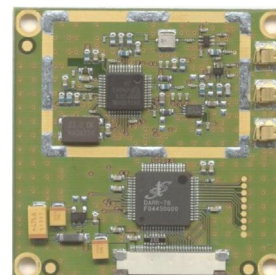


DWAM78

Digital Wireless Audio Module

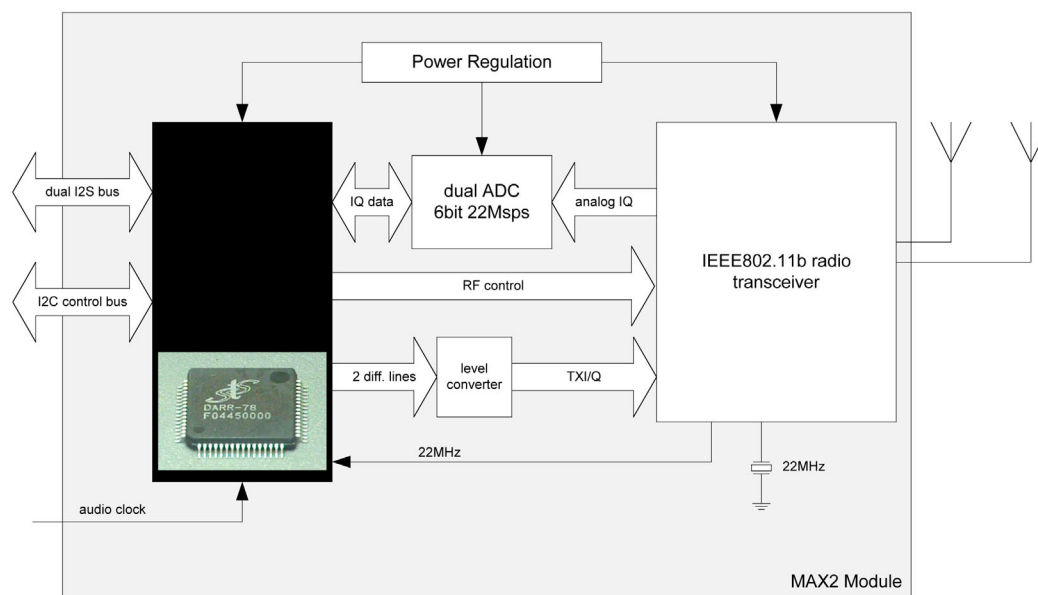


Product Description

The DWAM78 is an OEM module (50x50mm) that utilizes the STS DARR78 chipset. It is a wireless digital audio transceiver operating in the 2.4GHz ISM band. It can be configured to transmit or receive 3 high quality audio channels. A bi-directional data channel is additionally available.

The module provides all required functionality for reliable wireless digital audio connection, i.e. the module interfaces directly with the external CODEC and only requires an external microcontroller for configuring the module and transmission of data messages (bi-directional for all applications). The module comprises advanced autonomic algorithms to cope with several simultaneous interference sources present in the 2.4GHz ISM band.

The DWAM78 interfaces with the customer application board over a flat cable connection through an I2C interface. The digital audio interface is over the same flat cable and is in either S/PDIF or I2S format. The module hosts RF connectors to interface with external antennas and supports spatial receiver diversity.



Above the basic block diagram of the MAX2 Technology based DWAM78 module is depicted. The same module is used for both the Central Unit (CU, transmitter) and Mobile Unit (MU, receiver). They only differ in terms of the configuration string that is externally supplied by a general purpose microcontroller. Also, with this configuration string, the DWAM78 can be configured to host many different applications. The DWAM78 is a true Wireless Audio Platform.



©STS/2005 STS is a trade name of Wireless Sound Solutions BV
 Zekeringstraat 40 • 1014 BT Amsterdam, The Netherlands
 Tel: +31 20 420 4200 • Fax: +31 20 420 9652 • www.sts.nl • info@sts.nl

Basic Features

- Secure, wide band, scrambled digital 2.4GHz wireless link in the world-wide license exempt 2400-2483.5 MHz ISM-band.
- Digital audio:
 - uncompressed audio (44.1ksps or 48ksps, 16bit)
 - or optional proprietary low latency compression algorithm
 - up to three audio channels per link (up to three CU's may be interconnected to extend the number of audio channels)
- Low latency (configurable from 10...17ms)
- Advanced dedicated base band controller to provide an enhanced level of robustness against both in- and out of band interferers:
 - Microwave ovens
 - WLAN (802.11.x)
 - 2.4GHz cordless phones
 - Bluetooth (class I, II, III)
 - GSM telephones
 - DECT telephones
- In-room or multi-room usage (point to multi-point is also supported)
- I²S and S/PDIF input/output
- Bi-directional data channel
- Programmable digital audio gain
- Soft audio muting under poor link circumstances
- Automatically controlled receiver antenna spatial diversity
- Automatic frequency allocation
- Compliance with applicable European and US American laws, especially EN 300 328 and FCC Part 15.247
- I²C control bus
- Efficient link quality monitoring
- Power Down Duty Cycle mode: if the CU is powered down, the MU will automatically enter into low power state until the CU is powered up after which the MU will automatically power up again

MAX2 Technology Example Applications

Wireless 3 Channel Audio System

- High quality, uni-directional 3 channel (e.g. 2 rear speakers and 1 subwoofer) audio link
- Bi-directional data traffic

Wireless Stereo System

- Add any number of speakers/headsets to tune in on wireless audio
- High quality uni-directional 2-channel audio
- Bi-directional data traffic
- Multi-room, multi-speaker (point-to-multipoint) functionality

Wireless Headphone System

- High quality, stereo uni-directional audio link with multi-room, multi-speaker functionality
- Bi-directional data traffic, low power consumption receiver

Wireless Microphone System

- High quality, mono uni-directional audio link
- Bi-directional data traffic, low power consumption transmitter



For one of the MAX2 Technology Example Applications as listed above, the specifications are detailed here below:

Wireless 3 Channel Audio System Specifications				
ID	Parameter	Value	Unit	Remarks
RF Characteristics				
	RF frequency range	2400-2483.5	MHz	
	Number of RF channels	3		
Air framing				
	Addressing	12	Bit	
	Data message size	16	Byte	
	CRC	16	Bit	
Control				
	Control interface	I ² C		Compliant with the I2C protocol, 0Ö 400kbps. Base address 0x80, can be offset by A0 and A1 HW pins.
	Data Bandwidth	20	kbps	Bi-directional
	Data latency	15	ms	Maximum
Link budget				
	Range indoor	> 50	m	Same room, no drop-outs from multi-path guaranteed
	Range line of sight	>100	m	Open Field
	Output power	16	dBm	Typical Value
Interference Robustness				
	Fixed frequency devices (e.g. WLAN, microwave oven)			Fully coexistent *)
	Frequency hopping devices (e.g. Bluetooth, 2.4GHz cordless phones)			Fully coexistent *)
*) Laboratory tests have verified coexistence with interference sources collocated. Exact ranges are scenario dependent (function of latency, output power, audio compression, etc.). A mix of interference sources is allowed. Interference of fixed frequency devices may result in the loss of one useable RF channel.				



Current Consumption/Power Supply				
	Supply voltage Typical	3.3	V	Regulated voltage
	Average current Mobile Unit	25/39	mA	Compressed/uncompressed audio, single audio channel, NACK protocol, 48ksps
		40/68	mA	Compressed/uncompressed audio, stereo audio, NACK protocol, 48ksps
	Average current Central Unit	78/120	mA	Compressed/uncompressed audio, stereo audio, NACK protocol, 48ksps
Audio Interface				
	Available Interface Types	I ² S S/PDIF LRJ		configurable
	Number of audio output channels on Mobile Unit	1, 2 or 3		Per RF channel
	Number of audio input channels on Central Unit	1, 2 or 3		Per RF channel
Operating Conditions				
	Min operating temp.	-10	°C	
	Max operating temp.	60	°C	
Audio Quality				
	Sample rate	44.1 or 48	ksps	At 48ksps, the third audio channel must be of compressed format.
	Sample width	16	bit	
	Latency	16.0	ms	Configurable from 10 to 17ms ¹ .
	SINAD	99.7	dB	A-weighted, measured at S/PDIF interface, uncompressed audio
	THD (compressed audio)	0.3	%	Measured at S/PDIF interface
	THD (uncompressed audio)	0.003	%	Measured at S/PDIF interface
	Frequency response	0	dB	20HzÖ 22kHz (measured at S/PDIF interface)
Dimensions				
	Board dimensions	50x50x5	mm ³	



Pin description

The host interface is a 30 pin 0.5mm pitch FFC (type number FCI SFV30R-4STE1, Molex 54104-3096 or equivalent). The pin functions are listed in the table below:

	Pin Number	Pin Name	I/O	Description
Audio				
	6	SDOUT_A	Bidirectional	I2S or S/P-DIF Out (port A)
	7	SDIN_A	In	I2S or S/P-DIF In (port A)
	8	BCK	Bidirectional	Bit Clock for ports A and B
	9	LRCK	Bidirectional	Left Right Clock for ports A and B
	14	AUDIO_CLK	Input	11.2896 MHz /12.288 TTL input
	10	SDOUT_B	Bidirectional	I2S output data, port B
	11	SDIN_B	Input	I2S input data, port B
Control				
	15	A0	Input	A0 and A1 form two bit offset address for 2-wire I2C Slave Address (Base Address 0x80)
	16	A1	Input	See A0
	17	I2C_SDA	Bidirectional	Data pin of 2 wire serial bus
	18	I2C_SCL	Output	Clock pin of 2wire serial bus
	19	INT	Output	Low Level Interrupt pin. Requires external pull-up resistor.
	20	RESN	Input	Low Active Reset Pin
	21	CTRL_SYNC	Bidirectional	Synchronization pin for CUIs (only applicable when operating collocated multiple CUIs)
	22	EN	Input	Enabling Wireless operation mode (no MCU)
	23	SYNC_STATUS	Output	Signal showing if module is in sync.
Power				
	1,2	VDD		3.3V Regulated voltage
	3,4,5	GND		
Miscellaneous				
	12, 13, 24, 25, 26, 27, 28, 30	NC		Leave Not Connected or connect to GND for isolation purposes.
	29	Debug_TXD		For debugging purposes

RF Connections

The MAX2 module has three Radial UMP R107.103.030 RF connectors. These can be configured as follows:

- One RF connection to an external antenna (no RX diversity, shared antenna for both TX and RX)
- Connection of two external antennas (RX diversity, one RX antenna is used for transmission)
- Connection of three external RF connectors (RX diversity and one dedicated TX antenna).

