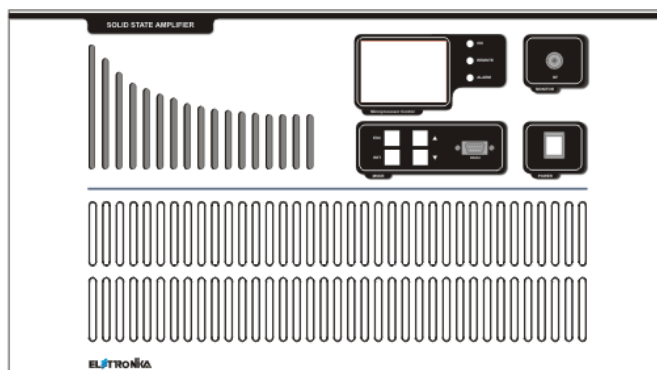


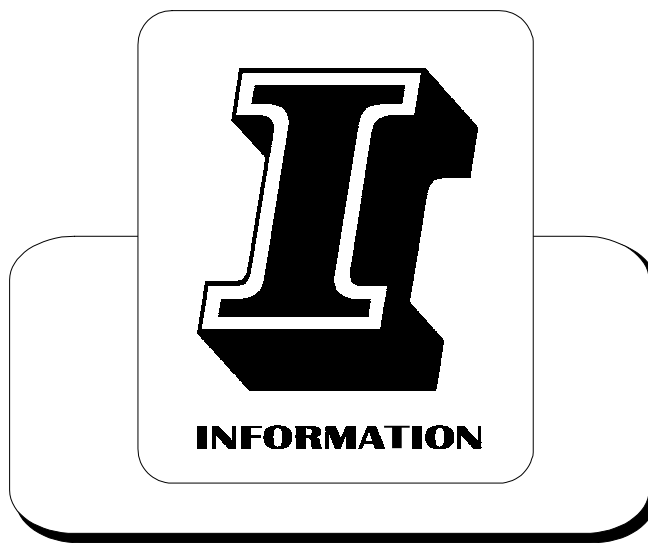
LDMOS - UHF TV AMPLIFIER



AUTV/1500LD

User's manual

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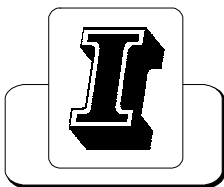


Section 1 - Information

Contents:

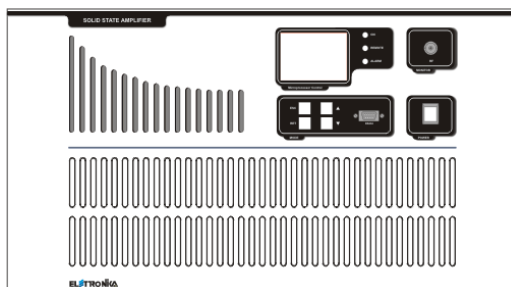
1.1 Description

1.2 Technical characteristics



AUTV/1500LD

LDMOS - UHF TV AMPLIFIER



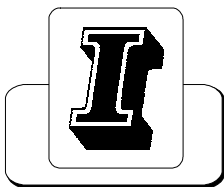
1.1 DESCRIPTION

The AUTV/1500LD is an amplifier operating into Band IV-V for common amplification process of the Vision and Sound carriers.

The amplifier has been designed to offer to the customer high performances, high reliability and greater simplicity in his operation and maintenance procedures.

The amplifiers modules employ all solid state LDMOS technology in order to obtain high gain, wide-band performances, very good linearity, reliability and high efficiency.

The equipment design allows the soft degradation (RF power loss) for several transistor faulty: in fact the output combiner uses RF power resistors for unbalancing power dissipation. The unit is enclosed in a cabinet for 19"- 6U rackmounting.



1.2 TECHNICAL CHARACTERISTICS

RF

Frequency range	470 - 860MHz
Output power	1300W PEP
Video/Sound power ratio	10/1
Out stage technology	Solid State LDMOS
Vision-Sound amplification	Common
I.M.D. (-8, -10, -16dB)	Better than -54dB
Standards	G, K, N
Spurious and harmonics level	In compliance with CCIR rec.
RF Output impedance	50Ω
RF Output connector	7/16"

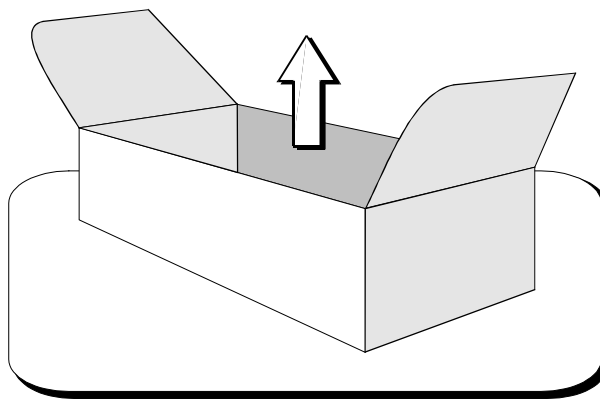
GENERAL

Power supply	230Vac, ±10%, 50/60Hz 400Vac 3P+N (on request)
Power consumption	3400VA at black level
RS232 Socket	DB9 Connector (on front panel)
RS485 Socket	DB9 Connector (on rear panel)
Telemeasuring socket	DB9 Connector (on rear panel)
AGC Socket	DB9 Connector (on rear panel)
Power factor	>= 0.9
Ambient temperature	-5° to +45°C
Relative humidity	20% - 90%
Altitude	Up to 2.500 meters
Cooling	Forced air
Cabinet	Rack 19"-6U
Dimensions	760x263x266mm
Weight	70kg

PROTECTION THR.

FWD Power	1500W
REF Power	150W
Unbalancing	350W
Temperature	75°C
I_{DC}	25A
V_{DC}	Min 10V - Max 33,5V

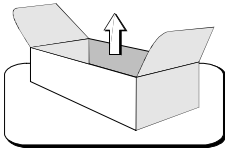
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Section 2 - Installation

Contents:

- 2.1 Operating environment*
- 2.2 Preliminary operations*
- 2.3 Telemeasuring socket connections*
- 2.4 RS232, RS485 and AGC socket connections*
- 2.5 Preventive maintenance*
 - Front panel*
 - Rear panel*



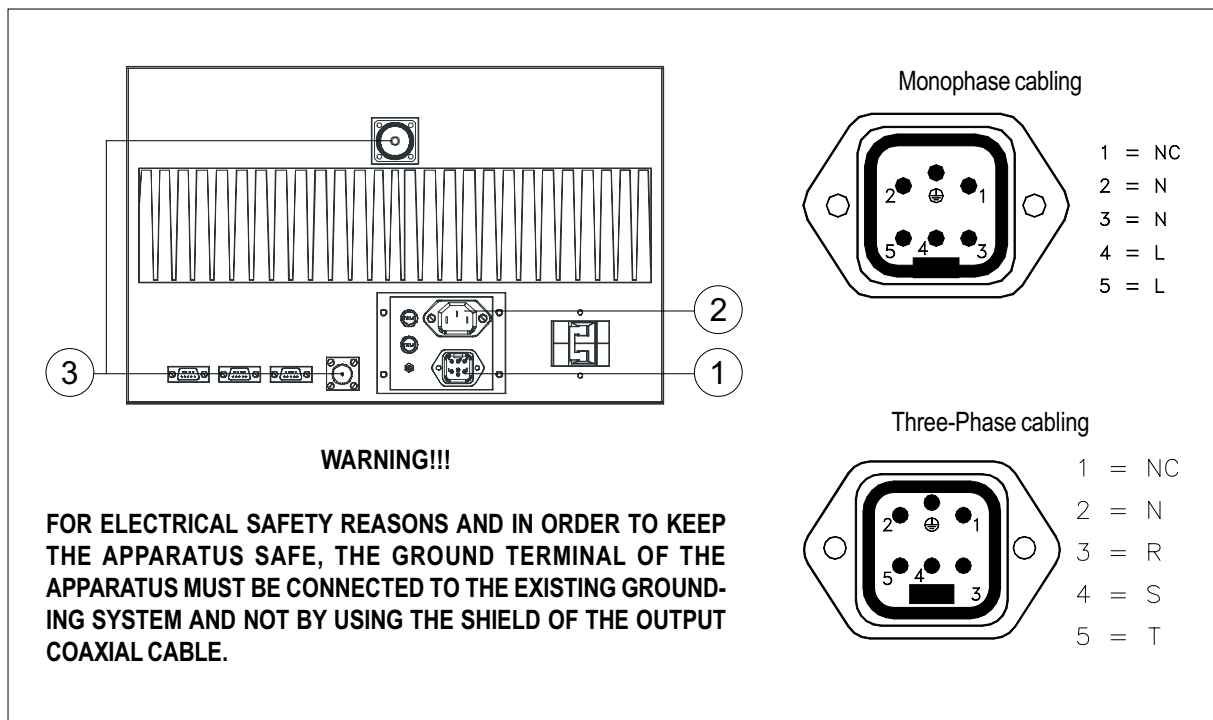
2.1 OPERATING ENVIRONMENT

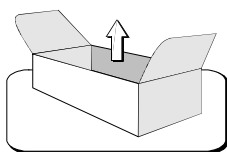
You can install the apparatus in a standard component rack or on a suitable surface such as a bench or desk. In any case, the area should be as clean and well-ventilated as possible. Always allow for at least 2 cm of clearance under the unit for ventilation. If you set the apparatus on a flat surface, install spacers on the bottom cover plate. If you install the apparatus in a rack, provide adequate clearance above and below. Do not locate the apparatus directly above a hot piece of equipment.

2.2 PRELIMINARY OPERATIONS

Correct installation of the equipment is important for maximum performance and reliability. Antenna and earth connections must be installed with the greatest care. The equipment adjustment isn't need, because the unit is completely adjusted by our technical staff. This is the installation procedure:

1. connect the power supply cable of the exciter to the auxiliary socket on the rear panel of the amplifier;
2. connect the power supply cable of the amplifier to the electric network (230VAC). If there is the Isolator Transformer, the amplifier is provided with cable and plug;
3. connect the exciter / antenna cables respectively to the RF IN and RF OUT on the rear panel of the amplifier.



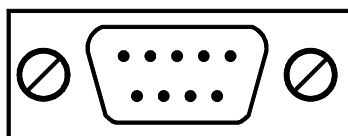


When the apparatus is put within a combined system it is directly connected to the input splitting and output combining systems.

Before fully powering the apparatus, check that the output connections of the coaxial cable to the antenna system are working.

In order to this it is possible to check the indication of the reflected power at low power levels. Only if the SWR indication on the display is 0, the output power can be slowly increased. At maximum output power, some watts might be shown as reflected power.

2.3 TELEMESURING SOCKET CONNECTIONS



DB9 Socket

PIN N°	SIGNAL TYPE	IN / OUT	FUNCTION
1	Analog	Output	FWD Power
2	Analog	Output	REF Power
3	Digital	Output	Temperature
4	Digital	Input	Interlock
5	GND	-	-
6 - 7	Digital	Output	Free contact (closed when alarm)
8	Digital	Input	0V = ON 5V = Normal
9	Digital	Input	0V = OFF 5V = Normal

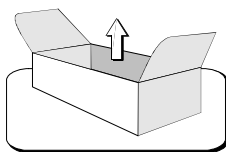
2.4 RS232, RS485 AND AGC SOCKET CONNECTIONS

PIN	1	2	3	4	5	6	7	8	9
FUNCTIONS	-	TxD	RxD	-	GND	-	-	-	-

RS232 - DB9 Socket

PIN	1	2	3	4	5	6	7	8	9
FUNCTIONS	-	Rx-	Rx+	5V	GND	-	Tx-	Tx+	-

RS485 - DB9 Socket



PIN N°	SIGNAL TYPE	IN / OUT	FUNCTION
1	GND	-	-
2	Digital	Output	0V = Normal 5V = AGC Alarm
3	Digital	Output	0V = Normal 5V = AGC Alarm
8	Analog	Output	FWD Power
9	Analog	Output	FWD Power

AGC - DB9 Socket

2.5 PREVENTIVE MAINTENANCE

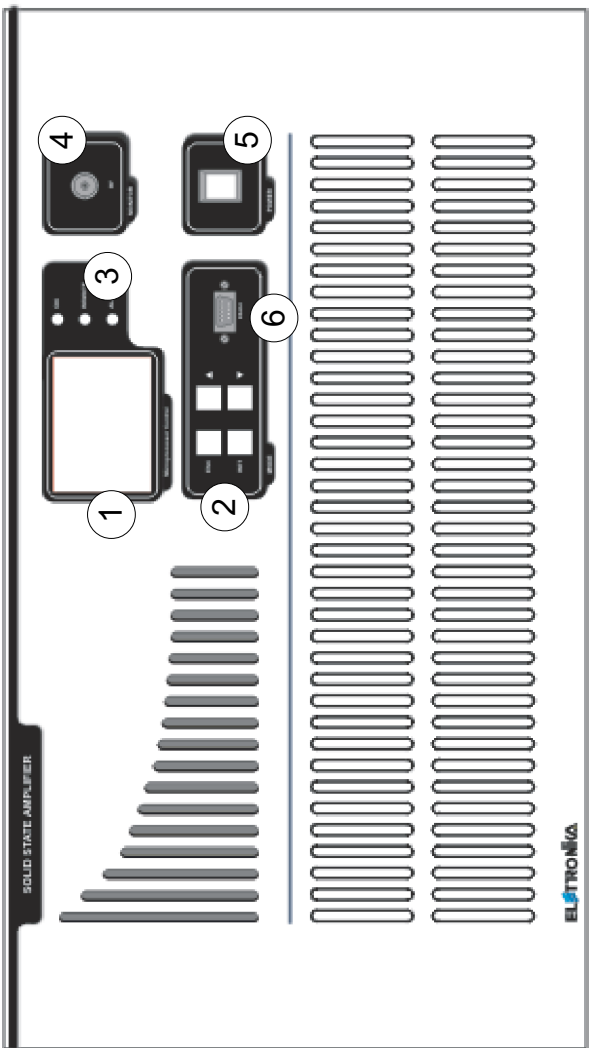
To ensure maximum performance and minimum repair trouble, we strongly recommend you to follow the below stated headlines for preventive maintenance:

1. check antenna installation and ground connection at regular intervals;
2. keep your apparatus clean and dry externally: this will ensure continuous functioning of the front panel controls;
3. if the apparatus has not been used for a long period of time combined with exposure to extreme environmental conditions, open the unit and make a visual inspection.

Remove salt, water or ice with a moist cloth before turning the apparatus on. Check that the cooling fans are running freely.

4. for general maintenance and top performance, call an authorized service technician to give the apparatus and the complete antenna/earth connection installation a general check every 12-18 months;
5. check at regular intervals that the air intake located on the front panel is free of dust. If there is visible dust, remove it by means of a soft brush.

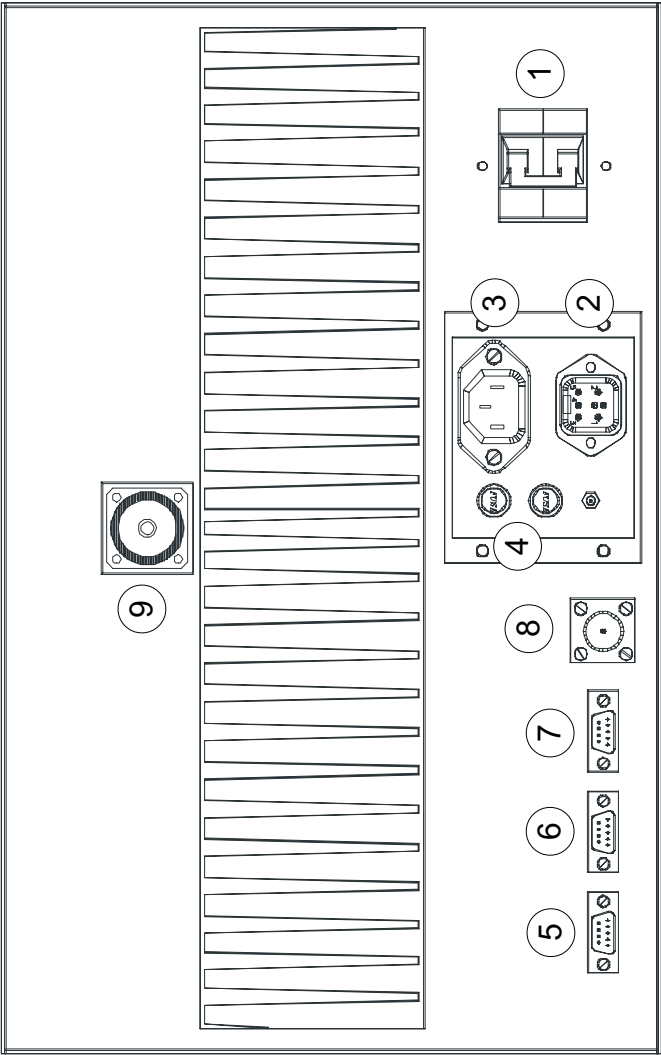
Front panel



DESCRIPTION

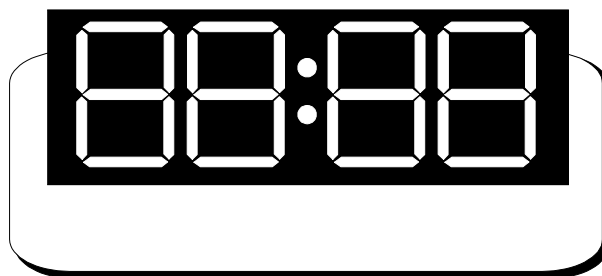
1	LCD Display
2	Function keys
3	Status LEDs
4	RF Monitor connector
5	Main switch
6	RS232 Socket

Rear panel



DESCRIPTION

1	Breaker
2	Power supply socket
3	Auxiliary socket
4	Fuse
5	RS485 Socket
6	AGC Socket
7	Telemeasure socket
8	RF Input connector
9	RF Output connector



Section 3 - Operation

Contents:

- 3.1 Operation*
- 3.2 Display*
- 3.3 Menus*



3.1 OPERATION

At startup, after initial image, the display shows the main screen with the RF powers as in Figure 1:

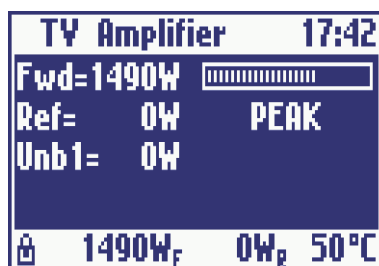


Figure 1: Main screen

The user may turn on and off the amplifier by means of the switch on the front panel. The control board turns on all the power supplies, the exciter (if any), and internal cooling fans. While the amplifier is working, the micro-controller monitors continuously the most important parameters: power supply voltages, absorbed currents, high power zone temperature, forward and reflected powers, unbalances (if any). Each measure is associated to a maximum threshold beyond which the amplifier is immediately put in protection status by turning off one or more power supply, depending on the failed block. In order to prevent a temporary problem to trigger a definitive protection status, the failed block is turned on again, after some seconds, for up to five times. If it goes beyond the protection threshold for more than five times, it is declared as FAILED and it will no longer be turned on. In this case, the amplifier will have to be turned off manually by means of the switch on the front panel, then turned on again after performing the needed maintenance.

On the front panel there are also three LEDs labelled ON, REMOTE and ALARM. Their meanings are explained in Table 1.

LED	COLOUR	MEANING	MEANING WHEN BLINKING
ON	Green	The amplifier is on	The amplifier has been turned on locally but it has been turned off by remote
REMOTE	Yellow	Remote control is enabled	It never blinks
ALARM	Red	An alarm is present	It never blinks

Table 1: Meanings of the three LEDs on the front panel

¹ Screenshots in this manual are indicative, so they can be different from those on your equipment.



3.2 DISPLAY

The control board is provided with a modern pixels graphic display with blue background. Normally it always shows a title bar (on the top line) and a status bar (on the bottom line).

The title bar, see Figure 2, shows the name of the amplifier (TV Amplifier) and the current time. If the amplifier is a single unit coupled externally with other units in a high power transmitter, the title bar shows the amplifier number (slave address) too.



Figure 2: Title bar

The status bar (Figure 3) indicates the forward and reflected powers and the temperature. It also contains two symbols for the interlock (lock) and the alarm (bell).



Figure 3: Status Bar

The bell symbol is continuously displayed in case of alarm. It blinks if there has been an alarm which has ended but has not yet been seen by the user. It stops blinking once the Log has been checked.

The interlock symbol is displayed only when this function is enabled. It may be either a close lock, as in Figure 3, when there is no alarm (interlock chain closed) or an open lock in case of alarm (interlock chain open).

Since the status bar is always showed on the display, regardless of the screen, the user may monitor at any time the most important parameters and the presence of alarms while moving between different screens.

3.3 MENUS

The user may see or modify locally some configuration parameters using the four buttons on the front panel. All screens are organized in a hierarchical menus and the user may move between them in a simple and intuitive way.

To see the menu it's sufficient to press the ESC key (see Figure 4).

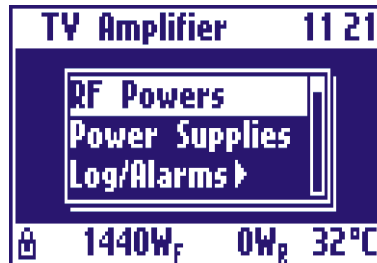



Figure 4: Main menu

The display only shows three items at a time: all the items can be scrolled by the UP and DOWN arrow keys. Any item can be chosen by selecting it and pressing the RET key. Menu entries with an arrow on the right  open sub-menus when chosen. Thus there is a hierarchical structure as in Figure 5. To go back from a sub-menu to the previous menu, press the ESC key. If the ESC key is pressed in the main menu, the RF powers screen is accessed.

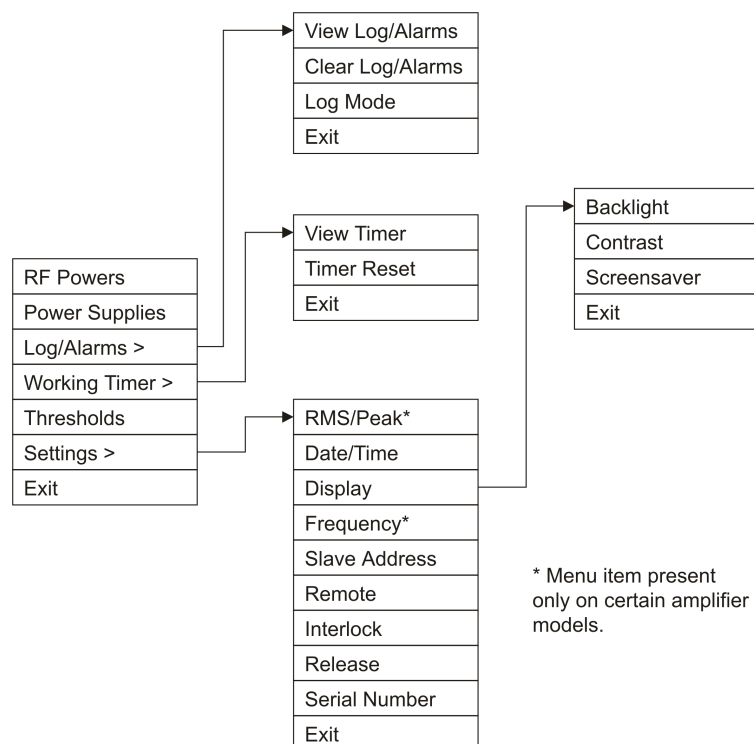


Figure 5: Hierarchical menu structure

All menu items are described in detail below.



- RF Powers

This is the main screen showing the RF powers of the amplifier: forward power, reflected power, unbalances, if any. For forward power a level bar is displayed. See an example in Figure 1.

- Power Supply

This screen shows all the signals coming from the power supply. To check the next (previous) power supply press the UP (DOWN) key. For each power supply, the two voltages, the two absorbed currents and the status (ON or OFF) are shown.

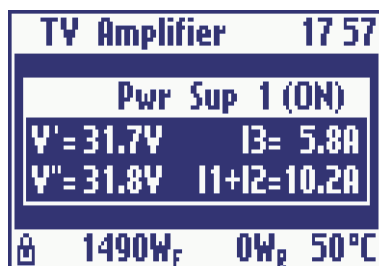


Figure 6: Power supply screen

- Log/Alarms

The control board is provided with an external EEPROM and a clock. Any alarm or switching event with the time at which it occurred is saved in the EEPROM. The Log/Alarms sub-menu allows to manage this log. It is possible to see the events stored in the log by selecting Log/Alarms → View Log/Alarms. All events can be scrolled by pressing the UP and DOWN keys. For example, the event shown in Figure 7 is the turning on of the amplifier by means of the local switch. For every event/alarm a short description and the date and time at which it occurred is displayed.

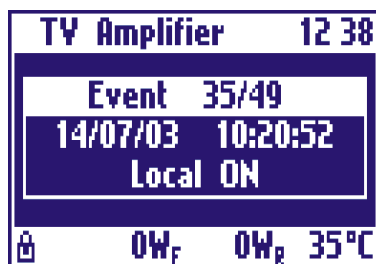


Figure 7: Event stored in the log



In case of alarm, the value of the measure which caused the alarm is saved into the log. In case of alarm still existing after five turning-on attempts, the parameter is marked as FAILED. Table 2 is the list of all the events which can be logged.

EVENT	DESCRIPTION
Local ON	Amplifier turned on by means of the local switch
Local OFF	Amplifier turned off by means of the local switch
Remote ON	Amplifier turned on remotely
Remote OFF	Amplifier turned off remotely
Interlock open	Interlock chain open
Interlock closed	Interlock chain closed
Power Supply ON	Power supply on
Fwd Pwr xxxW	Alarm for forward power
Ref Pwr xxxW	Alarm for reflected power
UnbY xxxW	Unbalancing alarm
Pwr Sup x: V1 xx.xV	Power supply voltage alarm
I1 xx.xA	Power supply current alarm
Pwr Sup x: OVERVOLT	Power supply overvoltage alarm
Pwr Sup x: OVERTEMP	Power supply overtemperature alarm

Table 2: Events managed and logged by the control board

The log may be completely deleted by selecting Log/Alarms → Clear Log/Alarms.

Amplifier can store in the log details about alarms and generic events. You can change this behaviour selecting Log/Alarms → Log/Mode menu item.

- Working Timer

The control board has a working timer which is always enabled while the amplifier is working (i. e. there is at least one power supply working). The menu entry Working Timer → View Timer allows to check the hours for which the timer has been enabled. Working Timer → Timer Reset resets the timer.

- Thresholds

This is a screen showing the alarm threshold of each signals monitored by the control board. The list can be scrolled by means of the UP and DOWN keys.



- RMS/Peak

The control board can monitor both the RMS and peak powers, the first used in digital systems. The menu entry Settings → RMS/Peak allows to choose the power to be displayed and monitored. This menu is present only in certain amplifiers.

- Date/Time

This screen allows to set the current date and time. The setting is changed by pressing the arrow keys, then pressing the RET key to move to the following value and eventually save the changes. To go back to the previous menu and discard any change made, press the ESC key. Figure 8 shows an example of this screen.

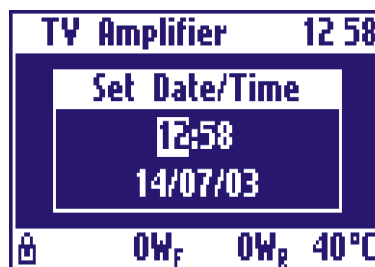


Figure 8: Date and time setting screen

- Display

The menu entry Settings → Display allows to change some settings of the display, such as back light, contrast and screensaver. The back light and the contrast are set by means of the UP and DOWN arrow keys. The changes made are saved by pressing the RET key or discarded pressing the ESC key. Figure 9 shows an example of this screen.

With Settings → Display → Screensaver you can set an interval time after which display backlight is turned off. When display backlight is off, press any key to switch it on.

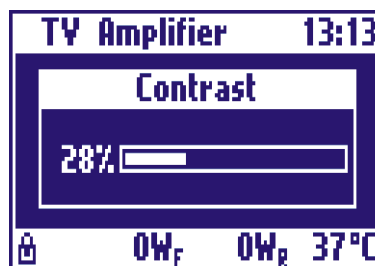


Figure 9: Display contrast setting screen



- Frequency (only for some Amplifiers)

The forward and reflected RF powers is measured by means of a directional coupler. In order to compensate for the effect due to the sampling made by the coupler, it is possible to set the frequency by menu entry Settings → Frequency. The setting can be changed by pressing the arrow keys. The changes made are saved by pressing the RET key or discarded pressing the ESC key. Set the video carrier frequency.

- Slave Address

The amplifier may be used either in stand-alone mode or as a slave of a master in a high power multiple units transmitter. In the latter case an unique address for each amplifier has to be specified, in order for all of them to communicate with the master on the same RS485 bus. The menu entry Settings → Slave Address allows to choose the stand-alone mode or set a slave address by means of the UP and DOWN arrow keys. The changes made are saved by pressing the RET key or discarded pressing the ESC key. An example of this screen is shown in Figure 10.

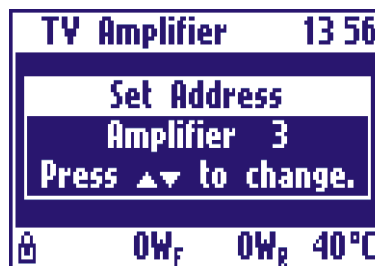


Figure 10: Slave address setting screen

- Remote

The amplifier may be controlled either locally, by means of the keys and display, or remotely. There are three possibilities for remote control:

- using a direct serial connection between amplifier RS232 connector and a PC RS232;
- using the remote control device manufactured by Elettronika S.r.l. (RCU), on the RS485;
- using a general-purpose control system connected to telemeasures.

You can enable / disable remote control choosing menu item Settings → Remote. When remote control is enabled, the yellow REMOTE LED on the front panel is lit.

- Interlock

One of the pins of the telemeasure connector, located on the rear panel, is used for the interlock alarm. It is an input line which turns off the amplifier in case of alarm. The interlock check can be enabled or disabled using



menu item Settings → Interlock. When it is enabled, the status bar shows the lock symbol (see Figure 3), which is close if the interlock chain is closed (no alarm) or open if it is open (alarm).

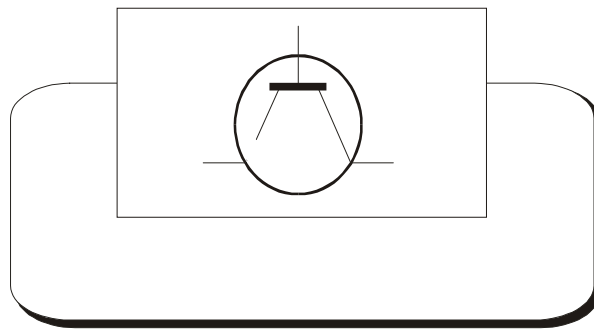
- *Firmware Release*

The menu entry Settings → Firmware Release allows to display the firmware version number and the hardware release of the amplifier.

- *Serial Number*

The menu entry Settings → Serial Number allows to display the serial number of the apparatus.

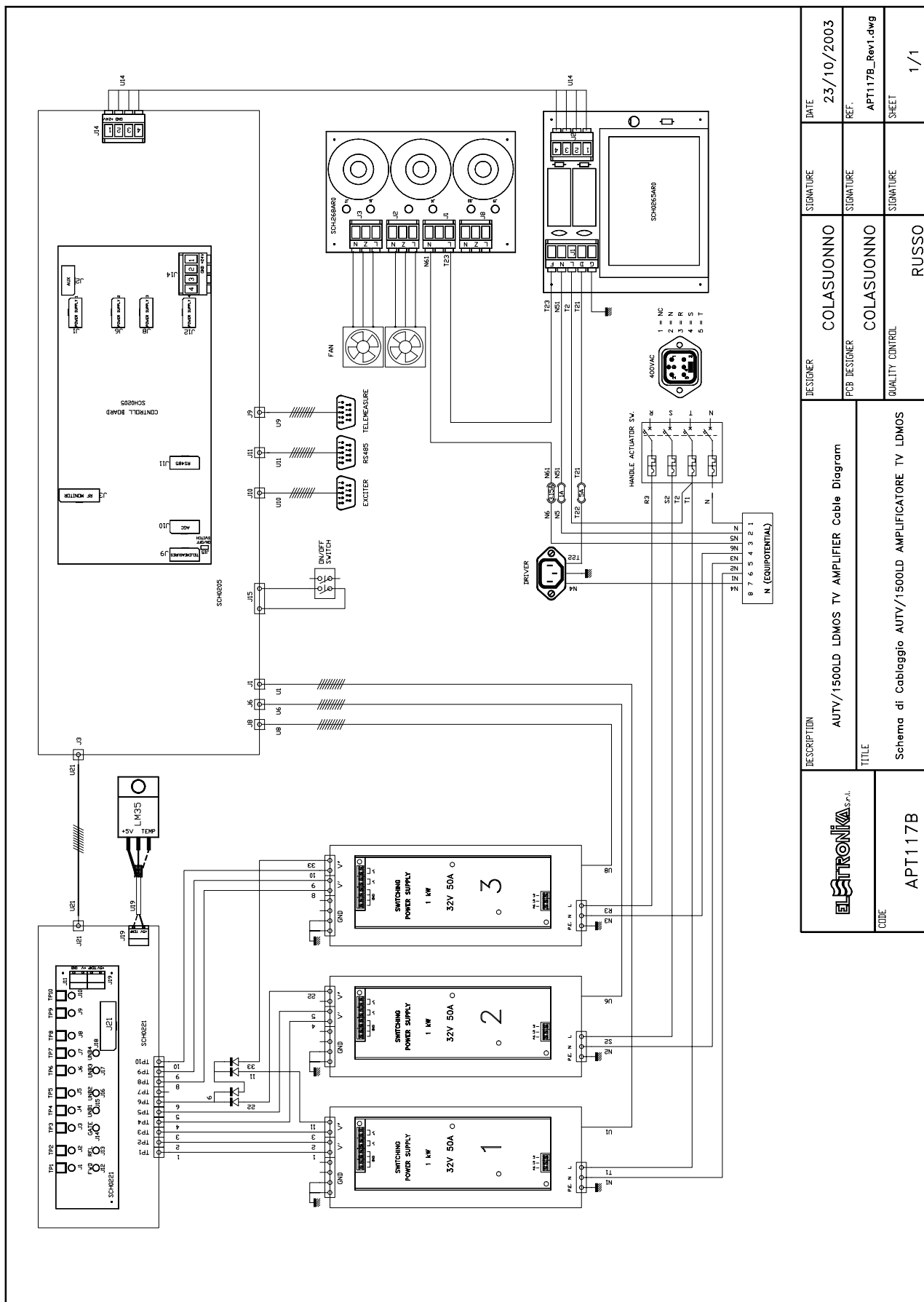
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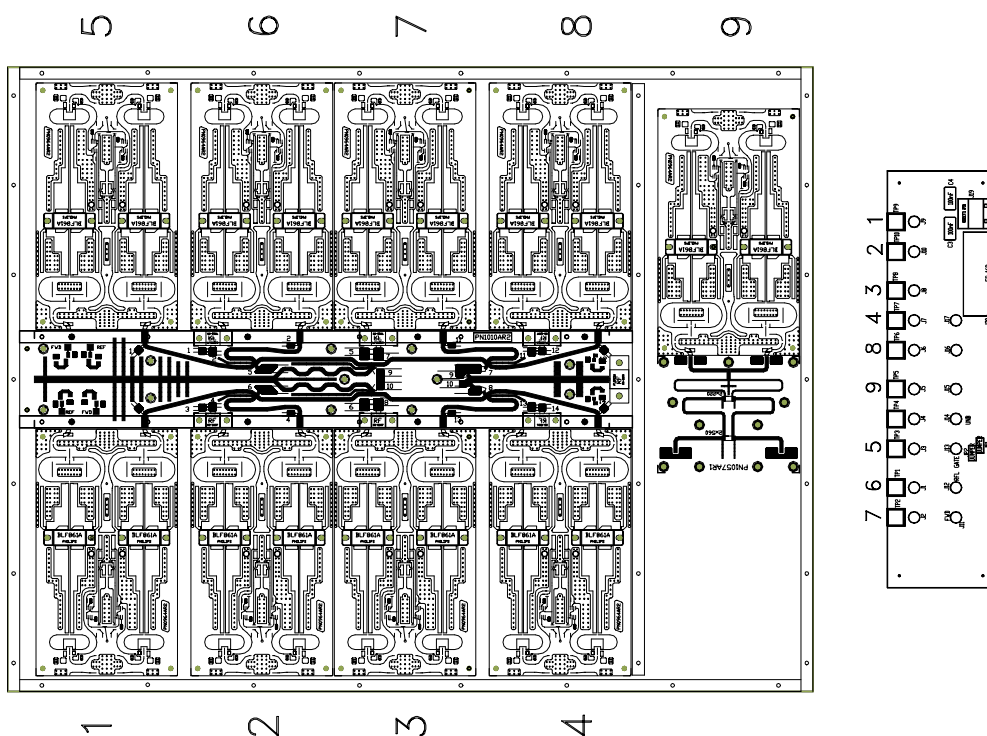
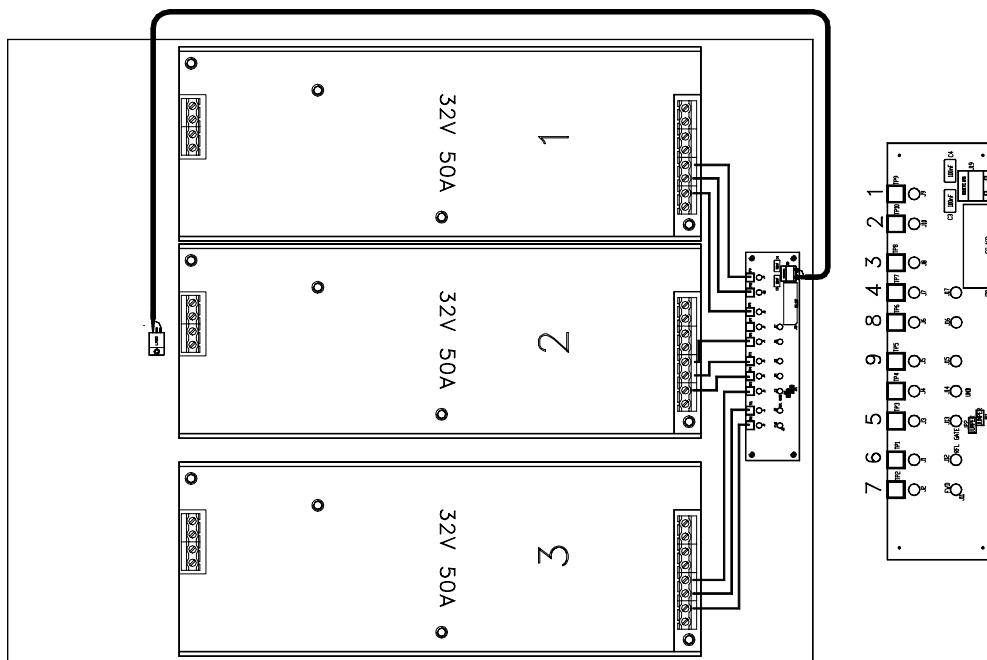
Section 4 - Diagram

Contents:

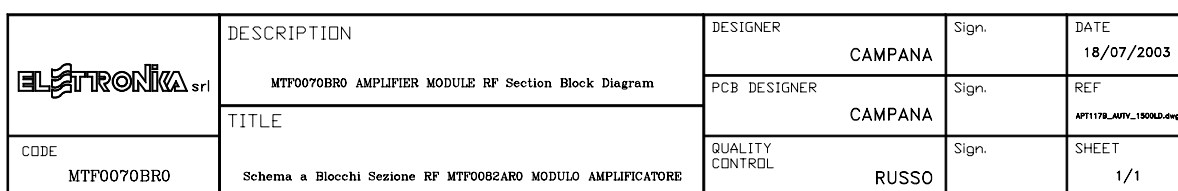
- *Cable diagram*
- *AUTV/1500LD Component layout*
- *RF Section Block Diagram*
- *MTF0070BR0 Amplifier module - Component list*
- *SCH0192AR0 (200W UHF LDMOS Amplifier module)*
- *SCH0223AR1 (Control board and display)*
- *SCH0221AR1 (Amplifier interface)*
- *SCH0215AR0 (Mains distribution board)*
- *E0026 (1kW 32Vdc Switching power supply)*



ELATRONIKA S.p.A.	DESCRIPTION AUTV/1500LD LDMOS TV AMPLIFIER Cable Diagram	DESIGNER COLASUONNO	SIGNATURE	DATE 23/10/2003
CODE APT117B	TITLE Schema di Cablaggio AUTV/1500LD AMPLIFICATORE TV LDMOS	PCB DESIGNER COLASUONNO	SIGNATURE	REF. APT117B_Rev1.dwg
APT117B	QUALITY CONTROL RUSSO	SIGNATURE	SHEET 1/1	



ELETRONIKA srl CODE APT117B	DESCRIPTION	DESIGNER	Sign.	DATE
	AUTV/1500LD LDMOS UHF TV AMPLIFIER Component Layout	COLASUONNO		18/07/2003
	TITLE	PCB DESIGNER	Sign.	REF
	Piano di Montaggio AMPLIFICATORE TV UHF LDMOS AUTV/1500LD	COLASUONNO		
		QUALITY CONTROL	Sign.	SHEET
		RUSSO		1/1



Component list**MTF0070BR0 Amplifier module**

Part Name Code	Description	Qty
00001	0Ω 1206 SMD RESISTOR	2
01041D	1nF 1206 2% SMD CAPACITOR	2
00221B	75Ω 1206 1% SMD RESISTOR	2
03207	HSMS-2802*L31 DIODE	2
SCH0192AR0	200W UHF LDMOS AMPLIFIER MODULE	9
SCH0221AR0	AMPLIFIER INTERFACE	1
SCH0248AR0	8 WAY WILKINSON	1
SCH0249AR0	4 WAY WILKINSON Dx	1
SCH0250AR0	4 WAY WILKINSON Sx	1
SCH0251AR0	2 WAY WILKINSON	1
SCH0252AR0	1500W UHF INPUT COUPLER	1
PN1091A	C.S. PN1091AR3 OUTPUT DIRECTIONAL COUPLER	1
02402	7/16" FEMALE CONNECTOR cod. 0142	1
02512	J01151A0531 SMA SOCKET WITHOUT BAT.	1
01400	2499-003-X5U0-102M FEED-THROUGH CAPACITOR	14
01408	5000PF FEED-THROUGH CAPACITOR	2
DET0726	DET0726R2 SIDE x 1500W UHF AMP. MOD.	2
DET0727	DET0727R1 INTERNAL FRONT SIDE x AMP. MOD.	1
DET0728	DET0728R4 INTERNAL SIDE x AMP. MOD.	2
DET0729	DET0729R2 FRONT SIDE x AMP. MOD.	1
DET0730	DET0730R2 REAR SIDE x AMP. MOD.	1
DET0732	DET0732R1 CONNECTIONS SUPPORT BOARD	1
DET0734	DET0734R0 COVER x AMPLIFIER MODULE P. 2634	1
DET0736	DET0736R5 HEATSINK x AMPLIFIER MODULE	1
DET0807	DET0807R3 SCREEN DIR. COUPLER MODULE	1
DET0810	DET0810R0 PART. x DIRECTIONAL COUPLER	1
DET0811	DET0811R1 COVER x DIRECTIONAL COUPLER	1
DET0812	DET0812R1 TEFLON RING x DIRECTIONAL COUPLER	1
DET0819	DET0819R0 SPESS. x INPUT DIR. COUPLER	1
DET0828	DET0828R0 COVER x AMPLIFIER MODULE P. 2644	1
DET0839	DET0839R2 DIRECTIONAL COUPLER	1
08502	RG316 50Ω CABLE	3,00
08527	HF-85 ENDIFORM CABLE	0,20

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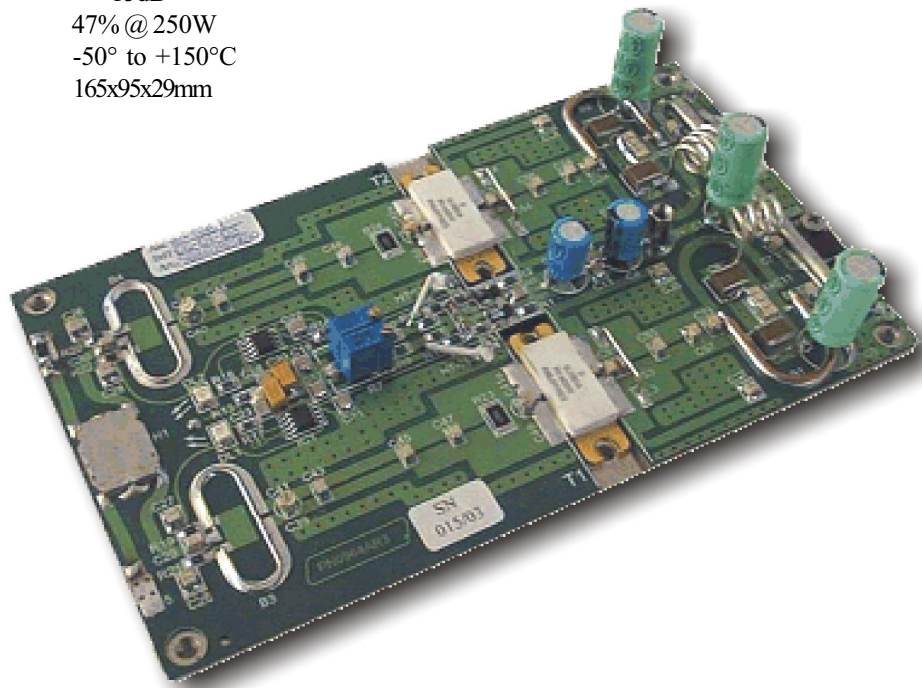
DESCRIPTION

The RF module is an integrated TV linear amplifier designed for UHF band, this module employs push-pull LDMOS technology in order to achieve very good efficiency, high linearity and reliability.

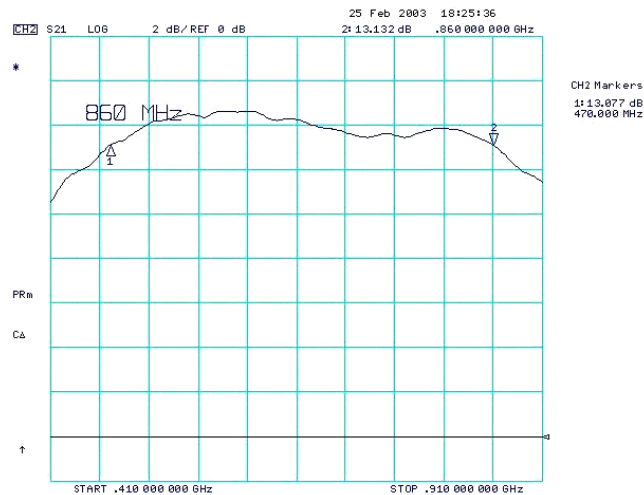
LDMOS transistors operate in AB class. It is a wideband amplifier over the full frequency, no adjustment is required for the channel change. The board includes RF section amplifier, bias circuit, protection circuit and matching networks. A silver plated copper plate is brazed with PCB in order to obtain low thermal resistance. Providing a minimum of 200W Pk sync linear power, this module is the perfect amplifier for any broadband UHF power transmitter.

TECHNICAL CHARACTERISTICS

Output power	300W max
Input power	15W max
Frequency	470 - 860MHz
Gain	> 13dB
LDMOS Power supply	32V \pm 2%
LDMOS Bias current @+32V Vdc	2A
RF Input impedance	50 Ω
RF Output impedance	50 Ω
Input / Output return loss	\geq 15dB
Drain efficiency	47% @ 250W
Storage temperature range	-50° to +150°C
Dimensions (LxWxH)	165x95x29mm



- Curve response graphic



Middle frequency 660MHz, span 500MHz, 2dB/div., reference to the arrow

CALIBRATION PROCEDURE

- Technical characteristics

Power supply voltage	32V ($\pm 2\%$)
Polarisation current	1.0 cold for each device (2A total), ± 0.1 A
Gain for low signal	Not less than 13dB in the 470-860MHz band (± 1 dB) Compare to the typical curve enclosed

- Adjustment procedure

Polarisation current calibration	32V stabilised power supply 10A amperometer
Gain curve	Network analyser

- Adjustment points description

R7-R8 (Trimmers)	Adjust the current absorbed in stand-by (1.0A per device)
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- Calibration steps

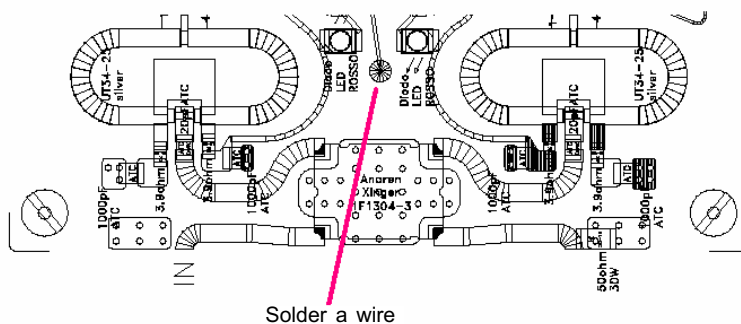
STEP 1. Close the input and the output of the module by connecting them to a 50Ω dummy load and connect the spectrum analyser through a directive sample, in order to look for self-oscillation of the module, if any (anyway the module has been designed so that it would not self-oscillate even if totally decoupled, without any input or output load).

STEP 2. Check the voltages of the polarisation circuits *without assembling the transistors first*: connect the 32V power supply to the proper turret by means of a fastening screw, then give power and check data:

- the stabilised voltage on the zener diodes DZ1 and DZ2 is about 15V compared to the ground;
- the stabilised voltage on the zener diodes DZ3 and DZ4 is about 6.8V compared to the ground;
- the voltage on the pads to which the gates of the LDMOS transistors will be soldered (R23 and R24 resistors side) changes from 0V to a maximum value of about 6V when moving the relevant trimmer (R7-R8).

STEP 3. Check the work of the protections.

- Set both trimmers so that there is a value of about 4.5V on the pads of the gates;
- solder some wire to the pad between the two LEDs, next to the serigraphy of the input hybrid H1;



- in order to check the work of the protections aboard, a power of about 4V has to be supplied to the wire, for example by touching with it the reophore of C23 or C24 which is not connected to ground; the two red LEDs will immediately light up and the two RF transistors will be switched off at the same time: the polarisation current (2A) will decrease to 0 and of course the gain curve displayed by the spectrum analyser will decrease;
- after this it is **important** to *restore the position of the two trimmers for the minimum voltage!* Then disconnect the 32V power supply.

STEP 4. Fastening of the LDMOS transistors: after properly cleaning the plate surface, smear a thin layer of silicone fat on the lower side of the flange of the MOSFETs, fasten them to the heat sink and solder the gate first, then the drain. Solder the two 13pF (ATC) chip capacitors and above them the two 1-5pF

capacitive trimmers, between the two pair of gates, as shown by the mounting plan.

STEP 5. Connect serially a c.c. amperometer to the power supply, with scale starting from more than 5A (i.e. 10A).

STEP 6. Power the module and check the MOSFET is not absorbing current; this means that the device is integral and working correctly.

STEP 7. Slowly turn the R7 trimmer until the MOSFET absorbs 1A, always checking that there are no self-oscillation; under this conditions it is possible to check by means of a digital tester that the voltage on the gate is about 5.2-5.4V.

STEP 8. Repeat the previous step for the other section of the module, this time turnign R8 and checking that the indication of the current on the amperometer increases to 2A total (which includes the current of the other device left on).

STEP 9. Check the response curve of the module by means of the *network analyser*.

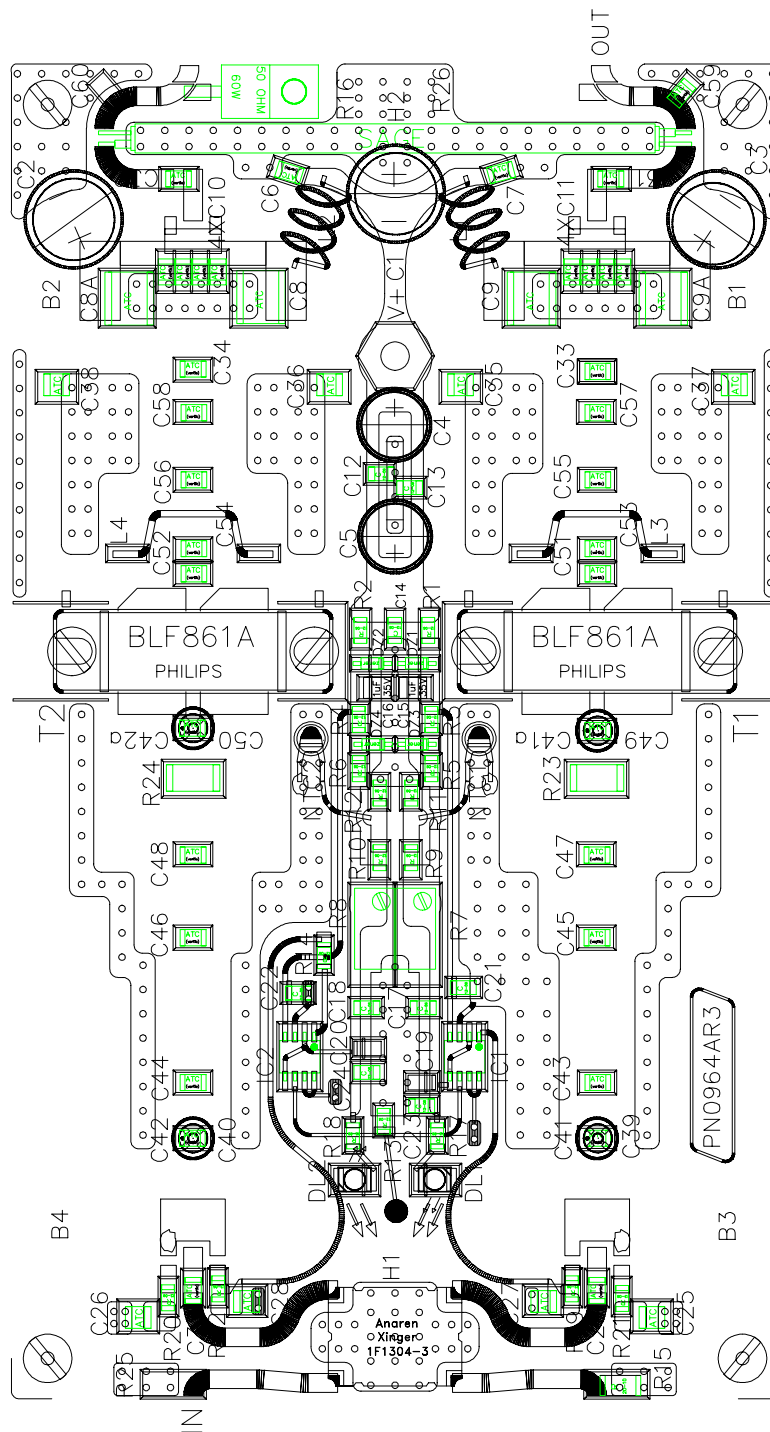
STEP 10. Check the response curve for low signal with centre 660MHz and span 500MHz, 2dB/div.

STEP 11. The curve should be similar to the one enclosed, with a tolerance of $\pm 0.5\text{dB}$. To obtain this, act on the four trimmers C41-C41a and C42-C42a with the proper “calibrator”, inorder to flatten the curve as much as possible, especially at the edged of the band which represents the minimum values.

STEP 12. Finally, check that the current in stand-by does not increase by more than 15÷20%, reaching at worst 2.3÷2.4A when the heat sink is hot and not ventilated.

Note: when mounting-removing the PALLET on the heat sink, tightly fasten the screw of each all “N” input and output connectors. These are mounted with a single 3mm screw and if it is not properly fastened it may be detached from the PCB by a movement of the connector once it has already been soldered to the path.

Component layout SCH0192AR0



COMPONENT LIST SCH0192AR0

REF.	DESCRIPTION	ELETTRONIKACODE	Page 1/3
R1	2200Ω 1/4W 1206 SMD RESISTOR	00045A	
R2	2200Ω 1/4W 1206 SMD RESISTOR	00045A	
R3	2200Ω 1/4W 1206 SMD RESISTOR	00045A	
R4	2200Ω 1/4W 1206 SMD RESISTOR	00045A	
R5	1200Ω 1/4W 1206 SMD RESISTOR	00042A	
R6	1200Ω 1/4W 1206 SMD RESISTOR	00042A	
R7	50kΩ MULTITURNS PTH TRIMMER	00800	
R8	50kΩ MULTITURNS PTH TRIMMER	00800	
R9	1200Ω 1/4W 1206 SMD RESISTOR	00042A	
R10	1200Ω 1/4W 1206 SMD RESISTOR	00042A	
R11	18kΩ 1/4W 1206 SMD RESISTOR	00056B	
R12	18kΩ 1/4W 1206 SMD RESISTOR	00056B	
R13	680KΩ 1/4W 1206 SMD RESISTOR	00075A	
R14	0Ω 1/4W 1206 SMD RESISTOR	00001	
R15	50Ω 30W 1512EBX SMD RESISTOR	00416A	
R16	50Ω 60W	00432	
R17	4.7kΩ 1/4W 1206 SMD RESISTOR	00049A	
R18	4.7kΩ 1/4W 1206 SMD RESISTOR	00049A	
R19	3.9Ω 1/4W 1206 SMD RESISTOR	00012A	
R20	3.9Ω 1/4W 1206 SMD RESISTOR	00012A	
R21	3.9Ω 1/4W 1206 SMD RESISTOR	00012A	
R22	3.9Ω 1/4W 1206 SMD RESISTOR	00012A	
R23	1000Ω 1W 2512 SMD RESISTOR	00396	
R24	1000Ω 1W 2512 SMD RESISTOR	00396	
*R25	= R15 (da montare se si inverte l'ingresso)		
*R26	= R26 (da montare se si inverte l'uscita)		
C1	470uF 50V PTH ELECTROLYTIC CAPACITOR	01807B	
C2	470uF 50V PTH ELECTROLYTIC CAPACITOR	01807B	
C3	470uF 50V PTH ELECTROLYTIC CAPACITOR	01807B	
C4	100uF 50V PTH ELECTROLYTIC CAPACITOR	01795	
C5	100uF 50V PTH ELECTROLYTIC CAPACITOR	01795	
C6	1nF ATC 100B CAPACITOR OR EQUIVALENT	01145	
C7	1nF ATC 100B CAPACITOR OR EQUIVALENT	01145	
C8 x 2	2 x 100nF ATC CAPACITOR OR EQUIVALENT	01065H	
C9 x 2	2 x 100nF ATC CAPACITOR OR EQUIVALENT	01065H	
C10 x 4	4 x 100pF ATC 100B CAPACITOR OR EQUIVALENT	01135	
C11 x 4	4 x 100pF ATC 100B CAPACITOR OR EQUIVALENT	01135	
C12	100nF 1210 SMD CAPACITOR	1065G	
C13	100nF 1210 SMD CAPACITOR	1065G	
C14	100nF 1210 SMD CAPACITOR	1065G	
C15	1uF 35V SMD TANTALIUM CAPACITOR	01613A	
C16	1uF 35V SMD TANTALIUM CAPACITOR	01613A	
C17	100nF 1210 SMD CAPACITOR	1065G	

REF.	DESCRIPTION	ELETTRONIKA CODE	Page 2/3
C18	100nF 1210 SMD CAPACITOR	1065G	
C19	10uF 16V SMD TANTALIUM CAPACITOR	01626A	
C20	10uF 16V SMD TANTALIUM CAPACITOR	01626A	
C21	100nF 1210 SMD CAPACITOR	1065G	
C22	100nF 1210 SMD CAPACITOR	1065G	
C23	100nF 1210 SMD CAPACITOR	1065G	
C24	100nF 1210 SMD CAPACITOR	1065G	
C25	1nF ATC 100B CAPACITOR OR EQUIVALENT	01145	
C26	1nF ATC 100B CAPACITOR OR EQUIVALENT	01145	
C27	1nF ATC 100B CAPACITOR OR EQUIVALENT	01145	
C28	1nF ATC 100B CAPACITOR OR EQUIVALENT	01145	
C29	20pF ATC 100B CAPACITOR OR EQUIVALENT	01123	
C30	20pF ATC 100B CAPACITOR OR EQUIVALENT	01123	
C31	20pF ATC 100B CAPACITOR OR EQUIVALENT	01123	
C32	20pF ATC 100B CAPACITOR OR EQUIVALENT	01123	
C33	1.3pF ATC 100B CAPACITOR OR EQUIVALENT	01104	
C34	1.3pF ATC 100B CAPACITOR OR EQUIVALENT	01104	
C35	470pF ATC 100B CAPACITOR OR EQUIVALENT	01143	
C36	470pF ATC 100B CAPACITOR OR EQUIVALENT	01143	
C37	470pF ATC 100B CAPACITOR OR EQUIVALENT	01143	
C38	470pF ATC 100B CAPACITOR OR EQUIVALENT	01143	
C39	4.7pF ATC 100B CAPACITOR OR EQUIVALENT	01108	
C40	4.7pF ATC 100B CAPACITOR OR EQUIVALENT	01108	
C41 x 2	2 x 1÷5pF JOHANSON SMD TRIMMER	1485	
C42 x 2	2 x 1÷5pF JOHANSON SMD TRIMMER	1485	
C43	3.6pF ATC 100B CAPACITOR OR EQUIVALENT	01104B	
C44	3.6pF ATC 100B CAPACITOR OR EQUIVALENT	01104B	
C45	6.8pF ATC 100B CAPACITOR OR EQUIVALENT	01111	
C46	6.8pF ATC 100B CAPACITOR OR EQUIVALENT	01111	
C47	6.8pF ATC 100B CAPACITOR OR EQUIVALENT	01111	
C48	6.8pF ATC 100B CAPACITOR OR EQUIVALENT	01111	
C49	13pF ATC 100B CAPACITOR OR EQUIVALENT	01119A	
C50	13pF ATC 100B CAPACITOR OR EQUIVALENT	01119A	
C51	8.2pF ATC 100B CAPACITOR OR EQUIVALENT	01113	
C52	8.2pF ATC 100B CAPACITOR OR EQUIVALENT	01113	
C53	8.2pF ATC 100B CAPACITOR OR EQUIVALENT	01113	
C54	8.2pF ATC 100B CAPACITOR OR EQUIVALENT	01113	
C55	10pF ATC 100B CAPACITOR OR EQUIVALENT	01117	
C56	10pF ATC 100B CAPACITOR OR EQUIVALENT	01117	
C57	4.7pF ATC 100B CAPACITOR OR EQUIVALENT	01108	
C58	4.7pF ATC 100B CAPACITOR OR EQUIVALENT	01108	
C59	0.3pF ATC 100B CAPACITOR OR EQUIVALENT	01160	
T1	BLF861A RF LDMOS POWER TRANSISTOR	04034	
T2	BLF861A RF LDMOS POWER TRANSISTOR	04034	
B1	COAX 2:1 BALUN	08491	

REF.	DESCRIPTION	ELETTRONIKA CODE	Page 3/3
B2	COAX 2:1 BALUN	08491	
B3	COAX 4:1 BALUN	08492	
B4	COAX 4:1 BALUN	08492	
L1	4 TURNS SILV. COP. WIRE 1.2mm WOUND ON OD 5mm	07684	
L2	4 TURNS SILV. COP. WIRE 1.2mm WOUND ON OD 5mm	07684	
L3	½ TURN COIL		
L4	½ TURN COIL		
H1	HYBRID COUPLER 3dB 90° ANAREN	05368	
H2	HYBRID COUPLER 3dB 90° SAGE	05369	
NTC1	NTC 100KΩ PTH	00661	
NTC2	NTC 100KΩ PTH	00661	
IC1	DG419DY	04583	
IC2	DG419DY	04583	
DZ1	15V SMD ZENER DIODE	03135	
DZ2	15V SMD ZENER DIODE	03135	
DZ3	6.8V SMD ZENER DIODE	03137	
DZ4	6.8V SMD ZENER DIODE	03137	
DL1	SMD LED DIODE - RED -	03056	
DL2	SMD LED DIODE - RED -	03056	
PN964AR3	PCB	0643K	
	Torretta 3x10 f/f	V0774	
	Imballo velapack 200x125x50	09983	