UK MICROWAVE GROUP

3.4GHz Loan Equipment

Basic Description and Operating Instructions

INTRODUCTION

As part of its membership benefits, the UKuG loans out items of GHz bands equipment for short periods, usually 6 months. This allows members to get an idea about operation on the various bands before committing time and money to their own equipment. The equipment represents the type of equipment that can be assembled from a combination of homebrew, surplus and commercial parts.

SYSTEM DESCRIPTION

Built by M0GHZ, it comprises an SG Lab 3.4GHz – 432MHz transverter and a 15W Ionica PA in a weatherproof diecast box with a 10MHz OCXO. All transmit / receive switching is provided in the box, controlled by the external transceiver PTT. It is supplied with a patch panel antenna with a gain of 23dBi connected by an N-Type to N-Type LDF 2-50 patch lead. The user could alternatively supply and use a dish with a suitable feed. The transverter box and patch antenna have clamps to mount to a 2" pole. The transverter requires a nominal drive of 1W. Great care must be taken not to exceed the drive level.

UNDER NO CIRCUMSTANCES SHOULD THE DRIVE, INCLUDING TRANSIENT, EXCEED THIS POWER so many rigs will need an attenuator.

Power requirements are 13.8V at 7A. Note: The Ionica PA is supplied by a 10V LVD regulator with a maximum drop out voltage of 11.5V. Due to the volt drop in the supplied 10m of 2.5mm^2 cable, the minimum voltage required is approx. 12.5 V at the 4mm plugs, so battery operation will not be suitable.

Reverse supply protection is provided by a reverse biased diode and 10A 1.25" fuse in the transverter enclosure.

The Transverter produces approximately 14W at the connector on 3.4GHz with a maximum 432MHz drive of 1 Watt.

The transverter has the following, clearly marked, connectors and cables:

a) 3 pole 500V / 30A Multipole SP21 Bulkhead IP68 Waterproof Connector with mating plug and cable terminated in two 4mm stackable plugs for connection to the 13.8V supply, colour coded Red for +ve and Black for -ve, and a yellow phono plug for connection to the rig PTT.

b) N female for 432MHz IF input/output

c) N female for 3.4GHz antenna

PTT

PTT details given on the SG Labs data sheet are *active: LOW level or connect to ground*

Ideally this should be provided from a volt free relay contact driven by the rig PTT. For users of the IC-705/IC-9700 the 'Send' line can be used operate the PTT direct with suitable plug adaptors. The responsibility for ensuring the transverter does not damage the rig PTT line, or the rig PTT not damaging the transverter input lies with the loanee.

The SG Lab transverter can also be switched by applying DC voltage 5-15 V in the coaxial cable A bias tee is needed to insert DC power into coaxial cable. This has not been tested by UKuG and will require the VTT ON link to be made in the transverter.

Whilst the SG Lab transverter has a VOX feature the user is requested not to use this as it could have an adverse effect on the sequencing of the SMA relay and PA.

Under no circumstances should you operate the transverter without the feed connected, there is no VSWR protection for the PA!

BASIC OPERATION

Mount the panel antenna and transverter box on a vertical pole. Connect the 3.4GHz N type socket on the transverter box to the panel antenna using the suppled LDF 2-50 cable.

Connect the 432MHz transceiver, set for minimum Tx power, to the transverter 432MHz connector.

Connect up the Red and Black 4mm plugs to a 13.8V power supply.

Connect the PTT phono plug to the rig PTT line.

Note that the TCXO will take a few minutes to warm up and give an accurate and stable reference.

INITIAL SET-UP

With the power off, remove the transverter enclosure lid so the LEDs on the SG Lab transverter can be observed. Ensure that no rain/snow can enter the enclosure whist performing this operation.

Set the rig Tx power to minimum.

Switch on the power supply and keep a safe EMF distance from the antenna whilst setting the drive level, or alternatively fit a dummy load which will provide a good match at 3.4GHz and is rated at 15W minimum.

Set the rig to FM or CW and transmit. Increase the Tx power until the Input LED on the SG Lab transverter changes from orange (Input power low) to green – (Input power is normal). If the LED changes to red this indicates the input power is too high. It has been noted that some rigs have limited fine power adjustment making it impossible to obtain a green LED indication. In this eventuality it is necessary to remove the lid of the SG Lab transverter and adjust the TX TUNE pot (see page 5) to obtain a green LED indication.

Set the rig to Rx and remove power.

Replace the lid(s), ensuring the enclosure is dry, and that the gasket and mating face are clean while doing so.

NOTES

1. ***Whilst the box is weatherproof, the RF connectors etc are not, so for any operation outdoors you are responsible for providing weather protection. For short portable operations, a plastic bag can be used to keep the rain off, but for more permanent installations, proper weatherproofing of all connectors and leads is the responsibility of the loanee.***
2. ***Whilst the SG Lab data sheet is included for information, the loanee is requested not to make any changes to the settings other than to the VTT ON link, and to return it as delivered.***

SG LAB

3400 / 432 MHz Transverter V2

Specifications

	Min.	Typ.	Max.
Frequency range RF	3380 MHz		3480 MHz
Frequency range IF	420	432 MHz	450
LO Frequency:		see tables	
LO Accuracy at 20 deg. C		+/- 1 ppm	
LO temp. stability -20 ...+70 deg . C		+/- 2.5 ppm	
Output Power	2.5 W	3.0 W	
Power Supply	11.0 V	12.0V	15.0 V
Current Consumption		1.2 A	1.3 A
Input Power	0.2 W		5 W
Receive Gain , Adjustable	0 dB		+10 dB
Noise Figure (Split mode)		1.3 dB	
Noise Figure (Rx/Tx mode)		1.7 dB	
Dimensions			124x94x30mm
Spurious response		< -55 dBc	

Features

3 W output power
Low noise figure , GaAs pHEMT input stage
High performance UP / DOWN converters
High stability TCXO
Input for 10 MHz external reference oscillator
Internal Tx/Rx switch
Possibility to work with split Tx/Rx (selectable , required soldering)
Internal Directional Coupler
PTT can be switched by connecting PTT to ground, by RF power (RF VOX) or by DC voltage
Output SWR indicator - bi color LED
Optimal input power indicator - bi color LED
Integrated Sequencer
4 LO frequencies , programmable by PC (RS-232 , 3.3V levels)

3380-3480 MHz Rx/Tx (or TX only in Split Mode) SMA connector

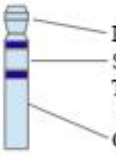
3380-3480 MHz RX only in Split Mode SMA connector

12 V power supply - DC Jack 5.5x2.1 mm
max. 1.3 A

IF 420-450 MHz SMA connector

Input LED
Output LED

PTT and Sequencer - 3.5 mm audio jack

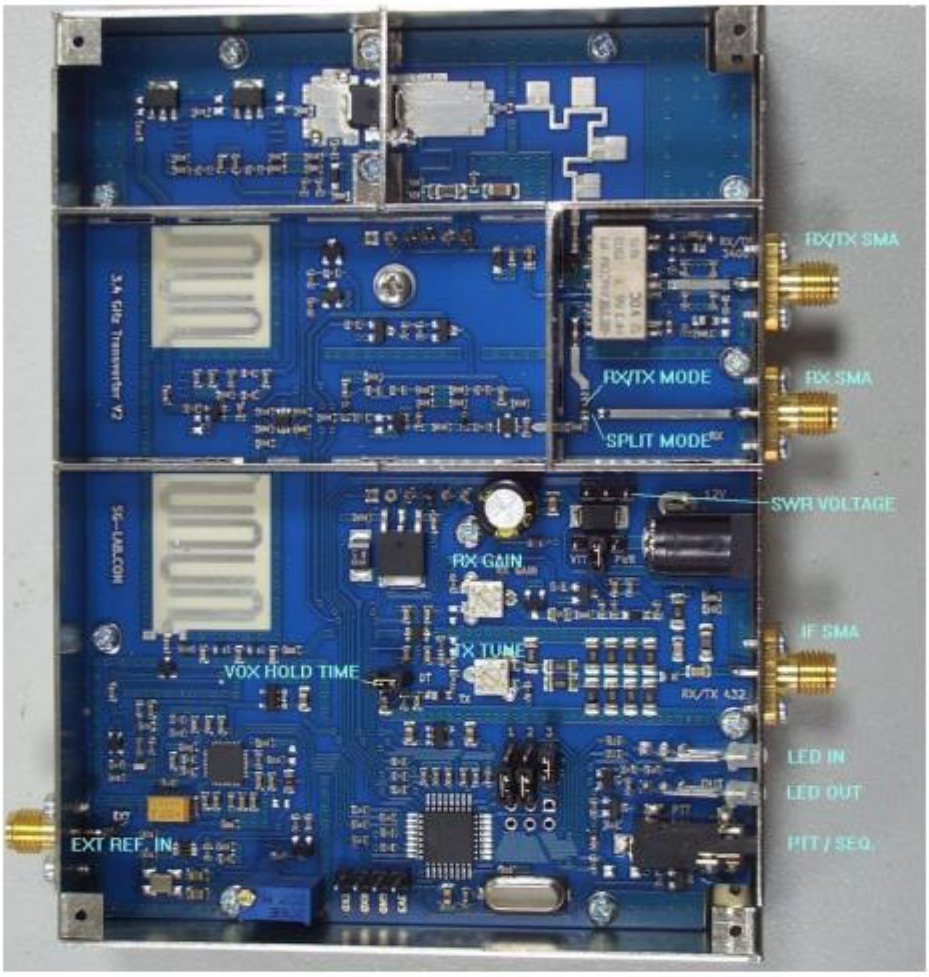


PTT - 3.5 mm audio jack , active: LOW level or connect to ground
Sequencer output , open collector NPN transistor 30V/0.3A max.
Time delay: 30 mS after PTT LOW. RF power is applied to the output after additional 30 mS
Ground

Input power adjustment:

Input LED color: orange - Input power is low
green - Input power is normal
red - Input power is too high

Output LED color : green - Excellent output SWR
orange - Moderate output SWR
red - High output SWR



Trimmers

RX GAIN - You can adjust the overall gain from 0 to +10dB
TX POWER - When PTT is LOW and power supplied to the IF input , rotate until the "Input" LED lights up in green

SWR Voltage

Can be measured by high impedance voltmeter
FWD - voltage of forward wave
REF - voltage of reflected wave
GND - ground

PWR / VTT

PWR ON: The Transverter can be DC powered by coaxial cable.
VTT ON: PTT can be switched on by applying DC voltage 5-15 V in coaxial cable
A bias tee is needed to insert DC power into coaxial cable.

DET

OFF - RF VOX detector time is low
ON - RF VOX detector time is high (0.3 - 0.5sec.)

RF VOX is always switched ON. The Transverter automatically switches to the TX mode when RF power is applied to IF (430-440 MHz input)

Jumper 3

ON - Internal frequency reference is used
OFF - Internal reference is switched OFF. External reference with 10 MHz frequency with -10...0 dBm power must be connected to **Ext Reference Input SMA**
The transverter needs **restart** to switch between two modes.

PLL unlock indicator: Blinking Input LED in Red means a PLL unlock.

Default LO Frequencies

Jumpers	1	2	LO Freq. , MHZ Rx / Tx
LO Frequency 1	off	off	2968 / 2968
LO Frequency 2	on	off	3024 / 3024
LO Frequency 3	off	on	2970 / 2970
LO Frequency 4	on	on	3026 / 3026

Alternate LO Frequencies

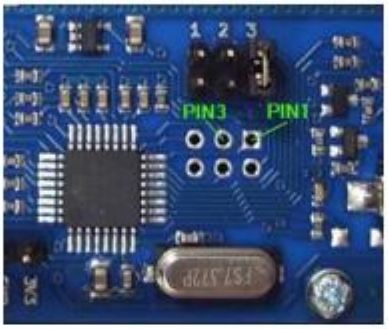
Jumpers	1	2	LO Freq. , MHZ Rx / Tx
LO Frequency 1	off	off	2968 / 2968
LO Frequency 2	on	off	2966 / 2966
LO Frequency 3	off	on	2963 / 2963
LO Frequency 4	on	on	2960 / 2960

How to program alternate frequencies:

1. Switch power OFF
2. Connect PIN 3 to GND
3. Switch power ON . Whenn IN LED light up in green, alternate frequencies are loaded in non-volatile memory

How to return to default frequencies

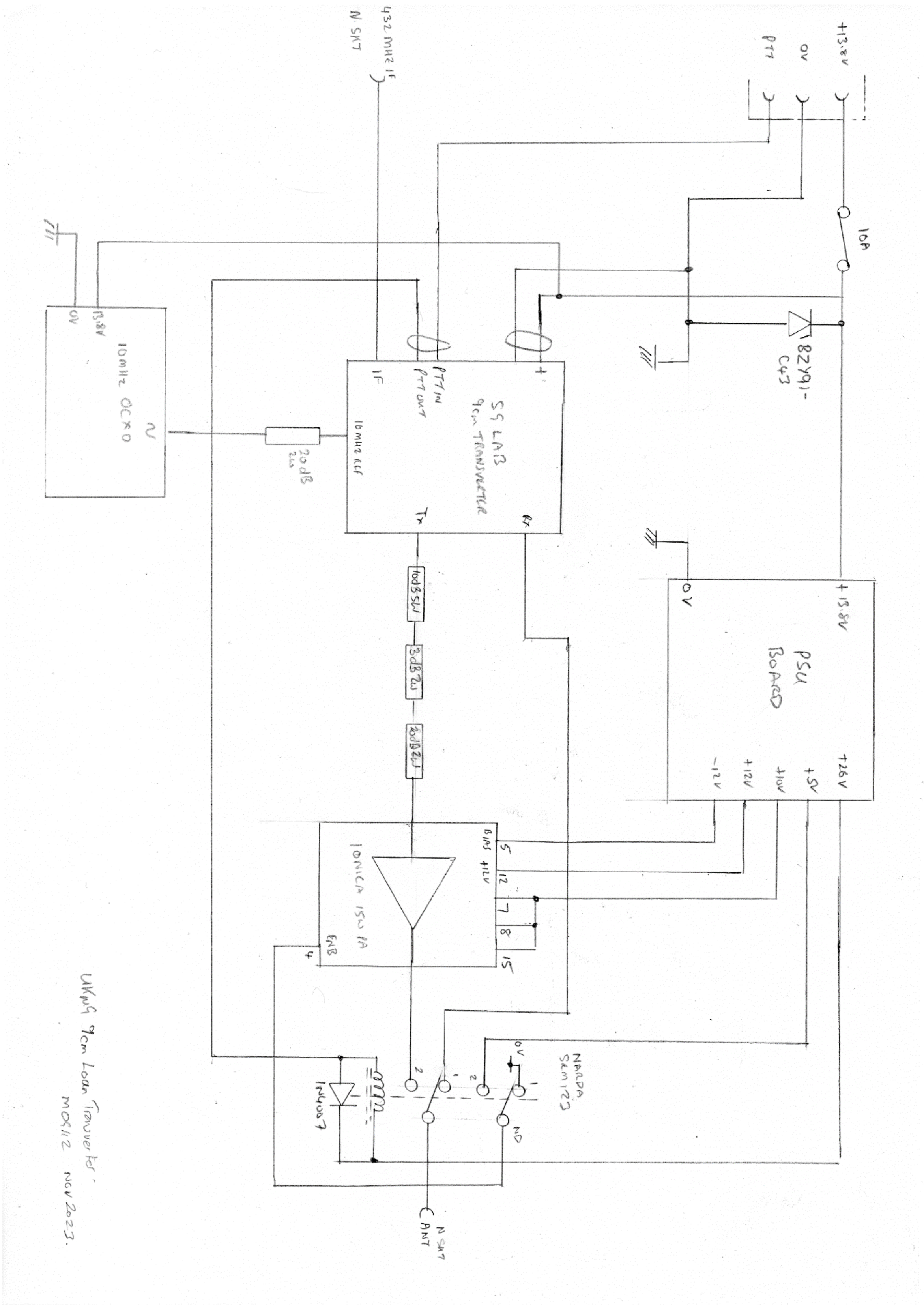
The same , connect PIN1 to GND



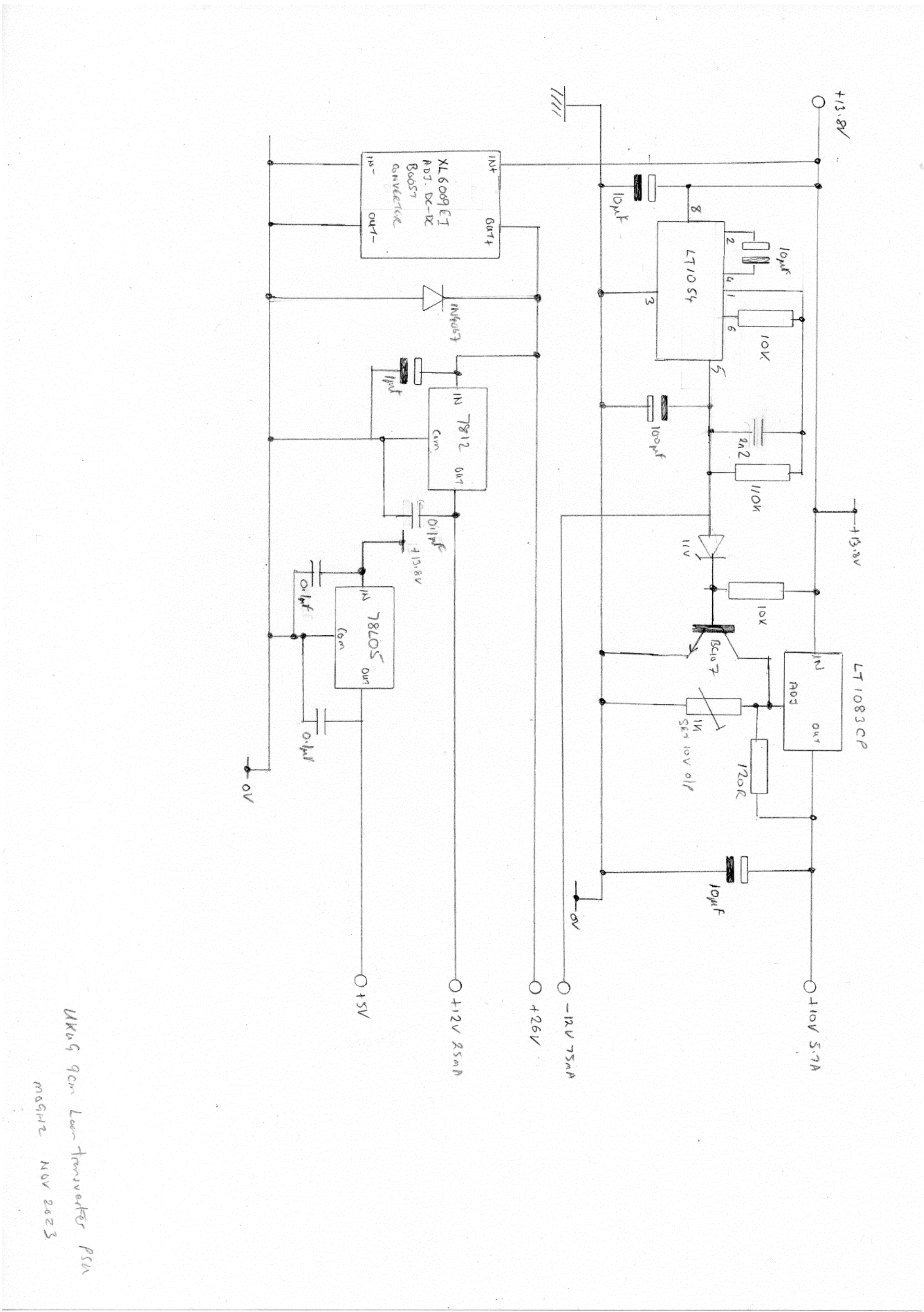
How to understand what is the current LO frequency:

After switching power ON, input LED lights up in Red for 3 sec. If you switch ON and hold PTT during this time, you can hear on CW , on 432.000 MHZ what are current LO frequencies - RX and TX .

V2 2/2020



432 MHz IF
N SKT
+13.8V
0V
PTT
10A
BZY91-C43
10MHz OCXO
13.8V
0V
SG LAB 9cm TRANSVERTER
IF
PTT IN
PTT OUT
10MHz REF
20dB 2W
Tx
Rx
10dB 5W
3dB 2W
20dB 2W
PSU BOARD
0V
+13.8V
-12V
+12V
+10V
+5V
+26V
IONICA 15W PA
BIAS
+12V
5
12
7
8
15
ENB
4
NARDA SEM123
1N4007
NO
N SKT
ANT
UKuG 9cm Loan Transverter -
Nov 2023.


+13.8V
XL6009EJ
ADJ. DC-DC
BOOST
CONVERTER
LT1054
7812
78L05
LT1083CP
BC107
+5V
+12V 25mA
+26V
-12V 75mA
+10V 5.7A
0V