

## Surface Mount Thin Film Fixed Chip Attenuator

RoHS KIT

A-Series thin film fixed attenuators are compact, offer high impedance precision, and are ideally suited for RF and microwave applications. A-Series offer excellent frequency response and can also be configured for upside-down, planarized installation to maximize performance.



### FEATURES

- 99.5% Al<sub>2</sub>O<sub>3</sub> substrate material
- Ultra low noise attenuator element
- Excellent high frequency performance
- Low inductance and parasitic capacitance
- Stable characteristics over temperature and time
- Nickel barrier layer for excellent solderability and mechanical integrity
- Polyimide passivation of attenuator element
- 100% matte tin finish
- +/- 10% impedance accuracy on A-0402WA/IMS2647/IMS2652 sizes

### SPECIFICATIONS

| ITEM                                    | SPECIFICATION                  |
|---|--------------------------------|
| Value Range:                            | 0dB to 10dB, 16dB <sup>1</sup> |
| Standard Impedance:                     | 50Ω Nominal                    |
| DC Attenuation Stability <sup>2</sup> : | .001 dB/dB/°C                  |
| Operating Temperature:                  | -55°C to 150°C                 |
| Storage Temperature:                    | -65°C to 150°C                 |
| Thermal Conductivity:                   | 26 W/m-°K                      |
| Attachment:                             | Solder and Epoxy               |
| End of Life:                            | No E.O.L Planned               |
| Moisture Level:                         | Level 1                        |

1. A-1206 and A-1612 only

2. Based on TCR and resistor tolerance at DC.

### ACCURACY

| CASE SIZE | ATTENUATION INCREMENT |         |         |         |
|-----------|-----------------------|---------|---------|---------|
|           | 0 - 3                 | 4 - 7   | 8 - 10  | 16      |
| 0402      | ± 0.3dB               | ± 0.5dB | ± 0.7dB | N/A     |
| 0603      | ± 0.3dB               | ± 0.5dB | ± 0.7dB | N/A     |
| 0805      | ± 0.3dB               | ± 0.3dB | ± 0.3dB | N/A     |
| 1206      | ± 0.3dB               | ± 0.3dB | ± 0.3dB | ± 0.5dB |
| 1612      | ± 0.3dB               | ± 0.3dB | ± 0.3dB | ± 0.5dB |

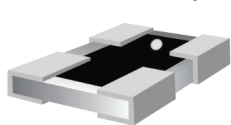
### DIMENSIONS

| Part Number                  | Length 'L'     | Width 'W'      | Height (max) 'H' | Terminal 't'   | Rated Power (70° C) | Impedance |
|------------------------------|----------------|----------------|------------------|----------------|---------------------|-----------|
| ⊖ A-0402WA, IMS2647, IMS2652 | 0.039" ± .002" | 0.020" ± .002" | 0.015"           | 0.011" ± .002" | 32mW                | 50Ω       |
| ⊖ A-0603 & IMS2533           | 0.063" ± .004" | 0.032" ± .004" | 0.020"           | 0.020" ± .006" | 63mW                | 50Ω       |
| ⊖ A-0805 & IMS1141           | 0.079" ± .008" | 0.049" ± .008" | 0.020"           | 0.020" ± .008" | 100mW               | 50Ω       |
| A-1206                       | 0.126" ± .008" | 0.063" ± .008" | 0.020"           | 0.039" ± .010" | 125mW               | 50Ω       |
| A-1612                       | 0.165" ± .008" | 0.118" ± .008" | 0.038"           | 0.035" ± .020" | 250mW               | 50Ω       |

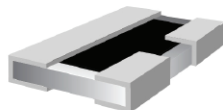
⊖ Data available in Modelithics Library

### TERMINAL STYLE

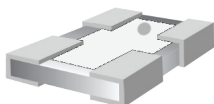
#### WA -Full Wraparound



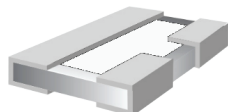
A-0402WA/IMS2647



A-0603, A-0805, A-1206, A-1612

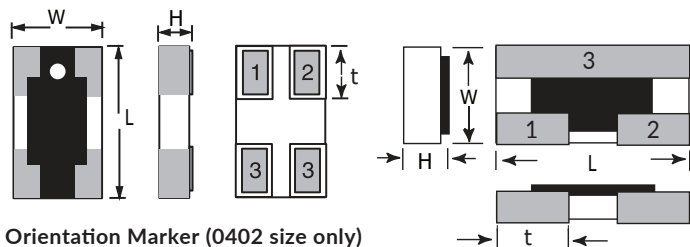


IMS2652



IMS2533, IMS1141

### TERMINAL DIMENSIONS & FUNCTION



Orientation Marker (0402 size only) located between In / Out terminals

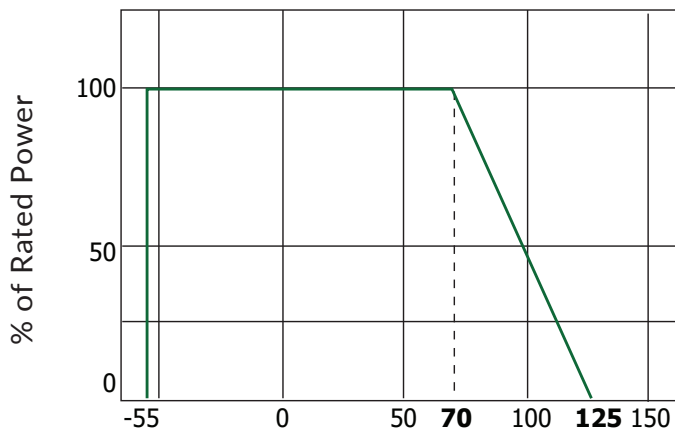
Terminal Functions (all sizes)

- 1 - Input / Output
- 2 - Output / Output
- 3 - Ground

## INPUT POWER @ 70°C

|      | A-0402WA<br>IMS2647<br>IMS2652 | A-0603<br>IMS2533 | A-0805<br>IMS1141 | A-1206 | A-1612 |
|------|--------------------------------|-------------------|-------------------|--------|--------|
| 1dB  | 155mW                          | 300mW             | 485mW             | 607mW  | 1.2W   |
| 2dB  | 87mW                           | 171mW             | 271mW             | 339mW  | 678mW  |
| 3dB  | 64mW                           | 126mW             | 200mW             | 251mW  | 501mW  |
| 4dB  | 53mW                           | 105mW             | 166mW             | 208mW  | 415mW  |
| 5dB  | 47mW                           | 92mW              | 146mW             | 183mW  | 365mW  |
| 6dB  | 43mW                           | 85mW              | 134mW             | 168mW  | 336mW  |
| 7dB  | 40mW                           | 79mW              | 125mW             | 156mW  | 313mW  |
| 8dB  | 38mW                           | 75mW              | 119mW             | 148mW  | 297mW  |
| 9dB  | 37mW                           | 72mW              | 114mW             | 143mW  | 286mW  |
| 10dB | 36mW                           | 70mW              | 111mW             | 139mW  | 278mW  |

## Power De-Rating Curve



## RF PERFORMANCE ESTIMATES - FREQUENCY AT -15dB RETURN LOSS

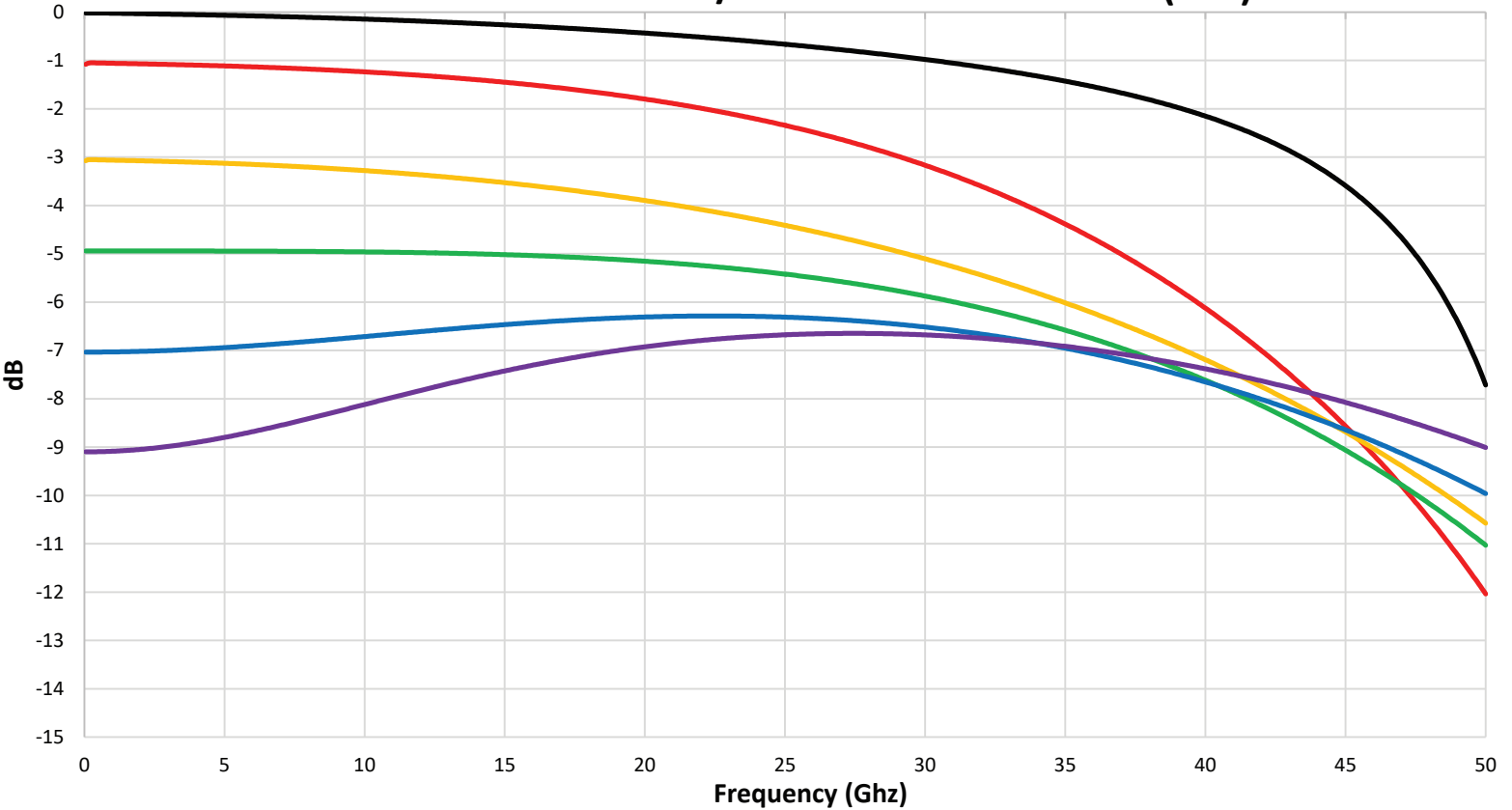
|      | A-0402WA<br>IMS2647 <sub>1</sub><br>IMS2652 <sub>1</sub> | A-0603 <sub>2</sub><br>IMS2533 <sub>2</sub> | A-0805 <sub>3</sub><br>IMS1141 <sub>3</sub> | A-1206   |
|------|--|---|---|----------|
| 0dB  | 13.5 Ghz   | 48.0 Ghz                                    | 11.7 Ghz                                    | 34.6 Ghz |
| 1dB  | 13.0 Ghz   | 46.7 Ghz                                    | 14.2 Ghz                                    | 36.0 Ghz |
| 2dB  | 14.0 Ghz   | 47.6 Ghz                                    | 14.8Ghz                                     | 36.9 Ghz |
| 3dB  | 14.9 Ghz   | 47.3 Ghz                                    | 15.0 Ghz                                    | 36.9 Ghz |
| 4dB  | 15.7 Ghz   | 46.8 Ghz                                    | 14.8 Ghz                                    | 28.3 Ghz |
| 5dB  | 15.4 Ghz   | 49.0 Ghz                                    | 13.1 Ghz                                    | 26.6 Ghz |
| 6dB  | 15.4 Ghz   | 45.6 Ghz                                    | 13.1 Ghz                                    | 27.9 Ghz |
| 7dB  | 14.3 Ghz   | 40.3 Ghz                                    | 13.8 Ghz                                    | 28.2 Ghz |
| 8dB  | 13.6 Ghz   | 38.7 Ghz                                    | 12.6 Ghz                                    | 28.7 Ghz |
| 9dB  | 12.4 Ghz   | 36.7 Ghz                                    | 12.7 Ghz                                    | 28.8 Ghz |
| 10dB | 12.3 Ghz   | 32.2 Ghz                                    | 13.0 Ghz                                    | 26.7 Ghz |

1 - A-0402WA / IMS2647 / IMS2652 - 6.6mil Rogers 4350B  
 2 - A-0603 / IMS2533 - 6.6mil Rogers 4350B  
 3 - A-0805 / IMS1141 - 20 mil Rogers 4350B

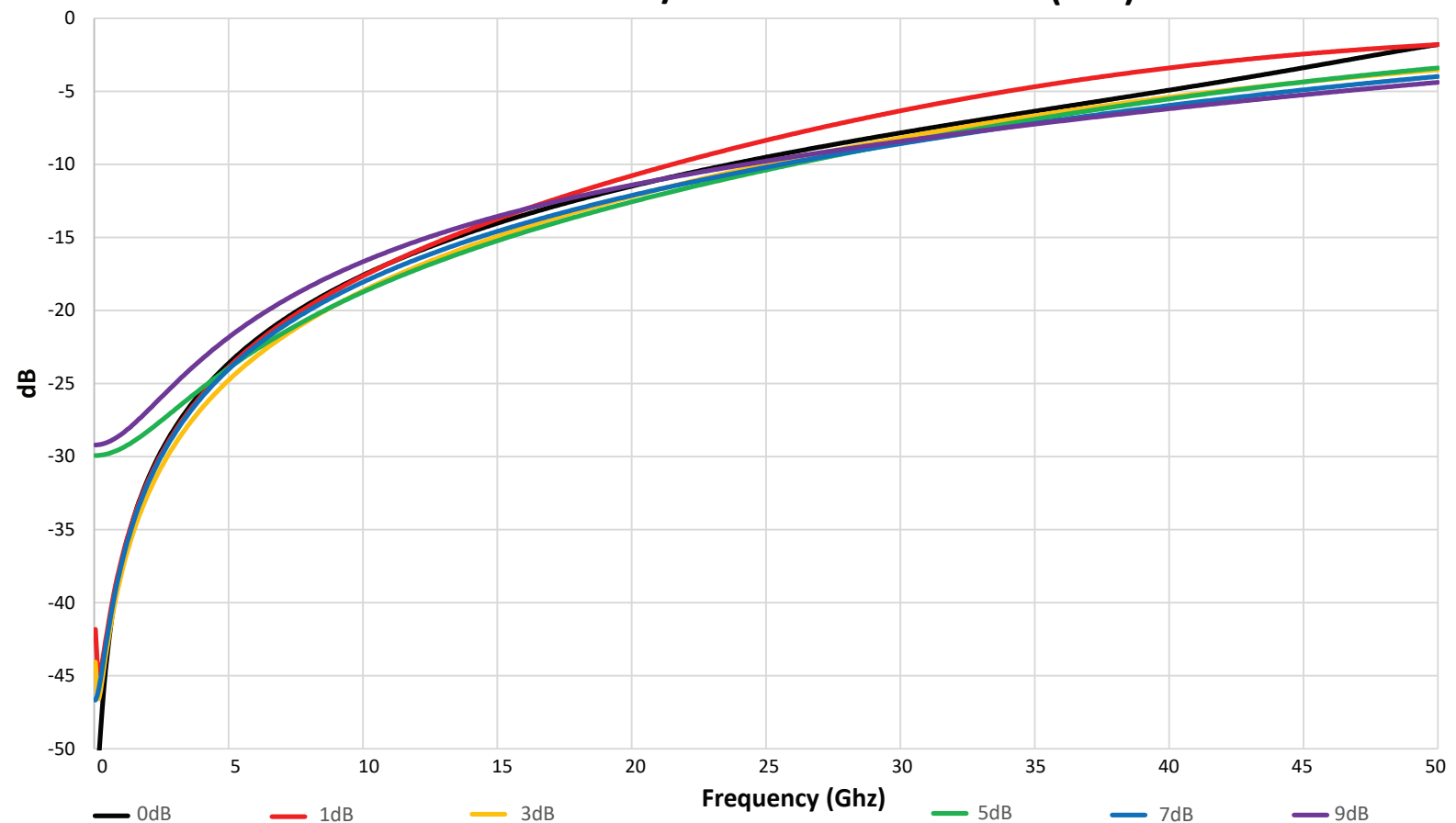
\*A-1612-C Performance Unavailable

## INSERTION AND RETURN LOSS PLOTS

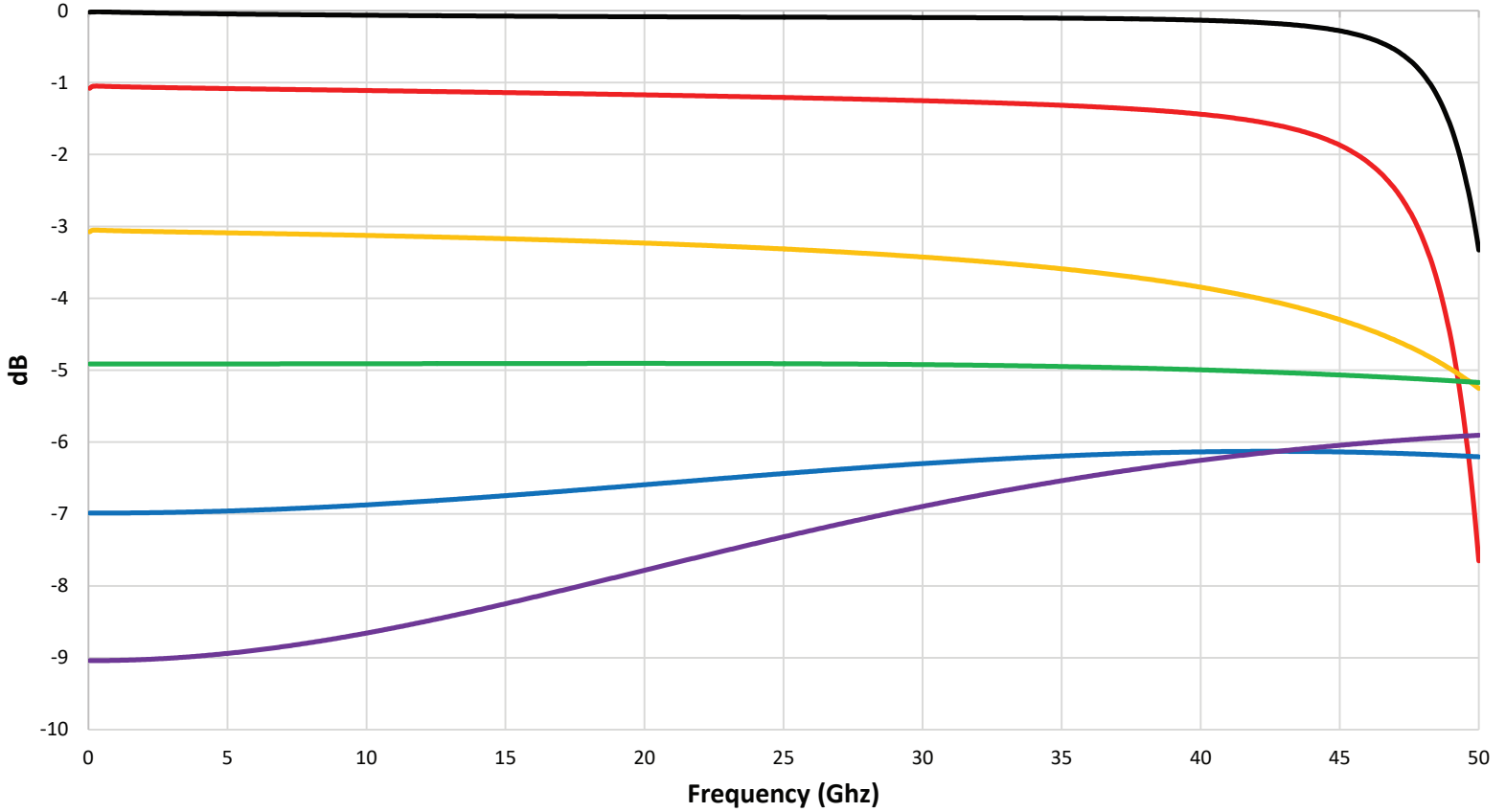
### A-0402WA/IMS2647 Insertion Loss (S21)



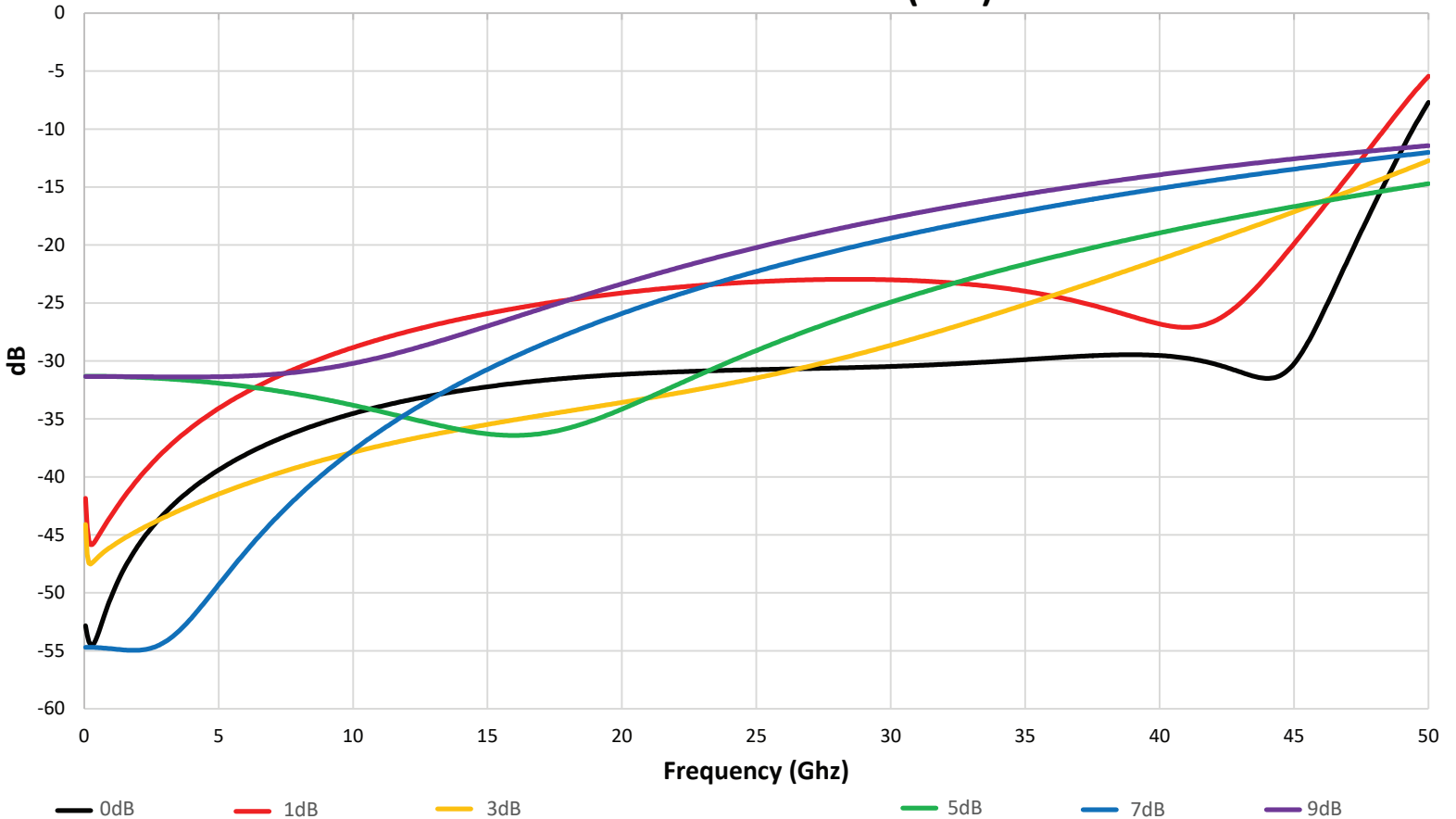
### A-0402WA/IMS2647 Return Loss (S11)



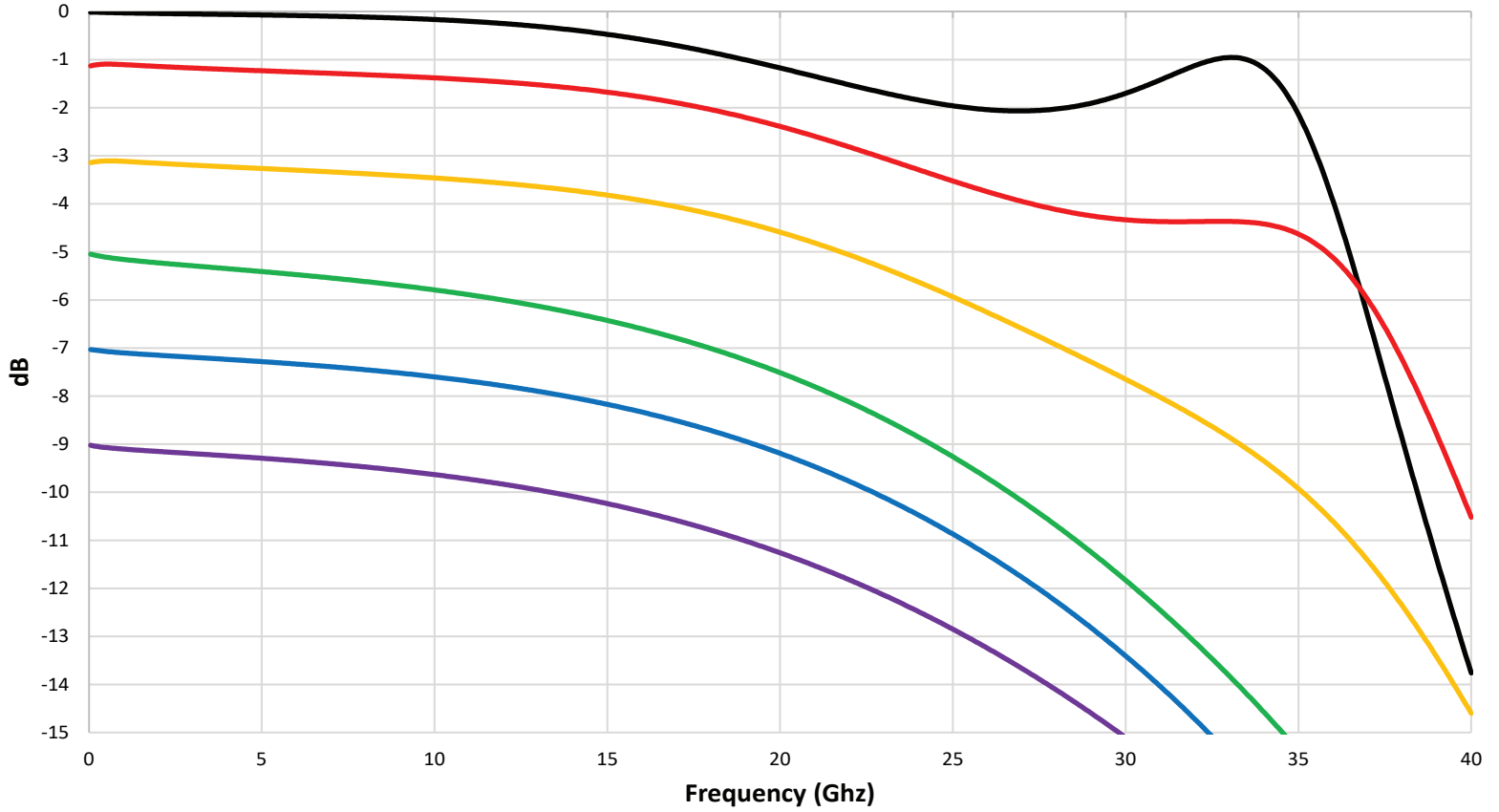
## IMS2652 Insertion Loss (S21)



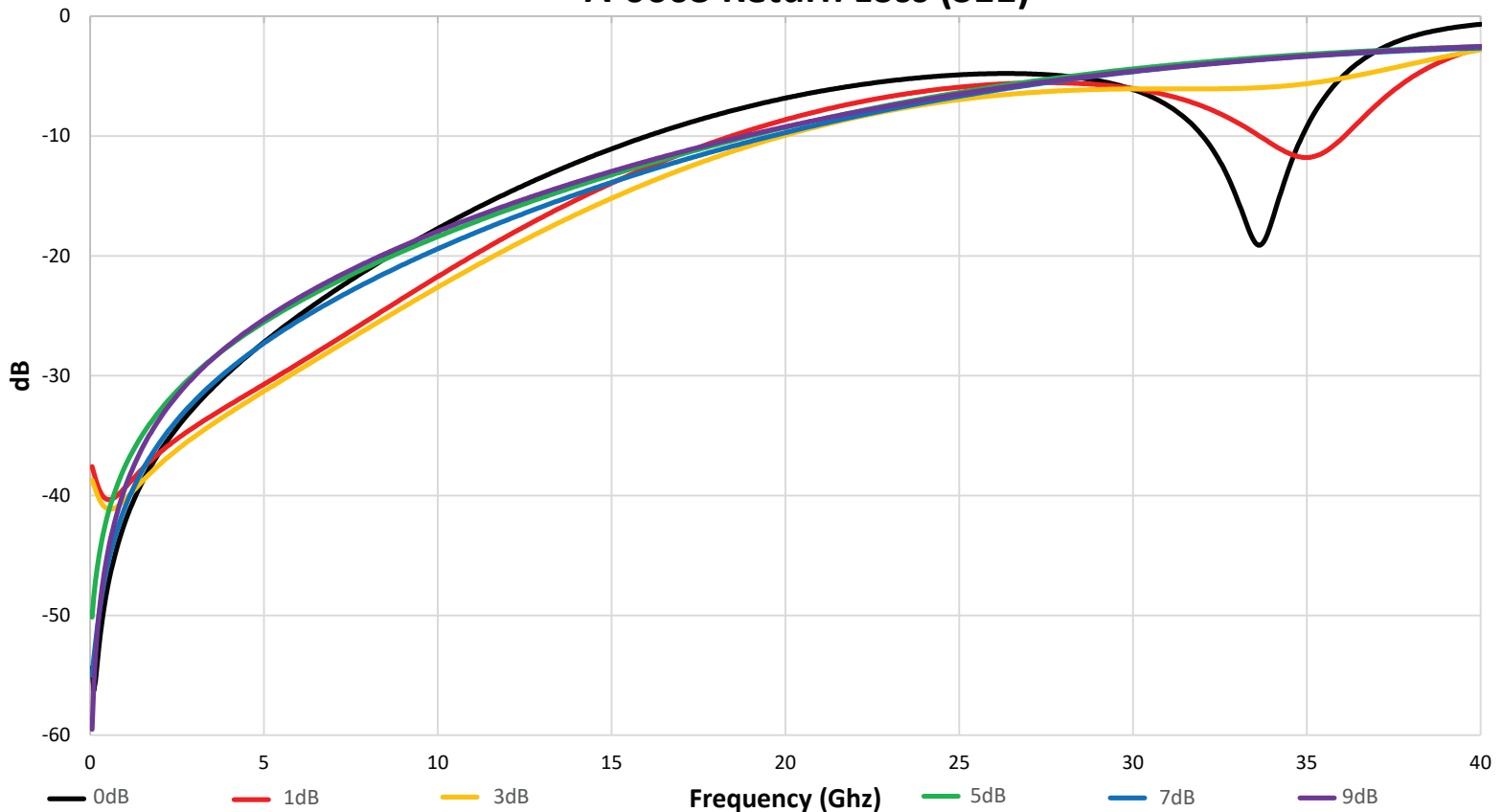
## IMS2652 Return Loss (S11)



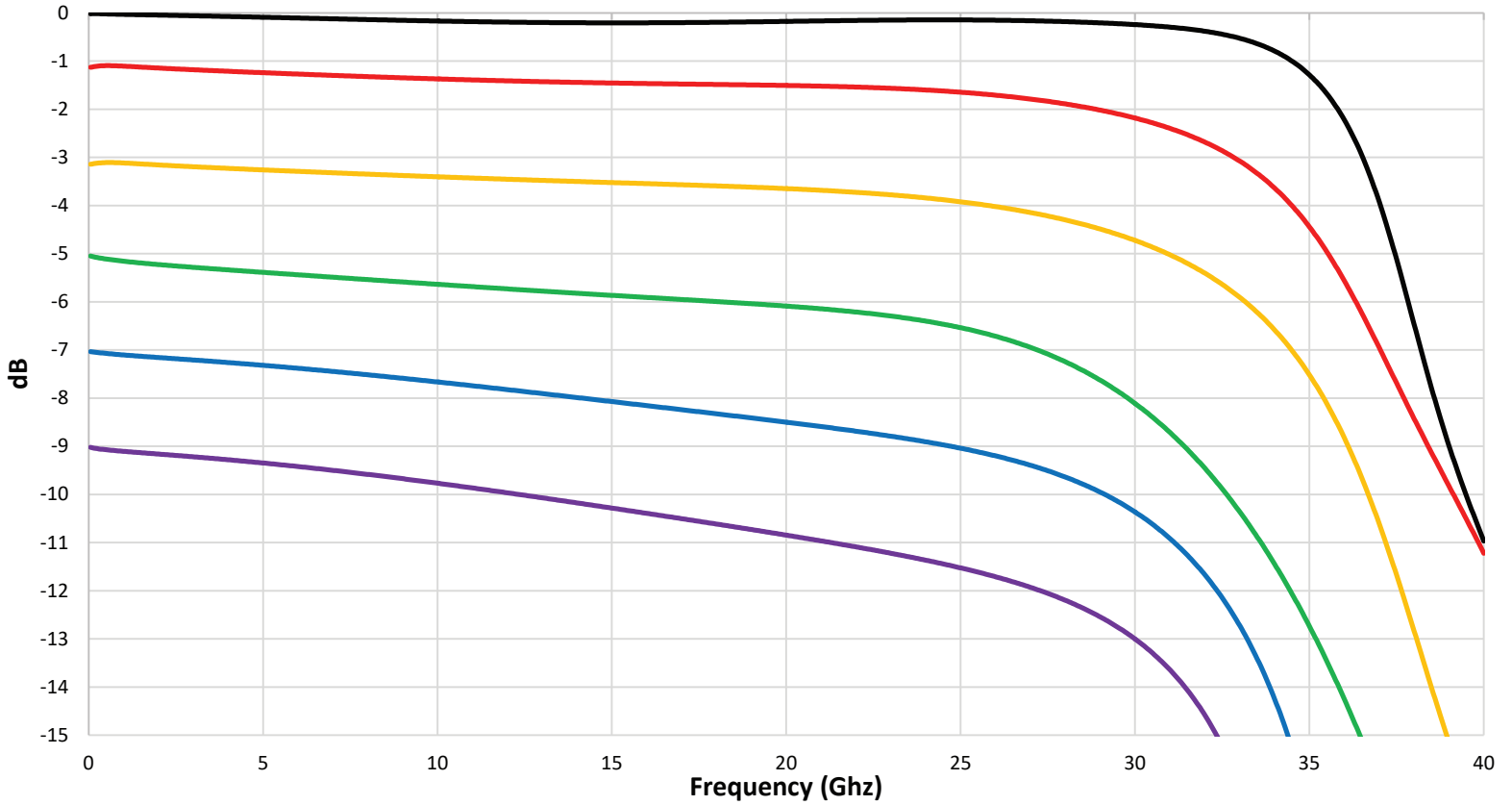
## A-0603 Insertion Loss(S21)



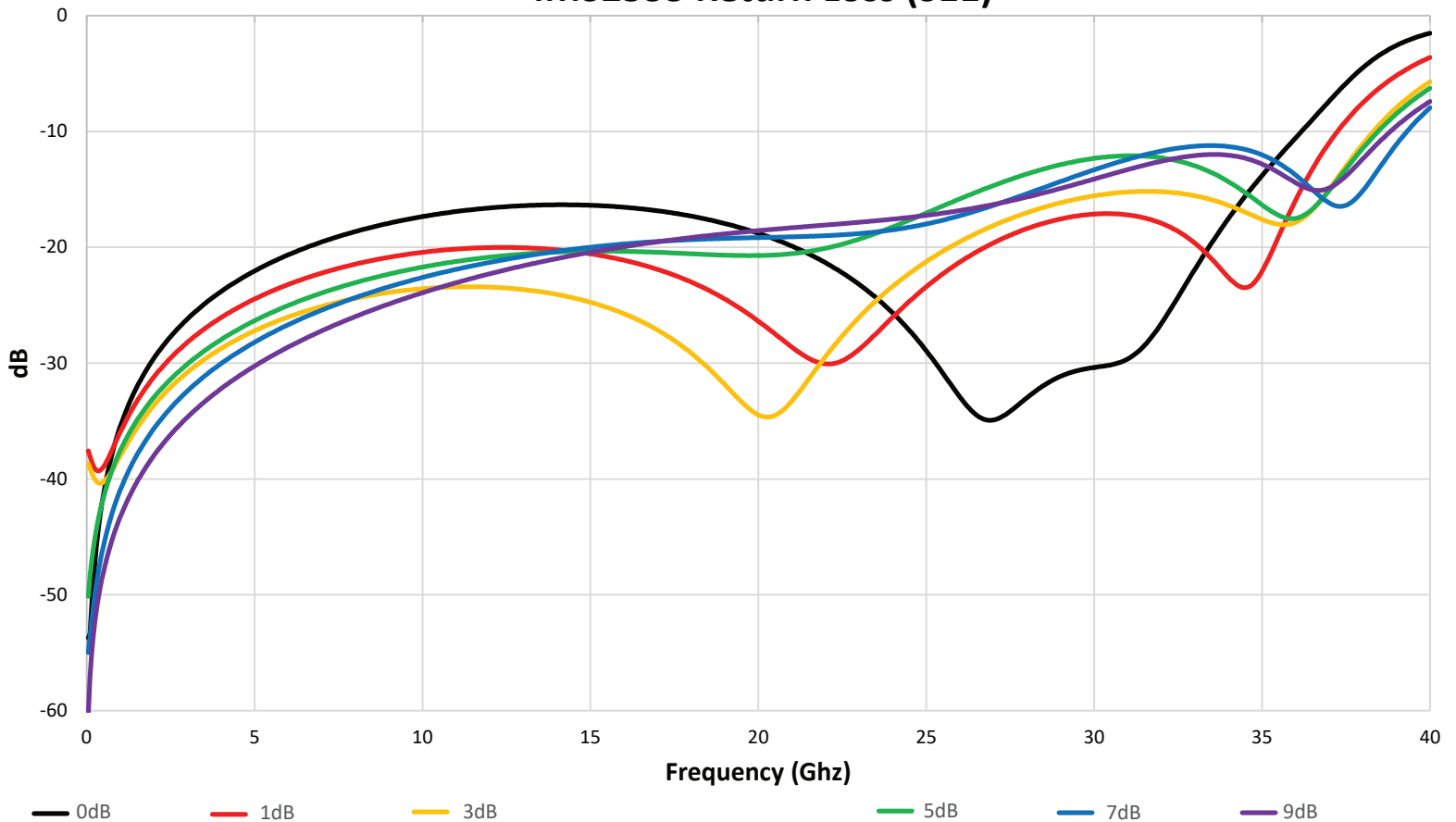
## A-0603 Return Loss (S11)



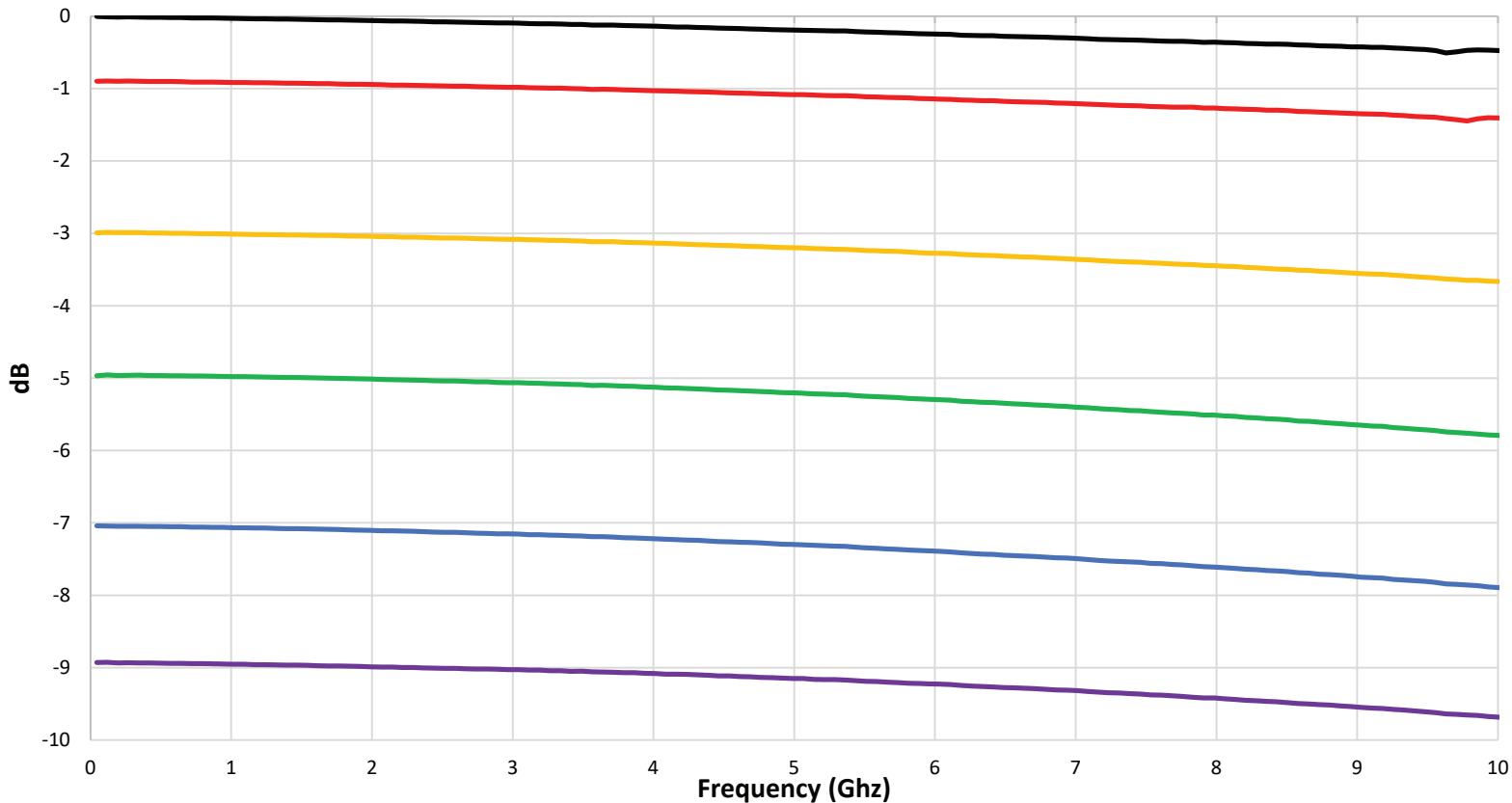
## IMS2533 Insertion Loss (S21)



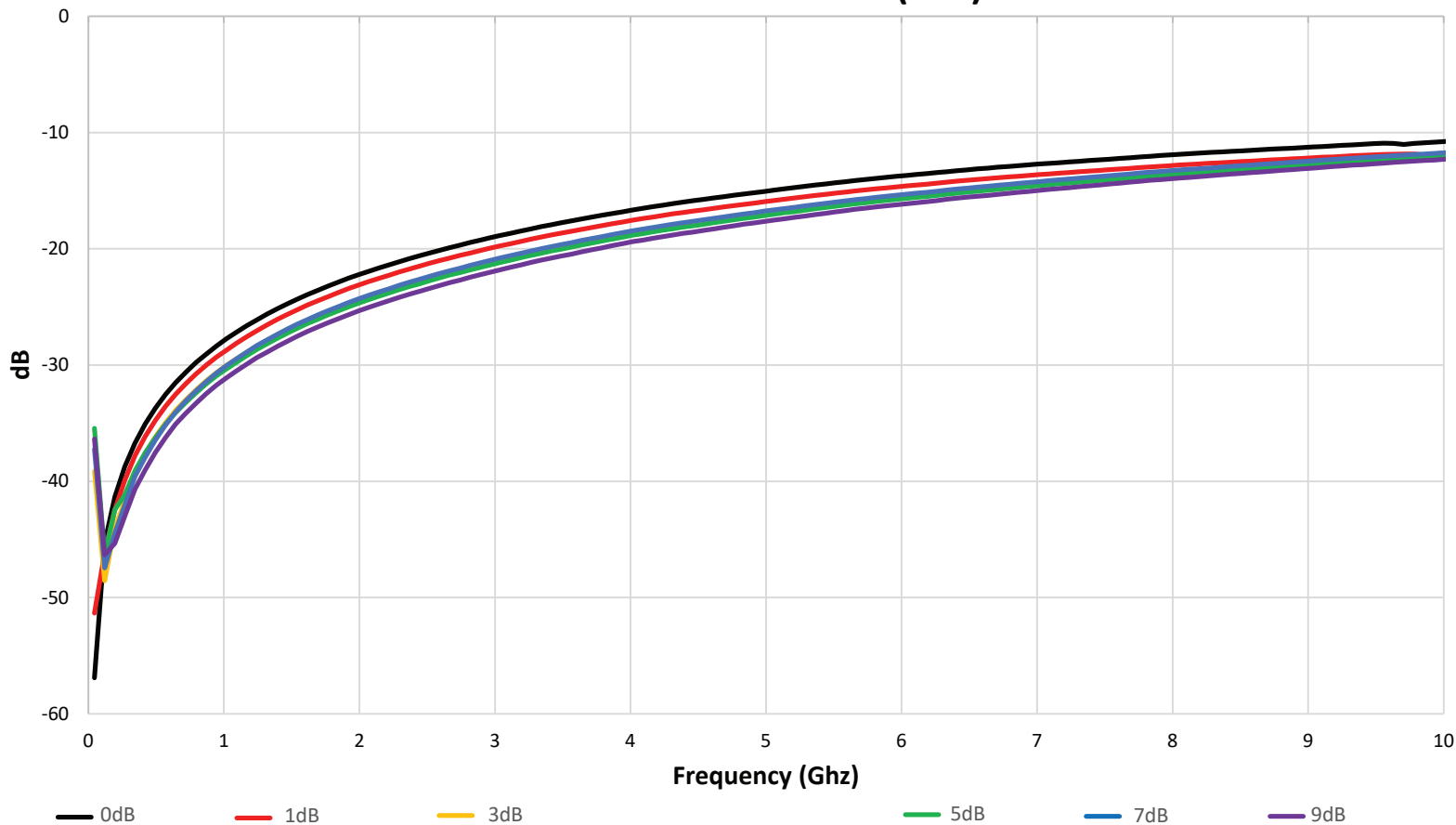
## IMS2533 Return Loss (S11)



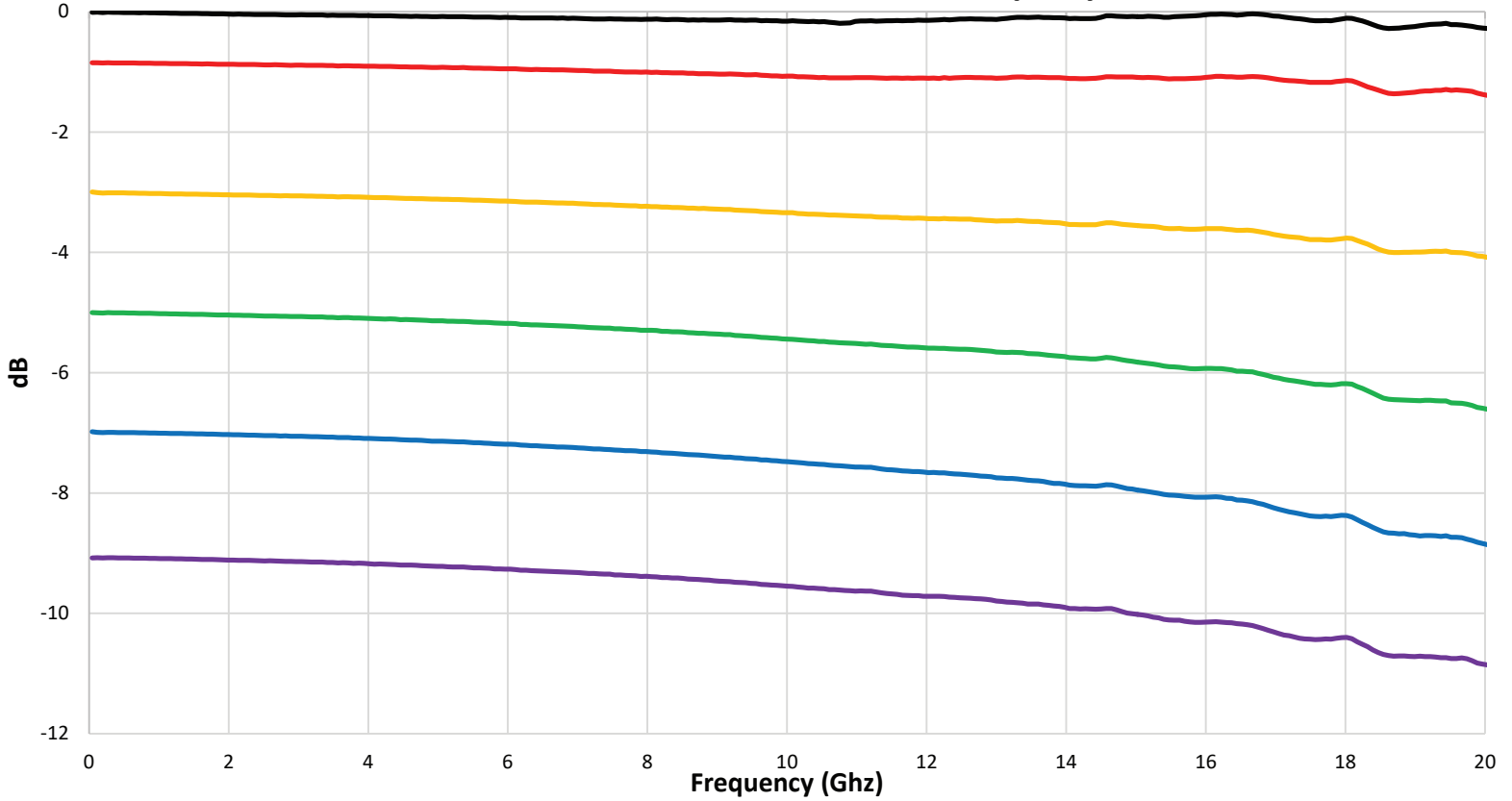
## A-0805 Insertion Loss (S21)



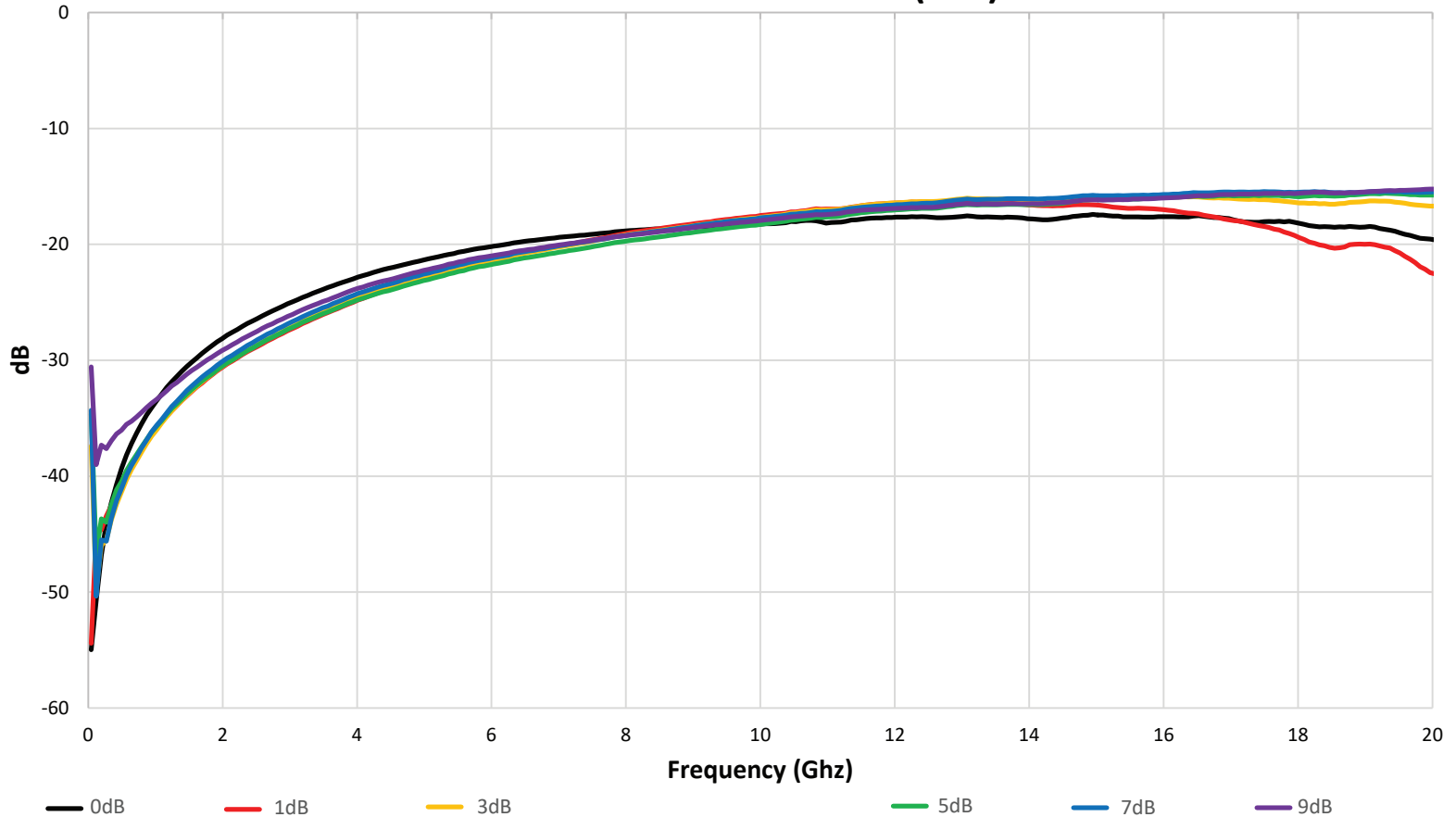
## A-0805 Return Loss (S11)



## IMS1141 Insertion Loss (S21)

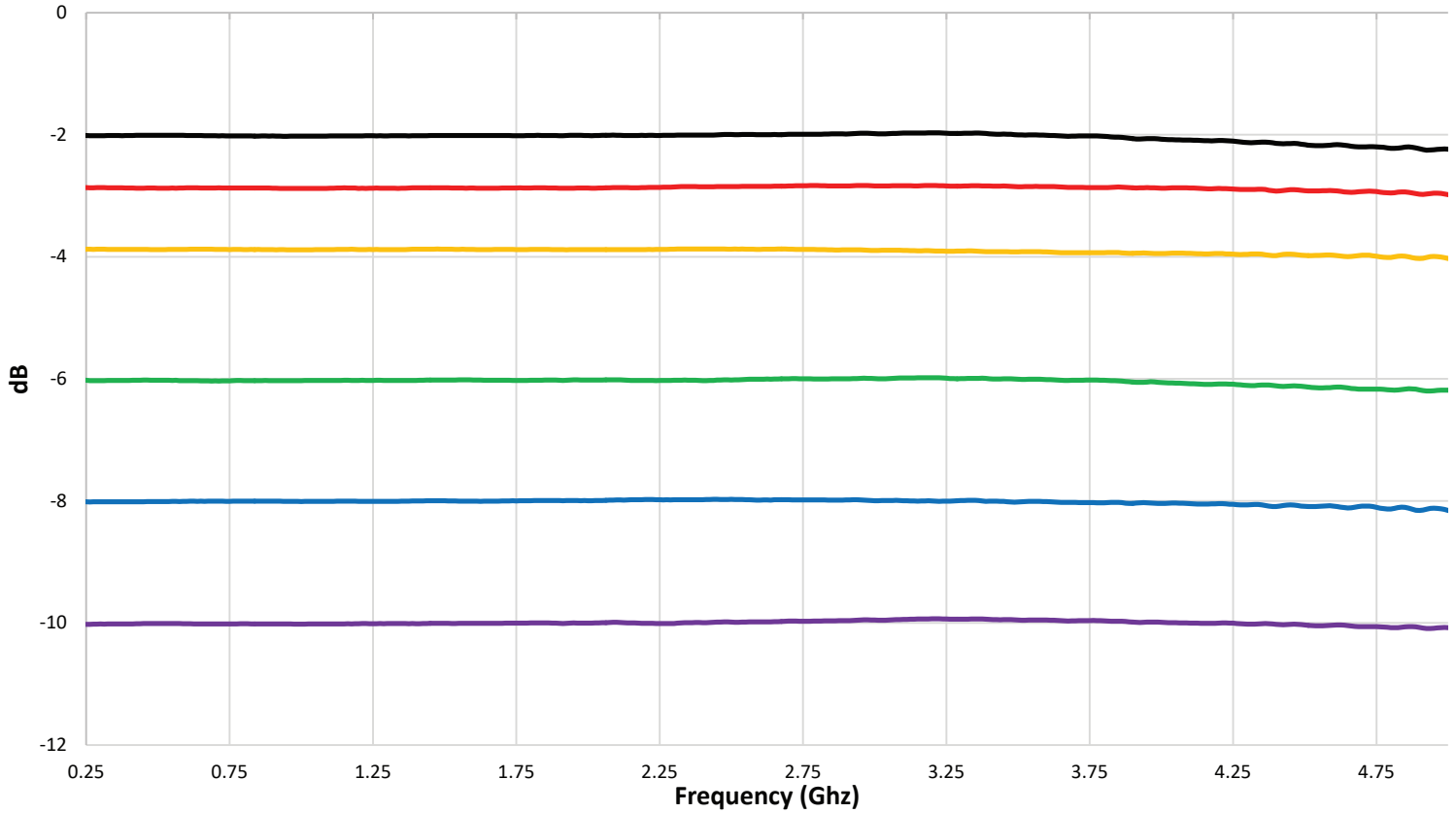


## IMS1141 Return Loss (S11)

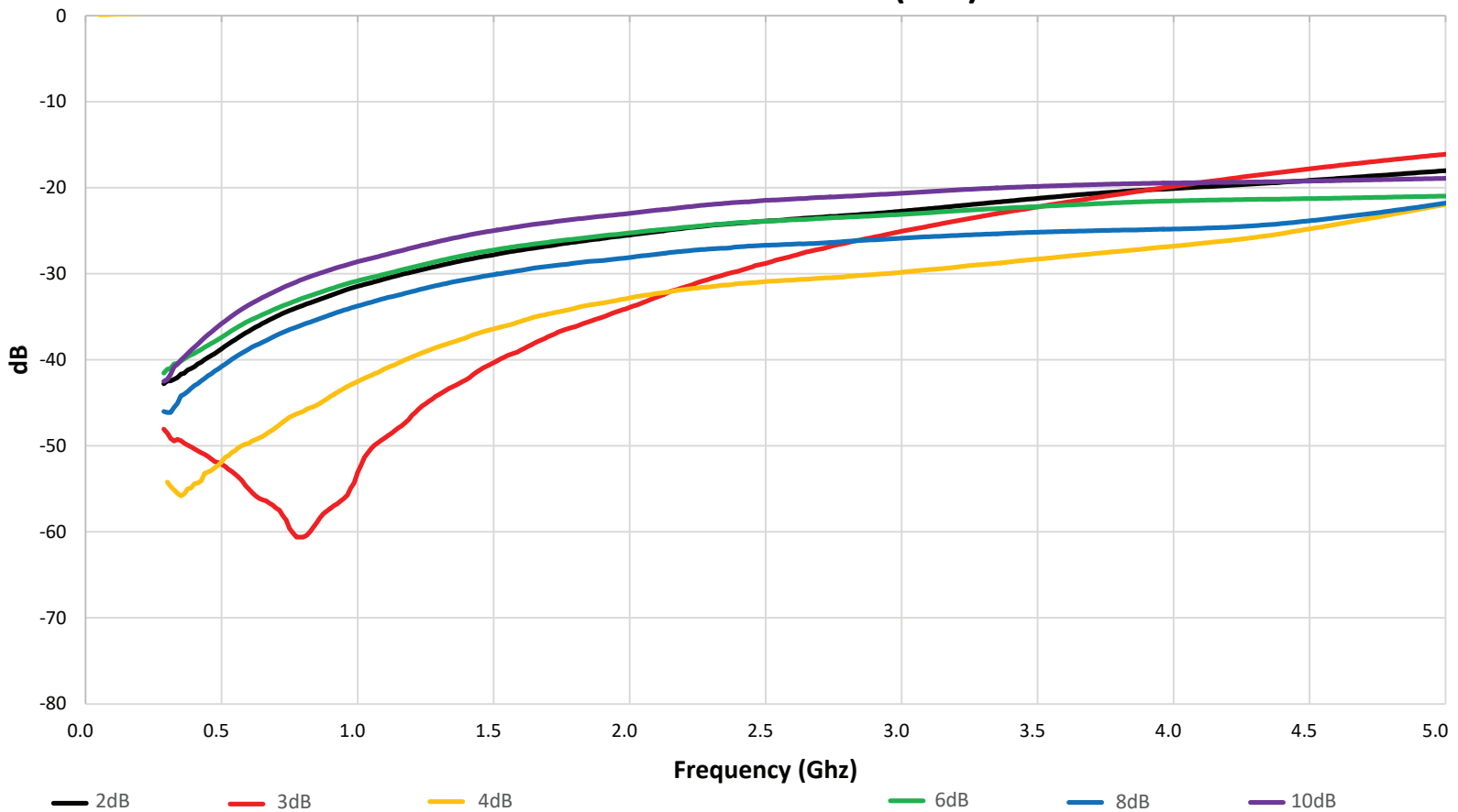




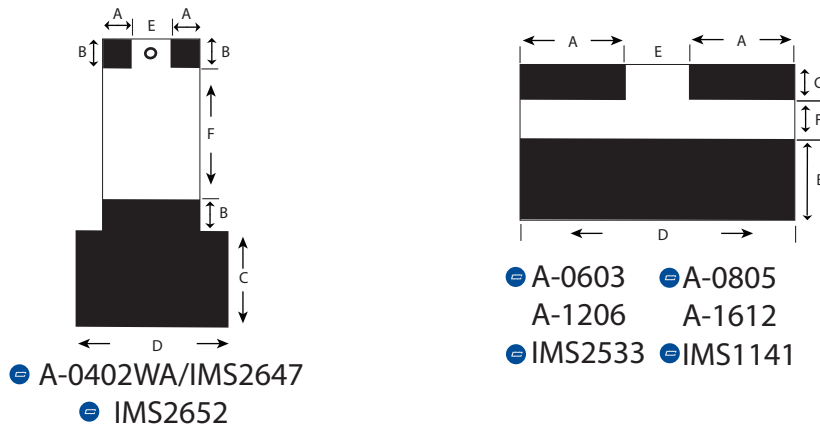
## A-1206 Insertion Loss (S21)



## A-1206 Return Loss (S11)



## TERMINAL DIMENSIONS OF INSTALLED SURFACE



All dimensions are in inches (nominal)

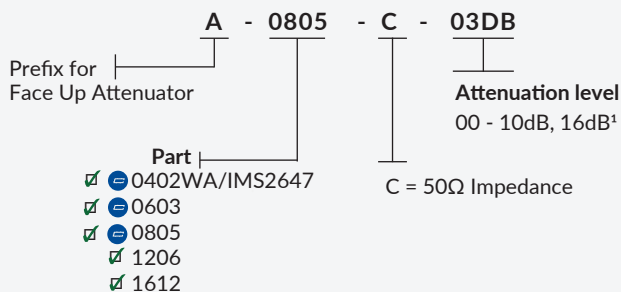
| Part                                      | A    | B    | C    | D    | E    | F    |
|---|------|------|------|------|------|------|
| <input type="checkbox"/> A-0402WA/IMS2647 | .009 | .014 | .024 | .048 | .008 | .016 |
| <input type="checkbox"/> A-0603           | .023 | .046 | .013 | .070 | .023 | .012 |
| <input type="checkbox"/> A-0805           | .030 | .051 | .024 | .090 | .030 | .013 |
| A-1206                                    | .049 | .051 | .026 | .136 | .038 | .026 |
| A-1612                                    | .030 | .027 | .047 | .175 | .115 | .027 |
| <input type="checkbox"/> IMS2652          | .009 | .014 | .024 | .048 | .008 | .016 |
| <input type="checkbox"/> IMS2533          | .023 | .046 | .013 | .070 | .023 | .012 |
| <input type="checkbox"/> IMS1141          | .030 | .051 | .024 | .090 | .030 | .013 |

## RESISTOR SIDE MOUNT ORIENTATION

| A-0402WA<br>IMS2647 | IMS2652 | A-0603 | IMS2533 | A-0805 | IMS1141 | A-1206 | A-1612 |
|---------------------|---------|--------|---------|--------|---------|--------|--------|
| UP                  | DOWN    | UP     | DOWN    | UP     | DOWN    | UP     | UP     |

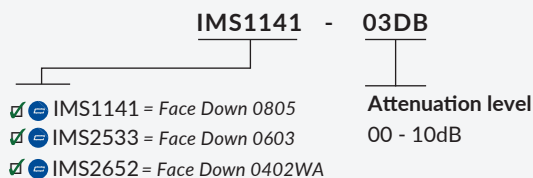
## ORDERING INFORMATION

Face Up Example: 3dB, 100mW, SMT 0805 attenuator



1. A-1206 and A-1612 only

Face Down Example: 3dB, 100mW, SMT 0805 attenuator



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