

AQS Amplifiers

BLA2BB150/60 & BLAX300 User Manual

Version 002

BRUKER

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This manual describes the units as they are at the time of printing. On request, the manufacturer shall supply circuit diagrams, lists of components, descriptions, calibrating instructions and any other information for use by qualified personnel of the user, in charge of repairing the parts of the unit which have been stated by the manufacturer to be "repairable". Such supply shall in no event constitute permission to modify or repair the units or approval of the same.

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This unit is not designed for any type of use which is not specifically described in this manual. Such use may be hazardous.

This manual was written by

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© April 10, 2003: Bruker SA

Wissembourg, France

Manual P/N: Z31479

DWG-Nr: 1182.002

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BLA2BB150/60

1

Introduction

1.1

This Unit (P/N:W1345049) is composed of 2 identical amplifiers (P/N:W1345169) that can deliver 150W from 20 to 162MHz and 60W from 180 to 400MHz.

Three of its four Blanking entries can be mixed and directed to an amplifier, the fourth one is directed to another amplifier.

The Interface allows to commute the entry lines and to measure the output power of each amplifier through a I²C bus.

Description of the unit

1.2

The amplifier is mounted in a rack 10TE x 6HE x 290mm and is fitted with following sub-assemblies:

- | | | |
|------------------------|--------------------|----------|
| 1. Two RF power module | BLMXH150/60 | W1345169 |
| 2. A control Interface | INTERFACE & ROUTER | W1346123 |

Using and interface configuration

1.3

XX is the value sent by the I²C bus.

P0 and P1 are the ports of the I/O expander «PCF8574T».

I1, I2, I3, I4 are the RF entries and O1, O2 are the concerned RF outputs.

The commutation can only be done with the JP1 and JP2 jumpers or with the I²C bus.

Table 1.1. Commutation configuration

XX	JP1 or P1 (TP5)	JP2 or P0 (TP6)	(J11) 02 1H	(J12) 01 X/QNP
00	0	0	I2+I1A	I1+I2A
01	0	1	I2	I1+I1A+I2A
02	1	0	I2+I2A+I1A	I1
03	1	1	I2+I2A	I1+I1A

XX is the value sent by the I²C bus to read the ports of the A/D and D/A converter «PCF8591T»

TP3 is the level adjust with RV1 for the amplifier 1 @ 150W - 100MHz.

TP4 is the level adjust with RV2 for the amplifier 2 @ 150W - 100MHz.

Table 1.2. Power detection level

XX	TP3	TP4	TP1 (FWD1)	TP2 (FWD2)
00	2.5V max.		1.9V for 150W	
01		2.5V max.		1.9V for 150W

Wiring

1.4

Figure 1.1. Front panel

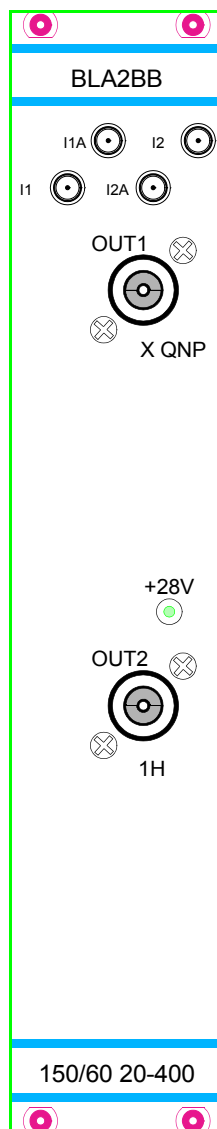
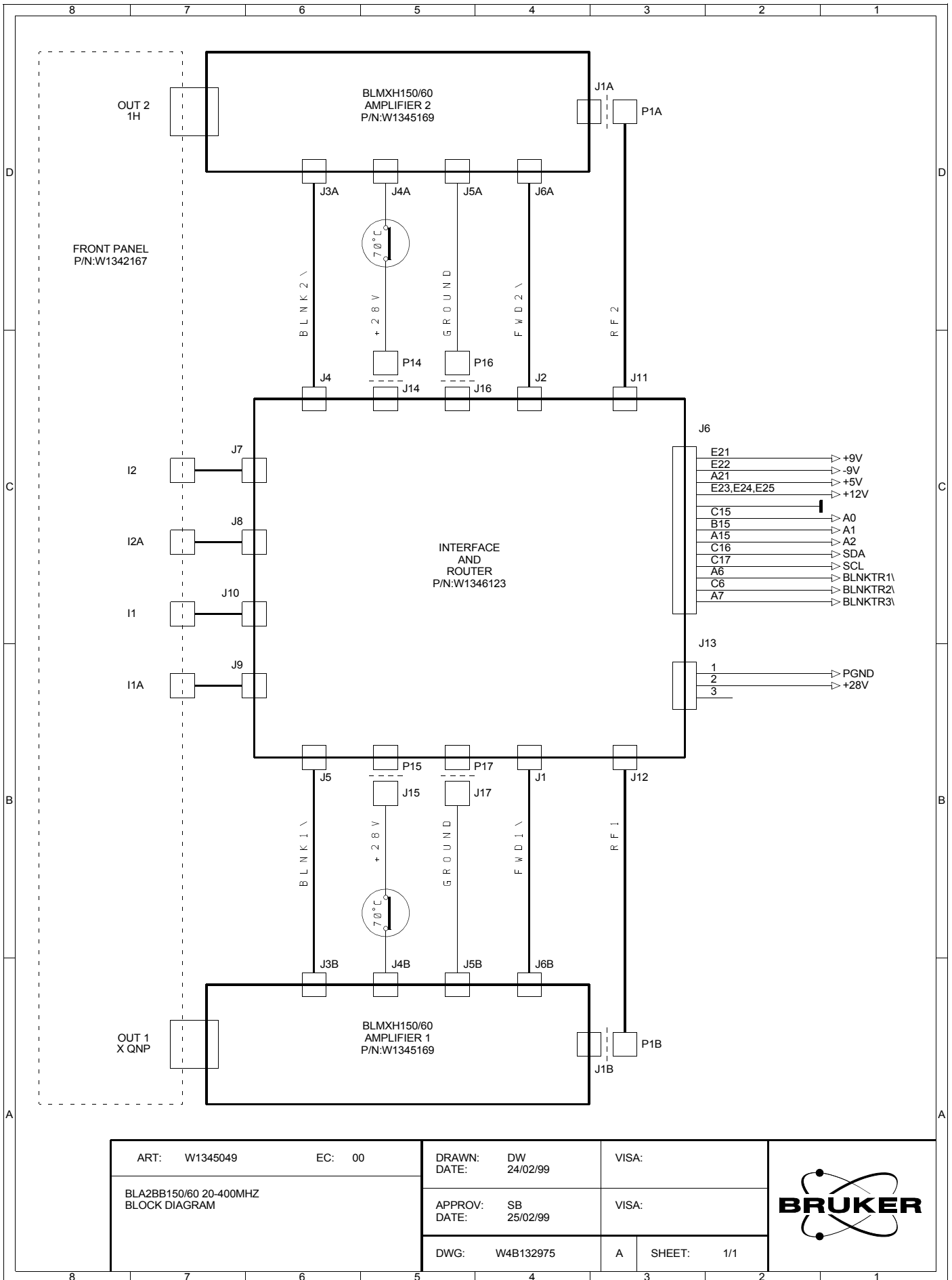


Figure 1.2. BLA2BB150/60 Amplifier 20-400MHz Block diagram



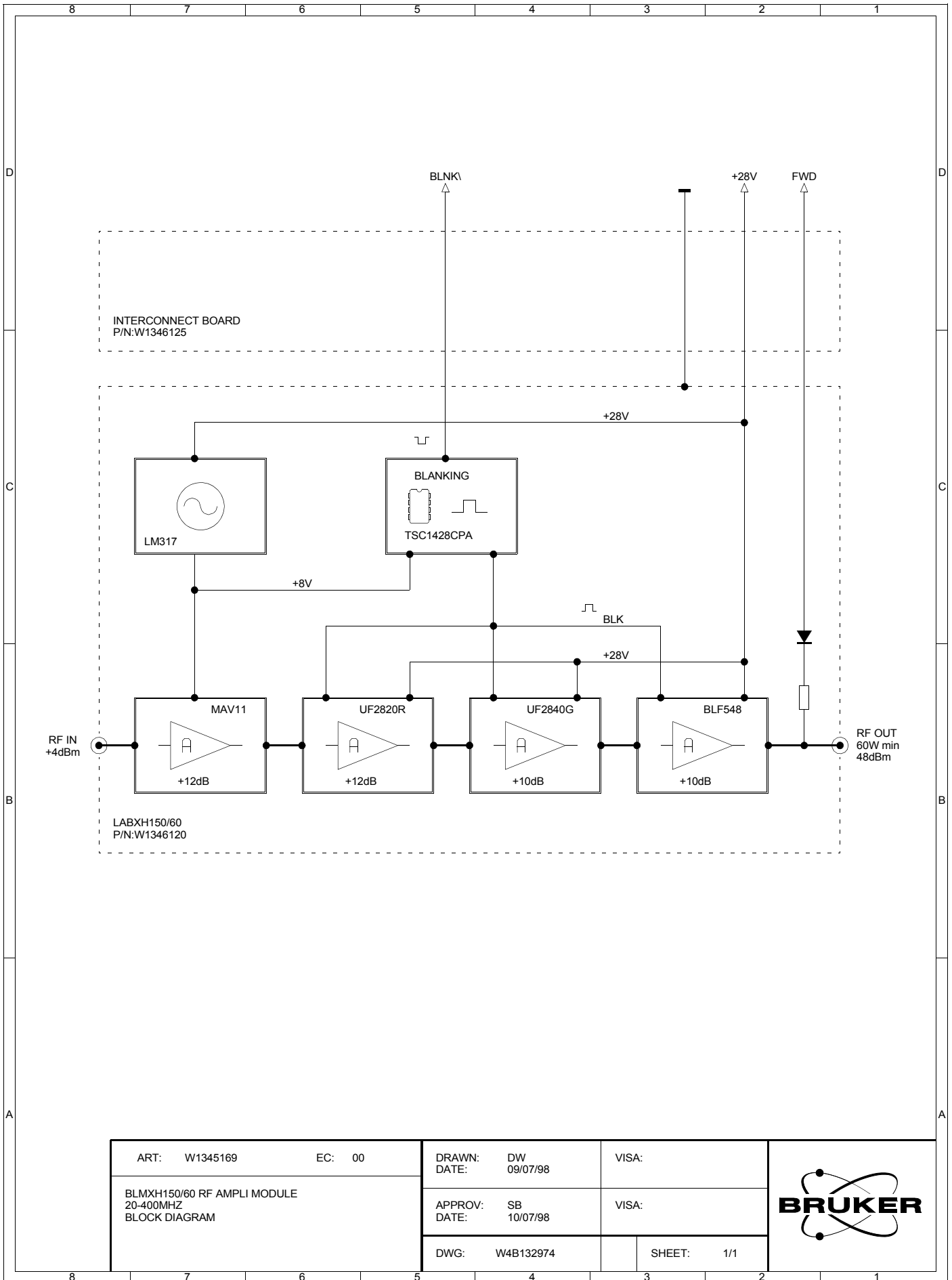
ART: W1345049	EC: 00
BLA2BB150/60 20-400MHZ BLOCK DIAGRAM	

DRAWN: DW	DATE: 24/02/99
APPROV: SB	DATE: 25/02/99
DWG: W4B132975	

VISA:
VISA:
A SHEET: 1/1



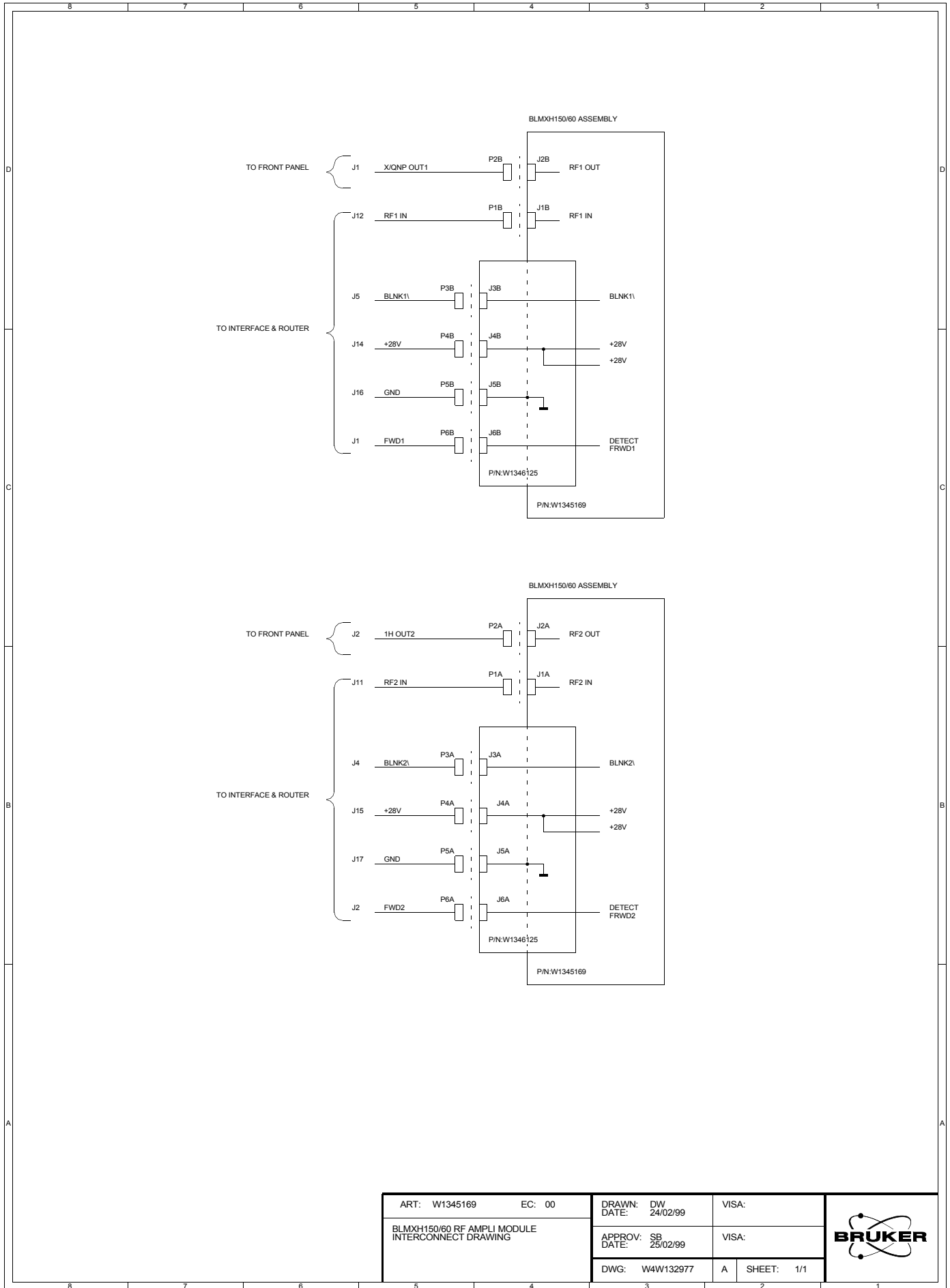
Figure 1.3. BLMXH150/60 Amplifier Module 20-400MHz Block diagram



ART: W1345169	EC: 00	DRAWN: DW	VISA:
BLMXH150/60 RF AMPLI MODULE 20-400MHZ BLOCK DIAGRAM		DATE: 09/07/98	
		APPROV: SB	VISA:
		DATE: 10/07/98	
		DWG: W4B132974	SHEET: 1/1



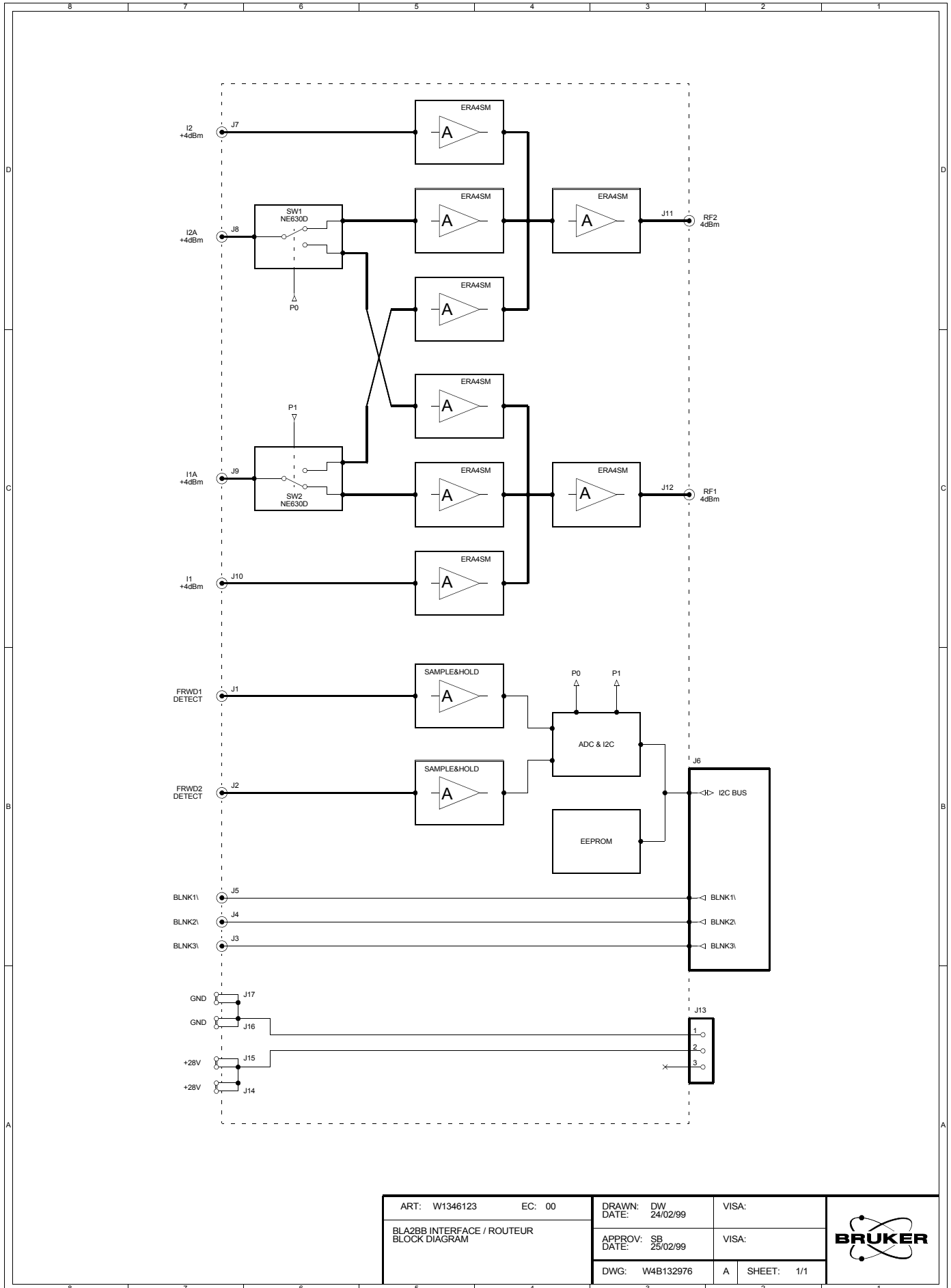
Figure 1.4. BLMXH150/60 Amplifier Module Interconnect drawing



ART: W1345169	EC: 00	DRAWN: DW DATE: 24/02/99	VISA:
BLMXH150/60 RF AMPLI MODULE INTERCONNECT DRAWING		APPROV: SB DATE: 25/02/99	VISA:
		DWG: W4W132977	A SHEET: 1/1



Figure 1.5. BLA2BB Interface I²C and Router Block diagram



ART: W1346123	EC: 00	DRAWN: DW DATE: 24/02/99	VISA:
BLA2BB INTERFACE / ROUTEUR BLOCK DIAGRAM		APPROV: SB DATE: 25/02/99	VISA:
		DWG: W4B132976	A SHEET: 1/1



Figure 1.6. BLA2BB Interface / Router Interconnect drawing

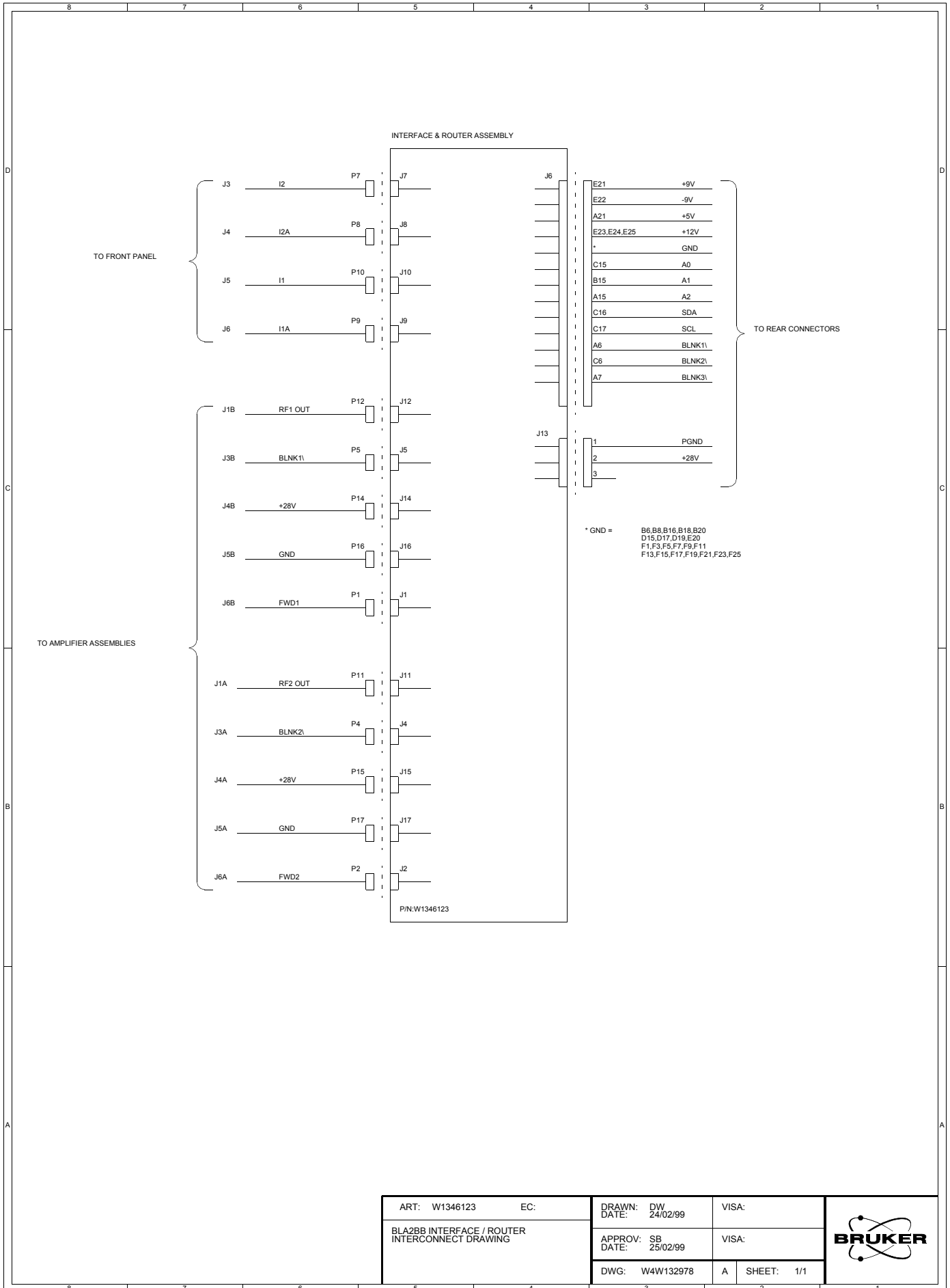


Table 1.3. Common Characteristics

RF input connectors	SMA (F)
RF output connectors	N (F)
External power supply	+28V / 15A

RF Specifications	X Range	Proton Range
Frequency range	20 to 162MHz	180 to 400MHz
Linear Gain	57dB \pm 1 typ. @ 100MHz	47dB \pm 1 typ. @ 300MHz
Gain Flatness	\pm 2dB max.	\pm 2dB max.
Minimum Pulsed Output Power	130W (20-162MHz)	60W (180-400)
CW Output Power	10W typ.	10W typ.
Linear Output Power @ 1dB compression	10W typ. @ 100MHz (Input typ. -18dBm)	20W typ. @ 300MHz (Input typ. -8dBm)
Linear Output Power @ 2dB compression	20W typ. @ 100MHz (Input typ. -16dBm)	40W typ. @ 300MHz (Input typ. -4dBm)
Amplifier Biasing	Class AB Operation	Class AB Operation
Blanking Delay	< 1.5 μ s typ.	< 1.5 μ s typ.
RF Rise Time & RF Fall Time	< 100ns	< 100ns
DC Ringing	\pm 200mV typ. (blanking signal)	\pm 200mV typ. (blanking signal)
Input Noise Figure	7dB max.	7dB max.
Output Noise Power (Unblanked)	< -103dBm @ 1 Hz	< -116 dBm @ 1 Hz
Output Noise Power (Blanked)	< -174 dBm @ 1 Hz	< -174 dBm @ 1 Hz
Isolation channel X / channel H	> 80dB	> 80dB
IN/OUT Impedance	50 ohms	50 ohms
Input V.S.W.R.	1,5 max.	1,5 max.
Pulse Width max.	10ms @ 130W	10ms @ 60W
Duty Cycle	10% @ 130W	10% @ 60W
Amplitude Droop	< 10% @ 130W for 10ms Pulse Width	< 10% @ 60W for 10ms Pulse Width

Table 1.4. BLA2BB Amplifier specifications

Introduction

2.1

The AQS BLAX300 6-243 MHz amplifier is a 19" system plug-in housed system, specially fitted for NMR AV*00M¹ spectrometer.

This device (P/N:W1345052) is a linear broad band amplifier which is able to give a RF power of 300 W in the 6 to 243 MHz range (up to 31P on a 600 MHz spectrometer).

The RF output voltage can be read through an I²C diagnostic bus.

Description of the unit

2.2

The amplifier is mounted in a rack 12TE x 6HE x 290mm and is fitted with following sub-assemblies :

- | | | |
|------------------------|-----------|----------|
| 1. One RF power module | BLMX300 | W1345173 |
| 2. A control Interface | INTERFACE | W1346132 |

Connections to the module's rear side are made via a power connector ERNI 044581, for + 28 V power supply.

Another ERNI 064558 connector is used to fed auxiliary supplies, I²C bus and blanking signals.

The RF input and output are located on the front panel of the module.

Using and interface configuration

2.3

The amplifier works in pulse mode with a pulse width of a few milliseconds and a duty cycle of 10 % at maximum power.

TP3 is the level adjust with RV1 for the amplifier @ 300W - 120MHz.

Table 2.1. Power detection level

TP3	TP1 (FWD1)
2.5V max.	1.5V to 2V for 300W

1. AV*00M : * =3 for 300 MHz ; * =4 for 400 MHz ; * = 5 for 500 MHz ; * = 6 for 600 MHz

Figure 2.1. Front panel

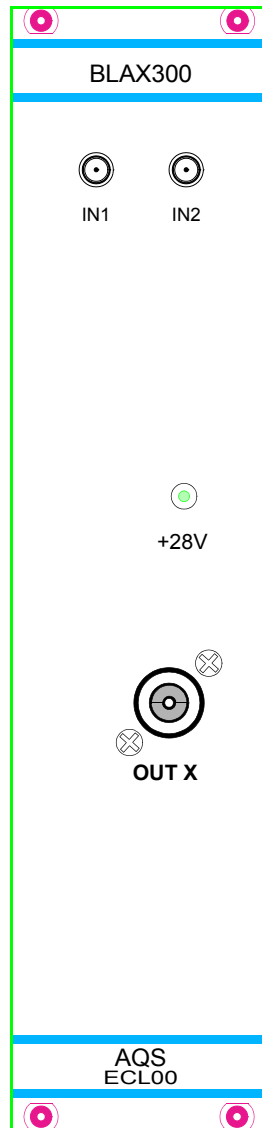
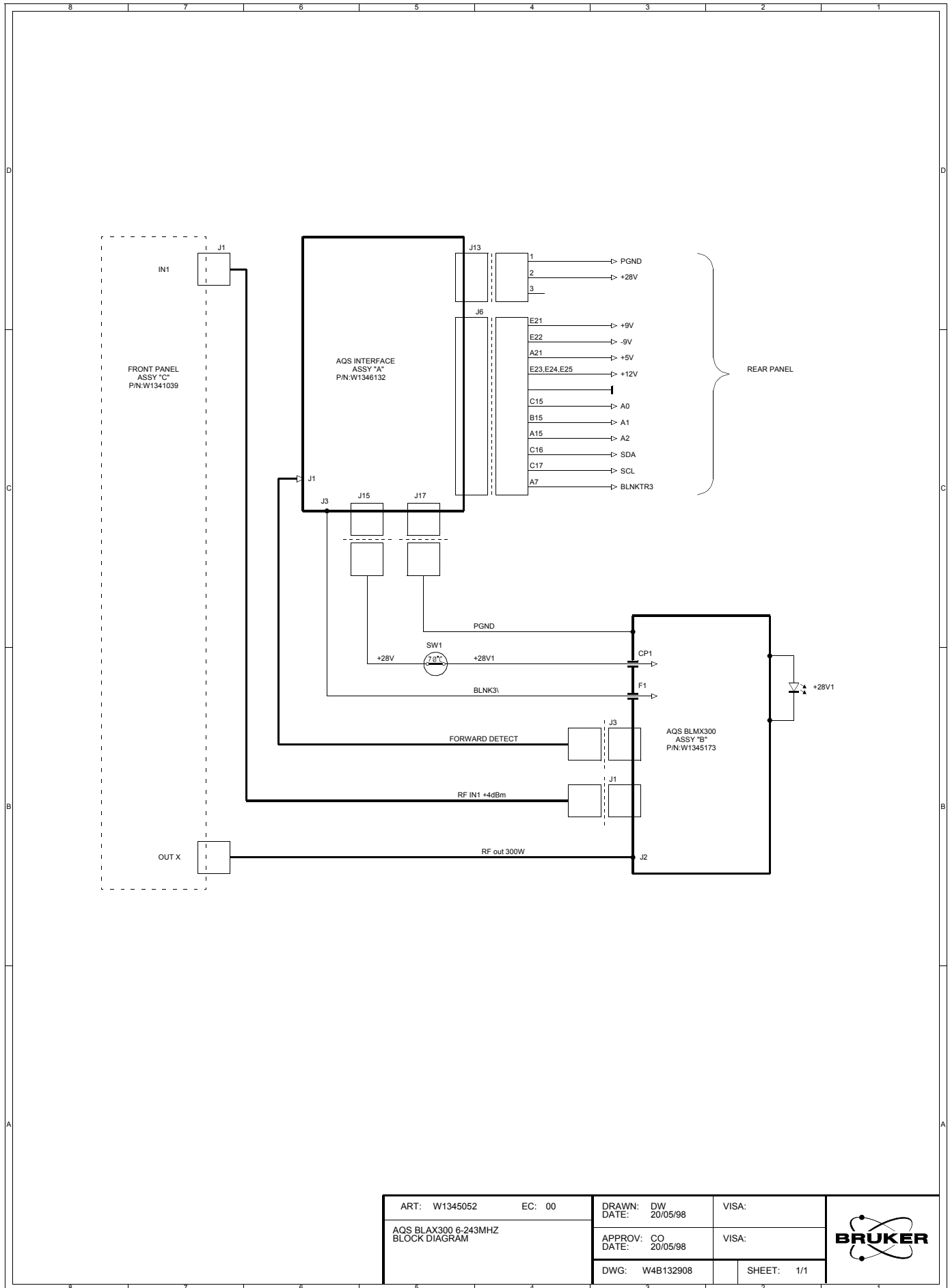


Figure 2.2. BLAX300 Amplifier 6-243MHz Block diagram



ART: W1345052	EC: 00	DRAWN: DW DATE: 20/05/98	VISA:	
AQS BLAX300 6-243MHZ BLOCK DIAGRAM		APPROV: CO DATE: 20/05/98	VISA:	
		DWG: W4B132908	SHEET: 1/1	

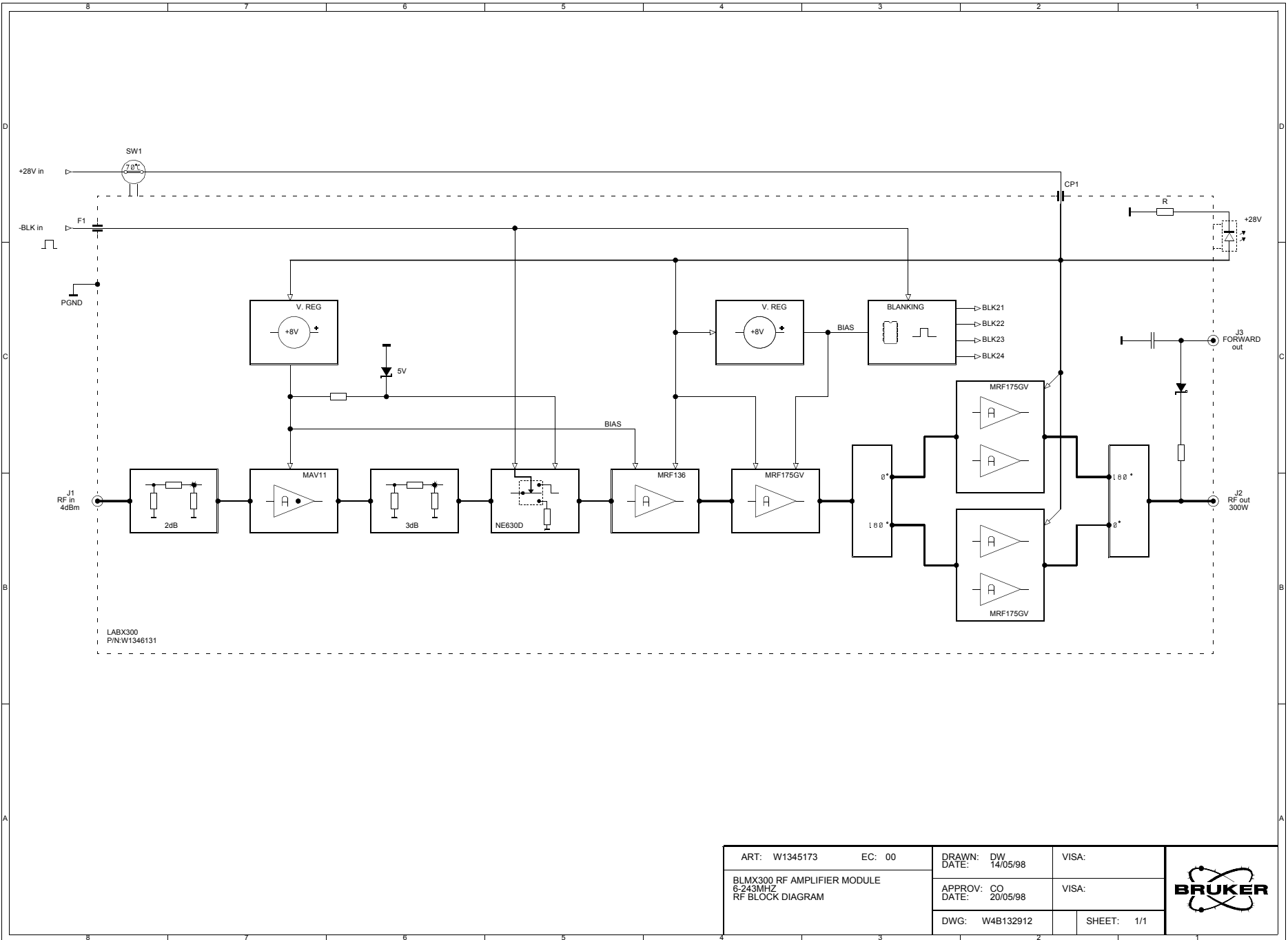
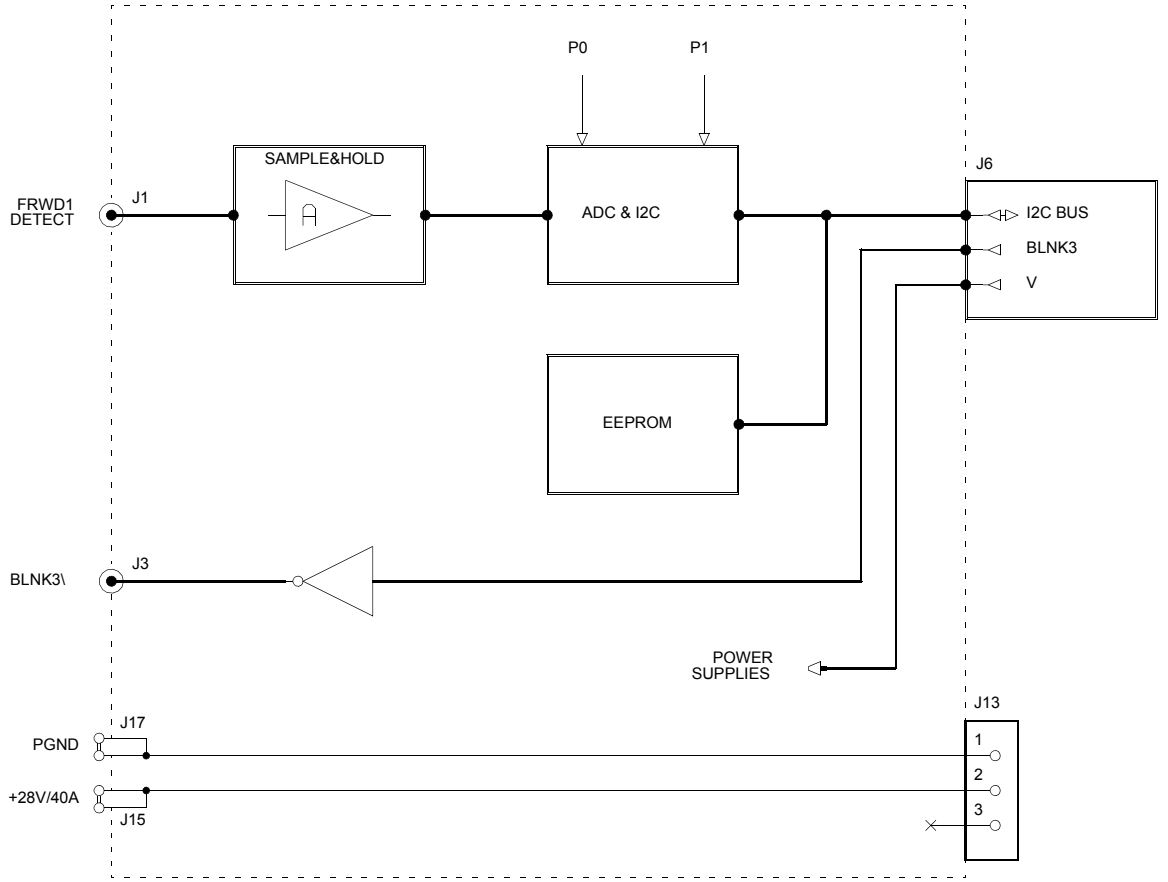


Figure 2.3. BLMX300 Amplifier Module 6-243MHz Block diagram



Figure 2.4. BLAX300 Interface I²C Block diagram



ART: W1346132	EC: 00	DRAWN: DW DATE: 15/05/98	VISA:
AQS INTERFACE BLAX300 BLOCK DIAGRAM		APPROV: CO DATE: 20/05/98	VISA:
		DWG: W4B132911	SHEET: 1/1



Table 2.2. Common Characteristics

RF input connectors	SMA (F)
RF output connectors	N (F)
External power supply	+28V / 40A Pulse; 1,5A CW

Table 2.3. BLAX300 Amplifier specifications

RF SPECIFICATIONS	CHANNEL X
Frequency range	6 to 243 MHz
Linear Gain	54 dB \pm 1 typ.
Gain Flatness	\pm 1,5dB max.
Minimum Pulsed Output Power	300 W min.(at nominal input +4dBm)
CW Output Power	30 W max.
Linear Output Power	250 W min. at 1dB compression
Amplifier Biasing	Class AB Operation
Blanking Delay	< 1 μ s typ.
RF Rise Time	< 100 ns
RF Fall Time	< 50 ns
DC Ringing	\pm 100 mV typ. (due to blanking signal)
Input Noise Figure	7 dB max.
Output Noise Power (Unblanked)	-113 dBm @ 1 Hz
Output Noise Power (Blanked)	< -164 dBm @ 1 Hz (< 10dB over Thermal Noise)
IN/OUT Impedance	50 ohms
Input V.S.W.R.	1,3 max.
Pulse Width	up to 10 ms @ 300 W
Duty Cycle	up to 10 % @ 300 W
Amplitude Droop	< 6 % @ 300 W for 10 ms Pulse Width < 3 % @ 30 W for 500 ms Pulse Width

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