

## Features

- Wide Supply Voltage Range from 2.0 V to 6.0 V
- I/O Tolerance Inputs to 6 V
- All Inputs with Schmitt-Trigger Action
- CMOS Low Power Dissipation
- I<sub>OFF</sub> Supports Partial Power-down Protection
- ESD Protection: ±3-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

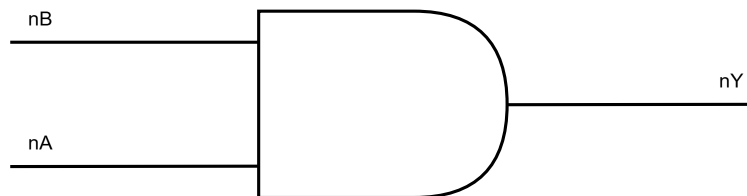
The T74A08 is a quad 2-input AND gate with the V<sub>CC</sub> supply from 2 V to 6 V. Schmitt-Trigger action allows inputs with slower rise-and-fall times and better noise immunity. I<sub>OFF</sub> circuits can prevent backflow current during power-down, thus supporting partial power-down protection.

The T74A08 is available in TSSOP14 and SOP14 packages and is characterized from -40°C to 125°C.

## Device Table

Device	Package	Body Size
T74A08-TS2R	TSSOP14	5 mm x 4.4 mm
T74A08-SO2R	SOP14	8.65 mm x 3.9 mm

## Typical Application Circuit



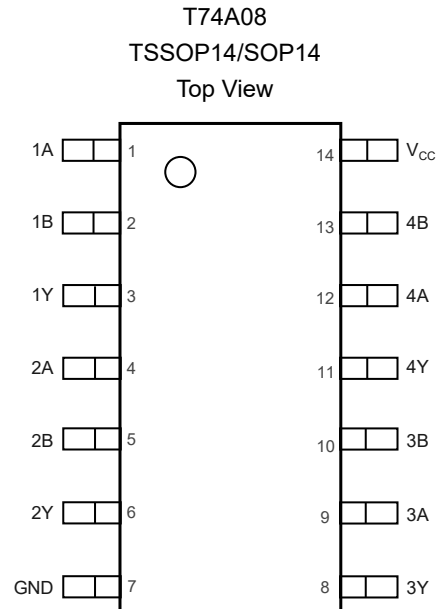
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## Revision History

Date	Revision	Notes
2025-02-26	Rev.Pre.0	Initial version.
2025-11-26	Rev.A.0	Released version.
2026-05-11	Rev.A.1	The following updates are all about the new datasheet formats or typos, and the actual product remains unchanged. Updated Electrostatic Discharge Protection.

## Pin Configuration and Functions



**Table 1. Pin Functions**

Pin No.	Name	I/O	Description
1, 4, 9, 12	1A, 2A, 3A, 4A	I	Input nA
2, 5, 10, 13	1B, 2B, 3B, 4B	I	Input nB
3, 6, 8, 11	1Y, 2Y, 3Y, 4Y	O	Output nY
7	GND	Power	Ground
14	V <sub>cc</sub>	Power	Supply pin

### Function Table

**Table 2. Truth Table**

Input		Output
nA	nB	nY
L	X	L
X	L	L
H	H	H

(1) H = High voltage level.

(2) L = Low voltage level.

(3) X = Don't care.

## Specifications

### Absolute Maximum Ratings <sup>(1)</sup>

Parameter		Min	Max	Unit
V <sub>CC</sub>	Supply Voltage	-0.5	7	V
V <sub>I</sub>	Input Voltage <sup>(2)</sup>	-0.5	7	V
I <sub>O</sub>	Continuous Output Current	-25	25	mA
I <sub>IK</sub>	Input Clamp Current, V <sub>I</sub> < 0	-20		mA
I <sub>OK</sub>	Output Clamp Current, V <sub>O</sub> < 0	-20		mA
	Continuous Current through V <sub>CC</sub> or GND	-75	75	mA
T <sub>J</sub>	Junction Temperature		150	°C
T <sub>STG</sub>	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 <sup>(1)</sup>	±3,000	V
CDM	Charged Device Model ESD	ANSI/ESDA/JEDEC JS-002, all pins <sup>(2)</sup>	±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<sub>CC</sub> or GND to ensure proper device operation.

Parameter		Min	Typ	Max	Unit
V <sub>CC</sub>	Supply Voltage	2		6	V
V <sub>I</sub>	Input Voltage	0		6	V
V <sub>O</sub>	Output Voltage	0		V <sub>CC</sub>	V
T <sub>A</sub>	Ambient Temperature	-40		125	°C
Δt/ΔV	Input Transition Rise-and-Fall Rate V <sub>CC</sub> = 3 V to 3.6 V			100	ns/V
	Input Transition Rise-and-Fall Rate V <sub>CC</sub> = 4.5 V to 5.5 V			20	ns/V

**Thermal Information**

Package Type	$\theta_{JA}$	$\theta_{JC}$	Unit
TSSOP14	145.8	71.2	°C/W
SOP14	123.9	56.7	°C/W

**Electrical Characteristics – DC Parameter**

All test conditions:  $T_A = -40^{\circ}\text{C}$  to  $125^{\circ}\text{C}$ , 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	$V_{CC} = 2\text{ V}$	1.5			V
		$V_{CC} = 3\text{ V}$	2.1			V
		$V_{CC} = 5.5\text{ V}$	3.85			V
		$V_{CC} = 6\text{ V}$	4.2			V
$V_{IL}$	Low-Level Input Voltage	$V_{CC} = 2\text{ V}$			0.5	V
		$V_{CC} = 3\text{ V}$			0.9	V
		$V_{CC} = 5.5\text{ V}$			1.65	V
		$V_{CC} = 6\text{ V}$			1.8	V
$V_{OH}$	High-Level Output Voltage	$I_{OH} = -50\text{ }\mu\text{A}; V_{CC} = 2\text{ V}$	1.9			V
		$I_{OH} = -50\text{ }\mu\text{A}; V_{CC} = 3\text{ V}$	2.9			V
		$I_{OH} = -50\text{ }\mu\text{A}; V_{CC} = 4.5\text{ V}$	4.4			V
		$I_{OH} = -4\text{ mA}; V_{CC} = 3\text{ V}$	2.4			V
		$I_{OH} = -8\text{ mA}; V_{CC} = 4.5\text{ V}$	3.7			V
		$I_{OH} = -8\text{ mA}; V_{CC} = 6\text{ V}$	5.2			V
$V_{OL}$	Low-Level Output Voltage	$I_{OL} = 50\text{ }\mu\text{A}; V_{CC} = 2\text{ V}$			0.1	V
		$I_{OL} = 50\text{ }\mu\text{A}; V_{CC} = 3\text{ V}$			0.1	V
		$I_{OL} = 50\text{ }\mu\text{A}; V_{CC} = 4.5\text{ V}$			0.1	V
		$I_{OL} = 4\text{ mA}; V_{CC} = 3\text{ V}$			0.55	V
		$I_{OL} = 8\text{ mA}; V_{CC} = 4.5\text{ V}$			0.55	V
		$I_{OL} = 8\text{ mA}; V_{CC} = 6\text{ V}$			0.55	V
$I_I$	Input Leakage Current	$V_I = \text{GND to } 6\text{ V};$ $V_{CC} = 0\text{ V to } 6\text{ V}$	-2	$\pm 0.1$	2	$\mu\text{A}$
$I_{OFF}$	Power-off Leakage Current	$V_I$ or $V_O = 0\text{ V to } 6\text{ V};$ $V_{CC} = 0\text{ V}$	-2	$\pm 0.1$	2	$\mu\text{A}$
$I_{CC}$	Supply Current	$V_I = \text{GND or } V_{CC}; I_O = 0\text{ A};$ $V_{CC} = 6\text{ V}$		0.1	10	$\mu\text{A}$
$C_I^{(1)}$	Input Capacitance	$V_I = V_{CC}$ or $\text{GND};$		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  $125^{\circ}\text{C}$ , all typical values are measured at  $T_A = 25^{\circ}\text{C}$ , unless otherwise noted.

Symbol <sup>(1)</sup>	Parameter	Conditions	Min	Typ	Max	Unit
$t_{PD}$ <sup>(2)</sup>	Propagation Delay	$C_{LOAD} = 15\text{ pF};$ $V_{CC} = 3\text{ V to }3.6\text{ V}$	1.5	4.5	7.7	ns
		$C_{LOAD} = 50\text{ pF};$ $V_{CC} = 3\text{ V to }3.6\text{ V}$	2.9	6.1	10.5	ns
		$C_{LOAD} = 15\text{ pF};$ $V_{CC} = 4.5\text{ V to }5.5\text{ V}$	1	3.8	6.1	ns
		$C_{LOAD} = 50\text{ pF};$ $V_{CC} = 4.5\text{ V to }5.5\text{ V}$	1.2	4.7	7.9	ns
$C_{PD}$ <sup>(3)</sup>	Power Dissipation Capacitance	$f = 1\text{ MHz};$ $V_I = \text{GND to }V_{CC}$		7.7		pF

(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  $\mu\text{W}$ ).

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

Where:

$f_i$  = Input frequency in MHz;

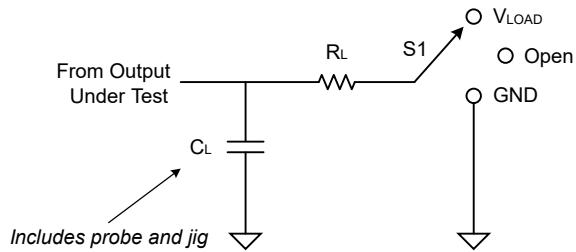
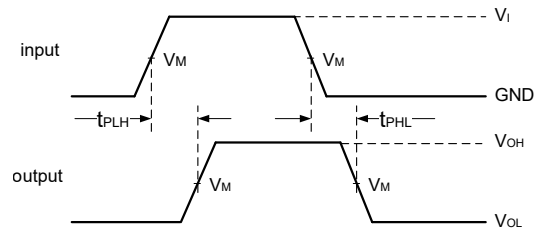
$f_o$  = Output frequency in MHz;

$C_L$  = 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
	$V_I$	$t_r/t_f$				$t_{PHL}/t_{PLH}$
3 V to 3.6 V	$V_{CC}$	$\leq 3$ ns	15 pF, 50 pF	1 k $\Omega$	$0.5V_{CC}$	Open
4.5 V to 5.5 V	$V_{CC}$	$\leq 3$ ns	15 pF, 50 pF	1 k $\Omega$	$0.5V_{CC}$	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.

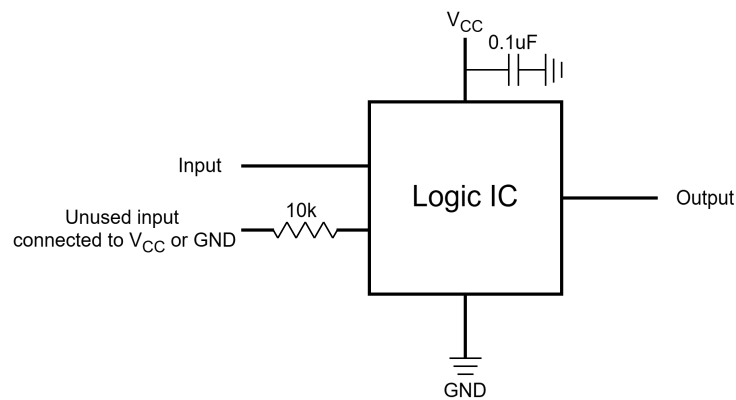
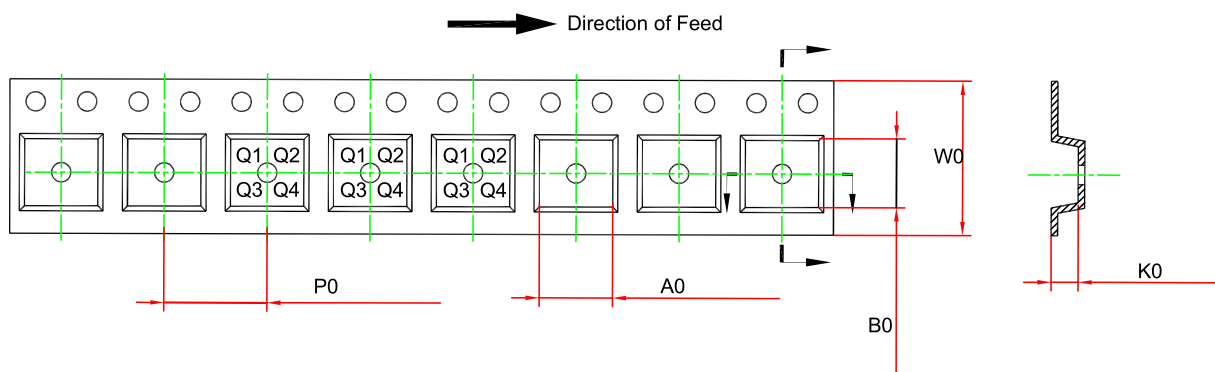
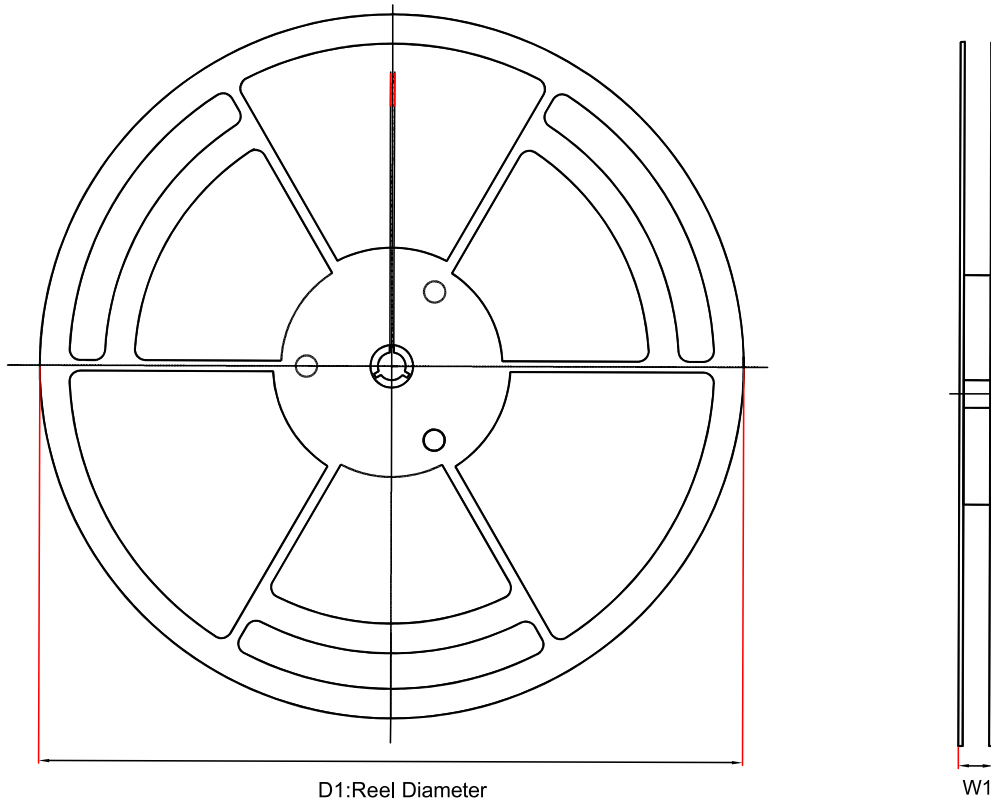


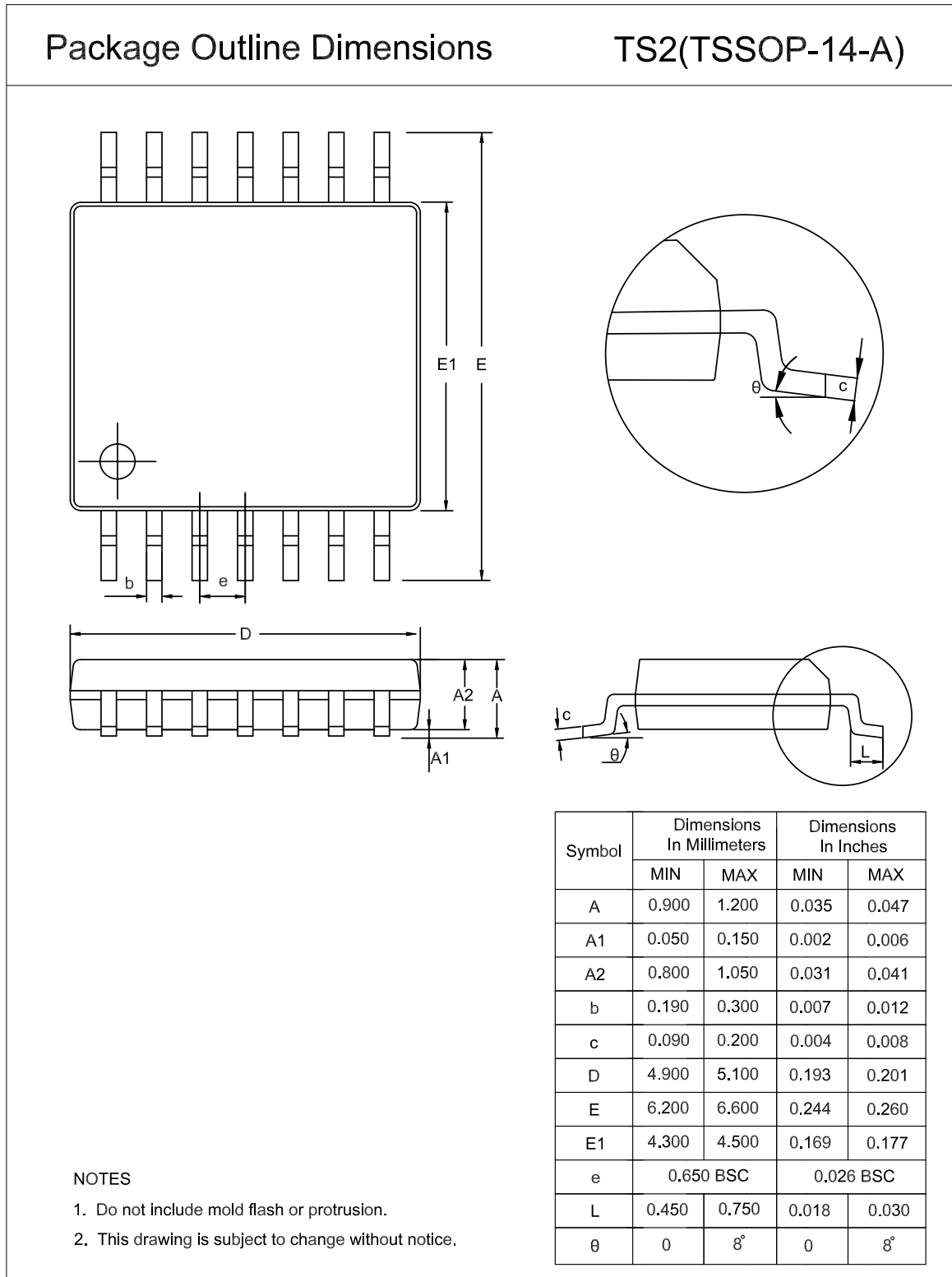
Figure 3. Typical Application Circuit

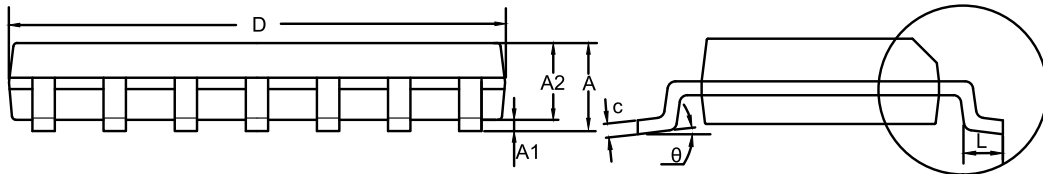
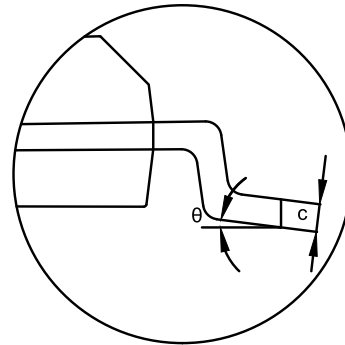
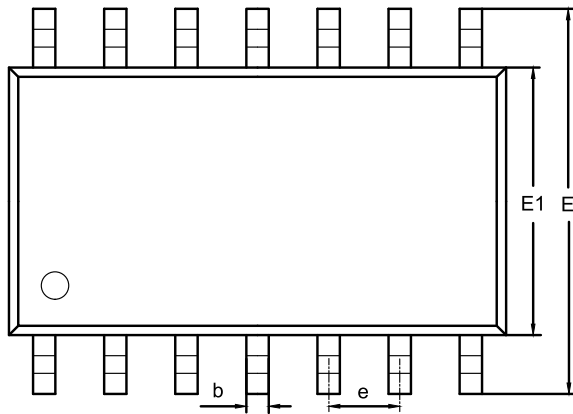
**Tape and Reel Information**


Order Number	Package	D1 (mm)	W1 (mm)	A0 (mm)	B0 (mm)	K0 (mm)	P0 (mm)	W0 (mm)	Pin1 Quadrant
T74A08-TS2R	TSSOP14	330	17.6	6.8	5.5	1.5	8	12	Q1
T74A08-SO2R	SOP14	330	21.6	6.5	9.3	2.1	8	16	Q1

Package Outline Dimensions

TSSOP14



**SOP14**
**Package Outline Dimensions**
**SO2(SOP-14-A)**


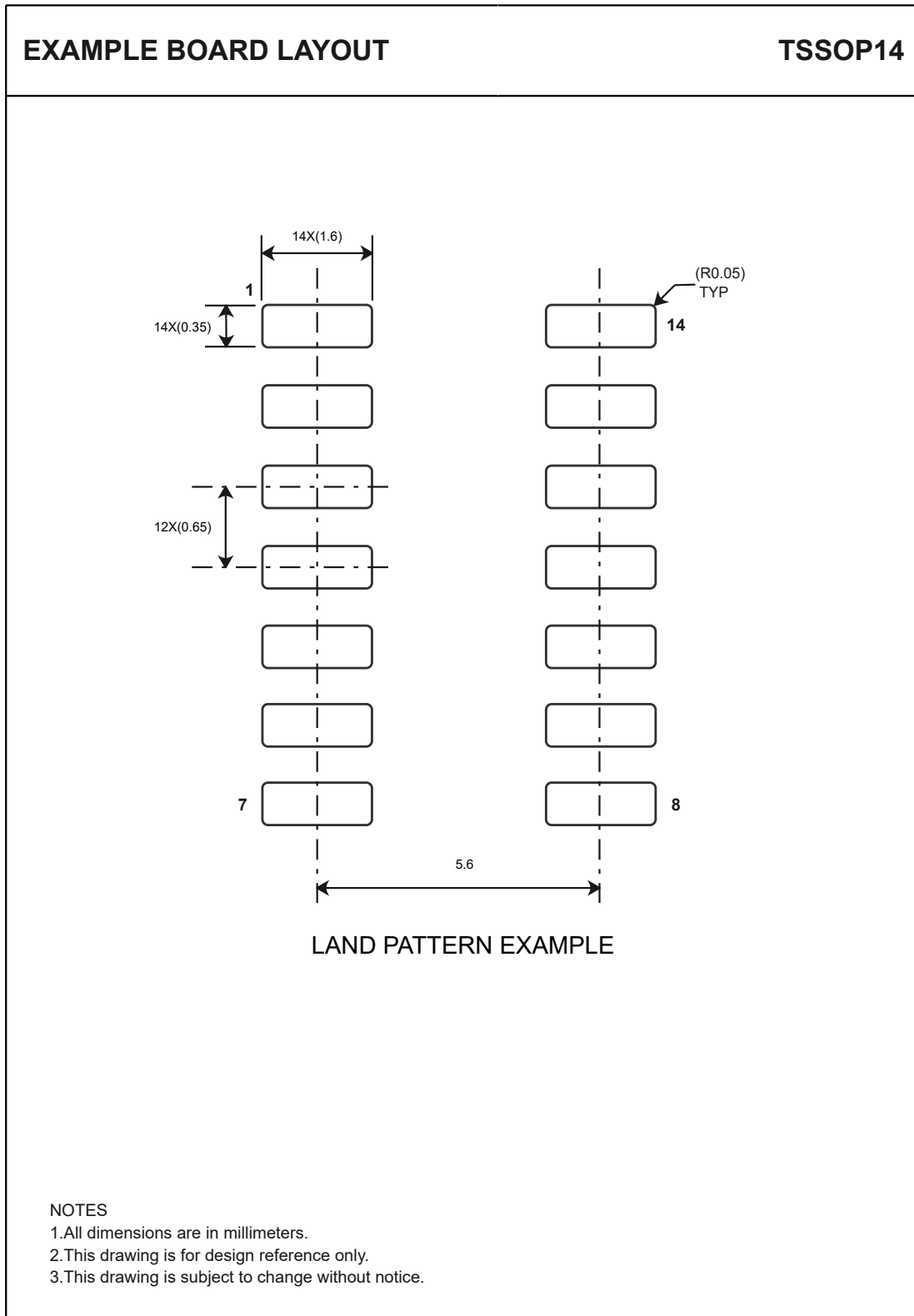
Symbol	Dimensions In Millimeters		Dimensions In Inches	
	MIN	MAX	MIN	MAX
A	1.350	1.750	0.053	0.069
A1	0.050	0.250	0.002	0.010
A2	1.250	1.650	0.049	0.065
b	0.310	0.510	0.012	0.020
c	0.100	0.250	0.004	0.010
D	8.450	8.850	0.333	0.348
E	5.800	6.200	0.228	0.244
E1	3.800	4.000	0.150	0.157
e	1.270 BSC		0.050 BSC	
L	0.400	1.270	0.016	0.050
$\theta$	0	8°	0	8°

**NOTES**

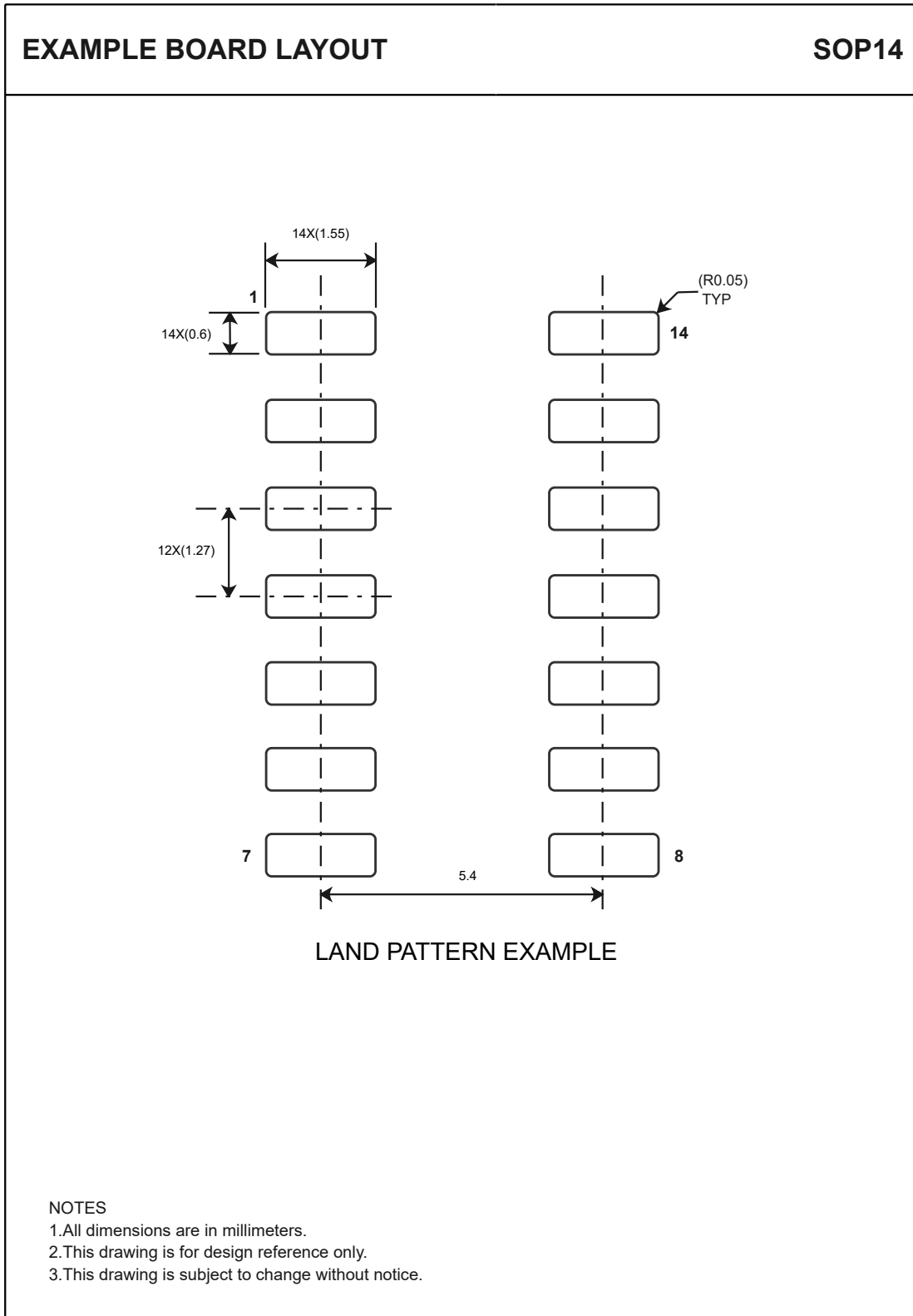
1. Do not include mold flash or protrusion.
2. This drawing is subject to change without notice.

Example Board Layout

TSSOP14



SOP14



## Order Information

Order Number	Operating Temperature Range	Package	Marking Information	MSL	Transport Media, Quantity	Eco Plan
T74A08-TS2R	-40 to 125°C	TSSOP14	AHC08	MSL3	Tape and Reel,3000	Green
T74A08-SO2R	-40 to 125°C	SOP14	T74A08	MSL3	Tape and Reel,2500	Green

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

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