

Description

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

The 74AUP1G07 is a single buffer-gate, with an open drain output 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 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:

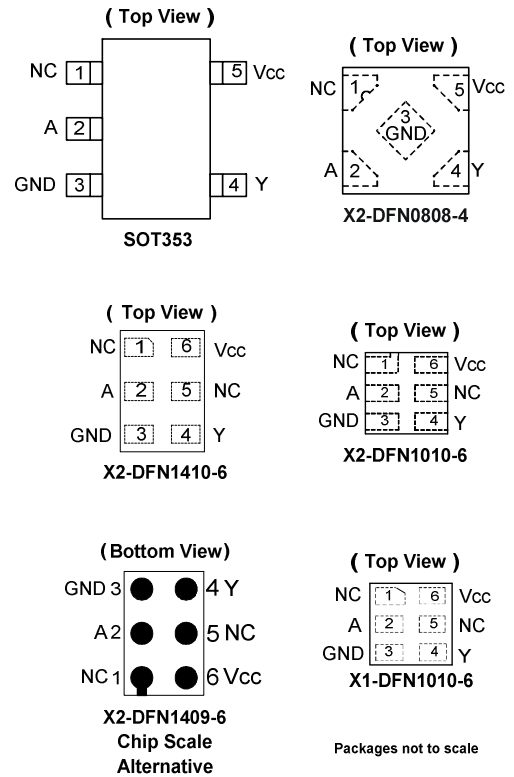
$$Y = A$$

Features

- Advanced Ultra Low Power (AUP) CMOS
- Supply Voltage Range from 0.8V to 3.6V
- 4 mA Output Drive at 3.0V
- Low Static Power Consumption
I_{CC} < 0.9µA
- Low Dynamic Power Consumption
C_{PD} = 6pF (Typical at 3.6V)
- Schmitt Trigger Action at all inputs makes the circuit tolerant for slower input rise and fall time. The hysteresis is typically 250 mV at V_{CC} = 3.0V.
- I_{OFF} Supports Partial-Power-Down Mode Operation
- ESD Protection Exceeds JESD 22
2000-V Human Body Model (A114)
Exceeds 1000-V Charged Device Model (C101)
- Latch-Up Exceeds 100mA per JESD 78, Class I
- Leadless Packages Named per JESD30E
- **Totally Lead-Free & Fully RoHS Compliant (Notes 1 & 2)**
- **Halogen and Antimony Free. "Green" Device (Note 3)**

- 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.

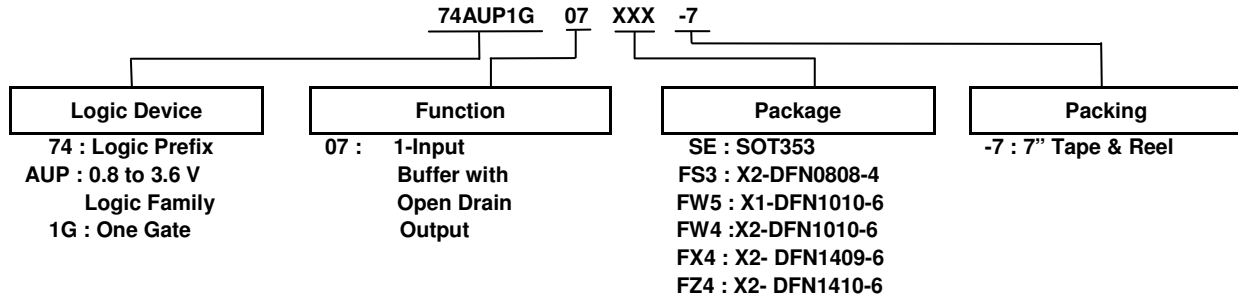
Pin Assignments



Applications

- Suited for Battery and Low Power Needs
- Wide array of products such as:
 - Tablets, E-readers
 - Cell Phones, Personal Navigation / GPS
 - MP3 Players, Cameras, Video Recorders
 - PCs, Ultrabooks, Notebooks, Netbooks
 - Computer Peripherals, Hard Drives, SSDs, CD/DVD ROMs
 - TVs, DVDs, DVRs, Set-Top Boxes

Ordering Information



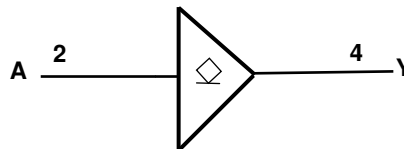
Device	Package Code	Package (Notes 4 & 5)	Package Size	7" Tape and Reel	
				Quantity	Part Number Suffix
74AUP1G07SE-7	SE	SOT353	2.0mm x 2.0mm x 1.1mm 0.65 mm lead pitch	3,000/Tape & Reel	-7
74AUP1G07FS3-7	FS3	X2-DFN0808-4	0.8mm x 0.8 mm x 0.35mm 0.5 mm pad pitch (diamond)	5,000/Tape & Reel	-7
74AUP1G07FW5-7	FW5	X1-DFN1010-6	1.0mm x 1.0mm x 0.5mm 0.35 mm pad pitch	5,000/Tape & Reel	-7
74AUP1G07FW4-7	FW4	X2-DFN1010-6	1.0mm x 1.0mm x 0.4mm 0.35 mm pad pitch	5,000/Tape & Reel	-7
74AUP1G07FX4-7	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
74AUP1G07FZ4-7	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
NC	No Connection
A	Data Input
GND	Ground
Y	Data Output
V _{CC}	Supply Voltage

Logic Diagram



Function Table

Inputs	Output
A	Y
H	Z
L	L

Absolute Maximum Ratings (Notes 6 & 7) (@ $T_A = +25^\circ\text{C}$, 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_{CC}	Supply Voltage Range	-0.5 to +4.6	V
V_I	Input Voltage Range	-0.5 to +4.6	V
V_O	Voltage Applied to Output in High or Low State	-0.5 to +4.6	V
I_{IK}	Input Clamp Current $V_I < 0$	50	mA
I_{OK}	Output Clamp Current ($V_O < 0$)	50	mA
I_O	Continuous Output Current ($V_O = 0$ to V_{CC})	± 20	mA
I_{CC}	Continuous Current through V_{CC}	50	mA
I_{GND}	Continuous Current through GND	-50	mA
T_J	Operating Junction Temperature	-40 to +150	$^\circ\text{C}$
T_{STG}	Storage Temperature	-65 to +150	$^\circ\text{C}$

- 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) (@ $T_A = +25^\circ\text{C}$, unless otherwise specified.)

Symbol	Parameter	Min	Max	Unit	
V_{CC}	Operating Voltage	0.8	3.6	V	
V_I	Input Voltage	0	3.6	V	
V_O	Output Voltage	0	3.6	V	
I_{OL}	Low-Level Output Current	$V_{CC} = 0.8\text{V}$	—	20	μA
		$V_{CC} = 1.1\text{V}$	—	1.1	mA
		$V_{CC} = 1.4\text{V}$	—	1.7	
		$V_{CC} = 1.65\text{V}$	—	1.9	
		$V_{CC} = 2.3\text{V}$	—	3.1	
		$V_{CC} = 3.0\text{V}$	—	4	
$\Delta t/\Delta V$	Input Transition Rise or Fall Rate	$V_{CC} = 0.8\text{V}$ to 3.6V	—	200	ns/V
T_A	Operating Free-Air Temperature	-40	+125	$^\circ\text{C}$	

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

Electrical Characteristics (@ $T_A = +25^\circ\text{C}$, unless otherwise specified.)

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

Electrical Characteristics (continued) (@ $T_A = +25^\circ\text{C}$, unless otherwise specified.)

Symbol	Parameter	Test Conditions	V_{CC}	$T_A = -40^\circ\text{C to } +125^\circ\text{C}$		Unit
				Min	Max	
V_{IH}	High-Level Input Voltage	—	0.8V to 1.65V	$0.80 \times V_{CC}$	—	V
		—	1.65V to 1.95V	$0.70 \times V_{CC}$	—	
		—	2.3V to 2.7V	1.6	—	
		—	3.0V to 3.6V	2.0	—	
V_{IL}	Low-Level Input Voltage	—	0.8V to 1.65V	—	$0.25 \times V_{CC}$	V
		—	1.65V to 1.95V	—	$0.35 \times V_{CC}$	
		—	2.3V to 2.7V	—	0.7	
		—	3.0V to 3.6V	—	0.9	
V_{OL}	Low-Level Output Voltage	$I_{OL} = 20\mu\text{A}$	0.8V to 3.6V	—	0.11	V
		$I_{OL} = 1.1\text{mA}$	1.1V	—	$0.3 \times V_{CC}$	
		$I_{OL} = 1.7\text{mA}$	1.4V	—	0.41	
		$I_{OL} = 1.9\text{mA}$	1.65V	—	0.39	
		$I_{OL} = 2.3\text{mA}$	2.3V	—	0.36	
		$I_{OL} = 3.1\text{mA}$		—	0.50	
		$I_{OL} = 2.7\text{mA}$	3V	—	0.36	
		$I_{OL} = 4\text{mA}$		—	0.50	
I_I	Input Current	A or B Input $V_I = \text{GND to } 3.6\text{V}$	0V to 3.6V	—	± 0.75	μA
I_{OFF}	Power Down Leakage Current	V_I or $V_O = 0\text{V to } 3.6\text{V}$	0	—	± 3.5	μA
I_{OZ}	Z State Leakage Current	$V_O = 3.6\text{V}$ $V_I = 3.6\text{V}$	3.6V	—	± 1.5	μA
ΔI_{OFF}	Delta Power Down Leakage Current	V_I or $V_O = 0\text{V to } 3.6\text{V}$	0V to 0.2V	—	± 2.5	μA
I_{CC}	Supply Current	$V_I = \text{GND or } V_{CC}, I_O = 0$	0.8V to 3.6V	—	3.0	μA
ΔI_{CC}	Additional Supply Current	Input at $V_{CC} - 0.6\text{V}$	3.3V	—	75	μA

Switching Characteristics

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

Parameter	From Input	TO OUTPUT	V _{cc}	T _A = +25°C			T _A = -40°C to +85°C		T _A = -40°C to +125°C		Unit
				Min	Typ	Max	Min	Max	Min	Max	
t _{pd}	A	Y	0.8V	—	11.6	—	—	—	—	—	ns
			1.2V ± 0.1V	2.0	4.1	7.5	2.0	9.1	2.0	10.0	
			1.5V ± 0.1V	1.5	3.0	5.1	1.5	6.1	1.5	6.7	
			1.8V ± 0.15V	1.2	2.7	4.0	1.2	5.0	1.2	5.5	
			2.5V ± 0.2V	1.0	2.3	3.2	1.0	4.0	1.0	4.4	
			3.3V ± 0.3V	0.8	2.2	2.8	0.8	3.3	0.8	3.6	

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

Parameter	From Input	TO OUTPUT	V _{cc}	T _A = +25°C			T _A = -40°C to +85°C		T _A = -40°C to +125°C		Unit
				Min	Typ	Max	Min	Max	Min	Max	
t _{pd}	A	Y	0.8V	—	14.7	—	—	—	—	—	ns
			1.2V ± 0.1V	2.5	5.1	9.0	2.5	11.2	2.5	12.3	
			1.5V ± 0.1V	2.0	3.8	6.1	2.0	7.4	2.0	8.1	
			1.8V ± 0.15V	1.7	3.6	4.8	1.7	6.1	1.7	6.7	
			2.5V ± 0.2V	1.4	3.3	4.5	1.4	4.8	1.4	5.3	
			3.3V ± 0.3V	1.2	3.1	4.2	1.2	4.5	1.2	5.0	

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

Parameter	From Input	TO OUTPUT	V _{cc}	T _A = +25°C			T _A = -40°C to +85°C		T _A = -40°C to +125°C		Unit
				Min	Typ	Max	Min	Max	Min	Max	
t _{pd}	A	Y	0.8V	—	17.7	—	—	—	—	—	ns
			1.2V ± 0.1V	2.9	6.1	10.4	2.9	13.1	2.9	14.5	
			1.5V ± 0.1V	2.3	4.5	6.8	2.3	8.6	2.3	9.4	
			1.8V ± 0.15V	2.1	4.4	6.7	2.1	7.8	2.1	8.6	
			2.5V ± 0.2V	1.7	4.2	5.9	1.7	6.8	1.7	6.9	
			3.3V ± 0.3V	1.5	4.0	5.7	1.5	6.1	1.5	6.7	

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

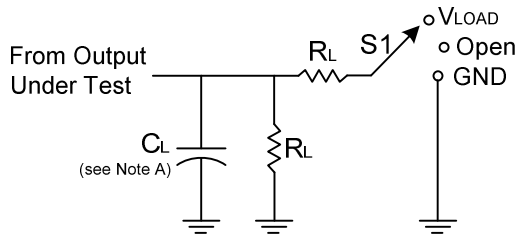
Parameter	From Input	TO OUTPUT	V _{cc}	T _A = +25°C			T _A = -40°C to +85°C		T _A = -40°C to +125°C		Unit
				Min	Typ	Max	Min	Max	Min	Max	
t _{pd}	A	Y	0.8V	—	24.6	—	—	—	—	—	ns
			1.2V ± 0.1V	3.9	9.0	15.6	3.9	18.8	3.9	20.7	
			1.5V ± 0.1V	3.2	7.5	13.4	3.2	13.7	3.2	13.7	
			1.8V ± 0.15V	2.9	6.8	12.4	2.9	12.6	2.9	12.6	
			2.5V ± 0.2V	2.5	6.5	10.7	2.5	10.9	2.5	12.1	
			3.3V ± 0.3V	2.3	6.4	9.7	2.3	10.4	2.3	11.4	

Operating and Package Characteristics (@ $T_A = +25^\circ\text{C}$, unless otherwise specified.)

Parameter		Test Conditions		V _{CC}	Typ	Unit
C _{pd}	Power Dissipation Capacitance	f = 1MHz No Load		0.8V	2.6	pF
				1.2V ± 0.1V	2.8	
				1.5V ± 0.1V	2.9	
				1.8V ± 0.15V	3.1	
				2.5V ± 0.2V	3.6	
				3.3V ± 0.3V	4.2	
C _i	Input Capacitance	V _i = V _{CC} or GND		0V or 3.3V	1.5	pF
θ _{JA}	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 _{JC}	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	S1	RL
tPLZ/tPZL	Vload	5kΩ

VCC	Inputs		VM	VLOAD	CL	VΔ
	VI	tr/td				
0.8V	VCC	≤3ns	VCC/2	2 X VCC	5, 10, 15, 30pF	0.1V
1.2V±0.1V	VCC	≤3ns	VCC/2	2 X VCC	5, 10, 15, 30pF	0.1V
1.5V±0.1V	VCC	≤3ns	VCC/2	2 X VCC	5, 10, 15, 30pF	0.1V
1.8V±0.15V	VCC	≤3ns	VCC/2	2 X VCC	5, 10, 15, 30pF	0.15V
2.5V±0.2V	VCC	≤3ns	VCC/2	2 X VCC	5, 10, 15, 30pF	0.15V
3.3V±0.3V	VCC	≤3ns	VCC/2	2 X VCC	5, 10, 15, 30pF	0.3V

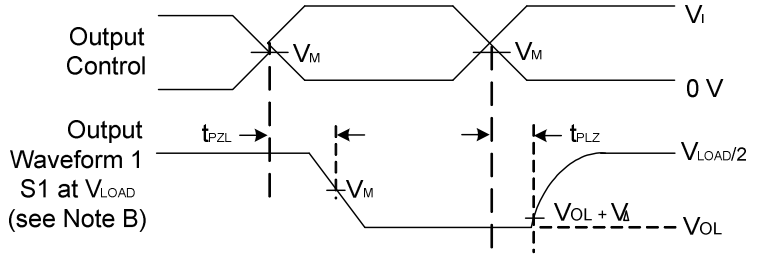
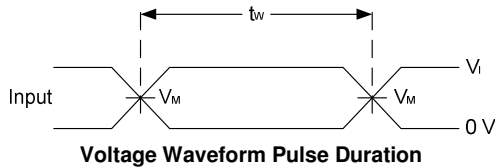
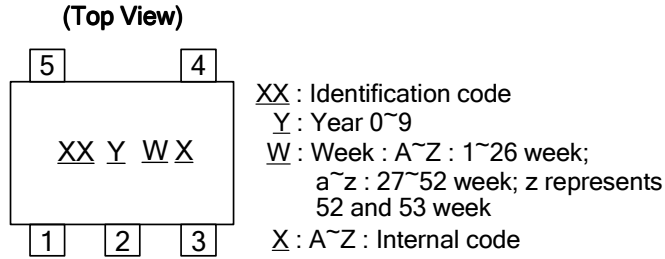


Figure 1 Load Circuit and Voltage Waveforms

- Notes:
- A. Includes test lead and test apparatus capacitance.
 - B. All pulses are supplied at pulse repetition rate ≤ 10 MHz.
 - C. Inputs are measured separately one transition per measurement.
 - D. For the open drain device the specified propagation delay tPD is the same as tPLZ and tPZL.

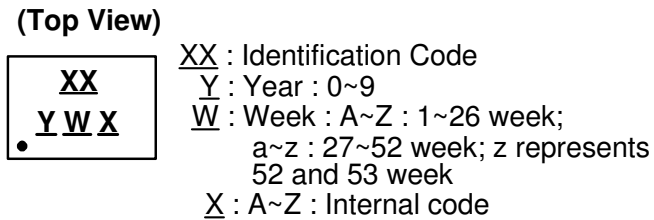
Marking Information

(1) SOT353



Part Number	Package	Identification Code
74AUP1G07SE-7	SOT353	XN

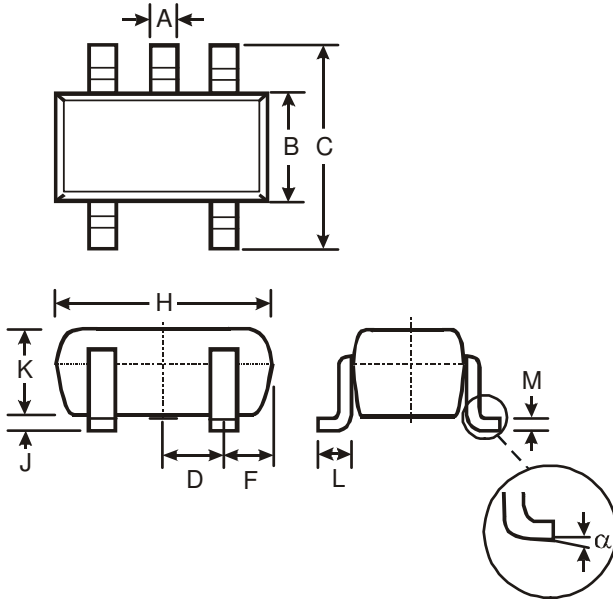
(2) X2-DFN0808-4, X1-DFN1010-6, X2-DFN1010-6, X2-DFN1409-6 and X2-DFN1410-6



Part Number	Package	Identification Code
74AUP1G07FS3-7	X2-DFN0808-4	YN
74AUP1G07FW5-7	X1-DFN1010-6	Q6
74AUP1G07FW4-7	X2-DFN1010-6	XN
74AUP1G07FX4-7	X2-DFN1409-6	HE
74AUP1G07FZ4-7	X2-DFN1410-6	XN

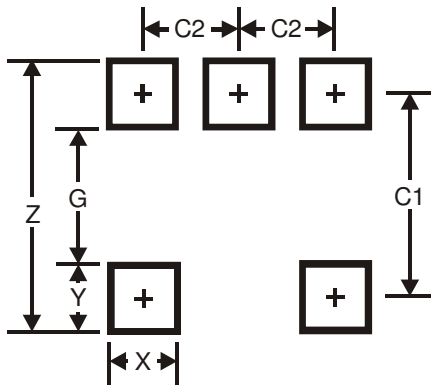
SOT353 Package Outline Dimensions and Suggested Pad Layout

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
α	0°	8°	-

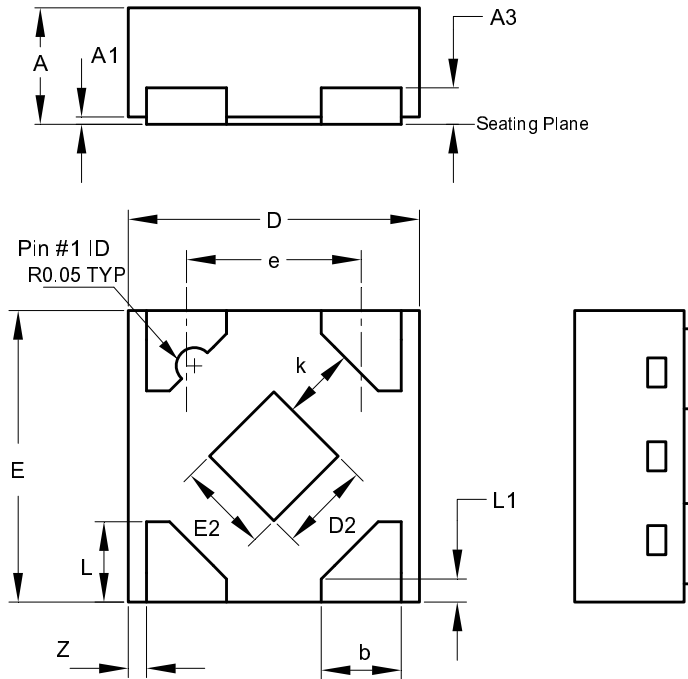
All Dimensions in mm



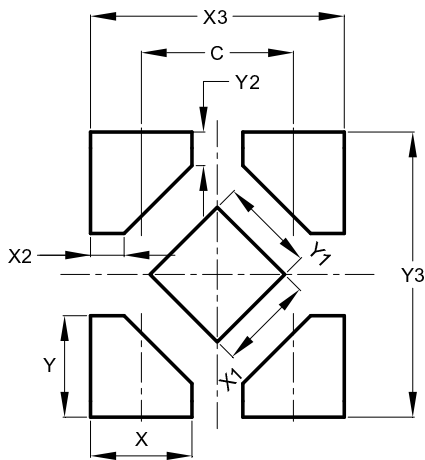
Dimensions	Value (in mm)
Z	2.5
G	1.3
X	0.42
Y	0.6
C1	1.9
C2	0.65

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.



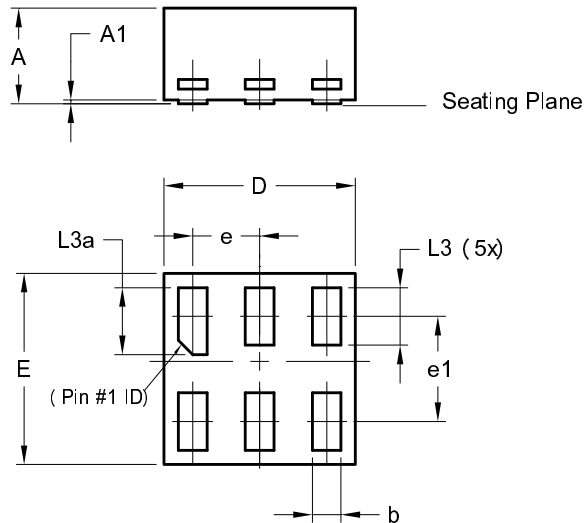
X2-DFN0808-4			
Dim	Min	Max	Typ
A	0.25	0.35	0.30
A1	0	0.04	0.02
A3	-	-	0.13
b	0.17	0.27	0.22
D	0.75	0.85	0.80
D2	0.15	0.35	0.25
E	0.75	0.85	0.80
E2	0.15	0.35	0.25
e	-	-	0.48
K	0.20	-	-
L	0.17	0.27	0.22
L1	0.02	0.12	0.07
Z	-	-	0.05
All Dimensions in mm			



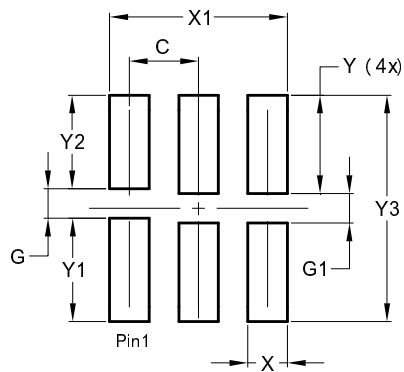
Dimensions	Value
C	0.480
X	0.320
X1	0.300
X2	0.106
X3	0.800
Y	0.320
Y1	0.300
Y2	0.106
Y3	0.900

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

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



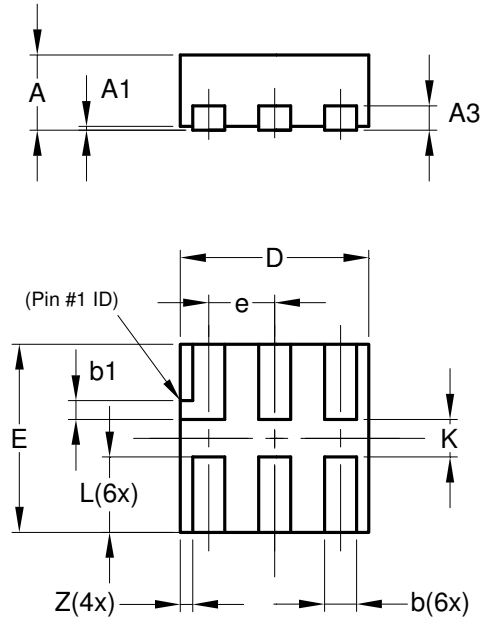
X1-DFN1010-6 (Type B)			
Dim	Min	Max	Typ
A	-	0.50	0.39
A1	-	0.04	-
b	0.12	0.20	0.15
D	0.95	1.050	1.00
E	0.95	1.050	1.00
e	0.35 BSC		
e1	0.55 BSC		
L3	0.27	0.30	0.30
L3a	0.32	0.40	0.35
All Dimensions in mm			



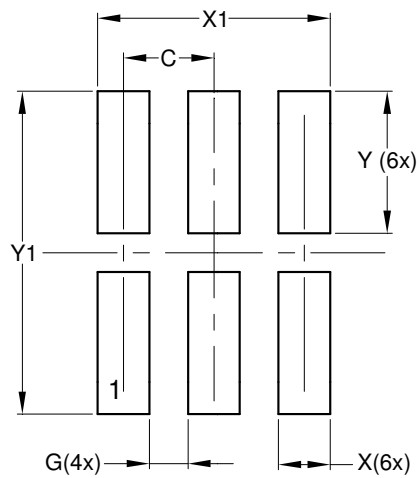
Dimensions	Value (in mm)
C	0.350
G	0.150
G1	0.150
X	0.200
X1	0.900
Y	0.500
Y1	0.525
Y2	0.475
Y3	1.150

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.



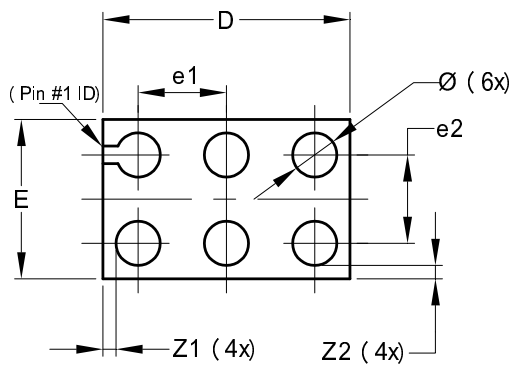
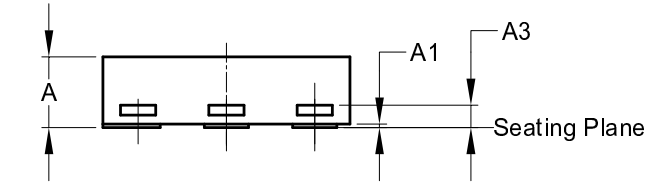
X2-DFN1010-6			
Dim	Min	Max	Typ
A	—	0.40	0.39
A1	0.00	0.05	0.02
A3	—	—	0.13
b	0.14	0.20	0.17
b1	0.05	0.15	0.10
D	0.95	1.05	1.00
E	0.95	1.05	1.00
e	—	—	0.35
L	0.35	0.45	0.40
K	0.15	—	—
Z	—	—	0.065
All Dimensions in mm			



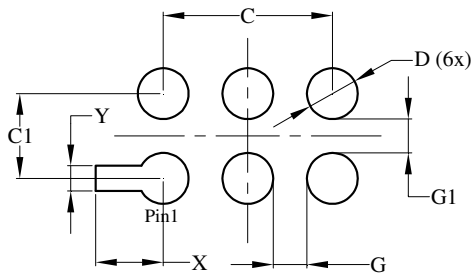
Dimensions	Value (in mm)
C	0.350
G	0.150
X	0.200
X1	0.900
Y	0.550
Y1	1.250

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.



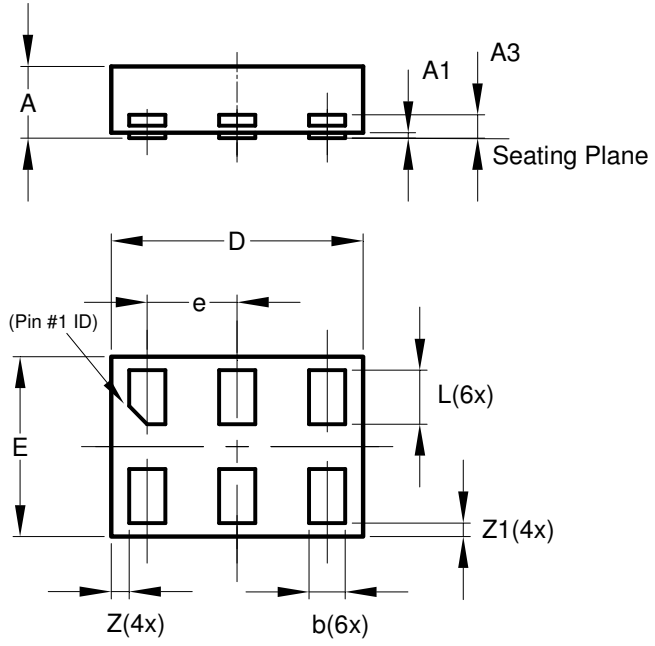
X2-DFN1409-6			
Dim	Min	Max	Typ
A	-	0.40	0.39
A1	0	0.05	0.02
A3	-	-	0.13
Ø	0.20	0.30	0.25
D	1.35	1.45	1.40
E	0.85	0.95	0.90
e1	-	-	0.50
e2	-	-	0.50
Z1	-	-	0.075
Z2	-	-	0.075
All Dimensions in mm			



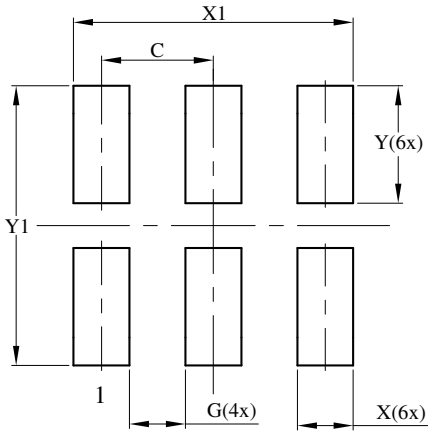
Dimensions	Value (in mm)
C	1.000
C1	0.500
D	0.300
G	0.200
G1	0.200
X	0.400
Y	0.150

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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