

BZ5T2500U

Application for FCC Certification

Modulator Input 2500Watt UHF Translator

Active Devices and Function List / Tune Up Procedure

Modulator

INTEGRATED CIRCUIT	LF351N	IC7
INTEGRATED CIRCUIT	CD4047AE	IC5
INTEGRATED CIRCUIT	LM311P	IC6, IC8
INTEGRATED CIRCUIT	LM358	IC9, IC17
INTEGRATED CIRCUIT	TL072CDP	IC1
INTEGRATED CIRCUIT	MC145106P	IC15
TRANSISTOR	2N2369A	Q1,Q2,Q3,Q4
TRANSISTOR	TIP30A	Q15
VOLTAGE REGULATOR	UA78L08	IC11,IC16
TRANSISTOR	2N3904	Q5,Q9,Q12, Q13,Q16,Q18,Q19
TRANSISTOR	2N3906	Q6,Q8,Q17
TRANSISTOR	BF245C	Q10,Q11
INTEGRATED CIRCUIT	MAR6	IC2
INTEGRATED CIRCUIT	MAR3	IC1, IC3, IC4, IC12, IC13
INTEGRATED CIRCUIT	NE5539N	IC18, IC19, IC20, IC21
INTEGRATED CIRCUIT	NC12022P	IC17
TRANSISTOR	BFR90/BFR91A	Q14
TRANSISTOR	2N5566	Q7

Upconverter

IF Amplifier

INTEGRATED CIRCUIT	1458	IC5
TRANSISTOR	BC546A	Q1,Q2,Q3
TRANSISTOR	MPS918	Q4
INTEGRATED CIRCUIT	MAR-6	IC3
INTEGRATED CIRCUIT	MAR-7	IC1,IC2
INTEGRATED CIRCUIT	MAR-3	IC4

Precorrector

TRANSISTOR	2N3866	Q2,Q3,Q5,Q8
TRANSISTOR	2N5179	Q1
INTEGRATED CIRCUIT	MAV11	IC1
TRANSISTOR	BFR90/BFR91	Q4,Q6,Q7,Q9,Q10

AGC

INTEGRATED CIRCUIT	1458	IC1
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Upconverter

INTEGRATED CIRCUIT	LM 358	IC5
TRANSISTOR	BC556A	Q3
TRANSISTOR	BC640	Q1
TRANSISTOR	UA78L08ACP	IC4
INTEGRATED CIRCUIT	MAR6	IC3
INTEGRATED CIRCUIT	MAR3	IC1
INTEGRATED CIRCUIT	MAV11	IC2
INTEGRATED CIRCUIT	MC12022AP	IC7
INTEGRATED CIRCUIT	MC145152P2	IC6
TRANSISTOR	BFR90/BFR91A	Q2
TRANSISTOR	MC78L05ACZ	IC8

BZ5T2500U
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Driver

Amplifier protection

INTEGRATE CIRCUIT	LM358	IC2,IC3,IC4,IC5
TRANSISTOR	BC547A	Q1

2W Amp

TRANSISTOR	MRF373A	Q1
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100W Amp

TRANSISTOR	MRF373A	Q1,Q2,Q3,Q4
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625W amp

Amplifier protection

INTEGRATE CIRCUIT	LM358	IC2,IC3,IC4,IC5
TRANSISTOR	BC547A	Q1
FIXED VOLTAGE REGULATOR	7812	IC1

625W amp

TRANSISTOR LDMOS	MRF373A	Q1,Q2,Q3,Q4
INTEGRATED CIRCUIT	LM358	IC2
INTEGRATED CIRCUIT	TL494CN	IC1
TRANSISTOR	BC547A	Q1,Q8,Q11
TRANSISTOR	BC557A	Q10
TRANSISTOR	BD139	Q2,Q3,Q4,Q5,Q6,Q7

Metering and Control

INTEGRATED CIRCUIT	CD4013AE	IC11,IC12,IC14
INTEGRATED CIRCUIT	CD4047AE	IC7,IC8
INTEGRATED CIRCUIT	MOC3060	IC16
INTEGRATED CIRCUIT	LM358	IC3,IC4,IC13
TRANSISTOR	BC337	Q1,Q3,Q5,Q6,Q7
VOLTAGE REGULATOR	7812	IC15
INTEGRATED CIRC.	1458	IC2
INTEGRATED CIRC.	LM311P	IC1,IC3
TRANSISTOR	2N2369A	Q2
TRANSISTOR	BF245C	Q1
INTEGRATED CIRC.	ICL7662CPA	IC4,IC5
INTEGRATED CIRC.	OPA603AP	IC6

T2500U

1.INSTALLATION:

1.1. Unpacking

All the equipment is carefully inspected and tested under the company quality control. Any irregularity must be filed immediately with the carrier responsible for the transportation equipment. Any doubts, contact your **RF TELECOMMUNICATIONS** representative before installing the equipment so that your doubt do not become a problem.

1.2. Repacking and Transportation

If it is necessary the equipment be sent back to the company or any distant place, some precaution must be considered:

- Wrap the equipment with air bubble plastic. Do not let any part of the equipment exposed to protect it against any damage to the equipment painting;
- Wrap the equipment with cardboard and wood pack it to protect against any impact;
- Ensure that anything was left loose inside the package. Put the package stood to avoid any impact.

1.3. Installation Requirement

- **Installation Site:** The equipment should not be installed in places that exceeds 2000 meters of altitude; have a proper air conditioning system (if it is necessary), voltage regulator, ventilation air conducting; ensure that sufficient space around the equipment is available to permit easy access, and to enhance future ease of maintenance. It is recommended a minimum 0.5m of clearance both right and left sides, and 1.0m both front and rear of the equipment; the ceiling should have at least 3.0m of height where the blower exhaust will be installed. The place must be free of dirt, humidity and dust.
- **Installation Surface:** For small equipment, it is recommended being installed on a table or a standard rack 19", which it should have at least 0.3m of clearance from the wall in order to have a proper ventilation.
- **Power board:** It is necessary a power board to organize, separate, and distribute the power supply and mainly for equipment protection. The power board is connected to the power line. Thermomagnetic disjunctors must be used in order to feed isolatedly the equipment, illumination, air conditional, blower exhaust, etc.

BZ5T2500U

Application for FCC Certification

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- **Voltage Regulator:** A voltage regulator is used for protection against any variation and transient coming from the power line so that it will provide a better performance of your equipment. The regulator should provide at least 30% more power than the equipment consumes. It is recommended using an electronic kind regulator, microprocessed, with a perfect senoidal output, and an isolator transformer for the entrance.
- **Grounding:** All the equipments must be connected to the main station ground system but isolated from the wall, protecting it against electrostatic discharges, lightning strikes, etc. Grounding should be 5 Ohms maximum to have an adequate protection. Ensure that the following items are connected to the main ground system:
 - ✓ Tower base;
 - ✓ Lightning rod;
 - ✓ Neutral wire;
 - ✓ Power supply ground;
 - ✓ All the equipment grounds such as power board, voltage regulator, etc;
 - ✓ Broadcast Antennas, coaxial cable and transmission line.If you have any doubts about the station ground system quality, a specialized company should be contacted.
- **Lightning Rod:** Its use on the tower is vital and a distance of 2.0m between the last antenna and the lightning rod should be preserved.
- **Ambient Temperature:** the ambient temperature must not exceed 25°. If it is not possible, the use of an air conditioning system should be considered. The air conditioning system should be able to keep the ambient temperature 25° maximum with full power operation of the equipment. The blower exhaust must also be installed in order to reduce the ambient temperature at the same time the power consuming of the air conditioning system reduces.
- **Humidity:** The relative humidity of air must not exceed 80%. If it is not possible, the use of an air conditioning system will be necessary.
- **Antennas and cables:** Pay a careful attention to the quality of coaxial cables and connectors that will be used in the system; the maximum curvature of coaxial cables must be respected; avoid loose connections.

1.4 First time start-up procedure:

1. Verify the power line supply and the voltage regulator output. For 220V or 380V you have to use a three phase voltage Y or Delta connection, respectively.
2. Connect the transmitter RF output (on the top of the transmitter) to a 50 ohm antenna or dummy load. Pay attention to the maximum curvature of the coaxial cables that are being used.
3. If the equipment has an audio and video modulator, connect the video signal to the video input jack 75 ohms and the audio signal to the audio input jack 600 ohms balanced located at the top of the transmitter.
4. If the equipment is a retransmitter, connect the Booster converter output to the IF input jack;
5. Connect the ac input at the rear of the equipment. It is recommended using a power cable feed 10.0mm.
6. Reduce the IF level from the audio and video modulator by turning its control counter-clockwise. For retransmitters, The IF level control is located at the front panel of the Channel converter. For Dual Driver Equipments, repeat the process for both Driver A and B;
7. For Dual Driver equipment, place the AUTO/MANUAL selector switch to the MANUAL position, and the PREF. A/PREF. B selector switch to the PREF. A position.
8. Disconnect all 650W amplifiers # modules.
9. Turn on the equipment by pressing the main switch at the front panel of the channel converter and at the right superior panel of the equipment. For Dual Driver turn on the main switch of channel converter "B" also.
10. Ensure that all the voltage supplies (at the Amplifier # modules connector) from each 650W amplifier module are ok;
11. By this time, only the "A" Driver will be running.
12. Check all the voltage supplies and the local oscillator of the channel converter against the equipment test list.
13. Check the Blower system. If it is rotating incorrectly check again the incoming phase voltage.
14. Turn off the equipment and reconnect all amplifier # modules. Ensure that the IF level is at its minimum level.
15. Turn on the equipment and check again all the voltage supplies;
16. Ensure that the SIGNAL, SUPPLIER "A" TEMPERATURE, SUPPLIER "B" TEMPERATURE, LOAD TEMPERATURE, FILTER REFLECTED POWER, ANTENNA REFLECTED POWER, PHASE LOSS alarm LED's are off, otherwise contact our representative.
17. Place the selector switch of the superior panel to the Video Signal position. Increase it slowly by turning the IF level control clockwise. Observe the Reflect power alarm LED at the front panel. If it lights on,

BZ5T2500U**Application for FCC Certification****Modulator Input 2500Watt UHF Translator**

- turn off the equipment and check the antenna connections one more time.
18. It is recommended to increase the IF level for a reading of 50% on forward power level at first. Follow the 19, 20, and 21 steps and let it running for a while. If everything is ok increase the IF level for a reading of 100% on forward power level and repeat the following steps.
 19. By increasing the IF level, the Forward Power LED's of each amplifier # module will turn from red to green.
 20. In the meantime, monitor the REFLECTED POWER, FORWARD POWER, CURRENT, and VOLTAGE SUPPLY levels, constantly.
 21. Place the selector switch on the superior panel to the Reflect Power position. Check if it does not exceed 1,5:1. If it exceeds, check the antenna connections again.
 22. Observe the Temperature alarm LED's of each 625W amplifier # module. If it lights on, turn off the equipment and check again the ventilation system and the ambient temperature.
 23. For dual driver equipment, place the selector switch to the PREF. A/PREF. B position.
 24. By this time, only the "B" driver will be running. Repeat the 12 to 22 steps.
 25. Place the AUTO/MANUAL selector switch to the AUTO position. This procedure is recommendable for the equipment to commute automatically between "A" and "B drivers if one of them fails.
 26. If everything is ok, check the video image at your TV monitor.

2.0 Alignment

2.1 Local Oscillator and Upconverter System Alignment:

1. Program the oscillator according to the given channel chart and with a multimeter in PT2, adjust trimmer C21 to a 4.5V reading. The led helps the adjustment, when it is turned off it indicates that the oscillator is in the desired frequency. In the point meas. at oscillator shows 0.5V level indicating the RF presence that comes from the local oscillator.

2. Put the sweep generator in the IF band in 41 to 47 MHz, and apply to the IF input, in JP1. Adjust the channel filter to the maximum gain and a better linearity, with the detector in the channel output.

Channel Selection chart

Channel	Osc Frequency	1	2	3	4	5	6	7	8	Frequency	Vis. Carrier	Aur. Carrier
14	517	0	0	0	0	1	0	0	0	470-476	471.25	475.75
15	523	0	0	0	1	0	1	0	0	476-482	477.25	481.75
16	529	0	0	0	0	0	0	1	0	482-488	483.25	487.75
17	535	0	0	0	1	1	0	1	0	488-494	489.25	493.75
18	541	0	0	0	0	1	1	1	0	494-500	495.25	499.75
19	547	0	0	0	1	0	0	0	1	500-506	501.25	505.75
20	553	0	0	0	0	0	1	0	1	506-512	507.25	511.75
21	559	0	0	0	1	1	1	0	1	512-518	513.25	517.75
22	565	0	0	0	0	1	0	1	1	518-534	519.25	523.75
23	571	0	0	0	1	0	1	1	1	524-530	525.25	529.75
24	577	0	1	0	0	0	0	0	0	530-536	531.25	535.75
25	583	0	1	0	1	1	0	0	0	536-542	537.25	541.75
26	589	0	1	0	0	1	1	0	0	542-548	543.25	547.75
27	595	0	1	0	1	0	0	1	0	548-554	549.25	553.75
28	601	0	1	0	0	0	1	1	0	554-560	555.25	559.75
29	607	0	1	0	1	1	1	1	0	560-566	561.25	565.75
30	613	0	1	0	0	1	0	0	1	566-572	567.25	571.75
31	619	0	1	0	1	0	1	0	1	572-578	573.25	577.75
32	625	0	1	0	0	0	0	1	1	578-584	579.25	583.75
33	631	0	1	0	1	1	0	1	1	584-590	585.25	589.75

BZ5T2500U
Application for FCC Certification
Modulator Input 2500Watt UHF Translator

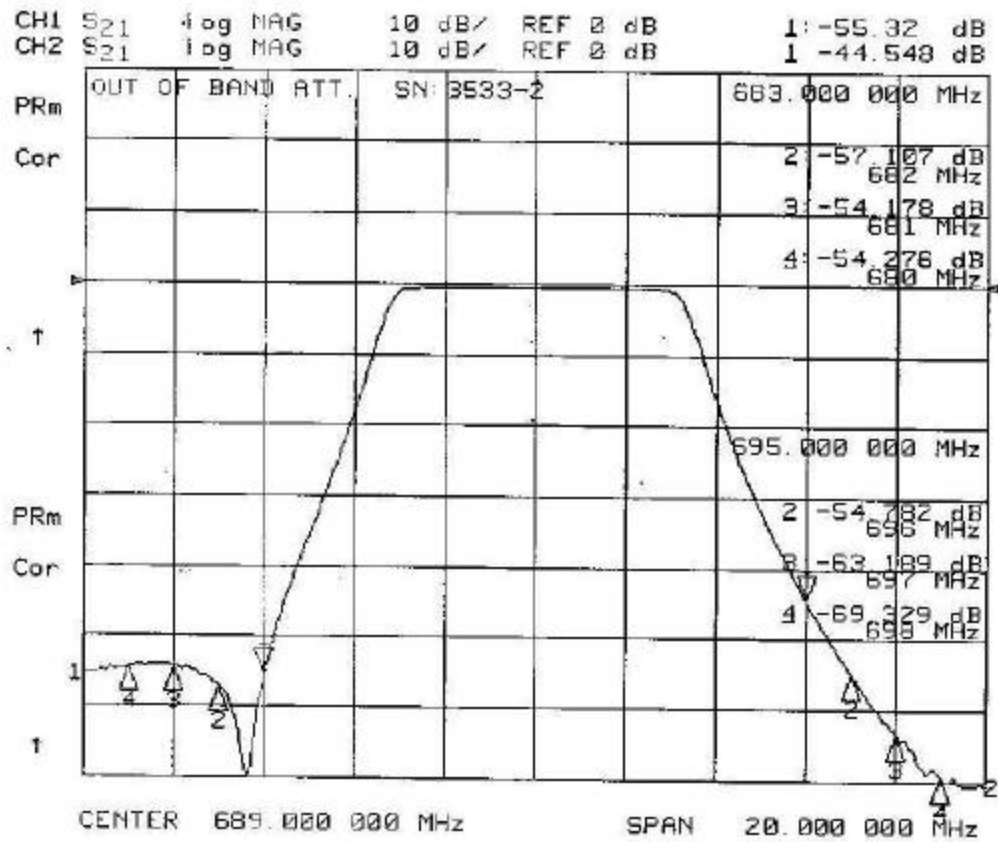
34	637	0	1	0	0	1	1	1	1	590-596	591.25	595.75
35	643	1	0	0	1	0	0	0	0	596-602	597.25	601.75
36	649	1	0	0	0	0	1	0	0	602-608	603.25	607.75
37	655	1	0	0	1	1	1	0	0	608-614	609.25	613.75
38	661	1	0	0	0	1	0	1	0	614-620	615.25	619.75
39	667	1	0	0	1	0	1	1	0	620-626	621.25	625.75
40	673	1	0	0	0	0	0	0	1	626-632	627.25	631.75
41	679	1	0	0	1	1	0	0	1	632-638	633.25	637.75
42	685	1	0	0	0	1	1	0	1	638-644	639.25	643.75
43	691	1	0	0	1	0	0	1	1	644-650	645.25	645.75
44	697	1	0	0	0	0	1	1	1	650-656	651.25	655.25
45	697	1	0	0	1	1	1	1	1	656-662	657.25	661.75
46	709	1	1	0	0	1	0	0	0	662-668	663.25	667.75
47	715	1	1	0	1	0	1	0	0	668-674	689.25	673.75
48	721	1	1	0	0	0	0	1	0	674-680	675.25	679.75
49	727	1	1	0	1	1	0	1	0	680-686	681.25	685.75
50	733	1	1	0	0	1	1	1	0	686-692	687.25	691.75
51	739	1	1	0	1	0	0	0	1	692-698	693.25	697.75
52	745	1	1	0	0	0	1	0	1	698-704	699.25	703.75
53	751	1	1	0	1	1	1	0	1	704-710	705.25	709.75
54	757	1	1	0	0	1	0	1	1	710-716	711.25	715.75
55	763	1	1	0	1	0	1	1	1	716-722	717.25	721.75
56	769	0	0	1	0	0	0	0	0	722-728	723.25	727.75
57	775	0	0	1	1	1	0	0	0	728-734	729.25	733.75
58	781	0	0	1	0	1	1	0	0	734-740	735.25	739.75
59	787	0	0	1	1	0	0	1	0	740-746	741.25	745.75
60	793	0	0	1	0	0	1	1	0	746-752	747.25	751.75
61	799	0	0	1	1	1	1	1	0	752-758	753.25	757.75
62	805	0	0	1	0	1	0	0	1	758-764	759.25	763.75
63	811	0	0	1	1	0	1	0	1	764-770	765.25	769.75
64	817	0	0	1	0	0	0	1	1	770-776	771.25	775.75

BZ5T2500U**Application for FCC Certification****Modulator Input 2500Watt UHF Translator**

65	823	0	0	1	1	1	0	1	1	776-782	777.25	781.75
66	829	0	0	1	0	1	1	1	1	782-788	783.25	787.75
67	835	0	1	1	1	0	0	0	0	788-794	789.25	793.75
68	841	0	1	1	0	0	1	0	0	794-800	795.25	799.75
69	847	0	1	1	1	1	1	0	0	800-806	801.25	805.75

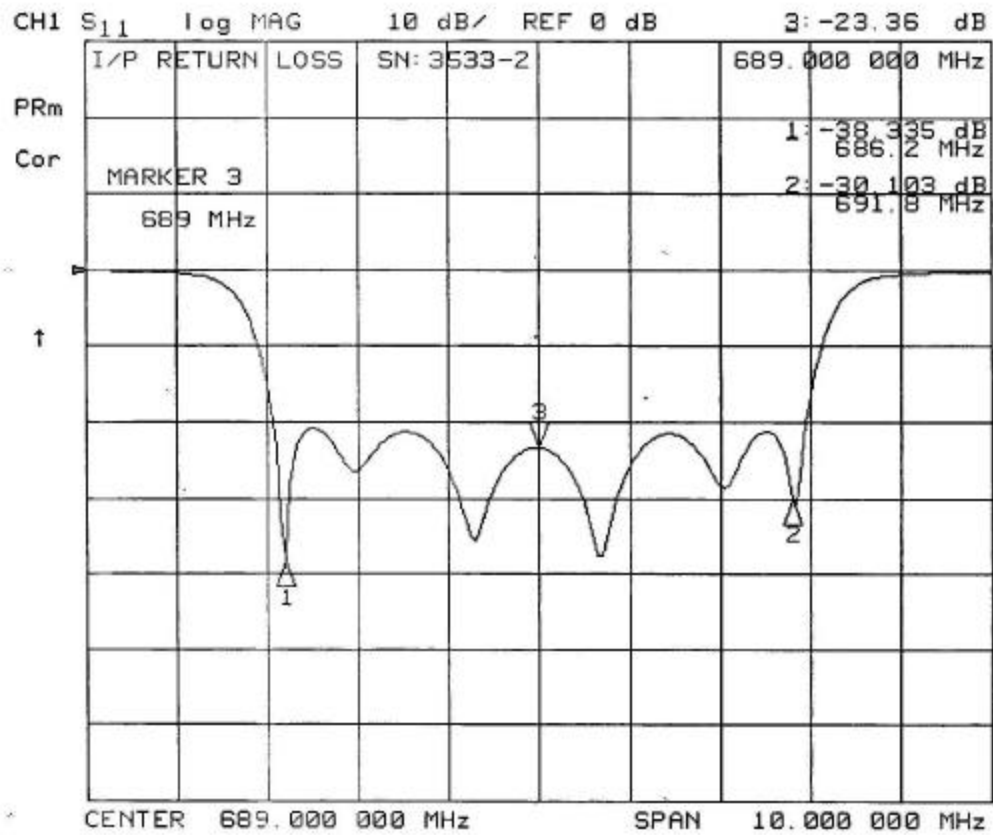
2.2 Output Filter Alignment:

The output bandpass filter must be aligned to the new channel. Typical channel filter response is as shown in the following figures:



Frequency Response

Application for FCC Certification Modulator Input 2500Watt UHF Translator



Return Loss.