



**THE DATASHEET OF  
74AVCH1T45FW3-7**



**SINGLE BIT DUAL POWER SUPPLY TRANSLATING TRANSCEIVER WITH 3 STATE OUTPUTS**
**Description**

The 74AVCH1T45 is a single bit, dual supply transceiver with 3-state outputs suitable for transmitting a single logic bit across different voltage domains. The 74AVCH1T45 is a variant of the 74AVC1T45 that includes a bus hold feature at each input. The A input/output pin is designed to track  $V_{CCA}$  while the B input/output tracks  $V_{CCB}$ . This arrangement allows for universal low-voltage translation between any voltages from 1.2V to 3.6V. The Direction pin (DIR) controls the direction of the transceiver and in a logic voltage related to  $V_{CCA}$ . When a high logic level is applied to DIR the A pin becomes an input and the B pin becomes the output. Conversely the roles of A and B are reversed when DIR is asserted low.

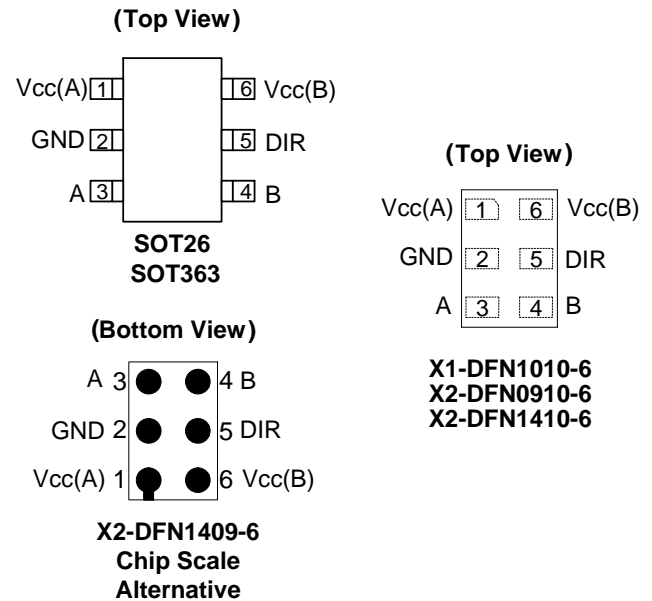
The 3-state feature occurs when either of the power supply voltages are zero. This is also an Ioff feature and allows for the output to remain in a high impedance state with both power supplies at 0V preventing damaging backflow currents and providing power down electrical isolation up to 3.6 V as not to interfere with any logic activity on pin A or B.

The bus hold feature maintains the previous logic level therefore a valid logic level is always present eliminating the need for additional resistors for an unused or disconnected inputs.

**Features**

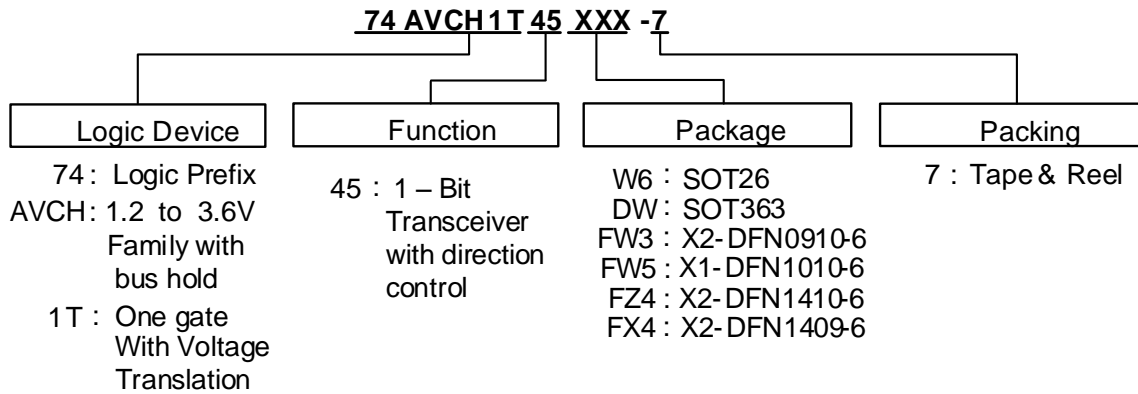
- Wide Supply Voltage Range:
  - $V_{CC(A)}$ : from 1.2V to 3.6V
  - $V_{CC(B)}$ : from 1.2V to 3.6V
- $\pm 12\text{mA}$  Output Drive at 3.3V
- High Noise Immunity - (100mV hysteresis typical)
- $I_{OFF}$  Supports Partial-Power-Down Mode Operation
- $I_{OFF}$  controlled by either  $V_{CC}$  being at 0V
- Inputs accept up to 4.6V
- ESD Protection Exceeds JESD 22
  - 200-V Machine Model (A115)
  - 2000-V Human Body Model (A114)
  - 1000 V Charged Device Model ( C101)
- Latch-Up Exceeds 100mA per JESD 78, Class I
- X2-DFN1409-6 package designed as a direct replacement for chip scale packaging.
- **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](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**

- Voltage Level Translation:  
Well suited to join logic types operating at different voltages
- Power Down Signal Isolation:  
If either voltage domain is turned off the signal is isolated and there is no loading on signal lines
- Wide array of products such as:
  - Cell Phones, Tablets, E-Readers
  - PCs, Notebooks, Netbooks, Ultrabooks
  - Networking, Routers, Gateways
  - Computer Peripherals, Hard Drives, CD/DVD ROMs
  - TVs, DVDs, DVRs, Set Top Boxes
  - Personal Navigation / GPS
  - MP3 players, Cameras, Video Recorders

## Ordering Information



Part Number	Package Code	Packaging	7" Tape and Reel (Note 7)	
			Quantity	Part Number Suffix
74AVCH1T45W6-7	W6	SOT26	3,000/Tape & Reel	-7
74AVCH1T45DW-7	DW	SOT363	3,000/Tape & Reel	-7
74AVCH1T45FW3-7	FW3	X2-DFN0910-6	5,000/Tape & Reel	-7
74AVCH1T45FW5-7	FW5	X1-DFN1010-6	5,000/Tape & Reel	-7
74AVCH1T45FZ4-7	FZ4	X2-DFN1410-6	5,000/Tape & Reel	-7
74AVCH1T45FX4-7	FX4	X2-DFN1409-6	5,000/Tape & Reel	-7

Notes: 4. The taping orientation is located on our website at <http://www.diodes.com/datasheets/ap02007.pdf>

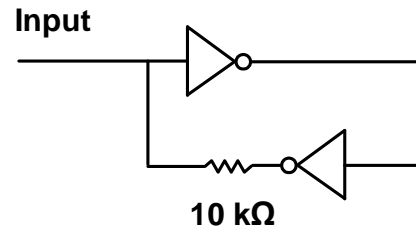
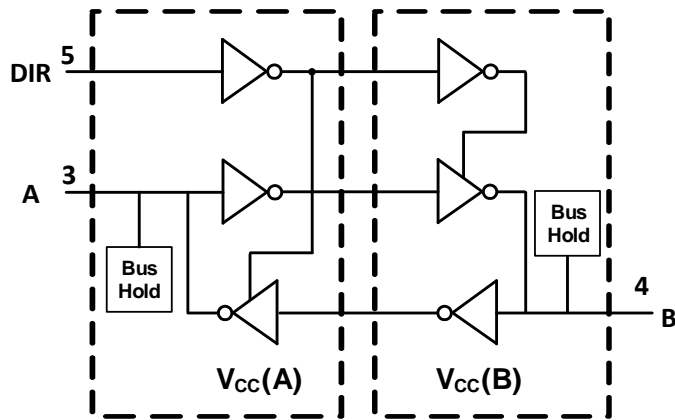
## Pin Descriptions

Pin Name	Pin	Function
VCC(A)	1	Supply for I/O pin A and reference for DIR
GND	2	Ground
A	3	Data Input/Output
B	4	Data Input/Output
DIR	5	Direction Control
VCC(B)	6	Supply for I/O pin B

## Function Table

Supply voltage	Input	Input/Output	
		A	B
V <sub>CC(A)</sub> , V <sub>CC(B)</sub>	DIR (Direction Pin)	A=B	input
1.2 V to 3.6 V	L	input	B=A
1.2 V to 3.6 V	H	input	B=A
GND	X	Z	Z

**Logic Diagram**



**Bus Hold Circuit**  
Previous Input is Latched  
Input Signals must be strong enough to override 10kΩ

**Absolute Maximum Ratings** (Note 5) (@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
ESD MM	Machine Model ESD Protection	200	V
V <sub>CC(A), V<sub>CC(B)</sub></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 Impedance or I <sub>OFF</sub> State	-0.5 to +4.6	V
V <sub>O</sub>	Voltage Applied to Output in High or Low State	A pin	-0.5 to V <sub>CC(A)</sub> +0.5
		B pin	-0.5 to V <sub>CC(B)</sub> +0.5
I <sub>IK</sub>	Input Clamp Current V <sub>I</sub> <0	-50	mA
I <sub>OK</sub>	Output Clamp Current	-50	mA
I <sub>O</sub>	Continuous Output Current	±50	mA
	Continuous Current Through V <sub>CC</sub> or GND	±100	mA
T <sub>J</sub>	Operating Junction Temperature	-40 to +150	°C
T <sub>STG</sub>	Storage Temperature	-65 to +150	°C

Note: 5. 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.

**Recommended Operating Condition** (Notes 6, 7 & 8) (@ $T_A = +25^\circ\text{C}$ , unless otherwise specified.)

Symbol	Parameter		$V_{CCI}$	$V_{CCO}$	Min	Max	Units
$V_{CC(A)}$	Operating Voltage		—	—	1.2	3.6	V
$V_{CC(B)}$	Operating Voltage		—	—	1.2	3.6	V
$V_{IH}$	High-Level Input Voltage	Data Inputs	1.2 to 1.95V	1.2 to 3.6V	$0.65 \times V_{CC(A)}$	—	V
			1.95 to 2.7V	1.2 to 3.6V	1.6	—	
			2.7V to 3.6V	1.2 to 3.6V	2	—	
$V_{IL}$	Low-Level Input Voltage	Data Inputs	1.2 to 1.95V	1.2 to 3.6V	—	$0.35 \times V_{CC(A)}$	V
			1.95 to 2.7V	1.2 to 3.6V	—	0.7	
			2.7V to 3.6V	1.2 to 3.6V	—	0.8	
$V_{IH}$	High-Level Input Voltage	DIR (referenced to $V_{CCA}$ )	1.2 to 1.95V	1.2 to 3.6V	$0.65 \times V_{CC(B)}$	—	V
			1.95 to 2.7V	1.2 to 3.6V	1.6	—	
			2.7 to 3.6V	1.2 to 3.6V	2	—	
$V_{IL}$	Low-Level Input Voltage	DIR (referenced to $V_{CCA}$ )	1.2 to 1.95V	1.2 to 3.6V	—	$0.35 \times V_{CC(B)}$	V
			1.95 to 2.7V	1.2 to 3.6V	—	0.7	
			2.7 to 3.6V	1.2 to 3.6V	—	0.8	
$V_I$	Input Voltage		—	—	0	3.6	V
$V_O$	Output Voltage	Active state	—	—	0	$V_{CCO}$	V
		3-state	—	—	0	3.6	V
$I_{OH}$	High-Level Output Current	1.2 to 3.6V	1.2V	—	—	-3	mA
		1.2 to 3.6V	1.4 to 1.6V	—	—	-6	
		1.2 to 3.6V	1.65 to 1.95V	—	—	-8	
		1.2 to 3.6V	2.3 to 2.7V	—	—	-9	
		1.2 to 3.6V	3 to 3.6V	—	—	-12	
$I_{OL}$	Low-Level Output Current	1.2 to 3.6V	1.2V	—	—	3	mA
		1.2 to 3.6V	1.4 to 1.6V	—	—	6	
		1.2 to 3.6V	1.65 to 1.95V	—	—	8	
		1.2 to 3.6V	2.3 to 2.7V	—	—	9	
		1.2 to 3.6V	3 to 3.6V	—	—	12	
$\Delta t/\Delta V$	Input Transition Rise or Fall Rate		1.2 to 3.6V	1.2 to 3.6V	—	5	ns/V
$T_A$	Operating Free-Air Temperature				-40	+85	$^\circ\text{C}$

- Note:
6.  $V_{CCO}$  is the  $V_{CC}$  associated with the output port.
  7.  $V_{CCI}$  is the  $V_{CC}$  associated with the input port.
  8. All unused inputs of the device must be held at  $V_{CCI}$  of GND.

**Electrical Characteristics** (Notes 9 & 10) (@ $T_A = +40^\circ\text{C}$  to  $+85^\circ\text{C}$ , unless otherwise specified.)

Symbol	Parameter	Test Conditions	V <sub>CC</sub> (A)	V <sub>CC</sub> (B)	T <sub>A</sub> = +25°C			T <sub>A</sub> = -40°C to +85°C		Unit	
					Min	Typ	Max	Min	Max		
V <sub>OH</sub>	High Level Output Voltage	I <sub>OH</sub> = -100μA	1.2 to 3.6V	1.2V to 3.6V	—	—	—	V <sub>CC</sub> - 0.2	—	V	
		I <sub>OH</sub> = -3mA	1.2V	1.2V	—	0.95	—	—	—		
		I <sub>OH</sub> = -6mA	1.4V	1.4V	—	—	—	1.05	—		
		I <sub>OH</sub> = -8mA	1.65V	1.65V	—	—	—	1.2	—		
		I <sub>OH</sub> = -9mA	2.3V	2.3V	—	—	—	1.75	—		
		I <sub>OH</sub> = -12mA	3V	3V	—	—	—	2.3	—		
V <sub>OL</sub>	Low-Level Output Voltage	I <sub>OL</sub> = 100μA	1.2 to 3.6V	1.2V to 3.6V	—	—	—	—	0.2	V	
		I <sub>OL</sub> = 3mA	1.2V	1.2V	—	0.15	—	—	—		
		I <sub>OL</sub> = 6mA	1.4V	1.4V	—	—	—	—	0.35		
		I <sub>OL</sub> = 8mA	1.65V	1.65V	—	—	—	—	0.45		
		I <sub>OL</sub> = 9mA	2.3V	2.3V	—	—	—	—	0.55		
		I <sub>OL</sub> = 12mA	3V	3V	—	—	—	—	0.7		
I <sub>I</sub>	Input Current	DIR	V <sub>I</sub> = V <sub>CC</sub> (A) or GND	1.2 to 3.6V	1.2 to 3.6V	-0.25	±0.25	0.25	-1	1	μA
I <sub>OFF</sub>	Power Down Leakage Current	A Pin	V <sub>I</sub> or V <sub>O</sub> = 0 to 3.6V	0V	0 to 3.6V	-1	±0.1	1	-5	5	μA
		B Pin		0 to 3.6V	0	-1	±0.1	1	-5	5	
I <sub>OZ</sub>	3-State Leakage Current	B Pin	V <sub>O</sub> = V <sub>CCO</sub> or Gnd	0V	0 to 3.6V	-2.5	±0.5	2.5	-5	5	μA
		A Pin	V <sub>I</sub> = V <sub>CCI</sub> or Gnd	0 to 3.6V	0	-2.5	±0.5	2.5	-5	5	
I <sub>CCA</sub>	Supply Current	V <sub>I</sub> = V <sub>CCI</sub> or GND I <sub>O</sub> = 0	1.2 to 3.6V	11.2 to 3.6V	—	—	—	—	10	μA	
			3.6V	0V	—	—	—	—	-2		
			0V	3.6V	—	—	—	—	10		
I <sub>CCB</sub>	Supply Current	V <sub>I</sub> = V <sub>CCI</sub> or GND I <sub>O</sub> = 0	1.2 to 3.6V	1.2 to 3.6V	—	—	—	—	10	μA	
			0V	3.6V	—	—	—	—	10		
			3.6V	0V	—	—	—	—	-2		
I <sub>CCA</sub> + I <sub>CCB</sub>	Supply Current	V <sub>I</sub> = V <sub>CCI</sub> or GND I <sub>O</sub> = 0	1.2 to 3.6V	1.2 to 3.6V	—	—	—	—	20	μA	
C <sub>I</sub>	Input Capacitance	DIR	V <sub>I</sub> = V <sub>CC</sub> (A) or GND	3.3V	3.3V	—	2.5	—	—	—	pF
C <sub>IO</sub>	Input/Output Capacitance	A or B pin	V <sub>I</sub> = V <sub>CC</sub> (A)/(B) or GND	3.3V	3.3V	—	6.0	—	—	—	pF

Notes: 9. V<sub>CCO</sub> is the V<sub>CC</sub> associated with the output port.  
10. V<sub>CCI</sub> is the V<sub>CC</sub> associated with the input port.

**Package Characteristics** ( $V_{CC} = 3.3V$ ,  $T_A = +25^\circ C$ , unless otherwise specified.)

Symbol	Parameter	Package	Test Conditions	Min	Typ	Max	Unit
$\theta_{JA}$	Thermal Resistance Junction-to-Ambient	SOT26	(Note 11)	—	166	—	$^\circ C/W$
		SOT363		—	371	—	
		X2-DFN0910-6		—	530	—	
		X2-DFN1410-6		—	430	—	
		X2-DFN1409-6		—	450	—	
		X1-DFN1010-6		—	510	—	
$\theta_{JC}$	Thermal Resistance Junction-to-Case	SOT26	(Note 11)	—	46	—	$^\circ C/W$
		SOT363		—	143	—	
		X2-DFN0910-6		—	260	—	
		X2-DFN1410-6		—	190	—	
		X2-DFN1409-6		—	200	—	
		X1-DFN1010-6		—	250	—	

Note: 11. Test condition for all packages: Device mounted on FR-4 substrate PC board, 2oz copper with minimum recommended pad layout.

**Switching Characteristics**

$V_{CC} (A) = 1.2V$ ,  $T_A = -40^\circ C$  to  $+85^\circ C$ , See Figure 1

Parameter	From (Input)	To (Output)	$V_{CC}(B) = 1.2V$	$V_{CC}(B) = 1.5V \pm 0.1$	$V_{CC}(B) = 1.8V \pm 0.15V$	$V_{CC}(B) = 2.5V \pm 0.2V$	$V_{CC}(B) = 3.3V \pm 0.3V$	Unit
			TYP	TYP	TYP	TYP	TYP	
$t_{PLH}$	A	B	3.3	2.7	2.4	2.3	2.4	ns
$t_{PHL}$			3.3	2.7	2.4	2.3	2.4	
$t_{PLH}$	B	A	3.3	3.1	2.9	2.8	2.7	ns
$t_{PHL}$			3.3	3.1	2.9	2.8	2.7	
$t_{PHZ}$	DIR	A	5.1	5.2	5.3	5.2	3.7	ns
$t_{PLZ}$			5.1	5.2	5.3	5.2	3.7	
$t_{PHZ}$	DIR	B	5.3	4.3	4.0	3.3	3.7	ns
$t_{PLZ}$			5.3	4.3	4.0	3.3	3.7	
$t_{PZH}^*$	DIR	A	8.6	7.3	6.8	6.1	6.4	ns
$t_{PZL}^*$			8.6	7.3	6.8	6.1	6.4	
$t_{PZH}^*$	DIR	B	8.3	7.8	7.7	7.5	5.8	ns
$t_{PZL}^*$			8.3	7.8	7.7	7.5	5.8	

\*Enable times are calculated vales see table at end of switching characteristics.

$V_{CC} (A) = 1.5V \pm 0.1V$ ,  $T_A = -40^\circ C$  to  $+85^\circ C$ , See Figure 1

Parameter	From (Input)	To (Output)	$V_{CC}(B) = 1.2V$	$V_{CC}(B) = 1.5V \pm 0.1$		$V_{CC}(B) = 1.8V \pm 0.15V$		$V_{CC}(B) = 2.5V \pm 0.2V$		$V_{CC}(B) = 3.3V \pm 0.3V$		Unit
			TYP	Min	Max	Min	Max	Min	Max	Min	Max	
$t_{PLH}$	A	B	2.9	0.7	5.6	0.6	5.2	0.5	4.2	0.5	3.8	ns
$t_{PHL}$			2.9	0.7	5.6	0.6	5.2	0.5	4.2	0.5	3.8	
$t_{PLH}$	B	A	2.6	0.6	5.5	0.4	5.3	0.3	4.9	0.3	4.8	ns
$t_{PHL}$			2.6	0.6	5.5	0.4	5.3	0.3	4.9	0.3	4.8	
$t_{PHZ}$	DIR	A	3.8	1.6	6.7	1.5	6.8	0.3	6.9	0.9	6.9	ns
$t_{PLZ}$			3.8	1.6	6.7	1.5	6.8	0.3	6.9	0.9	6.9	
$t_{PHZ}$	DIR	B	5.1	1.8	8.1	1.6	7.1	1.1	4.7	1.4	4.5	ns
$t_{PLZ}$			5.1	1.8	8.1	1.6	7.1	1.1	4.7	1.4	4.5	
$t_{PZH}^*$	DIR	A	7.7	—	13.6	—	12.4	—	9.6	—	9.3	ns
$t_{PZL}^*$			7.7	—	13.6	—	12.4	—	9.6	—	9.3	
$t_{PZH}^*$	DIR	B	6.7	—	12.3	—	12	—	11.1	—	10.7	ns
$t_{PZL}^*$			6.7	—	12.3	—	12	—	11.1	—	10.7	

\*Enable times are calculated vales see table at end of switching characteristics.

**Switching Characteristics** (Continued)

 $V_{CC(A)} = 1.8V \pm 0.15V$ ,  $T_A = -40^\circ C$  to  $+85^\circ C$ , See Figure 1

Parameter	From (Input)	To (Output)	$V_{CC(B)} = 1.2V$	$V_{CC(B)} = 1.5V \pm 0.1$		$V_{CC(B)} = 1.8V \pm 0.15V$		$V_{CC(B)} = 2.5V \pm 0.2V$		$V_{CC(B)} = 3.3V \pm 0.3V$		Unit
			TYP	Min	Max	Min	Max	Min	Max	Min	Max	
$t_{PLH}$	A	B	2.7	0.6	5.3	0.5	5.0	0.4	3.9	0.4	3.4	ns
$t_{PHL}$			2.7	0.6	5.3	0.5	5.0	0.4	3.9	0.4	3.4	
$t_{PLH}$	B	A	2.3	0.5	5.2	0.4	5.0	0.3	4.6	0.2	4.4	ns
$t_{PHL}$			2.3	0.5	5.2	0.4	5.0	0.3	4.6	0.2	4.4	
$t_{PHZ}$	DIR	A	3.8	1.6	5.9	1.6	5.9	1.6	5.9	0.5	6.0	ns
$t_{PLZ}$			3.8	1.6	5.9	1.6	5.9	1.6	5.9	0.5	6.0	
$t_{PHZ}$	DIR	B	5.0	1.8	7.7	1.4	6.8	1.0	4.4	1.4	5.3	ns
$t_{PLZ}$			5.0	1.8	7.7	1.4	6.8	1.0	4.4	1.4	5.3	
$t_{PZH}^*$	DIR	A	7.3	—	12.9	—	11.8	—	9.0	—	8.7	ns
$t_{PZL}^*$			7.3	—	12.9	—	11.8	—	9.0	—	8.7	
$t_{PZH}^*$	DIR	B	6.5	—	11.2	—	10.9	—	9.8	—	9.4	ns
$t_{PZL}^*$			6.5	—	11.2	—	10.9	—	9.8	—	9.4	

\*Enable times are calculated vales see table at end of switching characteristics.

 $V_{CC(A)} = 2.5V \pm 0.2V$ ,  $T_A = -40^\circ C$  to  $+85^\circ C$ , See Figure 1

Parameter	From (Input)	To (Output)	$V_{CC(B)} = 1.2V$	$V_{CC(B)} = 1.5V \pm 0.1$		$V_{CC(B)} = 1.8V \pm 0.15V$		$V_{CC(B)} = 2.5V \pm 0.2V$		$V_{CC(B)} = 3.3V \pm 0.3V$		Unit
			TYP	Min	Max	Min	Max	Min	Max	Min	Max	
$t_{PLH}$	A	B	2.6	0.5	4.9	0.4	4.6	0.3	3.4	0.3	3.0	ns
$t_{PHL}$			2.6	0.5	4.9	0.4	4.6	0.3	3.4	0.3	3.0	
$t_{PLH}$	B	A	2.2	0.4	4.2	0.3	3.8	0.2	3.4	0.2	3.3	ns
$t_{PHL}$			2.2	0.4	4.2	0.3	3.8	0.2	3.4	0.2	3.3	
$t_{PHZ}$	DIR	A	2.8	0.3	3.8	0.8	3.8	0.4	3.8	0.5	3.8	ns
$t_{PLZ}$			2.8	0.3	3.8	0.8	3.8	0.4	3.8	0.5	3.8	
$t_{PHZ}$	DIR	B	4.9	2.0	7.6	1.5	6.5	0.6	4.1	1.0	4.0	ns
$t_{PLZ}$			4.9	2.0	7.6	1.5	6.5	0.6	4.1	1.0	4.0	
$t_{PZH}^*$	DIR	A	7.1	—	11.8	—	10.3	—	7.5	—	7.3	ns
$t_{PZL}^*$			7.1	—	11.8	—	10.3	—	7.5	—	7.3	
$t_{PZH}^*$	DIR	B	5.4	—	8.6	—	8.1	—	7.0	—	6.6	ns
$t_{PZL}^*$			5.4	—	8.6	—	8.1	—	7.0	—	6.6	

\*Enable times are calculated vales see table at end of switching characteristics.

 $V_{CC(A)} = 3.3V \pm 0.3V$ ,  $T_A = -40^\circ C$  to  $+85^\circ C$ , See Figure 1

Parameter	From (Input)	To (Output)	$V_{CC(B)} = 1.2V$	$V_{CC(B)} = 1.5V \pm 0.1$		$V_{CC(B)} = 1.8V \pm 0.15V$		$V_{CC(B)} = 2.5V \pm 0.2V$		$V_{CC(B)} = 3.3V \pm 0.3V$		Unit
			TYP	Min	Max	Min	Max	Min	Max	Min	Max	
$t_{PLH}$	A	B	2.6	0.4	4.7	0.3	4.4	0.2	3.3	0.2	2.8	ns
$t_{PHL}$			2.6	0.4	4.7	0.3	4.4	0.2	3.3	0.2	2.8	
$t_{PLH}$	B	A	2.2	0.4	3.8	0.3	3.4	0.2	3	0.1	2.8	ns
$t_{PHL}$			2.2	0.4	3.8	0.3	3.4	0.2	3	0.1	2.8	
$t_{PHZ}$	DIR	A	3.1	1.3	4.3	1.3	4.3	1.3	4.3	1.3	4.3	ns
$t_{PLZ}$			3.1	1.3	4.3	1.3	4.3	1.3	4.3	1.3	4.3	
$t_{PHZ}$	DIR	B	4	0.7	7.4	0.6	6.5	0.7	4	1.5	4.9	ns
$t_{PLZ}$			4	0.7	7.4	0.6	6.5	0.7	4	1.5	4.9	
$t_{PZH}^*$	DIR	A	6.2	—	11.2	—	9.9	—	7	—	6.7	ns
$t_{PZL}^*$			6.2	—	11.2	—	9.9	—	7	—	6.7	
$t_{PZH}^*$	DIR	B	5.7	—	8.9	—	8.5	—	7.2	—	6.8	ns
$t_{PZL}^*$			5.7	—	8.9	—	8.5	—	7.2	—	6.8	

\*Enable times are calculated vales see table at end of switching characteristics.

## Enable Time Calculations

Enable times can be calculated as follows:

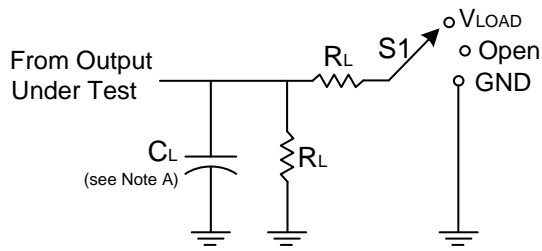
- $t_{PZH} \text{ (DIR to A)} = t_{PLZ} \text{ (DIR to B)} + t_{PLH} \text{ (B to A)}$
- $t_{PZL} \text{ (DIR to A)} = t_{PHZ} \text{ (DIR to B)} + t_{PHL} \text{ (B to A)}$
- $t_{PZH} \text{ (DIR to B)} = t_{PLZ} \text{ (DIR to A)} + t_{PLH} \text{ (A to B)}$
- $t_{PZL} \text{ (DIR to B)} = t_{PHZ} \text{ (DIR to A)} + t_{PHL} \text{ (A to B)}$

These times represent the length of time from a direction change plus the propagation time through the part. A new input signal should not be applied until the new input pin has been disabled.

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

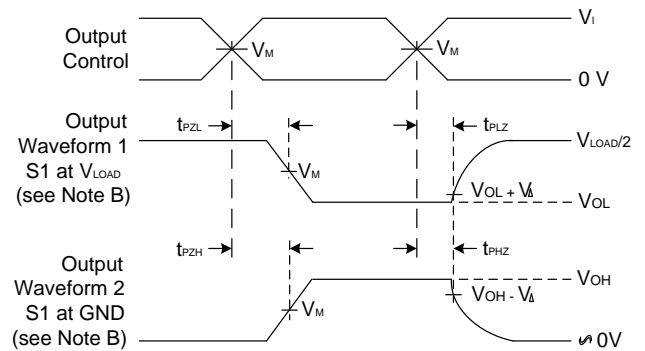
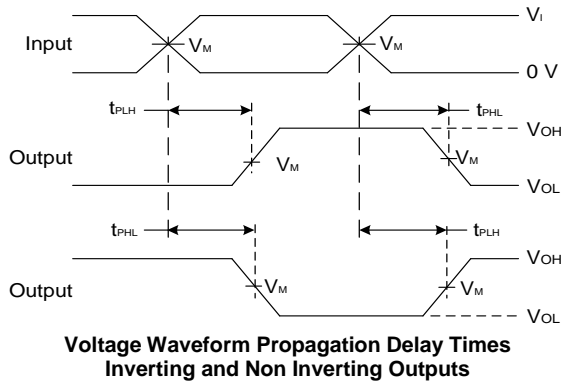
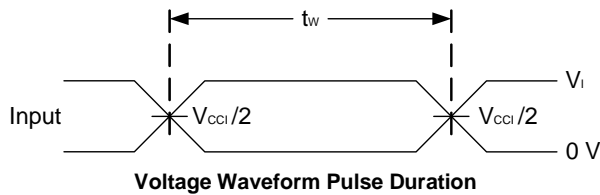
Parameter Power Dissipation Capacitance		Test Conditions	$V_{CC(A)} =$ $V_{CC(B)} = 1.8\text{V}$	$V_{CC(A)} =$ $V_{CC(B)} = 2.5\text{V}$	$V_{CC(A)} =$ $V_{CC(B)} = 3.3\text{V}$	$V_{CC(A)} =$ $V_{CC(B)} = 5\text{V}$	Unit
			Typ	Typ	Typ	Typ	
C <sub>PD</sub> (A)	A- input, B- output	C <sub>L</sub> = 0 pF f = 10 MHz tr = tf = 1 ns	3	4	4	4	pF
	B- input, A- output		18	19	20	21	
C <sub>PD</sub> (B)	A- input, B- output	C <sub>L</sub> = 0 pF f = 10 MHz tr = tf = 1 ns	18	19	20	21	pF
	B- input, A- output		3	4	4	4	

**Parameter Measurement Information**



TEST	S1
$t_{PLH}/t_{PHL}$	Open
$t_{PLZ}/t_{PZL}$	Vload
$t_{PHZ}/t_{PZH}$	GND

$V_{CC}$	Inputs		$V_M$	$V_{LOAD}$	$C_L$	$R_L$	$V_{\Delta}$
	$V_I$	$t_r/t_f$					
1.2V	$V_{CCI}$	$\leq 2ns$	$V_{CCO}/2$	$2 \times V_{CCO}$	15pF	2K $\Omega$	0.15V
1.8V $\pm$ 0.15V	$V_{CCI}$	$\leq 2ns$	$V_{CCO}/2$	$2 \times V_{CCO}$	15pF	2K $\Omega$	0.15V
2.5V $\pm$ 0.2V	$V_{CCI}$	$\leq 2ns$	$V_{CCO}/2$	$2 \times V_{CCO}$	15pF	2K $\Omega$	0.15V
3.3V $\pm$ 0.3V	$V_{CCI}$	$\leq 2.5ns$	$V_{CCO}/2$	$2 \times V_{CCO}$	15pF	2K $\Omega$	0.3V

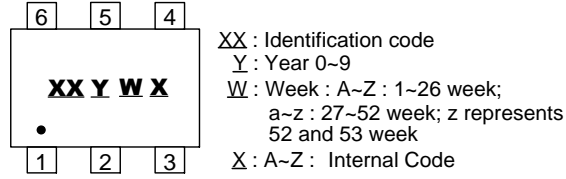


**Figure 1 Load Circuit and Voltage Waveforms**

- Notes:
- A. Includes test lead and test apparatus capacitance.
  - B. Waveform 1 is for an output with input set up as a low and device coming out or into 3-state via DIR control. Waveform 2 is for an output with input set up as a high and device coming out or into 3-state via DIR control.
  - C. All pulses are supplied at pulse repetition rate  $\leq 10$  MHz.
  - D.  $t_{PLZ}$  and  $t_{PHZ}$  are the same as  $t_{DIS}$ .
  - E.  $t_{PZL}$  and  $t_{PZH}$  are the same as  $t_{EN}$ .
  - F.  $t_{PLH}$  and  $t_{PHL}$  are the same as  $t_{PD}$ .
  - G.  $V_{CCI}$  is the  $V_{CC}$  associated with the input.
  - F.  $V_{CCO}$  is the  $V_{CC}$  associated with the output.

**Marking Information**

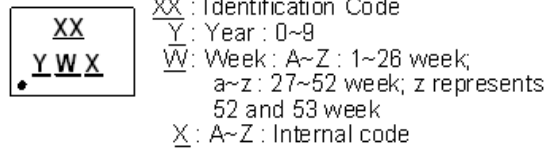
(1) SOT26, SOT363



Part Number	Package	Identification Code
74AVCH1T45W6-7	SOT26	VT
74AVCH1T45DW-7	SOT363	VR

(2) X2-DFN0910-6, X2-DFN1010-6, X2-DFN1410-6, and X2-DFN1409-6

(Top View)

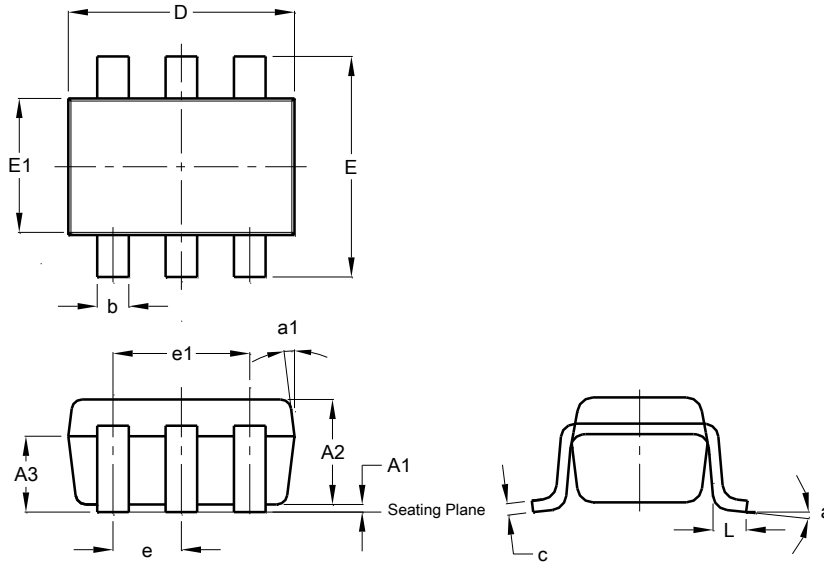


Part Number	Package	Identification Code
74AVCH1T45FW3-7	X2-DFN0910-6	ZR
74AVCH1T45FW5-7	X1-DFN1010-6	VR
74AVCH1T45FX4-7	X2-DFN1409-6	VT
74AVCH1T45FZ4-7	X2-DFN1410-6	VS

**Package Outline Dimensions**

Please see <http://www.diodes.com/package-outlines.html> for the latest version.

**SOT26**

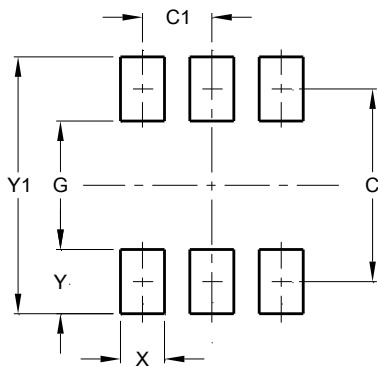


SOT26			
Dim	Min	Max	Typ
A1	0.013	0.10	0.05
A2	1.00	1.30	1.10
A3	0.70	0.80	0.75
b	0.35	0.50	0.38
c	0.10	0.20	0.15
D	2.90	3.10	3.00
e	-	-	0.95
e1	-	-	1.90
E	2.70	3.00	2.80
E1	1.50	1.70	1.60
L	0.35	0.55	0.40
a	-	-	8°
a1	-	-	7°
All Dimensions in mm			

**Suggested Pad Layout**

Please see <http://www.diodes.com/package-outlines.html> for the latest version.

**SOT26**

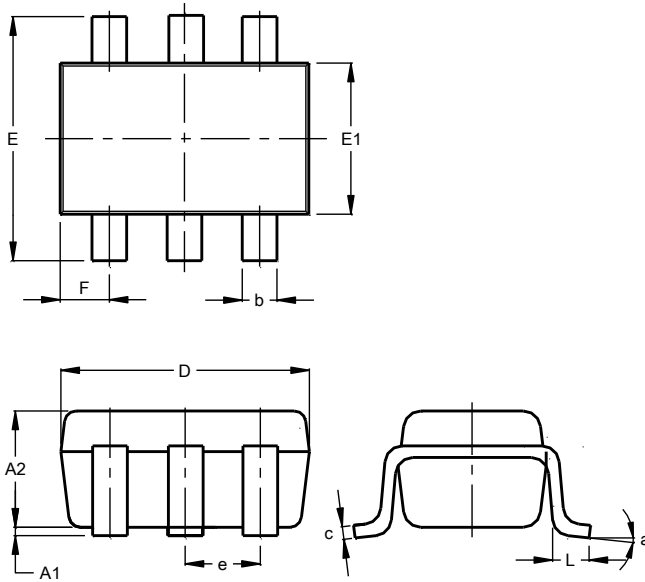


Dimensions	Value (in mm)
C	2.40
C1	0.95
G	1.60
X	0.55
Y	0.80
Y1	3.20

**Package Outline Dimensions (Cont.)**

Please see <http://www.diodes.com/package-outlines.html> for the latest version.

**SOT363**

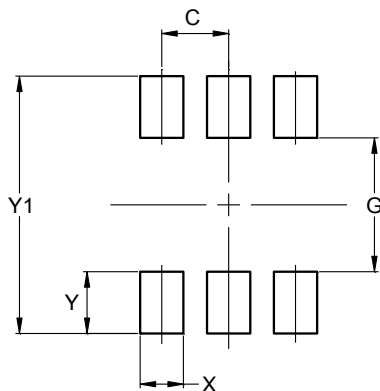


SOT363			
Dim	Min	Max	Typ
A1	0.00	0.10	0.05
A2	0.90	1.00	1.00
b	0.10	0.30	0.25
c	0.10	0.22	0.11
D	1.80	2.20	2.15
E	2.00	2.20	2.10
E1	1.15	1.35	1.30
e	0.650 BSC		
F	0.40	0.45	0.425
L	0.25	0.40	0.30
a	0°	8°	--
All Dimensions in mm			

**Suggested Pad Layout**

Please see <http://www.diodes.com/package-outlines.html> for the latest version.

**SOT363**

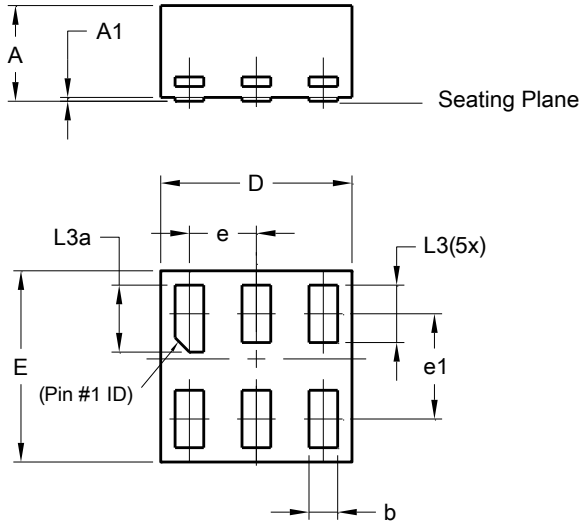


Dimensions	Value (in mm)
C	0.650
G	1.300
X	0.420
Y	0.600
Y1	2.500

**Package Outline Dimensions**

Please see <http://www.diodes.com/package-outlines.html> for the latest version.

**X1-DFN1010-6 (Type B)**

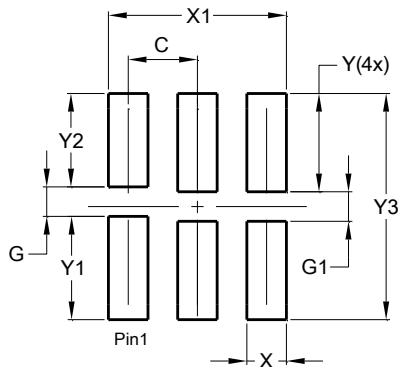


X1-DFN1010-6 (Type B)			
Dim	Min	Max	Typ
A	-	0.50	0.39
A1	-	0.04	-
b	0.12	0.20	0.15
D	0.95	1.050	1.00
E	0.95	1.050	1.00
e	0.35 BSC		
e1	0.55 BSC		
L3	0.27	0.30	0.30
L3a	0.32	0.40	0.35
All Dimensions in mm			

**Suggested Pad Layout**

Please see <http://www.diodes.com/package-outlines.html> for the latest version.

**X1-DFN1010-6 (Type B)**

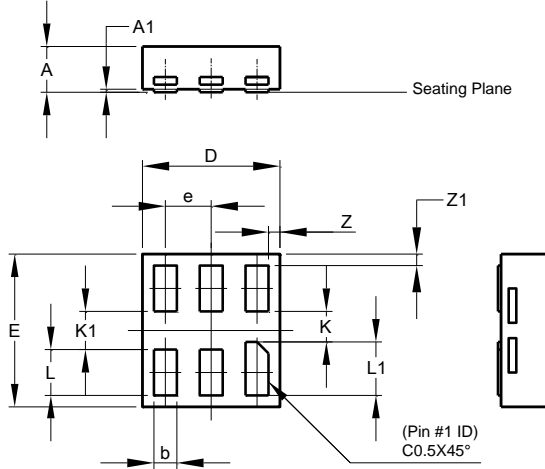


Dimensions	Value (in mm)
C	0.350
G	0.150
G1	0.150
X	0.200
X1	0.900
Y	0.500
Y1	0.525
Y2	0.475
Y3	1.150

**Package Outline Dimensions**

Please see <http://www.diodes.com/package-outlines.html> for the latest version.

**X2-DFN0910-6**

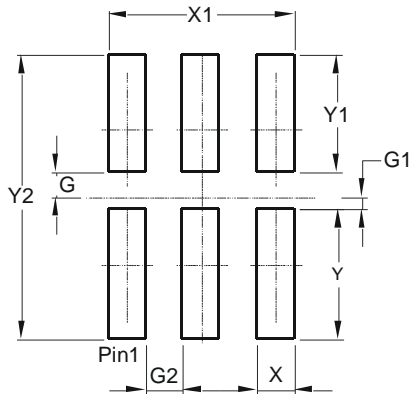


X2-DFN0910-6			
Dim	Min	Max	Typ
A	-	0.35	0.30
A1	0	0.03	0.02
b	0.10	0.20	0.15
D	0.85	0.95	0.90
E	0.95	1.05	1.00
e	-	-	0.30
K	0.20	-	-
K1	0.25	-	-
L	0.25	0.35	0.30
L1	0.30	0.40	0.35
Z	-	-	0.075
Z1	-	-	0.075
All Dimensions in mm			

**Suggested Pad Layout**

Please see <http://www.diodes.com/package-outlines.html> for the latest version.

**X2-DFN0910-6**

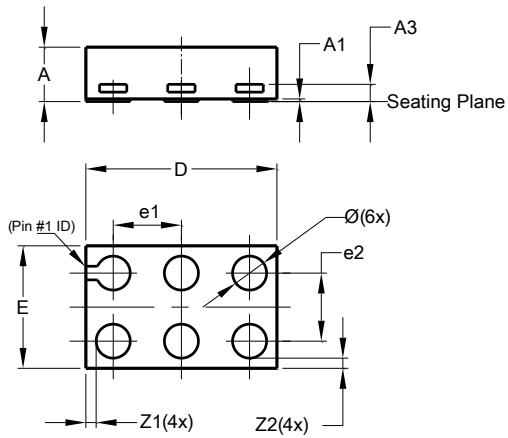


Dimensions	Value (in mm)
G	0.100
G1	0.050
G2	0.150
X	0.150
X1	0.750
Y	0.525
Y1	0.475
Y2	1.150

**Package Outline Dimensions (Cont.)**

Please see <http://www.diodes.com/package-outlines.html> for the latest version.

**X2-DFN1409-6**

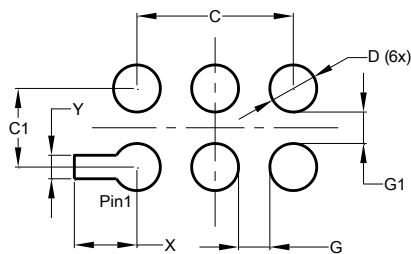


X2-DFN1409-6			
Dim	Min	Max	Typ
A	-	0.40	0.39
A1	0	0.05	0.02
A3	-	-	0.13
Ø	0.20	0.30	0.25
D	1.35	1.45	1.40
E	0.85	0.95	0.90
e1	-	-	0.50
e2	-	-	0.50
Z1	-	-	0.075
Z2	-	-	0.075
All Dimensions in mm			

**Suggested Pad Layout**

Please see <http://www.diodes.com/package-outlines.html> for the latest version.

**X2-DFN1409-6**

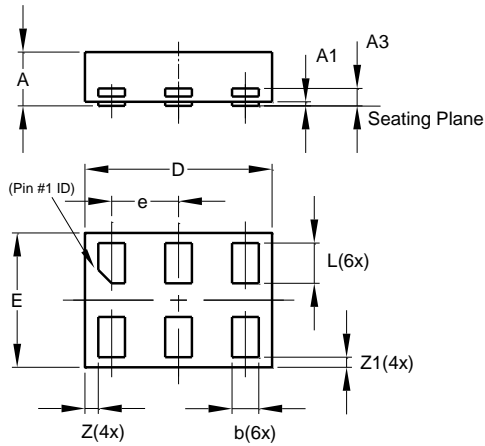


Dimensions	Value (in mm)
C	1.000
C1	0.500
D	0.300
G	0.200
G1	0.200
X	0.400
Y	0.150

**Package Outline Dimensions (Cont.)**

Please see <http://www.diodes.com/package-outlines.html> for the latest version.

**X2-DFN1410-6**

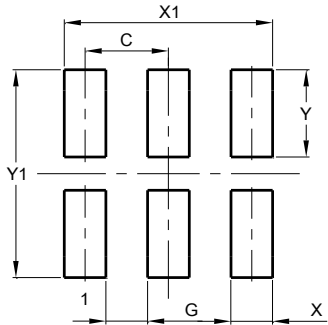


X2-DFN1410-6			
Dim	Min	Max	Typ
A	—	0.40	0.39
A1	0.00	0.05	0.02
A3	—	—	0.13
b	0.15	0.25	0.20
D	1.35	1.45	1.40
E	0.95	1.05	1.00
e	—	—	0.50
L	0.25	0.35	0.30
Z	—	—	0.10
Z1	0.045	0.105	0.075
All Dimensions in mm			

**Suggested Pad Layout**

Please see <http://www.diodes.com/package-outlines.html> for the latest version.

**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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