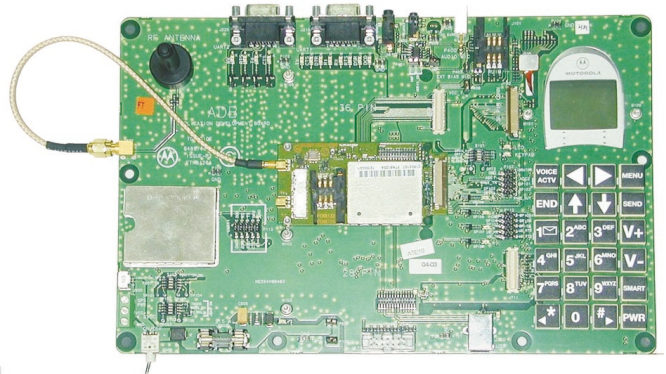


*Developer's Guide*

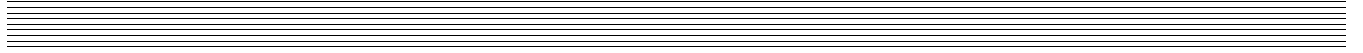
# Motorola c18 Developer's Kit

98-08901C64-B





# c18 Developer's Kit



© Motorola Israel Ltd., 2005  
A subsidiary of Motorola Inc.  
All rights reserved.

**Developer's Guide**

98-08901C64-B

**REVISION HISTORY**

Revision	Date	Purpose
O	July 2003	Initial Release.
A	November 2003	Adding a new USB Driver CD to the kit. Removing the c18 module from the Developer Kit content.
B	February 2005	Minor changes



## CONTENTS

REVISION HISTORY .....	ii
<b>PREFACE</b>	
1.1 SCOPE OF THIS MANUAL .....	1
1.2 WHO SHOULD USE THIS MANUAL.....	1
1.3 DISCLAIMER .....	1
1.4 REGULATORY REQUIREMENTS .....	1
1.5 REGULATORY STATEMENT.....	1
1.6 SAFETY .....	2
1.6.1 User Operation .....	2
1.6.2 Antenna Installation .....	2
1.7 APPLICABLE DOCUMENTS .....	2
1.8 TRADEMARKS .....	2
1.9 HOW THIS MANUAL IS ORGANIZED.....	2
<b>INTRODUCTION</b>	
2.1 GENERAL DESCRIPTION.....	3
2.2 TERMS AND ABBREVIATIONS .....	3
2.3 SAFETY PRECAUTIONS .....	4
<b>DEVELOPER BOARD AND INTERFACES DESCRIPTION</b>	
3.1 GENERAL.....	5
3.1.1 Getting Started with the Developer's Kit.....	6
3.1.2 System Requirements .....	8
3.1.3 Hardware Setup .....	8
3.1.4 Configuring the Communication Mode .....	10
3.1.5 Testing the Installation.....	11
3.2 DEVELOPER BOARD DESCRIPTION .....	12
3.2.1 Connectors Description .....	12
3.2.2 Configuration Switches Description .....	24
3.2.3 Jumper Description .....	28

3.2.4 LED Indicators Description.....	30
3.2.5 Headers Description .....	31
3.2.6 Test Points Description.....	35

## **MECHANICAL DESCRIPTION**

### **SERVICE AND SUPPORT**

5.1 CUSTOMER ASSISTANCE.....	39
5.2 TROUBLESHOOTING .....	39

### **PARTS LIST**

6.1 DEVELOPER BOARD PART LIST.....	41
------------------------------------	----

### **SCHEMATICS AND PLACEMENT DIAGRAMS**

7. CONTENTS .....	47
-------------------	----

### **INDEX**

# LIST OF FIGURES

Figure 1. Developer Board with Accessories.....	5
Figure 2. Developer Board Components.....	7
Figure 3. 70-pin Interface Configuration .....	8
Figure 4. 36-pin ZIF-connector Interface Configuration .....	9
Figure 5. 28-pin DIN-connector Interface Configuration .....	9
Figure 6. RS232 Communication Requirements.....	11
Figure 7. Developer Board.....	12
Figure 8. Auxiliary Audio Input Jumper Locations .....	18
Figure 9. Audio Block Layout.....	19
Figure 10. RF Connection to GPS Antenna Connector .....	21
Figure 11. Developer Board Configuration Switches .....	24
Figure 12. Configuration Switches Closeup .....	24
Figure 13. P501 Location .....	28
Figure 14. LED Indicators Location .....	30
Figure 15. Headers Location .....	31
Figure 16. Test Points Location .....	35

# LIST OF TABLES

Table 1. Terms and Abbreviations .....	3
Table 2. Developer’s Kit Components .....	6
Table 3. J500 Connector Pinout .....	13
Table 4. P500 Connector Pinout .....	14
Table 5. J300 Connector Pinout .....	15
Table 6. J210 Connector Pinout .....	15
Table 7. J220 Connector Pinout .....	16
Table 8. J410 Connector Pinout .....	17
Table 9. P400 Connector Pinout .....	17
Table 10. Auxiliary Audio Input Jumpers.....	17
Table 11. P405 Connector Pinout .....	19
Table 12. J401 Connector Pinout .....	20
Table 13. P404 Connector Pinout .....	20
Table 14. J402 Connector Pinout .....	21
Table 15. J101 Connector Pinout .....	22
Table 16. P108 Connector Pinout .....	23
Table 17. S101 Switch Settings.....	25
Table 18. S102 Switch Settings.....	25
Table 19. S103 Switch Settings.....	26
Table 20. RS232 Mode Settings.....	26
Table 21. USB Mode Settings.....	27
Table 22. RS232 + USB Mode Settings.....	27
Table 23. Flashing Mode Settings.....	27
Table 24. P501 Jumper Settings .....	28
Table 25. P401 Jumper Settings .....	29
Table 26. P402 Jumper Settings .....	29
Table 27. P406 Jumper Settings .....	29
Table 28. P107 Signal Header Pinout .....	32
Table 29. P112 Signal Header Pinout .....	33
Table 30. P113 Signal Header Pinout .....	34
Table 31. Test Points .....	35
Table 32. Developer Board Connectors .....	37
Table 33. Troubleshooting .....	39
Table 34. Developer Board Part List.....	41

---

---

---

---

---

---

---

---

---

---

## 1.1 SCOPE OF THIS MANUAL

This manual introduces the c18 Developer's Kit, and describes the technical details required by the data terminal equipment (DTE) team to successfully integrate the Motorola c18 cellular engine into a wireless host device. With the help of this manual, the DTE team can use the Developer's Kit to conduct a full series of test and evaluation procedures on the c18, 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](mailto:n2cshd@motorola.com).

## 1.2 WHO SHOULD USE THIS MANUAL

This manual is intended for all members of the DTE integration team who will use the c18 Developer's Kit, including representatives from hardware, software and RF engineering disciplines.

## 1.3 DISCLAIMER

This guide provides advice and guidelines for integration teams. Responsibility for use of the information contained herein lies entirely with the integrator. 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 specification.

## 1.4 REGULATORY REQUIREMENTS

The Federal Communications Commission (FCC) requires application for certification of digital devices in accordance with CFR Title 47, Part 2 and Part 15. This includes Electromagnetic Energy Exposure (EME) testing. As the c18 modem is not a standalone transceiver but is an integrated module, the c18 cannot be tested by itself for EME certification. It is, however, the integrator's responsibility to have the completed device tested for EME certification.

## 1.5 REGULATORY STATEMENT

The following safety precautions must be observed during all phases of the operation, usage, service or repair of any cellular terminal or mobile incorporating the c18 module. Manufacturers of the cellular terminal are advised to convey the following safety information to users and operating personnel, and to incorporate these guidelines into all manuals supplied with the product. Failure to comply with these precautions violates safety standards of design, manufacture and intended use of the product. Motorola assumes no liability for customer failure to comply with these precautions.

1. The c18 must be operated at the voltages described in the technical documentation.
2. The c18 must not be mechanically nor electrically changed. Use of connectors should follow the guidance of the technical documentation.
3. Systems using the c18 are subject to mandatory EMC testing under directive 89/336/EEC. Other directives, such as the LVD directive 73/23/EE, may also apply to a system using the c18 module.

## 1.6 SAFETY

### 1.6.1 User Operation

Do not operate your Developer's Kit 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 phone 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.



**Warning**

The telephone must be installed in a manner that provides a minimum separation distance of 20 cm or more between the antenna and persons in order to satisfy FCC RF exposure requirements for mobile transmitting devices.

To comply with the FCC RF exposure limits and satisfy the categorical exclusion requirements for mobile transmitters, the requirements described in this manual must be met.

### 1.6.2 Antenna Installation

- A minimum separation distance of 20 cm must be maintained between the antenna and all persons.
- The effective radiated power of the transmitter must be less than 1.5 Watts ERP (Cellular)/3.0 Watts EIRP (PCS). This requires that the combination of antenna gain and feed line loss does not exceed +6.1 dBi.

## 1.7 APPLICABLE DOCUMENTS

- c18 Cellular Engine Module Description – 9808901C63-A
- c18 AT Commands – 9808901C65-A
- c18 Developer's Kit Quick Start User Guide - 68P02969C30-O

## 1.8 TRADEMARKS

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

Copyright © 2003 Motorola. ALL RIGHTS RESERVED.

## 1.9 HOW THIS MANUAL IS ORGANIZED

This manual contains the following chapters:

- **Chapter 1** contains this Preface.
- **Chapter 2** introduces the c18 Developer's Kit and provides important safety instructions.
- **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 Quick Start procedures for first-time use.
- **Chapter 4** provides a mechanical description of the Developer Board.
- **Chapter 5** provides contact information for Customer Assistance and troubleshooting information.
- **Chapter 6** includes a complete parts list for the c18 Developer's Kit.

---

---

---

---

---

---

---

---

---

---

---

---

## 2.1 GENERAL DESCRIPTION

The c18 Developer's Kit (F4441A) is intended for evaluating the c18 module, as well as for developing and testing software applications for it. The Developer's Kit can accommodate c18 models with different interfaces, including the full-featured 70-pin interface connector, a 36-pin ZIF connector and a 28-pin DIN connector.

## 2.2 TERMS AND ABBREVIATIONS

Table 1. Terms and Abbreviations

Acronyms/Terms	Definition/Description
1X	Platform 1X
ACK	Acknowledgement from the radio that the test command was successful
ADB	Application Development Board (former name for the Developer Board)
AGND	Audio ground
BOM	Bill of materials
aGPS	Assisted Global Positioning System (GPS)
c18a	c18 DMA 800/1900, AMPS 800, aGPS, OEM model
c18c	c18 CDMA800-only model
CDMA	Code division multiple access
ESD	Electrostatic discharge
GHz	Gigahertz
GND	Electrical ground
KHz	Kilohertz
LPF	Low-pass filter
mA	Milliampere
MHz	Megahertz
N/A	Not applicable
NC	Not connected
PA	Power amplifier
PCB	Printed circuit board
PCS	Personal communications system
PCS	PCS band; also known as CDMA 1900
RF	Radio frequency
R-UIM	Removable User Identity Module

Table 1. Terms and Abbreviations (*Continued*)

Acronyms/Terms	Definition/Description
SW	Software
TBD	To be determined
ZIF	Zero Insertion Force

### 2.3 SAFETY 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 c18 module attached to it.

# DEVELOPER BOARD AND INTERFACES DESCRIPTION

## 3.1 GENERAL

The Developer Board is the main component in the Developer's Kit. It serves as a mounting platform for the c18 module, providing the c18 with supply voltage and standard communication interfaces (USB and RS232).

Figure 1 shows the Developer Board and some of its accessories with the c18 module attached to it:

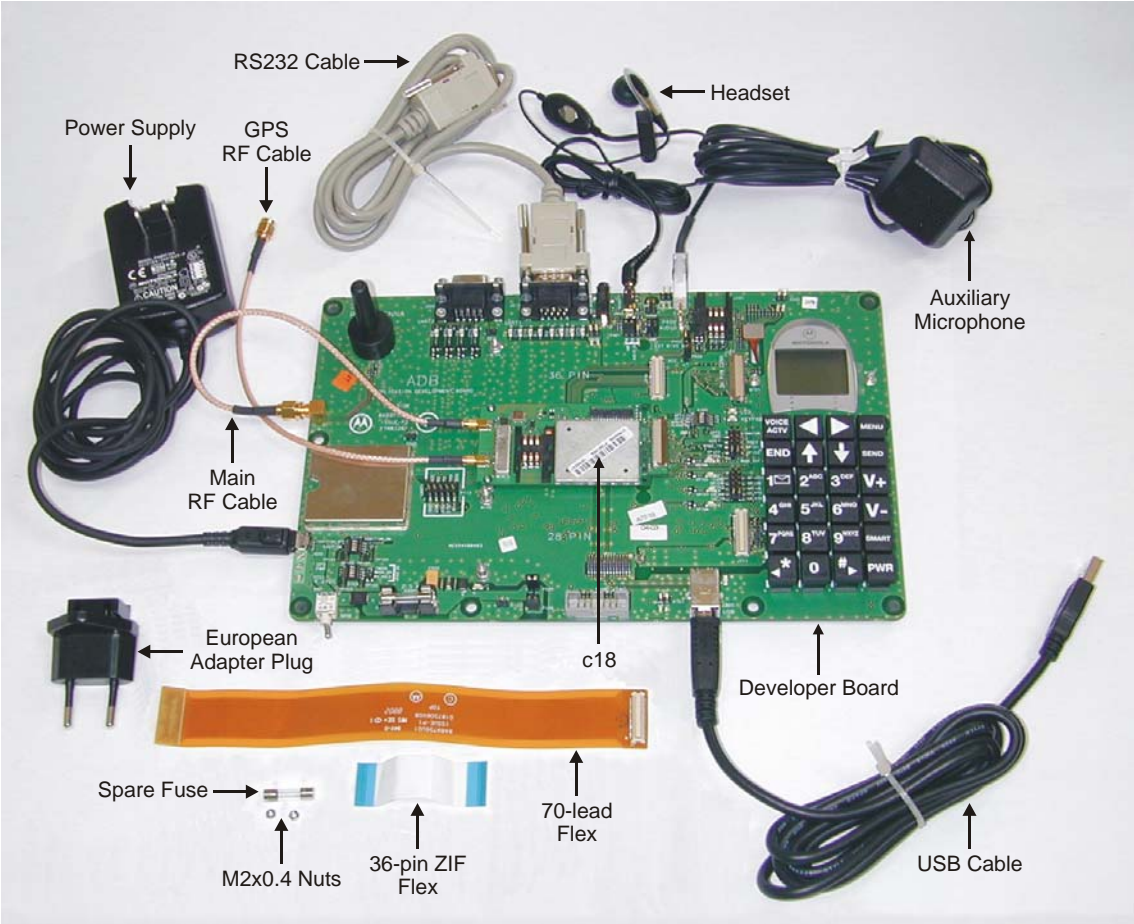


Figure 1. Developer Board with Accessories

See Table 2 for a list of Developer's Kit components.

### 3.1.1 Getting Started with the Developer’s Kit

Table 2 lists the components contained in the Developer’s Kit:

Table 2. Developer’s Kit Components

Item #	Item Description	Part Number	Quantity
1	Developer Board	FTN8126A	1
2	Power supply	SPN4716B	1
3	European adapter plug	SYN7456A	1
4	RS232 cable	3087563V13	1
5	USB cable	3087563V12	1
6	RF cable (Main and GPS)	3087563V05	2
7	Documentation CD	FTN6246A	1
8	Nut M2x0.4	0280349L02	4
9	Antenna	8509397T03	1
10	Spare 1.6A fast-acting fuse	6502069C48	1
11	Spare jumper	0984181L01	1
12	Headset	SYN8419B	1
13	Active (auxiliary) microphone	FTN6077A	1
14	36-pin ZIF flex cable (50mm)	3086229J10	1
15	70-lead flex cable - Molex	0187506V08	1
16	70-lead flex cable - Hirose (optional)	0187506V29	1
17	Hirose Adapter Board	FCN6349A	1
18	Mobile Phone Tool CD	SVN4776A	1

Figure 2 shows the Developer Board and its components.

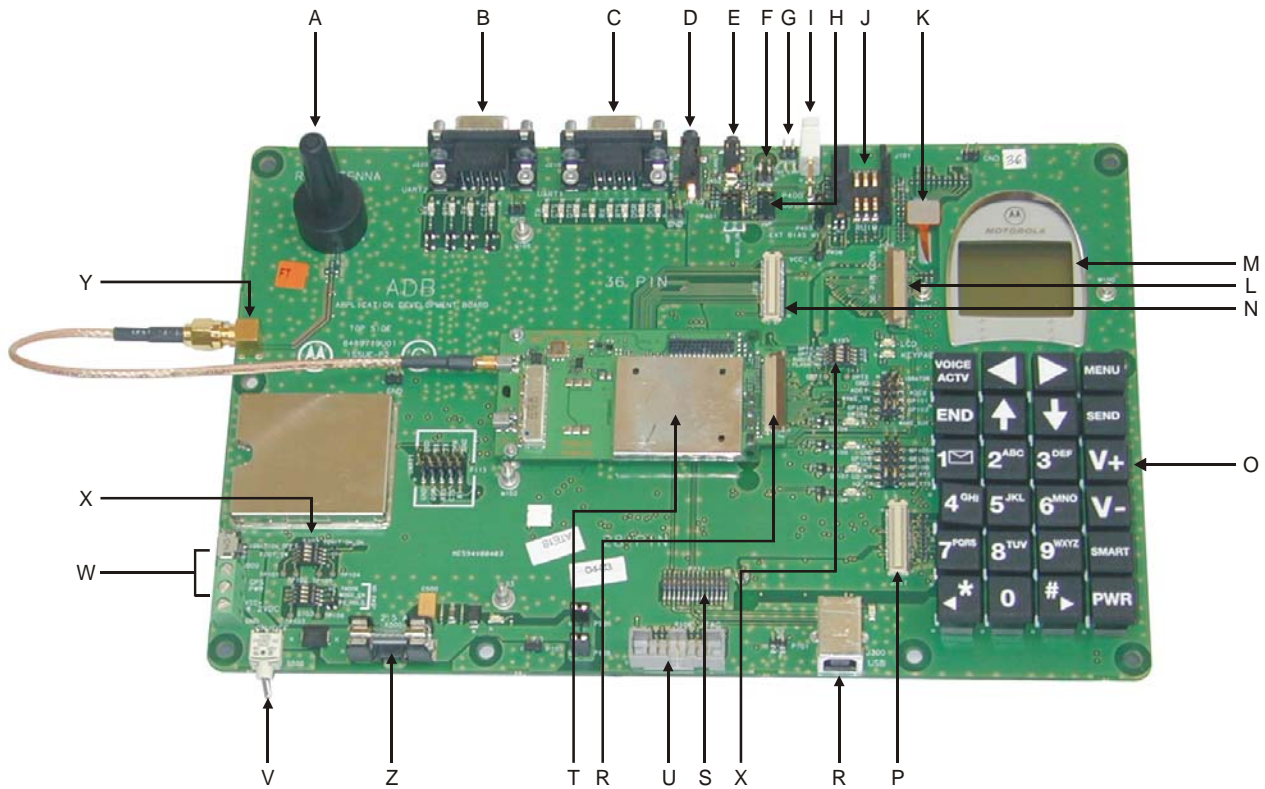


Figure 2. Developer Board Components

**Legend:**

A	Antenna	N	Supplementary connector for J102
B	RS232 DB9 connector (UART2)	O	Keypad
C	RS232 DB9 connector (UART1)	P	Supplementary connector for P111
D	Auxiliary audio output	Q	70-pin connector
E	Headset interface connector	R	USB connector
F	Socket for condenser microphone	S	28-pin DIN connector
G	Differential earpiece output connector	T	c18
H	Microphone connector	U	JTAG connector
I	Auxiliary audio input	V	Power on/off switch
J	R-UIM card socket	W	Power supply connectors
K	LCD connector	X*	Configuration switches
L	36-pin ZIF connector	Y	RF antenna connector
M	Display	Z	Fuse

\* Note that configuration switches are located in two different locations on the board.

For more information about the location of Developer Board LEDs, headers and test points, see Figure 14, Figure 15 and Figure 16, respectively.

### 3.1.2 System Requirements

The Developer's Kit has the following system requirements:

- Personal computer
- Available COM (RS232) port
- Available USB 1.1 or newer (full-speed) port
- Windows 2000 (for USB support)

### 3.1.3 Hardware Setup

There are three possible interface configurations for the Developer Board (which are marked on the board), including:

- 70-pin interface configuration
- 36-pin ZIF-connector interface configuration
- 28-pin DIN-connector interface configuration

Each is illustrated in the figures below.

#### **70-pin interface configuration:**

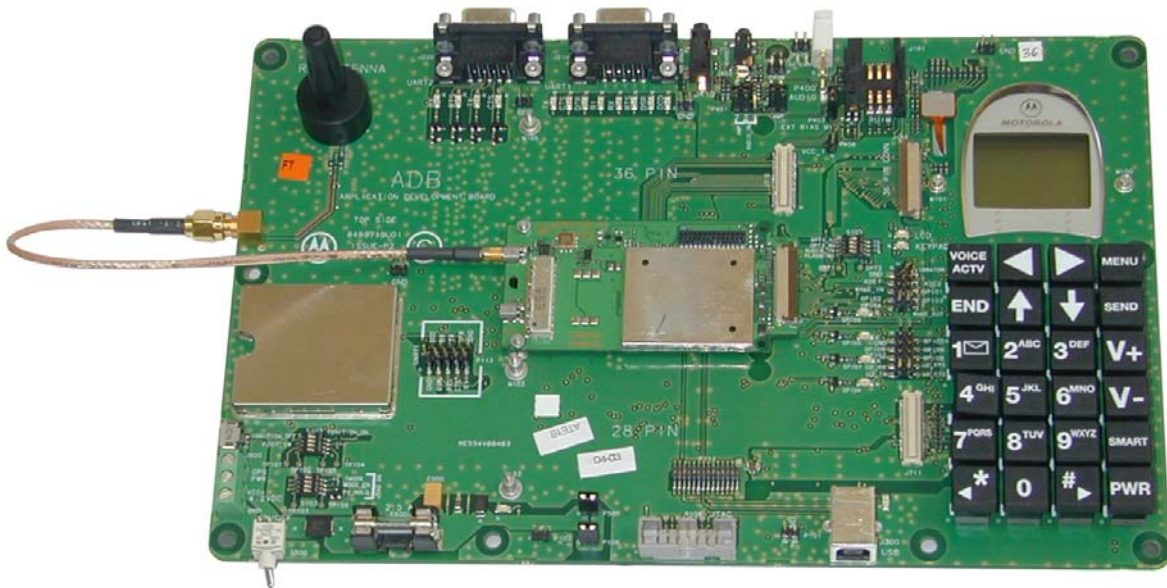


Figure 3. 70-pin Interface Configuration

**36-pin ZIF-connector interface configuration:**

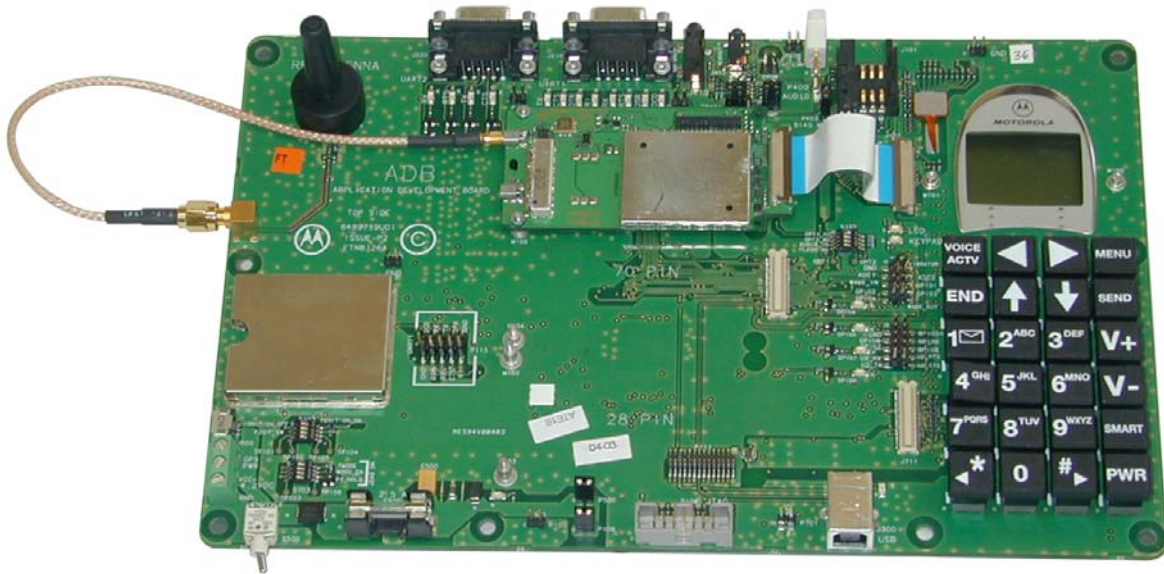


Figure 4. 36-pin ZIF-connector Interface Configuration

**28-pin DIN-connector interface configuration:**

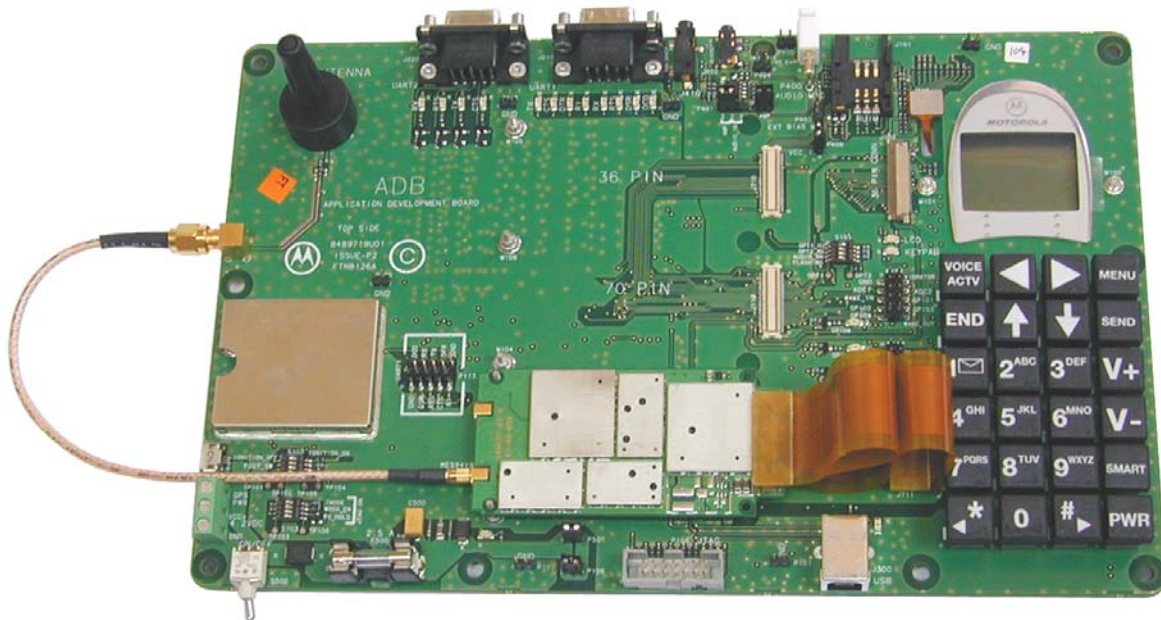


Figure 5. 28-pin DIN-connector Interface Configuration

For hardware setup, follow the instructions below:

1. Mount the c18 module on the supporting spacers and plug it into the matching connector on the Developer Board.
2. Secure the module using two M2x0.4 nuts provided in the kit (the other two nuts in the kit are spares).
3. Plug the RF cable (Motorola part number 3087563V05) into the Developer Board and then into the c18 module.

## Developer Board and Interfaces Description

4. Attach the supplied headset to the headset connector on the Developer Board.
5. Mount the antenna onto the antenna base (M601; A in Figure 2) on the Developer Board.
6. Connect the desired communications cable between a PC and the Developer Board (RS232 or USB). If an RS232 cable is used, connect the RS232 cable to the connectors marked J210 and UART1 (C in Figure 2). See “J210 – RS232 DB9 Connector (UART1)” on page 15.
7. Connect the power supply provided in the kit to the Developer Board power connector (J500; D in Figure 7).
8. Plug the power supply into the mains.
9. The second RF cable can be used to connect an external aGPS antenna that is not part of the Developer’s Kit.

### 3.1.3.1 Power-up

To power-up the Developer Board, switch the power switch (U in Figure 7) into the ON position. This action turns on some of the Developer Board LEDs and supplies voltage to the c18 module. Although at this point the Developer Board is on, the c18 module remains off and the LCD remains blank.

To turn the module on, press the PWR key on the keypad for at least two seconds.

### 3.1.4 Configuring the Communication Mode

The c18 module enters USB communications mode when all of the following conditions are met:

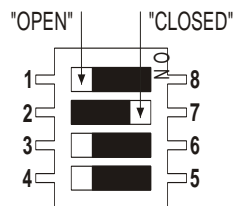
- It is powered up.
- No configuration switches are closed.
- A USB cable connects the Developer Board with an active USB port on a PC.

To select RS232 mode, make sure the RS232 cable is properly connected to the Developer Board and a PC. Move the S101 OPT1 configuration switch (X in Figure 2) to the closed position. See Figure 11 for more detail about the location of this switch.



**Note**

Configuration switches have the word “ON” printed on them. When a switch tab is set to the ON direction, the switch is closed. When the switch is set in the opposite direction, the switch is open. See the figure below for reference.



See “Configuration Switches Description” on page 24.

### 3.1.5 Testing the Installation

After the hardware setup is complete, communication with the module can be tested using software such as HyperTerminal. Methods for testing RS232 communications and USB communications are described below.

#### 3.1.5.1 RS232 Communication

Below is an example of the HyperTerminal setup required for communication with the c18 module:

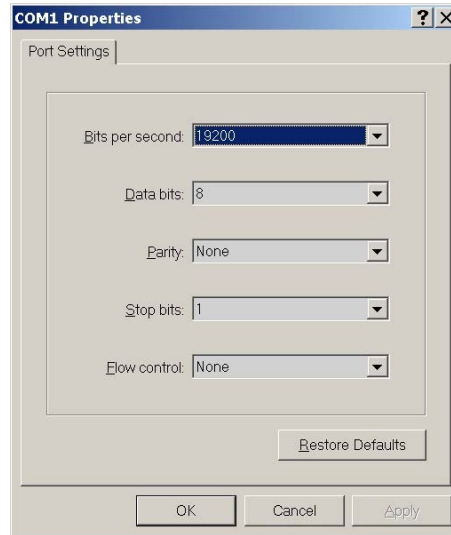


Figure 6. RS232 Communication Requirements

#### 3.1.5.2 USB Communication

To be able to use this mode of communication, you must install the USB driver supplied on a CD (SVN4776A) with this kit. Follow instructions that are part of the driver's installation procedure.

## 3.2 DEVELOPER BOARD DESCRIPTION

This section describes the Developer Board and its components. See Figure 2 for a photograph of the Developer Board and its components.

### 3.2.1 Connectors Description

This section describes the connectors used on the Developer Board. Figure 7 below shows the location of connectors on the Developer Board:

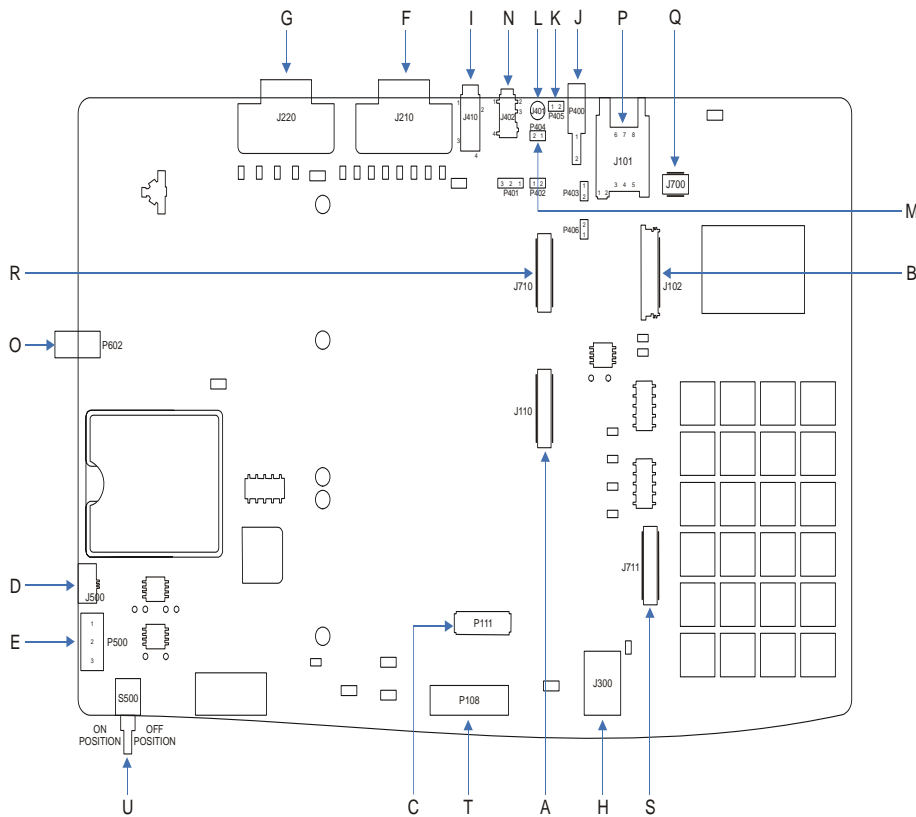


Figure 7. Developer Board

**Legend:**

A	J110	Full-featured 70-pin interface connector	L	J401	Socket for condenser (electret) microphone
B	J102	36-pin ZIF interface connector	M	P404	Differential microphone input connector
C	P111	28-pin DIN interface connector	N	J402	Headset interface connector
D	J500	Power supply connector	O	P602	RF antenna connector
E	P500	Power supply connector	P	J101	R-UIM card socket
F	J210	RS232 DB9 connector (UART1)	Q	J700	LCD connector
G	J220	RS232 DB9 connector (UART2)	R	J710	Supplementary connector for J102
H	J300	USB connector	S	J711	Supplementary connector for P111
I	J410	Auxiliary audio output	T	P108	JTAG connector
J	P400	Auxiliary audio input	U	S500	Main power switch
K	P405	Differential earpiece output connector			

### 3.2.1.1 J110 – 70-pin Interface Connector

The J110 connector (A in Figure 7) is a full-featured 70-pin interface connector. c18 modules with a 70-pin connector should be plugged directly into the J110 connector. Use the nuts provided in the Developer’s Kit to mechanically secure the c18 module. Alternatively, the c18 module can be connected to the Developer Board using the 70-lead flex cable provided with the kit (Motorola part number 0187506V08 or 0187506V29), for easy access to the bottom side of the c18 module.

If you are using the c18 module with a different type of 70-pin connector, a flex cable with matching mating connectors is supplied with the kit.



The 70-pin board-to-board connector is guaranteed to withstand a maximum of 50 insertions. Therefore, the c18 module should not be removed frequently from the Developer Board after mounting it onto the board. The Developer’s Kit may stop working properly when the maximum guaranteed number of insertions is exceeded.

### 3.2.1.2 J102 – 36-pin ZIF Interface Connector

The J102 connector (B in Figure 7) is a 36-pin ZIF interface connector. Connect a c18 module with a 36-pin ZIF connector to the J102 connector on the Developer Board using a 5cm 36-lead flex cable provided with the kit (Motorola part number 3086229J10). If preferred, a longer 30cm 36-lead flex cable can be used. This 30cm cable must be purchased separately (Motorola part number 3086229J09). When the c18 is attached to the Developer Board using the 36-pin connector, a supplementary connector (J710; R in Figure 7) must be used in order to operate the keypad and LCD.

See “J710 – Supplementary Connector for J102” on page 22.

### 3.2.1.3 P111 – 28-pin DIN Interface Connector

The P111 connector (C in Figure 7) is a 28-pin DIN interface connector. Plug a c18 module with a 28-pin DIN connector into the J102 connector (B in Figure 7) on the Developer Board. When the c18 is attached to the Developer Board using the 28-pin connector, a supplementary connector (J711; S in Figure 7) must be used in order to operate the keypad and LCD.

See “J711 – Supplementary Connector for P111” on page 22.

### 3.2.1.4 Power Supply Connectors

This section describes the power supply connectors used on the Developer Board.

#### 3.2.1.4.1 J500 – Power Supply Connector

The J500 power supply connector (D in Figure 7) is intended for use with a PSM4716A power supply (included in the Developer’s Kit).

Table 3. J500 Connector Pinout

Pin #	Pin Name
1	GND
2	Not connected
3	PS_VCC

#### 3.2.1.4.2 P500 – Power Supply Connector

The P500 connector (E in Figure 7) is a power supply connector intended for use with laboratory power supplies. The power supply should be capable of providing 4.5V DC and a continuous current of at least 1.5 A. Protection circuitry generates a voltage drop of approximately 0.5 V at full load (maximum c18 power), thereby providing the c18 module with a nominal 4.0 V.

## Developer Board and Interfaces Description

For c18 models with active GPS antenna capability, the power supply for the active GPS antenna should be connected to pin 1 of this connector. Voltage and current supply requirements for the active GPS antenna power supply depend on the type of active antenna in use (typically 3 V or 5 V, with currents of up to tens of mA).

Table 4. P500 Connector Pinout

Pin #	Pin Name
1	GPS_ANT_POWER
2	PS_VCC
3	GND

The S500 switch (U in Figure 7) serves as the Developer's Kit ON/OFF switch. In its OFF position, supply voltage to the c18 module and all Developer Board circuitry is disconnected. In the ON position, voltage supply is routed to the Developer Board circuitry and the c18 module.

Note that GPS\_ANT\_POWER is not affected by the S500 switch. The active antenna power supply is routed directly to the c18 interface connector.



In order to avoid damage to the kit and/or power supplies, do not apply both power supply connectors simultaneously. If power for an active GPS antenna is needed, use the P500 connector (E in Figure 7) only.

### 3.2.1.5 Communications Connectors

This section describes the communications connectors used on the Developer Board.

#### 3.2.1.5.1 J300 – USB Connector

The J300 connector (H in Figure 7) provides a USB interface to the c18 module. Signals from this connector are directly routed to the c18 interface connector.

Table 5. J300 Connector Pinout

Pin #	Pin Name
1	USB_VBUS
2	USB_D-
3	USB_D+
4	GND

#### 3.2.1.5.2 J210 – RS232 DB9 Connector (UART1)

The J210 connector (F in Figure 7) is an RS232 DB9 connector (UART1). This connector provides the RS232 interface for the c18 module's UART1. It has eight communications signals. c18 UART1 signals from the c18 interface connector are routed to the RS232 transceiver on the Developer Board. The transceiver converts UART LV TTL to RS232 signals.

Table 6. J210 Connector Pinout

Pin #	Pin Name
1	U1_RS232_DCD
2	U1_RS232_RX
3	U1_RS232_TX
4	U1_RS232_DTR
5	GND
6	U1_RS232_DSR
7	U1_RS232_RTS
8	U1_RS232_CTS
9	U1_RS232_RI

### 3.2.1.5.3 J220 – RS232 DB9 Connector (UART2)

The J220 connector (G in Figure 7) is an RS232 DB9 connector (UART2). This connector provides the RS232 interface for the c18 module's UART2. It has four communication signals. c18 UART2 signals from the c18 interface connector are routed to the RS232 transceiver on the Developer Board. The transceiver converts UART LV TTL to RS232 signals.

Table 7. J220 Connector Pinout

Pin #	Pin Name
1	NC
2	U2_RS232_RX
3	U2_RS232_TX
4	NC
5	GND
6	NC
7	U2_RS232_RTS
8	U2_RS232_CTS
9	NC



**Note**

The J220 UART2 connector is being developed for future use.

### 3.2.1.6 Audio Interface Connectors

This section describes the audio interface connectors used on the Developer Board.

#### 3.2.1.6.1 J410 – Auxiliary Audio Output Connector

The J410 connector (I in Figure 7) is a connector that provides single-ended auxiliary audio output. c18 auxiliary output is routed through a capacitor to remove its DC bias. As a result, the audio signal on this interface is the same as that at the c18 output.

This output can be used in car-kit-like applications. A set of powered PC speakers (with amplifier) can be used as auxiliary audio output indicators when plugged in to the J410 connector.

Table 8. J410 Connector Pinout

Pin #	Pin Name
1	AGND
2	NC (AUDIO_OUT)
3	AUDIO_OUT
4	NC

### 3.2.1.6.2 P400 – Auxiliary Audio Input Connector

The P400 connector (J in Figure 7) is a connector that provides single-ended auxiliary audio input.

Table 9. P400 Connector Pinout

Pin #	Pin Name
1	AGND
2	AUDIO_IN

For this input, two different modes of operation are supported. In the first mode, the input can be routed directly to the c18 interface connector via a 1uF capacitor. In the second mode, input is routed through a preamplifier on the Developer Board. In preamplifier mode, a DC bias can be added to the audio input, thus making the interface capable of accommodating various active microphones (typically found in car-kit-like applications). Preamplifier gain is set to 9.1.

The behavior of this input is defined by the P401, P402, P406 and P403 jumpers, as shown in the table below.

Table 10. Auxiliary Audio Input Jumpers

Mode	Jumper Position			
	P401	P402	P406	P403
Directly routed	1-2	Open	Open	Not connected
Directly routed with internal bias *	1-2	Closed	Closed	Not connected
Preamplifier without input DC bias	2-3	Closed	Open	Not connected
Preamplifier with internal bias	2-3	Closed	Closed	Not connected
Preamplifier with external bias	2-3	Closed	Open	Connect desired DC bias voltage from external source

\* For use with the active microphone supplied with the Developer's Kit (default setup).

*Developer Board and Interfaces Description*

See Figure 8 for jumper locations.

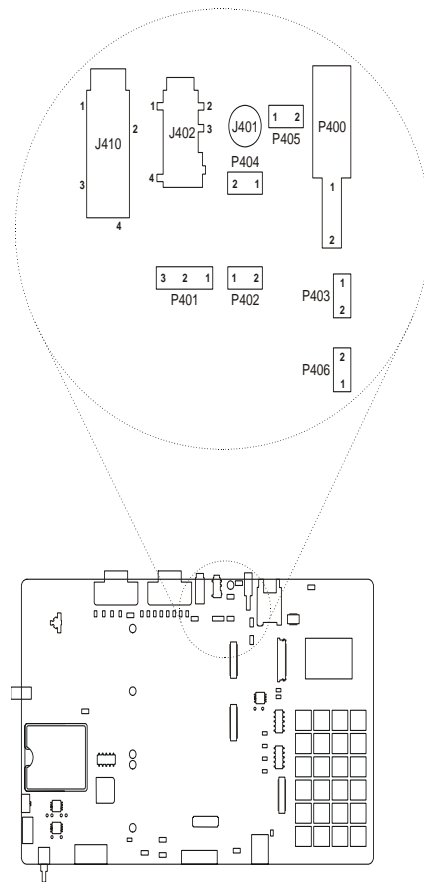


Figure 8. Auxiliary Audio Input Jumper Locations

Figure 9 below shows the layout for the audio block.

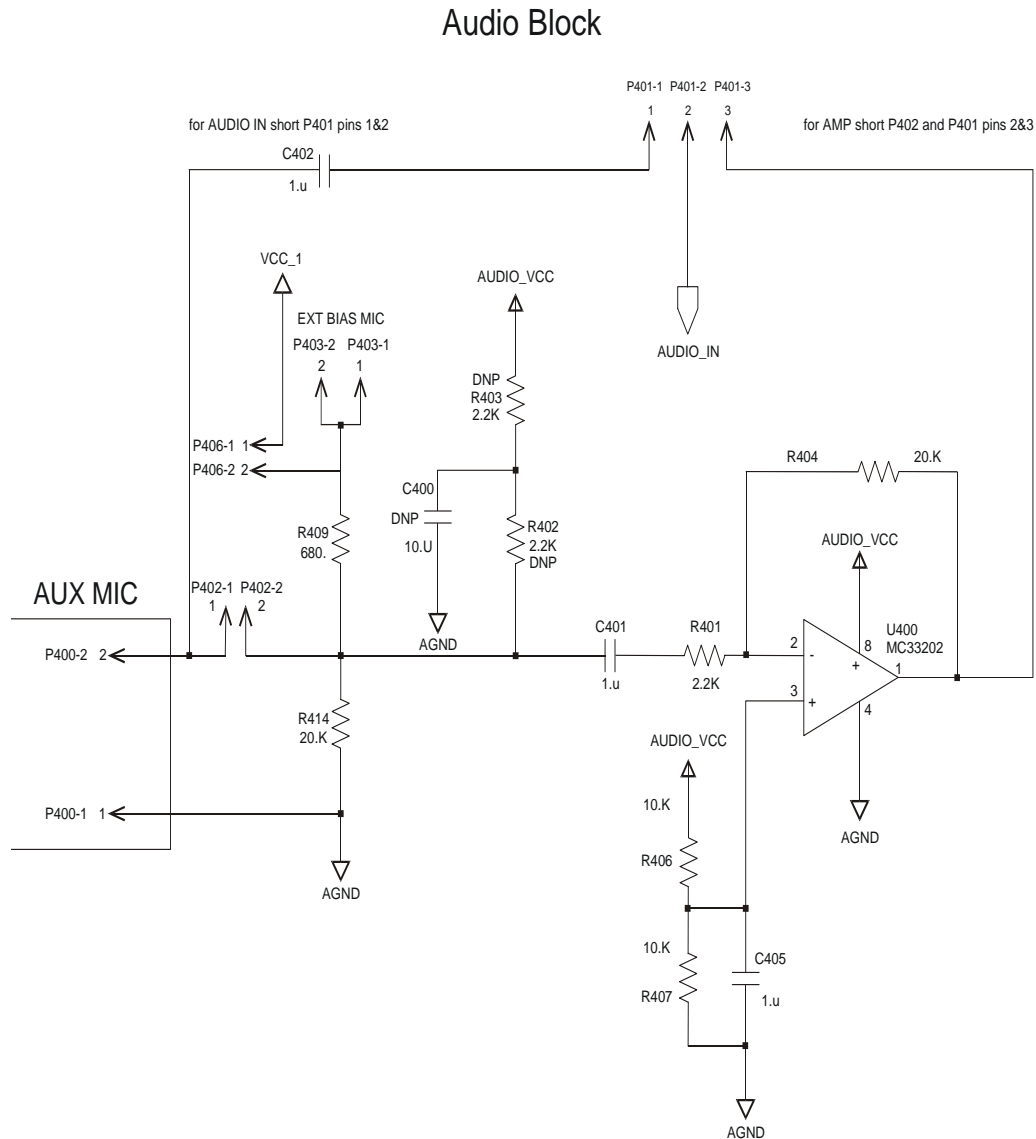


Figure 9. Audio Block Layout

### 3.2.1.6.3 P405 – Differential Earpiece Output Connector

The P405 connector (K in Figure 7) defines the differential earpiece output intended for handset-like applications. The c18 module is capable of driving 35 milliwatts in a 32Ω earpiece using this output. The common mode is 1.2V DC typical.

Table 11. P405 Connector Pinout

Pin #	Pin Name
1	EARPIECE-
2	EARPIECE+

### 3.2.1.6.4 J401 – Socket for Condenser (Electret) Microphone Connector

The J401 connector (L in Figure 7) defines the socket for a condenser (electret) microphone (such as Motorola part number 5087974K01). This differential input is intended for handset-like applications. The socket is routed directly to the c18 module's MIC\_IN- and MIC\_IN+ differential inputs. The c18 module provides the required biasing for an active condenser microphone (1.8 V).

Table 12. J401 Connector Pinout

Pin #	Pin Name
1	MIC_IN+
2	MIC_IN+
3	MIC_IN-
4	MIC_IN-

### 3.2.1.6.5 P404 – Differential Microphone Input Connector

The P404 connector (M in Figure 7) provides a header that can be used for monitoring differential microphone input, or for attaching different condenser microphones that do not fit the J401 socket (F in Figure 2). When different microphones are attached to the P404 connector, the microphone installed in the J401 socket must be removed.

Table 13. P404 Connector Pinout

Pin #	Pin Name
1	MIC_IN-
2	MIC_IN+

### 3.2.1.6.6 J402 – Headset Interface Connector

The J402 connector (N in Figure 7) is for headset connection. A standard Motorola headset is provided in the Developer's Kit (Motorola part number SYN8419B) that can be used as headphones.

Table 14. J402 Connector Pinout

Pin #	Pin Name
1	AGND
2	HEADSET_INT_N
3	HEADSET_SP
4	HEADSET_MIC
5	PD (2.2kΩ pull-down)

### 3.2.1.7 RF Antenna Connectors

This section describes the RF antenna connectors used on the Developer Board.

#### 3.2.1.7.1 P602 – RF Antenna Connector

The P602 connector (O in Figure 7) provides the connection between the c18 module's cellular bands antenna connector (J31) and the on-board antenna (M601; A in Figure 2). This connection is made via an RF cable (Motorola part number 3087563V05) provided in the Developer's Kit. The RF cable can be used to connect the c18 RF interface with an external (user-provided) antenna, or to test equipment. When used with test equipment, the cable should be disconnected from the P602 connector and connected to the test equipment or antenna.

#### 3.2.1.7.2 RF Connector to GPS Antenna

A second RF connector is provided in the Developer's Kit for interfacing with the c18 module's GPS antenna connector (J30). This input connects to the user's GPS antenna directly without going through the Developer Board. The c18 provided with the Developer's Kit is prepared for an active GPS antenna. Therefore, voltage should be supplied to the GPS antenna power via P500 (E in Figure 7) if an active antenna is used.

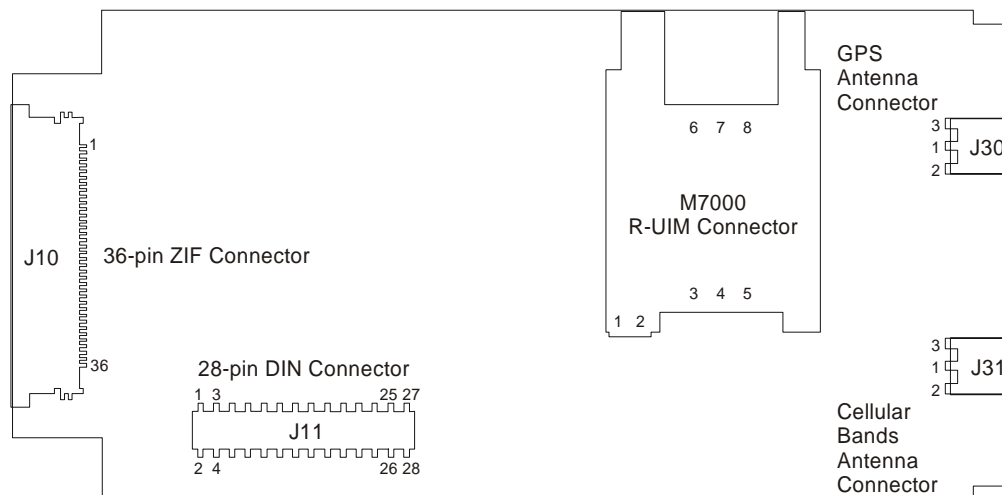


Figure 10. RF Connection to GPS Antenna Connector



Use caution when inserting/removing the RF cable connector to/from the c18 module's J30 and J31 connectors. Do not insert or remove the cable at an angle, but rather straight in/out along the axis of the center pin. Otherwise, a connector may be torn off from the PCB.

When using the active GPS antenna, use only the P500 power supply connector (E in Figure 7). See “P500 – Power Supply Connector” on page 13.

### 3.2.1.8 R-UIM Connector

The J101 connector (P in Figure 7) is an R-UIM-card socket connector.

Table 15. J101 Connector Pinout

Pin #	Pin Name
1	GND
2	UIM_CR_DET
3	UIM_CLK
4	UIM_RESET
5	UIM_PWR
6	UIM_DATA
7	UIM_PWR (UIM_VPP)
8	GND

### 3.2.1.9 Miscellaneous Connectors

This section describes a variety of miscellaneous connectors used on the Developer Board.

#### 3.2.1.9.1 J700 – LCD Connector

The J700 connector (Q in Figure 7) is a serial LCD connector that provides an interface between the Developer Board and the LCD module.



Take care not to manipulate or harm the LCD module in any way. This module is designed to be non-user-accessible.

#### 3.2.1.9.2 J710 – Supplementary Connector for J102

The J710 connector (R in Figure 7) is a supplementary connector for the J102 connector. This connector enables you to use the keypad and LCD module on the c18 module, when using the 36-pin ZIF connector. The keypad and LCD module cannot be accessed when using the 36-pin ZIF connector for the c18 module unless the J710 connector is used. See “Hardware Setup” on page 8.

#### 3.2.1.9.3 J711 – Supplementary Connector for P111

The J711 connector (S in Figure 7) is a supplementary connector for the P111 connector. This connector enables you to use the keypad and LCD modules on the c18 module, when using the 28-pin DIN connector for development purposes. The keypad and LCD module cannot be accessed when using the 28-pin DIN connector for the c18 module unless the J711 connector is used. See “Hardware Setup” on page 8.

### 3.2.1.9.4 P108 – JTAG Connector

The P108 connector (T in Figure 7) is a JTAG connector for non-commercial c18 modules only.

Table 16. P108 Connector Pinout

Pin #	Pin Name
1	JTAG_VCC
2	GND
3	TRST_N
4	GND
5	TDI
6	GND
7	TMS
8	GND
9	TCK
10	GND
11	TDO
12	RESET_IN
13	JTAG_VCC
14	GND



Commercial c18 models do not support a JTAG interface. The P108 connector should not be used with commercial c18 modules, as it may impair their proper operation and possibly damage them.

### 3.2.2 Configuration Switches Description

This section describes the configuration switches used with the Developer Board. Figure 11 shows the location of the three Developer Board configuration switches:

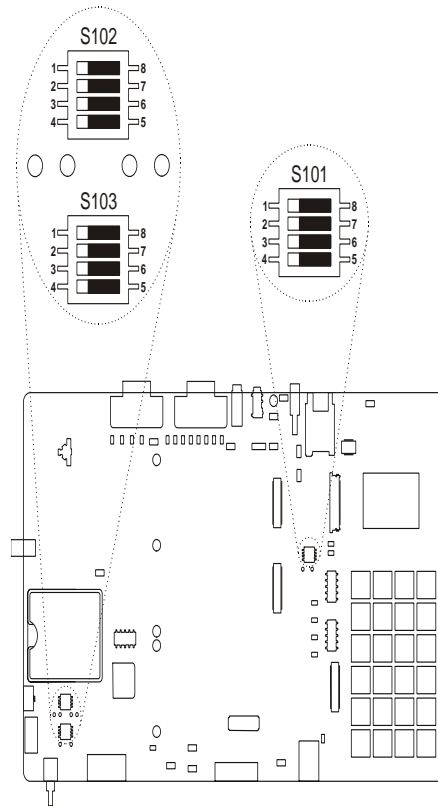


Figure 11. Developer Board Configuration Switches

Configuration switches have the word “ON” printed on them. When a switch tab is set to the ON direction, the switch is closed. When the switch is set in the opposite direction, the switch is open. See Figure 12 for reference.

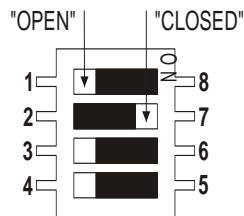


Figure 12. Configuration Switches Closeup

### 3.2.2.1 S101 – Operation Mode Switch

The S101 is an operation mode switch.

Table 17. S101 Switch Settings

Switch Pins	Switch Name	Signal State (Value)	
		Open (OFF)	Closed (ON)
1 – 8	OPT1	1	0
2 – 7	OPT2	1	0
3 – 6	AUDIO_IN	1	0
4 – 5	FLASHING	Disabled	Enabled

### 3.2.2.2 S102 – Ignition Switch

The S102 switch is an ignition switch.

Table 18. S102 Switch Settings

Switch Pins	Switch Name	Signal State (Value)	
		Open (OFF)	Closed (ON)
1 – 8	IGNITION	0	VCC
2 – 7	GPIO8_FOOTSWITCH	1	0
3 – 6	SPARE	-	-
4 – 5	SPARE	-	-



**Note**

For proper functioning of the ignition function, the c18 VCC must be 4.0 V or higher.

### 3.2.2.3 S103 – JTAG Mode Switch

The S103 switch is a JTAG mode switch.

Table 19. S103 Switch Settings

Switch Pins	Switch Name	Signal State (Value)	
		Open (OFF)	Closed (ON)
1 – 8	TMODE	1	0
2 – 7	WDOG_EN	1	0
3 – 6	PS_HOLD	PS_HOLD	JTAG_VCC
4 – 5	SPARE	-	-

### 3.2.2.4 Supported Operation Modes

The following operation modes are supported by the c18 module:

- RS232 mode
- USB mode
- RS232 + USB mode
- Flashing mode
- JTAG mode

The required switch settings for each of these modes are described in the sections that follow.

#### 3.2.2.4.1 RS232 Mode

Table 20 shows the required switch settings for RS232 mode operation.

Table 20. RS232 Mode Settings

S101		S102	
Switch Name	Switch State	Switch Name	Switch State
OPT1	Closed	IGNITION	Open
OPT2	Open	GPIO8_FOOTSWITCH	Don't Care
AUDIO_IN	Open	SPARE	Don't Care
FLASHING	Open	SPARE	Don't Care

### 3.2.2.4.2 USB Mode

Table 21 shows the required switch settings for USB mode operation. USB\_VBUS is greater than 4.0 V in this operational mode (for example, when the module is connected to the active USB port).

Table 21. USB Mode Settings

S101		S102	
Switch Name	Switch State	Switch Name	Switch State
OPT1	Open	IGNITION	Open
OPT2	Open	GPIO8_FOOTSWITCH	Don't Care
AUDIO_IN	Open	SPARE	Don't Care
FLASHING	Open	SPARE	Don't Care

### 3.2.2.4.3 RS232 + USB Mode

Table 22 shows the required switch settings for RS232 + USB mode operation.

Table 22. RS232 + USB Mode Settings

S101		S102	
Switch Name	Switch State	Switch Name	Switch State
OPT1	Open	IGNITION	Open
OPT2	Open	GPIO8_FOOTSWITCH	Don't Care
AUDIO_IN	Closed	SPARE	Don't Care
FLASHING	Open	SPARE	Don't Care

### 3.2.2.4.4 Flashing Mode

Table 23 shows the required switch settings for flashing mode operation.

Table 23. Flashing Mode Settings

S101		S102	
Switch Name	Switch State	Switch Name	Switch State
OPT1	Open	IGNITION	Open
OPT2	Open	GPIO8_FOOTSWITCH	Don't Care
AUDIO_IN	Open	SPARE	Don't Care
FLASHING	Closed	SPARE	Don't Care



The c18 module can enter flashing mode only on power-up. To enter flashing mode, power down the c18 module, set the switches as shown above, and then power up the c18 again.

Flashing mode is used to update the software version on the c18 module, and is typically performed by Motorola personnel.

### 3.2.2.4.5 JTAG Mode



The c18 module provided with the Developer's Kit **does not** support JTAG mode.

Attempting to enter JTAG mode on commercial c18 models can damage the module or disturb its proper operation. All four switches (TMODE, WDOG\_EN, PS\_HOLD and SPARE) should be kept OPEN in all normal usage modes. Commercial c18 models do not support JTAG mode.

In order to enter JTAG mode on JTAG-enabled c18 models, the TMODE and WDOG\_EN switches should be closed. The module should be powered up before closing the PS\_HOLD switch.

## 3.2.3 Jumper Description

This section describes the required jumper settings for Developer Board operation.

### 3.2.3.1 P501 – c18 Power Supply Jumper

The settings for the P501 c18 power supply jumper are shown in Table 24.

Table 24. P501 Jumper Settings

State	Description
Closed	VCC supplied to c18 module
Open	VCC disconnected from c18 module

Figure 14 shows the location of the P501 power supply jumper on the Developer Board:

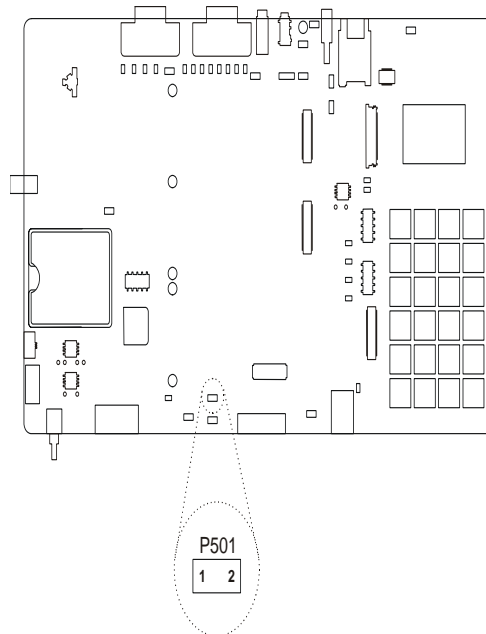


Figure 13. P501 Location

P501 should be closed for proper c18 operation. This jumper can be replaced with an ampere meter in order to measure c18 current consumption.



**Note**

The current drawn by the c18 module can vary depending on the hardware configuration in use and the possible c18 loads (for example, LCD, backlight LEDs, Vibrator, and so on).

### 3.2.3.2 P401 – Audio Input Path Selection Jumper

Table 25 shows the required P401 jumper settings for audio input path selection.

Table 25. P401 Jumper Settings

State	Description
1-2	AUDIO_IN directly routed to c18
2-3	AUDIO_IN routed to c18 through preamplifier

### 3.2.3.3 P402 – Preamplifier Input Jumper

Table 26 shows the required P402 jumper settings to enable preamplifier input.

Table 26. P402 Jumper Settings

State	Description
Closed	AUDIO_IN routed to the preamplifier on the Developer Board
Open	AUDIO_IN disconnected from the preamplifier

### 3.2.3.4 P403 – Auxiliary Audio Input Jumper (External Bias Mode)

P403 acts as a header, which provides the user with an access point for supplying external microphone bias different from the bias built into the Developer Board. If this kind of bias is needed, connect the external bias source to both pins (they are shorted to each other).

### 3.2.3.5 P406 – Auxiliary Audio Input Jumper (Internal Bias Mode)

Table 27 shows the required P406 jumper settings for auxiliary audio input operating in internal bias mode.

Table 27. P406 Jumper Settings

State	Description
Closed	4.5V DC bias enabled
Open	Internal DC bias disabled

### 3.2.4 LED Indicators Description

There are six groups of LED Indicators on the Developer Board, as follows:

- **Green LED power indicator (D501):** Indicates that power supply voltage is present and the ON/OFF switch is ON.
- **Red LED UART1 indicators (D200 through D207):** Indicate the state of each of the eight UART1 signals.
- **Red LED UART2 indicators (D210 through D213):** Indicate the state of each of the four UART2 signals.
- **Red LED USB VBUS indicator (D300):** Indicates the presence of a USB interface.
- **Red GPIO-state indicators (D130 through D133):** Indicate the inverse state of the GPIO5, GPIO6, GPIO7 and GPIO9 pins.
- **Green backlight LED indicators, including:**
  - **D731:** Keypad (KEYB\_DRV) backlight indicator.
  - **D730:** LCD (BL\_SINK) backlight indicator.

Figure 14 shows the location of the LED indicators on the Developer Board:

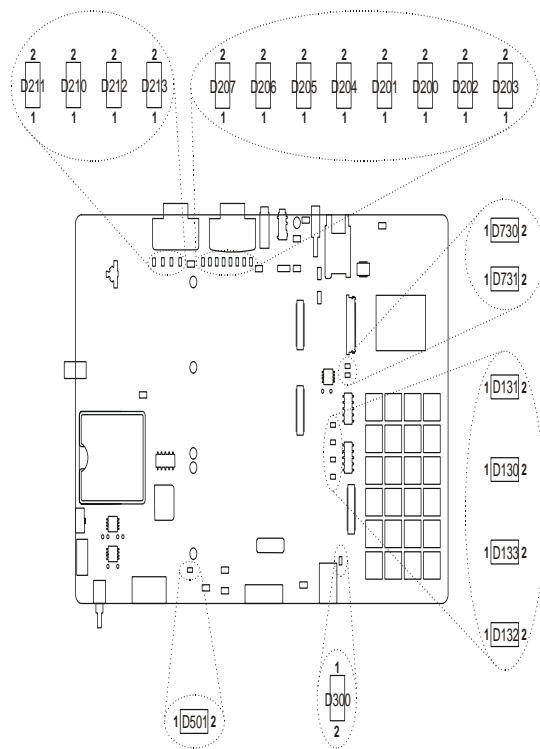


Figure 14. LED Indicators Location

### 3.2.5 Headers Description

This section describes the headers used with the Developer Board. Figure 15 below shows the location of the headers on the Developer Board:

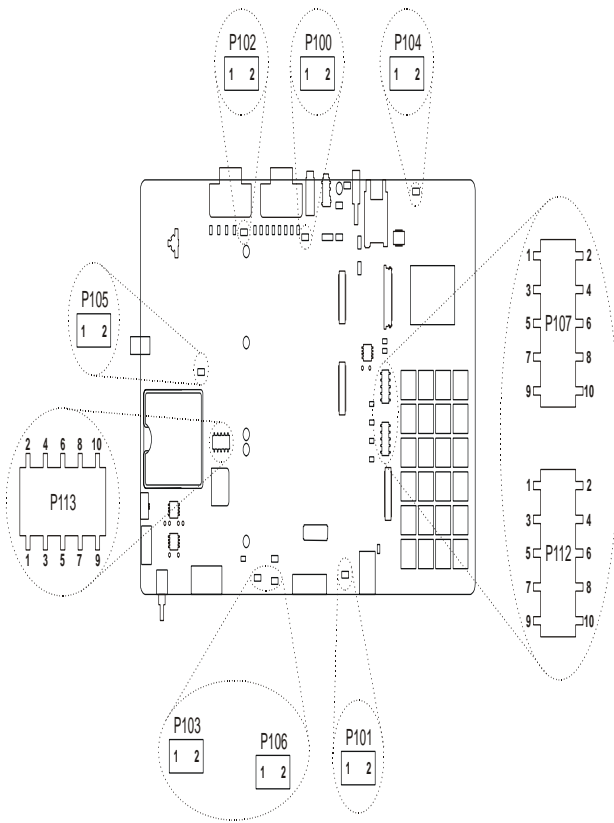


Figure 15. Headers Location

### **3.2.5.1 Signal Headers**

This section describes Developer Board signal headers used to monitor signals of interest.

#### **3.2.5.1.1 P107 – Signal Header**

Table 28 shows the pinout for the P107 signal header.

Table 28. P107 Signal Header Pinout

Pin #	Pin Name
1	GND
2	VIBRATOR
3	ADC1
4	ADC2
5	WAKE_IN_N
6	PCM_DIN_GPIO1
7	PCM_DOUT_GPIO2
8	PCM_CLK_GPIO3
9	PCM_FS_GPIO4
10	WAKE_OUT_N

### 3.2.5.1.2 P112 – Signal Header

Table 29 shows the pinout for the P112 signal header.

Table 29. P112 Signal Header Pinout

Pin #	Pin Name
1	GND
2	GPIO5
3	GPIO9
4	GPIO6_ENT_MUTE
5	GPIO7_SP_MUTE
6	GPIO8_FOOTSWITCH
7	U2_RS232_RX
8	U2_RS232_RTS
9	U2_RS232_TX
10	U2_RS232_CTS

### 3.2.5.1.3 P113 – Signal Header

Table 30 shows the pinout for the P113 signal header.

Table 30. P113 Signal Header Pinout

Pin #	Pin Name
1	GND
2	U1_RS232_DCD
3	U1_RS232_DSR
4	U1_RS232_RX
5	U1_RS232_RTS
6	U1_RS232_TX
7	U1_RS232_CTS
8	U1_RS232_DTR
9	U1_RS232_RI
10	GND

### 3.2.5.2 P106 – VCC Header

The P106 header is used to monitor VCC voltage.

### 3.2.5.3 Ground Headers

The Developer Board ground headers include the P100, P101, P102, P103, P104 and P105 headers.

### 3.2.6 Test Points Description

Table 31 lists the Developer Board test points.

Table 31. Test Points

Test Point	Descriptor
TP100	OPT1 pin
TP101	SPARE pin
TP102	SPARE pin
TP103	SPARE pin
TP104	SPARE pin
TP105	SPARE pin
TP106	SPARE pin
TP120	OPT2 pin

Figure 16 shows the location of the test points on the Developer Board:

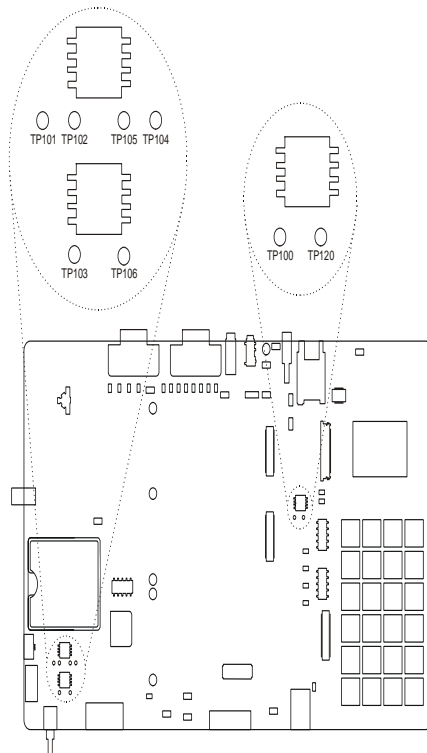


Figure 16. Test Points Location



# MECHANICAL DESCRIPTION

---

---

---

---

---

---

---

---

---

---

---

---

The c18 Developer Board measures 250 mm x 160 mm. Table 32 lists the board connectors, including their manufacturer and part number.

Table 32. Developer Board Connectors

Ref	Description	Manufacturer	Manufacturer P/N
J220	DB-9 RS-232	Tyco Electronics	788797-1
J210	DB-9 RS-232	Tyco Electronics	788797-1
J402	Headset	Hosiden	HSJ1805-019070
J410	Speaker	Hosiden	HSJ1501-01901D
J101	R-UIM connector	FCI	7111S1615A01
J710	70-pin connector	Molex	52991-0708
J711	70-pin connector	Molex	52991-0708
J102	36-pin ZIF connector	Elco	04-6240-036-003-800
J300	USB B receptacle	Molex	67068-0001
P111	DIN 28 pin	Samtec	CLP-114-02-L-D-P-TR



## 5.1 CUSTOMER ASSISTANCE

For customer assistance, contact us as directed below:

**Help desk email:** n2cshd@motorola.com

**Help desk telephone:** +972-3-568-4040

## 5.2 TROUBLESHOOTING

Refer to Table 33 for assistance in troubleshooting c18 problems.

Table 33. Troubleshooting

Problem	Possible Cause	Action
The c18 module does not turn on and the Developer Board LEDs are off.	There is no supply voltage.	<ul style="list-style-type: none"> <li>Verify that the main switch (S500; U in Figure 7) is on.</li> <li>Check the fuse (F500; Z in Figure 2) and replace it if the fuse has blown.</li> <li>Check the power supply connections.</li> </ul>
The c18 module does not turn on and the Developer Board LEDs are on.	The module is not turned on.	Press on PWR key for at least two seconds.
The c18 module does not turn on and the Developer Board LEDs are on.	The P501 jumper has been removed.	Ensure that the P501 jumper is in place in order to enable voltage supply to the module.
The c18 module does not turn on and the Developer Board LEDs are on.	The module is connected to the wrong connector (J710; R in Figure 7).	Typically, the module should be mounted on J110. If operation through a 36-pin connector is required, ensure that the module is connected to J102 (B in Figure 7) via the 36-pin flex cable, and plug it in to the J710 connector (R in Figure 7) if the LCD and keypad are required.

Table 33. Troubleshooting (Continued)

Problem	Possible Cause	Action
<p>The c18 is on, it responds to the keypad, and the LCD is active. However, there is no communication via RS232.</p>	<p>Configuration switches are set incorrectly.</p>	<ul style="list-style-type: none"> <li>• Set the S101 and S102 configuration switches (X in Figure 2) as required. See “RS232 Mode Settings” on page 26.</li> <li>• Ensure that all S103 (X in Figure 2) switches are open.</li> </ul>
<p>The c18 is on, it responds to the keypad, and the LCD is active. However, there is no communication via RS232.</p>	<p>There are problems with the physical connection between the Developer’s Kit and the PC.</p>	<ul style="list-style-type: none"> <li>• Check the cable connections.</li> <li>• Verify that the correct PC COM port is used.</li> <li>• Check that the Developer Board UART1 (J210; F in Figure 7) is used.</li> </ul>
<p>The c18 is on, it responds to the keypad, and the LCD is active. However, there is no communication via RS232.</p>	<p>The communication software (such as HyperTerminal) is not set properly.</p>	<p>Check the terminal setup. It should be set as follows:</p> <ul style="list-style-type: none"> <li>• 19200 bps.</li> <li>• 8 bits data.</li> <li>• No parity.</li> <li>• 1 stop bit.</li> </ul>

## 6.1 DEVELOPER BOARD PART LIST

Table 34. Developer Board Part List

REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION
<b>Resistors</b>		
R100-102	0662057P10	RES 10K
R103	0662057B47	RES 0
R105	0662057P10	RES 10K
R106	0662057B47	RES 0
R107-110	0662057A45	RES 680
R112-130	0662057B47	RES 0
R132-136	0662057B47	RES 0
R138	0662057B47	RES 0
R140-144	0662057P10	RES 10K
R145	0662057B47	RES 0
R200-207	0662057A45	RES 680
R210-213	0662057A45	RES 680
R233	0662057P10	RES 10K
R234	0662057B47	RES 0
R250-252	0662057B47	RES 0
R300	0662057A45	RES 680
R400	0662057A57	RES 2.2K
R401	0662057A57	RES 2.2K
R404	0662057A8	RES 20K
R406-407	0662057P10	RES 10K
R409	0662057A45	RES 680
R412-413	0662057B47	RES 0
R414	0662057A80	RES 20K
R415	0662057B47	RES 0
R500	0662057A35	RES 270
R501	0662057P15	RES 13K
R502	0662057T61	RES 7.5
R503	0662057P10	RES 10K
R504	0662057T61	RES 7.5K

Table 34. Developer Board Part List (Continued)

REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION
R510	0662057B47	RES 0
R511	0662057B47	RES 0
R514	0662057A13	RES 33
R522-523	0662057B47	RES 0
R600	0662057B47	RES 0
R701-714	0662057B47	RES 0
R717	0662057B47	RES 0
R719-722	0662057B47	RES 0
R730-731	0662057A35	RES 270
R748-756	0662057B47	RES 0
Capacitors		
C101	2113928A01	CAP 1 $\mu$ F
C201	2113928A01	CAP 1 $\mu$ F
C202	2113928A01	CAP 1 $\mu$ F
C203	2113928A01	CAP 1 $\mu$ F
C204	2113928A01	CAP 1 $\mu$ F
C205	2113743E20	CAP 100nF
C211	2113928A01	CAP 1 $\mu$ F
C212	2113928A01	CAP 1 $\mu$ F
C213	2113928A01	CAP 1 $\mu$ F
C214	2113928A01	CAP 1 $\mu$ F
C215	2113743E20	CAP 100nF
C401	2113928A01	CAP 1 $\mu$ F
C402	2113928A01	CAP 1 $\mu$ F
C405	2113928A01	CAP 1 $\mu$ F
C410	2113928A01	CAP 1 $\mu$ F
C500	2311049C55	CAPP 330 $\mu$ F
C501	2113928D08	CAP 10 $\mu$ F
C502	2113928D08	CAP 10 $\mu$ F
C503	2113928D08	CAP 10 $\mu$ F
C504	2113928D08	CAP 10 $\mu$ F
C505	2113743E20	CAP 100nF
C506	2113743E20	CAP 100nF
C507	2113743E20	CAP 100nF
C508	2113743E20	CAP 100nF
C509	2113743E20	CAP 100nF
C510	2109622N06	CAP 1nF
C511	2113743E20	CAP 100nF
C512	2113928D08	CAP 10 $\mu$ F
C513	2113928D08	CAP 10 $\mu$ F

Table 34. Developer Board Part List (Continued)

REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION
C515	2113928D08	CAP 10 $\mu$ F
C601	2113740F01	CAP 0.5pF
C603	2113740F21	CAP 5.6pF
C700	2113740F41	CAP 39.pF
C701	2113740F41	CAP 39.pF
C702	2113740F41	CAP 39.pF
C703	2113740F41	CAP 39.pF
C704	2113740F41	CAP 39.pF
C705	2113740F41	CAP 39.pF
Diodes		
D130-133	4805729G44	RED LED BR1102W
D200-207	4805729G44	RED LED BR1102W
D210-213	4805729G44	RED LED BR1102W
D300	4805729G44	RED LED BR1102W
D500	4813833B04	3.0A SCHOTTKY MBRS320
D501	4802579S03	GREEN LED AG1102W
D730-731	4802579S03	GREEN LED AG1102W
VR100	4813832C28	15V ZENER MMBZ15
VR200-207	4813832C28	15V ZENER MMBZ15
VR210-213	4813832C28	15V ZENER MMBZ15
VR500	4813831A13	4.7V ZENER 1SMB591 3BT3-D
Connectors and Headers		
J101	4009060S03	RUIM SOCKET WITH CARD DETECT
J102	0988716K01	36-PIN ZIF CONNECTOR
J110	2887581U01	70-PIN CONNECTOR
J210	0909672B03	DB9 RECEPTACLE RIGHT ANGLE
J220	0909672B03	DB9 RECEPTACLE RIGHT ANGL
J300	0987583U01	USB B RECEPTACLE
J401	0985622G01	2-PIN MIC SOCKET
J402	0987837L02	2.5mm HEADSET RECEPTACLE
J410	0909032K01	3.5mm SPEAKER RECEPTACLE
J500	0989601K01	3-PIN RECEPTACLE P2K
J700	0987817K01	22-PIN RECEPTACLE
J710	2887581U01	70-PIN CONNECTOR
J711	2887581U01	70-PIN CONNECTOR
P100-106	2880001R02	2- PIN HEADER

Table 34. Developer Board Part List (Continued)

REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION
P107	2802935S07	10-PIN HEADER
P108	2808044H01	14-PIN HEADER
P111	2880471L02	28-PIN MALE DIN
P112-113	2802935S07	10-PIN HEADER
P400	2809711B04	2-PIN HEADER RIGHT ANGLE
P401	2880001R03	3- PIN HEADER
P402-406	2880001R02	2-PIN HEADER
P500	3102151C30	3-PIN POWER TERMINAL
P501	2880001R02	2-PIN HEADER
P602	0909908P02	FEMALE SMA CONN
<b>Inductor</b>		
L603	2413926G01	IDCTR 3.3nH
<b>Transistors</b>		
Q130-133	4809579E18	P-CHAN MOSFET TP0101T
Q200-207	4809579E18	P-CHAN MOSFET TP0101T
Q210-213	4809579E18	P-CHAN MOSFET TP0101T
Q300	4809579E16	N-CHAN MOSFET TN0200
<b>Integrated Circuits</b>		
U200	5109781E76	RS232 TRANSCIEVER MAX3238
U205	5109781E76	RS232 TRANSCIEVER MAX3238
U210	5113837A29	TRIPPLE BUFFER NL37WZ16U
U400	5113818A14	DUAL OP AMP MC3320
U500	5104187K10	LINEAR REGULATOR MAX604ESA
U501	5104187K10	LINEAR REGULATOR MAX604ESA
<b>Mechanical Parts</b>		
M100	4302809C1	SPACER
M101	4302809C13	SPACER
M102	4387646V01	SPACER
M103	4387646V0	SPACER
M104-106	4387647V01	SPACER
M601	3903920K01	ANTENNA CONTACT
S101-103	4080564C02	DIP SWITCH
S500	4008241G06	SWITCH ET01
SH1	2604044K01	SHIELD
S_0	4089323U01	SWITCH
S_1	4089323U01	SWITCH

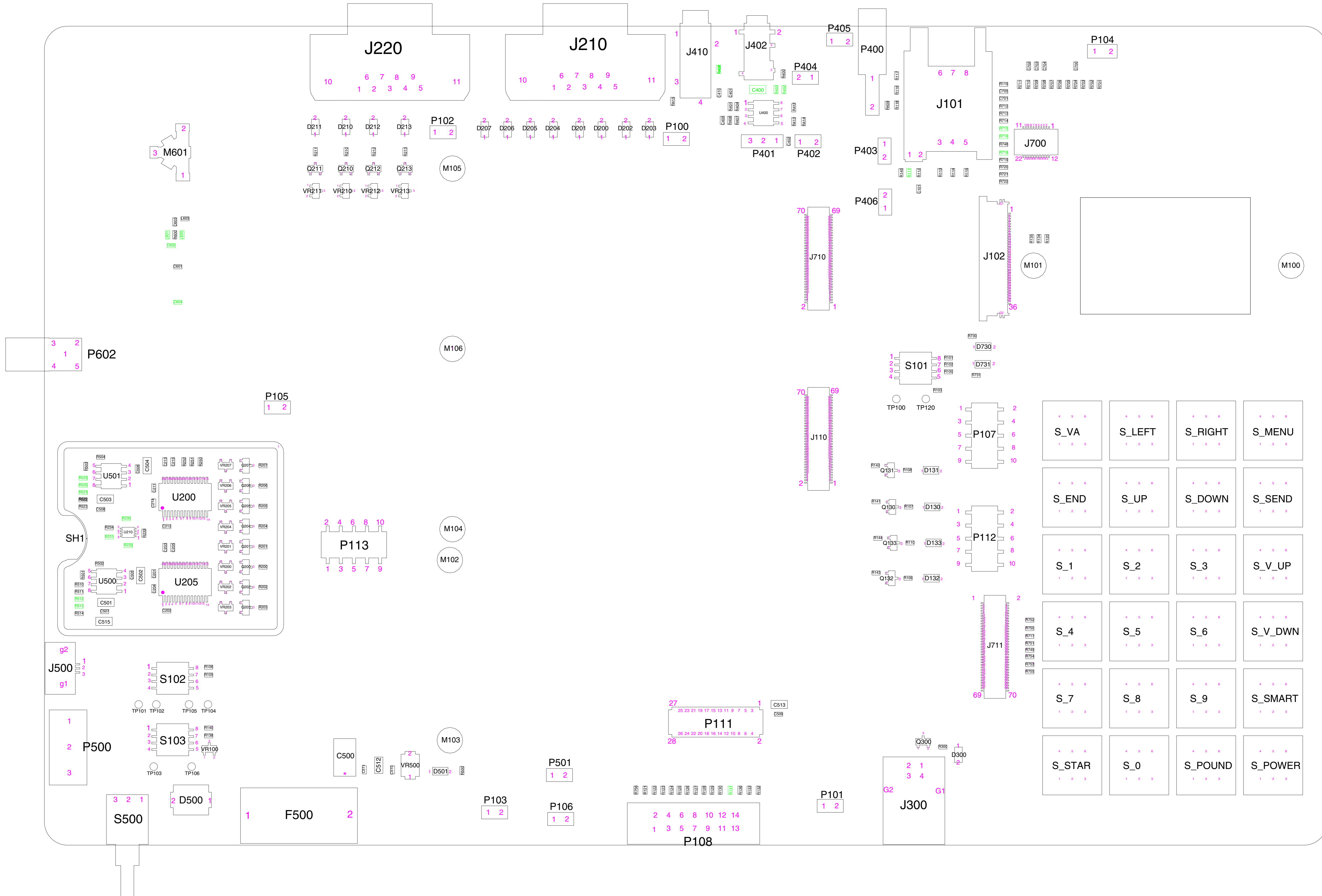
Table 34. Developer Board Part List (Continued)

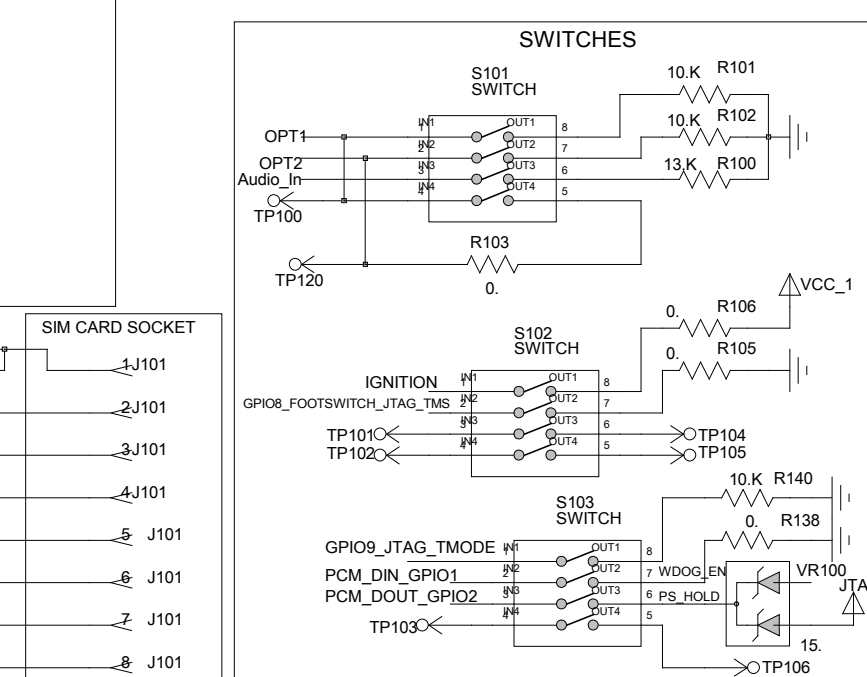
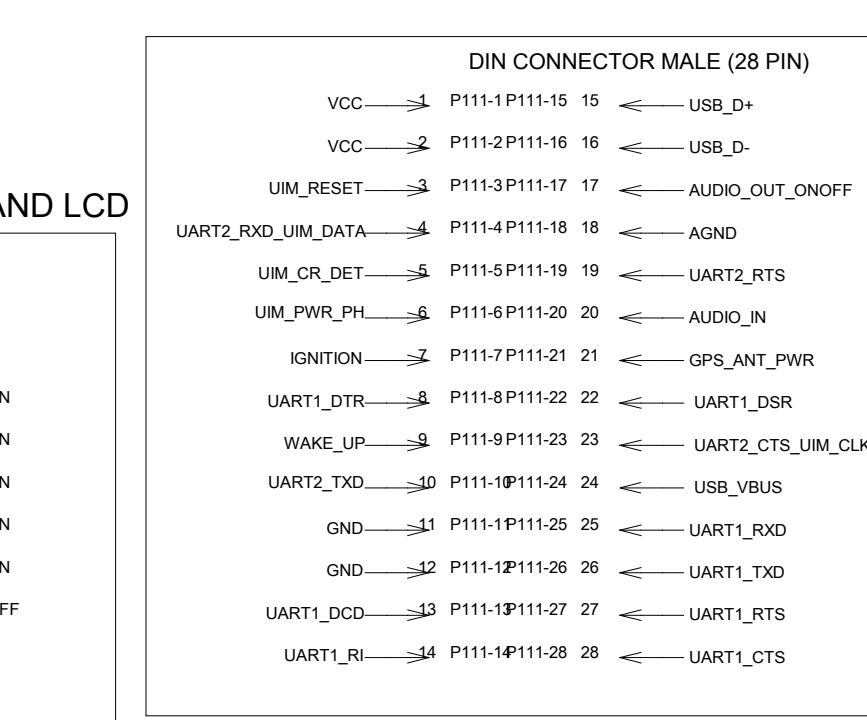
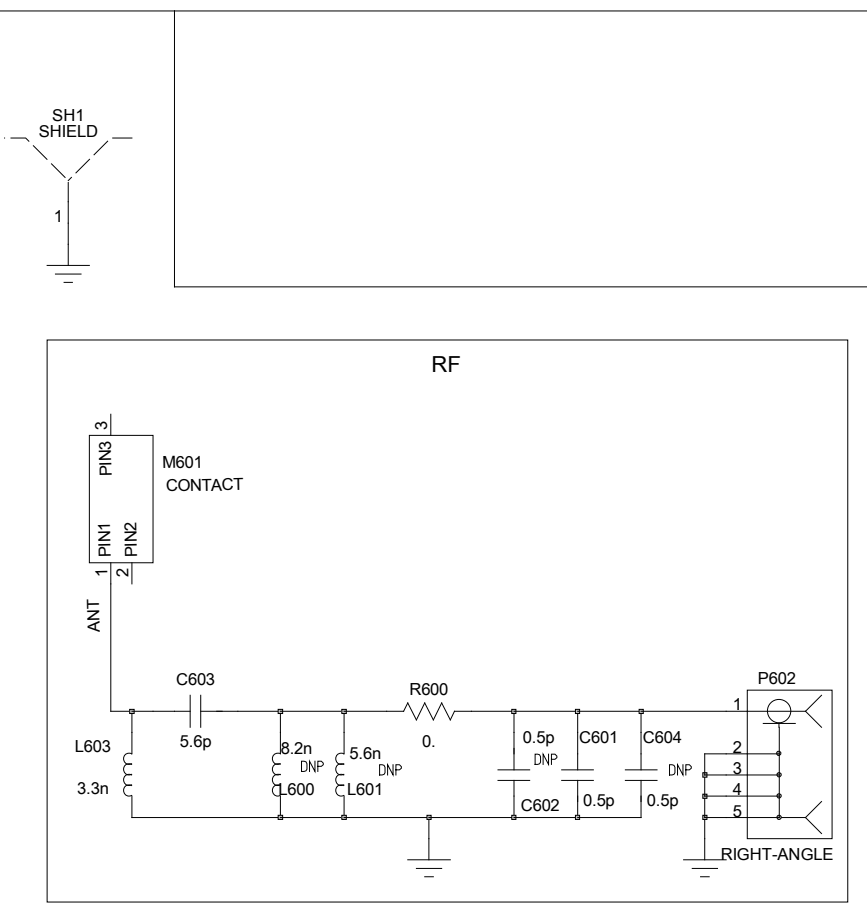
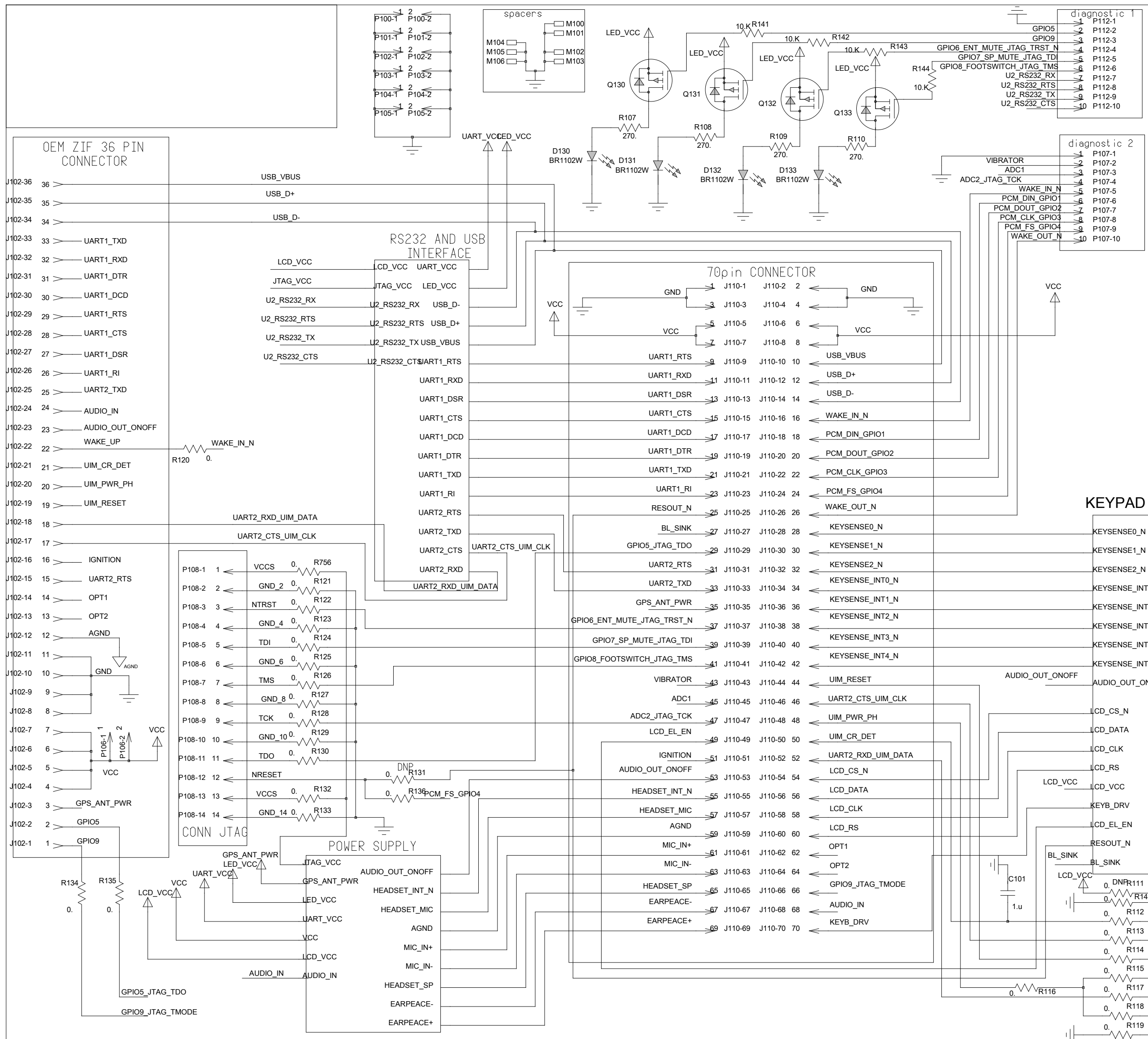
REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION
S_2	4089323U01	SWITCH
S_3	4089323U01	SWITCH
S_4	4089323U01	SWITCH
S_5	4089323U01	SWITCH
S_6	4089323U01	SWITCH
S_7	4089323U01	SWITCH
S_8	4089323U01	SWITCH
S_9	4089323U01	SWITCH
S_DOWN	4089323U01	SWITCH
S_END	4089323U01	SWITCH
S_LEFT	4089323U01	SWITCH
S_MENU	4089323U01	SWITCH
S_POUND	4089323U01	SWITCH
S_POWER	4089323U01	SWITCH
S_RIGHT	4089323U01	SWITCH
S_SEND	4089323U01	SWITCH
S_SMART	4089323U01	SWITCH
S_STAR	4089323U01	SWITCH
S_UP	4089323U01	SWITCH
S_VA	4089323U01	SWITCH
S_V_DWN	4089323U01	SWITCH
S_V_UP	4089323U01	SWITCH
SF500	0904923K01	FUSE HOLDER





# ADB P2 Top Side Components View (8489719u01\_p2, KIT FTN8126A)





ISSUE	RELEASE	DATE	APVD
O	XXXX	XXIX	XXXX
A	XXXX	XXIX	XXXX
B	XXXX	XXIX	XXXX
C	XXXX	XXIX	XXXX
D	XXXX	XXIX	XXXX

FUNCTION	REF DES	RANGE
TOP	100-199	
RS232	200-299	
USB	300-399	
AUDIO	400-499	
POWER SUPPLY	500-599	
RF	600-699	
LCD AND KEYPAD	700-799	

1. DRAWING GENERATED BY COMPUTER.  
2. MOTOROLA CONFIDENTIAL PROPRIETARY !!

**MOTOROLA**

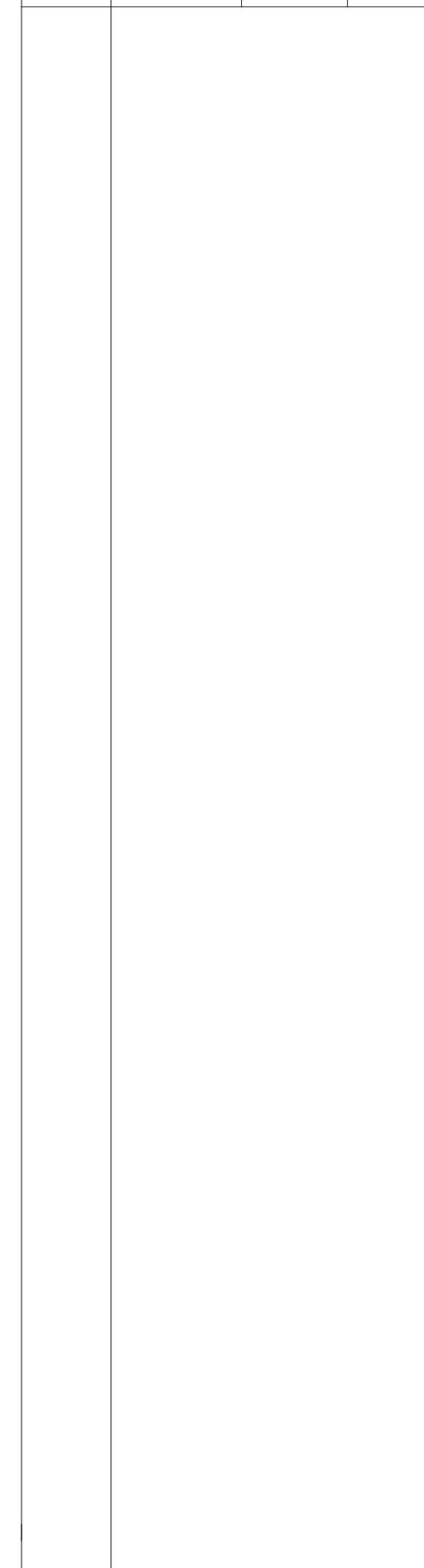
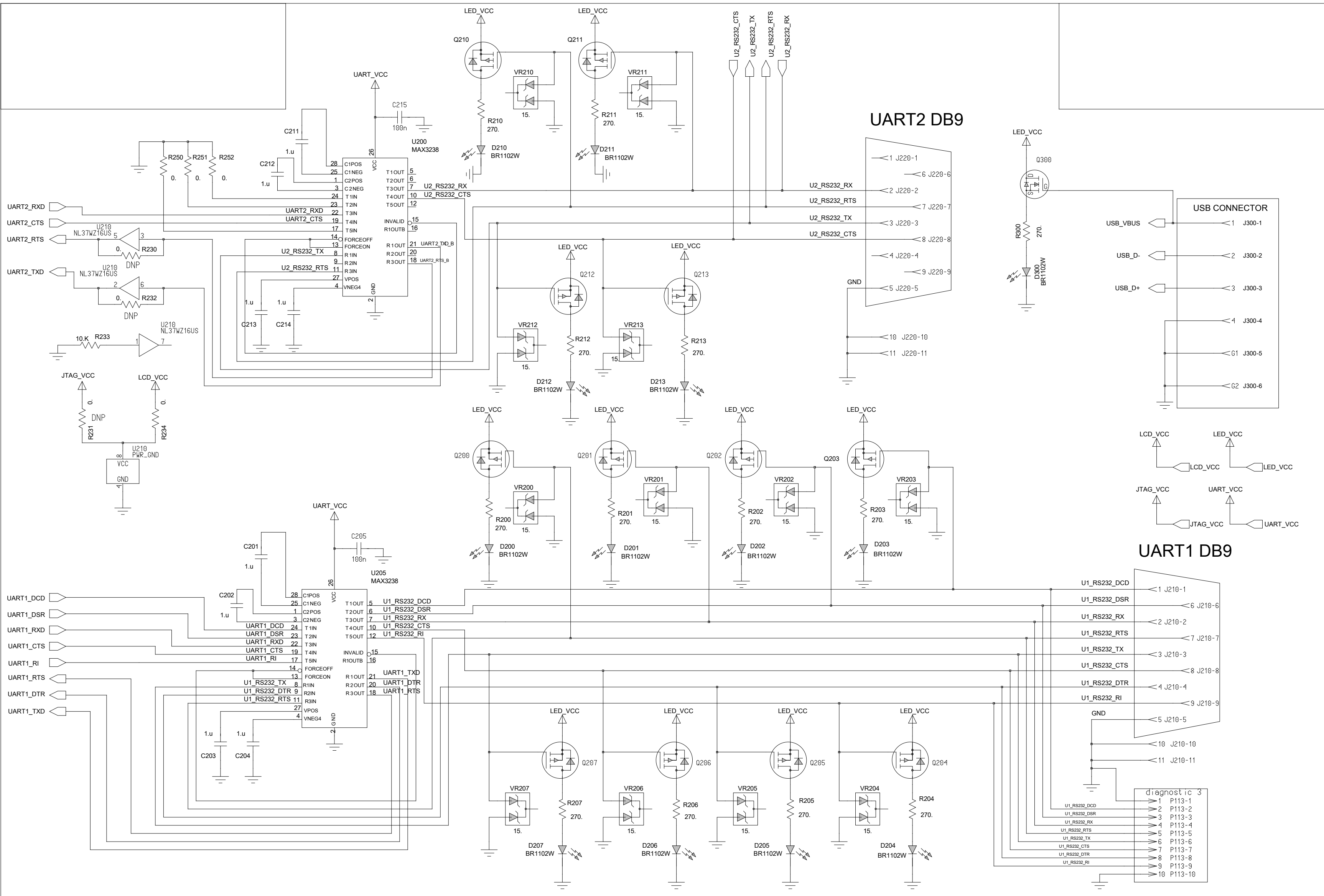
PROJ. C18- ADB

DESCRIPTION: KIT NO. FTN8126A NAME ADB - APPLICATION DEVELOPMENT BOARD 8489719u01\_p2 PCB\_NO:

DRAWN	BNK010	26/12/2002	CHECKED	XXXX	XX/XX/XX
APPROVED	XXXX	XX/XX/XX	RELEASED	XXXX	XX/XX/XX

X X D X X X X X G X X - X SHEET 1 OF X

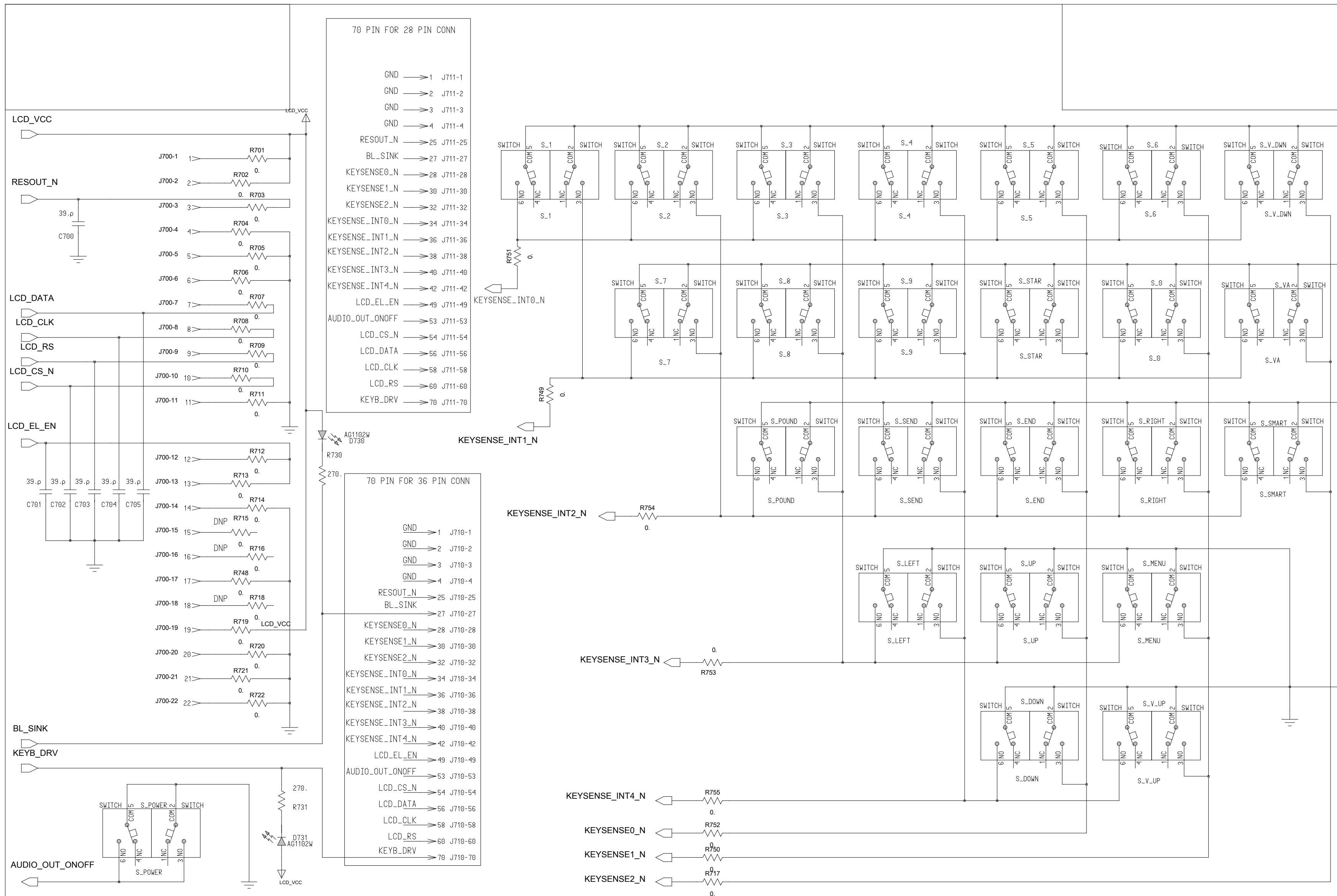
ISSUE	RELEASE	DATE	APVD
O	XXXXX	XX XX	XXXX
A	XXXXX	XX XX	XXXX
B	XXXXX	XX XX	XXXX
C	XXXXX	XX XX	XXXX
D	XXXXX	XX XX	XXXX



PROJ.	C-18 - ADB				
DESCRIPTION:	KIT NO.		NAME	PCB_NO:	
FTN8126A	FTN8126A		RS232 AND USB INTERFACE	8489719u01_p2	
DRAWN	BMY013	10/12/2002	CHECKED	XXXX	XX/XX/XX
APPROVED	XXXX	XX/XX/XX	RELEASED	XXXX	XX/XX/XX
X	X	D	X	X	X
X	X	X	X	G	X
X	X	-	X		
SHEET				X	OF X

1. DRAWING GENERATED BY COMPUTER.  
 2. MOTOROLA CONFIDENTIAL PROPRIETARY !!

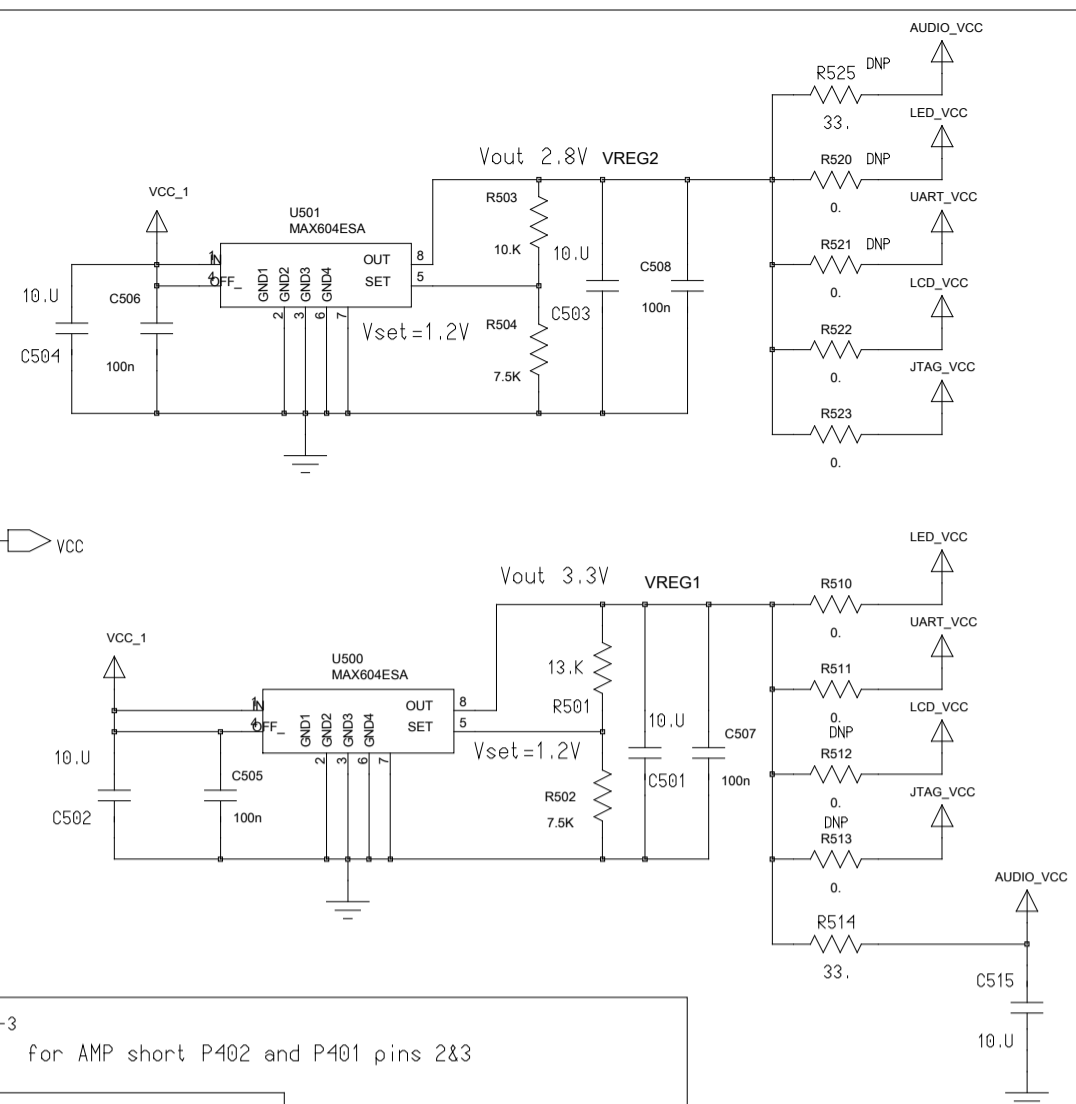
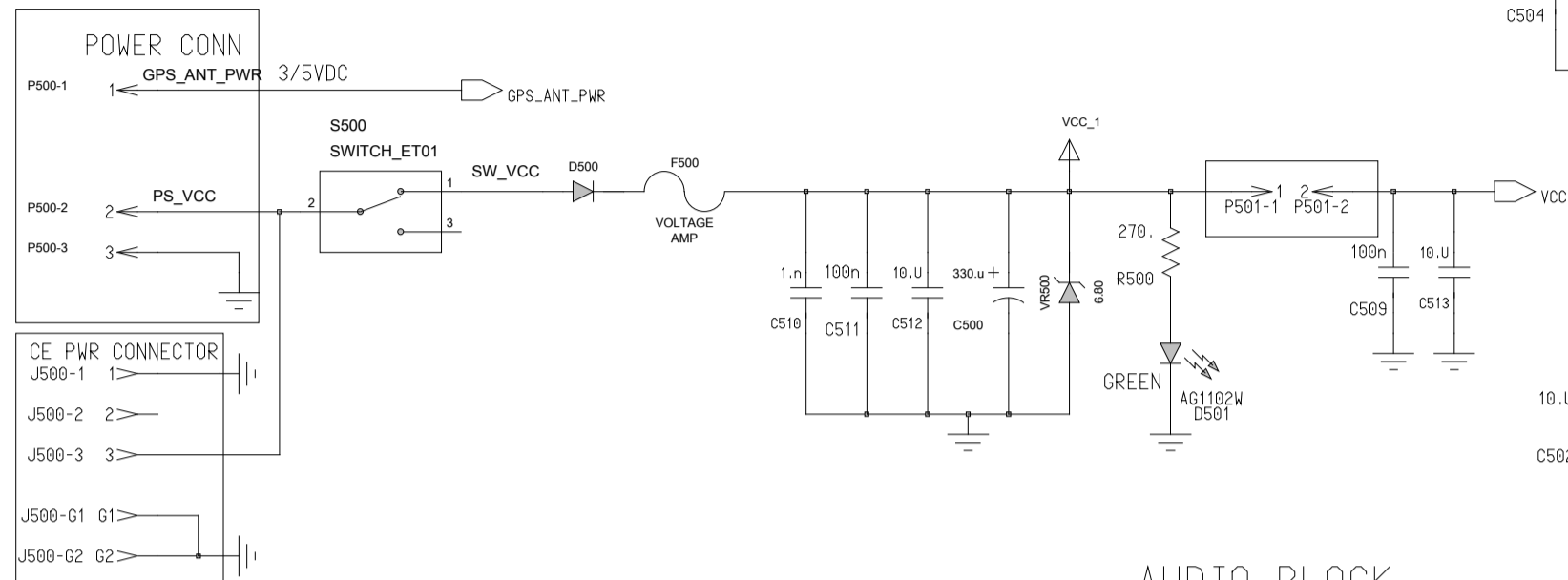
ISSUE	RELEASE	DATE	APVD
O	XXXX	XXIX	XXXX
A	XXXX	XXIX	XXXX
B	XXXX	XXIX	XXXX
C	XXXX	XXIX	XXXX
D	XXXX	XXIX	XXXX



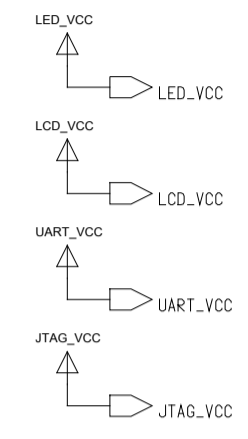
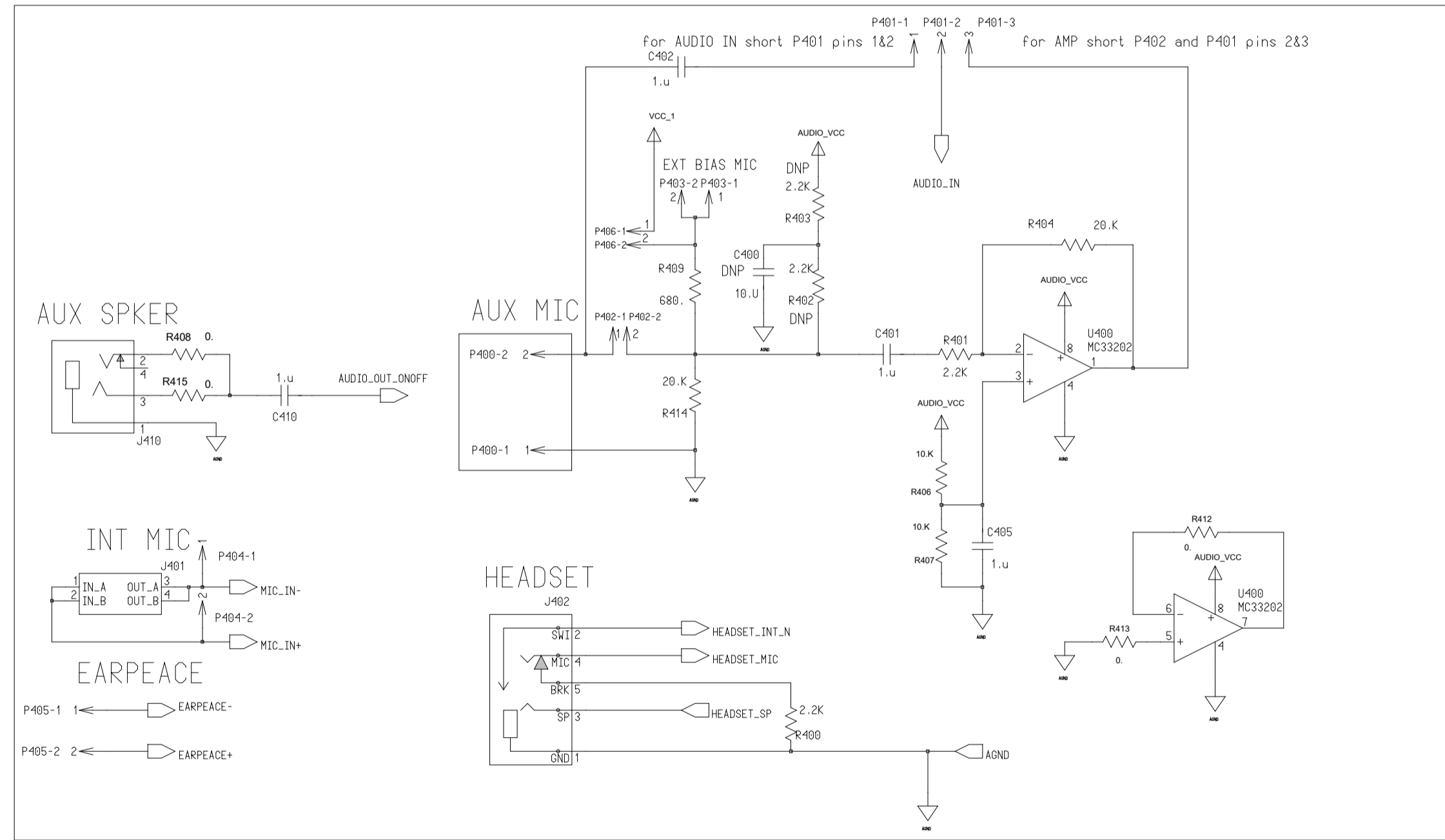
PROJ. <b>C18 ADB</b>					
DESCRIPTION: KIT NO. FTN8126A		NAME KEYPAD AND LCD		PCB_NO: 8489719u01_P2	
DRAWN	BMY013	09/12/2002	CHECKED	XXXX	XX/XX/XX
APPROVED	XXXX	XX/XX/XX	RELEASED	XXXX	XX/XX/XX
X	X	D	X	X	X
X	X	X	X	G	X
X	X	-	X		
SHEET X OF			X		

1. DRAWING GENERATED BY COMPUTER.  
2. MOTOROLA CONFIDENTIAL PROPRIETARY!!

ISSUE	RELEASE	DATE	APVD
O	XXXXX	XX   XX	XXXX
A	XXXXX	XX   XX	XXXX
B	XXXXX	XX   XX	XXXX
C	XXXXX	XX   XX	XXXX
D	XXXXX	XX   XX	XXXX



**AUDIO BLOCK**



PROJ.	C18 - ADB				
DESCRIPTION:	KIT NO. FTN8126A		NAME	PCB_NO: 8489719U01_P2	
DRAWN	BYM013	25/12/2002	CHECKED	XXXX	XX/XX/XX
APPROVED	XXXX	XX/XX/XX	RELEASED	XXXX	XX/XX/XX
X	X	D	X	X	X
X	X	X	X	X	G
X	X	X	X	X	-
X	X	X	X	X	X

1. DRAWING GENERATED BY COMPUTER.  
 2. MOTOROLA CONFIDENTIAL PROPRIETARY !!



---

## A

Abbreviations 3  
 Antenna  
   Installation Safety 2  
   RF Antenna Connector 21  
   RF Connector to GPS Antenna 21  
 Audio Input Path Selection Jumper 29  
 Audio Interface  
   Connectors 16  
   J401 Connector 20  
   J402 Connector 21  
   J410 Connector 16  
   P400 Connector 17  
   P404 Connector 20  
   P405 Connector 19  
 Auxiliary Audio Input Jumper 29

---

## C

c18  
 Audio Interface Connectors 16  
 Communication Connectors 15  
 Communication Mode Configuration 10  
 Configuration Switches 24  
 Customer Assistance 39  
 Developer Board 5  
 Developer Board Description 12  
 General Description 3  
 Getting Started 6  
 Ground Headers 34  
 Hardware Setup 8  
 Headers 31  
 Installation Testing 11  
 J101 Connector 22  
 J102 Connector 13  
 J110 Connector 13  
 J210 Connector 15  
 J220 Connector 16  
 J300 Connector 15  
 J401 Connector 20  
 J402 Connector 21  
 J410 Connector 16

J500 Connector 13  
 J700 Connector 22  
 J710 Connector 22  
 J711 Connector 22  
 Jumpers 28  
 Kit Components 6  
 LED Indicators 30  
 Mechanical Description 37  
 Miscellaneous Connectors 22  
 Operation Modes 26  
 P107 Header 32  
 P108 Connector 23  
 P111 Connector 13  
 P112 Header 33  
 P113 Header 34  
 P401 Jumper 29  
 P402 Jumper 29  
 P403 Jumper 29  
 P404 Connector 20  
 P405 Connector 19  
 P406 Jumper 29  
 P500 Connector 13  
 P501 Jumper 28  
 P602 Connector 21  
 Parts List 41  
 Power Supply Connectors 13  
 Power-up 10  
 RF Connector to GPS Antenna 21  
 S101 Switch 25  
 S102 Switch 25  
 S103 Switch 26  
 Schematics 47  
 System Requirements 8  
 Test Points 35  
 Troubleshooting 39  
 USB Communication 11  
 VCC Header 34  
 Communication  
   Connectors 15  
   J210 Connector 15  
   J220 Connector 16  
   J300 Connector 15  
 Configuration  
   28-pin Interface 9

## Index

- 36-pin Interface 9
- 70-pin Interface 8
- Communication Mode 10
- Switches 24

### Connectors

- Audio Interface 16
- Communication 15
- J101 22
- J102 13
- J110 13
- J500 13
- JTAG 23
- LCD 22
- Miscellaneous 22
- P111 13
- P400 17
- P500 13
- Power Supply 13
- RF Antenna 21
- R-UIM 22
- Supplementary Connector for J102 22
- Supplementary Connector for P111 22
- USB 15

Customer Assistance 39

---

## D

- Developer Board 5
  - Description 12
  - Mechanical Description 37
  - Parts List 41

---

## E

- Earpiece Output Connector 19

---

## F

- Flashing Mode 27

---

## G

- Ground Headers 34

---

## H

- Hardware Setup 8
  - 28-pin Interface Configuration 9
  - 36-pin Interface Configuration 9
  - 70-pin Interface Configuration 8
- Headers 31
  - Ground 34
  - Signal 32

- VCC 34
- Headset Connector 21

---

## I

- Ignition Switch 25
- Installation Testing 11
  - for RS232 Communication 11
  - for USB Communication 11

---

## J

- J101 Connector 22
- J102 Connector 13
- J110 Connector 13
- J210 Connector 15
- J220 Connector 16
- J300 Connector 15
- J401 Connector 20
- J402 Connector 21
- J410 Connector 16
- J500 Connector 13
- J700 Connector 22
- J710 Connector 22
- J711 Connector 22
- JTAG
  - Connector 23
  - Mode Switch 26
  - Operation Mode 28
- Jumpers 28
  - P401 29
  - P402 29
  - P403 29
  - P406 29
  - P501 28

---

## L

- LCD Connector 22
- LED Indicators 30

---

## M

- Mechanical Description 37
- Microphone
  - Connector 20
  - Input Connector 20
- Miscellaneous Connectors 22
  - J700 22
  - J710 22
  - J711 22
  - P108 23

---

**O**

Operation Mode Switch 25  
Operation Modes 26  
    Flashing 27  
    JTAG 28  
    RS232 26  
    RS232 + USB 27  
    USB 27  
Operation Safety 2

---

**P**

P107 Header 32  
P108 Connector 23  
P111 Connector 13  
P112 Header 33  
P113 Header 34  
P400 Connector 17  
P401 Jumper 29  
P402 Jumper 29  
P403 Jumper 29  
P404 Connector 20  
P405 Connector 19  
P406 Jumper 29  
P500 Connector 13  
P501 Jumper 28  
P602 Connector 21  
Parts List 41  
Power Supply 13  
Power Supply Jumper 28  
Powering Up the c18 10  
Preamplifier Input Jumper 29

---

**R**

Regulatory  
    Requirements 1  
    Statement 1  
Requirements  
    Regulatory 1  
RF Antenna  
    Connector to GPS Antenna 21  
    Connectors 21  
    P602 Connector 21  
RS232

Installation Testing 11  
    Mode 26  
RS232 + USB  
    Operation Mode 27  
R-UIM Connector 22

---

**S**

S101 Switch 25  
S102 Switch 25  
S103 Switch 26  
Safety 2  
    Antenna Installation 2  
    Precautions 4  
    User Operation 2  
Schematics 47  
Signal Headers 32  
    P107 32  
    P112 33  
    P113 34  
Switches  
    Configuration 24  
    Ignition 25  
    S101 25  
    S102 25  
    S103 26  
System Requirements 8

---

**T**

Terms 3  
Test Points 35  
Trademarks 2  
Troubleshooting 39

---

**U**

USB  
    Communication 11  
    Connector 15  
    Operation Mode 27

---

**V**

VCC Headers 34







MOTOROLA and the Stylized M Logo are registered in the US Patent & Trademark Office.  
All other product or service names are the property of their respective owners.  
©Copyright 2005 Motorola, Inc.  
Java™ Technology and/or J2ME™ : Java and all other Java-based marks are trademarks or registered trademarks of Sun Microsystems, Inc. in the U.S. and other countries.  
UNIX® : UNIX is a registered trademark of The Open Group in the United States and other countries.



**98-08901C64-B**