

AXC-SMALLPKG1EVM Evaluation Module

This user's guide describes the characteristics, operation, and use of the AXC-SMALLPKG1EVM Evaluation Module (EVM). A complete printed-circuit board layout, schematic diagrams, and bill of materials are included in this document.

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1 Introduction

SN74AXCxxx devices are a new family of direction controlled level translators from Texas Instruments. AXC devices have dual-supply pins enabling configurable voltage translation from 0.65 V to 3.6 V and any intermediate voltage ranges. The AXC-SMALLPKG1EVM can be used to evaluate small package one, four and eight channel translator devices that are available in the AXC family. Refer to the competitive advantages of the AXC Family in the application report *Power sequencing for the AXC family of devices* (SCEA058). Watch [Introduction to the AXC family of direction controlled translation device](#).

1.1 Features

The AXC family of direction controlled translation devices are dual-supply with configurable voltage translation and an operating range from 0.65 V to 3.6 V. The A port is designed to track V_{CCA} . V_{CCA} accepts any supply voltage from 0.65 V to 3.6 V. The B port is designed to track V_{CCB} . V_{CCB} accepts any supply voltage from 0.65 V to 3.60 V. This device is fully specified for partial-power-down applications using I_{OFF} . The I_{OFF} circuitry disables the outputs, thus preventing damaging current backflow through the device when it is powered down. The V_{CC} isolation feature ensures that if either V_{CC} input is at ground, both A and B data I/O ports are in the high-impedance state.

The eight channel [SN74AXC8T245](#) device has two direction control pins, each controlling 4 data I/Os enabling independent and simultaneous up and down translation. The DIR1 pin controls the direction of data I/O channels 1 through 4, and the DIR2 pin controls the direction of data I/O channels 5 through 8. The functional table of the [SN74AXC8T245](#) is listed in [Table 1](#) and the [SN74AXC1T45](#) is listed in [Table 3](#). Refer to [SN74AXC8T245EVM](#) for testing SN74AXC8T245PW package.

This EVM is designed to support [SN74AXC1T45](#) in DEA and the DTQ packages. There is an option of populating the [SN74AXC8T245](#) in the RJW package and [SN74AVC4T245](#) or the SN74AXC4T245 in the RSV package. It is also designed to support the bus-hold and -Q1 devices for the respective channel counts.

Table 1. Function: SN74AXC8T245

OE	DIR1	DIR2	Signal Direction
H	X	X	Hi-Z
L	L	L	B data to A bus
L	L	H	B{1:4} to A{1:4} and A{5:8} to B{5:8}
L	H	L	A data to B bus
L	H	H	A{1:4} to B{1:4} and B{5:8} to A{5:8}

Table 2. Function: SN74AXC4T245

$\overline{OE}$	DIR1	DIR2	Signal Direction
H	X	X	Hi-Z
L	L	L	B data to A bus
L	L	H	B{1:2} to A{1:2} and A{3:4} to B{3:4}
L	H	L	A{1:2} to B{1:2} and B{3:4} to A{3:4}
L	H	H	A data to B bus

Table 3. Function: SN74AXC1T45

DIR	Signal Direction
L	B data to A bus
H	A data to B bus

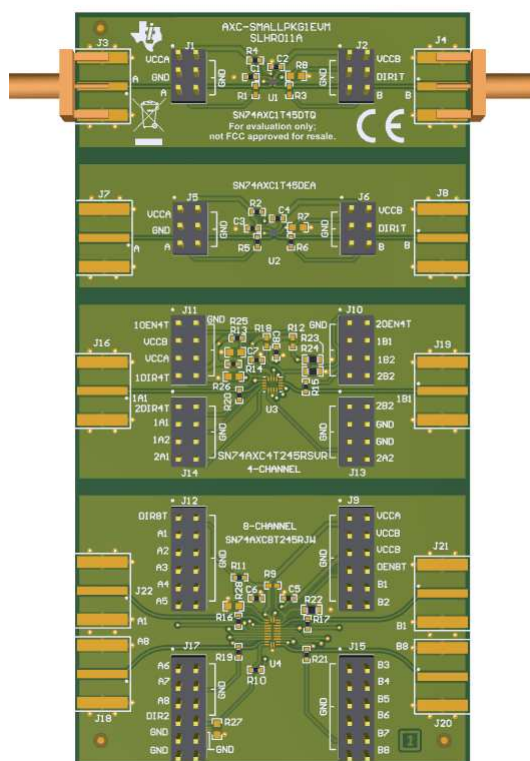


Figure 1. AXC-SMALLPKG1EVM: 8, 4, 2, 1 Channel versions

The supported packages are listed in [Table 4](#).

Table 4. EVM Package Options

Version	Package	Device Populated
One Channel	DEA	Yes
One Channel	DTQ	Yes
Four Channel	RSV	No
Eight Channel	RJW	No

1.2 Hardware Description

1.2.1 Headers

The EVM has standard 100-mil headers with the side closer to the device connected to ground. The side farther away from the device is mapped to the device pinout for easier connection as seen in [Figure 1](#). The silkscreen indicates the pin function.

1.2.2 Bypass Capacitors

C1, C3, C6, and C7 are the bypass capacitors for V_{CCA} while C2, C4, C5, and C8 are the bypass capacitors for V_{CCB} with a value of 0.1 μ F.

1.2.3 Pullup and Pulldown Resistors

The direction control and output enable pins are the inputs for the devices and should never be left floating. The CMOS inputs must be held at a known state, either V_{CC} or ground, to ensure proper device operation. Refer to *Implications of Slow or Floating CMOS Inputs* ([SCBA004](#)). The default state of the control input is referenced to V_{CCA} using a 10-k Ω pullup resistor. There is also the option of connecting the inputs to ground using pulldown resistors, or directly to ground via jumper on the header pins.

[Table 5](#) lists the pullup and pulldown resistors.

Table 5. Pullup and Pulldown Resistors

Device	Pin	Pullup	Pulldown
One Channel DTQ	DIR	R4	R8
One Channel DEA	DIR	R2	R7
Four Channel RSV ⁽¹⁾	DIR1	R14	R25
	DIR2	R13	R26
	1OEN	R12	R23
	2OEN	R18	R24
Eight Channel RJW ⁽²⁾	DIR1	R11	R28
	DIR2	R10	R27
	OEN	R9	R22

⁽¹⁾ Four channel considering SN74AVC4T245

⁽²⁾ Eight channel considering SN74AXC8T245

1.2.4 SMB Connectors

The edge-mounted SMB connector option is provided for each of the channel versions on data I/O pins of A1 and B1, respectively, for high-speed operation. One pair of SMB connector is installed on the A and B data I/O pair of the SN74AXC1T45DTQ package while the corresponding header pin has an uninstalled R1 and R3 zero-ohm resistor.

2 Board Layout

Figure 2 illustrates the AXC-SMALLPKG1EVM layout. Increase zoom level for clarity.

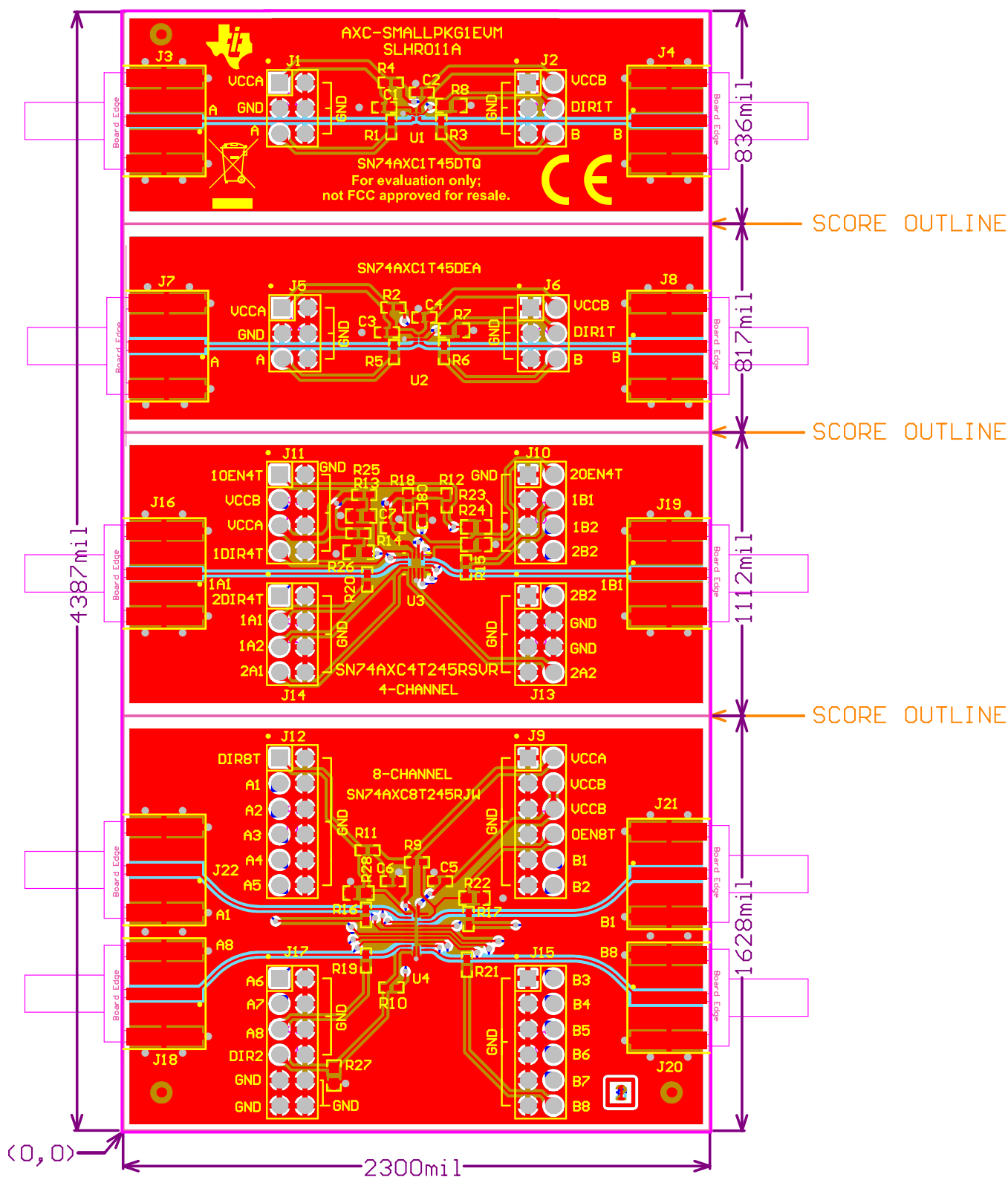
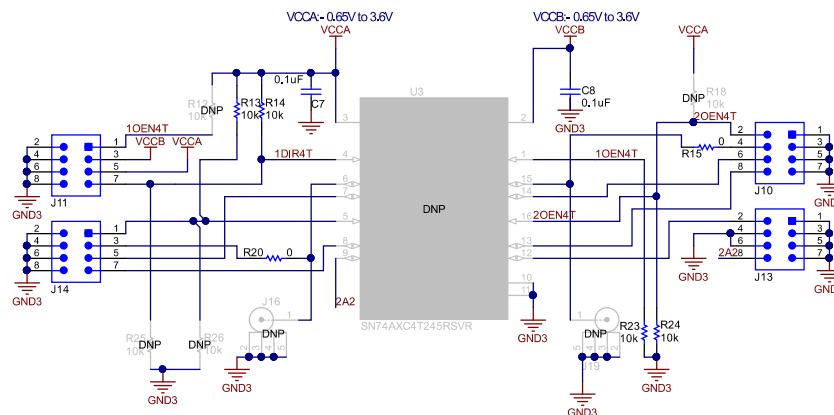


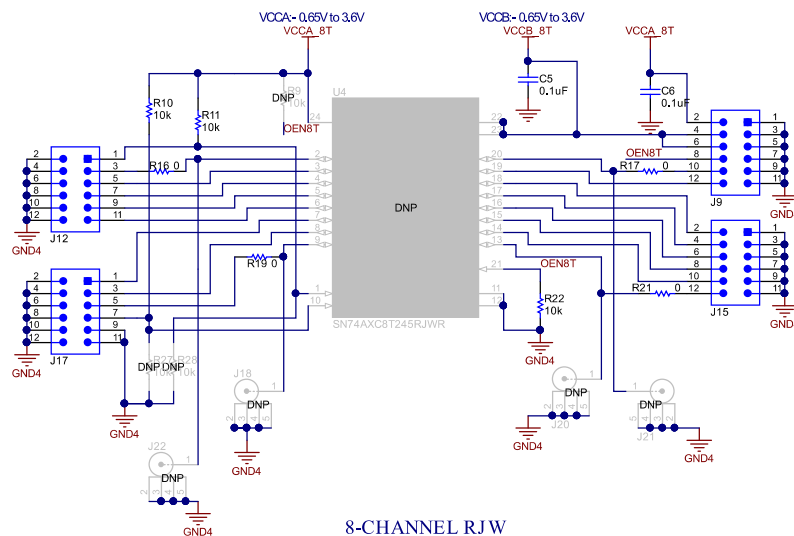
Figure 2. AXC-SMALLPKG1EVM Layout



4-CHANNEL RSV

Figure 5. Schematic - Four Channel RSV

Figure 6 illustrates the AXC-SMALLPKG1EVM One channel DTQ schematic



8-CHANNEL RJW

Figure 6. Schematic - Eight Channel RJW

3.2 Bill of Materials

Table 6 lists the AXC-SMALLPKG1EVM bill of materials.

Table 6. AXC-SMALLPKG1EVM Bill of Materials

Designator	Quantity	Value	Description	Package Reference	Part Number	Manufacturer
!PCB1	1		Printed Circuit Board		SLHR011	Any
C1, C2, C3, C4, C5, C6, C7, C8	8	0.1uF	CAP, CERM, 0.1 uF, 16 V, +/- 10%, X7R, 0402	0402	0402YC104KAT2A	AVX
J1, J2, J5, J6	4		Header, 100mil, 3x2, Gold, TH	3x2 Header	TSW-103-07-G-D	Samtec
J3, J4	2		Connector, SMB Jack, End launch, SMT	SMB End launch Jack, SMT	131-3701-801	Cinch Connectivity
J9, J12, J15, J17	4		Header, 100mil, 6x2, Gold, TH	6x2 Header	TSW-106-07-G-D	Samtec
J10, J11, J13, J14	4		Header, 100mil, 4x2, Gold, TH	4x2 Header	TSW-104-07-G-D	Samtec
R2, R4, R10, R11, R13, R14	6	10k	RES, 10 k, 5%, 0.063 W, AEC-Q200 Grade 0, 0402	0402	CRCW040210K0JNED	Vishay-Dale
R5, R6, R15, R16, R17, R19, R20, R21	8	0	RES, 0, 5%, 0.063 W, 0402	0402	ERJ-2GE0R00X	Panasonic
R22, R23, R24	3	10k	RES, 10 k, 5%, 0.1 W, AEC-Q200 Grade 0, 0603	0603	CRCW060310K0JNEA	Vishay-Dale
U1	1		Single-Bit Dual-Supply Bus Transceiver with Configurable Voltage-Level Shifting and 3-State Outputs, DTQ0006A (X2SON-6)	DTQ0006A	SN74AXC1T45DTQR	Texas Instruments
U2	1		Single-Bit Dual-Supply Bus Transceiver With Configurable Voltage Translation and Tri-State Outputs, DEA0006A (X2SON-6)	DEA0006A	SN74AXC1T45DEAR	Texas Instruments
FID1, FID2, FID3	0		Fiducial mark. There is nothing to buy or mount.	N/A	N/A	N/A
J7, J8, J16, J18, J19, J20, J21, J22	0		Connector, SMB Jack, End launch, SMT	SMB End launch Jack, SMT	131-3701-801	Cinch Connectivity
R1, R3	0	0	RES, 0, 5%, 0.063 W, 0402	0402	ERJ-2GE0R00X	Panasonic
R7, R8, R25, R26, R27, R28	0	10k	RES, 10 k, 5%, 0.1 W, AEC-Q200 Grade 0, 0603	0603	CRCW060310K0JNEA	Vishay-Dale
R9, R12, R18	0	10k	RES, 10 k, 5%, 0.063 W, AEC-Q200 Grade 0, 0402	0402	CRCW040210K0JNED	Vishay-Dale
U3	0		Quad-Bit Bus Transceiver with Configurable Voltage Translation and 3-State Outputs, RSV0016A (UQFN-16)	RSV0016A	SN74AXC4T245RSVR	Texas Instruments
U4	0		8-Bit Dual-Supply Bus Transceiver with Configurable Voltage Translation and 3-State Outputs, RJW0024A (UQFN-24)	RJW0024A	SN74AXC8T245RJWR	Texas Instruments

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This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

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NOTE: This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

FCC Interference Statement for Class B EVM devices

NOTE: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- *Reorient or relocate the receiving antenna.*
- *Increase the separation between the equipment and receiver.*
- *Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.*
- *Consult the dealer or an experienced radio/TV technician for help.*

3.2 Canada

3.2.1 For EVMs issued with an Industry Canada Certificate of Conformance to RSS-210 or RSS-247

Concerning EVMs Including Radio Transmitters:

This device complies with Industry Canada license-exempt RSSs. Operation is subject to the following two conditions:

(1) this device may not cause interference, and (2) this device must accept any interference, including interference that may cause undesired operation of the device.

Concernant les EVMs avec appareils radio:

Le présent appareil est conforme aux CNR d'Industrie Canada applicables aux appareils radio exempts de licence. L'exploitation est autorisée aux deux conditions suivantes: (1) l'appareil ne doit pas produire de brouillage, et (2) l'utilisateur de l'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.

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http://www.tij.co.jp/llds/ti_ja/general/eStore/notice_01.page

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