Theory of Operation

AM1010B and AM1010H

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Version 1.2

1.0 Theory of Operation

1.1 System Abstract:

The characterstics of AM1010 is that One Chip IC offers all functions. AURA IC's Short Range Magnetic Induction ASIC, AB1002 and AH1002 provide communications signal for BU(AM1010B Base Unit) and HU(AM1010H Headset Unit). AM1010 IC sends and receives AM modulation signal through LC antenna. Wireless communication's receiver and transmitter are created by Magnetic Induction and the power consumption is very low and the unwanted emission are minimized. Receiver signal is controlled by AGC(Automatic Gain Controller) and it creates communication signal by IQ-Modulator and Direct Conversion method. Communication signal transmits low noise signal though Compressor and Expender in the IC. ASIC has TX, LO1, LO2 derived by PLL and can choose maximum 2 channels.

1.2 Dimensional Antenna

The biggest characteristic of AM1010 is that 3 receiver and transmitter antenna with X,Y,Z axis are built in BU. This method prevents from lowering signal output by the signal direction of Magnetic Induction. Each axis of receiver antenna and transmitter antenna are constructed in the same direction. ASIC of BU do summing the signals from each axis and combines communication signals and then sends the signal by transmitter antenna which finds the strongest signals among the 3 axis antenna. The selection of transmitter antenna continues during communication and BU's transmitter antenna is selected automatically which is depends on the direction of HU's transmitter antenna.

1.3 X-Tal, TX, Local Oscillator 1 and 2

The set up for AM1010 wireless frequency is determined by Channel Switch. The channel can have maximum 2. Transmitter frequency is controlled by the internal PLL, according to selected channel value and transmitter frequency is calculated according to the following table. Reference frequency is obtained from X-tal(3.58MHz). TX Oscillator and Fist Local Oscillator and Second Local Oscillator are created internal ASIC. Especially, HU's wireless frequency can be automatically tracking according to Base's transmitter frequency. HU's wireless frequency Tracking can control automatically HU's Reference frequency by Varactor Diode which is installed inside of HU's ASIC AH1002. Therefore,

for frequency variation due to the environment, HU and BU can maintain the same frequency.

1.4 Modulation

After BU and HU pass Compressor equally, communication signals change and become Buffering through Inverter IC which connects to external ASIC and AM signals are Radiated through LC antenna.

1.5 AGC(Automatic Gain Control)

The signal received by antenna is amplified by input amplifier in internal ASIC. Because the amplifier gain is fixed by RF-load, when the over limit signal sends to antenna, the signal becomes saturated and it causes signal Distortion. To prevent this, AGC (Atomatic Gain Controller) using Transistor Switch is built between antenna and RF-Load. When the internal Gain Controller voltage becomes over the limit level, it will turn on Transistor Switch and reduce the impedance of Rf-load and lower the Gain

1.6 Demodulator

After the receiver signal mixes with LO1(First Local Oscillator) inside ASIC and passes 455KHz IF filter outside, it makes communication signal though I-Q modulator. In I-Q modulator, it mixes with LO2 (second Local Oscillator). In BU, separate I-Q modulator is installed where 2 I-Q Modulator will inspect the third axis receiver signal and will transmit to the direction of the antenna which finds the strongest signal.

1.7 OOR (Out of Range Detector)

Depending on the demodulated communication signal volume, it sets OOR by comparing the DC size for found Gain Error and externally fixed OOR Range with resistance. BU indicates the status of OOR in Yellow color LED and HU warns the distance Tone signal to the user through speaker. When OOR is set, it

mutes the block of internal receiver communication output and prevents the noise signal to go outside through Audio Line.

Table 1: Headset Transceiver Frequency Chart

<FS2, FS1, FS0>	Synth	Freq (Hz)	M	N
<1,0,0>	TX	484238	133	9
	LO1	2260992	69	1
	LO2	455111	125	9
	RX	1805880		
<1,0,1>	TX	494796	151	10
	LO1	2277376	139	2
	LO2	455475	139	10
	RX	1821900		

Table 2: Base Unit Transceiver Frequency Chart

<FS2,FS1,FS0>	Synth	Freq (Hz)	M	N
<1,0,0>	TX	1805880	496	9
	LO1	939349	86	3
	LO2	455111	125	9
	RX	484238		
<1,0,1>	TX	1821900	278	5
	LO1	950272	29	1
	LO2	455475	139	10
	RX	494796		