

C4210 CIRCUIT DESCRIPTION

CONTENT

1. Introduction
2. Functional Blocks of C4210 Handset
3. C4210 Handset Unit Circuit Block Description
4. Functional Blocks of C4210 Base unit
5. C4210 Base Unit Circuit Block Description
6. Functional Blocks of the RF Module
7. RF Module Circuit Block Description
8. C4210 Basic Operation (Base)
9. C4210 Basic Operation (Handset)
10. C4210 Basic Operation (Base and Handset)
11. RF Channels

1. Introduction

C4210 is a 40 channel (2.4GHz) cordless telephone with CID (type I and II) and Message Waiting features.

This unit is made up of two parts:

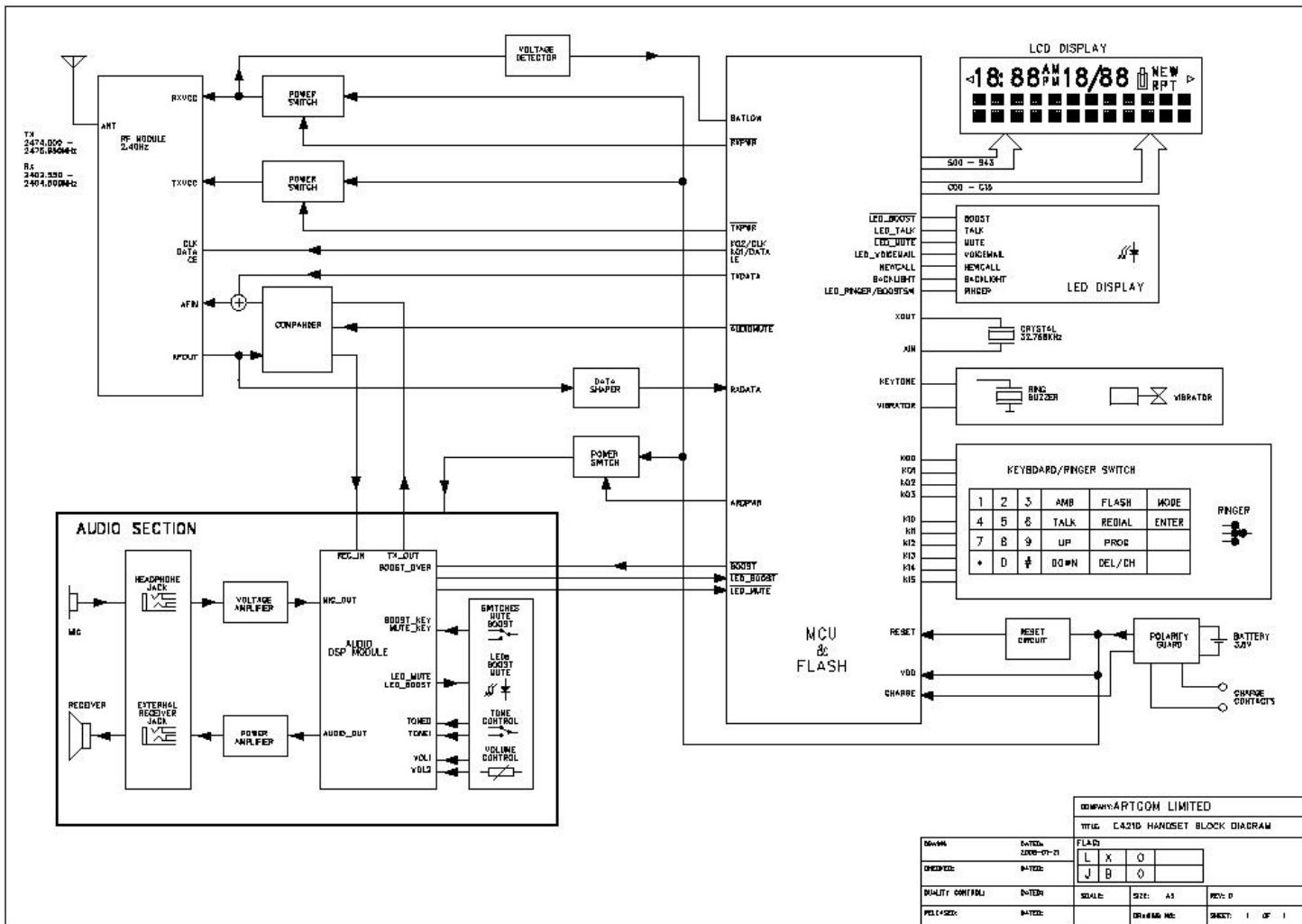
- a. A Handset unit.
- b. A Base unit.

2. Functional Blocks of C4210 Handset

The block diagram of C4210 handset unit is as shown below. It is made up of the following parts:

- 2.1 Keyboard Matrix, Switches and Function LED
- 2.2 MCU and MCU Interface
- 2.3 RF Module
- 2.4 Comander
- 2.5 Data Shaper
- 2.6 Charge and Control
- 2.7 Low Battery Detector
- 2.8 Buzzer
- 2.9 Audio Circuit

C4210 Handset Block Diagram



3. C4210 Handset Unit Circuit Block Description

3.1 Keyboard Matrix, Switches and Function LED

The keyboard consists of the following keys:

- UP/DOWN – for menu operation
- MODE – for menu operation
- TALK – for On/Off hook control
- ENTER – for voice mail operation
- PROG – for memory program and dialing
- 1, 2, 3, 4, 5, 6, 7, 8, 9, *, 0, # – numeric keys
- FLASH — provides timed On/Off hook function
- AMB – one touch memory key
- RD/P – redials the last number or provides a pause during dialing
- MUTE – turns on/off handset microphone

The MUTE key is connected to the DSP_MODULE board.

The push switches consist of the followings:

- BOOST – for On/Off the receiver amplifier gain.
This is connected to the DSP_MODULE board.
- CH/DEL – for changing RF channel and CID/Memory operation

The function of the slide switch:

- RINGER ON/VIBRATOR/OFF – turns On/Off buzzer sound and vibrator.
- TONE 1/2/3 – varies the receiver output response.
This is connected to the DSP_MODULE board.

The keyboard, push switches and slide switch are connected to Pins 84 to 94 and pin 97 of the MCU (MCU1).

The jacks consist of the following:

- HEADSET – for connection of an external microphone and receiver
- NECKLOOP – for connection of an external receiver

The function LEDs consist of the followings:

- MICMUTE (LED19 - Red) – Located under the “MUTE” key. It is On/Off when microphone is Off/On.
- BOOST (LED13 – RED) – Located under the “TALK” key. It is On/Off

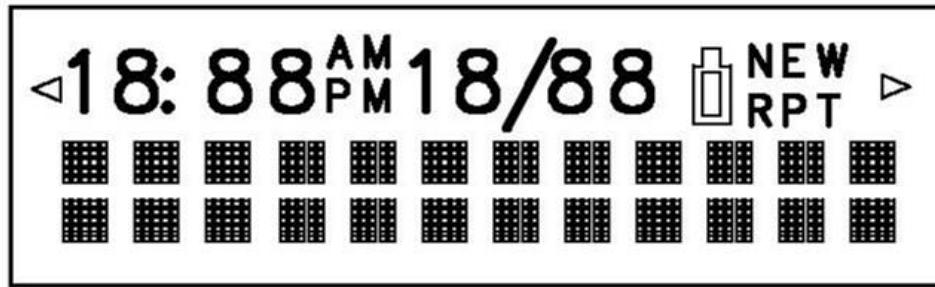
when the receiver amplifier extra gain is On/Off.

- INUSE (LED13 – GREEN) – Located under the “TALK” key. It is On/Off when the handset is Off-hook/On-hook.
- BACKLIGHT (LED1 – LED12 - Green) – Located under the keyboard. On for a short time when any key is pressed
- LCD backlight (LED20, LED21 – Green) – On for a short time when any key is pressed
- NEWCALL (LED18 - Red) – Located under the “MODE” key. Flashes when there is incoming caller ID information to be reviewed.
- VOICEMAIL (LED17 - Blue) – Located under the “ENTER” key. Blinks when there is voice mail available.
- RINGER (LED16 - Red) – Located in the handset antenna. Flashes when the telephone line rings. Steady on/off when handset is off-hook/on-hook.

These LEDs are controlled by pins 66, 91, 96, 98 and 99 of MCU.

The MUTE and BOOST LEDs are controlled by the DSP module.

The display format of the LCD is as shown below.



The display is controlled by pins 12 – 65 of MCU.

3.2 MCU and MCU Interface

The controller of the handset is MCU1. The frequency of the crystal used is 32.768 KHz. It controls the functions of the handset through the keyboard interface and signals from the base unit. The data to and from the base goes through pin 69 (data from base) and pin 71 (data to base).

The phone number memories are stored in U13.

3.3 RF Section

For operation and frequency see RF module section.

It receives the PLL data through pins 4, 5, 6 from MCU pins 95, 93 and 94.

The antenna located at the top of the unit and is permanent attached to RF module through a copper wire.

3.4 Comander

A compander U11 is used for improving the S/N of transmit and receive audio signals.

3.5 Data Shaper

The information which sent from base unit is recovered by the amplifier Q8, Q25 and Q26.

3.6 Charge and Control

ZD2, D304, D305, D306, D307, D21, D22 provide over-voltage and polarity protection during battery charging. The charge signal is detected by pin 87 of the MCU. When the handset is put into the base cradle, a negative pulse is sent to pin 74 of the MCU.

3.7 Low Battery Detector

The battery voltage is detected by U1-B and Q22. The signal is sent to pin 67 of MCU.

3.8 Buzzer and Vibrator

Q3 is the buzzer signal amplifier and driven by the MCU pins 72. Q15 is the on/off control device for the vibrator.

3.9 Audio Circuit

The DSP module checks the “TONE” switch, the “MUTE” key and the “BOOST” switch and turn on/off the MUTE and BOOST LEDs.

Speech signal is picked up by the handset microphone MIC1 and sent to the gain control module U3 (DSP_MODULE) and sent to telephone line through the compander U11 and the RF module.

The incoming speech is received through the RF module, the compander, the gain control module U3 (DSP_MODULE) and amplifier U2. When BOOST mode is On, extra gain is inserted in this audio path by U3 (DSP_MODULE).

The headset jack is for external receiver and microphone.

The neckloop jack is for an external hearing aid device.

3.10 DSP Module

The DSP_Module controls the gain and frequency response of the speech signal.

The brain of its operation is a TI DSP controller (U6) which provides the following functions:

- a. controls the CODEC (U2);
- b. scan the Timer (U5);
- c. scan the Tone switch (SW5);
- d. scan the “BOOST” switch (SW3);
- e. scan the “MUTE” key;
- f. scan the setting of the Volume (VR1); and
- g. on/off the “BOOST” and “MUTE” LEDs.

This DSP runs with a crystal of clock frequency 24.576 MHz.

The EEPROM (U7) provides the main program storage for U6.

The timer IC (U5) is used to measure the setting of the Volume control.

The handset microphone signal is picked up by the DSP_Module pin 1, Op Amp (U1) and then pin 2 of the CODEC (U2). The processed signal is sent out from CODEC (U2) pin 15, Op Amp (U3), and the DSP_Module pin 34.

The audio signal from telephone line is picked up by the DSP_Module pin 2, CODEC (U2) pin 3. The processed signal is sent out from CODEC (U2) pin 16, and the DSP_Module pin 35. The gain is depending on the VOLUME setting.

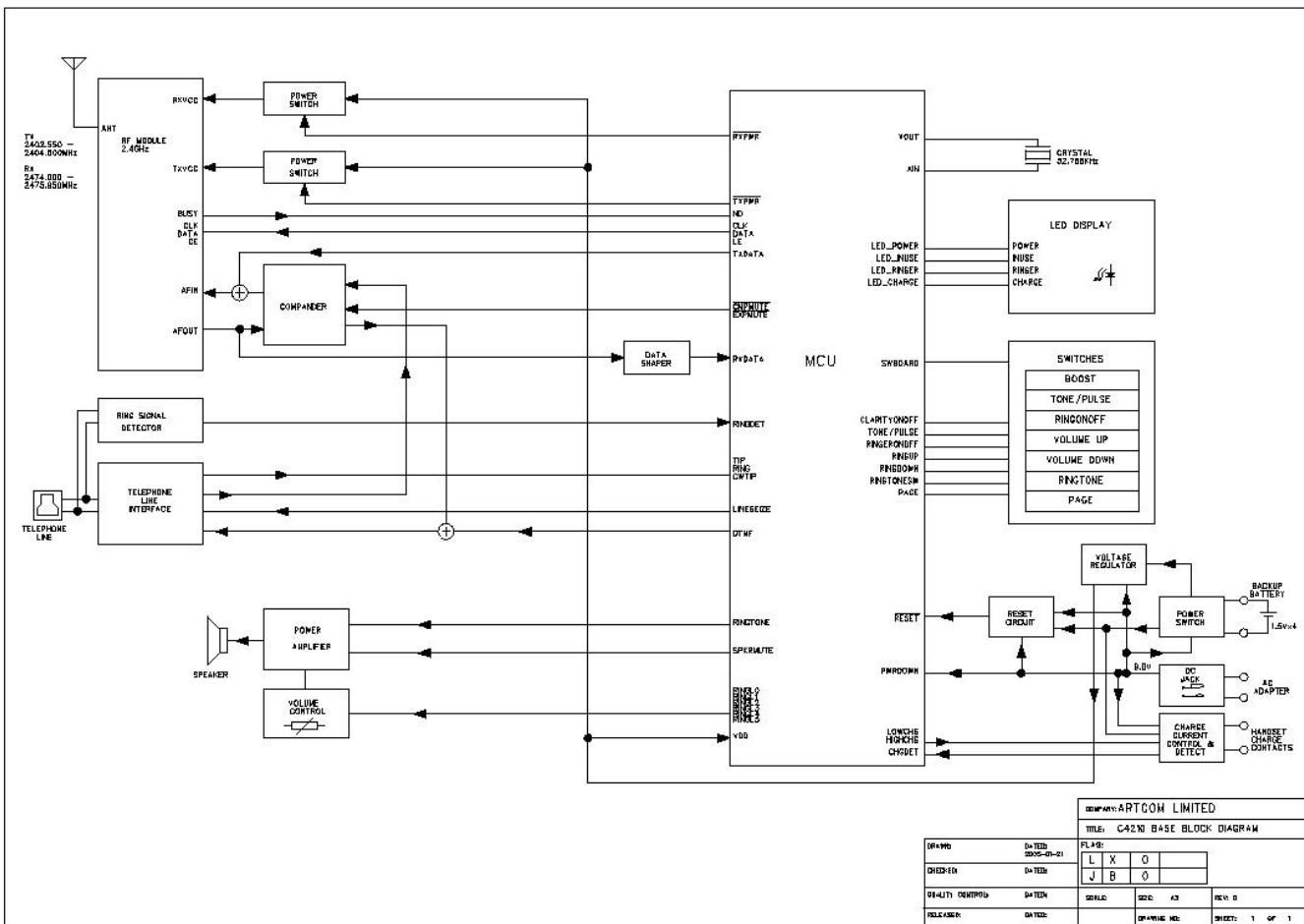
When BOOST mode is “On”, the DSP will adjust gain/frequency response depending on the combination of signal amplitude, frequency and the settings of the TONE switch (SW5).

4. Functional Blocks of C4210 Base Unit

The block diagram of C4210 base unit is as shown below. It is made up of the following parts:

- Power Supply
- MCU and MCU Interface
- RF Module
- Compander
- Data Shaper
- Charge and Control
- Telephone Line Interface
- Ring Signal Detector
- Base Ringer
- Keyboard Matrix, Switches and Function LED

C4210 Base Unit Block Diagram



5. C4210 Base Unit Circuit Block Description

5.1 Power Supply

The base unit is powered by an AC adapter (9V dc). The voltage regulator (BU3) regulates the input DC to 5V. This provides power to every part of the unit. When there is no AC power, BQ18 and BQ19 are turned on to connect the backup batteries to power the base while BZD2 controls the regulated battery output voltage to approximately 5V. The backup batteries voltage is checked periodically by BU7A and this signal is connected to pin 39 of the MCU.

5.2 MCU and MCU Interface

The controller of the base is BMCUX1 and controls the function of the unit.

On the telephone side,

- A. It monitors telephone line ring signal at pin 7.
- B. It monitors parallel phone hook status (MEI) at pin 5 through BU7-B (LM358).
- C. Decodes CID (Type 1 and Type II) and Message Waiting signals through pin 8 and pin 9.
- D. It provides DTMF signal at pin 2.

The keyboard interface is provided by pins 17 – 24.

It communicates with the handset through the RF module. PLL data to the RF module BMD1 is sent through pins 29, 37 and 44.

The data between Handset and Base is via the pin 41 (data from handset) and pin 43 (data to handset) through the RF module.

The transmitter and receiver powers are controlled by the signals from BU2-pin5 and U6-pin6 which are programmed by BMCUX1.

The frequency of the crystal used is 32.768 KHz.

5.3 RF Module

For operation and frequency see RF module section..

It receives the PLL data through pins 4, 5, 6 from MCU pins 44, 29 and 37.

The antenna located inside the base of the unit is permanent attached to RF module.

5.4 Comander

The compander BU1 is used for improving the S/N of the transmit and receive audio signals.

5.5 Data Shaper

The information sent from handset unit is recovered by the amplifier BQ15, BQ28 and BQ29.

5.6 Charge and Control

BQ4 detects the handset charging current and sends signal to MCU pin 38. BQ2, BQ13, BQ36 and BQ16 control the charging current delivered to the handset. Resistors BR108 and BR109 provide current limiting function. BQ5 detect the 9V supply and send a negative pulse to MCU pin 40 if the 9V supply fails.

5.7 Telephone Line Interface

BL1, BL2, BF1, BVAR1, BR149 and BC61 provide telephone line surge protection. BQ3, BD24, BD25, BD26, BD27, BU6 provide telephone On/Off hook function. BD3, BR34 and BT1 line transformer are the audio interface to the telephone line. The transformer BT1 is also used for telephone line isolation.

5.8 Ring Signal Detector

BL1, BC57, BR31, BZD6, BZD5, BD2, BU5, BF1 and BL2 form the ring signal detector. The signal is sent to pin 7 of MCU.

5.9 Base Ringer

BU11 and speaker BSPK1 provide base ringer sound output. MCU pin 42 provides ringer tones (six types), and this is set by MCU pin 20 (RING STYLE). The level is controlled by pin 18 (VOLUME UP), or pin 19 (VOLUME DOWN). The MCU then sets the output pins 15, 1 – 5 of BU4 (74HC595) which controls the ringer sound output level through transistors BQ30 – BQ35.

5.10 Keyboard Matrix, Switches and Function LEDs

The keyboard and switches consist of the followings:.

- PAGE – for base to page handset
- STYLE – for changing Ringer sound frequency
- VOLUME DOWN – for reducing Ringer sound output volume
- VOLUME UP – for increasing Ringer output sound volume
- RINGER ON/OFF – turns On/Off the ringer output
- BOOST ON/OFF – turns On/Off handset receiver extra gain
- T/P – for selecting Tone or Pulse mode dialing

The switches are connected to pins 17 - 24 of MCU (BMCU1).

The function LEDs consist of the followings:

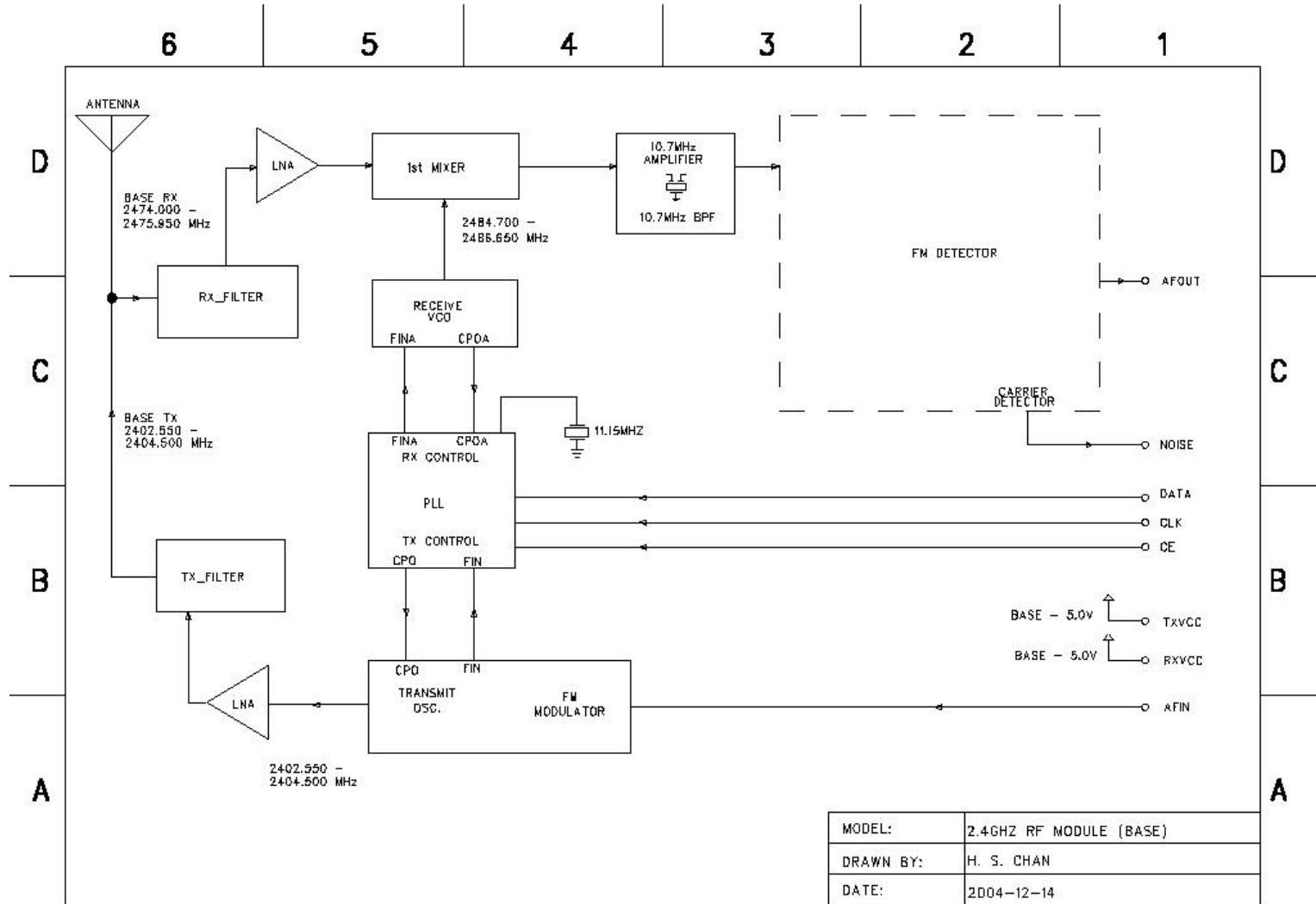
- **RINGER** (BLED6, BLED7 – Red) – Located under the antenna red lens. They are controlled by transistor BQ11 and pin 36 of MCU (BMCU1).
- **INUSE** (BLED21 – Green) – Green when C4210 is talking to the telephone line. It is controlled by transistor BQ6 and pin 15 of BU2 which is set by BMCU1.
- **CHARGE** (BLED31 – Red) – Red when handset is the cradle. It is controlled by transistor BQ10 and pin 7 of BU2 which is set by BMCU1.
- **POWER** (BLED11, BLED12 – Red/Green) – Indicates base power conditions. This is controlled by transistors BQ23, BQ27 and BU2-pin 1 which is set by MCU1.
 - Green – when the base is powered by AC adapter and good batteries.
 - Red – when the base is powered by AC adapter only.
 - Blinking Red/Green – when the base is powered AC adapter with bad batteries.
 - Blinking Red – when the base is powered by good batteries only.
 - Flashing Red – when the base is powered by batteries and the battery voltage is low.

6. Functional Blocks of the RF Modules

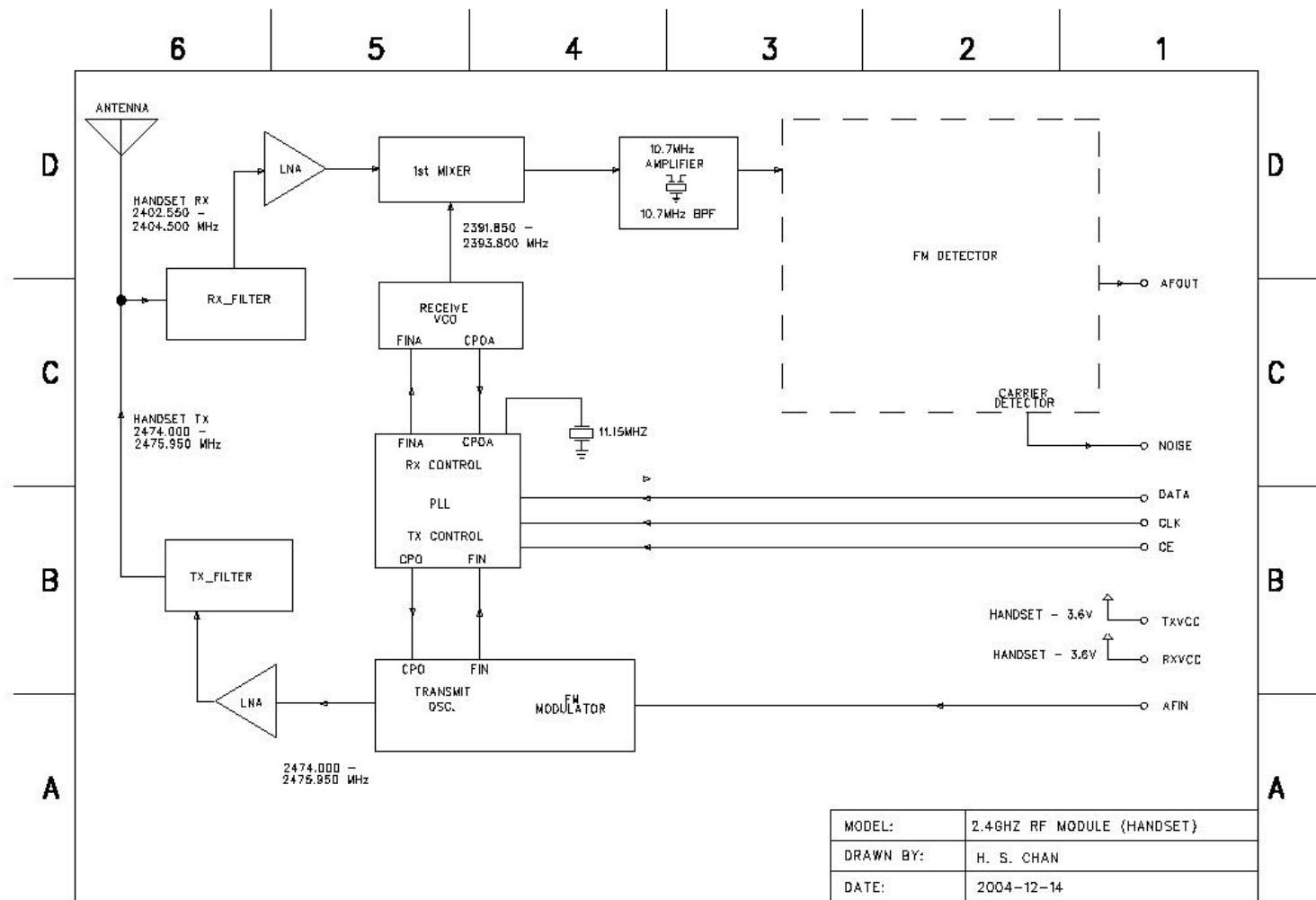
The block diagram of RF Module is as shown below. It is made up of the following parts:

- 6.1 Power Supply
- 6.2 PLL and MCU Interface
- 6.3 RF Transmitter
- 6.4 RF Receiver
- 6.5 Audio Detector

RF Module (Base) Block Diagram



RF Section (Handset) Block Diagram



MODEL:	2.4GHZ RF MODULE (HANDSET)
DRAWN BY:	H. S. CHAN
DATE:	2004-12-14

7. RF Module Circuit Block Description

7.1 Power Supply

The RF transmitter (Q6, Q7, and Q1) receives power from TXVCC. This voltage is 5V for the base unit and 3.6V for the handset unit. For the base unit, TXVCC is enabled only during TALK or RINGING mode. For the handset unit, TXVCC is enabled only during TALK mode.

The RF receiver (Q3) receives power from RXVCC. This voltage is 5V for the base unit and 3.6V for the handset unit.

For the base unit, RXVCC is enabled all the time when there is AC power. When running on backup batteries, it is on only while scanning for “TALK” signal from the handset.

For the handset unit, RXVCC is enabled only during TALK or scanning for ringing signal from the base unit.

7.2 PLL and MCU Interface

The frequencies of the RF transmitter and RF local oscillator are controlled by a PLL IC (U1). It receives the frequency data through DATA, CLK and CE signal lines from the MCU. The basic clock frequency of the PLL is derived from an 11.15MHz crystal (X1) inside the RF module.

7.3 RF Transmitter

The RF transmitter frequency for the base is 2402.550 MHz – 2404.500 MHz and the handset is 2474.000 MHz – 2475.950 MHz.

The RF transmitter signal is derived from Q1. The transmit frequency is controlled by the signal pin CPO of the PLL IC (U1). The PLL samples the RF frequency through FIN. The audio input signal AFIN is fed to this RF oscillator through the FM modulator VD1.

The RF oscillator output is amplified through the LNA (Q6, Q7) and coupled to the RF antenna through the TX_FILTER (DF1).

7.4 RF Receiver

The incoming RF signal is coupled from the antenna through RX_FILTER (DF2) to a LNA (Q3) where it is amplified and fed to the 1st mixer (Q4). The frequency of the receiver local oscillator (Q2) is controlled by the signal pin CPOA of the PLL IC (U1). The PLL samples the local oscillator RF frequency through signal pin FINA.

For the base unit, the local oscillator frequency is (RF + 10.7MHz).

For the handset unit, the local oscillator frequency is (RF – 10.7MHz).

7.5 Audio Detector

The audio detector receives the incoming signal from the 10.7MHz amplifier (Q5) and filter (CF1). The audio signal is recovered by a FM detector (U2) to AFOUT. The quality of the incoming RF signal is indicated by logic output NOISE.

C4210 Basic Operation (Base)

8.1 Setting the Ringers

The RINGER OFF/ON switches on the side of the handset and base set the handset/base ringer off/on.

Pressing the “UP” key on the base increases the ringer sound by one level while pressing the “DOWN” key reduces the sound by one level.

There are a total of six levels from maximum to minimum.

There are six types of ringer sound output. To change the tone, press the “STYLE” key once.

The speaker will output a sample of two seconds with the latest selection of tone frequency and output level when any of these keys are pressed.

See later section for details about the interactions between the base and handset Ringer On/Off switches.

8.2 PULSE/TONE SWITCH (Base)

It is a 2-position switch for setting dialing mode.

T – TONE (DTMF)

P – PULSE (10pps, 40/60).

The dialing mode is determined while going from on-hook to off-hook.

8.3 BOOST ON/OFF SWITCH (Base)

When set to “OFF”, the handset will go off-hook with the DSP module in the low gain mode.

When set to “ON”, the handset will go off-hook with the DSP module in the high gain mode.

8.4 PAGE KEY (BASE)

The base can page the handset by pressing the “PAGE” key once.

See later section for details.

8. C4210 Basic Operation (Handset)

9.1 Setting Parameters

When handset battery is installed, the handset enters setup mode automatically.

While in standby mode, press and hold “MODE” button for 3 seconds to enter setup mode

a. Set Language

After entering setup mode, the LCD display will show “SEL LANGUAGE” and then “1.ENG 2.SPA” alternately with a tick mark against the selected language.

Press “1”, or “2” button once to change the language. The tick mark will move against the new selection.

Press “UP(↑)” to go to the next menu.

If there is no input within 30 seconds, the language will be set to the last selected one and go back to stand-by mode.

b. Set Contrast

There are 3 contrast levels and the default is set to level 2.

After setting the language, press “UP(↑)” key to begin setting contrast.

The LCD display will show “LCD CONTRAST” and “1 2 3”.

Press “1”, “2” or “3” key to change the level. The current selected level will be highlighted

Press the “UP(↑)” or “DOWN(↓)” button to go to the next menu.

If there is no input within 30 seconds, the program will set to last selected value and go back to stand-by mode.

c. Set AREA CODE 1

After setting Contrast, press “UP(↑)” button to set Area Code 1.

The LCD display will show “AREA CODE 1” and “XYZ” with “X” digit blinking.

Enter the area code number using the numeric keys on the handset.

Press the “UP(↑)” or “DOWN(↓)” button to go to the next menu.

If there is no input within 30 seconds, the program will set the area code to last selected value and go back to stand-by mode.

d. Set AREA CODE 2

After setting Area Code 1, press “UP(↑)” button to set Area Code 2.

The LCD display will show “AREA CODE 2” and “XYZ” with “X” digit blinking.

Enter the area code number using the numeric keys on the handset.

Press the “UP(↑)” or “DOWN(↓)” button to go to the next menu.

If there is no input within 30 seconds, the program will set the area code to last selected value and go back to stand-by mode.

e. Set LDS CODE

After setting Area Code 2, press “UP(↑)” button to set LDS Code.

The LCD display will show “LDS CODE” and “X” with “X” digit blinking.

Enter the LDS number using the numeric keys on the handset.

Press the “UP(↑)” or “DOWN(↓)” button to go to the next menu.

If there is no input within 30 seconds, the program will set the area code to last selected value and go back to stand-by mode.

f. Set EASY MODE

After setting LDS Code, press “UP(↑)” button to set the Easy Mode.

The LCD display will show “EASY MODE” and “1.ON 2.OFF”.

Press “1” or “2” to change the mode. The tick mark will move against the selected mode.

Press the “UP(↑)” or “DOWN(↓)” button to change the mode.

If there is no input within 30 seconds, the program will set to last selected value and go back to stand-by mode.

g. Set VOICEMAIL NO

After setting Easy Mode, press “UP(↑)” button to set Voice Mail Number.

The LCD display will show “VOICE MAIL NO” and “XXX-XXX-XXXX” with the last digit blinking.

Enter the voicemail number using the numeric keys on the handset. Press “CH/DEL” key to delete and move cursor back one place.

Press the “UP(↑)” or “DOWN(↓)” button to go to the next menu.

If there is no input within 30 seconds, the program will set the voicemail no to the last selected value and go back to stand-by mode.

h. Set MESSAGE WAITING ON/OFF

After setting Voicemail No, press “UP(↑)” button to set Message Waiting function on/off.

The LCD display will show “MESS WAITING”, and “1.ON 2.OFF” with a tick mark against the selected item.

Press “1” or “2”button to change the mode.

Press the “UP(↑)” or “DOWN(↓)” button to go to the next menu.

If there is no input within 30 seconds, the program will save the last selected value and go back to stand-by mode.

i. Set AUTO_TALK ON/OFF

After setting Message Waiting Light Off, press “UP(↑)” button to set Auto-Talk ON/OFF (default to ON).

The LCD display will show “AUTOTALK”, “1.ON 2.OFF”.

Press “1” or “2” to change or current selected value. The tick mark will move against the selected value.

Press the “UP(↑)” or “DOWN(↓)” button to change the mode.

Press the “UP(↑)” or “DOWN(↓)” button to go to the next menu.

If there is no input within 30 seconds, the program will set to last selected value and go back to stand-by mode.

9.2 Receiving/Terminating/Making A Call

a. Receiving a Call

When the phone rings, the handset LCD displays “RINGING”.

- If the handset is out of the cradle, press the “TALK” button.
- If the handset is in the cradle with Auto-Talk mode - ON, lift the handset. The handset will be in receiver mode.
- If the handset is in the cradle with Auto-Talk mode - OFF, lift the handset. The handset will still be in stand-by mode. Press “TALK” button to receive the call.

The handset LCD displays “TALK” and “00:00:XX”.

b. Terminating a Call

Putting the handset back into the cradle will terminate the call on the handset. Or, press “TALK” button.

The handset will mute the audio, off the lighted LED. The LCD will display “OFF” for 2 seconds and go back to stand-by.

c. Making a Call

The handset must be out of the cradle in order to make a call.

- Press the “TALK” button. Handset will go off-hook in receiver mode.
The handset LCD displays “LINE IN USE”.
- Press numeric keys to dial the numbers.
In Pulse dialing mode, press “*” will change to Tone dialing mode.

When the handset is in receiver mode, press “BOOST” button will add extra gain in the receiver output. Adjust “VOLUME” control to vary the receiver output level.

9.3 Memory Operations

a. Review Memory Information

- i. Unit must be in stand-by mode only.
- ii. Press “MODE” key twice. The LCD will show “PHONEBOOK”
- iii. If the phonebook is empty, after ~1 second the display shows “- NO RECORDS -”.
- iv. Otherwise, the display will show the first alphabetical record with the record number on the top icon line. The record number may not be the first one.
- v. Press the “UP(↑)” or “DOWN(↓)” button to go to the next record. Or select any other alphabetical list pressing “2” to “9” key.
- vi. When at the end of phonebook list, pressing “DOWN(↓)” button will show “END OF” and “RECORD”. Press “UP(↑)” button to go to the last record.

b. Dial-Out Sequence

- i. Unit must be in stand-by mode and display is showing a phonebook record.
- ii. Press “TALK” button to dial the displayed number in TONE or PULSE mode determined by the base “T/P” switch while on-hook to off-hook.

c. Deleting a Stored Number

- i.** Unit must be in stand-by mode and display is showing a phonebook record.
- ii.** Press “DEL/CH” key once. The LCD will show “DELETE ?”.
- iii.** Press “DEL/CH” to confirm.
- iv.** The display will show “MEMO” and “DELETED” for 3 seconds together with a success keynote.
- v.** The display will show the next available record or “-NO RECORDS-”.
 - If the memory location is empty, pressing “DEL” key will have no action.
 - This sequence will time-out after 30 seconds if no key is pressed.

d. Deleting All Stored Number

- i.** Unit must be in phonebook mode and is displaying a valid phone record.
- ii.** Press and hold “CH/DEL” button for 3 seconds to delete all phonebook records. Display will show “DELETE ALL ?”.
- iii.** Press “DEL/CH” to confirm. Display will show “-NO RECORDS-” for ~2 seconds together with a success keynote.
 - If the memory location is empty, pressing “DEL” key will have no action.
 - This sequence will time-out after 30 seconds if no key is pressed.

e. Adding a Memory Number

- i.** Unit must be in stand-by mode only.
- ii.** Press “MODE” key twice. The display will show “PHONEBOOK” for ~1 second and then display the first available record.
- iii.** Press “PROG” key to add new phone record.
- iv.** If the phonebook is full, the display will show “PHONEBOOK FULL” for ~1 second together with an error keynote. Then return to review mode.
- v.** If memory is available, the display will show “SAVE NEW NUM” and then “ENTER NUMBER”. The second line will change to “ENTER TO END” and the third line is blanked. Enter phone number up to 23 digits (“RED/P” treated as Pause, counted as one digit). Press “DEL/CH” to erase any mistake.

- vi. Press “ENTER(↙)” to confirm number. The LCD will display “ENTER NAME” and then the second line is blanked. Enter name up to 21 characters using key “2” to “9”.
 Press “2” once for “A” and twice for “B”.
 Press “1” to insert “1” and punctuation marks.
 Use “#/→” key to insert a space between alphabets. Press “DEL/CH” key to erase any mistake.
- vii. Press “ENTER(↙)” to confirm name. The LCD will display “NUMBER”, “STORED”. Then displays the just entered information.

9.4 MESSAGE WAITING Information

The C4210 will detect for Message Waiting signal:

- A. During the incoming ring signal;
- B. During initial off-hook period (stutter tone);
- C. Automatically after 30 seconds of off-hook;
- D. After a ringing signal has not been answered.

This function is turned off if “MESSAGE WAITING” is set to “OFF” during setup.

If C4210 finds that there is voice message to be retrieved, it will turn on the Message Waiting indicator (behind “ENTER” key). Otherwise, it will turn it off.

To retrieve this message, press the “ENTER” key while the indicator is on. The handset will go off-hook and dial the stored Voicemail number.

9.5 CALLER ID Information

Type I + Type II (Caller ID with Call Waiting capability)

This function is turned off when “EASY MODE” is set to “ON” during setup.

a. Caller Information

When somebody calls, the received caller information is displayed on the LCD. If the call is answered by this phone, this caller information is considered “old”. Otherwise, the CID information will be stored in the call log. Information which has not been reviewed will be considered as “new call”. The LED under the “MODE” key (NewCall) will blink.

The top row will display the time and date of call.

The second row will display the caller's ID or "CALL" if there is no information.

The third row will display the incoming telephone number. If the number is longer than 12 digits, press [\leftarrow/\ast] or [$\#/\rightarrow$] to scroll left or right to review the number. If the number of digits is 10, it will be displayed as XXX-XXX-XXXX.

Maximum 12 characters and 16 digits will be stored in the call log.

If you answer the incoming call before the second ring, the unit will not display the call information.

b. Receiving Call Waiting Caller ID

When you are on an existing call, you will hear a beep and the display will show incoming call waiting caller ID information.

If you access the call waiting call, the Caller ID information will disappear and the Time/Day screen will appear.

If you do not access the call waiting call, the Caller ID information will be transferred into the Caller log. This caller information is considered "old".

c. Unknown Call

If a call is from another country or caller's number is not available, "UNKNOWN" and "-----" are displayed. It will be stored in Caller ID log.

d. Blocked Call

If the number is blocked or withheld, "PRIVATE" and "-----" are displayed. It will be stored in Caller ID log.

e. Repeated Call

If this is a repeated call, it means the same number called before and has not been reviewed.

9.6 CALLER ID LIST

a. Caller ID Review

If there is new call information, the "MODE" key will blink.

During stand-by mode, press "MODE" button once. LCD will display "CID MODE" and then the last CID information.

Press "UP(\uparrow)" or "DOWN(\downarrow)" again to view the CID content. Press "DOWN(\downarrow)" to scroll the caller ID information from the most recent record. Or, press the "UP(\uparrow)" button scroll the caller ID information from the oldest record.

If the caller's number is longer than 12 digits, the display will show the first 12 digits and the rest of the numbers alternatively.

While it scrolls over the list, "END OF LIST" is shown.

If the CID list is empty, the display will show "- NO CALLS -".

- At anytime, user can press "FLASH" button one time to go back to stand-by mode. Or
- It will go back to stand-by automatically at 30 seconds time out if there is no action.

b. Callback from Caller ID Information

To callback from incoming call information, the base "T/P" switch should be set at "T".

While reviewing the incoming call list, press "UP" will format the number with the following dialing variations:

i. 7 digits without a 1 prefix:

If the area code of the Caller ID number matches to the setting of the stored area code, the dialed numbers can be 7 digits only.

ii. Area Code + 7 digits without a 1 prefix:

If the area code of the Caller ID number matches to the setting of the stored area code, the dialed numbers can be Area Code + 7 digits.

iii. 10 digits without a 1 prefix:

If the area code of the Caller ID number is different from the stored area code, the dialed numbers can be 10 digits without a "1" prefix.

iv. 10 digits with a 1 prefix:

If the area code of the Caller ID number is different from the stored area code, the dialed numbers can be "1" + 10 digits.

When reviewing the Caller ID information, press "ENTER" will cause the LCD to display the formatted numbers in sequence.

Example 1:

Stored area code: 770.

Stored incoming call number 770-123-4567.

- Press "ENTER" key will show blinking "123-4567".
- Press "TALK" or "ENTER" key again will dial out "1234567".

OR

- Press "UP" key will show blinking "770-123-4567". Then press "TALK" or "ENTER" key again will dial out "7701234567".

OR

d. Press “UP” key will show blinking “1-7701234567”. Press “TALK” or “ENTER” key will dial out “17701234567”.

OR

e. Press “UP” key will show blinking “123-4567” again.

Example 2:

Stored area code: 770.

Stored incoming call number 413-456-7890.

- a. Press “ENTER” key will show blinking “413-456-7890”.
- b. Press “TALK” or “ENTER” key again will dial out “4134567890”.

OR

c. Press “UP” key will show blinking “1-4134567890”. Press “TALK” or “ENTER” key will dial out “14134567890”.

OR

d. Press “UP” key will show blinking “413-456-7890” again.

c. Delete Caller ID Information

While reviewing the Caller ID, press “DEL/CH” button to delete the displayed caller information. LCD will display flashing “DELETE ?”.

Press “DEL/CH” to confirm. “CID DELETED” will be displayed for 2 seconds.

The next record is shown automatically or “- NO CALLS -” if the list is empty.

- At anytime, user can press “FLASH” button one time to go back to stand-by mode. Or
- It will go back to stand-by automatically at 30 seconds time out if there is no action.

d. Delete All Caller ID Information

While reviewing the Caller ID, press and hold the “DEL/CH” button for two seconds. LCD will display flashing “DELETE ALL ?”.

Press “DEL/CH” to confirm.

LCD will display “ALL CID” and “DELETED” for 2 seconds and then “-- NO CALLS --”.

- At anytime, user can press “FLASH” button one time to go back to stand-by mode. Or
- It will go back to stand-by automatically at 30 seconds time out if there is no action.

9. **C4210 Basic Operation (Base and Handset)**

10.1 PAGE Function

Only the base can page the handset while the unit is in stand-by mode.

Press the base “PAGE” button once and the handset will beep for 15 seconds.

Press and hold for 5 seconds, the handset will beep for 60 seconds.

The handset LCD displays “PAGING”.

Press any key on the handset to stop paging.

If there is no response from handset, the LCD display will revert back to normal.

10.2 Ringer Function

The relationship between the handset and base ringer sound outputs are as shown in the following table.

Charge State	Ringer Switch		Base		Handset	
	Base	Handset	Sound	LED	Sound	LED
Off	Off	Off	Off	On	Off	On
Off	Off	On	Off	On	On	On
Off	On	On	On	On	On	On
Off	On	Off	On	On	Off	On
On	Off	Off	Off	On	Off	On
On	Off	On	On	On	Off	On
On	On	On	On	On	Off	On
On	On	Off	On	On	Off	On

10. RF Channels

RF CHANNEL	HANDSET (KHz)		BASE (KHz)	
	TX	RX	TX	RX
01	2,474,000	2,391,850	2,402,550	2,484,700
02	2,474,050	2,391,900	2,402,600	2,484,750
03	2,474,100	2,391,950	2,402,650	2,484,800
04	2,474,150	2,392,000	2,402,700	2,484,850
05	2,474,200	2,392,050	2,402,750	2,484,900
06	2,474,250	2,392,100	2,402,800	2,484,950
07	2,474,300	2,392,150	2,402,850	2,485,000
08	2,474,350	2,392,200	2,402,900	2,485,050
09	2,474,400	2,392,250	2,402,950	2,485,100
10	2,474,450	2,392,300	2,403,000	2,485,150
11	2,474,500	2,392,350	2,403,050	2,485,200
12	2,474,550	2,392,400	2,403,100	2,485,250
13	2,474,600	2,392,450	2,403,150	2,485,300
14	2,474,650	2,392,500	2,403,200	2,485,350
15	2,474,700	2,392,550	2,403,250	2,485,400
16	2,474,750	2,392,600	2,403,300	2,485,450
17	2,474,800	2,392,650	2,403,350	2,485,500
18	2,474,850	2,392,700	2,403,400	2,485,550
19	2,474,900	2,392,750	2,403,450	2,485,600
20	2,474,950	2,392,800	2,403,500	2,485,650
21	2,475,000	2,392,850	2,403,550	2,485,700
22	2,475,050	2,392,900	2,403,600	2,485,750
23	2,475,100	2,392,950	2,403,650	2,485,800
24	2,475,150	2,393,000	2,403,700	2,485,850
25	2,475,200	2,393,050	2,403,750	2,485,900
26	2,475,250	2,393,100	2,403,800	2,485,950
27	2,475,300	2,393,150	2,403,850	2,486,000
28	2,475,350	2,393,200	2,403,900	2,486,050
29	2,475,400	2,393,250	2,403,950	2,486,100
30	2,475,450	2,393,300	2,404,000	2,486,150
31	2,475,500	2,393,350	2,404,050	2,486,200
32	2,475,550	2,393,400	2,404,100	2,486,250
33	2,475,600	2,393,450	2,404,150	2,486,300
34	2,475,650	2,393,500	2,404,200	2,486,350
35	2,475,700	2,393,550	2,404,250	2,486,400
36	2,475,750	2,393,600	2,404,300	2,486,450
37	2,475,800	2,393,650	2,404,350	2,486,500
38	2,475,850	2,393,700	2,404,400	2,486,550
39	2,475,900	2,393,750	2,404,450	2,486,600
40	2,475,950	2,393,800	2,404,500	2,486,650