

# TS3USBCA410 EVM User's Guide

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The TS3USBCA410 is a passive 3:1 mux capable of switching differential or single-ended signals on the SBU terminals of a USB Type-C connector to three different interfaces. This guide describes how to bring up the EVM and configure to evaluate the performance of the TS3USBCA410.

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## 1 Introduction

The EVM comes with SMP connectors to interface to each transmission signal of the mux with jumpers to configure the device through GPIO settings, and optional header for I2C interface.

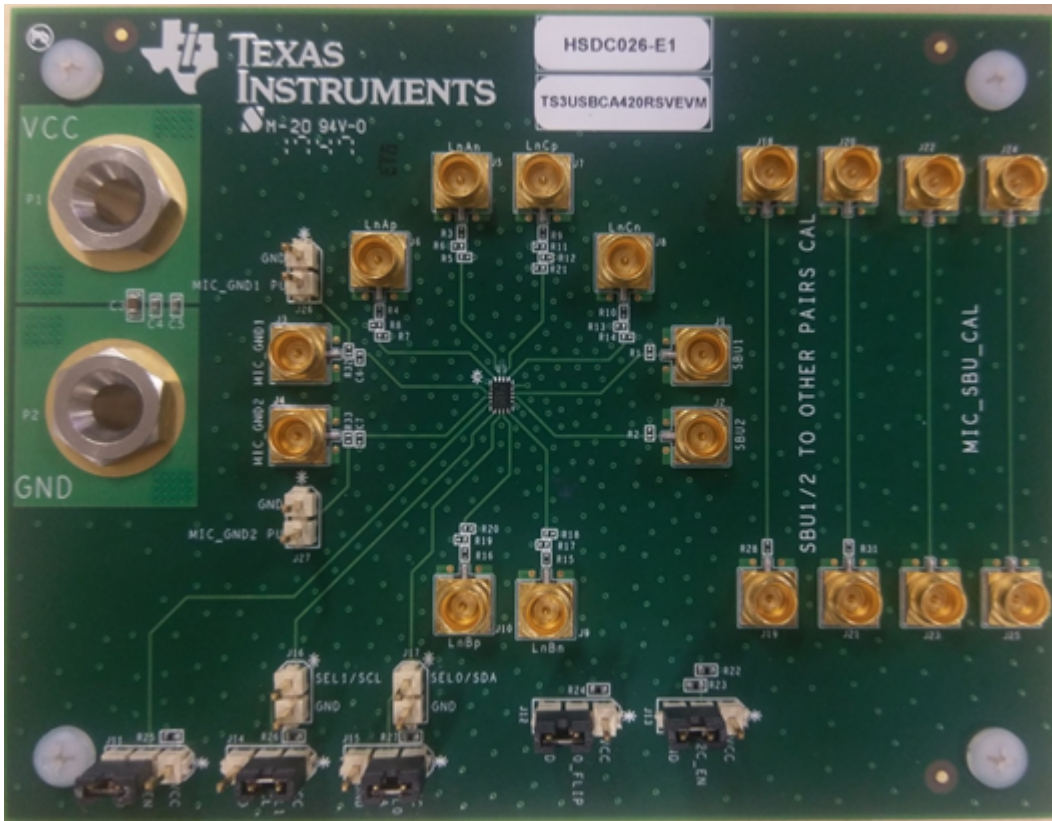


Figure 1. TS3USBCA410EVM

The TS3USBCA410EVM is designed to interface directly to test equipment to evaluate the switching performance of the device. Figure 2 is an example test set-up.

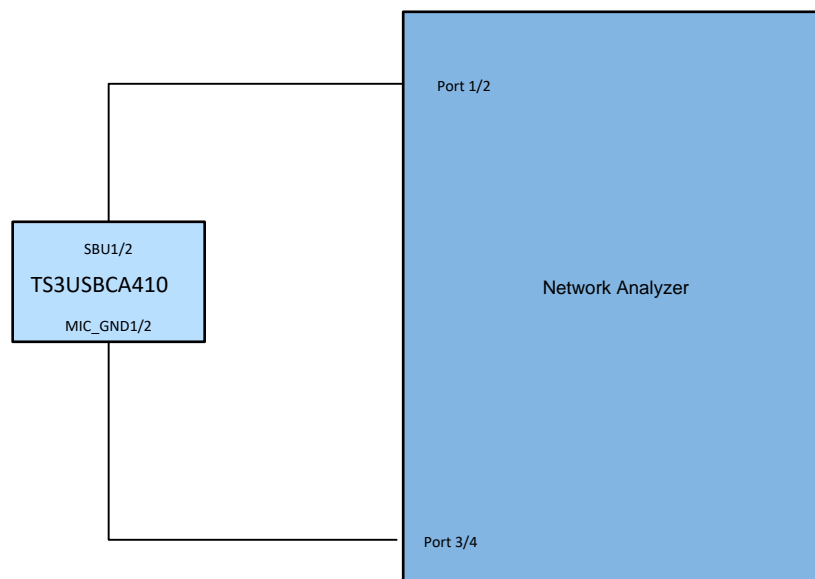


Figure 2. Example Test Board Setup

## 2 TS3USBCA410EVM Configuration

This section provides the configuration options available in the TS3USBCA410EVM.

### 2.1 TS3USBCA410EVM Default Configuration

The following headers and shunt placements are provided for default TS3USBCA410 configuration. The EVM is configured to operate in GPIO mode by default. If I2C configuration is desired, JMP13 (I2C\_EN) shunt must be changed to shunt pins 1-2 VCC). Options are included in the design to populate pull-up and/or pull-down resistors on each transmission signal, these options are not populated by default.

**Table 1. TS3USBCA410 Configuration Pins**

Reference Designator	Configuration Signal	Configuration
J11	OEn	SHUNT on pin 2-3 (GND)
J12	410_FLIP	SHUNT on pin 2-3 (Not Connected by Default)
J13	I2C_EN	SHUNT on pin 2-3 (GND)
J14	SEL1/SCL	SHUNT on pin 1-2 (VCC)
J15	SEL0/SDA	SHUNT on pin 1-2 (VCC)
J16	SCL	OPEN
J17	SDA	OPEN
J26	MIC_GND1 100k	OPEN (Not Connected by Default)
J27	MIC_GND2 100k	OPEN (Not Connected by Default)

### 2.2 TS3USBCA410 Switch Control

Table 2 provides the details of the TS3USBCA410 mux switching as controlled by the SWSEL[1:0] I2C register (See the datasheet for details) or the SEL[1:0] configuration pins.

**NOTE:** Highlighted configuration only available in I2C mode.

**Table 2. Switch Control Pin Level Definitions**

SWSEL[1:0], FLIPSEL (I2C Config Mode)	SEL1, SEL0, FLIP (Pin-Configuration Mode)	Input Pin	Output Pin
000	LLL	SBU1	LnBp
		SBU2	LnBn
001	LLH	SBU1	LnBn
		SBU2	LnBp
010	LHL	SBU1	MIC/GND1
		SBU2	MIC/GND2
011	LHH	SBU1	MIC/GND1
		SBU2	MIC/GND2
100	HLL	SBU1	
		SBU2	
101	HLH	SBU1	
		SBU2	
110	HHL	SBU1	LnAp
		SBU2	LnAn
111	HHH	SBU1	LnAn
		SBU2	LnAp

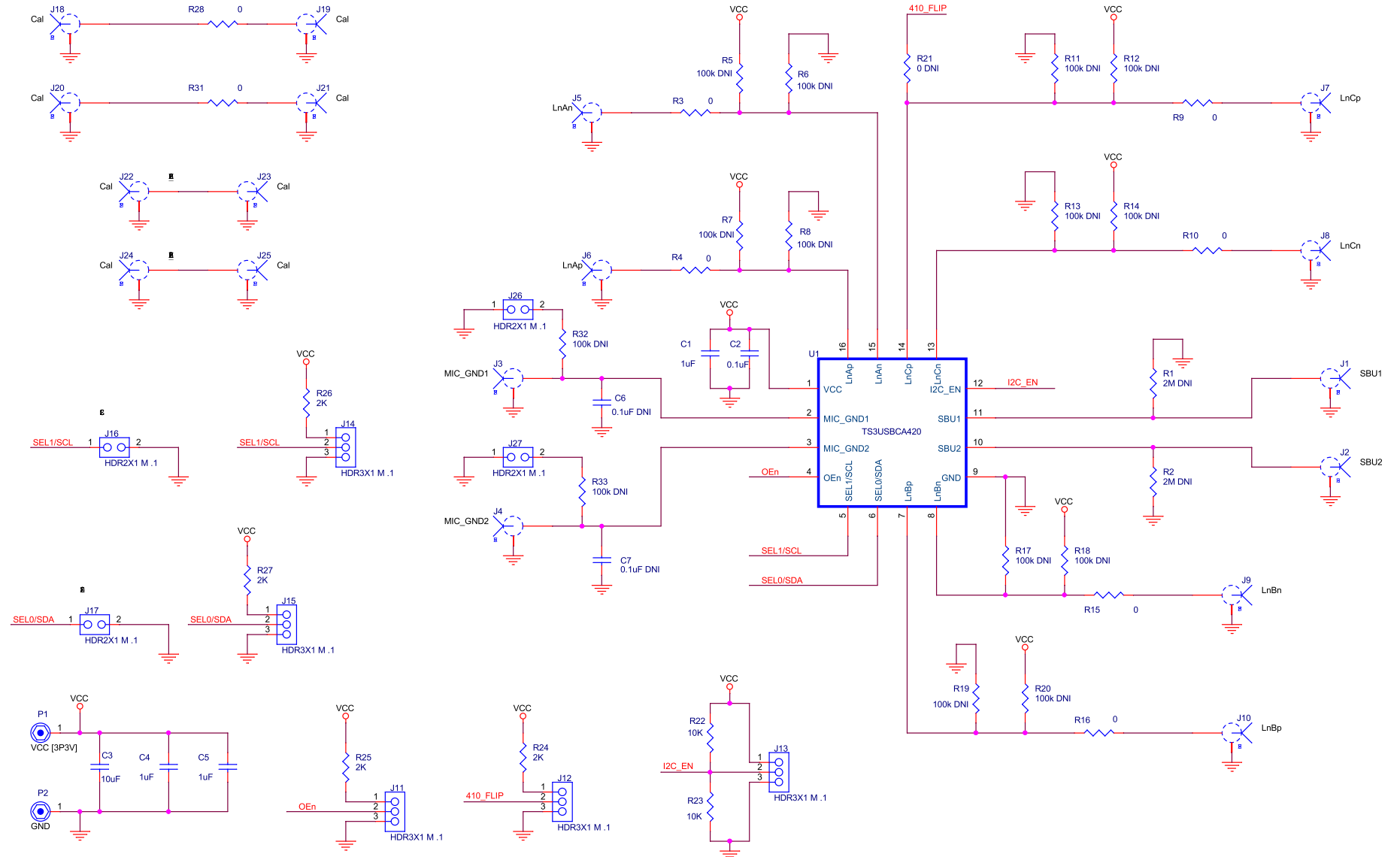
### **2.3 Power**

The EVM is designed to operate from an external 3.3-V power supply using standard banana jack plug cables. VCC should be connected to P1 and GND connected to P2. Refer to datasheet for valid operating voltage ranges supported by the TS3USBCA410.

### **2.4 Calibration Traces**

The TS3USBCA410EVM includes calibration traces equal to the input and output trace lengths to the TS3USBCA410 device on the EVM. Calibration traces are available for SBU1/2 to Lnx pairs as well as MIC to SBU signal pairs.

### 3 TS3USBCA410EVM Schematics



**Figure 3. TS3USBCA410 EVM Schematics**

## 4 Bill of Materials

**Table 3. Bill of Materials**

Item	Quantity	Reference	Description	Manufacturer	Part Number
1	3	C1,C4,C5	1uF	Murata	GRM155R60J105ME19D
2	1	C2	0.1uF	Murata	GRM155R61A104KA01D
3	1	C3	10uF	Murata	GRM188R61C106MA73D
4	0	C6, C7	0.1uF DNI	Murata	GRM033R61A104KE15D
5	18	J1, J2, J3, J4, J5, J6, J7, J8, J9, J10, J18, J19, J20, J21, J22, J23, J24, J25	SMP	Rosenberger	19S101-40ML5
6	5	J11, J12, J13, J14, J15	HDR3X1 M .1	3M	961103-6404-AR
7	4	J16, J17, J26, J27	HDR2X1 M .1	3M	961102-6404-AR
8	1	LB1	THD-47-478-10	Brady	THD-47-478-10
9	2	P1, P2	Banana-Jack	Pomona	3267
10	0	R1, R2	2M DNI	Panasonic Electronic Components	ERJ-1GEJ205C
11	9	R3, R4, R9, R10, R15, R16, R21, R28, R31	0	Panasonic Electronic Components	ERJ-1GN0R00C
12	0	R5, R6, R7, R8, R11, R12, R13, R14, R17, R18, R19, R20, R32, R33	100k DNI	Panasonic Electronic Components	ERJ-1GEF1003C
13	2	R22, R23	10K	Panasonic Electronic Components	ERJ-2GEJ103X
14	4	R24, R25, R26, R27	2K	Panasonic Electronic Components	ERJ-2GEJ202X
15	4	SCRW1, SCRW2, SCRW3, SCRW4	NY PMS 440 005 PH	B & F Fastener	NY PMS 440 005 PH
16	4	SHNT1, SHNT2, SHNT3, SHNT4	QPC02SXGN-RC	Sullins Connector Solutions	QPC02SXGN-RC
17	4	STDOFF1, STDOFF2, STDOFF3, STDOFF4	1902E	Keystone	1902E
18	1	U1	TS3USBCA410	Texas Instruments	TS3USBCA410RSV

### 4.1 Related Documentation

*TS3USBCA4 USB Type-C SBU Multiplexer with MIC/AGND, ([SLLSF73](#))*

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- 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.

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

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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/lstds/ti\\_ja/general/eStore/notice\\_01.page](http://www.tij.co.jp/lstds/ti_ja/general/eStore/notice_01.page)

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2. Use EVMs only after User obtains the license of Test Radio Station as provided in Radio Law of Japan with respect to EVMs, or
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