DS90UB913A-CXEVM & DS90UB914A-CXEVM REV A User's Guide

User's Guide



Literature Number: SNLU135 JUNE 2013



Introduction

1.1 Overview

The Texas Instruments DS90UB913A-CXEVM & DS90UB914A-CXEVM REV A Evaluation Modules (EVM) provides an easy way to evaluate the operation and performance of the DS90UB913AQ / DS90UB914AQ FPD-Link III Serializer/Deserializer.

- (A) The DS90UB913A-CXEVM REV A contains the DS90UB913AQ Evaluation board.
- (B) The DS90UB914A-CXEVM REV A contains the DS90UB914AQ Evaluation board

Other components required: Power supply (5V) and 50 Ω coaxial cable. ^{(1) (2)}



Figure 1-1. DS90UB913A-CXEVM & DS90UB914A-CXEVM pair

Specification for orderable coax cable: (3)

Water Blue, FAKRA Jack to FAKRA Jack Cable, 60inch length, using RG174 Coax cable. EVM boards have SMB connector mounted as shown in Figure 1-1.

⁽³⁾ Not a specific recommendation, for evaluation purpose only.

⁽¹⁾ Coax cable is not provided with the EVM.

⁽²⁾ Boards are configured to transmit power over coax cable, hence connect power to Deserializer board only.





Figure 1-2. DS90UB913A-CXEVM REV A Serializer Board (Default Settings)







1.3 Operation

Make sure S1, S2, JP8, JP13 of Serializer board and S1, S2, JP6, JP12 of Deserializer board are configured as shown in Figure 1-2 and Figure 1-3.

- 1. Connect the DS90UB913AQ and DS90UB914AQ Evaluation boards using a coax cable.
- 2. Connect the 5V power supply to Deserializer board (recommended current limit is 300mA) and apply power as shown in Figure 2-1.
- 3. Look for the LED D2 to light up on the DS90UB914AQ board. If the LED is lit and stable, then the DS90UB914AQ is LOCKED to the FPD-Link III serial stream.

CONGRATULATIONS, you are up and running! If not, continue to the next section...

1.4 Trouble Shooting the EVM setup

- 1. Check power supply polarity!!! Warning: reverse supply polarity can damage the board.
- 2. Check to make sure there is sufficient current (300mA) by checking that the voltage (5V) is correct using DMM.
- 3. Check to make sure there is a FPD-Link III signal by probing on both C16 AND C19 on SER board and C6 AND C7 on DES board.
- 4. Monitor the LOCK signal at pin 4 (pin 3 is GND) of connector JP2 using oscilloscope on DES board. Do not rely on visual inspection of D2 (Lock LED) present on deserializer board.
- 5. With no PCLK input applied on SER board, PCLK output frequency on DES board should be 50MHz for the default settings.

Table 1-1. PCLK output (on DES) without applying PCLK input(on SER)

Mode Selected	PCLK output expected
10 bit mode (default mode)	50MHz
12 bit low frequency mode	25MHz
12 bit high frequency mode	37.5MHz

6. Go back to Figure 1-2 & Figure 1-3 to double check factory settings.



Board Setup Details

This section describes the connectors and jumpers on the board as well as how to properly connect, set up and use the DS90UB913A/914A REV A EVM in detail.

2.1 Power Connections

- 1. Connect an external 5V to pin 1 or 2 of JP5, on Deserializer board. (Refer Figure 2-1)
- 2. Connect ground to pin 3 or 4 of JP5, on Deserializer board. (Refer Figure 2-1)
- 3. Optionally, these boards can be configured for 12V supply via Power Jack, JP11 on both the boards separately. However, this would require U21, TPS65320 to be mounted on Deserializer board, as it is not populated on the EVM.
- 4. Since boards are configured to transmit power over coax cable (PoC), it is not required to connect external power to Serializer, unless PoC is not used.



Figure 2-1. Powering DS90UB913A-CXEVM & DS90UB914A-CXEVM Boards

2.2 FPD-Link III Connection

J1 - is the default SMB connector on both the boards. The FPD-Link III serial stream comes out of J1 on Serializer board as a single ended signal. Connect it to J1 on the Deserializer board. DOUT- on serializer and RIN1- on deserializer are terminated to ground through 47nF capacitor in series with 50 Ω resistance.







2.3 LVCMOS Input Connector Description (On DS90UB913AQ board)

JP1 – GPO0, GPO1, CLK OUT, CLK IN, DIN[11:0], HSYNC, VSYNC, PCLK IN are the input pins for the LVCMOS interface on Serializer board. The even numbered pins are the input signals. All the odd numbered pins are connected to VSS. Refer to Figure 2-3 below.



JP10 and JP1 pins are not connected.

Figure 2-3. Parallel Input Connector on Serializer Board

2.4 LVCMOS Output Connector Description (On DS90UB914AQ board)

JP1 – ROUT[11:0], HSYNC, VSYNC, PCLKO are the pins of output connector for the LVCMOS interface on Deserializer board. The even numbered pins are the output signals. All the odd numbered pins are connected to VSS.

JP8– GPIO0, GPIO1, GPIO2, GPIO3 are the access points for DS90UB914AQ GPIO data. Refer to Figure 2-4 below.



Factory Set Switch Settings and Jumpers Default Configuration

VSS SIGNAL

JP1 and JP7 pins are not connected.

Figure 2-4. Parallel Output Connector on Deserializer Board

2.5 Factory Set Switch Settings and Jumpers Default Configuration

2.5.1 Serializer Board default configuration

S1, S2, JP8 and JP13 of Serializer board are factory configured as shown in Figure 1-2 for plug and play operation.

 The S1 switch is factory set as shown in Figure 2-5. The PDN switch (S1.2) is set HIGH and will turn on the DS90UB913AQ upon power up. This switch is connected to PDB pin of the device. The RES pin (S1.1) is pulled low as recommended by datasheet.





2. The Mode Select switch, S2 is factory set as shown below in Figure 2-6 to use Serializer in PCLK from imager mode. To operate in external oscillator mode, move S2.1 to deselect position and S2.2 to select position ⁽¹⁾. Refer device datasheet for more details on these modes.

⁽¹⁾ A power down and power up sequence through switch S1.2 is required, for the mode change to be effective.





Only one switch is allowed to be in SELECT mode at a time.

Figure 2-6. Switch S2: Default settings on Serializer Board

- 3. S3 is a momentary switch, which is present on the top right corner of the SER board. Press this switch to clear the output of one shot latches for low pulse on GPO0 and GPO1.
- 4. S4 is a momentary switch for Transmitter Power Down.
- 5. On JP8 and JP13, a 2-pin jumper is factory placed as shown in Figure 1-2. This selects power from U4 for 1.8V VDD and from U3 for 3.3V VDDIO respectively.

2.5.2 Deserializer Board default configuration

S1, S2, JP6, JP12 of Deserializer board are factory configured as shown in Figure 1-3 for plug and play operation.

- 1. The S1 switch is factory set as shown below in Figure 2-7.
 - (a) The PDN switch is set high and will turn on the Deserializer upon power up. This switch is connected to PDB pin of the device.
 - (b) The OEN and OSS_SEL switch are set HIGH and will enable outputs to toggle upon power up.
 - (c) The SEL switch is set high to select RIN1+/- input, which feeds serial stream data to the device from coax cable.

Refer Table 2-1 for more details.





Figure 2-7. Switch S1: Default settings on Deserializer Board

Switch reference	Default Setting	Function		
S1.1-PDN	High	High: Deserializer is enabled and is ON. Low: Deserializer is in Sleep (power down mode). In this mode, programmed control register data are NOT retained and reset to default values.		
S1.2-BISTEN	Low	High: BIST Mode Enabled Low: BIST Mode Disabled		
S1.3-OEN	High	Refer table on "Output States" in the device datasheet		
S1.4-OSS SEL	Figh			
S1.5-SEL	High	High: RIN1+/- input is selected as the active channel on the Deserializer. Low: RIN0+/- input is selected as the active channel on the Deserializer.		
S1.6-RES	Low	Percented and must be set Low always		
S1.7-RES	LOW	Reserved and must be set Low always.		

Table 2-1. Switch S1: Deserializer Board



2. The S2 switch is factory set as shown below in Figure 2-8. This will configures the SER/DES link in 10 bit mode.



Only one switch is allowed to be in SELECT mode at a time.

Figure 2-8. Switch S2: Default settings on Deserializer Board

Switch reference	Default Setting	Frequency Range supported	Function
S2.1 - 10 bit mode	Select	20MHz to 100MHz	When SELECTed, configures device in 10 bit mode and hence LVCMOS input DIN10, DIN11 and LVCMOS output ROUT10, ROUT11 can not be used.
S2.2 - 12 bit high frequency mode	Deselect	15MHz to 75MHz	When SELECTed, configures device in 12 bit high frequency mode
S2.3 - 12 bit low frequency mode	Deselect	10MHz to 50MHz	When SELECTed, configures device in 12 bit low frequency mode

Table 2-2. Switch S2: Deserializer Board

- 3. S3 is a momentary switch located at the bottom center of the DES board. Press this switch to clear the output of latches for low pulse on LOCK and PASS.
- 4. S4 is a momentary switch for Receiver Power Down.
- 5. On JP6 and JP12, a 2-pin jumper is factory placed as shown in Figure 1-3. This selects power from U4 and U3 LDOs for 1.8V VDD and 3.3V VDDIO respectively.



Chapter 3 SNLU135–JUNE 2013

Using I2C

3.1 Default Addresses

The default 7-bit I2C address of DS90UB913AQ is set to 0x58 (101 1000) using suitable resistor divider on ID[x] pin. Also, 7-bit I2C address of DS90UB914AQ is set to 0x60 (110 0000) using suitable resistor dividers on pins IDx[0] and IDx[1]. Change resistor R25 on Serializer board and R32, R33 on Deserializer board to change the address of these devices, refer device datasheet for more information.

3.2 SPA Dongle Board (1) (2)

The SPA dongle is required to use interactive GUI over I2C i.e., ALP (Analog LaunchPAD). Download and install ALP from: http://www.ti.com/tool/ALP. Before using ALP for these devices, it is also required to download DS90UB913-914-ALP-PROFILES from the same web page and copy DS90UB913 & DS90UB914 folders to location: Program Files\National Semiconductor Corp\Analog LaunchPAD vx.xx.xxxx\Profiles on your system. The SPA dongle is shown in Figure 3-1 below. It is powered through the USB port of computer and LED

D1 will light up RED when the SPA dongle is connected to a computer to indicate that the board is powered.



Figure 3-1. SPA Dongle

As shown in above Figure 3-1, I2C port of DS90UB913AQ (JP12) or DS90UB914AQ (JP9) evaluation board must be connected to connector, JP8 on SPA dongle.

Refer Figure 1-2 and Figure 1-3 for these connections.

EEPROM Setup of SPA dongle

Once ALP software is running and SPA dongle is connected as stated above, the following steps are required to communicate with a particular device, for e.g., DS90UB913,

1. Under the **Devices** tab, there could be any device name at the place highlighted in RED as shown in Figure 3-2.

⁽¹⁾ Not provided with the EVM

⁽²⁾ Any I2C controller which support clock stretching can be used.







2. To communicate with a particular device, go to Tools > EEPROM Setup.







SPA Dongle Board (5) (6)

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3. Select the current device, which will be highlighted in BLUE as shown in Figure 3-4.

ALP EEPROM Setup				X
EEPROM This dialog provides a method to displa Begin by selecting the device that you Device and Profile Selection	ay and program the contents I want to display or program t	of the ALP identity EEPROM th	nat is present se.	on each attached ALP daughter board.
Select a device	Select a device profile			Connector: Valid Signature:
Revealed ALP Nano USB 1	Name	Short Name	-	I2C Address: Valid Checksum:
	AV5_Demo CP104_Nano DP83640 DP83640_Nano D5100BR210_111 D5100BR210_401 D5100KR800_401 D5100MB203 Module Version Long Name Device GUID	AV5_Demo CP104 - Nano DP83640 DP83640 DS100BR×xx Duals DS100BR410 DS100KR800_401 DS100MB203 MUX		Assigned Serial Number New S/N Board Status Rework Level Operational 00 Board Notes (Max 60 Chars) Image: Comparison of the second s
		Ok		

Figure 3-4. ALP EEPROM Setup Window1

4. Select a device profile, which is DS90UB913 for example and then click on Write EEPROM.



ALP EEPROM Setup				\mathbf{X}			
EEPROM This dialog provides a method to display and program the contents of the ALP identity EEPROM that is present on each attached ALP daughter board. Begin by selecting the device that you want to display or program then select the ALP profile to use.							
Device and Profile Selection				Device Specific EEPROM Details			
Select a device	Select a device profile			Connector: 1 Valid Signature: Yes			
	Name DS64MB201 DS80PCI102 DS80PCI402_800 DS90UB913 DS90UB914 DS90UB914A DS90UB925 Module Version 0000 Long Name FPD-Link III Serializer Device GUID 40668869-8835-477A-913	Short Name D564MB201 - Nano D580PCI102 D580PCI800 D580PCI800 D580PCI800 Setup D590UB913 D590UB914 D590UB914 D590UB925 83-CEE68DD8D677		Assigned Serial Number E77E50C5-A4FD-4644-9E4D-5A980E1E8BFA New S/N Board Status Rework Level Operational 0 Board Notes (Max 60 Chars) View EEPROM Write EEPROM			
		Ok					

Figure 3-5. Selecting Device Profile

5. EEPROM Status will prompt as shown in Figure 3-6, press OK.



Figure 3-6. EEPROM Status

6. ALP EEPROM Setup window will show up with device name **DS90UB913** as highlighted in Figure 3-7. Press **OK**.



SPA Dongle Board ⁽⁹⁾ (10)

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ALP EEPROM Setup				×			
EEPROM This dialog provides a method to display and program the contents of the ALP identity EEPROM that is present on each attached ALP daughter board.							
Device and Profile Selection	u want to display or program t	nen select the ALP profile to u	se.	Device Specific EEPROM Details			
Select a device	Select a device profile			Connector: Valid Signature: I2C Address: Valid Checksum:			
DS90UB913	Name AVS_Demo CP104_Nano DP83640 DP83640_Nano DS100BR210_111 DS100BR410 DS100KR800_401 DS100KR800_401 DS100MB203 Module Version Long Name Device CLUD	Short Name AVS_Demo CP104 - Nano DP83640 DS100BRXXX Duals DS100BR410 DS100KR800_401 DS100MB203 MUX		Assigned Serial Number New S/N Board Status Rework Level Operational 00 Board Notes (Max 60 Chars) Image: Compare the second			
		Ok 🚽					



7. Under the Devices tab click on **DS90UB913** to select the device and open up the device profile and its associated tabs.





Figure 3-8. ALP EEPROM Setup Window3



Chapter 4 SNLU135–JUNE 2013

Additional Features

4.1 Eye Monitor – CMLOUTP/N



Figure 4-1. Top view of CML access points on Deserializer Board

Connector J3 connects CMLOUTP (or TEST+) and J4 connects to CMLOUTN (or TEST-), which are present on left hand side of DS90UB914A-CXEVM board. CMLOUTP/N must be enabled by register, 0x3F[4] = 0, to be able to monitor the FPD-Link III serial stream.

4.2 Differential operation over a pair of Coax cables

For differential operation,

- 1. On DS90UB913A-CXEVM board, change C19 to 0.1uF, remove R80 and mount J3.
- 2. On DS90UB914A-CXEVM board, change C7 to 0.1uF, remove R74 and mount J2.

4.3 Use of optional Rosenberger HSD connector with STP cable

Following changes are required for using an STP cable with the EVM,

- 1. On Serializer board, depopulate C16 and C19 capacitors and populate the C17 and C18, 0.1uF. Also, populate P1 (Rosenberger HSD connector).
- 2. On Deserializer board, depopulate C6 and C7 capacitors and populate the C4 and C5, 0.1uF. Also, populate P1 (Rosenberger HSD connector).
- 3. Set the pin 5 of switch S1 LOW on DES board, to accept input from RIN0+/-.

This configuration will require Serializer and Deserializer both to be powered separately. To enable power over STP there are two options available as shown in Figure 4-2 and Figure 4-3:

- 1. To transmit power over the pair carrying data, mount R30 (0 Ω), R31 (0 Ω), L3 on SER board and R36 (0 Ω), R37 (0 Ω), L1 on DES board. ⁽¹³⁾
- 2. To transmit power over unused pair of STP cable, On SER board,
 - Mount L6 (10uH), L7 (10uH)
 - Put jumpers across pin 1 and pin 2 of jumpers JP2
 - Put jumpers across pin 2 and pin 3 of jumpers JP3
- ⁽¹³⁾ Refer Schematic and BOM section for specification.



- On DES board, • Mount L5 (2.7uH), L6 (2.7uH)
- Put jumpers on JP3 and JP4 to match the polarity of supply (check on pin2 of each header)



Figure 4-2. Power over STP: SER configuration



Figure 4-3. Power over STP: DES configuration

4.4 Optional use of header provided for external Imager and Host

This hardware configuration allows connecting an external imager (OV10630) to DS90UB913AQ Serializer and an external host (PIXCI ECB1-34 Base camera link express card/frame grabber) to DS90UB914AQ Deserializer board. To operate in this configuration, following hardware changes are required:

1. On Serializer board, populate JP10, R67, R68, R69, R70, R72, R73, R75, R76, R77, R78, R79, R81,



Optional use of header provided for external Imager and Host

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R82, R83, R84. It is recommended to remove JP1.

2. On Deserializer board, populate JP7, R70, R71, R72, R73, R75, R76, R77, R78, R79, R80, R81, R82, R84, R85, R86. It is recommended to remove JP1.



Appendix A SNLU135–JUNE 2013

Schematics



A.1 DS90UB913A-CXEVM Serializer Board Schematic

1. DS90UB913AQ Serializer





DS90UB913A-CXEVM Serializer Board Schematic







DS90UB913A-CXEVM Serializer Board Schematic

3. Header Adapter to Imager for Serializer board

Header to External Imager





4. Buck Regulator on Serializer board

TPS65320 20V TO 5V BUCK REGULATOR





A.2 DS90UB914A-CXEVM Deserializer Board Schematic

1. DS90UB914AQ Deserializer





2. Power to Deserializer board





DS90UB914A-CXEVM Deserializer Board Schematic

3. Header Adapter for Deserializer board

Header to External Host



NO-STUFF: JP7, R70-73, R75-82, R84-86

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4. Buck Regulator on Deserializer board

TPS65320 20V TO 5V BUCK REGULATOR







Bill of Materials

B.1 DS90UB913A-CXEVM Serializer Board BOM

Qty.	Reference	Part	PCB footprint	MFR and Part#
18	R21, R47, R67, R68, R69, R70,R72, R73, R75, R76, R77, R78, R79, R81, R82, R83, R84 , R106, R107	0-NO-STUFF	0402	Panasonic ERJ-2GE0R00X, 0.1W
6	R10, R25, R35, R40, R54, R55, R104, R105	0	0402	Panasonic ERJ-2GE0R00X, 0.0 ohm, 0.1W
2	R42, R44	49.9	0402	Panasonic ERJ-2RKF49R9X, 1%, 100ppm, 0.1W
1	R80	50	0402	Panasonic ERJ-2RKF49R9X, 1%, 100ppm, 0.1W
2	R62, R63	100	0402	Panasonic ERJ-2RKF1000X, 100 ohm, 1%, 0.1W
5	R22, R23, R45, R65, R66	330	0402	Panasonic ERJ-2RKF3300X, 330 ohm, 1%, 0.1W, 0402
2	R26, R27	4.7K	0402	Panasonic ERJ-2RKF4701X, 1%, 100ppm, 0.1W
25	R1, R2, R3, R4, R5, R6, R7, R8, R9, R11, R12, R13, R14, R15, R16, R17, R18, R19, R20, R24, R32, R33, R34, R46, R64	10K	0402	10K+-5%, +-200ppm/C, Panasonic, ERJ-2GEJ103X
1	R101	22	0402	Panasonic ERJ-2GEJ220X, 5%
1	R102	22-NO-STUFF	0402	Panasonic ERJ-2GEJ220X, 5%
3	R29, R36, R37	0	0603	Panasonic ERJ-3GEY0R00V, 0ohm, 0603
5	R30, R31, R49, R51, R53, R93, R94	0-NO-STUFF	0603	Panasonic ERJ-3GEY0R00V, 00hm, 0603
2	R28, R71, R80	1K	0603	Panasonic ERJ-3EKF1001V, 1Kohm, 1%, 0603
1	R58	4.53K	0603	Panasonic ERJ-3EKF4531V, 1%, 100ppm, 0.1W
1	R90	5.69K	0603	Panasonic,PAT0603E5691BST1, 0.15W 0.1%
5	R48, R50, R52, R57, R59, R91, R92	10K	0603	Panasonic ERJ-3EKF1002V, 1%, 0.1W, 100ppm
1	R56	16.5K	0603	Panasonic ERJ-3EKF1652V, 1%, 100ppm, 0.1W
2	R86, R88	20K	0603	Panasonic, ERJ-3EKF2002V, 0.1W 1%
1	R89	30K	0603	Panasonic, ERJ-3EKF3002V, 0.1W 1%
1	R87	34K	0603	Panasonic, ERJ-3EKF3402V, 0.1W 1%
1	R85	52.45K	0603	Vishay,PAT0603E5302BST1, 0.15W 0.1%
1	R96	TBD	0603	
1	R39	4.7K	0805	Panasonic ERJ-6GEYJ472V, 5%, 0.125W
1	R38	100K	0805	Panasonic ERJ-6ENF1003V, 0.125W
1	R41	0	2512	Vishay Dale,CRCW25120000Z0EGHP, 1.5W
2	C8, C21	5PF-NO-STUFF	0402	Murata GRM1555C1H5R0CZ01D, 5pF+-0.25pF, 50V, NPO
7	C45, C46	10PF	0402	Murata GRM1555C1H100JZ01D, 10pF, 5%, COG, 50V
1	C59	12PF-NO-STUFF	0402	KEMET,C0402C120J3GACAUTO,CAP CER 25V 5% NP0

Table B-1. DS90UB913A-CXEVM BOM

Table B-1.	DS90UB913A-CXEVM BOM	(continued)
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Qty.	Reference	Part	PCB footprint	MFR and Part#
1	C58	3.9NF	0402	KEMET,C0402C392K4RACTU,CAP CER 3900PF 16V 10% X7R
1	C53	78.13NF	0402	KEMET,C0402C823K4RACTU,CAP CER 0.082UF 16V 10% X7R
24	C1, C3, C4, C6, C7, C10, C13, C23, C30, C32, C34, C36, C37, C39, C47, C48, C49, C50, C51, C54, C101, C102	0.1UF	0402	Murata GRM155R71C104KA88D, 0.1uF, 16V, 10%, X7R
3	C62, C64, C65	0.1UF-NO-STUFF	0402	Murata GRM155R71C104KA88D, 0.1uF, 16V, 10%, X7R
1	C61	NO STUFF	0402	
1	C16, C66	0.1UF 50V	0603	TDK,C1608X7R1H104K080AA,CAP CER 50V 10% X7R
2	C17, C18	NO-STUFF	0603	Murata GRM188R72A104KA35D, 0.1UF, +-10%, 100V, X7R
1	C19	47nF	0603	
4	C26, C27	0.1UF 100V	0603	Murata GRM188R72A104KA35D, 0.1UF, +-10%, 100V, X7R
7	C2, C5, C9, C11, C12, C14, C31	1UF	0603	Murata, GRM188R71E105KA12x, 10%, 25V, -55 to 125C
4	C22, C24, C33, C35	4.7UF	0805	Murata GRM21BR71C475KA73L, 16V, X7R, 10%
8	C20, C25, C29, C38, C40, C43, C63, C103	10UF	0805	Murata GRM21BR61C106KE15L, 10%, 16V, X5R
1	C52	4.7UF	1206	TDK,C3216X7R1H475M160AC,CAP CER 50V 20% X7R
4	C55, C56, C57, C60	22UF	1206	TDK,C3216X5R1E226M160AB,CAP CER 25V 20% X5R
2	C15, C28	22UF	1210	Murata GCM32ER71C226KE19L,10%, 16V, X7R
3	L1, L4, L8	1K@100MHz	0603	Murata, Ferrite Bead, 1K @100MHz, BLM18AG102SN1D
1	L9	2.2UH		CoilCraft, LPS3015-222ML, 2.2UH+-10%
1	L15	2.2UH	1007	Taiyo-Yuden, 2.2uH, 1A, 20%, BRL2518T2R2M
1	L10	5.6UH		CoilCraft, 1008PS-562KL, 5.6UH+-10%
2	L6, L7	10UH-NO-STUFF		CoilCraft, 1008PS-103KL, 10UH+-10%
1	L2	100UH		CoilCraft, MSS7314T-104ML, 100UH+-20%
1	L3	KA4909-NO- STUFF		Coilcraft differential choke KA4909-AL
1	L5	NO-STUFF	Murata_DLW2 1	Murata common mode choke, DLW21SN261XQ2
2	L12, L13	XFL4020-472ME		COILCRAFT,XFL4020-472ME_,Power Inductors
1	X1	100MHz		ECS-3963-1000-BN-TR, 100MHz
1	U1	DS90UB913Q	LLP32	Serializer
1	U2	TPD2E001DRLR	SOT-533	ESD Protection, ARRAY 2CH SOT-5
2	U3,U4	LP38693MP-ADJ	SOT-223	LP38693MP-ADJ, LDO, SOT223-5
1	U5	LM3671MF- 1.8/NOPB		LM3671MF-1.8/NOPB, DC-DC Down converter
1	U6	CY25814-NO- STUFF	SOIC-8	On Semi, P3P25814AG-08SR, SSC Gen, x4
2	U7, U8	NC7SP04P5X	SC70-5	Fairchild Semi, Inverter, NZ7SP04P5X
2	U9, U10	NC7SZ175P6X	SC70-6	Fairhild Semi, latch, NC7SZ175P6X
1	U20	CY2302	SOIC	Cypress
1	U21	TPS65320- NO STUFF		TI, TPS65320QPWPQ1, Step down regulator

Qty.	Reference	Part	PCB footprint	MFR and Part#
1	JP1	HEADER 19X2		TE Connectivity, 0.1 pitch, 2x30 pin header, CUT to FIT, 3-87215-0
6	JP2, JP3, JP6, JP7, JP8, JP9, JP13	HEADER 3		Amp/Tyco, 0.1" pitch
1	JP4	HEADER 4		Molex, 1x4 header pin, 0.1 pitch
1	JP5	HDR_2		1X2 HEADER
1	JP10	HEADER 16X2		Use 2x30 female header, 0.1" pitch, CUT to FIT
1	JP11	RAPC722X	POWER JACK	Johnson end launch, bulkhead, round contact, 142- 0701-871
1	JP12	Header 4x1		Molex, 1x4 header pin, 0.1 pitch
1	J1	SMB	SMB-Board Edge, End Launch	JACK RCPT END LAUNCH RND SMB, J10107-ND
1	J3	NO-STUFF	SMB-Board Edge, End Launch	JACK RCPT END LAUNCH RND SMB, J10107-ND
1	J2	NO-STUFF		Rosenberger FAKRA SMT connector, 59S20X- 40ML5-Y
1	D1	LED-green	0603	Lite On Inc, 0603, Green LED, LTST-C191GKT
1	D2	LED-orange	0603	Lite On Inc, 0603, Orange LED, LTST-C191KFKT
2	D3, D4	LED-RED	0603	Lite On Inc, 0603, Red LED, LTST-C191KRKT
1	D5	LED-red orange	0603	Lite On Inc, 0603, Red Orange LED, LTST- C191KAKT
2	D6, D7	Diode schottky		On Semi, 1.5A 40V SMB, MBRS1540T3GOSTR-ND
1	S1, S2	SW DIP-2		C & T, 204-2ST, 2 Position Dip SW
1	S3, S4	SW-PB		Panasonic EVQ-PNF04M push switch
1	P1	NO STUFF		Rosenberger HSD connector, D4S20D-40ML5-Y
2	TP1, TP2			test point

Table B-1. DS90UB913A-CXEVM BOM (continued)

B.2 DS90UB914A-CXEVM Deserializer Board BOM

Table B-2. DS90UB914A-CXEVM BOM

Qty.	Reference	Part	PCB footprint	MFR and Part#
13	R70, R71, R72, R73, R75, R76, R77, R78, R79, R80, R81, R82, R84, R85, R86	0-NO-STUFF	0402	Panasonic ERJ-2GE0R00X, 0.1W
4	R32, R33, R40	0	0402	Panasonic ERJ-2GE0R00X, 0.0 ohm, 0.1W
2	R48, R49	49.9	0402	Panasonic ERJ-2RKF49R9X, 1%, 100ppm, 0.1W
1	R74	50	0402	Panasonic ERJ-2RKF49R9X, 1%, 100ppm, 0.1W
2	R52, R53	100	0402	Panasonic ERJ-2RKF1000X, 100 ohm, 1%, 0.1W
5	R28, R29, R50, R66, R67	330	0402	Panasonic ERJ-2RKF3300X, 330 ohm, 1%, 0.1W, 0402
1	R45	3K	0402	Panasonic ERJ-2RKF3001X, 6.04K, 1%, 0.1W
2	R35, R43	4.7K	0402	Panasonic ERJ-2RKF4701X, 1%, 100ppm, 0.1W
37	R1, R2, R3, R4, R5, R6, R7, R8, R9, R10, R11, R12, R13, R14, R15, R16, R17, R18, R19, R20, R21, R22, R23, R24, R25, R26, R27, R30, R31, R34, R65	10K	0402	10K+-5%, +-200ppm/C, Panasonic, ERJ-2GEJ103X
8	R36, R37, R38, R41, R42, R68, R69	0	0603	Panasonic ERJ-3GEY0R00V, 0ohm, 0603

Qty.	Reference	Part	PCB footprint	MFR and Part#
2	R55, R57, R58, R97, R99	0-NO-STUFF	0603	Panasonic ERJ-3GEY0R00V, 0ohm, 0603
2	R83, R87	1K	0603	Panasonic ERJ-3EKF1001V, 1Kohm, 1%, 0603
1	R61	4.53K	0603	Panasonic ERJ-3EKF4531V, 1%, 100ppm, 0.1W
1	R106	5.69K	0603	Panasonic,PAT0603E5691BST1, 0.15W 0.1%
7	R51, R54, R56, R60, R62, R96, R98	10K	0603	Panasonic ERJ-3EKF1002V, 1%, 0.1W, 100ppm
1	R59	16.5K	0603	Panasonic ERJ-3EKF1652V, 1%, 100ppm, 0.1W
2	R103, R014	20K	0603	Panasonic,ERJ-3EKF2002V,0.1W 1%
1	R105	30K	0603	Panasonic,ERJ-3EKF3002V,0.1W 1%
1	R102	34K	0603	Panasonic,ERJ-3EKF3402V,0.1W 1%
1	R100	52.45K	0603	Vishay,PAT0603E5302BST1, 0.15W 0.1%
1	R101	NO STUFF	0603	TBD
2	R47, R107	0	0805	PanasonicERJ-6GEY0R00V
1	R46	ЗK	0805	Panasonic ERJ-6ENF3001V, 1%, 0.125W
1	R39	10K	0805	10K+-5%, +-200ppm/C, Panasonic, ERJ-6GEYJ103V
1	R45	11K	0805	Panasonic ERJ-6ENF1102V, 1%, 0.125W
1	R108	0	2512	Vishay Dale,CRCW25120000Z0EGHP, 1.5W
2	C1, C11	5PF-NO-STUFF	0402	Murata GRM1555C1H5R0CZ01D, 5pF+-0.25pF, 50V, NPO
2	C19, C20	10PF-NO- STUFF	0402	Murata GRM1555C1H100JZ01D, 10pF, 5%, COG, 50V
1	C76	12PF-NO- STUFF	0402	KEMET,C0402C120J3GACAUTO,CAP CER 25V 5% NP0
1	C75	3.9NF	0402	KEMET,C0402C392K4RACTU,CAP CER 3900PF 16V 10% X7R
1	C72	78.13NF	0402	KEMET,C0402C823K4RACTU,CAP CER 0.082UF 16V 10% X7R
25	C2, C8, C9, C13, C21, C23, C25, C26, C27, C29, C35, C36, C37, C38, C40, C42, C44, C46, C48, C50, C53, C56, C58, C60, C73	0.1UF	0402	Murata GRM155R71C104KA88D, 0.1uF, 16V, 10%, X7R
3	C67, C68, C71	0.1UF-NO- STUFF	0402	Murata GRM155R71C104KA88D, 0.1uF, 16V, 10%, X7R
1	C74	NO STUFF	0402	TBD
1	C77	0.1UF 50V	0603	TDK,C1608X7R1H104K080AA,CAP CER 50V 10% X7R
2	C4, C5	NO-STUFF	0603	Murata GRM188R72A104KA35D, 0.1UF, +-10%, 100V, X7R
6	C6, C7, C15, C16	0.1UF 100V	0603	Murata GRM188R72A104KA35D, 0.1UF, +-10%, 100V, X7R
11	C39, C41, C43, C45, C47, C49, C51, C54, C57, C59, C61	1UF	0603	Murata, GRM188R71E105KA12x, 10%, 25V, -55 to 125C
4	C3, C14, C22, C24	4.7UF	0805	Murata GRM21BR71C475KA73L, 16V, X7R, 10%
8	C10, C12, C18, C28, C30, C33, C62, C66	10UF	0805	Murata GRM21BR61C106KE15L, 10%, 16V, X5R
1	C63	4.7UF	1206	TDK,C3216X7R1H475M160AC,CAP CER 50V 20% X7R
2	C64, C65	22UF	1206	TDK,C3216X5R1E226M160AB,CAP CER 25V 20% X5R
2	C69, C70	22UF-NO- STUFF	1206	TDK,C3216X5R1E226M160AB,CAP CER 25V 20% X5R
3	C17, C52, C55	22UF	1210	Murata GCM32ER71C226KE19L,10%, 16V, X7R

Table B-2. DS90UB914A-CXEVM BOM (continued)

TEXAS INSTRUMENTS

Table B-2.	DS90UB914A-CXEVM	BOM (continued)
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Qty.	Reference	Part	PCB footprint	MFR and Part#
1	L1	KA4909-NO- STUFF		Coilcraft differential choke KA4909-AL
1	L2	100UH		CoilCraft, MSS7314T-104ML, 100UH+-20%
2	L3, L8	1K@100MHz	0603	Murata, Ferrite Bead, 1K @100MHz, BLM18AG102SN1D
1	L4	NO-STUFF	Murata_DLW21	Murata common mode choke, DLW21SN261XQ2
3	L5, L6	10UH-NO- STUFF		CoilCraft, 1008PS-103KL, 10UH+-10%
1	L7	2.2UH	1007	Taiyo-Yuden, 2.2uH, 1A, 20%, BRL2518T2R2M
1	L9	5.6UH		CoilCraft, 1008PS-562KL, 5.6UH+-10%
2	L12, L13	XFL4020- 472ME		COILCRAFT,XFL4020-472ME_,Power Inductors
1	U1	DS90UB914Q	LLP48	TI, Deserializer
1	U2	ESD Protection	SOT-533	Digikey# 296-21883-1-ND
2	U3, U4	LP38693MP- ADJ	SOT-223	LP38693MP-ADJ, LDO, SOT223-5
1	U5	LM3671MF- 1.8/NOPB	TLA05CBA	LM3671MF-1.8/NOPB, DC-DC Down converter
2	U6, U8	NC7SP04P5X	SC70-5	Fairchild Semi, Inverter, NZ7SP04P5X
2	U7, U9	NC7SZ175P6X	SC70-6	Fairhild Semi, latch, NC7SZ175P6X
1	U21	TPS65320- NO STUFF		TI, TPS65320QPWPQ1, Step down regulator
2	JP1	HEADER 15X2		CONN HEADER VERT DUAL 40POS GOLD
1	JP2	HEADER 2X2		Use CUT and FIT from JP1
3	JP3, JP4, JP6, JP12	HEADER 3		Amp/Tyco, 0.1" pitch
1	JP5	HEADER 4		Molex, 1x4 header pin, 0.1 pitch
1	JP7	2X16 HEADER MALE		CONN HEADER VERT DUAL 40POS GOLD
1	JP8	Header 2x4		Use CUT-n-FIT remaining from JP1
1	JP9	Header 4x1		Molex, 1x4 header pin, 0.1 pitch
1	JP11	RAPC722X	POWER JACK	Johnson end launch, bulkhead, round contact, 142- 0701-871
1	J1	SMB	SMB-Board Edge, End Launch	JACK RCPT END LAUNCH RND SMB, J10107-ND
3	J2, J3, J4	NO-STUFF	SMB-Board Edge, End Launch	JACK RCPT END LAUNCH RND SMB, J10107-ND
1	J5	NO-STUFF		Rosenberger FAKRA SMT connector, 59S20X-40ML5- Y
1	J6	Mini USB CONN		UX60-MB-5ST, CONN RECEPT MINI USB2.0 5POS
1	D1	LED-green	0603	Lite On Inc, 0603, Green LED, LTST-C191GKT
1	D2	LED-orange	0603	Lite On Inc, 0603, Orange LED, LTST-C191KFKT
2	D3, D4	LED-RED	0603	Lite On Inc, 0603, Red LED, LTST-C191KRKT
1	D5	LED-red orange	0603	Lite On Inc, 0603, Red Orange LED, LTST-C191KAKT
2	D6, D7	Diode schottky		On Semi, 1.5A 40V SMB, MBRS1540T3GOSTR-ND
2	TP1, TP2			test point
1	S1	DIP Switch-7		Grayhill Inc, 78B07ST, SWITCH DIP EXTENDED SEALED 7POS
1	S2	DIP Switch-3		Grayhill Inc, 78B03ST, SWITCH DIP EXTENDED SEALED 3POS
1	S3, S4	SW-PB		Panasonic EVQ-PNF04M push switch



Qty.	Reference	Part	PCB footprint	MFR and Part#
1	P1	NO STUFF		Rosenberger HSD connector, D4S20D-40ML5-Y

Table B-2. DS90UB914A-CXEVM BOM (continued)

EVALUATION BOARD/KIT/MODULE (EVM) ADDITIONAL TERMS

Texas Instruments (TI) provides the enclosed Evaluation Board/Kit/Module (EVM) under the following conditions:

The user assumes all responsibility and liability for proper and safe handling of the goods. Further, the user indemnifies TI from all claims arising from the handling or use of the goods.

Should this evaluation board/kit not meet the specifications indicated in the User's Guide, the board/kit may be returned within 30 days from the date of delivery for a full refund. THE FOREGOING LIMITED WARRANTY IS THE EXCLUSIVE WARRANTY MADE BY SELLER TO BUYER AND IS IN LIEU OF ALL OTHER WARRANTIES, EXPRESSED, IMPLIED, OR STATUTORY, INCLUDING ANY WARRANTY OF MERCHANTABILITY OR FITNESS FOR ANY PARTICULAR PURPOSE. EXCEPT TO THE EXTENT OF THE INDEMNITY SET FORTH ABOVE, NEITHER PARTY SHALL BE LIABLE TO THE OTHER FOR ANY INDIRECT, SPECIAL, INCIDENTAL, OR CONSEQUENTIAL DAMAGES.

Please read the User's Guide and, specifically, the Warnings and Restrictions notice in the User's Guide prior to handling the product. This notice contains important safety information about temperatures and voltages. For additional information on TI's environmental and/or safety programs, please visit www.ti.com/esh or contact TI.

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REGULATORY COMPLIANCE INFORMATION

As noted in the EVM User's Guide and/or EVM itself, this EVM and/or accompanying hardware may or may not be subject to the Federal Communications Commission (FCC) and Industry Canada (IC) rules.

For EVMs **not** subject to the above rules, this evaluation board/kit/module is intended for use for ENGINEERING DEVELOPMENT, DEMONSTRATION OR EVALUATION PURPOSES ONLY and is not considered by TI to be a finished end product fit for general consumer use. It generates, uses, and can radiate radio frequency energy and has not been tested for compliance with the limits of computing devices pursuant to part 15 of FCC or ICES-003 rules, which are designed to provide reasonable protection against radio frequency interference. Operation of the equipment may cause interference with radio communications, in which case the user at his own expense will be required to take whatever measures may be required to correct this interference.

General Statement for EVMs including a radio

User Power/Frequency Use Obligations: This radio is intended for development/professional use only in legally allocated frequency and power limits. Any use of radio frequencies and/or power availability of this EVM and its development application(s) must comply with local laws governing radio spectrum allocation and power limits for this evaluation module. It is the user's sole responsibility to only operate this radio in legally acceptable frequency space and within legally mandated power limitations. Any exceptions to this are strictly prohibited and unauthorized by Texas Instruments unless user has obtained appropriate experimental/development licenses from local regulatory authorities, which is responsibility of user including its acceptable authorization.

For EVMs annotated as FCC – FEDERAL COMMUNICATIONS COMMISSION Part 15 Compliant

Caution

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.

FCC Interference Statement for Class A EVM devices

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

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.

For EVMs annotated as IC – INDUSTRY CANADA Compliant

This Class A or B digital apparatus complies with Canadian ICES-003.

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

Concerning EVMs including radio transmitters

This device complies with Industry Canada licence-exempt RSS standard(s). 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.

Concerning EVMs including detachable antennas

Under Industry Canada regulations, this radio transmitter may only operate using an antenna of a type and maximum (or lesser) gain approved for the transmitter by Industry Canada. To reduce potential radio interference to other users, the antenna type and its gain should be so chosen that the equivalent isotropically radiated power (e.i.r.p.) is not more than that necessary for successful communication.

This radio transmitter has been approved by Industry Canada to operate with the antenna types listed in the user guide with the maximum permissible gain and required antenna impedance for each antenna type indicated. Antenna types not included in this list, having a gain greater than the maximum gain indicated for that type, are strictly prohibited for use with this device.

Cet appareil numérique de la classe A ou B est conforme à la norme NMB-003 du Canada.

Les changements ou les modifications pas expressément approuvés par la partie responsable de la conformité ont pu vider l'autorité de l'utilisateur pour actionner l'équipement.

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.

Concernant les EVMs avec antennes détachables

Conformément à la réglementation d'Industrie Canada, le présent émetteur radio peut fonctionner avec une antenne d'un type et d'un gain maximal (ou inférieur) approuvé pour l'émetteur par Industrie Canada. Dans le but de réduire les risques de brouillage radioélectrique à l'intention des autres utilisateurs, il faut choisir le type d'antenne et son gain de sorte que la puissance isotrope rayonnée équivalente (p.i.r.e.) ne dépasse pas l'intensité nécessaire à l'établissement d'une communication satisfaisante.

Le présent émetteur radio a été approuvé par Industrie Canada pour fonctionner avec les types d'antenne énumérés dans le manuel d'usage et ayant un gain admissible maximal et l'impédance requise pour chaque type d'antenne. Les types d'antenne non inclus dans cette liste, ou dont le gain est supérieur au gain maximal indiqué, sont strictement interdits pour l'exploitation de l'émetteur.

[Important Notice for Users of this Product in Japan]

This development kit is NOT certified as Confirming to Technical Regulations of Radio Law of Japan

If you use this product in Japan, you are required by Radio Law of Japan to follow the instructions below with respect to this product:

- Use this product in a shielded room or any other test facility as defined in the notification #173 issued by Ministry of Internal Affairs and Communications on March 28, 2006, based on Sub-section 1.1 of Article 6 of the Ministry's Rule for Enforcement of Radio Law of Japan,
- 2. Use this product only after you obtained the license of Test Radio Station as provided in Radio Law of Japan with respect to this product, or
- 3. Use of this product only after you obtained the Technical Regulations Conformity Certification as provided in Radio Law of Japan with respect to this product. Also, please do not transfer this product, unless you give the same notice above to the transferee. Please note that if you could not follow the instructions above, you will be subject to penalties of Radio Law of Japan.

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EVALUATION BOARD/KIT/MODULE (EVM) WARNINGS, RESTRICTIONS AND DISCLAIMERS

For Feasibility Evaluation Only, in Laboratory/Development Environments. Unless otherwise indicated, this EVM is not a finished electrical equipment and not intended for consumer use. It is intended solely for use for preliminary feasibility evaluation in laboratory/development environments by technically qualified electronics experts who are familiar with the dangers and application risks associated with handling electrical mechanical components, systems and subsystems. It should not be used as all or part of a finished end product.

Your Sole Responsibility and Risk. You acknowledge, represent and agree that:

- 1. You have unique knowledge concerning Federal, State and local regulatory requirements (including but not limited to Food and Drug Administration regulations, if applicable) which relate to your products and which relate to your use (and/or that of your employees, affiliates, contractors or designees) of the EVM for evaluation, testing and other purposes.
- 2. You have full and exclusive responsibility to assure the safety and compliance of your products with all such laws and other applicable regulatory requirements, and also to assure the safety of any activities to be conducted by you and/or your employees, affiliates, contractors or designees, using the EVM. Further, you are responsible to assure that any interfaces (electronic and/or mechanical) between the EVM and any human body are designed with suitable isolation and means to safely limit accessible leakage currents to minimize the risk of electrical shock hazard.
- 3. You will employ reasonable safeguards to ensure that your use of the EVM will not result in any property damage, injury or death, even if the EVM should fail to perform as described or expected.
- 4. You will take care of proper disposal and recycling of the EVM's electronic components and packing materials.

Certain Instructions. It is important to operate this EVM within TI's recommended specifications and environmental considerations per the user guidelines. Exceeding the specified EVM ratings (including but not limited to input and output voltage, current, power, and environmental ranges) may cause property damage, personal injury or death. If there are questions concerning these ratings please contact a TI field representative prior to connecting interface electronics including input power and intended loads. Any loads applied outside of the specified output range may result in unintended and/or inaccurate operation and/or possible permanent damage to the EVM and/or interface electronics. 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 60°C as long as the input and output are maintained at a normal ambient operating temperature. These components include but are not limited to linear regulators, switching transistors, pass transistors, and current sense resistors which can be identified using the EVM schematic located in the EVM User's Guide. When placing measurement probes near these devices during normal operation, please be aware that these devices may be very warm to the touch. As with all electronic evaluation tools, only qualified personnel knowledgeable in electronic measurement and diagnostics normally found in development environments should use these EVMs.

Agreement to Defend, Indemnify and Hold Harmless. You agree to defend, indemnify and hold TI, its licensors and their representatives harmless from and against any and all claims, damages, losses, expenses, costs and liabilities (collectively, "Claims") arising out of or in connection with any use of the EVM that is not in accordance with the terms of the agreement. This obligation shall apply whether Claims arise under law of tort or contract or any other legal theory, and even if the EVM fails to perform as described or expected.

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