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Methone Board **User Manual**

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1 Introduction

This document describes the functional requirements for the Methone board designed to fit on a SBRIO from National Instruments. The board will house a PC module from either Kontron or Toradex and have the necessary connectors for the PC environment as well as power conversion for the system. This document describes the function, pin-outs and general handling.

2 System Overview

A block diagram of the hardware is shown in. It shows the major blocks of the system which will be described in the following chapters.

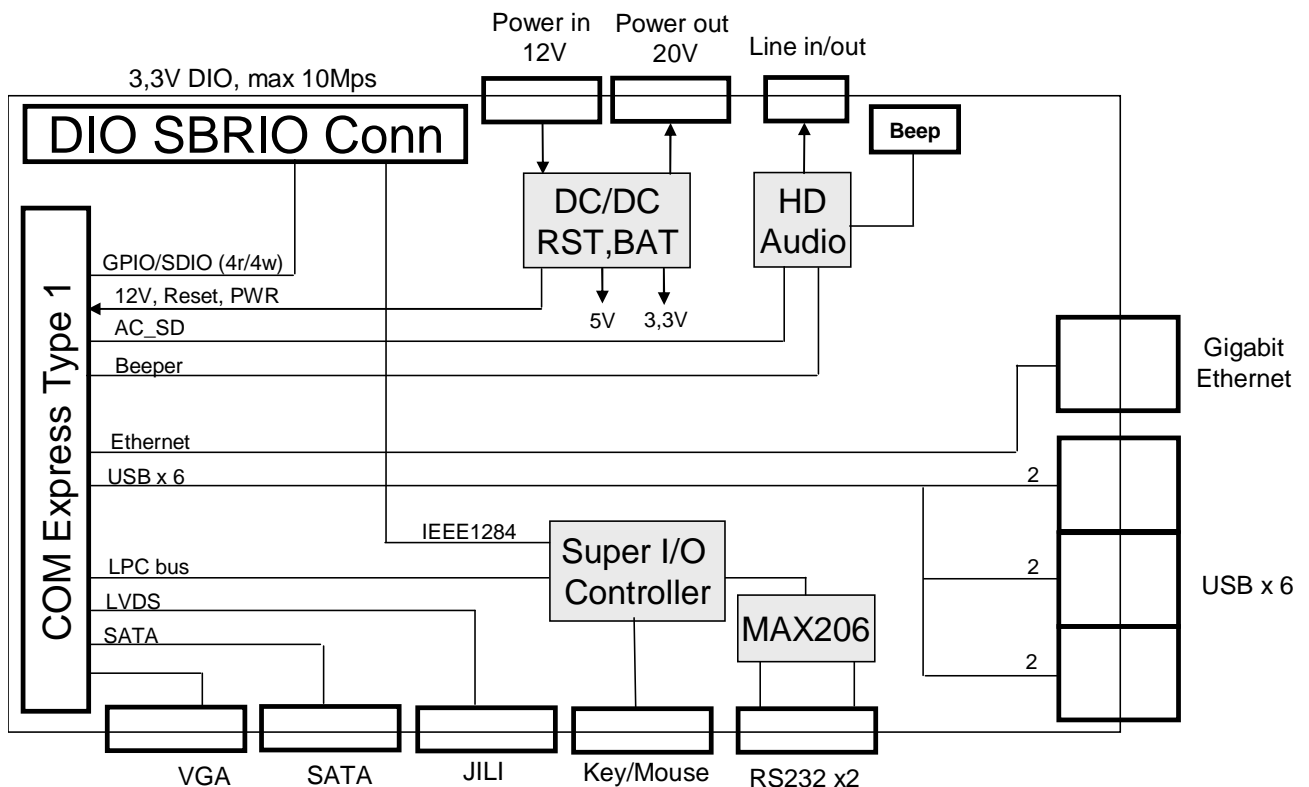


Figure 1: Block diagram of the Methone Board.

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3 Functionality

The Methone board doesn't have any own intelligence; it's mainly an adapter board with connectors to the SBRIO and PC module and the outside world it also handles the power conversion for all parts of the system.

3.1 SBRIO connector (J2)

The connection to the SBRIO is made over one of the 4 DIO connectors on the SBRIO board. The connector is a standard 2.54 mm pitch dual row 50 pin header. The signals are 3.3V with clamp diodes to GND and 5V and a 33 ohm current-limiting resistor. Maximum current is specified to 3mA.

The following signals from the PC module are connected to the DIO connector:

- 8 GPIO/SDIO signals (4 in and 4 out) directly from the COM Express.
- 17 IEEE1284 signals from the superI/O chip to enable EPP/ECP communication.

J2			
1	GND	26	GND
2	LPT_ERR# (Port5 DIOCTL)	27	GPO2 (Port6 DIO2)
3	LTP_PD_0 (Port5 DIO0)	28	GND
4	N/C (Port5 DIO9)	29	GPO3 (Port6 DIO3)
5	LTP_PD_1 (Port5 DIO1)	30	GND
6	N/C (5V from SBRIO)	31	LPT_AFD# (Port6 DIO4)
7	LTP_PD_2 (Port5 DIO2)	32	GND
8	GND	33	LPT_SLIN# (Port6 DIO5)
9	LTP_PD_3 (Port5 DIO3)	34	GND
10	N/C (5V from SBRIO)	35	LPT_STB# (Port6 DIO6)
11	LTP_PD_4 (Port5 DIO4)	36	GND
12	GND	37	LPT_INIT# (Port6 DIO7)
13	LTP_PD_5 (Port5 DIO5)	38	GND
14	GND	39	LPT_BUSY (Port6 DIO8)
15	LTP_PD_6 (Port5 DIO6)	40	GND
16	GND	41	GPI0 (Port2 DIO4)
17	LTP_PD_7 (Port5 DIO7)	42	GND
18	GND	43	GPI1 (Port2 DIO5)
19	N/C (Port5 DIO8)	44	GND
20	GND	45	GPI2 (Port2 DIO6)
21	LPT_SLCT (Port6 DIO9)	46	GND
22	LPT_PE (Port6 DIOCTL)	47	GPI3 (Port2 DIO7)
23	GPO0 (Port6 DIO0)	48	GND
24	GND	49	LPT_ACK# (Port2 DIO8)
25	GPO1 (Port6 DIO1)	50	GND

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3.2 COM Express connector (J1)

The connection to the PC Module is made over a standardized COM Express interface. The Methone uses the first of the two 220-pin connectors (Row A&B). The connector is surface mounted with 0.5mm pitch and selected so the height between the boards will be 8 mm. The connector is specified for very high data rates and great care has to be taken when creating the layout to handle signals of up to 3Gb/s.

J1 (1-55)		J1 (56-110)	
Pin#	PC mod_signal	Pin#	PC mod_signal
A1	GND	B1	GND
A2	GBE0_MDI3-	B2	GBE0_ACT#
A3	GBE0_MDI3+	B3	LPC_FRAME#
A4	GBE0_LINK100#	B4	LPC_AD0
A5	GBE0_LINK1000#	B5	LPC_AD1
A6	GBE0_MDI2-	B6	LPC_AD2
A7	GBE0_MDI2+	B7	LPC_AD3
A8	GBE0_LINK#	B8	
A9	GBE0_MDI1-	B9	
A10	GBE0_MDI1+	B10	LPC_CLK
A11	GND	B11	GND
A12	GBE0_MDI0-	B12	PWRBTN#
A13	GBE0_MDI0+	B13	SMB_CK
A14	GBE0_CTREF	B14	SMB_DAT
A15	SUS_S3#	B15	SMB_ALERT#
A16	SATA0_TX+	B16	
A17	SATA0_TX-	B17	
A18	SUS_S4#	B18	SUS_STAT#
A19	SATA0_RX+	B19	
A20	SATA0_RX-	B20	
A21	GND	B21	GND
A22		B22	
A23		B23	
A24	SUS_S5#	B24	PWR_OK
A25		B25	
A26		B26	
A27	BATLOW#	B27	WDT
A28	ATA_ACT#	B28	
A29	AC_SYNC	B29	AC_SDIN1
A30	AC_RST#	B30	AC_SDIN0
A31	GND	B31	GND
A32	AC_BITCLK	B32	SPKR
A33	AC_SDOOUT	B33	I2C_CK
A34	BIOS_DISABLE#	B34	I2C_DAT
A35	THRMTRIP#	B35	THRM#
		A56	GND
		A57	GND
		A58	
		A59	
		A60	GND
		A61	
		A62	
		A63	SDIO0_DATA1
		A64	
		A65	
		A66	GND
		A67	SDIO0_DATA2
		A68	PCIE_TX0+
		A69	PCIE_TX0-
		A70	GND
		A71	LVDS_A0+
		A72	LVDS_A0-
		A73	LVDS_A1+
		A74	LVDS_A1-
		A75	LVDS_A2+
		A76	LVDS_A2-
		A77	LVDS_VDD_EN
		A78	LVDS_A3+
		A79	LVDS_A3-
		A80	GND
		A81	LVDS_A_CK+
		A82	LVDS_A_CK-
		A83	LVDS_I2C_CK
		A84	LVDS_I2C_DAT
		A85	SDIO0_DATA3
		A86	KBD_RST#
		A87	KBD_A20GATE
		A88	PCIE0_CK_REF+
		A89	PCIE0_CK_REF-
		A90	GND
		B56	
		B57	SDIO0_WP
		B58	
		B59	
		B60	GND
		B61	
		B62	
		B63	SDIO0_CD#
		B64	
		B65	
		B66	WAKE0#
		B67	WAKE1#
		B68	PCIE_RX0+
		B69	PCIE_RX0-
		B70	GND
		B71	
		B72	
		B73	
		B74	
		B75	
		B76	
		B77	
		B78	
		B79	LVDS_BKLT_EN
		B80	GND
		B81	
		B82	
		B83	LVDS_BKLT_CTRL
		B84	
		B85	
		B86	
		B87	
		B88	
		B89	VGA_RED
		B90	GND

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A36	USB6	B36	USB7-	A91		B91	VGA_GRN
A37	USB6+	B37	USB7+	A92		B92	VGA_BLU
A38	USB_6_7_OC#	B38	USB_4_5_OC#	A93	SDIO0_CLK	B93	VGA_HSYNC
A39	USB4-	B39		A94		B94	VGA_VSYNC
A40	USB4+	B40		A95		B95	VGA_I2C_CK
A41	GND	B41	GND	A96	GND	B96	VGA_I2C_DAT
A42	USB2-	B42	USB3-	A97	VCC_Main	B97	TV_DAC_A
A43	USB2+	B43	USB3+	A98	VCC_Main	B98	TV_DAC_B
A44	USB_2_3_OC#	B44	USB_0_1_OC#	A99	VCC_Main	B99	TV_DAC_C
A45	USB0-	B45	USB1-	A100	GND	B100	GND
A46	USB0+	B46	USB1+	A101	VCC_Main	B101	VCC_Main
A47	VCC_RTC	B47		A102	VCC_Main	B102	VCC_Main
A48	EXCD0_PERST#	B48		A103	VCC_Main	B103	VCC_Main
A49	EXCD0_CPPE#	B49	SYS_RESET#	A104	VCC_Main	B104	VCC_Main
A50	LPC_SERIRQ	B50	CB_RESET#	A105	VCC_Main	B105	VCC_Main
A51	GND	B51	GND	A106	VCC_Main	B106	VCC_Main
A52		B52		A107	VCC_Main	B107	VCC_Main
A53		B53		A108	VCC_Main	B108	VCC_Main
A54	SDIO0_DATA0	B54	SDIO0_CMD	A109	VCC_Main	B109	VCC_Main
A55		B55		A110	GND	B110	GND

3.3 Ethernet (J5)

The PC module supplies Gbit LAN signals over the Com Express connector. The Methone board has a RJ45 connector with built-in magnetics and filtering.

J5	
Pin#	Diff_pair
1	Pair 1
2	Pair 1
3	Pair 2
4	Pair 2
5	Pair 3
6	Pair 3
7	Pair 4
8	Pair 4

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3.4 USB (J6, J7, J8)

The PC module supplies USB 2.0 signals over the Com Express connector. The Methone board has three double USB type A connectors for the USB signals as well as power supply with over-current protection and signaling. Note that for Toradex modules USB channels 4 and 6 (J8) are Hi-speed (480 Mbit) only.

J6		J7		J8	
Pin#	Signal	Pin#	Signal	Pin#	Signal
U1	USB0 +5V	U1	USB2 +5V	U1	USB4 +5V
U2	USB0 D-	U2	USB2 D-	U2	USB4 D-
U3	USB0 D+	U3	USB2 D+	U3	USB4 D+
U4	GND	U4	GND	U4	GND
L1	USB1 +5V	L1	USB3 +5V	L1	USB6 +5V
L2	USB1 D-	L2	USB3 D-	L2	USB6 D-
L3	USB1 D+	L3	USB3 D+	L3	USB6 D+
L4	GND	L4	GND	L4	GND

Note that the signal names above describe the connection to the Com Express connector, the actual signal in the PC-module may vary depending on manufacturer.

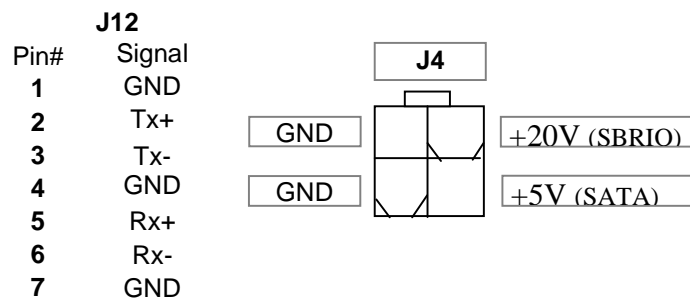
For Toradex Robin module the signals are mapped as follows:

Com Exp.	PC-module	Remark
USB0	USB0	
USB1	USB1	
USB2	USB3	
USB3	USB4	
USB4	USB6	Hi-speed only (480 Mbit)
USB6	USB7	Hi-speed only (480 Mbit)

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3.5 SATA (J12)

The PC module supplies SATA 1,5/3Gb/s signals over the Com Express connector. The Methone board has one SATA data connector as well as a power connector J4 for 5V power limited to 1A for an external 2.5" hard disk.



3.6 VGA (J14)

The PC module supplies VGA signals for an external monitor over the Com Express connector. The Methone board has one 15-pin 3 row D-Sub for the signals.

Note that VGA is currently only supported by the Toradex module.

3.7 LVDS (J11)

The PC module supplies LVDS signals for an external LCD display over the Com Express connector. This functionality is not supported on all PC modules. The Methone board has a 40 pin flat-foil connector (FFC) to support the LVDS signals, power for electronics and backlight, control signals and an I2C link for identification. The interface is referred to as JILI (Jumpteck Intelligent LVDS Interface).

Note that this interface is only fully supported by the Kontron module and described in their documentation.

3.8 Super I/O

The Methone board uses a Winbond W83627HF Super I/O chip to generate two RS232 ports, PS/2 signals for keyboard and mouse and IEE1284 signals for communication with the SBRIO over the DIO interface. The Super I/O communicates with the PC module via the LPC (Low Pin Count) bus in the Com Express connector.

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3.8.1 Dual RS232 serial (J22, J23)

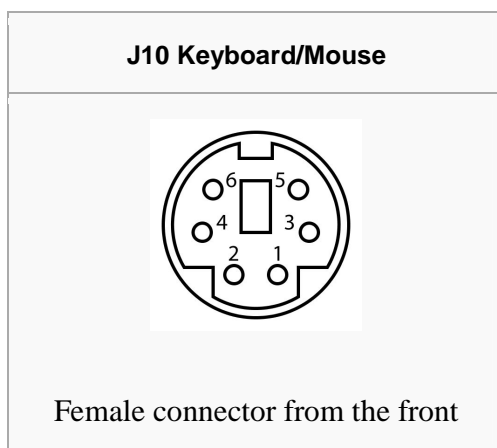
The Methone board has two RS232 channels with RXD/TXD, CTS/RTS, DSR/DTR and Ground in a stacked double 9-pin D-Sub (plug). There is also +5V available on one pin in each D-sub. The total current for the two pins together is limited to 1A

J22 (Com1)		J23 (Com2)	
Pin#	Signal	Pin#	Signal
1	5 V	1	5 V
2	TxD	2	TxD
3	RxD	3	RxD
4	DTR	4	DTR
5	GND	5	GND
6	DSR	6	DSR
7	CTS	7	CTS
8	RTS	8	RTS
9	N/C	9	N/C

3.8.2 Keyboard and Mouse (J10)

The Super I/O has support for keyboard and mouse over PS/2.

The Methone layout supports both a double keyboard/mouse connector as well as combined signals for both keyboard and mouse. The pin configuration of the lower connector is default for the keyboard and if a mouse also needs to be attached a splitter cable has to be used. If a double connector is used the top will be for mouse and have the corresponding mouse-signals and power connected.



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Pin 1	+DATA (K)	Data for Keyboard
Pin 2	+DATA (M)	Data for Mouse*
Pin 3	GND	Ground
Pin 4	Vcc	+5 V DC at 100 mA
Pin 5	+CLK (K)	Clock for Keyboard
Pin 6	+CLK (M)	Clock for Mouse**
<p>* Splitter cable is needed for Mouse data. Pin also used in top connector for mouse.</p> <p>** Splitter cable is needed for Mouse clock. Pin also used in top connector for mouse.</p>		

Figure 12: Keyboard/Mouse connector.

3.9 Sound (J21)

The Methone board has a Realtek ALC888 HDAudio Codec chip to handle audio. The line in /out are connected to a pin header (J21) on the Methone board and it's up to the user to do any adaption needed for the system (amplifiers etc.) The Codec is connected to seven pins on COM Express connector allocated to support HD Audio. There is also a beeper on the Methone board and it connects to the Com Express as well as the Codec. The board also has a digital (SPDIF) output (J24).

J21		J24	
Pin#	Signal	Pin#	Signal
1	Line_out_R	1	Digital out
2	GND	2	GND
3	Line_out_L		
4	Line_in_R		
5	GND		
6	Line_in_L		

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3.10 Power Distribution (J19, J4)

The input voltage to the Methone board should be 12V DC at 6A minimum.

The incoming 12V is connected to J19 and the rail is short-circuit protected by a fuse and has a hardware/software controlled transistor for on and off. Push button S2 activates the power (if software control is used) otherwise there should be a jumper inserted in J3 to keep the power on all time. The 12V will be connected to the PC module via the COM Express connector and the module consumes roughly 6W (0,5A).

Push button S1 is generating a reset signal to the system.

The 12 V is also connected to J20 to drive a Fan.

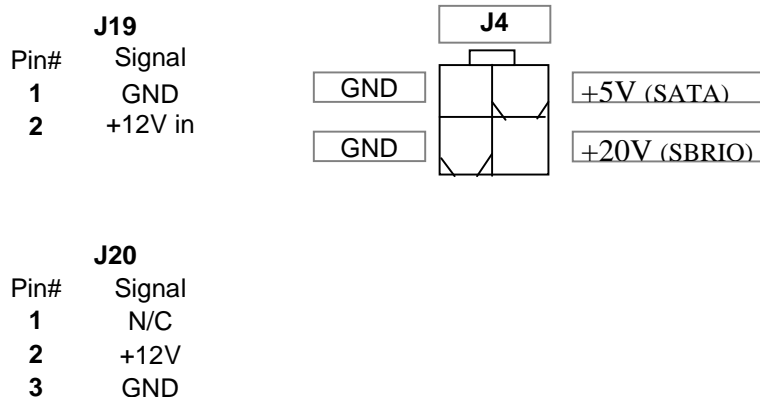
The Methone board also has a battery holder for a back-up battery (mainly for the Real time clock on the PC module). The battery should be a 3V Lithium type CR2032.

Other voltage supplies required for the system is generated on the Methone board. They are:

- 20V \pm 3% 1,0A for the SBRIO card (J4), to be supplied over a cable to the SBRIO.
- 5V \pm 5% 5,5A for USB, SATA, JILI, RS232, the Super I/O and internal logic.
- 3.3V \pm 5% 0,1A for internal logic.

The 5V supply is mainly provided for external devices connected to the USB, SATA (2.5" drive), JILI Electronics (the Backlight needs more current and is supplied from the 12V) and RS232 ports through dedicated 5V supply pins.

The Methone board is able to supply a total of 5 A for external 5V. Current limiting circuits are implemented for short-circuit protection and limitation of current on each dedicated 5V supply pin.



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3.11 Mechanical

The Methone board is mounted on top of the SBRIO board connected to connector P2 on the SBRIO. The board has a cut-outs for the large capacitor on the SBRIO. The Methone board mounting stand-offs fits both the digital and analog SBRIO boards.

