



ABSTRACT

The TMUXHS222 evaluation module (EVM) can be used to evaluate many high-speed interfaces for data rates up to 3 Gbps, such as USB 2.0 and eUSB2 LS, FS and HS signaling. How to setup and configure the EVM to test functionality and signal integrity is described in this user's guide.

Table of Contents

1 Introduction	2
2 Setup and Configuration	2
2.1 Signal Connection.....	2
2.2 AC Coupling Capacitors.....	3
2.3 Jumper Configuration.....	3
2.4 Power.....	3
2.5 Calibration.....	3
2.6 REACH Compliance.....	3
3 Schematics	4
4 Bill of Materials	5

List of Figures

Figure 1-1. TMUXHS222 Functional Block Diagram.....	2
Figure 2-1. TMUXHS222EVM.....	2
Figure 3-1. TMUXHS222EVM Schematic.....	4

List of Tables

Table 2-1. Mux Configuration Control Logic.....	3
Table 2-2. Component List.....	3
Table 4-1. TMUXHS222EVM BOM.....	5

Trademarks

All trademarks are the property of their respective owners.

1 Introduction

The TMUXHS222 is a high-speed bidirectional passive switch with integrated 2×2 cross-point optimized for USB 2.0 and eUSB2 LS, FS and HS signaling. The TMUXHS222 supports differential and single ended CMOS signaling with a voltage range of -0.3 V to 3.6 V. Figure 1-1 shows that the device provides switching on differential channels between Port A0 and A1 or Port B0 and B1.

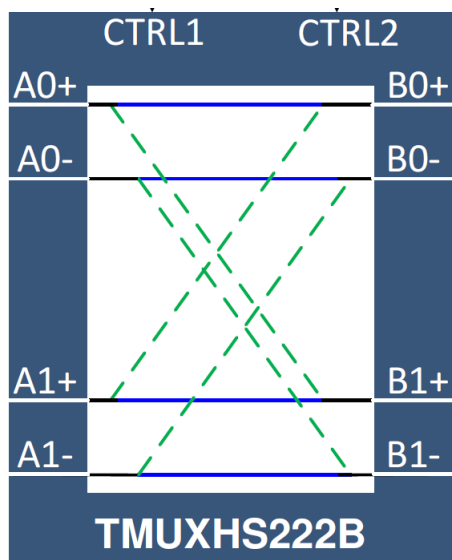


Figure 1-1. TMUXHS222 Functional Block Diagram

2 Setup and Configuration

Figure 2-1 shows a top view photo of the EVM.

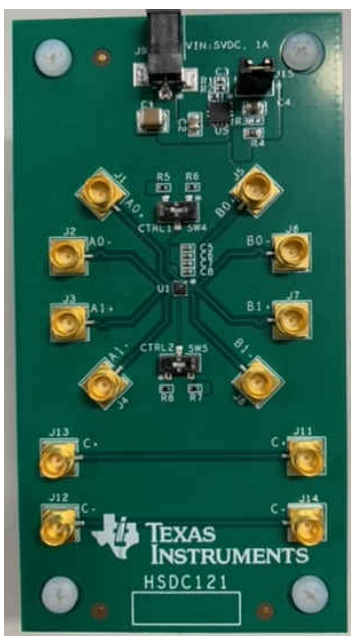


Figure 2-1. TMUXHS222EVM

2.1 Signal Connection

The EVM provides SMP receptacles for the high-speed signal connections. Each SMP receptacle is labeled with the signal's port (A or B), channel (0 or 1), and polarity (+ or -). SMA to SMP cables may be required to connect to test equipment or fixtures. The signal traces are all equal length and have 45 Ω single-ended impedance.

2.2 AC Coupling Capacitors

USB2 is DC coupled, there is no AC capacitors on this EVM.

2.3 Jumper Configuration

The TMUXHS222 function mode is controlled by CTRL1 (SW4) and CTRL2(SW5). [Table 2-1](#) shows the mux configuration control logic.

Table 2-1. Mux Configuration Control Logic

CTRL1 (SW4)	CTRL2 (SW5)	Mux Configuration
L	L	A0 to B1, A1 to B0
H	L	A0 to B0, A1 to B1
*	H	HiZ

2.4 Power

The EVM is designed to operate from an external 5V power supply using DC jack J9, or a 1.8v external power supply can be directly applied to J15. A power supply current limit of 200 mA is more than adequate to power the EVM.

2.5 Calibration

The EVM provides a pair of calibration traces to allow the EVM to be de-embedded from the TMUXHS222 chip during measurement. The calibration traces are length matched to the combined length of the input and output traces to the TMUXHS222.

2.6 REACH Compliance

In compliance with the Article 33 provision of the EU REACH regulation we are notifying you that this EVM includes one or more of the components containing at least one Substance of Very High Concern (SVHC) above 0.1%. These uses from Texas Instruments do not exceed 1 ton per year. [Table 2-2](#) shows the SVHC:

Table 2-2. Component List

Component manufacturer	Component type	Component part number	SVHC Substance	SVHC CAS (when available)
Rosenberger	Connector	19S101-40ML5	Lead	7439-92-1

3 Schematics

Figure 3-1 shows the EVM schematic.

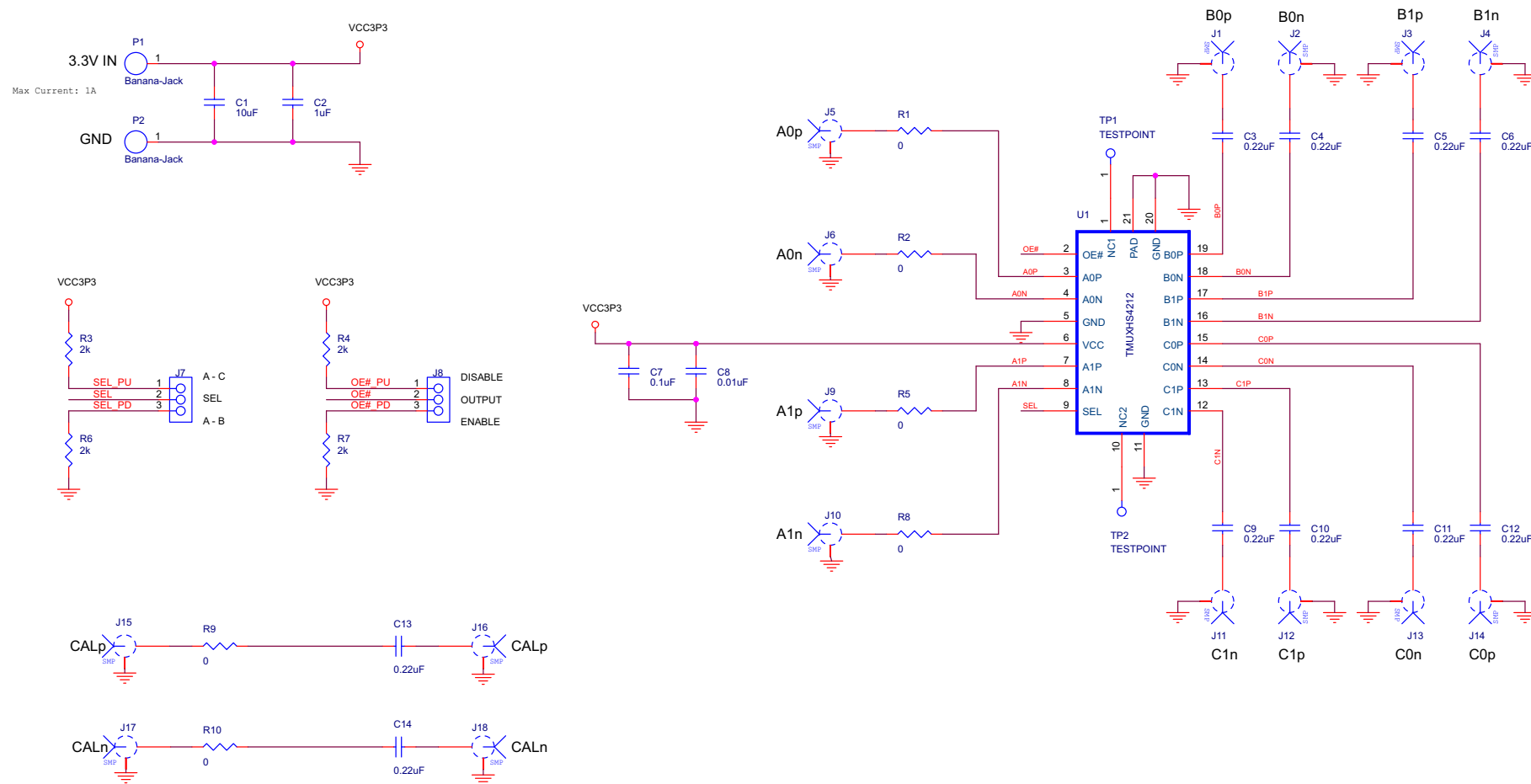


Figure 3-1. TMUXHS222EVM Schematic

4 Bill of Materials

Table 4-1 shows the EVM Bill of Materials.

Table 4-1. TMUXHS222EVM BOM

Item	Quantity	Reference	Value	Manufacturer	Part Number	Footprint
1	1	C1	47 μ F	TDK	C3225X5R1A476M250AC	cap_1210
2	1	C2	1 μ F	KEMET	C0805C105K4RACTU	cap_805
3	3	C3, C7, C8	0.01 μ F	KEMET	C0402C103K3RACTU	cap_402
4	1	C4	10 μ F	KEMET	C0805C106K8PACTU	cap_805
5	2	C5,C6	0.1 μ F	YAGEO	C0402KRX5R6BB104	cap_402
6	12	J1, J2, J3, J4, J5, J6, J7, J8, J11, J12, J13, J14	SMP	Rosenberger	19S101-40ML5	CON_SMVT_19S101-40M L5_R04350
7	1	J15	HDR2X1	Sullins	PEC02SAAN	HDR_THVT_1X2_254_87 1
8	1	J9	DC JACK	CUI	PJ1-022-SMT-TR	JACK_SMRT_PJ1-022- SMT-TR
9	1	PCB1	HSDC121	Any	HSDC121	n/a
10	1	R1	28.0K	Yageo	RC0402FR-0728KL	res_0402
11	1	R2	56.2K	Yageo	RT0402BRD0756K2L	res_0402
12	1	R3	1K-DNI	Yageo	RT0402BRE071KL	res_0402
13	1	R4	0	Yageo	RC0603JR-070RL	res_0603
14	4	R5, R6, R7, R8	10K	Yageo	RT0402BRD0710KL	res_0402
15	4	SCRW1, SCRW2, SCRW3, SCRW4	NY PMS 440 005 PH	B&F Fastener	NY PMS 440 005 PH	screw
16	6	SHNT1, SHNT2, SHNT3, SHNT4, SHNT5, SHNT6	QPC02 SXGN-RC	Sullins	QPC02SXGN-RC	0.1
17	4	STDOFF1, STDOFF2, STDOFF3, STDOFF4	1902E	Keystone	1902E	Standoff
18	2	SW4, SW5	Switch	Nidec Copal	CJS-1201TB	SW_SMVT_CJS-1201B
19	1	U1	TMUXHS222	Texas Instruments	TMUXHS222	RMG0012AA
20	1	U5	TPS73601 DRB	Texas Instruments	TPS73601DRB	DRB0008BA_150x175

IMPORTANT NOTICE AND DISCLAIMER

TI PROVIDES TECHNICAL AND RELIABILITY DATA (INCLUDING DATA SHEETS), DESIGN RESOURCES (INCLUDING REFERENCE DESIGNS), APPLICATION OR OTHER DESIGN ADVICE, WEB TOOLS, SAFETY INFORMATION, AND OTHER RESOURCES "AS IS" AND WITH ALL FAULTS, AND DISCLAIMS ALL WARRANTIES, EXPRESS AND IMPLIED, INCLUDING WITHOUT LIMITATION ANY IMPLIED WARRANTIES OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE OR NON-INFRINGEMENT OF THIRD PARTY INTELLECTUAL PROPERTY RIGHTS.

These resources are intended for skilled developers designing with TI products. You are solely responsible for (1) selecting the appropriate TI products for your application, (2) designing, validating and testing your application, and (3) ensuring your application meets applicable standards, and any other safety, security, regulatory or other requirements.

These resources are subject to change without notice. TI grants you permission to use these resources only for development of an application that uses the TI products described in the resource. Other reproduction and display of these resources is prohibited. No license is granted to any other TI intellectual property right or to any third party intellectual property right. TI disclaims responsibility for, and you will fully indemnify TI and its representatives against, any claims, damages, costs, losses, and liabilities arising out of your use of these resources.

TI's products are provided subject to [TI's Terms of Sale](#) or other applicable terms available either on ti.com or provided in conjunction with such TI products. TI's provision of these resources does not expand or otherwise alter TI's applicable warranties or warranty disclaimers for TI products.

TI objects to and rejects any additional or different terms you may have proposed.

Mailing Address: Texas Instruments, Post Office Box 655303, Dallas, Texas 75265
Copyright © 2022, Texas Instruments Incorporated