



S4CWM-11WS-B255-C

User manual

Version: 0.3
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1. INTRODUCTION

S4CWM-11WS-B255C is a **Bluetooth/WLAN Antenna Device** includes, PCB with BT/WLAN SoC AW690 with periphery and two conformal antennas. PCB and antennas are mounted inside of a plastic cover. The device is powered by single 3,3V voltage. A 1,8V switch regulator is on board of the device. Wi-Fi 6 and Bluetooth (BT) 5.2 are integrated into the used SoC NXP®AW690.

AW690 supports only SISO in CDW (Concurrent Dual Wi-Fi) application and MIMO in single band is still available. Supporting a MIMO configuration in 5GHz band, the System-on-Chip (SoC) implements advanced features including MU-MIMO, OFDMA and Target Wake Time (TWT). The device provides host interface for the Wi-Fi radios (PCIe) and Bluetooth radio (UART) with built-in 1V8 switch regulator which provide a flexible design for easy integration into demanding automotive applications.

1.1 Interface

Host Interface

The device supports PCIe (Gen1) and high-speed UART as the host interfaces for connecting the WLAN and BLUETOOTH to the host processor.

Digital Audio Interface

PCM interface supports continual transmission and reception of PCM data without processor overhead. The PCM clock rate from 64 kHz to 2.048MHz with multi-slot handshake and synchronization. PCM encoding/decoding support A-law, μ -law, and linear voice.

Configuration

WLAN host interface of **S4CWM-11WS-B255C** only support PCIe and doesn't support SDIO. To avoid wrong settings in CFG, device internally is configured default for PCIe. CFG1 and CFG2 is set to 1 by internal 10k Ohm pull-up resistor and CFG3 is set to 0 by internal 10k Ohm pull-down resistor. User does not require additional settings.

1.2 Order Information

Harman P/N	Qisda P/N	Descriptions	SOC	3V3 SW	Antenna Description	EC
4112804	5J.5T801.006	MOD QIS BT/WLAN S4CWM-11WS-B255-C-C1	AW690	•	2 antenna ports with Wi-Fi 5G MIMO + 2G4 SISO + BT	01

2. SPECIFICATION

2.1 Hardware Requirement

Figure 2-1 System Interface

2.1.1 Pin Function

Pin	Interface	Pin Name	Type	Supply	Description
39	PCIe WLAN0	WLAN0_PCl_e_PERST_L	I	VIO	PCIe Reset
38		WLAN0_PCl_e_REFCLK_P	I	Internal 1V8	PCIe Differential reference clock
36		WLAN0_PCl_e_REFCLK_N			
32		WLAN0_PCl_e_TX_P	O	Internal 1V8	PCIe Differential transmit
30		WLAN0_PCl_e_TX_N			
24		WLAN0_PCl_e_RX_P	I	Internal 1V8	PCIe Differential receive
26		WLAN0_PCl_e_RX_N			
Remark					The signal PCIe_CLKREQ_L of the root complex (SOC Host) should be always pulled down

□ Product System (PS)

46	UART Bluetooth0	BT0_UART_CTS	I	VIO	BT UART Clear to send
48		BT0_UART_RX	I		BT UART Receive
42		BT0_UART_TX	O		BT UART Transmit
44		BT0_UART_RTS	O		BT UART Request to send
31	PCM Bluetooth0	BT0_PCM_CLK	O	VIO	BT PCM Clock (master), Configuration pin. shall be HIGH during boot. (33kOhm internal Pull-Up)
33		BT0_PCM_SYNC	O		BT PCM Sync (master)
35		BT0_PCM_DOUT	O		BT PCM Data Out, Configuration pin. shall be HIGH during boot. (33kOhm internal Pull-Up)
37		BT0_PCM_DIN	I		BT PCM Data In, Configuration pin. shall be HIGH during boot. (33kOhm internal Pull-Up)
23	CONTROL	BT0_PDn	I	VIO	Bluetooth0 reset (active low, internal 10K ohm pull-down)
21		WLAN0_PDn	I		WLAN0 reset (active low, internal 10K ohm pull- down)
19		WLAN0_DEV_WAKE	I		Wake up for WLAN0
27	Antenna	ANT_DIAG	RF	-	Antenna diagnosis
Power					
45	PWR	VCC_3V3	I	PWR	Positive supply for IC
47					
41		VCC_VIO	I	PWR	VCC_VIO supply domain. Digital positive supply for GPIOs (1V8/2V5/3V3)
4,9,10,13, 16,17,22, 28,29,34, 40,43,49, 50	GND	GND			Ground
Not connected					
1,2,3,5,6, 7,8,11,12, 14,15,18, 20,25	NC	NC			Not connected

2.1.2 Electrical Characteristics

Absolute maximum ratings

Symbol	Parameter	Min.	Max.	Units
VCC_VIO	Power supply voltage with respect to VSS	0	4.5	V
VCC_3V3	Power supply voltage with respect to VSS	0	4.5	V
Tstg	Storage Temperature	-50	95	°C
Ta	Ambient Temperature	-40	85	°C

Recommended operating conditions

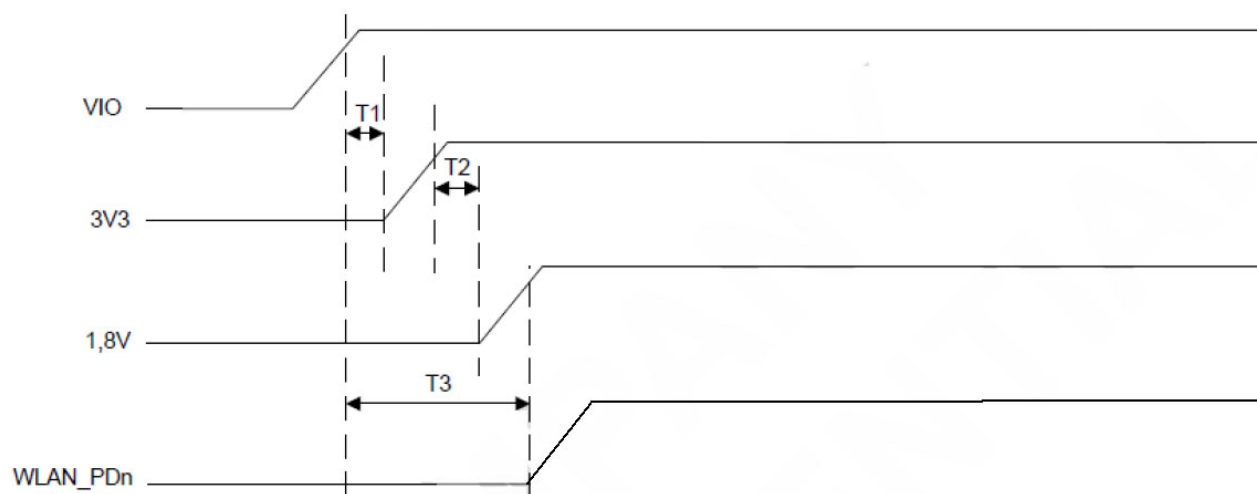
□ Product System (PS)

Symbol	Parameter	Min.	Typ.	Max	Units
VCC_VIO	Digital I/O power supply	1.62	1.8	1.98	V
		2.97	3.3	3.63	V
VCC_3V3	Main power supply	3.15	3.3	3.45	V

DC Characteristics

Symbol	Parameters	Mode	Min.	Typ.	Max	Units
V_{IH}	Input High Voltage	1.8V	1.2	1.8	2.1	V
		3.3V	2.3	3.3	3.6	V
V_{IL}	Input Low Voltage	1.8V	-0.3	0	0.6	V
		3.3V	-0.3	0	1.1	V
V_{HYS}	Input hysteresis	1.8V	250			mV
		3.3V	400			mV
V_{OH}	Output High Voltage	1.8V	1.22	1.8		V
		3.3V	2.57	3.3		V
V_{OL}	Output Low Voltage	1.8V		0	0.4	V
		3.3V		0	0.4	V
PDn	PDn input, High level		1.4	3.3	5.5	V
	PDn input, Low level		-0.3	0	0.5	V

2.1.3 Start-up Timing



Symbol	Description	Min	Typical	Max
T1	Delay from VIO high (at least 90%) to start of 3V3 ramp up	0 ms	-	-
T2	Delay from 3V3 high (at least 90%) to start of 1V8 ramp up	0 ms	100 ms	-
T3	Delay from VIO high (at least 90%) to start of WLAN_PDn ramp up	0 ms	-	-

2.1.4 Antenna Diagnosis parameters

Symbol	Description	Min	Typical	Max
T1	Delay from VIO high (at least 90%) to start of 3V3 ramp up	0 ms	-	-
T2	Delay from 3V3 high (at least 90%) to start of 1V8 ramp up	0 ms	100 ms	-
T3	Delay from VIO high (at least 90%) to start of WLAN_PDn ramp up	0 ms	-	-

2.2 RF Subsystem Requirement

2.2.1 Radio Specification 802.11b/g/n/ax WLAN (2G4 band)

Features	Description
WLAN standard	IEEE 802.11 b/g/n/ax Wi-Fi compliant
Frequency Band	2.4000 – 2.4835 GHz (2.4 GHz ISM Band)
Number of Channel	CH1~CH11($f=2412+n*5\text{MHz}$, $n=0, \dots, 12$)
Modulation	802.11b: DBPSK, DQPSK, CCK
	802.11g/n: BPSK, QPSK, 16QAM, 64QAM
	802.11ax: BPSK, QPSK, 16QAM, 64QAM, 256QAM, 1024QAM
Operation temperature	-40°C ~ 85°C
VCC	3V3 +/- 5%
Carrier Frequency Accuracy	+/- 18PPM

Output power for WLAN 2.4G band

Standard	Packet	EVM	Min.	Typ.	Max.	Units
IEEE 802.11b	11M bps	-9.1dB				dBm
IEEE 802.11g	54M bps	-15dB				dBm
IEEE 802.11n	MCS7 HT 20	-27dB				dBm
IEEE 802.11n	MCS7 HT 40	-27dB				dBm
IEEE 802.11ax	HE_MU 20	TBD				dBm

Sensitivity for WLAN 2.4G band at 25°C

Standard	Packet	Min.	Typ.	Max.	Units
IEEE 802.11b	11M bps	-	-89	-86	dBm
IEEE 802.11g	54M bps	-	-75	-73	dBm
IEEE 802.11n	MCS7 HT 20	-	-72	-70	dBm
IEEE 802.11n	MCS7 HT 40	-	-70	-68	dBm
IEEE 802.11ax	HE_MU 20	-	-62	-60	dBm

2.2.2 Radio Specification 802.11a/n/ac/ax WLAN (5G band)

Features	Description
WLAN standard	IEEE 802.11a/n/ac/ax Wi-Fi compliant
Frequency Band	5.1700 – 5.835 GHz (5 GHz Band)
Number of Channel	Please see the 5G band frequency table
Modulation	802.11 a/n: BPSK, QPSK, 16QAM, 64QAM
	802.11 ac: BPSK, QPSK, 16QAM, 64QAM, 256QAM
	802.11ax: BPSK, QPSK, 16QAM, 64QAM, 256QAM, 1024QAM
Operation temperature	-40°C ~ 85°C
VCC	3V3 +/- 5%
Carrier Frequency Accuracy	+/- 18PPM

Output power for WLAN 5G band

Standard	Packet	EVM	Min.	Typ.	Max.	Units
IEEE 802.11a	OFDM-54	-25dB				dBm
IEEE 802.11n	MCS7 HT 20	-27dB				dBm
IEEE 802.11n	MCS7 HT 40	-27dB				dBm
IEEE 802.11ac	MCS8 VHT 20	-30dB				dBm
IEEE 802.11ac	MCS9 VHT 80	-32dB				dBm
IEEE 802.11ax	HE_MU 20	TBD				dBm
IEEE 802.11ax	HE_MU 40	TBD				dBm
IEEE 802.11ax	HE_MU 80	TBD				dBm

Sensitivity for WLAN 5G band at 25°C

Standard	Packet	Min.	Typ.	Max.	Units
IEEE 802.11a	MCS7 HT 20	-	-72	-72	dBm
IEEE 802.11n	MCS7 HT 20	-	-70	-70	dBm
IEEE 802.11n	MCS7 HT 40	-	-67	-67	dBm
IEEE 802.11ac	MCS8 VHT 20	-	-67	-67	dBm
IEEE 802.11ac	MCS9 VHT 80	-	-60	-58	dBm
IEEE 802.11ax	HE_MU 20	-	-59	-59	dBm
IEEE 802.11ax	HE_MU 40	-	-57	-57	dBm
IEEE 802.11ax	HE_MU 80	-	-56	-55	dBm

Note: The WLAN RF criteria is for reference in C0 EC02 stage

2.2.3 Radio Specification 802.11 Bluetooth

Features	Description
Frequency Band	2.4 GHz ISM Band
Number of selectable Sub	79 channels

□ Product System (PS)

channels	(f=2402+k MHz, k=0, ...,78)
Modulation	FHSS
	GFSK, $\pi/4$ -DQPSK, 8DPSK
Supported rates	1, 2, 3 Mbps
Power Class	Class 1.5
Output Power	7dBm (Typical)
Output Power (LE)	6dBm (Typical)
Sensitivity	1Mbps: -89dBm @ 0.1% BER
	2Mbps: -87dBm @ 0.01% BER
	3Mbps: -83dBm @ 0.01% BER

Note: The BT RF criteria is for reference in C0 EC02 stage

2.3 Mechanical Requirement

2.3.1 Form Factor

A 38.4*37.3mm PCBA, with periphery and two conformal antennas. PCB and antennas are mounted inside of a plastic cover. Mechanical interface to main board is a 40 pins edge connector.

2.3.2 PCBA Dimension

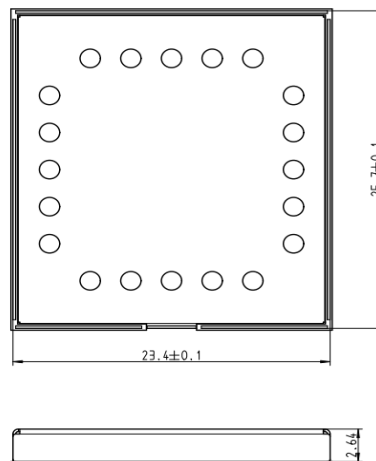
Description	Layer	Surface Finish	Min. line width/space Inner Layer (um)	Min. line width/space Outer Layer (um)	Min. Mech. Drill (um)	Mech. Drill Q'ty	PCB Size (mm)	Chamfer (card edge connector)
PCB_WIFI	4	GOLD	100/100	90/100	150	290	38.4 (E) x 37.3 (F) x 1.6	No

2.3.3 Weight

36g(Typ.) include PCBA and mechanical housing, antenna.

2.3.4 Drawing

2.4.4.1 Standard Shield



3. Packing REQUIREMENTS

3.1 The device is placed in the aluminum bag

The packing of S4CWM-11 has been verified that it can resist $\pm 8\text{KV}$ static electricity when placed in the aluminum bag (Test for top & bottom side, 8 test points).



3.2 Device has been unpacked from the aluminum bag

If aluminum bag has been opened, the antistatic ability will be limited.
The antistatic ability of the device is as follows

Contact discharge test in unpowered handling mode:

- (1) +/- 8 KV for the antenna pins
- (2) +/- 2 KV for all the other pins

4. Regulatory Information

S4CWM11 is designed to comply with the standards listed below

REGULATORY ITEMS		
CE/UKCA	EMC	EN 301 908-1/-17
	Safety	EN IEC 62368-1 + AS/NZS 62368-1
	RF	EN300 328 (BT dual mode)
		EN300 328 (WLAN 2.4GHz)
		EN301 893 (WLAN 5GHz + DFS Slave)
		EN 3004 40 (WLAN 5.8GHz)
	SAR (MPE)	EN 62311, EN 50665
FCC/ISED	EMC	Part 15B + ICES-003
	RF	FCC_Part 15C + RSS-247 (BT dual mode)
		FCC_Part 15C + RSS-247 (WLAN 2.4GHz)
		FCC_Part 15E + RSS-247 (WLAN 5GHz + DFS)
	SAR (MPE)	KDB 447498 D01, D04 RSS102, IEEE C95.3
AS/NZS	EMC	CFR47 FCC Part 15 Subpart B,
	RF	AS/NZ4268 (BT dual mode)

☐ Product System (PS)

		AS/NZ4268 (WLAN 2.4GHz)
		AS/NZ4268 (WLAN 6E an/ac/ax)
	SAR (MPE)	AS/NZS 2772.2

5. PACKING LABEL DRAWING

5.1 Attention Label Drawing

(4E.G3503.001 size:55*55mm)



5.2 OOB Label Content

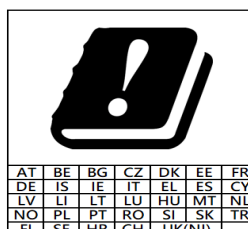
(4E.1HR03.001 size:100*50mm)

□ Product System (PS)

Bag ID: AYYYYMM0001  P/O No.: 45004234982 Lot No.: L2021110001 Model No.: WAM606 Harman P/N: 04056585 Part No.: 5J.5T801.001 General Desc.: MOD-SM QIS S4CWM-11WS-B255-C B0 Q'ty: XXX QC Inspected OK		Bag
Carton ID: CYYYYMM0001  P/O No.: 45004234982 Lot No.: L2021110001 Model No.: WAM606 Harman P/N: 04056585 Part No.: 5J.5T801.001 General Desc.: MOD-SM QIS S4CWM-11WS-B255-C B0 Q'ty: XXX QC Inspected OK		Carton

*Beside Marks, English Font: Arial, H=6 pt

5.3 Warning message



5.4 Model Define Rule

5J.5T801.OXX (HARMAN)		
Item	Content	Remark
Reel ID	X code (R/A/B/C) + Year + Month + SN A = bag C = Carton	SN is from 0001 ~ 9999
P/O No		Defined by Customer, will be Changed for each shipment
Lot No	L + Year + Month + SN	(a) SN is from 0001 ~ 9999. Ex: L2021120001
Model No	S4CWM-11WS-B255C	Qisda Model No.
Harman P/N	04061918	Defined by Harman
Part No	5J.5T801.004	Qisda Part No.
General Desc.	MOD-SM QIS S4CWM-11WS-B255-C-B1	

☐ Product System (PS)

Quantity	XXX pcs for each bag XXX pcs for each Carton	Quantity depend on real shipment quantity
EC Level	EC-XX	Started at 01
MSL	NA	

6. HANDLING

HANDLE WITH CARE, DO NOT DROP.

7. SAFETY WARNING

Federal Communications Commission (FCC) Statement

15.105(b)

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.

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.

15.21

You are cautioned that changes or modifications not expressly approved by the part responsible for compliance could void the user's authority to operate the equipment.

FCC RF Radiation Exposure Statement:

1. This Transmitter must not be co-located or operating in conjunction with any other antenna or transmitter.
2. This equipment complies with RF radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated, keeping the radiator at least 20cm or more away from the person's body.

For ISED

This device contains licence-exempt transmitter(s)/receiver(s) that comply with Innovation, Science and Economic Development Canada's licence-exempt RSS(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.

L'émetteur/récepteur exempt de licence contenu dans le présent appareil est conforme aux CNR d'Innovation, Sciences et Développement économique 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

□ Product System (PS)

2. l'utilisateur de l'appareil doit accepter tout brouillage radioelectrique subi, meme si le brouillage est susceptible d'en compromettre le fonctionnement.

Caution: Exposure to Radio Frequency Radiation

1. To comply with the Canadian RF exposure compliance requirements, this device and its antenna must not be co-located or operating in conjunction with any other antenna or transmitter.
2. To comply with RSS 102 RF exposure compliance requirements, this equipment should be installed and operated, keeping the radiator at least 20cm or more away from the person's body.

Attention: exposition au rayonnement radiofréquence

1. Pour se conformer aux exigences de conformité RF canadienne l'exposition, cet appareil et son antenne ne doivent pas être co-localisés ou fonctionnant en conjonction avec une autre antenne ou transmetteur.
2. Pour se conformer aux exigences de conformité CNR 102 RF exposition, cet équipement doit être installé et utilisé en maintenant le radiateur à au moins 20cm ou plus du corps de la personne.

For CE

Operation in 5150~5350MHz is restricted to indoor use only.

This equipment should be installed and operated with a minimum distance of 20 cm between the radiator and your body.