# Fanavari Moj Khavar

# Products Catalog

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# Fanamoj history

Fanamoj as one of the pioneers of digital Telecommunication in Iran was established in 1998 by a group of university professors and researchers in the fields of Telecommunication, Electronics and Computer. As a High-Tech company, it has developed several products of wireless telecom and broadcast. To illustrate, DVB-T/T2 digital TV transmitters and modulators, DVB-S/S2 satellite broadcast equipment, Mpeg Re-Multiplexer and Radio Links from 5-38GHz are prominent products which have been designed and manufactured by the company. Due to our diverse product portfolio, our customers range from governmental authorities to private sector. Today more than 90 % of Low and medium power digital TV transmitters all around the country are Fanamoj products and we are one of the biggest suppliers of IRIB in transmitters and relevant equipment.

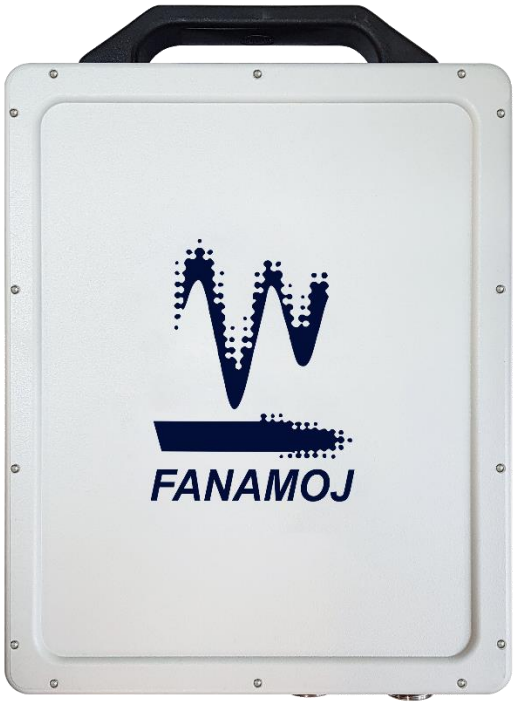
Competitive advantages of the company:

- Advanced Research and Development department including experienced university professors and researchers.
- More than 20000 $m^2$ production facility in Tehran with modern manufacturing-, QC-, and test- equipment.
- High financial and technical capability for participation in national and international projects.
- Wide range of national and international suppliers of diverse fields.

# 1. Radio links

# Full-Outdoor IP Radio (5GHz)

## FNJ-RO-IP-05




**Version 1**
**2022**

# Description

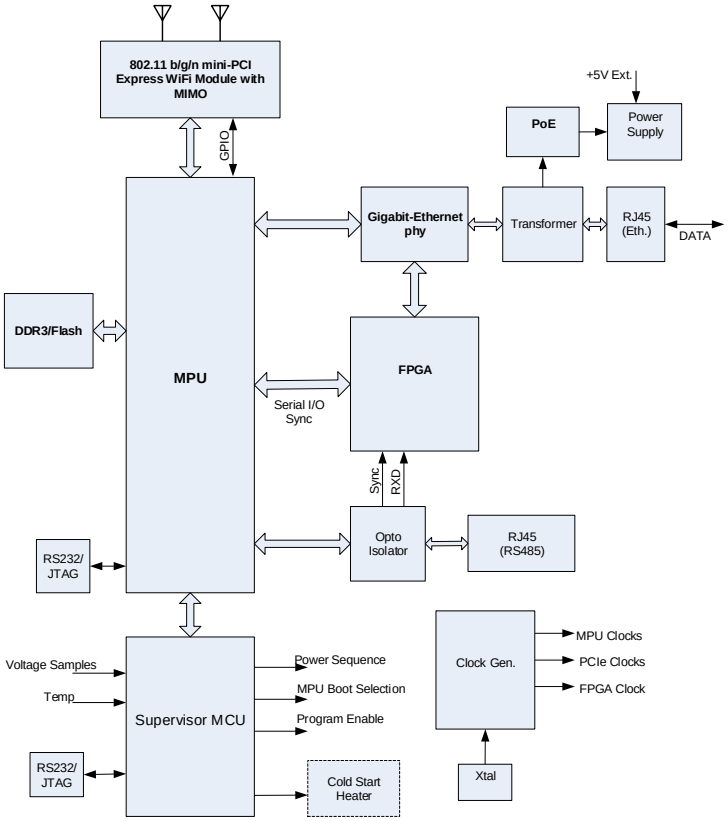
Fanamoj Company is one of the pioneers of wireless radio links in Iran and has designed and manufactured wide variety of licensed radio links on the 5-38 GHz bands.

FNJ-RO-IP-05 is our latest product, a license free Full-outdoor IP radio link which operates on 5 GHz band. This product was developed due the local market need for a secure, long range, industrial and reliable wireless radio link. The system provides up to 200 Mbps bitrate and ranges up to 100 km based on the antenna gain and environmental conditions.

# Features

- MIMO technology for diversity mode used in unstable conditions or increasing bitrate in normal conditions
- OFDM modulation for operation in multipath conditions and dense radio environments which increases link reliability
- Up to 100 km range with high gain antenna
- Asymmetric bitrate for send and receive directions
- Capability to operate in nLOS /NLOS
- Adaptable coding and modulation
- Automatic channel selection
- Spectrum viewer
- Queue Management
- DFS (Dynamic frequency selection)
- Web user interface for installation and configuration

# Block diagram



# Technical Descriptions

## ➢ Back Panel


## • Radio

| | |
|---|---|
| • Operating Frequency | 5250 ~ 5850 MHz |
| • Channel Bandwidth | 5, 10, 20, 40 MHz |
| • Max. Output Power | +23dBm |
| • Capacity | Net aggregate throughput up to 200 Mbps |
| • Modulation | MIMO2X2-OFDM (BPSK/QPSK/16QAM/64QAM) |
| • Error Correction | FEC: 1/2, 2/3, 3/4, 5/6 |
| • Security | AES 128 Encryption |
| • Duplexing Technology | TDD |
| • Range | Up to 100 km |
| • Power Feeding | Provided over ODU-IDU cable (PoE) |
| • Antenna Connectors | 2x N-type for External Antenna (Vertical and Horizontal in Dual Polarized type) |

## • Control & Monitoring

| | |
|---|---|
| Remote Connection Port | RJ45 (Ethernet 100/1000) |
| Remote User Interface | WEB, SNMP v1/v2/v3 |

## • Physical

### ▪ Power Requirement

| | |
|---|---|
| Operating Voltage | Power over Ethernet (42-56V) |
| Power Consumption | 25W max |

### ▪ Dimension & Weight

| | |
|---|---|
| Weight | 2.8 kg |
| Dimensions (W x H x D) | 19.7 cm x 24.3 cm x 4 cm (Width: 19 inch, Height: 1RU) |

### Environmental

| | |
|---|---|
| Operating Temperature | -30 ~ +60 °C |
| Relative Humidity | IP65 |

### Compliance

| | |
|---|---|
| Functionality | ETSI EN 302 217, EN 301 126, EN 302 326 |
| Safety | UL60950-1, EN 62368-1 |
| EMC | EN301 489-1, EN301 489-4 |

## Ordering

| Model | Type |
|---|---|
| FNJ-ROIP-05 | 5GHz IP Radio link |

# Microwave Radio Link (15~38GHz)

## FNJ-MOJ Family

**Version 1**
**Summer 2022**

# Description

Fanamoj Company with more than 22 years' of telecom and electronic experience, is one of the pioneers of wireless radio links in Iran. The company is committed to design and production of customer-adapted, high-quality wireless solutions at competitive prices. Wide variety of licensed and license free microwave radio links from 5 to 38 GHz have already been designed and produced for different governmental and private sector customers.

FNJ-MOJ-XX (XX = 15/18/23/38 GHz) family are split mount radio links for carrier-class multi-technology traffic aggregation. As high performance radio links, they are capable of high capacity transport with Carrier Ethernet, IP engine and multiple 1/10 Gbps ports, while maintaining full support of the E1 traffic. MOJ split mount radio links family are compact, cost effective, easy to install and efficient solution that offer up to 1 Gbps traffic on modulation schemes from QPSK to 1024 QAM.

# Features

- ODU From 15-38 GHz
- Up to 310 Mbps throughput upgradable to 1 Gbps
- Carrier-class multi-technology traffic aggregation
- Monitoring and control via SNMP V. 3
- Optimized for TCP/IP transport compliant to LTE traffic.
- QPSK to 1024 QAM modulation
- Hitless Adaptive Code and Modulation
- Header Compression
- Radio LAG over multiple ODU with XPIC
- Multi Carrier Aggregation up to 2+0
- Mixed TDM/Ethernet interfaces for dual native transport
- Single Universal ODU for any capacity and modulation
- Network Management System (NMS)

# Technical Descriptions

## • ODU+ Outdoor Accessories Specifications

| | |
|---|---|
| Power Supply | -36 ~ -72V DC |
| Power Consumption | < 25W |
| Aperture Polarization | Vertical & Horizontal |
| RF Interface | Integrated WR-42 |
| Outdoor Connector | N Type, 50ohm, Female |
| Interconnection Cable | Single RG-316 coaxial cable |
| ODU dimension | 280*92*280 |
| Weight | <4.5 |
| IP code | IP66 |
| Antenna diameter | 0.3/0.6 m |
| Gain | 35.5/40 |
| VSWR | 1.3 |
| Regulatory compliance | ETSI class 3 |
| Cross polarization | 30 |
| Polarization | V or H |


## • ODU Technical Features

| | |
|---|---|
| Frequency Range | 15/18/23/38 GHz |
| Modulation Method | QPSK/16QAM/32QAM/64QAM/128QAM/256QAM /512QAM/1024QAM |
| Traffic Capacity | 310Mbps upgradable to 1 Gbps |
| Power control | 1 dB step up to 30 dBm |
| TX Max Power | +24 dBm for QPSK<br>+21 dBm for 16QAM<br>+18 dBm for 32QAM<br>+18 dBm for 64QAM<br>+18 dBm for 128QAM<br>+17 dBm for 256QAM |
| Phase Noise @ 10 KHz | -60 dBc |
| Frequency Step | 250 KHz |
| Max RF Input | -20 dBm |
| RX Gain Range | 60 dB |
| RX Noise Figure at Max Gain | 6 dB |
| TX IF Center Frequency | 350 MHz |
| RX IF Center Frequency | 140 MHz |
| Frequency Stability | Better than ± 7 ppm |
| Ambient temp. | -40 to 60 ℃ |

## • IDU (MoDem+Interface) Electrical Specifications

| | |
|---|---|
| Power Supply | -40 ~ -60V DC |
| Power Consumption | < 30W |
| IF Interface | TNC-Type |
| E1 Impedance | 75 Ω |
| Heat dissipation | Fan cooling |
| Ambient temp. | IDU -5 to 55 ℃ |
| Case | Standard 2U 19-Inch Rack Mounted |
| Weight | <8 Kg |
| Dimension (H*W*D) | 442*225*90 mm |
| Cards | 1 modem card (+1 optional modem card) |
| | 1 CSU(E1 and Ethernet interfaces) |
| | Fan card |
| | Master/slave Redundant power supply |
| | 1 optional extended Ethernet card |

## • IDU Interface Specification

| | |
|---|---|
| E1 Inputs | 16+ E1 cross connect |
| Impedance E1 Inputs | 75 |
| Ethernet Inputs | 2FE/2Gbe/1 NMS port |
| VLAN | IEEE 802.1 VLAN |
| QoS | Egress 8 classes Queueing, ingress 8 classes classify(CoS) |
| STP | MSTP, RSTP(IEEE 802.1w) |
| LAG | LAG/LACP(802.1AX), radio traffic aggregation |
| Header compression | L2/L3/L4 header compression, payload compression |
| Maintenance | Support RMON performance statistics on various types of object (IETF RFC 2819) |
| Management plane | In band control network, M plane access control list |
| Physical interface | 2 RJ45 electrical port |
| | 2 optical SFP port |
| | 1 RJ45 NMS electrical port |
| MAC table | Up to 8000 |
| Support Jumbo frame bytes | FE<2000 |
| | Gbe<9600 |
| NMS interface types | Ethernet port (SNMP V3.0 Protocol) |
| NMS features | Fault management |
| | Configuration management |
| | Report management |
| | Performance management |
| | Security management |
| | Topology management |

# • Monitoring Parameters

| | | |
|---|---|---|
| Modem Supply Voltage Monitor | | Power supply voltage and current monitoring |
| Temperature | | IDU/ODU Temperature |
| OW Configuration | | TX/RX Gain control |
| Loopback types | | E1 Loopback |
| E1 Remote Loopback | | |
| Modem Digital Loopback | | |
| IF Loopback | | |
| RF Loopback | | |
| BER Monitoring | | BER Monitoring |
| EVM Monitoring | | EVM Monitoring |
| E1 LOS Monitoring in LIU | | E1 LOS Monitoring |
| E1 AIS Monitoring in LIU | | E1 AIS Monitoring |
| E1 Monitoring in LIU | | E1 Monitoring |
| RX Sync Loss Monitoring | | RX Sync Loss Monitoring |
| MODEM Connection Status | | MODEM Connection Status |
| Active E1 Selection | | Active E1 Selection/Monitoring |
| Date/Time | | Date/Time Setting/Monitoring |
| TX Power Mode Selection: ATPC/Normal | | Power Mode Selection: ATPC/Normal and optimum RX signal level |
| Password | | Password Setting |
| Ethernet Capacity Selection | | Ethernet Capacity Selection |
| Synthesizer and PLO Lock | | Synthesizer and PLO Lock |
| Modem RX Level | | |
| | | Modem RX Level upper/lower bounds |
| Configuration/Monitoring | | |
| Modem in CW mode | | CW mode Activate/Deactivate |
| Reed Solomon Activate/Deactivate | | Reed Solomon Activate/Deactivate |
| TX Sync Status | | TX Sync Loss Monitoring |
| ODU Modem connection Status | ODU | Modem connection Status Monitoring |
| Synthesizer and PLO Lock | | Synthesizer and PLO Lock Monitoring |
| ODU TX Power | | TX gain control + ODU TX power Monitoring |
| ODU Temperature Monitor | | Temperature Boundary Configuration/ Monitoring |
| ODU RX Power | | RX gain control + ODU RX power Monitoring |

# UHF/VHF Portable Link

## FNJ-UHFL-01

**Version 1**
**2020**

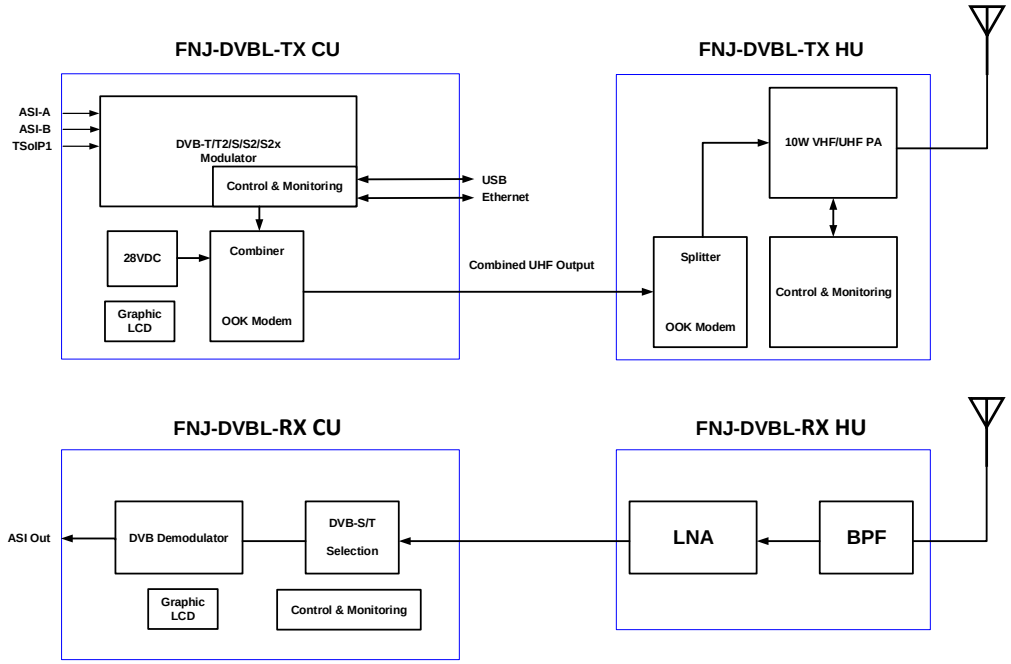
# Description

FNJ-UHFL-01 is a one way radio link on UHF/VHF band which enables TV signal transmission between adjacent stations or even mobile live broadcast (The Tx unit of this system is capable of mobile signal transmission). Usually the TV signal transmission with microwave links requires expensive and complicated devices due to needed bandwidth. UHF link is very cost effective and efficient due to wider bandwidth and availability of low cost modules. Furthermore, UHF band enables longer range and nLOS communication especially in cities which providing a secure communication link is difficult. The customer can order the system in three configurations: fixed, mobile and marine for live broadcast from vessels.

# Features

- Near Line Of Sight communicaiton in DVB-T/T2 mode
- Up to 180 Mbps bitrate
- Up to more than 100 Km link range
- Fixed or portable modes
- Ship to shore Broadcast
- Economic and efficient solution with competitive price
- Optimized bandwidth usage (50 Mbps in 8 MHz bandwidth)
- Fast and easy set up ,installation and maintenance
- High security and encryption capability
- Frequency band scan capability
- Frequency diversity and  different configuration capability (1+0, 1+1)
- Simultaneous transfer of two DVB-T signals for increasing bitrate up to 63.5 Mbps

# Block Diagram




# Technical Descriptions

## ➢ Technical Specifications

### • TX

#### ▪ Input

| | |
|---|---|
| Connector | 2x BNC, 75 Ohm |
| Input Level | IP (ULE), ASI, Ethernet for TSoIP |

#### ▪ Output

| | |
|---|---|
| Frequency Range | 170~235MHz (VHF) / 470~860MHz (UHF) |
| TX Power | Up to 13W (nominal) |
| TX Antenna | Patch Antenna, Panel Antenna, LDPA, Discone |

**Supported DVB-T2 Modes:**

| | |
|---|---|
| Modulation Mode | Single PLP, Multi-PLP |
| Bandwidth | 8MHz |
| FFT Size | 1K, 2K, 4K, 8K, 16K, 32K (including extended modes) |
| Guard Interval | 1/32, 1/16, 1/8, 1/4, 1/128, 19/128, 19/256 |
| Constellation | QPSK, 16QAM, 64QAM, 256QAM |
| Interleaving | Time, Frequency, Cell |
| Max. Throughput | 50.34 Mbps |
| Code Rate | 1/2, 3/5, 2/3, 3/4, 4/5, 5/6 |

**Supported DVB-S2/S2X Modes:**

| | |
|---|---|
| Constellation | QPSK, 8PSK, 16APSK and 32APSK |
| Inner Coding Rate: | |
| QPSK | 1/4, 1/3, 2/5, 1/2, 3/5, 2/3, 3/4, 4/5, 5/6 and 8/9 rates |
| 8PSK | 3/5, 2/3, 3/4, 5/6, 8/9 rates |
| Pilot | Yes/No |
| FECFRAME | Normal, Short |
| Base Band Shaping | 0.35, 0.25, 0.20, 0.15, 0.1, 0.05 |
| Symbol Rate | 1 - 45Msym/sec |

### • RX

### Input

| | |
|---|---|
| Operating Freq. | 170~235MHz (VHF) / 470~860MHz (UHF) |
| Input Signal Modulation | DVB-T/T2 * 2<br>DVB-S/S2/S2X * 2 |
| Input Sensitivity | -92dBm for (QPSK, CR = 1/2, GI = 1/8)<br>-89dBm for (16-QAM, CR = 1/2, GI = 1/8)<br>-86dBm for (64-QAM, CR = 1/2, GI = 1/8)<br>-82dBm for (256-QAM, CR = 1/2, GI = 1/8)<br>-76dBm for (256-QAM, CR = 4/5, GI = 1/128) |

### Output

| | |
|---|---|
| DVB-ASI: | |
| Connector | 2x BNC 75 Ohm |
| ASI Standard | EN50083-9 |
| TSOIP: | |
| Connection Port | 1x Gigabit Ethernet outputs, 100/1000 auto-sensing |
| TSOIP Standards | Complying ETSI TS102034 and SMPTE 2022-n family |

## Control & Monitoring

| | |
|---|---|
| Local User Interface | Character LCD and keypad |
| Remote Connection Port | 1x RJ45 (10/100 Base-T) |
| Remote User Interface | WEB, SNMP v1/v2/v3 |

## Physical

### Power Requirement

| | |
|---|---|
| Operating Voltage | 220±44VAC |
| Power Consumption | 70W max |

### Dimension & Weight

| | |
|---|---|
| Weight | 6 kg (outdoor)<br>2 Kg (indoor) |
| Dimensions (W x H x D) | 28x28x15(cm) TX Out-door<br>1U sub rack Rx & TX In-door |

### Environmental

| | |
|---|---|
| Operating Temperature | -20 ~ +50 °C (outdoor)<br>-10 ~ +50 °C (indoor) |
| Storage Temperature | -30 ~ +55 °C |
| Relative Humidity | 95% (Non-condensing) |

### Compliance

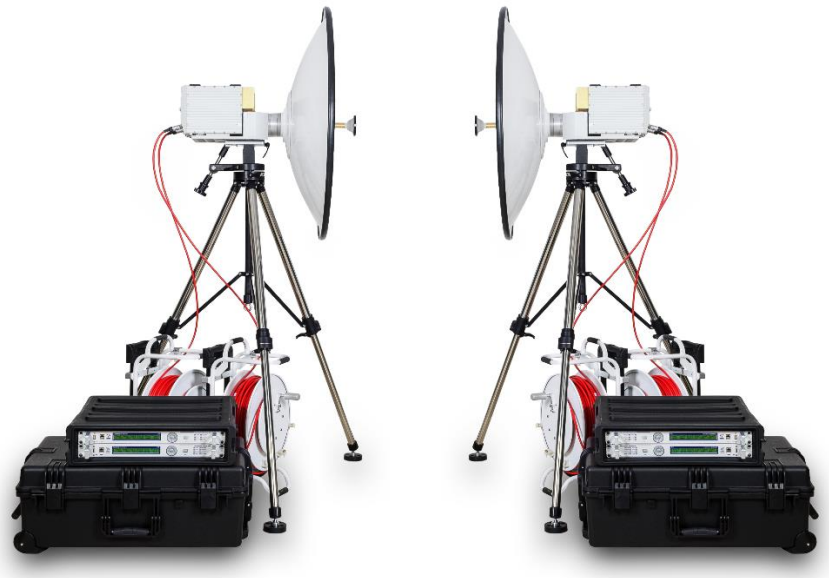
| | |
|---|---|
| DVB-T/T2 | ETSI 300744 – ETSI 302755 |
| DVBS2 | EN302307 |
| DVB-S/DSNG | EN 300 421, EN 301 210 |
| ASI | DIN EN 500083-9 |
| Power Supply: | |
| Safety | UL60950-1, IEC/EN60950-1, IEC/EN61558-1, EN61558-2-16, IEC/EN60335-1, CCC GB4943, TUV EN60950-1 |
| EMC | EN55022 Class B, EN55014, EN61000-3-2/3, GB9254, EN61000-4-2/3/4/5/6/8/11 |

- **Ordering**

| Model | Product Type |
|---|---|
| FNJ-UHFL-PF | UHF digital portable link for live broadcast (Fixed receiver) |
| FNJ-VHFL-PF | VHF digital portable link for live broadcast (Fixed receiver) |
| FNJ-UHFL-PP | UHF digital portable link (Portable receiver and transmitter) |
| FNJ-VHFL-PP | VHF digital portable link (Portable receiver and transmitter) |
| FNJ-UHFL-M | UHF Digital marine link |
| FNJ-VHFL-M | VHF Digital marine link |
| FNJ-UHFL-FF | UHF Digital fixed link |
| FNJ-VHFL-FF | VHF Digital fixed link |

# Portable Video/Audio Link Series

## FNJ-PDML-HD-01



**Version 1**

**Summer 2020**

# Description

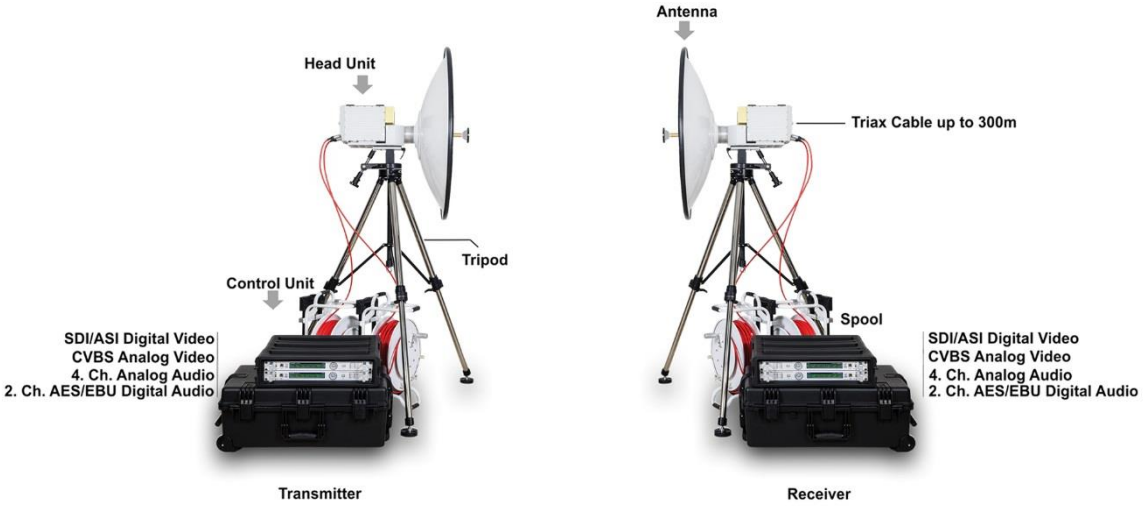
Fanamoj audio/video digital microwave portable link, FNJ-PDML-HD1, is a versatile, easy to use, easy to carry and rugged digital portable link. It is a unilateral radio link with a set up time less than 20 minutes. It interfaces directly to cameras of any type at the transmitter side without any additional equipment in between. The variety of standard inputs and outputs and wide range of supply voltage are considered as main features which make FNJ-PDML-HD1 a highly flexible solution. Utilization of multicarrier modulation and advanced channel coding techniques based on EN300744 and EN302755 standards has caused superior resiliency and robustness of link in urban as well as rural environments.

Putting all above in a nutshell, FNJ-PDML-HD1 is a highly economic, flexible and reliable solution for TV reportage applications or live covering of events.

# Features

- Fully compliant to EN300744 and EN302755 Standards.
- Simple and quick installation and commissioning.
- Easy maintenance thanks to modular design.
- Equipped with NEL manufactured H.263/H.264 encoder core featuring low Processing delay.
- Weatherproof RF head units.
- Exceptional RF efficiency thanks to advanced pre-correction mechanisms.
- Excellent reliability due to the employment of 1+1 configuration and the ability to automatically switch over to redundant transmission.

## Block Diagram




## Technical Descriptions

### ➢ Technical Specifications

#### • RF Parameters

| | |
|---|---|
| Frequency band of operation | 10.2GHz to 10.7GHz |
| Tuning Resolution | 1MHz |
| TX Output Power | Max 30dBm |
| RX sensitivity | -97dBm @ QPSK for QEF reception |

#### • Coding and Modulation Parameters

##### ▪ DVB-T

| | |
|---|---|
| Modulation Type | OFDM 2k, 4k, 8k |
| Guard Interval | 1/4, 1/8, 1/16, 1/32 |
| Modulation Modes | QPSK, 16QAM, 64QAM |
| FEC | 1/2, 2/3, 3/4, 5/6, 7/8 |
| Channel Bandwidth | 7, 8 MHz |
| Maximum Throughput | 31.67Mbps |

##### ▪ DVB-T2

| | |
|---|---|
| Modulation Type | OFDM 1k, 2k, 4k, 8k, 16k, 32k (Normal/Extended) |
| Guard Interval | 1/4, 1/8, 1/16, 1/32, 1/128, 19/256, 19/128 |
| Modulation Modes | QPSK, 16QAM, 64QAM, 256 QAM (Normal and Rotated) |
| FEC | 1/2, 3/5, 2/3, 3/4, 4/5, 5/6 |
| Channel Bandwidth | 8MHz |
| Maximum Throughput | 50.34Mbps |

## Video Input/Outputs

Composite Video (PAL/NTSC, 525 lines, 625 lines)
SD-SDI (complying SMPTE 259M along with SMPTE272M for audio embedding)
HD-SDI (complying SMPTE 292M along with SMPTE299M for audio embedding)
DVB-ASI (complying EN 50083-9)

## Video Encoder/Decoder

Video Coding Standards: MPEG2, MPEG4 AVC /H.264
MPEG2 supported profiles and levels:

| | |
|---|---|
| MP@ML | 512 kbps~15 Mbps |
| 422P@ML | 3 Mbps~50 Mbps |
| MPEG4 AVC supported profiles and levels: | |
| Profiles | Baseline, Main, High, High 422 |
| Levels | 3, 3.1, 3.2, 4, 4.1 |
| Minimum achievable bit rate | 256kbps |

## Audio Inputs/Outputs

Two analog stereo channels
Two digital stereo channels with AES/EBU format

## Audio Encoder/Decoder

| | |
|---|---|
| Audio Coding Standards | MPEG1 layer ll, AAC, ACC+, HE-AAC-V2 |

## Remote Control

| | |
|---|---|
| Local User Interface | Character LCD and keypad |
| Connection Port | 2x RJ45 (10/100 Base-T) |
| User Interface | WEB, SNMP v1/v2/v3 |

## Physical

### Power Requirement

| | |
|---|---|
| Operating Voltage | 90~260 VAC |
| Power Consumption | 30W max |

### Weight

| | |
|---|---|
| Head Units | App. 9kg |
| Control Units | 8Kg |
| Parabolic Antenna | 4Kg (60cm antenna with Feed) |
| Tripod | 17Kg |
| Spool Weight | 17Kg (With Cable) |

### Dimension

| | |
|---|---|
| Head Units | 18 cm x 23cm x 10.5cm (H x W x D) |
| TX Control Unite | 4.4 cm x 48cm x 50cm (H x W x D) |
| RX Control Units | 4.4 cm x48cm x 50cm (H x W x D) |
| Parabolic Antenna Dimeter | 60 cm (Gain: 32dBi). 90cm (Gain: 35dBi) |
| Tripod | 1m |
| Spool Weight | 17Kg (up to 300 meter Supported) |

### Environmental

| | |
|---|---|
| **Head Units** | |
| Inventory Temperature | -30 ~ +55 °C |
| Operation Temperature | -20 ~ +50 °C |
| Altitude | 5000m above sea level |
| Humidity | 95%, Long term |
| **Control Units** | |
| Inventory Temperature | -20 ~ +50 °C |
| Operation Temperature | -10 ~ +45 °C |
| Altitude | 5000m above sea level |
| Humidity | 95%, Long term |

## ▪ Compliance

| | |
|---|---|
| DVB | ETSI 300744 – ETSI 302755 |
| ASI | DIN EN 500083-9 |
| Environmental Conditions | EN 300 019-1-3 V2.3.2 (2009-11) Class 3.3 |
| Power Supply: | |
| Safety | UL60950-1, IEC/EN60950-1, IEC/EN61558-1, EN61558-2-16, IEC/EN60335-1, CCC GB4943, TUV EN60950-1 |
| EMC | EN55022 Class B, EN55014, EN61000-3-2/3, GB9254, EN61000-6-2, EN61000-4-2/3/4/5/6/8/11 |

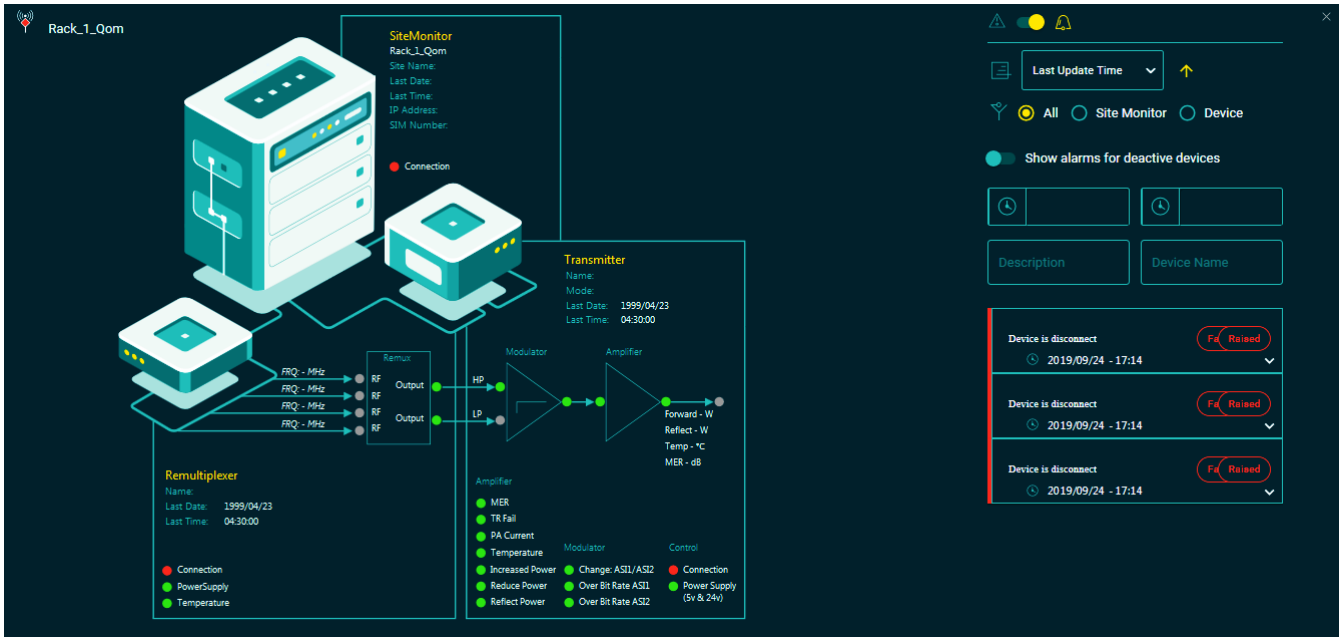
# ➢ Ordering

| Model | Type |
|---|---|
| FNJ-PDML-HD-01 | Portable HD Link in 1+0 configuration |
| FNJ-PDML-HD-02 | Portable HD Link in 1+1 configuration |

# 2. Monitoring Systems

# Network Management System

## FNJ-NMS-01




**Version 1**
**Summer 2020**

# Descriptions

As a facility grows and its equipment multiplies, its infrastructure becomes large and decentralized. Thus, it faces an increasing need to monitor the equipment through an easy-to-use, integrated, central system.

As broadcast facilities grow in size from an individual building to geographically separate locations, broadcasters must be able to monitor the system in its totality from a central location in real time. FNJ-NMS-01 is a facility-monitoring and control system that offers ease of use to personnel of all skill.

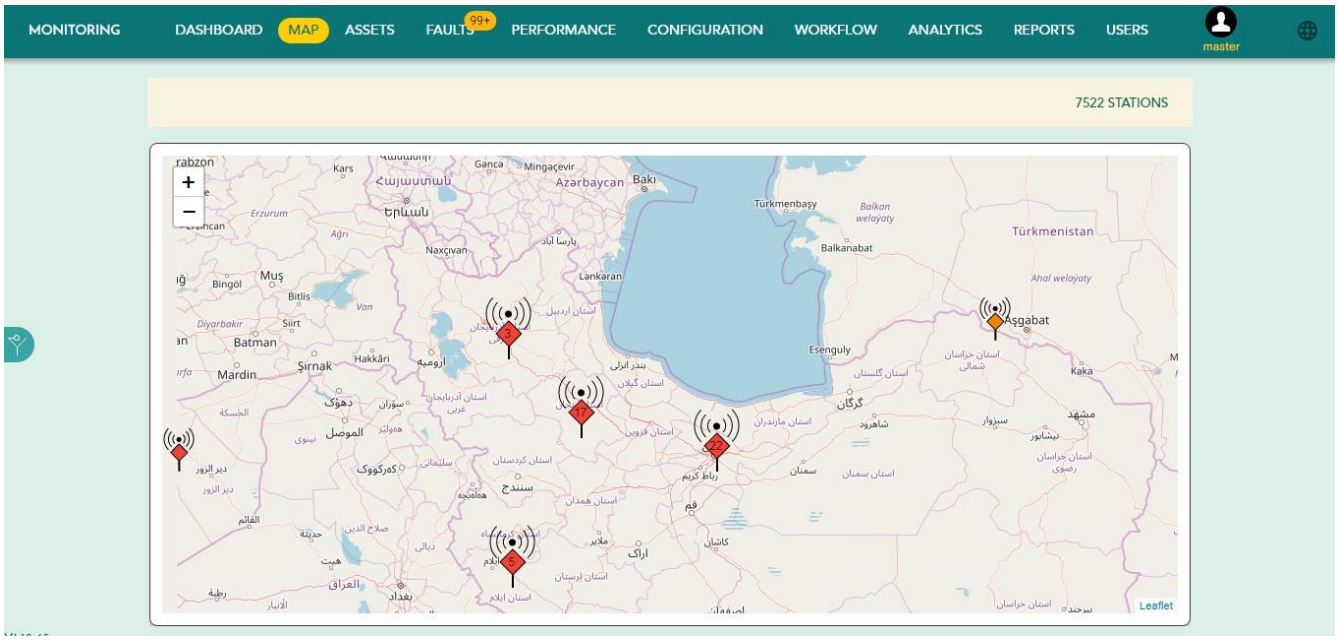
The system consists of a software and a site monitor which is an interface between main server and remote equipment. The site monitor gathers and transfers data and command from and to equipment in the facilities. Supporting SNMP v.3 enables secure communication and even devices without SNMP protocol can be monitored via Modbus, RS232/485, SIO or other standard industrial communication protocols.

# Features

- Web-based software based on microservice architecture including:
  - Configuration Management
  - Map
  - Fault Management
  - Data analysis (Error statistics, Error source, Error chain etc.)
  - Ticket Management
  - Performance Management
  - User Management
  - Asset Management
  - Workflow Management
  - Backup and restore
- Customized user dashboard
- Secure connection via SNMP v.3 protocol between equipment and server
- Monitoring and control on different levels based on location, permission etc.
- Site monitor with back up battery for reporting during power outage and last alarm option before system shut down
- User-definable faceplate signal chain
- Automatic alarm in case of failure via SMS and Email

# Functions

- Monitoring and control in:
  - Broadcast including Terrestrial and Satellite signal chain, TV and Radio stations
  - Data centers
  - Gas, Water and Energy networks
  - Telecom networks



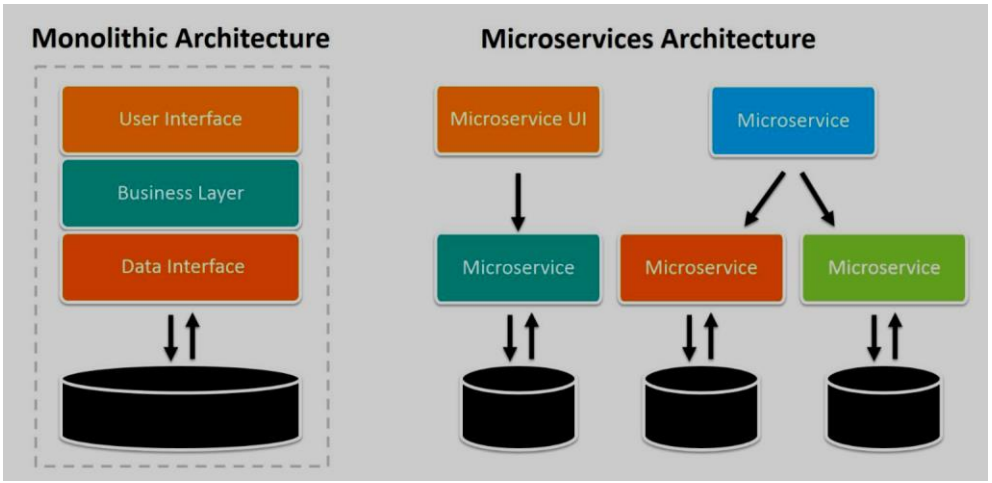

# Technical descriptions

## ➢ Web-based access

NetManager software enables users to connect to the system server and directly monitor and control the equipment via a web browser based on the user permission. (No need for an extra software.)

## ➢ Micro service architecture

In the Micro service architecture software components have been implemented independently and finally connect via network. Consequently, modularity level increases, down time during system upgrade and maintenance are minimized and services can function independently. In case of developing facilities or devices, it is possible to deploy services (Modules) on different hardware and distribute processing load. System extension in such architecture is horizontal and new hardware could simply be added to the system without substitution with the old one.



## ➢ User dashboard

- Customizing user dashboard based on tasks and access zones
- Capable of adding unlimited widgets further to user-definable widget arrange
- Adding Map-, alarm list-, ticket- and received status chart- widgets capable of sorting and filtering
- All of these functionalities (Information display, add, remove etc.) are controlled by user access level.

## ➢ Map

- Displaying stations and summary of equipment status on the map
- Hierarchical display of stations, racks within the stations and installed equipment in the racks.
- Capability of searching and filtering the stations on the system map
- Hierarchical access to faceplates via system map
- Live status of faceplates including values, faults (LED) and alarms
- Displaying and managing faceplate faults and notifications
- All the actions including setting change, add or remove are limited to user access level

## ➢ Assets

- Managing and displaying all the equipment in the system
- Advanced search and sorting option based on the equipment name, serial number, owner, zone
- Access to site monitor faceplate via equipment information
- Capable of defining equipment type for an efficient management of assets (When setting: status send intervals, error type display, search or software update)
- Capable of group- change or upgrade in the network
- Add/Remove new equipment by identity verification
- Capable of editing equipment information
- All the mentioned options are limited to user access level

## ➢ Configuration Management

- Remote access to the equipment for changing system setting
- Displaying current settings of the equipment in the network
- Tracking implemented setting records and searching option
- All the mentioned options are limited to user access level

## ➢ Faults

- Displaying all system faults simultaneously capable of searching, managing and troubleshooting them
- Efficient filtering f faults based on equipment, zone and occurring time
- Displaying history of fault changes
- All the mentioned options are limited to user access level

## ➢ Performance Management

- User-friendly display of time charts of equipment status (Max/Min/ average analysis of status data in different time intervals)
- Comparing each equipment efficiency based on time charts
- Defining tasks for equipment debugging
- Reporting status information as excel file
- Server resources charts (CPU, RAM, Network)
- All the mentioned options/functions are limited to user access level

## ➢ Work flow management

- Capable of defining tickets for each fault

- Assigning responsible user to troubleshoot the tickets
- Ticket definition as chain
- Capable of defining priority and Severity of tickets
- Efficient search between tickets based on owner priority, time, sensitivity, tickets of one or more specific equipment, tickets of one or more specific alarm
- Displaying records of ticket changes
- Capable of changing informing channel
- Capable of assigning repair cycle for equipment faults
- All the mentioned options/functions are limited to user access level

## ➢ Analytical charts

- Capable of displaying(plotting) analytical charts in order to identify equipment with most common or repetitive faults

## ➢ User management

- Dynamic access role definition
- Dynamic access zones definition (Province, Station)
- Add/Remove users with different access levels
- Capable of connecting to other user management systems with web service API and standard protocol
- System log reports from user activities to managers
- All the mentioned options/functions are limited to user access level

## ➢ Other equipment monitoring and control

- NetManager enables users to control and monitor any device equipped with RS232/485 ،SIO ports

# • Ordering

| Product | Description |
|---|---|
| **NetManager** | NMS software including 11 main modules |
| **NetManager Support Types** | Signal chain customization (Faceplate)<br>Monitoring and control of equipment without network ports |

# 3. Terrestrial TV Broadcast equipment

# Digital TV Transmitter (200, 500W)

## FNJ-DTR Series

**(2+1 Configuration)**

# Description

FNJ-DTR series are medium power 200W, 500W UHF/VHF digital TV transmitters in full compliance with the DVB-T/T2 standards. It aims to guarantee continuous broadcasting and benefits from state of the art techniques, technologies and components. The system can be ordered based on customer requirements in different configurations (1+0, 1+1, 2+1, etc.) A transmitter in 2+1 configuration consists of three standalone 200W or 500W transmitters, two main that broadcast individual TS signals and the third one that is reserved. In case of any failure which interrupts functionality of main transmitters, a central control unit puts the reserve transmitter on the air and substitutes it with the defective one. In 2+1 configuration and normal conditions, RSC is responsible for sending the main transmitter settings (with higher program priority) to the reserve transmitter in certain intervals.

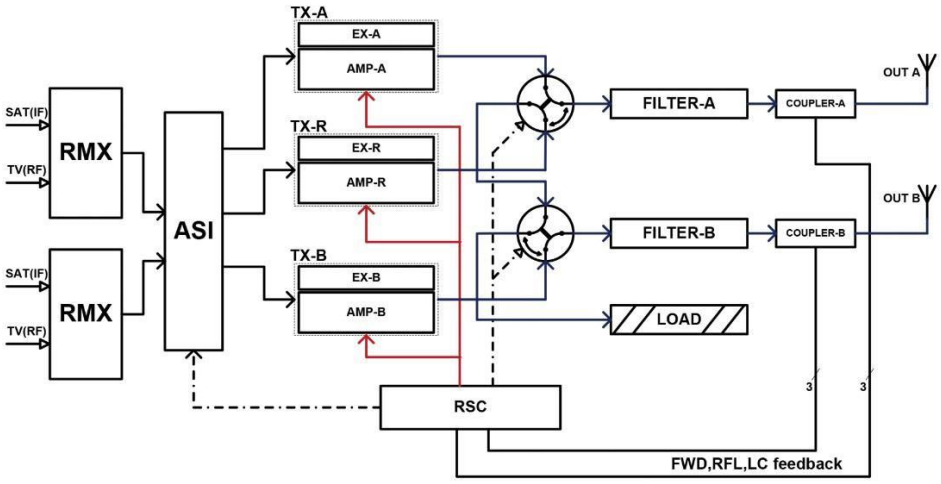
## Components of 2+1 system

- (FNJ-RMX-03) IRD/Remux-1 Unit
- (FNJ-RMX-03) IRD/Remux-2 Unit
- (FNJ-ASI-02) ASI Distributor Unit
- (FNJ-RSC (2+1)-01) Rack and Switch Controller Unit
- (FNJ-DPA-250-01) Amplifier-A Unit
- (FNJ-DT2-02) Exciter-A Unit
- (FNJ-DPA-250-01) Amplifier-B Unit
- (FNJ-DT2-02) Exciter-B Unit
- (FNJ-DPA-250-01) Amplifier-R Unit
- (FNJ-DT2-02) Exciter-R Unit
- Coaxial Switch 1 (Capable of manual switch)
- Coaxial Switch 2 (Capable of manual switch)
- Channel A Filter (Factory adjustable on the whole band)
- Channel B Filter (Factory adjustable on the whole band)
- Output Coupler A
- Output Coupler B
- Dummy Load (400 W) with cooling fan and temperature protection
- Isolation transformer with adjusting the output voltage (Tap changer)
- Each of above units is product of FANAMOJ Company and full specifications are available in their own catalogue.

## Features

- Automatic (by smart control) and manual (by operator) change over between main and reserve transmitters
- Automatic switch on reserve, in case of main transmitter fault, with the current operating conditions and no need to manual settings. In 2+1 configuration and in normal conditions, RSC is responsible for sending the main transmitter settings (with higher program priority) to the reserve transmitter in certain intervals.
- Re-switch on the main transmitter after fault elimination
- Monitoring and control of the whole system, and each transmitter, via the control unit (RSC)
- The system would operate in current conditions in case of controller unit fault
- Advanced adaptive algorithms for eliminating linear and non-linear distortions of amplified signals which guarantees high MER and shoulder distance
- Seamless switching between main and reserve TS inputs
- Graphical view of the system qualitative parameters (Analyzed in transmitter) including MER, Shoulder distance, Frequency response, Group delay and Constellation
- Ultra-fast and efficient protective mechanisms against destructive incidents including output impedance mismatch
- Easy installation and maintenance thanks to compactness and modular design
- Employing state of the art LDMOS transistors
- Control and monitoring locally by graphical touch screen LCD and remotely by WEB and SNMP through IP-Network and by SMS through GSM network
- Keeping system logs

## Block Diagram



# ➢ Technical Specifications

## • Input

All ASI modes (continuous, packet, burst) in line with DIN EN 500083-9

| | |
|---|---|
| Input FIFO | 4k → ± 20 transport packets, burst |
| Input switch over | Manual and Automatic Seamless input switch over |
| Input monitoring | |

MFN with stuffing and PCR correction FIFOs as buffers for dynamic delay changes

MIP evaluation in compliance with TS 101 1910 (DVB)

## • Output

| | |
|---|---|
| Nominal Output Power (After Output Filter) | 200 or 400W |
| Rated Output Power (After Output Filter) | 250 W or 500 W |
| Frequency Range | 470MHz to 862MHz |
| Output Connector | 7/16 (F) |

## • Pre-correction and AGC

| | |
|---|---|
| Nonlinear Pre-correction Performance | Maximum 10dB MER Improvement (Dependent on |
| PA Model) Linear Pre-correction dynamic range | up to ±500ns group delay, up to ±5dB Amplitude |
| Variation AGC dynamic range | ±3dB |

## • Qualitative Signal Characteristics

| | |
|---|---|
| MER | > 35 dB (with non-linear correction) |
| Shoulder Distance | >42 dB |
| Amplitude Variations in One Channel | <±0.5dB |
| Group Delay after output filter | <10 ns |
| Average Crest Factor | 7~12 dB Adjustable (Envelope CCDF) |
| Harmonic and Spurious Levels (after filter) | <-60dBc Synthesizer Phase Noise |
| 100 Hz | < -90 dBc/Hz |
| 1 kHz | < -100 dBc/Hz |
| 10 kHz | < -105 dBc/Hz |
| 100 kHz | < -110 dBc/Hz |

## • Remote Control

| | |
|---|---|
| Connection Port | RJ45 (10/100 Base-T) |
| User Interface | TCP/IP v4/v6, SNMP v1/v2/v3, HTTP |

## • Physical

### ▪ Power

| | |
|---|---|
| AC Input Voltage | Single phase / 176~264 V (50Hz ±2%) |
| With tap changer (± %10) isolation transformer | |
| Max AC Input Current | 10A @ Dual 200 W output power |

### ▪ Dimension & Weight

| | |
|---|---|
| Weight | ~ 250kg |

| | |
|---|---|
| Dimensions (W x H x D) | 19" rack x 42U x 80cm |

## Environmental

| | |
|---|---|
| Operating Temperature | -5 ~ +45 °C |
| Storage Temperature | -25 ~ +60 °C |
| Relative Humidity | 95% (Non-condensing) |

## Compliance

| | |
|---|---|
| DVB | ETSI 300744 – ETSI 302755 |
| ASI | DIN EN 500083-9 |
| SFN | ETSI TS 101 191 |
| Environmental Conditions | EN 300 019-1-3 V2.3.2 (2009-11) Class 3.3 Power Supply: |
| Safety | UL60950-1, IEC/EN60950-1, IEC/EN61558-1, EN61558-2-16, IEC/EN60335-1, CCC GB4943, TUV EN60950-1 |
| EMC | EN55022 Class B/Class A, EN55014, EN61000-3-2/3, GB9254, EN61000-4-2/3/4/5/6/8/11 |

# Ordering

| TX. Type(W) | Model | Max. Output power(W) | System |
|---|---|---|---|
| 200 | FNJ-DTR-200-10 | 250 | 1+0 |
| 200 | FNJ-DTR-200-11 | 250 | 1+1 |
| 200 | FNJ-DTR-200-21 | 250 | 2+1 |
| 500 | FNJ-DTR-500-10 | 600 | 1+0 |
| 500 | FNJ-DTR-500-11 | 600 | 1+1 |
| 500 | FNJ-DTR-500-21 | 600 | 2+1 |

# Compact Transmitter Series (10, 50, 100W)

## FNJ-DTC-01


**Version 1**

**2020**

# Description

FNJ-DTC is the newest series of digital TV transmitters to the international markets. These transmitters are in full compliance with the latest version of DVB-T and DVB-T2 standards and are equipped with a wide variety of mechanisms which make them a comprehensive solution for broadcasters. These transmitters are manufactured in different models with respect to the output power including 10W, 50W and 100W in the whole UHF band.

The most noteworthy feature of these transmitters is the distinctive capability of broadcasting two independent transport streams on two different channels at the same time. This great feature is obtained by employing state of the art technology in the dual output modulator of the transmitter.

Furthermore, an internal IRD/Remux totally obviates any need for external sub-headend. Thanks to this optional feature it is possible to demodulate up to four transport streams from DVB-T/T2 or DVB-S/S2 signals. These four streams are processed by the embedded Remux to generate two customized transport streams which along with the external ASI inputs can be used for feeding the dual output modulator.

On the other hand the transmitters are equipped with an embedded signal analyzer which constantly measures the key qualitative parameters of the output signal including MER per carrier, shoulder distance and frequency response. Precise results of analyzer are plotted on the front panel LCD and give a great insight about the transmitter operating condition.

Integrating all these features in a 3U case has led to a compact and highly economic solution for terrestrial broadcasting.

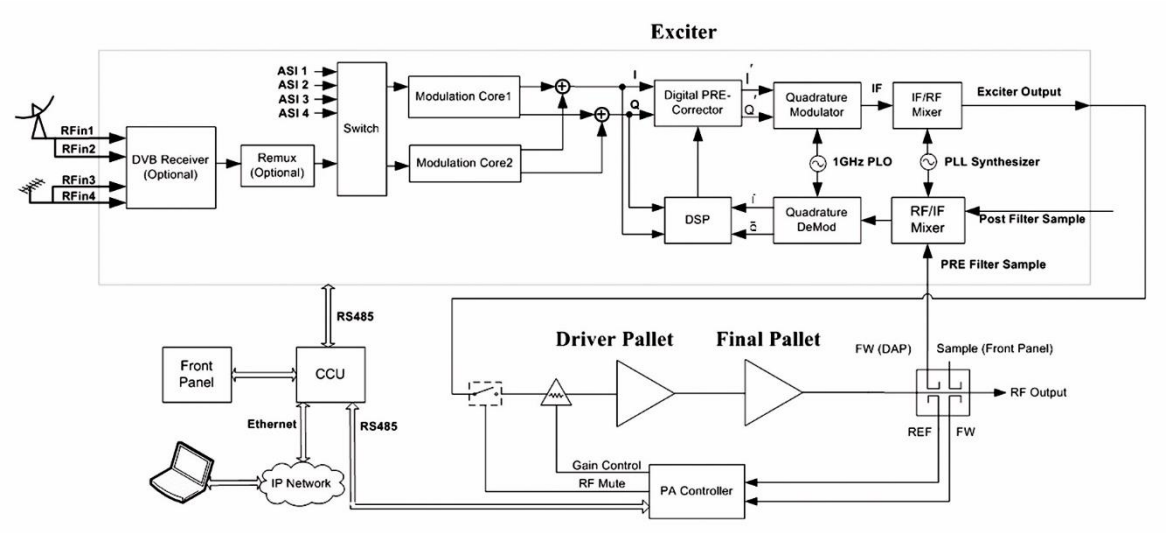
# Features

- Capable of transmitting one DVB-T2 or two independent DVB-T signals at the same time.
- In full compliance with the latest version of EN300744 (DVB-T) and EN302755 (DVB-T2) standards.
- Optional IRD/Remux capable of demodulating any of DVB-T/T2/S/S2 signals with superior input sensitivity and BISS decryption.
- Utilization of advanced adaptive algorithms for eliminating linear and non-linear distortions of amplified signals which guarantees high MER and shoulder distance.

  Measurement of key qualitative parameters of transmitter output signal including MER, shoulder distance, frequency response and etc.
- Utilization of ultra-fast and efficient protective mechanisms against destructive incidents including output impedance mismatch.
- Easy installation and maintenance thanks to compactness and modular design.
- Employing state of the art LDMOS transistors.

  Control and monitoring locally by front panel graphical touch screen LCD and remotely by WEB and SNMP through IP network and by SMS through GSM network.

## Block Diagram




## Technical Descriptions

- ### Rear view

- ### Technical Specifications

  - ### TX & RX

    - #### Input

| | |
|---|---|
| ASI Inputs | 4xBNC, 75 Ohms, Complying EN50083-9 |
| TSOIP Input | 1xRJ45 TS Over IP Input Based on SMPTE-2022 |
| DVB-T/T2 RF Input (Optional) | Up to 2x F Connector,<br>Frequency Range:VHF/UHF<br>Level: -70 ~ -25 dBm |
| DVB-S/S2 RF Input (Optional) | Up to 2x F Connector,<br>Frequency Range: 950-2150MHz,<br>Level -92 ~ -10dBm,<br>LNB Feed: 13V/14V, 18V/19V, 22 kHz |
| 10MHz Reference Input | 1xBNC, 50 Ohms, 500mVpp~5Vpp |

| | |
|---|---|
| 1PPS Reference Input | 1xBNC, 50 Ohms, LVTTL |
| Post-Filter Feedback Input | 1xSMA, 50 Ohms, -10~10 dBm |

### ▪ Output

| | |
|---|---|
| RF Output | 1xN-Female |
| RF Monitoring Output | 1xBNC, 50Ω |
| 10MHz Reference Output | 1xBNC, 50Ω |

## • Qualitative Signal Characteristics

| | |
|---|---|
| MER | > 34dB (Typical: 38dB) |
| Shoulder Distance | > 40dB (Typical: 42dB) |
| Amplitude Variations in One Channel | < 0.5 dB |
| Group Delay Variations in One Channel | < 10 ns (With Pre-correction) |
| Average Crest Factor | 7~12 dB Adjustable (Envelope CCDF) |
| Harmonic and Spurious Levels | < 60dBc |

## • Modulation (DVB-T2)

| | |
|---|---|
| Number of Modulation Cores | Up to Two DVB-T Cores and One DVB-T2 Core |
| Output Channel Spacing | All Channels Within 24MHz Bandwidth |
| Transmission Mode | MFN, SFN (T/T2) & SFN-SISO/MISO (T2) |
| IFFT | 2K, 4K, 8K (T/T2) & 1k, 16k, 32k (Normal/Extended) |
| (T2) | |
| Constellation | QPSK, 16QAM, 64QAM (T/T2) & 256 QAM (All |
| Normal | |
| | and Rotated) (T2) |
| Guard Interval | 1/4, 1/8, 1/16, 1/32 (T/T2) & 1/128, 19/256, 19/128 (T2) |
| FEC (T) | 1/2, 2/3, 3/4, 5/6, 7/8 (For Both LP & HP Streams) |
| FEC (T2) | 1/2, 3/5, 2/3, 3/4, 4/5, 5/6 |
| Interleaving | Native, In Depth (T) & Time, Frequency, Cell (T2) |
| Maximum Throughput | 31.67 Mbps at Each DVB-T Channel & 50.34 Mbps |
| | at DVB-T2 |
| Bandwidth: | 7, 8 MHz (T) & 8MHz (T2) |
| Digital Adaptive Pre-Correction | |

## • Pre-correction Mode

| | |
|---|---|
| Single Output: | Adaptive LC, Adaptive NLC |
| Dual Output: | Fixed NLC |
| Correction Criterion | MER, Right/Left Shoulder, Group Delay, In-band Flatness |
| Crest Factor Reduction (CFR) | Soft and Hard Clipping |
| NLC Performance | Typically 10dB MER Improvement |
| | (Dependent on PA Model) |
| LC Performance | Up to ±5dB Amplitude and ±500ns Group Delay Correction |

## Control & Monitoring

| | |
|---|---|
| Connection Port | 2 x RJ45 (10/100 Base-T) |
| User Interface | WEB, SNMP v1/v2/v3 |

## Physical

### Power Requirement

| | |
|---|---|
| Operating Voltage | 90~260 VAC, 50~60Hz |

### Dimension & Weight

| | |
|---|---|
| Dimensions (W x H x D) | 48.2 x 13.3 x 50 (Cm) → (19” Wide, 3RU* High) |
| Weight | App. 20 Kg |

*2RU High Case Available for 10W and Lower Models.

### Environmental

| | |
|---|---|
| Operating Temperature | 0°C to +50°C |
| Storage Temperature | -25°C to +60°C |
| Relative Humidity | Max. 95% , Non-Condensing |

### Compliance

| | |
|---|---|
| DVB | ETSI 300744 – ETSI 302755 |
| ASI | DIN EN 500083-9 |
| SFN | ETSI TS 101 191 |
| Environmental Conditions | EN 300 019-1-3 V2.3.2 (2009-11) Class 3.3 |
| Safety | IEC-215 |
| | EN 60950-1: 2001 |
| | CSA C22.2 No. 60950-1: 2003 |
| | UL 60950-1: 2003 |
| EMC | ETSI EN 301489-1 / -14 |
| | ETSI EN 302296 / 302297 |
| | Rec. 1999/519/EC |

## Ordering

| Model | Max. Output power(W) | Product Type |
|---|---|---|
| FNJ-DTC-10-02 | 10 | DVB-T/T2 Compact Transmitter |
| FNJ-DTC-50-02 | 50 | DVB-T/T2 Compact Transmitter |
| FNJ- DTC-100-02 | 100 | DVB-T/T2 Compact Transmitter |
| IRD-Remux (As option) | | Internal Remultiplexer |

# Economic Digital Outdoor Transmitter (2, 5W)

## FNJ-DTO-01

**Version 1**
**Summer 2020**

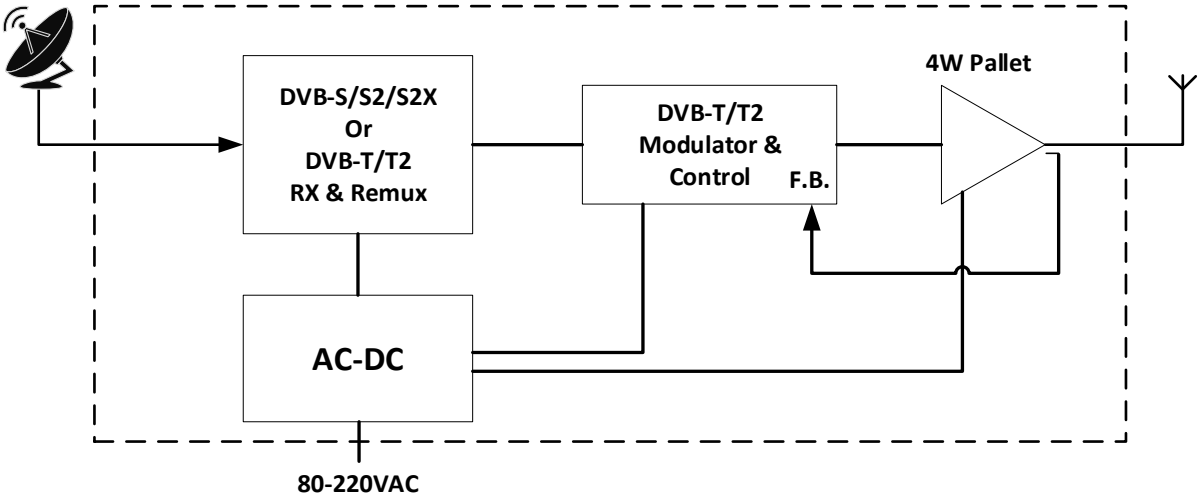
## Description

FNJ-DTO-01 is an economic Full Outdoor transmitter for TV coverage of rural areas, where building a station is neither economical nor possible. The system can receive DVB-T/T2/S/S2/S2X signals (Based on the configuration) and transmit DVB-T/T2/2T signals with 5W nominal power. The receiver module delivers the received signals to the modulator, based on the user-defined frequency channel. Afterwards the modulator output is sent to the amplifier and finally the signals would be transmitted on the specified channel on UHF band. This system can also be used as a UHF band relay for repeating a DVB-T2 or two DVB-T signals. For rural areas without power mains or infrastructure, the transmitter can be powered with a solar panel and installed with different types of antenna and accessories on a simple tower.

## Features

- Digital TV coverage for rural areas
- Economic solution for digital TV
- UHF/VHF support
- Capable of receiving different terrestrial or satellite signals
- Monitoring and control via WEB, NMS or SNMP
- Fanless Air Convection
- Monitoring and control via Wi-Fi and GSM
- Off-grid function with solar cell

## Block Diagram



# Technical Descriptions

## Technical Specifications

### TX & RX

#### Input

| | |
|---|---|
| Input Freq. | 950~2150MHz/470~860MHz |
| Rx Connector | F-type (F) |
| Input Signal Modulation | DVB-S/S2/S2X * 2 or<br>DVB-T/T2 * 2 |
| RX Antenna | Yagi or Reflector Antenna |
| Input Sensitivity (DVB-T/T2) | -92dBm for (QPSK, CR = 1/2, GI = 1/8)<br>-89dBm for (16-QAM, CR = 1/2, GI = 1/8)<br>-86dBm for (64-QAM, CR = 1/2, GI = 1/8)<br>-82dBm for (256-QAM, CR = 1/2, GI = 1/8)<br>-76dBm for (256-QAM, CR = 4/5, GI = 1/128) |
| Input Sensitivity (DVB-S/S2) | -65dB |

#### Output

| | |
|---|---|
| Output Frequency | 470~860MHz |
| Output Power | 1~5W |
| TX Antenna | Microstrip Patch Antenna, Panel Antenna, LDPA, Discone |

### Modulation (DVB-T2)

| | |
|---|---|
| Modulation Mode | Single PLP, Multi-PLP |
| Bandwidth | 8MHz |
| FFT Size | 1K, 2K, 4K, 8K, 16K, 32K (including extended modes) |
| Guard Interval | 1/32, 1/16, 1/8, 1/4, 1/128, 19/128, 19/256 |
| Constellation | QPSK, 16QAM, 64QAM, 256QAM |
| Interleaving | Time, Frequency, Cell |
| Max. Throughput | 50.34 Mbps |

### Control & Monitoring

| | |
|---|---|
| Remote Connection Port | Wi-Fi(10/100 Base-T), GSM & 3G |
| Remote User Interface | WEB, SNMP v1/v2/v3 |

### Physical

#### Power Requirement

| | |
|---|---|
| Operating Voltage | 88~264VAC |
| Power Consumption | 50W max |
| Power Entry Connector | Circular 10 pin |

## Dimension & Weight

| | |
|---|---|
| Weight | 6 kg (without Antenna) |
| Dimensions (W x H x D) | 28x28x15(cm) Outdoor |

## Environmental

| | |
|---|---|
| Operating Temperature | -20 ~ +50 °C |
| Storage Temperature | -30 ~ +55 °C |
| Relative Humidity | 95% (Non-condensing) |

## Compliance

| | |
|---|---|
| DVB | ETSI 300744 – ETSI 302755 |
| ASI | DIN EN 500083-9 |
| SFN | ETSI TS 101 191 |
| Environmental Conditions | EN 300 019-1-3 V2.3.2 (2009-11) Class 3.3 |
| Power Supply: | |
| Safety | UL60950-1, CCC GB4943, TUV EN60950-1 |
| EMC | EN55022 Class B, EN61000-6-2, EN61000-3-2/3, EN61000-4-2/3/4/5/6/8/11 |

# Ordering

| Model | Max. Output power(W) | Product Type |
|---|---|---|
| FNJ-DTO-5W-S | 5 | DVB-T/T2 Compact Transmitter with DVB-S/S2 Receiver |
| FNJ-DTO-5W-T | 5 | DVB-T/T2 Compact Transmitter with DVB-T/T2 Receiver |

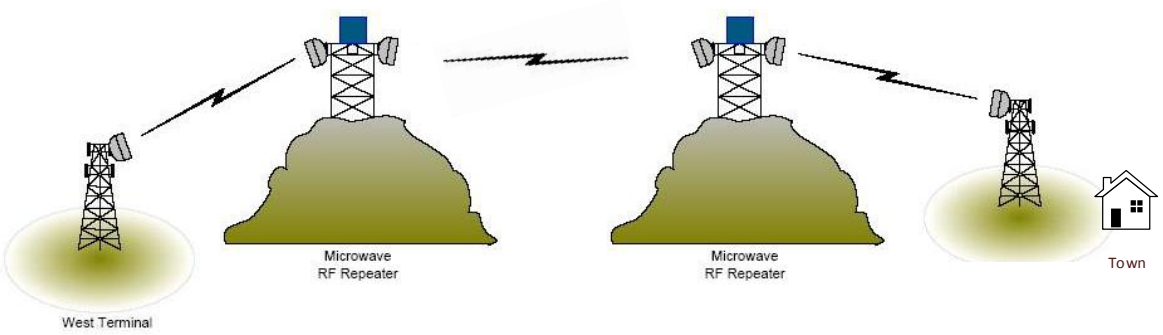
# UHF Repeater

## FNJ-UHFR-01

**Version 1**
**Summer 2020**

# Description

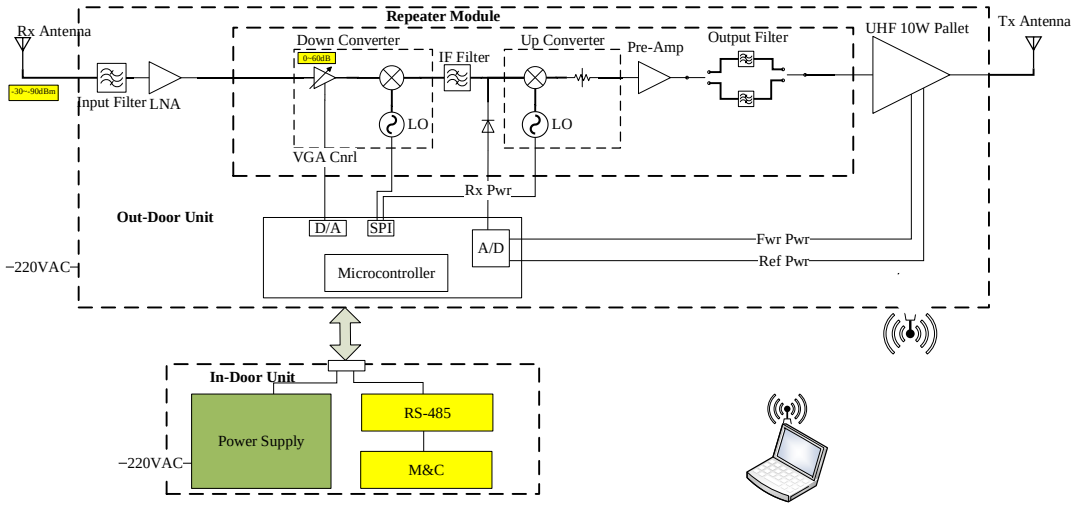
FNJ-UHFR-01 is a UHF channel relay for digital TV coverage of remote areas and non-line of sight conditions. This device was developed in order to complete the coverage of digital terrestrial TV broadcast in the whole country. The system is composed of a receiver and a frequency shifter, which receives the signal in a specific UHF channel and then shifts it to a pre-defined channel in the UHF band. After channel shifting, a power amplifier amplifies the signal to a specific level and then transmits the signal. The system supports secure connection via GSM and Wi-Fi for monitoring and control purposes.




# Features

- Repeating 1 or 2 UHF channel based on the order
- Non-Line Of Sight
- TV coverage for remote areas
- Long range up to 100 Km
- Economic solution
- Easy installation and maintenance
- Monitoring and control via Wi-Fi or GSM modem

# Block Diagram



# Technical Descriptions

## ➢ Technical Specifications

### • Input

| | | |
|---|---|---|
| Operating Freq. | 470 ~ 860MHz | |
| TX Power | Up to 13W (nominal) | |
| TX Antenna | Patch Antenna, Panel Antenna, LDPA, Discone | |
| Input power | -70 ~ -30dBm | |
| Noise Figure | <1.5dB | |
| Power Consumption | 70W (MAX) | |
| Repeater Gain | 60 ~110dB | |
| LO Phase Noise | 100 Hz | <-85dBc/Hz |
| | 1 kHz | <-90dBc/Hz |
| | 10 kHz | <-95dBc/Hz |
| | 100 kHz | <-112dBc/Hz |
| Signal bandwidth | <25MHz | |
| Frequency adjustment | 1MHz | |

### • Output

| | |
|---|---|
| Output power | 1~15W |
| Output adjustment gain | 12 dB |
| Output adjustment step | 1W (option 0.2W) |

### • Control & Monitoring

| | |
|---|---|
| Remote User Interface | WEB, SNMP v1/v2/v3 |

### • Physical

#### ▪ Power Requirement

| | |
|---|---|
| Operating Voltage | 220±44VAC |
| Power Consumption | 70W max |
| Input RF Connector | N-Type (female) |
| Output RF Connector | N-Type (female) |
| Power entry Connector | Circular – 10 pin |

#### ▪ Dimension & Weight

| | |
|---|---|
| Weight | 14 kg (outdoor) |
| Dimensions (W x H x D) | 40x50x20(cm) Outdoor |

#### ▪ Environmental

| | |
|---|---|
| Operating Temperature | -20 ~ +50 °C (outdoor) |
| Storage Temperature | -25 ~ +55 °C |
| Relative Humidity | 95% (Non-condensing) |

#### ▪ Compliance

| | |
|---|---|
| DVB | ETSI 300744 – ETSI 302755 |
| Environmental Conditions | EN 300 019-1-3 V2.3.2 (2009-11) Class 3.3 |
| Power Supply: | |
| Safety | UL60950-1, TUV EN60950-1, CCC GB4943 |
| EMC | EN55022 Class B, EN55014, EN61000-3-2/3, EN61000-6-2<br>EN61000-4-2/3/4/5/6/8/11 |

## • Ordering

| Type | Model |
|---|---|
| FNJ-UHFR-01 | UHF band digital single channel repeater |
| FNJ-UHFR-02 | UHF band digital double channel repeater |

# Terrestrial Modulator Series(DVB-T/T2/Tx2)

# FNJ-DT2-04


**Version 1**
**Summer 2020**

# Description

Today in many countries digital terrestrial broadcasting is being considered as primary means of delivering multimedia services to the mass audience. In this regard Fanamoj Company has provided FNJ-DT2 as a professional DVB-T/T2 modulator/exciter to the international markets. The capability of this product to broadcast simultaneously two DVB-T signals is considered as a distinctive feature.

FNJ-DT2 is in full compliance with EN300744 and EN302755 standards. By utilizing it as the exciter of TV transmitters, it is possible to transmit two independent transport streams on two different channels at the same time with only one transmitter. This astonishing feature can help broadcasters to realize very economic solutions.

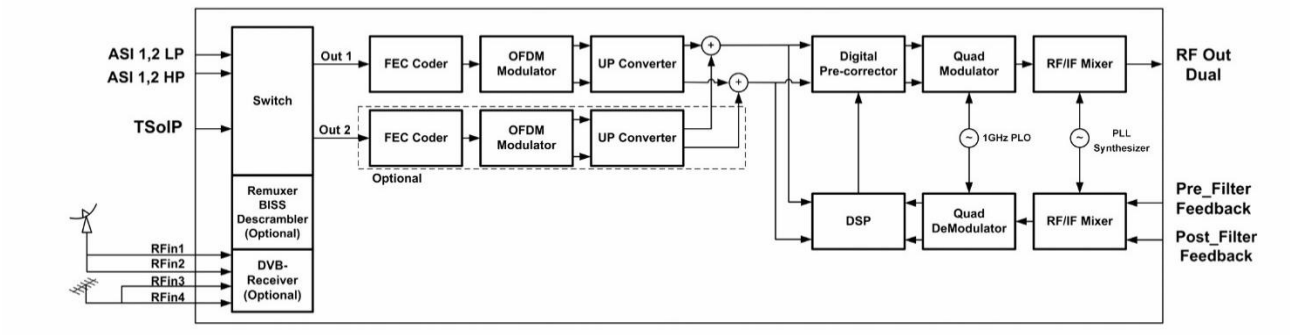
Furthermore an internal self-contained IRD/Remux totally obviates any need for external Sub-Headends. Thanks to this optional feature it is possible to demodulate up to four transport streams from DVB-T/T2 or DVB-S/S2 signals. These four streams are processed by the embedded Remux to generate two customized transport streams which along with the external ASI inputs can be used for feeding the dual output modulator. Moreover it is possible to decrypt BISS encoded services from any input streams prior to multiplexing without any limitation on the number of encrypted components.

FNJ-DT2 is equipped with a wide variety range of mechanisms which make it a competent selection as a DVB-T/T2 exciter. One of these mechanisms is the adaptive linear/nonlinear precorrector which is considered as a crucial feature. This capability makes it possible to drive any RF power amplifier with up to tens of kilowatts output and achieve the best possible signal quality.

# Features

- Capable of transmitting one DVB-T2 or two independent DVB-T signals at the same time
- In full compliance with the latest version of EN300744 (DVB-T) and EN302755 (DVB-T2) standard
- VHF or UHF output frequency band
- Optional IRD/Remux capable of demodulating any of DVB-T/T2/S/S2 signals with superior input sensitivity
- BISS decryption capability
- Remote control and monitoring via HTTP, SNMP and GSM network
- Capable of true RMS output power measurement of transmitter
- Up to +10dBm output power in order to directly drive a wide range of amplifiers
- Utilization of advanced adaptive precorrector for eliminating linear and nonlinear distortions of amplified signals
- Measurement of key qualitative parameters of transmitter output signal including MER, Shoulder Distance, Frequency Response and etc

# Block Diagram




# Technical Descriptions

## ➢ Back Panel

## ➢ Technical Specifications

### • Input

| | |
|---|---|
| ASI Inputs | up to 4xBNC, 75 Ω, DVB-ASI, 188 /204 Bytes |
| TSOIP Input | 1xRJ45 TS over IP Input Based on SMPTE-2022 |
| DVB-T/T2 RF Input (Optional) | Up to 4 F Connectors, RF Frequency Range: VHF/UHF, Level: -70dBm ~ -25dBm |
| DVB-S/S2 RF Input (Optional) | Up to 4 F connectors, RF Frequency Range: 950-2150MHz, Level: -92dBm ~ -10dBm, LNB Feed: 13V/14V, 18V/19V, 22 kHz |
| 10 MHz Reference Input | 1xBNC, 50 Ω, 500mVpp~5Vpp |
| 1 PPS Reference Input | 1xBNC, 50 Ω, LVTTL |
| Pre-Filter Feedback Input | 1xSMA, 50 Ω, -10~10dBm |
| Post-Filter Feedback Input | 1xSMA, 50 Ω, -10~10dBm |

### • Output

| | |
|---|---|
| RF Output | 1xSMA, 50 Ω, Frequency Range: 470-862 MHz (UHF option), 174-230 MHz (VHF option), (Resolution: 1 Hz) Level: -15 to 0dBm (Resolution: 0.1 dB), (-15 to +10dBm Available as an Option) |
| RF Monitoring Connector | 1xBNC, 50Ω, Coupling Factor: 30dB |
| 10MHz Reference Output | 1xBNC, 50Ω, 3.3V CMOS |

### • Digital Adaptive Pre-Correction

| | |
|---|---|
| Pre-Correction Modes | Signal Output: Adaptive LC, Adaptive NLC Dual DVB-T Mode: Fixed NLC |

| | |
|---|---|
| Correction Criterion | MER, Right/Left Shoulder, Group Delay, In-band Flatness |
| Crest Factor Reduction (CFR) | Soft and Hard Clipping |
| NLC Performance | Typically 10dB MER Improvement (Dependent on PA Model) |
| LC Performance | Up to ±5dB Amplitude and ±500ns Group Delay Correction |

## • Qualitative Signal Characteristics

| | | |
|---|---|---|
| MER | >40dB (Typical: 42dB) | |
| Shoulder Distance | >50dB (Typical: 57dB) | |
| Output PAPR | Adjustable in 7 to 12dB range | |
| Amplitude Variations in One Channel | <0.3dB | |
| Group Delay after output filter | <10 ns | |
| Out of Band Spurious Emissions | <60dBc | |
| LO Phase Noise | 10 Hz | <-55dBc/Hz |
| | 100 Hz | <-85dBc/Hz |
| | 1 kHz | <-90dBc/Hz |
| | 10 kHz | <-95dBc/Hz |
| | 100 kHz | <-112dBc/Hz |

## • Modulation (DVB-T)

| | |
|---|---|
| Number of Modulation Cores | Up to Two DVB-T Cores (EN 300 744 Compliant) |
| Output Channel Spacing | All Channels within 40MHz Bandwidth (Dual DVB-T Mode) |
| Transmission Modes | MFN, SFN |
| IFFT | 2K, 4K, 8K |
| Constellation | QPSK, 16QAM, 64QAM |
| Guard Interval | 1/4, 1/8, 1/16, 1/32 |
| FEC | 1/2, 2/3, 3/4, 5/6, 7/8 (For Both LP & HP Streams) |
| Interleaving | Native, In Depth |
| Hierarchical Mode | Supported, Mapping α=1, 2, 4 |
| Maximum Throughput | 31.67 Mbps at Each Modulator |
| Bandwidth | 8 MHz, 7 MHz |

## • Modulation (DVB-T2)

| | |
|---|---|
| Transmission Mode | MFN, SFN-SISO, SFN-MISO |
| Modulation Mode | Single PLP, Multi-PLP op to 255 PLPs |
| IFFT | 1K, 2K, 4K, 8K, 8K Extended, 16K, 16K Extended, 32K, 32K Extended |
| Constellation | QPSK, 16QAM, 64QAM, 256 QAM (Normal and Rotated) |
| Guard Interval | 1/4, 1/8, 1/16, 1/32, 1/128, 19/128, 19/256 |
| FEC | 1/2, 2/3, 3/4, 3/5, 4/5, 5/6 |
| Interleaving | Time, Frequency, Cell |
| Hierarchical Mode | Supported, Mapping α=1, 2, 4 |
| Maximum Throughput | 50.34 Mbps |
| Bandwidth | 8 MHz, 7 MHz |

## • Control & Monitoring

| | |
|---|---|
| Local User Interface | Character LCD and keypad |
| Remote Connection Port | 2x RJ45 (10/100 Base-T) |
| Remote User Interface | WEB, SNMP v1/v2/v3 |

## • Physical

### ▪ Power Requirement

| | |
|---|---|
| Operating Voltage | 90~260 VAC, 50~60Hz |

| | |
|---|---|
| Power Consumption | 30W max |

## ▪ Dimension & Weight

| | |
|---|---|
| Weight | 4.5 kg |
| Dimensions (W x H x D) | 48 cm x 4.4 cm x 35 cm (Width: 19 inch, Height: 1RU) |

## ▪ Environmental

| | |
|---|---|
| Operating Temperature | 0 ~ +50 °C |
| Storage Temperature | -25 ~ +60 °C |
| Relative Humidity | 95% (Non-condensing) |

## ▪ Compliance

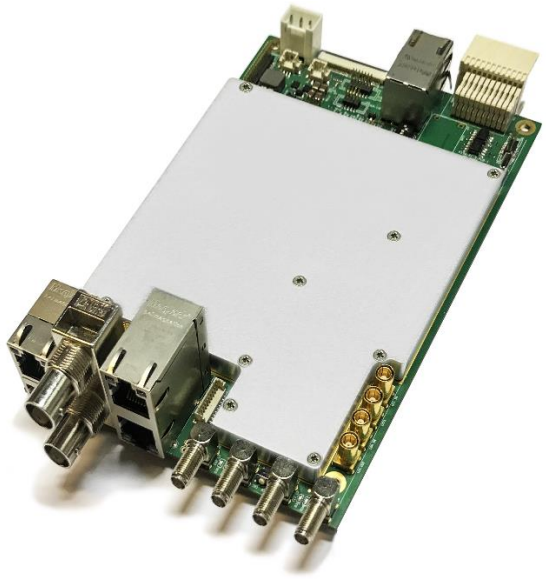
| | |
|---|---|
| DVB | ETSI 300744 – ETSI 302755 |
| ASI | DIN EN 500083-9 |
| SFN | ETSI TS 101 191 |
| Environmental Conditions | EN 300 019-1-3 V2.3.2 (2009-11) Class 3.3 |
| Power Supply: | |
| Safety | UL60950-1, TUV EN60950-1, IEC-215 |
| EMC | EN55022 Class B, EN61000-3-2/3, EN61000-4-2/3/4/5/6/8/11<br>EN61000-6-2 |

# • Ordering

| Model | Type |
|---|---|
| FNJ-DT2-Base | (Base System) |
| FNJ-DT2-IRD/RMX | (Remux and BISS Descrambler) |
| FNJ-DT2-TX CTRL | (Simple Transmitter Control) |
| FNJ-DT2-EXT PWR | (Extended output Power up to +10dBm) |
| FNJ-DT2-GPS | (GPS Receiver) |

# OEM Modulator Series (DVBT/T2/2T)

## FNJ-OEM6K-01



**Version 1**
**2020**

# Description

FNJ-OEM6K is an OEM modulator for terrestrial broadcasting fully compliant with DVB-T/T2 standards. The system has great level of reliability and excellent processing performance for broadcast applications. The product can be used as the exciter of digital TV transmitters.

Thanks to novel hardware architecture, FNJ-OEM6K is a dual core modulator which makes it possible to transmit four DVB-T signal on four distinct channels or two DVB-T2 signal on two distinct channels with just one transmitter.

FNJ-OEM6K is equipped with dual output Re-multiplexing core for selection of input services. It also supports BISS decoding, service level add/drop and component level add/drop options.

The output signal spectrum (UHF/VHF) is free of any unwanted components and a very low noise floor. This fact has dramatically reduced the modulation errors in all operating modes and achieved high signal quality at the output of the transmitter.

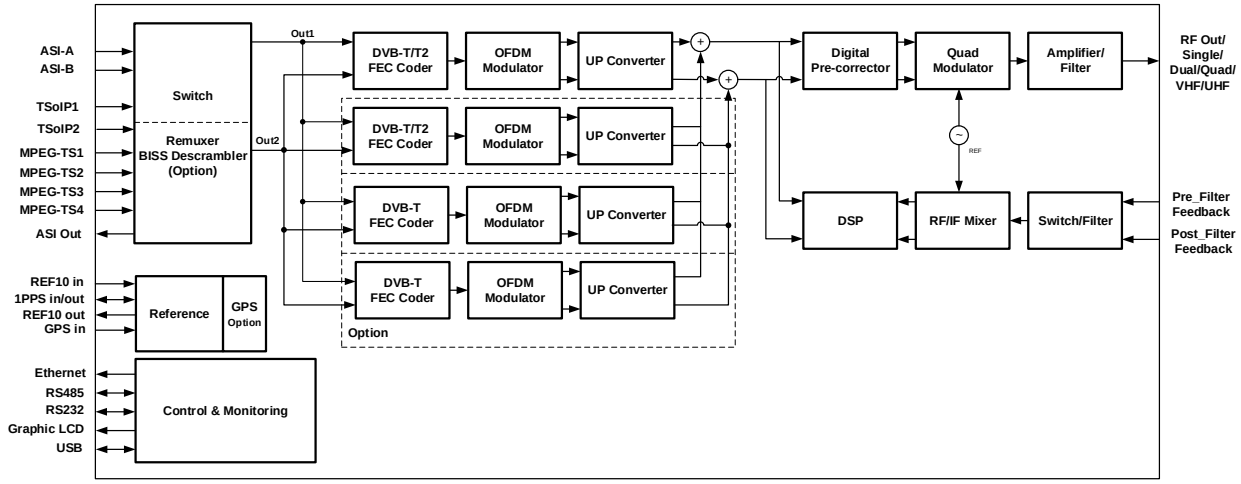
Adaptive pre-corrector is the most remarkable mechanism which eliminates distortions and optimizes signal quality and efficiency of power amplifiers.

Simple integration, high flexibility, advanced correction algorithms, control and monitoring via web and front panel, compact size and economic price has made it a comprehensive solution for digital TV transmitter manufacturers.

# Features

- Two independent DVB-T2 or four independent DVB-T output
- UHF/VHF band selection via software
- In full compliance with (EN302755 DVB-T2) and (EN300744 DVB-T)
- dual output remultplexing core
- Pre-corrector option in order to increase system efficiency
- Supporting T2MI Over IP, TS Over IP
- Displaying transmitter output signal analysis (MER, Shoulder distance, Group delay) and monitoring via RS 485, front panel LCD, web
- SFN mode (Capable of receiving time and frequency reference from NTP server)
- OCXO frequency reference
- UP to +10 dBm RF output Power

# Block Diagram




# Technical Specifications

## • Input

| | |
|---|---|
| ASI Inputs | 2xBNC, 75 Ω, DVB-ASI, 188/204 Bytes |
| TSOIP Input | 2xRJ45 Gigabit TS Over IP Inputs Based on SMPTE-2022 |
| 10 MHz Reference Input | 1xSMB, 50 Ω, 500mVpp~5Vpp |
| 1 PPS Reference Input | 1xSMB, 500mVpp~5Vpp |
| GPS Antenna input | 1xSMB, 50 Ω (Option) |
| Pre-Filter Feedback Input | 1xSMA, 50 Ω, -10~10dBm |
| Post-Filter Feedback Input | 1xSMA, 50 Ω, -10~10dBm |

## • Output

| | |
|---|---|
| RF Output | 1xSMA, 50 Ω<br>Frequency Range: (Resolution: 1 Hz)<br>470-862 MHz UHF band<br>174-230 MHz VHF band<br>Level: -15 to 0dBm (Resolution: 0.1 dB)<br>(-15 to +10dBm Available as an Option) |
| RF Monitoring Connector | 1xSMA, 50Ω, Coupling Factor: 30dB |
| 10MHz Reference Output | 1xSMB, 50Ω, 3.3V CMOS |
| 1 PPS Reference Output | 1xSMB, LVTTL (shared with 1PPS input) |
| ASI Output | 1xSMB, 75 Ω, DVB-ASI, 188/204 Bytes |
| TSOIP Output (option) | 2xRJ45 Gigabit TS over IP outputs Based on SMPTE-2022 |

## • Remux Core Parameters(Option)

| | |
|---|---|
| Re-multiplexing capabilities | Remux at Service components level, ADD/Del components<br>PID re-mapping, PCR re-stamping, BISS descrambling,<br>Complete TS analyzing |
| Supported Tables & Descriptors | NIT, SDT, TDT, TOT, EIT, LCN |
| Decryption | BISS Modes 1 and E |

## • Qualitative Signal Characteristics

| | | |
|---|---|---|
| MER | >40dB (Typical: 42dB) | |
| Shoulder Distance | >50dB (Typical: 58dB) | |
| Output PAPR | PAPR Adjustable in 7 to 12dB range | |
| Amplitude Variations in One Channel | <0.3dB | |
| Group Delay after output filter | <10 ns | |
| Out of Band Spurious Emissions | <60dBc | |
| LO Phase Noise | 10 Hz | <-55dBc/Hz |
| | 100 Hz | <-85dBc/Hz |
| | 1 kHz | <-90dBc/Hz |
| | 10 kHz | <-95dBc/Hz |
| | 100 kHz | <-112dBc/Hz |

## • Modulation (DVB-T)

| | |
|---|---|
| Number of Modulation Cores | Up to 4 DVB-T Cores (EN 300 744 Compliant) |
| Output Channel Spacing | All Channels within 40MHz Bandwidth (Quad DVB-T Mode) |
| Transmission Modes | MFN, SFN |
| IFFT | 2K, 4K, 8K |
| Constellation | QPSK, 16QAM, 64QAM |
| Guard Interval | 1/4, 1/8, 1/16, 1/32 |
| FEC | 1/2, 2/3, 3/4, 5/6, 7/8 (For Both LP & HP Streams) |
| Interleaving | Native, In Depth |
| Hierarchical Mode | Supported, Mapping α=1, 2, 4 |
| Maximum Throughput | 31.67 Mbps at Each Modulator |
| Bandwidth | 8 MHz, 7 MHz |

## • Modulation (DVB-T2)

| | |
|---|---|
| Number of Modulation Cores | Up to 2 DVB-T2 Cores (EN302755 v1.4.1 Compliant) |
| Output Channel Spacing | All Channels within 40MHz Bandwidth (Dual DVB-T2 Mode) |
| Transmission Modes | MFN, SFN-SISO, SFN-MISO |
| Modulation Modes | Single PLP, Multi-PLP up to 255 PLPs |
| IFFT | 1k, 2k, 4 k, 8k, 8k Extended, 16k, 16k Extended, 32k, 32k |
| Extended | |
| Constellation | QPSK, 16QAM, 64 QAM, 256 QAM (Normal and Rotated) |
| Guard Interval | 1/128, 1/32, 1/16, 19/256, 1/8, 19/128, 1/4 |
| FEC | 1/2, 3/5, 2/3, 3/4, 4/5, 5/6 |
| Interleaving | Time, Frequency, Cell |
| Maximum Throughput | 50.34 Mbps at Each Modulator Core |
| Bandwidth | 8 MHz, 7 MHz |

## • Digital Adaptive Pre-Correction

| | |
|---|---|
| Pre-correction Modes | Single Output: Adaptive LC, Adaptive NLC |
| Multi Core DVB-T/T2 | Fixed NLC |
| Correction Criterion | MER, Right/Left Shoulder, Group Delay, In-Band Flatness |
| Crest Factor Reduction (CFR) | Soft and Hard Clipping |
| NLC Performance | Typically 10dB MER Improvement (Dependent on PA model) |
| LC Performance | Up to ±5dB Amplitude and ±500ns Group Delay Correction |

## • Control & Monitoring

| | |
|---|---|
| Monitoring & Control Connection Port | 1x RJ45 (10/100 Base-T), 1xRS232, 1xRS485, 1x Graphic LCD |
| Remote User Interface | WEB, SNMP v1/v2/v3 |
| Firmware Upgrade Interface | WEB, USB |

## • Physical

## Power Requirement

| | |
|---|---|
| Operating Voltage | 8~55 VDC |
| Power Consumption | 25W max |

## Dimension & Weight

| | |
|---|---|
| Weight | 400 g |
| Dimensions (W x H x D) | 18 cm x 3.5 cm x 11 cm |

## Environmental

| | |
|---|---|
| Operating Temperature | 0 ~ +50 °C |
| Storage Temperature | -25 ~ +60 °C |
| Relative Humidity | 95% (Non-condensing) |

## Compliance

| | |
|---|---|
| DVB | ETSI 300744 – ETSI 302755 |
| ASI | DIN EN 500083-9 |
| SFN | ETSI TS 101 191 |

# Ordering

| Model | Type |
|---|---|
| FNJ-DT2-Base | (Base System) |
| FNJ-DT2-IRD/RMX | (Remux and BISS Descrambler) |
| FNJ-DT2-TX CTRL | (Simple Transmitter Control) |
| FNJ-DT2-EXT PWR | (Extended output Power up to +10dBm) |
| FNJ-DT2-GPS | (GPS Receiver) |
| FNJ-DT2-T2x2 | Dual DVB-T2 Mode |
| FNJ-DT2-Tx4 | Quad DVB-T Mode |

# RF Switch Control

## FNJ-RFSC-01


**Version 1**
**Summer 2022**

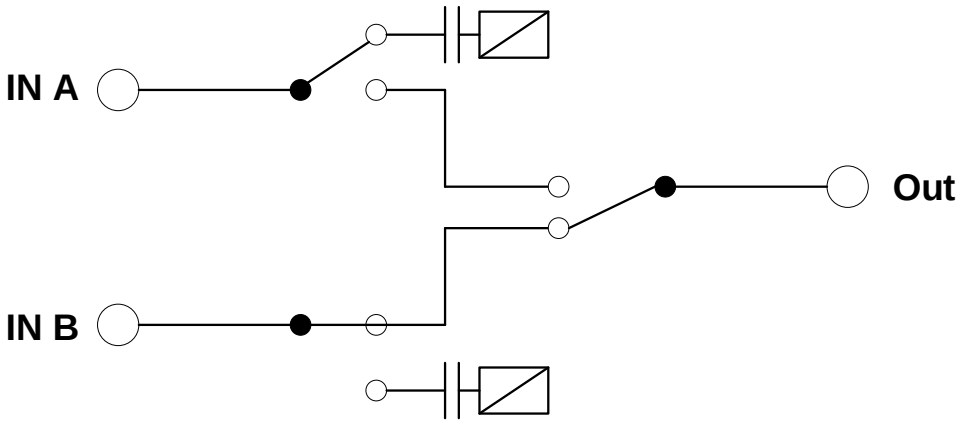
## Description

FNJ-RFSC-01 is an automatic UHF/VHF or L band switch which can be ordered depending on the function. The switch has been designed with the state of the art components and techniques in order to provide reliable service for broadcasters. Main applications of the switch are for seamless switching between TV transmitters on UHF/VHF band or DVB-S/S2 modulators as SSPA inputs on the L-band.

## Features

- UHF/VHF or L-Band
- Up to 2W input power
- Up to 1A DC current on each input
- Remote monitoring and control via Ethernet, SNMP, RS232/485

## Block Diagram



# Technical Descriptions

| | |
|---|---|
| Frequency Range | DC…2500 MHz |
| Impedance, Connectors | SMA (f) |
| Damage Level | +30 dBm |
| Return Loss Selected Path | >14 dB, typical 16 dB |
| Return Loss not Selected Path | >14 dB, typical 16 dB |
| Insertion Loss | <2 dB |
| Isolation on/off | >60 dB (up to 1200 MHz)<br>>40 dB (1200 to 2500 MHz) |
| Relay Type | Latching |
| Contact Rating | 28 V DC, 1.5 A |
| Switching Cycles | >10E6 (no DC)<br>>10E5 (28 V DC, 1.5 A) |
| Interfaces (Connectors) | Ethernet (RJ-45)<br>Serial Interface RS232 (Sub D9)<br>USB |
| Supply Voltage | 100~240 VAC supplied by two different Lines |
| Dimensions | 19" Width, 1RU Height, 300 mm Depth |

# MPEG Re-Multiplexer Series

## FNJ-RMX-04


**Version 1**

**Summer 2020**

# Description

FNJ-RMX is an innovative, feature rich MPEG-TS Re-multiplexer for broadcast applications. This modular re-multiplexer is equipped with a variety of inputs that ensure compatibility with all transmission media. Typically it consists of RF cards for DVB-T/T2 and DVB-S/S2 signal reception. It generally receives up to eight transport streams through its RF interfaces or external ASI inputs. All the input streams are thoroughly analyzed and a list of available services is constructed for the user. Thanks to the existence of two independent multiplexing cores, the user will be able to generate two independent transport streams by re-multiplexing of TS services.

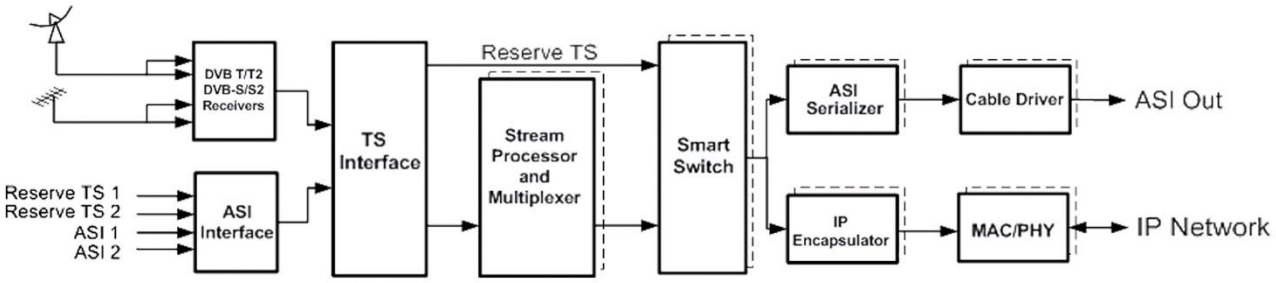
FNJ-RMX is capable to perform component level multiplexing. Component re-multiplexing makes it a distinctive re-multiplexer in comparison with similar products available in the market. Another noteworthy feature is the ability to perform BISS decryption of encrypted services.

FNJ-RMX has a smart switch mechanism. The locally multiplexed TS and a reserve TS signal, are inputs of switch. The reserve TS has the same content as multiplexed signal but is provided from a different distribution network. The smart switch continuously analyzes its inputs for detection of errors, defined by TR101290 and dynamically outputs the signal with fewer errors. Monitoring and control could be done either locally or remotely via Web.

# Features

- Modular design
- Two independent multiplex cores
- TS analysis module for all inputs
- BISS-1 decoding
- Component and service level multiplexing
- Automatic PID remapping
- Supporting EIT, NIT, SDT, TDT and TOT tables
- Supporting DiseqC standard
- Supporting up to 150 Mb/s bit rate for each multiplexed output
- Supporting DVB-T/T2/S/S2 RF inputs
- Equipped with cable driver for ASI outputs
- Remote control and monitoring through IP network
- Software upgrade through IP network and USB port
- Equipped with redundant power supply

# Block Diagram




# Technical Descriptions

## Back Panel

## Technical Specifications

### Input

#### Terrestrial

| | | |
|---|---|---|
| Connector | | 2x F-Type, 75 Ohm (up to 4) |
| Input Level | | -92dBm ~ -25dBm |
| Frequency Range | | 50MHz ~ 1GHz |
| Supported DVB-T Modes: | | |
| | Bandwidth | 6, 7, 8MHz |
| | FFT size | 2K, 8K |
| | Guard Interval | 1/32, 1/16, 1/8, 1/4 |
| | Constellation | QPSK, 16QAM, 64QAM |
| | Code Rate | 1/2, 2/3, 3/4, 5/6, 7/8 |
| Supported DVB-T2 Modes: | | |
| | Bandwidth | 1.7, 5, 6, 7, 8MHz |
| | FFT Size | 1K, 2K, 4K, 8K, 16K, 32K (including extended modes) |
| | Guard Interval | 1/32, 1/16, 1/8, 1/4, 1/128, 19/128, 19/256 |
| | Constellation | QPSK, 16QAM, 64QAM, 256QAM |
| | Code Rate | 1/2, 3/5, 2/3, 3/4, 4/5, 5/6 |

### Satellite

| | |
|---|---|
| Connector | 2x F-Type, 75 Ohm (up to 4) |
| Input Level | -70dBm ~ -25dBm |
| Frequency Range | 950MHz ~ 2.15GHz |
| LNB Power | 13V, 18V or off, 22 kHz on/off |
| Supported DVB-S Modes: | |
| Symbol Rate | 1Msym/s to 45Msym/s |
| FEC | 1/2, 2/3, 3/4, 5/6, 7/8 |
| Supported DVB-S2/S2X Modes: | |
| Symbol Rate | 1Msym/s to 60Msym/s (40Msym/s in 32 APSK) |
| FEC (QPSK) | 1/4, 1/3, 2/5, 1/2, 3/5, 2/3, 3/4, 4/5, 5/6, 8/9, 9/10 |
| FEC (8 PSK) | 3/5, 2/3, 3/4, 5/6, 8/9, 9/10 |
| FEC (16 APSK) | 2/3, 3/4, 4/5, 5/6, 8/9, 9/10 |
| FEC (32 APSK) | 3/4, 4/5, 5/6, 8/9, 9/10 |

## Output

| | |
|---|---|
| DVB-ASI: | |
| Connector | 2x BNC 75 Ohm |
| ASI Standard | EN50083-9 |
| TSOIP: | |
| Connection Port | 1x Gigabit Ethernet outputs, 10/100/1000 auto-sensing |
| TSOIP Standards | Complying ETSI TS102034 and SMPTE 2022-n family |

## Control & Monitoring

| | |
|---|---|
| Local User Interface | Character LCD and keypad |
| Remote Connection Port | 1x RJ45 (10/100 Base-T) |
| Remote User Interface | WEB, SNMP v1/v2/v3 |

## Physical

### Power Requirement

| | |
|---|---|
| Operating Voltage | 85~264VAC |
| Power Consumption | 15W max |

### Dimension & Weight

| | |
|---|---|
| Weight | 4 kg |
| Dimensions (W x H x D) | 48 cm x 4.4 cm x 35 cm (Width: 19 in, Height: 1RU) |

### Environmental

| | |
|---|---|
| Operating Temperature | -5 ~ +55 °C |
| Storage Temperature | -25 ~ +55 °C |
| Relative Humidity | 95% (Non-condensing) |

### Compliance

| | |
|---|---|
| EMC: | EN55022, EN61000-3-2, EN61000-3-3, EN55024, CISPR22, FCC CFR47 Part 15B Class A |
| Safety: | EN60950-1, IEC60950-1, UL60950-1 |

## Ordering

**FNJ– RMX– W– X X X X X**

**1 2 3 4 5 6**

**1: Product Version**

**04**=Slot Remux

**2: Slot 1 Input**

**0=**Blank
**1=** Up to 2 Input T/T2
**2=** Up to 2 Input S/S2
**3=** Up to 1 Input T / Up to 1 Input S
**4=** Up to 4 Input ASI

**3: Slot 2 Input**

**0=**Blank
**1=** Up to 2 Input T/T2
**2=** Up to 2 Input S/S2
**3=** Up to 1 Input T / Up to 1 Input S
**4=** Up to 4 Input ASI

**4:TSoIP Output**

**A=** Available TSoIP Outputs
**N=** Not Available TSoIP Outputs

**5:ASI Output**

No. of ASI Outputs (0~4)

**6: Smart Switch**

A= Available Smart Switch
**N=** Not Available Smart Switch

For Example: **FNJ-RMX-04-22N1A**

# 4. Satellite TV broadcast equipment

# Satellite Modulator Series

## FNJ-DS2-03


**Version 1**

**2020**

# Description

FNJ-DS2 is a new generation DVB-S/S2 Modulator for satellite broadcasting. This product fully complies ETSI300421 and ETSI302307 standards and due to possessing several features it is considered as one of the best modulators in this class available in the market. The main feature of this product is its high level of reliability which guarantees the highest uptime in the network.

This modulator not only accepts MPEG transport streams on ASI interface but also fully supports TSoIP and special care was taken to cope with jittery transport streams over IP. On the other hand the modulated carrier is available either on L Band or IF frequencies including 70 or 140 MHz through separate connectors. It should be mentioned that when IF output is activated a replica of signal is also available on L-band output on a fixed frequency for monitoring purposes. Also a switchable 10 MHz reference signal and optional 24 Vdc or 48 Vdc for an outdoor BUC is multiplexed on the L-band interface.

FNJ-DS2 possesses an advanced feature set. A great feature of this modulator is the ability to perform BISS encryption on input TS components prior to transmission. Another remarkable feature is the DVB-CID as a means of uplink station identification. This mechanism plays a vital role in interference source recognition in satellite networks.

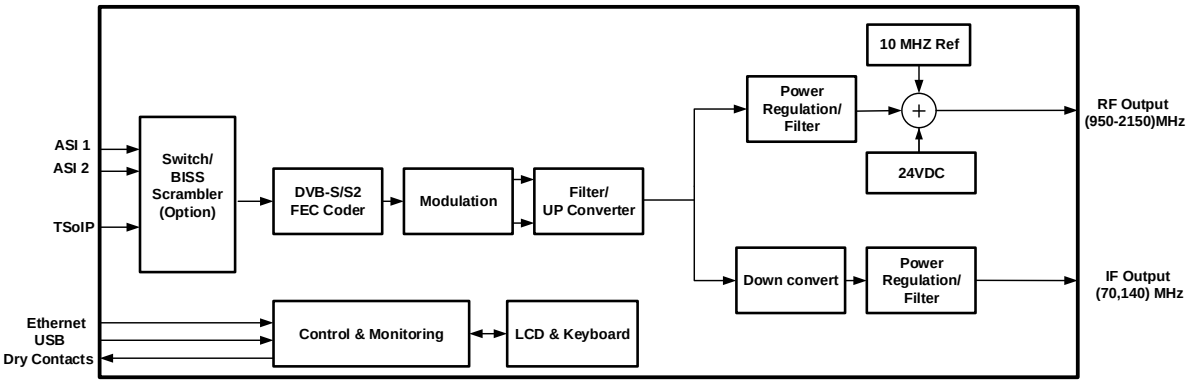
FNJ-DS2 currently supports parts of DVB-S2x standard and therefore is able to transmit up to 200Mbps. Such a capacity makes it possible to transmit 40 SD quality or 10 HD quality video programs coded by H.264 via a single transponder which is a significant ability for broadcasters. It should be noted that the hardware of FNJ-DS2 is designed based on future extendibility. Hence achieving higher transmit bitrates as well as implementing new features like multiple TS input along with variable coding and modulation (VCM) mechanism is possible just with a simple firmware update.

Although being rich in features and taking advantage of new technologies, FNJ-DS2 is designed to be more economic in comparison with similar products in satellite broadcasting market

# Features

- In full compliance with DVB-S/S2/DSNG and in partial compliance with DVB-S2x standards.
- Supporting up to 200Mbps at ASI and 80Mbps at TSoIP input.
- Capable to perform BISS encryption on input services prior to transmission (optional).
- Supporting up to 45Msym/s with 1sym/s steps.
- Generating modulated signal on L band or IF frequencies (70MHz or 140MHZ).
- Supporting DVB-CID in compliance with ETSI-TS103129 standard.
- Control and monitoring through web or SNMP over IP networks.
- Easy software upgrading using web or USB port.
- Equipped with reserve power supply (optional).

# Block Diagram




# Technical Descriptions

## Back Panel


## Technical Specifications

### TX & RX

#### Input

| | |
|---|---|
| ASI Inputs | up to 4xBNC, 75 Ω, DVB-ASI, 188/204 bytes, Bitrate up to 200Mbit/sec |
| TSOIP Input | 1xRJ45 TS over IP input based on SMPTE-2022, Bitrate up to 1Gbps |
| 10 MHz Reference Input | 1xBNC, 50 Ω, 500mVpp~5Vpp |

## Output

#### L-Band

| | | |
|---|---|---|
| Main Connector | 1x SMA (F), 50 Ω | |
| Monitoring Connector | 1x BNC (F), 50 Ω, Coupling Factor: -25dB | |
| Frequency | 950 to 2150 MHz, Step 1KHz | |
| Level | -30 to +5dBm (±1dBm), Step 0.1dB | |
| Return Loss | ≥14dB | |
| 10 MHz reference over L-band output | -3dBm (Software Switchable) | |
| DC Supply Over L-Band Output | 24VDC, 2A (Software Switchable) | |
| Out of Band Spurious Emissions | <60dBc | |
| Phase Noise | 10 Hz | <-55dBc/Hz |
| | 100 Hz | <-75dBc/Hz |
| | 1 kHz | <-85dBc/Hz |
| | 10 kHz | <-90dBc/Hz |

| | |
|---|---|
| 100 kHz | <-90dBc/Hz |
| 1 MHz | <-115dBc/Hz |

### IF

| | |
|---|---|
| Main Connector | 1 x BNC (F), 50 Ω |
| Monitoring Connector | 1 x BNC (F), 50 Ω, Coupling Factor: -25dB |
| Frequency | 70 or 140 MHz |
| Level | -25 to +5dBm (±1dBm), 0.1dB step |
| Out of Band Spurious Emissions | <60dBc |

## Modulation (DVB-S2)

| | |
|---|---|
| Constellations | QPSK, 8PSK, 16APSK, 32APSK |
| Inner Coding Rates: | |
| QPSK | 1/4, 1/3, 2/5, 1/2, 3/5, 2/3, 3/4, 4/5, 5/6, 8/9, 9/10 |
| 8PSK | 3/5, 2/3, 3/4, 5/6, 8/9, 9/10 |
| 16APSK | 2/3, 3/4, 4/5, 5/6, 8/9, 9/10 |
| 32APSK | 3/4, 4/5, 5/6, 8/9, 9/10 |
| Pilots | ON or OFF |
| FEC Frames | Normal (64,800), Short (16,200) |
| Roll-off Factor | 0.35, 0.25, 0.20, 0.15, 0.1, 0.05 |
| Baud Rate Range | 0.5 ~ 45Mbaud |
| Packet Stuffing | TS Null Packet Insertion with PCR Correction or Dummy PLFRAME Insertion |

## Modulation (DVB-S/DSNG)

| | |
|---|---|
| Constellations | QPSK, 8PSK |
| Inner Coding Rates: | |
| QPSK | 1/2, 2/3, 3/4, 5/6, 7/8 |
| 8PSK | 2/3, 5/6, 8/9 |
| Roll-off Factor | 0.35, 0.25, 0.2, 0.15, 0.1, 0.05 |
| Baud Rate Range | 0.5~ 45Mbaud |

## Control & Monitoring

| | |
|---|---|
| Local User Interface | Character LCD and keypad |
| Remote Connection Port | 1 x RJ45 (10/100 Base-T) |
| Remote User Interface | WEB, SNMP v1/v2/v3 |
| Alarm Interface | Dry Contacts, Connector 9 Pin Sub-D (F) |

# Physical

## Power Requirement

| | |
|---|---|
| Operating Voltage | 90~240 VAC, 50~60Hz |
| Power Consumption | 45W max |
| Redundancy | Up to 2 redundant supplies |

## Dimension & Weight

| | |
|---|---|
| Weight | 5.5 kg |
| Dimensions (W x H x D) | 48 cm x 4.4 cm x 35 cm (Width: 19 inch, Height: 1RU) |

## Environmental

| | |
|---|---|
| Operating Temperature | 0 ~ +50 °C |
| Storage Temperature | -25 ~ +60 °C |
| Relative Humidity | 95% (Non-condensing) |

## Compliance

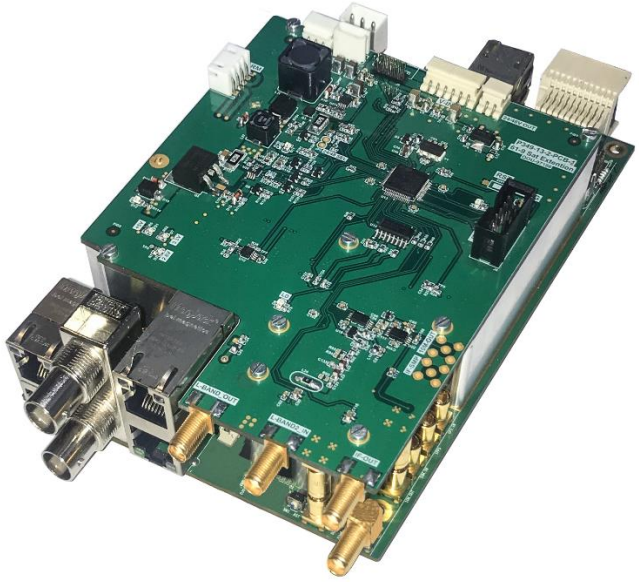
| | |
|---|---|
| DVBS2 | EN302307 |
| DVB-S/DSNG | EN 300 421, EN 301 210 |
| DVB-CID | ETSI TS 103 129 |
| Environmental Conditions | EN 300 019-1-3 V2.3.2 (2009-11) Class 3.3 |
| Power Supply: | |
| Safety | UL60950-1 |
| EMC | EN55022 Class B, EN61000-3-2/3, EN61000-4-2/3/4/5/6/8/11 |

# Ordering

| Model | Type |
|---|---|
| FNJ-DS2-Base | Base System |
| FNJ-DS2-IRD/RMX | TS Remultiplexer and BISS Descrambler |

# OEM Modulator Series (DVB-S/S2/S2X)

## FNJ-OEM7K-01



**Version 1**

**Summer 2020**

# Description

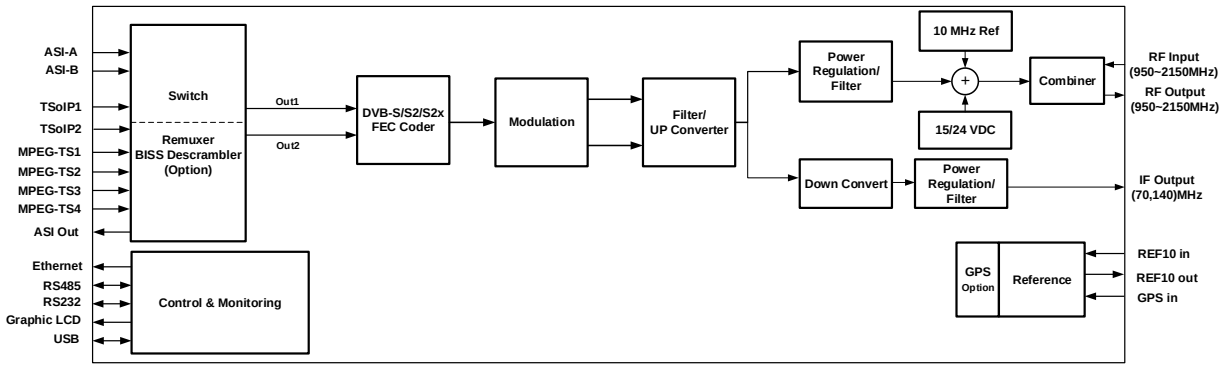
FNJ-OEM 7K is an OEM modulator for satellite broadcasting, fully compliant with DVB-S/DSNG/S2/S2X standards. Advanced design of analog output section causes excellent return loss and high quality signal parameters. main output signal can be combined with an L-band input signal. This feature is used in SNG or transmission of several transponders with an amplifier. Maximum throughput of FNJ-OEM7K-01 is 360 Mbps. So it is possible to transmit 120 SD or 30 HD video programs via a single transponder. Another remarkable feature is the DVB-CID for identification of interfering carrier.

Thanks to the internal re-multiplexer core with two outputs, this product is capable of selecting and combining services from all inputs. For security reasons it can also perform BISS encryption on TS components prior to transmission. The modulator fully supports TSoIP input and special care was taken to receive jittery transport streams over IP. Simple integration, high performance and flexibility, ACM/VCM/Multi point support, compact size and economic price, suits FNJ-OEM 7K perfectly as a comprehensive OEM solution for satellite uplinks, flyaway terminals and Encoder modulator in SNGs. SNMP, Serial, web interface and front panel are used for control and monitoring.

# Features

- In compliance with (EN 300 421, EN 301 210 DVB-S/DSNG), (EN302 307-1 DVB-S2), (EN 302 307-2 DVB-S2X)
- Symbol rate 0.5KSPS to 72MSPS
- Data rate up to 360 Mbit/s
- Optional BISS content protection
- Supporting DVB-CID, GSE, MPE
- Single voltage 5V DC supply
- Re-multiplex core capable of re-multiplexing all TS inputs
- All-in-one single board and compact hardware
- Full control and monitoring through RS485 and Ethernet interfaces

# Block Diagram




# Technical Descriptions

## Technical Specifications

### Input

| | |
|---|---|
| ASI Inputs | 2xBNC, 75 Ω, DVB-ASI, 188/204 Bytes |
| TSOIP Input | 2xRJ45 Gigabit TS Over IP Inputs Based on SMPTE-2022 |
| L-Band Input | 1xSMA, 50 Ω |
| 10 MHz Reference Input | 1xSMB, 50 Ω, 500mVpp~5Vpp |
| GPS Antenna input | 1xSMB, 50 Ω (Option) |

### Output

| | |
|---|---|
| RF Output | 1xSMA, 50 Ω<br>Frequency Range 950-2150 MHz L-band (Resolution 1 Hz)<br>Level: -30 to +7dBm (Resolution 0.1 dB)<br>10 MHz reference, 0dBm (Software Switchable)<br>15/24VDC, 2.5A (Software Switchable) |
| IF Output | 1xSMA, 50 Ω<br>Frequency Range 50-180 MHz L-band (Resolution 1 Hz)<br>Level: -30 to +7dBm (Resolution 0.1 dB) |
| RF Monitor | 1xSMA, 50Ω, Coupling Factor 30dB |
| IF Monitor | 1xSMA, 50Ω, Coupling Factor 30dB |
| 10MHz Reference Output | 1xSMB, 50Ω, 3.3V CMOS |
| ASI Output | 1xSMB, 75 Ω, DVB-ASI, 188/204 Bytes |
| TSOIP Output | 2xRJ45 Gigabit TS over IP outputs Based on SMPTE-2022(option) |

### Remux Core Parameters(Option)

| | |
|---|---|
| Remultiplexing capabilities | Remux at Service components level, ADD/Del components<br>PID re-mapping, PCR re-stamping, BISS descrambling,<br>Complete TS analyzing |
| Supported Tables & Descriptors | NIT, SDT, TDT, TOT, EIT, LCN |
| Decryption | BISS Modes 1 and E |

### Qualitative Signal Characteristics

| | | |
|---|---|---|
| Return Loss | **L-band:** | ≥14dB @950~1200MHz<br>≥18dB @1200~2150MHz |
| | **IF:** | ≥14dB @50~180MH |

| | | |
|---|---|---|
| Output Spurious Emissions | <60dBc | |
| LO Phase Noise | 10 Hz | <-55dBc/Hz |
| | 100 Hz | <-75dBc/Hz |
| | 1 kHz | <-85dBc/Hz |
| | 10 kHz | <-90dBc/Hz |
| | 100 kHz | <-90dBc/Hz |
| | 1 MHz | <-115dBc/Hz |

## • Modulation Standard

| | | |
|---|---|---|
| DVB-S/DSNG MODCODs | QPSK | 1/2, 2/3, 3/4, 5/6, 7/8 |
| | 8PSK | 2/3, 5/6, 8/9 |
| DVB-S2 MODCODs | QPSK | 1/4, 1/3, 2/5, 1/2, 3/5, 2/3, 3/4, 4/5, 5/6, 8/9, 9/10 |
| (64K and 16K FEC) | 8PSK | 3/5, 2/3, 3/4, 5/6, 8/9, 9/10 |
| (9/10 just for 16K FEC) | 16APSK | 2/3, 3/4, 4/5, 5/6, 8/9, 9/10 |
| | 32APSK | 3/4, 4/5, 5/6, 8/9, 9/10 |
| DVB-S2X MODCODs | **64K FEC:** | |
| | QSPK | 13/45, 9/20, 11/20 |
| | 8PSK | 23/36, 25/36, 13/18 |
| | 16APSK | 26/45, 3/5, 28/45, 23/36, 25/36, 13/18, 7/9, 77/90 |
| | 32APSK | 32/45, 11/15, 7/9 |
| | 64APSK | 11/15, 7/9, 4/5, 5/6 |
| | 128APSK | 3/4, 7/9 |
| | 256APSK | 3/4, 32/45 |
| | **16K FEC:** | |
| | QPSK | 11/45, 4/15, 14/45, 7/15, 8/15, 32/45 |
| | 8PSK | 7/15, 8/15, 26/45, 32/45 |
| | 16APSK | 7/15, 8/15, 26/45, 3/5, 32/45 |
| | 32APSK | 2/3, 32/45 |
| | **Linear – 64K FEC:** | |
| | 8PSK | 5/9-L, 26/45-L |
| | 16APSK | 1/2-L, 8/15-L, 5/9-L, 3/5-L, 2/3-L |
| | 32APSK | 25/36-L |
| | 64APSK | 32/45-L |
| | 256APSK | 29/45-L, 2/3-L, 31/45-L, 11/15-L |
| Pilots | ON or OFF (not applicable in DVB-S/DSNG mode) | |
| FEC Frames | Normal (64,800), Short (16,200) (not applicable in DVB-S/DSNG mode) | |
| Roll-off Factor | 0.35, 0.25, 0.20, 0.15, 0.1, 0.05 | |
| Symbol Rate | 0.5 ~ 72Mbaud | |
| Packet Stuffing | TS Null Packet Insertion with PCR Correction or Dummy PLFRAME Insertion | |
| Carrier ID | DVB-CID according to ETSI TS 103129 | |

## • Control & Monitoring

| | |
|---|---|
| Monitoring & Control Connection Port | 1x RJ45 (10/100 Base-T), 1xRS232, 1xRS485, 1x Graphic LCD |
| Remote User Interface | WEB, SNMP v1/v2/v3 |
| Firmware Upgrade Interface | WEB, USB |
| Alarm Interface | 2xDry Contacts |

## • Physical

### ▪ Power Requirement

| | |
|---|---|
| Operating Voltage | 8~55 VDC |

| | |
|---|---|
| Power Consumption | 50W max |

### ▪ Dimension & Weight

| | |
|---|---|
| Weight | 400 g |
| Dimensions (W x H x D) | 18 cm x 3.5 cm x 11 cm |

### ▪ Environmental

| | |
|---|---|
| Operating Temperature | 0 ~ +50 °C |
| Storage Temperature | -25 ~ +60 °C |
| Relative Humidity | 95% (Non-condensing) |

### ▪ Compliance

| | |
|---|---|
| DVB | EN 300 421, EN 301 210, EN302307-1, EN 302307-2 |
| ASI | DIN EN 500083-9 |

## • Ordering

| Model | Type |
|---|---|
| FNJ-DS2-Base | (Base System) |
| FNJ-DS2-S2X | (DVB-S2X Mode) |

# Test Loop Translator

## FNJ-TLT-01

**Version 1**

**Summer 2020**

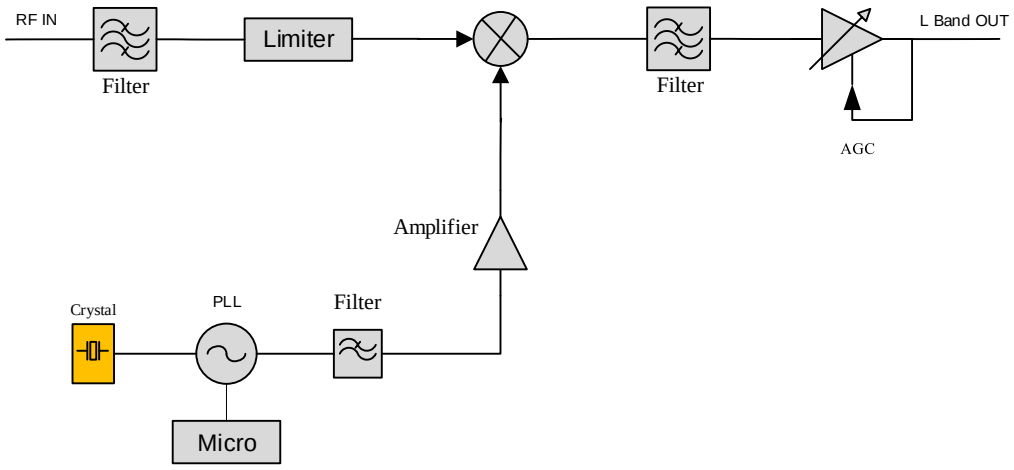
# Description

FNJ-TLT-01 is a satellite test loop translator for monitoring of transmitter output signal. The module down-converts output signal frequency from DBS or Ku band to L band and provides phase noise and frequency stability characteristics, necessary for satellite communication. It shifts the whole input frequency band to L band and minimizes spurs generated by mixer. There is no filter in the basic module but it can be ordered with filter. The module design is very flexible in order to meet wide range of customer requirements.

# Features

- High stability and excellent phase noise
- Minimum attenuation of input signal
- Several order options:
  - Web based Monitoring
  - Indoor or outdoor casing
  - DC power supply
  - Power supply via L Band path
  - 30 dB variable attenuator

# Block Diagram




# Technical descriptions

## Rear view

## ➢ Technical specification

### • Input

| | |
|---|---|
| Input-Band | Ku:13.75~14.5 GHz,<br>DBS: 17.3~18.4 GHz |
| Connector | SMA (f), 50Ω |
| Return loss | >18dB |
| Max input power | +15dBm |

### • Output

| | |
|---|---|
| Output | 950~2050 MHz |
| Connector | SMA (f), 50Ω |
| Return loss | >15dB |
| Output Power | -20dBm |

#### ▪ RF Performance

| | |
|---|---|
| LO phase noise | -72dBc/Hz @ 100Hz<br>-85dBc/Hz @ 1 kHz<br>-98dBc/Hz @ 10 kHz<br>-103dBc/Hz @ 100 kHz<br>-120dBc/Hz @ 1MHz |

#### ▪ Internal Reference

| | |
|---|---|
| Ultra Low Phase Noise VCXO | -162 dBc/Hz Typ. @ 10 kHz offset |
| Frequency Stability (Over -40º C to +85ºC) | ±18ppm |
| Aging | ±2ppm |

#### ▪ External Reference Input

| | |
|---|---|
| Frequency | 10~100 MHz (Optional) |
| Level 0dBm | ±3dB |
| Connector | SMA (f), 50Ω |

Required phase noise to be better than 45dBc/Hz of output phase noise

### • Physical

#### ▪ Power Requirement

| | |
|---|---|
| Operating Voltage | 85~264 VAC |
| Power Consumption | 15W max |
| Frequency | 47-63Hz |

#### ▪ Dimension & Weight

| | |
|---|---|
| Weight | 850 gr |
| Dimensions (W x H x D) | 220 mm x 77 mm x 40 mm (Width: 19 inch, Height: 1RU) |

#### ▪ Environmental

| | |
|---|---|
| Operating Temperature | -15 ~ +50 °C |
| Storage Temperature | -25 ~ +60 °C |
| Relative Humidity | 95% (Non-condensing) |

#### ▪ Options

Adjustable Output Power
Input Power Alarm
External Input Reference 10~100MHz
N-type (f) input connection
N-type (f) output connection
OCXO Reference With ±10ppb Frequency Stability
30dB variable attenuator
Power supply fed with L-band connector

## • Ordering

| Model | Type |
|---|---|
| FNJ-TLT-01-DBS | DBS band down convertor |
| FNJ-TLT-01-Kue | Ku band down-convertor |

# 5. Signal analysis and compression equipment

# Broadcast Signal Processor

## FNJ-BSP-01


**Version 1**

**2020**

# Description

FNJ-BSP-01 is a broadcast signal analyzer, which is able to receive and analyze several MPEG2-TS signals with a powerful processor, on different physical platforms (DVB-T/T2, DVB-S/S2, ASI and IP). Modular design of the system enables the users to customize it based on the needed function. Main functions of this system are: 1. Analysis of RF and digital signal parameters. 2. Content streaming for Audio/video monitoring systems.

The system is capable of analyzing RF parameters of DVB-T/T2/S/S2 signals including Input signal power, CNR, Modulation type, BER etc.

TS stream analysis in the system complies with ETR 101 290 standard and error identification in different standard levels are done in the system. Moreover, it is able to identify bitrate drop or service failure and PID Add/Remove in the list of inputs PID.

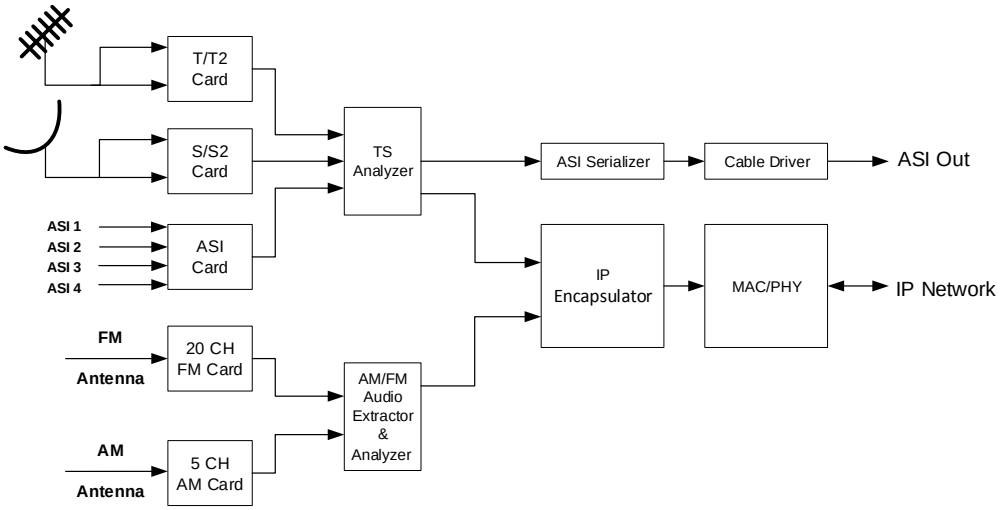
Another important function of this system is simultaneous monitoring of several AM/FM Radio transmitters. For Audio/Video monitoring of AM/FM/TS signals, they are streamed on the IP network and shown on a mosaic multi-viewer. Analysis reports of the system are available via system web interface.

FNJ-BSP-01 provides a complete chain of receiving, converting and analyzing AM/FM/TS signals. The system can also be integrated in the FANAMOJ network monitoring system. Potential customers of the device are, TS signal equipment manufacturers and digital terrestrial and IP broadcasters.

# Features

- Real time analysis of TS packet errors in compliance with ETR 101 290 standards
- Extracting, displaying and analyzing of programs and MPEG-TS signal PID's
- Displaying an overview of the all input signals status
- Analyzing PAT, PMT,SDT, NIT, CAT, TOT, TDT, EIT tables
- Add/Remove notification for new PID's
- Notification for change in PAT table
- Analysis of DVB-T/T2/S/S2 signals
- Analysis of AM/FM signals with AM/FM cards (Option)
- TSoIP output
- Graphical displaying of PID's Bitrates
- Displaying PCR graph
- Logging error time and type capable of filtering error reports
- Monitoring and control via WEB and NMS system
- SNMP v3 support

## Block Diagram




## Technical Descriptions

### ➢ Back Panel

### ➢ Technical Specifications

- **Input**

  - **ASI**

| | |
|---|---|
| Connector | 4x BNC, 75 Ohm |
| Standard | DVB-ASI Interface |
| Input Bitrate | Up to 180Mbit/s |

  - **Terrestrial**

| | |
|---|---|
| Connector | 2x F-Type, 75 Ohm (up to 4x) |
| Input Level | -92dBm ~ -25dBm |
| Frequency Range | 50MHz – 1GHz |
| Supported DVB-T Modes: | |
| Bandwidth | 6, 7, 8 MHz |
| FFT size | 2K, 8K |
| Guard Interval | 1/32, 1/16, 1/8, 1/4 |
| Constellation | QPSK, 16QAM, 64 QAM |
| Code Rate | 1/2, 2/3, 3/4, 5/6, 7/8 |
| Supported DVB-T2 Modes: | |

| | |
|---|---|
| Bandwidth | 1.7, 5, 6, 7, 8 MHz |
| FFT Size | 1K, 2K, 4K, 8K, 16K, 32K (including extended modes) |
| Guard Interval | 1/32, 1/16, 1/8, 1/4, 1/128, 19/128, 19/256 |
| Constellation | QPSK, 16QAM, 64QAM, 256QAM |
| Code Rate | 1/2, 3/5, 2/3, 3/4, 4/5, 5/6 |

### ▪ Satellite

| | |
|---|---|
| Connector | 2x F-Type, 75 Ohm (up to 4x) |
| Input Level | -70dBm ~ -25dBm |
| Frequency Range | 950MHz – 2.15GHz |
| LNB Power | 13V, 18V or off, 22 kHz on/off Supported DVB-S Modes: |
| Symbol Rate | 1Msym/s to 45Msym/s |
| FEC 1/2, 2/3, 3/4, 5/6, 7/8 | |
| Supported DVB-S2/S2X Modes: | |
| Symbol Rate | 1Msym/s to 60Msym/s (40Msym/s in 32 APSK) |
| FEC (QPSK) | 1/4, 1/3, 2/5, 1/2, 3/5, 2/3, 3/4, 4/5, 5/6, 8/9, 9/10 |
| FEC (8 PSK) | 3/5, 2/3, 3/4, 5/6, 8/9, 9/10 |
| FEC (16 APSK) | 2/3, 3/4, 4/5, 5/6, 8/9, 9/10 |
| FEC (32 APSK) | 3/4, 4/5, 5/6, 8/9, 9/10 |

## • Output

| | |
|---|---|
| DVB-ASI: | |
| Connector | 2x BNC 75 Ohm |
| ASI Standard | EN50083-9 |
| TSOIP: | |
| Connection Port | 1x Gigabit Ethernet outputs, 100/1000 auto-sensing |
| TSOIP Standards | Complying ETSI TS102034 and SMPTE 2022-n family |

## • Control & Monitoring

| | |
|---|---|
| Local User Interface | Character LCD and keypad |
| Remote Connection Port | 1x RJ45 (10/100 Base-T) |
| Remote User Interface | WEB, SNMP v1/v2/v3 |

## • Physical

### ▪ Power Requirement

| | |
|---|---|
| Operating Voltage | 85~264VAC |
| Power Consumption | 15W max |

### ▪ Dimension & Weight

| | |
|---|---|
| Weight | 3 kg |
| Dimensions (W x H x D) | 48 cm x 4.4 cm x 35 cm (Width: 19 in, Height: 1RU) |

## ▪ Environmental

| | |
|---|---|
| Operating Temperature | -5 ~ +60 °C |
| Storage Temperature | -25 ~ +55 °C |
| Relative Humidity | 95% (Non-condensing) |

## ▪ Compliance

| | |
|---|---|
| DVB-T/T2 | ETSI 300744 – ETSI 302755 |
| DVBS2 | EN302307 |
| DVB-S/DSNG | EN 300 421, EN 301 210 |
| MPEG-2 TS Measurement and analysis | ETR 101 290 |
| ASI | DIN EN 500083-9 |
| AM/FM Radio | |
| Environmental Conditions | EN 300 019-1-3 V2.3.2 (2009-11) Class 3.3 Power Supply: |
| Safety | UL60950-1, TUV EN60950-1, IEC-215 |
| EMC | EN55022 Class B, EN61000-3-2/3, EN61000-4-2/3/4/5/6/8/11 EN61000-6-2 |

- **Ordering**

| Model | Type |
|---|---|
| FNJ-BSP-01-AM/FM | (AM/FM Analyzer) |
| FNJ- BSP-01-ASI | (ASI Analyzer) |
| FNJ-BSP-01-T/T2 | (T/T2 Analyzer) |

# HEVC ENCODER

## FNJ-HEVCENC-01


**Version 1**
**Summer 2021**

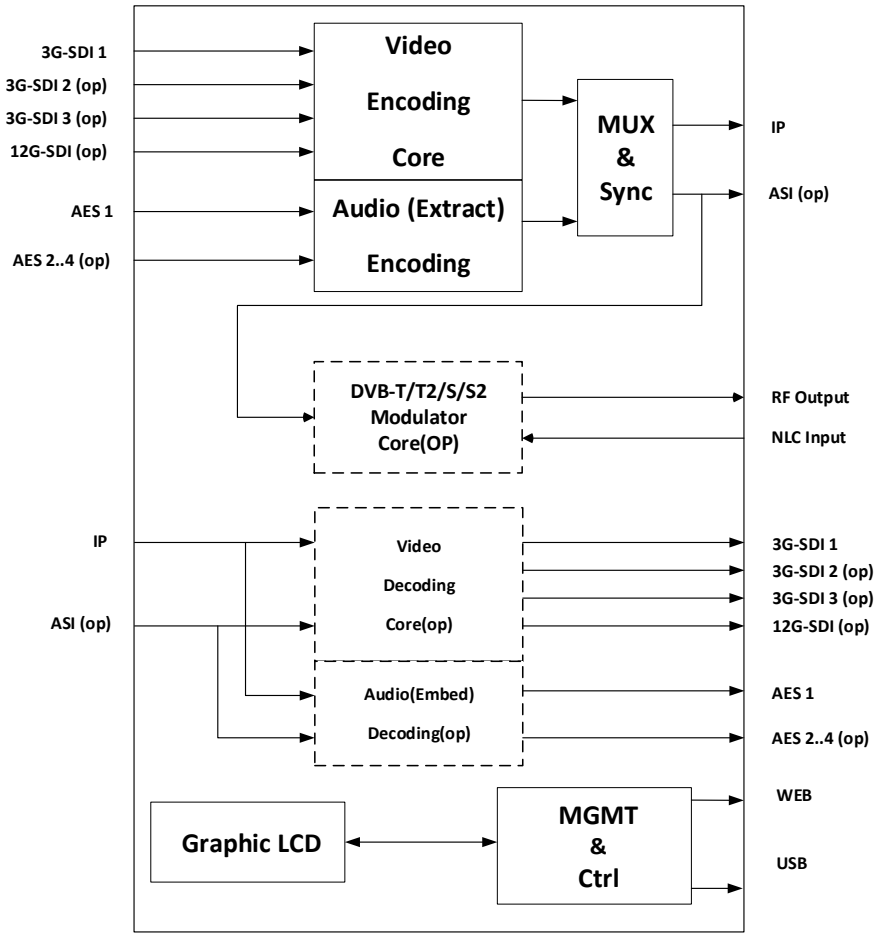
# Description

FNJ-HEVC is a broadcast quality H.265 Encoder, offering exceptional compression ratios on video resolutions up to 4K UHD. It can be easily integrated into existing contribution links, SNG trucks or flyaway systems to provide a cost-effective upgrade to the latest encoding technology. The product employs the latest HEVC compression engines, offering significant bitrate savings over traditional H.264 solutions thus reducing bandwidth costs. HEVC standards also support the new 4K UHD formats required for contribution. Latency is critical in many broadcast applications and this encoder is built to minimize delay without compromising quality. The encoder supports a 12G –SDI input or maximum four 3G-SDI video and four stereo audio inputs and provides compressed signal in IP or ASI in the output. In the four 3G-SDI input mode, it is capable of simultaneous encoding of four 1080P signals of similar encoding parameters. Furthermore, the system supports decoding function with software upgrade via license key. This option enables the real-time transcoding of signals for different functions. Another prominent option is the modulator module that converts the system into an encoder modulator. In this case, the system would be capable of broadcasting compressed TV signals on DVB-T/T2 or DVB-S/S2 formats.

# Features

- Up to 50% bit-rate reduction compared with H.264
- Compression of video signals up to 4K UHD
- Modulator option for transmission of DVB-T/T2 or DVB-S/S2 standard
- Compression of multi-channel audio with HE-AAC format
- Ultra-low Latency for live applications
- IP and DVB-ASI in/out
- Decoder option for real time transcoding as for simultaneous encoding and decoding features

## Block Diagram




## Technical Descriptions

- **Rear view**

# Technical Specifications

## Input

| | |
|---|---|
| SDI IN | Up to 4x BNC Female, 75Ω |
| AES IN | Up to 4x BNC Female, 75Ω |
| 12G-SDI IN | Optical fiber input |

## Output

| | |
|---|---|
| ASI Out | 1x BNC Female, 75Ω |
| IP Out | RJ45 (10/100/1000 BaseT) |

## Management

| | |
|---|---|
| Local Control | LCD（2x40 digits )+ Keypad (6 buttons) |
| Local Control | WEB GUI, SNMP v1,v2,v3 |
| Front Panel USB | Used for Software Upgrade |

## Power

| | |
|---|---|
| AC In | 220 VAC<br>15W |

## Latency

| | |
|---|---|
| Encoder + Decoder | 55ms |

## Encoder Parameters

| | |
|---|---|
| **Encode Mode** | **H.265/HEVC, H.264/MPEG-4 AVC** |
| **Profile** | **H.265/HEVC**<br>Profile: Main, Main Intra, Main 10, Main 10 Intra, Main 4:2:2 10, Main 4:2:2 10 Intra<br>level Up to 5.1 High Tier<br>**H.264/MPEG-4 AVC**<br>Profile: Baseline, Main, High, High 10, High 4:2:2, High10 Intra, High 4:2:2 Intra<br>Level: Up to 5.2 |
| **Video Format** | **H.265/HEVC**<br>2160p（3840x2160）@23.98Hz, 29.97Hz, 50Hz, 59.94Hz<br>1080p（1920x1080）@23.98Hz, 29.97Hz, 50Hz, 59.94Hz<br>1080i （1920/1440x1080）@25Hz, 29.97Hz<br>720p （1280x720） @50Hz, 59.94Hz<br>576i （720x576） @25Hz<br>**H.264/MPEG-4 AVC**<br>2160p（3840x2160）@23.98Hz, 29.97Hz, 50Hz, 59.94Hz<br>1080p（1920x1080）@23.98Hz, 29.97Hz, 50Hz, 59.94Hz, 60Hz<br>720p （1280x720） @50Hz, 59.94Hz |
| **Encode Audio Type** | **Embedded Audio 4ch stereo (SMPTE ST 299, SMPTE ST 272）, AES/EBU 4ch**<br>MPEG-2 AAC-LC : 8ch<br>MPEG-4 AAC-LC : 8ch<br>MPEG-4 HE-AACv1 : 8ch<br>MPEG-4 AAC-ELD : 8ch |

# Physical

## Dimension & Weight

| | |
|---|---|
| Dimensions (W x H x D) | 210mm x 352mm x 1RU |
| Weight | 6 Kg |

## Environmental

| | |
|---|---|
| Operating Temperature | 0 ~ +50 °C |
| Storage Temperature | -25 ~ +60 °C |
| Relative Humidity | 95% (Non-condensing) |

# Ordering

| Model | Description |
|---|---|
| **FNJ-HEVCENC_BASE** | 2x AES IN, 1x 3G SDI IN, IP output |
| **FNJ-HEVCENC_ASI** | 1x ASI OUT |
| **FNJ-HEVCENC_AES** | 2x additional AES IN |
| **FNJ-HEVCENC_4k** | 1x Fiber LC Connection 12G SDI IN |
| **FNJ-HEVCENC_SDI** | 3x additional 3G SDI IN |
| **FNJ-HEVCENC_DECODER** | HEVC/H.264 Decoding Core |
| **FNJ-HEVCENC_MOD_T** | DVB-T/T2 Modulator Core |
| **FNJ-HEVCENC_MOD_S** | DVB-S/S2 Modulator Core |