SINGLE 2 INPUT POSITIVE OR GATE

Description

The 74LVC1G32 is a single 2-input positive OR gate with a standard push-pull output. The device is designed for operation with a power supply range of 1.65V to 5.5V. The inputs are tolerant to 5.5V allowing this device to be used in a mixed voltage environment. The device is fully specified for partial power down applications using I_{OFF}. The I_{OFF} circuitry disables the output preventing damaging current backflow when the device is powered down.

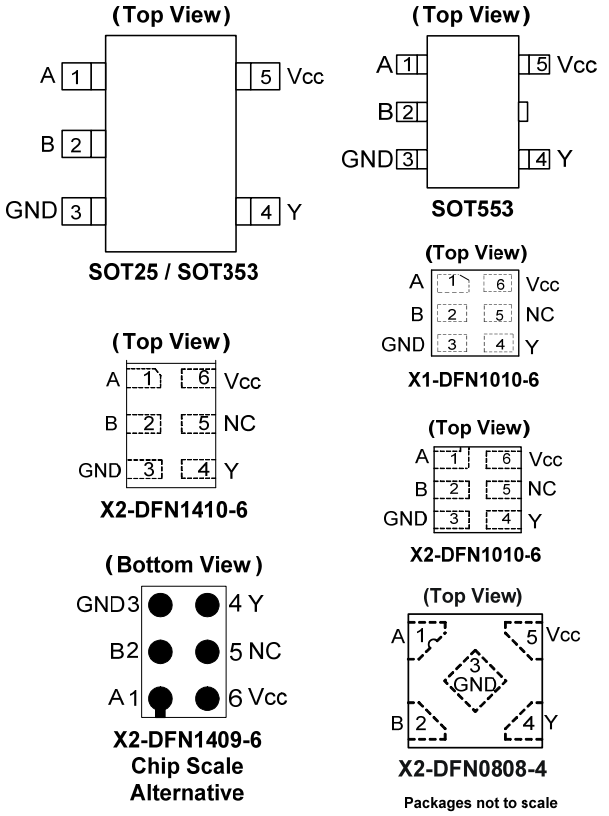
The gate performs the positive Boolean function:

$$Y = A + B \text{ or } Y = \overline{\overline{A} \bullet \overline{B}}$$

Features

- Wide Supply Voltage Range from 1.65 to 5.5V
- ± 24mA Output Drive at 3.3V
- CMOS Low Power Consumption
- I_{OFF} Supports Partial-Power-Down Mode Operation
- Inputs Accept Up to 5.5V
- ESD Protection Tested per JESD 22
  - Exceeds 200-V Machine Model (A115)
  - Exceeds 2000-V Human Body Model (A114)
  - Exceeds 1000-V Charged Device Model (C101)
- Latch-Up Exceeds 100mA per JESD 78, Class I
- Range of Package Options
- Direct Interface with TTL Levels
- **Totally Lead-Free & Fully RoHS Compliant (Notes 1 & 2)**
- **Halogen and Antimony Free. "Green" Device (Note 3)**

Pin Assignments



Applications

- Voltage Level Shifting
- General Purpose Logic
- Power Down Signal Isolation
- Wide Array of Products Such as.
  - PCs, Networking, Notebooks, Netbooks, PDAs
  - Tablet Computers, E-readers
  - Computer Peripherals, Hard Drives, CD/DVD ROM
  - TV, DVD, DVR, set top box
  - Cell Phones, Personal Navigation / GPS
  - MP3 players ,Cameras, Video Recorders

Notes:
1. No purposely added lead. Fully EU Directive 2002/95/EC (RoHS) & 2011/65/EU (RoHS 2) compliant.
2. See http://www.diodes.com/quality/lead_free.html for more information about Diodes Incorporated's definitions of Halogen- and Antimony-free, "Green" and Lead-free.
3. Halogen- and Antimony-free "Green" products are defined as those which contain <900ppm bromine, <900ppm chlorine (<1500ppm total Br + Cl) and <1000ppm antimony compounds.

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Ordering Information

74 LVC1G 32 XXX -7

Logic Device	Function	Package	Packing
74 : Logic Prefix LVC : 1.65 to 5.5 V Logic Family 1G : One Gate	32 : 2-Input OR Gate	W5 : SOT25 SE : SOT353 Z : SOT553 FS3 : X2-DFN0808-4 FW5 : X1-DFN1010-6 FW4 :X2-DFN1010-6 FX4 : X2- DFN1409-6 FZ4 : X2- DFN1410-6	-7 : 7" Tape & Reel

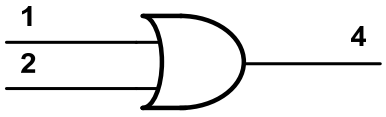
Part Number	Package Code	Package (Notes 4 & 5)	Package Size	7" Tape and Reel	
				Quantity	Part Number Suffix
74LVC1G32W5-7	W5	SOT25	3.0mm X 2.8mm X 1.2mm 0.95 mm lead pitch	3000/Tape & Reel	-7
74LVC1G32SE-7	SE	SOT353	2.0mm X 2.0mm X 1.1mm 0.65 mm lead pitch	3000/Tape & Reel	-7
74LVC1G32Z-7	Z	SOT553	1.6mm X 1.6 mm X 0.62mm 0.5 mm lead pitch	4000/Tape & Reel	-7
74LVC1G32FS3-7	FS3	X2-DFN0808-4	0.9mm X 0.9 mm X 0.35mm 0.5 mm pad pitch (diamond)	5000/Tape & Reel	-7
74LVC1G32FW5-7	FW5	X1-DFN1010-6	1.0mm X 1.0mm X 0.5mm 0.35 mm pad pitch	5000/Tape & Reel	-7
74LVC1G32FW4-7	FW4	X2-DFN1010-6	1.0mm X 1.0mm X 0.4mm 0.35 mm pad pitch	5000/Tape & Reel	-7
74LVC1G32FX4-7	FX4	X2-DFN1409-6 **(Chip scale alternative)**	1.4mm X 0.9mm X 0.4mm 0.5 mm pad pitch	5000/Tape & Reel	-7
74LVC1G32FZ4-7	FZ4	X2-DFN1410-6	1.4mm X 1.0mm X 0.4mm 0.5 mm pad pitch	5000/Tape & Reel	-7

Notes: 4. Pad layout as shown on Diodes Inc. suggested pad layout document AP02001, which can be found on our website at http://www.diodes.com/datasheets/ap02001.pdf.
5. The taping orientation is located on our website at http://www.diodes.com/datasheets/ap02007.pdf

Pin Descriptions

Pin Name	Description
A	Data Input
B	Data Input
GND	Ground
Y	Data Output
V_{CC}	Supply Voltage
NC	No Connection

Logic Diagram



Function Table

Inputs		Output
A	B	Y
H	X	H
X	H	H
L	L	L

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Absolute Maximum Ratings (Notes 6 & 7) (@T_A = +25°C, unless otherwise specified.)

Symbol	Description	Rating	Unit
ESD HBM	Human Body Model ESD Protection	2	kV
ESD CDM	Charged Device Model ESD Protection	1	kV
ESD MM	Machine Model ESD Protection	200	V
V_{CC}	Supply Voltage Range	-0.5 to 6.5	V
V_I	Input Voltage Range	-0.5 to 6.5	V
V_O	Voltage Applied to Output in High Impedance or I_{OFF} State	-0.5 to 6.5	V
V_O	Voltage Applied to Output in High or Low State.	-0.5 to V_{CC} +0.5	V
I_{IK}	Input Clamp Current V_I < 0	-50	mA
I_{OK}	Output Clamp Current	-50	mA
I_O	Continuous Output Current	±50	mA
I_{CC}, I_{GND}	Continuous Current Through V_{CC} or GND	±100	mA
T_J	Operating Junction Temperature	-40 to +150	°C
T_{STG}	Storage Temperature	-65 to +150	°C

Notes: 6. Stresses beyond the absolute maximum may result in immediate failure or reduced reliability. These are stress values and device operation should be within recommend values.
7. Forcing the maximum allowed voltage could cause a condition exceeding the maximum current or conversely forcing the maximum current could cause a condition exceeding the maximum voltage. The ratings of both current and voltage must be maintained within the controlled range..

Recommended Operating Conditions (Note 8) (@T_A = +25°C, unless otherwise specified.)

Symbol	Parameter		Min	Max	Unit
V_{CC}	Operating Voltage	Operating	1.65	5.5	V
		Data retention only	1.5	—	V
V_{IH}	High-Level Input Voltage	V_{CC} = 1.65V to 1.95V	0.65 X V_{CC}	—	V
		V_{CC} = 2.3V to 2.7V	1.7	—	
		V_{CC} = 3V to 3.6V	2	—	
		V_{CC} = 4.5V to 5.5V	0.7 X V_{CC}	—	
V_{IL}	Low-Level Input voltage	V_{CC} = 1.65V to 1.95V	—	0.35 X V_{CC}	V
		V_{CC} = 2.3V to 2.7V	—	0.7	
		V_{CC} = 3V to 3.6V	—	0.8	
		V_{CC} = 4.5V to 5.5V	—	0.3 X V_{CC}	
V_I	Input Voltage		0	5.5	V
V_O	Output Voltage		0	V_{CC}	V
I_{OH}	High-Level Output Current	V_{CC} = 1.65V	—	-4	mA
		V_{CC} = 2.3V	—	-8	
		V_{CC} = 2.7V	—	-12	
		V_{CC} = 3V	—	-16	
			—	-24	
		V_{CC} = 4.5V	—	-32	
I_{OL}	Low-Level Output Current	V_{CC} = 1.65V	—	4	mA
		V_{CC} = 2.3V	—	8	
		V_{CC} = 2.7V	—	12	
		V_{CC} = 3V	—	16	
			—	24	
		V_{CC} = 4.5V	—	32	
Δt/ΔV	Input transition Rise or Fall Rate	V_{CC} = 1.8V ± 0.15V, 2.5V ± 0.2V	—	20	ns/V
		V_{CC} = 3.3V ± 0.3V	—	10	
		V_{CC} = 5V ± 0.5V	—	5	
T_A	Operating Free-Air Temperature	—	-40	+125	°C

Note: 8. Unused inputs should be held at V_{CC} or Ground.

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Electrical Characteristics (All typical values are at V_{CC} = 3.3V, T_A = +25°C)

Symbol	Parameter	Test Conditions	V_{CC}	-40°C to +85°C			-40°C to +125°C		Unit
				Min	Typ	Max	Min	Max	
V_{OH}	High-Level Output Voltage	I_{OH} = -100µA	1.65V to 5.5V	V_{CC} – 0.1	—	—	V_{CC} – 0.1	—	V
		I_{OH} = -4mA	1.65V	1.2	—	—	0.95	—	
		I_{OH} = -8mA	2.3V	1.9	—	—	1.7	—	
		I_{OL} = -12mA	2.7V	2.2	—	—	1.9	—	
		I_{OH} = -16mA	3V	2.4	—	—	2.2	—	
		I_{OH} = -24mA		2.3	—	—	2.0	—	
		I_{OH} = -32mA	4.5V	3.8	—	—	3.4	—	
V_{OL}	Low-Level Output Voltage	I_{OL} = 100µA	1.65V to 5.5V	—	—	0.1	—	0.1	V
		I_{OL} = 4mA	1.65V	—	—	0.45	—	0.7	
		I_{OL} = 8mA	2.3V	—	—	0.3	—	0.45	
		I_{OL} = 12mA	2.7V	—	—	0.4	—	0.6	
		I_{OL} = 16mA	3V	—	—	0.4	—	0.6	
		I_{OL} = 24mA		—	—	0.55	—	0.8	
		I_{OL} = 32mA	4.5V	—	—	0.55	—	.8	
I_I	Input Current	V_I = 5.5 V or GND	0 to 5.5V	—	± 0.1	±5	—	± 100	µA
I_{OFF}	Power Down Leakage Current	V_I or V_O = 5.5V	0V	—	—	±10	—	±200	µA
I_{CC}	Supply Current	V_I = 5.5V or GND I_O=0	5.5V	—	0.1	10	—	200	µA
ΔI_{CC}	Additional Supply Current	One input at V_{CC} –0.6V Other inputs at V_{CC} or GND	3V to 5.5V	—	—	500	—	5000	µA
C_i	Input Capacitance	V_i = V_{CC} – or GND	3.3V	—	5	—	—	—	pF

Package Characteristics (All typical values are at V_{CC} = 3.3V, T_A = +25°C)

Symbol	Parameter	Test Conditions	V_{CC}	Min	Typ.	Max	Unit
θ_{JA}	Thermal Resistance Junction-to-Ambient	SOT25	(Note 9)	—	204	—	°C/W
		SOT353		—	371	—	
		SOT553		—	231	—	
		X2-DFN0808-4		—	400	—	
		X1-DFN1010-6		—	435	—	
		X2-DFN1010-6		—	445	—	
		X2-DFN1409-6		—	470	—	
		X2-DFN1410-6		—	460	—	
θ_{JC}	Thermal Resistance Junction-to-Case	SOT25	(Note 9)	—	52	—	°C/W
		SOT353		—	143	—	
		SOT553		—	105	—	
		X2-DFN0808-4		—	225	—	
		X1-DFN1010-6		—	250	—	
		X2-DFN1010-6		—	250	—	
		X2-DFN1409-6		—	275	—	
		X2-DFN1410-6		—	265	—	

Note: 9. Test condition for each of the 8 package types: Device mounted on FR-4 substrate PC board, 2oz copper, with minimum recommended pad layout.

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Switching Characteristics

Figure 1 Typical Values at T_A = +25°C and nominal voltages 1.8V, 2.5V, 2.7V, 3.3V, and 5.0V.

Parameter	From Input	To Output	V_{CC}	T_A = -40°C to +85°C			T_A = -40°C to +125°C		Unit
				Min	Typ.	Max	Min	Max	
t_{pd}	A or B	Y	1.8V ± 0.15V	1.0	3.1	8.0	1.0	10.5	ns
			2.5V ± 0.2V	0.5	2.1	5.5	0.5	7.0	
			2.7V	0.5	2.5	5.5	0.5	7.0	
			3.3V ± 0.3V	0.5	2.1	4.5	0.5	6.0	
			5.0V ± 0.5V	0.5	1.7	4.0	0.5	5.5	

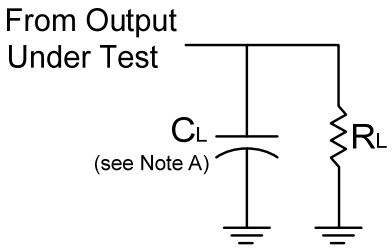
Operating Characteristics

T_A = +25°C

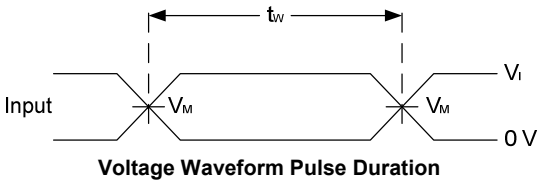
Parameter		Test Conditions	V_{CC} = 1.8V	V_{CC} = 2.5V	V_{CC} = 3.3V	V_{CC} = 5V	Unit
			Typ	Typ	Typ	Typ	
C_{pd}	Power Dissipation Capacitance	f = 10 MHz	20	20	21	22	pF

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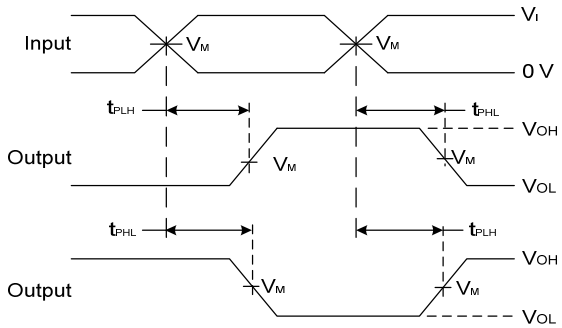
Parameter Measurement Information



V_{CC}	Inputs		V_M	C_L	R_L
	V_I	t_r/t_f			
1.8V ± 0.15V	V_{CC}	≤2ns	$V_{CC}/2$	30pF	1kΩ
2.5V ± 0.2V	V_{CC}	≤2ns	$V_{CC}/2$	30pF	500Ω
2.7V	V_{CC}	≤2.5ns	1.5V	50pF	500Ω
3.3V ± 0.3V	3.0V	≤2.5ns	1.5V	50pF	500Ω
5.0V ± 0.5V	V_{CC}	≤2.5ns	$V_{CC}/2$	50pF	500Ω



Voltage Waveform Pulse Duration



Voltage Waveform Propagation Delay Times
Inverting and Non Inverting Outputs

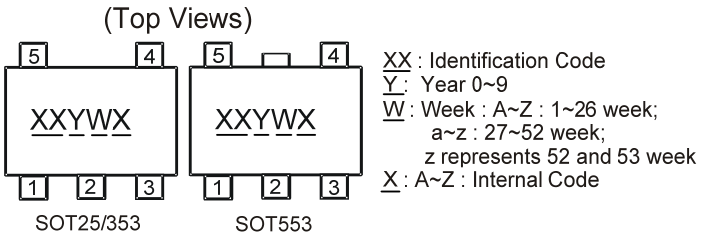
Figure 1 Load Circuit and Voltage Waveforms

Notes: A. Includes test lead and test apparatus capacitance.
B. All pulses are supplied at pulse repetition rate ≤ 10MHz.
C. Inputs are measured separately one transition per measurement.
D. t_{PLH} and t_{PHL} are the same as t_{PD}.

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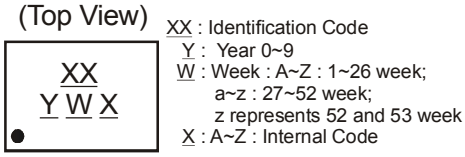
Marking Information

(1) SOT25, SOT353 and SOT553



Part Number	Package	Identification Code
74LVC1G32W5-7	SOT25	UW
74LVC1G32SE-7	SOT353	UW
74LVC1G32Z-7	SOT553	UW

(2) DFN Packages



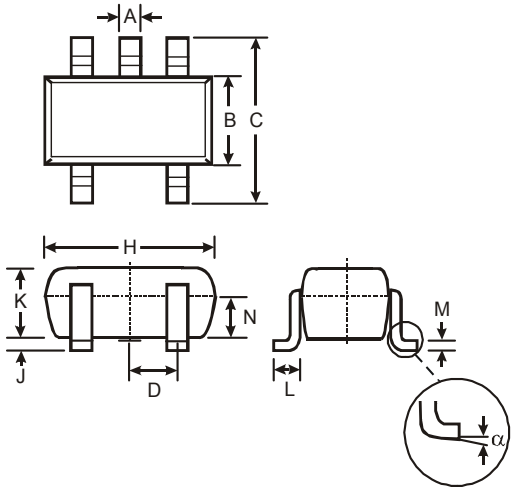
Part Number	Package	Identification Code
74LVC1G32FS3-7	X2-DFN0808-4	WW
74LVC1G32FW5-7	X1-DFN1010-6	VP
74LVC1G32FW4-7	X2-DFN1010-6	UW
74LVC1G32FX4-7	X2-DFN1409-6	MJ
74LVC1G32FZ4-7	X2-DFN1410-6	UW

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Package Outline Dimensions (All dimensions in mm.)

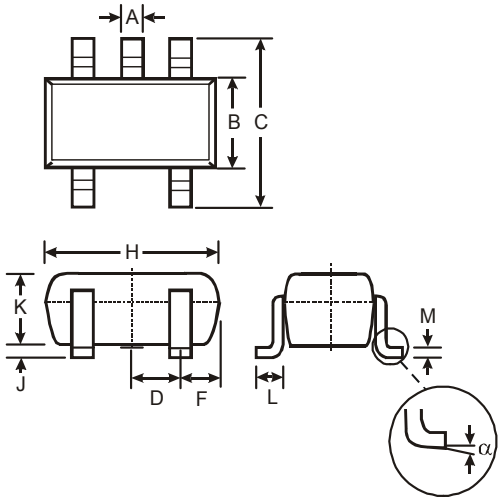
Please see AP02002 at http://www.diodes.com/datasheets/ap02002.pdf for latest version.

(1) SOT25



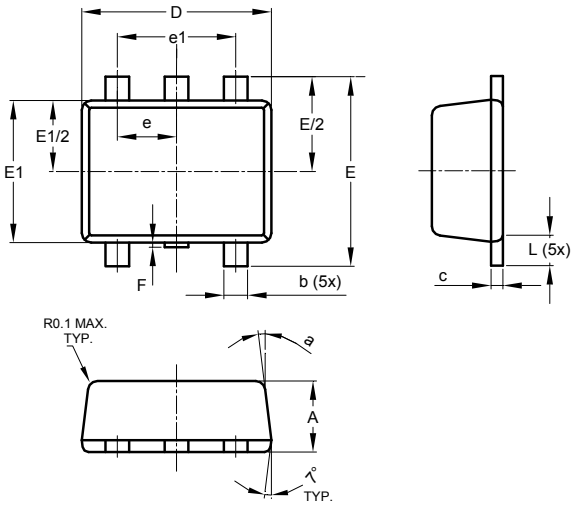
SOT25			
Dim	**Min**	**Max**	**Typ**
A	0.35	0.50	0.38
B	1.50	1.70	1.60
C	2.70	3.00	2.80
D	—	—	0.95
H	2.90	3.10	3.00
J	0.013	0.10	0.05
K	1.00	1.30	1.10
L	0.35	0.55	0.40
M	0.10	0.20	0.15
N	0.70	0.80	0.75
α	0°	8°	—
All Dimensions in mm			

(2) SOT353



SOT353		
Dim	**Min**	**Max**
A	0.10	0.30
B	1.15	1.35
C	2.00	2.20
D	0.65 Typ	
F	0.40	0.45
H	1.80	2.20
J	0	0.10
K	0.90	1.00
L	0.25	0.40
M	0.10	0.22
α	0°	8°
All Dimensions in mm		

(3) SOT553



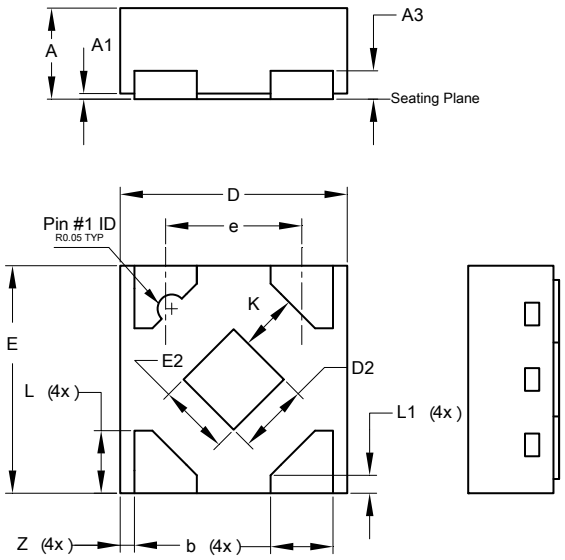
SOT553			
Dim	**Min**	**Max**	**Typ**
A	0.55	0.62	0.60
b	0.15	0.30	0.20
c	0.10	0.18	0.15
D	1.50	1.70	1.60
E	1.55	1.70	1.60
E1	1.10	1.25	1.20
e	0.50 BSC		
e1	1.00 BSC		
F	0.00	0.10	—
L	0.10	0.30	0.20
a	6°	8°	7°
All Dimensions in mm			

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Package Outline Dimensions (cont.) (All dimensions in mm.)

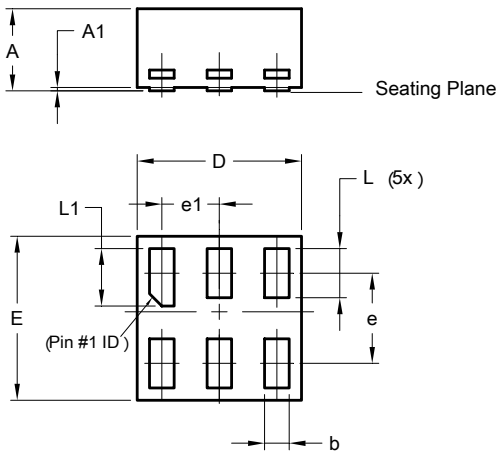
Please see AP02002 at http://www.diodes.com/datasheets/ap02002.pdf for latest version.

(4) X2-DFN0808-4



X2-DFN0808-4			
Dim	**Min**	**Max**	**Typ**
A	0.25	0.35	0.30
A1	0	0.04	0.02
A3	-	-	0.13
b	0.17	0.27	0.22
D	0.75	0.85	0.80
D2	0.15	0.35	0.25
E	0.75	0.85	0.80
E2	0.15	0.35	0.25
e	-	-	0.48
K	0.20	-	-
L	0.17	0.27	0.22
L1	0.02	0.12	0.07
Z	-	-	0.05
All Dimensions in mm			

(5) X1-DFN1010-6



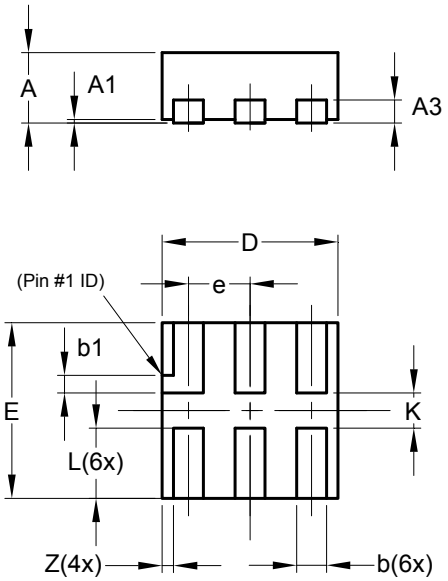
X1-DFN1010-6			
Dim	**Min**	**Max**	**Typ**
A	-	0.50	0.39
A1	-	0.04	-
b	0.12	0.20	0.15
D	0.95	1.050	1.00
E	0.95	1.050	1.00
e	0.55 BSC		
e1	0.35 BSC		
L	0.27	0.35	0.30
L1	0.32	0.40	0.35
All Dimensions in mm			

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Package Outline Dimensions (cont.) (All dimensions in mm.)

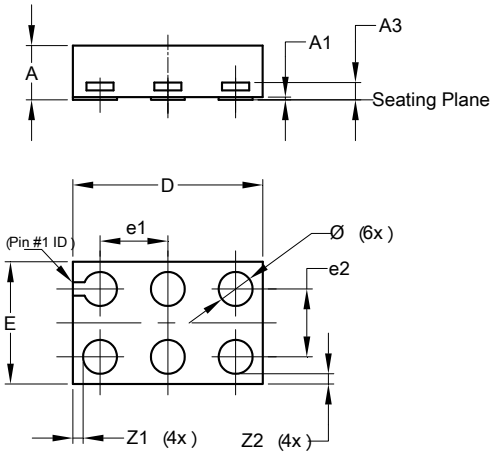
Please see AP02002 at http://www.diodes.com/datasheets/ap02002.pdf for latest version.

(6) X2-DFN1010-6



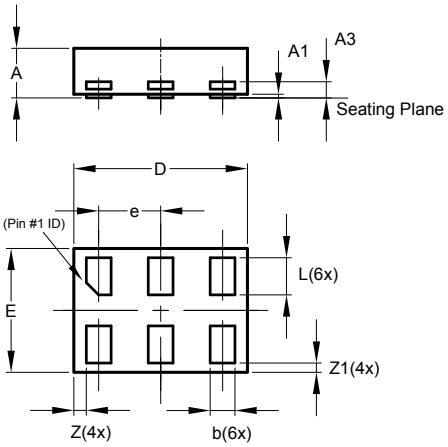
X2-DFN1010-6			
Dim	**Min**	**Max**	**Typ**
A	—	0.40	0.39
A1	0.00	0.05	0.02
A3	—	—	0.13
b	0.14	0.20	0.17
b1	0.05	0.15	0.10
D	0.95	1.05	1.00
E	0.95	1.05	1.00
e	—	—	0.35
L	0.35	0.45	0.40
K	0.15	—	—
Z	—	—	0.065
All Dimensions in mm			

(7) X2-DFN1409-6 CHIP SCALE ALTERNATIVE



X2-DFN1409-6			
Dim	**Min**	**Max**	**Typ**
A	-	0.40	0.39
A1	0	0.05	0.02
A3	-	-	0.13
Ø	0.20	0.30	0.25
D	1.35	1.45	1.40
E	0.85	0.95	0.90
e1	-	-	0.50
e2	-	-	0.50
Z1	-	-	0.075
Z2	-	-	0.075
All Dimensions in mm			

(8) X2-DFN1410-6



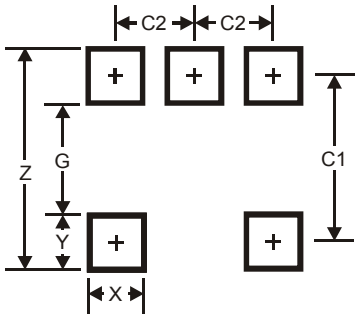
X2-DFN1410-6			
Dim	**Min**	**Max**	**Typ**
A	—	0.40	0.39
A1	0.00	0.05	0.02
A3	—	—	0.13
b	0.15	0.25	0.20
D	1.35	1.45	1.40
E	0.95	1.05	1.00
e	—	—	0.50
L	0.25	0.35	0.30
Z	—	—	0.10
Z1	0.045	0.105	0.075
All Dimensions in mm			

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Suggested Pad Layout

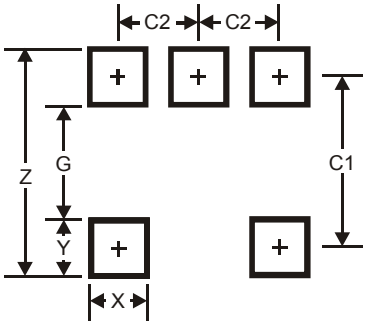
Please see AP02001 at http://www.diodes.com/datasheets/ap02001.pdf for the latest version.

(1) SOT25



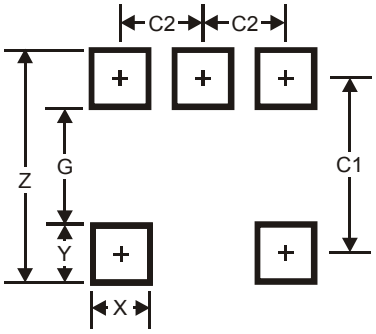
Dimensions	Value (in mm)
Z	3.20
G	1.60
X	0.55
Y	0.80
C1	2.40
C2	0.95

(2) SOT353



Dimensions	Value (in mm)
Z	2.5
G	1.3
X	0.42
Y	0.6
C1	1.9
C2	0.65

(3) SOT553



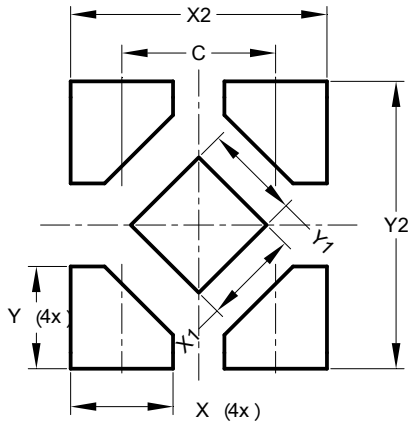
Dimensions	Value (in mm)
Z	2.2
G	1.2
X	0.375
Y	0.5
C1	1.7
C2	0.5

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Suggested Pad Layout (cont.)

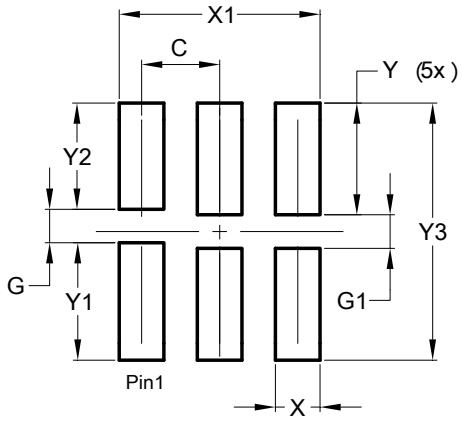
Please see AP02001 at http://www.diodes.com/datasheets/ap02001.pdf for the latest version.

(4) X2-DFN0808-4



Dimensions	Value (in mm)
C	0.480
X	0.320
X1	0.300
X2	0.800
Y	0.320
Y1	0.300
Y2	0.900

(5) X1-DFN1010-6



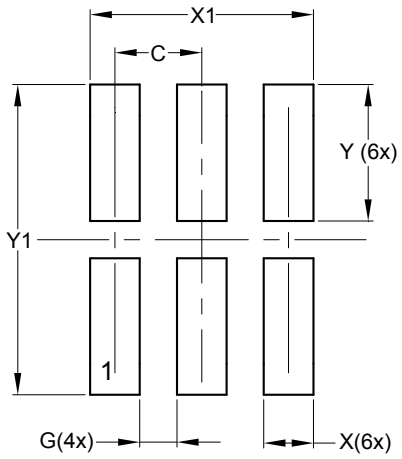
Dimensions	Value (in mm)
C	0.350
G	0.150
G1	0.150
X	0.200
X1	0.900
Y	0.500
Y1	0.525
Y2	0.475
Y3	1.150

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Suggested Pad Layout (cont.)

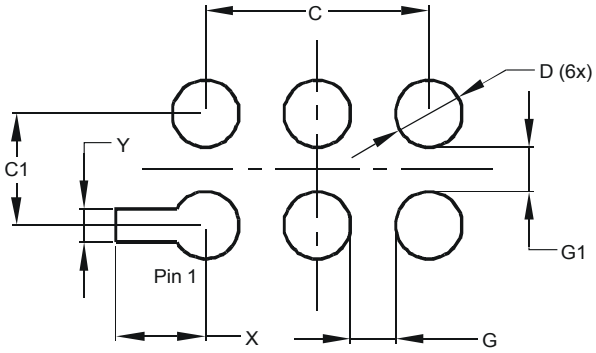
Please see AP02001 at http://www.diodes.com/datasheets/ap02001.pdf for the latest version.

(6) X2-DFN1010-6



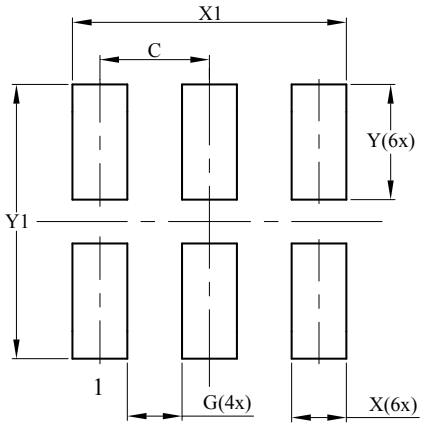
Dimensions	Value (in mm)
C	0.350
G	0.150
X	0.200
X1	0.900
Y	0.550
Y1	1.250

(7) X2-DFN1409-6



Dimensions	Value (in mm)
C	1.000
C1	0.500
D	0.300
G	0.200
G1	0.200
X	0.400
Y	0.150

(8) X2-DFN1410-6



Dimensions	Value (in mm)
C	0.500
G	0.250
X	0.250
X1	1.250
Y	0.525
Y1	1.250

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