Thin Film Technology Corp.

Product Family: Temperature Variable Attenuators

Part Number Series: ATV0805J Series (10GHz)

Construction:

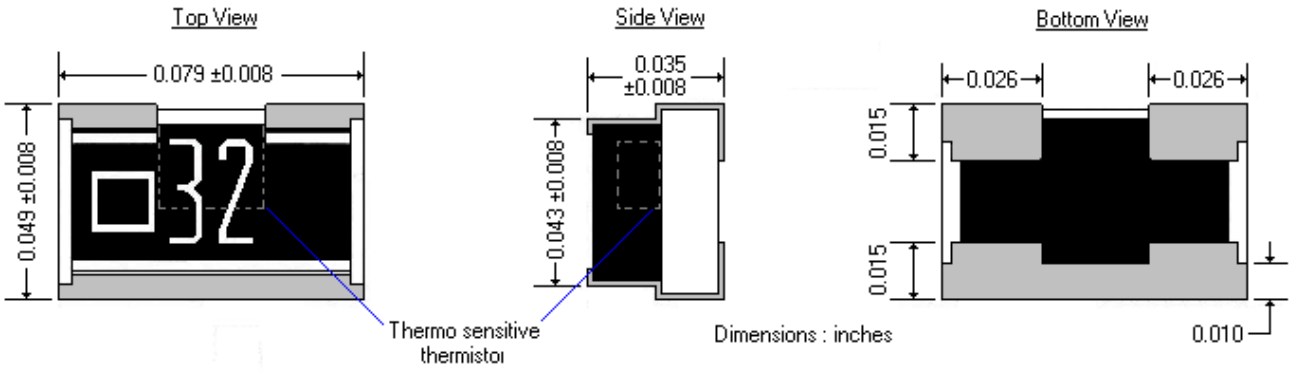
- High purity Alumina Substrate
- Thermo-sensitive thermistor
- Ni alloy thin-film resistive elements
- 100% matte tin finish terminations (RoHS compliant and Pb Free)

Features:

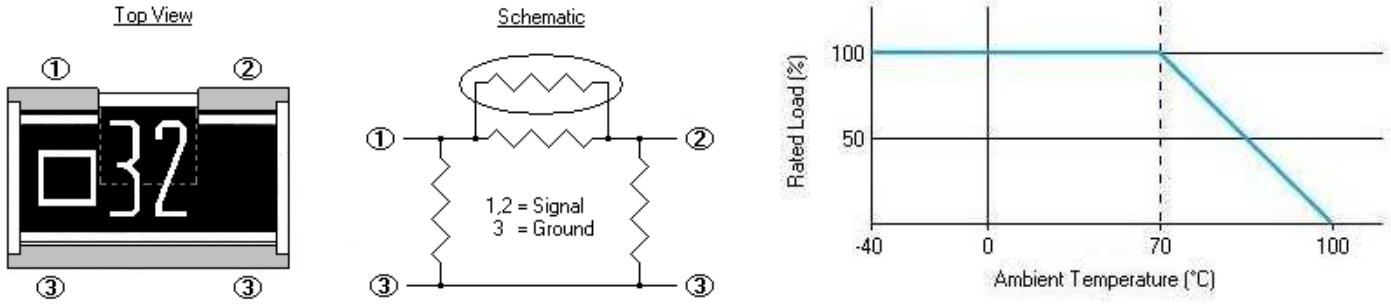
- 0805 English case size
- 63mW power rating
- Attenuation values between 1 and 6dB
- Attenuation tolerance to ±0.5dB
- DC to 10GHz
- High volume production suitable for commercial and special applications

The ATV0805J series of 10GHz temperature variable attenuators utilizes a temperature-sensitive thermistor to control attenuation change over temperature. These are useful in replacing temperature compensation circuits and can simplify auto gain control (AGC) and circuit design in power amplification devices resulting in reduced design time, reduced board space and cost savings due to the reduced number of components required for these control circuits.

Product Dimensions:



Schematic and Derating Curve:



ATV Series Part Numbering: Ex: ATV0805J-03DBN1

Product Designator	English Size	Frequency	Attenuation Value	Temperature Characteristic
ATV	0805	J = 10 GHz	**- 01DB** = 1dB, **- 02DB** = 2dB, **- 03DB** = 3dB, **- 04DB** = 4dB, **- 05DB** = 5dB, **- 06DB** = 6dB	Refer to electrical tables **N1, N2, N3**

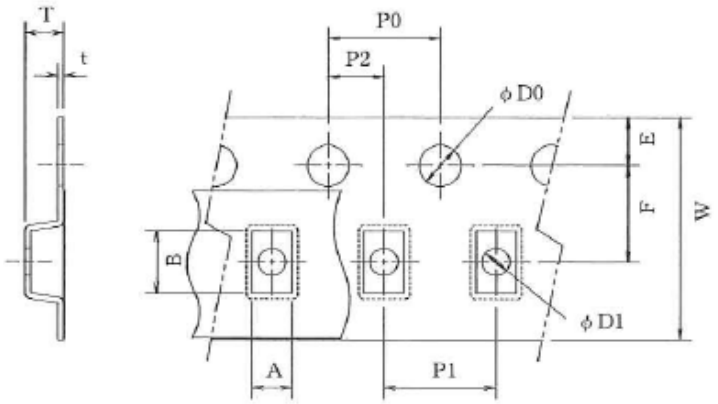
Electrical Specifications:

Type	ATV0805J
English Size	0805
Metric Size	2012
Attenuation (at 25°C)	1, 2, 3, 4, 5, 6dB
Attenuation Tolerance (at 25°C)	±0.5dB (DC to 3GHz) ±1.0dB (3GHz to 10GHz)
Impedance	50Ω
VSWR	Less than 1.3 (Refer to VSWR temperature table)
Temperature Characteristic	Each attenuation has either 2 or 3 available temperature characteristics, N1 ~ N3. (Refer to temperature characteristic graphs)
Frequency Range	DC to 3 GHz
Power Rating	63mW (refer to derating curve)
Operating Temperature Range	-40°C to 100°C
Rated Ambient Temperature	70°C
Packaging	Tape & Reel (1,000 pcs/reel)

Reliability Specifications:

Test	Test Method	Specification	
		Attenuation	Impedance
Short Time Overload	Applied voltage: 2.5X rated voltage or 2X maximum operating voltage, whichever is less. Test duration: 5 seconds	±0.1dB	±1%
Load Life	Test Temperature: 70°C Applied voltage: rated voltage Test period: 1000 hours with power cycling as follows: 90 min. power ON/30 min. power OFF,	±0.2dB	±2%
Moisture Load Life	Test Condition: 60°C/90-95% RH Applied voltage: rated voltage Test period: 1000 hours with power cycling as follows: 90 min. power ON/30 min. power OFF	±0.2dB	±2%
Temperature Cycle	Repeat 5 cycles as follows: -40°C(30 min.) / Room temp (3 min) / +100°C(30 min.) / Room temp (3 min)	±0.1dB	±1%
Resistance to Soldering Heat	Solder dip at 260°C for 10 seconds	±0.1dB	±1%
Vibration	Sine Wave: 10~55Hz, Amplitude 1.5mm, Sweeping condition: 10~55Hz-10Hz/minute added amplitude time: XYZ each 2 hours	±0.1dB	±1%
Solderability	Solder dip at 245°C for 3 seconds	A new uniform coating of solder shall cover a minimum of 95% of immersed surface.	

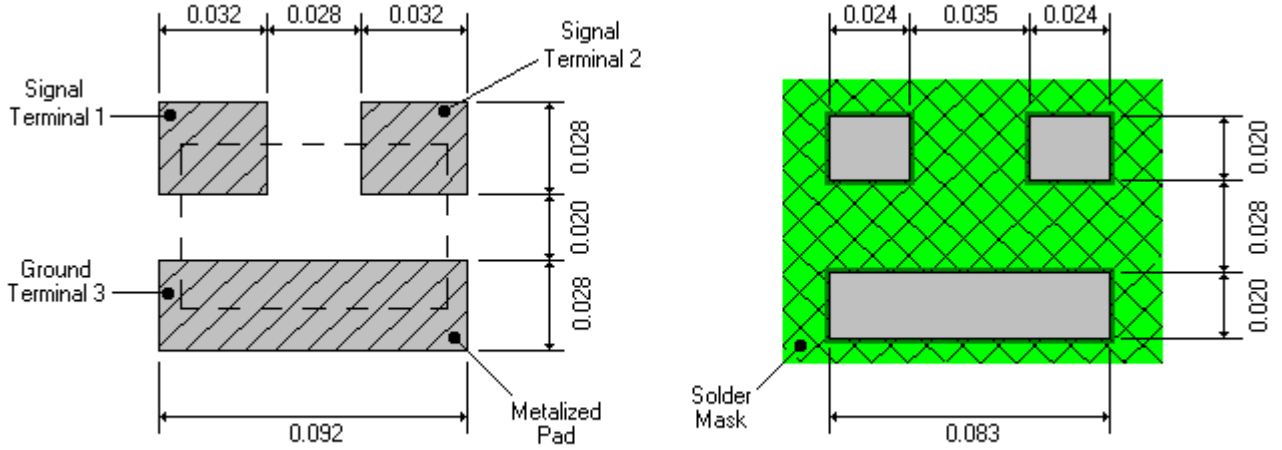
Tape and Reel Dimensions:



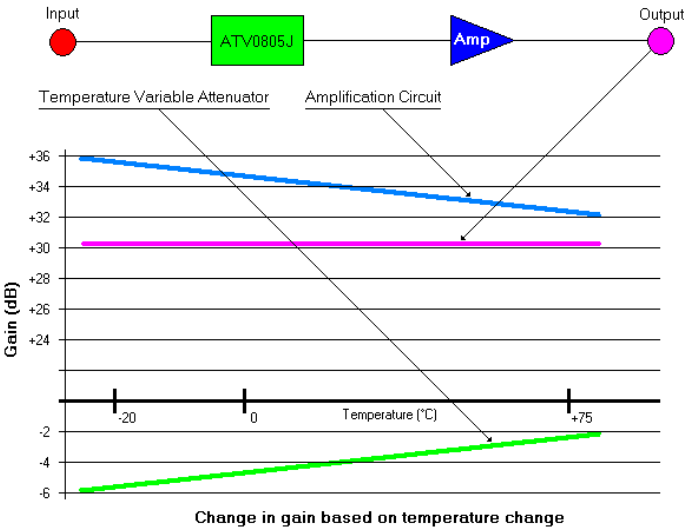
Symbol	Dimensions (mm)
A	1.45 ±0.1
B	2.3 ±0.1
W	8.0 ±0.1
F	3.5 ±0.05
E	1.75 ±0.1
T	1.3 ±0.2

Symbol	Dimensions (mm)
P_0	4.0 ±0.1
P_1	4.0 ±0.1
P_2	2.0 ±0.05
D_0	1.5 +0.1/-0
D_1	1.0 +0.2/-0
t	0.25 ±0.05

Recommended Land Pattern:



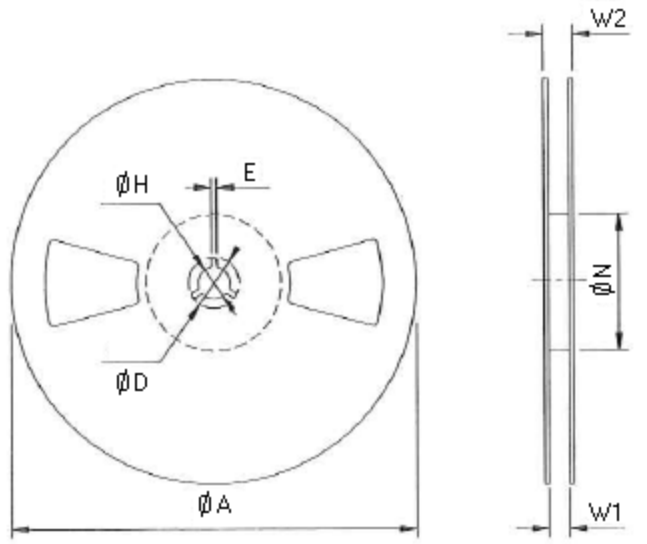
Compensation Example:



Notes:

- The amplifiers output gain is reduced as the temperature rises. This is represented by the blue line in the chart to the left.
- The temperature variable attenuators output attenuation is reduced as the temperature rises. This is represented by the green line in the chart to the left.
- Placing the proper temperature variable attenuator in series with the amplification circuit allows the gain reduction of the amplifier to be offset by the attenuation reduction of the attenuator, resulting in a stable output. This is represented by the pink line in the chart to the left.

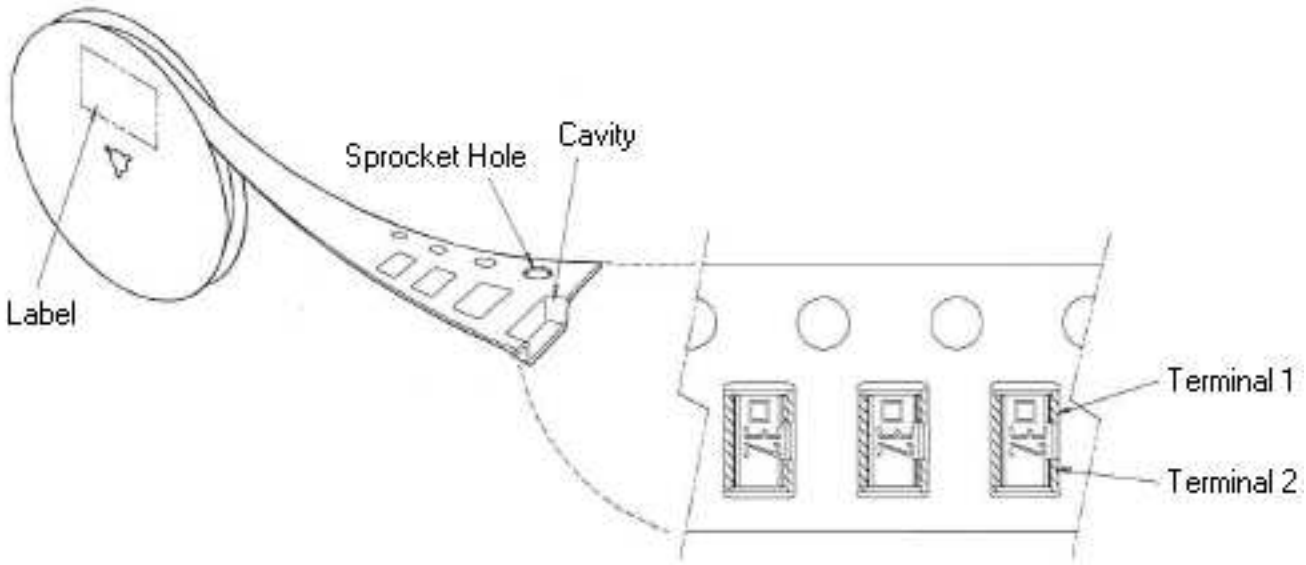
Reel Dimensions:



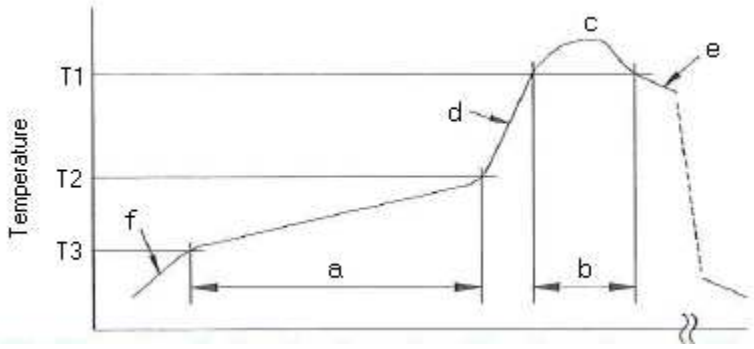
Dimension	Specification (mm)
A	180 +0/-3
N	60 +0/-1
W1	9.0 ±0.3
W2	13.0 ±1.4
D	21.0 ±0.8
H	13.0 ±0.2
E	2.0 ±0.5

Material : Plastic

Taping Orientation:



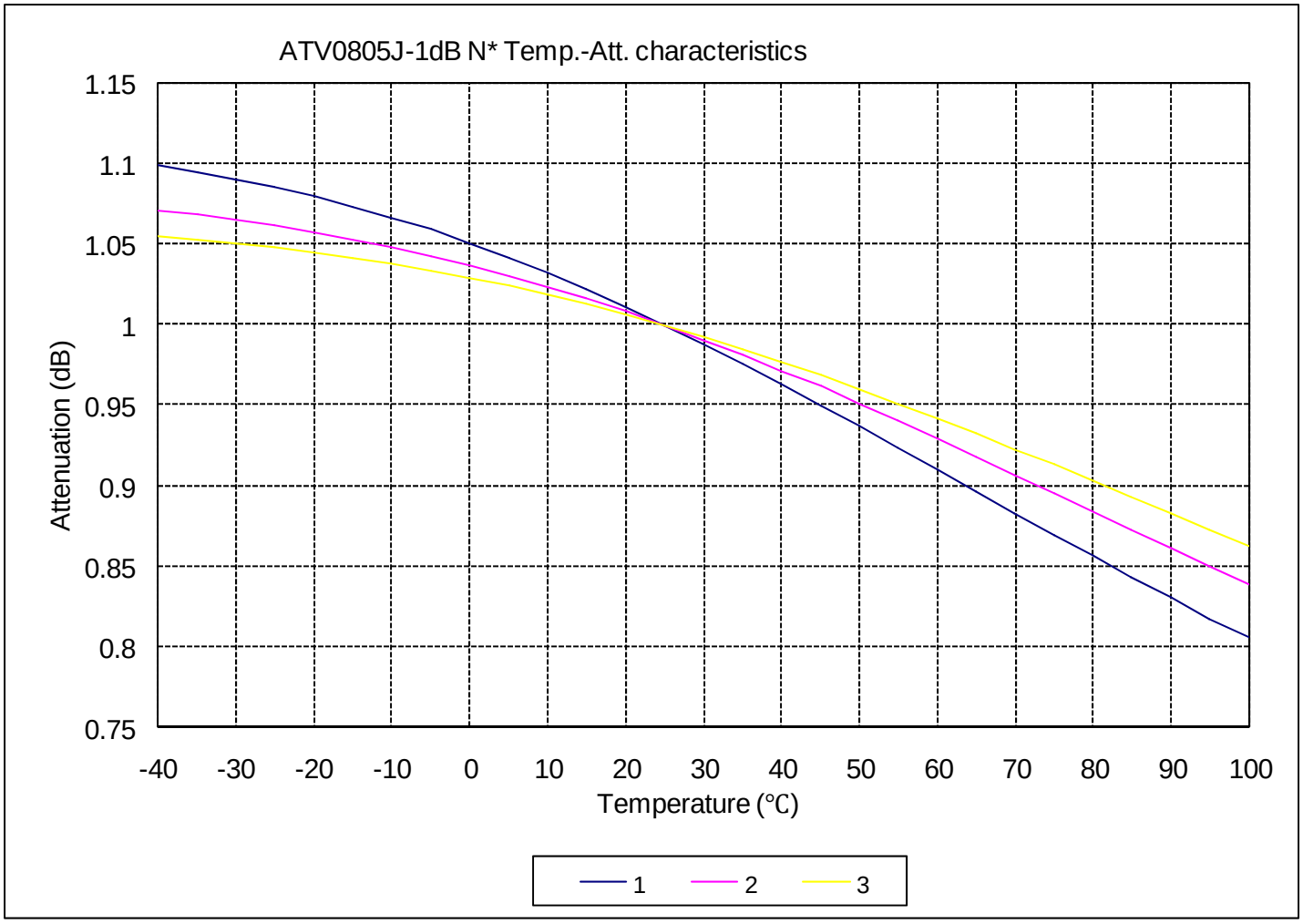
Recommended Reflow:



Parameter	Specification
T1	200°C
T2	140 ~ 170°C
T3	130 ±10°C
a (pre-heating)	40~150 seconds
b (heating)	10~60 seconds
c (peak)	Less than 250°C
d (change)	Less than 10°C/second
e (change)	Less than 8°C/second
f (change)	1~3°C/second

Note: Up to two reflows are allowed by recommended profile

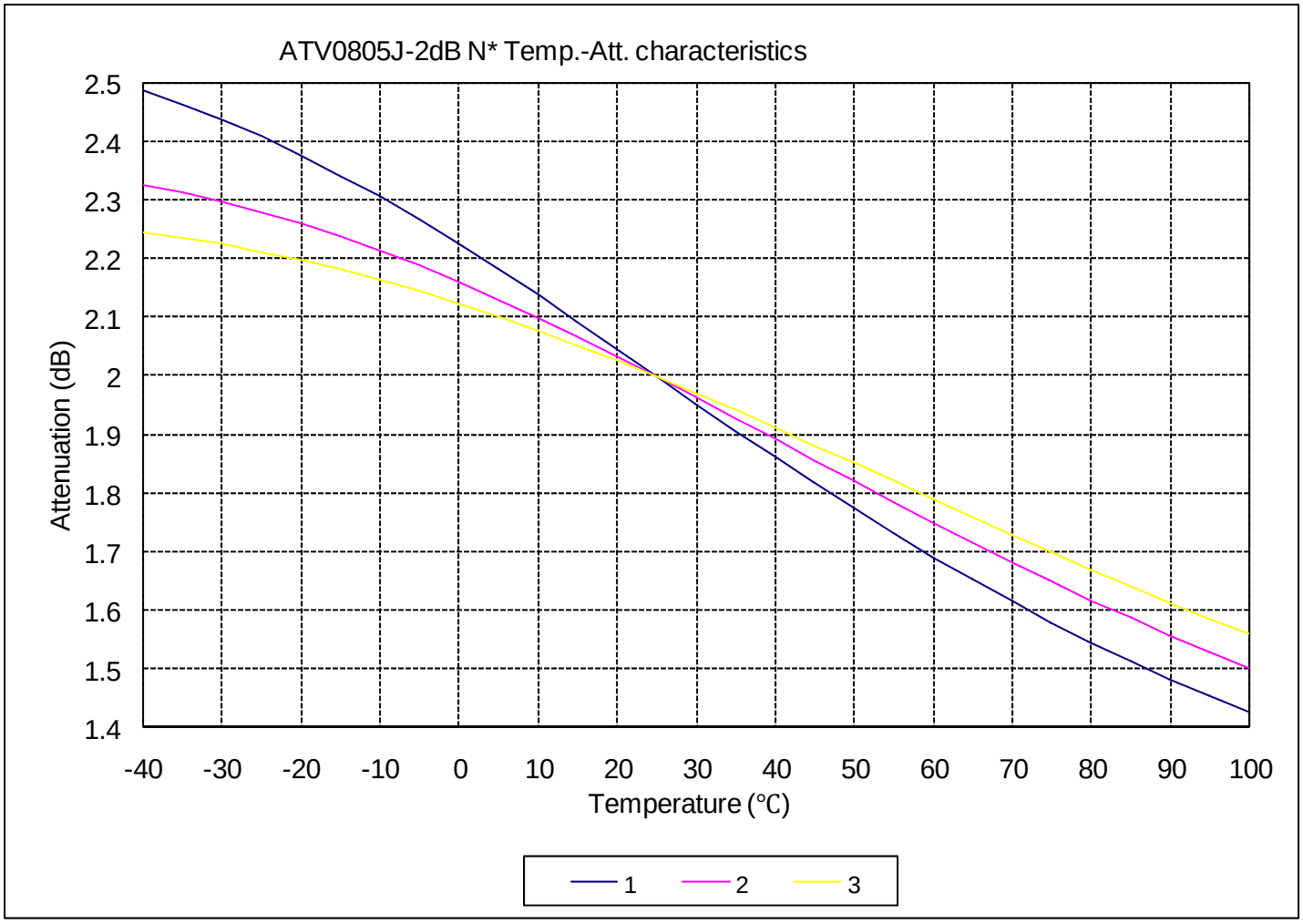
Temperature Characteristics - 1dB Product:



Attenuation at temperature (1dB Product)

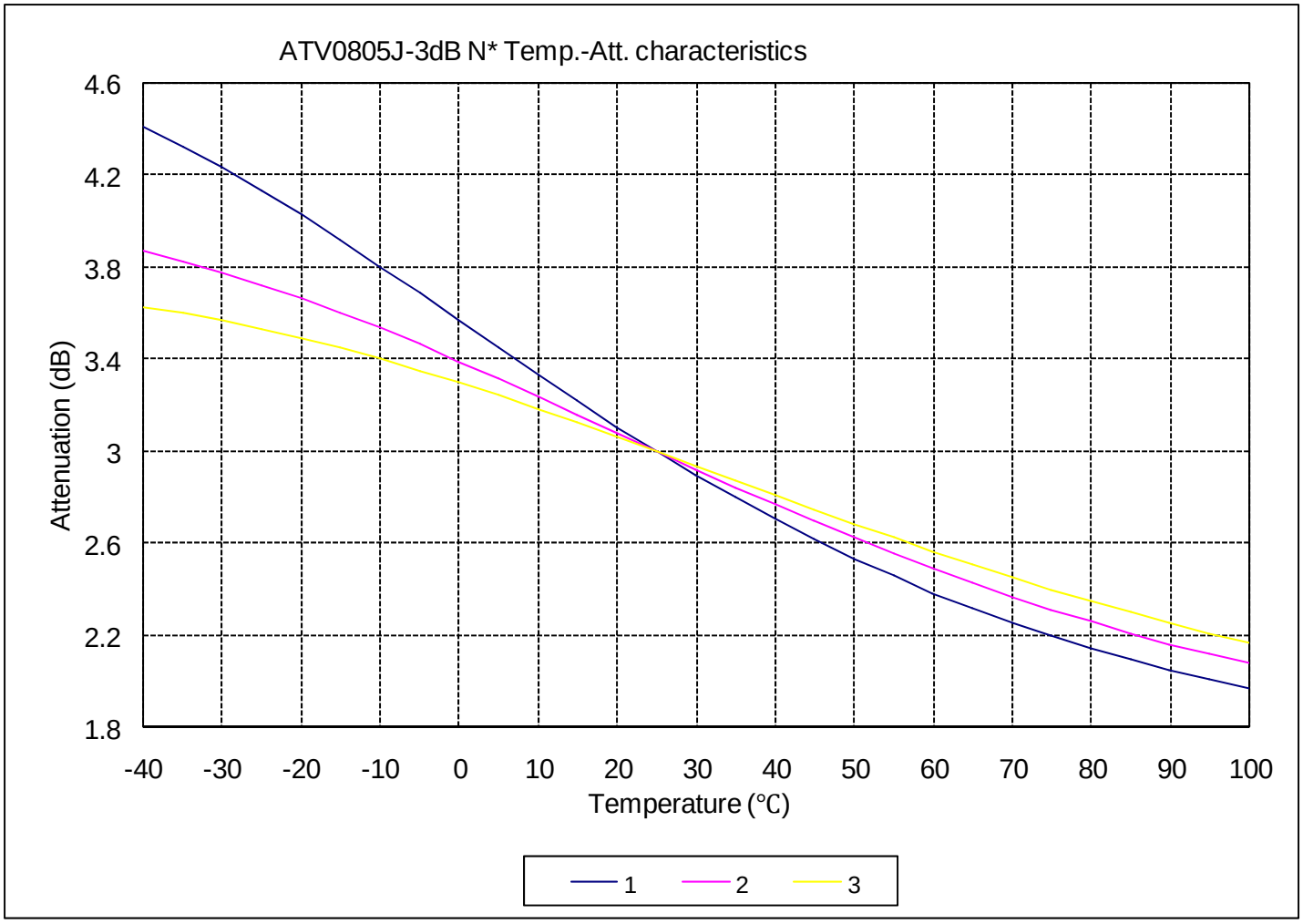
	N1	N2	N3
Temperature (°C)	Att. (dB)	Att. (dB)	Att. (dB)
-40	1.099	1.071	1.056
-35	1.095	1.068	1.053
-30	1.091	1.065	1.051
-25	1.086	1.062	1.048
-20	1.080	1.058	1.045
-15	1.074	1.054	1.042
-10	1.067	1.049	1.038
-5	1.059	1.043	1.034
0	1.051	1.037	1.029
5	1.042	1.031	1.024
10	1.032	1.024	1.019
15	1.022	1.016	1.013
20	1.011	1.008	1.007
25	1.000	1.000	1.000
30	0.988	0.991	0.993
35	0.976	0.982	0.985
40	0.963	0.972	0.977
45	0.950	0.962	0.969
50	0.937	0.951	0.960
55	0.924	0.941	0.951
60	0.910	0.930	0.942
65	0.897	0.918	0.933
70	0.883	0.907	0.923
75	0.870	0.896	0.913
80	0.856	0.884	0.903
85	0.843	0.873	0.893
90	0.830	0.861	0.883
95	0.818	0.850	0.873
100	0.805	0.839	0.862

Temperature Characteristics - 2dB Product:



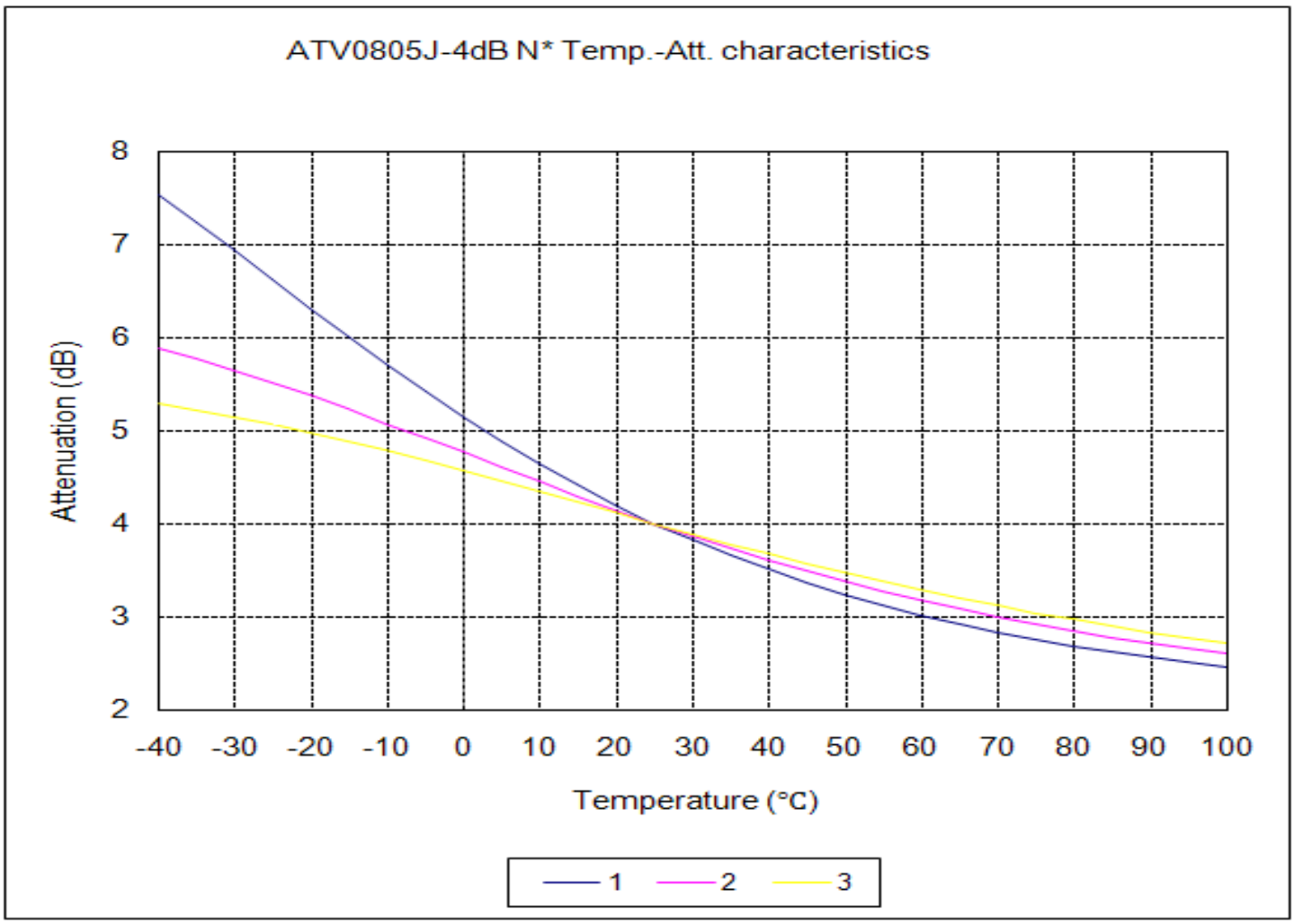
	N1	N2	N3
Temperature (°C)	Att. (dB)	Att. (dB)	Att. (dB)
-40	2.488	2.328	2.247
-35	2.465	2.314	2.237
-30	2.439	2.298	2.226
-25	2.410	2.280	2.213
-20	2.378	2.260	2.199
-15	2.344	2.238	2.183
-10	2.307	2.215	2.165
-5	2.268	2.189	2.146
0	2.226	2.161	2.125
5	2.183	2.132	2.103
10	2.138	2.101	2.079
15	2.093	2.068	2.054
20	2.047	2.035	2.027
25	2.000	2.000	2.000
30	1.953	1.965	1.972
35	1.907	1.929	1.942
40	1.862	1.893	1.912
45	1.817	1.857	1.882
50	1.774	1.821	1.852
55	1.732	1.785	1.821
60	1.691	1.750	1.790
65	1.652	1.716	1.759
70	1.615	1.682	1.729
75	1.579	1.649	1.699
80	1.545	1.617	1.670
85	1.513	1.587	1.641
90	1.482	1.557	1.613
95	1.453	1.529	1.586
100	1.426	1.502	1.560

Temperature Characteristics - 3dB Product:



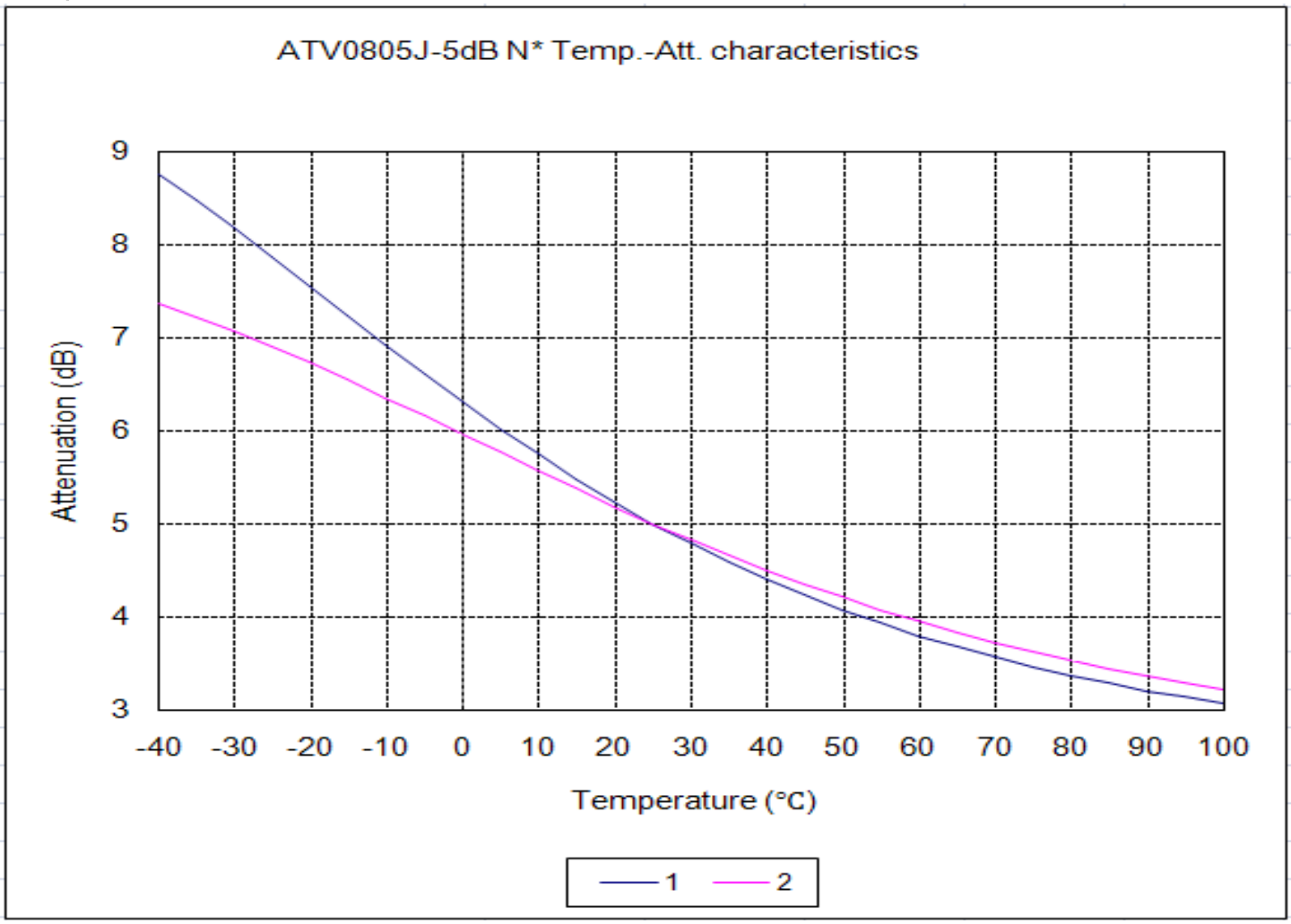
	N1	N2	N3
Temperature (°C)	Att. (dB)	Att. (dB)	Att. (dB)
-40	4.415	3.871	3.629
-35	4.330	3.827	3.600
-30	4.237	3.779	3.568
-25	4.137	3.725	3.532
-20	4.031	3.667	3.493
-15	3.920	3.604	3.450
-10	3.805	3.537	3.403
-5	3.688	3.466	3.353
0	3.569	3.392	3.299
5	3.451	3.316	3.243
10	3.334	3.238	3.185
15	3.219	3.159	3.125
20	3.108	3.079	3.063
25	3.000	3.000	3.000
30	2.897	2.921	2.936
35	2.799	2.844	2.873
40	2.705	2.769	2.809
45	2.618	2.695	2.747
50	2.535	2.624	2.685
55	2.458	2.556	2.624
60	2.385	2.491	2.566
65	2.318	2.429	2.508
70	2.255	2.370	2.453
75	2.197	2.313	2.400
80	2.144	2.260	2.349
85	2.094	2.210	2.300
90	2.047	2.163	2.254
95	2.005	2.119	2.209
100	1.965	2.077	2.167

Temperature Characteristics - 4dB Product:



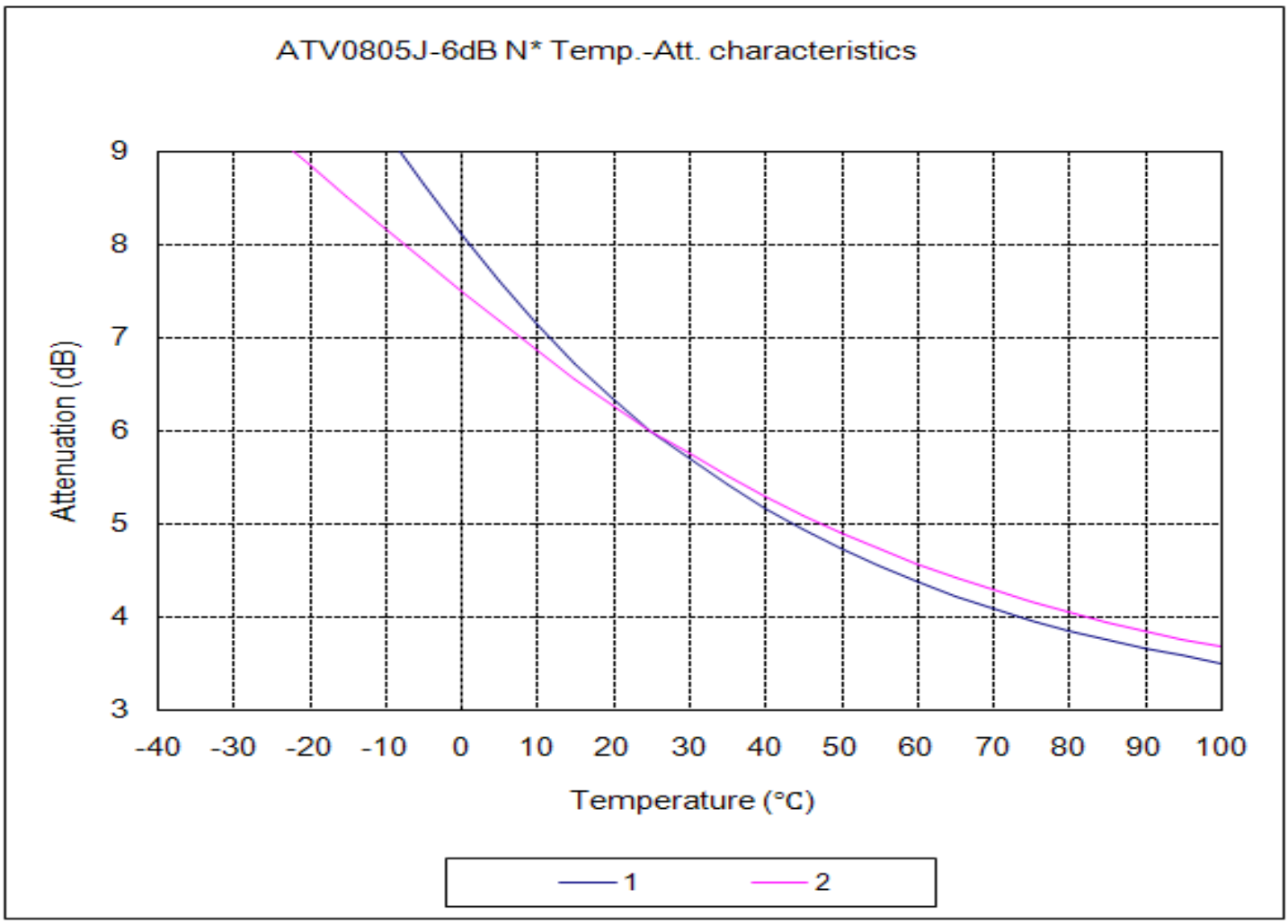
Temperature (°C)	N1 Att. (dB)	N2 Att. (dB)	N3 Att. (dB)
-40	7.522	5.879	5.284
-35	7.231	5.767	5.218
-30	6.930	5.645	5.144
-25	6.623	5.513	5.064
-20	6.314	5.373	4.976
-15	6.009	5.226	4.882
-10	5.711	5.074	4.783
-5	5.422	4.918	4.678
0	5.145	4.761	4.569
5	4.885	4.603	4.458
10	4.639	4.447	4.344
15	4.410	4.294	4.229
20	4.197	4.144	4.114
25	4.000	4.000	4.000
30	3.819	3.861	3.888
35	3.653	3.729	3.778
40	3.501	3.603	3.671
45	3.362	3.484	3.567
50	3.235	3.372	3.468
55	3.120	3.267	3.372
60	3.015	3.169	3.282
65	2.919	3.077	3.195
70	2.832	2.992	3.113
75	2.753	2.913	3.036
80	2.681	2.839	2.963
85	2.616	2.771	2.894
90	2.555	2.707	2.830
95	2.501	2.649	2.770
100	2.452	2.594	2.713

Temperature Characteristics - 5dB Product:



Temperature (°C)	N1 Att. (dB)	N2 Att. (dB)
-40	8.747	7.356
-35	8.466	7.216
-30	8.170	7.063
-25	7.863	6.898
-20	7.549	6.723
-15	7.233	6.540
-10	6.918	6.349
-5	6.609	6.155
0	6.308	5.957
5	6.018	5.760
10	5.741	5.563
15	5.479	5.370
20	5.232	5.182
25	5.000	5.000
30	4.784	4.825
35	4.584	4.657
40	4.399	4.498
45	4.228	4.347
50	4.071	4.205
55	3.927	4.071
60	3.794	3.946
65	3.673	3.829
70	3.562	3.720
75	3.460	3.619
80	3.367	3.524
85	3.282	3.437
90	3.204	3.356
95	3.132	3.280
100	3.066	3.210

Temperature Characteristics - 6dB Product:



Temperature (°C)	N1 Att. (dB)	N2 Att. (dB)
-40	13.622	10.131
-35	12.817	9.836
-30	12.031	9.523
-25	11.274	9.195
-20	10.553	8.858
-15	9.872	8.515
-10	9.235	8.171
-5	8.643	7.829
0	8.098	7.494
5	7.596	7.168
10	7.138	6.854
15	6.721	6.554
20	6.343	6.269
25	6.000	6.000
30	5.690	5.748
35	5.410	5.512
40	5.158	5.292
45	4.930	5.088
50	4.725	4.899
55	4.540	4.725
60	4.373	4.565
65	4.222	4.417
70	4.086	4.281
75	3.963	4.156
80	3.851	4.041
85	3.750	3.936
90	3.659	3.838
95	3.578	3.749
100	3.500	3.667