

# 74LVC1G58GM,132 Datasheet



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DiGi Electronics Part Number 74LVC1G58GM,132-DG

Manufacturer Nexperia USA Inc.

Manufacturer Product Number 74LVC1G58GM,132

Description IC CONFIG MULTI-FUNC GATE 6XSON

**Detailed Description** Configurable Multiple Function Configurable 1 Circ

uit 3 Input 6-XSON, SOT886 (1.45x1)



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# **Purchase and inquiry**

Manufacturer Product Number:	Manufacturer:
74LVC1G58GM,132	Nexperia USA Inc.
Series:	Product Status:
74LVC	Active
Logic Type:	Number of Circuits:
Configurable Multiple Function	1
Number of Inputs:	Schmitt Trigger Input:
3	Yes
Output Type:	Current - Output High, Low:
Output Type: Single-Ended	Current - Output High, Low: 32mA, 32mA
Single-Ended	32mA, 32mA
Single-Ended  Voltage - Supply:	32mA, 32mA Operating Temperature:
Single-Ended  Voltage - Supply:  1.65V ~ 5.5V	32mA, 32mA  Operating Temperature: -40°C ~ 125°C
Single-Ended  Voltage - Supply:  1.65V ~ 5.5V  Mounting Type:	32mA, 32mA  Operating Temperature: -40°C ~ 125°C  Package / Case:

# **Environmental & Export classification**

8542.39.0001

RoHS Status:	Moisture Sensitivity Level (MSL):
ROHS3 Compliant	1 (Unlimited)
REACH Status:	ECCN:
REACH Unaffected	EAR99
HTSUS:	

# 74LVC1G58

# Low-power configurable multiple function gate

Rev. 12 — 18 August 2023

**Product data sheet** 

## 1. General description

The 74LVC1G58 is a configurable multiple function gate with Schmitt-trigger inputs. The device can be configured as any of the following logic functions AND, OR, NAND, NOR, XOR, inverter and buffer; using the 3-bit input. All inputs can be connected diectly to  $V_{\rm CC}$  or GND. Inputs can be driven from either 3.3 V or 5 V devices. This feature allows the use of these devices as translators in mixed 3.3 V and 5 V environments.

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

### 2. Features and benefits

- Wide supply voltage range from 1.65 V to 5.5 V
- High noise immunity
- ±24 mA output drive (V<sub>CC</sub> = 3.0 V)
- CMOS low power dissipation
- I<sub>OFF</sub> circuitry provides partial Power-down mode operation
- · Latch-up performance exceeds 250 mA
- · Direct interface with TTL levels
- Overvoltage tolerant inputs to 5.5 V
- Complies with JEDEC standard:
  - JESD8-7 (1.65 V to 1.95 V)
  - JESD8-5 (2.3 V to 2.7 V)
  - JESD8C (2.7 V to 3.6 V)
  - JESD36 (4.5 V to 5.5 V)
- ESD protection:
  - HBM: ANSI/ESDA/JEDEC JS-001 class 2 exceeds 2000 V
  - CDM: ANSI/ESDA/JEDEC JS-002 class C3 exceeds 1000 V
- · Multiple package options
- Specified from -40 °C to +85 °C and -40 °C to +125 °C.



### Low-power configurable multiple function gate

# 3. Ordering information

**Table 1. Ordering information** 

Type number	Package			
	Temperature range	Name	Description	Version
74LVC1G58GW	-40 °C to +125 °C	TSSOP6	plastic thin shrink small outline package; 6 leads; body width 1.25 mm	SOT363-2
74LVC1G58GV	-40 °C to +125 °C	SC-74; TSOP6	plastic surface-mounted package; 6 leads	SOT457
74LVC1G58GM	-40 °C to +125 °C	XSON6	plastic extremely thin small outline package; no leads; 6 terminals; body 1 × 1.45 × 0.5 mm	SOT886
74LVC1G58GN	-40 °C to +125 °C	XSON6	extremely thin small outline package; no leads; 6 terminals; body 0.9 × 1.0 × 0.35 mm	SOT1115
74LVC1G58GS	-40 °C to +125 °C	XSON6	extremely thin small outline package; no leads; 6 terminals; body 1.0 × 1.0 × 0.35 mm	SOT1202

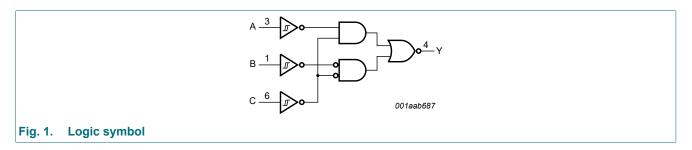
# 4. Marking

Table 2. Marking

Type number	Marking code [1]
74LVC1G58GW	YK
74LVC1G58GV	V58
74LVC1G58GM	YK
74LVC1G58GN	YK
74LVC1G58GS	YK

<sup>[1]</sup> The pin 1 indicator is located on the lower left corner of the device, below the marking code.

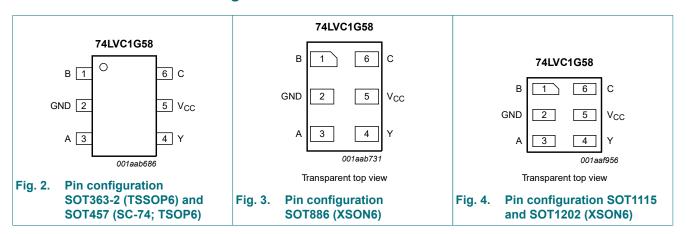
# 5. Functional diagram



Low-power configurable multiple function gate

# 6. Pinning information

### 6.1. Pinning



### 6.2. Pin description

Table 3. Pin description

Pin	Description
1	data input
2	ground (0 V)
3	data input
4	data output
5	supply voltage
6	data input
	1 2 3 4 5

# 7. Functional description

#### **Table 4. Function table**

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

Inputs			Output
С	В	A	Υ
L	L	L	L
L	L	Н	Н
L	Н	L	L
L	Н	Н	Н
Н	L	L	Н
Н	L	Н	Н
Н	Н	L	L
Н	Н	Н	L

#### Low-power configurable multiple function gate

# 7.1. Logic configurations

**Table 5. Function selection table** 

Logic function	Figure
2-input NAND	see Fig. 5
2-input NAND with both inputs inverted	see Fig. 8
2-input AND with inverted input	see Fig. 6 and Fig. 7
2-input NOR with inverted input	see Fig. 6 and Fig. 7
2-input OR	see Fig. 8
2-input OR with both inputs inverted	see Fig. 5
2-input XOR	see Fig. 9
Buffer	see Fig. 10
Inverter	see Fig. 11

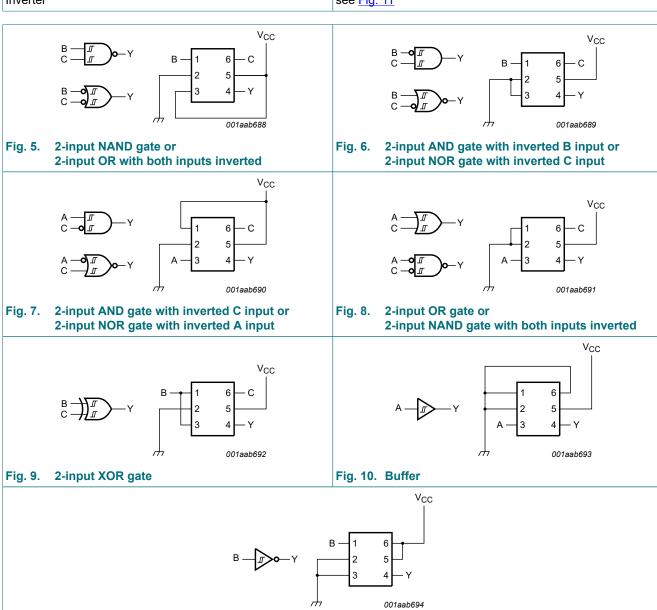


Fig. 11. Inverter

#### Low-power configurable multiple function gate

# 8. Limiting values

#### **Table 6. 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 <sub>CC</sub>	supply voltage		-0.5	+6.5	V
I <sub>IK</sub>	input clamping current	V <sub>I</sub> < 0 V	-50	-	mA
VI	input voltage	[1]	-0.5	+6.5	V
I <sub>OK</sub>	output clamping current	$V_O > V_{CC}$ or $V_O < 0 V$	-	±50	mA
Vo	output voltage	Active mode [1]	-0.5	+6.5	V
		Power-down mode; V <sub>CC</sub> = 0 V [1]	-0.5	+6.5	V
I <sub>O</sub>	output current	$V_O = 0 V \text{ to } V_{CC}$	-	±50	mA
I <sub>CC</sub>	supply current		-	100	mA
I <sub>GND</sub>	ground current		-100	-	mA
T <sub>stg</sub>	storage temperature		-65	+150	°C
P <sub>tot</sub>	total power dissipation	$T_{amb} = -40  ^{\circ}\text{C} \text{ to } +125  ^{\circ}\text{C}$ [2]	-	250	mW

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

For SOT457 (SC-74; TSOP6) package: Ptot derates linearly with 4.1 mW/K above 89 °C.

For SOT886 (XSON6) package: Ptot derates linearly with 3.3 mW/K above 74 °C.

For SOT1115 (XSON6) package: Ptot derates linearly with 3.2 mW/K above 71 °C.

For SOT1202 (XSON6) package: Ptot derates linearly with 3.3 mW/K above 74 °C.

# 9. Recommended operating conditions

Table 7. Recommended operating conditions

Symbol	Parameter	Conditions	Min	Тур	Max	Unit
V <sub>CC</sub>	supply voltage		1.65	-	5.5	V
VI	input voltage		0	-	5.5	V
Vo	output voltage	Active mode	0	-	V <sub>CC</sub>	V
		Power-down mode; V <sub>CC</sub> = 0 V	0	-	5.5	V
T <sub>amb</sub>	ambient temperature		-40	-	+125	°C

<sup>[2]</sup> For SOT363-2 (TSSOP6) package: Ptot derates linearly with 3.7 mW/K above 83 °C.

### Low-power configurable multiple function gate

# 10. Static characteristics

#### **Table 8. Static characteristics**

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

Symbol	Parameter	Conditions	Min	Typ [1]	Max	Unit
T <sub>amb</sub> = -	40 °C to +85 °C		•			
V <sub>OL</sub>	LOW-level output voltage	$V_I = V_{T+}$ or $V_{T-}$				
		I <sub>O</sub> = 100 μA; V <sub>CC</sub> = 1.65 V to 5.5 V	-	-	0.1	V
		I <sub>O</sub> = 4 mA; V <sub>CC</sub> = 1.65 V	-	-	0.45	V
		I <sub>O</sub> = 8 mA; V <sub>CC</sub> = 2.3 V	-	-	0.3	V
		I <sub>O</sub> = 12 mA; V <sub>CC</sub> = 2.7 V	-	-	0.4	V
		$I_{O}$ = 24 mA; $V_{CC}$ = 3.0 V	-	-	0.55	V
		$I_{O}$ = 32 mA; $V_{CC}$ = 4.5 V	-	-	0.55	V
V <sub>OH</sub>	HIGH-level output voltage	$V_I = V_{T+}$ or $V_{T-}$				
		$I_{O}$ = -100 $\mu$ A; $V_{CC}$ = 1.65 V to 5.5 V	V <sub>CC</sub> - 0.1	-	-	V
		I <sub>O</sub> = -4 mA; V <sub>CC</sub> = 1.65 V	1.2	-	-	V
		I <sub>O</sub> = -8 mA; V <sub>CC</sub> = 2.3 V	1.9	-	-	V
		I <sub>O</sub> = -12 mA; V <sub>CC</sub> = 2.7 V	2.2	-	-	V
		I <sub>O</sub> = -24 mA; V <sub>CC</sub> = 3.0 V	2.3	-	-	V
		$I_{O}$ = -32 mA; $V_{CC}$ = 4.5 V	3.8	-	-	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	-	±0.1	±1	μA
I <sub>OFF</sub>	power-off leakage current	$V_{I}$ or $V_{O} = 5.5 \text{ V}$ ; $V_{CC} = 0 \text{ V}$	-	±0.1	±2	μΑ
I <sub>CC</sub>	supply current	$V_1 = 5.5 \text{ V or GND}; V_{CC} = 1.65 \text{ V to } 5.5 \text{ V}; I_O = 0 \text{ A}$	-	0.1	4	μΑ
Δl <sub>CC</sub>	additional supply current	V <sub>I</sub> = V <sub>CC</sub> - 0.6 V; I <sub>O</sub> = 0 A; V <sub>CC</sub> = 2.3 V to 5.5 V	-	5	500	μA
Cı	input capacitance		-	2.5	-	pF

### Low-power configurable multiple function gate

Symbol	Parameter	Conditions	Min	Typ [1]	Max	Unit
T <sub>amb</sub> = -	40 °C to +125 °C					
$V_{OL}$	LOW-level output voltage	$V_I = V_{T+}$ or $V_{T-}$				
		I <sub>O</sub> = 100 μA; V <sub>CC</sub> = 1.65 V to 5.5 V	-	-	0.1	V
		I <sub>O</sub> = 4 mA; V <sub>CC</sub> = 1.65 V	-	-	0.7	V
		I <sub>O</sub> = 8 mA; V <sub>CC</sub> = 2.3 V	-	-	0.45	V
		$I_{O}$ = 12 mA; $V_{CC}$ = 2.7 V	-	-	0.6	V
		$I_{O}$ = 24 mA; $V_{CC}$ = 3.0 V	-	-	0.8	V
		$I_{O}$ = 32 mA; $V_{CC}$ = 4.5 V	-	-	8.0	V
V <sub>OH</sub>	HIGH-level output voltage	$V_I = V_{T+}$ or $V_{T-}$				
		$I_{O}$ = -100 $\mu$ A; $V_{CC}$ = 1.65 V to 5.5 V	V <sub>CC</sub> - 0.1	-	-	V
		I <sub>O</sub> = -4 mA; V <sub>CC</sub> = 1.65 V	0.95	-	-	V
		I <sub>O</sub> = -8 mA; V <sub>CC</sub> = 2.3 V	1.7	-	-	V
		I <sub>O</sub> = -12 mA; V <sub>CC</sub> = 2.7 V	1.9	-	-	V
		I <sub>O</sub> = -24 mA; V <sub>CC</sub> = 3.0 V	2.0	-	-	V
		I <sub>O</sub> = -32 mA; V <sub>CC</sub> = 4.5 V	3.4	-	-	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	-	-	±1	μΑ
I <sub>OFF</sub>	power-off leakage current	$V_{I}$ or $V_{O} = 5.5 \text{ V}$ ; $V_{CC} = 0 \text{ V}$	-	-	±2	μA
I <sub>CC</sub>	supply current	$V_1 = 5.5 \text{ V or GND}; V_{CC} = 1.65 \text{ V to } 5.5 \text{ V}; I_O = 0 \text{ A}$	-	-	4	μA
Δl <sub>CC</sub>	additional supply current	V <sub>I</sub> = V <sub>CC</sub> - 0.6 V; I <sub>O</sub> = 0 A; V <sub>CC</sub> = 2.3 V to 5.5 V	-	-	500	μA

<sup>[1]</sup> Typical values are measured at maximum  $V_{CC}$  and  $T_{amb}$  = 25 °C.

# 11. Dynamic characteristics

### **Table 9. Dynamic characteristics**

Voltages are referenced to GND (ground = 0 V); for test circuit see Fig. 13.

Symbol	Parameter	Conditions	-40 °C to +85 °C		-40 °C to +125 °C			
			Min	Typ [1]	Max	Min	Max	
t <sub>pd</sub>	propagation delay	A, B, C to Y; see <u>Fig. 12</u> [2]						
		V <sub>CC</sub> = 1.65 V to 1.95 V	1.0	6.0	14.4	1.0	18.0	ns
		V <sub>CC</sub> = 2.3 V to 2.7 V	0.5	3.5	8.3	0.5	10.4	ns
		V <sub>CC</sub> = 2.7 V	0.5	4.2	8.5	0.5	10.6	ns
		V <sub>CC</sub> = 3.0 V to 3.6 V	0.5	3.8	6.3	0.5	7.9	ns
		V <sub>CC</sub> = 4.5 V to 5.5 V	0.5	3.0	5.1	0.5	6.4	ns
$C_{PD}$	power dissipation capacitance	$V_{CC} = 3.3 \text{ V}; V_{I} = \text{GND to } V_{CC}$ [3]	-	20	-	-	-	pF

Typical values are measured at nominal  $V_{CC}$  and at  $T_{amb}$  = 25 °C.

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

 $f_i$  = input frequency in MHz;

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

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

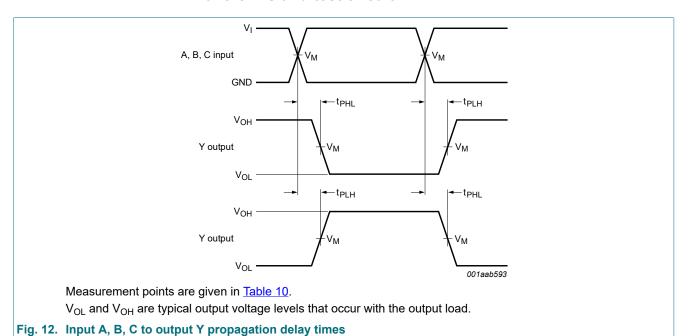
 $V_{CC}$  = supply voltage in V;

N = number of inputs switching;  $\Sigma(C_L \times V_{CC}^2 \times f_0)$  = sum of outputs.

 $t_{pd}$  is the same as  $t_{PLH}$  and  $t_{PHL}$ .  $C_{PD}$  is used to determine the dynamic power dissipation ( $P_D$  in  $\mu W$ ).

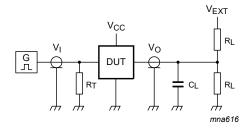
### Low-power configurable multiple function gate

### 11.1. Waveforms and test circuit



#### **Table 10. Measurement points**

Table 101 medeal ement pente					
Supply voltage	Input	Output			
V <sub>CC</sub>	V <sub>M</sub>	V <sub>M</sub>			
1.65 V to 1.95 V	0.5 × V <sub>CC</sub>	0.5 × V <sub>CC</sub>			
2.3 V to 2.7 V	0.5 × V <sub>CC</sub>	0.5 × V <sub>CC</sub>			
2.7 V	1.5 V	1.5 V			
3.0 V to 3.6 V	1.5 V	1.5 V			
4.5 V to 5.5 V	0.5 × V <sub>CC</sub>	0.5 × V <sub>CC</sub>			



Test data is given in Table 11.

Definitions for test circuit:

R<sub>I</sub> = Load resistance;

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

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

V<sub>EXT</sub> = External voltage for measuring switching times.

Fig. 13. Test circuit for measuring switching times

### Low-power configurable multiple function gate

Table 11. Test data

Supply voltage	Input		Load		V <sub>EXT</sub>
V <sub>CC</sub>	V <sub>I</sub>	t <sub>r</sub> = t <sub>f</sub>	C <sub>L</sub>	R <sub>L</sub>	t <sub>PLH</sub> , t <sub>PHL</sub>
1.65 V to 1.95 V	V <sub>CC</sub>	≤ 2.0 ns	30 pF	1 kΩ	open
2.3 V to 2.7 V	V <sub>CC</sub>	≤ 2.0 ns	30 pF	500 Ω	open
2.7 V	2.7 V	≤ 2.5 ns	50 pF	500 Ω	open
3.0 V to 3.6 V	2.7 V	≤ 2.5 ns	50 pF	500 Ω	open
4.5 V to 5.5 V	V <sub>CC</sub>	≤ 2.5 ns	50 pF	500 Ω	open

# 12. Transfer characteristics

#### **Table 12. Transfer characteristics**

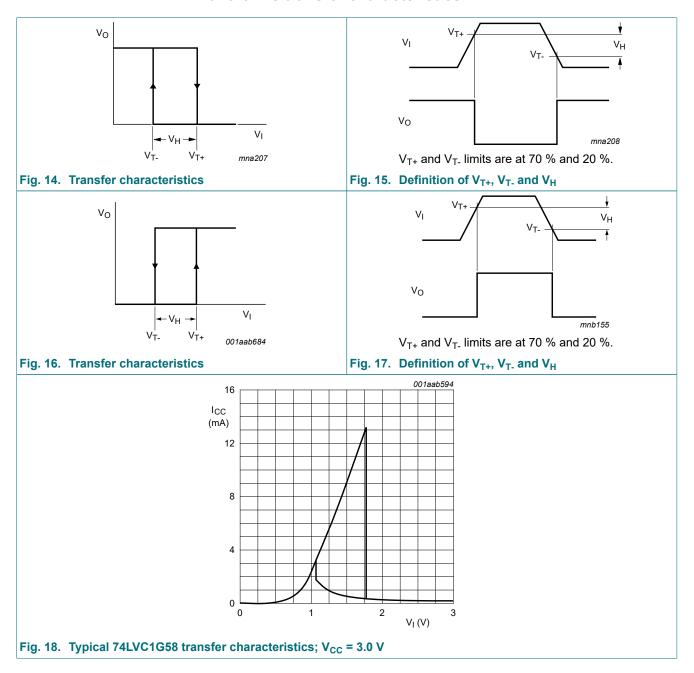
At recommended operating conditions; voltages are referenced to GND (ground = 0 V).

Symbol	Parameter	Conditions	-40 °C to +85 °C			-40 °C to +125 °C		Unit
			Min	Typ [1]	Max	Min	Max	
V <sub>T+</sub>	positive-going threshold voltage	see <u>Fig. 14</u> , <u>Fig. 15</u> , <u>Fig. 16</u> and <u>Fig. 17</u>						
		V <sub>CC</sub> = 1.8 V	0.70	1.02	1.20	0.67	1.20	V
		V <sub>CC</sub> = 2.3 V	1.11	1.42	1.60	1.08	1.60	V
		V <sub>CC</sub> = 3.0 V	1.50	1.79	2.00	1.47	2.00	V
		V <sub>CC</sub> = 4.5 V	2.16	2.52	2.74	2.13	2.74	V
		V <sub>CC</sub> = 5.5 V	2.61	2.99	3.33	2.58	3.33	V
V <sub>T-</sub> negative-going threshold voltage	negative-going threshold voltage	see Fig. 14, Fig. 15, Fig. 16 and Fig. 17						
		V <sub>CC</sub> = 1.8 V	0.30	0.53	0.72	0.30	0.75	V
		V <sub>CC</sub> = 2.3 V	0.58	0.77	1.00	0.58	1.03	V
		V <sub>CC</sub> = 3.0 V	0.80	1.04	1.30	0.80	1.33	V
	V <sub>CC</sub> = 4.5 V	1.21	1.55	1.90	1.21	1.93	V	
	V <sub>CC</sub> = 5.5 V	1.45	1.86	2.29	1.45	2.32	V	
V <sub>H</sub> hysteresis voltage	hysteresis voltage	(V <sub>T+</sub> - V <sub>T-</sub> ); see <u>Fig. 14</u> , <u>Fig. 15</u> , <u>Fig. 16</u> and <u>Fig. 17</u>						
		V <sub>CC</sub> = 1.8 V	0.30	0.48	0.62	0.23	0.62	V
		V <sub>CC</sub> = 2.3 V	0.40	0.64	0.80	0.34	0.80	V
		V <sub>CC</sub> = 3.0 V	0.50	0.75	1.00	0.44	1.00	V
		V <sub>CC</sub> = 4.5 V	0.71	0.97	1.20	0.65	1.20	V
		V <sub>CC</sub> = 5.5 V	0.71	1.13	1.40	0.65	1.40	V

<sup>[1]</sup> Typical values are measured at  $T_{amb}$  = 25 °C.

### Low-power configurable multiple function gate

### 12.1. Waveforms transfer characteristics



### Low-power configurable multiple function gate

# 13. Package outline

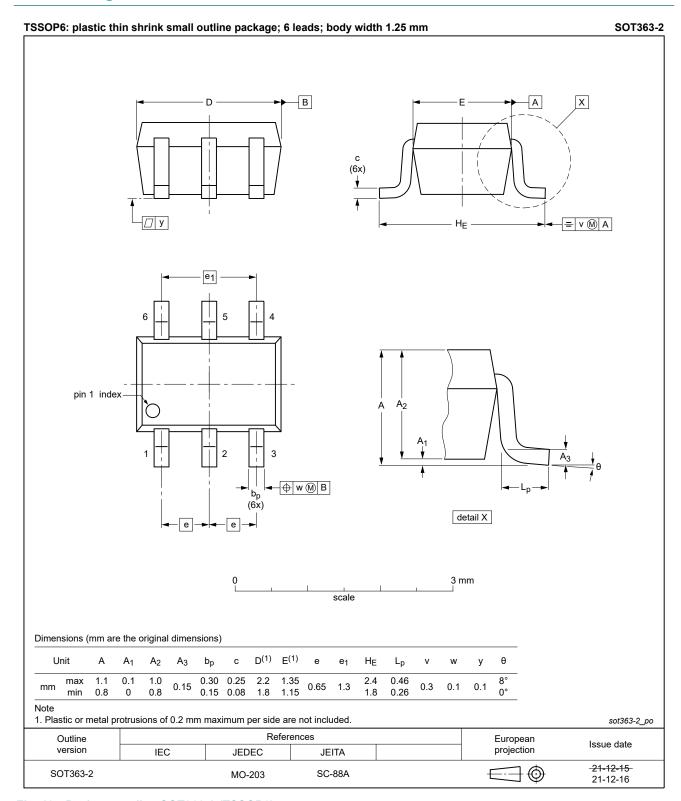


Fig. 19. Package outline SOT363-2 (TSSOP6)

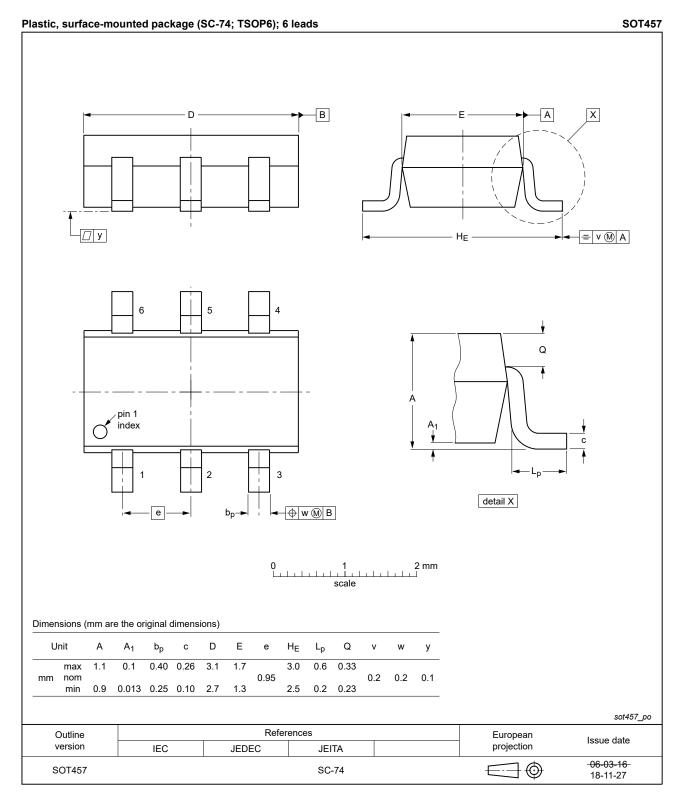


Fig. 20. Package outline SOT457 (SC-74; TSOP6)

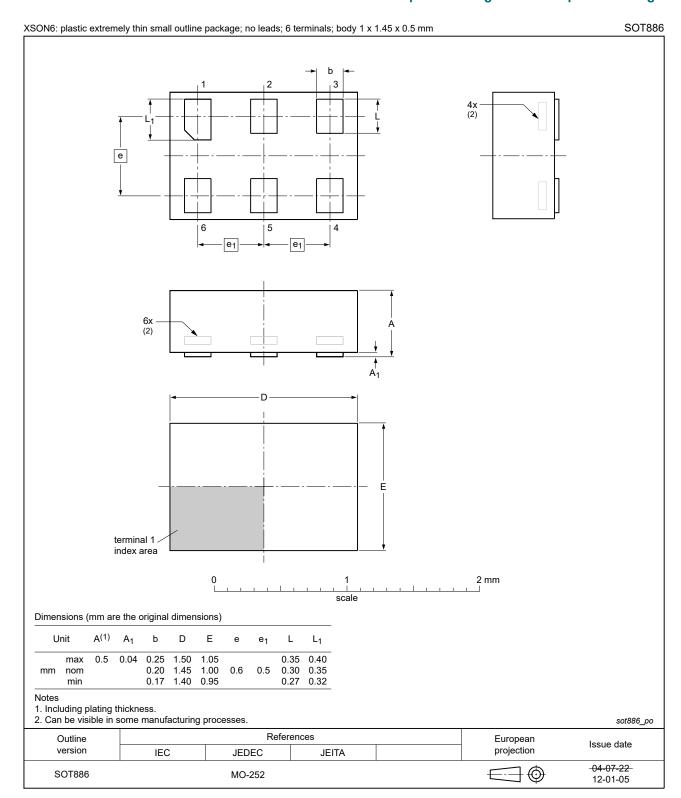


Fig. 21. Package outline SOT886 (XSON6)

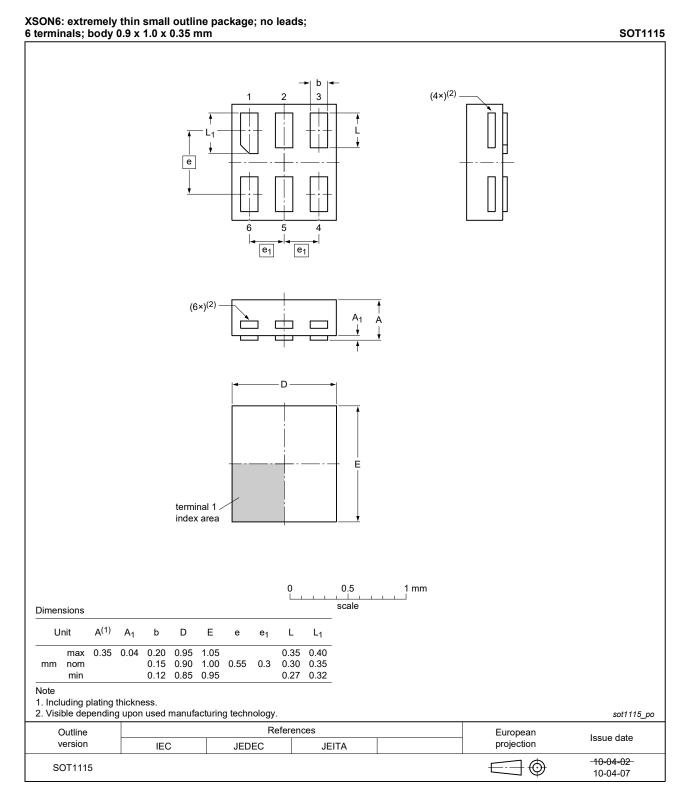


Fig. 22. Package outline SOT1115 (XSON6)

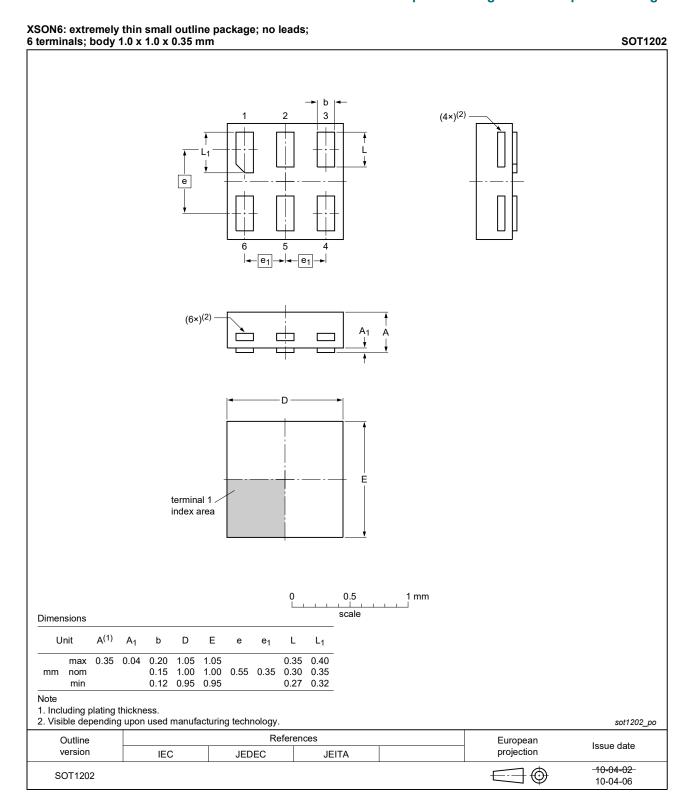


Fig. 23. Package outline SOT1202 (XSON6)

### Low-power configurable multiple function gate

# 14. Abbreviations

#### **Table 13. Abbreviations**

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

# 15. Revision history

#### **Table 14. Revision history**

Document ID	Release date	Data sheet status	Change notice	Supersedes		
74LVC1G58 v.12	20230818	Product data sheet	-	74LVC1G58 v.11		
Modifications:	Section 2: E	<u>Section 2</u> : ESD specification updated according to the latest JEDEC standard.				
74LVC1G58 v.11	20220201	Product data sheet	-	74LVC1G58 v.10		
Modifications:	Package St	Package SOT363 (SC-88) changed to SOT363-2 (TSSOP6).				
74LVC1G58 v.10	20210607	Product data sheet	-	74LVC1G58 v.9		
Modifications:	guidelines of Legal texts Type number Section 1 a Section 8: [	<ul> <li>The format of this data sheet has been redesigned to comply with the identity guidelines of Nexperia.</li> <li>Legal texts have been adapted to the new company name where appropriate.</li> <li>Type number 74LVC1G58GF (SOT891 / XSON6) removed.</li> <li>Section 1 and Section 2 updated.</li> <li>Section 8: Derating values for P<sub>tot</sub> total power dissipation updated.</li> <li>Fig. 20: Package outline drawing SOT457 (SC-74; TSOP6) updated.</li> </ul>				
74LVC1G58 v.9	20161207	Product data sheet	-	74LVC1G58 v.8		
Modifications:	• <u>Table 8</u> : The	e maximum limits for leaka	ige current and su	pply current have changed.		
74LVC1G58 v.8	20140422	Product data sheet	-	74LVC1G58 v.7		
Modifications:	• Package ou	Package outline drawing of SOT886 (Fig. 21) modified.				
74LVC1G58 v.7	20111206	Product data sheet	-	74LVC1G58 v.6		
Modifications:	Legal page:	Legal pages updated.				
74LVC1G58 v.6	20110923	Product data sheet	-	74LVC1G58 v.5		
74LVC1G58 v.5	20101015	Product data sheet	-	74LVC1G58 v.4		
74LVC1G58 v.4	20090427	Product data sheet	-	74LVC1G58 v.3		
74LVC1G58 v.3	20070827	Product data sheet	-	74LVC1G58 v.2		
74LVC1G58 v.2	20070222	Product data sheet	-	74LVC1G58 v.1		
74LVC1G58 v.1	20040915	Product data sheet	-	-		

### 16. Legal information

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Document status [1][2]	Product status [3]	Definition
Objective [short] data sheet	Development	This document contains data from the objective specification for product development.
Preliminary [short] data sheet	Qualification	This document contains data from the preliminary specification.
Product [short] data sheet	Production	This document contains the product specification.

- Please consult the most recently issued document before initiating or completing a design.
- [2] The term 'short data sheet' is explained in section "Definitions".
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74LVC1G58

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For more information, please visit: http://www.nexperia.com For sales office addresses, please send an email to: salesaddresses@nexperia.com Date of release: 18 August 2023

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