



Gigabit Ethernet (1000Base-T)

H5007

Performance Data

DataCom Products Group

Hank Hinrichs, Principal Engineer

H5007 Performance Data



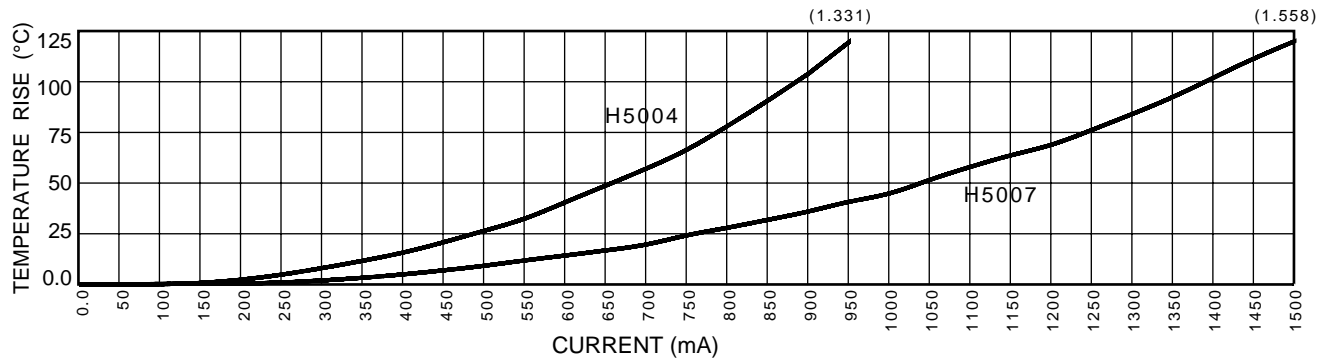
The following graphs typify the scattering (both balanced and unbalanced) and impedance parameters of the H5007, a magnetic transceiver for long haul gigabit (802.3ab) applications. The H5007 is designed around a 10/100/1000Base-T compliant transformer, having a 1:1 turns ratio and includes both series and shunt chokes for common mode signal suppression.

S-parameter measurements were taken using a HP8751A network analyzer connected to a HP4380A cable analyzer and includes S11 and S22, attenuation and phase response for S12 and S21, differential to common mode rejection, common to common mode rejection ratio, and common to differential mode rejection.

Z-parameter measurements were taken using a HP4396A network analyzer with a HP43961 RF impedance test adapter installed, and include Z11, Z22, and the shunt choke's common mode impedance.

Temperature rise measurements were taken by forcing a variable DC bias through the media side (secondary) while monitoring the resistance change associated with the primary winding's temperature rise.

TEMPERATURE RISE VERSUS MEDIA SIDE CURRENT



THE ABOVE CHART SHOWS THE INTERNAL TEMPERATURE INCREASE (EXPRESSED IN °C) ASSOCIATED WITH VARIOUS DRIVE LEVELS (EXPRESSED IN mA) APPLIED TO THE MEDIA SIDE OF H5004 AND H5007. EACH CURVE'S UPPER LIMIT IS RESTRICTED TO 150°C, THE TRANSFER MOLDING COMPOUND'S GLASS TRANSITION TEMPERATURE. THE 2 PARENTHEZIZED VALUES LOCATED ABOVE THE CHART REPRESENT THE POWER DISSIPATED (EXPRESSED IN WATTS) AT EACH DEVICE'S MAXIMUM CURRENT.

THE FOLLOWING ALGORITHMS CAN BE USED TO APPROXIMATE THE RESPONSES:

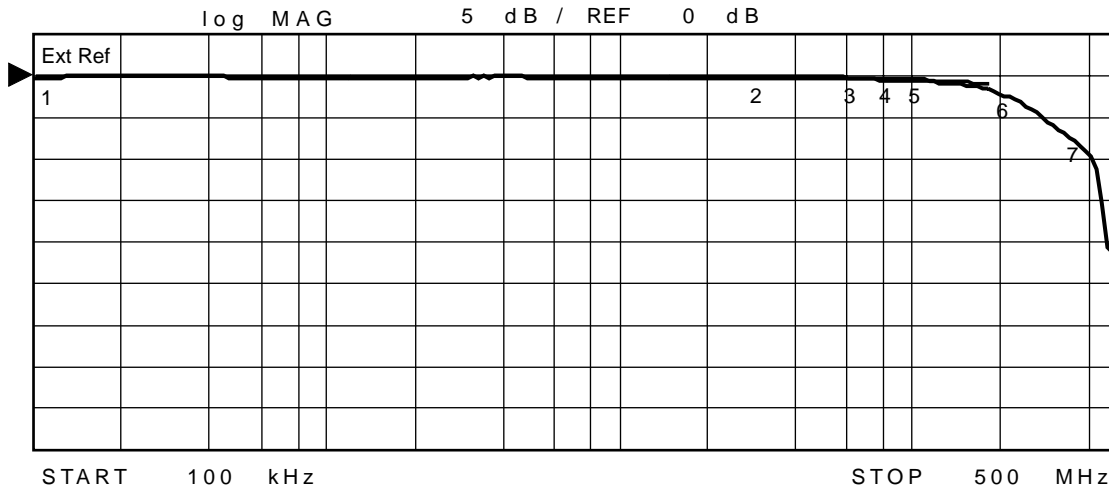
$$\begin{aligned} \text{H5004 TEMP RISE (}^\circ\text{C)} &= -.4557 -.0019743 * A +.000082313 * A^2 +.000000054335 * A^3 \\ \text{H5007 TEMP RISE (}^\circ\text{C)} &= -.3783 -.0013633 * A +.000033491 * A^2 +.000000013683 * A^3 \end{aligned}$$

WHERE "A" IS THE DRIVE LEVEL EXPRESSED IN mA.

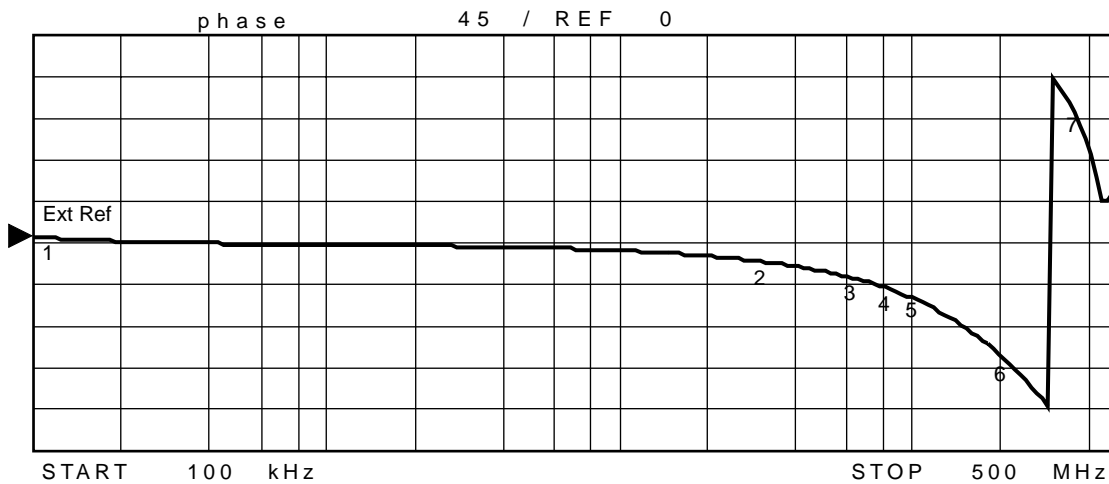
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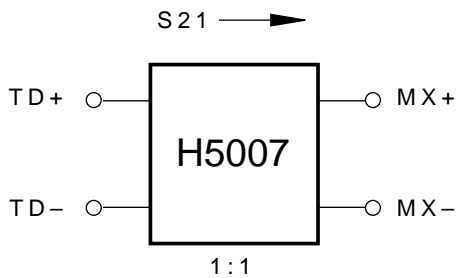
S21



S21



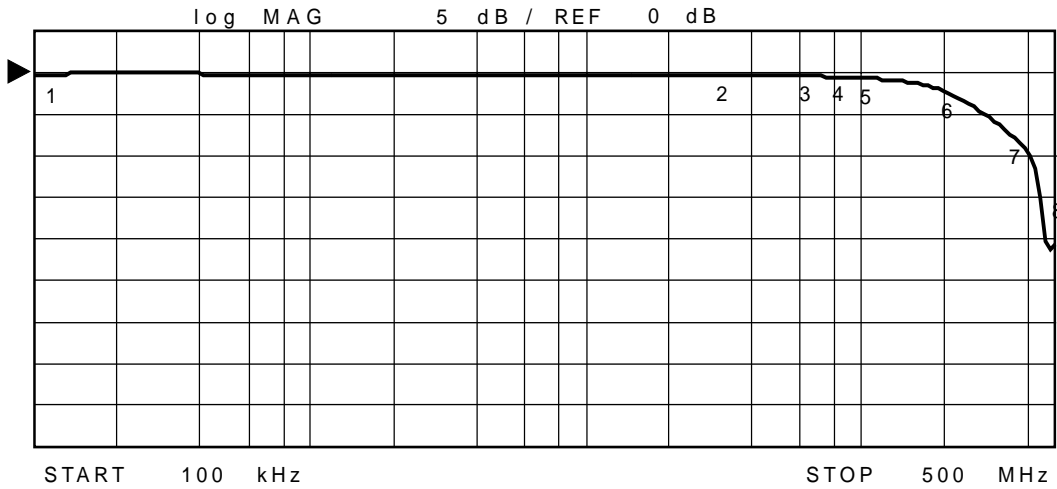
N	SWP PARAM	S21	PHASE
1	100 kHz	-.1949 dB	8.4262
2	30 MHz	-.2688 dB	-17.653
3	60 MHz	-.3994 dB	-64.68
4	80 MHz	-.5008 dB	-46.177
5	100 MHz	-.6231 dB	-57.946
6	200 MHz	-2.2249 dB	-120.83
7	350 MHz	-7.7089 dB	146.77
8	500 MHz	-20.970 dB	44.822



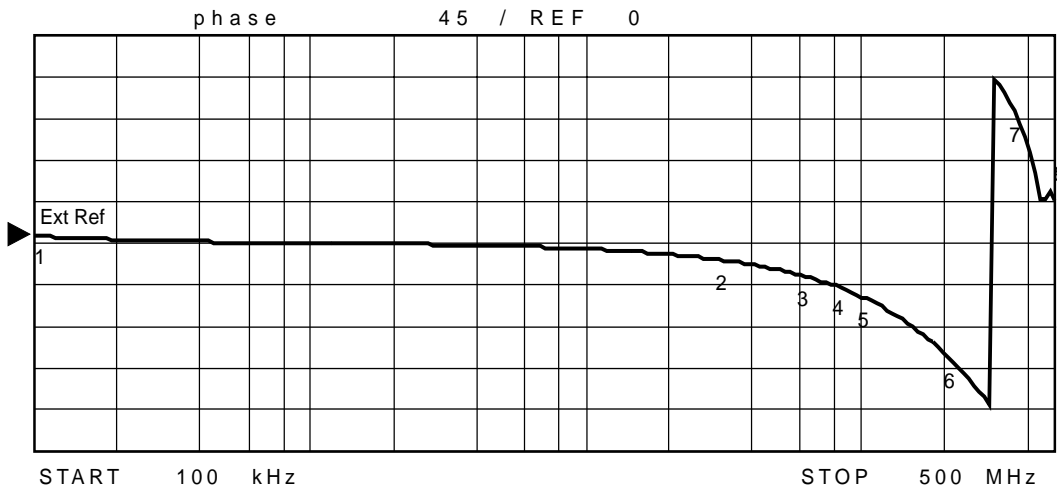
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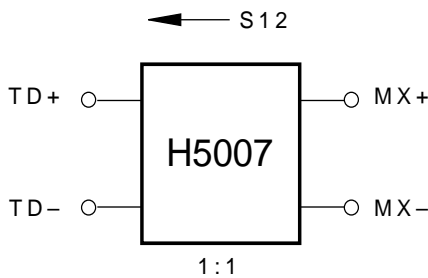
S12



S12 PHASE



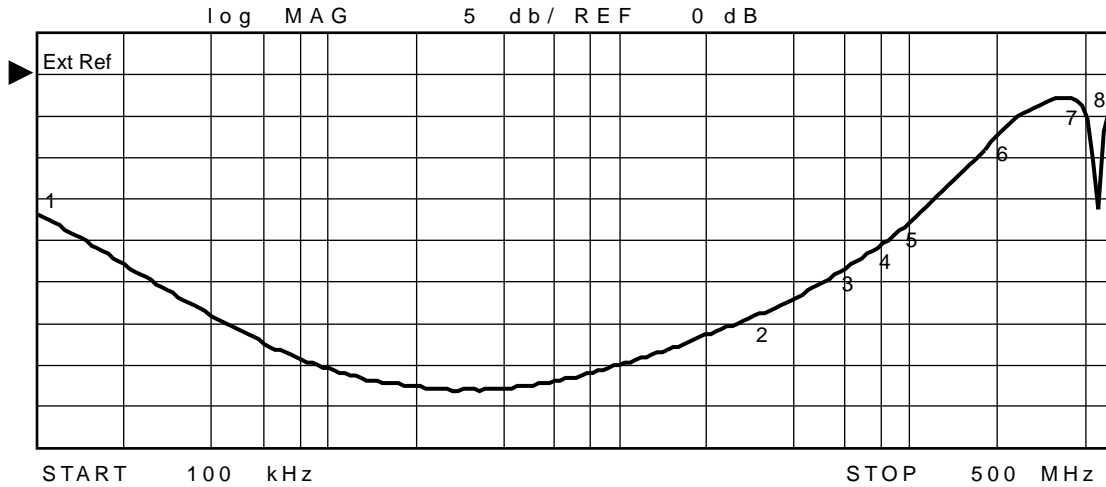
N	SWP PARAM	S12	PHASE
1	100 kHz	-0.1987 dB	8.4019
2	30 MHz	-0.2762 dB	-17.709
3	60 MHz	-0.4044 dB	-34.769
4	80 MHz	-0.5082 dB	-46.343
5	100 MHz	-0.6397 dB	-58.2
6	200 MHz	-2.2760 dB	-120.85
7	350 MHz	-7.6801 dB	146.07
8	500 MHz	-20.705 dB	46.067



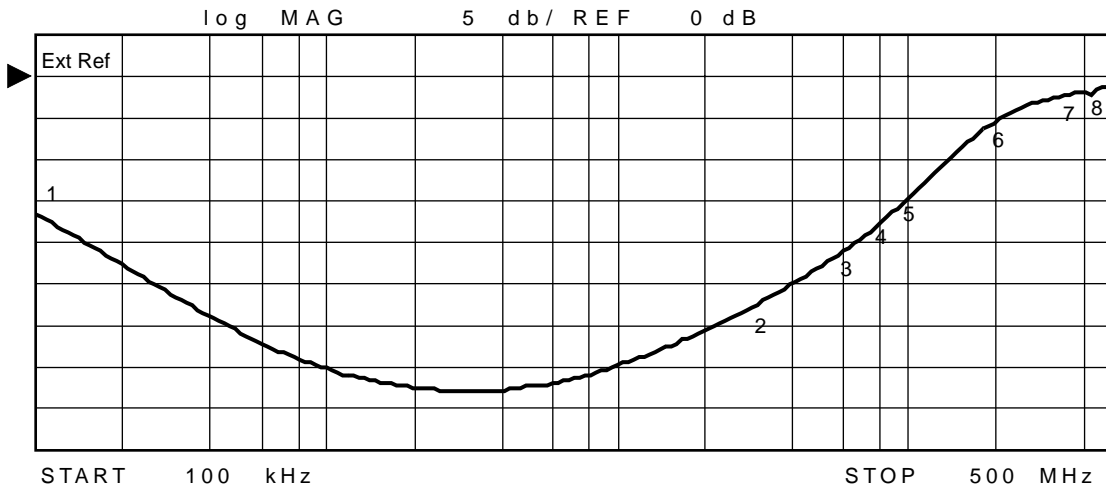
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S11



S22

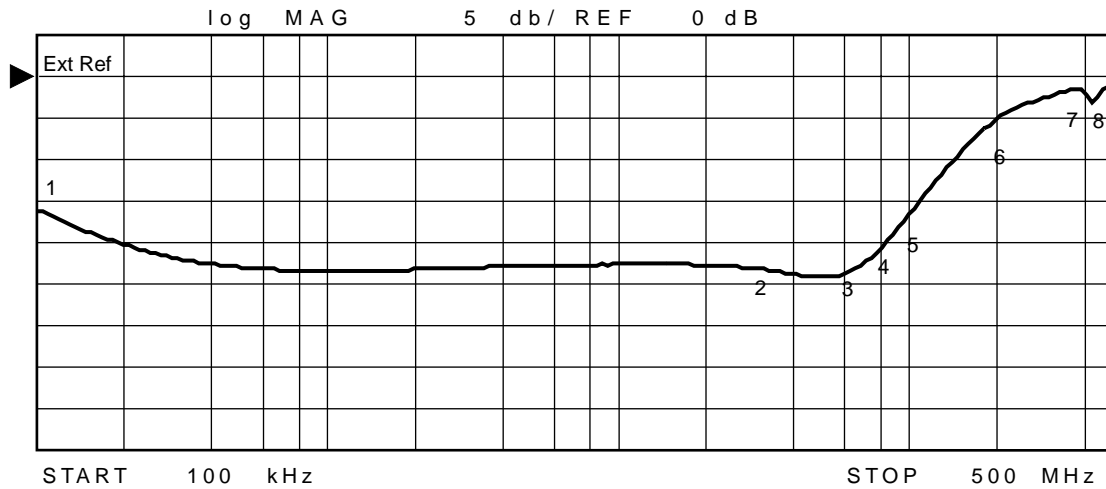


		N	SWP	PARAM	S11	S22
		1	100 kHz		-16.764 dB	-16.533 dB
		2	30 MHz		-28.902 dB	-27.376 dB
		3	60 MHz		-23.270 dB	-20.892 dB
		4	80 MHz		-20.342 dB	-17.560 dB
		5	100 MHz		-17.723 dB	-14.452 dB
		6	200 MHz		-7.2511 dB	-5.3206 dB
		7	350 MHz		-2.7136 dB	-2.2031 dB
		8	500 MHz		-3.9959 dB	-1.4686 dB

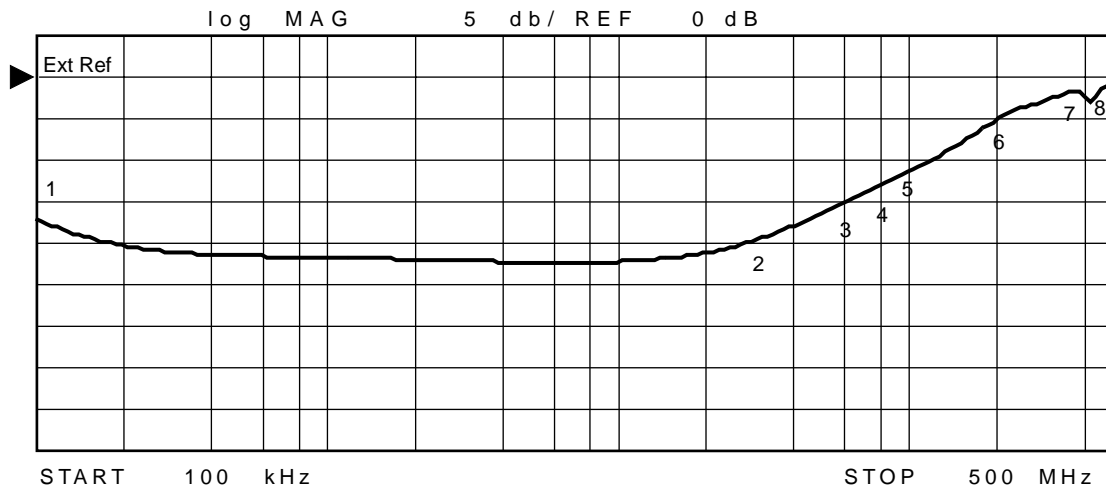
H5007 Performance Data



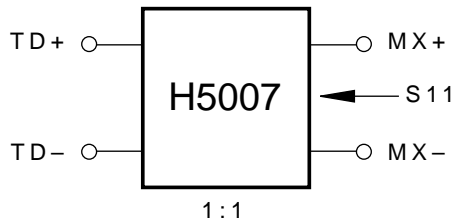
S11 @ 115 OHMS



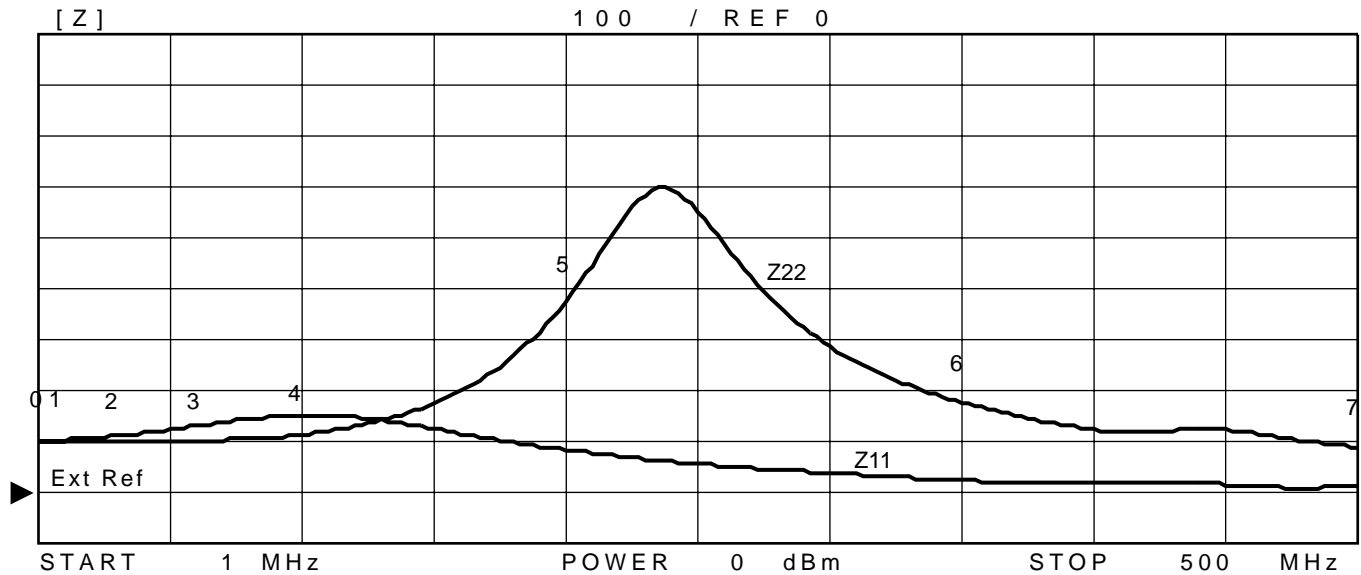
S11 @ 85 OHMS



N	SWP PARAM	115 OHMS	85 OHMS
1	100 kHz	-16.101 dB	-17.277 dB
2	30 MHz	-23.193 dB	-19.725 dB
3	60 MHz	-23.749 dB	-15.194 dB
4	80 MHz	-20.516 dB	-13.074 dB
5	100 MHz	-16.495 dB	-11.472 dB
6	200 MHz	-5.0599 dB	-5.2948 dB
7	350 MHz	-1.7193 dB	-2.0846 dB
8	500 MHz	-1.1405 dB	-1.2940 dB

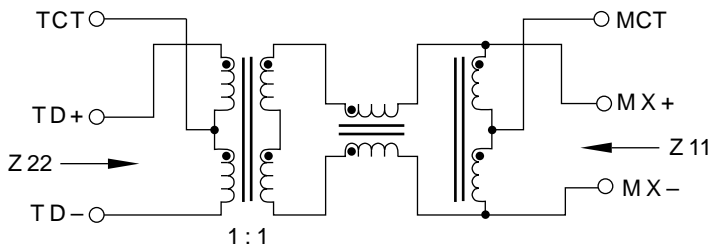


Z11 AND Z22

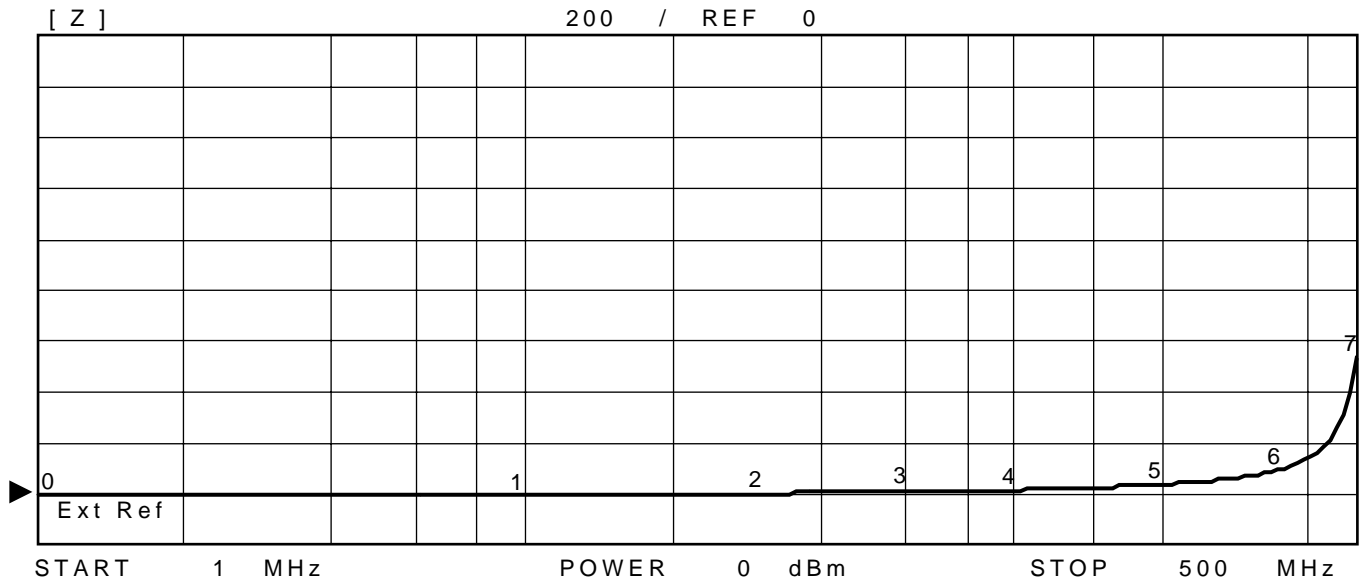


IMPEDANCE MEASURED AT THE INDICATED SIDE WITH THE OPPOSITE SIDE TERMINATED IN 100 OHMS. MEASUREMENTS TAKEN USING A H4380A CABLE ANALYZER IN CONJUNCTION WITH A HP8751A NETWORK ANALYZER.

N	SWP PARAM	Z22	Z11
0	1 MHz	99.455	99.355
1	10 MHz	101.33	102.54
2	30 MHz	102.17	110.80
3	60 MHz	101.90	129.52
4	100 MHz	112.76	151.31
5	200 MHz	370.80	83.572
6	350 MHz	176.70	23.290
7	500 MHz	87.883	12.338

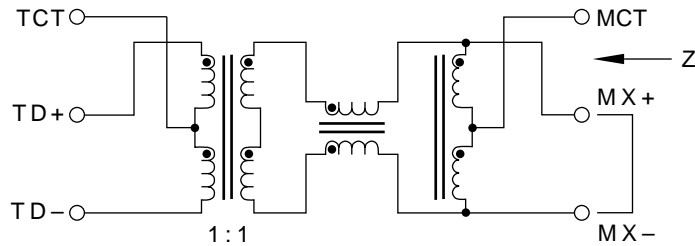


COMMON MODE SHUNT IMPEDANCE

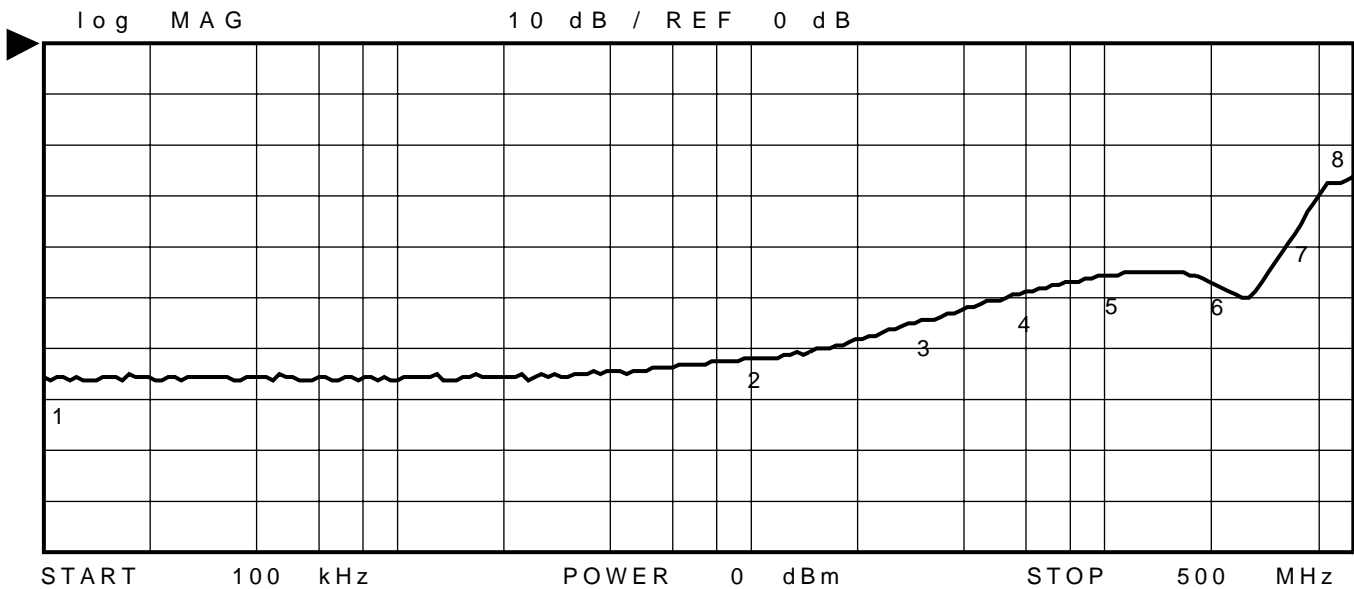


IMPEDANCE MEASURED FROM THE MEDIA SIDE INPUT LINES TO THE MEDIA SIDE GROUND.

N	SWP PARAM	VAL
0	1 MHz	293.69 m
1	10 MHz	1.9859
2	30 MHz	5.516
3	60 MHz	10.625
4	100 MHz	18.053
5	200 MHz	40.643
6	350 MHz	98.901
7	500 MHz	539.51

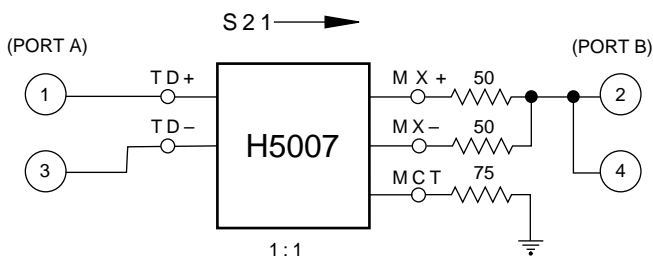


DIFFERENTIAL TO COMMON MODE REJECTION, 75 OHMS

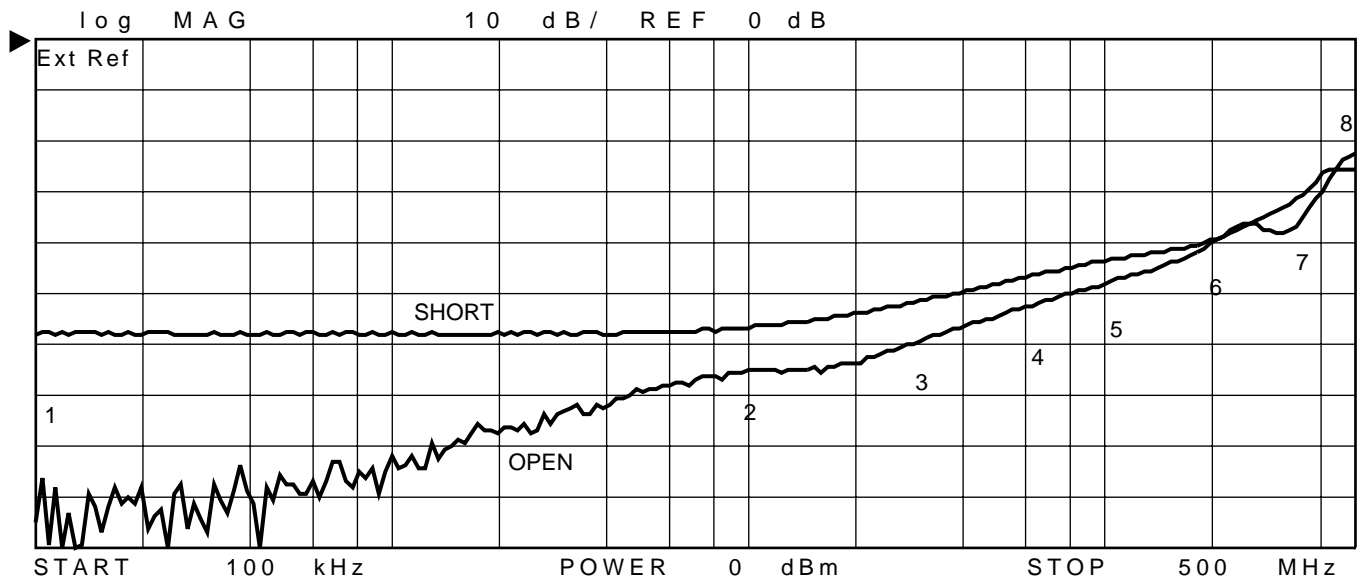


OHMIC VALUE IN TITLE REFLECTS VALUE OF RESISTANCE BETWEEN TRANSFORMER'S MEDIA CENTER TAP (MCT) AND GROUND. MEASUREMENT TAKEN USING A HP4380A CABLE ANALYZER IN CONJUNCTION WITH A HP8751A NETWORK ANALYZER.

N	SWP PARAM	75 OHMS
1	100 kHz	-65.870 dB
2	10 MHz	-62.068 dB
3	30 MHz	-54.627 dB
4	60 MHz	-48.886 dB
5	100 MHz	-45.727 dB
6	200 MHz	-47.018 dB
7	350 MHz	-36.084 dB
8	500 MHz	-26.473 dB

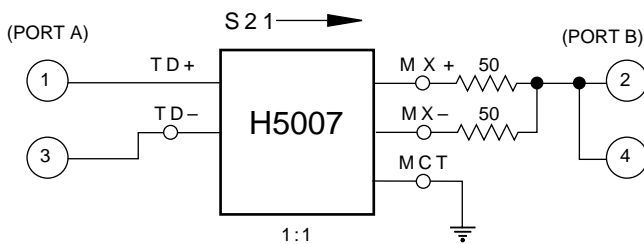


DIFFERENTIAL TO COMMON MODE REJECTION

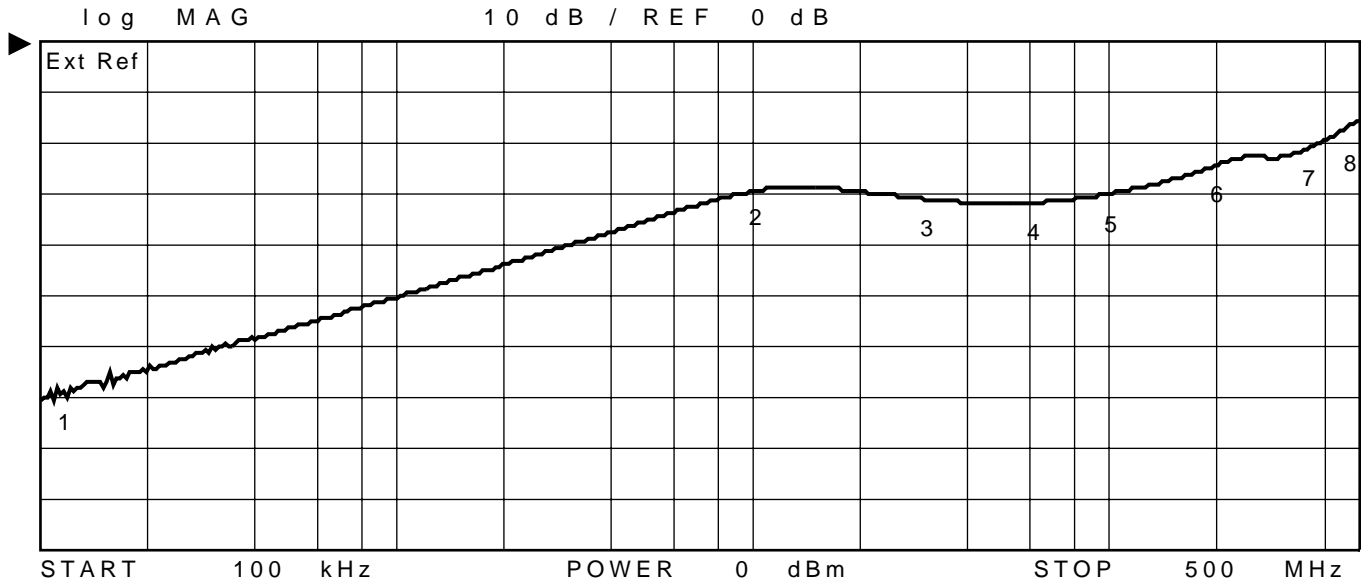


SHORT/OPEN COLUMNS REFLECT WHETHER TRANSFORMER'S MECA CENTER TAP (MCT) IS TIED TO GROUND. MEASUREMENTS TAKEN USING A HP4380A CABLE ANALYZER IN CONJUNCTION WITH A HP8751A NETWORK ANALYZER.

N	SWP PARAM	SHORT	OPEN
1	100 kHz	-57.900 dB	-95.062 dB
2	10 MHz	-56.559 dB	-65.158 dB
3	30 MHz	-51.527 dB	-59.359 dB
4	60 MHz	-46.749 dB	-52.658 dB
5	100 MHz	-43.472 dB	-47.919 dB
6	200 MHz	-39.413 dB	-39.805 dB
7	350 MHz	-30.746 dB	-35.639 dB
8	500 MHz	-25.377 dB	-22.711 dB

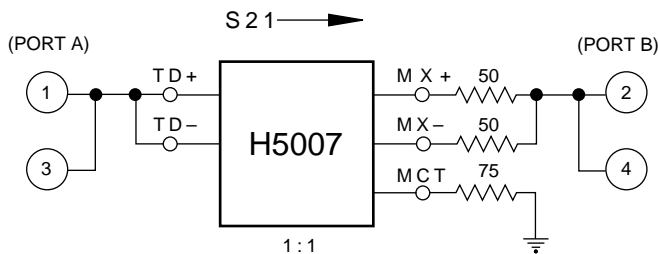


COMMON MODE REJECTION RATIO, 75 OHMS

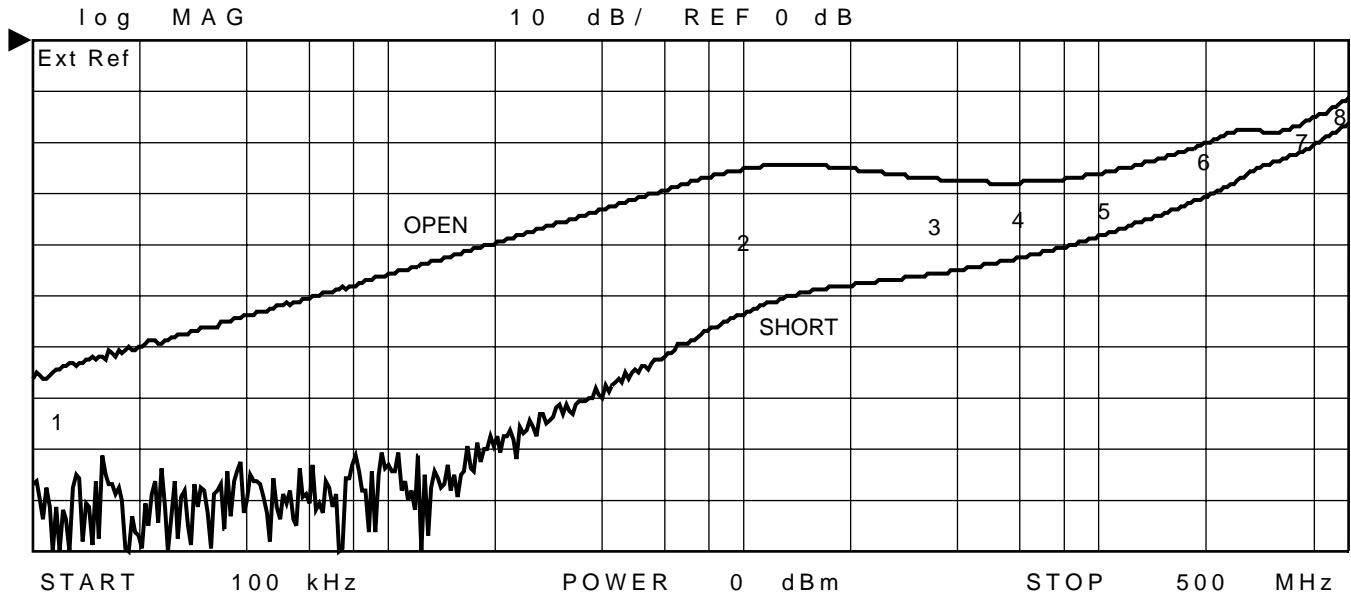


OHMIC VALUE IN TITLE REFLECTS VALUE OF RESISTANCE BETWEEN TRANSFORMER'S MEDIA CENTER TAP (MCT) AND GROUND. MEASUREMENT TAKEN USING A HP4380A CABLE ANALYZER IN CONJUNCTION WITH A HP8751A NETWORK ANALYZER.

N	SWP PARAM	75 OHMS
1	100 kHz	-70.454 dB
2	10 MHz	-29.426 dB
3	30 MHz	-30.963 dB
4	60 MHz	-31.722 dB
5	100 MHz	-29.875 dB
6	200 MHz	-24.285 dB
7	350 MHz	-21.271 dB
8	500 MHz	-15.414 dB

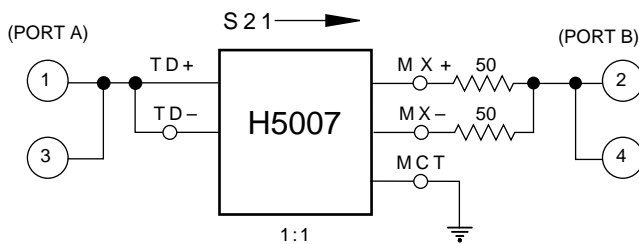


COMMON MODE REJECTION RATIO

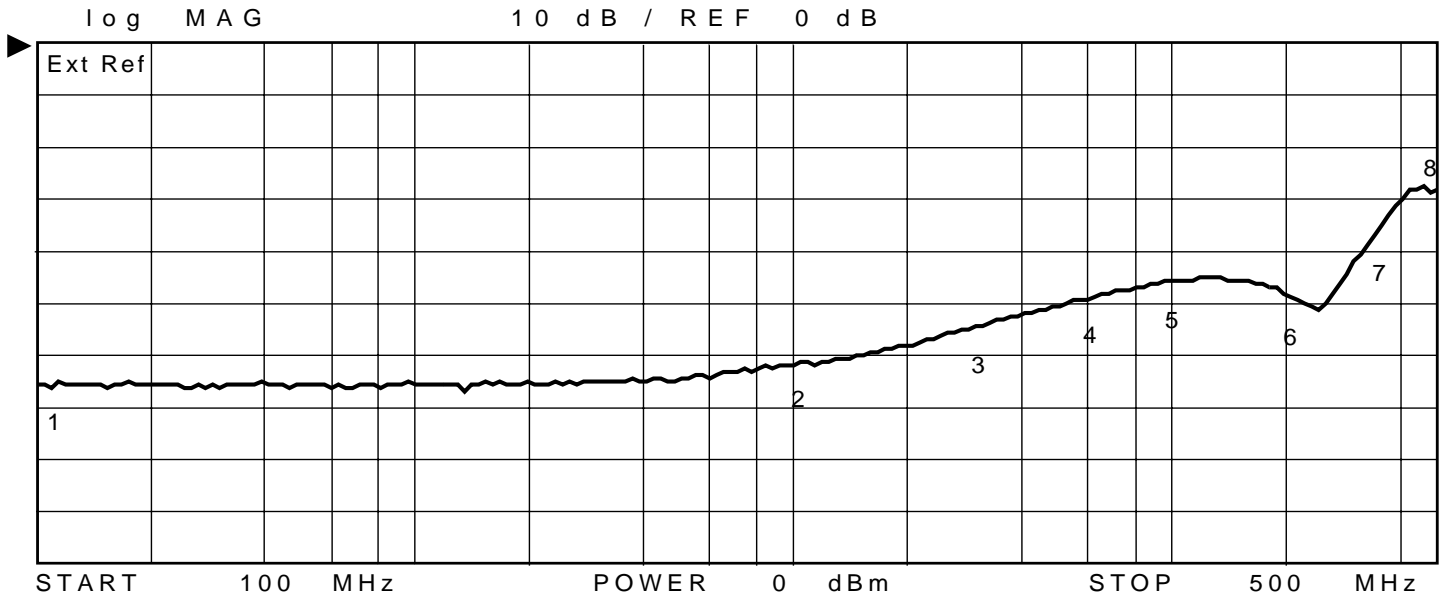


SHORT/OPEN COLUMNS REFLECT WHETHER TRANSFORMER'S MEDIA CENTER TAP (MCT) IS TIED TO GROUND. MEASUREMENTS TAKEN USING A HP4380A CABLE ANALYZER IN CONJUNCTION WITH A HP8751A NETWORK ANALYZER.

N	SWP PARAM	SHORT	OPEN
1	100 MHz	-87.172 dB	-66.454 dB
2	10 MHz	-53.472 dB	-25.188 dB
3	30 MHz	-46.164 dB	-26.703 dB
4	60 MHz	-42.527 dB	-27.795 dB
5	100 MHz	-38.250 dB	-26.021 dB
6	200 MHz	-30.440 dB	-19.988 dB
7	350 MHz	-22.479 dB	-17.105 dB
8	500 MHz	-16.394 dB	-11.480 dB

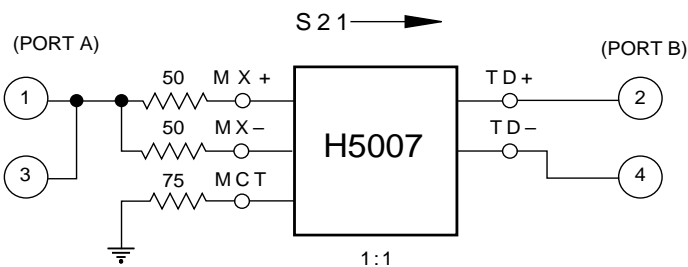


COMMON TO DIFFERENTIAL MODE REJECTION, 75 OHMS

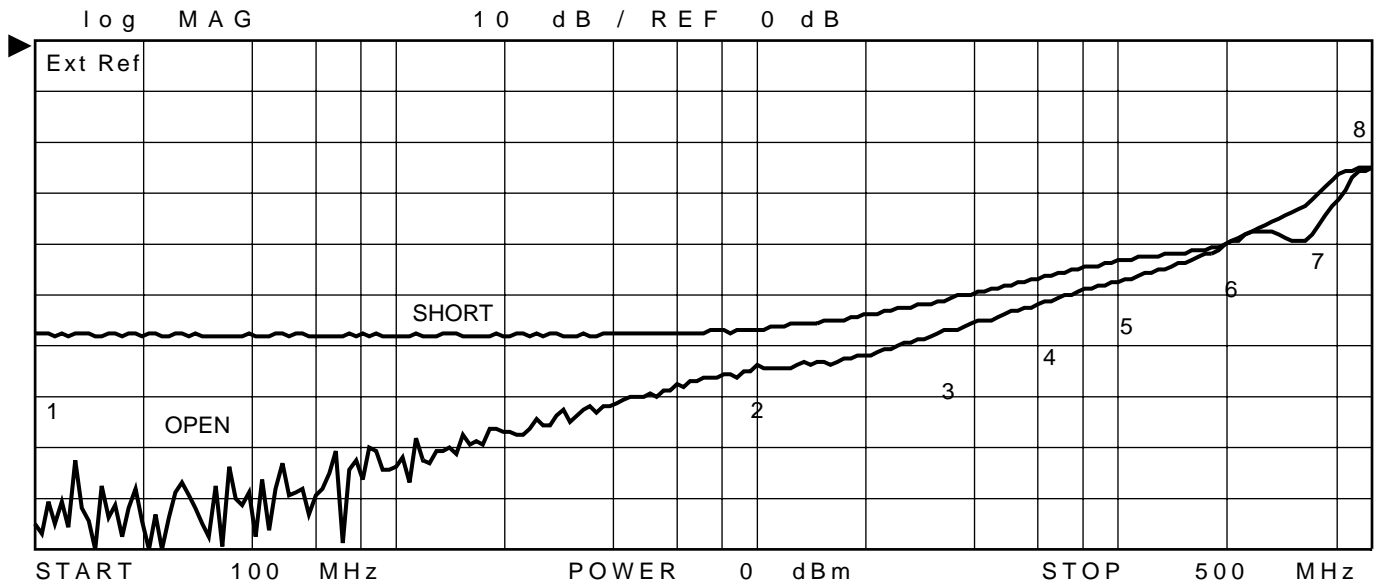


OHMIC VALUE IN TITLE REFLECTS VALUE OF RESISTANCE BETWEEN TRANSFORMER'S MEDIA CENTER TAP (MCT) AND GROUND. MEASUREMENT TAKEN USING A HP4380A CABLE ANALYZER IN CONJUNCTION WITH A HP8751A NETWORK ANALYZER.

N	SWP	PARAM	75 OHMS
1	100	kHz	-65.461 dB
2	10	MHz	-61.706 dB
3	30	MHz	-54.459 dB
4	60	MHz	-49.011 dB
5	100	MHz	-45.759 dB
6	200	MHz	-48.123 dB
7	350	MHz	-35.513 dB
8	500	MHz	-28.112 dB

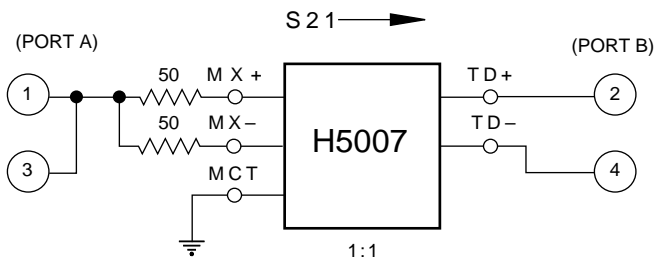


COMMON TO DIFFERENTIAL MODE REJECTION



SHORT/OPEN COLUMNS REFLECT WHETHER TRANSFORMER'S MECA CENTER TAP (MCT) IS TIED TO GROUND. MEASUREMENTS TAKEN USING A HP4380A CABLE ANALYZER IN CONJUNCTION WITH A HP8751A NETWORK ANALYZER.

N	SWP PARAM	SHORT	OPEN
1	100 kHz	-57.801 dB	-94.970 dB
2	10 MHz	-56.665 dB	-63.971 dB
3	30 MHz	-51.575 dB	-57.967 dB
4	60 MHz	-46.633 dB	-51.733 dB
5	100 MHz	-43.390 dB	-47.245 dB
6	200 MHz	-39.829 dB	-39.989 dB
7	350 MHz	-30.647 dB	-36.918 dB
8	500 MHz	-24.955 dB	-25.204 dB

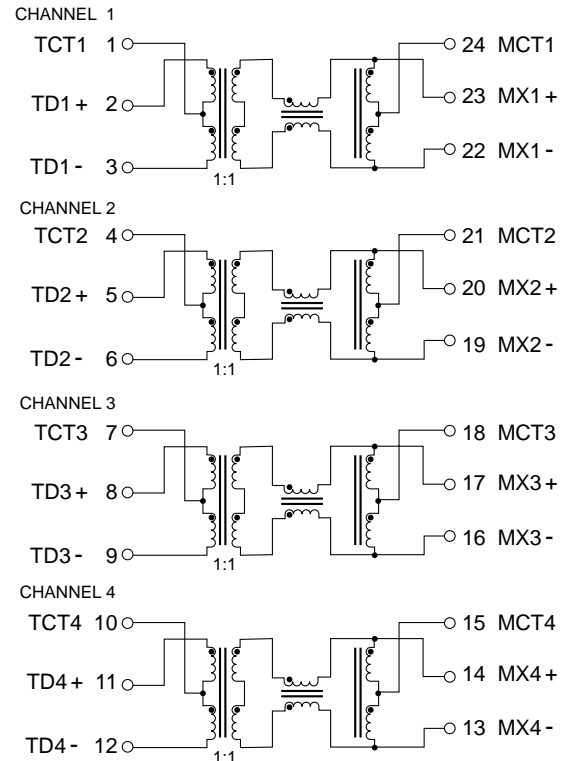
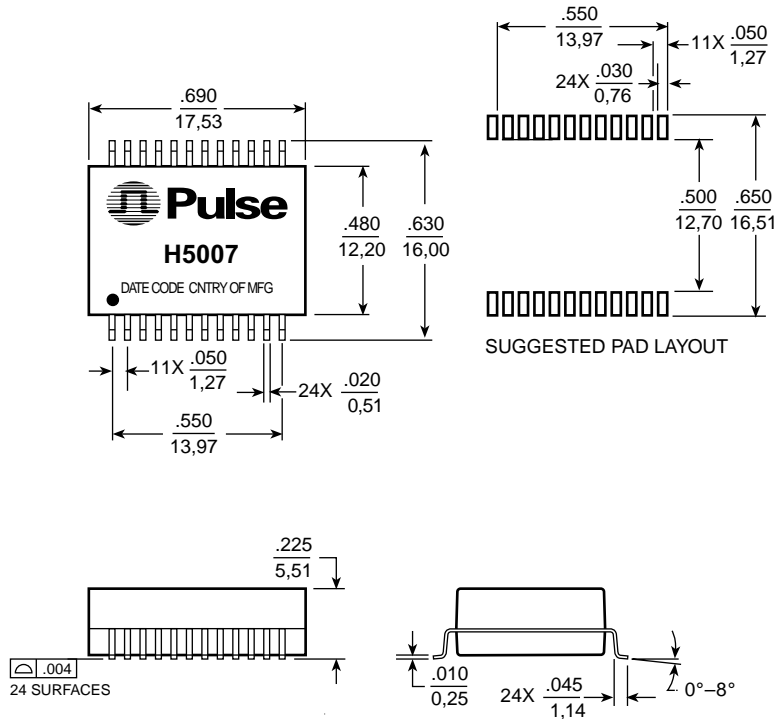


H5007 Performance Data



Mechanical

Schematic



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