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# Attenuation Data on Various Cables

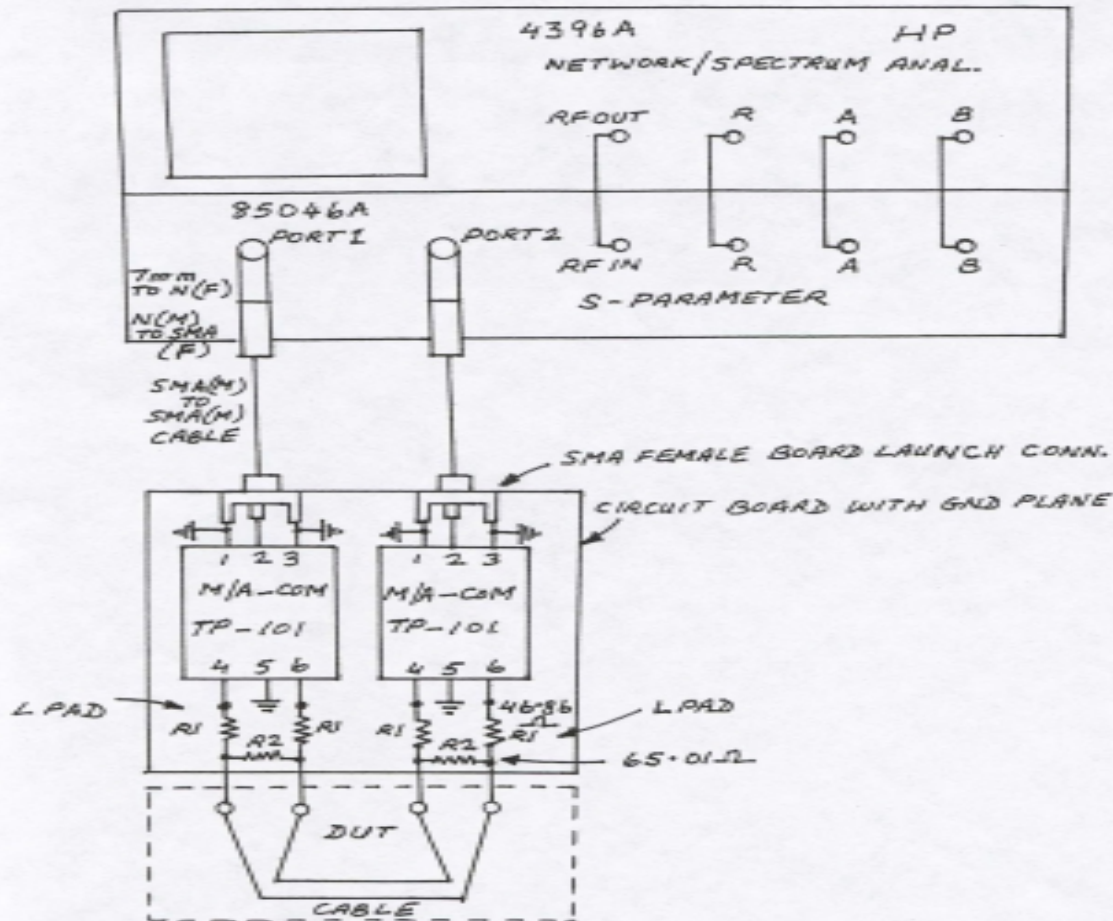
## T10/00-385r0

Seagate - Bruce Manildi

Santa Cruz, CA

October 10-11, 2000

# Measurement Setup



# Cables and lengths measured

## ■ Amphenol (Twist and Flat)

- Amp TnF222 = TPE, 4.25" twist, 1.75" flat, 30 AWG, solid, 222 feet
- AmpTnF\_b = TPE, 22.25" twist, 1.75" flat, 30 AWG, solid, 84 feet
- AmpTnF\_c = PVC, 3.75" twist, 2.25" flat, 30 AWG, solid, 61.5 feet
- AmpTnF\_d = PVC, 5.75" twist, 4.1" flat, 30 AWG, solid, 86 feet
- AmpTnF\_e = TPE, 8.1" twist, 1.75" flat, 30 AWG, solid, 207 feet
- AmpTnF\_F = TPE, 3.5" twist, 1.75" flat, 30 AWG, solid, 199.1 feet
- AmpTnF\_G = PVC, 8.1" twist, 1.75" flat, 30 AWG, Stranded (7), 124.8 feet
- AmpTnF\_H = PVC, 3.75" twist, 1.75" flat, 30 AWG, stranded (7), 147 feet

# Cable tested (continued)

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## ■ Hitachi

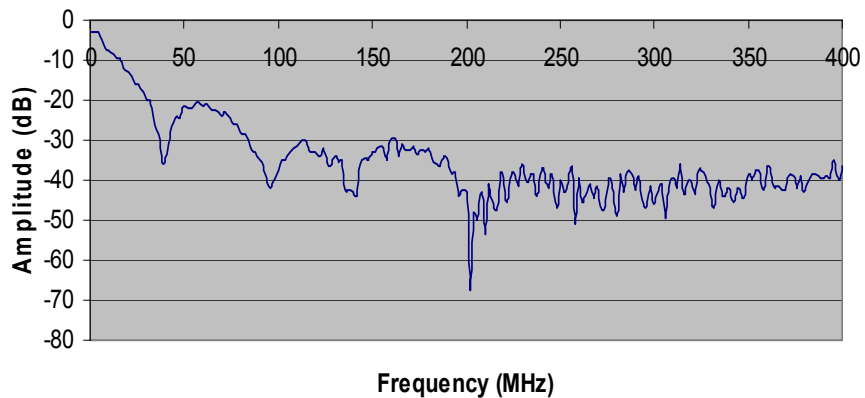
- Hit200b = shielded round, 28 AWG (7) stranded, 200 ft #48213-068
- Hit250a = shielded round, 30 AWG solid, 250 ft #49557-
- Hitnf\_c = TnF, 8" twist, 2" flat, 30 AWG stranded, 205 ft #20089
- Hitw61M = TnF, 8" twist, 2" flat, 30 AWG stranded 207 ft #21057

## ■ Madison

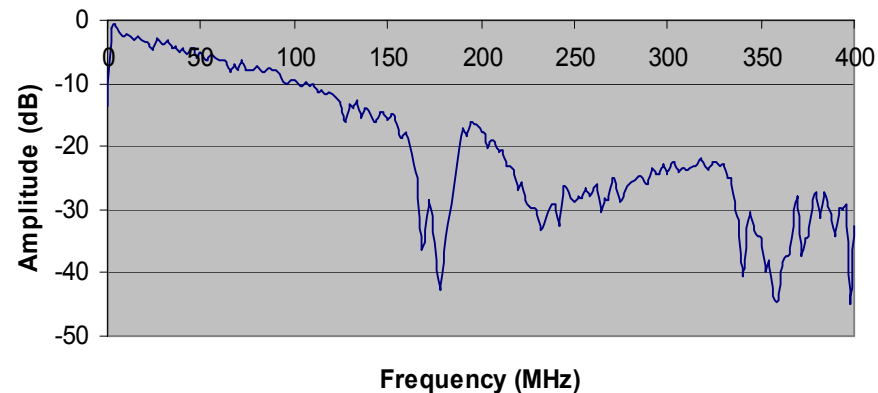
- M38 = shielded round, stranded, 38.5 ft #14779
- M82 = shielded round, 28 AWG solid, 82 ft #14748

# Data Plots

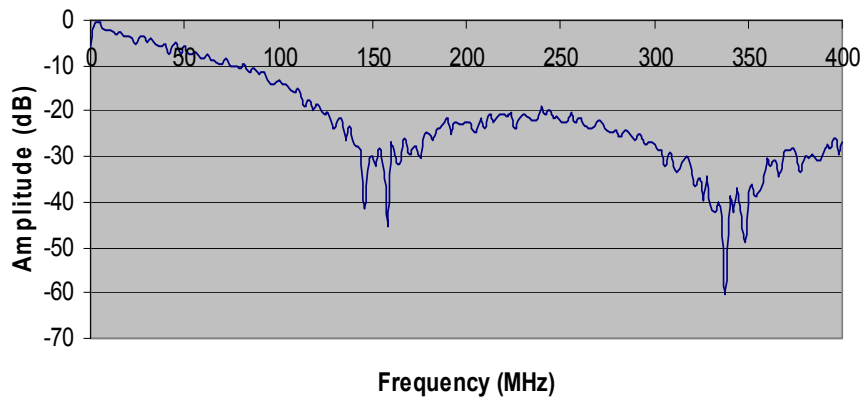
AmpTnF222



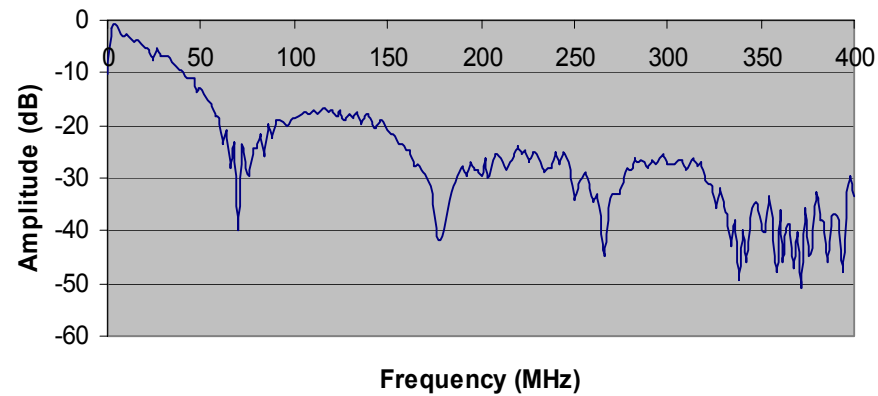
AmpTnF\_b



AmpTnF\_c

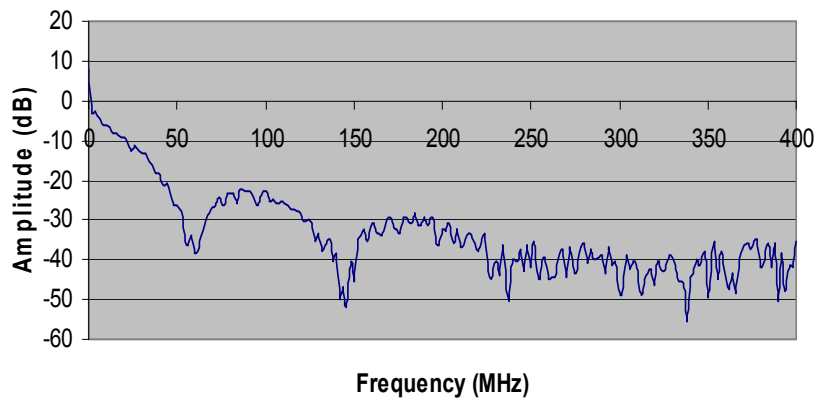


AmpTnF\_d

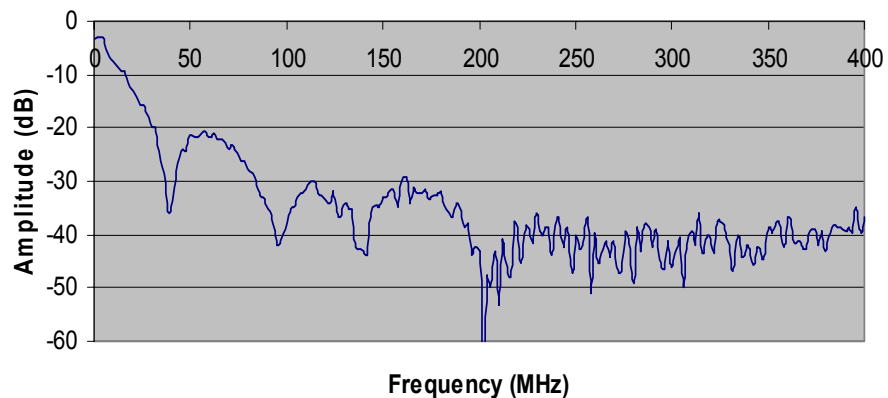


# Data Plots (continued)

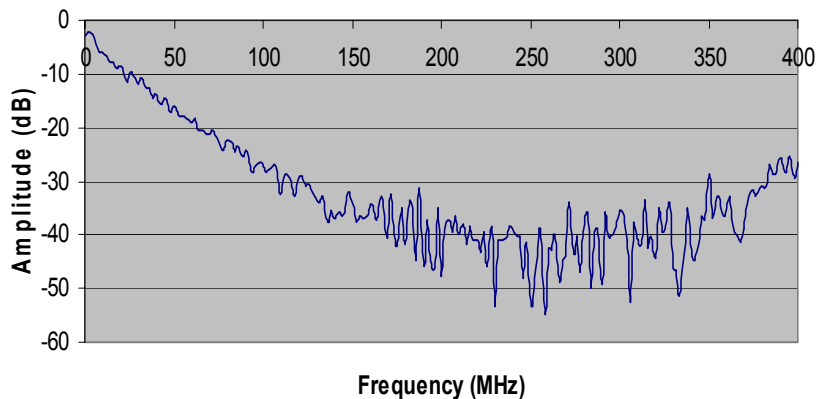
AmpTnF\_e



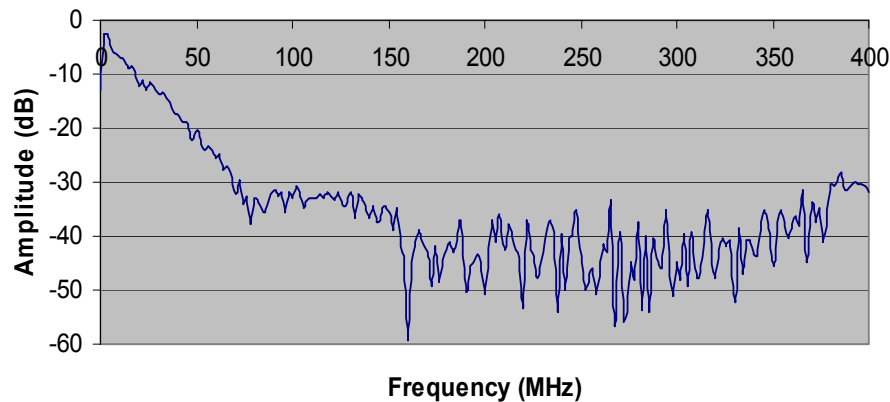
AmpTnF\_F



AmpTnF\_G

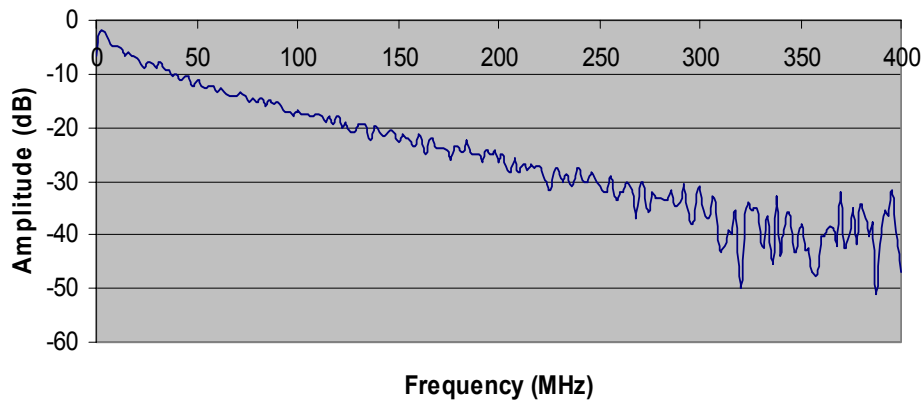


AmpTnF\_H

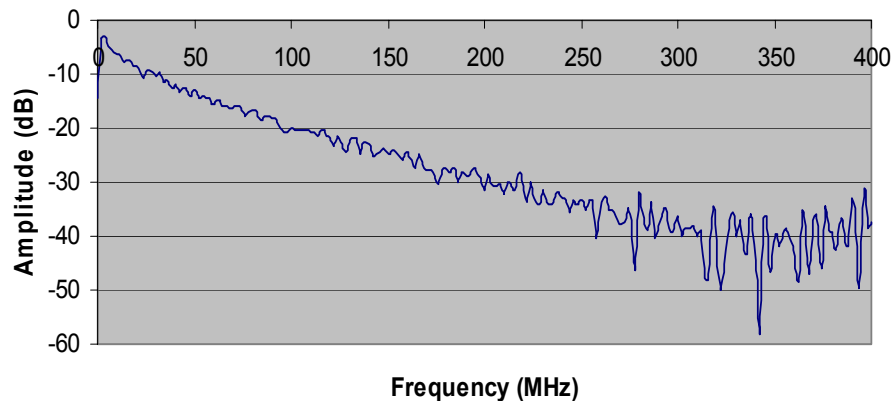


# Data Plots (continued)

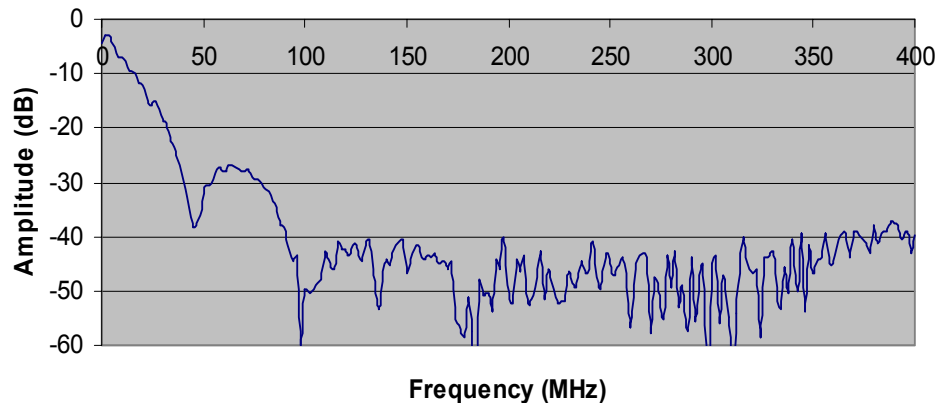
Hit 200 b



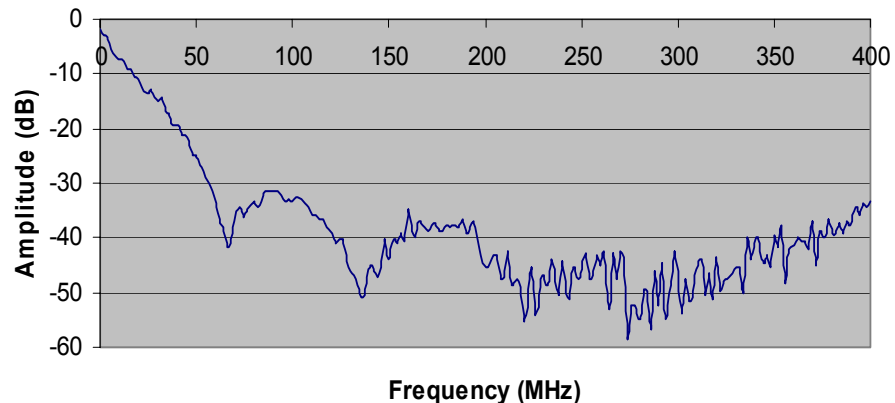
Hit 250 a



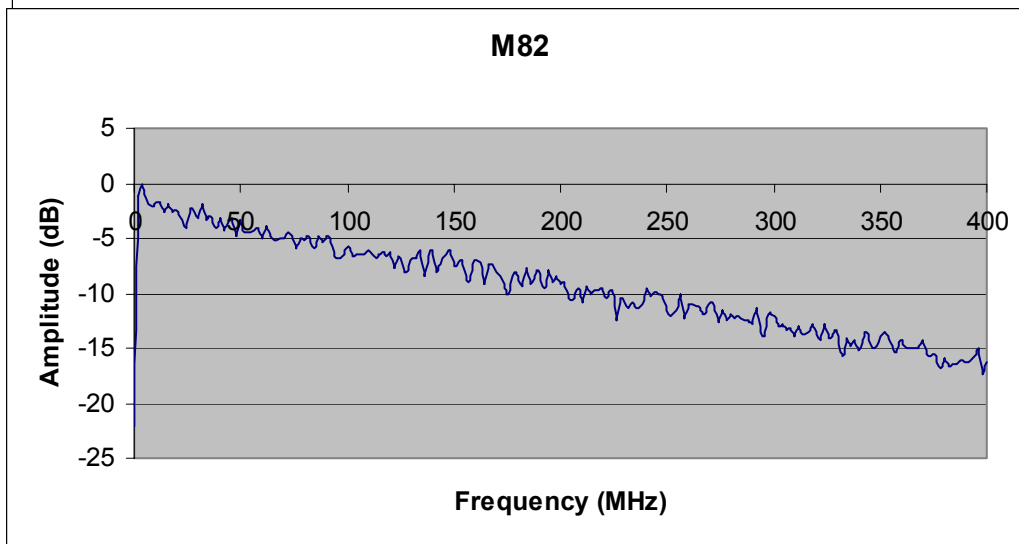
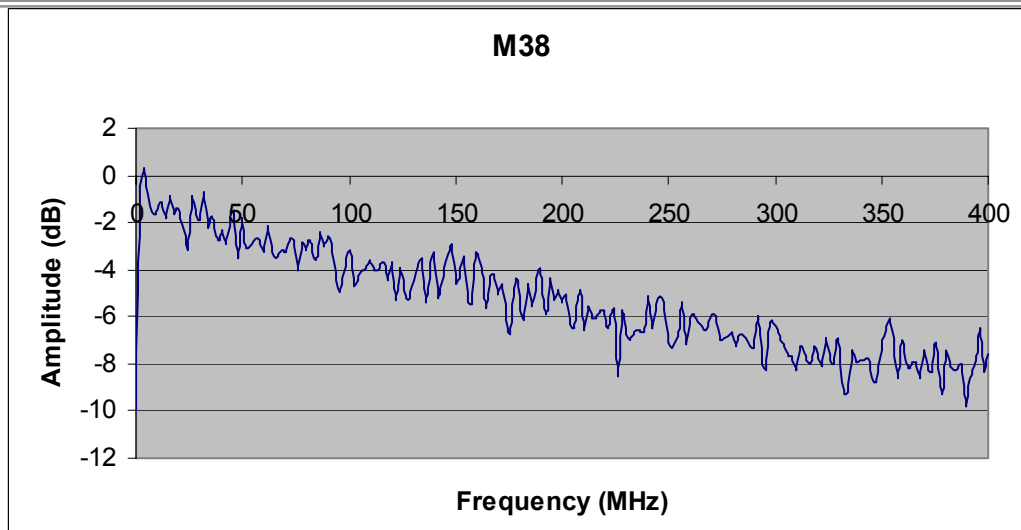
Hitnf\_c



Hitnf61M



# Data Plots (continued)





# Attenuation Vs. Length

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- Attenuation is directly proportional to length
- But - important parameter is attenuation not length
- Attenuation is now determined at 200 MHz
  - At Fast-80 this included fifth harmonic
  - At Fast-160 it doesn't even include the 3rd
  - There is very little energy in the third anyway
- Define attenuation at 80MHz and then all cables will meet the specification at a certain length (defined by their attenuation)

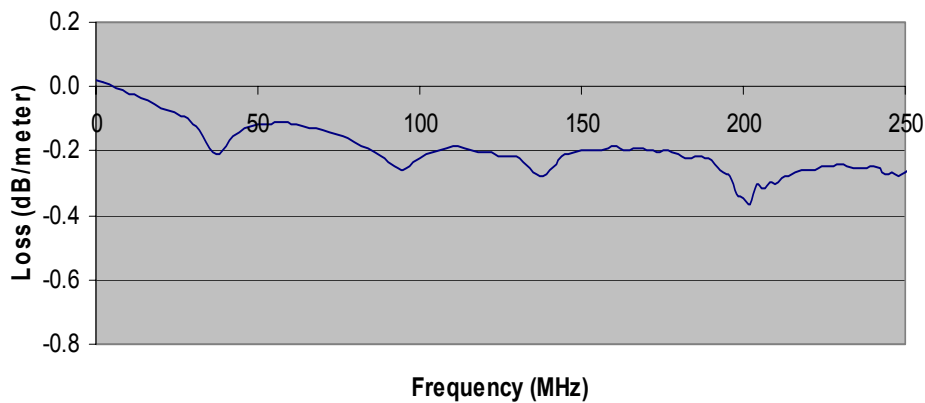
# Normalize Data to Length

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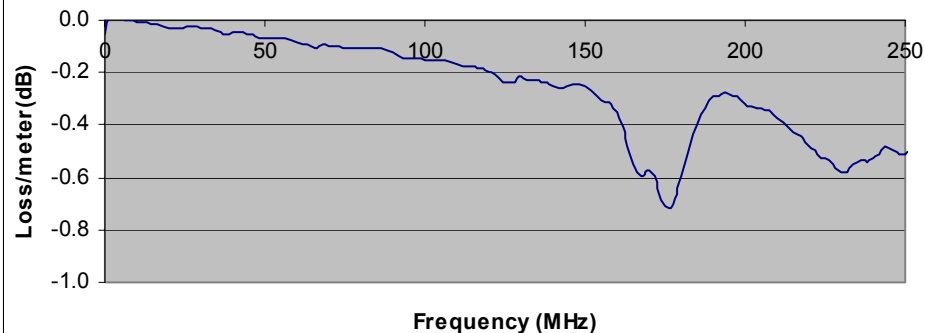
- Re-plotted data by dividing by the length in meters
- We now have attenuation per meter
- Determine the attenuation at 80 MHz (in dB) (or greatest loss below 80 MHz) and divide into 3 dB
- The result is the number of meters allowed for the cable to meet the specification
- The above procedure was used on the previous data and follows - - -

# Attenuation per meter

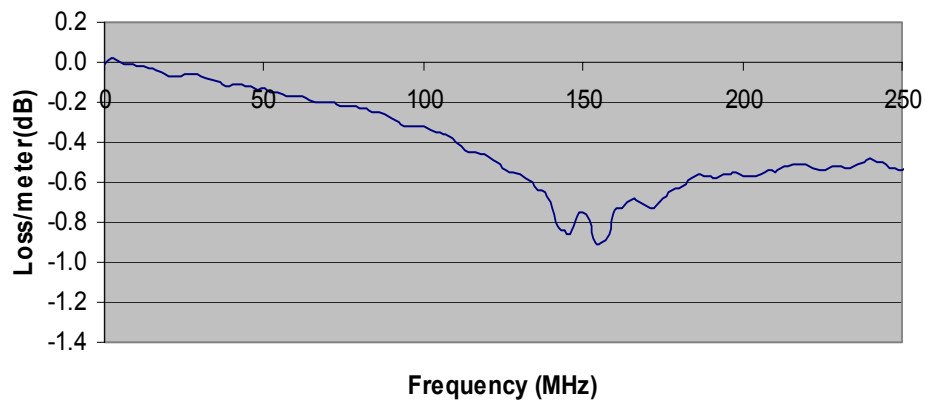
AmpTnF222



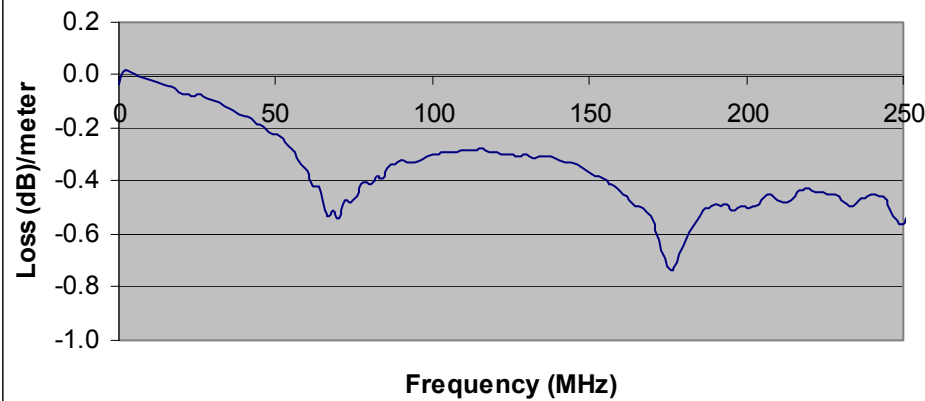
AmpTnF\_b



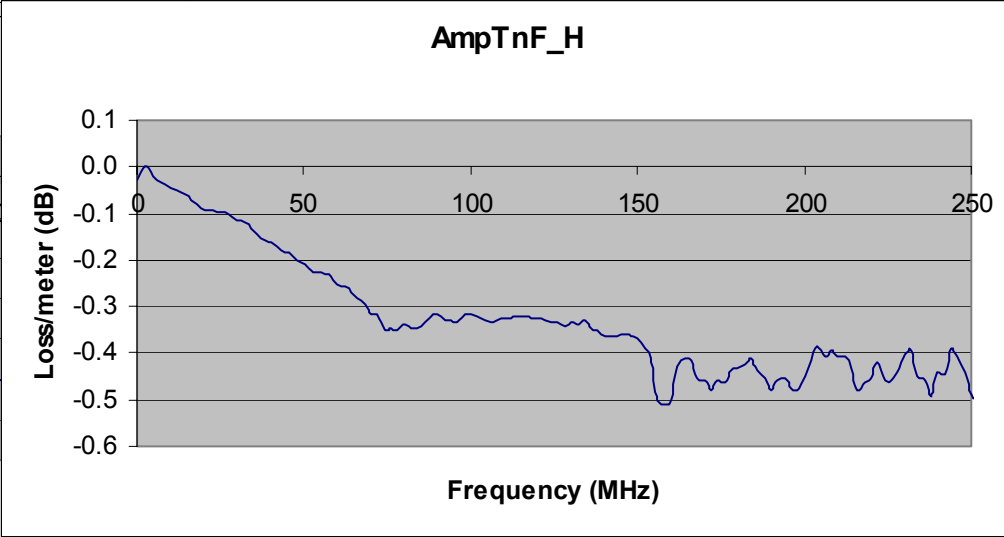
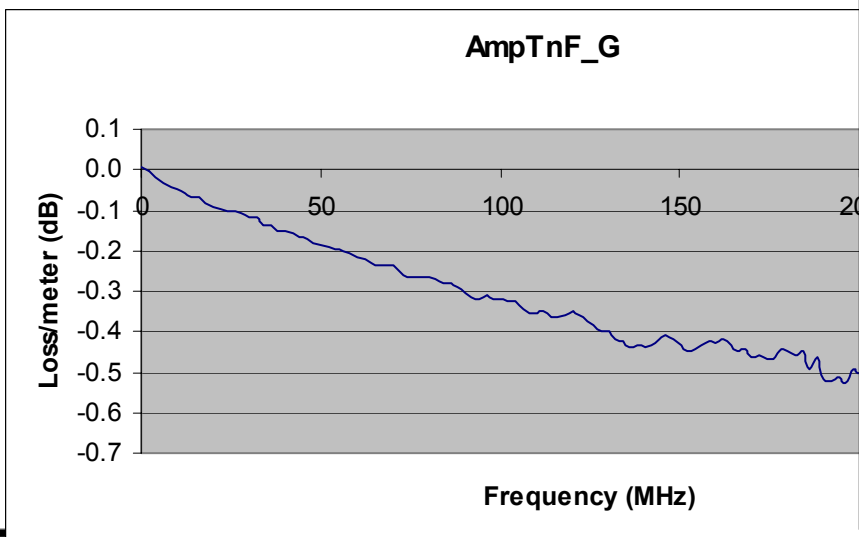
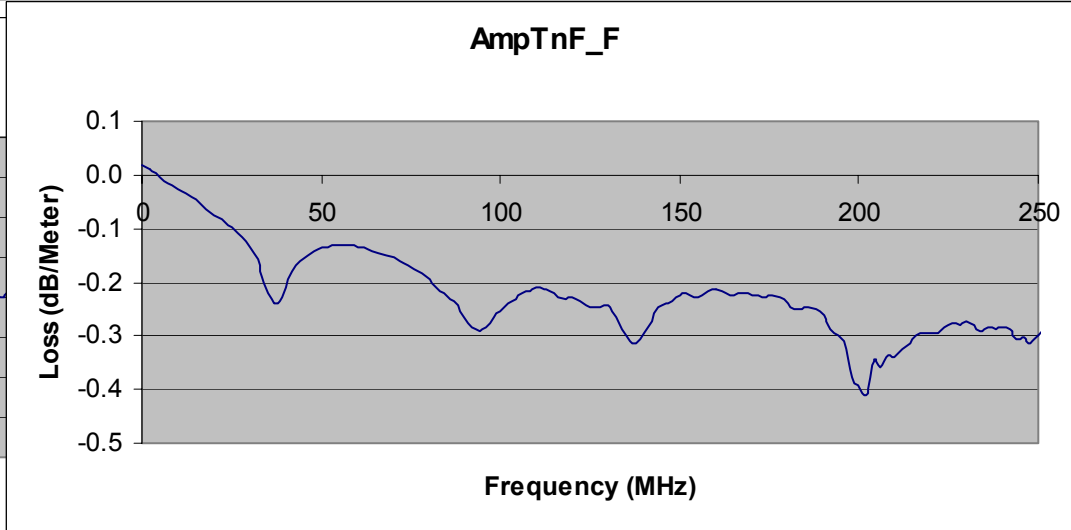
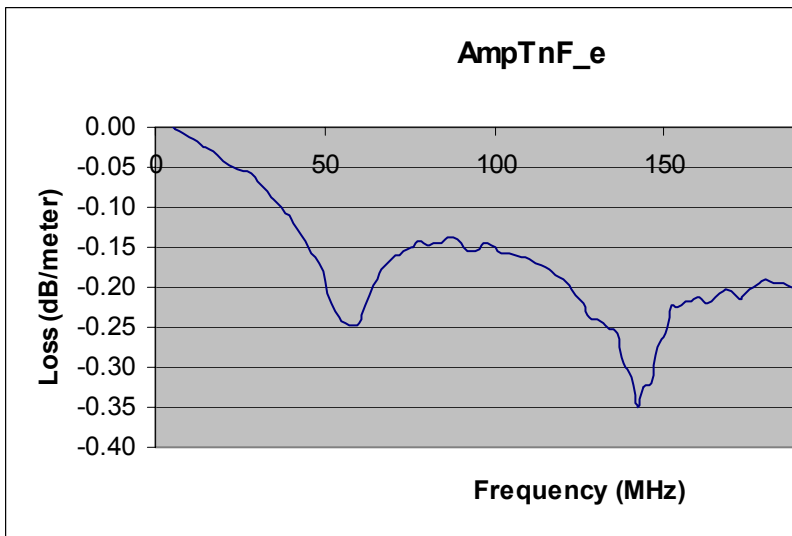
AmpTnF\_c



AmpTnF\_d

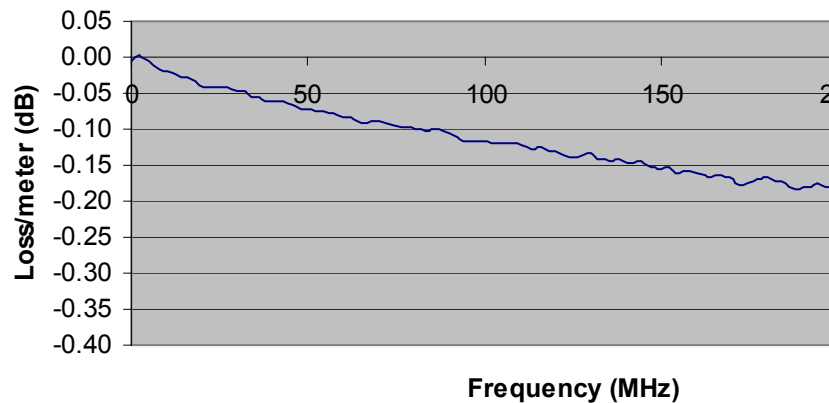


# Attenuation per meter

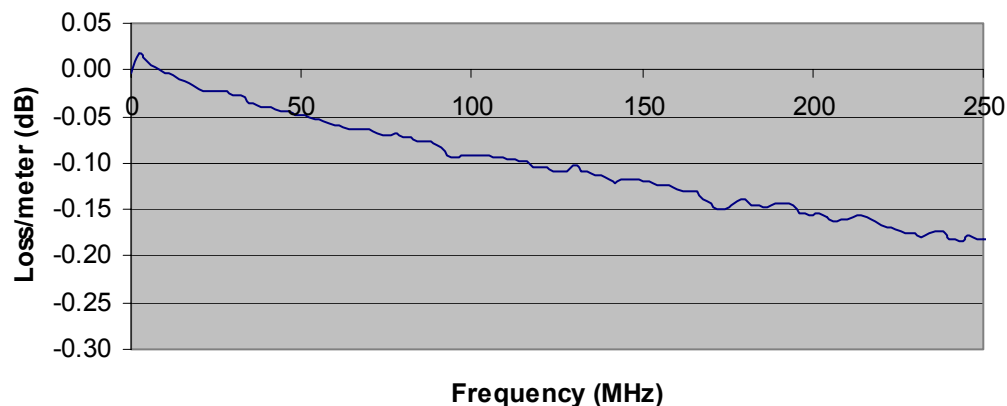


# Attenuation per meter

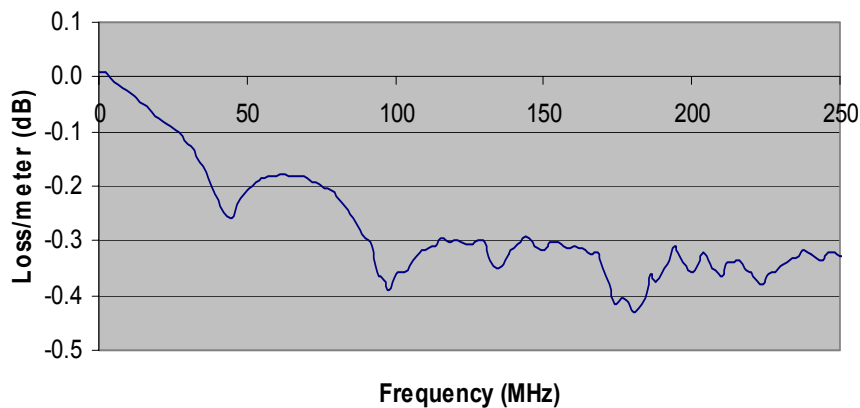
Hit 200 b



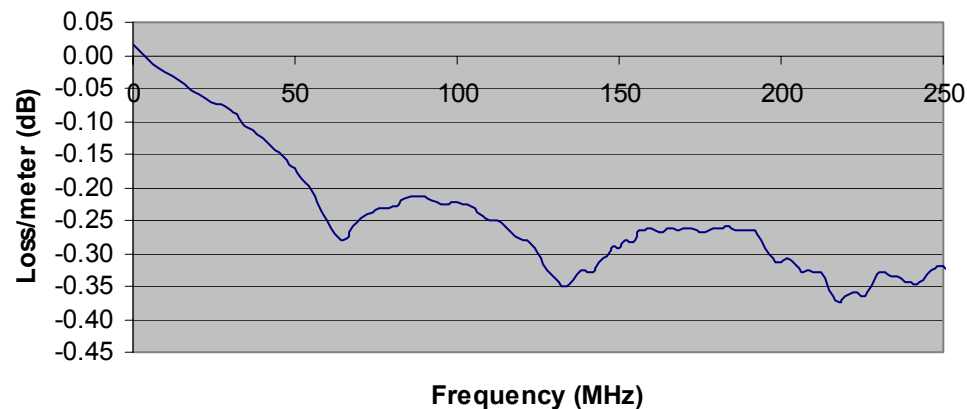
Hit 250 a



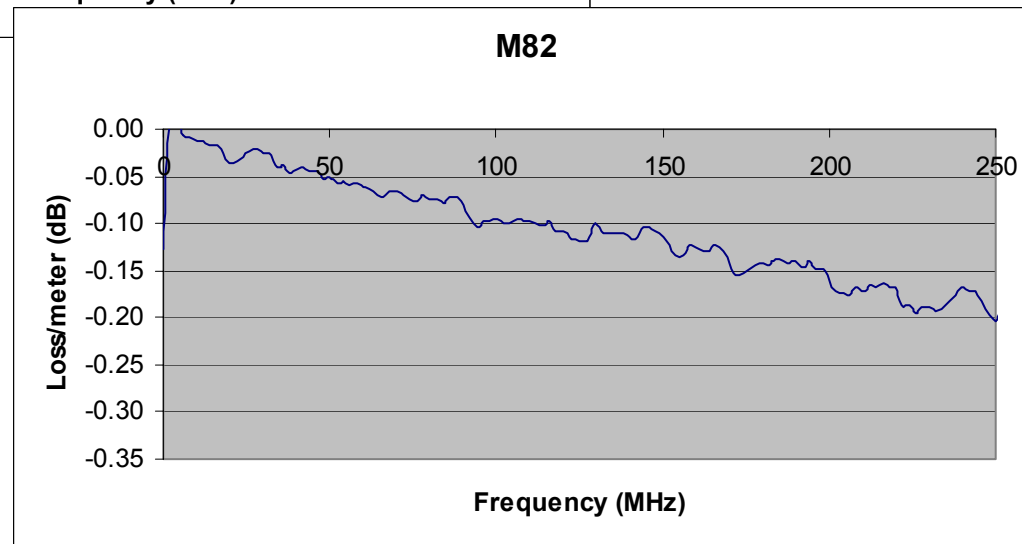
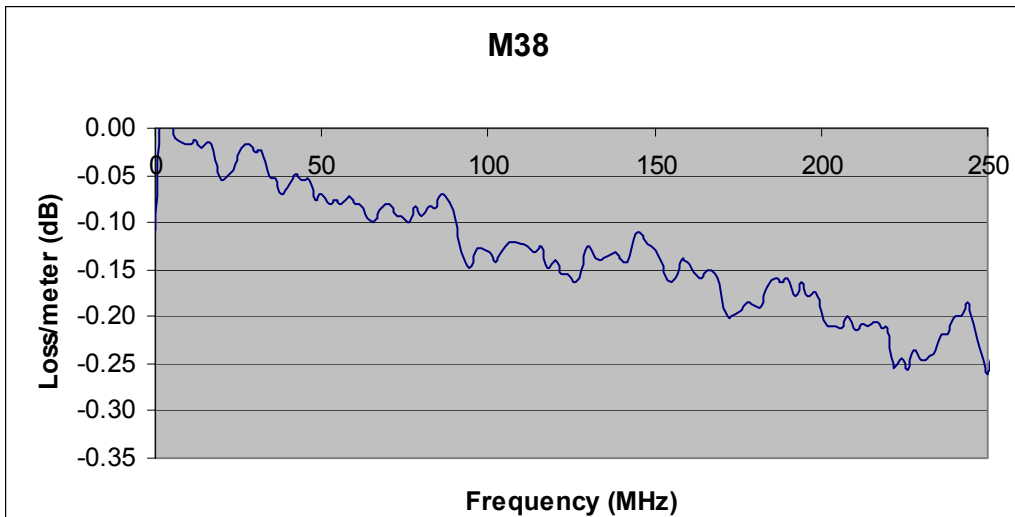
Hitnf\_c



Hitnf61M



# Attenuation per meter



# Cables spec lengths (in meters)

## ■ Amphenol (Twist and Flat)

- Amp TnF222 =3/0.2 =15
- AmpTnF\_b =3/0.1 =30
- AmpTnF\_c =3/0.22 =14
- AmpTnF\_d =3/0.5 =6
- AmpTnF\_e =3/0.25 =12
- AmpTnF\_F =3/0.25 =12
- AmpTnF\_G =3/0.25 =12
- AmpTnF\_H =3/0.35 =8

# Cable spec lengths(in meters) (continued)

- Hitachi
  - Hit200b =3/0.1 =30
  - Hit250a =3/0.07 =43
  - Hitnf\_c =3/0.25 =12
  - Hitw61M =3/0.27 =11
- Madison
  - M38 =3/0.1 =30
  - M82 =3/0.07 =43



# Invitational Challenge

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- We set up our lab to facilitate these kind of measurements - and partially automated the collection of data and its presentation
  - First Pulse
  - Frequency attenuation
  - Cable measurements
- We invite you to use our lab
  - Send us you materials and we will measure
  - Come with your materials and we can measure together