

## 1. General Description

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The EM74AHC1G32 and EM74AHCT1G32 are single 2-input OR gates. Inputs are overvoltage tolerant. This feature allows the use of these devices as translators in mixed voltage environments.

## 2. Features and Benefits

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- Wide supply voltage range from 2.0 V to 5.5 V
- Overvoltage tolerant inputs to 5.5 V
- High noise immunity
- CMOS low power dissipation
- Latch-up performance exceeds 200 mA
- Symmetrical output impedance
- Balanced propagation delays
- Input levels:
  - For EM74AHC1G32: CMOS level
  - For EM74AHCT1G32: TTL level
- ESD protection:
  - HBM ANSI/ESDA/JEDEC JS-001 Class 3A exceeds 7000 V
  - CDM ANSI/ESDA/JEDEC JS-002 Class C3 exceeds 2000 V
- Multiple package options

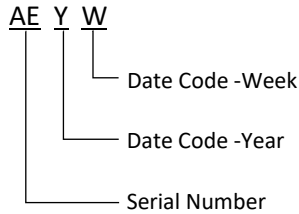
### 3. Ordering Information

Table 1. Ordering information

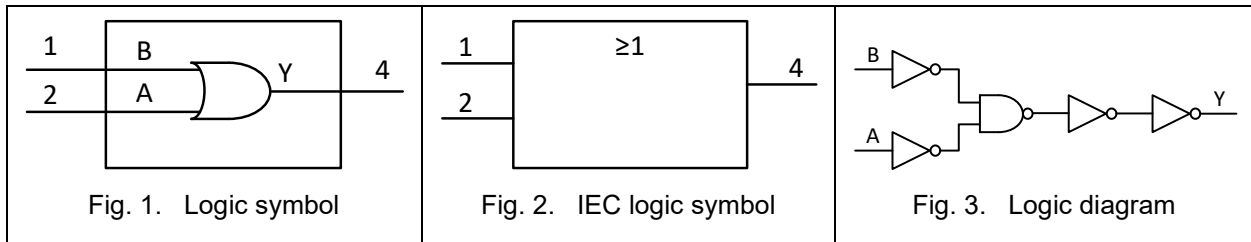
Type number	Topside marking	Package		
		Name	Description	Quantity
EM74AHC1G32GV	AEYW	SOT23-5L	SOT23 package, 5 pins 2.92 mm × 1.6 mm; 1.25 mm (Max) height	3000
EM74AHCT1G32GV	CEYW			
EM74AHC1G32GW	AEYW	SOT353	SOT353 package, 5 pins 2.1 mm × 1.25 mm; 1.1 mm (Max) height	3000
EM74AHCT1G32GW	CEYW			
EM74AHC1G32DRL	AEYW	SOT553	SOT553 package, 5 pins 1.6 mm × 1.2 mm; 0.6 mm (Max) height	3000
EM74AHCT1G32DRL	CEYW			

**MARKING INFORMATION**

NOTE: YW = Date Code.



### 4. Function Diagram



## 5. Pinning Information

### 5.1. Pinning

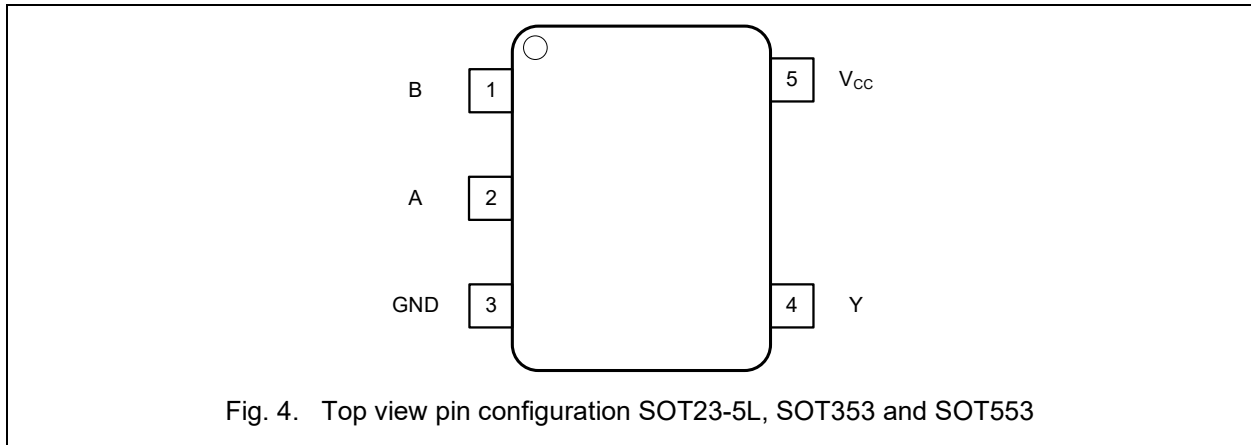


Fig. 4. Top view pin configuration SOT23-5L, SOT353 and SOT553

### 5.2. Pin description

Table 2. Pin description

Symbol	Pin	Description
B	1	Data input
A	2	Data input
GND	3	Ground (0V)
Y	4	Data output
V <sub>CC</sub>	5	Supply voltage

## 6. Functional Description

Table 3. Function table

H = HIGH voltage level; L = LOW voltage level.

Input		Output
A	B	Y
L	L	L
L	H	H
H	L	H
H	H	H

## 7. Absolute Maximum Ratings

Stresses exceeding the absolute maximum ratings may damage the device. The device may not function or be operable above the recommended operating conditions and stressing the parts to these levels is not recommended. In addition, extended exposure to stresses above the recommended operating conditions may affect device reliability. The absolute maximum ratings are stress ratings only.

**Table 4. Absolute Maximum Ratings**

In accordance with the Absolute Maximum Rating System (IEC 60134). Voltages are referenced to GND.

Symbol	Parameter	Conditions	Min	Max	Unit
V <sub>CC</sub>	supply voltage		-0.5	7.0	V
V <sub>I</sub>	input voltage		-0.5	7.0	V
I <sub>IK</sub>	input clamping current	V <sub>I</sub> < -0.5 V	-20		mA
I <sub>OK</sub>	output clamping current	V <sub>O</sub> < -0.5 V or V <sub>O</sub> > V <sub>CC</sub> + 0.5 V [1]		±20	mA
I <sub>O</sub>	output current	-0.5 V < V <sub>O</sub> < V <sub>CC</sub> + 0.5 V		±25	mA
I <sub>CC</sub>	supply current			75	mA
I <sub>GND</sub>	ground current		-75		mA
P <sub>tot</sub>	total power dissipation	T <sub>amb</sub> = -40 °C to + 125 °C		250	mW
T <sub>stg</sub>	storage temperature		-65	150	°C

[1] The input and output voltage ratings may be exceeded if the input and output current ratings are observed.

## 8. Recommended Operating Conditions

The Recommended Operating Conditions table defines the conditions for actual device operation. Recommended operating conditions are specified to ensure optimal performance to the datasheet specifications. EnergyMath does not recommend exceeding them or designing to Absolute Maximum Ratings.

**Table 5. Recommended Operating Conditions**

Symbol	Parameter	Conditions	EM74AHC1G32			EM74AHCT1G32			Unit
			Min	Typ	Max	Min	Typ	Max	
V <sub>CC</sub>	supply voltage		2.0	5.0	5.5	4.5	5.0	5.5	V
V <sub>I</sub>	input voltage		0		5.5	0		5.5	V
V <sub>O</sub>	output voltage		0		V <sub>CC</sub>	0		V <sub>CC</sub>	V
T <sub>amb</sub>	ambient temperature		-40	25	125	-40	25	125	°C
Δt/ΔV	input transition rise and fall rate	V <sub>CC</sub> = 3.3 V ± 0.3 V			100				ns/V
		V <sub>CC</sub> = 5.0 V ± 0.5 V			20			20	ns/V

## EM74AHC1G32; EM74AHCT1G32

Single 2-input OR gate

# 9. Static Characteristics

**Table 6. Static characteristics**

At recommended operating conditions. Voltages are referenced to GND (ground = 0 V).

Symbol	Parameter	Conditions	-40 °C to +85 °C			-40 °C to +125 °C		Unit
			Min	Typ[1]	Max	Min	Max	
<b>EM74AHC1G32</b>								
V <sub>IH</sub>	HIGH-level input voltage	V <sub>CC</sub> = 2.0 V	1.5			1.5		V
		V <sub>CC</sub> = 3.0 V	2.1			2.1		V
		V <sub>CC</sub> = 5.5 V	3.85			3.85		V
V <sub>IL</sub>	LOW-level input voltage	V <sub>CC</sub> = 2.0 V			0.5		0.5	V
		V <sub>CC</sub> = 3.0 V			0.9		0.9	V
		V <sub>CC</sub> = 5.5 V			1.65		1.65	V
V <sub>OH</sub>	HIGH-level output voltage	V <sub>I</sub> = V <sub>IH</sub> or V <sub>IL</sub>						
		I <sub>O</sub> = -50 μA; V <sub>CC</sub> = 2.0 V	1.9	2.0		1.9		V
		I <sub>O</sub> = -50 μA; V <sub>CC</sub> = 3.0 V	2.9	3.0		2.9		V
		I <sub>O</sub> = -50 μA; V <sub>CC</sub> = 4.5 V	4.4	4.5		4.4		V
		I <sub>O</sub> = -4.0 mA; V <sub>CC</sub> = 3.0 V	2.48	2.93		2.40		V
I <sub>O</sub> = -8.0 mA; V <sub>CC</sub> = 4.5 V	3.80	4.39		3.70		V		
V <sub>OL</sub>	LOW-level output voltage	V <sub>I</sub> = V <sub>IH</sub> or V <sub>IL</sub>						
		I <sub>O</sub> = 50 μA; V <sub>CC</sub> = 2.0 V		0	0.1		0.1	V
		I <sub>O</sub> = 50 μA; V <sub>CC</sub> = 3.0 V		0	0.1		0.1	V
		I <sub>O</sub> = 50 μA; V <sub>CC</sub> = 4.5 V		0	0.1		0.1	V
		I <sub>O</sub> = 4.0 mA; V <sub>CC</sub> = 3.0 V		0.05	0.44		0.55	V
I <sub>O</sub> = 8.0 mA; V <sub>CC</sub> = 4.5 V		0.07	0.44		0.55	V		
I <sub>I</sub>	input leakage current	V <sub>I</sub> = 5.5 V or GND ; V <sub>CC</sub> = 0 V to 5.5 V		±0.01	±1.0		±2.0	μA
I <sub>CC</sub>	supply current	V <sub>I</sub> = V <sub>CC</sub> or GND ; I <sub>O</sub> = 0 A ; V <sub>CC</sub> = 5.5 V		0.01	10		40	μA
C <sub>i</sub>	input capacitance			3.5				pF

## EM74AHC1G32; EM74AHCT1G32

Single 2-input OR gate

Symbol	Parameter	Conditions	-40 °C to +85 °C			-40 °C to +125 °C		Unit
			Min	Typ[1]	Max	Min	Max	
<b>EM74AHCT1G32</b>								
V <sub>IH</sub>	HIGH-level input voltage	V <sub>CC</sub> = 4.5 V to 5.5 V	2.0			2.0		V
V <sub>IL</sub>	LOW-level input voltage	V <sub>CC</sub> = 4.5 V to 5.5 V			0.8		0.8	V
V <sub>OH</sub>	HIGH-level output voltage	V <sub>I</sub> = V <sub>IH</sub> or V <sub>IL</sub> ; V <sub>CC</sub> = 4.5 V						
		I <sub>O</sub> = -50 μA;	4.4	4.5		4.4		V
V <sub>OL</sub>	LOW-level output voltage	V <sub>I</sub> = V <sub>IH</sub> or V <sub>IL</sub> ; V <sub>CC</sub> = 4.5 V						
		I <sub>O</sub> = 50 μA;		0	0.1		0.1	V
		I <sub>O</sub> = 8.0 mA;		0.07	0.44		0.55	V
I <sub>I</sub>	input leakage current	V <sub>I</sub> = 5.5 V or GND ; V <sub>CC</sub> = 0 V to 5.5 V		±0.01	±1.0		±2.0	μA
I <sub>CC</sub>	supply current	V <sub>I</sub> = V <sub>CC</sub> or GND ; I <sub>O</sub> = 0 A ; V <sub>CC</sub> = 5.5 V		0.01	10		40	μA
ΔI <sub>CC</sub>	additional supply current	per input pin ; V <sub>I</sub> = 3.4 V; other inputs at V <sub>CC</sub> or GND; I <sub>O</sub> = 0 A; V <sub>CC</sub> = 5.5 V		0.23	1.35		1.35	mA
C <sub>I</sub>	input capacitance			3.5				pF

[1]All typical values are measured at T<sub>amb</sub> = 25°C.

## EM74AHC1G32; EM74AHCT1G32

Single 2-input OR gate

# 10. Dynamic Characteristics

**Table 7. Dynamic characteristics**

Voltages are referenced to GND (ground = 0 V); for test circuit see Fig. 6.

Symbol	Parameter	Conditions	-40 °C to +85 °C			-40 °C to +125 °C		Unit
			Min	Typ[1]	Max	Min	Max	
<b>EM74AHC1G32</b>								
t <sub>pd</sub>	propagation delay	A and B to Y; see Fig. 5 [2]						
		V <sub>CC</sub> = 3.0 V to 3.6 V, C <sub>L</sub> = 15 pF	1.0	4.3	9.5	1.0	10.0	ns
		V <sub>CC</sub> = 4.5 V to 5.5 V, C <sub>L</sub> = 15 pF	1.0	3.1	6.5	1.0	7.0	ns
C <sub>PD</sub>	power dissipation capacitance	C <sub>L</sub> = 15 pF ; f = 1MHz ; V <sub>I</sub> = GND to V <sub>CC</sub> ; [3]		26				pF
<b>EM74AHCT1G32</b>								
t <sub>pd</sub>	propagation delay	A and B to Y; see Fig. 5 [2]						
		V <sub>CC</sub> = 4.5 V to 5.5 V, C <sub>L</sub> = 15 pF	1.0	4.3	8.0	1.0	8.5	ns
C <sub>PD</sub>	power dissipation capacitance	C <sub>L</sub> = 15 pF ; f = 1MHz ; V <sub>I</sub> = GND to V <sub>CC</sub> ; [3]		22				pF

[1] Typical values are measured at T<sub>amb</sub> = 25 °C and V<sub>CC</sub> = 3.3 V and 5.0 V respectively.

[2] t<sub>pd</sub> is the same as t<sub>PLH</sub> and t<sub>PHL</sub>.

[3] C<sub>PD</sub> is used to determine the dynamic power dissipation (P<sub>D</sub> in μW).

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

f<sub>i</sub> = input frequency in MHz;

f<sub>o</sub> = output frequency in MHz;

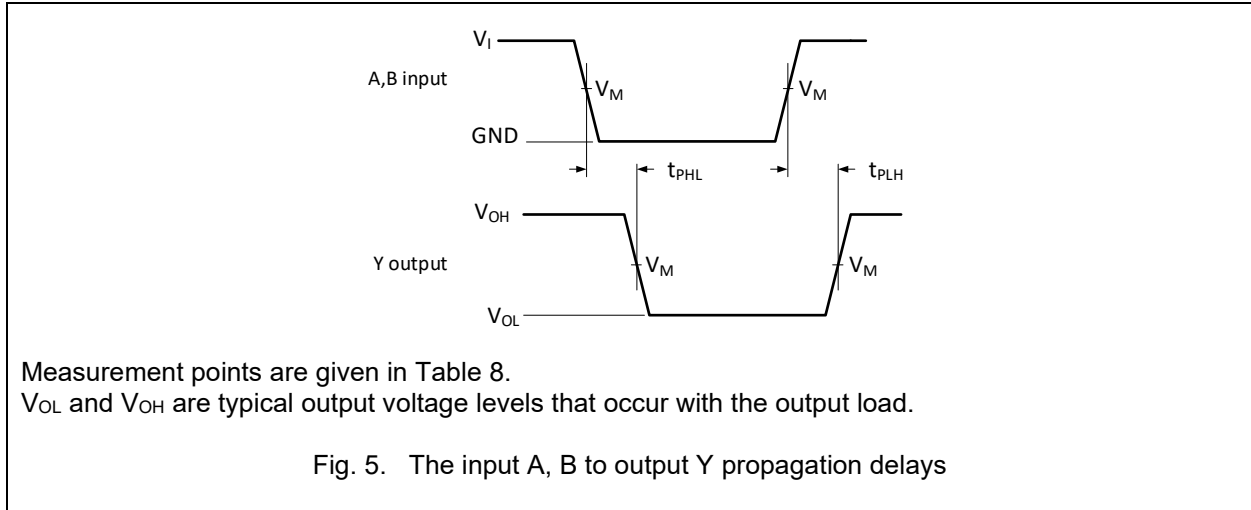
C<sub>L</sub> = output load capacitance in pF;

V<sub>CC</sub> = supply voltage in V;

N = number of inputs switching;

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

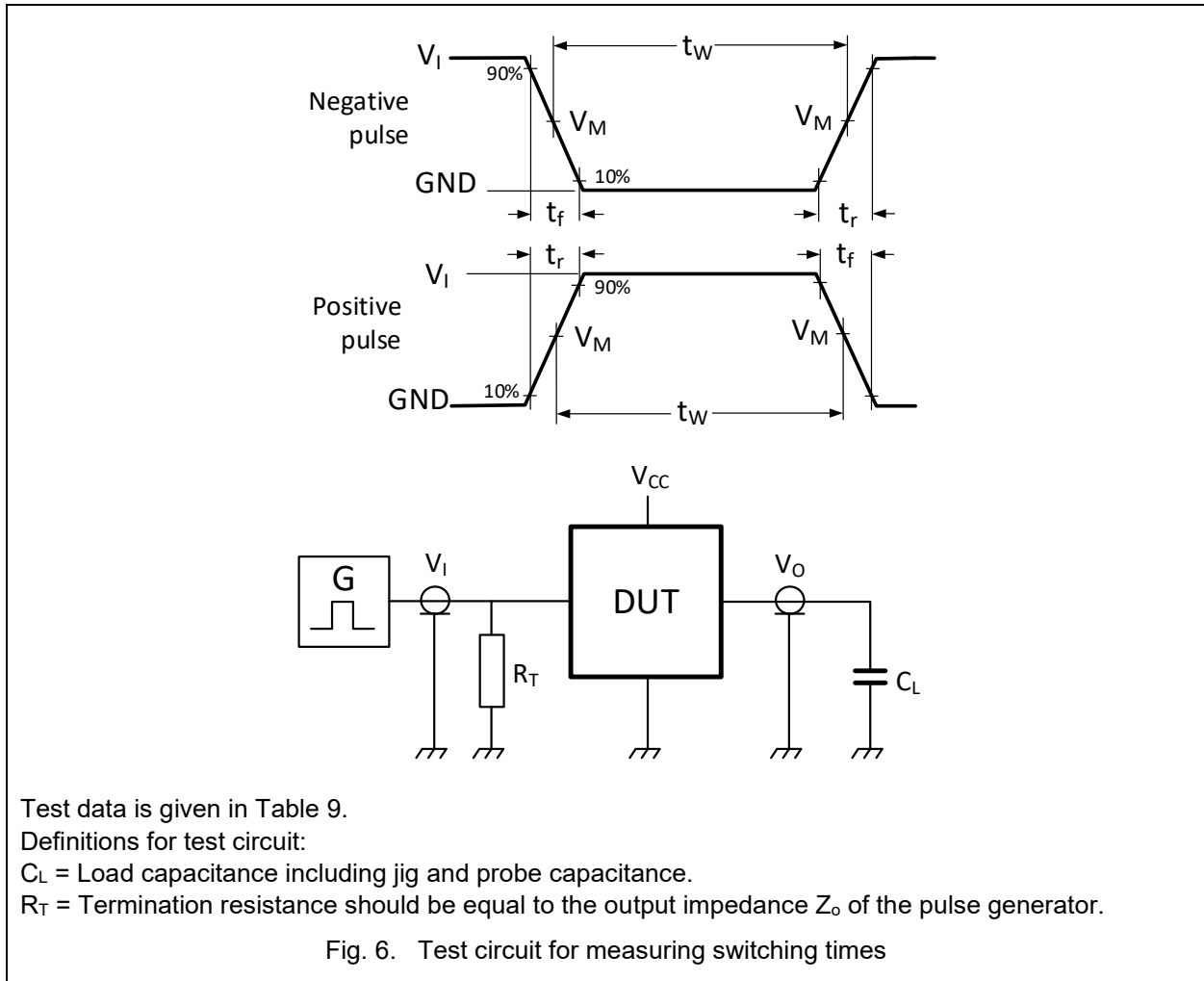
### 10.1. Waveforms and test circuit


**Table 8. Measurement points**

Type	Input		Output
	$V_I$	$V_M$	$V_M$
EM74AHC1G32	GND to $V_{CC}$	$0.5 \times V_{CC}$	$0.5 \times V_{CC}$
EM74AHCT1G32	GND to 3.0 V	1.5 V	$0.5 \times V_{CC}$

# EM74AHC1G32; EM74AHCT1G32

Single 2-input OR gate

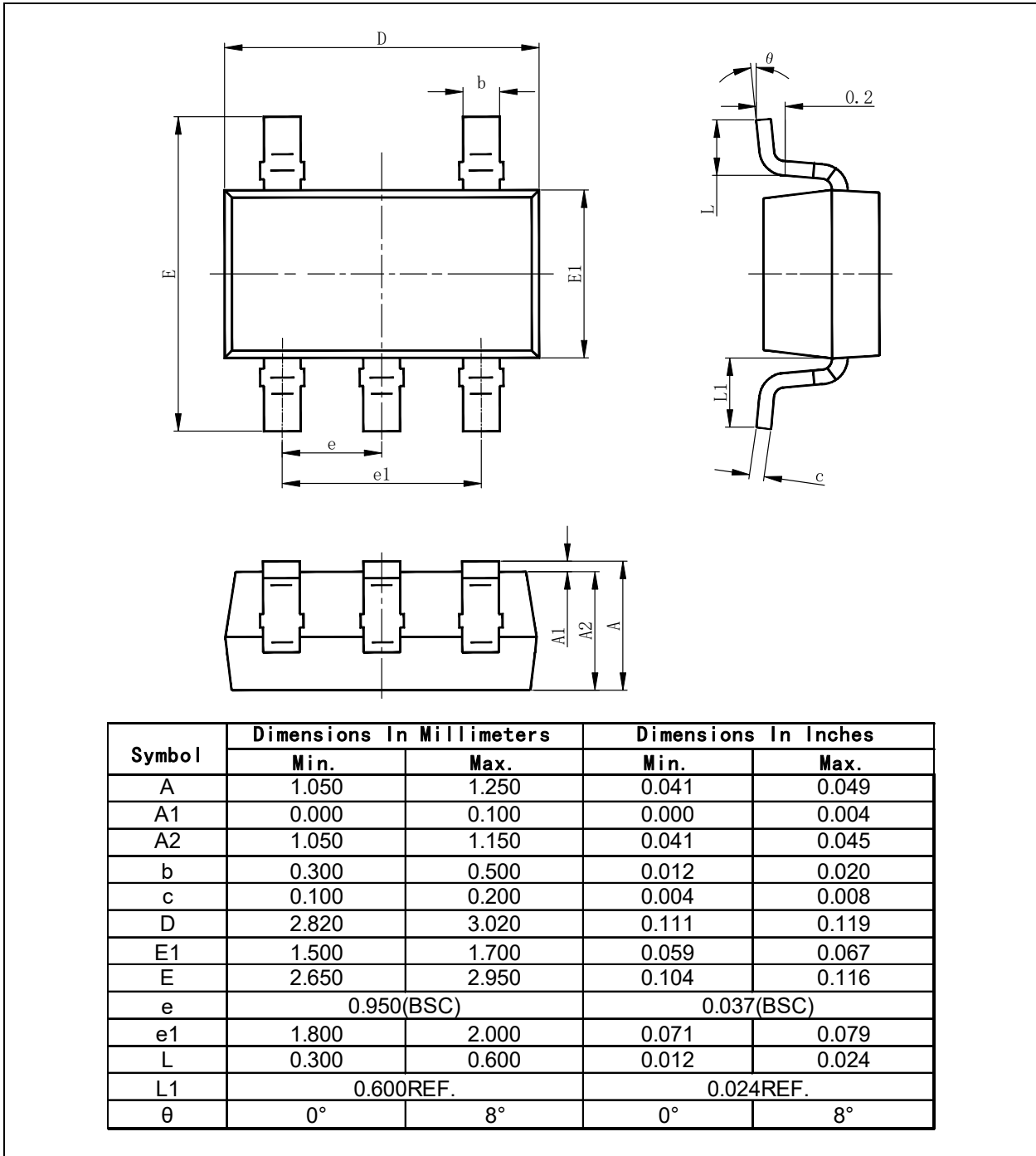


**Table 9. Test data**

Type	Input	Load
	$t_r = t_f$	$C_L$
EM74AHC1G32	$\leq 2.5$ ns	15 pF
EM74AHCT1G32	$\leq 2.5$ ns	15 pF

# 11. Package Outline

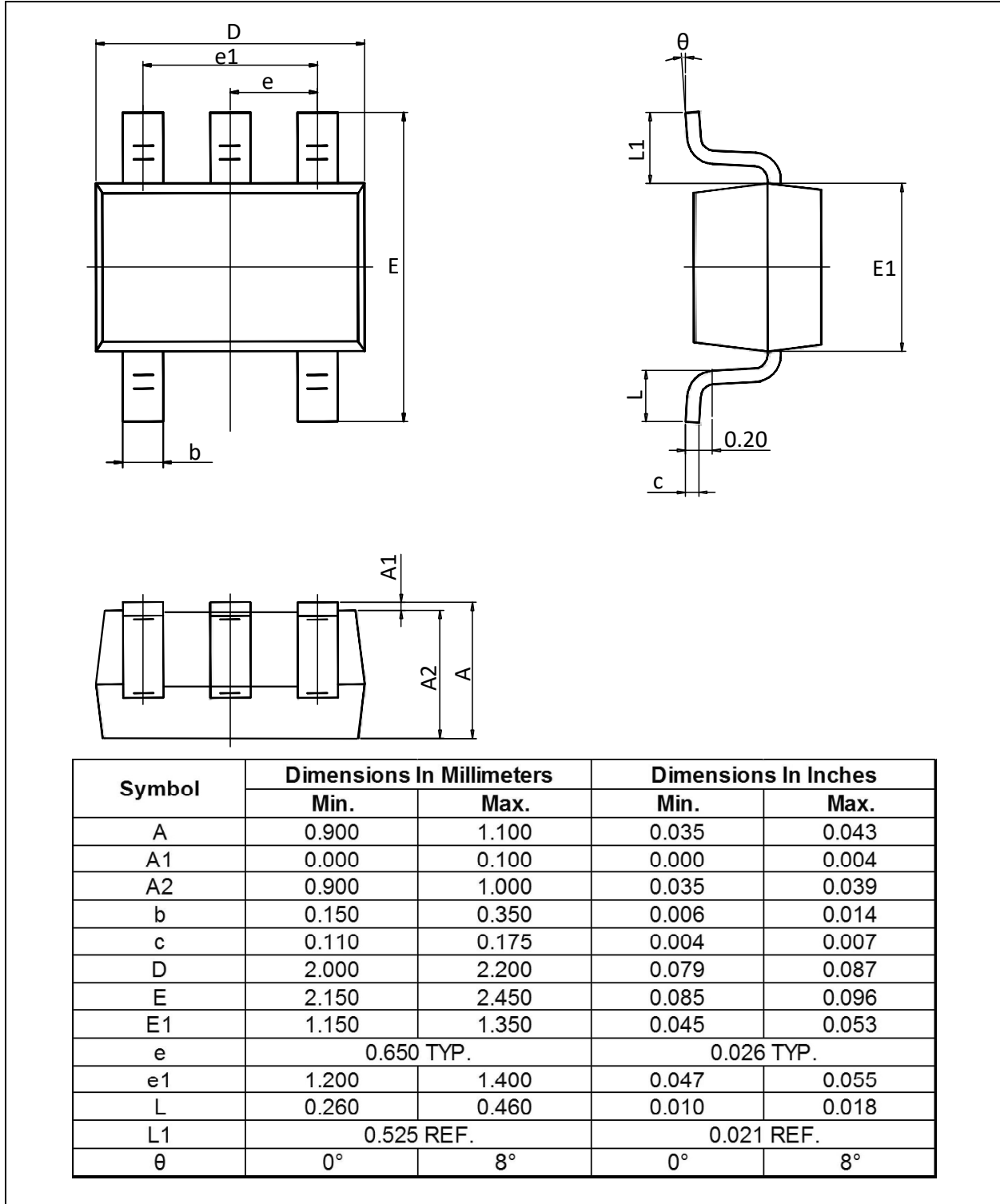
SOT23-5L



EM74AHC1G32; EM74AHCT1G32

Single 2-input OR gate

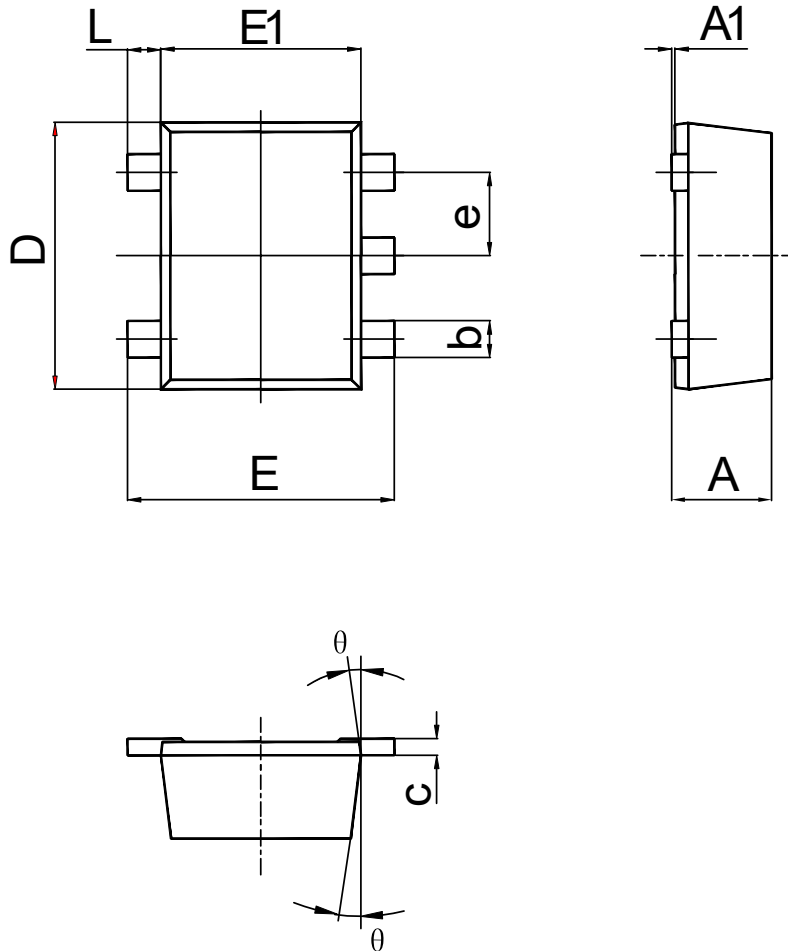
SOT353



EM74AHC1G32; EM74AHCT1G32

Single 2-input OR gate

SOT553



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	0.525	0.600	0.021	0.024
A1	0.000	0.050	0.000	0.002
e	0.450	0.550	0.018	0.022
c	0.090	0.160	0.004	0.006
D	1.500	1.700	0.059	0.067
b	0.170	0.270	0.007	0.011
E1	1.100	1.300	0.043	0.051
E	1.500	1.700	0.059	0.067
L	0.100	0.300	0.004	0.012
θ	7 °REF.		7 °REF.	

## 12. Tape and Reel Information

### 12.1. Carrier tape dimensions

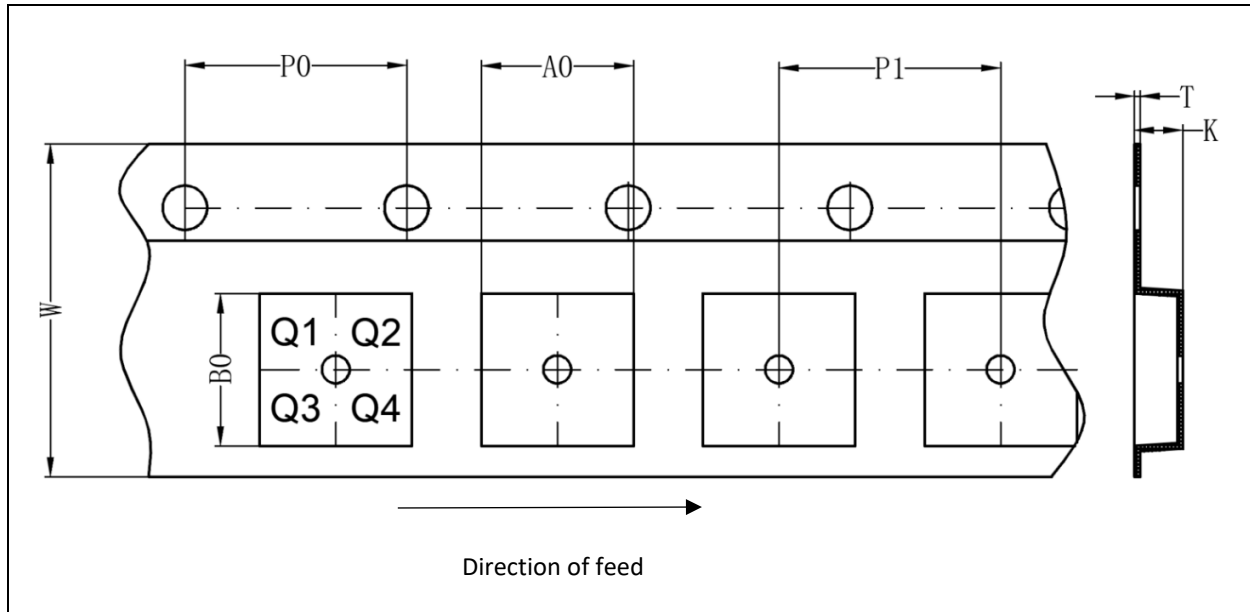


Table 10. Carrier tape dimensions

Package version	A0(mm)	B0(mm)	K0(mm)	T(mm)	P1(mm)	W(mm)	P0(mm)	PIN 1
SOT353	2.55	2.55	1.2	0.2	4	8	4	Q3
SOT23-5L	3.23	3.17	1.37	0.25	4	8	4	Q3

## 12.2. Reel and box dimensions

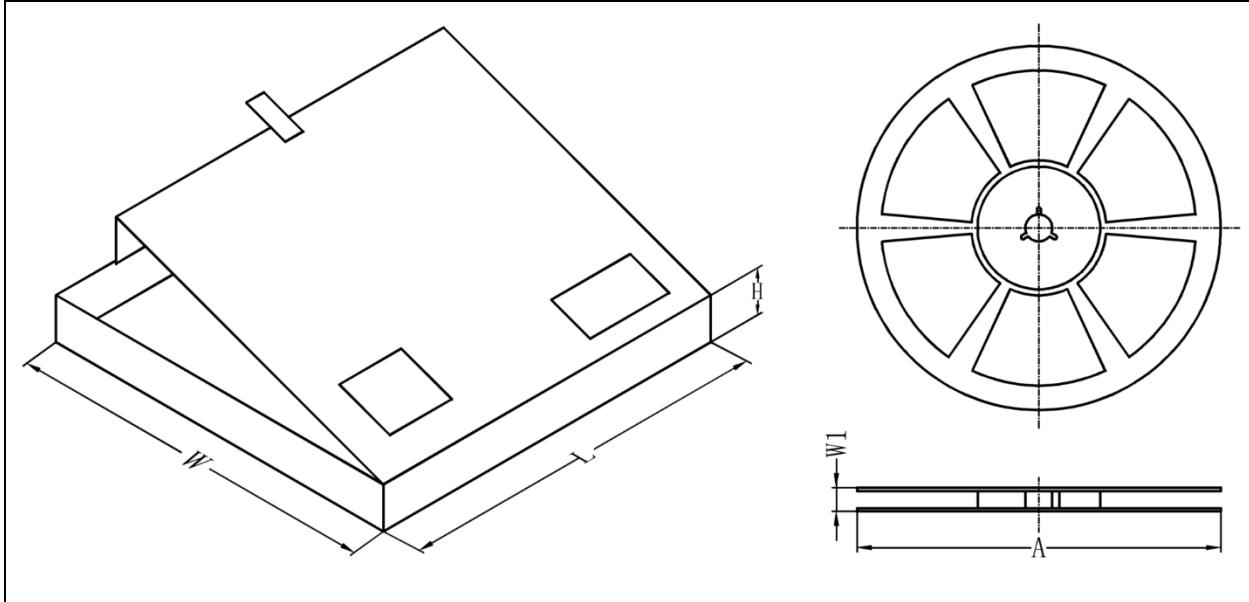


Table 11. Dimensions and quantities

Package version	Type NO. ending	Reel Dimension A (mm)	Reel Width W1 (mm)	SPQ (pcs)[1]	Reels per box	Outer box dimensions L×W×H(mm)[2]
SOT353	GW	180	12.2	3000	1	210x200x40
SOT23-5L	GV	180	12.2	3000	1	210x200x40

[1] Packing quantity dependent on specific product type. Please contact your local Energymath representative for ordering.

[2] Dimensions for reference only.

## 13. Abbreviations

**Table 12. Abbreviations**

Acronym	Description
CMOS	Complementary Metal-Oxide Semiconductor
DUT	Device Under Test
ESD	ElectroStatic Discharge
HBM	Human Body Model
CDM	Charged Device Model
TTL	Transistor-Transistor Logic

## 14. Revision History

**Table 13. Revision history**

Document ID	Release Date	Data sheet status	Change notice	Supersedes
EM74AHC_AHCT1G32 Rev. 1.1	Dec 15, 2025	Product datasheet		EM74AHC_AHCT1G32 Rev. 1.0
Modifications:	<ul style="list-style-type: none"> <li>Table 1: Added topside marking information.</li> <li>Section 12 : Added Tape and Reel Information.</li> </ul>			
EM74AHC_AHCT1G32 Rev. 1.0	Apr 20, 2024	Product datasheet		