

Product Overview

NCA8245 is an octal buffer/driver used for improving driver ability of bus-oriented receivers and transmitters, clock drivers etc. and ensuring the accuracy of signal timing. The device provides a direction-control (DIR) input for transmitting data bidirectionally. When DIR is logic high, it transmits data from A to B, and from B to A when DIR is logic low. When /OE is high, the outputs are in the high-impedance state. During power up and power down, /OE should be tied to VCC through a pull-up resistor to ensure the high impedance state.

NCA8245 can tolerate up to 5.5V input voltage and each channel supports maximum 24 mA current drive. All unused inputs must be held at V_{CC} or GND to prevent excess supply current.

Key Features

- Qualified for Automotive applications:
NCA8245-Q1TSTR
- Inputs are TTL compatible
- Power supply voltage: 4.5V to 5.5V
- 5.5 V Tolerant Inputs
- ESD Protection Exceeds JESD 22
 - 4000V Human-Body Model (A114-A)
 - 2000V Charged-Device Model (C101)
- Operation temperature: -40°C ~125°C
- RoHS-compliant packages: TSSOP20

Applications

- Motor driver
- Traction inverter
- I/O modules
- LED displays

Device Information

Part Number	Package	Body Size
NCA8245-DTSTR	TSSOP20	6.50mm × 4.50mm
NCA8245-Q1TSTR	TSSOP20	6.50mm × 4.50mm

Functional Block Diagrams

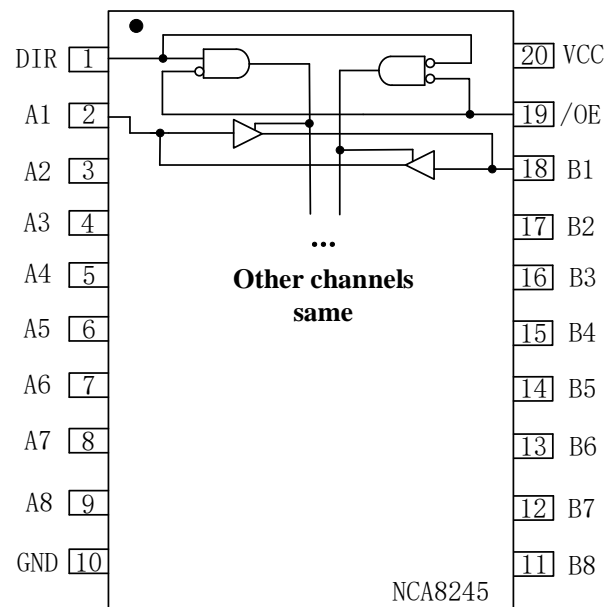


Figure 1. NCA8245 Block Diagram

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1. Pin Configuration and Functions

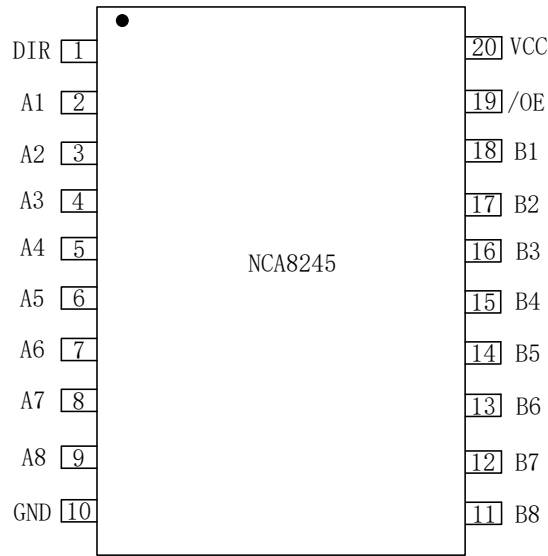


Figure 1.1 NCA8245 Package

Table 1.1 NCA8245 Pin Configuration and Description

NCA8245 PIN NO.	SYMBOL	FUNCTION
1	DIR	Direction control, referenced to V_{CCA} . DIR is logic high, direction is from A to B and DIR is logic low, transmission is from B to A.
2	A1	Input/Output of B1
3	A2	Input/Output of B2
4	A3	Input/Output of B3
5	A4	Input/Output of B4
6	A5	Input/Output of B5
7	A6	Input/Output of B6
8	A7	Input/Output of B7
9	A8	Input/Output of B8
10	GND	Ground
11	B8	Input/Output of A8
12	B7	Input/Output of A7
13	B6	Input/Output of A6
14	B5	Input/Output of A5
15	B4	Input/Output of A4

16	B3	Input/Output of A3
17	B2	Input/Output of A2
18	B1	Input/Output of A1
19	/OE	Active low Output enable
20	V _{CC}	Power

2. Absolute Maximum Ratings

Parameters	Symbol	Min	Typ	Max	Unit	Comments
Power Supply Voltage	V _{CC}	-0.5		7	V	
Maximum Input Voltage	V _I	-0.5		V _{CC} +0.5	V	The maximum voltage must not exceed 7V
Maximum Output Voltage	V _O	-0.5		V _{CC} +0.5	V	The maximum voltage must not exceed 7V
Input clamp current	I _{IK}	-20		20	mA	V _I < 0 or V _I > V _{CC}
Output clamp current	I _{OK}	-20		20	mA	V _I < 0 or V _I > V _{CC}
Continuous output current	I _O	-50		50	mA	V _O =0 to V _{CC}
Ambient Temperature	T _a	-40		125	°C	
Junction Temperature	T _J			150	°C	
Storage Temperature	T _{stg}	-65		150	°C	
Electrostatic discharge	HBM	-4000		4000	V	Per ANSI/ESDA/JEDEC JS-001
	CDM	-2000		2000	V	Per JEDEC specification JESD22-C101

3. Recommended Operating Conditions

Over recommended operating free-air temperature range (unless otherwise noted)

Parameters	Symbol	Min	Typ	Max	Unit	Comments
Power Supply Voltage	V _{CC}	4.5		5.5	V	
High-level output current	I _{OH}	-24			mA	
High-level output current	I _{OL}			24	mA	
Input transition rise or fall rate	Δt/Δv			8	ns/V	
Operating free-air temperature	T _a	-40		125	°C	

(1) All unused inputs of the device must be held at V_{CC} or GND to ensure proper device operation.

4. Thermal Information

Parameters	Symbol	TSSOP20	Unit
Junction-to-ambient thermal resistance	$R_{\theta JA}$	103	°C/W
Junction-to-case(top) thermal resistance	$R_{\theta JC (top)}$	37.7	°C/W
Junction-to-board thermal resistance	$R_{\theta JB}$	54	°C/W
Junction-to- top characterization parameter	Ψ_{JT}	6.8	°C/W
Junction-to- board characterization parameter	Ψ_{JB}	65.1	°C/W

5. Specifications

5.1. Electrical Characteristics

($V_{CC}=4.5V-5.5V$, $T_a=-40^{\circ}C$ to $125^{\circ}C$. Unless otherwise noted, Typical values are at $T_a=25^{\circ}C$)

Parameters	Symbol	Min	Typ	Max	Unit	Comments
Supply current	I_{CC}			80	μA	$V_{CC}=5.5V$, $V_i = V_{CC}$ or GND, $I_o = 0$
Increasing supply current	ΔI_{CC}			1.5	mA	One input at 3.4 V, Other inputs at GND or V_{CC}
High-level input voltage	V_{IH}	2			V	
Low-level input voltage	V_{IL}			0.8	V	
High-level output voltage	V_{OH}	4.4	4.49		V	$V_{CC}=4.5V$, $I_{OH}=-50\mu A$
		5.4	5.49		V	$V_{CC}=5.5V$, $I_{OH}=-50\mu A$
		3.9			V	$V_{CC}=4.5V$, $I_{OH}=-24mA$
		4.9			V	$V_{CC}=5.5V$, $I_{OH}=-24mA$
		3.85				$V_{CC}=5.5V$, $I_{OH}=-75mA$
Low-level output voltage	V_{OL}		0.001	0.1	V	$V_{CC}=4.5V$, $I_{OL}=50\mu A$
			0.001	0.1	V	$V_{CC}=5.5V$, $I_{OL}=50\mu A$
				0.55	V	$V_{CC}=4.5V$, $I_{OL}=24mA$
				0.55	V	$V_{CC}=5.5V$, $I_{OL}=24mA$
				1.65	V	$V_{CC}=5.5V$, $I_{OL}=75mA$
Three-state output current	I_{OZ}	-2.5		2.5	μA	$V_{CC}=5.5V$, $V_o = V_{CC}$ or GND
Input current	I_i	-1		1	μA	$V_{CC}=5.5V$, $V_i = V_{CC}$ or GND
Input capacitance	C_i		2.5		pF	
Output capacitance	C_o		8		pF	

(1) This applies in the disabled state only.

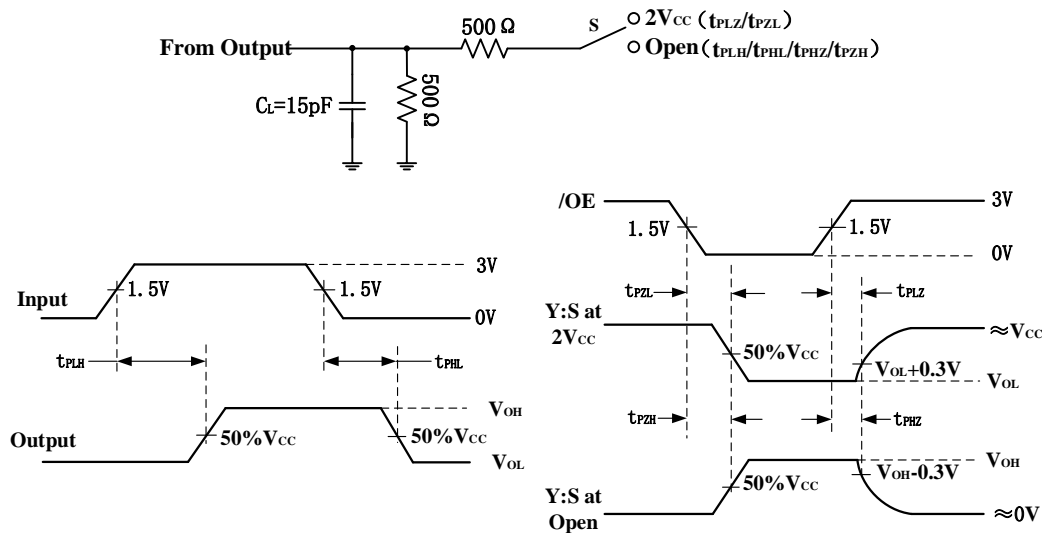
(2) The increasing of supply current for each input that is at one of the specified TTL voltage levels, rather than 0V or V_{CC} .

5.2. Dynamic Characteristics

($V_{CC}=4.5V-5.5V$, $T_a=-40^{\circ}C$ to $125^{\circ}C$. Unless otherwise noted, Typical values are at $T_a = 25^{\circ}C$)

Parameters	Symbol	Min	Typ	Max	Unit	Comments
Propagation Delay	t_{PLH}		8	15	ns	See figure 1
	t_{PHL}		7	15	ns	
Enable to Data high Valid	t_{PZH}		7	15	ns	
Enable to Data Low Valid	t_{PZL}		7	15	ns	
Disable high to tri-state	t_{PHZ}		8	15	ns	
Disable low to tri-state	t_{PLZ}		7.5	15	ns	

5.3. Parameter measurement information



Note:

- 1) All input pulses with the following characteristics: $PRR \leq 1MHz$, $Z_0 = 50\Omega$, $t_r \leq 2.5ns$, $t_f \leq 2.5ns$;
- 2) C_L includes probe and test-fixture capacitance.

Figure 5.1 Load Circuit and Voltage Waveforms for NCA8245

6. Function Description

6.1. Overview

NCA8245 is an octal buffer used for improving driver ability of 3-state memory address, clock drivers, and bus-oriented receivers and transmitters and ensuring the accuracy of signal timing. The device provides a direction-control (DIR) input for transmitting data bidirectionally. When DIR is logic high, it transmits data from A to B, and from B to A when DIR is logic low. When /OE is high, the outputs are in the high-impedance state. During power up and power down, /OE should be tied to V_{CC} through a pull-up resistor to ensure the high impedance state. All unused inputs of NCA8245 must be held at V_{CC} or GND to prevent excess I_{CC} .

Table 6.1 Function Table

A_IN⁽¹⁾	/OE status	VCC status	B_OUT	Comment
L	L	Ready	L	Normal operation.
H	L	Ready	H	
X	H	Ready	Z	Output Disabled, the output is high impedance.
X	X	Unready	Z	The output follows the same status with the input after V _{CC} is powered on and output is enabled.

(1) L=Logic low; H=Logic high; X=Logic low or logic high.

7. Application Note

7.1. Application Information

The NCA8245 can be used in Motor driver, Traction inverter, IO modules and LED displays. The maximum output current can be up to 24 mA.

7.2. Typical Application Circuit

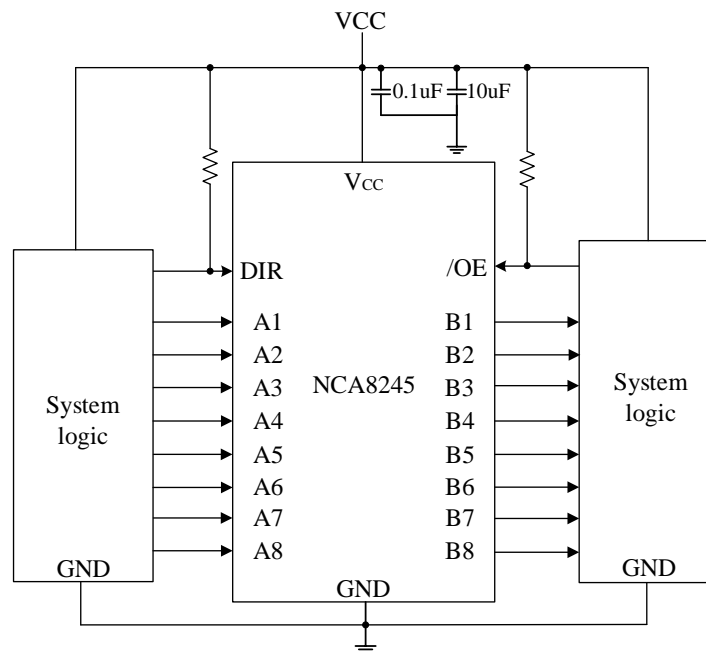


Figure 7.1 Typical application circuit for NCA8245

8. Package Information

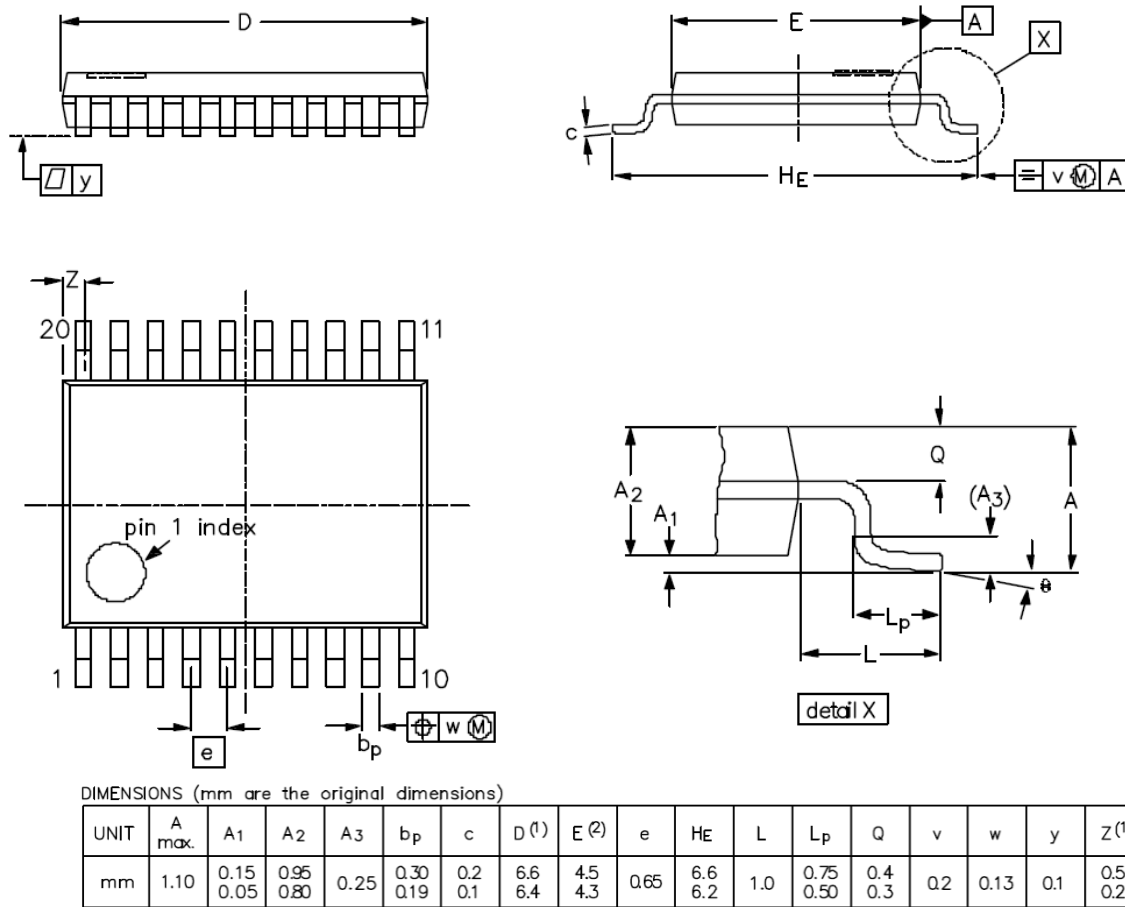


Figure 8.1 TSSOP20 Package Shape and Dimension in millimeters

9. Ordering Information

Part Number	PINS	Temperature	MSL	Package Type	Package Drawing	SPQ
NCA8245-DTSTR	20	-40 to 125°C	1	TSSOP20	TSSOP20	2500
NCA8245-Q1TSTR	20	-40 to 125°C	1	TSSOP20	TSSOP20	2500

NOTE: All packages are RoHS-compliant with peak reflow temperatures of 260 °C according to the JEDEC industry standard classifications and peak solder temperatures.

10. Tape and Reel Information

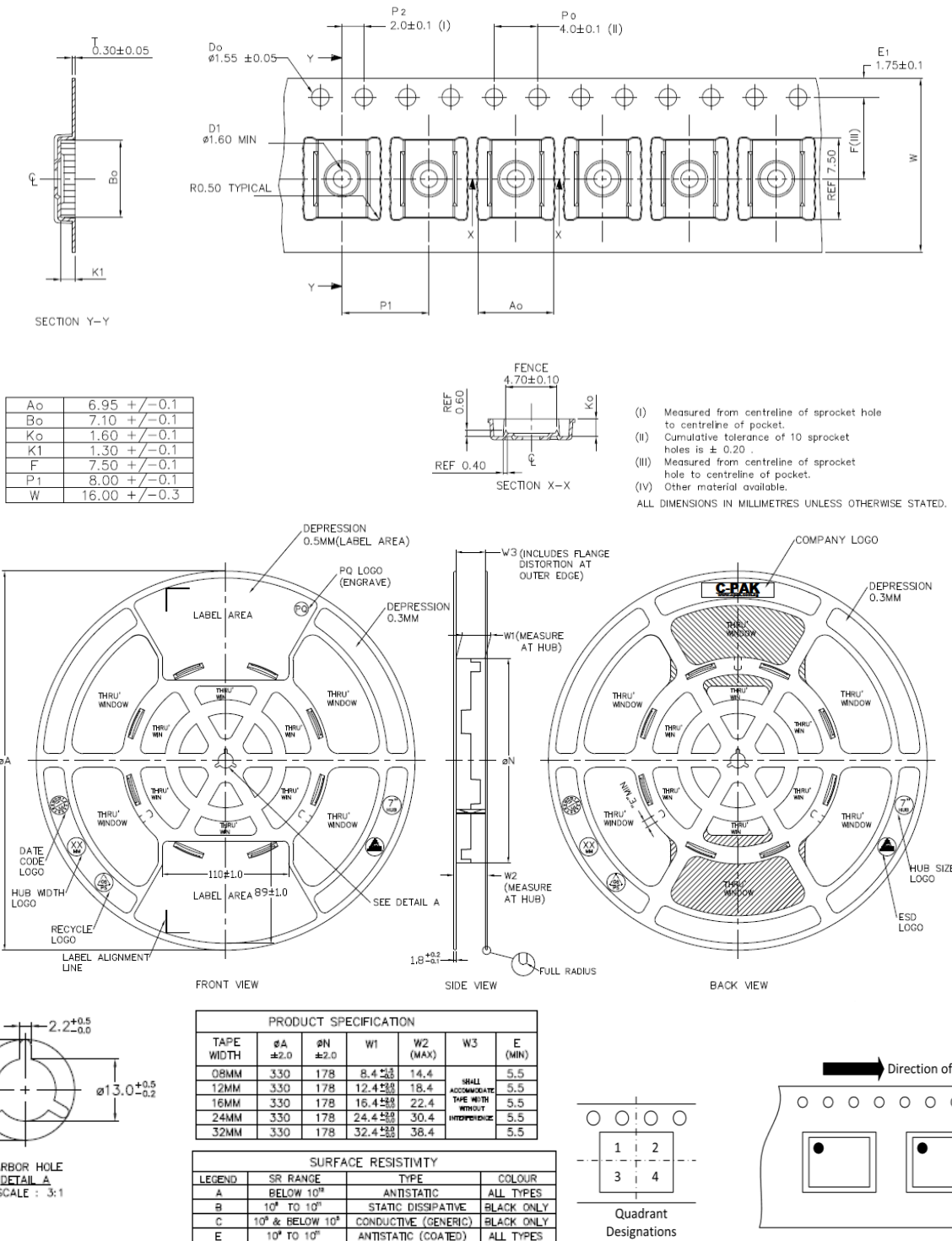


Figure 10.1 Tape and Reel Information of TSSOP

11. Revision History

Revision	Description	Date
1.0	Initial Version.	2023/4/21
1.1	Modify body size of NCA8245-Q1	2023/10/25

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