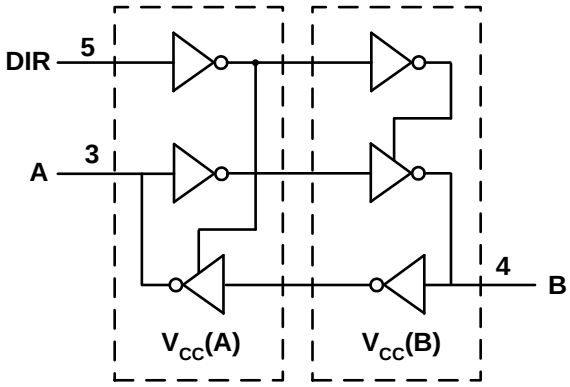
## Pin Descriptions

| Pin Name | Pin | Function |
|---|---|---|
| VCC(A) | 1 | Supply for I/O Pin A; Reference for DIR |
| GND | 2 | Ground |
| A | 3 | Data Input/Output |
| B | 4 | Data Input/Output |
| DIR | 5 | Direction Control |
| VCC(B) | 6 | Supply for I/O Pin B |

## Logic Diagram




## Function Tables

| Input<br>DIR (Direction Pin) | Operation |
|---|---|
| L | B Data to A Output |
| H | A Data to B Output |

| Inputs | | | Outputs | |
|---|---|---|---|---|
| A | B | DIR | A | B |
| Note 4 | L | L | L | Note 4 |
| Note 4 | H | L | H | Note 4 |
| L | Note 4 | H | Note 4 | L |
| H | Note 4 | H | Note 4 | H |

Note: 4. Pin condition not applicable as defined by DIR.

## Absolute Maximum Ratings (Note 5) (@$T_A$ = +25°C, unless otherwise specified.)

| Symbol | Parameter | | 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 |
| $V_{CC}$(A), $V_{CC}$(B) | 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 | A Pin | -0.3 to $V_{CC}$(A) +0.5 | V |
| | | B Pin | -0.3 to $V_{CC}$(B) +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 |
| — | 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 |

Note: 5. 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.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## Recommended Operating Conditions (Note 6) (@$T_A$ = +25°C, unless otherwise specified.)

| Symbol | Parameter | | $V_{CC}$ Inputs | $V_{CC}$ Outputs | Min | Max | Units |
|---|---|---|---|---|---|---|---|
| $V_{CC}(A)$ | Operating Voltage | | — | — | 1.65 | 5.5 | V |
| $V_{CC}(B)$ | | | — | — | 1.65 | 5.5 | V |
| $V_{IH}$ | High-Level Input Voltage Pin A or DIR Referenced to $V_{CC}(A)$ | | $V_{CC}$ = 1.65V to 1.95V | — | 0.65 X $V_{CC(A)}$ | — | 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 $V_{CC(A)}$ | — | |
| $V_{IL}$ | Low-Level Input Voltage Pin A or DIR Referenced to $V_{CC}(A)$ | | $V_{CC}$ = 1.65V to 1.95V | — | — | 0.35 X $V_{CC(A)}$ | 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 $V_{CC(A)}$ | |
| $V_{IH}$ | High-Level Input Voltage Pin B Referenced to $V_{CC}(B)$ | | $V_{CC}$ = 1.65V to 1.95V | — | 0.65 X $V_{CC(B)}$ | — | 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 $V_{CC(B)}$ | — | |
| $V_{IL}$ | Low-Level Input Voltage Pin B Referenced to $V_{CC}(B)$ | | $V_{CC}$ = 1.65V to 1.95V | — | — | 0.35 X $V_{CC(B)}$ | 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 $V_{CC(B)}$ | |
| $V_I$ | Input Voltage | | — | — | 0 | 5.5 | V |
| $V_O$ | Output Voltage | | — | — | 0 | $V_{CC}$ | V |
| $I_{OH}$ | High-Level Output Current | | — | $V_{CC}$ = 1.65V to 1.95V | — | -4 | mA |
| | | | — | $V_{CC}$ = 2.3V to 2.7V | — | -8 | |
| | | | — | $V_{CC}$ = 3V to 3.6V | — | -24 | |
| | | | — | $V_{CC}$ = 4.5V to 5.5V | — | -32 | |
| $I_{OL}$ | Low-Level Output Current | | — | $V_{CC}$ = 1.65V to 1.95V | — | 4 | mA |
| | | | — | $V_{CC}$ = 2.3V to 2.7V | — | 8 | |
| | | | — | $V_{CC}$ = 3V to 3.6V | — | 24 | |
| | | | — | $V_{CC}$ = 4.5V to 5.5V | — | 32 | |
| Δt/ΔV | Input Transition Rise or Fall Rate | Data Inputs | $V_{CC}$ = 1.65V to 1.95V | — | – | 20 | ns/V |
| | | | $V_{CC}$ = 2.3V to 2.7V | — | – | 20 | |
| | | | $V_{CC}$ = 3V to 3.6V | — | – | 10 | |
| | | | $V_{CC}$ = 4.5V to 5.5V | — | – | 5 | |
| | | Control Inputs | $V_{CC}$ = 1.65V to 5.5V | — | — | 5 | |
| $T_A$ | Operating Free-Air Temperature | | — | — | -40 | +125 | °C |

Note: 6. Unused inputs should be held at $V_{CC}$ or Ground.


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## Electrical Characteristics (@$T_A$ = +40°C to +85°C, unless otherwise specified.)

| Symbol | Parameter | Test Conditions | | $V_{CC}$ (A) | $V_{CC}$ (B) | $T_A$ = +25°C | | | $T_A$ = -40°C to +85°C | | Unit |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | Min | Typ | Max | Min | Max | |
| $V_{OH}$ | High Level Output Voltage | $I_{OH}$ = -100μA | | 1.65V to 5.5V | 1.65V to 5.5V | — | — | — | $V_{CC}$ – 0.1 | — | V |
| | | $I_{OH}$ = -4mA | | 1.65V | 1.65V | — | — | — | 1.2 | — | |
| | | $I_{OH}$ = -8mA | | 2.3V | 2.3V | — | — | — | 1.9 | — | |
| | | $I_{OH}$ = -24mA | | 3V | 3V | — | — | — | 2.4 | — | |
| | | $I_{OH}$ = -32mA | | 4.5V | 4.5V | — | — | — | 3.8 | — | |
| $V_{OL}$ | Low-Level Output Voltage | $I_{OL}$ = 100μA | | 1.65V to 5.5V | 1.65V to 5.5V | — | — | — | — | 0.1 | V |
| | | $I_{OL}$ = 4mA | | 1.65V | 1.65V | — | — | — | — | 0.45 | |
| | | $I_{OL}$ = 8mA | | 2.3V | 2.3V | — | — | — | — | 0.3 | |
| | | $I_{OL}$ = 24mA | | 3V | 3V | — | — | — | — | 0.55 | |
| | | $I_{OL}$ = 32mA | | 4.5V | 4.5V | — | — | — | — | 0.55 | |
| $I_I$ | Input Current | DIR | $V_I$ = $V_{CC}$(A) or GND | 0 to 5.5V | 0 to 5.5V | — | — | ± 1 | — | ±2 | μA |
| $I_{OFF}$ | Power Down Leakage Current | A Pin | $V_I$ or $V_O$ = 0 to 5.5V | 0 | 0V to 5.5V | — | — | ± 1 | — | ±2 | μA |
| | | B Pin | | 0 to 5.5V | 0 | — | — | ± 1 | — | ±2 | |
| $I_{OZ}$ | 3-State Leakage Current | A Pin | $V_O$ = $V_{CC}$(A) | 1.65V to 5.5V | 1.65V to 5.5V | — | — | ± 1 | — | ±2 | μA |
| | | B Pin | $V_O$ = $V_{CC}$(B) | 1.65V to 5.5V | 1.65V to 5.5V | — | — | ± 1 | — | ±2 | |
| $I_{CCA}$ | Supply Current | $V_I$ = 5.5V or GND<br>$I_O$ = 0 | | 1.65V to 5.5V | 1.65V to 5.5V | — | — | — | — | 3 | μA |
| | | | | 5.5V | 0 | — | — | — | — | 2 | |
| | | | | 0 | 5.5V | — | — | — | — | -2 | |
| $I_{CCB}$ | Supply Current | $V_I$ = 5.5V or GND<br>$I_O$ = 0 | | 1.65V to 5.5V | 1.65V to 5.5V | — | — | — | — | 3 | μA |
| | | | | 0V | 5.5V | — | — | — | — | 2 | |
| | | | | 5.5V | 0V | — | — | — | — | -2 | |
| $I_{CCA}$ + $I_{CCB}$ | Supply Current | $V_I$ = 5.5V or GND $I_O$ = 0 | | 1.65V to 5.5V | 1.65V to 5.5V | — | — | — | — | 4 | μA |
| $\Delta I_{CCA}$ | Additional Supply Current | A Pin | A = $V_{CC}$(A) -0.6V<br>DIR = $V_{CC}$(A)<br>B = Open | 3V to 5.5V | 3V to 5.5V | — | — | — | — | 50 | μA |
| | | DIR | DIR= $V_{CC}$(A) -0.6V<br>A= $V_{CC}$(A) or GND<br>B = Open | | | | | | | 50 | |
| $\Delta I_{CCB}$ | Additional Supply Current | B Pin | B = $V_{CC}$(B) -0.6V<br>DIR = GND<br>A = Open | 3V to 5.5V | 3V to 5.5V | — | — | — | — | 50 | μA |
| $C_I$ | Input Capacitance | DIR | $V_I$= $V_{CC}$(A) or GND | 3.3V | 3.3V | — | 2.5 | — | — | — | pF |
| $C_{IO}$ | Input/Output Capacitance | A or B Pin | $V_I$= $V_{CC}$(A)/(B) or GND | 3.3V | 3.3V | — | 6.0 | — | — | — | pF |


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## Electrical Characteristics (@$T_A$ = +40°C to +125°C, unless otherwise specified.)

| Symbol | Parameter | Test Conditions | | $V_{CC}$(A) | $V_{CC}$(B) | $T_A$ = -40°C to +125°C | | Unit |
|---|---|---|---|---|---|---|---|---|
| | | | | | | Min | Max | |
| $V_{OH}$ | High Level Output Voltage | $I_{OH}$ = -100µA | | 1.65V to 5.5V | 1.65V to 5.5V | $V_{CC}$ – 0.1 | — | V |
| | | $I_{OH}$ = -4mA | | 1.65V | 1.65V | 1.2 | — | |
| | | $I_{OH}$ = -8mA | | 2.3V | 2.3V | 1.9 | — | |
| | | $I_{OH}$ = -24mA | | 3V | 3V | 2.4 | — | |
| | | $I_{OH}$ = -32mA | | 4.5V | 4.5V | 3.8 | — | |
| $V_{OL}$ | High-Level Input Voltage | $I_{OL}$ = 100µA | | 1.65V to 5.5V | 1.65V to 5.5V | — | 0.1 | V |
| | | $I_{OL}$ = 4mA | | 1.65V | 1.65V | — | 0.45 | |
| | | $I_{OL}$ = 8mA | | 2.3V | 2.3V | — | 0.3 | |
| | | $I_{OL}$ = 24mA | | 3V | 3V | — | 0.55 | |
| | | $I_{OL}$ = 32mA | | 4.5V | 4.5V | — | 0.55 | |
| $I_I$ | Input Current | DIR | $V_I$ = $V_{CC}$(A) or GND | 0 to 5.5V | 0 to 5.5V | — | ± 2 | µA |
| $I_{OFF}$ | Power Down Leakage Current | A Pin | $V_I$ or $V_O$ = 0 to 5.5V | 0 | 1.65V to 5.5V | — | ± 2 | µA |
| | | B Pin | | 1.65V to 5.5V | 0V | — | ± 2 | |
| $I_{OZ}$ | 3-State Leakage Current | B Pin<br>$V_O$ =$V_{CC}$ (B)<br>DIR = 0 V | $V_I$ = 0 to 5.5V | 1.65V to 5.5V | 1.65V to 5.5V | — | ± 2 | µA |
| | | A Pin<br>$V_O$ = $V_{CC}$(A)<br>DIR= $V_{cc}$(A) | | 1.65V to 5.5V | 1.65V to 5.5V | — | ± 2 | |
| $I_{CCA}$ | Supply Current | $V_I$ = 5.5V or GND<br>$I_O$ = 0 | | 1.65V to 5.5V | 1.65V to 5.5V | — | 3 | µA |
| | | | | 5.5V | 0 | — | 2 | |
| | | | | 0 | 5.5V | — | -2 | |
| $I_{CCB}$ | Supply Current | $V_I$ = 5.5V or GND<br>$I_O$ = 0 | | 1.65V to 5.5V | 1.65V to 5.5V | — | 3 | µA |
| | | | | 5.5V | 0 | — | 2 | |
| | | | | 0 | 5.5V | — | -2 | |
| $I_{CCA}$ + $I_{CCB}$ | Supply Current | $V_I$ = 5.5V or GND<br>$I_O$ = 0 | | 1.65V to 5.5V | 1.65V to 5.5V | — | 4 | µA |
| $\Delta I_{CCA}$ | Additional Supply Current | A Pin | A = $V_{CC}$ (A) -0.6V<br>DIR = $V_{CC}$ (A)<br>B = Open | 3V to 5.5V | 3V to 5.5V | — | 50 | µA |
| | | DIR | DIR= $V_{CC}$ (A) -0.6V<br>A= $V_{CC}$ (A) or GND<br>B = Open | | | | 50 | |
| $\Delta I_{CCB}$ | Additional Supply Current | B Pin | B = $V_{CC}$ (B) -0.6V<br>DIR = GND<br>A = Open | 3V to 5.5V | 3V to 5.5V | — | 50 | µA |


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## Package Characteristics ($V_{CC}$ = 3.3V, $T_A$ = +25°C, unless otherwise specified.)

| Symbol | Parameter | Package | Test Conditions | Min | Typ | Max | Unit |
|---|---|---|---|---|---|---|---|
| $\Theta_{JA}$ | Thermal Resistance Junction-to-Ambient | SOT26 | Note 7 | — | 166 | — | °C/W |
| | | SOT363 | | — | 371 | — | |
| | | SOT563 | | — | 290 | — | |
| | | DFN1410 | | — | 430 | — | |
| | | DFN1409 | | — | 450 | — | |
| | | DFN1010 | | — | 510 | — | |
| $\Theta_{JC}$ | Thermal Resistance Junction-to-Case | SOT26 | Note 7 | — | 46 | — | °C/W |
| | | SOT363 | | — | 143 | — | |
| | | SOT563 | | — | 96 | — | |
| | | DFN1410 | | — | 190 | — | |
| | | DFN1409 | | — | 200 | — | |
| | | DFN1010 | | — | 250 | — | |

Note: 7. Test condition for SOT26, SOT363, DFN1410, DFN1409 and DFN1010: Device mounted on FR-4 substrate PCB, 2oz copper with minimum recommended pad layout.

## Switching Characteristics ($V_{CC}$ (A) = 1.8V ± 0.15V, $T_A$ = -40°C to +85°C, see Figure 1)

| Parameter | From (Input) | To (Output) | $V_{CC}$(B) = 1.8V ±0.15V | | $V_{CC}$(B) = 2.5V ±0.2V | | $V_{CC}$(B) = 3.3V ±0.3V | | $V_{CC}$(B)= 5V ±0.5V | | Unit |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Min | Max | Min | Max | Min | Max | Min | Max | |
| $t_{pLH}$ | A | B | 3 | 17.7 | 2.2 | 10.3 | 1.7 | 8.3 | 1.4 | 7.5 | ns |
| $t_{pHL}$ | | | 2.8 | 14.3 | 2.2 | 8.5 | 1.8 | 8.1 | 1.7 | 7.5 | |
| $t_{pLH}$ | B | A | 3 | 17.7 | 2.3 | 16 | 2.1 | 15.5 | 1.9 | 15.1 | ns |
| $t_{pHL}$ | | | 2.8 | 14.3 | 2.1 | 12.9 | 2 | 12.6 | 1.8 | 12.2 | |
| $t_{pHZ}$ | DIR | A | 5.2 | 19.4 | 4.8 | 18.5 | 4.7 | 18.4 | 5.1 | 17.1 | ns |
| $t_{pLZ}$ | | | 2.3 | 10.5 | 2.1 | 10.5 | 2.4 | 10.7 | 3.1 | 10.9 | |
| $t_{pHZ}$ | DIR | B | 6.4 | 21.9 | 4.9 | 11.5 | 4.6 | 10.3 | 2.8 | 8.2 | ns |
| $t_{pLZ}$ | | | 4.2 | 17 | 3.7 | 9.6 | 3.3 | 8.8 | 2.4 | 8.0 | |
| $t_{pZH}$ | DIR | A | — | 33.7 | — | 25.2 | — | 23.9 | — | 21.5 | ns |
| $t_{pZL}$ | | | — | 36.2 | — | 24.4 | — | 22.9 | — | 20.4 | |
| $t_{pZH}$ | DIR | B | — | 28.2 | — | 20.8 | — | 19 | — | 18.1 | ns |
| $t_{pZL}$ | | | — | 33.7 | — | 27 | — | 25.5 | — | 24.1 | |

## Switching Characteristics (continued) ($V_{CC}$ (A) = 2.5V ± 0.2V, $T_A$ = -40°C to +85°C, see Figure 1)

| Parameter | From (Input) | To (Output) | $V_{CC}$(B) = 1.8V ±0.15V | | $V_{CC}$(B) = 2.5V ±0.2V | | $V_{CC}$(B) = 3.3V ±0.3V | | $V_{CC}$(B) = 5V ±0.5V | | Unit |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Min | Max | Min | Max | Min | Max | Min | Max | |
| $t_{pLH}$ | A | B | 2.3 | 16 | 1.5 | 8.5 | 1.3 | 6.4 | 1.1 | 5.1 | ns |
| $t_{pHL}$ | | | 2.1 | 12.9 | 1.4 | 7.5 | 1.3 | 5.4 | 0.9 | 4.6 | |
| $t_{pLH}$ | B | A | 2.2 | 10.3 | 1.5 | 8.5 | 1.4 | 8 | 1 | 7.5 | ns |
| $t_{pHL}$ | | | 2.2 | 8.5 | 1.4 | 7.5 | 1.3 | 7 | 0.9 | 6.2 | |
| $t_{pHZ}$ | DIR | A | 3 | 8.1 | 3.1 | 8.1 | 2.8 | 8.1 | 3.2 | 8.1 | ns |
| $t_{pLZ}$ | | | 1.3 | 5.9 | 1.3 | 5.9 | 1.3 | 5.9 | 1 | 5.8 | |
| $t_{pHZ}$ | DIR | B | 5.5 | 23.7 | 3.6 | 11.4 | 3.5 | 10.2 | 2.4 | 7.1 | ns |
| $t_{pLZ}$ | | | 3.9 | 18.9 | 3.2 | 9.6 | 2.8 | 8.4 | 1.8 | 5.3 | |
| $t_{pZH}$ | DIR | A | — | 29.2 | — | 18.1 | — | 16.4 | — | 12.8 | ns |
| $t_{pZL}$ | | | — | 32.2 | — | 18.9 | — | 17.2 | — | 13.3 | |
| $t_{pZH}$ | DIR | B | — | 21.9 | — | 14.4 | — | 12.3 | — | 10.9 | ns |


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## Switching Characteristics (continued) ($V_{CC}$ (A) = 3.3V ± 0.3V, $T_A$ = -40°C to +85°C, see Figure 1)

| Parameter | From (Input) | To (Output) | $V_{CC}$(B) = 1.8V ±0.15V | | $V_{CC}$(B) = 2.5V ±0.2V | | $V_{CC}$(B) = 3.3V ±0.3V | | $V_{CC}$(B) = 5V ±0.5V | | Unit |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Min | Max | Min | Max | Min | Max | Min | Max | |
| $t_{pLH}$ | A | B | 2.1 | 15.5 | 1.4 | 8 | 0.7 | 5.8 | 0.7 | 4.4 | ns |
| $t_{pHL}$ | | | 2 | 12.6 | 1.3 | 7 | 0.8 | 5 | 0.7 | 4 | |
| $t_{pLH}$ | B | A | 1.7 | 8.3 | 1.3 | 6.4 | 0.7 | 5.8 | 0.6 | 5.4 | ns |
| $t_{pHL}$ | | | 1.8 | 7.1 | 1.3 | 5.4 | 0.8 | 5 | 0.7 | 4.5 | |
| $t_{pHZ}$ | DIR | A | 2.9 | 7.3 | 3 | 7.3 | 2.8 | 7.3 | 3.4 | 7.3 | ns |
| $t_{pLZ}$ | | | 1.8 | 5.6 | 1.6 | 5.6 | 2.2 | 5.7 | 2.2 | 5.7 | |
| $t_{pHZ}$ | DIR | B | 4.0 | 20.5 | 3.5 | 10.1 | 2.9 | 8.8 | 2.4 | 6.8 | ns |
| $t_{pLZ}$ | | | 3.3 | 14.5 | 2.9 | 7.8 | 2.4 | 7.1 | 1.7 | 4.9 | |
| $t_{pZH}$ | DIR | A | — | 22.8 | — | 14.2 | — | 12.9 | — | 10.3 | ns |
| $t_{pZL}$ | | | — | 27.6 | — | 15.5 | — | 13.8 | — | 11.3 | |
| $t_{pZH}$ | DIR | B | — | 21.1 | — | 13.6 | — | 11.5 | — | 10.1 | ns |
| $t_{pZL}$ | | | — | 19.9 | — | 14.3 | — | 12.3 | — | 11.3 | |

## Switching Characteristics (continued) ($V_{CC}$ (A) = 5V ± 0.5V, $T_A$ = -40°C to +85°C, see Figure 1)

| Parameter | From (Input) | To (Output) | $V_{CC}$(B) = 1.8V ±0.15V | | $V_{CC}$(B) = 2.5V ±0.2V | | $V_{CC}$(B) = 3.3V ±0.3V | | $V_{CC}$(B)= 5V ±0.5V | | Unit |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Min | Max | Min | Max | Min | Max | Min | Max | |
| $t_{pLH}$ | A | B | 1.9 | 15.1 | 1 | 7.5 | 0.6 | 5.4 | 0.5 | 3.9 | ns |
| $t_{pHL}$ | | | 1.8 | 12.2 | 0.9 | 6.2 | 0.7 | 4.5 | 0.5 | 3.5 | |
| $t_{pLH}$ | B | A | 1.4 | 8.5 | 1 | 5.1 | 0.7 | 4.4 | 0.5 | 3.9 | ns |
| $t_{pHL}$ | | | 1.7 | 8.5 | 0.9 | 4.6 | 0.7 | 4 | 0.5 | 3.5 | |
| $t_{pHZ}$ | DIR | A | 2.1 | 5.4 | 2.2 | 5.4 | 2.2 | 5.5 | 2.2 | 5.4 | ns |
| $t_{pLZ}$ | | | 0.9 | 3.8 | 1 | 3.8 | 1 | 3.7 | 0.9 | 3.7 | |
| $t_{pHZ}$ | DIR | B | 4.8 | 20.2 | 2.5 | 9.8 | 1 | 8.5 | 2.2 | 6.5 | ns |
| $t_{pLZ}$ | | | 4.2 | 14.8 | 2.5 | 7.4 | 2.5 | 7 | 1.6 | 4.5 | |
| $t_{pZH}$ | DIR | A | — | 22 | — | 12.5 | — | 11.4 | — | 8.4 | ns |
| $t_{pZL}$ | | | — | 27.2 | — | 14.4 | — | 12.5 | — | 10 | |
| $t_{pZH}$ | DIR | B | — | 18.9 | — | 11.3 | — | 9.1 | — | 7.6 | ns |

## Operating Characteristics ($T_A$ = +25°C, unless otherwise specified.)

| Parameter Power Dissipation Capacitance | | Test Conditions | $V_{CC}$(A) = $V_{CC}$(B) = 1.8V | $V_{CC}$(A) = $V_{CC}$(B) = 2.5V | $V_{CC}$(A) = $V_{CC}$(B) = 3.3V | $V_{CC}$(A) = $V_{CC}$(B) = 5V | Unit |
|---|---|---|---|---|---|---|---|
| | | | Typ | Typ | Typ | Typ | |
| $C_{pd}$ (A) | A- Input, B- Output | $C_L$ = 0 pF<br>f = 10 MHz<br>tr = tf = 1 ns | 3 | 4 | 4 | 4 | pF |
| | B- Input, A- Output | | 18 | 19 | 20 | 21 | |
| $C_{pd}$ (B) | A- Input, B- Output | $C_L$ = 0 pF<br>f = 10 MHz<br>tr = tf = 1 ns | 18 | 19 | 20 | 21 | pF |
| | B- Input, A- Output | | 3 | 4 | 4 | 4 | |


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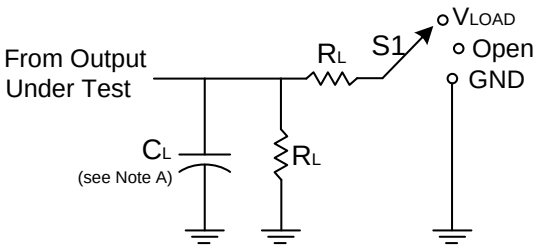
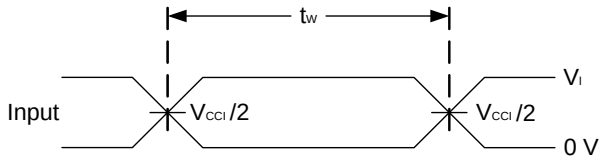
## Parameter Measurement Information

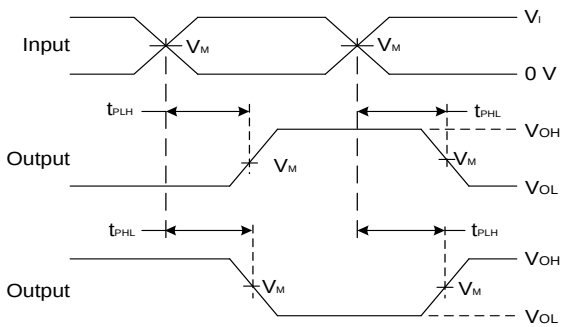



| TEST | S1 |
|---|---|
| $t_{PLH}/t_{PHL}$ | Open |
| $t_{PLZ}/t_{PZL}$ | Vload |
| $t_{PHZ}/t_{PZH}$ | GND |

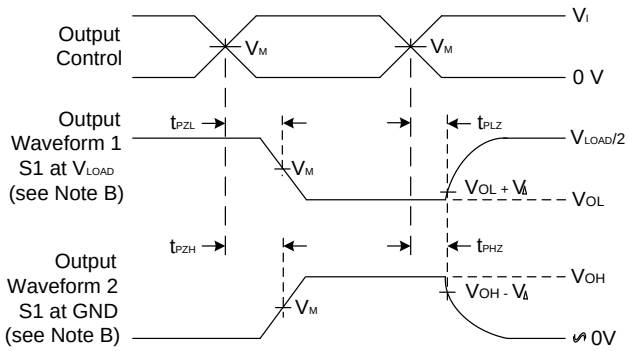
| $V_{CC}$ | Inputs | | $V_M$ | $V_{LOAD}$ | $C_L$ | $R_L$ | $V\Delta$ |
|---|---|---|---|---|---|---|---|
| | $V_I$ | $t_r/t_f$ | | | | | |
| 1.8V±0.15V | $V_{CCI}$ | ≤2ns | $V_{CCO}/2$ | 2 X $V_{CCO}$ | 15pF | 2KΩ | 0.15V |
| 2.5V±0.2V | $V_{CC}$ | ≤2ns | $V_{CCO}/2$ | 2 X $V_{CCO}$ | 15pF | 2KΩ | 0.15V |
| 3.3V±0.3V | 3V | ≤2.5ns | $V_{CCO}/2$ | 2 X $V_{CCO}$ | 15pF | 2KΩ | 0.3V |
| 5V±0.5V | $V_{CC}$ | ≤2.5ns | $V_{CCO}/2$ | 2 X $V_{CCO}$ | 15pF | 2KΩ | 0.3V |




**Voltage Waveform Pulse Duration**




**Voltage Waveform Propagation Delay Times**
**Inverting and Non Inverting Outputs**




**Voltage Waveform Enable and Disable Times**
**Low and High Level Enabling**

**Figure 1 Load Circuit and Voltage Waveforms**

Notes:
8. Includes test lead and test apparatus capacitance.
9. Waveform 1 is for an output with input set up as a low and device coming out or into 3-state via DIR control.
   Waveform 2 is for an output with input set up as a high and device coming out or into 3-state via DIR control.
10. All pulses are supplied at pulse repetition rate ≤ 10 MHz.
11. $t_{PLZ}$ and $t_{PHZ}$ are the same as $t_{dis}$.
12. $t_{PZL}$ and $t_{PZH}$ are the same as $t_{EN}$.
13. $t_{PLH}$ and $t_{PHL}$ are the same as $t_{PD}$.
14. $V_{CCI}$ is the $V_{CC}$ associated with the input.
15. $V_{CCO}$ is the $V_{CC}$ associated with the output.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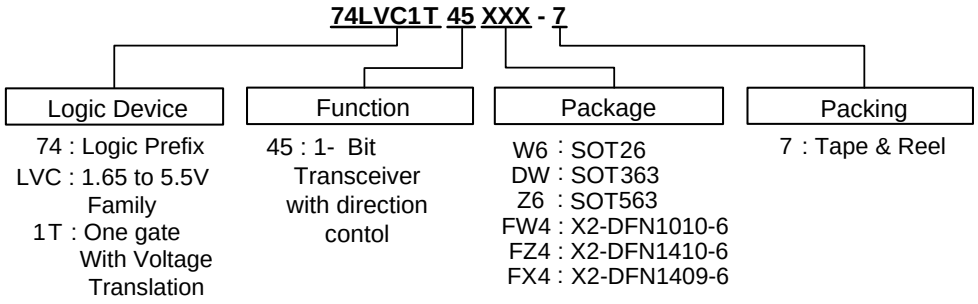
## Ordering Information

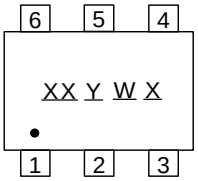



| Part Number | Package Code | Packaging | 7" Tape and Reel (Note 7) | |
|---|---|---|---|---|
| | | | Quantity | Part Number Suffix |
| 74LVC1T45W6-7 | W6 | SOT26 | 3000/Tape & Reel | -7 |
| 74LVC1T45DW-7 | DW | SOT363 | 3000/Tape & Reel | -7 |
| 74LVC1T45Z6-7 | Z6 | SOT563 | 4000/Tape & Reel | -7 |
| 74LVC1T45FW4-7 | FW4 | X2-DFN1010-6 | 5000/Tape & Reel | -7 |
| 74LVC1T45FZ4-7 | FZ4 | X2-DFN1410-6 | 5000/Tape & Reel | -7 |
| 74LVC1T45FX4-7 | FX4 | X2-DFN1409-6 | 5000/Tape & Reel | -7 |

Note: 16. The taping orientation is located on our website at http://www.diodes.com/package-outlines.html.

## Marking Information

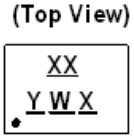
**(1) SOT363, SOT563**




XX : Identification code
Y : Year 0~9
W : Week : A~Z : 1~26 week;
a~z : 27~52 week; z represents 52 and 53 week
X : A~Z : Internal Code

| Part Number | Package | Identification Code |
|---|---|---|
| 74LVC1T45W6 | SOT26 | TT |
| 74LVC1T45DW | SOT363 | TR |
| 74LVC1T45Z6 | SOT563 | TS |

**(2) X2-DFN1010-6, X2-DFN1410-6, and X2-DFN1409-6**




XX : Identification Code
Y : Year : 0~9
W : Week : A~Z : 1~26 week;
a~z : 27~52 week; z represents 52 and 53 week
X : A~Z : Internal code

| Part Number | Package | Identification Code |
|---|---|---|
| 74LVC1T45FW4 | X2-DFN1010-6 | TR |
| 74LVC1T45FX4 | X2-DFN1409-6 | TT |
| 74LVC1T45FZ4 | X2-DFN1410-6 | TS |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## Package Outline Dimensions (All dimensions in mm.)

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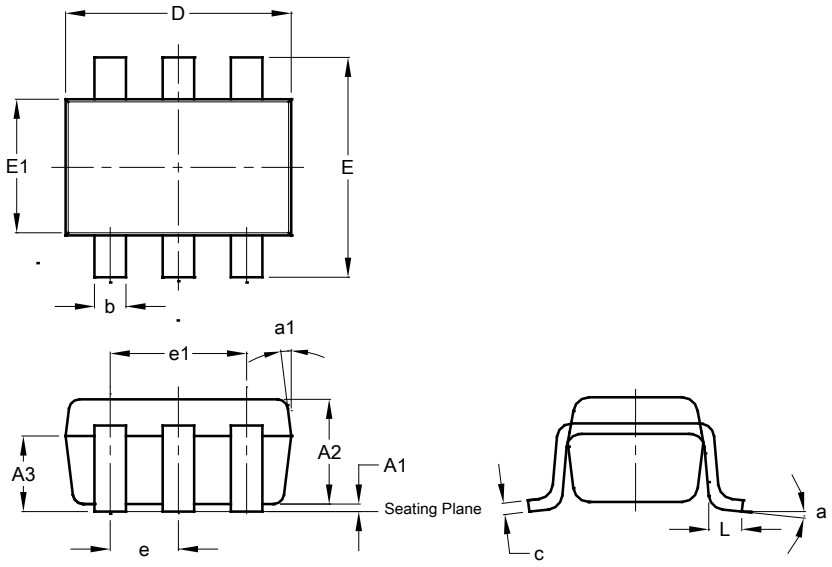
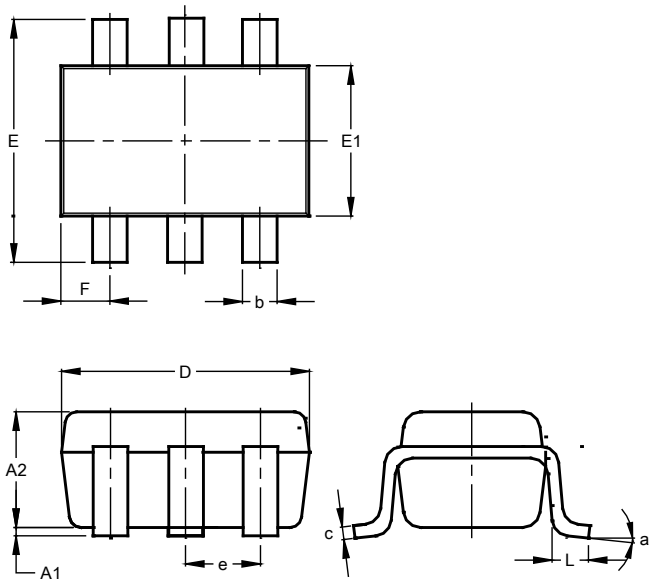
### (1) Package Type: SOT26




| SOT26 (SC74R) | | | |
|---|---|---|---|
| **Dim** | **Min** | **Max** | **Typ** |
| **A1** | 0.013 | 0.10 | 0.05 |
| **A2** | 1.00 | 1.30 | 1.10 |
| **A3** | 0.70 | 0.80 | 0.75 |
| **b** | 0.35 | 0.50 | 0.38 |
| **c** | 0.10 | 0.20 | 0.15 |
| **D** | 2.90 | 3.10 | 3.00 |
| **e** | — | — | 0.95 |
| **e1** | — | — | 1.90 |
| **E** | 2.70 | 3.00 | 2.80 |
| **E1** | 1.50 | 1.70 | 1.60 |
| **L** | 0.35 | 0.55 | 0.40 |
| **a** | — | — | 8° |
| **a1** | — | — | 7° |
| **All Dimensions in mm** | | | |

### (2) Package Type: SOT363




| SOT363 | | | |
|---|---|---|---|
| **Dim** | **Min** | **Max** | **Typ** |
| **A1** | 0.00 | 0.10 | 0.05 |
| **A2** | 0.90 | 1.00 | 0.95 |
| **b** | 0.10 | 0.30 | 0.25 |
| **c** | 0.10 | 0.22 | 0.11 |
| **D** | 1.80 | 2.20 | 2.15 |
| **E** | 2.00 | 2.20 | 2.10 |
| **E1** | 1.15 | 1.35 | 1.30 |
| **e** | 0.650 BSC | | |
| **F** | 0.40 | 0.45 | 0.425 |
| **L** | 0.25 | 0.40 | 0.30 |
| **a** | 0° | 8° | — |
| **All Dimensions in mm** | | | |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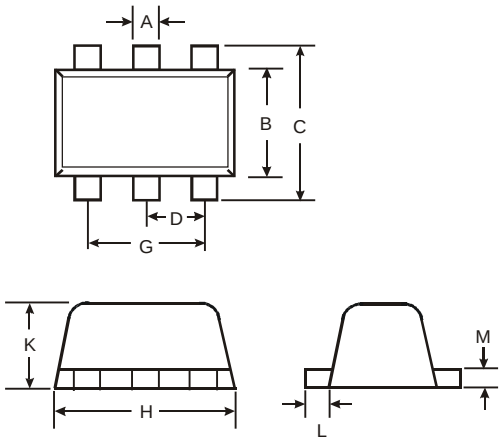
## Package Outline Dimensions (All dimensions in mm.)

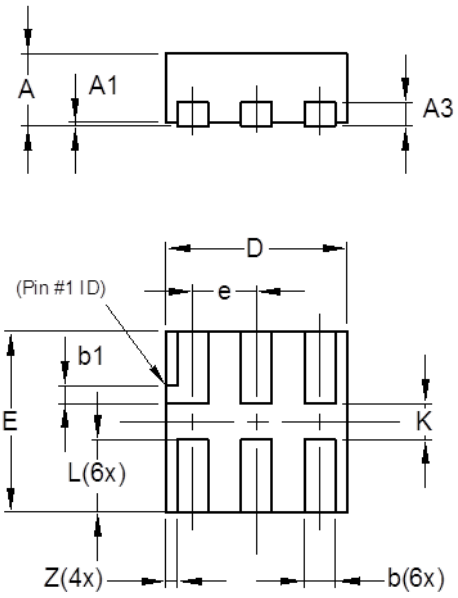
Please see http://www.diodes.com/package-outlines.html for the latest version.

### (3) Package Type: SOT563




| SOT563 | | | |
|---|---|---|---|
| **Dim** | **Min** | **Max** | **Typ** |
| **A** | 0.15 | 0.30 | 0.20 |
| **B** | 1.10 | 1.25 | 1.20 |
| **C** | 1.55 | 1.70 | 1.60 |
| **D** | — | — | 0.50 |
| **G** | 0.90 | 1.10 | 1.00 |
| **H** | 1.50 | 1.70 | 1.60 |
| **K** | 0.55 | 0.60 | 0.60 |
| **L** | 0.10 | 0.30 | 0.20 |
| **M** | 0.10 | 0.18 | 0.11 |
| **All Dimensions in mm** | | | |

### (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** | | | |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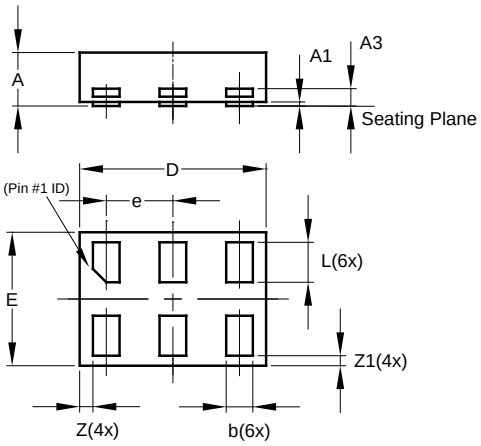
## Package Outline Dimensions (All dimensions in mm.)

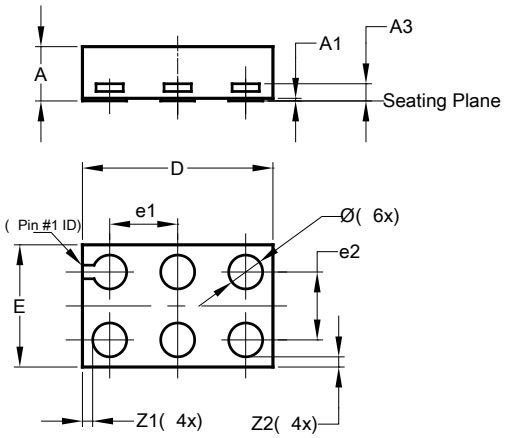
Please see http://www.diodes.com/package-outlines.html for the latest version.

### (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** | | | |

### (6) Package Type: X2-DFN1409-6




| X2-DFN1409-6 | | | |
|---|---|---|---|
| **Dim** | **Min** | **Max** | **Typ** |
| **A** | - | 0.40 | 0.39 |
| **A1** | 0 | 0.05 | 0.02 |
| **A3** | - | - | 0.13 |
| **Ø** | 0.20 | 0.30 | 0.25 |
| **D** | 1.35 | 1.45 | 1.40 |
| **E** | 0.85 | 0.95 | 0.90 |
| **e1** | - | - | 0.50 |
| **e2** | - | - | 0.50 |
| **Z1** | - | - | 0.075 |
| **Z2** | - | - | 0.075 |
| **All Dimensions in mm** | | | |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## Suggested Pad Layout

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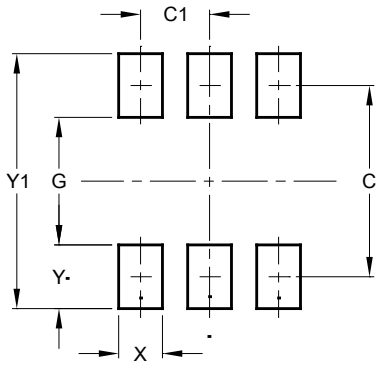
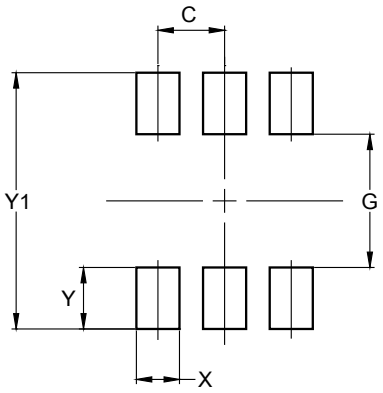
**(1) Package Type: SOT26**



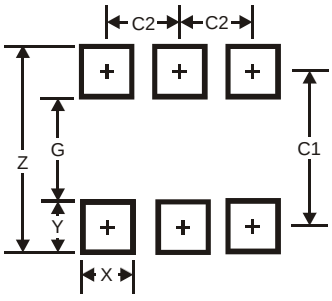

| Dimensions | Value (in mm) |
|---|---|
| C | 2.40 |
| C1 | 0.95 |
| G | 1.60 |
| X | 0.55 |
| Y | 0.80 |
| Y1 | 3.20 |

**(2) Package Type: SOT363**




| Dimensions | Value (in mm) |
|---|---|
| C | 0.650 |
| G | 1.300 |
| X | 0.420 |
| Y | 0.600 |
| Y1 | 2.500 |

**(3) Package Type: SOT563**




| Dimensions | SOT563 |
|---|---|
| Z | 2.2 |
| G | 1.2 |
| X | 0.375 |
| Y | 0.5 |
| C1 | 1.7 |
| C2 | 0.5 |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## Suggested Pad Layout

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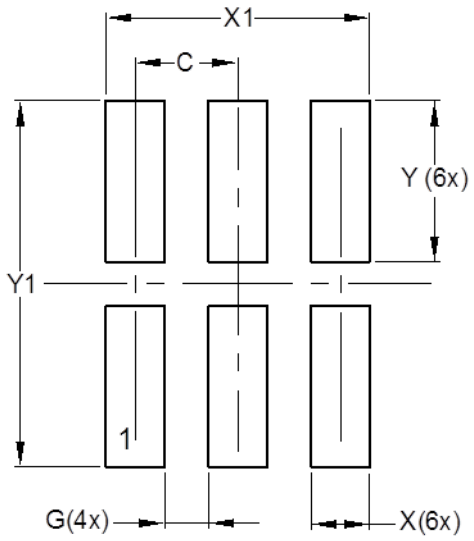
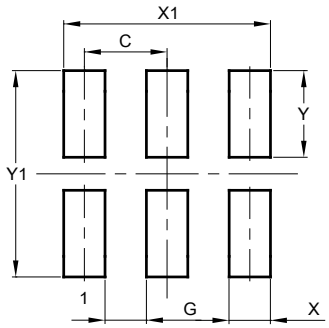
**(4) Package Type X2-DFN1010-6**



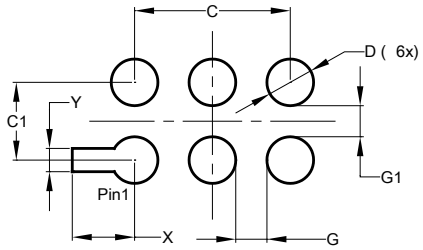

| Dimensions | Value (in mm) |
|---|---|
| C | 0.350 |
| G | 0.150 |
| X | 0.200 |
| X1 | 0.900 |
| Y | 0.550 |
| Y1 | 1.250 |

**(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 |

**(6) Package Type: X2-DFN1409-6**




| Dimensions | Value (in mm) |
|---|---|
| C | 1.000 |
| C1 | 0.500 |
| D | 0.300 |
| G | 0.200 |
| G1 | 0.200 |
| X | 0.400 |
| Y | 0.150 |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2. support or sustain life and whose failure to perform when properly used in accordance with instructions for use provided in the labeling can be reasonably expected to result in significant injury to the user.

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