

# SILICON TRANSISTOR

# NE68019 / 2SC5008 Part No.

# NPN SILICON EPITAXIAL TRANSISTOR 3 PINS ULTRA SUPER MINI MOLD

#### **DESCRIPTION**

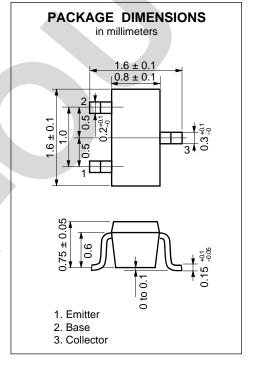
The NE68019 / 2SC5008 is an NPN epitaxial silicon transistor designed for use in low noise and small signal amplifiers from VHF band to L band. Low noise figure, high gain, and high current capability achieve a very wide dynamic range and excellent linearity. This is achieved by direct nitride passivated base surface, process (NEST2 process) which is a proprietary fabrication technique.

#### **FEATURES**

- · Low Voltage Use.
- High ft: 8.0 GHz TYP. (@ VcE = 3 V, Ic = 5 mA, f = 2 GHz)
- Low Cre: 0.3 pF TYP. (@ VcE = 3 V, IE = 0, f = 1 MHz)
- Low NF: 1.9 dB TYP. (@ VcE = 3 V, Ic = 5 mA, f = 2 GHz)
- High |S<sub>21e</sub>|<sup>2</sup>: 7.5 dB TYP. (@ VcE = 3 V, Ic = 5 mA, f = 2 GHz)
- Ultra Super Mini Mold Package.

#### ORDERING INFORMATION

PART NUMBER	QUANTITY	PACKING STYLE
NE68019-A 2SC5008-A	50 pcs./Unit	Embossed tape 8 mm wide. Pin3 (Collector) face to perforation side
NE68019-T-A 2SC5008-T-A	3 kpcs./Reel	of the tape.



\* To order evaluation samples, please contact your nearby sales office. Unit sample quantity shall be 50 pcs.

### ABSOLUTE MAXIMUM RATINGS (TA = 25 °C)

Collector to Base Voltage	Vсво	20	V
Collector to Emitter Voltage	Vceo	10	V
Emitter to Base Voltage	Vево	1.5	V
Collector Current	Ic	35	mΑ
Total Power Dissipation	Рт	125 mW	
Junction Temperature	$T_j$	150	°C
Storage Temperature	Tsta	-65 to + 150	° C

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# ELECTRICAL CHARACTERISTICS (TA = 25 °C)

CHARACTERISTIC	SYMBOL	MIN.	TYP.	MAX.	UNIT	TEST CONDITIONS
Collector Cutoff Current	Ісво			1.0	μΑ	Vcb = 10 V, IE = 0
Emitter Cutoff Current	ІЕВО			1.0	μΑ	VEB = 1 V, Ic = 0
DC Current Gain	hfe	80		160		Vce = 3 V, lc = 5 mA*1
Gain Bandwidth Product	f⊤	5.5	8.0		GHz	VcE = 3 V, Ic = 5 mA
Feed-back Capacitance	Cre		0.3	0.7	pF	VcB = 3 V, IE = 0, f = 1 MHz*2
Insertion Power Gain	IS <sub>21e</sub> l <sup>2</sup>	5.5	7.5		dB	VcE = 3 V, Ic = 5 mA, f = 2 GHz
Noise Figure	NF		1.9	3.2	dB	VcE = 3 V, Ic = 5 mA, f = 2 GHz

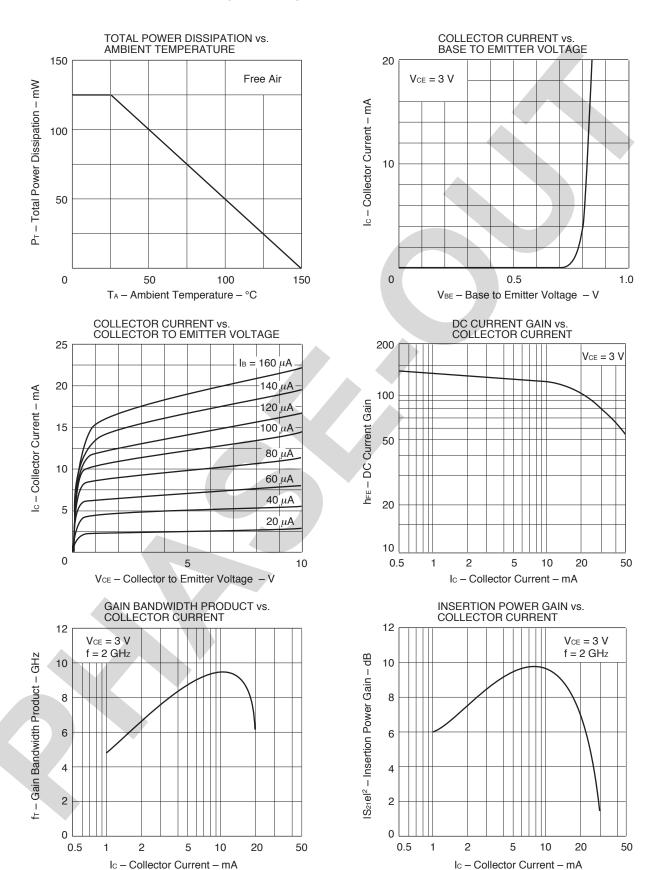
<sup>\*1</sup> Pulse Measurement PW  $\leq$  350  $\mu$ s, Duty Cycle  $\leq$  2 %

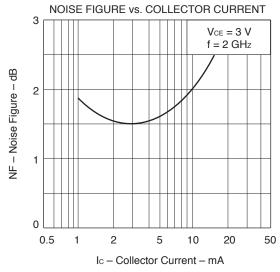
### hfe Classification

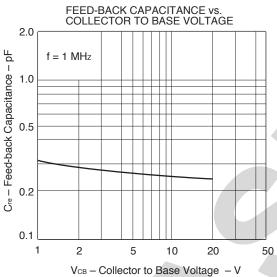
RANK	FB
Marking	44
hfE	80 to 160

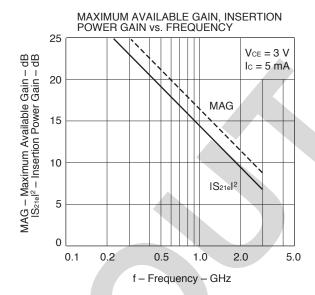
<sup>\*2</sup> The emitter terminal and the case shall be connected to the guard terminal of the three-terminal capacitance bridge.

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









VcE = 3 V, Ic = 10	mA, Zo = 5							
FREQUENCY		S11	;	S21		S12		S22
MHz	MAG	ANG	MAG	ANG	MAG	ANG	MAG	ANG
100.00	.739	-23.1	15.190	151.5	.016	74.9	.922	-13.6
200.00 300.00	.617 .507	-45.5 -64.6	13.966 12.474	131.9 115.9	.027 .035	63.0 57.3	.804	-22.2 -25.8
400.00	.414	-81.0	10.826	102.7	.042	51.8	.632	-27.3
500.00	.344	-94.7	9.421	91.8	.049	49.7	.583	-28.1
600.00	.296	-105.9	8.147	82.9	.055	47.0	.550	-28.1
700.00	.260	-116.6	7.211	74.9	.062	44.4	.525	-28.3
800.00 900.00	.236 .218	-126.3 -136.2	6.434 5.806	67.7 60.9	.068 .075	41.8 39.1	.506 .490	-28.7 -28.9
1000.00	.205	-130.2 -144.8	5.288	54.6	.073	36.4	.490	-20.9 -29.6
1100.00	.199	-153.1	4.864	48.6	.089	33.4	.466	-29.9
1200.00	.194	-161.6	4.500	42.7	.096	30.2	.457	-31.0
1300.00	.193	-168.9	4.191	37.0	.102	27.7	.449	-31.7
1400.00 1500.00	.194 .196	-175.6 178.7	3.908 3.680	31.4 26.2	.111 .118	24.2 21.0	.441 .435	-32.8 -33.9
1600.00	.202	173.5	3.489	20.2	.116	17.6	.433	-35.5
1700.00	.214	167.9	3.317	15.0	.133	12.6	.417	-37.2
1800.00	.222	161.7	3.154	9.6	.139	9.4	.406	-38.2
1900.00	.229	156.3	2.994	4.2	.145	6.0	.397	-39.4
2000.00	.237	151.7	2.857	-1.0	.152	2.6	.390	-40.5
2100.00 2200.00	.246 .253	147.5 144.6	2.748 2.626	-6.1 -11.1	.159 .167	9 -4.6	.381 .374	-42.1 -43.6
2300.00	.263	140.9	2.539	-16.2	.174	-4.0 -8.0	.366	-45.2
2400.00	.271	137.9	2.445	-21.3	.182	-11.6	.357	-46.8
2500.00	.283	134.8	2.363	-26.3	.190	-15.2	.347	-48.4
2600.00	.292	132.0	2.288	-31.4	.197	-19.2	.338	-50.6
2700.00 2800.00	.303 .315	129.7 127.4	2.218 2.147	-36.4 -41.4	.204	–22.9 –26.7	.328 .318	-52.5 -54.8
2900.00	.326	127.4	2.147	-41.4 -46.3	.220	-20.7 -30.8	.309	-54.6 -56.9
3000.00	.339	122.7	2.032	-51.2	.227	-34.2	.299	<b>–</b> 59.5
Vce = 3 V, Ic = 7 I	mA, Zo = 50	) Ω S11		S21		S12		S22
	MAG	S11 ANG	MAG	ANG	MAG	ANG	MAG	S22 ANG
FREQUENCY MHz 100.00	MAG .815	S11 ANG -17.7	MAG 11.972	ANG 155.6	.016	ANG 77.0	.947	ANG -11.5
FREQUENCY MHz 100.00 200.00	MAG .815 .732	ANG -17.7 -34.0	MAG 11.972 11.228	ANG 155.6 138.4	.016 .029	ANG 77.0 63.4	.947 .855	ANG -11.5 -20.4
FREQUENCY MHz 100.00 200.00 300.00	MAG .815 .732 .634	ANG -17.7 -34.0 -50.1	MAG 11.972 11.228 10.480	ANG 155.6 138.4 123.5	.016 .029 .039	ANG 77.0 63.4 56.1	.947 .855 .757	ANG -11.5 -20.4 -25.1
FREQUENCY MHz 100.00 200.00 300.00 400.00	MAG .815 .732 .634 .539	ANG -17.7 -34.0 -50.1 -64.9	MAG 11.972 11.228 10.480 9.549	ANG 155.6 138.4 123.5 110.7	.016 .029 .039 .047	ANG 77.0 63.4 56.1 51.8	.947 .855 .757 .687	ANG -11.5 -20.4 -25.1 -27.9
FREQUENCY MHz 100.00 200.00 300.00	MAG .815 .732 .634 .539 .455	ANG -17.7 -34.0 -50.1 -64.9 -78.9 -89.6	MAG 11.972 11.228 10.480	ANG 155.6 138.4 123.5	.016 .029 .039	ANG 77.0 63.4 56.1	.947 .855 .757	ANG -11.5 -20.4 -25.1
FREQUENCY  MHz 100.00 200.00 300.00 400.00 500.00 600.00 700.00	MAG .815 .732 .634 .539 .455 .392	ANG -17.7 -34.0 -50.1 -64.9 -78.9 -89.6 -100.4	MAG 11.972 11.228 10.480 9.549 8.722 7.703 6.951	ANG 155.6 138.4 123.5 110.7 99.0 89.1 80.3	.016 .029 .039 .047 .054 .060	ANG 77.0 63.4 56.1 51.8 47.4 44.0 41.4	.947 .855 .757 .687 .630 .589	ANG -11.5 -20.4 -25.1 -27.9 -29.6 -30.5 -30.9
FREQUENCY  MHz 100.00 200.00 300.00 400.00 500.00 600.00 700.00 800.00	MAG .815 .732 .634 .539 .455 .392 .336	ANG -17.7 -34.0 -50.1 -64.9 -78.9 -89.6 -100.4 -110.0	MAG 11.972 11.228 10.480 9.549 8.722 7.703 6.951 6.265	ANG 155.6 138.4 123.5 110.7 99.0 89.1 80.3 72.2	.016 .029 .039 .047 .054 .060 .066	ANG 77.0 63.4 56.1 51.8 47.4 44.0 41.4 38.5	.947 .855 .757 .687 .630 .589 .557	ANG -11.5 -20.4 -25.1 -27.9 -29.6 -30.5 -30.9 -31.5
FREQUENCY  MHz 100.00 200.00 300.00 400.00 500.00 600.00 700.00 800.00 900.00	MAG .815 .732 .634 .539 .455 .392 .336 .297	ANG -17.7 -34.0 -50.1 -64.9 -78.9 -89.6 -100.4 -110.0 -119.5	MAG 11.972 11.228 10.480 9.549 8.722 7.703 6.951 6.265 5.700	ANG 155.6 138.4 123.5 110.7 99.0 89.1 80.3 72.2 64.9	.016 .029 .039 .047 .054 .060 .066 .073	ANG 77.0 63.4 56.1 51.8 47.4 44.0 41.4 38.5 35.8	.947 .855 .757 .687 .630 .589 .557 .532	ANG -11.5 -20.4 -25.1 -27.9 -29.6 -30.5 -30.9 -31.5 -31.9
FREQUENCY  MHz  100.00  200.00  300.00  400.00  500.00  600.00  700.00  800.00  900.00  1000.00	MAG .815 .732 .634 .539 .455 .392 .336 .297 .268	ANG -17.7 -34.0 -50.1 -64.9 -78.9 -89.6 -100.4 -110.0 -119.5 -128.0	MAG 11.972 11.228 10.480 9.549 8.722 7.703 6.951 6.265 5.700 5.221	ANG 155.6 138.4 123.5 110.7 99.0 89.1 80.3 72.2 64.9 58.3	.016 .029 .039 .047 .054 .060 .066 .073 .079	ANG 77.0 63.4 56.1 51.8 47.4 44.0 41.4 38.5 35.8 32.7	.947 .855 .757 .687 .630 .589 .557 .532 .511	ANG -11.5 -20.4 -25.1 -27.9 -29.6 -30.5 -30.9 -31.5 -31.9 -32.5
FREQUENCY  MHz 100.00 200.00 300.00 400.00 500.00 600.00 700.00 800.00 900.00	MAG .815 .732 .634 .539 .455 .392 .336 .297	ANG -17.7 -34.0 -50.1 -64.9 -78.9 -89.6 -100.4 -110.0 -119.5	MAG 11.972 11.228 10.480 9.549 8.722 7.703 6.951 6.265 5.700	ANG 155.6 138.4 123.5 110.7 99.0 89.1 80.3 72.2 64.9	.016 .029 .039 .047 .054 .060 .066 .073	ANG 77.0 63.4 56.1 51.8 47.4 44.0 41.4 38.5 35.8	.947 .855 .757 .687 .630 .589 .557 .532	ANG -11.5 -20.4 -25.1 -27.9 -29.6 -30.5 -30.9 -31.5 -31.9
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	MAG .815 .732 .634 .539 .455 .392 .336 .297 .268 .244 .228	ANG -17.7 -34.0 -50.1 -64.9 -78.9 -89.6 -100.4 -110.0 -119.5 -128.0 -136.6 -145.2 -153.4	MAG 11.972 11.228 10.480 9.549 8.722 7.703 6.951 6.265 5.700 5.221 4.802 4.479 4.169	ANG 155.6 138.4 123.5 110.7 99.0 89.1 80.3 72.2 64.9 58.3 51.8 45.5 39.6	.016 .029 .039 .047 .054 .060 .066 .073 .079 .086 .092 .098	ANG 77.0 63.4 56.1 51.8 47.4 44.0 41.4 38.5 35.8 32.7 29.7 27.4 24.0	.947 .855 .757 .687 .630 .589 .557 .532 .511 .494 .480 .468	ANG -11.5 -20.4 -25.1 -27.9 -29.6 -30.5 -30.9 -31.5 -31.9 -32.5 -32.9 -33.8 -34.4
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	MAG .815 .732 .634 .539 .455 .392 .336 .297 .268 .244 .228 .216 .208	ANG -17.7 -34.0 -50.1 -64.9 -78.9 -89.6 -100.4 -110.0 -119.5 -128.0 -136.6 -145.2 -153.4 -160.8	MAG 11.972 11.228 10.480 9.549 8.722 7.703 6.951 6.265 5.700 5.221 4.802 4.479 4.169 3.900	ANG 155.6 138.4 123.5 110.7 99.0 89.1 80.3 72.2 64.9 58.3 51.8 45.5 39.6 33.9	.016 .029 .039 .047 .054 .060 .066 .073 .079 .086 .092 .098 .106	ANG 77.0 63.4 56.1 51.8 47.4 44.0 41.4 38.5 35.8 32.7 29.7 27.4 24.0 21.1	.947 .855 .757 .687 .630 .589 .557 .532 .511 .494 .480 .468 .459	ANG -11.5 -20.4 -25.1 -27.9 -29.6 -30.5 -30.9 -31.5 -31.9 -32.5 -32.9 -33.8 -34.4 -35.6
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	MAG .815 .732 .634 .539 .455 .392 .336 .297 .268 .244 .228 .216 .208	ANG -17.7 -34.0 -50.1 -64.9 -78.9 -89.6 -100.4 -110.0 -119.5 -128.0 -136.6 -145.2 -153.4 -160.8 -167.7	MAG 11.972 11.228 10.480 9.549 8.722 7.703 6.951 6.265 5.700 5.221 4.802 4.479 4.169 3.900 3.674	ANG 155.6 138.4 123.5 110.7 99.0 89.1 80.3 72.2 64.9 58.3 51.8 45.5 39.6 33.9 28.2	.016 .029 .039 .047 .054 .060 .066 .073 .079 .086 .092 .098 .106 .113	ANG 77.0 63.4 56.1 51.8 47.4 44.0 41.4 38.5 35.8 32.7 29.7 27.4 24.0 21.1 17.5	.947 .855 .757 .687 .630 .589 .557 .532 .511 .494 .480 .468 .459	ANG -11.5 -20.4 -25.1 -27.9 -29.6 -30.5 -30.9 -31.5 -31.9 -32.5 -32.9 -33.8 -34.4 -35.6 -36.6
FREQUENCY  MHz  100.00  200.00  300.00  400.00  500.00  600.00  700.00  800.00  1000.00  1100.00  1200.00  1400.00  1500.00  1600.00	MAG .815 .732 .634 .539 .455 .392 .336 .297 .268 .244 .228 .216 .208 .203	ANG -17.7 -34.0 -50.1 -64.9 -78.9 -89.6 -100.4 -110.0 -119.5 -128.0 -136.6 -145.2 -153.4 -160.8 -167.7 -173.8	MAG 11.972 11.228 10.480 9.549 8.722 7.703 6.951 6.265 5.700 5.221 4.802 4.479 4.169 3.900 3.674 3.478	ANG 155.6 138.4 123.5 110.7 99.0 89.1 80.3 72.2 64.9 58.3 51.8 45.5 39.6 33.9 28.2 22.7	.016 .029 .039 .047 .054 .060 .066 .073 .079 .086 .092 .098 .106 .113 .121	ANG 77.0 63.4 56.1 51.8 47.4 44.0 41.4 38.5 35.8 32.7 29.7 27.4 24.0 21.1 17.5 14.3	.947 .855 .757 .687 .630 .589 .557 .532 .511 .494 .480 .468 .459 .449	ANG -11.5 -20.4 -25.1 -27.9 -29.6 -30.5 -30.9 -31.5 -31.9 -32.5 -32.9 -33.8 -34.4 -35.6 -36.6 -37.8
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	MAG .815 .732 .634 .539 .455 .392 .336 .297 .268 .244 .228 .216 .208	ANG -17.7 -34.0 -50.1 -64.9 -78.9 -89.6 -100.4 -110.0 -119.5 -128.0 -136.6 -145.2 -153.4 -160.8 -167.7	MAG 11.972 11.228 10.480 9.549 8.722 7.703 6.951 6.265 5.700 5.221 4.802 4.479 4.169 3.900 3.674	ANG 155.6 138.4 123.5 110.7 99.0 89.1 80.3 72.2 64.9 58.3 51.8 45.5 39.6 33.9 28.2	.016 .029 .039 .047 .054 .060 .066 .073 .079 .086 .092 .098 .106 .113	ANG 77.0 63.4 56.1 51.8 47.4 44.0 41.4 38.5 35.8 32.7 29.7 27.4 24.0 21.1 17.5	.947 .855 .757 .687 .630 .589 .557 .532 .511 .494 .480 .468 .459	ANG -11.5 -20.4 -25.1 -27.9 -29.6 -30.5 -30.9 -31.5 -31.9 -32.5 -32.9 -33.8 -34.4 -35.6 -36.6
MHz 100.00 200.00 300.00 400.00 500.00 600.00 700.00 800.00 1100.00 1200.00 1300.00 1400.00 1500.00 1600.00	MAG .815 .732 .634 .539 .455 .392 .336 .297 .268 .244 .228 .216 .208 .202 .205 .214 .219	ANG -17.7 -34.0 -50.1 -64.9 -78.9 -89.6 -100.4 -110.0 -119.5 -128.0 -136.6 -145.2 -153.4 -160.8 -167.7 -173.8 179.6 172.5 165.7	MAG 11.972 11.228 10.480 9.549 8.722 7.703 6.951 6.265 5.700 5.221 4.802 4.479 4.169 3.900 3.674 3.478 3.316 3.153 3.001	ANG 155.6 138.4 123.5 110.7 99.0 89.1 80.3 72.2 64.9 58.3 51.8 45.5 39.6 33.9 28.2 22.7 17.3 11.6 6.0	.016 .029 .039 .047 .054 .060 .066 .073 .079 .086 .092 .098 .106 .113 .121 .128 .135 .141	ANG 77.0 63.4 56.1 51.8 47.4 44.0 41.4 38.5 35.8 32.7 29.7 27.4 24.0 21.1 17.5 14.3 10.2 6.4 3.5	.947 .855 .757 .687 .630 .589 .557 .532 .511 .494 .480 .468 .459 .449 .440 .433 .421	ANG -11.5 -20.4 -25.1 -27.9 -29.6 -30.5 -30.9 -31.5 -31.9 -32.5 -32.9 -33.8 -34.4 -35.6 -36.6 -37.8 -39.7 -40.7 -41.7
MHz 100.00 200.00 300.00 400.00 500.00 600.00 700.00 800.00 1000.00 1100.00 1300.00 1400.00 1500.00 1600.00 1700.00 1800.00 1900.00	MAG .815 .732 .634 .539 .455 .392 .336 .297 .268 .244 .228 .216 .208 .203 .202 .205 .214 .219 .223	ANG -17.7 -34.0 -50.1 -64.9 -78.9 -89.6 -100.4 -110.0 -119.5 -128.0 -136.6 -145.2 -153.4 -160.8 -167.7 -173.8 179.6 172.5 165.7 160.0	MAG 11.972 11.228 10.480 9.549 8.722 7.703 6.951 6.265 5.700 5.221 4.802 4.479 4.169 3.900 3.674 3.478 3.316 3.153 3.001 2.874	ANG 155.6 138.4 123.5 110.7 99.0 89.1 80.3 72.2 64.9 58.3 51.8 45.5 39.6 33.9 28.2 22.7 17.3 11.6 6.0	.016 .029 .039 .047 .054 .060 .066 .073 .079 .086 .092 .098 .106 .113 .121 .128 .135 .141 .146	ANG 77.0 63.4 56.1 51.8 47.4 44.0 41.4 38.5 35.8 32.7 29.7 27.4 24.0 21.1 17.5 14.3 10.2 6.4 3.5	.947 .855 .757 .687 .630 .589 .557 .532 .511 .494 .480 .468 .459 .449 .440 .433 .421 .409 .399	ANG -11.5 -20.4 -25.1 -27.9 -29.6 -30.5 -30.9 -31.5 -31.9 -32.5 -32.9 -33.8 -34.4 -35.6 -36.6 -37.8 -39.7 -40.7 -41.7 -43.0
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 2100.00	MAG .815 .732 .634 .539 .455 .392 .336 .297 .268 .244 .228 .216 .208 .203 .202 .205 .214 .219 .223 .230 .236	ANG -17.7 -34.0 -50.1 -64.9 -78.9 -89.6 -100.4 -110.0 -119.5 -128.0 -136.6 -145.2 -153.4 -160.8 -167.7 -173.8 179.6 172.5 165.7 160.0 155.4	MAG 11.972 11.228 10.480 9.549 8.722 7.703 6.951 6.265 5.700 5.221 4.802 4.479 4.169 3.900 3.674 3.478 3.316 3.3153 3.001 2.874 2.753	ANG 155.6 138.4 123.5 110.7 99.0 89.1 80.3 72.2 64.9 58.3 51.8 45.5 39.6 33.9 28.2 22.7 17.3 11.6 6.0 .7 -4.6	.016 .029 .039 .047 .054 .060 .066 .073 .079 .086 .092 .098 .106 .113 .121 .128 .135 .141 .146 .153	ANG 77.0 63.4 56.1 51.8 47.4 44.0 41.4 38.5 35.8 32.7 29.7 27.4 24.0 21.1 17.5 14.3 10.2 6.4 3.5 0.0 -3.2	.947 .855 .757 .687 .630 .589 .557 .532 .511 .494 .480 .468 .459 .449 .449 .433 .421 .409 .399 .391	ANG -11.5 -20.4 -25.1 -27.9 -29.6 -30.5 -30.9 -31.5 -31.9 -32.5 -32.9 -33.8 -34.4 -35.6 -36.6 -37.8 -39.7 -40.7 -41.7 -43.0 -44.4
FREQUENCY  MHz  100.00  200.00  300.00  400.00  500.00  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 .815 .732 .634 .539 .455 .392 .336 .297 .268 .244 .228 .216 .203 .202 .205 .214 .219 .223 .230 .236 .244	ANG -17.7 -34.0 -50.1 -64.9 -78.9 -89.6 -100.4 -110.0 -119.5 -128.0 -136.6 -145.2 -153.4 -160.8 -167.7 -173.8 179.6 172.5 165.7 160.0 155.4	MAG 11.972 11.228 10.480 9.549 8.722 7.703 6.951 6.265 5.700 5.221 4.802 4.479 4.169 3.900 3.674 3.478 3.316 3.153 3.001 2.874 2.753 2.631	ANG 155.6 138.4 123.5 110.7 99.0 89.1 80.3 72.2 64.9 58.3 51.8 45.5 39.6 33.9 28.2 22.7 17.3 11.6 6.0 .7 -4.6 -9.6	.016 .029 .039 .047 .054 .060 .066 .073 .079 .086 .092 .098 .106 .113 .121 .128 .135 .141 .146 .153 .160	ANG 77.0 63.4 56.1 51.8 47.4 44.0 41.4 38.5 35.8 32.7 29.7 27.4 24.0 21.1 17.5 14.3 10.2 6.4 3.5 0.0 -3.2 -6.9	.947 .855 .757 .687 .630 .589 .557 .532 .511 .494 .480 .468 .459 .449 .449 .433 .421 .409 .399 .391 .382	ANG -11.5 -20.4 -25.1 -27.9 -29.6 -30.5 -30.9 -31.5 -31.9 -32.5 -32.9 -33.8 -34.4 -35.6 -36.6 -37.8 -39.7 -40.7 -41.7 -43.0 -44.4 -45.7
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	MAG .815 .732 .634 .539 .455 .392 .336 .297 .268 .244 .228 .216 .208 .203 .202 .205 .214 .219 .223 .230 .236	ANG -17.7 -34.0 -50.1 -64.9 -78.9 -89.6 -100.4 -110.0 -119.5 -128.0 -136.6 -145.2 -153.4 -160.8 -167.7 -173.8 179.6 172.5 165.7 160.0 155.4	MAG 11.972 11.228 10.480 9.549 8.722 7.703 6.951 6.265 5.700 5.221 4.802 4.479 4.169 3.900 3.674 3.478 3.316 3.3153 3.001 2.874 2.753	ANG 155.6 138.4 123.5 110.7 99.0 89.1 80.3 72.2 64.9 58.3 51.8 45.5 39.6 33.9 28.2 22.7 17.3 11.6 6.0 .7 -4.6	.016 .029 .039 .047 .054 .060 .066 .073 .079 .086 .092 .098 .106 .113 .121 .128 .135 .141 .146 .153	ANG 77.0 63.4 56.1 51.8 47.4 44.0 41.4 38.5 35.8 32.7 29.7 27.4 24.0 21.1 17.5 14.3 10.2 6.4 3.5 0.0 -3.2	.947 .855 .757 .687 .630 .589 .557 .532 .511 .494 .480 .468 .459 .449 .449 .433 .421 .409 .399 .391	ANG -11.5 -20.4 -25.1 -27.9 -29.6 -30.5 -30.9 -31.5 -31.9 -32.5 -32.9 -33.8 -34.4 -35.6 -36.6 -37.8 -39.7 -40.7 -41.7 -43.0 -44.4
FREQUENCY  MHz  100.00  200.00  300.00  400.00  500.00  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 .815 .732 .634 .539 .455 .392 .336 .297 .268 .244 .228 .216 .208 .203 .202 .205 .214 .219 .223 .230 .236 .244	ANG -17.7 -34.0 -50.1 -64.9 -78.9 -89.6 -100.4 -110.0 -119.5 -128.0 -136.6 -145.2 -153.4 -160.8 -167.7 -173.8 179.6 172.5 165.7 160.0 155.4 151.6 147.1	MAG 11.972 11.228 10.480 9.549 8.722 7.703 6.951 6.265 5.700 5.221 4.802 4.479 4.169 3.900 3.674 3.478 3.316 3.153 3.001 2.874 2.753 2.631 2.548	ANG 155.6 138.4 123.5 110.7 99.0 89.1 80.3 72.2 64.9 58.3 51.8 45.5 39.6 33.9 28.2 22.7 17.3 11.6 6.0 .7 -4.6 -9.6 -14.9	.016 .029 .039 .047 .054 .060 .066 .073 .079 .086 .092 .098 .106 .113 .121 .128 .135 .141 .146 .153 .160 .167	ANG 77.0 63.4 56.1 51.8 47.4 44.0 41.4 38.5 35.8 32.7 29.7 27.4 24.0 21.1 17.5 14.3 10.2 6.4 3.5 0.0 -3.2 -6.9 -10.4	.947 .855 .757 .687 .630 .589 .557 .532 .511 .494 .480 .468 .459 .449 .440 .433 .421 .409 .399 .391 .382 .374	ANG -11.5 -20.4 -25.1 -27.9 -29.6 -30.5 -30.9 -31.5 -31.9 -32.5 -32.9 -33.8 -34.4 -35.6 -36.6 -37.8 -39.7 -40.7 -41.7 -43.0 -44.4 -45.7 -47.2
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	MAG .815 .732 .634 .539 .455 .392 .336 .297 .268 .244 .228 .216 .208 .205 .214 .219 .223 .230 .236 .244 .219 .223	S11  ANG -17.7 -34.0 -50.1 -64.9 -78.9 -89.6 -100.4 -110.0 -119.5 -128.0 -136.6 -145.2 -153.4 -160.8 -167.7 -173.8 179.6 172.5 165.7 160.0 155.4 151.6 147.1 143.5 140.2 137.1	MAG 11.972 11.228 10.480 9.549 8.722 7.703 6.951 6.265 5.700 5.221 4.802 4.479 4.169 3.900 3.674 3.478 3.316 3.153 3.001 2.874 2.753 2.631 2.548 2.453 2.370 2.295	ANG 155.6 138.4 123.5 110.7 99.0 89.1 80.3 72.2 64.9 58.3 51.8 45.5 39.6 33.9 28.2 22.7 17.3 11.6 6.0 .7 -4.6 -9.6 -14.9 -20.0 -25.0 -30.2	.016 .029 .039 .047 .054 .060 .066 .073 .079 .086 .092 .098 .106 .113 .121 .128 .135 .141 .146 .153 .160 .167 .174 .181 .189 .196	ANG 77.0 63.4 56.1 51.8 47.4 44.0 41.4 38.5 35.8 32.7 29.7 27.4 24.0 21.1 17.5 14.3 10.2 6.4 3.5 0.0 -3.2 -6.9 -10.4 -13.8 -17.4 -21.0	.947 .855 .757 .687 .630 .589 .557 .532 .511 .494 .480 .468 .459 .449 .440 .433 .421 .409 .399 .391 .382 .374 .365 .356	ANG -11.5 -20.4 -25.1 -27.9 -29.6 -30.5 -30.9 -31.5 -31.9 -32.5 -32.9 -33.8 -34.4 -35.6 -36.6 -37.8 -39.7 -40.7 -41.7 -43.0 -44.4 -45.7 -47.2 -49.0 -50.5 -52.7
MHz 100.00 200.00 300.00 400.00 500.00 600.00 700.00 800.00 1100.00 1200.00 1300.00 1400.00 1500.00 1600.00 1700.00 1800.00 2000.00 2100.00 2300.00 2400.00 2500.00 2600.00	MAG .815 .732 .634 .539 .455 .392 .336 .297 .268 .244 .216 .208 .205 .214 .219 .223 .230 .236 .244 .254 .244 .254 .254	S11  ANG -17.7 -34.0 -50.1 -64.9 -78.9 -89.6 -100.4 -110.0 -119.5 -128.0 -136.6 -145.2 -153.4 -160.8 -167.7 -173.8 179.6 172.5 165.7 160.0 155.4 151.6 147.1 143.5 140.2 137.1	MAG 11.972 11.228 10.480 9.549 8.722 7.703 6.951 6.265 5.700 5.221 4.802 4.479 4.169 3.900 3.674 3.478 3.316 3.153 3.001 2.874 2.753 2.631 2.548 2.453 2.295 2.228	ANG 155.6 138.4 123.5 110.7 99.0 89.1 80.3 72.2 64.9 58.3 51.8 45.5 39.6 33.9 28.2 22.7 17.3 11.6 6.0 .7 -4.6 -9.6 -14.9 -20.0 -25.0 -30.2 -35.2	.016 .029 .039 .047 .054 .060 .066 .073 .079 .086 .092 .098 .106 .113 .121 .128 .135 .141 .146 .153 .160 .167 .174 .181 .189 .196 .203	ANG 77.0 63.4 56.1 51.8 47.4 44.0 41.4 38.5 35.8 32.7 29.7 27.4 24.0 21.1 17.5 14.3 10.2 6.4 3.5 0.0 -3.2 -6.9 -10.4 -13.8 -17.4 -21.0 -24.9	.947 .855 .757 .687 .630 .589 .557 .532 .511 .494 .480 .468 .459 .449 .440 .433 .421 .409 .399 .391 .382 .374 .365 .356 .346	ANG -11.5 -20.4 -25.1 -27.9 -29.6 -30.5 -30.9 -31.5 -31.9 -32.5 -32.9 -33.8 -34.4 -35.6 -36.6 -37.8 -39.7 -40.7 -41.7 -43.0 -44.4 -45.7 -47.2 -49.0 -50.5 -52.7 -54.6
MHz 100.00 200.00 300.00 400.00 500.00 600.00 700.00 800.00 1100.00 1200.00 1300.00 1400.00 1500.00 1600.00 1700.00 1800.00 2000.00 2100.00 2200.00 2300.00 2400.00 2500.00 2600.00 2700.00	MAG .815 .732 .634 .539 .455 .392 .336 .297 .268 .244 .228 .216 .208 .205 .214 .219 .223 .230 .236 .244 .254 .262 .273 .281 .293 .303	S11  ANG -17.7 -34.0 -50.1 -64.9 -78.9 -89.6 -100.4 -110.0 -119.5 -128.0 -136.6 -145.2 -153.4 -160.8 -167.7 -173.8 179.6 172.5 165.7 160.0 155.4 151.6 147.1 143.5 140.2 137.1 134.1 131.4	MAG 11.972 11.228 10.480 9.549 8.722 7.703 6.951 6.265 5.700 5.221 4.802 4.479 4.169 3.900 3.674 3.478 3.316 3.153 3.001 2.874 2.753 2.631 2.548 2.453 2.295 2.228 2.156	ANG 155.6 138.4 123.5 110.7 99.0 89.1 80.3 72.2 64.9 58.3 51.8 45.5 39.6 33.9 28.2 22.7 17.3 11.6 6.0 .7 -4.6 -9.6 -14.9 -20.0 -25.0 -30.2 -35.2 -40.2	.016 .029 .039 .047 .054 .060 .066 .073 .079 .086 .092 .098 .106 .113 .121 .128 .135 .141 .146 .153 .160 .167 .174 .181 .189 .196 .203 .211	ANG 77.0 63.4 56.1 51.8 47.4 44.0 41.4 38.5 35.8 32.7 29.7 27.4 24.0 21.1 17.5 14.3 10.2 6.4 3.5 0.0 -3.2 -6.9 -10.4 -13.8 -17.4 -21.0 -24.9 -28.3	.947 .855 .757 .687 .630 .589 .557 .532 .511 .494 .480 .449 .449 .449 .449 .399 .391 .382 .374 .365 .356 .346 .337	ANG -11.5 -20.4 -25.1 -27.9 -29.6 -30.5 -30.9 -31.5 -31.9 -32.5 -32.9 -33.8 -34.4 -35.6 -36.6 -37.8 -39.7 -40.7 -41.7 -43.0 -44.4 -45.7 -47.2 -49.0 -50.5 -52.7 -54.6 -56.7
MHz 100.00 200.00 300.00 400.00 500.00 600.00 700.00 800.00 1100.00 1200.00 1300.00 1400.00 1500.00 1600.00 1700.00 1800.00 2000.00 2100.00 2300.00 2400.00 2500.00 2600.00	MAG .815 .732 .634 .539 .455 .392 .336 .297 .268 .244 .216 .208 .205 .214 .219 .223 .230 .236 .244 .254 .244 .254 .254	S11  ANG -17.7 -34.0 -50.1 -64.9 -78.9 -89.6 -100.4 -110.0 -119.5 -128.0 -136.6 -145.2 -153.4 -160.8 -167.7 -173.8 179.6 172.5 165.7 160.0 155.4 151.6 147.1 143.5 140.2 137.1	MAG 11.972 11.228 10.480 9.549 8.722 7.703 6.951 6.265 5.700 5.221 4.802 4.479 4.169 3.900 3.674 3.478 3.316 3.153 3.001 2.874 2.753 2.631 2.548 2.453 2.295 2.228	ANG 155.6 138.4 123.5 110.7 99.0 89.1 80.3 72.2 64.9 58.3 51.8 45.5 39.6 33.9 28.2 22.7 17.3 11.6 6.0 .7 -4.6 -9.6 -14.9 -20.0 -25.0 -30.2 -35.2	.016 .029 .039 .047 .054 .060 .066 .073 .079 .086 .092 .098 .106 .113 .121 .128 .135 .141 .146 .153 .160 .167 .174 .181 .189 .196 .203	ANG 77.0 63.4 56.1 51.8 47.4 44.0 41.4 38.5 35.8 32.7 29.7 27.4 24.0 21.1 17.5 14.3 10.2 6.4 3.5 0.0 -3.2 -6.9 -10.4 -13.8 -17.4 -21.0 -24.9	.947 .855 .757 .687 .630 .589 .557 .532 .511 .494 .480 .468 .459 .449 .440 .433 .421 .409 .399 .391 .382 .374 .365 .356 .346	ANG -11.5 -20.4 -25.1 -27.9 -29.6 -30.5 -30.9 -31.5 -31.9 -32.5 -32.9 -33.8 -34.4 -35.6 -36.6 -37.8 -39.7 -40.7 -41.7 -43.0 -44.4 -45.7 -47.2 -49.0 -50.5 -52.7 -54.6

VcE = 3 V, Ic = 5	mA, Zo = 50	Ω						
FREQUENCY	,	S11		S21		S12		S22
MHz	MAG	ANG	MAG	ANG	MAG	ANG	MAG	ANG
100.00		-13.9	9.067	158.8	.017	76.2	.964	-9.7
200.00		-27.3	8.687	143.1	.031	65.8	.897	-17.8
300.00		-40.3	8.368	129.3	.042	58.0	.814	-23.3
400.00 500.00		–53.0 –66.1	7.864 7.479	117.5 106.3	.052 .059	51.2 45.9	.748 .687	-27.0 -29.5
600.00		-76.2	6.765	96.3	.066	41.4	.643	-29.5 -31.2
700.00		-87.2	6.297	86.6	.072	38.2	.604	-32.3
800.00		-96.8	5.812	77.7	.078	34.7	.574	-33.3
900.00		-106.1	5.365	69.7	.083	32.7	.547	-33.9
1000.00		-114.9	4.964	62.4	.090	29.2	.527	-34.7
1100.00 1200.00		–123.3 –131.9	4.616 4.298	55.4 49.0	.096 .101	25.9 23.0	.509 .493	-35.2 -36.1
1300.00		-139.7	4.032	42.4	.107	20.4	.481	<b>–</b> 36.7
1400.00		-147.4	3.784	36.7	.115	17.1	.471	-37.8
1500.00		-154.7	3.568	30.8	.122	14.2	.460	-38.9
1600.00		-161.3	3.385	25.0	.129	11.2	.450	-40.2
1700.00 1800.00		-168.9 -176.7	3.230	19.1 13.5	.137 .141	7.1	.438	-41.9 -42.8
1900.00		-176.7 176.3	3.069 2.929	7.8	.141	3.4	.425 .413	-42.8 -44.0
2000.00		169.5	2.802	2.3	.153	-2.4	.405	-45.2
2100.00		163.9	2.690	-3.0	.159	-6.1	.396	-46.5
2200.00		159.4	2.583	-8.3	.166	-9.3	.387	-48.0
2300.00		154.3	2.495	-13.6	.173	-12.8	.377	-49.5
2400.00 2500.00		150.1 146.2	2.404 2.324	-18.8 -23.9	.179 .187	-16.2 -19.3	.367 .358	–51.1 –52.7
2600.00		142.3	2.251	-29.2	.194	-23.3	.348	-54.8
2700.00		139.2	2.188	-34.3	.200	-26.9	.339	-56.8
2800.00		135.9	2.117	-39.4	.207	-30.2	.328	-59.0
2900.00		132.9	2.056	-44.5	.215	-34.1	.319	-60.9
3000.00	.325	130.0	2.003	-49.5	.223	-37.5	.309	-63.5
., ., .								
Vce = 3 V, Ic = 3				C01		C10		522
Vce = 3 V, Ic = 3 FREQUENCY		) Ω S11		S21		S12		S22
FREQUENCY MHz	MAG	S11 ANG	MAG	ANG	MAG	ANG	MAG	ANG
FREQUENCY MHz 100.00	MAG .936	S11 ANG -10.5	MAG 5.612	ANG 163.6	.017	ANG 79.6	.981	ANG -7.1
FREQUENCY MHz 100.00 200.00	MAG .936 .892	ANG -10.5 -20.4	MAG 5.612 5.628	ANG 163.6 148.9	.017 .034	ANG 79.6 69.7	.981 .944	ANG -7.1 -14.0
FREQUENCY MHz 100.00 200.00 300.00	MAG .936 .892 .842	ANG -10.5 -20.4 -30.5	MAG 5.612 5.628 5.602	ANG 163.6 148.9 136.8	.017 .034 .048	ANG 79.6 69.7 60.6	.981 .944 .887	ANG -7.1 -14.0 -19.3
FREQUENCY MHz 100.00 200.00	MAG .936 .892 .842	ANG -10.5 -20.4	MAG 5.612 5.628	ANG 163.6 148.9	.017 .034	ANG 79.6 69.7	.981 .944	ANG -7.1 -14.0
FREQUENCY  MHz  100.00  200.00  300.00  400.00  500.00  600.00	MAG .936 .892 .842 .785 .732	ANG -10.5 -20.4 -30.5 -41.2 -50.8 -59.2	MAG 5.612 5.628 5.602 5.393 5.328 4.924	ANG 163.6 148.9 136.8 126.0 116.2 106.6	.017 .034 .048 .060 .069	ANG 79.6 69.7 60.6 53.2 46.4 40.6	.981 .944 .887 .837 .782	ANG -7.1 -14.0 -19.3 -23.7 -27.2 -29.9
FREQUENCY  MHz  100.00  200.00  300.00  400.00  500.00  600.00  700.00	MAG .936 .892 .842 .785 .732 .681	ANG -10.5 -20.4 -30.5 -41.2 -50.8 -59.2 -68.7	MAG 5.612 5.628 5.602 5.393 5.328 4.924 4.767	ANG 163.6 148.9 136.8 126.0 116.2 106.6 97.2	.017 .034 .048 .060 .069 .077	ANG 79.6 69.7 60.6 53.2 46.4 40.6 35.8	.981 .944 .887 .837 .782 .740	ANG -7.1 -14.0 -19.3 -23.7 -27.2 -29.9 -32.0
FREQUENCY  MHz  100.00  200.00  300.00  400.00  500.00  600.00  700.00  800.00	MAG .936 .892 .842 .785 .732 .681 .618	ANG -10.5 -20.4 -30.5 -41.2 -50.8 -59.2 -68.7 -77.9	MAG 5.612 5.628 5.602 5.393 5.328 4.924 4.767 4.575	ANG 163.6 148.9 136.8 126.0 116.2 106.6 97.2 88.0	.017 .034 .048 .060 .069 .077 .084	ANG 79.6 69.7 60.6 53.2 46.4 40.6 35.8 31.0	.981 .944 .887 .837 .782 .740 .698	ANG -7.1 -14.0 -19.3 -23.7 -27.2 -29.9 -32.0 -33.9
FREQUENCY  MHz  100.00  200.00  300.00  400.00  500.00  600.00  700.00  800.00  900.00	MAG .936 .892 .842 .785 .732 .681 .618	ANG -10.5 -20.4 -30.5 -41.2 -50.8 -59.2 -68.7 -77.9 -86.9	MAG 5.612 5.628 5.602 5.393 5.328 4.924 4.767 4.575 4.365	ANG 163.6 148.9 136.8 126.0 116.2 106.6 97.2 88.0 79.4	.017 .034 .048 .060 .069 .077 .084 .090	ANG 79.6 69.7 60.6 53.2 46.4 40.6 35.8 31.0 27.0	.981 .944 .887 .837 .782 .740 .698 .663	ANG -7.1 -14.0 -19.3 -23.7 -27.2 -29.9 -32.0 -33.9 -35.2
FREQUENCY  MHz  100.00  200.00  300.00  400.00  500.00  600.00  700.00  800.00	MAG .936 .892 .842 .785 .732 .681 .618 .564 .510	ANG -10.5 -20.4 -30.5 -41.2 -50.8 -59.2 -68.7 -77.9	MAG 5.612 5.628 5.602 5.393 5.328 4.924 4.767 4.575	ANG 163.6 148.9 136.8 126.0 116.2 106.6 97.2 88.0	.017 .034 .048 .060 .069 .077 .084	ANG 79.6 69.7 60.6 53.2 46.4 40.6 35.8 31.0	.981 .944 .887 .837 .782 .740 .698	ANG -7.1 -14.0 -19.3 -23.7 -27.2 -29.9 -32.0 -33.9
FREQUENCY  MHz  100.00  200.00  300.00  400.00  500.00  600.00  700.00  800.00  900.00  1100.00  1200.00	MAG .936 .892 .842 .785 .732 .681 .618 .564 .510 .459	ANG -10.5 -20.4 -30.5 -41.2 -50.8 -59.2 -68.7 -77.9 -86.9 -96.0 -104.8 -113.0	MAG 5.612 5.628 5.602 5.393 5.328 4.924 4.767 4.575 4.365 4.191 3.991 3.790	ANG 163.6 148.9 136.8 126.0 116.2 106.6 97.2 88.0 79.4 70.9 62.9 55.7	.017 .034 .048 .060 .069 .077 .084 .090 .094 .100	ANG 79.6 69.7 60.6 53.2 46.4 40.6 35.8 31.0 27.0 23.5 19.8	.981 .944 .887 .837 .782 .740 .698 .663 .627 .599	ANG -7.1 -14.0 -19.3 -23.7 -27.2 -29.9 -32.0 -33.9 -35.2 -36.5 -37.5 -38.5
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	MAG .936 .892 .842 .785 .732 .681 .518 .564 .510 .459 .413 .375	ANG -10.5 -20.4 -30.5 -41.2 -50.8 -59.2 -68.7 -77.9 -86.9 -96.0 -104.8 -113.0 -120.8	MAG 5.612 5.628 5.602 5.393 5.328 4.924 4.767 4.575 4.365 4.191 3.991 3.790 3.588	ANG 163.6 148.9 136.8 126.0 116.2 106.6 97.2 88.0 79.4 70.9 62.9 55.7 48.7	.017 .034 .048 .060 .069 .077 .084 .090 .094 .100 .110	ANG 79.6 69.7 60.6 53.2 46.4 40.6 35.8 31.0 27.0 23.5 19.8 17.1	.981 .944 .887 .837 .782 .740 .698 .663 .627 .599 .577	ANG -7.1 -14.0 -19.3 -23.7 -27.2 -29.9 -32.0 -33.9 -35.2 -36.5 -37.5 -38.5 -39.6
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 .936 .892 .842 .785 .732 .681 .564 .510 .459 .413 .375 .350	ANG -10.5 -20.4 -30.5 -41.2 -50.8 -59.2 -68.7 -77.9 -86.9 -96.0 -104.8 -113.0 -120.8 -128.3	MAG 5.612 5.628 5.602 5.393 5.328 4.924 4.767 4.575 4.365 4.191 3.991 3.790 3.588 3.410	ANG 163.6 148.9 136.8 126.0 116.2 106.6 97.2 88.0 79.4 70.9 62.9 55.7 48.7 42.0	.017 .034 .048 .060 .069 .077 .084 .090 .094 .100 .116 .110	ANG 79.6 69.7 60.6 53.2 46.4 40.6 35.8 31.0 27.0 23.5 19.8 17.1 14.2	.981 .944 .887 .837 .782 .740 .698 .663 .627 .599 .577 .558 .542	ANG -7.1 -14.0 -19.3 -23.7 -27.2 -29.9 -32.0 -33.9 -35.2 -36.5 -37.5 -38.5 -39.6 -40.8
FREQUENCY  MHz  100.00  200.00  300.00  400.00  500.00  600.00  700.00  1000.00  1100.00  1200.00  1300.00  1400.00  1500.00	MAG .936 .892 .842 .785 .732 .681 .564 .510 .459 .413 .375 .350 .325	ANG -10.5 -20.4 -30.5 -41.2 -50.8 -59.2 -68.7 -77.9 -86.9 -96.0 -104.8 -113.0 -120.8 -128.3 -135.8	MAG 5.612 5.628 5.602 5.393 5.328 4.924 4.767 4.575 4.365 4.191 3.991 3.790 3.588 3.410 3.234	ANG 163.6 148.9 136.8 126.0 116.2 106.6 97.2 88.0 79.4 70.9 62.9 55.7 48.7 42.0 35.7	.017 .034 .048 .060 .069 .077 .084 .090 .094 .100 .106 .110 .116	ANG 79.6 69.7 60.6 53.2 46.4 40.6 35.8 31.0 27.0 23.5 19.8 17.1 14.2 11.1 7.8	.981 .944 .887 .837 .782 .740 .698 .663 .627 .599 .577 .558 .542 .525	ANG -7.1 -14.0 -19.3 -23.7 -27.2 -29.9 -32.0 -33.9 -35.2 -36.5 -37.5 -38.5 -39.6 -40.8 -41.8
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	MAG .936 .892 .842 .785 .732 .681 .618 .564 .510 .459 .413 .375 .350 .325 .307 .295	ANG -10.5 -20.4 -30.5 -41.2 -50.8 -59.2 -68.7 -77.9 -86.9 -96.0 -104.8 -113.0 -120.8 -128.3 -135.8 -142.9	MAG 5.612 5.628 5.602 5.393 5.328 4.924 4.767 4.575 4.365 4.191 3.991 3.790 3.588 3.410 3.234 3.086	ANG 163.6 148.9 136.8 126.0 116.2 106.6 97.2 88.0 79.4 70.9 62.9 55.7 48.7 42.0 35.7 29.5	.017 .034 .048 .060 .069 .077 .084 .090 .094 .100 .116 .110 .121 .126	ANG 79.6 69.7 60.6 53.2 46.4 40.6 35.8 31.0 27.0 23.5 19.8 17.1 14.2 11.1 7.8 4.9	.981 .944 .887 .837 .782 .740 .698 .663 .627 .599 .577 .558 .542 .525 .513	ANG -7.1 -14.0 -19.3 -23.7 -27.2 -29.9 -32.0 -33.9 -35.2 -36.5 -37.5 -38.5 -39.6 -40.8 -41.8 -43.2
FREQUENCY  MHz  100.00  200.00  300.00  400.00  500.00  600.00  700.00  800.00  1000.00  1100.00  1200.00  1400.00  1500.00  1600.00  1700.00  1800.00	MAG .936 .892 .842 .785 .732 .681 .618 .564 .510 .459 .413 .375 .350 .325 .307 .295 .289	ANG -10.5 -20.4 -30.5 -41.2 -50.8 -59.2 -68.7 -77.9 -86.9 -96.0 -104.8 -113.0 -120.8 -128.3 -135.8	MAG 5.612 5.628 5.602 5.393 5.328 4.924 4.767 4.575 4.365 4.191 3.991 3.790 3.588 3.410 3.234	ANG 163.6 148.9 136.8 126.0 116.2 106.6 97.2 88.0 79.4 70.9 62.9 55.7 48.7 42.0 35.7	.017 .034 .048 .060 .069 .077 .084 .090 .094 .100 .106 .110 .116	ANG 79.6 69.7 60.6 53.2 46.4 40.6 35.8 31.0 27.0 23.5 19.8 17.1 14.2 11.1 7.8	.981 .944 .887 .837 .782 .740 .698 .663 .627 .599 .577 .558 .542 .525	ANG -7.1 -14.0 -19.3 -23.7 -27.2 -29.9 -32.0 -33.9 -35.2 -36.5 -37.5 -38.5 -39.6 -40.8 -41.8
FREQUENCY  MHz  100.00  200.00  300.00  400.00  500.00  600.00  700.00  800.00  1100.00  1200.00  1300.00  1400.00  1500.00  1600.00  1700.00  1800.00  1900.00	MAG .936 .892 .842 .785 .732 .681 .618 .564 .510 .459 .413 .375 .350 .325 .307 .295 .289 .283	S11  ANG -10.5 -20.4 -30.5 -41.2 -50.8 -59.2 -68.7 -77.9 -86.9 -96.0 -104.8 -113.0 -120.8 -128.3 -135.8 -142.9 -150.9 -158.6 -166.4	MAG 5.612 5.628 5.602 5.393 5.328 4.924 4.767 4.575 4.365 4.191 3.790 3.588 3.410 3.234 3.086 2.960 2.830 2.707	ANG 163.6 148.9 136.8 126.0 116.2 106.6 97.2 88.0 79.4 70.9 62.9 55.7 48.7 42.0 35.7 29.5 23.3 17.0 11.2	.017 .034 .048 .060 .069 .077 .084 .090 .094 .100 .116 .111 .121 .126 .134 .140	ANG 79.6 69.7 60.6 53.2 46.4 40.6 35.8 31.0 27.0 23.5 19.8 17.1 14.2 11.1 7.8 4.9 1.0 -2.7 -5.6	.981 .944 .887 .837 .782 .740 .698 .663 .627 .599 .577 .558 .542 .525 .513 .499 .486 .471	ANG -7.1 -14.0 -19.3 -23.7 -27.2 -29.9 -32.0 -33.9 -35.2 -36.5 -37.5 -38.5 -39.6 -40.8 -41.8 -43.2 -44.8 -46.0 -47.1
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	MAG .936 .892 .842 .785 .732 .681 .618 .564 .510 .459 .413 .375 .350 .325 .307 .295 .289 .283 .276	S11  ANG -10.5 -20.4 -30.5 -41.2 -50.8 -59.2 -68.7 -77.9 -86.9 -96.0 -104.8 -113.0 -120.8 -128.3 -135.8 -142.9 -150.9 -158.6 -166.4 -174.1	MAG 5.612 5.628 5.602 5.393 5.328 4.924 4.767 4.575 4.365 4.191 3.790 3.588 3.410 3.234 3.086 2.960 2.830 2.707 2.597	ANG 163.6 148.9 136.8 126.0 116.2 106.6 97.2 88.0 79.4 70.9 62.9 55.7 48.7 42.0 35.7 29.5 23.3 17.0 11.2 5.4	.017 .034 .048 .060 .069 .077 .084 .090 .094 .100 .116 .111 .121 .126 .134 .140 .143 .148	ANG 79.6 69.7 60.6 53.2 46.4 40.6 35.8 31.0 27.0 23.5 19.8 17.1 14.2 11.1 7.8 4.9 1.0 -2.7 -5.6 -8.5	.981 .944 .887 .837 .782 .740 .698 .663 .627 .599 .577 .558 .542 .525 .513 .499 .486 .471 .457	ANG -7.1 -14.0 -19.3 -23.7 -27.2 -29.9 -32.0 -33.9 -35.2 -36.5 -37.5 -38.5 -39.6 -40.8 -41.8 -46.0 -47.1 -48.4
FREQUENCY  MHz  100.00  200.00  300.00  400.00  500.00  700.00  800.00  1000.00  1100.00  1200.00  1300.00  1400.00  1500.00  1700.00  1800.00  1900.00  2000.00  2100.00	MAG .936 .892 .842 .785 .732 .681 .618 .564 .510 .459 .413 .375 .350 .325 .307 .295 .289 .283 .276 .273	S11  ANG -10.5 -20.4 -30.5 -41.2 -50.8 -59.2 -68.7 -77.9 -86.9 -96.0 -104.8 -113.0 -120.8 -128.3 -135.8 -142.9 -150.9 -158.6 -166.4 -174.1 179.6	MAG 5.612 5.628 5.602 5.393 5.328 4.924 4.767 4.575 4.365 4.191 3.991 3.790 3.588 3.410 3.234 3.086 2.960 2.830 2.707 2.597 2.504	ANG 163.6 148.9 136.8 126.0 116.2 106.6 97.2 88.0 79.4 70.9 62.9 55.7 48.7 42.0 35.7 29.5 23.3 17.0 11.2 5.4 3	.017 .034 .048 .060 .069 .077 .084 .090 .094 .100 .106 .110 .116 .121 .126 .134 .140 .143 .148	ANG 79.6 69.7 60.6 53.2 46.4 40.6 35.8 31.0 27.0 23.5 19.8 17.1 14.2 11.1 7.8 4.9 1.0 -2.7 -5.6 -8.5 -11.6	.981 .944 .887 .837 .782 .740 .698 .663 .627 .599 .577 .558 .542 .525 .513 .499 .486 .471 .457 .448	ANG -7.1 -14.0 -19.3 -23.7 -27.2 -29.9 -32.0 -33.9 -35.2 -36.5 -37.5 -38.5 -39.6 -40.8 -41.8 -43.2 -44.8 -46.0 -47.1 -48.4 -49.8
FREQUENCY  MHz  100.00  200.00  300.00  400.00  500.00  700.00  800.00  1000.00  1100.00  1200.00  1400.00  1500.00  1700.00  1800.00  1700.00  1800.00  2000.00  2100.00	MAG .936 .892 .842 .785 .732 .681 .618 .564 .510 .459 .413 .375 .350 .325 .307 .295 .289 .283 .276 .273 .273	S11  ANG -10.5 -20.4 -30.5 -41.2 -50.8 -59.2 -68.7 -77.9 -86.9 -96.0 -104.8 -113.0 -120.8 -128.3 -135.8 -142.9 -150.9 -158.6 -166.4 -174.1 179.6 174.0	MAG 5.612 5.628 5.602 5.393 5.328 4.924 4.767 4.575 4.365 4.191 3.991 3.790 3.588 3.410 3.234 3.086 2.960 2.830 2.707 2.597 2.504 2.405	ANG 163.6 148.9 136.8 126.0 116.2 106.6 97.2 88.0 79.4 70.9 62.9 55.7 48.7 42.0 35.7 29.5 23.3 17.0 11.2 5.4 3 -5.9	.017 .034 .048 .060 .069 .077 .084 .090 .094 .100 .116 .111 .126 .134 .149 .143 .148 .153 .159	ANG 79.6 69.7 60.6 53.2 46.4 40.6 35.8 31.0 27.0 23.5 19.8 17.1 14.2 11.1 7.8 4.9 1.0 -2.7 -5.6 -8.5 -11.6 -14.4	.981 .944 .887 .837 .782 .740 .698 .663 .627 .599 .577 .558 .542 .525 .513 .499 .486 .471 .457 .448	ANG -7.1 -14.0 -19.3 -23.7 -27.2 -29.9 -32.0 -33.9 -35.2 -36.5 -37.5 -38.5 -39.6 -40.8 -41.8 -43.2 -44.8 -46.0 -47.1 -48.4 -49.8 -51.3
FREQUENCY  MHz  100.00  200.00  300.00  400.00  500.00  700.00  800.00  1000.00  1100.00  1200.00  1300.00  1400.00  1500.00  1700.00  1800.00  1900.00  2000.00  2100.00	MAG .936 .892 .842 .785 .732 .681 .510 .459 .413 .375 .350 .325 .307 .295 .289 .283 .276 .273 .273 .275	S11  ANG -10.5 -20.4 -30.5 -41.2 -50.8 -59.2 -68.7 -77.9 -86.9 -96.0 -104.8 -113.0 -120.8 -128.3 -135.8 -142.9 -150.9 -158.6 -166.4 -174.1 179.6	MAG 5.612 5.628 5.602 5.393 5.328 4.924 4.767 4.575 4.365 4.191 3.991 3.790 3.588 3.410 3.234 3.086 2.960 2.830 2.707 2.597 2.504	ANG 163.6 148.9 136.8 126.0 116.2 106.6 97.2 88.0 79.4 70.9 62.9 55.7 48.7 42.0 35.7 29.5 23.3 17.0 11.2 5.4 3	.017 .034 .048 .060 .069 .077 .084 .090 .094 .100 .106 .110 .116 .121 .126 .134 .140 .143 .148	ANG 79.6 69.7 60.6 53.2 46.4 40.6 35.8 31.0 27.0 23.5 19.8 17.1 14.2 11.1 7.8 4.9 1.0 -2.7 -5.6 -8.5 -11.6	.981 .944 .887 .837 .782 .740 .698 .663 .627 .599 .577 .558 .542 .525 .513 .499 .486 .471 .457 .448	ANG -7.1 -14.0 -19.3 -23.7 -27.2 -29.9 -32.0 -33.9 -35.2 -36.5 -37.5 -38.5 -39.6 -40.8 -41.8 -43.2 -44.8 -46.0 -47.1 -48.4 -49.8
FREQUENCY  MHz  100.00  200.00  300.00  400.00  500.00  600.00  900.00  1000.00  1200.00  1300.00  1400.00  1500.00  1600.00  1700.00  1800.00  2100.00  2100.00  2300.00  2400.00	MAG .936 .892 .842 .785 .732 .681 .618 .564 .510 .459 .413 .375 .350 .325 .307 .295 .289 .283 .276 .273 .275 .280 .284	S11  ANG -10.5 -20.4 -30.5 -41.2 -50.8 -59.2 -68.7 -77.9 -86.9 -96.0 -104.8 -113.0 -120.8 -128.3 -135.8 -142.9 -150.9 -158.6 -166.4 -174.1 179.6 174.0 167.8 162.6 157.7	MAG 5.612 5.628 5.602 5.393 5.328 4.924 4.767 4.575 4.365 4.191 3.991 3.790 3.588 3.410 3.234 3.086 2.960 2.830 2.707 2.597 2.504 2.405 2.332 2.248 2.177	ANG 163.6 148.9 136.8 126.0 116.2 106.6 97.2 88.0 79.4 70.9 62.9 55.7 48.7 42.0 35.7 29.5 23.3 17.0 11.2 5.4 -3 -5.9 -11.5 -16.9	.017 .034 .048 .060 .069 .077 .084 .090 .094 .100 .116 .121 .126 .134 .140 .143 .148 .153 .159 .164 .170	ANG 79.6 69.7 60.6 53.2 46.4 40.6 35.8 31.0 27.0 23.5 19.8 17.1 14.2 11.1 7.8 4.9 1.0 -2.7 -5.6 -8.5 -11.6 -14.4 -17.9 -20.9 -23.8	.981 .944 .887 .837 .782 .740 .698 .663 .627 .599 .577 .558 .542 .525 .513 .499 .486 .471 .457 .448 .435 .428 .417 .406	ANG -7.1 -14.0 -19.3 -23.7 -27.2 -29.9 -32.0 -33.9 -35.2 -36.5 -37.5 -38.5 -39.6 -40.8 -41.8 -43.2 -44.8 -46.0 -47.1 -48.4 -49.8 -51.3 -52.7 -54.2 -55.9
FREQUENCY  MHz  100.00  200.00  300.00  400.00  500.00  600.00  900.00  1000.00  1200.00  1300.00  1400.00  1700.00  1800.00  1700.00  1800.00  2100.00  2200.00  2300.00  2400.00  2500.00	MAG .936 .892 .842 .785 .732 .681 .618 .564 .510 .459 .413 .375 .350 .325 .307 .295 .289 .283 .276 .273 .273 .273 .275 .280 .284 .292	S11  ANG -10.5 -20.4 -30.5 -41.2 -50.8 -59.2 -68.7 -77.9 -86.9 -96.0 -104.8 -113.0 -120.8 -128.3 -135.8 -142.9 -150.9 -158.6 -166.4 -174.1 179.6 174.0 167.8 162.6 157.7	MAG 5.612 5.628 5.602 5.393 5.328 4.924 4.767 4.575 4.365 4.191 3.991 3.790 3.588 3.410 3.234 3.086 2.960 2.830 2.707 2.597 2.504 2.405 2.332 2.248 2.177 2.109	ANG 163.6 148.9 136.8 126.0 116.2 106.6 97.2 88.0 79.4 70.9 62.9 55.7 48.7 42.0 35.7 29.5 23.3 17.0 11.2 5.4 -3 -5.9 -11.5 -16.9 -22.2 -27.6	.017 .034 .048 .060 .069 .077 .084 .090 .094 .100 .116 .121 .126 .134 .140 .143 .153 .153 .159 .164 .170 .176 .182	ANG 79.6 69.7 60.6 53.2 46.4 40.6 35.8 31.0 27.0 23.5 19.8 17.1 14.2 11.1 7.8 4.9 1.0 -2.7 -5.6 -8.5 -11.6 -14.4 -17.9 -20.9 -23.8 -27.3	.981 .944 .887 .837 .782 .740 .698 .663 .627 .599 .577 .558 .542 .525 .513 .499 .486 .471 .457 .448 .435 .428 .417 .406 .396	ANG -7.1 -14.0 -19.3 -23.7 -27.2 -29.9 -32.0 -33.9 -35.2 -36.5 -37.5 -38.5 -39.6 -40.8 -41.8 -43.2 -44.8 -46.0 -47.1 -48.4 -49.8 -51.3 -52.7 -54.2 -55.9 -57.9
FREQUENCY  MHz  100.00  200.00  300.00  400.00  500.00  600.00  900.00  1000.00  1300.00  1400.00  1500.00  1600.00  1700.00  1800.00  2000.00  2100.00  2300.00  2400.00  2500.00  2600.00  2700.00	MAG .936 .892 .842 .785 .732 .681 .618 .564 .510 .459 .413 .375 .350 .325 .307 .295 .289 .283 .276 .273 .273 .273 .275 .280 .284 .292 .298	S11  ANG -10.5 -20.4 -30.5 -41.2 -50.8 -59.2 -68.7 -77.9 -86.9 -96.0 -104.8 -113.0 -120.8 -128.3 -135.8 -142.9 -150.9 -158.6 -166.4 -174.1 179.6 174.0 167.8 162.6 157.7 152.8 148.7	MAG 5.612 5.628 5.602 5.393 5.328 4.924 4.767 4.575 4.365 4.191 3.991 3.790 3.588 3.410 3.234 3.086 2.960 2.830 2.707 2.597 2.504 2.405 2.332 2.248 2.177 2.109 2.051	ANG 163.6 148.9 136.8 126.0 116.2 106.6 97.2 88.0 79.4 70.9 62.9 55.7 48.7 42.0 35.7 29.5 23.3 17.0 11.2 5.4 -3 -5.9 -11.5 -16.9 -22.2 -27.6 -32.9	.017 .034 .048 .060 .069 .077 .084 .090 .094 .100 .116 .121 .126 .134 .140 .143 .148 .153 .159 .164 .170 .176 .182 .187	ANG 79.6 69.7 60.6 53.2 46.4 40.6 35.8 31.0 27.0 23.5 19.8 17.1 14.2 11.1 7.8 4.9 1.0 -2.7 -5.6 -8.5 -11.6 -14.4 -17.9 -23.8 -27.3 -30.7	.981 .944 .887 .837 .782 .740 .698 .663 .627 .599 .577 .558 .542 .525 .513 .499 .486 .471 .457 .448 .435 .428 .417 .406 .396 .386	ANG -7.1 -14.0 -19.3 -23.7 -27.2 -29.9 -32.0 -33.9 -35.2 -36.5 -37.5 -38.5 -39.6 -40.8 -41.8 -43.2 -44.8 -46.0 -47.1 -48.4 -49.8 -51.3 -52.7 -54.2 -55.9 -57.9 -59.9
FREQUENCY  MHz  100.00  200.00  300.00  400.00  500.00  600.00  700.00  1000.00  1100.00  1200.00  1400.00  1500.00  1600.00  1700.00  1800.00  2000.00  2100.00  2200.00  2300.00  2400.00  2500.00  2600.00  2700.00  2800.00	MAG .936 .892 .842 .785 .732 .681 .564 .510 .459 .413 .375 .350 .325 .307 .295 .289 .283 .276 .273 .273 .273 .275 .280 .284 .292 .298 .307	S11  ANG -10.5 -20.4 -30.5 -41.2 -50.8 -59.2 -68.7 -77.9 -86.9 -96.0 -104.8 -113.0 -120.8 -128.3 -135.8 -142.9 -150.9 -158.6 -166.4 -174.1 179.6 174.0 167.8 162.6 157.7 152.8 148.7 144.7	MAG 5.612 5.628 5.602 5.393 5.328 4.924 4.767 4.575 4.365 4.191 3.991 3.790 3.588 3.410 3.234 3.086 2.960 2.830 2.707 2.597 2.504 2.405 2.332 2.248 2.177 2.109 2.051 1.988	ANG 163.6 148.9 136.8 126.0 116.2 106.6 97.2 88.0 79.4 70.9 62.9 55.7 48.7 42.0 35.7 29.5 23.3 17.0 11.2 5.4 -3 -5.9 -11.5 -16.9 -22.2 -27.6 -32.9 -38.1	.017 .034 .048 .060 .069 .077 .084 .090 .094 .100 .116 .121 .126 .134 .140 .143 .148 .153 .159 .164 .170 .176 .182 .187	ANG 79.6 69.7 60.6 53.2 46.4 40.6 35.8 31.0 27.0 23.5 19.8 17.1 14.2 11.1 7.8 4.9 1.0 -2.7 -5.6 -8.5 -11.6 -14.4 -17.9 -20.9 -23.8 -27.3 -30.7 -33.8	.981 .944 .887 .837 .782 .740 .698 .663 .627 .599 .577 .558 .542 .525 .513 .499 .486 .471 .457 .448 .435 .428 .417 .406 .396 .376	ANG -7.1 -14.0 -19.3 -23.7 -27.2 -29.9 -32.0 -33.9 -35.2 -36.5 -37.5 -38.5 -39.6 -40.8 -41.8 -43.2 -44.8 -46.0 -47.1 -48.4 -49.8 -51.3 -52.7 -54.2 -55.9 -57.9 -59.9 -61.8
FREQUENCY  MHz  100.00  200.00  300.00  400.00  500.00  600.00  900.00  1000.00  1300.00  1400.00  1500.00  1600.00  1700.00  1800.00  2000.00  2100.00  2300.00  2400.00  2500.00  2600.00  2700.00	MAG .936 .892 .842 .785 .732 .681 .564 .510 .459 .413 .375 .350 .325 .307 .295 .289 .283 .276 .273 .273 .275 .280 .284 .292 .298 .307 .316 .326	S11  ANG -10.5 -20.4 -30.5 -41.2 -50.8 -59.2 -68.7 -77.9 -86.9 -96.0 -104.8 -113.0 -120.8 -128.3 -135.8 -142.9 -150.9 -158.6 -166.4 -174.1 179.6 174.0 167.8 162.6 157.7 152.8 148.7	MAG 5.612 5.628 5.602 5.393 5.328 4.924 4.767 4.575 4.365 4.191 3.991 3.790 3.588 3.410 3.234 3.086 2.960 2.830 2.707 2.597 2.597 2.504 2.405 2.332 2.248 2.177 2.109 2.051	ANG 163.6 148.9 136.8 126.0 116.2 106.6 97.2 88.0 79.4 70.9 62.9 55.7 48.7 42.0 35.7 29.5 23.3 17.0 11.2 5.4 -3 -5.9 -11.5 -16.9 -22.2 -27.6 -32.9	.017 .034 .048 .060 .069 .077 .084 .090 .094 .100 .116 .121 .126 .134 .140 .143 .148 .153 .159 .164 .170 .176 .182 .187	ANG 79.6 69.7 60.6 53.2 46.4 40.6 35.8 31.0 27.0 23.5 19.8 17.1 14.2 11.1 7.8 4.9 1.0 -2.7 -5.6 -8.5 -11.6 -14.4 -17.9 -23.8 -27.3 -30.7	.981 .944 .887 .837 .782 .740 .698 .663 .627 .599 .577 .558 .542 .525 .513 .499 .486 .471 .457 .448 .435 .428 .417 .406 .396 .386	ANG -7.1 -14.0 -19.3 -23.7 -27.2 -29.9 -32.0 -33.9 -35.2 -36.5 -37.5 -38.5 -39.6 -40.8 -41.8 -43.2 -44.8 -46.0 -47.1 -48.4 -49.8 -51.3 -52.7 -54.2 -55.9 -57.9 -59.9

Vce = 3 V, Ic	= 1 mA 70 =	: 50 O						
FREQUE		S11		S21		S12		S22
		0		0		0.2		0
	Hz MA			ANG	MAG	ANG	MAG	ANG
	.98		6.4 1.963		.019	82.2	.996	-4.0
	00.00 .97				.036	73.4	.987	-8.1
	.95 .90.00 .93				.053 .070	66.7 58.7	.966 .953	-11.8 -15.4
	0.00 .9				.084	52.1	.929	-13.4 -18.7
	00.00 .89				.098	45.0	.909	-22.0
	.8. 00.00				.109	38.5	.883	-24.9
	.83				.120	32.1	.859	-27.7
	.80				.127	25.8	.830	-30.5
	0.00 .76				.137	20.2	.803	-33.0
	0.00 .73				.143	14.4	.776	-35.0
	.69 .60.00 .60.00				.148 .154	9.7 4.5	.754 .734	-37.1 -39.0
	0.00 .62				.157	<del>-</del> .1	.712	-41.1
	00.00 .59				.162	-4.4	.693	-42.9
	00.00 .57				.165	-8.3	.676	-44.6
	.54 00.00				.170	-12.9	.660	-46.5
	00.00 .52				.172	-17.5	.640	-48.3
	00.00 .49				.174	-21.5	.622	-49.9
	00.00 .45 00.00 .45				.174 .174	-25.3 -28.5	.610 .595	–51.7 –53.3
	0.00 .4				.174	-26.5 -31.9	.583	-55.0
	0.00 .43				.177	-35.1	.567	-56.8
	0.00 .42				.178	-38.1	.557	-58.6
	0.00 .4				.180	-40.5	.545	-60.5
	00.00 .4				.182	-43.6	.534	-62.6
	00.00 .4				.183	-46.5	.523	-64.6
	0.00 .4				.186	-48.7	.515	-66.9
	00.00 .4 <sup>-</sup> 00.00 .4 <sup>-</sup>		4.7 1.442 9.5 1.413		.189	-51.4 -53.5	.504 .495	-69.2 -71.7
300	0.00 .4	19 13	9.5 1.413	-40.3	.191	-55.5	.493	-/1./
Vce = 1 V, Ic				V				
Vce = 1 V, Ic FREQUE		: 50 Ω S11		S21		S12		S22
FREQUE	NCY	S11	G MAG		MAG		MAG	
FREQUE	NCY IHz MA	S11 AG AN		ANG	MAG 021	ANG	MAG 949	ANG
FREQUE M 10	NCY Hz MA 00.00 .84	S11 AG AN 49 –1	9.1 8.397	ANG 156.6	.021	ANG 75.5	.949	ANG -11.9
FREQUE M 10 20	HZ MA 00.00 .84 00.00 .76 00.00 .68	S11 AG AN 49 -1: 64 -3: 81 -4:	9.1 8.397 4.1 8.259	ANG 156.6 139.2		ANG		ANG
FREQUE M 10 20 30 40	HZ MA 00.00 .84 00.00 .76 00.00 .68 00.00 .66	S11 AG AN 49 -1: 64 -3: 81 -4: 12 -6:	9.1 8.397 4.1 8.259 9.1 7.901 3.6 7.397	ANG 156.6 139.2 125.1 113.1	.021 .037 .051 .060	ANG 75.5 63.8 54.8 48.4	.949 .866 .767 .689	ANG -11.9 -21.8 -28.2 -32.3
FREQUE M 10 20 30 40 50	HZ MA 00.00 .84 00.00 .76 00.00 .68 00.00 .6 00.00 .5	S11 AG AN 49 -1: 64 -3: 81 -4: 12 -6: 34 -7:	9.1 8.397 4.1 8.259 9.1 7.901 3.6 7.397 8.0 7.006	ANG 156.6 139.2 125.1 113.1 101.8	.021 .037 .051 .060 .068	ANG 75.5 63.8 54.8 48.4 42.2	.949 .866 .767 .689 .623	ANG -11.9 -21.8 -28.2 -32.3 -35.2
FREQUE M 10 20 30 40 50 60	HZ MA 00.00 .84 00.00 .76 00.00 .66 00.00 .6 00.00 .5 00.00 .4	S11 AG AN 49 -1: 64 -3: 81 -4: 12 -6: 34 -7: 73 -8:	9.1 8.397 4.1 8.259 9.1 7.901 3.6 7.397 8.0 7.006 9.5 6.297	ANG 156.6 139.2 125.1 113.1 101.8 91.7	.021 .037 .051 .060 .068	ANG 75.5 63.8 54.8 48.4 42.2 38.7	.949 .866 .767 .689 .623	ANG -11.9 -21.8 -28.2 -32.3 -35.2 -37.0
FREQUE M 10 20 30 40 50 60 70	HZ MA 00.00 .84 00.00 .76 00.00 .66 00.00 .6 00.00 .5 00.00 .4	S11 AG AN 49 -1: 64 -3: 81 -4: 12 -6: 34 -7: 73 -8: 14 -10	9.1 8.397 4.1 8.259 9.1 7.901 3.6 7.397 8.0 7.006 9.5 6.297 1.5 5.833	ANG 156.6 139.2 125.1 113.1 101.8 91.7 82.2	.021 .037 .051 .060 .068 .076	ANG 75.5 63.8 54.8 48.4 42.2 38.7 35.3	.949 .866 .767 .689 .623 .573	ANG -11.9 -21.8 -28.2 -32.3 -35.2 -37.0 -38.1
FREQUE M 10 20 30 40 50 60 70 80	HZ MA 00.00 .84 00.00 .76 00.00 .66 00.00 .6 00.00 .5 00.00 .4 00.00 .4	S11 AG AN 49 -1: 64 -3: 81 -4: 12 -6: 34 -7: 73 -8: 14 -10: 71 -11:	9.1 8.397 4.1 8.259 9.1 7.901 3.6 7.397 8.0 7.006 9.5 6.297 1.5 5.833 2.1 5.352	ANG 156.6 139.2 125.1 113.1 101.8 91.7 82.2 73.6	.021 .037 .051 .060 .068 .076 .082	ANG 75.5 63.8 54.8 48.4 42.2 38.7 35.3 31.9	.949 .866 .767 .689 .623 .573 .531	ANG -11.9 -21.8 -28.2 -32.3 -35.2 -37.0 -38.1 -39.2
FREQUE M 10 20 30 40 50 60 70 80 90	HZ MA 00.00 .84 00.00 .76 00.00 .66 00.00 .6 00.00 .5 00.00 .4 00.00 .4 00.00 .3	S11  AG AN 49 -1: 64 -3: 81 -4: 12 -6: 34 -7: 73 -8: 14 -10 71 -11: 39 -12:	9.1 8.397 4.1 8.259 9.1 7.901 3.6 7.397 8.0 7.006 9.5 6.297 1.5 5.833 2.1 5.352 2.2 4.924	ANG 156.6 139.2 125.1 113.1 101.8 91.7 82.2 73.6 65.7	.021 .037 .051 .060 .068 .076 .082 .089	ANG 75.5 63.8 54.8 48.4 42.2 38.7 35.3 31.9 28.7	.949 .866 .767 .689 .623 .573 .531 .499	ANG -11.9 -21.8 -28.2 -32.3 -35.2 -37.0 -38.1 -39.2 -39.9
FREQUE  M 10 20 30 40 50 60 70 80 90	HZ MA 00.00 .84 00.00 .76 00.00 .66 00.00 .6 00.00 .5 00.00 .4 00.00 .4	S11  AG AN 49 -1: 64 -3: 81 -4: 12 -6: 34 -7: 73 -8: 14 -10: 71 -11: 39 -12: 14 -13	9.1 8.397 4.1 8.259 9.1 7.901 3.6 7.397 8.0 7.006 9.5 6.297 1.5 5.833 2.1 5.352 2.2 4.924 1.4 4.557	ANG 156.6 139.2 125.1 113.1 101.8 91.7 82.2 73.6 65.7 58.5	.021 .037 .051 .060 .068 .076 .082	ANG 75.5 63.8 54.8 48.4 42.2 38.7 35.3 31.9	.949 .866 .767 .689 .623 .573 .531	ANG -11.9 -21.8 -28.2 -32.3 -35.2 -37.0 -38.1 -39.2 -39.9 -40.9
FREQUE  M 10 20 30 40 50 60 70 80 90 1100	HZ MA 00.00 .84 00.00 .77 00.00 .66 00.00 .67 00.00 .47 00.00 .47 00.00 .37 00.00 .33 00.00 .33	S11  AG AN 49 -1: 64 -3: 81 -4: 12 -6: 34 -7: 73 -8: 14 -10: 71 -11: 39 -12: 14 -13	9.1 8.397 4.1 8.259 9.1 7.901 3.6 7.397 8.0 7.006 9.5 6.297 1.5 5.833 2.1 5.352 2.2 4.924 1.4 4.557 0.2 4.219	ANG 156.6 139.2 125.1 113.1 101.8 91.7 82.2 73.6 65.7 58.5 51.6	.021 .037 .051 .060 .068 .076 .082 .089	ANG 75.5 63.8 54.8 48.4 42.2 38.7 35.3 31.9 28.7 25.6	.949 .866 .767 .689 .623 .573 .531 .499 .472	ANG -11.9 -21.8 -28.2 -32.3 -35.2 -37.0 -38.1 -39.2 -39.9
FREQUE  M 10 20 30 40 50 60 70 80 90 100 110 120 130	HZ MA 00.00 84 00.00 66 00.00 66 00.00 67 00.00 47 00.00 37 00.00 33 00.00 33 00.00 32 00.00 32	S11  AG AN 49 -11 64 -3 81 -4 12 -6 34 -7 73 -8 14 -10 71 -11 39 -12 14 -13 95 -14 33 -14 75 -15	9.1 8.397 4.1 8.259 9.1 7.901 3.6 7.397 8.0 7.006 9.5 6.297 1.5 5.833 2.1 5.352 2.1 4.924 1.4 4.557 0.2 4.219 8.3 3.935 6.2 3.672	ANG 156.6 139.2 125.1 113.1 101.8 91.7 82.2 73.6 65.7 58.5 51.6 45.2 38.8	.021 .037 .051 .060 .068 .076 .082 .089 .095 .103 .109 .115	ANG 75.5 63.8 54.8 48.4 42.2 38.7 35.3 31.9 28.7 25.6 22.8 20.1 16.9	.949 .866 .767 .689 .623 .573 .531 .499 .472 .448 .429 .414	ANG -11.9 -21.8 -28.2 -32.3 -35.2 -37.0 -38.1 -39.2 -39.9 -40.9 -41.2 -42.2 -42.8
FREQUE  M 10 20 30 40 50 60 70 80 90 110 120 130 140	HZ MA 00.00 84 00.00 66 00.00 66 00.00 67 00.00 37 00.00 37 00.00 32 00.00 32	S11  AG AN 49 -11 64 -3 81 -4 12 -6 34 -7 73 -8 14 -10 71 -11 39 -12 14 -13 95 -14 33 -14 75 -15 70 -16	9.1 8.397 4.1 8.259 9.1 7.901 3.6 7.397 8.0 7.006 9.5 6.297 1.5 5.833 2.1 5.352 2.2 4.924 1.4 4.557 0.2 4.219 8.3 3.935 6.2 3.672 3.3 3.448	ANG 156.6 139.2 125.1 113.1 101.8 91.7 82.2 73.6 65.7 58.5 51.6 45.2 38.8 32.9	.021 .037 .051 .060 .068 .076 .082 .089 .095 .103 .109 .115 .122	ANG 75.5 63.8 54.8 48.4 42.2 38.7 35.3 31.9 28.7 25.6 22.8 20.1 16.9 13.8	.949 .866 .767 .689 .623 .573 .531 .499 .472 .448 .429 .414 .398	ANG -11.9 -21.8 -28.2 -32.3 -35.2 -37.0 -38.1 -39.2 -39.9 -40.9 -41.2 -42.2 -42.8 -44.0
FREQUE  M 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150	HZ MA 00.00 84 00.00 66 00.00 66 00.00 67 00.00 37 00.00 37 00.00 33 00.00 33 00.00 32 00.00 22 00.00 22 00.00 22	S11  AG AN 49 -1: 64 -3: 81 -4: 12 -6: 34 -7: 73 -8: 14 -10: 71 -11: 39 -12: 14 -13 95 -14: 75 -15: 70 -16: 67 -17:	9.1 8.397 4.1 8.259 9.1 7.901 3.6 7.397 8.0 7.006 9.5 6.297 1.5 5.833 2.1 5.352 2.2 4.924 1.4 4.557 0.2 4.219 8.3 3.935 6.2 3.672 3.3 3.448 0.3 3.242	ANG 156.6 139.2 125.1 113.1 101.8 91.7 82.2 73.6 65.7 58.5 51.6 45.2 38.8 32.9 26.9	.021 .037 .051 .060 .068 .076 .082 .089 .095 .103 .109 .115 .122 .129	ANG 75.5 63.8 54.8 48.4 42.2 38.7 35.3 31.9 28.7 25.6 22.8 20.1 16.9 13.8 10.7	.949 .866 .767 .689 .623 .573 .531 .499 .472 .448 .429 .414 .398 .385	ANG -11.9 -21.8 -28.2 -32.3 -35.2 -37.0 -38.1 -39.2 -39.9 -40.9 -41.2 -42.2 -42.8 -44.0 -45.0
FREQUE  M 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150 160	HZ MA 00.00 84 00.00 66 00.00 66 00.00 67 00.00 37 00.00 37 00.00 37 00.00 32 00.00 22 00.00 22 00.00 22 00.00 22 00.00 22 00.00 22 00.00 22 00.00 22	S11  AG AN 49 -1: 64 -3: 81 -4: 12 -6: 34 -7: 73 -8: 14 -10 71 -11: 39 -12: 14 -13 95 -14: 33 -14: 75 -15: 70 -16: 67 -17: 68 -17:	9.1 8.397 4.1 8.259 9.1 7.901 3.6 7.397 8.0 7.006 9.5 6.297 1.5 5.833 2.1 5.352 2.2 4.924 4.557 0.2 4.219 8.3 3.935 6.2 3.672 3.3 3.448 0.3 3.242 6.4 3.081	ANG 156.6 139.2 125.1 113.1 101.8 91.7 82.2 73.6 65.7 58.5 51.6 45.2 38.8 32.9 26.9 21.1	.021 .037 .051 .060 .068 .076 .082 .089 .095 .103 .109 .115 .122 .129	ANG 75.5 63.8 54.8 48.4 42.2 38.7 35.3 31.9 28.7 25.6 22.8 20.1 16.9 13.8 10.7 7.5	.949 .866 .767 .689 .623 .573 .531 .499 .472 .448 .429 .414 .398 .385 .374	ANG -11.9 -21.8 -28.2 -32.3 -35.2 -37.0 -38.1 -39.2 -39.9 -40.9 -41.2 -42.2 -42.8 -44.0 -45.0 -46.4
FREQUE  M 10 20 30 40 50 60 70 80 90 110 120 130 140 150 160 170	HZ MA 00.00 84 00.00 66 00.00 66 00.00 66 00.00 47 00.00 37 00.00 37 00.00 37 00.00 25 00.00 25	S11  AG AN 49 -1: 64 -3: 81 -4: 12 -6: 34 -7: 73 -8: 14 -10 71 -11: 39 -12: 14 -13 95 -14: 33 -14: 75 -15: 70 -16: 67 -17: 68 -17: 73 17	9.1 8.397 4.1 8.259 9.1 7.901 3.6 7.397 8.0 7.006 9.5 6.297 1.5 5.833 2.1 5.352 2.2 4.924 4.557 0.2 4.219 8.3 3.935 6.2 3.672 3.3 3.448 0.3 3.242 6.4 3.081 7.8 2.927	ANG 156.6 139.2 125.1 113.1 101.8 91.7 82.2 73.6 65.7 58.5 51.6 45.2 38.8 32.9 26.9 21.1	.021 .037 .051 .060 .068 .076 .082 .089 .095 .103 .109 .115 .122 .129 .136 .143	ANG 75.5 63.8 54.8 48.4 42.2 38.7 35.3 31.9 28.7 25.6 22.8 20.1 16.9 13.8 10.7 7.5 3.9	.949 .866 .767 .689 .623 .573 .531 .499 .472 .448 .429 .414 .398 .385 .374 .362	ANG -11.9 -21.8 -28.2 -32.3 -35.2 -37.0 -38.1 -39.2 -39.9 -40.9 -41.2 -42.2 -42.8 -44.0 -45.0 -46.4 -47.9
FREQUE  M 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150 160 170 180	HZ MA 00.00 84 00.00 66 00.00 66 00.00 66 00.00 47 00.00 37 00.00 37 00.00 32 00.00 22 00.00 22	S11  AG AN 49 -1: 64 -3: 81 -4: 12 -6: 34 -7: 73 -8: 14 -10: 71 -11: 39 -12: 14 -13: 39 -14: 67 -15: 67 -17: 68 -17: 73 17: 80 17:	9.1 8.397 4.1 8.259 9.1 7.901 3.6 7.397 8.0 7.006 9.5 6.297 1.5 5.833 2.1 5.352 2.2 4.924 1.4 4.557 0.2 4.219 8.3 3.935 6.2 3.672 3.3 3.448 0.3 3.242 6.4 3.081 7.8 2.927 2.2 2.783	ANG 156.6 139.2 125.1 113.1 101.8 91.7 82.2 73.6 65.7 58.5 51.6 45.2 38.8 32.9 26.9 21.1 15.4 9.6	.021 .037 .051 .060 .068 .076 .082 .089 .095 .103 .109 .115 .122 .129 .136 .143 .153 .160	ANG 75.5 63.8 54.8 48.4 42.2 38.7 35.3 31.9 28.7 25.6 22.8 20.1 16.9 13.8 10.7 7.5 3.9 1	.949 .866 .767 .689 .623 .573 .531 .499 .472 .448 .429 .414 .398 .385 .374 .362	ANG -11.9 -21.8 -28.2 -32.3 -35.2 -37.0 -38.1 -39.2 -39.9 -40.9 -41.2 -42.2 -42.8 -44.0 -45.0 -46.4
FREQUE  M 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150 160 170 180 190	HZ MA 00.00 84 00.00 66 00.00 66 00.00 66 00.00 47 00.00 37 00.00 37 00.00 37 00.00 25 00.00 25	S11  AG AN 49 -1: 64 -3: 81 -4: 12 -6: 34 -7: 73 -8: 14 -10 71 -11: 39 -12: 14 -13 95 -14: 33 -14: 67 -15: 67 -17: 68 -17: 73 17: 38 16:	9.1 8.397 4.1 8.259 9.1 7.901 3.6 7.397 8.0 7.006 9.5 6.297 1.5 5.833 2.1 5.352 2.2 4.924 1.4 4.557 0.2 4.219 8.3 3.935 6.2 3.672 3.3 3.448 0.3 3.242 6.4 3.081 7.8 2.927 2.2 2.783 5.8 2.663	ANG 156.6 139.2 125.1 113.1 101.8 91.7 82.2 73.6 65.7 58.5 51.6 45.2 38.8 32.9 26.9 21.1 15.4 9.6 3.9	.021 .037 .051 .060 .068 .076 .082 .089 .095 .103 .109 .115 .122 .129 .136 .143	ANG 75.5 63.8 54.8 48.4 42.2 38.7 35.3 31.9 28.7 25.6 22.8 20.1 16.9 13.8 10.7 7.5 3.9	.949 .866 .767 .689 .623 .573 .531 .499 .472 .448 .429 .414 .398 .385 .374 .362	ANG -11.9 -21.8 -28.2 -32.3 -35.2 -37.0 -38.1 -39.2 -39.9 -40.9 -41.2 -42.2 -42.8 -44.0 -45.0 -46.4 -47.9 -49.5
FREQUE  M 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150 160 170 180 190 200 210	HZ MA 00.00 84 00.00 .77 00.00 .66 00.00 .57 00.00 .57 00.00 .57 00.00 .41 00.00 .37 00.00 .37 00.00 .28 00.00 .27 00.00 .27 00.00 .27 00.00 .27 00.00 .27 00.00 .27 00.00 .28 00.00 .29 00.00 .29	S11  AG AN 49 -1: 64 -3: 81 -4: 12 -6: 34 -7: 34 -10: 71 -11: 39 -12: 14 -13 95 -14: 33 -14: 75 -15: 67 -17: 68 -17: 68 -17: 68 16: 94 16: 01 15:	9.1 8.397 4.1 8.259 9.1 7.901 3.6 7.397 8.0 7.006 9.5 6.297 1.5 5.833 2.1 5.352 2.2 4.924 1.4 4.557 0.2 4.219 8.3 3.935 6.2 3.672 3.3 3.448 5.6.4 3.081 7.8 2.927 2.2 2.783 5.8 2.663 0.1 2.540 5.4 2.445	ANG 156.6 139.2 125.1 113.1 101.8 91.7 82.2 73.6 65.7 58.5 51.6 45.2 38.8 32.9 26.9 21.1 15.4 9.6 3.9 -1.7 -7.0	.021 .037 .051 .060 .068 .076 .082 .089 .095 .103 .109 .115 .122 .129 .136 .143 .153 .160 .165 .171	ANG 75.5 63.8 54.8 48.4 42.2 38.7 35.3 31.9 28.7 25.6 22.8 20.1 16.9 13.8 10.7 7.5 3.91 -3.8 -6.8 -10.1	.949 .866 .767 .689 .623 .573 .531 .499 .472 .448 .429 .414 .398 .385 .374 .362 .353 .340 .326	ANG -11.9 -21.8 -28.2 -32.3 -35.2 -37.0 -38.1 -39.9 -40.9 -41.2 -42.2 -42.8 -44.0 -45.0 -46.4 -47.9 -49.5 -51.1 -52.2 -53.7
FREQUE  M 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150 160 170 180 190 200 210 220	HZ MA 00.00 84 00.00 66 00.00 66 00.00 66 00.00 47 00.00 47 00.00 33 00.00 36 00.00 25 00.00 36 00.00 36 00.00 37 00.00 36 00.00 36	S11  AG AN 49 -1: 64 -3: 81 -4: 12 -6: 34 -7: 73 -8: 14 -10: 71 -1: 39 -12: 14 -13 95 -14: 33 -14: 75 -15: 67 -17: 68 -17: 68 17: 73 17: 38 16: 94 16: 97 15:	9.1 8.397 4.1 8.259 9.1 7.901 3.6 7.397 8.0 7.006 9.5 6.297 1.5 5.833 2.1 5.352 2.2 4.924 1.4 4.557 0.2 4.219 8.3 3.935 6.2 3.672 3.3 3.448 2.663 3.081 7.8 2.927 2.2 2.783 5.8 2.663 0.1 2.540 5.4 2.445 1.6 2.347	ANG 156.6 139.2 125.1 113.1 101.8 91.7 82.2 73.6 65.7 58.5 51.6 45.2 38.8 32.9 26.9 21.1 15.4 9.6 3.9 -1.7 -7.0	.021 .037 .051 .060 .068 .076 .082 .089 .095 .103 .109 .115 .122 .129 .136 .143 .153 .160 .165 .171 .177	ANG 75.5 63.8 54.8 48.4 42.2 38.7 35.3 31.9 28.7 25.6 22.8 20.1 16.9 13.8 10.7 7.5 3.91 -3.8 -6.8 -10.1 -13.8	.949 .866 .767 .689 .623 .573 .531 .499 .472 .448 .429 .414 .398 .385 .374 .362 .353 .340 .326 .316 .304 .293	ANG -11.9 -21.8 -28.2 -32.3 -35.2 -37.0 -38.1 -39.2 -40.9 -41.2 -42.2 -42.8 -44.0 -45.0 -46.4 -47.9 -49.5 -51.1 -52.2 -53.7 -55.4
FREQUE  M 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150 160 170 180 200 210 220 230	HZ MA 00.00 84 00.00 66 00.00 66 00.00 66 00.00 3 00.00 3 00.00 25 00.00 36 00.00 36	S11  AG AN 49 -1: 64 -3: 81 -4: 12 -6: 34 -7: 73 -8: 14 -10: 71 -11: 39 -12: 14 -13 95 -14: 83 -14: 75 -15: 67 -17: 68 -17: 73 17: 30 17: 38 16: 94 16: 97 15: 17 14:	9.1 8.397 4.1 8.259 9.1 7.901 3.6 7.397 8.0 7.006 9.5 6.297 1.5 5.833 2.1 5.352 2.2 4.219 8.3 3.935 6.2 3.672 3.3 3.448 0.3 3.242 6.4 3.081 7.8 2.927 2.783 2.1 2.783 0.1 2.540 5.4 2.445 5.4 2.445 6.4 2.347 7.3 2.260	ANG 156.6 139.2 125.1 113.1 101.8 91.7 82.2 73.6 65.7 58.5 51.6 45.2 38.8 32.9 26.9 21.1 15.4 9.6 3.9 -1.7 -7.0 -12.4	.021 .037 .051 .060 .068 .076 .082 .089 .095 .103 .109 .115 .122 .129 .136 .143 .153 .160 .165 .171 .177 .186 .192	ANG 75.5 63.8 54.8 48.4 42.2 38.7 35.3 31.9 28.7 25.6 22.8 20.1 16.9 13.8 10.7 7.5 3.91 -3.8 -6.8 -10.1 -13.8 -17.2	.949 .866 .767 .689 .623 .573 .531 .499 .472 .448 .429 .414 .398 .385 .374 .362 .353 .340 .326 .316 .304 .293 .284	ANG -11.9 -21.8 -28.2 -32.3 -35.2 -37.0 -38.1 -39.2 -40.9 -41.2 -42.2 -42.8 -44.0 -45.0 -46.4 -47.9 -49.5 -51.1 -52.2 -53.7 -55.4 -57.0
FREQUE  M 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150 160 170 180 190 200 210 220 230 240	HZ MA 00.00 84 00.00 66 00.00 66 00.00 67 00.00 33 00.00 33 00.00 22 00.00 33 00.00 34 00.00 35 00.00 35	S11  AG AN 49 -1: 64 -3: 81 -4: 12 -6: 34 -7: 73 -8: 14 -10: 67 -11: 68 -17: 68 -17: 68 -17: 68 -17: 68 -17: 68 -17: 68 -16: 67 -17: 68 -16: 67 -17: 68 -16: 67 -17: 68 -16: 67 -17: 68 -17: 73 -18: 694 -16: 677 -15:	9.1 8.397 4.1 8.259 9.1 7.901 3.6 7.397 8.0 7.006 9.5 6.297 1.5 5.833 2.1 5.352 2.1 4.924 1.4 4.557 0.2 4.219 8.3 3.935 6.2 3.672 3.3 3.448 0.3 3.242 6.4 3.081 7.8 2.927 2.2 2.783 5.5 2.663 0.1 2.540 5.4 2.445 5.4 2.445 6.4 2.347 7.3 2.260 3.6 2.177	ANG 156.6 139.2 125.1 113.1 101.8 91.7 82.2 73.6 65.7 58.5 51.6 45.2 38.8 32.9 26.9 21.1 15.4 9.6 3.9 -1.7 -7.0 -12.4 -17.8 -23.0	.021 .037 .051 .060 .068 .076 .082 .089 .095 .103 .109 .115 .122 .129 .136 .143 .153 .160 .165 .171 .177 .186 .192 .199	ANG 75.5 63.8 54.8 48.4 42.2 38.7 35.3 31.9 28.7 25.6 22.8 20.1 16.9 13.8 10.7 7.5 3.91 -3.8 -6.8 -10.1 -13.8 -17.2 -20.8	.949 .866 .767 .689 .623 .573 .531 .499 .472 .448 .429 .414 .398 .385 .374 .362 .353 .340 .326 .316 .304 .293 .284	ANG -11.9 -21.8 -28.2 -32.3 -35.2 -37.0 -38.1 -39.2 -39.9 -41.2 -42.2 -42.8 -44.0 -45.0 -46.4 -47.9 -49.5 -51.1 -52.2 -53.7 -55.4 -57.0 -58.9
FREQUE  M 10 20 30 40 50 60 70 80 100 110 120 130 140 150 160 170 180 190 200 210 220 230 240 250	HZ MA 00.00 84 00.00 66 00.00 66 00.00 67 00.00 33 00.00 33 00.00 22 00.00 26 00.00 26 00.00 26 00.00 26 00.00 36	S11  AG AN 49 -1: 64 -3: 81 -4: 12 -6: 34 -7: 73 -8: 14 -10: 71 -11: 339 -12: 14 -13 95 -14: 33 -14: 75 -15: 67 -17: 68 -17: 73 17: 38 16: 94 16: 97 15: 17 14: 24 14: 34 14:	9.1 8.397 4.1 8.259 9.1 7.901 3.6 7.397 8.0 7.006 9.5 6.297 1.5 5.833 2.1 5.352 2.1 4.924 1.4 4.557 0.2 4.219 8.3 3.935 6.2 3.672 3.3 3.448 0.3 3.242 6.4 3.081 7.8 2.927 2.2 2.783 5.5 2.663 0.1 2.540 5.4 2.445 5.4 2.445 5.4 2.445 6.5 2.347 7.3 2.260 3.6 2.177 0.2 2.105	ANG 156.6 139.2 125.1 113.1 101.8 91.7 82.2 73.6 65.7 58.5 51.6 45.2 38.8 32.9 26.9 21.1 15.4 9.6 3.9 -1.7 -7.0 -12.4 -17.8 -23.0 -28.2	.021 .037 .051 .060 .068 .076 .082 .089 .095 .103 .109 .115 .122 .129 .136 .143 .153 .160 .165 .171 .177 .186 .192 .199 .207	ANG 75.5 63.8 54.8 48.4 42.2 38.7 35.3 31.9 28.7 25.6 22.8 20.1 16.9 13.8 10.7 7.5 3.91 -3.8 -6.8 -10.1 -13.8 -17.2 -20.8 -23.9	.949 .866 .767 .689 .623 .573 .531 .499 .472 .448 .429 .414 .398 .385 .374 .362 .353 .340 .326 .316 .304 .293 .284 .272	ANG -11.9 -21.8 -28.2 -32.3 -35.2 -37.0 -38.1 -39.2 -39.9 -41.2 -42.2 -42.8 -44.0 -45.0 -46.4 -47.9 -49.5 -51.1 -52.2 -53.7 -55.4 -57.0 -58.9 -60.8
FREQUE  M 10 20 30 40 50 60 70 80 100 110 120 130 140 150 160 170 180 190 200 210 220 230 240 250 260	HZ MA  00.00 84  00.00 66  00.00 67  00.00 37  00.00 37  00.00 37  00.00 22  00.00 22  00.00 22  00.00 22  00.00 22  00.00 32  00.00 32  00.00 32  00.00 32  00.00 33  00.00 33  00.00 33  00.00 33  00.00 33  00.00 33  00.00 33  00.00 33  00.00 33  00.00 33  00.00 33  00.00 33	S11  AG AN 49 -1: 64 -3: 81 -4: 12 -6: 34 -7: 73 -8: 14 -10: 71 -11: 339 -12: 14 -13 95 -14: 33 -15: 75 -15: 67 -17: 68 -17: 73 17: 88 16: 94 16: 97 15: 17 14 24 14: 34 14:	9.1 8.397 4.1 8.259 9.1 7.901 3.6 7.397 8.0 7.006 9.5 6.297 1.5 5.833 2.1 5.352 2.2 4.924 1.4 4.557 0.2 4.219 8.3 3.935 6.2 3.672 3.3 3.448 0.3 3.242 6.4 3.081 7.8 2.927 2.2 2.783 6.5 2.663 0.1 2.540 6.1 2.540 7.3 2.260 7.0 2.037	ANG 156.6 139.2 125.1 113.1 101.8 91.7 82.2 73.6 65.7 58.5 51.6 45.2 38.8 32.9 26.9 21.1 15.4 9.6 3.9 -1.7 -7.0 -12.4 -17.8 -23.0 -28.2 -33.5	.021 .037 .051 .060 .068 .076 .082 .089 .095 .103 .109 .115 .122 .129 .136 .143 .153 .160 .165 .171 .177 .186 .192 .199 .207	ANG 75.5 63.8 54.8 48.4 42.2 38.7 35.3 31.9 28.7 25.6 22.8 20.1 16.9 13.8 10.7 7.5 3.91 -3.8 -6.8 -10.1 -13.8 -17.2 -20.8 -23.9 -27.8	.949 .866 .767 .689 .623 .573 .531 .499 .472 .448 .429 .414 .398 .385 .374 .362 .353 .340 .326 .316 .304 .293 .284 .272 .261	ANG -11.9 -21.8 -28.2 -32.3 -35.2 -37.0 -38.1 -39.2 -39.9 -40.9 -41.2 -42.2 -42.8 -44.0 -45.0 -46.4 -47.9 -49.5 -51.1 -52.2 -53.7 -55.4 -57.0 -58.9 -60.8 -63.7
FREQUE  M 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150 160 170 180 190 200 210 220 230 240 250 260 270	HZ MA 00.00 84 00.00 66 00.00 66 00.00 67 00.00 33 00.00 33 00.00 22 00.00 26 00.00 26 00.00 26 00.00 26 00.00 36	S11  AG AN 49 -1: 64 -3: 81 -4: 12 -6: 34 -7: 73 -8: 14 -10: 39 -11: 39 -12: 14 -13: 95 -14: 83 -14: 75 -15: 70 -16: 67 -17: 68 -17: 73 17: 58 16: 94 16: 97 15: 17 14: 24 14: 34 14: 45 13:	9.1 8.397 4.1 8.259 9.1 7.901 3.6 7.397 8.0 7.006 9.5 6.297 1.5 5.833 2.1 5.352 2.2 4.924 1.4 4.557 0.2 4.219 8.3 3.935 6.2 3.672 3.3 3.448 0.3 3.242 6.4 3.081 7.8 2.927 2.2 2.783 0.1 2.540 5.4 2.445 1.6 2.347 7.3 2.260 3.6 2.107 0.2 2.105 7.0 2.037 4.0 1.977	ANG 156.6 139.2 125.1 113.1 101.8 91.7 82.2 73.6 65.7 58.5 51.6 45.2 38.8 32.9 26.9 21.1 15.4 9.6 3.9 -1.7 -7.0 -12.4 -17.8 -23.0 -28.2 -33.5 -38.6	.021 .037 .051 .060 .068 .076 .082 .089 .095 .103 .109 .115 .122 .129 .136 .143 .153 .160 .165 .171 .177 .186 .192 .199 .207	ANG 75.5 63.8 54.8 48.4 42.2 38.7 35.3 31.9 28.7 25.6 22.8 20.1 16.9 13.8 10.7 7.5 3.91 -3.8 -6.8 -10.1 -13.8 -17.2 -20.8 -23.9	.949 .866 .767 .689 .623 .573 .531 .499 .472 .448 .429 .414 .398 .385 .374 .362 .353 .340 .326 .316 .304 .293 .284 .272	ANG -11.9 -21.8 -28.2 -32.3 -35.2 -37.0 -38.1 -39.2 -39.9 -41.2 -42.2 -42.8 -44.0 -45.0 -46.4 -47.9 -49.5 -51.1 -52.2 -53.7 -55.4 -57.0 -58.9 -60.8
FREQUE  M 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150 160 170 180 190 200 210 220 230 240 250 260 270 280	HZ MA  00.00 84  00.00 66  00.00 67  00.00 67  00.00 37  00.00 37  00.00 29  00.00 27  00.00 27  00.00 27  00.00 27  00.00 37  00.00 37  00.00 37  00.00 37  00.00 37  00.00 38	S11  AG AN 49 -1: 64 -3: 81 -4: 64 -7: 73 -8: 14 -10: 71 -11: 39 -12: 39 -14: 31 -15: 70 -16: 67 -17: 68 -17: 68 -17: 73 17: 18 16: 19 17 14: 19 17 14: 19 18 18: 18 18 18: 18 18 18: 18 18 18: 18 18 18: 18 18 18: 18 18 18: 18 18 18 18: 18 18 18 18: 18 18 18 18: 18 18 18 18: 18 18 18 18: 18 18 18 18: 18 18 18 18 18: 18 18 18 18 18: 18 18 18 18 18 18 18 18 18 18 18 18 18 1	9.1 8.397 4.1 8.259 9.1 7.901 3.6 7.397 8.0 7.006 9.5 6.297 1.5 5.833 2.1 5.352 2.2 4.924 4.517 0.2 4.219 8.3 3.935 6.2 3.672 3.3 3.448 0.3 3.242 6.4 3.081 7.8 2.927 2.2 2.783 6.1 2.540 6.1 2.540 6.1 2.347 7.8 2.267 7.0 2.037 7.0 2.037 4.0 1.977 1.0 1.913 8.2 1.856	ANG 156.6 139.2 125.1 113.1 101.8 91.7 82.2 73.6 65.7 58.5 51.6 45.2 38.8 32.9 26.9 21.1 15.4 9.6 3.9 -1.7 -7.0 -12.4 -17.8 -23.0 -28.2 -33.5 -38.6 -43.8 -48.9	.021 .037 .051 .060 .068 .076 .082 .089 .095 .103 .109 .115 .122 .129 .136 .143 .153 .160 .165 .171 .177 .186 .192 .199 .207 .214 .221 .228 .235	ANG 75.5 63.8 54.8 48.4 42.2 38.7 35.3 31.9 28.7 25.6 22.8 20.1 16.9 13.8 10.7 7.5 3.91 -3.8 -6.8 -10.1 -13.8 -17.2 -20.8 -23.9 -27.8 -31.4	.949 .866 .767 .689 .623 .573 .531 .499 .472 .448 .429 .414 .398 .385 .374 .362 .353 .340 .326 .316 .304 .293 .284 .272 .261 .251 .241 .230	ANG -11.9 -21.8 -28.2 -32.3 -35.2 -37.0 -38.1 -39.9 -40.9 -41.2 -42.2 -42.8 -44.0 -45.0 -46.4 -47.9 -49.5 -51.1 -52.2 -53.7 -55.4 -57.0 -68.9 -60.8
FREQUE  M 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150 160 170 180 190 200 210 220 230 240 250 260 270 280 290	HZ MA  00.00 84  00.00 66  00.00 67  00.00 67  00.00 37  00.00 37  00.00 29  00.00 27  00.00 27  00.00 27  00.00 27  00.00 27  00.00 28  00.00 28  00.00 36	S11  AG AN 49 -1: 64 -3: 81 -4: 64 -7: 73 -8: 14 -10: 71 -11: 39 -12: 39 -14: 31 -15: 70 -16: 67 -17: 68 -17: 68 -17: 73 17: 18 16: 19 17 14: 19 17 14: 19 18 18: 18 18 18: 18 18 18: 18 18 18: 18 18 18: 18 18 18: 18 18 18: 18 18 18 18: 18 18 18 18: 18 18 18 18: 18 18 18 18: 18 18 18 18: 18 18 18 18: 18 18 18 18 18: 18 18 18 18 18: 18 18 18 18 18 18 18 18 18 18 18 18 18 1	9.1 8.397 4.1 8.259 9.1 7.901 3.6 7.397 8.0 7.006 9.5 6.297 1.5 5.833 2.1 5.352 2.2 4.924 4.517 0.2 4.219 8.3 3.935 6.2 3.672 3.3 3.448 0.3 3.242 6.4 3.081 7.8 2.927 2.2 2.783 6.1 2.540 6.1 2.540 6.1 2.347 7.8 2.267 7.0 2.037 7.0 2.037 4.0 1.977 1.0 1.913 8.2 1.856	ANG 156.6 139.2 125.1 113.1 101.8 91.7 82.2 73.6 65.7 58.5 51.6 45.2 38.8 32.9 26.9 21.1 15.4 9.6 3.9 -1.7 -7.0 -12.4 -17.8 -23.0 -28.2 -33.5 -38.6 -43.8 -48.9	.021 .037 .051 .060 .068 .076 .082 .089 .095 .103 .109 .115 .122 .129 .136 .143 .153 .160 .165 .171 .177 .186 .192 .199 .207 .214 .221	ANG 75.5 63.8 54.8 48.4 42.2 38.7 35.3 31.9 28.7 25.6 22.8 20.1 16.9 13.8 10.7 7.5 3.91 -3.8 -6.8 -10.1 -13.8 -17.2 -20.8 -23.9 -27.8 -31.4 -35.3	.949 .866 .767 .689 .623 .573 .531 .499 .472 .448 .429 .316 .304 .326 .316 .304 .293 .284 .272 .261 .251	ANG -11.9 -21.8 -28.2 -32.3 -35.2 -37.0 -38.1 -39.2 -39.9 -40.9 -41.2 -42.2 -42.8 -44.0 -45.0 -46.4 -47.9 -49.5 -51.1 -52.2 -53.7 -55.4 -57.0 -58.9 -60.8 -63.7 -65.9 -68.6

$V_{CE} = 1 \text{ V}, \text{ Ic} = 3 \text{ m/s}$	$A, Zo = 50 \Omega$	2						
FREQUENCY	S	11	S2	21	S	12	S	22
MHz	MAG	ANG	MAG	ANG	MAG	ANG	MAG	ANG
100.00	.928	-11.2	5.570	160.2	.022	78.7	.974	-8.7
200.00	.876	-22.9	5.562	146.9	.040	67.5	.928	-16.9
300.00	.821	-34.2	5.509	134.3	.057	57.4	.859	-23.0
400.00 500.00	.758 .705	-45.7 -56.7	5.289 5.198	123.2 113.1	.070 .081	49.7 43.3	.798 .738	-28.0 -32.0
600.00	.652	-66.1	4.787	103.2	.089	37.0	.689	-35.2
700.00	.588	-76.8	4.617	93.6	.097	31.9	.640	-37.5
800.00	.535	-87.1	4.406	84.1	.103	27.6	.601	-39.4
900.00	.484	-97.1	4.187	75.5	.108	23.9	.565	-41.0
1000.00	.438 .401	-107.0	3.986 3.771	67.1	.115 .120	20.3 16.5	.533 .508	-42.6 -43.6
1100.00 1200.00	.371	-116.3 -125.4	3.771	59.1 51.8	.120	13.4	.486	-43.6 -44.7
1300.00	.350	-133.4	3.362	44.8	.131	10.3	.468	-45.7
1400.00	.333	-141.3	3.177	38.3	.137	7.0	.449	-47.2
1500.00	.320	-148.7	3.015	31.8	.143	4.1	.436	-48.3
1600.00	.312	-156.1	2.872	25.8	.149	1.1	.421	-49.7
1700.00 1800.00	.310 .310	-162.9 -170.2	2.745 2.623	19.5 13.4	.157 .162	-2.5 -6.5	.408 .391	-51.4 -52.9
1900.00	.309	-177.5	2.514	7.3	.165	-9.7	.377	-54.2
2000.00	.310	175.4	2.407	1.4	.171	-12.7	.366	-55.5
2100.00	.313	169.8	2.318	-4.2	.177	-16.1	.351	-57.2
2200.00	.317	164.9	2.227	-9.8	.182	-19.1	.343	-58.5
2300.00 2400.00	.324 .331	159.5 155.0	2.157 2.076	-15.4 -20.8	.188 .194	-22.3 -25.6	.330 .319	-60.4 -62.2
2500.00	.338	150.6	2.070	-20.8 -26.2	.200	-28.8	.307	-62.2 -64.1
2600.00	.346	146.5	1.947	-31.7	.207	-32.4	.296	-66.8
2700.00	.356	142.6	1.894	-36.9	.213	-35.6	.285	-69.0
2800.00	.365	139.0	1.833	-42.3	.220	-39.1	.274	-71.8
2900.00 3000.00	.375 .386	135.7 132.4	1.782 1.737	-47.5 -52.7	.226 .234	-42.7 -46.1	.265 .254	-74.3 -77.2
0000.00	.000	102.1	11.707	02.7	.20 .	10.1	.201	,,,_
$V_{CE} = 1 \text{ V} \cdot I_{C} = 1 \text{ m/s}$	$7_0 = 50.0$	)						
Vce = 1 V, Ic = 1 mA		<u>2</u> 11	S2	21	S	12	S	22
FREQUENCY	S	11				112		
FREQUENCY MHz	S MAG	11 ANG	MAG	ANG	MAG	ANG	MAG	ANG
FREQUENCY MHz 100.00	MAG .983	11 ANG -6.8	MAG 1.986	ANG 166.5	MAG .022	ANG 83.1	MAG .993	ANG -4.6
FREQUENCY MHz	S MAG	11 ANG	MAG	ANG 166.5 156.0	MAG .022 .044	ANG	MAG .993 .983	ANG
FREQUENCY  MHz 100.00 200.00 300.00 400.00	MAG .983 .968 .952 .925	ANG -6.8 -14.0 -21.0 -28.5	MAG 1.986 2.016 2.067 2.064	ANG 166.5 156.0 145.7 135.9	MAG .022 .044 .064 .083	ANG 83.1 73.1 65.2 56.7	MAG .993 .983 .959	ANG -4.6 -9.3 -13.6 -17.7
FREQUENCY  MHz 100.00 200.00 300.00 400.00 500.00	MAG .983 .968 .952 .925	ANG -6.8 -14.0 -21.0 -28.5 -35.3	MAG 1.986 2.016 2.067 2.064 2.096	ANG 166.5 156.0 145.7 135.9 127.1	MAG .022 .044 .064 .083	ANG 83.1 73.1 65.2 56.7 49.8	MAG .993 .983 .959 .942	ANG -4.6 -9.3 -13.6 -17.7 -21.6
MHz 100.00 200.00 300.00 400.00 500.00 600.00	MAG .983 .968 .952 .925 .904 .878	ANG -6.8 -14.0 -21.0 -28.5 -35.3 -41.8	MAG 1.986 2.016 2.067 2.064 2.096 1.992	ANG 166.5 156.0 145.7 135.9 127.1 118.1	MAG .022 .044 .064 .083 .100	ANG 83.1 73.1 65.2 56.7 49.8 42.7	MAG .993 .983 .959 .942 .913	ANG -4.6 -9.3 -13.6 -17.7 -21.6 -25.2
FREQUENCY  MHz 100.00 200.00 300.00 400.00 500.00 600.00 700.00	MAG .983 .968 .952 .925 .904 .878 .844	ANG -6.8 -14.0 -21.0 -28.5 -35.3 -41.8 -48.6	MAG 1.986 2.016 2.067 2.064 2.096 1.992 1.971	ANG 166.5 156.0 145.7 135.9 127.1 118.1 109.4	MAG .022 .044 .064 .083 .100 .116 .129	ANG 83.1 73.1 65.2 56.7 49.8 42.7 35.5	MAG .993 .983 .959 .942 .913 .889	ANG -4.6 -9.3 -13.6 -17.7 -21.6 -25.2 -28.5
MHz 100.00 200.00 300.00 400.00 500.00 600.00	MAG .983 .968 .952 .925 .904 .878 .844	ANG -6.8 -14.0 -21.0 -28.5 -35.3 -41.8 -48.6 -55.6	MAG 1.986 2.016 2.067 2.064 2.096 1.992 1.971 1.945	ANG 166.5 156.0 145.7 135.9 127.1 118.1 109.4 100.6	MAG .022 .044 .064 .083 .100 .116 .129	ANG 83.1 73.1 65.2 56.7 49.8 42.7 35.5 28.7	MAG .993 .983 .959 .942 .913 .889 .859	ANG -4.6 -9.3 -13.6 -17.7 -21.6 -25.2 -28.5 -31.7
FREQUENCY  MHz 100.00 200.00 300.00 400.00 500.00 600.00 700.00 800.00	MAG .983 .968 .952 .925 .904 .878 .844 .816 .782 .749	ANG -6.8 -14.0 -21.0 -28.5 -35.3 -41.8 -48.6 -55.6 -62.3 -69.9	MAG 1.986 2.016 2.067 2.064 2.096 1.992 1.971 1.945 1.900 1.926	ANG 166.5 156.0 145.7 135.9 127.1 118.1 109.4 100.6 92.3 84.3	MAG .022 .044 .064 .083 .100 .116 .129 .141 .151	ANG 83.1 73.1 65.2 56.7 49.8 42.7 35.5 28.7 22.5 16.3	MAG .993 .983 .959 .942 .913 .889 .859 .829 .795	ANG -4.6 -9.3 -13.6 -17.7 -21.6 -25.2 -28.5 -31.7 -34.8 -37.4
FREQUENCY  MHz 100.00 200.00 300.00 400.00 500.00 600.00 700.00 800.00 900.00 1000.00	MAG .983 .968 .952 .925 .904 .878 .844 .816 .782 .749	ANG -6.8 -14.0 -21.0 -28.5 -35.3 -41.8 -48.6 -55.6 -62.3 -69.9 -77.8	MAG 1.986 2.016 2.067 2.064 2.096 1.992 1.971 1.945 1.900 1.926 1.940	ANG 166.5 156.0 145.7 135.9 127.1 118.1 109.4 100.6 92.3 84.3 76.0	MAG .022 .044 .064 .083 .100 .116 .129 .141 .151 .159	ANG 83.1 73.1 65.2 56.7 49.8 42.7 35.5 28.7 22.5 16.3 11.1	MAG .993 .983 .959 .942 .913 .889 .859 .829 .795 .765	ANG -4.6 -9.3 -13.6 -17.7 -21.6 -25.2 -28.5 -31.7 -34.8 -37.4 -39.7
FREQUENCY  MHz 100.00 200.00 300.00 400.00 500.00 600.00 700.00 800.00 900.00 1100.00 1200.00	MAG .983 .968 .952 .925 .904 .878 .844 .816 .782 .749 .709 .673	ANG -6.8 -14.0 -21.0 -28.5 -35.3 -41.8 -48.6 -55.6 -62.3 -69.9 -77.8 -85.8	MAG 1.986 2.016 2.067 2.064 2.096 1.992 1.971 1.945 1.900 1.926 1.940 1.952	ANG 166.5 156.0 145.7 135.9 127.1 118.1 109.4 100.6 92.3 84.3 76.0 68.2	MAG .022 .044 .064 .083 .100 .116 .129 .141 .151 .159 .166	ANG 83.1 73.1 65.2 56.7 49.8 42.7 35.5 28.7 22.5 16.3 11.1 5.8	MAG .993 .983 .959 .942 .913 .889 .859 .829 .795 .765 .736	ANG -4.6 -9.3 -13.6 -17.7 -21.6 -25.2 -28.5 -31.7 -34.8 -37.4 -39.7 -42.0
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 .983 .968 .952 .925 .904 .878 .844 .816 .782 .749 .709 .673 .639	ANG -6.8 -14.0 -21.0 -28.5 -35.3 -41.8 -48.6 -55.6 -62.3 -69.9 -77.8 -85.8 -92.8	MAG 1.986 2.016 2.067 2.064 2.096 1.992 1.971 1.945 1.900 1.926 1.940 1.952 1.904	ANG 166.5 156.0 145.7 135.9 127.1 118.1 109.4 100.6 92.3 84.3 76.0 68.2 60.4	MAG .022 .044 .064 .083 .100 .116 .129 .141 .151 .159 .166 .172	ANG 83.1 73.1 65.2 56.7 49.8 42.7 35.5 28.7 22.5 16.3 11.1 5.8	MAG .993 .983 .959 .942 .913 .889 .859 .829 .795 .765 .736 .709	ANG -4.6 -9.3 -13.6 -17.7 -21.6 -25.2 -28.5 -31.7 -34.8 -37.4 -39.7 -42.0 -44.2
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 .983 .968 .952 .925 .904 .878 .844 .816 .782 .749 .709 .673 .639	ANG -6.8 -14.0 -21.0 -28.5 -35.3 -41.8 -48.6 -55.6 -62.3 -69.9 -77.8 -85.8 -92.8 -100.6	MAG 1.986 2.016 2.067 2.064 2.096 1.992 1.971 1.945 1.900 1.926 1.940 1.952 1.904 1.889	ANG 166.5 156.0 145.7 135.9 127.1 118.1 109.4 100.6 92.3 84.3 76.0 68.2 60.4 52.8	MAG .022 .044 .064 .083 .100 .116 .129 .141 .151 .159 .166 .172 .178	ANG 83.1 73.1 65.2 56.7 49.8 42.7 35.5 28.7 22.5 16.3 11.1 5.8 .8 -3.9	MAG .993 .983 .959 .942 .913 .889 .859 .829 .795 .765 .736 .709 .686	ANG -4.6 -9.3 -13.6 -17.7 -21.6 -25.2 -28.5 -31.7 -34.8 -37.4 -39.7 -42.0 -44.2 -46.3
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 .983 .968 .952 .925 .904 .878 .844 .816 .782 .749 .709 .673 .639	ANG -6.8 -14.0 -21.0 -28.5 -35.3 -41.8 -48.6 -55.6 -62.3 -69.9 -77.8 -85.8 -92.8	MAG 1.986 2.016 2.067 2.064 2.096 1.992 1.971 1.945 1.900 1.926 1.940 1.952 1.904	ANG 166.5 156.0 145.7 135.9 127.1 118.1 109.4 100.6 92.3 84.3 76.0 68.2 60.4	MAG .022 .044 .064 .083 .100 .116 .129 .141 .151 .159 .166 .172	ANG 83.1 73.1 65.2 56.7 49.8 42.7 35.5 28.7 22.5 16.3 11.1 5.8	MAG .993 .983 .959 .942 .913 .889 .859 .829 .795 .765 .736 .709	ANG -4.6 -9.3 -13.6 -17.7 -21.6 -25.2 -28.5 -31.7 -34.8 -37.4 -39.7 -42.0 -44.2
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 .983 .968 .952 .925 .904 .878 .844 .816 .782 .749 .709 .673 .639 .606 .578 .551	ANG -6.8 -14.0 -21.0 -28.5 -35.3 -41.8 -48.6 -55.6 -62.3 -69.9 -77.8 -85.8 -92.8 -100.6 -107.5 -114.6 -122.6	MAG 1.986 2.016 2.067 2.064 2.096 1.992 1.971 1.945 1.900 1.926 1.940 1.952 1.904 1.889 1.837 1.801 1.782	ANG 166.5 156.0 145.7 135.9 127.1 118.1 109.4 100.6 92.3 84.3 76.0 68.2 60.4 52.8 45.2 38.0 30.7	MAG .022 .044 .064 .083 .100 .116 .129 .141 .151 .159 .166 .172 .178 .182 .185 .189 .195	ANG 83.1 73.1 65.2 56.7 49.8 42.7 35.5 28.7 22.5 16.3 11.1 5.8 8 -3.9 -8.9 -12.8 -17.6	MAG .993 .983 .959 .942 .913 .889 .859 .829 .795 .765 .736 .709 .686 .661 .641	ANG -4.6 -9.3 -13.6 -17.7 -21.6 -25.2 -28.5 -31.7 -34.8 -37.4 -39.7 -42.0 -44.2 -46.3 -48.2 -50.2 -52.2
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 .983 .968 .952 .925 .904 .878 .844 .816 .782 .749 .709 .673 .639 .606 .578 .551 .526	ANG -6.8 -14.0 -21.0 -28.5 -35.3 -41.8 -48.6 -55.6 -62.3 -69.9 -77.8 -85.8 -92.8 -100.6 -107.5 -114.6 -122.6 -129.5	MAG 1.986 2.016 2.067 2.064 2.096 1.992 1.971 1.945 1.900 1.926 1.940 1.952 1.904 1.889 1.837 1.801 1.782 1.727	ANG 166.5 156.0 145.7 135.9 127.1 118.1 109.4 100.6 92.3 84.3 76.0 68.2 60.4 52.8 45.2 38.0 30.7 23.8	MAG .022 .044 .064 .083 .100 .116 .129 .141 .151 .159 .166 .172 .178 .182 .185 .189 .195 .196	ANG 83.1 73.1 65.2 56.7 49.8 42.7 35.5 28.7 22.5 16.3 11.1 5.8 8 -3.9 -8.9 -12.8 -17.6 -22.3	MAG .993 .983 .959 .942 .913 .889 .859 .795 .765 .736 .709 .686 .661 .641 .621 .603 .582	ANG -4.6 -9.3 -13.6 -17.7 -21.6 -25.2 -28.5 -31.7 -34.8 -37.4 -39.7 -42.0 -44.2 -46.3 -48.2 -50.2 -52.2 -54.4
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 .983 .968 .952 .925 .904 .878 .844 .816 .782 .749 .709 .673 .639 .606 .578 .551 .526 .509	ANG -6.8 -14.0 -21.0 -28.5 -35.3 -41.8 -48.6 -55.6 -62.3 -69.9 -77.8 -85.8 -92.8 -100.6 -107.5 -114.6 -122.6 -129.5 -137.3	MAG 1.986 2.016 2.067 2.064 2.096 1.992 1.971 1.945 1.900 1.926 1.940 1.952 1.904 1.889 1.837 1.801 1.782 1.727	ANG 166.5 156.0 145.7 135.9 127.1 118.1 109.4 100.6 92.3 84.3 76.0 68.2 60.4 52.8 45.2 38.0 30.7 23.8 16.9	MAG .022 .044 .064 .083 .100 .116 .129 .141 .151 .159 .166 .172 .178 .182 .185 .189 .195 .196 .196	ANG 83.1 73.1 65.2 56.7 49.8 42.7 35.5 28.7 22.5 16.3 11.1 5.8 -3.9 -8.9 -12.8 -17.6 -22.3 -26.3	MAG .993 .983 .959 .942 .913 .889 .859 .795 .765 .736 .709 .686 .661 .641 .621 .603 .582 .562	ANG -4.6 -9.3 -13.6 -17.7 -21.6 -25.2 -28.5 -31.7 -34.8 -37.4 -39.7 -42.0 -44.2 -46.3 -48.2 -50.2 -52.2 -54.4 -56.1
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 1900.00	MAG .983 .968 .952 .925 .904 .878 .844 .816 .782 .749 .709 .673 .639 .606 .578 .551 .526 .509 .487	ANG -6.8 -14.0 -21.0 -28.5 -35.3 -41.8 -48.6 -55.6 -62.3 -69.9 -77.8 -85.8 -92.8 -100.6 -107.5 -114.6 -122.6 -129.5 -137.3 -145.4	MAG 1.986 2.016 2.067 2.064 2.096 1.992 1.971 1.945 1.900 1.926 1.940 1.952 1.904 1.889 1.837 1.801 1.782 1.727 1.702	ANG 166.5 156.0 145.7 135.9 127.1 118.1 109.4 100.6 92.3 84.3 76.0 68.2 60.4 52.8 45.2 38.0 30.7 23.8 16.9 9.8	MAG .022 .044 .064 .083 .100 .116 .129 .141 .151 .159 .166 .172 .178 .182 .185 .189 .195 .196 .196 .196	ANG 83.1 73.1 65.2 56.7 49.8 42.7 35.5 28.7 22.5 16.3 11.1 5.8 8 -3.9 -8.9 -12.8 -17.6 -22.3 -26.3 -30.1	MAG .993 .983 .959 .942 .913 .889 .859 .795 .765 .736 .709 .686 .661 .641 .621 .603 .582 .562	ANG -4.6 -9.3 -13.6 -17.7 -21.6 -25.2 -28.5 -31.7 -34.8 -37.4 -39.7 -42.0 -44.2 -46.3 -48.2 -50.2 -54.4 -56.1 -57.9
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 .983 .968 .952 .925 .904 .878 .844 .816 .782 .749 .709 .673 .639 .606 .578 .551 .526 .509	ANG -6.8 -14.0 -21.0 -28.5 -35.3 -41.8 -48.6 -55.6 -62.3 -69.9 -77.8 -85.8 -92.8 -100.6 -107.5 -114.6 -122.6 -129.5 -137.3	MAG 1.986 2.016 2.067 2.064 2.096 1.992 1.971 1.945 1.900 1.926 1.940 1.952 1.904 1.889 1.837 1.801 1.782 1.727	ANG 166.5 156.0 145.7 135.9 127.1 118.1 109.4 100.6 92.3 84.3 76.0 68.2 60.4 52.8 45.2 38.0 30.7 23.8 16.9	MAG .022 .044 .064 .083 .100 .116 .129 .141 .151 .159 .166 .172 .178 .182 .185 .189 .195 .196 .196	ANG 83.1 73.1 65.2 56.7 49.8 42.7 35.5 28.7 22.5 16.3 11.1 5.8 -3.9 -8.9 -12.8 -17.6 -22.3 -26.3	MAG .993 .983 .959 .942 .913 .889 .859 .795 .765 .736 .709 .686 .661 .641 .621 .603 .582 .562	ANG -4.6 -9.3 -13.6 -17.7 -21.6 -25.2 -28.5 -31.7 -34.8 -37.4 -39.7 -42.0 -44.2 -46.3 -48.2 -50.2 -52.2 -54.4 -56.1
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	MAG .983 .968 .952 .925 .904 .878 .844 .816 .782 .749 .709 .673 .639 .606 .578 .551 .526 .509 .487 .466 .454 .446	ANG -6.8 -14.0 -21.0 -28.5 -35.3 -41.8 -48.6 -55.6 -62.3 -69.9 -77.8 -85.8 -92.8 -100.6 -107.5 -114.6 -122.6 -129.5 -137.3 -145.4 -152.5 -159.2 -166.3	MAG 1.986 2.016 2.067 2.064 2.096 1.992 1.971 1.945 1.900 1.926 1.940 1.952 1.904 1.889 1.837 1.801 1.782 1.727 1.702 1.674 1.637 1.590 1.571	ANG 166.5 156.0 145.7 135.9 127.1 118.1 109.4 100.6 92.3 84.3 76.0 68.2 60.4 52.8 45.2 38.0 30.7 23.8 16.9 9.8 3.4 -3.1 -9.5	MAG .022 .044 .064 .083 .100 .116 .129 .141 .151 .159 .166 .172 .178 .182 .185 .189 .195 .196 .196 .198 .198 .198 .199 .200	ANG 83.1 73.1 65.2 56.7 49.8 42.7 35.5 28.7 22.5 16.3 11.1 5.8 8 -3.9 -8.9 -12.8 -17.6 -22.3 -26.3 -30.1 -33.7 -36.9 -40.5	MAG .993 .983 .959 .942 .913 .889 .859 .795 .765 .736 .709 .686 .661 .641 .621 .603 .582 .562 .548 .530 .519	ANG -4.6 -9.3 -13.6 -17.7 -21.6 -25.2 -28.5 -31.7 -34.8 -37.4 -39.7 -42.0 -44.2 -46.3 -48.2 -50.2 -54.4 -56.1 -57.9 -59.6 -61.7 -63.5
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 2400.00	MAG .983 .968 .952 .925 .904 .878 .844 .816 .782 .749 .709 .673 .639 .606 .578 .551 .526 .509 .487 .466 .454 .446 .437	ANG -6.8 -14.0 -21.0 -28.5 -35.3 -41.8 -48.6 -55.6 -62.3 -69.9 -77.8 -85.8 -92.8 -100.6 -107.5 -114.6 -122.6 -129.5 -137.3 -145.4 -152.5 -159.2 -166.3 -172.8	MAG 1.986 2.016 2.067 2.064 2.096 1.992 1.971 1.945 1.900 1.926 1.940 1.952 1.904 1.889 1.837 1.801 1.782 1.727 1.702 1.674 1.637 1.590 1.571	ANG 166.5 156.0 145.7 135.9 127.1 118.1 109.4 100.6 92.3 84.3 76.0 68.2 60.4 52.8 45.2 38.0 30.7 23.8 16.9 9.8 3.4 -3.1 -9.5 -15.7	MAG .022 .044 .064 .083 .100 .116 .129 .141 .151 .159 .166 .172 .178 .182 .185 .189 .195 .196 .196 .198 .198 .199 .200 .201	ANG 83.1 73.1 65.2 56.7 49.8 42.7 35.5 28.7 22.5 16.3 11.1 5.8 8 -3.9 -8.9 -12.8 -17.6 -22.3 -26.3 -30.1 -33.7 -36.9 -40.5 -43.8	MAG .993 .983 .989 .942 .913 .889 .859 .795 .765 .736 .709 .686 .661 .641 .621 .603 .582 .562 .548 .530 .519 .502	ANG -4.6 -9.3 -13.6 -17.7 -21.6 -25.2 -28.5 -31.7 -34.8 -37.4 -39.7 -42.0 -44.2 -46.3 -48.2 -50.2 -54.4 -56.1 -57.9 -59.6 -61.7 -63.5 -65.7
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 2100.00 2300.00 2400.00 2500.00	MAG .983 .968 .952 .925 .904 .878 .844 .816 .782 .749 .709 .673 .639 .606 .578 .551 .526 .509 .487 .466 .454 .446 .437 .433	ANG -6.8 -14.0 -21.0 -28.5 -35.3 -41.8 -48.6 -55.6 -62.3 -69.9 -77.8 -85.8 -92.8 -100.6 -107.5 -114.6 -122.6 -129.5 -137.3 -145.4 -152.5 -159.2 -166.3 -172.8 -179.0	MAG 1.986 2.016 2.067 2.064 2.096 1.992 1.971 1.945 1.900 1.926 1.940 1.952 1.904 1.889 1.837 1.801 1.782 1.727 1.702 1.674 1.637 1.590 1.571 1.520 1.488	ANG 166.5 156.0 145.7 135.9 127.1 118.1 109.4 100.6 92.3 84.3 76.0 68.2 60.4 52.8 45.2 38.0 30.7 23.8 16.9 9.8 3.4 -3.1 -9.5 -15.7 -21.7	MAG .022 .044 .064 .083 .100 .116 .129 .141 .151 .159 .166 .172 .178 .182 .185 .189 .195 .196 .196 .198 .198 .199 .200 .201 .201	ANG 83.1 73.1 65.2 56.7 49.8 42.7 35.5 28.7 22.5 16.3 11.1 5.8 8 -3.9 -8.9 -12.8 -17.6 -22.3 -26.3 -30.1 -33.7 -36.9 -40.5 -43.8 -46.5	MAG .993 .983 .989 .942 .913 .889 .859 .829 .795 .765 .736 .709 .686 .661 .641 .621 .603 .582 .562 .548 .530 .519 .502 .490 .477	ANG -4.6 -9.3 -13.6 -17.7 -21.6 -25.2 -28.5 -31.7 -34.8 -37.4 -39.7 -42.0 -44.2 -46.3 -48.2 -50.2 -54.4 -56.1 -57.9 -59.6 -61.7 -63.5 -65.7 -67.7
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	MAG .983 .968 .952 .925 .904 .878 .844 .816 .782 .749 .709 .673 .639 .606 .578 .551 .526 .509 .487 .466 .454 .446 .437 .433 .430	ANG -6.8 -14.0 -21.0 -28.5 -35.3 -41.8 -48.6 -55.6 -62.3 -69.9 -77.8 -85.8 -92.8 -100.6 -107.5 -114.6 -122.6 -129.5 -137.3 -145.4 -152.5 -159.2 -166.3 -172.8 -179.0 174.8	MAG 1.986 2.016 2.067 2.064 2.096 1.992 1.971 1.945 1.900 1.926 1.940 1.952 1.904 1.889 1.837 1.801 1.782 1.727 1.702 1.674 1.637 1.590 1.571 1.520 1.488 1.459	ANG 166.5 156.0 145.7 135.9 127.1 118.1 109.4 100.6 92.3 84.3 76.0 68.2 60.4 52.8 45.2 38.0 30.7 23.8 16.9 9.8 3.4 -3.1 -9.5 -15.7 -21.7 -27.8	MAG .022 .044 .064 .083 .100 .116 .129 .141 .151 .159 .166 .172 .178 .182 .185 .189 .195 .196 .196 .198 .198 .199 .200 .201 .201	ANG 83.1 73.1 65.2 56.7 49.8 42.7 35.5 28.7 22.5 16.3 11.1 5.8 8 -3.9 -8.9 -12.8 -17.6 -22.3 -26.3 -30.1 -33.7 -36.9 -40.5 -43.8 -46.5 -49.3	MAG .993 .983 .989 .942 .913 .889 .859 .829 .795 .765 .736 .709 .686 .661 .641 .621 .603 .582 .562 .548 .530 .519 .502 .490 .477 .466	ANG -4.6 -9.3 -13.6 -17.7 -21.6 -25.2 -28.5 -31.7 -34.8 -37.4 -39.7 -42.0 -44.2 -46.3 -48.2 -50.2 -54.4 -56.1 -57.9 -59.6 -61.7 -63.5 -65.7 -67.7 -70.0
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 2400.00 2500.00 2600.00 2700.00	MAG .983 .968 .952 .925 .904 .878 .844 .816 .782 .749 .709 .673 .639 .606 .578 .551 .526 .509 .487 .466 .454 .446 .437 .433 .430 .429	ANG -6.8 -14.0 -21.0 -28.5 -35.3 -41.8 -48.6 -55.6 -62.3 -69.9 -77.8 -85.8 -92.8 -100.6 -107.5 -114.6 -122.6 -129.5 -137.3 -145.4 -152.5 -159.2 -166.3 -172.8 -179.0 174.8 169.2	MAG 1.986 2.016 2.067 2.064 2.096 1.992 1.971 1.945 1.900 1.926 1.940 1.952 1.904 1.889 1.837 1.801 1.782 1.727 1.702 1.674 1.637 1.590 1.571 1.520 1.488 1.459 1.425	ANG 166.5 156.0 145.7 135.9 127.1 118.1 109.4 100.6 92.3 84.3 76.0 68.2 60.4 52.8 45.2 38.0 30.7 23.8 16.9 9.8 3.4 -3.1 -9.5 -15.7 -21.7 -27.8 -33.7	MAG .022 .044 .064 .083 .100 .116 .129 .141 .151 .159 .166 .172 .178 .182 .185 .189 .195 .196 .196 .198 .198 .199 .200 .201 .201 .203 .204	ANG 83.1 73.1 65.2 56.7 49.8 42.7 35.5 28.7 22.5 16.3 11.1 5.8 -3.9 -8.9 -12.8 -17.6 -22.3 -26.3 -30.1 -33.7 -36.9 -40.5 -43.8 -46.5 -49.3 -52.3	MAG .993 .983 .983 .959 .942 .913 .889 .859 .795 .765 .736 .709 .686 .661 .641 .621 .603 .582 .562 .548 .530 .519 .502 .490 .477 .466 .453	ANG -4.6 -9.3 -13.6 -17.7 -21.6 -25.2 -28.5 -31.7 -34.8 -37.4 -39.7 -42.0 -44.2 -46.3 -48.2 -50.2 -54.4 -56.1 -57.9 -59.6 -61.7 -63.5 -65.7 -70.0 -72.4
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	MAG .983 .968 .952 .925 .904 .878 .844 .816 .782 .749 .709 .673 .639 .606 .578 .551 .526 .509 .487 .466 .454 .446 .437 .433 .430	ANG -6.8 -14.0 -21.0 -28.5 -35.3 -41.8 -48.6 -55.6 -62.3 -69.9 -77.8 -85.8 -92.8 -100.6 -107.5 -114.6 -122.6 -129.5 -137.3 -145.4 -152.5 -159.2 -166.3 -172.8 -179.0 174.8	MAG 1.986 2.016 2.067 2.064 2.096 1.992 1.971 1.945 1.900 1.926 1.940 1.952 1.904 1.889 1.837 1.801 1.782 1.727 1.702 1.674 1.637 1.590 1.571 1.520 1.488 1.459	ANG 166.5 156.0 145.7 135.9 127.1 118.1 109.4 100.6 92.3 84.3 76.0 68.2 60.4 52.8 45.2 38.0 30.7 23.8 16.9 9.8 3.4 -3.1 -9.5 -15.7 -21.7 -27.8	MAG .022 .044 .064 .083 .100 .116 .129 .141 .151 .159 .166 .172 .178 .182 .185 .189 .195 .196 .196 .198 .198 .199 .200 .201 .201	ANG 83.1 73.1 65.2 56.7 49.8 42.7 35.5 28.7 22.5 16.3 11.1 5.8 8 -3.9 -8.9 -12.8 -17.6 -22.3 -26.3 -30.1 -33.7 -36.9 -40.5 -43.8 -46.5 -49.3	MAG .993 .983 .989 .942 .913 .889 .859 .829 .795 .765 .736 .709 .686 .661 .641 .621 .603 .582 .562 .548 .530 .519 .502 .490 .477 .466	ANG -4.6 -9.3 -13.6 -17.7 -21.6 -25.2 -28.5 -31.7 -34.8 -37.4 -39.7 -42.0 -44.2 -46.3 -48.2 -50.2 -54.4 -56.1 -57.9 -59.6 -61.7 -63.5 -65.7 -67.7 -70.0

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