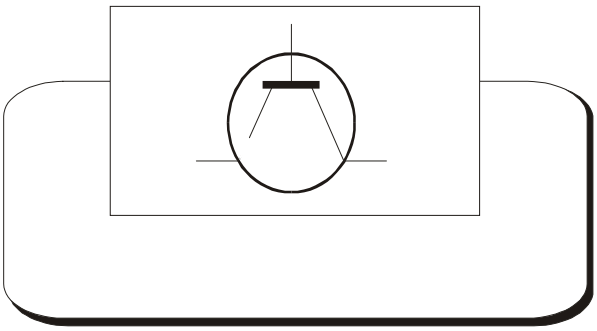
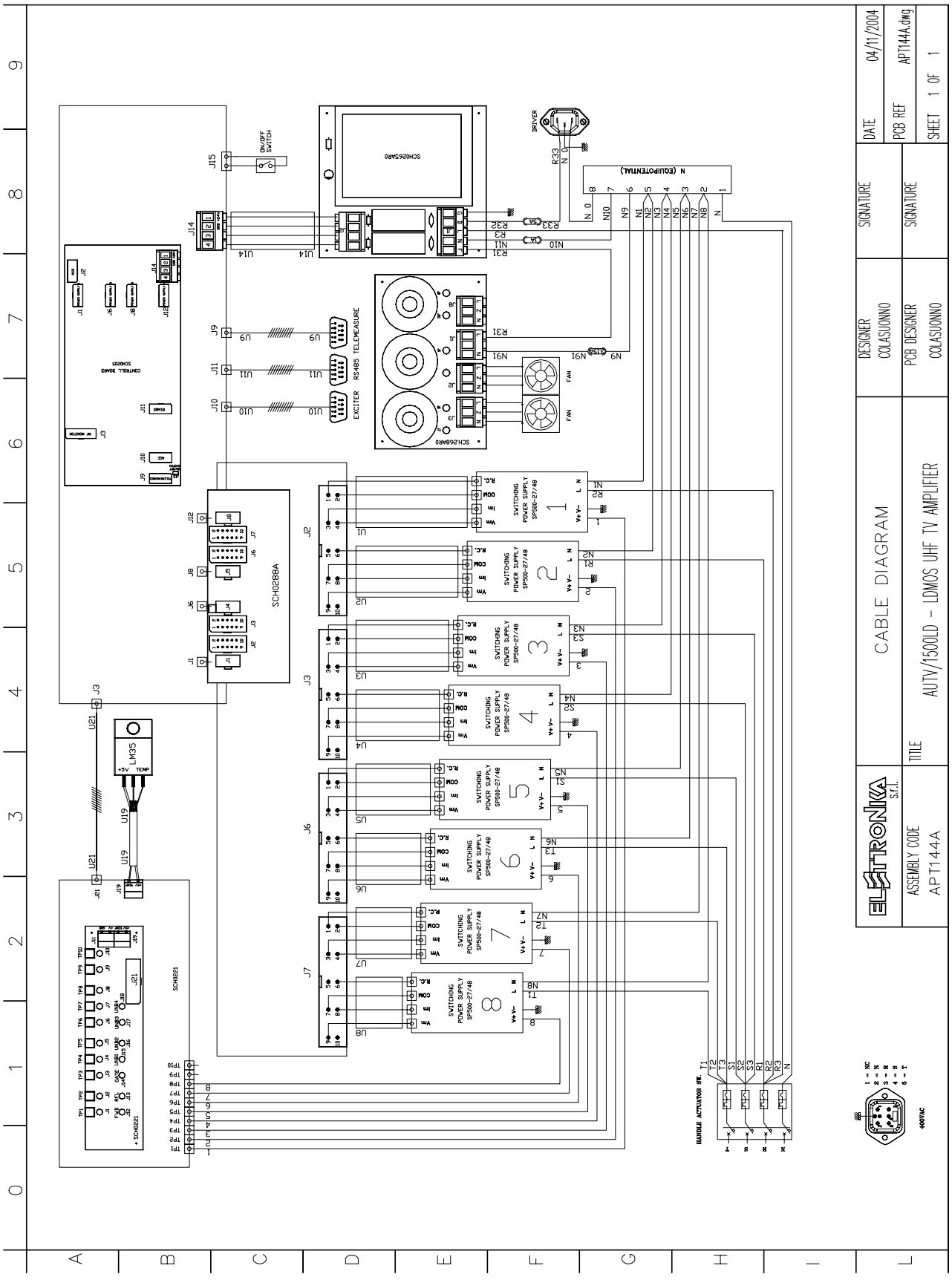
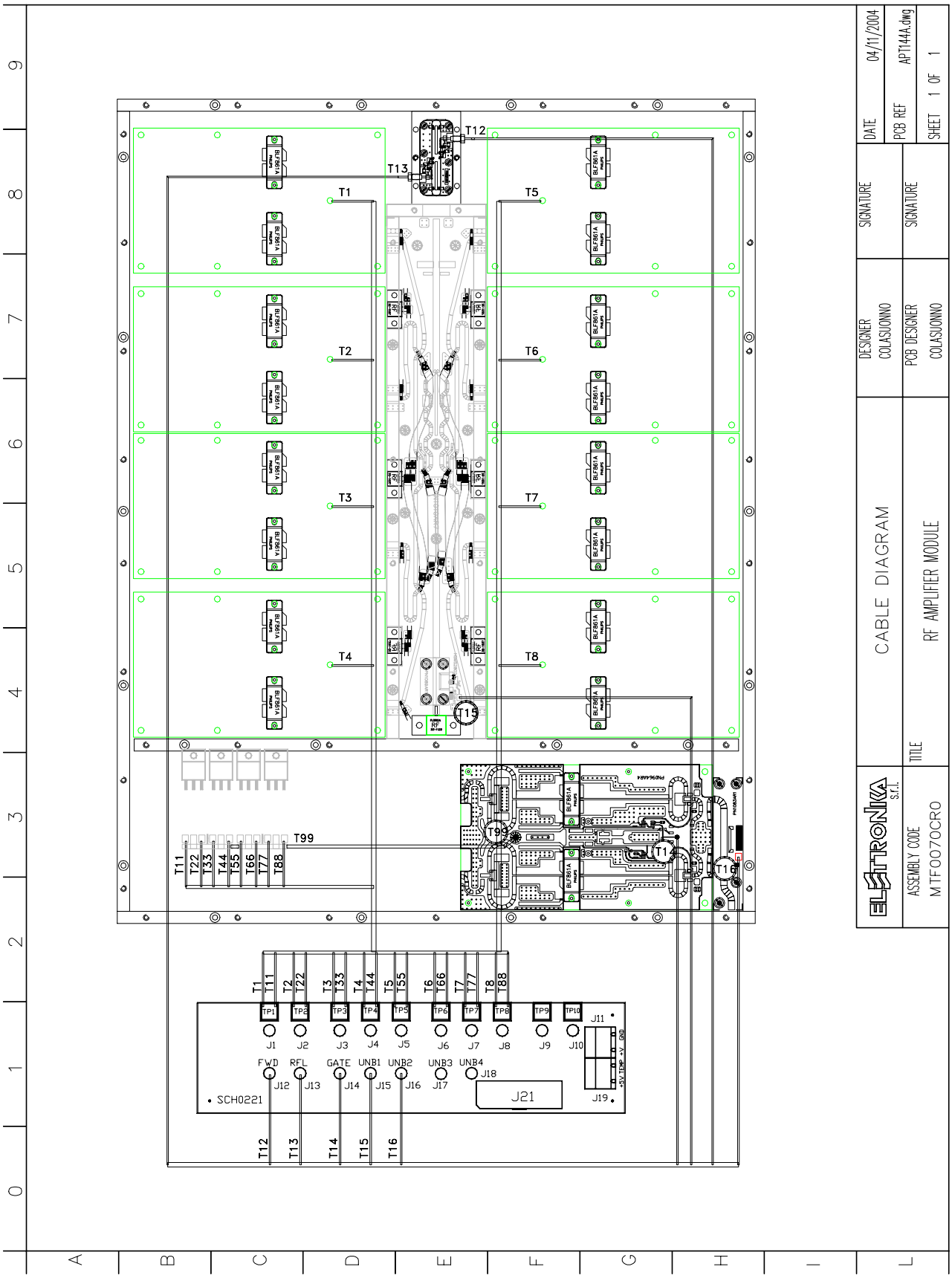
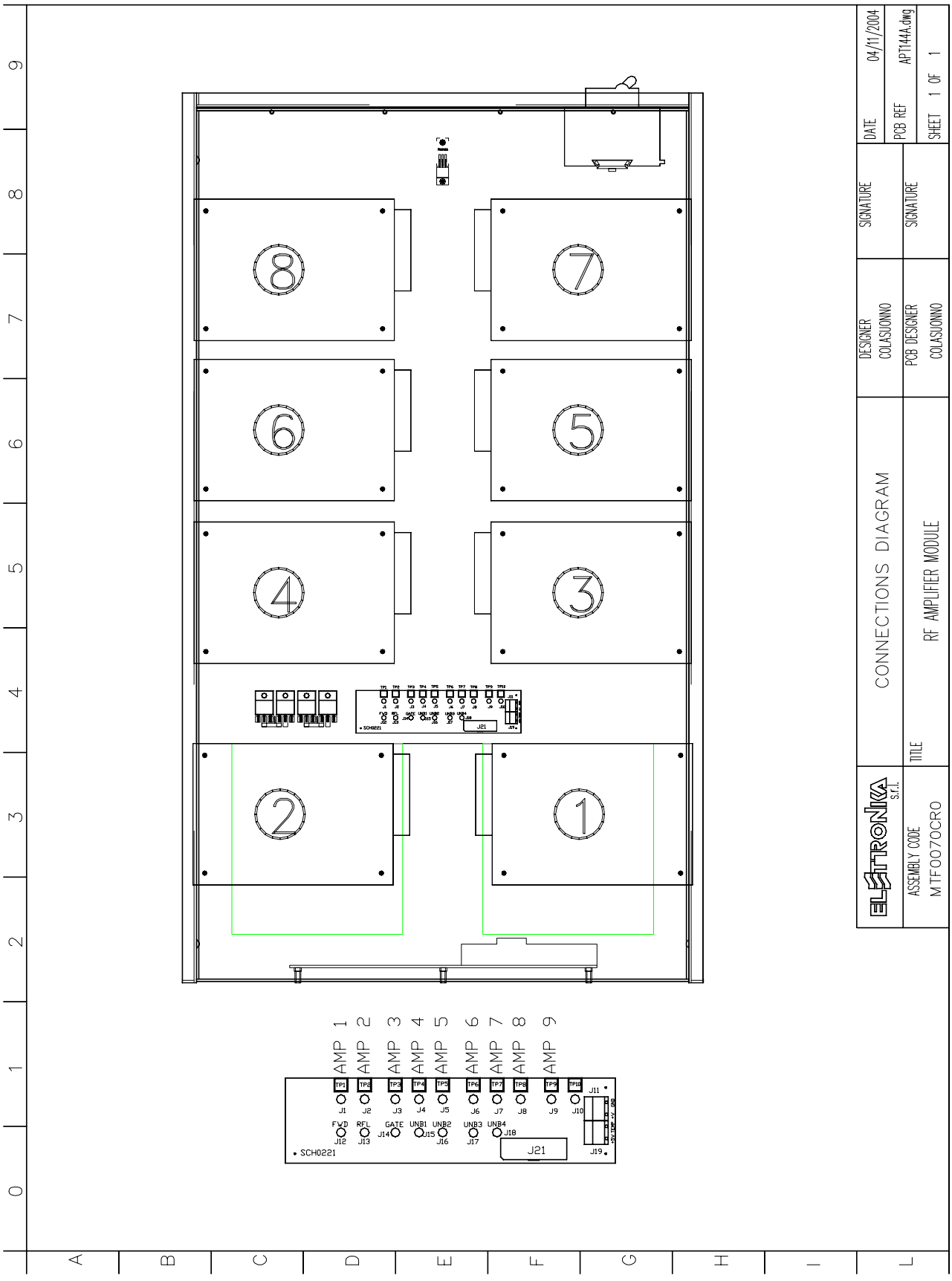


Section 4 - Diagram

Contents:


CABLE DIAGRAM
AUTV/1500LD - LDMOS UHF TV AMPLIFIER
ELETTRONIKA S.r.l.
TITLE
ASSEMBLY CODE
APT144A
DESIGNER
COLASUONNO
PCB DESIGNER
COLASUONNO
SIGNATURE
SIGNATURE
DATE
04/11/2004
PCB REF
APT144A.dwg
SHEET 1 OF 1
SCH0265A80
SCH0288A
SCH0221
SCH0268A80
SWITCHING POWER SUPPLY SP500-27/48
RS485 TELEMEASURE
EXCITER
FAN
DRIVER
N (EQUIPOTENTIAL)
SW/OFF SWITCH
LM35
400VAC


T12
T13
T1
T5
T2
T6
T3
T7
T4
T8
T15
T99
T11
T22
T33
T44
T55
T66
T77
T88
T9
T14
T16
T1
T11
T2
T22
T3
T33
T4
T44
T5
T55
T6
T66
T7
T77
T8
T88
TP1
TP2
TP3
TP4
TP5
TP6
TP7
TP8
TP9
TP10
J1
J2
J3
J4
J5
J6
J7
J8
J9
J10
J11
FWD
RFL
GATE
UNB1
UNB2
UNB3
UNB4
J12
J13
J14
J15
J16
J17
J18
J19
J21
SCH0221
T12
T13
T14
T15
T16
ELETRONIKA S.r.l.
CABLE DIAGRAM
RF AMPLIFIER MODULE
ASSEMBLY CODE
MTF0070CRO
TITLE
DESIGNER
COLASUONNO
PCB DESIGNER
COLASUONNO
SIGNATURE
SIGNATURE
DATE
04/11/2004
PCB REF
APT1444A.dwg
SHEET 1 OF 1


AMP 1
AMP 2
AMP 3
AMP 4
AMP 5
AMP 6
AMP 7
AMP 8
AMP 9
FWD
RFL
GATE
UNB1
UNB2
UNB3
UNB4
J21
SCH0221
CONNECTIONS DIAGRAM
RF AMPLIFIER MODULE
ELETTRONICA S.r.l.
ASSEMBLY CODE
MTF0070CRO
TITLE
DESIGNER
COLASUONNO
PCB DESIGNER
COLASUONNO
SIGNATURE
SIGNATURE
DATE
04/11/2004
PCB REF
APT1444.dwg
SHEET 1 OF 1

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	13
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	DET0736R6 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
03017	MBR3045PT DIODE	4
PN0998A	PN998AR1 POWER SUPPLY ADDED PCB	2

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Part Name Code	Description	Qty
05553B	KIT MANIGLIE 5-6U cod. 235.013	2
V0962	MORSETTIERA/GIUNZIONE ELECO E806	2
V0760	TAPPI NERI 0 9.5 PLASTICA DP-375	1
SCH0223AR1	CONTROL BOARD AND DISPLAY	1
SCH0265AR0	MAINS DISTRIBUTION BOARD	1
MTF0070CR0	RF AMPLIFIER MODULE	1
09419	C.S. PN419/A SUPPOR. SENSORE TEMPER.	1
PN1114A	C.S. PN1114AR1 SCHEDA CABL. VENT. x 1kW III	1
07925	PROTEZIONE IN GOMMA PVC PG 075	1
07515C	INTER. AUTOM. 4P*16A 4.5KA 2 mod. GW 90087	1
07524A	INTERR. NERI I3910	1
07541	PORTAFUS. 10A PANN. cod. P1820	3
02830	PRESA VDE 10A cod. PX675 A63	1
02893	MORSETTIERA ESTRA. 3VIE MAS. KSC 3	3
02894	MORSETTIERA ESTRA. 3 VIE FEM. KB 3	3
02695	CONNETTORE DB9F x CAVO IU008059	3
02699	CONNETTORE cod. IDS10FSR1 FEMM. 10 VIE	9
02700	CONNETTORE cod. IDS16FSR1 FEM. 16 VIE	1
02228	GE 15145 D/60 NF A VITONE	1
02502	J01150A0041 SMA x RG58/c	1
02876	PRESA VOLANTE ILME 16A PENTAPOLARE 4MT	1
02877	SPINA A PANNELLO ILME 16A 5P 35cm	1
07605A	COND. 2uF	2
07605B	VENTOLA D2E097-BI56-48	2
07605F	GRIGLIA 09485-2-4039	4
01041	1nF COND. CERAMICO 50V	2
00664	SENSORE TERMICO LM 35DT	1
FUS1A	FUSIBILI 1A 5x20 RITARDATI ST520210	1
FUS3A	FUSIB. 3.15A 5x20 RITAR. ST520231	1
FUS5A	FUSIBILI 5A 5x20 RITARDATI ST520250	1
CON0171	CON0171R5 SOST. VENT. 1kW LDM. PH. ZN P.2614	1
CON0178	CON0178R4 POST. 1500W LDMOS UHF ZN	1
DET0516	DET0516R0 SUPPORTO PRESE ZN P.2642	1
DET0772	DET0772R0 BARRETTA FISSAGGIO VENTOLE	2
Z0021	TONDO IN OTTONE x INT. MAGNET. TAV. 635/A	2
Z0081	SUPPORTO GUIDA DIN INT. MAG.	1
Z0673	TAV. 1199 CHIUS. CONT. PROF. 775 ZN P.2366	2
E0012	SP-500-27 DE2 SWITCHING POWER SUPPLY	8
PAN0074	PAN0074AR2 PANN. 6U AMPLIFICATORE LDMOS	1
08503	CABLE RG303 50Ω TEFLON	1,20
DET0575	DET0575R1 BARRA FISSAGGIO ALIM. SP-500	8
SCH0288AR2	INTERFACE BOARD	1
CON0237	CON0237R2 LAT. SX 1500W UHF MW P.2743 ZN	1
CON0238	CON0238R1 LAT. DX 1500W UHF MW P.2744 ZN	1
DET0996	DET0996R0 BARRA FISS. SCHEDA DISTR. RETE	1
DET0995	DET0995R0 BARRA FISSAGGIO ALIM. SP-500	1

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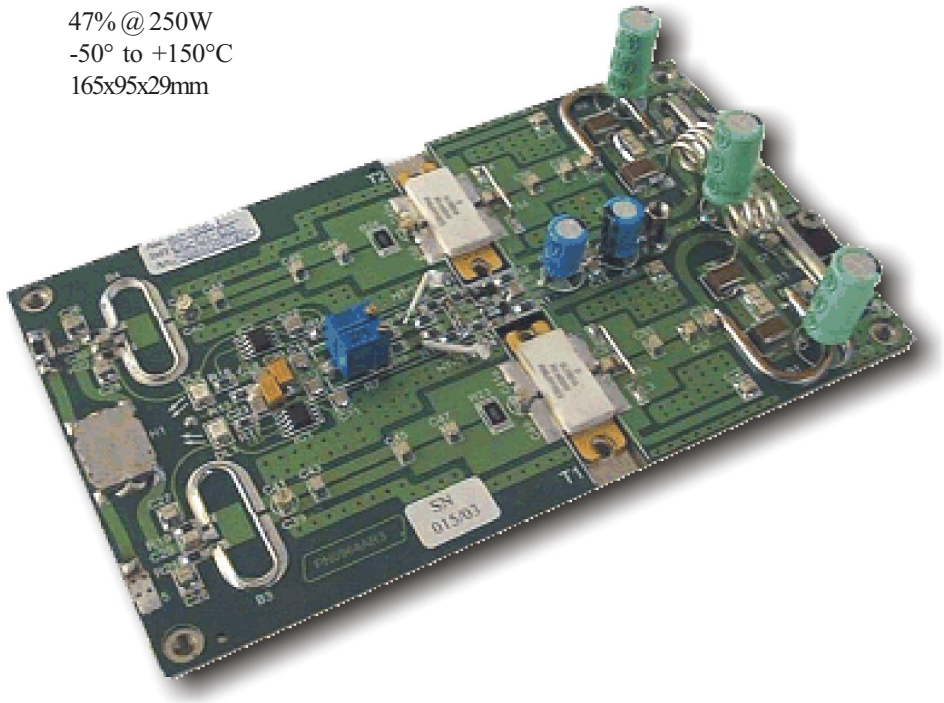
DESCRIPTION

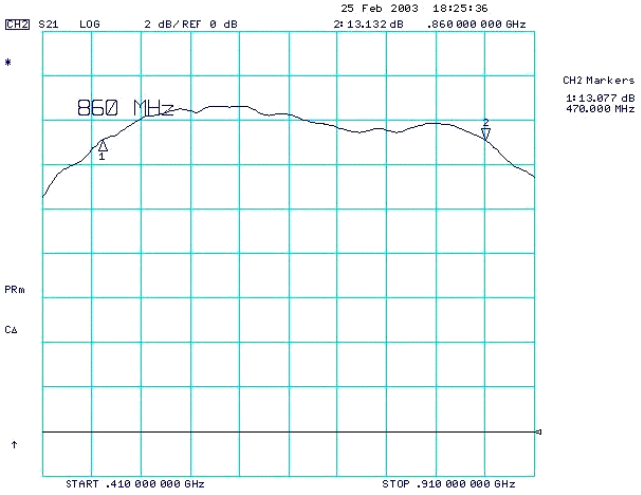
The RF module is an integrated TV linear amplifier designed for UHF band, this module employs push-pull LDMOS technology in order to achieve very good efficiency, high linearity and reliability.
LDMOS transistors operate in AB class. It is a wideband amplifier over the full frequency, no adjustment is 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 ±2%
LDMOS Bias current @+32V Vdc	2A
RF Input impedance	50Ω
RF Output impedance	50Ω
Input / Output return loss	> = 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 (± 2%)
Polarisation current	1.0 cold for each device (2A total), ± 0.1A
Gain for low signal	Not less than 13dB in the 470-860MHz band (± 1dB)
	Compare to the typical curve eclosed

- Adjustment procedure

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

- Adjustment points description

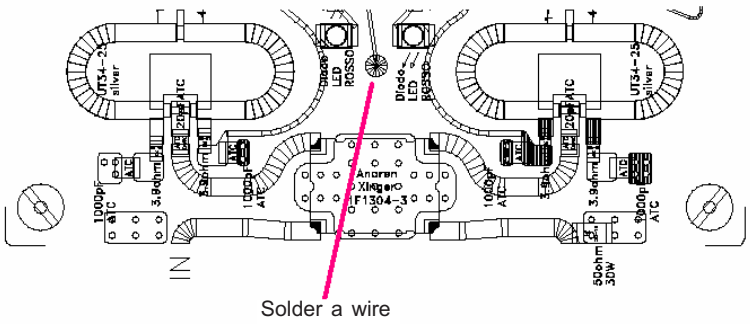
R7-R8 (Trimmers)	Adjust the current absorbed in stand-by (1.0A per device)

- 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 de-coupled, 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*.

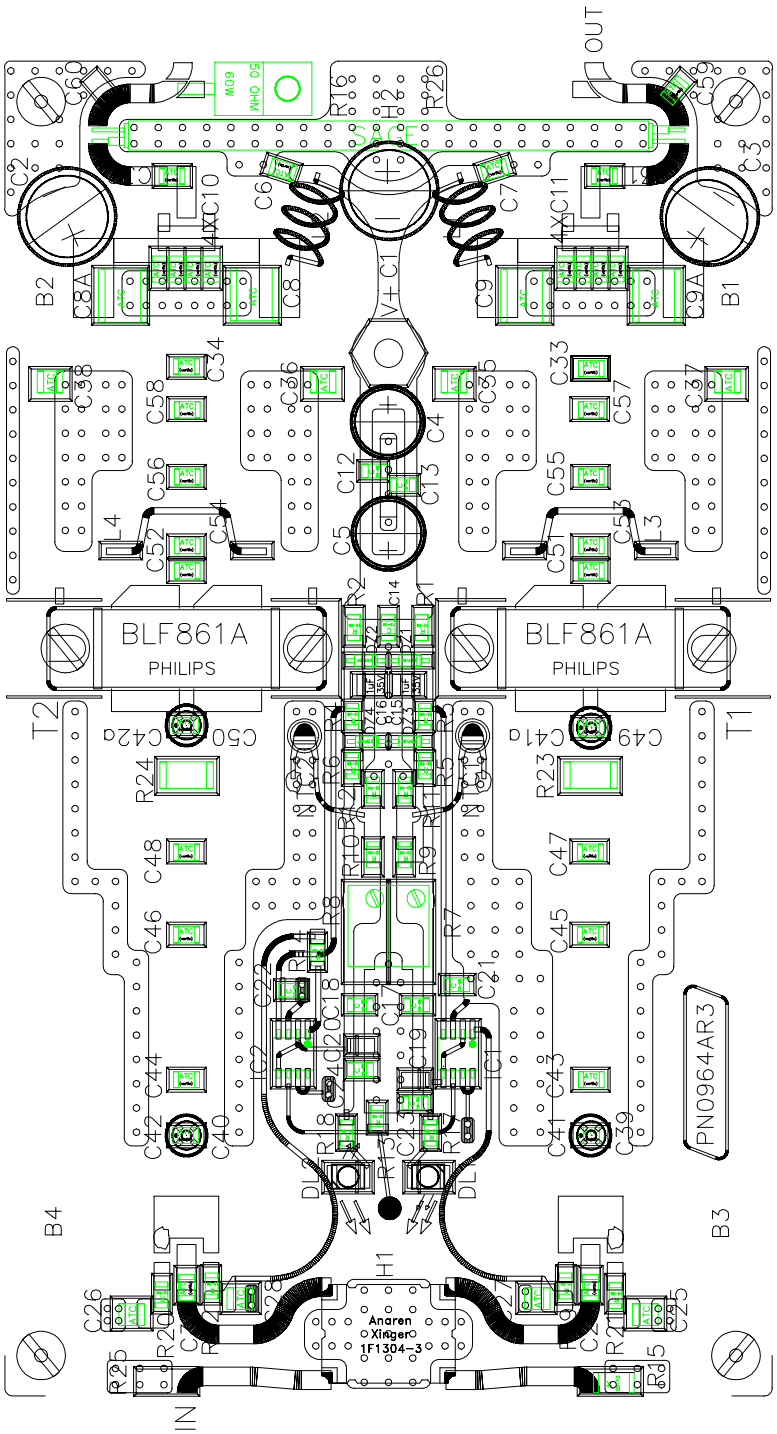
STEP 10. Check the response curve for low signal with centre 660MHz and span 500MHz, 2dB/div.

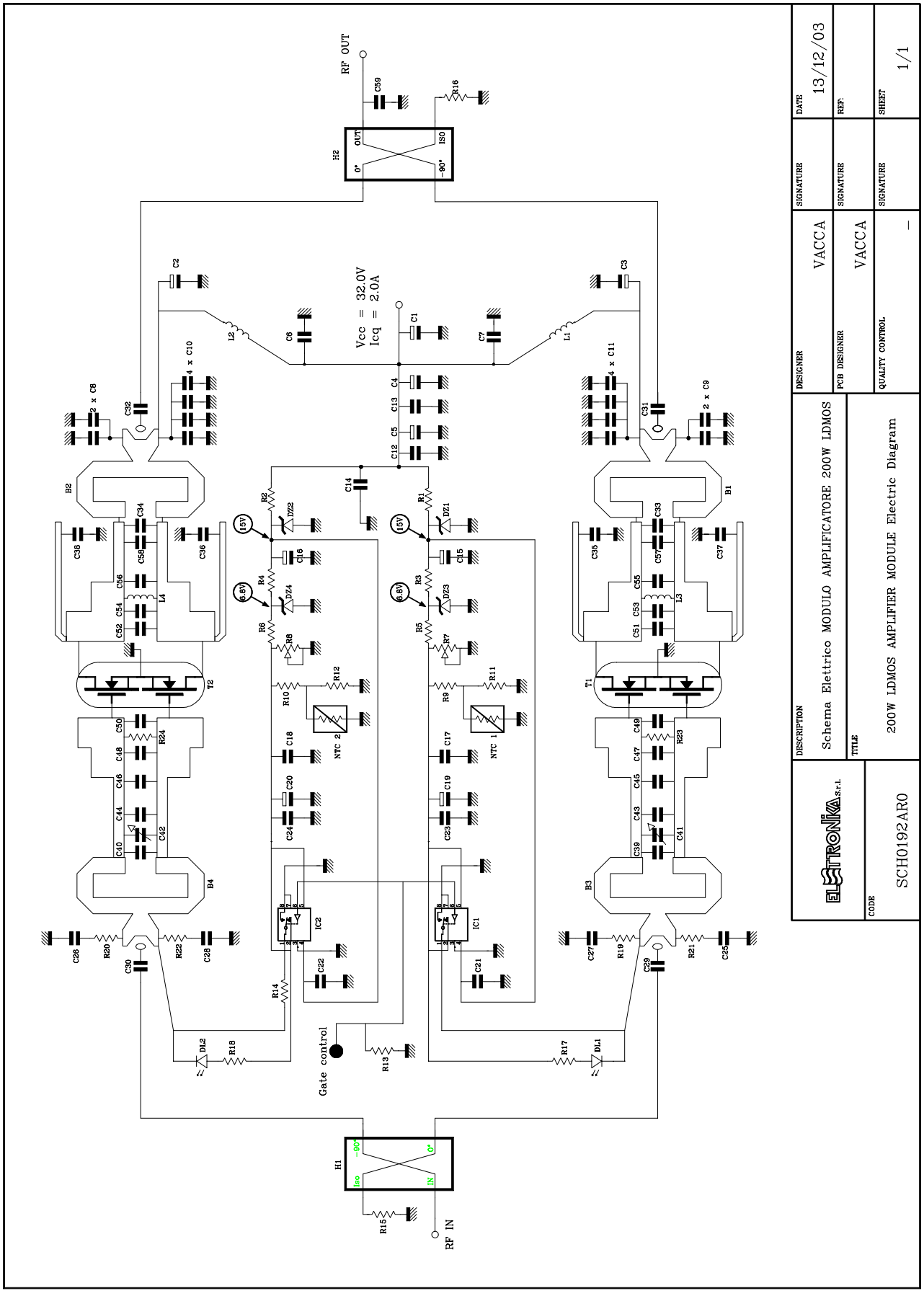
STEP 11. The curve should be similar to the one enclosed, with a tolerance of ± 0.5dB. To obtain this, act on the four trimmers C41-C41a and C42-C42a with the proper "calibrator", inorder to flatten the curve as much as possible, especially at the edged of the band which represents the minimum values.

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




RF OUT
RF IN
Vcc = 32.0V
Icq = 2.0A
Gate control
NTC 1
NTC 2
DESCRIPTION
Schema Elettrico MODULO AMPLIFICATORE 200W LDMOS
TITLE
200W LDMOS AMPLIFIER MODULE Electric Diagram
DESIGNER
VACCA
PCB DESIGNER
VACCA
QUALITY CONTROL
–
DATE
13/12/03
REF:
SHEET
1/1
CODE
SCH0192AR0

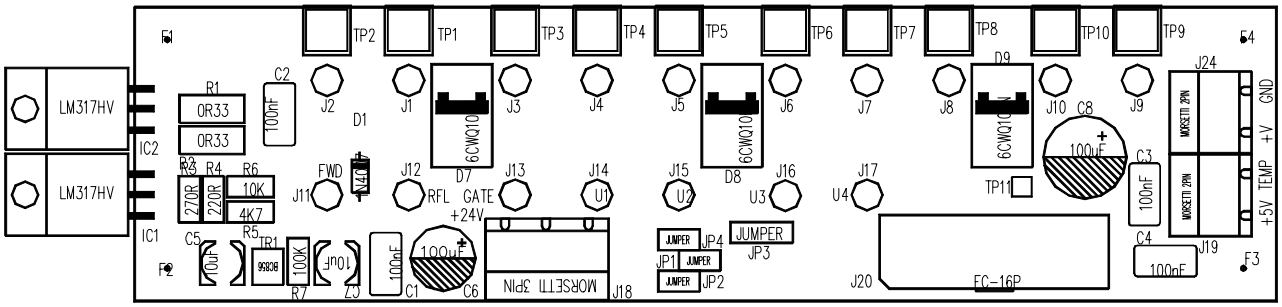
COMPONENT LIST *SCH0192AR0*

REF.	DESCRIPTION	ELETTRONIKA CODE	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	

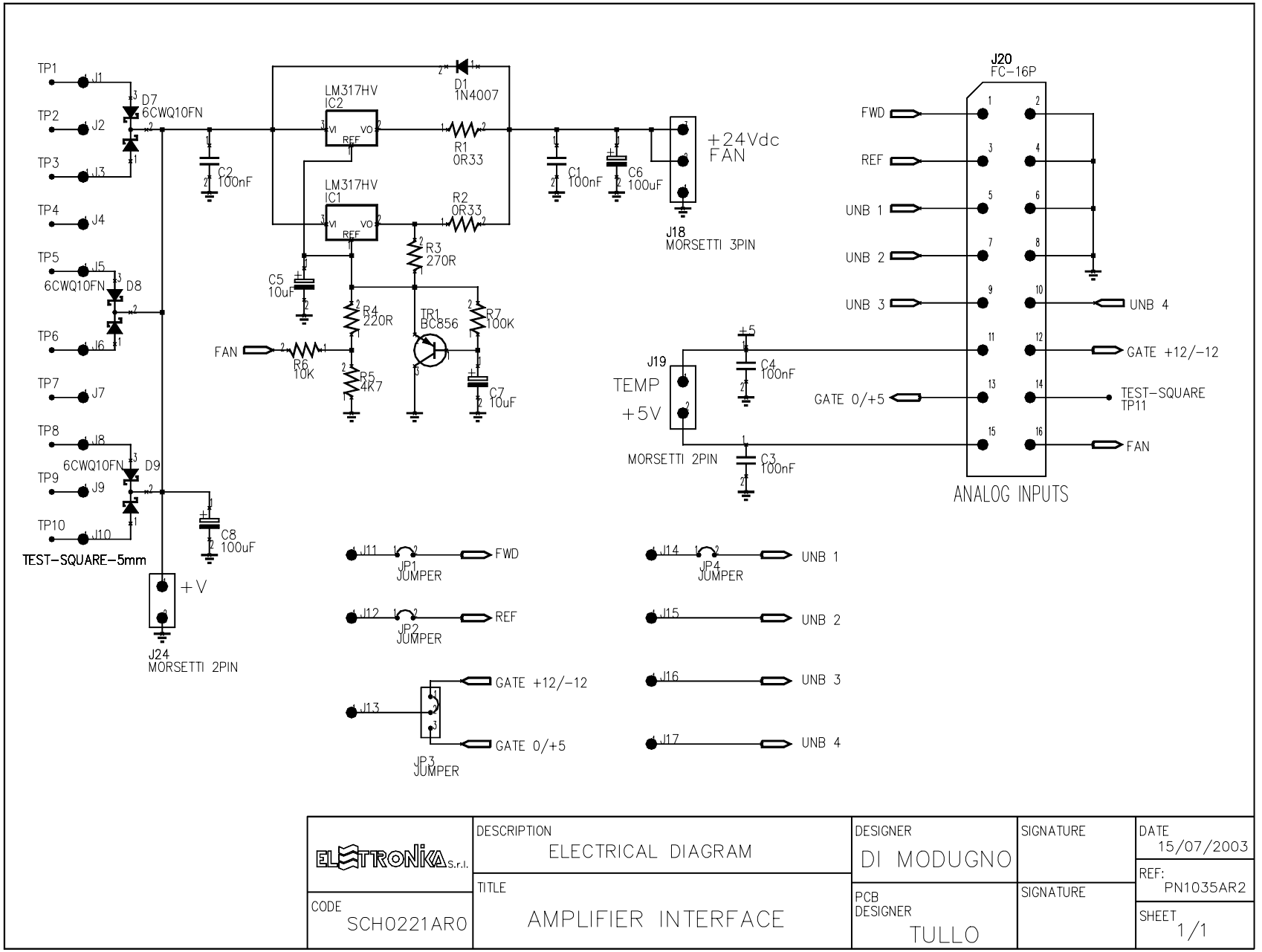
REF.	DESCRIPTION	ELETTRONIKA CODE	Page 3/3
B2	COAX 2:1 BALUN	08491	
B3	COAX 4:1 BALUN	08492	
B4	COAX 4:1 BALUN	08492	
L1	4 TURNS SILV. COP. WIRE 1.2mm WOUND ON OD 5mm	07684	
L2	4 TURNS SILV. COP. WIRE 1.2mm WOUND ON OD 5mm	07684	
L3	½ TURN COIL		
L4	½ TURN COIL		
H1	HYBRID COUPLER 3dB 90° ANAREN	05368	
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	

Component layout SCH0221AR0



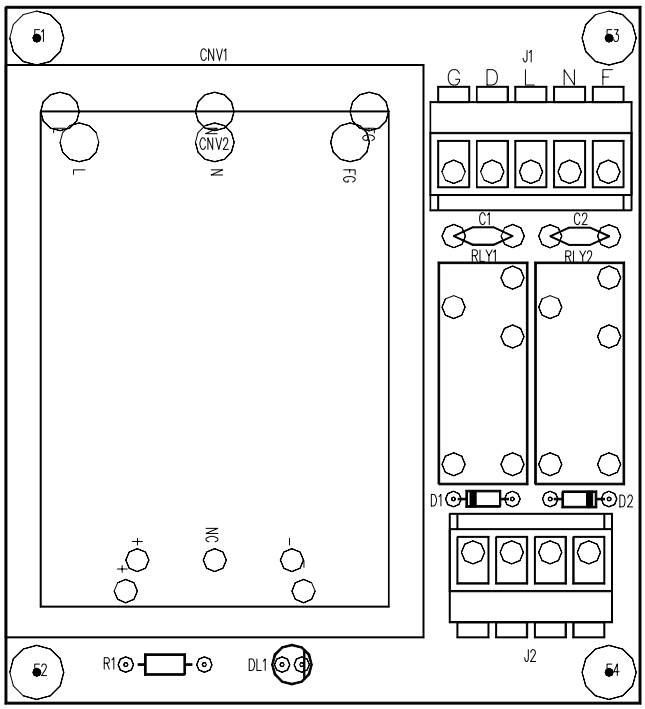
COMPONENT LIST *SCH0221AR0*

Part Name/Number	Description	Qty.	Comps.
CC 100nFAVX 01065A	01065A CERAMIC COND	4	C1-4
CE 100uF100V	01795B ELETT. COND.	1	C8
CE 100uF50V 01795	01795 ELETT. COND.	1	C6
CE 10uF35V-S 01778A	01778A ELETTR SMD COND	2	C5, C7
D 1N4007 03009	03009 DIODE	1	D1
D 6CWQ10FN	03026 SMD DIODE SCHOTTKY 3,5A	3	D7-9
IC LM317HV	04340A INTEG CIRCUIT	2	IC1-2
J FC-16P 02701-02700	02701+02700 PCB CONNECTOR POL	1	J20
J SCREWCONN2 02853	02853 PCB SCREW CONNECTOR	2	J19, J24
J SCREWCONN3 02860	02860 PCB SCREW CONNECTOR	1	J18
J TESTP1.3mm 07913	07913 TEST POINT	17	J1-17
JU JUMP2 02739-02742	02739+02742 MASCHIO PAN2	3	JP1-2, JP4
JU JUMP3 02707-02742	02707+02742 MASCHIO PAN3	1	JP3
R 0R33-1W-S	00380 RES 1W 5% SMD 2512	2	R1-2
R 100K-S 00065A	00065A RES 1/4W 5% SMD 1206	1	R7
R 10K-S 00053A	00053A RES 1/4W 5% SMD 1206	1	R6
R 220R-S 00033A	00033A RES 1/4W 5% SMD 1206	1	R4
R 270R-S 00034A	00034A RES 1/4W5% SMD 1206	1	R3
R 4K7-S 00049A	00049A RES 1/4W 5% SMD 1206	1	R5
TR BC856 03455	03455 PNP SMD TRANSISTOR	1	TR1



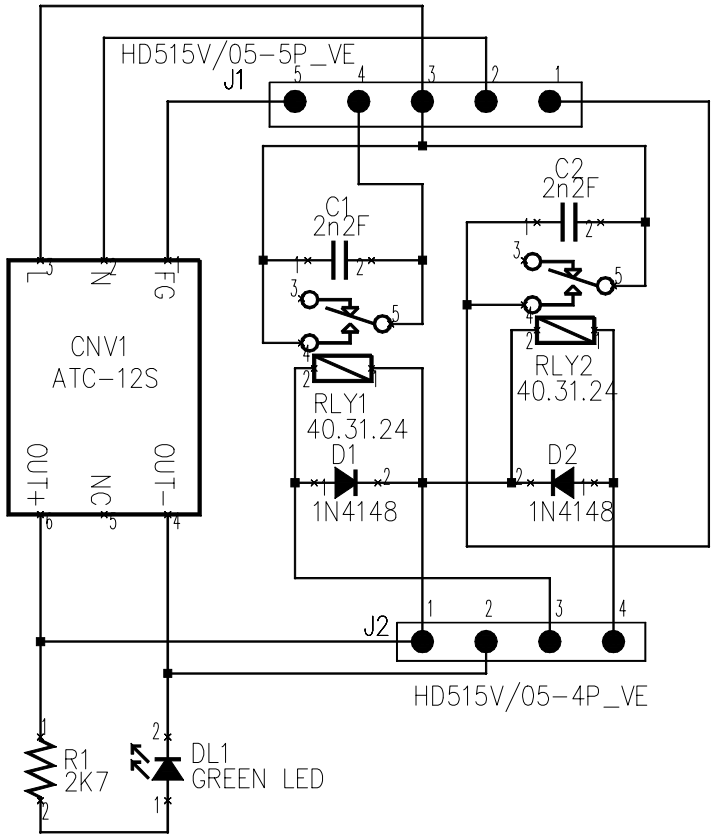
ELETTRONIKA S.r.l.	DESCRIPTION: ELECTRICAL DIAGRAM	DESIGNER: DI MODUGNO	SIGNATURE	DATE: 15/07/2003
CODE: SCH0221AR0	TITLE: AMPLIFIER INTERFACE	PCB DESIGNER: TULLO	SIGNATURE	REF: PN1035AR2
				SHEET: 1/1

Component layout SCH0265AR0



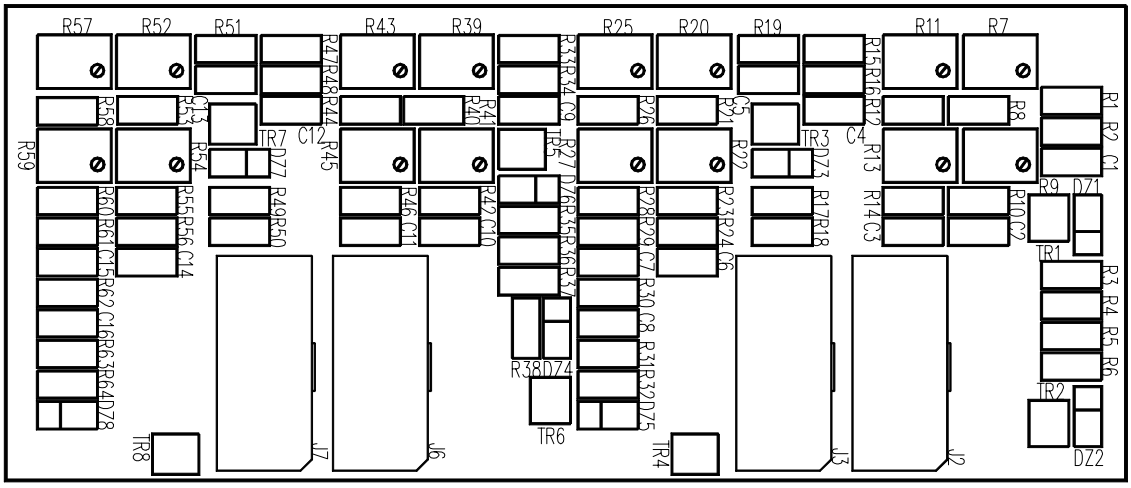
COMPONENT LIST *SCH0265AR0*

Part Name/Number	Description	Qty.	Comps.
CC 2nF2 2kV 01045A	01045A CERAMIC COND	2	C1-2
CNV AC-DC ATC-12S	E0037 AC DC CONVERTER	1	CNV1
D 1N4148 03001	03001 DIODE	2	D1-2
DL LEDG3 03053	03053 GREEN LED DIODE 3mm	1	DL1
J CON HD515V/05-4PVE	02881 + 02882 PANDUIT PCB CONN	1	J2
J CON HD515V/05-5PVE	PANDUIT PCB CO	1	J1
R 2K7 0046	0046 RES 1/4W 5%	1	R1
RL 40.31.24	7567C RELE	2	RLY1-2



ELETTRONIKA s.r.l.	DESCRIPTION: ELECTRICAL DIAGRAM	DESIGNER: DI MODUGNO	SIGNATURE	DATE: 17/11/03
CODE: SCH0265AR0	TITLE: MAINS DISTRIBUITION BOARD	PCB DESIGNER: TULLO D.CO	SIGNATURE	REF: PN1111AR1.SCM SHEET: 1 OF 1

Component layout SCH0288AR1

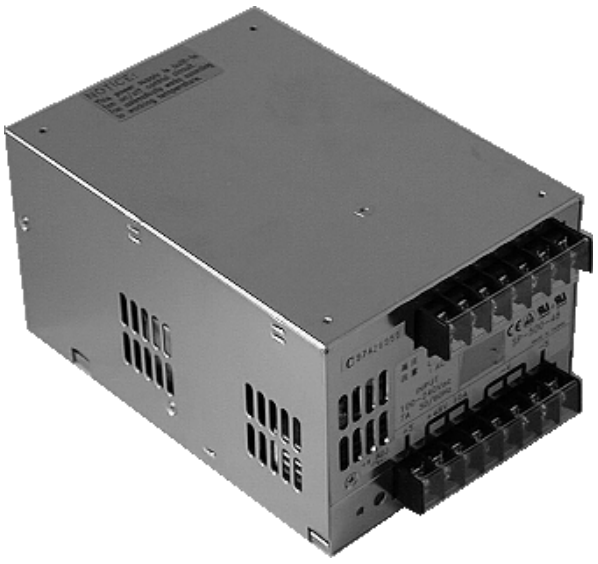


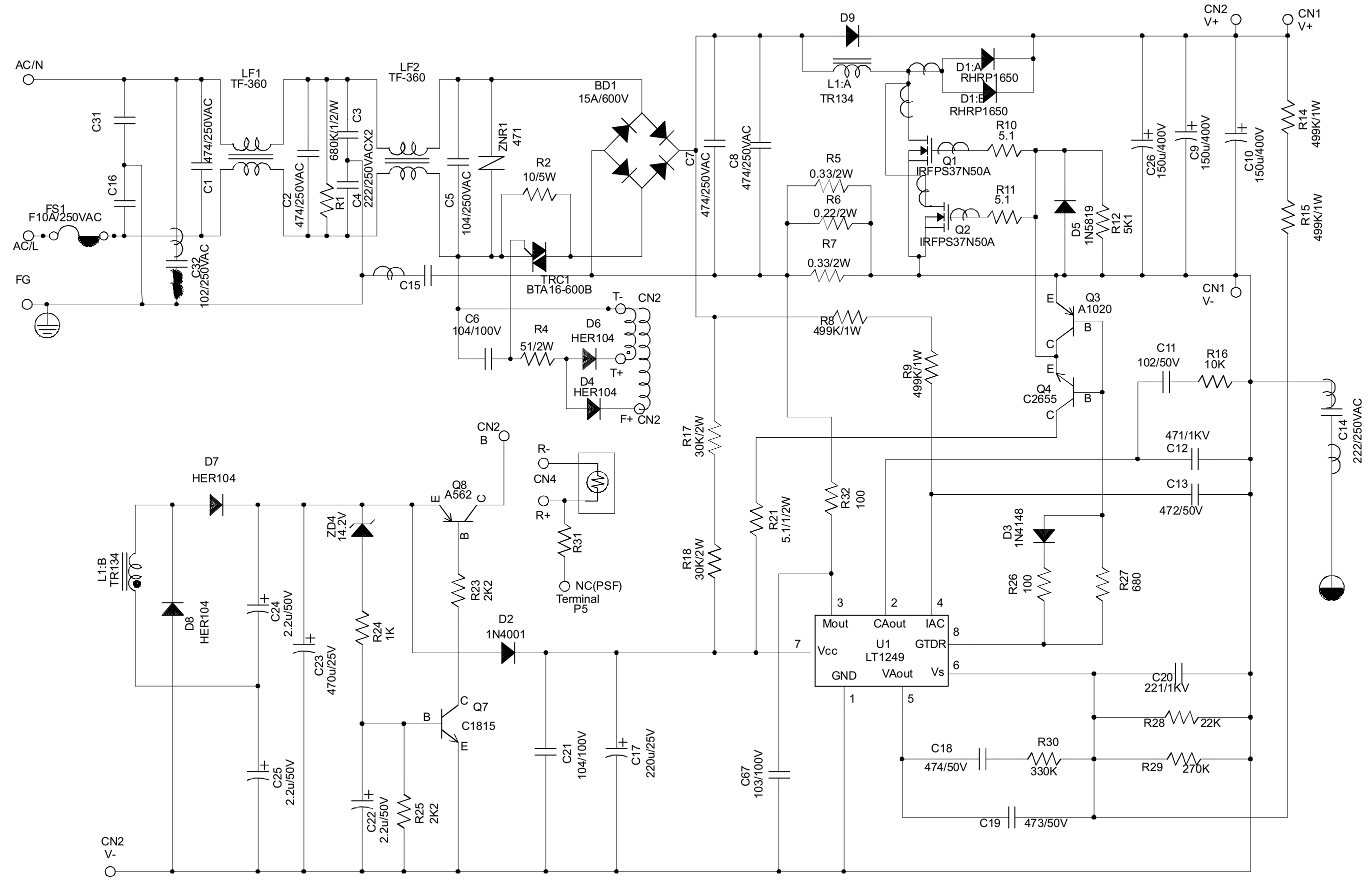
COMPONENT LIST *SCH0288AR1*

Part Name/Number	Description	Qty.	Comps.
CC 1nF-S 01096	01096 SMD 1206 COND	16	C1-16
DZ 5V1-S 03128	03128 SMD ZENER DIODE	8	DZ1-8
J FC-10P 02697-02699	02697+02699 PCB CONNECTOR POL	4	J2-3, J6-7
J FC-10P PCB FEMALE	02706 PCB FEMALE CONNECTOR POL	4	J1, J4-5, J8
R 0R0-S 00001	00001 RES 1/4W 5% SMD 1206	16	R1, R8, R12, R15, R21, R23, R26 R28, R33, R40, R44, R47, R53, R55, R58, R60
R 10K-S 00053A	00053A RES 1/4W 5% SMD 1206	16	R3-6, R17-18, R31-32, R35-38, R49-50, R63-64
R 1206 NOT MOUNTED	NOT MOUNTED RES 1/4W 5% SMD 12	16	R2, R10, R14, R16, R19, R24, R29, R30, R34, R42, R46, R48, R51, R56, R61-62
RV 3266W NOT MOUNT	NOT MOUNTED VARIABLE RESISTOR	16	R7, R9, R11, R13, R20, R22, R25, R27, R39, R41, R43, R45, R52, R54, R57, R59
TR BC847 03456	03456 NPN SMD TRANSISTOR	8	TR1-8

SPECIFICATION

MODEL	SP-500-27 *(E0012 Code)*	SP-500-48 *(E0013 Code)*
DC Output Voltage	27Vdc	48Vdc
Output Rated Current	18A	10A
Output Current Range	0-18A	0-10A
Ripple & Noise (p-p)	200mVp-p	240mVp-p
DC Output Power	486W	480W
Efficiency	87%	87%
DC Voltage Adj.	24-30V	41-56V
Over V. Protection	31V-36.5V	57.6V-67.2V
Input Voltage Range	88-264Vac	
Input Frequency	47-63Hz	
Power Factor	0.95/100-240Vac	
Overload Protection	105%-135% Type: Foldback current limiting Recovery: Auto	
Over Temp. Protection	> =70°C Output Shutdown	
Fan Control	Temp. > =60°C Fan On < =50°C Fan Off	
Working Temp., Humidity	-10°C/+50°C, 20%-90% RH	
Dimension	185x120x93	
Weight	1.8Kg.	





SP-500A DIFFERENT COMPONENT:

MODEL / PART NO.	12V	13.5V	15V	24V	27V	48V	54AD
R31	X	X	X	X	X	X	1K
ZD4	8.9V	8.9V	8.9V	8.9V	8.9V	8.9V	9.1V/1W

ELETTRONIKA S.r.l.	DESCRIPTION: SP500-27-DI Switching Power Supply	DESIGNER: ---	SIGNATURE	DATE: 28/10/2004
		PCB DESIGNER: ---	SIGNATURE	REF: E0012_Component layout.dwg
CODE: E0012	TITLE: Electric Diagram	QUALITY CONTROL: ---	SIGNATURE	SHEET: 2/2

UHF BANDPASS FILTER FC4E80C *Code 06674*

1.5kW, 4 Poles (Cross Coupling)

FEATURES

- UHF 1.5kW analog TV output filter
- 4 poles elliptical response
- Cross Coupling technique (two transmission zeros)
- Foreshorten folded combline structure
- Iris couplings with fine bandwidth regulation
- 3D Electromagnetic CAD
- High selectivity and low loss (Typ. 0.28dB @ V.C. Ch. 69 G)
- Temperature stabilized design (< 4kHz / K)
- Very compact and lightweight

SPECIFICATIONS *(Value referred to G Standard)*

Frequency Range	474 - 862MHz	Selectivity	> 40dB @ V.C. -5.5 / +11MHz
Max Input Power	1.5kW Analog TV		> 25dB @ V.C. -11 / +16.5MHz
Insertion Loss*	< 0.32dB @ V.C. Ch. 69	Temperature Stability	< 4kHz / K
	< 0.27dB @ V.C. Ch. 21	Connectors°	7/16 Female
Return Loss	> 28dB	Weight (Approx)	6kg
Group Delay Variation	< 30ns	Operating temperature	-10 to +50°C
Bandwidth	6 to 8MHz		

AVAILABLE OPTIONS

A	SMA Output Monitor Probe	B	SMB Output Monitor Probe
H	EIA 7/8" Flange Connectors	Z	Painted Black

CALIBRATION PROCEDURE

The output filter mod. 06674 is a 4-resonator, cross coupling bandpass filter, having thereby elliptical response. It can be tuned on all the channels of the UHF TV band (470 - 862MHz) and according to all worldwide standards (4.5 - 6.5MHz intercarrier). The elliptical response allows the exact placement of two deep transmission nulls at the IMD spurs frequencies (V.C. - I.C. / S.C. - I.C.), making analog TV channel filter response the most efficient.

Tunings ***(T1, T2, T3, T4)*** can be regulated simply by means of a suitable screwdriver.

Couplings ***(K12, K23, K34)*** are regulated varying the insertion of the Post Screws, which are located between the resonators; the insertion of the Post Screws increases the bandwidth, except for K23 which has the opposite effect of decreasing bandwidth as it is inserted. In order to execute this regulations it is necessary to loosen every lock nut by means of a pipe wrench n. 19.

The elliptical response characteristics transmission nulls are set by the ***K14*** Post Screw in a similar way as above.

External loads ***(KE)*** are adjusted by means of the two shafts (Coupling Stubs), available removing the protection caps opposite to each connector. A flat wrench n. 8 is required; the twist friction of these couplings can be set tightening the relevant clamps with a pipe wrench n. 16.
The regulation is carried out considering that when the marked dots are set towards the resonators coupling is maximum, otherwise tuning them 90 degrees from the maximum the minimum coupling is achieved.
The symmetry of the response curve is slightly affected by the orientation of the external loads ***(KE)***; ***to get the best response symmetry, always rotate both dots outwards***.

TUNING INSTRUCTIONS

The advised tuning sequence is the following:

1. set the instrument state as follows:
   - C.F. = (V.C. + S.C.) / 2
   - SPAN = INTERCARRIER * 5 (E.G. 27.5mhZ std. G)
   - TRANSMISSION SCALE = 5dB/div.
   - REFLECTION SCALE = 5dB/div.
   - MKR1 = V.C.
   - MKR2 = S.C.
   - MKR3 = V.C. - VSB (E.G. V.C. -0.75MHz std. G)

2. Preset the Coupling Posts ***K12, K23, K34*** and ***K14*** at middle value, i.e. at the middle of their stroke. Preset the external loads ***KE*** at middle value, i.e. the marked dots orientated 45 degrees one outward the other, starting from the highest position.

3. The tuning is based upon the sample diagram attached. The final response must be the same for any channel and any standard. Center the tunings ***(T1, T2, T3, T4)*** on the required channel's center frequency, and set ***K14*** in order to place the response nulls at the required IMD frequencies. Proceed with the external loads ***KE***

and bandwidth couplings ***K12/K34*** and ***K23***. Improve the tuning by repeatedly acting as before. The electrical symmetry implies ***K12*** equal to ***K34*** (same heights) and ***KE/KE*** (same rotation angle). Regulate ***K14*** each pass to set the transmission nulls.

IMPORTANT NOTICE: *the most effective tuning for analog TV channels is NOT equiripple, bus has -30dB R.L. at middle peak and -35dB R.L. at outer peaks.*

4. A high quality tuning will exhibit deep return loss dips, as in reported diagram. At the end of the tuning process, lock the trim points (Posts and Coupling Stubs) and assemble the coupling protection caps on the filter.

TIME DOMAIN TUNING

5. This filter is particularly suitable for time domain tuning. This tuning technique, available with HP/Agilent and Rohde & Schwarz analyzers, is time saving and gives optimum results. The time domain graph contains all the information about the parameters to be tuned, the tuning process becomes deterministic and it is not required to be skilled. A vector network analizer with S-parameter test set is recommended. The following instructions refers to Agilent HP8753ES unit. Execute a full two-port calibration, and start tuning the filter according the previous instructions, up tyo step 3. When the filter is roughly tuned in frequency domain, you can toggle modality.

5a. Turn on the Time Domain mode, taking a look at both S11 and S22 (System / Transform / Bandpass). Set the time scale from -80 to 130ns, and amplitude scale at 5dB/dib. The displayed trace should be similar to the example reported. The time domain interpretation is the following:

- the first peak is related to ***KE/KE***
- the first dip is related to ***T1/T4***
- the second peak is related to ***K12/K34***
- the second dip is related to ***T2/T3***
- the third peak is related to ***K23***

5b. Tune repeatedly the filter starting from the outside to the center, which corresponds to follow the time domain graph starting from left to right. The resonators shall produce the deepest dips, whereas the couplings shall be set to the following amplitude values (use markers to measure peak amplitudes).

TUNING	VALUE
KE/KE	-17dB
K12/K34	-10.5dB
K23	-10dB

IMPORTANT NOTICE: K14 *is NOT detectable in time domain, and have to be continuously set in the frequency domain.*

5c. Turn back to frequency domain mode to check the tuning. Maybe the filter is perfectly tuned, but slightly shifted in center frequency. This dependes upon a possible small difference between response centre and electrical centre frequencies. It is straighforward in this case to centre the filter acting on the tunings.

5d. A high quality tuning will exhibit deep return loss dips, as in reported diagram. At the end of the tuning process, lock the trim points (Posts and Coupling Stubs) and assemble the coupling protection caps on the filter.

Ref.: HP/Agilent 'Simplified Filter Tuning Usiong Time Domain', application note 1287-8.

SPECIFICATIONS OVER THE UHF BAND

MEASURE	VALUE
Insertion loss @ V.C. (dB)	< 0.32dB @ V.C. Ch. 69 G (Typ. 0.28) < 0.27dB @ V.C. Ch. 21 G (Typ. 0.24)
Return Loss (from V.C. -0.75 to V.C. +0.25)	> 28dB
Attenuation @ V.C. -INTERCARRIER	> 40dB
Attenuation @ V.C. +INTERCARRIER	> 40dB

FIG. 1
SAMPLE FREQUENCY RESPONSE DIAGRAM

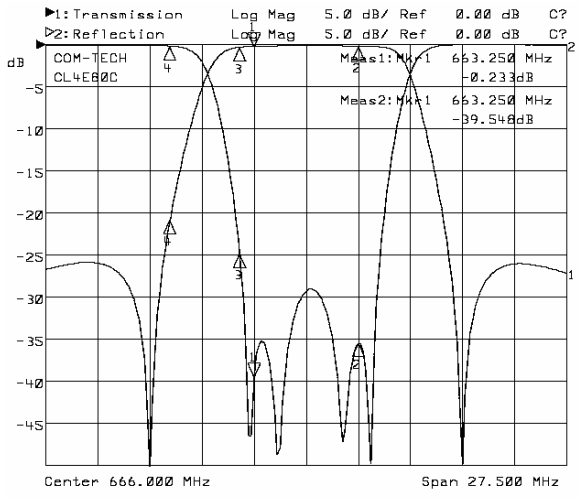


FIG. 2
SAMPLE TIME DOMAIN RESPONSE DIAGRAM