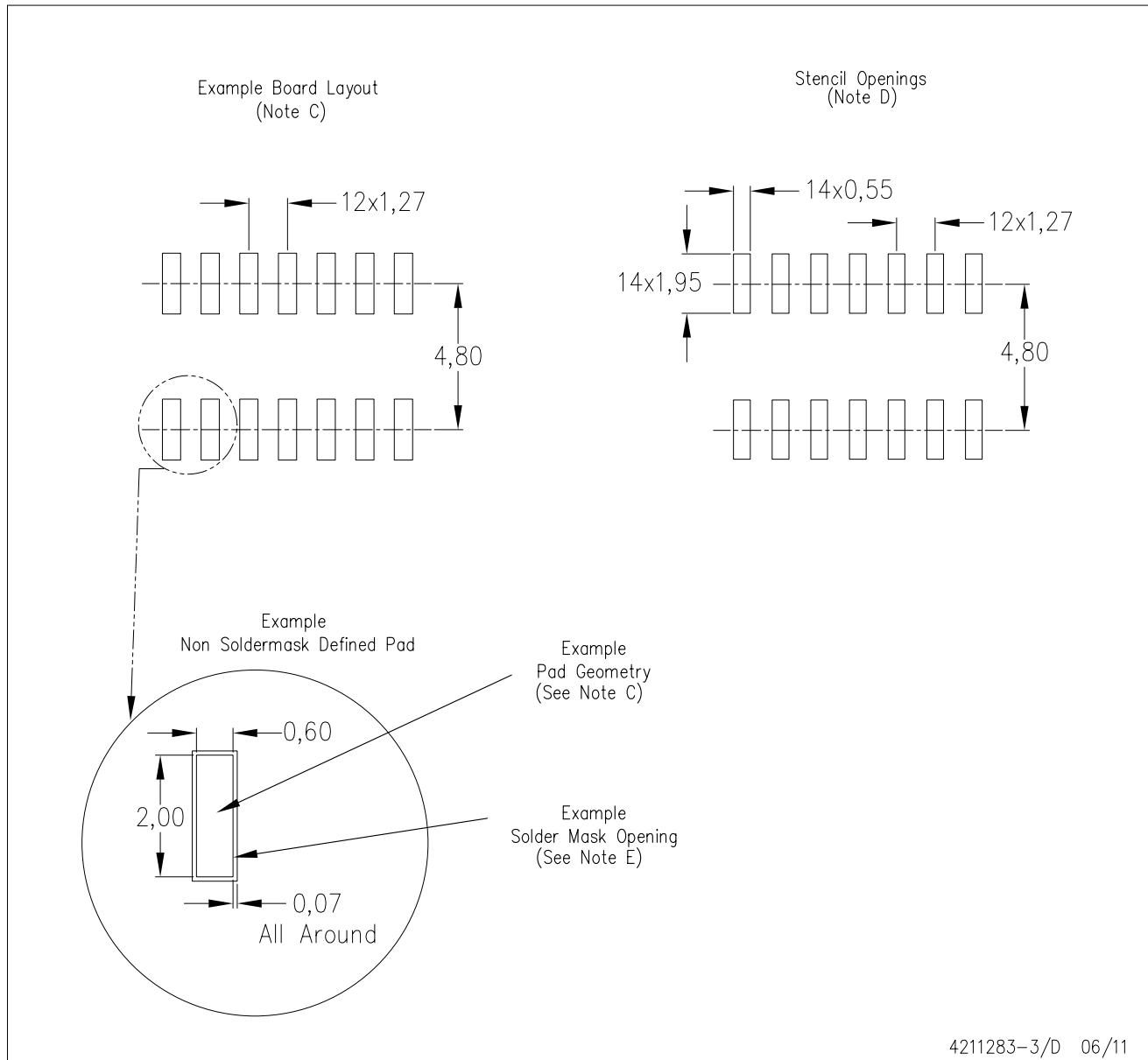
PLASTIC SMALL OUTLINE



4040047-5/M 06/11

D (R-PDSO-G14)

PLASTIC SMALL OUTLINE



- NOTES:
- A. All linear dimensions are in millimeters.
 - B. This drawing is subject to change without notice.
 - C. Publication IPC-7351 is recommended for alternate designs.
 - 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 for other stencil recommendations.
 - E. Customers should contact their board fabrication site for solder mask tolerances between and around signal pads.

PW (R-PDSO-G14)

PLASTIC SMALL OUTLINE

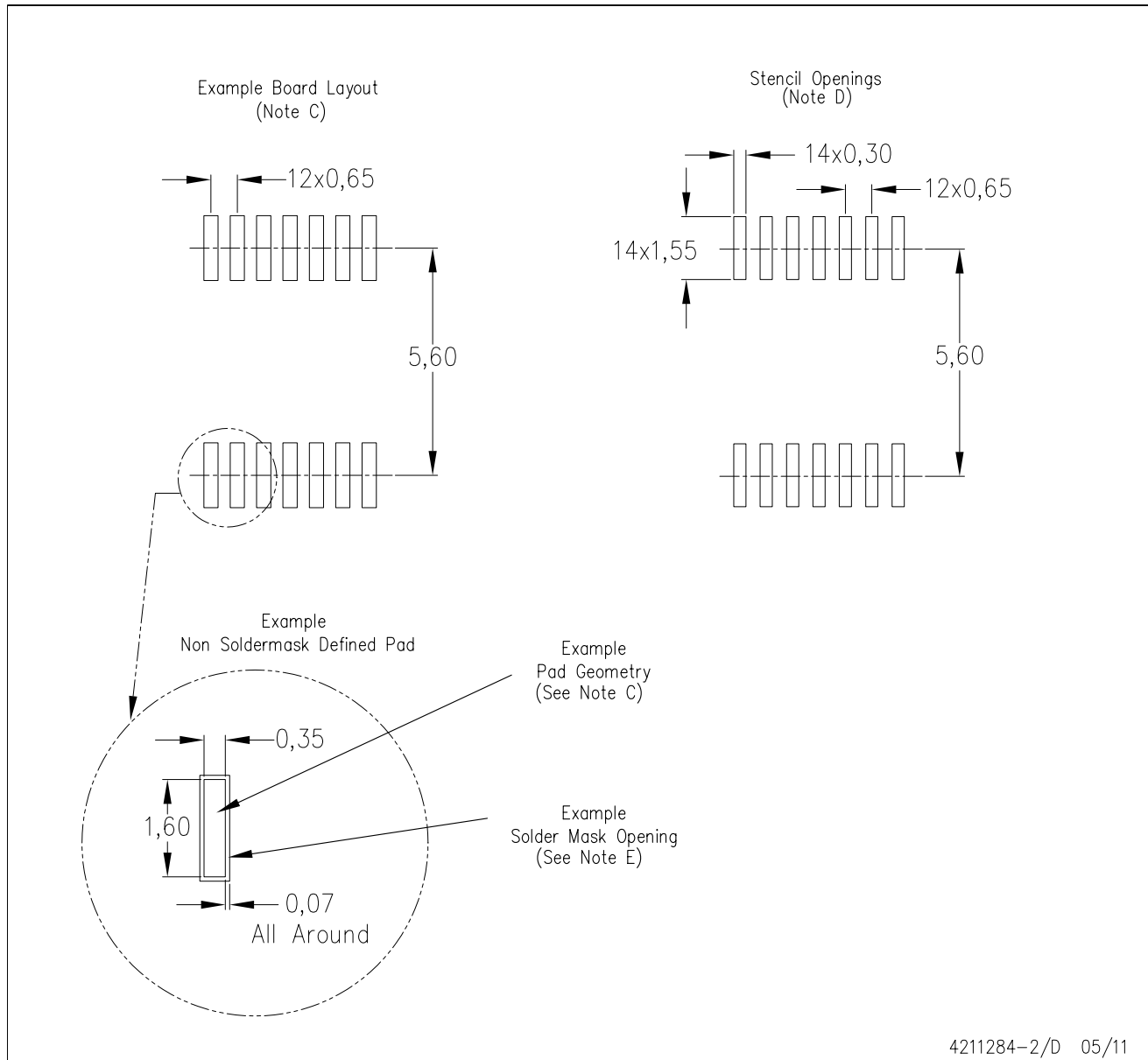


4040064-3/G 02/11

- NOTES:
- A. All linear dimensions are in millimeters. Dimensioning and tolerancing per ASME Y14.5M-1994.
 - 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 0,15 each side.
 - D. Body width does not include interlead flash. Interlead flash shall not exceed 0,25 each side.
 - E. Falls within JEDEC MO-153

PW (R-PDSO-G14)

PLASTIC SMALL OUTLINE



- NOTES:
- A. All linear dimensions are in millimeters.
 - B. This drawing is subject to change without notice.
 - C. Publication IPC-7351 is recommended for alternate designs.
 - 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 for other stencil recommendations.
 - E. Customers should contact their board fabrication site for solder mask tolerances between and around signal pads.

MECHANICAL DATA

NS (R-PDSO-G**)

PLASTIC SMALL-OUTLINE PACKAGE

14-PINS SHOWN



- 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.

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