## SILICON TRANSISTOR

2SC5014

### HIGH FREQUENCY LOW NOISE AMPLIFIER NPN SILICON EPITAXIAL TRANSISTOR 4 PINS SUPER MINI MOLD

#### **FEATURES**

- Small Package
- WWW.DZSC.COM High Gain Bandwidth Product (f⊤ = 12 GHz TYP.)
- Low Noise, High Gain
- Low Voltage Operation

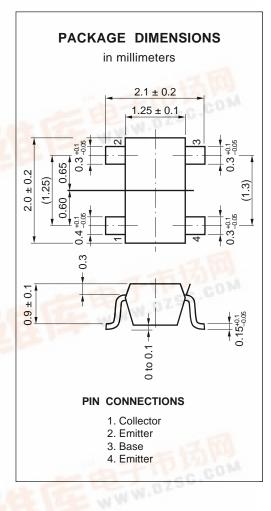
#### ORDERING INFORMATION

PART NUMBER	QUANTITY	PACKING STYLE
2SC5014-T1	3 Kpcs/Reel.	Embossed tape 8 mm wide. Pin3 (Base), Pin4 (Emitter) face to perforation side of the tape.
2SC5014-T2	3 Kpcs/Reel.	Embossed tape 8 mm wide. Pin1 (Collector), Pin2 (Emitter) face to perforation side of the tape.

Please contact with responsible NEC person, if you require evaluation sample. Unit sample quantity shall be 50 pcs. (Part No.: 2SC5014)

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

Collector to Base Voltage	Vсво	9	V	
Collector to Emitter Voltage	Vceo	6	V	
Emitter to Base Voltage	VEBO	2	V	
Collector Current	Ic	10	mΑ	
Total Power Dissipation	Рт	60	mW	
Junction Temperature	$T_j$	150	°C	
Storage Temperature	Tstg	-65 to +150	°C	







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

CHARACTERISTIC	SYMBOL	MIN.	TYP.	MAX.	UNIT	TEST CONDITION
Collector Cutoff Current	Ісво			0.1	μΑ	Vcb = 5 V, IE = 0
Emitter Cutoff Current	ІЕВО			0.1	μΑ	V <sub>EB</sub> = 1 V, I <sub>C</sub> = 0
DC Current Gain	hfe	75		150		VcE = 3 V, Ic = 5 mA*1
Gain Bandwidth Product	f⊤		12		GHz	VcE = 3 V, Ic = 5 mA
Feed-back Capacitance	Cre		0.2	0.4	pF	Vcb = 3 V, IE = 0, f = 1 MHz*2
Insertion Power Gain	S <sub>21e</sub>   <sup>2</sup>	9	11		dB	VcE = 3 V, Ic = 5 mA, f = 2.0 GHz
Noise Figure	NF		2.5	4.0	dB	VcE = 3 V, Ic = 3 mA, f = 2.0 GHz

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

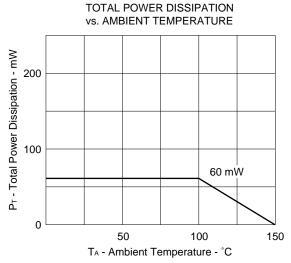
#### **h**FE Classification

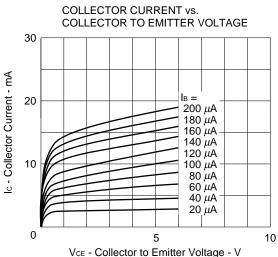
Rank	КВ
Marking	T82
hfe	75 to 150

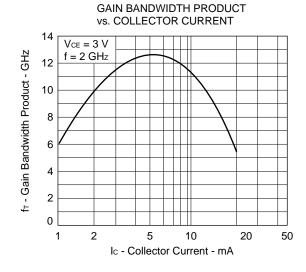
<sup>\*2</sup> Measured with 3 terminals bridge, Emitter and Case should be grounded.

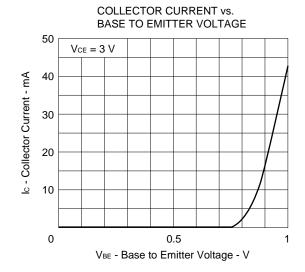
### **NEC**

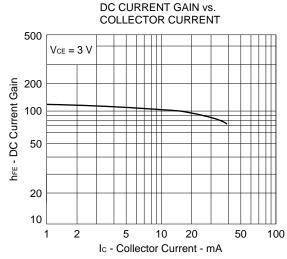
#### TYPICAL CHARACTERISTICS (TA = 25 °C)

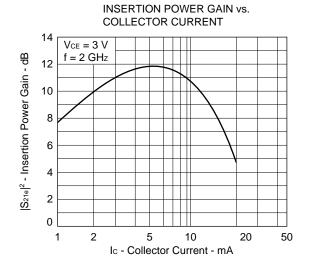


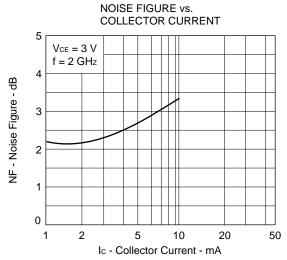


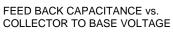


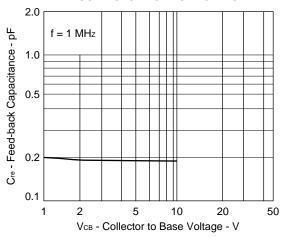




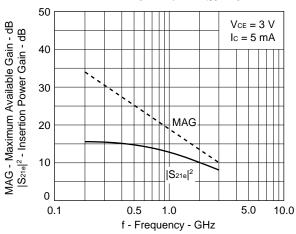








# INSERTION POWER GAIN/MAXIMUM AVAILABLE GAIN vs. FREQUENCY





### **S-PARAMETER**

Vce = 3 V, Ic = 5 mA

FREQUENCY	S	S <sub>11</sub>	Sz	21	S	12	5	S <sub>22</sub>
f (MHz)	MAG	ANG	MAG	ANG	MAG	ANG	MAG	ANG
100.00	.823	-8.8	11.035	169.7	.009	88.8	.985	-5.7
200.00 300.00	.793 .749	-18.1 -26.0	10.640 10.141	159.5 150.5	.020 .033	84.1 72.2	.957	-11.0
400.00	.695	-26.0 -33.0	9.390	142.2	.033	73.5	.930 .885	–15.8 –20.1
500.00	.635	-39.4	8.859	134.0	.042	68.9	.842	-23.8
600.00	.590	-45.4	8.274	127.8	.055	63.7	.795	-26.8
700.00	.539	-51.0	7.737	121.6	.059	64.9	.761	-29.5
800.00	.498	-55.5	7.130	116.0	.069	60.0	.720	-32.3
900.00	.448	-59.6	6.637	111.1	.073	60.3	.685	-33.3
1000.00	.410	-63.7	6.241	106.5	.078	58.1	.666	-34.7
1100.00	.374	-67.3	5.816	102.6	.079	56.9	.638	-36.7
1200.00	.340	-70.7	5.403	98.4	.084	58.3	.619	-38.1
1300.00	.306	-74.1	5.119	95.1	.094	57.5	.591	-39.6
1400.00 1500.00	.285 .249	–77.1 –80.7	4.838 4.587	91.6 88.1	.094 .102	56.5 55.4	.577 .556	-40.9 -42.0
1600.00	.230	-82.9	4.351	85.2	.110	54.0	.544	-42.0 -43.2
1700.00	.211	-90.3	4.155	82.8	.110	54.5	.520	-44.4
1800.00	.189	-93.1	3.961	79.7	.116	52.7	.520	-46.1
1900.00	.180	-93.5	3.780	77.3	.123	51.6	.508	-47.4
2000.00	.160	-101.3	3.645	74.1	.124	50.4	.505	-49.4
2100.00	.132	-103.4	3.473	71.8	.126	51.8	.485	-50.7
2200.00	.116	-113.9	3.340	68.6	.139	50.2	.477	-51.6
2300.00	.112	-115.1	3.199	67.1	.140	50.2	.481	-52.4
2400.00	.091	-121.2	3.095	64.8	.148	48.0	.452	-53.5 -55.5
2500.00	.082	–127.8 –138.4	2.992 2.896	62.1 59.8	.148 .157	50.0 45.7	.451 .451	-55.5 -55.1
2600.00 2700.00	.078 .070	-136.4 -147.3	2.779	58.7	.166	45.7 45.5	.451	-58.6
2800.00	.076	-147.5 -149.6	2.719	55.5	.163	44.2	.446	-50.0 -61.7
2900.00	.065	-158.2	2.614	54.0	.164	45.8	.431	-61.1
3000.00	.072	-165.5	2.532	51.4	.173	42.6	.432	-64.4
Vce = 3 V, Ic = 3 mA	S	311	S.	21	S	12	ç	300
FREQUENCY		S <sub>11</sub>	S <sub>2</sub>			12 ANG		S <sub>22</sub>
·	S MAG	S <sub>11</sub> ANG	S2 MAG	an ANG	S MAG	12 ANG	S MAG	S <sub>22</sub> ANG
FREQUENCY	MAG .884	ANG -6.6	MAG 8.068	ANG 172.0	MAG .011		MAG .992	ANG -4.4
FREQUENCY f (MHz) 100.00 200.00	MAG .884 .860	ANG -6.6 -14.2	MAG 8.068 7.892	ANG 172.0 163.8	.011 .024	93.9 80.0	MAG .992 .977	ANG -4.4 -9.0
FREQUENCY f (MHz) 100.00 200.00 300.00	.884 .860 .834	-6.6 -14.2 -20.5	8.068 7.892 7.693	ANG 172.0 163.8 156.3	.011 .024 .032	93.9 80.0 80.2	.992 .977 .958	-4.4 -9.0 -13.3
FREQUENCY f (MHz) 100.00 200.00 300.00 400.00	.884 .860 .834 .796	-6.6 -14.2 -20.5 -26.7	8.068 7.892 7.693 7.283	ANG 172.0 163.8 156.3 149.2	.011 .024 .032 .042	93.9 80.0 80.2 76.9	MAG .992 .977 .958 .925	-4.4 -9.0 -13.3 -17.0
FREQUENCY f (MHz) 100.00 200.00 300.00 400.00 500.00	.884 .860 .834 .796 .748	-6.6 -14.2 -20.5 -26.7 -32.8	8.068 7.892 7.693 7.283 7.076	ANG 172.0 163.8 156.3 149.2 141.6	MAG .011 .024 .032 .042 .052	93.9 80.0 80.2 76.9 67.6	MAG .992 .977 .958 .925 .895	-4.4 -9.0 -13.3 -17.0 -21.1
FREQUENCY f (MHz) 100.00 200.00 300.00 400.00 500.00 600.00	MAG .884 .860 .834 .796 .748	-6.6 -14.2 -20.5 -26.7 -32.8 -38.2	8.068 7.892 7.693 7.283 7.076 6.761	172.0 163.8 156.3 149.2 141.6 136.1	.011 .024 .032 .042 .052 .058	93.9 80.0 80.2 76.9 67.6 67.4	MAG .992 .977 .958 .925 .895 .862	-4.4 -9.0 -13.3 -17.0 -21.1 -24.5
FREQUENCY f (MHz) 100.00 200.00 300.00 400.00 500.00 600.00 700.00	.884 .860 .834 .796 .748 .717	-6.6 -14.2 -20.5 -26.7 -32.8 -38.2 -43.8	8.068 7.892 7.693 7.283 7.076 6.761 6.499	ANG 172.0 163.8 156.3 149.2 141.6 136.1 129.9	MAG .011 .024 .032 .042 .052 .058 .070	93.9 80.0 80.2 76.9 67.6 67.4 63.3	MAG .992 .977 .958 .925 .895 .862 .836	-4.4 -9.0 -13.3 -17.0 -21.1 -24.5 -26.7
FREQUENCY f (MHz) 100.00 200.00 300.00 400.00 500.00 600.00 700.00 800.00	MAG  .884  .860  .834  .796  .748  .717  .669  .628	-6.6 -14.2 -20.5 -26.7 -32.8 -38.2 -43.8 -48.0	8.068 7.892 7.693 7.283 7.076 6.761 6.499 6.091	ANG 172.0 163.8 156.3 149.2 141.6 136.1 129.9 124.2	MAG .011 .024 .032 .042 .052 .058 .070 .073	93.9 80.0 80.2 76.9 67.6 67.4 63.3 59.3	MAG .992 .977 .958 .925 .895 .862 .836 .793	-4.4 -9.0 -13.3 -17.0 -21.1 -24.5 -26.7 -30.8
FREQUENCY f (MHz) 100.00 200.00 300.00 400.00 500.00 600.00 700.00	.884 .860 .834 .796 .748 .717	-6.6 -14.2 -20.5 -26.7 -32.8 -38.2 -43.8	8.068 7.892 7.693 7.283 7.076 6.761 6.499	ANG 172.0 163.8 156.3 149.2 141.6 136.1 129.9	MAG .011 .024 .032 .042 .052 .058 .070	93.9 80.0 80.2 76.9 67.6 67.4 63.3	MAG .992 .977 .958 .925 .895 .862 .836	-4.4 -9.0 -13.3 -17.0 -21.1 -24.5 -26.7
FREQUENCY f (MHz) 100.00 200.00 300.00 400.00 500.00 600.00 700.00 800.00 900.00 1000.00	MAG  .884 .860 .834 .796 .748 .717 .669 .628 .578 .536	ANG  -6.6 -14.2 -20.5 -26.7 -32.8 -38.2 -43.8 -48.0 52.7 -56.1 -61.3	MAG 8.068 7.892 7.693 7.283 7.076 6.761 6.499 6.091 5.764 5.505 5.203	ANG  172.0 163.8 156.3 149.2 141.6 136.1 129.9 124.2 119.2 114.4 110.3	MAG .011 .024 .032 .042 .052 .058 .070 .073 .083 .092 .097	93.9 80.0 80.2 76.9 67.6 67.4 63.3 59.3 60.1 56.6 56.4	MAG .992 .977 .958 .925 .895 .862 .836 .793 .762 .743 .712	-4.4 -9.0 -13.3 -17.0 -21.1 -24.5 -26.7 -30.8 -32.5 -35.1 -36.7
FREQUENCY f (MHz) 100.00 200.00 300.00 400.00 500.00 600.00 700.00 800.00 900.00 1000.00 1100.00	MAG  .884 .860 .834 .796 .748 .717 .669 .628 .578 .536 .500 .468	-6.6 -14.2 -20.5 -26.7 -32.8 -38.2 -43.8 -48.0 52.7 -56.1 -61.3 -64.2	8.068 7.892 7.693 7.283 7.076 6.761 6.499 6.091 5.764 5.505 5.203 4.885	ANG  172.0 163.8 156.3 149.2 141.6 136.1 129.9 124.2 119.2 114.4 110.3 105.5	MAG .011 .024 .032 .042 .052 .058 .070 .073 .083 .092 .097 .100	93.9 80.0 80.2 76.9 67.6 67.4 63.3 59.3 60.1 56.6 56.4 55.4	MAG .992 .977 .958 .925 .895 .862 .836 .793 .762 .743 .712 .691	-4.4 -9.0 -13.3 -17.0 -21.1 -24.5 -26.7 -30.8 -32.5 -35.1 -36.7 -38.3
FREQUENCY f (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  .884 .860 .834 .796 .748 .717 .669 .628 .578 .536 .500 .468 .431	-6.6 -14.2 -20.5 -26.7 -32.8 -38.2 -43.8 -48.0 52.7 -56.1 -61.3 -64.2 -68.0	8.068 7.892 7.693 7.283 7.076 6.761 6.499 6.091 5.764 5.505 5.203 4.885 4.675	ANG  172.0 163.8 156.3 149.2 141.6 136.1 129.9 124.2 119.2 114.4 110.3 105.5 101.9	MAG .011 .024 .032 .042 .052 .058 .070 .073 .083 .092 .097 .100 .100	93.9 80.0 80.2 76.9 67.6 67.4 63.3 59.3 60.1 56.6 56.4 55.4	MAG .992 .977 .958 .925 .895 .862 .836 .793 .762 .743 .712 .691	-4.4 -9.0 -13.3 -17.0 -21.1 -24.5 -26.7 -30.8 -32.5 -35.1 -36.7 -38.3 -40.0
FREQUENCY f (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	MAG  .884 .860 .834 .796 .748 .717 .669 .628 .578 .536 .500 .468 .431 .399	-6.6 -14.2 -20.5 -26.7 -32.8 -38.2 -43.8 -48.0 52.7 -56.1 -61.3 -64.2 -68.0 -72.0	8.068 7.892 7.693 7.283 7.076 6.761 6.499 6.091 5.764 5.505 5.203 4.885 4.675 4.449	ANG  172.0 163.8 156.3 149.2 141.6 136.1 129.9 124.2 119.2 119.2 114.4 110.3 105.5 101.9 98.1	MAG .011 .024 .032 .042 .052 .058 .070 .073 .083 .092 .097 .100 .100 .108	93.9 80.0 80.2 76.9 67.6 67.4 63.3 59.3 60.1 56.6 56.4 55.4 54.5	MAG .992 .977 .958 .925 .895 .862 .836 .793 .762 .743 .712 .691 .657	-4.4 -9.0 -13.3 -17.0 -21.1 -24.5 -26.7 -30.8 -32.5 -35.1 -36.7 -38.3 -40.0 -42.5
FREQUENCY f (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	MAG  .884 .860 .834 .796 .748 .717 .669 .628 .578 .536 .500 .468 .431 .399 .366	-6.6 -14.2 -20.5 -26.7 -32.8 -38.2 -43.8 -48.0 52.7 -56.1 -61.3 -64.2 -68.0 -72.0 -75.4	8.068 7.892 7.693 7.283 7.076 6.761 6.499 6.091 5.764 5.505 5.203 4.885 4.675 4.449 4.243	ANG  172.0 163.8 156.3 149.2 141.6 136.1 129.9 124.2 119.2 114.4 110.3 105.5 101.9 98.1 94.4	MAG .011 .024 .032 .042 .052 .058 .070 .073 .083 .092 .097 .100 .100 .108 .113	93.9 80.0 80.2 76.9 67.6 67.4 63.3 59.3 60.1 56.6 56.4 55.4 54.5 53.8 51.2	MAG .992 .977 .958 .925 .895 .862 .836 .793 .762 .743 .712 .691 .657 .645	-4.4 -9.0 -13.3 -17.0 -21.1 -24.5 -26.7 -30.8 -32.5 -35.1 -36.7 -38.3 -40.0 -42.5 -44.0
FREQUENCY f (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	MAG  .884  .860  .834  .796  .748  .717  .669  .628  .578  .536  .500  .468  .431  .399  .366  .338	ANG  -6.6 -14.2 -20.5 -26.7 -32.8 -38.2 -43.8 -48.0 52.7 -56.1 -61.3 -64.2 -68.0 -72.0 -75.4 -78.3	8.068 7.892 7.693 7.283 7.076 6.761 6.499 6.091 5.764 5.505 5.203 4.885 4.675 4.449 4.243	ANG  172.0 163.8 156.3 149.2 141.6 136.1 129.9 124.2 119.2 114.4 110.3 105.5 101.9 98.1 94.4 91.0	MAG .011 .024 .032 .042 .052 .058 .070 .073 .083 .092 .097 .100 .100 .108 .113 .116	93.9 80.0 80.2 76.9 67.6 67.4 63.3 59.3 60.1 56.6 56.4 55.4 54.5 53.8 51.2 51.6	MAG .992 .977 .958 .925 .895 .862 .836 .793 .762 .743 .712 .691 .657 .645 .615	-4.4 -9.0 -13.3 -17.0 -21.1 -24.5 -26.7 -30.8 -32.5 -35.1 -36.7 -38.3 -40.0 -42.5 -44.0 -45.4
FREQUENCY f (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  .884 .860 .834 .796 .748 .717 .669 .628 .578 .536 .500 .468 .431 .399 .366 .338 .318	ANG  -6.6 -14.2 -20.5 -26.7 -32.8 -38.2 -43.8 -48.0 52.7 -56.1 -61.3 -64.2 -68.0 -72.0 -75.4 -78.3 -82.5	8.068 7.892 7.693 7.283 7.076 6.761 6.499 6.091 5.764 5.505 5.203 4.885 4.675 4.449 4.243 4.047 3.904	ANG  172.0 163.8 156.3 149.2 141.6 136.1 129.9 124.2 119.2 114.4 110.3 105.5 101.9 98.1 94.4 91.0 88.5	MAG .011 .024 .032 .042 .052 .058 .070 .073 .083 .092 .097 .100 .100 .108 .113 .116 .122	93.9 80.0 80.2 76.9 67.6 67.4 63.3 59.3 60.1 56.6 56.4 55.4 54.5 53.8 51.2 51.6 50.7	MAG .992 .977 .958 .925 .895 .862 .836 .793 .762 .743 .712 .691 .657 .645 .615 .599	ANG  -4.4 -9.0 -13.3 -17.0 -21.1 -24.5 -26.7 -30.8 -32.5 -35.1 -36.7 -38.3 -40.0 -42.5 -44.0 -45.4 -46.7
FREQUENCY f (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	MAG  .884  .860  .834  .796  .748  .717  .669  .628  .578  .536  .500  .468  .431  .399  .366  .338	ANG  -6.6 -14.2 -20.5 -26.7 -32.8 -38.2 -43.8 -48.0 52.7 -56.1 -61.3 -64.2 -68.0 -72.0 -75.4 -78.3	8.068 7.892 7.693 7.283 7.076 6.761 6.499 6.091 5.764 5.505 5.203 4.885 4.675 4.449 4.243	ANG  172.0 163.8 156.3 149.2 141.6 136.1 129.9 124.2 119.2 114.4 110.3 105.5 101.9 98.1 94.4 91.0	MAG .011 .024 .032 .042 .052 .058 .070 .073 .083 .092 .097 .100 .100 .108 .113 .116	93.9 80.0 80.2 76.9 67.6 67.4 63.3 59.3 60.1 56.6 56.4 55.4 54.5 53.8 51.2 51.6	MAG .992 .977 .958 .925 .895 .862 .836 .793 .762 .743 .712 .691 .657 .645 .615	ANG  -4.4 -9.0 -13.3 -17.0 -21.1 -24.5 -26.7 -30.8 -32.5 -35.1 -36.7 -38.3 -40.0 -42.5 -44.0 -45.4 -46.7 -48.2
FREQUENCY f (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  .884 .860 .834 .796 .748 .717 .669 .628 .578 .536 .500 .468 .431 .399 .366 .338 .318 .285	ANG  -6.6 -14.2 -20.5 -26.7 -32.8 -38.2 -43.8 -48.0 52.7 -56.1 -61.3 -64.2 -68.0 -72.0 -75.4 -78.3 -82.5 -86.3 -87.6 -94.1	8.068 7.892 7.693 7.283 7.076 6.761 6.499 6.091 5.764 5.505 5.203 4.885 4.675 4.449 4.243 4.047 3.904 3.719	ANG  172.0 163.8 156.3 149.2 141.6 136.1 129.9 124.2 119.2 114.4 110.3 105.5 101.9 98.1 94.4 91.0 88.5 84.9	MAG .011 .024 .032 .042 .052 .058 .070 .073 .083 .092 .097 .100 .100 .108 .113 .116 .122 .120	93.9 80.0 80.2 76.9 67.6 67.4 63.3 59.3 60.1 56.6 56.4 55.4 54.5 53.8 51.2 51.6 50.7 48.6	MAG .992 .977 .958 .925 .895 .862 .836 .793 .762 .743 .712 .691 .657 .645 .615 .599 .578	ANG  -4.4 -9.0 -13.3 -17.0 -21.1 -24.5 -26.7 -30.8 -32.5 -35.1 -36.7 -38.3 -40.0 -42.5 -44.0 -45.4 -46.7
FREQUENCY f (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 1900.00 1900.00	MAG  .884 .860 .834 .796 .748 .717 .669 .628 .578 .536 .500 .468 .431 .399 .366 .338 .318 .285 .267 .247	ANG  -6.6 -14.2 -20.5 -26.7 -32.8 -38.2 -43.8 -48.0 52.7 -56.1 -61.3 -64.2 -68.0 -72.0 -75.4 -78.3 -82.5 -86.3 -87.6 -94.1 -96.8	8.068 7.892 7.693 7.283 7.076 6.761 6.499 6.091 5.764 5.505 5.203 4.885 4.675 4.449 4.243 4.047 3.904 3.719 3.566 3.456 3.295	ANG  172.0 163.8 156.3 149.2 141.6 136.1 129.9 124.2 1114.4 110.3 105.5 101.9 98.1 94.4 91.0 88.5 84.9 82.3 79.0 76.4	MAG .011 .024 .032 .042 .052 .058 .070 .073 .083 .092 .097 .100 .100 .108 .113 .116 .122 .120 .133 .137 .142	93.9 80.0 80.2 76.9 67.6 67.4 63.3 59.3 60.1 56.6 56.4 55.4 54.5 53.8 51.2 51.6 50.7 48.6 47.7 44.6 48.1	MAG .992 .977 .958 .925 .895 .862 .836 .793 .762 .743 .712 .691 .657 .645 .615 .599 .578 .572 .556	ANG  -4.4 -9.0 -13.3 -17.0 -21.1 -24.5 -26.7 -30.8 -32.5 -35.1 -36.7 -38.3 -40.0 -42.5 -44.0 -45.4 -46.7 -48.2 -49.2 -52.5 -53.6
FREQUENCY f (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	MAG  .884 .860 .834 .796 .748 .717 .669 .628 .578 .536 .500 .468 .431 .399 .366 .338 .318 .285 .267 .247 .203	ANG  -6.6 -14.2 -20.5 -26.7 -32.8 -38.2 -43.8 -48.0 52.7 -56.1 -61.3 -64.2 -68.0 -72.0 -75.4 -78.3 -82.5 -86.3 -87.6 -94.1 -96.8 -100.7	8.068 7.892 7.693 7.283 7.076 6.761 6.499 6.091 5.764 5.505 5.203 4.885 4.675 4.449 4.243 4.047 3.904 3.719 3.566 3.456 3.295 3.179	ANG  172.0 163.8 156.3 149.2 141.6 136.1 129.9 124.2 119.2 114.4 110.3 105.5 101.9 98.1 94.4 91.0 88.5 84.9 82.3 79.0 76.4 73.0	MAG .011 .024 .032 .042 .052 .058 .070 .073 .083 .092 .097 .100 .100 .108 .113 .116 .122 .120 .133 .137 .142 .142	93.9 80.0 80.2 76.9 67.6 67.4 63.3 59.3 60.1 56.6 55.4 54.5 53.8 51.2 51.6 50.7 48.6 47.7 44.6 48.1	MAG .992 .977 .958 .925 .895 .862 .836 .793 .762 .743 .712 .691 .657 .645 .515 .599 .578 .572 .556 .552 .531	ANG  -4.4 -9.0 -13.3 -17.0 -21.1 -24.5 -26.7 -30.8 -32.5 -35.1 -36.7 -38.3 -40.0 -42.5 -44.0 -45.4 -46.7 -48.2 -49.2 -52.5 -53.6 -54.4
FREQUENCY f (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	MAG  .884 .860 .834 .796 .748 .717 .669 .628 .578 .536 .500 .468 .431 .399 .366 .338 .318 .285 .267 .247 .217 .203 .190	ANG  -6.6 -14.2 -20.5 -26.7 -32.8 -38.2 -43.8 -48.0 52.7 -56.1 -61.3 -64.2 -68.0 -72.0 -75.4 -78.3 -82.5 -86.3 -87.6 -94.1 -96.8 -100.7 -105.0	8.068 7.892 7.693 7.283 7.076 6.761 6.499 6.091 5.764 5.505 5.203 4.885 4.675 4.449 4.243 4.047 3.904 3.719 3.566 3.456 3.295 3.179 3.068	ANG  172.0 163.8 156.3 149.2 141.6 136.1 129.9 124.2 119.2 114.4 110.3 105.5 101.9 98.1 94.4 91.0 88.5 84.9 82.3 79.0 76.4 73.0 71.1	MAG .011 .024 .032 .042 .052 .058 .070 .073 .083 .092 .097 .100 .100 .108 .113 .116 .122 .120 .133 .137 .142 .142	93.9 80.0 80.2 76.9 67.6 67.4 63.3 59.3 60.1 56.6 56.4 55.4 54.5 53.8 51.2 51.6 50.7 48.6 47.7 44.6 48.1 44.9	MAG  .992 .977 .958 .925 .895 .862 .836 .793 .762 .743 .712 .691 .657 .645 .615 .599 .578 .572 .556 .552 .531 .525 .518	ANG  -4.4 -9.0 -13.3 -17.0 -21.1 -24.5 -26.7 -30.8 -32.5 -35.1 -36.7 -38.3 -40.0 -42.5 -44.0 -45.4 -46.7 -48.2 -49.2 -52.5 -53.6 -54.4 -54.8
FREQUENCY f (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	MAG  .884 .860 .834 .796 .748 .717 .669 .628 .578 .536 .500 .468 .431 .399 .366 .338 .318 .285 .267 .247 .217 .203 .190 .167	ANG  -6.6 -14.2 -20.5 -26.7 -32.8 -38.2 -43.8 -48.0 52.7 -56.1 -61.3 -64.2 -68.0 -72.0 -75.4 -78.3 -82.5 -86.3 -87.6 -94.1 -96.8 -100.7 -105.0 -105.7	8.068 7.892 7.693 7.283 7.076 6.761 6.499 6.091 5.764 5.505 5.203 4.885 4.675 4.449 4.243 4.047 3.904 3.719 3.566 3.456 3.295 3.179 3.068 2.958	ANG  172.0 163.8 156.3 149.2 141.6 136.1 129.9 124.2 119.2 114.4 110.3 105.5 101.9 98.1 94.4 91.0 88.5 84.9 82.3 79.0 76.4 73.0 71.1 68.5	MAG .011 .024 .032 .042 .052 .058 .070 .073 .083 .092 .097 .100 .100 .108 .113 .116 .122 .120 .133 .137 .142 .144 .144	93.9 80.0 80.2 76.9 67.6 67.4 63.3 59.3 60.1 56.6 56.4 55.4 54.5 53.8 51.2 51.6 50.7 48.6 47.7 44.6 48.1 44.9 44.0 42.7	MAG  .992 .977 .958 .925 .895 .862 .836 .793 .762 .743 .712 .691 .657 .645 .615 .599 .578 .572 .556 .552 .531 .525 .518	ANG  -4.4 -9.0 -13.3 -17.0 -21.1 -24.5 -26.7 -30.8 -32.5 -35.1 -36.7 -38.3 -40.0 -42.5 -44.0 -45.4 -46.7 -48.2 -49.2 -52.5 -53.6 -54.4 -54.8 -56.1
FREQUENCY f (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  .884 .860 .834 .796 .748 .717 .669 .628 .578 .536 .500 .468 .431 .399 .366 .338 .318 .285 .267 .247 .217 .203 .190 .167 .160	ANG  -6.6 -14.2 -20.5 -26.7 -32.8 -38.2 -43.8 -48.0 52.7 -56.1 -61.3 -64.2 -68.0 -72.0 -75.4 -78.3 -82.5 -86.3 -87.6 -94.1 -96.8 -100.7 -105.0 -105.7 -112.6	8.068 7.892 7.693 7.283 7.076 6.761 6.499 6.091 5.764 5.505 5.203 4.885 4.675 4.449 4.243 4.047 3.904 3.719 3.566 3.456 3.295 3.179 3.068 2.958 2.883	ANG  172.0 163.8 156.3 149.2 141.6 136.1 129.9 124.2 119.2 114.4 110.3 105.5 101.9 98.1 94.4 91.0 88.5 84.9 82.3 79.0 76.4 73.0 71.1 68.5 65.9	MAG .011 .024 .032 .042 .052 .058 .070 .073 .083 .092 .097 .100 .100 .108 .113 .116 .122 .120 .133 .137 .142 .144 .146 .147 .159	93.9 80.0 80.2 76.9 67.6 67.4 63.3 59.3 60.1 56.6 56.4 55.4 54.5 53.8 51.2 51.6 47.7 48.6 47.7 44.9 44.0 42.7 42.0	MAG  .992 .977 .958 .925 .895 .862 .836 .793 .762 .743 .712 .691 .657 .645 .615 .599 .578 .572 .556 .552 .531 .525 .518 .492 .492	ANG  -4.4 -9.0 -13.3 -17.0 -21.1 -24.5 -26.7 -30.8 -32.5 -35.1 -36.7 -38.3 -40.0 -42.5 -44.0 -45.4 -46.7 -48.2 -49.2 -52.5 -53.6 -54.4 -54.8 -56.1 -58.4
FREQUENCY f (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	MAG  .884 .860 .834 .796 .748 .717 .669 .628 .578 .536 .500 .468 .431 .399 .366 .338 .318 .285 .267 .247 .217 .203 .190 .167 .160 .140	ANG  -6.6 -14.2 -20.5 -26.7 -32.8 -38.2 -43.8 -48.0 52.7 -56.1 -61.3 -64.2 -68.0 -72.0 -75.4 -78.3 -82.5 -86.3 -87.6 -94.1 -96.8 -100.7 -105.0 -105.7 -112.6 -120.1	8.068 7.892 7.693 7.283 7.076 6.761 6.499 6.091 5.764 5.505 5.203 4.885 4.675 4.449 4.243 4.047 3.904 3.719 3.566 3.456 3.295 3.179 3.068 2.958 2.883 2.772	ANG  172.0 163.8 156.3 149.2 141.6 136.1 129.9 124.2 119.2 114.4 110.3 105.5 101.9 98.1 94.4 91.0 88.5 84.9 82.3 79.0 76.4 73.0 71.1 68.5 65.9 63.4	MAG  .011 .024 .032 .042 .052 .058 .070 .073 .083 .092 .097 .100 .100 .108 .113 .116 .122 .120 .133 .137 .142 .144 .147 .159 .162	93.9 80.0 80.2 76.9 67.6 67.4 63.3 59.3 60.1 56.6 56.4 55.4 54.5 53.8 51.2 51.6 47.7 44.6 48.1 44.9 44.0 42.7 42.0 43.1	MAG  .992 .977 .958 .925 .895 .862 .836 .793 .762 .743 .712 .691 .657 .645 .515 .599 .578 .572 .556 .552 .531 .525 .518 .492 .492 .481	ANG  -4.4 -9.0 -13.3 -17.0 -21.1 -24.5 -26.7 -30.8 -32.5 -35.1 -36.7 -38.3 -40.0 -42.5 -44.0 -45.4 -46.7 -48.2 -49.2 -52.5 -53.6 -54.4 -54.8 -56.1 -58.4 -58.7
FREQUENCY f (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 2300.00 2400.00 2500.00 2600.00 2700.00	MAG  .884 .860 .834 .796 .748 .717 .669 .628 .578 .536 .500 .468 .431 .399 .366 .338 .318 .285 .267 .247 .217 .203 .190 .167 .160 .140 .134	ANG  -6.6 -14.2 -20.5 -26.7 -32.8 -38.2 -43.8 -48.0 52.7 -56.1 -61.3 -64.2 -68.0 -72.0 -75.4 -78.3 -82.5 -86.3 -87.6 -94.1 -96.8 -100.7 -105.0 -105.7 -112.6 -120.1 -123.6	8.068 7.892 7.693 7.283 7.076 6.761 6.499 6.091 5.764 5.505 5.203 4.885 4.675 4.449 4.243 4.047 3.904 3.719 3.566 3.456 3.295 3.179 3.068 2.958 2.883 2.772 2.690	ANG  172.0 163.8 156.3 149.2 141.6 136.1 129.9 124.2 119.2 114.4 110.3 105.5 101.9 98.1 94.4 91.0 88.5 84.9 82.3 79.0 76.4 73.0 71.1 68.5 65.9 63.4 61.9	MAG  .011 .024 .032 .042 .052 .058 .070 .073 .083 .092 .097 .100 .100 .108 .113 .116 .122 .120 .133 .137 .142 .146 .147 .159 .162 .161	93.9 80.0 80.2 76.9 67.6 67.4 63.3 59.3 60.1 56.6 56.4 55.4 54.5 53.8 51.2 51.6 50.7 44.6 47.7 44.6 48.1 44.9 44.0 42.7 42.0 43.1 43.7	MAG  .992 .977 .958 .925 .895 .862 .836 .793 .762 .743 .712 .691 .657 .645 .515 .599 .578 .572 .556 .552 .531 .525 .518 .492 .481 .470	ANG  -4.4 -9.0 -13.3 -17.0 -21.1 -24.5 -26.7 -30.8 -32.5 -35.1 -36.7 -38.3 -40.0 -42.5 -44.0 -45.4 -46.7 -48.2 -49.2 -52.5 -53.6 -54.8 -56.1 -58.4 -58.7 -61.6
FREQUENCY f (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	MAG  .884 .860 .834 .796 .748 .717 .669 .628 .578 .536 .500 .468 .431 .399 .366 .338 .318 .285 .267 .247 .217 .203 .190 .167 .160 .134 .130	ANG  -6.6 -14.2 -20.5 -26.7 -32.8 -38.2 -43.8 -48.0 52.7 -56.1 -61.3 -64.2 -68.0 -72.0 -75.4 -78.3 -82.5 -86.3 -87.6 -94.1 -96.8 -100.7 -105.0 -105.7 -112.6 -120.1 -123.6 -125.1	8.068 7.892 7.693 7.283 7.076 6.761 6.499 6.091 5.764 5.505 5.203 4.885 4.675 4.449 4.243 4.047 3.904 3.719 3.566 3.456 3.295 3.179 3.068 2.958 2.883 2.772 2.690 2.621	ANG  172.0 163.8 156.3 149.2 141.6 136.1 129.9 124.2 119.2 114.4 110.3 105.5 101.9 98.1 94.4 91.0 88.5 84.9 82.3 79.0 76.4 73.0 71.1 68.5 65.9 63.4 61.9 58.8	MAG .011 .024 .032 .042 .052 .058 .070 .073 .083 .092 .097 .100 .100 .108 .113 .116 .122 .120 .133 .137 .142 .142 .146 .147 .159 .162 .161 .169	93.9 80.0 80.2 76.9 67.6 67.4 63.3 59.3 60.1 56.6 56.4 55.4 54.5 53.8 51.2 51.6 50.7 44.6 47.7 44.6 48.1 44.9 44.0 42.7 42.0 43.1 43.7 38.4	MAG  .992 .977 .958 .925 .895 .862 .836 .793 .762 .743 .712 .691 .657 .645 .515 .599 .578 .572 .556 .552 .511 .525 .518 .492 .492 .481 .470 .472	ANG  -4.4 -9.0 -13.3 -17.0 -21.1 -24.5 -26.7 -30.8 -32.5 -35.1 -36.7 -38.3 -40.0 -42.5 -44.0 -45.4 -46.7 -48.2 -52.5 -53.6 -54.4 -54.8 -56.1 -58.4 -58.7 -61.6 -64.0
FREQUENCY f (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 2500.00 2600.00 2700.00 2800.00	MAG  .884 .860 .834 .796 .748 .717 .669 .628 .578 .536 .500 .468 .431 .399 .366 .338 .318 .285 .267 .247 .217 .203 .190 .167 .160 .140 .134	ANG  -6.6 -14.2 -20.5 -26.7 -32.8 -38.2 -43.8 -48.0 52.7 -56.1 -61.3 -64.2 -68.0 -72.0 -75.4 -78.3 -82.5 -86.3 -87.6 -94.1 -96.8 -100.7 -105.0 -105.7 -112.6 -120.1 -123.6	8.068 7.892 7.693 7.283 7.076 6.761 6.499 6.091 5.764 5.505 5.203 4.885 4.675 4.449 4.243 4.047 3.904 3.719 3.566 3.456 3.295 3.179 3.068 2.958 2.883 2.772 2.690	ANG  172.0 163.8 156.3 149.2 141.6 136.1 129.9 124.2 119.2 114.4 110.3 105.5 101.9 98.1 94.4 91.0 88.5 84.9 82.3 79.0 76.4 73.0 71.1 68.5 65.9 63.4 61.9	MAG  .011 .024 .032 .042 .052 .058 .070 .073 .083 .092 .097 .100 .100 .108 .113 .116 .122 .120 .133 .137 .142 .146 .147 .159 .162 .161	93.9 80.0 80.2 76.9 67.6 67.4 63.3 59.3 60.1 56.6 56.4 55.4 54.5 53.8 51.2 51.6 50.7 44.6 47.7 44.6 48.1 44.9 44.0 42.7 42.0 43.1 43.7	MAG  .992 .977 .958 .925 .895 .862 .836 .793 .762 .743 .712 .691 .657 .645 .515 .599 .578 .572 .556 .552 .531 .525 .518 .492 .481 .470	ANG  -4.4 -9.0 -13.3 -17.0 -21.1 -24.5 -26.7 -30.8 -32.5 -35.1 -36.7 -38.3 -40.0 -42.5 -44.0 -45.4 -46.7 -48.2 -49.2 -52.5 -53.6 -54.8 -56.1 -58.4 -58.7 -61.6

### **S-PARAMETER**

Vce = 3 V, Ic = 1 mA

FREQUENCY	5	S <sub>11</sub>	Sa	21	S	12	S	22
f (MHz)	MAG	ANG	MAG	ANG	MAG	ANG	MAG	ANG
100.00	.958	-4.1	3.306	175.2	.012	90.6	.993	-2.6
200.00	.949	-8.4	3.287	170.0	.026	83.1	.990	-5.6
300.00	.940	-12.0	3.275	165.4	.039	83.7	.993	-8.3
400.00	.925	-16.2	3.205	160.8	.046	78.7	.976	-11.2
500.00	.908	-20.4	3.226	155.1	.055	74.7	.971	-14.3
600.00	.900	-24.1	3.182	151.3	.069	74.6	.960	-16.9
700.00	.879	-28.2	3.185	146.4	.079	68.4	.951	-19.4
800.00	.860	-31.9	3.100	141.5	.090	65.7	.930	-23.1
900.00	.822	-36.0	3.045	137.0	.100	65.1	.907	-25.2
1000.00	.811	-39.4	3.015	132.6	.110	61.9	.904	-27.4
1100.00	.782	-43.3	2.944	128.6	.115	57.3	.879	-30.1
1200.00	.749	-47.4	2.859	123.5	.127	57.3	.865	-32.8
1300.00	.722	-50.7	2.822	119.8	.130	54.9	.838	-35.0
1400.00	.694	-54.3	2.750	115.7	.141	50.6	.827	-38.1
1500.00	.663	-58.1	2.700	111.3	.145	50.5	.802	-39.6
1600.00	.641	-61.5	2.600	107.3	.155	47.1	.788	-41.8
1700.00	.616	-65.3	2.595	104.6	.158	45.3	.763	-44.3
1800.00	.580	-68.5	2.521	100.4	.163	42.4	.755	-46.3
1900.00	.562	-72.3	2.450	97.2	.165	40.2	.728	-48.5
2000.00	.531	-76.8	2.424	93.1	.172	39.6	.721	-51.1
2100.00	.498	-77.9	2.340	90.0	.180	38.4	.706	-53.3
2200.00	.470	-81.7	2.291	85.9	.185	35.7	.695	-55.0
2300.00	.453	-84.7	2.232	83.5	.181	33.9	.673	-56.5
2400.00	.419	-86.6	2.158	80.1	.188	32.4	.654	-57.9
2500.00	.404	-92.0	2.134	77.2	.191	32.8	.652	-60.2
2600.00	.372	-95.0	2.063	73.8	.192	31.7	.632	-60.0
2700.00	.366	-97.8	2.016	72.4	.190	31.6	.612	-63.1
2800.00	.355	-101.0	1.990	68.6	.189	29.4	.620	-66.5
2900.00	.340	-104.6	1.920	66.2	.196	28.2	.611	-66.7
3000.00	.316	-107.2	1.907	62.9	.204	26.9	.599	-70.0

[MEMO]

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While NEC Corporation has been making continuous effort to enhance the reliability of its semiconductor devices, the possibility of defects cannot be eliminated entirely. To minimize risks of damage or injury to persons or property arising from a defect in an NEC semiconductor device, customer must incorporate sufficient safety measures in its design, such as redundancy, fire-containment, and anti-failure features.

NEC devices are classified into the following three quality grades:

"Standard", "Special", and "Specific". The Specific quality grade applies only to devices developed based on a customer designated "quality assurance program" for a specific application. The recommended applications of a device depend on its quality grade, as indicated below. Customers must check the quality grade of each device before using it in a particular application.

Standard: Computers, office equipment, communications equipment, test and measurement equipment, audio and visual equipment, home electronic appliances, machine tools, personal electronic equipment and industrial robots

Special: Transportation equipment (automobiles, trains, ships, etc.), traffic control systems, anti-disaster systems, anti-crime systems, safety equipment and medical equipment (not specifically designed for life support)

Specific: Aircrafts, aerospace equipment, submersible repeaters, nuclear reactor control systems, life support systems or medical equipment for life support, etc.

The quality grade of NEC devices in "Standard" unless otherwise specified in NEC's Data Sheets or Data Books. If customers intend to use NEC devices for applications other than those specified for Standard quality grade, they should contact NEC Sales Representative in advance.

Anti-radioactive design is not implemented in this product.

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