

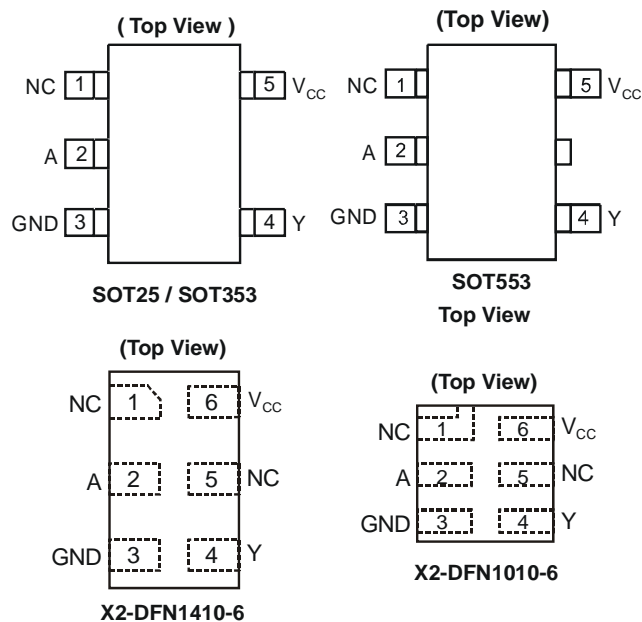
Description

The 74LVC1G06 is a single inverter gate with an open drain output. The device is designed for operation with a power supply range of 1.65V to 5.5V. The input is tolerant to 5.5V allowing this device to be used in a mixed voltage environment. The device is fully specified for partial power down applications using I_{OFF}. The I_{OFF} circuitry disables the output preventing damaging current backflow when the device is powered down. The open-drain output can be connected to other open drain outputs to implement active-low wired-OR or active-high wired-AND functions. The maximum sink current is 32 mA.

Features

- Wide Supply Voltage Range from 1.65 to 5.5V
- 24mA Sink Current at 3.3V
- CMOS low power consumption
- I_{OFF} Supports Partial-Power-Down Mode Operation
- Inputs accept up to 5.5V
- ESD Protection Tested per JESD 22
 - Exceeds 200-V Machine Model (A115-A)
 - Exceeds 2000-V Human Body Model (A114-A)
 - Exceeds 1000-V Charged Device Model (C101C)
- Latch-Up Exceeds 100mA per JESD 78, Class II
- Range of Package Options
- All packages Assembled with “Green” Molding Compound (no Br, Sb)
- Lead Free Finish/ RoHS Compliant (Note 1)

Pin Assignments



Applications

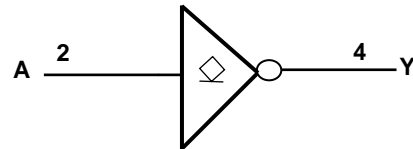
- Voltage Level Shifting
- General Purpose Logic
- Power Down Signal Isolation
- Wide array of products such as:
 - PCs, networking, notebooks, netbooks, PDAs
 - Tablet Computers, E-readers
 - Computer peripherals, hard drives, CD/DVD ROM
 - TV, DVD, DVR, set top box
 - Cell Phones, Personal Navigation / GPS
 - MP3 players, Cameras, Video Recorders

Notes: 1. EU Directive 2002/95/EC (RoHS) & 2011/65/EU (RoHS 2) compliant. No purposely added lead. Halogen and Antimony free. Please visit our website at http://www.diodes.com/products/lead_free.html

Pin Descriptions

| Pin Name | Description |
|-----------------|----------------|
| NC | No Connection |
| A | Data Input |
| GND | Ground |
| Y | Data Output |
| V _{CC} | Supply Voltage |

Logic Diagram



Function Table

| Inputs | Output |
|--------|--------|
| A | Y |
| H | L |
| L | Z |

Absolute Maximum Ratings (Note 3)

| Symbol | Description | Rating | Unit |
|------------------------------------|-----------------------------------------------------------------------|------------------------------|------|
| ESD HBM | Human Body Model ESD Protection | 2 | KV |
| ESD CDM | Charged Device Model ESD Protection | 1 | KV |
| ESD MM | Machine Model ESD Protection | 200 | V |
| V _{CC} | Supply Voltage Range | -0.5 to 6.5 | V |
| V _I | Input Voltage Range | -0.5 to 6.5 | V |
| V _O | Voltage applied to output in high impedance or I _{OFF} state | -0.5 to 6.5 | V |
| V _O | Voltage applied to output in high or low state | -0.3 to V _{CC} +0.5 | V |
| I _{IK} | Input Clamp Current V _I <0 | -50 | mA |
| I _{OK} | Output Clamp Current | -50 | mA |
| I _O | Continuous output current | 50 | mA |
| I _{CC} , I _{GND} | Continuous current through V _{CC} or GND | ±100 | mA |
| T _J | Operating Junction Temperature | -40 to 150 | °C |
| T _{STG} | Storage Temperature | -65 to 150 | °C |

Notes: 2. Stresses beyond the absolute maximum may result in immediate failure or reduced reliability. These are stress values and device operation should be within recommend values.

Recommended Operating Conditions (Note 3)

| Symbol | Parameter | Min | Max | Unit | |
|------------------------|------------------------------------|---------------------------------------------|------------------------|------------------------|------|
| V _{CC} | Operating Voltage | Operating | 1.65 | 5.5 | V |
| | | Data retention only | 1.5 | | V |
| V _{IH} | High-level Input Voltage | V _{CC} = 1.65V to 1.95V | 0.65 X V _{CC} | | V |
| | | V _{CC} = 2.3V to 2.7V | 1.7 | | |
| | | V _{CC} = 3V to 3.6V | 2 | | |
| | | V _{CC} = 4.5V to 5.5V | 0.7 X V _{CC} | | |
| V _{IL} | Low-level input voltage | V _{CC} = 1.65V to 1.95V | | 0.35 X V _{CC} | V |
| | | V _{CC} = 2.3V to 2.7V | | 0.7 | |
| | | V _{CC} = 3V to 3.6V | | 0.8 | |
| | | V _{CC} = 4.5V to 5.5V | | 0.3 X V _{CC} | |
| V _I | Input Voltage | 0 | 5.5 | V | |
| V _O | Output Voltage | 0 | V _{CC} | V | |
| I _{OL} | Low-level output current | V _{CC} = 1.65V | | 4 | mA |
| | | V _{CC} = 2.3V | | 8 | |
| | | V _{CC} = 3V | | 16 | |
| | | | | 24 | |
| V _{CC} = 4.5V | | 32 | | | |
| Δt/ΔV | Input transition rise or fall rate | V _{CC} = 1.8V ± 0.15V, 2.5V ± 0.2V | | 20 | ns/V |
| | | V _{CC} = 3.3V ± 0.3V | | 10 | |
| | | V _{CC} = 5V ± 0.5V | | 5 | |
| T _A | Operating free-air temperature | -40 | 125 | °C | |

Notes: 3. Unused inputs should be held at V_{CC} or Ground.

Electrical Characteristics (All typical values are at $V_{CC} = 3.3V$, $T_A = 25^\circ C$)

| Symbol | Parameter | Test Conditions | V_{CC} | -40°C to 85°C | | | -40°C to 125°C | | Unit |
|-----------------|----------------------------|----------------------------------|---------------|---------------|-----------|----------|----------------|-----------|---------|
| | | | | Min | Typ. | Max | Min | Max | |
| V_{OL} | Low Level Output Voltage | $I_{OL} = 100\mu A$ | 1.65V to 5.5V | | | 0.1 | | 0.1 | V |
| | | $I_{OL} = 4mA$ | 1.65V | | | 0.45 | | 0.7 | |
| | | $I_{OL} = 8mA$ | 2.3V | | | 0.3 | | 0.45 | |
| | | $I_{OL} = 16mA$ | 3V | | | 0.4 | | 0.6 | |
| | | $I_{OL} = 24mA$ | | | | 0.55 | | 0.8 | |
| | | $I_{OL} = 32mA$ | 4.5V | | | 0.55 | | .8 | |
| I_I | Input Current | $V_I = 5.5 V$ or GND | 0 to 5.5V | | ± 0.1 | ± 5 | | ± 100 | μA |
| I_{OFF} | Power Down Leakage Current | V_I or $V_O = 5.5V$ | 0V | | | ± 10 | | ± 200 | μA |
| I_{CC} | Supply Current | $V_I = 5.5V$ or GND $I_O = 0$ | 5.5V | | 0.1 | 10 | | 200 | μA |
| ΔI_{CC} | Additional Supply Current | Input at $V_{CC} - 0.6 V$ | 3V to 5.5V | | | 500 | | 5000 | μA |
| C_i | Input Capacitance | $V_i = V_{CC} -$ or GND | 3.3V | | 5 | | | | pF |

Package Characteristics (All typical values are at $V_{CC} = 3.3V$, $T_A = 25^\circ C$)

| Symbol | Parameter | Test Conditions | V_{CC} | Min | Typ. | Max | Unit |
|---------------|----------------------------------------|-----------------|----------|-----|------|-----|--------------|
| θ_{JA} | Thermal Resistance Junction-to-Ambient | SOT25 | (Note 4) | | 204 | | $^\circ C/W$ |
| | | SOT353 | | | 371 | | |
| | | SOT553 | | | 231 | | |
| | | X2-DFN1010-6 | | | 445 | | |
| | | X2-DFN1410-6 | | | 460 | | |
| θ_{JC} | Thermal Resistance Junction-to-Case | SOT25 | (Note 4) | | 52 | | $^\circ C/W$ |
| | | SOT353 | | | 143 | | |
| | | SOT553 | | | 105 | | |
| | | X2-DFN1010-6 | | | 250 | | |
| | | X2-DFN1410-6 | | | 265 | | |

Notes: 4. Test condition for SOT25, SOT353, SOT553, X2-DFN1410-6 and X2-DFN1010-6: Device mounted on FR-4 substrate PC board, 2oz copper, with minimum recommended pad layout.

Switching Characteristics

Figure 1 Typical Values at $T_A = 25^\circ C$ and nominal voltages 1.8V, 2.5V, 2.7V, 3.3V, and 5.0V.

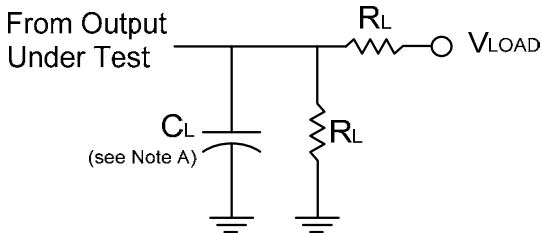
| Parameter | From Input | To Output | V_{CC} | $T_A = -40^\circ C$ to $85^\circ C$ | | | $T_A = -40^\circ C$ to $125^\circ C$ | | Unit |
|-----------|------------|-----------|------------------|-------------------------------------|-----|-----|--------------------------------------|-----|------|
| | | | | Min | Typ | Max | Min | Max | |
| t_{pd} | A or B | Y | $1.8V \pm 0.15V$ | 1.0 | 3.0 | 6.5 | 1.0 | 8.5 | ns |
| | | | $2.5V \pm 0.2V$ | 0.5 | 1.9 | 4.0 | 0.5 | 5.5 | |
| | | | 2.7V | 0.5 | 2.5 | 4.5 | 0.5 | 6.0 | |
| | | | $3.3V \pm 0.3V$ | 0.5 | 2.3 | 4.0 | 0.5 | 5.5 | |
| | | | $5.0V \pm 0.5V$ | 0.5 | 1.7 | 3.0 | 0.5 | 4.0 | |

Operating Characteristics

$T_A = 25^\circ C$

| Parameter | Test Conditions | $V_{CC} = 1.8V$ | $V_{CC} = 2.5V$ | $V_{CC} = 3.3V$ | $V_{CC} = 5V$ | Unit | |
|-----------|-------------------------------|-----------------|-----------------|-----------------|---------------|------|----|
| | | Typ. | Typ. | Typ. | Typ. | | |
| C_{pd} | Power dissipation capacitance | f = 10 MHz | 3 | 3 | 4 | 6 | pF |

Parameter Measurement Information



| TEST | Condition |
|-------------------------------|-----------|
| t_{PLZ} (see Notes D and E) | Vload |
| t_{PZL} (see Notes D and F) | Vload |

| V_{CC} | Inputs | | V_M | V_{LOAD} | C_L | R_L | V_{Δ} |
|------------------|----------|--------------|------------|-------------------|-------|--------------|--------------|
| | V_I | t_r/t_f | | | | | |
| $1.8V \pm 0.15V$ | V_{CC} | $\leq 2ns$ | $V_{CC}/2$ | $2 \times V_{CC}$ | 30pF | 1K Ω | 0.15V |
| $2.5V \pm 0.2V$ | V_{CC} | $\leq 2ns$ | $V_{CC}/2$ | $2 \times V_{CC}$ | 30pF | 500 Ω | 0.15V |
| 2.7V | 2.7V | $\leq 2.5ns$ | 1.5V | 6V | 50pF | 500 Ω | 0.3V |
| $3.3V \pm 0.3V$ | 3V | $\leq 2.5ns$ | 1.5V | 6V | 50pF | 500 Ω | 0.3V |
| $5V \pm 0.5V$ | V_{CC} | $\leq 2.5ns$ | $V_{CC}/2$ | $2 \times V_{CC}$ | 50pF | 500 Ω | 0.3V |

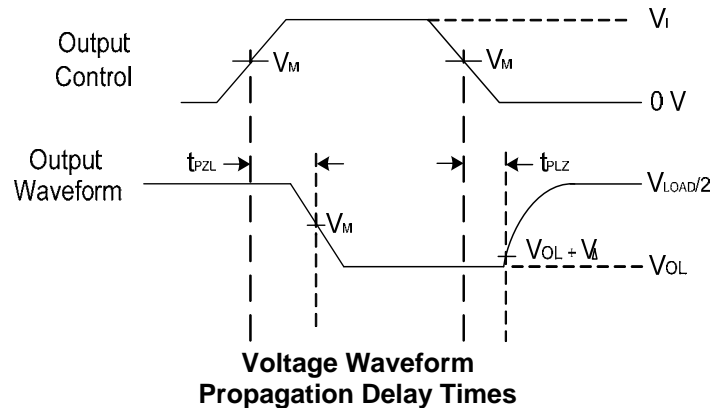
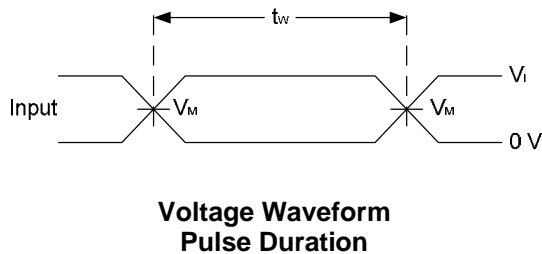
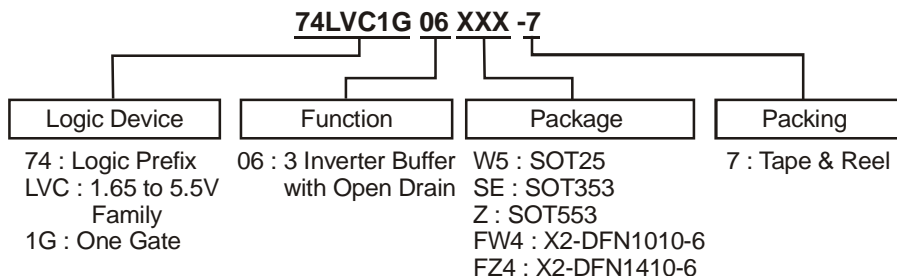


Figure 1. Load Circuit and Voltage Waveforms

- Notes:
- A. Includes test lead and test apparatus capacitance.
 - B. All pulses are supplied at pulse repetition rate ≤ 10 MHz
 - C. The inputs are measured one at a time with one transition per measurement.
 - D. For the open drain device t_{PLZ} and t_{PZL} are the same as t_{PD}
 - E. t_{PZL} is measured at V_M .
 - F. t_{PLZ} is measured at $V_{OL} + V_{\Delta}$

Ordering Information

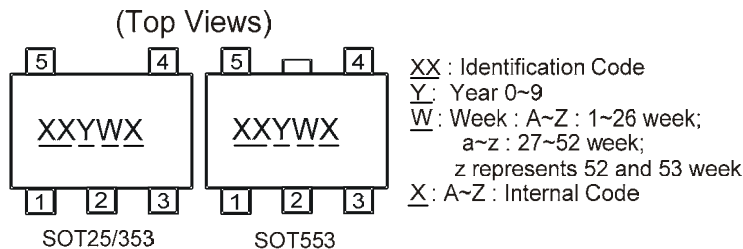


| Device | Package Code | Packaging (Note 6) | 7" Tape and Reel | |
|----------------|--------------|--------------------|------------------|--------------------|
| | | | Quantity | Part Number Suffix |
| 74LVC1G06W5-7 | W5 | SOT25 | 3000/Tape & Reel | -7 |
| 74LVC1G06SE-7 | SE | SOT353 | 3000/Tape & Reel | -7 |
| 74LVC1G06Z-7 | Z | SOT553 | 4000/Tape & Reel | -7 |
| 74LVC1G06FW4-7 | FW4 | X2-DFN1010-6 | 5000/Tape & Reel | -7 |
| 74LVC1G06FZ4-7 | FZ4 | X2-DFN1410-6 | 5000/Tape & Reel | -7 |

Notes: 5. Pad layout as shown on Diodes Inc. suggested pad layout document AP02001, which can be found on our website at <http://www.diodes.com/datasheets/ap02001.pdf>
 6. The taping orientation is located on our website at <http://www.diodes.com/datasheets/ap02007.pdf>

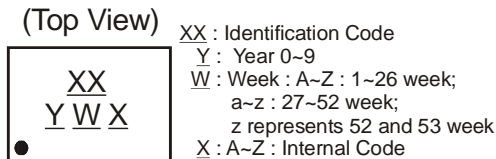
Marking Information

(1) SOT25, SOT353 and SOT553



| Part Number | Package | Identification Code |
|-------------|---------|---------------------|
| 74LVC1G06W5 | SOT25 | UM |
| 74LVC1G06SE | SOT353 | UM |
| 74LVC1G06Z | SOT553 | UM |

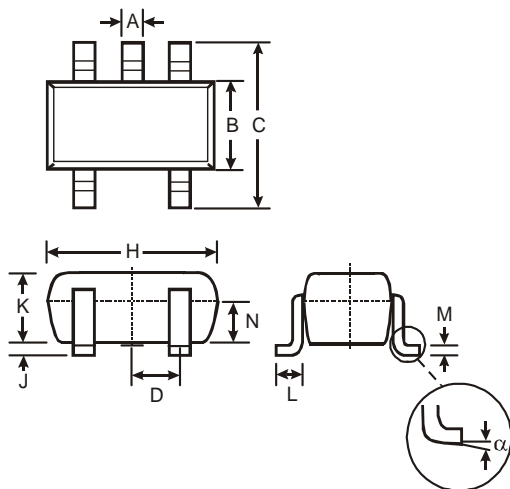
(2) X2-DFN1010-6 and X2-DFN1410-6



| Part Number | Package | Identification Code |
|--------------|--------------|---------------------|
| 74LVC1G06FW4 | X2-DFN1010-6 | UM |
| 74LVC1G06FZ4 | X2-DFN1410-6 | UM |

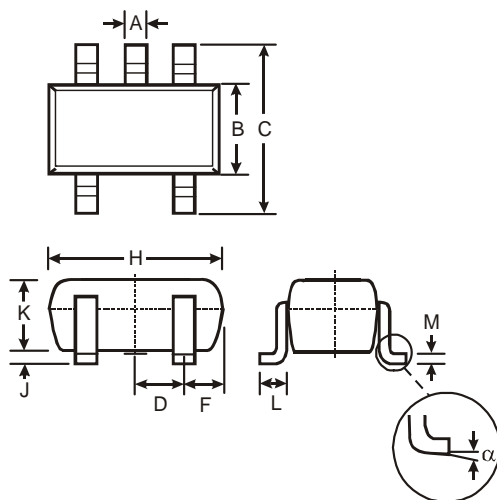
Package Outline Dimensions (All Dimensions in mm)

(1) Package Type: SOT25



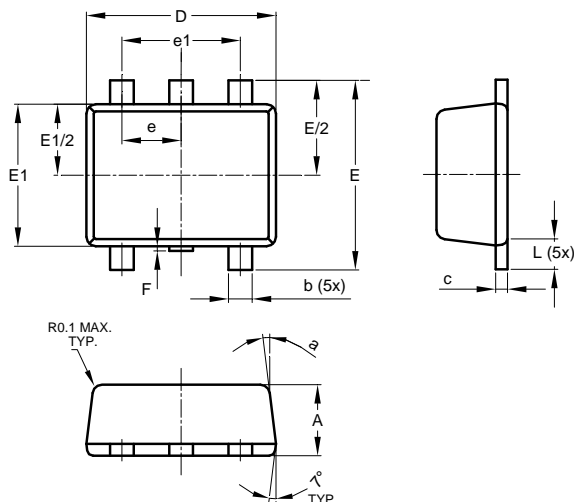
| SOT25 | | | |
|----------------------|-------|------|------|
| Dim | Min | Max | Typ |
| A | 0.35 | 0.50 | 0.38 |
| B | 1.50 | 1.70 | 1.60 |
| C | 2.70 | 3.00 | 2.80 |
| D | — | — | 0.95 |
| H | 2.90 | 3.10 | 3.00 |
| J | 0.013 | 0.10 | 0.05 |
| K | 1.00 | 1.30 | 1.10 |
| L | 0.35 | 0.55 | 0.40 |
| M | 0.10 | 0.20 | 0.15 |
| N | 0.70 | 0.80 | 0.75 |
| α | 0° | 8° | — |
| All Dimensions in mm | | | |

(2) Package Type: SOT353



| SOT353 | | |
|----------------------|----------|------|
| Dim | Min | Max |
| A | 0.10 | 0.30 |
| B | 1.15 | 1.35 |
| C | 2.00 | 2.20 |
| D | 0.65 Typ | |
| F | 0.40 | 0.45 |
| H | 1.80 | 2.20 |
| J | 0 | 0.10 |
| K | 0.90 | 1.00 |
| L | 0.25 | 0.40 |
| M | 0.10 | 0.22 |
| α | 0° | 8° |
| All Dimensions in mm | | |

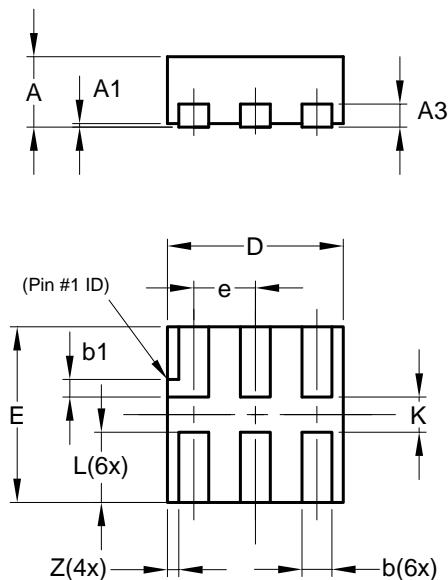
(3) Package Type: SOT553



| SOT553 | | | |
|----------------------|----------|------|------|
| Dim | Min | Max | Typ |
| A | 0.55 | 0.62 | 0.60 |
| b | 0.15 | 0.30 | 0.20 |
| c | 0.10 | 0.18 | 0.15 |
| D | 1.50 | 1.70 | 1.60 |
| E | 1.55 | 1.70 | 1.60 |
| E1 | 1.10 | 1.25 | 1.20 |
| e | 0.50 BSC | | |
| e1 | 1.00 BSC | | |
| F | 0.00 | 0.10 | — |
| L | 0.10 | 0.30 | 0.20 |
| a | 6° | 8° | 7° |
| All Dimensions in mm | | | |

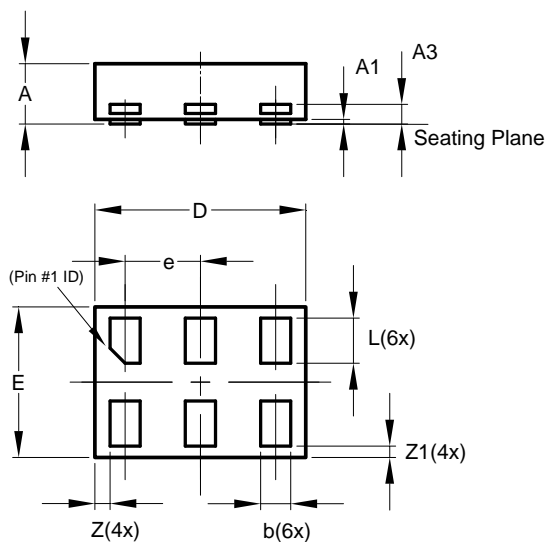
Package Outline Dimensions (cont.)

(4) Package Type X2-DFN1010-6



| X2-DFN1010-6 | | | |
|----------------------|------|------|-------|
| Dim | Min | Max | Typ |
| A | — | 0.40 | 0.39 |
| A1 | 0.00 | 0.05 | 0.02 |
| A3 | — | — | 0.13 |
| b | 0.14 | 0.20 | 0.17 |
| b1 | 0.05 | 0.15 | 0.10 |
| D | 0.95 | 1.05 | 1.00 |
| E | 0.95 | 1.05 | 1.00 |
| e | — | — | 0.35 |
| L | 0.35 | 0.45 | 0.40 |
| K | 0.15 | — | — |
| Z | — | — | 0.065 |
| All Dimensions in mm | | | |

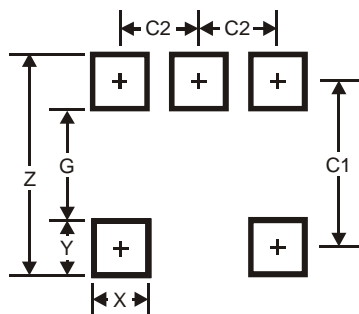
(5) Package Type: X2-DFN1410-6



| X2-DFN1410-6 | | | |
|----------------------|-------|-------|-------|
| Dim | Min | Max | Typ |
| A | — | 0.40 | 0.39 |
| A1 | 0.00 | 0.05 | 0.02 |
| A3 | — | — | 0.13 |
| b | 0.15 | 0.25 | 0.20 |
| D | 1.35 | 1.45 | 1.40 |
| E | 0.95 | 1.05 | 1.00 |
| e | — | — | 0.50 |
| L | 0.25 | 0.35 | 0.30 |
| Z | — | — | 0.10 |
| Z1 | 0.045 | 0.105 | 0.075 |
| All Dimensions in mm | | | |

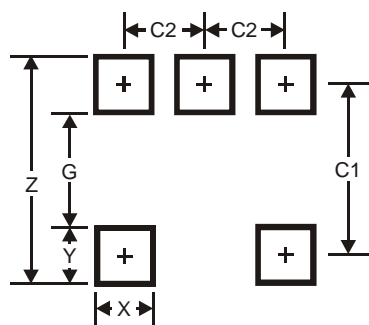
Suggested Pad Layout

(1) Package Type: SOT25



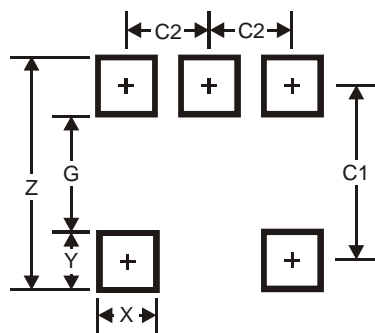
| Dimensions | Value (in mm) |
|------------|---------------|
| Z | 3.20 |
| G | 1.60 |
| X | 0.55 |
| Y | 0.80 |
| C1 | 2.40 |
| C2 | 0.95 |

(2) Package Type: SOT353



| Dimensions | Value (in mm) |
|------------|---------------|
| Z | 2.5 |
| G | 1.3 |
| X | 0.42 |
| Y | 0.6 |
| C1 | 1.9 |
| C2 | 0.65 |

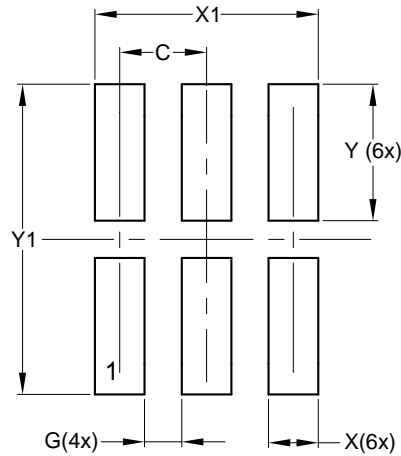
(3) Package Type: SOT553



| Dimensions | Value (in mm) |
|------------|---------------|
| Z | 2.2 |
| G | 1.2 |
| X | 0.375 |
| Y | 0.5 |
| C1 | 1.7 |
| C2 | 0.5 |

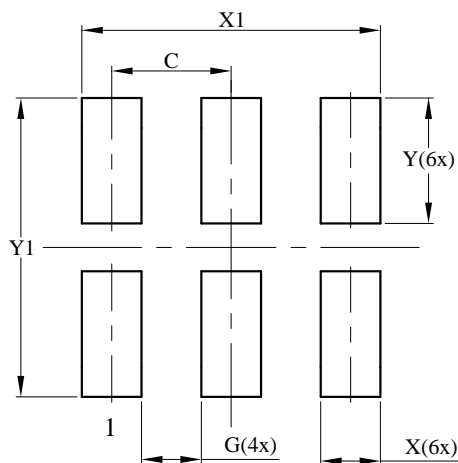
Suggested Pad Layout (cont.)

(4) Package Type X2-DFN1010-6



| Dimensions | Value (in mm) |
|------------|---------------|
| C | 0.350 |
| G | 0.150 |
| X | 0.200 |
| X1 | 0.900 |
| Y | 0.550 |
| Y1 | 1.250 |

(5) Package Type: X2-DFN1410-6



| Dimensions | Value (in mm) |
|------------|---------------|
| C | 0.500 |
| G | 0.250 |
| X | 0.250 |
| X1 | 1.250 |
| Y | 0.525 |
| Y1 | 1.250 |

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