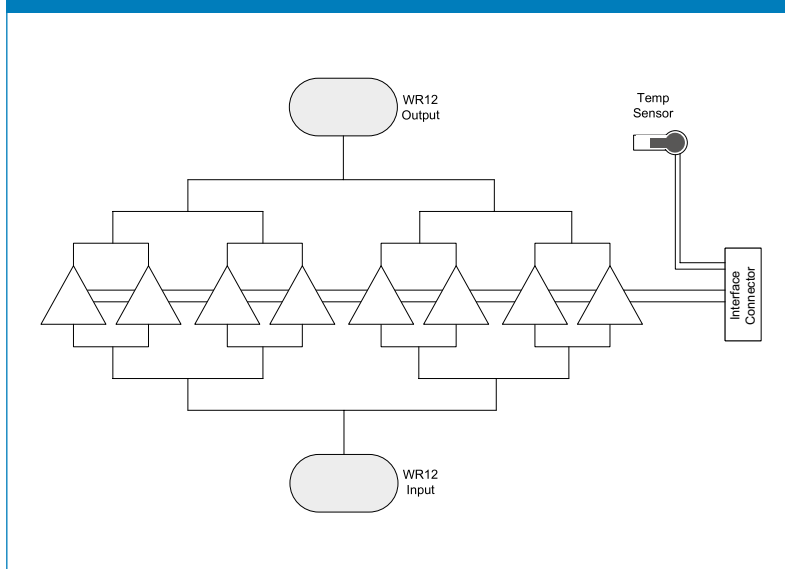




## Features

- 71-76GHz and 81-86GHz High Power Amplifiers
- Saturated powers up to  $>+36\text{dBm}$
- High linearity supports 256QAM modulation
- Wide 5GHz bandwidth
- $>20\text{dB}$  gain
- Suitable for military or commercial applications
- Low SWAP for airborne & HAPS applications

### Cerus 8 Amplifier Block Diagram



## Description

Filtronic's range of Cerus amplifiers provide market leading linear mmW power. Available in single to N-way configurations, the Cerus power amplifiers deliver unparalleled performance for long range E-Band communications.

The Cerus 8 E-Band amplifier modules each contain 8x Filtronic GaAs HEMT PA MMICs performance matched and power combined in waveguide to deliver maximum power.

An integrated temperature sensor provides users with accurate amplifier temperature data, and optional control circuitry facilitates functions including gain control, mute control and alarms.

- Proven system performance
  - Demonstrated in systems supporting 256QAM
- Field proven technology
  - $>50,000$  Filtronic millimetre wave transceivers deployed worldwide.

### AA021 Outline Specification

Over baseplate operating temperature -40 to to +70C  
All RF parameters referenced to waveguide output port.

Parameter	Min	Typ.	Max	Units
Tx Frequency	71		76	GHz
Bandwidth			5.0	GHz
Small Signal Gain		24		dB
P SAT		+35		dBm
P1dB		+31		dBm
OIP3 @ +29dBm		+39.5		dBm
Tx Power control range	10			dB
Absolute maximum RF input power			+24	dBm
Supply voltage 1	4.9	5.0	5.5	V
Supply current 1		11	12	A
Supply voltage 2	-5.2	-5.0	-4.8	V
Supply current 2			0.05	A
Size		40 x 40 x 47		mm
Weight		160		g
Interface	Waveguide input & output: WR12 DC connector: IPL1-112-02-L-D-K (without CTRL board) DC connector: IPL1-110-02-L-D-K (with CTRL board)			

### AA022 Outline Specification

Over baseplate operating temperature -40 to to +70C  
All RF parameters referenced to waveguide output port.

Parameter	Min	Typ.	Max	Units
Tx Frequency	81		86	GHz
Bandwidth			5.0	GHz
Small Signal Gain		24		dB
P SAT		+35		dBm
P1dB		+30		dBm
OIP3 @ +29dBm		39.5		dBm
Tx Power control range	10			dB
Absolute maximum RF input power			+24	dBm
Supply voltage 1	4.9	5.0	5.5	V
Supply current 1		11	12	A
Supply voltage 2	-5.2	-5.0	-4.8	V
Supply current 2			0.05	A
Size		40 x 40 x 47		mm
Weight		160		g
Interface	Waveguide input & output: WR12 DC connector: IPL1-112-02-L-D-K (without CTRL board)			

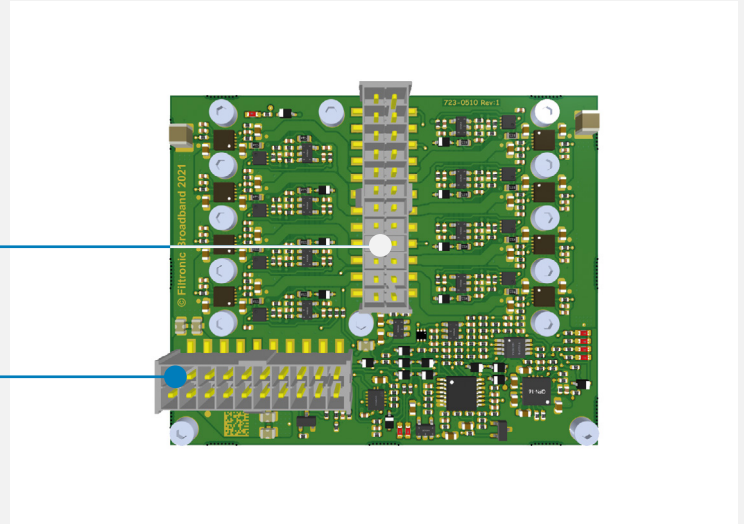
# AA021/AA022 Control Board pinout

**Connector CON1**

IPL1-112-02-L-D-K

**Connector CON2**

IPL1-110-02-L-D-K



## Connector CON1

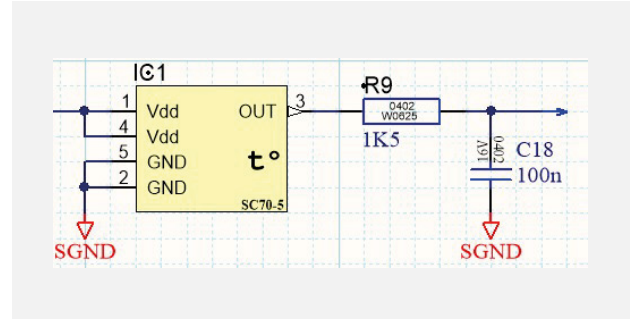
Connector CON1 controls the drain currents of the HPA assembly. The length of the wire harness must be as short as possible.

## Connector CON2 pinout

Pin NO.	Name	Type	Description
5	-5V	Power	Negative power supply.
6,7,8,9,10	GND	Power	Power supply Ground. All four pins are connected together and to the metalwork.
1,2,3,4,11,12,13,14	+5V	Power	Positive power supply. All four pins are connected together. Fast transient response power supply with current limit at least 14A is highly recommended.
15	ENABLE	Input	CMOS input with 3.3V logic level (5V tolerant). When ENABLE < 0.6V DC or left floating the HPA drain current is turned off. When ENABLE > 2.2V the HPA is turned on and the gain gradually increases up to the level specified by PWR_CTRL
17	PWR_CTRL	Input	HPA RF power control. Nominal input range is 0 to 2.5V DC referenced to SGND. Maximum output power is at 2.5V. For best accuracy when driving PWR_CTRL use SGND for remote ground sense.
18	ALARM	Output	Active high alarm output with 3.3V voltage level. Alarm activates if the HPA temperature exceeds 75°C (±5°C) or internal fault is detected.
19	TEMP_SENSOR	Output	Temperature sensor output.
20	SGND		Signal Ground. Internally connected to the metalwork/GND. Used as temperature sensor reference ground.
16	unused		This pin is currently unused. Do not connect.

## AA021/AA022 Temperature sensor

The HPA assembly contains a temperature sensor with analogue output. There is a low pass filter at the output. When measuring the output voltage make sure that the input impedance of the meter is high enough to avoid measurement errors.



## Temperature sensor transfer function

The transfer function of the temperature sensor can be approximated with the following polynomial, where x is the measured voltage in mV and T is the temperature in °C.

$$T = a_0 + a_1 * x + a_2 * x^2$$

$$a_0 = 181.765094640206$$

$$a_1 = 0.10716443871271$$

$$a_2 = 5.62383764920053e-06$$

The maximum absolute approximation error in the temperature range -45 to +90° is ±0.23°C.

Typical accuracy of the temperature sensor in the range -50°C to 0C is ±0.25°C

Typical accuracy of the temperature sensor in the range 0°C to 90C is ±0.7°C

Maximum temperature error in the range -50°C to 75C is ±2.0°C

If the temperature exceeds 75±2° the alarm output will become active. There is no over temperature protection and the unit will still continue to operate. It is up to the end user to make sure the amplifier does not exceed its absolute maximum ratings.

The look-up table shown below provides the temperature versus the voltage of **TEMP\_SENSOR** line.

## Temperature sensor transfer table

Temp	Vout	Temp2	Vout3	Temp4	Vout5	Temp6	Vout7	Temp8	Vout9
[°C]	[mV]	[°C]	[mV]	[°C]	[mV]	[°C]	[mV]	[°C]	[mV]
-50	1955	-20	1727	10	1486	40	1242	70	991
-49	1949	-19	1719	11	1478	41	1234	71	983
-48	1942	-18	1711	12	1470	42	1225	72	974
-47	1935	-17	1703	13	1462	43	1217	73	966
-46	1928	-16	1695	14	1454	44	1209	74	957
-45	1921	-15	1687	15	1446	45	1201	75	949
-44	1915	-14	1679	16	1438	46	1192	76	941
-43	1908	-13	1671	17	1430	47	1184	77	932
-42	1900	-12	1663	18	1421	48	1176	78	924
-41	1892	-11	1656	19	1413	49	1167	79	915
-40	1885	-10	1648	20	1405	50	1159	80	907
-39	1877	-9	1639	21	1397	51	1151	81	898
-38	1869	-8	1631	22	1389	52	1143	82	890
-37	1861	-7	1623	23	1381	53	1134	83	881
-36	1853	-6	1615	24	1373	54	1126	84	873
-35	1845	-5	1607	25	1365	55	1118	85	865
-34	1838	-4	1599	26	1356	56	1109	86	856
-33	1830	-3	1591	27	1348	57	1101	87	848
-32	1822	-2	1583	28	1340	58	1093	88	839
-31	1814	-1	1575	29	1332	59	1084	89	831
-30	1806	0	1567	30	1324	60	1076	90	822
-29	1798	1	1559	31	1316	61	1067	91	814
-28	1790	2	1551	32	1308	62	1059	92	805
-27	1783	3	1543	33	1299	63	1051	93	797
-26	1775	4	1535	34	1291	64	1042	94	788
-25	1767	5	1527	35	1283	65	1034	95	779
-24	1759	6	1519	36	1275	66	1025	96	771
-23	1751	7	1511	37	1267	67	1017	97	762
-22	1743	8	1502	38	1258	68	1008	98	754
-21	1735	9	1494	39	1250	69	1000	99	745

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