

# DATA SHEET

## **74LVC543A**

**Octal D-type registered transceiver;  
3-state**

Product specification  
Supersedes data of 2004 Feb 05

2004 Apr 07

## Octal D-type registered transceiver; 3-state

## 74LVC543A

## FEATURES

- 5 V tolerant inputs/outputs for interfacing with 5 V logic
- Supply voltage range from 1.2 V to 3.6 V
- Complies with JEDEC standard JESD8-B/JESD36
- CMOS low-power consumption
- Direct interface with TTL levels
- 8-bit octal transceiver with D-type latch
- Back-to-back registers for storage
- Separate controls for data flow in each direction
- 3-state non-inverting outputs for bus oriented applications
- High-impedance when  $V_{CC} = 0$  V
- ESD protection:
  - HBM EIA/JESD22-A114-B exceeds 2000 V
  - MM EIA/JESD22-A115-A exceeds 200 V.
- Specified from  $-40$  °C to  $+85$  °C and  $-40$  °C to  $+125$  °C.

## DESCRIPTION

The 74LVC543A is a high-performance, low-power, low-voltage, Si-gate CMOS device, superior to most advanced CMOS compatible TTL families.

The 74LVC543A is an octal registered transceiver containing two sets of D-type latches for temporary storage of the data flow in either direction. Separate latch enable inputs (pins  $\overline{LE}_{AB}$  and  $\overline{LE}_{BA}$ ) and output enable inputs (pins  $\overline{OE}_{AB}$  and  $\overline{OE}_{BA}$ ) are provided for each register to permit independent control of inputting and outputting in either direction of the data flow.

The 74LVC543A contains eight D-type latches, with separate inputs and controls for each set. For data flow from pins A to B, for example, the A to B enable input (pin  $\overline{E}_{AB}$ ) must be LOW in order to enter data from pins A0 to A7 or take data from pins B0 to B7, as indicated in the "Function table". With pin  $\overline{E}_{AB}$  LOW, a LOW signal on the A to B latch enable input (pin  $\overline{LE}_{AB}$ ) makes the A to B latches transparent; a subsequent LOW-to-HIGH transition on pin  $\overline{LE}_{AB}$  puts the A data into the latches where it is stored and the B outputs no longer change with the A inputs. With pins  $\overline{E}_{AB}$  and  $\overline{OE}_{AB}$  both LOW, the 3-state B output buffers are active and display the data present at the outputs of the A latches.

## QUICK REFERENCE DATA

GND = 0 V;  $T_{amb} = 25$  °C;  $t_r = t_f \leq 2.5$  ns.

SYMBOL	PARAMETER	CONDITIONS	TYPICAL	UNIT
$t_{PHL}/t_{PLH}$	propagation delay An to Bn; Bn to An	$C_L = 50$ pF; $V_{CC} = 3.3$ V	3.0	ns
$C_I$	input capacitance		4.0	pF
$C_{I/O}$	input/output capacitance		5.0	pF
$C_{PD}$	power dissipation capacitance per latch	$V_{CC} = 3.3$ V; notes 1 and 2 outputs enabled outputs disabled	15.0 3.0	pF pF

## Notes

1.  $C_{PD}$  is used to determine the dynamic power dissipation ( $P_D$  in  $\mu$ W).

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

$f_i$  = input frequency in MHz;

$f_o$  = output frequency in MHz;

$C_L$  = output load capacitance in pF;

$V_{CC}$  = supply voltage in Volts;

$N$  = total load switching outputs;

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

2. The condition is  $V_I = \text{GND}$  to  $V_{CC}$ .

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## FUNCTION TABLE

See note 1.

OPERATING MODES	INPUT				OUTPUT
	$\overline{OE}_{xx}$	$\overline{E}_{xx}$	$\overline{LE}_{xx}$	DATA	
Disabled	H	X	X	X	Z
	X	H	X	X	Z
Disabled plus latch	L	↑	L	h	Z
	L	↑	L	l	Z
Latch plus display	L	L	↑	h	H
	L	L	↑	l	L
Transparent	L	L	L	H	H
	L	L	L	L	L
Hold (do nothing)	L	L	H	X	NC

## Note

1. XX = AB for A to B direction; BA for B to A direction;

H = HIGH voltage level;

L = LOW voltage level;

h = HIGH state must be present one set-up time before the LOW-to-HIGH transition of  $\overline{LE}_{AB}$ ,  $\overline{LE}_{BA}$ ,  $\overline{E}_{AB}$  and  $\overline{E}_{BA}$ ;l = LOW state must be present one set-up time before the LOW-to-HIGH transition of  $\overline{LE}_{AB}$ ,  $\overline{LE}_{BA}$ ,  $\overline{E}_{AB}$  and  $\overline{E}_{BA}$ ;

X = don't care;

↑ = LOW-to-HIGH level transition;

NC = no change;

Z = high-impedance OFF-state.

## ORDERING INFORMATION

TYPE NUMBER	TEMPERATURE RANGE	PACKAGE			
		PINS	PACKAGE	MATERIAL	CODE
74LVC543AD	-40 °C to +125 °C	24	SO24	plastic	SOT137-1
74LVC543ADB	-40 °C to +125 °C	24	SSOP24	plastic	SOT340-1
74LVC543APW	-40 °C to +125 °C	24	TSSOP24	plastic	SOT355-1
74LVC543ABQ	-40 °C to +125 °C	24	DHVQFN24	plastic	SOT815-1

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PINNING

PIN	SYMBOL	DESCRIPTION
1	$\overline{LE}_{BA}$	B to A latch enable input (active LOW)
2	$\overline{OE}_{BA}$	B to A output enable input (active LOW)
3	A0	A data input or output
4	A1	A data input or output
5	A2	A data input or output
6	A3	A data input or output
7	A4	A data input or output
8	A5	A data input or output
9	A6	A data input or output
10	A7	A data input or output
11	$\overline{E}_{AB}$	A to B enable input (active LOW)
12	GND	ground (0 V)

PIN	SYMBOL	DESCRIPTION
13	$\overline{OE}_{AB}$	A to B output enable input (active LOW)
14	$\overline{LE}_{AB}$	A to B latch enable input (active LOW)
15	B7	B data output or input
16	B6	B data output or input
17	B5	B data output or input
18	B4	B data output or input
19	B3	B data output or input
20	B2	B data output or input
21	B1	B data output or input
22	B0	B data output or input
23	$\overline{E}_{BA}$	B to A enable input (active LOW)
24	V <sub>CC</sub>	positive supply voltage

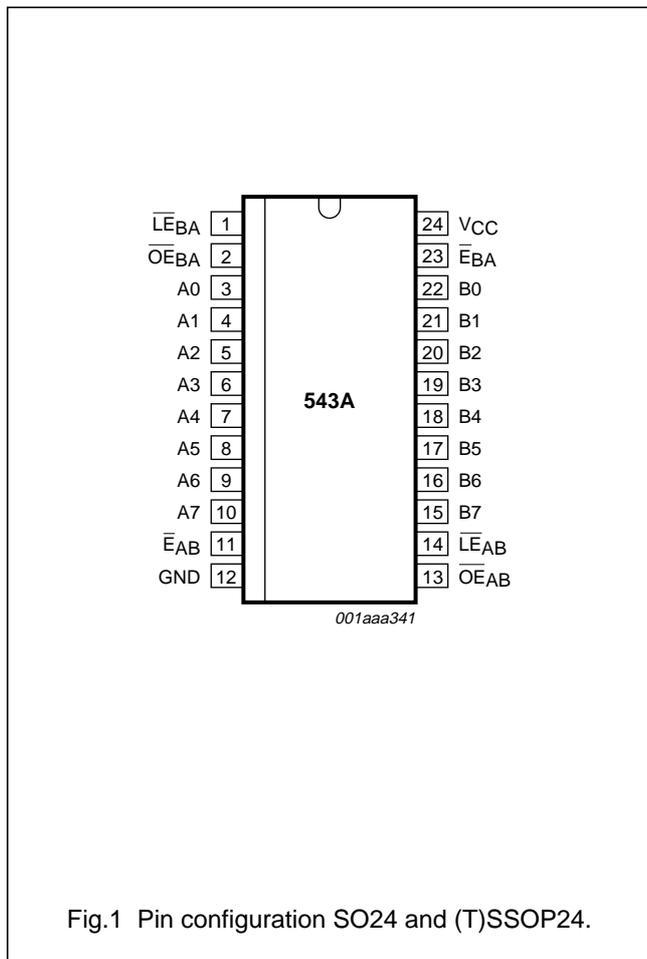


Fig.1 Pin configuration SO24 and (T)SSOP24.

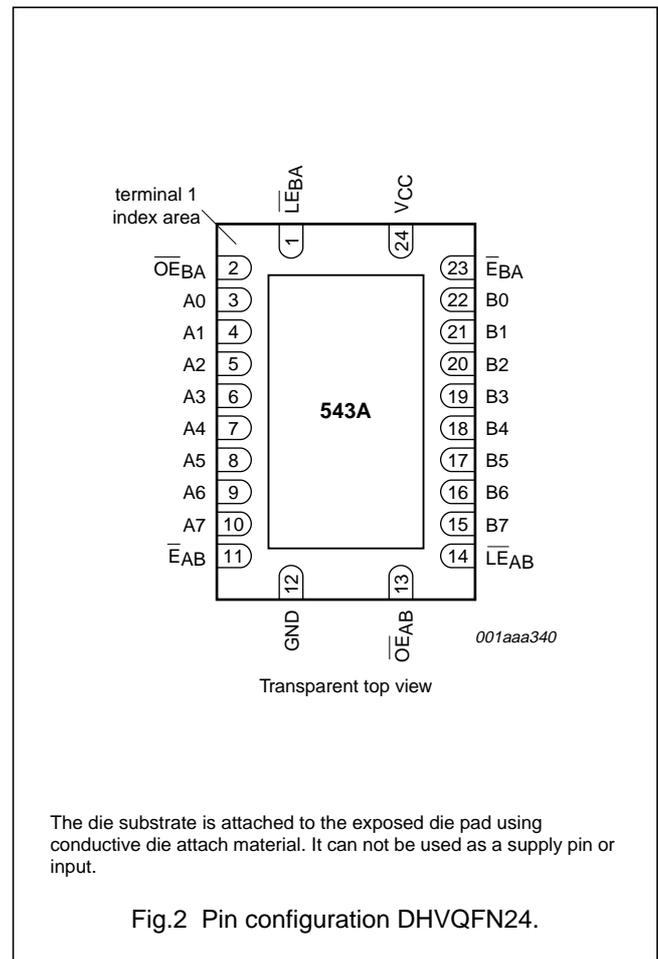
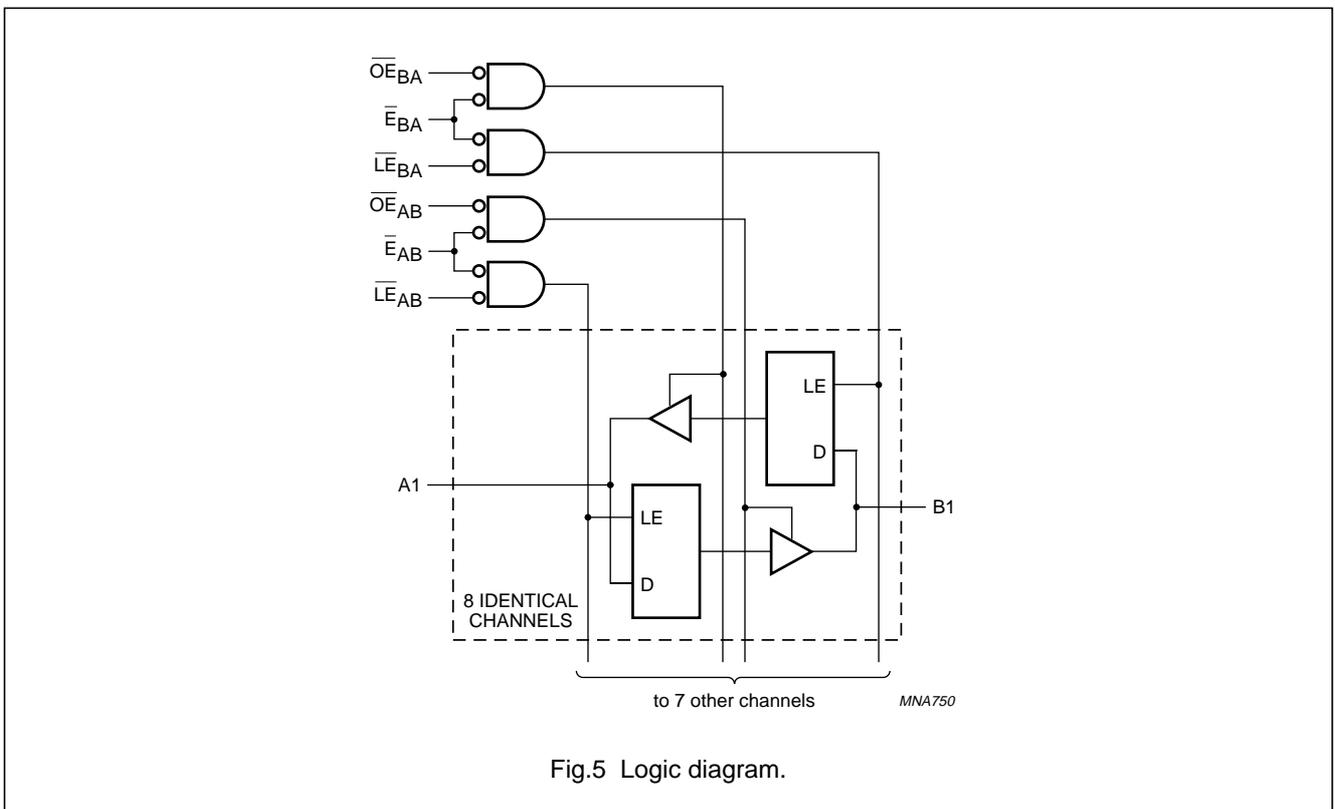
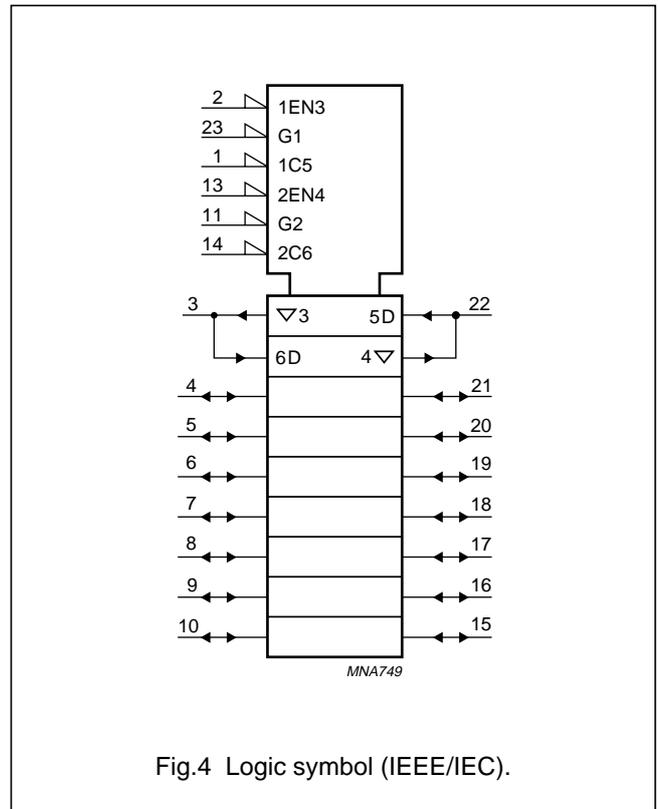
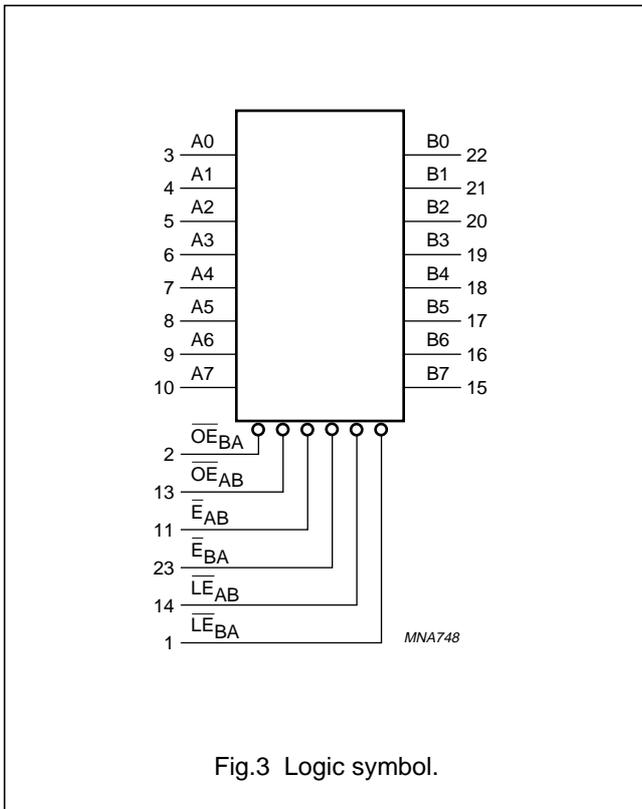


Fig.2 Pin configuration DHVQFN24.

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## RECOMMENDED OPERATING CONDITIONS

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
V <sub>CC</sub>	supply voltage	for maximum speed performance	2.7	3.6	V
		for low-voltage applications	1.2	3.6	V
V <sub>I</sub>	input voltage		0	5.5	V
V <sub>O</sub>	output voltage	output HIGH or LOW state	0	V <sub>CC</sub>	V
		output 3-state	0	5.5	V
T <sub>amb</sub>	operating ambient temperature	in free air	-40	+125	°C
t <sub>r</sub> , t <sub>f</sub>	input rise and fall times	V <sub>CC</sub> = 1.2 V to 2.7 V	0	20	ns/V
		V <sub>CC</sub> = 2.7 V to 3.6 V	0	10	ns/V

## LIMITING VALUES

In accordance with the Absolute Maximum Rating System (IEC 60134); voltages are referenced to GND (ground = 0 V); note 1.

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
V <sub>CC</sub>	supply voltage		-0.5	+6.5	V
I <sub>IK</sub>	input diode current	V <sub>I</sub> < 0 V	-	-50	mA
V <sub>I</sub>	input voltage	note 2	-0.5	+6.5	V
I <sub>OK</sub>	output diode current	V <sub>O</sub> > V <sub>CC</sub> or V <sub>O</sub> < 0 V	-	±50	mA
V <sub>O</sub>	output voltage	output HIGH or LOW state; note 2	-0.5	V <sub>CC</sub> + 0.5	V
		output 3-state; note 2	-0.5	+6.5	V
I <sub>O</sub>	output source or sink current	V <sub>O</sub> = 0 V to V <sub>CC</sub>	-	±50	mA
I <sub>CC</sub> , I <sub>GND</sub>	V <sub>CC</sub> or GND current		-	±100	mA
T <sub>stg</sub>	storage temperature		-65	+150	°C
P <sub>tot</sub>	power dissipation	T <sub>amb</sub> = -40 °C to +125 °C; note 3	-	500	mW

## 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.
- The input and output voltage ratings may be exceeded if the input and output current ratings are observed.
- For SO24 packages: above 70 °C the value of P<sub>tot</sub> derates linearly with 8 mW/K.  
For (T)SSOP24 packages: above 60 °C the value of P<sub>tot</sub> derates linearly with 5.5 mW/K.  
For DHVQFN24 packages: above 60 °C the value of P<sub>tot</sub> derates linearly with 4.5 mW/K.

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**DC CHARACTERISTICS**

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

SYMBOL	PARAMETER	TEST CONDITIONS		MIN.	TYP.	MAX.	UNIT
		OTHER	V <sub>CC</sub> (V)				
<b>T<sub>amb</sub> = -40 °C to +85 °C; note 1</b>							
V <sub>IH</sub>	HIGH-level input voltage		1.2	V <sub>CC</sub>	–	–	V
			2.7 to 3.6	2.0	–	–	V
V <sub>IL</sub>	LOW-level input voltage		1.2	–	–	GND	V
			2.7 to 3.6	–	–	0.8	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> = -100 µA	2.7 to 3.6	V <sub>CC</sub> - 0.2	V <sub>CC</sub> <sup>(2)</sup>	–	V
		I <sub>O</sub> = -12 mA	2.7	V <sub>CC</sub> - 0.5	–	–	V
		I <sub>O</sub> = -18 mA	3.0	V <sub>CC</sub> - 0.6	–	–	V
		I <sub>O</sub> = -24 mA	3.0	V <sub>CC</sub> - 0.8	–	–	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> = 100 µA	2.7 to 3.6	–	GND <sup>(2)</sup>	0.2	V
		I <sub>O</sub> = 12 mA	2.7	–	–	0.4	V
		I <sub>O</sub> = 24 mA	3.0	–	–	0.55	V
I <sub>LI</sub>	input leakage current	V <sub>I</sub> = 5.5 V or GND	3.6	–	±0.1	±5	µA
I <sub>OZ</sub>	3-state output OFF-state current	V <sub>I</sub> = V <sub>IH</sub> or V <sub>IL</sub> ; V <sub>O</sub> = 5.5 V or GND; note 3	3.6	–	0.1	±10	µA
I <sub>off</sub>	power-off leakage supply	V <sub>I</sub> or V <sub>O</sub> = 5.5 V	0.0	–	0.1	±10	µA
I <sub>CC</sub>	quiescent supply current	V <sub>I</sub> = V <sub>CC</sub> or GND; I <sub>O</sub> = 0 A	3.6	–	0.1	10	µA
ΔI <sub>CC</sub>	additional quiescent supply current per pin	V <sub>I</sub> = V <sub>CC</sub> - 0.6 V; I <sub>O</sub> = 0 A	2.7 to 3.6	–	5 <sup>(2)</sup>	500	µA

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SYMBOL	PARAMETER	TEST CONDITIONS		MIN.	TYP.	MAX.	UNIT
		OTHER	V <sub>CC</sub> (V)				
<b>T<sub>amb</sub> = -40 °C to +125 °C</b>							
V <sub>IH</sub>	HIGH-level input voltage		1.2	V <sub>CC</sub>	–	–	V
			2.7 to 3.6	2.0	–	–	V
V <sub>IL</sub>	LOW-level input voltage		1.2	–	–	0	V
			2.7 to 3.6	–	–	0.8	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> = -100 µA	2.7 to 3.6	V <sub>CC</sub> - 0.3	–	–	V
		I <sub>O</sub> = -12 mA	2.7	V <sub>CC</sub> - 0.65	–	–	V
		I <sub>O</sub> = -18 mA	3.0	V <sub>CC</sub> - 0.75	–	–	V
		I <sub>O</sub> = -24 mA	3.0	V <sub>CC</sub> - 1	–	–	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> = 100 µA	2.7 to 3.6	–	–	0.3	V
		I <sub>O</sub> = 12 mA	2.7	–	–	0.6	V
		I <sub>O</sub> = 24 mA	3.0	–	–	0.8	V
I <sub>LI</sub>	input leakage current	V <sub>I</sub> = 5.5 V or GND	3.6	–	–	±20	µA
I <sub>OZ</sub>	3-state output OFF-state current	V <sub>I</sub> = V <sub>IH</sub> or V <sub>IL</sub> ; V <sub>O</sub> = 5.5 V or GND; note 3	3.6	–	–	±20	µA
I <sub>off</sub>	power-off leakage supply	V <sub>I</sub> or V <sub>O</sub> = 5.5 V	0.0	–	–	±20	µA
I <sub>CC</sub>	quiescent supply current	V <sub>I</sub> = V <sub>CC</sub> or GND; I <sub>O</sub> = 0 A	3.6	–	–	40	µA
ΔI <sub>CC</sub>	additional quiescent supply current per pin	V <sub>I</sub> = V <sub>CC</sub> - 0.6 V; I <sub>O</sub> = 0 A	2.7 to 3.6	–	–	5000	µA

**Notes**

1. All typical values are measured T<sub>amb</sub> = 25 °C.
2. These typical values are measured at V<sub>CC</sub> = 3.3 V.
3. For transceivers, the parameter I<sub>OZ</sub> includes the input leakage current.

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## AC CHARACTERISTICS

GND = 0 V;  $t_r = t_f \leq 2.5$  ns;  $C_L = 50$  pF.

SYMBOL	PARAMETER	CONDITIONS		MIN.	TYP.	MAX.	UNIT
		WAVEFORMS	V <sub>CC</sub> (V)				
<b>T<sub>amb</sub> = -40 °C to +85 °C; note 1</b>							
t <sub>PHL</sub> /t <sub>PLH</sub>	propagation delay An to Bn; Bn to An	see Figs 6 and 10	1.2	–	15	–	ns
			2.7	1.5	–	8.0	ns
			3.0 to 3.6	1.0	3.0 <sup>(2)</sup>	7.0	ns
	propagation delay $\overline{LE}_{BA}$ to An; LE <sub>AB</sub> to Bn	see Figs 7 and 10	1.2	–	16	–	ns
			2.7	1.5	–	9.5	ns
			3.0 to 3.6	1.2	4.2 <sup>(2)</sup>	8.5	ns
t <sub>PZH</sub> /t <sub>PZL</sub>	3-state output enable time $\overline{OE}_{BA}$ to An; $\overline{OE}_{AB}$ to Bn	see Figs 8 and 10	1.2	–	17	–	ns
			2.7	1.5	–	9.2	ns
			3.0 to 3.6	1.3	3.4 <sup>(2)</sup>	7.7	ns
	3-state output enable time $\overline{E}_{BA}$ to An; $\overline{E}_{AB}$ to Bn	see Figs 8 and 10	1.2	–	18	–	ns
			2.7	1.5	–	9.3	ns
			3.0 to 3.6	1.3	3.6 <sup>(2)</sup>	8.0	ns
t <sub>PHZ</sub> /t <sub>PLZ</sub>	3-state output disable time $\overline{OE}_{BA}$ to An; $\overline{OE}_{AB}$ to Bn	see Figs 8 and 10	1.2	–	8.0	–	ns
			2.7	1.5	–	7.5	ns
			3.0 to 3.6	1.5	3.2 <sup>(2)</sup>	7.0	ns
	3-state output disable time $\overline{E}_{BA}$ to An; $\overline{E}_{AB}$ to Bn	see Figs 8 and 10	1.2	–	8.5	–	ns
			2.7	1.5	–	7.5	ns
			3.0 to 3.6	1.5	3.3 <sup>(2)</sup>	7.0	ns
t <sub>w</sub>	$\overline{LE}_{XX}$ pulse with LOW	see Fig.7	1.2	–	4.0	–	ns
			2.7	3.0	–	–	ns
			3.0 to 3.6	3.0	0.9 <sup>(2)</sup>	–	ns
t <sub>su</sub>	set-up time An, Bn to $\overline{LE}_{XX}$ ; An, Bn to $\overline{E}_{XX}$	see Fig.9	1.2	–	-1.5	–	ns
			2.7	1.5	–	–	ns
			3.0 to 3.6	+1.5	-0.5 <sup>(2)</sup>	–	ns
t <sub>h</sub>	hold time An, Bn to $\overline{LE}_{XX}$ ; An, Bn to $\overline{E}_{XX}$	see Fig.9	1.2	–	2.0	–	ns
			2.7	1.5	–	–	ns
			3.0 to 3.6	1.5	0.6 <sup>(2)</sup>	–	ns
t <sub>sk(0)</sub>	skew	note 3		–	–	1.0	ns

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SYMBOL	PARAMETER	CONDITIONS		MIN.	TYP.	MAX.	UNIT
		WAVEFORMS	V <sub>CC</sub> (V)				
<b>T<sub>amb</sub> = -40 °C to +125 °C</b>							
t <sub>PHL</sub> /t <sub>PLH</sub>	propagation delay An to Bn; Bn to An	see Figs 6 and 10	1.2	–	–	–	ns
			2.7	1.5	–	10.0	ns
			3.0 to 3.6	1.0	–	9.0	ns
	propagation delay $\overline{LE}_{BA}$ to An; LE <sub>AB</sub> to Bn	see Figs 7 and 10	1.2	–	–	–	ns
			2.7	1.5	–	12.0	ns
			3.0 to 3.6	1.2	–	11.0	ns
t <sub>PZH</sub> /t <sub>PZL</sub>	3-state output enable time $\overline{OE}_{BA}$ to An; OE <sub>AB</sub> to Bn	see Figs 8 and 10	1.2	–	–	–	ns
			2.7	1.5	–	11.5	ns
			3.0 to 3.6	1.3	–	10.0	ns
	3-state output enable time $\overline{E}_{BA}$ to An; $\overline{E}_{AB}$ to Bn	see Figs 8 and 10	1.2	–	–	–	ns
			2.7	1.5	–	12.0	ns
			3.0 to 3.6	1.3	–	10.0	ns
t <sub>PHZ</sub> /t <sub>PLZ</sub>	3-state output disable time $\overline{OE}_{BA}$ to An; $\overline{OE}_{AB}$ to Bn	see Figs 8 and 10	1.2	–	–	–	ns
			2.7	1.5	–	9.5	ns
			3.0 to 3.6	1.5	–	9.0	ns
	3-state output disable time $\overline{E}_{BA}$ to An; $\overline{E}_{AB}$ to Bn	see Figs 8 and 10	1.2	–	–	–	ns
			2.7	1.5	–	11.5	ns
			3.0 to 3.6	1.5	–	9.0	ns
t <sub>w</sub>	$\overline{LE}_{XX}$ pulse with LOW	see Fig.7	1.2	–	–	–	ns
			2.7	3.0	–	–	ns
			3.0 to 3.6	3.0	–	–	ns
t <sub>su</sub>	set-up time An, Bn to $\overline{LE}_{XX}$ ; An, Bn to $\overline{E}_{XX}$	see Fig.9	1.2	–	–	–	ns
			2.7	1.5	–	–	ns
			3.0 to 3.6	1.5	–	–	ns
t <sub>h</sub>	hold time An, Bn to $\overline{LE}_{XX}$ ; An, Bn to $\overline{E}_{XX}$	see Fig.9	1.2	–	–	–	ns
			2.7	1.5	–	–	ns
			3.0 to 3.6	1.5	–	–	ns
t <sub>sk(0)</sub>	skew	note 3		–	–	1.5	ns

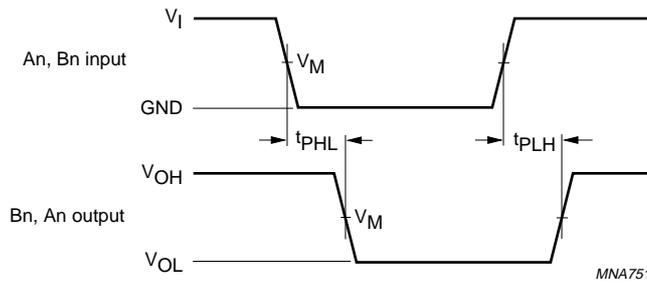
**Notes**

1. All typical values are measured at T<sub>amb</sub> = 25 °C.
2. These typical values are measured at V<sub>CC</sub> = 3.3 V.
3. Skew between any two outputs of the same package switching in the same direction. This parameter is guaranteed by design.

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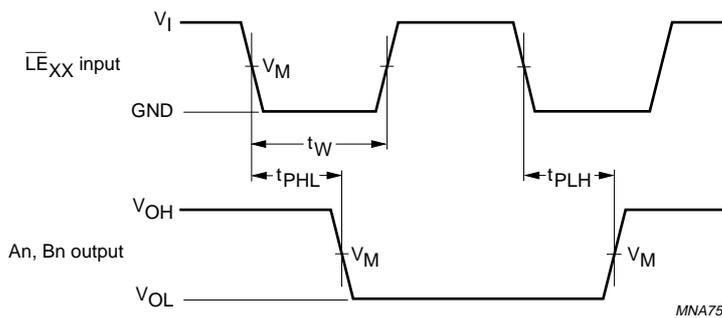
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AC WAVEFORMS



$V_M = 1.5 \text{ V}$  at  $V_{CC} \geq 2.7 \text{ V}$ .  
 $V_M = 0.5 \times V_{CC}$  at  $V_{CC} < 2.7 \text{ V}$ .  
 $V_{OL}$  and  $V_{OH}$  are typical output voltage drop that occur with the output load.

Fig.6 Input (An and Bn) to output (Bn and An) propagation delays.

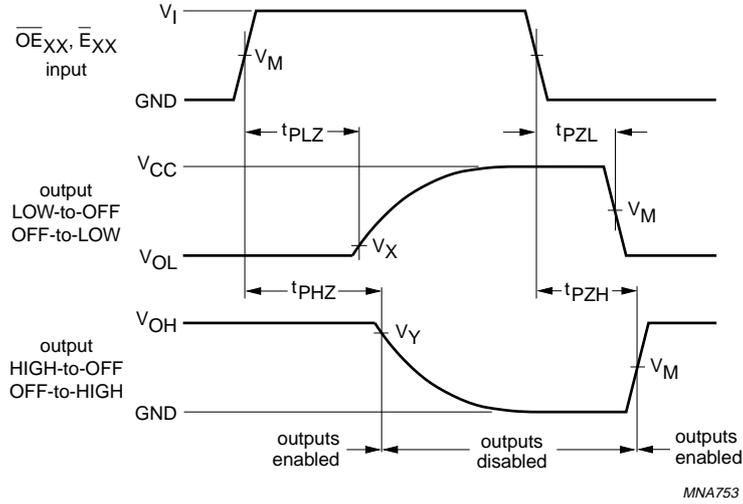


$V_M = 1.5 \text{ V}$  at  $V_{CC} \geq 2.7 \text{ V}$ .  
 $V_M = 0.5 \times V_{CC}$  at  $V_{CC} < 2.7 \text{ V}$ .  
 $V_{OL}$  and  $V_{OH}$  are typical output voltage drop that occur with the output load.

Fig.7 Latch enable input ( $\overline{LE}_{XX}$ ) pulse width and latch enable input to output An and Bn propagation delays.

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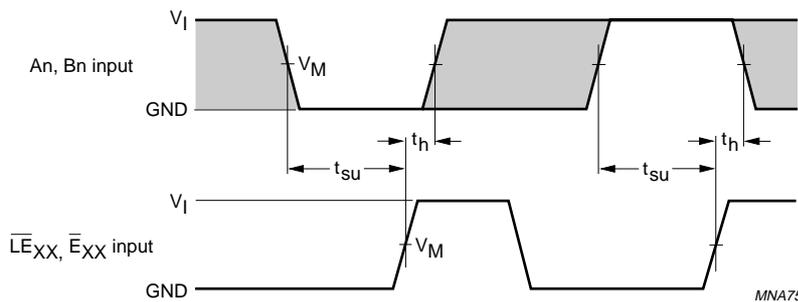
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MNA753

$V_M = 1.5\text{ V}$  at  $V_{CC} \geq 2.7\text{ V}$ .  
 $V_M = 0.5 \times V_{CC}$  at  $V_{CC} < 2.7\text{ V}$ .  
 $V_{OL}$  and  $V_{OH}$  are typical output voltage drop that occur with the output load.  
 $V_X = V_{OL} + 0.3\text{ V}$  at  $V_{CC} \geq 2.7\text{ V}$ ;  $V_X = V_{OL} + 0.1 \times V_{CC}$  at  $V_{CC} < 2.7\text{ V}$ .  
 $V_Y = V_{OH} - 0.3\text{ V}$  at  $V_{CC} \geq 2.7\text{ V}$ ;  $V_Y = V_{OH} - 0.1 \times V_{CC}$  at  $V_{CC} < 2.7\text{ V}$ .

Fig.8 3-state enable and disable times.



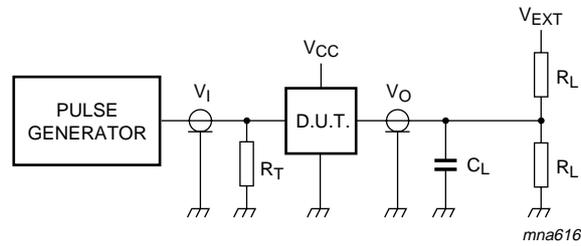
MNA754

$V_M = 1.5\text{ V}$  at  $V_{CC} \geq 2.7\text{ V}$ .  
 $V_M = 0.5 \times V_{CC}$  at  $V_{CC} < 2.7\text{ V}$ .  
 The shaded areas indicate when the input is permitted to change for predictable output performance.

Fig.9 Data set-up and hold times for the inputs An and Bn to  $\overline{LE}_{XX}$  and  $\overline{E}_{XX}$  inputs.

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V <sub>CC</sub>	V <sub>I</sub>	C <sub>L</sub>	R <sub>L</sub>	V <sub>EXT</sub>		
				t <sub>PLH</sub> /t <sub>PHL</sub>	t <sub>PZH</sub> /t <sub>PHZ</sub>	t <sub>PZL</sub> /t <sub>PLZ</sub>
1.2 V	V <sub>CC</sub>	50 pF	500 Ω <sup>(1)</sup>	open	GND	2 × V <sub>CC</sub>
2.7 V	2.7 V	50 pF	500 Ω	open	GND	2 × V <sub>CC</sub>
3.0 V to 3.6 V	2.7 V	50 pF	500 Ω	open	GND	2 × V <sub>CC</sub>

**Note**

1. The circuit performs better when R<sub>L</sub> = 1000 Ω.

Definitions for test circuits:

R<sub>L</sub> = Load resistor.

C<sub>L</sub> = Load capacitance including jig and probe capacitance.

R<sub>T</sub> = Termination resistance should be equal to the output impedance Z<sub>o</sub> of the pulse generator.

Fig.10 Load circuitry for switching times.

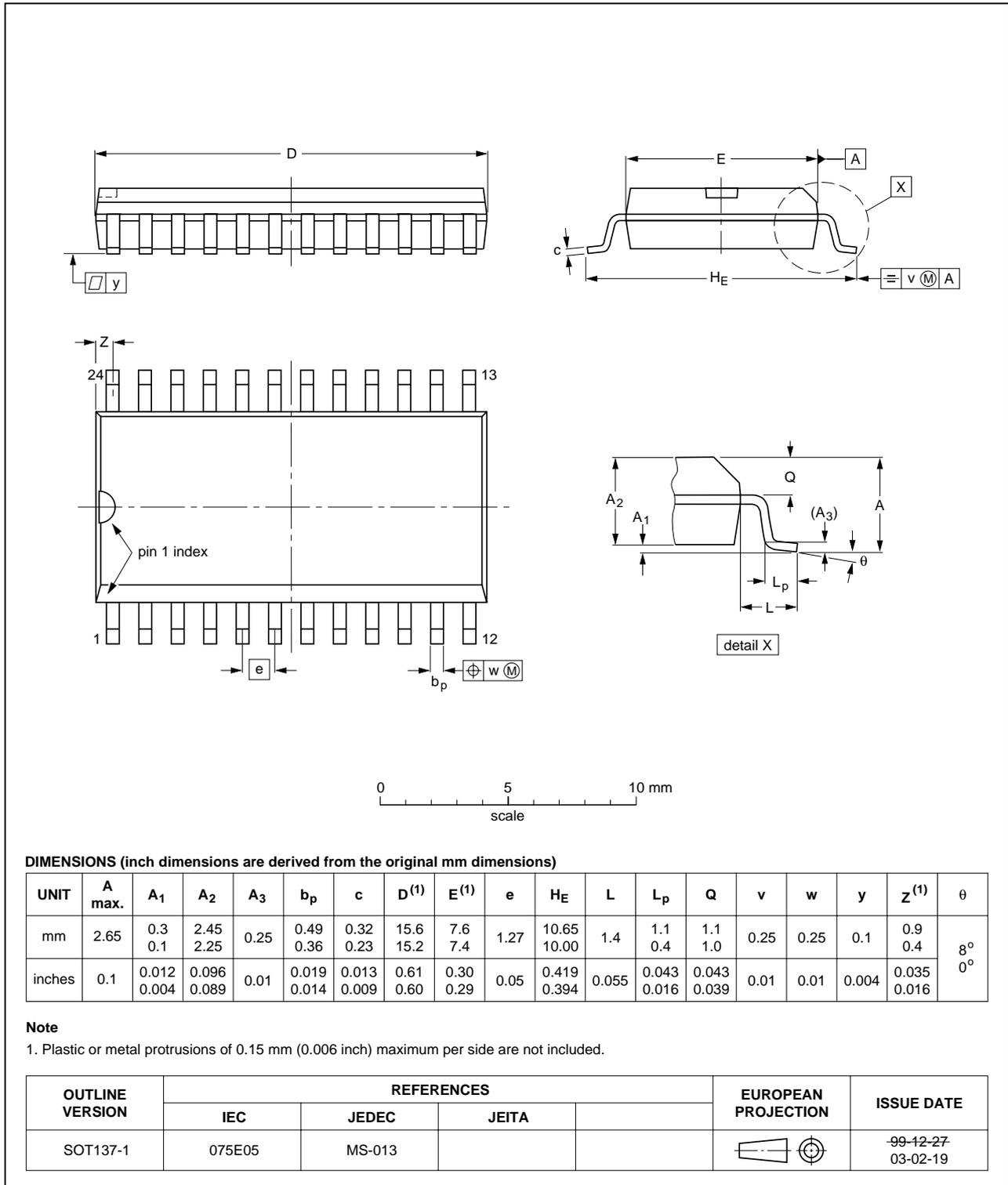
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PACKAGE OUTLINES

SO24: plastic small outline package; 24 leads; body width 7.5 mm

SOT137-1

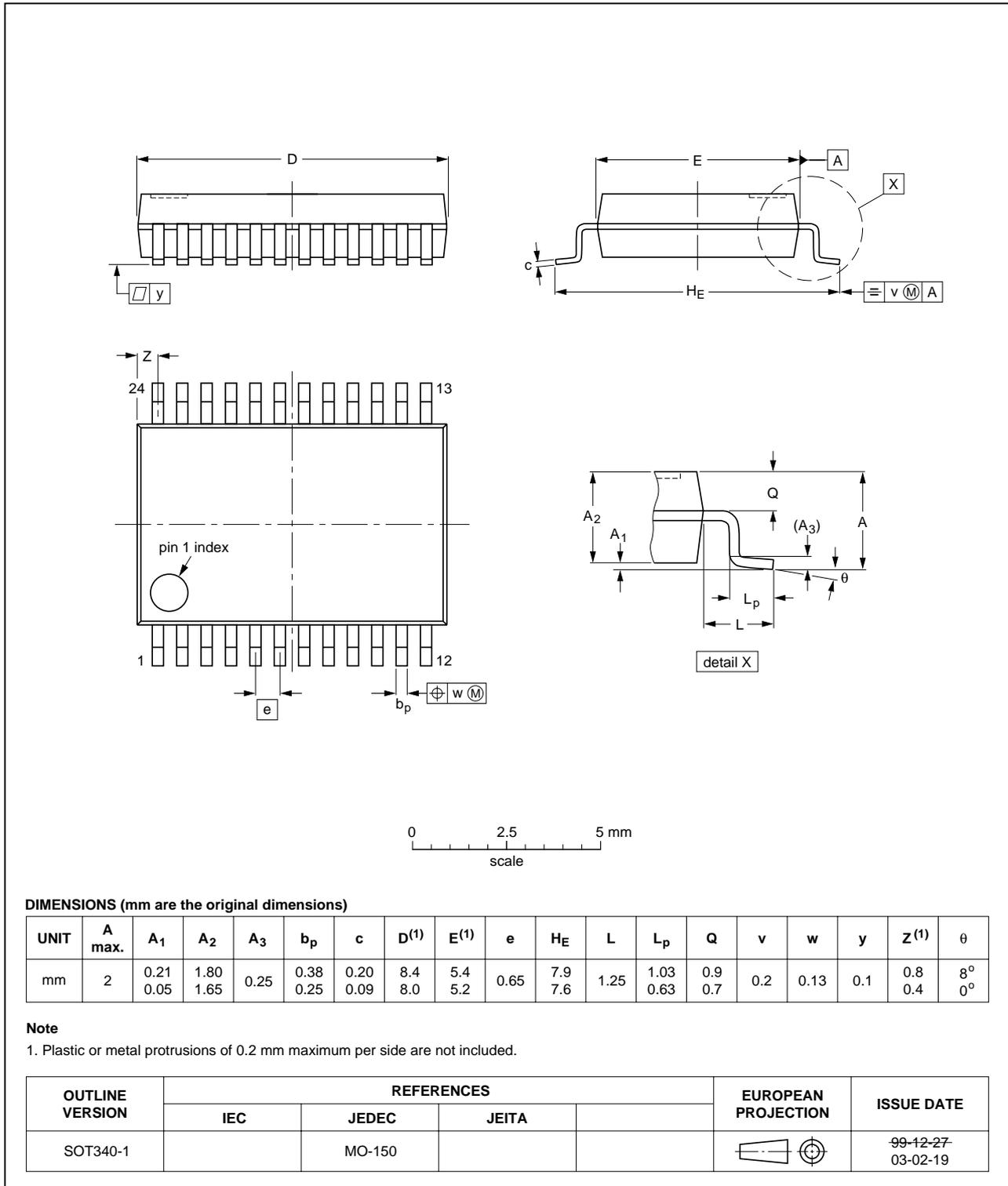


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SSOP24: plastic shrink small outline package; 24 leads; body width 5.3 mm

SOT340-1

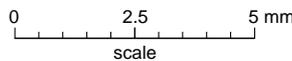
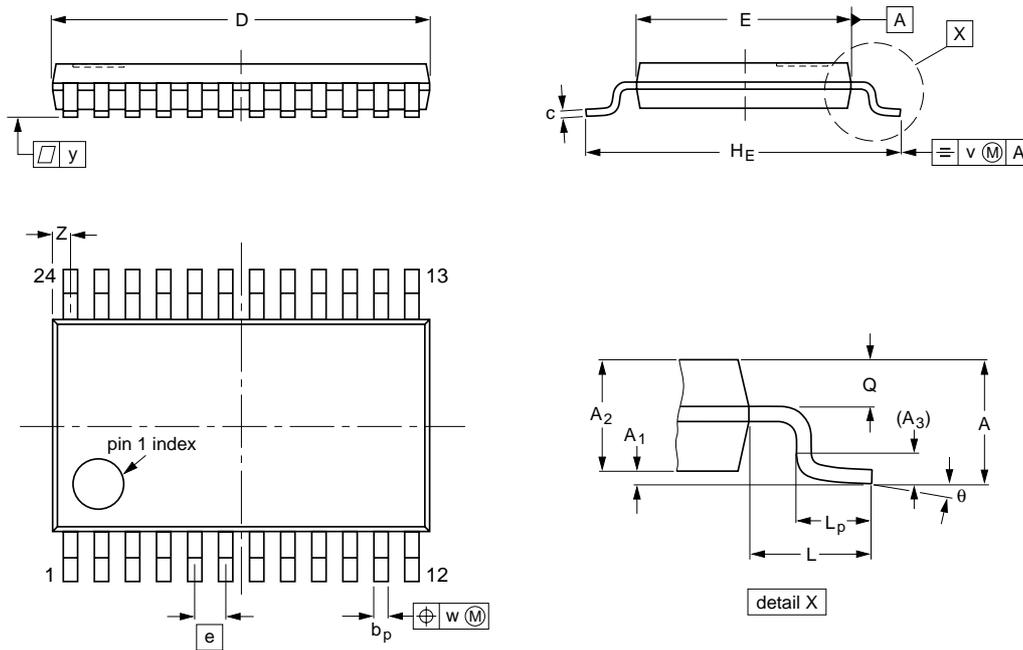


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TSSOP24: plastic thin shrink small outline package; 24 leads; body width 4.4 mm

SOT355-1



DIMENSIONS (mm are the original dimensions)

UNIT	A max.	A <sub>1</sub>	A <sub>2</sub>	A <sub>3</sub>	b <sub>p</sub>	c	D <sup>(1)</sup>	E <sup>(2)</sup>	e	H <sub>E</sub>	L	L <sub>p</sub>	Q	v	w	y	z <sup>(1)</sup>	θ
mm	1.1	0.15 0.05	0.95 0.80	0.25	0.30 0.19	0.2 0.1	7.9 7.7	4.5 4.3	0.65	6.6 6.2	1	0.75 0.50	0.4 0.3	0.2	0.13	0.1	0.5 0.2	8° 0°

Notes

1. Plastic or metal protrusions of 0.15 mm maximum per side are not included.
2. Plastic interlead protrusions of 0.25 mm maximum per side are not included.

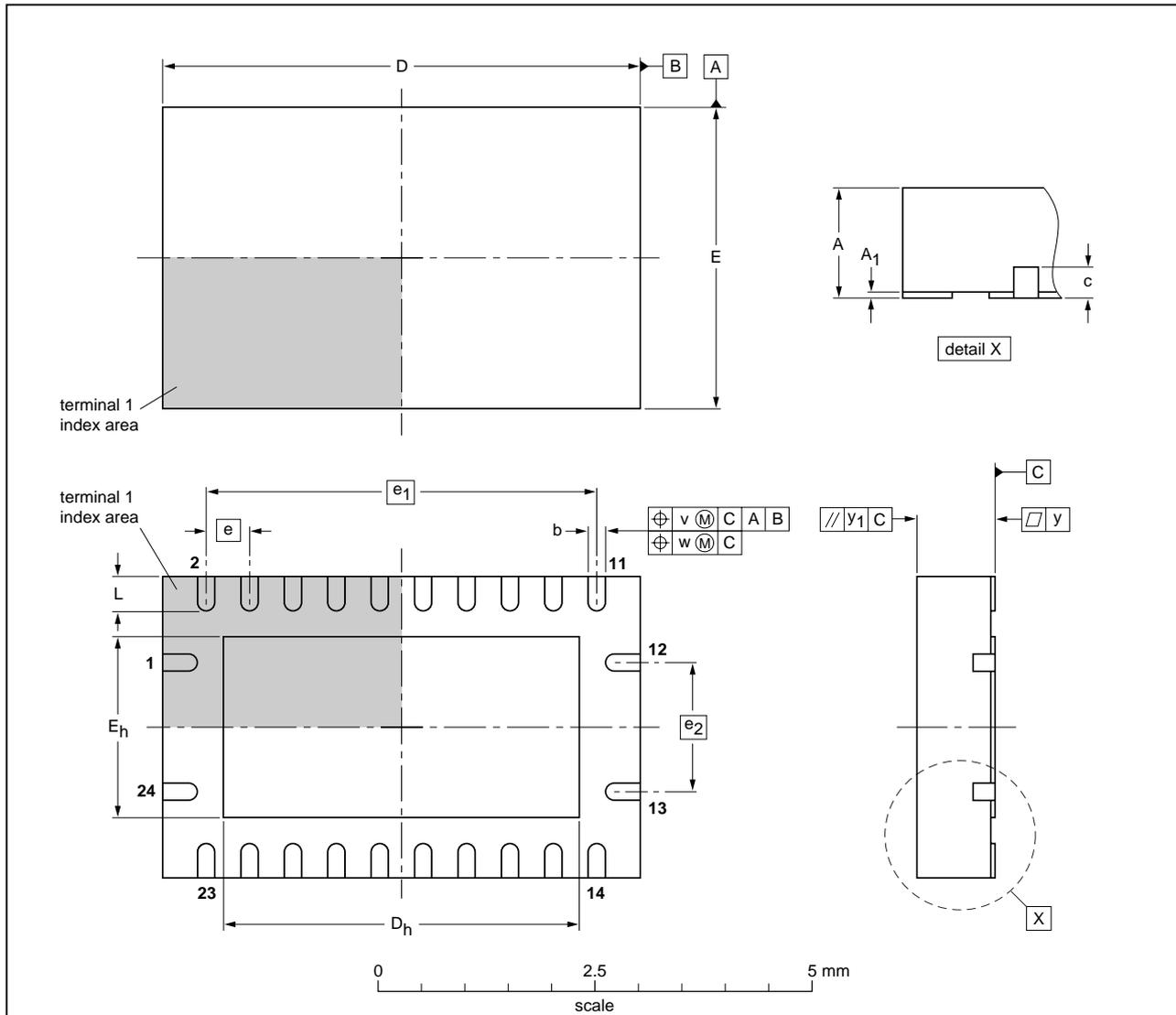
OUTLINE VERSION	REFERENCES				EUROPEAN PROJECTION	ISSUE DATE
	IEC	JEDEC	JEITA			
SOT355-1		MO-153				99-12-27 03-02-19

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DHVQFN24: plastic dual in-line compatible thermal enhanced very thin quad flat package; no leads; 24 terminals; body 3.5 x 5.5 x 0.85 mm

SOT815-1



DIMENSIONS (mm are the original dimensions)

UNIT	A <sup>(1)</sup> max.	A <sub>1</sub>	b	c	D <sup>(1)</sup>	D <sub>h</sub>	E <sup>(1)</sup>	E <sub>h</sub>	e	e <sub>1</sub>	e <sub>2</sub>	L	v	w	y	y <sub>1</sub>
mm	1	0.05 0.00	0.30 0.18	0.2	5.6 5.4	4.25 3.95	3.6 3.4	2.25 1.95	0.5	4.5	1.5	0.5 0.3	0.1	0.05	0.05	0.1

Note

1. Plastic or metal protrusions of 0.075 mm maximum per side are not included.

OUTLINE VERSION	REFERENCES			EUROPEAN PROJECTION	ISSUE DATE
	IEC	JEDEC	JEITA		
SOT815-1	---	---	---		03-04-29

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## DATA SHEET STATUS

LEVEL	DATA SHEET STATUS <sup>(1)</sup>	PRODUCT STATUS <sup>(2)(3)</sup>	DEFINITION
I	Objective data	Development	This data sheet contains data from the objective specification for product development. Philips Semiconductors reserves the right to change the specification in any manner without notice.
II	Preliminary data	Qualification	This data sheet contains data from the preliminary specification. Supplementary data will be published at a later date. Philips Semiconductors reserves the right to change the specification without notice, in order to improve the design and supply the best possible product.
III	Product data	Production	This data sheet contains data from the product specification. Philips Semiconductors reserves the right to make changes at any time in order to improve the design, manufacturing and supply. Relevant changes will be communicated via a Customer Product/Process Change Notification (CPCN).

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2. The product status of the device(s) described in this data sheet may have changed since this data sheet was published. The latest information is available on the Internet at URL <http://www.semiconductors.philips.com>.
3. For data sheets describing multiple type numbers, the highest-level product status determines the data sheet status.

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