

Quad 2-input OR gate

74AC32
74ACT32

- FEATURES**
 - 74ACT32 has TTL-compatible inputs
 - 74AC32 has CMOS-compatible inputs
 - Meets or exceeds JEDEC standard standard for 74AC(T)XX family
 - Superior ground bounce noise immunity
 - Output source/sink 24mA
- DESCRIPTION**

The 74AC32/74ACT32 provides the 2-input OR function.

QUICK REFERENCE DATA

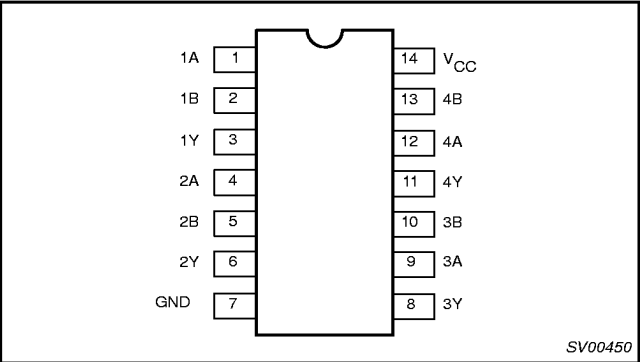
SYMBOL	PARAMETER	CONDITIONS	TYPICAL			UNIT
			AC		ACT	
			V _{CC} = 3.3V	V _{CC} = 5.0V	V _{CC} = 5.0V	
t _{PHL} /t _{PLH}	Propagation delay nA, nB to nY	C _L = 50pF	3.5	2.5	3.8	ns
C _I	Input capacitance		4.5			pF
C _{PD}	Power dissipation capacitance per gate	V _I = GND to V _{CC} ¹	26		28	pF

NOTE:
1. C_{PD} is used to determine the dynamic power dissipation (P_D in μW):
P_D = C_{PD} × V_{CC}² × f_i + Σ (C_L × V_{CC}² × f_o) where:
f_i = input frequency in MHz; C_L = output load capacity in pF;
f_o = output frequency in MHz; V_{CC} = supply voltage in V;
Σ (C_L × V_{CC}² × f_o) = sum of outputs.

ORDERING AND PACKAGE INFORMATION

PACKAGES	TEMPERATURE RANGE	OUTSIDE NORTH AMERICA	NORTH AMERICA	DRAWING NUMBER
14-Pin Plastic SO	−40°C to +85°C	74AC32D 74ACT32D	74AC32D 74ACT32D	SOT108-1
14-Pin Plastic SSOP Type II	−40°C to +85°C	74AC32DB 74ACT32DB	74AC32DB 74ACT32DB	SOT337-1
14-Pin Plastic TSSOP Type I	−40°C to +85°C	74AC32PW 74ACT32PW	74AC32PW DH 74ACT32PW DH	SOT402-1

PIN CONFIGURATION



PIN DESCRIPTION

PIN NUMBER	SYMBOL	NAME AND FUNCTION
1, 4, 9, 12	1A – 4A	Data inputs
2, 5, 10, 13	1B – 4B	Data inputs
3, 6, 8, 11	1Y – 4Y	Data outputs
7	GND	Ground (0 V)
14	V _{CC}	Positive supply voltage

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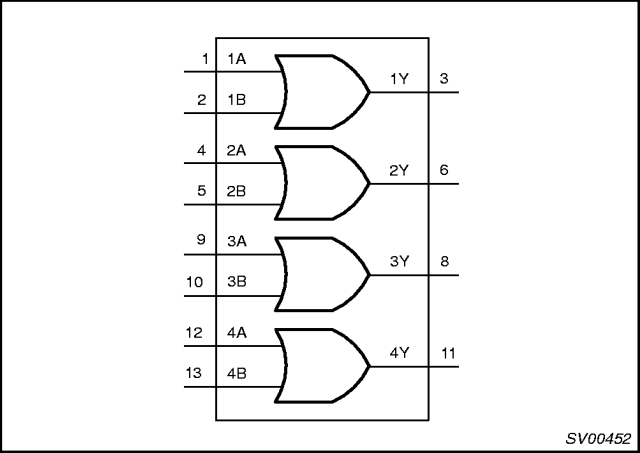
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FUNCTION TABLE

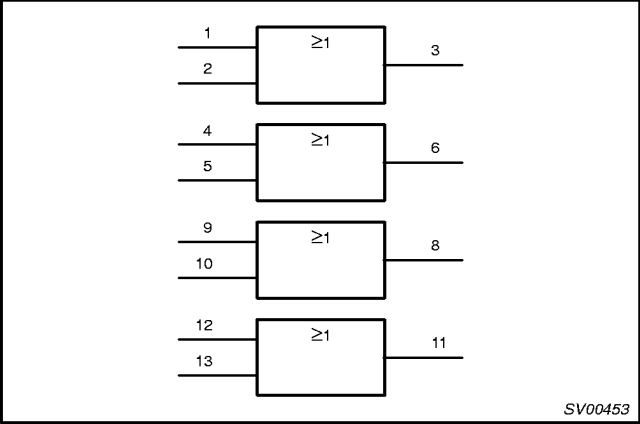
INPUTS		OUTPUTS
nA	nB	nY
L	L	L
L	H	H
H	L	H
H	H	H

NOTES:
H = HIGH voltage level
L = LOW voltage level

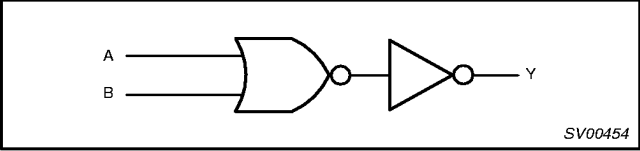
LOGIC SYMBOL



LOGIC SYMBOL (IEEE/IEC)



LOGIC DIAGRAM



RECOMMENDED OPERATING CONDITIONS

SYMBOL	PARAMETER	MIN	MAX	
V _{CC}	DC supply voltage for 'AC	2.0	6.0	V
	DC supply voltage for 'ACT	4.5	5.5	
V _{IN}	DC input voltage range	0	V _{CC}	V
V _O	DC output voltage range	0	V _{CC}	V
T _{amb}	Operating free-air temperature range	-40	+85	°C
ΔV/Δt	Minimum input edge rate — AC devices V _{IN} from 30% to 70% of V _{CC} V _{CC} @ 3.3V, 4.5V, 5.5V	125		mV/ns
	— ACT devices V _{IN} from 0.8V to 2.0V V _{CC} @ 4.5V, 5.5V	125		

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74ACT32**ABSOLUTE MAXIMUM RATINGS¹**

in accordance with the Absolute Maximum Rating System (IEC134)

Voltages are referenced to GND (ground = 0V)

SYMBOL	PARAMETER	CONDITIONS	RATING	UNIT
V_{CC}	DC supply voltage		-0.5 to +7.0	V
I_{IK}	DC input diode current	$V_{IN} = -0.5V$	-20	mA
		$V_{IN} = V_{CC} + 0.5V$	+20	
V_{IN}	DC input voltage		-0.5 to $V_{CC} + 0.5$	V
I_{OK}	DC output diode current	$V_O = -0.5V$	-20	mA
		$V_O = V_{CC} + 0.5V$	+20	
V_O	DC output voltage		-0.5 to $V_{CC} + 0.5$	V
I_O	DC output source or sink current		± 50	mA
I_{CC}, I_{GND}	DC V_{CC} or GND current per output		± 50	mA
	DC V_{CC} or GND current		± 200	
T_{stg}	Storage temperature range		-65 to +150	°C
P_{TOT}	Power dissipation per package			mW
	- plastic mini-pack (SO) - plastic shrink mini-pack (SSOP and TSSOP)	above +70°C derate linearly with 8 mW/K above +60°C derate linearly with 5.5 mW/K	500 500	

NOTES:

- Stresses beyond those listed may cause permanent damage to the device. These are stress ratings only and functional operation of the device at these or any other conditions beyond those indicated under "recommended operating conditions" is not implied. Exposure to absolute-maximum-rated conditions for extended periods may affect device reliability.

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74ACT32**DC CHARACTERISTICS FOR THE AC FAMILY**

Over recommended operating conditions voltages are referenced to GND (ground = 0V)

SYMBOL	PARAMETER	TEST CONDITIONS	V _{CC} (V)	LIMITS			UNIT
				Temp = -40°C to +85°C			
				MIN	TYP	MAX	
V _{IH}	HIGH level Input voltage	V _{OUT} = 0.1V or (V _{CC} – 0.1V)	3.0	2.1	1.5		V
			4.5	3.15	2.25		
			5.5	3.85	2.75		
V _{IL}	LOW level Input voltage	V _{OUT} = 0.1V or (V _{CC} – 0.1V)	3.0		1.5	0.9	V
			4.5		2.25	1.35	
			5.5		2.75	1.65	
V _{OH}	HIGH level output voltage	I _{OUT} = –50 μA	3.0	2.9	2.99		V
			4.5	4.4	4.49		
			5.5	5.4	5.49		
		V _{IN} = V _{IL} or V _{IH} ; I _{OH} = –12mA ¹	3.0	2.46			
		V _{IN} = V _{IL} or V _{IH} ; I _{OH} = –24mA ¹	4.5	3.76			
		V _{IN} = V _{IL} or V _{IH} ; I _{OH} = –24mA ¹	5.5	4.76			
V _{OL}	LOW level output voltage	I _{OUT} = 50 μA	3.0		0.01	0.1	V
			4.5		0.01	0.1	
			5.5		0.01	0.1	
		V _{IN} = V _{IL} or V _{IH} ; I _{OL} = 12mA ¹	3.0			0.44	
		V _{IN} = V _{IL} or V _{IH} ; I _{OL} = 24mA ¹	4.5			0.44	
		V _{IN} = V _{IL} or V _{IH} ; I _{OL} = 24mA ¹	5.5			0.44	
I _{IN}	Input leakage current	V _{IN} = V _{CC} , GND	5.5			± 1.0	μA
I _{OLD}	Dynamic output current ²	V _{OLD} = 1.65V max	5.5	75			mA
I _{OHD}	Dynamic output current ²	V _{OHD} = 3.85V min	5.5			–75	mA
I _{CC}	Quiescent supply current	V _{IN} = V _{CC} or GND	5.5			40	μA

NOTES:

1. All outputs loaded
2. Maximum test duration 2.0 ms; one output loaded at a time

Quad 2-input OR gate

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74ACT32**DC CHARACTERISTICS FOR THE ACT FAMILY**

Over recommended operating conditions voltages are referenced to GND (ground = 0V)

SYMBOL	PARAMETER	TEST CONDITIONS	V _{CC} (V)	LIMITS			UNIT
				Temp = -40°C to +85°C			
				MIN	TYP	MAX	
V _{IH}	HIGH level Input voltage	V _{OUT} = 0.1V or (V _{CC} – 0.1V)	4.5	2.0	1.5		V
			5.5	2.0	1.5		
V _{IL}	LOW level Input voltage	V _{OUT} = 0.1V or (V _{CC} – 0.1V)	4.5		1.5	0.8	V
			5.5		1.5	0.8	
V _{OH}	HIGH level output voltage	I _{OUT} = –50 μA	4.5	4.4	4.49		V
			5.5	5.4	5.49		
		V _{IN} = V _{IL} or V _{IH} ; I _{OH} = –24mA ¹	4.5	3.76			
		V _{IN} = V _{IL} or V _{IH} ; I _{OH} = –24mA ¹	5.5	4.76			
V _{OL}	LOW level output voltage	I _{OUT} = 50 μA	4.5		0.01	0.1	V
			5.5		0.01	0.1	
		V _{IN} = V _{IL} or V _{IH} ; I _{OL} = 24mA ¹	4.5			0.44	
		V _{IN} = V _{IL} or V _{IH} ; I _{OL} = 24mA ¹	5.5			0.44	
I _{IN}	Input leakage current	V _{IN} = V _{CC} , GND	5.5			± 1.0	μA
ΔI _{CC}	Additional quiescent supply current per input pin	V _{IN} = V _{CC} – 2.1V Other inputs at V _{CC} or GND; I _{OUT} = 0	5.5			1.5	mA
I _{OLD}	Dynamic output current ²	V _{OLD} = 1.65V max	5.5	75			mA
I _{OHD}	Dynamic output current ²	V _{OHD} = 3.85V min	5.5			–75	mA
I _{CC}	Quiescent supply current	V _{IN} = V _{CC} or GND	5.5			40	μA

NOTES:

1. All outputs loaded
2. Maximum test duration 2.0ms, one output loaded at a time

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AC CHARACTERISTICS FOR 74AC32

GND = 0V; $t_r = t_f \leq 2.5\text{ns}$; $C_L = 50\text{pF}$; $R_L = 500\Omega$; .

SYMBOL	PARAMETER	V _{CC} ¹	LIMITS					UNIT	WAVEFORM
			T _{amb} = +25°C			T _{amb} = −40°C to +85°C			
			MIN	TYP	MAX	MIN	MAX		
t _{PLH}	Propagation delay nA, nB to nY	3.3 5.0	2.0 1.5	3.6 2.5	8.0 5.5	1.5 1.0	9.0 6.0	ns	1, 2
t _{PHL}	Propagation delay nA, nB to nY	3.3 5.0	2.0 1.5	3.5 2.6	8.0 5.5	1.5 1.0	9.0 6.0	ns	

NOTE:

1. Voltage range 3.3V is V_{CC} = 3.3V ± 0.3V
Voltage range 5.0V is V_{CC} = 5.0V ± 0.5V

AC CHARACTERISTICS FOR 74ACT32

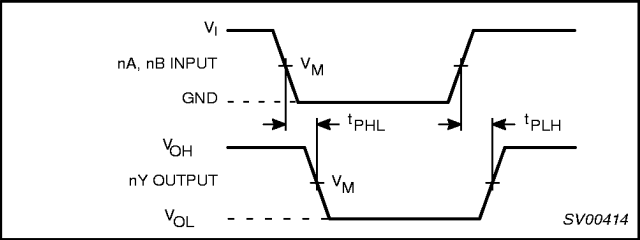
GND = 0V; $t_r = t_f \leq 2.5\text{ns}$; $C_L = 50\text{pF}$; $R_L = 500\Omega$; .

SYMBOL	PARAMETER	V _{CC} ¹	LIMITS					UNIT	WAVEFORM
			T _{amb} = +25°C			T _{amb} = −40°C to +85°C			
			MIN	TYP	MAX	MIN	MAX		
t _{PLH}	Propagation delay nA, nB to nY	5.0	2.0	4.2	9.0	1.5	10.0	ns	1, 2
t _{PHL}	Propagation delay nA, nB to nY	5.0	2.0	3.4	9.0	1.5	10.0	ns	

NOTE:

1. Voltage range 5.0V is V_{CC} = 5.0V ± 0.5V

AC WAVEFORMS

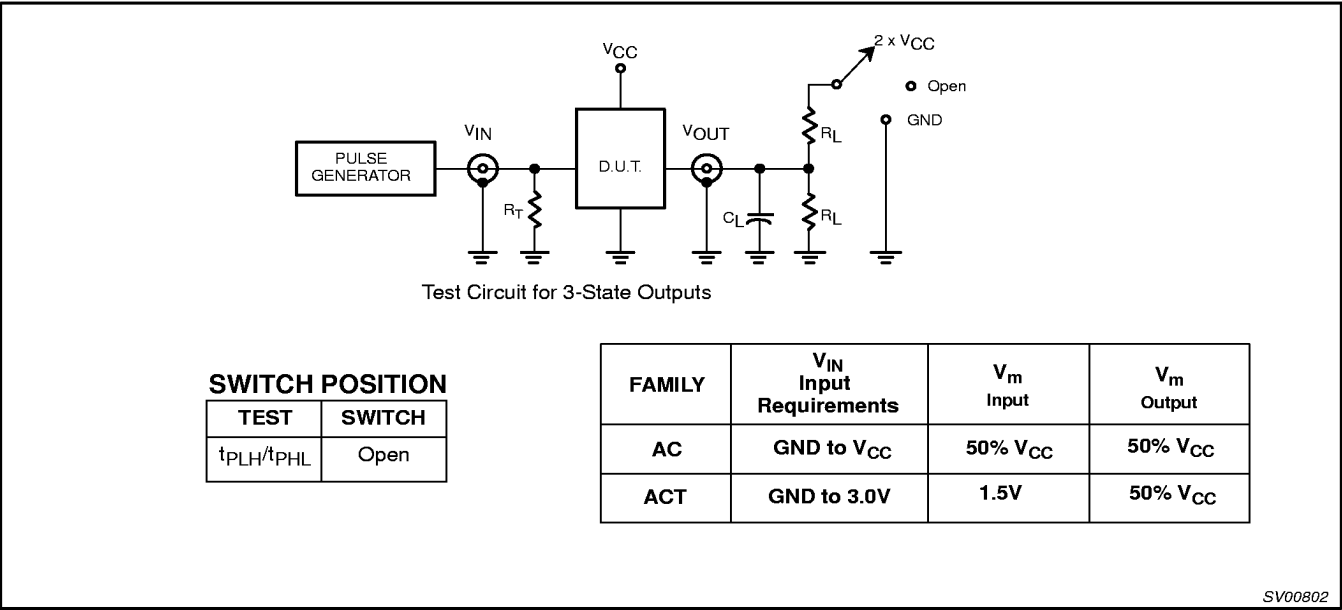


Waveform 1. Inputs (nA, nB) to output (nY) propagation delays

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TEST CIRCUIT



Waveform 2. Load circuitry for switching times.

DEFINITIONS

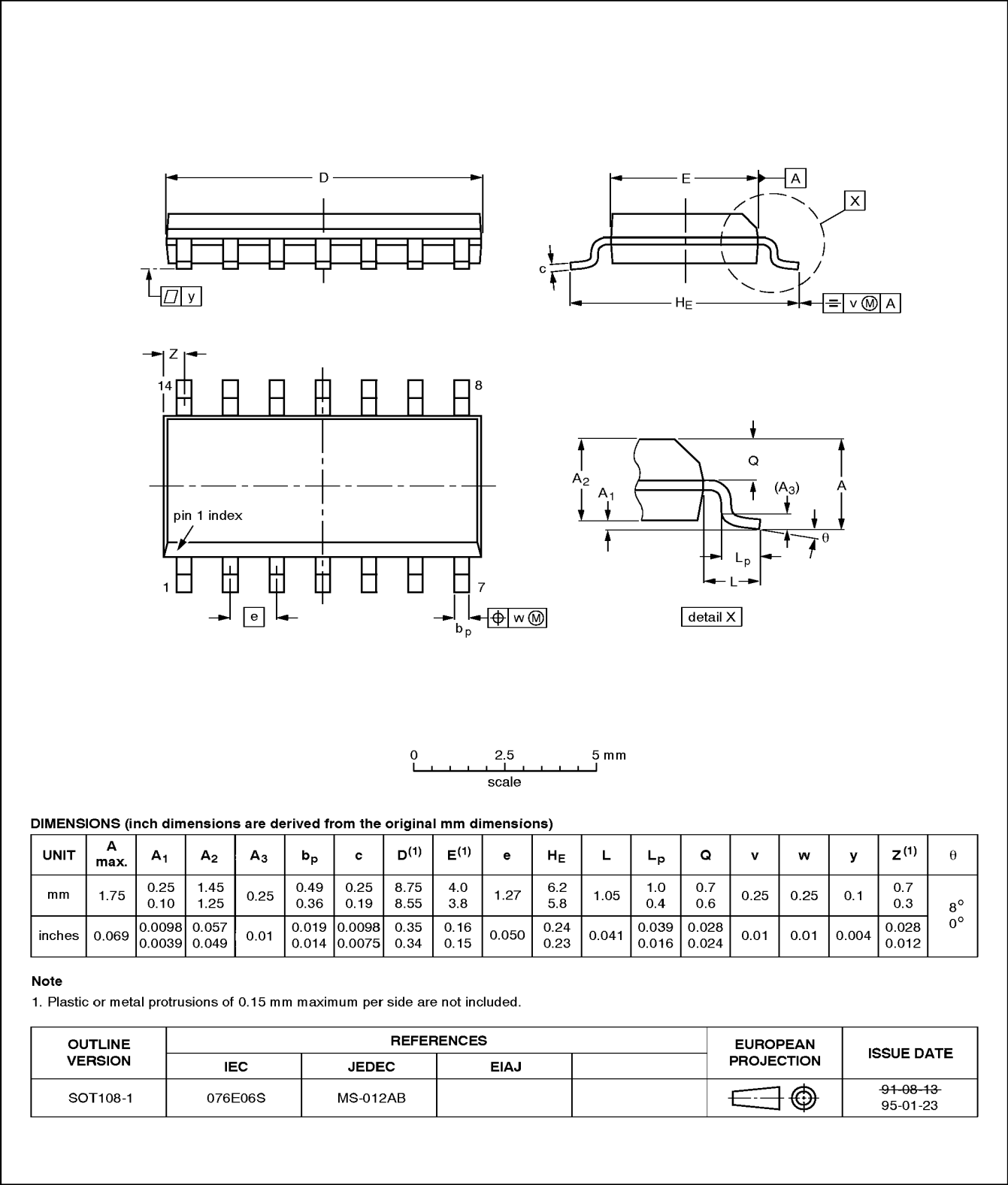
R_L = Load resistor; see AC Characteristics for value
 C_L = Load capacitance; see AC Characteristics
Termination resistance should be equal to Z_{OUT} of pulse generators

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SO14: plastic small outline package; 14 leads; body width 3.9 mm

SOT108-1

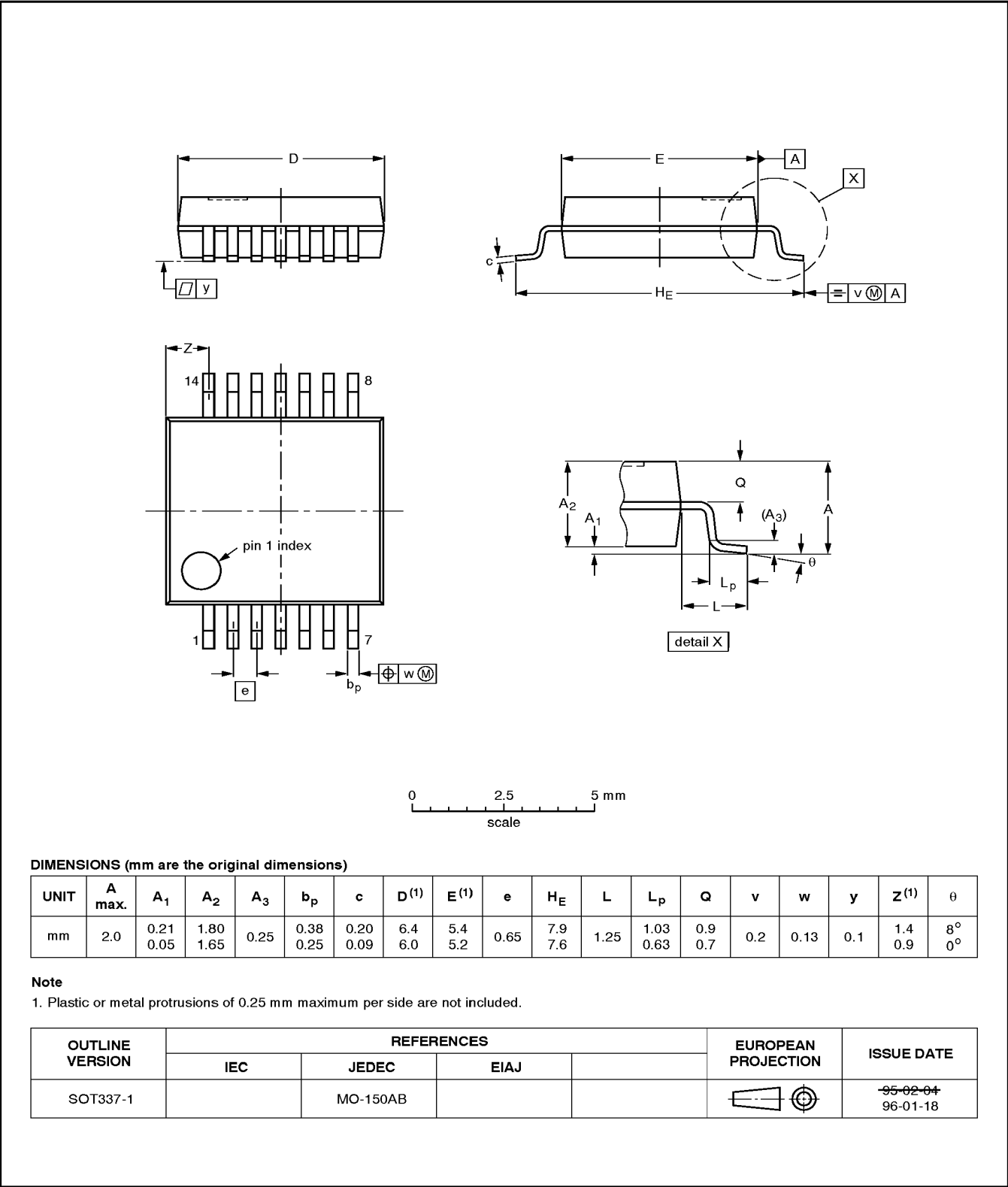


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SSOP14: plastic shrink small outline package; 14 leads; body width 5.3 mm

SOT337-1



Quad 2-input OR gate

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TSSOP14: plastic thin shrink small outline package; 14 leads; body width 4.4 mm

SOT402-1

