74AVC8T245
8-Bit Dual-Supply Translating Transceiver with Configurable Voltage Translation; 3-State Outputs

GENERAL DESCRIPTION

The 74AVC8T245 is an 8-bit, dual-supply translating transceiver with configurable voltage translation. The supply voltage (V_{CCA} and V_{CCB}) pins accept any voltage from 0.8V to 3.6V. This makes the device suitable for low voltage bidirectional translation voltage nodes of 0.8V, 1.2V, 1.5V, 1.8V, 2.5V and 3.3V.

The An and Bn are 8-bit input-output ports. DIR is the direction control input pin and $\overline{OE}$ is the output enable input pin. V_{CCA} and V_{CCB} are the dual supply pins. Pins An, $\overline{OE}$ and DIR are referenced to V_{CCA} and pins Bn are referenced to V_{CCB}. The DIR input determines the direction of the data flow. When DIR is high, it transmits data from An ports to Bn ports. When DIR is low, it transmits data from Bn ports to An ports. The output enable ($\overline{OE}$) input disables both An and Bn ports when it is high, so the buses are effectively isolated.

For partial power-down applications with power-off leakage current (I_{OFF}), this device is fully specified. The I_{OFF} circuitry makes the output disabled. When it is powered down, the damaging backflow current will be prevented from passing through the device. In suspend mode, both An and Bn ports are in the high-impedance state if either V_{CCA} or V_{CCB} is at GND.

FEATURES

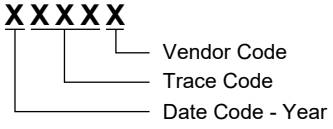
- **V_{CCA} Supply Voltage Range: 0.8V to 3.6V**
- **V_{CCB} Supply Voltage Range: 0.8V to 3.6V**
- **Typical Data Rates:**
  - **380Mbit/s (≥ 1.8V to 3.3V Translation)**
  - **260Mbit/s (≥ 1.1V to 3.3V Translation)**
  - **260Mbit/s (≥ 1.1V to 2.5V Translation)**
  - **210Mbit/s (≥ 1.1V to 1.8V Translation)**
  - **150Mbit/s (≥ 1.1V to 1.5V Translation)**
  - **100Mbit/s (≥ 1.1V to 1.2V Translation)**
- **Suspend Mode**
- **Maximum 3.6V Input Voltage**
- **No Current for I/O Ports in Power-Down Mode**
- **-40℃ to +125℃ Operating Temperature Range**
- **Available in a Green TQFN-5.5×3.5-24L Package**

PACKAGE/ORDERING INFORMATION

MODEL	PACKAGE DESCRIPTION	SPECIFIED TEMPERATURE RANGE	ORDERING NUMBER	PACKAGE MARKING	PACKING OPTION
74AVC8T245	TQFN-5.5×3.5-24L	-40℃ to +125℃	74AVC8T245XTQQ24G/TR	R43 XTQQ XXXXX	Tape and Reel, 3000

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}) ..... ±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, $\Delta t/\Delta V$ (6)
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 associated with the output port.

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

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

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

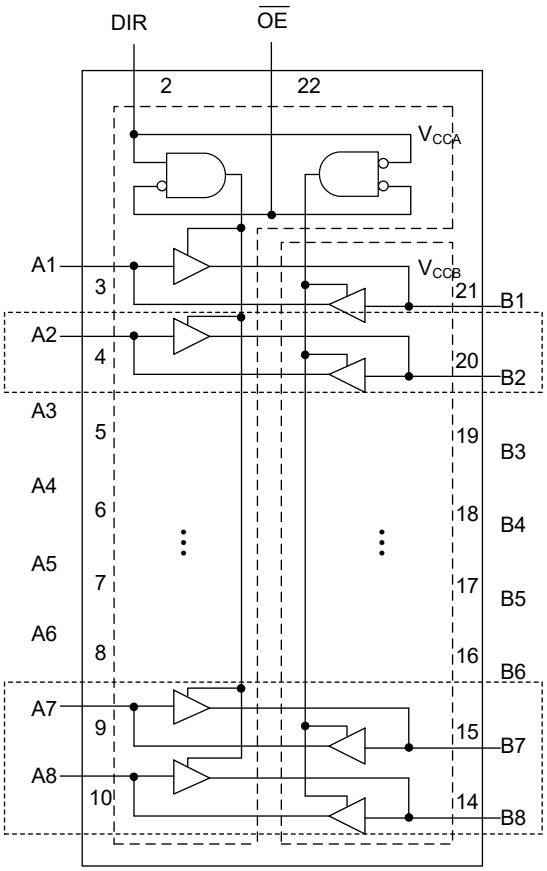
ESD SENSITIVITY CAUTION

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}	$\overline{OE}$	DIR	An	Bn
0.8V to 3.6V	L	L	An = Bn	Inputs
0.8V to 3.6V	L	H	Inputs	Bn = An
0.8V to 3.6V	H	*X*	Z	Z
GND	*X*	*X*	Z	Z

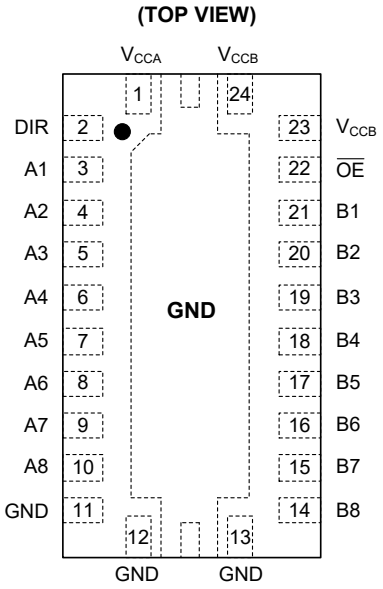
H = High Voltage Level

L = Low Voltage Level

Z = High-Impedance State

X = Don’t Care

PIN CONFIGURATION



TQFN-5.5×3.5-24L

PIN DESCRIPTION

PIN	NAME	FUNCTION
1	V_{CCA}	Supply Voltage $V_{CCA.}$
2	DIR	Direction Control Input.
3, 4, 5, 6, 7, 8, 9, 10	A1, A2, A3, A4, A5, A6, A7, A8	Data Inputs/Outputs.
11, 12, 13	GND	Ground.
14, 15, 16, 17, 18, 19, 20, 21	B8, B7, B6, B5, B4, B3, B2, B1	Data Inputs/Outputs.
22	$\overline{OE}$	Output Enable Input (Active Low).
23, 24	V_{CCB}	Supply Voltage $V_{CCB.}$

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, DIR, $\overline{OE}$ 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, DIR, $\overline{OE}$ 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		0.4	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		0.4	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			
		DIR, $\overline{OE}$ 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	
		DIR, $\overline{OE}$ 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	0.01	0.01	0.01	0.01	0.01	0.01	μA
0.8V	0.01	0.05	0.05	0.05	0.05	0.2	0.6	μA
1.2V	0.01	0.05	0.05	0.05	0.05	0.1	0.4	μA
1.5V	0.01	0.05	0.05	0.05	0.05	0.05	0.3	μA
1.8V	0.01	0.05	0.05	0.05	0.05	0.05	0.2	μA
2.5V	0.01	0.2	0.1	0.1	0.05	0.05	0.05	μA
3.3V	0.01	0.6	0.4	0.3	0.2	0.05	0.03	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 An to Bn), output enabled	1.1	1.1	1.2	1.2	1.3	1.4	pF
		A port: (direction An to Bn), output disabled	0.6	0.7	0.7	0.7	0.8	0.9	
		A port: (direction Bn to An), output enabled	13.3	13.5	13.5	13.7	14.5	15.3	
		A port: (direction Bn to An), output disabled	0.5	0.5	0.5	0.5	0.5	0.5	
		B port: (direction An to Bn), output enabled	13.7	13.7	14.0	14.3	15.0	15.7	
		B port: (direction An to Bn), output disabled	0.5	0.5	0.5	0.5	0.5	0.5	
		B port: (direction Bn to An), output enabled	1.1	1.1	1.2	1.2	1.3	1.4	
		B port: (direction Bn to An), 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}	An to Bn	43	20	18	17	17	17	ns
		Bn to An	38	32	31	30	29	29	
Disable Time	t_{DIS}	$\overline{OE}$ to An	37	37	35	35	35	33	ns
		$\overline{OE}$ to Bn	47	30	30	29	25	24	
Enable Time	t_{EN}	$\overline{OE}$ to An	44	43	43	42	42	42	ns
		$\overline{OE}$ to Bn	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}	An to Bn	43	34	33	32	31	31	ns
		Bn to An	38	20	18	17	17	16	
Disable Time	t_{DIS}	$\overline{OE}$ to An	37	14	11	9	8	6	ns
		$\overline{OE}$ to Bn	47	34	30	30	27	26	
Enable Time	t_{EN}	$\overline{OE}$ to An	44	13	14	7	5	4	ns
		$\overline{OE}$ to Bn	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)

Dynamic Characteristics

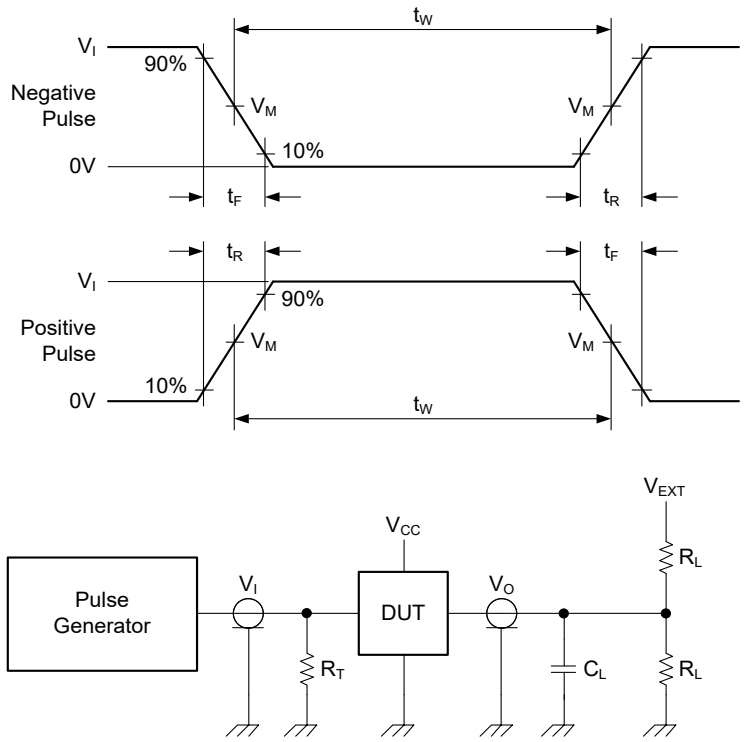
(For test circuit, see Figure 1, for waveforms see Figure 2 and Figure 3, full = -40℃ to +125℃, unless otherwise noted.)

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		
			MIN (1)	MAX (1)	MIN (1)	MAX (1)	MIN (1)	MAX (1)	MIN (1)	MAX (1)	MIN (1)	MAX (1)	
V_{CCA} = 1.1V to 1.3V													
Propagation Delay	t_{PD}	An to Bn	0.5	20.4	0.5	14.9	0.5	13.8	0.5	12.5	0.3	11.8	ns
		Bn to An	0.5	20.4	0.5	15.7	0.5	14.9	0.5	13.8	0.5	13.2	
Disable Time	t_{DIS}	$\overline{OE}$ to An	0.5	25.5	0.5	25.5	0.5	25.5	0.5	25.5	0.5	25.5	ns
		$\overline{OE}$ to Bn	0.5	25.5	0.5	20.8	0.5	20.6	0.5	19.4	0.5	19.8	
Enable Time	t_{EN}	$\overline{OE}$ to An	0.5	26.3	0.5	26.3	0.5	26.3	0.5	26.3	0.5	26.3	ns
		$\overline{OE}$ to Bn	0.5	26.3	0.5	22.1	0.5	21.2	0.5	21.1	0.5	20.9	
V_{CCA} = 1.4V to 1.6V													
Propagation Delay	t_{PD}	An to Bn	0.5	15.7	0.5	11.2	0.5	9.9	0.3	8.4	0.3	8.0	ns
		Bn to An	0.5	14.9	0.5	11.2	0.5	10.0	0.5	8.9	0.5	8.2	
Disable Time	t_{DIS}	$\overline{OE}$ to An	0.5	16.0	0.5	16.0	0.5	16.0	0.5	16.0	0.5	16.0	ns
		$\overline{OE}$ to Bn	0.5	19.8	0.5	16.0	0.5	14.6	0.5	13.4	0.5	13.2	
Enable Time	t_{EN}	$\overline{OE}$ to An	0.5	13.5	0.5	13.5	0.5	13.5	0.5	13.5	0.5	13.5	ns
		$\overline{OE}$ to Bn	0.5	19.8	0.5	13.5	0.3	12.5	0.5	11.7	0.5	11.8	
V_{CCA} = 1.65V to 1.95V													
Propagation Delay	t_{PD}	An to Bn	0.5	14.9	0.5	10.0	0.5	8.7	0.3	7.3	0.3	6.9	ns
		Bn to An	0.5	13.8	0.5	9.9	0.5	8.7	0.3	7.3	0.3	7.0	
Disable Time	t_{DIS}	$\overline{OE}$ to An	0.5	14.2	0.5	14.2	0.5	14.2	0.5	14.2	0.5	14.2	ns
		$\overline{OE}$ to Bn	0.5	19.4	0.5	15.2	0.5	14.2	0.5	12.6	0.5	11.6	
Enable Time	t_{EN}	$\overline{OE}$ to An	0.5	10.4	0.5	10.4	0.5	10.4	0.5	10.4	0.5	10.4	ns
		$\overline{OE}$ to Bn	0.5	18.2	0.5	12.0	0.5	10.4	0.3	9.4	0.3	9.2	
V_{CCA} = 2.3V to 2.7V													
Propagation Delay	t_{PD}	An to Bn	0.5	13.8	0.5	8.9	0.3	7.3	0.3	6.2	0.3	5.7	ns
		Bn to An	0.5	12.5	0.3	8.4	0.3	7.3	0.3	6.2	0.3	5.6	
Disable Time	t_{DIS}	$\overline{OE}$ to An	0.5	11.2	0.5	11.2	0.5	11.2	0.5	11.2	0.5	11.2	ns
		$\overline{OE}$ to Bn	0.5	18.7	0.5	13.6	0.5	12.1	0.5	11.2	0.5	10.3	
Enable Time	t_{EN}	$\overline{OE}$ to An	0.3	7.8	0.3	7.8	0.3	7.8	0.3	7.8	0.3	7.8	ns
		$\overline{OE}$ to Bn	0.5	16.9	0.5	10.5	0.3	9.2	0.3	7.8	0.3	7.5	
V_{CCA} = 3.0V to 3.6V													
Propagation Delay	t_{PD}	An to Bn	0.5	13.2	0.5	8.2	0.3	7.0	0.3	5.6	0.3	5.2	ns
		Bn to An	0.3	11.8	0.3	8.0	0.3	6.9	0.3	5.7	0.3	5.2	
Disable Time	t_{DIS}	$\overline{OE}$ to An	0.5	9.4	0.5	9.4	0.5	9.4	0.5	9.4	0.5	9.4	ns
		$\overline{OE}$ to Bn	0.5	18.3	0.5	13.1	0.5	11.8	0.5	10.9	0.5	9.4	
Enable Time	t_{EN}	$\overline{OE}$ to An	0.3	7.1	0.3	7.1	0.3	7.1	0.3	7.1	0.3	7.1	ns
		$\overline{OE}$ to Bn	0.5	16.2	0.5	9.8	0.3	8.5	0.3	7.6	0.3	7.1	

NOTES:

1. Specified by design and characterization; not production tested.
2. 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 including jig and probe capacitance.

R_T = Termination resistance should be equal to output impedance Z_O of the pulse generator.

V_{EXT} = External voltage for measuring switching times.

Figure 1. Test Circuit for Measuring Switching Times

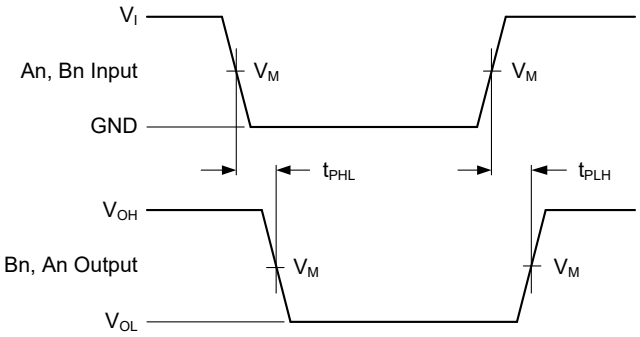
Table 1. Test Conditions

SUPPLY VOLTAGE	INPUT		LOAD		V_{EXT}		
V_{CCA}, V_{CCB}	V_I (1)	$\Delta t/\Delta V$ (2)	C_L	R_L	t_{PLH}, t_{PHL}	t_{PZH}, t_{PHZ}	t_{PZL}, t_{PLZ} (3)
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:

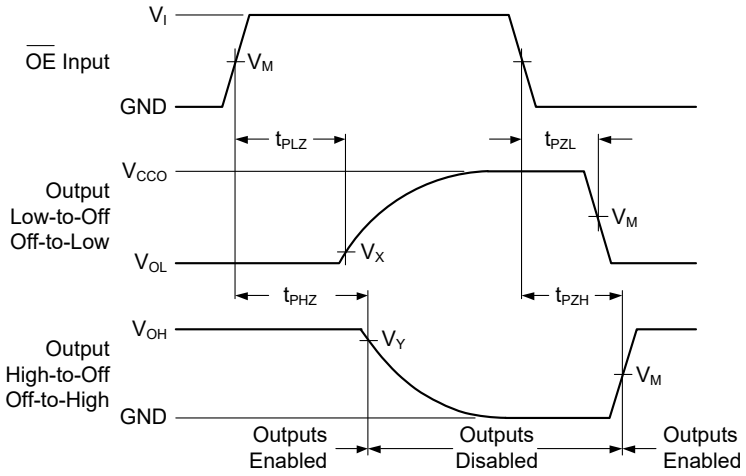
1. V_{CCI} is the supply voltage associated with the data input port.
2. dV/dt ≥ 1.0V/ns
3. V_{CCO} is the supply voltage associated with the output port.

WAVEFORMS



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

Figure 2. Input (An, Bn) to Output (Bn, An) Propagation Delay Times



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

Figure 3. Enable and Disable Times

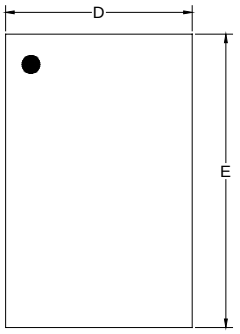
Table 2. Measurement Points

SUPPLY VOLTAGE	INPUT [1]	OUTPUT [2]		
V_{CCA}, V_{CCB}	V_M [3]	V_M	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

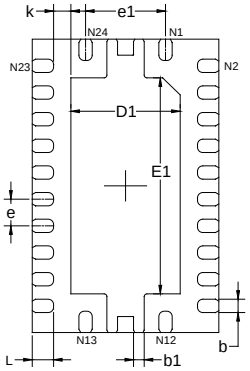
NOTES:
1. V_{CCI} is the supply voltage associated with the data input port.
2. V_{CCO} is the supply voltage associated with the output port.
3. The measurement points should be V_{IH} or V_{IL} when $\Delta t/\Delta V$ > 1.0ns/V.

PACKAGE OUTLINE DIMENSIONS

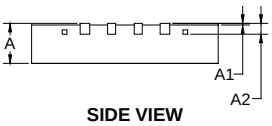
TQFN-5.5×3.5-24L



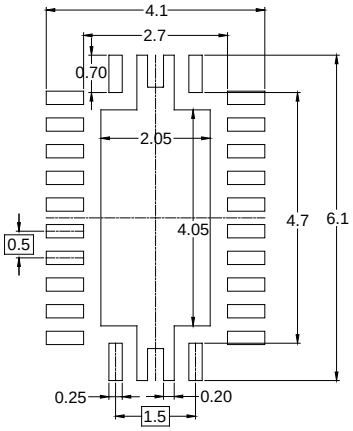
TOP VIEW



BOTTOM VIEW



SIDE VIEW



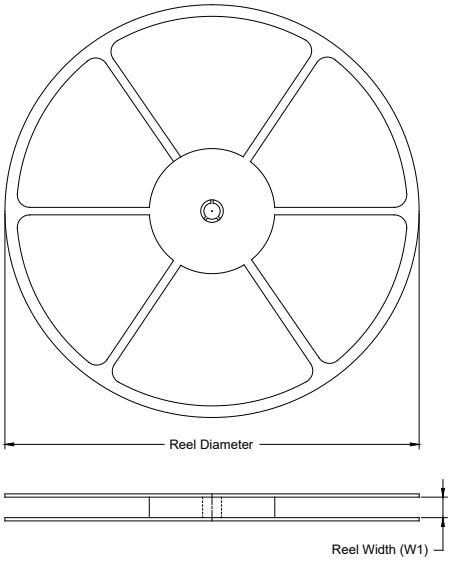
RECOMMENDED LAND PATTERN (Unit: mm)

Symbol	Dimensions In Millimeters		Dimensions In Inches	
	MIN	MAX	MIN	MAX
A	0.700	0.800	0.028	0.031
A1	0.000	0.050	0.000	0.002
A2	0.203 REF		0.008 REF	
D	3.400	3.600	0.134	0.142
D1	1.950	2.150	0.077	0.085
E	5.400	5.600	0.213	0.220
E1	3.950	4.150	0.156	0.163
k	0.325 REF		0.013 REF	
b	0.200	0.300	0.008	0.012
b1	0.150	0.250	0.006	0.010
L	0.300	0.500	0.012	0.020
e	0.500 BSC		0.020 BSC	
e1	1.500 BSC		0.059 BSC	

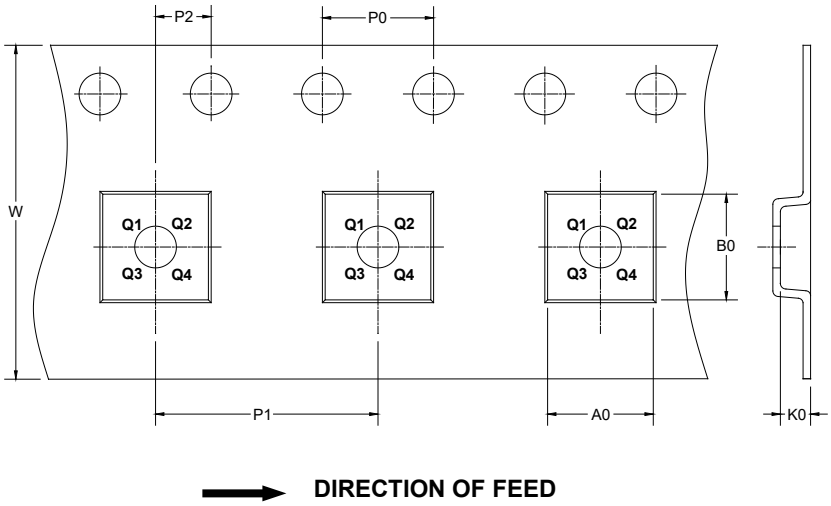
NOTE: This drawing is subject to change without notice.

TAPE AND REEL INFORMATION

REEL DIMENSIONS



TAPE DIMENSIONS



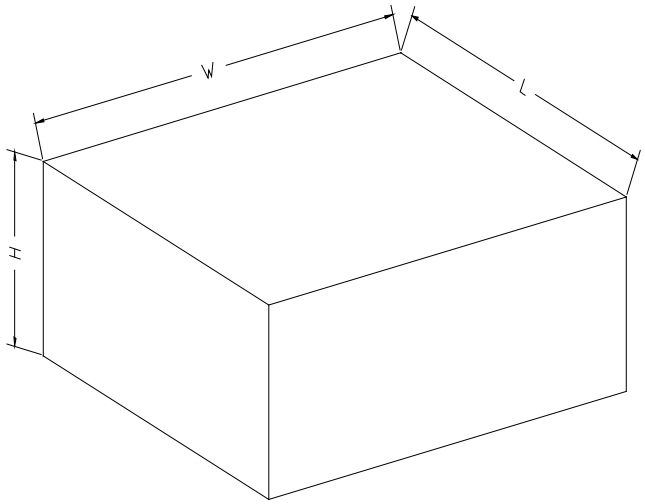
NOTE: The picture is only for reference. Please make the object as the standard.

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
TQFN-5.5×3.5-24L	13″	12.4	3.80	5.80	1.00	4.0	8.0	2.0	12.0	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