Application Note
RS232 interface for GT47 embedded apps UART

Sony Ericsson

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Sony Ericsson

Contents

1 Introduction

The GT47 Control Terminal from Sony Ericsson is a powerful and versatile device that can be used in a wide range of telemetry and telematics applications that rely on the remote exchange of data, voice, SMS or fax via the GSM cellular network.

The GT47 electrical interface is split between a standard serial command interface, compatible with RS232 PC modem communication, and a configurable electrical interface, which will meet a variety of interface requirements.

With the configurable interface, the voltage is determined by the application. Where the application demands a second RS232 interface from the GT47's configurable I/O it is necessary to provide the RS232 voltage levels externally.

This application note provides the design details of an RS232 voltage level translator compatible with the GT47. The interface cable and the level translator PCB assembly are provided as part of the GT47 Developer's kit and are available from Sony Ericsson Module Support.

2 Design Overview

2.1 Description

The RS232 Level Translator PCB Assembly consists of a PCB and plastic back shell or 'hood' compatible with 9-pin 'D' sub-miniature RS232 connectors (DB9).

It has been designed to provide a compatible termination to the 15-way cable assembly provided as part of the GT47 Developer's kit. The 15-way cable assembly has a 15 pin high density sub-miniature 'D' connector (HD15) at one end which connects to the GT47. At the other end of the cable the 15 connections are split between a DB9 socket and 7 flying leads (GND is common to both).

Down the edge of the RS232 PCB, solder terminals T1-T7 are designed to accept the seven flying leads of the GT47 accessory cable. The other end of the PCB has a DB9 socket with a DCE pin out. The RS232 PCB uses a DCE pin out so it can be connected directly to a PC Com Port (DTE) using a 9-way straight-through modem cable. If the GT47 needs to communicate with another DCE device use a "Null-Modem" cable between devices.

For a typical assembly, solder each of the 7 flying leads onto the 7 solder terminals of the level shifter PCB. When not used as part of the RS232 connection scheme, solder terminals T4, T6 and T7 still provide a suitable anchor point for the flying leads. The second hole for each solder terminal may be used for extending the wiring by soldering a new length of cable in series with the original.

Configuration of the design can be either the default, simple 3-wire interface (RD, TD, GND), or a 5-wire interface (RD, TD, RTS, CTS, GND) with the addition of two surface mount resistors.

The connections incorporated onto the PCB are listed in table 1.

Table 1 - PCB Connections List

GT47 HD15 Pin	Flying Lead Colour	PCB Solder Terminal	GT47 Signal Direction	Signal Name	DB9 Socket Pin
5	**Brown**	**T1**	Out	RD	**2**
9	**Red**	**T2**	Out	VDD	**-**
4	**Black**	**T3**	In	TD	**3**
12	**Yellow**	**T4**	Out	CTS	**8**
14	**Green**	**T5**	-	GND	**5**
11	**Orange**	**T6**	In	RTS	**7**
15	**Blue**	**T7**	In‡	-	**-**
-	-	-	-	DCD*	**1***
-	-	-	-	DTR*	**4***
-	-	-	-	DSR*	**6***
-	-	-	-	RI	**9**

* DB9 signals DCD, DTR and DSR (pins 1, 4 and 6) are internally shorted together to provide a hardware flow control loop back to the DTE.

‡ Solder Terminal T7 is provided as a spare. It is designated as a general purpose input to the GT47 when soldered to the blue flying lead of the developer's kit cable (which connects to HD15 pin 15).

2.2 3-Wire RS232

In the 3-wire configuration, surface mount strap resistors (ST1 and ST2) are not mounted. Flow control should be disabled on each communicating device (AT+ IFC)

As the GT47 general purpose outputs each require a resistor pull-up, these are provided on the RS232 interface PCB. The internal pull-up on ST1 makes the CTS signal on the DB9 appear as 'inactive' state. As long as flow control is disabled at the DTE this will not cause a problem. If flow control cannot be disabled at the DTE, the 'inactive' state on CTS will prevent the DTE from communicating. In this case, either solder a single strap resistor between the pads of both ST1 and ST2 as shown in Figure 4 or enable flow control from the GT47 and add straps ST1 and ST2 (see section 2.3).

2.3 5-Wire RS232

In the 5-wire configuration, surface mount strap resistors (ST1 and ST2) must be mounted. This requires soldering 0603-size zero ohm resistors into positions ST1 and ST2 as indicated in figure 3.

Adding the surface mount resistors should be performed by a skilled technician and the PCB must first be disconnected from all communicating devices.

2.4 DCE to DCE (Null-Modem)

If the GT47 UART is to be used as a DTE, instead of the default DCE configuration, the following changes will be necessary. A 9-way DB9 gender-changer should be used to convert the output from a socket to a plug. The following DB9 pin connections should be swapped

- Pin-2 swapped with pin-3
- Pin-7 swapped with pin-8.

The pin-swapping can be achieved by using a "Null-Modem" cable between the DB9 plugs of the communication devices.

2.5 Spare Connections

The spare soldering terminal, T7, is provided to easily lengthen the connection from the GT47 to the application hardware. The cable provided in the developer's kit is a fixed 1 metre length, with tinned-copper flying leads. In the event of the general purpose input wire length being too short, an extension wire can be joined using the spare terminal hole in T7. Terminal T7 is not electrically connected to the RS232 PCB electronics so signals carried on it will not affect RS232 operation.

3 Assembly Parts

Part	Description
PCB	RS232 Level Translator PCB P/N# 9188-P1B © Sony Ericsson M2M Com
R1, R2	1kΩ (0603)
C1,C2,C3,C4,C5	100nF (0603)
U1	SP3223EEY
X1	DB9 Socket (DCE)
ST1, ST2	0Ω link resistor (0603) [not mounted]
Back Shell	Plastic DB9 Hood [+ strain relief and screws)

APPENDIX A

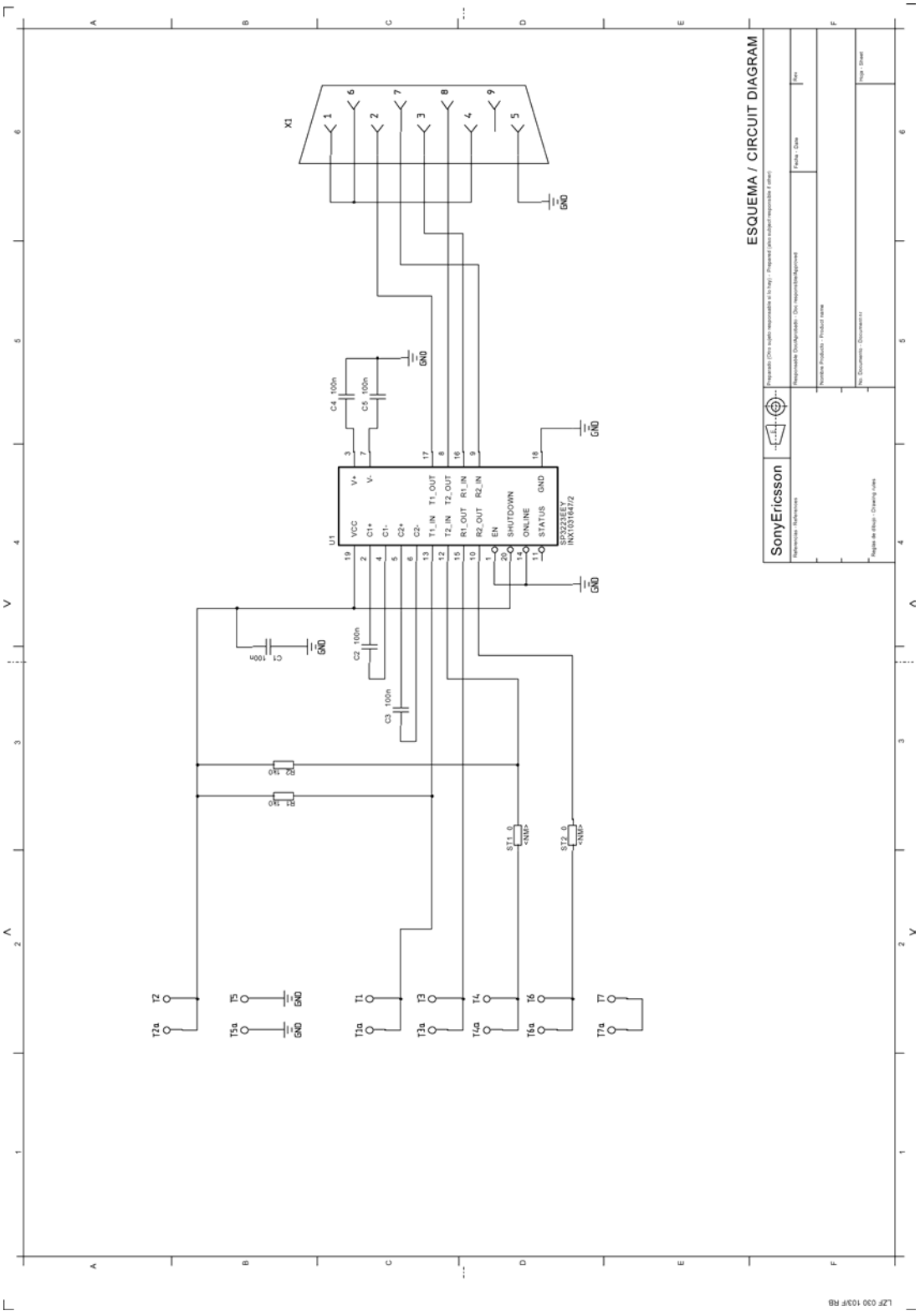

Figure 1. RS232 Converter Schematic

APPENDIX B

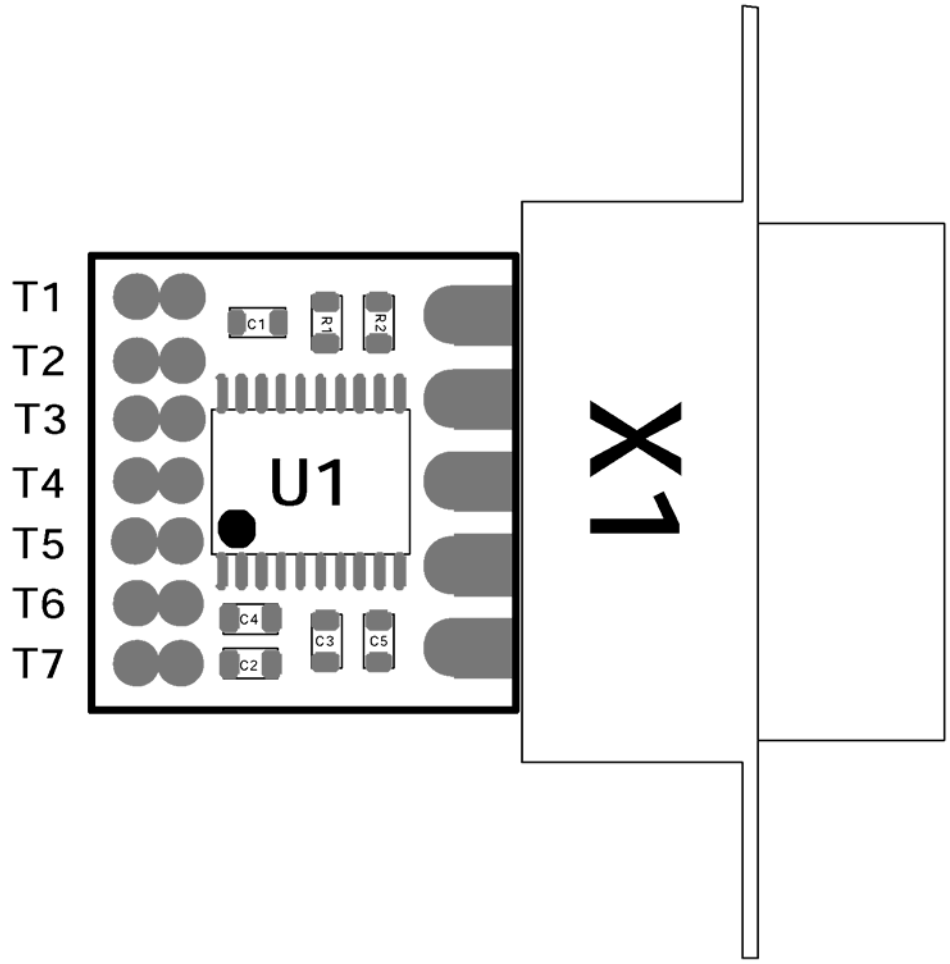

Figure 2 - PCB Top Side

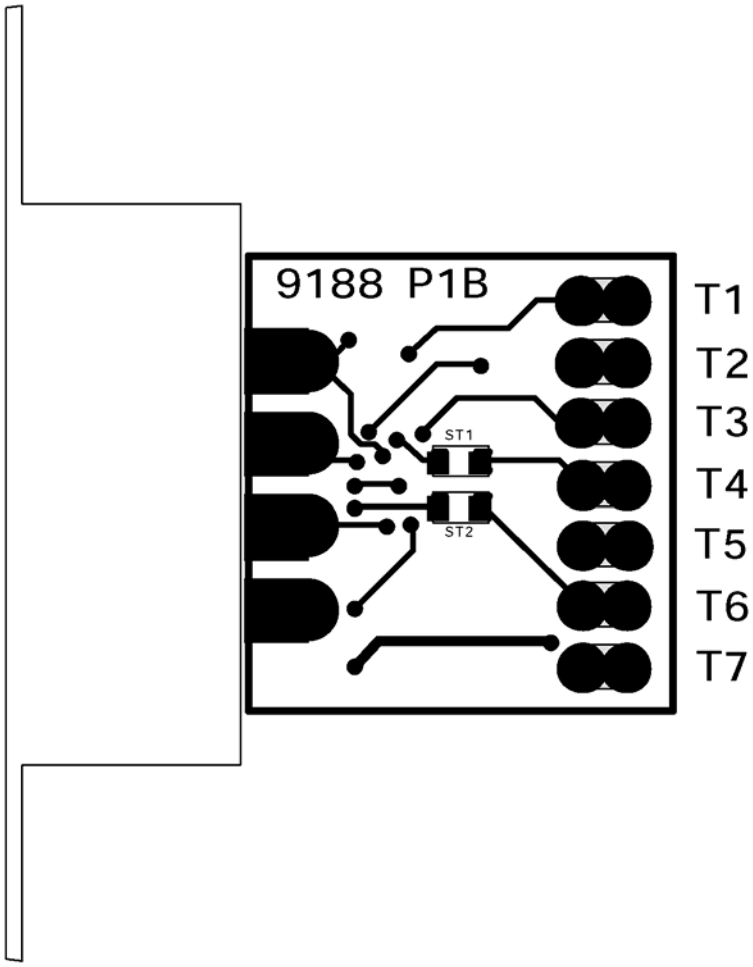

Figure 3 - PCB Bottom Side

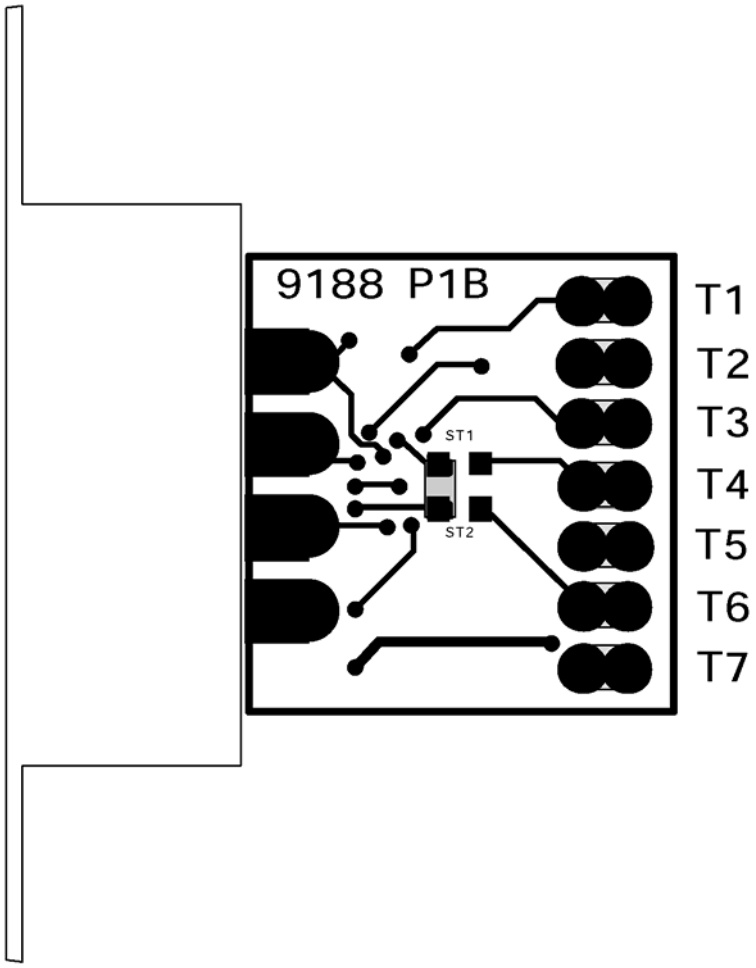

Figure 4 - RTS/CTS Flow Control Loop back

GLOSSARY

Com Port	Serial Communications Port
CTS	Clear To Send
DB9	Standard Density 9-pin ‘D’-type Sub-miniature Connector
DCD	Data Carrier Detect
DCE	Data Communicating Equipment
DSR	Data Set Ready
DTE	Data Terminating Equipment
DTR	Data Terminal Ready
GND	Power Supply Ground Connection
GSM	Global System for Mobile Communications
HD15	High Density 15-pin ‘D’-type Sub-miniature Connector
PCB	Printed Circuit Board
RD	Receive Data
RI	Ring Indicator
RTS	Request To Send
SMS	Short message Service
TD	Transmit Data
UART	Universal Asynchronous Receiver Transmitter
VDD	Power Supply Voltage Connection