

DATA SHEET

74LVC2G07

Buffers with open-drain outputs

Product specification
Supersedes data of 2004 Mar 19

2004 Sep 08

Buffers with open-drain outputs

74LVC2G07

FEATURES

- Wide supply voltage range from 1.65 V to 5.5 V
- 5 V tolerant input/output for interfacing with 5 V logic
- High noise immunity
- Complies with JEDEC standard:
 - JESD8-7 (1.65 V to 1.95 V)
 - JESD8-5 (2.3 V to 2.7 V)
 - JESD8B/JESD36 (2.7 V to 3.6 V).
- –24 mA output drive ($V_{CC} = 3.0$ V)
- CMOS low power consumption
- Latch-up performance exceeds 250 mA
- Direct interface with TTL levels
- Inputs accept voltages up to 5 V
- Multiple package options
- 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 74LVC2G07 is a high-performance, low-power, low-voltage, Si-gate CMOS device superior to most advanced CMOS compatible TTL families.

Input can be driven from either 3.3 V or 5 V devices. This feature allows the use of this device in a mixed 3.3 V and 5 V environment.

Schmitt trigger action at all inputs makes the circuit tolerant for slower input rise and fall time.

This device is fully specified for partial power-down applications using I_{off} . The I_{off} circuitry disables the output, preventing the damaging backflow current through the device when it is powered down.

The 74LVC2G07 provides two non-inverting buffers.

The output of the device is an open drain and can be connected to other open-drain outputs to implement active-LOW wired-OR or active-HIGH wired-AND functions.

QUICK REFERENCE DATA

GND = 0 V; $T_{amb} = 25$ °C.

SYMBOL	PARAMETER	CONDITIONS	TYPICAL	UNIT
t_{PLZ}/t_{PZL}	propagation delay input nA to output nY	$V_{CC} = 1.8$ V; $C_L = 30$ pF; $R_L = 1$ k Ω	3.5	ns
		$V_{CC} = 2.5$ V; $C_L = 30$ pF; $R_L = 500$ Ω	2.4	ns
		$V_{CC} = 2.7$ V; $C_L = 50$ pF; $R_L = 500$ Ω	2.3	ns
		$V_{CC} = 3.3$ V; $C_L = 50$ pF; $R_L = 500$ Ω	2.6	ns
		$V_{CC} = 5.0$ V; $C_L = 50$ pF; $R_L = 500$ Ω	1.5	ns
C_I	input capacitance		2.5	pF
C_{PD}	power dissipation capacitance per gate	$V_{CC} = 3.3$ V; notes 1 and 2	6.5	pF

Notes

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

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

f_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;

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

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

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FUNCTION TABLE

See note 1.

INPUT	OUTPUT
nA	nY
L	L
H	Z

Note

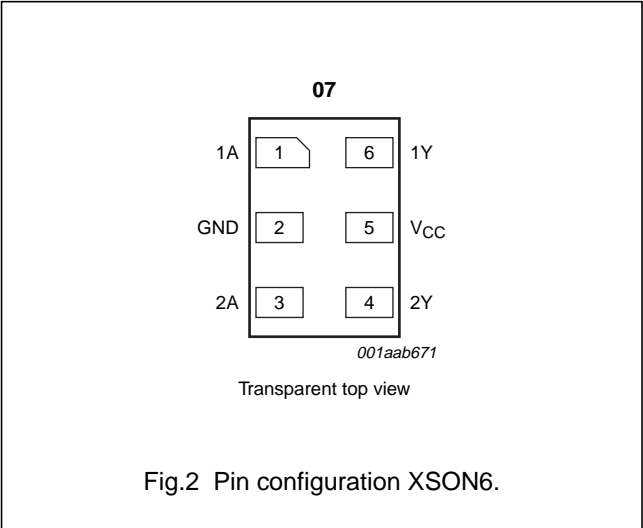
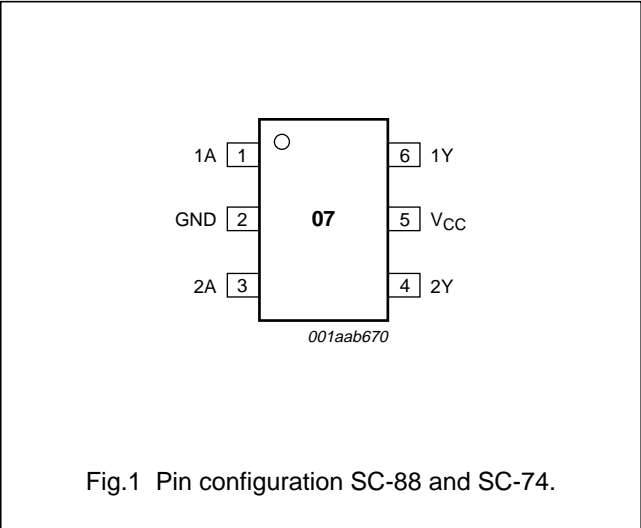
1. H = HIGH voltage level;
L = LOW voltage level;
Z = high-impedance OFF-state.

ORDERING INFORMATION

TYPE NUMBER	PACKAGE					
	TEMPERATURE RANGE	PINS	PACKAGE	MATERIAL	CODE	MARKING
74LVC2G07GW	−40 °C to +125 °C	6	SC-88	plastic	SOT363	V7
74LVC2G07GV	−40 °C to +125 °C	6	SC-74	plastic	SOT457	V07
74LVC2G07GM	−40 °C to +125 °C	6	XSON6	plastic	SOT886	V7

PINNING

PIN	SYMBOL	DESCRIPTION
1	1A	data input
2	GND	ground (0 V)
3	2A	data input
4	2Y	data output
5	V _{CC}	supply voltage
6	1Y	data output



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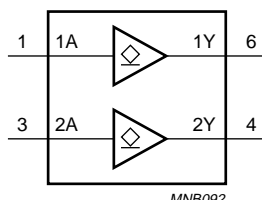


Fig.3 Logic symbol.

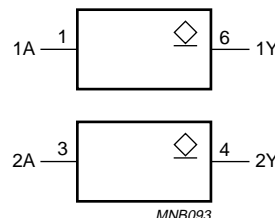


Fig.4 IEEE/IEC logic symbol.

RECOMMENDED OPERATING CONDITIONS

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
V_{CC}	supply voltage		1.65	5.5	V
V_I	input voltage		0	5.5	V
V_O	output voltage	active mode	0	V_{CC}	V
		$V_{CC} = 0$ V; Power-down mode	0	5.5	V
T_{amb}	operating ambient temperature		-40	+125	°C
t_r, t_f	input rise and fall times	$V_{CC} = 1.65$ V to 2.7 V	0	20	ns/V
		$V_{CC} = 2.7$ V to 5.5 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).

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
V_{CC}	supply voltage		-0.5	+6.5	V
I_{IK}	input diode current	$V_I < 0$ V	-	-50	mA
V_I	input voltage	note 1	-0.5	+6.5	V
I_{OK}	output diode current	$V_O < 0$ V	-	-50	mA
V_O	output voltage	active mode; notes 1 and 2	-0.5	+6.5	V
		Power-down mode; notes 1 and 2	-0.5	+6.5	V
I_O	output source or sink current	$V_O = 0$ V to 6.5 V	-	50	mA
I_{CC}, I_{GND}	V_{CC} or GND current		-	±100	mA
T_{stg}	storage temperature		-65	+150	°C
P_{tot}	power dissipation	$T_{amb} = -40$ °C to +125 °C	-	300	mW

Notes

1. The input and output voltage ratings may be exceeded if the input and output current ratings are observed.
2. When $V_{CC} = 0$ V (Power-down mode), the output voltage can be 5.5 V in normal operation.

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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 _{CC} (V)				
T _{amb} = −40 °C to +85 °C; note 1							
V _{IH}	HIGH-level input voltage		1.65 to 1.95	0.65 × V _{CC}	–	–	V
			2.3 to 2.7	1.7	–	–	V
			2.7 to 3.6	2.0	–	–	V
			4.5 to 5.5	0.7 × V _{CC}	–	–	V
V _{IL}	LOW-level input voltage		1.65 to 1.95	–	–	0.35 × V _{CC}	V
			2.3 to 2.7	–	–	0.7	V
			2.7 to 3.6	–	–	0.8	V
			4.5 to 5.5	–	–	0.3 × V _{CC}	V
V _{OL}	LOW-level output voltage	V _I = V _{IH} or V _{IL}					
		I _O = 100 μA	1.65 to 5.5	–	–	0.1	V
		I _O = 4 mA	1.65	–	–	0.45	V
		I _O = 8 mA	2.3	–	–	0.3	V
		I _O = 12 mA	2.7	–	–	0.4	V
		I _O = 24 mA	3.0	–	–	0.55	V
		I _O = 32 mA	4.5	–	–	0.55	V
I _{LI}	input leakage current	V _I = 5.5 V or GND	1.65 to 5.5	–	±0.1	±5	μA
I _{OZ}	output OFF-state current	V _I = V _{IH} or V _{IL} ; V _O = V _{CC} or GND	5.5	–	±0.1	±10	μA
I _{off}	power OFF leakage current	V _I or V _O = 5.5 V	0	–	±0.1	±10	μA
I _{CC}	quiescent supply current	V _I = V _{CC} or GND; I _O = 0 A	5.5	–	0.1	10	μA
ΔI _{CC}	additional quiescent supply current per pin	V _I = V _{CC} – 0.6 V; I _O = 0 A	2.3 to 5.5	–	5	500	μA

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SYMBOL	PARAMETER	TEST CONDITIONS		MIN.	TYP.	MAX.	UNIT
		OTHER	V _{CC} (V)				
T _{amb} = −40 °C to +125 °C							
V _{IH}	HIGH-level input voltage		1.65 to 1.95	0.65 × V _{CC}	—	—	V
			2.3 to 2.7	1.7	—	—	V
			2.7 to 3.6	2.0	—	—	V
			4.5 to 5.5	0.7 × V _{CC}	—	—	V
V _{IL}	LOW-level input voltage		1.65 to 1.95	—	—	0.35 × V _{CC}	V
			2.3 to 2.7	—	—	0.7	V
			2.7 to 3.6	—	—	0.8	V
			4.5 to 5.5	—	—	0.3 × V _{CC}	V
V _{OL}	LOW-level output voltage	V _I = V _{IH} or V _{IL}					
		I _O = 100 μA	1.65 to 5.5	—	—	0.1	V
		I _O = 4 mA	1.65	—	—	0.70	V
		I _O = 8 mA	2.3	—	—	0.45	V
		I _O = 12 mA	2.7	—	—	0.60	V
		I _O = 24 mA	3.0	—	—	0.80	V
		I _O = 32 mA	4.5	—	—	0.80	V
I _{LI}	input leakage current	V _I = 5.5 V or GND	1.65 to 5.5	—	—	±20	μA
I _{OZ}	output OFF-state current	V _I = V _{IH} or V _{IL} ; V _O = V _{CC} or GND	5.5	—	—	±10	μA
I _{off}	power OFF leakage current	V _I or V _O = 5.5 V	0	—	—	±20	μA
I _{CC}	quiescent supply current	V _I = V _{CC} or GND; I _O = 0 A	5.5	—	—	40	μA
ΔI _{CC}	additional quiescent supply current per pin	V _I = V _{CC} − 0.6 V; I _O = 0 A	2.3 to 5.5	—	—	5000	μA

Note

1. All typical values are measured at V_{CC} = 3.3 V and T_{amb} = 25 °C.

Buffers with open-drain outputs

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AC CHARACTERISTICS

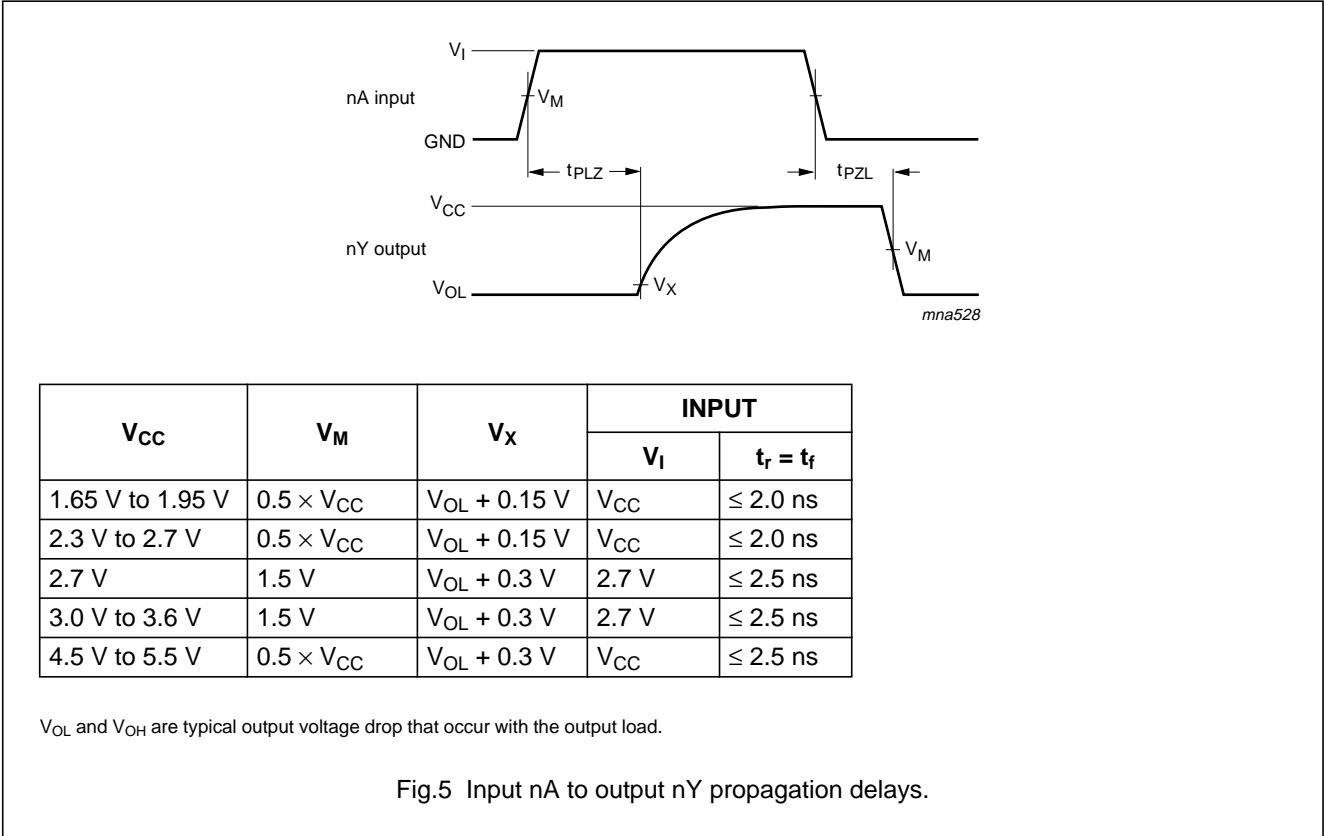
GND = 0 V.

SYMBOL	PARAMETER	TEST CONDITIONS		MIN.	TYP.	MAX.	UNIT
		WAVEFORMS	V _{CC} (V)				
T _{amb} = −40 °C to +85 °C; note 1							
t _{PLZ} /t _{PZL}	propagation delay input nA to output nY	see Figs 5 and 6	1.65 to 1.95	1.0	3.5	6.7	ns
			2.3 to 2.7	0.5	2.4	4.3	ns
			2.7	1.0	2.3	4.2	ns
			3.0 to 3.6	0.5	2.6	3.7	ns
			4.5 to 5.5	0.5	1.5	2.9	ns
T _{amb} = −40 °C to +125 °C							
t _{PLZ} /t _{PZL}	propagation delay input nA to output nY	see Figs 5 and 6	1.65 to 1.95	1.0	3.5	8.4	ns
			2.3 to 2.7	0.5	2.4	5.5	ns
			2.7	1.0	2.3	5.3	ns
			3.0 to 3.6	0.5	2.6	4.7	ns
			4.5 to 5.5	0.5	1.5	3.7	ns

Note

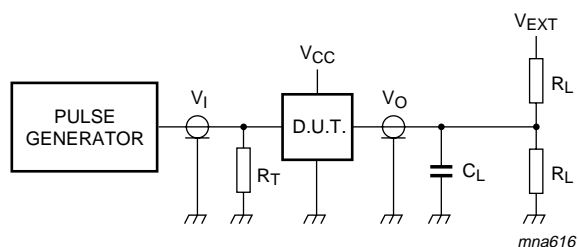
1. All typical values are measured at T_{amb} = 25 °C and at V_{CC} = 1.8 V, 2.5 V, 2.7 V, 3.3 V and 5.0 V respectively.

AC WAVEFORMS



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V_{CC}	V_I	C_L	R_L	V_{EXT}
				t_{PZL}/t_{PLZ}
1.65 V to 1.95 V	V_{CC}	30 pF	1 k Ω	$2 \times V_{CC}$
2.3 V to 2.7 V	V_{CC}	30 pF	500 Ω	$2 \times V_{CC}$
2.7 V	2.7 V	50 pF	500 Ω	6 V
3.0 V to 3.6 V	2.7 V	50 pF	500 Ω	6 V
4.5 V to 5.5 V	V_{CC}	50 pF	500 Ω	$2 \times V_{CC}$

Definitions for test circuit:

R_L = Load resistor.

C_L = Load capacitance including jig and probe capacitance.

R_T = Termination resistance should be equal to the output impedance Z_o of the pulse generator.

Fig.6 Load circuitry for switching times.

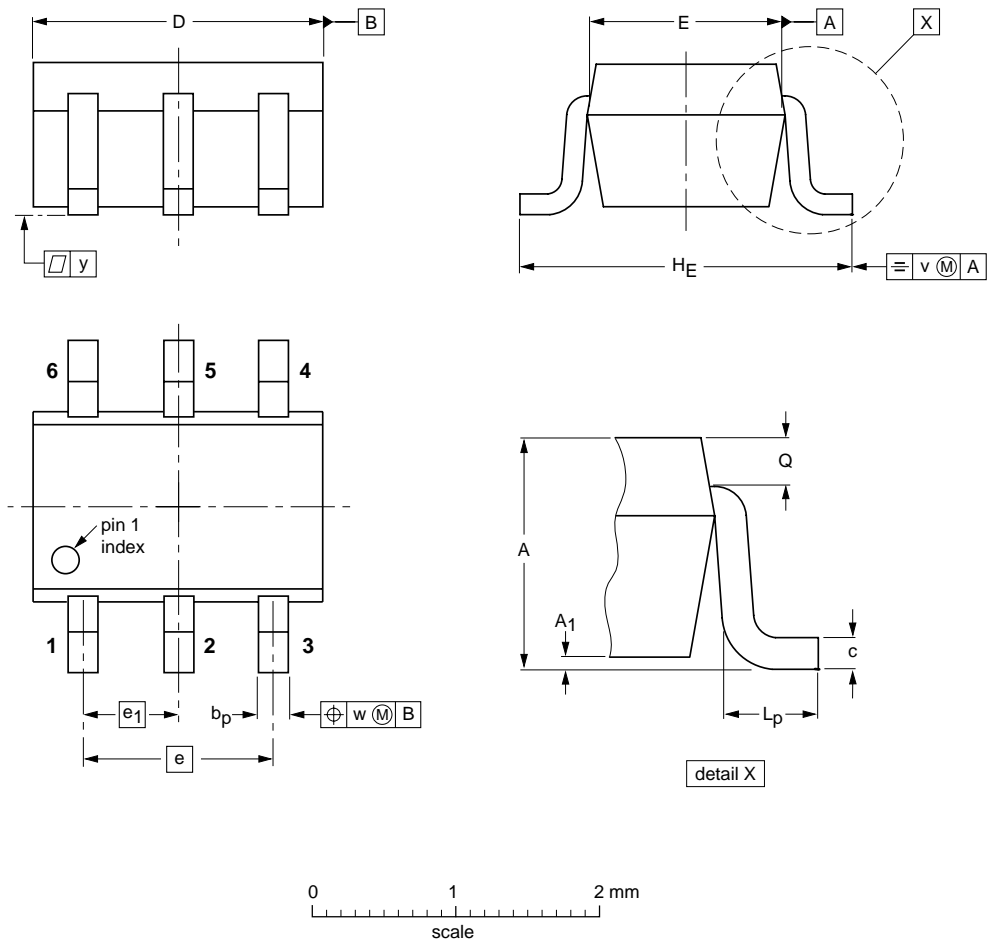
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PACKAGE OUTLINES


Plastic surface mounted package; 6 leads

SOT363



DIMENSIONS (mm are the original dimensions)

UNIT	A	A ₁ max	b _p	c	D	E	e	e ₁	H _E	L _p	Q	v	w	y
mm	1.1 0.8	0.1	0.30 0.20	0.25 0.10	2.2 1.8	1.35 1.15	1.3	0.65	2.2 2.0	0.45 0.15	0.25 0.15	0.2	0.2	0.1

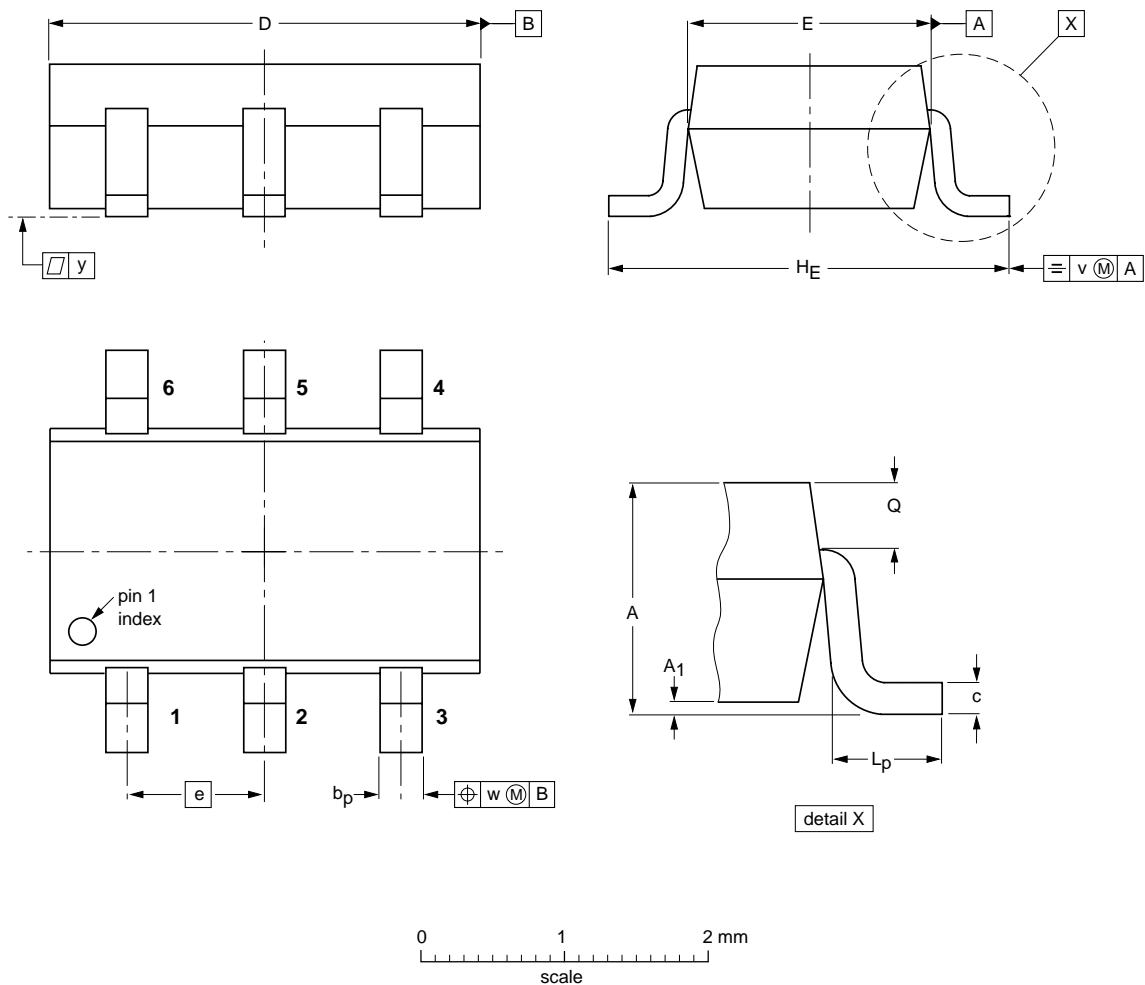
OUTLINE VERSION	REFERENCES				EUROPEAN PROJECTION	ISSUE DATE
	IEC	JEDEC	EIAJ			
SOT363			SC-88			97-02-28

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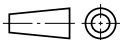
Plastic surface mounted package; 6 leads

SOT457



DIMENSIONS (mm are the original dimensions)

UNIT	A	A ₁	b _p	c	D	E	e	H _E	L _p	Q	v	w	y
mm	1.1 0.9	0.1 0.013	0.40 0.25	0.26 0.10	3.1 2.7	1.7 1.3	0.95	3.0 2.5	0.6 0.2	0.33 0.23	0.2	0.2	0.1

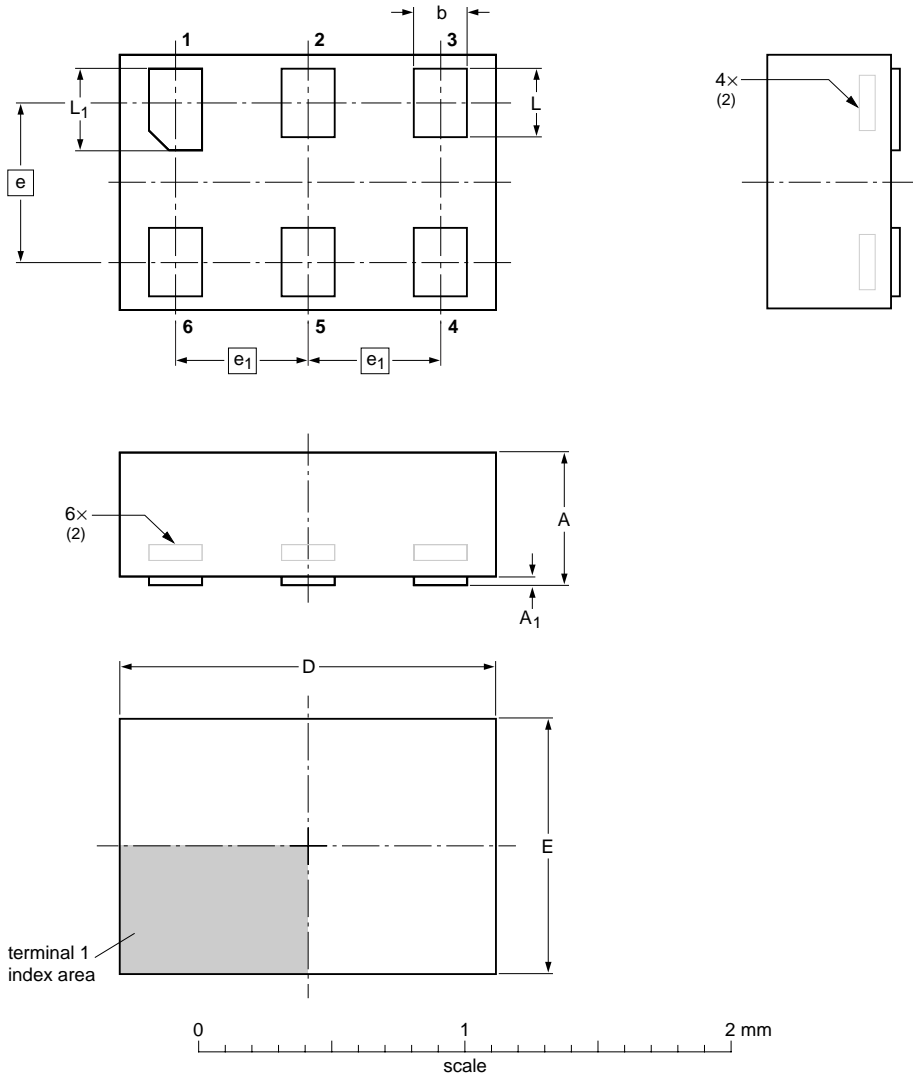
OUTLINE VERSION	REFERENCES				EUROPEAN PROJECTION	ISSUE DATE
	IEC	JEDEC	EIAJ			
SOT457			SC-74			97-02-28 01-05-04

Buffers with open-drain outputs

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XSON6: plastic extremely thin small outline package; no leads; 6 terminals; body 1 x 1.45 x 0.5 mm

SOT886



DIMENSIONS (mm are the original dimensions)

UNIT	A ⁽¹⁾ max	A ₁ max	b	D	E	e	e ₁	L	L ₁
mm	0.5	0.04	0.25 0.17	1.5 1.4	1.05 0.95	0.6	0.5	0.35 0.27	0.40 0.32

- Notes
1. Including plating thickness.
 2. Can be visible in some manufacturing processes.

OUTLINE VERSION	REFERENCES				EUROPEAN PROJECTION	ISSUE DATE
	IEC	JEDEC	JEITA			
SOT886		MO-252				04-07-15 04-07-22

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LEVEL	DATA SHEET STATUS ⁽¹⁾	PRODUCT STATUS ⁽²⁾⁽³⁾	DEFINITION
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