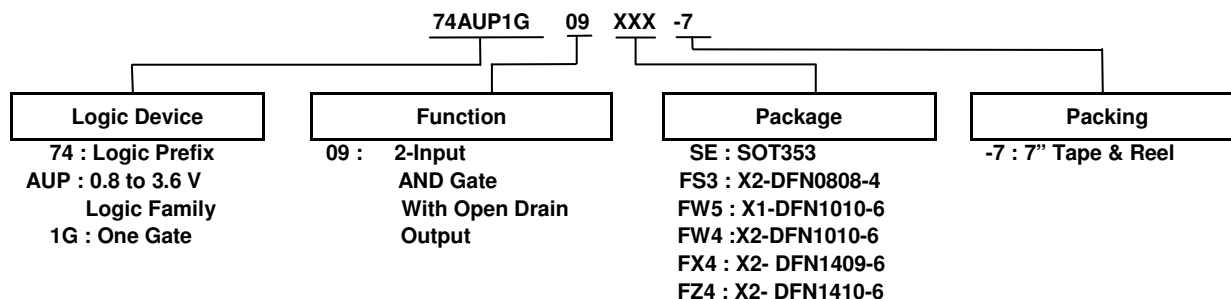


## Ordering Information



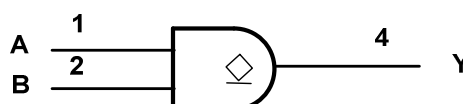
Device	Package Code	Package (Notes 4 & 5)	Package Size	7" Tape and Reel	
				Quantity	Part Number Suffix
74AUP1G09SE-7	SE	SOT353	2.0mm x 2.0mm x 1.1mm 0.65 mm lead pitch	3,000/Tape & Reel	-7
74AUP1G09FS3-7	FS3	X2-DFN0808-4	0.8mm x 0.8mm x 0.35mm 0.5 mm pad pitch (diamond)	5,000/Tape & Reel	-7
74AUP1G09FW5-7	FW5	X1-DFN1010-6	1.0mm x 1.0mm x 0.5mm 0.35 mm pad pitch	5,000/Tape & Reel	-7
74AUP1G09FW4-7	FW4	X2-DFN1010-6	1.0mm x 1.0mm x 0.4mm 0.35 mm pad pitch	5,000/Tape & Reel	-7
74AUP1G09FX4-7	FX4	X2-DFN1409-6 Chip Scale Alternative	1.4mm x 0.9mm x 0.4mm 0.5 mm pad pitch	5,000/Tape & Reel	-7
74AUP1G09FZ4-7	FZ4	X2-DFN1410-6	1.4mm x 1.0mm x 0.4mm 0.5 mm pad pitch	5,000/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	Function
A	Data Input
B	Data Input
GND	Ground
Y	Data Output
Vcc	Supply Voltage

## Logic Diagram



## Function Table

Inputs		Output
A	B	Y
L	L	L
L	H	L
H	L	L
H	H	Z

## Absolute Maximum Ratings (Notes 6 & 7) (@T<sub>A</sub> = +25°C, unless otherwise specified.)

Symbol	Parameter	Rating	Unit
ESD HBM	Human Body Model ESD Protection	2	kV
ESD CDM	Charged Device Model ESD Protection	1	kV
V <sub>CC</sub>	Supply Voltage Range	-0.5 to +4.6	V
V <sub>I</sub>	Input Voltage Range	-0.5 to +4.6	V
V <sub>O</sub>	Voltage applied to output in High or Low State	-0.5 to +4.6	V
I <sub>IK</sub>	Input Clamp Current V <sub>I</sub> < 0	50	mA
I <sub>OK</sub>	Output Clamp Current (V <sub>O</sub> < 0)	50	mA
I <sub>O</sub>	Continuous Output Current (V <sub>O</sub> = 0 to V <sub>CC</sub> )	±20	mA
I <sub>CC</sub>	Continuous Current Through V <sub>CC</sub>	50	mA
I <sub>GND</sub>	Continuous Current Through GND	-50	mA
T <sub>J</sub>	Operating Junction Temperature	-40 to +150	°C
T <sub>STG</sub>	Storage Temperature	-65 to +150	°C

- Notes:
- 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.
  - 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<sub>A</sub> = +25°C, unless otherwise specified.)

Symbol	Parameter		Min	Max	Unit	
V <sub>CC</sub>	Operating Voltage		0.8	3.6	V	
V <sub>I</sub>	Input Voltage		0	3.6	V	
V <sub>O</sub>	Output Voltage		0	3.6	V	
I <sub>OL</sub>	Low-Level Output Current	V <sub>CC</sub> = 0.8V	—	20	μA	
		V <sub>CC</sub> = 1.1V	—	1.1	mA	
		V <sub>CC</sub> = 1.4V	—	1.7		
		V <sub>CC</sub> = 1.65V	—	1.9		
		V <sub>CC</sub> = 2.3V	—	3.1		
		V <sub>CC</sub> = 3.0V	—	4		
Δt/ΔV	Input Transition Rise or Fall Rate	V <sub>CC</sub> = 0.8V to 3.6V		—	200	ns/V
T <sub>A</sub>	Operating Free-Air Temperature		-40	125	°C	

- Note:
- Unused inputs should be held at V<sub>CC</sub> or Ground.

**Electrical Characteristics** (@T<sub>A</sub> = +25 °C, unless otherwise specified.)

Symbol	Parameter	Test Conditions	V <sub>CC</sub>	T <sub>A</sub> = +25 °C		T <sub>A</sub> = -40 °C to +85 °C		Unit
				Min	Max	Min	Max	
V <sub>IH</sub>	High-Level Input Voltage	—	0.8V to 1.65V	0.80 x V <sub>CC</sub>	—	0.80 x V <sub>CC</sub>	—	V
		—	1.65V to 1.95V	0.65 x V <sub>CC</sub>	—	0.65 x V <sub>CC</sub>	—	
		—	2.3V to 2.7V	1.6	—	1.6	—	
		—	3.0V to 3.6V	2.0	—	2.0	—	
V <sub>IL</sub>	Low-Level Input voltage	—	0.8V to 1.65V	—	0.30 x V <sub>CC</sub>	—	0.30 x V <sub>CC</sub>	V
		—	1.65V to 1.95V	—	0.35 x V <sub>CC</sub>	—	0.35 x V <sub>CC</sub>	
		—	2.3V to 2.7V	—	0.7	—	0.7	
		—	3.0V to 3.6V	—	0.9	—	0.9	
V <sub>OL</sub>	Low-Level Output Voltage	I <sub>OL</sub> = 20μA	0.8V to 3.6V	—	0.1	—	0.1	V
		I <sub>OL</sub> = 1.1mA	1.1V	—	0.3 x V <sub>CC</sub>	—	0.3 x V <sub>CC</sub>	
		I <sub>OL</sub> = 1.7mA	1.4V	—	0.31	—	0.37	
		I <sub>OL</sub> = 1.9mA	1.65V	—	0.31	—	0.35	
		I <sub>OL</sub> = 2.3mA	2.3V	—	0.31	—	0.33	
		I <sub>OL</sub> = 3.1mA		—	0.44	—	0.45	
		I <sub>OL</sub> = 2.7mA	3V	—	0.31	—	0.33	
		I <sub>OL</sub> = 4mA		—	0.44	—	0.45	
I <sub>I</sub>	Input Current	A or B Input V <sub>I</sub> = GND to 3.6V	0V to 3.6V	—	± 0.1	—	± 0.5	μA
I <sub>OFF</sub>	Power Down Leakage Current	V <sub>I</sub> or V <sub>O</sub> = 0V to 3.6V	0	—	± 0.2	—	± 0.5	μA
I <sub>OZ</sub>	Z State Leakage Current	V <sub>O</sub> = 3.6V V <sub>I</sub> = 3.6V	3.6V	—	± 0.2	—	± 0.5	μA
ΔI <sub>OFF</sub>	Delta Power Down Leakage Current	V <sub>I</sub> or V <sub>O</sub> = 0V to 3.6V	0V to 0.2V	—	0.2	—	0.6	μA
I <sub>CC</sub>	Supply Current	V <sub>I</sub> = GND or V <sub>CC</sub> I <sub>O</sub> = 0	0.8V to 3.6V	—	0.5	—	0.9	μA
ΔI <sub>CC</sub>	Additional Supply Current	Input at V <sub>CC</sub> -0.6V	3.3V	—	40	—	50	μA

**Electrical Characteristics** (continued) (@T<sub>A</sub> = +25°C, unless otherwise specified.)

Symbol	Parameter	Test Conditions	V <sub>CC</sub>	T <sub>A</sub> = -40°C to +125°C		Unit
				Min	Max	
V <sub>IH</sub>	High-Level Input Voltage	—	0.8V to 1.65V	0.80 x V <sub>CC</sub>	—	V
		—	1.65V to 1.95V	0.70 x V <sub>CC</sub>	—	
		—	2.3V to 2.7V	1.6	—	
		—	3.0V to 3.6V	2.0	—	
V <sub>IL</sub>	Low-Level Input Voltage	—	0.8V to 1.65V	—	0.25 x V <sub>CC</sub>	V
		—	1.65V to 1.95V	—	0.35 x V <sub>CC</sub>	
		—	2.3V to 2.7V	—	0.7	
		—	3.0V to 3.6V	—	0.9	
V <sub>OL</sub>	Low-Level Output Voltage	I <sub>OL</sub> = 20 µA	0.8V to 3.6V	—	0.11	V
		I <sub>OL</sub> = 1.1 mA	1.1V	—	0.3 x V <sub>CC</sub>	
		I <sub>OL</sub> = 1.7 mA	1.4V	—	0.41	
		I <sub>OL</sub> = 1.9 mA	1.65V	—	0.39	
		I <sub>OL</sub> = 2.3 mA	2.3V	—	0.36	
		I <sub>OL</sub> = 3.1 mA		—	0.50	
		I <sub>OL</sub> = 2.7 mA	3V	—	0.36	
		I <sub>OL</sub> = 4 mA		—	0.50	
I <sub>I</sub>	Input Current	A or B Input V <sub>I</sub> = GND to 3.6V	0V to 3.6V	—	± 0.75	µA
I <sub>OFF</sub>	Power Down Leakage Current	V <sub>I</sub> or V <sub>O</sub> = 0V to 3.6V	0	—	± 3.5	µA
I <sub>OZ</sub>	Z State Leakage Current	V <sub>O</sub> = 3.6V V <sub>I</sub> = 3.6V	3.6V	—	± 1.5	µA
ΔI <sub>OFF</sub>	Delta Power Down Leakage Current	V <sub>I</sub> or V <sub>O</sub> = 0V to 3.6V	0V to 0.2V	—	± 2.5	µA
I <sub>CC</sub>	Supply Current	V <sub>I</sub> = GND or V <sub>CC</sub> , I <sub>O</sub> = 0	0.8V to 3.6V	—	3.0	µA
ΔI <sub>CC</sub>	Additional Supply Current	Input at V <sub>CC</sub> -0.6V	3.3V	—	75	µA

## Switching Characteristics

 $C_L = 5\text{pF}$ , See Figure 1

Parameter	From Input	TO OUTPUT	$V_{CC}$	$T_A = +25^\circ\text{C}$			$T_A = -40^\circ\text{C to } +85^\circ\text{C}$		$T_A = -40^\circ\text{C to } +125^\circ\text{C}$		Unit
				Min	Typ	Max	Min	Max	Min	Max	
$t_{pd}$	A	Y	0.8V	—	13.5	—	—	—	—	—	ns
			$1.2\text{V} \pm 0.1\text{V}$	1.9	4.6	10.4	1.8	11.4	1.8	12.6	
			$1.5\text{V} \pm 0.1\text{V}$	1.5	3.3	6.5	1.4	7.4	1.4	8.2	
			$1.8\text{V} \pm 0.15\text{V}$	1.2	2.9	5.1	1.1	5.9	1.1	6.5	
			$2.5\text{V} \pm 0.2\text{V}$	1.0	2.4	4.4	0.9	4.6	0.9	4.9	
			$3.3\text{V} \pm 0.3\text{V}$	0.9	2.3	4.0	0.8	4.5	0.8	4.9	

 $C_L = 10\text{pF}$ , See Figure 1

Parameter	From Input	TO OUTPUT	$V_{CC}$	$T_A = +25^\circ\text{C}$			$T_A = -40^\circ\text{C to } +85^\circ\text{C}$		$T_A = -40^\circ\text{C to } +125^\circ\text{C}$		Unit
				Min	Typ	Max	Min	Max	Min	Max	
$t_{pd}$	A	Y	0.8V	—	16.3	—	—	—	—	—	ns
			$1.2\text{V} \pm 0.1\text{V}$	2.3	5.6	12.3	2.1	13.7	2.1	15.1	
			$1.5\text{V} \pm 0.1\text{V}$	1.8	4.1	7.6	1.7	8.8	1.7	9.7	
			$1.8\text{V} \pm 0.15\text{V}$	1.6	3.2	7.3	1.4	7.1	1.4	7.0	
			$2.5\text{V} \pm 0.2\text{V}$	1.4	2.9	6.1	1.2	6.4	1.2	5.9	
			$3.3\text{V} \pm 0.3\text{V}$	1.3	2.9	5.7	1.1	5.4	1.1	5.9	

 $C_L = 15\text{pF}$ , See Figure 1

Parameter	From Input	TO OUTPUT	$V_{CC}$	$T_A = +25^\circ\text{C}$			$T_A = -40^\circ\text{C to } +85^\circ\text{C}$		$T_A = -40^\circ\text{C to } +125^\circ\text{C}$		Unit
				Min	Typ	Max	Min	Max	Min	Max	
$t_{pd}$	A	Y	0.8V	—	19.0	—	—	—	—	—	ns
			$1.2\text{V} \pm 0.1\text{V}$	2.6	7.6	14.2	2.4	15.8	2.4	17.4	
			$1.5\text{V} \pm 0.1\text{V}$	2.1	6.5	12.1	1.9	12.7	1.9	12.9	
			$1.8\text{V} \pm 0.15\text{V}$	1.9	5.5	9.6	1.7	10.1	1.7	10.3	
			$2.5\text{V} \pm 0.2\text{V}$	1.6	4.6	8.1	1.5	9.1	1.5	9.3	
			$3.3\text{V} \pm 0.3\text{V}$	1.6	4.1	7.5	1.4	8.3	1.4	9.1	

 $C_L = 30\text{pF}$ , See Figure 1

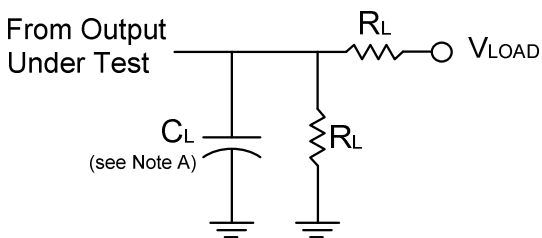
Parameter	From Input	TO OUTPUT	$V_{CC}$	$T_A = +25^\circ\text{C}$			$T_A = -40^\circ\text{C to } +85^\circ\text{C}$		$T_A = -40^\circ\text{C to } +125^\circ\text{C}$		Unit
				Min	Typ	Max	Min	Max	Min	Max	
$t_{pd}$	A	Y	0.8V	—	27	—	—	—	—	—	ns
			$1.2\text{V} \pm 0.1\text{V}$	3.6	9.5	19.5	3.2	21.8	3.2	24	
			$1.5\text{V} \pm 0.1\text{V}$	2.9	8.5	16.1	2.6	13.6	2.6	15	
			$1.8\text{V} \pm 0.15\text{V}$	2.6	7.7	15.2	2.3	13.3	2.3	14.6	
			$2.5\text{V} \pm 0.2\text{V}$	2.4	7	13.1	2.1	13.3	2.1	13.5	
			$3.3\text{V} \pm 0.3\text{V}$	2.3	6.5	12.7	2.1	12.9	2.1	12.9	

**Operating and Package Characteristics** (@T<sub>A</sub> = +25 °C, unless otherwise specified.)

Parameter		Test Conditions		V <sub>CC</sub>	Typ	Unit
C <sub>pd</sub>	Power Dissipation Capacitance	f = 1MHz No Load		0.8V	6.5	pF
				1.2V ± 0.1V	6.3	
				1.5V ± 0.1V	6.3	
				1.8V ± 0.15V	6.2	
				2.5V ± 0.2V	6.2	
				3.3V ± 0.3V	6.1	
C <sub>i</sub>	Input Capacitance	V <sub>i</sub> = V <sub>CC</sub> or GND		0V or 3.3V	1.5	pF
θ <sub>JA</sub>	Thermal Resistance Junction-to-Ambient	SOT353	(Note 9)	—	371	°C/W
		X2-DFN0808-4		—	430	
		X1-DFN1010-6		—	435	
		X2-DFN1010-6		—	445	
		X2-DFN1409-6		—	470	
		X2-DFN1410-6		—	460	
θ <sub>JC</sub>	Thermal Resistance Junction-to-Case	SOT353	(Note 9)	—	143	°C/W
		X2-DFN0808-4		—	240	
		X1-DFN1010-6		—	250	
		X2-DFN1010-6		—	250	
		X2-DFN1409-6		—	275	
		X2-DFN1410-6		—	265	

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

## Parameter Measurement Information



TEST	Condition
$t_{PLZ}$ (see Notes D and E)	$V_{load}$
$t_{PZL}$ (see Notes D and F)	$V_{load}$

$V_{CC}$	Inputs		$V_M$	$V_{LOAD}$	$C_L$	$R_L$	$V_{\Delta}$
	$V_I$	$t_r/t_f$					
0.8 V	$V_{CC}$	$\leq 3ns$	$V_{CC}/2$	$2 \times V_{CC}$	5, 10, 15, 30 pF	5K $\Omega$	0.1V
1.2 V $\pm$ 0.1 V	$V_{CC}$	$\leq 3ns$	$V_{CC}/2$	$2 \times V_{CC}$	5, 10, 15, 30 pF	5K $\Omega$	0.1V
1.5 V $\pm$ 0.1 V	$V_{CC}$	$\leq 3ns$	$V_{CC}/2$	$2 \times V_{CC}$	5, 10, 15, 30 pF	5K $\Omega$	0.15V
1.8 V $\pm$ 0.15 V	$V_{CC}$	$\leq 3ns$	$V_{CC}/2$	$2 \times V_{CC}$	5, 10, 15, 30 pF	5K $\Omega$	0.15V
2.5 V $\pm$ 0.2 V	$V_{CC}$	$\leq 3ns$	$V_{CC}/2$	$2 \times V_{CC}$	5, 10, 15, 30 pF	5K $\Omega$	0.15V
3.3 V $\pm$ 0.3 V	$V_{CC}$	$\leq 3ns$	$V_{CC}/2$	$2 \times V_{CC}$	5, 10, 15, 30 pF	5K $\Omega$	0.3V

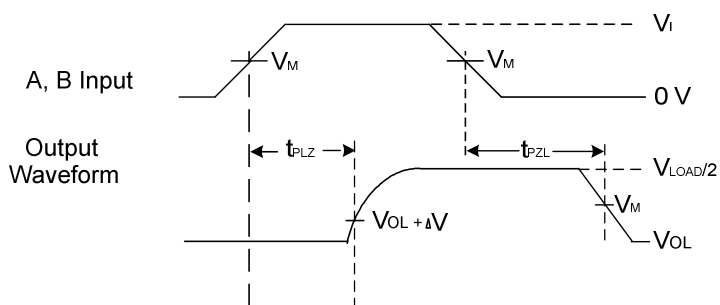
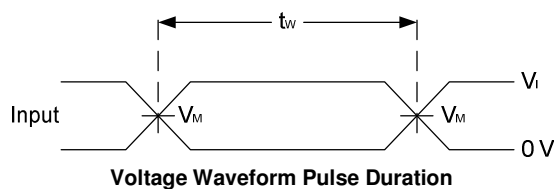


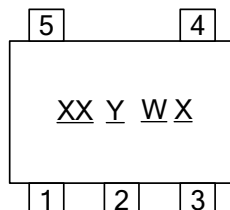
Figure 1 Load Circuit and Voltage Waveforms

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

## Marking Information

### (1) SOT353

(Top View)

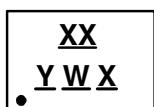


XX : Identification code  
Y : Year 0~9  
W : Week : A~Z : 1~26 week;  
           a~z : 27~52 week; z represents  
           52 and 53 week  
X : A~Z : Internal code

Part Number	Package	Identification Code
74AUP1G09SE	SOT353	XR

### (2) X2-DFN0808-4, X1-DFN1010-6, X2-DFN1010-6, X2-DFN1409-6 and X2-DFN1410-6

(Top View)



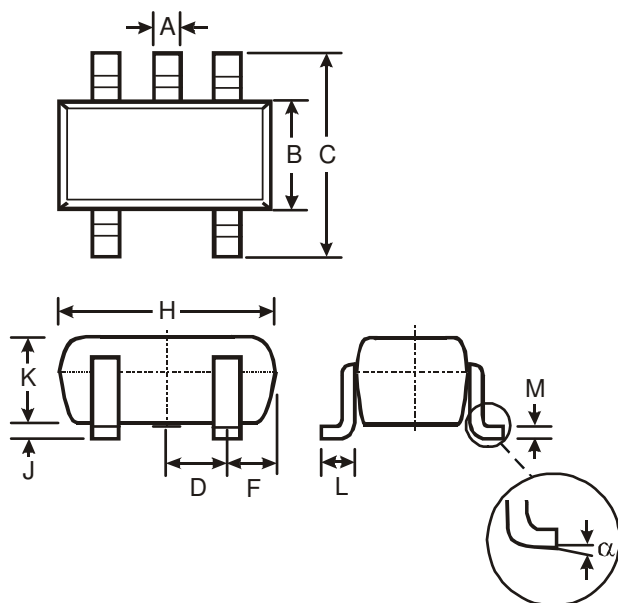
XX : Identification Code  
Y : Year : 0~9  
W : Week : A~Z : 1~26 week;  
           a~z : 27~52 week; z represents  
           52 and 53 week  
X : A~Z : Internal code

Part Number	Package	Identification Code
74AUP1G09FS3	X2-DFN0808-4	YU
74AUP1G09FW5	X1-DFN1010-6	Q8
74AUP1G09FW4	X2-DFN1010-6	XR
74AUP1G09FX4	X2-DFN1409-6	HG
74AUP1G09FZ4	X2-DFN1410-6	XR

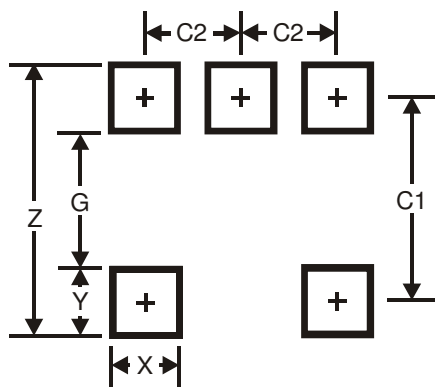


# SOT353 Package Outline Dimensions and Suggested Pad Layout

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



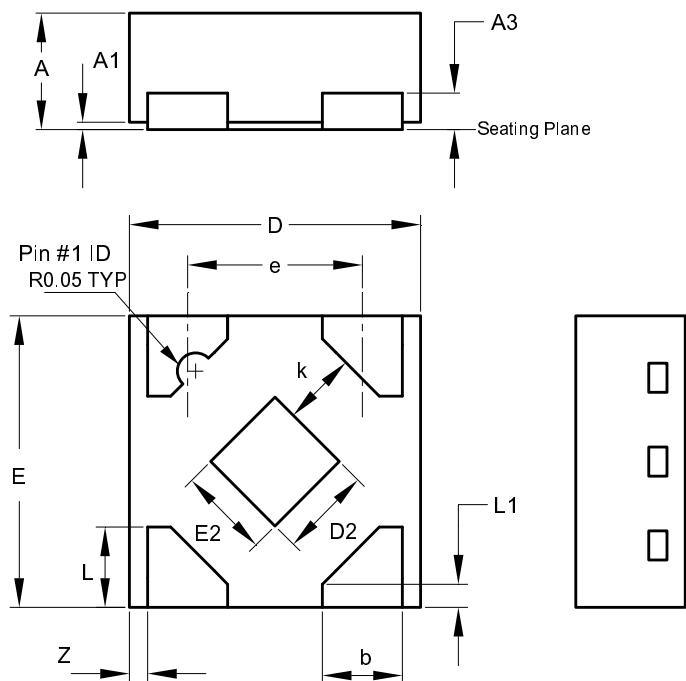
SOT353			
Dim	Min	Max	Typ
A	0.10	0.30	0.25
B	1.15	1.35	1.30
C	2.00	2.20	2.10
D	0.65 Typ		
F	0.40	0.45	0.425
H	1.80	2.20	2.15
J	0	0.10	0.05
K	0.90	1.00	1.00
L	0.25	0.40	0.30
M	0.10	0.22	0.11
$\alpha$	0°	8°	-
All Dimensions in mm			



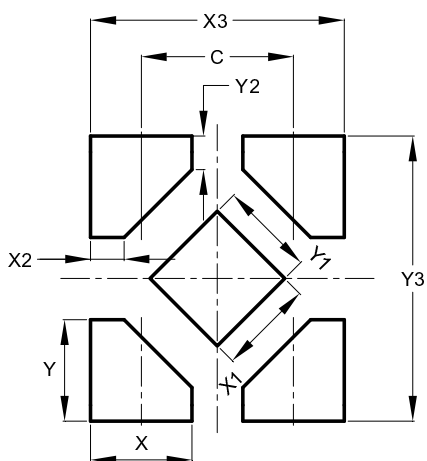
Dimensions	Value (in mm)
Z	2.5
G	1.3
X	0.42
Y	0.6
C1	1.9
C2	0.65

# X2-DFN0808-4 Package Outline Dimensions and Suggested Pad Layout

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



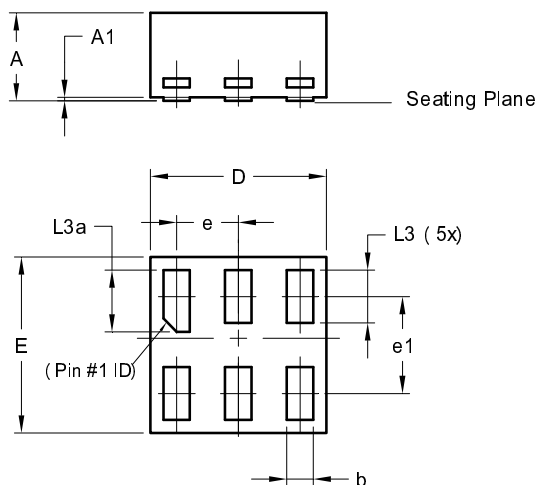
X2-DFN0808-4			
Dim	Min	Max	Typ
A	0.25	0.35	0.30
A1	0	0.04	0.02
A3	-	-	0.13
b	0.17	0.27	0.22
D	0.75	0.85	0.80
D2	0.15	0.35	0.25
E	0.75	0.85	0.80
E2	0.15	0.35	0.25
e	-	-	0.48
K	0.20	-	-
L	0.17	0.27	0.22
L1	0.02	0.12	0.07
Z	-	-	0.05
All Dimensions in mm			



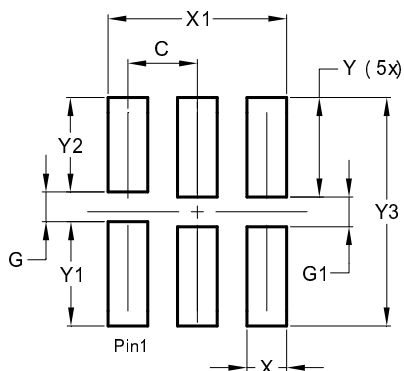
Dimensions	Value
C	0.480
X	0.320
X1	0.300
X2	0.106
X3	0.800
Y	0.320
Y1	0.300
Y2	0.106
Y3	0.900

# X1-DFN1010-6 Package Outline Dimensions and Suggested Pad Layout

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



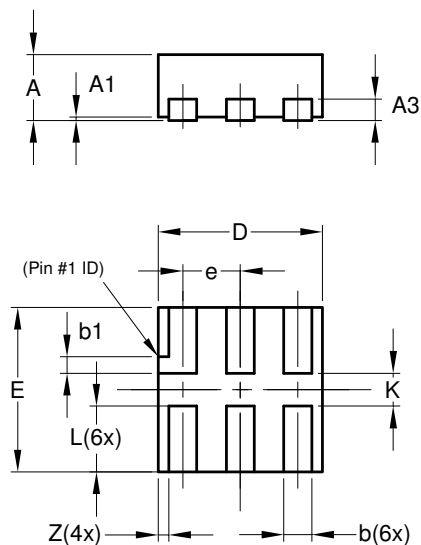
X1-DFN1010-6			
Dim	Min	Max	Typ
A	-	0.50	0.39
A1	-	0.04	-
b	0.12	0.20	0.15
D	0.95	1.050	1.00
E	0.95	1.050	1.00
e	0.35 BSC		
e1	0.55 BSC		
L3	0.27	0.30	0.30
L3a	0.32	0.40	0.35
All Dimensions in mm			



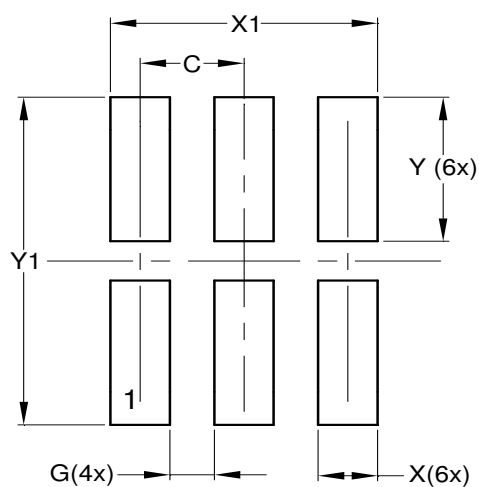
Dimensions	Value (in mm)
C	0.350
G	0.150
G1	0.150
X	0.200
X1	0.900
Y	0.500
Y1	0.525
Y2	0.475
Y3	1.150

## X2-DFN1010-6 Package Outline Dimensions and Suggested Pad Layout

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



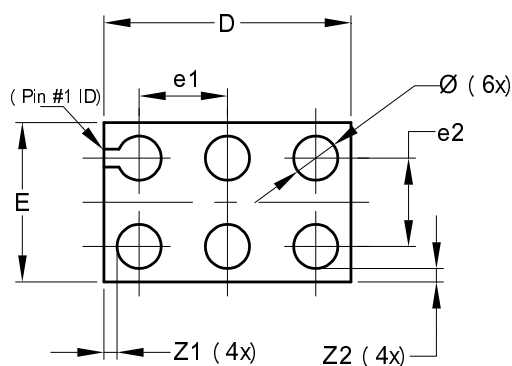
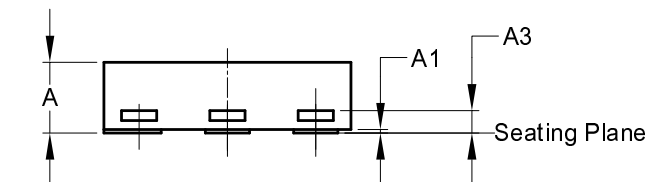
X2-DFN1010-6			
Dim	Min	Max	Typ
A	—	0.40	0.39
A1	0.00	0.05	0.02
A3	—	—	0.13
b	0.14	0.20	0.17
b1	0.05	0.15	0.10
D	0.95	1.05	1.00
E	0.95	1.05	1.00
e	—	—	0.35
L	0.35	0.45	0.40
K	0.15	—	—
Z	—	—	0.065
All Dimensions in mm			



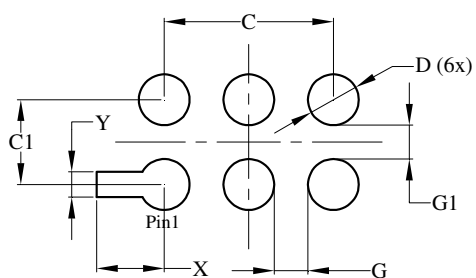
Dimensions	Value (in mm)
C	0.350
G	0.150
X	0.200
X1	0.900
Y	0.550
Y1	1.250

## X2-DFN1409-6 Package Outline Dimensions and Suggested Pad Layout

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



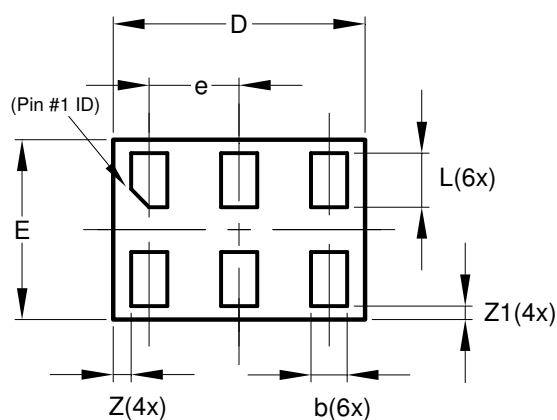
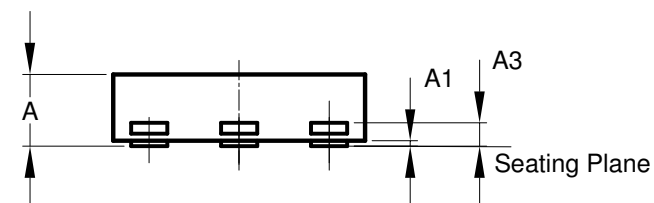
X2-DFN1409-6			
Dim	Min	Max	Typ
A	-	0.40	0.39
A1	0	0.05	0.02
A3	-	-	0.13
Ø	0.20	0.30	0.25
D	1.35	1.45	1.40
E	0.85	0.95	0.90
e1	-	-	0.50
e2	-	-	0.50
Z1	-	-	0.075
Z2	-	-	0.075
All Dimensions in mm			



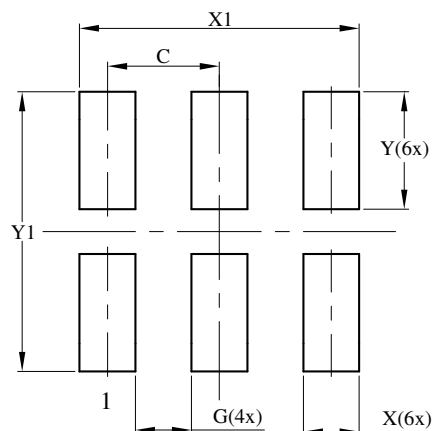
Dimensions	Value (in mm)
C	1.000
C1	0.500
D	0.300
G	0.200
G1	0.200
X	0.400
Y	0.150

## X2-DFN1410-6 Package Outline Dimensions and Suggested Pad Layout

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



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			



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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