# AIE-W8LR

## 8 Port Air Interface Emulator 500 … 9000 MHz, 50 Ω

### Features

- wideband
- 2 watt power capability
- 127 dB attenuation range
- LAN and USB Remote Interface
- Trigger interface
- compact 19", 2 U device

### Applications

- Air Interface Emulation
- Wi-Fi communication testing
- 802.11 a/h, ac, b, g, n, p
- V2X and V2V
- Fading simulation

### At a Glance

The air interface emulator AIE-W8LR enables the realistic emulation of HF levels for radio field communication such as in wireless networks. The device offers 8 bidirectional inputs and outputs for connecting different network access points. Each of the 8 ports can be fed separately with a composite RF signal. A freely programmable mixture of the other 7 signals can then be set individually for each port. The levels can be varied over a wide dynamic range using internal precision attenuators. The AIE-W8LR makes it possible to emulate a realistic air interface in which connected access points simultaneously receive field signals of different strengths from other access points in the network. The reproducibility of different realistic scenarios in a laboratory environment saves time and money in product development and verification.

### Matrix function

The AIE-W8LR can also be used as a non-blocking matrix switch. Each input and output can be connected to the other ports in any way. Attenuators between the signal paths also allow the emulation of fading effects. Due to the fast response time of the attenuators, the device is ideal for efficient and fast solutions in automatic test systems.

### Wideband

The operating frequency range is 500MHz to 9000MHz. Therefore, the AIE-W8LR is usable for all Wi-Fi standards including 802.11p for V2X and V2V communication.

### High Dynamic

The adjustment range of the digitally controlled attenuator is 127.0 dB and can be freely adjusted in 0.25 dB steps. This enables use in test applications with the highest demands on dynamics and accuracy. The high attenuation range allows RF signal levels to be reduced below the sensitivity limit of connected devices. All RF connections of the device allow power levels of up to 2 watts.

### Synchronous Operation

The AIE-W8LR can be conveniently and efficiently remotely controlled via LAN and USB interfaces and an additional TRIGGER-IO port. With each execution of switching commands, the trigger interface delivers a precise voltage pulse that can be used for the synchronous execution of switching commands from other devices in the compound. In addition, external pulses can be applied to this port in order to synchronously trigger the execution of pending switching commands. The emulator's attenuator configuration can be preloaded with SCPI-oriented ASCII strings in a queue over the LAN interface. After a positive TTL pulse edge at the trigger input, the preloaded damper configuration is then executed by the hardware without delay.

### Principle diagram

**RF Specifications**

| Parameter | Symbol | Min. | Typ. | Max. | Unit | Condition |
|---|---|---|---|---|---|---|
| impedance | $Z_{IN}/Z_{OUT}$ | | 50 | | Ω | |
| low frequency | $f_{min}$ | | 400 | 500 | MHz | |
| high frequency | $f_{max}$ | 8000 | 9000 | | MHz | |
| number of RF ports | $n_{RF}$ | | 8 | | | bi-directional |
| return loss*2 | $S_{11}, S_{22}$ | | -15 | -7 | dB | |
| insertion loss*1 | $S_{21}$ | -36 | -30 | | dB | f = 1 GHz |
| | $S_{21}$ | -39 | -32 | | dB | f = 2 GHz |
| | $S_{21}$ | -48 | -41 | | dB | f = 5 GHz |
| | $S_{21}$ | -54 | -47 | | dB | f = 7 GHz |
| | $S_{21}$ | -57 | -52 | | dB | f = 8 GHz |
| attenuation dynamic*3 | dATT | | -30 | | dB | |
| attenuation range | $\Delta S_{21}$ | 0.00 | | 127.0 | dB | |
| attenuation resolution | $dS_{21}$ | | 0.25 | | dB | |
| attenuation accuracy | $ATT_{ERR}$ | | ± 0.50 | | dB | @ 3 GHz, ATT = 63.5 dB |
| | $t_{ASET}$ | | 1 | | µs | |
| atten. response time | $t_{ARSP}$ | | 1 | | ms | |
| DC voltage | $U_{DC}$ | | | 20 | V | |
| ESD discharge resistor | $R_{ESD}$ | | 4.7 | | kΩ | all inputs and outputs |
| input power | $P_{RF}$ | | | +33 | dBm | CW |
| RF connector | $X_{RF}$ | | N female | | | rear side |
| trigger input | $X_{TRIG}$ | | BNC female | | | internal 1 kΩ pull up, active high |
| trigger level | $u_{TRIG}$ | | TTL (0 / 5 V) | | | |
| trigger offset | $t_O$ | | 0.5 | | µs | 50% trigger → 50% RF |
| attenuator settling time | $t_{RISE}$ | | 0.3 | | µs | 10% → 90% RF |

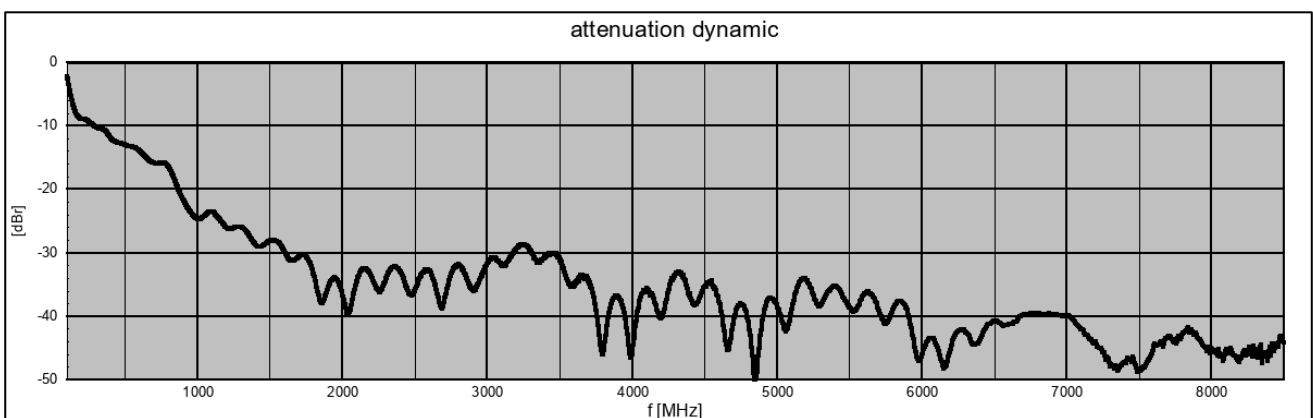*1: ch. attenuator setting: 0.00 dB

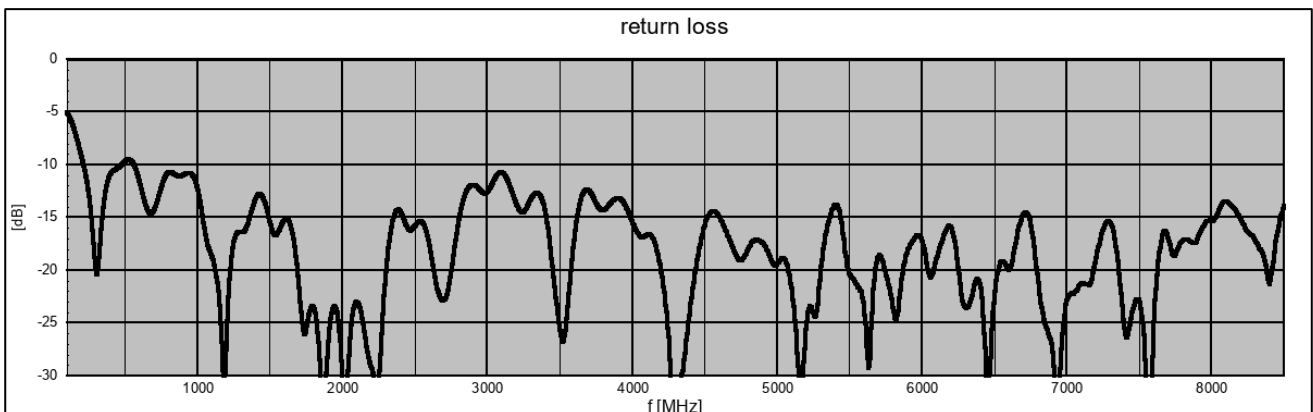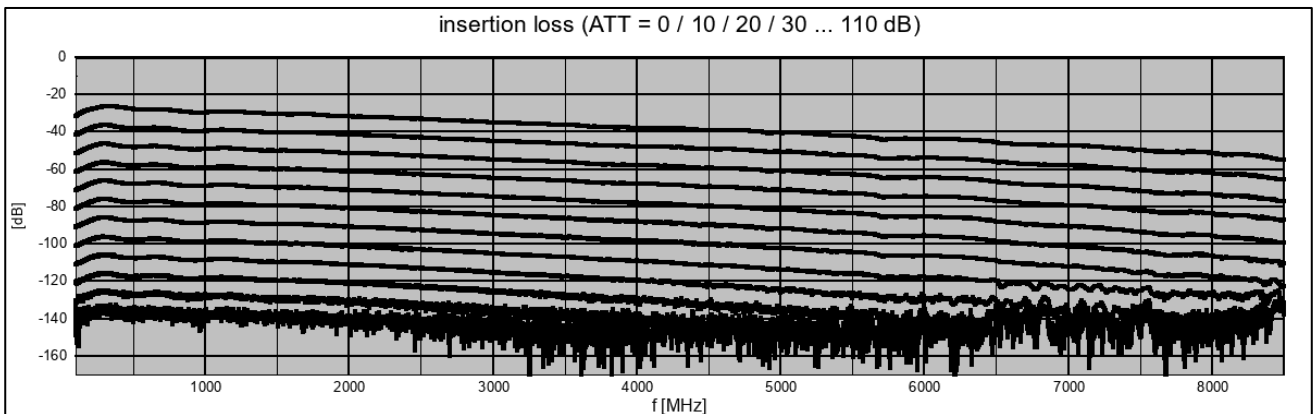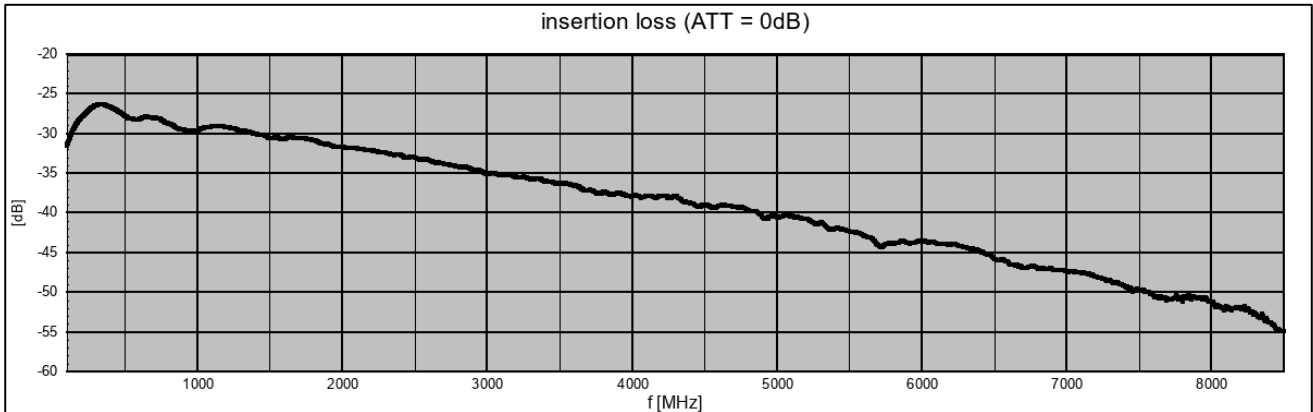*2: ch. attenuator setting: 127.00 dB

*3  ch.. attenuator setting 127.00, all other ch. attenuator setting 0.00 dB, referred to insertion loss


**Common Specification**

| Parameter | Symbol | Min. | Typ. | Max. | Unit | Condition |
|---|---|---|---|---|---|---|
| voltage supply range | $U_{AC}$ | 90 | 230 | 260 | V | 50 / 60 Hz AC |
| power consumption | $P_{AC}$ | | 3 | | W | |
| power socket | $X_{AC}$ | | IEC-60320 C14 | | | country specific mains cable |
| **Dimensions and weight** | | | | | | |
| dimensions | W x H x D | | approx. 482 x 89 x 460 | | mm | 19" 2 U, without connectors and handles |
| weight | m | | 9 | | kg | |
| **Environment conditions** | | | | | | |
| operating temp. range | $T_o$ | +5 | | +45 | °C | |
| storage temp. range | $T_s$ | -40 | | +70 | °C | |
| **Remote interfaces** | | | | | | |
| remote ports | LAN | | 10/100BaseT | TCP/IP | | RJ45 |
| | USB | | 2.0 (high speed) | | | USB type B |
| **Product conformity** | | | | | | |
| Electromagnetic compatibility | | EU: in line with EMC directive (2014/30/EC) | | | | applied harmonized standards: EN 61326-1 (for use in industrial environment), EN 61326-2-1, EN 55011 (class B), EN 61000-3-2, EN 61000-3-3 |
| Electrical safety | | EU: in line with low voltage directive (2014/35/EC) | | | | applied harmonized standard: EN 61010-1 |
| **Ordering information** | | AIE-W8LR | | 2109.4102.1 | | |

**S-Paramters** (typical responses, preliminary)

insertion loss (ATT = 0dB)

insertion loss (ATT = 0 / 10 / 20 / 30 ... 110 dB)

return loss

attenuation dynamic

## Appearances

**Front View**



**Rear View**



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Quality Made in Germany

Subject to change in specification and design without notice.
Released Version 1.02 - November 2023

RoHS compliant in accordance with
EU Directive 2015/863

**Dimensions**

465,00

76,40

88,40

444,00

455,50

452,50

514,20

482,60

all dimensions in mm
±2mm

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**Related Products**

| Product | Description | P/N |
|---------|-------------|-----|
| AIE-W5LR | 5 Port Air Interface Emulator 500… 9000 MHz | 2109.4002.1 |
| AIE-4X4LR | 4X4 Channel Air Interface Emulator, 500…9000 MHz | 2109.4502.2 |
| QATT-7G | 4 Channel Step Attenuator 100 kHz … 7000 MHz, 0 …95.25 dB, 0.25 dB steps | 1302.4702.1 |
| QATT | 4 Channel Step Attenuator 100 kHz … 4000 MHz, 0 … 100.0 dB, 0.5 dB steps | 1302.4002.1 |
| QDLL | 4 Channel Programmable Delay Line 250 MHz … 4000 MHz, 0 …1700 ps | 1303.4002.1 |