ALARIS KUHNE
INSPIRING THE NEXT RF SOLUTION

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V 1.0

KU PA 190250 – 80 LIN

Manual

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A DIVISION OF ALARIS THE RF TECHNOLOGY GROUP

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Specification

Specifications (Ta = 25 °C):

Frequency range	1900 ... 2500 MHz
Input power	
Normal operation	+5 ... 10 dBm
Maximum	+10 dBm
Output power	
Output power COFDM	typ. 40 dBm
Output power COFDM	typ. 10 W
Gain	
Flatness with ALC (small signal)	typ. +/- 1 dB
Harmonics	
Harmonic rejection @ 40 dBm	typ. 60 dB
Protection	
Output protection	Isolator
ON voltage	+3 ... 14 V DC
Supply voltage	+28 ... 32 V DC
Quiescent current	typ. 1.4 A
Current consumption	typ. 3.5 A @ 10 W
Monitor output	
Forward detection	yes (RMS detector)
Reverse detection	yes (RMS detector)
Operating case temperature range	-20 ... +55 °C
Mechanics	
Input connector / impedance	SMA-female, 50 ohms
Output connector / impedance	SMA-female, 50 ohms
Case	milled aluminium
Dimensions (mm)	184 x 100 x 20
Weight	typ. 550 g

Features:

- LDMOS FET technology
- High linearity (built-in linearizer)
- Good harmonic rejection
- Isolator for protection against high VSWR
- Monitor outputs for forward and reverse power detection (DC voltage)
- ON / OFF control with DC voltage (ON at 3 ... 14 V)
- Adjustable ALC (automatic level control)
- Serial interface

Applications:

- Multichannel Multipoint Distribution Service (MMDS)
- Digital broadcast systems (DVB-T, DVB-S)
- COFDM systems using modulation types QPSK, QAM

Accessories:

- Recommended power supply: RSP 150 W 27
- Recommended heat sink: SK 200 - 125
- Recommended fan: FAN 60 x 60, 24V

Amplifier should be mounted on heat sink!

CE Konformität / CE Conformity

EMC directive 2014/30/EU
Low voltage directive 2014/35/EU
RoHS directive 2011/65/EU

CE

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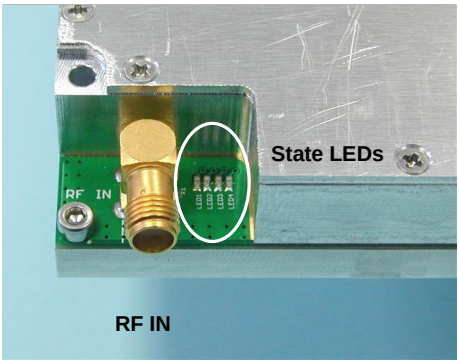
Connectors

RF IN

RF input (+5 ... 10 dBm)



State LEDs

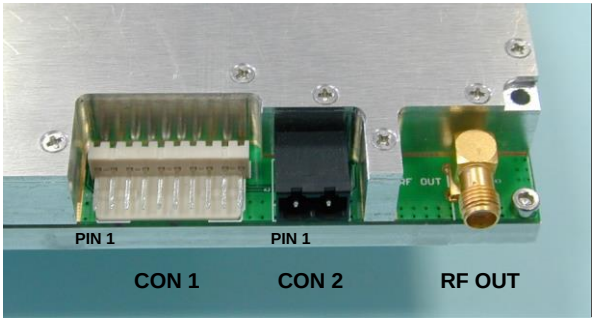
LED 1	LED is ON if supply voltage is attached to CON 2
LED 2	Linearizer state - LED flashes during analyzing the signal - LED is ON as soon as the PA is linearized and in tracking state
LED 3	With every OFF to ON transition the linearizer in the PA will be reseted and the input level will be internaly optimized for the linearizer. This LED is ON as soon as the input level is optimized.
LED 4	Warning LED - the LED flashes if the input signal is out of frequency range

CON 1

PIN 1	ON (+3 ... 14 V DC)
PIN 2	GND
PIN 3	TEMP output - DC voltage of the internal temperature sensor
PIN 4	OVERTEMP output - The amplifier switches off at about +65 °C, this will be indicated with +5 V on this PIN
PIN 5	Alarm output – can be set by a serial command
PIN 6	Serial interface – TX
PIN 7	Serial interface – RX
PIN 8	GND
PIN 9	Output which monitors forward power (DC voltage). The MON pin is not calibrated and no linear function. It is intended for observing the output power - not for exact measurements.
PIN 10	Output which monitors reverse power (DC voltage). The VSWR MON pin is not calibrated and no linear function. It is intended for observing the reverse power - not for exact measurements.

CON 2

PIN 1	Supply voltage input (+28 ... 32 V DC)
PIN 2	Supply GND



RF OUT

RF output protected with an isolator

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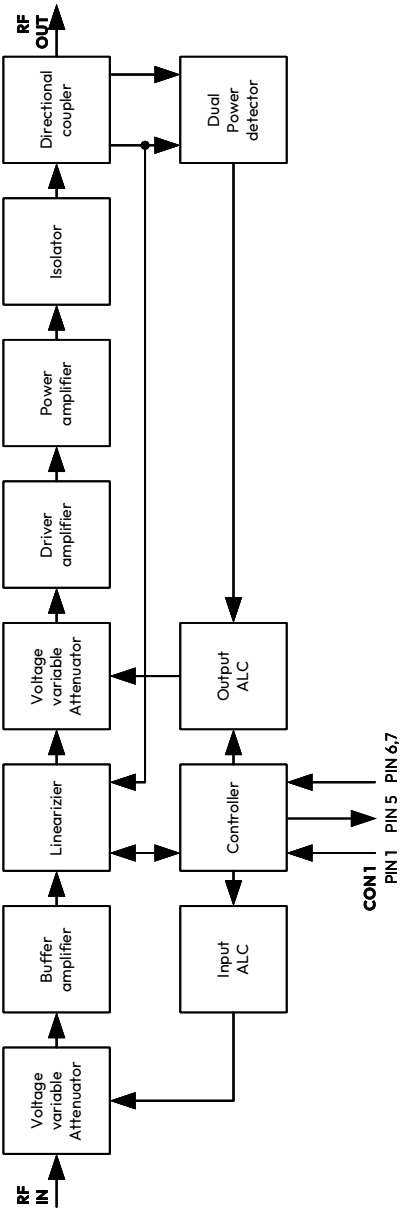
Block chart



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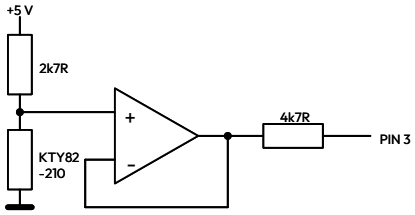
Details

CON 1

PIN 3 TEMP output - DC voltage of the internal temperature sensor



Start-up sequence

1. Connect the serial interface with your controller (CON 1 / PIN 6, 7)
2. Connect RF input cabel and RF output load to the amplifier
3. Apply +28 ... 32 V (CON 2)
4. Apply RF input signal to the amplifier (1900 ... 2500 MHz / +5 ... 10 dBm)
5. Switch the amplifier ON (CON 1 / PIN 1)
6. Set the output power via the serial interface
7. Is the output power correct send a reset to the power amplifier
8. Now the amplifier is analyzing the input signal
   - The input level for the linearizer will be adjusted with the input ALC
   - The output signal will be corrected
   - This adjustment procedure needs a few seconds
9. If correction is done and all is OK LED 1, LED 2, and LED 3 are ON

Serial interface (RXD / TXD)

Commands and the state of the PA can be read out and controlled with the built-in serial interface

- 3.3 V logic level
- 9600 BAUD data rate
- 8 data bits
- 1 stop bit

Command structure for all commands

Start command	(
Command	X
Data Highbyte	8 bit
Data Lowbyte	8 bit
Stop command	)

Depending on the command the controller returns „A“ (acknowledge) as soon as the command is executed or 16 bit data in binary format

If the controller returns „B“ (busy), the amplifier ignores the command. Wait about 500 ms and try it one more time

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Serial commands

R (Answer „A“)

Resets the linearizer and the input ALC. After sending this command the input ALC will be set from the internal controller and the linearizer optimizes the output signal. A reset is recommended after changing the input frequency or the output power.
Send „(R00)“ or in HEX: 28 52 30 30 29

P + 16 bit data (Answer „A“)

Send P and a 16 bit data in the range from 0 ... 1023 to set the output power. For example the value 595 is about 10 watts.
Send „(P[16bit])“ or in HEX: 28 50 02 44 29

A (Answer „A“)

Sets the output pin (CON 1 / PIN 5) high.
Send „(A00)“ or in HEX: 28 41 30 30 29

N (Answer „A“)

Sets the output pin (CON 1 / PIN 5) low.
Send „(N00)“ or in HEX: 28 4E 30 30 29

B (Answer „A“)

Sets the output pin (CON 1 / PIN 5) as state output for the linearizer.
(CON 1 / PIN 5) flashes during analyzing the signal
(CON 1 / PIN 5) is ON as soon as the PA is linearized and in tracking state
The controller switches to 3.3 volts for ON. There is a 68 ohms series resistor between controller output and (CON 1 / PIN 5) pin.
Commands „A“ and „N“ are now not available.
Send „(B00)“ or in HEX: 28 42 30 30 29

M (Answer „A“)

Deaktivates the pin (CON 1 / PIN 5) as state output.
Commands „A“ and „N“ are now available.
Send „(M00)“ or in HEX: 28 4D 30 30 29

T + 16 bit data (Answer „A“)

The output ALC of this power amplifier is digital temperature compensated to get stable output power over a wide temperature range. It is possible to modify or deactivate the compensation. The temperature coefficient can be set in the range from 0 ... 10. Standard is 4. The value 0 deactivates the compensation. Without compensation (0) the output power of this power amplifier rises with rising temperature. The value 10 reduces the output power most with rising temperature.
Example for value 3, send „(T[16bit])“ or in HEX: 28 54 00 03 29

S (Answer „A“)

The actual temperature coefficient can be saved in the EEPROM. At a new power up the amplifier uses the saved temperature coefficient.
Send „(S00)“ or in HEX: 28 53 30 30 29

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Serial commands

Further commands

C + 16 bit data (Answer „A“)

This command saves the ON PIN configuration of the amplifier.
After sending the command the configuration will be saved in the EEPROM.
At a new power up the power amplifier starts with the new ON PIN configuration.

There are three configurations for the ON PIN

Case 0: Hardware ON/OFF. The power amplifier must be switched ON with a control voltage (CON 1 / PIN 1). The commands „O“ and „X“ are deactivated.
Send: HEX: 28 43 00 00 29

Case 1: The power amplifier can be switched ON or OFF via the serial interface. Use the commands „O“ or „X“ to switch the amplifier ON or OFF.
Send: HEX: 28 43 00 01 29
Important: Do not connect (CON 1 / PIN 1) if you use case 1.

Case 2: After power up the amplifier is always ON. The commands „O“ and „X“ are deactivated.
Send: HEX: 28 43 00 02 29
Important: Do not connect (CON 1 / PIN 1) if you use case 2.

O (Answer „A“)

Switches the amplifier ON if config is set to 1.
Send: HEX: 28 4F 00 00 29

X (Answer „A“)

Switches the amplifier OFF if config is set to 1.
Send: HEX: 28 58 00 00 29

W (Answer „A“)

The actually set output power can be saved in the EEPROM. At a new power up the power amplifier starts with the saved output power.
Send HEX: 28 57 00 00 29

K + 16 bit data (Answer „A“)

Send K and a 16 bit data in the range from 0 ... 999 to set the output power correction value. This value is substracted from the output power value. After sending the command the value is directly saved into the EEPROM.
For example you can set the value to 100.
Send „(K[16bit])“ or in HEX: 28 4B 00 64 29

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Serial commands

Calibration function

Q + 128 + 15 (Answer „A“)

Send Q, 128 and 15 to activate the calibration function. After sending the command the command is directly saved into the EEPROM. After a new power up the amplifier starts with calibration function.
Send in HEX: 28 51 80 0F 29

With activated calibration the output power can be set in dBm with the „P“ command. For example you can send 370 for 37.0 dBm output power.

Send P and a 16 bit data in the range from 0 ... 400 to set the output power. For example the value 370 is about 5 watts.
Send „(P[16bit])“ or in HEX: 28 50 01 72 29

Q + 0 + 15 (Answer „A“)

Send Q, 0 and 15 to deactivate the calibration function. After sending the command the command is directly saved into the EEPROM. After a new power up the amplifier starts without calibration function.
Send in HEX: 28 51 00 0F 29

Readable values

p (Answer 16 bit Data)

The controller returns a ADC value of the forward power
Value range from 0 ... 1023.
Send „(p00)“ or in HEX: 28 70 30 30 29

r (Answer 16 bit Data)

The controller returns a ADC value of the reflected power
Value range from 0 ... 1023.
Send „(r00)“ or in HEX: 28 72 30 30 29

t (Answer 16 bit Data)

The controller returns a ADC value of the temperature sensor voltage
Value range from 0 ... 1023.
Send „(t00)“ or in HEX: 28 74 30 30 29

c (Answer 16 bit Data)

This command reads the ON PIN configuration.
The controller returns 0, 1 or 2 regarding the three cases of the „C“ command.
Send HEX: 28 63 00 00 29