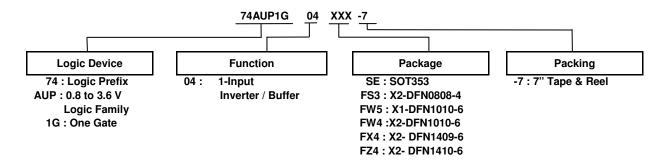


## **Ordering Information**



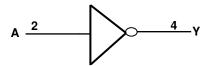
Device	Package	Package	Package	7" Tape	and Reel
Device	Code	(Notes 4 & 5)	Size	Quantity	Part Number Suffix
74AUP1G04SE-7	SE	SOT353	2.0mm x 2.0mm x 1.1mm 0.65 mm lead pitch	3,000/Tape & Reel	-7
74AUP1G04FS3-7	FS3	X2-DFN0808-4	0.8mm x 0.8mm x 0.35mm 0.5 mm pad pitch (diamond)	5,000/Tape & Reel	-7
74AUP1G04FW5-7	FW5	X1-DFN1010-6	1.0mm x 1.0mm x 0.5mm 0.35 mm pad pitch	5,000/Tape & Reel	-7
74AUP1G04FW4-7	FW4	X2-DFN1010-6	1.0mm x 1.0mm x 0.4mm 0.35 mm pad pitch	5,000/Tape & Reel	-7
74AUP1G04FX4-7	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
74AUP1G04FZ4-7	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.

# **Pin Descriptions**

Pin Name	Function
NC	No Connection
Α	Data Input
GND	Ground
Υ	Data Output
Vcc	Supply Voltage

# **Logic Diagram**



#### **Function Table**

Inputs	Output
Α	Υ
Н	L
L	Н

<sup>5.</sup> The taping orientation is located on our website at http://www.diodes.com/datasheets/ap02007.pdf.



### 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				
$V_{CC}$	Supply Voltage Range	-0.5 to +4.6	V			
VI	Input Voltage Range	-0.5 to +4.6	V			
Vo	Voltage applied to output in high or low state	-0.5 to V <sub>CC</sub> +0.5	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			
lo	Continuous Output Current (V <sub>O</sub> = 0 to V <sub>CC</sub> )	±20	mA			
Icc	Continuous Current Through V <sub>CC</sub>	50	mA			
I <sub>GND</sub>	Continuous Current Through GND	-50	mA			
TJ	Operating Junction Temperature	-40 to +150	.€			
T <sub>STG</sub>	Storage Temperature	-65 to +150	∞			

Notes:

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

Symbol	Parame	eter	Min	Max	Unit
V <sub>CC</sub>	Operating Voltage		0.8	3.6	V
VI	Input Voltage		0	3.6	V
Vo	Output Voltage		0	Vcc	V
		$V_{CC} = 0.8V$	_	-20	μΑ
		$V_{CC} = 1.1V$	_	-1.1	
la	High Loyal Output Current	$V_{CC} = 1.4V$	_	-1.7	
Іон	High-Level Output Current	V <sub>CC</sub> = 1.65V	_	-1.9	mA
		$V_{CC} = 2.3V$	_	-3.1	
		$V_{CC} = 3.0V$	_	-4	
		$V_{CC} = 0.8V$	_	20	μΑ
		$V_{CC} = 1.1V$	_	1.1	
	Low-Level Output Current	$V_{CC} = 1.4V$	_	1.7	
loL	Low-Level Output Current	$V_{CC} = 1.65V$	_	1.9	mA
		$V_{CC} = 2.3V$	_	3.1	
		$V_{CC} = 3.0V$	_	4	
Δt/ΔV	Input Transition Rise or Fall Rate $V_{CC} = 0.8V$ to 3.6V			200	ns/V
T <sub>A</sub>	Operating Free-Air Temperature		-40	+125	∞

Note:

8. Unused inputs should be held at  $V_{\text{CC}}$  or Ground.

<sup>6.</sup> 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.

<sup>7.</sup> 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.



## **Electrical Characteristics**

Symbol	Parameter	Test Conditions	V	T <sub>A</sub> =	+25℃	T <sub>A</sub> = -40 °C	C to +85℃	Unit
Symbol	Parameter	rest Conditions	Vcc	Min	Max	Min	Max	Unit
		_	0.8V to 1.65V	0.80 x V <sub>CC</sub>	_	0.80 x V <sub>CC</sub>	_	
$V_{IH}$	High-Level Input	_	1.65V to 1.95V	0.65 x V <sub>CC</sub>	_	0.65 x V <sub>CC</sub>	_	V
VIH	Voltage	_	2.3V to 2.7V	1.6	_	1.6	_	V
		_	3.0V to 3.6V	2.0	_	2.0	_	
		_	0.8V to 1.65V		0.30 x V <sub>CC</sub>		0.30 x V <sub>CC</sub>	
$V_{IL}$	Low-Level Input	_	1.65V to 1.95V	_	0.35 x V <sub>CC</sub>	_	0.35 x V <sub>CC</sub>	V
V IL	Voltage	_	2.3V to 2.7V	_	0.7		0.7	v
		_	3.0V to 3.6V		0.9		0.9	
		$I_{OH} = -20\mu A$	0.8V to 3.6V	V <sub>CC</sub> - 0.1	_	$V_{CC} - 0.1$	_	
		$I_{OH} = -1.1 \text{mA}$	1.1V	0.75 x V <sub>CC</sub>	_	0.7 x V <sub>CC</sub>	_	
V <sub>OH</sub> High-Level Output Voltage	I <sub>OH</sub> = -1.7mA	1.4V	1.11	_	1.03	_		
	I <sub>OH</sub> = -1.9mA	1.65V	1.32	_	1.3	_	.,,	
		I <sub>OH</sub> = -2.3mA	0.01/	2.05	_	1.97	_	V
		I <sub>OH</sub> = -3.1mA	2.3V	1.9	_	1.85	_	
		I <sub>OH</sub> = -2.7mA	0)/	2.72	_	2.67	_	
		I <sub>OH</sub> = -4mA	3V	2.6	_	2.55	_	
		I <sub>OL</sub> = 20μA	0.8V to 3.6V	_	0.1	_	0.1	
		I <sub>OL</sub> = 1.1mA	1.1V		0.3 x V <sub>CC</sub>	_	0.3 x V <sub>CC</sub>	
		$I_{OL} = 1.7 \text{mA}$	1.4V		0.31	_	0.37	
	Low-Level Output	I <sub>OL</sub> = 1.9mA	1.65V	_	0.31	_	0.35	
$V_{OL}$	Voltage	I <sub>OL</sub> = 2.3mA		_	0.31	_	0.33	V
		I <sub>OL</sub> = 3.1mA	2.3V	_	0.44	_	0.45	
		I <sub>OL</sub> = 2.7mA		_	0.31	_	0.33	
		I <sub>OL</sub> = 4mA	3V	_	0.44	_	0.45	
II	Input Current	A or B Input V <sub>I</sub> = GND to 3.6V	0V to 3.6V	_	± 0.1	_	± 0.5	μΑ
loff	Power Down Leakage Current	$V_I$ or $V_O = 0V$ to 3.6V	0	_	0.2	_	0.6	μΑ
$\Delta I_{OFF}$	Delta Power Down Leakage Current	$V_I$ or $V_O = 0V$ to 3.6V	0V to 0.2V	_	0.2		0.6	μΑ
I <sub>CC</sub>	Supply Current	$V_I = GND \text{ or } V_{CC}$ $I_O = 0$	0.8V to 3.6V	_	0.5	_	0.9	μΑ
$\Delta I_{CC}$	Additional Supply Current	Input at V <sub>CC</sub> -0.6	3.3V	_	40	1	50	μΑ



## **Electrical Characteristics** (continued)

Symbol	Parameter	Test Conditions	V	T <sub>A</sub> = -40 ℃	to +125℃	Unit
Symbol	Parameter	rest Conditions	Vcc	Min	Max	Unit
		_	0.8V to 1.65V	0.80 x V <sub>CC</sub>	_	
$V_{IH}$	High-Level Input	_	1.65V to 1.95V	0.70 x V <sub>CC</sub>	_	
VIH	Voltage	_	2.3V to 2.7V	1.6	_	<b>∀</b> ′
		_	3.0V to 3.6V	2.0	_	
		_	0.8V to 1.65V	_	0.25 x V <sub>CC</sub>	
$V_{IL}$	Low-Level Input	_	1.65V to 1.95V	_	0.30 x V <sub>CC</sub>	V
۷IL	Voltage	_	2.3V to 2.7V	_	0.7	v
		_	3.0V to 3.6V	_	0.9	
		$I_{OH} = -20\mu A$	0.8V to 3.6V	$V_{CC} - 0.11$	_	
		I <sub>OH</sub> = -1.1mA	1.1V	0.6 x V <sub>CC</sub>	_	
		I <sub>OH</sub> = -1.7mA	1.4V	0.93	_	
V <sub>OH</sub> High-Level Output Voltage	I <sub>OH</sub> = -1.9mA	1.65V	1.17	_	V	
	I <sub>OH</sub> = -2.3mA	0.01/	1.77	_	\ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \	
		I <sub>OH</sub> = -3.1mA	2.3V	1.67	_	
		I <sub>OH</sub> = -2.7mA	0)/	2.40	_	
		I <sub>OH</sub> = -4mA	- 3V	2.30	_	
		$I_{OL} = 20\mu A$	0.8V to 3.6V	_	0.11	
		I <sub>OL</sub> = 1.1mA	1.1V	_	0.33 x V <sub>CC</sub>	
		I <sub>OL</sub> = 1.7mA	1.4V	_	0.41	
	Low-Level Output	I <sub>OL</sub> = 1.9mA	1.65V	_	0.39	T
$V_{OL}$	Voltage	I <sub>OL</sub> = 2.3mA		_	0.36	V
		I <sub>OL</sub> = 3.1mA	2.3V	_	0.50	
		$I_{OL} = 2.7 \text{mA}$		_	0.36	
		I <sub>OL</sub> = 4mA	3V	_	0.50	
II	Input Current	A or B Input V <sub>I</sub> = GND to 3.6V	0V to 3.6V	_	± 0.75	μA
loff	Power Down Leakage Current	$V_I$ or $V_O = 0V$ to 3.6V	0V	_	± 3.5	μA
Δl <sub>OFF</sub>	Delta Power Down Leakage Current	$V_I$ or $V_O = 0V$ to 3.6V	0V to 0.2V	_	± 2.5	μA
Icc	Supply Current	$V_I = GND \text{ or } V_{CC}, I_O = 0$	0.8V to 3.6V	_	3.0	μA
ΔI <sub>CC</sub>	Additional Supply Current	Input at V <sub>CC</sub> -0.6V Other Inputs at V <sub>CC</sub> or GND	3.3V	_	75	μΑ



# **Switching Characteristics**

C<sub>L</sub> = 5pF, See Figure 1

Parameter	From Input	TO OUTPUT	V	T <sub>A</sub> = +25 ℃			T <sub>A</sub> = -40 °C to +85 °C		T <sub>A</sub> = -40 °C to +125 °C		Unit
i arainetei			V <sub>CC</sub>	Min	Тур	Max	Min	Max	Min	Max	Oilit
			V8.0	_	16.0	_	_	_	_	_	
			1.2V ± 0.1V	2.4	5.0	10.3	2.1	14.1	2.1	14.1	- ns
	A or B	V	1.5V ± 0.1V	1.8	3.6	6.4	1.6	7.4	1.6	8.2	
t <sub>pd</sub>	AUID	T	1.8V ± 0.15V	1.5	2.9	5.0	1.4	5.9	1.4	6.5	
			2.5V ± 0.2V	1.2	2.4	3.9	1.1	4.5	1.1	5.0	
			$3.3V \pm 0.3V$	1.1	2.1	3.2	1.1	3.9	1.1	4.3	

C<sub>L</sub> = 10pF, See Figure 1

Parameter	From	То	V	T,	T <sub>A</sub> = +25 ℃			T <sub>A</sub> = -40 °C to +85 °C		T <sub>A</sub> = -40 °C to +125 °C	
i aranneter	Input	Output	Vcc	Min	Тур	Max	Min	Max	Min	Max	Unit
			V8.0	_	19.8	_	_	_	_		
	A or B	Υ	1.2V ± 0.1V	2.8	5.9	12.2	2.6	17.0	2.6	17.0	
4 .			1.5V ± 0.1V	2.3	4.2	7.5	2.1	8.7	2.1	9.6	
t <sub>pd</sub>			1.8V ± 0.15V	2.0	3.5	5.9	1.8	7.0	1.8	7.7	ns
			$2.5V \pm 0.2V$	1.7	2.9	4.6	1.5	5.4	1.5	6.0	
			$3.3V \pm 0.3V$	1.4	2.7	3.8	1.4	4.5	1.4	5.0	

C<sub>L</sub> = 15pF, See Figure 1

Parameter	From Input	To Output	V	T,	A = +25°C	;	T <sub>A</sub> = -40 °C to +85 °C		T <sub>A</sub> = -40 °C to +125 °C		Unit
			V <sub>CC</sub>	Min	Тур	Max	Min	Max	Min	Max	Ollit
			V8.0		23.3	_	_		_	_	
		Υ	1.2V ± 0.1V	3.2	8.0	14.0	3.0	26.0	3.0	26.0	- ns
	A or B		1.5V ± 0.1V	2.6	7.5	9.0	2.4	10.0	2.4	11.0	
t <sub>pd</sub>	AUID		1.8V ± 0.15V	2.3	5.2	6.7	2.1	8.0	2.1	8.8	
			2.5V ± 0.2V	2.1	3.1	5.1	1.8	6.1	1.8	6.8	
			3.3V ± 0.3V	1.8	3.1	4.2	1.8	5.0	1.8	5.5	

C<sub>L</sub> = 30pF, See Figure 1

Parameter	From Input	To Output	V	T <sub>A</sub> = +25 ℃			T <sub>A</sub> = -40 °C to +85 °C		T <sub>A</sub> = -40 °C to +125 °C		Unit
raiametei			Vcc	Min	Тур	Max	Min	Max	Min	Max	Ullit
			V8.0	_	33.6	_	_	_	_	_	
		Y	1.2V ± 0.1V	4.4	13.0	18.0	4.0	27.0	4.0	27.0	
	Λ α « D		1.5V ± 0.1V	3.6	6.3	12.0	3.2	13.8	3.2	14.2	
t <sub>pd</sub>	A or B		1.8V ± 0.15V	3.2	5.3	9.0	2.9	10.5	2.9	11.6	ns
			2.5V ± 0.2V	2.9	4.5	6.5	2.6	7.6	2.6	8.4	
			3.3V ± 0.3V	2.1	4.2	5.4	2.1	6.2	2.1	6.9	



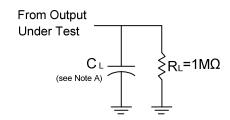
# Operating and Package Characteristics (@T<sub>A</sub> = +25 ℃, unless otherwise specified.)

	Parameter	Test Condition	ons	V <sub>CC</sub>	Тур	Unit
				0.8V	6.5	
				1.2V ± 0.1V	6.3	
_	Power Dissipation	f = 1MH	lz	1.5V ± 0.1V	6.3	"r
$C_{pd}$	Capacitance	No Loa	d	1.8V ± 0.15V	6.2	pF
				2.5V ± 0.2V	6.2	
				$3.3V \pm 0.3V$	6.1	
Ci	Input Capacitance	$V_i = V_{CC}$ or	GND	0V or 3.3V	1.5	pF
		SOT353		_	371	
		X2-DFN0808-4	(Note 9)	_	430	
0	Thermal Resistance	X1-DFN1010-6		_	435	«C/W
$\theta_{JA}$	Junction-to-Ambient	X2-DFN1010-6		_	445	-C/VV
		X2-DFN1409-6	]	_	470	
		X2-DFN1410-6	]	_	460	
		SOT353		_	143	
		X2-DFN0808-4		_	240	
_	Thermal Resistance	X1-DFN1010-6	(NI=4= 0)	_	250	00.444
$\theta_{JC}$	Junction-to-Case	X2-DFN1010-6	(Note 9)	_	250	
		X2-DFN1409-6		_	275	
		X2-DFN1410-6		_	265	

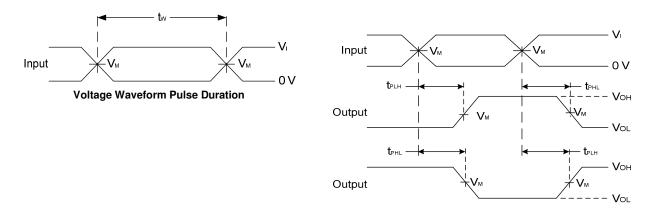
Note: 9. Test condition for each of the six package types: Device mounted on FR-4 substrate PC board, 2oz copper, with minimum recommended pad layout.



## **Parameter Measurement Information**



Vcc	Inputs		, , , , , , , , , , , , , , , , , , ,	0
VCC	VI	t <sub>r</sub> /t <sub>f</sub>	V <sub>M</sub>	CL
0.8V	V <sub>CC</sub>	≤3ns	V <sub>CC</sub> /2	5, 10, 15, 30pF
1.2V±0.1V	V <sub>CC</sub>	≤3ns	V <sub>CC</sub> /2	5, 10, 15, 30pF
1.5V±0.1V	V <sub>CC</sub>	≤3ns	V <sub>CC</sub> /2	5, 10, 15, 30pF
1.8V ±0.15V	V <sub>CC</sub>	≤3ns	V <sub>CC</sub> /2	5, 10, 15, 30pF
2.5V±0.2V	V <sub>CC</sub>	≤3ns	V <sub>CC</sub> /2	5, 10, 15, 30pF
3.3V±0.3V	V <sub>CC</sub>	≤3ns	V <sub>CC</sub> /2	5, 10, 15, 30pF



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  $t_{PD.}$



### **Marking Information**

(1) SOT353

#### (Top View)

5 4 XX Y WX

2

XX: Identification code

Y: Year 0~9

<u>W</u>: 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
74AUP1G04SE	SOT353	XK

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

(Top View)

3

<u>XX</u> <u>Y W X</u> XX: Identification Code

<u>Y</u> : Year : 0~9

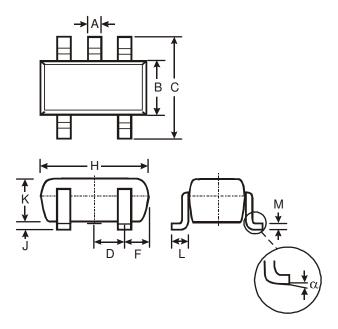
W : Week : A~Z : 1~26 week; a~z : 27~52 week; z represents 52 and 53 week

X: A~Z: Internal code

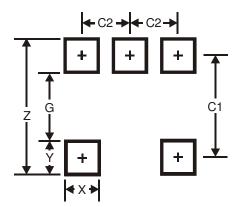
Part Number	Package	Identification Code
74AUP1G04FS3	X2-DFN0808-4	YK
74AUP1G04FW5	X1-DFN1010-6	Q4
74AUP1G04FW4	X2-DFN1010-6	XK
74AUP1G04FX4	X2-DFN1409-6	HC
74AUP1G04FZ4	X2-DFN1410-6	XK



## SOT353 Package Outline Dimensions and Suggested Pad Layout



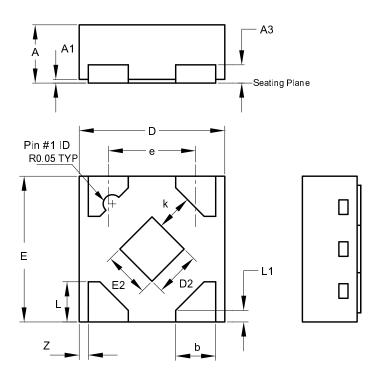
SOT353				
Dim	Min Max Typ			
Α	0.10	0.30	0.25	
В	1.15	1.35	1.30	
C	2.00	2.20	2.10	
D		0.65 Typ	)	
F	0.40	0.45	0.425	
Н	1.80	2.20	2.15	
J	0	0.10	0.05	
K	0.90	1.00	1.00	
L	0.25	0.40	0.30	
М	0.10	0.22	0.11	
α	0°	8°	-	
All Dimensions in mm				



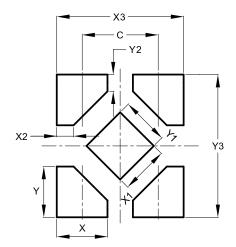
Dimensions	Value (in mm)
Z	2.5
G	1.3
Х	0.42
Υ	0.6
C1	1.9
C2	0.65



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



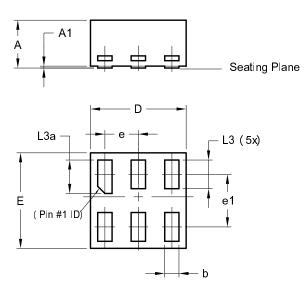
X2-DFN0808-4				
Dim	Min	Max	Тур	
Α	0.25	0.35	0.30	
<b>A</b> 1	0	0.04	0.02	
А3	-	-	0.13	
b	0.17	0.27	0.22	
D	0.75	0.85	0.80	
D2	0.15	0.35	0.25	
Е	0.75	0.85	0.80	
E2	0.15	0.35	0.25	
е	1	-	0.48	
K	0.20	-	-	
L	0.17	0.27	0.22	
L1	0.02	0.12	0.07	
Z	-	-	0.05	
All Dimensions in mm				



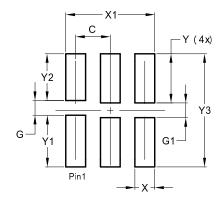
Dimensions	Value
С	0.480
Х	0.320
X1	0.300
X2	0.106
Х3	0.800
Y	0.320
Y1	0.300
Y2	0.106
Y3	0.900



# X1-DFN1010-6 (Type B) Package Outline Dimensions and Suggested Pad Layout



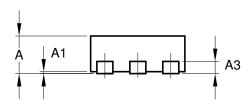
	X1-DFN1010-6 (Type B)				
Dim	· · · · · · · · · · · · · · · · · · ·				
Α	-	0.50	0.39		
A1	-	0.04	-		
b	0.12	0.20	0.15		
D	0.95	1.050	1.00		
Е	0.95	1.050	1.00		
е	0.35 BSC				
e1		0.55 BSC			
L3	0.27	0.30	0.30		
L3a	0.32	0.40	0.35		
All	All Dimensions in mm				

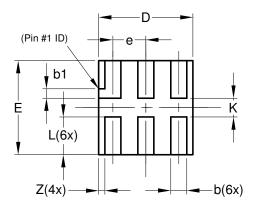


Dimensions	Value	
Dillielisions	(in mm)	
С	0.350	
G	0.150	
G1	0.150	
Х	0.200	
X1	0.900	
Υ	0.500	
Y1	0.525	
Y2	0.475	
Y3	1.150	

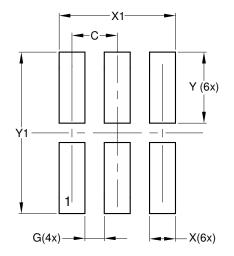


# X2-DFN1010-6 Package Outline Dimensions and Suggested Pad Layout





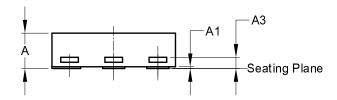
)	X2-DFN1010-6				
Dim	Min	Max	Тур		
Α		0.40	0.39		
<b>A</b> 1	0.00	0.05	0.02		
<b>A3</b>		_	0.13		
b	0.14	0.20	0.17		
b1	0.05	0.15	0.10		
D	0.95	1.05	1.00		
Е	0.95	1.05	1.00		
е			0.35		
L	0.35	0.45	0.40		
K	0.15	_			
Z			0.065		
All Dimensions in mm					

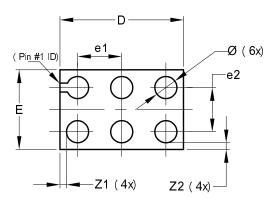


Dimensions	Value (in mm)
С	0.350
G	0.150
X	0.200
X1	0.900
Υ	0.550
Y1	1.250

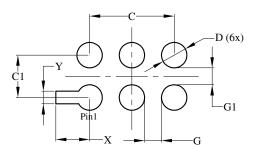


# X2-DFN1409-6 Package Outline Dimensions and Suggested Pad Layout





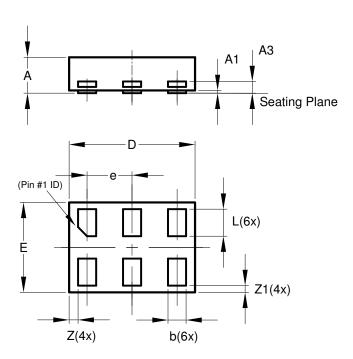
X2-DFN1409-6				
Dim	Min	Max	Тур	
Α	-	0.40	0.39	
A1	0	0.05	0.02	
A3	-	-	0.13	
Ø	0.20	0.30	0.25	
D	1.35	1.45	1.40	
E	0.85	0.95	0.90	
e1	-	1	0.50	
e2	-	-	0.50	
Z1	-	-	0.075	
Z2	-	-	0.075	
All Dimensions in mm				



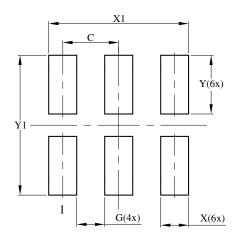
Dimensions	Value (in mm)
С	1.000
C1	0.500
D	0.300
G	0.200
G1	0.200
X	0.400
Υ	0.150



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



X2-DFN1410-6				
Dim	Min	Max	Тур	
Α	_	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	
Е	0.95	1.05	1.00	
е			0.50	
L	0.25	0.35	0.30	
Z			0.10	
<b>Z</b> 1	0.045	0.105	0.075	
All Dimensions in mm				



Dimensions	Value	
Dimensions	(in mm)	
С	0.500	
G	0.250	
Х	0.250	
X1	1.250	
Υ	0.525	
Y1	1.250	



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