QATT

4 Channel Step Attenuator 100 kHz … 4000 MHz, 0 … 100 dB in 0.5 dB steps

Features

- 4 independent RF channels
- attenuation range 0 … 100 dB in 0.5 dB steps
- MMI for local control
- LAN and USB remote interface
- intuitive graphic user interface (GUI)
- trigger port for synchronous operation
- compact 19”, 1 U design

Applications

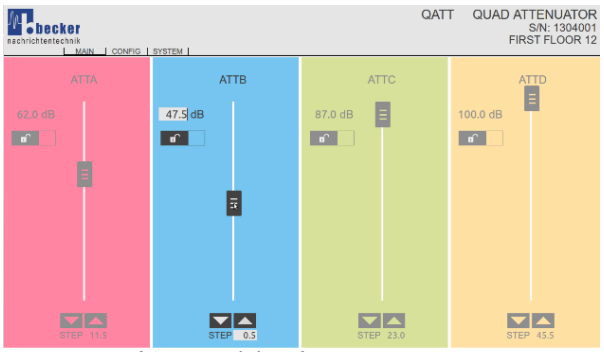
- air interface emulations
- product testing and validation
- cellular and wireless
- broadcast and GNSS

Scope

QATT is a 4 channel step attenuator suitable in the frequency range from 100 kHz up to 4000 MHz. It is designed in 50 Ohm technology. Each channel has an attenuation range of 100 dB adjustable in 0.5 dB steps. The attenuators are based on wear-free semiconductor switches for a reproducible operation.
QATT is designed in 19” technology for an easy installation into 19” system racks. It is also suitable as table top unit for laboratory use.

Versatile Control Modes

QATT has a MMI (Man Machine Interface) for local operation.
For remote control use the device offers LAN and USB interfaces. The control occurs via ASCII strings.
Additional QATT has a graphic user interface (GUI) for an intuitive control via LAN interface. The GUI enables a location-independent operation regardless of the user's operating system also with multiple devices in a single network.



Appearance of QATT web interface

Synchronous Operation

Like many other products of Becker Nachrichtentechnik, 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 synchronously.

RF Specification

Parameter	Symbol	Min.	Typ.	Max.	Unit	Condition
impedance	Z_{in} / Z_{out}		50		Ohm	
number of channels	n_{CH}		4			
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
channel isolation	S_{23}	100	110		dB	f ≤ 3300 MHz @ 22.5 dB
	S_{23}	80	90		dB	f > 3300 MHz @ 22.5 dB
attenuator settling time	T_{SET}		0.3	1	µs	rise/fall time between ATT steps
RF commands processing rate	PR		500		cmd/s	setting a single channel in MASTER or OUT mode without additional system load (e.g. web interface)
DC voltage	U_{DC}			20	V	all RF ports
ESD discharge resistor	R_{ESD}		4.7		kΩ	all RF ports
input power	P_{RF}			+27	dBm	CW
RF connectors	X_{RF}		N female			

TRIGGER IO Specification

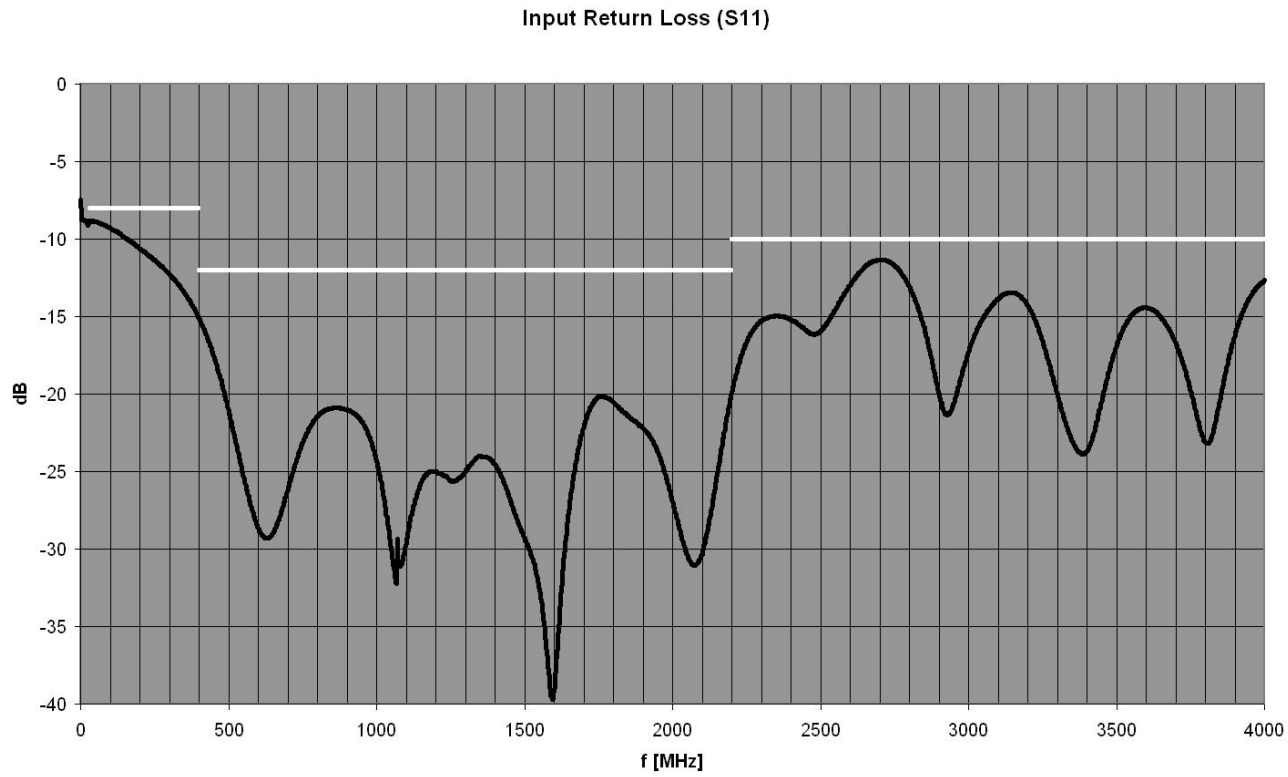
Parameter	Symbol	Min.	Typ.	Max.	Unit	Condition
connector type		BNC female				
function type		open collector, wired AND				positive edge = trigger
		low state = BUSY				“SLAVE” mode
logic high level	U_H	2.0	5.0	5.5	V	
logic low level	U_L	-0.5	0.0	1.2	V	
pulse width	T_W		50		µs	
rise time	T_R		0.1[1]	0.5[2]	µs	
sinking current	I_S			60	mA	
passive pull up	R_{PU}		1		kΩ	
active pull up	I_{PU}		10		mA	“MASTER” & “OUT” mode
drivable capacitance	C_D			2	nF	
load capacitance	C_L		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”)

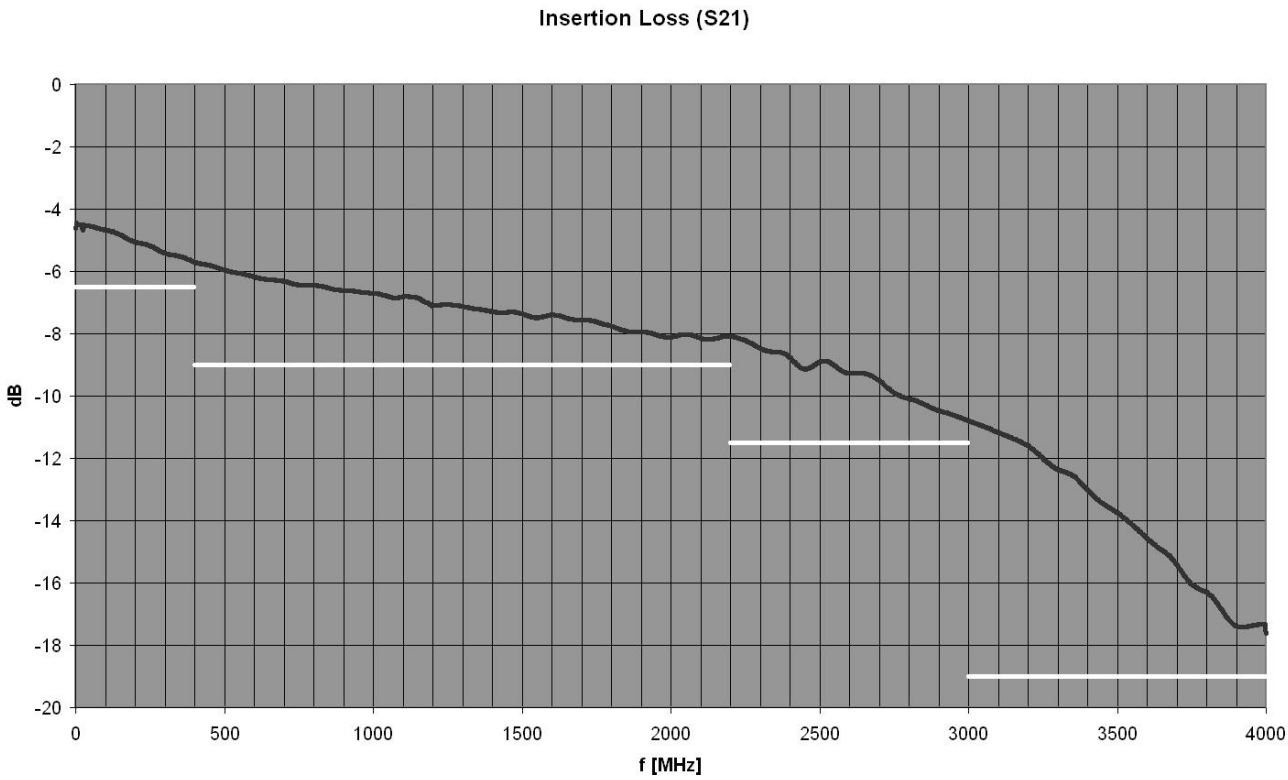
Note 1: capacitive load < 100 pF
Note 2: capacitive load ≤ 2 nF

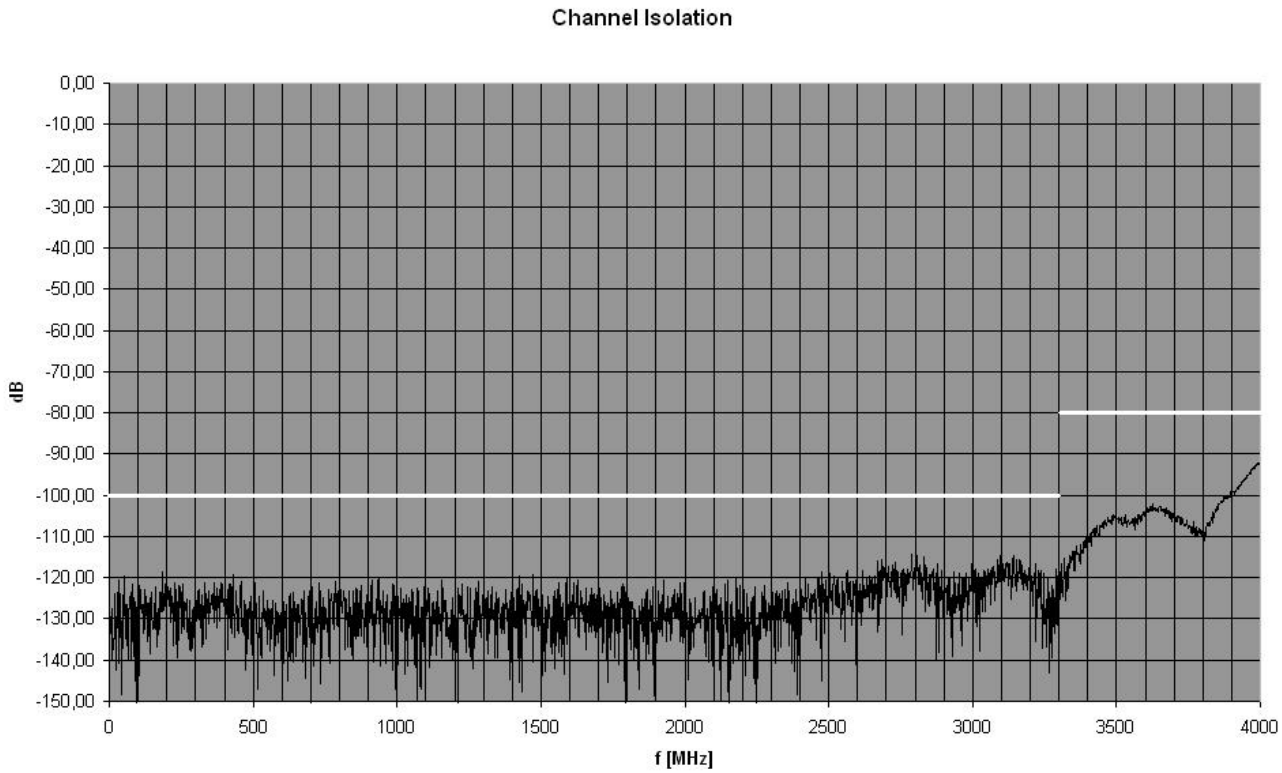
Common Specification

Parameter	Symbol	Min.	Typ.	Max.	Unit	Condition
voltage supply range	U_{AC}	90	230	260	V	50 / 60 Hz AC
power consumption	P_{AC}		9		W	
power socket	X_{AC}	IEC-60320 C14				country specific mains cable
Dimensions and weight						
dimensions	W x H x D	approx. 482 x 44 x 210			mm	19” 1 U, without connectors and handles
weight	m		2.6		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	QATT	P/N: 1302.4002.1				

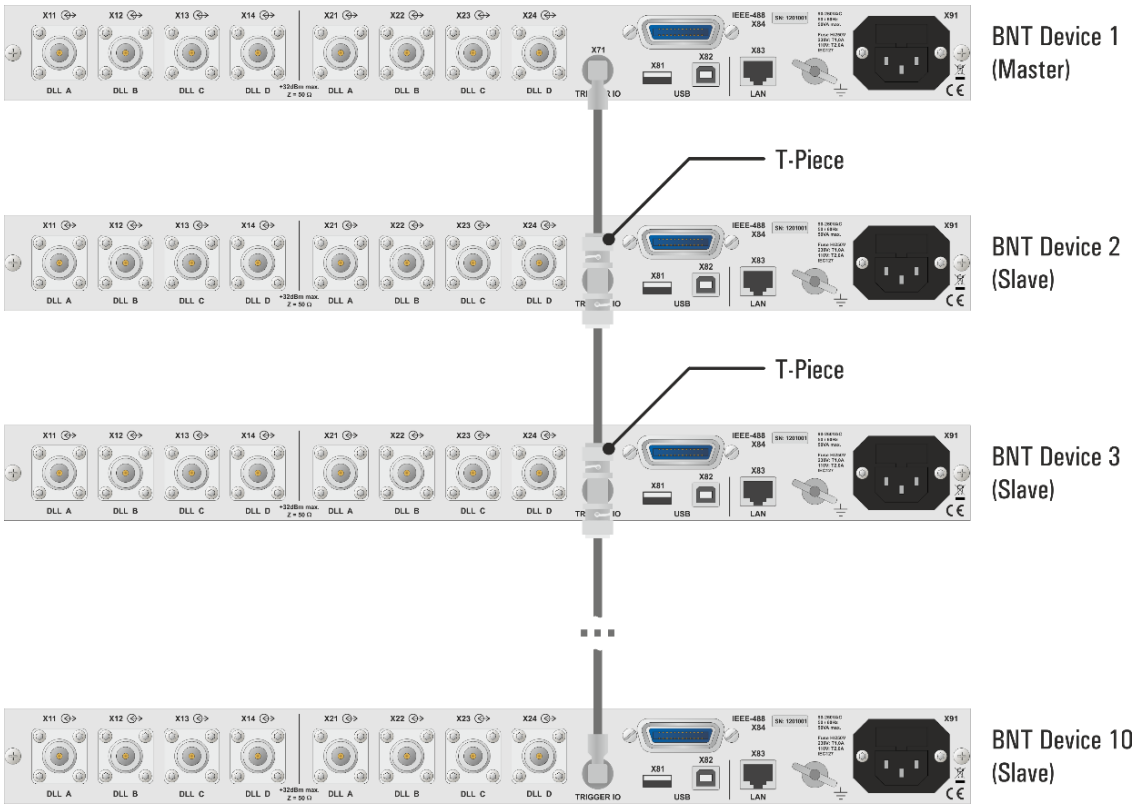
S-Parameters (typical responses)



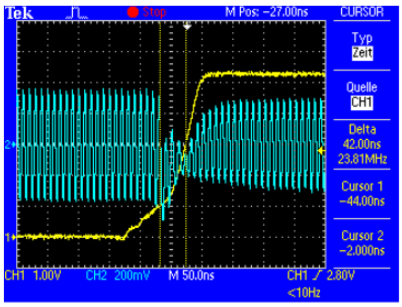



Channel Isolation
0,00
-10,00
-20,00
-30,00
-40,00
-50,00
-60,00
-70,00
-80,00
-90,00
-100,00
-110,00
-120,00
-130,00
-140,00
-150,00
dB
0
500
1000
1500
2000
2500
3000
3500
4000
f [MHz]

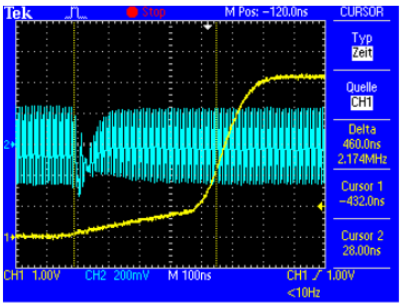
Trigger I/O Connection



Trigger IO responses (typical)

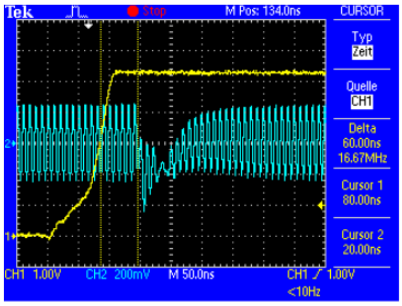


TRIG:MODE OUT, LOAD 0 nF, 50/50

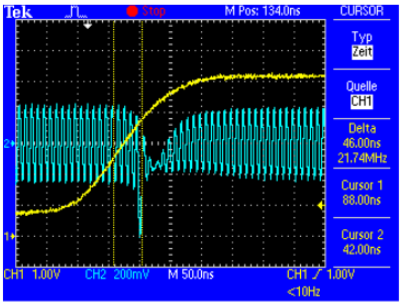


TRIG:MODE OUT, LOAD 2.2 nF, 50/50

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

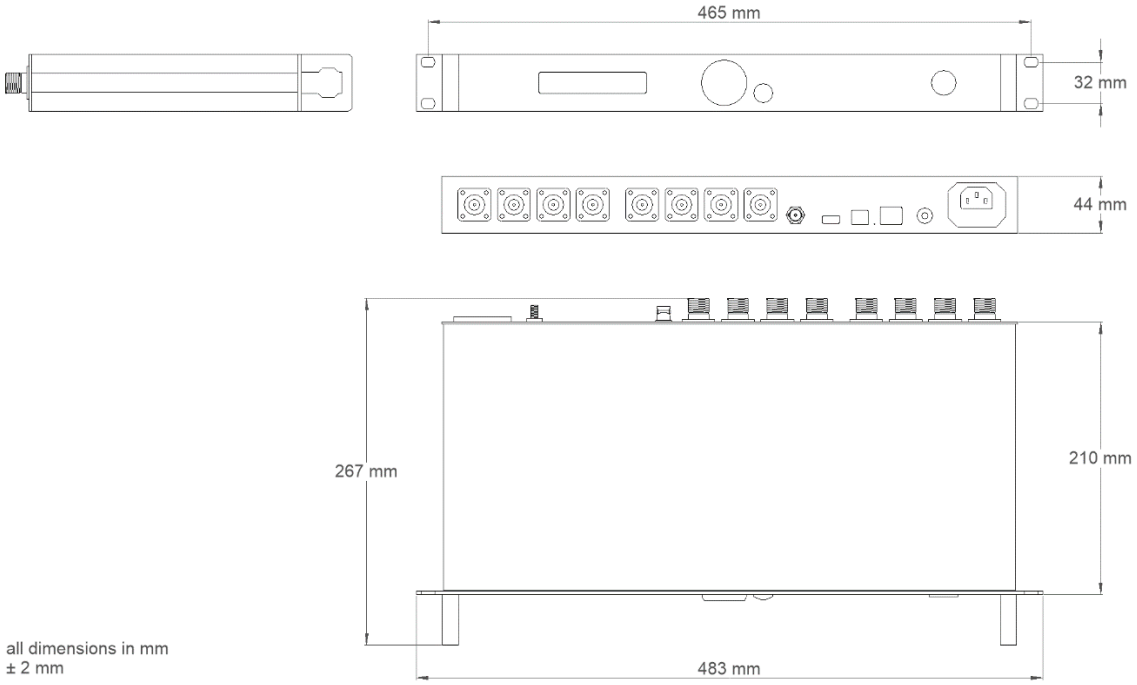
External Trigger (yellow) vs. RF Signal (blue), Trigger Mode “MASTER”, with and without capacitive load

Appearances

Front View

Rear View

Dimensions



all dimensions in mm
± 2 mm

Related Products

Product	Description	P/N
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 dB, 0.5 dB steps	1302.4702.1
QDLL	4 Channel Programmable Delay Line 250 MHz … 4000 MHz, 0 …1700 ps	1303.4002.1
AIE-4X4ER	4X4 Channel Air Interface Emulator 400 … 6000 MHz	1201.4902.1
AIE-W9R	9 Port Air Interface Emulator 1800 … 6400 MHz	1309.4029.1
AIE-W5ER	5 Port Air Interface Emulator 400 … 6000 MHz	1309.4052.1