

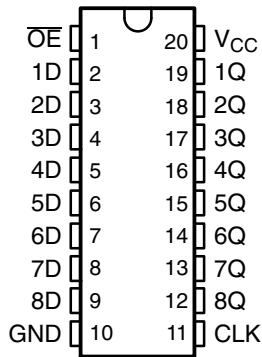
# SN54LVTH574, SN74LVTH574

## 3.3-V ABT OCTAL EDGE-TRIGGERED D-TYPE FLIP-FLOPS WITH 3-STATE OUTPUTS

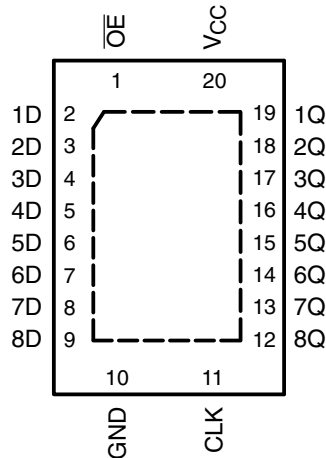
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- Support Mixed-Mode Signal Operation (5-V Input and Output Voltages With 3.3-V  $V_{CC}$ )
- Support Unregulated Battery Operation Down to 2.7 V
- Typical  $V_{OLP}$  (Output Ground Bounce)  $<0.8$  V at  $V_{CC} = 3.3$  V,  $T_A = 25^\circ\text{C}$
- $I_{off}$  and Power-Up 3-State Support Hot Insertion
- Bus Hold on Data Inputs Eliminates the Need for External Pullup/Pulldown Resistors
- Latch-Up Performance Exceeds 500 mA Per JESD 17
- ESD Protection Exceeds JESD 22
  - 2000-V Human-Body Model (A114-A)
  - 200-V Machine Model (A115-A)

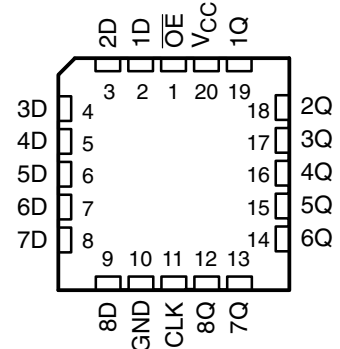
SN54LVTH574 ... J OR W PACKAGE  
SN74LVTH574 ... DB, DW, NS,  
OR PW PACKAGE  
(TOP VIEW)



SN74LVTH574 ... RGY PACKAGE  
(TOP VIEW)



SN54LVTH574 ... FK PACKAGE  
(TOP VIEW)



### description/ordering information

These octal flip-flops are designed specifically for low-voltage (3.3-V)  $V_{CC}$  operation, but with the capability to provide a TTL interface to a 5-V system environment.

### ORDERING INFORMATION

| $T_A$          | PACKAGE†              |               | ORDERABLE PART NUMBER | TOP-SIDE MARKING |
|----------------|-----------------------|---------------|-----------------------|------------------|
| -40°C to 85°C  | QFN – RGY             | Tape and reel | SN74LVTH574RGYR       | LXH574           |
|                | SOIC – DW             | Tube          | SN74LVTH574DW         | LVTH574          |
|                |                       | Tape and reel | SN74LVTH574DWR        |                  |
|                | SOP – NS              | Tape and reel | SN74LVTH574NSR        | LVTH574          |
|                | SSOP – DB             | Tape and reel | SN74LVTH574DBR        | LXH574           |
|                | TSSOP – PW            | Tube          | SN74LVTH574PW         | LXH574           |
|                |                       | Tape and reel | SN74LVTH574PWR        |                  |
| -55°C to 125°C | VFBGA – GQN           | Tape and reel | SN74LVTH574GQNR       | LXH574           |
|                | VFBGA – ZQN (Pb-free) |               | SN74LVTH574ZQNR       |                  |
|                | CDIP – J              | Tube          | SNJ54LVTH574J         | SNJ54LVTH574J    |
|                | CFP – W               | Tube          | SNJ54LVTH574W         | SNJ54LVTH574W    |
|                | LCCC – FK             | Tube          | SNJ54LVTH574FK        | SNJ54LVTH574FK   |

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

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# SN54LVTH574, SN74LVTH574

## 3.3-V ABT OCTAL EDGE-TRIGGERED D-TYPE FLIP-FLOPS WITH 3-STATE OUTPUTS

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### description/ordering information (continued)

The eight flip-flops of the 'LVTH574 devices are edge-triggered D-type flip-flops. On the positive transition of the clock (CLK) input, the Q outputs are set to the logic levels set up at the data (D) inputs.

A buffered output-enable ( $\overline{OE}$ ) input can be used to place the eight outputs in either a normal logic state (high or low logic levels) or a high-impedance state. In the high-impedance state, the outputs neither load nor drive the bus lines significantly. The high-impedance state and increased drive provide the capability to drive bus lines without need for interface or pullup components.

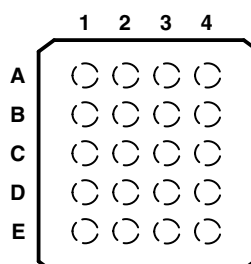
$\overline{OE}$  does not affect the internal operations of the flip-flops. Old data can be retained or new data can be entered while the outputs are in the high-impedance state.

To ensure the high-impedance state during power up or power down,  $\overline{OE}$  should be tied to  $V_{CC}$  through a pullup resistor; the minimum value of the resistor is determined by the current-sinking capability of the driver.

Active bus-hold circuitry is provided to hold unused or floating data inputs at a valid logic level. Use of pullup or pulldown resistors with the bus-hold circuitry is not recommended.

These devices are fully specified for hot-insertion applications using  $I_{off}$  and power-up 3-state. The  $I_{off}$  circuitry disables the outputs, preventing damaging current backflow through the devices when they are powered down. The power-up 3-state circuitry places the outputs in the high-impedance state during power up and power down, which prevents driver conflict.

SN74LVTH574 . . . GQN OR ZQN PACKAGE  
(TOP VIEW)



### terminal assignments

|   | 1   | 2               | 3        | 4  |
|---|-----|-----------------|----------|----|
| A | 1D  | $\overline{OE}$ | $V_{CC}$ | 1Q |
| B | 3D  | 3Q              | 2D       | 2Q |
| C | 5D  | 4D              | 5Q       | 4Q |
| D | 7D  | 7Q              | 6D       | 6Q |
| E | GND | 8D              | CLK      | 8Q |

FUNCTION TABLE  
(each flip-flop)

| INPUTS |            |   | OUTPUT<br>Q |
|--------|------------|---|-------------|
| OE     | CLK        | D |             |
| L      | $\uparrow$ | H | H           |
| L      | $\uparrow$ | L | L           |
| L      | H or L     | X | $Q_0$       |
| H      | X          | X | Z           |

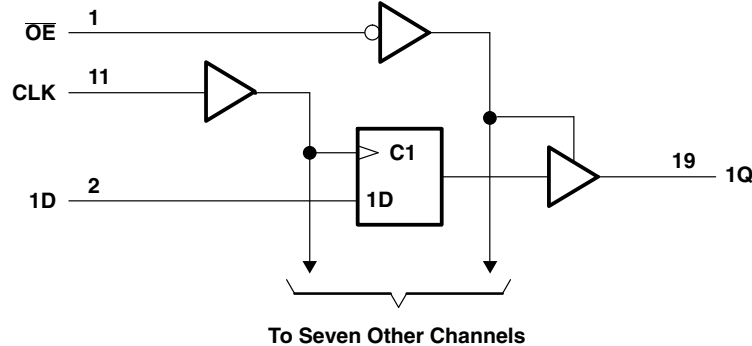
# SN54LVTH574, SN74LVTH574

## 3.3-V ABT OCTAL EDGE-TRIGGERED D-TYPE FLIP-FLOPS

### WITH 3-STATE OUTPUTS

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#### logic diagram (positive logic)



Pin numbers shown are for the DB, DW, FK, J, NS, PW, RGY, and W packages.

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

|                                                                                                  |                            |
|--------------------------------------------------------------------------------------------------|----------------------------|
| Supply voltage range, $V_{CC}$                                                                   | –0.5 V to 4.6 V            |
| Input voltage range, $V_I$ (see Note 1)                                                          | –0.5 V to 7 V              |
| Voltage range applied to any output in the high-impedance or power-off state, $V_O$ (see Note 1) | –0.5 V to 7 V              |
| Voltage range applied to any output in the high state, $V_O$ (see Note 1)                        | –0.5 V to $V_{CC} + 0.5$ V |
| Current into any output in the low state, $I_O$ : SN54LVTH574                                    | 96 mA                      |
| SN74LVTH574                                                                                      | 128 mA                     |
| Current into any output in the high state, $I_O$ (see Note 2): SN54LVTH574                       | 48 mA                      |
| SN74LVTH574                                                                                      | 64 mA                      |
| Input clamp current, $I_{IK}$ ( $V_I < 0$ )                                                      | –50 mA                     |
| Output clamp current, $I_{OK}$ ( $V_O < 0$ )                                                     | –50 mA                     |
| Package thermal impedance, $\theta_{JA}$ (see Note 3): DB package                                | 70°C/W                     |
| (see Note 3): DW package                                                                         | 58°C/W                     |
| (see Note 3): GQN/ZQN package                                                                    | 78°C/W                     |
| (see Note 3): NS package                                                                         | 60°C/W                     |
| (see Note 3): PW package                                                                         | 83°C/W                     |
| (see Note 4): RGY package                                                                        | 37°C/W                     |
| 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. The input and output negative-voltage ratings may be exceeded if the input and output clamp-current ratings are observed.
  2. This current flows only when the output is in the high state and  $V_O > V_{CC}$ .
  3. The package thermal impedance is calculated in accordance with JESD 51-7.
  4. The package thermal impedance is calculated in accordance with JESD 51-5.

# SN54LVTH574, SN74LVTH574

## 3.3-V ABT OCTAL EDGE-TRIGGERED D-TYPE FLIP-FLOPS

### WITH 3-STATE OUTPUTS

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#### recommended operating conditions (see Note 5)

|                          |                                    | SN54LVTH574     |     | SN74LVTH574 |     | UNIT      |
|--------------------------|------------------------------------|-----------------|-----|-------------|-----|-----------|
|                          |                                    | MIN             | MAX | MIN         | MAX |           |
| $V_{CC}$                 | Supply voltage                     | 2.7             | 3.6 | 2.7         | 3.6 | V         |
| $V_{IH}$                 | High-level input voltage           | 2               |     | 2           |     | V         |
| $V_{IL}$                 | Low-level input voltage            |                 | 0.8 |             | 0.8 | V         |
| $V_I$                    | Input voltage                      |                 | 5.5 |             | 5.5 | V         |
| $I_{OH}$                 | High-level output current          |                 | –24 |             | –32 | mA        |
| $I_{OL}$                 | Low-level output current           |                 | 48  |             | 64  | mA        |
| $\Delta t/\Delta v$      | Input transition rise or fall rate | Outputs enabled |     |             | 10  | ns/V      |
| $\Delta t/\Delta V_{CC}$ | Power-up ramp rate                 | 200             |     | 200         |     | $\mu$ s/V |
| $T_A$                    | Operating free-air temperature     | –55             | 125 | –40         | 85  | °C        |

NOTE 5: All unused control 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.

# SN54LVTH574, SN74LVTH574

## 3.3-V ABT OCTAL EDGE-TRIGGERED D-TYPE FLIP-FLOPS

### WITH 3-STATE OUTPUTS

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

| PARAMETER            |                | TEST CONDITIONS                                                                                              |                                  | SN54LVTH574          |      |     | SN74LVTH574          |      |     | UNIT |    |
|----------------------|----------------|--------------------------------------------------------------------------------------------------------------|----------------------------------|----------------------|------|-----|----------------------|------|-----|------|----|
|                      |                |                                                                                                              |                                  | MIN                  | TYP† | MAX | MIN                  | TYP† | MAX |      |    |
| V <sub>IK</sub>      |                | V <sub>CC</sub> = 2.7 V, I <sub>I</sub> = −18 mA                                                             |                                  | −1.2                 |      |     | −1.2                 |      |     | V    |    |
| V <sub>OH</sub>      |                | V <sub>CC</sub> = 2.7 V to 3.6 V, I <sub>OH</sub> = −100 μA                                                  |                                  | V <sub>CC</sub> −0.2 |      |     | V <sub>CC</sub> −0.2 |      |     | V    |    |
|                      |                | V <sub>CC</sub> = 2.7 V, I <sub>OH</sub> = −8 mA                                                             |                                  | 2.4                  |      |     | 2.4                  |      |     |      |    |
|                      |                | V <sub>CC</sub> = 3 V                                                                                        | I <sub>OH</sub> = −24 mA         | 2                    |      |     |                      |      |     |      |    |
|                      |                |                                                                                                              | I <sub>OH</sub> = −32 mA         |                      |      |     | 2                    |      |     |      |    |
| V <sub>OL</sub>      |                | V <sub>CC</sub> = 2.7 V                                                                                      | I <sub>OL</sub> = 100 μA         | 0.2                  |      |     | 0.2                  |      |     | V    |    |
|                      |                |                                                                                                              | I <sub>OL</sub> = 24 mA          | 0.5                  |      |     | 0.5                  |      |     |      |    |
|                      |                | V <sub>CC</sub> = 3 V                                                                                        | I <sub>OL</sub> = 16 mA          | 0.4                  |      |     | 0.4                  |      |     |      |    |
|                      |                |                                                                                                              | I <sub>OL</sub> = 32 mA          | 0.5                  |      |     | 0.5                  |      |     |      |    |
|                      |                |                                                                                                              | I <sub>OL</sub> = 48 mA          | 0.55                 |      |     |                      |      |     |      |    |
|                      |                |                                                                                                              | I <sub>OL</sub> = 64 mA          |                      |      |     | 0.55                 |      |     |      |    |
| I <sub>I</sub>       | Control inputs | V <sub>CC</sub> = 0 or 3.6 V, V <sub>I</sub> = 5.5 V                                                         |                                  | 10                   |      |     | 10                   |      |     | μA   |    |
|                      |                | V <sub>CC</sub> = 3.6 V, V <sub>I</sub> = V <sub>CC</sub> or GND                                             |                                  | ±1                   |      |     | ±1                   |      |     |      |    |
|                      | Data inputs    | V <sub>CC</sub> = 3.6 V                                                                                      | V <sub>I</sub> = V <sub>CC</sub> |                      | 1    |     |                      | 1    |     |      |    |
|                      |                |                                                                                                              | V <sub>I</sub> = 0               |                      | −5   |     |                      | −5   |     |      |    |
| I <sub>off</sub>     |                | V <sub>CC</sub> = 0, V <sub>I</sub> or V <sub>O</sub> = 0 to 4.5 V                                           |                                  |                      |      |     | ±100                 |      |     | μA   |    |
| I <sub>I(hold)</sub> | Data inputs    | V <sub>CC</sub> = 3 V                                                                                        | V <sub>I</sub> = 0.8 V           |                      | 75   |     |                      | 75   |     |      | μA |
|                      |                |                                                                                                              | V <sub>I</sub> = 2 V             |                      | −75  |     |                      | −75  |     |      |    |
|                      |                | V <sub>CC</sub> = 3.6 V‡, V <sub>I</sub> = 0 to 3.6 V                                                        |                                  |                      |      |     | ±500                 |      |     |      |    |
| I <sub>OZH</sub>     |                | V <sub>CC</sub> = 3.6 V, V <sub>O</sub> = 3 V                                                                |                                  | 5                    |      |     | 5                    |      |     | μA   |    |
| I <sub>OZL</sub>     |                | V <sub>CC</sub> = 3.6 V, V <sub>O</sub> = 0.5 V                                                              |                                  | −5                   |      |     | −5                   |      |     | μA   |    |
| I <sub>OZPU</sub>    |                | V <sub>CC</sub> = 0 to 1.5 V, V <sub>O</sub> = 0.5 V to 3 V, OE = don't care                                 |                                  | ±100*                |      |     | ±100                 |      |     | μA   |    |
| I <sub>OZPD</sub>    |                | V <sub>CC</sub> = 1.5 V to 0, V <sub>O</sub> = 0.5 V to 3 V, OE = don't care                                 |                                  | ±100*                |      |     | ±100                 |      |     | μA   |    |
| I <sub>CC</sub>      |                | V <sub>CC</sub> = 3.6 V, I <sub>O</sub> = 0, V <sub>I</sub> = V <sub>CC</sub> or GND                         | Outputs high                     |                      | 0.19 |     |                      | 0.19 |     |      | mA |
|                      |                |                                                                                                              | Outputs low                      |                      | 5    |     |                      | 5    |     |      |    |
|                      |                |                                                                                                              | Outputs disabled                 |                      | 0.19 |     |                      | 0.19 |     |      |    |
| ΔI <sub>CC</sub> §   |                | V <sub>CC</sub> = 3 V to 3.6 V, One input at V <sub>CC</sub> − 0.6 V, Other inputs at V <sub>CC</sub> or GND |                                  | 0.2                  |      |     | 0.2                  |      |     | mA   |    |
| C <sub>i</sub>       |                | V <sub>I</sub> = 3 V or 0                                                                                    |                                  | 3                    |      |     | 3                    |      |     | pF   |    |
| C <sub>O</sub>       |                | V <sub>O</sub> = 3 V or 0                                                                                    |                                  | 7                    |      |     | 7                    |      |     | pF   |    |

\* On products compliant to MIL-PRF-38535, this parameter is not production tested.

† All typical values are at  $V_{CC} = 3.3\text{ V}$ ,  $T_A = 25^\circ\text{C}$ .

‡ This is the bus-hold maximum dynamic current. It is the minimum overdrive current required to switch the input from one state to another.

§ This is the increase in supply current for each input that is at the specified TTL voltage level, rather than  $V_{CC}$  or GND.



# SN54LVTH574, SN74LVTH574

## 3.3-V ABT OCTAL EDGE-TRIGGERED D-TYPE FLIP-FLOPS

### WITH 3-STATE OUTPUTS

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timing requirements over recommended operating free-air temperature range (unless otherwise noted) (see Figure 1)

|                    |                                 | SN54LVTH574                              |     |                         |     | SN74LVTH574                              |     |                         |     | UNIT |
|--------------------|---------------------------------|------------------------------------------|-----|-------------------------|-----|------------------------------------------|-----|-------------------------|-----|------|
|                    |                                 | $V_{CC} = 3.3\text{ V} \pm 0.3\text{ V}$ |     | $V_{CC} = 2.7\text{ V}$ |     | $V_{CC} = 3.3\text{ V} \pm 0.3\text{ V}$ |     | $V_{CC} = 2.7\text{ V}$ |     |      |
|                    |                                 | MIN                                      | MAX | MIN                     | MAX | MIN                                      | MAX | MIN                     | MAX |      |
| $f_{\text{clock}}$ | Clock frequency                 | 150                                      |     | 150                     |     | 150                                      |     | 150                     |     | MHz  |
| $t_w$              | Pulse duration, CLK high or low | 3.3                                      |     | 3.3                     |     | 3.3                                      |     | 3.3                     |     | ns   |
| $t_{\text{su}}$    | Setup time, data before CLK↑    | 2                                        |     | 2.4                     |     | 2                                        |     | 2.4                     |     | ns   |
| $t_h$              | Hold time, data after CLK↑      | 0.9                                      |     | 0.9                     |     | 0.3                                      |     | 0                       |     | ns   |

switching characteristics over recommended free-air temperature,  $C_L = 50\text{ pF}$  (unless otherwise noted) (see Figure 1)

| PARAMETER        | FROM<br>(INPUT) | TO<br>(OUTPUT) | SN54LVTH574                        |     |                         |     | SN74LVTH574                        |      |                         |     | UNIT |     |
|------------------|-----------------|----------------|------------------------------------|-----|-------------------------|-----|------------------------------------|------|-------------------------|-----|------|-----|
|                  |                 |                | V <sub>CC</sub> = 3.3 V<br>± 0.3 V |     | V <sub>CC</sub> = 2.7 V |     | V <sub>CC</sub> = 3.3 V<br>± 0.3 V |      | V <sub>CC</sub> = 2.7 V |     |      |     |
|                  |                 |                | MIN                                | MAX | MIN                     | MAX | MIN                                | TYP† | MAX                     | MIN |      | MAX |
| f <sub>max</sub> |                 |                | 150                                |     | 150                     |     | 150                                |      |                         | 150 |      | MHz |
| t <sub>PLH</sub> | CLK             | Q              | 1.7                                | 4.9 | 5.9                     |     | 1.8                                | 3    | 4.5                     | 5.3 |      | ns  |
| t <sub>PHL</sub> |                 |                | 1.7                                | 4.9 | 5.5                     |     | 1.8                                | 3    | 4.5                     | 5.3 |      |     |
| t <sub>PZH</sub> | OE              | Q              | 1.4                                | 5.1 | 6.5                     |     | 1.5                                | 3.2  | 4.8                     | 5.9 |      | ns  |
| t <sub>PZL</sub> |                 |                | 1.4                                | 5.1 | 6.1                     |     | 1.5                                | 3.5  | 4.8                     | 5.9 |      |     |
| t <sub>PHZ</sub> | OE              | Q              | 1                                  | 5.9 | 6.4                     |     | 2                                  | 3.5  | 4.8                     | 5.1 |      | ns  |
| t <sub>PLZ</sub> |                 |                | 0.8                                | 4.8 | 5.3                     |     | 2                                  | 3.2  | 4.4                     | 4.4 |      |     |

$\dagger$  All typical values are at  $V_{CC} = 3.3\text{ V}$ ,  $T_A = 25^\circ\text{C}$ .

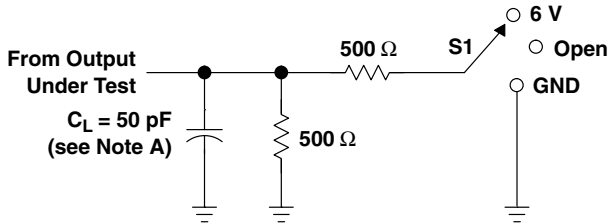
# SN54LVTH574, SN74LVTH574

## 3.3-V ABT OCTAL EDGE-TRIGGERED D-TYPE FLIP-FLOPS

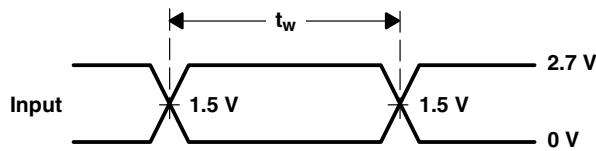
### WITH 3-STATE OUTPUTS

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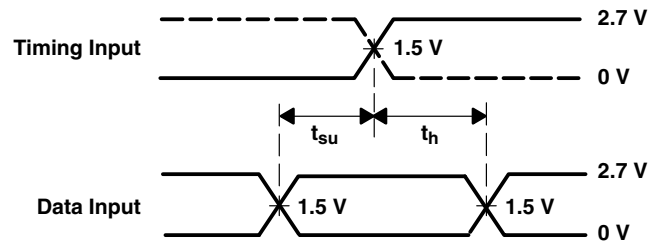
#### PARAMETER MEASUREMENT INFORMATION



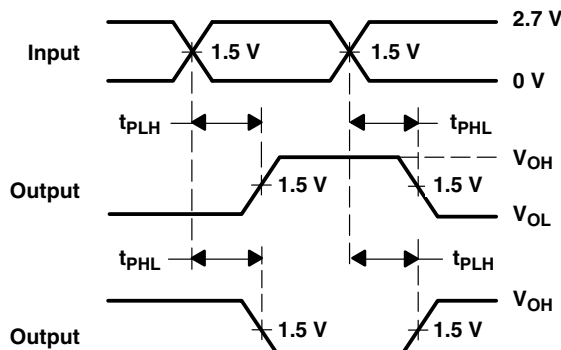
LOAD CIRCUIT



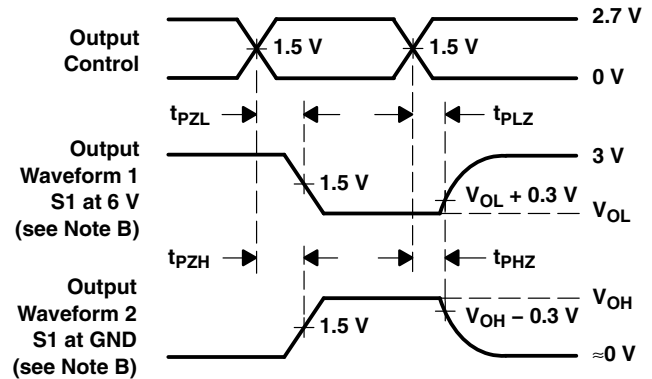
VOLTAGE WAVEFORMS  
PULSE DURATION



VOLTAGE WAVEFORMS  
SETUP AND HOLD TIMES



VOLTAGE WAVEFORMS  
PROPAGATION DELAY TIMES  
INVERTING AND NONINVERTING OUTPUTS



VOLTAGE WAVEFORMS  
ENABLE AND DISABLE TIMES  
LOW- AND HIGH-LEVEL ENABLING

- NOTES:
- $C_L$  includes probe and jig capacitance.
  - Waveform 1 is for an output with internal conditions such that the output is low except when disabled by the output control. Waveform 2 is for an output with internal conditions such that the output is high except when disabled by the output control.
  - All input pulses are supplied by generators having the following characteristics:  $PRR \leq 10 \text{ MHz}$ ,  $Z_O = 50 \Omega$ ,  $t_r \leq 2.5 \text{ ns}$ ,  $t_f \leq 2.5 \text{ ns}$ .
  - The outputs are measured one at a time with one transition per measurement.
  - All parameters and waveforms are not applicable to all devices.

Figure 1. Load Circuit and Voltage Waveforms

## PACKAGING INFORMATION

| Orderable Device | Status<br>(1) | Package Type | Package<br>Drawing | Pins | Package<br>Qty | Eco Plan<br>(2)     | Lead finish/<br>Ball material<br>(6) | MSL Peak Temp<br>(3) | Op Temp (°C) | Device Marking<br>(4/5)                   | Samples                 |
|------------------|---------------|--------------|--------------------|------|----------------|---------------------|--------------------------------------|----------------------|--------------|-------------------------------------------|-------------------------|
| 5962-9583201Q2A  | ACTIVE        | LCCC         | FK                 | 20   | 1              | Non-RoHS<br>& Green | SNPB                                 | N / A for Pkg Type   | -55 to 125   | 5962-<br>9583201Q2A<br>SNJ54LVTH<br>574FK | <a href="#">Samples</a> |
| 5962-9583201QSA  | ACTIVE        | CFP          | W                  | 20   | 1              | Non-RoHS<br>& Green | SNPB                                 | N / A for Pkg Type   | -55 to 125   | 5962-9583201QS<br>A<br>SNJ54LVTH574W      | <a href="#">Samples</a> |
| 5962-9583201VSA  | ACTIVE        | CFP          | W                  | 20   | 25             | Non-RoHS<br>& Green | SNPB                                 | N / A for Pkg Type   | -55 to 125   | 5962-9583201VS<br>A<br>SNV54LVTH574W      | <a href="#">Samples</a> |
| SN74LVTH574DB    | ACTIVE        | SSOP         | DB                 | 20   | 70             | RoHS & Green        | NIPDAU                               | Level-1-260C-UNLIM   | -40 to 85    | LXH574                                    | <a href="#">Samples</a> |
| SN74LVTH574DBR   | ACTIVE        | SSOP         | DB                 | 20   | 2000           | RoHS & Green        | NIPDAU                               | Level-1-260C-UNLIM   | -40 to 85    | LXH574                                    | <a href="#">Samples</a> |
| SN74LVTH574DW    | ACTIVE        | SOIC         | DW                 | 20   | 25             | RoHS & Green        | NIPDAU                               | Level-1-260C-UNLIM   | -40 to 85    | LVTH574                                   | <a href="#">Samples</a> |
| SN74LVTH574DWR   | ACTIVE        | SOIC         | DW                 | 20   | 2000           | RoHS & Green        | NIPDAU                               | Level-1-260C-UNLIM   | -40 to 85    | LVTH574                                   | <a href="#">Samples</a> |
| SN74LVTH574NSR   | ACTIVE        | SO           | NS                 | 20   | 2000           | RoHS & Green        | NIPDAU                               | Level-1-260C-UNLIM   | -40 to 85    | LVTH574                                   | <a href="#">Samples</a> |
| SN74LVTH574PW    | ACTIVE        | TSSOP        | PW                 | 20   | 70             | RoHS & Green        | NIPDAU                               | Level-1-260C-UNLIM   | -40 to 85    | LXH574                                    | <a href="#">Samples</a> |
| SN74LVTH574PWR   | ACTIVE        | TSSOP        | PW                 | 20   | 2000           | RoHS & Green        | NIPDAU                               | Level-1-260C-UNLIM   | -40 to 85    | LXH574                                    | <a href="#">Samples</a> |
| SN74LVTH574RGYR  | ACTIVE        | VQFN         | RGY                | 20   | 3000           | RoHS & Green        | NIPDAU                               | Level-2-260C-1 YEAR  | -40 to 85    | LXH574                                    | <a href="#">Samples</a> |
| SNJ54LVTH574FK   | ACTIVE        | LCCC         | FK                 | 20   | 1              | Non-RoHS<br>& Green | SNPB                                 | N / A for Pkg Type   | -55 to 125   | 5962-<br>9583201Q2A<br>SNJ54LVTH<br>574FK | <a href="#">Samples</a> |
| SNJ54LVTH574W    | ACTIVE        | CFP          | W                  | 20   | 1              | Non-RoHS<br>& Green | SNPB                                 | N / A for Pkg Type   | -55 to 125   | 5962-9583201QS<br>A<br>SNJ54LVTH574W      | <a href="#">Samples</a> |

(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.

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

<sup>(2)</sup> **RoHS:** TI defines "RoHS" to mean semiconductor products that are compliant with the current EU RoHS requirements for all 10 RoHS substances, including the requirement that RoHS substance do not exceed 0.1% by weight in homogeneous materials. Where designed to be soldered at high temperatures, "RoHS" products are suitable for use in specified lead-free processes. TI may reference these types of products as "Pb-Free".

**RoHS Exempt:** TI defines "RoHS Exempt" to mean products that contain lead but are compliant with EU RoHS pursuant to a specific EU RoHS exemption.

**Green:** TI defines "Green" to mean the content of Chlorine (Cl) and Bromine (Br) based flame retardants meet JS709B low halogen requirements of <=1000ppm threshold. Antimony trioxide based flame retardants must also meet the <=1000ppm threshold requirement.

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

<sup>(4)</sup> There may be additional marking, which relates to the logo, the lot trace code information, or the environmental category on the device.

<sup>(5)</sup> Multiple Device Markings will be inside parentheses. Only one Device Marking contained in parentheses and separated by a "-" will appear on a device. If a line is indented then it is a continuation of the previous line and the two combined represent the entire Device Marking for that device.

<sup>(6)</sup> Lead finish/Ball material - Orderable Devices may have multiple material finish options. Finish options are separated by a vertical ruled line. Lead finish/Ball material values may wrap to two lines if the finish value exceeds the maximum column width.

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In no event shall TI's liability arising out of such information exceed the total purchase price of the TI part(s) at issue in this document sold by TI to Customer on an annual basis.

**OTHER QUALIFIED VERSIONS OF SN54LVTH574, SN54LVTH574-SP, SN74LVTH574 :**

- Catalog : [SN74LVTH574](#), [SN54LVTH574](#)
- Enhanced Product : [SN74LVTH574-EP](#), [SN74LVTH574-EP](#)
- Military : [SN54LVTH574](#)
- Space : [SN54LVTH574-SP](#)

NOTE: Qualified Version Definitions:

- Catalog - TI's standard catalog product
- Enhanced Product - Supports Defense, Aerospace and Medical Applications
- 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



\*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 |
|-----------------|--------------|-----------------|------|------|--------------------|--------------------|---------|---------|---------|---------|--------|---------------|
| SN74LVTH574DBR  | SSOP         | DB              | 20   | 2000 | 330.0              | 16.4               | 8.2     | 7.5     | 2.5     | 12.0    | 16.0   | Q1            |
| SN74LVTH574DWR  | SOIC         | DW              | 20   | 2000 | 330.0              | 24.4               | 10.8    | 13.3    | 2.7     | 12.0    | 24.0   | Q1            |
| SN74LVTH574NSR  | SO           | NS              | 20   | 2000 | 330.0              | 24.4               | 8.4     | 13.0    | 2.5     | 12.0    | 24.0   | Q1            |
| SN74LVTH574PWR  | TSSOP        | PW              | 20   | 2000 | 330.0              | 16.4               | 6.95    | 7.0     | 1.4     | 8.0     | 16.0   | Q1            |
| SN74LVTH574RGYR | VQFN         | RGY             | 20   | 3000 | 330.0              | 12.4               | 3.8     | 4.8     | 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) |
|-----------------|--------------|-----------------|------|------|-------------|------------|-------------|
| SN74LVTH574DBR  | SSOP         | DB              | 20   | 2000 | 356.0       | 356.0      | 35.0        |
| SN74LVTH574DWR  | SOIC         | DW              | 20   | 2000 | 367.0       | 367.0      | 45.0        |
| SN74LVTH574NSR  | SO           | NS              | 20   | 2000 | 367.0       | 367.0      | 45.0        |
| SN74LVTH574PWR  | TSSOP        | PW              | 20   | 2000 | 356.0       | 356.0      | 35.0        |
| SN74LVTH574RGYR | VQFN         | RGY             | 20   | 3000 | 356.0       | 356.0      | 35.0        |

## TUBE

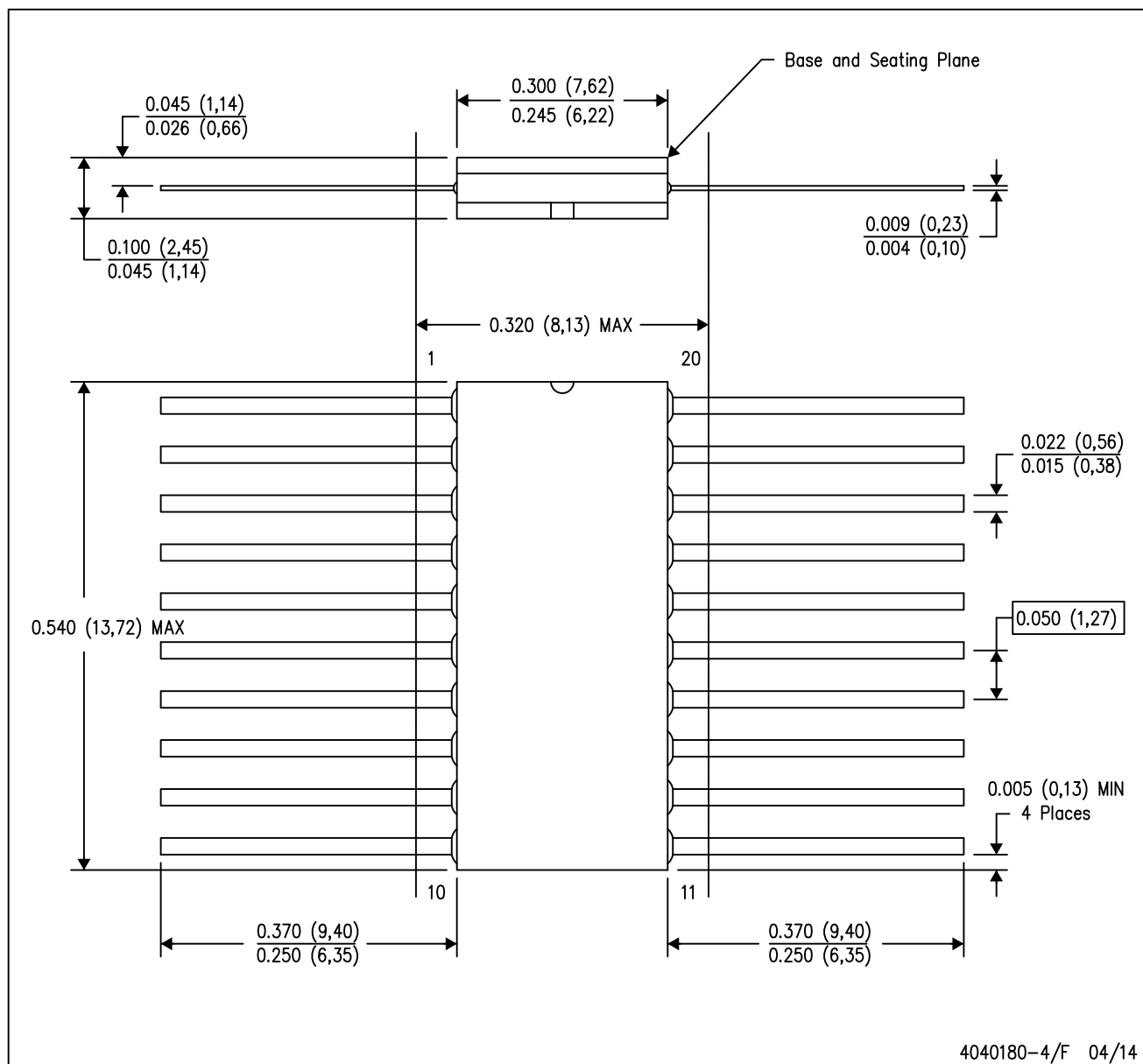


\*All dimensions are nominal

| Device          | Package Name | Package Type | Pins | SPQ | L (mm) | W (mm) | T (μm) | B (mm) |
|-----------------|--------------|--------------|------|-----|--------|--------|--------|--------|
| 5962-9583201Q2A | FK           | LCCC         | 20   | 1   | 506.98 | 12.06  | 2030   | NA     |
| 5962-9583201VSA | W            | CFP          | 20   | 25  | 506.98 | 26.16  | 6220   | NA     |
| SN74LVTH574DB   | DB           | SSOP         | 20   | 70  | 530    | 10.5   | 4000   | 4.1    |
| SN74LVTH574DW   | DW           | SOIC         | 20   | 25  | 507    | 12.83  | 5080   | 6.6    |
| SN74LVTH574PW   | PW           | TSSOP        | 20   | 70  | 530    | 10.2   | 3600   | 3.5    |
| SNJ54LVTH574FK  | FK           | LCCC         | 20   | 1   | 506.98 | 12.06  | 2030   | NA     |

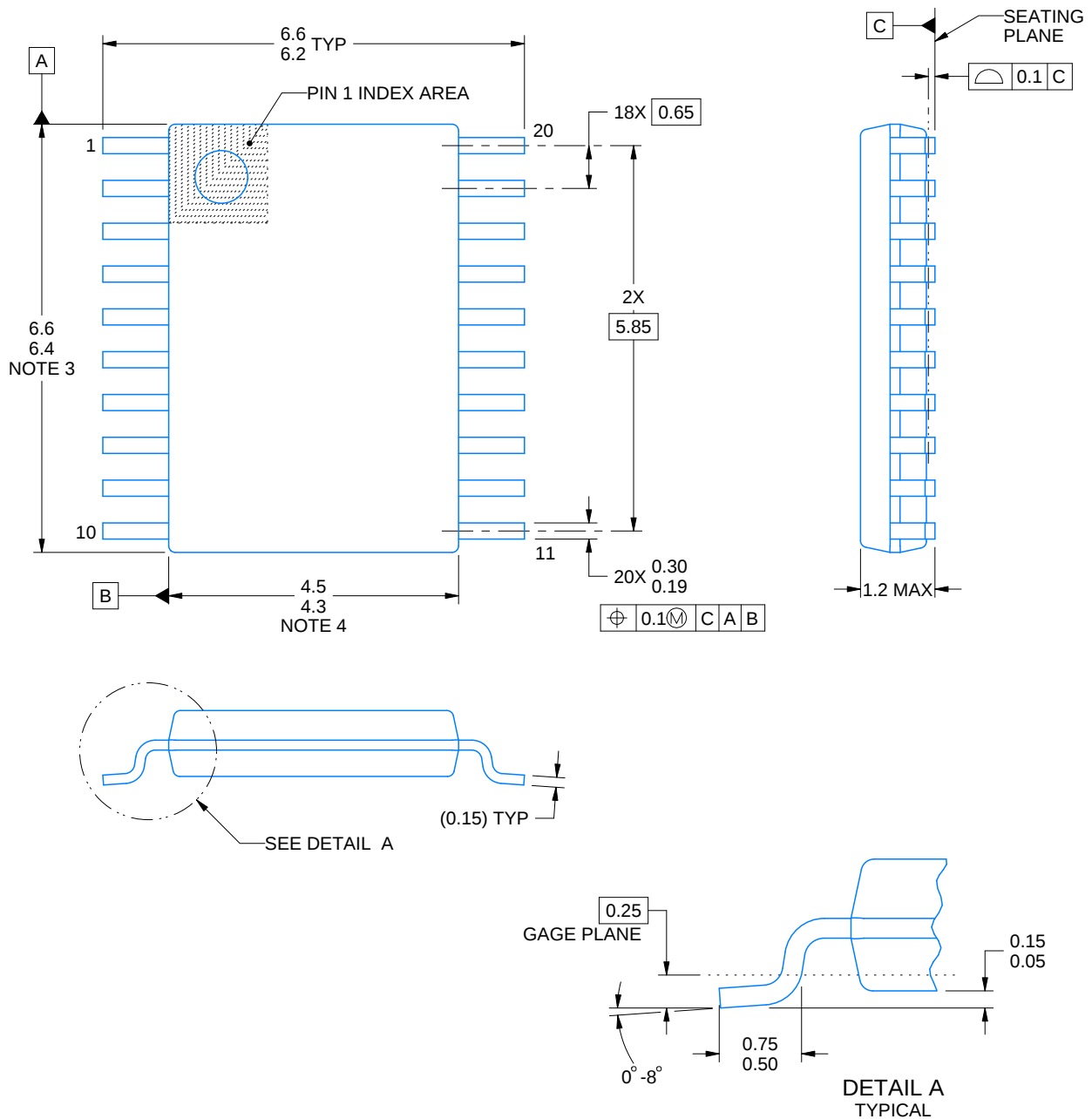
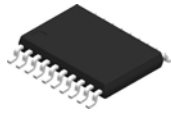
W (R-GDFP-F20)

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 GDFP2-F20



4220206/A 02/2017

## NOTES:

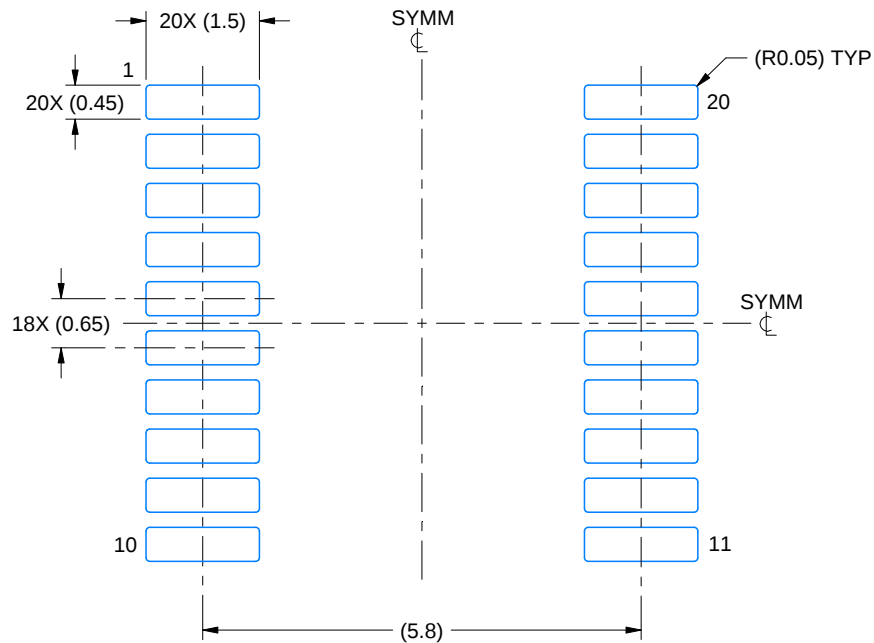
1. All linear dimensions are in millimeters. Any dimensions in parenthesis are for reference only. Dimensioning and tolerancing per ASME Y14.5M.
2. This drawing is subject to change without notice.
3. This dimension does not include mold flash, protrusions, or gate burrs. Mold flash, protrusions, or gate burrs shall not exceed 0.15 mm per side.
4. This dimension does not include interlead flash. Interlead flash shall not exceed 0.25 mm per side.
5. Reference JEDEC registration MO-153.

# EXAMPLE BOARD LAYOUT

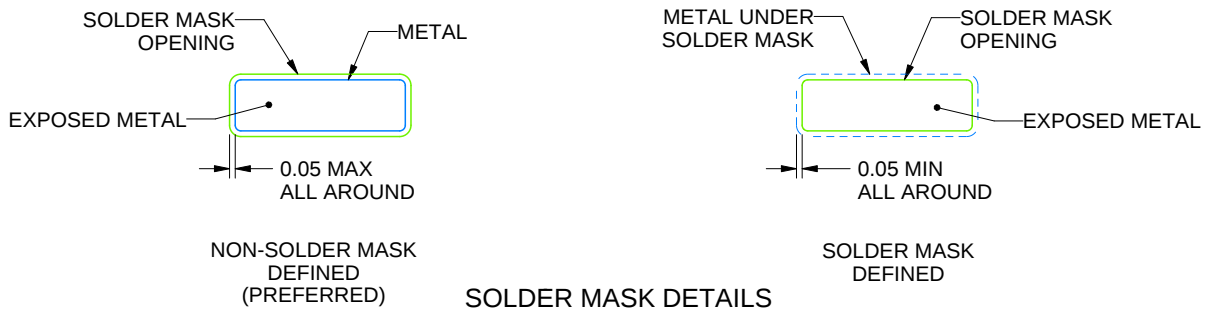
PW0020A

TSSOP - 1.2 mm max height

SMALL OUTLINE PACKAGE



LAND PATTERN EXAMPLE  
EXPOSED METAL SHOWN  
SCALE: 10X



4220206/A 02/2017

NOTES: (continued)

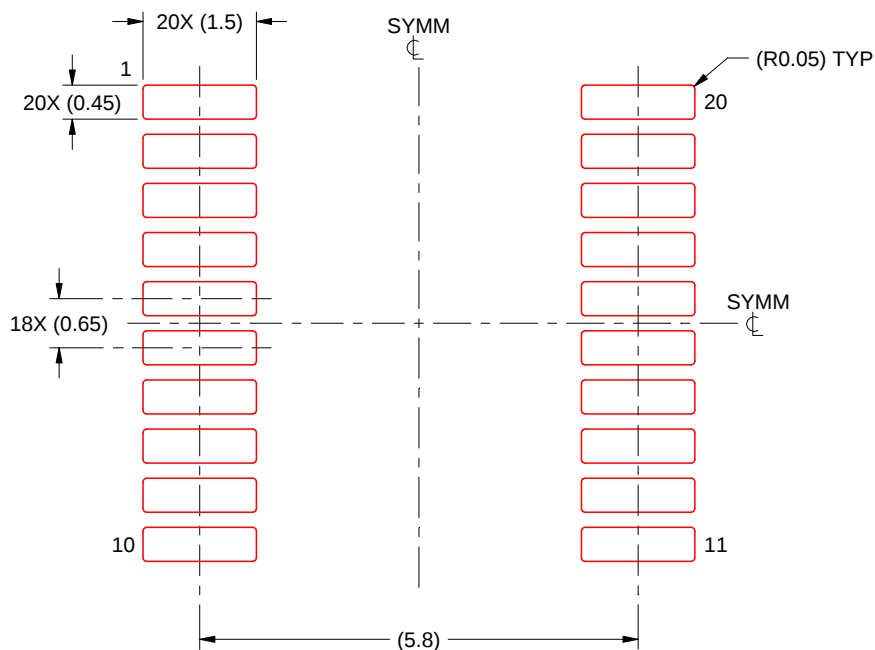
6. Publication IPC-7351 may have alternate designs.
7. Solder mask tolerances between and around signal pads can vary based on board fabrication site.

## EXAMPLE STENCIL DESIGN

PW0020A

TSSOP - 1.2 mm max height

SMALL OUTLINE PACKAGE



SOLDER PASTE EXAMPLE  
BASED ON 0.125 mm THICK STENCIL  
SCALE: 10X

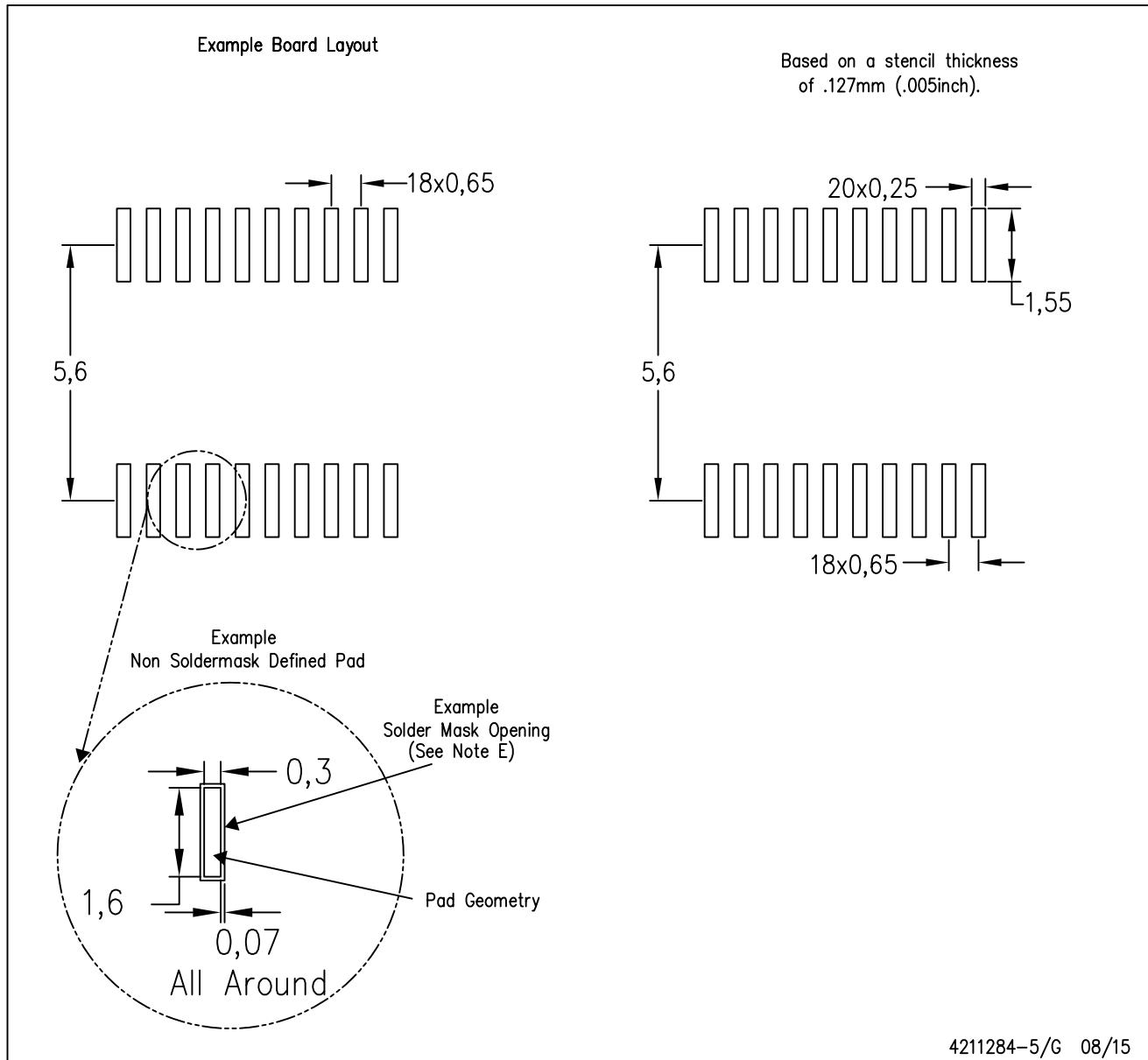
4220206/A 02/2017

NOTES: (continued)

8. Laser cutting apertures with trapezoidal walls and rounded corners may offer better paste release. IPC-7525 may have alternate design recommendations.
9. Board assembly site may have different recommendations for stencil design.

PW (R-PDSO-G20)

PLASTIC SMALL OUTLINE

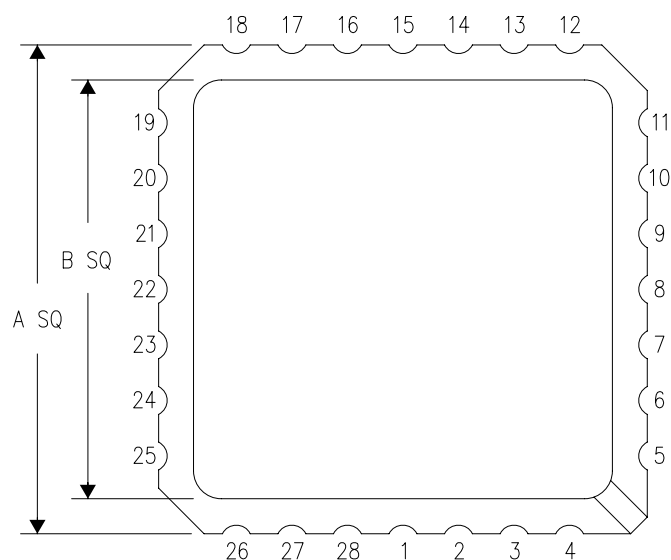


- NOTES:
- A. All linear dimensions are in millimeters.
  - B. This drawing is subject to change without notice.
  - C. Publication IPC-7351 is recommended for alternate design.
  - D. Laser cutting apertures with trapezoidal walls and also rounding corners will offer better paste release. Customers should contact their board assembly site for stencil design recommendations. Refer to IPC-7525 for other stencil recommendations.
  - E. Customers should contact their board fabrication site for solder mask tolerances between and around signal pads.

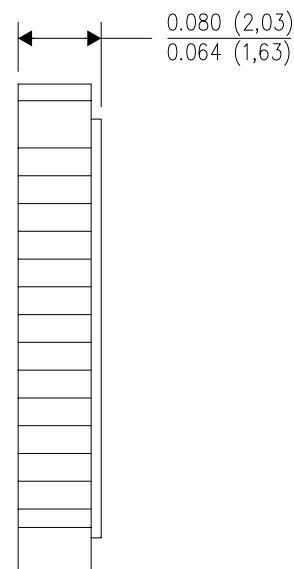
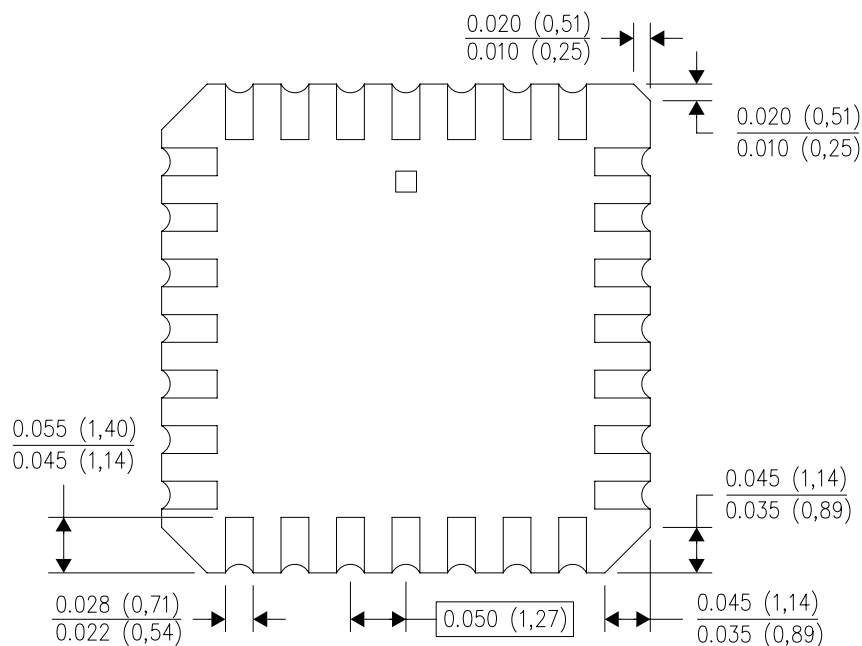
FK (S-CQCC-N\*\*)

LEADLESS CERAMIC CHIP CARRIER

28 TERMINAL SHOWN

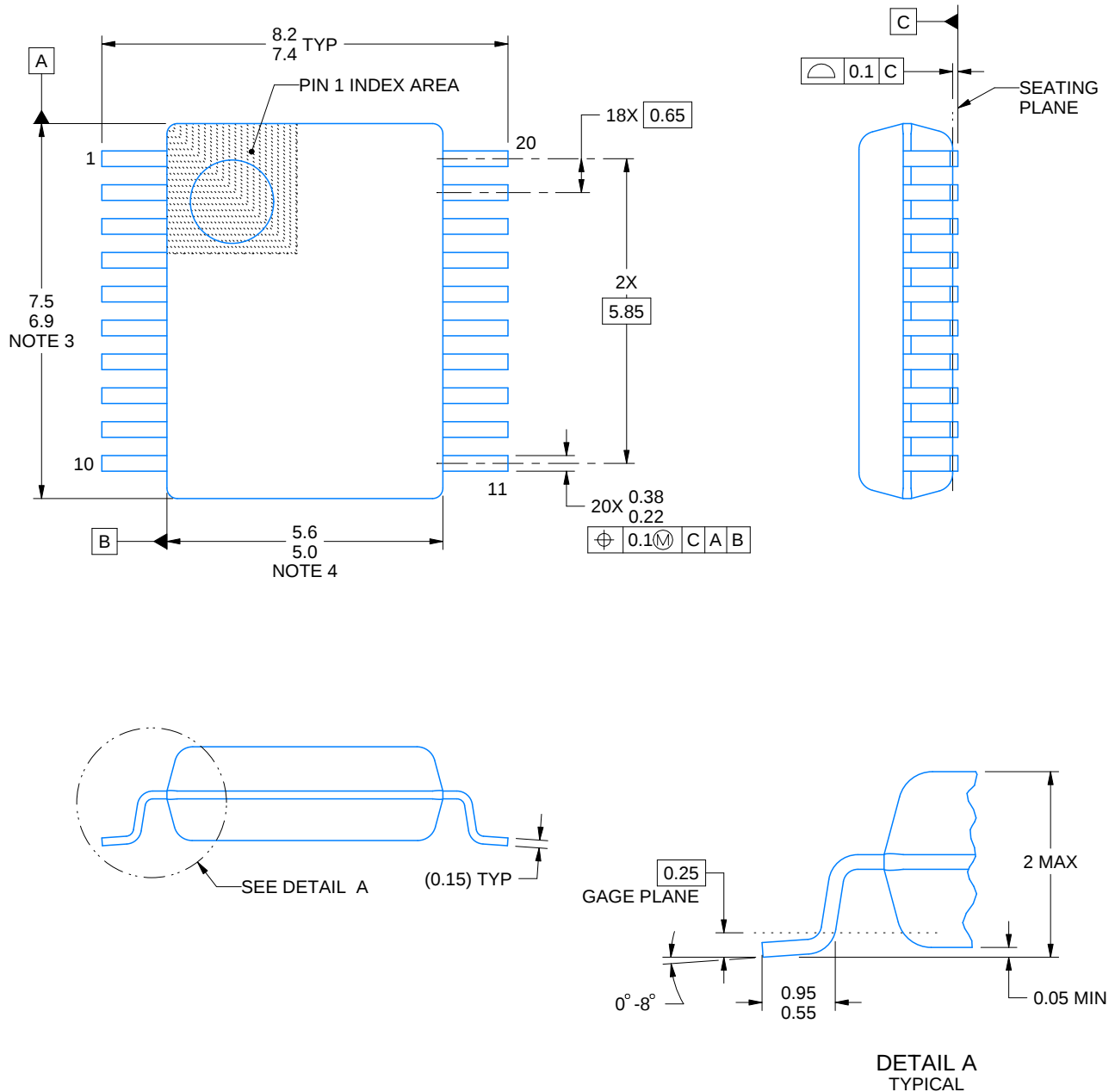
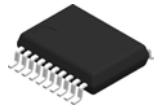


| NO. OF<br>TERMINALS<br>** | A                |                  | B                |                  |
|---------------------------|------------------|------------------|------------------|------------------|
|                           | MIN              | MAX              | MIN              | MAX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



4214851/B 08/2019

## NOTES:

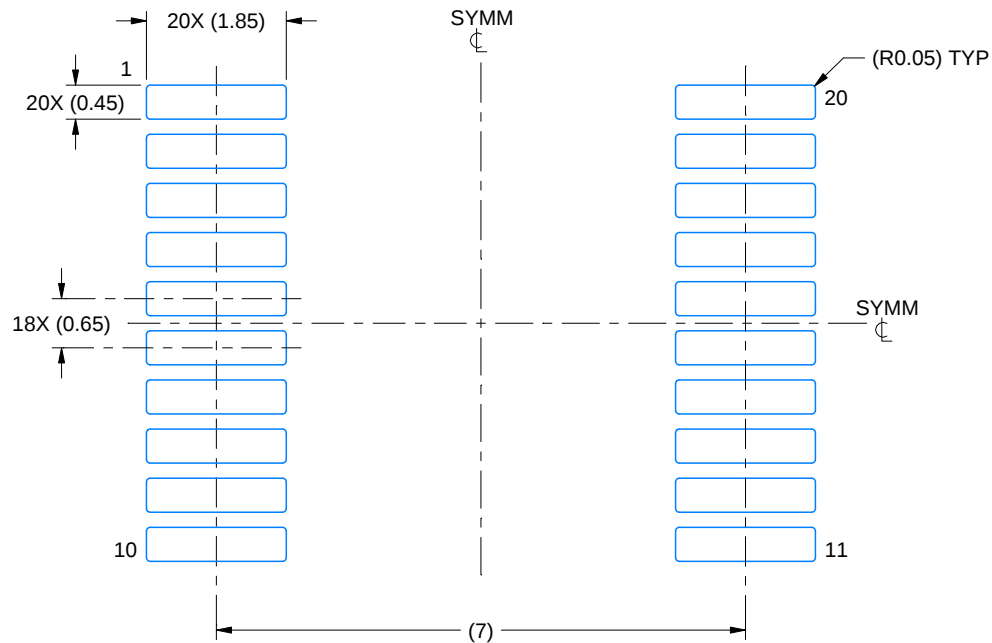
1. All linear dimensions are in millimeters. Any dimensions in parenthesis are for reference only. Dimensioning and tolerancing per ASME Y14.5M.
2. This drawing is subject to change without notice.
3. This dimension does not include mold flash, protrusions, or gate burrs. Mold flash, protrusions, or gate burrs shall not exceed 0.15 mm per side.
4. This dimension does not include interlead flash. Interlead flash shall not exceed 0.25 mm per side.
5. Reference JEDEC registration MO-150.

# EXAMPLE BOARD LAYOUT

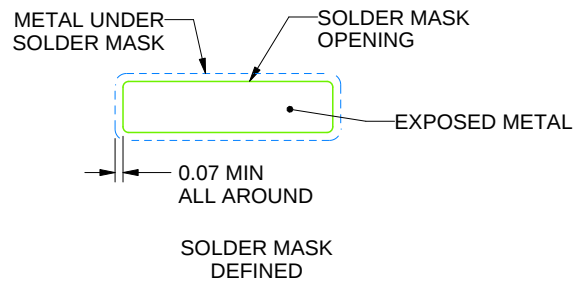
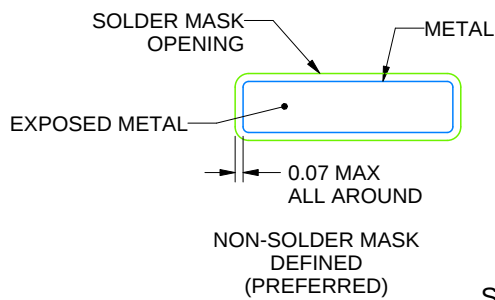
DB0020A

SSOP - 2 mm max height

SMALL OUTLINE PACKAGE



LAND PATTERN EXAMPLE  
EXPOSED METAL SHOWN  
SCALE: 10X



SOLDER MASK DETAILS

4214851/B 08/2019

NOTES: (continued)

6. Publication IPC-7351 may have alternate designs.

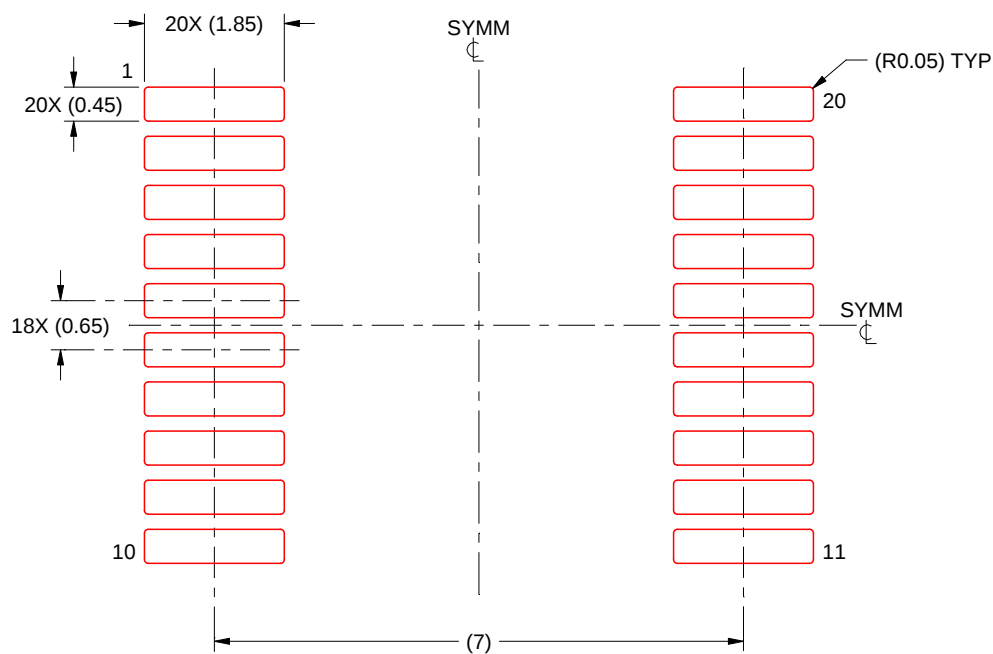
7. Solder mask tolerances between and around signal pads can vary based on board fabrication site.

## EXAMPLE STENCIL DESIGN

DB0020A

SSOP - 2 mm max height

SMALL OUTLINE PACKAGE



SOLDER PASTE EXAMPLE  
BASED ON 0.125 mm THICK STENCIL  
SCALE: 10X

4214851/B 08/2019

NOTES: (continued)

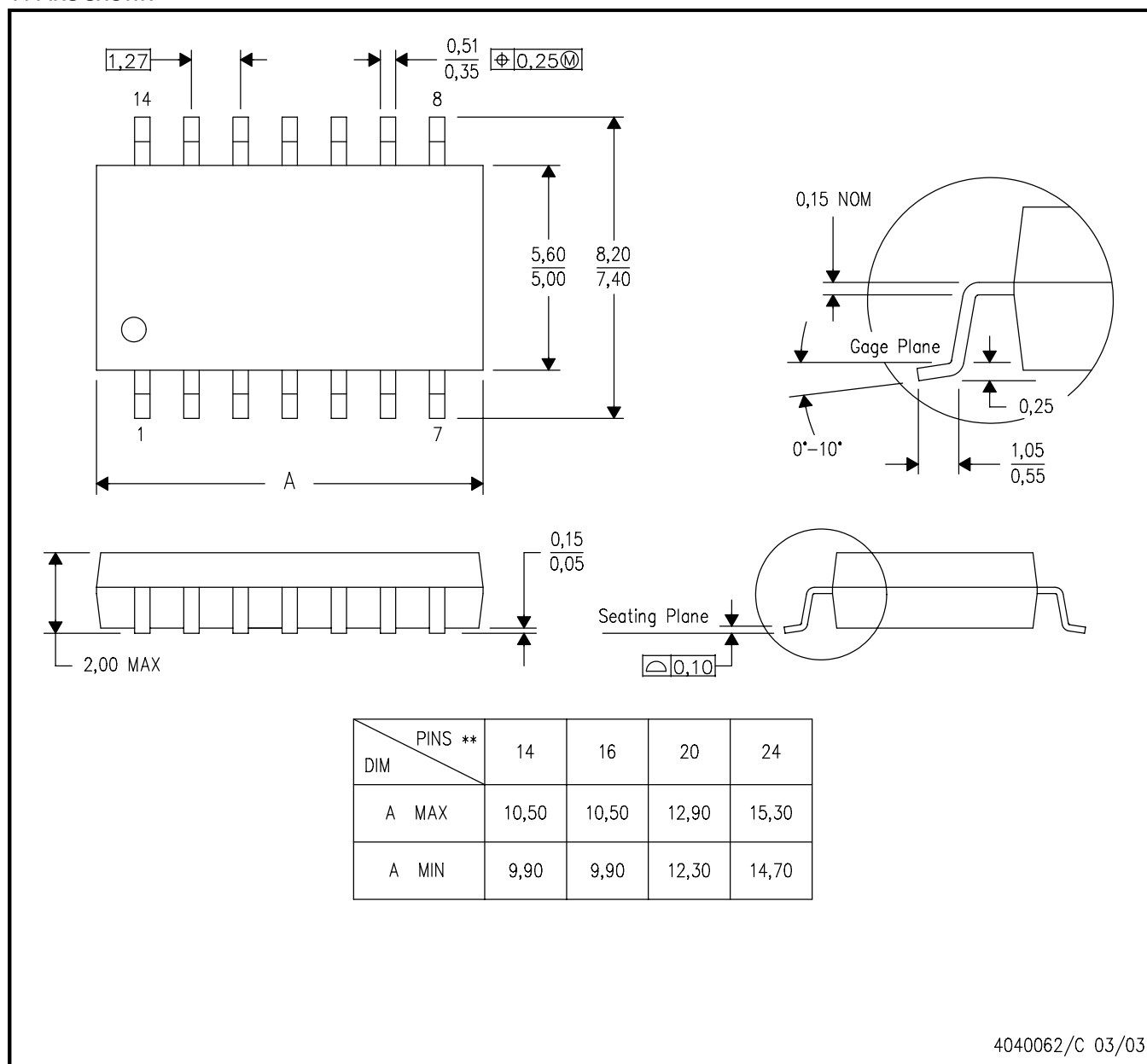
8. Laser cutting apertures with trapezoidal walls and rounded corners may offer better paste release. IPC-7525 may have alternate design recommendations.
9. Board assembly site may have different recommendations for stencil design.

# 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.

## GENERIC PACKAGE VIEW

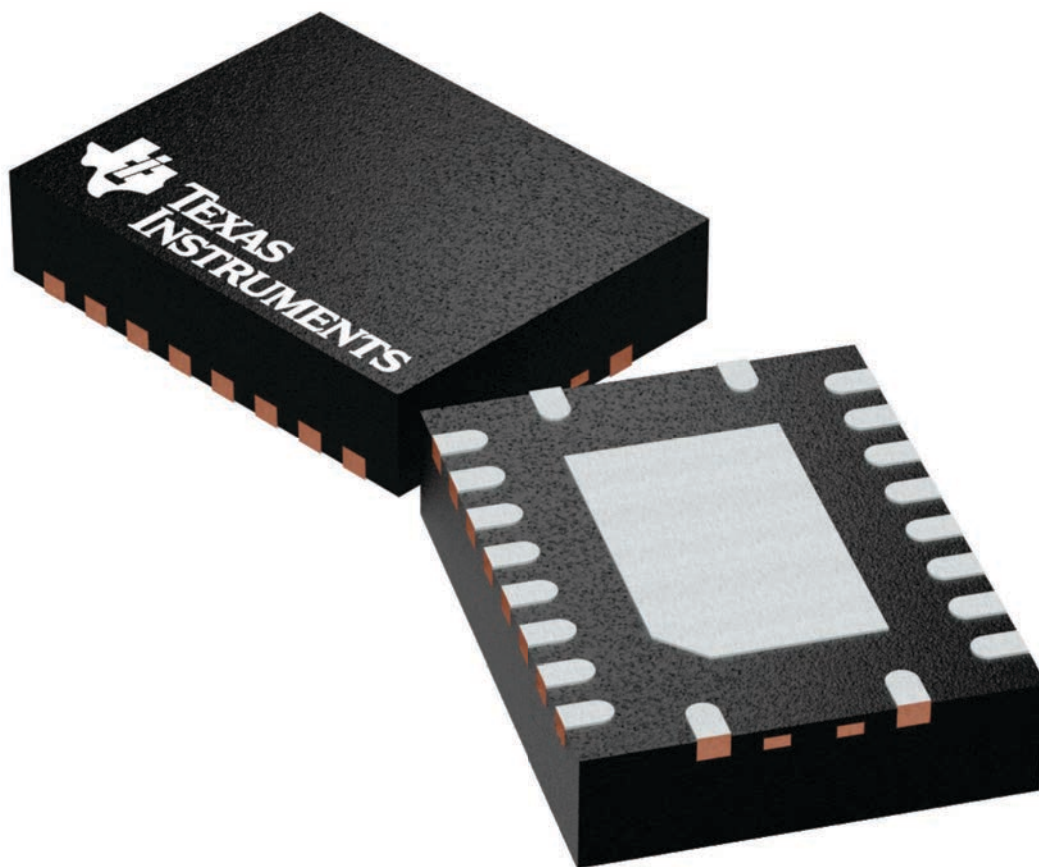
**RGY 20**

**VQFN - 1 mm max height**

3.5 x 4.5, 0.5 mm pitch

PLASTIC QUAD FGLATPACK - NO LEAD

This image is a representation of the package family, actual package may vary.  
Refer to the product data sheet for package details.



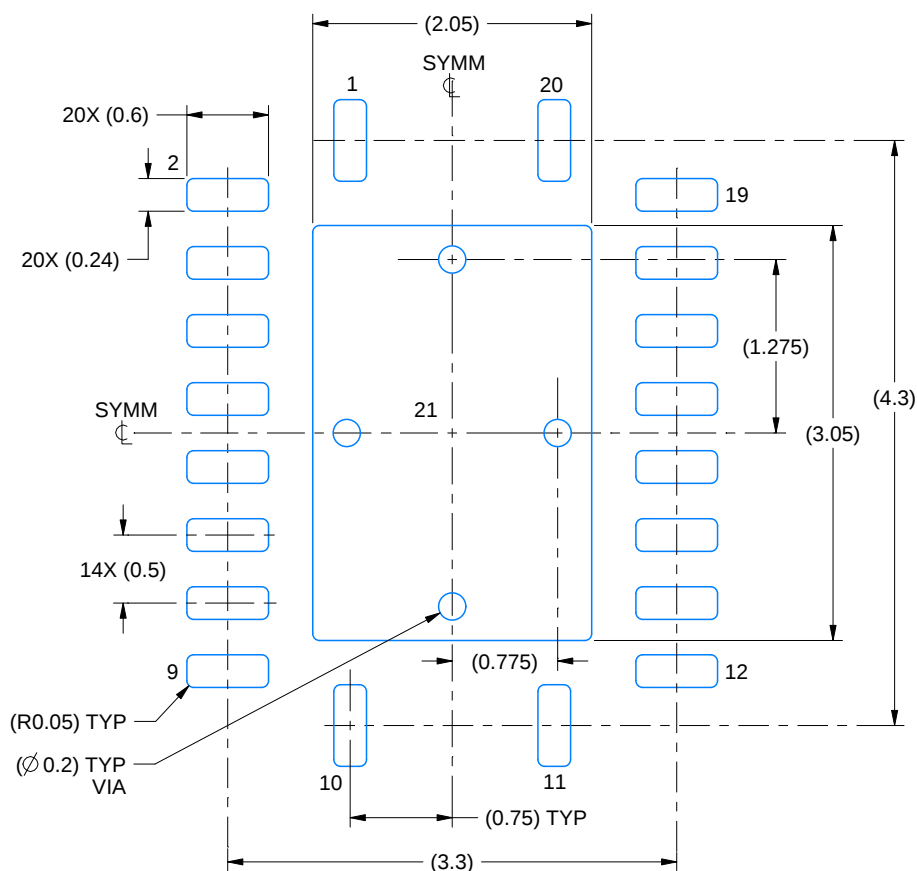
4225264/A



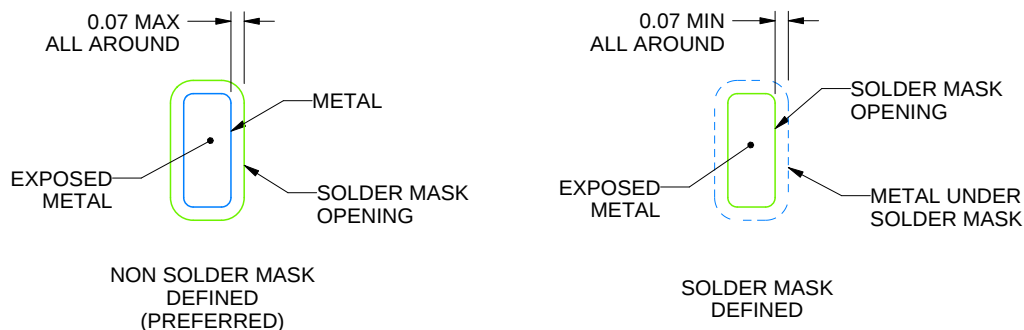
# RGY0020A

### VQFN - 1 mm max height

PLASTIC QUAD FLATPACK - NO LEAD



LAND PATTERN EXAMPLE  
EXPOSED METAL SHOWN  
SCALE:18X



## SOLDER MASK DETAILS

4225320/A 09/2019

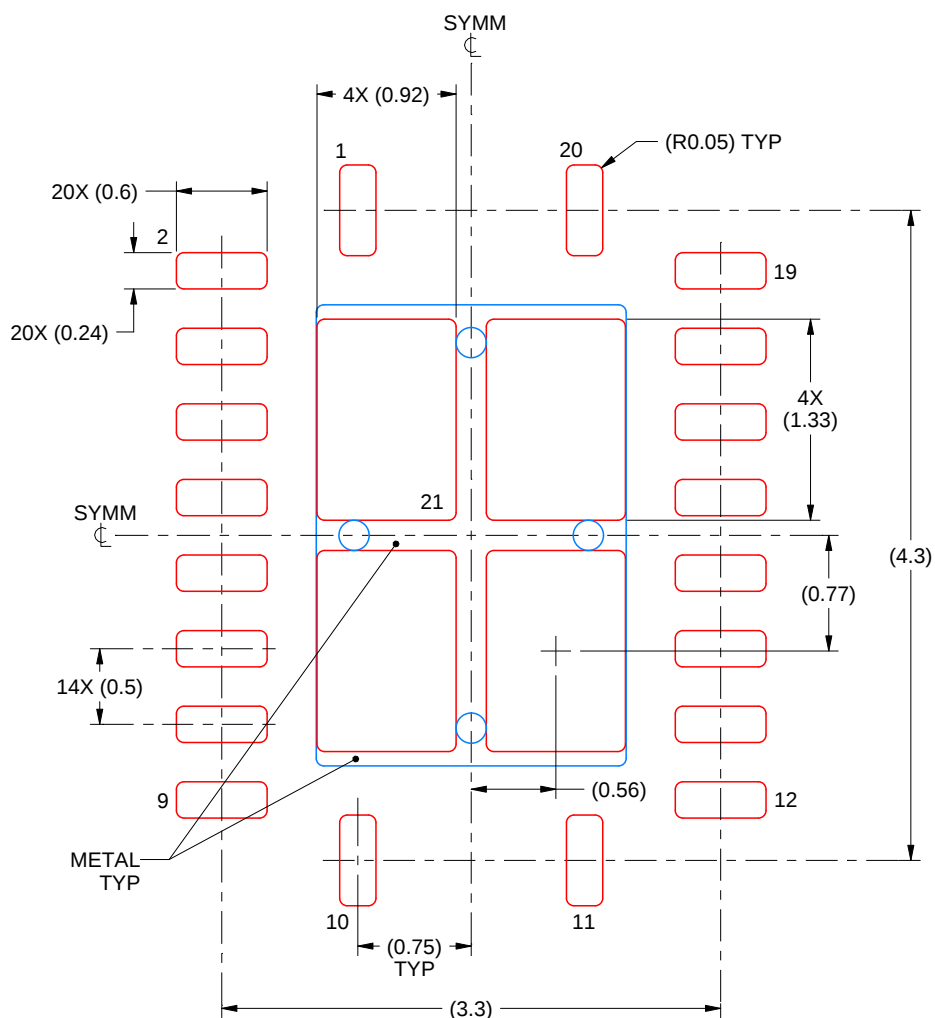
NOTES: (continued)

4. This package is designed to be soldered to a thermal pad on the board. For more information, see Texas Instruments literature number SLUA271 ([www.ti.com/lit/slua271](http://www.ti.com/lit/slua271)).
5. Vias are optional depending on application, refer to device data sheet. If any vias are implemented, refer to their locations shown on this view. It is recommended that vias under paste be filled, plugged or tented.

**RGY0020A**

**VQFN - 1 mm max height**

PLASTIC QUAD FLATPACK - NO LEAD



## SOLDER PASTE EXAMPLE

BASED ON 0.125 mm THICK STENCIL

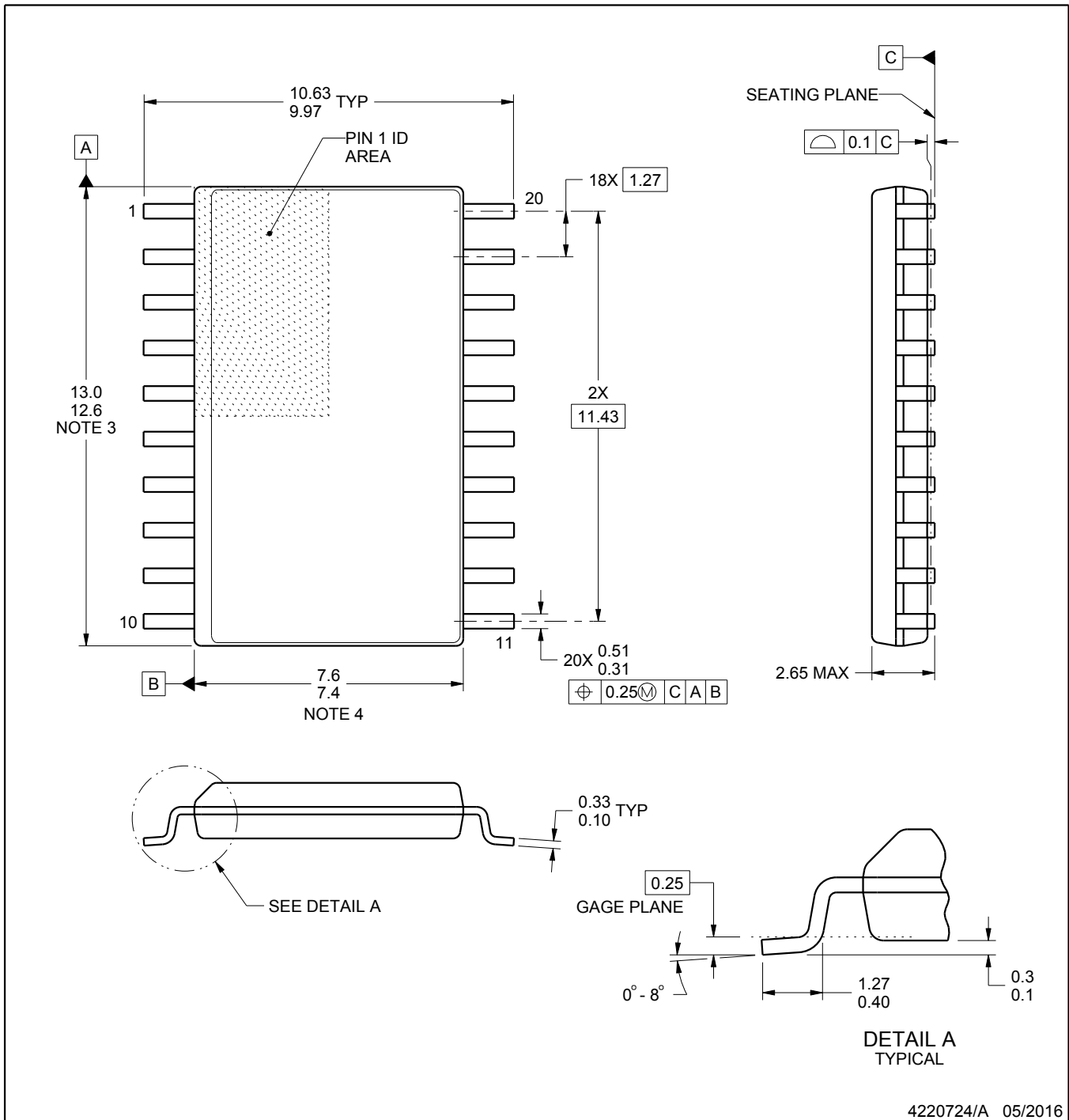
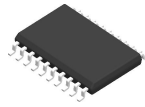
EXPOSED PAD 21

78% PRINTED SOLDER COVERAGE BY AREA UNDER PACKAGE  
SCALE:20X

4225320/A 09/2019

NOTES: (continued)

6. Laser cutting apertures with trapezoidal walls and rounded corners may offer better paste release. IPC-7525 may have alternate design recommendations.



4220724/A 05/2016

## NOTES:

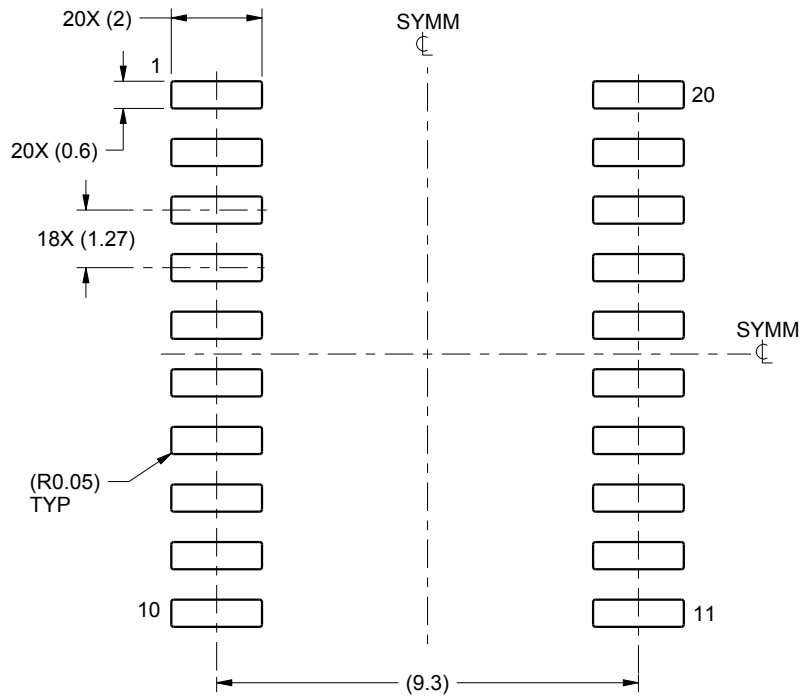
1. All linear dimensions are in millimeters. Dimensions in parenthesis are for reference only. Dimensioning and tolerancing per ASME Y14.5M.
2. This drawing is subject to change without notice.
3. This dimension does not include mold flash, protrusions, or gate burrs. Mold flash, protrusions, or gate burrs shall not exceed 0.15 mm per side.
4. This dimension does not include interlead flash. Interlead flash shall not exceed 0.43 mm per side.
5. Reference JEDEC registration MS-013.

# EXAMPLE BOARD LAYOUT

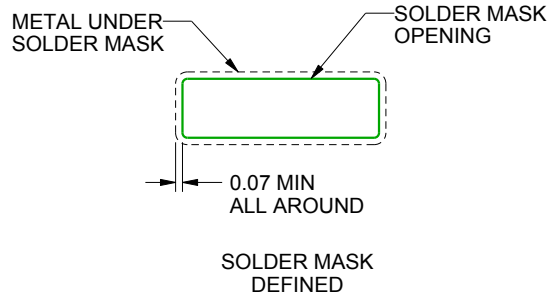
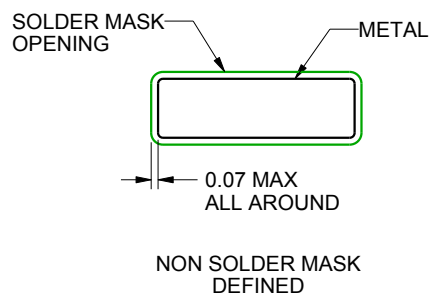
DW0020A

SOIC - 2.65 mm max height

SOIC



LAND PATTERN EXAMPLE  
SCALE:6X



SOLDER MASK DETAILS

4220724/A 05/2016

NOTES: (continued)

6. Publication IPC-7351 may have alternate designs.

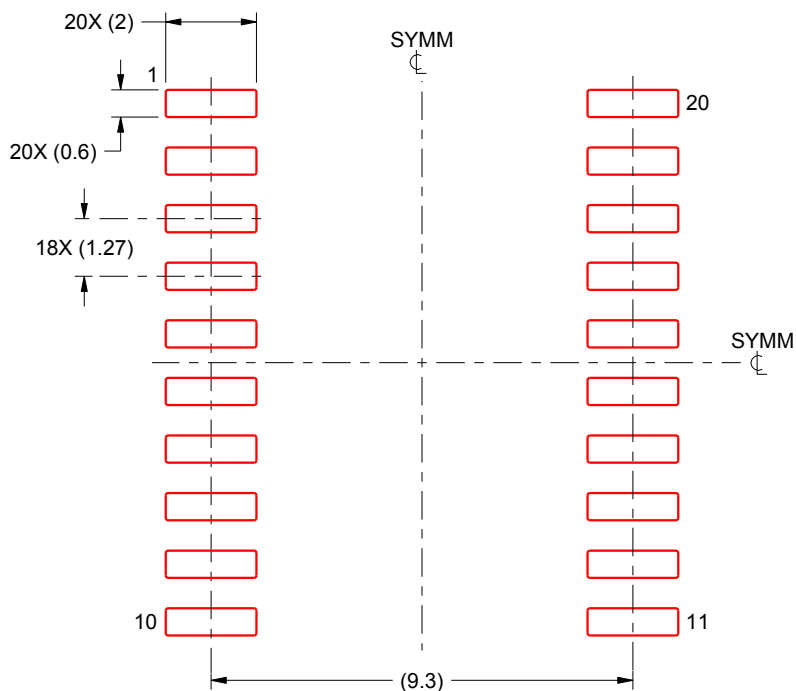
7. Solder mask tolerances between and around signal pads can vary based on board fabrication site.

## EXAMPLE STENCIL DESIGN

DW0020A

SOIC - 2.65 mm max height

SOIC



SOLDER PASTE EXAMPLE  
BASED ON 0.125 mm THICK STENCIL  
SCALE:6X

4220724/A 05/2016

NOTES: (continued)

8. Laser cutting apertures with trapezoidal walls and rounded corners may offer better paste release. IPC-7525 may have alternate design recommendations.
9. Board assembly site may have different recommendations for stencil design.

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