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74AUP2G17

DUAL SCHMITT TRIGGER BUFFERS

Description

The Advanced Ultra Low Power (AUP) CMOS logic family is designed for low power and extended battery life in portable applications.

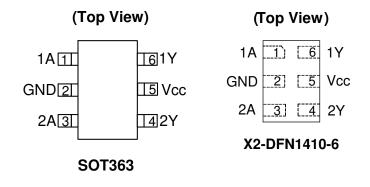
The 74AUP2G17 is composed of two Schmitt trigger buffers with standard push-pull outputs designed for operation over a power supply range of 0.8V to 3.6V. The device is fully specified for partial power down applications using l_{OFF} . The l_{OFF} circuitry disables the output preventing damaging current backflow when the device is powered down. The gates perform the positive Boolean function:

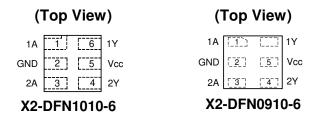
Y = A

Features

- Advanced Ultra Low Power (AUP) CMOS
- Supply Voltage Range from 0.8V to 3.6V
- ± 4mA Output Drive at 3.0V
- Low Static Power Consumption
- I_{CC} < 0.9μA
- Low Dynamic Power Consumption
- C_{PD} = 4pF Typical at 3.6V
- Schmitt Trigger Action at All Inputs Make the Circuit Tolerant for Slower Input Rise and Fall Time
- I_{OFF} Supports Partial-Power-Down Mode Operation
- ESD Protection 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
- Leadless Packages per JESD30E
 - DFN1410 denoted as X2-DFN1410-6
 - DFN1010 denoted as X2-DFN1010-6
 - DFN0910 denoted as X2-DFN0910-6
- Totally Lead-Free & Fully RoHS Compliant (Notes 1 & 2)
- Halogen and Antimony Free. "Green" Device (Note 3)

Pin Assignments





Applications

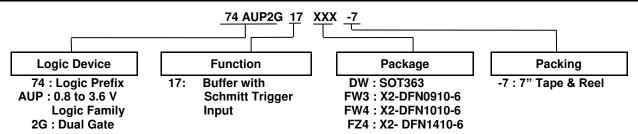
- Suited for Battery and Low Power Needs
- Wide array of products such as:
 - PCs, Networking, Notebooks, Netbooks, PDAs
 - Tablet Computers, E-readers
 - Computer Peripherals, Hard Drives, CD/DVD ROM
 - TV, DVD, DVR, Set-Top Box
 - Cell Phones, Personal Navigation / GPS
 - MP3 players ,Cameras, Video 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.



Ordering Information



Part Number	Package	Package	Package	7" Tape and Reel			
Part Number	Code	(Notes 4 & 5)	Size	Quantity	Part Number Suffix		
74AUP2G17DW-7	DW	SOT363	2.0mm X 2.0mm X 1.1mm 0.65 mm lead pitch	3000/Tape & Reel	-7		
74AUP2G17FW3-7	FW3	X2-DFN0910-6	0.9mm X 1.0mm X 0.35mm 0.35 mm pad pitch	5000/Tape & Reel	-7		
74AUP2G17FW4-7	FW4	X2-DFN1010-6	1.0mm X 1.0mm X 0.4mm 0.35 mm pad pitch	5000/Tape & Reel	-7		
74AUP2G17FZ4-7	FZ4	X2-DFN1410-6	1.4mm X 1.0mm X 0.4mm 0.5 mm pad pitch	5000/Tape & Reel	-7		

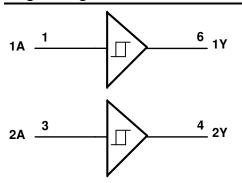
Notes:

- 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	Pin NO	Function
1A	1	Data Input
GND	2	Ground
2A	3	Data Input
2Y	4	Data Output
V_{CC}	5	Supply Voltage
1Y	6	Data Output

Logic Diagram



Function Table Diagram

Inputs	Output
nA	nY
Н	Н
L	L



Absolute Maximum Ratings (Notes 6 & 7) (@T_A = +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		
ESD MM	Machine Model ESD Protection	200	V		
V _{CC}	Supply Voltage Range	-0.5 to +4.6	V		
V_{I}	Input Voltage Range	-0.5 to +4.6	V		
Vo	Voltage Applied to Output in High or Low State	-0.5 to V _{CC} +0.5			
I _{IK}	Input Clamp Current V _I < 0	-50	mA		
lok	Output Clamp Current (V _O < 0)	-50	mA		
Io	Continuous Output Current (V _O = 0 to V _{CC})	±20	mA		
Icc	Continuous Current Through V _{CC}	50	mA		
I _{GND}	Continuous Current Through GND	-50	mA		
T_J	Operating Junction Temperature	-40 to +150	°C		
T _{STG}	Storage Temperature	-65 to +150	°C		

Notes:

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

Symbol	Par	ameter	Min	Max	Unit
Vcc	Operating Voltage	_	0.8	3.6	V
VI	Input Voltage		0	3.6	V
Vo	Output Voltage		0	V _{CC}	V
		V _{CC} = 0.8V	_	-20	μΑ
		V _{CC} = 1.1V	_	-1.1	
	High-Level	V _{CC} = 1.4V	_	-1.7	
Іон	Output Current	V _{CC} = 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	V _{CC} = 1.4V	_	1.7	
I_{OL}	Output Current	V _{CC} = 1.65V	_	1.9	mA
		V _{CC} = 2.3V	_	3.1	
		V _{CC} = 3.0V	_	4	
TA	Operating Free-Air Temperature	_	-40	+125	°C

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

^{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.



Electrical Characteristics (@T_A = +25°C, unless otherwise specified.)

Cumahal	Davamatav	Toot Conditions	V	T _A = -	+25°C	$T_A = -40^{\circ}C$	c to +85°C	Unit
Symbol	Parameter	Test Conditions	V _{CC}	Min	Max	Min	Max	
			0.8V	0.3	0.6	0.3	0.6	
			1.1V	0.53	0.9	0.53	0.9	
V_{T+}	Positive-going Input		1.4V	0.74	1.11	0.74	1.11	V
v T+	Threshold Voltage		1.65V	0.91	1.29	0.91	1.29	V
			2.3V	1.37	1.77	1.37	1.77	
			3.0V	1.88	2.29	1.88	2.29	
			0.8V	0.1	0.6	0.1	0.6	
	Negative-going Input		1.1V	0.26	0.65	0.26	0.65	
V _T -		_	1.4V	0.39	0.75	0.39	0.75	V
	Threshold Voltage		1.65V	0.47	0.84	0.47	0.84	
			2.3V	0.69	1.04	0.69	1.04	
			3.0V	0.88	1.24	0.88	1.24	
			0.8V	0.07	0.5	0.07	0.5	
			1.1V	0.08	0.46	0.08	0.46	
ΔV_T	Hysteresis	_	1.4V	0.18	0.56	0.18	0.56	V
	$(V_{T+} - V_{T-})$		1.65V	0.27	0.66	0.27	0.66	v
			2.3V	0.53	0.92	0.53	0.92	
			3.0V	0.79	1.31	0.79	1.31	
		I _{OH} = -20μA	0.8V to 3.6V	V _{CC} – 0.1	_	V _{CC} – 0.1	_	
		$I_{OH} = -1.1 \text{mA}$	1.1V	0.75 X V _{CC}	_	0.7 X V _{CC}		
		I _{OH} = -1.7mA	1.4V	1.11	_	1.03	_	
V_{OH}	High-Level Output	$I_{OH} = -1.9 \text{mA}$	1.65V	1.32	_	1.30	_	٧
VOH	Voltage	I _{OH} = -2.3mA	2.3V	2.05	_	1.97		·
	$I_{OH} = -3.1 \text{mA}$		2.0 V	1.9	_	1.85	_	
		I _{OH} = -2.7mA 3V		2.72	_	2.67	1]
		$I_{OH} = -4mA$	3 V	2.6	_	2.55	_	
		I _{OL} = 20μA	0.8V to 3.6V	_	0.1	_	0.1	
		I _{OL} = 1.1mA	1.1V	_	0.3 X V _{CC}	_	0.3 X V _{CC}	
		$I_{OL} = 1.7 \text{mA}$	1.4V	_	0.31	_	0.37	
	Low-Level Output	I _{OL} = 1.9mA	1.65V	_	0.31	_	0.35	
V_{OL}	Voltage	I _{OL} = 2.3mA		_	0.31	_	0.33	V
		I _{OL} = 3.1mA	2.3V	_	0.44	_	0.45	
		I _{OL} = 2.7mA		_	0.31	_	0.33	
		I _{OL} = 4mA	- 3V	_	0.44	_	0.45	
l _l	Input Current	$V_I = GND \text{ to } 3.6V$	0 to 3.6V	_	± 0.1	_	±0.5	μA
loff	Power Down Leakage Current	V_1 or $V_0 = 0V$ to 3.6V	0V	_	± 0.1	_	±0.5	μA
Δl _{OFF}	Delta Power Down Leakage Current	V_1 or $V_0 = 0V$ to 3.6V	0V to 0.2V	_	± 0.2	_	±0.6	μA
Icc	Supply Current	$V_I = GND \text{ or } V_{CC}, I_O = 0$	0.8V to 3.6V	_	0.5	_	0.9	μΑ
ΔI _{CC}	Additional Supply Current	Input at V _{CC} -0.6V	3.3V	_	40	_	50	μΑ



Electrical Characteristics (cont.) (@T_A = +25°C, unless otherwise specified.)

Symbol	Parameter	Test Conditions	V	T _A = -40°C	to +125°C	Unit
Syllibol	Parameter	rest Conditions	V _{CC}	Min	Max	
			0.8V	0.3	0.62	
			1.1V	0.53	0.92	
M	Positive-Going Input Threshold		1.4V	0.74	1.13	V
V_{T+}	Voltage	_	1.65V	0.91	1.31	V
			2.3V	1.37	1.80	
			3.0V	1.88	2.32	
			0.8V	0.1	0.6	
			1.1V	0.26	0.65	
V_{T-}	Negative-Going Input Threshold		1.4V	0.39	0.75	V
	Voltage	_	1.65V	0.47	0.84	'
			2.3V	0.69	1.04	
			3.0V	0.88	1.24	
			0.8V	0.07	0.5	
			1.1V	0.08	0.46	
$\Delta V_{ op}$	Hysteresis	_	1.4V	0.18	0.56	V
Δ۷Ι	(V _{T+} - V _{T-)}	_	1.65V	0.27	0.66	'
			2.3V	0.53	0.92	
			3.0V	0.79	1.31	
		$I_{OH} = -20\mu A$	0.8V to 3.6V	V _{CC} - 0.11	_	
		I _{OH} = -1.1mA	1.1V	0.6 X V _{CC}	_	
		$I_{OH} = -1.7mA$	1.4V	0.93	_	
V_{OH}	High-Level Output Voltage	I _{OH} = -1.9 mA	1.65V	1.17	_	V
VOH	Thigh Level Output Voltage	$I_{OH} = -2.3 \text{mA}$	2.3V	1.77	_	v
		I _{OH} = -3.1mA	2.30	1.67	_	
		I _{OH} = -2.7mA	0)/	2.40	_	
		I _{OH} = -4mA	3V	2.30	_	
		I _{OL} = 20μA	0.8V to 3.6V	_	0.11	
		I _{OL} = 1.1mA	1.1V	_	0.33 X V _{CC}	
		I _{OL} = 1.7mA	1.4V	_	0.41	
	Lave Lavel Cutavit Valtage	I _{OL} = 1.9mA	1.65V	_	0.39	.,
V_{OL}	Low-Level Output Voltage	I _{OL} = 2.3mA	0.01/	_	0.36	V
		I _{OL} = 3.1mA	2.3V	_	0.50	
		I _{OL} = 2.7mA		_	0.36	
		I _{OL} = 4mA	3V	_	0.50	
II	Input Current	V _I = GND to 3.6V	0V to 3.6V	_	± 0.75	μA
loff	Power Down Leakage Current	V _I or VO = 0V to 3.6V	0V	_	± 1.0	μA
Δl _{OFF}	Delta Power Down Leakage Current	V_I or $VO = 0V$ 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	_	1.4	μA
Δlcc	Additional Supply Current	Input at V _{CC} -0.6V	3.3V	_	75	μA



Switching Characteristics

 $C_L = 5pF$ see Figure 1

Parameter	From	TO OUTPUT	V	T _A = +25°C		T _A = -40°C to +85°C		T _A = -40°C to +125°C		Unit	
Inp	Input		V _{CC}	Min	Тур	Max	Min	Max	Min	Max	Oilit
			V8.0	_	19.9	_	_	_	_	_	
		Y	1.2V ± 0.1V	2.7	5.9	11.0	2.4	11.1	2.4	11.2	ns
	٨		1.5V ± 0.1V	2.6	4.3	6.6	2.4	7.1	2.4	7.4	
t _{pd}	Α		1.8V ± 0.15V	2.1	3.7	5.4	2.0	6.0	2.0	6.2	
			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	1.0	3.9	1.0	4.3	

C_L = 10pF see Figure 1

Parameter	From	то	V		Γ _A = +25°(T _A = -40°C to +85°C		$T_A = -40^{\circ}C \text{ to } +125^{\circ}C$		Unit
Input	OUTPUT	V _{CC}	Min	Тур	Max	Min	Max	Min	Max	Oilit	
			V8.0	_	23.4	_	_	_	_	_	
		Y	1.2V ± 0.1V	2.9	6.8	12.7	2.8	12.8	2.8	12.9	ns
	٨		1.5V ± 0.1V	2.8	5.0	7.7	2.6	8.2	2.6	8.6	
t _{pd}	Α		1.8V ± 0.15V	2.7	4.2	6.2	2.5	6.7	2.5	7.1	
			2.5V ± 0.2V	1.6	2.9	4.6	1.5	5.4	1.5	6.0	
			$3.3V \pm 0.3V$	1.5	2.7	3.8	1.4	4.5	1.4	5.0	

C_L = 15pF see Figure 1

Parameter	From	то	Vcc	7	Γ _A = +25°(;	$T_A = -40^{\circ}C \text{ to } +85^{\circ}C$		$T_A = -40^{\circ}C \text{ to } +125^{\circ}C$		Unit
rarameter	Input OUTPUT	OUTPUT		Min	Тур	Max	Min	Max	Min	Max	Unit
			V8.0	_	26.9	_	_	_	_	_	
		Y	1.2V ± 0.1V	3.3	7.6	14.3	3.0	17.4	3.0	18.5	ns
	٨		1.5V ± 0.1V	3.3	5.5	8.6	2.9	9.4	2.9	9.8	
t _{pd}	Α		1.8V ± 0.15V	2.8	4.7	7.0	2.8	7.7	2.8	8.1	
			2.5V ± 0.2V	2.1	3.3	5.1	1.8	6.1	1.8	6.8	
			3.3V ± 0.3V	2.0	3.1	4.2	1.8	5.0	1.8	5.5	

C_L = 30pF see Figure 1

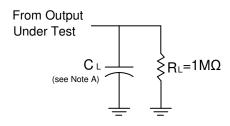
Parameter	From	ТО	V	7	Γ _A = +25°($T_A = -40^{\circ}C \text{ to } +85^{\circ}C$		T _A = -40°C	to +125°C	Unit
Parameter	Input OUTPUT	OUTPUT	Vcc	Min	Тур	Max	Min	Max	Min	Max	UIIIL
			V8.0	_	37.3	_	_	_	_	_	
		Y	1.2V ± 0.1V	4.0	9.8	18.7	3.9	19.6	3.9	20.0	ns ns
	٨		1.5V ± 0.1V	3.7	7.1	11.2	3.6	12.3	3.6	12.9	
t _{pd}	Α		1.8V ± 0.15V	3.6	6.0	9.1	3.6	10.0	3.6	10.6	
		2.5V ± 0.2V	2.4	4.5	6.5	2.3	7.6	2.3	8.4		
ì			3.3V ± 0.3V	2.2	4.2	5.4	2.1	6.2	2.1	6.9	-



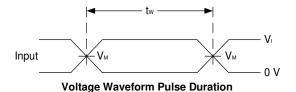
Operating and Package Characteristics (@T_A = +25°C, unless otherwise specified.)

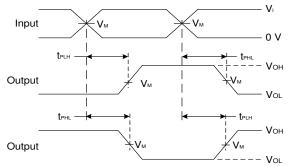
	Parameter	Test Conditions	V _{CC}	Тур	Unit
			0.8V	5.1	
			1.2V ± 0.1V	5.2	
0	Power Dissipation	f = 1MHz	1.5V ± 0.1V	5.2	
C_{pd}	Capacitance	No Load	1.8V ± 0.15V	5.5	pF
			2.5V ± 0.2V	5.7	
			3.3V ± 0.3V	6.0	
Cı	Input Capacitance	$V_i = V_{CC}$ or GND	0V or 3.3V	2.0	pF
Co	Output Capacitance	$V_O = V_{CC}$ or GND	0V	2.0	pF

Parameter Measurement Information



Vcc Inputs V _I t _r /t _f	Inputs		V	6
	V _M	CL		
1.2V ± 0.1V	Vcc	≤3ns	V _{CC} /2	5, 10, 15, 30pF
1.5V ± 0.1V	V _{CC}	≤3ns	V _{CC} /2	5, 10, 15, 30pF
1.8V ± 0.15V	V _{CC}	≤3ns	V _{CC} /2	5, 10, 15, 30pF
2.5V ± 0.2V	Vcc	≤3ns	V _{CC} /2	5, 10, 15, 30pF
3.3V ± 0.3V	V _{CC}	≤3ns	V _{CC} /2	5, 10, 15, 30pF
0V or 3.3V	V _{CC}	≤3ns	V _{CC} /2	5, 10, 15, 30pF





Voltage Waveform Propagation Delay Times Inverting and Non Inverting Outputs

Figure 1 Load Circuit and Voltage Waveforms

A. Includes test lead and test apparatus capacitance. Notes:

- 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) SOT363

5 4

XXYWX

2 3 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
74AUP2G17DW-7	SOT363	SS

(2) X2-DFN1410-6, X2-DFN1010-6, X2-DFN0910-6

(Top View)

XX $\frac{XX}{Y}$: Identification Code $\frac{X}{Y}$: Year : 0~9

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

a~z: 27~52 week; z represents

...

Output

Description

Output

Description

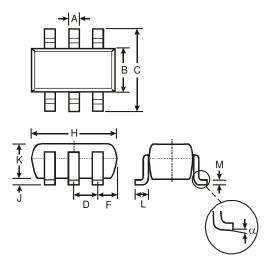
Descript

52 and 53 week X: A~Z: Internal code

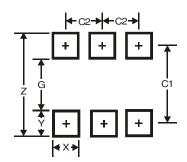
Part Number	Package	Identification Code
74AUP2G17FZ4-7	X2-DFN1410-6	RS
74AUP2G17FW4-7	X2-DFN1010-6	SS
74AUP2G17FW3-7	X2-DFN0910-6	MS



SOT363 Package Outline Dimensions and Suggested Pad Layout



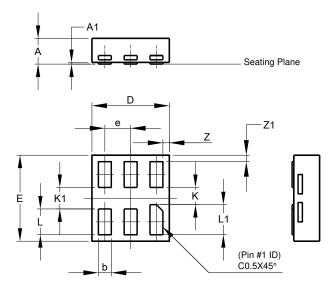
	SOT363				
Dim	Min	Max	Тур		
Α	0.10	0.30	0.25		
В	1.15	1.35	1.30		
C	2.00	2.20	2.10		
D		0.65 Ty	þ		
F	0.40	0.45	0.425		
Н	1.80	2.20	2.15		
J	0	0.10	0.05		
Κ	0.90	1.00	1.00		
L	0.25	0.40	0.30		
М	0.10	0.22	0.11		
α	0°	8°	-		
All Dimensions in mm					



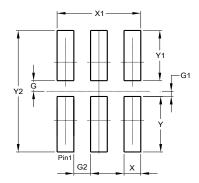
Dimensions	Value	
Dimensions	(in mm)	
Z	2.5	
G	1.3	
Х	0.42	
Υ	0.6	
C1	1.9	
C2	0.65	



X2-DFN0910-6 Package Outline Dimensions and Suggested Pad Layout



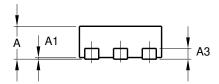
X2-DFN0910-6				
Dim	Min	Max	Тур	
Α	-	0.35	0.30	
A 1	0	0.03	0.02	
b	0.10	0.20	0.15	
D	0.85	0.95	0.90	
Е	0.95	1.05	1.00	
е	-	-	0.30	
K	0.20	-	-	
K1	0.25	-	-	
L	0.25	0.35	0.30	
L1	0.30	0.40	0.35	
Z	-	-	0.075	
Z 1	-	-	0.075	
All Dimensions in mm				

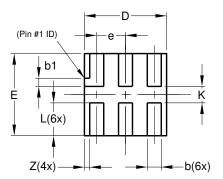


Dimensions	Value (in mm)
G	0.100
G1	0.050
G2	0.150
X	0.150
X1	0.750
Υ	0.525
Y1	0.475
Y2	1.150

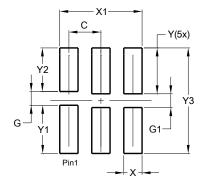


X2-DFN1010-6 Package Outline Dimensions and Suggested Pad Layout





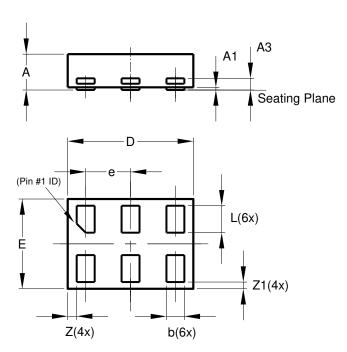
	X2-DFN1010-6				
Dim	Min	Max	Тур		
Α		0.40	0.39		
A1	0.00	0.05	0.02		
А3	_	_	0.13		
b	0.14	0.20	0.17		
b1	0.05	0.15	0.10		
D	0.95	1.05	1.00		
Е	0.95	1.05	1.00		
е	_	_	0.35		
L	0.35	0.45	0.40		
K	0.15		_		
Z			0.065		
All Dimensions in mm					



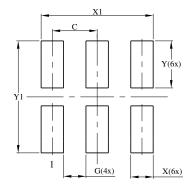
Dimensions	Value (in mm)
С	0.350
G	0.150
G1	0.150
X	0.200
X1	0.900
Υ	0.500
Y1	0.525
Y2	0.475
Y3	1.150



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		
Z1	0.045	0.105	0.075		
All Dimensions in mm					



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



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