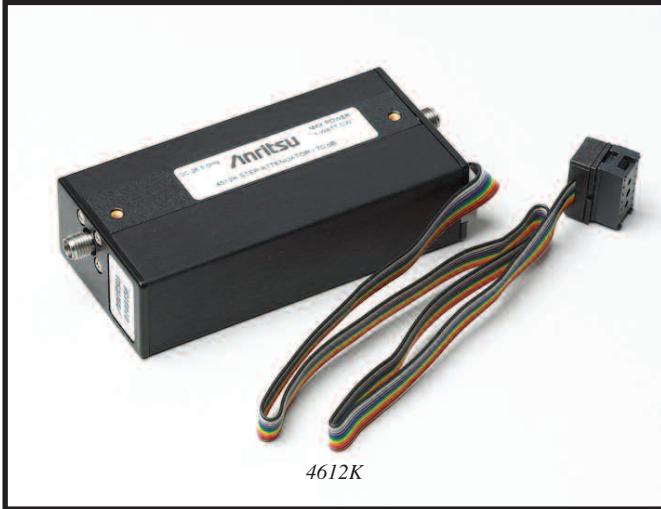


STEP ATTENUATORS

4400, 4500, 4600 Series DC to 40 GHz



Anritsu programmable step attenuators bring a substantial increase in the frequency and attenuation range available in one small package. Using the latest technology, these units offer superior performance, reliability, and ease of use to 40 GHz. All are plug-compatible with competitive units.

Features

- DC-20 GHz, DC-26.5 GHz, DC-40 GHz
- 70 dB and 110 dB attenuation ranges
- Low insertion loss
- Precise repeatability
- Life of 5 million operations
- Small, rugged, light weight

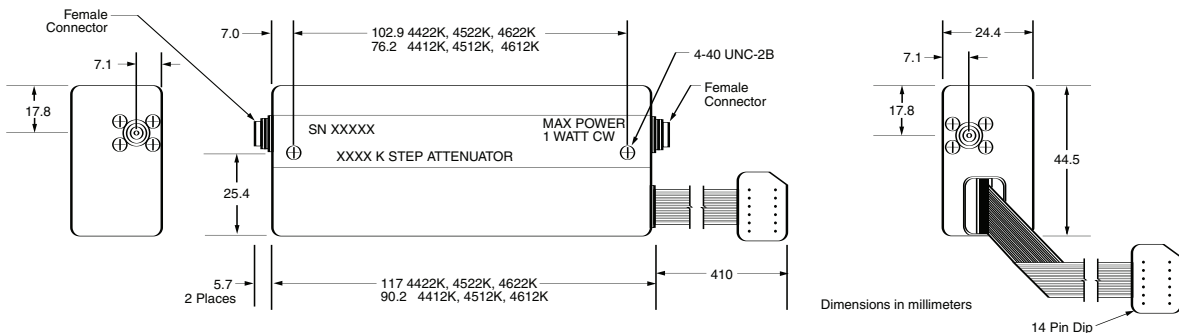
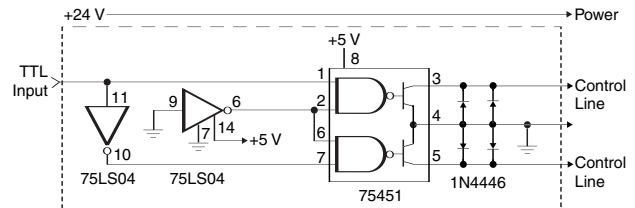
Advanced technology-advanced performance

Anritsu has lowered throughline loss by designing the first 40 dB attenuator sections to operate above 18 GHz. Compared with designs that use 30 dB sections, these attenuators have a shorter thru path and fewer switching contacts. As a result, insertion loss is as much as 1.7 dB less than that of units made by other companies. RF input power requirements for systems that use these attenuators can be reduced, saving money, space, and weight.

Integrated switching structure

The push rods that switch in the attenuator modules and thru-lines are driven by a solenoid actuator. By designing the solenoid as an integral part of the attenuator assembly, switching speeds of 20 ms (including settling time) are achieved. Upon completion of the switching operation, the solenoid is magnetically latched to withstand shock and vibration. At the same time, the solenoid current is automatically turned off to save power and to minimize temperature rise.

Also integrated in the design is solid state dc switching circuitry that avoids the relatively high failure rate of mechanical DC switches. Each attenuator section is controlled by its own driver circuit, which requires 24V, 125 mA. A typical external driver circuit for one section is shown in the figure below.



4400, 4500, and 4600 series outline

STEP ATTENUATORS

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Accuracy enhancing calibration data

Attenuation accuracy can be improved by using optional calibration data taken on an Anritsu vector network analyzer. The calibration data can be used to normalize the effect of frequency response and reflections. The calibration data is traceable to NIST.

Specifications

Frequency and attenuation ranges

Model	Frequency range	Attenuation range in 10 dB steps	Connectors
4412K 4422K	DC to 20 GHz	0 to 70 dB 0 to 110 dB	K(f)
4512K 4522K	DC to 26.5 GHz	0 to 70 dB 0 to 110 dB	K(f)
4612K 4622K	DC to 40 GHz	0 to 70 dB 0 to 110 dB	K(f)

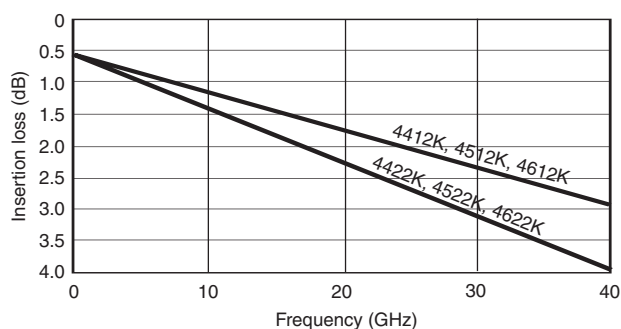
Attenuator accuracy (\pm dB)

Frequency (GHz)	Attenuation (dB)								
	10	20	30	40	50	60	70	80-110	
DC to 8	0.3	0.5	0.6	0.7	0.8	1.0	1.1	1.4	
>8 to 12	0.4	0.5	0.7	0.9	1.0	1.3	1.5	2.0	
>12 to 20	0.5	0.6	0.8	1.1	1.2	1.4	1.7	2.2	
>20 to 26.5	0.7	0.8	1.0	1.5	1.6	1.9	2.3	2.8	
>26.5 to 40	0.9	1.0	1.2	1.7	1.9	2.3	2.6	3.2	

Electrical

Switching speed (maximum)	20 ms
Operating voltage	20 to 30 Volts
Switching control current	125 mA at 24V nominal per section 3 sections in 4412K, 4512K, 4612K 4 sections in 4422K, 4522K, 4622K
Solenoid coil impedance	190 Ω
Solenoid coil inductance	65 mH
RF input power (maximum)	1W average, 100W peak for 10 μ s
RF power sensitivity	0.001 dB/W
Life (minimum operations per section)	5 million
Repeatability (typical after 1 million operations)	\pm 0.03 dB to 18 GHz \pm 0.05 dB to 26.5 GHz \pm 0.08 dB to 40 GHz

Insertion loss (maximum)



Impedance match

Frequency (GHz)	Return loss (dB)	SWR
DC to 8	19	1.25
>8 to 12	14	1.5
>12 to 20	12.7	1.6
>20 to 26.5	11	1.8
>26.5 to 40	9	2.1

Mechanical

Weight	4412K, 4512K, 4612K: 170g 4422K, 4522K, 4622K: 213g
Mounting position	Any
RF connectors	K Connectors, female, in-line
Programming connector	14 pin DIP
Programming cable length	406 mm

Environment

Temperature	Operating:	0C to +70C
	Non-operating:	-55C to +85C
Altitude	Operating:	4.6 km (440 mm Hg)
	Non-operating:	15 km
Shock	Operating:	10g, 6 ms, on 6 sides, 3 blows
	Non-operating:	500g, 1.8 ms, in 6 directions
Humidity	0 to 95% relative humidity	
EMC	Mil-Std-461, Method RE02, VDE 0871, CISPR#2	

Ordering information

Please specify model/order number, name, and quantity when ordering.

Model/Order No.	Name
4412K	Step Attenuator, DC to 20 GHz, 70 dB
4512K	Step Attenuator, DC to 26.5 GHz, 70 dB
4612K	Step Attenuator, DC to 40 GHz, 70 dB
4422K	Step Attenuator, DC to 20 GHz, 110 dB
4522K	Step Attenuator, DC to 26.5 GHz, 110 dB
4622K	Step Attenuator, DC to 40 GHz, 110 dB
Options	
Option C*	Calibration Data (4412K, 4512K, 4612K)

*Calibration data is taken every 100 MHz from DC to 900 MHz and every 500 MHz from 1 GHz to 40 GHz.