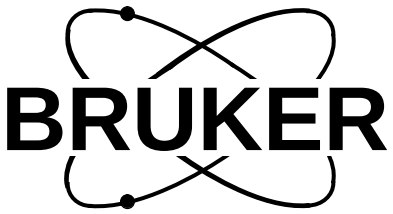

FTLP/4M
Manual

Version 1.0

BRUKER - SPECTROSPIN AG

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Introduction 1

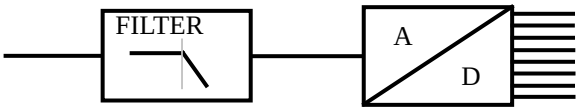
General 1.1

This document describes the board FTLP/4M. It includes the description of the hard- and software interface. In special there is a section giving hints on trouble-shooting. Finally the complete technical data shows the performance of this board.

System overview 1.2

For measurements in digital systems, analog to digital converters are used. So the analogbandwith must be reduced with a lowpassfilter. „Antialiasing-Filter“ is the technical name given to this type of filter.

Figure 1: digital measurement system



The FTLP-board is an antialiasing-filter, which is designed for the fast AD-converter system FADC.

You will find more details about the system configuration, in the RCU-manual

(P/N: Z31209).

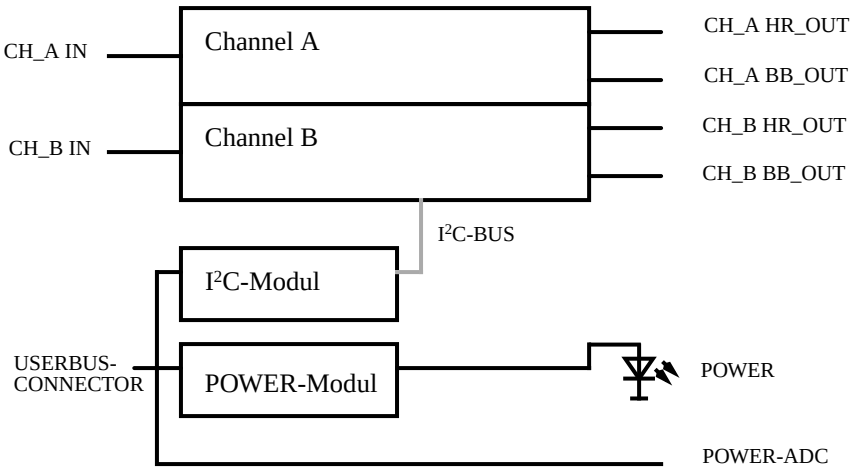
Description 2.1

The boardname FTLP/4M is a mnemonics word for

FIL**T**ER **L**OW**P**ASS / **4M**HZ - BOARD.

Board overview 2.1.1

Figure 2: block diagram



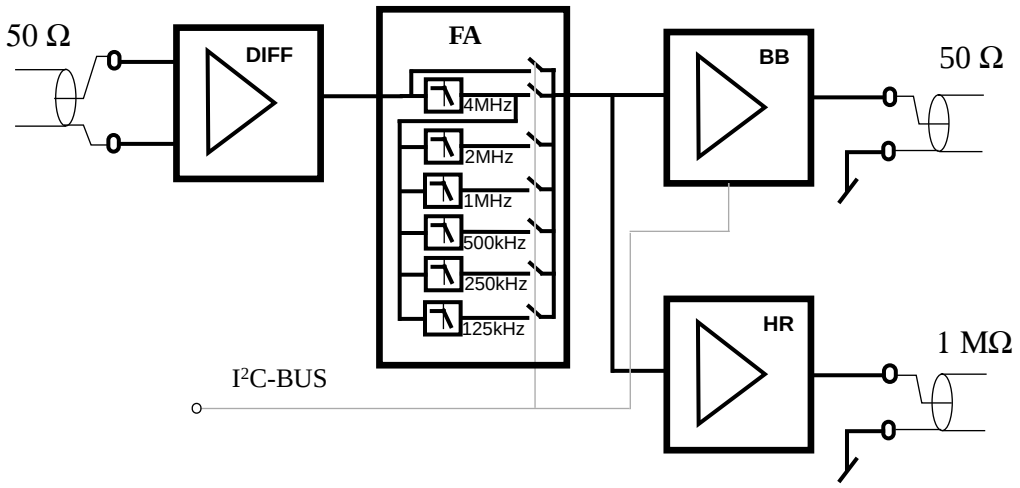
The FTLP/4M is a two channel lowpass filtersystem with variable 3dB-frequencies.

The filtermoduls of FTLP/4M are designed as dedicated 4 pole Butterworth type. The selection of a particular filterpath is realised with a I^2C bus system.

The supply voltage for the filter electronic is generated on the board. Each voltage is controlled and its status is displayed on the front panel with a common green LED „**POWER**“.

On the front panel connector „**POWER-ADC**“ is the standard AQR power supply (+/-19V and +/-9V). With this connector the FTLP supplies the analog part of the FADC.

Figure 3: filterchannel



One filterchannel includes four blocks:

Inputamplifier (DIFF):

The differential inputamplifier is designed especially for a high common mode rejection.

Filterarray (FA):

Six filtermoduls with different 3dB-frequencies and a bypass-path are selectable by the I^2C bus. For filter bandwiths lower than 4MHz, there are two filtermoduls connected in series. About that, the system has filterpaths with 8 poles, but the selected lower filter is dominating.

BB-Outputamplifier (BB):

The broad band path with a special high bandwith has two different gains. These are selectable by the I^2C bus.

HR-Outputamplifier (HR):

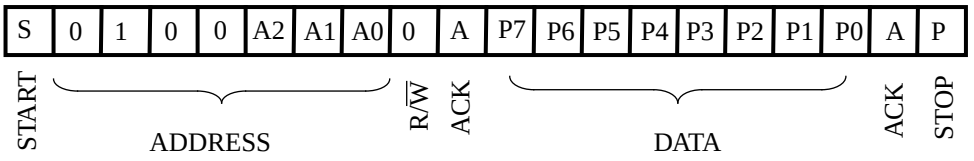
The high resolution path is additionally included for future use.

Board Interface 2.2

Standard I²C-BUS components are implemented on the FTLP/4M board. To use this board, the I²C-system must conform to the I²C specification defined by Philips. Refer to I²C specification for further details.

The board function is controlled with the I/O expander PCF8574T .

Figure 4: complete data transfer



ADDRESS 2.2.1

On the FTLP/4M board the I/O expander I²C address pins are routed to the backplane connector and are fixed with pullup resistors, so the backplane defines the I²C address, when the board is plugged in, alternatively the lower address pins are always high.

The actual I²C-address is defined by the slot of the AQR-system.

Table 1. I²C-Address

Function	Address in AQR-SLOT „FLT“	Address-range	IC-type
Port identification	AC HEX	A0-AF HEX	X24022
Port controlling	4C HEX	40-4F HEX	PCF8574

Table 2. Board Function

P7 MSB	P2	P1	P0 LSB	Channel A&B	Bypass	3dB-frequencies	BB-Gain
X	H	H	H	OFF (OV)	OFF	---	---
X	L	L	L	ON	ON	---	X
X	L	L	H	ON	OFF	125 kHz	X
X	L	H	L	ON	OFF	250 kHz	X
X	L	H	H	ON	OFF	500 kHz	X
X	H	L	L	ON	OFF	1 MHz	X
X	H	L	H	ON	OFF	2 MHz	X
X	H	H	L	ON	OFF	4 MHz	X
L	X	X	X	X	X	X	1
H	X	X	X	X	X	X	5

Troubleshooting 2.3

Figure 5: flow diagram for troubleshooting

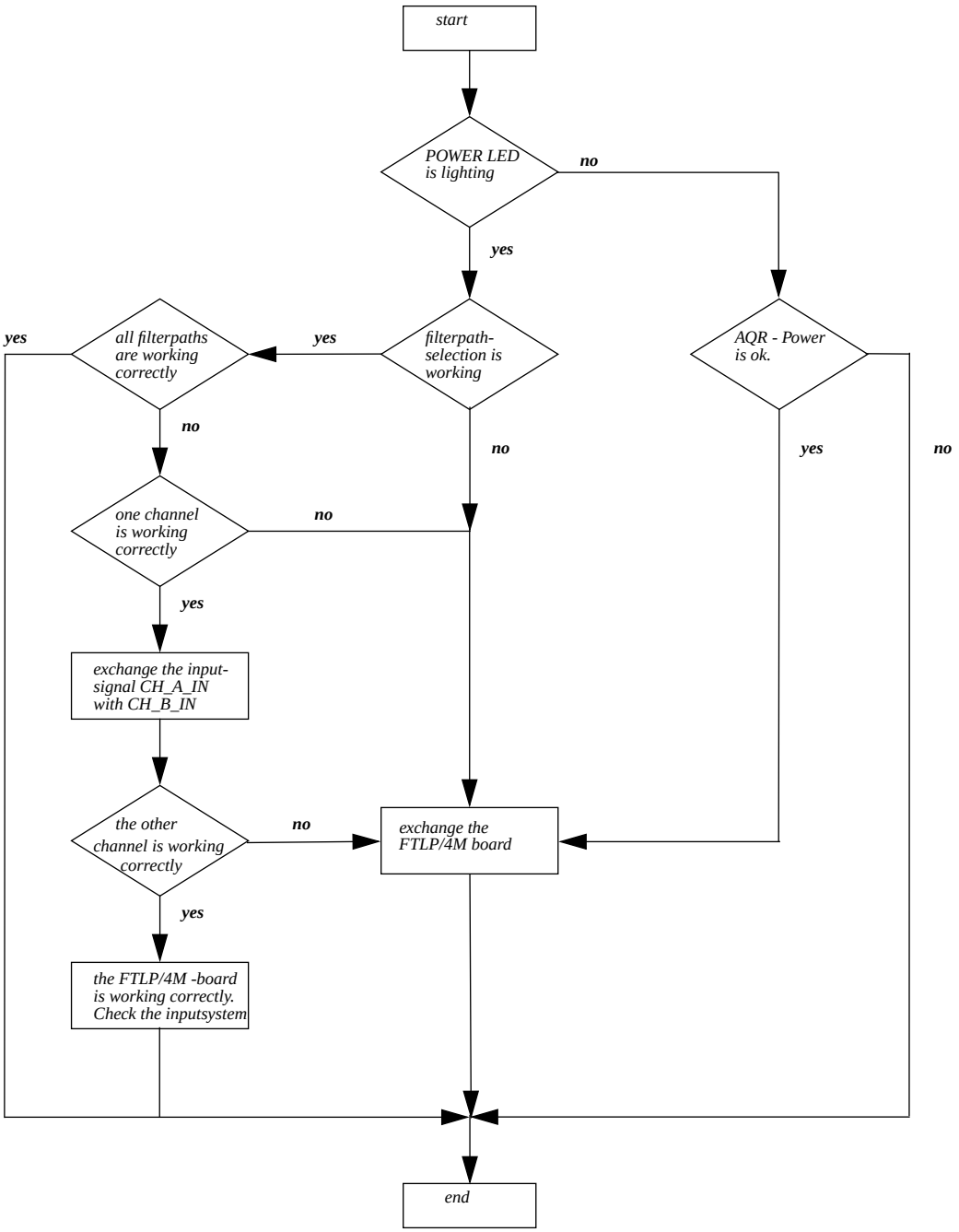


Table 3. Filterboard

Number of Filterchannel	2
Number of different 3dB-frequencies	6
Bypass	yes

Table 4. Filterchannel

Modul	3dB-frequency	settling time [1]
Filter 1	125 kHz	20 µs
Filter 2	250 kHz	10 µs
Filter 3	500 kHz	5 µs
Filter 4	1 MHz	2.5 µs
Filter 5	2 MHz	1.5 µs
Filter 6	4 MHz	0.8 µs
Bypass	---	0.2 µs

Note 1: time from the input transition until the outputsignal arrived 90% of the final value.

Table 5. Inputamplifier

PARAMETER	CONDITIONS	TYP	UNITS
Input Voltage Range		1	Vpp
Full Power Bandwith		10	MHz
Input Resistance		50	Ω

Table 6. BB-Outputamplifier

PARAMETER	CONDITIONS	TYP	UNITS
DC Gain	P7=0	1	
DC Gain	P7=1	5	
Output Voltage Swing	Vin=1Vpp Gain=1	1	Vpp
Output Voltage Swing	Vin=1Vpp Gain=5	5	Vpp
Full Power Bandwith		10	MHz
Output Resistance		50	Ω
Output Offset Voltage	Gain=1	+/- 10	mV
Output Offset Voltage	Gain=5	+/- 50	mV
Output Noise	Gain=1	300	µVrms
Output Noise	Gain=5	1	mVrms

Table 7. HR-Outputamplifier

PARAMETERS	CONDITIONS	TYP	UNITS
DC Gain		10	
Output Voltage Swing	Vin=1Vpp	10	Vpp
Full Power Bandwith		2	MHz
Output Resistance		35	Ω
Maximum Output Current		50	mA
Output Offset Voltage		+/-150	mV
Output Noise		2	mVrms

Table 8. Power Supply Requirements

PARAMETER	CONDITIONS	MIN	TYP	MAX	UNITS
Supply Voltage 19V		14.5	19	21	V
Supply Voltage -19V		-14.5	-19	-21	V
Supply Voltage 9V		8	9	15	V
Supply Current 19V	V=19V		0.35	0.5	A
Supply Current -19V	V=-19V		-0.35	-0.5	A
Supply Current 9V	V=9V		0.15	0.3	A

Table 9. Mechanical

HF-CONNECTOR	ST KOAX SMA BU W PRT L=29,5mm 85SMA50-0-X2857 Nr.22656
„POWER ADC“ -CONNECTOR	ST BU 9W PRT MINI-D KPL. DE-9S-1A8N-A197 Nr.14462
USERBUS-CONNECTOR	ST SFT 48 W PRT DIN 41612-C/2 100-348-053 Nr.22744
Board dimensions	Standard „HF-KASSETTE“ 6HE / Double Extended(220mm) / 7TE

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