

Features

- Wide Supply Voltage Range from 1.65 V to 5.5 V
- I/O Tolerance Inputs to 5.5 V
- All Inputs with Schmitt-Trigger Action
- CMOS Low Power Dissipation
- I_{OFF} Supports Partial Power-down Protection
- ESD Protection: ±4-kV HBM Model, ±1-kV CDM Model
- Latch-up Performance Exceeds 100 mA per JESD 78, Class II

Applications

- Computing
- Tablet PC
- Television
- Wearable Device
- Server
- Industrial Equipment

Description

The T74L2G04 is a dual inverter with V_{CC} supply from 1.65 V to 5.5 V. Schmitt-Trigger action with slower rise-and-fall times and better noise immunity. I_{OFF} circuits can prevent backflow current during power-down, thus supporting partial power-down protection.

The T74L2G04 is available in SOT363 and SOT23-6 packages and is characterized from -40°C to 125°C.

Device Table

| Device | Package | Body Size |
|---------------|---------|------------------|
| T74L2G04-SC6R | SOT363 | 2.1 mm x 1.25 mm |
| T74L2G04-S6TR | SOT23-6 | 2.9 mm x 1.6 mm |

Typical Application Circuit

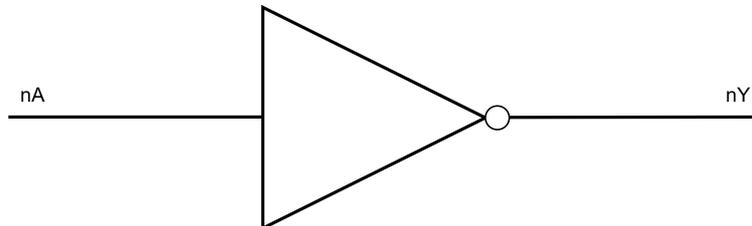


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Revision History

| Date | Revision | Notes |
|------------|-----------|-------------------|
| 2025-06-13 | Rev.Pre.0 | Initial version. |
| 2025-10-15 | Rev.A.0 | Released version. |

Pin Configuration and Functions

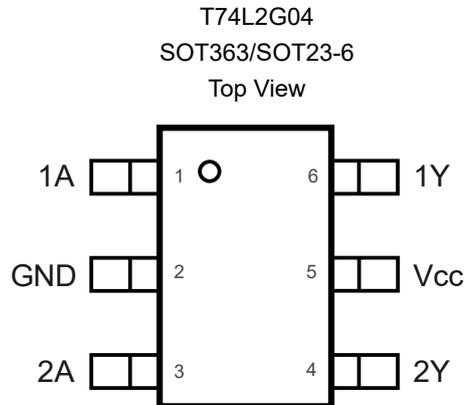


Table 1. Pin Functions

| Pin No. | Name | I/O | Description |
|---------|-----------------|-------|-------------|
| 1 | 1A | I | Input 1A |
| 2 | GND | Power | Ground |
| 3 | 2A | I | Input 2A |
| 4 | 2Y | O | Output 2Y |
| 5 | V _{CC} | Power | Supply pin |
| 6 | 1Y | O | Output 1Y |

Function Table

Table 2. Truth Table

| Input | Output |
|-------|--------|
| nA | nY |
| L | H |
| H | L |

(1) H = High voltage level.

(2) L = Low voltage level.

(3) X = Don't care.

Specifications

Absolute Maximum Ratings ⁽¹⁾

| Parameter | | Min | Max | Unit |
|------------------|---|------|-----------------------|------|
| V _{CC} | Supply Voltage | -0.5 | 6.5 | V |
| V _I | Input Voltage ⁽²⁾ | -0.5 | 6.5 | V |
| V _O | Output Voltage, in Power-off Mode ⁽²⁾ | -0.5 | 6.5 | V |
| V _O | Output Voltage, in Active Mode ⁽²⁾ | -0.5 | V _{CC} + 0.5 | V |
| I _O | Continuous Output Current | -50 | 50 | mA |
| I _{IK} | Input Clamp Current, V _I < 0 | -50 | | mA |
| I _{OK} | Output Clamp Current, V _O < 0 | -50 | | mA |
| | Continuous Current through V _{CC} or GND | -100 | 100 | mA |
| T _J | Junction Temperature | | 150 | °C |
| T _{STG} | Storage Temperature | -65 | 150 | °C |

(1) Stresses beyond those listed under Absolute Maximum Ratings may cause permanent damage to the device. These are stress ratings only, which do not imply functional operation of the device at these or any other conditions beyond those indicated under Recommended Operating Conditions. Exposure to absolute-maximum-rated conditions for extended periods may affect device reliability.

(2) The minimum input and output voltage ratings may be exceeded if the input and output current ratings are observed.

ESD, Electrostatic Discharge Protection

| Symbol | Parameter | Condition | Minimum Level | Unit |
|--------|--------------------------|---|---------------|------|
| HBM | Human Body Model ESD | ANSI/ESDA/JEDEC JS-001, all pins ⁽¹⁾ | ±4,000 | V |
| CDM | Charged Device Model ESD | ANSI/ESDA/JEDEC JS-002, all pins ⁽²⁾ | ±1,000 | V |

(1) JEDEC document JEP155 states that 500-V HBM allows safe manufacturing with a standard ESD control process.

(2) JEDEC document JEP157 states that 250-V CDM allows safe manufacturing with a standard ESD control process.

Recommended Operating Conditions

All unused inputs of the device must be held at V_{CC} or GND to ensure proper device operation.

| Parameter | | Min | Typ | Max | Unit |
|-----------------|--|------|-----|-----------------|------|
| V _{CC} | Supply Voltage | 1.65 | | 5.5 | V |
| V _I | Input Voltage | 0 | | 5.5 | V |
| V _O | Output Voltage | 0 | | V _{CC} | V |
| T _A | Ambient Temperature | -40 | | 125 | °C |
| Δt/ΔV | Input Transition Rise-and-Fall Rate, V _{CC} = 1.65 V to 2.7 V | | | 20 | ns/V |
| | Input Transition Rise-and-Fall Rate, V _{CC} = 2.7 V to 5.5 V | | | 10 | ns/V |

Thermal Information

| Package Type | θ_{JA} | θ_{JC} | Unit |
|--------------|---------------|---------------|------|
| SOT363 | 230.1 | 62.7 | °C/W |
| SOT23-6 | 180.2 | 91.4 | °C/W |

Electrical Characteristics – DC Parameter

All test conditions: $T_A = -40^{\circ}\text{C}$ to 125°C , all typical values are measured at $T_A = 25^{\circ}\text{C}$, unless otherwise noted.

| Symbol | Parameter | Conditions | Min | Typ | Max | Unit |
|-------------------------------|---------------------------|--|--------------------------|------|--------------------|------|
| V _{IH} | High-Level Input Voltage | V _{CC} = 1.65 V to 1.95 V | 0.7V _{CC} | | | V |
| | | V _{CC} = 2.3 V to 2.7 V | 1.7 | | | V |
| | | V _{CC} = 2.7 V to 3.6 V | 2 | | | V |
| | | V _{CC} = 4.5 V to 5.5 V | 0.7V _{CC} | | | V |
| V _{IL} | Low-Level Input Voltage | V _{CC} = 1.65 V to 1.95 V | | | 0.3V _{CC} | V |
| | | V _{CC} = 2.3 V to 2.7 V | | | 0.7 | V |
| | | V _{CC} = 2.7 V to 3.6 V | | | 0.8 | V |
| | | V _{CC} = 4.5 V to 5.5 V | | | 0.3V _{CC} | V |
| V _{OH} | High-Level Output Voltage | I _{OH} = -100 μA; V _{CC} = 1.65 V to 5.5 V | V _{CC} - 0.1 | | | V |
| | | I _{OH} = -4 mA; V _{CC} = 1.65 V | 0.95 | | | V |
| | | I _{OH} = -8 mA; V _{CC} = 2.3 V | 1.7 | | | V |
| | | I _{OH} = -12 mA; V _{CC} = 2.7 V | 1.9 | | | V |
| | | I _{OH} = -24 mA; V _{CC} = 3 V | 2 | | | V |
| | | I _{OH} = -32 mA; V _{CC} = 4.5 V | 3.4 | | | V |
| V _{OL} | Low-Level Output Voltage | I _{OL} = 100 μA; V _{CC} = 1.65 V to 5.5 V | | | 0.1 | V |
| | | I _{OL} = 4 mA; V _{CC} = 1.65 V | | | 0.7 | V |
| | | I _{OL} = 8 mA; V _{CC} = 2.3 V | | | 0.45 | V |
| | | I _{OL} = 12 mA; V _{CC} = 2.7 V | | | 0.6 | V |
| | | I _{OL} = 24 mA; V _{CC} = 3 V | | | 0.8 | V |
| | | I _{OL} = 32 mA; V _{CC} = 4.5 V | | | 0.8 | V |
| I _I | Input Leakage Current | V _I = GND or 5.5 V; V _{CC} = 0 V to 5.5 V | -1 | ±0.1 | 1 | μA |
| I _{OFF} | Power-off Leakage Current | V _I or V _O = 5.5 V; V _{CC} = 0 V | -1 | ±0.1 | 1 | μA |
| I _{CC} | Supply Current | V _I = GND or V _{CC} ; I _O = 0 A; V _{CC} = 1.65 V to 5.5 V | | 0.1 | 2 | μA |
| ΔI _{CC} | Additional Supply Current | V _I = V _{CC} - 0.6 V; I _O = 0 A; V _{CC} = 2.3 V to 5.5 V | | 0.1 | 10 | μA |
| C _I ⁽¹⁾ | Input Capacitance | | | 2.1 | | pF |

(1) Spec limit is based on bench characterization and design simulation, not tested in production.

Electrical Characteristics – AC Parameter

All test conditions: $T_A = -40^{\circ}\text{C}$ to 125°C , all typical values are measured at $T_A = 25^{\circ}\text{C}$, unless otherwise noted.

| Symbol ⁽¹⁾ | Parameter | Conditions | Min | Typ | Max | Unit |
|-------------------------|--|---|---|-----|------|------|
| t_{PD} ⁽²⁾ | Propagation Delay at 30-pF C_{LOAD} | $C_{LOAD} = 30\text{ pF};$ $V_{CC} = 1.65\text{ V to }1.95\text{ V}$ | 3.6 | 8.9 | 16.3 | ns |
| | | $C_{LOAD} = 30\text{ pF};$ $V_{CC} = 2.3\text{ V to }2.7\text{ V}$ | 2.3 | 5.8 | 9.8 | ns |
| | Propagation Delay at 50-pF C_{LOAD} | $C_{LOAD} = 50\text{ pF};$ $V_{CC} = 2.7\text{ V}$ | 2.7 | 5.6 | 9.1 | ns |
| | | $C_{LOAD} = 50\text{ pF};$ $V_{CC} = 3\text{ V to }3.6\text{ V}$ | 2.1 | 5.1 | 8.4 | ns |
| | | $C_{LOAD} = 50\text{ pF};$ $V_{CC} = 4.5\text{ V to }5.5\text{ V}$ | 1.7 | 4.2 | 6.5 | ns |
| | C_{PD} ⁽³⁾ | Power Dissipation Capacitance | $f = 10\text{ MHz};$ $V_{CC} = 3.3\text{ V}$ | | 13 | |

(1) Spec limit is based on bench characterization and design simulation, not tested in production.

(2) t_{PD} is the same as t_{PLH} and t_{PHL} .

(3) C_{PD} is used to determine the dynamic power dissipation (PD in μW).

$$P_D = C_{PD} \times V_{CC}^2 \times f_i \times N + \Sigma(C_L \times V_{CC}^2 \times f_o)$$

Where:

f_i = Input frequency in MHz;

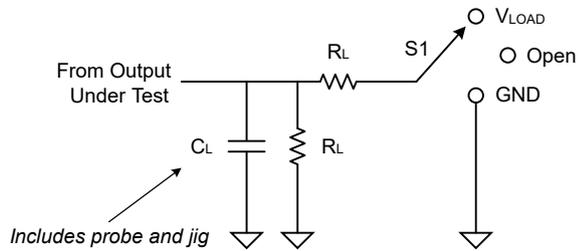
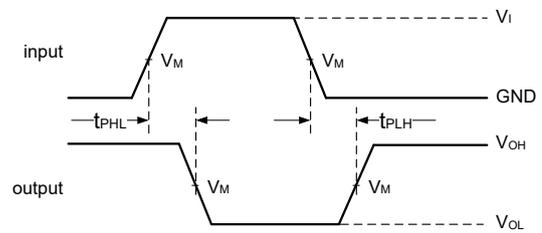
f_o = Output frequency in MHz;

C_L = Output load capacitance in pF;

V_{CC} = Supply voltage in Volts;

N = Number of inputs switching;

$\Sigma(C_L \times V_{CC}^2 \times f_o)$ = Sum of the outputs.

Parameter Measurement Waveforms

Figure 1. Timing Measurement Load Circuit

Figure 2. Propagation Delay Times
Table 3. Test Data

| V _{CC} | Inputs | | C _L | R _L | V _M | S1 |
|------------------|-----------------|--------------------------------|----------------|----------------|--------------------|------------------------------------|
| | V _I | t _r /t _f | | | | t _{PHL} /t _{PLH} |
| 1.65 V to 1.95 V | V _{CC} | ≤ 2 ns | 30 pF | 1 kΩ | 0.5V _{CC} | Open |
| 2.3 V to 2.7 V | V _{CC} | ≤ 2 ns | 30 pF | 500 Ω | 0.5V _{CC} | Open |
| 2.7 V | 2.7 V | ≤ 2.5 ns | 50 pF | 500 Ω | 1.5 V | Open |
| 3 V to 3.6 V | 2.7 V | ≤ 2.5 ns | 50 pF | 500 Ω | 1.5 V | Open |
| 4.5 V to 5.5 V | V _{CC} | ≤ 2.5 ns | 50 pF | 500 Ω | 0.5V _{CC} | Open |

Application and Implementation

Note

Information in the following application sections is not part of the 3PEAK's component specification and 3PEAK does not warrant its accuracy or completeness. 3PEAK's customers are responsible for determining suitability of components for their purposes. Customers should validate and test their design implementation to confirm system functionality.

Typical Application

Figure 3 shows the typical application schematic.

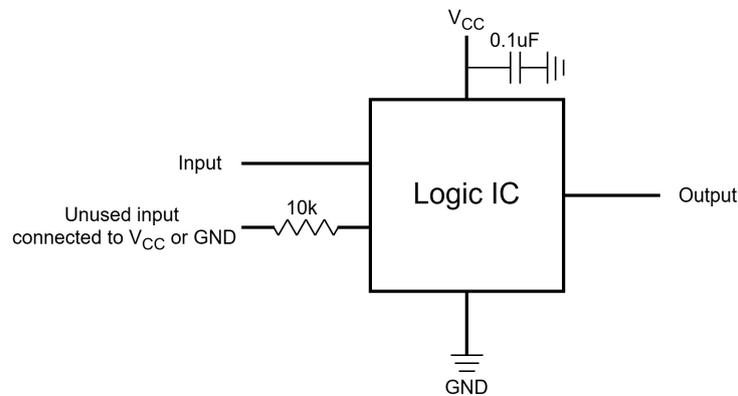
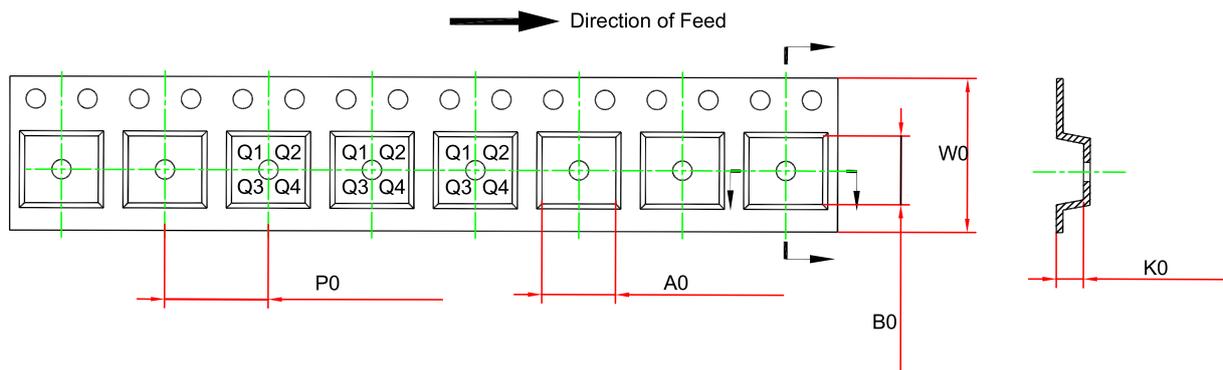
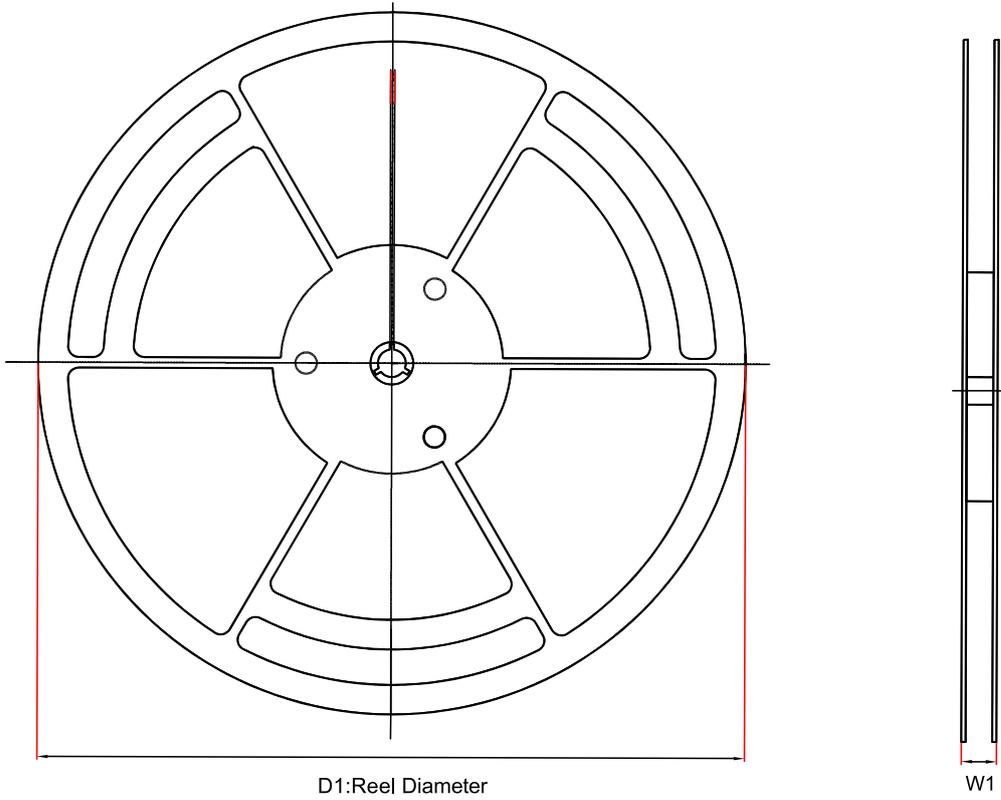


Figure 3. Typical Application Circuit

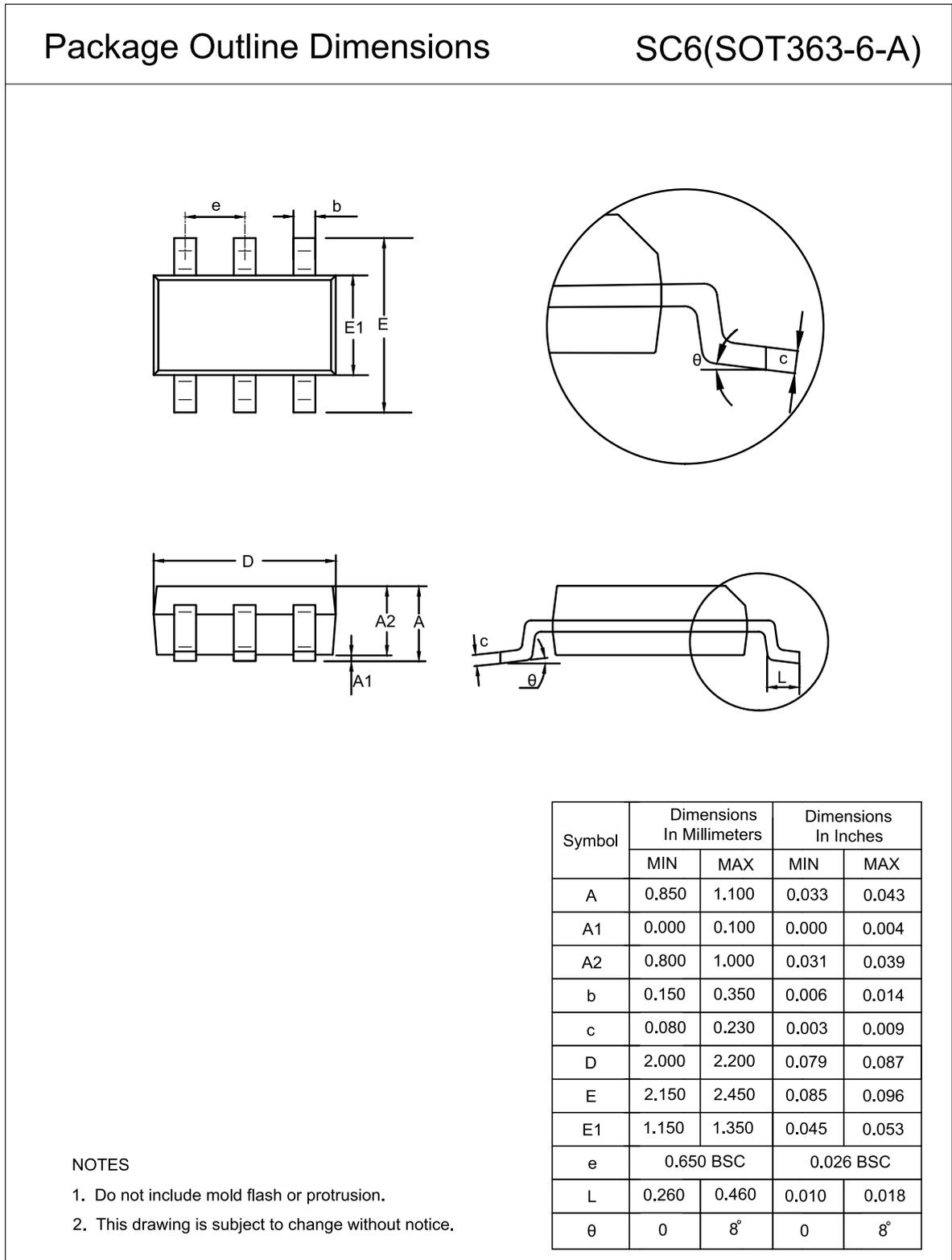
Tape and Reel Information



| Order Number | Package | D1 (mm) | W1 (mm) | A0 (mm) | B0 (mm) | K0 (mm) | P0 (mm) | W0 (mm) | Pin1 Quadrant |
|---------------|---------|---------|---------|---------|---------|---------|---------|---------|---------------|
| T74L2G04-SC6R | SOT363 | 178 | 12.1 | 2.4 | 2.5 | 1.2 | 4 | 8 | Q3 |
| T74L2G04-S6TR | SOT23-6 | 180 | 12 | 3.3 | 3.2 | 1.4 | 4 | 8 | Q3 |

Package Outline Dimensions

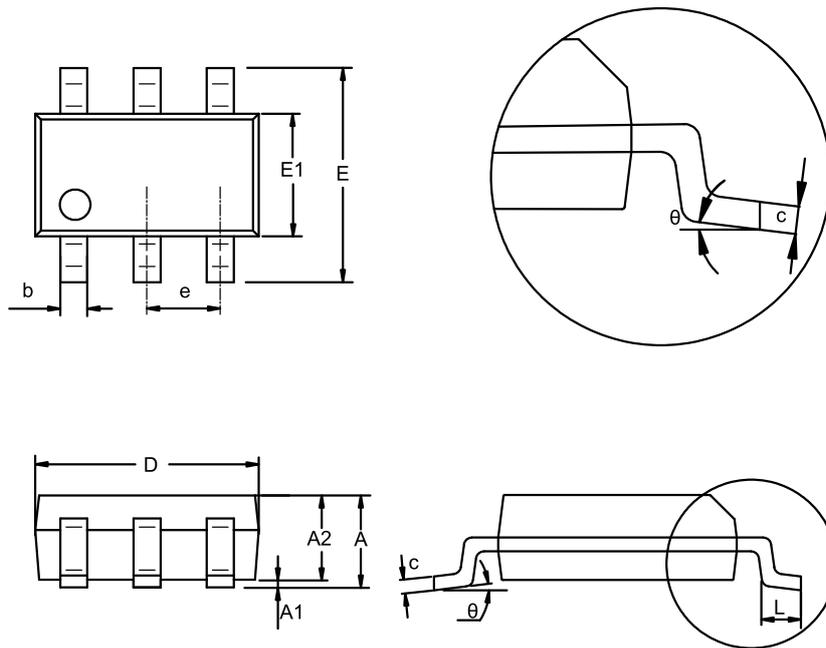
SOT363



SOT23-6

Package Outline Dimensions

S6T(SOT23-6-A)



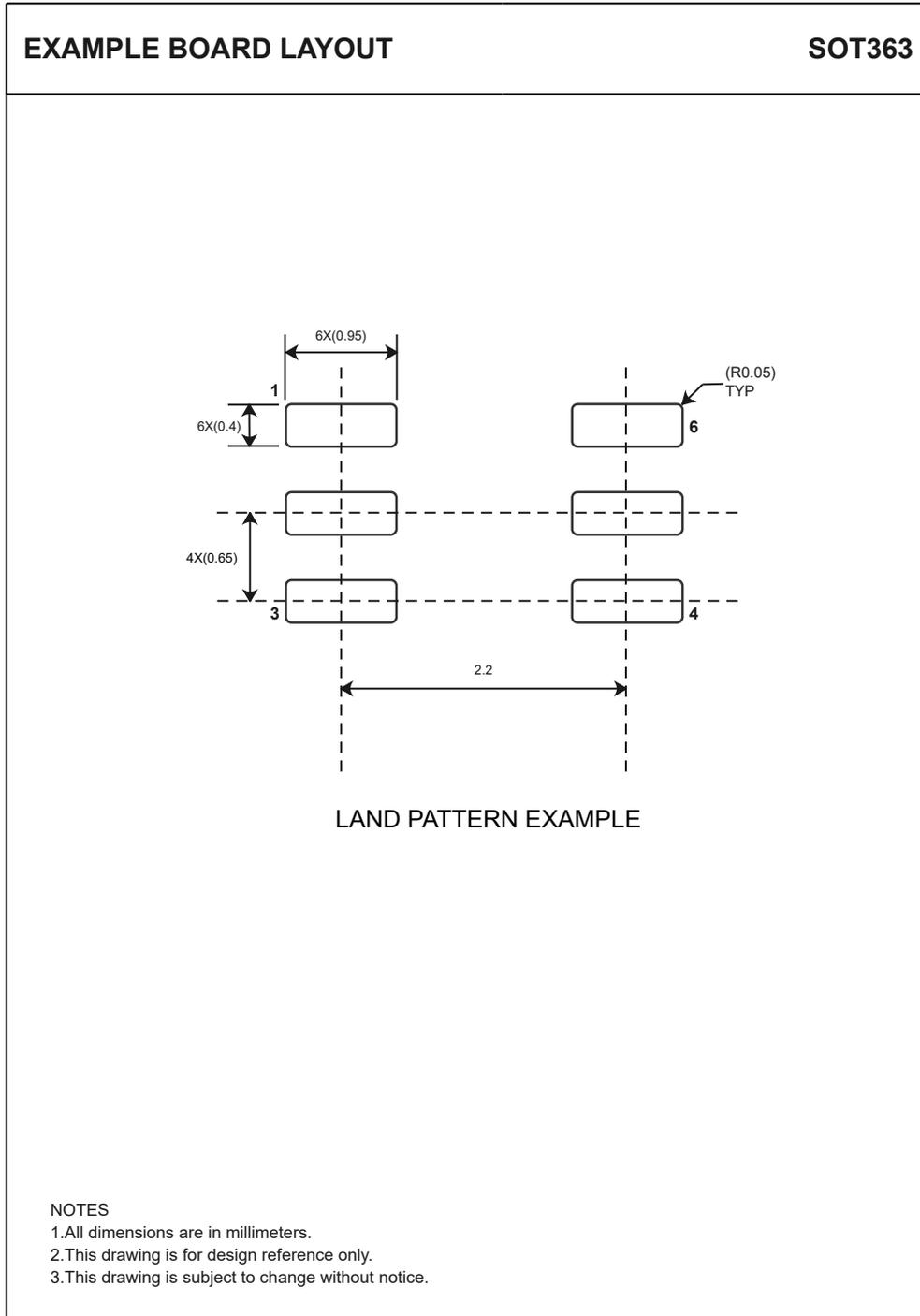
| Symbol | Dimensions In Millimeters | | Dimensions In Inches | |
|--------|------------------------------|-------|-------------------------|-------|
| | MIN | MAX | MIN | MAX |
| A | 1.050 | 1.250 | 0.041 | 0.049 |
| A1 | 0.000 | 0.150 | 0.000 | 0.006 |
| A2 | 1.000 | 1.200 | 0.039 | 0.047 |
| b | 0.280 | 0.500 | 0.011 | 0.020 |
| c | 0.100 | 0.230 | 0.004 | 0.009 |
| D | 2.820 | 3.020 | 0.111 | 0.119 |
| E | 2.600 | 3.000 | 0.102 | 0.118 |
| E1 | 1.500 | 1.720 | 0.059 | 0.068 |
| e | 0.950 BSC | | 0.037 BSC | |
| L | 0.300 | 0.600 | 0.012 | 0.024 |
| θ | 0 | 8° | 0 | 8° |

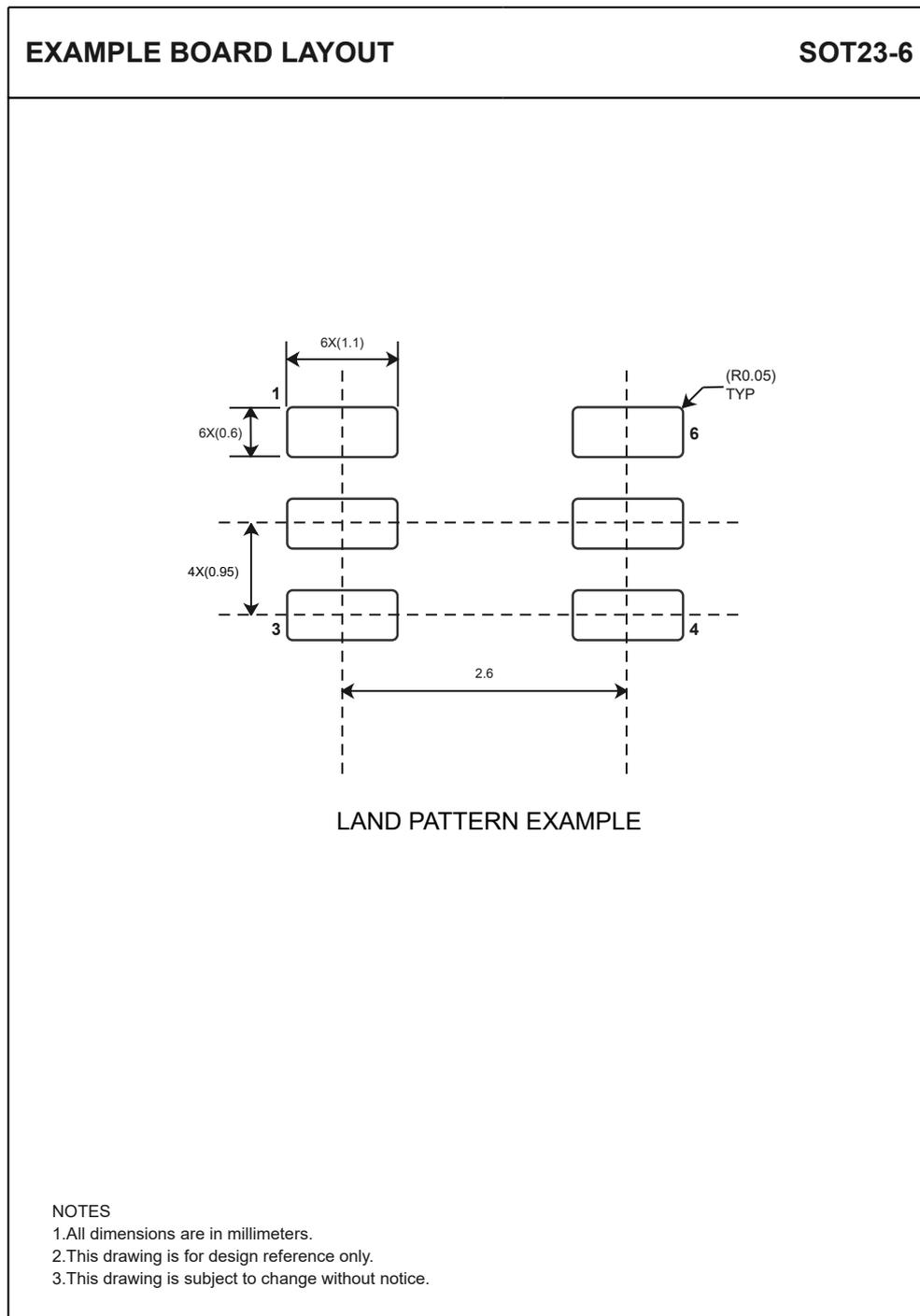
NOTES

1. Do not include mold flash or protrusion.
2. This drawing is subject to change without notice.
3. Reference JEDEC MO-178.

Land Pattern

SOT363



SOT23-6

Order Information

| Order Number | Operating Temperature Range | Package | Marking Information | MSL | Transport Media, Quantity | Eco Plan |
|---------------|-----------------------------|---------|---------------------|------|---------------------------|----------|
| T74L2G04-SC6R | -40 to 125°C | SOT363 | V4 | MSL3 | Tape and Reel,3000 | Green |
| T74L2G04-S6TR | -40 to 125°C | SOT23-6 | L24 | MSL3 | Tape and Reel,3000 | Green |

Green: 3PEAK defines "Green" to mean RoHS compatible and free of halogen substances.

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