## **Product description**

The optical transmitter MO001 is intended to distribute SAT IF, DTT, FM, DAB signals through a fibre optic. AGC (automatic gain control) provides constant RF level to the laser only for RF input. The product is intended for indoor usage only.

## **External view**



Figure 1. External view of the transmitter

- 1 RF input of SAT IF and DTT signals, DC output +10..+20 V. Maximum 350 mA current per output. No short circuit/overload protection. Avoid to overload DC output. F socket.
- 2 RF input of DTT signal, DC output for preamplifier +10..+20 V switchable. Short circuit/overload protected DC output. Maximum 100 mA output F socket.
- 3 TEST output. F socket.
- 4 DC IN/OUT +10..+20 V. No short circuit/overload protection. Avoid to overload DC output. F socket.
- 5 +10...+20 V DC powering input. DC socket 3.5/1.3 mm.
- 6 Optical output. FC/APC or SC/APC socket.
- 7 Functional grounding clamp.
- 8 Switch for Terr.TV preamplifier powering ON/OFF.
- 9 Gain adjustment 0...8 dB by 1 dB step (only for RF input).
- 10 LED indicator of laser status: Red – laser is damaged Green – works correctly
  - Yellow laser ageing
- 11 LED indicator of RF IN input level: Red – too high Green – correct (AGC range)
  - Yellow too low

## Safety instructions



The transmitter must be installed in accordance with IEC 60728-11 and national safety standards. The transmitter is powered from a 10-20 V power supply unit (PSU). This voltage is not dangerous to life. PSU must have a short circuit protection.

Any repairs must be done by a skilled personnel.

Do not plug the PSU into the mains socket until all cables have been connected correctly.

The mains socket of PSU must be easily accessible.

The transmitter must not be exposed to dripping or splashing water.

Avoid placing the transmitter near heat sources, e.g. central heating components and in areas of high humidity. If the transmitter has been stored in cold conditions for a long time, bringing it into a warm environment may cause condensation. In such cases let it warm up for at least 2 hours before plugging it into the mains.

# Safety of laser product



Optical Transmitter module contains laser diode sources. These devices are rated under IEC60825-1: "Safety of Laser Products", Part 1: Equipment classification and requirements as CLASS 1M laser product. When operating the equipment note the following:

Most fiber optic laser wavelengths are totally invisible to the eye and will cause permanent eye damage. Never look into the end of a fiber on a powered device through a magnifying device (microscope, eye loupe, magnifying glass, etc.). Before using such devices always double check that power is disconnected or, if possible, completely disconnect the unit from any power source.

To verify the light output always use an instrument, such as an optical power meter.

Operate only with the proper optical fiber installed in the device optical connector.

Whenever the optical connector is empty the laser transmitter should be turned off.

Before applying power always connect a fiber to the output of the device.

Never leave equipment with radiating bare fibers accessible - always cap the connectors.

# INSTALLATION

# Table 1.Requirements for external power supply unit:

| Output voltage range | +10 V min+20 V max                       |  |
|----------------------|--|--|
| Output current       | 1 - 2 A. Short circuit current < 1 A RMS |  |
| Output connector     | 3.5/1.3 mm DC plug, (+) in center        |  |

Short circuit protected

• Double insulated (marked 🛄 )

• Meet EN 55022 class B conducted emisions requirements, measuring with grounded load

# Mounting

We recommend at least 5 cm of air space around the transmitter. Unit can get hot to the touch and require a flow of air to avoid overheating.



Figure 2. Mounting of the transmitter

Transmitter must be fixed with 2 steel screws Ø 4-4.5 mm. The screws are not included in a package.



# Structure diagram





Figure 3. DC path of the transmitter

# **Optical connections**

**Note**: All optical connectors and adaptors should be cleaned before connecting them. If optical reception power of the receiver decrease, fiber connection should be cleaned and maintained. Fiber connectors should never be left uncovered.

Optical connection for MO001 with FC/APC socket:

1. Align the FC/APC connector key-way (type R) with the receptable key-way.



2. Push firmly to locate the key-ways and then rotate the coupling ring.



Do not exceed the minimum bending radius of fibers: must be not less 30 mm when connecting optic cable to the system.

# **OPERATING AND SETTINGS**

#### **General notes**

Read the safety instruction first.

All unused F type connectors must be terminated with 75  $\Omega$  loads. SAT IF and Terr.TV inputs and DC output on transmitter due to DC voltage must be terminated with 75  $\Omega$  loads with DC voltage blocking coupler (VBC).

Before connecting to the receiver, check the optical level of the signal on the optical fibre using an optical power meter. The optical input signal higher than 0 dBm may damage the device. To avoid overload, an optical attenuator must be connected to the input of the receiver.

#### Powering

Connect DC voltage +10...+20 V to the DC IN 3.5/1.3 mm socket or DC IN/OUT F socket. Within 1-5 seconds the module will run in normal operation mode and is ready to work.

**Note** : If external terrestrial preamplifier is used, switch the Terr. TV preamplifier powering to "ON". On Terr. TV input of DTT signals appears DC voltage +10...+20 V with max load 100 mA.

#### RF input levels to the transmitter

Transmiter has two inputs – wideband RF (47-2400 MHz), equipped with AGC, suitable for SAT IF, DTT, FM, DAB and narrow band Terr.TV (47-790 MHz), suitable for terrestrial signals (DTT, FM, DAB):

#### 1. SAT IF alone is transmitted

For SAT IF transmitting is used RF input.

- Input level 65 90 dBuV (per transponder); (AGC range).
- OMI is about 4.9% ( 30 transponders, attenuation = 0 dB).

- Using attenuator (0..8 dB) OMI could be decreased for better performance. Note, if value of attenuator is changed, the AGC range will also change, e.g.:

if att = 0 dB  $\rightarrow$  5 dB, AGC range = 65-90 dB $\mu$ V  $\rightarrow$  60-85 dB $\mu$ V

### 2. SAT IF and terrestrial signals (DTT, FM, DAB) are transmitted

In this case alone RF input or both RF and Terr.TV inputs could be used.

#### 2.1 Alone RF input is used

- SAT IF input level 65 90 dBuV (per transponder).
- DTT input level 6 dB higher than SAT IF.
- OMI (attenuator = 0 dB) about 3.5% for SAT IF ( 30 transponders)

about 7.0% for DTT (8 transponders).

- Using attenuator (0..8 dB) OMI could be decreased for better performance.

#### 2.2 Both RF and Terr.TV inputs used

Signal level from satellite is fluctuating much more than terrestrial signals; in order to keep DTT level higher 6 dB than SAT IF level constant, Terr.TV input for DTT signals could be used.

| - RF input:      | SAT IF input level 65 – 90 dBuV (per transponder); AGC range |
|------------------|--|
|                  | OMI ≈3.5% (attenuator = 3 dB).                               |
| - Terr.TV input: | DTT input level 88 dBuV ± 2.0 dBuV                           |
|                  | OMI ≈ 7.0% (8 transponders).                                 |

In all cases FM and DAB input levels must be minimum 10 dB lower than total power of DTT signals.

Note, that all above given RF levels values are approximate, supposing that all channels levels are equalised and frequency response of equipment is ignored.

| Туре   |                                      | M0001*                          |  |   |   |  |
|--|--------------------------------------|---------------------------------|--|---|---|--|
| Optical  | wavelenght                           |                                 |  | 1310 nm   | 1550 nm                                     |  |
| output   | output power                         |                                 | 6 dBm  |   |   |  |
|  | laser type                           |                                 |  | FP  | DFB   |  |
|  | optical return loss                  |                                 |  | > 45 dB   |   |  |
| Wide band  | frequency range                      |                                 |  | 45-2400 MHz   |   |  |
| RF input   | return loss/impedance                |                                 |  | $>$ 12 dB / 75 $\Omega$   |   |  |
|  | flatness                             |                                 |  | ± 1.5 dB  |   |  |
|  | RF input level, AGC range            |                                 |  | 65-90 dB $\mu$ V (per transponder); 80-105 dB $\mu$ V (total level) |   |  |
|  | gain adjustment                      |                                 | 0 - 8 dB by 1 dB step                                  |   |   |  |
| OMI (SAT IF 30 transponders, AGC range                                 |                                      | rs, AGC range)                  | 4.9 %  |   |   |  |
|  | external remote feeding DC OUT 1     |                                 |  | 10 V - 20 V 350 mA max. (no short circuit/overload protection)      |   |  |
| Terr.TV  | frequency range                      |                                 |  | 45-790 MHz  |   |  |
| RF input   | return loss/impedance                |                                 |  | > 12 dB / 75 Ω  |   |  |
|  | flatness                             |                                 | ± 1.5 dB   |   |   |  |
|  | RF input level                       |                                 | 88 dB $\mu$ V ± 2.0 dB $\mu$ V (per transponder)       |   |   |  |
| external remote feeding DC OUT 2                                       |                                      | 10 V - 20 V 100 mA max.         |  |   |   |  |
|  | OMI (Terr.TV input 8 channels)       |                                 | 7 %  |   |   |  |
| RF test output   | RF IN (wideband)**, output level     |                                 | $62 \text{ dB}\mu\text{V} \pm 2 \text{ dB}$            |   |   |  |
|  | Terr. TV IN, loss                    |                                 |  | $-23 \text{ dB} \pm 2 \text{ dB}$                                   |   |  |
|  | return loss/impedance                |                                 |  | > 12 dB / 75 Ω  |   |  |
|  | flatness                             |                                 |  | ± 1.5 dB  |   |  |
| DC IN/OUT  | input-output port                    |                                 |  | 10 V - 20 V 1 A max. (no  | nax. (no short circuit/overload protection) |  |
| DC IN  | input port                           |                                 |  | S   | see Table 1                                 |  |
| Supply voltage   |                                      | 10 V - 20 V                     |  |   |   |  |
| Power consump  | tion without exter                   | rnal load                       |  | 2 W   |   |  |
| Power consumption with max. external load                              |                                      | 11 W                            |  |   |   |  |
| Operating temperature range  |                                      |                                 |  | -20° ÷ + 50° C  |   |  |
| Dimensions/Weight (packed)   |                                      | 116x84x25.5 mm/0.28 kg          |  |   |   |  |
| * Type<br>M0001 6F31 F<br>M0001 6D55 I<br>M0001 6F31 F<br>M0001 6D55 J | Power<br>6 dBm<br>F 6 dBm<br>1 6 dBm | Laser<br>FP<br>DFB<br>FP<br>DFB | Wavelenght<br>1310 nm<br>1550 nm<br>1310 nm<br>1550 nm | Connector IN<br>FC/APC<br>FC/APC<br>SC/APC<br>SC/APC                |   |  |

\*\* RF input, 30 SAT IF transponders, AGC range

INVISIBLE LASER RADIATION DO NOT VIEW DIRECTLY WITH OPTICAL INSTRUMENTS.

Wave length 1270-1610 nm, IEC60825-1.

This product complies with the relevant clauses of the European Directive 2002/96/EC. The unit must be recycled or discarded according to applicable local and national regulations.

Equipment intended for indoor usage only.

Functional grounding. Connect to the main potential equalization.

CE This product is in accordance to following norms of EU: EMC norm EN50083-2, safety norm EN IEC62368-1 and RoHS norm EN50581.

This product is in accordance with Custom Union Technical Regulations: "Electromagnetic compatibility of technical equipment" CU TR 020/2011, "On safety of low-voltage equipment" CU TR 004/2011.

K This product is in accordance with safety standard AS/NZS 60065 and EMC standards of Australia.

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