## Old Company Name in Catalogs and Other Documents

On April 1<sup>st</sup>, 2010, NEC Electronics Corporation merged with Renesas Technology Corporation, and Renesas Electronics Corporation took over all the business of both companies. Therefore, although the old company name remains in this document, it is a valid Renesas Electronics document. We appreciate your understanding.

Renesas Electronics website: http://www.renesas.com

April 1<sup>st</sup>, 2010 Renesas Electronics Corporation

Issued by: Renesas Electronics Corporation (http://www.renesas.com)

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## SILICON TRANSISTOR

2SC5454

## NPN EPITAXIAL SILICON TRANSISTOR 4-PIN MINI MOLD

#### **FEATURE**

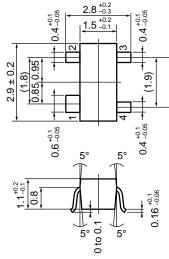
- · High gain, low noise
- · Small reverse transfer capacitance
- · Can operate at low voltage

#### ABSOLUTE MAXIMUM RATINGS (TA = $25 \, ^{\circ}$ C)

PARAMETER	SYMBOL	RATING	UNIT
Collector to Base Voltage	Vсво	9	V
Collector to Emitter Voltage	VCEO	6	V
Emitter to Base Voltage	Vево	2	V
Collector Current	Ic	50	mA
Total Power Dissipation	Рт	200	mW
Junction Temperature	Tj	150	°C
Storage Temperature	T <sub>stg</sub>	-65 to +150	°C

### ELECTRICAL CHARACTERISTICS (TA = 25 °C)

# PACKAGE DIMENSIONS (in mm)



#### **PIN CONNECTIONS**

- 1: Collector
- 2: Emitter
- 3: Base
- 4: Emitter

PARAMETER	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNIT
Collector Cut-off Current	Ісво	Vcb = 5 V, IE = 0			0.1	μΑ
Emitter Cut-off Current	ІЕВО	VEB = 1 V, Ic = 0			0.1	μΑ
DC Current Gain	hfe	Vce = 3 V, Ic = 20 mA <sup>Note 1</sup>	75		150	
Gain Bandwidth Product	f⊤	VcE = 3 V, Ic = 20 mA, f = 2 GHz		14.5		GHz
Reverse Transfer Capacitance	Cre	Vcb = 3 V, IE = 0, f = 1 MHzNote 2		0.3	0.5	pF
Insertion Power Gain	S <sub>21e</sub>   <sup>2</sup>	VcE = 3 V, Ic = 20 mA, f = 2 GHz	10	12.0		dB
Noise Figure	NF	VcE = 3 V, Ic = 5 mA, f = 2 GHz		1.5	2.5	dB

**Notes 1.** Pulse measurement Pw  $\leq$  350  $\mu$ s, duty cycle  $\leq$  2 %

2. Collector to base capacitance measured by capacitance meter (automatic balance bridge method) when emitter pin is connected to the guard pin.

Because this product uses high-frequency process, avoid excessive input of static electricity, etc.

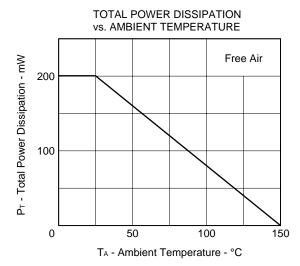
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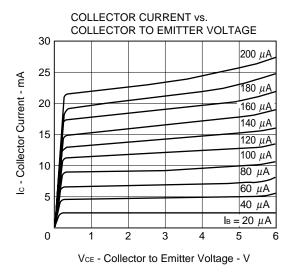


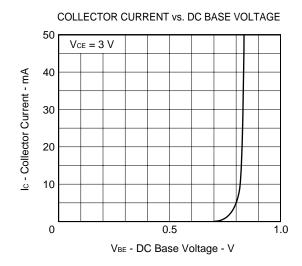
#### **hfe CLASSIFICATION**

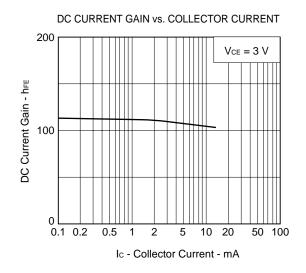
RANK	FB
Marking	R54
hfE	75 to 150

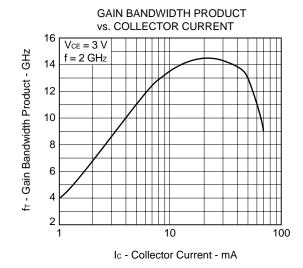
## TYPICAL CHARACTERISTICS (TA = 25 °C)

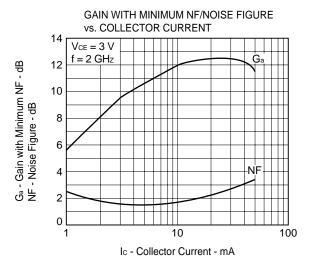


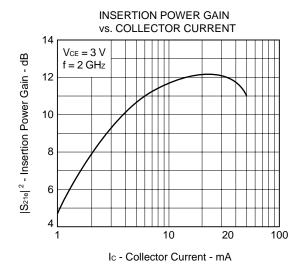


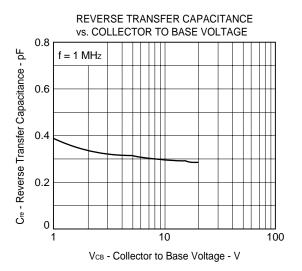




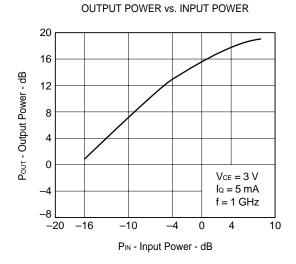


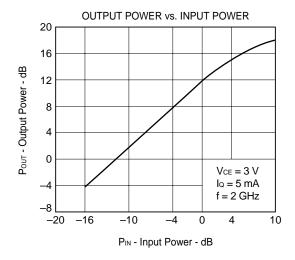






## 





f - Frequency - GHz

VcE = 3 V, Ic = 5 mA,	$Z_0 = 50 \Omega$							
FREQUENCY		S <sub>11</sub>	Sa	1	S <sub>1</sub>	2	S	S <sub>22</sub>
MHz	MAG	ANG	MAG	ANG	MAG	ANG	MAG	ANG
100.00	0.829	-19.2	14.261	164.7	0.015	78.1	0.972	-11.1
200.00	0.783	-37.0	13.252	150.7	0.029	69.1	0.913	-21.6
300.00	0.727	-54.1	12.245	139.2	0.040	59.1	0.843	-30.2
400.00	0.666	-68.7	10.804	129.3	0.048	52.8	0.764	-37.5
500.00	0.606	-82.9	9.964	118.9	0.053	49.2	0.699	-42.6
600.00	0.556	-95.8	9.028	111.1	0.057	44.9	0.645	-47.3
700.00 800.00	0.517 0.486	−106.6 −117.5	8.120 7.393	104.1 98.0	0.061 0.063	42.4 40.0	0.591 0.557	-51.3 -54.4
900.00	0.460	-117.5 -126.8	6.709	92.5	0.065	39.3	0.557	-54.4 -57.9
1000.00	0.446	-135.6	6.178	87.4	0.067	38.3	0.491	-60.3
1100.00	0.433	-143.5	5.702	82.9	0.069	38.2	0.470	-63.3
1200.00	0.426	-151.0	5.280	78.5	0.071	37.7	0.450	-65.9
1300.00	0.422	-157.9	4.919	74.6	0.072	38.3	0.433	-69.2
1400.00	0.420	-164.1	4.610	70.6	0.073	37.5	0.420	-71.6
1500.00	0.422	-170.2	4.331	67.0	0.075	37.7	0.408	-75.3
1600.00	0.424	-175.5	4.070	63.3	0.077	39.3	0.400	-78.3
1700.00 1800.00	0.429 0.434	179.4 174.8	3.856 3.661	59.7 56.5	0.078 0.082	39.0 40.2	0.393 0.389	-81.8 -84.7
1900.00	0.434	170.2	3.481	53.1	0.082	40.5	0.378	-89.2
2000.00	0.448	166.4	3.306	50.0	0.086	41.9	0.378	-91.4
2100.00	0.456	162.2	3.150	46.6	0.088	41.7	0.372	-96.5
2200.00	0.465	158.7	3.013	43.5	0.090	42.7	0.378	-98.3
2300.00	0.470	155.1	2.857	40.2	0.093	43.1	0.370	-104.0
2400.00	0.482	151.7	2.758	37.3	0.097	44.1	0.380	-105.1
2500.00	0.484	148.8	2.637	34.8	0.100	45.1	0.378	-110.7
2600.00 2700.00	0.495 0.503	145.8 143.4	2.526 2.456	31.7 28.6	0.105 0.109	44.9 45.7	0.389 0.394	-112.3 -117.8
2800.00	0.503	140.4	2.430	25.9	0.109	45.7	0.403	-117.8 -120.2
2900.00	0.522	138.0	2.261	22.7	0.119	45.6	0.403	-125.1
3000.00	0.528	135.3	2.171	20.3	0.123	45.0	0.418	-128.1
\/ 2\/  - 10 m \	7. 50.0							
Vce = 3 V, lc = 10 mA	, $Z_0 = 50 \Omega$	<b>c</b>	9.		9.		c	S
FREQUENCY		S <sub>11</sub>	S <sub>2</sub>		S <sub>1</sub>			S22
FREQUENCY MHz	MAG	ANG	MAG	ANG	MAG	ANG	MAG	ANG
FREQUENCY MHz 100.00	MAG 0.706	ANG -27.6	MAG 23.264	ANG 159.2	MAG 0.014	ANG 75.1	MAG 0.940	ANG -15.8
FREQUENCY MHz 100.00 200.00	MAG 0.706 0.636	ANG -27.6 -52.0	MAG 23.264 20.474	ANG 159.2 141.9	MAG 0.014 0.026	ANG 75.1 64.8	MAG 0.940 0.837	ANG -15.8 -29.1
FREQUENCY MHz 100.00 200.00 300.00	MAG 0.706 0.636 0.561	ANG -27.6 -52.0 -73.4	MAG 23.264 20.474 17.706	ANG 159.2 141.9 128.5	MAG 0.014 0.026 0.033	ANG 75.1 64.8 57.4	MAG 0.940 0.837 0.724	ANG -15.8 -29.1 -38.7
FREQUENCY MHz 100.00 200.00	MAG 0.706 0.636	ANG -27.6 -52.0	MAG 23.264 20.474	ANG 159.2 141.9	MAG 0.014 0.026	ANG 75.1 64.8	MAG 0.940 0.837	ANG -15.8 -29.1
FREQUENCY MHz 100.00 200.00 300.00 400.00	MAG 0.706 0.636 0.561 0.503	ANG -27.6 -52.0 -73.4 -90.1	MAG 23.264 20.474 17.706 14.932	ANG 159.2 141.9 128.5 118.5	MAG 0.014 0.026 0.033 0.039	ANG 75.1 64.8 57.4 52.2	MAG 0.940 0.837 0.724 0.628	ANG -15.8 -29.1 -38.7 -45.8
FREQUENCY MHz 100.00 200.00 300.00 400.00 500.00	MAG 0.706 0.636 0.561 0.503 0.457 0.423 0.401	ANG -27.6 -52.0 -73.4 -90.1 -105.7	MAG 23.264 20.474 17.706 14.932 12.978	ANG 159.2 141.9 128.5 118.5 109.0	MAG 0.014 0.026 0.033 0.039 0.042 0.046 0.049	75.1 64.8 57.4 52.2 50.5	MAG 0.940 0.837 0.724 0.628 0.557 0.503 0.457	ANG -15.8 -29.1 -38.7 -45.8 -49.8 -53.5 -56.6
FREQUENCY MHz  100.00 200.00 300.00 400.00 500.00 600.00 700.00 800.00	MAG 0.706 0.636 0.561 0.503 0.457 0.423 0.401 0.386	ANG -27.6 -52.0 -73.4 -90.1 -105.7 -119.0 -130.0 -140.1	MAG 23.264 20.474 17.706 14.932 12.978 11.348 9.988 8.935	ANG 159.2 141.9 128.5 118.5 109.0 102.1 96.1 90.8	MAG 0.014 0.026 0.033 0.039 0.042 0.046 0.049	ANG 75.1 64.8 57.4 52.2 50.5 49.0 48.7 48.1	MAG 0.940 0.837 0.724 0.628 0.557 0.503 0.457 0.424	ANG -15.8 -29.1 -38.7 -45.8 -49.8 -53.5 -56.6 -59.5
FREQUENCY MHz  100.00 200.00 300.00 400.00 500.00 600.00 700.00 800.00 900.00	MAG 0.706 0.636 0.561 0.503 0.457 0.423 0.401 0.386 0.377	ANG -27.6 -52.0 -73.4 -90.1 -105.7 -119.0 -130.0 -140.1 -148.8	MAG 23.264 20.474 17.706 14.932 12.978 11.348 9.988 8.935 8.023	ANG 159.2 141.9 128.5 118.5 109.0 102.1 96.1 90.8 86.3	MAG 0.014 0.026 0.033 0.039 0.042 0.046 0.049 0.052 0.055	ANG 75.1 64.8 57.4 52.2 50.5 49.0 48.7 48.1 48.0	MAG 0.940 0.837 0.724 0.628 0.557 0.503 0.457 0.424 0.394	ANG -15.8 -29.1 -38.7 -45.8 -49.8 -53.5 -56.6 -59.5 -61.9
FREQUENCY MHz  100.00 200.00 300.00 400.00 500.00 600.00 700.00 800.00 900.00 1000.00	MAG 0.706 0.636 0.561 0.503 0.457 0.423 0.401 0.386 0.377 0.373	ANG -27.6 -52.0 -73.4 -90.1 -105.7 -119.0 -130.0 -140.1 -148.8 -156.7	MAG 23.264 20.474 17.706 14.932 12.978 11.348 9.988 8.935 8.023 7.305	ANG 159.2 141.9 128.5 118.5 109.0 102.1 96.1 90.8 86.3 82.0	MAG 0.014 0.026 0.033 0.039 0.042 0.046 0.049 0.052 0.055 0.057	ANG 75.1 64.8 57.4 52.2 50.5 49.0 48.7 48.1 48.0 48.8	MAG 0.940 0.837 0.724 0.628 0.557 0.503 0.457 0.424 0.394 0.374	ANG -15.8 -29.1 -38.7 -45.8 -49.8 -53.5 -56.6 -59.5 -61.9 -64.3
FREQUENCY MHz  100.00 200.00 300.00 400.00 500.00 600.00 700.00 800.00 1000.00 1100.00	MAG 0.706 0.636 0.561 0.503 0.457 0.423 0.401 0.386 0.377 0.373 0.370	ANG -27.6 -52.0 -73.4 -90.1 -105.7 -119.0 -130.0 -140.1 -148.8 -156.7 -163.6	MAG 23.264 20.474 17.706 14.932 12.978 11.348 9.988 8.935 8.023 7.305 6.687	ANG 159.2 141.9 128.5 118.5 109.0 102.1 96.1 90.8 86.3 82.0 78.2	MAG 0.014 0.026 0.033 0.039 0.042 0.046 0.049 0.052 0.055 0.057 0.061	ANG 75.1 64.8 57.4 52.2 50.5 49.0 48.7 48.1 48.0 48.8 48.6	MAG 0.940 0.837 0.724 0.628 0.557 0.503 0.457 0.424 0.394 0.374 0.355	ANG -15.8 -29.1 -38.7 -45.8 -49.8 -53.5 -56.6 -59.5 -61.9 -64.3 -67.5
FREQUENCY MHz  100.00 200.00 300.00 400.00 500.00 600.00 700.00 800.00 900.00 1000.00 1100.00 1200.00	MAG 0.706 0.636 0.561 0.503 0.457 0.423 0.401 0.386 0.377 0.373 0.370 0.371	ANG -27.6 -52.0 -73.4 -90.1 -105.7 -119.0 -130.0 -140.1 -148.8 -156.7 -163.6 -170.1	MAG 23.264 20.474 17.706 14.932 12.978 11.348 9.988 8.935 8.023 7.305 6.687 6.157	ANG 159.2 141.9 128.5 118.5 109.0 102.1 96.1 90.8 86.3 82.0 78.2 74.4	MAG 0.014 0.026 0.033 0.039 0.042 0.046 0.049 0.052 0.055 0.057 0.061 0.065	ANG 75.1 64.8 57.4 52.2 50.5 49.0 48.7 48.1 48.0 48.8 48.6 48.9	MAG 0.940 0.837 0.724 0.628 0.557 0.503 0.457 0.424 0.394 0.374 0.355 0.342	ANG -15.8 -29.1 -38.7 -45.8 -49.8 -53.5 -56.6 -59.5 -61.9 -64.3 -67.5 -69.5
FREQUENCY MHz  100.00 200.00 300.00 400.00 500.00 600.00 700.00 800.00 1000.00 1100.00	MAG 0.706 0.636 0.561 0.503 0.457 0.423 0.401 0.386 0.377 0.373 0.370	ANG -27.6 -52.0 -73.4 -90.1 -105.7 -119.0 -130.0 -140.1 -148.8 -156.7 -163.6	MAG 23.264 20.474 17.706 14.932 12.978 11.348 9.988 8.935 8.023 7.305 6.687	ANG 159.2 141.9 128.5 118.5 109.0 102.1 96.1 90.8 86.3 82.0 78.2	MAG 0.014 0.026 0.033 0.039 0.042 0.046 0.049 0.052 0.055 0.057 0.061	ANG 75.1 64.8 57.4 52.2 50.5 49.0 48.7 48.1 48.0 48.8 48.6	MAG 0.940 0.837 0.724 0.628 0.557 0.503 0.457 0.424 0.394 0.374 0.355	ANG -15.8 -29.1 -38.7 -45.8 -49.8 -53.5 -56.6 -59.5 -61.9 -64.3 -67.5
FREQUENCY MHz  100.00 200.00 300.00 400.00 500.00 600.00 700.00 800.00 900.00 1000.00 1100.00 1200.00 1300.00	MAG 0.706 0.636 0.561 0.503 0.457 0.423 0.401 0.386 0.377 0.373 0.370 0.371 0.375	ANG -27.6 -52.0 -73.4 -90.1 -105.7 -119.0 -130.0 -140.1 -148.8 -156.7 -163.6 -170.1 -175.8	MAG 23.264 20.474 17.706 14.932 12.978 11.348 9.988 8.935 8.023 7.305 6.687 6.157 5.720	ANG 159.2 141.9 128.5 118.5 109.0 102.1 96.1 90.8 86.3 82.0 78.2 74.4 70.9	MAG 0.014 0.026 0.033 0.039 0.042 0.046 0.049 0.052 0.055 0.057 0.061 0.065 0.068	ANG 75.1 64.8 57.4 52.2 50.5 49.0 48.7 48.1 48.0 48.8 48.6 48.9 49.7	MAG 0.940 0.837 0.724 0.628 0.557 0.503 0.457 0.424 0.394 0.374 0.355 0.342 0.326	ANG -15.8 -29.1 -38.7 -45.8 -49.8 -53.5 -56.6 -59.5 -61.9 -64.3 -67.5 -69.5 -73.0
FREQUENCY MHz  100.00 200.00 300.00 400.00 500.00 600.00 700.00 800.00 1000.00 1100.00 1200.00 1300.00 1400.00 1500.00 1600.00	MAG 0.706 0.636 0.561 0.503 0.457 0.423 0.401 0.386 0.377 0.373 0.370 0.371 0.375 0.378 0.384 0.389	ANG -27.6 -52.0 -73.4 -90.1 -105.7 -119.0 -130.0 -140.1 -148.8 -156.7 -163.6 -170.1 -175.8 178.9 174.1	MAG 23.264 20.474 17.706 14.932 12.978 11.348 9.988 8.935 8.023 7.305 6.687 6.157 5.720 5.332 4.997 4.693	ANG 159.2 141.9 128.5 118.5 109.0 102.1 96.1 90.8 86.3 82.0 78.2 74.4 70.9 67.6 64.4 61.1	MAG 0.014 0.026 0.033 0.039 0.042 0.046 0.049 0.052 0.055 0.057 0.061 0.065 0.068 0.071 0.074 0.078	ANG 75.1 64.8 57.4 52.2 50.5 49.0 48.7 48.1 48.0 48.8 48.6 48.9 49.7 50.0 50.5 50.2	MAG 0.940 0.837 0.724 0.628 0.557 0.503 0.457 0.424 0.394 0.374 0.355 0.342 0.326 0.320 0.309 0.307	ANG -15.8 -29.1 -38.7 -45.8 -49.8 -53.5 -56.6 -59.5 -61.9 -64.3 -67.5 -69.5 -73.0 -75.5 -79.4 -82.4
FREQUENCY MHz  100.00 200.00 300.00 400.00 500.00 600.00 700.00 800.00 1000.00 1100.00 1200.00 1300.00 1400.00 1500.00 1600.00 1700.00	MAG 0.706 0.636 0.561 0.503 0.457 0.423 0.401 0.386 0.377 0.373 0.370 0.371 0.375 0.378 0.384 0.389 0.397	ANG -27.6 -52.0 -73.4 -90.1 -105.7 -119.0 -130.0 -140.1 -148.8 -156.7 -163.6 -170.1 -175.8 178.9 174.1 169.7 165.8	MAG 23.264 20.474 17.706 14.932 12.978 11.348 9.988 8.935 8.023 7.305 6.687 6.157 5.720 5.332 4.997 4.693 4.450	ANG 159.2 141.9 128.5 118.5 109.0 102.1 96.1 90.8 86.3 82.0 78.2 74.4 70.9 67.6 64.4 61.1 58.0	MAG 0.014 0.026 0.033 0.039 0.042 0.046 0.049 0.052 0.055 0.057 0.061 0.065 0.068 0.071 0.074 0.078 0.081	ANG 75.1 64.8 57.4 52.2 50.5 49.0 48.7 48.1 48.0 48.8 48.6 48.9 49.7 50.0 50.5 50.2 50.4	MAG 0.940 0.837 0.724 0.628 0.557 0.503 0.457 0.424 0.394 0.374 0.355 0.342 0.326 0.320 0.309 0.307 0.298	ANG -15.8 -29.1 -38.7 -45.8 -49.8 -53.5 -56.6 -59.5 -61.9 -64.3 -67.5 -69.5 -73.0 -75.5 -79.4 -82.4 -86.4
FREQUENCY MHz  100.00 200.00 300.00 400.00 500.00 600.00 700.00 800.00 1000.00 1100.00 1200.00 1300.00 1400.00 1500.00 1600.00 1700.00	MAG 0.706 0.636 0.561 0.503 0.457 0.423 0.401 0.386 0.377 0.373 0.370 0.371 0.375 0.378 0.384 0.389 0.397 0.403	ANG -27.6 -52.0 -73.4 -90.1 -105.7 -119.0 -130.0 -140.1 -148.8 -156.7 -163.6 -170.1 -175.8 178.9 174.1 169.7 165.8 162.1	MAG 23.264 20.474 17.706 14.932 12.978 11.348 9.988 8.935 8.023 7.305 6.687 6.157 5.720 5.332 4.997 4.693 4.450 4.192	ANG 159.2 141.9 128.5 118.5 109.0 102.1 96.1 90.8 86.3 82.0 78.2 74.4 70.9 67.6 64.4 61.1 58.0 55.0	MAG 0.014 0.026 0.033 0.039 0.042 0.046 0.049 0.052 0.055 0.057 0.061 0.065 0.068 0.071 0.074 0.078 0.081 0.084	ANG 75.1 64.8 57.4 52.2 50.5 49.0 48.7 48.1 48.0 48.8 48.6 48.9 49.7 50.0 50.5 50.2 50.4 50.5	MAG 0.940 0.837 0.724 0.628 0.557 0.503 0.457 0.424 0.394 0.374 0.355 0.342 0.326 0.320 0.309 0.307 0.298 0.296	ANG -15.8 -29.1 -38.7 -45.8 -49.8 -53.5 -56.6 -59.5 -61.9 -64.3 -67.5 -69.5 -73.0 -75.5 -79.4 -82.4 -89.1
FREQUENCY MHz  100.00 200.00 300.00 400.00 500.00 600.00 700.00 800.00 1000.00 1100.00 1200.00 1300.00 1400.00 1500.00 1600.00 1700.00 1800.00	MAG 0.706 0.636 0.561 0.503 0.457 0.423 0.401 0.386 0.377 0.373 0.370 0.371 0.375 0.378 0.384 0.389 0.397 0.403 0.413	ANG -27.6 -52.0 -73.4 -90.1 -105.7 -119.0 -130.0 -140.1 -148.8 -156.7 -163.6 -170.1 -175.8 178.9 174.1 169.7 165.8 162.1 158.6	MAG 23.264 20.474 17.706 14.932 12.978 11.348 9.988 8.935 8.023 7.305 6.687 6.157 5.720 5.332 4.997 4.693 4.450 4.192 3.978	ANG 159.2 141.9 128.5 118.5 109.0 102.1 96.1 90.8 86.3 82.0 78.2 74.4 70.9 67.6 64.4 61.1 58.0 55.0 51.8	MAG 0.014 0.026 0.033 0.039 0.042 0.046 0.049 0.052 0.055 0.057 0.061 0.065 0.068 0.071 0.074 0.078 0.081 0.084 0.089	ANG 75.1 64.8 57.4 52.2 50.5 49.0 48.7 48.1 48.0 48.8 48.6 48.9 49.7 50.0 50.5 50.2 50.4 50.5 49.8	MAG 0.940 0.837 0.724 0.628 0.557 0.503 0.457 0.424 0.394 0.374 0.355 0.342 0.326 0.320 0.309 0.307 0.298 0.296 0.289	ANG -15.8 -29.1 -38.7 -45.8 -49.8 -53.5 -56.6 -59.5 -61.9 -64.3 -67.5 -69.5 -73.0 -75.5 -79.4 -82.4 -89.1 -94.6
FREQUENCY MHz  100.00 200.00 300.00 400.00 500.00 600.00 700.00 800.00 1000.00 1100.00 1200.00 1300.00 1400.00 1500.00 1600.00 1700.00 1800.00 1900.00	MAG 0.706 0.636 0.561 0.503 0.457 0.423 0.401 0.386 0.377 0.373 0.370 0.371 0.375 0.378 0.384 0.389 0.397 0.403 0.413 0.420	ANG -27.6 -52.0 -73.4 -90.1 -105.7 -119.0 -130.0 -140.1 -148.8 -156.7 -163.6 -170.1 -175.8 178.9 174.1 169.7 165.8 162.1 158.6 155.7	MAG 23.264 20.474 17.706 14.932 12.978 11.348 9.988 8.935 8.023 7.305 6.687 6.157 5.720 5.332 4.997 4.693 4.450 4.192 3.978 3.791	ANG 159.2 141.9 128.5 118.5 109.0 102.1 96.1 90.8 86.3 82.0 78.2 74.4 70.9 67.6 64.4 61.1 58.0 55.0 51.8 49.0	MAG 0.014 0.026 0.033 0.039 0.042 0.046 0.049 0.052 0.055 0.057 0.061 0.065 0.068 0.071 0.074 0.078 0.081 0.084 0.089 0.092	ANG 75.1 64.8 57.4 52.2 50.5 49.0 48.7 48.1 48.0 48.8 48.6 48.9 49.7 50.0 50.5 50.2 50.4 50.5 49.8 49.7	MAG 0.940 0.837 0.724 0.628 0.557 0.503 0.457 0.424 0.394 0.374 0.355 0.342 0.326 0.320 0.309 0.307 0.298 0.298 0.298	ANG -15.8 -29.1 -38.7 -45.8 -49.8 -53.5 -56.6 -59.5 -61.9 -64.3 -67.5 -69.5 -73.0 -75.5 -79.4 -82.4 -86.4 -89.1 -94.6 -96.8
FREQUENCY MHz  100.00 200.00 300.00 400.00 500.00 600.00 700.00 800.00 1000.00 1100.00 1200.00 1300.00 1400.00 1500.00 1600.00 1700.00 1800.00 1900.00 2000.00 2100.00	MAG 0.706 0.636 0.561 0.503 0.457 0.423 0.401 0.386 0.377 0.373 0.370 0.371 0.375 0.378 0.384 0.389 0.397 0.403 0.413 0.420 0.431	ANG -27.6 -52.0 -73.4 -90.1 -105.7 -119.0 -130.0 -140.1 -148.8 -156.7 -163.6 -170.1 -175.8 178.9 174.1 169.7 165.8 162.1 158.6 155.7	MAG 23.264 20.474 17.706 14.932 12.978 11.348 9.988 8.935 8.023 7.305 6.687 6.157 5.720 5.332 4.997 4.693 4.450 4.192 3.978 3.791 3.590	ANG 159.2 141.9 128.5 118.5 109.0 102.1 96.1 90.8 86.3 82.0 78.2 74.4 70.9 67.6 64.4 61.1 58.0 55.0 51.8 49.0 46.1	MAG 0.014 0.026 0.033 0.039 0.042 0.046 0.049 0.052 0.055 0.057 0.061 0.065 0.068 0.071 0.074 0.078 0.081 0.084 0.089 0.092 0.096	ANG 75.1 64.8 57.4 52.2 50.5 49.0 48.7 48.1 48.0 48.8 48.6 48.9 49.7 50.0 50.5 50.2 50.4 50.5 49.8 49.7 49.8	MAG 0.940 0.837 0.724 0.628 0.557 0.503 0.457 0.424 0.394 0.374 0.355 0.342 0.326 0.320 0.309 0.307 0.298 0.296 0.289 0.293 0.286	ANG -15.8 -29.1 -38.7 -45.8 -49.8 -53.5 -56.6 -59.5 -61.9 -64.3 -67.5 -69.5 -73.0 -75.5 -79.4 -82.4 -86.4 -94.6 -96.8 -102.4
FREQUENCY MHz  100.00 200.00 300.00 400.00 500.00 600.00 700.00 800.00 1000.00 1100.00 1200.00 1300.00 1400.00 1500.00 1600.00 1700.00 1800.00 1900.00	MAG 0.706 0.636 0.561 0.503 0.457 0.423 0.401 0.386 0.377 0.373 0.370 0.371 0.375 0.378 0.384 0.389 0.397 0.403 0.413 0.420	ANG -27.6 -52.0 -73.4 -90.1 -105.7 -119.0 -130.0 -140.1 -148.8 -156.7 -163.6 -170.1 -175.8 178.9 174.1 169.7 165.8 162.1 158.6 155.7	MAG 23.264 20.474 17.706 14.932 12.978 11.348 9.988 8.935 8.023 7.305 6.687 6.157 5.720 5.332 4.997 4.693 4.450 4.192 3.978 3.791	ANG 159.2 141.9 128.5 118.5 109.0 102.1 96.1 90.8 86.3 82.0 78.2 74.4 70.9 67.6 64.4 61.1 58.0 55.0 51.8 49.0	MAG 0.014 0.026 0.033 0.039 0.042 0.046 0.049 0.052 0.055 0.057 0.061 0.065 0.068 0.071 0.074 0.078 0.081 0.084 0.089 0.092	ANG 75.1 64.8 57.4 52.2 50.5 49.0 48.7 48.1 48.0 48.8 48.6 48.9 49.7 50.0 50.5 50.2 50.4 50.5 49.8 49.7	MAG 0.940 0.837 0.724 0.628 0.557 0.503 0.457 0.424 0.394 0.374 0.355 0.342 0.326 0.320 0.309 0.307 0.298 0.298 0.298	ANG -15.8 -29.1 -38.7 -45.8 -49.8 -53.5 -56.6 -59.5 -61.9 -64.3 -67.5 -69.5 -73.0 -75.5 -79.4 -82.4 -86.4 -89.1 -94.6 -96.8
FREQUENCY MHz  100.00 200.00 300.00 400.00 500.00 600.00 700.00 800.00 1000.00 1100.00 1200.00 1300.00 1400.00 1500.00 1600.00 1700.00 1800.00 1900.00 2000.00 2100.00	MAG 0.706 0.636 0.561 0.503 0.457 0.423 0.401 0.386 0.377 0.373 0.370 0.371 0.375 0.378 0.384 0.389 0.397 0.403 0.413 0.420 0.431 0.441	ANG -27.6 -52.0 -73.4 -90.1 -105.7 -119.0 -130.0 -140.1 -148.8 -156.7 -163.6 -170.1 -175.8 178.9 174.1 169.7 165.8 162.1 158.6 155.7 152.1	MAG 23.264 20.474 17.706 14.932 12.978 11.348 9.988 8.935 8.023 7.305 6.687 6.157 5.720 5.332 4.997 4.693 4.450 4.192 3.978 3.791 3.590 3.450	ANG 159.2 141.9 128.5 118.5 109.0 102.1 96.1 90.8 86.3 82.0 78.2 74.4 70.9 67.6 64.4 61.1 58.0 55.0 51.8 49.0 46.1 43.2 40.3 37.8	MAG 0.014 0.026 0.033 0.039 0.042 0.046 0.049 0.052 0.055 0.057 0.061 0.065 0.068 0.071 0.074 0.078 0.081 0.084 0.089 0.092 0.096 0.100	ANG 75.1 64.8 57.4 52.2 50.5 49.0 48.7 48.1 48.0 48.8 48.6 48.9 49.7 50.0 50.5 50.2 50.4 50.5 49.8 49.7 49.8 49.5	MAG 0.940 0.837 0.724 0.628 0.557 0.503 0.457 0.424 0.394 0.374 0.355 0.342 0.326 0.320 0.309 0.307 0.298 0.296 0.289 0.293 0.286 0.292	ANG -15.8 -29.1 -38.7 -45.8 -49.8 -53.5 -56.6 -59.5 -61.9 -64.3 -67.5 -69.5 -73.0 -75.5 -79.4 -82.4 -86.4 -89.1 -94.6 -96.8 -102.4 -104.1
FREQUENCY MHz  100.00 200.00 300.00 400.00 500.00 600.00 700.00 800.00 1000.00 1100.00 1200.00 1300.00 1400.00 1500.00 1600.00 1700.00 1800.00 1900.00 2000.00 2100.00 2200.00 2300.00 2500.00	MAG 0.706 0.636 0.561 0.503 0.457 0.423 0.401 0.386 0.377 0.373 0.370 0.371 0.375 0.378 0.384 0.389 0.397 0.403 0.413 0.420 0.431 0.447 0.461 0.462	ANG -27.6 -52.0 -73.4 -90.1 -105.7 -119.0 -130.0 -140.1 -148.8 -156.7 -163.6 -170.1 -175.8 178.9 174.1 169.7 165.8 162.1 158.6 155.7 152.1 149.5 146.4 143.8	MAG 23.264 20.474 17.706 14.932 12.978 11.348 9.988 8.935 8.023 7.305 6.687 6.157 5.720 5.332 4.997 4.693 4.450 4.192 3.978 3.791 3.590 3.450 3.276 3.139 3.011	ANG 159.2 141.9 128.5 118.5 109.0 102.1 96.1 90.8 86.3 82.0 78.2 74.4 70.9 67.6 64.4 61.1 58.0 55.0 51.8 49.0 46.1 43.2 40.3 37.8 35.5	MAG 0.014 0.026 0.033 0.039 0.042 0.046 0.049 0.052 0.055 0.057 0.061 0.065 0.068 0.071 0.074 0.078 0.081 0.084 0.089 0.092 0.096 0.100 0.103 0.107 0.111	ANG 75.1 64.8 57.4 52.2 50.5 49.0 48.7 48.1 48.0 48.8 48.6 48.9 49.7 50.0 50.5 50.2 50.4 50.5 49.8 49.7 49.8 49.5 49.3 48.9 49.2	MAG 0.940 0.837 0.724 0.628 0.557 0.503 0.457 0.424 0.394 0.374 0.355 0.342 0.326 0.320 0.309 0.307 0.298 0.298 0.298 0.293 0.289 0.292 0.289 0.293	ANG -15.8 -29.1 -38.7 -45.8 -49.8 -53.5 -56.6 -59.5 -61.9 -64.3 -67.5 -69.5 -73.0 -75.5 -79.4 -82.4 -86.4 -89.1 -94.6 -96.8 -102.4 -104.1 -111.0 -111.1
FREQUENCY MHz  100.00 200.00 300.00 400.00 500.00 600.00 700.00 800.00 1000.00 1100.00 1200.00 1300.00 1400.00 1500.00 1600.00 1700.00 1800.00 1900.00 2000.00 2100.00 2200.00 2300.00 2400.00 2500.00 2600.00	MAG 0.706 0.636 0.561 0.503 0.457 0.423 0.401 0.386 0.377 0.373 0.370 0.371 0.375 0.378 0.384 0.389 0.397 0.403 0.413 0.420 0.431 0.441 0.447 0.461 0.462 0.475	ANG -27.6 -52.0 -73.4 -90.1 -105.7 -119.0 -130.0 -140.1 -148.8 -156.7 -163.6 -170.1 -175.8 178.9 174.1 169.7 165.8 162.1 158.6 155.7 152.1 149.5 146.4 143.8 141.3	MAG 23.264 20.474 17.706 14.932 12.978 11.348 9.988 8.935 8.023 7.305 6.687 6.157 5.720 5.332 4.997 4.693 4.450 4.192 3.978 3.791 3.590 3.450 3.276 3.139 3.011 2.882	ANG 159.2 141.9 128.5 118.5 109.0 102.1 96.1 90.8 86.3 82.0 78.2 74.4 70.9 67.6 64.4 61.1 58.0 55.0 51.8 49.0 46.1 43.2 40.3 37.8 35.5 32.7	MAG 0.014 0.026 0.033 0.039 0.042 0.046 0.049 0.052 0.055 0.057 0.061 0.065 0.068 0.071 0.074 0.078 0.081 0.084 0.089 0.092 0.096 0.100 0.103 0.107 0.111 0.117	ANG 75.1 64.8 57.4 52.2 50.5 49.0 48.7 48.1 48.0 48.8 48.6 48.9 49.7 50.0 50.5 50.2 50.4 50.5 49.8 49.7 49.8 49.5 49.3 48.9 49.2 48.7	MAG 0.940 0.837 0.724 0.628 0.557 0.503 0.457 0.424 0.394 0.374 0.355 0.342 0.326 0.320 0.309 0.307 0.298 0.298 0.298 0.293 0.286 0.292 0.289 0.293 0.296 0.293 0.296	ANG -15.8 -29.1 -38.7 -45.8 -49.8 -53.5 -56.6 -59.5 -61.9 -64.3 -67.5 -69.5 -73.0 -75.5 -79.4 -82.4 -86.4 -89.1 -94.6 -96.8 -102.4 -104.1 -111.0 -111.1 -117.1 -118.2
FREQUENCY MHz  100.00 200.00 300.00 400.00 500.00 600.00 700.00 800.00 1000.00 1100.00 1200.00 1300.00 1400.00 1500.00 1600.00 1700.00 1800.00 1900.00 2100.00 2200.00 2300.00 2400.00 2500.00 2600.00 2700.00	MAG 0.706 0.636 0.561 0.503 0.457 0.423 0.401 0.386 0.377 0.373 0.370 0.371 0.375 0.378 0.384 0.389 0.397 0.403 0.413 0.420 0.431 0.441 0.447 0.461 0.462 0.475 0.484	ANG -27.6 -52.0 -73.4 -90.1 -105.7 -119.0 -130.0 -140.1 -148.8 -156.7 -163.6 -170.1 -175.8 178.9 174.1 169.7 165.8 162.1 158.6 155.7 152.1 149.5 146.4 143.8 141.3 138.7	MAG 23.264 20.474 17.706 14.932 12.978 11.348 9.988 8.935 8.023 7.305 6.687 6.157 5.720 5.332 4.997 4.693 4.450 4.192 3.978 3.791 3.590 3.450 3.276 3.139 3.011 2.882 2.803	ANG 159.2 141.9 128.5 118.5 109.0 102.1 96.1 90.8 86.3 82.0 78.2 74.4 70.9 67.6 64.4 61.1 58.0 55.0 51.8 49.0 46.1 43.2 40.3 37.8 35.5 32.7 29.9	MAG 0.014 0.026 0.033 0.039 0.042 0.046 0.049 0.052 0.055 0.057 0.061 0.065 0.068 0.071 0.074 0.078 0.081 0.084 0.089 0.092 0.096 0.100 0.103 0.107 0.111 0.117 0.122	ANG 75.1 64.8 57.4 52.2 50.5 49.0 48.7 48.1 48.0 48.8 48.6 48.9 49.7 50.0 50.5 50.2 50.4 50.5 49.8 49.7 49.8 49.5 49.3 48.9 49.2 48.7 48.2	MAG 0.940 0.837 0.724 0.628 0.557 0.503 0.457 0.424 0.394 0.374 0.355 0.342 0.326 0.320 0.309 0.307 0.298 0.296 0.289 0.293 0.286 0.292 0.289 0.296 0.293 0.307 0.315	ANG -15.8 -29.1 -38.7 -45.8 -49.8 -53.5 -56.6 -59.5 -61.9 -64.3 -67.5 -69.5 -73.0 -75.5 -79.4 -82.4 -86.1 -94.6 -96.8 -102.4 -104.1 -111.0 -111.1 -117.1 -118.2 -124.0
FREQUENCY MHz  100.00 200.00 300.00 400.00 500.00 600.00 700.00 800.00 1000.00 1100.00 1200.00 1300.00 1400.00 1500.00 1600.00 1700.00 1800.00 2000.00 2200.00 2300.00 2400.00 2500.00 2600.00 2700.00 2800.00	MAG 0.706 0.636 0.561 0.503 0.457 0.423 0.401 0.386 0.377 0.373 0.370 0.371 0.375 0.378 0.384 0.389 0.397 0.403 0.413 0.420 0.431 0.441 0.447 0.461 0.462 0.475 0.484 0.494	ANG -27.6 -52.0 -73.4 -90.1 -105.7 -119.0 -130.0 -140.1 -148.8 -156.7 -163.6 -170.1 -175.8 178.9 174.1 169.7 165.8 162.1 158.6 155.7 152.1 149.5 146.4 143.8 141.3 138.7 136.9	MAG 23.264 20.474 17.706 14.932 12.978 11.348 9.988 8.935 8.023 7.305 6.687 6.157 5.720 5.332 4.997 4.693 4.450 4.192 3.978 3.791 3.590 3.450 3.276 3.139 3.011 2.882 2.803 2.689	ANG 159.2 141.9 128.5 118.5 109.0 102.1 96.1 90.8 86.3 82.0 78.2 74.4 70.9 67.6 64.4 61.1 58.0 55.0 51.8 49.0 46.1 43.2 40.3 37.8 35.5 32.7 29.9 27.4	MAG 0.014 0.026 0.033 0.039 0.042 0.046 0.049 0.052 0.055 0.057 0.061 0.065 0.068 0.071 0.074 0.078 0.081 0.084 0.089 0.092 0.096 0.100 0.103 0.107 0.111 0.117 0.122 0.127	ANG 75.1 64.8 57.4 52.2 50.5 49.0 48.7 48.1 48.0 48.8 48.6 48.9 49.7 50.0 50.5 50.2 50.4 50.5 49.8 49.7 49.8 49.7 49.8 49.7 49.8 49.7 49.8 49.7 49.8 49.7 49.8 49.7 49.8	MAG 0.940 0.837 0.724 0.628 0.557 0.503 0.457 0.424 0.394 0.374 0.355 0.342 0.326 0.320 0.309 0.307 0.298 0.296 0.289 0.293 0.286 0.292 0.289 0.296 0.293 0.289 0.296 0.293 0.307 0.315 0.323	ANG -15.8 -29.1 -38.7 -45.8 -49.8 -53.5 -56.6 -59.5 -61.9 -64.3 -67.5 -73.0 -75.5 -79.4 -86.4 -89.1 -94.6 -96.8 -102.4 -104.1 -111.0 -111.1 -118.2 -124.0 -126.8
FREQUENCY MHz  100.00 200.00 300.00 400.00 500.00 600.00 700.00 800.00 1000.00 1100.00 1200.00 1300.00 1400.00 1500.00 1600.00 1700.00 1800.00 1900.00 2100.00 2200.00 2300.00 2400.00 2500.00 2600.00 2700.00	MAG 0.706 0.636 0.561 0.503 0.457 0.423 0.401 0.386 0.377 0.373 0.370 0.371 0.375 0.378 0.384 0.389 0.397 0.403 0.413 0.420 0.431 0.441 0.447 0.461 0.462 0.475 0.484	ANG -27.6 -52.0 -73.4 -90.1 -105.7 -119.0 -130.0 -140.1 -148.8 -156.7 -163.6 -170.1 -175.8 178.9 174.1 169.7 165.8 162.1 158.6 155.7 152.1 149.5 146.4 143.8 141.3 138.7	MAG 23.264 20.474 17.706 14.932 12.978 11.348 9.988 8.935 8.023 7.305 6.687 6.157 5.720 5.332 4.997 4.693 4.450 4.192 3.978 3.791 3.590 3.450 3.276 3.139 3.011 2.882 2.803	ANG 159.2 141.9 128.5 118.5 109.0 102.1 96.1 90.8 86.3 82.0 78.2 74.4 70.9 67.6 64.4 61.1 58.0 55.0 51.8 49.0 46.1 43.2 40.3 37.8 35.5 32.7 29.9	MAG 0.014 0.026 0.033 0.039 0.042 0.046 0.049 0.052 0.055 0.057 0.061 0.065 0.068 0.071 0.074 0.078 0.081 0.084 0.089 0.092 0.096 0.100 0.103 0.107 0.111 0.117 0.122	ANG 75.1 64.8 57.4 52.2 50.5 49.0 48.7 48.1 48.0 48.8 48.6 48.9 49.7 50.0 50.5 50.2 50.4 50.5 49.8 49.7 49.8 49.5 49.3 48.9 49.2 48.7 48.2	MAG 0.940 0.837 0.724 0.628 0.557 0.503 0.457 0.424 0.394 0.374 0.355 0.342 0.326 0.320 0.309 0.307 0.298 0.296 0.289 0.293 0.286 0.292 0.289 0.296 0.293 0.307 0.315	ANG -15.8 -29.1 -38.7 -45.8 -49.8 -53.5 -56.6 -59.5 -61.9 -64.3 -67.5 -69.5 -73.0 -75.5 -79.4 -82.4 -86.1 -94.6 -96.8 -102.4 -104.1 -111.0 -111.1 -117.1 -118.2 -124.0

FREQUENCY		S <sub>11</sub>	S	21	S	12	S	22
MHz	MAG	ANG	MAG	ANG	MAG	ANG	MAG	ANC
100.00	0.550	-39.8	33.319	152.6	0.012	73.8	0.886	-21
200.00	0.478	-71.8	27.020	132.5	0.021	63.3	0.734	-36
300.00	0.420	-96.3	21.715	118.9	0.027	56.8	0.598	-45
400.00	0.381	-115.0	17.550	109.5	0.032	55.7	0.502	-51
500.00	0.363	-129.9	14.737	101.5	0.035	56.4	0.439	-54
600.00	0.351	-141.9	12.630	95.6	0.039	55.7	0.395	-57
700.00	0.344	-151.7	10.983	90.4	0.043	56.8	0.357	-59
800.00	0.344	-160.1	9.738	86.1	0.047	57.1	0.335	-61
900.00	0.343	-167.5	8.689	82.0	0.051	57.2	0.310	-64
1000.00	0.347	-173.7	7.876	78.3	0.055	57.8	0.294	-66
1100.00	0.350	-179.2	7.199	74.9	0.059	57.7	0.281	-69 -69
	0.355	175.4	6.619	74.5	0.059	57.7 57.6	0.268	-0s -72
1200.00								
1300.00	0.362	171.0	6.132	68.4	0.068	57.7	0.261	-75 -75
1400.00	0.367	166.7	5.704	65.3	0.072	57.4	0.257	-78
1500.00	0.375	163.0	5.338	62.4	0.076	57.1	0.246	-82
1600.00	0.382	159.4	5.011	59.5	0.080	56.6	0.246	-80
1700.00	0.391	156.4	4.728	56.6	0.085	56.4	0.239	-90
1800.00	0.398	153.4	4.476	54.0	0.089	56.0	0.240	-93
1900.00	0.408	150.5	4.226	50.8	0.093	55.7	0.237	-99
2000.00	0.416	148.3	4.028	48.4	0.098	54.7	0.238	-10
2100.00	0.427	145.1	3.829	45.6	0.102	54.1	0.235	-10
2200.00	0.437	143.2	3.661	42.9	0.107	53.2	0.241	-10
2300.00	0.443	140.4	3.489	40.3	0.110	52.7	0.239	-116
2400.00	0.457	138.3	3.330	37.8	0.115	51.6	0.247	-11
2500.00	0.459	136.1	3.206	35.6	0.119	51.7	0.250	-12
2600.00	0.473	133.8	3.603	33.0	0.125	50.8	0.259	-12
2700.00	0.480	132.5	2.967	30.2	0.130	50.9	0.271	-13
2800.00	0.492	129.8	2.857	28.0	0.135	48.9	0.277	-13
2900.00	0.501	128.3	2.747	25.2	0.140	47.7	0.292	-13
3000.00	0.509	125.7	2.655	23.3	0.144	46.8	0.295	-14
= 3 V, Ic = 30 mA	, $Z_0 = 50 \Omega$							
FREQUENCY		S <sub>11</sub>	S			12	S	22
MHz	MAG	ANG	MAG	ANG	MAG	ANG	MAG	AN
100.00	0.459	-49.1	38.164	148.7	0.011	70.7	0.849	-24
200.00	0.404	-85.8	29.422	127.7	0.019	62.8	0.674	-40
300.00	0.368	-111.3	22.866	114.5	0.024	58.5	0.537	-48
400.00	0.347	-129.3	18.143	105.5	0.029	57.5	0.445	-5
500.00	0.341	-142.9	15.068	98.2	0.033	59.4	0.386	-5
600.00	0.337	-153.4	12.826	92.7	0.037	60.8	0.350	-5
700.00	0.337	-162.3	11.115	87.9	0.040	60.4	0.317	-6
800.00	0.340	-169.5	9.819	83.9	0.046	61.1	0.296	-6:
900.00	0.343	-176.0	8.752	80.1	0.049	61.1	0.278	-6
1000.00	0.349	178.6	7.932	76.6	0.054	61.0	0.276	_6 _6
1100.00	0.354	173.9	7.224	73.3	0.054	61.2	0.253	-7
1200.00	0.360	169.2	6.638	70.2	0.063	61.4	0.233	-7: -7:
1300.00	0.368	165.4	6.149	67.2	0.068	61.1	0.243	-7. -7
1400.00	0.366	161.6	5.716	64.2	0.008	61.1	0.234	-71 -71

MHz	MAG	ANG	MAG	ANG	MAG	ANG	MAG	ANG
100.00	0.459	-49.1	38.164	148.7	0.011	70.7	0.849	-24.6
200.00	0.404	-85.8	29.422	127.7	0.019	62.8	0.674	-40.3
300.00	0.368	-111.3	22.866	114.5	0.024	58.5	0.537	-48.1
400.00	0.347	-129.3	18.143	105.5	0.029	57.5	0.445	-53.4
500.00	0.341	-142.9	15.068	98.2	0.033	59.4	0.386	-55.5
600.00	0.337	-153.4	12.826	92.7	0.037	60.8	0.350	-57.7
700.00	0.337	-162.3	11.115	87.9	0.040	60.4	0.317	-60.2
800.00	0.340	-169.5	9.819	83.9	0.046	61.1	0.296	-62.3
900.00	0.343	-176.0	8.752	80.1	0.049	61.1	0.278	-64.4
1000.00	0.349	178.6	7.932	76.6	0.054	61.0	0.264	-66.5
1100.00	0.354	173.9	7.224	73.3	0.058	61.2	0.253	-70.0
1200.00	0.360	169.2	6.638	70.2	0.063	61.4	0.243	-72.3
1300.00	0.368	165.4	6.149	67.2	0.068	61.1	0.234	-76.6
1400.00	0.374	161.6	5.716	64.2	0.073	61.1	0.231	-79.1
1500.00	0.382	158.3	5.351	61.4	0.077	59.7	0.226	-83.8
1600.00	0.389	155.1	5.015	58.5	0.081	59.8	0.223	-87.6
1700.00	0.399	152.5	4.742	55.6	0.085	58.8	0.221	-92.5
1800.00	0.405	149.7	4.476	52.9	0.090	57.8	0.223	-95.9
1900.00	0.415	147.1	4.229	50.2	0.095	57.0	0.217	-101.9
2000.00	0.423	145.1	4.021	47.5	0.100	56.1	0.220	-103.7
2100.00	0.434	142.2	3.814	44.8	0.104	55.3	0.218	-111.0
2200.00	0.444	140.5	3.659	42.2	0.109	54.6	0.225	-111.8
2300.00	0.450	137.8	3.473	39.6	0.114	53.5	0.225	-120.1
2400.00	0.464	135.8	3.323	37.2	0.117	53.2	0.231	-119.7
2500.00	0.465	133.7	3.194	34.9	0.122	52.7	0.236	-127.5
2600.00	0.479	131.8	3.056	32.5	0.127	52.0	0.247	-127.2
2700.00	0.487	130.4	2.981	30.0	0.133	50.5	0.258	-134.1
2800.00	0.498	127.9	2.852	27.8	0.138	49.6	0.267	-136.0
2900.00	0.508	126.4	2.740	25.0	0.143	47.8	0.279	-141.3
3000.00	0.515	124.0	2.652	23.0	0.147	47.4	0.285	-144.2

Vce = 5 V, Ic = 5 mA, 2	7° = 50 O							
	20 = 50 22	0	0		0			
FREQUENCY MHz	MAG	S <sub>11</sub>	S: MAG	ANG	S <sub>1</sub> MAG	ANG		S <sub>22</sub> ANG
		ANG					MAG	
100.00	0.836	-18.3	14.254	165.1	0.014	78.2	0.970	-10.4
200.00 300.00	0.792 0.736	-35.6 -52.0	13.300 12.328	151.4 140.2	0.027 0.038	69.3 60.4	0.920 0.849	-20.6 -28.9
400.00	0.730	-66.1	10.931	130.3	0.046	54.1	0.776	-25.8 -35.8
500.00	0.612	-80.1	10.126	119.9	0.051	49.6	0.715	-40.9
600.00	0.561	-92.6	9.208	112.1	0.055	45.8	0.659	-45.5
700.00	0.521	-103.4	8.276	105.2	0.059	43.1	0.608	-49.2
800.00	0.487	-113.9	7.567	99.0	0.061	41.3	0.572	-52.4
900.00	0.461	-123.3	6.874	93.5	0.063	39.9	0.536	-55.6
1000.00	0.442	-132.2	6.347	88.3	0.064	39.2	0.509	-58.1
1100.00 1200.00	0.429 0.419	-140.1 -147.9	5.862 5.432	83.8 79.4	0.066 0.068	38.8 38.5	0.486 0.468	-61.0 -63.8
1300.00	0.419	-147.9 -154.8	5.068	75.4 75.4	0.069	38.8	0.450	-66.7
1400.00	0.410	-161.3	4.754	71.4	0.071	39.0	0.437	-69.4
1500.00	0.411	-167.3	4.461	67.8	0.073	39.6	0.425	-72.7
1600.00	0.413	-172.9	4.195	64.1	0.074	40.2	0.418	-75.6
1700.00	0.417	-178.1	3.983	60.7	0.076	40.6	0.407	-79.1
1800.00	0.421	177.1	3.779	57.3	0.078	41.3	0.405	-81.9
1900.00	0.428	172.3	3.582	53.7	0.080	41.6	0.396	-86.2
2000.00	0.434	168.4	3.411	50.7	0.083	43.0	0.395	-88.6
2100.00	0.442	164.0	3.253	47.0	0.086	43.6	0.386	-93.7
2200.00 2300.00	0.452 0.457	160.5 156.7	3.114 2.969	44.2 40.9	0.089 0.091	43.9 44.6	0.392 0.383	-95.3 -100.7
2400.00	0.468	153.2	2.846	37.9	0.094	45.5	0.393	-100.7 -102.0
2500.00	0.470	150.3	2.733	35.5	0.097	46.2	0.387	-107.2
2600.00	0.481	147.2	2.621	32.0	0.102	46.8	0.401	-108.9
2700.00	0.490	144.8	2.540	29.2	0.107	47.2	0.408	-114.1
2800.00	0.500	141.7	2.432	26.5	0.112	47.1	0.415	-117.1
2900.00	0.509	139.3	2.340	23.2	0.116	46.7	0.426	-121.8
3000.00	0.517	136.4	2.250	21.0	0.121	46.5	0.428	-125.0
Vce = 5 V, Ic = 10 mA.	$Z_0 = 50 \Omega$							
Vce = 5 V, lc = 10 mA,	, $Z_0 = 50 \Omega$	S44	Q.	24	S.	12	c	300
FREQUENCY		S <sub>11</sub>	S: MAG		S <sub>1</sub>			S <sub>22</sub>
FREQUENCY MHz	MAG	ANG	MAG	ANG	MAG	ANG	MAG	ANG
FREQUENCY MHz 100.00	MAG 0.722	ANG -26.0	MAG 23.176	ANG 159.8	MAG 0.013	ANG 77.0	MAG 0.943	ANG -14.8
FREQUENCY MHz 100.00 200.00	MAG 0.722 0.653	ANG -26.0 -49.0	MAG 23.176 20.533	ANG 159.8 142.9	MAG 0.013 0.024	ANG 77.0 65.3	MAG 0.943 0.844	ANG -14.8 -27.7
FREQUENCY MHz 100.00 200.00 300.00	MAG 0.722 0.653 0.575	ANG -26.0 -49.0 -69.4	MAG 23.176 20.533 17.914	ANG 159.8 142.9 129.9	MAG 0.013 0.024 0.032	ANG 77.0 65.3 57.6	MAG 0.943 0.844 0.738	ANG -14.8 -27.7 -36.6
FREQUENCY MHz 100.00 200.00 300.00 400.00	MAG 0.722 0.653 0.575 0.512	ANG -26.0 -49.0 -69.4 -86.2	MAG 23.176 20.533 17.914 15.194	ANG 159.8 142.9 129.9 119.8	MAG 0.013 0.024 0.032 0.037	ANG 77.0 65.3 57.6 52.9	MAG 0.943 0.844 0.738 0.647	ANG -14.8 -27.7 -36.6 -43.5
FREQUENCY MHz 100.00 200.00 300.00	MAG 0.722 0.653 0.575	ANG -26.0 -49.0 -69.4	MAG 23.176 20.533 17.914	ANG 159.8 142.9 129.9	MAG 0.013 0.024 0.032	ANG 77.0 65.3 57.6	MAG 0.943 0.844 0.738	ANG -14.8 -27.7 -36.6
FREQUENCY MHz 100.00 200.00 300.00 400.00 500.00	MAG 0.722 0.653 0.575 0.512 0.462	ANG -26.0 -49.0 -69.4 -86.2 -101.1	MAG 23.176 20.533 17.914 15.194 13.254	ANG 159.8 142.9 129.9 119.8 110.1	MAG 0.013 0.024 0.032 0.037 0.041	77.0 65.3 57.6 52.9 51.2 49.3 48.9	MAG 0.943 0.844 0.738 0.647 0.575	ANG -14.8 -27.7 -36.6 -43.5 -47.5
FREQUENCY MHz  100.00 200.00 300.00 400.00 500.00 600.00 700.00 800.00	MAG 0.722 0.653 0.575 0.512 0.462 0.423 0.398 0.379	ANG -26.0 -49.0 -69.4 -86.2 -101.1 -113.9 -125.2 -135.3	MAG 23.176 20.533 17.914 15.194 13.254 11.637 10.262 9.193	ANG 159.8 142.9 129.9 119.8 110.1 103.2 97.1 92.0	MAG 0.013 0.024 0.032 0.037 0.041 0.045 0.047 0.050	ANG 77.0 65.3 57.6 52.9 51.2 49.3 48.9 48.9	MAG 0.943 0.844 0.738 0.647 0.575 0.522 0.475 0.443	ANG -14.8 -27.7 -36.6 -43.5 -47.5 -51.5 -54.3 -56.8
FREQUENCY MHz  100.00 200.00 300.00 400.00 500.00 600.00 700.00 800.00 900.00	MAG 0.722 0.653 0.575 0.512 0.462 0.423 0.398 0.379 0.367	ANG -26.0 -49.0 -69.4 -86.2 -101.1 -113.9 -125.2 -135.3 -144.3	MAG 23.176 20.533 17.914 15.194 13.254 11.637 10.262 9.193 8.257	ANG 159.8 142.9 129.9 119.8 110.1 103.2 97.1 92.0 87.4	MAG 0.013 0.024 0.032 0.037 0.041 0.045 0.047 0.050 0.054	ANG 77.0 65.3 57.6 52.9 51.2 49.3 48.9 48.9	MAG 0.943 0.844 0.738 0.647 0.575 0.522 0.475 0.443 0.413	ANG -14.8 -27.7 -36.6 -43.5 -47.5 -51.5 -54.3 -56.8 -59.6
FREQUENCY MHz  100.00 200.00 300.00 400.00 500.00 600.00 700.00 800.00 900.00	MAG 0.722 0.653 0.575 0.512 0.462 0.423 0.398 0.379 0.367 0.361	ANG -26.0 -49.0 -69.4 -86.2 -101.1 -113.9 -125.2 -135.3 -144.3 -152.5	MAG 23.176 20.533 17.914 15.194 13.254 11.637 10.262 9.193 8.257 7.531	ANG 159.8 142.9 129.9 119.8 110.1 103.2 97.1 92.0 87.4 82.8	MAG 0.013 0.024 0.032 0.037 0.041 0.045 0.047 0.050 0.054 0.057	ANG 77.0 65.3 57.6 52.9 51.2 49.3 48.9 48.9 48.6 49.3	MAG 0.943 0.844 0.738 0.647 0.575 0.522 0.475 0.443 0.413 0.392	ANG -14.8 -27.7 -36.6 -43.5 -47.5 -51.5 -54.3 -56.8 -59.6 -61.6
FREQUENCY MHz  100.00 200.00 300.00 400.00 500.00 600.00 700.00 800.00 900.00 1100.00	MAG 0.722 0.653 0.575 0.512 0.462 0.423 0.398 0.379 0.367 0.361 0.357	ANG -26.0 -49.0 -69.4 -86.2 -101.1 -113.9 -125.2 -135.3 -144.3 -152.5 -159.6	MAG 23.176 20.533 17.914 15.194 13.254 11.637 10.262 9.193 8.257 7.531 6.895	ANG 159.8 142.9 129.9 119.8 110.1 103.2 97.1 92.0 87.4 82.8 79.0	MAG 0.013 0.024 0.032 0.037 0.041 0.045 0.047 0.050 0.054 0.057 0.059	ANG 77.0 65.3 57.6 52.9 51.2 49.3 48.9 48.9 48.6 49.3 49.6	MAG 0.943 0.844 0.738 0.647 0.575 0.522 0.475 0.443 0.413 0.392 0.374	ANG -14.8 -27.7 -36.6 -43.5 -47.5 -51.5 -54.3 -56.8 -59.6 -61.6 -64.4
FREQUENCY MHz  100.00 200.00 300.00 400.00 500.00 600.00 700.00 800.00 900.00 1000.00 1100.00 1200.00	MAG 0.722 0.653 0.575 0.512 0.462 0.423 0.398 0.379 0.367 0.361 0.357	ANG -26.0 -49.0 -69.4 -86.2 -101.1 -113.9 -125.2 -135.3 -144.3 -152.5 -159.6 -166.5	MAG 23.176 20.533 17.914 15.194 13.254 11.637 10.262 9.193 8.257 7.531 6.895 6.370	ANG 159.8 142.9 129.9 119.8 110.1 103.2 97.1 92.0 87.4 82.8 79.0 75.2	MAG 0.013 0.024 0.032 0.037 0.041 0.045 0.047 0.050 0.054 0.057 0.059 0.062	ANG 77.0 65.3 57.6 52.9 51.2 49.3 48.9 48.9 48.6 49.3 49.6 49.8	MAG 0.943 0.844 0.738 0.647 0.575 0.522 0.475 0.443 0.413 0.392 0.374 0.358	ANG -14.8 -27.7 -36.6 -43.5 -47.5 -51.5 -54.3 -56.8 -59.6 -61.6 -64.4 -66.6
FREQUENCY MHz  100.00 200.00 300.00 400.00 500.00 600.00 700.00 800.00 900.00 1100.00 1200.00 1300.00	MAG 0.722 0.653 0.575 0.512 0.462 0.423 0.398 0.379 0.367 0.361 0.357 0.356 0.358	ANG -26.0 -49.0 -69.4 -86.2 -101.1 -113.9 -125.2 -135.3 -144.3 -152.5 -159.6 -166.5 -172.4	MAG 23.176 20.533 17.914 15.194 13.254 11.637 10.262 9.193 8.257 7.531 6.895 6.370 5.906	ANG 159.8 142.9 129.9 119.8 110.1 103.2 97.1 92.0 87.4 82.8 79.0 75.2 71.9	MAG 0.013 0.024 0.032 0.037 0.041 0.045 0.047 0.050 0.054 0.057 0.059 0.062 0.065	ANG 77.0 65.3 57.6 52.9 51.2 49.3 48.9 48.6 49.3 49.6 49.8 50.2	MAG 0.943 0.844 0.738 0.647 0.575 0.522 0.475 0.443 0.413 0.392 0.374 0.358 0.345	ANG -14.8 -27.7 -36.6 -43.5 -47.5 -51.5 -54.3 -56.8 -59.6 -61.6 -64.4 -66.6 -69.7
FREQUENCY MHz  100.00 200.00 300.00 400.00 500.00 600.00 700.00 800.00 900.00 1000.00 1100.00 1200.00	MAG 0.722 0.653 0.575 0.512 0.462 0.423 0.398 0.379 0.367 0.361 0.357	ANG -26.0 -49.0 -69.4 -86.2 -101.1 -113.9 -125.2 -135.3 -144.3 -152.5 -159.6 -166.5	MAG 23.176 20.533 17.914 15.194 13.254 11.637 10.262 9.193 8.257 7.531 6.895 6.370 5.906 5.512	ANG 159.8 142.9 129.9 119.8 110.1 103.2 97.1 92.0 87.4 82.8 79.0 75.2 71.9 68.4	MAG 0.013 0.024 0.032 0.037 0.041 0.045 0.047 0.050 0.054 0.057 0.059 0.062	ANG 77.0 65.3 57.6 52.9 51.2 49.3 48.9 48.9 48.6 49.3 49.6 49.8	MAG 0.943 0.844 0.738 0.647 0.575 0.522 0.475 0.443 0.413 0.392 0.374 0.358 0.345 0.338	ANG -14.8 -27.7 -36.6 -43.5 -47.5 -51.5 -54.3 -56.8 -59.6 -61.6 -64.4 -66.6
FREQUENCY MHz  100.00 200.00 300.00 400.00 500.00 600.00 700.00 800.00 1000.00 1100.00 1200.00 1300.00 1400.00	MAG 0.722 0.653 0.575 0.512 0.462 0.423 0.398 0.379 0.367 0.361 0.357 0.356 0.358 0.361	ANG -26.0 -49.0 -69.4 -86.2 -101.1 -113.9 -125.2 -135.3 -144.3 -152.5 -159.6 -166.5 -172.4 -177.9	MAG 23.176 20.533 17.914 15.194 13.254 11.637 10.262 9.193 8.257 7.531 6.895 6.370 5.906	ANG 159.8 142.9 129.9 119.8 110.1 103.2 97.1 92.0 87.4 82.8 79.0 75.2 71.9	MAG 0.013 0.024 0.032 0.037 0.041 0.045 0.047 0.050 0.054 0.057 0.059 0.062 0.065 0.069	ANG 77.0 65.3 57.6 52.9 51.2 49.3 48.9 48.6 49.3 49.6 49.8 50.2 50.1	MAG 0.943 0.844 0.738 0.647 0.575 0.522 0.475 0.443 0.413 0.392 0.374 0.358 0.345	ANG -14.8 -27.7 -36.6 -43.5 -47.5 -51.5 -54.3 -56.8 -59.6 -61.6 -64.4 -66.6 -69.7 -72.1
FREQUENCY MHz  100.00 200.00 300.00 400.00 500.00 600.00 700.00 800.00 1000.00 1100.00 1200.00 1300.00 1400.00 1500.00 1600.00 1700.00	MAG 0.722 0.653 0.575 0.512 0.462 0.423 0.398 0.379 0.367 0.361 0.357 0.356 0.358 0.361 0.367 0.371 0.379	ANG -26.0 -49.0 -69.4 -86.2 -101.1 -113.9 -125.2 -135.3 -144.3 -152.5 -159.6 -166.5 -172.4 -177.9 177.1 172.4 168.4	MAG 23.176 20.533 17.914 15.194 13.254 11.637 10.262 9.193 8.257 7.531 6.895 6.370 5.906 5.512 5.172 4.856 4.615	ANG 159.8 142.9 129.9 119.8 110.1 103.2 97.1 92.0 87.4 82.8 79.0 75.2 71.9 68.4 65.1 62.0 58.6	MAG 0.013 0.024 0.032 0.037 0.041 0.045 0.047 0.050 0.054 0.057 0.059 0.062 0.065 0.069 0.072 0.075 0.079	ANG 77.0 65.3 57.6 52.9 51.2 49.3 48.9 48.6 49.3 49.6 49.8 50.2 50.1 50.4 50.7 50.8	MAG 0.943 0.844 0.738 0.647 0.575 0.522 0.475 0.443 0.413 0.392 0.374 0.358 0.345 0.338 0.327 0.321 0.313	ANG -14.8 -27.7 -36.6 -43.5 -47.5 -51.5 -54.3 -56.8 -59.6 -61.6 -64.4 -66.6 -69.7 -72.1 -75.9 -82.6
FREQUENCY MHz  100.00 200.00 300.00 400.00 500.00 600.00 700.00 800.00 1000.00 1100.00 1200.00 1300.00 1400.00 1500.00 1600.00 1700.00	MAG 0.722 0.653 0.575 0.512 0.462 0.423 0.398 0.379 0.367 0.361 0.357 0.356 0.358 0.361 0.367 0.371 0.379 0.385	ANG -26.0 -49.0 -69.4 -86.2 -101.1 -113.9 -125.2 -135.3 -144.3 -152.5 -159.6 -166.5 -172.4 -177.9 177.1 172.4 168.4 164.5	MAG 23.176 20.533 17.914 15.194 13.254 11.637 10.262 9.193 8.257 7.531 6.895 6.370 5.906 5.512 5.172 4.856 4.615 4.332	ANG 159.8 142.9 129.9 119.8 110.1 103.2 97.1 92.0 87.4 82.8 79.0 75.2 71.9 68.4 65.1 62.0 58.6 55.8	MAG 0.013 0.024 0.032 0.037 0.041 0.045 0.047 0.050 0.054 0.057 0.059 0.062 0.065 0.069 0.072 0.075 0.079 0.083	ANG 77.0 65.3 57.6 52.9 51.2 49.3 48.9 48.6 49.3 49.6 49.8 50.2 50.1 50.4 50.7 50.8 50.9	MAG 0.943 0.844 0.738 0.647 0.575 0.522 0.475 0.443 0.413 0.392 0.374 0.358 0.345 0.338 0.327 0.321 0.313 0.313	ANG -14.8 -27.7 -36.6 -43.5 -47.5 -51.5 -54.3 -56.8 -59.6 -61.6 -64.4 -66.6 -69.7 -72.1 -75.9 -82.6 -85.5
FREQUENCY MHz  100.00 200.00 300.00 400.00 500.00 600.00 700.00 800.00 1000.00 1100.00 1200.00 1300.00 1400.00 1500.00 1600.00 1700.00 1800.00	MAG 0.722 0.653 0.575 0.512 0.462 0.423 0.398 0.379 0.367 0.361 0.357 0.356 0.358 0.361 0.367 0.371 0.379 0.385 0.395	ANG -26.0 -49.0 -69.4 -86.2 -101.1 -113.9 -125.2 -135.3 -144.3 -152.5 -159.6 -166.5 -172.4 -177.9 177.1 172.4 168.4 164.5 160.7	MAG 23.176 20.533 17.914 15.194 13.254 11.637 10.262 9.193 8.257 7.531 6.895 6.370 5.906 5.512 5.172 4.856 4.615 4.332 4.123	ANG 159.8 142.9 129.9 119.8 110.1 103.2 97.1 92.0 87.4 82.8 79.0 75.2 71.9 68.4 65.1 62.0 58.6 55.8 52.5	MAG 0.013 0.024 0.032 0.037 0.041 0.045 0.047 0.050 0.054 0.057 0.062 0.065 0.069 0.072 0.075 0.079 0.083 0.086	ANG 77.0 65.3 57.6 52.9 51.2 49.3 48.9 48.6 49.3 49.6 49.8 50.2 50.1 50.4 50.7 50.8 50.9 50.8	MAG 0.943 0.844 0.738 0.647 0.575 0.522 0.475 0.443 0.413 0.392 0.374 0.358 0.345 0.338 0.327 0.321 0.313 0.304	ANG -14.8 -27.7 -36.6 -43.5 -47.5 -51.5 -54.3 -56.8 -59.6 -61.6 -64.4 -66.6 -69.7 -72.1 -75.9 -78.9 -82.6 -85.5 -90.4
FREQUENCY MHz  100.00 200.00 300.00 400.00 500.00 600.00 700.00 800.00 1000.00 1100.00 1200.00 1300.00 1400.00 1500.00 1600.00 1700.00 1800.00 1900.00	MAG 0.722 0.653 0.575 0.512 0.462 0.423 0.398 0.379 0.367 0.361 0.357 0.356 0.358 0.361 0.367 0.371 0.379 0.385 0.395 0.402	ANG -26.0 -49.0 -69.4 -86.2 -101.1 -113.9 -125.2 -135.3 -144.3 -152.5 -159.6 -166.5 -172.4 -177.9 177.1 172.4 168.4 164.5 160.7	MAG 23.176 20.533 17.914 15.194 13.254 11.637 10.262 9.193 8.257 7.531 6.895 6.370 5.906 5.512 5.172 4.856 4.615 4.332 4.123 3.914	ANG 159.8 142.9 129.9 119.8 110.1 103.2 97.1 92.0 87.4 82.8 79.0 75.2 71.9 68.4 65.1 62.0 58.6 55.8 52.5 49.8	MAG 0.013 0.024 0.032 0.037 0.041 0.045 0.047 0.050 0.054 0.057 0.062 0.065 0.069 0.072 0.075 0.079 0.083 0.086 0.089	ANG 77.0 65.3 57.6 52.9 51.2 49.3 48.9 48.6 49.3 49.6 49.8 50.2 50.1 50.4 50.7 50.8 50.9 50.8 51.2	MAG 0.943 0.844 0.738 0.647 0.575 0.522 0.475 0.443 0.413 0.392 0.374 0.358 0.345 0.338 0.327 0.321 0.313 0.304 0.308	ANG -14.8 -27.7 -36.6 -43.5 -47.5 -51.5 -54.3 -56.8 -59.6 -61.6 -64.4 -66.6 -69.7 -72.1 -75.9 -78.9 -82.6 -85.5 -90.4 -92.6
FREQUENCY MHz  100.00 200.00 300.00 400.00 500.00 600.00 700.00 800.00 1000.00 1100.00 1200.00 1300.00 1400.00 1500.00 1600.00 1700.00 1800.00 1900.00 2000.00 2100.00	MAG 0.722 0.653 0.575 0.512 0.462 0.423 0.398 0.379 0.367 0.361 0.357 0.356 0.358 0.361 0.367 0.371 0.379 0.385 0.395 0.402 0.413	ANG -26.0 -49.0 -69.4 -86.2 -101.1 -113.9 -125.2 -135.3 -144.3 -152.5 -159.6 -166.5 -172.4 -177.9 177.1 172.4 168.4 164.5 160.7 157.9 153.9	MAG 23.176 20.533 17.914 15.194 13.254 11.637 10.262 9.193 8.257 7.531 6.895 6.370 5.906 5.512 5.172 4.856 4.615 4.332 4.123 3.914 3.734	ANG 159.8 142.9 129.9 119.8 110.1 103.2 97.1 92.0 87.4 82.8 79.0 75.2 71.9 68.4 65.1 62.0 58.6 55.8 52.5 49.8 46.9	MAG 0.013 0.024 0.032 0.037 0.041 0.045 0.047 0.050 0.054 0.057 0.059 0.062 0.065 0.069 0.072 0.075 0.079 0.083 0.086 0.089 0.093	ANG 77.0 65.3 57.6 52.9 51.2 49.3 48.9 48.6 49.3 49.6 49.8 50.2 50.1 50.4 50.7 50.8 50.9 50.8 51.2 50.7	MAG 0.943 0.844 0.738 0.647 0.575 0.522 0.475 0.443 0.413 0.392 0.374 0.358 0.345 0.338 0.327 0.321 0.313 0.304 0.308 0.300	ANG -14.8 -27.7 -36.6 -43.5 -47.5 -51.5 -54.3 -56.8 -59.6 -61.6 -64.4 -66.6 -69.7 -72.1 -75.9 -78.9 -82.6 -85.5 -90.4 -92.6 -98.1
FREQUENCY MHz  100.00 200.00 300.00 400.00 500.00 600.00 700.00 800.00 1000.00 1100.00 1200.00 1300.00 1500.00 1600.00 1700.00 1800.00 1800.00 1900.00 2000.00 2100.00	MAG 0.722 0.653 0.575 0.512 0.462 0.423 0.398 0.379 0.367 0.361 0.357 0.356 0.358 0.361 0.367 0.371 0.379 0.385 0.395 0.402 0.413 0.424	ANG -26.0 -49.0 -69.4 -86.2 -101.1 -113.9 -125.2 -135.3 -144.3 -152.5 -159.6 -166.5 -172.4 -177.9 177.1 172.4 168.4 164.5 160.7 157.9 153.9	MAG 23.176 20.533 17.914 15.194 13.254 11.637 10.262 9.193 8.257 7.531 6.895 6.370 5.906 5.512 5.172 4.856 4.615 4.332 4.123 3.914 3.734 3.579	ANG 159.8 142.9 129.9 119.8 110.1 103.2 97.1 92.0 87.4 82.8 79.0 75.2 71.9 68.4 65.1 62.0 58.6 55.8 52.5 49.8 46.9 44.1	MAG 0.013 0.024 0.032 0.037 0.041 0.045 0.047 0.050 0.054 0.057 0.059 0.062 0.065 0.069 0.072 0.075 0.079 0.083 0.086 0.089 0.093 0.098	ANG 77.0 65.3 57.6 52.9 51.2 49.3 48.9 48.6 49.3 49.6 49.8 50.2 50.1 50.4 50.7 50.8 50.9 50.8 51.2 50.7 50.6	MAG 0.943 0.844 0.738 0.647 0.575 0.522 0.475 0.443 0.413 0.392 0.374 0.358 0.345 0.338 0.327 0.321 0.313 0.313 0.304 0.308 0.300 0.305	ANG -14.8 -27.7 -36.6 -43.5 -47.5 -51.5 -54.3 -56.8 -59.6 -61.6 -64.4 -66.6 -69.7 -72.1 -75.9 -78.9 -82.6 -85.5 -90.4 -92.6 -98.1 -99.6
FREQUENCY MHz  100.00 200.00 300.00 400.00 500.00 600.00 700.00 800.00 1000.00 1100.00 1200.00 1300.00 1400.00 1500.00 1600.00 1700.00 1800.00 1900.00 2000.00 2100.00 2300.00	MAG 0.722 0.653 0.575 0.512 0.462 0.423 0.398 0.379 0.367 0.361 0.357 0.356 0.358 0.361 0.367 0.371 0.379 0.385 0.395 0.402 0.413 0.424 0.429	ANG -26.0 -49.0 -69.4 -86.2 -101.1 -113.9 -125.2 -135.3 -144.3 -152.5 -159.6 -166.5 -172.4 -177.9 177.1 172.4 168.4 164.5 160.7 157.9 153.9 151.3 148.2	MAG 23.176 20.533 17.914 15.194 13.254 11.637 10.262 9.193 8.257 7.531 6.895 6.370 5.906 5.512 5.172 4.856 4.615 4.332 4.123 3.914 3.734 3.579 3.390	ANG 159.8 142.9 129.9 119.8 110.1 103.2 97.1 92.0 87.4 82.8 79.0 75.2 71.9 68.4 65.1 62.0 58.6 55.8 52.5 49.8 46.9 44.1 41.2	MAG 0.013 0.024 0.032 0.037 0.041 0.045 0.047 0.050 0.054 0.057 0.059 0.062 0.065 0.069 0.072 0.075 0.079 0.083 0.086 0.089 0.093 0.098 0.101	ANG 77.0 65.3 57.6 52.9 51.2 49.3 48.9 48.6 49.3 49.6 49.8 50.2 50.1 50.4 50.7 50.8 51.2 50.7 50.6 50.7	MAG 0.943 0.844 0.738 0.647 0.575 0.522 0.475 0.443 0.413 0.392 0.374 0.358 0.345 0.338 0.327 0.321 0.313 0.313 0.304 0.308 0.300 0.305 0.299	ANG -14.8 -27.7 -36.6 -43.5 -47.5 -51.5 -54.3 -56.8 -59.6 -61.6 -64.4 -66.6 -69.7 -72.1 -75.9 -78.9 -82.6 -85.5 -90.4 -92.6 -98.1 -99.6 -106.1
FREQUENCY MHz  100.00 200.00 300.00 400.00 500.00 600.00 700.00 800.00 1000.00 1100.00 1200.00 1300.00 1500.00 1600.00 1700.00 1800.00 1800.00 1900.00 2000.00 2100.00	MAG 0.722 0.653 0.575 0.512 0.462 0.423 0.398 0.379 0.367 0.361 0.357 0.356 0.358 0.361 0.367 0.371 0.379 0.385 0.395 0.402 0.413 0.424	ANG -26.0 -49.0 -69.4 -86.2 -101.1 -113.9 -125.2 -135.3 -144.3 -152.5 -159.6 -166.5 -172.4 -177.9 177.1 172.4 168.4 164.5 160.7 157.9 153.9	MAG 23.176 20.533 17.914 15.194 13.254 11.637 10.262 9.193 8.257 7.531 6.895 6.370 5.906 5.512 5.172 4.856 4.615 4.332 4.123 3.914 3.734 3.579	ANG 159.8 142.9 129.9 119.8 110.1 103.2 97.1 92.0 87.4 82.8 79.0 75.2 71.9 68.4 65.1 62.0 58.6 55.8 52.5 49.8 46.9 44.1	MAG 0.013 0.024 0.032 0.037 0.041 0.045 0.047 0.050 0.054 0.057 0.059 0.062 0.065 0.069 0.072 0.075 0.079 0.083 0.086 0.089 0.093 0.098	ANG 77.0 65.3 57.6 52.9 51.2 49.3 48.9 48.6 49.3 49.6 49.8 50.2 50.1 50.4 50.7 50.8 50.9 50.8 51.2 50.7 50.6	MAG 0.943 0.844 0.738 0.647 0.575 0.522 0.475 0.443 0.413 0.392 0.374 0.358 0.345 0.338 0.327 0.321 0.313 0.313 0.304 0.308 0.300 0.305	ANG -14.8 -27.7 -36.6 -43.5 -47.5 -51.5 -54.3 -56.8 -59.6 -61.6 -64.4 -66.6 -69.7 -72.1 -75.9 -78.9 -82.6 -85.5 -90.4 -92.6 -98.1 -99.6
FREQUENCY MHz  100.00 200.00 300.00 400.00 500.00 600.00 700.00 800.00 1000.00 1100.00 1200.00 1300.00 1400.00 1500.00 1600.00 1700.00 1800.00 1900.00 2000.00 2200.00 2300.00 2400.00 2500.00 2600.00	MAG 0.722 0.653 0.575 0.512 0.462 0.423 0.398 0.379 0.367 0.356 0.358 0.361 0.367 0.371 0.379 0.385 0.402 0.413 0.424 0.429 0.443 0.444 0.458	ANG -26.0 -49.0 -69.4 -86.2 -101.1 -113.9 -125.2 -135.3 -144.3 -152.5 -159.6 -166.5 -172.4 -177.9 177.1 172.4 168.4 164.5 160.7 157.9 153.9 151.3 148.2 145.4	MAG 23.176 20.533 17.914 15.194 13.254 11.637 10.262 9.193 8.257 7.531 6.895 6.370 5.906 5.512 5.172 4.856 4.615 4.332 4.123 3.914 3.734 3.579 3.390 3.257	ANG 159.8 142.9 129.9 119.8 110.1 103.2 97.1 92.0 87.4 82.8 79.0 75.2 71.9 68.4 65.1 62.0 58.6 55.8 52.5 49.8 46.9 44.1 41.2 38.6	MAG 0.013 0.024 0.032 0.037 0.041 0.045 0.047 0.050 0.054 0.057 0.059 0.062 0.065 0.069 0.072 0.075 0.079 0.083 0.086 0.089 0.093 0.098 0.101 0.105	ANG 77.0 65.3 57.6 52.9 51.2 49.3 48.9 48.9 48.6 49.3 49.6 49.8 50.2 50.1 50.4 50.7 50.8 50.9 50.8 51.2 50.7 50.6 50.7 50.3 50.2 49.8	MAG 0.943 0.844 0.738 0.647 0.575 0.522 0.475 0.443 0.413 0.392 0.374 0.358 0.345 0.338 0.327 0.321 0.313 0.313 0.304 0.308 0.300 0.305 0.299 0.305 0.306 0.319	ANG -14.8 -27.7 -36.6 -43.5 -47.5 -51.5 -54.3 -56.8 -59.6 -61.6 -64.4 -66.6 -69.7 -72.1 -75.9 -78.9 -82.6 -85.5 -90.4 -92.6 -98.1 -99.6 -106.1 -106.8
FREQUENCY MHz  100.00 200.00 300.00 400.00 500.00 600.00 700.00 800.00 1000.00 1100.00 1200.00 1300.00 1400.00 1500.00 1600.00 1700.00 1800.00 1900.00 2000.00 2200.00 2300.00 2400.00 2500.00 2600.00 2700.00	MAG 0.722 0.653 0.575 0.512 0.462 0.423 0.398 0.379 0.367 0.356 0.358 0.361 0.367 0.371 0.379 0.385 0.395 0.402 0.413 0.424 0.429 0.443 0.424 0.429 0.443 0.444 0.458 0.467	ANG -26.0 -49.0 -69.4 -86.2 -101.1 -113.9 -125.2 -135.3 -144.3 -152.5 -159.6 -166.5 -172.4 -177.9 177.1 172.4 168.4 164.5 160.7 157.9 153.9 151.3 148.2 145.4 142.9 140.2 138.4	MAG 23.176 20.533 17.914 15.194 13.254 11.637 10.262 9.193 8.257 7.531 6.895 6.370 5.906 5.512 5.172 4.856 4.615 4.332 4.123 3.914 3.734 3.579 3.390 3.257 3.135 2.999 2.909	ANG 159.8 142.9 129.9 119.8 110.1 103.2 97.1 92.0 87.4 82.8 79.0 75.2 71.9 68.4 65.1 62.0 58.6 55.8 52.5 49.8 46.9 44.1 41.2 38.6 36.2 33.5 30.5	MAG 0.013 0.024 0.032 0.037 0.041 0.045 0.047 0.050 0.054 0.057 0.059 0.062 0.065 0.069 0.072 0.075 0.079 0.083 0.086 0.089 0.093 0.098 0.101 0.105 0.109 0.114 0.119	ANG 77.0 65.3 57.6 52.9 51.2 49.3 48.9 48.9 48.6 49.3 49.6 49.8 50.2 50.1 50.4 50.7 50.8 50.9 50.8 51.2 50.7 50.6 50.7 50.3 50.2 49.8 50.0	MAG 0.943 0.844 0.738 0.647 0.575 0.522 0.475 0.443 0.413 0.392 0.374 0.358 0.345 0.338 0.327 0.321 0.313 0.313 0.304 0.308 0.300 0.305 0.299 0.305 0.306 0.319 0.325	ANG -14.8 -27.7 -36.6 -43.5 -47.5 -51.5 -54.3 -56.8 -59.6 -61.6 -64.4 -66.6 -69.7 -72.1 -75.9 -78.9 -82.6 -85.5 -90.4 -92.6 -98.1 -99.6 -106.1 -106.8 -112.7 -113.7 -119.6
FREQUENCY MHz  100.00 200.00 300.00 400.00 500.00 600.00 700.00 800.00 1000.00 1100.00 1200.00 1300.00 1400.00 1500.00 1600.00 1700.00 1800.00 1900.00 2000.00 2100.00 2200.00 2300.00 2400.00 2500.00 2600.00 2700.00 2800.00	MAG 0.722 0.653 0.575 0.512 0.462 0.423 0.398 0.379 0.367 0.361 0.357 0.356 0.358 0.361 0.367 0.371 0.379 0.385 0.395 0.402 0.413 0.424 0.429 0.443 0.424 0.429 0.443 0.444 0.458 0.467 0.477	ANG -26.0 -49.0 -69.4 -86.2 -101.1 -113.9 -125.2 -135.3 -144.3 -152.5 -159.6 -166.5 -172.4 -177.9 177.1 172.4 168.4 164.5 160.7 157.9 153.9 151.3 148.2 145.4 142.9 140.2 138.4	MAG 23.176 20.533 17.914 15.194 13.254 11.637 10.262 9.193 8.257 7.531 6.895 6.370 5.906 5.512 5.172 4.856 4.615 4.332 4.123 3.914 3.734 3.579 3.390 3.257 3.135 2.999 2.909 2.797	ANG 159.8 142.9 129.9 119.8 110.1 103.2 97.1 92.0 87.4 82.8 79.0 75.2 71.9 68.4 65.1 62.0 58.6 55.8 52.5 49.8 46.9 44.1 41.2 38.6 36.2 33.5 30.5 28.1	MAG 0.013 0.024 0.032 0.037 0.041 0.045 0.047 0.050 0.054 0.057 0.059 0.062 0.065 0.069 0.072 0.075 0.079 0.083 0.086 0.089 0.093 0.098 0.101 0.105 0.109 0.114 0.119 0.124	ANG 77.0 65.3 57.6 52.9 51.2 49.3 48.9 48.9 48.6 49.3 49.6 49.8 50.2 50.1 50.4 50.7 50.8 50.9 50.8 51.2 50.7 50.6 50.7 50.3 50.2 49.8 50.0 48.8	MAG 0.943 0.844 0.738 0.647 0.575 0.522 0.475 0.443 0.413 0.392 0.374 0.358 0.345 0.338 0.327 0.321 0.313 0.304 0.308 0.300 0.305 0.299 0.305 0.306 0.319 0.325 0.332	ANG -14.8 -27.7 -36.6 -43.5 -47.5 -51.5 -54.3 -56.8 -59.6 -61.6 -64.4 -66.6 -69.7 -72.1 -75.9 -82.6 -85.5 -90.4 -92.6 -98.1 -99.6 -106.1 -106.8 -112.7 -113.7 -119.6 -122.0
FREQUENCY MHz  100.00 200.00 300.00 400.00 500.00 600.00 700.00 800.00 1000.00 1100.00 1200.00 1300.00 1400.00 1500.00 1600.00 1700.00 1800.00 1900.00 2000.00 2200.00 2300.00 2400.00 2500.00 2600.00 2700.00	MAG 0.722 0.653 0.575 0.512 0.462 0.423 0.398 0.379 0.367 0.356 0.358 0.361 0.367 0.371 0.379 0.385 0.395 0.402 0.413 0.424 0.429 0.443 0.424 0.429 0.443 0.444 0.458 0.467	ANG -26.0 -49.0 -69.4 -86.2 -101.1 -113.9 -125.2 -135.3 -144.3 -152.5 -159.6 -166.5 -172.4 -177.9 177.1 172.4 168.4 164.5 160.7 157.9 153.9 151.3 148.2 145.4 142.9 140.2 138.4	MAG 23.176 20.533 17.914 15.194 13.254 11.637 10.262 9.193 8.257 7.531 6.895 6.370 5.906 5.512 5.172 4.856 4.615 4.332 4.123 3.914 3.734 3.579 3.390 3.257 3.135 2.999 2.909	ANG 159.8 142.9 129.9 119.8 110.1 103.2 97.1 92.0 87.4 82.8 79.0 75.2 71.9 68.4 65.1 62.0 58.6 55.8 52.5 49.8 46.9 44.1 41.2 38.6 36.2 33.5 30.5	MAG 0.013 0.024 0.032 0.037 0.041 0.045 0.047 0.050 0.054 0.057 0.059 0.062 0.065 0.069 0.072 0.075 0.079 0.083 0.086 0.089 0.093 0.098 0.101 0.105 0.109 0.114 0.119	ANG 77.0 65.3 57.6 52.9 51.2 49.3 48.9 48.9 48.6 49.3 49.6 49.8 50.2 50.1 50.4 50.7 50.8 50.9 50.8 51.2 50.7 50.6 50.7 50.3 50.2 49.8 50.0	MAG 0.943 0.844 0.738 0.647 0.575 0.522 0.475 0.443 0.413 0.392 0.374 0.358 0.345 0.338 0.327 0.321 0.313 0.304 0.308 0.300 0.305 0.299 0.305 0.306 0.319 0.325	ANG -14.8 -27.7 -36.6 -43.5 -47.5 -51.5 -54.3 -56.8 -59.6 -61.6 -64.4 -66.6 -69.7 -72.1 -75.9 -78.9 -82.6 -85.5 -90.4 -92.6 -98.1 -99.6 -106.1 -106.8 -112.7 -113.7 -119.6

VcE = 5 V, $Ic = 20 mA$ ,	$Z_0 = 50 \Omega$
FREQUENCY	
MHz	MAG
100.00	0.584

FREQUENCY		S <sub>11</sub>	S	14	S	10	9	22
MHz	MAG	ANG	MAG	ANG	MAG	ANG	MAG	ANG
100.00	0.584	-36.1	33.272	153.6	0.012	73.1	0.896	-19.7
200.00	0.503	-65.9	27.312	134.0	0.020	63.7	0.751	-34.7
300.00	0.434	-89.4	22.196	120.4	0.027	58.1	0.618	-43.4
400.00	0.385	-107.3	18.070	110.8	0.031	56.3	0.526	-48.9
500.00	0.361	-122.5	15.219	102.7	0.034	56.6	0.459	-51.9
600.00	0.341	-135.0	13.079	96.8	0.038	57.0	0.415	-54.6
700.00	0.331	-145.4	11.392	91.4	0.042	57.1	0.374	-56.9
800.00	0.327	-154.4	10.113	87.1	0.046	57.1	0.353	-58.8
900.00	0.325	-162.3	9.025	83.0	0.049	57.2	0.326	-61.5
1000.00	0.326	-169.1	8.193	79.2	0.054	57.6	0.312	-63.2
1100.00	0.329	-175.0	7.486	75.8	0.057	57.9	0.300	-65.7
1200.00	0.334	179.1	6.878	72.4	0.061	58.2	0.288	-68.2
1300.00	0.338	174.5	6.379	69.3	0.066	58.0	0.278	-71.6
1400.00	0.344	169.9	5.935	66.2	0.070	57.7	0.270	-74.6
1500.00	0.352	165.9	5.566	63.2	0.074	57.3	0.263	-78.1
1600.00	0.358	162.1	5.220	60.3	0.078	57.4	0.260	-81.1
1700.00	0.367	158.9	4.949	57.4	0.082	57.0	0.255	-85.8
1800.00	0.373	155.7	4.651	54.6	0.087	56.6	0.254	-88.9
1900.00	0.385	152.7	4.411	51.8	0.091	55.6	0.248	-94.5
2000.00	0.391	150.3	4.195	49.0	0.096	55.2	0.250	-96.7
2100.00	0.403	147.2	3.990	46.3	0.099	54.3	0.246	-103.1
2200.00	0.414	145.1	3.817	43.9	0.104	53.8	0.252	-104.1
2300.00	0.421	142.2	3.633	41.0	0.108	53.5	0.247	-111.5
2400.00	0.435	140.0	3.488	38.6	0.113	52.6	0.256	-112.0
2500.00 2600.00	0.436	137.8 135.4	3.349	36.3	0.116	52.3	0.258	-118.4
2700.00	0.450		3.203	33.9 31.2	0.121	51.7	0.269	-118.7
2800.00	0.459 0.470	134.0 131.3	3.126 2.995	28.7	0.127 0.132	51.2 49.6	0.275 0.285	-125.1 -127.4
2900.00	0.470	129.7	2.881	26.0	0.132	48.8	0.265	-127.4 -133.1
3000.00	0.489	129.7	2.788	24.0	0.137	48.0	0.302	-135.1 -136.2
VCE = 5 V, Ic = 30 mA,	$Z_0 = 50 \Omega$	C	C		C		0	
FREQUENCY		S <sub>11</sub>	Sa		S			222
	Z <sub>0</sub> = 50 Ω MAG	S <sub>11</sub> ANG	S: MAG	ANG	S. MAG	ANG	S MAG	ANG
FREQUENCY								
FREQUENCY MHz	MAG	ANG	MAG	ANG	MAG	ANG	MAG	ANG
FREQUENCY MHz 100.00 200.00 300.00	MAG 0.508 0.433 0.378	ANG -42.8 -76.3 -100.7	MAG 38.283 30.011 23.555	ANG 149.9 129.4 116.0	MAG 0.011 0.019 0.023	ANG 72.3 61.8 59.8	MAG 0.861 0.692 0.558	ANG -22.9 -37.6 -45.6
FREQUENCY MHz 100.00 200.00 300.00 400.00	MAG 0.508 0.433 0.378 0.342	ANG -42.8 -76.3 -100.7 -119.6	MAG 38.283 30.011 23.555 18.822	ANG 149.9 129.4 116.0 107.1	MAG 0.011 0.019 0.023 0.028	ANG 72.3 61.8 59.8 59.3	MAG 0.861 0.692 0.558 0.472	ANG -22.9 -37.6 -45.6 -50.4
FREQUENCY MHz 100.00 200.00 300.00 400.00 500.00	MAG 0.508 0.433 0.378 0.342 0.332	ANG -42.8 -76.3 -100.7 -119.6 -133.8	MAG 38.283 30.011 23.555 18.822 15.690	ANG 149.9 129.4 116.0 107.1 99.5	MAG 0.011 0.019 0.023 0.028 0.032	ANG 72.3 61.8 59.8 59.3 59.2	MAG 0.861 0.692 0.558 0.472 0.411	ANG -22.9 -37.6 -45.6 -50.4 -52.5
FREQUENCY MHz 100.00 200.00 300.00 400.00 500.00 600.00	MAG 0.508 0.433 0.378 0.342 0.332 0.321	ANG -42.8 -76.3 -100.7 -119.6 -133.8 -145.1	MAG 38.283 30.011 23.555 18.822 15.690 13.390	ANG 149.9 129.4 116.0 107.1 99.5 93.9	MAG 0.011 0.019 0.023 0.028 0.032 0.036	72.3 61.8 59.8 59.3 59.2 61.0	MAG 0.861 0.692 0.558 0.472 0.411 0.369	ANG -22.9 -37.6 -45.6 -50.4 -52.5 -54.9
FREQUENCY MHz  100.00 200.00 300.00 400.00 500.00 600.00 700.00	MAG 0.508 0.433 0.378 0.342 0.332 0.321 0.317	ANG -42.8 -76.3 -100.7 -119.6 -133.8 -145.1 -154.9	MAG 38.283 30.011 23.555 18.822 15.690 13.390 11.613	ANG 149.9 129.4 116.0 107.1 99.5 93.9 89.1	MAG 0.011 0.019 0.023 0.028 0.032 0.036 0.041	72.3 61.8 59.8 59.3 59.2 61.0 60.5	MAG 0.861 0.692 0.558 0.472 0.411 0.369 0.337	ANG -22.9 -37.6 -45.6 -50.4 -52.5 -54.9 -57.0
FREQUENCY MHz  100.00 200.00 300.00 400.00 500.00 600.00 700.00 800.00	MAG 0.508 0.433 0.378 0.342 0.332 0.321 0.317 0.316	ANG -42.8 -76.3 -100.7 -119.6 -133.8 -145.1 -154.9 -163.1	MAG 38.283 30.011 23.555 18.822 15.690 13.390 11.613 10.259	ANG 149.9 129.4 116.0 107.1 99.5 93.9 89.1 84.9	MAG 0.011 0.019 0.023 0.028 0.032 0.036 0.041 0.045	ANG 72.3 61.8 59.8 59.3 59.2 61.0 60.5 60.7	MAG 0.861 0.692 0.558 0.472 0.411 0.369 0.337 0.315	ANG -22.9 -37.6 -45.6 -50.4 -52.5 -54.9 -57.0 -58.5
FREQUENCY MHz  100.00 200.00 300.00 400.00 500.00 600.00 700.00 800.00 900.00	MAG 0.508 0.433 0.378 0.342 0.332 0.321 0.317 0.316 0.318	ANG -42.8 -76.3 -100.7 -119.6 -133.8 -145.1 -154.9 -163.1 -169.9	MAG 38.283 30.011 23.555 18.822 15.690 13.390 11.613 10.259 9.171	ANG 149.9 129.4 116.0 107.1 99.5 93.9 89.1 84.9 81.1	MAG 0.011 0.019 0.023 0.028 0.032 0.036 0.041 0.045 0.048	ANG 72.3 61.8 59.8 59.3 59.2 61.0 60.5 60.7 61.6	MAG 0.861 0.692 0.558 0.472 0.411 0.369 0.337 0.315 0.297	ANG -22.9 -37.6 -45.6 -50.4 -52.5 -54.9 -57.0 -58.5 -60.9
FREQUENCY MHz  100.00 200.00 300.00 400.00 500.00 600.00 700.00 800.00 900.00 1000.00	MAG 0.508 0.433 0.378 0.342 0.332 0.321 0.317 0.316 0.318 0.323	ANG -42.8 -76.3 -100.7 -119.6 -133.8 -145.1 -154.9 -163.1 -169.9 -176.1	MAG 38.283 30.011 23.555 18.822 15.690 13.390 11.613 10.259 9.171 8.300	ANG 149.9 129.4 116.0 107.1 99.5 93.9 89.1 84.9 81.1 77.5	MAG 0.011 0.019 0.023 0.028 0.032 0.036 0.041 0.045 0.048 0.053	ANG 72.3 61.8 59.8 59.3 59.2 61.0 60.5 60.7 61.6 60.8	MAG 0.861 0.692 0.558 0.472 0.411 0.369 0.337 0.315 0.297 0.283	ANG -22.9 -37.6 -45.6 -50.4 -52.5 -54.9 -57.0 -58.5 -60.9 -62.7
FREQUENCY MHz  100.00 200.00 300.00 400.00 500.00 600.00 700.00 800.00 900.00 1100.00	MAG 0.508 0.433 0.378 0.342 0.332 0.321 0.317 0.316 0.318 0.323 0.326	ANG -42.8 -76.3 -100.7 -119.6 -133.8 -145.1 -154.9 -163.1 -169.9 -176.1 178.5	MAG 38.283 30.011 23.555 18.822 15.690 13.390 11.613 10.259 9.171 8.300 7.579	ANG 149.9 129.4 116.0 107.1 99.5 93.9 89.1 84.9 81.1 77.5 74.2	MAG 0.011 0.019 0.023 0.028 0.032 0.036 0.041 0.045 0.048 0.053 0.058	ANG 72.3 61.8 59.8 59.3 59.2 61.0 60.5 60.7 61.6 60.8 60.9	MAG 0.861 0.692 0.558 0.472 0.411 0.369 0.337 0.315 0.297 0.283 0.271	ANG -22.9 -37.6 -45.6 -50.4 -52.5 -54.9 -57.0 -58.5 -60.9 -62.7 -65.6
FREQUENCY MHz  100.00 200.00 300.00 400.00 500.00 600.00 700.00 800.00 900.00 1000.00 1100.00 1200.00	MAG 0.508 0.433 0.378 0.342 0.332 0.321 0.317 0.316 0.318 0.323 0.326 0.332	ANG -42.8 -76.3 -100.7 -119.6 -133.8 -145.1 -154.9 -163.1 -169.9 -176.1 178.5 173.3	MAG 38.283 30.011 23.555 18.822 15.690 13.390 11.613 10.259 9.171 8.300 7.579 6.964	ANG 149.9 129.4 116.0 107.1 99.5 93.9 89.1 84.9 81.1 77.5 74.2 71.1	MAG 0.011 0.019 0.023 0.028 0.032 0.036 0.041 0.045 0.048 0.053 0.058 0.062	ANG 72.3 61.8 59.8 59.3 59.2 61.0 60.5 60.7 61.6 60.8 60.9 61.2	MAG 0.861 0.692 0.558 0.472 0.411 0.369 0.337 0.315 0.297 0.283 0.271 0.263	ANG -22.9 -37.6 -45.6 -50.4 -52.5 -54.9 -57.0 -58.5 -60.9 -62.7 -65.6 -67.9
FREQUENCY MHz  100.00 200.00 300.00 400.00 500.00 600.00 700.00 800.00 900.00 1000.00 1100.00 1200.00 1300.00	MAG 0.508 0.433 0.378 0.342 0.332 0.321 0.317 0.316 0.318 0.323 0.326 0.332 0.339	ANG -42.8 -76.3 -100.7 -119.6 -133.8 -145.1 -154.9 -163.1 -169.9 -176.1 178.5 173.3 169.1	MAG 38.283 30.011 23.555 18.822 15.690 13.390 11.613 10.259 9.171 8.300 7.579 6.964 6.463	ANG 149.9 129.4 116.0 107.1 99.5 93.9 89.1 84.9 81.1 77.5 74.2 71.1 68.1	MAG 0.011 0.019 0.023 0.028 0.032 0.036 0.041 0.045 0.048 0.053 0.058 0.062 0.066	ANG 72.3 61.8 59.8 59.3 59.2 61.0 60.5 60.7 61.6 60.8 60.9 61.2 61.0	MAG 0.861 0.692 0.558 0.472 0.411 0.369 0.337 0.315 0.297 0.283 0.271 0.263 0.256	ANG -22.9 -37.6 -45.6 -50.4 -52.5 -54.9 -57.0 -58.5 -60.9 -62.7 -65.6 -67.9 -71.6
FREQUENCY MHz  100.00 200.00 300.00 400.00 500.00 600.00 700.00 800.00 900.00 1000.00 1100.00 1200.00 1300.00 1400.00	MAG 0.508 0.433 0.378 0.342 0.332 0.321 0.317 0.316 0.318 0.323 0.326 0.332 0.339 0.345	ANG -42.8 -76.3 -100.7 -119.6 -133.8 -145.1 -154.9 -163.1 -169.9 -176.1 178.5 173.3 169.1 165.0	MAG 38.283 30.011 23.555 18.822 15.690 13.390 11.613 10.259 9.171 8.300 7.579 6.964 6.463 6.012	ANG 149.9 129.4 116.0 107.1 99.5 93.9 89.1 84.9 81.1 77.5 74.2 71.1 68.1 65.1	MAG 0.011 0.019 0.023 0.028 0.032 0.036 0.041 0.045 0.048 0.053 0.058 0.062 0.066 0.071	ANG 72.3 61.8 59.8 59.3 59.2 61.0 60.5 60.7 61.6 60.8 60.9 61.2 61.0 60.2	MAG 0.861 0.692 0.558 0.472 0.411 0.369 0.337 0.315 0.297 0.283 0.271 0.263 0.256 0.248	ANG -22.9 -37.6 -45.6 -50.4 -52.5 -54.9 -57.0 -58.5 -60.9 -62.7 -65.6 -67.9 -71.6 -74.6
FREQUENCY MHz  100.00 200.00 300.00 400.00 500.00 600.00 700.00 800.00 900.00 1000.00 1100.00 1200.00 1300.00 1400.00 1500.00	MAG 0.508 0.433 0.378 0.342 0.332 0.321 0.317 0.316 0.318 0.323 0.326 0.332 0.339 0.345 0.354	ANG -42.8 -76.3 -100.7 -119.6 -133.8 -145.1 -154.9 -163.1 -169.9 -176.1 178.5 173.3 169.1 165.0 161.5	MAG 38.283 30.011 23.555 18.822 15.690 13.390 11.613 10.259 9.171 8.300 7.579 6.964 6.463 6.012 5.620	ANG 149.9 129.4 116.0 107.1 99.5 93.9 89.1 84.9 81.1 77.5 74.2 71.1 68.1 65.1 62.3	MAG 0.011 0.019 0.023 0.028 0.032 0.036 0.041 0.045 0.048 0.053 0.058 0.062 0.066 0.071 0.074	ANG 72.3 61.8 59.8 59.3 59.2 61.0 60.5 60.7 61.6 60.8 60.9 61.2 61.0 60.2 59.9	MAG 0.861 0.692 0.558 0.472 0.411 0.369 0.337 0.315 0.297 0.283 0.271 0.263 0.256 0.248 0.241	ANG -22.9 -37.6 -45.6 -50.4 -52.5 -54.9 -57.0 -58.5 -60.9 -62.7 -65.6 -67.9 -71.6 -74.6 -78.7
FREQUENCY MHz  100.00 200.00 300.00 400.00 500.00 600.00 700.00 800.00 900.00 1100.00 1100.00 1200.00 1300.00 1400.00 1500.00 1600.00	MAG 0.508 0.433 0.378 0.342 0.332 0.321 0.317 0.316 0.318 0.323 0.326 0.332 0.339 0.345 0.354 0.359	ANG -42.8 -76.3 -100.7 -119.6 -133.8 -145.1 -154.9 -163.1 -169.9 -176.1 178.5 173.3 169.1 165.0 161.5 158.0	MAG 38.283 30.011 23.555 18.822 15.690 13.390 11.613 10.259 9.171 8.300 7.579 6.964 6.463 6.012 5.620 5.271	ANG 149.9 129.4 116.0 107.1 99.5 93.9 89.1 84.9 81.1 77.5 74.2 71.1 68.1 65.1 62.3 59.4	MAG 0.011 0.019 0.023 0.028 0.032 0.036 0.041 0.045 0.048 0.053 0.058 0.062 0.066 0.071 0.074 0.080	ANG 72.3 61.8 59.8 59.3 59.2 61.0 60.5 60.7 61.6 60.8 60.9 61.2 61.0 60.2 59.9 59.6	MAG 0.861 0.692 0.558 0.472 0.411 0.369 0.337 0.315 0.297 0.283 0.271 0.263 0.256 0.248 0.241 0.242	ANG -22.9 -37.6 -45.6 -50.4 -52.5 -54.9 -57.0 -58.5 -60.9 -62.7 -65.6 -67.9 -71.6 -74.6 -78.7 -82.4
FREQUENCY MHz  100.00 200.00 300.00 400.00 500.00 600.00 700.00 800.00 1000.00 1100.00 1200.00 1300.00 1400.00 1500.00 1600.00 1700.00	MAG 0.508 0.433 0.378 0.342 0.332 0.321 0.317 0.316 0.318 0.323 0.326 0.332 0.339 0.345 0.354 0.359 0.369	ANG -42.8 -76.3 -100.7 -119.6 -133.8 -145.1 -154.9 -163.1 -169.9 -176.1 178.5 173.3 169.1 165.0 161.5 158.0	MAG 38.283 30.011 23.555 18.822 15.690 13.390 11.613 10.259 9.171 8.300 7.579 6.964 6.463 6.012 5.620 5.271 4.972	ANG 149.9 129.4 116.0 107.1 99.5 93.9 89.1 84.9 81.1 77.5 74.2 71.1 68.1 65.1 62.3 59.4 56.4	MAG 0.011 0.019 0.023 0.028 0.032 0.036 0.041 0.045 0.048 0.053 0.058 0.062 0.066 0.071 0.074 0.080 0.083	ANG 72.3 61.8 59.8 59.3 59.2 61.0 60.5 60.7 61.6 60.8 60.9 61.2 61.0 60.2 59.9 59.6 58.7	MAG 0.861 0.692 0.558 0.472 0.411 0.369 0.337 0.315 0.297 0.283 0.271 0.263 0.256 0.248 0.241 0.242 0.236	ANG -22.9 -37.6 -45.6 -50.4 -52.5 -54.9 -57.0 -58.5 -60.9 -62.7 -65.6 -67.9 -71.6 -74.6 -78.7 -82.4 -86.8
FREQUENCY MHz  100.00 200.00 300.00 400.00 500.00 600.00 700.00 800.00 1000.00 1100.00 1200.00 1300.00 1400.00 1500.00 1600.00 1700.00	MAG 0.508 0.433 0.378 0.342 0.332 0.321 0.317 0.316 0.318 0.323 0.326 0.332 0.339 0.345 0.359 0.369 0.376	ANG -42.8 -76.3 -100.7 -119.6 -133.8 -145.1 -154.9 -163.1 -169.9 -176.1 178.5 173.3 169.1 165.0 161.5 158.0 155.0	MAG 38.283 30.011 23.555 18.822 15.690 13.390 11.613 10.259 9.171 8.300 7.579 6.964 6.463 6.012 5.620 5.271 4.972 4.693	ANG 149.9 129.4 116.0 107.1 99.5 93.9 89.1 84.9 81.1 77.5 74.2 71.1 68.1 65.1 62.3 59.4 56.4 54.0	MAG 0.011 0.019 0.023 0.028 0.032 0.036 0.041 0.045 0.048 0.053 0.058 0.062 0.066 0.071 0.074 0.080 0.083 0.088	ANG 72.3 61.8 59.8 59.3 59.2 61.0 60.5 60.7 61.6 60.8 60.9 61.2 61.0 60.2 59.9 59.6 58.7 58.0	MAG 0.861 0.692 0.558 0.472 0.411 0.369 0.337 0.315 0.297 0.283 0.271 0.263 0.256 0.248 0.241 0.242 0.236 0.233	ANG -22.9 -37.6 -45.6 -50.4 -52.5 -54.9 -57.0 -58.5 -60.9 -62.7 -65.6 -67.9 -71.6 -74.6 -78.7 -82.4 -86.8 -90.5
FREQUENCY MHz  100.00 200.00 300.00 400.00 500.00 600.00 700.00 800.00 1000.00 1100.00 1200.00 1300.00 1400.00 1500.00 1600.00 1700.00 1800.00	MAG 0.508 0.433 0.378 0.342 0.332 0.321 0.317 0.316 0.318 0.323 0.326 0.332 0.339 0.345 0.354 0.359 0.369 0.376 0.387	ANG -42.8 -76.3 -100.7 -119.6 -133.8 -145.1 -154.9 -163.1 -169.9 -176.1 178.5 173.3 169.1 165.0 161.5 158.0 155.0 152.4 149.5	MAG 38.283 30.011 23.555 18.822 15.690 13.390 11.613 10.259 9.171 8.300 7.579 6.964 6.463 6.012 5.620 5.271 4.972 4.693 4.454	ANG 149.9 129.4 116.0 107.1 99.5 93.9 89.1 84.9 81.1 77.5 74.2 71.1 68.1 65.1 62.3 59.4 56.4 54.0 51.2	MAG 0.011 0.019 0.023 0.028 0.032 0.036 0.041 0.045 0.048 0.053 0.058 0.062 0.066 0.071 0.074 0.080 0.083 0.088 0.092	ANG 72.3 61.8 59.8 59.3 59.2 61.0 60.5 60.7 61.6 60.8 60.9 61.2 61.0 60.2 59.9 59.6 58.7 58.0 57.5	MAG 0.861 0.692 0.558 0.472 0.411 0.369 0.337 0.315 0.297 0.283 0.271 0.263 0.256 0.248 0.241 0.242 0.236 0.233 0.229	ANG -22.9 -37.6 -45.6 -50.4 -52.5 -54.9 -57.0 -58.5 -60.9 -62.7 -65.6 -67.9 -71.6 -74.6 -78.7 -82.4 -86.8 -90.5 -96.2
FREQUENCY MHz  100.00 200.00 300.00 400.00 500.00 600.00 700.00 800.00 1000.00 1100.00 1200.00 1300.00 1400.00 1500.00 1600.00 1700.00 1800.00 1900.00	MAG 0.508 0.433 0.378 0.342 0.332 0.321 0.317 0.316 0.318 0.323 0.326 0.332 0.339 0.345 0.354 0.359 0.369 0.376 0.387 0.393	ANG -42.8 -76.3 -100.7 -119.6 -133.8 -145.1 -154.9 -163.1 -169.9 -176.1 178.5 173.3 169.1 165.0 161.5 158.0 155.0 152.4 149.5 147.5	MAG 38.283 30.011 23.555 18.822 15.690 13.390 11.613 10.259 9.171 8.300 7.579 6.964 6.463 6.012 5.620 5.271 4.972 4.693 4.454 4.222	ANG 149.9 129.4 116.0 107.1 99.5 93.9 89.1 84.9 81.1 77.5 74.2 71.1 68.1 65.1 62.3 59.4 56.4 54.0 51.2 48.6	MAG 0.011 0.019 0.023 0.028 0.032 0.036 0.041 0.045 0.048 0.053 0.058 0.062 0.066 0.071 0.074 0.080 0.083 0.088 0.092 0.097	ANG 72.3 61.8 59.8 59.3 59.2 61.0 60.5 60.7 61.6 60.8 60.9 61.2 61.0 60.2 59.9 59.6 58.7 58.0 57.5 56.9	MAG 0.861 0.692 0.558 0.472 0.411 0.369 0.337 0.315 0.297 0.283 0.271 0.263 0.256 0.248 0.241 0.242 0.236 0.233 0.229 0.232	ANG -22.9 -37.6 -45.6 -50.4 -52.5 -54.9 -57.0 -58.5 -60.9 -62.7 -65.6 -67.9 -71.6 -74.6 -78.7 -82.4 -86.8 -90.5 -96.2 -97.9
FREQUENCY MHz  100.00 200.00 300.00 400.00 500.00 600.00 700.00 800.00 1000.00 1100.00 1200.00 1300.00 1400.00 1500.00 1600.00 1700.00 1800.00 1900.00 2000.00 2100.00	MAG 0.508 0.433 0.378 0.342 0.332 0.321 0.317 0.316 0.318 0.323 0.326 0.332 0.339 0.345 0.354 0.359 0.369 0.376 0.387 0.393 0.405	ANG -42.8 -76.3 -100.7 -119.6 -133.8 -145.1 -154.9 -163.1 -169.9 -176.1 178.5 173.3 169.1 165.0 161.5 158.0 155.0 155.4 149.5 147.5	MAG 38.283 30.011 23.555 18.822 15.690 13.390 11.613 10.259 9.171 8.300 7.579 6.964 6.463 6.012 5.620 5.271 4.972 4.693 4.454 4.222 4.035	ANG 149.9 129.4 116.0 107.1 99.5 93.9 89.1 84.9 81.1 77.5 74.2 71.1 68.1 65.1 62.3 59.4 56.4 54.0 51.2 48.6 45.7	MAG 0.011 0.019 0.023 0.028 0.032 0.036 0.041 0.045 0.048 0.053 0.058 0.062 0.066 0.071 0.074 0.080 0.083 0.088 0.092 0.097 0.102	ANG 72.3 61.8 59.8 59.3 59.2 61.0 60.5 60.7 61.6 60.8 60.9 61.2 61.0 60.2 59.9 59.6 58.7 58.0 57.5 56.9 56.3	MAG 0.861 0.692 0.558 0.472 0.411 0.369 0.337 0.315 0.297 0.283 0.271 0.263 0.256 0.248 0.241 0.242 0.236 0.233 0.229 0.232	ANG -22.9 -37.6 -45.6 -50.4 -52.5 -54.9 -57.0 -58.5 -60.9 -62.7 -65.6 -67.9 -71.6 -74.6 -78.7 -82.4 -86.8 -90.5 -96.2 -97.9 -104.8
FREQUENCY MHz  100.00 200.00 300.00 400.00 500.00 600.00 700.00 800.00 1000.00 1100.00 1200.00 1300.00 1500.00 1600.00 1700.00 1800.00 1900.00 2000.00 2100.00	MAG 0.508 0.433 0.378 0.342 0.332 0.321 0.317 0.316 0.318 0.323 0.326 0.332 0.339 0.345 0.354 0.359 0.369 0.376 0.387 0.393 0.405 0.416	ANG -42.8 -76.3 -100.7 -119.6 -133.8 -145.1 -154.9 -163.1 -169.9 -176.1 178.5 173.3 169.1 165.0 161.5 158.0 155.0 155.4 149.5 147.5 144.4 142.5	MAG 38.283 30.011 23.555 18.822 15.690 13.390 11.613 10.259 9.171 8.300 7.579 6.964 6.463 6.012 5.620 5.271 4.972 4.693 4.454 4.222 4.035 3.850	ANG 149.9 129.4 116.0 107.1 99.5 93.9 89.1 84.9 81.1 77.5 74.2 71.1 68.1 65.1 62.3 59.4 56.4 54.0 51.2 48.6 45.7 43.2	MAG 0.011 0.019 0.023 0.028 0.032 0.036 0.041 0.045 0.048 0.053 0.058 0.062 0.066 0.071 0.074 0.080 0.083 0.088 0.092 0.097 0.102 0.107	ANG 72.3 61.8 59.8 59.3 59.2 61.0 60.5 60.7 61.6 60.8 60.9 61.2 61.0 60.2 59.9 59.6 58.7 58.0 57.5 56.9 56.3 54.9	MAG 0.861 0.692 0.558 0.472 0.411 0.369 0.337 0.315 0.297 0.283 0.271 0.263 0.256 0.248 0.241 0.242 0.236 0.233 0.229 0.232 0.232 0.233	ANG -22.9 -37.6 -45.6 -50.4 -52.5 -54.9 -57.0 -58.5 -60.9 -62.7 -65.6 -67.9 -71.6 -74.6 -78.7 -82.4 -86.8 -90.5 -96.2 -97.9 -104.8 -106.3
FREQUENCY MHz  100.00 200.00 300.00 400.00 500.00 600.00 700.00 800.00 1000.00 1100.00 1200.00 1300.00 1500.00 1600.00 1700.00 1800.00 1900.00 2000.00 2100.00 2300.00	MAG 0.508 0.433 0.378 0.342 0.332 0.321 0.317 0.316 0.318 0.323 0.326 0.332 0.339 0.345 0.354 0.359 0.369 0.376 0.387 0.393 0.405 0.416 0.422	ANG -42.8 -76.3 -100.7 -119.6 -133.8 -145.1 -154.9 -163.1 -169.9 -176.1 178.5 173.3 169.1 165.0 161.5 158.0 155.0 155.4 149.5 147.5 144.4 142.5 139.9	MAG 38.283 30.011 23.555 18.822 15.690 13.390 11.613 10.259 9.171 8.300 7.579 6.964 6.463 6.012 5.620 5.271 4.972 4.693 4.454 4.222 4.035 3.850 3.660	ANG 149.9 129.4 116.0 107.1 99.5 93.9 89.1 84.9 81.1 77.5 74.2 71.1 68.1 65.1 62.3 59.4 56.4 54.0 51.2 48.6 45.7 43.2 40.5	MAG 0.011 0.019 0.023 0.028 0.032 0.036 0.041 0.045 0.048 0.053 0.058 0.062 0.066 0.071 0.074 0.080 0.083 0.088 0.092 0.097 0.102 0.107 0.111	ANG 72.3 61.8 59.8 59.3 59.2 61.0 60.5 60.7 61.6 60.8 60.9 61.2 61.0 60.2 59.9 59.6 58.7 58.0 57.5 56.9 56.3 54.9 54.1	MAG 0.861 0.692 0.558 0.472 0.411 0.369 0.337 0.315 0.297 0.283 0.271 0.263 0.256 0.248 0.241 0.242 0.236 0.233 0.229 0.232 0.232 0.233 0.231	ANG -22.9 -37.6 -45.6 -50.4 -52.5 -54.9 -57.0 -58.5 -60.9 -62.7 -65.6 -67.9 -71.6 -74.6 -78.7 -82.4 -86.8 -90.5 -90.5 -97.9 -104.8 -106.3 -114.3
FREQUENCY MHz  100.00 200.00 300.00 400.00 500.00 600.00 700.00 800.00 1000.00 1100.00 1200.00 1300.00 1500.00 1600.00 1700.00 1800.00 1900.00 2000.00 2100.00	MAG 0.508 0.433 0.378 0.342 0.332 0.321 0.317 0.316 0.318 0.323 0.326 0.332 0.339 0.345 0.354 0.359 0.369 0.376 0.387 0.393 0.405 0.416	ANG -42.8 -76.3 -100.7 -119.6 -133.8 -145.1 -154.9 -163.1 -169.9 -176.1 178.5 173.3 169.1 165.0 161.5 158.0 155.0 155.4 149.5 147.5 144.4 142.5	MAG 38.283 30.011 23.555 18.822 15.690 13.390 11.613 10.259 9.171 8.300 7.579 6.964 6.463 6.012 5.620 5.271 4.972 4.693 4.454 4.222 4.035 3.850	ANG 149.9 129.4 116.0 107.1 99.5 93.9 89.1 84.9 81.1 77.5 74.2 71.1 68.1 65.1 62.3 59.4 56.4 54.0 51.2 48.6 45.7 43.2	MAG 0.011 0.019 0.023 0.028 0.032 0.036 0.041 0.045 0.048 0.053 0.058 0.062 0.066 0.071 0.074 0.080 0.083 0.088 0.092 0.097 0.102 0.107	ANG 72.3 61.8 59.8 59.3 59.2 61.0 60.5 60.7 61.6 60.8 60.9 61.2 61.0 60.2 59.9 59.6 58.7 58.0 57.5 56.9 56.3 54.9	MAG 0.861 0.692 0.558 0.472 0.411 0.369 0.337 0.315 0.297 0.283 0.271 0.263 0.256 0.248 0.241 0.242 0.236 0.233 0.229 0.232 0.232 0.233	ANG -22.9 -37.6 -45.6 -50.4 -52.5 -54.9 -57.0 -58.5 -60.9 -62.7 -65.6 -67.9 -71.6 -74.6 -78.7 -82.4 -86.8 -90.5 -96.2 -97.9 -104.8 -106.3
FREQUENCY MHz  100.00 200.00 300.00 400.00 500.00 600.00 700.00 800.00 900.00 1100.00 1200.00 1300.00 1400.00 1500.00 1600.00 1700.00 1800.00 1900.00 200.00 2100.00 2200.00 2300.00 2400.00	MAG 0.508 0.433 0.378 0.342 0.332 0.321 0.317 0.316 0.318 0.323 0.326 0.332 0.339 0.345 0.354 0.359 0.369 0.376 0.387 0.393 0.405 0.416 0.422 0.436	ANG -42.8 -76.3 -100.7 -119.6 -133.8 -145.1 -154.9 -163.1 -169.9 -176.1 178.5 173.3 169.1 165.0 161.5 158.0 155.0 155.4 149.5 147.5 144.4 142.5 139.9 137.9	MAG 38.283 30.011 23.555 18.822 15.690 13.390 11.613 10.259 9.171 8.300 7.579 6.964 6.463 6.012 5.620 5.271 4.972 4.693 4.454 4.222 4.035 3.850 3.660 3.517	ANG 149.9 129.4 116.0 107.1 99.5 93.9 89.1 84.9 81.1 77.5 74.2 71.1 68.1 65.1 62.3 59.4 56.4 54.0 51.2 48.6 45.7 43.2 40.5 38.0	MAG 0.011 0.019 0.023 0.028 0.032 0.036 0.041 0.045 0.048 0.053 0.058 0.062 0.066 0.071 0.074 0.080 0.083 0.088 0.092 0.097 0.102 0.107 0.111 0.115	ANG 72.3 61.8 59.8 59.3 59.2 61.0 60.5 60.7 61.6 60.8 60.9 61.2 61.0 60.2 59.9 59.6 58.7 58.0 57.5 56.9 56.3 54.9 54.1 54.0	MAG 0.861 0.692 0.558 0.472 0.411 0.369 0.337 0.315 0.297 0.283 0.271 0.263 0.256 0.248 0.241 0.242 0.236 0.233 0.229 0.232 0.232 0.233 0.231 0.240	ANG -22.9 -37.6 -45.6 -50.4 -52.5 -54.9 -57.0 -58.5 -60.9 -62.7 -65.6 -67.9 -71.6 -74.6 -78.7 -82.4 -86.8 -90.5 -96.2 -97.9 -104.8 -106.3 -114.3 -113.8
FREQUENCY MHz  100.00 200.00 300.00 400.00 500.00 600.00 700.00 800.00 900.00 1000.00 1100.00 1200.00 1300.00 1400.00 1500.00 1600.00 1700.00 1800.00 1900.00 2100.00 2200.00 2300.00 2400.00 2500.00	MAG 0.508 0.433 0.378 0.342 0.332 0.321 0.317 0.316 0.318 0.323 0.326 0.332 0.339 0.345 0.354 0.359 0.369 0.376 0.387 0.393 0.405 0.416 0.422 0.436 0.438	ANG  -42.8  -76.3  -100.7  -119.6  -133.8  -145.1  -154.9  -163.1  -169.9  -176.1  178.5  173.3  169.1  165.0  161.5  158.0  155.0  152.4  149.5  147.5  144.4  142.5  139.9  137.9	MAG 38.283 30.011 23.555 18.822 15.690 13.390 11.613 10.259 9.171 8.300 7.579 6.964 6.463 6.012 5.620 5.271 4.972 4.693 4.454 4.222 4.035 3.850 3.660 3.517 3.360	ANG 149.9 129.4 116.0 107.1 99.5 93.9 89.1 84.9 81.1 77.5 74.2 71.1 68.1 65.1 62.3 59.4 56.4 54.0 51.2 48.6 45.7 43.2 40.5 38.0 36.0	MAG 0.011 0.019 0.023 0.028 0.032 0.036 0.041 0.045 0.048 0.053 0.058 0.062 0.066 0.071 0.074 0.080 0.083 0.088 0.092 0.097 0.102 0.107 0.111 0.115 0.119	ANG 72.3 61.8 59.8 59.3 59.2 61.0 60.5 60.7 61.6 60.8 60.9 61.2 61.0 60.2 59.9 59.6 58.7 58.0 57.5 56.9 56.3 54.9 54.1 54.0 53.1	MAG 0.861 0.692 0.558 0.472 0.411 0.369 0.337 0.315 0.297 0.283 0.271 0.263 0.256 0.248 0.241 0.242 0.236 0.233 0.229 0.232 0.232 0.233 0.231 0.240 0.240	ANG -22.9 -37.6 -45.6 -50.4 -52.5 -54.9 -57.0 -58.5 -60.9 -62.7 -65.6 -67.9 -71.6 -74.6 -78.7 -82.4 -86.8 -90.5 -96.2 -97.9 -104.8 -106.3 -114.3 -113.8 -120.9
FREQUENCY MHz  100.00 200.00 300.00 400.00 500.00 600.00 700.00 800.00 900.00 1100.00 1200.00 1300.00 1400.00 1500.00 1600.00 1700.00 1800.00 1900.00 2000.00 2100.00 2200.00 2300.00 2400.00 2500.00	MAG 0.508 0.433 0.378 0.342 0.332 0.321 0.317 0.316 0.318 0.323 0.326 0.332 0.339 0.345 0.354 0.359 0.369 0.376 0.387 0.393 0.405 0.416 0.422 0.436 0.438 0.453	ANG  -42.8  -76.3  -100.7  -119.6  -133.8  -145.1  -154.9  -163.1  -169.9  -176.1  178.5  173.3  169.1  165.0  161.5  158.0  155.0  152.4  149.5  147.5  144.4  142.5  139.9  137.9  135.7	MAG  38.283 30.011 23.555 18.822 15.690 13.390 11.613 10.259 9.171 8.300 7.579 6.964 6.463 6.012 5.620 5.271 4.972 4.693 4.454 4.222 4.035 3.850 3.660 3.517 3.360 3.235	ANG 149.9 129.4 116.0 107.1 99.5 93.9 89.1 84.9 81.1 77.5 74.2 71.1 68.1 65.1 62.3 59.4 56.4 54.0 51.2 48.6 45.7 43.2 40.5 38.0 36.0 33.6	MAG 0.011 0.019 0.023 0.028 0.032 0.036 0.041 0.045 0.048 0.053 0.058 0.062 0.066 0.071 0.074 0.080 0.083 0.088 0.092 0.097 0.102 0.107 0.111 0.115 0.119 0.124	ANG 72.3 61.8 59.8 59.3 59.2 61.0 60.5 60.7 61.6 60.8 60.9 61.2 61.0 60.2 59.9 59.6 58.7 58.0 57.5 56.9 56.3 54.9 54.1 54.0 53.1	MAG 0.861 0.692 0.558 0.472 0.411 0.369 0.337 0.315 0.297 0.283 0.271 0.263 0.256 0.248 0.241 0.242 0.236 0.233 0.229 0.232 0.232 0.233 0.229 0.232 0.233 0.240 0.240 0.254 0.262 0.270	ANG -22.9 -37.6 -45.6 -50.4 -52.5 -54.9 -57.0 -58.5 -60.9 -62.7 -65.6 -67.9 -71.6 -74.6 -78.7 -82.4 -86.8 -90.5 -96.2 -97.9 -104.8 -106.3 -114.3 -113.8 -120.9 -121.0
FREQUENCY MHz  100.00 200.00 300.00 400.00 500.00 600.00 700.00 800.00 1000.00 1100.00 1200.00 1300.00 1400.00 1500.00 1600.00 1700.00 1800.00 1900.00 2000.00 2300.00 2400.00 2500.00 2600.00 2700.00	MAG 0.508 0.433 0.378 0.342 0.332 0.321 0.317 0.316 0.318 0.323 0.326 0.332 0.339 0.345 0.354 0.359 0.369 0.376 0.387 0.393 0.405 0.416 0.422 0.436 0.438 0.453 0.461 0.473 0.483	ANG  -42.8  -76.3  -100.7  -119.6  -133.8  -145.1  -154.9  -163.1  -169.9  -176.1  178.5  173.3  169.1  165.0  165.0  152.4  149.5  147.5  144.4  142.5  139.9  137.9  135.7  133.5  132.3  129.6  128.1	MAG  38.283 30.011 23.555 18.822 15.690 13.390 11.613 10.259 9.171 8.300 7.579 6.964 6.463 6.012 5.620 5.271 4.972 4.693 4.454 4.222 4.035 3.850 3.660 3.517 3.360 3.235 3.147 3.010 2.905	ANG 149.9 129.4 116.0 107.1 99.5 93.9 89.1 84.9 81.1 77.5 74.2 71.1 68.1 65.1 62.3 59.4 56.4 54.0 51.2 48.6 45.7 43.2 40.5 38.0 36.0 33.6 31.0 28.6 25.9	MAG 0.011 0.019 0.023 0.028 0.032 0.036 0.041 0.045 0.048 0.053 0.058 0.062 0.066 0.071 0.074 0.080 0.083 0.088 0.092 0.097 0.102 0.107 0.111 0.115 0.119 0.124 0.130 0.135 0.140	ANG 72.3 61.8 59.8 59.3 59.2 61.0 60.5 60.7 61.6 60.8 60.9 61.2 61.0 60.2 59.9 59.6 58.7 58.0 57.5 56.9 56.3 54.9 54.1 54.0 53.1 52.5 51.6 50.2 49.3	MAG 0.861 0.692 0.558 0.472 0.411 0.369 0.337 0.315 0.297 0.283 0.271 0.263 0.256 0.248 0.241 0.242 0.236 0.233 0.229 0.232 0.232 0.233 0.229 0.232 0.233 0.240 0.240 0.254 0.262 0.270 0.283	ANG  -22.9 -37.6 -45.6 -50.4 -52.5 -54.9 -57.0 -58.5 -60.9 -62.7 -65.6 -67.9 -71.6 -74.6 -78.7 -82.4 -86.8 -90.5 -96.2 -97.9 -104.8 -106.3 -114.3 -113.8 -120.9 -121.0 -127.4 -129.8 -135.7
FREQUENCY MHz  100.00 200.00 300.00 400.00 500.00 600.00 700.00 800.00 1000.00 1100.00 1200.00 1300.00 1400.00 1500.00 1600.00 1700.00 1800.00 1900.00 2000.00 2100.00 2200.00 2300.00 2400.00 2500.00 2600.00 2700.00 2800.00	MAG 0.508 0.433 0.378 0.342 0.332 0.321 0.317 0.316 0.318 0.323 0.326 0.332 0.339 0.345 0.354 0.359 0.369 0.376 0.387 0.393 0.405 0.416 0.422 0.436 0.438 0.453 0.461 0.473	ANG  -42.8  -76.3  -100.7  -119.6  -133.8  -145.1  -154.9  -163.1  -169.9  -176.1  178.5  173.3  169.1  165.0  165.0  155.0  152.4  149.5  147.5  144.4  142.5  139.9  137.9  135.7  133.5  132.3  129.6	MAG  38.283 30.011 23.555 18.822 15.690 13.390 11.613 10.259 9.171 8.300 7.579 6.964 6.463 6.012 5.620 5.271 4.972 4.693 4.454 4.222 4.035 3.850 3.660 3.517 3.360 3.235 3.147 3.010	ANG 149.9 129.4 116.0 107.1 99.5 93.9 89.1 84.9 81.1 77.5 74.2 71.1 68.1 65.1 62.3 59.4 56.4 54.0 51.2 48.6 45.7 43.2 40.5 38.0 36.0 33.6 31.0 28.6	MAG 0.011 0.019 0.023 0.028 0.032 0.036 0.041 0.045 0.048 0.053 0.058 0.062 0.066 0.071 0.074 0.080 0.083 0.088 0.092 0.097 0.102 0.107 0.111 0.115 0.119 0.124 0.130 0.135	ANG 72.3 61.8 59.8 59.3 59.2 61.0 60.5 60.7 61.6 60.8 60.9 61.2 61.0 60.2 59.9 59.6 58.7 58.0 57.5 56.9 56.3 54.9 54.1 54.0 53.1 52.5 51.6 50.2	MAG 0.861 0.692 0.558 0.472 0.411 0.369 0.337 0.315 0.297 0.283 0.271 0.263 0.256 0.248 0.241 0.242 0.236 0.233 0.229 0.232 0.232 0.233 0.229 0.232 0.233 0.240 0.240 0.254 0.262 0.270	ANG -22.9 -37.6 -45.6 -50.4 -52.5 -54.9 -57.0 -58.5 -60.9 -62.7 -65.6 -67.9 -71.6 -74.6 -78.7 -82.4 -86.8 -90.5 -96.2 -97.9 -104.8 -106.3 -114.3 -113.8 -120.9 -121.0 -127.4 -129.8

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