

**TDR-F-1P5 Digital Microwave Radio Equipment  
with Protection Switching  
for 2 Mbps (E1) transmission  
in the 1350 - 1525 MHz frequency band**



**Radio Unit**



**Protection Switching Unit**

**Features:**

- 1+0, 1+1 (HS, FD, SD) protection
- 4 / 16 / 32 QAM
- Reed-Solomon FEC
- Software configurable transmit power and channel frequency
- Auxiliary data channel
- Engineering order wire
- SNMP based management



**1+1 Protected Equipment**

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## TDR-F-1P5

### DIGITAL MICROWAVE RADIO WITH PROTECTION SWITCHING

This member of the Totaltel Digital Radio Equipment Family operating in the 1350 – 1525 MHz frequency band serves for the transmission of digital signals of data rate 2 Mbps.

It is suitable for cost effective realization of low capacity links in public or private networks over ranges up to 40 – 60 km depending on modulation applied. It is especially well suited for modulation transfer of several audio programme channels from the studio to the radio broadcasting transmitter.

The excellent transmission performance, considerable flexibility, ease of handling, low power consumption and high reliability make up the important equipment features.

The single indoor radio equipment housed in an 1U high 19" subrack is interconnected to the antenna by a low-loss coaxial cable of length limited only by the link budget.

The equipment can work with different modulation formats. The software selectable 4 / 16 / 32 QAM modulation yield different frequency efficiency and system gain offering a trade-off among these characteristics. The DSP-based modem applies Reed-Solomon forward error correction and adaptive equalization. Coverage of the frequency band is provided by minimum number of diplexer tuning versions depending on the actual frequency plan. The channel frequency and transmit power are software configured. Equipment and interface characteristics correspond to the relevant ITU recommendations and the ETSI/IEEE standards.

Equipment maintenance and supervisory functions built in: order wire, auxiliary data channel, test loops for diagnostics, continuous BER and Tx power indication and registration of the transmission performance statistics. Control of the supervisory functions may take place using the front panel LCD display or by local PC, or via SNMP from the network management centre.

The design and production techniques applied result in excellent equipment reliability. For particular demand on enhanced availability, in need of uninterrupted service the 1+1 hot standby protection in combination with frequency and space diversity may be applied. This task is accomplished by the protection switching equipment controlling two individual radios. The protection switching equipment is housed in a similar 1U high subrack.

|  |   |               |                        |
|--|---|---------------|------------------------|
| Frequency band                         | 1350 – 1525 MHz                                 |               |                        |
| Duplex spacing                         | > 48 MHz  |               |                        |
| Channel frequency step size            | 250 kHz   |               |                        |
| Frequency stability                    | better than $\pm 3$ ppm                         |               |                        |
| Transmission rate                      | 2048 kbps (E1)                                  |               |                        |
| Channel spacing                        | 0.5 MHz   | 0.875 / 1 MHz | 1.75 / 2 MHz           |
| Modulation                             | 32 QAM  | 16 QAM        | 4 QAM                  |
| Transmit power                         | 30 dBm  | 30 dBm        | 33 dBm                 |
| Transmit power control range           | 0 .. -20 dB in 2 dB steps                       |               |                        |
| Receiver threshold @ $10^{-6}$ BER     | -91 dBm   | -93 dBm       | -95 dBm                |
| Receiver dynamic range                 | -30 .. -95 dBm (65 dB)                          |               |                        |
| Spurious and harmonic emissions        | less than -50 dBm (-80 dBc)                     |               |                        |
| E1 interface                           | 75 Ohm Unbal./120 Ohm Balanced                  |               |                        |
| Auxiliary data channel                 | 9600 bps, RS232                                 |               |                        |
| Order wire                             | 2W FXS interface                                |               |                        |
| Diagnostic functions                   | alarms: TX, RSSI, BER, ISL; test loops: RF, mux |               |                        |
| Insertion loss of protection switching | Tx branch: < 1,8 dB,                            |               | Rx branch: < 4,8 dB    |
| Ambient temperature                    | operation: -10 .. +50 °C                        |               | storage: -40 .. +70 °C |
| Power supply                           | 230 V AC 50 Hz                                  |               |                        |
| Power consumption                      | 1+0: 50 W,                                      |               | 1+1: 110 W             |
| Dimensions Radio / Prot. switch each   | 484 mm x 44 mm x 345 mm                         |               |                        |
| Weight                                 | Radio unit: 8 kg / Prot. switch: 2 kg           |               |                        |

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