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SERVICE MANUAL

800M CDMA Wireless Kit
EMII-800

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Introduction

The EMII-800 is designed for the test and simulation of the CDMA wireless data communications. User can connect the EMII-800 to your PC or Notebook and easily test the wireless communications. User can use this to develop your applications software even before user's own hardware is ready. It also can be used as a debugging during user's hardware test.

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FCC RF Exposure Information

Warning! Read this information before using this device.

In August 1996 the Federal Communications Commission (FCC) of the United States with its action in Report and Order FCC 96-326 adopted an updated safety standard for human exposure to radio frequency electromagnetic energy emitted by FCC regulated transmitters. Those guidelines are consistent with the safety standard previously set by both U.S. and international standards bodies. The design of this device complies with the FCC guidelines and these international standards.

CAUTION

Operating Requirements

- The user can not make any changes or modifications not expressly approved by the party responsible for compliance, otherwise it could void the user's authority to operate the equipment.
- To satisfy FCC RF exposure compliance requirements for a mobile transmitting device, this device and its antenna should generally maintain a separation distance of 20cm or more from a person's body.

Special accessories

In order to ensure this device in compliance with FCC regulation, the special accessories are provided with this device and must be used with the device only. The user is not allowed to use any other accessories than the special accessories given with this device

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General Introduction

The EMII-800 functions digital cellular module worked in CDMA (Code Division Multiple Access) mode. CDMA type digital mode applies DSSS (Direct Sequence Spread Spectrum) mode which is used in military.

This feature enables the phone to keep communication from being crossed and use one frequency channel by multiple users in the same specific area, resulting that it increases the capacity 10 times more compared with that in the analog mode currently used.

Soft/Softer Handoff, Hard Handoff, and Dynamic RF power Control technologies are combined into this phone to reduce the call being interrupted in a middle of talking over phone.

CDMA digital cellular network consists of MSC (Mobile Switching Office), BSC (Base Station Controller), BTS (Base station Transmission System), and MS (Mobile Station). Communication between MS and BTS is designed to meet the specification of IS-95A (Common Air Interface). MS meets the specifications of the below :

- IS-95A/B/C (Common Air Interface) : Protocol between MS and BTS
- IS-96A (Vocoder) : Voice signal coding
- IS-98 : Basic MS functions
- IS-126 : Voice loopback
- IS-99 : Short Message Service, Async Data Service, and G3 Fax Service

EMII-800 is digital mode is designed to be operated in full duplex.

CHAPTER 1. System Introduction

1. System Introduction

1.1 CDMA Abstract

The cellular system has a channel hand-off function that is used for collecting the information on the locations and movements of radio mobile telephones from the cell site by automatically controlling several cell site through the setup of data transmission routes and thus, enabling one switching system to carry out the automatic remote adjustment. This is to maintain continuously the call state through the automatic location confirmation and automatic radio channel conversion when the busy subscriber moves from the service area of one cell site to that of another by using automatic location confirmation and automatic radio channel conversion functions. The call state can be maintained continuously by the information exchange between switching systems when the busy subscriber moves from one cellular system area to the other cellular system area.

In the cellular system, the cell site is a small-sized low output type and utilizes a frequency allocation system that considers mutual interference, in an effort to enable the re-use of corresponding frequency from a cell site separated more than a certain distance. The analog cellular systems are classified further into an AMPS system, E-AMPS System, NMT system, ETACS system, and JTACS system depending on technologies used.

Unlike the time division multiple access (TDMA) or frequency division multiple access (FDMA) used in the band limited environment, the Code Division Multiple Access(CDMA) system which is one of digital cellular systems is a multi-access technology under the interference limited environment. It can process more number of subscribers compared to other systems (TDMA system has the processing capacity three times greater than the existing FDMA system whereas CDMA system, about 12~15 times of that of the existing system).
CDMA system can be explained as follows: TDMA or SDMA can be used to enable each person to talk alternately or provide a separate room for each person when two persons desire to talk with each other at the same time, whereas FDMA can be used to enable one person to talk in soprano, whereas the other in bass (one of the two talkers can carry out synchronization for hearing in case there is a bandpass filter function in the area of the hearer).

Another method available is to make two persons to sing in different languages at the same time, space, and frequency when wishing to let the audience hear the singing without being confused. This is the characteristics of CDMA.

On the other hand, when employing the CDMA technology, each signal has a different pseudo-random binary sequence used to spread the spectrum of carrier. A great number of CDMA signals share the same frequency spectrum. In the perspective of frequency area or time area, several CDMA signals are overlapped. Among these types of signals, only desired signal energy is selected and received through the use of pre-determined binary sequence; desired signals can be separated and then, received with the correlator used for recovering the spectrum into its original state. At this time, the spectrums of other signals that have different codes are not recovered into its original state and instead, processed as noise and appears as the self-interference of the system.

2. Features and Advantages of CDMA Module

2.1 Various Types of Diversities

In the CDMA broadband modulation(1.25MHz band), three types of diversities (time, frequency, and space) are used to reduce serious fading problems generated from radio channels in order to obtain high-quality calls.
Time diversity can be obtained through the use of code interleaving and error correction code whereas frequency diversity can be obtained by spreading signal energy to more wider frequency band. The fading related to normal frequency can affect the normal 200~300kHz among signal bands and accordingly, serious affect can be avoided. Moreover, space diversity (also called path diversity) can be realized with the following three types of methods.
First, it can be obtained by the duplication of cell site receive antenna. Second, it can be obtained through the use of multi-signal processing device that receives a transmit signal having each different transmission delay time and then, combines them. Third, it can be obtained through the multiple cell site connection (Soft Handoff) that connects the mobile station and more than two cell sites at the same time.

2.2 Power Control

The CDMA system utilizes the forward (from a base station to mobile stations) and backward (from the mobile station to the base station) power control in order to increase the call processing capacity and obtain high-quality calls. In case the originating signals of mobile stations are received by the cell site in the minimum call quality level (signal to interference) through the use of transmit power control on all the mobile stations, the system capacity can be maximized.
If the signal of mobile station is received too strong, the performance of that mobile station is improved. However, because of this, the interference on other mobile stations using the same channel is increased and accordingly, the call quality of other subscribers is reduced unless the maximum accommodation capacity is reduced.
In the CDMA system, forward power control, backward open loop power control, and closed loop power control methods are used. The forward power control is carried out in the cell site to reduce the transmit power on mobile stations less affected by the multi-path fading and shadow phenomenon and the interference of other cell sites when the mobile station is not engaged in the call or is relatively nearer to the corresponding cell site. This is also used to provide additional power to mobile stations having high call error rates, located in bad reception areas or far away from the cell site.
The backward open loop power control is carried out in a corresponding mobile station; the mobile station measures power received from the cell site and then, reversely increases/decreases transmit power in order to compensate channel changes caused by the forward link path loss and terrain characteristics in relation to the mobile station in the cell site. By doing so, all the mobile office transmit signals in the cells are received by the cell site in the same strength.
Moreover, the backward closed loop power control used by the mobile station to control power with the commands issued out by the cell site. The cell site receives the signal of each corresponding mobile station and compares this with the pre-set threshold value and then, issues out power increase/decrease commands to the corresponding mobile station every 1.25 msec (800 times per second).
By doing so, the gain tolerance and the different radio propagation loss on the forward/backward link are complemented.

2.3 Voice Encoder and Variable Data Speed

The bi-directional voice service having variable data speed provides voice communication which employs voice encoder algorithm having power variable data rate between the mobile telephone cell site and mobile station. On the other hand, the transmit voice encoder performs voice sampling and then, creates encoded voice packets to be sent out to the receive voice encoder, whereas the receive voice encoder demodulates the received voice packets into voice samples.

One of the two voice encoders described in the above is selected for use depending on inputted automatic conditions and message/data; both of them utilize four-stage frames of 9600, 4800, 2400, and 1200 bits per second. In addition, this type of variable voice encoder utilizes adaptive threshold values when selecting required data rate. It is adjusted in accordance with the size of background noise and the data rate is increased to high rate only when the voice of caller is inputted.

Therefore, background noise is suppressed and high-quality voice transmission is possible under the environment experiencing serious noise. In addition, in case the caller does not talk, data transmission rate is reduced so that the transmission is carried out in low energy. This will reduce the interference on other CDMA signals and as a result, improve system performance (capacity, increased by about two times).

2.4 Protecting Call Confidentiality

CDMA signals have the function of effectively protecting call confidentiality by spreading and interleaving call information in broad bandwidth. This makes the unauthorized use of crosstalk, search receiver, and radio very hard substantially. Also included is the encryption function on various authentication and calls specified in IS-95 for the double protection of call confidentiality.

2.5 Soft Handoff

During the soft hand, the cell site already in the busy state and the cell site to be engaged in the call later participate in the call conversion. The call conversion is carried out through the original call connection cell site, both cell sites, and then, new cell site. This method can minimize call disconnection and prevent the user from detecting the hand-off.

2.6 Frequency Re-Use and Sector Segmentation

Unlike the existing analog cellular system, the CDMA system can reuse the same frequency at the adjacent cell and accordingly, there is no need to prepare a separate frequency plan. Total interference generated on mobile station signals received from the cell site is the sum of interference generated from other mobile stations in the same cell site and interference generated from the mobile station of adjacent cell site. That is, each mobile station signal generates interference in relation to the signals of all the other mobile signals.

Total interference from all the adjacent cell sites is the ratio of interference from all the cell sites versus total interference from other mobile stations in the same cell site (about 65%). In the case of directional cell site, one cell normally uses a 120° sector antenna in order to divide the sector into three. In this case, each antenna is used only for 1/3 of mobile stations in the cell site and accordingly, interference is reduced by 1/3 on the average and the capacity that can be supported by the entire system is increased by three times.

2.7 Soft Capacity

The subscriber capacity of CDMA system is flexible depending on the relation between the number of users and service classes. For example, the system operator can increase the number of channels available for use during the busy hour despite the drop in call quality. This type of function requires 40% of normal call channels in the standby mode during the handoff support, in an effort to avoid call disconnection resulting from the lack of channels.

In addition, in the CDMA system, services and service charges are classified further into different classes so that more transmit power can be allocated to high class service users for easier call set-up; they can also be given higher priority of using hand-off function than the general users.

3. Structure and Functions of CDMA Module

The mobile station of CDMA system is made up of a radio frequency part and logic/control (digital) part. The mobile station is fully compatible with the existing analog FM system. The mobile station antenna is connected with the transmitter/receiver via a duplexer filter so that it can carry out the transmit/receive function at the same time.

The transmit frequency is the 25MHz band of 824~849MHz, whereas the receive frequency is the 25MHz band of 869~894MHz. The transmit/receive frequency is separated by 45MHz. The RF signal from the antenna is converted into intermediate frequency(IF) band by the frequency synthesizer and frequency down converter and then, passes the bandpass SAW filter having the 1.25MHz band. IF output signals that have been filtered from spurious signal are converted into digital signals via an analog-to-digital converters(ADC) and then, sent out respectively to 5 correlators in each CDMA de-modulator. Of these, one is called a searcher whereas the remaining 4 are called data receiver(finger). Digitalized IF signals include a great number of call signals that have been sent out by the adjacent cells. These signals are detected with pseudo-noise sequence (PN Sequence). Signal to interference ratio (C/I) on signals that match the desired PN sequence are increased through this type of correlation detection process. Then, other signals obtain processing gain by not increasing the ratio. The carrier wave of pilot channel from the cell site most adjacently located is demodulated in order to obtain the sequence of encoded data symbols. During the operation with one cell site, the searcher searches out multi-paths in accordance with terrain and building reflections. On three data receivers, the most powerful four paths are allocated for the parallel tracing and receiving. Fading resistance can be improved a great deal by obtaining the diversity combined output for de-modulation. Moreover, the searcher can be used to determine the most powerful path from the cell sites even during the soft handoff during the two cell sites. Moreover, four data receivers are allocated in order to carry out the de-modulation of these paths. Data output that has been demodulated change the data string in the combined data row as in the case of original signals(deinterleaving), and then, are de-modulated by the forward error correction decoder which uses the Viterbi algorithm.

On the other hand, mobile station user information sent out from the mobile station to the cell site pass through the digital voice encoder via a mike. Then, they are encoded and forward errors are corrected through the use of convolution encoder. Then, the order of code rows is changed in accordance with a certain regulation in order to remove any errors in the interleaver. Symbols made through the above process are spread after being loaded onto PN carrier waves. At this time, PN sequence is selected by each address designated in each call.

Signals that have been code spread as above are digital modulated (QPSK) and then, power controlled at the automatic gain control amplifier (AGC Amp). Then, they are converted into RF band by the frequency synthesizer synchronizing these signals to proper output frequencies.

Transmit signals obtained pass through the duplexer filter and then, are sent out to the cell site via the antenna.

4. Specification

4.1 General Specification

4.1.1 Transmit/Receive Frequency Interval : 45 MHz

4.1.2 Number of Channels (Channel Bandwidth)

CDMA : 20 CH (BW: 1.23MHz)

41.3 Operating Voltage : DC 6~12V

4.1.4 Operating Temperature : -30° ~ +60°

4.1.5 Frequency Stability :CDMA : ±300 Hz

4.1.6 Antenna : Whip Type, 50 W

4.1.7 Size and Weight

1) **Size : 121mm x 57mm x 24mm (L x W x D) with case**
2) **Weight : 112g**

4.1.8 Channel Spacing : CDMA : 1.25MHz

4.2 Receive Specification

4.2.1 Frequency Range

Digital : 869.04 MHz ~ 893.97 MHz

4.2.2 Local Oscillating Frequency Range : 966.88MHz±12.5MHz

4.2.3 Intermediate Frequency : 85.38MHz

4.2.4 Sensitivity : less than -104dBm

4.2.5 CDMA Input Signal Range

· **Dynamic range : -104~ -25 dBm (more than 80dB) at the 1.23MHz band.**

4.3 Transmit Specification

4.3.1 Frequency Range

824.04 MHz ~ 848.97 MHz

4.3.2 Local Oscillating Frequency Range : 966.88 MHz ± 12.5 MHz

4.3.3 Intermediate Frequency : 130.38 MHz

4.3.4 Output Power: 0.32W

4.3.5 Interference Rejection

1) Single Tone : -101dBm with Jammer of -30dBm at 900 kHz

2) Two Tone : -101dBm with Jammer of -43dBm at 900 kHz & 1700kHz

4.3.7 CDMA TX Frequency Deviation : ±300Hz or less

4.3.8 CDMA TX Conducted Spurious Emissions

- **less than - 42 dBc/30kHz @ 900KHz**
- **less than - 54 dBc/30kHz @1.98MHz**

4.3.9 CDMA Minimum TX Power Control : less than - 50dBm

4.4 MS (Mobile Station) Transmitter Frequency

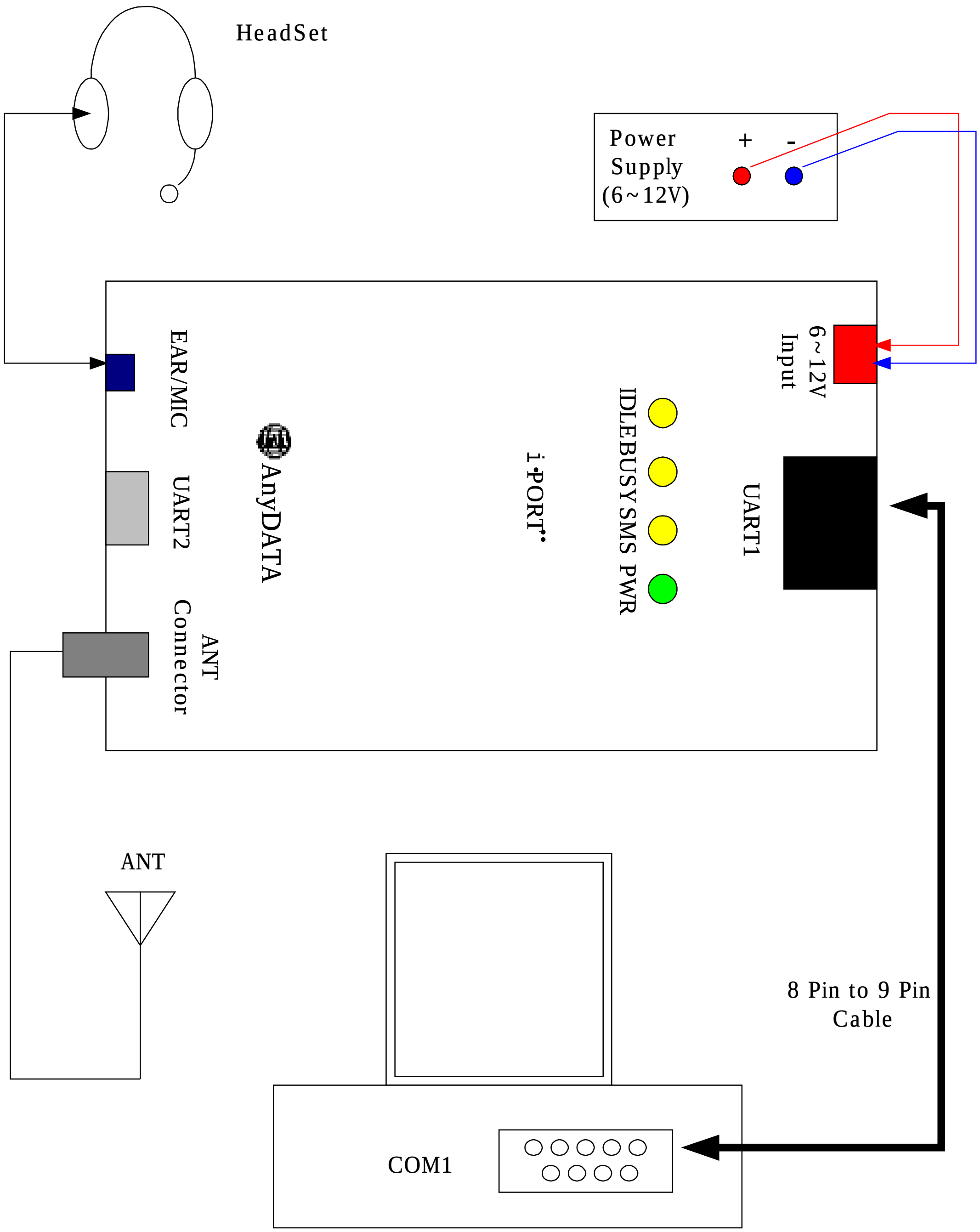
FA NO.	CH.NO.	CENTER FREQUENCY	FA NO.	CH.NO.	CENTER FREQUENCY
1	1011	824.640 MHz	11	404	837.120 MHz
2	29	825.870 MHz	12	445	838.350 MHz
3	70	827.100 MHz	13	486	839.580 MHz
4	111	828.330 MHz	14	527	840.810 MHz
5	152	829.560 MHz	15	568	842.04 MHz
6	193	830.790 MHz	16	609	843.270 MHz
7	234	832.020 MHz	17	650	844.500 MHz
8	275	833.250 MHz	18	697	845.910 MHz
9	316	834.480 MHz	19	738	847.140 MHz
10	363	835.890 MHz	20	779	848.370 MHz

4.5 MS (Mobile Station) Receiver Frequency

FA NO.	CH.NO.	CENTER FREQUENCY	FA NO.	CH.NO.	CENTER FREQUENCY
1	1011	869.640 MHz	11	404	882.120 MHz
2	29	870.870 MHz	12	445	883.350 MHz
3	70	872.100 MHz	13	486	884.580 MHz
4	111	873.330 MHz	14	527	885.810 MHz
5	152	874.560 MHz	15	568	887.04 MHz
6	193	875.790 MHz	16	609	888.270 MHz
7	234	877.020 MHz	17	650	889.500 MHz
8	275	878.250 MHz	18	697	890.910 MHz
9	316	879.480 MHz	19	738	892.140 MHz
10	363	880.890 MHz	20	779	893.370 MHz

CHAPTER 2. NAM Input Method

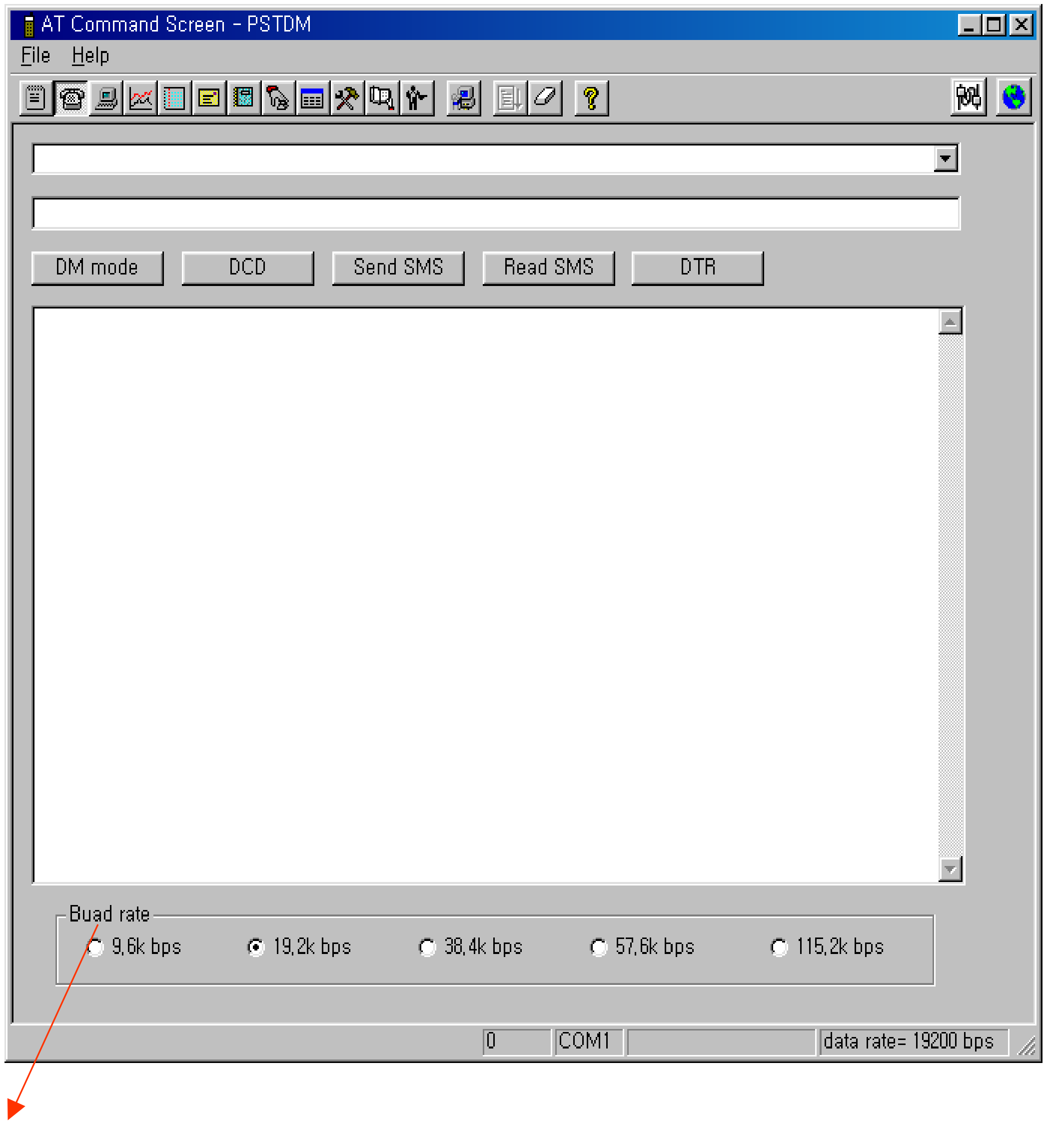
1.INSTALLATION METHOD



1) Supply the voltage of 6~12V to 2pin Connector of the EMII-800.
2) Connect the UART1 to PC COM1 port with the RS-232C cable.
3) Install the operating program.

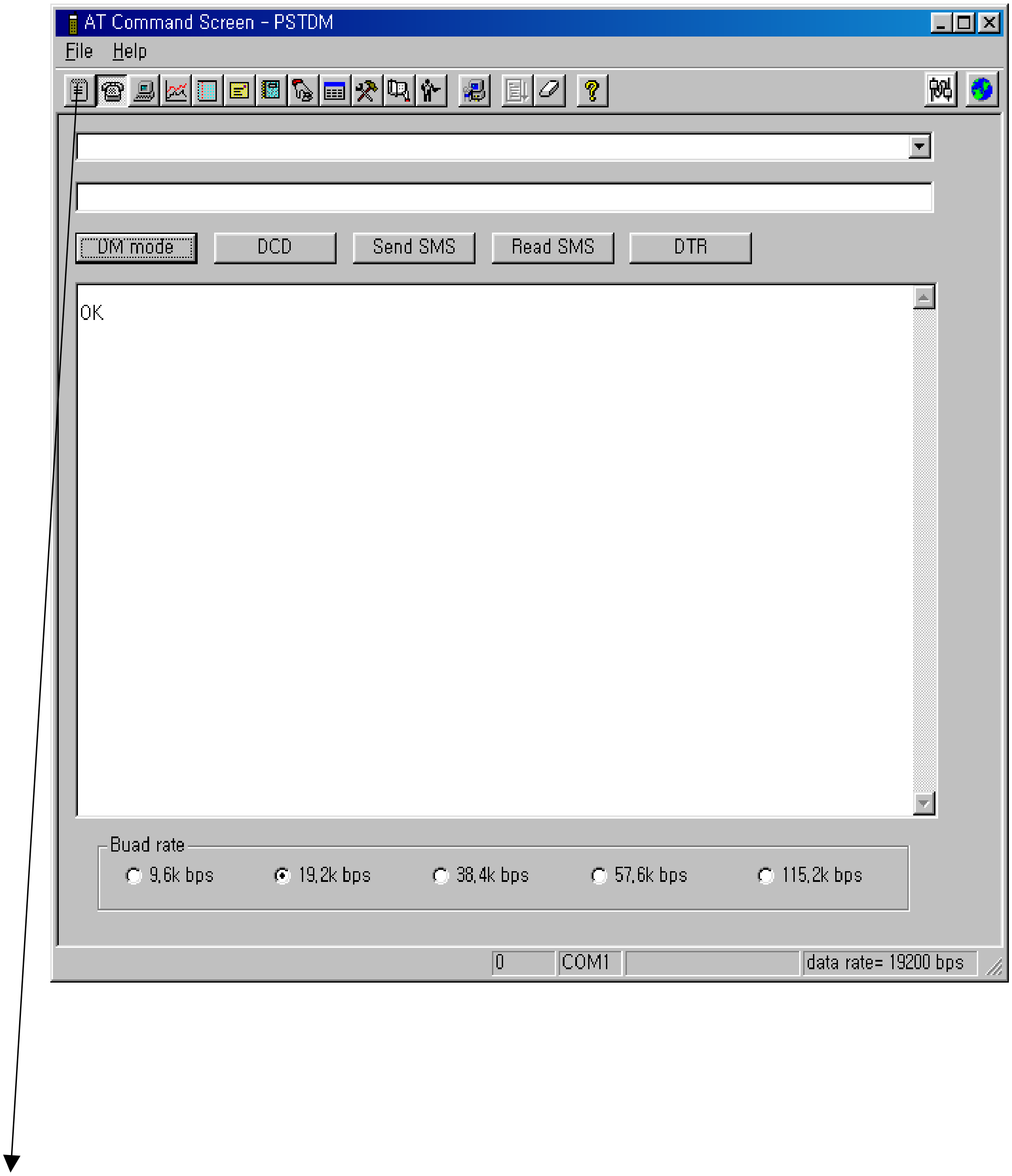
2. OPERATION METHOD

1) Run PSTDM program at Windows95 or Windows98

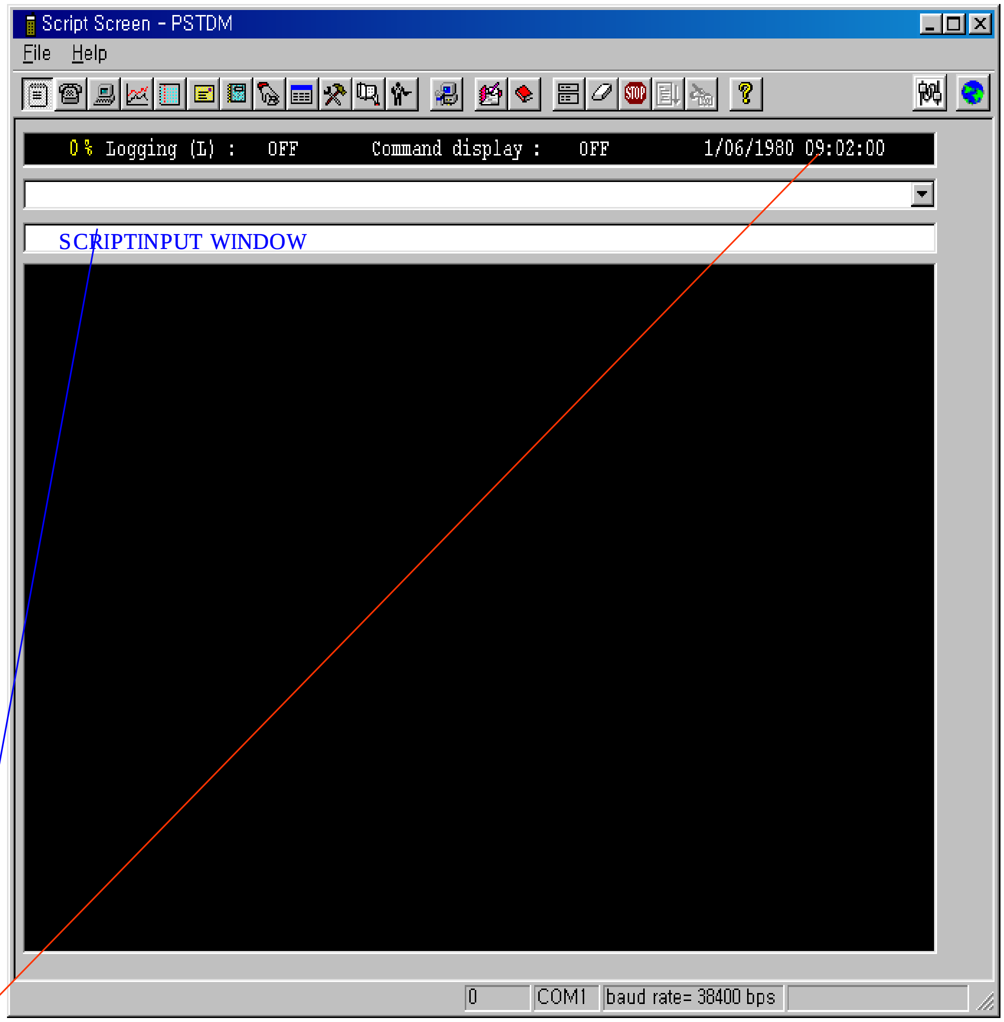


2) Set Buad rate to the modem's.

3) Click [DM mode]



4) If OK is displayed in the message box, modem is now ready for communication with PC.
5) Click MENU BAR icon.



6) As shown in the picture above, service file input plane will be displayed

(See if clock is running. If it isn’t, communication with PC is not activated.

Repeat step 1 through 5, or reset the power of modem and repeat step 1 through 5)

7) Type NAM Programming script like the example shown below,

<NAM Programming script example>

Mode offline-d [ENTER]

nv_write name_nam {0," AnyDATA telecom "} [ENTER]

nv_write name_nam {1," AnyDATA telecom "} [ENTER]

Mode reset [ENTER]

CHAPTER 3. Circuit Description

1. Overview

IFR3000 receives modulated digital signals from the MSM of the digital circuit and then, changes them into analog signals by the digital/analog converter (DAC, D/A Converter) in order to create baseband signals. Created baseband signals are changed into IF signals by RFT3100 and then, fed into the Mixer after going through AGC. IF signals that have been fed are mixed with the signals of VCO and changed into the RF sign als and then, they are amplified at the Power AMP. Finally, they are sent out to the cell site via the antenna after going through the isolator and duplexer.

2. RF Transmit / Receive Part

2.1 CDMA Transmit End

8 bit I and Q transmit signals are inputted into 2 DACs (DIGITAL-TO-ANALOG CONVERTER) from the output terminal TX_IQDATA0 ~ TX_IQDATA7 of MSM through the input terminals TXD0~TXD7 of BBA. Transmit signal input speed is two times of TXCLK+, TXCLK- which are two transmit/receive reference frequen cy.

Among transmit signals being inputted, signals are inputted into I signal DAC when the transmit clock is in the rise edge, whereas signals are inputted into Q Signal DAC during the drop edge. I and Q transmit signals are compensated and outputted at MSM in order to compensate the 1/2 clock time difference generated between reference clocks. In the signals coming out from the output terminal of DAC, there are spurious frequency ingredients resulting from DAC output transition edge and parasite ingredien ts, transmit clock frequencies and harmonics which are unwanted signals. Accordingly, spurious ingredients are removed by passing the signals through LPF of passband 6.30KHz. Unlike the receive end, the transmit end LPF requires no OFFSET adjustment. Analog baseband signals that have passed the CDMA LPF are mixed with I and Q signals of frequency 130.38 MHz (260.76 MHz created in the BBA internal VCO are divided by half into frequency 130.38MHz having the phase difference of 90 degrees) in two mixers. The mixed signals are added again and converted into IF frequency 130.38 MHz ±630 KHz (CDMA Spread Power Density Modulated Signals) and then, outputted.

2.2. Tx IF/Baseband Processors, RFT3100 (U102)

The RFT3100 connects diretly with QUALCOMM's MSM5100 utilizing an analog baseband interface. The basebaand quadrature signals are upconverted to the Cellular or PCS frequency bands and amplified to provide signal drive capability to the PA. The RFT3100 includes an IF mixer for upconverting analog baseband to IF, a programmable PLL for generating Tx IF frequency, single sideband upconversion from IF to RF, two cellular and two PCS driver amplifiers, and Tx power control through an 85 dB VGA. As added benefit, the single sideband upconversion eliminates the need for a bandpass filter normally required between the upconverter and driver amplifier providing overall board area and cost savings. RFT3100 functionality is specifically controlled from the MSM5100 via the three-line serial bus interface (SBI).

Designed to meet the requirements for global CDMA markets, the RFT3100 will operate over the following Tx frequency ranges :

Cellular band 824MHz ~ 925MHz
PCS band 1750MHz ~1910MHz

2.3. Upconverter (U104)

Upconverters made up of a mixer part and Driver AMP part. The mixer part is used to receive double-balanced OUT+ and OUT- of transmit AGC from baseband and mix the output of VCO (U171) with UHF output signal, whereas the Amp part is used to buffer the output of this mixer. U105 has the operation range of RF500MHz~1500MHz and has the conversion gain of 0 dB. In addition, the suppression of spurious signals which are unwanted noise is about 30 dBc when being compared to RF output. The IF input signal range of the mixer is DC~200MHz. The isolation on RF output terminal and LO signal input terminal at the IF input terminal is 30dB. The range of LO signal that can be inputted is 300~1700MHz and power level is -6~0 dBm.

2.4. Transmit Bandpass Filter (FL101)

Transmit signals that have been converted from IF signals into RF signals after passing through the upconverter U105 are inputted into the Power Amp U103 after passing once again through RF BPF F101in order to filter out noise signals amplified during the amplification of RF signals after going through upconverter(U105). This is carried out in order to create power level inputted to the Power AMP via RF BPF FL101 IL of two RF BPFs is 4dB as a maximum, whereas the ripple in the passing band is 2dB(maximum). The degree of the suppression of transmit signals on receive band is at least 20dB or greater. The maximum power that can be inputted is about 25dBm.

2.5. Power Amplifier (U103)

The power amplifier U102 that can be used in the CDMA and FM mode has linear amplification capability, whereas in the FM mode, it has a high efficiency. For higher efficiency, it is made up of one MMIC (Monolithic Microwave Integrated Circuit) for which RF input terminal and internal interface circuit are integrated onto one IC after going through the AlGaAs/GaAs HBT (heterojunction bipolar transistor) process. The module of power amplifier is made up of an output end interface circuit including this MMIC. The maximum power that can be inputted through the input terminal is +17dBm and conversion gain is about 28dB. RF transmit signals that have been amplified through the power amplifier are sent to the duplexer and then, sent out to the cell site through the antenna in order to prevent any damages on circuits, that may be generated by output signals reflected from the duplexer and re-inputted to the power amplifier output end.

2.6. Description of Frequency Synthesizer Circuit

2.6.1 Voltage Control Temperature Compensation Crystal Oscillator(TCX201, VCTCXO)

The temperature range that can be compensated by TCX201 which is the reference frequency generator of mobile terminal is -30 ~ +80 degrees. TCX201 receives frequency tuning signals called TRK_LO_ADJ from MSM as 0.5V~2.5V DC via R and C filters in order to generate the reference frequency of 19.68MHz and input it into the frequency synthesizer of UHF band. Frequency stability depending on temperature is ± 2.0 ppm.

2.6.2 UHF Band Frequency Synthesizer (U202)

Reference frequency that can be inputted to U202 is 3MHz~40MHz. It is the dual mode frequency synthesizer (PLL) that can synthesize the frequencies of UHF band 50MHz~1200MHz and IF band 20MHz~300MHz. U202 that receives the reference frequency of 19.68MHz from U174 creates 30kHz comparison frequency with the use of internal program and then, changes the frequency of 900MHz band inputted from X200 which is the voltage adjustment crystal oscillator into the comparison frequency of 30kHz at the prescaler in U202. Then, two signal differences are calculated from the internal phase comparator. The calculated difference is inputted to DC for adjusting the frequency of U202 through U202 No.2 PIN and external loop filter in order to generate UHF signals. In addition, outputs of other PIN17 are inputted into BBA after going through the VRACTOR diode and tank circuit so that the outputs of BBA internal receive end VCO are adjusted to 170.76MHz.

2.6.3 Voltage Control Crystal Oscillator (U204)

U171 that generates the LO frequency (900MHz) of mobile terminal receives the output voltage of PLL U202 and then, generates the frequency of 954MHz at 0.7V and the frequency of 980MHz at 2.7V. The sensitivity on control voltage is 23MHz/v and the output level is 1dBm(maximum). Since LO frequency signal is very important for the sensitivity of mobile terminal, they must have good spurious characteristics. U174 is -70dBc(maximum).

3. Digital/Voice Processing Part

3.1 Overview

The digital/voice processing part processes the user's commands and processes all the digital and voice signal processing in order to operate in the phone. The digital/voice processing part is made up of a receptacle part, voice processing part, mobile station modem part, memory part, and power supply part.

3.2 Configuration

3.2.1 Voice Processing Part

The voice processing part is made up of an audio codec into digital voice signals and digital voice signals into analog voice signals, amplifying part for amplifying the voice signals and sending them to the ear piece, amplifying part that amplifies ringer signals coming out from MSM5100, and amplifying part that amplifies signals coming out from MIC and transferring them to the audio processor.

3.2.2 MSM (Mobile Station Modem) Part

MSM is the core elements of CDMA terminal and carries out the functions of CPU, encoder, interleaver, deinterleaver, Viterbi decoder, Mod/Demod, and vocoder.

3.2.3 Memory Part

The memory part is made up of a flash memory, SRAM for storing data, and EEPROM.

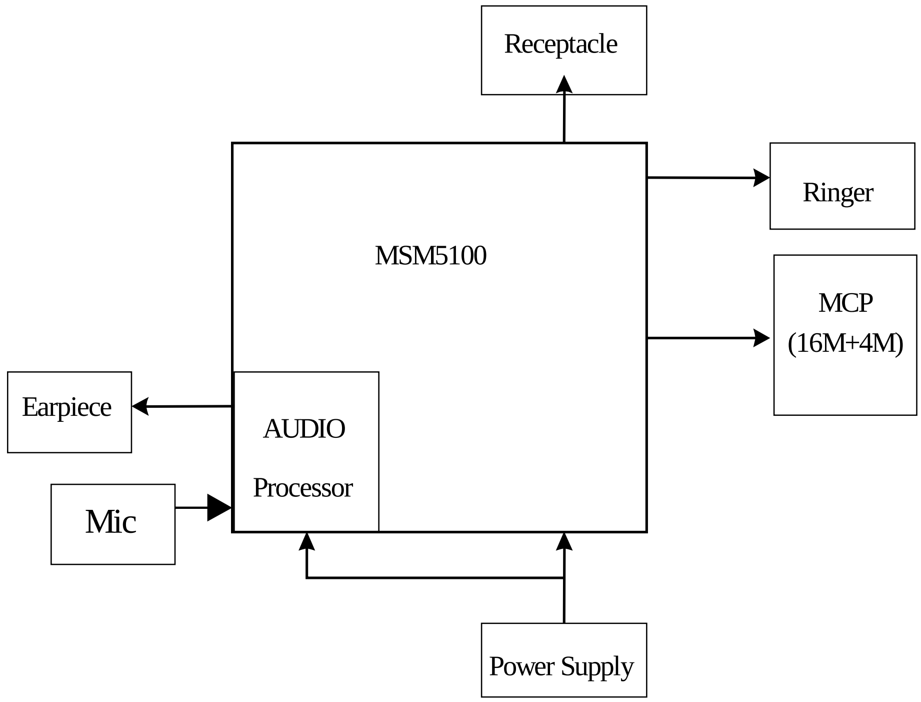
3.2.4 Power Supply Part

The power supply part is made up of circuits for generating various types of power, used for the digital/voice processing part.

+4.2V from external DC (+6V) is fed into five regulators(U605,U603,U602,U604,U606).

The five regulators produces +3.0V for the IFR3000(U204) and for Tx Parts.

3.3 Circuit Description



[Figure 3-1] Block Diagram of Digital/Voice Processing Part

3.3.1 MSM Part

MSM5100, which is U401, is the core element of CDMA system terminal that includes ARM7TDMI microprocessor core. It is made up of a CPU, encoder, interleaver, deinterleaver, Viterbi decoder, MOD/DEM, and vocoder. MSM5100, when operated in the CDMA mode, utilizes CHIPX8 (9.8304MHz) as the reference clock that is received from IFR3000, and uses TCXO (19.68MHz) that is received from TCX201. CPU controls the terminal operation. Digital voice data that have been inputted are voice-encoded and variable-rated. Then, they are convolutionally encoded so that error detection and correction are possible. Coded symbols are interleaved in order to cope with multi-path fading. Each data channel is scrambled by the long code PN sequence of the user in order to ensure the confidentiality of calls.

Moreover, binary quadrature codes are used based on Walsh functions in order to discern each channel. Data created thus are 4-phase modulated by one pair of Pilot PN code and they are used to create I and Q data.

When received, I and Q data are demodulated into symbols by the demodulator and then, de-interleaved in reverse to the case of transmission. Then, the errors of data received from Viterbi decoder are detected and corrected. They are voice decoded at the vocoder in order to output digital voice data.

3.3.2 Memory Part

Memory part, MCP consists of 16M Flash memory and 4M static RAM.
In the MCP, there are programs used for terminal operation. The programs can be changed through down loading after the assembling of terminals and data generated during the terminal operation are stored temporarily and non-volatile data such as unique numbers (ESN) of terminals are stored.

3.3.3 Power Supply Part

When the input voltage (4.0V) in the DTSS-1900 is fed to the five regulators generated +3.0V and the one regular generated +2.7V. The generated voltages are used for MSM5100, RFT3100, IFR3000 and other LOGIC parts. PWR ASIC is operated by the control signal SLEEP/ from MSM5100 and POWER_EN signal.

3.3.4 Logic Part

The Logic part consists of internal CPU of MSM, MCP. The MSM5100 receives TCXO (=19.68Mz) from VC-TCXO and CHIPX8 clock signals from the IFR3000, and then controls the module during the CDMA and the FM mode. The major components are as follows:

CPU : ARM7TDMI core
MEMORY : MCP (MB84VD21182A-85-PBS : U505)

CPU

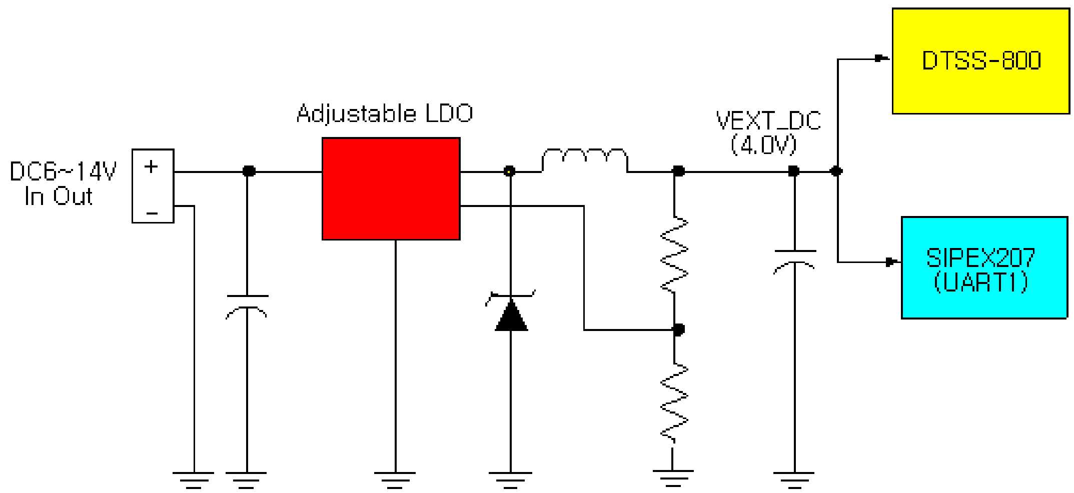
ARM7TDMI CMOS type 16-bit microprocessor is used and CPU controls all the circuitry. For the CPU clock, 32.768KHz is used.

MCP(16M +4M)

MCP is used to store the terminal's program. Using the down-loading program, the program can be changed even after the terminal is fully assembled.
SRAM is used to store the internal flag information, call processing data, and timer data.

4. Level Translator Part

4.1 EMII-800 supply power to Modem(4.0V).



[Fig 4-1] The Block Diagram of Source (in brief)

4.2 UART Interface

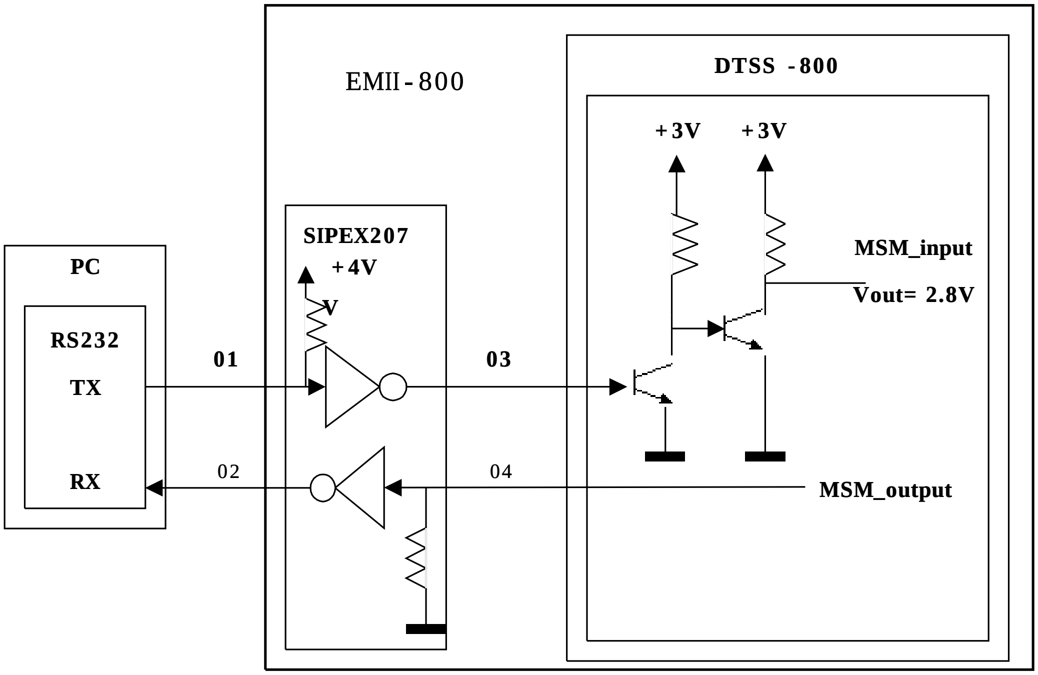
The Universal Asynchronous Receiver Transmitter (UART) communicates with serial data that conforms the RS-232 Interface protocol. The modem provides 3.0V CMOS level outputs and 3.0V CMOS switching input level. And all inputs have 5.0V tolerance but 3.0V or 3.3V CMOS logic compatible signals are highly recommended.
All the control signals of the RS-232 signals are active low, but data signals of RXD, and TXD are active high.

The UART has a 64byte transmit (TX) FIFO and a 64byte receive (RX) FIFO. The UART Features hardware handshaking, programmable data sizes, programmable stop bits, and odd, even, no parity. The UART operates at a 115.2kbps maximum bit rate.

4.2.1 UART Inter Pinouts

NAME	DESCRIPTION	CHARACTERISTIC
DP_DCD/	Data Carrier Detect	Network connected from the modem
DP_RI/	Ring Indicator	Output to host indicating coming call
DP_RTS/	Request to Send	Ready for receive from host
DP_TXD	Transmit Data	Output data from the modem
DP_DTR/	Data Terminal Ready	Host ready signal
DP_RXD	Receive Data	Input data to the modem
DP_CTS/	Clear to Send	Modem output signal
GND	Signal Ground	Signal ground

4.2.2 Signal level of RXD/TXD



RS232		PHONE	
TX01	RX02	TX04	RX03
V_{MAX} = 7.68V V_{MIN} = -7.68V	V_{MAX} = 6.50V V_{MIN} = -6.64V	V_{MAX} = 3.00V V_{MIN} = 0V	V_{MAX} = 3.9V V_{MIN} = 0V

[Figure 4-2] Signal Level of RXD, TXD

4.3 The function of Real Audio Test(including Voice Test)

NAME	TYPE	DESCRIPSION
MIC+	I	Microphone audio input
MIC-	IS	Ear/microphone set detect
EAR	O	Ear audio output
GND_A		Audio ground

CHAPTER 4. FCC Notice

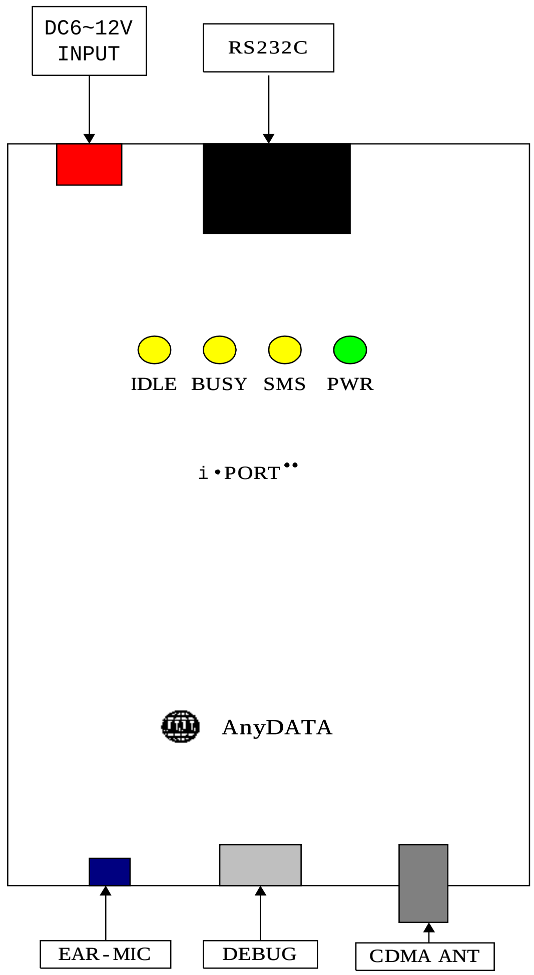
This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate 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:

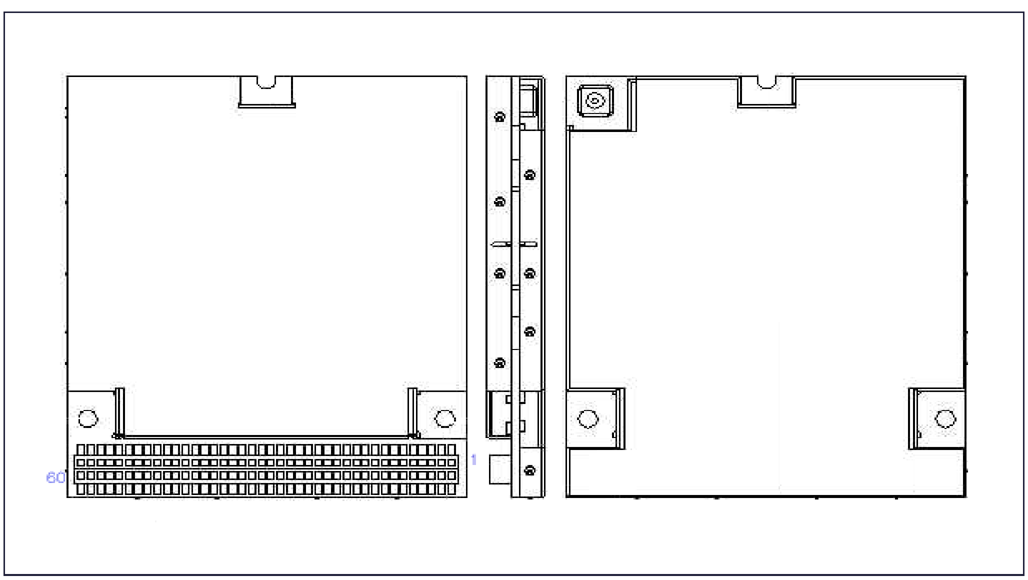
- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

APPENDIX

1. Assembly and Disassembly Diagram
2. Block & Circuit Diagram
3. Part List
4. Component Layout

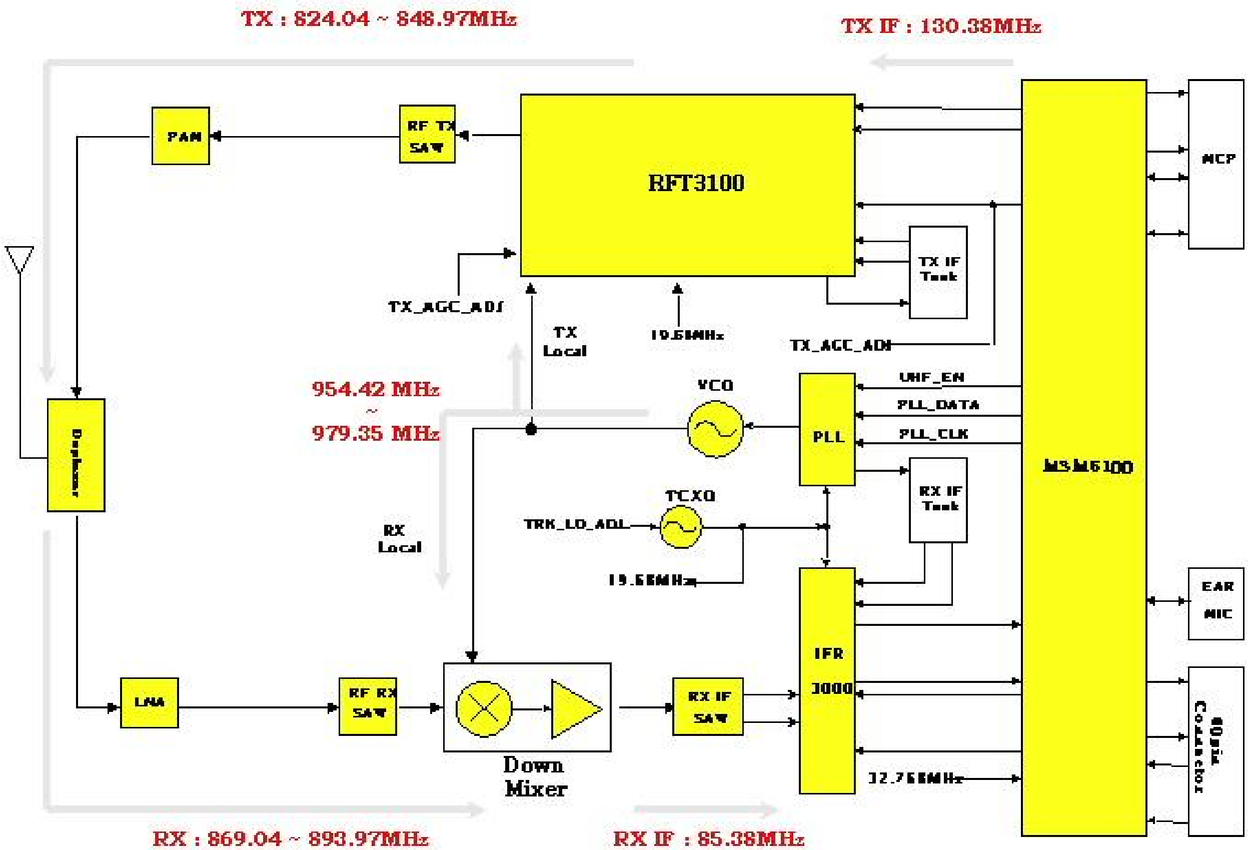
1. Assembly and Disassembly Diagram



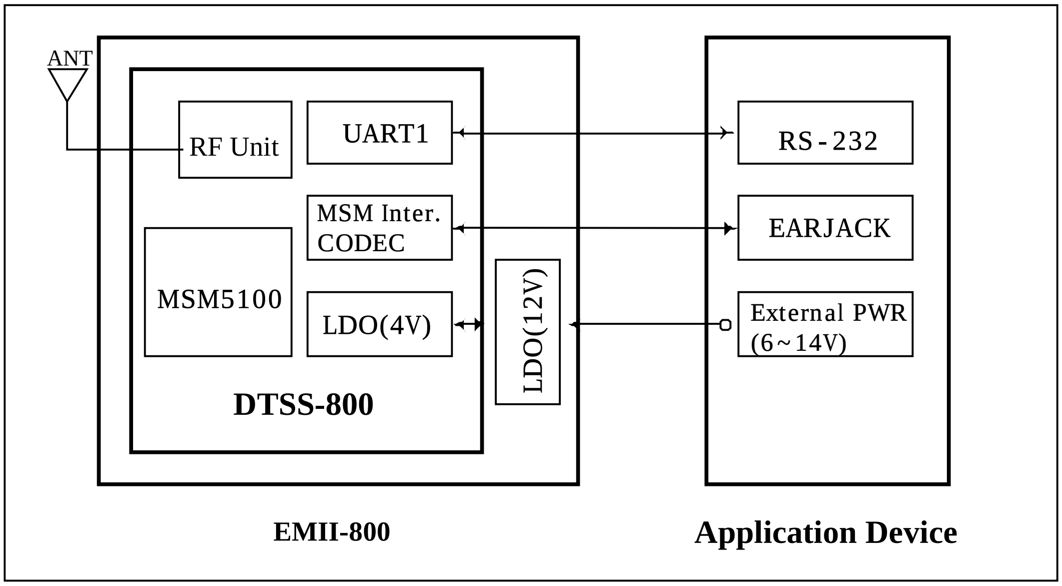


2. Block & Circuit Diagram

2.1. MODEM Block Diagram



2.2. EMII-800 Block Diagram



3. Part List

3-1. MODEM Part List

V0.4 **2002.01.07**

NO	COMPONENT NAME	DESCRIPTION	Lay.	DESIGN NUMBER	Q'ty	MAKER
LOGIC						
1	MSM5100-A208FBGA-TR	MSM5100 (208P)	BOT	U401	1	QUALCOMM
2	IFR3000-48BCCF-TR	IFR3000 (48P)	BOT	U201	1	QUALCOMM
3	RFT3100-32BCCP-TR	RFT3100 (32P)	BOT	U102	1	QUALCOMM
4	MB84VD21182A-85-PBS	MCP(16M+4M)	BOT	U505	1	FUJITSU
5	MIC5245-3.0VBM5	LDO (3.0V)	TOP	U601,U602,U604,U603,U607	5	MICREL
6	MIC5245-2.7VBM5	LDO (2.7V)	BOT	U606	1	MICREL
7	TC7SU04FU	INVERTER	TOP	U205	1	TOSHIBA
8	FDC634P	P CH-MOSFET(SSOT-6)	BOT	U104	1	FAIRCHILD
9	S-80827ALNP-EDT-T2	RESET IC	TOP	U608,U609	1	SEIKO
10	DTC124EE-TL	DIGITAL TR	TOP	Q302,Q307,Q303,Q305,Q304	5	ROHM
			BOT	Q104	1	ROHM
11	UMC4N-TR	DIGITAL TR	TOP	Q306	1	ROHM
12	UMH2N-TN	DIGITAL TR	BOT	U504	1	ROHM
13	UPS5819	SCHOTTKY DIODE	TOP	ZD601	1	MICRO SEMI
14	B06B-4101-606	60PIN CONNECTOR	TOP	CON301	1	SKY
15	1SV281	VARACTOR DIODE	TOP	VD201,VD202	2	TOSHIBA
			BOT	VD101,VD102	2	TOSHIBA

16	NT732ATD683K	THERMISTOR	TOP	TH201	1	KOA
17	F0805B3R00FW	FUSE (2012 Size)	TOP	FUSE1	1	AVX
RF						
1	RM912	PAM	TOP	U103	1	CONEXANT
2	FAR-D5CC	DUPLEXER	TOP	DUP101	1	FUJITSU
3	BFP420	BUFFER AMP	BOT	U203	1	EPCOS
4	B4943	RX IF SAW FILTER	TOP	FL103	1	EPCOS
5	FS0881B1	RX RF SAW FILTER	TOP	FL102	1	LG
6	FS0836B1	TX RF SAW FILTER	TOP	FL101	1	LG
7	VC_3R0A80_0967A	VCO	BOT	U204	1	FUJITSU
8	CMY212	DOWN MIXER	TOP	U101	1	INFINEON
9	LMX2354SLBX	PLL	BOT	U202	1	N.S
10	KT16-DCV30L-19.68M	VC-TCXO	TOP	TCX201	1	AVX
11	SSP-T6	X-TAL(32.768K-7.0PF)	BOT	X401	1	SEIKO
12	ATF38143	LNA	TOP	Q101	1	AGILENT
13	MCA-ST-00T	MOBLE SWITHCH	BOT	SW101	1	SUNRIDGE
14	HSMP-389F	DOIODE	TOP	Q107	1	AGILENT
INDUCTOR						
1	0603CS-30NXG-BC	30N CHIP COIL(2%)	BOT	L113	1	COILCRFT
2	0603CS-72NXG-BC	72N CHIP COIL(2%)	TOP	L203	1	COILCRFT
3	0603CS-180NXG-BC	180N CHIP COIL(2%)	BOT	L106	1	COILCRFT
4	0603CS-220NXG-BC	220N CHIP COIL(2%)	TOP	L114	1	COILCRFT
5	CI-B1005-47NSJT	IND/4.7N(+/-5%)	BOT	L201	1	CERATECH
6	CI-B1005-82NSJT	IND/8.2N(+/-5%)	BOT	L111	1	CERATECH
7	CI-B1005-120NSJT	IND/12N (+/-5%)	TOP	L103	1	CERATECH
8	CI-B1005-150NSJT	IND/15N (+/-5%)	TOP	L116,L119,L120	3	CERATECH
9	CI-B1608-82NJJT	IND/8.2N (+/-5%)	TOP	L102	1	CERATECH
10	CI-B1608-120NJJT	IND/12N (+/-5%)	TOP	L115	1	CERATECH
11	CI-B1608-150NJJT	IND/15N (+/-5%)	TOP	L109	1	CERATECH
12	CI-B1608-270NJJT	IND/27N (+/-5%)	BOT	L118,L117	2	CERATECH
13	CI-B1608-101NJJT	IND/100N(+/-5%)	TOP	L101	1	CERATECH
14	CI-B1608-181NJJT	IND/180N(+/-5%)	BOT	L105	1	CERATECH
15	CI-B2012-271NJJT	IND270N(+/-5%)	TOP	L121	1	CERATECH
16	BLM1608A601SPT	FERITE BEAD	TOP	BL101,BL605,BL102, BL607,BL1	5	MURATA
			BOT	BL202,BL606	2	MURATA
CAPACITOR						

1	GRM36C0G010C50PT	1pF-1005 Cap	TOP	C168	1	MURATA
2	GRM36C0G1R5C50PT	1.5pF-1005 Cap	TOP	C104	1	MURATA
3	GRM36COG020C50PT	2pF-1005 Cap	BOT	C249	1	MURATA
4	GRM36C0G030C50PT	3pF-1005 Cap	TOP	C113	1	MURATA
5	GRM36COG040D50PT	4pF-1005 Cap	TOP	C186	1	MURATA
			BOT	C135	1	MURATA
6	GRM36COG060D50PT	6pF-1005 Cap	TOP	C114,C132	2	MURATA
			BOT	C133	1	MURATA
7	GRM36COG070D50PT	7pF-1005 Cap	TOP	C212	1	MURATA
			BOT	C147	1	MURATA
8	GRM36COG100J50PT	10pF-1005 Cap	TOP	C107,C112	2	MURATA
			BOT	C143	1	MURATA
9	GRM36COG150J50PT	15pF-1005 Cap	BOT	C158,C402,C403	3	MURATA
10	GRM36C0G220J50PT	22pF-1005 Cap	TOP	C109	1	MURATA
			BOT	C129	1	MURATA
11	GRM36COG240J50PT	24pF-1005 Cap	BOT	C164,C165	2	MURATA
12	GRM36C0G680J50PT	68pF-1005 Cap	BOT	C142	1	MURATA
13	GRM36C0G820J50PT	82pF-1005 Cap	TOP	C211,C213	2	MURATA
			BOT	C146,C151	2	MURATA
14	GRM36COG101J50PT	100pF-1005 Cap	TOP	C100,C134,C418,C417, C108,C101,C103	7	MURATA
			BOT	C243,C241,C285,C280,C288 ,C230,C231,C232,C218,C236, C139,C702,C235	10	MURATA
15	GRM36COG221J50PT	220pF-1005 Cap	BOT	C156,C155	2	MURATA
16	GRM36COG471J50PT	470pF-1005 Cap	TOP	C127,C310,C309,C306,C311	5	MURATA
			BOT	C345,C346,C349,C350,C347, C348,C343,C344,C339,C342, C341,C340,C337,C335,C338, C336,C333,C334,C331,C332, C329,C330,C327,C328,C325, C326,C323,C324,C321,C322, C319,C320,C317,C318,C315, C316,C313,C314,C301,C303, C305,C312,C307,C308,C302, C304	40	MURATA
17	GRM36X7R102K50PT	1nF-1005 Cap	TOP	C115,C121,C451	3	MURATA

			BOT	C289,C284,C219,C470,C144, C136,C137	7	MURATA
18	GRM36COG103J50PT	10nF-1005 Cap	TOP	C258,C209,C118,C128,C620, C630,C455,C622,C611,C603, C641,C618,C453	10	MURATA
			BOT	C283,C290,C215,C250,C216, C205,C206,C220,C221,C614, C110,C450,C460,C410,C701, C130	15	MURATA
19	GRM36COG123J50PT	12nF-1005 Cap	BOT	C425,C427	2	MURATA
20	GRM36Y5V223Z25PT	22nF-1005 Cap	TOP	C421	1	MURATA
			BOT	C420	1	
21	GRM36COG333J50PT	33nF-1005 Cap	BOT	C260	1	MURATA
22	GRM36Y5V683Z25PT	68nF-1005 Cap	TOP	C150	1	MURATA
23	GRM36Y5V104Z25PT	100nF-1005 Cap	TOP	C259,C454,C623,C452	5	MURATA
			BOT	C287,C229,C286,C265,C228, C291,C226,C223,C222,C270, C424,C423,C428,C426,C120, C111,C191,C159,C160,C141, C131,C138,C166	20	MURATA
24	GRM36COG105J50PT	1uF-1005 Cap	TOP	C105,C106,C116,C117,C456	4	MURATA
			BOT	C247	1	
25	GRM39COG050J50PT	5pF-1608 Cap	TOP	C102	1	MURATA
26	GRM39COG101J50PT	100pF-1608 Cap	TOP	C501	1	MURATA
27	GRM39COG102J50PT	1nF-1608 Cap	TOP	C253	1	MURATA
			BOT	C148	1	MURATA
28	GRM39Y5V103Z25PT	10nF-1608 Cap	BOT	C281	1	MURATA
29	GRM39Y5V104Z25PT	100nF-1608 Cap	TOP	C207	1	MURATA
30	GRM39Y5V224Z25PT	220nF-1608 Cap	TOP	C214	1	MURATA
			BOT	C282	1	MURATA
31	GRM39Y5V684Z25PT	680nF-1608 Cap	BOT	C149	1	MURATA
32	TA-016TCML1R0M-PR	Tan Cap (1uF/16V/A)	TOP	C10	1	TOWA
33	TA-6R3TCMS100M-AR	Tan Cap (10uF/6.3V/A)	TOP	C269	2	TOWA
34	TA-6R3TCMS100M-PR	Tan Cap (10uF/6.3V/P)	TOP	C627,C625,C422	2	TOWA
			BOT	C240	1	
35	TA-6R3TCMS4R7M-AR	Tan Cap (4.7uF/6.3V/A)	TOP	C608,C612,C604	3	TOWA
			BOT	C9	1	TOWA

36	TA-6R3TCMS4R7M-PR	Tan Cap (4.7uF/6.3V/P)	TOP	C124	1	TOWA
37	TA-6R3TCR330K-A	Tan Cap (33uF/6.3V/A)	TOP	C606,C419	2	TOWA
38	514756A , SPRAGUE	Tan Cap(100uF/6.3V/595D-B)	TOP	C626,C125	2	SPRAGUE
RESISTOR						
1	MCR01MZSJX000	0W 5%-1005 Resistor	TOP	R156,R221,R123,R133,R426, R134,R136	7	ROHM
			BOT	R244,R206,R290,R180	4	ROHM
2	MCR03MZSJX000	0W 5%-1608 Resistor	TOP	R603	1	ROHM
6	MCR01MZSJX330	33W 5%-1005 Resistor	TOP	R120,R121,R130	3	ROHM
7	MCR01MZSJX390	39W 5%-1005 Resistor	TOP	R109	1	ROHM
8	MCR01MZSJX101	100W 5%-1005 Resistor	TOP	R280	1	ROHM
			BOT	R243,R246,R106	3	ROHM
9	MCR01MZSJX151	150W 5%-1005 Resistor	TOP	R110,R111	2	ROHM
10	MCR01MZSJX331	330W 5%-1005 Resistor	BOT	R240,R402	2	ROHM
11	MCR01MZSJX471	470W 5%-1005 Resistor	BOT	R361,R362,R365,R366,R363, R364,R360,R359,R358,R355, R357,R356,R353,R351,R354, R352,R349,R350,R347,R348, R346,R345,R343,R344,R341, R342,R329,R340,R327,R328, R325,R326,R323,R324,R321, R322,R319,R320,R301,R302, R318,R303,R308,R309,R304, R317	40	ROHM
12	MCR01MZSJX511	510W 5%-1005 Resistor	BOT	R231	1	ROHM
14	MCR01MZSJX102	1KW 5%-1005 Resistor	TOP	R122,R108,R210,R455,R610, R113,R253	7	ROHM
			BOT	R241,R223,R220,R224,R104, R410	5	ROHM
15	MCR01MZSJX152	1.5KW 5%-1005 Resistor	TOP	R421	1	ROHM
16	MCR01MZSJX182	1.8KW 5%-1005 Resistor	BOT	R115	1	ROHM
17	MCR01MZSTX202	2.0KW 5%-1005 Resistor	TOP	R611	1	ROHM
17	MCR01MZSTX222	2.2KW 5%-1005 Resistor	TOP	R420	1	ROHM
18	MCR01MZSJX332	3.3KW 5%-1005 Resistor	TOP	R202	1	ROHM
19	MCR01MZSJX472	4.7KW 5%-1005 Resistor	TOP	R470	1	ROHM
			BOT	R203	1	ROHM
20	MCR01MZSJX512	5.1KW 5%-1005 Resistor	BOT	R236	1	ROHM

21	MCR01MZSJX822	8.2KW 5%-1005 Resistor	BOT	R209	1	ROHM
22	MCR01MZSJX103	10KW 5%-1005 Resistor	TOP	R204,R205,R126,R128,R316, R307,R305,R701,R311,R314, R312,R475	10	ROHM
			BOT	R235,R208,R207,R424,R425, R502,R501,R114,R116,R102	10	ROHM
23	MCR01MZSJX223	22KW 5%-1005 Resistor	TOP	R313,R315,R310,R330	4	ROHM
24	MCR01MZSJX363	36KW 5%-1005 Resistor	BOT	R211	1	ROHM
25	MCR01MZSJX104	100KW 5%-1005 Resistor	TOP	R189	1	ROHM
26	MCR01MZSJX184	180KW 5%-1005 Resistor	BOT	R422,R423	2	ROHM
27	MCR01MZSJX474	470KW 5%-1005 Resistor	BOT	R427	1	ROHM
28	MCR01MZSFX1212	12.1KW 1%-1005 Resistor	BOT	R119	1	ROHM
29	MCR01MZSFX1003	100KW 1%-1005 Resistor	TOP	R222	1	ROHM
30	MCR01MZSFX1503	150KW 1%-1005 Resistor	TOP	R225	1	ROHM
31	MCR01MZSFX1004	1MW 1%-1005 Resistor	TOP	R118,R117	2	ROHM
기타						
1	DTSS-1800 V0.3 PCB	Main PCB			1	LGE
2	DTSS-1800 TOP COVER	기구 TOP COVER			1	JUNG IL
3	DTSS-1800 TOP FRAME	기구 TOP FRAME			1	JUNG IL
4	DTSS-1800 BOT COVER	기구 BOT COVER			1	JUNG IL
5	DTSS-1800 BOT FRAME	기구 BOT FRAME			1	JUNG IL
6	DTSS-1800 LABEL	LABEL			1	SHIN HUNG
DNI						
1		RESISTOR	TOP	R370,R254,R403,R260,R127, R132,R131,R135	8	
			BOT	R107,R155,R230,R242	4	
2		CAPACITOR	TOP	C435,C140	2	
			BOT	C224,C169,C187,C352,C246	5	
3		INDUCTOR	TOP	L100	1	
			BOT	L202	1	
4		Others	TOP	VA301	1	
			BOT			

3-2. EM Main Board Partlist

28. Jan. 2002

No	Commponent Name	Description	Lay	DESIGN NO		Vendor
LOGIC					1	
1	SMA R/A(F)+ MCA Cable	SMA(F) + MCA	TOP	CDMA	1	LINK Tec.
2	PH127-60SMD-16H-2.0	60pin connetor	BOT	CN1	1	SKY Elec.
3	TC7SHU04F	inverter	TOP	U19	3	TOSHIBA
4	UMT2907A	PNP TR	TOP	U14,16,17	1	ROHM
5	SP207-EA	Tranceiver IC	TOP	U2	1	SIPEX
6	MIC4576BU	LDO (TO-263)	TOP	U3	1	MICREL
7	MBRS360T3	Schottky Diode	TOP	ZD1	1	MOTOROLA
8	657PL8	8pin Modular Housing	TOP	J2	1	ARIN
9	BL-2141N	LED(Green)	TOP	D4	1	BRT
10	BL-3141N	LED(Yellow)	TOP	D1,D2,D3	3	BRT
11	HSJ1621-019011	EARJACK	TOP	U15	1	HOSIDEN
12	53047-0310	1.25mm male 3pin	TOP	CN10	1	MOLEX
13	5268	2.5mm male 3pin®	TOP	CN2	1	MOLEX
14	5268	2.5mm male 2pin®	TOP	J1	1	MOLEX
RESISTOR						
15	MCR03MZSJX000	RESISTOR(1608) 0R	TOP	R30,R31,R44,R45, R46,R47	6	ROHM
16	MCR03MZSJX101	RESISTOR(1608) 100R	TOP	R7,R8,R9,R34,R35, R36,R37	7	ROHM
17	MCR03MZSJX332	RESISTOR(1608) 3.3K	TOP	R1,R2,R3	3	ROHM
18	MCR03MZSJX472	RESISTOR(1608) 4.7K	TOP	R6	3	ROHM
19	MCR03MZSJX103	RESISTOR(1608) 10K	TOP	R5	3	ROHM
CAPACITOR						
20	GR39COG471J50PT	470pF -1608 -capacitor	TOP	C9	1	MURATA
21	TA-035TCMR10M-AR	TANTAL 0.1uF/35V	TOP	C5,C6,C7,C8	3	TOWA
22	470uF/16V(10x10.5) "MVK" 85°C	Elec. Cap (chip type)	TOP	C1	1	SAMYANG
23	1000uF/6.3V(10x10.5) "RGV"85°C	Elec. Cap (chip type)	TOP	C2	1	RUBYCON
INDUCTOR						
24	PL52C-33-1000	COIL INDUCTOR (33uH)	TOP	L2	1	COOPER
The Others						

25	EM(II)_PCB _V0.1	EM(II)_PCB_MAIN_ V0.1				UNIC Elec.
26	EM-BODY-00	BODY				TOSUNG
27	EM-FRONT-00	FRONT				TOSUNG
28	EM-REAR-00	REAR				TOSUNG
DNI						
29	DNI	RESISTOR	TOP	R4,R13,R14,R15, R16, R17,R18,R19, R20,R21,R22,R23, R24,R25,R26,R27, R40,R41,R42,R43	20	
30	DNI	CAPACITOR	TOP	C3,C4	2	
31	DNI	DA114	TOP	D5	1	
32	DNI	INDUCTOR	TOP	L1	1	
33	DNI	MIC5205-3.0V	TOP	U4	1	
34	DNI	TC74HC07AF(SOP-14)	TOP	U6	1	
35	DNI	TC74HC4052AFT(SOP-16)	TOP	U5	1	
36	DNI	53047-0810(8PIN)	TOP	U7	1	
37	DNI	5268(3PIN)	TOP	CN3, CN4	2	

4. Component Layout