KEA 4.0

SECOND GENERATION 1000BaseT HYBRID TRANSFORMER

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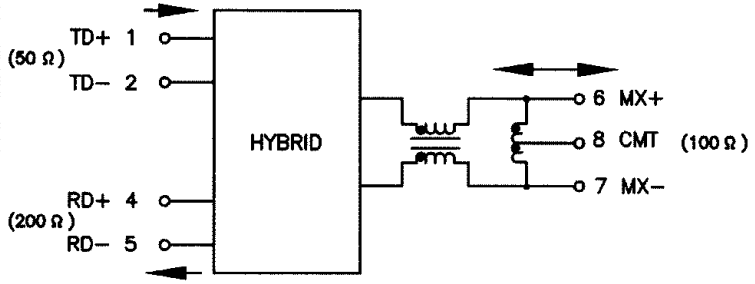
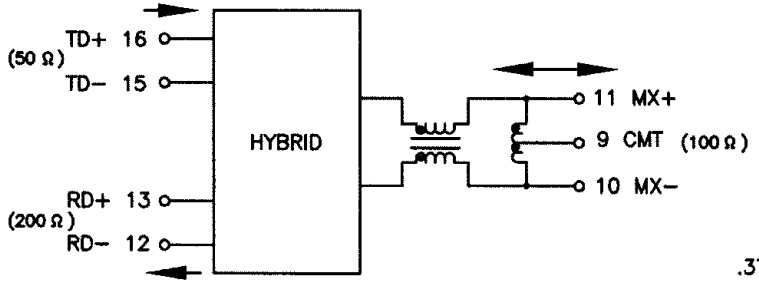
OVERVIEW

* BLOCK DIAGRAM & MECHANICAL OUTLINE
* NORMAL MODE TEST RESULTS
  - INSERTION LOSS
  - TRANS HYBRID LOSS
  - RETURN LOSS
* COMMON MODE TEST RESULTS
  - DIFF – COM MODE REJECTION
  - COMON MODE REJECTION RATIO
  - COM – DIFF MODE REJECTION
* MISCELLANEOUS TEST RESULTS
  - CHANNEL – CHANNEL CROSSTALK
* SUMMARY



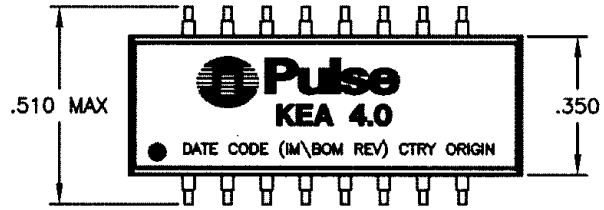
CHANNEL 1

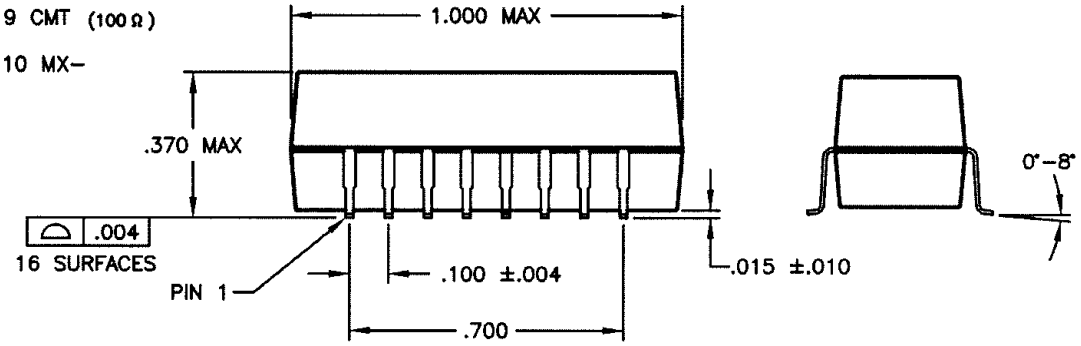


CHANNEL 2

$\frac{Vout}{Vin}$, CHANNELS 1 AND 2:

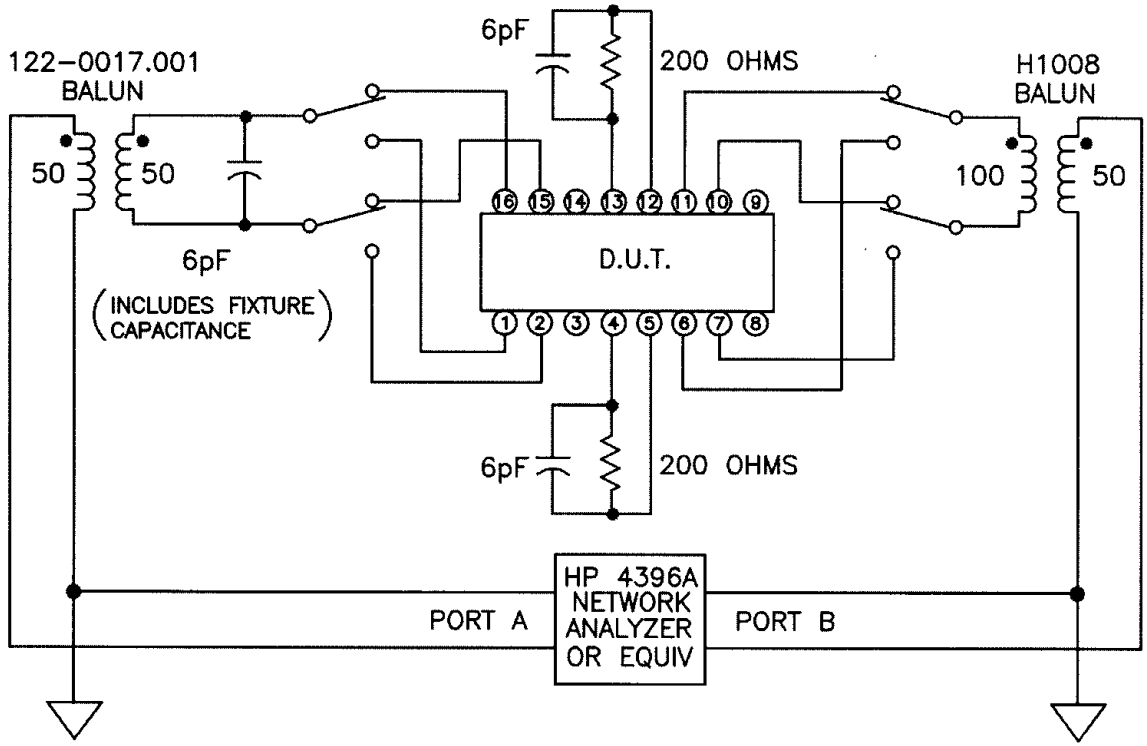
TRANSMIT – MEDIA = $1:\sqrt{2}$
MEDIA – RECEIVE = $1:\sqrt{2}$



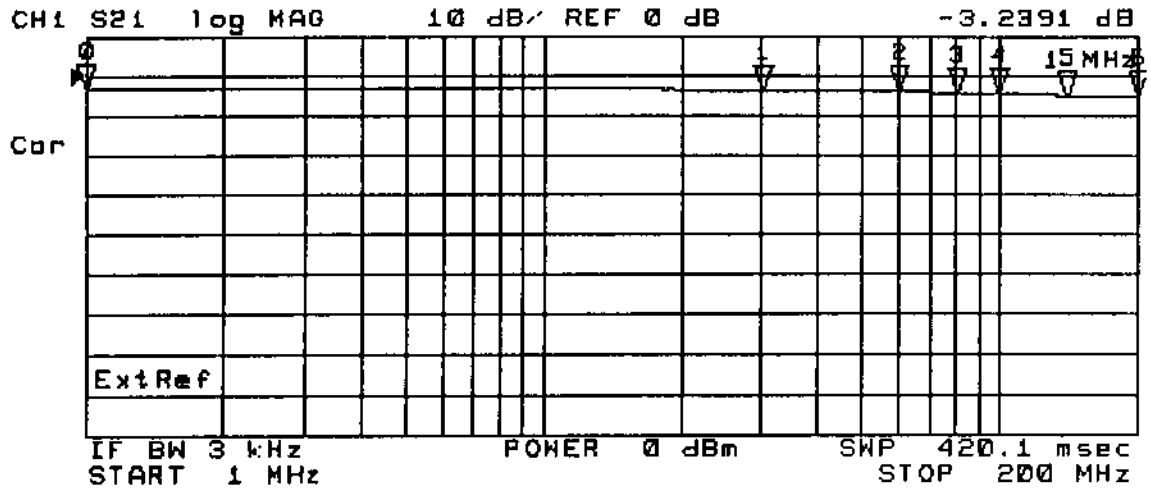


FINAL OUTLINE

NOTE: PINS 3 AND 14 ARE NOT INTERNALLY CONNECTED.

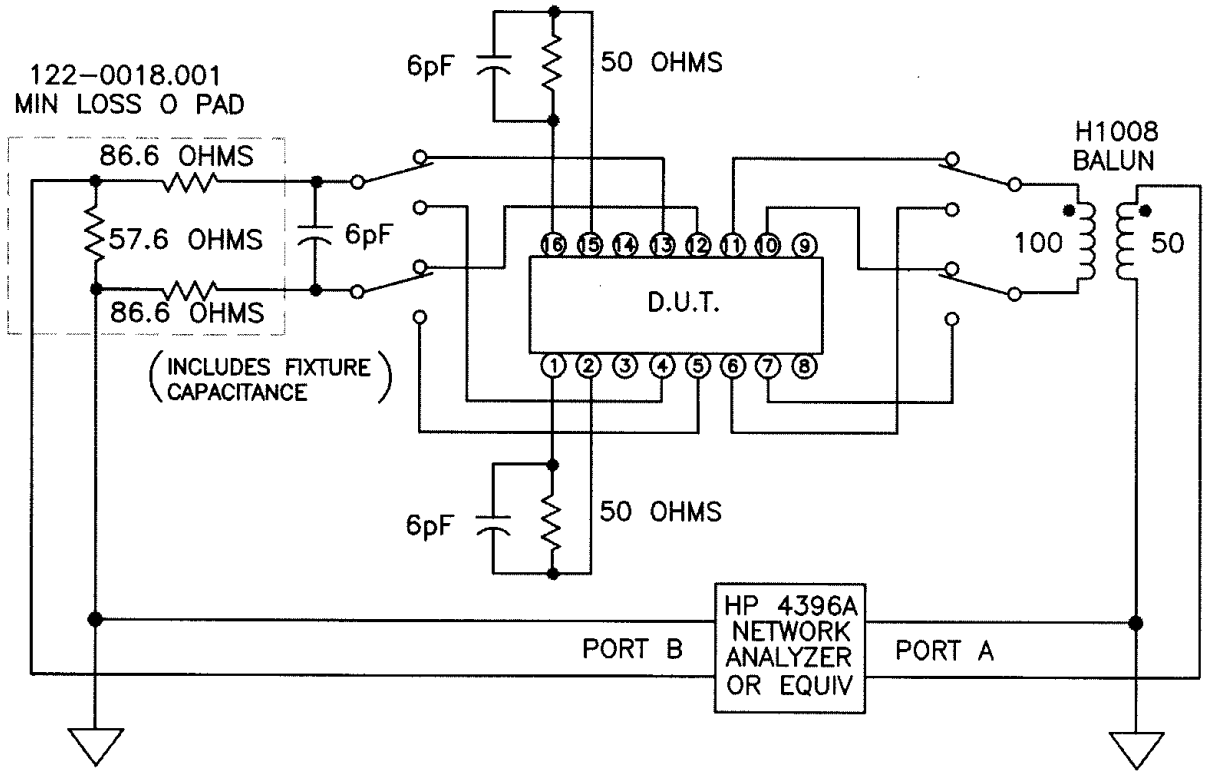


TRANSMIT – MEDIA INSERTION LOSS CIRCUIT

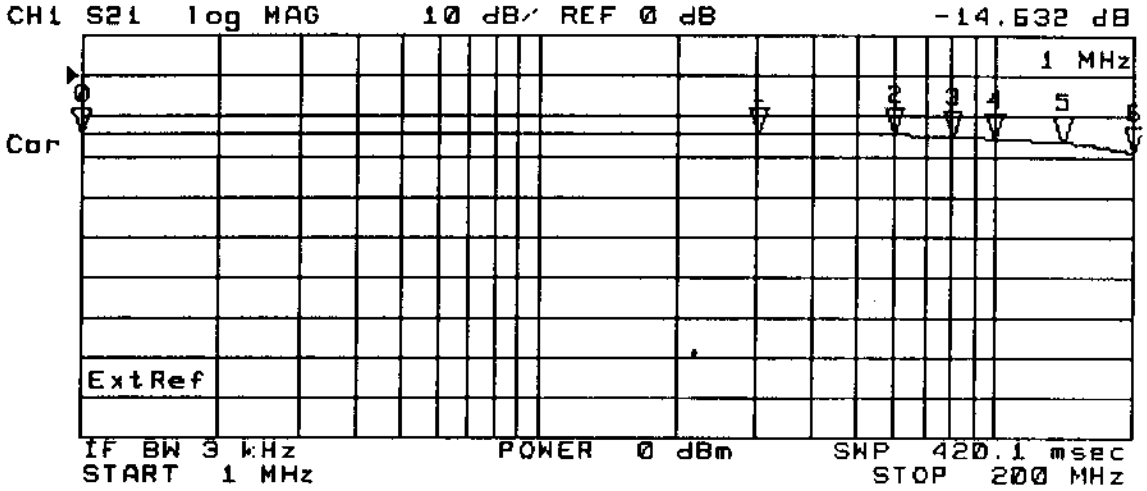


N	SWEEP FREQUENCY	ATTENUATION
0	1 MHz	−3.24 dB
1	30 MHz	−3.56 dB
2	60 MHz	−3.89 dB
3	80 MHz	−4.20 dB
4	100 MHz	−4.44 dB
5	140 MHz	−4.72 dB
6	200 MHz	−4.96 dB

TRANSMIT – MEDIA INSERTION LOSS

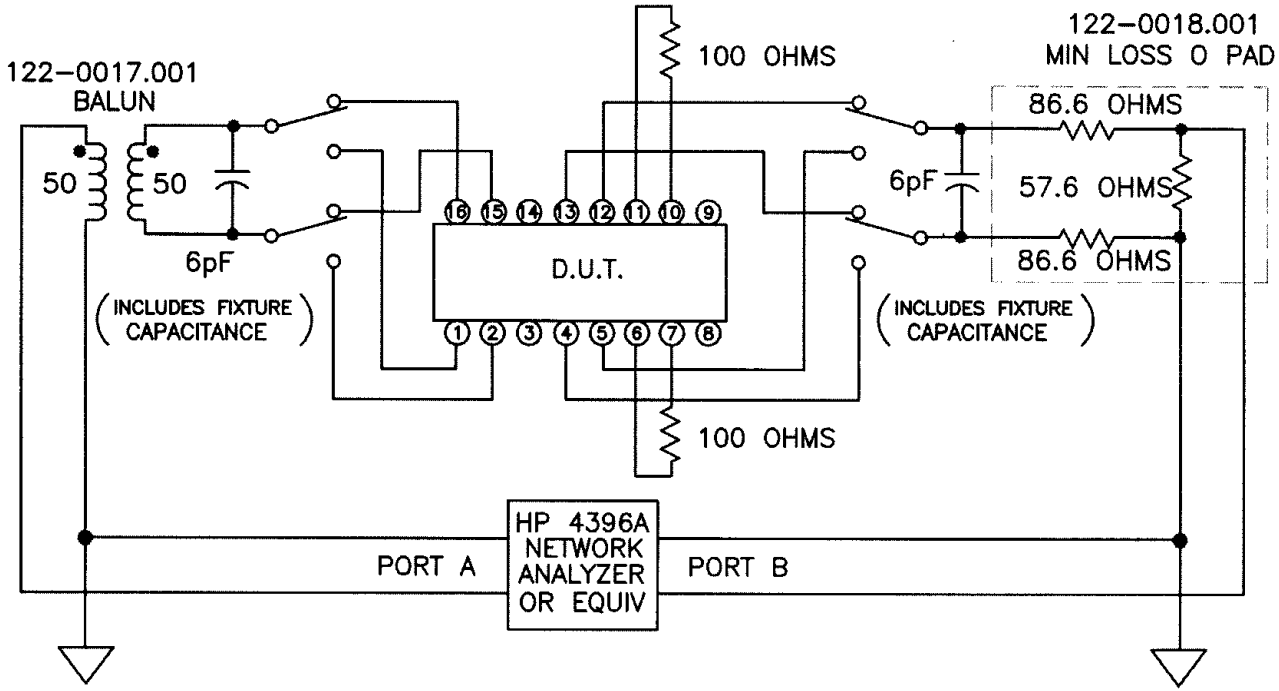


MEDIA – RECEIVE INSERTION LOSS TEST CIRCUIT

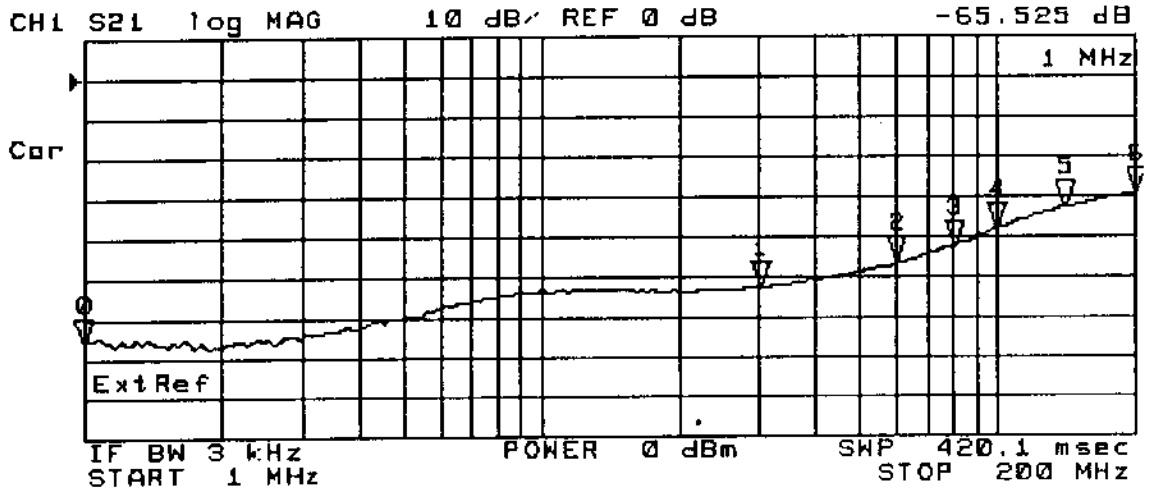


N	SWEEP FREQUENCY	MEASURED ATTENUATION	HYBRID ONLY ATTENUATION
0	1 MHz	−14.63 dB	−3.18 dB
1	30 MHz	−14.48 dB	−3.03 dB
2	60 MHz	−14.63 dB	−3.18 dB
3	80 MHz	−14.98 dB	−3.53 dB
4	100 MHz	−15.40 dB	−3.95 dB
5	140 MHz	−16.37 dB	−4.92 dB
6	200 MHz	−18.79 dB	−7.34 dB

MEDIA – RECEIVE INSERTION LOSS



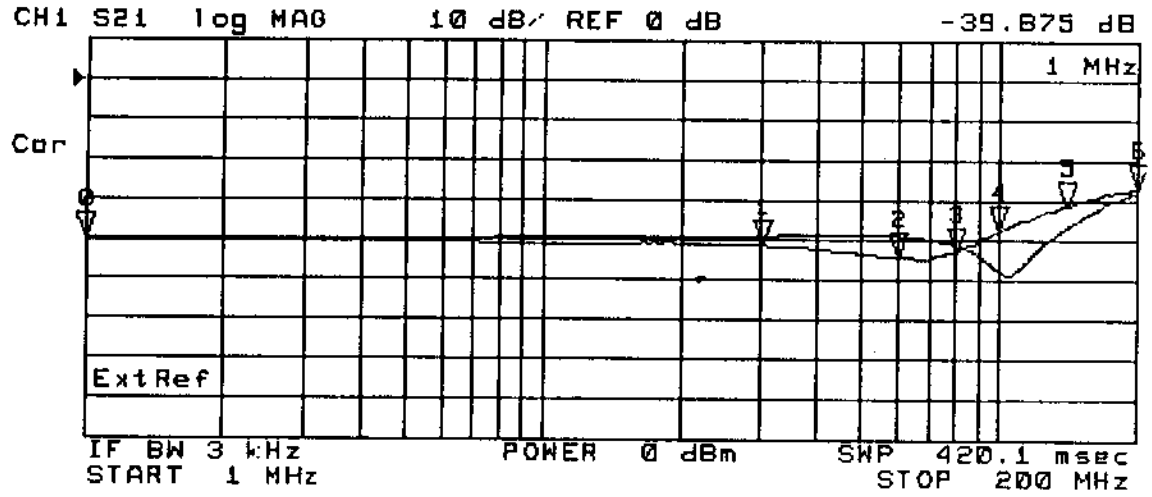
TRANSMIT – RECEIVE TRANS HYBRID LOSS CIRCUIT



N	SWEEP FREQUENCY	MEASURED ATTENUATION	HYBRID ONLY ATTENUATION
0	1 MHz	−65.53 dB	−54.08 dB
1	30 MHz	−52.50 dB	−41.05 dB
2	60 MHz	−46.48 dB	−35.03 dB
3	80 MHz	−42.20 dB	−30.75 dB
4	100 MHz	−37.98 dB	−26.53 dB
5	140 MHz	−32.72 dB	−21.27 dB
6	200 MHz	−29.38 dB	−11.93 dB

TRANSMIT – RECEIVE TRANS HYBRID LOSS

MEDIA IMPEDANCE = 100 OHMS



NOTE: MARKERS REFERENCE 115 OHM TRACE

MEDIA = 85 OHMS

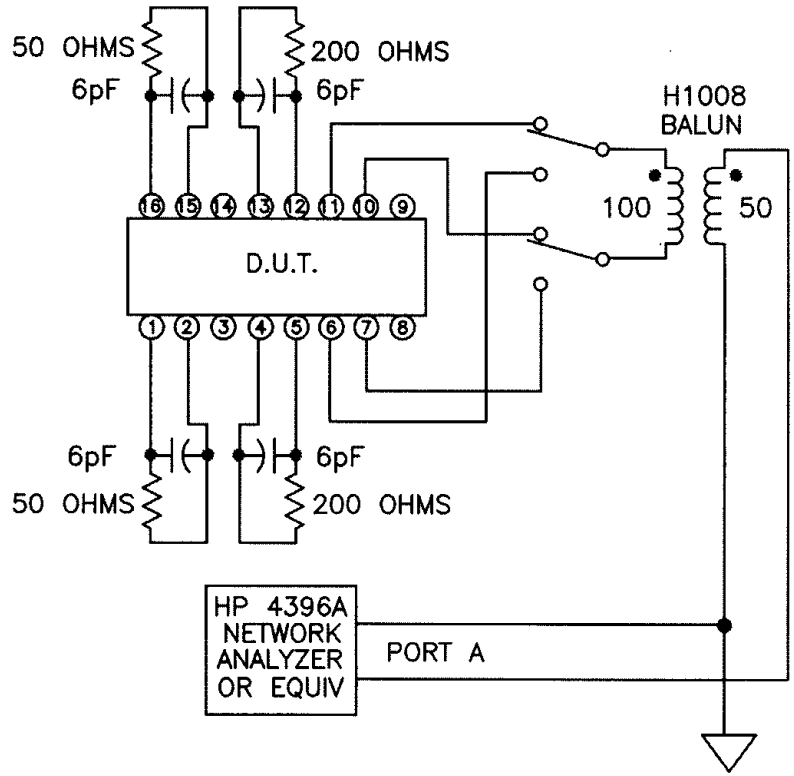
N	SWEEP FREQUENCY	MEASURED ATTENUATION	HYBRID ONLY ATTENUATION
0	1 MHz	−40.67 dB	−29.22 dB
1	30 MHz	−39.21 dB	−27.76 dB
2	60 MHz	−39.22 dB	−27.77 dB
3	80 MHz	−41.73 dB	−30.28 dB
4	100 MHz	−48.74 dB	−37.29 dB
5	140 MHz	−36.96 dB	−25.51 dB
6	200 MHz	−28.06 dB	−16.61 dB

MEDIA = 115 OHMS

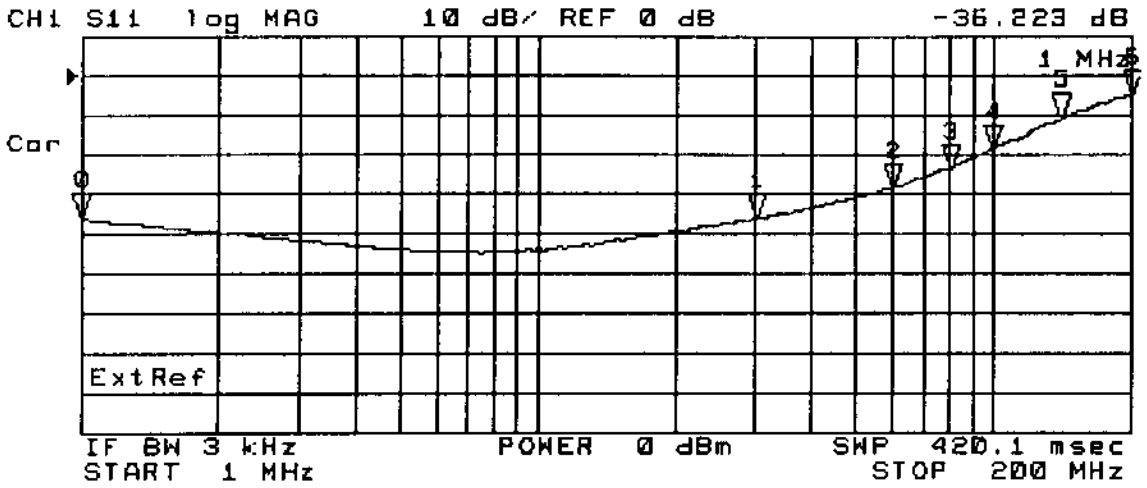
N	SWEEP FREQUENCY	MEASURED ATTENUATION	HYBRID ONLY ATTENUATION
0	1 MHz	−39.88 dB	−28.43 dB
1	30 MHz	−41.49 dB	−30.04 dB
2	60 MHz	−44.55 dB	−35.10 dB
3	80 MHz	−42.87 dB	−31.42 dB
4	100 MHz	−37.76 dB	−26.31 dB
5	140 MHz	−31.32 dB	−19.87 dB
6	200 MHz	−26.96 dB	−15.51 dB

TRANSMIT – RECEIVE TRANS HYBRID LOSS

MEDIA IMPEDANCE = 85 AND 115 OHMS

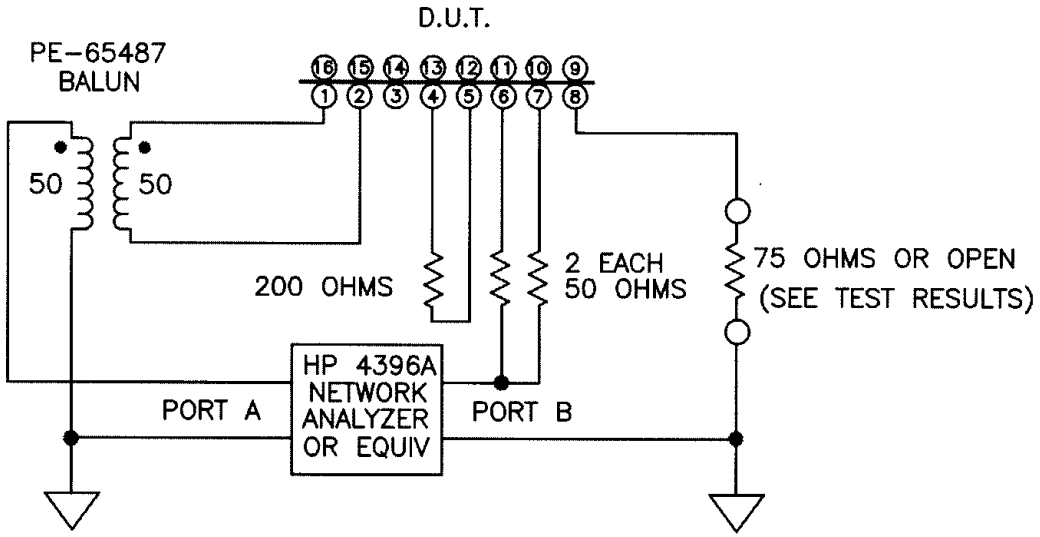


MEDIA RETURN LOSS CIRCUIT

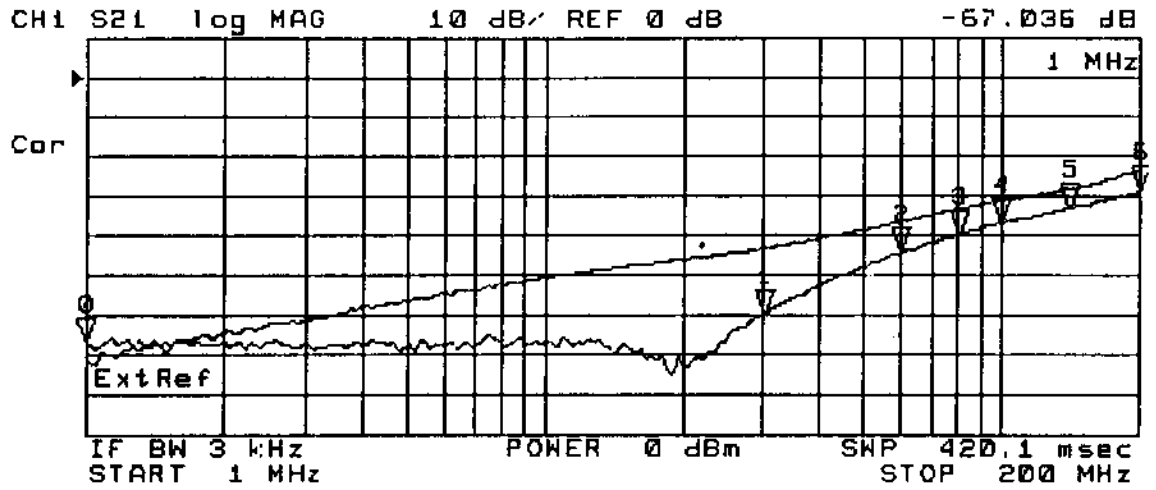


N	SWEEP FREQUENCY	ATTENUATION
0	1 MHz	−36.22 dB
1	30 MHz	−36.48 dB
2	60 MHz	−28.49 dB
3	80 MHz	−23.46 dB
4	100 MHz	−18.59 dB
5	140 MHz	−10.92 dB
6	200 MHz	−4.93 dB

MEDIA RETURN LOSS



DIFFERENTIAL TO COMMMON MODE REJECTION CIRCUIT



NOTE: MARKERS REFERENCE CONNECTED CONDITION

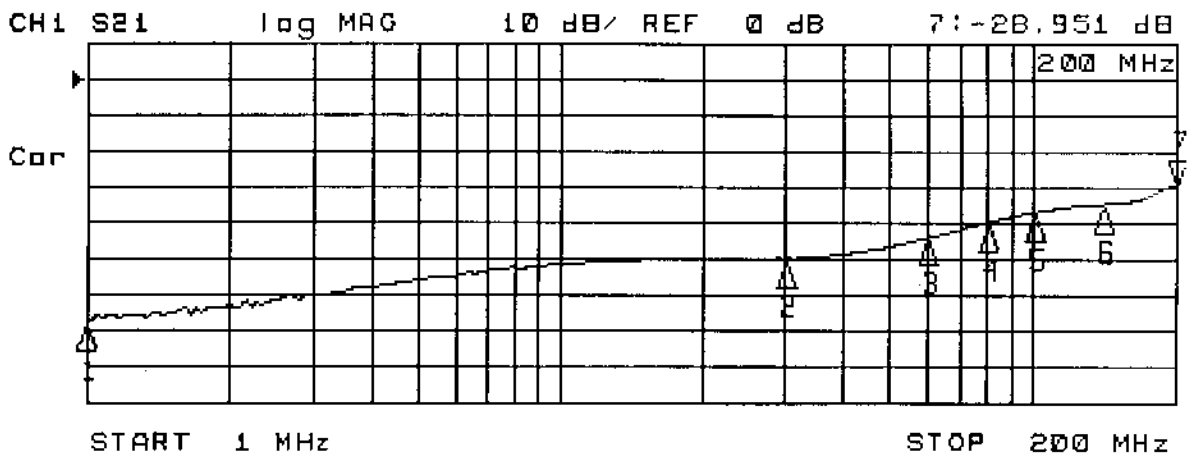
SHUNT CHOKE (PINS 8,9) NOT CONNECTED

N	SWEEP PARAMETER	ATTENUATION
0	1 MHz	−69.64 dB
1	30 MHz	−43.44 dB
2	60 MHz	−36.57 dB
3	80 MHz	−33.31 dB
4	100 MHz	−31.18 dB
5	140 MHz	−28.37 dB
6	200 MHz	−23.49 dB

SHUNT CHOKE (PINS 8,9) CONNECTED THROUGH 75 OHM RESISTOR TO GROUND

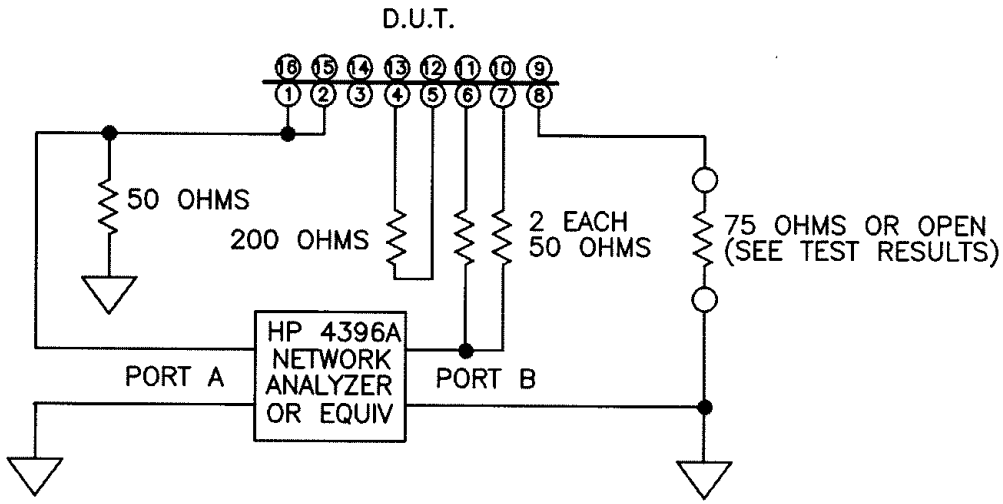
N	SWEEP PARAMETER	ATTENUATION	RELATIVE IMPROVEMENT
0	1 MHz	−67.04 dB	+2.60 dB
1	30 MHz	−59.87 dB	−16.43 dB
2	60 MHz	−44.64 dB	−8.07 dB
3	80 MHz	−39.97 dB	−6.61 dB
4	100 MHz	−36.90 dB	−5.72 dB
5	140 MHz	−33.30 dB	−4.93 dB
6	200 MHz	−28.78 dB	−5.29 dB

DIFFERENTIAL – COMMON MODE REJECTION

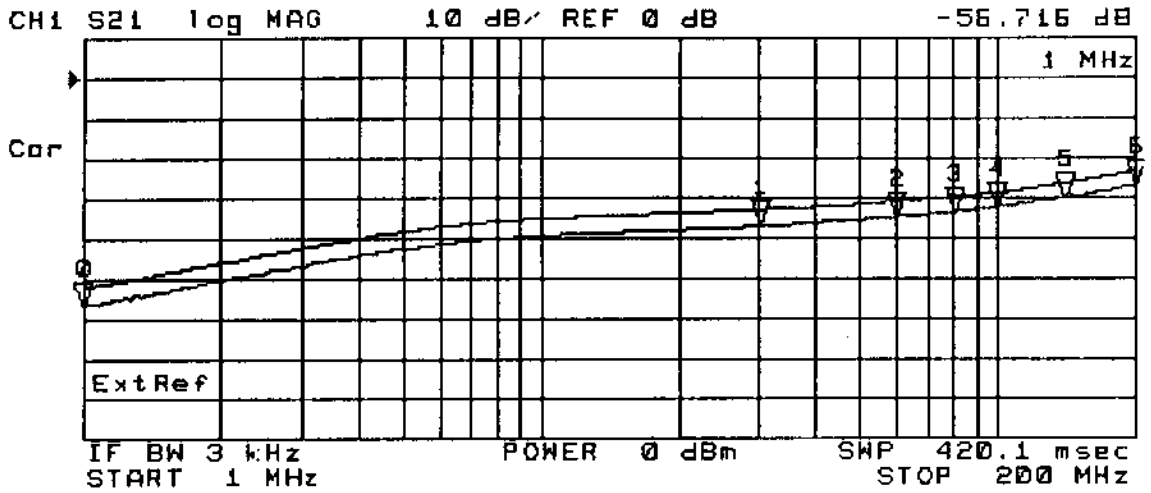


N	SWEEP FREQUENCY	ATTENUATION
0	1 MHz	−67.60 dB
1	30 MHz	−49.65 dB
2	60 MHz	−43.92 dB
3	80 MHz	−39.67 dB
4	100 MHz	−36.89 dB
5	140 MHz	−34.67 dB
6	200 MHz	−28.95 dB

DIFFERENTIAL TO COMMON MODE REJECTION
CONVENTIONAL 10/100 MBIT MAGNETICS



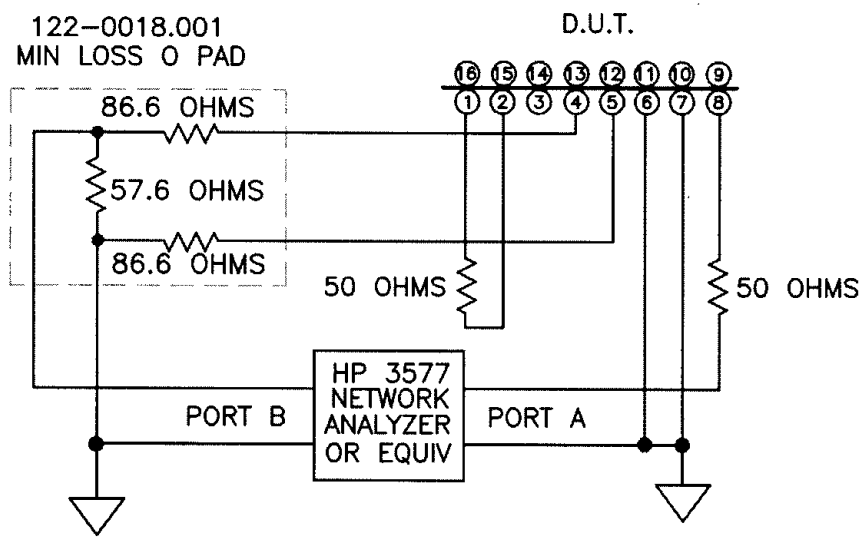
COMMON MODE REJECTION RATIO CIRCUIT



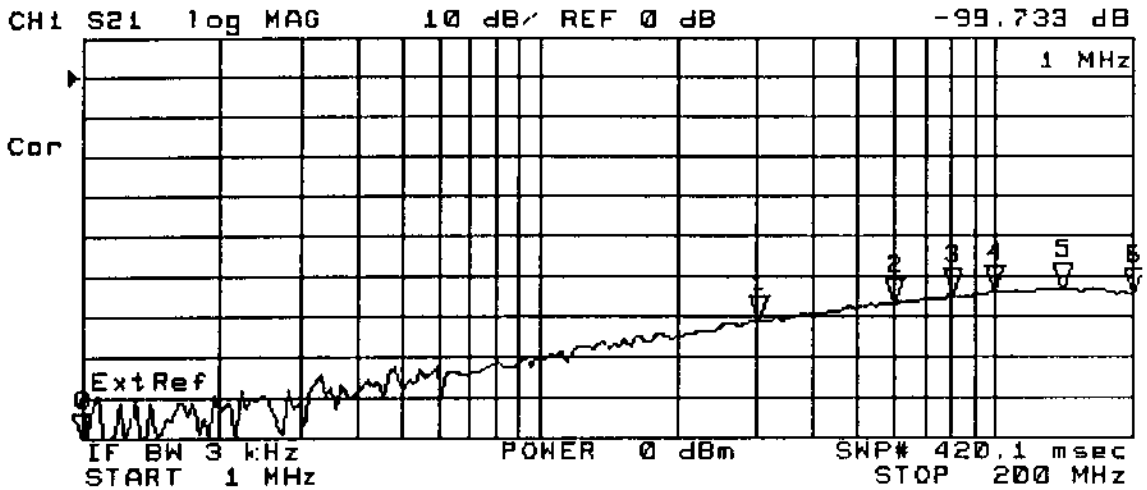
NOTE: MARKERS REFERENCE CONNECTED CONDITION

SHUNT CHOKE (PINS 8,9) NOT CONNECTED			SHUNT CHOKE (PINS 8,9) CONNECTED THROUGH 75 OHM RESISTOR TO GROUND			
N	SWEEP FREQUENCY	ATTENUATION	N	SWEEP FREQUENCY	ATTENUATION	RELATIVE IMPROVEMENT
0	1 MHz	−52.32 dB	0	1 MHz	−56.71 dB	−4.39 dB
1	30 MHz	−32.94 dB	1	30 MHz	−37.01 dB	−4.07 dB
2	60 MHz	−30.79 dB	2	60 MHz	−34.72 dB	−3.93 dB
3	80 MHz	−29.65 dB	3	80 MHz	−33.47 dB	−3.82 dB
4	100 MHz	−28.68 dB	4	100 MHz	−32.25 dB	−3.57 dB
5	140 MHz	−26.25 dB	5	140 MHz	−29.91 dB	−3.66 dB
6	200 MHz	−23.10 dB	6	200 MHz	−26.59 dB	−3.49 dB

COMMON MODE REJECTION RATIO

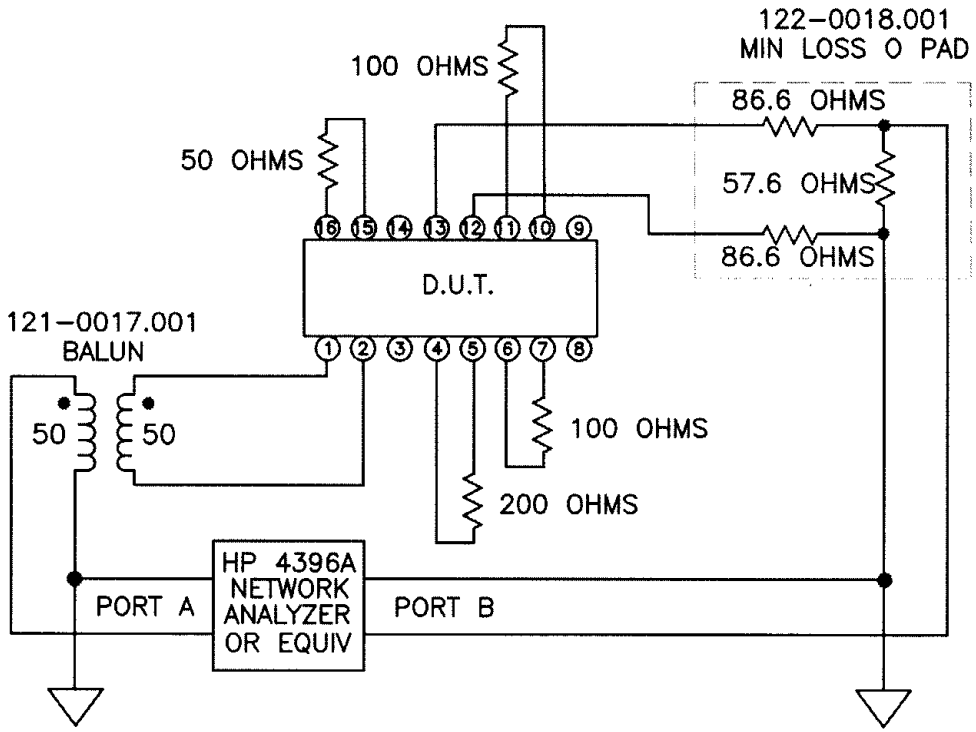


COMMON TO DIFFERENTIAL MODE REJECTION CIRCUIT

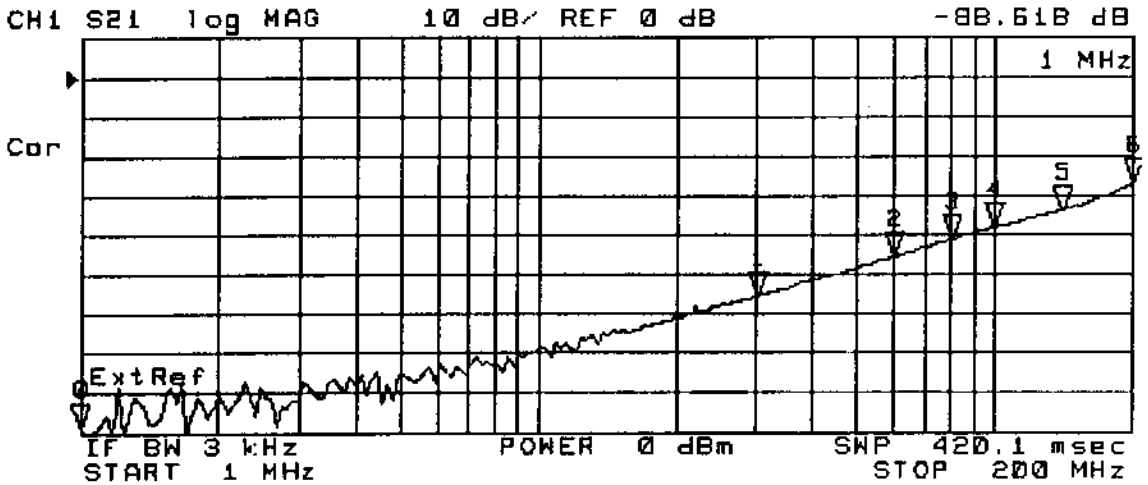


N	SWEEP FREQUENCY	MEASURED ATTENUATION	HYBRID ONLY ATTENUATION
0	1 MHz	−99.73 dB	−88.28 dB
1	30 MHz	−61.16 dB	−49.71 dB
2	60 MHz	−56.61 dB	−45.16 dB
3	80 MHz	−54.62 dB	−43.17 dB
4	100 MHz	−53.90 dB	−42.45 dB
5	140 MHz	−53.15 dB	−41.70 dB
6	200 MHz	−54.45 dB	−43.00 dB

COMMON TO DIFFERENTIAL MODE REJECTION RESULTS



CHANNEL 1 TO CHANNEL 2 CROSSTALK CIRCUIT



N	SWEEP FREQUENCY	MEASURED ATTENUATION	HYBRID ONLY ATTENUATION
0	1 MHz	−88.62 dB	−77.17 dB
1	30 MHz	−55.61 dB	−44.16 dB
2	60 MHz	−45.59 dB	−34.14 dB
3	80 MHz	−41.33 dB	−29.88 dB
4	100 MHz	−38.14 dB	−26.69 dB
5	140 MHz	−33.64 dB	−22.19 dB
6	200 MHz	−26.97 dB	−15.52 dB

CHANNEL 1 TO CHANNEL 2 CROSSTALK

SUMMARY

* TURNS RATIO COMPENSATES FOR VOLTAGE DROP OF HYBRID TRANSFORMER
* COMMON MODE PERFORMANCE IS COMPARABLE TO 10/100 MBIT Tx MAGNETICS