Developer's Guide

Motorola g20 Developer's Kit

98-08901C67-O

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REVISION HISTORY

Revision	Date	Purpose

MOTOROLA

g20 Developer's Kit

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PREFACE

1.1 SCOPE OF THIS MANUAL

This manual introduces the g20 Developer's Kit, and describes the technical details required by the user to successfully integrate the Motorola g20 cellular engine into an original equipment manufacturer (OEM) wireless host device. With the help of this manual, the user can utilize the Developer's Kit to conduct a full series of test and evaluation procedures on the g20, as well as perform application development.

We at Motorola want to make this guide as helpful as possible. Keep us informed of your comments and suggestions for improvements.

You can reach us by email: n2cshd@motorola.com.

1.2 WHO SHOULD USE THIS MANUAL

This manual is intended for all members of the integration team who are responsible for integrating the g20 into the host application, including representatives from hardware, software and RF engineering disciplines.

1.3 DISCLAIMER

This guide provides advice and guidelines to developers. Responsibility regarding how the information is used lies entirely with the user. Statements indicating support provided by, or offered by, Motorola are subject to change at any time.

Motorola reserves the right to make any changes to this manual.

1.4 SAFETY

1.4.1 Precautions

Most Developer Board circuits are not shielded. Be sure to take appropriate precautionary measures in order to avoid ESD while handling the kit. ESD can damage the Developer Board and/or the g20 module attached to it.

1.4.2 User Operation

Do not operate your unit when a person is within eight inches (20 centimeters) of the antenna. A person or object within eight inches (20 centimeters) of the antenna could impair call quality and may cause the unit to operate at a higher power level than necessary, as well as expose that person to RF energy in excess of that established by the FCC RF Exposure Guidelines.

IMPORTANT: The unit must be installed in a manner that provides a minimum separation distance of eight inches (20 centimeters) or more between the antenna and persons in order to satisfy FCC RF exposure requirements for mobile transmitting devices.

IMPORTANT: To comply with the FCC RF exposure limits and to satisfy the categorical exclusion requirements for mobile transmitters, the requirements described in the following section must be met.

1.4.3 Antenna Installation

- A minimum separation distance of eight inches (20 centimeters) must be maintained between the antenna and all persons.
- The effective radiated power of the transmitter must be less than 3.0 Watts ERP (4.9 Watts or 36.9 dBm EIRP). This requires that the combination of antenna gain and feed line loss should not exceed 16 dBi.

1.5 APPLICABLE DOCUMENTS

g20 Cellular Engine Module Description: 9808901C66-O

g20 AT Commands: 9808901C68-O

1.6 TRADEMARKS

MOTOROLA and the Stylized M Logo are registered in the U.S. Patent and Trademark Office. All other product and service names are the property of their respective owners.

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1.7 TERMS AND ABBREVIATIONS

This section provides definitions for terms and abbreviations used in this document.

Table 1. Terms and Abbreviations

Acronym/Term	Definition/Description
ADC	Analog to Digital Converter
CMOS	Complementary Metal Oxide Semiconductor
CODEC	Coder-Decoder
DIAG	Diagnostics
DTE	Data Terminal Equipment (such as terminals, PCs and so on)
EME	Electromagnetic Emission
ESD	Electro-Static Discharge
EVB	Evaluation Board
GPRS	General Packet Radio Service
GSM	Global System for Mobile Communications
IRQ	Interrupt Request
LED	Light-Emitting Diode
MIDI	Musical Instrument Digital Interface
MMCX	Mini Micro Coax
MMI	Man-Machine Interface
OEM	Original Equipment Manufacturer
PCM	Pulse Code Modulation
RF	Radio Frequency
SIM	Subscriber Identity Module
SPI	Serial Peripheral Interface
UART	Universal Asynchronous Receiver Transmitter
USB	Universal Serial Bus
UUT	Unit Under Test

1.8 HOW THIS MANUAL IS ORGANIZED

This manual contains the following chapters:

- **Chapter 1** contains this preface.
- **Chapter 2** introduces the g20 Developer's Kit.
- **Chapter 3** describes the Developer Board and its components in detail, including connectors, jumpers, Dip switches and LED indicators. It also includes a set of setup procedures for first-time use.
- **Chapter 4** provides contact information for Motorola Service Support and Customer Assistance.
- **Chapter 5** provides a parts list for the g20 Developer's Kit.

2.1 GENERAL DESCRIPTION

The g20 Developer's Kit is intended for evaluating the g20 module, as well as for developing and testing software applications for it.

The main component of the g20 Developer's Kit is the Developer Board, which is mounted in a chassis. The kit includes a cover for the Developer Board. The cover has openings on the top and sides for the Developer Board's external connectors.

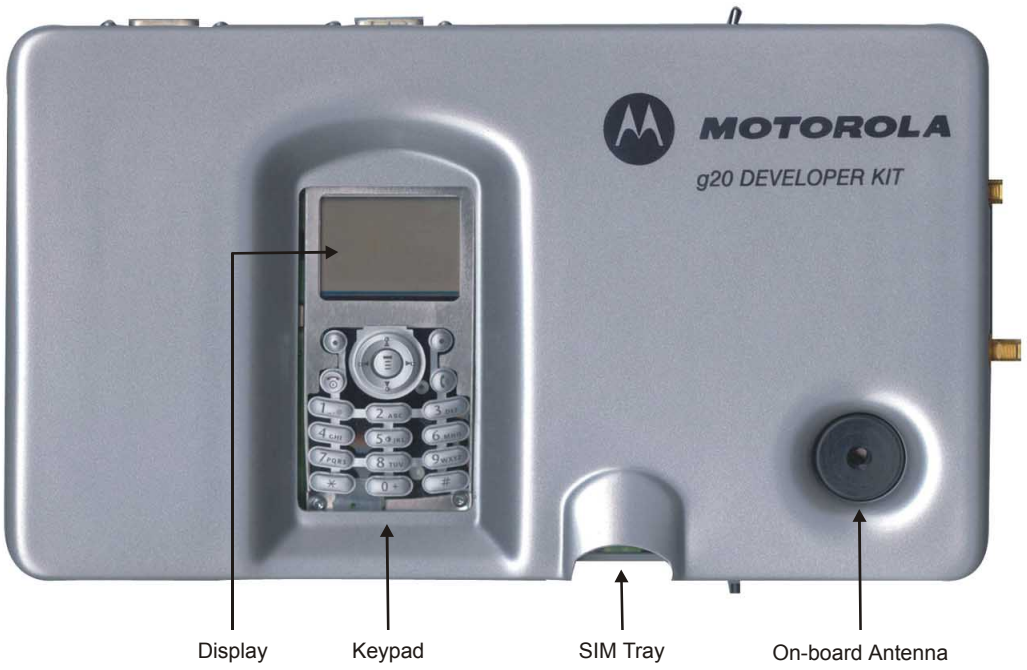


Figure 1. g20 Developer's Kit (top view, with cover)

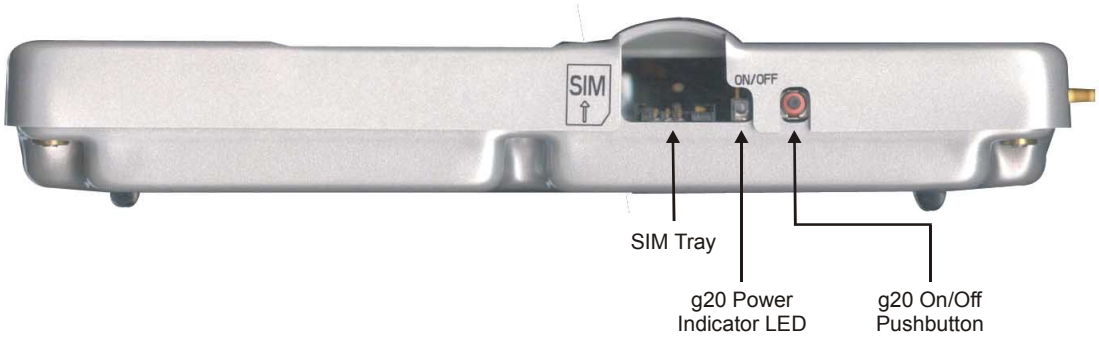


Figure 2. g20 Developer's Kit (front, with cover)

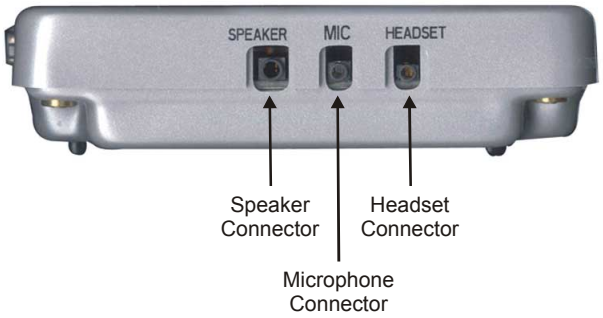


Figure 3. g20 Developer's Kit (left side, with cover)

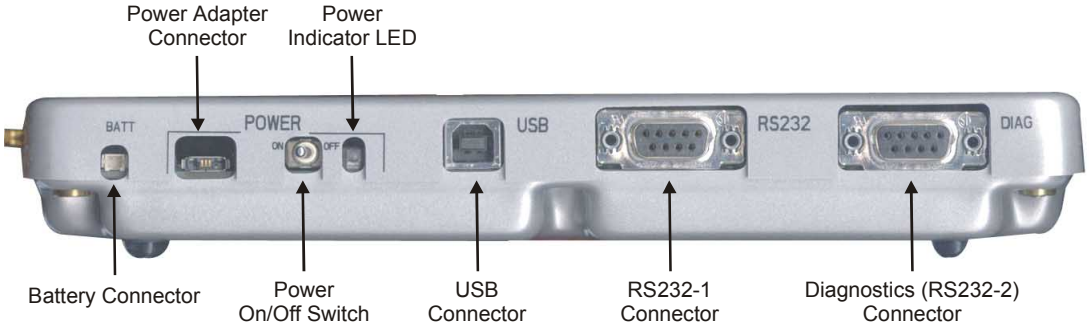


Figure 4. g20 Developer's Kit (rear, with cover)

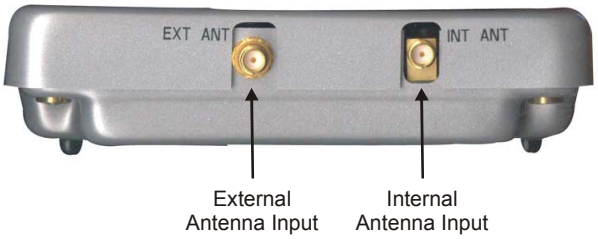


Figure 5. g20 Developer's Kit (right side, with cover)

2.2 PACKAGE CONTENTS

The g20 Developer's Kit includes the Developer Board, chassis and cover, as well as accessories that enable you to better utilize the board. The kit contains the following components:

Table 2. g20 Developer's Kit Package Contents

Part No.	Description	Quantity
FTN8121B	Developer Board	1
SPN4716B	Wall Mount Power Adapter	1
SYN7456A	European Plug for Adapter	1
8102316T02	Test SIM Card	1
SYN6962A	Mono Headset w/Detect	1
3087563V12	USB Cable	1
3087563V13	RS232 Cable	1
2987604U01	DC Power Input Mount — VCC	1
2987604U02	DC Power Input Mount — GND	1
0310907A03	M2/6mm Screw (for g20 fastening)	2
8509397T03	Antenna Stub	1
1587867V01	Developer Board Chassis	1
1587867V02	Developer Board Cover	1
3087568V01	RF cable between internal antenna and external connectors	1
3087568V02	RF cable with MMCX connector between g20 and external antenna connector	1
FVN5245A	Documentation CD	1
SVN4651A	Software CD	1

Kit Number: F3030A

Figure 6 shows the g20 Developer's Kit, including the Developer Board (without cover) and the g20 and some accessories attached.

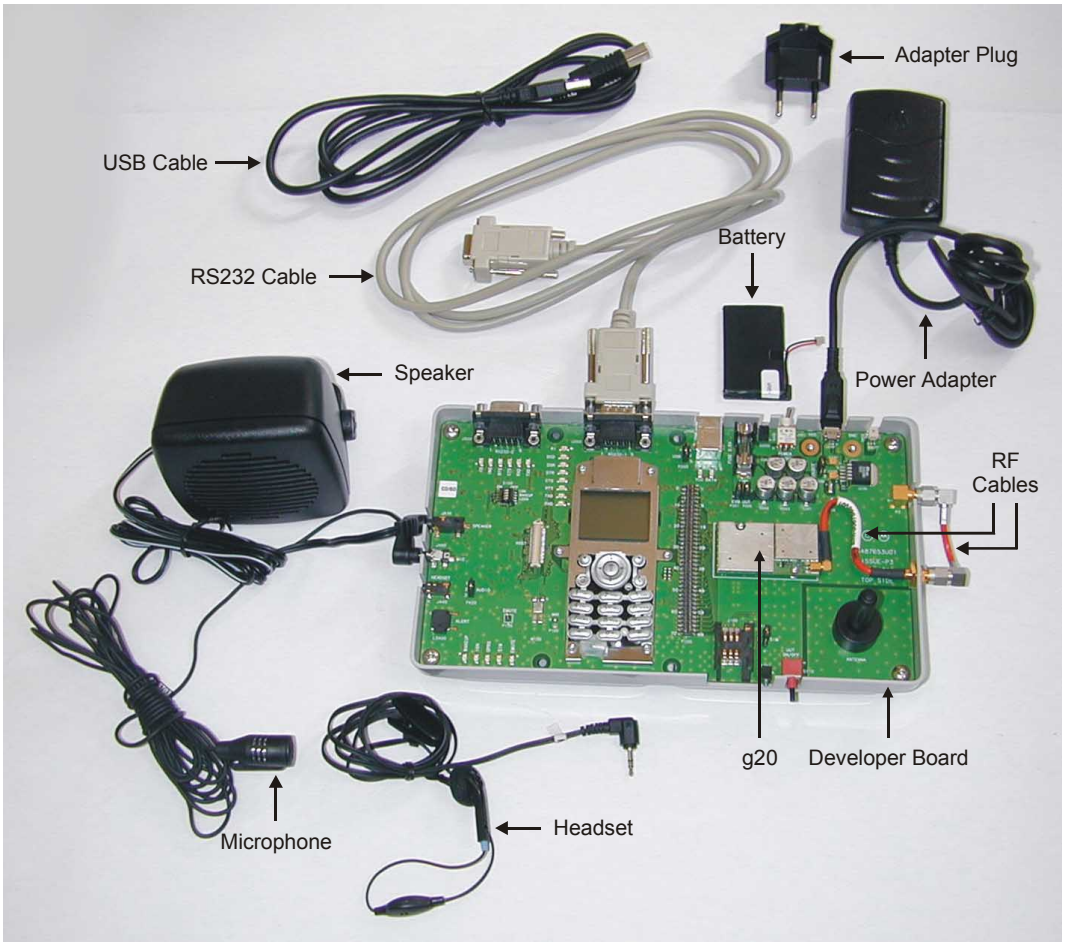


Figure 6. g20 Developer's Kit with Accessories and the g20

The Developer's Kit does not include a g20 device. A g20 must be obtained separately.

2.3 ACCESSORIES

Table 3 provides a list of additional accessories for the Developer's Kit, which are sold separately.

Table 3. Accessories Sold Separately

Part No.	Description
0189727L01	3.6V Lithium-Ion Battery
0187506V08	Host Interconnect Flex Cable
FSN5527A	Audio Speaker 8Ω
SYN5708D	Audio Microphone (Passive)
SYN7455A	UK Plug for Adapter

DEVELOPER BOARD AND INTERFACES DESCRIPTION

3.1 HOW THIS CHAPTER IS ORGANIZED

This chapter contains the following sections:

- **Overview** provides an overview of the Developer Board.
- **Initial Setup** describes how to set up and prepare the Developer Board for first-time use.
- **Configuration** describes how to modify the default settings to control the operation of the Developer Board.
- **Components and Specifications** lists each connector, switch, jumper, Dip switch and LED and provides other details and specifications for the Developer Board.

3.2 OVERVIEW

The g20 Developer Board is designed to support the hardware and software development and validation of the g20 GSM/GPRS data module. The Developer Board provides a peripheral platform to operate the g20 as a standalone product, and to easily access the g20's 70-pin interface connector signals.

The Developer Board has the following functions:

- Serves as a mounting platform for the g20 module
- Supplies the g20 module with power
- Provides standard communication interfaces (USB and RS232) to the g20

3.2.1 Developer Board Features

The Developer Board provides the following features to facilitate software and hardware development:

- Easy access to the g20's 70-pin interface connector signals, through a large header connector and an external host connector
- AC, battery and DC power supplies for board operation
- LED indicators for critical signals
- Display and keypad for phone operation
- USB and RS232 serial interfaces
- Diagnostics interface for g20 debugging (RS232-2)
- Digital audio interface
- Analog audio interface for speaker, alert transducer, microphone and headset
- SIM card connector
- Switches and jumpers for controlling board operation

3.2.2 Developer Board Components

Figure 7 shows the Developer Board and its components:

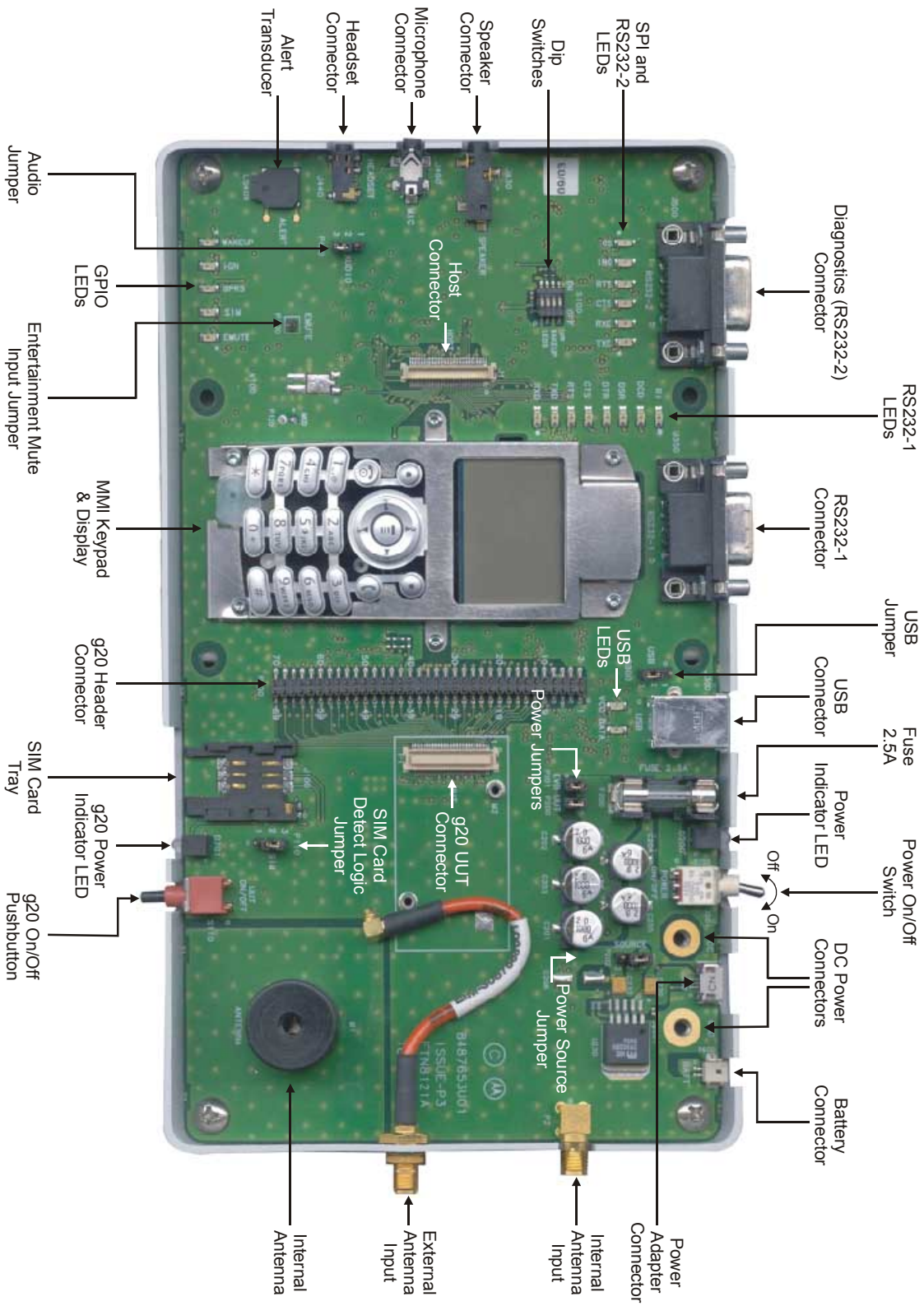


Figure 7. Developer Board Components

3.3 INITIAL SETUP

This section describes the initial procedure for setting up the g20 Developer Board for testing and evaluating of the g20. The tasks in this section need to be performed only once, before the first time you use the g20 Developer's Kit. After performing the initial setup, you can modify the default settings or use different peripheral devices, as described in "Configuration" on page 14.

Perform the steps in this section in sequence.

Before starting, remove the cover of the Developer Board. The cover simply slides up off the board, and does not require the removal of any screws or clips. After setting up the Developer Board, you can place the cover back on the Developer Board by simply pushing it gently back into place. Make sure the cover is aligned properly with the external connectors on the side of the board.

3.3.1 g20

The Developer Board works with all versions of the g20. There are four versions of the g20:

- European version
- European version with USB driver
- North American version
- North American version with USB driver

Connect the g20 to the Developer Board by performing the following steps:

- Place the g20 into the area on the Developer Board marked by a white rectangle, and push the g20 70-pin connector down into the UUT 70-pin connector (P1). The two screw holes on the g20 should be aligned with the g20 spacers (M2 and M3).
- Fasten the g20 to the Developer Board using the two M2 screws provided with the kit.

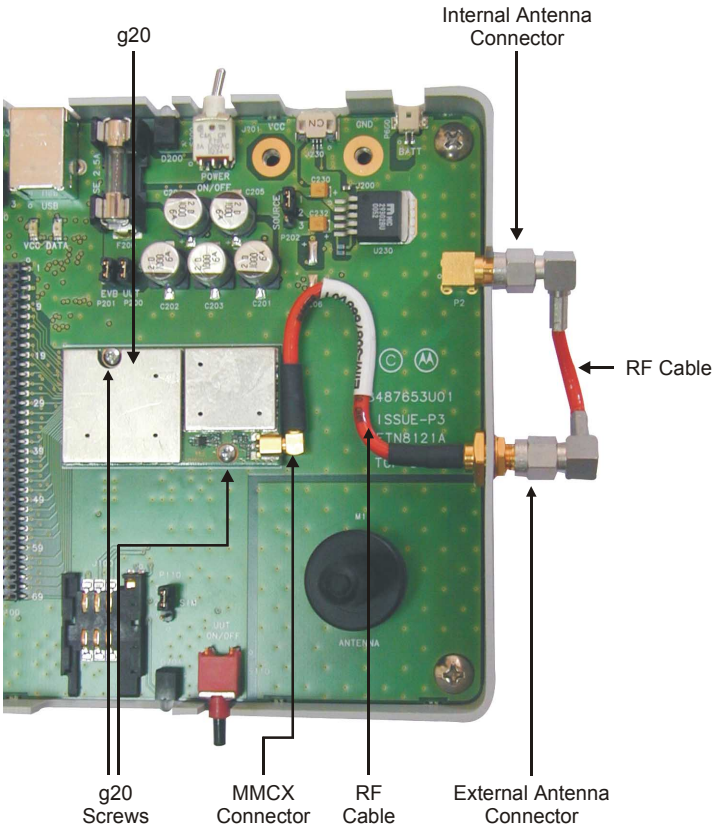


Figure 8. Connecting the g20

- An RF cable with an MMCX connector is connected to the external antenna connector. Connect the RF cable's MMCX connector to the MMCX connector of the g20 by pushing it in until it clicks. This connects the g20 to the antenna.

3.3.2 USB Driver

By default, the developer board is configured to support g20 models without a USB driver. If you are using such a g20, no changes in the USB configuration are required.

If your g20 unit includes a USB driver, you must change the position of the USB jumper. The USB jumper (P300) is located near the USB connector, and is labeled USB.

For more information on the USB jumper, refer to "USB" on page 18.

3.3.3 External Connectors

Place the cover back on the Developer Board and connect the following external connectors.

3.3.3.1 Power Supply

Make sure the Developer Board power switch is off before connecting the power supply.

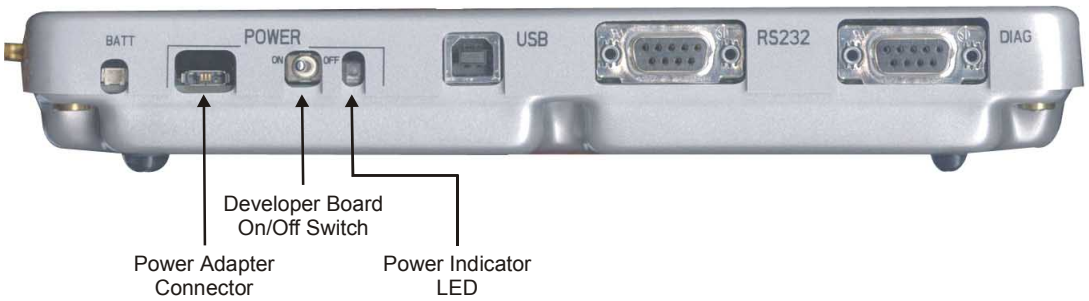


Figure 9. Developer Board Power Switch and Adapter Connector

Connect the supplied power adapter to the Developer Board adapter connector (J230), which is labeled Power on the cover of the Developer Board. Plug the adapter into a wall outlet.

Note

The g20 Developer Board can also be powered by an external DC power supply or battery cell. These options are described in "Configuration" on page 14.

3.3.3.2 PC Connection

USB and RS232 serial interfaces are available for PC communications. If a PC connection is required, connect either a RS232 cable with a male D-type connector to the RS232 connector (J350), or a USB cable with a B-type connector to the USB connector (J300).

The g20 Developer's Kit includes the necessary RS232 and USB cables.

3.3.3.3 Audio Devices

If you wish to use the audio capabilities of the g20, you may connect the supplied headset, which includes a speaker and microphone. The headset connector is labeled HEADSET and is located on the left side of the Developer Board, along with connectors for additional audio devices.

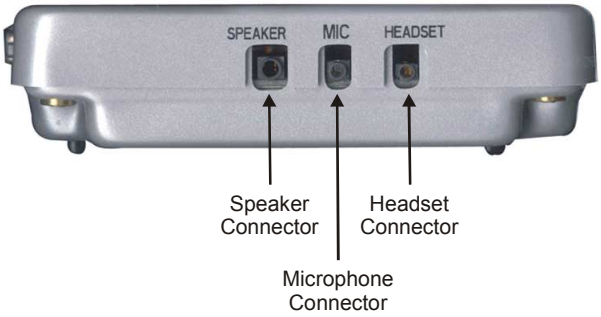


Figure 10. Audio Connectors

3.3.3.4 SIM Card

Insert a SIM card into the SIM tray (J100) with the contacts down and the cut-off corner to the front and right. A diagram on the cover indicates how to insert the SIM.

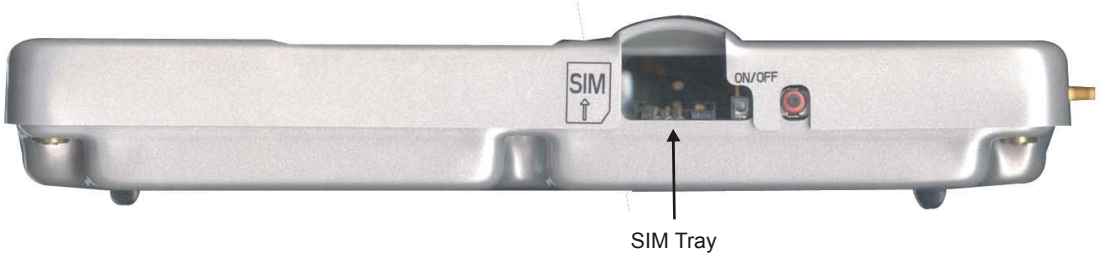


Figure 11. SIM Tray

A test SIM card is provided with the g20 Developer's Kit.

3.3.3.5 Antenna

Attach the supplied antenna stub by screwing it in to its base, on top of the Developer's Kit.

The Developer's Kit arrives configured to operate with its on-board internal antenna. The EXT ANT and INT ANT antenna connectors are connected together through an external RF cable, on the board's right side.

3.3.3.6 Power Up

You must turn on the Developer Board power and then turn on the g20.

- Turn on the Developer Board power by switching on the power switch (S200). The Developer Board power indicator LED is lit.
- Turn on the g20 by pushing in the g20 on/off switch (S110), holding it in for about a second and then releasing it. You can also turn on the g20 by pressing and holding the red function button on the keypad. (The red button also functions as the end-call button.) The g20 on/off LED is lit and the display above the keypad shows text.

The Developer Board is now ready for use.

3.4 CONFIGURATION

After performing the initial setup in the previous chapter, you can use the Developer Board with the default setup. This section describes how to change this setup in order to use different peripherals or to change the way the board operates.

3.4.1 Alternate Power Sources

Developer Board power can be supplied from an AC power adapter, external DC power source or battery. The same power source is used for the g20 and the board peripherals.

You must connect the Developer Board to a power source, and then set the power source jumper (P202), if necessary.

There are two other jumpers that help control the power supply in the Developer Board:

- **P201:** Connects/disconnects the power from the Developer Board peripherals
- **P200:** Connects/disconnects the power from the g20

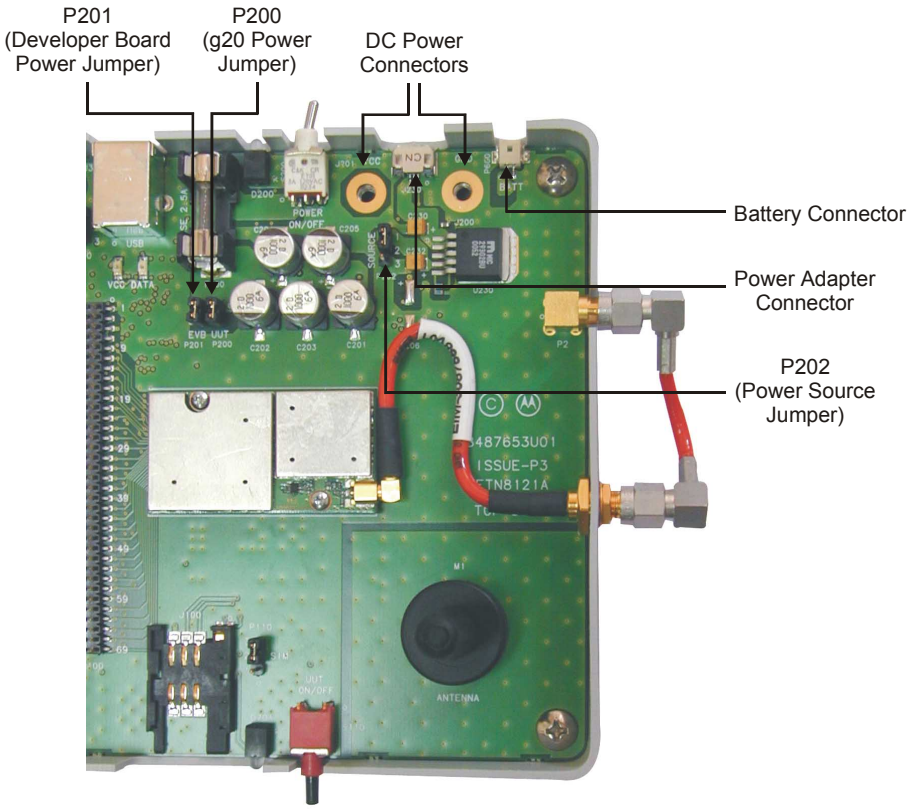


Figure 12. Power Supply Connectors, Jumpers and Switches

Each power supply option is described in the sections that follow.

3.4.1.1 AC Adapter Operation

When using an AC adapter, the adapter is connected to the power adapter connector (J230). The adapter supplies a constant 4.5 V, which is regulated to a nominal 4.1 V on the Developer Board.

Table 4. Power Adapter Connector Pinout (J230)

Pin #	Pin Name
1	GND
2	Detection circuit
3	VCC

3.4.1.2 DC Power Source Operation

You can use an external DC power supply by connecting it to the VCC (J201) and GND (J200) connectors.

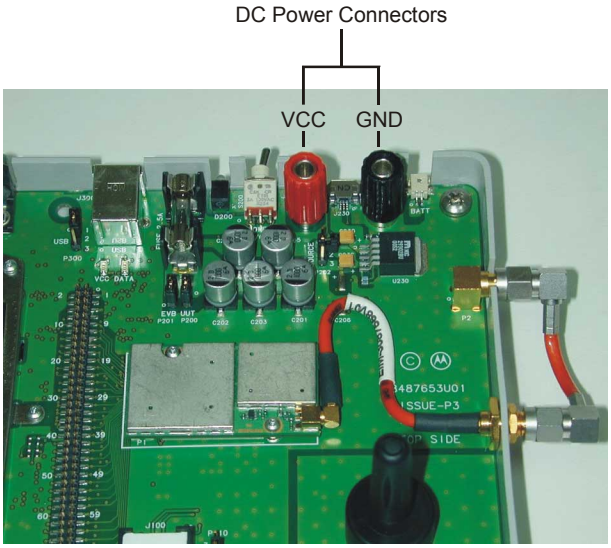


Figure 13. DC Power Connectors

The supplied DC input connectors must be attached to the Developer Board in order to use an external DC power source. Use the red connector for VCC and the black one for GND. Connect the DC power source to these connectors using banana plugs, alligator clips or wire.

The DC voltage applied through this connection should not exceed the recommended operational limits of 3 V to 4.2 V. In all cases, the DC source input is protected from over voltage and reverse polarity, and includes a 2.5A protective fuse.

When using the DC power input connectors, the Developer Board cover must be removed.

Caution

It is recommended to remove jumper P202 when using the DC power source. The DC power source should not be used when other sources are connected.

3.4.1.3 Battery Operation

The Developer Board supports a battery power supply. The battery used must be a 3.6V lithium-ion cell, corresponding to Motorola part number 0189727L01. The battery is an optional accessory.

When using a battery as the main power source, the AC adapter input operates as a battery charger, which connects to an on-board battery charging circuit.

Table 5. Battery Connector Pinout (P600)

Pin #	Pin Name
1	VCC
2	GND

3.4.1.4 Power Source Selection

The Developer Board AC adapter and battery power inputs include a selection jumper (P202) that diverts either the regulated AC adapter power or the battery power to the board.

Table 6. Power Source Jumper (P202)

P202 Jumper Position			Selected Mode	Power Source
1	2	3		
●	●		Adapter	AC Adapter
	●	●	Battery	Li-Ion Battery
			Adapter and battery disconnected	DC power only

Jumpers are provided for disconnecting the power from the Developer Board and for disconnecting the power from the g20.

You may wish to remove the Developer Board power jumper and shut off the power to the board in order to diagnose a problem that may be caused by the board. The g20 will continue to receive power..

Table 7. Developer Board Power Jumper (P201)

P201 Jumper Position		Selected Mode
1	2	
●	●	Developer Board connected to power source
		Developer Board disconnected from power source

You may also want to remove the g20 power jumper and then connect an amperometer to the jumper's two pins to measure the current through the g20.

Table 8. g20 Power Jumper (P201)

P200 Jumper Position		Selected Mode
1	2	
●	●	g20 connected to power source
		g20 disconnected from power source

3.4.2 Communication Interfaces

The g20 Developer Board includes three serial interfaces:

- RS232
- USB
- Diagnostics

The RS232 and USB ports are multiplexed within the g20, and therefore cannot be operated simultaneously. The default connection is RS232.

The USB and RS232 is not detected dynamically. The selected serial connection is determined by the USB cable connection at power up. If the USB cable is connected (and the PC is on), then USB is selected. Otherwise, RS232 is selected.

The Diagnostics RS232 interface is used for debugging.

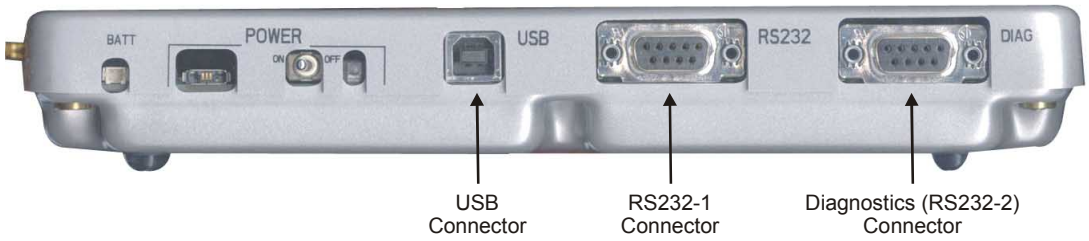


Figure 14. USB, RS232 and Diagnostics Connectors

Each of these serial interfaces is described in the sections that follow.

3.4.2.1 RS232

The 9-pin, D-type RS232-1 serial port (J350) is the primary interface to the g20 UUT. The UUT RS232 signals are active-low CMOS-level signals (0-2.7 V), which are converted by the Developer Board to standard RS232 levels for PC communications.

Table 9. RS232-1 Connector Pinout (J350)

Pin #	Description	DTE I/O
1	DCD	In
2	RXD	In
3	TXD	Out
4	DTR	Out
5	Ground	
6	DSR	In
7	RTS	Out
8	CTS	In
9	RI	In

Note

The RS232-1 connector pin names are DTE-oriented.

3.4.2.2 USB

The USB interface (J300) operates according to the g20 UUT configuration. The Developer Board has a complete USB transceiver circuit to support USB communications for g20 units that do not include a USB driver of their own. The Developer Board USB interface can be overridden manually when using a g20 unit that does include its own USB driver interface.

Table 10. USB Connector Pinout (J300)

Pin #	Description
1	VCC
2	D-
3	D+
4	Ground

The USB jumper (P300) located next to the USB connector selects between the Developer Board USB interface and the UUT USB interface. By changing the jumper position, the USB_VBUS signal is diverted to the selected driver (in the g20 or on the Developer Board) and operates it.

Table 11. USB Jumper (P300)

P300 Jumper Position			Selected Mode	USB Source
1	2	3		
●	●		g20	g20 driver
	●	●	EVB (Developer Board)	EVB driver
			USB disconnected	

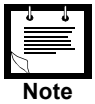
3.4.2.3 Diagnostics

The 9-pin D-type Diagnostics serial port (J500) is connected to the g20 internal SPI bus. This interface is used to debug applications.

On the Developer Board, the g20 SPI interface is converted to standard RS232 signals for PC communications. The conversion process uses the RS232 interface as a second slave on the internal g20 SPI bus, and communicates with it as such. SPI read and write operations are performed normally, using the CS and IRQ signals provided by the conversion circuit. The IRQ signal is connected to a g20 IRQ pin.

Table 12. Diagnostics Connector Pinout (J500)

Pin #	Description	DTE I/O
1	Unused	
2	RXD	In
3	TXD	Out
4	Unused	
5	Ground	
6	Unused	
7	RTS	Out
8	CTS	In
9	Unused	



Note

The RS232-2 connector pin names are DTE-oriented.

3.4.3 Audio Interface

The Developer Board includes analog and digital audio interfaces. The audio interface contains a hands-free speaker and microphone, a headset, and an alert transducer.

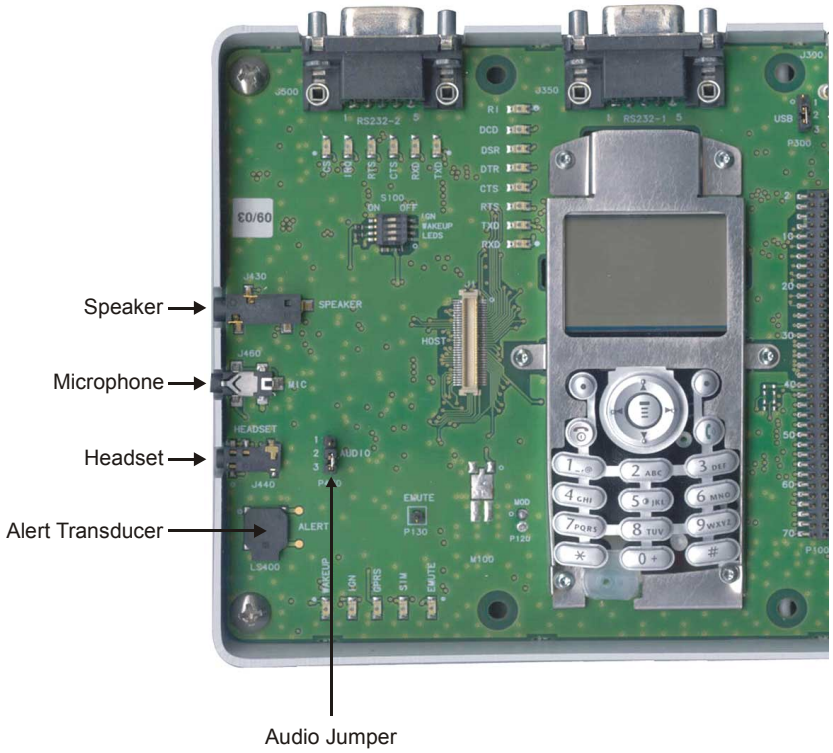


Figure 15. Audio Connectors and Jumper

3.4.3.1 Speaker

The differential speaker interface is designed as a hands-free speaker. The Developer Board uses an audio amplifier to amplify the speaker audio output to desired levels. The speaker connector (J430) is labeled SPEAKER. The speaker output is 8 ohms matched.

Table 13. Speaker Connector Pinout (J430)

Pin #	Description
1	Not connected
2	Speaker positive output
3	Speaker negative output
4	Not connected

3.4.3.2 Microphone

The microphone interface is designed as a hands-free microphone. The microphone connector (J460) is labeled MIC.

Table 14. Microphone Connector Pinout (J460)

Pin #	Description
1	Ground
2	Microphone audio-in
3	Ground
4	Ground
5	Ground

3.4.3.3 Audio Source Selection

Microphone and speaker audio can be routed through two different sources: the g20 audio amplifiers or the g20 digital audio interface. The Developer Board includes a CODEC that converts the g20 digital audio data to analog audio signals.

The P420 jumper, labeled AUDIO, selects the speaker and microphone source, as indicated in Table 15. This enables you to test the digital or analog audio channels.

Table 15. Audio Jumper (P420)

P300 Jumper Position			Selected Mode	USB Source
1	2	3		
●	●		Digital audio	CODEC audio I/O
	●	●	Analog audio	g20 audio I/O
			Audio disconnected	

3.4.3.4 Headset

The headset interface is designed as a portable phone audio interface, and is similar to a phone headset interface. The headset connector (J440), labeled HEADSET, includes a speaker, microphone and a detection signal. The speaker and microphone signals are directly connected to the g20 audio signals.

The purpose of the detection circuit is to switch the g20 headset audio paths on and off, whenever a headset connection is detected. Headset detection is made whenever a headset plug is inserted into the jack. This action disables the g20 microphone and speaker, and routes the audio signals to the headset.

Table 16. Headset Connector Pinout (J440)

Pin #	Description
1	Ground
2	Headset-detect switch
3	Speaker audio-out
4	Microphone audio-in
5	Ground

3.4.3.5 Alert Transducer

The Developer Board includes an on-board transducer, labeled ALERT, for alert audio sounds (LS400). The transducer is connected directly to the g20 differential alert outputs. The alert transducer sounds the g20 MIDI signals.

Table 17. Alert Transducer Pinout (LS400)

Pin #	Description
1	Alert audio inverted output
2	Alert audio positive output
3	Alert audio inverted output
4	Alert audio inverted output

3.4.4 Antenna

An antenna (internal or external) must be connected to the Developer Board for adequate GSM reception. You can connect the g20 to either the on-board internal antenna or to an external antenna.

Two RF connectors on the side of Developer Board, labeled INT ANT and EXT ANT on the cover, are used for setting up the antenna.

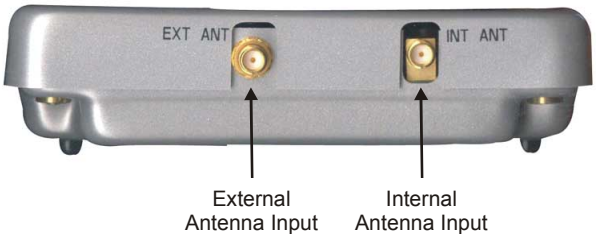


Figure 16. Antenna Connectors (external)

On the inside of the Developer Board, the EXT ANT connector is connected to the g20 and the INT ANT is connected to the on-board internal antenna.

You must perform one of the following:

- To use the internal antenna, connect the EXT ANT and INT ANT connectors with the additional RF cable supplied in the Developer's Kit. This is the Developer Board's default configuration. It arrives with the EXT ANT and INT ANT already connected.

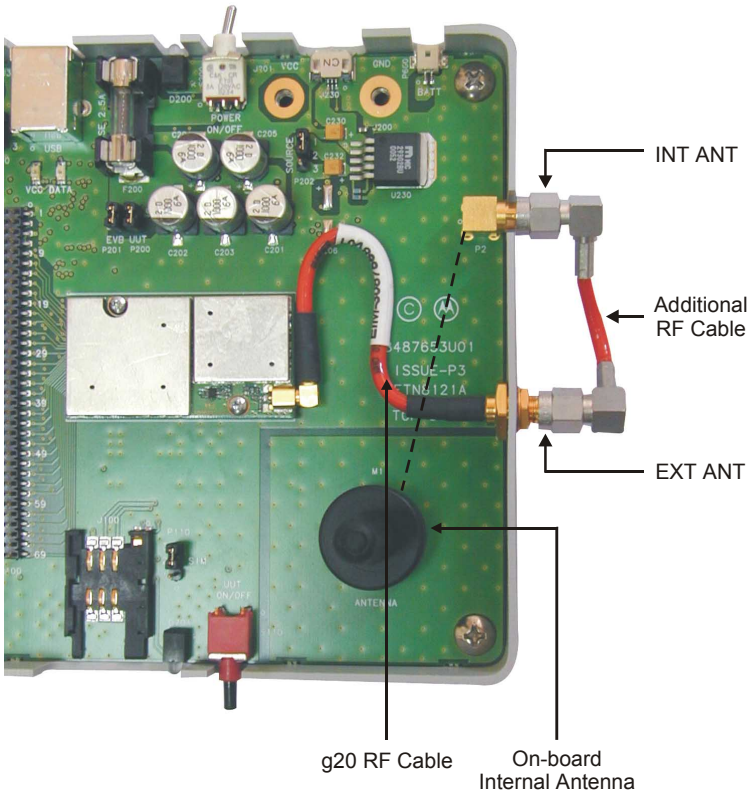


Figure 17. Antenna Connectors (internal)

- To use an external antenna, connect an external antenna or antenna application to the EXT ANT connector. (The connection cable is not included.) You must first disconnect the external RF cable from the EXT ANT connector.

3.4.5 Option Switches

Figure 18 shows the Dip switches provided on the Developer Board, which are located on the S100 component.

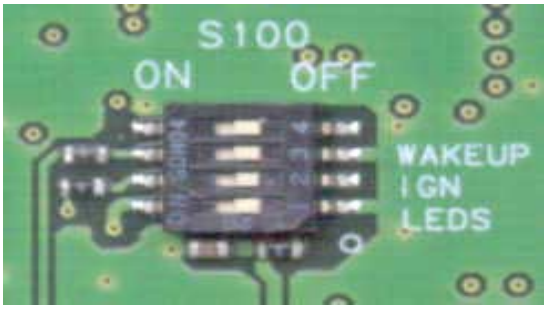


Figure 18. Option Switches

The following Dip switches are provided:

Table 18. Option Switches

Reference	Description
WAKEUP	g20 wakeup signal
IGN	g20 ignition circuit
LEDS	on/off switch for LEDs

3.4.5.1 Wakeup

The WAKEUP switch is connected to the g20's internal wakeup interrupt module through the WAKEUP_IN_N signal.

Generally, your application wakes up the g20. In cases where the application is not ready for integration, you can force wakeup of the g20 by turning on this Dip switch.

3.4.5.2 Ignition

The IGN switch activates the g20 ignition circuits through the IGN signal. You can use this switch to turn the g20 on and off.

3.4.5.3 LEDs Control

The Developer Board includes LED indicators for critical signals.

The LED switch enables you to turn off all the LEDs on the Developer Board, for example, to reduce power consumption. The Developer Board power on/off LED and the g20 on/off LED are always active and cannot be disabled.

3.4.6 SIM Card

The SIM card connector (J100) is external to the g20, but is connected directly to it, similar to an internal SIM. The g20 can accept 1.8V and 3V SIM cards.

Table 19. SIM Connector Pinout (J100)

Pin	Description
1	Ground
2	Presence detect
3	Clock
4	Reset
5	VCC
6	Serial data I/O
7	VPP
8	Ground

The g20 detects the presence of the SIM card through the SIM_PD signal. This signal is configured in the g20 as active-low. The Developer Board is configured to support the g20's default active-low detection, but can also support active-high detection, if necessary. Use the SIM card detect logic jumper (P110), labeled SIM, to select active-low or active-high SIM card detection configurations.

Table 20. SIM Card Detect Logic Jumper (P110)

P110 Jumper Position			Selected Mode
1	2	3	
●	●		Active-low
	●	●	Active-high
			Not active

3.4.7 Host Connection

An external application may communicate with the g20 through the host connector (J1) and control some or all of the g20's functions. The host connector enables you to integrate the g20 into an application without installing the g20 inside the product.

The host connector operates in parallel with the developer board peripherals and enables an external application to share g20 resources with the developer board. You may select any g20 function to control externally, through the host connector, and allow the developer board to control other functions.

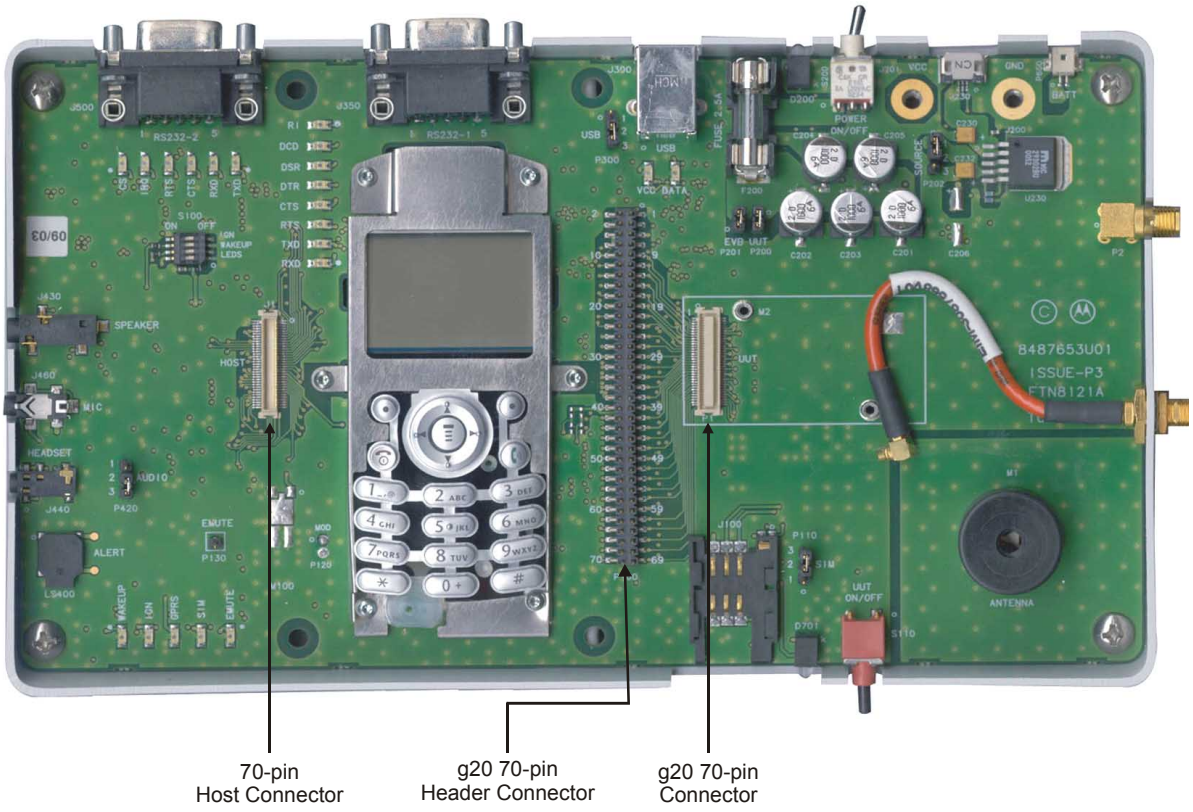


Figure 19. 70-pin Connectors

You can connect an external application to the g20 Developer Board using a host interconnect flex cable and connecting it to the host connector (J1). Connect the other end of the cable to the external application. The cable is an optional accessory.

All pin numbers and functions of the host connector are identical to those of the g20 UUT (P1) and the g20 diagnostic connector (P100). For more information on the pins of the host connector, refer to “UUT Interface Connector” on page 28.

The following are guidelines for using the host connector:

- When using an external SIM card through the host connector, the developer board SIM card jumper (P110) must be disconnected and the SIM card tray should be empty.
- When using any of the serial communication channels (USB, RS232, SPI) through the host connector, the developer board serial connectors should not be used.
- When using the IGN or WAKEUP functions through the host connector, the functions should be switched off on the developer board Dip switches.
- When using the analog audio channels through the host connector, disconnect all audio devices from the developer board.
- When using the PCM digital audio through the host connector, it is recommended to place the audio selection jumper (P420) to analog audio mode.
- When connecting an external application that provides the power to the g20 and the Developer Board, remove any other power sources from the Developer Board.

3.5 COMPONENTS AND SPECIFICATIONS

3.5.1 Connectors Description

All the Developer Board connectors are marked by their reference number and by a pin-1 indicator. Table 21 describes the available connectors on the Developer Board.

Table 21. Connectors

Reference	Connector	Description
Internal Connectors (not visible when cover is on)		
P1	g20 UUT	g20 UUT (unit under test) connector
J1	Host	Emulates the g20 connector for host systems
P100	Header	Debug header connector (70-pin)
J201	VCC	Developer Board DC power supply
J200	GND	Developer Board common ground
External Connectors (visible when cover is on)		
J300	USB	USB B-type connector
J350	RS232-1	Primary RS232 to PC
J500	RS232-2	Secondary RS232 for debugging (Diagnostics)
J430	Speaker	Hands-free system speaker jack
J460	Microphone	Hands-free system microphone jack
J440	Headset	Headset jack
P600	Battery	Battery connector
J230	AC adapter/charger	Wall-mount adapter connector
J100	SIM card	SIM card socket with detection
P2	Antenna connector	SMA connector for internal antenna
M1	RF Antenna	Internal antenna

3.5.1.1 UUT Interface Connector

Table 22 lists the pin names and functions available for the g20 interface connectors. All pin numbers and functions are identical for the g20 UUT (P1), host (J1) and g20 Diagnostic (P100) connectors on the Developer Board.

Table 22. g20 Connectors Pinout

Pin #	Pin Name	Pin #	Pin Name
1	GND	2	GND
3	GND	4	GND
5	VCC	6	VCC
7	VCC	8	VCC
9	RTS_N	10	USB_DET
11	RXD_N	12	Not connected
13	DSR_N	14	Not connected
15	CTS_N	16	WAKEUP_IN_N
17	DCD_N	18	PCM_DIN
19	DTR_N	20	PCM_DOUT
21	TXD_N	22	PCM_CLK
23	RI_N	24	PCM_FS
25	RESET_N	26	WAKEUP_OUT_N
27	BL_SINK	28	KBC1_N
29	CHRG_DIS	30	KBC0_N
31	CHRG_SW	32	KBR0_N
33	CHRG_STATE	34	KBR1_N
35	CHRG_DET_N	36	KBR2_N
37	Not connected	38	KBR3_N
39	TX_EN_N	40	KBR4_N
41	Not connected	42	KBR5_N
43	VIB_OUT	44	SIM_RST_N

Table 22. g20 Connectors Pinout *(Continued)*

Pin #	Pin Name	Pin #	Pin Name
45	CHRG_TYP	46	SIM_CLK
47	THERM	48	SIM_VCC
49	GPRS_DET_N	50	SIM_PD
51	IGN	52	SIM_DIO
53	ON_OFF_N	54	LCD_CS
55	HDST_INT_N	56	LCD_DATA
57	HDST_MIC	58	LCD_CLK
59	MIC_GND	60	LCD_RS
61	MIC	62	SPI_IRQ_N
63	ALRT_N	64	SPI_DIN
65	ALRT_P	66	SPI_CLK
67	SPKR_N	68	SPI_DOUT
69	SPKR_P	70	SPI_CS

3.5.2 Switches and Jumpers

Figure 20 shows the jumpers and switches on the Developer Board.

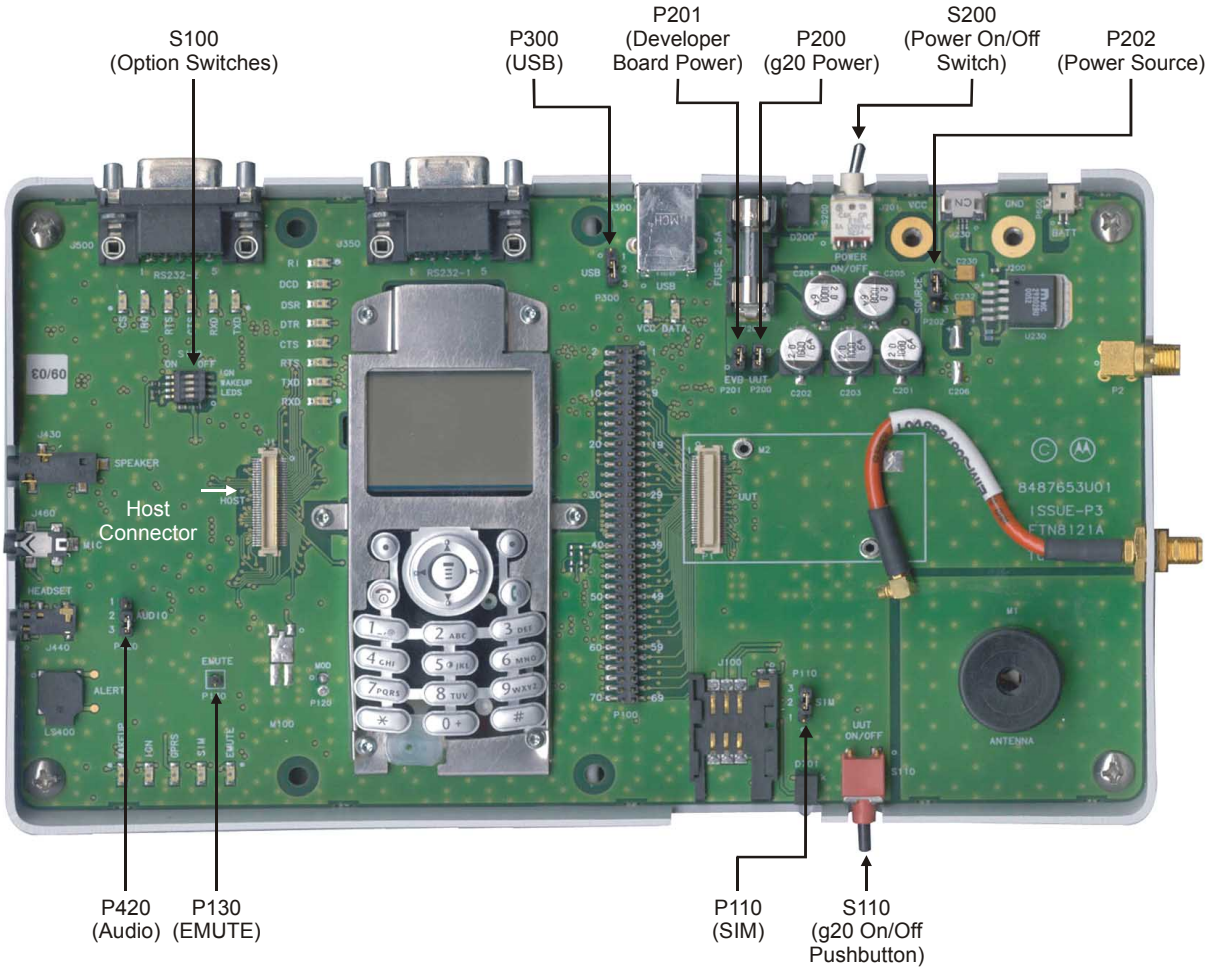


Figure 20. Jumpers and Switches on Developer Board

Table 23 describes the available switches and jumpers on the Developer Board.

Table 23. Switches and Jumpers

Reference	Switch/Jumper	Description
Switches		
S200	Board on/off	Developer Board on/off switch
S110	g20 on/off	g20 on/off pushbutton switch
Dip Switches		
S100	Option switches	Four switches for Developer Board options

Table 23. Switches and Jumpers *(Continued)*

Reference	Switch/Jumper	Description
Jumpers		
P420	Audio	Analog/digital audio-selection jumper
P201	EVB	Peripheral power input jumper
P200	UUT	g20 UUT power input jumper
P202	Source	Power source selection jumper
P110	SIM	SIM card detect logic selection jumper
P300	USB	USB driver source selection jumper
P130	EMUTE	Entertainment mute connection point

3.5.3 LED Indicators

Figure 21 shows the LEDs on the Developer Board.

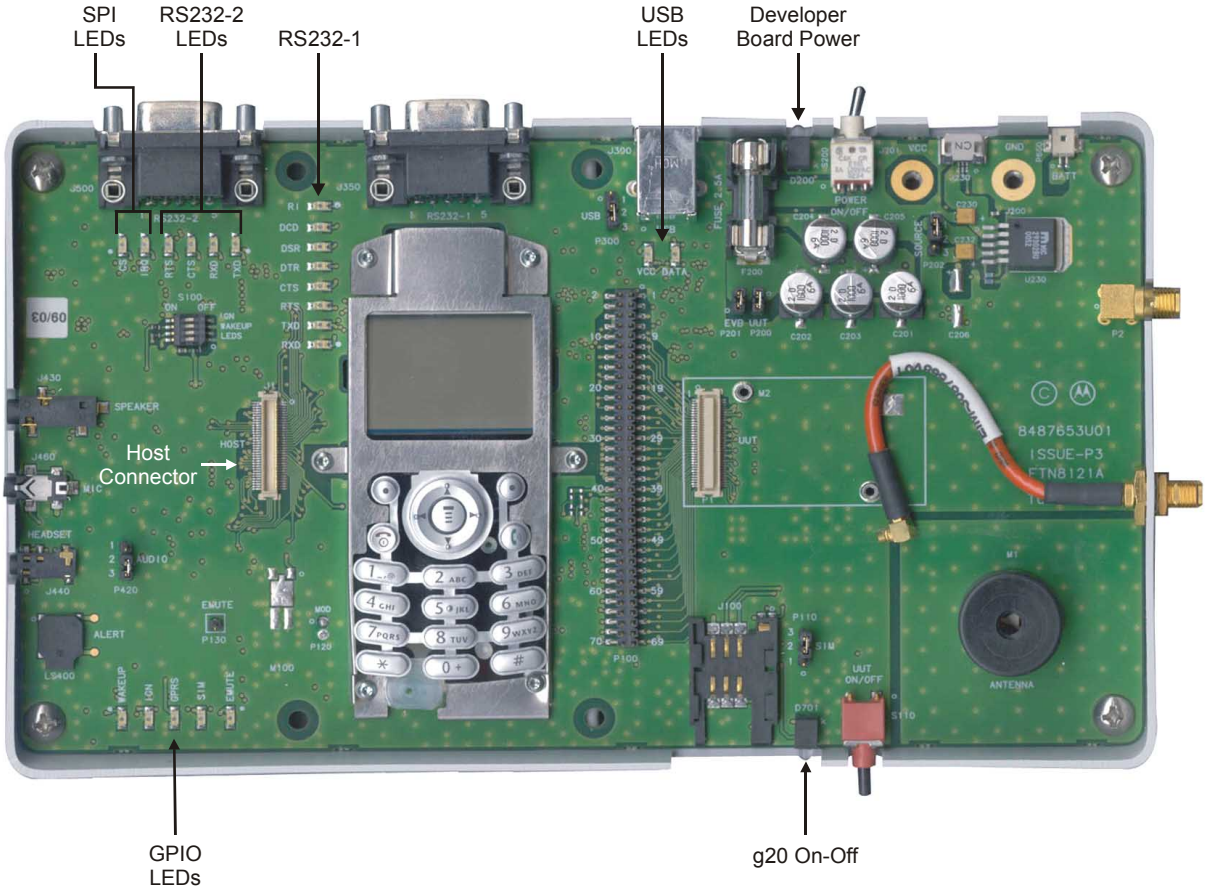


Figure 21. LEDs on Developer Board

Table 24 describes the LED indicators on the Developer Board. Each LED is marked on the board by the function it represents.

Table 24. LEDs

Group	LED	Reference	Description
GPIO	WAKEUP	D704	Wake-up in/out
	IGN	D702	Ignition input
	GPRS	D710	GPRS coverage indication
	SIM	D703	SIM card reset indication
	EMUTE	D708	Entertainment mute indicator
Power	UUT	D701	g20 on/off
	PWR	D200	Power

Table 24. LEDs

Group	LED	Reference	Description
SPI	CS	D741	SPI chip-select output
	IRQ	D744	SPI IRQ input
USB	VCC	D760	USB VBUS
	DATA	D761	USB D+
RS232-1	RXD	D722	DTE receive data
	TXD	D721	DTE transmit data
	RTS	D724	Request to send
	CTS	D723	Clear to send
	DTR	D725	Data terminal ready
	DSR	D726	Data set ready
	DCD	D727	Carrier detect
	RI	D728	Ring indicator
RS232-2	RXD	D743	DTE receive data
	TXD	D742	DTE transmit data
	CTS	D744	Clear to send
	RTS	D745	Request to send

3.5.4 MMI

The Developer Board includes a man-machine interface (MMI), complete with display and keypad. The MMI is intended for initial operation and evaluation of the g20.

For more information on MMI connections, refer to the schematics in "Schematics and Placement Diagrams" at the end of this guide.

3.5.5 AC Adapter Detection Circuit

The g20 charger module includes a detection logic circuit for detecting charger presence and type. The detection circuit is internal to the g20 module. However, the Developer Board does contain the necessary routing from the g20 UUT to the AC adapter connector.

Two g20 signals are used for this detection:

- **CHRG_TYP:** ADC signal for charger type detection
- **CHRG_SW:** Charger rate control

These detection signals are present to provide compatibility with the phone. They may be removed in future versions.

3.5.6 Electrical Specifications

Table 25 describes the electrical specifications of the Developer Board.

Table 25. Electrical Specifications

Parameter	Units	Min	Typ	Max
DC power supply	V	3.0	3.6	4.2
Adapter power supply	V	4.4	4.6	12
Battery power supply	V	3.0	3.6	4.2
Off current*	uA	3.6		42.6
On current	mA	8.0	8.25	8.45
Active current, peripherals off	mA	12.3	12.4	---
Active current, peripherals on**	mA	12.6	---	---

* When using DC power supply only.
** Depends on the active peripherals (LEDs, UART, USB, and so on) in use.

SERVICE SUPPORT

4.1 CUSTOMER ASSISTANCE

This section provides contact information for any possible queries that may arise, such as the following:

- Have questions?
- Having trouble getting the Developer Board set up?
- Technical questions?
- Configuration questions/problems?
- Technical operating problems?
- Need documentation?

The GSM/CDMA Data Module Customer Support Center is ready to assist you on integration issues.

Use the following email address to contact customer assistance: n2cshd@motorola.com

Note

The support services provided by Motorola are subject to the agreement between the customer and Motorola and may be at an additional charge to the customer. Motorola will inform the customer in advance of any such charge.

Every new call/problem report should be directed to the help desk email address noted above. It is recommended to report each individual issue in a separate email. The following information is required when reporting a problem:

- Customer name and address
- Customer contact information for this request, including:
  - Name
  - Telephone
  - Fax number
  - Mobile number
  - Email address
- Product name (g20)
- Software version of the unit (ATI3 command) or model number
- PCB version. This information is located on the PCB near the RF connector.
- Severity of the problem
- Problem description, including:
  - Operator name
  - Type of SIM card (for example, Test, Pre-paid, or 5v/3v/1.8v)
  - Configuration of the setup (such as Developer Board, handset, host, connections, and so on)
  - Detailed scenario from startup
  - Log of all the commands and the responses, beginning from startup

- Answers to the following questions:
  - Was the same scenario tested on the Developer Board and the PC to reproduce the problem?
  - How many units do you have, and how many of them have this problem?
  - How often does the problem recur?

In addition to the information requested above, send the following AT commands and the HyperTerminal log with the responses:

AT+CMEE=2	//	To get textual error message
AT+CPIN?	//	To get SIM card status
AT+CREG?	//	To see if the TXVR is registered to the network
AT+CSQ	//	To get the signal strength (RX level)
AT+CGSN	//	To read the IMEI number of the unit
ATI3	//	To get the software version of the TXVR
AT\S	//	To get the setting of basic AT commands
AT+CMER=0,0,1,1	//	To get messages and indicators from the handset display to the DTE

4.1.1 Motorola Workflow

The help desk uses the following workflow when responding to new calls:

1. Each new call is registered in the help desk data base.
2. The help desk immediately notifies the customer with the help desk system record number for each issue.
3. A champion is assigned to be responsible for the new call, from arrival to closing.
4. During this time, the champion updates the help desk system with the progress of the resolution process.
5. The champion is the contact to the customer and the engineering team, and coordinates activities that are required to solve the problem.

4.1.2 Service Centers

Motorola Electronics Taiwan PCS

11F, No, 296, Sec. 4, Jen-Ai Road

Taipei, 106, Taiwan, R.O.C

Motorola GmbH

Am Sophienhof 10

D-24941 Flensburg

Germany

Motorola Communications ISRAEL Ltd.

Service Operation

Attention: Shukrun Ofer

3 Krementsky Street

Tel Aviv, Israel 67899

Telephone: (972) 3 5658829

JNB Electronics Pty Ltd.

347 Settlement Road, Thomastown

VIC 3074

Australia

Field service should be coordinated with the Service Manager in Motorola using the following email address: N2CSFS01@motorola.com

4.2 TROUBLESHOOTING

The following table lists problems that may occur during board operation, and describes how to resolve them. If the problem persists, please contact your Motorola representative.

Table 26. Troubleshooting

Problem	Indication	Action
Power		
Developer board does not power up	Power LED does not light	Check the power source connection. If using an external DC power source, verify that the supply is within the limits of 3.0 V to 4.2 V. Verify that the board power switch (S200) is on. Check the source jumper (P202) position. Verify that the EVB jumper (P201) is present. Verify that the protective fuse is not burned out.
The g20 does not power up	The g20 on/off LED doesn't light or lights for a short period	Check the g20 connection to the Developer Board. Verify that the UUT jumper (P200) is present. Depress the g20 on/off pushbutton for a longer period.
	The g20 on/off LED lights up automatically when power is applied	Verify that the IGN option switch is off.
	The g20 on/off LED blinks	Contact your Motorola representative.
	Image freezes on the display at start up	Contact your Motorola representative.
High current consumption	The protective fuse burns out	Check the polarity of the DC power inputs. Verify that only one optional power source is connected.
GSM Reception		
No GSM reception available	The g20 unit searches unsuccessfully for network	Verify that the g20 supports the GSM bands in your area. If using an external DC power source, verify that the supply is within the limits of 3.0 V to 4.2 V. Fasten the g20 to the board with the supplied screws. Check the MMCX RF cable connection to the g20. Fasten the RF cable connections between the EXT ANT and INT ANT connectors. Fasten the onboard antenna stub into its base.
SIM card		
The SIM card does not operate	**Insert SIM** is displayed on the board display	Verify that the SIM card operates at 3 V or 1.8 V. Verify that the SIM card is inserted properly into its tray. Check the SIM detect jumper (P110) setting.

Serial Communications		
The USB port does not work with the PC	The PC does not recognize connection	Check the USB jumper (P300) position. Check the USB cable connection to the PC.
The RS232 port does not work with the PC	The PC does not communicate	Verify that the USB cable is not plugged into the board. Check the serial cable connection to the PC. Verify that the PC port settings comply with the g20 defaults.
	Incorrect RS232 LEDs are lit	Contact your Motorola representative.
Data logger does not operate	No activity in the application window	Check the serial cable connection to the PC. Verify that the PC port settings comply with the g20 defaults.
MMI		
The display does not operate	Blank screen, image flickering, corrupt images	Contact your Motorola representative.
The display freezes	Image freezes on the display	Contact your Motorola representative.
The keypad does not respond	No audio or visual response to key press	Contact your Motorola representative.
Audio		
The headset does not work	No sound in the headset earpiece	Verify that the headset is inserted correctly into the headset (J440) audio connector. Use only the supplied headset. Check the g20 volume level.
	No sound output from the headset microphone	Verify that the headset is inserted correctly into the headset (J440) audio connector. Use only the supplied headset.
Digital audio does not work	No sound from the speaker or microphone	Verify that the g20 supports this feature. Check the audio jumper (P420) position.
General		
The LEDs do not light	The LEDs are not lit	Verify that the LEDs option switch is on.
The g20 does not enter sleep mode	The g20 always active	Verify that the WAKEUP option switch is off.

Additional Accessories*		
The speaker does not work	No sound from the speaker	Verify that the speaker plug is inserted correctly into the speaker (J430) audio connector. Check the audio jumper (P420) position. Verify that the headset is not plugged in and active. Check the g20 volume level. Use only the recommended accessory speaker.
The microphone does not work	No sound from the microphone	Verify that the microphone plug is inserted correctly into the microphone (J460) audio connector. Check the audio jumper (P420) position. Verify that the headset is not plugged in and active. Use only the recommended accessory microphone.
The Developer Board does not power up with a battery	The power LED doesn't light	Check the battery connection. Verify that the battery is not empty. Verify that the board power switch (S200) is on. Check the source jumper (P202) position. Verify that the EVB jumper (P201) is present. Verify that the protective fuse is not burned out.
Battery charging does not work	No charging	Verify that the g20 supports this feature. Check the power adapter connection. Check the source jumper (P202) position.
Some options do not work with host flex cable	Selective operation	Verify that the proper jumper settings are implemented for host flex operation.

*The additional accessories are not included in the Developer's Kit. They are sold separately.

5.1 DEVELOPER BOARD PARTS LIST

The following table is a parts list for the g20 Developer's Kit. Schematic diagrams for the kit are provided at the end of this guide.

Table 27. Developer Board Parts List

REFERENCE SYMBOL	DESCRIPTION
Resistors	
R321	47KΩ 1%
R440	68Ω 5%
R600, R905	75Ω 5%
R330	100Ω 5%
R773	130Ω 5%
R723, R725, R745, R747	180Ω 5%
R703	270Ω 5%
R705, R707, R709, R713, R718, R727, R729, R731, R733, R735,R737, R743, R749, R751, R753, R763, R764	300Ω 5%
R203	390Ω 5%
R603	820Ω 5%
R202, R604, R781, R907	1000Ω 5%
R602	1200Ω 5%
R312, R416	1500Ω 5%
R412	2200Ω 5%
R201	4700Ω 5%
R179, R197, R200, R333, R441, R525, R601, R607, R774	10KΩ 5%
R230, R231, R232	12KΩ 5%
R332, R411, R418	20KΩ 5%
R191, R192, R196, R320, R331, R370, R504, R608, R609, R780, R906	47KΩ 5%

Table 27. Developer Board Parts List

REFERENCE SYMBOL	DESCRIPTION
R10, R107, R11, R116, R117, R118, R119, R120, R121, R122, R123, R124, R125, R126, R127, R128, R129, R130, R131, R132, R133, R134, R135, R136, R137, R138, R139, R140, R141, R142, R143, R144, R146, R148, R149, R15, R151, R152, R153, R155, R157, R159, R16, R170, R172, R173, R174, R175, R176, R181, R182, R183, R184, R189, R190, R302, R350, R402, R407, R408, R409, R410, R413, R414, R417, R419, R423, R427, R460, R503, R511, R512, R513, R514, R515, R516, R517, R518, R519, R520, R521, R522, R523, R524, R606, R612, R615, R616, R617, R700, R702, R704, R706, R708, R711, R712, R716, R720, R722, R724, R726, R728, R730, R732, R734, R736, R740, R742, R744, R746, R748, R750, R752, R760, R761, R770, R771, R801, R802, R803, R804, R805	0Ω
R322	12.1KΩ 1%
R430, R431, R433, R434	20.0KΩ 1%
R221	100.0KΩ 1%
R234	130.0KΩ 1%
R211, R220, R241	150.0KΩ 1%
R210, R240	200.0KΩ 1%
R233	301KΩ 1%
R310, R311	33.2Ω 1%
R772	3.3Ω 5%
Capacitors	
C4	1pF
C208	3.3pF
C207, C215, C217, C234	8.2pF
C442, C444, C447, C450, C462, C472, C473	10pF

Table 27. Developer Board Parts List

REFERENCE SYMBOL	DESCRIPTION
C148, C150, C151, C153, C155, C157, C159, C191, C192, C211, C221, C241, C312, C401, C402, C403, C404, C416, C417, C418, C421, C422, C423, C424, C425, C426, C427, C428, C435, C436, C437, C438, C439, C443, C445, C446, C448, C449, C451, C452, C461, C463, C464, C470, C471, C474, C475, C502, C781, C810, C811, C812, C813, C814, C815, C816, C817, C818	33pF
C125, C128, C131, C134, C216, C218, C231, C511, C512	39pF
C5	330uF
C414	10nF
C101, C107, C117, C119, C120, C121, C122, C123, C124, C126, C127, C129, C132, C133, C136, C138, C139, C140, C142, C144, C146, C600	0.10uF
C430, C431, C433, C434	0.22uF
C361, C362, C363, C364, C521, C522, C523, C524	0 .33uF
C310, C313	4.7uF
C440, C441	10.0uF
C172, C173, C180, C190, C233, C300, C311, C350, C360, C400, C410, C413, C420, C432, C453, C500, C513, C520, C700, C720, C770, C771, C772, C773, C774, C780, C800	1.0uF
C230, C232	10uF
C210, C212, C220, C222, C240, C242	10uF
C201, C202, C203, C204, C205	1000uF

Table 27. Developer Board Parts List

REFERENCE SYMBOL	DESCRIPTION
Inductors	
C3	3.9nH
C1	12nH
R1	18nH
L440	33nH
Connectors	
J430	Hosiden HSJ1501-019010
J460	SMK LGK2009-0301
J350, J500	AMP 788797-1
P2	Huber-Suhner 85-SMA-50-0-1
J1	Molex 53748-0704
J300	Molex 67068-0001
J440	Hosiden HSJ1805-019070
J230	Motorola P2K Power Connector
P130	Jumper 1pin
P200, P201	Jumper 2pin
P110, P202, P300, P420	Jumper 3pin
P600	Hirose DF13-2P-1.25H
P100	Samtec TMMH-135-04-S-DV-TR
P1	Molex 52991-0708
M1	Motorola Antenna Contact
Switches	
S200	C&K ET01
S110	C&K EP11
J100	FCI 7111S1615A02
S100	Augat GDH04S
LEDs	
D702, D703, D704, D708, D710, D721, D722, D723, D724, D725, D726, D727, D728, D741, D742, D743, D744, D745, D746, D760, D761	Stanley BR1102W
D200, D701	Dialight 591-2001

Table 27. Developer Board Parts List

REFERENCE SYMBOL	DESCRIPTION
Transistors	
Q330	Siliconix SI1905DY
Q200, Q780	Siliconix SI4463DY
Q1000, Q720, Q740	Rohm UMC5NTL
Q110, Q310, Q320, Q370, Q500, Q701, Q702, Q703, Q708, Q760, Q761	Rohm DTC114YE
Q705, Q707, Q711, Q721, Q722, Q723, Q724, Q725, Q726, Q727, Q728, Q741, Q742, Q743, Q744, Q745, Q746	Rohm DTA114TE
Q610, Q620, U771	OnSemi MMBT3904
Q201	OnSemi MMBT3906
Q600	OnSemi MMJT9435
Q190	OnSemi MMJT9410
Diodes	
VR200	OnSemi 1SMB5918B
D320, D600, D700	OnSemi MMBD6100
VR100, VR101, VR102, VR103, VR104, VR105, VR310	Rohm UMZ6.8EN
Integrated Circuits	
U510	Maxim MAX3100E
U210, U220, U240	Maxim MAX604
U230	Micrel MIC29302BU
U540	Toshiba TC7SZ126FU
U440	Toshiba TC7SH08FU
U370	Toshiba TC7SH32FU
U520	Maxim MAX3223
U340, U380, U530	Toshiba TC7S00FU
U330	Fairchild NC7SZ125P
U360	Maxim MAX3238E
U320	Microchip TC54VN2902E
U420	Motorola MC74HC4053
U410	Motorola MC145483
U300, U350, U400, U500	OnSemi MC74LCX244
U430	Texas Instruments TPA6203A1
U600	Motorola MC13715
U310	Philips ISP1104W
U770	National Semi. LM2795B

Table 27. Developer Board Parts List

REFERENCE SYMBOL	DESCRIPTION
Fuses	
F200	Schurter OGN-0031.8221
F600	AVX F0603C2R50FW
General	
SH400	Motorola Shield
M2, M3, M4, M5, M6, M7, M8, M9	Mac8 2SSA-3.0
Y510	NDK CP12A-3.6864 MHz
LS400	Motorola Transducer
J200, J201	Motorola Hex Nut

5.2 DEVELOPER BOARD UNPLACED PARTS LIST

Table 28. Developer Board Unplaced Parts List

REFERENCE SYMBOL
Resistors
R185, R186, R187, R188, R198, R300, R301, R351, R352, R400, R401, R415, R424, R425, R426, R465, R466, R480, R481, R482, R483, R484, R485, R500, R501, R502, R510, R594, R595, R596, R597, R611, R613, R614, R618, R790, R800
Capacitors
C100, C102, C103, C104, C105, C106, C108, C109, C110, C111, C112, C113, C114, C115, C116, C118, C130, C135, C137, C141, C143, C145, C147, C149, C152, C154, C156, C158, C160, C170, C171, C2, C200, C206, C411, C412, C415, C460, C465, C466, C503, C504, C505, C506, C507, C508, C509, C510, C801
Connectors
P120
LEDs
D770, D771
General
DS800, M100

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  Internal 23
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  Analog 21
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  Battery 16, 34
  External DC Power 15, 34
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SCHEMATICS AND PLACEMENT DIAGRAMS

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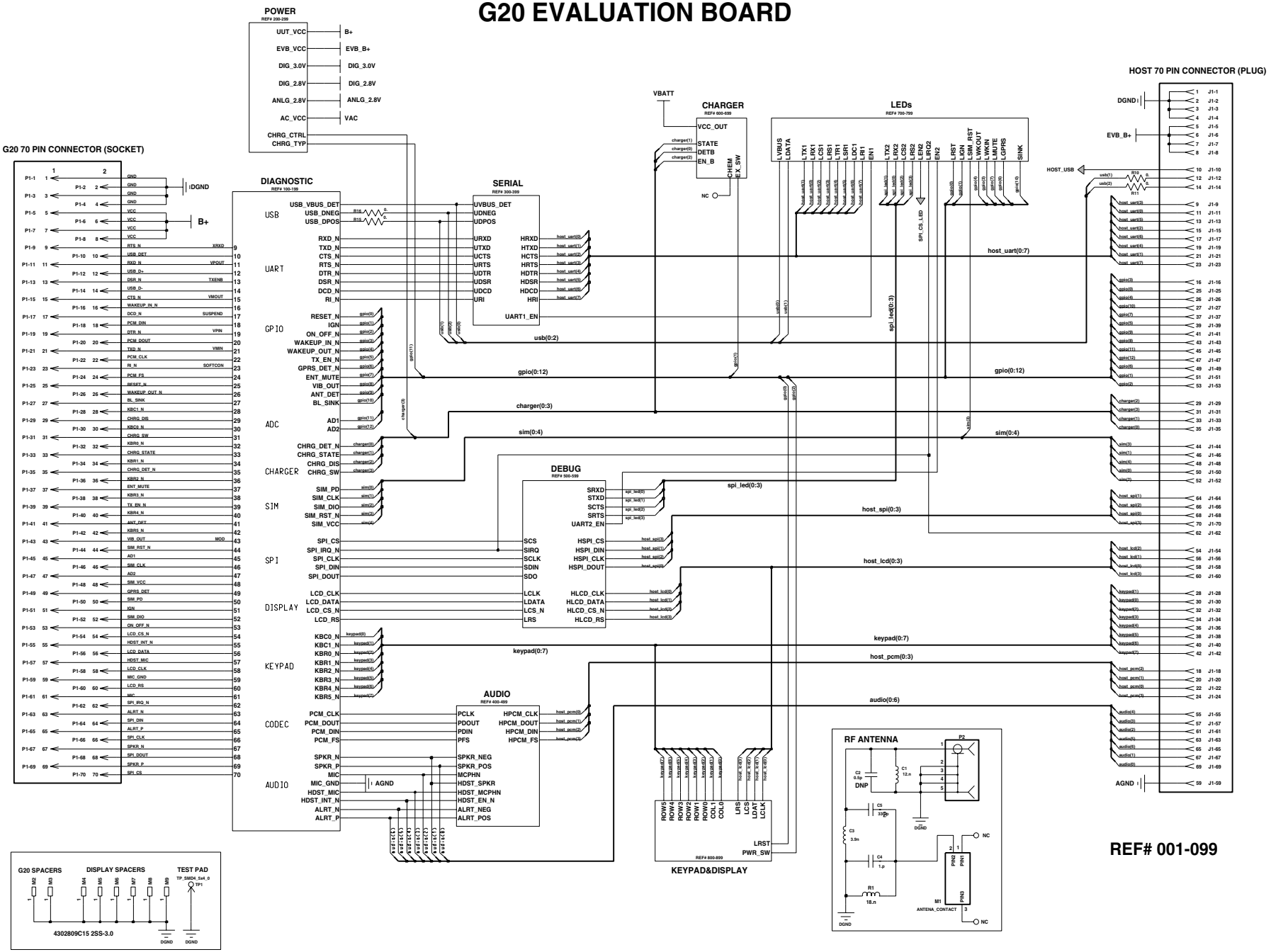
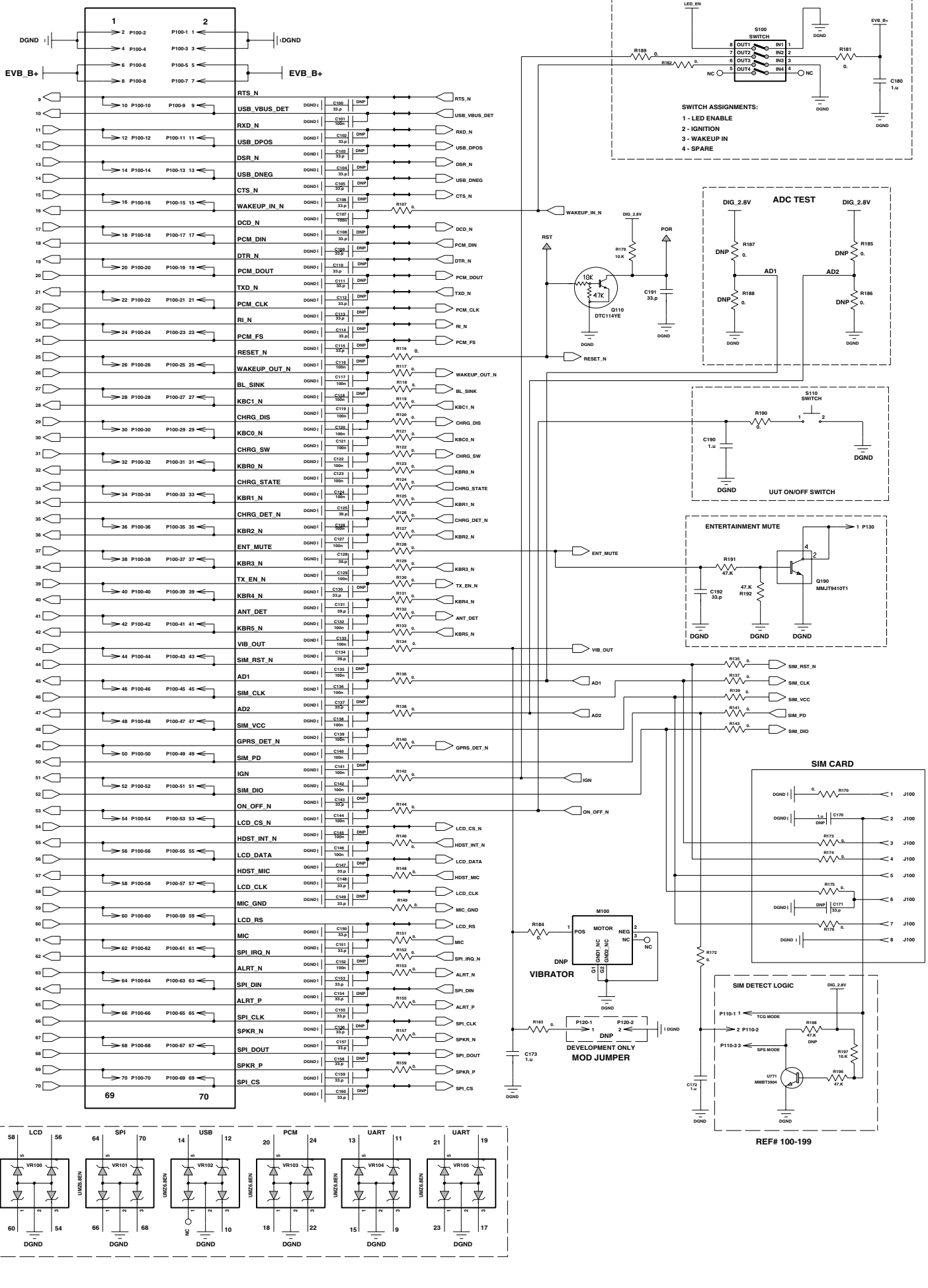
The following schematics and placement diagrams are provided on the pages that follow:

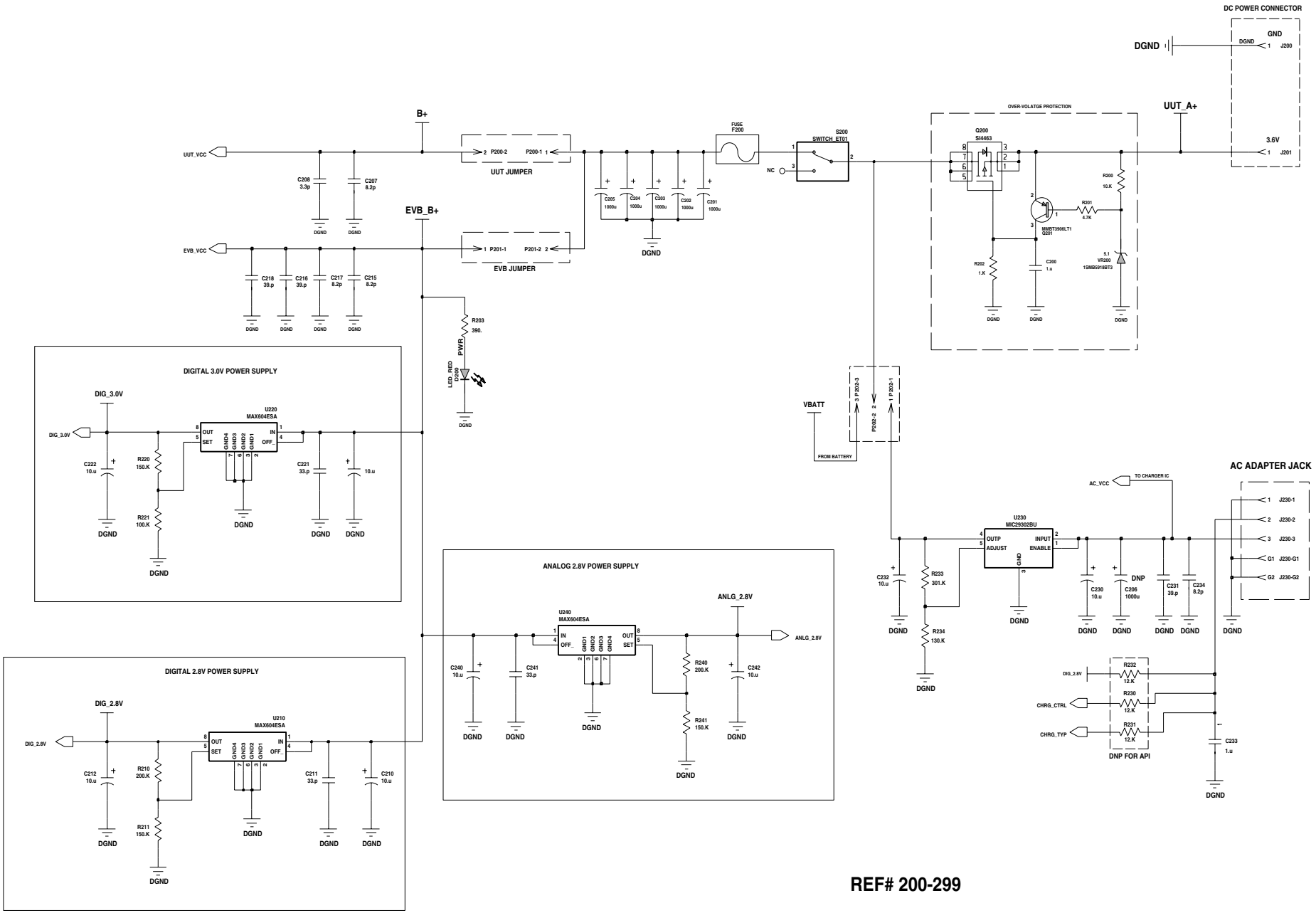
- Developer Board Top-Level Design
- Diagnostics
- Power
- Serial Interface
- Audio Interface
- Debug Interface
- Battery Charger
- LEDs
- Keypad and Display
- Developer Board Top Layout
- Developer Board Bottom Layout

G20 EVALUATION BOARD

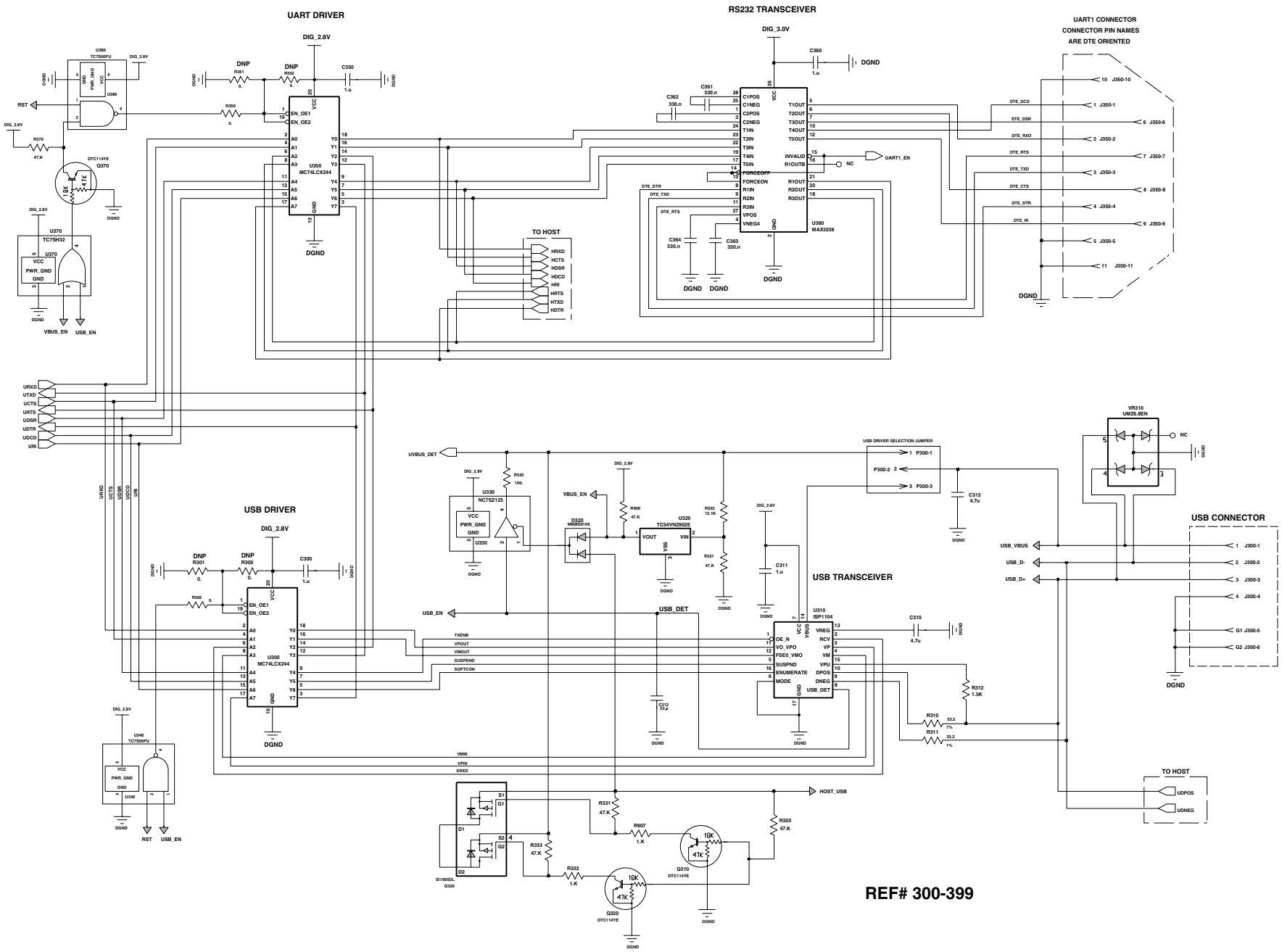


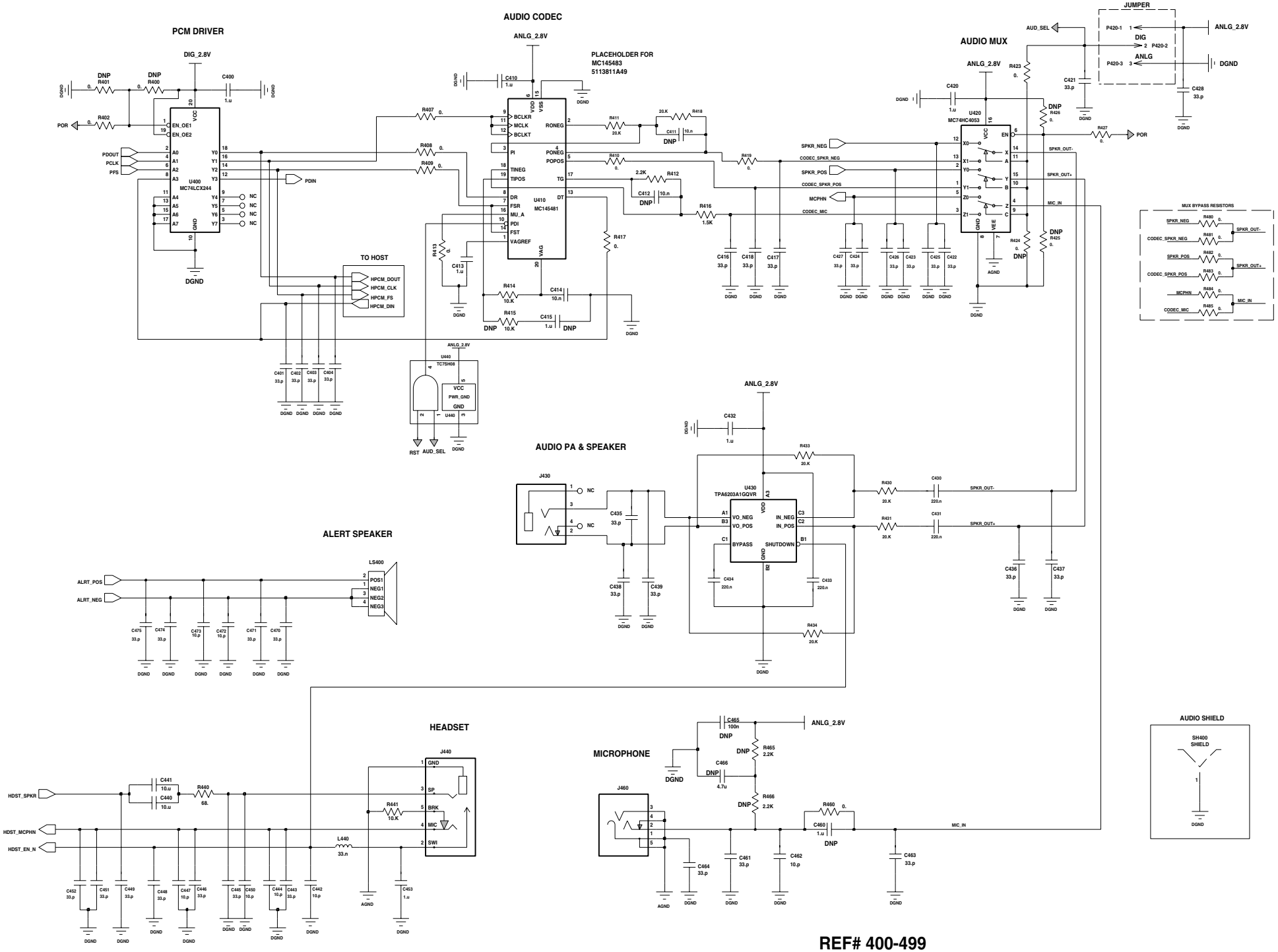
DIAGNOSTICS 70 PIN CONNECTOR (HEADER)

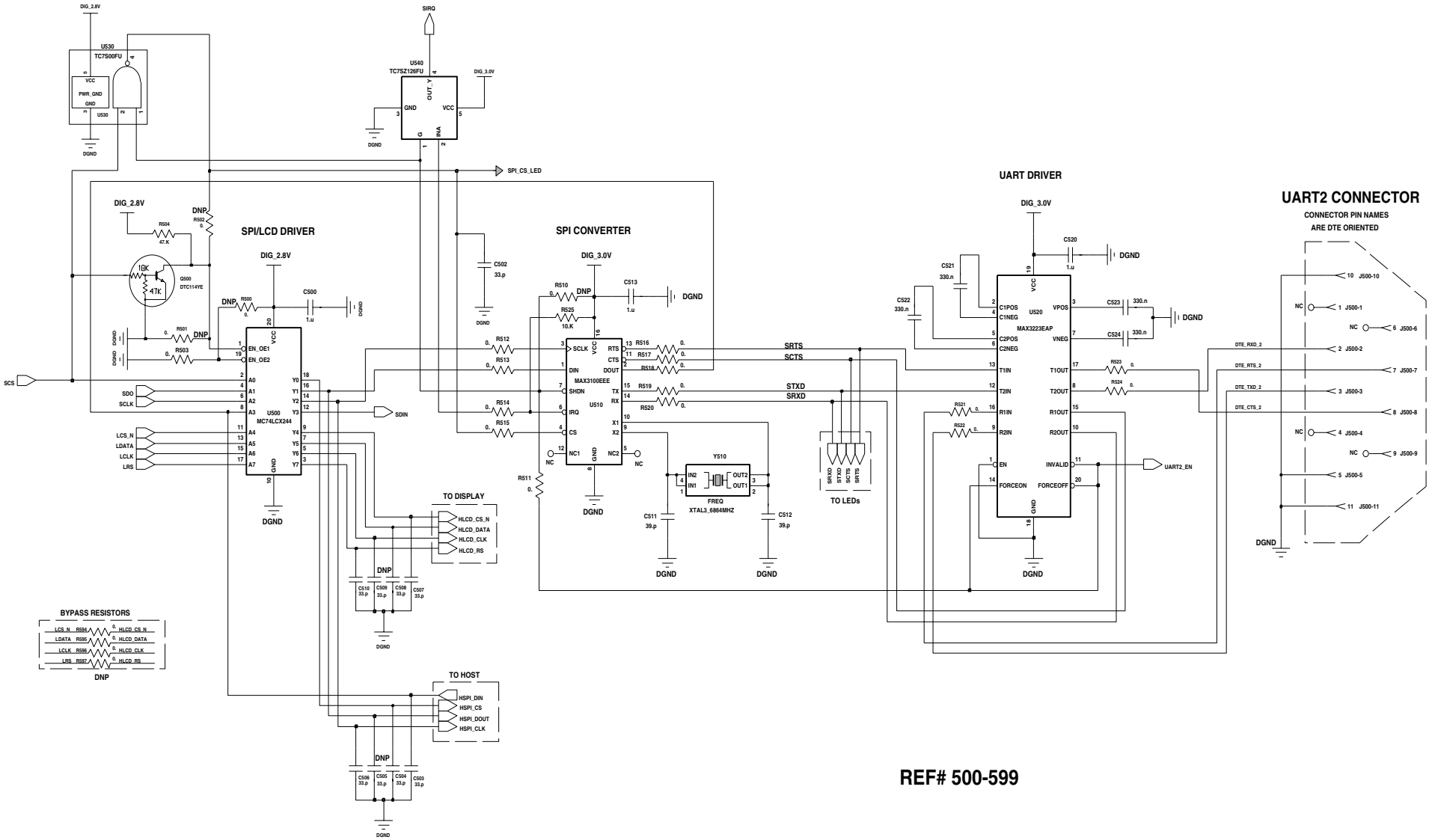


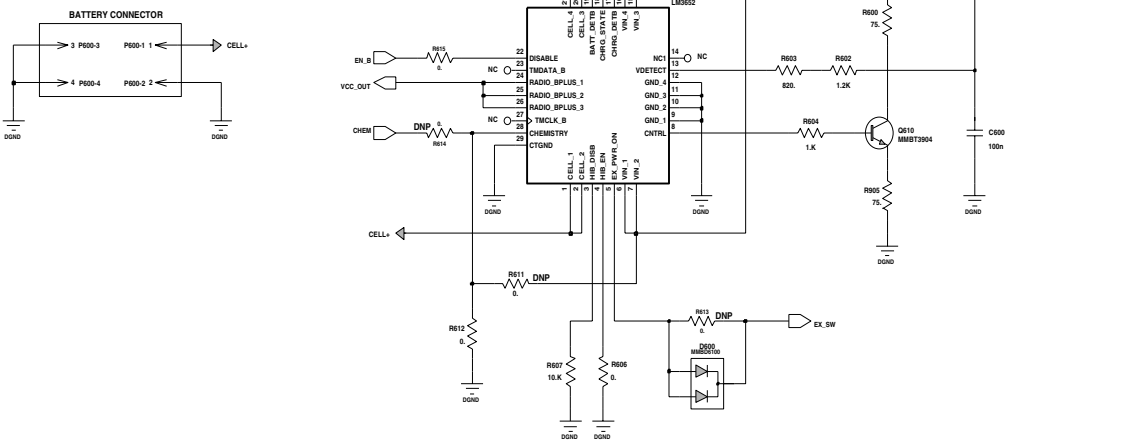

DC POWER CONNECTOR
DGND
GND
J200
B+
UUT_VCC
P200-2
P200-1
UUT JUMPER
FUSE
F200
S200
SWITCH_ET01
NC
OVER-VOLATGE PROTECTION
Q200
SI4463
UUT_A+
3.6V
J201
C208
3.3p
C207
8.2p
C205
1000u
C204
1000u
C203
1000u
C202
1000u
C201
1000u
R200
10.K
R201
4.7K
MMBT3906LT1
Q201
R202
1.K
C200
1.u
5.1
VR200
1SMB5918BT3
EVB_B+
EVB_VCC
P201-1
P201-2
EVB JUMPER
C218
39.p
C216
39.p
C217
8.2p
C215
8.2p
R203
390.
PWR
LED_RED
D200
DIGITAL 3.0V POWER SUPPLY
DIG_3.0V
U220
MAX604ESA
OUT
SET
IN
OFF_
GND4
GND3
GND2
GND1
C222
10.u
R220
150.K
R221
100.K
C221
33.p
10.u
VBATT
FROM BATTERY
P202-3
P202-2
P202-1
AC ADAPTER JACK
AC_VCC
TO CHARGER IC
J230-1
J230-2
J230-3
G1
J230-G1
G2
J230-G2
U230
MIC29302BU
OUTP
ADJUST
INPUT
ENABLE
GND
C232
10.u
R233
301.K
R234
130.K
C230
10.u
DNP
C206
1000u
C231
39.p
C234
8.2p
ANALOG 2.8V POWER SUPPLY
ANLG_2.8V
U240
MAX604ESA
C240
10.u
C241
33.p
R240
200.K
R241
150.K
C242
10.u
DIGITAL 2.8V POWER SUPPLY
DIG_2.8V
U210
MAX604ESA
C212
10.u
R210
200.K
R211
150.K
C211
33.p
C210
10.u
R232
12.K
R230
12.K
R231
12.K
CHRG_CTRL
CHRG_TYP
DNP FOR API
C233
1.u
DGND

REF# 200-299

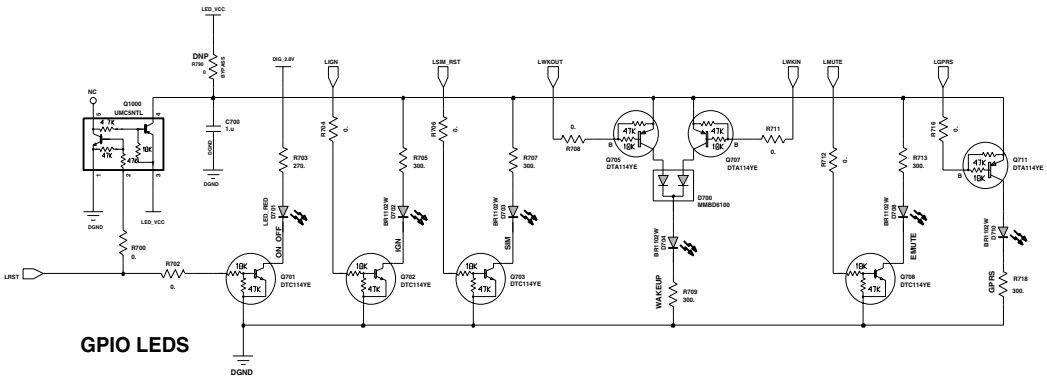

UART DRIVER
RS232 TRANSCEIVER
UART1 CONNECTOR
CONNECTOR PIN NAMES
ARE DTE ORIENTED
DIG_2.8V
DIG_3.0V
DGND
U350
MC74LCX244
U360
MAX3238
TO HOST
HRXD
HCTS
HDSR
HDCD
HRI
HRTS
HTXD
HDTR
DTE_DCD
DTE_DSR
DTE_RXD
DTE_RTS
DTE_TXD
DTE_CTS
DTE_DTR
DTE_RI
J350-1
J350-2
J350-3
J350-4
J350-5
J350-6
J350-7
J350-8
J350-9
J350-10
J350-11
UART1_EN
NC
VBUS_EN
USB_EN
URXD
UTXD
UCTS
URTS
UDSR
UDTR
UDCD
URI
USB DRIVER
USB TRANSCEIVER
USB CONNECTOR
USB DRIVER SELECTION JUMPER
P300-1
P300-2
P300-3
UVBUS_DET
USB_DET
HOST_USB
TXENB
VPOUT
VMOUT
SUSPEND
SOFTCON
VMIN
VPIN
XRXD
USB_VBUS
USB_D-
USB_D+
UDPOS
UDNEG
U310
ISP1104
U320
TC54VN2902E
U330
NC7SZ125
U340
TC7S00FU
VR310
UM26.8EN
Q310
Q320
DTC114YE
Si1900DL
Q330
REF# 300-399


PCM DRIVER
AUDIO CODEC
AUDIO MUX
JUMPER
TO HOST
MUX BYPASS RESISTORS
AUDIO PA & SPEAKER
ALERT SPEAKER
HEADSET
MICROPHONE
AUDIO SHIELD
PLACEHOLDER FOR
MC145483
5113811A49
DIG_2.8V
ANLG_2.8V
DGND
AGND
U400
MC74LCX244
U410
MC145481
U420
MC74HC4053
U430
TPA6203A1GQVR
U440
TC7SH08
J430
J440
J460
LS400
SH400
SHIELD
P420-1
P420-2
P420-3
DIG
ANLG
PDOUT
PCLK
PFS
PDIN
POR
AUD_SEL
RST
HPCM_DOUT
HPCM_CLK
HPCM_FS
HPCM_DIN
SPKR_NEG
SPKR_POS
MCPHN
CODEC_MIC
CODEC_SPKR_NEG
CODEC_SPKR_POS
SPKR_OUT-
SPKR_OUT+
MIC_IN
ALRT_POS
ALRT_NEG
HDST_SPKR
HDST_MCPHN
HDST_EN_N
DNP
NC
REF# 400-499

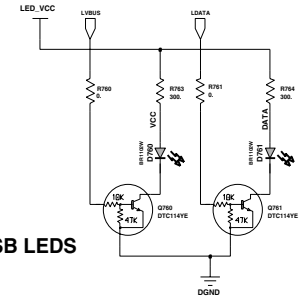

SPI/LCD DRIVER
SPI CONVERTER
UART DRIVER
UART2 CONNECTOR
CONNECTOR PIN NAMES
ARE DTE ORIENTED
SPI_CS_LED
SIRQ
SCS
SDO
SCLK
SDIN
LCS_N
LDATA
LCLK
LRS
SRTS
SCTS
STXD
SRXD
TO DISPLAY
HLCD_CS_N
HLCD_DATA
HLCD_CLK
HLCD_RS
TO HOST
HSPI_DIN
HSPI_CS
HSPI_DOUT
HSPI_CLK
TO LEDs
UART2_EN
BYPASS RESISTORS
DNP
DGND
DIG_2.8V
DIG_3.0V
MC74LCX244
MAX3100EEE
MAX3223EAP
TC7S00FU
TC7SZ126FU
DTC114YE
FREQ
XTAL3_6864MHZ
DTE_RXD_2
DTE_RTS_2
DTE_TXD_2
DTE_CTS_2
REF# 500-599


BATTERY CONNECTOR
3 P600-3
P600-1 1
CELL+
4 P600-4
P600-2 2
DGND
DGND
Q620
MMBT3904
DNP
R618
0.
R608
47.K
R609
47.K
R616
0.
STATE
R617
0.
DETB
Q600
MMJT9435
FUSE
F600
16.
AMP
VAC
R601
10.K
CELL+
U600
LM3652
CELL_4
CELL_3
BATT_DETB
CHRG_OUT
CHRG_DETB
VIN_4
VIN_3
EN_B
R615
0.
DISABLE
NC
TMDATA_B
VCC_OUT
RADIO_BPLUS_1
RADIO_BPLUS_2
RADIO_BPLUS_3
NC
TMCLK_B
CHEM
DNP
R614
0.
CHEMISTRY
CTGND
NC1
VDETECT
GND_4
GND_3
GND_2
GND_1
CNTRL
NC
R603
820.
R602
1.2K
R600
75.
R604
1.K
Q610
MMBT3904
C600
100n
R905
75.
CELL_1
CELL_2
HIB_DISB
HIB_IN
EX_PWR_ON
VIN_1
VIN_2
CELL+
R611
DNP
0.
R612
0.
R613
DNP
0.
EX_SW
D600
MMBD6100
R607
10.K
R606
0.

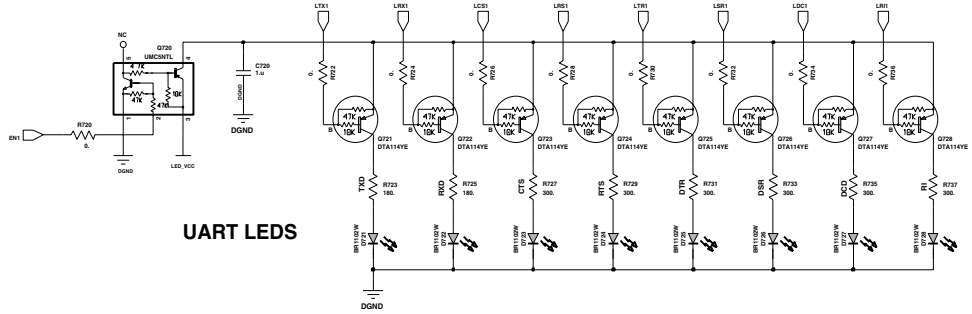
REF# 600-699



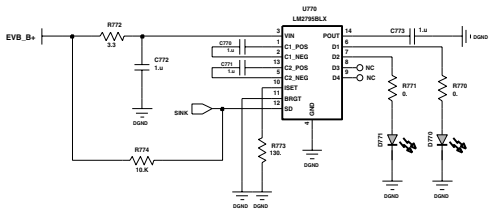
GPIO LEDS



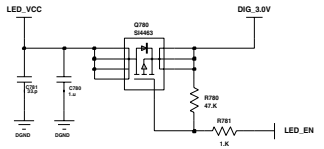
USB LEDS



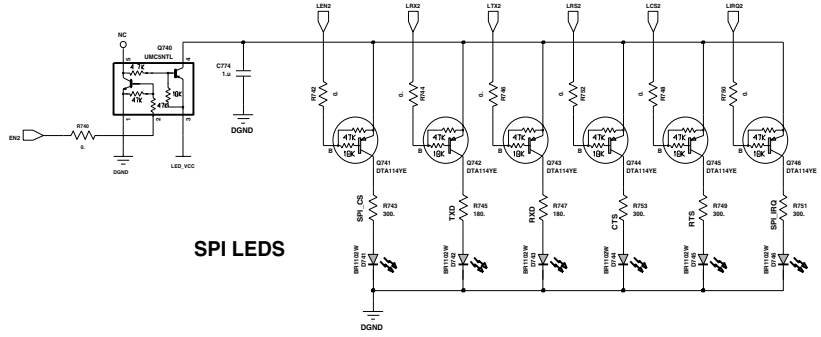
UART LEDS



DISPLAY LEDS



LED SUPPLY



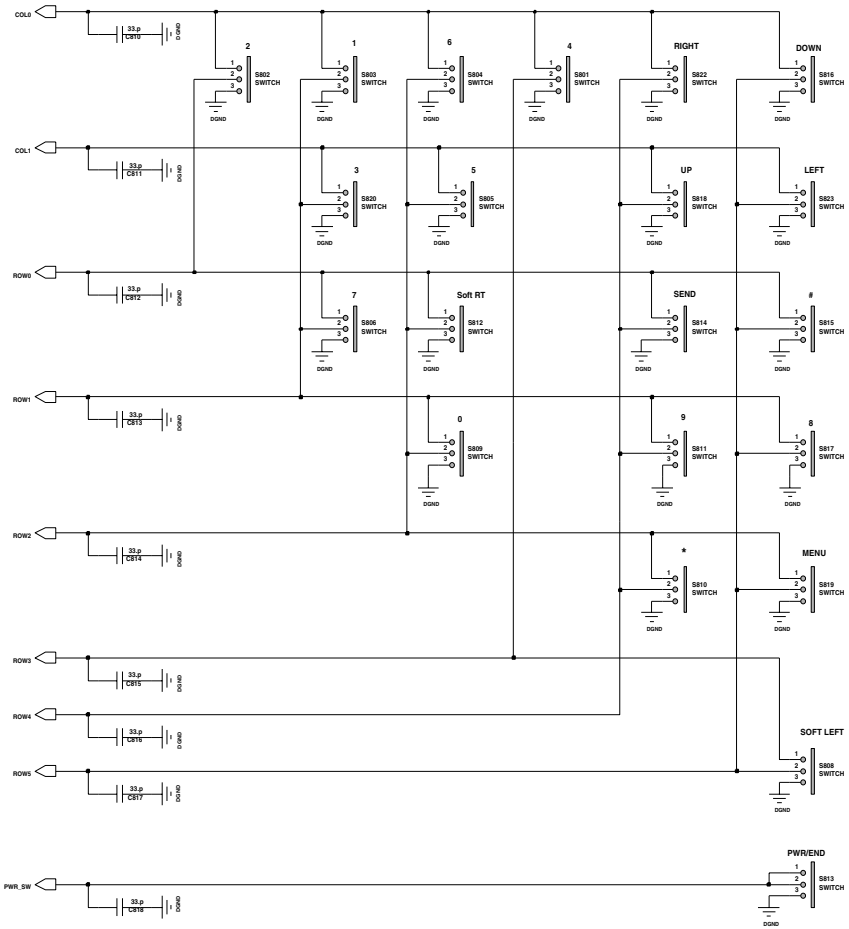
SPI LEDS

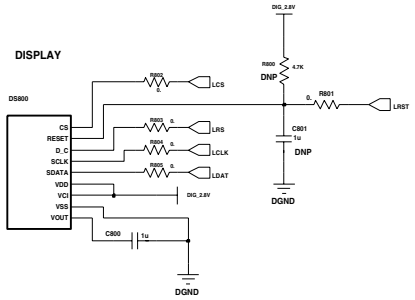
4805729G44 - Stanley BR1102W (RED)

4802579S03 - Stanley BG1102W (GREEN)

REF# 700-799

KEYPAD





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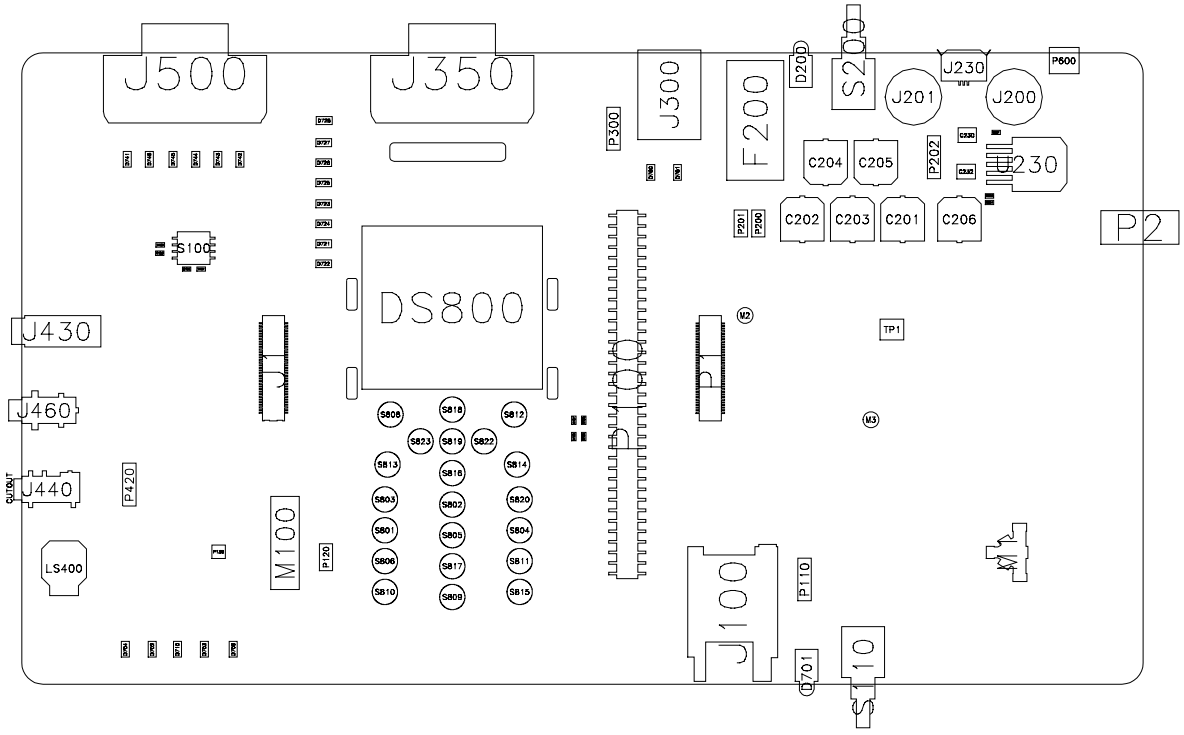
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C203
C201
C206
P201
P200
P2
DS100
DS800
J430
J460
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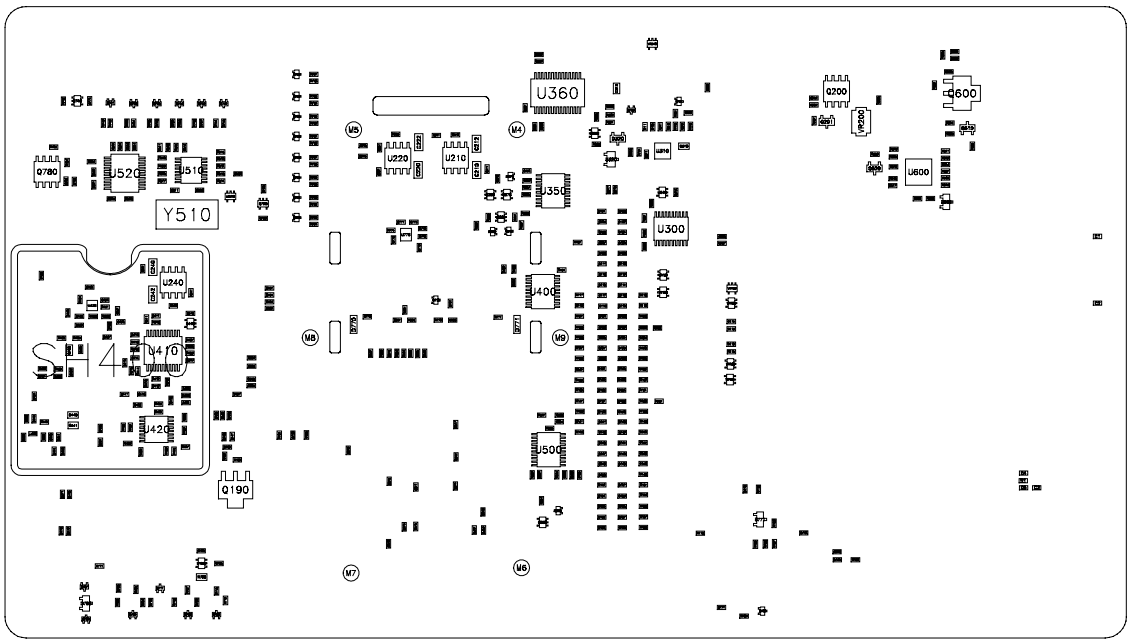
M1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U500
Q190
M4
M5
M6
M7
M8
M9