Attenuation of SCSI Cables at Extended Frequencies

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Objectives

- Provide comparative attenuation data
- Consider both round and flat cables
- Isolate conductor effects on attenuation
- Show cable length limits as a f(freq.)

Cables selected for test

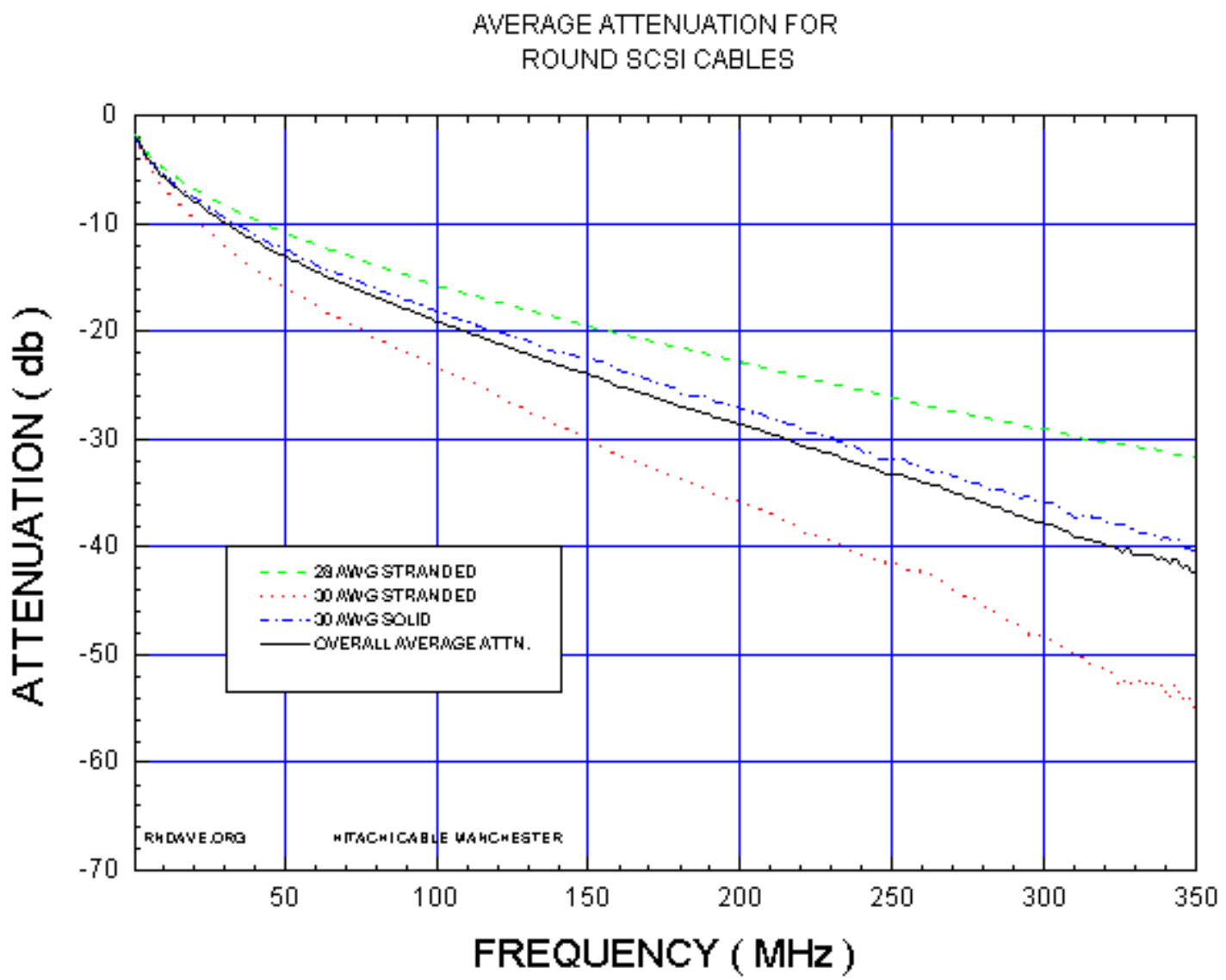
- Round designs
  - FRFMPP insulation, foil and braid shield
    - HCM 9251 - 30 AWG stranded
    - HCM 9557 - 30 AWG solid
    - HCM 8212 - 28 AWG stranded
- Flat designs
  - TPE insulation
    - HCM R3007 - 30 AWG stranded .025 pitch
    - HCM R3001 - 30 AWG solid .025 pitch
    - HCM R2807 - 28 AWG stranded .050 pitch

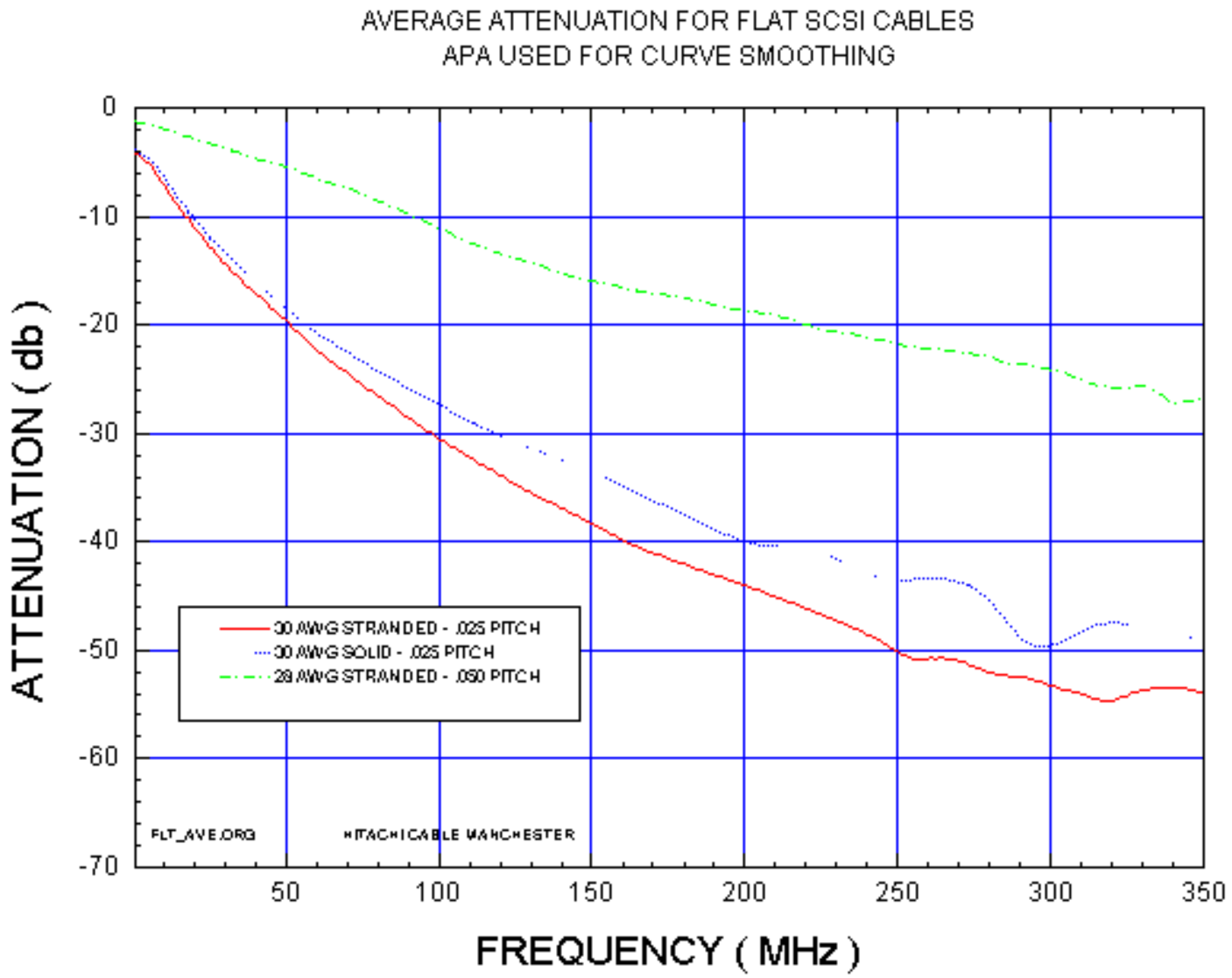
Test Equipment

- HP 8751A Network Analyzer
- HP 87511A S Parameter Test Set
- North Hill 100 ohm baluns

Test setup

- Attn. tested per ASTM D4566-94
- Round cables
  - Balanced mode
  - Shield tied to earth ground
  - All other lines floating
- Flat cables
  - Tested G-S-G (all other lines floating)
  - Three locations on the span
    - Edge, 1/4 span, 1/2 span


AVERAGE ATTENUATION FOR
ROUND SCSI CABLES
ATTENUATION (db)
0
-10
-20
-30
-40
-50
-60
-70
50
100
150
200
250
300
350
FREQUENCY (MHz)
28 AWG STRANDED
30 AWG STRANDED
30 AWG SOLID
OVERALL AVERAGE ATTN.
RHDAVE.ORG
HITACHI CABLE MANCHESTER

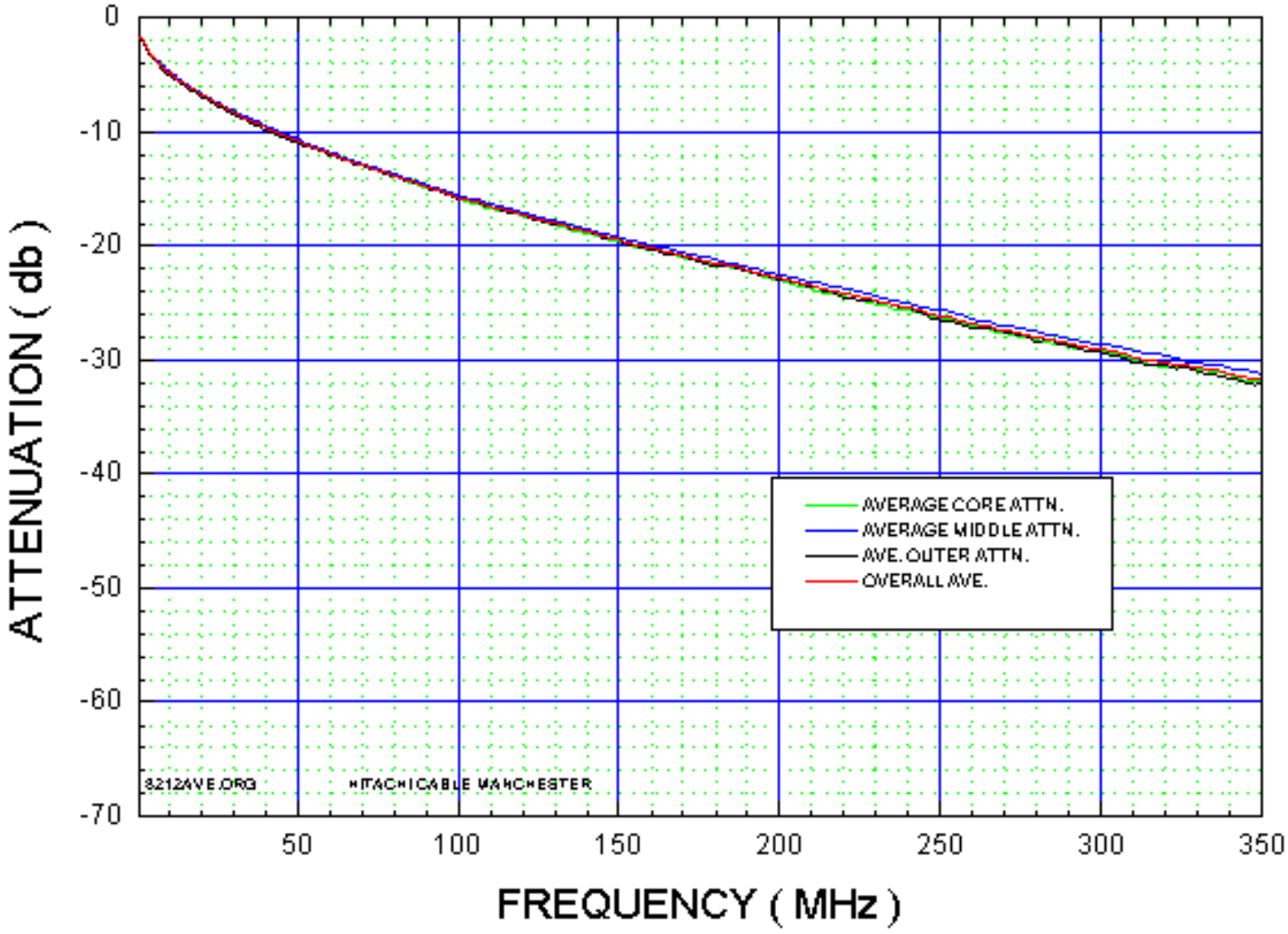

AVERAGE ATTENUATION FOR FLAT SCSI CABLES
APA USED FOR CURVE SMOOTHING
ATTENUATION (db)
0
-10
-20
-30
-40
-50
-60
-70
50
100
150
200
250
300
350
FREQUENCY (MHz)
30 AWG STRANDED - .025 PITCH
30 AWG SOLID - .025 PITCH
28 AWG STRANDED - .050 PITCH
FLT_AVE.ORG
HITACHI CABLE MANCHESTER

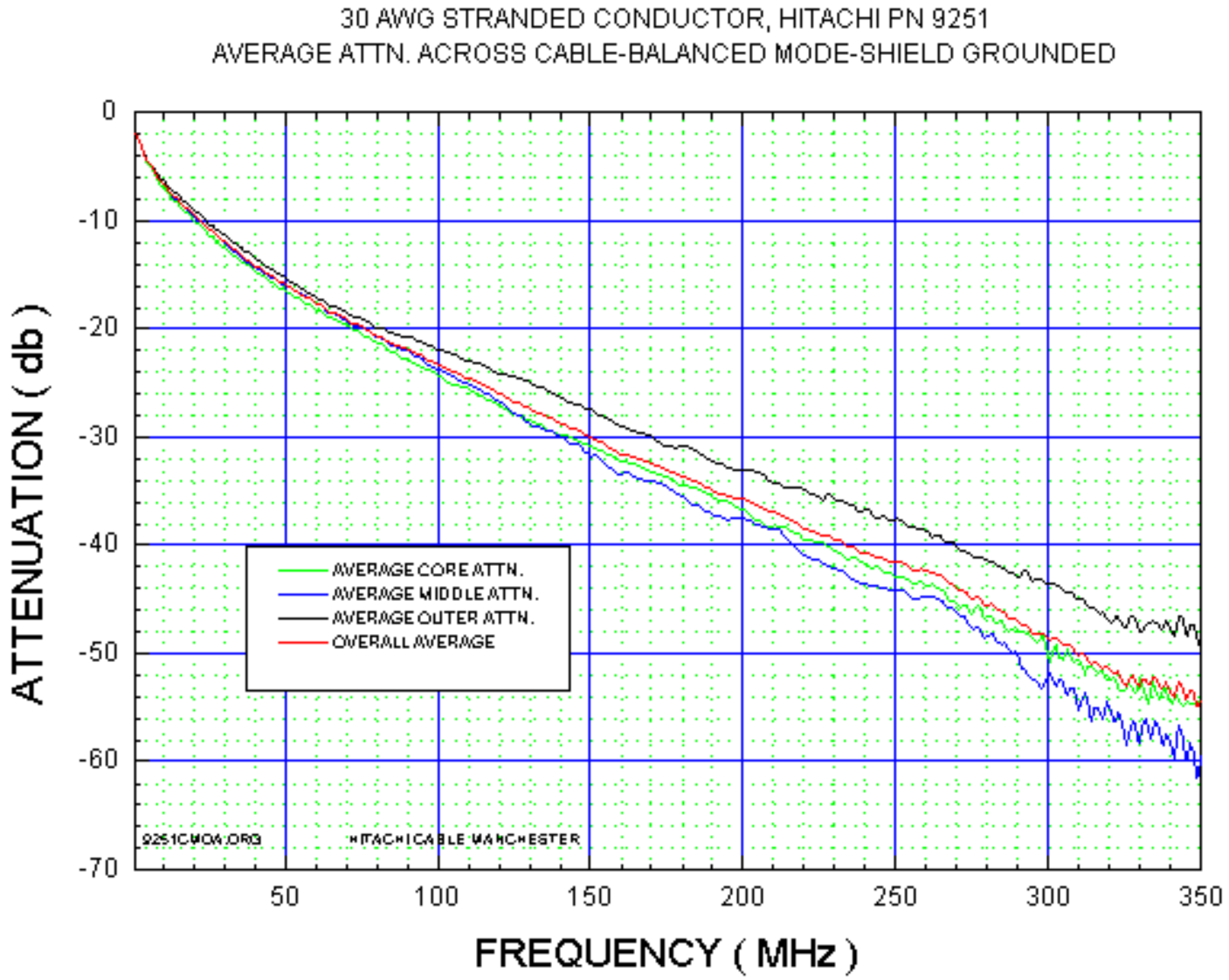
MAXIMUM LENGTH OF CABLES TO MEET 15% AND 50% ATTENUATION LIMITS

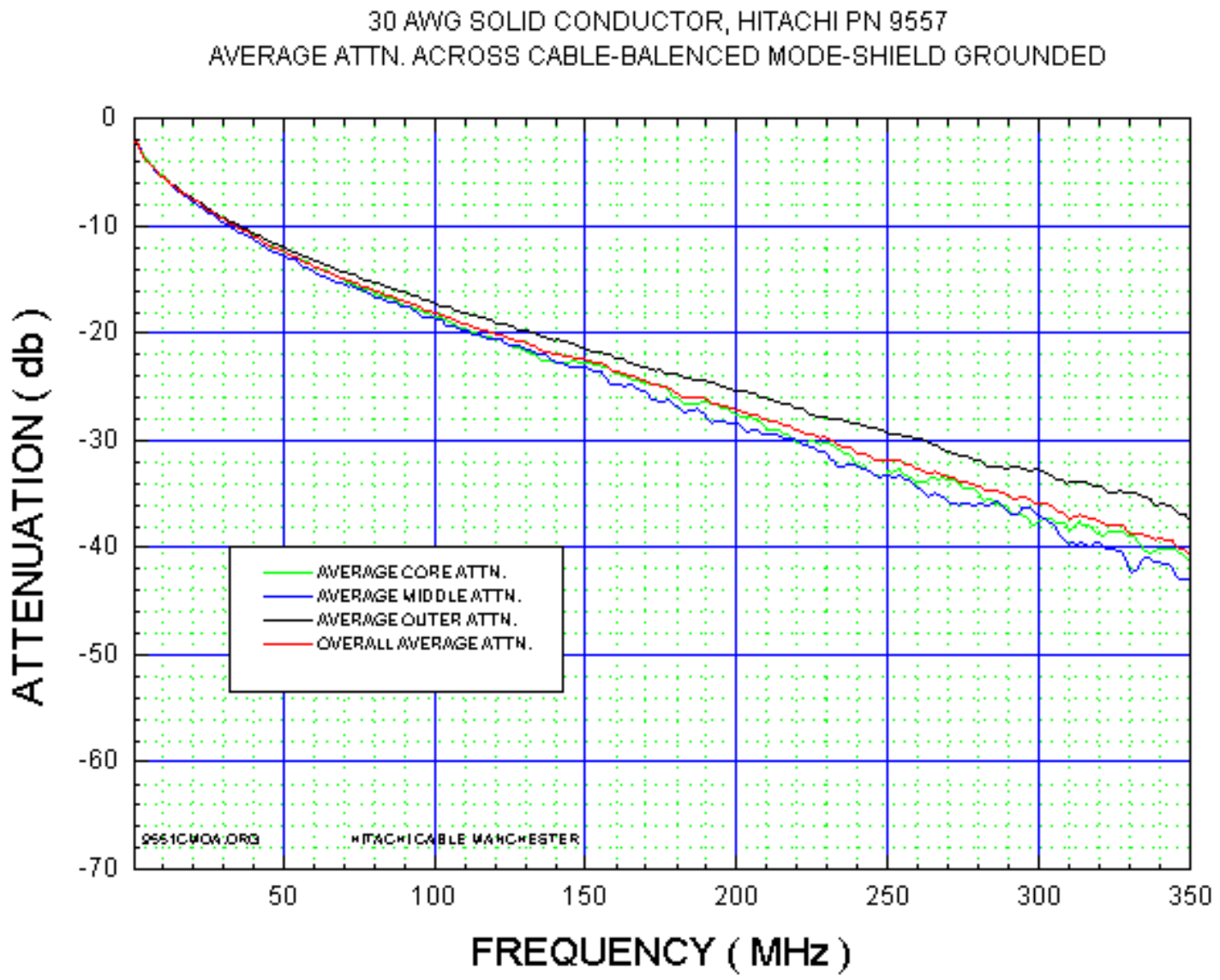
CABLE	CABLE ATTN. AT 61 M LENGTHS FREQUENCY				CABLE ATTENUATION PER METER FREQUENCY			
	50 MHz	100 MHz	150 MHz	200 MHz	50 MHz	100 MHz	150 MHz	200 MHz
ROUND CABLES								
28 AWG STRANDED	11	15.5	19.5	22.5	0.18	0.25	0.32	0.37
30 AWG SOLID	12.5	18	22.5	27	0.21	0.30	0.37	0.44
30 AWG STRANDED	16	23.5	36.5	42	0.26	0.39	0.60	0.69
FLAT CABLES								
28 AWG STRANDED	5.5	11	16	18.5	0.09	0.18	0.26	0.30
30 AWG SOLID	18.5	27.5	33.5	40	0.30	0.45	0.55	0.66
30 AWG STRANDED	19.5	30.5	38	44	0.32	0.50	0.62	0.72
CABLE	MAX. LGTH. ATTN.<15%		1.4		MAX. LGTH. ATTN.<50%		6	
	FREQUENCY				FREQUENCY			
	50 MHz	100 MHz	150 MHz	200 MHz	50 MHz	100 MHz	150 MHz	200 MHz
ROUND CABLES								
28 AWG STRANDED	7.76	5.51	4.38	3.79	33.25	23.60	18.76	16.26
30 AWG SOLID 6.83	4.74	3.79	3.16	29.26	20.32	16.26	13.55	
30 AWG STRANDED	5.33	3.63	2.34	2.03	22.86	15.56	10.02	8.71
FLAT CABLES								
28 AWG STRANDED	15.52	7.76	5.33	4.61	66.50	33.25	22.86	19.77
30 AWG SOLID	4.61	3.10	2.55	2.13	19.77	13.30	10.92	9.14
30 AWG STRANDED	4.38	2.80	2.25	1.94	18.76	11.99	9.63	8.31

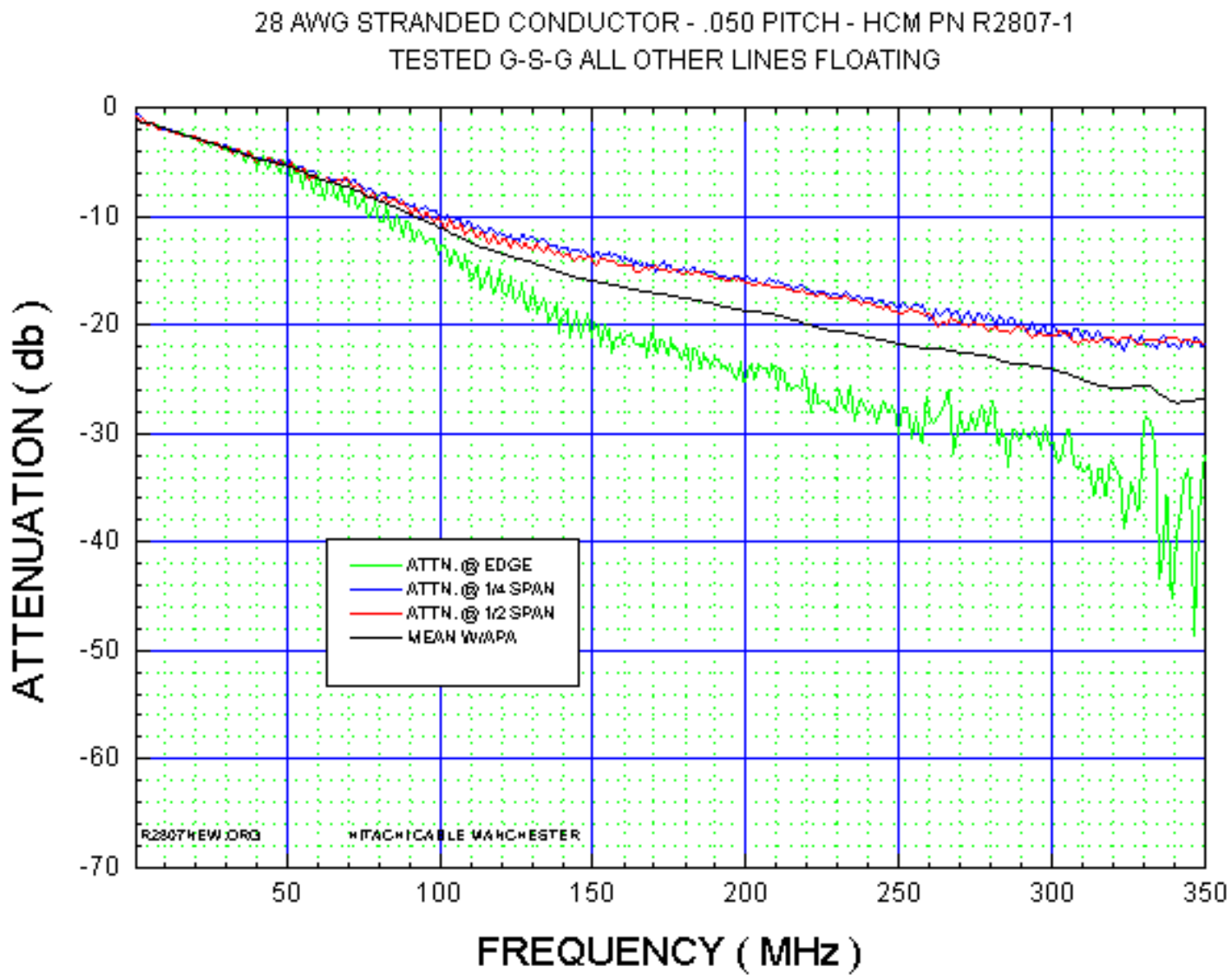
MAXIMUM LENGTH OF CABLES TO MEET 15% AND 50% ATTENUATION LIMITS								
CABLE	CABLE ATTN. AT 200 FT LENGTHS				CABLE ATTENUATION PER FOOT			
	FREQUENCY				FREQUENCY			
	50 MHz	100 MHz	150 MHz	200 MHz	50 MHz	100 MHz	150 MHz	200 MHz
ROUND CABLES								
28 AWG STRANDED	11	15.5	19.5	22.5	0.06	0.08	0.10	0.11
30 AWG SOLID	12.5	18	22.5	27	0.06	0.09	0.11	0.14
30 AWG STRANDED	16	23.5	36.5	42	0.08	0.12	0.18	0.21
FLAT CABLES								
28 AWG STRANDED	5.5	11	16	18.5	0.03	0.06	0.08	0.09
30 AWG SOLID	18.5	27.5	33.5	40	0.09	0.14	0.17	0.20
30 AWG STRANDED	19.5	30.5	38	44	0.10	0.15	0.19	0.22
CABLE	**MAX. LGTH. ATTN.<15%**			1.4	**MAX. LGTH. ATTN.<50%**			6
	FREQUENCY				FREQUENCY			
	50 MHz	100 MHz	150 MHz	200 MHz	50 MHz	100 MHz	150 MHz	200 MHz
ROUND CABLES								
28 AWG STRANDED	25.45	18.06	14.36	12.44	109.09	77.42	61.54	53.33
30 AWG SOLID	22.40	15.56	12.44	10.37	96.00	66.67	53.33	44.44
30 AWG STRANDED	17.50	11.91	7.67	6.67	75.00	51.06	32.88	28.57
FLAT CABLES								
28 AWG STRANDED	50.91	25.45	17.50	15.14	218.18	109.09	75.00	64.86
30 AWG SOLID	15.14	10.18	8.36	7.00	64.86	43.64	35.82	30.00
30 AWG STRANDED	14.36	9.18	7.37	6.36	61.54	39.34	31.58	27.27

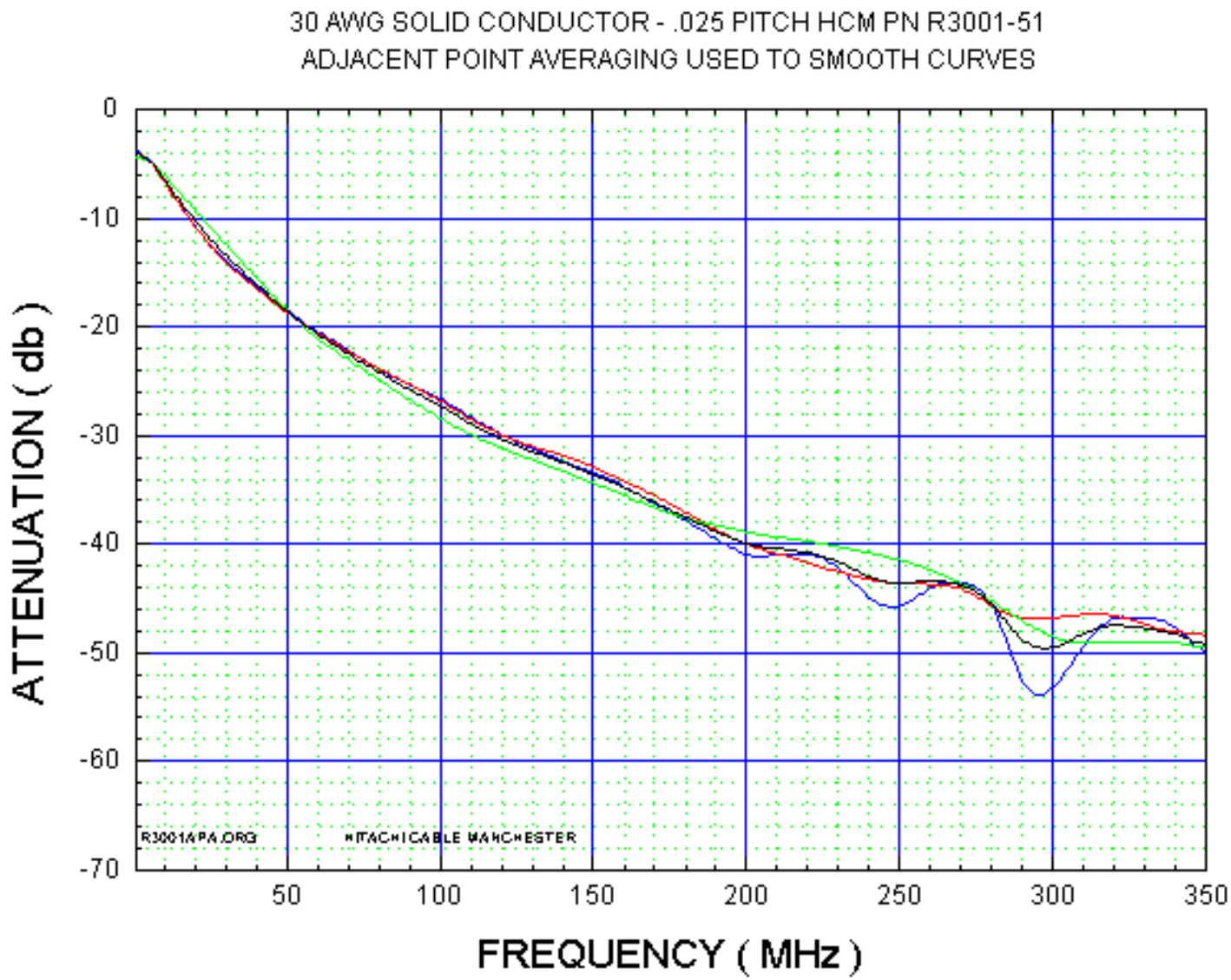
28 AWG STRANDED CONDUCTOR, HITACHI PN 8212
AVERAGE ATTN. ACROSS CABLE- BALANCED MODE - SHIELD GROUNDED

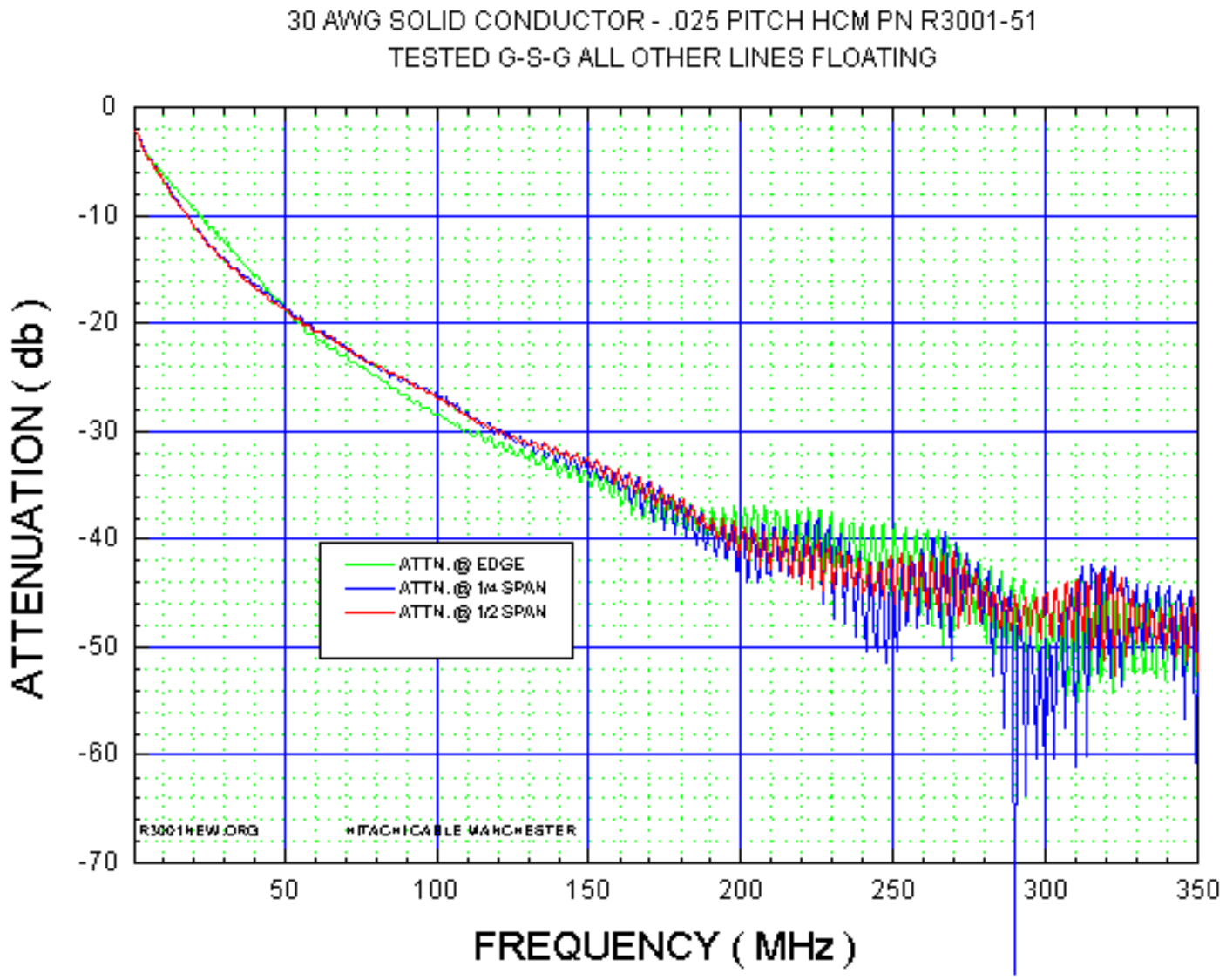


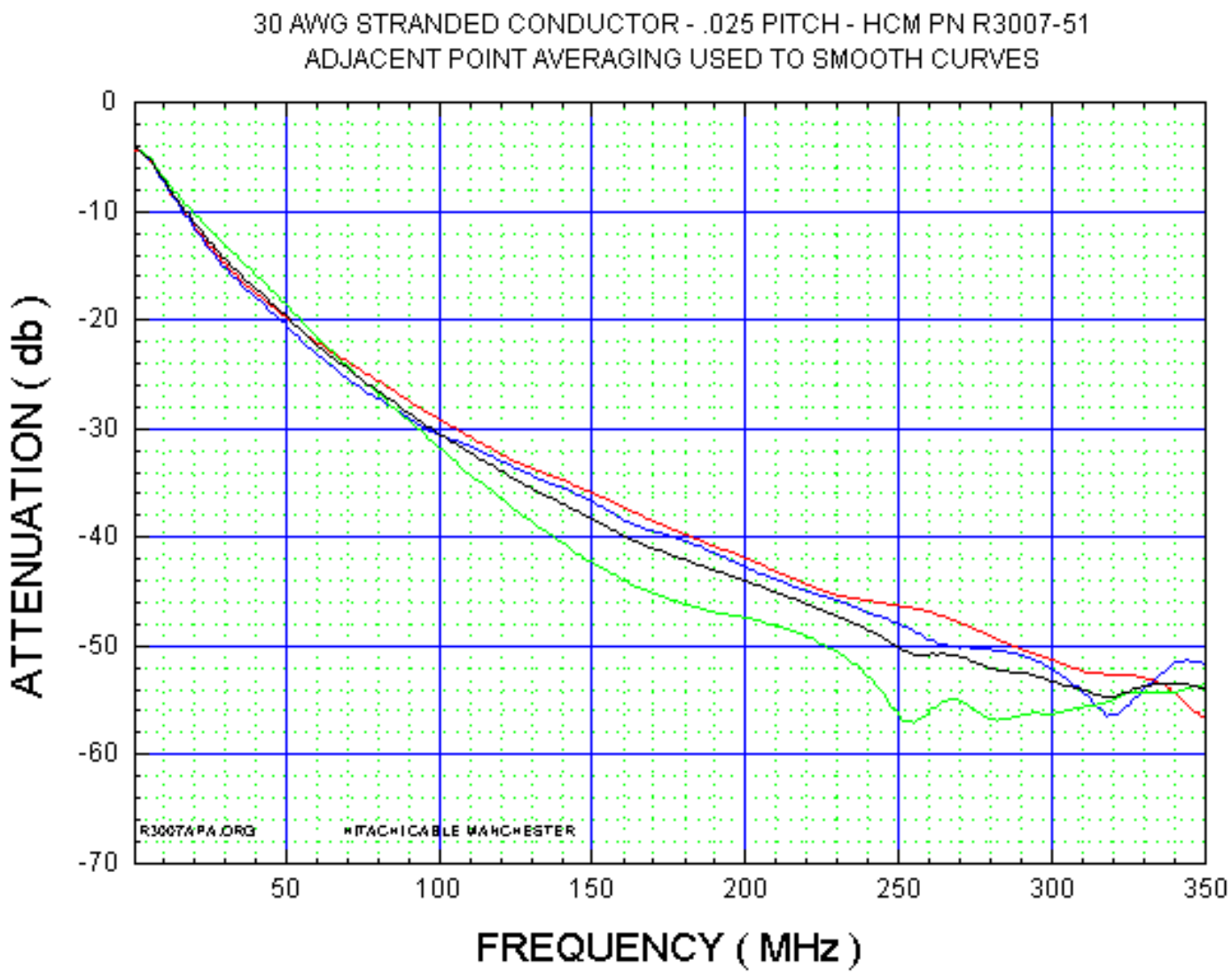

30 AWG STRANDED CONDUCTOR, HITACHI PN 9251
AVERAGE ATTN. ACROSS CABLE-BALANCED MODE-SHIELD GROUNDED
ATTENUATION (db)
0
-10
-20
-30
-40
-50
-60
-70
50
100
150
200
250
300
350
FREQUENCY (MHz)
AVERAGE CORE ATTN.
AVERAGE MIDDLE ATTN.
AVERAGE OUTER ATTN.
OVERALL AVERAGE
9251CMOA.ORG
HITACHI CABLE MANCHESTER

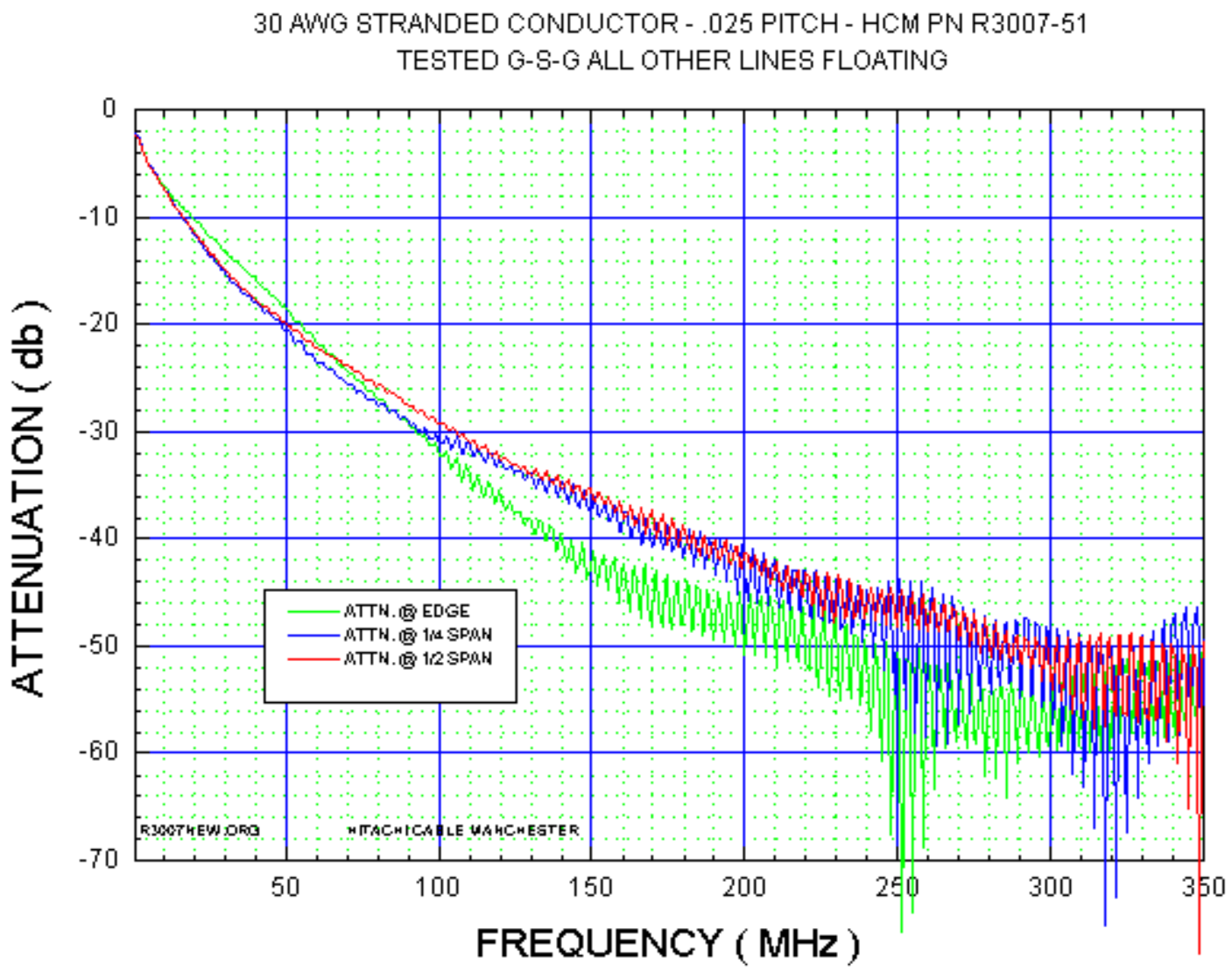

30 AWG SOLID CONDUCTOR, HITACHI PN 9557
AVERAGE ATTN. ACROSS CABLE-BALENCED MODE-SHIELD GROUNDED
ATTENUATION (db)
0
-10
-20
-30
-40
-50
-60
-70
50
100
150
200
250
300
350
FREQUENCY (MHz)
AVERAGE CORE ATTN.
AVERAGE MIDDLE ATTN.
AVERAGE OUTER ATTN.
OVERALL AVERAGE ATTN.
9557CMOA.ORG
HITACHI CABLE MANCHESTER


28 AWG STRANDED CONDUCTOR - .050 PITCH - HCM PN R2807-1
TESTED G-S-G ALL OTHER LINES FLOATING
ATTENUATION (db)
0
-10
-20
-30
-40
-50
-60
-70
50
100
150
200
250
300
350
FREQUENCY (MHz)
ATTN. @ EDGE
ATTN. @ 1/4 SPAN
ATTN. @ 1/2 SPAN
MEAN W/APA
R2807NEW.ORG
HITACHI CABLE MANCHESTER


30 AWG SOLID CONDUCTOR - .025 PITCH HCM PN R3001-51
ADJACENT POINT AVERAGING USED TO SMOOTH CURVES
ATTENUATION (db)
0
-10
-20
-30
-40
-50
-60
-70
50
100
150
200
250
300
350
FREQUENCY (MHz)
R3001APA.ORG
HITACHI CABLE MANCHESTER


30 AWG SOLID CONDUCTOR - .025 PITCH HCM PN R3001-51
TESTED G-S-G ALL OTHER LINES FLOATING
ATTENUATION (db)
0
-10
-20
-30
-40
-50
-60
-70
50
100
150
200
250
300
350
FREQUENCY (MHz)
ATTN. @ EDGE
ATTN. @ 1/4 SPAN
ATTN. @ 1/2 SPAN
R3001NEW.ORG
HITACHICABLE MANCHESTER


30 AWG STRANDED CONDUCTOR - .025 PITCH - HCM PN R3007-51
ADJACENT POINT AVERAGING USED TO SMOOTH CURVES
ATTENUATION (db)
0
-10
-20
-30
-40
-50
-60
-70
50
100
150
200
250
300
350
FREQUENCY (MHz)
R3007APA.ORG
HITACHI CABLE MANCHESTER


30 AWG STRANDED CONDUCTOR - .025 PITCH - HCM PN R3007-51
TESTED G-S-G ALL OTHER LINES FLOATING
ATTENUATION (db)
0
-10
-20
-30
-40
-50
-60
-70
50
100
150
200
250
300
350
FREQUENCY (MHz)
ATTN. @ EDGE
ATTN. @ 1/4 SPAN
ATTN. @ 1/2 SPAN
R3007NEW.ORG
HITACHICABLE MANCHESTER