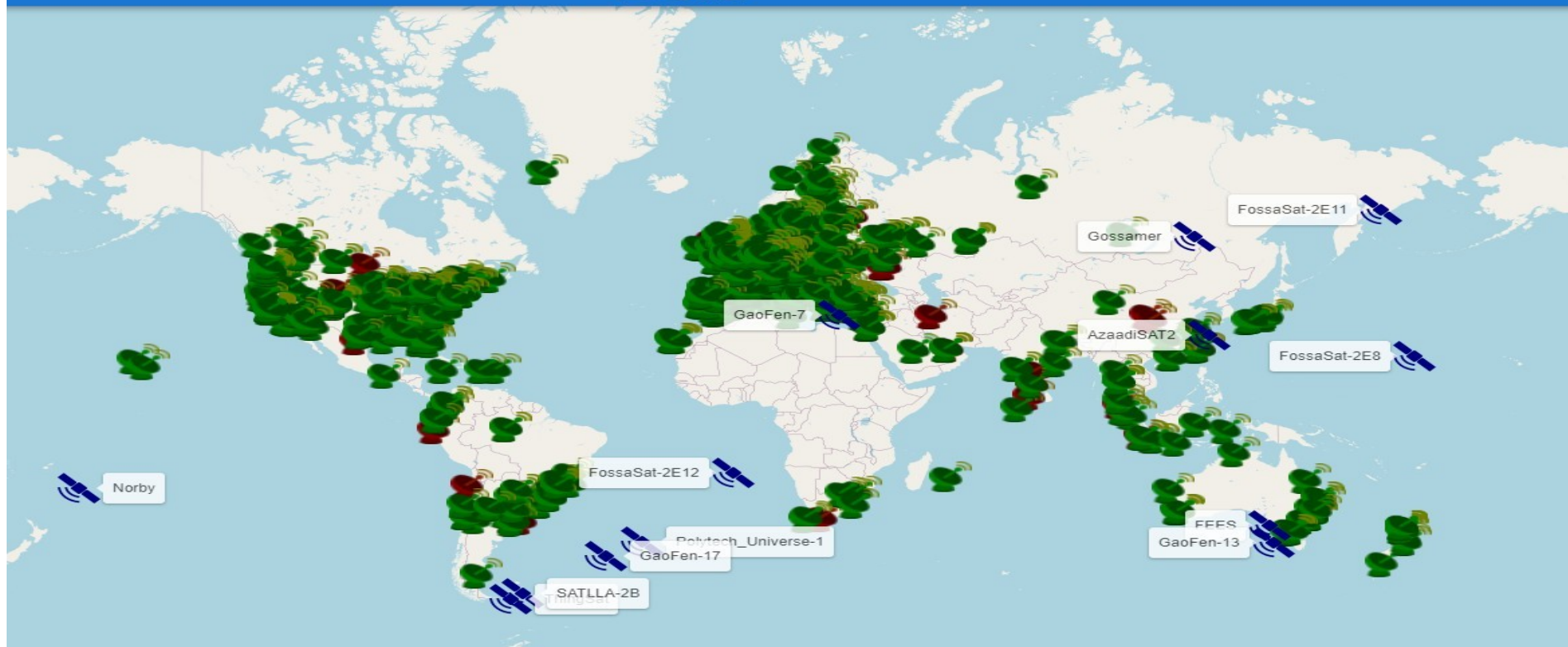


# TinyGS



# Was ist TinyGS?

- Empfang von Satelliten (und Ballons), die LoRa verwenden
- Verwendung von billigen ESP32-Boards (z.B. Lora32, TTGO-T-Bea
- Steuerung des RX mittels MQTT von zentralem Server
- Bereitstellung der empfangenen Daten an den Erbauer des Sat
- Über 1000 aktive Empfangsstationen weltweit
- Wissensaustausch via Telegram



# Installation

- <https://github.com/G4lile0/tinyGS>
- <https://github.com/G4lile0/tinyGS/wiki/Quick-Start>
- Falls das Board schon eine andere Firmware geladen hatte, bi  
vorhandene Firmware löschen, z.B mit PlatformIO oder dem esptc  
`esptool.py --port COM27 --chip esp32 erase_flash`
- Nutzung des TinyGS-Uploader
- Board konfigurieren  
<https://github.com/G4lile0/tinyGS/wiki/Ground-Station-configuration>

# Board konfigurieren

Nicht sicher | 192.168.1.117



Station dashboard

Configure parameters

Upload new version

Restart Station

192.168.1.117/dashboard



### Groundstation Status

Name	DE5RBVgs_3
Version	2105260
MQTT Server	CONNECTED
WiFi	CONNECTED
Radio	READY
Test Mode	DISABLED

### Modem Configuration

Listening to	GaoFen-7
Modulation	LoRa
Frequency	400.45
Spreading Factor	9
Coding Rate	5
Bandwidth	500.00

### Last Packet Received

Received at	15:17:00
Signal RSSI	-124.00
Signal SNR	-11.00
Frequency error	4320.13

```
15:16:00 [SX12x8] Frequency error: 3296.722900 Hz
15:16:00 [SX12x8] CRC error! Data cannot be retrieved
15:16:30 [SX12x8] RSSI: -119.500000 dBm
[SX12x8] SNR: -7.500000 dB
[SX12x8] Frequency error: 3296.722900 Hz
15:16:30 Packet (100 bytes):
15:16:30 ebf64009e7ef2e07f81061b9517947cececd36eac8e96269625961409e7ef2c00004ad2ca9f39d00b1342c2e288436c6457432a6c1743a3adb4ad2ca9f39d00b1342
15:16:45 [SX12x8] RSSI: -121.750000 dBm
[SX12x8] SNR: -9.750000 dB
[SX12x8] Frequency error: 3816.816650 Hz
15:16:45 Packet (100 bytes):
15:16:45 ebf68009e7ef3d07f81061b9517947cececd36eac8e96269625961409e7ef3b00004ad2c0b39eafea242c2e270436c64614327161a43a5d1cc4ad2c0b39e112cb42
15:17:00 [SX12x8] RSSI: -124.000000 dBm
[SX12x8] SNR: -11.000000 dB
[SX12x8] Frequency error: 4320.133301 Hz
15:17:00 Packet (100 bytes):
15:17:00 ebf6c009e7ef4c07f81061b9517947cececd36eac8e96269625961409e7ef4a00004ad2d0903a007c6e42c2e25e436c646a4322e41d43a863dd4ad2d0903a007c6e42
15:22:00 Attempting MQTT connection...
15:22:00 If this is taking more than expected, connect to the config panel on the ip: 192.168.1.117 to review the MQTT connection credentials.
15:22:03 Connected to MQTT!
```

Enter command

Go Back



#### System configuration

GroundStation Name (will be seen on the map)

DE5RBVgs\_3

Password for this dashboard (user is **admin**)

WiFi SSID

5rbv-m

WiFi password

Latitude (3 decimals, will be public)

49,764

Longitude (3 decimals, will be public)

11,950

Time Zone

Europe/Berlin

MQTT credentials (get them [here](#))

Server address

mqtt.tinygs.com

Server Port

8883

MQTT Username

1331188417

MQTT Password

#### Board config

Board type

T-BEAM V1.0 + OLED

OLED Bright

2

Enable TX (HAM licence/ no preamp)

Allow Automatic Tuning

Allow sending telemetry to third party

Test mode

Automatic Firmware Update

Advanced Config (do not modify unless you know what you are doing)

Board Template (requires manual restart)

Modem startup

```
{"mode":"LoRa","sat":"GaoFen-7","NORAD":54687,"freq":400.45,"bw":500,"pl":8,"
```


Advanced parameters

Apply

[Firmware update](#)

# MQTT-Username und Passwort

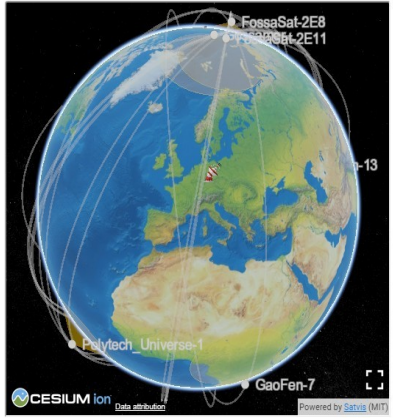
- <https://t.me/joinchat/DmYSElZahijGwHX6jCzB3Q>

- A screenshot of a Telegram chat interface with a green patterned background. The chat contains several messages:
  - A white message bubble: "I hope you have a good time. And thanks for joining the TinyGS community." with a timestamp of "09:51".
  - A white message bubble: "These are the currently available commands:  
/mqtt - Creates or edits your MQTT account  
/stations - Shows the status of your stations  
/delete - Deletes one station from the database.  
/weblogin - Generates a login link for the web." with a timestamp of "09:51".
  - A green message bubble: "/mqtt" with a timestamp of "09:51" and two checkmarks.
  - A white message bubble: "This are your own credentials for MQTT (These are private, do not share them!):  
User: 1331188417".

# Anzeige der empfangenen Daten

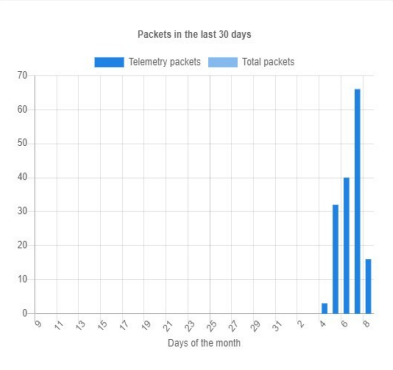
← BACK DE5RBVgs\_3 Console

Status ● Online	Listening GaoFen-7	Version 2105260	Creation date 9 days ago
Last seen a few seconds ago	Last Packet 9 minutes ago	Position (Lat, Long) 49.764, 11.95	QTH Locator JN59xs
Elevation 425.00 m	Auto tuning OFF	Test mode OFF	Confirmed packets 125
Telemetry packets 125	Type of antenna Turnstile	Band 308 - 516 MHz	Record distance 7921.1 Km

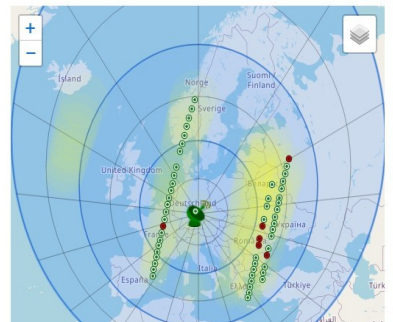



Powered by [Satble \(MIT\)](#)

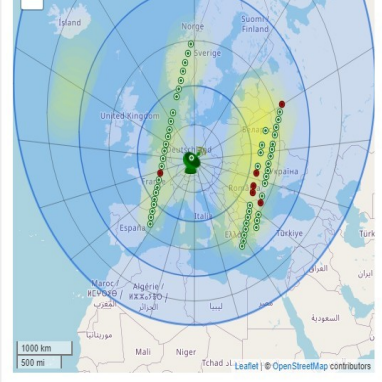
Packets in the last 30 days



Days of the month

Days of the month



<b>GaoFen-7</b>	Mode LoRa@400.45	Power 3000mW	Distance 1769Km	Elevation 10.15°	RSSI -124 dBm	SNR -11 dB	Predicted Doppler -5302.01Hz
Apr 8, 2023 3:17 PM (10 minutes ago)	Frequency Error 4320.13Hz	CRC Error	Received by 87 Stations				
<b>GaoFen-7</b>	Mode LoRa@400.45	Power 3000mW	Distance 1704Km	Elevation 11.15°	RSSI -121.75 dBm	SNR -9.75 dB	Predicted Doppler -4813.42Hz
Apr 8, 2023 3:16 PM (10 minutes ago)	Frequency Error 3816.82Hz	CRC Error	Received by 97 Stations				
<b>GaoFen-7</b>	Mode LoRa@400.45	Power 3000mW	Distance 1653Km	Elevation 12.00°	RSSI -119.5 dBm	SNR -7.5 dB	Predicted Doppler -4335.13Hz
Apr 8, 2023 3:16 PM (10 minutes ago)	Frequency Error 3296.72Hz	CRC Error	Received by 103 Stations				
<b>Unknown</b>	Mode LoRa@400.45	Power --	Distance 1568Km	Elevation 13.50°	RSSI -125.25 dBm	SNR -13.25 dB	Predicted Doppler -3244.37Hz
Apr 8, 2023 3:16 PM (11 minutes ago)	Frequency Error 2273.31Hz	CRC Error ●	Received by 123 Stations				



# Anzeige der eines Datenpaketes

## Norby

Received on: April 8, 2023 2:37 PM  
LoRa 436.703 Mhz SF: 10 CR: 5 BW: 250 kHz  
Sat In Sun Eclipse Depth: -66.01°  
Theoretical coverage 5076 km

2000mW 17°C  
 8242mV 1364mW 17°C  
 2573mW 12828mAh 6134mW  
 Board PMM: 9°C PAM: 12°C PDM: 7°C  
 Solar Array X: 8°C X+: 7°C  
 2045.60810

### Hexadecimal view

Download

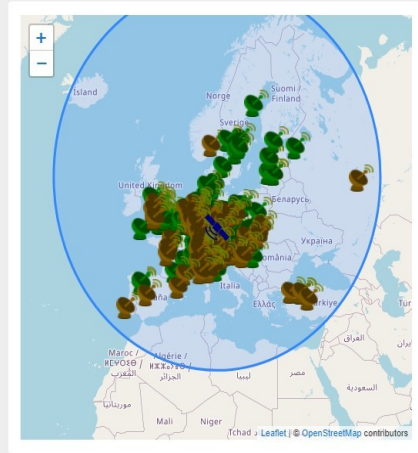
```
0 1 2 3 4 5 6 7 8 9 A B C D E F 0123456789AB
0000 8E FF FF FF FF 0A 06 01 C9 B3 B1 00 00 00 00 F1 .....
0010 0F 00 00 8A ED 85 7A DE 01 42 52 4B 20 4D 57 20 .....Z...BRK
0020 56 45 52 3A 30 35 61 5F 30 31 00 00 00 00 0E VER:05a_01..
0030 01 00 FD 07 00 00 00 02 11 00 08 DB 0A 8A F8 25 .....
0040 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 .....
0050 00 00 00 00 00 00 00 23 00 07 00 05 FF DD FD .....#...
0060 00 00 00 00 00 00 04 04 0F 0F 0F 0F 0F 0F .....
0070 07 08 BF FC B2 60 0A 1C 32 0E 0C 00 0C 00 00 F6 .....2...
0080 17 0D 0A 54 05 09 0C 07 00 60 10 32 20 04 A2 ...T.....2
```

### Raw parsed view

copy

```
{ ... }
```

Station Name 580 Km 67.64° 14:37:15.920 -123.75 dBm -12.75 dB 1025.98 Hz 434.1105 Hz



### Hexadecimal view

Download

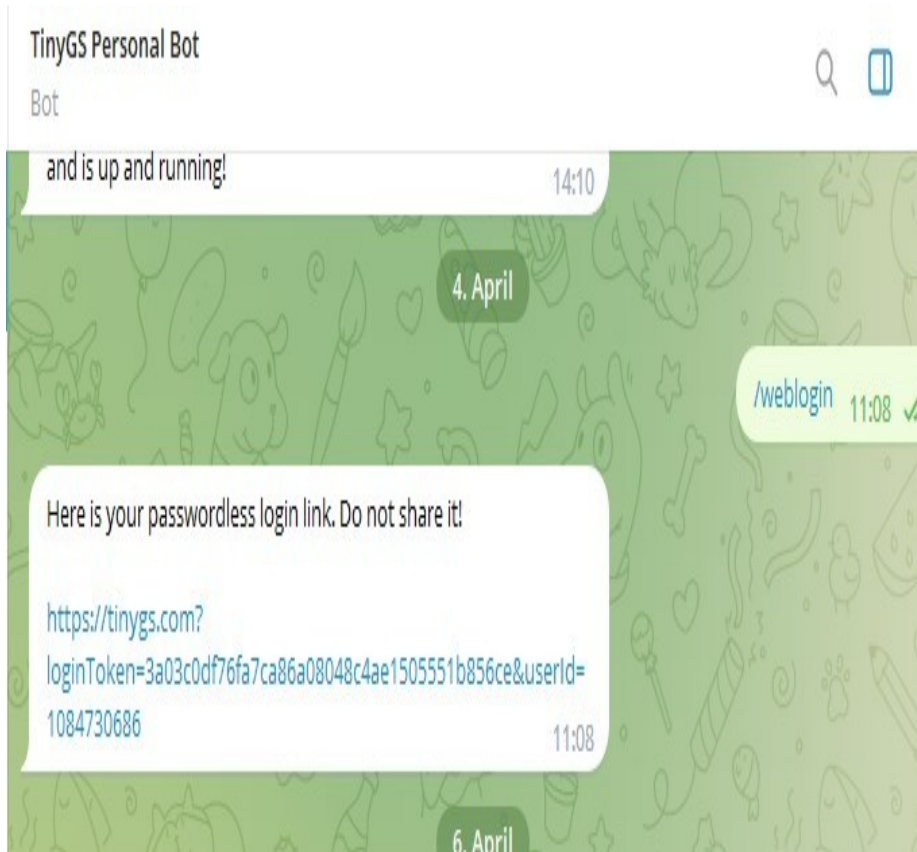
```
0 1 2 3 4 5 6 7 8 9 A B C D E F 0123456789AB
0000 8E FF FF FF FF 0A 06 01 C9 B3 B1 00 00 00 00 F1 .....
0010 0F 00 00 8A ED 85 7A DE 01 42 52 4B 20 4D 57 20 .....Z...BRK
0020 56 45 52 3A 30 35 61 5F 30 31 00 00 00 00 0E VER:05a_01..
0030 01 00 FD 07 00 00 00 02 11 00 08 DB 0A 8A F8 25 .....
0040 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 .....
0050 00 00 00 00 00 00 00 23 00 07 00 05 FF DD FD .....#...
0060 00 00 00 00 00 00 04 04 0F 0F 0F 0F 0F 0F .....
0070 07 08 BF FC B2 60 0A 1C 32 0E 0C 00 0C 00 00 F6 .....2...
0080 17 0D 0A 54 05 09 0C 07 00 60 10 32 20 04 A2 ...T.....2
```

### Raw parsed view

copy

```
{
  header: {
    length: 142,
    receiverAddress: 4294967295,
    transmitterAddress: [ ... ],
    transactionNumber: 45491,
    reserved: [ ... ],
    msgTypeId: 0
  },
  payload: {
    frameStartMark: [ ... ],
    frameDefinition: 0,
    frameNumber: 60810,
    frameGenerationTime: 31357573,
    brkTitle: "BRK MW VER:05a_01 00",
    brkNumberActive: 0,
    brkRestartsCountActive: 2045,
    brkCurrentModeId: 0,
    brkTransmitterPowerActive: 2,
    brkTempActive: 17,
    brkModuleStateActive: [ ... ],
    brkVoltageOffsetAmplifierActive: 2779,
    brkLastReceivedPacketBssiActive: 110
  }
}
```

# Anpassen der eigenen Station



TINY GS BETA


SIGN OUT


### User Console

We are still working on this component.)

We are still working on this component.)

Station Name	Listening	Version	Last packet	Auto tune	Test mode	Telemetry packets	Confirmed packets
DESRBVgs_4	FossaSat-2E11	2105260	15 minutes ago	ON	OFF	8301	8680
DESRBVgs	FossaSat-2E11	2105260	14 minutes ago	ON	OFF	2951	3365
DESRBVgs_3	GaoFen-7	2105260	15 minutes ago	OFF	OFF	125	125
DESRBV	Norbi	2105260	2 years ago	ON	OFF	56	88
DESRBVgs_8	ThingSet	2105260	7 months ago	OFF	OFF	0	0


BETA

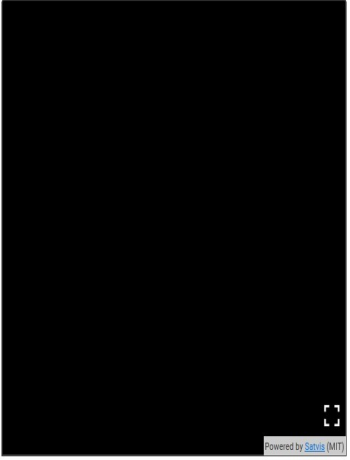

SIGN OUT

---

← **DE5RBVgs\_3 Console**

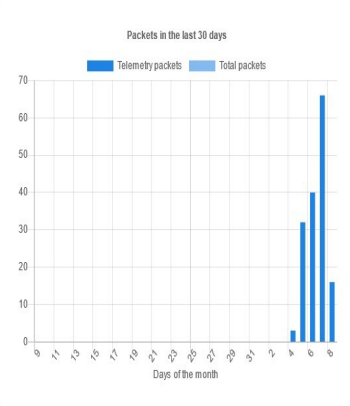
EDIT STATION
OPERATE


Status	Listening	Version	Creation date
● Online	GaoFen-7	2105260	9 days ago
Last Packet	Position (Lat, Long)	QTH Locator	Elevation
15 minutes ago	49.764, 11.95	JN59xs	425.00 m
Auto tuning	Test mode	Confirmed packets	Telemetry packets
OFF	OFF	125	125
Type of antenna	Band	Record distance	Local IP
Turnstile	308 - 516 MHz	7921.1 Km	<a href="#">192.168.1.117</a>



Powered by [Satvis](#) (MIT)

Packets in the last 30 days





## Edit station parameters

Name  
DE5RBVgs\_3

Description

0 / 500

Discone

1/4λ Collinear

5/8λ Collinear

Eggbeater

Eggbeater 2

1/4λ Ground plane

Drag and drop to upload photos of your station!  
 ...or click to select a picture from your computer

SAVE

### Operation

Automatic Tuning ⓘ

Auto Tune  
Disabled

Manual Tuning

Satellite Name: GaoFen-7

NORAD: 54687

Frequency: 400.4 MHz

Mode: LoRa

Spreading Fa...: 9 MHz

Bandwidth: 500 kHz

Coding Rate: 5

Syncword: 18

CRC: Enable

Preamble L...: 8

FLDRO: Disable

Current limit: 120

Gain: 0

TX Power: 5

CONFIG SAVED

### Transmission

Transmission is disabled on your station by hardware configuration. This is a security feature, you can allow transmission in the local station configuration dashboard.

TEXT BINARY

This option will transmit a plain text message from your station. It will be encoded in 8 bit ASCII.

Message to transmit

SEND TX ⌘

SEND TEST FRAME ⌘

### Operation

Automatic Tuning ⓘ

Manual Tuning

Satellite Name: GaoFen-7

Spreading Fa...: 9 MHz

Bandwidth: 500 kHz

Coding Rate: 5

Syncword: 18

CRC: Enable

Preamble L...: 8

FLDRO: Disable

Current limit: 120

Gain: 0

TX Power: 5

CONFIG SAVED

### Transmission

Auto Tune

- Enabled 433
- Enabled 868-915
- Enabled 2.4G
- Disabled

# Beispiele für Stationen

← BACK GroundStation\_RIOJA Console

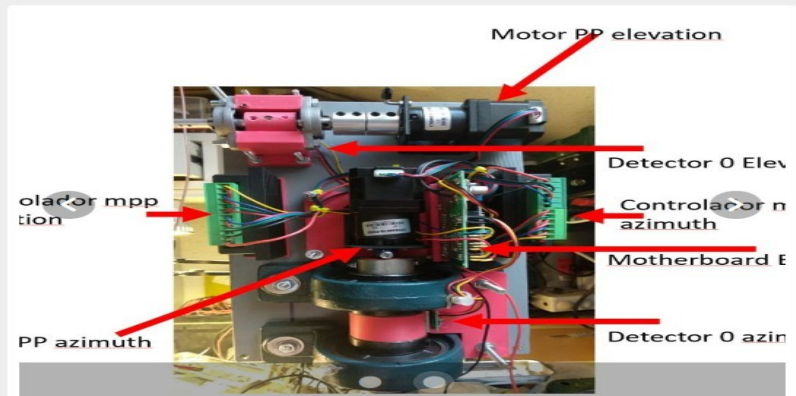


Status ● Online	Listening FossaSat-2E8	Version 2303252	Creation date 2 years ago
Last seen a few seconds ago	Last Packet 2 minutes ago	Position (Lat, Lang) 42.454, -2.436	QTH Locator IN82sk
Elevation 394.00 m	Auto tuning ON	Test mode OFF	Confirmed packets 23873
Telemetry packets 22788	Type of antenna Yagi-Uda	Band 393 - 467 MHz	Record distance 12955.5 Km

#### Description

Yagi Uda: <https://www.ebay.es/itm/403485449946> + rotor home made: [https://github.com/redmilenium/ROTOR\\_PLUS](https://github.com/redmilenium/ROTOR_PLUS) + Lna: [https://www.guerrilla-rf.com/products/CustomTunes?sku=2080&file\\_name=GRF2080%20430-450MHz.pdf](https://www.guerrilla-rf.com/products/CustomTunes?sku=2080&file_name=GRF2080%20430-450MHz.pdf) + PCB lna: [https://www.guerrilla-rf.com/includes/prodFiles/Manufacturing/GRF208X\\_RevA.zip](https://www.guerrilla-rf.com/includes/prodFiles/Manufacturing/GRF208X_RevA.zip) + Filtro pasa banda + TTGO

← BACK GroundStation\_RIOJA Console



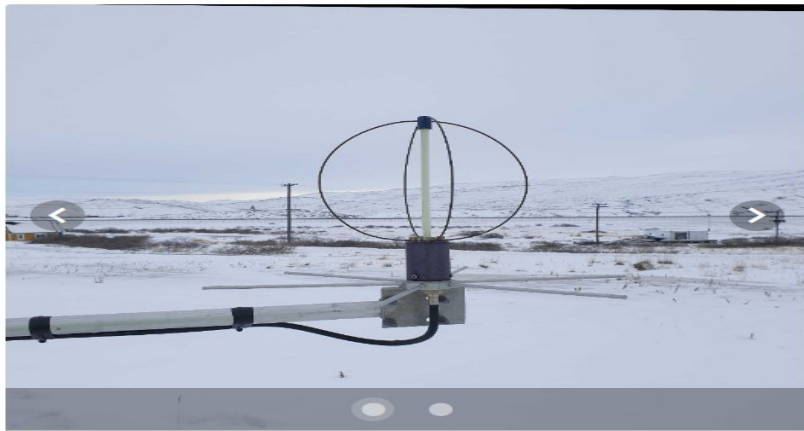
Status ● Online	Listening FossaSat-2E8	Version 2303252	Creation date 2 years ago
Last seen a few seconds ago	Last Packet 2 minutes ago	Position (Lat, Lang) 42.454, -2.436	QTH Locator IN82sk
Elevation 394.00 m	Auto tuning ON	Test mode OFF	Confirmed packets 23873
Telemetry packets 22788	Type of antenna Yagi-Uda	Band 393 - 467 MHz	Record distance 12955.5 Km

#### Description

Yagi Uda: <https://www.ebay.es/itm/403485449946> + rotor home made: [https://github.com/redmilenium/ROTOR\\_PLUS](https://github.com/redmilenium/ROTOR_PLUS) + Lna: [https://www.guerrilla-rf.com/products/CustomTunes?sku=2080&file\\_name=GRF2080%20430-450MHz.pdf](https://www.guerrilla-rf.com/products/CustomTunes?sku=2080&file_name=GRF2080%20430-450MHz.pdf) + PCB lna: [https://www.guerrilla-rf.com/includes/prodFiles/Manufacturing/GRF208X\\_RevA.zip](https://www.guerrilla-rf.com/includes/prodFiles/Manufacturing/GRF208X_RevA.zip) + Filtro pasa banda + TTGO

← BACK

## OX3HI\_1 Console



Status  
● Online

Listening  
GaoFen-13

Version  
2105260

Creation date  
2 years ago

Last seen  
a few seconds  
ago

Last Packet  
6 hours ago

Position (Lat, Lang)  
67.011, -50.73

QTH Locator  
GP47pa

Elevation  
37.00 m

Auto tuning  
ON

Test mode  
OFF

Confirmed packets  
26824

Telemetry packets  
26675

Type of antenna  
Eggbeater

Band  
401 - 479 MHz

Record distance  
13382.5 Km

### Description

Antenna: EB-432 EGGBEATER Preamplifier: SSB Super-Amp SP-70  
Receive: LILYGO® TTGO LoRa32 V1.1 433MHZ LoRa ESP-32 OLED  
0.96 Inch

← BACK

## ve3gtc\_TinyGS Console



Status  
● Online

Listening  
GaoFen-19

Version  
2105260

Creation date  
2 years ago

Last seen  
a few seconds  
ago

Last Packet  
6 hours ago

Position (Lat, Lang)  
45.3, -75.3

QTH Locator  
FN25ih

Elevation  
64.00 m

Auto tuning  
ON

Test mode  
OFF

Confirmed packets  
29254

Telemetry packets  
28422

Type of antenna  
5/8λ Ground  
plane

Band  
430 - 450 MHz

Record distance  
13306.6 Km

### Description

Custom Arduino form factor built using a Cytron screw terminal shield, Espressif ESP32 Wroom dev module, and Makerfabs LoRa 433MHz Arduino shield. Antenna is a Laird B4302N UHF 430 to 450MHz 2.4dB 5/8 wave antenna mounted on a custom 8 radial ground plane with a VHFDESIGN LNA EME ATF531 for 70cm band high quality 23dB gain very low noise switching preamplifier mounted just below the antenna with 75 feet of LMR270 coax feeding my radio rack inside the house.

# Nützliche Links

- <https://tinygs.com/>
- <https://github.com/G4lile0/tinyGS>
- <https://github.com/G4lile0/tinyGS/wiki/Quick-Start>
- <https://github.com/G4lile0/tinyGS/wiki/Ground-Station-configuration>
- <https://satnogs.org/>