User Manual

1. Introduction

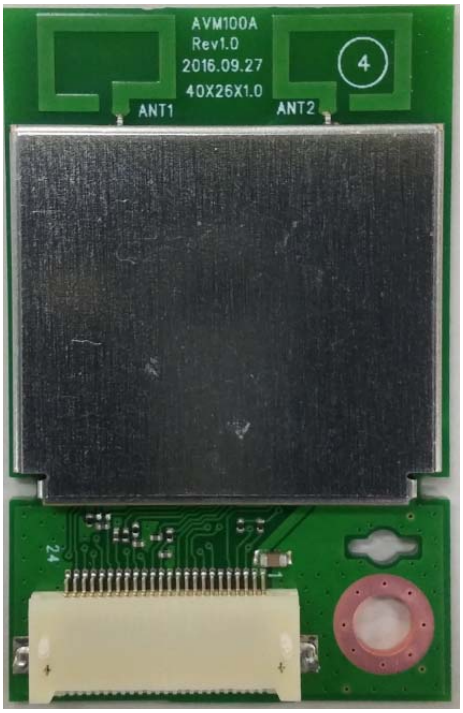
The WSM520V module is wireless audio module based on AV5100. The AV5100 is 5GHz wireless audio SoC (System-on-chip), optimized for building point to multi-point digital wireless audio solutions such as wireless subwoofers, wireless rear speakers and in home theater system. The AV5100 contains all the necessary radio transceiver and digital baseband circuitry to form a complete digital wireless node without the need for external processing.

The WSM520V can be powered from a +5V supply input and the AV5100 contains all the necessary power management and analog circuitry needed to operate the chip.

The WSM520V can operate in upper bands (5725~5825MHz) of 5GHz spectrum, enabling worldwide coverage.

2. Feature

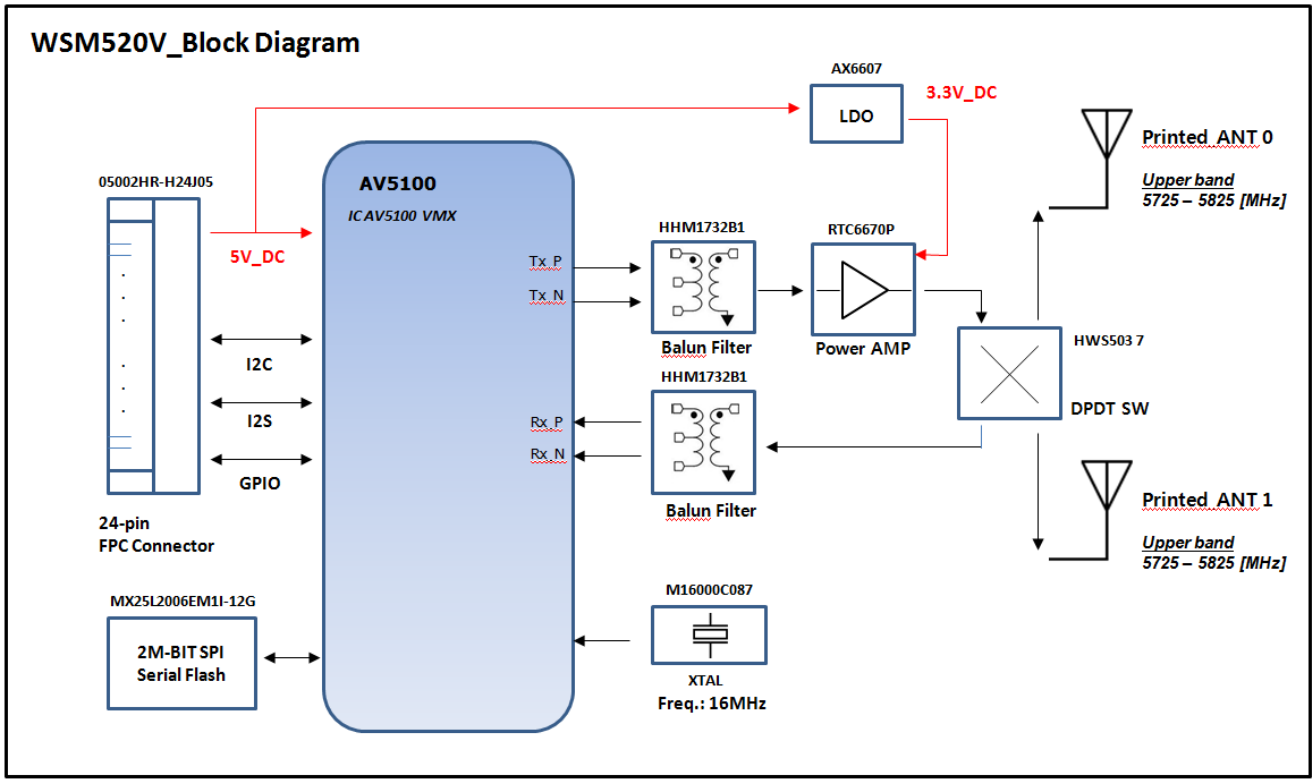
- Product form factor
  - Module Size (mm): 40.0 (W) X 26.0 (L) X 3.0 (H)
  - PCB size (mm): 40.0 (W) X 2.6.0 (L) x 1.0 (H)
  - Shield can (mm): 24.7 (W) X 21.9 (L) X 2.0(H)
  - Antenna Type : PCB Printed Antenna



- Complete VMX wireless audio comm. system
- 5.725-5.825 GHz RF operation
- 96dB SNR
- Multiple OTA audio configuration
- Low, fixed latency (<20ms)
- Separate RF transmit and receive RF I/O
- RX diversity
- USB digital audio capability
- I2S digital audio capability
- Complete power management
- 24pin I/O connector

3. Block Diagram

The Block diagram of WSM520V module is shown in the below picture.

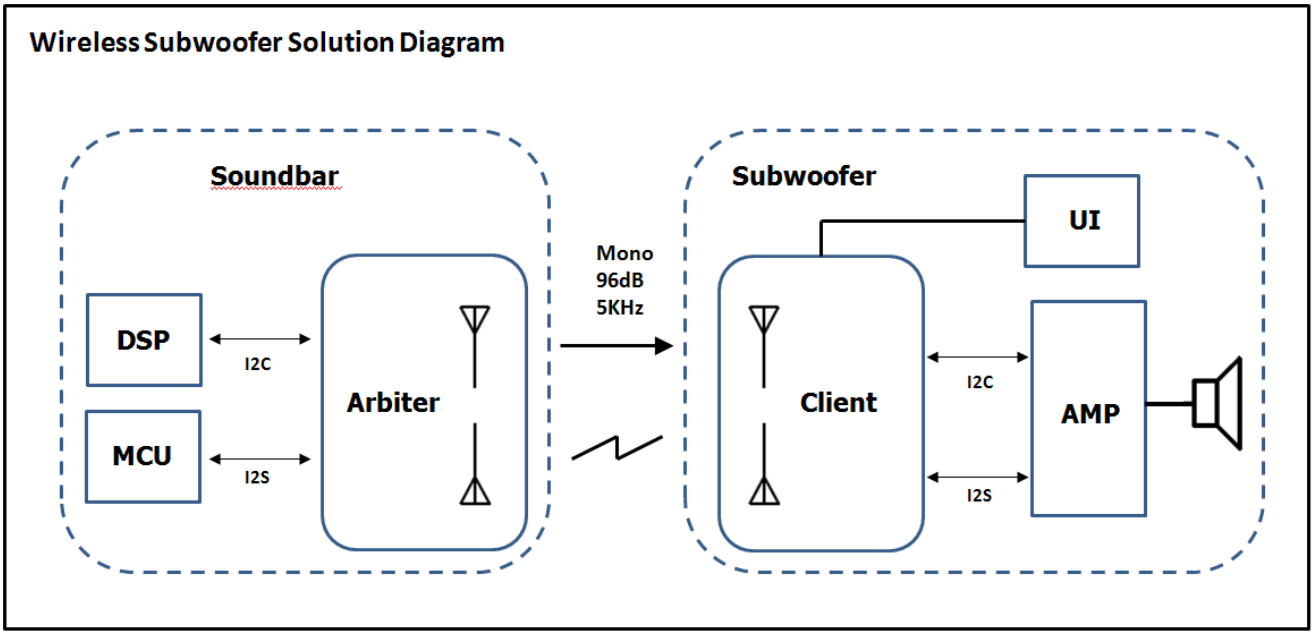


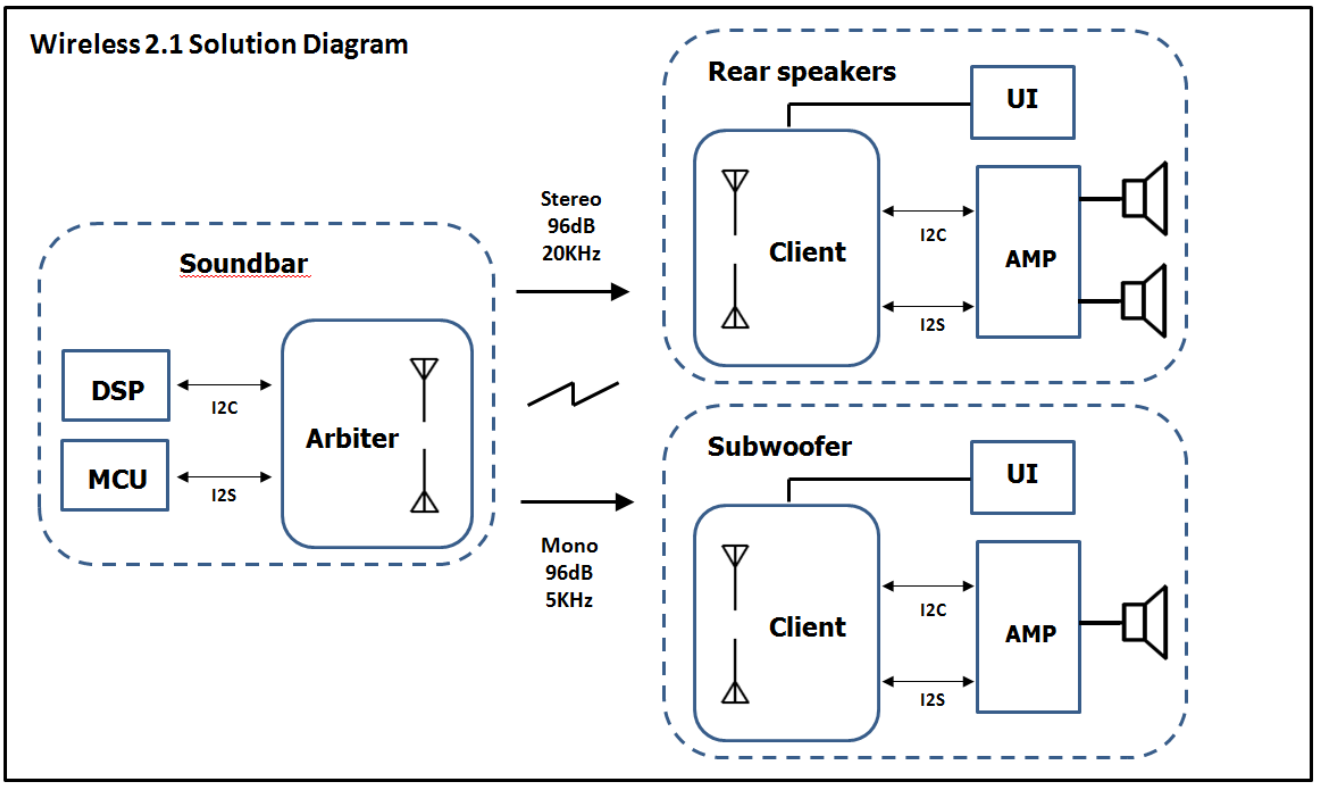
WSM520V block diagram

- PCB Antenna 0: 5725~5825MHz
- PCB Antenna 1: 5725~5825MHz
- X-TAL: 16MHz

4. Functional Diagram

The functional diagrams of WSM520V module are shown in the below pictures
The WSM520V can provide wireless audio service in applications with wireless subwoofer solution and wireless 2.1 solutions.





5. Operating Conditions

Symbol	Parameter	Min.	Typ.	Max.	Unit
V dc	Supply Voltage	4.5	5.0	5.5	V
I dc	Supply current	-	-	500	mA
Temp	Operating Temperature	5		35	℃

6. RF Characteristics

Parameter	Value	Unit
Modulation	Pi/4DQPSK / SSB	
RF Frequency Range	5725 – 5825	MHz
Bandwidth	2	MHz
RF Frequency	Channel (0) LO : 5725, Fc: NOT USED Channel (1) LO : 5727, Fc: NOT USED Channel (2) LO : 5729, Fc: 5730.35 Channel (3) LO : 5731, Fc: 5732.35 Channel (4) LO : 5733, Fc: 5734.35 . . . . . . Channel (45) LO : 5815, Fc: 5816.35 Channel (46) LO : 5817, Fc: 5818.35 Channel (47) LO : 5819, Fc: 5820.35 Channel (48) LO : 5821, Fc: NOT USED Channel (49) LO : 5823, Fc: NOT USED	MHz
Diversity	1TX / 2RX	
Antenna peak gain	2.2	dBi
RF TX output power (tolerance)	14.0 (+2dB)	dBm

7. Transmit mode

In transmit mode, the audio engine transforms the audio data into packetized digital IQ signals. These are in turn pulse-shaped before conversion by DAC to match to the analog IQ inputs of the radio transceiver. The radio transceiver has programmable baseband filter to lower the RF spectrum side lobes and to suppress the DAC image and the DAC spurious. The output power is programmable. A power detector (PD_Out) on the radio transceiver enables close-loop TX power control. The differential RF TX DA outputs are connected via a balun filter to Power amplifier and the amplified TX carrier signal is radiated by a printed antenna in the module after going through Transmit/Receive switch placed between

power amplifier and the printed antenna.

8. Receive mode

In receive mode , antenna diversity is supported. The single ended output of the T/R switch is connected to the differential RF LNA inputs in the AV5100 through balun filter. Filtering and amplification is all performed by the radio transceiver function in the AV5100. The gain setting is controlled by BB. The analog IQ outputs are sampled by the BB having dual channel ADC to convert. The received data is demodulated and fed to the audio processing engine controlling the audio function

9. Clock

The main crystal is connected to the AV5100 IC. The clock frequency is 16MHz and feed it to the AV5100.

10. I/O interface

The WSM520V module has 24pin-FPC connector for I/O interface. The 24-pin connector is configured as the following table.

Pin Number	Pin Name	I/O	Description
1	VDD_5V	PWR	Regulated 4.5V to 5.5V input
2	VDD_5V	PWR	Regulated 4.5V to 5.5V input
3	GPIO5 / I2CS_SCL	I/O	I2C serial clock slave
4	GPIO4 / I2CS_SDA	I/O	I2C serial data slave
5	GPIO19 / WCLK1	I/O	I2S Left Light clock 1
6	RESET	I	Reset
7	GPIO9 / MISO_EXT_FLASH	I/O	External flash memory data output
8	GPIO8 / MOSI_EXT_FLASH	I/O	External flash memory data input
9	GPIO17 / I2CM_SCL	I/O	I2C serial clock master
10	GPIO16 / I2CM_SDA	I/O	I2C serial data master
11	GPIO10 /MCLK	I/O	12.288MHz Audio clock I/O
12	GND	GND	GND
13	GPIO11 /I2S_BCK0	I/O	I2S Bit clock 0
14	GPIO12 /I2S_WCLK0	I/O	I2S Left Light clock 0
15	GPIO6 / CS_EXT_FLASH	I/O	External flash memory chip select
16	GPIO13 /I2S_DAT_0	I/O	I2S data 0
17	GPIO7 / SCLK_EXT_FLASH	I/O	External flash memory clock input
18	GPIO14 / I2S_DAT_1	I/O	I2S data 1
19	GPIO15 / I2S_DAT_2	I/O	I2S data 2
20	GPIO18 /BCK1	I/O	I2S Bit clock 1
21	GPIO2 /S_SSB	I/O	
22	GPIO3 /S_SCLK	I/O	
23	GPIO24	I/O	GPIO
24	GND	GND	GND

11. Notice

FCC Statement

This device complies with Part 15 of FCC Rules, Operation is Subject to following two conditions:

(1) This device may not cause harmful interference, and
(2) This device must accept any interference received including interference that cause undesired operation.

Caution: Any changes or modifications to the equipment not expressly approved by the party responsible for compliance could void user s authority to operate the equipment.

This equipment has been tested and found to comply within 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 different circuit from that to which the receiver is connected
• Consult the dealer or an experienced radio/TV technician for help.

This device and its antenna(s) must not be co-located or operation in conjuction with any other antenna or transmitter.

IMPORTANT NOTE:

FCC Radiation Exposure Statement;
This appliance and its antenna must not be co-located or operation in conjunction with any other antenna or transmitter.
A minimum separation distance of 20 ㎝ must be maintained between the antenna and the person for this appliance to satisfy the RF exposure requirements.

USER MANUAL OF THE END PRODUCT:

In the users manual of the end of product, the end user has to be informed to keep at least 20cm separation with the antenna while this end product is installed and operated.

The end user has to be informed that the FCC radio-frequency exposure guidelines for an uncontrolled environment can be satisfied. The end user has to also be informed that any changes or modifications not expressly approved by the manufacturer could void the user's authority to operate this equipment.
If the size of the end product is smaller than 8x10cm, then additional FCC part15.19statement is required to be available in the users manual; This device complies with Part15 of FCC rules.

LABEL OF THE END PRODUCT:

The final end product must be labeled in a visible area with the following " Contains TX FCC ID: A3LWSM520V ". If the size of the end product is larger than 8x10cm, then the following FCC part 15.19 statement has to also be available on the label: This device complies with Part 15 of 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.

IC Statement

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

Operation is subject to the following two conditions:

(3) this device may not cause harmful interference and
(4) this device must accept any interference received, including interference that may cause undesired operation.

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

This device and its antenna(s) must not be co-located or operation in conjuction with any other antenna or transmitter. The device could automatically discontinue transmission in case of absence of information to transmit, or operational failure. Note that this is not intended to prohibit transmission of control or signaling information or the use of repetitive codes where required by the technology.

IMPORTANT NOTE:

IC Radiation Exposure Statement:
This equipment complies with IC RSS-102 radiation exposure limits set forth for an uncontrolled environment.
This equipment should be installed and operated with minimum distance 20cm between the radiator & your body

IMPORTANT NOTE:

This module is intended for OEM integrator. The OEM integrator is still responsible for the IC compliance requirement of the end product, which integrates this module.
20cm minimum distance has to be able to be maintained between the antenna and the users for the host this module is integrated into. Under such configuration, the IC RSS-102 radiation exposure limits set forth for an population/ uncontrolled environment can be satisfied.
Any changes or modifications not expressly approved by the manufacturer could void the user's authority to operate this equipment.

USERS MANUAL OF THE END PRODUCT:

In the users manual of the end product, the end user has to be informed to keep at least 20cm separation with the antenna while this end product is installed and operated. The end user has to be informed that the IC radio-frequency exposure guidelines for an uncontrolled environment can be satisfied. The end user has to also be informed that any changes or modifications not expressly approved by the manufacturer could void the user's authority to operate this equipment. IC statement is required to be available in the users manual: This Class B digital apparatus complies with Canadian ICES-003.
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.

LABEL OF THE END PRODUCT:

The final end product must be labeled in a visible area with the following " Contains TX IC : 649E-WSM520V ".