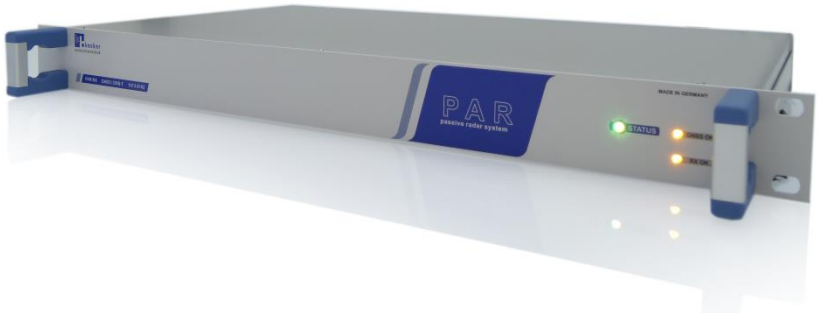
PAR-RX

Dual Channel Receiver Unit for DAB3 and DVB-T

Features

- High dynamic
- Diversity inputs
- Compact 19”, 1 HU design
- Normal and low distortion mode
- Integrated synthesizer
- GNSS disciplined OCXO reference
- Sample clock generation



Applications

- Passive Radar System (PARASOL)
- RX frontend for signal acquisition

Scope

The PAR-RX is a dual SuperHET Receiver, especially designed for the reception of DAB3 and DVB-T signals.
Each channel has a signal switch for diversity operation.

Overload Detector

In order to detect strong out-of-band signals, PAR-RX offers over-level detectors in each channel.

Low Distortion Mode

For operation with normal antenna signal levels PAR-RX provides the normal (NOR) mode, which offers highest sensitivity and good linearity. For situations where strong signals are received, PAR-RX provides a low distortion (LD) mode. In this mode, the input signal of the receiver can be lowered and linearity is increased.

Adjustable IF Gain

To allow the optimum signal level for data acquisition, PAR-RX provides an adjustable IF2 gain, which can be varied for approx. 30 dB.

Control Interface

PAR-RX offers a LAN control interface. This interface is used for managing the dual receiver and reading the built-in test results of the unit. The communication is realized as an SCPI-oriented ASCII interface.

Built-In Test Function

For system diagnostic functions PAR-RX offers a built-in test function. Parameters such as operating points of amplifier stages, LO signal levels and module temperature are monitored. The results can be queried via LAN remote interface.

GNSS disciplined Reference

PAR-RX offers an oven-controlled crystal oscillator (OCXO) as its internal frequency reference. This reference is continuously calibrated by navigation signals like GPS, GLONASS or BeiDou, provided by an external antenna.

RF Specifications

Parameter	Symbol	Min.	Typ.	Max.	Unit	Condition
General						
impedance	Z_{IN} / Z_{OUT}		50		Ohm	all RF-Ports
number of channels	n		2			'CH1 – upper element', 'CH2 – lower element'
channel isolation	S_{12}		-60		dBr	
settling time	t_{SET}		100		ms	for any kind of switching command
RF inputs						
inputs per Channel	n		2			'prim ANTU', 'sec ANTU'
connectors			N female			X11, X12 (CH1) X21, X22 (CH2)
preselection bands	n_{BAND}		3			DAB3, DVB-T (low), DVB-T (low)
input return loss	S_{11}		-17		dB	within selected RX band
input isolation	S_{21}		-35		dB	'prim ANTU' to 'sec ANTU' @790 MHz
maximum input level	Pin			-10	dBm	normal Mode
noise figure	NF		8		dB	normal mode
			20		dB	low distortion mode
intercept point	IPIP3		+3		dBm	normal mode
			+12		dBm	low distortion mode
1 dB compression	IP_{1dB}		-3		dBm	normal mode
	Band 'DAB3'					
low frequency	f_{MIN}			174,160	MHz	VHF-III, Channel 5A
high frequency	f_{MAX}	228,304			MHz	VHF-III, Channel 12D
frequency spacing			16		kHz	
suppression	S_{21}		-16		dBr	f ≤ 108 MHz (FM)
	S_{21}		-20		dBr	f ≥ 470 MHz (DVB-T)
image rejection	a_{image1}		-80		dBr	2559...2614 MHz
	a_{image2}		-80		dBr	f_{RF} – 181...187 MHz
LO re-radiations	P_{LO}		-80		dBm	1367…1422 MHz
IF rejection	$a_{1st\ IF}$		-80		dBr	1189…1195 MHz
	Band 'DVB-T low'					
low frequency	f_{MIN}			474	MHz	UHF-IV, Channel 21
high frequency	f_{MAX}	690			MHz	UHF-V, Channel 48
frequency spacing	f_{SET}		8		MHz	
suppression	S_{21}		-20		dBr	f ≤ 230 MHz (DAB3)
	S_{21}		-15		dBr	f ≥ 790 MHz (LTE)
image rejection	a_{image1}		-100		dBr	2834...3050 MHz
	a_{image2}		-80		dBr	f_{RF} – 156...164 MHz
LO re-radiations	P_{LO}		-110		dBm	1654…1870 MHz
IF rejection	$a_{1st\ IF}$		-80		dBr	1176…1184 MHz
	Band 'DVB-T full'					
DVB-T full	f_{MIN}		470	474	MHz	UHF-IV, Channel 21
	f_{MIN}	786	790		MHz	UHF-V, Channel 60
frequency spacing	f_{SET}			8	MHz	
suppression	S_{21}		-20		dBr	f ≤ 230 MHz (DAB3)
	S_{21}		-15		dBr	f ≥ 880 MHz (GSM)
image rejection	a_{image1}		-100		dBr	2834...3146 MHz
	a_{image2}		-80		dBr	f_{RF} – 152...168 MHz
LO re-radiations	P_{LO}		-80		dBm	1654…1966 MHz
IF rejection	$a_{1st\ IF}$		-80		dBr	1176…1184 MHz

Parameter	Symbol	Min.	Typ.	Max.	Unit	Condition
IF Outputs						
number of outputs	n		2			IF1 (CH1), IF2 (CH2)
Connectors			SMA female			X13, X23
IF Modes	n		2			DAB / DVB-T
spectrum polarity			reverse			
maximum gain	S_{21}		52		dB	normal mode, IF2ATT=0dB
nominal gain	S_{21}		32		dB	normal mode, IF2ATT=20dB
	S_{21}		20		dB	low distortion mode, IF2ATT=20dB
intercept point*	OPIP3		+35	dBm		IF2ATT=0dB
low distortion mode	ΔS_{21}		-12		dBr	attenuation
Overall SSBPHN	SSBPHN		-91		dBc/Hz	fe=600 MHz, 100 Hz offset
	SSBPHN		-105		dBc/Hz	fe=600 MHz, 1 kHz offset
	SSBPHN		-112		dBc/Hz	fe=600 MHz, 10 kHz offset
	SSBPHN		-115		dBc/Hz	fe=600 MHz, 100 kHz offset
	SSBPHN		-125		dBc/Hz	fe=600 MHz, 1 MHz offset
	Mode 'DAB'					
center frequency	f_{IF}		92,16		MHz	
bandwidth	Δf_{IF}		5,2		MHz	3 channels
stopband attenuation	a_{IF}		80		dBr	f ≤ 58 MHz, f ≥ 126 MHz
Output return loss	S_{22}		-17		dB	89,5…94,8 MHz
	Mode 'DVB-T'					
center frequency	f_{IF}		80,0		MHz	
bandwidth	Δf_{IF}		8,0		MHz	1 channel
stopband attenuation	a_{IF}		90		dBr	f ≤ 52 MHz, f ≥ 108 MHz
Output return loss	S_{22}		-17		dB	76,0…84,0 MHz
GNSS Input						
connector			N female			X31
frequencies*[2]	f_1		1602		MHz	GLONASS
	f_2		1561,098		MHz	BeiDou
	f_3		1575,42		MHz	GPS
input return loss	S_{11}		-12		dB	f_1 / f_2 / f_3 ± 1 MHz
Phantom supply	U_{PHS}		5		V	
	I_{PHS}			100	mA	
REF output						
connector			SMA female			X32
frequency	f_{REF}		10		MHz	GNSS disciplined
output return loss	S_{22}		-12		dB	10 MHz ± 1 MHz
output level	P_{REF}		+10		dBm	
accuracy	f_{ACC}		1		ppm	without GNSS locking
			50		ppb	GNSS locked
SMPCLK output						
connector			SMA female			X33
frequency	f_{SMPCLK}		64 / 73,728		MHz	switchable
output return loss	S_{22}		-12		dB	@ desired frequency
output level	P_{SMPCLK}		+10		dBm	
Phasenoise	SSBPHN		-115		dBc/Hz	1 kHz offset

* @ P_{OUT} = 2 x 0 dBm, Δf = 2 MHz

*[2]GNSS Receiver is capable to receive these frequencies, there usage for reference disciplination is not finally specified yet

Common Specifications

Parameter	Symbol	Min.	Typ.	Max.	Unit	Condition
power supply		90	230	260	V	50 / 60 Hz AC, X91
power consumption			25		VA	
optical indication			STATUS			OK (green) / WARNING (yellow) / FAIL (red), result of build in test
			GNSS OK			OCXO is locked to GNSS
			RX OK			PAR-DSP signals trouble free reception
Dimensions (L x W x H)			appr.265 x 482 x 44		mm	19” 1U, without connectors and handles
weight			5600		g	
operating temp. range		+5		+ 40	°C	
storage temp. range		- 40		+ 70	°C	
Remote interfaces						
LAN			10/100BaseT			RJ45, X83
USB Device			2.0 (high speed)			USB type B, X82
USB Host*			2.0 (high speed)			USB type A, service port, X81
EMC			in line with direction ETSI EN301489			
Safety			in line with direction EN60950-1:2006 + A11:2009 + A1:2010			
Ordering information	PAR-RX	P/N:	1413.8102.1			PARASOL RECEIVER UNIT

*future use

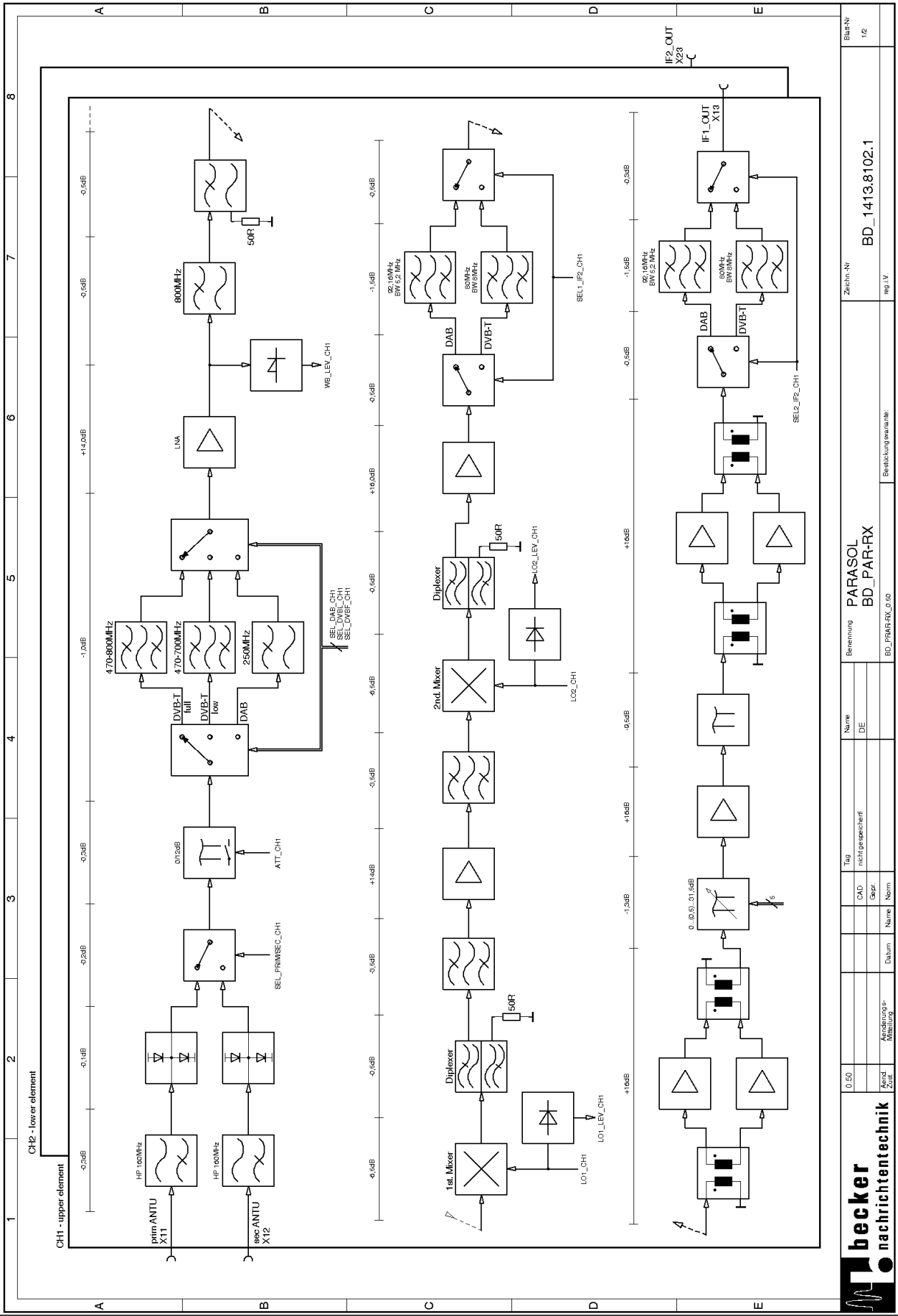
Front view

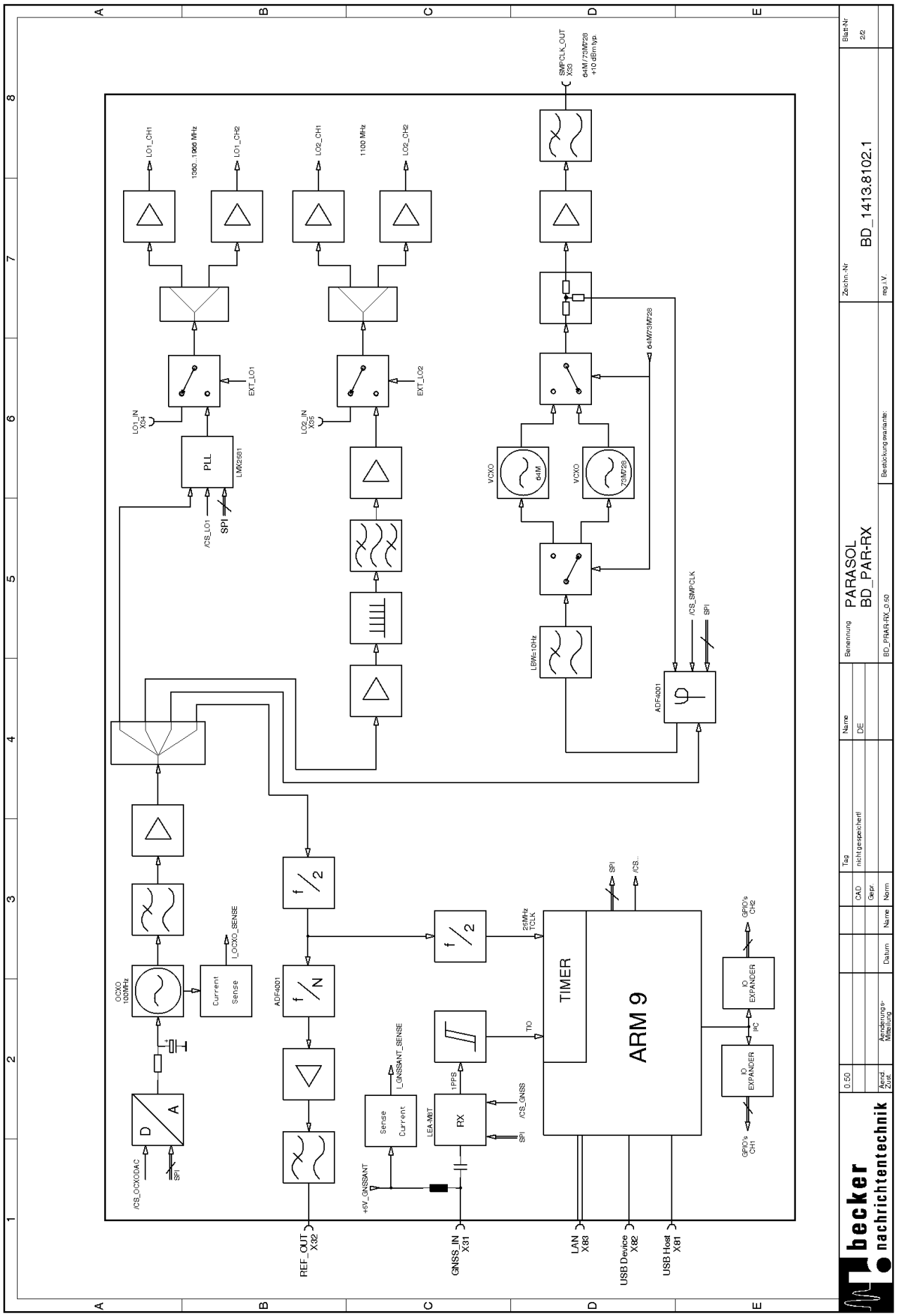
Rear view

Related Products

Product	Description	P/N
PAR-DSP	Dual Channel Parasol Processing Unit	1413.3102.1
PAR-RX_DSPU	Evaluation unit for flying object recognition	1413.1102.1

Block Diagramm




SMPCLK_OUT X33
64M / 75MHz
+10 dBm typ
LO1_CH1
1360...1960 MHz
LO1_CH2
LO2_CH1
1100 MHz
LO2_CH2
EXT_LO1
EXT_LO2
LO1_IN X34
LO2_IN X35
PLL
LMX2581
/CS_LO1
SPI
VCXO
64M
VCXO
75MHz
64M/75MHz
LBW=10Hz
/CS_SMPCLK
SPI
ADF4001
OCXO 100MHz
Current Sense
LOCXO_SENSE
ADF4001
f/2
f/N
f/2
26MHz TCLK
TIMER
ARM 9
SPI
/CS...
GPIO's CH2
IO EXPANDER
I²C
IO EXPANDER
GPIO's CH1
D
A
/CS_OCXODAC
SPI
Sense
Current
LGNSSANT_SENSE
+5V_GNSSANT
LEA-M8T
RX
1PPS
TID
/CS_GNSS
SPI
REF_OUT X32
GNSS_IN X31
LAN X83
USB Device X82
USB Host X81
becker nachrichtentechnik
PARASOL
BD_PAR-RX
BD_1413.8102.1
BD_PRAR-RX_0.50
Bestückungsvariante:
Zeichn.-Nr
reg.i.V.
Blatt-Nr
2/2
Benennung
Name
DE
Tag
nicht gespeichert!
CAD
Gepr.
Norm
Datum
Name
Änderung-Meldung
Kenzl.
Ausg.
0.50