PCM270xEVM-U

This user's guide contains information on the setup, operation, and construction of the PCM270xEVM-U, an evaluation module (EVM) for digital-to-analog converters (DACs) PCM2704 and PCM2705.

Contents

List of Figures

List of Tables

1   Description

The PCM270xEVM-U is an evaluation board for the USB interface DACs PCM2704 (DEM-PCM2704) and PCM2705 (DEM-PCM2705).

A USB connector is mounted on the PCM270xEVM-U. This connector allows a customer to evaluate DAC performance by connecting a USB interface to it.

By the use of jumper settings on the board, the PCM270xEVM-U can be operated either from USB bus power or from an external 5-V power supply.

The PCM270xEVM-U outputs a stereo audio signal for headphones at stereo minijack CN2 (PD = 12 mW at R_L = 32 Ω), and an S/PDIF digital interface output at optical Toslink™ connector U4.

The PCM270xEVM-U is fully compliant with the USB 1.1 specification with full-speed transceiver format.

1.1   Related Documentation From Texas Instruments

PCM2704, PCM2705, PCM2706, PCM2707 Stereo Audio DAC With USB Interface, Single-Ended Headphone Output and S/PDIF Output data sheet (SLES081)

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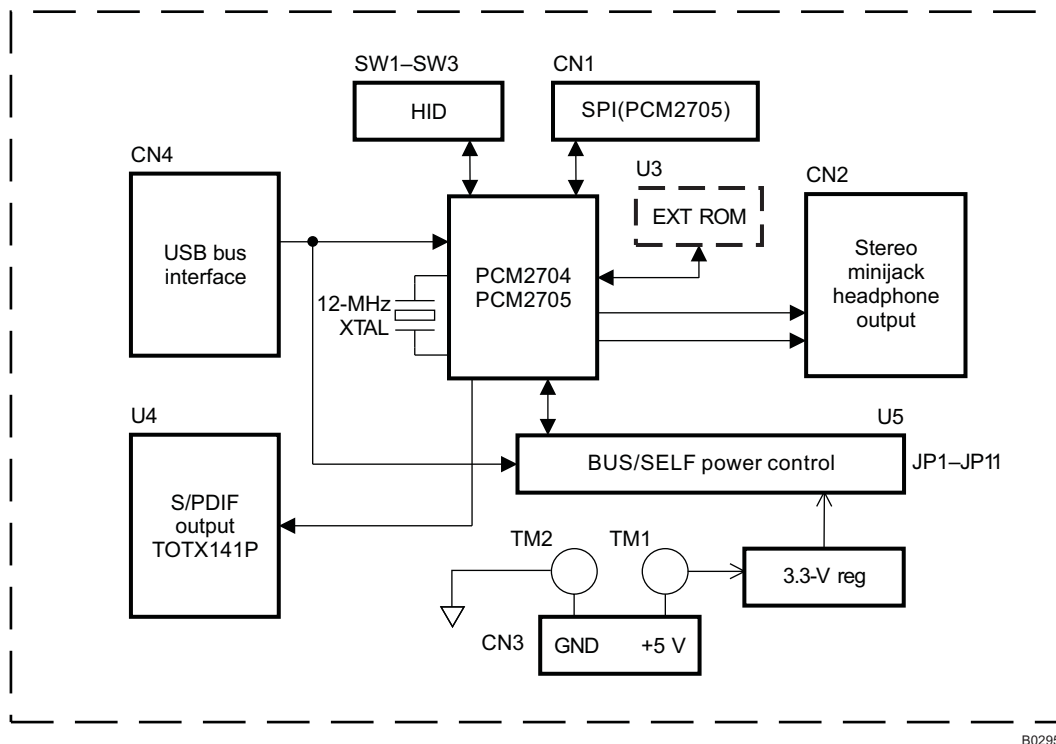
1.2 Block Diagram

Figure 1. PCM270xEVM-U Block Diagram

1.3 Basic Operating Connections

1.3.1 Universal Serial Bus (USB)

A USB interface is connected to USB connector CN4.

1.3.2 Stereo Headphone Output

A stereo headphone plug is connected to stereo minijack audio output connector CN2.

1.3.3 Bus-Power/Self-Power Selection

Operation in the bus-powered or self-powered mode is user selectable, chosen by jumper plug settings on the board. The default setting is self-powered operation.

Bus-Powered

JP1, (JP7): Shorting plug of jumper JP1 must be connected. (JP7 can be removed if the application draws less than 100 mA.)

JP2–JP6, JP8: Shorting plugs of jumpers JP2–JP6, JP8 must be removed.

JP9, JP10, JP11: Shorting plugs of jumpers JP9, JP10, and JP11 must be connected on the BUS side.

CN3 or TM1, TM2 external power supply:

External 5-V power supply must not be connected.

Self-Powered (default setting)

JP1: Shorting plug of jumper JP1 must be removed.

JP2–JP8: Shorting plugs of jumpers JP2–JP8 must be connected.

JP9, JP10, JP11: Shorting plugs of jumpers JP9, JP10, and JP11 must be connected on the SELF side.

CN3 or TM1, TM2 external power supply:

External power supply must be connected either to CN3 or to TM1 and TM2. (V_{CC} = 4.5 V to 10 V. I_{CC} = 30 mA typical, 70 mA maximum.) A 3.3-V regulator IC is mounted to provide a 3.3-V power supply for PCM2704/2705 and logic circuitry on the board from the external power supply.

In the case of self-powered operation, device is enabled when the USB interface is connected and HOST is set to High.

1.3.4 SPI Interface (PCM2705)

An SPI interface (MS, MC, MD) for operational control of the PCM2705 can be connected at CN1.

1.3.5 Suspend

Suspend status is indicated at the SSPND pin of CN1.

1.3.6 S/PDIF Output

USB audio data input to the PCM2704/2705 is output in S/PDIF format. This electrical output is sent to U4, which converts the S/PDIF signal into light for optical transmission.

2 Schematic, BOM, and Printed-Circuit Board

This chapter presents the PCM270xEVM-U printed-circuit board and schematic.
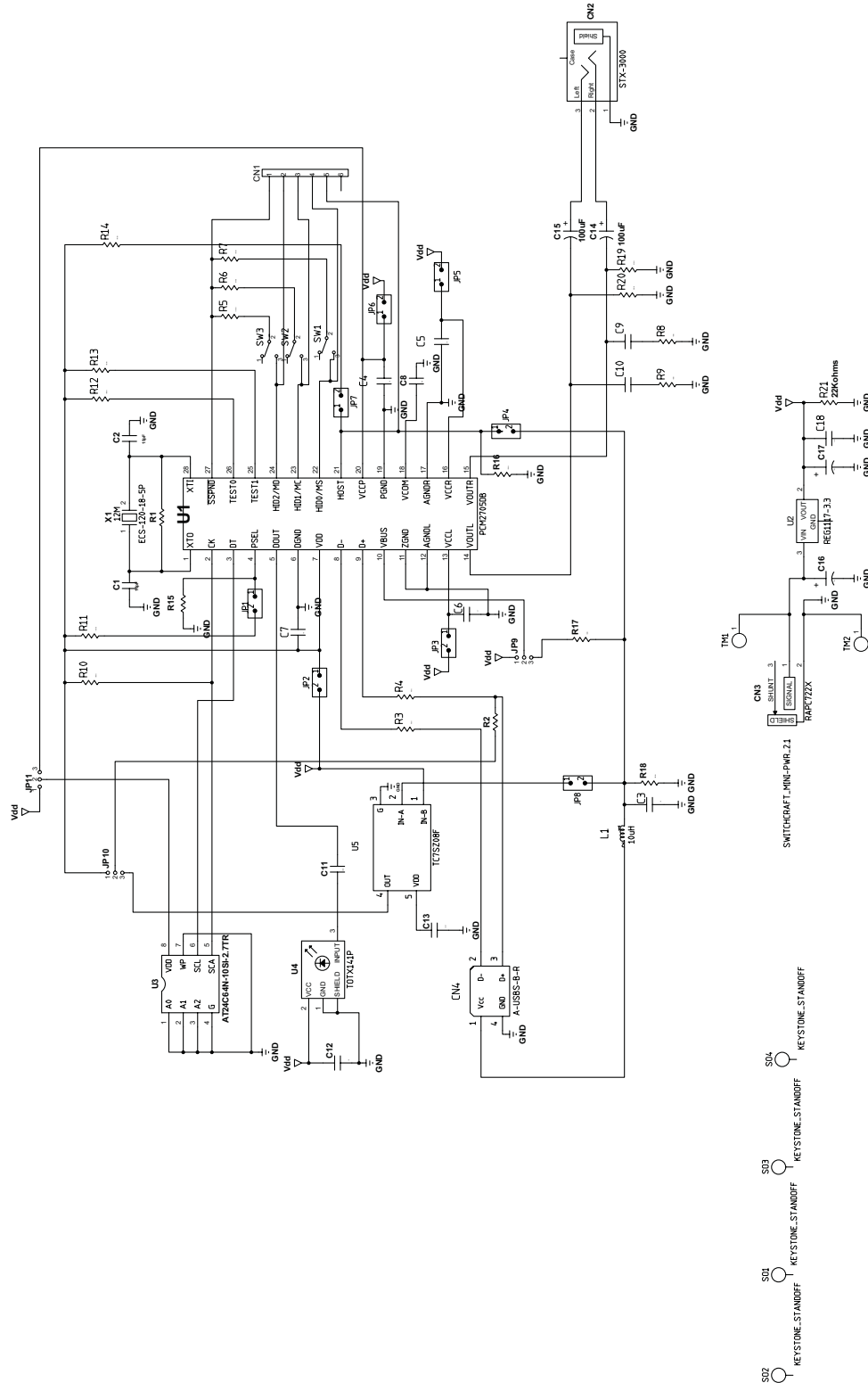
2.1 PCM270xEVM-U Schematic

Figure 2. PCM270xEVM-U Circuit Diagram

2.2 PCM270xEVM-U Parts List (BOM)

Table 1. Bill of Materials

Item	QTY	MFG	MFG Part#	REF DES	Description	Value or Function
	REF	–	PCM2704/2705 EVMA	–	ASSEMBLY	–
	REF	–	PCM2704/2705 EVMA	–	SCHEMATIC	–
	1	One Source Group	PCM2704/2705 EVMA	–	FABRICATION	–
	REF	–	PCM2704/2705 EVMA	–	ARTWORK	–
1	4		2031	SO1, SO2, SO3, SO4		STANDOFF,4-40,1.0INx3/16IN,ALUM RND F-F
2	3		26630301RP2	JP9, JP10, JP11		HEADER 3 PIN, PCB 2.0MM ROHS
3	1		26630601RP2	CN1		HEADER 6 PIN, PCB 2.0MM ROHS
4	1		RAPC722X	CN3		JACK MINI-PWR THRU-RA 2,1ID/5.5OD 5A ROHS
5	1		STX-3000	CN2		JACK,MINI-STEREO,ROHS
6	1		TC7SZ08F	U5		2-Input AND Gate
7	1		TOTX141P	U4		TOSLINK TRANSMITTER 3.3V 15MB SHUTTER ROHS
8	6		GRM185R61A105KE36D	C3, C4, C5, C6, C7, C12	603	CAP SMD0603 CERM 1.0UFD 10V 10% X5R ROHS
9	1		GRM21BR71A106KE51L-VSA	C8	805	CAP SMD0805 CERM 10UFD 10V10% X7R ROHS
10	1		3750-0	TM2	Black	BINDING POST, BLACK 60V/15A GOLD ROHS
11	1	PANASONIC	ECQ-B1H104JF	C18	CAP,RAD,POLY	CAP,THU,POLYES-FILM,0.1µF,50V,5%,85C
12	2	MURATA	GRM39X7R223K16V	C9, C10	CAP,SMT,0603	CAPACITOR,SMT,0603,CERAMIC,16V,10%,.022µF
13	2	MURATA	GRM40COG150J50V	C1, C2	CAP,SMT,0805	50V,±5%,15pF
14	2	MURATA	GRM40X7R103K50V	C11, C13	CAP,SMT,0805	50V,10%,.010µF
15	2	PANASONIC	EEVFC0J101P	C14, C15	CAPACITOR,SMT,ELEC	CAPACITOR,SMT,ELEC,100uF,6.3V,20%, –40~105°C
16	1	ASSMANN ELEC	A-USBS-B-R	CN4	CONNECTOR,THU,4P	CONNECTOR,THU,4P,USB RECEPTACLE,TYPE B, PCB MOUNT
17	1	ECS	ECS-120-18-5P	X1	CRYSTAL,SMT,2P	XTL,SMT,12.000MHz,18pF,Fund,50ppm,-10~70°C
18	3		G12AP-RO	SW1, SW2, SW3	G12AP	SWITCH THRU SPDT STRAIGHT ULTRA MINIATURE ROHS
19	8	SAMTEC	TSW-101-07-G-D	JP1, JP2, JP3, JP4, JP5, JP6, JP7, JP8	HEADER,THU	HEADER,THU,2P,2X1,MALE,DUAL ROW,100LS,100TL
20	1	ATMEL	AT24C64N-10SI-2.7TR	U3	IC,SMT,8P	2 WIRE SERIAL EEPROM
21	1	PANASONIC	ELJFA100KJ/F	L1	INDUCTOR,SMT	10.0µH
22	2		ECA1CM100	C16, C17	M	CAP ALUM ELEC M RADIAL 10UFD 16V 20% ROHS
23	2	VISHAY	CRCW08051002F	R19, R20	RES,SMT,0805	RESISTOR,SMT,0805,THICK FILM,1%,1/8W,10.0K
24	3	VISHAY	CRCW08051004F	R1, R15, R16	RES,SMT,0805	RESISTER,SMT,0805,THICK FILM,1%,1/8W,1.00M
25	1	VISHAY	CRCW080510R0F	R17	RES,SMT,0805	RESISTER,SMT,0805,THICK FILM,1%,1/8W,10.0 Ω
26	9	VISHAY	CRCW08051501F	R2, R5, R6, R7, R10, R11, R12, R13, R14	RES,SMT,0805	RESISTOR,SMT,0805,THICK FILM,1%,1/8W,1.50K
27	1	PANASONIC	ERJ-6GEYJ106V	R18	RES,SMT,0805	RESISTOR,SMT,0805,THICK FILM,10M,5%,1/8W
28	2	PANASONIC	ERJ-6GEYJ160V	R8, R9	RES,SMT,0805	RESISTOR,SMT,0805,THICK FILM,5%,1/8W,16
29	2	PANASONIC	ERJ-6GEYJ270V	R3, R4	RES,SMT,0805	RESISTOR,SMT,0805,THICK FILM,5%,1/8W,27
30	1	PANASONIC	ERA-6YEB223V	R21	RES,SMT,2P	RESISTOR,SMT,0805,22K,0.1%,1/10W,25ppm
31	1		3750-2	TM1	Red	BINDING POST, RED 60V/15A GOLD ROHS
32	1		REG1117-3.3	U2	SOT223-DCY	VOLT REG 3.3V 800mA SOT223-DCY ROHS
33	1		PCM2705DB	U1	SSOP28-DB	STEREO AUDIO DAC W/USB SE HEADPHONE/SPDIF OUT SSOP28-DB ROHS

NOTE: ASTERISK(*) NEXT TO PART MANUFACTURER'S NAME DENOTES POSSIBLE LONG LEAD TIME ITEM.
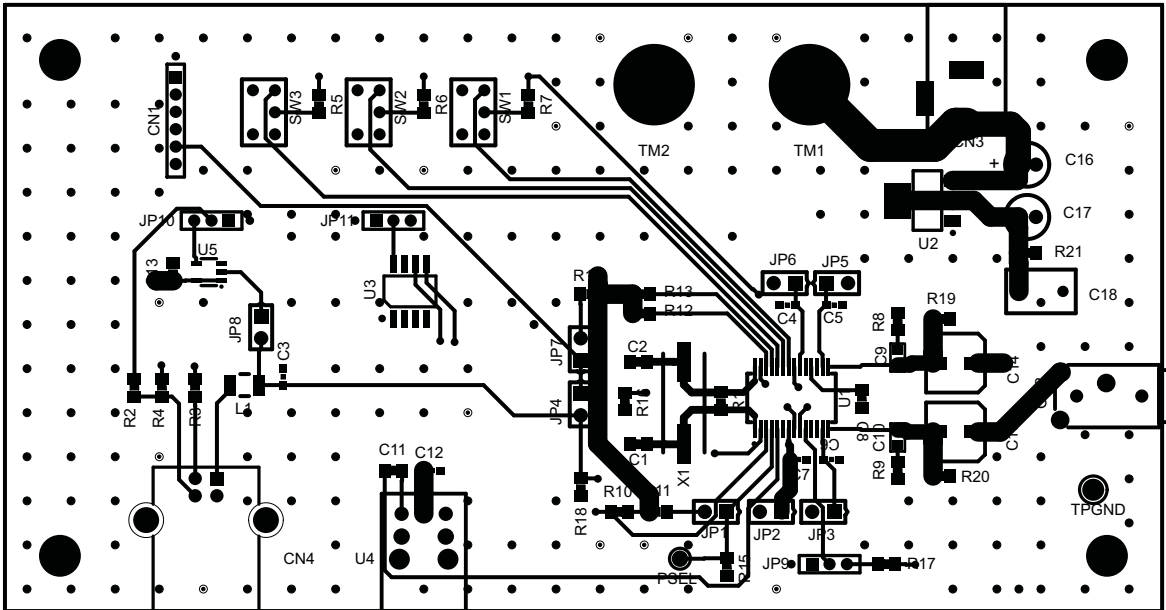
2.3 PCM270xEVM-U Printed-Circuit Board

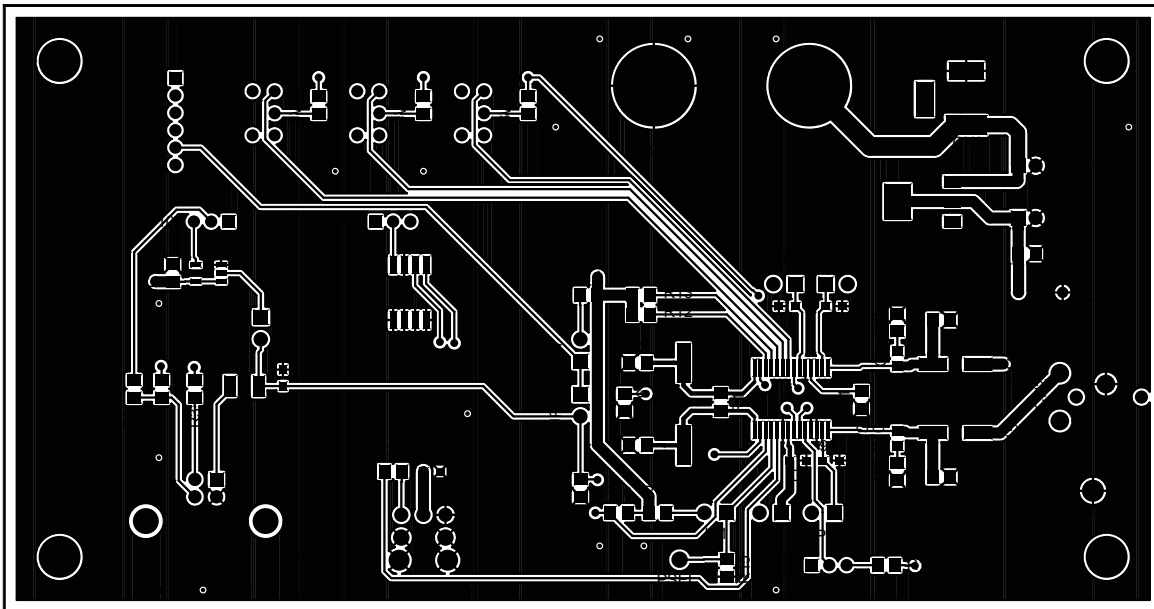**Figure 3. PCM270xEVM-U Silkscreen**
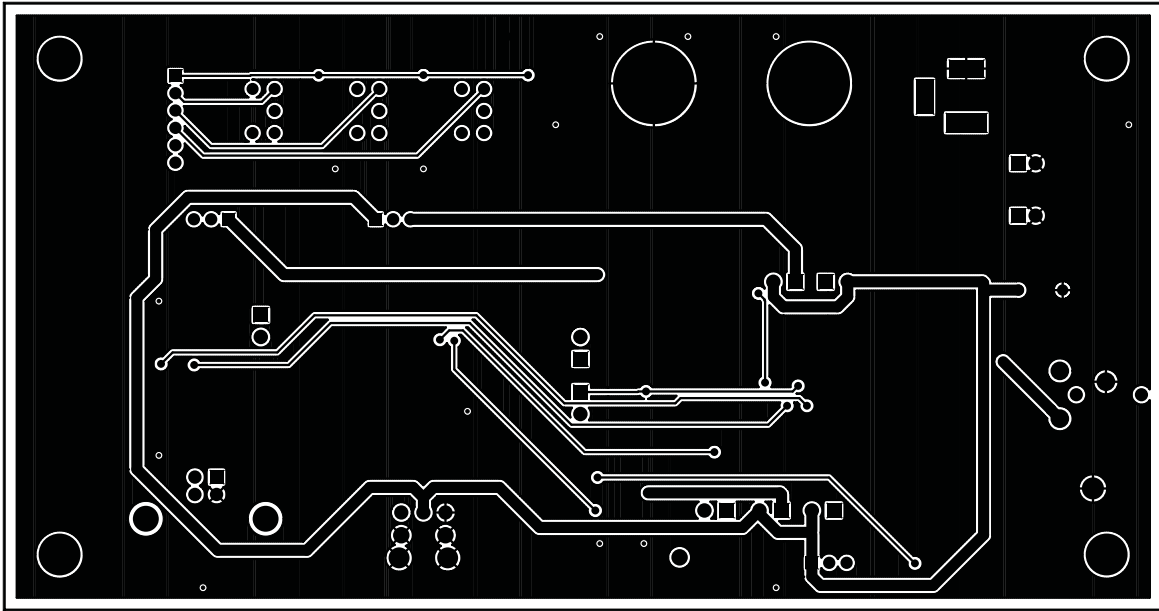

Figure 4. PCM270xEVM-U—Top View

Figure 5. PCM270xEVM-U—Bottom View

SLEU114–May 2011   PCM270xEVM-U   7
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EVM Warnings and Restrictions

It is important to operate this EVM within the input voltage range of 5 V and the output voltage range of 5 V .

Exceeding the specified input range may cause unexpected operation and/or irreversible damage to the EVM. If there are questions concerning the input range, please contact a TI field representative prior to connecting the input power.

Applying loads outside of the specified output range may result in unintended operation and/or possible permanent damage to the EVM. Please consult the EVM User's Guide prior to connecting any load to the EVM output. If there is uncertainty as to the load specification, please contact a TI field representative.

During normal operation, some circuit components may have case temperatures greater than 55°C. The EVM is designed to operate properly with certain components above 55°C as long as the input and output ranges are maintained. These components include but are not limited to linear regulators, switching transistors, pass transistors, and current sense resistors. These types of devices can be identified using the EVM schematic located in the EVM User's Guide. When placing measurement probes near these devices during operation, please be aware that these devices may be very warm to the touch.

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