EVM User's Guide: AWR2188EVM

AWR2188EVM User Guide

Description

The AWR2188EVM is a high performance front end mmWave sensing device that implements a 2-device, cascaded, array of AWR2188 mmWave sensors. In this cascaded radar configuration, a primary device distributes a 20GHz LO signal between both devices, allowing these two devices to operate as a single RF transceiver. This enables support for up to 16 TX and 16 RX antenna elements, giving a total number of 256 virtual channels in the MIMO virtual array. In TX beam-forming, beam-steering and MIMO/SIMO use-cases the larger number of antenna elements allows for higher SNR and higher angular resolution compared to a single-device system.

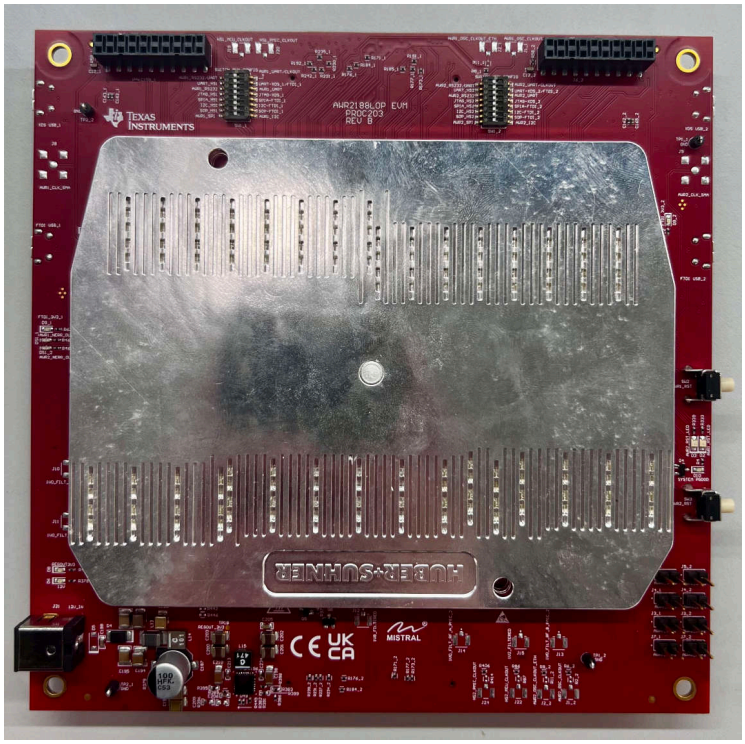
The AWR2188EVM interfaces to a companion TI DCA2000EVM capture board that is responsible for controlling the mmWave devices and receiving captured IF ADC samples. The DCA2000EVM includes SSD storage for supporting longer term data capture scenarios and 1Gb Ethernet connectivity for control and offloading captured data to a host PC.

Features

- 2x Cascaded AWR2188 76-81GHz Radar SoC with integrated VCO, LO distribution, PA, LNA, ADC, 8TX and 8RX, ARM Cortex R5F and M4 controllers
- Huber+Suhner 16x16 3D Waveguide Antenna with 15dBi gain @ 81GHz
- CSI2.0 @ 824Mbps/lane for 6.6Gbps ADC IF data per device
- On-board FTDI and XDS110 for SPI, JTAG, I2C UART, and GPIO
- 10x on-board INA228 current sensors for power measurement
- On-board TMP112 temperature sensor
- ASIL-B capable LP8772x-Q1 PMIC

Applications

- Imaging Radar
- Long Range Radar
- Satellite Radar
- Medium or Short Range Radar



1 Evaluation Module Overview

1.1 Introduction

The AWR2188EVM is an easy-to-use evaluation board for the AWR2188 mmWave sensing device with direct connectivity to the DCA2000EVM. Included is a 16x16 3D waveguide antenna enabling a 256 channel virtual array for increased range and resolution. In conjunction with the DCA2000EVM capture card and TI's mmWave Studio IDE, the AWR2188EVM contains everything needed to for easy evaluation of the next generation of high performance front end sensors.

Note

The AWR2188EVM is designed to be mounted to the companion DCA2000EVM host/capture board. The combination AWR2188EVM + DCA2000EVM is controlled vai a host PC over Ethernet and USB interfaces using TI's mmWave Studio IDE.

For more information on assembling, powering, and configuring the two-board AWR2188EVM + DCA2000EVM system, please refer to the DCA2000EVM User Guide.

1.2 Kit Contents

The AWR2188EVM includes the following:

- AWR2188EVM
- Huber+Suhner 3D waveguide antenna
- 2x Micro USB cable
- Quick Start Guide
- Warranty card (disclaimer sheet)
- Mounting hardware

1.3 Specifications

The AWR2188 is an FMCW transceiver with the following key specifications.

Table 1-1. Key System Specifications

Parameter	Specification
FMCW Transceiver	Integrated PLL, transmitter, receiver, baseband, and ADC
Bandwidth	76-81GHz operation with up to 4.5GHz continuous chirp bandwidth
Number of Transmitters (per device)	8
Number of Receivers(per device)	8
TX Power	13.5dBm
Noise Figure	11dB
Phase noise @ 1MHz	-96dBc/Hz (76GHz to 81GHz)

1.4 Device Information

The AWR2188 device is an integrated FMCW transceiver capable of operation in the 76GHz to 81GHz band. The device enables unprecedented levels of integration in an extremely small form factor.

The AWR2188 device is a self-contained FMCW transceiver single-chip device that simplifies the implementation of Automotive Radar sensors in the band of 76GHz to 81GHz. The device is built on TI’s low-power 45nm RFCMOS process, which enables a monolithic implementation of a 8TX, 8RX system with built-in PLL and ADC converters. Simple programming model changes can enable a wide variety of sensor implementation (Short, Mid, Long) with the possibility of dynamic reconfiguration for implementing a multimode sensor. Additionally, the device is provided as a complete platform device including reference hardware design, software drivers, sample configurations, API guide, and user documentation.

2 Hardware

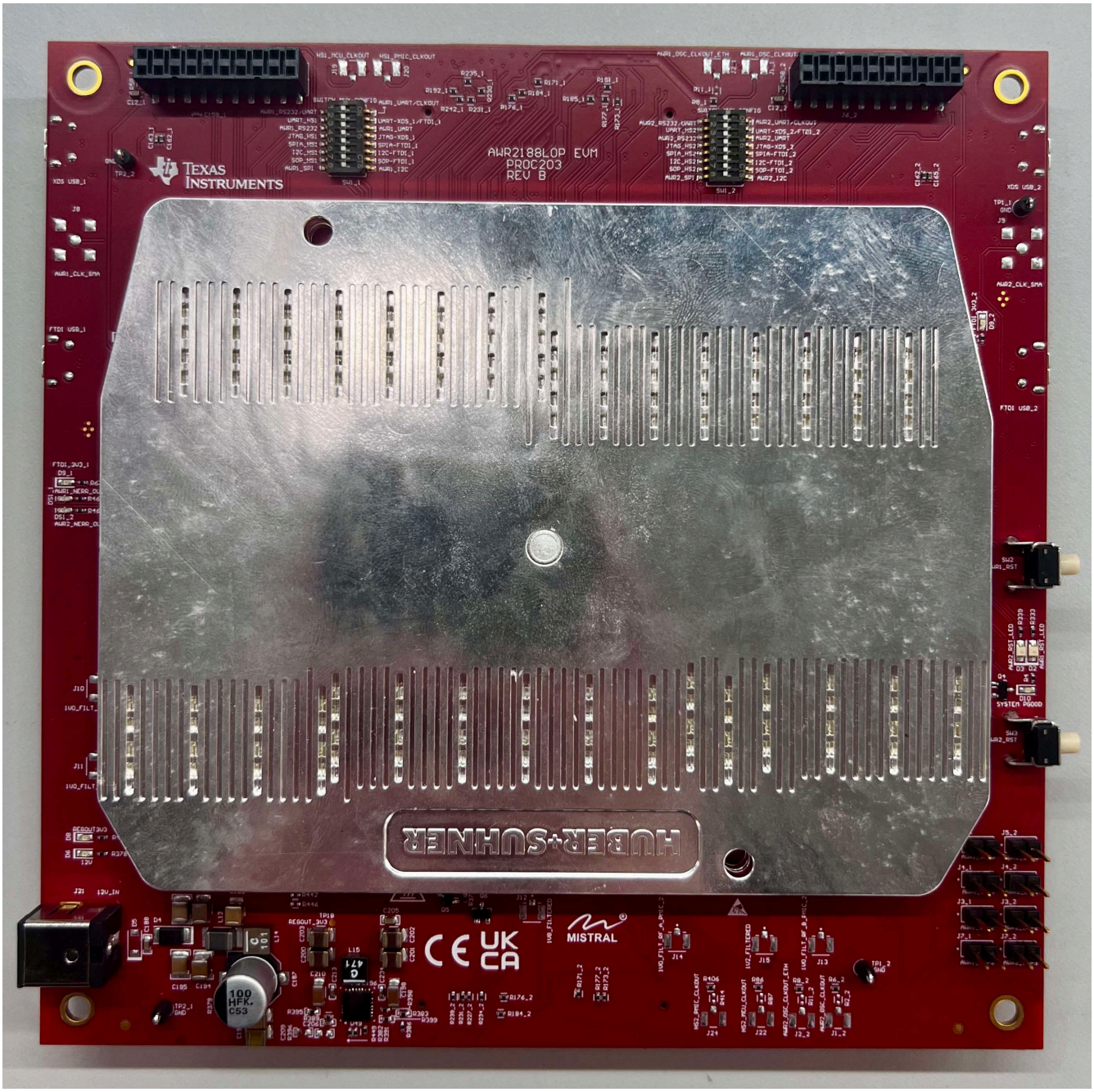


Figure 2-1. Board Top Side

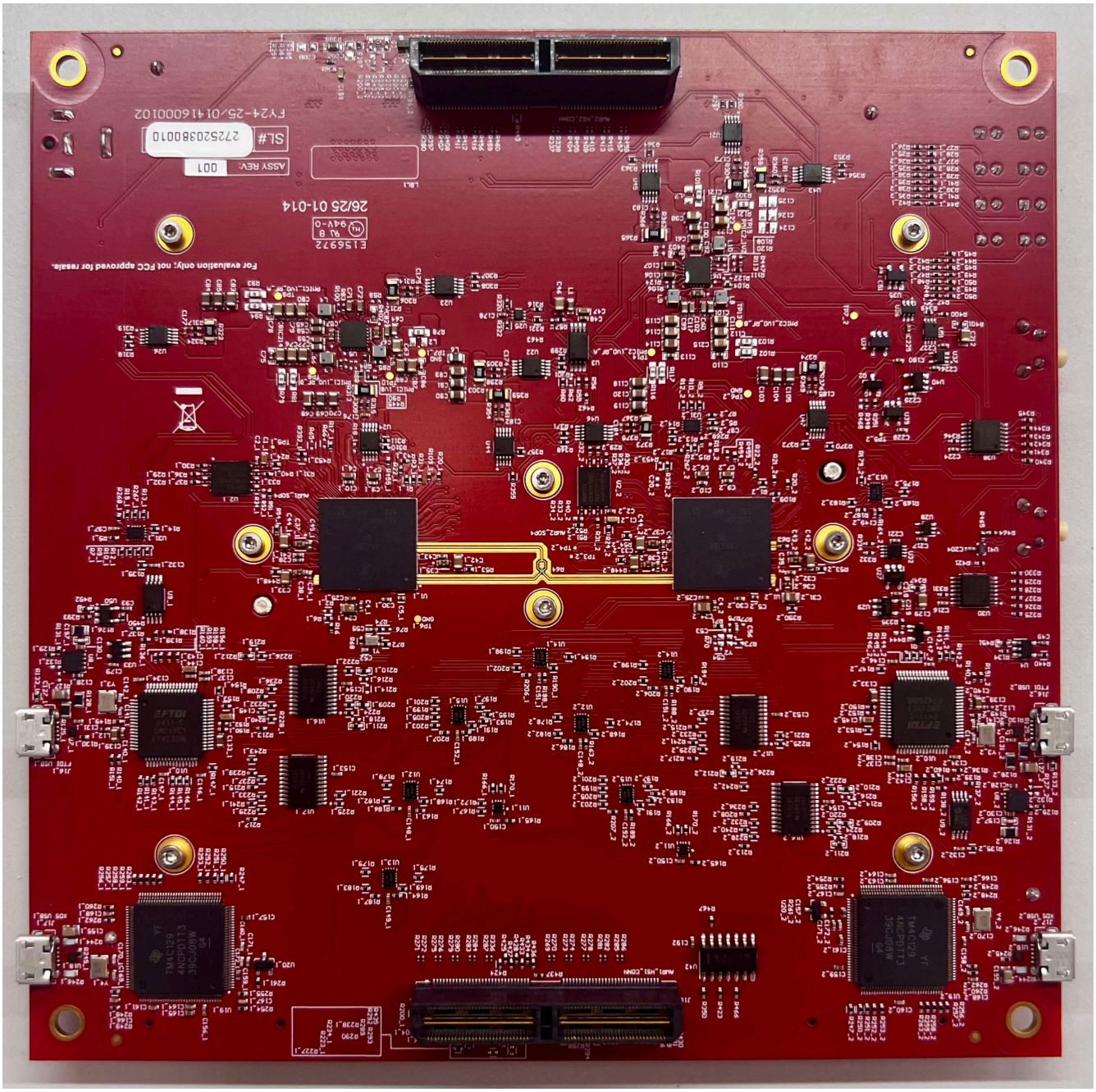


Figure 2-2. Board Bottom Side

2.1 Block Diagram

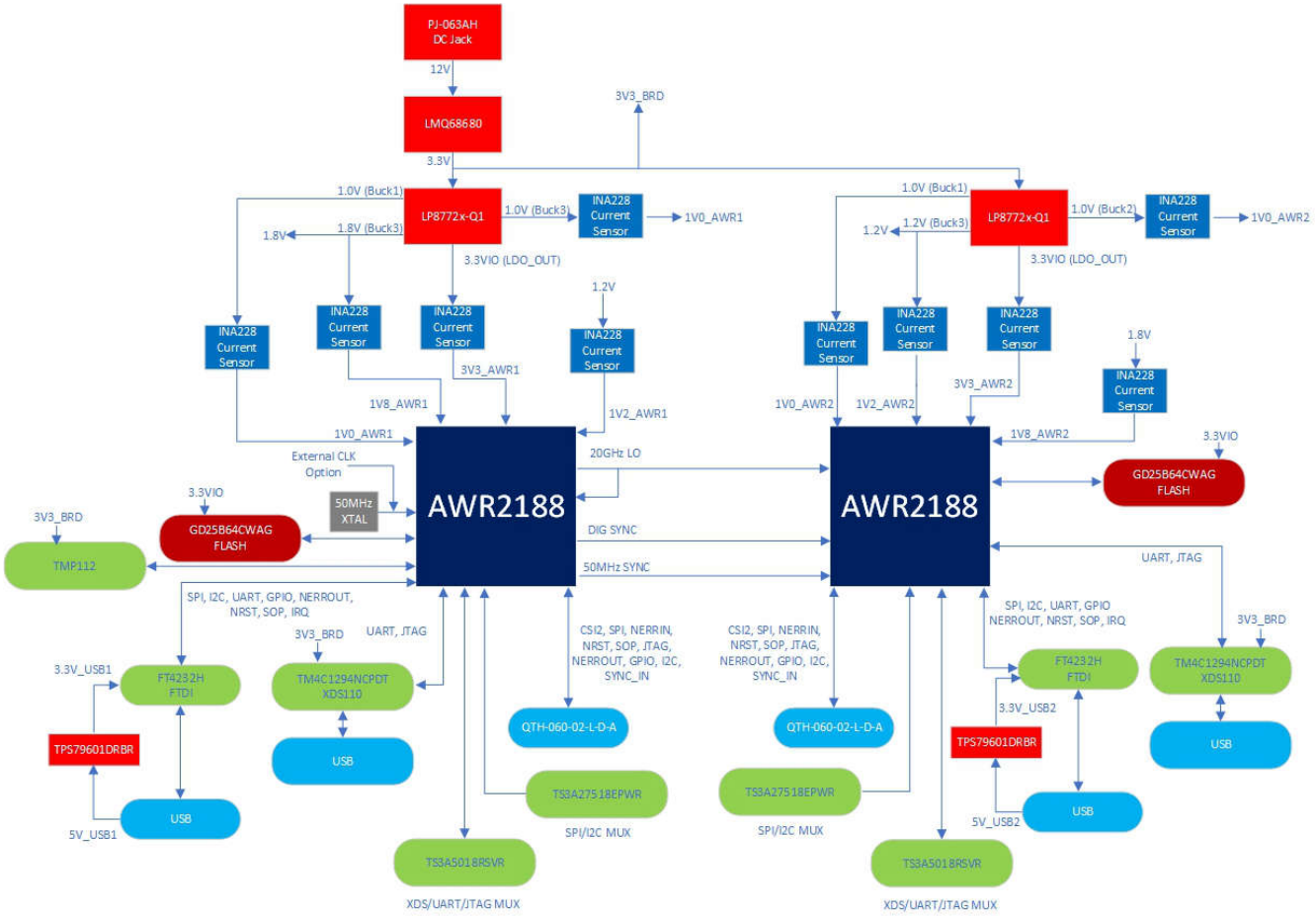


Figure 2-3. Block Diagram

2.2 PCB Handling Recommendations

This EVM contains components that can potentially be damaged by electrostatic discharge. Always transport and store the EVM in the supplied ESD bag when not in use. Handle using an antistatic wristband. Operate on an antistatic work surface. For more information on proper handling, refer to SSYA010A.

2.3 Power Connections

The AWR2188EVM is powered by the 12-V power jack (>2.5-A current capability). When power is provided the 12V, REGOUT_3V3, and SYS_PGOOD LEDs glow, indicating that the board is powered up.

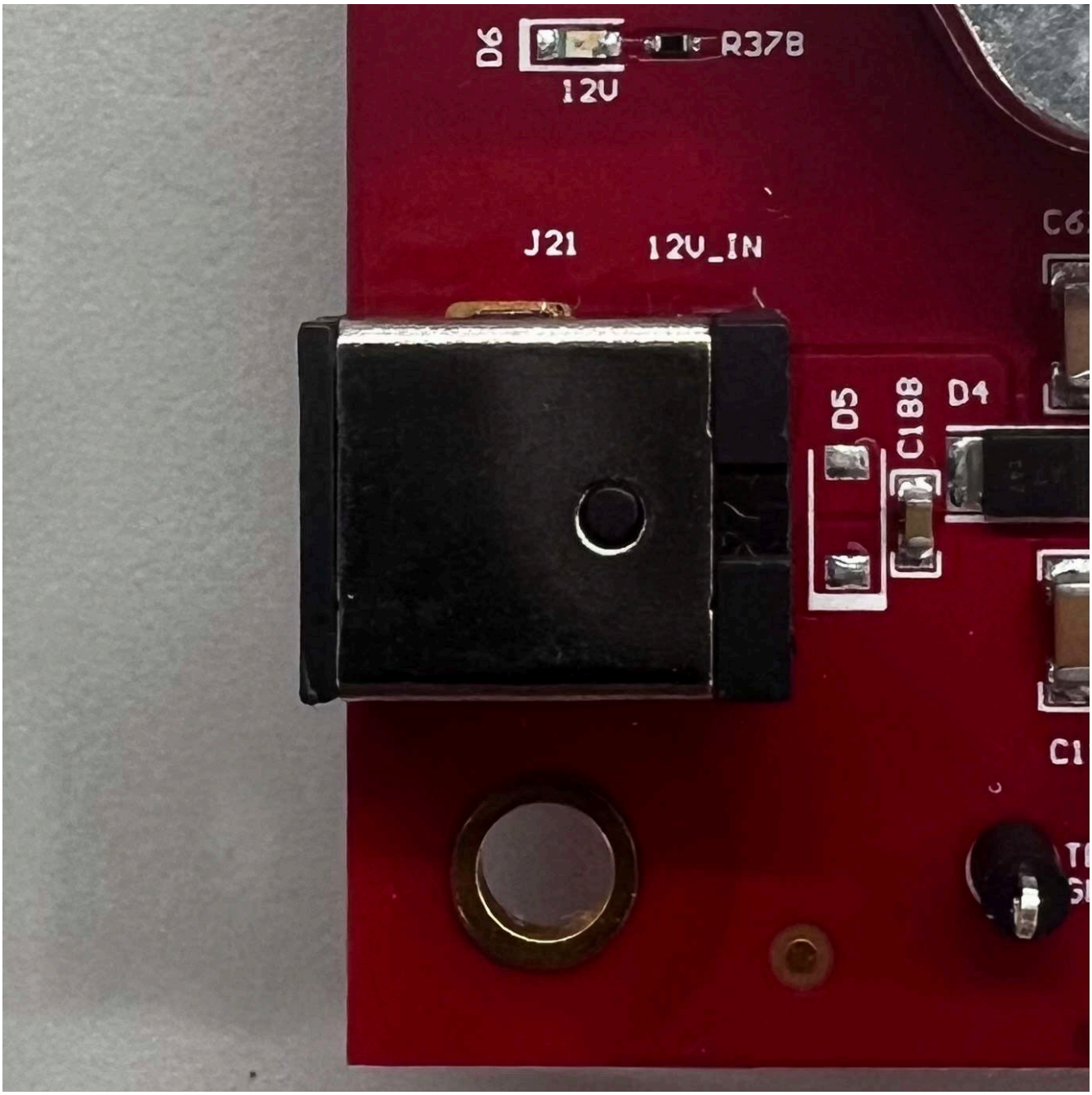


Figure 2-4. Power Connector (J21)

Note

After the 12-V power supply is provided to the EVM, TI recommends manually toggling the NRST one time to provide for a reliable boot-up state.

2.4 Connectors

2.4.1 Primary Radar Connector (J18)

The primary radar connector provides all of the reset, boot, digital control, and CSI2 signals from the primary radar device to the host (DCA2000EVM). This connector mates directly with the primary radar connector on the DCA2000EVM. In cases where the user wishes to mate the AWR2188EVM to the DCA2000EVM using cables, the recommended part number is the HDR-241659-03-HQCD cable from Samtec.

Table 2-1. Primary Radar Connector Pin Assignment

Pin Number	Definition	Pin Number	Definition
1	GND	2	AWR_SOP3_DBG_1
3	AWR_CSI2A_TX3_1_P	4	AWR_SOP2_DBG_1
5	AWR_CSI2A_TX3_1_N	6	AWR_SOP1_DBG_1
7	GND	8	AWR_SOP0_DBG_1
9	AWR_CSI2A_TX2_1_P	10	GND
11	AWR_CSI2A_TX2_1_N	12	AWR_MSS_GPIO0_DGB_SPI_BUSY_1
13	GND	14	AWR_MSS_HOST_IRQ_AE_INTR_DBG_1
15	AWR_CSI2A_CLK_1_P	16	AWR_MSS_GPIO1_LPMODE_DBG_1
17	AWR_CSI2A_CLK_1_N	18	GND
19	GND	20	AWR_DBGMcSPIA_MOSI_1
21	AWR_CSI2A_TX1_1_P	22	AWR_DBGMcSPIA_MISO_1
23	AWR_CSI2A_TX1_1_N	24	AWR_DBGMcSPIA_CLK_1
25	GND	26	AWR_DBGMcSPIA_CS0_1
27	AWR_CSI2A_TX0_1_P	28	GND
29	AWR_CSI2A_TX0_1_N	30	AWR_MSS_GPIO2_DBG_I2C_ADDR_0_1
31	GND	32	AWR_MSS_GPIO4_DBG_I2C_ADDR_1_1
33	NC	34	AWR_MSS_GPIO5_DBG_I2C_ADDR_2_1
35	NC	36	AWR_MSS_I2CA_SDA_DBG_1
37	NC	38	AWR_MSS_I2CA_SCL_DBG_1
39	NC	40	GND
41	PMIC_NERROUT_1	42	GND
43	PMIC_NERROUT_2	44	AWR_DBG_BSS_UARTA_TX_1
45	PMIC1_RSTOUT	46	AWR_DBG_MSS_UARTB_TX_1
47	PMIC2_RSTOUT	48	AWR_RS232_DBG_TX_1
49	PMIC_INT_1	50	AWR_RS232_DBG_RX_1
51	PMIC_INT_2	52	GND
53	SOC_GPIO_RST_CTRL_BUF_1	54	AWR_ADC_VALID_1
55	SOC_PREG_DIS	56	NC
57	SOC_PMIC1_DIS	58	GND
59	SOC_PMIC2_DIS	60	AWR_EXT_DIG_SYNCOUT

Table 2-1. Primary Radar Connector Pin Assignment (continued)

Pin Number	Definition	Pin Number	Definition
61	GND	62	GND
63	AWR_CSI2B_TX3_1_P	64	AWR_OSC_DBG_CLKOUT_1
65	AWR_CSI2B_TX3_1_N	66	GND
67	GND	68	AWR_DBG_MCU_CLKOUT_1
69	AWR_CSI2B_TX2_1_P	70	GND
71	AWR_CSI2B_TX2_1_N	72	AWR_OSC_DBG_CLKOUT_ETH_1
73	GND	74	GND
75	AWR_CSI2B_CLK_1_P	76	AWR_DBG_PMIC__CLKOUT_1
77	AWR_CSI2B_CLK_1_N	78	AWR_DBG_MSS_UARTA_TX_1
79	GND	80	AWR_DBG_MSS_UARTA_RX_1
81	AWR_CSI2B_TX1_1_P	82	GND
83	AWR_CSI2B_TX1_1_N	84	AWR_DBG_TDO_1
85	GND	86	AWR_DBG_TDI_1
87	AWR_CSI2B_TX0_1_P	88	AWR_DBG_TMS_1
89	AWR_CSI2B_TX0_1_N	90	AWR_DBG_TCK_1
91	GND	92	GND
93	NC	94	NC
95	NC	96	NC
97	NC	98	NC
99	NC	100	NC
101	NC	102	GND
103	NC	104	AWR_NERROROUT_BUF_1
105	NC	106	DCA_GPIO_RST_CTRL_BUF_1
107	NC	108	GND
109	NC	110	DCA_FTDI_RST_CTRL_BUF_1
111	NC	112	GND
113	NC	114	DCA_XDS_RST_CTRL_BUF_1
115	NC	116	GND
117	NC	118	SYS_PGOOD
119	NC	120	NC

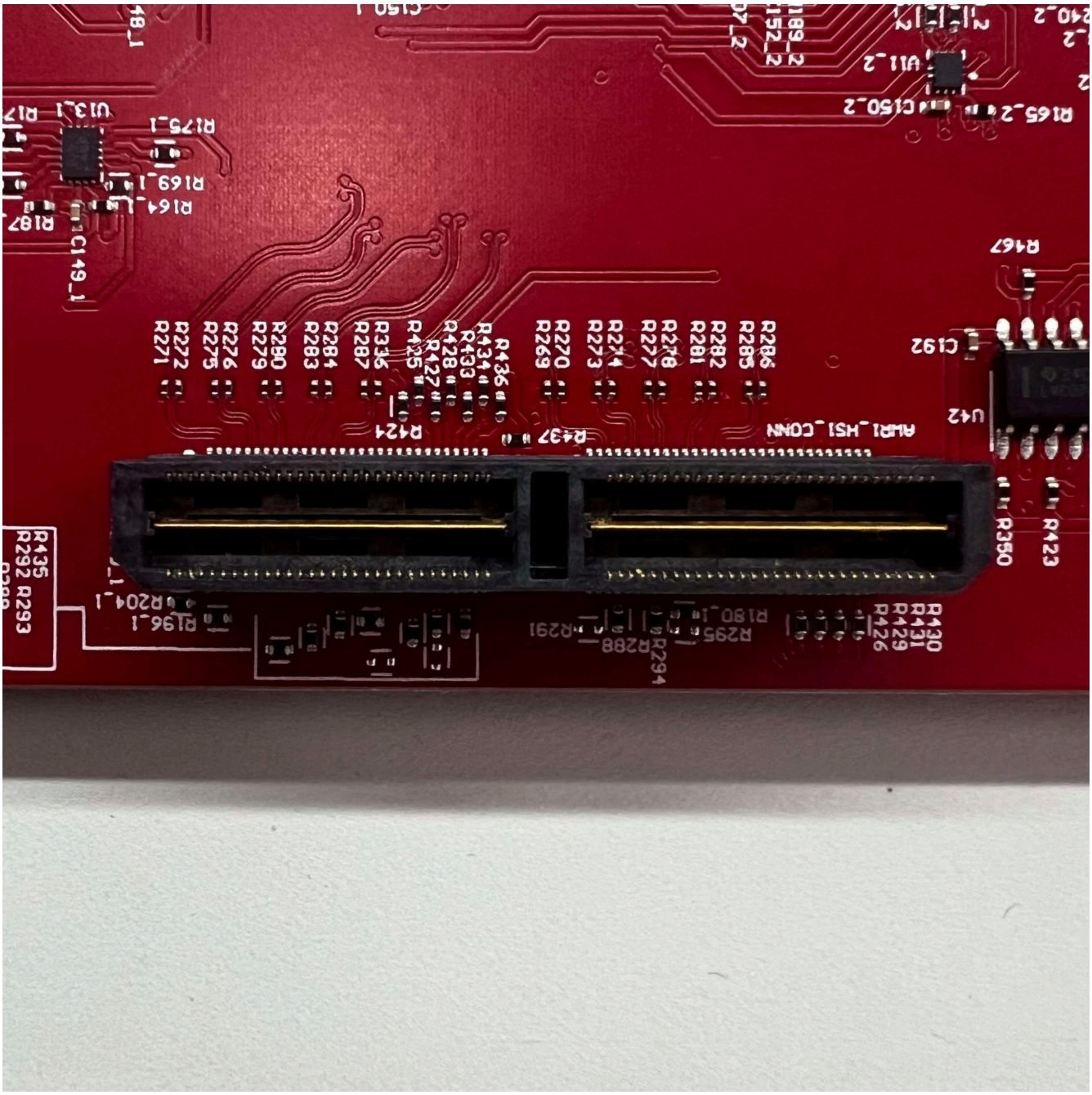


Figure 2-5. Primary Radar Connector (J18)

2.4.2 Secondary Radar Connector (J23)

The secondary radar connector provides all of the reset, boot, digital control, and CSI2 signals from the secondary radar device to the host (DCA2000EVM). This connector mates directly with the secondary radar connector on the DCA2000EVM. In cases where the user wishes to mate the AWR2188EVM to the DCA2000EVM using cables, the recommended part number is the HDR-241659-03-HQCD cable from Samtec.

Table 2-2. Secondary Radar Connector Pin Assignment

Pin Number	Definition	Pin Number	Definition
1	AWR_SOP3_DBG_2	2	GND
3	AWR_SOP2_DBG_2	4	AWR_CSI2A_TX3_2_P

Table 2-2. Secondary Radar Connector Pin Assignment (continued)

Pin Number	Definition	Pin Number	Definition
5	AWR_SOP1_DBG_2	6	AWR_CSI2A_TX3_2_N
7	AWR_SOP0_DBG_2	8	GND
9	GND	10	AWR_CSI2A_TX2_2_P
11	AWR_MSS_GPIO0_DBG_SPI_BUSY_2	12	AWR_CSI2A_TX2_2_N
13	AWR_MSS_HOST_IRQ_AE_INTR_DBG_2	14	GND
15	AWR_MSS_GPIO1_LPMODE_DBG_2	16	AWR_CSI2A_CLK_2_P
17	GND	18	AWR_CSI2A_CLK_2_N
19	AWR_DBG_McSPIA_MOSI_2	20	GND
21	AWR_DBG_McSPIA_MISO_2	22	AWR_CSI2A_TX1_2_P
23	AWR_DBG_McSPIA_CLK_2	24	AWR_CSI2A_TX1_2_N
25	AWR_DBG_McSPIA_CS0_2	26	GND
27	GND	28	AWR_CSI2A_TX0_2_P
29	AWR_MSS_GPIO2_DBG_I2C_ADDR_0_2	30	AWR_CSI2A_TX0_2_N
31	AWR_MSS_GPIO4_DBG_I2C_ADDR_1_2	32	GND
33	AWR_MSS_GPIO5_DBG_I2C_ADDR_2_2	34	NC
35	AWR_MSS_I2CA_SDA_DBG_2	36	NC
37	AWR_MSS_I2CA_SCL_DBG_2	38	NC
39	GND	40	NC
41	GND	42	NC
43	AWR_DBG_BSS_UARTA_TX_2	44	NC
45	AWR_DBG_MSS_UARTB_TX_2	46	NC
47	AWR_RS232_DBG_TX_2	48	NC
49	AWR_RS232_DBG_RX_2	50	NC
51	GND	52	NC
53	AWR_ADC_VALID_2	54	SOC_GPIO_RST_CTRL_BUF_2
55	NC	56	NC
57	GND	58	NC
59	NC	60	NC
61	GND	62	GND
63	AWR_OSC_DBG_CLKTOUT_2	64	AWR_CSI2B_TX3_2_P
65	GND	66	AWR_CSI2B_TX3_2_N
67	AWR_DBG_MCU_CLKOUT_2	68	GND
69	GND	70	AWR_CSI2B_TX2_2_P
71	AWR_OSC_DBG_CLKOUT_ETH_2	72	AWR_CSI2B_TX2_2_N

Table 2-2. Secondary Radar Connector Pin Assignment (continued)

Pin Number	Definition	Pin Number	Definition
73	GND	74	GND
75	AWR_DBG_PMIC__CLKOUT_2	76	AWR_CSI2B_CLK_2_P
77	AWR_DBG_MSS_UARTA_TX_2	78	AWR_CSI2B_CLK_2_N
79	AWR_DBG_MSS_UARTA_RX_2	80	GND
81	GND	82	AWR_CSI2B_TX1_2_P
83	AWR_DBG_TDO_2	84	AWR_CSI2B_TX1_2_N
85	AWR_DBG_TDI_2	86	GND
87	AWR_DBG_TMS_2	88	AWR_CSI2B_TX0_2_P
89	AWR_DBG_TCK_2	90	AWR_CSI2B_TX0_2_N
91	GND	92	GND
93	NC	94	NC
95	NC	96	NC
97	NC	98	NC
99	NC	100	NC
101	GND	102	NC
103	AWR_NERROROUT_BUF_2	104	NC
105	DCA_GPIO_RST_CTRL_BUF_2	106	NC
107	GND	108	NC
109	DCA_FTDI_RST_CTRL_BUF_2	110	
111	GND	112	NC
113	DCA_XDS_RST_CTRL_BUF_2	114	NC
115	GND	116	NC
117	NC	118	NC
119	NC	120	NC

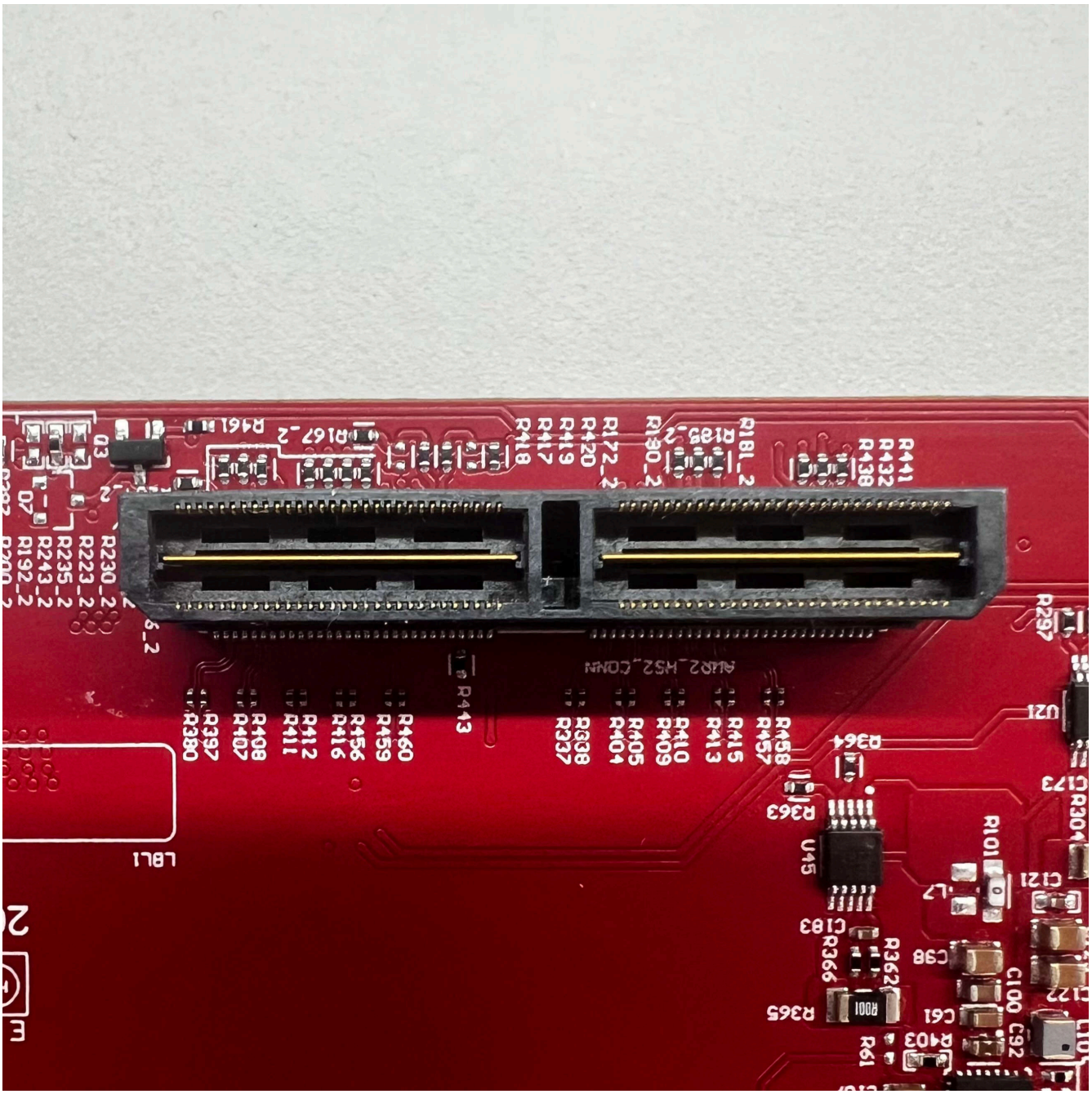


Figure 2-6. Secondary Radar Connector (J23)

2.4.3 USB Connectors (J16_1, J17_1, J16_2, J17_2)

The AWR2188EVM has four standard micro USB connectors, two connectors for the primary radar FTDI and XDS110 ports and two connectors for the secondary radar FTDI and XDS110 ports.

Micro USB Connector J16_1 provides access to the primary radar UART, SPI, I2C, RS232, and SOP interfaces through the onboard FTDI chip.

Table 2-3. Primary Radar FTDI Pin Assignment

Pin Number	Description	Pin Number	Description
1	FTDI_VBUS	2	FTDI_USBD_N
3	FTDI_USBD_P	4	FTDI_USBID

Table 2-3. Primary Radar FTDI Pin Assignment (continued)

Pin Number	Description	Pin Number	Description
5	GND	6	GND
7	GND	8	GND
9	GND	10	GND
11	GND		

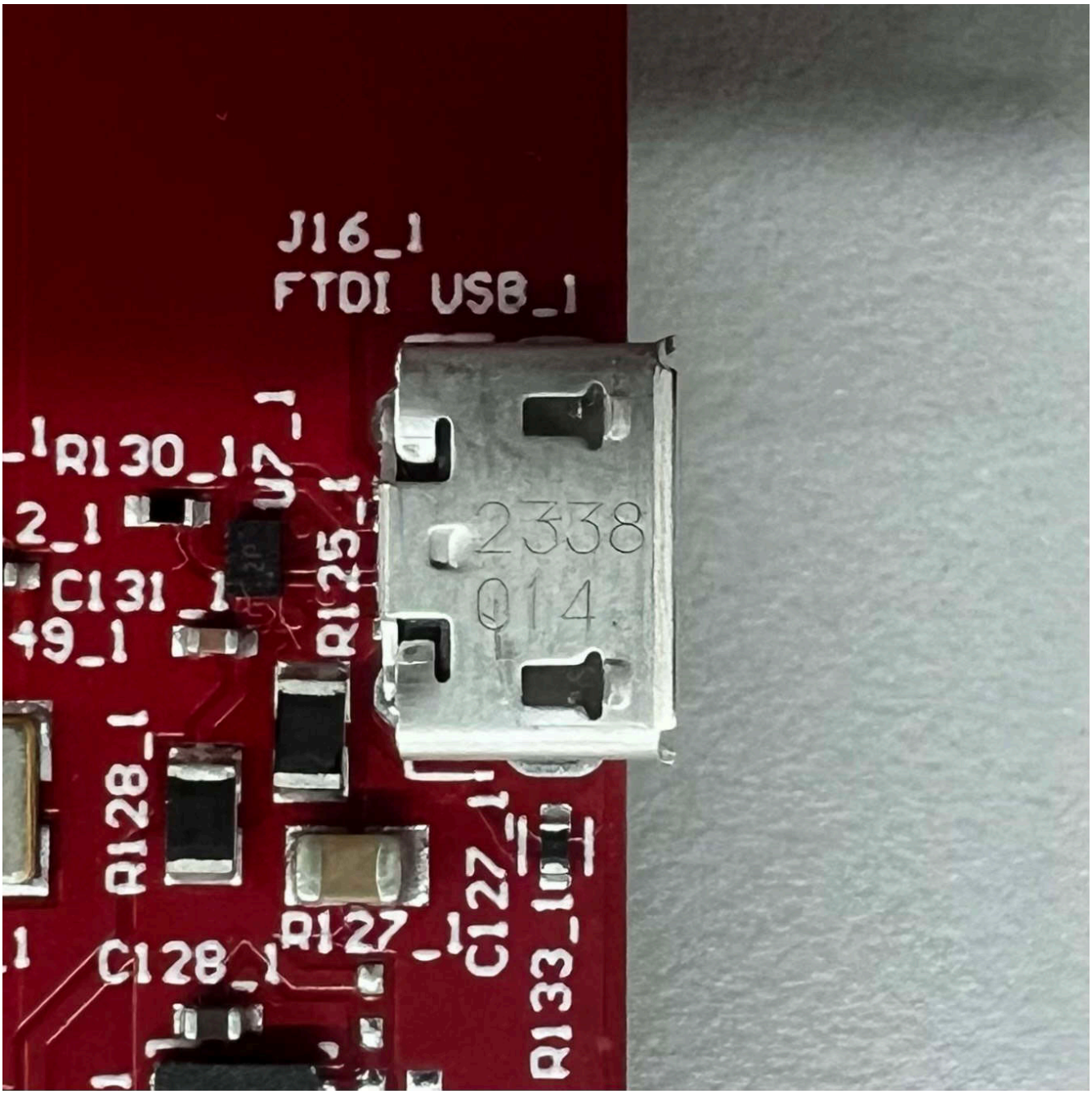


Figure 2-7. Primary Radar FTDI Port (J16_1)

Micro USB Connector J17_1 provides access to the primary radar UART and JTAG interfaces through the onboard XDS110 emulator.

Table 2-4. Primary Radar XDS110 Pin Assignment

Pin Number	Description	Pin Number	Description
1	XDSET_VBUS	2	XDSET_D_N
3	XDSET_D_P	4	XDSET_ID
5	GND	6	GND
7	NC	8	NC
9	GND	10	GND
11	GND		

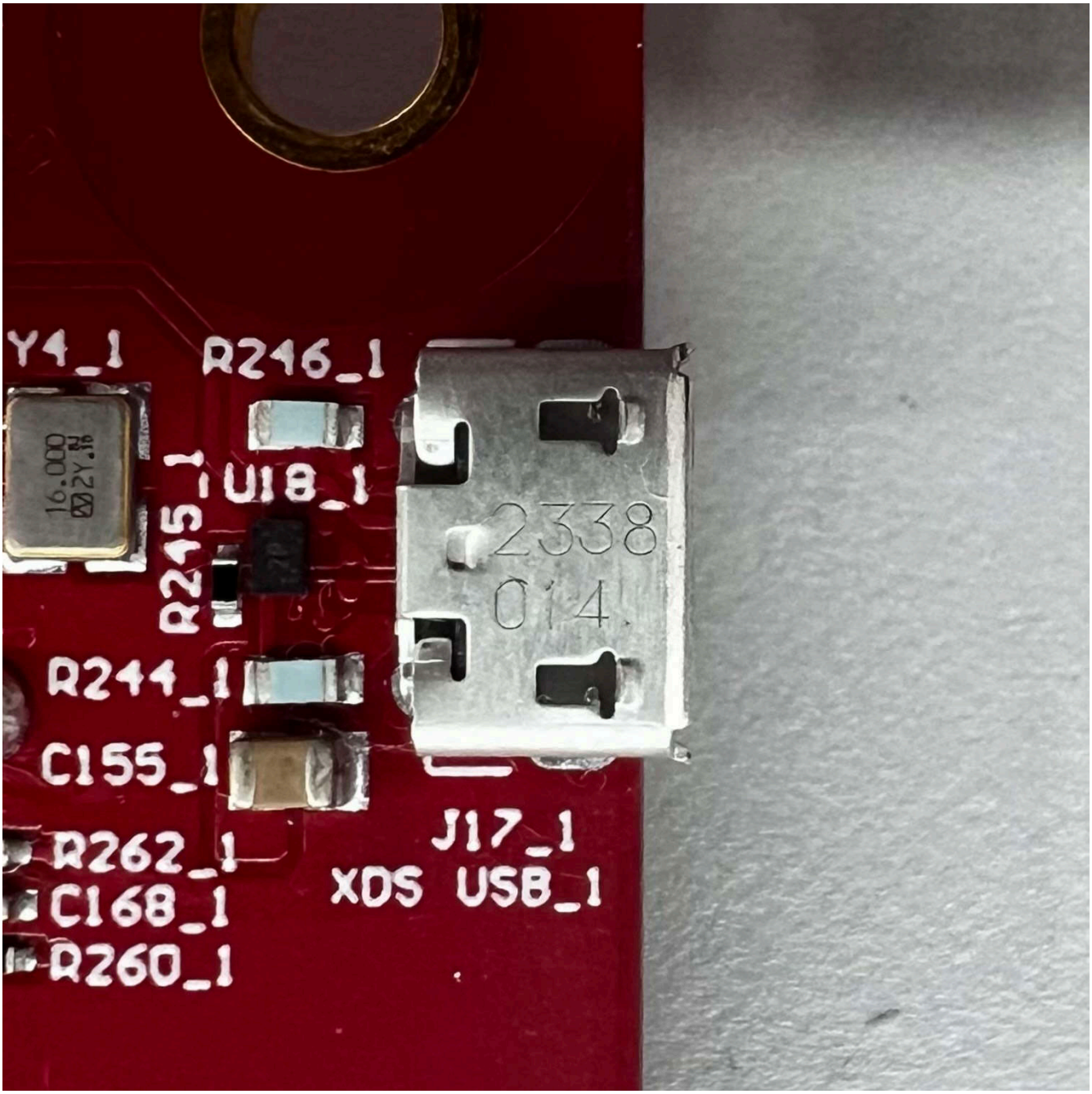


Figure 2-8. Primary Radar XDS110 Port (J17_1)

Micro USB Connector J16_2 provides access to the secondary radar UART, SPI, I2C, RS232, and SOP interfaces through the FTDI chip.

Table 2-5. Secondary Radar FTDI Pin Assignment

Pin Number	Description	Pin Number	Description
1	FTDI_VBUS	2	FTDI_USBD_N
3	FTDI_USBD_P	4	FTDI_USBID
5	GND	6	GND
7	GND	8	GND
9	GND	10	GND
11	GND		

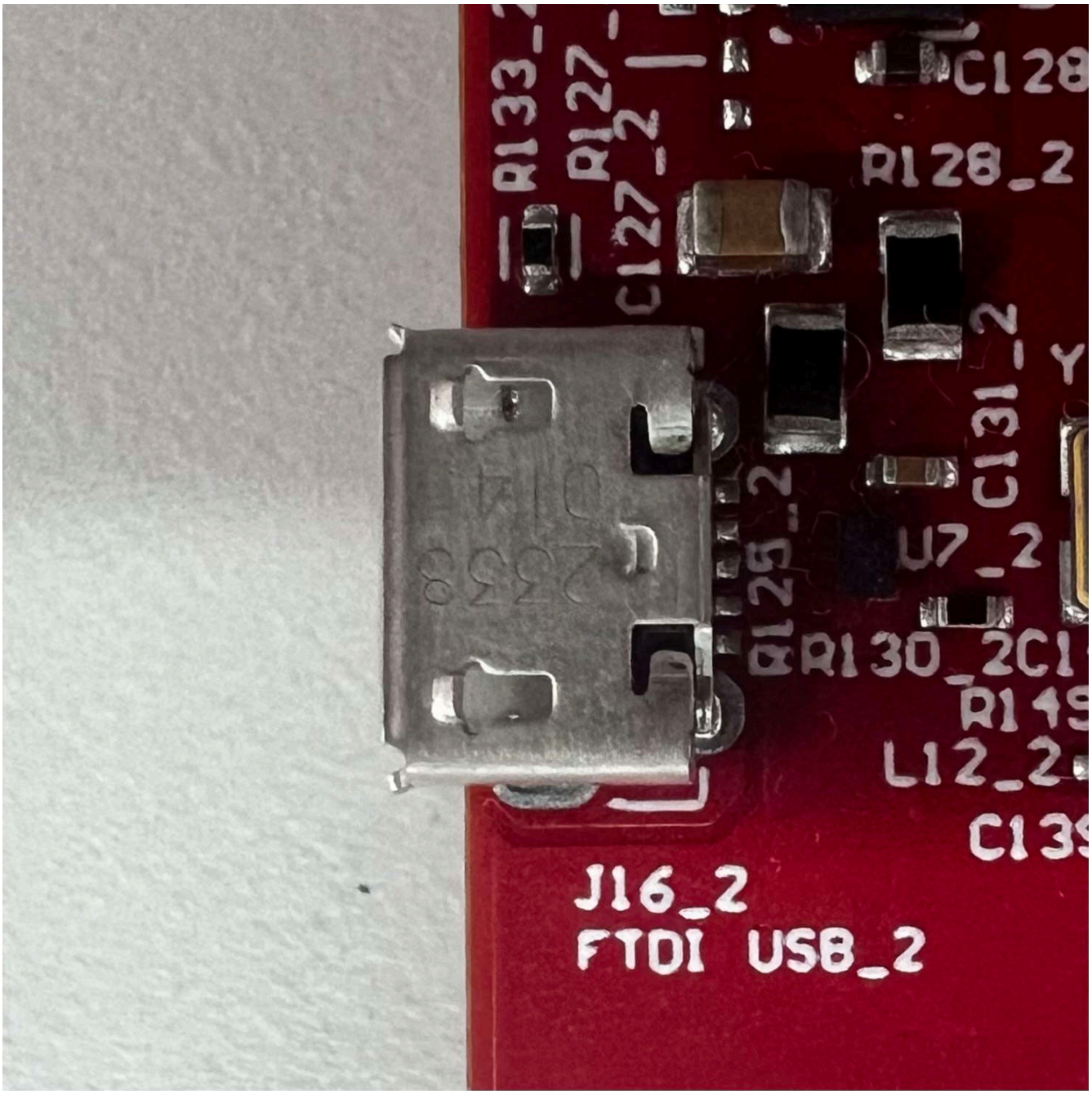


Figure 2-9. Secondary Radar FTDI Port (J16_2)

Micro USB Connector J17_2 provides access to the secondary radar UART and JTAG interfaces through the onboard XDS110 emulator.

Table 2-6. Secondary Radar XDS110 Pin Assignment

Pin Number	Description	Pin Number	Description
1	XDSET_VBUS	2	XDSET_D_N
3	XDSET_D_P	4	XDSET_ID
5	GND	6	GND
7	NC	8	NC
9	GND	10	GND

Table 2-6. Secondary Radar XDS110 Pin Assignment (continued)

Pin Number	Description	Pin Number	Description
11	GND		

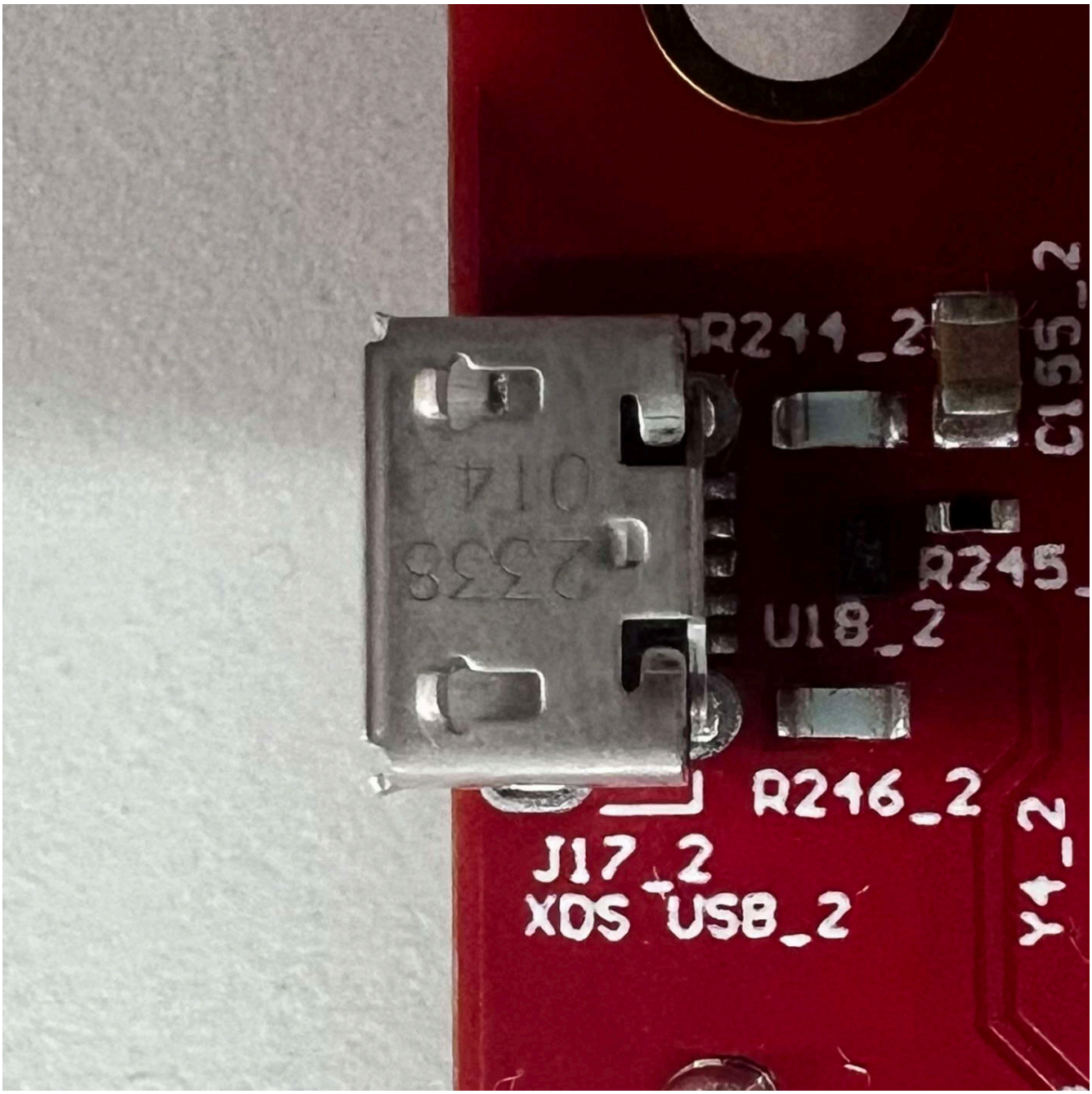


Figure 2-10. Secondary Radar XDS110 Port (J17_2)

2.4.4 Debug Connectors (J6_1, J6_2)

The AWR2188EVM contains two debug connectors, one for the primar radar and one for the secondary radar.

Table 2-7. Primary Radar Debug Connector Pin Assignment

Pin Number	Description	Pin Number	Description
1	3V3_VIO_PMIC_1	2	GND

Table 2-7. Primary Radar Debug Connector Pin Assignment (continued)

Pin Number	Description	Pin Number	Description
3	3V3_VIO_PMIC_1	4	GND
5	3V3_VIO_PMIC_1	6	GND
7	AWR_NERROUT_1	8	AWR_MSS_GPIO2_I2C_ADDR_0_1
9	AWR_DBG_BSS_UARTA_TX_1	10	AWR_MSS_GPIO4_I2C_ADDR_1_1
11	AWR_DBG_MSS_UARTA_RX_1	12	AWR_MSS_GPIO5_I2C_ADDR_2_1
13	AWR_MSS_GPIO1_LP_MODE_1	14	AWR_MSS_HOST_IRQ_AE_INTR_1
15	AWR_MSS_GPIO0_SPI_BUSY_1	16	AWR_RS232_TX_1
17	AWR_ADC_VALID_1	18	AWR_RS232_RX_1
19	NRST_AWR1	20	VPP_1P7_1

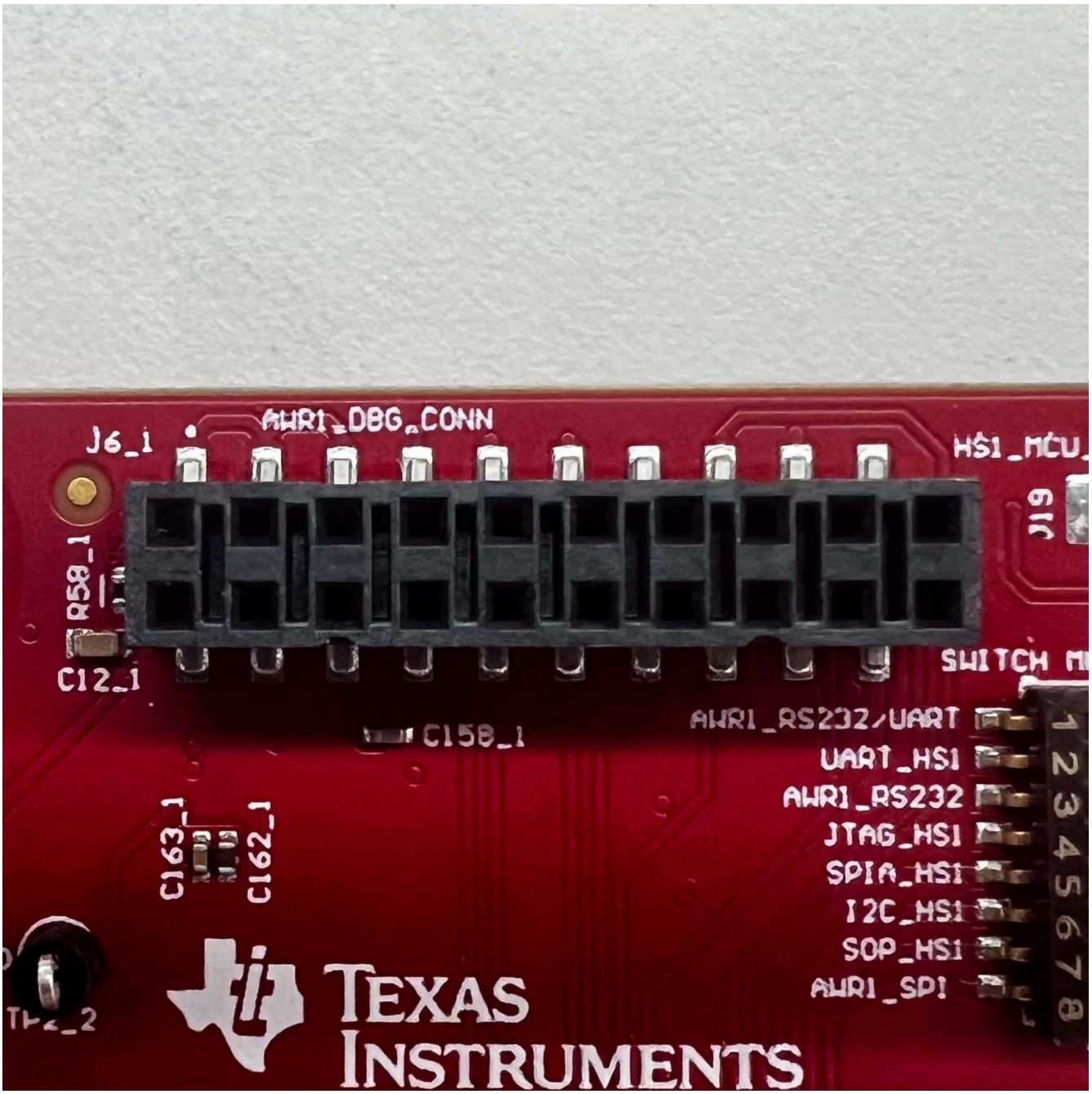


Figure 2-11. Primary Radar Debug Connector (J6_1)

Table 2-8. Secondary Radar Debug Connector Pin Assignment

Pin Number	Description	Pin Number	Description
1	3V3_VIO_PMIC_2	2	GND
3	3V3_VIO_PMIC_2	4	GND
5	3V3_VIO_PMIC_2	6	GND
7	AWR_NERROUT_2	8	AWR_MSS_GPIO2_I2C_ADDR_0_2
9	AWR_DBG_BSS_UARTA_TX_2	10	AWR_MSS_GPIO4_I2C_ADDR_1_2

Table 2-8. Secondary Radar Debug Connector Pin Assignment (continued)

Pin Number	Description	Pin Number	Description
11	AWR_DBG_MSS_UARTA_RX_2	12	AWR_MSS_GPIO5_I2C_ADDR_2_2
13	AWR_MSS_GPIO1_LP_MODE_2	14	AWR_MSS_HOST_IRQ_AE_INTR_2
15	AWR_MSS_GPIO0_SPI_BUSY_2	16	AWR_RS232_TX_2
17	AWR_ADC_VALID_2	18	AWR_RS232_RX_2
19	NRST_AWR_2	20	VPP_1P7_2

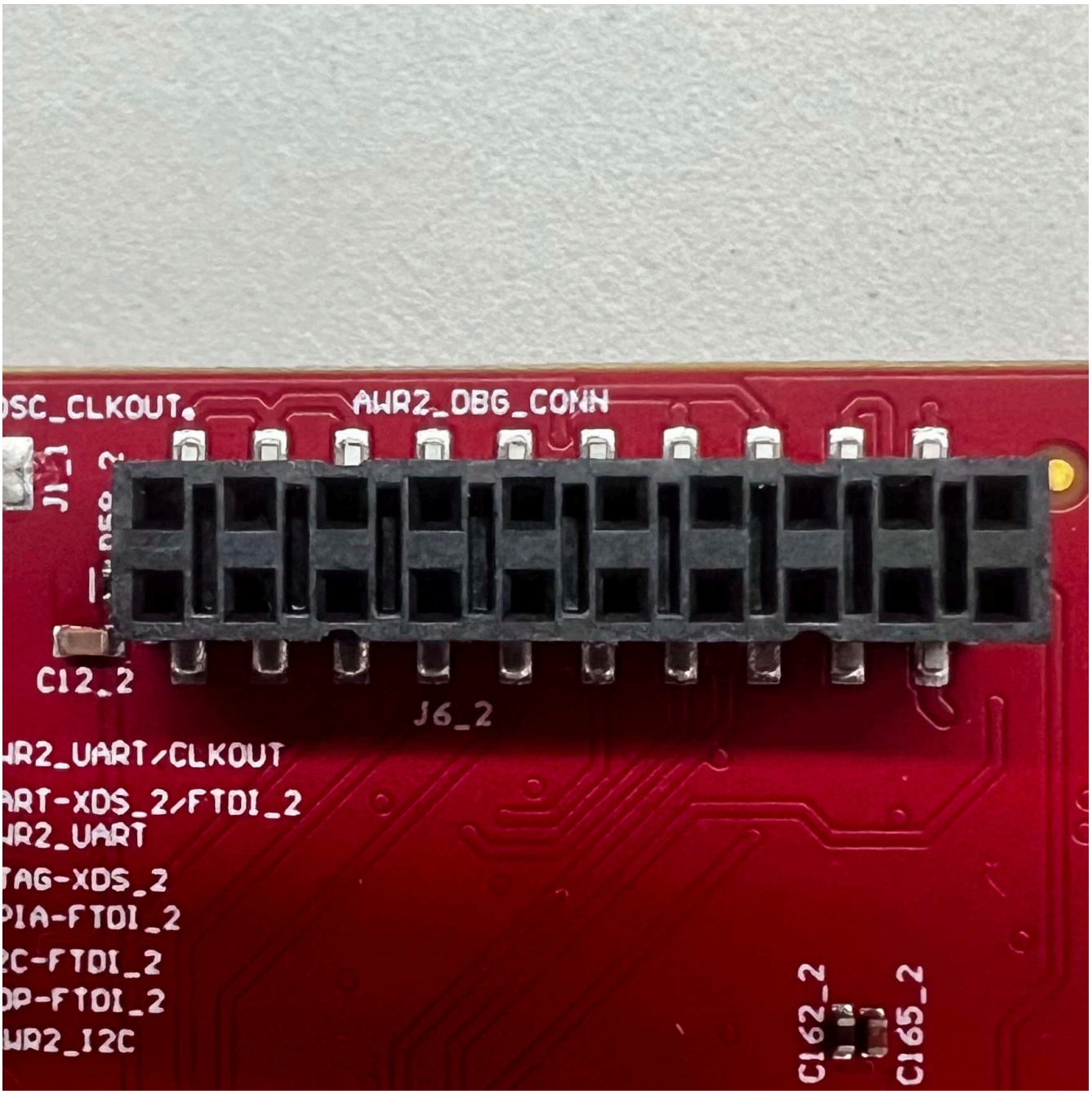


Figure 2-12. Secondary Radar Debug Connector (J6_2)

2.5 Antenna

The AWR2188EVM includes a 3D waveguide antenna by Huber+Suhner for the 16 receivers and 16 transmitters. This antenna design utilizes a near-regular array which enables estimation of both azimuth and elevation angles, allowing for object detection in a 3-D plane

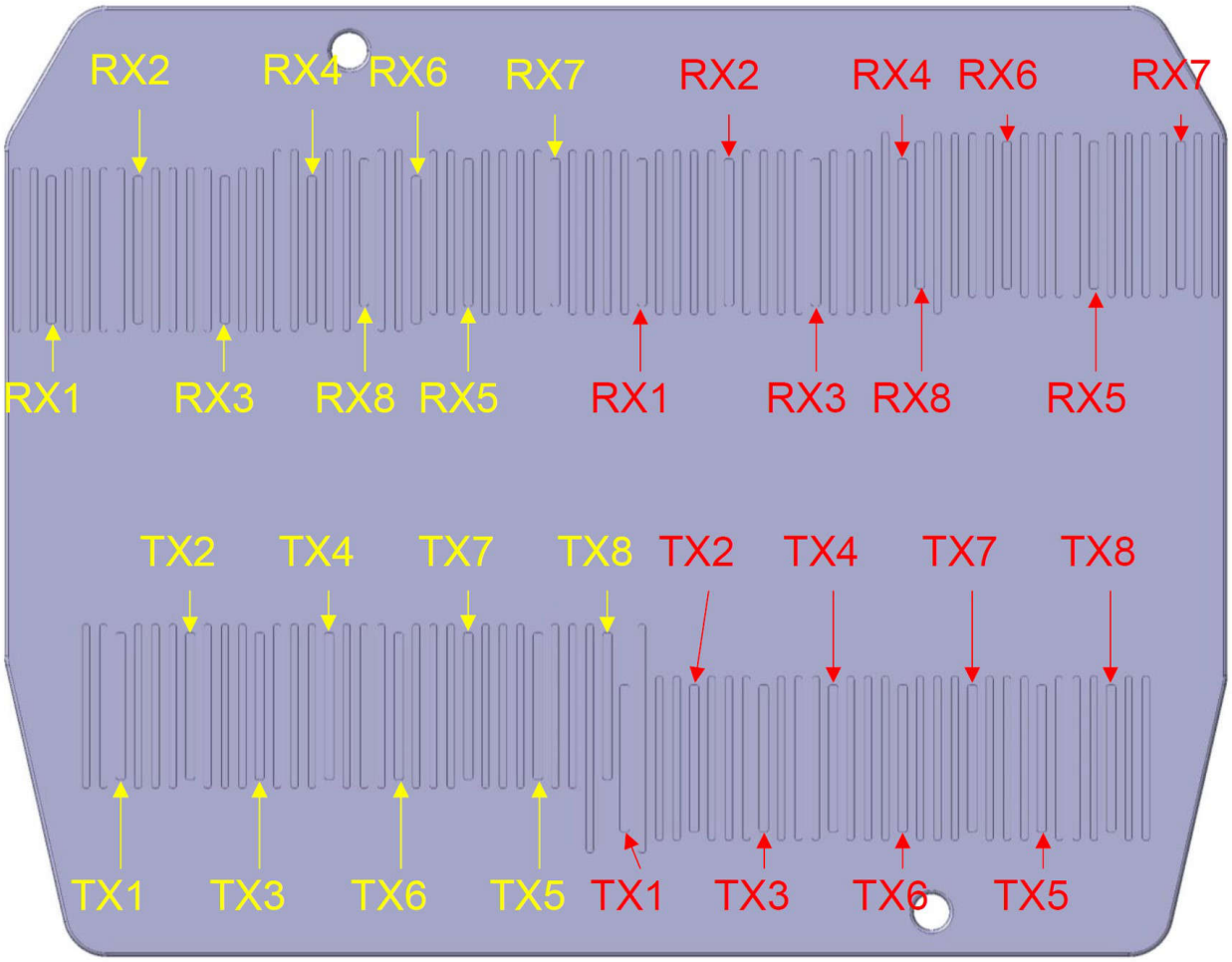


Figure 2-13. Antenna Port Assignment

The virtual array of the 16 transmitters is shown in the TX Virtual Array figure.

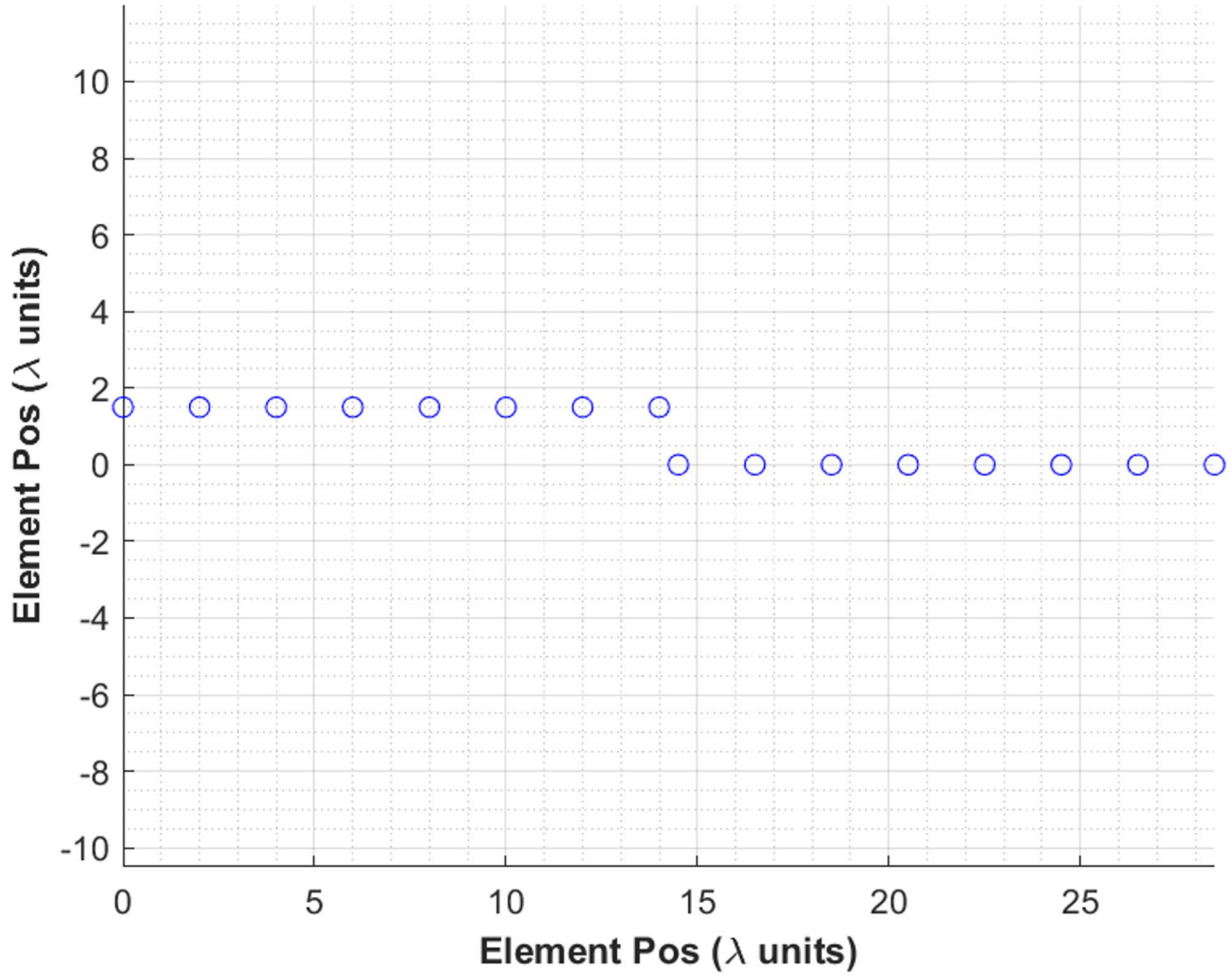


Figure 2-14. TX Virtual Array

The virtual array of the 16 receivers is shown in the RX Virtual Array figure.

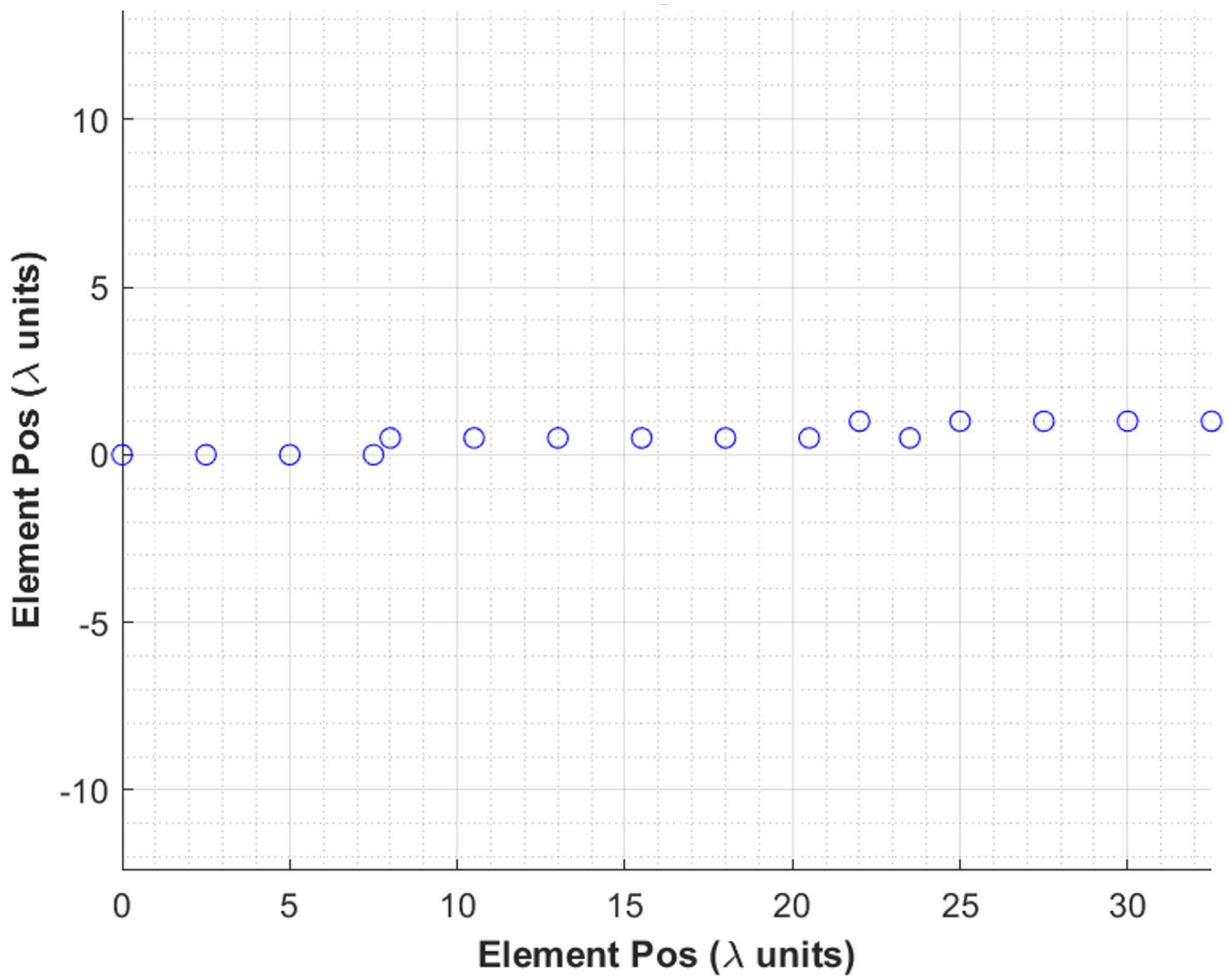


Figure 2-15. RX Virtual Array

The total resulting virtual array of the 16x16 combined elements is shown in the Antenna Near-Regular Array Configuration figure.

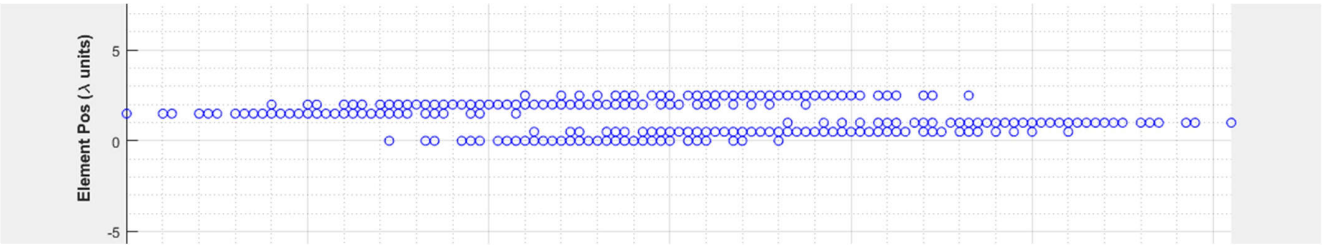


Figure 2-16. Antenna Near-Regular Array Configuration

The simulated antenna gain is 15dBi in the 76-81GHz region.

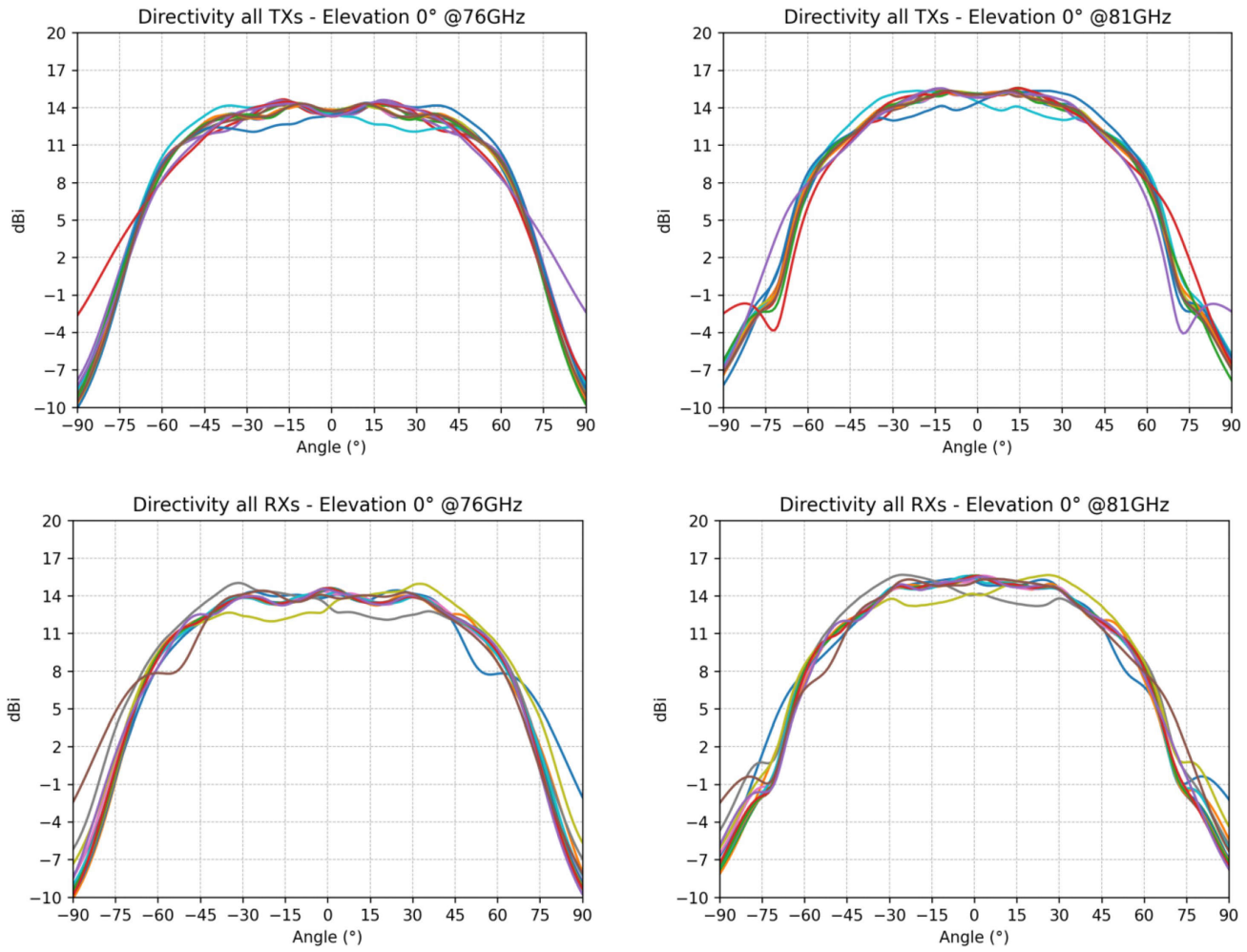


Figure 2-17. TX and RX Simulated Directivity

2.6 PC Connection

The AWR2188EVM interfaces to a companion TI DCA2000EVM capture board that is responsible for controlling the mmWave devices and offloading captured data to a host PC. For details on how to interface the AWR2188EVM and DCA2000EVM to the host PC, please refer to the DCA2000EVM User Guide.

2.7 Jumpers, Switches, and LEDs

2.7.1 Switches (SW1_1, SW1_2)

The AWR2188EVM contains two switches, SW1_1 and SW1_2, which are used to configure the primary and secondary radar control paths respectively. For typical operation with the DCA2000EVM, set all switches on SW1_1 and SW1_2 to the ***OFF*** position.

Table 2-9. SW1_1, Primary Radar Mux Switches

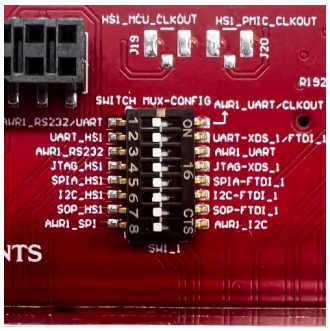
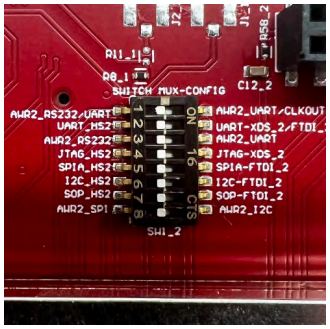
Reference	Usage	Comments	Image
SW1_1.1	RS232, PMIC_CLKOUT, and MCU_CLKOUT Mux	Set to the OFF position to enable the MSS_RS232, MSS_UARTB_TX, and BSS_UARTA_TX signal path. Set to the ON position to enable the MSS_UARTB, BSS_UARTA, PMIC_CLKOUT, and MCU_CLKOUT signal path.	
SW1_1.2	MSS and BSS UARTs	Set to the OFF position to bring the MSS_UARTA, MSS_UARTB_TX, and BSS_UARTA_TX signals to the primary radar connector (J18). Set to the ON position to bring the MSS_UARTA, MSS_UARTB_TX, and BSS_UARTA_TX signals to the onboard FTDI and XDS110.	
SW1_1.3	MSS_RS232 and MSS_UARTA	Set to the OFF position to bring the RS232 signals to the primary radar connector (J18). Set to the ON position to bring the MSS_UARTA signals to MUX U12 input (controlled by SW1_1.2).	
SW1_1.4	JTAG	Set to the OFF position to bring JTAG to the primary radar connector (J18). Set to the ON position to bring the JTAG to the onboard XDS110.	
SW1_1.5	MSS_McSPIA	Set to the OFF position to bring the MSS_McSPIA interface to the primary radar connector (J18). Set to the ON position to bring the MSS_McSPIA interface to the onboard FTDI.	
SW1_1.6	MSS_I2C	Set to the OFF position to bring the MSS_I2C interface to the primary radar connector (J18). Set to the ON position to bring the MSS_I2C interface to the onboard FTDI.	
SW1_1.7	SOP	Set to the OFF position to bring the SOP interface to the primary radar connector (J18). Set to the ON position to bring the SOP interface to the onboard FTDI.	
SW1_1.8	SPI/I2C Selection	Set to the OFF position for SPI mode. Set to the ON position for I2C mode.	

Table 2-10. SW1_2, Secondary Radar Mux Switches

Reference	Usage	Comments	Image

Table 2-10. SW1_2, Secondary Radar Mux Switches (continued)

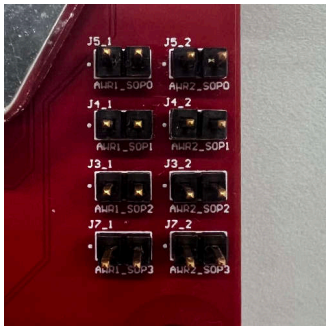
SW1_2.1	RS232, PMIC_CLKOUT, and MCU_CLKOUT Mux	Set to the OFF position to enable the MSS_RS232, MSS_UARTB_TX, and BSS_UARTA_TX signal path. Set to the ON position to enable the MSS_UARTB, BSS_UARTA, PMIC_CLKOUT, and MCU_CLKOUT signal path.	
SW1_2.2	MSS and BSS UARTs	Set to the OFF position to bring the MSS_UARTA, MSS_UARTB_TX, and BSS_UARTA_TX signals to the primary radar connector (J18). Set to the ON position to bring the MSS_UARTA, MSS_UARTB_TX, and BSS_UARTA_TX signals to the onboard FTDI and XDS110.	
SW1_2.3	MSS_RS232 and MSS_UARTA	Set to the OFF position to bring the RS232 signals to the primary radar connector (J18). Set to the ON position to bring the MSS_UARTA signals to MUX U12 input (controlled by SW1_1.2).	
SW1_2.4	JTAG	Set to the OFF position to bring JTAG to the primary radar connector (J18). Set to the ON position to bring the JTAG to the onboard XDS110.	
SW1_2.5	MSS_McSPIA	Set to the OFF position to bring the MSS_McSPIA interface to the primary radar connector (J18). Set to the ON position to bring the MSS_McSPIA interface to the onboard FTDI.	
SW1_2.6	MSS_I2C	Set to the OFF position to bring the MSS_I2C interface to the primary radar connector (J18). Set to the ON position to bring the MSS_I2C interface to the onboard FTDI.	
SW1_2.7	SOP	Set to the OFF position to bring the SOP interface to the primary radar connector (J18). Set to the ON position to bring the SOP interface to the onboard FTDI.	
SW1_2.8	SPI/I2C Selection	Set to the OFF position for SPI mode. Set to the ON position for I2C mode.	

2.7.2 Jumpers

The AWR2188EVM can be set to operate in different modes based on the state of the SOP [4:0] lines. These lines are sensed ONLY during boot up of the AWR2188 device. The state of the device is described in this section. A closed jumper refers to a ‘1’ and open the jumper refers to a ‘0’ state of the SOP signal going to the AWR2188 device.

Note

The SOP[3:0] pins can also be controlled via FTDI. In this case the FTDI settings would override the jumper settings.

Reference	Usage	Comments	Image
J3(SOP2), J4 (SOP1), J5 (SOP0)	SOP[2:0]	• 101 (SOP mode 5) = flashing mode • 001 (SOP mode 4) = functional mode • 000 (SOP mode 3) = reserved • 011 (SOP mode 2) = development mode • 010 (SOP mode 1) = reserved	
J7(SOP3)	SOP[3]	• 0 = single chip mode • 1 = cascade mode	

Additionally, the SOP4 signal defines the XTAL clock input as per the below configurations.

- Populate R51, Remove R52 (default) = 50MHz XTAL mode
- Populate R52, Remove R51 = 40MHz XTAL mode

2.7.3 LEDs

The AWR2188EVM contains several status indication LEDs.

Reference Designator	Color	Usage	Comments	Image
D6	YELLOW	VIN	This LED illuminates when the input supply is present	

Reference Designator	Color	Usage	Comments	Image
D8	YELLOW	REGOUT_3V3	This LED illuminates when the REGOUT_3V3 supply is ON.	

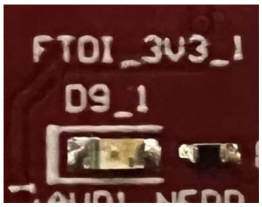
Reference Designator	Color	Usage	Comments	Image
D10	YELLOW	SYS_PGOOD	This LED illuminates when the system PGOOD is ON.	

Reference Designator	Color	Usage	Comments	Image
D2	GREEN	NRESET_1	This LED illuminates when the primary radar is out of reset.	

Reference Designator	Color	Usage	Comments	Image
D3	GREEN	NRESET_2	This LED illuminates when the secondary radar is out of reset.	

Reference Designator	Color	Usage	Comments	Image
DS1_1	RED	NERROUT_1	This LED illuminates when the primary radar is out of reset.	

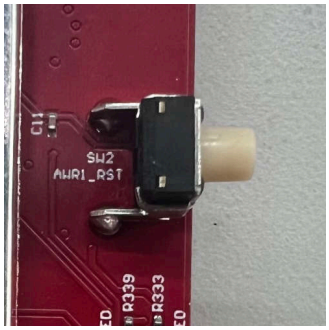
Reference Designator	Color	Usage	Comments	Image
DS1_2	RED	NERROUT_2	This LED illuminates when the secondary radar is out of reset.	

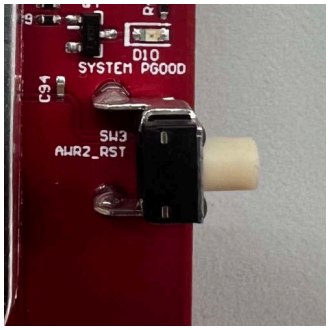
Reference Designator	Color	Usage	Comments	Image
D9_1	YELLOW	FTDI_VBUS_1	This LED illuminates when the primary FTDI is powered ON.	

Reference Designator	Color	Usage	Comments	Image
D9_2	YELLOW	FTDI_VBUS_2	This LED illuminates when the secondary FTDI is powered ON.	

2.8 Push Buttons (SW2, SW3)

The AWR2188EVM contains two push buttons, SW2 and SW3, that can be used to manually reset the primary and secondary radars respectively.

Reference Designator	Usage	Comments	Image
SW2	NRESET_1	When SW2 is depressed the primary radar will be reset.	

Reference Designator	Usage	Comments	Image
SW3	NRESET_2	When SW3 is depressed the primary radar will be reset.	

3 Tools and Software

Tools

DCA2000EVM	Data capture card for the AWR2188EVM

Software

MmWave Studio	Stand-alone Windows® GUI that provides the ability to configure and control mmWave sensor modules and collect analog-to-digital (ADC) data for offline analysis.

4 Hardware Design Files

To view the schematics, assembly drawings, and BOM, see AWR2188EVM Schematic, Assembly, and BOM Files.

To view the design database and layout details, see AWR2188EVM Design Database Files.

5 Additional Information

5.1 Trademarks

All trademarks are the property of their respective owners.

6 Revision History

NOTE: Page numbers for previous revisions may differ from page numbers in the current version.

DATE	REVISION	NOTES
November 2025	*	Initial release

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