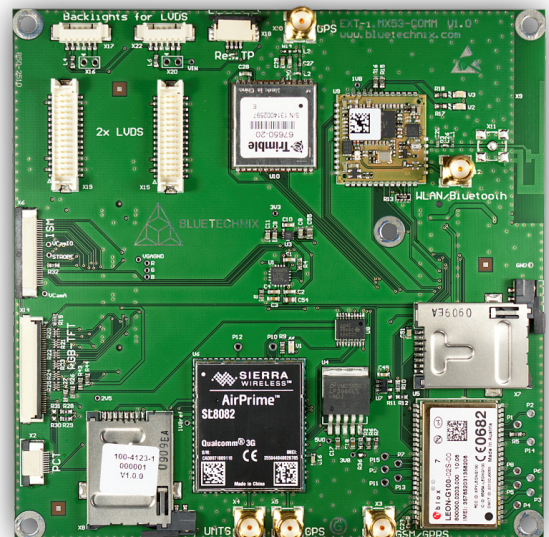


BLUETECHNIX
Embedding Ideas

EXT-DEV-i.MX53- COMM

Hardware User Manual

Version 1.1





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Warning

Due to technical requirements components may contain dangerous substances.

1 Introduction

The EXT-DEV-i.MX53-COMM extends the DEV-i.MX53 development board for several communication- (WLAN, Bluetooth, UMTS, GPS) and display interfaces (2 x LVDS, Parallel Display & Touch Panel). It features an additional image-sensor connector (ISM) and integrates some intelligent sensors such as magnetometer, accelerometer and gyroscope.

Antenna connectors for GSM, GPS, UMTS and WLAN are available for external antennas. Possible applications are wireless communication, mobile Navigation, surveillance, locating and industrial applications.

1.1 Overview

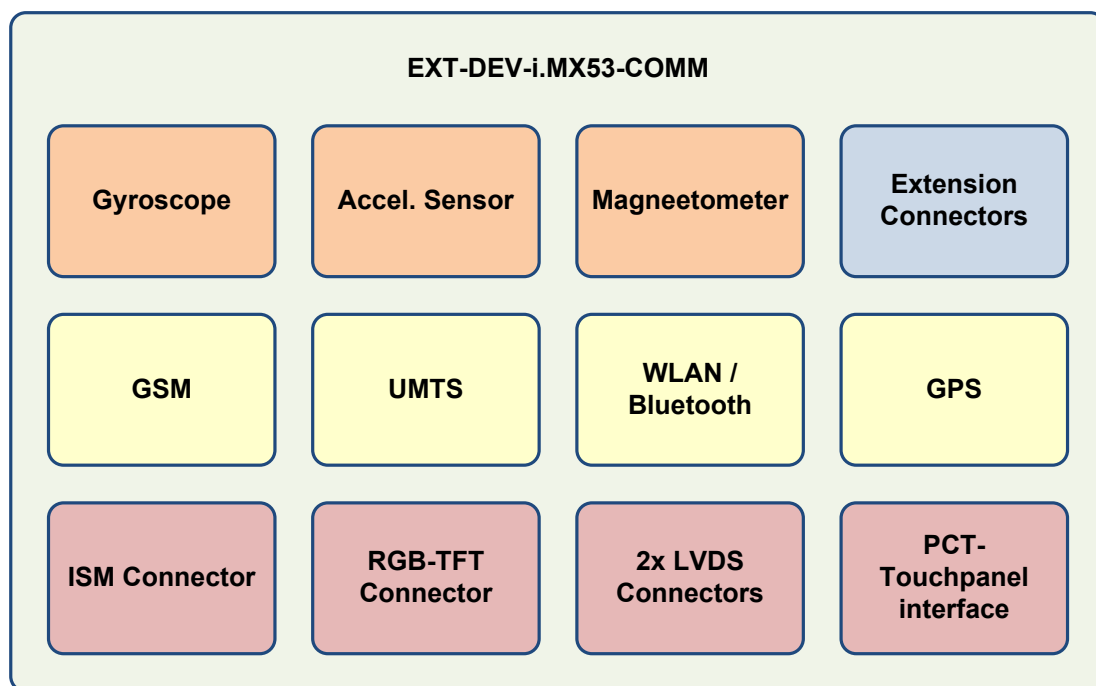


Figure 1-1: Main Components on the EXT-DEV-i.MX53-COMM

1.2 Key Features

1.2.1 RF-Modules:

GPS Module

- Telit Condor C1919
- SMA antenna connector

GSM/GPRS Module

- U-Blox LEON G100 incl. SIM Card Holder
- SMA antenna connector

UMTS Module (incl. GPS)

- Sierra Wireless SL8082
- UMTS/HSDPA
- GPS included
- Two SMA antenna connectors (for UMTS and GPS)

WiFi / Bluetooth

- Lesswire WiBear-SF
- On-board PCB patch antenna
- (optional) SMA antenna connector

1.2.2 Inertial Sensors

Gyroscope

- ST-Microelectronics L3G4200D
- 16 bit resolution
- Dynamically selectable full-scale ($\pm 250/\pm 500/\pm 2000$ °/s)
- 800Hz output rate
- Temperature sensor included

Accelerometer

- Freescale MMA8453QT
- $\pm 2g/\pm 4g/\pm 8g$ dynamically selectable full-scale
- 800Hz output rate
- 10 bit or 8 bit resolution

Magnetometer

- Freescale MAG3110FCR1
- $\pm 1000\mu T$ dynamically selectable full-scale
- $0.1\mu T$ sensitivity
- 80Hz output rate

1.2.3 Video Interfaces

Parallel RGB Display

- 40 pin ZIF connector
- Various compatible EDT displays available (3,5" to 7"; 320x240 to 800x480)



2x LVDS Connectors

- 30 pin LVDS data connectors
- 6 pin LVDS backlight connectors
- Supports Toshiba LT104AC36000 LVDS display

Touch Panel Connector

- 10 Pin ZIF connector
- compatible with a TBD

Camera Connector (BLT-ISM-Connector)

- 30 pin ZIF connector
- Compatible with all Bluetechnix [Image Sensor Modules](#)

1.3 Applications

- Rapid prototyping
- POS terminals
- Onboard units
- Multimedia products
- Wireless applications
- Automation and control systems
- Graphical User Interfaces

2 General Description

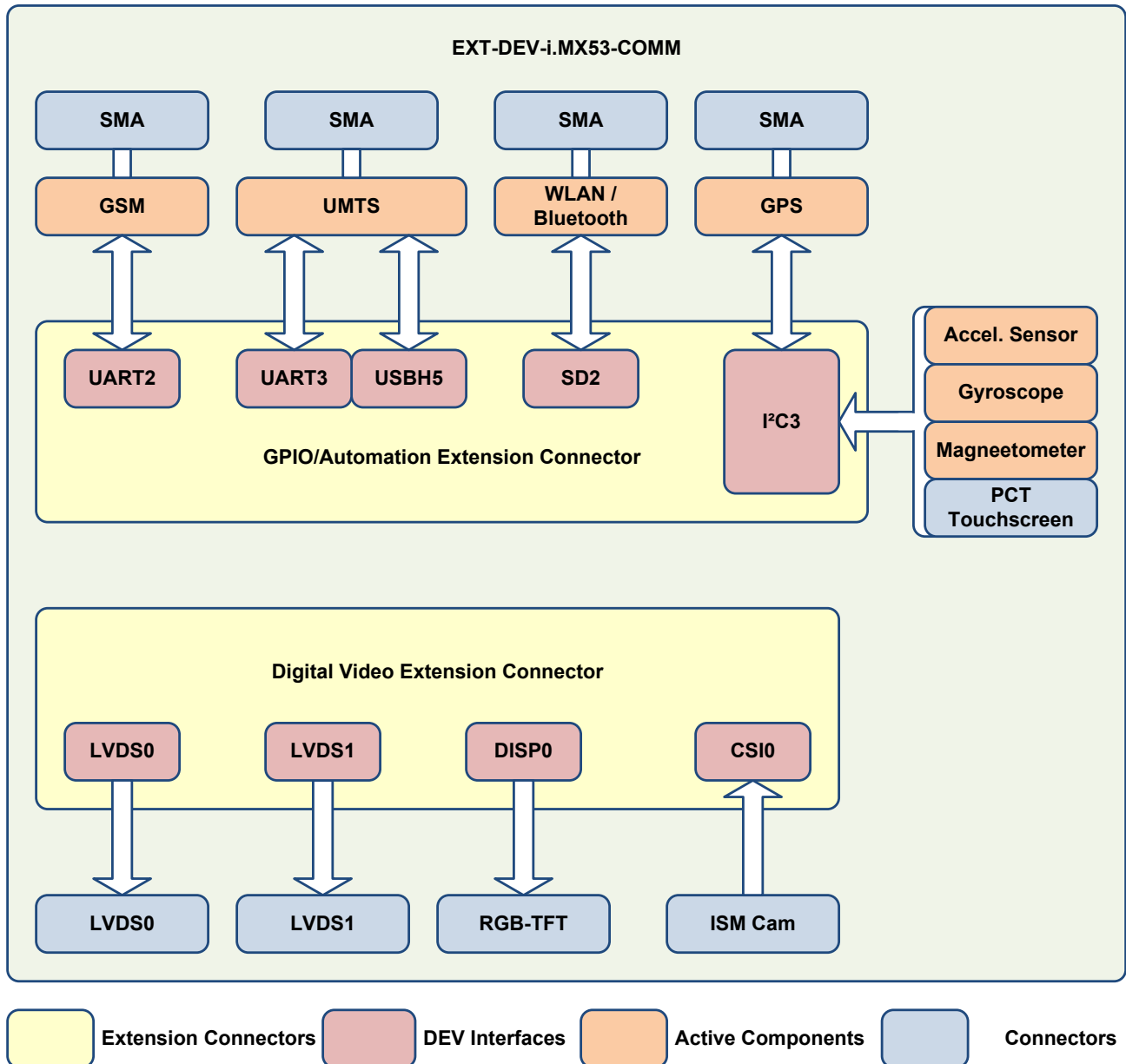


Figure 2-1: Interconnection Diagram

2.1 Functional Description

The Extension Board is fully powered by the DEV-i.MX53. No additional power adapters are needed.

The extension Board includes only the PCB-patch antenna for the WiFi/Bluetooth module. Antennas for the other Modules (UMTS, GSM, GPS) are not included.

3 Specifications

3.1 Electrical Specifications

3.1.1 Maximum Ratings

Stressing the device above the rating listed in the absolute maximum ratings table may cause permanent damage to the device. These are stress ratings only. Operation of the device at these or any other conditions greater than those indicated in the operating sections of this specification is not implied. Exposure to absolute maximum rating conditions for extended periods may affect device reliability.

Symbol	Parameter	Min	Max	Unit
V_{IO}	Input or output voltage	-0.5	3.6	V
V_{IN}	Input supply voltage	3.0	5.5	V
I_{OH}/I_{OL}	Current per pin	0	10	mA
T_{AMB}	Ambient temperature	-40	85	°C
T_{STO}	Storage temperature	-55	150	°C
T_{SLD}	Solder temperature for 10 seconds		260	°C
Φ_{AMB}	Relative ambient humidity		90	%

Table 3.1: Absolute maximum ratings

3.1.2 ESD Sensitivity



ESD (electrostatic discharge) sensitive device. Charged devices and circuit boards can discharge without detection. Although this product features patented or proprietary protection circuitry, damage may occur on devices subjected to high energy ESD. Therefore, proper ESD precautions should be taken to avoid performance degradation or loss of functionality.



4 Connector Description

4.1 Extension Connectors

4.1.1 GPIO Extension Connector X1

Pin No	Signal	Type	Description
1	GND	PWR	Power Ground
2	GND	PWR	Power Ground
3	GND	PWR	Power Ground
4	5V0	PWR	Power Supply
5	5V0	PWR	Power Supply
6	USBH7.D_P	IO	USB Data+
7	USBH7.D_N	IO	USB Data-
8	USBH7.PWR	O	USB Power Enable
9	USBH7.OC	I	USB Over Current
10	GND	PWR	Power Ground
11	I2C3.SCL	O	I2C Clock
12	I2C3.SDA	IO	I2C Data
13	OWIRE	IO	One Wire Interface
14	VUSB5	PWR	500mA Current Limited 5V Power Supply for USB Host 5
15	VUSB5	PWR	500mA Current Limited 5V Power Supply for USB Host 5
16	CAN1.RXD	I	CAN Receive Data / GPIO4_11
17	CAN1.TXD	O	CAN Transmit Data / GPIO4_10
18	P_LDO4_2V8	PWR	Power Supply
19	GPIO.(2V8)_3	IO	GPIO4_3
20	GPIO.(2V8)_4	IO	GPIO4_4
21	GND	PWR	Power Ground
22	UART2.RXD	I	UART Receive Data
23	UART2.TXD	O	UART Transmit Data
24	UART2.RTS	O	UART Request To Send
25	UART2.CTS	I	UART Clear To Send
26	GND	PWR	Power Ground
27	UART3.RXD	I	UART Receive Data
28	UART3.TXD	O	UART Transmit Data
29	UART3.RTS	O	UART Request To Send
30	UART3.CTS	I	UART Clear To Send
31	FIRI.RXD	O	Fast Infrared Interface Receive Data
32	FIRI.TXD	I	Fast Infrared Interface Transmit Data
33	GND	PWR	Power Ground
34	NC	NC	Not Connected
35	CTRL.PWM1	O	Pulse Width Modulation Output / GPIO1_9
36	CTRL.PWM2	O	Pulse Width Modulation Output / GPIO1_19
37	P_SW3_2V5	PWR	Power Supply
38	NC	NC	Not Connected
39	GND	PWR	Power Ground
40	ECSPI2.MOSI	O	SPI MOSI
41	ECSPI2.MISO	I	SPI MISO
42	ECSPI2.SS1	O	SPI Select1
43	ECSPI2.SS2	O	SPI Select2



Pin No	Signal	Type	Description
44	NC	NC	Not Connected
45	ECSPi2.SCLK	O	SPI CLK
46	3V3	PWR	Power Supply
47	3V3	PWR	Power Supply
48	GND	PWR	Power Ground
49	GND	PWR	Power Ground
50	GND	PWR	Power Ground
51	GND	PWR	Power Ground
52	GND	PWR	Power Ground
53	GND	PWR	Power Ground
54	VIN	PWR	Power Supply
55	VIN	PWR	Power Supply
56	ECSPi1.SCLK	O	SPI CLK
57	NC	NC	Not Connected
58	ECSPi1.SS1	O	SPI Select1
59	ECSPi1.SS0	O	SPI Select0
60	ECSPi1.MISO	I	SPI MISO
61	ECSPi1.MOSI	O	SPI MOSI
62	GND	PWR	Power Ground
63	ADIN4	I	Vin4 (AD7993)
64	ADIN3	I	Vin3 (AD7993)
65	ADIN2	I	Vin2 (AD7993)
66	ADIN1	I	Vin1 (AD7993)
67	SD2.D7	IO	SD Data7 / GPIO2_15
68	SD2.D6	IO	SD Data6 / GPIO2_14
69	SD2.D5	IO	SD Data5 / GPIO2_13
70	SD2.D4	IO	SD Data4 / GPIO2_12
71	SD2.D3	IO	SD Data3 / GPIO1_12
72	SD2.D2	IO	SD Data2 / GPIO1_13
73	SD2.D1	IO	SD Data1 / GPIO1_14
74	SD2.D0	IO	SD Data0 / GPIO1_15
75	GND	PWR	Power Ground
76	SD2.CLK	O	SD Clock / GPIO1_10
77	SD2.CMD	O	SD Command / GPIO1_11
78	GND	PWR	Power Ground
79	SD2.WP	I	SD Card Detect / GPIO2_31
80	SD2.CD	I	SD Write Protect / GPIO1_2
81	P_SW3_2V5	PWR	Power Supply
82	GPIO.(2V5)_3	IO	GPIO5_13
83	GPIO.(2V5)_2	IO	GPIO1_18
84	GPIO.(2V5)_1	IO	GPIO1_17
85	GPIO.(2V5)_0	IO	GPIO1_16
86	GND	PWR	Power Ground
87	USBH5_OC	I	USB Over Current
88	USBH5_PWR	O	USB Power Enable
89	USBH5_D_N	IO	USB Data-
90	USBH5_D_P	IO	USB Data+
91	GND	PWR	Power Ground
92	USBH6_OC	I	USB Over Current
93	USBH6_PWR	O	USB Power Enable



Pin No	Signal	Type	Description
94	USBH6_D_N	IO	USB Data-
95	USBH6_D_P	IO	USB Data+
96	5V0	PWR	Power Supply
97	5V0	PWR	Power Supply
98	GND	PWR	Power Ground
99	GND	PWR	Power Ground
100	GND	PWR	Power Ground

Table 4.1: GPIO Extension Connector description X1

4.1.2 Video Extension Connector X13

Pin No	Signal	Type	Description
1	GND	PWR	Power Ground
2	GND	PWR	Power Ground
3	GND	PWR	Power Ground
4	5V0	PWR	Power Supply
5	5V0	PWR	Power Supply
6	DISP0.D1	O	Display Port 0 Data
7	DISP0.D3	O	Display Port 0 Data
8	DISP0.D5	O	Display Port 0 Data
9	DISP0.D7	O	Display Port 0 Data
10	GND	PWR	Power Ground
11	DISP0.D9	O	Power Ground
12	DISP0.D11	O	Display Port 0 Data
13	DISP0.D13	O	Display Port 0 Data
14	DISP0.D15	O	Display Port 0 Data
15	DISP0.D17	O	Display Port 0 Data
16	GND	PWR	Power Ground
17	DISP0.CLK	O	Display Port 0 Clock
18	GND	PWR	Power Ground
19	CSIO_D10	IO	CMOS sensor interface 0 Data
20	CSIO_D10	IO	CMOS sensor interface 0 Data
21	CSIO_D10	IO	CMOS sensor interface 0 Data
22	CSIO_D10	IO	CMOS sensor interface 0 Data
23	CSIO_D10	IO	CMOS sensor interface 0 Data
24	CSIO_D10	IO	CMOS sensor interface 0 Data
25	CSIO_D10	IO	CMOS sensor interface 0 Data
26	CSIO_D10	IO	CMOS sensor interface 0 Data
27	CSIO_D10	IO	CMOS sensor interface 0 Data
28	CSIO_D10	IO	CMOS sensor interface 0 Data
29	GND	PWR	Power Ground
30	CSIO_DE	O	CMOS sensor interface 0 Data Enable
31	GND	PWR	Power Ground
32	CSIO_PCLK	I	CMOS sensor interface 0 Pixel Clock
33	GND	PWR	Power Ground
34	CSIO_HSYNC	I	CMOS sensor interface 0 HSYNC
35	CSIO_VSYNC	I	CMOS sensor interface 0 VSYNC
36	LVDS1.CLK_N	IO	LVDS Clock (-)
37	LVDS1.CLK_P	IO	LVDS Clock (+)
38	LVDS1.TX0_N	O	LVDS Transmit Data0 (-)
39	LVDS1.TX0_P	O	LVDS Transmit Data0 (+)
40	LVDS1.TX1_N	O	LVDS Transmit Data1 (-)
41	LVDS1.TX1_P	O	LVDS Transmit Data1 (+)



Pin No	Signal	Type	Description
42	LVDS1.TX2_N	O	LVDS Transmit Data2 (-)
43	LVDS1.TX2_P	O	LVDS Transmit Data2 (+)
44	LVDS1.TX3_N	O	LVDS Transmit Data3 (-)
45	LVDS1.TX3_P	O	LVDS Transmit Data3 (+)
46	P_SW3_2V5	PWR	Power Supply
47	P_SW3_2V5	PWR	Power Supply
48	GND	PWR	Power Ground
49	GND	PWR	Power Ground
50	GND	PWR	Power Ground
51	GND	PWR	Power Ground
52	GND	PWR	Power Ground
53	GND	PWR	Power Ground
54	3V3	PWR	Power Supply
55	3V3	PWR	Power Supply
56	LVDS0.TX3_P	O	LVDS Transmit Data3 (+)
57	LVDS0.TX3_N	O	LVDS Transmit Data3 (-)
58	LVDS0.TX2_P	O	LVDS Transmit Data2 (+)
59	LVDS0.TX2_N	O	LVDS Transmit Data2 (-)
60	LVDS0.TX1_P	O	LVDS Transmit Data1 (+)
61	LVDS0.TX1_N	O	LVDS Transmit Data1 (-)
62	LVDS0.TX0_P	O	LVDS Transmit Data0 (+)
63	LVDS0.TX0_N	O	LVDS Transmit Data0 (-)
64	LVDS0.CLK_P	IO	LVDS Clock (+)
65	LVDS0.CLK_N	IO	LVDS Clock (-)
66	GPIO4_1	IO	Camera Output Enable
67	GPIO4_0	O	Camera Trigger
68	GPIO4_2	O	Global Camera Reset
69	VGAGND	PWR	Power Ground
70	RGB.R	O	AV Out Red
71	VGAGND	PWR	Power Ground
72	RGB.G	O	AV Out Green
73	VGAGND	PWR	Power Ground
74	RGB.B	O	AV Out Black
75	VGAGND	PWR	Power Ground
76	NC	NC	Not Connected
77	I2C1.SCL	IO	I2C Clock
78	I2C1.SDA	IO	I2C Data
79	NC	NC	Not Connected
80	CTRL.PWM2	O	PWM
81	GND	PWR	Power Ground
82	DISP0.DE	O	Display Port 0 Data Enable
83	DISP0.VSYNC	I	Display Port 0 Data VSYNC
84	DISP0.HSYNC	I	Display Port 0 Data HSYNC
85	GND	PWR	Power Ground
86	DISP0.D16	O	Display Port 0 Data
87	DISP0.D14	O	Display Port 0 Data
88	DISP0.D12	O	Display Port 0 Data
89	DISP0.D10	O	Display Port 0 Data
90	DISP0.D8	O	Display Port 0 Data
91	GND	PWR	Power Ground
92	DISP0.D6	O	Display Port 0 Data
93	DISP0.D4	O	Display Port 0 Data
94	DISP0.D2	O	Display Port 0 Data
95	DISP0.D0	O	Display Port 0 Data
96	VIN	PWR	Power Supply



Pin No	Signal	Type	Description
97	VIN	PWR	Power Supply
98	GND	PWR	Power Ground
99	GND	PWR	Power Ground
100	GND	PWR	Power Ground

Table 4.2: Video Extension Connector description X13

4.2 LVDS

4.2.1 Signal Connectors X15 and X19

For the LVDS-Interface a Hirose DF13-30DP-1.25V(55) is used.

Pin No	Signal	Type	Description
1, 2	nc	-	No Connection
3	3V3	PWR	Power Supply
4	GND	PWR	Power Ground
5	LVDS.CLK_N	O	LVDS Clock (-)
6	LVDS.CLK_P	O	LVDS Clock (+)
7	3V3	PWR	Power Supply
8	GND	PWR	Power Ground
9	LVDS.TX0_P	O	LVDS Transmit Data0 (+)
10	LVDS.TX0_N	O	LVDS Transmit Data0 (-)
11	LVDS.TX1_N	O	LVDS Transmit Data1 (-)
12	LVDS.TX1_P	O	LVDS Transmit Data1 (+)
13	LVDS.TX2_N	O	LVDS Transmit Data2 (-)
14	LVDS.TX2_P	O	LVDS Transmit Data2 (+)
15	LVDS.TX3_N	O	LVDS Transmit Data3 (-)
16	LVDS.TX3_P	O	LVDS Transmit Data3 (+)
17 to 26	nc	-	No Connection
27	3V3	PWR	Power Supply
28	GND	PWR	Power Ground
29, 30	nc	-	No Connection

Table 4.3: LVDS Connector description X13

4.2.2 Backlight Connectors X17 and X22

For the LVDS Backlight supply a 6 pole Molex PicoBlade connector (53261-0671) or compatible is used.

Pin No	Signal	Type	Description
1	VIN	PWR	12V Backlight Power Supply
2	VIN	PWR	12V Backlight Power Supply
3	GND	PWR	Power Ground
4	GND	PWR	Power Ground
5	EN	O	Backlight Enable Output
6	PWM	O	Backlight Intensity PWM Output

Table 4.4: LVDS Backlight Connector description



4.3 RGB-TFT Display Connector X14

The 18 bit parallel RGB interface for a TFT Display is routed to a 40 pole ZIF connector.

Pin No	Signal	Type	Description
1	GND	PWR	Power Ground
2	GND	PWR	Power Ground
3	DISP0.D5	O	Display Port 0 Blue Data5
4	DISP0.D4	O	Display Port 0 Blue Data4
5	DISP0.D3	O	Display Port 0 Blue Data3
6	DISP0.D2	O	Display Port 0 Blue Data2
7	DISP0.D1	O	Display Port 0 Blue Data1
8	DISP0.D0	O	Display Port 0 Blue Data0
9	GND	PWR	Power Ground
10	DISP0.D11	O	Display Port 0 Green Data11
11	DISP0.D10	O	Display Port 0 Green Data10
12	DISP0.D9	O	Display Port 0 Green Data9
13	DISP0.D8	O	Display Port 0 Green Data8
14	DISP0.D7	O	Display Port 0 Green Data7
15	DISP0.D6	O	Display Port 0 Green Data6
16	GND	PWR	Power Ground
17	DISP0.D17	O	Display Port 0 Red Data17
18	DISP0.D16	O	Display Port 0 Red Data16
19	DISP0.D15	O	Display Port 0 Red Data15
20	DISP0.D14	O	Display Port 0 Red Data14
21	DISP0.D13	O	Display Port 0 Red Data13
22	DISP0.D12	O	Display Port 0 Red Data12
23	GND	PWR	Power Ground
24	DISP0.CLK	I	Display Port 0 Pixel Clock
25	GPIO1_17	O	Wake
26	DISP0.HSYNC	I	Display Port 0 Data HSYNC
27	DISP0.VSYNC	I	Display Port 0 Data VSYNC
28	DISP0.DE	O	Display Port 0 Data Enable
29	GPIO1_18	O	Power Control Output
30	2V5	PWR	Digital Power Supply
31	GND	PWR	Power Ground
32	GND	PWR	Power Ground
33	3V3	PWR	Analog Power Supply
34	3V3	PWR	Analog Power Supply
35	GPIO5_13	I	Interrupt
36	PWM1	O	Backlight Control PWM Output
37	I ² C3.SCL	O	Serial Interface Clock Output
38	I ² C3.SDA	IO	Serial Interface Data
39	nc	-	No Connection
40	nc	-	No Connection

Table 4.5: Parallel RGB-TFT Connector description

4.4 PCT Interface Connector X2

This connector gives the possibility to apply a PCT (Projected capacitive Touchpanel) with I²C Interface. The connector is a 10 pole 0.5mm pitch top-side ZIF type.

Pin No	Signal	Type	Description
1	GND	PWR	Power Ground
2	3V3	PWR	3.3V Power Supply



Pin No	Signal	Type	Description
3	I ² C3.SCL	O	Serial Interface Clock Output
4	nc	-	No Connection
5	I ² C3.SDA	IO	Serial Interface Data
6	nc	-	No Connection
7	GPIO1_16	IO	General Purpose Input Output
8	GPIO5_22	IO	General Purpose Input Output
9	GPIO5_23	IO	General Purpose Input Output
10	GND	PWR	Power Ground

Table 4.6: Parallel RGB-TFT Connector description

4.5 ISM Interface Connector X6

This connector allows plugging in a Bluetechnix ISM Camera Module. The used connector is a 30 pole bottom-side 0.5mm pitch ZIF-type.

Pin No	Signal	Type	Description
1	2V85	O	Output Enable (always enabled)
2	CSI0.D9	I	CMOS sensor interface 0 Data 9
3	CSI0.D8	I	CMOS sensor interface 0 Data 8
4	CSI0.D7	I	CMOS sensor interface 0 Data 7
5	CSI0.D6	I	CMOS sensor interface 0 Data 6
6	GND	PWR	Power Ground
7	CSI0.D5	I	CMOS sensor interface 0 Data 5
8	CSI0.D4	I	CMOS sensor interface 0 Data 4
9	CSI0.D3	I	CMOS sensor interface 0 Data 3
10	CSI0.D2	I	CMOS sensor interface 0 Data 2
11	GND	PWR	Power Ground
12	2V85	PWR	Camera Power Supply
13	CSI0.D1	I	CMOS sensor interface 0 Data 1
14	CSI0.D0	I	CMOS sensor interface 0 Data 0
15	nc	-	No Connection
16	nc	-	No Connection
17	nc	-	No Connection
18	nc	-	No Connection
19	CSI0.HSYNC	I	Horizontal Synchronization Signal
20	CSI0.VSYNC	I	Vertical Synchronization Signal
21	CSI0.PCLK	I	Pixel Clock
22	GND	PWR	Power Ground
23	nc	-	No Connection
24	I ² C3.SDA	IO	Serial Interface Data
25	I ² C3.SCL	O	Serial Interface Clock Output
26	GPIO4_3	O	Camera Reset
27	nc	-	No Connection
28	GND	PWR	Power Ground
29	GND	PWR	Power Ground
30	2V85	PWR	Camera Power Supply

Table 4.7: ISM Connector description

4.6 RF Connectors X3, X4, X5, X10, X11, X12

All Radio Frequency Modules (GSM, UMTS, Wi-Fi, Bluetooth and GPS) have standard SMA antenna connectors. The Connector X11 is normally not populated, as the Signal is routed to a PCB-patch antenna.



4.7 SIM-Card slots X7 and X8

Each, the GSM module and the UMTS module, have a SIM-card slot located next to the module.

4.8 Top Side Connector Location

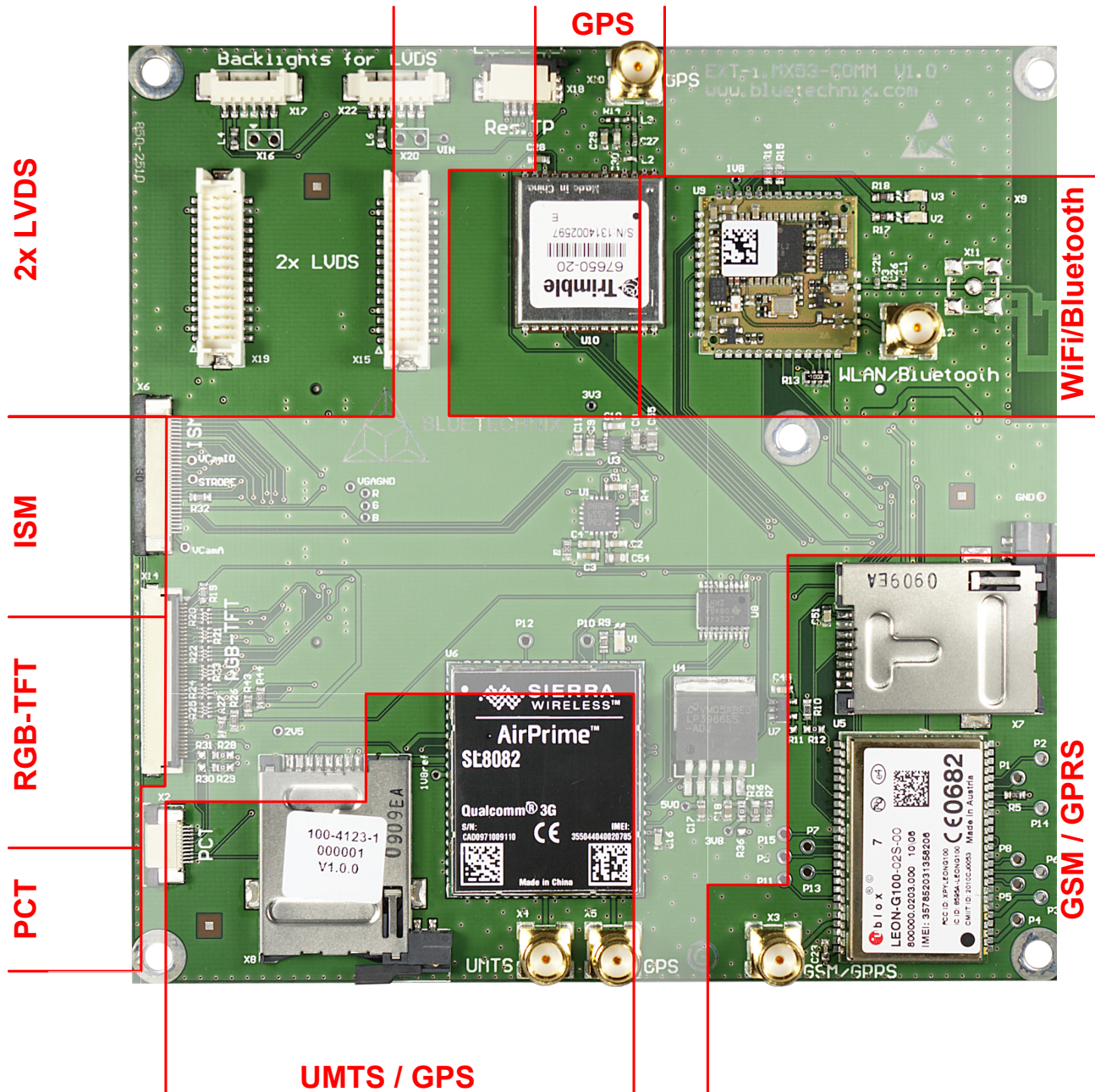


Figure 4-1: RF-Module and Connector Location



5 Mechanical Outline

All Dimensions in this chapter are given in mm.

5.1 Top View

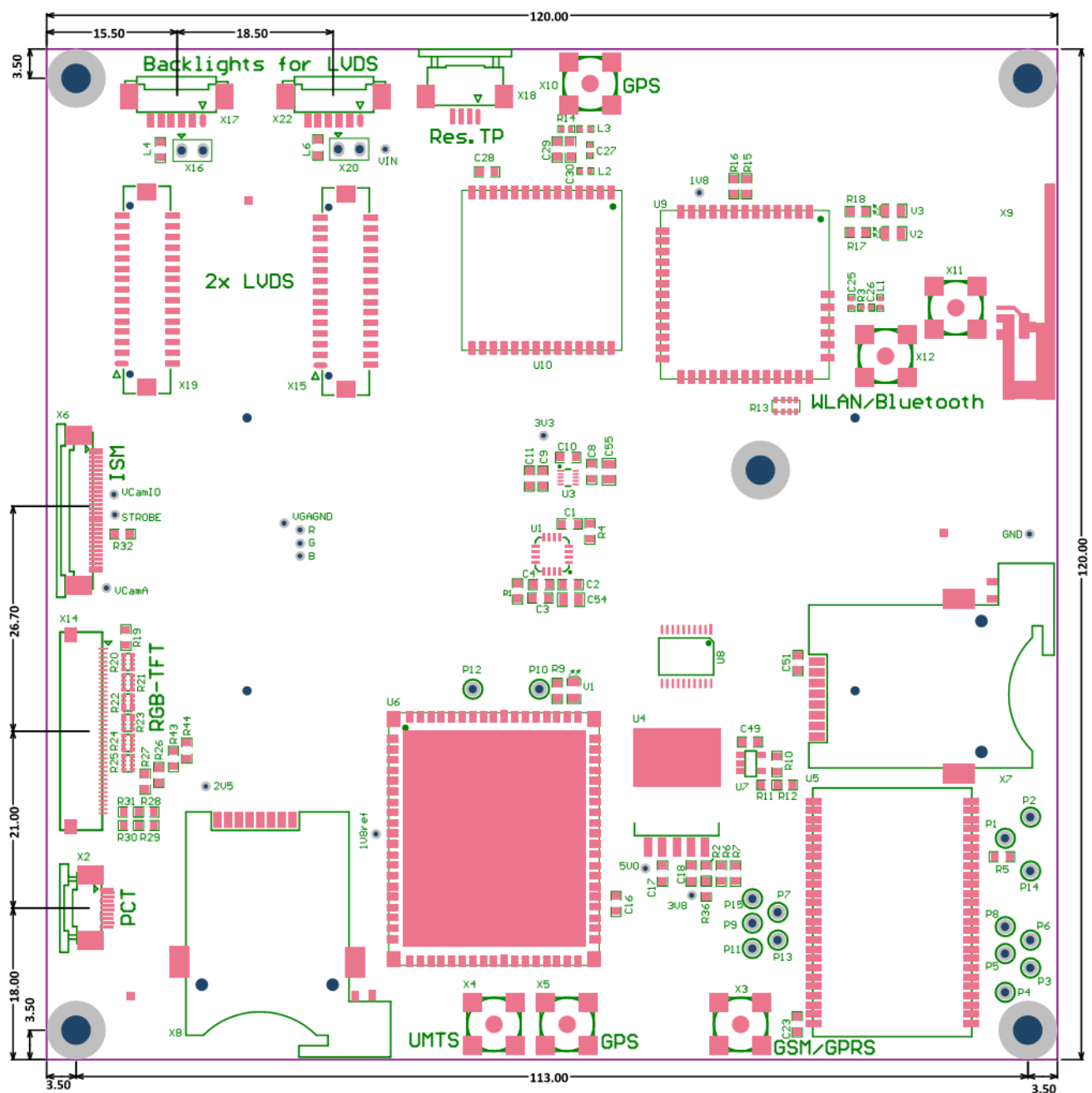


Figure 5-1: Top Side Dimensions



5.2 Bottom View

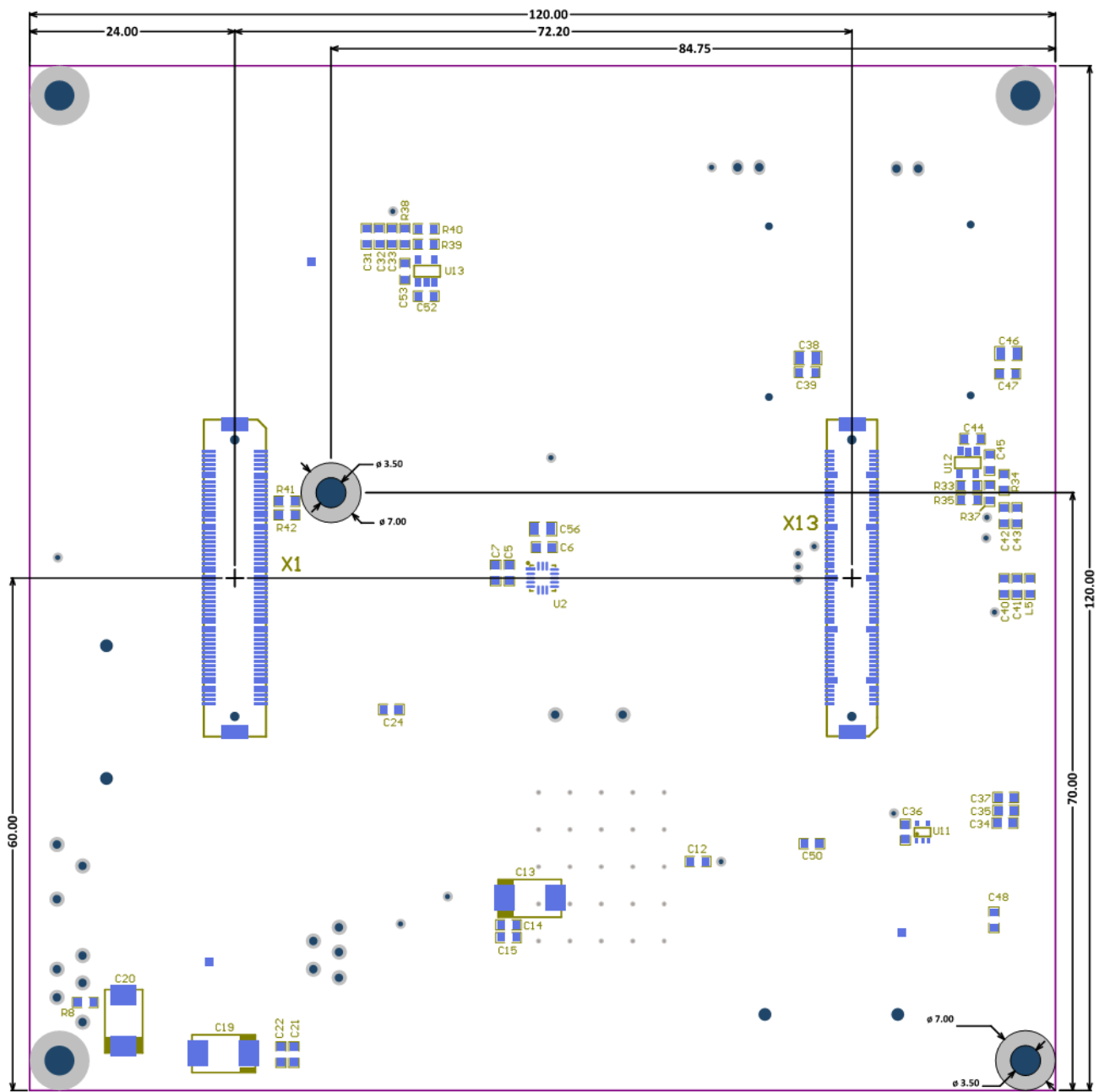


Figure 5-2: Bottom Side Dimensions



6 Support

6.1 General Support

General support for products can be found at Bluetechnix' support site <https://support.bluetechnix.at/wiki>

6.2 Board Support Packages

Board support packages and software downloads are for registered customers only <https://support.bluetechnix.at/software/>

6.3 Blackfin® Software Support

6.3.1 BLACKSheep® OS

BLACKSheep® OS stands for a powerfully and multithreaded real-time operating system (RTOS) originally designed for digital signal processing application development on Analog Devices Blackfin® embedded processors. This high-performance OS is based on the reliable and stable real-time VDK kernel from Analog Devices that comes with VDSP++ IDE. Of course BLACKSheep® OS is fully supported by all Bluetechnix Core-Modules and development hardware.

6.3.2 LabVIEW

You can get LabVIEW embedded support for Bluetechnix Core Modules by Schmid-Engineering AG <http://www.schmid-engineering.ch>.

6.3.3 uClinux

You can get uClinux support (boot loader and uClinux) for Bluetechnix Core Modules at <http://blackfin.uClinux.org>.

6.4 Blackfin® Design Services

Based on more than seven years of experience with Blackfin, Bluetechnix offers development assistance as well as custom design services and software development.

6.4.1 Upcoming Products and Software Releases

Keep up to date with all product changes, releases and software updates of Bluetechnix at <http://www.bluetechnix.com>.



7 Ordering Information

7.1 EXT-DEV-i.MX53-COMM

Article Number	Name	Temperature Range
100-4123-1	EXT-DEV-i.MX53-COMM	Commercial
100-4120	DEV-i.MX53 Development Kit with CM-i.MX53	Commercial
100-4124	DEV-i.MX53 Development Kit with CM-i.MX53 Industrial	Industrial

Table 7.1: Ordering information

NOTE: Custom Core Modules are available on request! Please contact Bluetechnix (office@bluetechnix.com) if you are interested in custom Core Modules.

8 Dependability

8.1 MTBF

Please keep in mind that a part stress analysis would be the only way to obtain significant failure rate results, because MTBF numbers just represent a statistical approximation of how long a set of devices should last before failure. Nevertheless, we can calculate an MTBF of the Core Module using the bill of material. We take all the components into account. The PCB and solder connections are excluded from this estimation. For test conditions we assume an ambient temperature of 30°C of all Core Module components except the Blackfin® processor (80°C) and the memories (70°C). We use the MTBF Calculator from ALD (<http://www.aldservice.com/>) and use the reliability prediction MIL-217F2 Part Stress standard. Please get in touch with Bluetechnix (office@bluetechnix.com) if you are interested in the MTBF result.



9 Product History

9.1 Version Information

9.1.1 EXT-DEV-i.MX53-COMM

Version	Assembled Components	Type
1.0.0	GSM Module GPS Module UMTS Module (incl. GPS) WiFi / Bluetooth Gyroscope Accelerometer Magnetometer	U-Blox LEON-G100 Telit Condor C1919 Sierra Wireless SL8082 Lesswire WiBear-SF ST-Microelectronics L3G4200D Freescale MMA8453QT Freescale MAG3110FCR1

Table 9.1: Overview PRODUCTNAME product changes

9.2 Anomalies

Version	Date	Description
V1.0	2009 12 03	Resistive Touch-Panel interface for LVDS does not work. (No Workaround) GPS on UMTS-Module does not work. (No Workaround)

Table 9.2 – Product anomalies



10 Document Revision History

Version	Date	Document Revision
1	2012 10 30	First draft V1 of this Document

Table 10.1: Revision history



11 List of Abbreviations

Abbreviation	Description
CSI	CMOS Sensor Interface
eCM	Enhanced Core Module
ESD	Electrostatic Discharge
GPIO	General Purpose Input Output
I	Input
I²C	Inter-Integrated Circuit
I/O or IO	Input/Output
ISM	Image Sensor Module
MTBF	Mean Time Between Failure
NC	Not Connected
O	Output
OS	Operating System
PCT	Projected Capacitive Touch-Panel
PWR	Power
RTOS	Real-Time Operating System
SPI	Serial Peripheral Interface
TFT	Thin-Film Transistor
TSC	Touch Screen Controller
UART	Universal Asynchronous Receiver Transmitter
USB	Universal Serial Bus
ZIF	Zero Insertion Force

Table 11.1: List of abbreviations



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