SINGLE BIT DUAL POWER SUPPLY TRANSLATING TRANSCEIVER WITH 3 STATE OUTPUTS

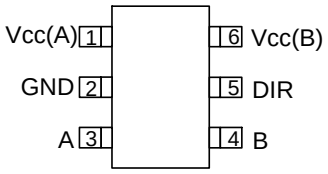
Description

The 74LVC1T45 is a single bit, dual supply transceiver with 3-state outputs suitable for transmitting a single logic bit across different voltage domains. 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 1.65V to 5.5V. 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 and damaging backflow currents and providing power down electrical isolation up to 5.5V as not to interfere with any logic activity on pin A or B.

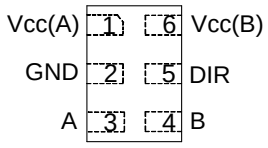
Pin Assignments

(Top View)



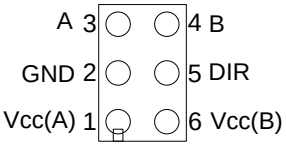
SOT26 SOT363 SOT563

(Top View)



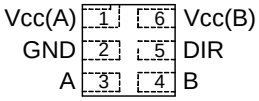
X2-DFN1410-6

(Bottom View)



X2-DFN1409-6
Chip Scale
Alternative

(Top View)



X2-DFN1010-6

Features

- Wide Supply Voltage Range:
  - V_{CC}(A): from 1.65V to 5.5V
  - V_{CC}(B): from 1.65V to 5.5V
- ± 24mA Output Drive at 3.3V
- CMOS low power consumption 16µA maximum I_{CC}
- High Noise Immunity -- (100mV hysteresis typical)
- I_{OFF} Supports Partial-Power-Down Mode Operation
- I_{OFF} controlled by either V_{CC} being at 0 V
- Inputs accept up to 5.5V
- ESD Protection Exceeds JESD 22
  - 200-V Machine Model (A115-A)
  - 2000-V Human Body Model (A114-A)
  - 1000 V Charged Device Model (C101)
- Latch-Up Exceeds 100mA per JESD 78, Class II
- 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)**

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 ROM
  - TV, DVD, DVR, set top box
  - 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.

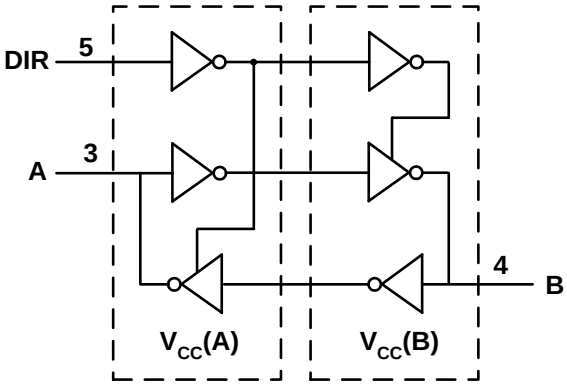
Click for Ordering Information

© Diodes Incorporated

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

Logic Diagram



Function Tables

Input DIR (Direction Pin)	Operation
L	B data to A output
H	A data to B output

Inputs			Outputs	
A	B	DIR	A	B
*	L	L	L	*
*	H	L	H	*
L	*	H	*	L
H	*	H	*	H

*pin condition not applicable as defined by DIR.

Absolute Maximum Ratings (Note 4) (@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}(A), V_{CC}(B)	Supply Voltage Range		-0.5 to +6.5	V
V_I	Input Voltage Range		-0.5 to +6.5	V
V_O	Voltage Applied to Output in High Impedance or I_{OFF} State		-0.5 to +6.5	V
V_O	Voltage Applied to Output in High or Low State	A pin	-0.3 to V_{CC}(A) +0.5	V
		B pin	-0.3 to V_{CC}(B) +0.5	V
I_{IK}	Input Clamp Current V_I<0		-50	mA
I_{OK}	Output Clamp Current		-50	mA
I_O	Continuous Output Current		±50	mA
	Continuous Current Through V_{cc} or GND		±100	mA
T_J	Operating Junction Temperature		-40 to +150	°C
T_{STG}	Storage Temperature		-65 to +150	°C

Notes: 4. 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.

© Diodes Incorporated

Recommended Operating Conditions (Note 5) (@T_A = +25°C, unless otherwise specified.)

Symbol	Parameter		V_{CC} Inputs	V_{CC} Outputs	Min	Max	Units
$V_{CC}(A)$	Operating Voltage		–	–	1.65	5.5	V
$V_{CC}(B)$			–	–	1.65	5.5	V
V_{IH}	High-Level Input Voltage Pin A or DIR Referenced to $V_{CC}(A)$		V_{CC} = 1.65V to 1.95V	–	0.65 X $V_{CC(A)}$	–	V
			V_{CC} = 2.3V to 2.7V	–	1.7	–	
			V_{CC} = 3V to 3.6V	–	2	–	
			V_{CC} = 4.5V to 5.5V	–	0.7 X $V_{CC(A)}$	–	
V_{IL}	Low-Level Input Voltage Pin A or DIR Referenced to $V_{CC}(A)$		V_{CC} = 1.65V to 1.95V	–	–	0.35 X $V_{CC(A)}$	V
			V_{CC} = 2.3V to 2.7V	–	–	0.7	
			V_{CC} = 3V to 3.6V	–	–	0.8	
			V_{CC} = 4.5V to 5.5V	–	–	0.3 X $V_{CC(A)}$	
V_{IH}	High-Level Input Voltage Pin B Referenced to $V_{CC}(B)$		V_{CC} = 1.65V to 1.95V	–	0.65 X $V_{CC(B)}$	–	V
			V_{CC} = 2.3V to 2.7V	–	1.7	–	
			V_{CC} = 3V to 3.6V	–	2	–	
			V_{CC} = 4.5V to 5.5V	–	0.7 X $V_{CC(B)}$	–	
V_{IL}	Low-Level Input Voltage Pin B Referenced to $V_{CC}(B)$		V_{CC} = 1.65V to 1.95V	–	–	0.35 X $V_{CC(B)}$	V
			V_{CC} = 2.3V to 2.7V	–	–	0.7	
			V_{CC} = 3V to 3.6V	–	–	0.8	
			V_{CC} = 4.5V to 5.5V	–	–	0.3 X $V_{CC(B)}$	
V_I	Input Voltage		–	–	0	5.5	V
V_O	Output Voltage		–	–	0	V_{CC}	V
I_{OH}	High-Level Output Current		–	V_{CC} = 1.65V to 1.95V	–	-4	mA
			–	V_{CC} = 2.3V to 2.7V	–	-8	
			–	V_{CC} = 3V to 3.6V	–	-16	
			–	V_{CC} = 4.5V to 5.5V	–	-24	
			–	V_{CC} = 1.65V to 1.95V	–	-32	
I_{OL}	Low-Level Output Current		–	V_{CC} = 2.3V to 2.7V	–	4	mA
			–	V_{CC} = 3V to 3.6V	–	8	
			–	V_{CC} = 4.5V to 5.5V	–	16	
			–	V_{CC} = 1.65V to 1.95V	–	24	
			–	V_{CC} = 2.3V to 2.7V	–	32	
• t/• V	Input Transition Rise or Fall Rate	Data Inputs	V_{CC} = 1.65V to 1.95V	–	–	20	ns/V
			V_{CC} = 2.3V to 2.7V	–	–	20	
			V_{CC} = 3V to 3.6V	–	–	10	
			V_{CC} = 4.5V to 5.5V	–	–	5	
		Control Inputs	V_{CC} = 1.65V to 5.5V	–	–	5	
T_A	Operating Free-Air Temperature		–	–	-40	+125	°C

Note: 5. Unused inputs should be held at V_{CC} or Ground.

© Diodes Incorporated

Electrical Characteristics (@T_A = +40°C to +85°C, unless otherwise specified.)

Symbol	Parameter	Test Conditions		V_{CC} (A)	V_{CC} (B)	T_A = +25°C			T_A = -40°C to +85°C		Unit
						Min	Typ	Max	Min	Max	
V_{OH}	High Level Output Voltage	I_{OH} = -100µA		1.65V to 5.5V	1.65V to 5.5V	–	–	–	V_{CC} – 0.1	–	V
		I_{OH} = -4mA		1.65V	1.65V	–	–	–	1.2	–	
		I_{OH} = -8mA		2.3V	2.3V	–	–	–	1.9	–	
		I_{OH} = -24mA		3V	3V	–	–	–	2.4	–	
		I_{OH} = -32mA		4.5V	4.5V	–	–	–	3.8	–	
V_{OL}	Low-Level Output Voltage	I_{OL} = 100µA		1.65V to 5.5V	1.65V to 5.5V	–	–	–	–	0.1	V
		I_{OL} = 4mA		1.65V	1.65V	–	–	–	–	0.45	
		I_{OL} = 8mA		2.3V	2.3V	–	–	–	–	0.3	
		I_{OL} = 24mA		3V	3V	–	–	–	–	0.55	
		I_{OL} = 32mA		4.5V	4.5V	–	–	–	–	0.55	
I_I	Input Current	DIR	V_I = V_{CC}(A) or GND	0 to 5.5V	0 to 5.5V	–	–	± 1	–	± 2	µA
I_{OFF}	Power Down Leakage Current	A Pin	V_I or V_O = 0 to 5.5V	0V	0 V to 5.5V	–	–	± 1	–	± 2	µA
		B Pin		0 V to 5.5V	0V	–	–	± 1	–	± 2	
I_{OZ}	3-State Leakage Current	A Pin	V_O = V_{CC}(A)	1.65V to 5.5V	1.65V to 5.5V	–	–	± 1	–	± 2	µA
		B Pin	V_O = V_{CC}(B)	1.65V to 5.5V	1.65V to 5.5V	–	–	± 1	–	± 2	
I_{CCA}	Supply Current	V_I = 5.5V or GND I_O = 0		1.65V to 5.5V	1.65V to 5.5V	–	–	–	–	3	µA
				5.5V	0V	–	–	–	–	2	
				0V	5.5V	–	–	–	–	-2	
I_{CCB}	Supply Current	V_I = 5.5V or GND I_O = 0		1.65V to 5.5V	1.65V to 5.5V	–	–	–	–	3	µA
				0V	5.5V	–	–	–	–	2	
				5.5V	0V	–	–	–	–	-2	
I_{CCA} + I_{CCB}	Supply Current	V_I = 5.5V or GND I_O = 0		1.65V to 5.5V	1.65V to 5.5V	–	–	–	–	4	µA
• I_{CCA}	Additional Supply Current	A pin	A = V_{CC}(A) -0.6V DIR = V_{CC}(A) B = open	3V to 5.5V	3V to 5.5V	–	–	–	–	50	µA
		DIR	DIR= V_{CC}(A) -0.6V A= V_{CC}(A) or GND B = open							50	
• I_{CCB}	Additional Supply Current	B pin	B = V_{CC}(B) -0.6V DIR = GND A = open	3V to 5.5V	3V to 5.5V	–	–	–	–	50	µA
C_I	Input Capacitance	DIR	V_I= V_{CC}(A) or GND	3.3V	3.3V	–	2.5	–	–	–	pF
C_{IO}	Input/Output Capacitance	A or B pin	V_I= V_{CC}(A)/(B) or GND	3.3V	3.3V	–	6.0	–	–	–	pF

© Diodes Incorporated

Electrical Characteristics (@T_A = +40°C to +125°C, unless otherwise specified.)

Symbol	Parameter	Test Conditions		V_{CC}(A)	V_{CC}(B)	T_A = -40°C to +125°C		Unit
						Min	Max	
V_{OH}	High Level Output Voltage	I_{OH} = -100µA		1.65V to 5.5V	1.65V to 5.5V	V_{CC} – 0.1	–	V
		I_{OH} = -4mA		1.65V	1.65V	1.2	–	
		I_{OH} = -8mA		2.3V	2.3V	1.9	–	
		I_{OH} = -24mA		3V	3V	2.4	–	
		I_{OH} = -32mA		4.5V	4.5V	3.8	–	
V_{OL}	High-Level Input Voltage	I_{OL} = 100µA		1.65V to 5.5V	1.65V to 5.5V	–	0.1	V
		I_{OL} = 4mA		1.65V	1.65V	–	0.45	
		I_{OL} = 8mA		2.3V	2.3V	–	0.3	
		I_{OL} = 24mA		3V	3V	–	0.55	
		I_{OL} = 32mA		4.5V	4.5V	–	0.55	
I_I	Input Current	DIR	V_I = V_{CC}(A) or GND	0 to 5.5V	0 to 5.5V	–	± 2	µA
I_{OFF}	Power Down Leakage Current	A Pin	V_I or V_O = 0 to 5.5V	0V	1.65V to 5.5V	–	± 2	µA
		B Pin		1.65V to 5.5V	0V	–	± 2	
I_{OZ}	3-State Leakage Current	B Pin V_O =V_{CC} (B) DIR = 0 V	V_I = 0 to 5.5V	1.65V to 5.5V	1.65V to 5.5V	–	± 2	µA
		A Pin V_O = V_{CC}(A) DIR= V_{cc}(A)		1.65V to 5.5V	1.65V to 5.5V	–	± 2	
I_{CCA}	Supply Current	V_I = 5.5V or GND I_O = 0		1.65V to 5.5V	1.65V to 5.5V	–	3	µA
				5.5V	0V	–	2	
				0V	5.5V	–	-2	
I_{CCB}	Supply Current	V_I = 5.5V or GND I_O = 0		1.65V to 5.5V	1.65V to 5.5V	–	3	µA
				5.5V	0V	–	2	
				0V	5.5V	–	-2	
I_{CCA} + I_{CCB}	Supply Current	V_I = 5.5V or GND I_O = 0		1.65V to 5.5V	1.65V to 5.5V	–	4	µA
• I_{CCA}	Additional Supply Current	A pin	A = V_{CC} (A) -0.6V DIR = V_{CC} (A) B = open	3V to 5.5V	3V to 5.5V	–	50	µA
		DIR	DIR= V_{CC} (A) -0.6V A= V_{CC} (A) or GND B = open				50	
• I_{CCB}	Additional Supply Current	B pin	B = V_{CC} (B) -0.6V DIR = GND A = open	3V to 5.5V	3V to 5.5V	–	50	µA

© Diodes Incorporated

Package Characteristics (V_{CC} = 3.3V, T_A = +25°C, unless otherwise specified.)

Symbol	Parameter	Package	Test Conditions	Min	Typ	Max	Unit
• JA	Thermal Resistance Junction-to-Ambient	SOT26	Note 6	–	166	–	°C/W
		SOT363		–	371	–	
		SOT563		–	TBD	–	
		DFN1410		–	430	–	
		DFN1409		–	450	–	
		DFN1010		–	510	–	
• JC	Thermal Resistance Junction-to-Case	SOT26	Note 6	–	46	–	°C/W
		SOT363		–	143	–	
		SOT563		–	TBD	–	
		DFN1410		–	190	–	
		DFN1409		–	200	–	
		DFN1010		–	250	–	

Note: 6. Test condition for SOT26, SOT363, DFN1410, DFN1409 and DFN1010 : Device mounted on FR-4 substrate PC board, 2oz copper with minimum recommended pad layout.

Switching Characteristics (V_{CC} (A) = 1.8V ± 0.15V, T_A = -40°C to +85°C, see Figure 1)

Parameter	From (Input)	To (Output)	V_{CC}(B) = 1.8V ±0.15V		V_{CC}(B) = 2.5V ±0.2V		V_{CC}(B) = 3.3V ±0.3V		V_{CC}(B)= 5V ±0.5V		Unit
			Min	Max	Min	Max	Min	Max	Min	Max	
t_{pLH}	A	B	3	17.7	2.2	10.3	1.7	8.3	1.4	7.5	ns
t_{pHL}			2.8	14.3	2.2	8.5	1.8	8.1	1.7	7.5	
t_{pLH}	B	A	3	17.7	2.3	16	2.1	15.5	1.9	15.1	ns
t_{pHL}			2.8	14.3	2.1	12.9	2	12.6	1.8	12.2	
t_{pHZ}	DIR	A	5.2	19.4	4.8	18.5	4.7	18.4	5.1	17.1	ns
t_{pLZ}			2.3	10.5	2.1	10.5	2.4	10.7	3.1	10.9	
t_{pHZ}	DIR	B	6.4	21.9	4.9	11.5	4.6	10.3	2.8	8.2	ns
t_{pLZ}			4.2	17	3.7	9.6	3.3	8.8	2.4	8.0	
t_{pZH}	DIR	A	–	33.7	–	25.2	–	23.9	–	21.5	ns
t_{pZL}			–	36.2	–	24.4	–	22.9	–	20.4	
t_{pZH}	DIR	B	–	28.2	–	20.8	–	19	–	18.1	ns
t_{pZL}			–	33.7	–	27	–	25.5	–	24.1	

Switching Characteristics (cont.) (V_{CC} (A) = 2.5V ± 0.2V, T_A = -40°C to +85°C, see Figure 1)

Parameter	From (Input)	To (Output)	V_{CC}(B) = 1.8V ±0.15V		V_{CC}(B) = 2.5V ±0.2V		V_{CC}(B) = 3.3V ±0.3V		V_{CC}(B) = 5V ±0.5V		Unit
			Min	Max	Min	Max	Min	Max	Min	Max	
t_{pLH}	A	B	2.3	16	1.5	8.5	1.3	6.4	1.1	5.1	ns
t_{pHL}			2.1	12.9	1.4	7.5	1.3	5.4	0.9	4.6	
t_{pLH}	B	A	2.2	10.3	1.5	8.5	1.4	8	1	7.5	ns
t_{pHL}			2.2	8.5	1.4	7.5	1.3	7	0.9	6.2	
t_{pHZ}	DIR	A	3	8.1	3.1	8.1	2.8	8.1	3.2	8.1	ns
t_{pLZ}			1.3	5.9	1.3	5.9	1.3	5.9	1	5.8	
t_{pHZ}	DIR	B	5.5	23.7	3.6	11.4	3.5	10.2	2.4	7.1	ns
t_{pLZ}			3.9	18.9	3.2	9.6	2.8	8.4	1.8	5.3	
t_{pZH}	DIR	A	–	29.2	–	18.1	–	16.4	–	12.8	ns
t_{pZL}			–	32.2	–	18.9	–	17.2	–	13.3	
t_{pZH}	DIR	B	–	21.9	–	14.4	–	12.3	–	10.9	ns

© Diodes Incorporated

Switching Characteristics (cont.) (V_{CC} (A) = 3.3V ± 0.3V, T_A = -40°C to +85°C, see Figure 1)

Parameter	From (Input)	To (Output)	V_{CC}(B) = 1.8V ±0.15V		V_{CC}(B) = 2.5V ±0.2V		V_{CC}(B) = 3.3V ±0.3V		V_{CC}(B) = 5V ±0.5V		Unit
			Min	Max	Min	Max	Min	Max	Min	Max	
t_{pLH}	A	B	2.1	15.5	1.4	8	0.7	5.8	0.7	4.4	ns
t_{pHL}			2	12.6	1.3	7	0.8	5	0.7	4	
t_{pLH}	B	A	1.7	8.3	1.3	6.4	0.7	5.8	0.6	5.4	ns
t_{pHL}			1.8	7.1	1.3	5.4	0.8	5	0.7	4.5	
t_{pHZ}	DIR	A	2.9	7.3	3	7.3	2.8	7.3	3.4	7.3	ns
t_{pLZ}			1.8	5.6	1.6	5.6	2.2	5.7	2.2	5.7	
t_{pHZ}	DIR	B	4.0	20.5	3.5	10.1	2.9	8.8	2.4	6.8	ns
t_{pLZ}			3.3	14.5	2.9	7.8	2.4	7.1	1.7	4.9	
t_{pZH}	DIR	A	–	22.8	–	14.2	–	12.9	–	10.3	ns
t_{pZL}			–	27.6	–	15.5	–	13.8	–	11.3	
t_{pZH}	DIR	B	–	21.1	–	13.6	–	11.5	–	10.1	ns
t_{pZL}			–	19.9	–	14.3	–	12.3	–	11.3	

Switching Characteristics (cont.) (V_{CC} (A) = 5V ± 0.5V, T_A = -40°C to +85°C, see Figure 1)

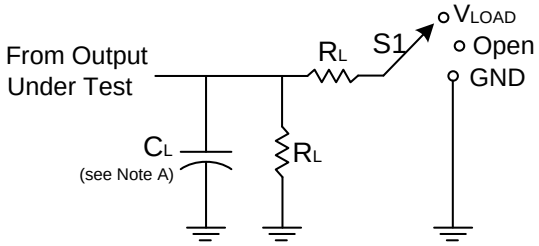
Parameter	From (Input)	To (Output)	V_{CC}(B) = 1.8V ±0.15V		V_{CC}(B) = 2.5V ±0.2V		V_{CC}(B) = 3.3V ±0.3V		V_{CC}(B)= 5V ±0.5V		Unit
			Min	Max	Min	Max	Min	Max	Min	Max	
t_{pLH}	A	B	1.9	15.1	1	7.5	0.6	5.4	0.5	3.9	ns
t_{pHL}			1.8	12.2	0.9	6.2	0.7	4.5	0.5	3.5	
t_{pLH}	B	A	1.4	8.5	1	5.1	0.7	4.4	0.5	3.9	ns
t_{pHL}			1.7	8.5	0.9	4.6	0.7	4	0.5	3.5	
t_{pHZ}	DIR	A	2.1	5.4	2.2	5.4	2.2	5.5	2.2	5.4	ns
t_{pLZ}			0.9	3.8	1	3.8	1	3.7	0.9	3.7	
t_{pHZ}	DIR	B	4.8	20.2	2.5	9.8	1	8.5	2.2	6.5	ns
t_{pLZ}			4.2	14.8	2.5	7.4	2.5	7	1.6	4.5	
t_{pZH}	DIR	A	–	22	–	12.5	–	11.4	–	8.4	ns
t_{pZL}			–	27.2	–	14.4	–	12.5	–	10	
t_{pZH}	DIR	B	–	18.9	–	11.3	–	9.1	–	7.6	ns

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

Parameter Power Dissipation Capacitance		Test Conditions	V_{CC}(A) = V_{CC}(B) = 1.8V	V_{CC}(A) = V_{CC}(B) = 2.5V	V_{CC}(A) = V_{CC}(B) = 3.3V	V_{CC}(A) = V_{CC}(B) = 5V	Unit
			Typ	Typ	Typ	Typ	
C_{pd} (A)	A- input, B- output	C_L = 0 pF f = 10 MHz tr = tf = 1 ns	3	4	4	4	pF
	B- input, A- output		18	19	20	21	
C_{pd} (B)	A- input, B- output	C_L = 0 pF f = 10 MHz tr = tf = 1 ns	18	19	20	21	pF
	B- input, A- output		3	4	4	4	

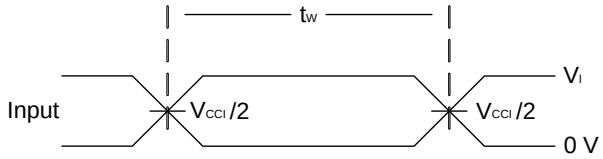
© Diodes Incorporated

Parameter Measurement Information

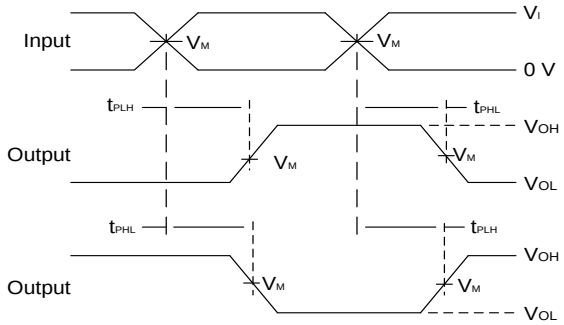


TEST	S1
t_{PLH}/t_{PHL}	Open
t_{PLZ}/t_{PZL}	Vload
t_{PHZ}/t_{PZH}	GND

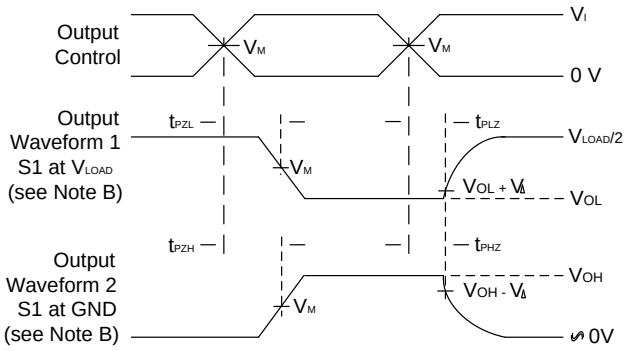
V_{CC}	Inputs		V_M	V_{LOAD}	C_L	R_L	V•
	V_I	t_r/t_f					
1.8V±0.15V	V_{CCI}	• 2ns	$V_{CCO}/2$	2 X V_{CCO}	15pF	2K•	0.15V
2.5V±0.2V	V_{CC}	• 2ns	$V_{CCO}/2$	2 X V_{CCO}	15pF	2K•	0.15V
3.3V±0.3V	3V	• 2.5ns	$V_{CCO}/2$	2 X V_{CCO}	15pF	2K•	0.3V
5V±0.5V	V_{CC}	• 2.5ns	$V_{CCO}/2$	2 X V_{CCO}	15pF	2K•	0.3V



Voltage Waveform Pulse Duration



Voltage Waveform Propagation Delay Times
Inverting and Non Inverting Outputs



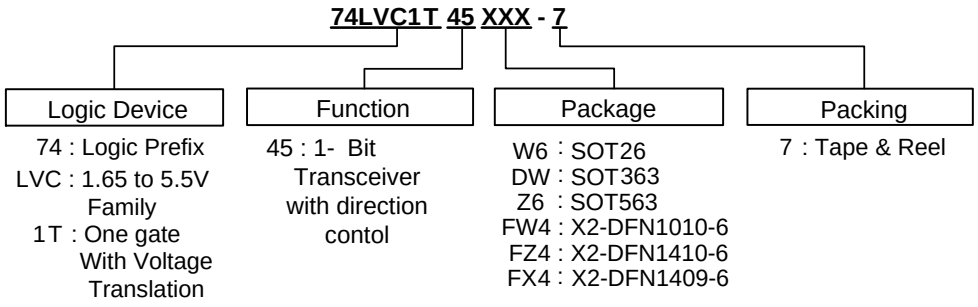
Voltage Waveform Enable and Disable Times
Low and High Level Enabling

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 • 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.

© Diodes Incorporated

Ordering Information

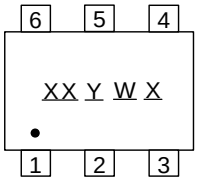


Part Number	Package Code	Packaging	7" Tape and Reel (Note 7)	
			Quantity	Part Number Suffix
74LVC1T45W6-7**	W6	SOT26	3000/Tape & Reel	-7
74LVC1T45DW-7**	DW	SOT363	3000/Tape & Reel	-7
74LVC1T45Z6-7 **	Z6	SOT563	4000/Tape & Reel	-7
74LVC1T45FW4-7	FW4	X2-DFN1010-6	5000/Tape & Reel	-7
74LVC1T45FZ4-7	FZ4	X2-DFN1410-6	5000/Tape & Reel	-7
74LVC1T45FX4-7	FX4	X2-DFN1409-6	5000/Tape & Reel	-7

Notes: 8. The taping orientation is located on our website at http://www.diodes.com/datasheets/ap02007.pdf
** Future packages.

Marking Information

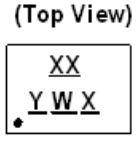
(1) SOT363, SOT563



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
74LVC1T45W6	SOT26	TT
74LVC1T45DW	SOT363	TR
74LVC1T45Z6	SOT563	TS

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



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

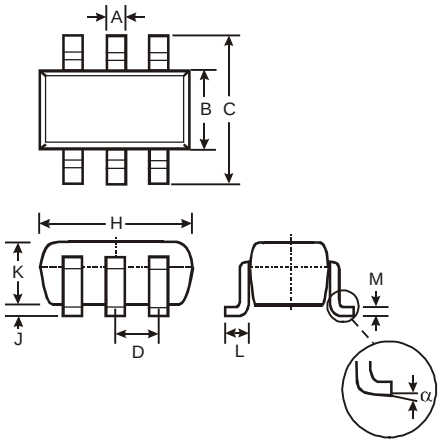
Part Number	Package	Identification Code
74LVC1T45FW4	X2-DFN1010-6	TR
74LVC1T45FX4	X2-DFN1409-6	TT
74LVC1T45FZ4	X2-DFN1410-6	TS

© Diodes Incorporated

Package Outline Dimensions (All dimensions in mm.)

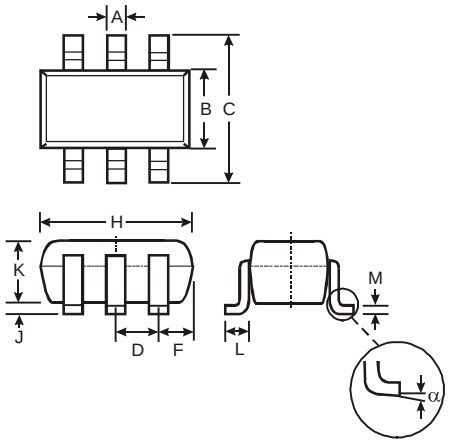
Please see AP02002 at http://www.diodes.com/datasheets/ap02002.pdf for latest version.

(1) Package Type: SOT26



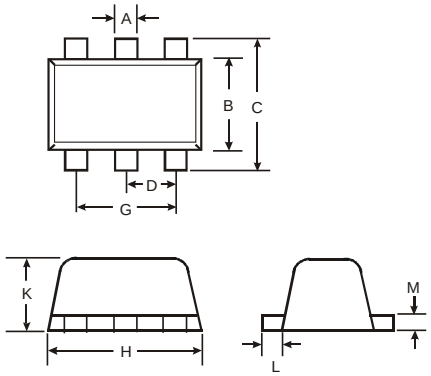
SOT26			
Dim	**Min**	**Max**	**Typ**
A	0.35	0.50	0.38
B	1.50	1.70	1.60
C	2.70	3.00	2.80
D	—	—	0.95
H	2.90	3.10	3.00
J	0.013	0.10	0.05
K	1.00	1.30	1.10
L	0.35	0.55	0.40
M	0.10	0.20	0.15
α	0°	8°	—
All Dimensions in mm			

(2) Package Type: SOT363



SOT363		
Dim	**Min**	**Max**
A	0.10	0.30
B	1.15	1.35
C	2.00	2.20
D	0.65 Typ	
F	0.40	0.45
H	1.80	2.20
J	0	0.10
K	0.90	1.00
L	0.25	0.40
M	0.10	0.22
α	0°	8°
All Dimensions in mm		

(3) Package Type: SOT563



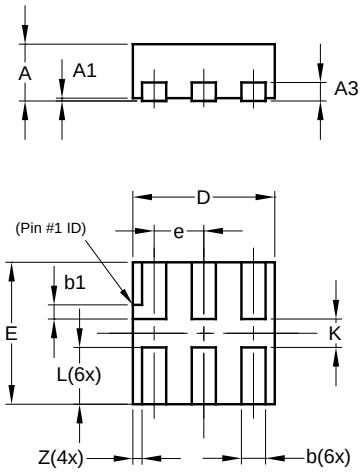
SOT563			
Dim	**Min**	**Max**	**Typ**
A	0.15	0.30	0.20
B	1.10	1.25	1.20
C	1.55	1.70	1.60
D	-	-	0.50
G	0.90	1.10	1.00
H	1.50	1.70	1.60
K	0.55	0.60	0.60
L	0.10	0.30	0.20
M	0.10	0.18	0.11
All Dimensions in mm			

© Diodes Incorporated

Package Outline Dimensions (cont.) (All dimensions in mm.)

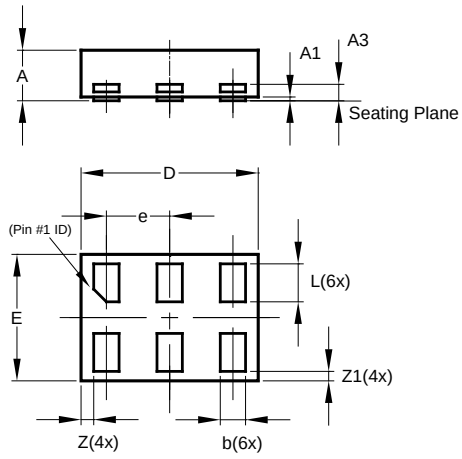
Please see AP02002 at http://www.diodes.com/datasheets/ap02002.pdf for latest version.

(4) Package Type X2-DFN1010-6



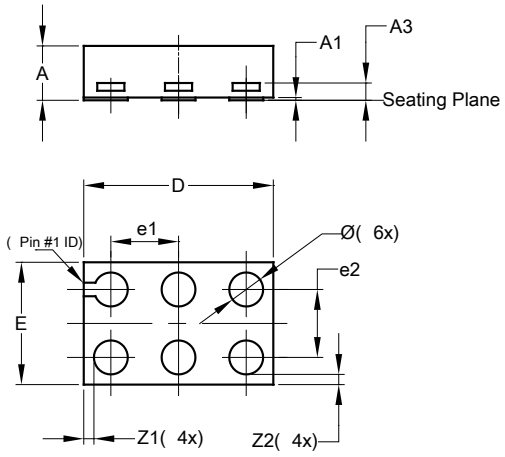
X2-DFN1010-6			
Dim	**Min**	**Max**	**Typ**
A	—	0.40	0.39
A1	0.00	0.05	0.02
A3	—	—	0.13
b	0.14	0.20	0.17
b1	0.05	0.15	0.10
D	0.95	1.05	1.00
E	0.95	1.05	1.00
e	—	—	0.35
L	0.35	0.45	0.40
K	0.15	—	—
Z	—	—	0.065
All Dimensions in mm			

(5) Package Type: 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			

(6) Package Type: X2-DFN1409-6 CHIP SCALE ALTERNATIVE



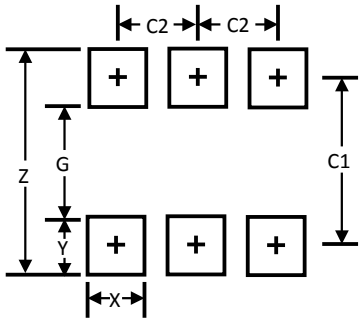
X2-DFN1409-6			
Dim	**Min**	**Max**	**Typ**
A	-	0.40	0.39
A1	0	0.05	0.02
A3	-	-	0.13
Ø	0.20	0.30	0.25
D	1.35	1.45	1.40
E	0.85	0.95	0.90
e1	-	-	0.50
e2	-	-	0.50
Z1	-	-	0.075
Z2	-	-	0.075
All Dimensions in mm			

© Diodes Incorporated

Suggested Pad Layout

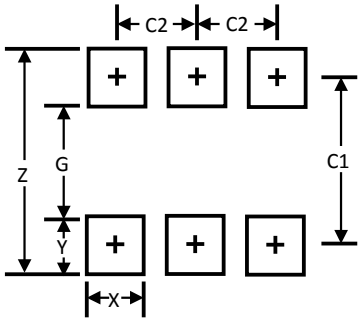
Please see AP02001 at http://www.diodes.com/datasheets/ap02001.pdf for the latest version.

(1) Package Type: SOT26



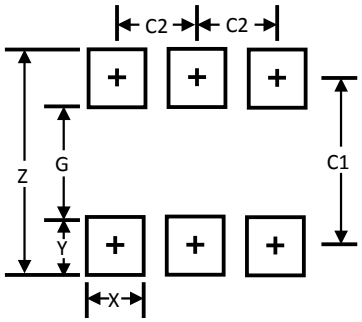
Dimensions	Value (in mm)
Z	3.20
G	1.60
X	0.55
Y	0.80
C1	2.40
C2	0.95

(2) Package Type: SOT363



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

(3) Package Type: SOT563



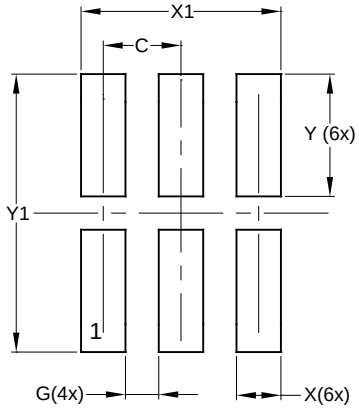
Dimensions	Value (in mm)
Z	2.2
G	1.2
X	0.375
Y	0.5
C1	1.7
C2	0.5

© Diodes Incorporated

Suggested Pad Layout (cont.)

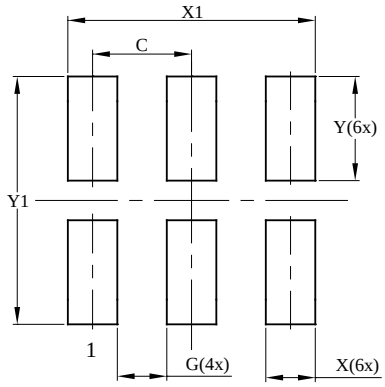
Please see AP02001 at http://www.diodes.com/datasheets/ap02001.pdf for the latest version.

(4) Package Type X2-DFN1010-6



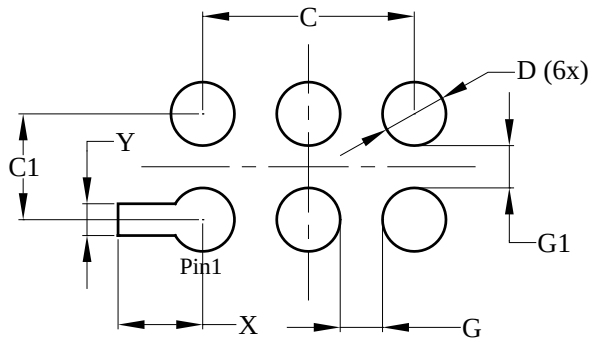
Dimensions	Value (in mm)
C	0.350
G	0.150
X	0.200
X1	0.900
Y	0.550
Y1	1.250

(5) Package Type: 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

(6) Package Type: 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

© Diodes Incorporated

IMPORTANT NOTICE

DIODES INCORPORATED MAKES NO WARRANTY OF ANY KIND, EXPRESS OR IMPLIED, WITH REGARDS TO THIS DOCUMENT, INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE (AND THEIR EQUIVALENTS UNDER THE LAWS OF ANY JURISDICTION).

Diodes Incorporated and its subsidiaries reserve the right to make modifications, enhancements, improvements, corrections or other changes without further notice to this document and any product described herein. Diodes Incorporated does not assume any liability arising out of the application or use of this document or any product described herein; neither does Diodes Incorporated convey any license under its patent or trademark rights, nor the rights of others. Any Customer or user of this document or products described herein in such applications shall assume all risks of such use and will agree to hold Diodes Incorporated and all the companies whose products are represented on Diodes Incorporated website, harmless against all damages.

Diodes Incorporated does not warrant or accept any liability whatsoever in respect of any products purchased through unauthorized sales channel. Should Customers purchase or use Diodes Incorporated products for any unintended or unauthorized application, Customers shall indemnify and hold Diodes Incorporated and its representatives harmless against all claims, damages, expenses, and attorney fees arising out of, directly or indirectly, any claim of personal injury or death associated with such unintended or unauthorized application.

Products described herein may be covered by one or more United States, international or foreign patents pending. Product names and markings noted herein may also be covered by one or more United States, international or foreign trademarks.

This document is written in English but may be translated into multiple languages for reference. Only the English version of this document is the final and determinative format released by Diodes Incorporated.

LIFE SUPPORT

Diodes Incorporated products are specifically not authorized for use as critical components in life support devices or systems without the express written approval of the Chief Executive Officer of Diodes Incorporated. As used herein:

A. Life support devices or systems are devices or systems which:

1. are intended to implant into the body, or

2. support or sustain life and whose failure to perform when properly used in accordance with instructions for use provided in the labeling can be reasonably expected to result in significant injury to the user.

B. A critical component is any component in a life support device or system whose failure to perform can be reasonably expected to cause the failure of the life support device or to affect its safety or effectiveness.

Customers represent that they have all necessary expertise in the safety and regulatory ramifications of their life support devices or systems, and acknowledge and agree that they are solely responsible for all legal, regulatory and safety-related requirements concerning their products and any use of Diodes Incorporated products in such safety-critical, life support devices or systems, notwithstanding any devices- or systems-related information or support that may be provided by Diodes Incorporated. Further, Customers must fully indemnify Diodes Incorporated and its representatives against any damages arising out of the use of Diodes Incorporated products in such safety-critical, life support devices or systems.

Copyright © 2013, Diodes Incorporated

www.diodes.com