Service Manual
Level 3
Preliminary

MOTOROLA™
DIGITAL WIRELESS TELEPHONE

Model V810
CDMA 800, 1900MHz & Analog 800MHz

Introduction

Motorola® Inc. maintains a worldwide organization that is dedicated to provide responsive, full-service customer support. Motorola products are serviced by an international network of company-operated product-care centers as well as authorized independent service firms.

Available on a contract basis, Motorola Inc. offers comprehensive maintenance and installation programs that enable customers to meet requirements for reliable, continuous communications.

To learn more about the wide range of Motorola service programs, contact your local Motorola products representative or the nearest Customer Service Manager.

Product Identification

Motorola products are identified by the model number on the housing. Use the entire model number when inquiring about the product. Numbers are also assigned to chassis and kits. Use these numbers when requesting information or ordering replacement parts.

Product Names

Product names are listed on the front cover. Product names are subject to change without notice. Some product names, as well as some frequency bands, are available only in certain markets.

Regulatory Agency Compliance

This device complies with Part 15 of the FCC Rules. Operation is subject to the following conditions:

• This device may not cause any harmful interference
• This device must accept interference received, including interference that may cause undesired operation

This class B device also complies with all requirements of the Canadian Interference-Causing Equipment Regulations (ICES-003).

Cet appareil numérique de la classe B respecte toutes les exigences du Règlement sur le matériel brouilleur du Canada.

Computer Program Copyrights

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About this Service Manual

Using this service manual and the suggestions contained in it assures proper installation, operation, and maintenance. Refer questions about this manual to the nearest Customer Service Manager.

Audience

This service manual aids service personnel in testing and repairing V810 telephones. Service personnel should be familiar with electronic assembly, testing, and troubleshooting methods, and with the operation and use of associated test equipment.

Use of this manual assures proper installation, operation, and maintenance of Motorola products and equipment. It contains all service information required for the equipment described and is current as of the printing date.

Scope

This manual provides basic information relating to V810 telephones, and also to provides procedures and processes for repairing the units at Level 1 and 2 service centers including:

• Unit swap out
• Repairing of mechanical faults
• Basic modular troubleshooting
• Testing and verification of unit functionality
• Initiate warranty claims and send faulty modules to Level 3 or 4 repair centers

Conventions

The following special characters and typefaces are used in this manual to emphasize certain types of information.

▶ *Note: Emphasizes additional information pertinent to the subject matter.*

⚠ *Caution: Emphasizes information about actions that may result in equipment damage.*

⚡ *Warning: Emphasizes information about actions that may result in personal injury.*

☰ Keys to be pressed are represented graphically. For example, instead of "Press the Menu Key", you will see "Press ☰".

Information from a screen is shown in text as similar as possible to what displays on the screen. For example, ALERTS or ALERTS or ALERTS.

Information that you need to type is printed in **boldface type**.

Warranty Service Policy

The product is sold with the standard 12-month warranty terms and conditions. Accidental damage, misuse, and extended warranties offered by retailers are not supported under warranty. Non warranty repairs are available at agreed fixed repair prices.

Out-of-Box Failure Policy

The standard out of box failure criteria applies. Customer units that fail very early on after the date of sale, are to be returned to Manufacturing for root cause analysis, to guard against epidemic criteria. Manufacturing will bear the costs of early life failure.

Product Support

Customer's original units will be repaired but not refurbished as standard. Appointed Motorola Service Hubs will perform warranty and non-warranty field service for level 2 (assemblies) and level 3 (limited PCB component). The Motorola High Technology Centers will perform level 4 (full component) repairs.

Customer Support

Customer support is available through dedicated Call Centers and in-country help desks. Product Service training is available through the local Motorola Support Center.

Parts Replacement

When ordering replacement parts or equipment, include the Motorola part number and description used in the service manual or supplement.

When the Motorola part number of a component is not known, use the product model number or other related major assembly along with a description of the related major assembly and of the component in question.

In the U.S.A., to contact Motorola, Inc. on your TTY, call: 800-793-7834

Accessories and Aftermarket Division (AAD)

Order replacement parts, test equipment, and manuals from AAD.

U.S.A.	Outside U.S.A.
Phone: 800-422-4210	Phone: 847-538-8023
FAX: 800-622-6210	FAX: 847-576-3023

In EMEA call +49 461 803 1638.

In Asia call +65 648 62995.

Specifications

General Function	Specification
Frequency Range 1900 MHz PCS	1931.250 -1988.750 MHz Rx 1851.250 -1908.750 MHz Tx
Frequency Range 800 MHz CDMA/ AMPS	869.04 - 893.97 Rx 824.04 - 848.97 Tx
Channel Spacing	50 kHz PCS 30 kHz CDMA/AMPS
Channels	1200 PCS 832 CDMA/AMPS
Modulation	1M25D1W (1.25 MHz bandwidth) CDMA 3G1XRTT (1.25 MHz bandwidth) CDMA-1X F3 +12 kHz for 100% at 1 kHz AMPS
Transmitter Phase Accuracy?	5 Degrees RMS, 20 Degrees peak
Duplex Spacing	80 MHz PCS 45 MHz AMPS
Frequency Stability	± 300 Hz (CDMA) ± 2.5 ppm (AMPS)
Power Supply	3.6V Li Ion 750 mAh battery
Average Transmit Current	310 mA at +13 dBm)
Average Stand-by Current	3.40 mA
Dimensions (with 750 mAh Li ion battery)	43 x 83 x 23.7 mm
Size (Volume)	87cc (5.80 in.^{3}) without antenna
Weight	≤100g (3.84 oz) with battery
Temperature Range	-30° C to +60° C (-22° F to +140° F)
Humidity	80% Relative Humidity at 50° C (122° F)
Battery Life, 750 mAh Li Ion Battery	Up to 180 minutes digital talk time (IS 95 A/B) Up to 90 minutes talk time (Analog) Up to 250 hours (IS 95 A/B) standby time Up to 350 hours (IS 2000) standby time Up to 15 hours standby time (Analog)
	All talk and standby times are approximate and depend on network configuration, signal strength, and features selected.

Transmitter Function	Specification
RF Power Output	0.20 watts -23 dBm into 50 ohms (CDMA nominal) .6 watts -27.0 dBm into 50 ohms (AMPS nominal)
Input/Output Impedance	50 ohms (nominal)
Transmit Audio Response	6 dBm/octave pre-emphasis
Modulation	1M25DIW (1.25 MHz bandwidth) CDMA
CDMA Transmit Waveform Quality (Rho)	0.94

Receiver Function	Specification
Receive Sensitivity	-116 dBm (AMPS, SINAD, C-MSG weighted) Sinad 12dB or greater -104 dBm (CDMA, 0.5% Static FER) 0.5% or less
Audio Distortion	Less than 5% at 1004 Hz, +/- 8 kHz peak frequency deviation (transmit and receive)

Receiver Function	Specification
Adjacent and Alternate Channel Desensitization	3% BER max at 107 dBm signal; -94 dBm/30 kHz, -65 dBm/60 kHz
IM (AMPS)	Greater than 65 dB

Product Overview

Motorola V810 mobile telephones feature Code Division Multiple Access (CDMA) technology. The mobile telephone uses a simplified icon and Graphical user interface (GUI) for easier operation, allow Short Message Service (SMS) text messaging, and include clock, alarm, datebook, calculator, and caller profiling personal management tools. The V810 also has a built in camera. The phone provides 32 Embedded ring tones including VibraCall vibrating alert and 32 Downloadable/Customizable iMelody ring tones. The V810 is a single band phone that allows roaming within the CDMA 800 MHz bands.

The V810 CDMA phone consists of a main housing assembly and a flip assembly. The phone has the main circuit board, battery, headset jack, and accessory connector in the main housing assembly. The display and camera are located in the hinged flip assembly.

The flip assembly contains the entire hinge mechanism. It is attached to the main housing by four screws. The main display is on the inside of the flip assembly and a one line LED display on the outside of the flip assembly. The main display is a 128 x160 pixel, 262K color TFT LCD. The external display is a 96x39 pixel, 4-color OLED. The camera is a 350K pixel, VGA CMOS Sensor Camera.

The main housing assembly includes a battery cover, chassis, main circuit board, keypad and plastic front housing.

The main circuit board contains the Receiver, Transmitter, Synthesizer and Control Logic Circuitry which together comprise the dual band tri-mode phone electronics.

The telephones are made of polycarbonate plastic with a metal enclosure. The display and speaker, as well as the 18-key keypad, transceiver printed-circuit board (PCB), microphone, charger and headphone connectors, and power button are contained within the flip form-factor housing. The 750 mAh Lithium Ion (Li Ion) battery provides up to 178 minutes of talk time in CDMA mode with up to 264 hours of standby time[1].

Features

V810 telephones use advanced, self-contained, sealed, custom integrated circuits to perform the complex functions required for CDMA communication. Aside from the space and weight advantage, microcircuits enhance basic reliability, simplify maintenance, and provide a wide variety of operational functions.

Features available in this family of telephones include:
- CDMA 1X voice and data (153 Kbps F/R)
- Supports 2 way SMS, Email MO SMS Messaging, Canned Messaging
- VibraCall® vibrating alert
- 5-way navigation key
- 19 embedded ring tones (5 embedded + 14 downloadable)
- Calling line identification[2]
- Supports call forwarding for incoming voice calls[2]
- Personal management tools calculator, real-time clock with date, reminders,

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1. All talk and standby times are approximate and depend on network configuration, signal strength, and features selected. Standby times are quoted as a range from DRX=2 to DRX=9. Talk times are quoted as a range from DTX off to DTX on.
2. Network, subscription or service provider dependent feature. Not available in all areas.

and caller profiling
- TTY compliant
- Hearing Aid Telephone Interconnection System (HATIS) support
- TrueSync™ Multi-Point Synchronization Capability
- AFLT/aGPS location services[3]

Simplified Text Entry

iTAP™ predictive text entry. Press a key to generate a character and a dynamic dictionary uses this to build and display a set of word or name options. The iTAP™ feature may not be available in all languages.

Caller Line Identification

Upon receipt of a call, the calling party's phone number is compared to the phone book. If the number matches a phone book entry, that name displays. If there is no phone book entry, the incoming phone number displays. If no caller identification information is available, an incoming call message displays.

▶ *User must subscribe to a caller line identification service through their service provider.*

Personal Information Management

The V810 telephone contains a built in date book with alarm reminders message center and a 100 number capacity phonebook.

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3. Network, subscription or service provider dependent feature. Not available in all areas.

General Operation

Controls, Indicators, and Input/Output (I/O) Connectors

The V810 telephones' controls are on the front and side of the device, and on the keyboard as shown in Figure 1. Indicator icons are displayed on the LCD (see Figure 2).

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Figure 1. V810 Telephone Controls and Indicators Locations

Menu Navigation

V810 telephones have a simple icon and GUI. The phone also features a user-definable Quick Access menu accessed by holding down the Menu key. A 5-way navigation key allows you to move easily through menus.

Color Display

The V810 phone features a 128 x160 pixel, 262K color display. The display provides constant graphical representations of battery capacity and signal strength, as well as the real-time clock.

Display animation makes the phone's icon menu move smoothly as the user scrolls up and down.

➤ *Whether a phone displays all indicators depends on the programming and services to which the user subscribes.*

Figure 2 shows some common icons displayed on the LCD.

Service Provider

STYLES   **RECENT**
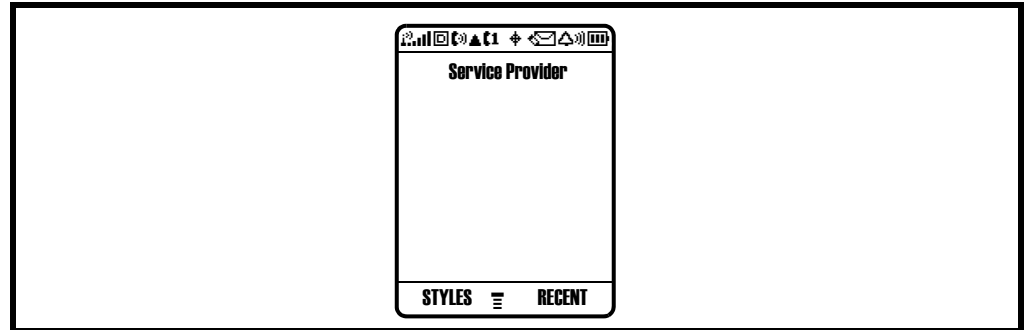
032237o

Figure 2. V810 Display Icon Indicators

1. **Signal Strength Indicator** Vertical bars show the strength of the phone's network connection. You cannot make or receive calls when the "no signal" indicator displays.
2. **Digital/Analog Signal Indicator** shows weather you are receiving a digital (▯) or analog (t) signal.
3. **In Use Indicator** Shows that a call is in progress.
4. **Roam Indicator** Shows that your phone is seeking or using another network system outside your home network.
5. **Message Waiting Indicator**[4] Displays when you receive a text message.
6. **Voice Message Waiting Indicator**[4] Appears when you receive a voicemail message.
7. **Battery Level Indicator** Shows the amount of charge left in the battery.
8. **Active Line Indicator** Indicates the current active line
9. **ALI Indicator** shows the status of the Automatic Location Information feature:

     ✤ = ALI on   ✤ɔ = ALI off

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4. Network, subscription or service provider dependent feature. Not available in all areas.

10. **Ring Style Indicator** indicates the phones current ringer alert setting.

⬧⬧ = loud	⬧⬧ = soft
⬧⬧ = vibrate	⬧⬧ = vibrate and ring
⬧⬧ = silent	

Alert Settings

In addition to preset ring tones, V810 telephones allow the user to download additional ring tones. (Availability is carrier and Network dependant).

Motorola V810 phones incorporate the VibraCall® discreet vibrating alert that avoids disturbing others when a ringing phone is unacceptable.

Alerts can be set to ring only, vibrate only, vibrate then ring, or no ring or vibrate.

Additionally, the profiling feature allows users to identify incoming calls by a specific ringer tone.

Battery Function

Battery Charge Indicator

The telephone displays a battery charge indicator icon in the idle screen to indicate the battery charge level. The gauge shows four levels: 100%, 66%, 33%, and Low Battery.

Battery Removal

Removing the battery causes the device to shut down immediately and loose any pending work (partially entered phone book entries or outgoing messages, for example).

All batteries can cause property damage and / or bodily injury such as burns if a conductive material such as jewelry, keys, or beaded chains touch exposed terminals. The conductive material may complete an electrical circuit (short circuit) and become quite hot. Exercise care in handling any charged battery, particularly when placing it inside a pocket, purse, or other container with metal objects.

If the battery is removed while receiving a message, the message is lost.

To ensure proper memory retention, turn the phone OFF before removing the battery. Immediately replace the old battery with a fresh battery.

Operation

For detailed operating instructions, refer to the appropriate User Guide listed in the Related Publications section toward the end of this manual.

Theory of Operation

Receiver

The receiver block consists of front end (RFL6000) and back end (RFR6000) also Audio signal processing is all achieved under DSP (Digital Signal Processor) control in the Audio/Logic section with MSM6050.

The received signal from the antenna is fed to antenna matching components, and then routed to the Band Selection Switch (SW100). At this point, the switch is selected as bands (Cellular, USPCS, GPS). For 800MHz (Cellular) band operation, the received signal is switched to the antenna port of the duplexer (DPX100) in both analog and digital mode (800MH CDMA), and then routed to the 800MHz LNA that is included in RFL6000 (IC101) through the receive port of the duplexer (DPX100). For 1900MHz (PCS – Personal Communications Service) operation, the received signal is switched to the antenna port of the 1900MHz duplexer (DPX101) and is fed to the 1900 MHz LNA that is contained in RFL6000 (IC101). For GPS, the GPS band pass filter (F103) is fed to the GPS LNA that is comprised in RFR6000 (IC100). F101 is band pass filter for 800MHz and F102 for 1900MHz. The IC101 is a front end IC that contains two sets of LNA.

The 800MHz and 1900Mhz receive signal is further filtered through the SAW band pass filters (F101, F102) for image rejection, LO leakage attenuation and Tx signal attenuation. The GPS receive signal is filtered through F103 for noise suppression before being fed to the LNA.

The LO signals for the 800Mhz and 1900Mhz is supplied by Dual band VCO. The GPS VCO is embedded in RFR6000 (IC100).

The 800MHz (CDMA), 1900MHz and GPS mixers down-convert the received signal to Baseband frequency and the 800Mhz (analog) to 12khz. All mixers typically require a LO input level of –4dBm at the LO input of IC100. The 800Mhz, 1.9Ghz and GPS Quadrature Downconverter outputs are combined to baseband filtering, and then are routed to IC201 (MSM6050).

This IC100 (RFR6000) provides these critical receiver functions for three different operating modes: CDMA, AMPS FM, and GPS position location. It is functionally compatible with the RFL6000, while adding GPS processing capability

RFR 6000

RFL 6000

PM 6000
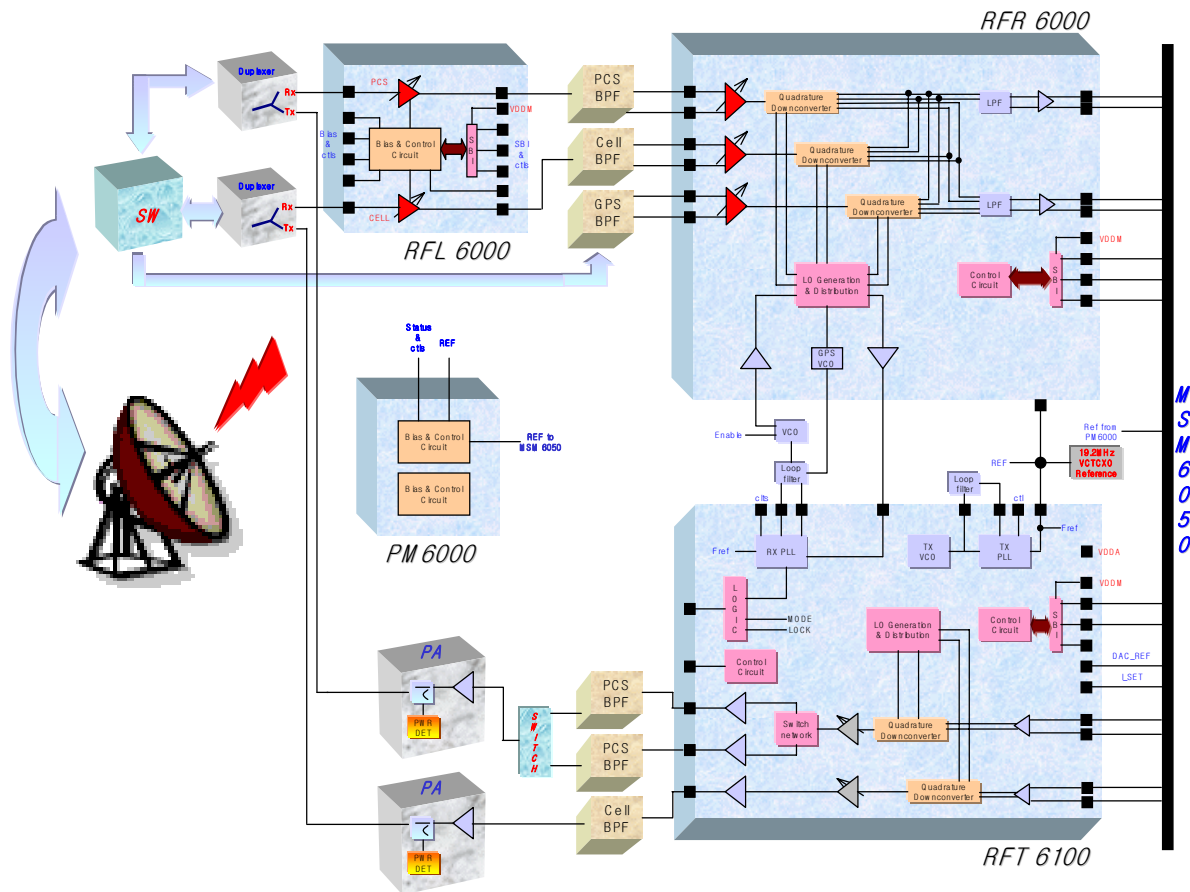
RFT 6100

MSM 6050

Transmitter

For the 800 MHz band, the IC103 (RFT6100) provides the Zero-IF transmitterSignal path, from analog baseband to RF driver amplifiers. In analog mode, also signals are used to generate from MSM6050. In digital mode, the I/Q signals are fed to I/Q modulator to provide QPSK. IC103 (RFT6100) has Tx VCO, Tx PLL and Rx PLL.

The final stage of IC103 (RFT6100) is Driver Amp, this provides adequate Pout and ACPR to PA block. According to Tx lineup calculation, Pout is 0.1dBm and ACPR is 56dBc in this stage. After that main signal pass cleanup filter, that has 2.4dB insertion loss for 824~849MHz and 38dB for Rxband rejection. The 800 MHz PA driver, IC104 has gain approximately 29dB. We have HBT PA module, Also High/ Low power mode in conjunction with digital bias control. The transmitter signal is going to the SAW duplexer TX port, SP3T switch Tx port and finally Ant port will meet 24dBm for digital mode and 27dBm for analog mode.

For the 1900MHz band, RFT6100 output for PCS provides 1.1dBm of Pout and 58dBc of ACPR to the next stage. After that signal pass through Split SAW band pass filter, F105, whose typical insertion loss is 2.4 dB and 38dB for Rxband rejection. SPDT switch control to pass Split band, 1850-1880MHz and 1880-1910MHz, respectively. PA driver, IC107, whose gain is approximately 28dB. The

output of IC107 is fed to PCS FBAR duplexer and then SP3T switch to Ant, the power level at the feeding point of the antenna is set to the suitable power output levels for each band of operation.

Synthesizer

The IC103 (RFT6100) consists of the Rx PLL, Tx PLL and Tx VCO.The external synthesizer block is composed of the RX dual band VCO (VCO100) and other supporting circuits including the loop filter and supports RF RX (Cellular 800Mhz, PCS CDMA and GPS). The TX RF synthesizer is totally internal to IC103 (RFT6100) except for the loop filter. All synthesizers are programmable via the data from MSM6050

The reference oscillator, TCXO100 is a temperature compensated crystal oscillator with frequency stability of 2 ppm over temperature extremes. Its frequency is 19.2MHz. Output of TCXO100 is supplied to MSM6050 (IC201), PM6000 (IC304), RFR6000 (IC100), and RFT6100 (IC103).

Main VCO covers the frequency range of 1715MHz to 1788MHz for the 800Mhz mode and 1.9Ghz mode. VCO control voltage range is 0.4 volts to 2.3 volts.

Control Logic Circuitry

Overview

The Audio and Control Logic circuitry is based on Qualcomm baseband IC (MSM6050/ PM6000). MSM6050 is a baseband CDMA Processor that has been optimized for wireless subscriber applications. It executes software that handles state control, MMI control, radio control, network communications and accessory control. External FLASH/PSRAM (IC309) provides the baseband Processor's MCU program and data memory. The General Control Power IC (IC304) provides the linear voltage regulator and battery charge control. Harness IC (IC300) is Motorola customed Asic to provide for CE bus Mux, additional GPIO and P-S converter etc.

External interfaces include Motorola's proprietary accessory interface (CN300) called as CE bus and an industry standard 2.5mm headset jack (EAR200). MIDI sound is created in MIDI IC (IC200). A microphone is located in the main board and a receiver speaker is located in the flip assembly. A dual window LCD is located in the flip assembly and main LCD support STN color display. White color backlighting is provided for main LCD display windows. Keypad with blue LED backlighting is provided in the main board.

Baseband Processor IC

IC201 MSM6050 CDMA 1X baseband Processor integrates functions that support a tri-mode CDMA/FM subscriber unit Subsystems within the MSM6050 device include a CDMA processor, a Digital FM (DFM) processor, QUALCOMM-designed DSP for voice compression, an ARM® ARM7TDMI microprocessor. To provide an optimized system solution for IS2000 –1X services, the MSM6050 device support 153kbps data rate air interface and also integrates a gpsOne Processor to support GPS one solution. Also integrated in the MSM6050 device are functions such as an audio voice codec, PLL, transmit DACs, ADCs, an Universal Serial Bus (USB) device controller, peripheral interfaces, and an enhanced clock and power management architecture. The MSM6050 IC contains the following major features:

- Integrated gpsOne Processor for direct interface to RF chipset

- Integrated 13-bit linear CODEC with multiple inputs (3) and outputs (3) with amplifiers
- Integrated general-purpose ADC for subscriber unit monitoring, e.g., temperature sensor
- Voice mode V1 (EVRC, PureVoice) all radio configurations
- Integrated PLL to provide additional on-chip clock frequencies
- Supports 19.2MHz TCXO frequencies
- Supports RadioOne ZIF (Zero I/F)
- Integrated Universal Serial Bus (USB) interface for plug-and-play (PC) applications
- 66-pin general-purpose interface (GPIO)
- Supports IS-95-A and IS-95-B compliant CDMA and DFM subscriber units
- Supports low-power, low-frequency crystal to enable TCXO shutoff
- Low Vdc power consumption during operation
- Software-controlled power management features
- ANSI/IEEE 1149.1A-93 compliant JTAG interface for Testability
- Enhanced I/O support for faster RS-232
- Supports page-mode flash memory

PM6000

The PM6000 chip (IC304) is a complete power management system device for CDMA handset applications whose primary functions provide battery management and charger control, and linear voltage regulation with programmable voltages for digital and RF/analog circuits. PM6000 IC contain the following features:

- 7 LDOs
- Serial Interface (SBI bus) to MSM
- TCXO control for Slotted mode operation
- Charging control for Li-Ion battery
- Ten 10-bit A to D converters (5 wired internally, 5 accessible)
- Keyboard/LCD backlight driver (not used)
- Ringer driver (not used)
- Vibrator driver (not used)
- MSM/32.768KHz clock driver
- Power On Reset control

FLASH/PSRAM Memory

IC309 Flash/PSRAM (Pseudo SRAM) Memory is mixed multi-chip package containing two 64Mbit Flash memories and one 64Mbit pseudo SRAM. The Flash/PSRAM Memory supports page mode for fast access time. Flash is for boot code, program code storage and NVM data storage. FLASH memory contains executable code that is executed directly from FLASH. Flash memory also contains configuration parameters, look-up tables, calibration constants, user selectable option settings, phonebook data, call history, etc. Pseudo SRAM contains run-time dynamic data storage, software stack/heap data, and other data that is frequently modified during run-time operation. The Baseband Processor accesses FLASH/PSRAM memory via a 16-bit asynchronous bus interface.

Accessory Interface

A 17 pin accessory connector (CN300), called as CE bus connector is provided at the bottom of the main housing. This interface supports charging accessories, analog

and digital audio accessories, and RS-232 and USB communication accessories. The accessory interface provides for auto-detection of accessories upon insertion. Depending on the accessory, power can be provided to the phone from an external approved power accessory or power can be provided to the accessory for battery powered applications.

Battery Interface

The PM6000 (IC304) will be hardware configured for battery charging, which the external charging power supply is expected to provide the constant voltage and current regulation. Since CE Bus charging accessories do not provide the current and voltage regulation for charging lithium ion batteries, an external voltage/current control circuit is required. Pass Transistor (Q303), Battery Transistor (IC306) and Sense Resistor (R314,346) will provide the regulated voltage and current that is required for charging lithium-ion batteries.

The Bipolar PNP Transistor is used for Pass Transistor (Q303) and the P-channel MOSFET for Battery Transistor (IC306). The Sense Resistor (R314,346) used for current monitoring and protection is 0.15 Ohm. The HKADC AD converter of PM6000 monitors charging current, that is read and controlled by software.

Chargers for V810 are 2 types, mid-rate (400mA capable) and fast-rate (1.5A capable). Those should be recognized by phone at initial insertion. Charger is connected through CE bus connector pin 1(GND), 2 (BATTFDBK_RTS) and 3 (EXT_B+). Pin 3 is EXT_B+, main charging current path and pin 2 is battery feedback and manual test multiplexed signal. PM6000 will monitor battery voltage and charging current for battery icon displaying normal phone operation, without a charger attached

Power Distribution

Voltage regulation is provided by the PM6000 IC. The Low Dropout Regulators output voltages can be controlled by the MSM through the SBI. All of the LDO's outputs can be enabled or disabled with the LDO_ENABLE register, with the exception of the MSMP and MSMC LDOs. There is no provision for the enabling or disabling the MSMP and MSMC LDOs. The regulators and their load circuitries are described below:

- VREG_MSMC (1.867V) – MSM IC internal
- VREG_MSMP (2.887V) – MSM Digital, Memory, Harness, USB Transceiver, RFT6100, RFR6000, RFL6000
- VREG_MSMA (2.6V) – MSM Analog
- VREG_TCXO (2.85V) – TCXO supply, VCO
- VREG_RF_RX (2.85V) – RFR6000, RFL6000
- VREG_RF_TX (2.85V) – RFT6100, Temperature Sensor
- VREG_SYNTH (2.85V) – RFT6100
- B+ (3.6V) – PM6000
- B+_PA (3.6V) – PAM(800/1900), LCD Backlight LED, Audio AMP
- VREG_LED – Keypad Backlight LED,

Audio Control Circuitry

Audio Line-up

The audio routing and gain control will be supported by MSM6050 IC. With the integrated microphone and earpiece amplifiers, the MSM interfaces directly to the microphone and earpiece and greatly reduces the audio interface into a few passive components. The integrated Codec converts an analog audio signal, either differential or single-ended, from the microphone into digital signals for the MSM6050's Vocoder. The integrated Codec also converts digital audio data from the Vocoder into an analog audio signal, either differential or single-ended, for the earpiece. The Codec is configured through the QDSP4000 Command types and is not directly controlled by the microprocessor. The Codec Configuration command is sent to the QDSP4000 and then the QDSP4000 executes the command and configures the Codec. The internal Vocoder supports EVRC, QCLEP 13K Vocoders, along with implementing two echo cancellers, an earseal (ESEC) and an acoustic echo canceller (AEC) for carkit applications. The Vocoder also supports digital FM (DFM), DTMF generation and detection, Noise Suppression, audio AGC control, and automatic volume control (AVC). The MSM6050 has an auxiliary Pulse Code Modulation (PCM) interface and programmable Tx and Rx 13-Tap compensation filters to support an auxiliary linear, mu-Law, or A-law Codec that is typically found in carkit applications.

Sidetone (DSP)

Sidetone is audio signal from the microphone summed into speaker path. The MSM6050 includes the capability of adding a portion of the Tx audio into the receive path. This sidetone is added with a programmable gain stage, with a range of 0 dB to -96 dB, controlled by the QDSP4000 DMA parameter CodecSTGain.

Transmit Path Audio

The mobile phone supports three microphone input paths identified as Internal Microphone (MIC1), Headset Microphone (MIC2), and External Accessory Microphone (AUDIO_IN). Headset and External Mic inputs are single ended and Internal MIC is differential Input. The proper Microphone path is selected by the MIC selector and path gain is programmable at the MIC AMP1, 2 in the MSM. Refer to the following sections and block diagram below.
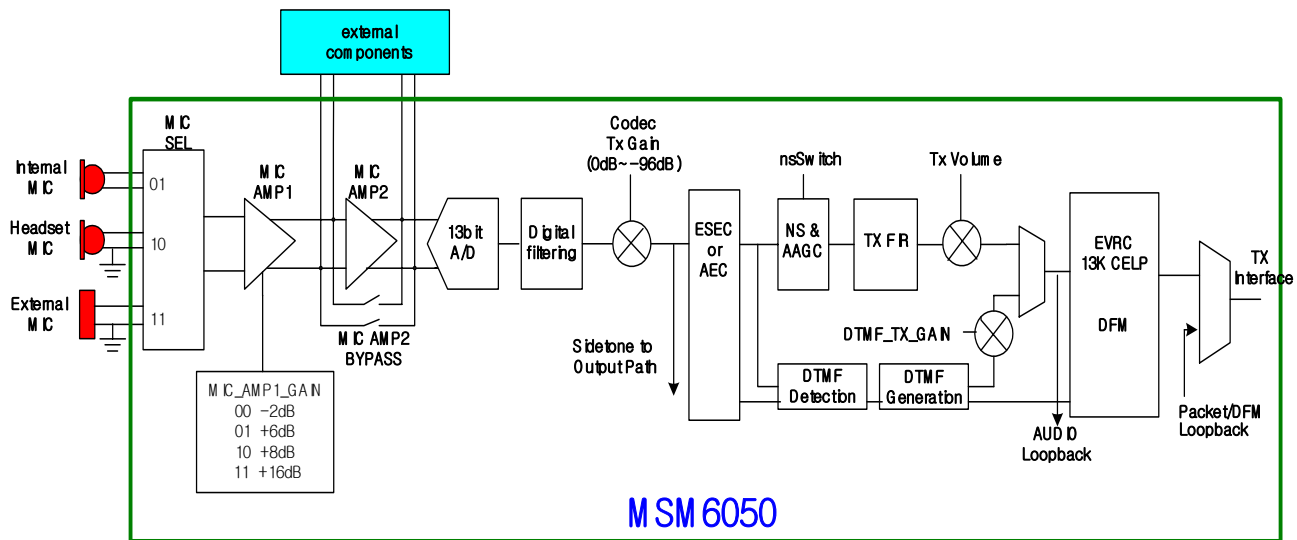
A/D Converter & Filtering

A/D is 13-bit linear two's complement converter. MIC AMP1 and MIC AMP2 gains should be selected to maximize the dynamic range without overloading the A/D (3.63Vpp max range). The transmit data from the microphone input is digitally filtered with an ITU G.712 compliant filter. The filter attenuates the input signals outside the 3400 Hz baseband and decimates the data rate to 8 kHz. The MSM6050 has two optional digital filters on the Tx path prior to the Vocoder, a slope filter and a high-pass filter. The slope filter is designed to provide pre-emphasis for the high frequency audio prior to the Vocoder.

Tx Volume Control

The Tx and Rx audio path have separate volume controls to adjust the loudness levels on the Tx and Rx audio paths. The Rx and Tx volume controls are programmable multipliers

Headset Microphone Path

The Headset Microphone is pin 4 of EAR200, which is a 2.5mm jack. MICBIAS 1.8V from MSM is used for headset Mic bias. The single-ended MIC2P signal is fed to MSM headset Mic input and this line is shared as headset SEND/END detect signal from headset.

External Microphone Path

The External Microphone input is connected to pin 16 of CN300 (AUDIO_IN), the accessory connector for the mobile phone. The path is routed through IC301 to protect ESD and to the AUXIP pin on MSM. This single-ended signal feeds directly to the input MIC select multiplexer without an intervening gain stage. The audio signal shall have a nominal level (-27dBv) of 43.5mVrms at 1 kHz, between 300 Hz and 3 kHz.

Receive Path Audio Circuits

The mobile phone supports three audio output paths. The output of MSM's internal DAC drives the internal AMP SEL. The outputs can be routed to one of the three supported outputs via the internal multiplexer. These outputs connect to the EAR1OP, EAR1ON amplifier (Ear Speaker), the EAR2O amplifier (Headset boom speaker), and the AUXOP, AUXON amplifier (Accessory connector output). All outputs use the same D/A converter so only one output can be active at one time. The user can adjust the gain of the audio outputs with the volume control buttons. Forward link audio path block diagram is as below.
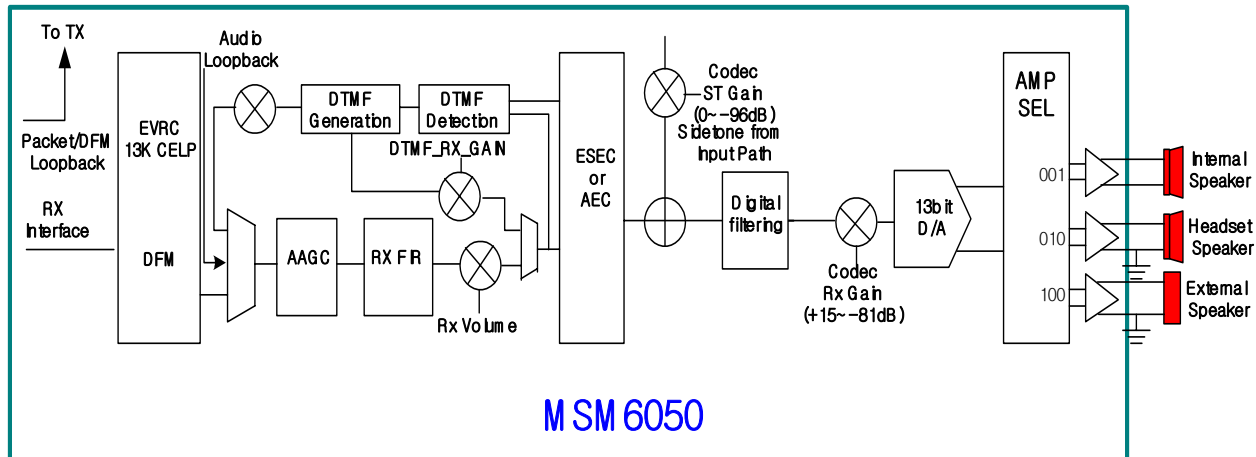
Rx FIR Filter

A type-I 13-tap FIR (Finite Impulse Response) filter is supported on the Tx and the Rx paths. Both filters are software programmable and can be reconfigured during Vocoder or DFM operation. Tx FIR is programmable 13-tap FIR filter whose coefficients can be programmed through the QDSP4000 parameters txPcmFiltLoad and Tx PcmFiltCoeff. Each filter consists of 7 coefficients with the outside taps, h[0] and h[12], h[1] and h[11], h[2] and h[10], h[3] and h[9], h[4] and h[8], and h[5] and h[7], using the same coefficient value. The Rx and Tx filters are intended to equalize the frequency response of the microphone (Tx), the earphone (Rx), and the frequency characteristics of the mechanical housing of the subscriber unit.

Codec Rx Gain

The Rx audio path contains a programmable gain stage, with a range of +15 dB to −81 dB, after the audio front end of the QDSP4000 and prior to the Digital-to-Analog conversion. The QDSP4000 DMA parameter CodecRxGain sets the Rx gain.

Ear Speaker Path

The Ear Speaker is driven by MSM's internal SPKR differential amplifier. This amplifier is powered by voltage VREG_MSMA and Speaker outputs from MSM are routed through the speaker path EAR1OP(+) and EAR1ON(-), that are routed to 40 pin B-B connector through main board and then connected to the transducer in the flip assembly.

Headset Speaker Path

The headset uses a standard 2.5mm phone jack. The phone will detect the presence of a headset using pin 2 on the headset jack, which is pulled high by R213 and connected to the HEADSET_DET_N to MSM interrupt. This pin is aligned with the ground sleeve of the headset plug and will be pulled to a logic low whenever the headset plug is inserted into the jack. The headset may contain a momentary switch, which is normally closed and is in series with the microphone cartridge. When the momentary switch is pressed, the bias current being supplied to the microphone will be interrupted. The phone will detect this action and make an appropriate response to this action, which could be to answer a call, end a call, or dial the last number from scratchpad.

The Headset Speaker makes use of the amplifier in MSM and the single-ended EAR2O output audio path is routed through C237 to pin 3 of the Headset Jack (EAR200). If an external headphone jack is plugged into the phone, the HEADSET_DET_N pin will be pulled to ground and drive the headset speaker as single-ended off the Speaker- audio path.

External Speaker Path

The External Speaker is connected to pin 15 of CN300 (AUDIO_OUT ON/OFF), the accessory connector for the mobile phone. The audio path is routed through IC302 to protect ESD and connected to MSM AUXOP. The DC level of this AUDIO_OUT signal is also used to externally command the phone to toggle it's ON/OFF state. The AUDIO_OUT signal connects to PM6000 KBDPWR_ON pin via D301 to provide this capability. AUDIO_OUT will be routed to MSM GPIO to detect POWER/END key.

MIDI Alert Interface

The YMU762 (IC200) is an MIDI sound generator IC for mobile phone ringing melodies. The YMU762 provides high quality audio while requiring few external components and minimal power consumption. Due to its excellent PSRR, it can be directly connected to the battery, saving the use of an LDO.

MMI (KEYPAD/DISPLAY)

Keypad Interface

The keypad interface consists of an array of twenty-three buttons and multi control switch buttons located in the main board. Multi control switches are provided on the main board for volume control and voice activation. Keypad actuation is detected by the Baseband processor (MSM6050) through the integrated Keypad Port. Activation of a switch (Keypad or multi control switch) will assert (active low) two array signals that will be decoded by the MSM6050 to determine the active key-press. Key strobe signal is provided from Harness Chip (IC300). Keypad back-lighting is provided through an array of 14 LEDs on the main board. ON/OFF control of the LEDs is controlled through the backlight sink circuit.

Flip Open/Close Detection

The Hall sensor switch (IC204) is located on the main board to detect flip open/close status. When flip is closed, the Hall sensor is activated (active low) and this signal is routed to MSM interrupt.

Display Module Interface

The display module is housed in the flip assembly. The display module includes window LCD panel, back-light circuitry, and display driver circuitry. The Display Module interfaces to the main board via CN200. 16-bit parallel interface is used for LCD.

CAMERA

OMNIVISION CAMERA is located on the LCD board. This camera is 300K Pixel COMS VGA type. Operating voltage is 2.5V and 3.0V.

LEDs

The Keypad Backlight LED is realized by ten blue color LEDs which part number is LTST-C192TBKT. One indicate led is used for indication LED. This LED's part number is LNJ115W8PRA.. Harness chip (IC300) controls Keypad Backlight LED and indicate LED.

Tools and Test Equipment

The following table lists tools and test equipment recommended for disassembly and reassembly of V810 telephones. Use either the listed items or equivalents.

Table 1. General Test Equipment and Tools

Motorola Part Number[1]	Description	Application
RSX4043-A	Torque Driver	Used to remove and replace screws
—	Torque Driver Bit T-6 Plus, Apex 440-6IP Torx Plus or equivalent	Used with torque driver
See Table 7	Rapid Charger	Used to charge battery and power phone
0180386A82	Antistatic Mat Kit (includes 66-80387A95 antistatic mat, 66-80334B36 ground cord, and 42-80385A59 wrist band)	Provides protection from damage to device caused by electrostatic discharge (ESD)
6680388B67	Disassembly tool, plastic with flat and pointed ends (manual opening tool)	Used during assembly/disassembly of phone
6680388B01	Tweezers, plastic	Used during assembly/disassembly
—	Digital Multimeter, HP34401A[2]	Used to measure battery voltage
6688054N01	Flip disassembly tool	Used to disassembly the flip assembly

1. To order in North America, contact Motorola Aftermarket and Accessories Division (AAD) at (800) 422-4210 or FAX (800) 622-6210; Internationally, AAD can be reached by calling (847) 538-8023 or by fax (847) 576-3023.
2. Not available from Motorola. To order, contact Hewlett Packard at (800) 452-4844.

Disassembly

The procedures in this section provide instructions for the disassembly of a V810 telephone. Tools and equipment used for the phone are listed in Table 1, preceding.

Many of the integrated devices used in this phone are vulnerable to damage from electrostatic discharge (ESD). Ensure adequate static protection is in place when handling, shipping, and servicing the internal components of this equipment.

Avoid stressing the plastic in any way to avoid damage to either the plastic or internal components.

Removing and Replacing the Antenna

1. Ensure that the phone is turned off.
2. By hand, rotate the antenna base counterclockwise, as indicated by the red arrows until loose.
3. When the antenna threads are completely disengaged, lift the antenna away from the housing. See Figure 3..
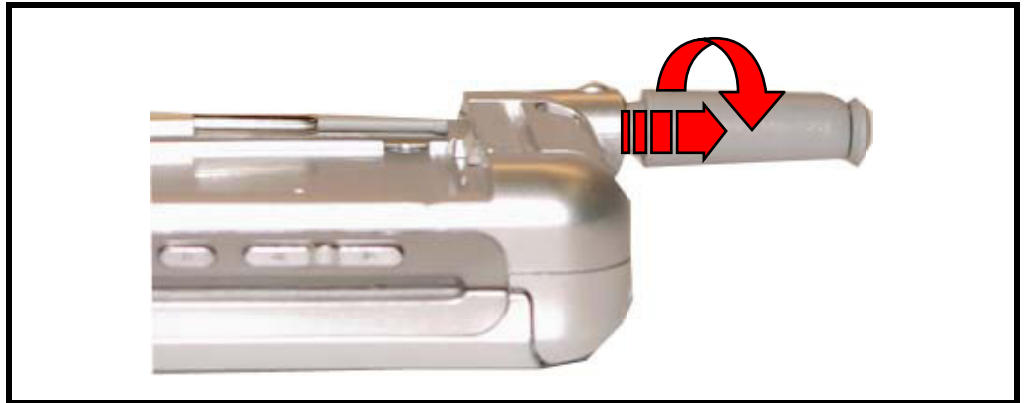
03222130

Figure 3. Removing the Antenna

> ⚠ *Ensure antenna threads are properly engaged before tightening to prevent damage to the antenna or housing.*

4. To replace, insert the threaded end of the antenna carefully into the housing and, after ensuring the threads are properly engaged, rotate clockwise. Tighten firmly by hand.

Removing the Battery Cover

1.   Ensure the phone is turned off.
2.   Lift the battery cover latch.
3.   Gently lift the battery cover as shown in Figure 4.
4.   Lift the battery cover away from the phone.

020200o

Figure 4. Removing the Battery Cover

Removing and Replacing the Battery

All batteries can cause property damage and / or bodily injury such as burns if a conductive material such as jewelry, keys, or beaded chains touch exposed terminals. The conductive material may complete an electrical circuit (short circuit) and become quite hot. Exercise care in handling any charged battery, particularly when placing it inside a pocket, purse, or other container with metal objects.

1. Ensure the phone is turned off.
2. Remove the antenna and battery cover as described in the procedures.
3. Slide the battery in the direction of the arrow as shown in Figure 5.
4. Lift the top of the battery near the antenna out of the battery compartment as shown in Figure 5.
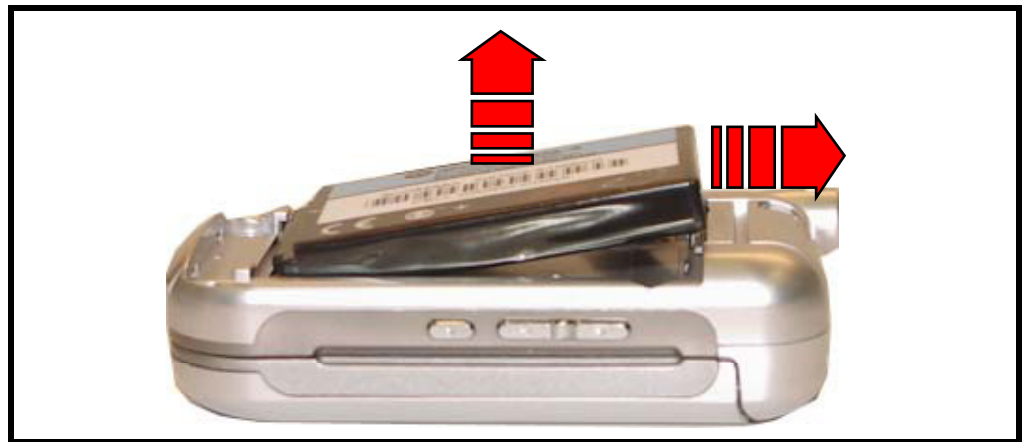
032215o

Figure 5. Removing the Battery

5. To replace, align the battery with the battery compartment so the contacts on the battery match the battery contacts in the phone.
6. Insert the battery, printed arrow first, into the battery compartment and push down.
7. Insert the ridge at the bottom of the housing into the base of the phone, then push the battery down and snap it into place.

Removing and Replacing the Rear Housing Assembly

⚠️ *This product contains static-sensitive devices. Use anti-static handling procedures to prevent electrostatic discharge (ESD) and component damage.*

1. Remove the antenna, battery cover, and battery as described in the procedures.
2. Using a Torx driver with a T-6 bit, remove the 4 screws from the rear housing assembly (See Figure 6). Retain the screws for re-use.
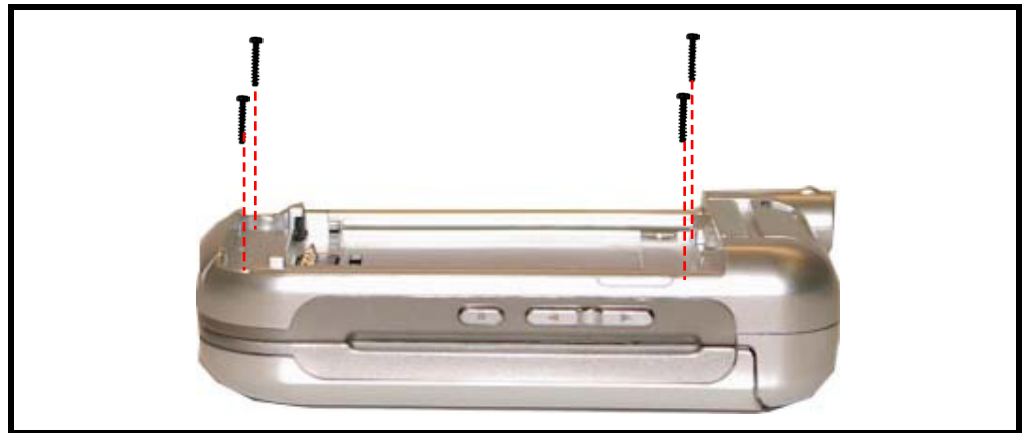
032216o

Figure 6. Removing the rear housing screws
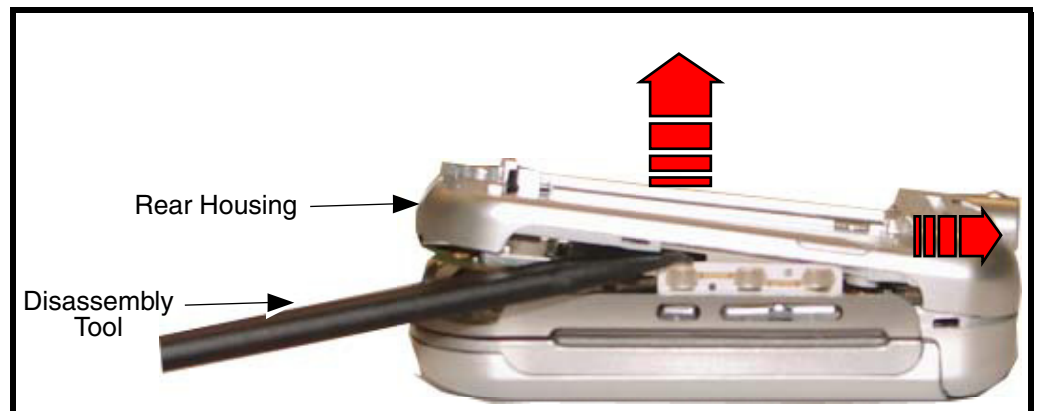
032217o

Figure 7. Removing the Rear Housing

3. Carefully slide the flat end of the disassembly tool along the opening between the back and the front housing to release the snap fittings on the sides of the phone and the latch on the top of the phone (see Figure 7).
4. Repeat step 4 for the other side of the phone.

5. After releasing the snaps gently lift the back housing away and slide it toward the antenna.

6. To replace, carefully align rear housing assembly with the front housing, then press the rear assembly down until the housing catches engage with the corresponding latches on the rear housing. Press the housings together until the catches snap into place.

7. Replace the 4 screws and tighten to a torque setting of 2.0 ± 0.2 Kgf.cm. Do not over tighten.

8. Replace the battery, battery cover and antenna as described in the procedures.

Removing the Flex Connector

1. Remove the antenna, battery cover, battery, and rear housing as described in the procedures.

⚠ *The flexible printed cable (FPC) (flex) is easily damaged. Exercise extreme care when handling.*

2. Use the flat end of the disassembly tool to disconnect the flex connector from the Transceiver PCB Assembly (see Figure 9).
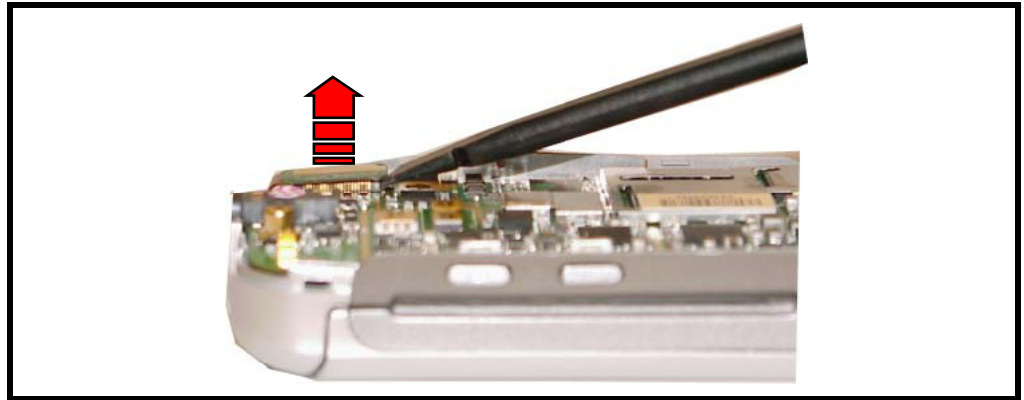
032218o

Figure 8. Removing the Flex Connector

3. To replace, align the connector with it's socket on the transceiver board.
4. Gently press the flex connector into position onto the flex connector socket.

Removing and Replacing the Transceiver Board Assembly

⚠ *This product contains static-sensitive devices. Use anti-static handling procedures to prevent electrostatic discharge (ESD) and component damage.*

1. Remove the antenna, battery cover, battery, and rear housing assembly, and flex connector as described in the procedures.

⚠ *The flexible printed cable (FPC) (flex) is easily damaged. Exercise extreme care when handling.*

2. Use the disassembly tool to lift the side of the transceiver PCB Assembly.
3. Carefully remove the transceiver board from the front housing (See Figure 9).
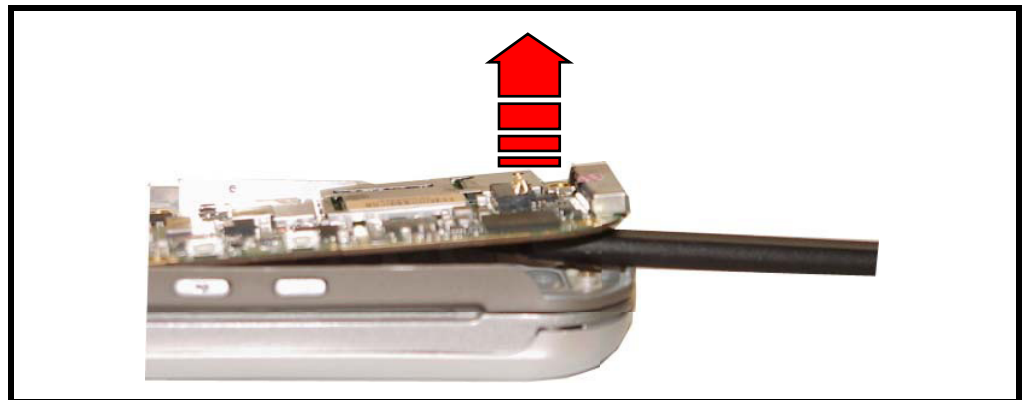
032219o

Figure 9. Removing the Transceiver Board

Removing and Replacing the Keypad

1. Remove the antenna, battery cover, battery, rear housing assembly, flex connector, and transceiver board assembly as described in the procedures.
2. Use the disassembly tool to lift the keypad from the front housing as shown in Figure 10.
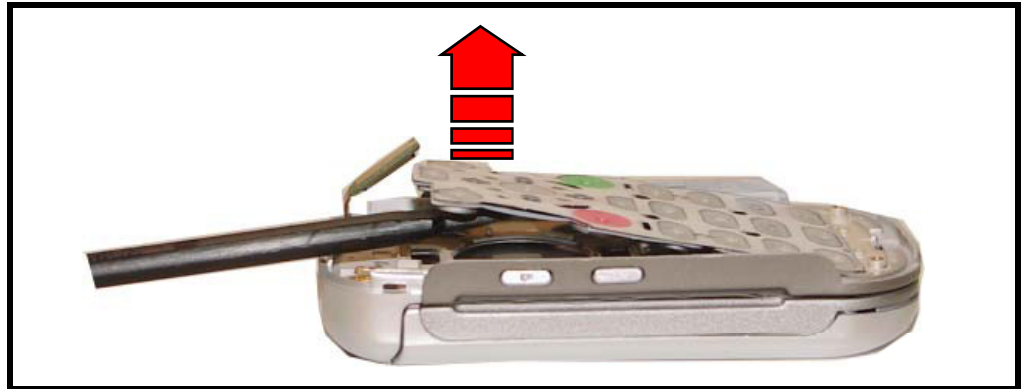
032220o

Figure 10. Removing the Keypad

3. To replace, insert the keypad into the front housing, ensuring the keys align properly with the openings in the front housing.
4. Replace the transceiver board, rear housing assembly, antenna, battery, and battery housing as described in the procedures.

Removing the Flip Ground Assembly

1. Remove the antenna, battery cover, battery, rear housing, flex connector, transceiver board assembly, and keypad as described in the procedures.
2. Use the tweezer to remove the flip ground assembly (see Figure 11).
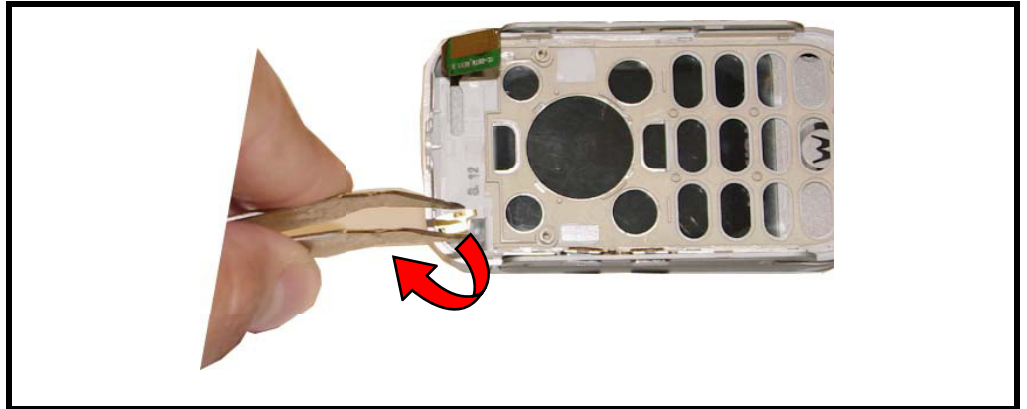
Figure 11. Removing the Flip Ground Assembly

Removing the Flip Hinge Assembly

1.   Using a small flat head screwdriver, push down on the hinge assembly.
2.   Pull the flip assembly off of the phone.
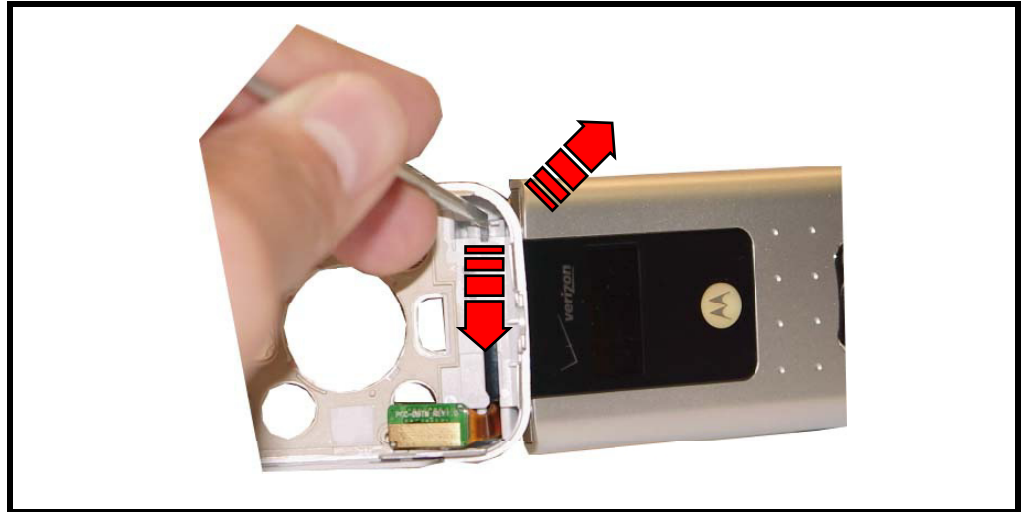
Figure 12. Removing the Flip HInge Assembly

Removing the Flip Assembly

1. Remove the antenna, battery cover, battery, rear housing, flex connector, transceiver board, keypad, flip ground, and flip hinge as described in the procedures.

> ⚠️ *The flex is fragile and easily damaged. Be very careful when passing the flex through the front housing opening.*

2. Twist the housing downward, pull the flip assembly upward to release the flip assembly (see Figure 13).
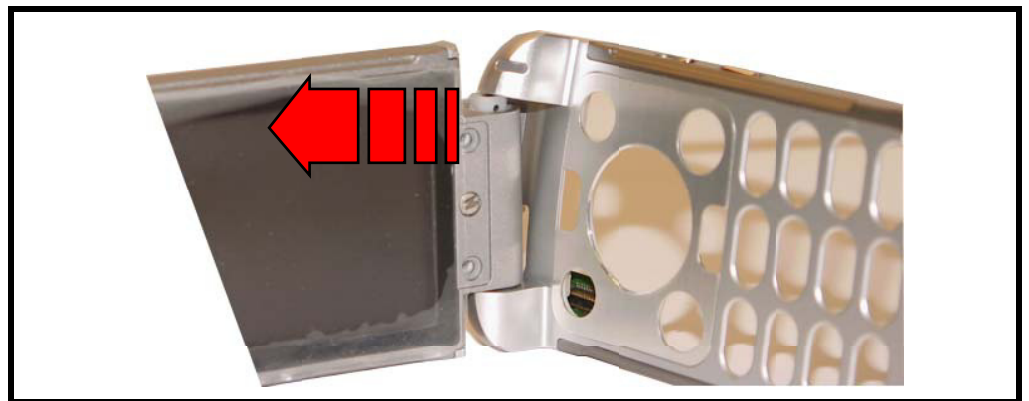
032224o

Figure 13. Removing the Flip Assembly

3. Use the metal tweezers to remove the rubber flip screw caps from the flip assembly.

032225o

Figure 14. Removing the Flip Assembly Screw Caps

4.   Use a small head Phillips screwdriver to remove the 4 screws from the flip assembly.
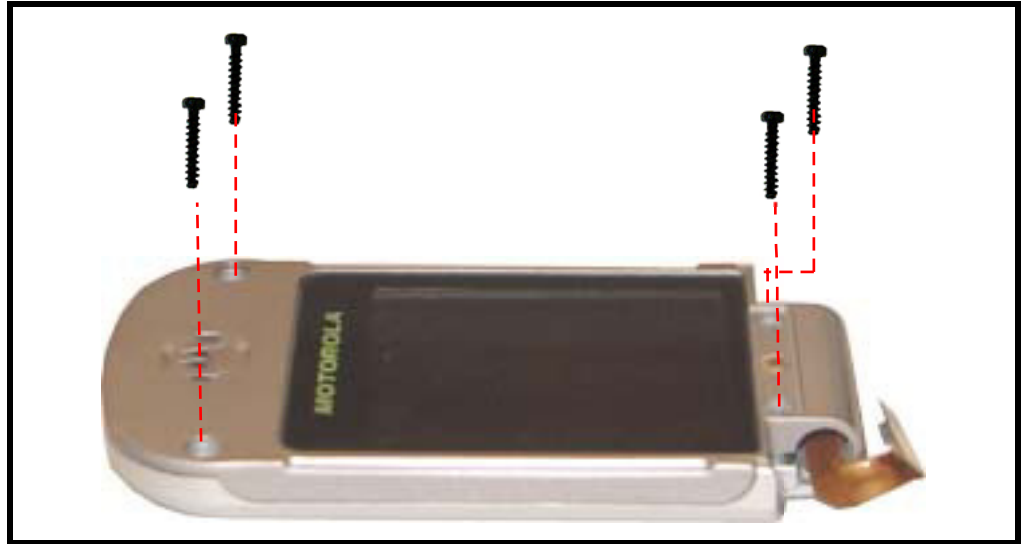
032226o

Figure 15. Removing the Flip Assembly Screws

5.   Set the screws aside for re-use.
6.   Use the disassembly tool to lift the flip cover away from the flip assembly.
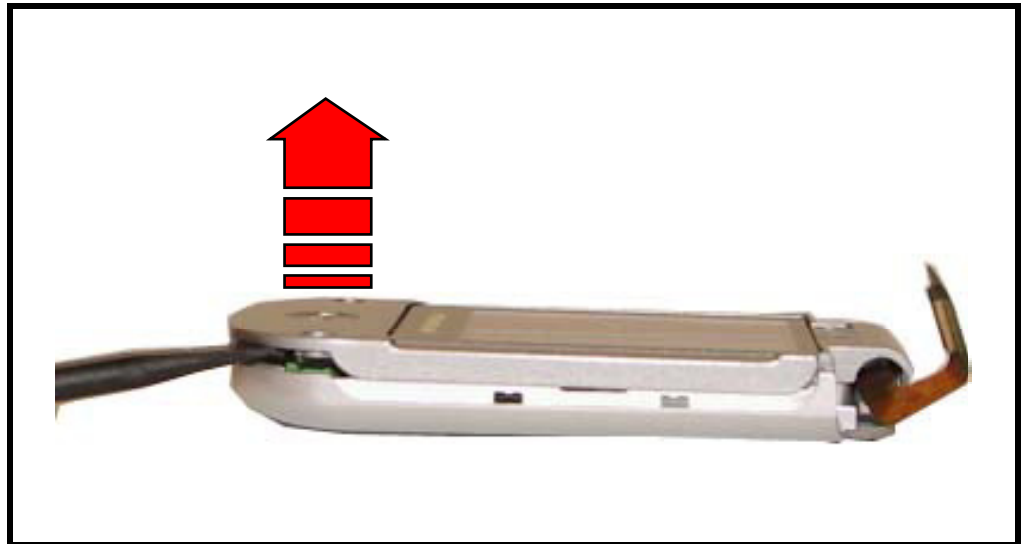
032227o

Figure 16. Removing the Flip Assembly Cover

Removing the Camera Assembly

1. Remove the antenna, battery cover, battery, rear housing, flex connector, transceiver board, keypad, flip ground, flip hinge, flip screws, and flip cover as described in the procedures.

⚠️ *The flex is fragile and easily damaged. Be very careful when handling the flex.*

2. Disconnect the camera assembly and remove from the.
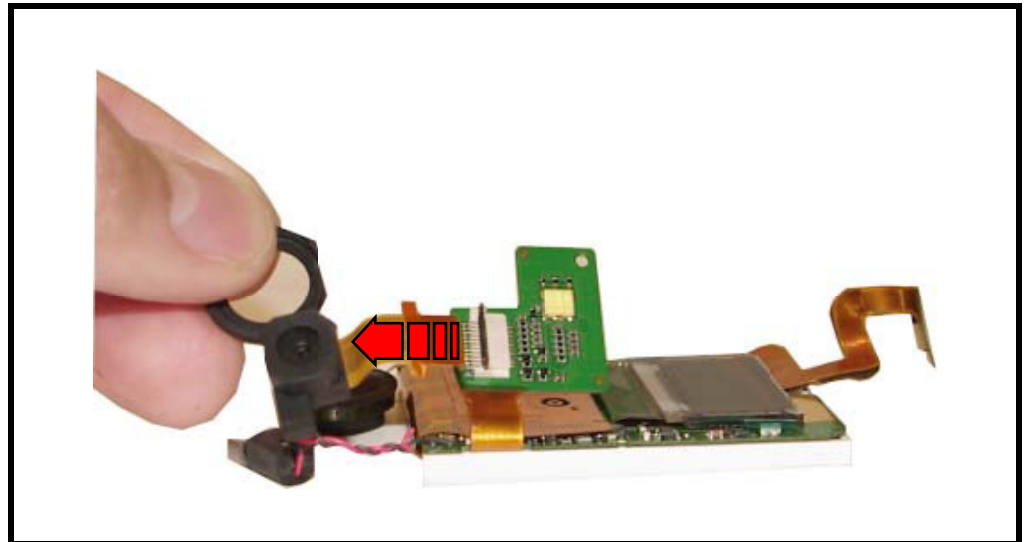
032231o

Figure 17. Removing the Camera Assembly

Removing the Vibrator

1. Remove the antenna, battery cover, battery, rear housing, flex connector, transceiver board, keypad, flip ground, flip hinge, flip screws, flip cover, and camera assembly as described in the procedures.
2. Use a flat head screwdriver to remove the vibrator motor from the flip housing (see Figure 18).
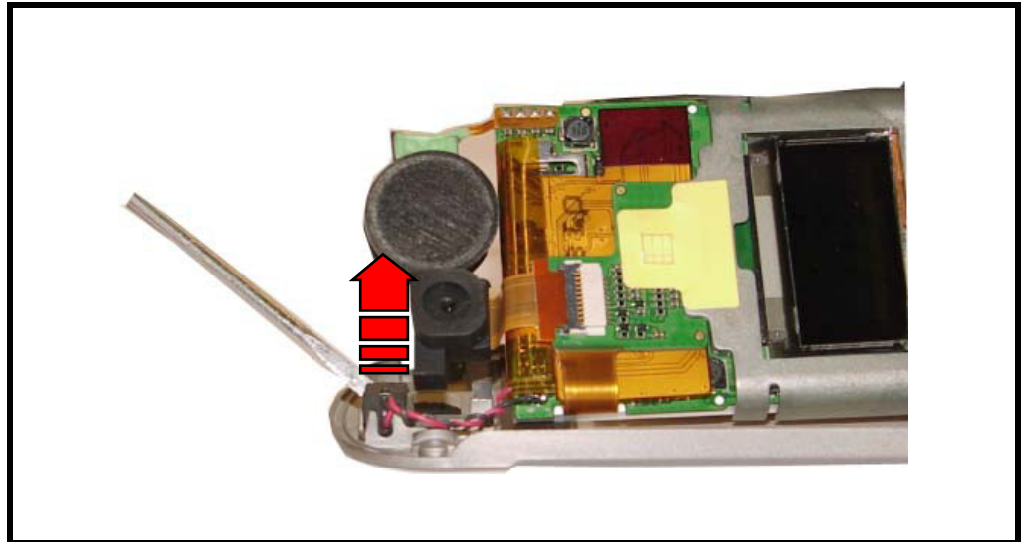
032232o

Figure 18. Removing the Motor/Vibrator Assembly

3.

Removing the Display Module

1. Remove the flip cover and flip assembly, as described in the procedures.
2. Use the disassembly tool to disconnect the flex connector from the display module assembly (see Figure 19A).
3. Carefully, remove the display module retainer clip with the plastic tweezers. Avoid damage to the retainer clip.
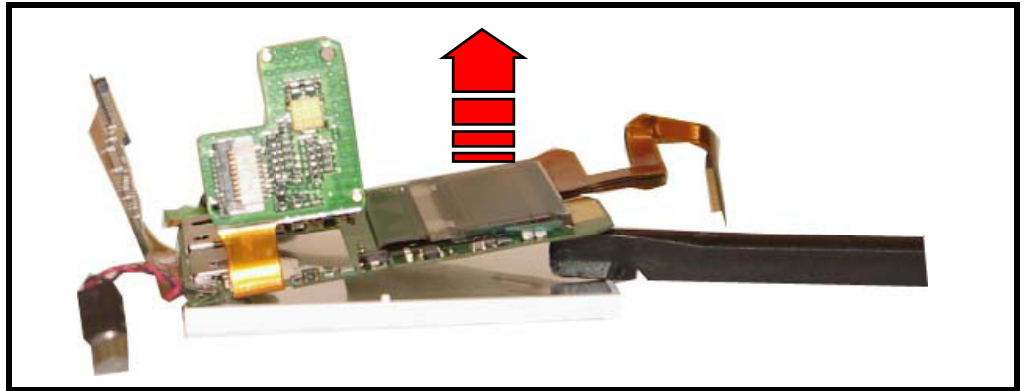
032233o

Figure 19. Removing the Display Module

4. Lift the flex away from the display module
5. Lift the display module up and out of the flip housing, being careful to not damage or stress the flex connector.
6. To replace, seat the display module back into the flip front housing.
7. Re-connect the flex connector.
8. Replace the display module retainer bracket.
9. Replace the flip assembly, keypad, transceiver board assembly, housing assembly, antenna, battery, and battery cover as described in the procedures.

Removing the Display Module Connector

1. Remove the flip cover and flip assembly, as described in the procedures.
2. Use the disassembly tool to disconnect the flex connector from the display module assembly (see Figure 20).
3. Carefully, remove the display module retainer clip with the plastic tweezers. Avoid damage to the retainer clip.
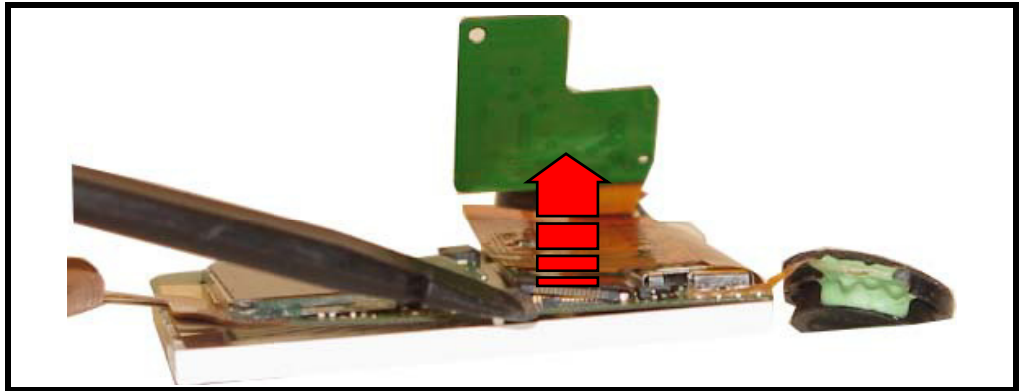
032234o

Figure 20. Removing the Display Module Connector

Phone Identification

Personality Transfer

A personality transfer is required when a phone is express exchanged or when the main board is replaced. Personality transfers reproduce the customer's original personalized details such as menu and stored memory such as phone books, or even just program a unit with basic user information such as language selection. V810 telephones use TrueSync® synchronization software to effect a personality transfer.

Identification

Each Motorola CDMA phone is labeled with a variety of identifying numbers. Figure 21 describes the current identifying labels.
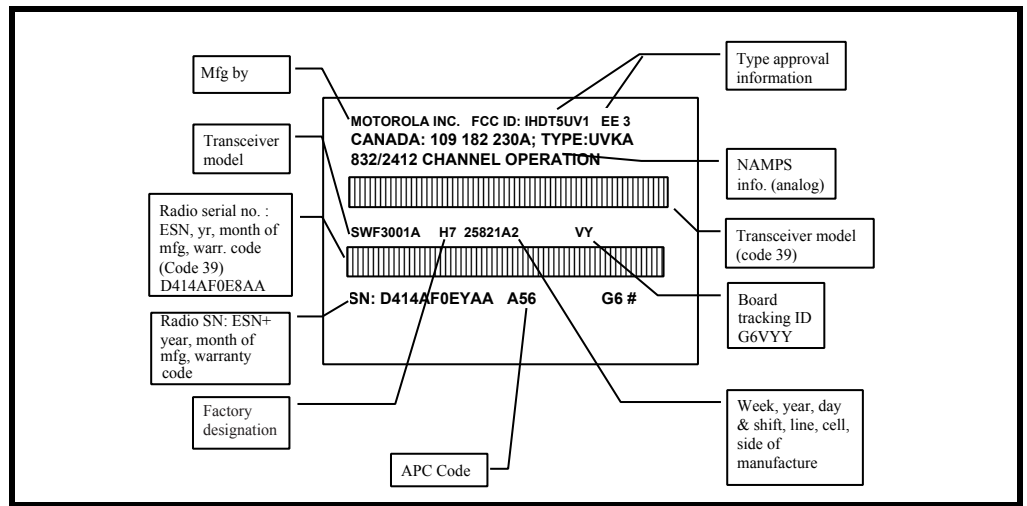
020463o

Figure 21. CDMA Telephone Identification Label

Troubleshooting

Table 2. V810 Telephone: Level 1 and 2 Troubleshooting Chart

Symptom	Probable Cause	Verification and Remedy
1. Telephone will not turn on or stay on.	a) Battery either discharged or defective.	Measure battery voltage across a 50 ohm (>1 Watt) load. If the battery voltage is <3.25 Vdc, recharge the battery using the appropriate battery charger. If the battery will not recharge, replace the battery. If battery is not at fault, proceed to b.
	b) Battery connectors open or misaligned.	Visually inspect the battery connectors on both the battery and the telephone. Realign and, if necessary, either replace the battery or refer to a Level 3 Service Center for the battery connector replacement. If battery connectors are not at fault, proceed to c.
	c) Transceiver board defective.	Remove the transceiver board. Substitute a known good transceiver board and temporarily reassemble the unit. Press the PWR button; if unit turns on and stays on, disconnect the dc power source and reassemble the telephone with the new transceiver board. Verify that the fault has been cleared. If the fault has not been cleared then proceed to d.
	d) keyboard assembly failure.	Replace the keyboard assembly. Temporarily connect a +3.6 Vdc supply to the battery connectors. Depress the PWR button. If unit turns on and stays on, disconnect the dc power source and reassemble with the new keyboard assembly.
2. Telephone exhibits poor reception or erratic operation such as calls frequently dropping or weak or distorted audio.	a) Antenna assembly defective.	Check to make sure that the antenna pin is properly connected to the transceiver board assembly. If connected properly, substitute a known good antenna. If the fault is still present, proceed to b.
	b) Transceiver board defective.	Replace the transceiver board (refer to 1c). Verify that the fault has been cleared and reassemble the unit with the new transceiver board.
3. Display is erratic, or provides partial or no display.	a) Connections to or from transceiver board defective.	Check general condition of flex and flex connector. If the flex and connector are good, check that the flex connector is fully connected. If not, check connector to transceiver board connections. If faulty connector, replace the transceiver board. If connector is not at fault, proceed to b.
	b) Flip assembly defective.	Temporarily replace the flip assembly with a known good assembly. If fault has been cleared, reassemble with the new flip assembly. If fault not cleared, proceed to c.
	c) Transceiver board assembly defective.	Replace the transceiver board (refer to 1c). Verify that the fault has been cleared and reassemble the unit with the new transceiver board.
4. Incoming call alert transducer audio distorted or volume is too low.	Faulty transceiver board assembly.	Replace the transceiver board (refer to 1c). Verify that the fault has been cleared and reassemble the unit with the new transceiver board.
5. Telephone transmit audio is weak. (usually indicated by called parties complaining of difficulty in hearing voice).	a) Microphone connections to the transceiver board assembly defective.	Gain access to the microphone as described in the procedures. Check connections. If connector is faulty proceed to c; if the connector is not at fault, proceed to b.

Table 2. V810 Telephone: Level 1 and 2 Troubleshooting Chart (Continued)

Symptom	Probable Cause	Verification and Remedy
	b) Microphone defective.	Gain access to microphone. Disconnect and substitute a known good microphone. Place a call and verify improvement in transmit signal as heard by called party. If good, reassemble with new microphone. If microphone is not at fault, reinstall original microphone and proceed to c.
	c) Transceiver board assembly defective.	Replace the transceiver board assembly (refer to 1c). Verify that the fault has been cleared and reassemble the unit with the new transceiver board assembly.
6. Receive audio from earpiece speaker is weak or distorted.	a) Connections to or from transceiver board assembly defective.	Gain access to the transceiver board assembly as described in the procedures. Check flex and the flex connector from the flip assembly to the transceiver board assembly. If flex is at fault, replace flip assembly. If flex connector is at fault, proceed to d. If connection is not at fault, proceed to b.
	b) Flip assembly defective.	Temporarily replace the flip assembly with a known good assembly. If fault has been cleared, reassemble with the new flip assembly. If fault not cleared, proceed to c.
	c) Antenna assembly defective.	Check to make sure the antenna is installed correctly. If the antenna is installed correctly, substitute a known good antenna assembly. If this does not clear the fault, reinstall the original antenna assembly and proceed to d.
	d) Transceiver board assembly defective.	Replace the transceiver board assembly (refer to 1c). Verify that the fault has been cleared and reassemble with the new transceiver board assembly.
7. Phone does not sense when flip is opened or closed (usually indicated by inability to answer incoming calls by opening the flip, or inability to make outgoing calls).	a) Flip assembly defective.	Temporarily replace the flip assembly with a known good assembly. If fault has been cleared, reassemble with the new flip assembly. If fault not cleared, proceed to b.
	b) Transceiver board assembly defective.	Replace the transceiver board assembly (refer to 1c). Verify that the fault has been cleared and reassemble the unit with the new transceiver board assembly.
8. Vibrator feature not functioning.	Transceiver board assembly defective.	Replace the transceiver board assembly (refer to 1c). Verify that the fault has been cleared and reassemble the unit with the new transceiver board assembly.
9. Internal Charger not working.	Faulty charger circuit on transceiver board assembly.	Test a selection of batteries in the rear pocket of the desktop charger. Check LED display for the charging indications. If these are charging properly, then the internal charger is at fault. Replace the transceiver board assembly (refer to 1c). Verify that the fault has been cleared and reassemble the unit with the new transceiver board assembly.
11. No or weak audio when using headset.	a) Headset not fully pushed home.	Ensure the headset plug is fully seated in the jack socket. If fault not cleared, proceed to b.
	b) Faulty jack socket on transceiver board assembly.	Replace the transceiver board assembly (refer to 1c). Verify that the fault has been cleared and reassemble the unit with the new transceiver board assembly.

Programming: Software Upgrade and Flexing

Contact your local technical support engineer for information about equipment and procedures for flashing and flexing.

Related Publications

Motorola V810 CDMA User Guide, English/Spanish SJJN5286A (6809467A43)

Antenna, SW & Duplexers Circuit:1   V810
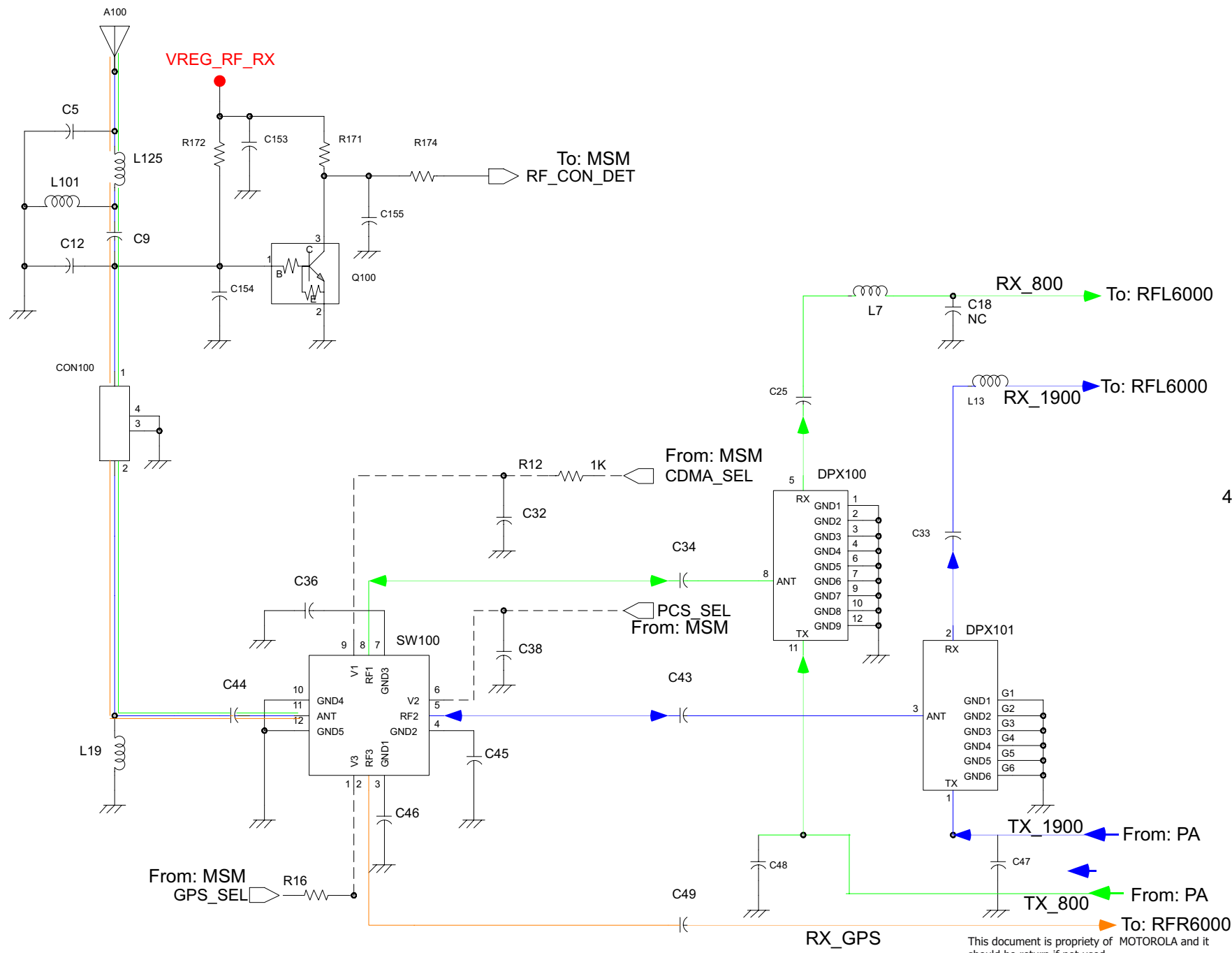
A100

VREG_RF_RX

C5
L125
L101
C12   C9

R172   C153   R171   R174

To: MSM
RF_CON_DET

C155

C154

Q100
B C E
1 3 2

CON100
1
4
3
2

RX_800   To: RFL6000
L7   C18
NC

C25

RX_1900   To: RFL6000
L13

R12   1K   From: MSM
CDMA_SEL

C32

C34

5   DPX100
RX   GND1   1
GND2   2
GND3   3
GND4   4
GND5   6
GND6   7
GND7   9
GND8   10
GND9   12
ANT   8
TX
11

C33

C36

PCS_SEL
From: MSM

SW100
9 8 7
V1 RF1 GND3
C44
10   GND4
11   ANT
12   GND5
V3 RF3 GND1
1 2 3

C38

C43

2   DPX101
RX

V2
RF2   6
GND2   5
4
C45
3   ANT   GND1   G1
GND2   G2
GND3   G3
GND4   G4
GND5   G5
GND6   G6
TX
1

L19

C46

TX_1900   From: PA
C47

From: MSM
GPS_SEL   R16
C48   C49

TX_800   From: PA

RX_GPS   To: RFR6000

49

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BOARD - Ver 3.4

Antenna, SW & Duplexers Circuit:1

V810

CDMA_SEL ▶ ----
From: MSM

To: RFL6000
RX_800

To: RFL6000
RX_PCS

C25

2 RX

DPX100
7
ANT
1
RX
TX

DPX101 3
ANT

50

L19 C44 R12 C32 C34

2

ANT SW1 RF2
RF1
RF3

C36
C38
C43
C45
C46

C49

CON100

R16

C52

1 TX

C47

To: RFR6000
RX_GPS

From: PA

From: PA

L101

1

C9

L125

A100

BOARD - Ver 3.4

V810

52

C11

RX FM → To RF FLT

C23

RX PCS → To RF FLT

L6

L11

L9 R4

L4

C2

L1

C15

R5

C3

VREG_RF_RX → From PM

IC101

C1

C4

R13

6

R1

1   2   3   4

L8   L14   L13

L7

C22   C31   C27

From Duplexer → RX FM

From Duplexer → RX PCS

FM_LNA_RANGE → From MSM

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BOARD - Ver 3.4

V810

From RFL6000 → RX Freq — C11

F101

IN	OUT1
GND1	GND2 OUT2

1 — IN, 3 — OUT1

RX FM → To: RFR6000

C20

2 — GND1
5 — GND2

4 — OUT2

RX FM → To: RFR6000
RX PCS → To: RFR6000

From RFL6000 → RX Freq — C23

F102

1
3 — IN
5 — OUT1

C26

2 — GND1
4 — GND2
1 — OUT2

L127

RX PCS → To: RFR6000

F103

5 — GND2
2 — GND1
3 — OUT1

RX GPS → To: RFR6000

From SW1 → RX Freq

1 — IN
4 — OUT2

RX GPS → To: RFR6000

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BOARD - Ver 3.4

RX BPF Filters Circuit: 3

V810

From RFL6000 ► RX FM — F101

C21 — L5 → To RFR6000

L3 — C17

C16 → To RFR6000

From RFL6000 ► RX PCS — F102

C24 — L10 → To RFR6000

L12 — C28

C29 — L15 → To RFR6000

From SW1 ► RX GPS — L127 — F103 — L16 → To RFR6000

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BOARD - Ver 3.4

RFR6000 Circuit: 4

V810

Labels on the schematic:

- VREG_TCXO
- VDDA2_RX
- VDDA1_RX, VDDA3_RX
- VREG_MSMP
- VREG_RF_RX
- C123
- IC100
- RFR6000
- L2
- C6
- C10
- C7
- C8
- From: VCO, From: RFT6100 — UHF_LO, CP_RX
- From: F101 — RX FM
- C16, L3, L5, C17, C21
- From: F102 — RX PCS
- C24, L10, L12, C29, L15, C28
- R7
- From: F103 — RX GPS
- From: Ref. Osc — TCXO
- C30, L16, C37
- R14
- To: RFT61000
- C19
- To: MSM
- UHF_LO_BUFF, RX_I_M, RX_I_P, RX_Q_M, RX_Q_P
- R10, R11
- SBDT, SBST, SBCK
- From: MSM

Pin labels (left side): LO_INM (15), LO_INP (16), GVCO_TUNE (21), CELL_INP (2), CELL_INM (40), PCS_INP (6), NC1 (36), NC2 (37), PCS_INM (8), GPS_INP (12), GPS_INM (10), TCXO (28), R_BIAS (38), GND1 (32), GND2 (35)

Pin labels (right side): VDDA1 (4), VDDA5 (17), VDDA4 (18), VDDA22 (29), VDDA11 (14), VDDA1 (39), VDDA3 (20), VDDA2 (27), VDDM (23), LO_OUT (19), RX_IM (30), RX-IP (31), RX_QM (33), RX-QP (34), SBDT (26), SBST (24), SBCK (25), GND3 (1), GND4 (5), GND5 (7), GND6 (9), GND7 (11), GND8 (13), GND9 (22), GND10 (3), GND_SLUG (41)

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RFR6000 Circuit: 4

V810

From:Ref.Osc
From: F101TCXO

RX_FM

L5

C42 **R14** **R11** **R10** **C41**

RX_QP → To: MSM
RX_QM → To: MSM
RX_IP → To: MSM
RX_IM → To: MSM

C17

L3

From: F101
RX_FM

L17

RX_PCS
From: F102

L10

**IC100
RFR6000**

C37

C28

L15

C8

From: F102
RX_PCS

L2

C19

RX_GPS
From: F103

L16

R7

C35 **L18** **C6** **C10** **C123** **C39** **C7**

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From: PM   VREG_TCXO
VREG_MSMP
UHF_LO
From: VCO

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BOARD - Ver 3.4

Ref, Osc & VCO Circuit: 5

V810

From:PM
VREG_TCXO

R18

TCXO100

C57   C58

VCC   4   3   OUT

TCXO
To:RFR6000
    PM
    RFT6100
    MSM
    HARNESS

C61

R24

TRK_LO_ADJ
From:MSM

VCON   1   2   GND

C60

From:PM
VREG_SYNT   VREG_SYNT1

R19

C63   C62

From:PM
VREG_TCXO   VDDA3_RX

R17

C141   C55   C56

VCO100

VCC   7

From:RFT6100
CP_RX

CO-VOLTAGE   5

OUT   1

UHF_LO
To:RFR6000

R25

EXT_VCO_EN
From:MSM

SW-SUPPLY   3

C65

GND1 GND2 GND3 GND4
2   4   6   8

BOARD - Ver 3.4

V810

UHF_LO
To RFR6000

From:MSM
EXT_VCO_EN

VCO100

1
2
3
4
5
6
7
8

R17

C55

C56

C141

TCXO100

3
2
4
1

19.2Mhz

TCXO

To:RFR6000
PM
RFT6100
MSM
HARNESS

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From:MSM
TRK_LO_ADJ

R24

CP_RX
From:RFT6100

R18   C57

VREG_TCXO
From:PM

V810

IC103
RFT6100

VREG_SYNT

VREG_RF_TX VREG_SYNT1

VREG_MSMP VREG_RF_TX

R26

Pin	Signal		Signal	Pin
39	VDDA11		VDDRF1	24
7	VDDA12		VDDRF2	26
16	VDDA41		VDDRF3	28
17	VDDA42		VDDRF4	22
12	VDDA21		VDD_MSM	1 VREG_MSMP1
13	VDDA22			
40	VDDA6			
14	VDDA3		RX_LO_IN	15
32	VDDA51			
31	VDDA52		TX_ON	2

C68   C69   C70

From: RFR6000
UHF_LO_BUFF

TX_ON   From: MSM
C14

C75

C76   C77

To F104 C78
TX_800
To F105 L120
TX_1900
L121
TX_1900
To F105

23 CELL_OUT   GND 29
25 PCSA_OUT   DAC_REF 37   DAC_IREF From: MSM
27 PCSB_OUT   TX_Q 33   TX_Q From: MSM

VREG_MSMP1   VREG_SYNT1   C83
C85
10 TX_CP   TX_QN 34   C84   TX_QN From: MSM
R29   R30
11 TX_FAQTX_I   35   TX_I From: MSM
To RFR6000
CP_RX
19 RX-CP   C86
R31   C88   C87   36 TX_IN   TX_IN From: MSM
20 RX-FAQ   8 TCXO   C89   TCXO From: MSM
R33   30 VCONTROL   TX_AGC_ADJ From: MSM
To MSM   C90   R32
6 LOCK
LOCK_DET

9 TX_CP_HOLD   SBDT 4   AUX_SBDT
18 RX_CP_HOLD   SBST 5   AUX_SBST From: MSM
38 R_BIASSBCK   3   AUX_SBCK
C99
R35   R36   GND_SLUG 41

C100

BOARD - Ver 3.4

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RFT6100 Circuit: 6

V810

From:RFR6000
UHF_LO_BUFF

R35
C70 R33 C87 C100 C75 R29 R30 C85

To:F104　TX_800

C78

21 20 19 18 17 16 15 14 13 12 11

22　　　　　　　　　10　C83
23　　　　　　　　　9　C99
24　　　　　　　　　8
25　　　　　　　　　7　C89　　TCXO
26　　IC103　　　　6　　　From:Ref.Osc
27　　RFT6100　　 5　C76
28　　　　　　　　　4　　　LOCK_DET To:PM
29　　　　　　　　　3　R31　TX_ON From:MSM
30　　　　　　　　　2　C68
31 32 33 34 35 36 37 38 39 40 1　R26　VREG_MSMP
　　　　　　　　　　　　　　　　　　From:PM

C97
To:F105　TX_PCS　L121

C80
To:F105　TX_PCS　L120

From:MSM
TX_AGC_ADJ　R32

C90　C69 C84 C86 R36 C77 C63

From:MSM　TX_Q
From:MSM　TX_QN
From:MSM　TX_I
From:MSM　TX_IN

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BOARD - Ver 3.4

TX Filters & PA's Circuit: 7   V810

TX_1900
To: Duplexer
C110

C66

L22
TX_800
To: Duplexer
C107

L110

IC104
8 RFOUT   RFIN 4
5 VCC1   VCONT 2
6 VCC2   VREF 1
   GND1 GND2 GND3 GND4
   3   7   9   10
C71 C72 C73
C74   R28

From: MSM
PA_R1   IC105
4   3
        2
5   1
C82

VREG_RF_TX

L23
C67

F104
3 OUT   IN 1
2 GND1
4 GND2

From: MSM
PA_ON0

From: RFT6100
TX_800

From: RFT6100
TX_1900

TX_1900
From: RFT6100

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B+_PA

IC106
4   2
   1   3
5   6
   1
R125
C65
C69

From: MSM
PA_ON

R128

IC107
1 VCC1   VCONT 4
10 VCC2
2   RFIN 2
8 RFOUT   VREF 5
   GND1 GND2 GND3 GND4
   3   6   7   9
C93 C94 C95
C101 R37

IC109
44   3
        2
55   1
C103 C104

VREG_RF_TX

L24
C96

IC108
5 J1   J3 1
2 GND
4 V1
6 V2   J2 3

F105
8 OUT1   IN1 2
6 OUT2   IN2 4
1 GND1   GND3 5
3 GND2   GND4 7

C97
C98

R39
R38
C105 C106

From: MSM
TX_PCS_HI
TX_PCS_LOW
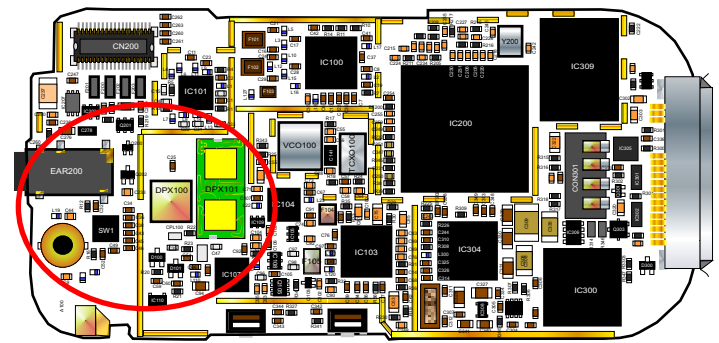From: MSM

From: MSM
PA_ON1

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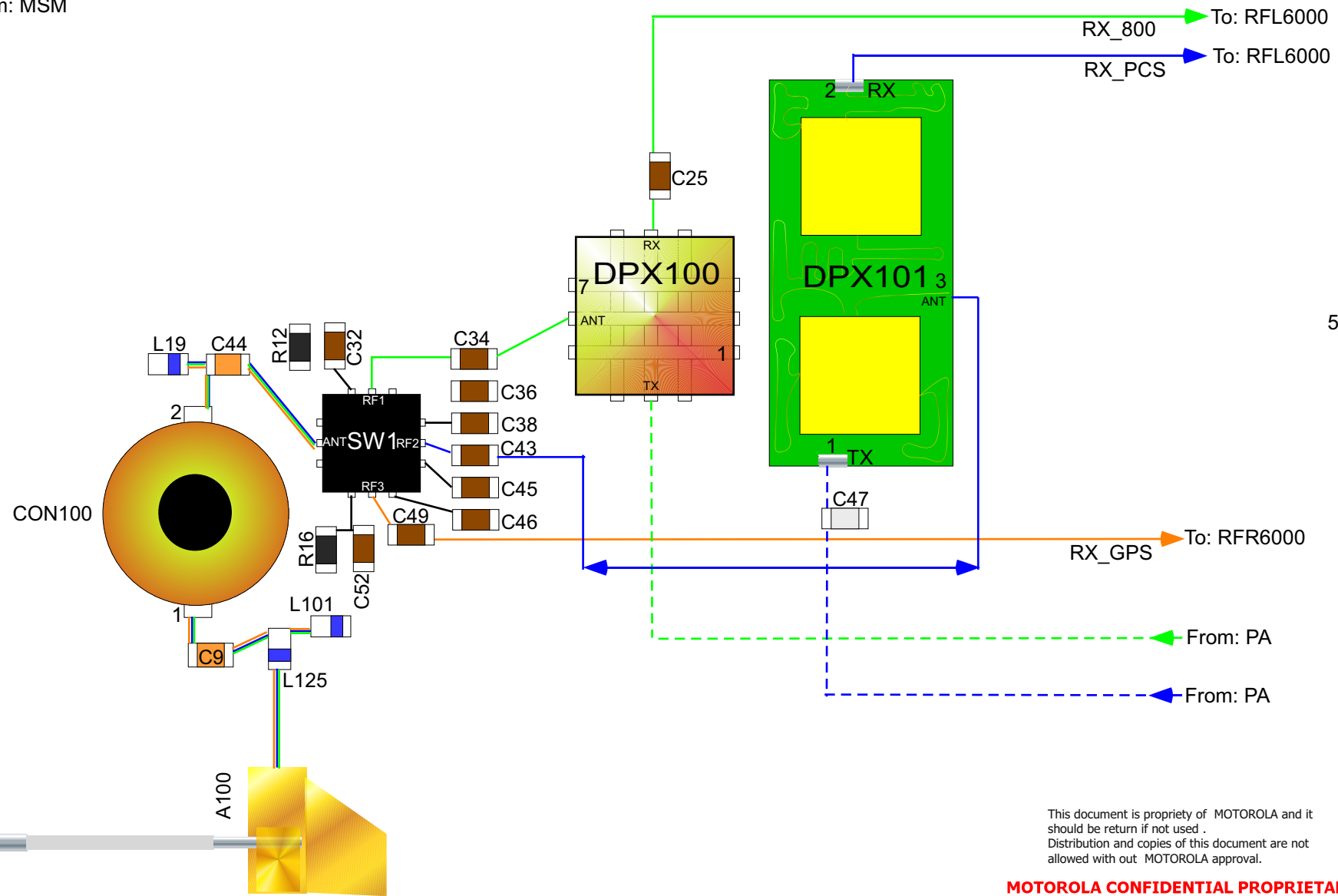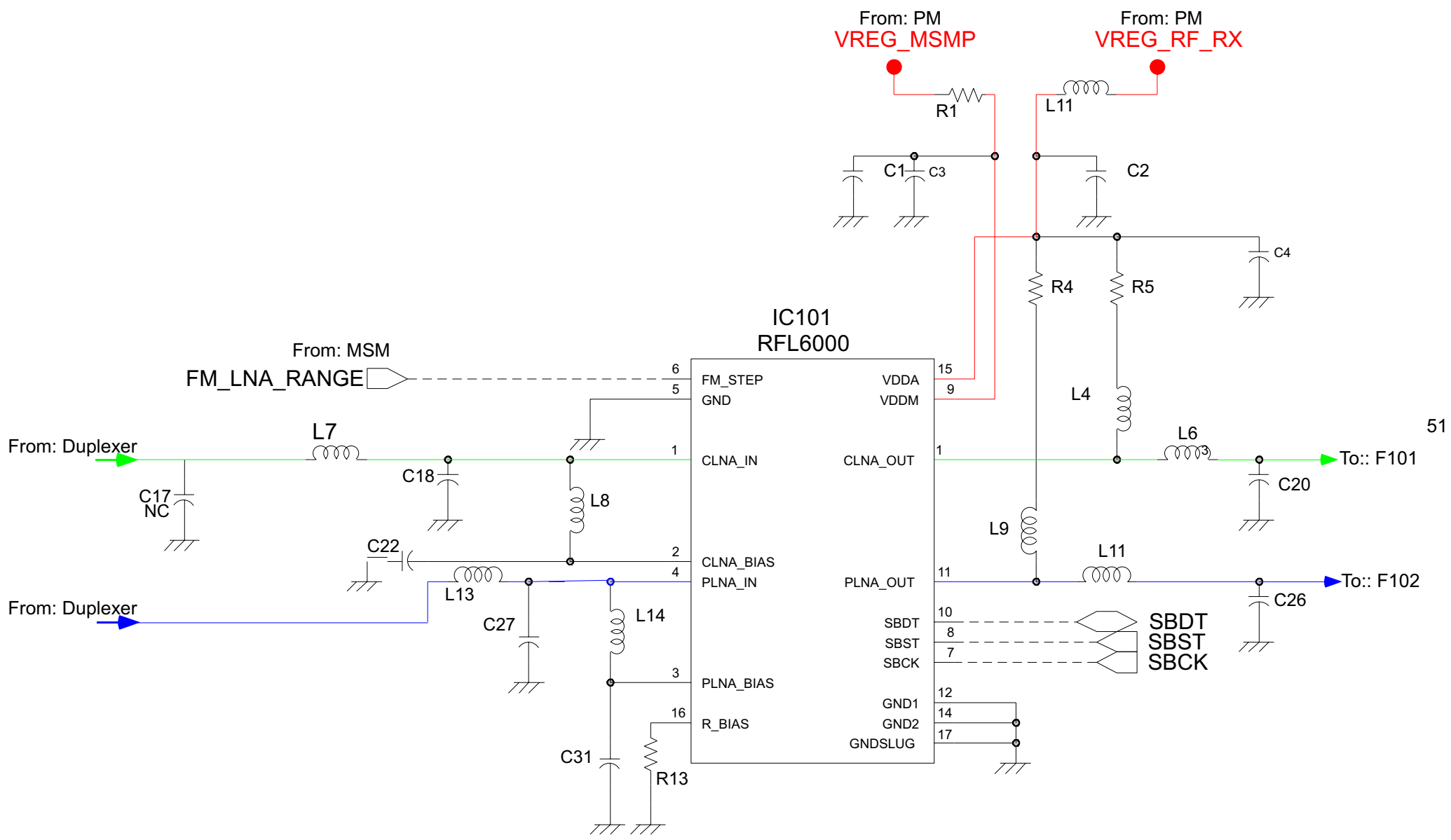allowed with out MOTOROLA approval.

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BOARD - Ver 3.4

TX Filters & PA's Circuit: 7   V810

PA_ON1   From:MSM

C73
C67
L23
C71
C107
OUT IC104 800 PA
L22
To:Duplexer
800_TX

OUT F104
IN

C91
C74

IC109

IC105
C82
R28   TX_800   From:RFT6100
PA_ON   From:MSM

C103
C104
C92
C101

VREG_RF_TX   From:PM
TX_PCS_LOW   From:MSM
TX_PCS   From:RFT6100

To:Duplexer
PCS_TX

R37
R42
C97   F105
C98

IC108

C66
C110
L110
OUT IC107
PCS PA
IN

C96
C94
C93
C105
C95

TX_PCS   From:RFT6100
TX_PCS_HI   From:MSM

B+_PA   From:PM

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BOARD - Ver 3.4

IC200
MSM6050

A(1:22)

A(22) A(21) A(20) A(19) A(18) A(17) A(16) A(15) A(14) A(13) A(12) A(11) A(10) A(9) A(8) A(7) A(6) A(5) A(4) A(3) A(2) A(1)

GPIO39 GPIO38 A20 A19 A18 A17 A16 A15 A14 A13 A12 A11 A10 A9 A8 A7 A6 A5 A4 A3 A2

D(0:15)

ASIC_RXD — DP_RX_DATA
ASIC_TXD — DP_TX_DATA

EAR10P — HPH_R
EAR10P
EAR10N — EAR10N
EAR20 — EAR20
AUXOP
AUXON
C205 C206 NC

MICFBN
MICINP
R205 C208 R207 C207 MICOUTN
C214
R208
C215 R209 C216 MICOUTP
R211 C217
R15 MICINN
R14 MICFBP

AUDIO_IN_FLT — C218 — AU00P
VREG_MSMP — AUXIN
C220
R215 R216 C224 CCOMP
AUDIO_IN_DET_N — GND4
C226 C227 MICBIAS
R217

MIC_P — C230 — MIC1P
MIC_N — C231 — MIC1N
C235 C236 R220
MIC2P — MIC2P
MIC2N — MIC2N

D15 D(15)
D14 D(14)
D13 D(13)
D12 D(12)
D11 D(11)
D10 D(10)
D9 D(9)
D8 D(8)
D7 D(7)
D6 D(6)
D5 D(5)
D4 D(4)
D3 D(3)
D2 D(2)
D1 D(1)
D0 D(0)

ROM_CS0_N — ROM_CS0_N
RAM_CS0_N — RAM_CS_N
GPIO32 (ROM_CS1_N) — ROM_CS1_N
GPIO33 (RAM_CS1_N) — RF_CON_DET

OE_N — RD_N
WE_N — WE_N
LB_N — LB_N
UB_N — UB_N

RESIN_N — RESET_N
RESOUT_N — RESOUT_N

SCL — GPIO2 (I2C_SCL)
SDA — GPIO3 (I2C_SDA)
GPIO4
GPIO5 (PDM1)
GPIO6 (PDM2)
GPIO7 (GP_MN)
GPIO8

GPIO62 (KEY_SENSE0_N) — KEY_SENSE0
GPIO63 (KEY_SENSE1_N) — KEY_SENSE1
GPIO64 (KEY_SENSE2_N) — KEY_SENSE2
GPIO65 (KEY_SENSE3_N) — KEY_SENSE3
GPIO66 (KEY_SENSE4_N) — KEY_SENSE4
GPIO61 — SPK_DRV_EN
GPIO60 — WHITE_LED
GPIO59 — LCD_RESOUT_N
GPIO58
GPIO57

CN201
1 KEY_UP
1 KEY_SEL
1 KEY_DOWN
C239 C240 C241
SIDE_KEY

CAMERA_INT

PCS_SEL
R225 R226 CDMA_SEL
C243 C244

XTAL48_IN — C242
Y200 TSX-3225(48M)
XTAL48_OUT — R5 — C245
SLEEP_XTAL_IN — SLEEP_CLK
SLEEP_XTAL_OUT

GPIO54 — VREG_LED_CNTL
RFR_N — ASIC_RFR_N
CTS_N — ASIC_CTS_N

VREG_MSMP
IC204
A3212ELH
OUT VCC
GND
C246 33p

USB_DATA — GPIO10
USB_OE_N — GPIO11
USB_VMO — GPIO12
USB_VPO — GPIO13
ASIC_INT_N — GPIO14
CEBUS_OPTION1 — GPIO15
CEBUS_OPTION2 — GPIO16
ASIC_DSR — GPIO17
ASIC_DTR — GPIO18
ASIC_RI — GPIO19
GPIO21

GPIO44 — USB_DET
GPIO45 — PA_ON
GPIO49
GPIO50 — REMOTE_PWR

WDOG_EN — R229 NC

5105_PCM_DOUT — GPIO24
5105_PCM_DIN — GPIO25
5105_PCM_SYNC — GPIO26
5105_PCM_CLK — GPIO27
PCM_DOUT — GPIO28
PCM_DIN — GPIO29
PCM_SYNC — GPIO30
PCM_CLK — GPIO31

TX_PCS_HI — TX_PCS_HI
TX_PCS_LOW — TX_PCS_LOW
GPIO56
GPIO55 — TCXO_EN
EXT_VCO_EN — EXT_VCO_EN
FM_LNA_RANGE — FM_LNA_RANGE
TX_ON — TX_ON
I_OUT — TX_I
I_OUT_N — TX_IN
R230 GPS_SEL
C248

ASIC_GP_CS_N — GPIO34
HEADSET_DET_N — GPIO35
SEND_END_DET_N — GPIO36
LCD_CS_N — GPIO37
ASIC_HKSW — GPIO40
AUDIO_OUT_EN — GPIO41
ASIC_IGN — GPIO42
PM_6000_INT_N — GPIO43

Q_OUT — TX_Q
Q_OUT_N — TX_QN

DAC_IREF — DAC_IREF
VREG_DAC

PS_HOLD — GPIO46
ASIC_DCD — GPIO47
PWR_END_KEY — GPIO48

I_IP — RX_I_P
I_IN — RX_I_M
Q_IP — RX_Q_P
Q_IN — RX_Q_M
C249

AUX_SBDT — AUX_SBI_DT
AUX_SBCK — AUX_SBI_CK
AUX_SBST — AUX_SBI_ST

TX_AGC_ADJ — R231 — TX_AGC_ADJ
TRK_LO_ADJ — R232 — TRK_LO_ADJ

MODE0 — MODE0
MODE1 — MODE1
JTAG_TDO — TDO
JTAG_TDI — TDI
JTAG_TRST_N — TRST*
JTAG_TMS — TMS
JTAG_TCK — TCK
R233

PA_ON0 — PA_ON0
PA_ON1 — PA_ON1
C251 C250

TCXO — VREG_MSMC
TCXO_OUT

FLIP_TEMP — HKAIN0
HKAIN1
HKAIN2
HKAIN3
HKAIN4
HKAIN5
HKAIN6

VDD_C1
VDD_C2
VDD_C3
VDD_C4
C252 C253

VREG_DAC
VREG_MSMA
VDD_A1
VDD_A2
VDD_A3
VDD_A4
VDD_A5
VDD_A6
VDD_A7
C254 C255
BF200 600/100uH (1005)

LOCK_DET — SYNTH_LOCK
PA_R1 — PA_R0
PA_R1
SBST — SBST
SBDT — SBDT
SBCK — SBCK

VDD_P01
VDD_P02
VDD_P11
VDD_P12
C258 C259
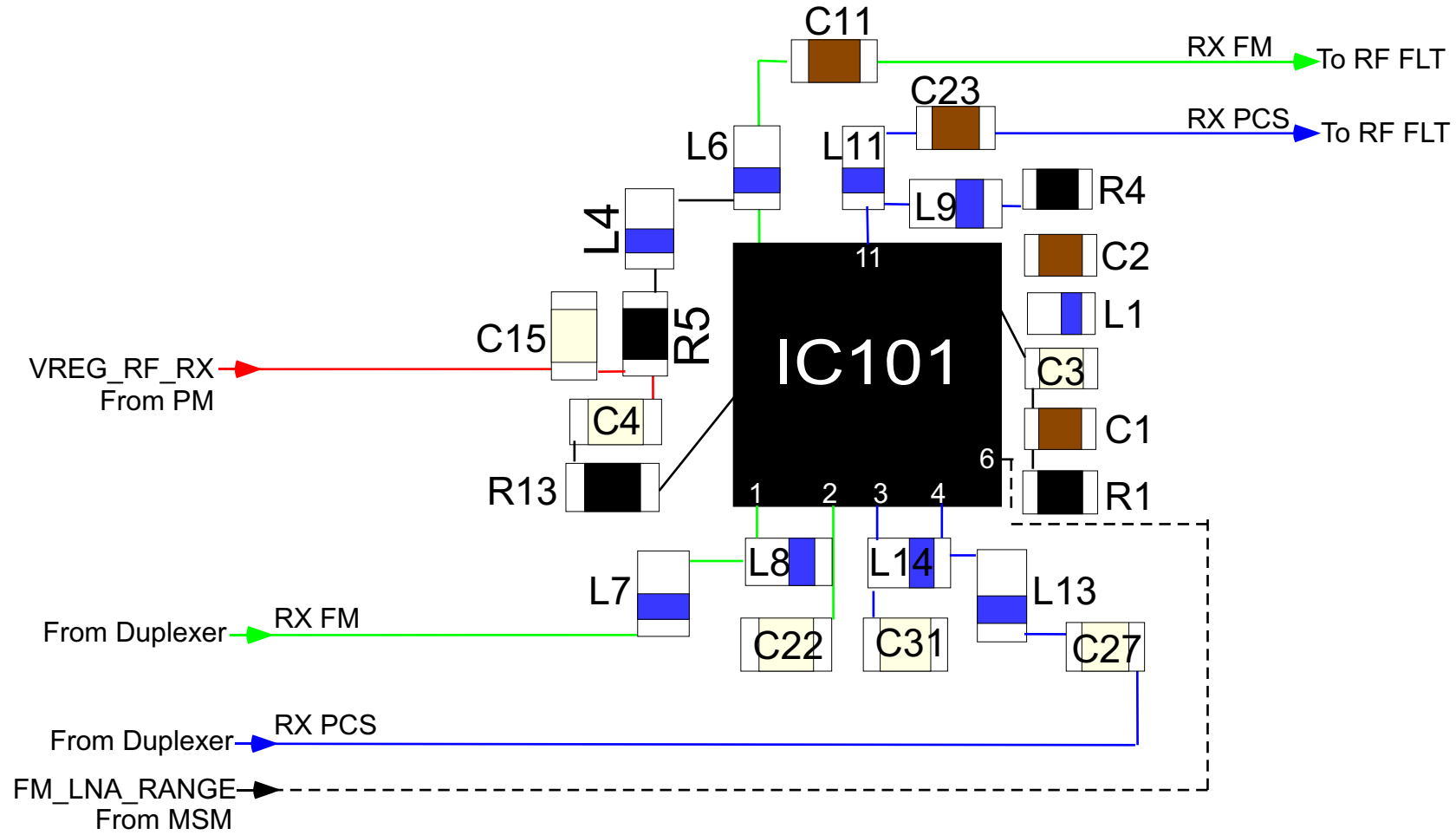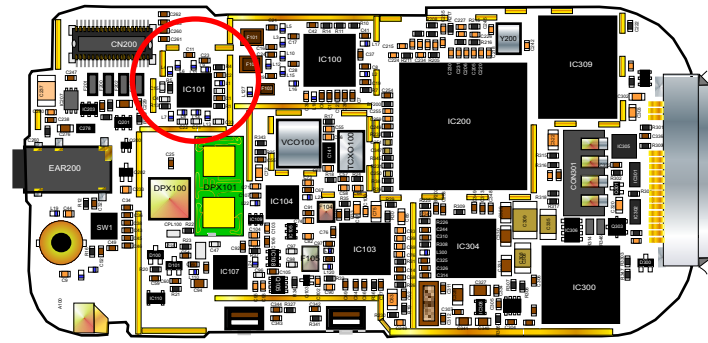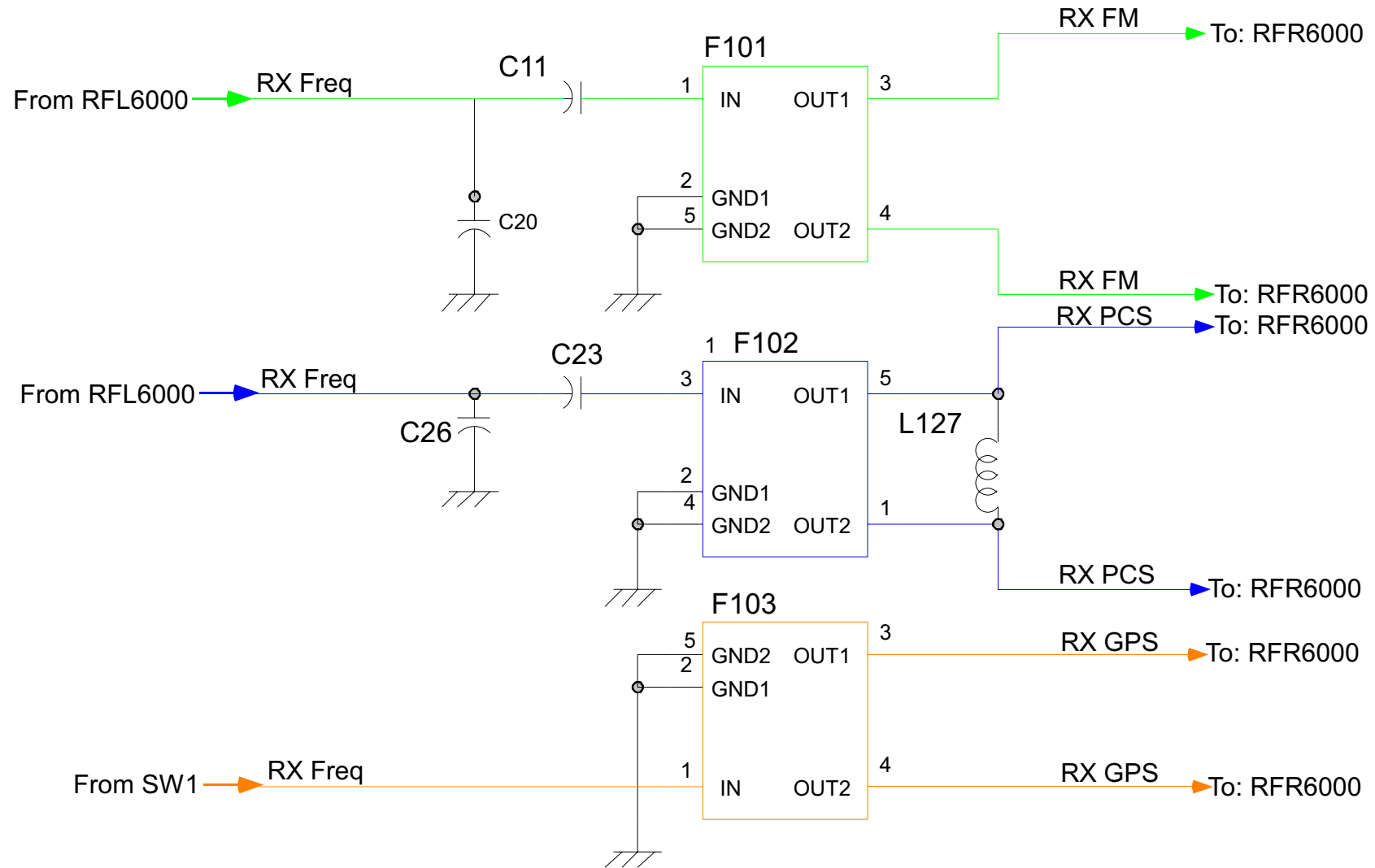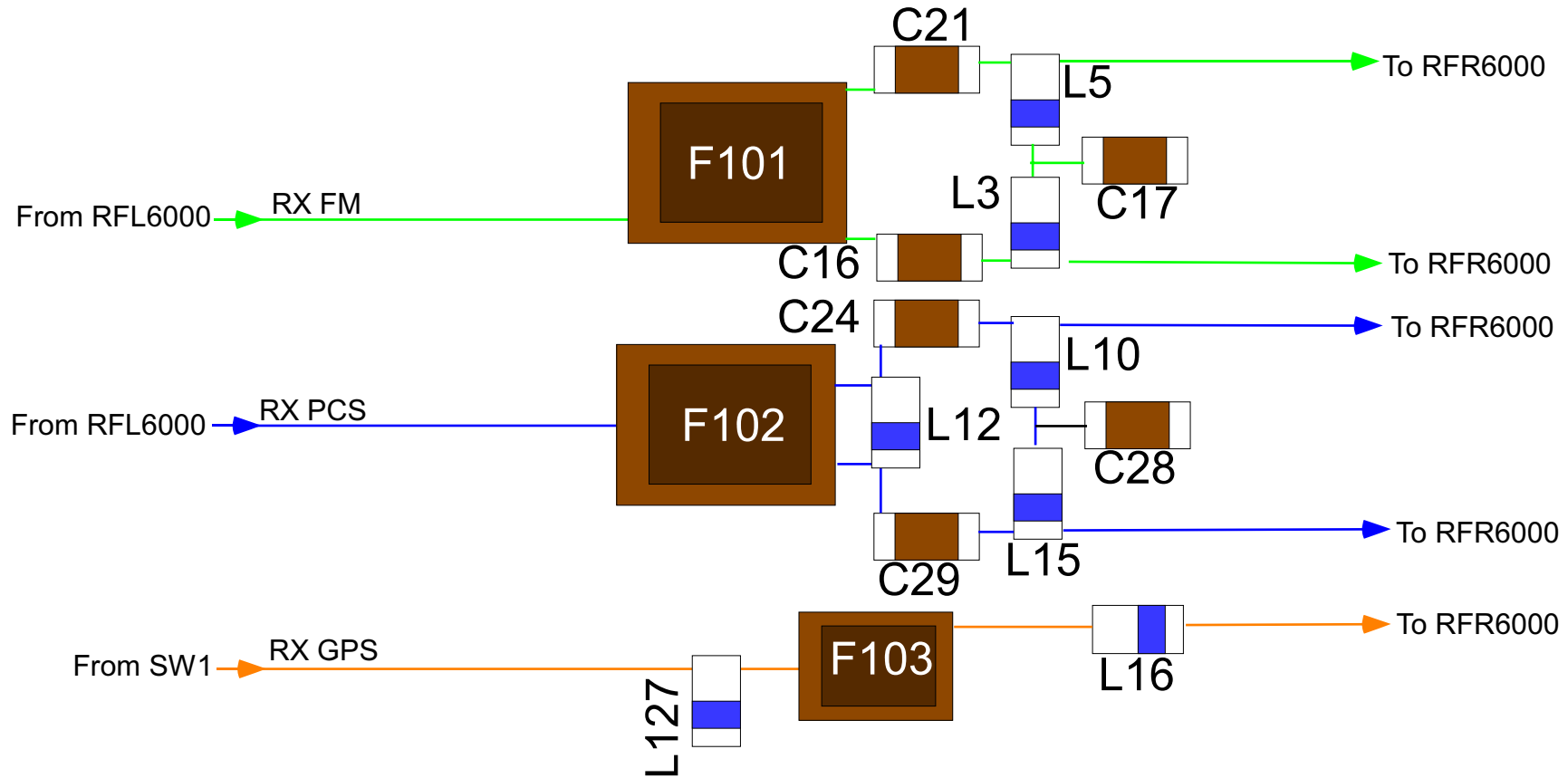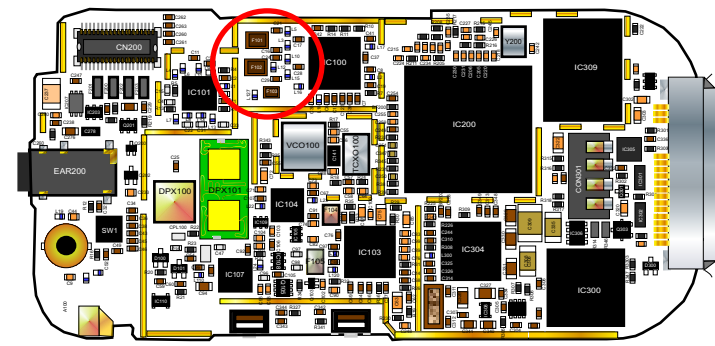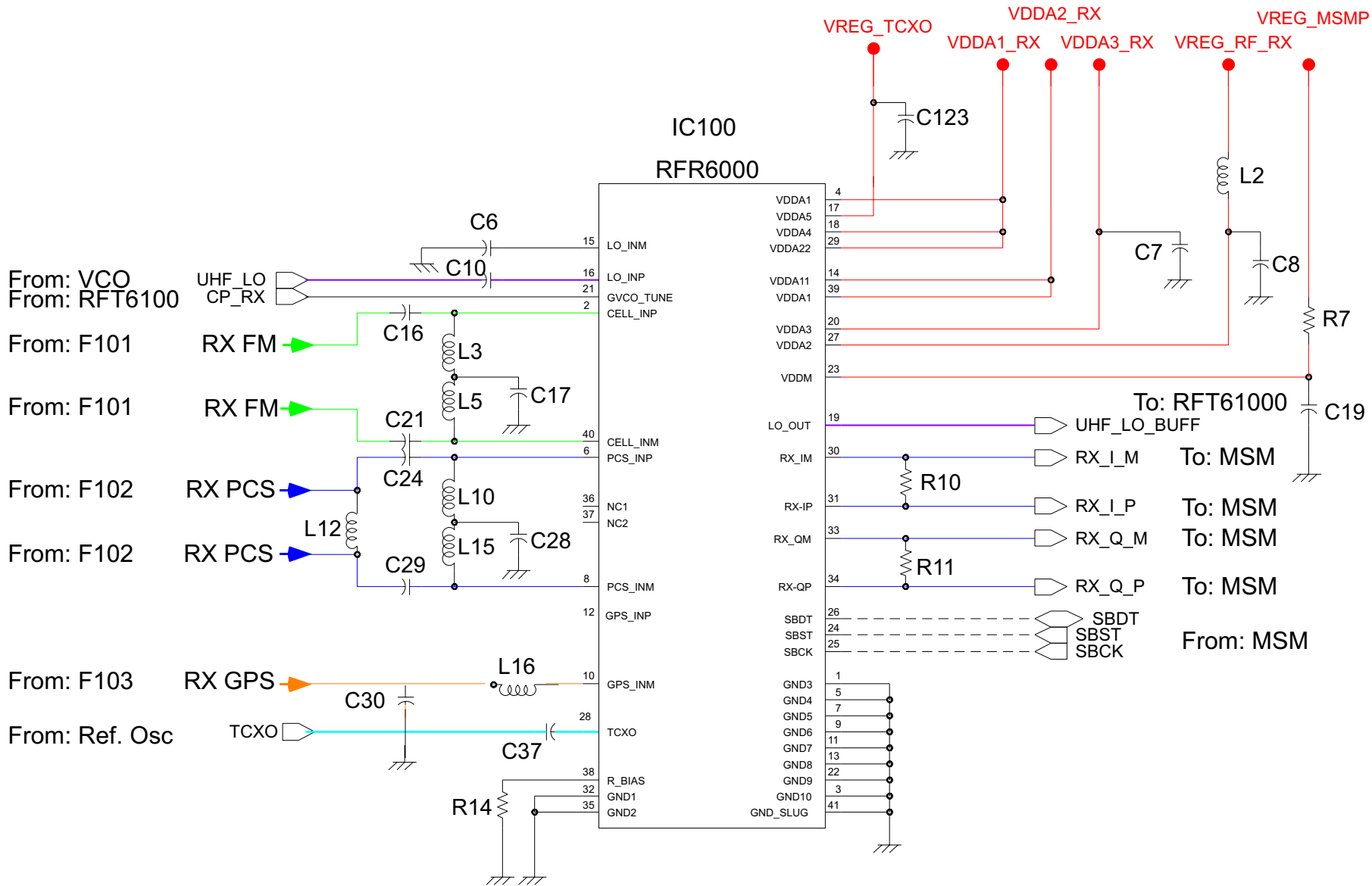BF202 600/100uH (1005)
VREG_MSMP

NC1
NC2
GND

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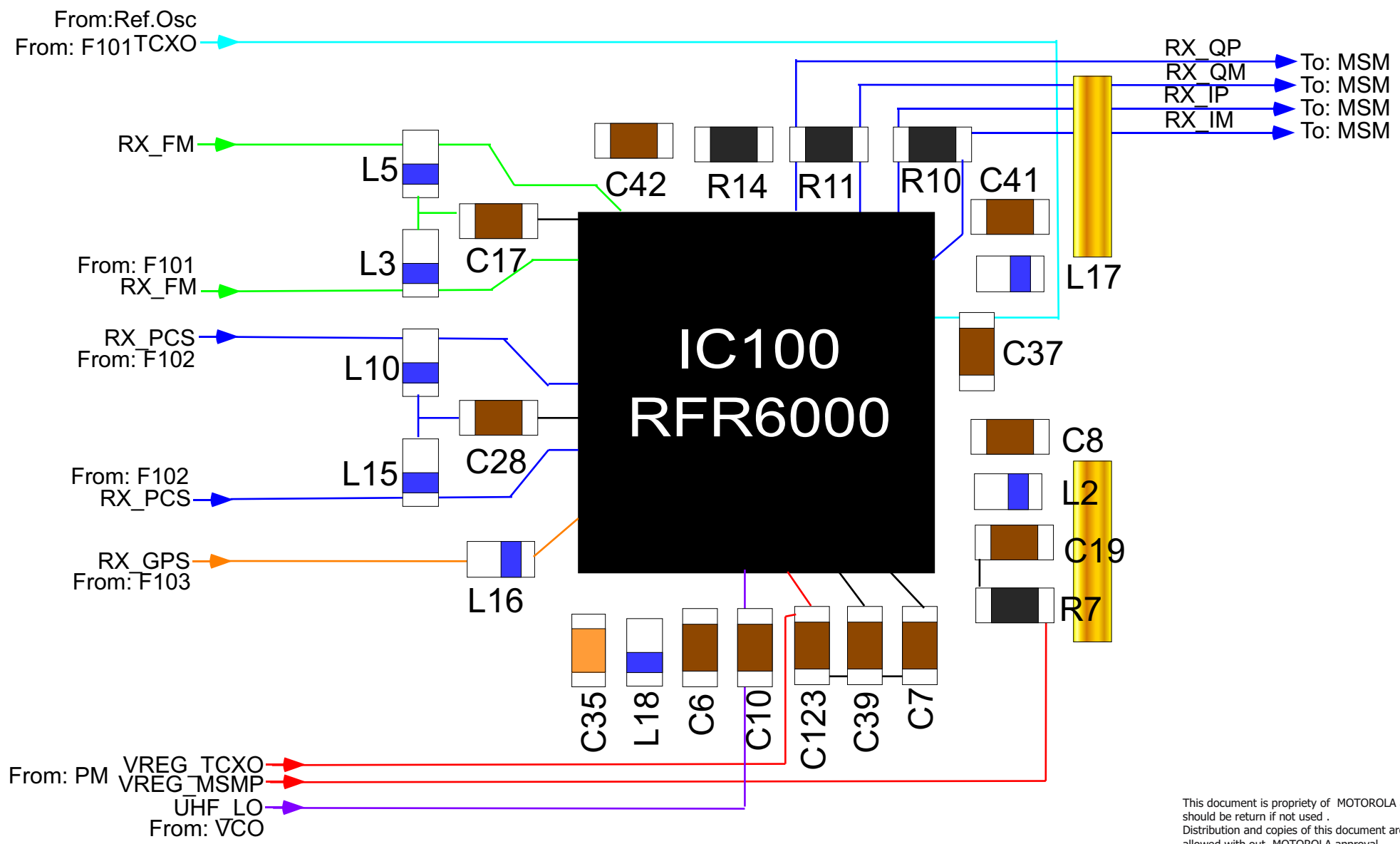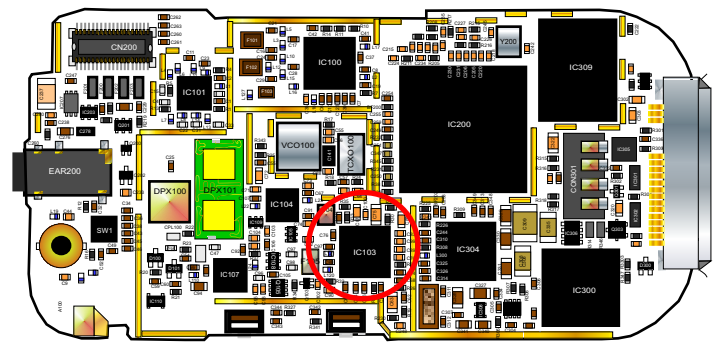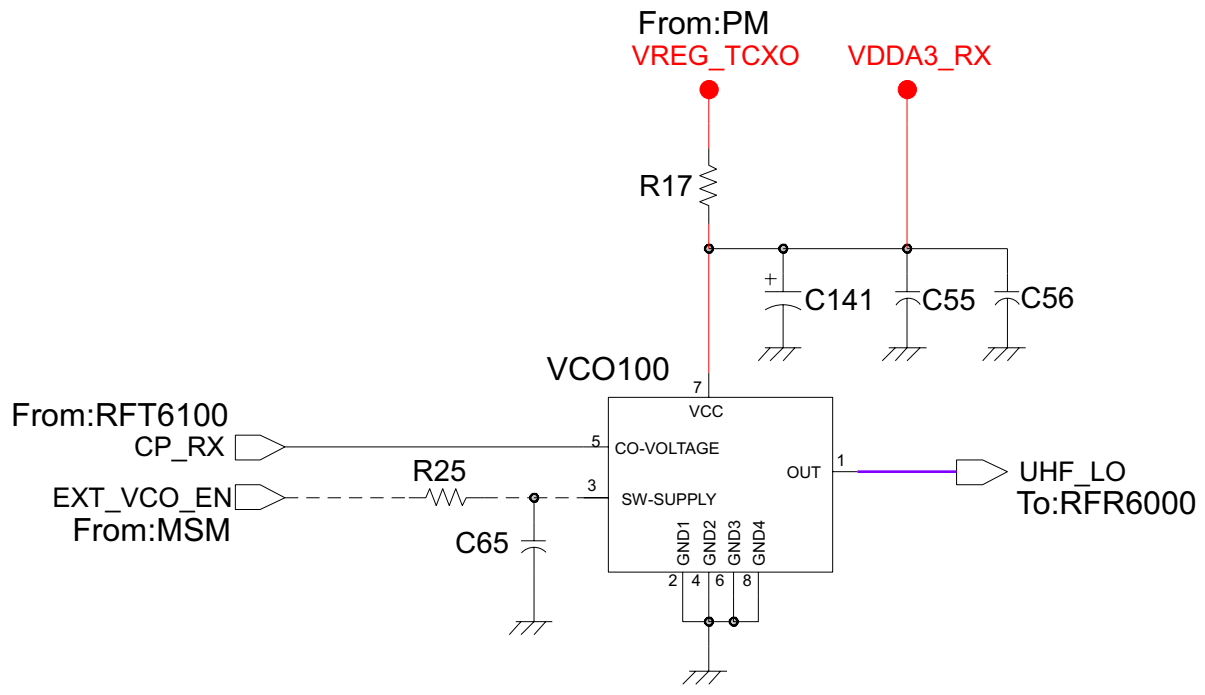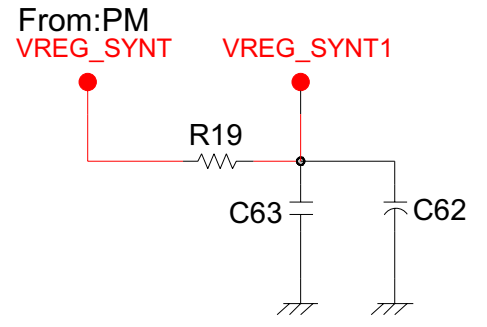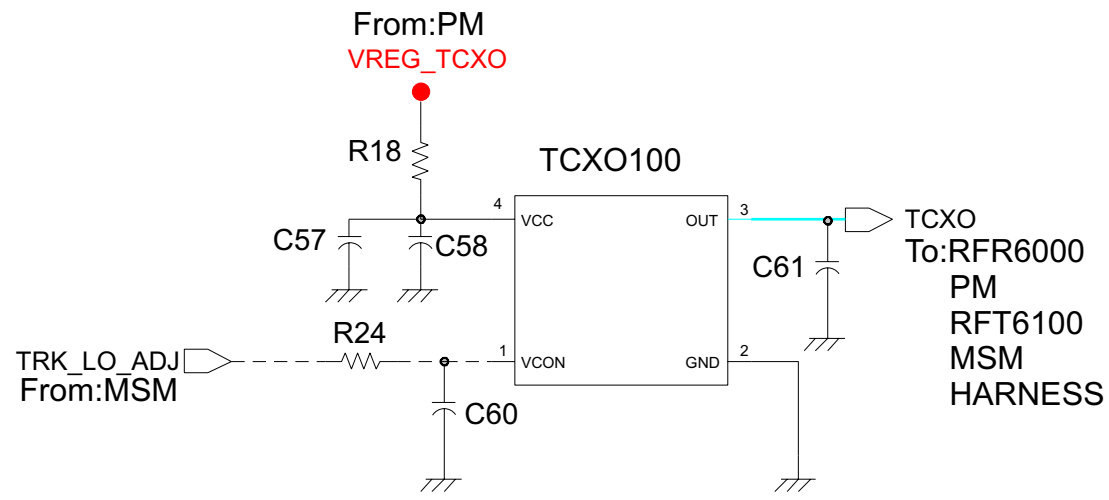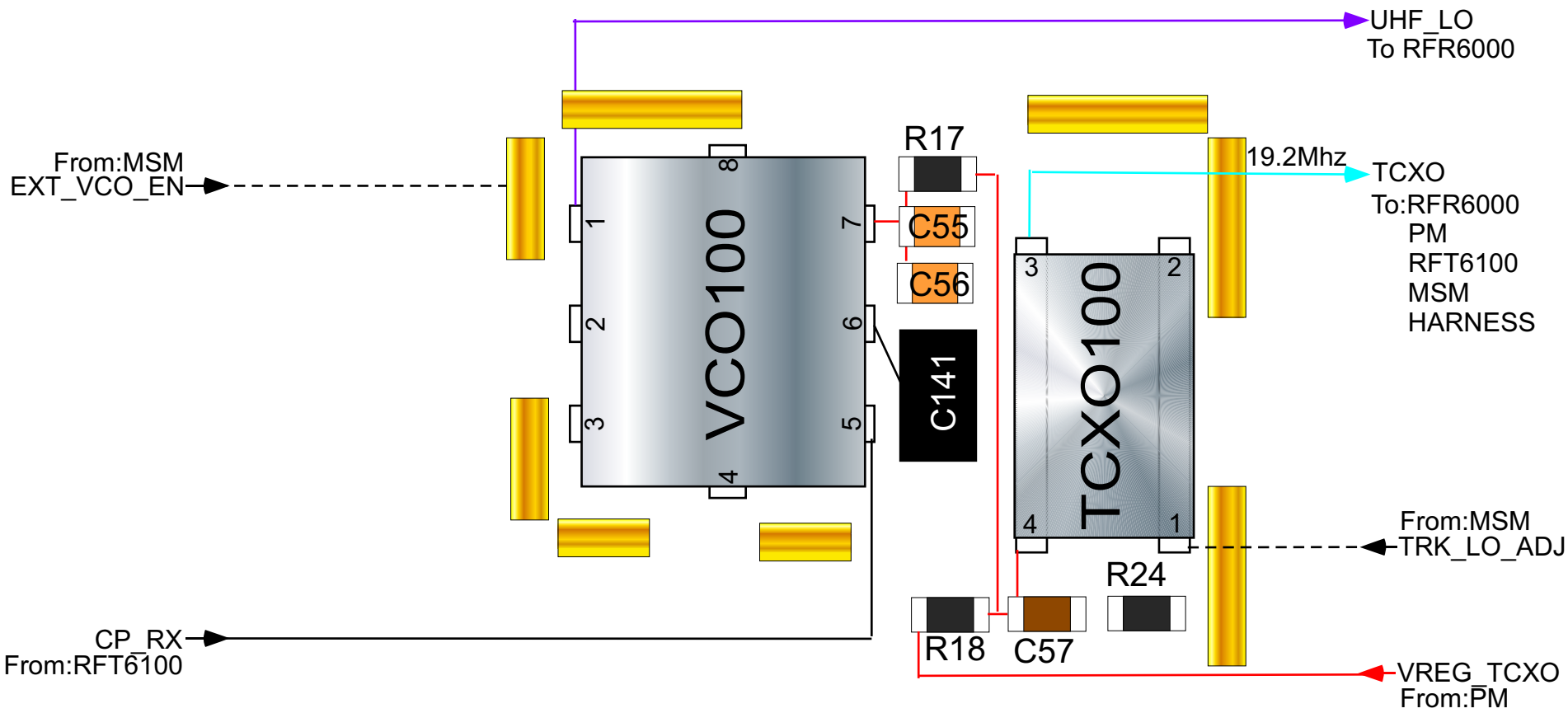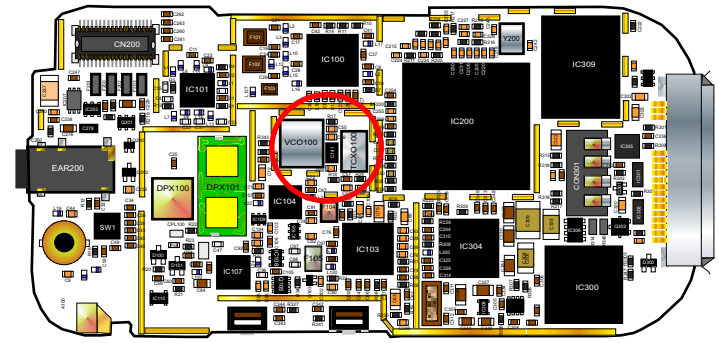
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BOARD - Ver 3.4

V810

Y200

C235 R217

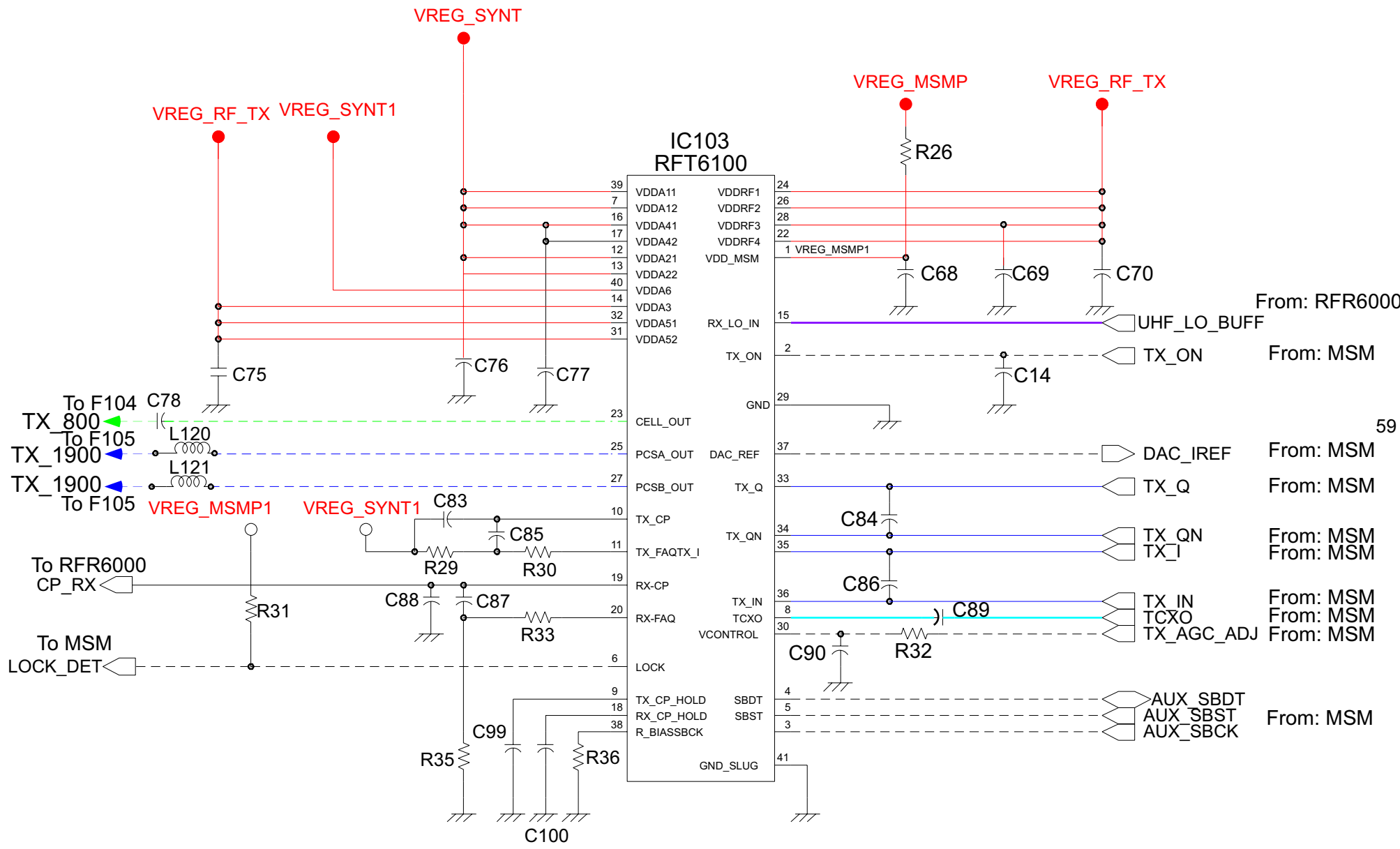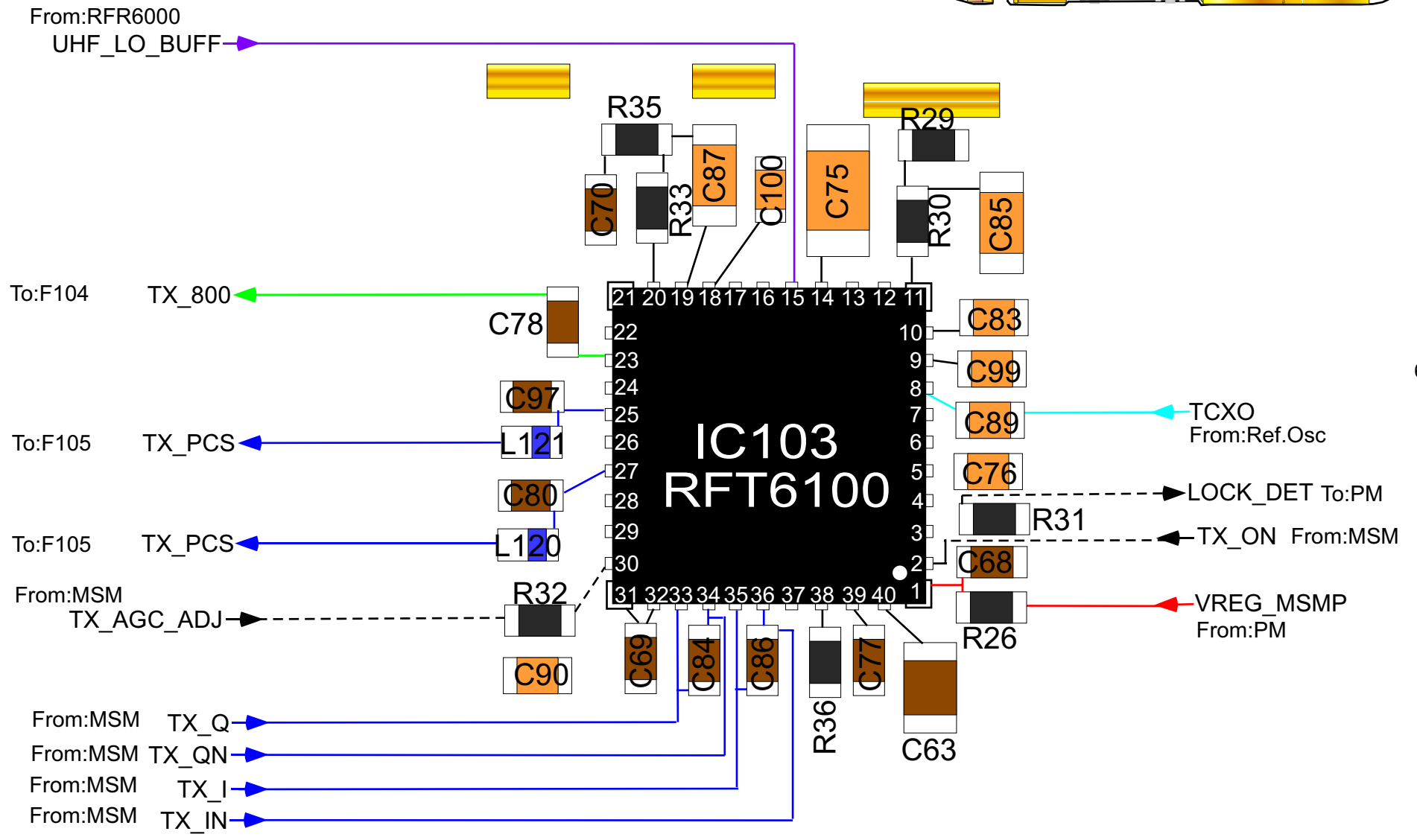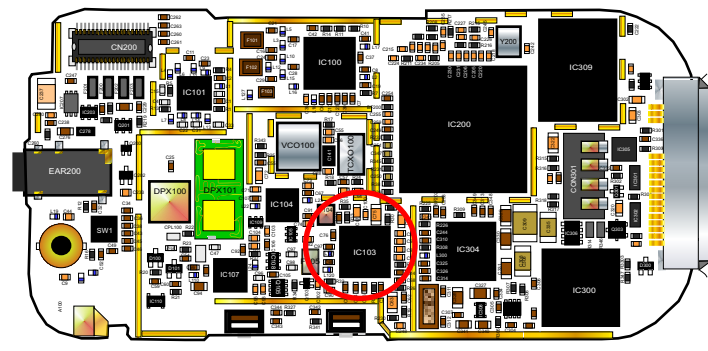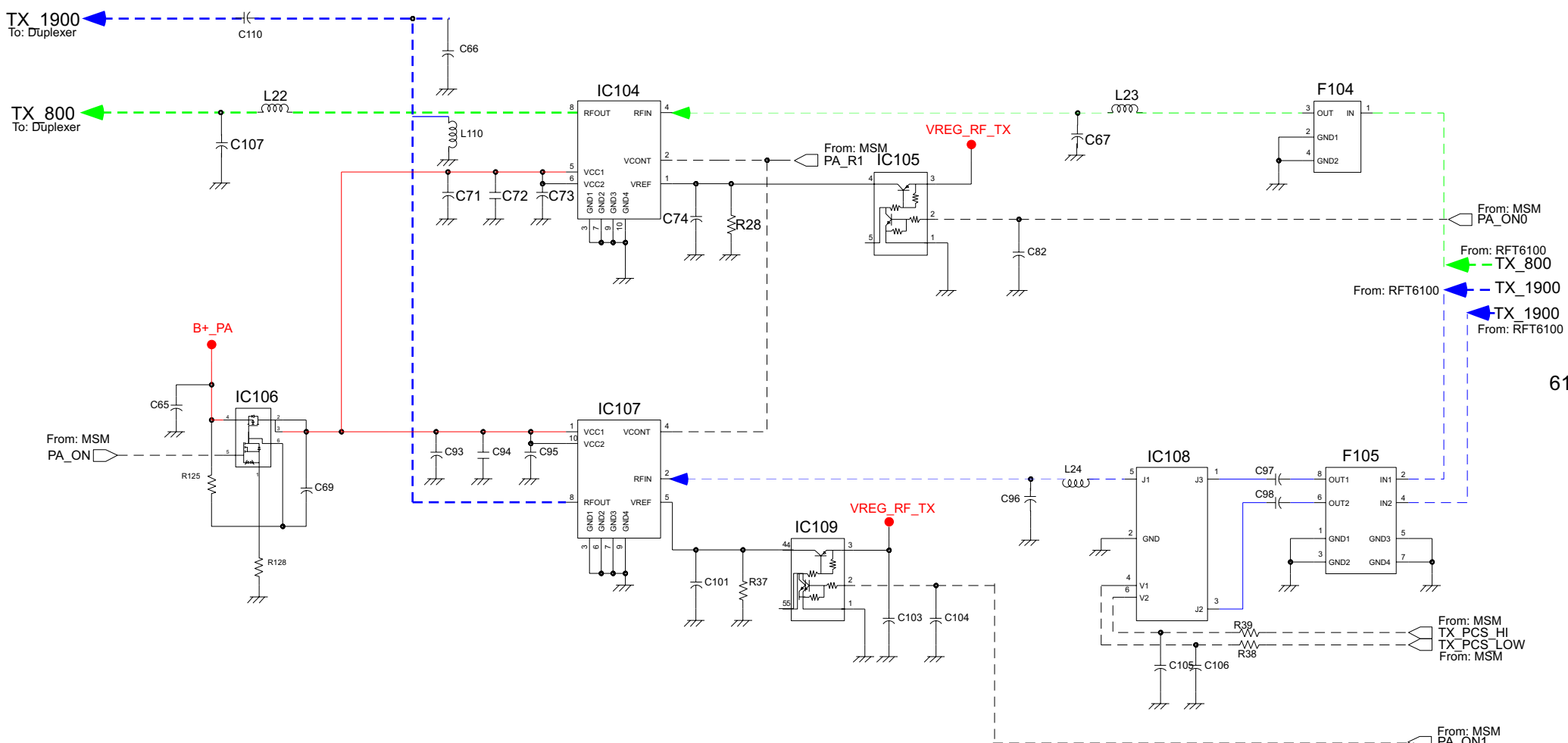R208   C227 R215 C245

C226

R216

C215

C224 R211 C234 R205

C218

C230 C231 C206 C205 C220

C254

C255

C259

C249

Epoxy

R232

C251

C347

R345

R231

C250

R38

R39

IC200

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BOARD - Ver 3.4

PM & Charger Circuit: 9

V810

IC304
PM-6000

Pin	Signal
28	SBDT
26	SBST
27	SBCK
6	TCXO_EN
4	TCXO_IN
5	TCXO_OUT
29	KBDPWR_ON
24	PS_HOLD
39	ADC_BYP
36	HKADC9
35	HKADC8
38	HKADC7
40	HKADC6
41	HKADC5
16	CHARGER_SEL
1	VCHARGER
48	CHG_CNTB
47	ICHARGE
46	ICHARGEOUT
3	BAT_FETB
2	VBAT

Left side signals:
- SBDT, SBST, SBCK
- TCXO_EN, TCXO, TCXO_OUT
- PWR_ON, PS_HOLD
- VREG_MSMP / R310
- RF_TEMP, PCS_DETECT, THERMISTOR, CELL_DETECT, CEBUS_BATTFDBK_R
- B+_PA, EXT_BATT
- C348, C349
- R312, C370
- Q303 (E, B, C pins 2, 1, 3)
- R346, R314, C321, R313
- BATT+, B+
- IC306 (pins 6, 5, 2, 1, 3, 4)
- C335
- BATT+

C310, R308, C313

Right side signals:

Pin	Signal
8	VDD_MAIN
18	VDD_RF
31	VDD_MSM
14	XTAL_IN
15	XTAL_OUT
11	BACKUP_CAP
34	VIBRATOR_DRV
20	KEYB_DRV
21	LCD_DRV
25	MSM_INTERRUPTB
23	PON_RESETB
12	SLEEP_CLK
30	VREG_MSMA
32	VREG_MSMC
33	VREG_MSMP
43	VDEFP
10	VDEFC
17	VREG_RFRX
19	VREG_RFTX
9	VREG_SYNT
7	VREG_TCXO
42	REF_GND
13	NC1
37	NC2
44	RINGER_OUT
45	RINGER_TONE
22	REF_BYP

B+

R308
C306 C307 C308 C309
C311, C312, C314, Y301

PM_6000_INT_N
RESET_N
SLEEP_CLK

VREG_MSMA, VREG_MSMC, VREG_MSMP
VREG_RF_RX, VREG_RF_TX, VREG_SYNT, VREG_TCXO

L300
C325 C326 C327 C328 C329 C330 C331

C334

65

BAT CONT-PART

BATT+   VREG_MSMP

CON301
- BAT 4
- 3
- 2
- GND 1

C322 10u (2012)

R315 4.7K
R316 100
C333 33p — BATT_SERIAL_DATA

VREG_TCXO

R317 10K
R318 10K(1%)
C337 33p — THERMISTOR

BOARD - Ver 3.4

V810

2.83V → VREG_MSMP

BF202
R225
C258
R309
C349
C313
C348
C329
C309
C335

C243
R226
C244
C310
R308
C330

IC304
PM6000

VREG_TCXO ← 2.87V
L300

1.88V → VREG_MSMC
2.63V → VREG_MSMA

VREG_SYNT ← 2.87V
C325
C326
C314

C331
C308

66

R307
R306
C306

C311
C328
C327
C334

3.1V → VREG_RF_TX
3.0V → VREG_RF_RX

C305
IC308

32.768K
C312
C307
C341
C340
C304

R305

BOARD - Ver 3.4

V810

EXT_BATT

C302

C303

BATT_FDBK

BATT+

C322

CON301

R315

R316

BATT_SERIAL_DATA

C333

THERMISTOR

R318

R317

From:PM
BAT_FETB

C335

To:PM
ICHARGEOUT

IC306

B+

B+_PA

From:PM
CHRG_CNTB

C321

R313

R303

D300

D301

Q303

R314

R346

IC302

R304

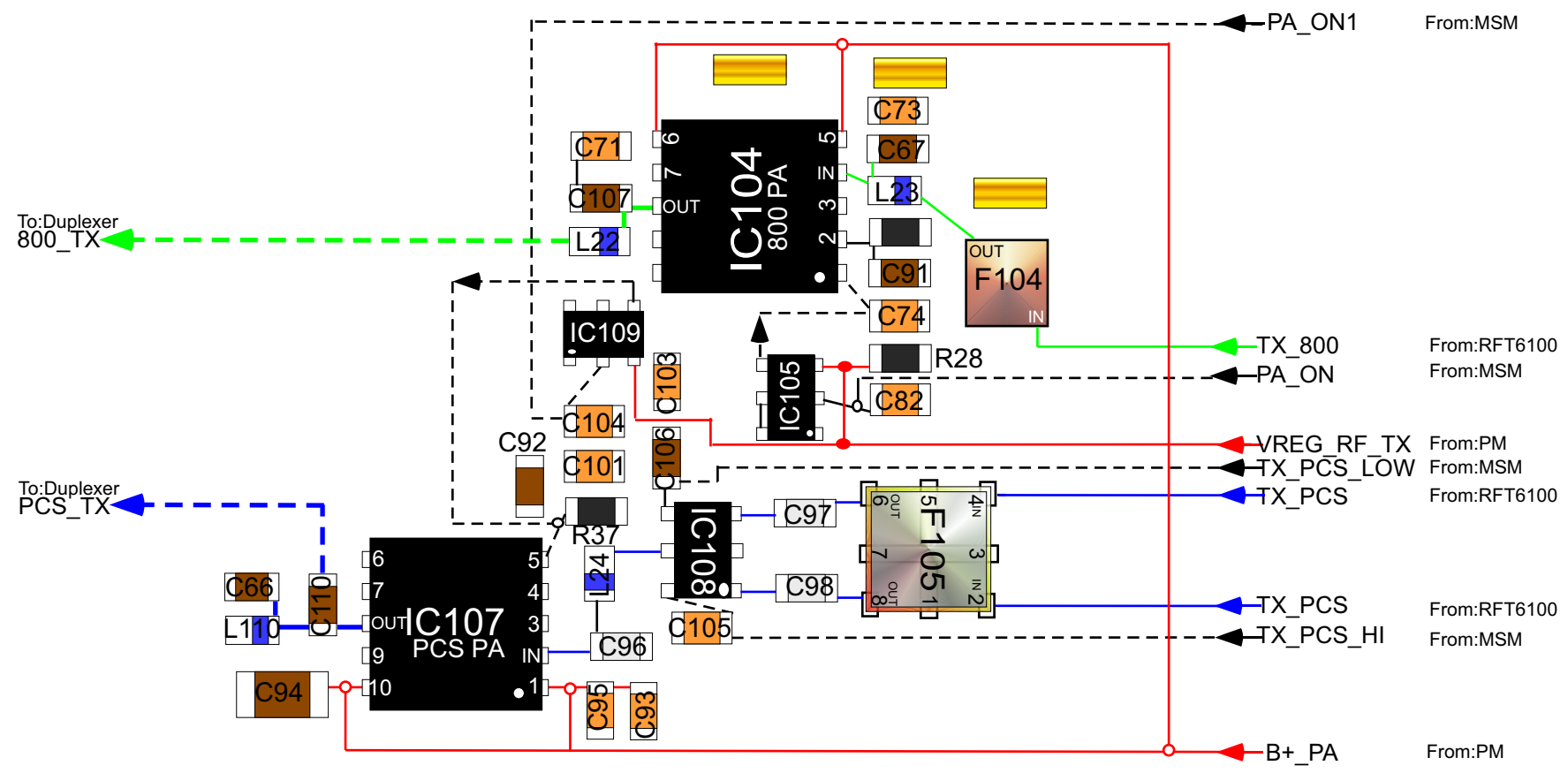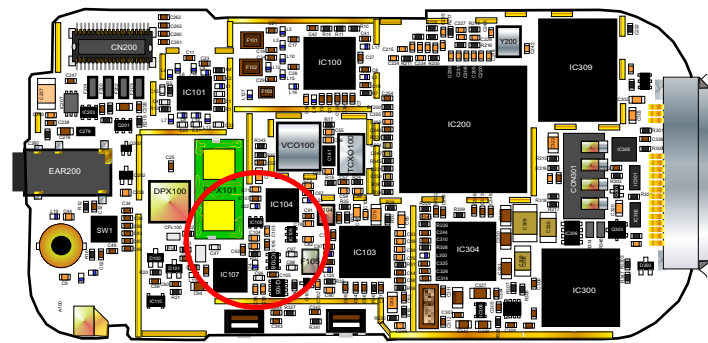IC301

Q301

R302

C332

C320

IC305

R301

C336

R300

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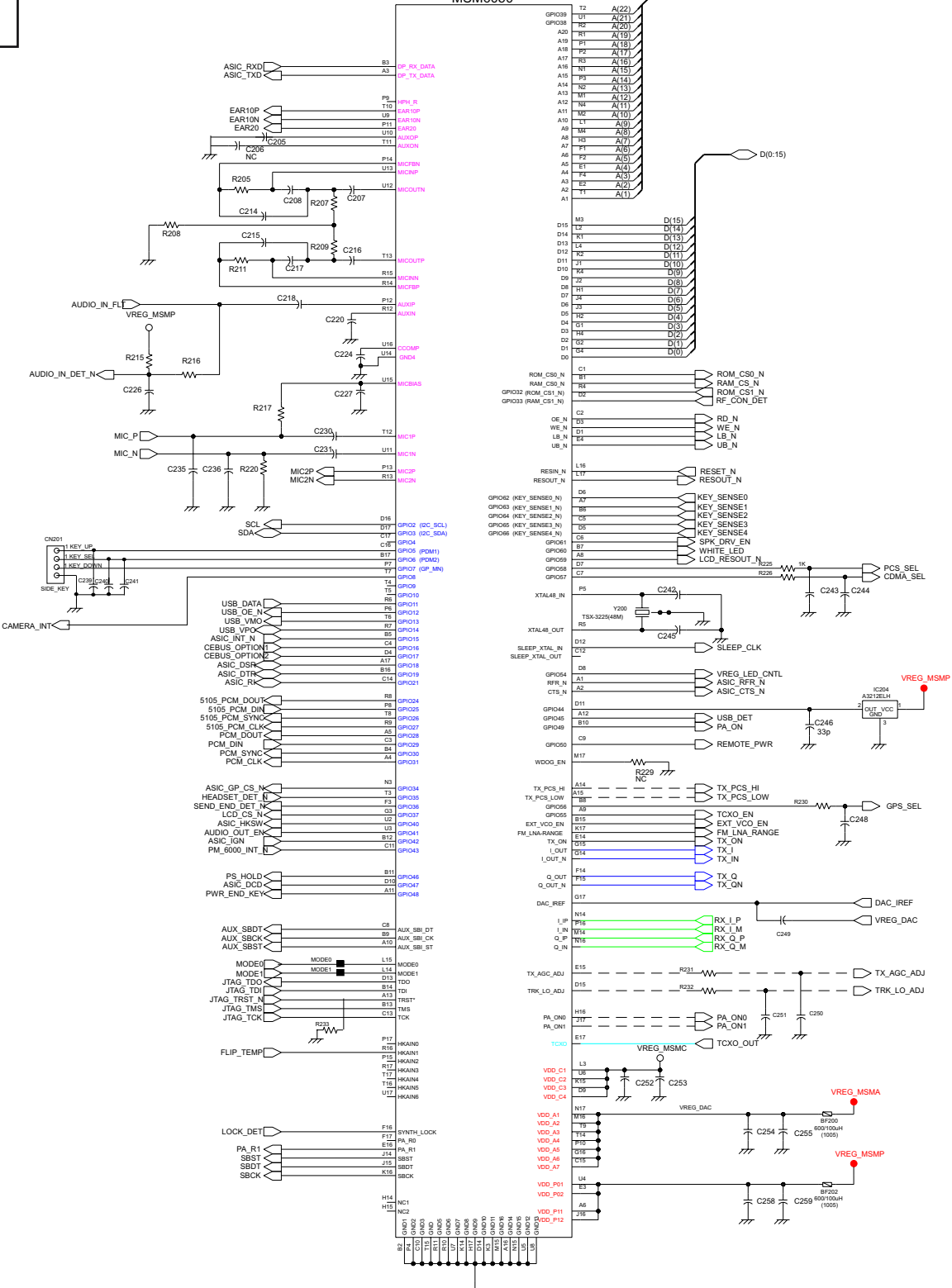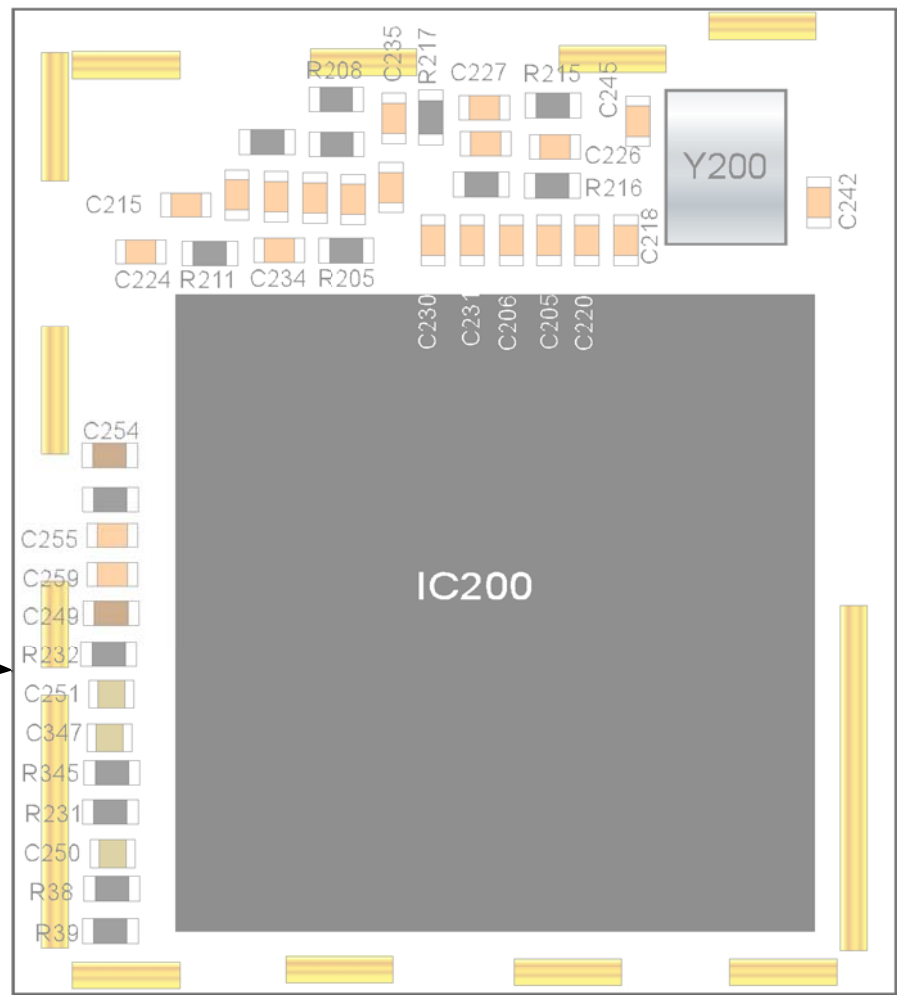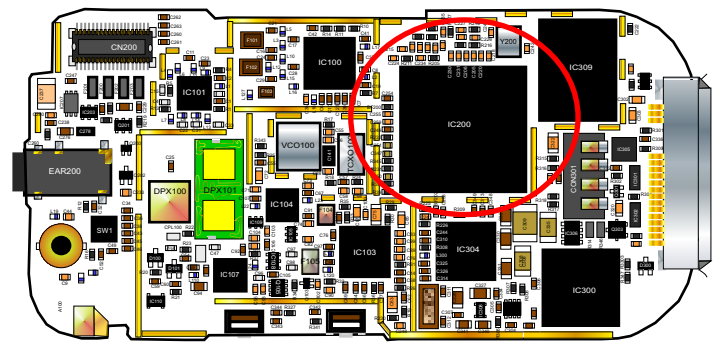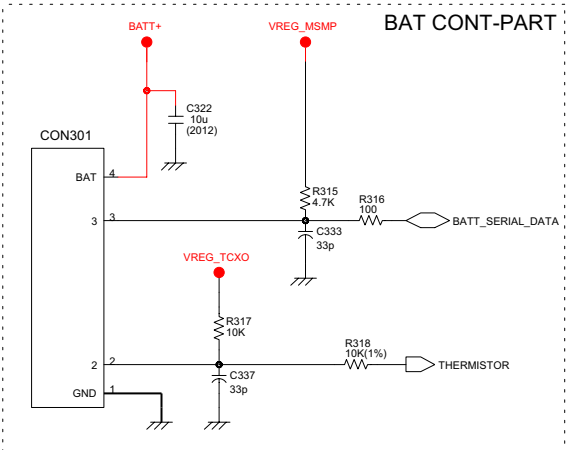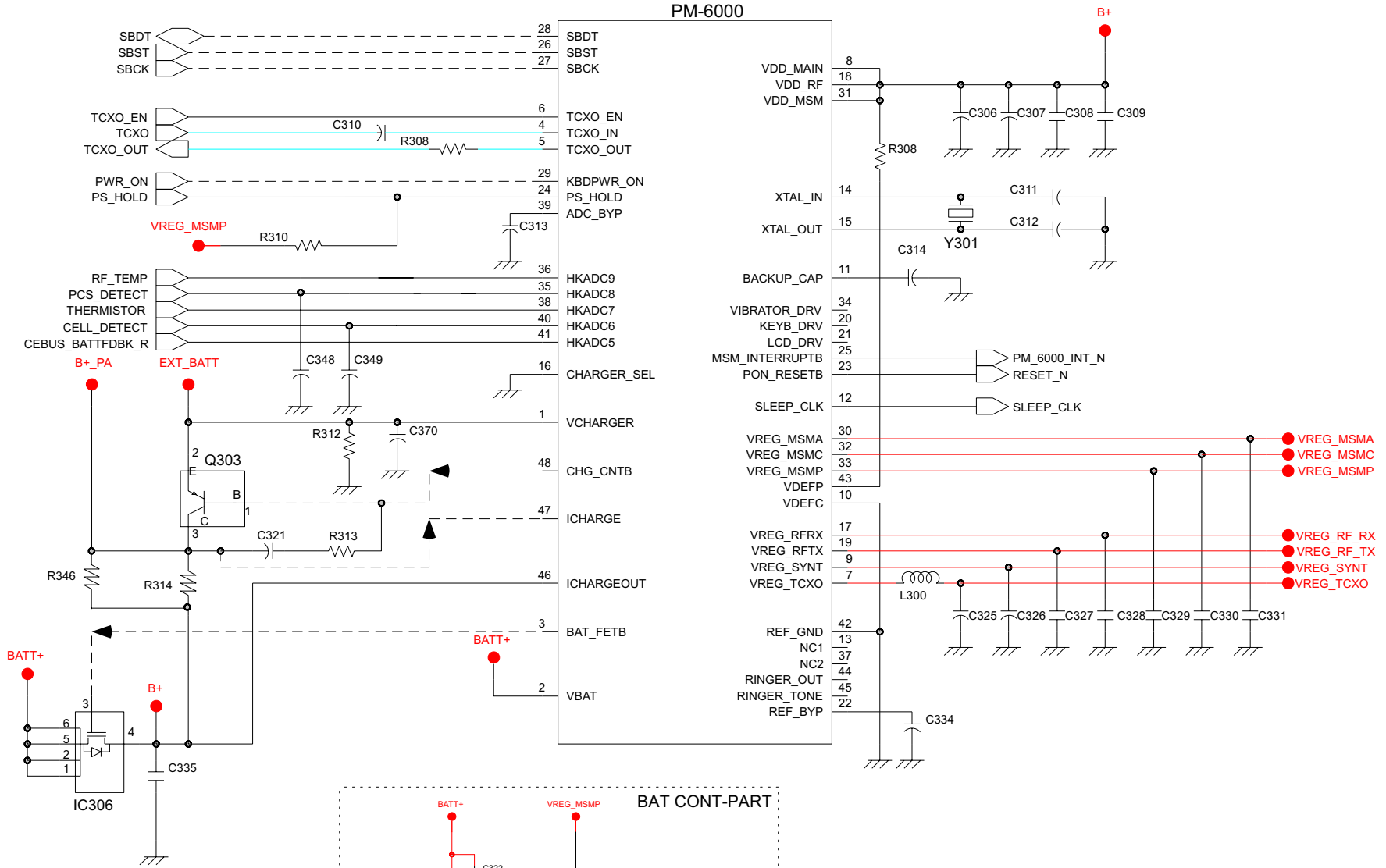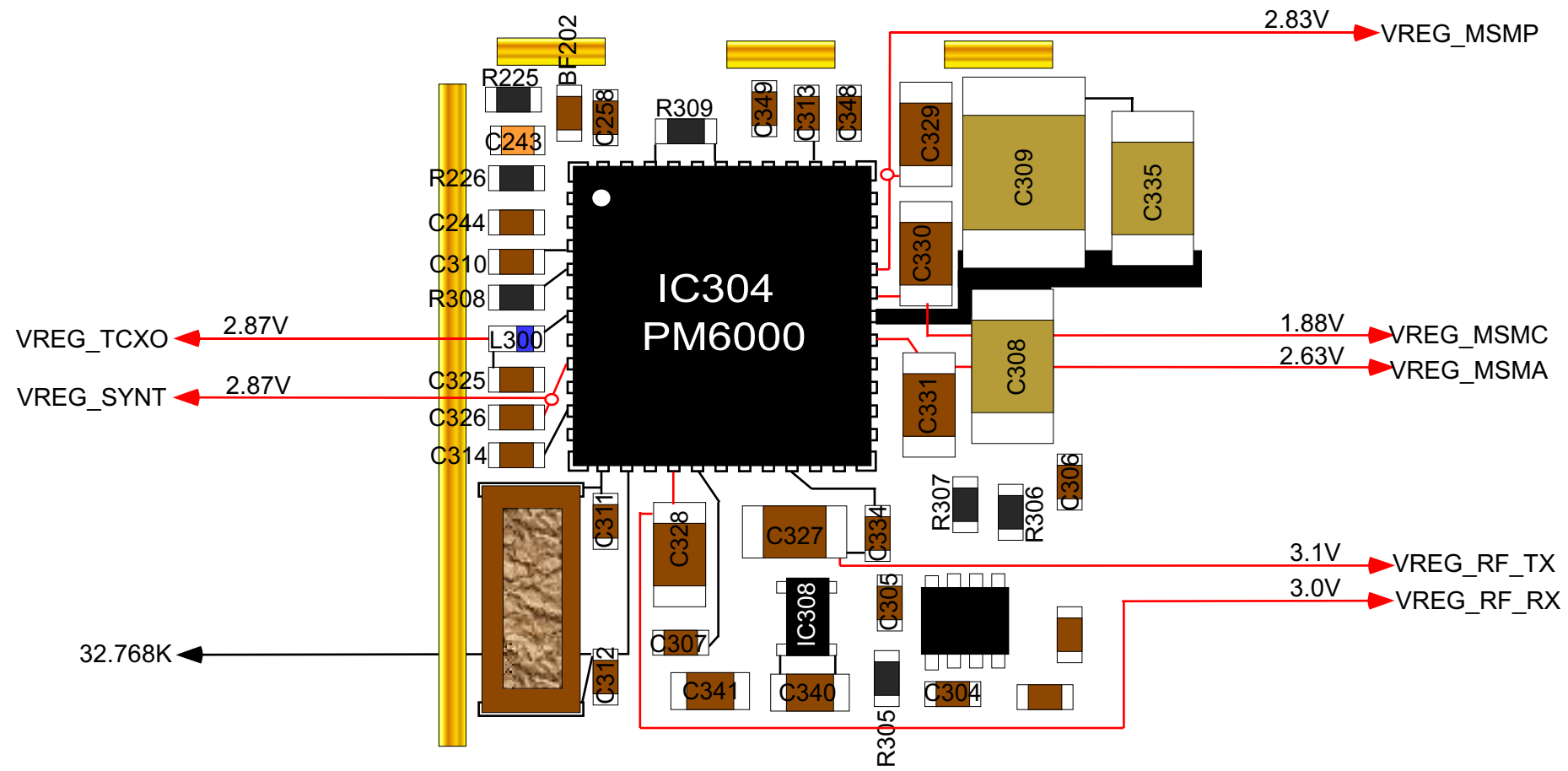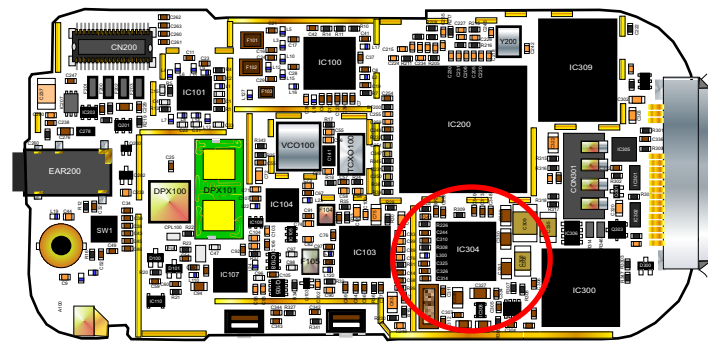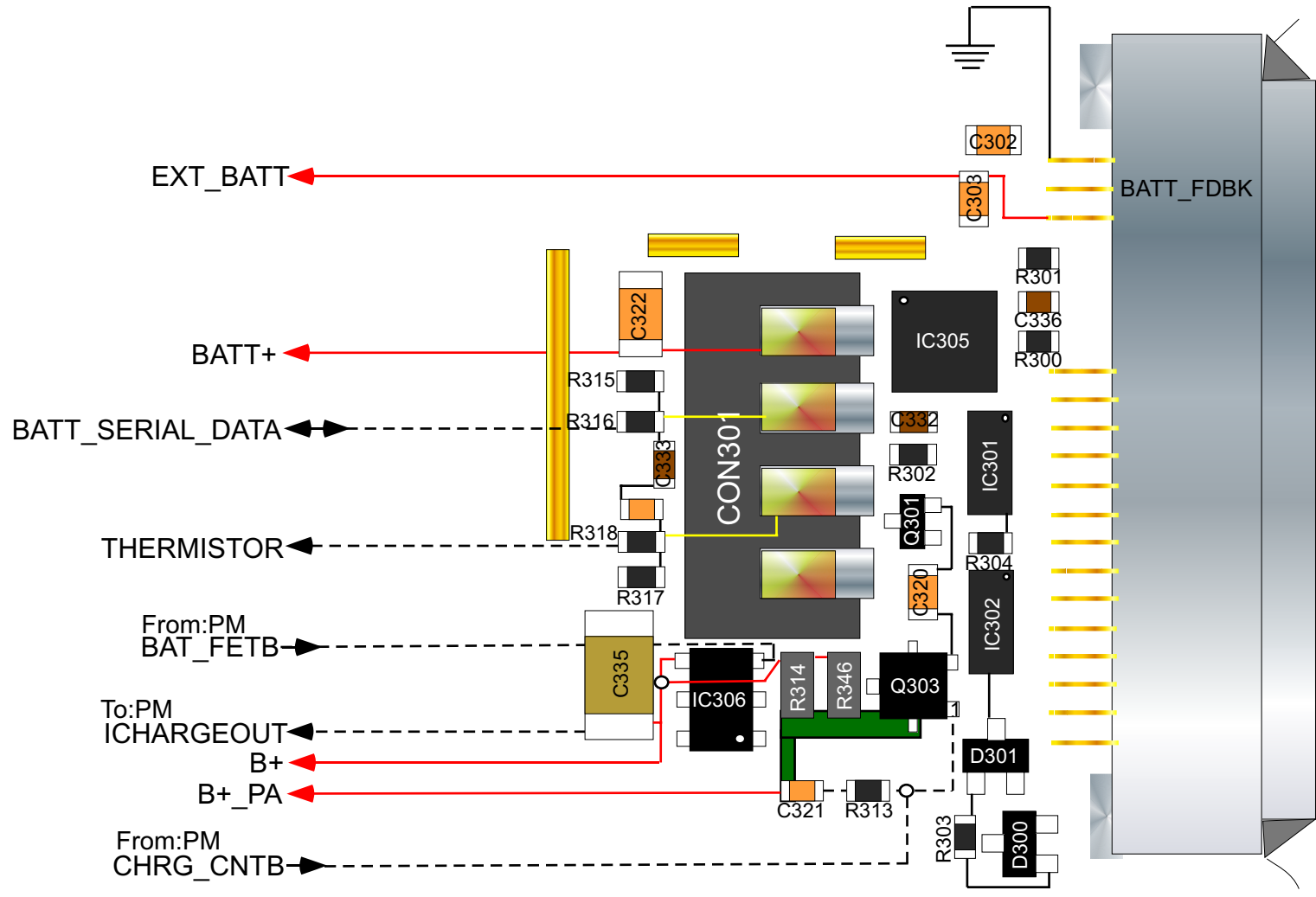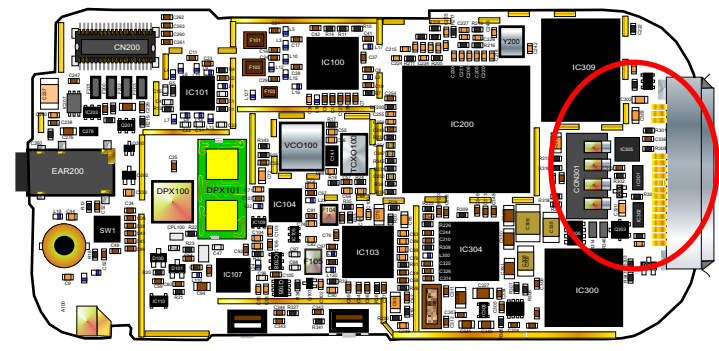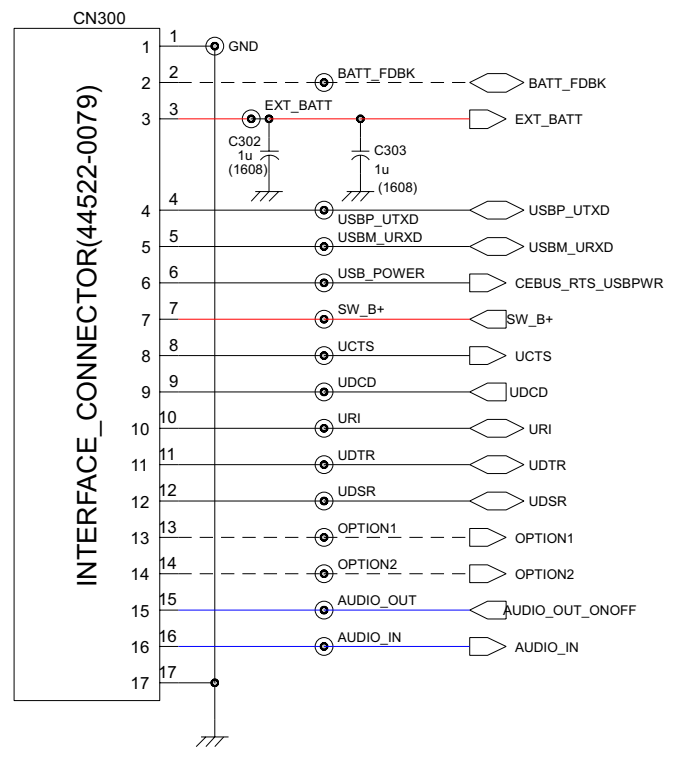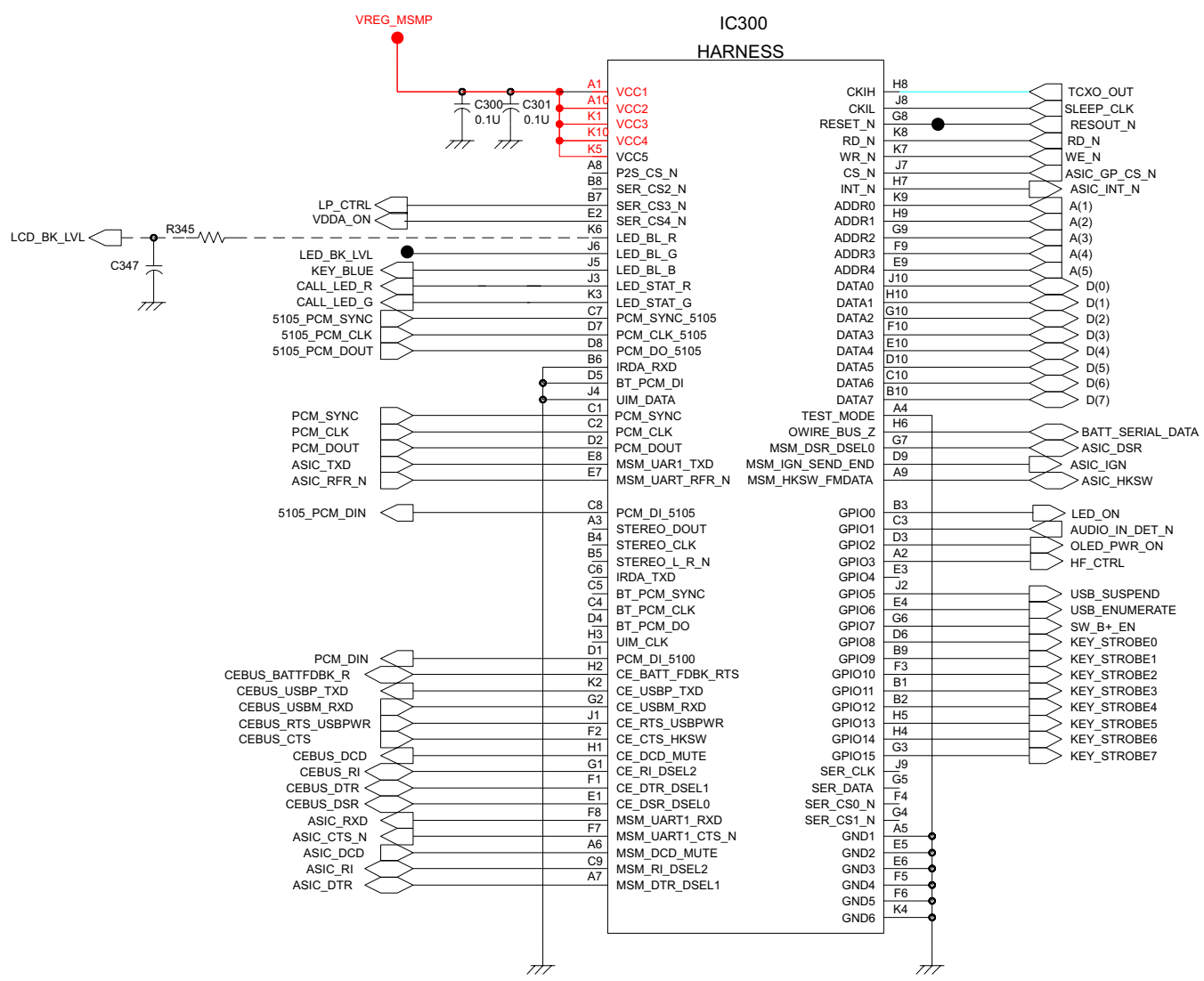allowed with out MOTOROLA approval.

BOARD - Ver 3.4

CN300

INTERFACE_CONNECTOR(44522-0079)

Pin	Signal		Net
1	1	GND	
2	2	BATT_FDBK	BATT_FDBK
3	3	EXT_BATT	EXT_BATT
4	4	USBP_UTXD	USBP_UTXD
5	5	USBM_URXD	USBM_URXD
6	6	USB_POWER	CEBUS_RTS_USBPWR
7	7	SW_B+	SW_B+
8	8	UCTS	UCTS
9	9	UDCD	UDCD
10	10	URI	URI
11	11	UDTR	UDTR
12	12	UDSR	UDSR
13	13	OPTION1	OPTION1
14	14	OPTION2	OPTION2
15	15	AUDIO_OUT	AUDIO_OUT_ONOFF
16	16	AUDIO_IN	AUDIO_IN
17	17		

C302 1u (1608)
C303 1u (1608)

VREG_MSMP

C300 0.1U   C301 0.1U

IC300
HARNESS

Pin	Signal (left)		Signal (right)	Pin
A1	VCC1	CKIH	TCXO_OUT	H8
A10	VCC2	CKIL	SLEEP_CLK	J8
K1	VCC3	RESET_N	RESOUT_N	G8
K10	VCC4	RD_N	RD_N	K8
K5	VCC5	WR_N	WE_N	K7
A8	P2S_CS_N	CS_N	ASIC_GP_CS_N	J7
B8	SER_CS2_N	INT_N	ASIC_INT_N	H7
B7	SER_CS3_N	ADDR0	A(1)	K9
E2	SER_CS4_N	ADDR1	A(2)	H9
K6	LED_BL_R	ADDR2	A(3)	G9
J6	LED_BL_G	ADDR3	A(4)	F9
J5	LED_BL_B	ADDR4	A(5)	E9
J3	LED_STAT_R	DATA0	D(0)	J10
K3	LED_STAT_G	DATA1	D(1)	H10
C7	PCM_SYNC_5105	DATA2	D(2)	G10
D7	PCM_CLK_5105	DATA3	D(3)	F10
D8	PCM_DO_5105	DATA4	D(4)	E10
B6	IRDA_RXD	DATA5	D(5)	D10
D5	BT_PCM_DI	DATA6	D(6)	C10
J4	UIM_DATA	DATA7	D(7)	B10
C1	PCM_SYNC	TEST_MODE		A4
C2	PCM_CLK	OWIRE_BUS_Z	BATT_SERIAL_DATA	H6
D2	PCM_DOUT	MSM_DSR_DSEL0	ASIC_DSR	G7
E8	MSM_UAR1_TXD	MSM_IGN_SEND_END	ASIC_IGN	D9
E7	MSM_UART_RFR_N	MSM_HKSW_FMDATA	ASIC_HKSW	A9
C8	PCM_DI_5105	GPIO0	LED_ON	B3
A3	STEREO_DOUT	GPIO1	AUDIO_IN_DET_N	C3
B4	STEREO_CLK	GPIO2	OLED_PWR_ON	D3
B5	STEREO_L_R_N	GPIO3	HF_CTRL	A2
C6	IRDA_TXD	GPIO4		E3
C5	BT_PCM_SYNC	GPIO5	USB_SUSPEND	J2
C4	BT_PCM_CLK	GPIO6	USB_ENUMERATE	E4
D4	BT_PCM_DO	GPIO7	SW_B+_EN	G6
H3	UIM_CLK	GPIO8	KEY_STROBE0	D6
D1	PCM_DI_5100	GPIO9	KEY_STROBE1	B9
H2	CE_BATT_FDBK_RTS	GPIO10	KEY_STROBE2	F3
K2	CE_USBP_TXD	GPIO11	KEY_STROBE3	B1
G2	CE_USBM_RXD	GPIO12	KEY_STROBE4	B2
J1	CE_RTS_USBPWR	GPIO13	KEY_STROBE5	H5
F2	CE_CTS_HKSW	GPIO14	KEY_STROBE6	H4
H1	CE_DCD_MUTE	GPIO15	KEY_STROBE7	G3
G1	CE_RI_DSEL2	SER_CLK		J9
F1	CE_DTR_DSEL1	SER_DATA		G5
E1	CE_DSR_DSEL0	SER_CS0_N		F4
F8	MSM_UART1_RXD	SER_CS1_N		G4
F7	MSM_UART1_CTS_N	GND1		A5
A6	MSM_DCD_MUTE	GND2		E5
C9	MSM_RI_DSEL2	GND3		E6
A7	MSM_DTR_DSEL1	GND4		F5
		GND5		F6
		GND6		K4

LP_CTRL
VDDA_ON
LCD_BK_LVL — R345 — LED_BK_LVL
C347
KEY_BLUE
CALL_LED_R
CALL_LED_G
5105_PCM_SYNC
5105_PCM_CLK
5105_PCM_DOUT

PCM_SYNC
PCM_CLK
PCM_DOUT
ASIC_TXD
ASIC_RFR_N

5105_PCM_DIN

PCM_DIN
CEBUS_BATTFDBK_R
CEBUS_USBP_TXD
CEBUS_USBM_RXD
CEBUS_RTS_USBPWR
CEBUS_CTS
CEBUS_DCD
CEBUS_RI
CEBUS_DTR
CEBUS_DSR
ASIC_RXD
ASIC_CTS_N
ASIC_DCD
ASIC_RI
ASIC_DTR

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BOARD - Ver 3.4

C302

C303

GND
BATT_FDBK
EXT_BATT

R301

IC305
USB

C336

R300

C332

USBP_UTXD
USBM_URXD
CEBUS_RTS_USBPWR
SW_B+
UCTS
UDCD
URI
UDTR
UDSR
OPTION1
OPTION2
AUDIO_OUT_ONOFF
AUDIO_IN
GND

IC301

R302

Q301

R304

C320

IC302

D301

R303

D300

IC300
HARNESS

C306

DVCC
FROM IC207

C301

BOARD - Ver 3.4

AUDIO Circuit: 11

V810

BOARD - Ver 3.4

AUDIO Circuit: 11

V810

CN200

From:MSM
MIDI_PATH

From:YAMAHA
EAR_MIDI

Audio

To:MSM
HEADSET_DET_N

C247

C237

IC207

IC203

C280

C238

R214

R213

C276

C278

R246

C228

C225

C229

R219

Q201

Q200

C281

Q202

C233

MIC2P
To:MSM

From:MSM
EAR20

SEND_END_DET_N
To:MSM

VREG_MSMA
From:PM

From:MSM
TCXO_EN

3

2   Spkr   5

EAR200

Mic

4

MIC

71

From:PM
VREG_MSMP

HF_CTRL
From:MSM

C210

C273

AUDIO_OUT
To:CEBUS

Audio Out

TCXO_OUT

From:PM
VREG_MSMP

C210

C204

R204

C212

C213

C202

32 31 30 29 28 27 26
1   25
                       24
                       23
                       22
IC200   21
YAMAHA   20
                       19
                       18
                       17
9   16
10 11 12 13 14 15 16

BF201

C209

C268

R238

From:PM
B+_PA

MSPK-
MSPK+

To:HEADSET
EAR_MIDI

C200

R202

R203

C211

C203

C272

C269

R235

R201

C201

Audio In

From:MSM
EAR20

BOARD - Ver 3.4

LCD CONNECTOR Circuit: 12   V810

CN200

IC207

VDDVOUT
RESET_N
CE   ECO   LP_CTRL
NC   GND

B+_PA   B+_PA   DVCC

C276   C278

CN200

LCD_BOARD_CONNECTOR

| 4 | | | C247 |
| 2 | | | |

F200
16	FD(0)	A2 FLTR1 _FLTR1 B2	D(0)
18	FD(2)	A4 FLTR2 _FLTR2 B4	D(2)
14	FD(5)	A1 FLTR3 _FLTR3 B1	D(5)
20	FD(7)	A5 FLTR4 _FLTR4 B5	D(7)
		B3 GND	

F201
12	FD(1)	A1 FLTR1 _FLTR1 B1	D(1)
8	FD(3)	A4 FLTR2 _FLTR2 B4	D(3)
6	FD(4)	A2 FLTR3 _FLTR3 B2	D(4)
10	FD(6)	A5 FLTR4 _FLTR4 B5	D(6)
		B3 GND	

F202
26	FD(8)	A4 FLTR1 _FLTR1 B4	D(8)
28	FD(10)	A5 FLTR2 _FLTR2 B5	D(10)
24	FD(11)	A2 FLTR3 _FLTR3 B2	D(11)
22	FD(13)	A1 FLTR4 _FLTR4 B1	D(13)
		B3 GND	

F203
36	FD(9)	A5 FLTR1 _FLTR1 B5	D(9)
34	FD(12)	A4 FLTR2 _FLTR2 B4	D(12)
30	FD(14)	A1 FLTR3 _FLTR3 B1	D(14)
32	FD(15)	A2 FLTR4 _FLTR4 B2	D(15)
		B3 GND	

F204
25	FA(1)	A5 FLTR1 _FLTR1 B5	A(1)
40	FA(2)	A4 FLTR2 _FLTR2 B4	A(2)
27	FA(3)	A2 FLTR3 _FLTR3 B2	A(3)
38	FA(4)	A1 FLTR4 _FLTR4 B1	A(4)
		B3 GND	

F205
9	RLCD_RESOUT_N	A1 FLTR1 _FLTR1 B1	CAMERA_RESOUT_N
21	FVDDA_ON	A2 FLTR2 _FLTR2 B2	VDDA_ON
19	FCAMERA_INT	A4 FLTR3 _FLTR3 B4	CAMERA_INT
		A5 FLTR4 _FLTR4 B5	
		B3 GND	

DVCC

11	RRD_N	R235	RD_N
33			MSPK+
31			MSPK-
37			EAR10P
35			EAR10N
1			
13	RVIBRATOR_ON	R238	VIBRATOR_ON
7	RLCD_BK_LVL	R239	LCD_BK_LVL
3	RWE_N	R240	WE_N
23	FLCD_CS_N	R241	LCD_CS_N
5	ROLED_PWR_ON	R242	OLED_PWR_ON
15			
17	RLCD_DET	R244 NC	LCD_DECT
29			
39			

C268 C260 C261 C262 C263 C264 C269 C265 C270 C266 C267 C272

CN200

DVCC WE_N OLED_PWR_ON LCD_BK_LVL LCD_RESOUT_N RD_N VIBRATOR_ON LCD_DET CAMERA_INT VDDA_ON LCD_CS_N A(1) A(3) GND MSPK- MSPK+ EAR10N EAR10P GND

1 3 5 7 9 11 13 15 17 19 21 23 25 27 29 31 33 35 37 39

2 4 6 8 10 12 14 16 18 20 22 24 26 28 30 32 34 36 38 40

B+_PA B+_PA D(4) D(3) D(6) D(6) D(1) D(5) D(0) D(2) D(7) D(13) D(11) D(8) D(10) D(14) D(15) D(12) D(9) A(4) A(2)

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BOARD - Ver 3.4

V810

LED-PART

B+_PA

VREG_LED

IC308

VIN VOUT
EN
GND

LED_ON
FROM:HARNESS

C341

C340

VREG_LED

LED200

FROM:HARNESS
CALL_LED_R

CALL_LED_G
FROM:HARNESS

R234

R236

C275

C257

C256

VREG_LED

LTST-C192TBKT X14

C345

C346

R326 LED300
R327 LED301
R328 LED302
R329 LED303
R330 LED304
R331 LED305
R332 LED306
R333 LED307
R334 LED308
R335 LED309
R336 LED310
R337 LED311
R338 LED312
R339 LED313

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KEY_BLUE
FROM:HARNESS

Q301

BOARD - Ver 3.4

V810

Regulator

From:Harness
LED_ON → 3   IC308   2

From:PM
B+_PA → 4   1

C341   C340

VREG_LED ←

From:Harness
CALL_LED_R → 1   LED200

CALL_LED_G → 4
From:Harness

VREG_LED →

74

LED313   R327
          LED30
R339

LED310   R336

LED309   R335

LED303   C323 R313
R329

LED305   C345
R331

LED308   R333
         LED307

LED306   R332

LED302   C252 C253
R328

LED304   R330
R340

LED312   C346 R338

LED300   R326
C239   C241 C240

LED312   R338

Q301   2
3   1 ← KEY_BLUE
       From:Harness

R334

C40

BOARD - Ver 3.4

Signal Flow

V810

TX 800
RX 800
RX GPS
RX PCS
TX 1900
UHF_LO_BUFF
REF_OSC

RX_Q_M   RX_I_M
RX_Q_P   RX_I_P

REF, OSC
19.6Mhz

TX_Q   TX_I
TX_Q_N   TX_I_N

2.63V   VREG_MSMA
1.88V   VREG_MSMC
2.83V   VREG_MSMP
3.0V   VREG_RF_RX
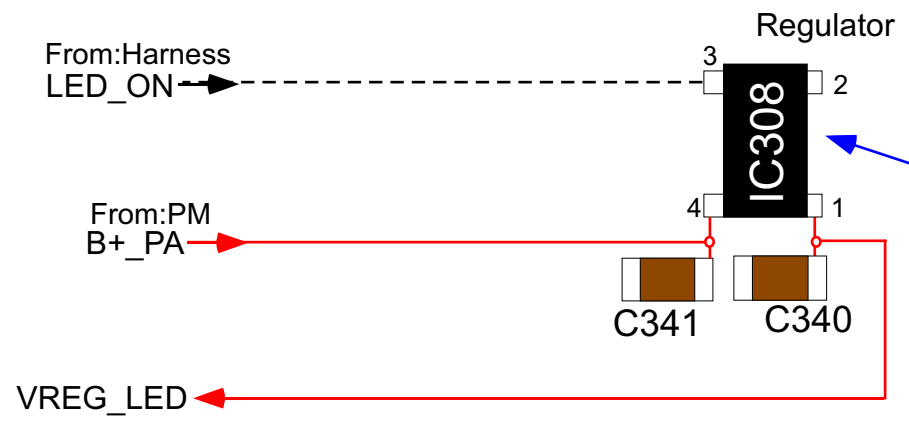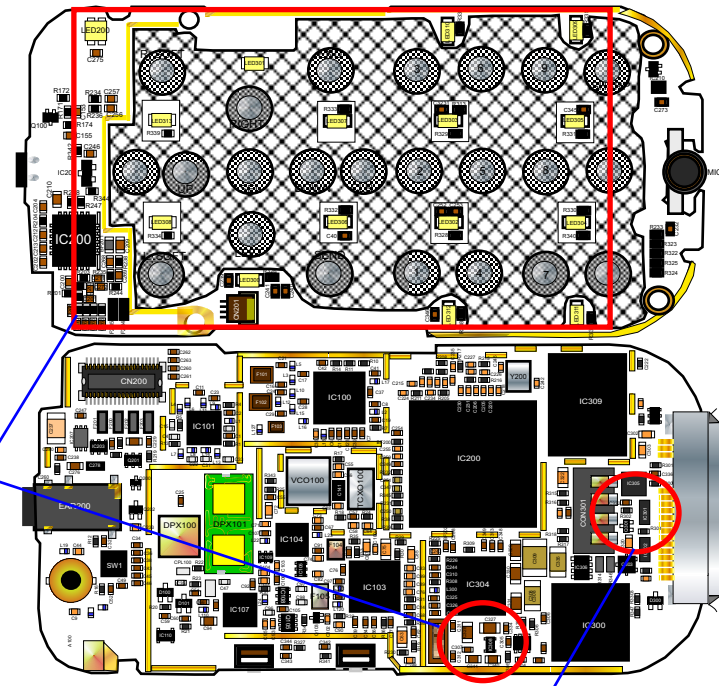3.1V   VREG_RF_TX
2.87V   VREG_SYNT
2.87V   VREG_TCXO

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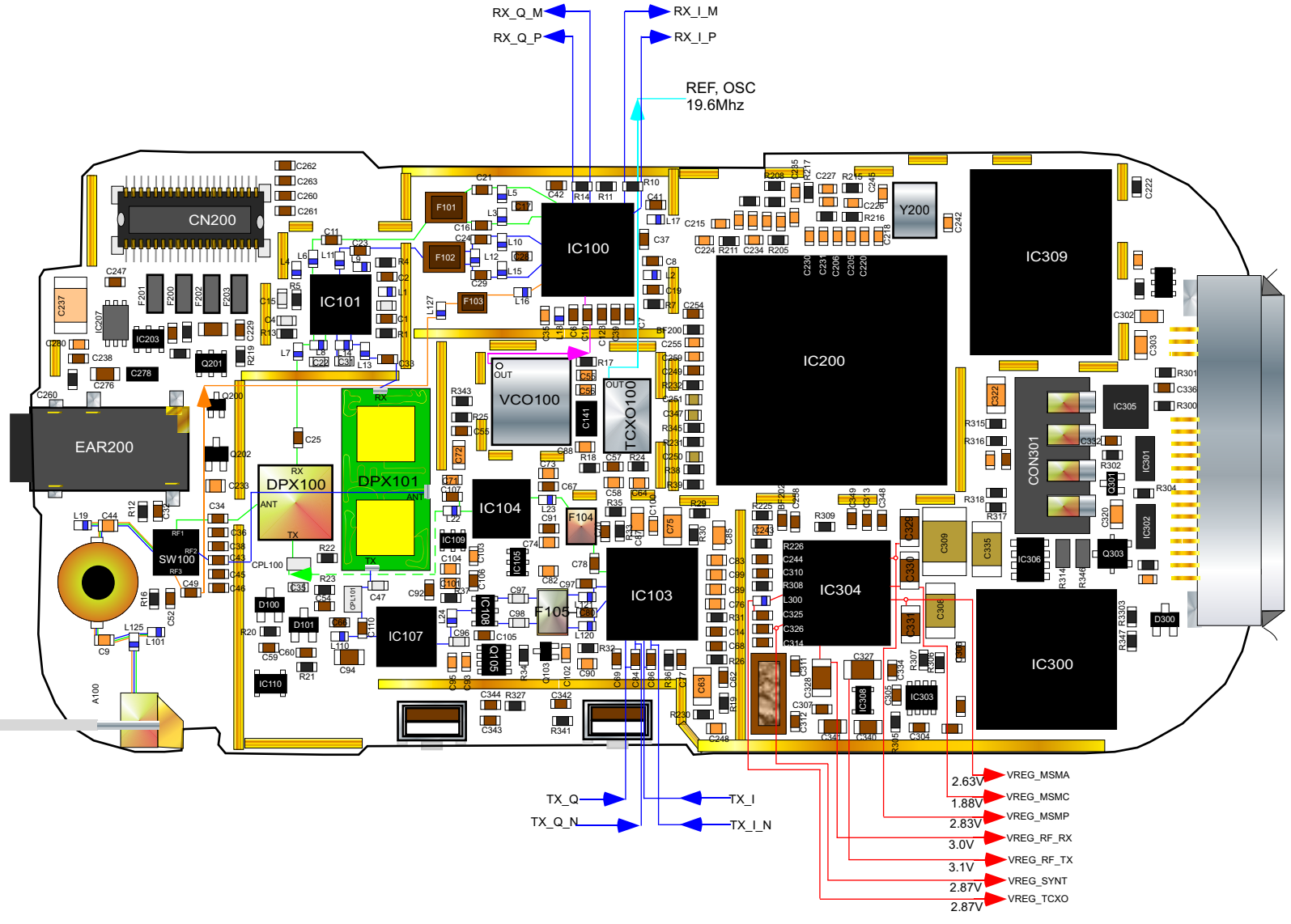Distribution and copies of this document are not allowed with out MOTOROLA approval.

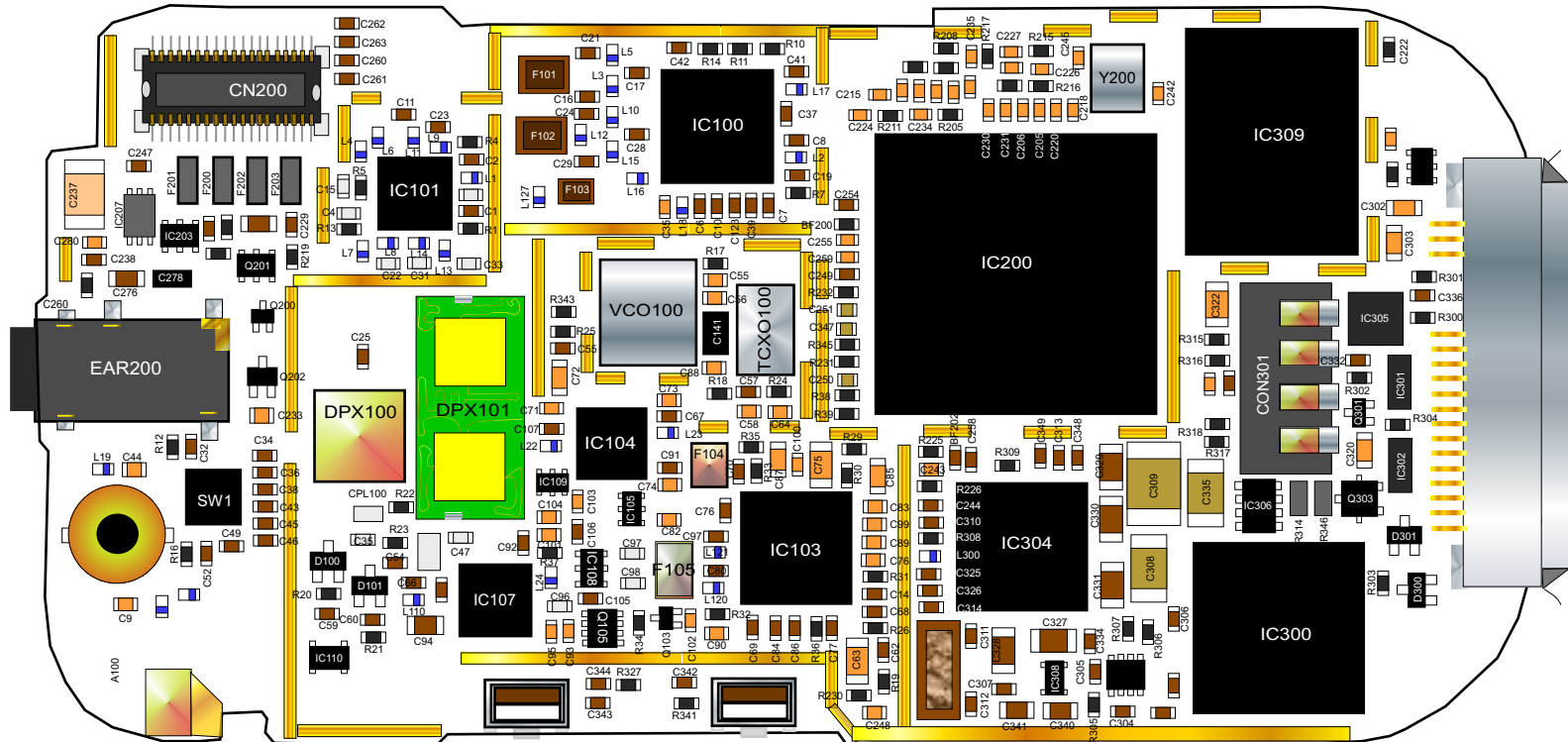MOTOROLA CONFIDENTIAL PROPRIETARY

BOARD - Ver 3.4

V810

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BOARD - Ver 3.4

V810
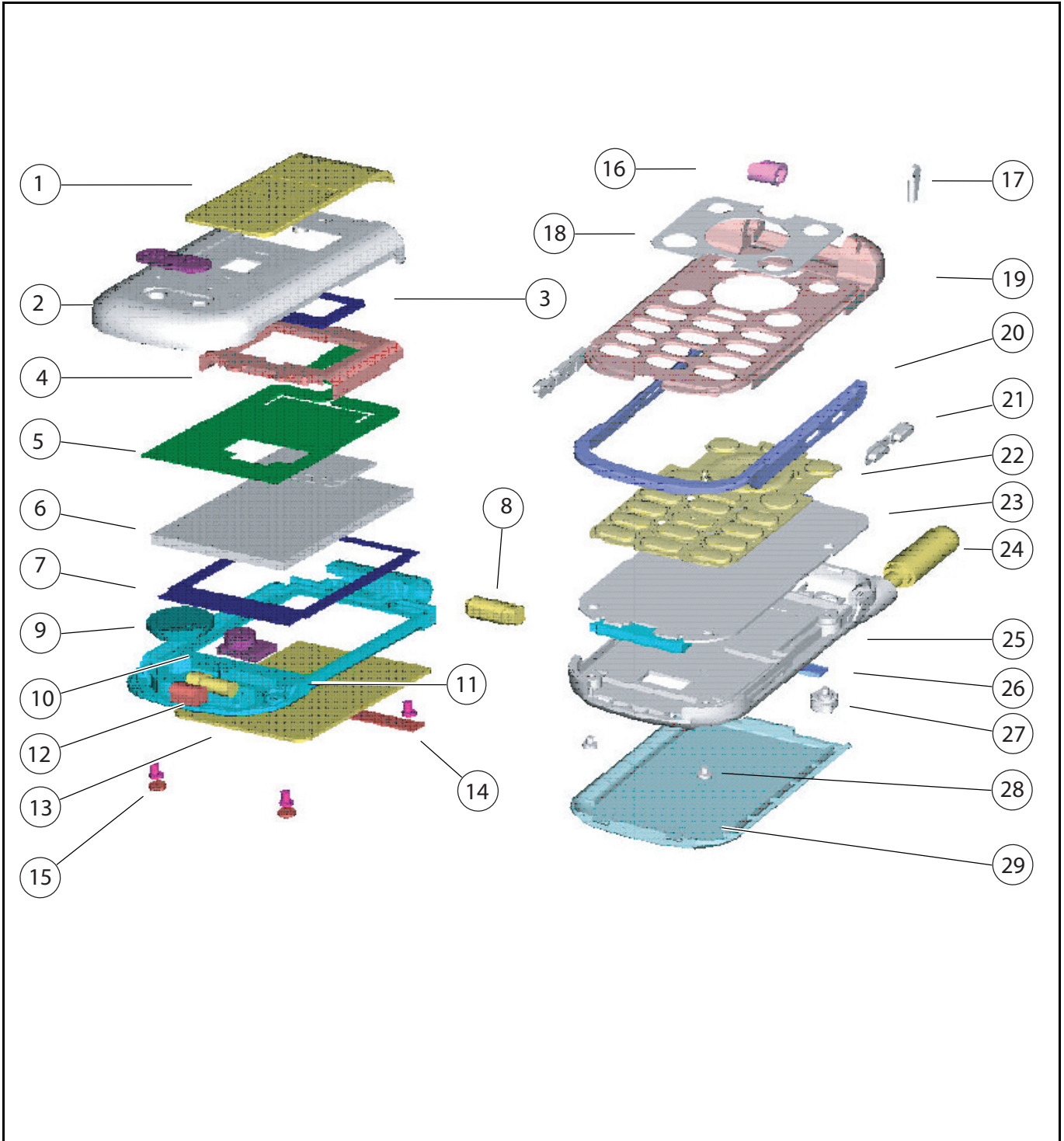

LED200
C275

R172
R171
R234 C257
R153
R236 C256
R174
Q100
C155
R342 C246
IC204
C210 R248 R344
R247
C202 C213 C212 R204 C204
IC200
BT201
C268 R238 C269
C209
R203 R235 C272
R201 C200 R244
F205 F204
C271 C266 C266 C266

R SOFT
LED313
R339
RIGHT

MENU
UP
SET
DOWN

L SOFT
LED308
R334
LED
LED300
C239 C241
C240
CN201
R326
SEND
C346

LED30
END

3
6
9
SHARP

R333
LED307

C3231 R313
LED303
R329

C345
LED305
R331

LED310 R336
LED309 R335

D300
C210
C273

2
5
8
0

R332
LED306
C40

C252 C253
LED302
R328

R330
LED304
R340

MIC200
R233 C232
R323
R322
R325
R324

1
4
7

LED312
R338

LED311

R337

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BOARD - Ver 3.4

Exploded View Diagram

Figure 22. Exploded View

Exploded View Parts List

Table 3. Exploded View Parts List

Item Number	Motorola Part Number	Description	Item Number	Part Number	Description
1		Flip Cover Lens	16		
2	01-36013-11	Flip Cover	17		
3			18		Plate Deco Front
4			19	01-36011-01	Front housing
5			20		Front housing frame
6			21	40-00010-01	Side Keys
7			22	10-36000-03	Navigation Keypad
8		Flip Hinge	23		Transceiver PC Board
9			24	01-36000-01	Antenna
10		Camera Assembly	25	01-36012-01	Rear Housing
11	15-36013-01	Flip Rear Housing	26		
12		Motor/Vibrator	27		
13			28		Base Housing Screws
14			29	15-36016-11	Battery Cover Std
15		Flip Screw Covers	29	15-36016-21	Battery Cover EXD
15A		Flip Screws x4	--	37-36000-01	Keypad

⚡ *There is a danger of explosion if the Lithium Ion battery pack is replaced incorrectly. Replace only with the same type of battery or equivalent as recommended by the battery manufacturer. Dispose of used batteries according to the manufacturer's instructions.*

Accessories

Table 4. Accessories

Description	Part Number
Battery - Lithium 750 mAh Battery - Lithium 1100 mAh	SNN5588 SNN5595
Rapid Universal Travel Charger Mid-Rate Wall Charger Linear Wall Charger	SPN4716B SPN4940C SPN4992A
Desktop Charger Base	SPN5019A
Rapid Vehicle Power Adapter	SYN7818A
Easy-Install HF Kit Universal	SYN8597B
Pro-Install carkit USB	S9609B

Table 4. Accessories (Continued)

Description	Part Number
Silver Headset Next Gen. Retractable Headset Boom Headset Retractable Headset Headset w/ Send/End Button FM Stereo Headset	AAYN4264 SYN9050 SYN8908 SYN8284 SYN8419 SYN8609B
Belt Clip Leather Case	SHN7175 SYN9171
Battery 1000 mAh, Silver	SHN8061
USB Cable + CDROM (Connectivity Software) RS232 Cable + Smart Cable Head + CDROM (Connectivity Software) RS232 Cable + Head + Palm III/V Cables + CDROM (Connectivity Software) MP-3 Player	S8951 S8952 S8953 S9117
Clip-on Speaker	SPN5028