

Model: IBM3815

TECHNICAL DESCRIPTION

Content

HANDSET

1. RF/Audio Sections

1.1 Receiver

1.2 Transmitter

1.3 Duplexer

1.4 Alerter

1.5 microphone

2. MCU

2.1 Battery Detect

2.2 Carrier Detection

BASE

3. RF/Audio Sections

4. Telephone Network

4.1 Telephone Interface

4.2 Ring Detect

4.3 Sidetone Cancellation Network

4. MCU

5.1 Charging Network

5.2 Carrier Detection

HANDSET

1. RF/Audio Section

The radio link Handset and Base is full duplex at 2475/2403 MHz with the 40 channels. FM modulation is used for the link. The 1st IF frequency is 10.7MHz and the 2nd IF FREQUENCY IS 455kHz. The operating frequency for the cordless phone is selected from one of the following channels and controlled by the synthesizer U2 which is programmed by the MCU. Please refer to Table 1 for the Channel Frequency Table.

This section is common to both handset and base as the same ICs are used: LMX1602(U2), KA3361(U1) is made up of dual serial input PLL frequency synthesizer with 2.4GHz prescaler. KA3361 is a narrow-band IF detector IC.

1.1 Receiver

The receiver section is made of double conversion with 10.7MHz as the first and second IF. Rx signal from the duplexer circuit is amplified by a Low Noise RF transistor and passed to a Mixer (Q2), and it is converted to 10.7MHz IF and it is then double converted to 455kHz IF in the internal mixer of U1. Voice/data signal is demodulated and output from pin 9 of U1. The demodulated signal is then divided into two paths, a path is fed into the data amplifier Q201, Q202. The recovered data signal RX-DATA is extracted from the output of Q202. The other path will go through a de-emphasized amplifier and an expander in U1 (DBL5015). Recovered signal can be muted by the pin 13 of U1, the 2 volume levels of the signal can be controlled by the switch SW1.

1.2 Transmitter

Audio signal (from Microphone for handset/Tip & Ring for base) is first fed into the amplifier and compressor inside U1 (DBL5015). The signal will pass through a limiter. The AGC and the limiter has the property to limit the maximum signal which feed into the transmitter so that the RF deviation is limited. The transmitter section mainly divided into two parts. They are the voice/data modulator and the Tx power amplifier. The voltage controlled oscillator VCO operated at the Tx frequency controlled by the synthesizer is modulated by the audio and data signals. Modulated signal is amplified by the RF amplifier and sending the signal to the duplexer for radiation by the antenna.

1.3 Duplexer

Two band-pass filter are matched to use as duplexer. The function of the duplexer is to multiplex the transmitting and receiving signals to a common

antenna while providing isolation and rejection of interference and other spurious signals.

1.4Alerter

The alerting signals include the following: Ringing, Paging, Key Beep and Low battery warning tone. These tones are generated by the MCU to the alerter through the driving circuit formed Q103 and the associated components.

1.5 microphone

The condenser microphone is in the headset and it biased by the resistor R132. The signal is applied to the amplifier inside U1(DBL5015)

2. MCU

2.1Battery Detect

The voltage detector is composed of Q101,Q102 which is used to detect battery low condition. The detecting accuracy of the voltage detector is $3.2\pm 0.2V$. The detect pin BAT-LOW is connected to the pin 70 of the MCU.

2.2 Carrier Detection

This 40 channels cordless has the features of auto-scanning. This is done by the detection of the RSSI at pin 71 of MCU of handset. During PHONE on or CHANNEL changing, the MCU will select the clearest channel for the RF communication.

BASE

3. RF/Audio sections

The operation of the RF/Audio section are similar to that of the handset.

4. Telephone Network

4.1Telephone Interface

Fuse FUSE1 is for over-voltage protection. Relay RL1 controls the on/off hook state and pulse dialing. The Tip&Ring are isolated from the base circuit by the

transformer T1, relay RL1.

4.2 Ring Detect

When ring signal is present on the Tip Ring, and envelope waveform of the ring pattern will transfer to pin 69 of MCU by the Q102. The MCU will read this waveform and determine whether it will send ringer command.

4.3 Sidetone Cancellation Network

The sidetone cancellation is a hybrid circuit of the Tx and Rx paths of the telephone circuit formed by the Q103

5. MCU

5.1 Charging Network

Base charging circuit provides a DC current for handset batter. Resistor R303 controls the current flow.

5.2 Carrier Detection

This is similar to the handset counterpart.

Antenna Description

The antennas used in base unit and handset, which are soldered on the RF module of PCB board, are soft wires. In addition, they are integral.

FREQUENCY TABLE OF IBM-3815

1st IF 10.7MHz

2nd IF:450khz

				(H TX+10.7)/3		(B TX+10.7)/3	
CH No.			BASE TX	BASE LOCAL		HAND TX	HAND LOCAL
1	0	2403.05	801.0166667	828.2333333	2474.00	824.6666667	801.3333333
2	1	2403.10	801.0333333	828.2500000	2474.05	824.6833333	801.6000000
3	2	2403.15	801.0500000	828.2666667	2474.10	824.7000000	801.6166667
4	3	2403.20	801.0666667	828.2833333	2474.15	824.7166667	801.6333333
5	4	2403.25	801.0833333	828.3000000	2474.20	824.7333333	801.6500000
6	5	2403.30	801.1000000	828.3166667	2474.25	824.7500000	801.6666667
7	6	2403.35	801.1166667	828.3333333	2474.30	824.7666667	801.6833333
8	7	2403.40	801.1333333	828.3500000	2474.35	824.7833333	801.7000000
9	8	2403.45	801.1500000	828.3666667	2474.40	824.8000000	801.7166667
10	9	2403.50	801.1666667	828.3833333	2474.45	824.8166667	801.7333333
11	A	2403.55	801.1833333	828.4000000	2474.50	824.8333333	801.7500000
12	B	2403.60	801.2000000	828.4166667	2474.55	824.8500000	801.7666667
13	C	2403.65	801.2166667	828.4333333	2474.60	824.8666667	801.7833333
14	D	2403.70	801.2333333	828.4500000	2474.65	824.8833333	801.8000000
15	E	2403.75	801.2500000	828.4666667	2474.70	824.9000000	801.8166667
16	F	2403.80	801.2666667	828.4833333	2474.75	824.9166667	801.8333333
17	10	2403.85	801.2833333	828.5000000	2474.80	824.9333333	801.8500000
18	11	2403.90	801.3000000	828.5166667	2474.85	824.9500000	801.8666667
19	12	2403.95	801.3166667	828.5333333	2474.90	824.9666667	801.8833333
20	13	2404.00	801.3333333	828.5500000	2474.95	824.9833333	801.9000000
21	14	2404.05	801.3500000	828.5666667	2475.00	825.0000000	801.9166667
22	15	2404.10	801.3666667	828.5833333	2475.05	825.0166667	801.9333333
23	16	2404.15	801.3833333	828.6000000	2475.10	825.0333333	801.9500000
24	17	2404.20	801.4000000	828.6166667	2475.15	825.0500000	801.9666667
25	18	2404.25	801.4166667	828.6333333	2475.20	825.0666667	801.9833333
26	19	2404.30	801.4333333	828.6500000	2475.25	825.0833333	801.9999999
27	1A	2404.35	801.4500000	828.6666667	2475.30	825.1000000	801.9999999
28	1B	2404.40	801.4666667	828.6833333	2475.35	825.1166667	801.9999999
29	1C	2404.45	801.4833333	828.7000000	2475.40	825.1333333	801.9999999
30	1D	2404.50	801.5000000	828.7166667	2475.45	825.1500000	801.9999999
31	1E	2404.55	801.5166667	828.7333333	2475.50	825.1666667	801.9999999
32	1F	2404.60	801.5333333	828.7500000	2475.55	825.1833333	801.9999999
33	20	2404.65	801.5500000	828.7666667	2475.60	825.2000000	801.9999999
34	21	2404.70	801.5666667	828.7833333	2475.65	825.2166667	801.9999999
35	22	2404.75	801.5833333	828.8000000	2475.70	825.2333333	801.9999999
36	23	2404.80	801.6000000	828.8166667	2475.75	825.2500000	801.9999999
37	24	2404.85	801.6166667	828.8333333	2475.80	825.2666667	801.9999999
38	25	2404.90	801.6333333	828.8500000	2475.85	825.2833333	801.9999999
39	26	2404.95	801.6500000	828.8666667	2475.90	825.3000000	801.9999999
40	27	2405.00	801.6666667	828.8833333	2475.95	825.3166667	801.9999999