



# TBMR-110M

DC - 110 MHz high speed EMI-Analyzer

## Datasheet

Rev.1.3

# 1 Main Features

- EMI Analyzer 1 Hz - 110 MHz (Measurement Receiver)
  - -162 dBm/Hz noise floor down to 1 kHz
  - 7-band hardware pre-selector filter bank.
  - 30 dBm maximum input power
  - CISPR-16, ANSI and MIL-STD compliant detectors
  - Peak, Quasi-Peak, Average, CISPR-Average, RMS and CISPR-RMS detectors working in parallel.
  - Sweep, STFFT and direct parallel resolution bandwidth setting (-3 dB and -6dB)
  - Numerous predefined Standards, ready to load and use
  - Pre-measurement with selective Peak measurement
  - Direct fast compliant STFFT measurement
  - Many pre-defined transducers, antenna factors and various other compensation files
  - Many data manipulation, display and documentation features
  - Direct control from EMCview or standalone operation
  - Quick load of predefined setups
- Spectrum Analyzer
  - 1 Hz - 110 MHz measurement range
  - Tracking Generator
  - 0.1 Hz to 3.5 MHz arbitrary RBW and VBW setting
  - Zero Span operation with time domain triggering
  - Linear, log amplitude and frequency display
  - Sweep, STFFT and direct parallel resolution bandwidth setting
  - Parallel RMS, Pos./Neg. peak and average detector
  - Trace Memory option, normalization
  - Equation based trace display
  - Peak hold
  - Noise marker, max and band power display
  - Quick load of predefined setups
- Tracking Analyzer 1 Hz - 110 MHz
  - Linear and logarithmic sweep
  - -50 dBm to -10 dBm adjustable TG power (0 dBm up to 100 MHz)
  - 120 dB dynamic range
  - Use of power correction file and level correction file
  - Quick load of predefined setups.

- Noise Analyzer 1 Hz - 110 MHz
  - Measurement of absolute RMS noise power or voltage spectral density
  - Noise figure measurement
  - Noise can be referenced to the input or output of devices under test
  
- Oscilloscope 250 MS/s, DC - 110 MHz
  - 1 ns/DIV to 1 s/DIV horizontal resolution
  - Interpolated sampling up to 4 GS/s
  - Real-time Sampling up to 250 MS/s, 14 Bit
  - Up to 16 MS sampling size
  - Various Trigger options
  - Vertical CIC Filter option for noise reduction
  - Many automatic measurement features
  
- Mains harmonics analyzer
  - Mains harmonics measurement according to EN 61000-3-2
  - requires external current coupler (e.g. TBMHA1) and clean AC supply
  
- Demodulator
  - Direct demodulation into the PC sound system
  - FM, AM and SSB demodulator
  - Adjustable bandwidth, center frequency and demodulator parameters
  - Automatic demodulation parameter measurements
  
- IQ Stream Generator
  - GNU-Radio data source.
  - Directly stream floating point I and Q data into file or network
  - Adjustable center frequency and bandwidth
  
- Remote Control
  - Direct remote control of the EMI Analyzer over network
  - Text based protocol
  - EMCview compatible

## 2 Specifications

| Parameter                                         | Description                                      | Value/Range                                                               | Remark                                           |
|---------------------------------------------------|--------------------------------------------------|---------------------------------------------------------------------------|--------------------------------------------------|
| <b>Operating Voltage</b>                          | Mains Voltage Range                              | 100-120 VAC / 200 - 240 VAC,<br>50-60 Hz                                  | Mains voltage<br>selection switch                |
| <b>Operating Temperature</b>                      |                                                  | 0 °C – 40 °C,                                                             |                                                  |
| <b>Storage Temperature</b>                        |                                                  | -20 °C – 60 °C                                                            |                                                  |
| <b>Frequency Range</b>                            | Oscilloscope                                     | DC - 110 MHz                                                              | True DC coupled                                  |
|                                                   | Spectrum Analyzer                                | 1 Hz - 110 MHz                                                            | Max. 0V DC                                       |
|                                                   | EMI Analyzer                                     | 1 Hz - 110 MHz                                                            | Max. 0V DC                                       |
|                                                   | Tracking Analyzer                                | 1 Hz - 110 MHz                                                            | Max. 0V DC                                       |
| <b>Reference Frequency<br/>accuracy</b>           | Initial accuracy after 30<br>minutes warm-up     | +/- 10 ppm                                                                |                                                  |
| <b>RF Input connector</b>                         |                                                  | 50 Ohm, Type-N                                                            |                                                  |
| <b>RF input VSWR</b>                              |                                                  | < 1 : 1.15                                                                | 10 ... 30dB att.                                 |
|                                                   |                                                  | < 1 : 1.5                                                                 | 0 ... 30dB gain                                  |
| <b>Maximum RF input level</b>                     | Attenuation / gain                               | +30 dBm/137dBμV/7V                                                        | 20dB/30dB att.                                   |
|                                                   | dependent                                        | +25 dBm/132dBμV/4V                                                        | 10 dB att.                                       |
|                                                   | Negative att. = gain                             | +15 dBm/122dBμV/1.25V                                                     | 0 ... -30dB att.                                 |
| <b>Input RF attenuator</b>                        |                                                  | 0 - 30 dB in 10 dB steps                                                  |                                                  |
| <b>Input LNA</b>                                  |                                                  | 0 - 30 dB in 10 dB steps                                                  |                                                  |
| <b>Amplitude Accuracy</b>                         | DC - 110 MHz                                     | Better +/- 0.8 dB                                                         | at 18°C - 28°C                                   |
| <b>Noise (DANL)</b>                               | f = 10 Hz                                        | - 132 dBm typ.                                                            | RBW = 1Hz                                        |
|                                                   | f = 100 Hz                                       | - 144 dBm typ.                                                            | RBW = 1Hz                                        |
|                                                   | f = 1 kHz                                        | - 149 dBm typ.                                                            | RBW = 1Hz                                        |
|                                                   | f = 10 kHz                                       | -156 dBm typ.                                                             | RBW = 1Hz                                        |
|                                                   | f = 100 kHz                                      | - 160 dBm typ.                                                            | RBW = 1Hz                                        |
|                                                   | f > 1MHz - 110 MHz                               | - 162 dBm typ.                                                            | RBW = 1Hz                                        |
| <b>Intercept Point 2</b>                          | f = 10 MHz                                       | + 50 dBm typ.                                                             | ATT = 0 dB                                       |
| <b>Intercept Point 3</b>                          | f <sub>1</sub> = 32 MHz, f <sub>2</sub> = 33 MHz | + 43 dBm typ.                                                             | ATT = 30 dB                                      |
|                                                   |                                                  | + 24 dBm typ.                                                             | ATT = 0 dB                                       |
|                                                   |                                                  | - 6 dBm typ.                                                              | ATT = -30 dB                                     |
| <b>Resolution Bandwidth</b>                       |                                                  | 0.1 Hz - 3.5 MHz                                                          | arbitrary                                        |
| <b>Video Bandwidth</b>                            |                                                  | 0.1 Hz - 3.5 MHz                                                          | arbitrary                                        |
| <b>Pre-Selector Filter Bank</b>                   |                                                  | 7 Bands + Bypass                                                          | 6th order band-<br>pass                          |
| <b>Sampling Rate</b>                              |                                                  | 250 MSPS, 14 Bit                                                          |                                                  |
| <b>Detector</b>                                   |                                                  | RMS, pos./neg. Peak, Average,<br>Quasi Peak, CISPR Average,<br>CISPR RMS. | According to<br>CISPR-16-1-1<br>and Mil Std. 461 |
| <b>Processing</b>                                 |                                                  | Sweep, STFFT, parallel sweep                                              |                                                  |
| <b>Tracking Generator<br/>frequency stability</b> |                                                  | +/- 25 ppm                                                                |                                                  |
| <b>Tracking Generator<br/>amplitude stability</b> | DC - 100 MHz<br>Level > -30 dBm                  | better +/- 0.5 dB                                                         |                                                  |
| <b>Tracking Generator<br/>amplitude range</b>     | DC - 100 MHz<br>100 MHz - 110 MHz                | -50 dBm to 0 dBm<br>-50 dBm to -10 dBm                                    |                                                  |
| <b>Dimensions / weight</b>                        |                                                  | L x W x H: 33 x 38 x 12 cm;<br>5.2 kg                                     |                                                  |

| Attenuation [dB]                  | Absolute Max. Input Level [dBm, dBuV, V] |
|-----------------------------------|------------------------------------------|
| <b>30</b>                         | <b>30 dBm, 137 dBuV, 7 V</b>             |
| <b>20</b>                         | <b>30 dBm, 137 dBuV, 7 V</b>             |
| <b>10</b>                         | <b>25 dBm, 132 dBuV, 4 V</b>             |
| <b>0</b>                          | <b>15 dBm, 122 dBuV, 1.25 V</b>          |
| <b>-10 (equivalent 10dB gain)</b> | <b>15 dBm, 122 dBuV, 1.25 V</b>          |
| <b>-20 (equivalent 20dB gain)</b> | <b>15 dBm, 122 dBuV, 1.25 V</b>          |
| <b>-30 (equivalent 30dB gain)</b> | <b>15 dBm, 122 dBuV, 1.25 V</b>          |

### 3 History

| Version | Date       | Application software version | Changes                                    |
|---------|------------|------------------------------|--------------------------------------------|
| V1.0    | 24.4.2024  | V1.0                         | Initial document                           |
| V1.1    | 28.10.2024 | V1.1                         | TG amplitude range detail                  |
| V1.2    | 16.1.2025  | V1.4                         | Noise analyzer application added           |
| V1.3    | 1.12.2025  | V1.5                         | Mains harmonics analyzer application added |

The application software version refers to the most recent version available at the time of writing the datasheet.