

TS3DV642-Q1 12-channel 1:2 MUX/DEMUX with 1.8 V Compatible Control Power-down Mode Evaluation Module User Guide



ABSTRACT

The TS3DV642-Q1 is a 12 channels 1:2 or 2:1 bidirectional multiplexer/demultiplexer. The TS3DV642-Q1 operates from a 2.6 V to 4.5 V supply, making it suitable for battery-powered applications. It offers low and flat on-state resistance (RON) as well as low I/O capacitance which allows it to achieve a typical bandwidth of up to 7.5 GHz. The device provides the high bandwidth necessary for MIPI C-PHY, D-PHY, HDMI and DisplayPort applications. This user guide describes how to setup and configure the EVM to test functionality and signal integrity.

Table of Contents

| | |
|--------------------------------------------------------------------|---|
| 1 Introduction | 2 |
| 2 Setup and Configuration | 3 |
| 2.1 Power..... | 3 |
| 2.2 Jumper Configuration..... | 4 |
| 2.3 Signal Connection..... | 4 |
| 2.4 Optional AC Coupling Capacitors and Termination Resistors..... | 4 |
| 2.5 Calibration Trace..... | 4 |
| 2.6 REACH Compliance..... | 4 |
| 3 Schematic | 5 |
| 4 Bill of Materials | 6 |

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1 Introduction

The TS3DV642-Q1 is a 12 channels 1:2 or 2:1 bidirectional multiplexer/demultiplexer. The TS3DV642-Q1 operates from a 2.6 V to 4.5 V supply, The device provides switching on differential channels between Port DA or Port DB to Port D (see [Figure 1-1](#)).

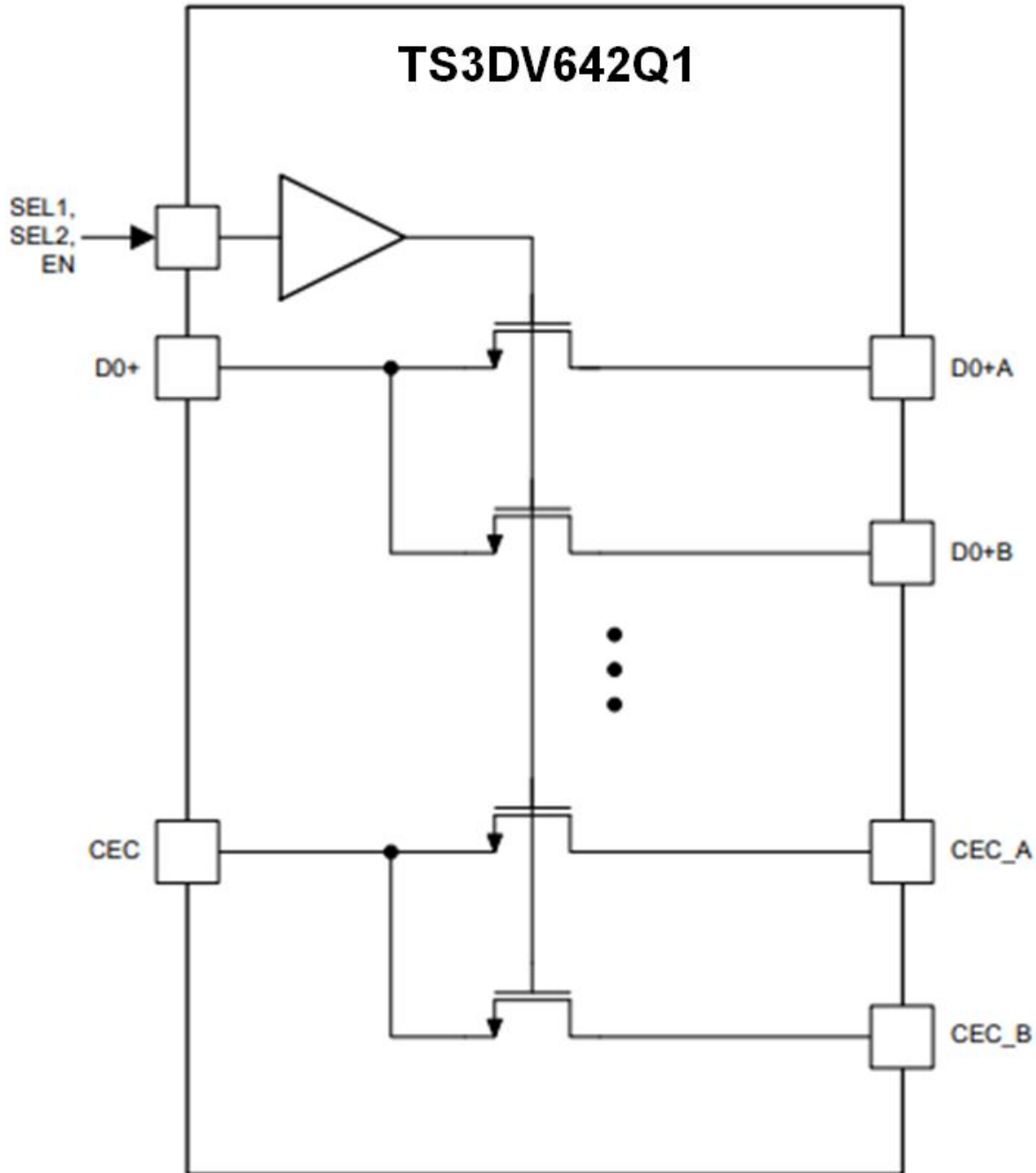


Figure 1-1. TS3DV642-Q1 Functional Block Diagram

2 Setup and Configuration

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

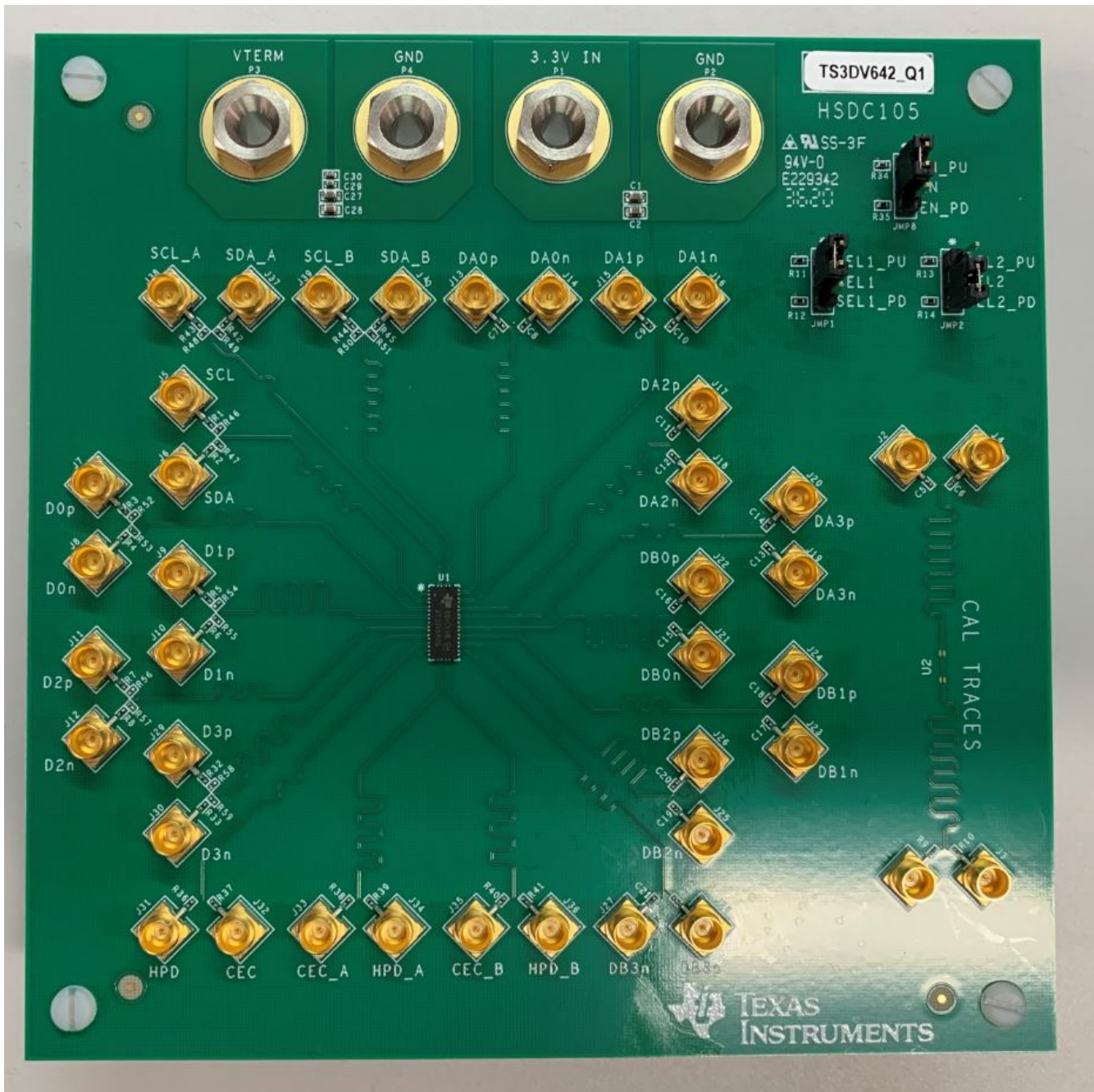


Figure 2-1. TS3DV642-Q1 EVM

2.1 Power

The TS3DV642-Q1 EVM is designed to operate from an external 2.6-4.5 V power supply using standard banana jack plug cables. Terminal P1 should be connected to the supply positive output and P2 to ground. A power supply current limit of 100 mA is more than adequate to power the EVM.

2.2 Jumper Configuration

The TS3DV642-Q1 EVM is controlled by an active-high enable signal and port select signals. Jumper JMP8 (EN) is used to enable or disable the switch. Jumper JMP1 (SEL1) and JMP2 (SEL2) control the port selection: Port D to Port DB, or Port D to Port DA. Both jumpers and their operational positions are labeled with silkscreens on the EVM for ease of use.

| EN | SEL1 | SEL2 | FUNCTION |
|----|------|------|----------------------------------------------------------------------------------------------------------------------|
| L | X | X | Switch disabled. All channel are Hi-Z |
| H | L | L | Channel D0+/D0- to D0+A/D0-A is ON. All the other channels (D1+/D1-, D2+/D2-, D3+/D3-, SCL, SDA, HPD, CEC) are Hi-Z. |
| H | L | H | Channel D0+/D0- to D0+B/D0-B is ON. All the other channels (D1+/D1-, D2+/D2-, D3+/D3-, SCL, SDA, HPD, CEC) are Hi-Z |
| H | H | L | All A channels are enabled. All B channels are Hi-Z. |
| H | H | H | All B channels are enabled. All A channels are Hi-Z. |

2.3 Signal Connection

The EVM provides SMP receptacles for the high-speed signal connections. Each SMP receptacle is labeled with the signal's port (D, DA, or DB), channel (0 or 1), and polarity (P or N). SMA to SMP cables may be required to connect to test equipment or fixtures. The signal traces are all equal length and have 50 Ω single-ended impedance.

2.4 Optional AC Coupling Capacitors and Termination Resistors

Most interfaces require AC coupling between the transmitter and receiver. For example, the DisplayPort specification requires AC coupling capacitors in the range of 75 – 200 nF on the TX. By default, the TS3DV642-Q1 EVM is populated with 0 Ω resistors on the input and output which can be replaced with capacitors if needed.

The TS3DV642-Q1 EVM also includes external termination resistors option on the Port D. When populating the external termination resistors, it is important to provide the external termination through the banana jack plug VTERM and GND. For now, the EVM leaves the external termination resistors to be un-populated.

2.5 Calibration Trace

The TS3DV642-Q1 EVM provides a pair of calibration traces to allow the EVM trace to be de-embedded from the TS3DV642-Q1 during measurement. The calibration traces are length matched to the combined length of the input and output traces to the TS3DV642-Q1. They are also populated with the same capacitors and resistors.

2.6 REACH Compliance

In compliance with the Article 33 provision of the EU REACH regulation we are notifying you that this EVM includes component(s) 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. The SVHC is shown in:

| Component Manufacturer | Component Type | Component Part Number | SVHC Substance | SVHC CAS (when available) |
|------------------------|----------------|-----------------------|----------------|---------------------------|
| Rosenberger | Connector | 19S101-40ML5 | Lead | 7439-92-1 |

3 Schematic

Figure 3-1 shows the TS3DV642-Q1 schematic

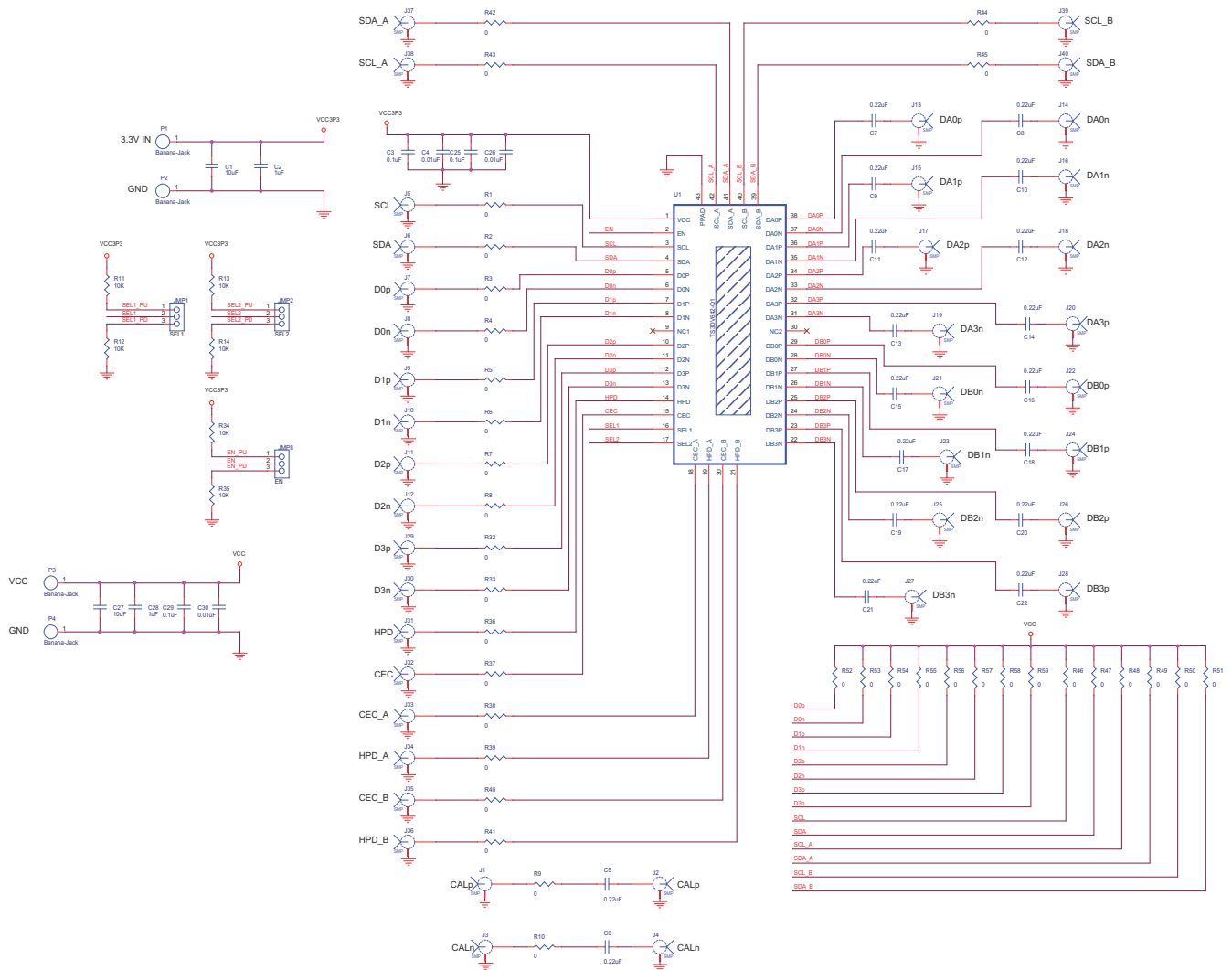


Figure 3-1. TS3DV642-Q1 Schematic

4 Bill of Materials

Table 4-1 shows the TS3DV642-Q1 EVM Bill of Materials

Table 4-1. Bill of Materials

| Item | Quantity | Reference | Value | Manufacturer | Man. Part Number | Footprint |
|------|----------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------|---------------------------------------|-------------------------|--------------------------|
| 1 | 2 | C1,C27 | 10 uF | TDK Corporation | C1608X5R1A106 K080AC | cap_0603 |
| 2 | 2 | C2,C28 | 1 uF | Taiyo Yuden | LMK107B7105KA- T | cap_0603 |
| 3 | 3 | C3,C25,C29 | 0.1 uF | Murata Electronics North America | GRM155R71C104 KA88D | cap_0402 |
| 4 | 3 | C4,C26,C30 | 0.01 uF | Samsung | CL05B103KB5NN NC | cap_0402 |
| 5 | 18 | C5,C6,C7,C8,C9, C10,C11, C12,C13,C14,C15 ,C16,C17, C18,C19,C20,C21 ,C22 | 0.22 uF | Taiyo Yuden | LMK063BJ224MP -F | cap_0201 |
| 6 | 3 | JMP1,JMP2,JMP8 | HDR3X1 M . 1 | AMP | 68000-103HLF | berg1x3tee |
| 7 | 40 | J1,J2,J3,J4,J5,J6, J7,J8, J9,J10,J11,J12,J1 3,J14, J15,J16,J17,J18,J 19,J20, J21,J22,J23,J24,J 25,J26, J27,J28,J29,J30,J 31,J32, J33,J34,J35,J36,J 37,J38, J39,J40 | SMP | Rosenberger | 19S101-40ML5 | SMP |
| 8 | 1 | LB1 | PCB Label 0.650"W x 0.200"H | Brady | THT-46-487-10 | THT-46-487-10 |
| 9 | 1 | PCB1 | | Any | | PCB |
| 10 | 4 | P1,P2,P3,P4 | Banana-Jack | Emerson Network Power | 108-0740-001 | 4mm |
| 11 | 36 | R1,R2,R3,R4,R5, R6,R7,R8, R9,R10,R32,R33, R36,R37, R38,R39,R40,R41 ,R42,R43, R44,R45,R46,R47 ,R48,R49, R50,R51,R52,R53 ,R54,R55, R56,R57,R58,R59 | 0 | Panasonic Electronic Components | ERJ-1GN0R00C | res_0201 |
| 12 | 6 | R11,R12,R13,R14 ,R34,R35 | 10K | Panasonic Electronic Components | ERA-2AED103X | res_0402 |
| 13 | 4 | SCRW1,SCRW2, SCRW3,SCRW4 | NY PMS 440 005 PH | B&F Fastener | NY PMS 440 0050 PH | 4-40 Phillips Panhead |

Table 4-1. Bill of Materials (continued)

| Item | Quantity | Reference | Value | Manufacturer | Man. Part Number | Footprint |
|------|----------|-----------------------------------------|--------------|-------------------|------------------|------------------------|
| 14 | 2 | SHNT1,SHNT2 | QPC02SXGN-RC | Kobiconn | 151-8000-E | 0.1" SP |
| 15 | 4 | STDOFF1,STDOF F2,STDOFF3, STDOFF4 | 1902E | Keystone | 1902E | OD3.96 L7.95 OL7.94 |
| 16 | 1 | U1 | Ts3DV642-Q1 | Texas Instruments | TS3DV642-Q1 | RUA0042A |
| 17 | 1 | U2 | DNI | DNI | DNI | RUA0042A |

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