

High Frequency Thin Film SMT Temperature Variable Attenuator (TVA)

Suitable for most applications up to 20GHz, the AV-0607 series of TVA's are characterized by the behavior of decreased attenuation (increased gain) with increased temperature. TVA's are used in applications to passively correct temperature related gain compensation issues with reduced signal distortion, phase change, and intermodulation compared to active compensation techniques. Applications may include radar, satcom, circulators, mixers, LNA's, and more.

FEATURES

- Low noise thin film construction
- Up to 200mW power dissipation
- 99.5% Al₂O₃ substrate
- Nickel Barrier w/ 100% matte tin finish
- Well defined TCA from -40°C to + 125°C

APPLICATIONS

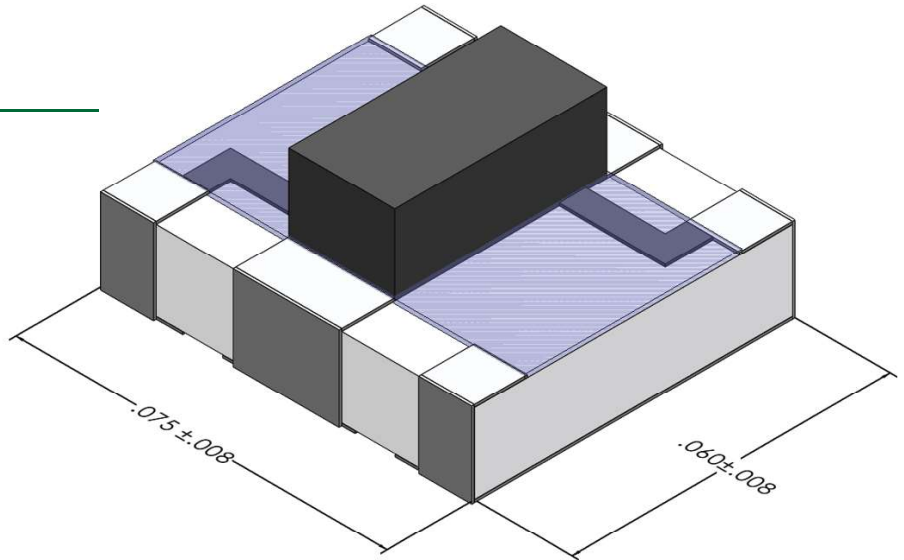
- RF power amplifiers
- Multiband communication
- Broadcast systems

DIMENSIONS

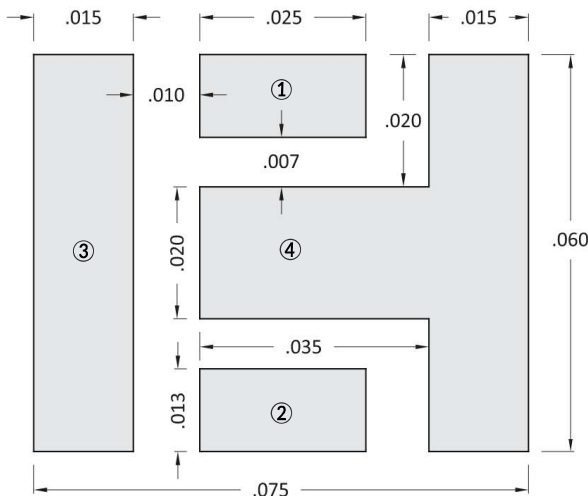
| PART | LENGTH | WIDTH | HEIGHT |
|-----------|-------------|-------------|------------|
| AV-0607-C | .060 ± .008 | .075 ± .008 | .043 (max) |

SPECIFICATIONS

| ITEM | SPECIFICATION |
|------------------------------|---|
| Standard Impedance: | 50Ω Nominal |
| dB Value Range: | 2dB - 9dB |
| N Value Range: | 1 - 8 (varies by Atn value) |
| Available Configurations: | See ordering info |
| Power Rating (*70C Free Air) | 160mW - 200mW |
| Attachment Method: | Solder |
| Operating Temperature: | -55° to 125° C |
| Storage Temperature: | -65° to 150° C |
| End Of Life: | No E.O.L. Planned |
| Moisture Level: | Level 1 |
| Attenuation Accuracy @25°C: | DC - 15Ghz: ± 1dB 15 - 20Ghz: ± 1.5dB 20 - 24Ghz: ± 1.8dB |
| VSWR (Typical) @ 25°C: | DC - 20Ghz: ≤ 1.5:1 20 - 24Ghz: ≤ 1.8:1 |

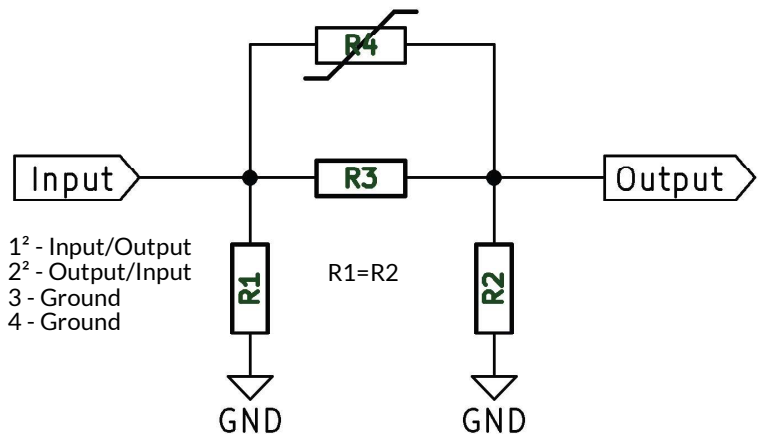


TERMINAL DIMENSIONS¹ & FUNCTION



1 - All dimensions in inches
2 - Device is electrically symmetrical

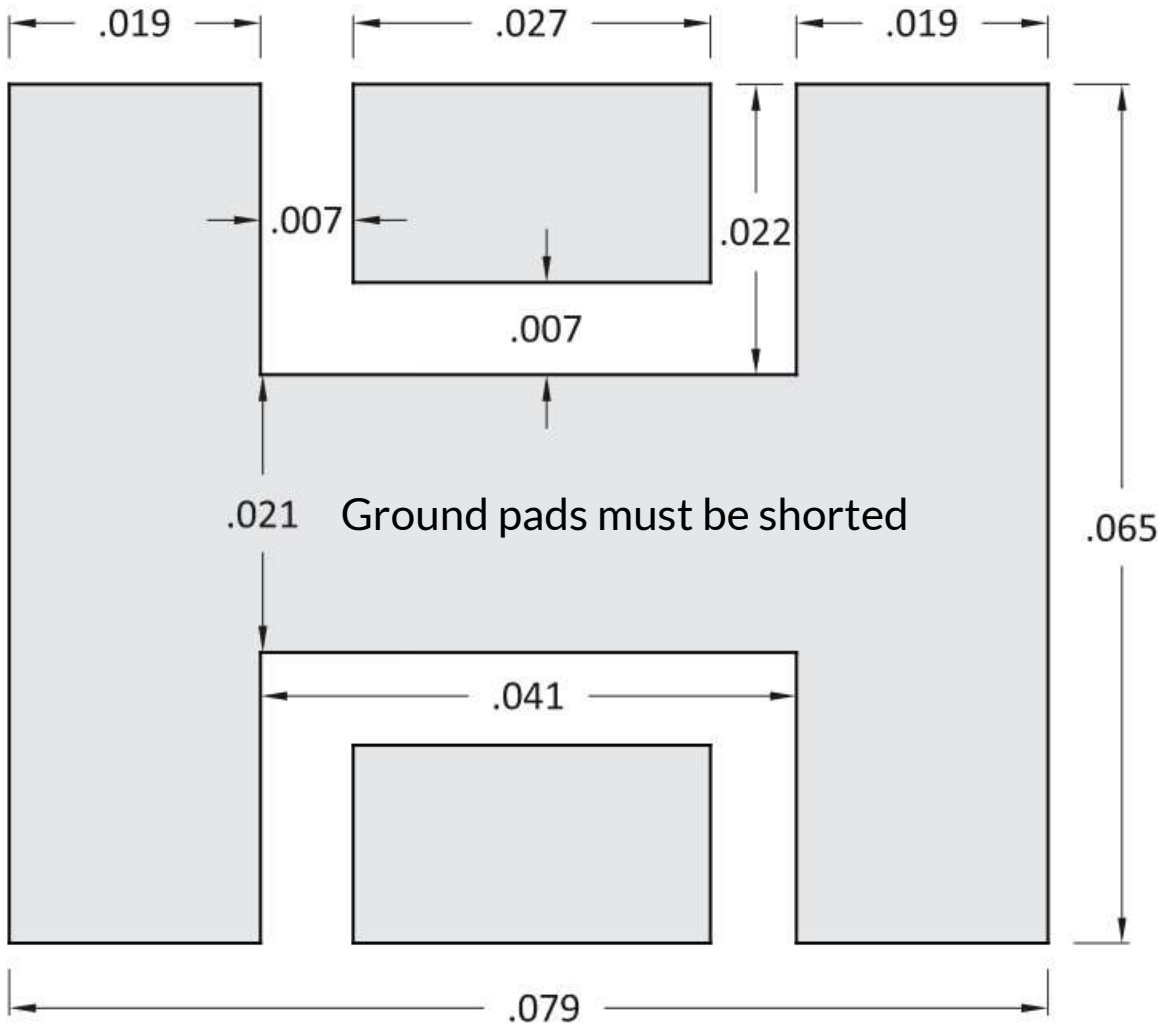
EQUIVALENT CIRCUIT DIAGRAM



1² - Input/Output
2² - Output/Input
3 - Ground
4 - Ground

R1=R2

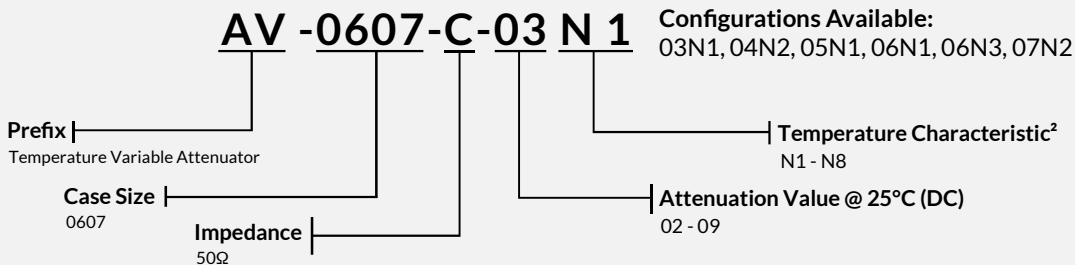
PCB LANDING EXAMPLE¹



1 - All dimensions in inches

ORDERING INFORMATION

Example: 0607 case size, 3dB @25°C, N1 temperature variable attenuator



2 - Temperature sensitivity decreases with increasing N value. N1 attenuation will decrease more than N9 for each °C increase. Contact your IMS Sales representative to request an evaluation of additional configuration requirements

For packaging options please visit our website www.ims-resistors.com/packaging

TEMPERATURE CHARACTERISTIC OF ATTENUATION (TCA)

$$TCA = \frac{S21_T - S21_{25^\circ C}}{(T - 25) * S21_{25^\circ C}} \frac{dB}{^\circ C}$$

- TCA - Temperature Coefficient of Attenuation in dB/°C
- T - Temperature during measurement or operation
- S21_T - Attenuation at Temperature T
- S21_{25°C} - Reference attenuation at 25°C

Designers may find it useful to solve the above formula to estimate attenuation at a target temperature (S21_T) as a function of a known TCA at some known or interpolated operating frequency, as well as the known attenuation at room temperature for a given part.

$$S21_T = S21_{25^\circ C} (TCA * T - 25 * TCA + 1) dB$$

TEMPERATURE CHARACTERISTIC OF ATTENUATION (TCA)

| 03N1 | | 0.01Ghz | 2 Ghz | 4 Ghz | 6 Ghz | 8 Ghz | 10 Ghz | 12 Ghz | 14 Ghz | 16 Ghz | 18 Ghz | 20 Ghz |
|-------------|-------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|
| Temperature | -40°C | -0.0043 | -0.0039 | -0.0036 | -0.0033 | -0.0032 | -0.0030 | -0.0029 | -0.0028 | -0.0025 | -0.0021 | -0.0016 |
| | -25°C | -0.0048 | -0.0042 | -0.0040 | -0.0037 | -0.0035 | -0.0034 | -0.0032 | -0.0031 | -0.0028 | -0.0023 | -0.0018 |
| | 0°C | -0.0052 | -0.0046 | -0.0043 | -0.0040 | -0.0039 | -0.0037 | -0.0036 | -0.0034 | -0.0030 | -0.0025 | -0.0018 |
| | 50°C | -0.0050 | -0.0041 | -0.0038 | -0.0033 | -0.0032 | -0.0030 | -0.0026 | -0.0023 | -0.0018 | -0.0014 | -0.0006 |
| | 75°C | -0.0047 | -0.0038 | -0.0035 | -0.0031 | -0.0029 | -0.0027 | -0.0024 | -0.0021 | -0.0016 | -0.0011 | -0.0004 |
| | 100°C | -0.0042 | -0.0035 | -0.0031 | -0.0028 | -0.0026 | -0.0024 | -0.0022 | -0.0019 | -0.0015 | -0.0010 | -0.0004 |
| | 125°C | -0.0037 | -0.0031 | -0.0027 | -0.0024 | -0.0023 | -0.0021 | -0.0019 | -0.0016 | -0.0013 | -0.0008 | -0.0001 |

| 04N2 | | 0.01Ghz | 2 Ghz | 4 Ghz | 6 Ghz | 8 Ghz | 10 Ghz | 12 Ghz | 14 Ghz | 16 Ghz | 18 Ghz | 20 Ghz |
|-------------|-------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|
| Temperature | -40°C | -0.0046 | -0.0045 | -0.0043 | -0.0041 | -0.0041 | -0.0041 | -0.0041 | -0.0041 | -0.0038 | -0.0036 | -0.0035 |
| | -25°C | -0.0051 | -0.0050 | -0.0047 | -0.0045 | -0.0045 | -0.0045 | -0.0046 | -0.0045 | -0.0042 | -0.0039 | -0.0038 |
| | 0°C | -0.0057 | -0.0056 | -0.0053 | -0.0051 | -0.0051 | -0.0051 | -0.0052 | -0.0052 | -0.0047 | -0.0044 | -0.0044 |
| | 50°C | -0.0054 | -0.0049 | -0.0047 | -0.0044 | -0.0044 | -0.0044 | -0.0044 | -0.0041 | -0.0039 | -0.0035 | -0.0028 |
| | 75°C | -0.0049 | -0.0044 | -0.0041 | -0.0038 | -0.0038 | -0.0039 | -0.0038 | -0.0034 | -0.0032 | -0.0028 | -0.0021 |
| | 100°C | -0.0044 | -0.0039 | -0.0036 | -0.0034 | -0.0034 | -0.0034 | -0.0033 | -0.0031 | -0.0029 | -0.0025 | -0.0019 |
| | 125°C | -0.0039 | -0.0034 | -0.0032 | -0.0030 | -0.0030 | -0.0030 | -0.0029 | -0.0027 | -0.0025 | -0.0021 | -0.0015 |

| 05N1 | | 0.01Ghz | 2 Ghz | 4 Ghz | 6 Ghz | 8 Ghz | 10 Ghz | 12 Ghz | 14 Ghz | 16 Ghz | 18 Ghz | 20 Ghz |
|-------------|-------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|
| Temperature | -40°C | -0.0109 | -0.0105 | -0.0099 | -0.0090 | -0.0081 | -0.0073 | -0.0064 | -0.0054 | -0.0042 | -0.0029 | -0.0017 |
| | -25°C | -0.0110 | -0.0104 | -0.0099 | -0.0091 | -0.0083 | -0.0075 | -0.0066 | -0.0057 | -0.0044 | -0.0032 | -0.0020 |
| | 0°C | -0.0103 | -0.0096 | -0.0091 | -0.0085 | -0.0079 | -0.0073 | -0.0066 | -0.0058 | -0.0046 | -0.0034 | -0.0022 |
| | 50°C | -0.0077 | -0.0069 | -0.0066 | -0.0063 | -0.0060 | -0.0057 | -0.0054 | -0.0048 | -0.0041 | -0.0032 | -0.0022 |
| | 75°C | -0.0063 | -0.0057 | -0.0054 | -0.0051 | -0.0049 | -0.0047 | -0.0044 | -0.0040 | -0.0034 | -0.0027 | -0.0019 |
| | 100°C | -0.0053 | -0.0047 | -0.0045 | -0.0042 | -0.0041 | -0.0039 | -0.0037 | -0.0033 | -0.0028 | -0.0022 | -0.0015 |
| | 125°C | -0.0045 | -0.0040 | -0.0037 | -0.0035 | -0.0034 | -0.0033 | -0.0030 | -0.0027 | -0.0023 | -0.0018 | -0.0012 |

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TEMPERATURE CHARACTERISTIC OF ATTENUATION (TCA)

| 06N1 | | 0.01Ghz | 2 Ghz | 4 Ghz | 6 Ghz | 8 Ghz | 10 Ghz | 12 Ghz | 14 Ghz | 16 Ghz | 18 Ghz | 20 Ghz |
|-------------|-------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|
| Temperature | -40°C | -0.0196 | -0.0179 | -0.0162 | -0.0145 | -0.0132 | -0.0120 | -0.0110 | -0.0099 | -0.0088 | -0.0081 | -0.0073 |
| | -25°C | -0.0180 | -0.0167 | -0.0154 | -0.0142 | -0.0132 | -0.0122 | -0.0114 | -0.0105 | -0.0095 | -0.0088 | -0.0079 |
| | 0°C | -0.0148 | -0.0139 | -0.0133 | -0.0127 | -0.0123 | -0.0118 | -0.0115 | -0.0109 | -0.0100 | -0.0095 | -0.0089 |
| | 50°C | -0.0089 | -0.0082 | -0.0079 | -0.0077 | -0.0078 | -0.0078 | -0.0077 | -0.0075 | -0.0073 | -0.0070 | -0.0063 |
| | 75°C | -0.0071 | -0.0065 | -0.0062 | -0.0061 | -0.0062 | -0.0062 | -0.0061 | -0.0060 | -0.0058 | -0.0056 | -0.0050 |
| | 100°C | -0.0058 | -0.0053 | -0.0050 | -0.0050 | -0.0050 | -0.0050 | -0.0050 | -0.0050 | -0.0049 | -0.0047 | -0.0042 |
| | 125°C | -0.0048 | -0.0044 | -0.0042 | -0.0041 | -0.0041 | -0.0041 | -0.0042 | -0.0041 | -0.0040 | -0.0039 | -0.0034 |

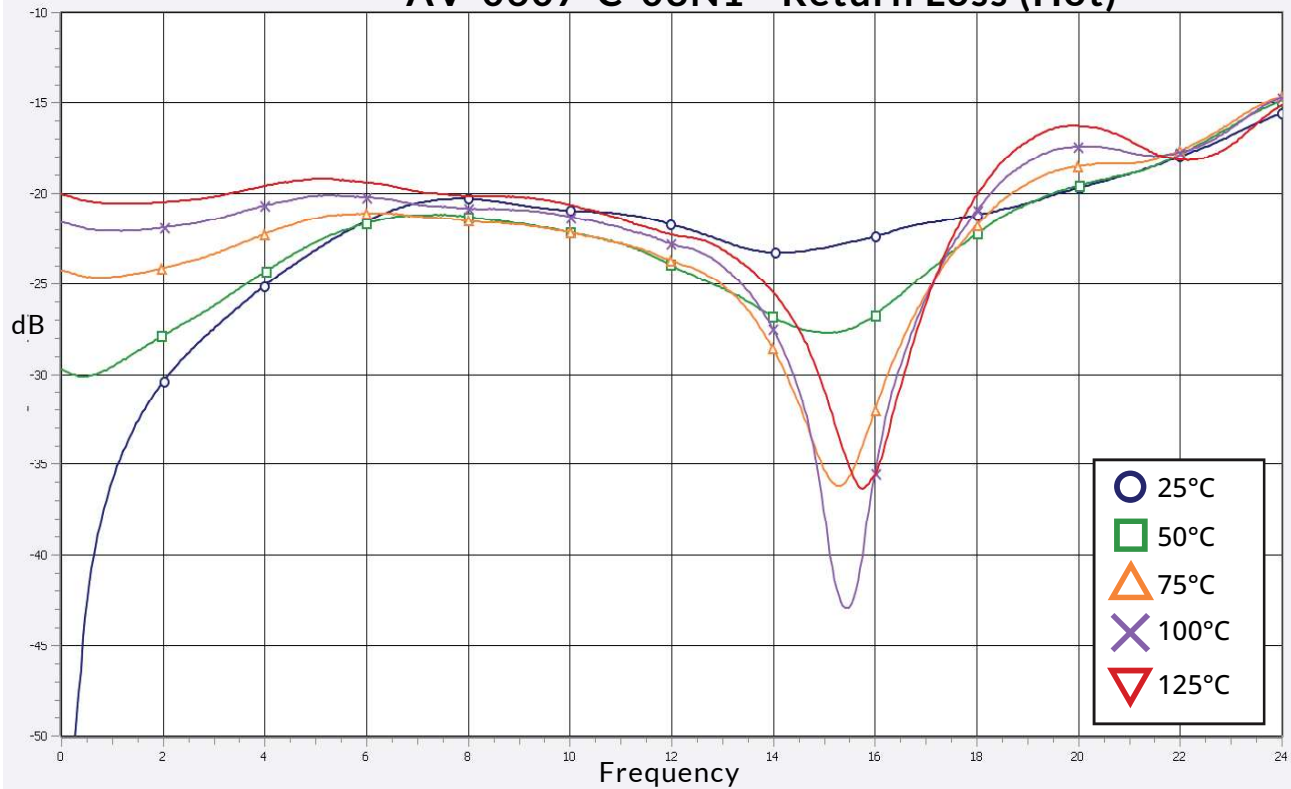
| 06N3 | | 0.01Ghz | 2 Ghz | 4 Ghz | 6 Ghz | 8 Ghz | 10 Ghz | 12 Ghz | 14 Ghz | 16 Ghz | 18 Ghz | 20 Ghz |
|-------------|-------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|
| Temperature | -40°C | -0.0058 | -0.0056 | -0.0054 | -0.0053 | -0.0053 | -0.0052 | -0.0052 | -0.0052 | -0.0050 | -0.0050 | -0.0050 |
| | -25°C | -0.0064 | -0.0061 | -0.0059 | -0.0058 | -0.0058 | -0.0057 | -0.0057 | -0.0057 | -0.0055 | -0.0055 | -0.0055 |
| | 0°C | -0.0072 | -0.0069 | -0.0066 | -0.0065 | -0.0066 | -0.0064 | -0.0065 | -0.0065 | -0.0062 | -0.0062 | -0.0063 |
| | 50°C | -0.0067 | -0.0064 | -0.0062 | -0.0061 | -0.0062 | -0.0061 | -0.0061 | -0.0061 | -0.0061 | -0.0059 | -0.0055 |
| | 75°C | -0.0054 | -0.0051 | -0.0049 | -0.0049 | -0.0050 | -0.0049 | -0.0049 | -0.0049 | -0.0049 | -0.0049 | -0.0044 |
| | 100°C | -0.0048 | -0.0046 | -0.0044 | -0.0043 | -0.0044 | -0.0044 | -0.0044 | -0.0044 | -0.0044 | -0.0043 | -0.0039 |
| | 125°C | -0.0042 | -0.0040 | -0.0038 | -0.0038 | -0.0039 | -0.0039 | -0.0039 | -0.0039 | -0.0039 | -0.0038 | -0.0035 |

| 07N2 | | 0.01Ghz | 2 Ghz | 4 Ghz | 6 Ghz | 8 Ghz | 10 Ghz | 12 Ghz | 14 Ghz | 16 Ghz | 18 Ghz | 20 Ghz |
|-------------|-------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|
| Temperature | -40°C | -0.0155 | -0.0147 | -0.0138 | -0.0127 | -0.0119 | -0.0111 | -0.0103 | -0.0097 | -0.0091 | -0.0086 | -0.0081 |
| | -25°C | -0.0148 | -0.0139 | -0.0132 | -0.0123 | -0.0116 | -0.0110 | -0.0103 | -0.0098 | -0.0092 | -0.0086 | -0.0080 |
| | 0°C | -0.0127 | -0.0119 | -0.0115 | -0.0110 | -0.0107 | -0.0104 | -0.0100 | -0.0096 | -0.0092 | -0.0087 | -0.0081 |
| | 50°C | -0.0085 | -0.0079 | -0.0077 | -0.0076 | -0.0076 | -0.0077 | -0.0076 | -0.0074 | -0.0074 | -0.0071 | -0.0066 |
| | 75°C | -0.0069 | -0.0064 | -0.0062 | -0.0061 | -0.0062 | -0.0062 | -0.0061 | -0.0060 | -0.0060 | -0.0058 | -0.0053 |
| | 100°C | -0.0056 | -0.0052 | -0.0051 | -0.0050 | -0.0051 | -0.0051 | -0.0050 | -0.0050 | -0.0050 | -0.0048 | -0.0044 |
| | 125°C | -0.0047 | -0.0044 | -0.0042 | -0.0041 | -0.0042 | -0.0042 | -0.0042 | -0.0041 | -0.0041 | -0.0040 | -0.0035 |

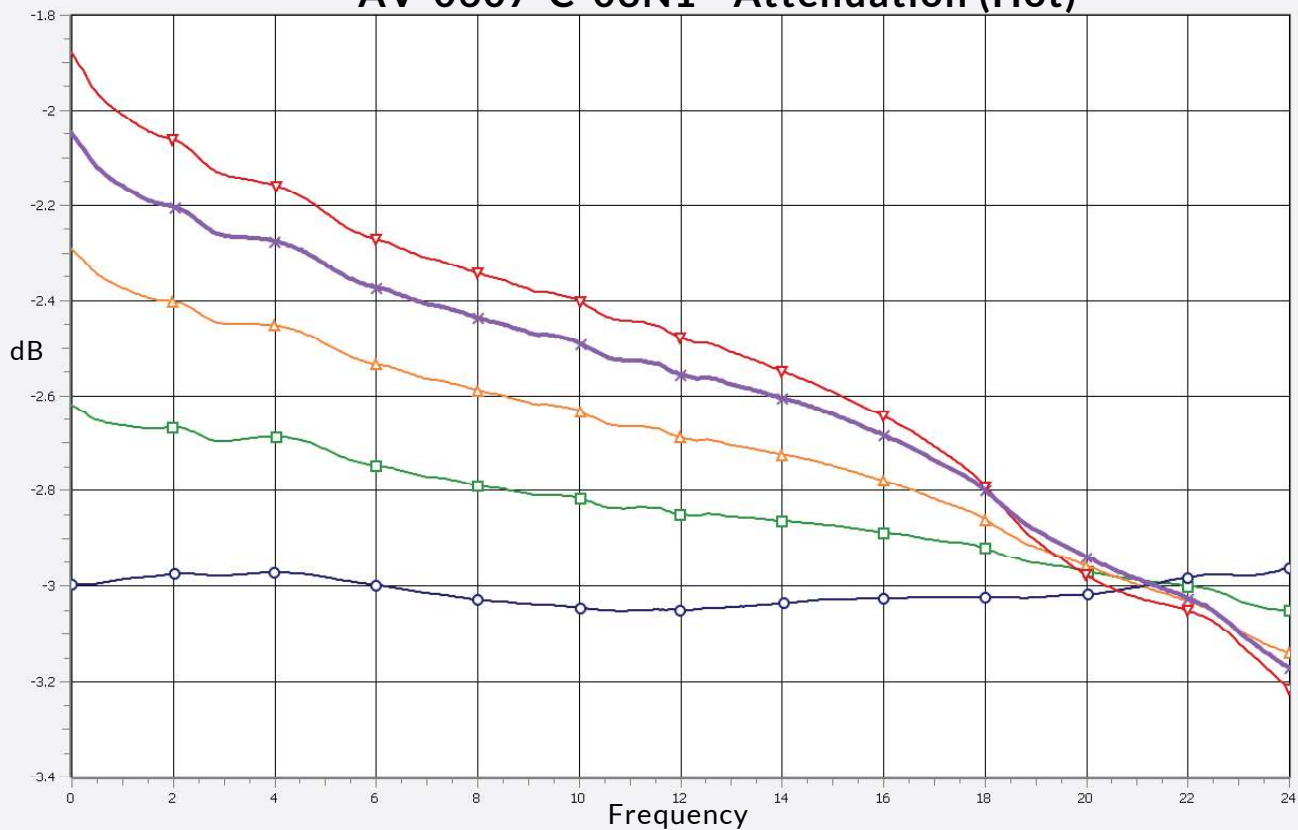
High Frequency Thin Film SMT Temperature Variable Attenuator (TVA)

TEMPERATURE CHARACTERISTIC DATA - 10MIL ROGERS 4350B

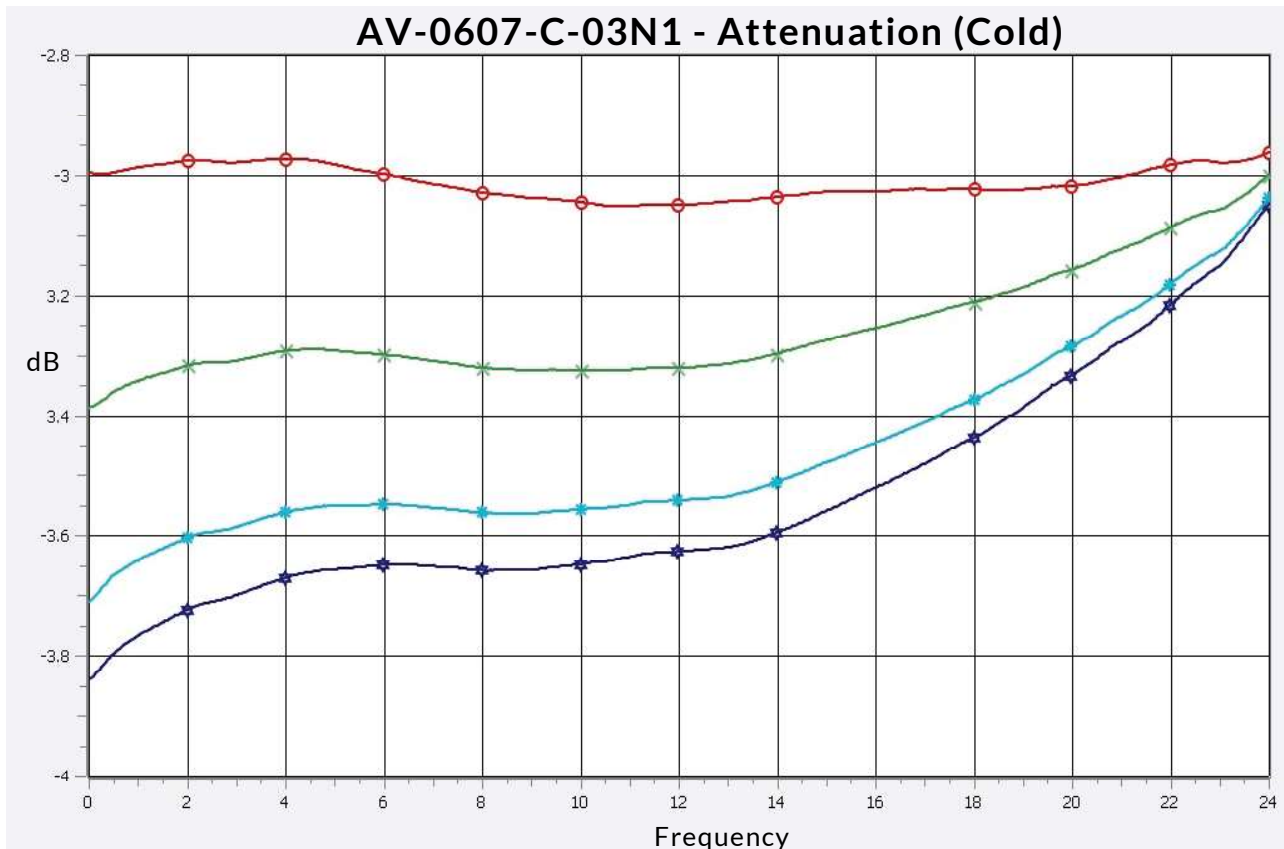
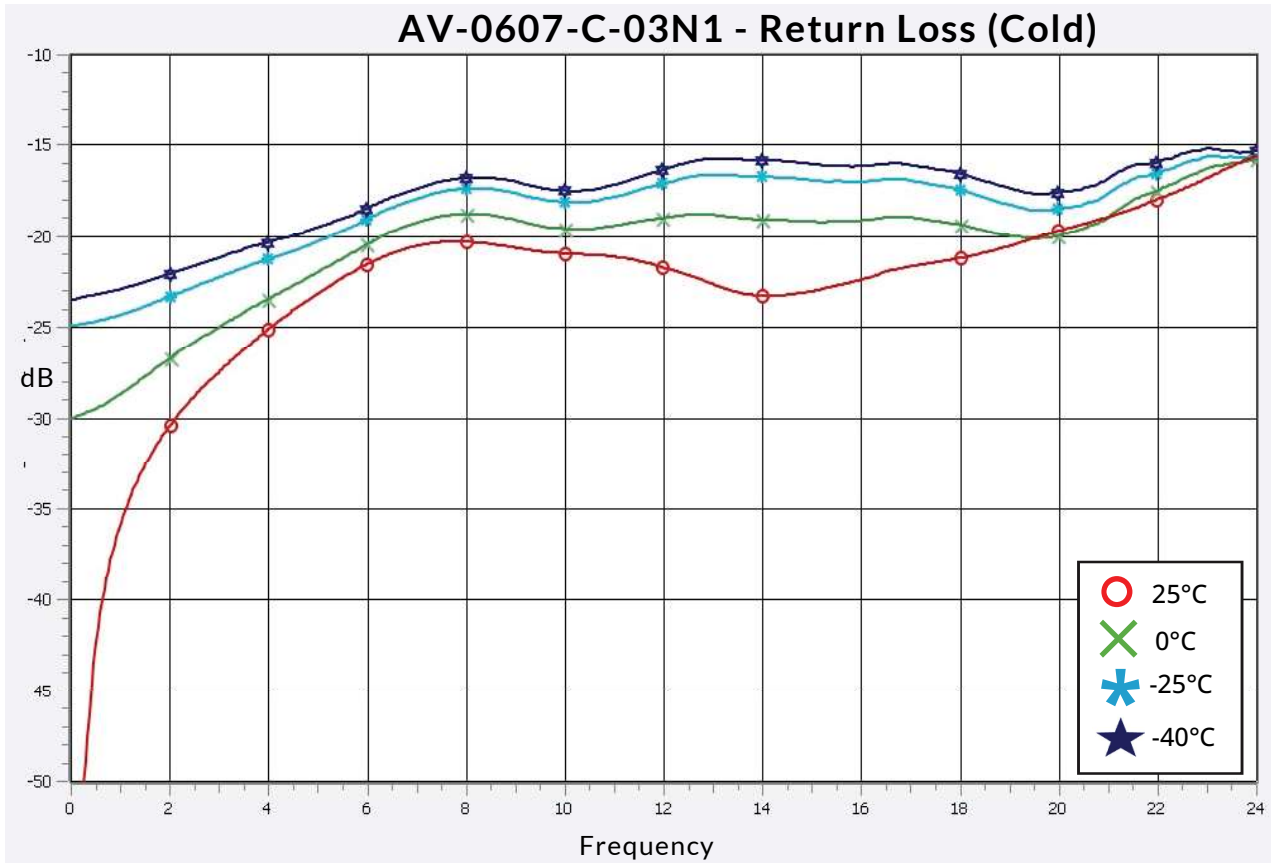
AV-0607-C-03N1 - Return Loss (Hot)



AV-0607-C-03N1 - Attenuation (Hot)

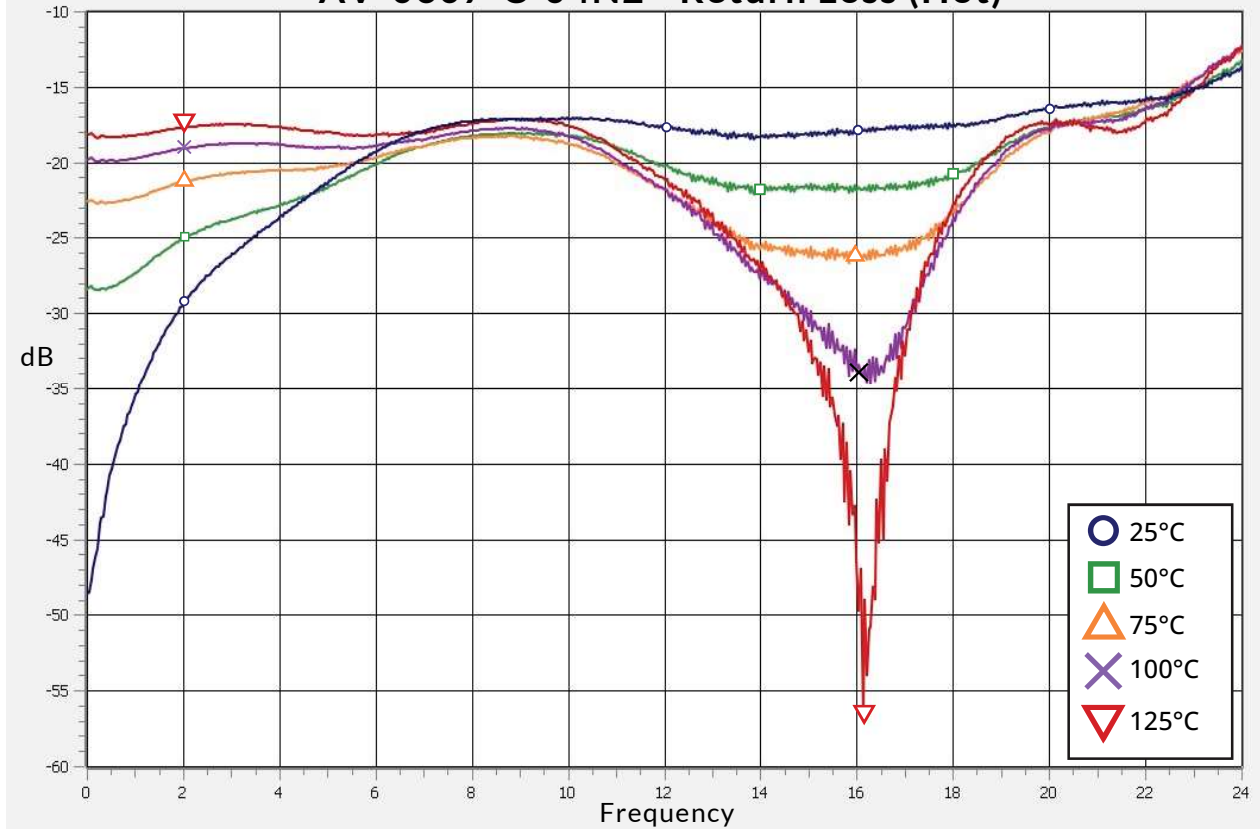


High Frequency Thin Film SMT Temperature Variable Attenuator (TVA)

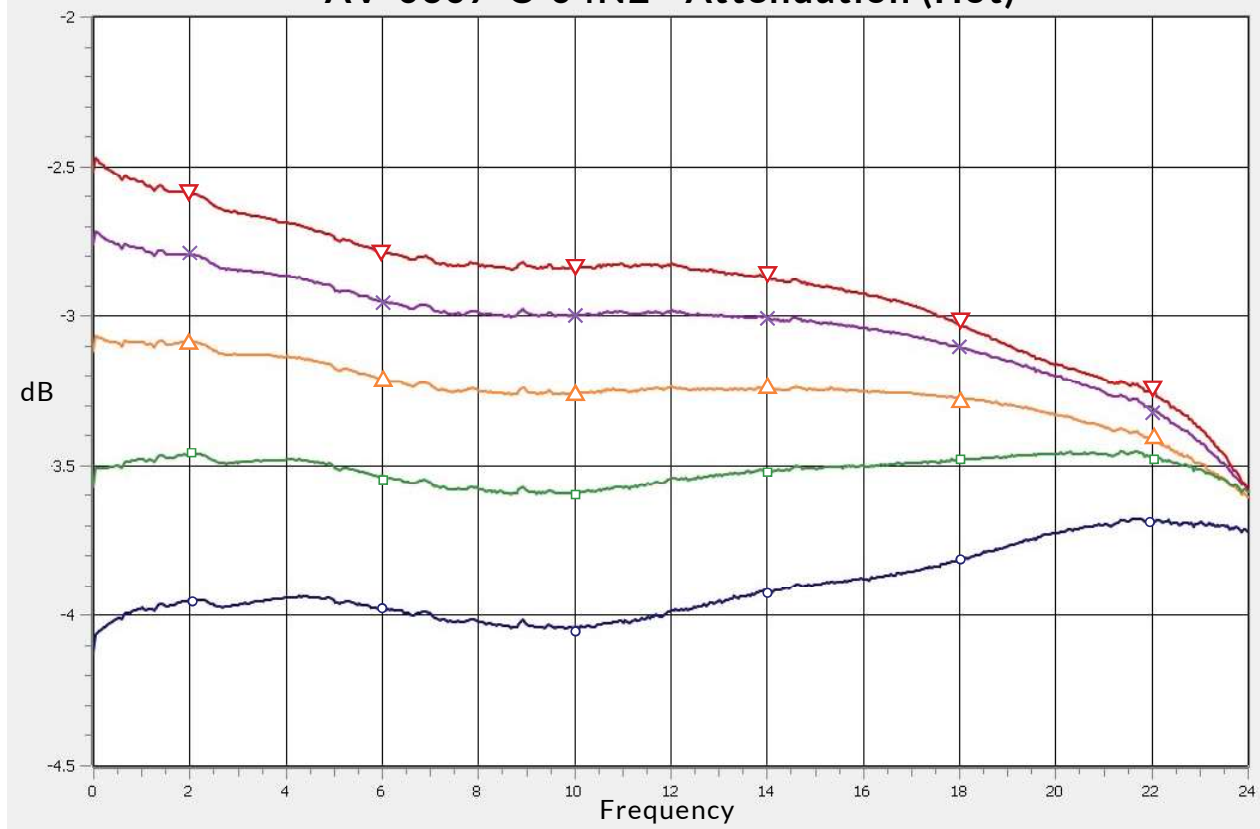


High Frequency Thin Film SMT Temperature Variable Attenuator (TVA)

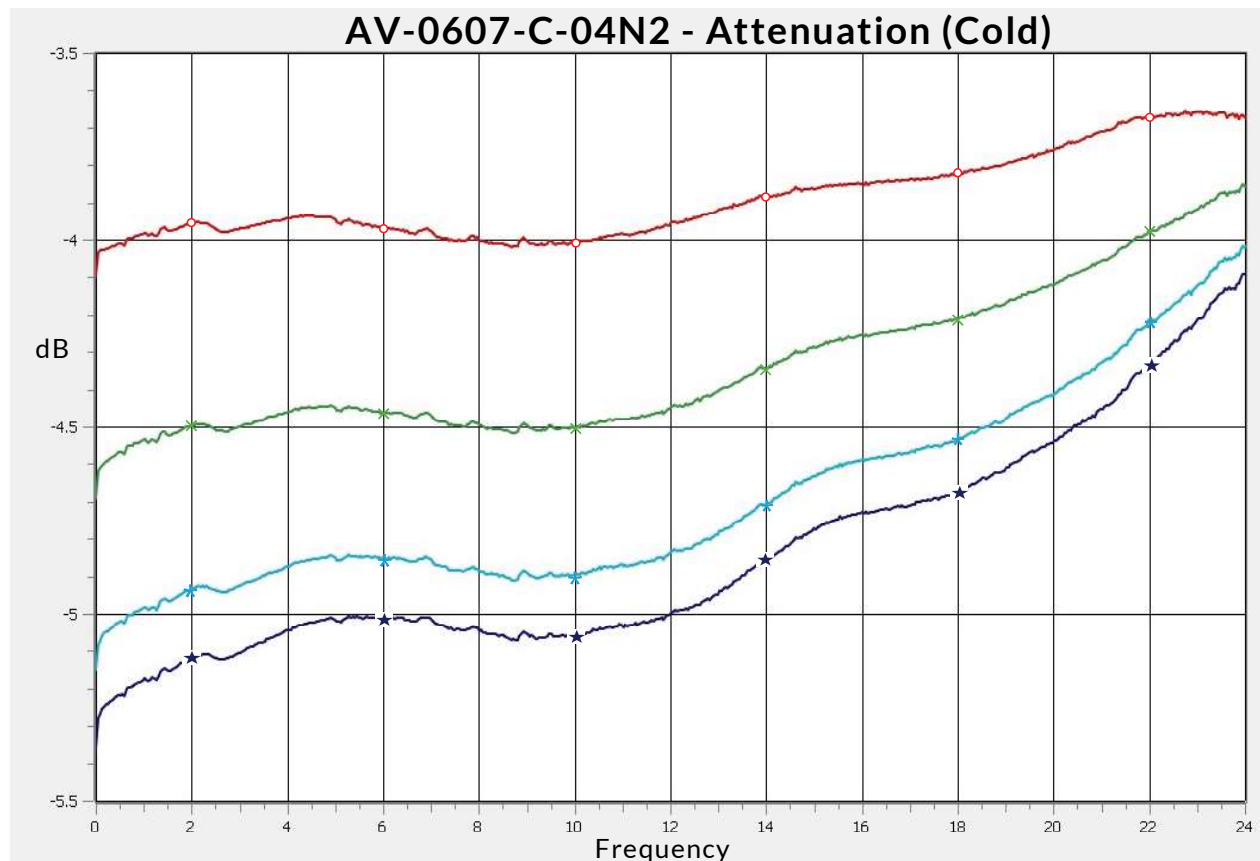
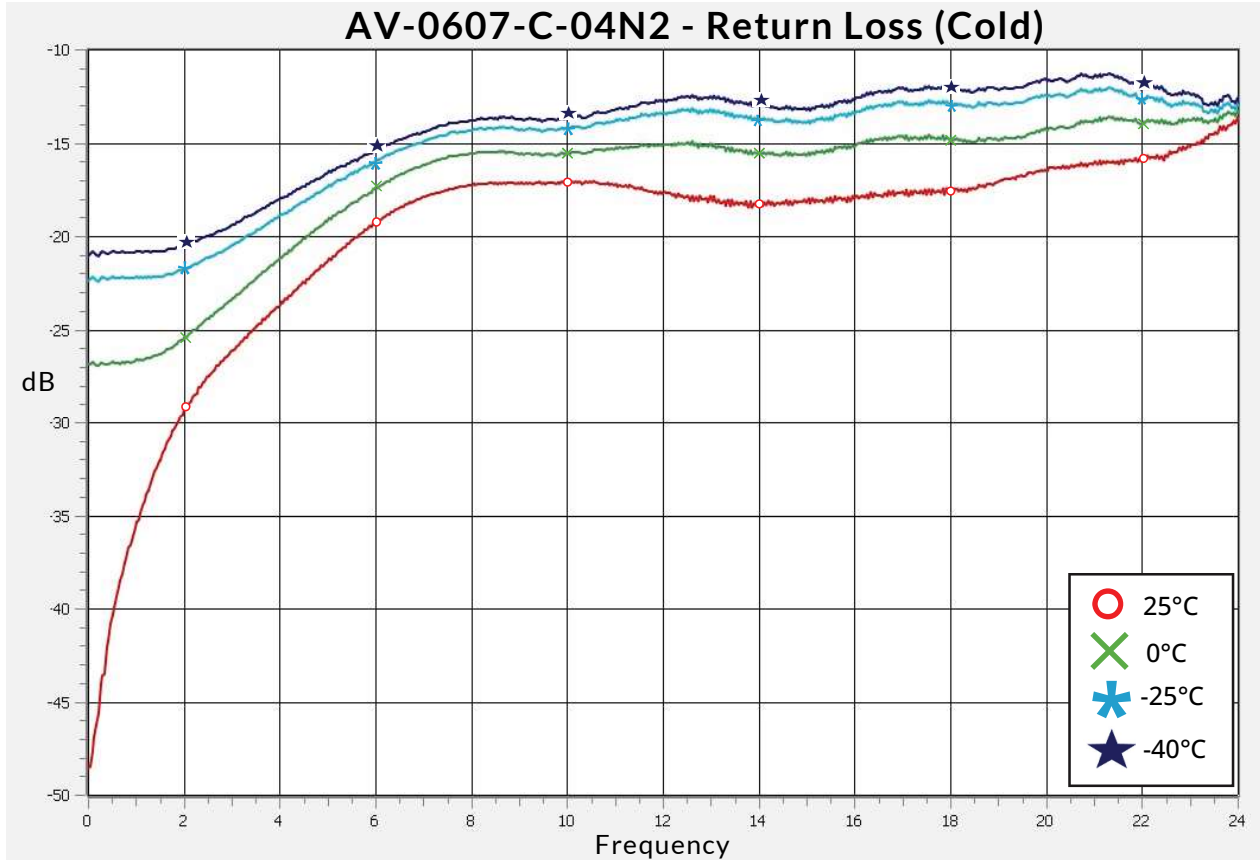
AV-0607-C-04N2 - Return Loss (Hot)



AV-0607-C-04N2 - Attenuation (Hot)

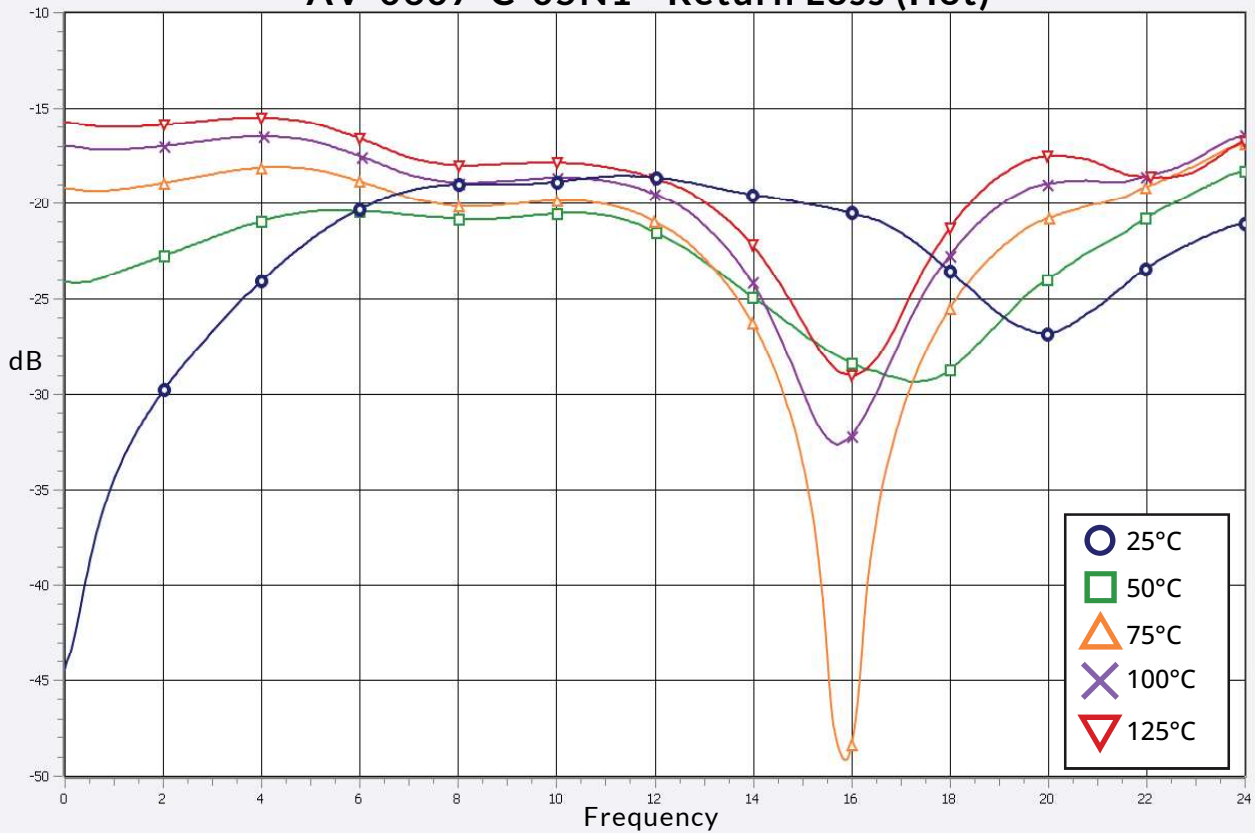


High Frequency Thin Film SMT Temperature Variable Attenuator (TVA)

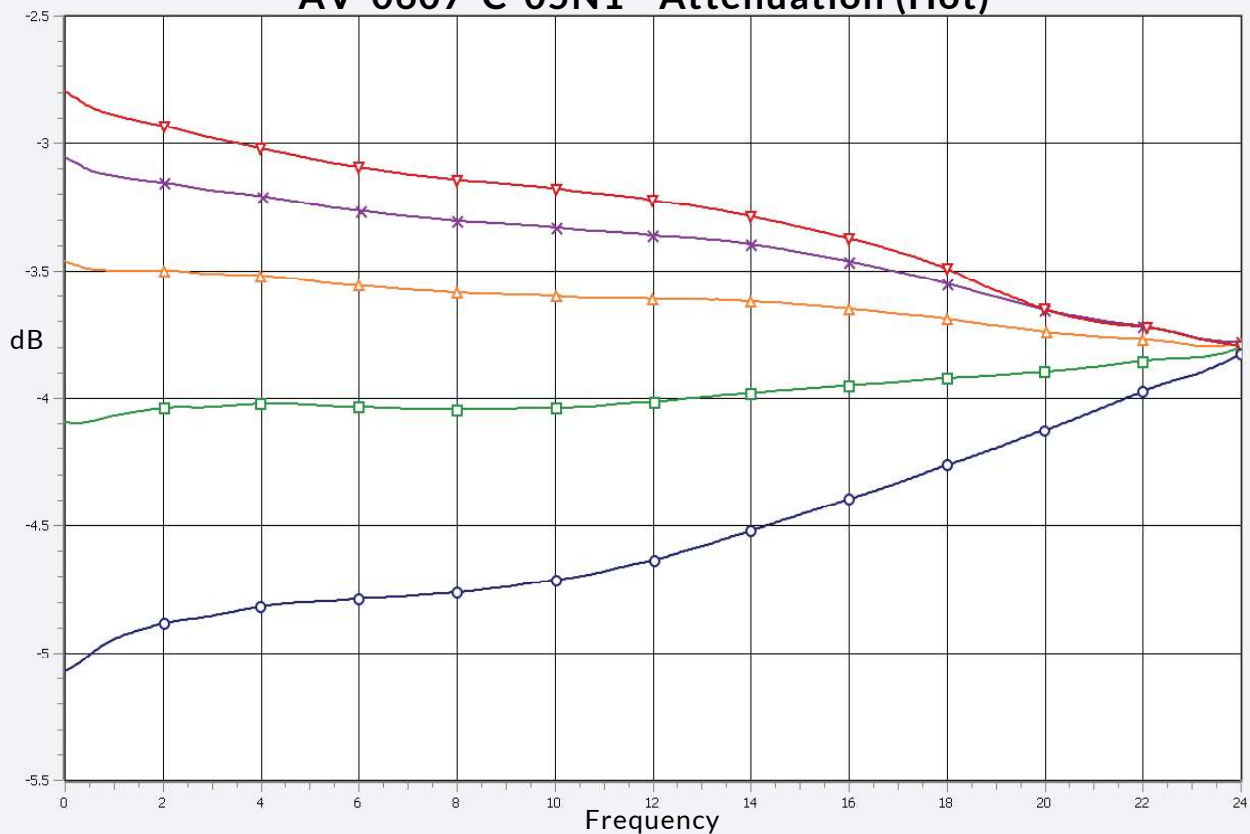


High Frequency Thin Film SMT Temperature Variable Attenuator (TVA)

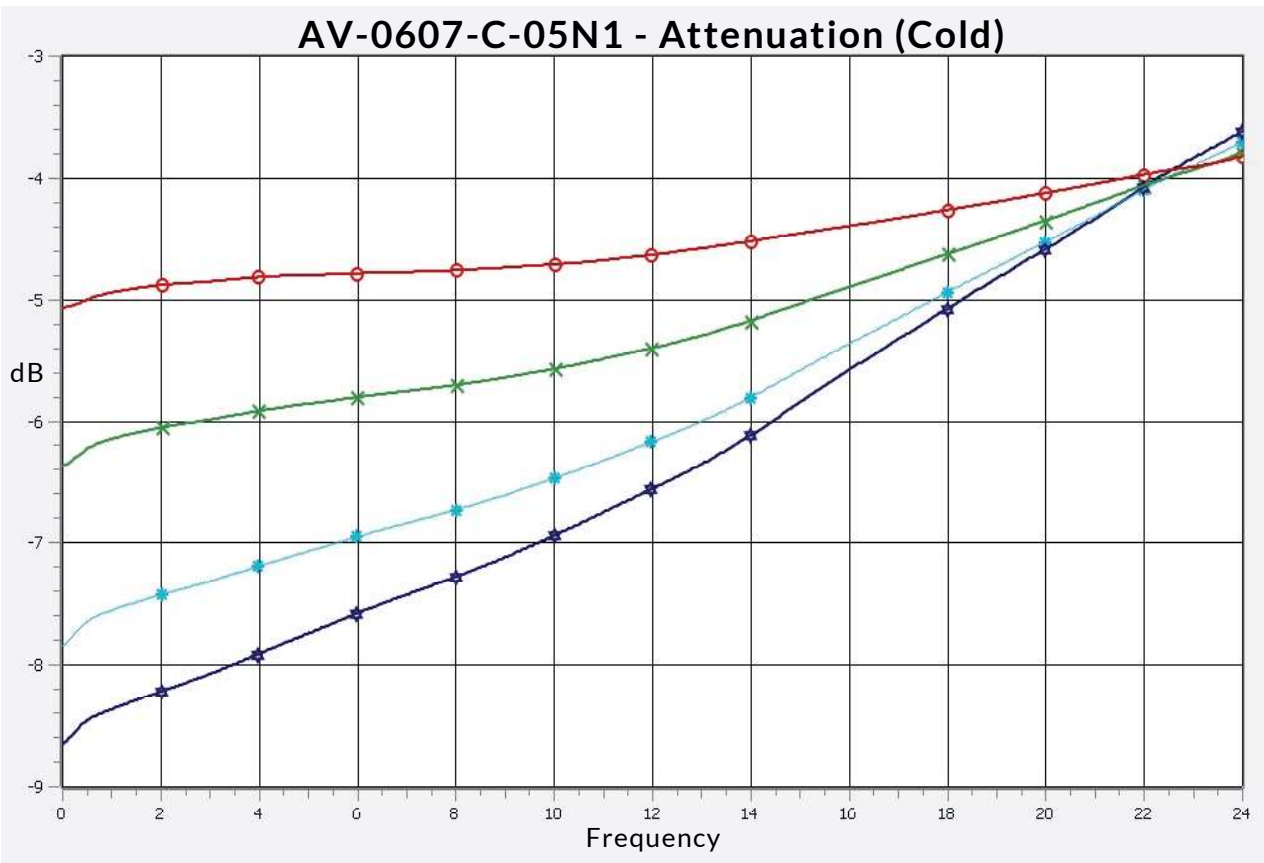
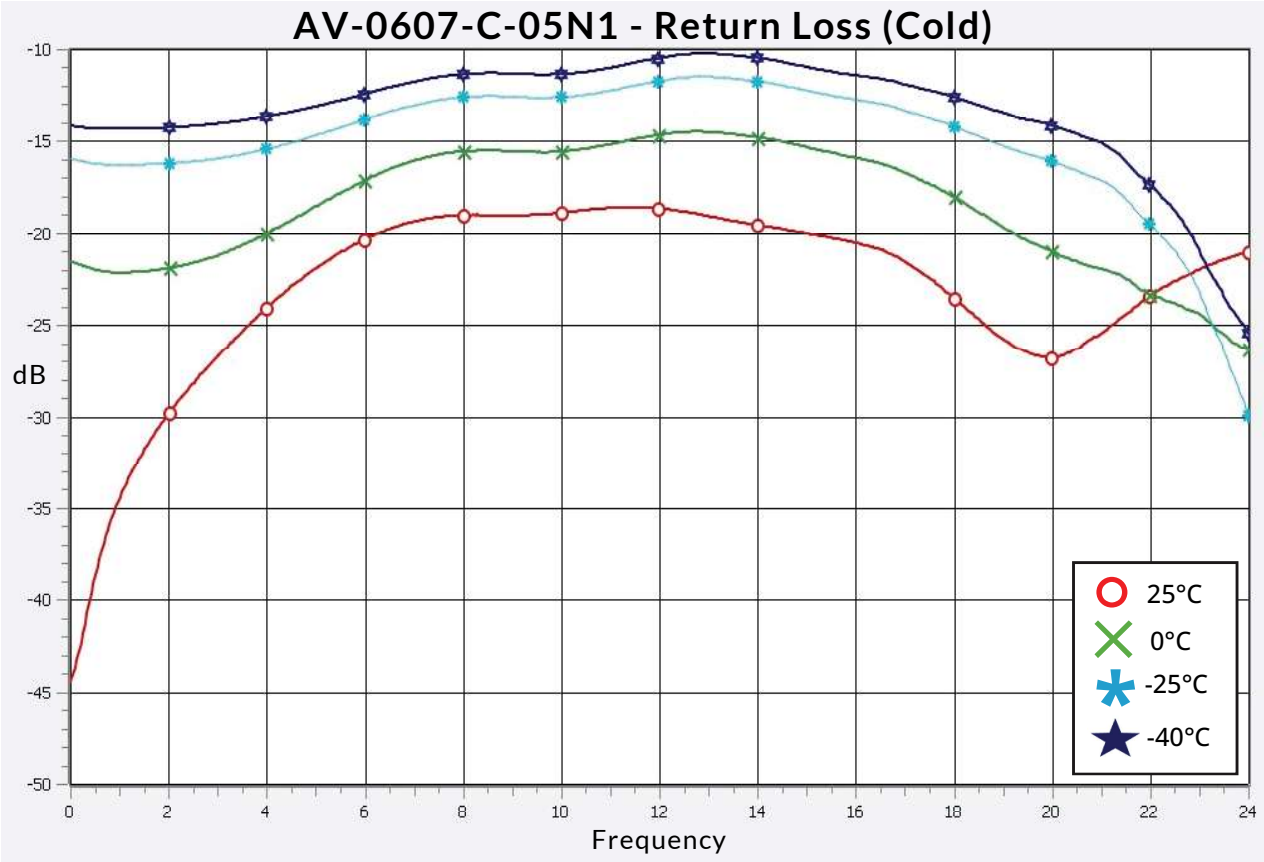
AV-0607-C-05N1 - Return Loss (Hot)



AV-0607-C-05N1 - Attenuation (Hot)

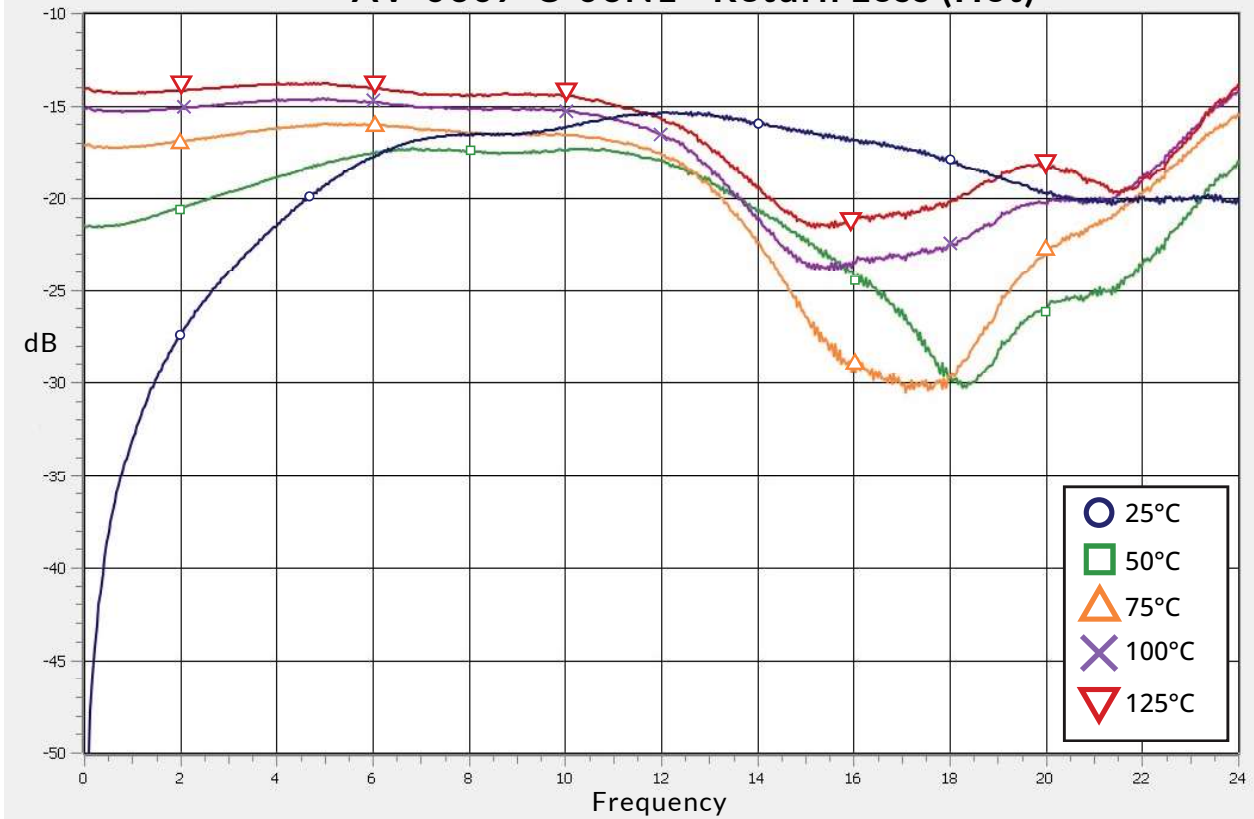


High Frequency Thin Film SMT Temperature Variable Attenuator (TVA)

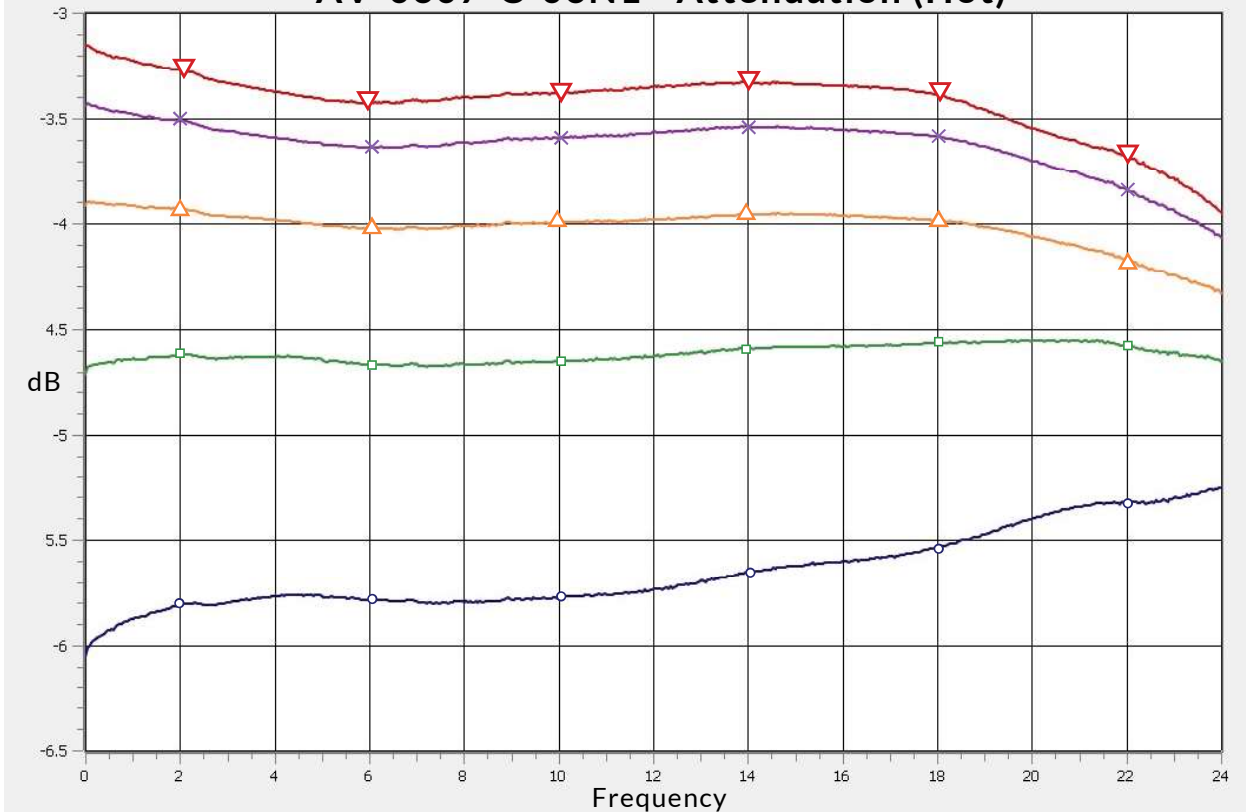


High Frequency Thin Film SMT Temperature Variable Attenuator (TVA)

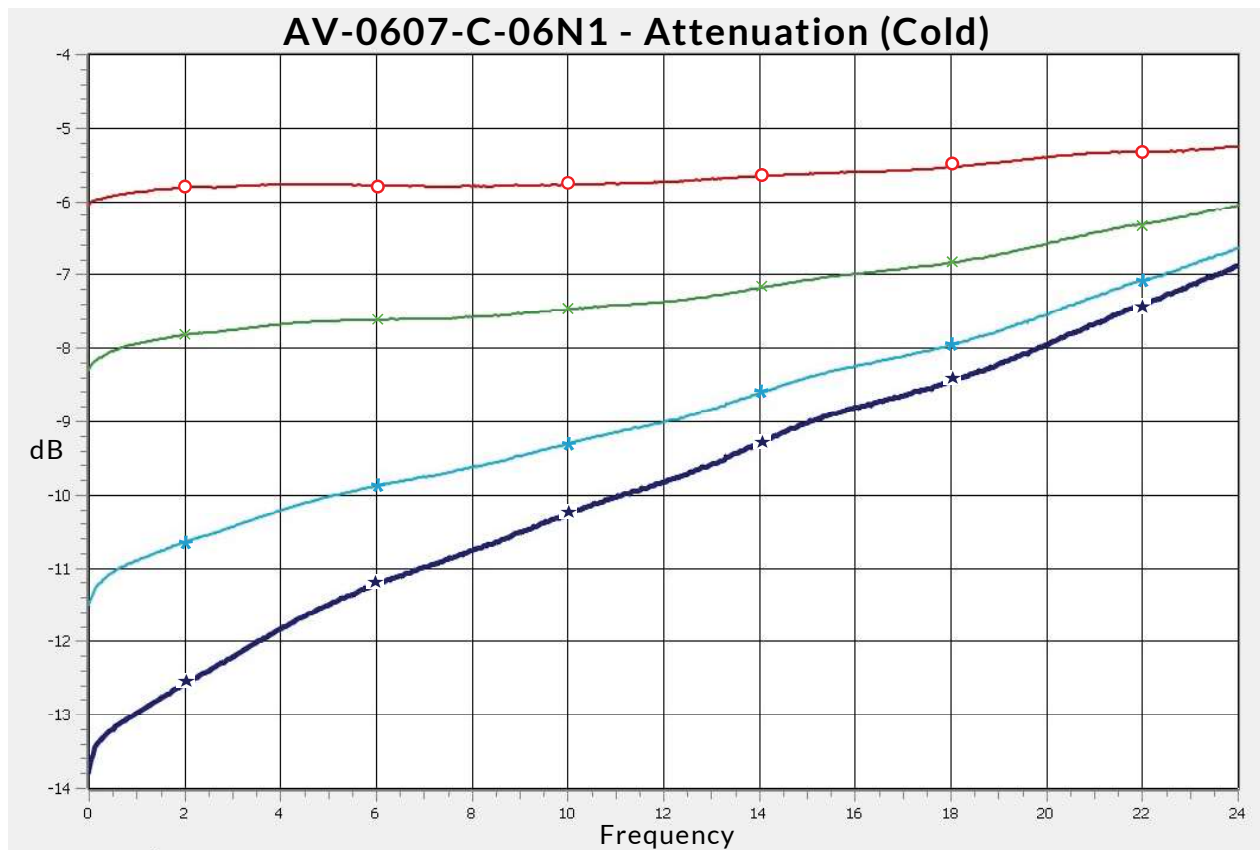
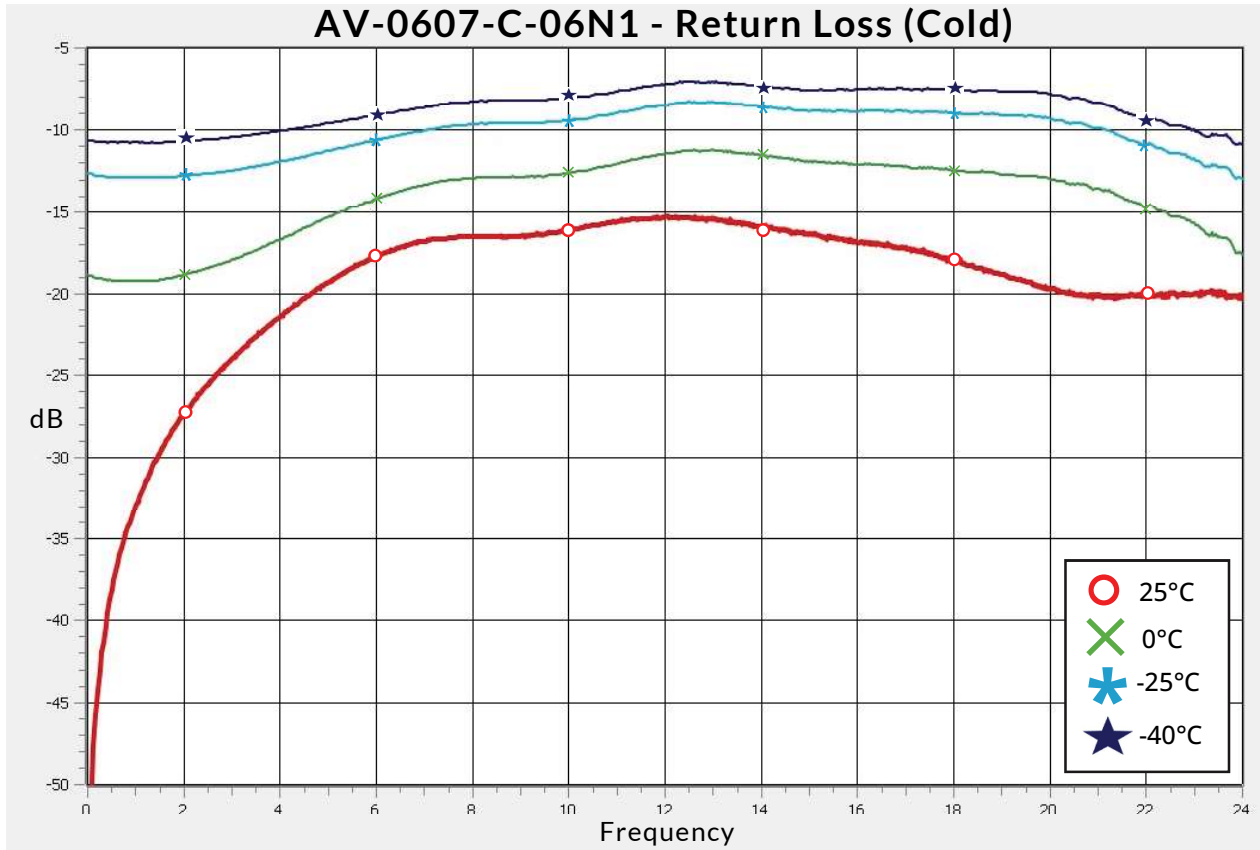
AV-0607-C-06N1 - Return Loss (Hot)



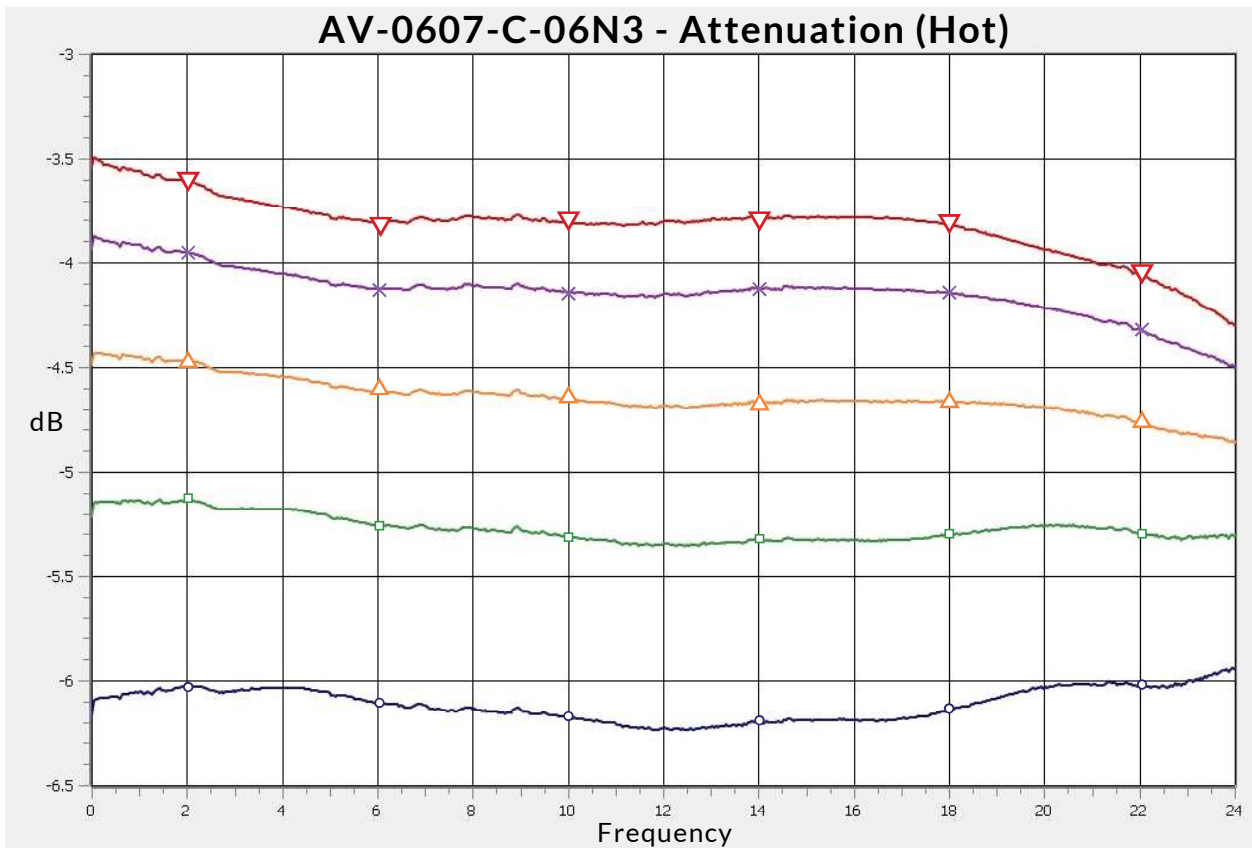
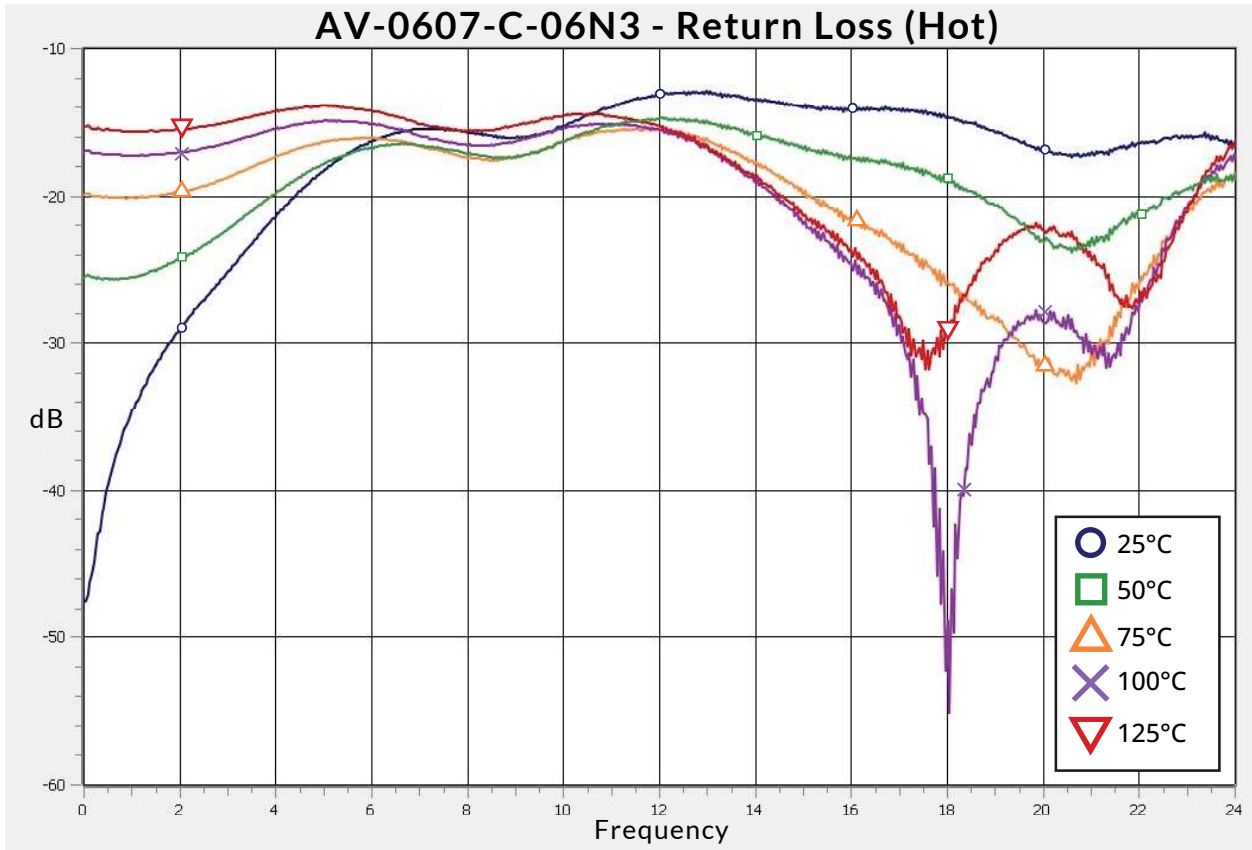
AV-0607-C-06N1 - Attenuation (Hot)



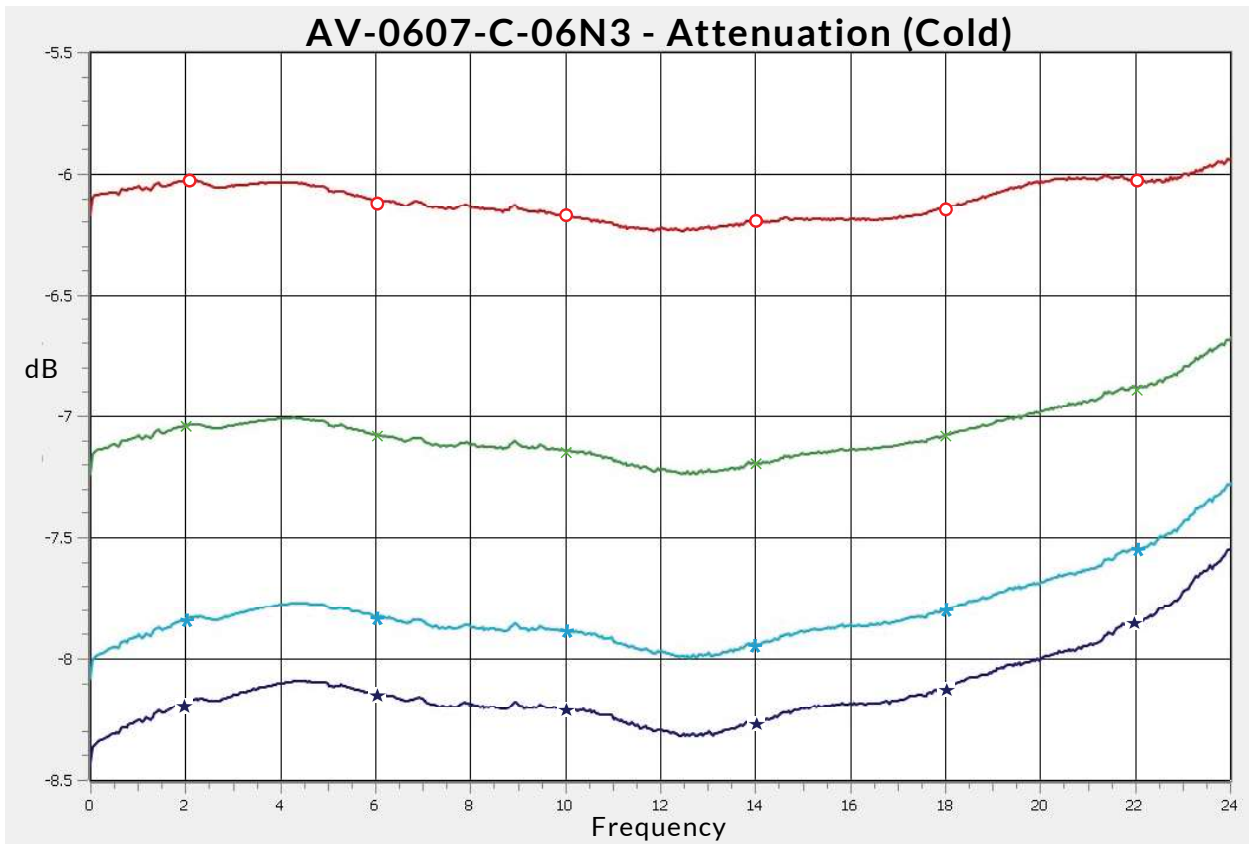
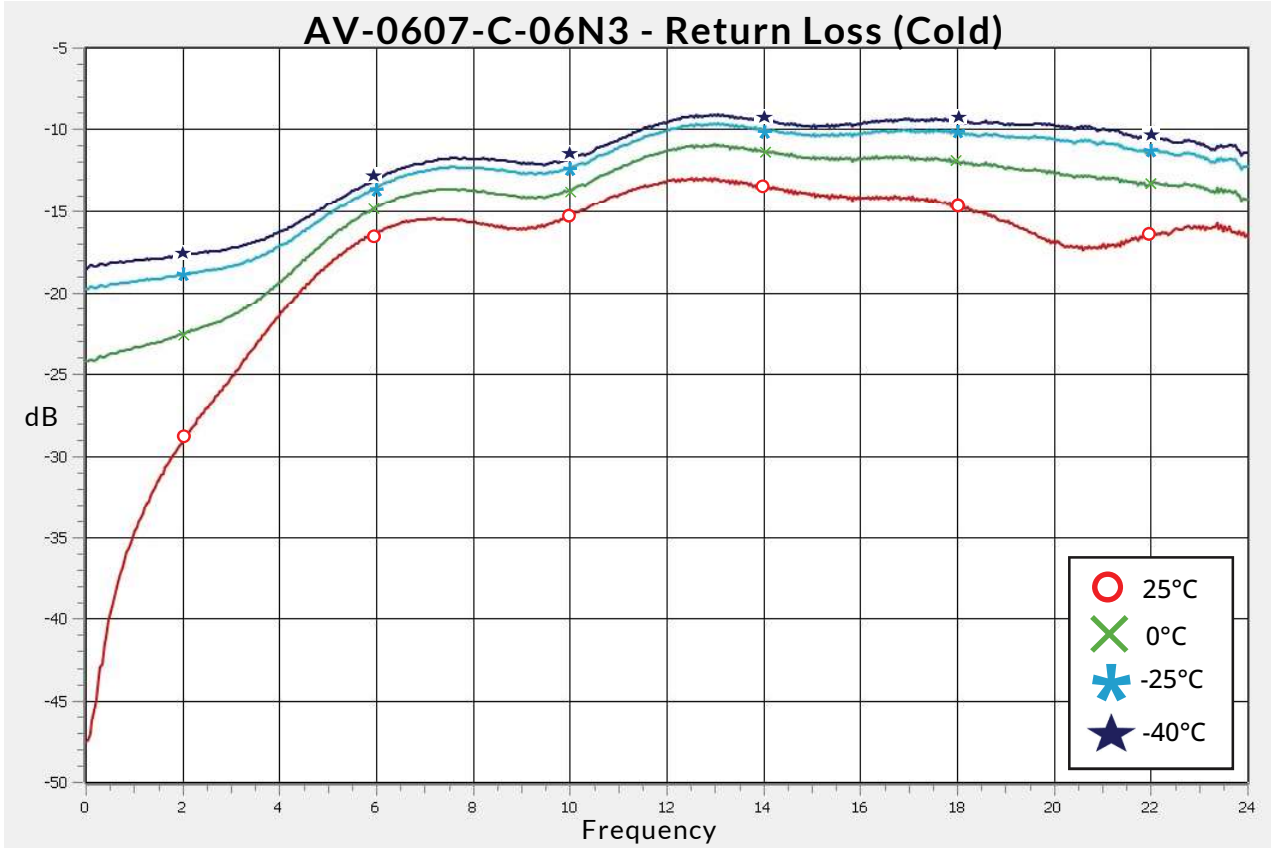
High Frequency Thin Film SMT Temperature Variable Attenuator (TVA)



High Frequency Thin Film SMT Temperature Variable Attenuator (TVA)

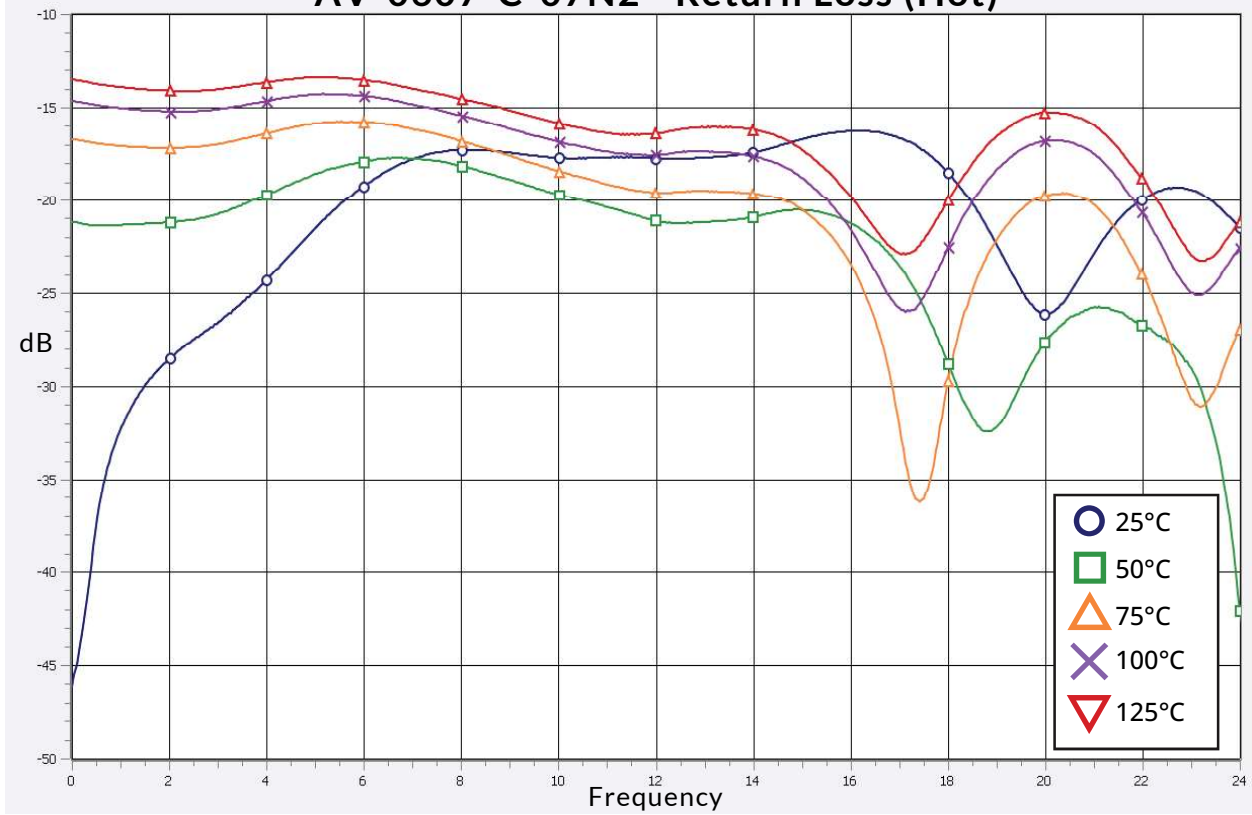


High Frequency Thin Film SMT Temperature Variable Attenuator (TVA)

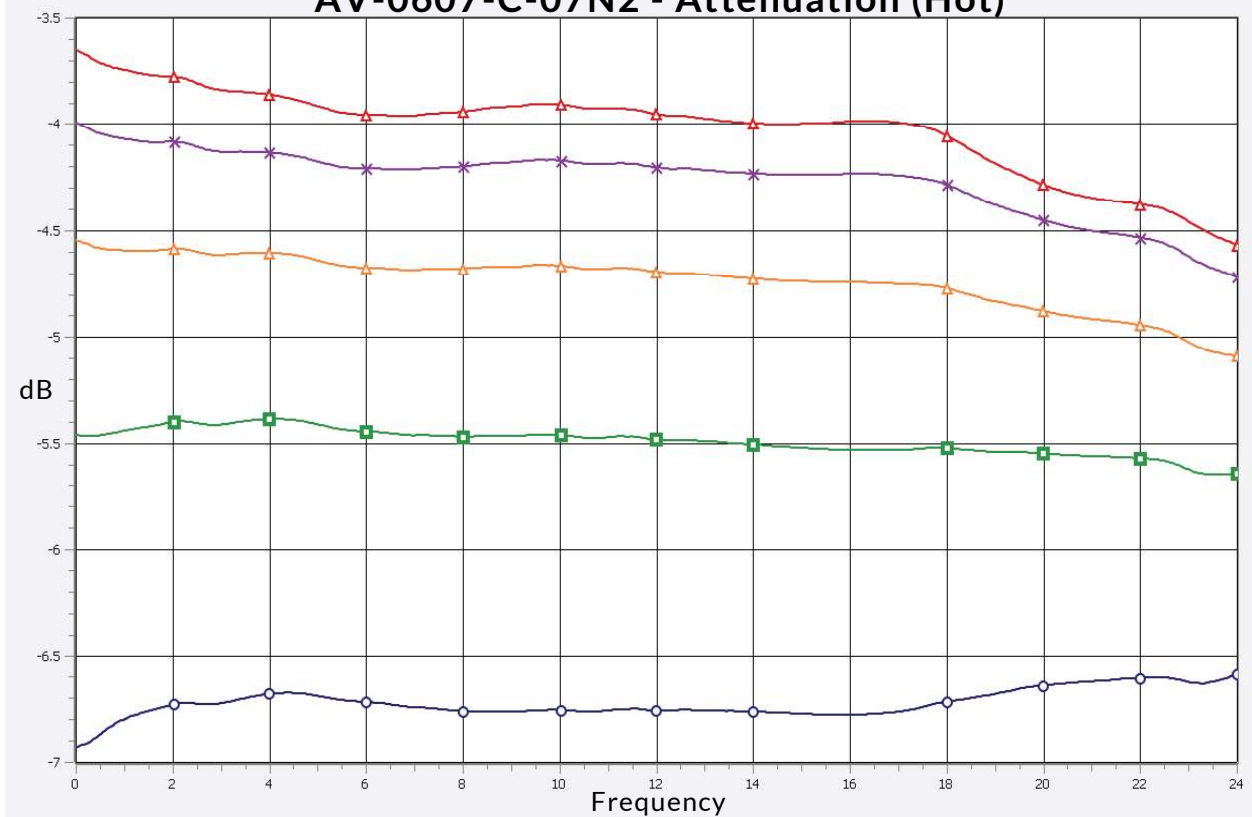


High Frequency Thin Film SMT Temperature Variable Attenuator (TVA)

AV-0607-C-07N2 - Return Loss (Hot)



AV-0607-C-07N2 - Attenuation (Hot)



High Frequency Thin Film SMT Temperature Variable Attenuator (TVA)

