



Gigabit Ethernet (1000Base-T)

H5004

Performance Data

DataCom Products Group

Hank Hinrichs, Principal Engineer

H5004 Performance Data



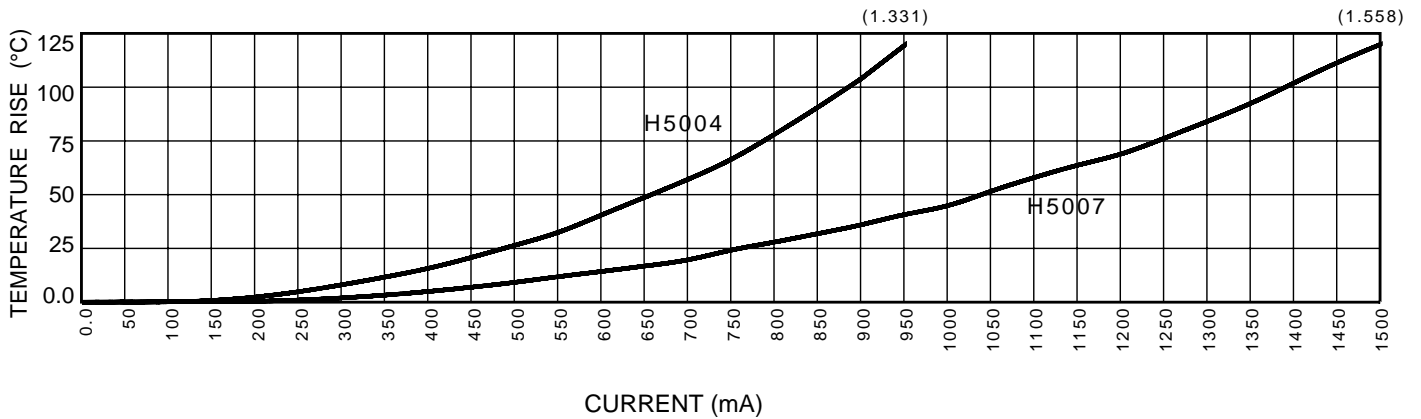
The following graphs typify the scattering (both balanced and unbalanced) and impedance parameters of the H5004, a magnetic transceiver for long haul gigabit (802.3ab) applications. The H5004 is designed around a 10/100/1000Base-T compliant transformer, having a 1:1 turns ratio and includes a series choke 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 and Z22.

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. THE CURVES' UPPER LIMITS ARE RESTRICTED TO LESS THAN 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:

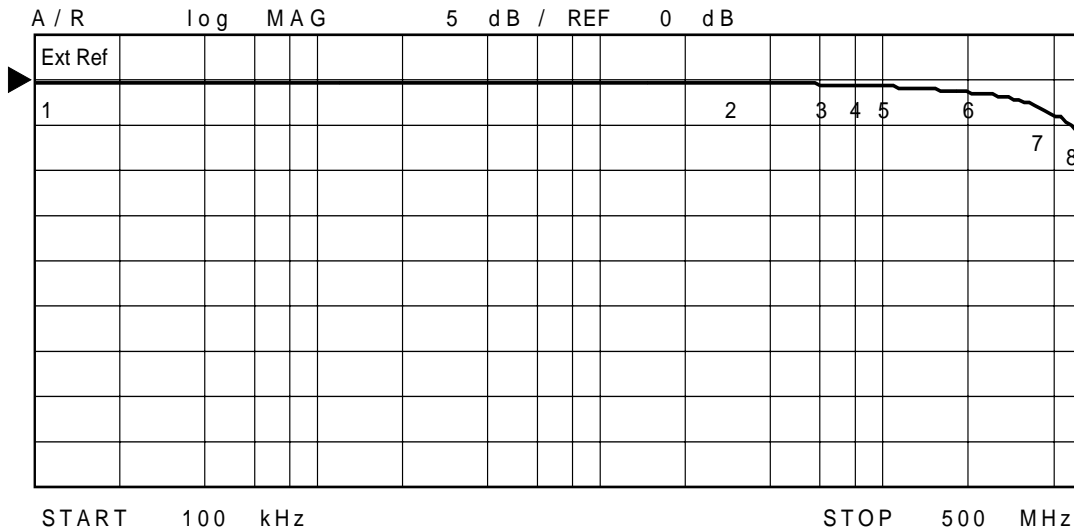
$$\begin{aligned} \text{H5004 TEMP RISE (}^\circ\text{C)} &= -.4557 -.0019743 * A +.000082313 * A^2 +.000000054335 * A^3 \\ \text{H5007 TEMP RISE (}^\circ\text{C)} &= -.3783 -.0013633 * A +.000033491 * A^2 +.000000013683 * A^3 \end{aligned}$$

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

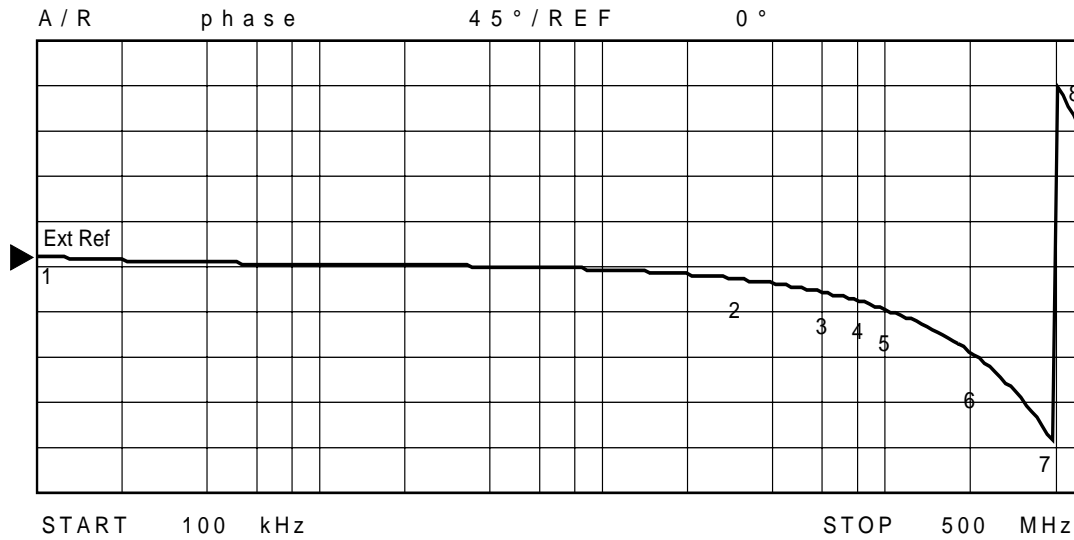
H5004 Performance Data



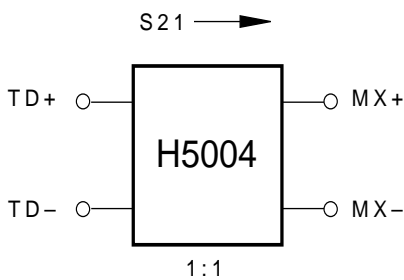
S21



S21 PHASE



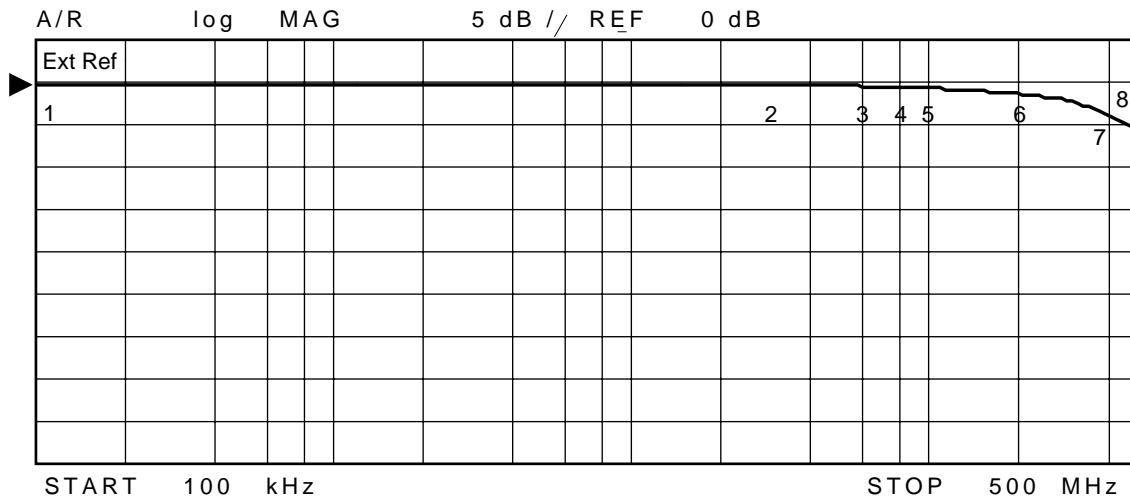
N	SWP PARAM	S21	PHASE
1	100 kHz	-0.2302 dB	8.9703
2	30 MHz	-0.3029 dB	-14.255
3	60 MHz	-0.4751 dB	-27.659
4	80 MHz	-0.6015 dB	-36.357
5	100 MHz	-0.7283 dB	-44.979
6	200 MHz	-1.3965 dB	-88.06
7	350 MHz	-2.9618 dB	-157.57
8	500 MHz	-5.9620 dB	127.6



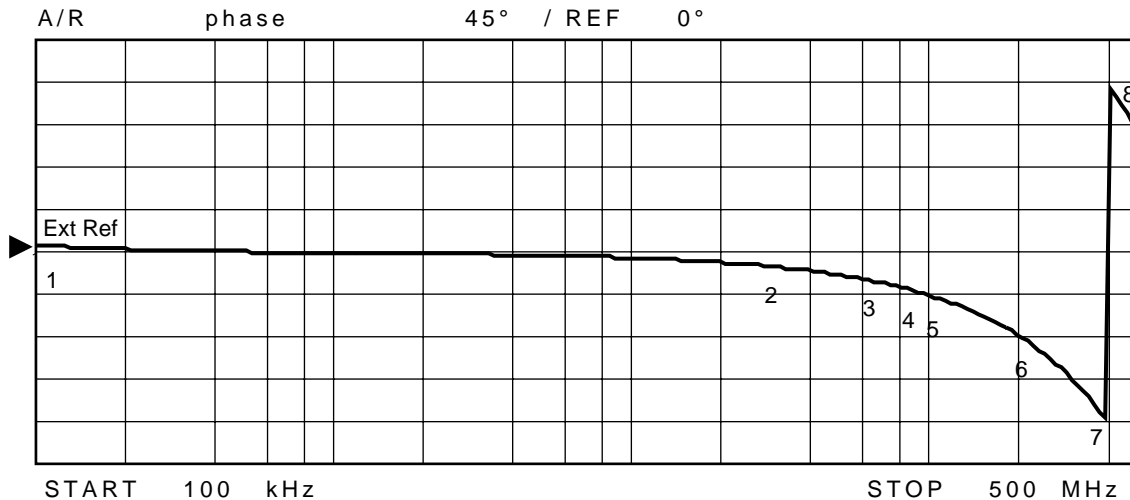
H5004 Performance Data



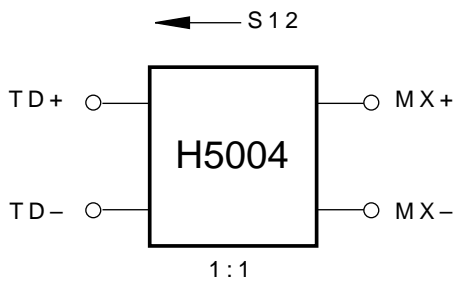
S12



S12 PHASE



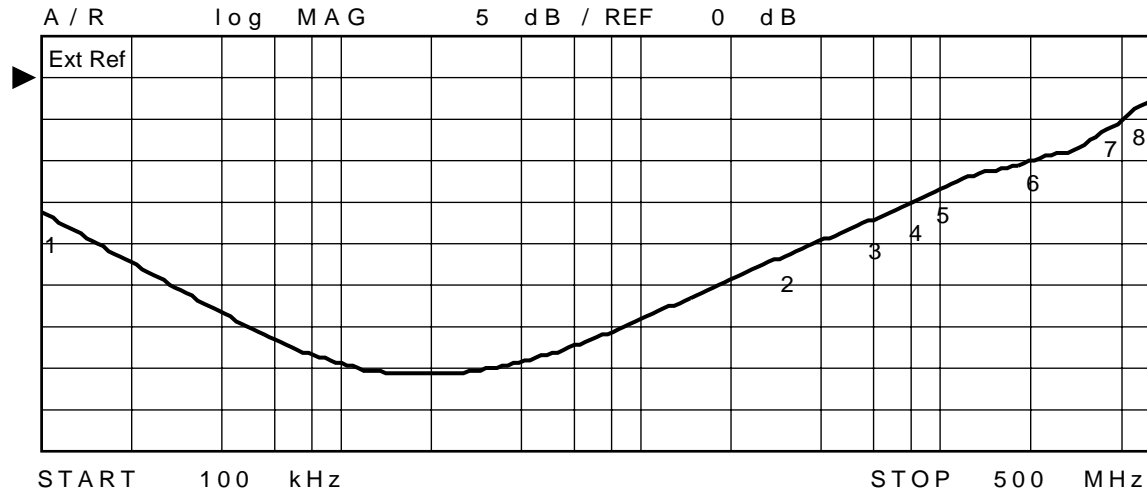
N	SWP PARAM	S12	PHASE
1	100 kHz	-.2279 dB	8.9253
2	30 MHz	-.3019 dB	-14.269
3	60 MHz	-.4753 dB	-27.669
4	80 MHz	-.5977 dB	-36.363
5	100 MHz	-.7200 dB	-45.02
6	200 MHz	-1.3787 dB	-88.255
7	350 MHz	-3.0251 dB	-157.58
8	500 MHz	-6.0033 dB	126.6



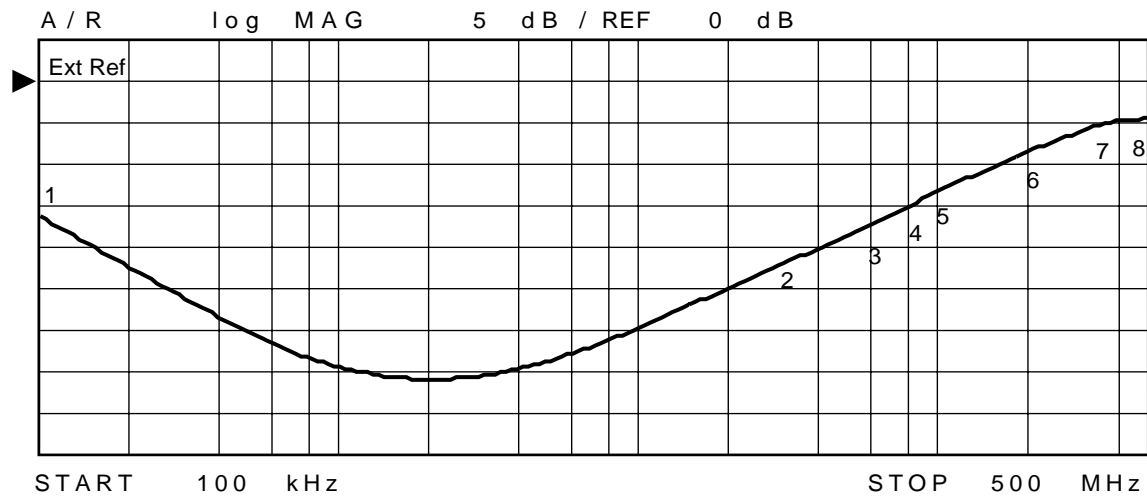
H5004 Performance Data



S11

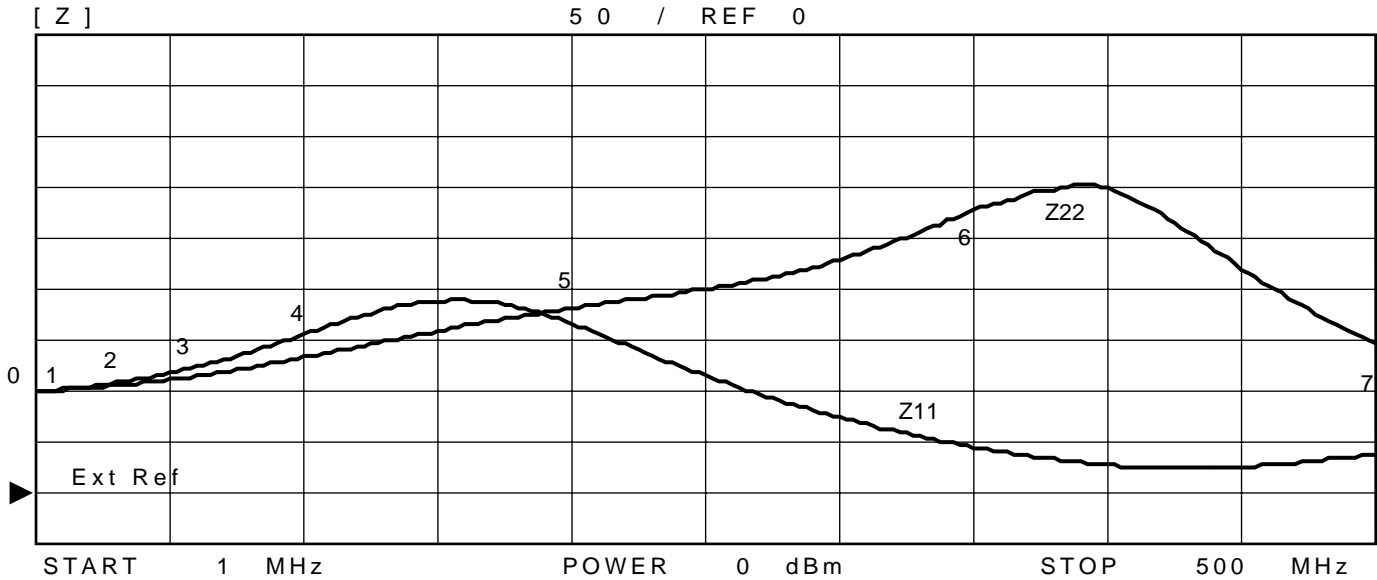


S22

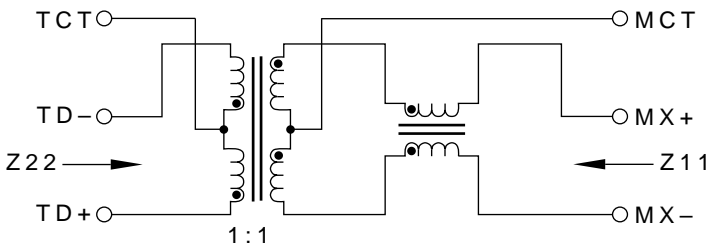


		N	SWP PARAM	S11	S22
		1	100 kHz	-16.239 dB	-16.320 dB
		2	30 MHz	-21.465 dB	-21.984 dB
		3	60 MHz	-16.991 dB	-17.184 dB
		4	80 MHz	-14.960 dB	-14.926 dB
		5	100 MHz	-13.281 dB	-13.125 dB
		6	200 MHz	-10.015 dB	-8.3751 dB
		7	350 MHz	-6.4452 dB	-5.1569 dB
		8	500 MHz	-2.9223 dB	-4.3037 dB

Z11 AND Z22 IMPEDANCE

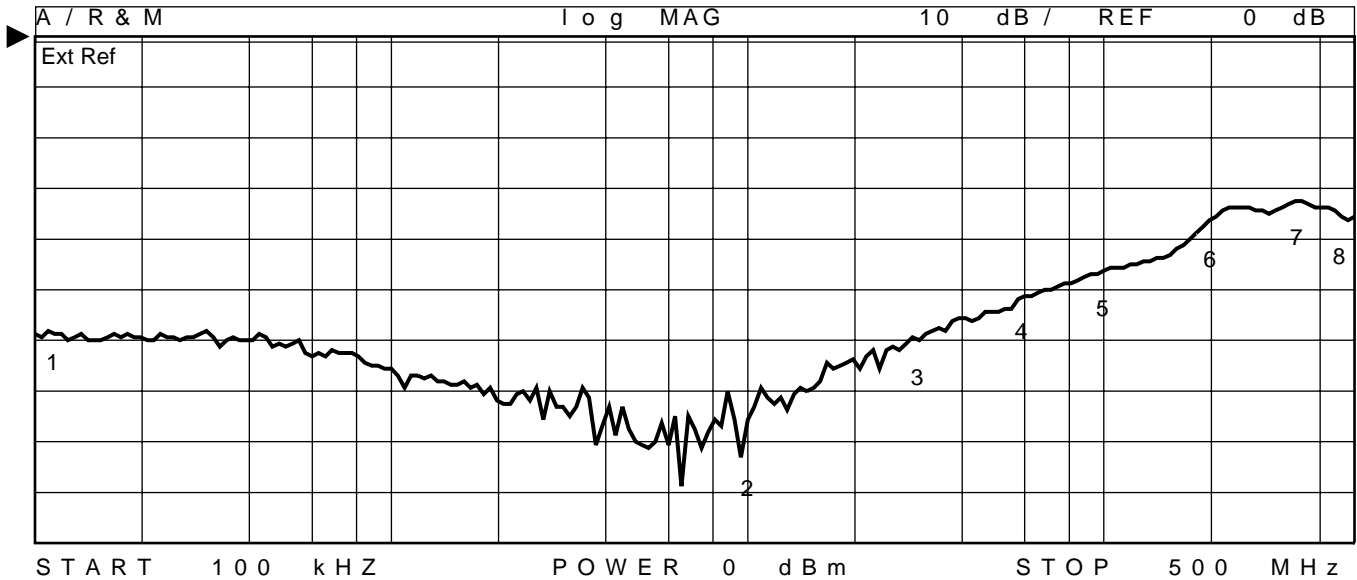


IMPEDANCE MEASURED AT THE INDICATED SIDE WITH THE OPPOSITE SIDE TERMINATED IN 100 OHMS. MEASUREMENTS TAKEN USING AN H4380A CABLE ANALYZER IN CONJUNCTION WITH AN HP8751A NETWORK ANALYZER.

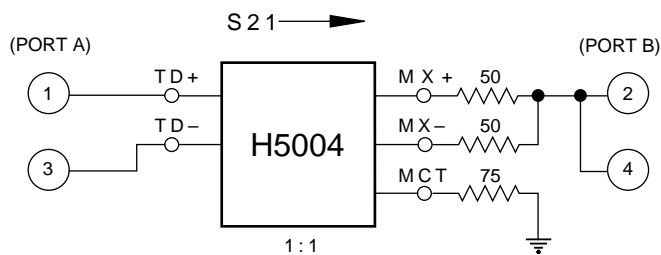


N	SWP PARAM	Z22 IMP	Z11 IMP
0	1 MHz	99.33	99.379
1	10 MHz	101.35	101.57
2	30 MHz	105.27	107.6
3	60 MHz	114.7	123.4
4	100 MHz	132.73	155.16
5	200 MHz	181.28	166.2
6	350 MHz	276.42	45.167
7	500 MHz	145.95	38.088

DIFFERENTIAL TO COMMON MODE REJECTION, 75 OHMS

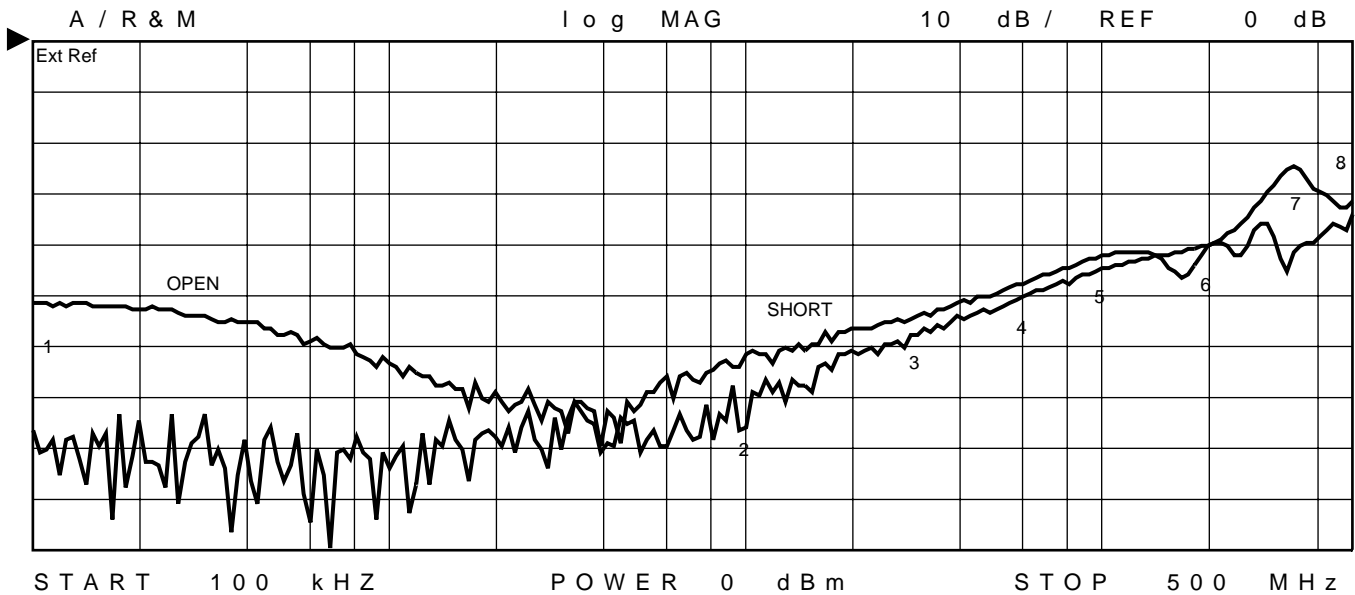


OHMIC VALUE IN TITLE REFLECTS VALUE OF RESISTANCE BETWEEN TRANSFORMER'S MEDIA CENTER TAP (MCT) AND GROUND. MEASUREMENT TAKEN USING A HP4380A CABLE ANALYZER IN CONJUNCTION WITH A HP8751A NETWORK ANALYZER.

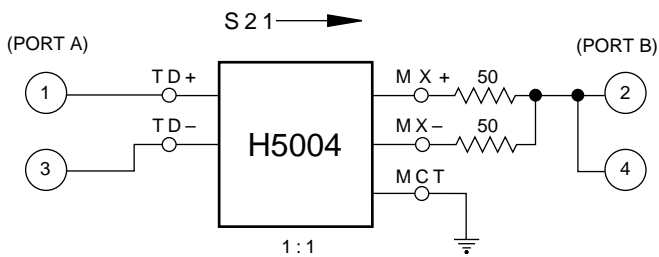


N	SWP PARAM	75 OHMS
1	100 kHz	-58.863 dB
2	30 MHz	-75.210 dB
3	60 MHz	-59.803 dB
4	80 MHz	-51.434 dB
5	100 MHz	-46.193 dB
6	200 MHz	-35.971 dB
7	350 MHz	-32.388 dB
8	500 MHz	-35.502 dB

DIFFERENTIAL TO COMMON MODE REJECTION

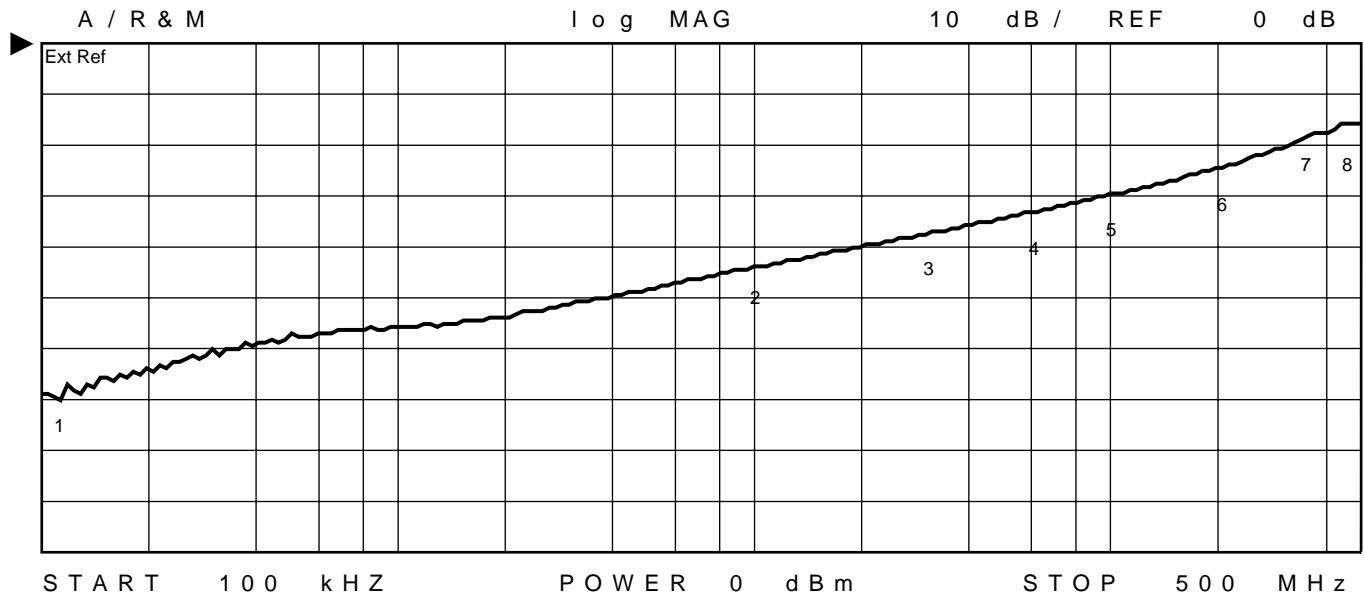


SHORT/OPEN COLUMNS REFLECT WHETHER TRANSFORMER'S MEDIA CENTER TAP (MCT) IS TIED TO GROUND. MEASUREMENTS TAKEN USING A HP4380A CABLE ANALYZER IN CONJUNCTION WITH A HP8751A NETWORK ANALYZER.



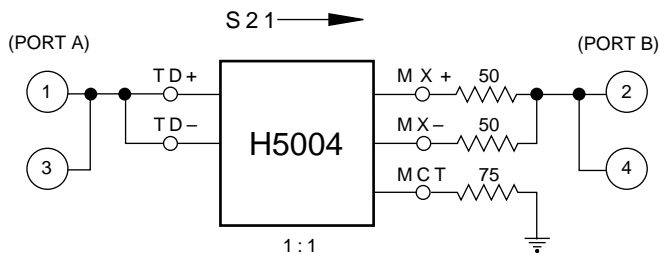
N	SWP PARAM	SHORT	OPEN
1	100 kHz	-51.661 dB	-77.145 dB
2	10 MHz	-75.139 dB	-61.848 dB
3	30 MHz	-58.312 dB	-54.651 dB
4	60 MHz	-50.530 dB	-47.749 dB
5	100 MHz	-45.100 dB	-42.508 dB
6	200 MHz	-40.080 dB	-40.440 dB
7	350 MHz	-25.561 dB	-41.059 dB
8	500 MHz	-32.115 dB	-34.415 dB

COMMON MODE REJECTION RATIO, 75 OHMS

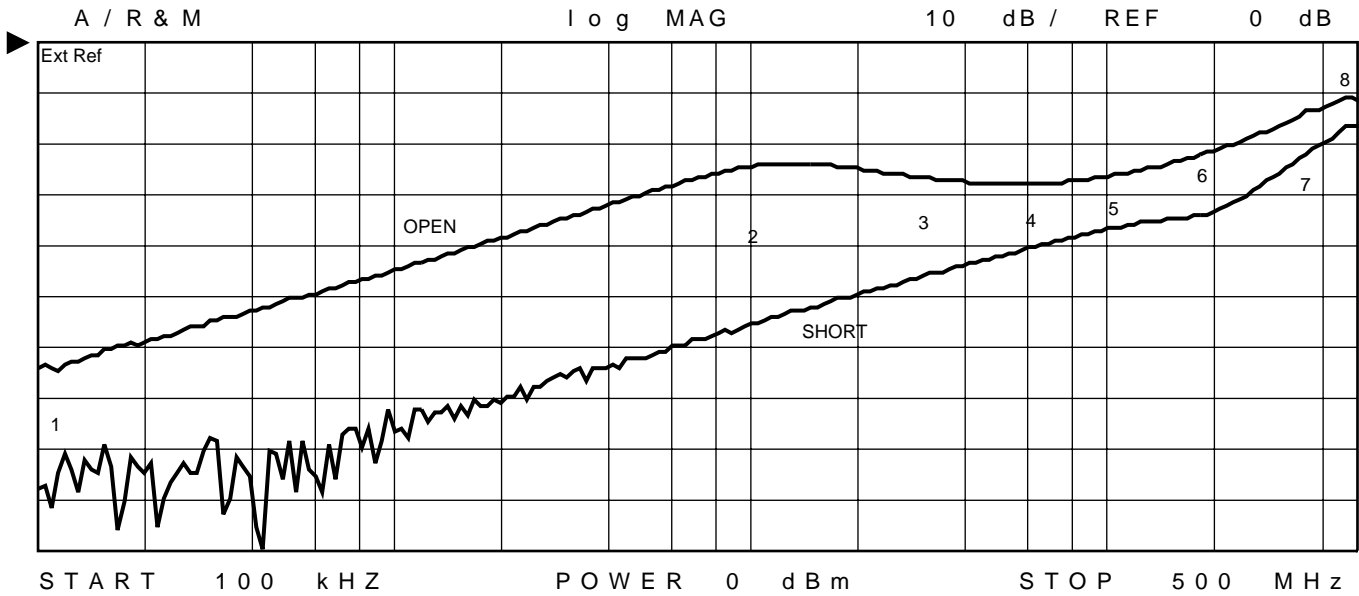


OHMIC VALUE IN TITLE REFLECTS VALUE OF RESISTANCE BETWEEN TRANSFORMER'S MEDIA CENTER TAP (MCT) AND GROUND. MEASUREMENT TAKEN USING A HP4380A CABLE ANALYZER IN CONJUNCTION WITH A HP8751A NETWORK ANALYZER.

N	SWP PARAM	75 OHMS
1	100 kHz	-68.702 dB
2	10 MHz	-43.973 dB
3	30 MHz	-37.342 dB
4	60 MHz	-33.100 dB
5	100 MHz	-29.605 dB
6	200 MHz	-24.394 dB
7	350 MHz	-18.403 dB
8	500 MHz	-15.625 dB

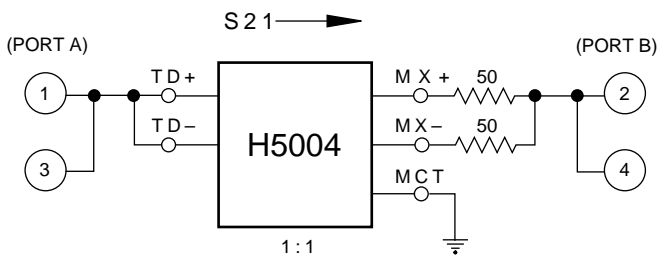


COMMON MODE REJECTION RATIO

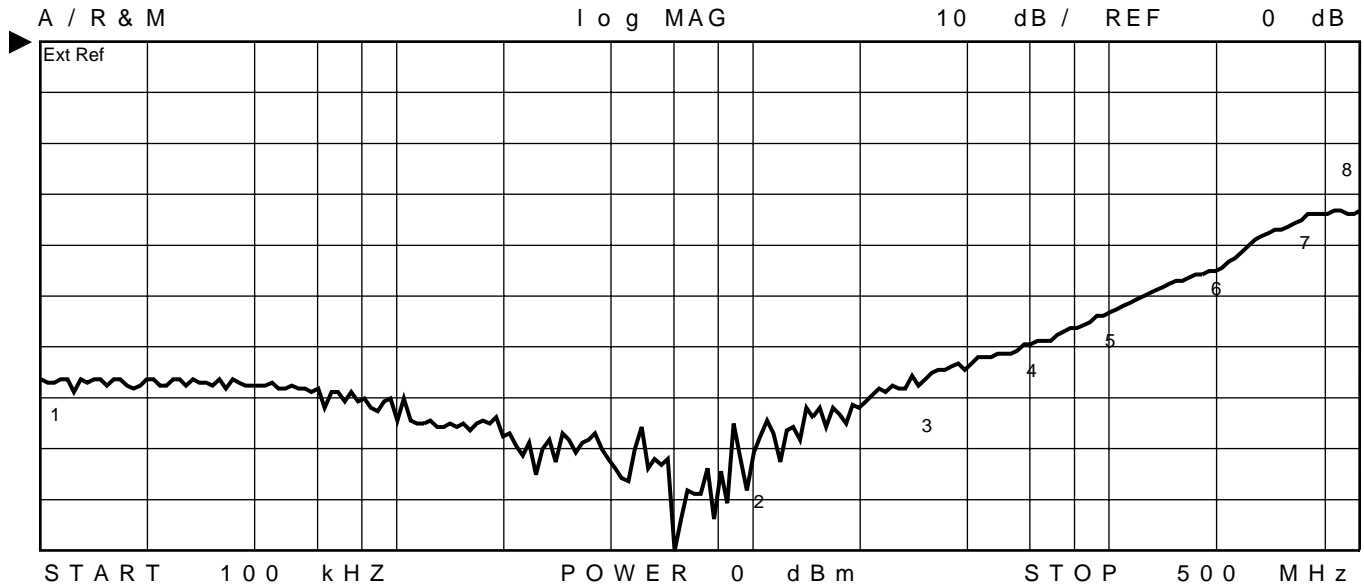


SHORT/OPEN COLUMNS REFLECT WHETHER TRANSFORMER'S MEDIA CENTER TAP (MCT) IS TIED TO GROUND. MEASUREMENTS TAKEN USING A HP4380A CABLE ANALYZER IN CONJUNCTION WITH A HP8751A NETWORK ANALYZER.

N	SWP PARAM	SHORT	OPEN
1	100 kHz	-38.341 dB	-64.331 dB
2	10 MHz	-55.775 dB	-24.694 dB
3	30 MHz	-46.411 dB	-26.972 dB
4	60 MHz	-40.324 dB	-25.233 dB
5	100 MHz	-37.009 dB	-26.704 dB
6	200 MHz	-33.557 dB	-21.556 dB
7	350 MHz	-22.660 dB	-14.307 dB
8	500 MHz	-16.655 dB	-11.774 dB

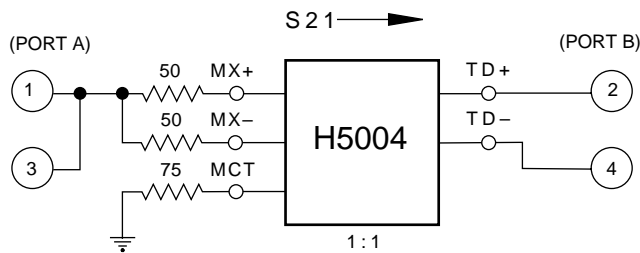


COMMON TO DIFFERENTIAL MODE REJECTION, 75 OHMS



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	-66.148 dB
2	10 MHz	-80.022 dB
3	30 MHz	-66.288 dB
4	60 MHz	-59.195 dB
5	100 MHz	-52.855 dB
6	200 MHz	-44.533 dB
7	350 MHz	-34.282 dB
8	500 MHz	-33.427 dB

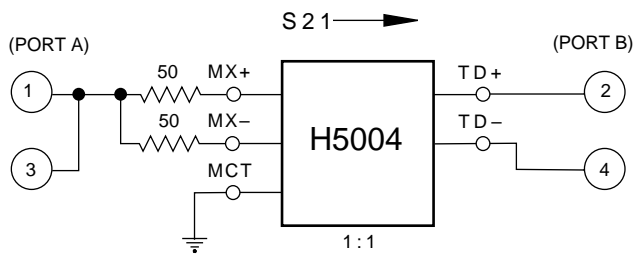


COMMON TO DIFFERENTIAL MODE REJECTION



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 kHz	-60.523 dB	-94.727 dB
2	10 MHz	-76.267 dB	-63.906 dB
3	30 MHz	-65.688 dB	-58.835 dB
4	60 MHz	-58.084 dB	-54.443 dB
5	100 MHz	-51.404 dB	-50.289 dB
6	200 MHz	-40.591 dB	-43.115 dB
7	350 MHz	-32.173 dB	-32.411 dB
8	500 MHz	-32.929 dB	-28.338 dB

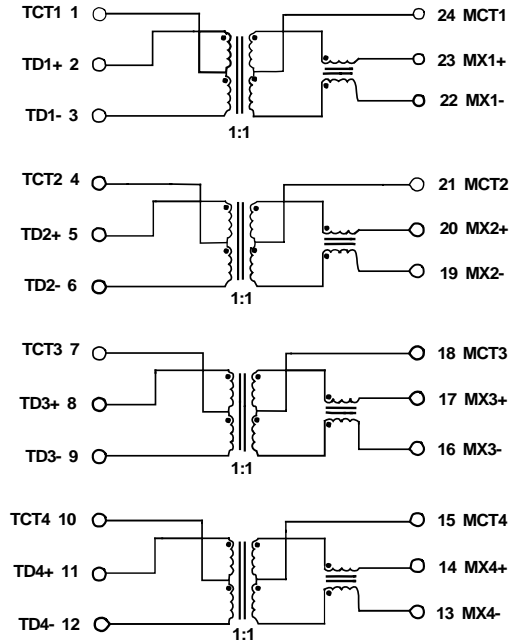
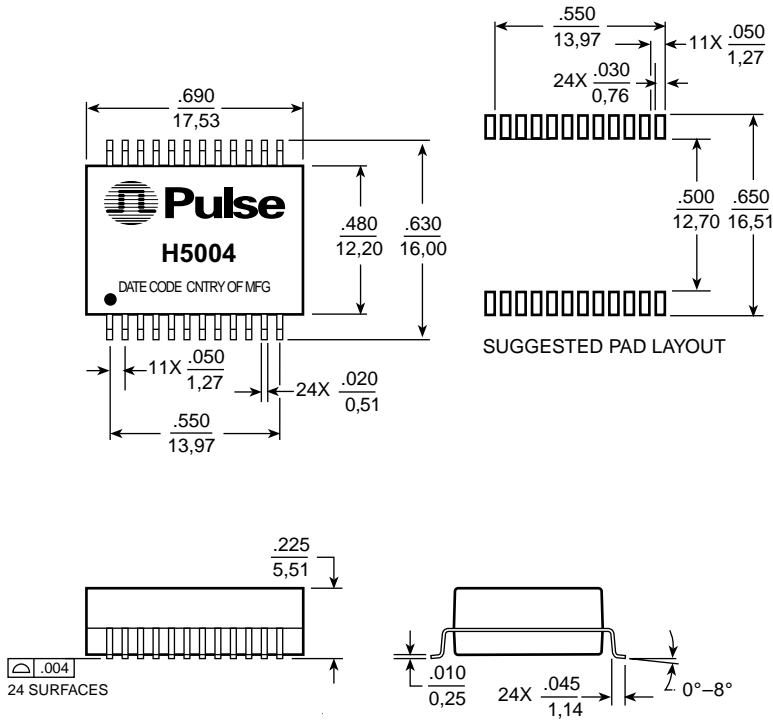


H5004 Performance Data

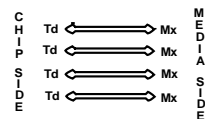


Mechanical

Schematic



LEGEND



H5004 Performance Data



For More Information :

United States (Worldwide)	United Kingdom (Northern Europe)	France (Southern Europe)	Singapore (Southern Asia)	Taiwan (Northern Asia)	Distributor
12220 World Trade Drive San Diego, CA 92128 United States Tel: 858 674 8100 FAX: 858 674 8262 http://www.pulseeng.com Quick-Facts: 858 674 9672	1 & 2 Huxley Road The Surrey Research Park Guildford, Surrey GU2 5RE United Kingdom Tel: 44 1483 401700 FAX: 44 1483 401701	Zone Industrielle F-39270 Orgelet, France Tel: 33 3 84 35 04 04 FAX: 33 3 84 25 46 41	150 Kampong Ampat #07-01/02 KA Centre Singapore 368324 Tel: 65 287 8998 FAX: 65 280 0080	3F-4, No. 81, Sec. 1 Hsin Tai Wu Road Hsi-Chih Taipei Hsien, Taiwan, R.O.C. Tel: 886 2 26980228 FAX: 886 2 26980948	

Performance warranty is limited to the parameters specified. Data is subject to change without notice. Other brand and product names mentioned herein may be trademarks or registered trademarks of their respective owners.

©1999, Pulse Engineering, Inc.