74AVC16T245
16-Bit Dual-Supply Translating Transceiver with Configurable Voltage Translation; 3-State Outputs

GENERAL DESCRIPTION

The 74AVC16T245 is a 16-bit dual-supply translating transceiver with configurable voltage translation and 3-state outputs.

The device can be used as two 8-bit transceivers or as a 16-bit transceiver. The nAn and nBn are four 8-bit input and output ports. nDIR are the direction control inputs and $n\overline{OE}$ are the output enable inputs. V_{CCA} and V_{CCB} are dual-supply pins. The supply voltage of V_{CCA} and V_{CCB} can range from 0.8V to 3.6V, making the device suitable for translating between any of the 0.8V, 1.2V, 1.5V, 1.8V, 2.5V and 3.3V voltage nodes. Pins nAn, $n\overline{OE}$ and nDIR are referenced to V_{CCA} and pins nBn are referenced to V_{CCB}.

When nDIR is set high, it allows transmission from nAn to nBn. When nDIR is set low, it allows transmission from nBn to nAn. $n\overline{OE}$ can be used to make the outputs disabled so that the buses are effectively isolated. In suspend mode, both nAn and nBn are in the high-impedance state when either V_{CCA} or V_{CCB} input is at GND.

FEATURES

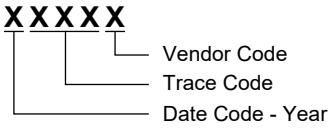
- **V_{CCA} Supply Voltage Range: 0.8V to 3.6V**
- **V_{CCB} Supply Voltage Range: 0.8V to 3.6V**
- **Inputs Accept Voltages up to 3.6V**
- **Data Rates:**
  - **380Mbps (≥ 1.8V to 3.3V Translation)**
  - **200Mbps (≥ 1.1V to 3.3V Translation)**
  - **200Mbps (≥ 1.1V to 2.5V Translation)**
  - **200Mbps (≥ 1.1V to 1.8V Translation)**
  - **150Mbps (≥ 1.1V to 1.5V Translation)**
  - **100Mbps (≥ 1.1V to 1.2V Translation)**
- **Outputs in High-Impedance State when V_{CCA} or V_{CCB} = 0V**
- **-40℃ to +125℃ Operating Temperature Range**
- **Available in a Green TSSOP-48 Package**

PACKAGE/ORDERING INFORMATION

MODEL	PACKAGE DESCRIPTION	SPECIFIED TEMPERATURE RANGE	ORDERING NUMBER	PACKAGE MARKING	PACKING OPTION
74AVC16T245	TSSOP-48	-40℃ to +125℃	74AVC16T245XTS48G/TR	74AVC16T245 XTS48 XXXXX	Tape and Reel, 2500

MARKING INFORMATION

NOTE: XXXXX = Date Code, Trace Code and Vendor Code.



Green (RoHS & HSF): SG Micro Corp defines "Green" to mean Pb-Free (RoHS compatible) and free of halogen substances. If you have additional comments or questions, please contact your SGMICRO representative directly.

ABSOLUTE MAXIMUM RATINGS (1)

Supply Voltage Range, V_{CCA} ..... -0.5V to 4.6V
Supply Voltage Range, V_{CCB} ..... -0.5V to 4.6V
Input Voltage Range, V_I (2) ..... -0.5V to 4.6V
Output Voltage Range, V_O
Active Mode (2)(3)(4) ..... -0.5V to (V_{CCO} + 0.5V)
Suspend or 3-State Mode (2) ..... -0.5V to 4.6V
Output Current, I_O (V_O = 0V to V_{CC})
Output in High-State .....-50mA
Output in Low-State 50mA
Supply Current, I_{CC}, per V_{CCA} or V_{CCB} Pin 100mA
Ground Current, I_{GND}, per GND Pin .....-100mA
Input Clamp Current, I_{IK} (V_I < 0).....-50mA
Output Clamp Current, I_{OK} (V_O < 0).....-50mA
Continuous Output Current.....±50mA
Junction Temperature (5).....+150℃
Storage Temperature Range .....-65℃ to +150℃
Lead Temperature (Soldering, 10s).....+260℃
ESD Susceptibility
HBM.....8000V
CDM 1000V

RECOMMENDED OPERATING CONDITIONS

Supply Voltage Range, V_{CCA}.....0.8V to 3.6V
Supply Voltage Range, V_{CCB}.....0.8V to 3.6V
Input Voltage Range, V_I.....0V to 3.6V
Output Voltage Range, V_O
Active Mode (3) ..... 0V to V_{CCO}
Suspend or 3-State Mode .....0V to 3.6V
Input Transition Rise and Fall Rate, $\Delta t/\Delta V$ (3)
V_{CCI} = 0.8V to 3.6V..... 10ns/V (MAX)
Operating Temperature Range .....-40℃ to +125℃

OVERSTRESS CAUTION

1. Stresses beyond those listed in Absolute Maximum Ratings may cause permanent damage to the device. Exposure to absolute maximum rating conditions for extended periods may affect reliability. Functional operation of the device at any conditions beyond those indicated in the Recommended Operating Conditions section is not implied.

2. The minimum input voltage ratings and output voltage ratings may be exceeded if the input and output current ratings are observed.

3. V_{CCO} is the supply voltage related to the output port.

4. V_{CCO} + 0.5V should not exceed 4.6V.

5. V_{CCI} is the supply voltage associated with the input port.

6. The performance capability of a high-performance integrated circuit in conjunction with its thermal environment can create junction temperatures which are detrimental to reliability.

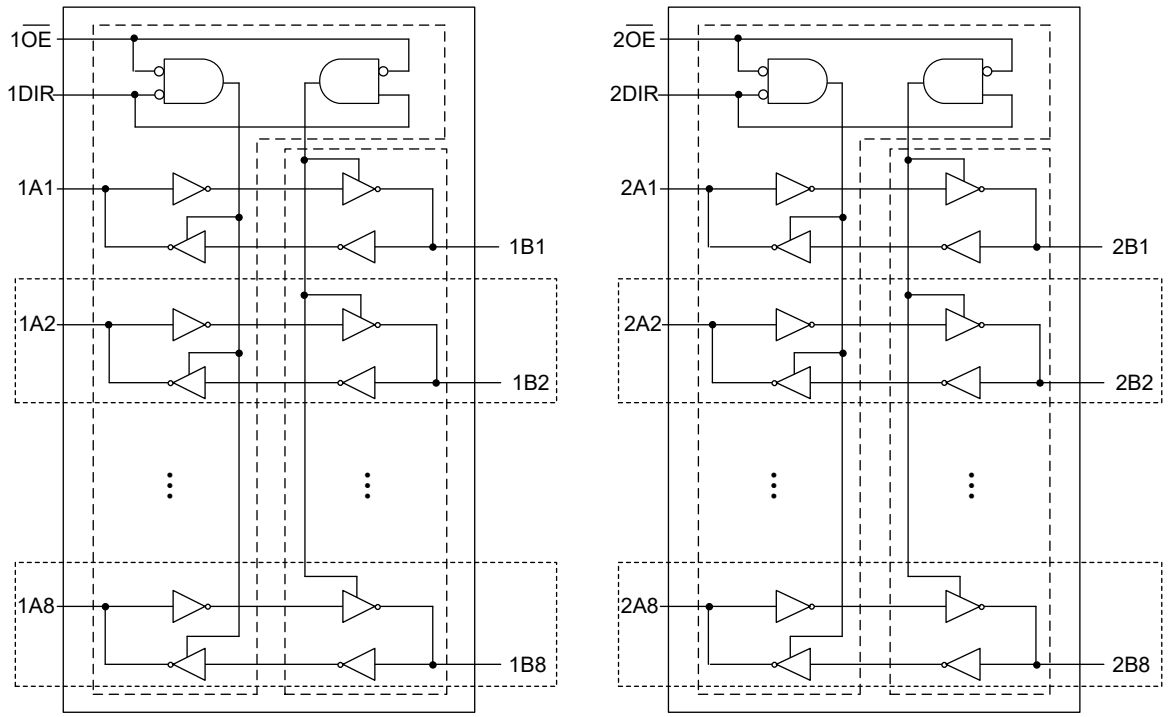
ESD SENSITIVITY CAUTION

This integrated circuit can be damaged if ESD protections are not considered carefully. SGMICRO recommends that all integrated circuits be handled with appropriate precautions. Failure to observe proper handling and installation procedures can cause damage. ESD damage can range from subtle performance degradation to complete device failure. Precision integrated circuits may be more susceptible to damage because even small parametric changes could cause the device not to meet the published specifications.

DISCLAIMER

SG Micro Corp reserves the right to make any change in circuit design, or specifications without prior notice.

LOGIC SYMBOL



FUNCTION TABLE

SUPPLY VOLTAGE	CONTROL INPUT		INPUT/OUTPUT	
V_{CCA}, V_{CCB}	n$\overline{OE}$	nDIR	nAn	nBn
0.8V to 3.6V	L	L	nAn = nBn	Inputs
0.8V to 3.6V	L	H	Inputs	nBn = nAn
0.8V to 3.6V	H	*X*	Z	Z
GND	*X*	*X*	Z	Z

H = High Voltage Level

L = Low Voltage Level

Z = High-Impedance State

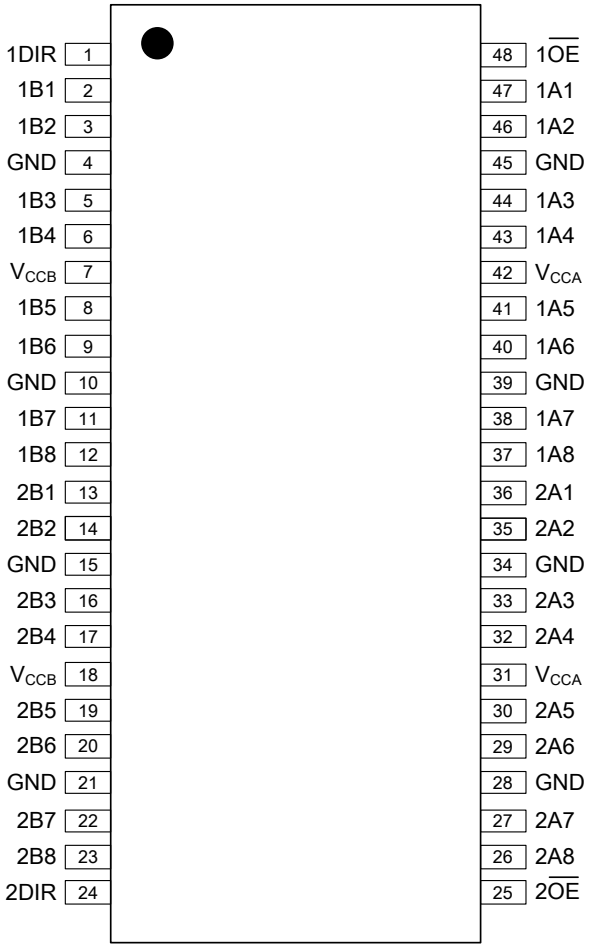
X = Don't Care

NOTES:

1. If at least one of V_{CCA} or V_{CCB} is at GND level, the device enters suspend mode.
2. The nAn, nDIR and n$\overline{OE}$ signals are referenced to V_{CCA}; The nBn signals are referenced to V_{CCB}.

PIN CONFIGURATION

(TOP VIEW)



TSSOP-48

PIN DESCRIPTION

PIN	NAME	FUNCTION
1, 24	1DIR, 2DIR	Direction Control Inputs.
2, 3, 5, 6, 8, 9, 11, 12	1B1, 1B2, 1B3, 1B4, 1B5, 1B6, 1B7, 1B8	Data Inputs/Outputs.
13, 14, 16, 17, 19, 20, 22, 23	2B1, 2B2, 2B3, 2B4, 2B5, 2B6, 2B7, 2B8	Data Inputs/Outputs.
4, 10, 15, 21, 28, 34, 39, 45	GND	Ground.
7, 18	V_{CCB}	Supply Voltage V_{CCB}.
48, 25	$1\overline{OE}$, $2\overline{OE}$	Output Enable Inputs (Active Low).
47, 46, 44, 43, 41, 40, 38, 37	1A1, 1A2, 1A3, 1A4,1A5, 1A6, 1A7, 1A8	Data Inputs/Outputs.
36, 35, 33, 32, 30, 29, 27, 26	2A1, 2A2, 2A3, 2A4,2A5, 2A6, 2A7, 2A8	Data Inputs/Outputs.
31, 42	V_{CCA}	Supply Voltage V_{CCA}.

ELECTRICAL CHARACTERISTICS

(Full = -40℃ to +125℃, V_{CCI} is the supply voltage associated with the data input port; V_{CCO} is the supply voltage associated with the output port, unless otherwise noted.)

PARAMETER	SYMBOL	CONDITIONS		TEMP	MIN	TYP	MAX	UNITS
High-Level Output Voltage	V_{OH}	V_{CCA} = V_{CCB} = 0.8V, V_I = V_{IH}, I_O = -1.5mA		+25℃		0.7		V
Low-Level Output Voltage	V_{OL}	V_{CCA} = V_{CCB} = 0.8V, V_I = V_{IL}, I_O = 1.5mA		+25℃		0.1		V
Input Leakage Current	I_I	V_{CCA} = V_{CCB} = 0.8V to 3.6V, nDIR, n$\overline{OE}$ inputs, V_I = 0V or 3.6V		Full		±0.01	±2	μA
Off-State Output Current (1)	I_{OZ}	V_{CCA} = V_{CCB} = 3.6V, A or B port, V_O = 0V or V_{CCO}		Full		±0.01	±2	μA
		V_{CCA} = 3.6V, V_{CCB} = 0V, suspend mode A port, V_O = 0V or V_{CCO}		Full		±0.01	±2	
		V_{CCA} = 0V, V_{CCB} = 3.6V, suspend mode B port, V_O = 0V or V_{CCO}		Full		±0.01	±2	
Power-Off Leakage Current	I_{OFF}	V_{CCA} = 0V, V_{CCB} = 0.8V to 3.6V, A port, V_I or V_O = 0V to 3.6V		Full		±0.01	±2	μA
		V_{CCB} = 0V, V_{CCA} = 0.8V to 3.6V, B port, V_I or V_O = 0V to 3.6V		Full		±0.01	±2	
Input Capacitance	C_I	V_{CCA} = V_{CCB} = 3.3V, nDIR, n$\overline{OE}$ inputs, V_I = 0V or 3.3V		+25℃		5		pF
Input/Output Capacitance	$C_{I/O}$	V_{CCA} = V_{CCB} = 3.3V, A and B ports, V_O = 3.3V or 0V		+25℃		8		pF
Supply Current	I_{CC}	A port, V_I = 0V or V_{CCI}, I_O = 0A	V_{CCA} = 0.8V to 3.6V, V_{CCB} = 0.8V to 3.6V	Full		0.8	35	μA
			V_{CCA} = 3.6V, V_{CCB} = 0V	Full		0.01	35	
			V_{CCA} = 0V, V_{CCB} = 3.6V	Full	-12	-0.01		
		B port, V_I = 0V or V_{CCI}, I_O = 0	V_{CCA} = 0.8V to 3.6V, V_{CCB} = 0.8V to 3.6V	Full		0.8	35	
			V_{CCA} = 3.6V, V_{CCB} = 0V	Full	-12	-0.01		
			V_{CCA} = 0V, V_{CCB} = 3.6V	Full		0.01	35	
		A plus B port (I_{CCA} + I_{CCB}), I_O = 0A, V_I = 0V or V_{CCI}, V_{CCA} = 0.8V to 3.6V, V_{CCB} = 0.8V to 3.6V		Full		0.8	45	
		A plus B port (I_{CCA} + I_{CCB}), I_O = 0A, V_I = 0V or V_{CCI}, V_{CCA} = 1.1V to 3.6V, V_{CCB} = 1.1V to 3.6V		Full		0.8	45	

NOTE:

1. For I/O ports, the parameter I_{OZ} includes the input leakage current.

ELECTRICAL CHARACTERISTICS (continued)

(Full = -40℃ to +125℃, V_{CCI} is the supply voltage associated with the data input port; V_{CCO} is the supply voltage associated with the output port, unless otherwise noted.)

PARAMETER	SYMBOL	CONDITIONS		TEMP	MIN	TYP	MAX	UNITS
High-Level Input Voltage	V_{IH}	Data inputs	V_{CCI} = 0.8V	Full	0.8 × V_{CCI}			V
			V_{CCI} = 1.1V to 1.95V	Full	0.7 × V_{CCI}			
			V_{CCI} = 2.3V to 2.7V	Full	1.6			
			V_{CCI} = 3.0V to 3.6V	Full	2			
		nDIR, n$\overline{OE}$ inputs	V_{CCA} = 0.8V	Full	0.8 × V_{CCA}			
			V_{CCA} = 1.1V to 1.95V	Full	0.7 × V_{CCA}			
			V_{CCA} = 2.3V to 2.7V	Full	1.6			
			V_{CCA} = 3.0V to 3.6V	Full	2			
Low-Level Input Voltage	V_{IL}	Data inputs	V_{CCI} = 0.8V	Full			0.3 × V_{CCI}	V
			V_{CCI} = 1.1V to 1.95V	Full			0.35 × V_{CCI}	
			V_{CCI} = 2.3V to 2.7V	Full			0.7	
			V_{CCI} = 3.0V to 3.6V	Full			0.8	
		nDIR, n$\overline{OE}$ inputs	V_{CCA} = 0.8V	Full			0.3 × V_{CCA}	
			V_{CCA} = 1.1V to 1.95V	Full			0.35 × V_{CCA}	
			V_{CCA} = 2.3V to 2.7V	Full			0.7	
			V_{CCA} = 3.0V to 3.6V	Full			0.8	
High-Level Output Voltage	V_{OH}	V_I = V_{IH}	I_O = -100μA, V_{CCA} = V_{CCB} = 0.8V to 3.6V	Full	V_{CCO} - 0.1			V
			I_O = -3mA, V_{CCA} = V_{CCB} = 1.1V	Full	0.85	1		
			I_O = -6mA, V_{CCA} = V_{CCB} = 1.4V	Full	1.05	1.26		
			I_O = -8mA, V_{CCA} = V_{CCB} = 1.65V	Full	1.2	1.5		
			I_O = -9mA, V_{CCA} = V_{CCB} = 2.3V	Full	1.75	2.1		
			I_O = -12mA, V_{CCA} = V_{CCB} = 3.0V	Full	2.3	2.8		
Low-Level Output Voltage	V_{OL}	V_I = V_{IL}	I_O = 100μA, V_{CCA} = V_{CCB} = 0.8V to 3.6V	Full			0.1	V
			I_O = 3mA, V_{CCA} = V_{CCB} = 1.1V	Full		0.11	0.25	
			I_O = 6mA, V_{CCA} = V_{CCB} = 1.4V	Full		0.19	0.35	
			I_O = 8mA, V_{CCA} = V_{CCB} = 1.65V	Full		0.22	0.45	
			I_O = 9mA, V_{CCA} = V_{CCB} = 2.3V	Full		0.22	0.55	
			I_O = 12mA, V_{CCA} = V_{CCB} = 3.0V	Full		0.28	0.7	

ELECTRICAL CHARACTERISTICS (continued)

Typical Total Supply Current (I_{CCA} + I_{CCB})

(T_A = +25℃, unless otherwise noted.)

V_{CCA}	V_{CCB}							UNITS
	0V	0.8V	1.2V	1.5V	1.8V	2.5V	3.3V	
0V	0	0.02	0.02	0.02	0.02	0.02	0.02	μA
0.8V	0.01	0.05	0.05	0.05	0.1	0.5	1.2	μA
1.2V	0.01	0.05	0.05	0.05	0.05	0.2	0.8	μA
1.5V	0.01	0.05	0.05	0.05	0.05	0.1	0.5	μA
1.8V	0.01	0.1	0.05	0.05	0.05	0.05	0.3	μA
2.5V	0.01	0.5	0.2	0.1	0.05	0.05	0.1	μA
3.3V	0.01	1.2	0.8	0.5	0.3	0.1	0.05	μA

Typical Power Dissipation Capacitance

(T_A = +25℃, V_{CCA} = V_{CCB}, unless otherwise noted.)

PARAMETER	SYMBOL	CONDITIONS	V_{CCA} = V_{CCB}						UNITS
			0.8V	1.2V	1.5V	1.8V	2.5V	3.3V	
Power Dissipation Capacitance (1) (2)	C_{PD}	A port: (direction nAn to nBn), output enabled	1.1	1.1	1.2	1.2	1.3	1.4	pF
		A port: (direction nAn to nBn), output disabled	0.6	0.7	0.7	0.7	0.8	0.9	
		A port: (direction nBn to nAn), output enabled	13.3	13.5	13.5	13.7	14.5	15.3	
		A port: (direction nBn to nAn), output disabled	0.5	0.5	0.5	0.5	0.5	0.5	
		B port: (direction nAn to nBn), output enabled	13.7	13.7	14.0	14.3	15.0	15.7	
		B port: (direction nAn to nBn), output disabled	0.5	0.5	0.5	0.5	0.5	0.5	
		B port: (direction nBn to nAn), output enabled	1.1	1.1	1.2	1.2	1.3	1.4	
		B port: (direction nBn to nAn), output disabled	0.6	0.7	0.7	0.7	0.8	0.9	

NOTES:

1. C_{PD} is used to determine the dynamic power dissipation (P_D in μW).

   $P_D = C_{PD} \times V_{CC}^2 \times f_i \times N + \Sigma(C_L \times V_{CC}^2 \times f_o)$

   where:

   f_i = Input frequency in MHz.

   f_o = Output frequency in MHz.

   C_L = Output load capacitance in pF.

   V_{CC} = Supply voltage in Volts.

   N = Number of inputs switching.

   $\Sigma(C_L \times V_{CC}^2 \times f_o)$ = Sum of the outputs.

2. f_i = 10MHz; V_I = GND to V_{CC}; t_R = t_F = 1ns; C_L = 0pF; R_L = ∞.

DYNAMIC CHARACTERISTICS

Typical Dynamic Characteristics at V_{CCA} = 0.8V and T_A = +25℃

(For test circuit, see Figure 1, for waveforms see Figure 2 and Figure 3, unless otherwise noted.)

PARAMETER	SYMBOL	CONDITIONS	V_{CCB}						UNITS
			0.8V	1.2V	1.5V	1.8V	2.5V	3.3V	
Propagation Delay	t_{PD}	nAn to nBn	43	20	18	17	17	17	ns
		nBn to nAn	38	32	31	30	29	29	
Disable Time	t_{DIS}	n$\overline{OE}$ to nAn	37	37	35	35	35	33	ns
		n$\overline{OE}$ to nBn	47	30	30	29	25	24	
Enable Time	t_{EN}	n$\overline{OE}$ to nAn	44	43	43	42	42	42	ns
		n$\overline{OE}$ to nBn	51	24	22	21	21	21	

NOTE:

1. t_{PD} is the same as t_{PLH} and t_{PHL}; t_{DIS} is the same as t_{PLZ} and t_{PHZ}; t_{EN} is the same as t_{PZL} and t_{PZH}.

Typical Dynamic Characteristics at V_{CCB} = 0.8V and T_A = +25℃

(For test circuit, see Figure 1, for waveforms see Figure 2 and Figure 3, unless otherwise noted.)

PARAMETER	SYMBOL	CONDITIONS	V_{CCA}						UNITS
			0.8V	1.2V	1.5V	1.8V	2.5V	3.3V	
Propagation Delay	t_{PD}	nAn to nBn	43	34	33	32	31	31	ns
		nBn to nAn	38	20	18	17	17	16	
Disable Time	t_{DIS}	n$\overline{OE}$ to nAn	37	14	11	9	8	6	ns
		n$\overline{OE}$ to nBn	47	34	30	30	27	26	
Enable Time	t_{EN}	n$\overline{OE}$ to nAn	44	13	14	7	5	4	ns
		n$\overline{OE}$ to nBn	51	40	44	47	61	35	

NOTE:

1. t_{PD} is the same as t_{PLH} and t_{PHL}; t_{DIS} is the same as t_{PLZ} and t_{PHZ}; t_{EN} is the same as t_{PZL} and t_{PZH}.

DYNAMIC CHARACTERISTICS (continued)

Typical Dynamic Characteristics at T_A = +25℃

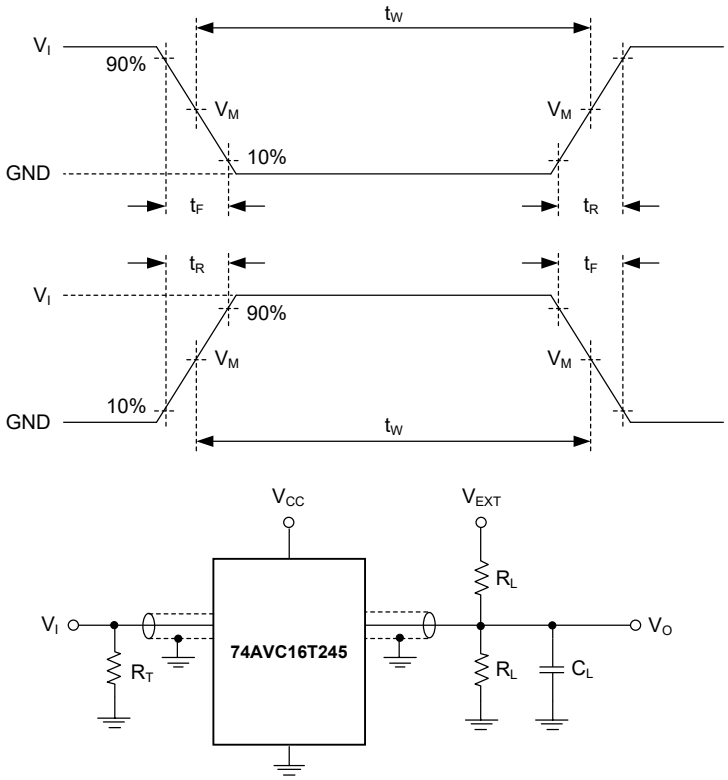
(For test circuit, see Figure 1, for waveforms see Figure 2 and Figure 3, unless otherwise noted.)

PARAMETER	SYMBOL	CONDITIONS	V_{CCB}					UNITS
			1.2V ± 0.1V	1.5V ± 0.1V	1.8V ± 0.15V	2.5V ± 0.2V	3.3V ± 0.3V	
			TYP	TYP	TYP	TYP	TYP	
V_{CCA} = 1.1V to 1.3V								
Propagation Delay	t_{PD}	nAn to nBn	12	10	9	9	8	ns
		nBn to nAn	12	9	8	8	7	
Disable Time	t_{DIS}	$n\overline{OE}$ to nAn	12	13	13	13	14	ns
		$n\overline{OE}$ to nBn	16	14	13	12	12	
Enable Time	t_{EN}	$n\overline{OE}$ to nAn	14	15	14	14	14	ns
		$n\overline{OE}$ to nBn	16	12	11	11	10	
V_{CCA} = 1.4V to 1.6V								
Propagation Delay	t_{PD}	nAn to nBn	10	7	7	6	5	ns
		nBn to nAn	10	7	6	6	5	
Disable Time	t_{DIS}	$n\overline{OE}$ to nAn	8	9	9	8	9	ns
		$n\overline{OE}$ to nBn	12	10	9	8	8	
Enable Time	t_{EN}	$n\overline{OE}$ to nAn	8	8	8	8	8	ns
		$n\overline{OE}$ to nBn	12	8	8	7	7	
V_{CCA} = 1.65V to 1.95V								
Propagation Delay	t_{PD}	nAn to nBn	9	7	6	5	5	ns
		nBn to nAn	9	6	6	5	5	
Disable Time	t_{DIS}	$n\overline{OE}$ to nAn	7	6	7	7	7	ns
		$n\overline{OE}$ to nBn	12	9	9	8	7	
Enable Time	t_{EN}	$n\overline{OE}$ to nAn	6	6	6	6	6	ns
		$n\overline{OE}$ to nBn	11	7	6	5	5	
V_{CCA} = 2.3V to 2.7V								
Propagation Delay	t_{PD}	nAn to nBn	8	6	6	4	4	ns
		nBn to nAn	9	5	5	4	4	
Disable Time	t_{DIS}	$n\overline{OE}$ to nAn	6	6	6	6	6	ns
		$n\overline{OE}$ to nBn	12	9	8	6	6	
Enable Time	t_{EN}	$n\overline{OE}$ to nAn	4	4	4	4	4	ns
		$n\overline{OE}$ to nBn	10	6	6	5	4	
V_{CCA} = 3.0V to 3.6V								
Propagation Delay	t_{PD}	nAn to nBn	8	5	4	4	4	ns
		nBn to nAn	8	5	5	4	4	
Disable Time	t_{DIS}	$n\overline{OE}$ to nAn	5	5	5	5	5	ns
		$n\overline{OE}$ to nBn	11	9	8	7	6	
Enable Time	t_{EN}	$n\overline{OE}$ to nAn	9	6	5	4	4	ns
		$n\overline{OE}$ to nBn	9	6	5	4	4	

NOTE:

1. t_{PD} is the same as t_{PLH} and t_{PHL}; t_{DIS} is the same as t_{PLZ} and t_{PHZ}; t_{EN} is the same as t_{PZL} and t_{PZH}.

TEST CIRCUIT



Test conditions are given in Table 1.

Definitions for test circuit:

R_L: Load resistance.

C_L: Load capacitance (includes jig and probe).

R_T: Termination resistance (equals to output impedance Z_O of the pulse generator).

V_{EXT}: External voltage used to measure switching time.

Figure 1. Test Circuit for Measuring Switching Times

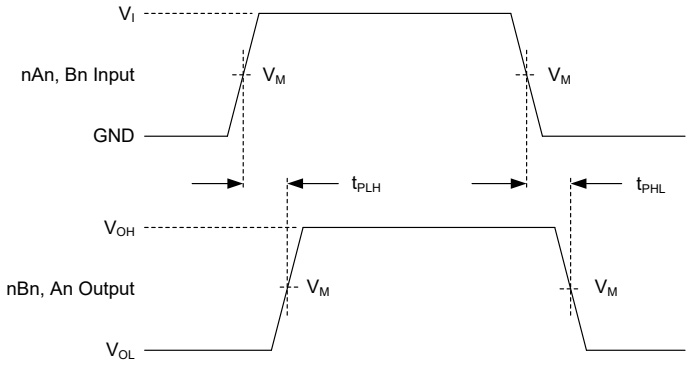
Table 1. Test Conditions

SUPPLY VOLTAGE	INPUT		LOAD		V_{EXT}		
V_{CCA}, V_{CCB}	V_I (1)	Δt/ΔV	C_L	R_L	t_{PLH}, t_{PHL}	t_{PZH}, t_{PHZ}	t_{PZL}, t_{PLZ} (2)
0.8V to 1.6V	V_{CCI}	≤ 1.0ns/V	15pF	2kΩ	Open	GND	2 × V_{CCO}
1.65V to 2.7V	V_{CCI}	≤ 1.0ns/V	15pF	2kΩ	Open	GND	2 × V_{CCO}
3.0V to 3.6V	V_{CCI}	≤ 1.0ns/V	15pF	2kΩ	Open	GND	2 × V_{CCO}

NOTES:

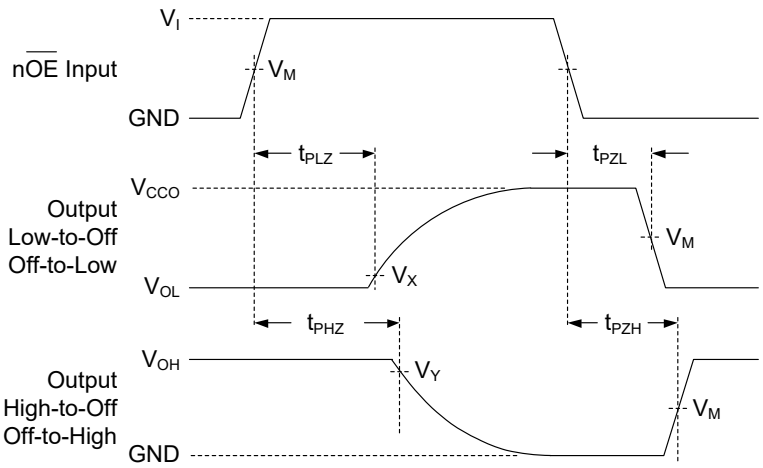
1. V_{CCI} is the supply voltage associated with the data input port.
2. V_{CCO} is the supply voltage associated with the output port.

WAVEFORMS



Test conditions are given in Table 1.
Measurement points are given in Table 2.
Logic Levels: V_{OL} and V_{OH} are typical output voltage levels that occur with the output load.

Figure 2. Input (nAn, nBn) to Output (nBn, nAn) Propagation Delay Times



Test conditions are given in Table 1.
Measurement points are given in Table 2.
Logic Levels: V_{OL} and V_{OH} are typical output voltage levels that occur with the output load.

Figure 3. Enable and Disable Times

Table 2. Measurement Points

SUPPLY VOLTAGE	INPUT (1)	OUTPUT		
V_{CCA}, V_{CCB}	V_M (2)	V_M (3)	V_X	V_Y
0.8V to 1.6V	0.5 × V_{CCI}	0.5 × V_{CCO}	V_{OL} + 0.1V	V_{OH} - 0.1V
1.65V to 2.7V	0.5 × V_{CCI}	0.5 × V_{CCO}	V_{OL} + 0.15V	V_{OH} - 0.15V
3.0V to 3.6V	0.5 × V_{CCI}	0.5 × V_{CCO}	V_{OL} + 0.3V	V_{OH} - 0.3V

NOTES:
1. V_{CCI} is the supply voltage associated with the data input port.
2. The measurement points should be V_{IH} or V_{IL} when $\Delta t/\Delta V$ > 1.0ns/V.
3. V_{CCO} is the supply voltage associated with the output port.

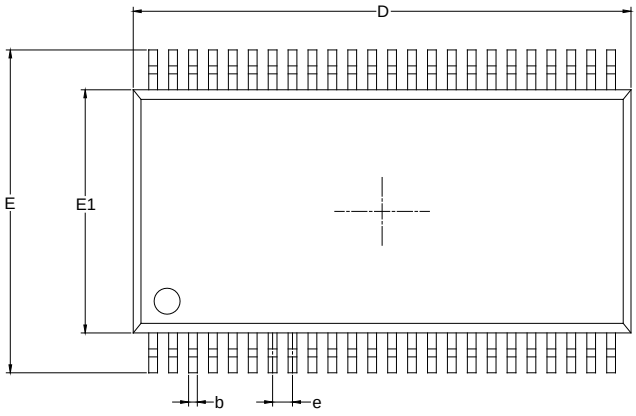
REVISION HISTORY

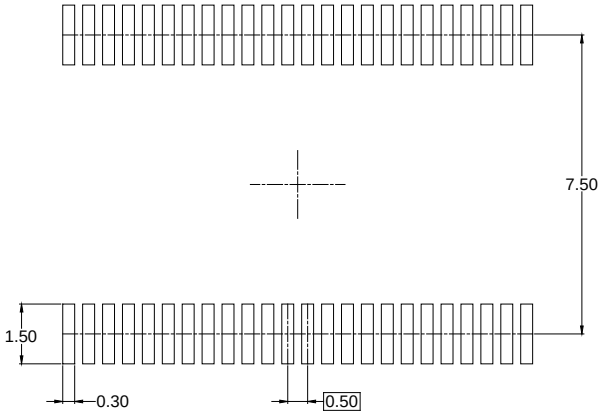
NOTE: Page numbers for previous revisions may differ from page numbers in the current version.

Changes from Original (MARCH 2021) to REV.A	Page
Changed from product preview to production data	All

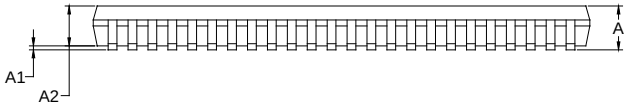
PACKAGE OUTLINE DIMENSIONS

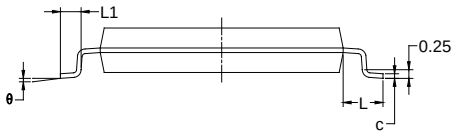
TSSOP-48





RECOMMENDED LAND PATTERN (Unit: mm)

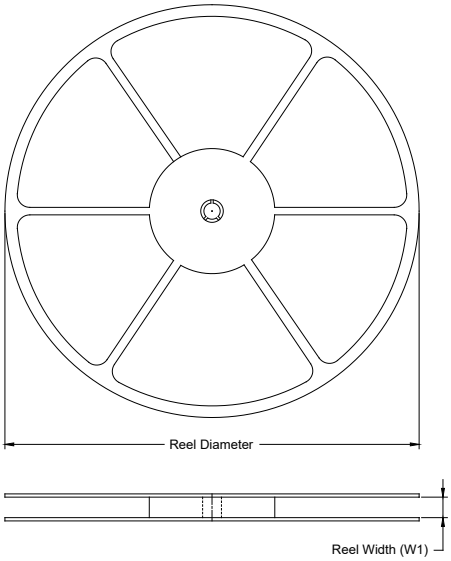




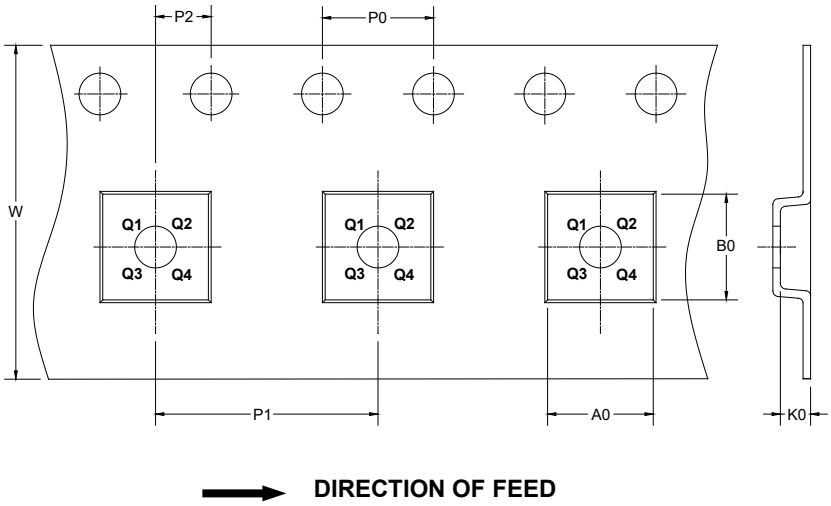
Symbol	Dimensions In Millimeters		
	MIN	MOD	MAX
A			1.20
A1	0.05	0.10	0.15
A2	0.85	0.95	1.05
b	0.18		0.26
c	0.15		0.19
D	12.40	12.50	12.60
E	7.90	8.10	8.30
E1	6.00	6.10	6.20
e	0.50 BSC		
L	1.00 REF		
L1	0.45		0.75
θ	0°		8°

TAPE AND REEL INFORMATION

REEL DIMENSIONS



TAPE DIMENSIONS



DIRECTION OF FEED

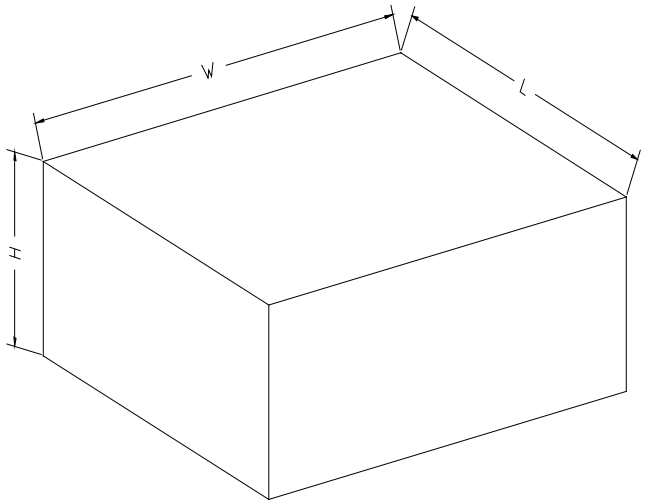
NOTE: The picture is only for reference. Please make the object as the standard.

KEY PARAMETER LIST OF TAPE AND REEL

Package Type	Reel Diameter	Reel Width W1 (mm)	A0 (mm)	B0 (mm)	K0 (mm)	P0 (mm)	P1 (mm)	P2 (mm)	W (mm)	Pin1 Quadrant
TSSOP-48	13”	24.4	8.60	13.00	1.80	4.0	12.0	2.0	24.0	Q1

DD0001

CARTON BOX DIMENSIONS



NOTE: The picture is only for reference. Please make the object as the standard.

KEY PARAMETER LIST OF CARTON BOX

Reel Type	Length (mm)	Width (mm)	Height (mm)	Pizza/Carton
13″	386	280	370	5

DD0002