



SMD Chip Attenuator

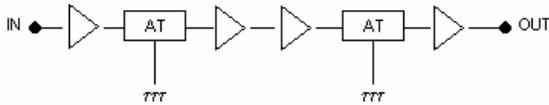
The content of this specification may change without notification 08/28/2008

Custom solutions are available.



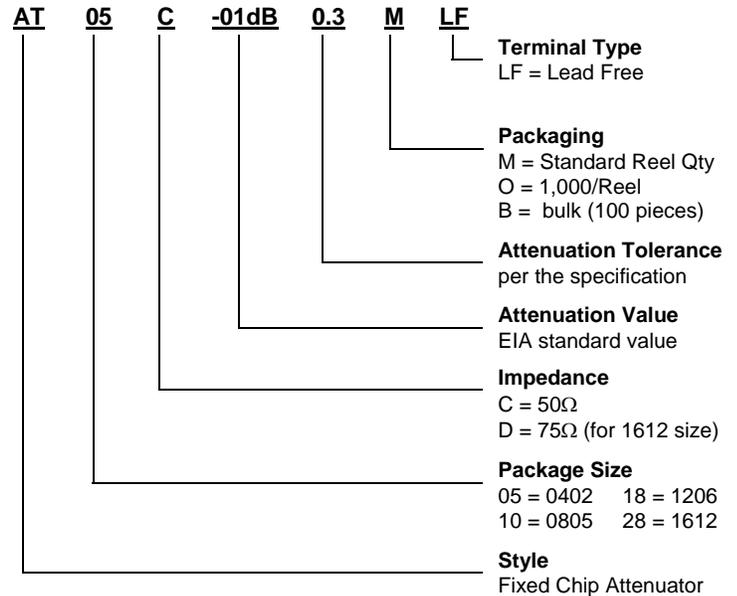
AAC AT series high performance 0402, 0805, 1206, and 1612 size thin film fixed chip attenuators exhibit excellent high frequency characteristics. The surface mount package is ideal for low noise, inductance and parasitic capacitance applications. The thin film metallization also offers very stable characteristics over temperature and time.

APPLICATION



Gain adjustment and impedance matching in high frequency circuits. Because control circuits need signals with identical levels, and a receiver receives signals with different signal levels, signal levels could be adjusted by combining a SMT attenuator and amplifier. At the same time, termination can be obtained using these low reflection attenuators.

HOW TO ORDER



FEATURES

- Minimized parasite capacitance and inductance
- Excellent temperature and noise characteristics due to thin film resistance elements
- Frequency ranges: DC – 10GHz
- Metallized resistors and electrodes are formed on ceramic substrate covered with polyamide resin.

SPECIFICATION

Size	Attenuation	Attenuation Tolerance	Imp	Impedance Tolerance	VSWR	Frequency Range	Rated Input Power	Temperature Range
0402	0-10dB	0-3dB: ±0.3dB 4-7dB: ±0.5dB 8-10dB: ±0.7dB	50Ω	---	≤1.5	0-10dB: DC-10GHz 15dB: DC-5GHz 20, 25dB: DC-3GHz	32mW	Refer to Derating Curve -55°C ~ 125°C
0805	0-10dB	0-10dB: ±0.3dB	50Ω	±7% (DC)	≤1.3	0-10dB: DC-10GHz	100mW	
1206	0-10dB, 16dB	0-10dB: ±0.3dB 16dB: ±0.5dB	50Ω	---	≤1.3	0-10dB: DC-3GHz 16dB: DC-3GHz	125mW	
1612	0-10dB, 16dB, 20dB	See below	50Ω	±2% (DC)	See Below	0-10dB: DC-10GHz 16, 20dB: DC-10GHz	250mW	

Rated Ambient Temperature is 70°C

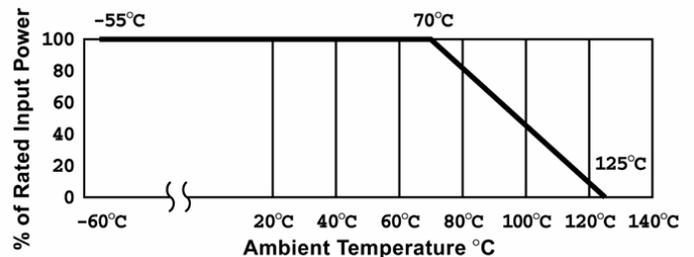
ATTENUATION TOLERANCE (1612 Size Only)

Attenuation	Rank	DC-2GHz	2-5GHz	5-10GHz
0dB	A	+0.1dB/-0dB	+0.2dB/-0dB	+0.4dB/-0dB
1-10dB	A	±0.1dB	±0.2dB	±0.4dB
	B	±0.2dB	±0.3dB	±0.5dB
16dB, 20dB	B	±0.2dB	±0.3dB	±0.5dB

VSWR (1612 Size Only)

1.1:	DC - 2GHz
1.2:	2 - 5GHz
1.3:	5 - 10GHz

DERATING CURVE



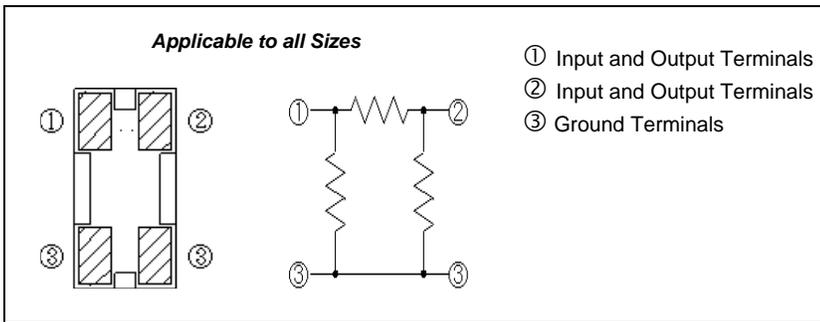
DIMENSIONS (mm)

Size	W	L	T	W1	W2	a1	a2	t
0402	0.50±0.05	1.00±0.05	0.02±0.01	0.17±0.04	0.14±0.06	0.39±0.07	0.29±0.05	0.30±0.05

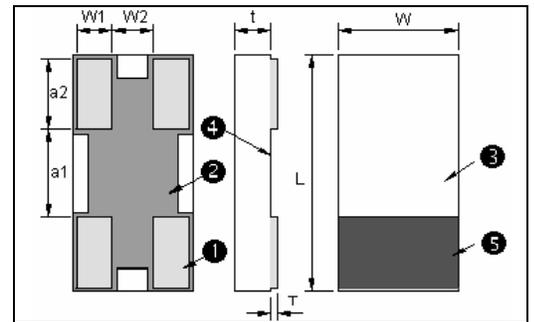
Size	L	W	t	a	b	W1	W2	W3
0805	2.0 ± 0.10	1.25 ± 0.10	0.40 ± 0.10	0.50 ± 0.20	0.60 ± 0.20	0.40 ± 0.20	0.40 ± 0.20	0.35 ± 0.20
1206	3.2 ± 0.20	1.60 ± 0.20	0.40 ± 0.10	1.00 ± 0.25	1.00 ± 0.20	0.55 ± 0.25	0.40±0.25	0.40 ± 0.20

1612	dB	L	W	L1	L2	W1	W2	W3	t
	0dB	4.20 ± 0.20	3.00 ± 0.20	----	4.20 ± 0.20	0.30 ± 0.15	0.85 ± 0.15	0.70 ± 0.10	0.8 ± 0.15
	1dB	4.20 ± 0.20	3.00 ± 0.20	1.90 ± 0.20	0.30 ± 0.20	0.30 ± 0.15	0.85 ± 0.15	0.70 ± 0.10	0.8 ± 0.15
	2 ~ 3dB	4.20 ± 0.20	3.00 ± 0.20	1.90 ± 0.20	0.30 ± 0.20	0.40 ± 0.15	0.85 ± 0.15	0.90 ± 0.10	0.8 ± 0.15
	4 ~ 6dB	4.20 ± 0.20	3.00 ± 0.20	1.75 ± 0.20	0.60 ± 0.20	0.40 ± 0.15	0.65 ± 0.15	0.90 ± 0.10	0.8 ± 0.15
	7 ~ 10dB	4.20 ± 0.20	3.00 ± 0.20	1.60 ± 0.20	0.90 ± 0.20	0.40 ± 0.15	0.65 ± 0.15	0.90 ± 0.10	0.8 ± 0.15
16 ~ 20dB	4.20 ± 0.20	3.00 ± 0.20	1.60 ± 0.20	1.80 ± 0.20	0.40 ± 0.15	0.85 ± 0.15	0.90 ± 0.10	0.8 ± 0.15	

CIRCUIT



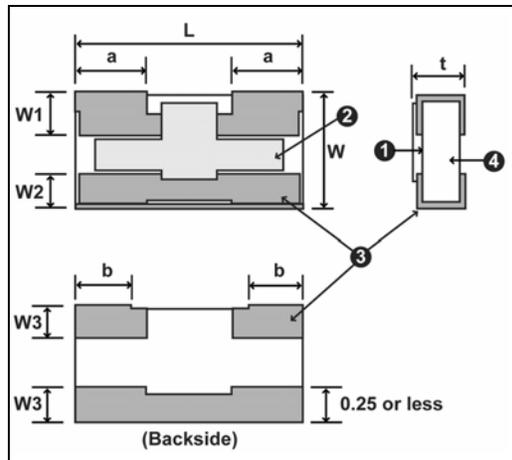
0402



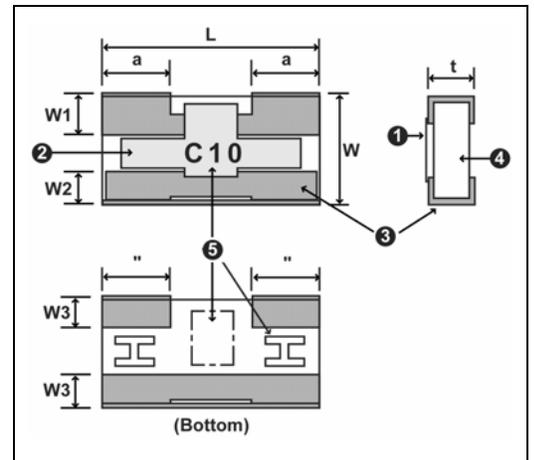
LEGEND

- ① **Resistor:**
Nichrome Thin Film
- ② **Protective Coat:**
Polyimide Resin
- ③ **Terminals:**
Solder Plating
- ④ **Substrate:**
Alumina Ceramics
- ⑤ **Marking:**
White Ink

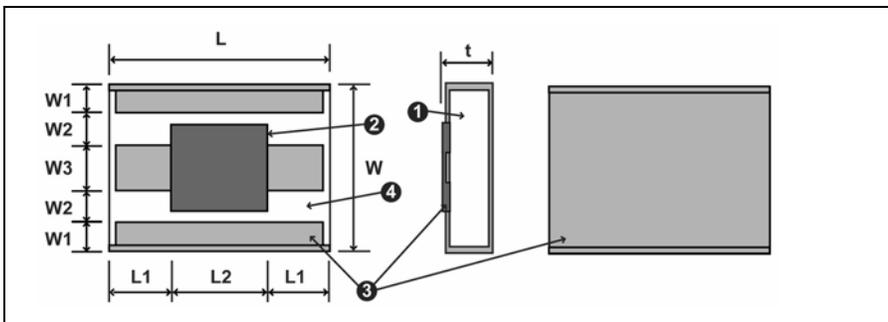
0805



1206



1612



CHARACTERISTICS

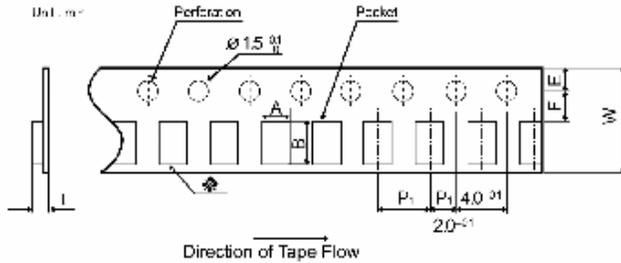
Item	Condition	Size	Specification		
			Attenuation		Impedance
			0~10dB	16, 20dB	
Short Time Overload	Voltage of 2.5 times the rated voltage shall be applied for 5 seconds.	0402	±0.03dB	±0.03dB	±0.5%
		0805	±0.02dB	±0.02dB	±0.2%
		1206	±0.02dB	±0.02dB	±0.2%
		1612	±0.01dB	±0.02dB	±0.2%
Load Life	The attenuator shall be subjected to rated voltage for 90 minutes followed by a pause of 30 minutes at a temperature of 70±3°C. This constitutes 1 cycle. The cycles shall be repeated for 1,000 hours.	0402	±0.05dB	±0.05dB	±1.0%
		0805	±0.04dB	±0.04dB	±0.5%
		1206	±0.04dB	±0.04dB	±0.5%
		1612	±0.02dB	±0.04dB	±0.5%
Moisture Load Life	The attenuator shall be subjected to rated voltage for 90 minutes followed by a pause of 30 minutes at a temperature of 60±2°C with relative humidity of 90% to 95%. This constitutes 1 cycle. The cycles shall be repeated for 1,000 hours.	0402	±0.05dB	±0.05dB	±1.0%
		0805	±0.04dB	±0.04dB	±0.5%
		1206	±0.04dB	±0.04dB	±0.5%
		1612	±0.02dB	±0.04dB	±0.5%
Temperature Cycle	[-55°C 30 minutes-R.T. 3 minutes-+125°C 30 minutes-R.T. 3 minutes] The attenuator shall be subjected to 5 continuous cycles.	0402	±0.03dB	±0.03dB	±0.5%
		0805	±0.02dB	±0.02dB	±0.2%
		1206	±0.02dB	±0.02dB	±0.2%
		1612	±0.01dB	±0.02dB	±0.2%
Resistance to Soldering Heat	The attenuator shall be immersed into the solder of 260±5°C for 10±1 seconds.	0402	±0.03dB	±0.03dB	±0.5%
		0805	±0.02dB	±0.02dB	±0.2%
		1206	±0.02dB	±0.02dB	±0.2%
		1612	±0.01dB	±0.02dB	±0.2%
Substrate Bending	Distance between the fulcrums: 90mm Bending width: 3mm Substrate: Glass-Epoxy t=1.6mm	0402	±0.03dB	±0.03dB	±0.5%
		0805	±0.02dB	±0.02dB	±0.2%
		1206	±0.02dB	±0.02dB	±0.2%
		1612	±0.01dB	±0.02dB	±0.2%
Solderability	The attenuator shall be dipped into the solder of 235±5°C for 3±0.5 seconds. A new uniform coating of solder shall cover 95% or more of surface being immersed.	0402	A new uniform coating of solder shall cover 95% or ore of surface being immersed		
		0805			
		1206			
		1612			
Insulation Resistance	DC 500V for 1 minute	0402	1000M Ω or over		
		0805			
		1206			
		1612			
Temperature Characteristic	R.T. – R.T. +100°C – R.T.	0402	±0.02dB	±0.02dB	±50ppm/°C
		0805	±0.005dB	±0.005dB	±50ppm/°C
		1206	±0.005dB	±0.005dB	±50ppm/°C
		1612	±0.005dB	±0.01dB	±50ppm/°C

Note: Impedance value and attenuation value shall be checked by DC measurement.

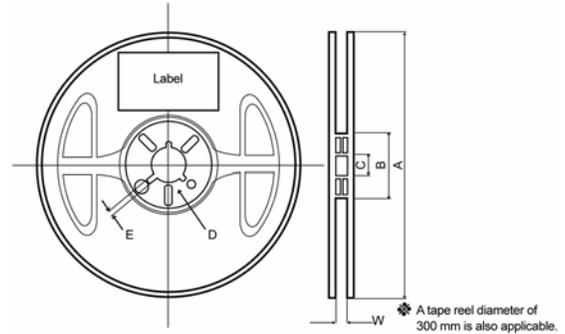
TAPE SIZE (mm) – Table 1

Size	A	B	W	F	E	P1	t
0402	0.65 ± 0.03	1.15 ± 0.03	8.0 ± 0.20	3.5 ± 0.05	1.75 ± 0.10	2.0 ± 0.05	0.5 ± 0.10
0805	1.60 ± 0.20	2.40 ± 0.20	8.0 ± 0.30	3.5 ± 0.05	1.75 ± 0.10	4.0 ± 0.10	1.5 Max
1206	1.85 ± 0.10	3.60 ± 0.10	8.0 ± 0.20	3.5 ± 0.05	1.75 ± 0.10	4.0 ± 0.10	1.0 ± 0.10
1612	4.60 ± 0.10	12.0 ± 0.10	12.0 ± 0.10	5.5 ± 0.10	1.75 ± 0.10	8.0 ± 0.10	0.8 ± 0.10

TABLE 1



REEL DRAWING

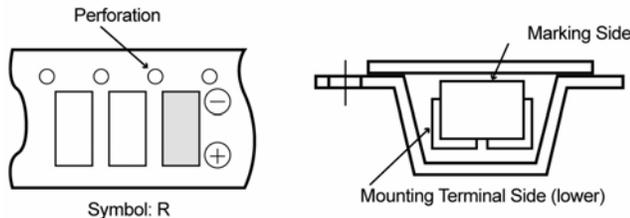


TAPE MATERIALS

A heat press sticks the transparent or half-transparent plastic covered tape.

INSERTING DIRECTION

Attenuators are packed with their cathodes on perforation side and with their electrodes faced with the bottoms of the pockets.



REEL DIMENSIONS (mm)

Tape Width	A ^{±2}	B ^{±5}	C ^{±1}	D ^{±0.5}	E ^{±1}	W ^{±2}
8.0 ^{±0.2}	Ø178	Ø60	Ø13.5	Ø21	2.5	8.4
12.0 ^{±0.1}	Ø178	Ø60	Ø13.5	Ø21	2.5	14.0

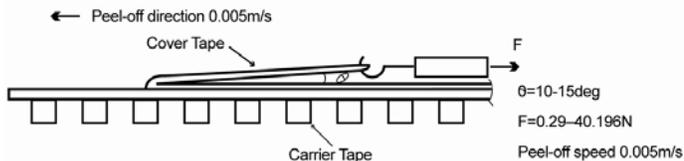
A tape reel diameter of 330mm is also applicable.

PACKAGE QUANTITY

Case Size	Standard Package Unit (pcs)	
	Type	Quantity
0402	Plastic Tape	10,000
0805	Plastic Tape	5,000
1206	Plastic Tape	5,000
1612	Plastic Tape	2,000

ADHESION STRENGTH OF COVER AT PEELING

When the cover tape is peeled off in such a manner as indicated in the illustration below, adhesion strength F must be within the range of 0.2994 ± 0.196N.



PACKAGE DESCRIPTION

The standard number of attenuators to be accommodated by one reel is as indicated in Table 1. One side surface of a reel is marked with the following items of information.

1. Name of Attenuator or product identification
2. Rated voltage
3. Attenuation value
4. Attenuation tolerance value
5. Quantity
6. Lot number for production month/year
7. Manufacturer's name or symbol

PACKING & STORAGE

The attenuators are packed in such a manner that they will not possibly be damaged during transit or storage. As far as they are stored at normal temperature with normal humidity (5 to 35°C, below 75% RH), they are warranted for a period of two years from the date of manufacture.