

TangiTek CleanSignal™ Technology Shielding Effectiveness Testing

Introduction

This document presents independent lab testing results of TangiTek **CleanSignal™** materials in the 1 GHz to 17 GHz frequency range. Northwest EMC (NW EMC) conducted these tests as per a modified IEEE-STD-299 methodology. The tests were conducted at the NW EMC facility in Beaverton, OR on October 20th 2011.

The purpose of these tests was to determine the shielding effectiveness of various **CleanSignal™** materials in comparison to some commercially available 3M shielding products.

Test Materials and Results

Table 1 below shows the list of materials tested along with their respective physical properties. All samples tested were 135.00 mm round disks.

| Table 1. CleanSignal™ Shielding Effectiveness Testing – Test Sample Description. | | | | |
|-----------------------------------------------------------------------------------------|-------------------------------|----------------------|-----------------------------------|-------------------------------|
| Sample Size: 135 mm round disk. | | | | |
| Test # | Sample Description | Material Type | Approximate Thickness (mm) | Approximate Weight (g) |
| 1 | 3M 1125 | Mat-flexible | 0.15 | 8.50 |
| 2 | 3M 1125 w/CleanSignal™ | Mat-flexible | 0.43 | 11.40 |
| 3 | 3M 1345 | Mat-flexible | 0.18 | 8.50 |
| 4 | 3M 1345 w/CleanSignal™ | Mat-flexible | 0.46 | 11.40 |
| 5 | 3 mil Cu w/CleanSignal™ | Rigid-Structural | 1.00 | 25.50 |
| 6 | 30 mil Composite | Rigid-Structural | 0.60 | 11.40 |
| 7 | Double CleanSignal™ | Rigid-Structural | 1.70 | 28.40 |
| 8 | Quilted CleanSignal™ | Fabric | 0.65 | 5.70 |
| 9 | 3M 5100 | Mat-flexible | 1.13 | 48.20 |
| 10 | 3M 7830 | Mat-flexible | 0.38 | 8.50 |
| 11 | 3M 1125 w/CleanSignal™ & Edge | Mat-flexible | 0.42 | 8.60 |

- Sample Tests #1, #3, #9, and #10 (solid lines in the graphs presented in this paper) present test data of shielding effectiveness of commercially available 3M products across a range of frequencies.
- Tests #2, #4, and #11 (dashed lines in the graphs presented in this paper) present test data of shielding effectiveness commercially available 3M products that were enhanced with TangiTek **CleanSignal™** composite material technology.

- Tests #5, #6, #7, and #8 (dashed lines in the graphs presented in this paper) present test data for low cost **CleanSignal™** composite materials manufactured by TangiTek without the use of 3M products.

Image 1 below shows the testing fixture and test setup in the anechoic chamber at the testing facility at NWEMC.

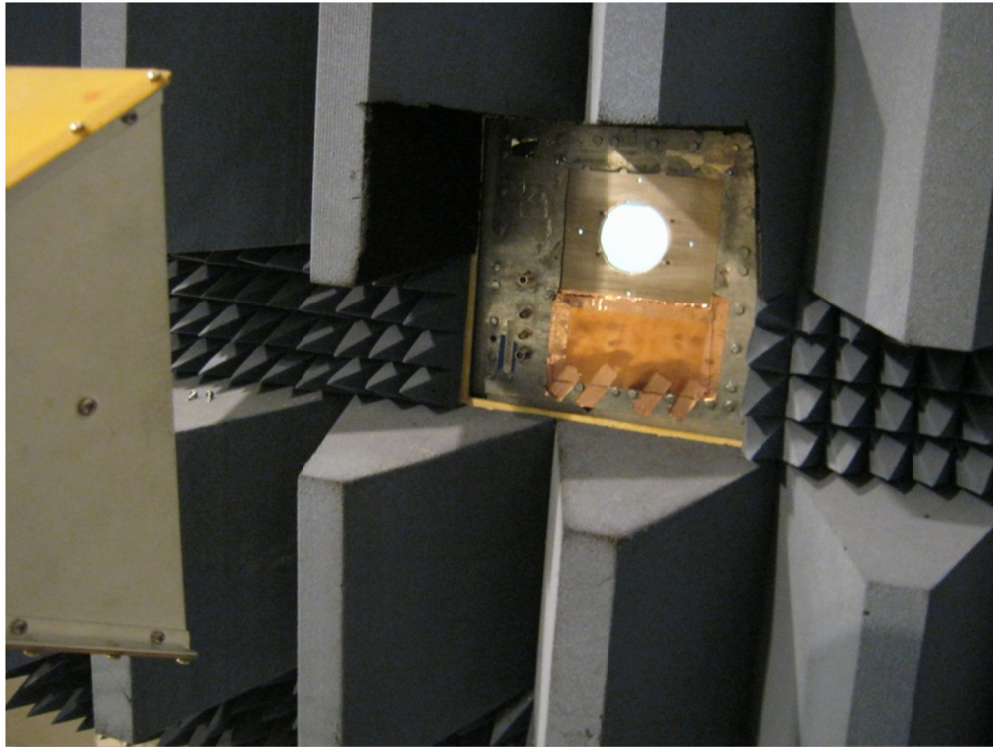


Image 1 Test Fixture in NWEMC Anechoic Chamber

The test data results across a 1GHz to 17GHz frequency range are presented as a series of plots of Shielding Effectiveness (dB) against Frequency (GHz).

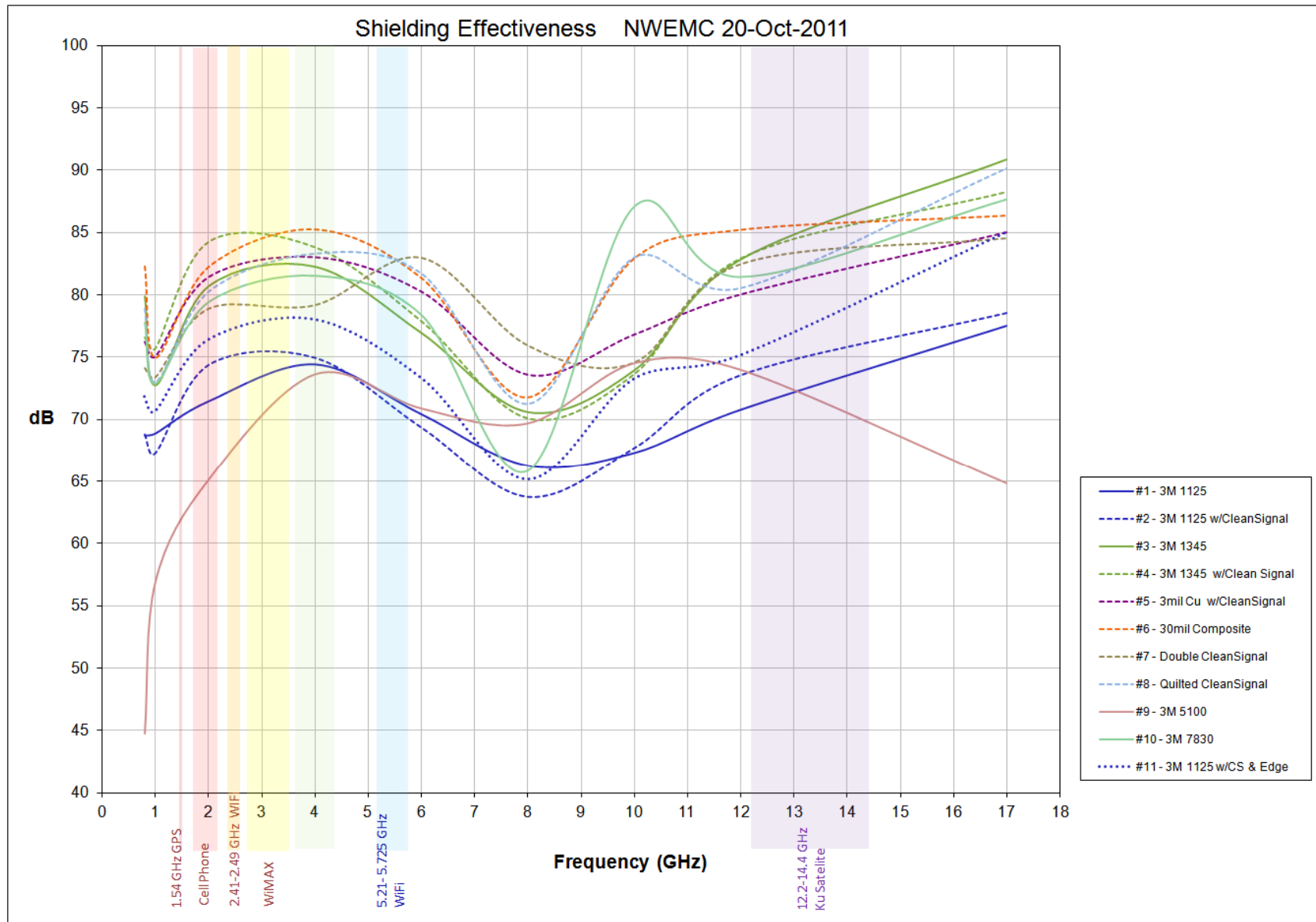


Figure 1 Shielding Effective Results of all materials – 1 GHz to 17 GHz

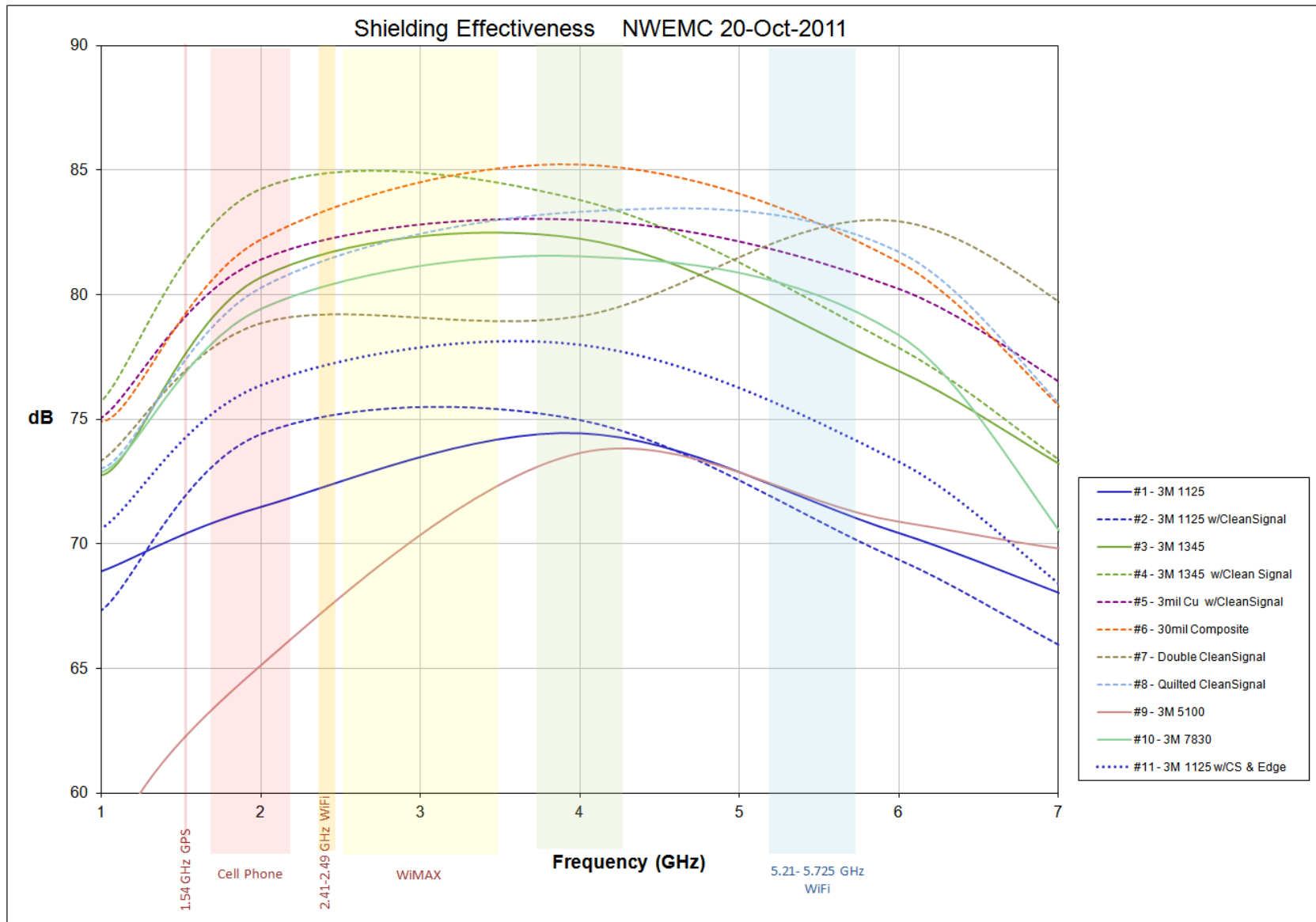


Figure 2 Shielding Effective Results of all materials – 1 GHz to 7 GHz

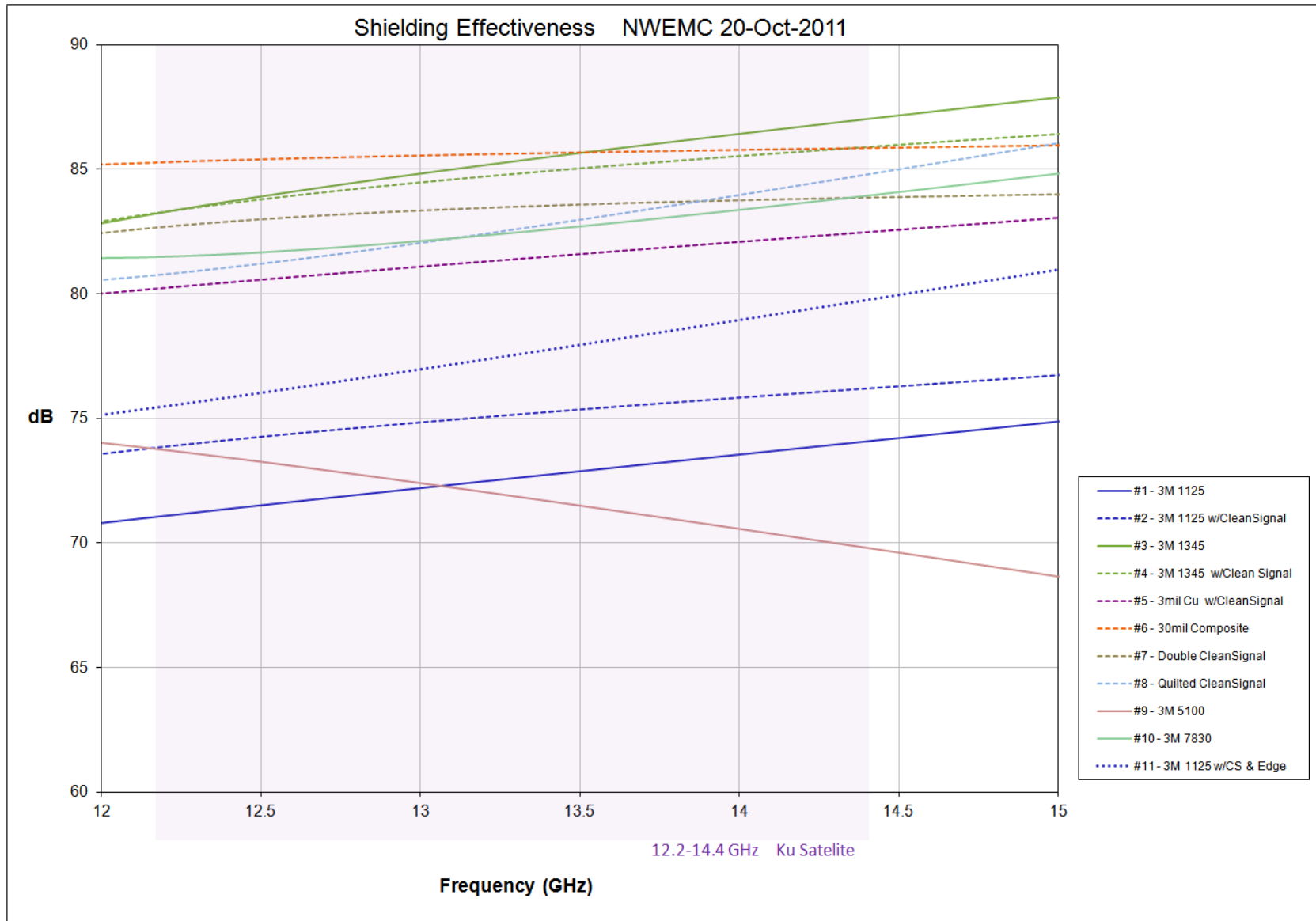


Figure 3 Shielding Effective Results of all materials – 12 GHz to 15 GHz

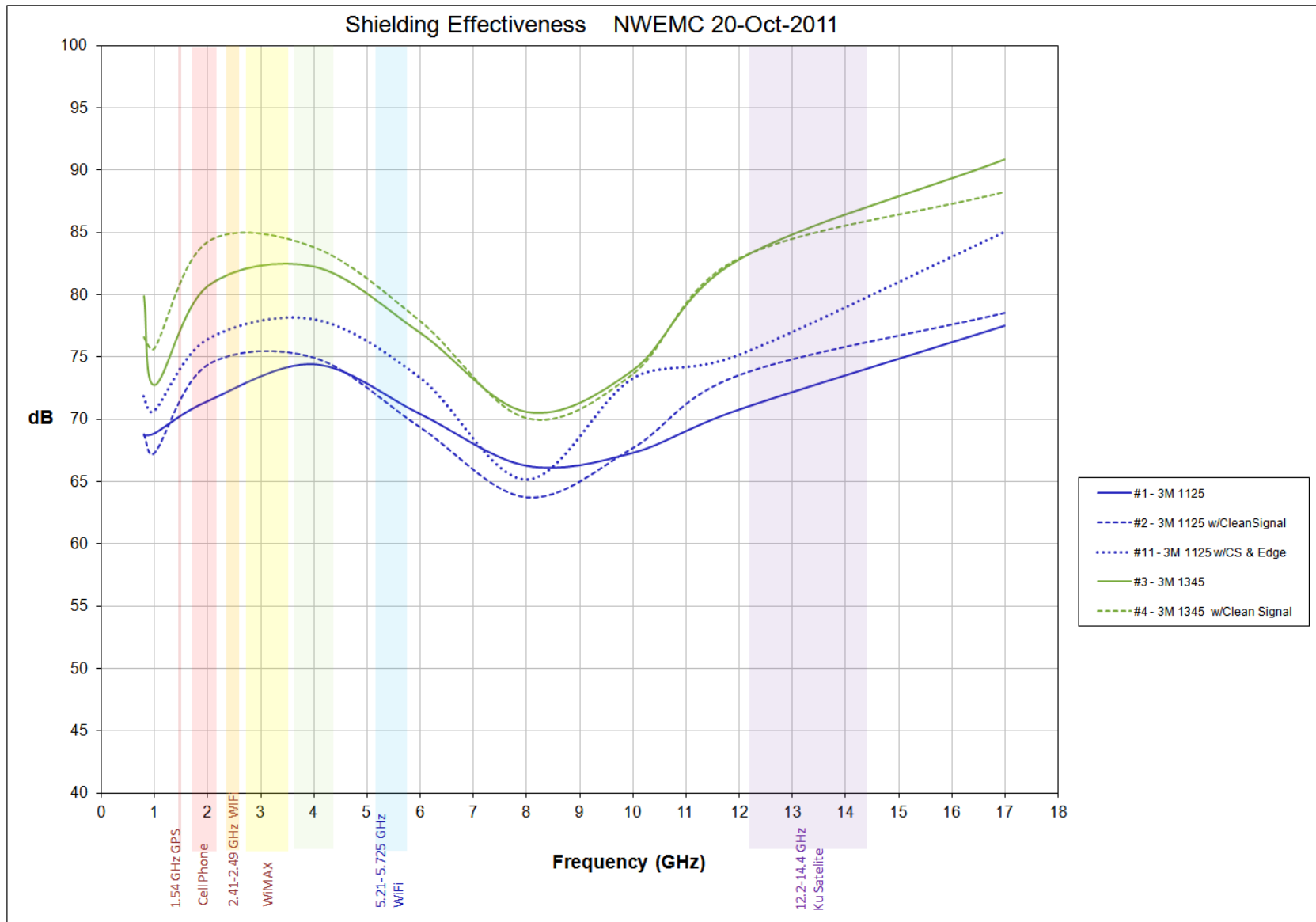


Figure 4 Shielding Effective Results of 3M and 3M-CleanSignal™ enhanced materials – 1 GHz to 17 GHz

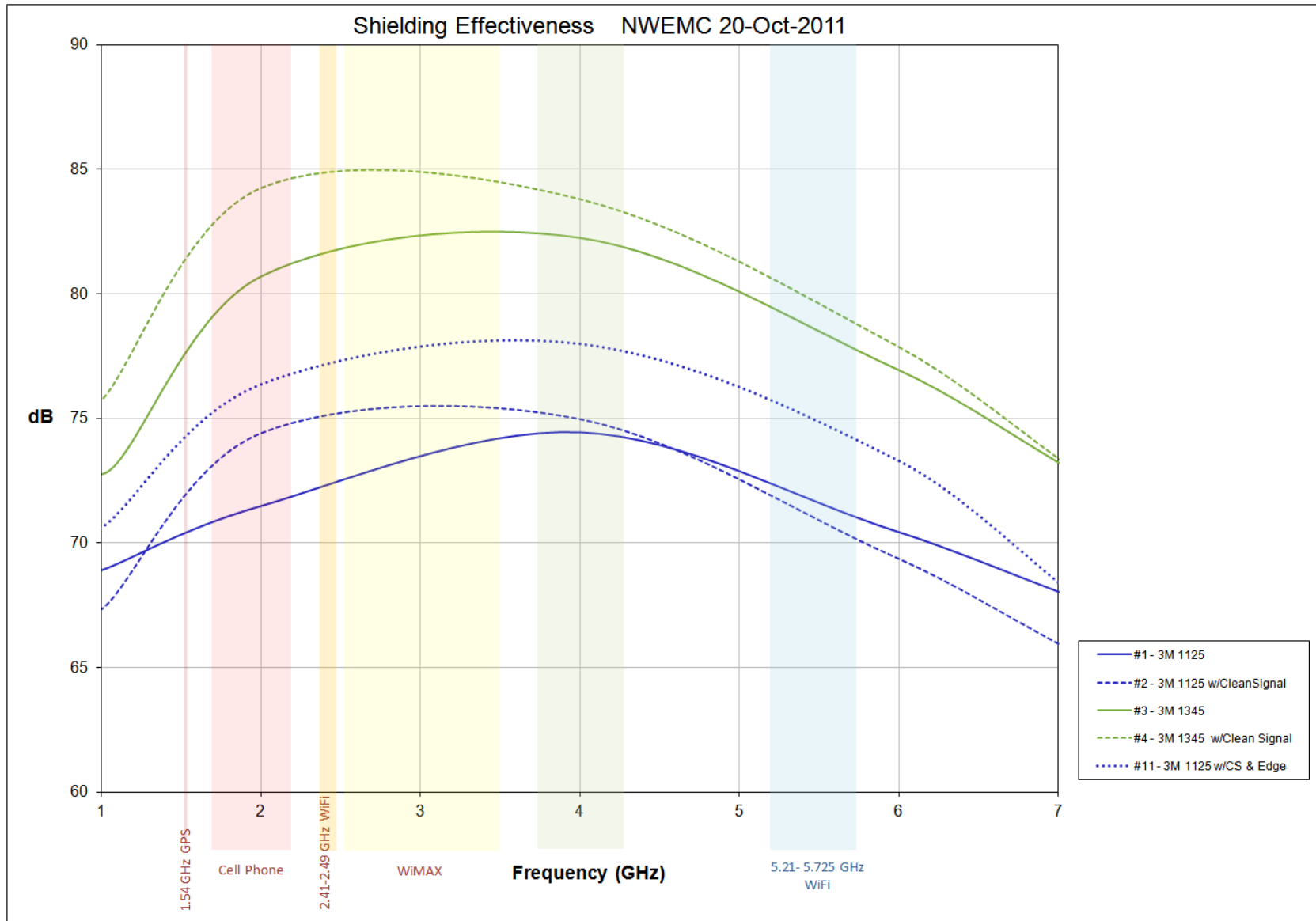


Figure 5 Shielding Effective Results of 3M and 3M-CleanSignal™ enhanced materials – 1 GHz to 7 GHz

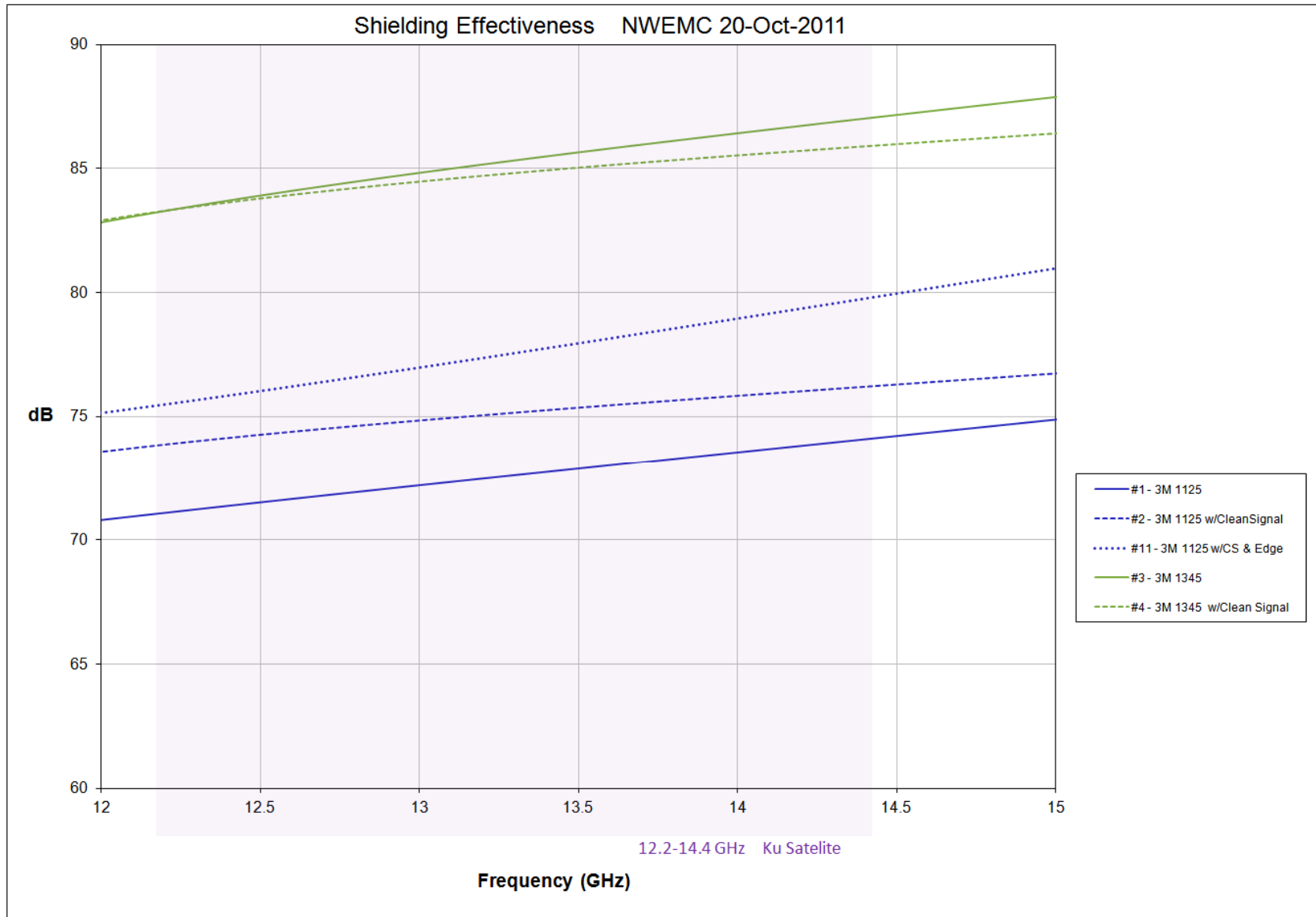


Figure 6 Shielding Effective Results of 3M and 3M-CleanSignal enhanced materials – 12 GHz to 15 GHz

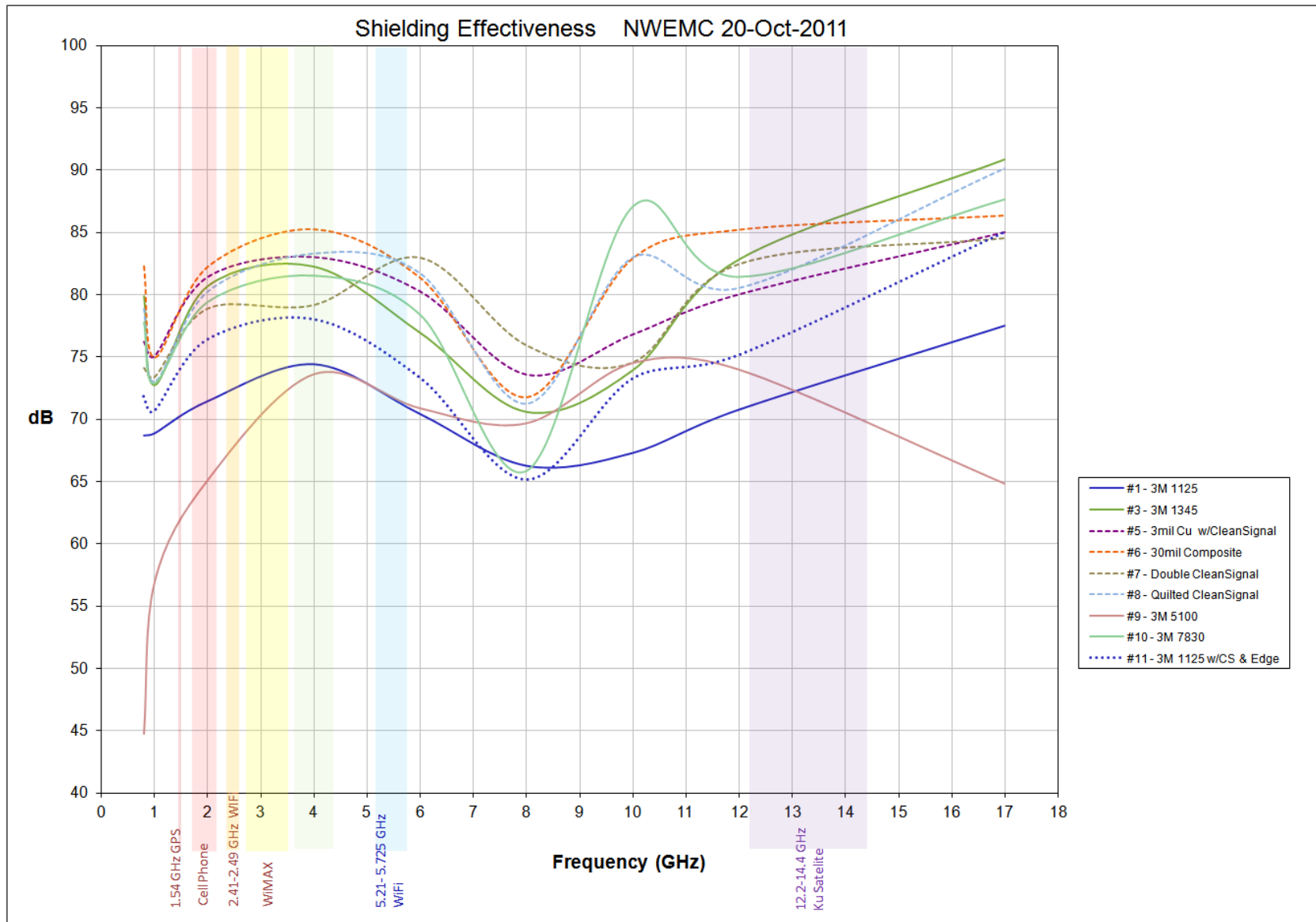


Figure 7 Shielding Effective Results Comparison of 3M and CleanSignal™ materials – 1 GHz to 17 GHz

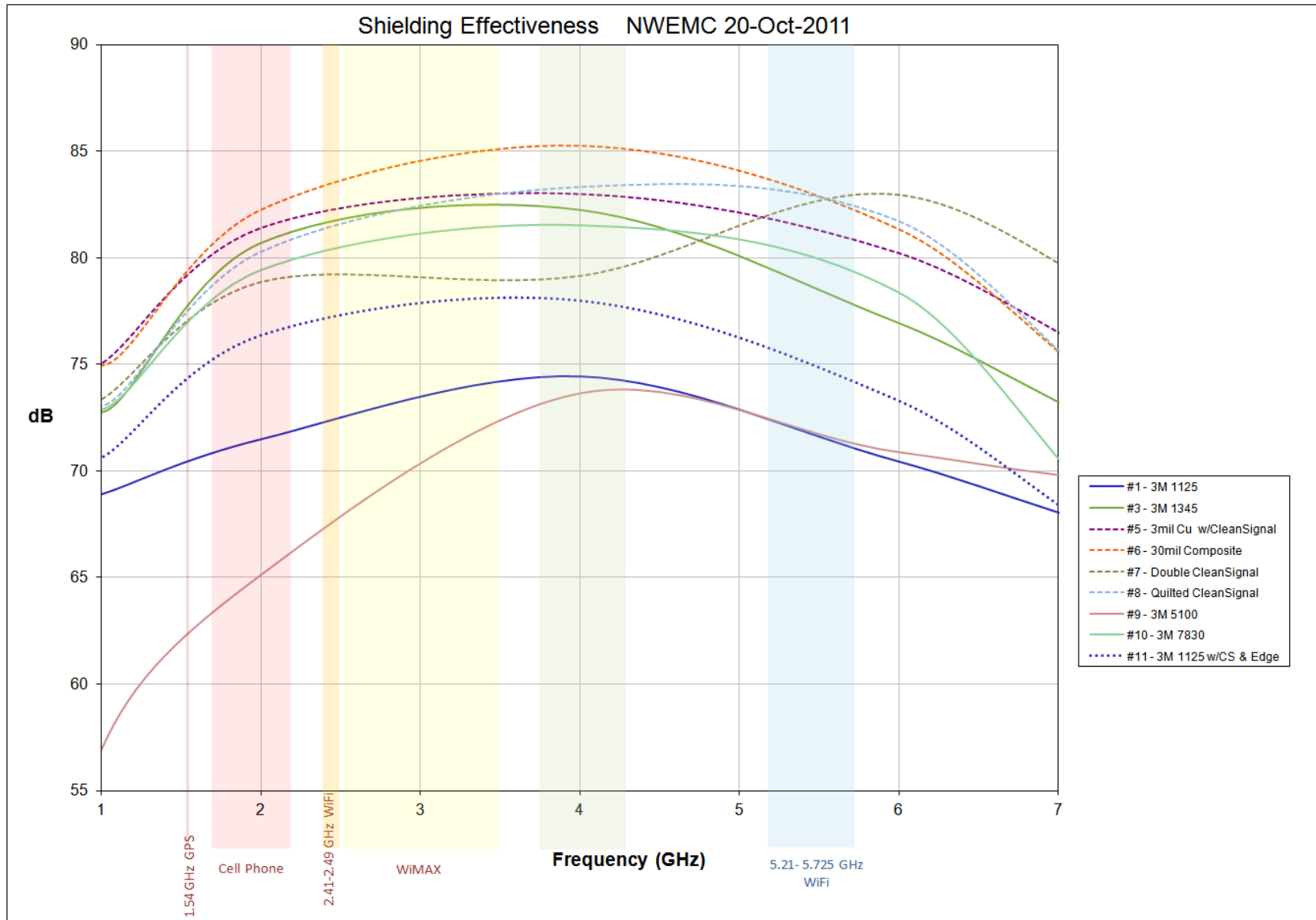


Figure 8 Shielding Effective Results of 3M and 3M-CleanSignal™ enhanced materials – 1 GHz to 7 GHz

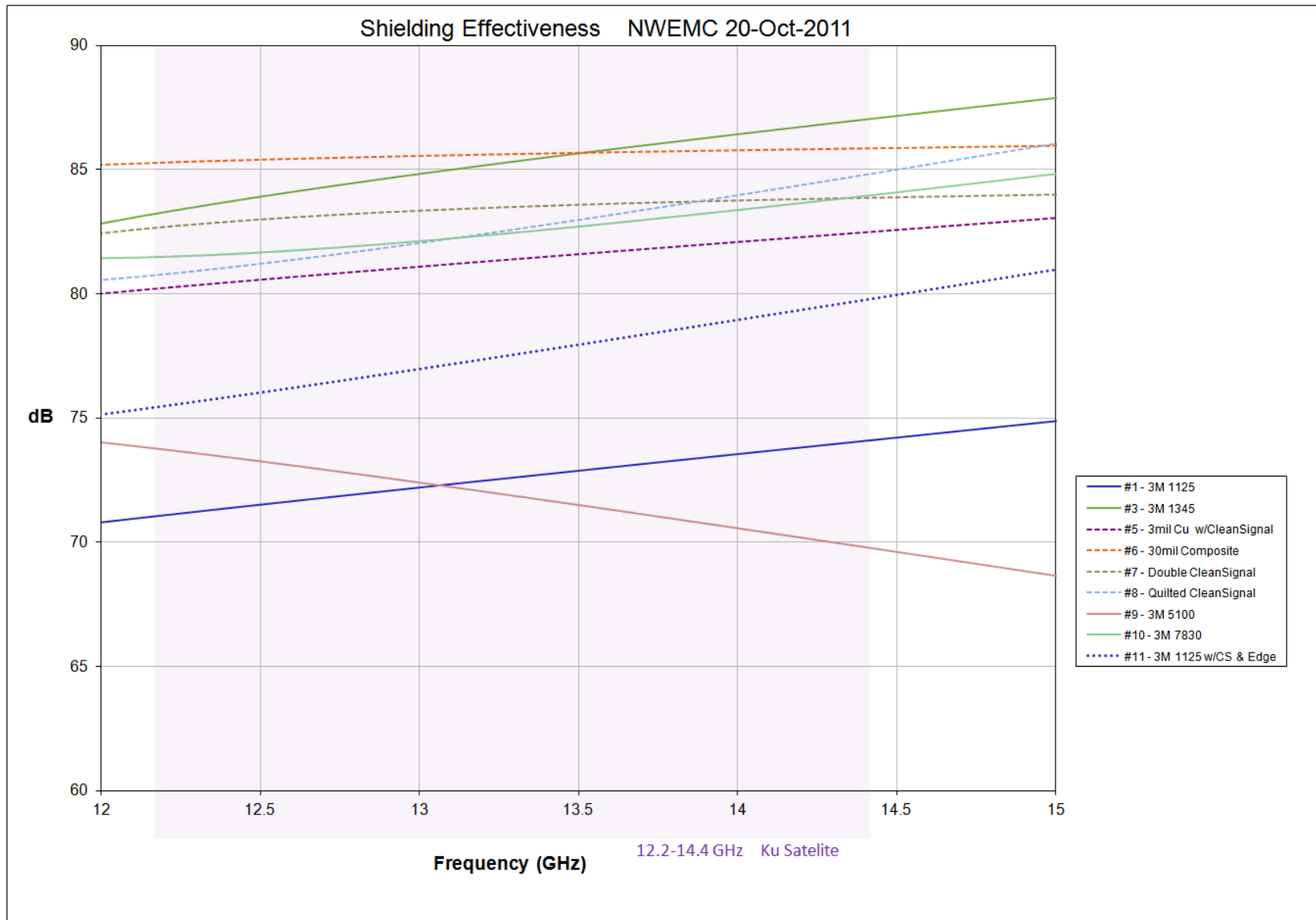


Figure 9 Shielding Effective Results - Comparison of 3M CleanSignal™ enhanced materials – 12 GHz to 15 GHz

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