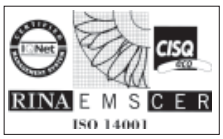
TXUP10000LD

LDMOS - UHF TV Solid State Transmitter

General description

Registration number: ***IT-17686***



Registration number: ***IT-24436***

CE 0682

SS 96 Km 113
70027 Palo del Colle (Ba) **ITALY**
Tel. +39 (0)80 626755
Fax +39 (0)80 629262
E-mail: elettronika@elettronika.it
Web site: http://www.elettronika.it

DESCRIPTION

The TXUP10000LD belongs to the High Power UHF products family of Television Transmitters fully in solid state technology.
The TXUP10000LD series represents the 10kW TV Transmitters operating in the IV/V Band for Common amplification process (separate amplification available) of the Vision and Sound carriers. This Transmitters family has been designed to offer to the customer high performances, high reliability and greater simplicity in their operation and maintenance procedures.
The Vision and Sound signal processing is provided for all TV Standards and all types of Audio applications (Mono & Dual sound - NICAM) together with colour systems such as PAL - NTSC - SECAM. Thanks to the amplitude and phase pre-correction circuit, it is possible to cancel the distortions in the output stage, thus cutting down the operating costs. The RF transposition in the driver is carried out by a synthesizer with various possibilities of accuracy and stability as well as precision offset locked by internal or external frequency reference.
The RF amplifier is made up by eight RF modules installed in a power rack, the modules are dedicated for the Vision and Sound carriers common amplification. The amplifiers employ solid state LDMOS technology in order to obtain wide band, reliability, and high efficiency. Each RF module has a built-in switching-mode power supply unit, self-protected against overcurrents and overvoltages, as well as overtemperature and VSWR for RF parameters. The cooling system is fully contained into the transmitter. The control unit provides full management of the transmitter without the presence of the operator, the system includes a central controller and several peripheral units installed in each RF module and rack. The control device includes a fault finding system to detect equipment malfunctions and locate the faulty subassembly which needs to be replaced. The interlock circuit is independent on the software and remains always operational whether computer control is present or not. The operator interface is made by a high resolution LCD graphic display and a simple keyboard, the menu is very friendly and easy to use.
The Control Unit can be fully controlled in REMOTE mode via link or via modem in RS232 or other interface.
The equipment design allows the soft degradation (RF power loss) for several transistors faults.

- TECHNICAL SPECIFICATIONS

RF SECTION

Frequenchy range	470 - 860MHz
Output power	10kW PEP
Audio / Video power ratio	10/1 single sound - 20/1/0.2 dual sound
Out stage technology	Solid State LDMOS
Audio / Video amplification	Common
Standards	G, K, I, M
Audio transmission	FM single sound - Dual sound coding IRT - NICAM 728
Harmonics and suppression emission	In compliance with CCIR rec.
Intermodulation products from audio and video	<= 56dB
Frequency stability	2,5ppm (option 0,05ppm)

VIDEO SECTION

Video input ..... BNC 75Ω connector
Nominal input level ..... 1Vpp ±6dB
Return loss ..... >= 30dB
DC Restoration ..... Clamped to the blanking level without affecting the burst
White limiter ..... At 90% picture signal without affecting the chrominance

Transmission characteristics

Sideband spewctrum response ..... According to the standard
Amplitude frequency response ..... According to the standard
Group delay variation without receiver pre-correction and TV demodulator flat ..... <= ±35ns
Non linearity distortion (10 to 75% mod.) ..... <= 5%
Differential gain (10 to 75% mod.) ..... <= 5%
Differential phase (10 to 75% mod.) ..... <= 5°
Signal to random noise ratio (weighted 0.2 to 5MHz) ..... >= 60dB
Blanking level variation ..... <= 2%
2T k factor ..... <= 2%

AUDIO SECTION

Nominal input level (±50kHz dev.) ..... -10 to +8dBm
Input impedance ..... 600Ω balanced
Pre-emphasis 50ms

Transmission characteristics

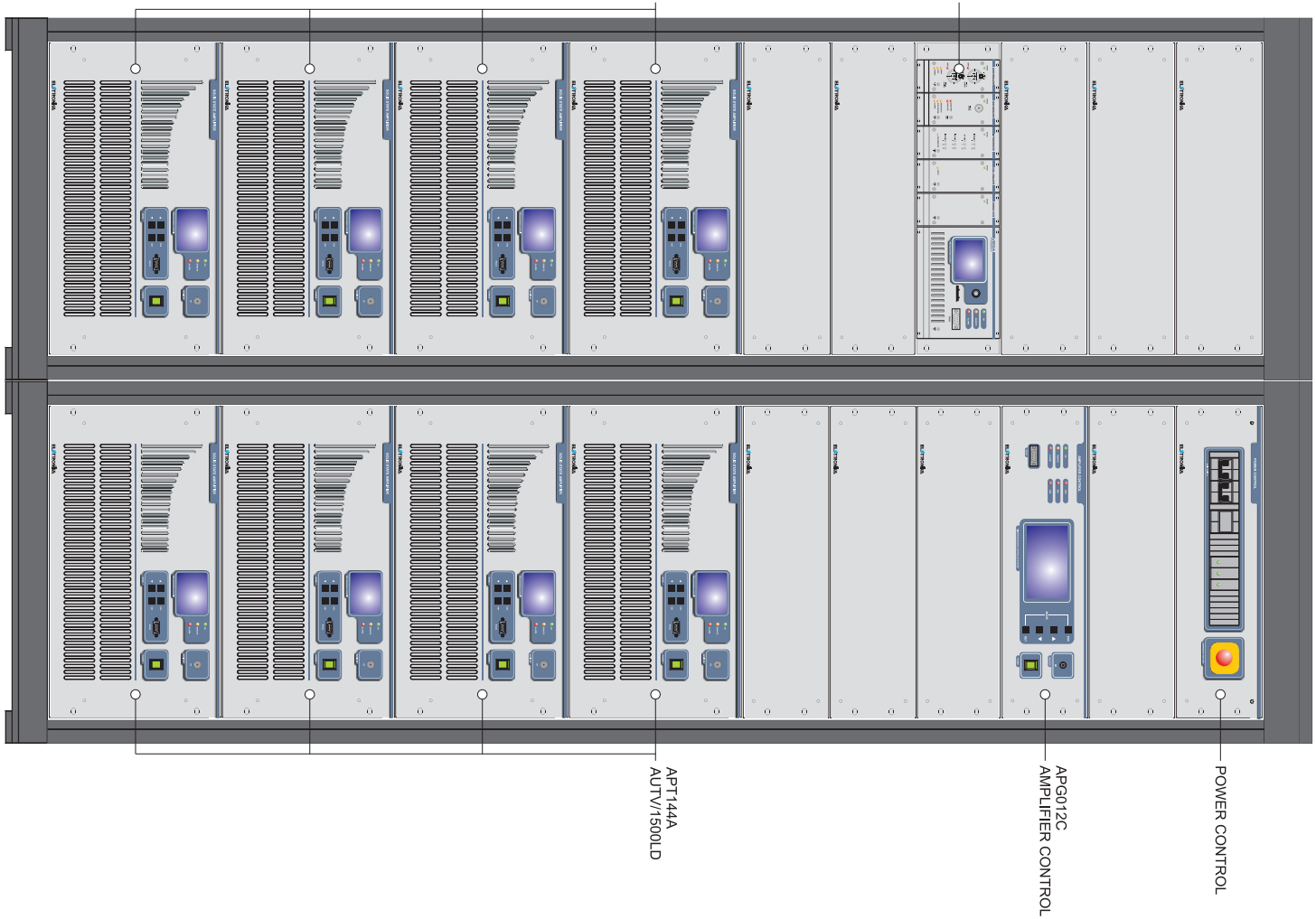
Amplitude frequency response ..... 40 to 15000Hz ±0.5dB
Total harmonic distortion ..... <= 0.5%
FM Signal to noise ratio (referred to ±50kHz dev. f = 400Hz) ..... >= 60dB (weighted)
AM Signal to nokise ratio ..... >= 50dB (referred to 100%)
AM Synchronous modulation ..... <= 40dB (referred to 100%)

REMOTE CONTROL

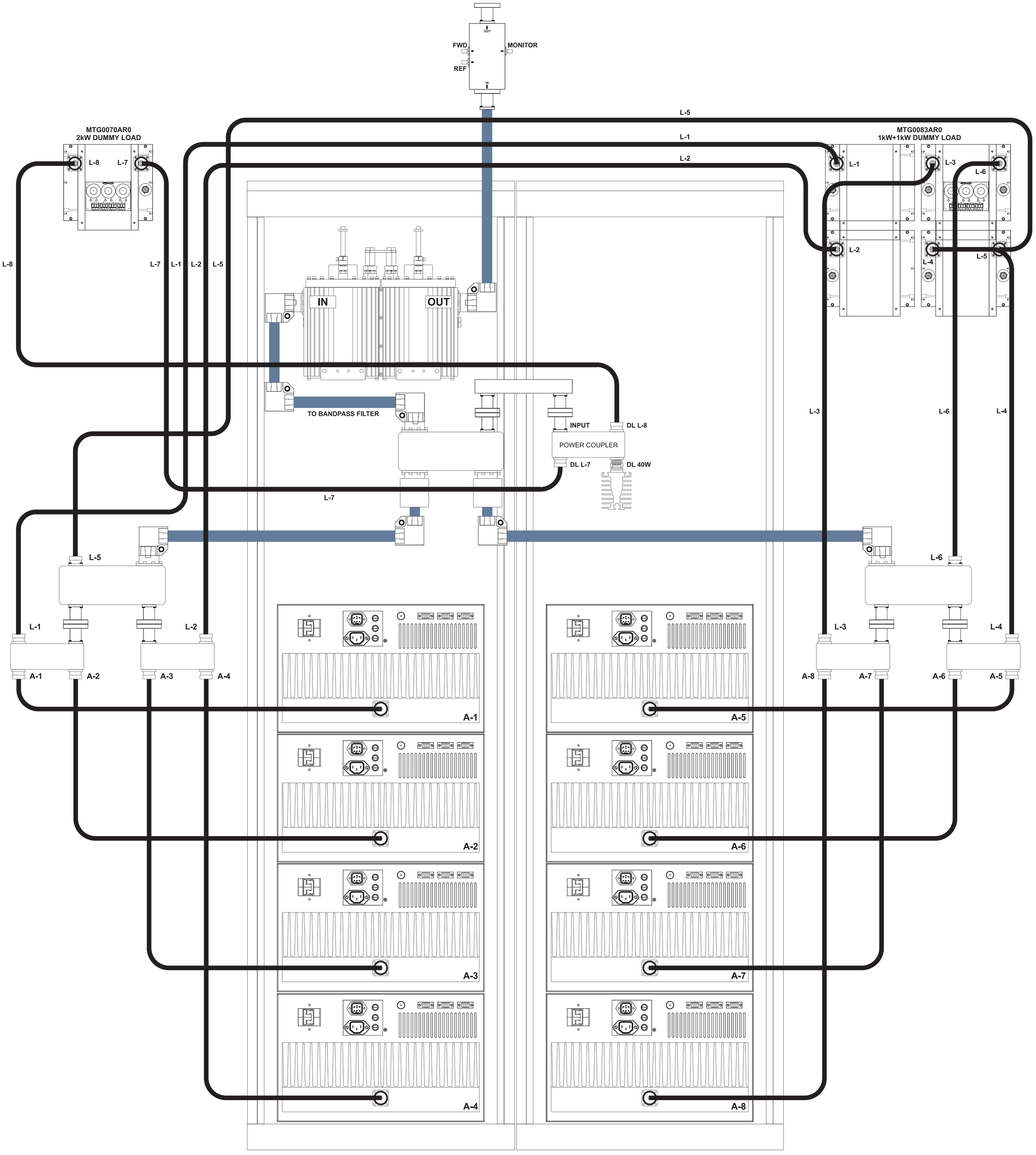
Parallel interface ..... On/Off, Alarms, Interlock
Serial interface ..... RS232 (Full monitoring and management)

GENERAL

Power supply voltage ..... 230VAC, ±10% (other on request)
Frequency ..... 50-60Hz, ±5%
Temperature operating range ..... 0 to 45°C
Altitude ..... Up to 2.500 meters (>= 2.500m with additional cooling system)
Power consumption (cooling system included) ..... <= 24.5kVA (black level)
Power factor ..... >= 0.9
Cooling ..... Forced air
Dimensions ..... n. 2 Rack 19”-42U



ELETTRONIKA S.r.l.	FRONTAL VIEW	DESIGNER LATTANZIO	SIGNATURE	DATE 08/07/2005
ASSEMBLY CODE STT028A	TITLE TXUP10000LD – LDMOS UHF TV TRANSMITTER	PCB DESIGNER LATTANZIO	SIGNATURE	PCB REF STT028A
				SHEET 1/1


OUT
FWD
MONITOR
REF
IN
L-5
L-1
L-2
MTG0070AR0
2kW DUMMY LOAD
L-8
L-7
MTG0083AR0
1kW+1kW DUMMY LOAD
L-3
L-6
L-4
L-8
L-7
L-1
L-2
L-5
IN
OUT
TO BANDPASS FILTER
INPUT
DL L-8
POWER COUPLER
DL L-7
DL 40W
L-7
L-5
L-6
L-1
L-2
L-3
L-4
A-1
A-2
A-3
A-4
A-5
A-6
A-7
A-8

MTG0070AR0
2kW DUMMY LOAD

OUT
IN
FWD
REF
MONITOR
UNB

RF IN
MAIN POWER SUPPLY
GND
1A FUSE
24Vdc
FANS CONTROL
AGC
TELEMEASURES
HCbus
RS485
INTERLOCK
DRIVER1 POWER
DRIVER2 POWER
FANS POWER
5A FUSE
D
E
F
G
H

UNB
FWD
REF

RF OUT
RF IN
RF OUT

2 WAYS HYBRID SPLITTER
470÷860MHz
INPUT MAX POWER 20W
RF INPUT

A-0
B-0

4 WAY HYBRID SPLITTER
470÷860MHz

A-3
A-4
A-2
A-1
A-7
A-8
A-6
A-5

A-1
A-5
A-2
A-6
A-3
A-7
A-4
A-8

ELETTRONIKA SRL

AMPLIFIER CONTROL

User's manual

AMPLIFIER CONTROL

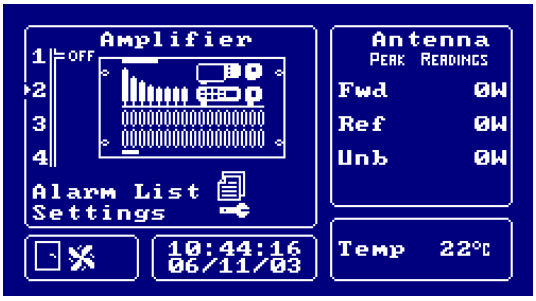
1.1 CONTROL SYSTEM OVERVIEW

The control system is made up by some *"Slave"* boards, which check locally the amplifier modules, and a *"Master"* board to monitor the status of the *Slave* boards in each module and show on a graphic display all the checked parameters.
The number of the *Slaves* changes depending on the output power of the amplifier. The communication between Master and Slaves is made via RS485 standard. The *Master* board reads the overall parameters of the equipment (Forward and Reflected power and Unbalancing), *polls* (interrogaes in sequence) the local boards, shows on the display the values requested by the user, indicates alarm conditions, if any, and allows to change some of the operating parameters of the apparatus. Besides it realizes a serial data interface to an external system able to analyse the working parameters of the equipment, using the RS232 and RS485 communication protocols.

1.2 FUNCTIONS

At start-up, the display of Amplifier Control module shows an informational message concerning the equipment and its firmware version.

- Main menu
The main menu has: a list of the amplifier modules, the measure of some parameters of the power in antenna, a window with icons to show the alarm status (Alarm Status Window) and some general information, that is date, time, temperature inside the module and, for FM equipment, transmission frequency.
The following picture is an exact representation of the main menu screen.



In the Amplifier List, next to each module, the following symbols can be found:

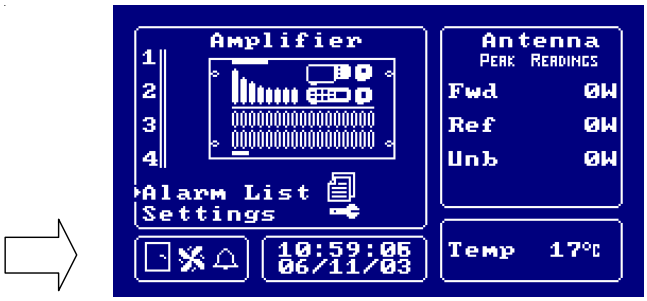
if the communication with the slave is correct and then

ON if the amplifier module is ON

OFF if the amplifier module is OFF

if the communication with the slave is interrupted

The *UP* and *DOWN* arrow keys allow to select one of the slave, the alarm list, or a menu allowing to change some settings of the control module and the apparatus; the *RET* key is used to confirm the selection.
In the main and slave menu the Alarm Status Window (which position is indicated by an arrow in the picture below) is shown: the gate symbol displays the status of the INTERLOCK, in case of alarm this icon blinks and the buzzer ringgs.
The INTERLOCK signal is a control available to the user to manage an ON/OFF sensor.
When the relevant PIN is grounded, the Master board does not signal any alarm, as soon as the PIN is left floating, an alarm is detected; the rotating screw symbol shows that the FANS work normally; in case of alarm this icon blinks and the buzzer rings; the bell symbol appears in case of alarm detected by the control module or the amplifier. It blinks if the alarm condition is terminated and the alarm itself can be displayed in the Alarm List.

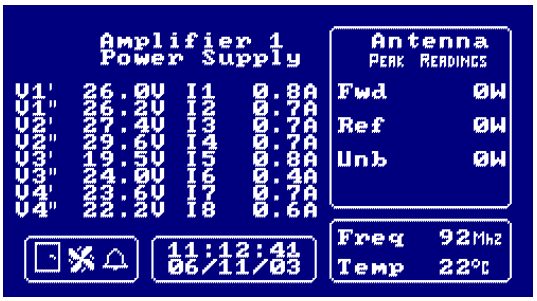


If one of the parameters of a *Slave* or any of the ones directly checked by the *Master* is alarmed, the general

alarm LED and the alarm icon blink until the Alarm List is checked to see the type of alarm occurred.
Besides, if an alarm for any of the powers of the signals in antenna occurs, the relevant measure in the *Antenna* window of the display and the relevant LED on the front panel of the Master module blink until the measure decreases below the threshold level, determined by the nominal power of the amplifier.
If the slave modules are working and an INTERLOCK or FANS alarm occurs, aside from the indication explained above, the amplifiers are switched off. This happens immediately after an INTERLOCK alarm, or about 7 seconds after a FANS alarm is detected.
In case the amplifiers are communicating but switched off, or they are not communicating and the INTERLOCK alarm contact is open, a WARNING condition occurs: buzzer on and blinking ALARM LED on the front panel; while if it is the FANS alarm contact to be open, the icon of the alarm appears in the box.
Further to any of these two alarms it is possible to choose whether to turn off the amplifiers or not. In fact, there is a submenu of the Settings menu which allows to choose whether to turn off the amplifiers connected to the control module as a consequence of an INTERLOCK and FAN alarm.

- Slave menu

By selecting one of the slaves, it is possible to see all the parameters of that amplifier module in two pages. The first one shows voltages and currents Power Supply, the second one shows RF Powers: forward and reflected power, temperature and, for some amplifiers, unbalancing and input power. The UP and DOWN keys allow to scroll the local measures of all the slaves, page by page. The ESC key is used to go back to the main menu. The following pictures show the menu screen of one amplifier.

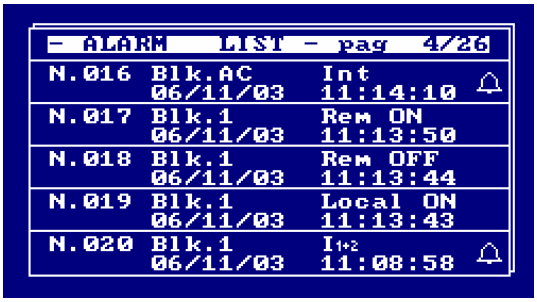


Note that no numerical value is shown for amplifiers which are not communicating with the control module.

- Alarm List

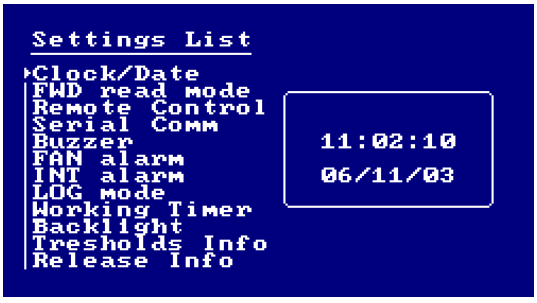
By selecting the Alarm List, 26 pages listing the latest 130 alarms saved are shown. Each page shows 5 alarms, each contained in a box providing the following information: progressive number of the alarm, starting with the most recent; number of the module in which the alarm occurred, following the "Blk." Message (the indication "AC" means that the alarm occurred in the Amplifier Control module); parameter in alarm, date and time of the alarm. Next to the parameter showing the alarm type there may be a bell symbol. In case it is not here, the alarm event has been communicated by an amplifier connected to the control module. These events are different and on option of the Settings menu allows to choose whether they are displayed or not in the alarm list.

The saved alarm can be deleted by keeping simultaneously pressed the *UP* and *DOWN* keys. The *ESC* key is used to go back to the main menu. The picture shows a page of the list, containing both alarms and general events.



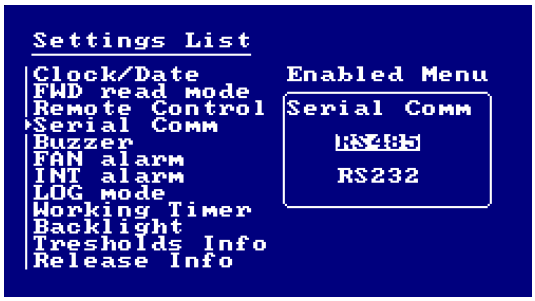
1.3 PROGRAMMING MODE

The Settings menu gives access to programming mode. As shown below, the menu offers a list of settings next to a window showing the default parameter set, or the one selected previously, when the pointer is moved on the relevant options.



The menu under the cursor is accessed by pressing the RET key. This is shown by the "Enabled Menu". Once

the menu is accessed, it is possible to change the value of the displayed fields or select a function by means of the arrow keys. The RET key is used to confirm the selection (an acoustic signal should be heard). The ESC key (or no key pressed for more than 7 seconds) sends back to the setting list. Pressing it again (or pressing no key for more than 10 seconds) brings back to the main menu.
Every selection made in the Settings menu is stored into the EEPROM until it is changed again, this allows to remember the settings status after an equipment reset.



Description of the submenus included in Settings.

SUBMENU	OPERATION
Clock / Date	Update the time and date shown in the main menu box.
FWD Read Mode	Selection of the analogue voltage signal (PEAK or RMS) to convert and display the Forward power in antenna. A message in the main menu screen confirms current choice.
Remote Control	It is possible to remotely control the apparatus, thus to monitor the parameters shown on the display of Amplifier Control module and check the status of the transmitter. This is done through RS232 or RS485 standard serial communication, digital and analog inputs through the DB25 telemetering connector on the rear panel of the Amplifier Control module. If the "Local" mode is set in this menu, the control module and the apparatus can only be controlled locally, and a remote command is ignored. If "Remote" is set instead, the REMOTE LED on the front panel of the module lights up after going back to the main screen. From then on, incoming remote commands from either the serial port or the telemeasuring connector on the rear panel are handled *(Note 1)*.

Serial Comm	Selects the remote control via serial port. **RS232 MODE:** the RS232 mode allows a direct access to the equipment via PC and a remote access via modem or switched telephone line. **RS485 MODE:** the RS485 mode allows a remote access to the equipment via modem over switched telephone line or GSM network. It allows the connection to the Remote Control System, designed to monitor several apparatuses located at the same site.
Buzzer	Enables / disables the buzzer during normal operation.
FAN Alarm	Select "OFF" to have the amplifiers turned off further to a FAN alarm; if "ON" is selected, they will stay on.
INT Alarm	Select "OFF" to have the amplifiers turned off further to a INTERLOCK alarm; if "ON" is selected, they will stay on.
LOG Mode	Select "only alarms" to store in the EEPROM and display in the module LOG only detected alarms; select "all events" to store and display also any event detected by any amplifier and sent via RS485 to the control module.
Working Timer	Updates the counter of the working time of the transmitter. Once this menu has been enabled, the counter reset option appears in the window.
Backlight	If "Switch Off" is selected and no key is pressed for 8 minutes, the back light of the display is turned off; select "always ON" to have it always on.
Frequency	This menu only exists in the firmware for Amplifier Control of FM transmitters. The working frequency can be selected within a range from 88 to 108MHz, this allows to optimise the display of the Forward power sent to the antenna.
Thresholds info	Shows for some seconds the alarms thresholds of the powers sent to the antenna.
Release info	Shows for some seconds information concerning the transmitter and the firmware version.

Note 1: to control the apparatus from remote, consider that pins n. 1 and n. 14 of the telemetering connector on the rear panel of Amplifier Control module are used to receive the ON (pin n. 1) and OFF (pin n. 14) commands, both impulsive and stationary. The digital level on these contacts is usually high, becoming low when the remote control is active. When a remote command to turn off the amplifiers is received while the transmitters is ON, the LED ON of the frontal panel blinks.

1.3 POWER CALIBRATION

- FWD Power calibration

Disconnect the antenna and connect a wattmeter to the antenna connector. Give power to the amplifier until you will read on the wattmeter a value corresponding to the equipment nominal power. Then turn the trimmer A (see mounting plan BOTTOM - PN1071AR2, it is a variable resistor used to adjust the A analog input measure) until you read approximately the same FWD power value on the display.

- REF Power calibration

Disconnect the antenna and connect a wattmeter to the antenna connector. Connect the Forward power monitoring cable to the Reflected power input connector. Give power to the amplifier until you will read on the wattmeter a value corresponding to 10% of the equipment nominal power. Then turn the trimmer B (see mounting plan BOTTOM - PN1071AR2, it is a variable resistor used to adjust the B analog input measure) until you read approximately the same REF power value on the display.

- UNB Calibration

Connect a wattmeter before the dummy load. Give power to the amplifier then turn off one slave module: you will read an amount of unbalancing power on the wattmeter. Turn the trimmer C (see mounting plan BOTTOM - PN1071AR2, it is a variable resistor used to adjust the C analog input measure) until you read approximately the same UNB power value on the display.

1.4 RS232 AND RS485 PIN TABLES

PIN N°	SYGNAL TYPE	IN/OUT	FUNCTION
1	-	-	-
2	Digital	Output	TX232
3	Digital	Input	RX232
4	-	-	-
5	GND	-	-
6	VDC +5V	-	-
7	-	-	-
8	-	-	-
9	-	-	-

RS232 - DB9 Connector (Front panel)

PIN N°	SYGNAL TYPE	IN/OUT	FUNCTION
1	-	-	-
2	Digital	Input	RX2_485B-
3	Digital	Input	RX2_485A+
4	-	-	-
5	GND	-	-
6	-	-	-
7	Digital	Output	TX2_485Z-
8	Digital	Output	TX2_485Y+
9	-	-	-

RS485 - DB9 Connector (Rear panel)

1.5 TELEMEASURING PINS TABLE

PIN N°	SIGNAL TYPE	IN / OUT	FUNCTION
1	Digital	-	REMOTE ON/OFF TTL: GND = REMOTE ON +5V = REMOTE OFF
2	Digital	Output	-
3	Digital	Output	-
4	Digital	Output	-
5	Digital	Output	-
6	Digital	Output	-
7	Digital	Output	AGC alarm TTL: GND = AGC alarm, +5V = no AGC alarm
8	Digital	Output	-
9	GND	-	-
10	Analog	Output	-
11	Analog	Output	-
12	Analog	Output	-
13	Analog	Output	-
14	Digital	Input	REMOTE AMPLIFIER ON/OFF TTL: if REMOTE ON then GND = AMPLIFIER OFF +5V = AMPLIFIER ON
15	Digital	Output	-
16	Digital	Output	-
17	Digital	Output	-
18	Digital	Output	-
19	Digital	Output	AGC alarm TTL: GND = AGC alarm, +5V = no AGC alarm
20	GND	-	-
21	+5V	-	-
22	Analog	Output	FWD Power [0,+ 5V]
23	Analog	Output	REF Power [0,+ 5V]
24	Analog	Output	UNB Power [0,+ 5V]
25	Analog	Output	-

1.6 OTHER TABLES

	SYGNAL TYPE	IN/OUT	FUNCTION
A	Analog	Input	FWD Power monitoring
B	Analog	Input	REF Power monitoring
C	Analog	Input	UNB Power monitoring
D	-	-	-
E	-	-	-
F	-	-	-
G	-	-	-

BNC Connectors

PIN N°	SYGNAL TYPE	IN/OUT	FUNCTION
1	GND	-	-
2	Digital	Output	AGC alarm TTL: GND = AGC alarm, +5V = no AGC alarm
3	Digital	Output	AGC alarm TTL: GND = AGC alarm, +5V = no AGC alarm
4	-	-	-
5	-	-	-
6	-	-	-
7	-	-	-
8	Analog	Output	FWD Power (range 0 - +5V)
9	Analog	Output	FWD Power (range 0 - +5V)

AGC Connector

BNC	SYGNAL TYPE	IN/OUT	FUNCTION
Contact	Digital	Input	FANS control Switch or TTL: closed/GND = no FANS alarm open/+5V = FANS alarm
Body	GND	-	-

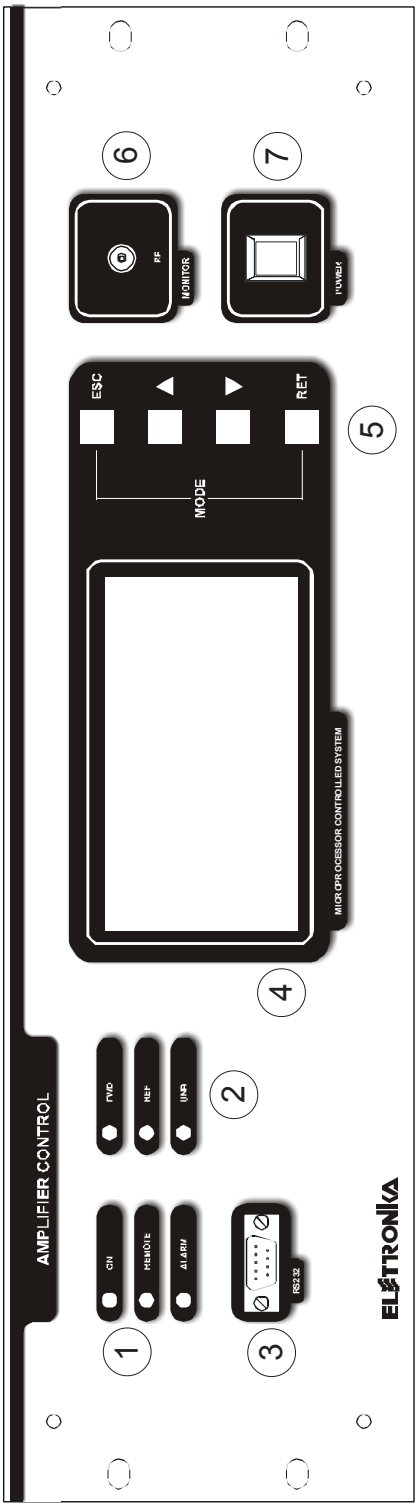
FANS CONTROL Connector

PIN N°	SYGNAL TYPE	IN/OUT	FUNCTION
1	-	-	-
2	Digital	Output	TX1_485Z-
3	Digital	Output	TX1_485Y-
4	-	-	-
5	GND	-	-
6	-	-	-
7	Digital	Input	RX1_485B-
8	Digital	Input	RX1_485A+
9	-	-	-

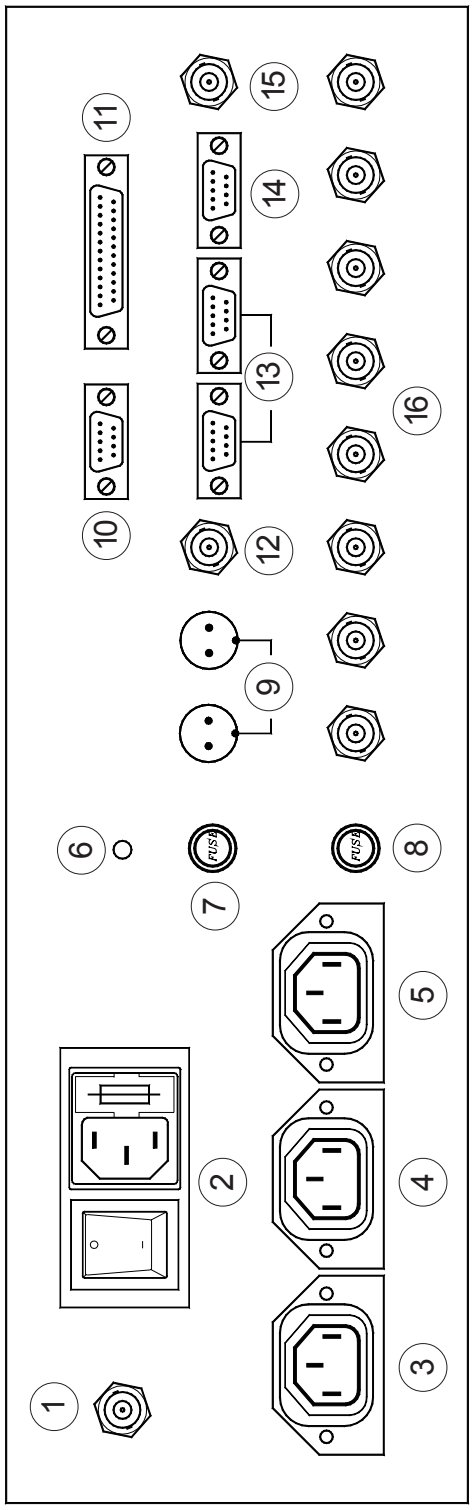
RS485 - DB9 Connector (Amplifiers communication)

PIN N°	SYGNAL TYPE	IN/OUT	FUNCTION
1	GND	-	-
2	VDC +24V	-	-

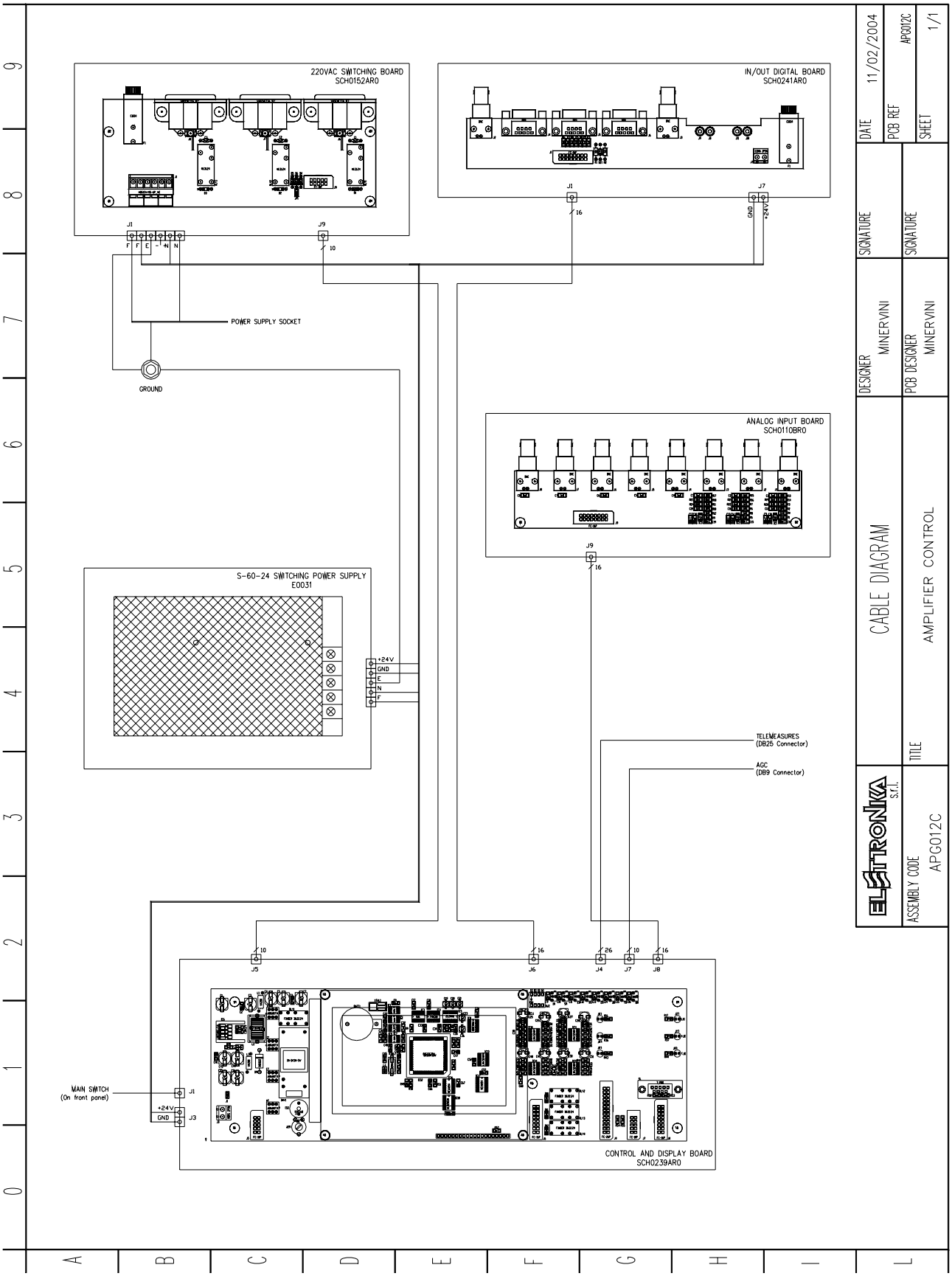
24VDC LOAD FAN Connector



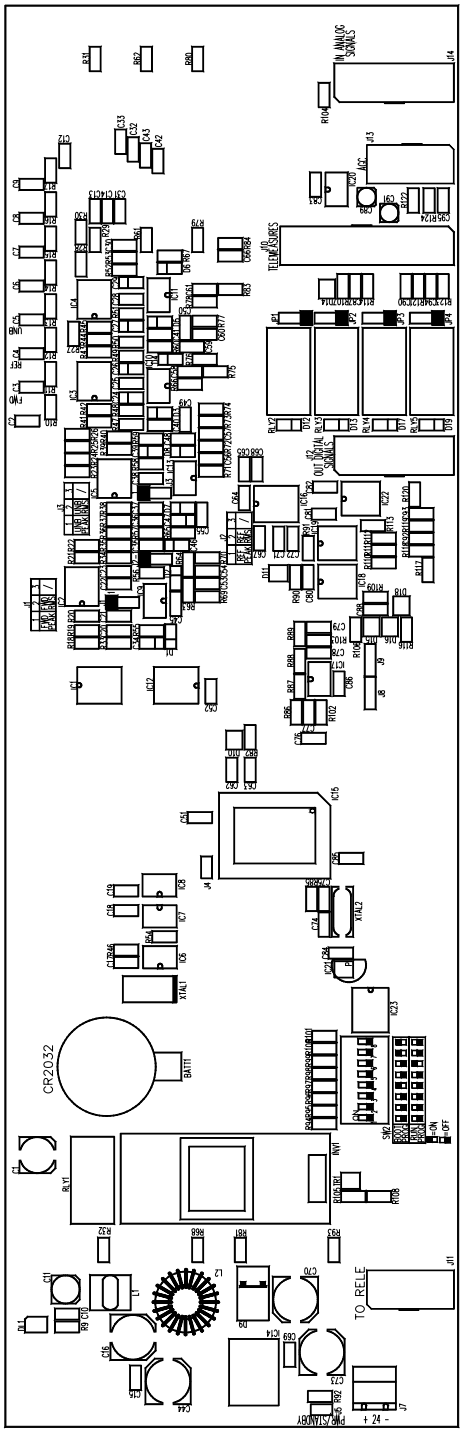
DESCRIPTION	
1	Status LEDs
2	Alarm LEDs
3	RS232 Socket
4	LCD Display
5	Function keys
6	RF Monitor connector
7	ON/OFF Switch



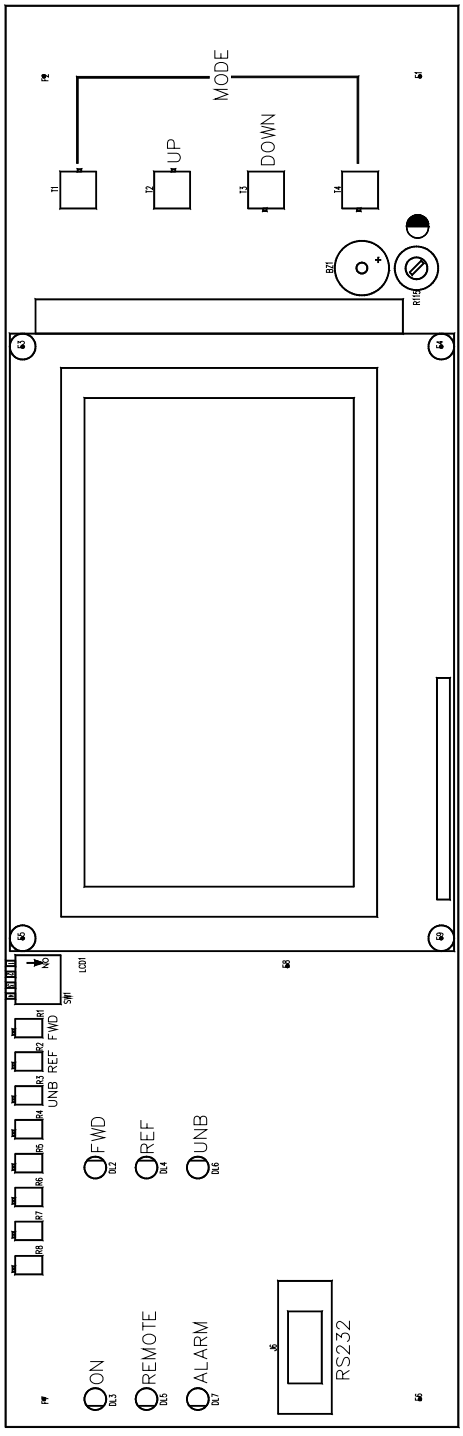
DESCRIPTION	
1	RF Input connector
2	Main Power supply socket with Fuse-Holder by 10A
3	Driver1 Power socket
4	Driver2 Power socket
5	Fans Power socket
6	GND
7	Fuse by 1A
8	Fuse by 8A
9	24Vdc Connectors
10	AGC Socket
11	Telemeasures socket
12	Fans Control connector
13	RS485 Socket (Amplifiers Communication)
14	RS485 Socket (Remote Control)
15	Interlock connector
16	Power measurement connector


220VAC SWITCHING BOARD
SCH0152AR0
IN/OUT DIGITAL BOARD
SCH0241AR0
POWER SUPPLY SOCKET
GROUND
ANALOG INPUT BOARD
SCH0110BR0
S-60-24 SWITCHING POWER SUPPLY
E0031
+24V
GND
E
N
F
TELEMEASURES
(DB25 Connector)
AGC
(DB9 Connector)
MAIN SWITCH
(On front panel)
CONTROL AND DISPLAY BOARD
SCH0239AR0
DATE 11/02/2004
PCB REF APG012C
SHEET 1/1
SIGNATURE
SIGNATURE
DESIGNER MINERVINI
PCB DESIGNER MINERVINI
CABLE DIAGRAM
AMPLIFIER CONTROL
ELETTRONIKA S.r.l.
ASSEMBLY CODE APG012C

SCH0239AR0 Top layer Component layout



SCH0239AR0 Bottom layer Component layout

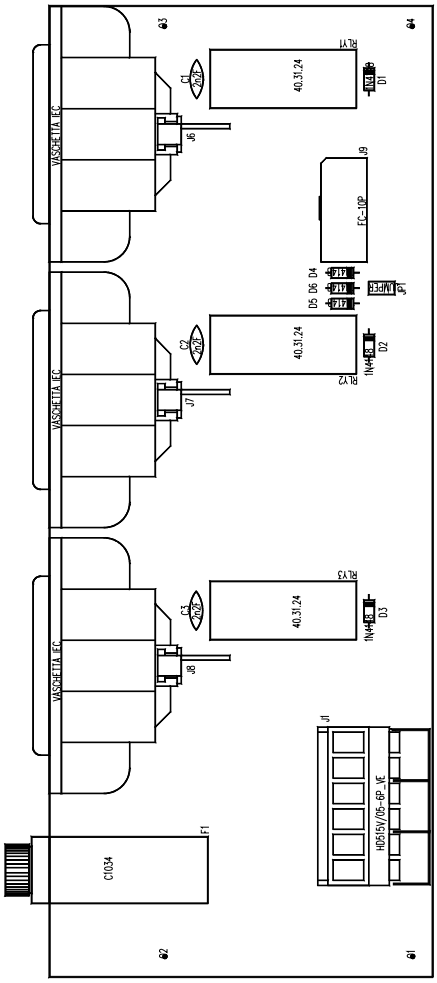


SCH0239AR0 COMPONENT LIST

Part Name/Number	Description	Qty.	Comps.	Page 1/2
BATT BH001RB 3093_90	03093 03090 BATTERY HOLDER	1	BATT1	
BZ AI-155 03705	03705 5VDC BUZZER	1	BZ1	
CC 100nF-S 01065C	01065C Y5V 1206 COND	33	C10, C15, C17-19, C22, C25, C28, C38, C45, C49-52, C55, C62-63, C68-69, C78, C80-85, C87-88, C90, C92-95	
CC 15pF-S 01088	01088 SMD 1206 COND	2	C74-75	
CC 1nF-S 01096	01096 SMD 1206 COND	20	C12-14, C31-33, C42-43, C53-54, C56-58, C60-61, C66, C76-77, C79, C86	
CC 1uF100V-S 01760A	01760A Y5V 1206 COND <<50 V>>	8	C21, C23, C37, C64-65, C67, C71-72	
CC 220pF-S 01093	01093 SMD 1206 COND	8	C2-9	
CC 47pF-S 01100	01100 SMD 1206 COND	8	C20, C30, C35-36, C40-41, C48, C59	
CE 10uF16V-S	01626B TANT. ELETTR SMD CO	8	C24, C26-27, C29, C34, C39, C46-47	
CE 1uF50V-S 01763A	01763A ELETTR SMD COND	2	C89, C91	
CE 220uF50V LOW ESR	1799A ELETTR SMD COND LOW ESR	4	C16, C44, C70, C73	
CE 47uF35V-S 01790A	01790A ELETTR SMD COND	1	C11	
CE 47uF50V-S 01791C	01791C ELETTR SMD COND	1	C1	
D 1N4148-S 03002	03002 SMD DIODE	4	D12-13, D17, D19	
D 50WQ06FN	03019A SMD DIODE SCHOTTKY 5,5A	1	D9	
D BAS85-S	03024 SMD DIODE SCHOTTKY	8	D1-8	
D BAT54S	03199 SMD SCHOTTKY DIODE A-K T	6	D10-11, D14-16, D18	
DIS WG240128B	03083 240/128 DOT MATRIX LCD	1	LCD1	
DL KA-3528SGC 03057	03057 GREEN SMD LED DIODE	1	DL1	
DL LEDG3 03053	03053 GREEN LED DIODE 3mm	1	DL3	
DL LEDR3 03058	03058 RED LED DIODE 3mm	4	DL2, DL4, DL6-7	
DL LEDY3 03051	03051 YELLOW LED DIODE 3mm	1	DL5	
IC 24LC64 04815	04815 SMD INTEG CIRCUIT	1	IC7	
IC 74HC00-S 4762A	4762A SMD INTEG CIRCUIT	1	IC19	
IC 82B715-S 04734A	04734A SMD INTEG CIRCUIT	1	IC17	
IC CD4053BC-S 04710A	04710A SMD INTEG CIRCUIT	1	IC12	
IC LM2596S-5.0	04580 SMD INTEG CIRCUIT	1	IC14	
IC LM75-S 00668	00668 SMD INTEG CIRCUIT	1	IC8	
IC LMC6482-S	04632 SMD INTEG CIRCUIT	1	IC20	
IC LMC6484-S	04634 SMD INTEG CIRCUIT	4	IC2-5	
IC M41T56 04611	04611 SMD INTEG CIRCUIT	1	IC6	
IC MAX232-S 04804B	04804B SMD INTEG CIRCUIT	1	IC16	
IC MAX3080-S 04770	04770 SMD INTEG CIRCUIT	1	IC22	
IC MAX3080-S N.M.	NOT MOUTED SMD INTEG CIRCUIT	1	IC18	
IC MAX942CSA-S	04572 SMD INTEG CIRCUIT	4	IC9-11, IC13	
IC MB90F543PF	04596 SMD INTEG CIRCUIT	1	IC15	
IC MPC100T-450I-TT	04577 SMD INTEG CIRCUIT	1	IC21	
IC ULN2003A 4870	04870 SMD INTEG CIRCUIT	2	IC1, IC23	
IND MS85 10uH-S	04948 INDUCTOR 2,7A	1	L1	
IND T100uH-1.8A 4958	04958 TOROIDAL-STORAGE CHOKES	1	L2	

Part Name/Number	Description	Qty.	Comps.	Page 2/2
INV IN-D43A-5V	03085 DC/AC MODULE	1	INV1	
J DB9_F-0° LT	02794 PCB CONNECTOR DB9 LONG T	1	J6	
J FC-10P 02697-02699	02697+02699 PCB CONNECTOR POL	2	J11, J13	
J FC-16P 02701-02700	02701+02700 PCB CONNECTOR POL	2	J12, J14	
J FC-26P 02855-02854	02855+02854 PCB CONNECTOR POL	1	J10	
J PAN2 02739	02739 PCB CONNECTOR	1	J4	
J PAN2 02739-40-41	02739+02740+02741 PCB CONNECTO	1	J5	
J PAN3 02707	02707 PCB CONNECTOR	3	J1-3	
J PAN3 NOT MOUNTED	NOT MOUNTED PCB CONNECTOR	2	J8-9	
J SCREWCONN2 02853	02853 PCB SCREW CONNECTOR	1	J7	
JU JUMP3 02707-02742	02707+02742 MASCHIO PAN3	4	JP1-4	
R 100R-S 00029A	00029A RES 1/4W 5% SMD 1206	6	R109, R114, R119-121, R123	
R 10K-S 00053A	00053A RES 1/4W 5% SMD 1206	37	R22-27, R30, R32-33, R40, R47, R50, R57, R68, R81-82, R85, R90-101, R105-108, R116, R118, R122, R124	
R 120R-S 00030A	00030A RES 1/4W 5% SMD 1206	2	R112-113	
R 1K0-S 00041A	00041A RES 1/4W 5% SMD 1206	5	R46, R54, R87-88, R104	
R 1K5-S 00043A	00043A RES 1/4W 5% SMD 1206	2	R110-111	
R 22K-S 00057A	00057A RES 1/4W 5% SMD 1206	11	R18, R20-21, R28, R34, R36, R38-39, R41, R43-44	
R 2K2-S 00045A	00045A RES 1/4W 5% SMD 1206	8	R19, R35, R37, R42, R45, R53, R59-60	
R 330R-S 00035B	00035B RES 1/4W 5% SMD 1206	2	R89, R103	
R 33R-S 00023A	00023A RES 1/4W 5% SMD 1206	2	R86, R102	
R 470K-S 00073A	00073A RES 1/4W 5% SMD 1206	8	R48-49, R51-52, R55-56, R58, R65	
R 470R-S 00037A	00037A RES 1/4W 5% SMD 1206	30	R10-17, R29, R31, R61-64, R66-67, R69-80, R83-84	
R 4K7-S 00049A	00049A RES 1/4W 5% SMD 1206	1	R117	
R 820R-S 00040A	00040A RES 1/4W 5% SMD 1206	1	R9	
RL 30.22.24 07569	07569 RELE	5	RLY1-5	
RV 10K-S-H 00715	00715 VARIABLE RESISTOR	1	R115	
RV 1M-3266X	00815 VARIABLE RESISTOR	8	R1-8	
SW SWITCH-4DIP 90°	07531A PCB DIP SWITCH 90°	1	SW1	
SW SWITCH-8DIP	07530A PCB DIP SWITCH SMD	1	SW2	
T 06086 N 7630 7632	7630 7632 KTI06086 PULSANTE 2	4	T1-4	
TR BC848 03457	03457 NPN SMD TRANSISTOR	1	TR1	
XTAL 32.768k-S 05146	05146 QUARTZ	1	XTAL1	
XTAL 4MHz-S 05101A	05101A QUARTZ	1	XTAL2	

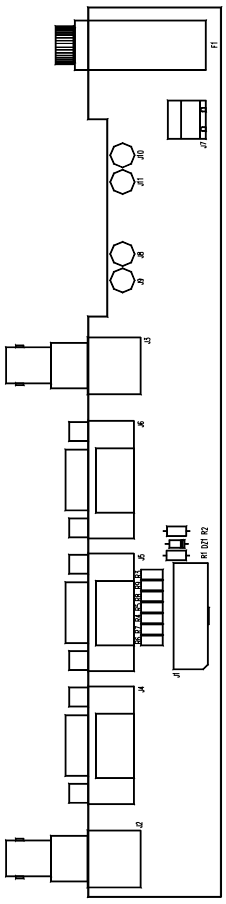
SCH0152AR0 Component layout



SCH0152AR0 COMPONENT LIST

Part Name/Number	Description	Qty.	Comps.
CC 2nF2 2kV 01045A	01045A CERAMIC CAPACITOR	3	C1-3
D 1N4148 03001	03001 DIODE	6	D1-6
FUSE OMEGA C1034	FUS00008 FUSE-HOLDER 5x20 D	1	F1
J CON HD515V/05-6PVE	02883 + 02884 PANDUIT PCB CONN	1	J1
J FC-10P 02697-02699	02697+02699 PCB CONNECTOR POL	1	J9
J VASCHETTA IEC	02879 VASCHETTA FEMALE PCB	3	J6-8
JU JUMP2 02739-02742	02739+02742 MALE PAN2	1	JP1
RL 40.31.24	7567C RELE	3	RLY1-3

SCH0241AR0 Component layout



SCH0241AR0 COMPONENT LIST

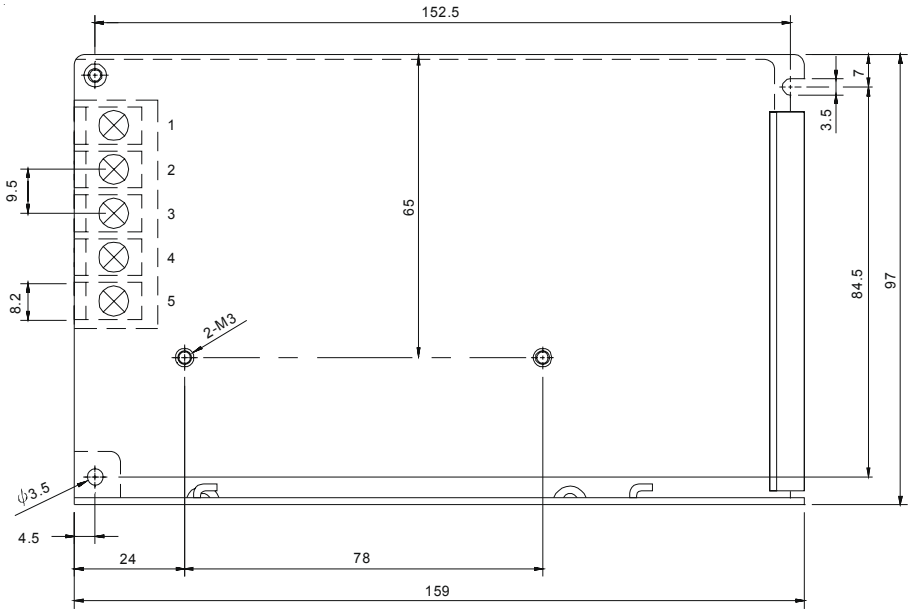
Part Name/Number	Description	Qty.	Comps.
DZ 5V1 03109	03109 ZENER DIODE	1	DZ1
FUSE OMEGA C1034	FUS00008 PORTA FUSIBILE 5x20 D	1	F1
J BNC-90G-PCB 2034	02034 PCB CONNECTOR	2	J2-3
J DB9-90G 02797	02797 PCB CONNECTOR	3	J4-6
J FC-16P 02701-02700	02701+02700 PCB CONNECTOR POL	1	J1
J SCREWCONN2 02853	02853 PCB SCREW CONNECTOR	1	J7
J TESTP2.5mm 07912	07912 TEST POINT	4	J8-11
R 0R0-S 00001	00001 RES 1/4W 5% SMD 1206	7	R3-9
R 10K 0053	0053 RES 1/4W 5%	1	R1
R 1K0 0041	0041 RES 1/4W 5%	1	R2

MAIN FEATURES

- Universal AC input / Full range
- Protections: Short circuit / Over load / Over voltage
- Cooling by free air convection
- 100% full load burn-in test
- Fixed switching frequency at 50kHz

MECHANICAL SPECIFICATION

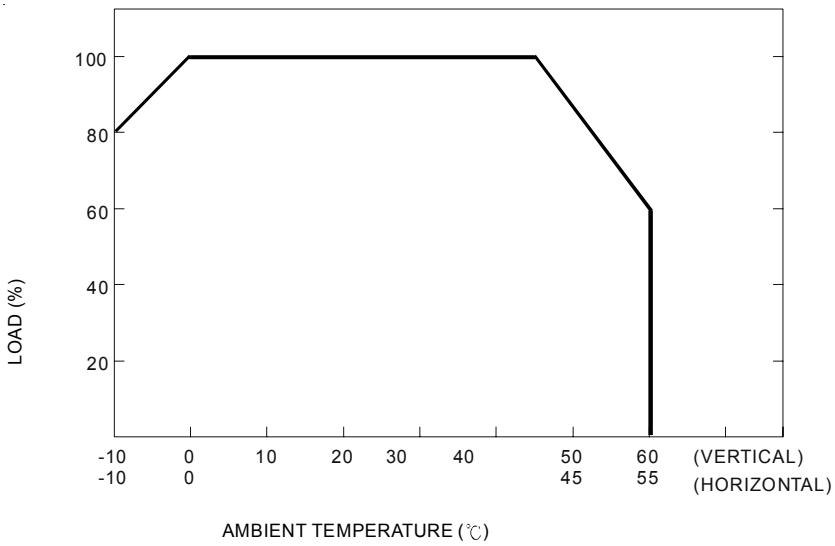
PIN N°	ASSIGNMENT
1	AC/L
2	AC/N
3	FG
4	DC OUTPUT -V
5	DC OUTPUT +V



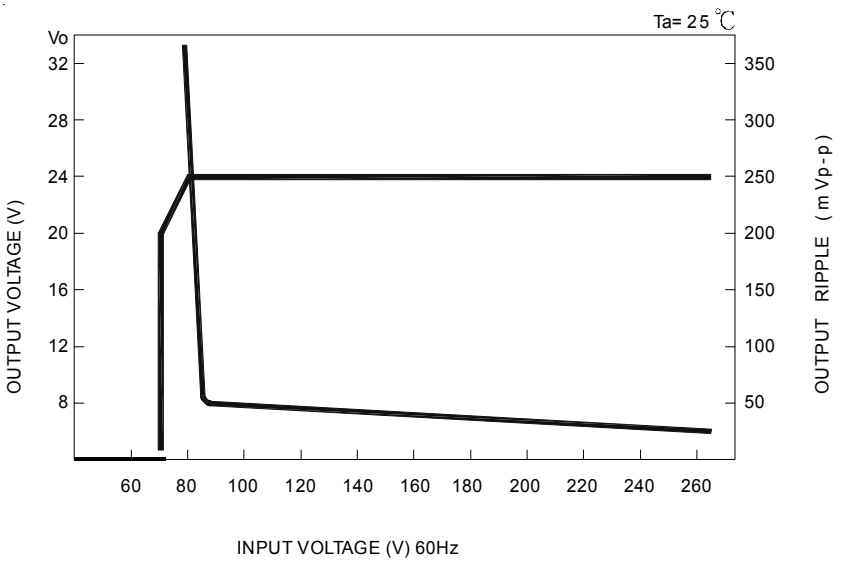
TECHNICAL CHARACTERISTICS

MODEL		S-60-15	S-60-24
OUTPUT	DC VOLTAGE	15V	24V
	RATED CURRENT	4A	2.5A
	CURRENT RANGE	0 ~ 4A	0 ~ 2.5A
	RATED POWER	60W	60W
	RIPPLE & NOISE (max.) Note 2	150mVp-p	150mVp-p
	VOLTAGE ADJ. RANGE	13.5 ~ 16.5V	21.6 ~ 26.4V
	VOLTAGE TOLERANCE Note 3	± 1.0%	± 1.0%
	LINE REGULATION	± 0.5%	± 0.5%
	LOAD REGULATION	± 0.5%	± 0.5%
	SETUP, RISE, HOLD TIME	300ms, 50ms, 80ms / 230VAC 800ms, 50ms, 10ms / 115VAC at full load	
INPUT	VOLTAGE RANGE	88 ~ 264VAC 120 ~ 370VDC	
	FREQUENCY RANGE	47 ~ 63Hz	
	EFFICIENCY (Typ.)	77%	79%
	AC CURRENT	24A/115VAC 1A/230VAC	
	INRUSH CURRENT (Max.)	COLD START 30A/115VAC 60A/230VAC	
	LEAKAGE CURRENT	<3.5mA/240VAC	
PROTECTION	OVER LOAD	105 ~ 150% rated output power	
		Protection type: Hiccup mode, recovers automatically after fault condition is removed	
	OVER VOLTAGE	17.25 ~ 20.25V	27.6 ~ 32.4V
		Protection type: Hiccup mode, recovers automatically after fault condition is removed	
ENVIRONMENT	WORKING TEMP.	-10 ~ +60°C (Refer to output load derating curve)	
	WORKING HUMIDITY	20 ~ 90% RH non-condensing	
	STORAGE TEMP., HUMIDITY	-20 ~ +85°C, 10 ~ 95% RH	
	TEMP. COEFFICIENT	± 0.03%/°C (0 ~ 50°C)	
	VIBRATION	10 ~ 500Hz, 2G 10min./1cycle, period for 60min. each along X, Y, Z axes	
SAFETY & EMC (Note 4)	SAFETY STANDARDS	UL1012, UL1950, TUV EN60950 Approved	
	WITHSTAND VOLTAGE	I/P-O/P:3KVAC I/P-FG:1.5KVAC O/P-FG:0.5KVAC	
	ISOLATION RESISTANCE	I/P-O/P, I/P-FG, O/P-GD:100M Ohms/500VDC	
	EMI CONDUCTION & RADIATION	Compliance to EN55022 (CISPR22) Class B	
	HARMONIC CURRENT	Compliance to EN61000-3-2,-3	
	EMS IMMUNITY	Compliance to EN61000-4-2,3,4,5,6,8,11; ENV50204, EN55024, Light industry level, criteria A	
OTHERS	MTBF	316.2K hrs min. MIL-HDBK-217F (25°C)	
	DIMENSION	159*97*38mm (L*W*H)	
	PACKING	0.51kg; 24pcs/13.1kg/0.7CUFT	

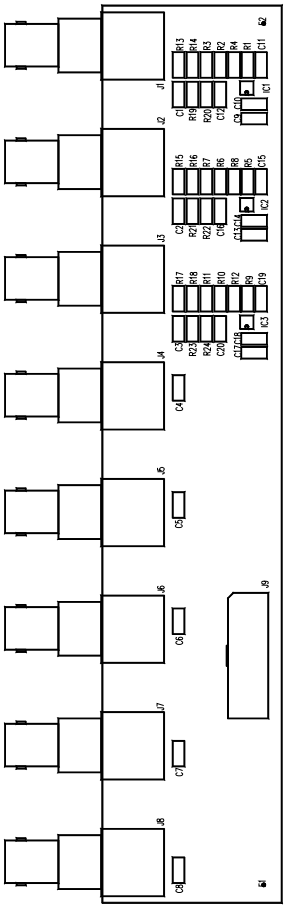
DERATING CURVE



OUTPUT DERATING VS INPUT VOLTAGE



SCH0110BR0 Component layout



SCH0110BR0 COMPONENT LIST

Part Name/Number	Description	Qty.	Comps.
CC 1206 N. M.	N. M. SMD 1206 CAPACITOR	17	C4-20
CC 1nF-S 01096	01096 SMD 1206 CAPACITOR	3	C1-3
J BNC-90G-PCB 2034	02034 PCB CONNECTOR	3	J1-3
J BNC-90G-PCB 2034	N. M. BNC-90G	5	J4-8
J FC-16P 02701-02700	02701+02700 PCB CONNECTOR POL	1	J9
R 0R0-S 00001	00001 RES 1/4W 5% SMD 1206	6	R13, R15, R17, R19, R21, R23
R 1206 N. M.	N. M. RES 1/4W 5% SMD 1206	18	R1-12, R14, R16, R18, R20, R22 R24
Z MICRO SOIC 8P N.M.	SMD INTEG CIRCUIT NOT MOUNTED	3	IC1-3