QATT

4 Channel Step Attenuator 100 kHz … 4000 MHz

Features

- four attenuator channels
- 0 … 100 dB in 0.5 dB steps
- wideband
- web interface
- high speed remote control
- synchronous operation

Applications

- air interface emulations
- AM, FM, DAB, DVB-T, GPS, SDARS…
- GSM, UMTS, LTE, WLAN…
- R&D

Overview

QATT is a 4 channel switchable step attenuator suitable for the frequency range from 100 kHz up to 4000 MHz in 50 Ohm technology. Each channel has an attenuation range of 100 dB and is adjustable in 0.5 dB steps. The attenuators are based on wear-free semiconductor switches. QATT is the ideal solution for applications where reproducible attenuation adjustments must be made.

The compact dimensions in 19” construction and the low weight of QATT make it ideally suited for applications in laboratories and also for installations in system racks.

With its four channels, QATT is especially suited for applications in radio field emulations.

Synchronous Operation

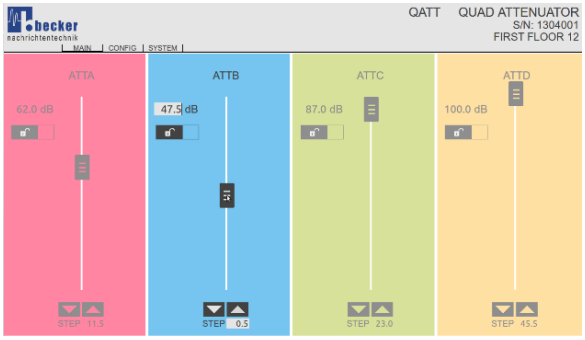
Like many other products of Becker Nachrichtentechnik GmbH (BNT), QATT offers a TRIGGER IO port. This Interface provides a precise trigger pulse which complies with the physical execution of the applied switching command. On the other hand, external pulses can be applied to this port in order to trigger the execution of queued switching commands. Therefore it is possible to link multiple devices to a synchronous switching compound.

Multiple Control Modes

QATT can be controlled manually either via front panel or via standard remote interfaces.

As remote control interfaces, USB and LAN are available. QATT is controlled through simple ASCII strings.

A special feature of QATT is the web capability. This allows location-independent operation of the device regardless of the user's operating system also for multiple devices in a single network.



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RF Specifications

Parameter	Symbol	Min.	Typ.	Max.	Unit	Condition
impedance	Z_{in} / Z_{out}		50		Ohm	
low frequency	f_{min}		50	100	kHz	
high frequency	f_{max}	4000	4500		MHz	
return loss	S_{11}, S_{22}		-10	-8	dB	50 MHz ≤ f ≤ 400 MHz
			-18	-12	dB	400 MHz < f ≤ 2200 MHz
			-14	-10	dB	f > 2200 MHz
insertion loss	S_{21}		-5	-6.5	dB	f ≤ 400 MHz
	S_{21}		-7.5	-9	dB	400 MHz < f ≤ 2200 MHz
	S_{21}		-10	-11.5	dB	2200 MHz < f ≤ 3000 MHz
	S_{21}		-14	-19	dB	3000 MHz < f ≤ 4000 MHz
attenuation range	a	0		100	dB	f ≤ 3500 MHz; 0.5 dB steps
	a	0		80	dB	f > 3500 MHz; 0.5 dB steps
attenuation accuracy						
100 kHz < f < 2800 MHz	da		0.2		dB	0.5 dB ≤ a ≤ 1.0 dB
			0.6		dB	1.0 dB < a ≤ 3.0 dB
			1.0		dB	3.0 dB < a ≤ 10.0 dB
			2.0		dB	10.0 dB < a ≤ 50.0 dB
			5.0		dB	50.0 dB < a ≤ 100.0 dB
2800 MHz ≤ f ≤ 3500 MHz			0.5		dB	0.5 dB ≤ a ≤ 1.0 dB
			0.6		dB	1.0 dB < a ≤ 3.0 dB
			1.5		dB	3.0 dB < a ≤ 10.0 dB
			3.0		dB	10.0 dB < a ≤ 50.0 dB
			5.0		dB	50.0 dB < a ≤ 79.5 dB
			8.5		dB	79.5 dB < a ≤ 89.5 dB
			15.0		dB	89.5 dB < a ≤ 100.0 dB
3500 MHz < f ≤ 4000 MHz			0.5		dB	0.5 dB ≤ a ≤ 1.0 dB
			0.6		dB	1.0 dB < a ≤ 3.0 dB
			1.5		dB	3.0 dB < a ≤ 10.0 dB
			3.0		dB	10.0 dB < a ≤ 50.0 dB
			8.0		dB	50.0 dB < a ≤ 80.0 dB
attenuator settling time	T_{set}		0.3	1	µs	rise/fall time between ATT steps
RF commands processing rate			500		cmd/s	setting a single channel in MASTER or OUT mode without additional system load (e.g. web interface)
input power	P_{max}			27	dBm	
channel isolation	a_{iso}	100	110		dB	f ≤ 3300 MHz @ 22.5 dB
	a_{iso}	80	90		dB	f > 3300 MHz @ 22.5 dB
RF connectors			N female			

TRIGGER IO Specifications

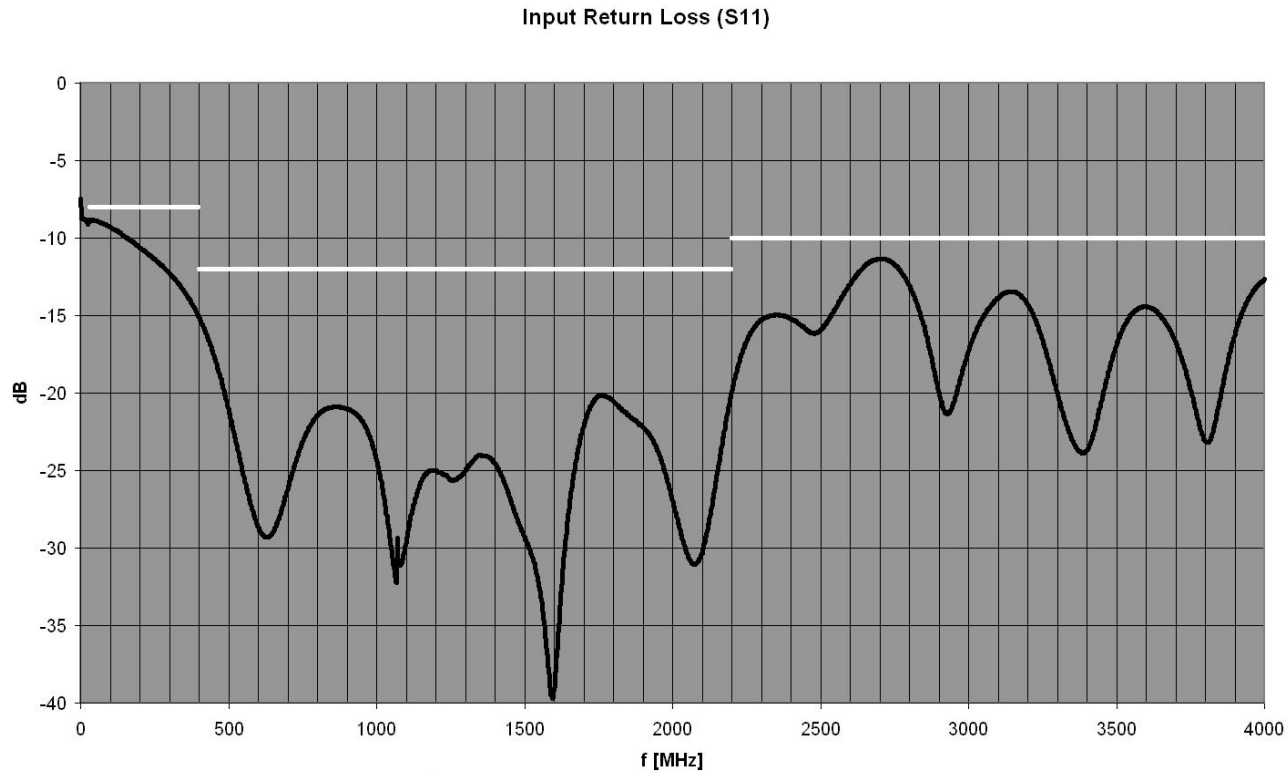
Parameter	Symbol	Min.	Typ.	Max.	Unit	Condition
connector type			BNC female			
function type			open collector, wired AND			positive edge = trigger
			low state = BUSY			mode “SLAVE”
logic high level	U_H	2.0	5.0	5.5	V	
logic low level	U_L	-0.5	0.0	1.2	V	
pulse width	T_{high}		50		µs	
rise time	T_R		0.1[1]	0.5[2]	µs	
sinking current	I_S			60	mA	
passive pull up			1		kΩ	
active pull up			10		mA	only in mode “MASTER” & “OUT”, bus acceleration @ U ≥ 0.78V
drivable capacitance	C_D			2	nF	
load capacitance			110		pF	mode “SLAVE”
trigger offset*	t_O	-500[2]	+0[1]		ns	50% trigger signal to 50% RF-switching (trigger mode “OUT”)
trigger offset*	t_O	+10	+60	+200	ns	50% trigger signal to 50% RF-switching (trigger mode “MASTER” or “SLAVE”)

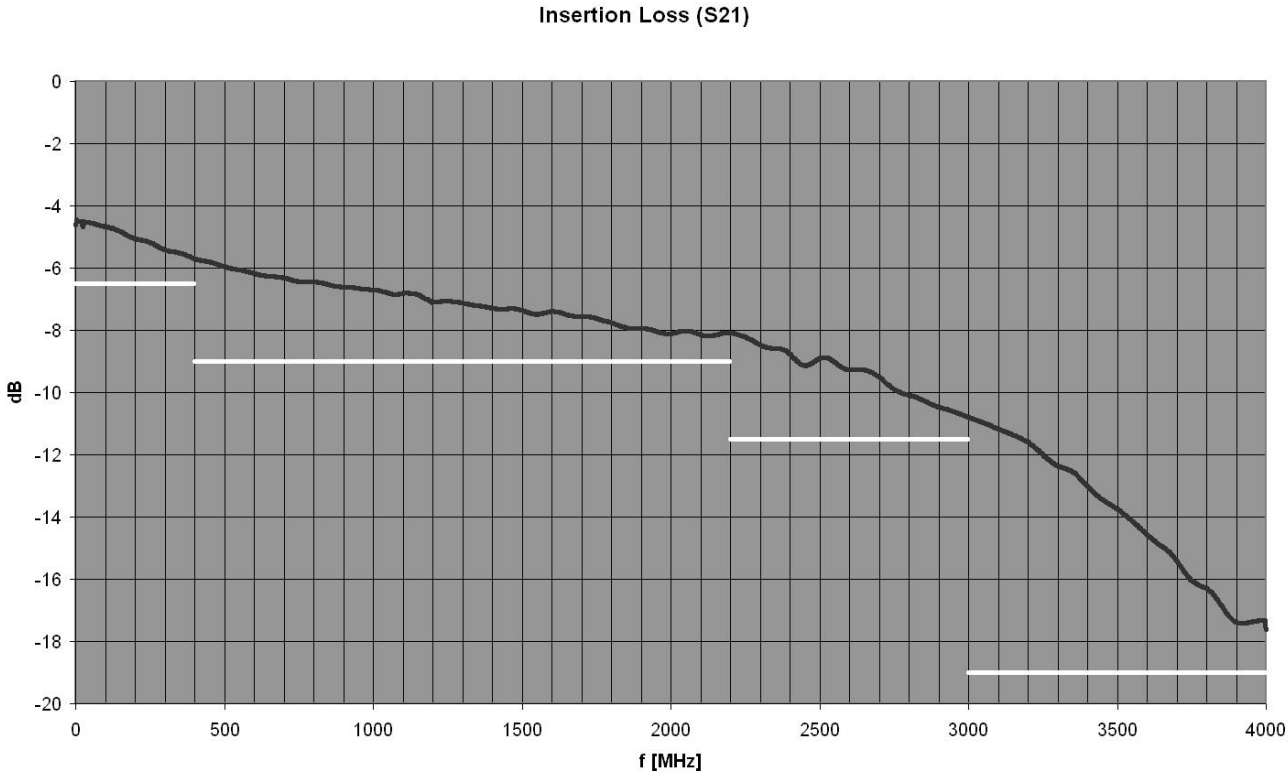
Note 1: capacitive load < 100 pF
Note 2: capacitive load ≤ 2 nF

Common Specifications

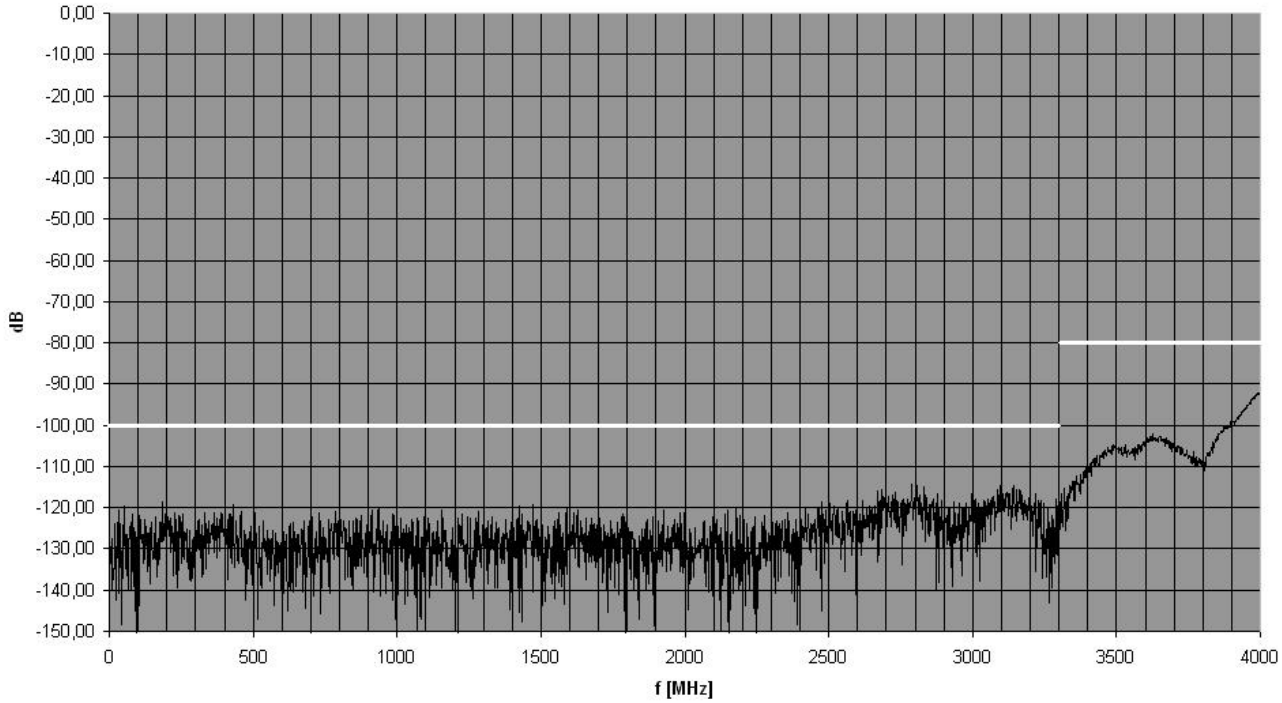
Parameter	Symbol	Min.	Typ.	Max.	Unit	Condition
power supply	U	90	230	260	V	50 / 60 Hz AC
power consumption	P		9		VA	
dimensions	L x W x H		approx. 210 x 482 x 44		mm	19” 1 U, without connectors and handles
weight	m		2600		g	
operating temp. range	T_o	+5		+40	°C	
storage temp. range	T_s	-40		+70	°C	
EMC			in line with EN55011 class B EN 61326-1 (industrial environment) EN 61326-2-1			
remote control interfaces						
Ethernet/LAN			RJ45 10/100BaseT			
SYNC Port			BNC female			
USB			2.0 (high speed)			USB type B
ordering information	QATT		1302.4002.1			

S-Parameters (typical responses)

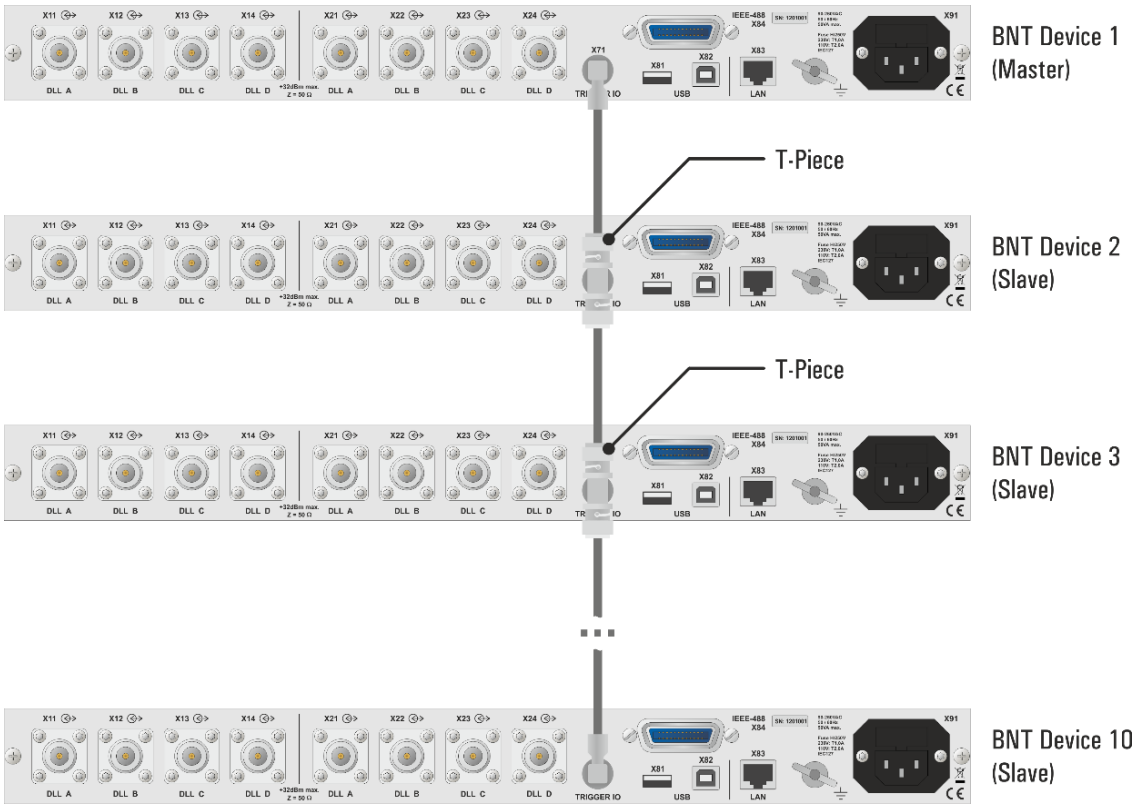




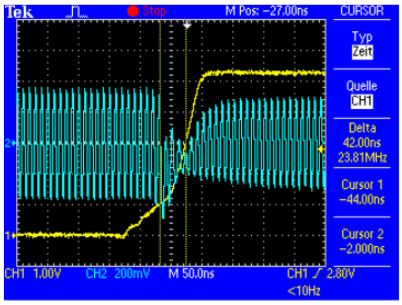
Channel Isolation @ 22.5 dB



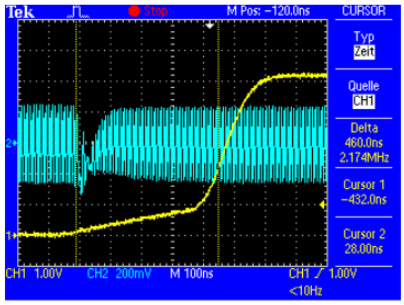
Scheme of a Trigger Compound



Trigger IO responses (typical)

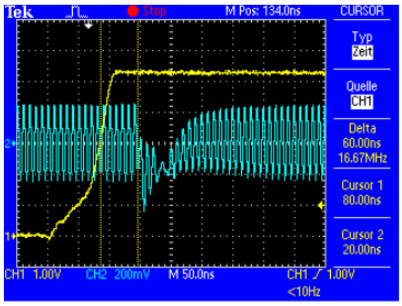


TRIG:MODE OUT, LOAD 0 nF, 50/50

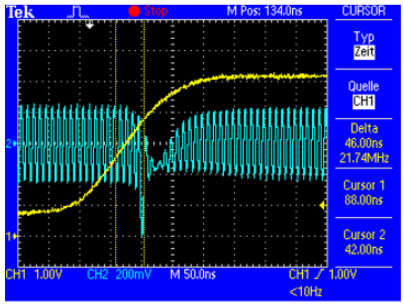


TRIG:MODE OUT, LOAD 2.2 nF, 50/50

External Trigger (yellow) vs. RF Signal (blue), Trigger Mode “OUT”, with and without capacitive load



TRIG:MODE MASTER, NO LOAD, 50/50



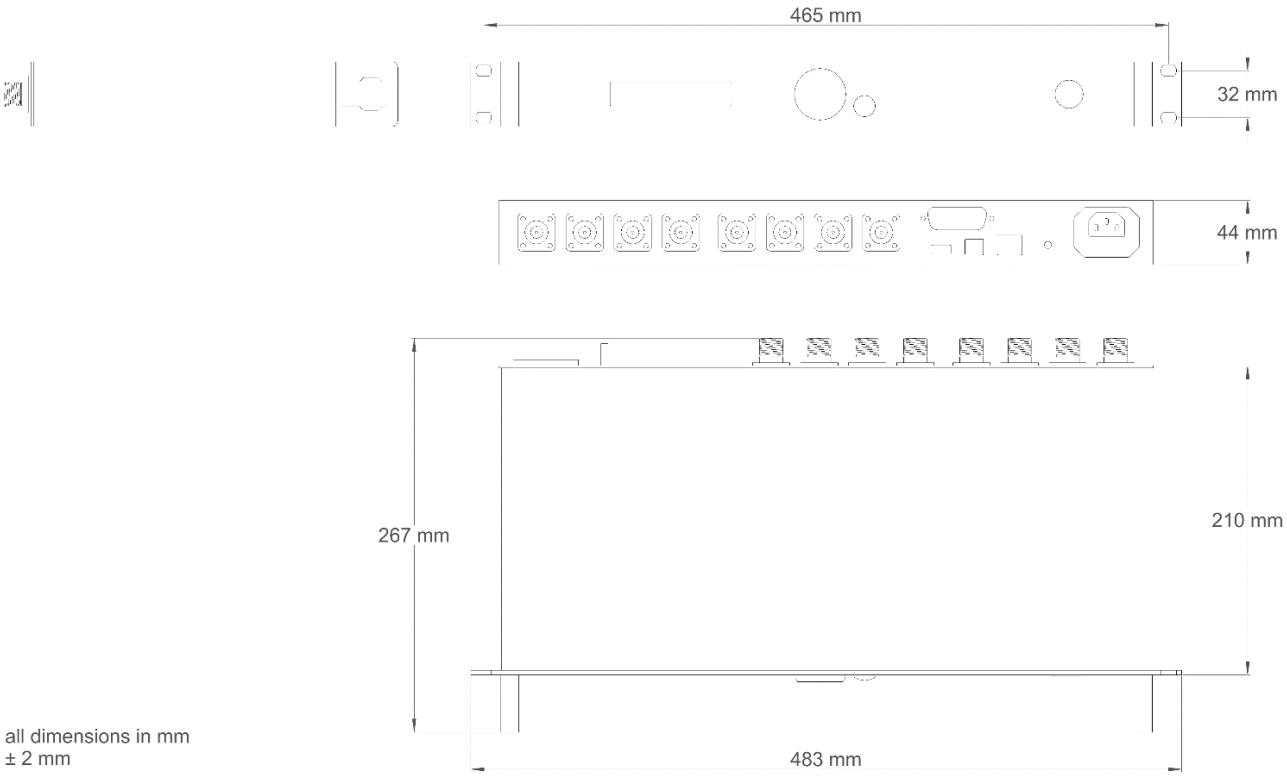
TRIG:MODE MASTER, LOAD 2.2 nF, 50/50

External Trigger (yellow) vs. RF Signal (blue), Trigger Mode “MASTER”, with and without capacitive load

Front View

Rear View (similar appearance)

Dimensions



all dimensions in mm
± 2 mm

Related Products

Product	Description	P/N
QATT-7G	4 Channel Step Attenuator 100 kHz … 7000 MHz	1302.4702.1
QDLL	4 Channel Programmable Delay Line 250 MHz … 4000 MHz	1303.4002.1
AIE4X4	4 Channel Air Interface Emulation System 500 …3000 MHz	1201.4002.1
AIE4X4-MIMO	4 Channel Air Interface Emulation System 250 … 4000 MHz	1308.4502.1
AIE-W9	9 Port Air Interface Emulator 1800 … 6400 MHz	1309.4029.1