NEC®

NPN MEDIUM POWER MICROWAVE TRANSISTOR

NE57500 NE57510 NE57520

FEATURES

- **HIGH OSCILLATOR POWER OUTPUT:** 700 mW at 1.7 GHz
- **GOLD METALLIZATON FOR RELIABILITY**
- **HIGH POWER GAIN:** 4 dB at 2 GHz (V_{CC} = 18 V)
- **HIGH POWER OUTPUT:** 1.6 W at 2 GHz (V_{CC} = 18 V)

DESCRIPTION AND APPLICATIONS

The NE575 series of NPN silicon medium power transistors is designed to operate in amplifiers and oscillators up to 2 GHz with supply voltages up to 18 volts. Transistors in this series are available in either a low-inductance can (TO-46), an economical stud-stripline (NE57520), or in chip form. The NE575 series employs NEC's titanium-platinum-gold metallization system. This unique metallization system, with NEC's stringent quality control procedures, yields the utmost in reliability and uniformity and eliminates many of the problems associated with aluminum and moly-gold metallization. This feature also allows for high temperature (100°C) operation at rated dissipation. The NE57520 (2SC1042) is processed and screened to NEC's Grade C (military) level of reliability which is patterned after MIL-S-19500. The Grade D (industrial) version is the 2SC1642.

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ABSOLUTE MAXIMUM RATINGS (T_A = 25°C)

SYMBOLS	PARAMETERS	UNITS	RATINGS
V_{CBO}	Collector to BaseVoltage	V	40
V_{CEO}	Collector to Emitter Voltage	V	20[3]
V_{EBO}	Emitter to BaseVoltage	V	3
$I_{C(DC)}$	Collector Current (DC)	mA	250
$I_{C(PEAK)}$	Collector Current (Peak)	mA	750
T_J	Junction Temperature	°C	200
T_{STG}	Storage Temperature	°C	-65 to +200

PERFORMANCE SPECIFICATIONS (T_A = 25°C)

PART NUMBER EIAJ[1] REGISTERED NUMBER PACKAGE OUTLINE			NE57500 00(CHIP)			NE57510 2SC1600-Grd D 10 (TO-46)			NE57520 2SC1042-Grd C 2SC1642-Grd D 20		
SYMBOLS	PARAMETERS AND CONDITIONS	UNITS	MIN	TYP	MAX	MIN	TYP	MAX	MIN	TYP	MAX
f_T	Gain Bandwidth Product (T_C = 25°C) at V_{CE} = 10 V, I_C = 100 mA	GHz	1.6	2		1.6	2		1.6	2	
$\|S_{21E}\|^2$	Insertion Power Gain at V_{CE} = 10 V, I_C = 100 mA, f = 1 GHz	dB		3.5			3.5			3.5	
P_{OUT}	Power Output at V_{CC} = 18 V, I_C = 125 mA, f = 2 GHz, P_{IN} = 630 mW	W	1.4	1.6		1.4	1.6		1.4	1.6	
P_{OSC}	Oscillator Output Power at V_{CC} = 18 V, I_C = 150 mA, f = 1.7 GHz	mW		700			700			700	
G_P	Power Gain at V_{CC} = 18 V, I_C = 100 mA, P_{IN} = 28 dBm, f = 2 GHz	dB	3.5	4		3.5	4		3.5	4	
MAG	Maximum Available Gain at V_{CE} = 10 V, I_C = 100 mA, f = 1 GHz	dB		4			8.8			8.8	

Notes:

1. Electronic Industrial Association of Japan.
2. PW ≤ 350 μs, duty cycle ≤ 2% pulsed.
3. Typical V_{CER} = 30 V for R ≤ 300 Ω.

ELECTRICAL CHARACTERISTICS (T_A = 25°C)

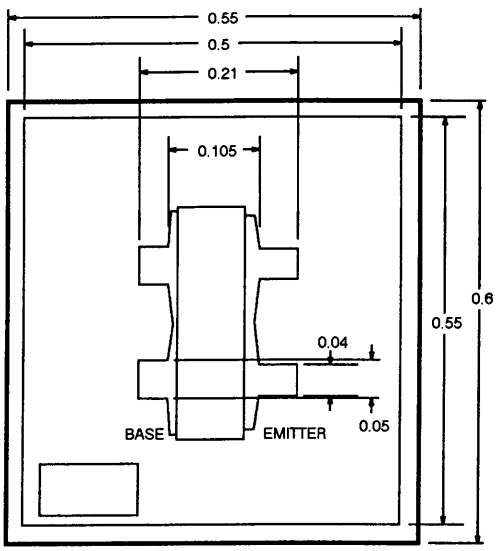
PART NUMBER EIAJ[1] REGISTERED NUMBER PACKAGE OUTLINE			NE57500 00(CHIP)			NE57520 2SC1042-Grd C 2SC1642-Grd D 20			NE57510 2SC1600-Grd D 10 (TO-46)		
SYMBOLS	PARAMETERS AND CONDITIONS	UNITS	MIN	TYP	MAX	MIN	TYP	MAX	MIN	TYP	MAX
I_{CBO}	Collector Cutoff Current at V_{CB} = 20 V, I_E = 0	µA			100			100			100
I_{EBO}	Emitter Cutoff Current at V_{EB} = 2 V, I_C = 0	µA			100			100			100
h_{FE}	Forward Current Gain at V_{CE} = 10 V, I_C = 100 mA[2]		15	80	200	15	80	200	15	80	200
C_{CB}	Collector to Base Capacitance[3] at V_{CB} = 10 V, I_E = 0, f = 1 MHz	pF		3			4	7		3	4.5
$R\phi_{JC}$	Thermal Resistance (Junction-to-Case)	°C			20			20			40
P_T	Total Power Dissipation (T_C = 25°C)	W			7.5			7.5			4.4

Notes:

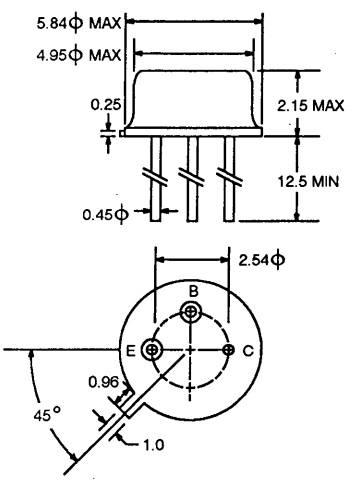
1. Electronic Industrial Association of Japan.
2. PW ≤ 350 µs, duty cycle ≤ 2% pulsed.
3. Emitter is grounded.

OUTLINE DIMENSIONS (Units in mm)

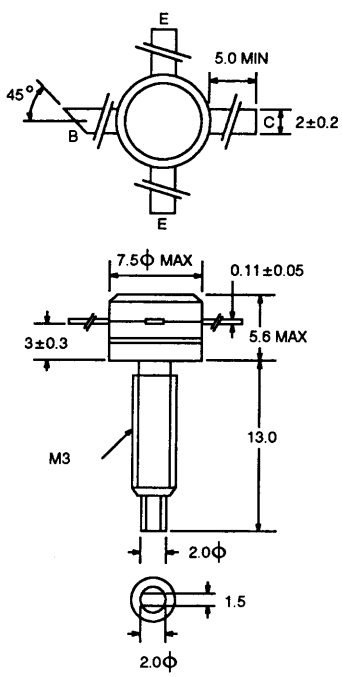
NE57500 (CHIP)
(Chip Thickness: 160±20 µm)



OUTLINE 10
(TO-46)

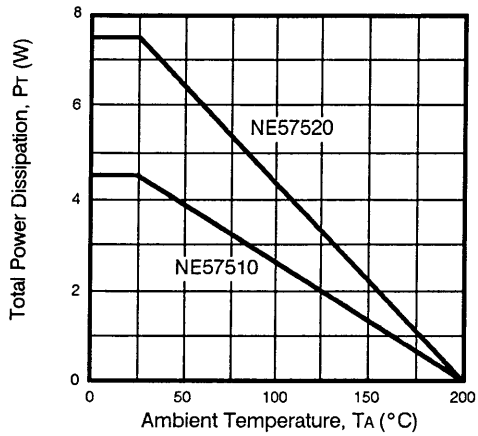


OUTLINE 20

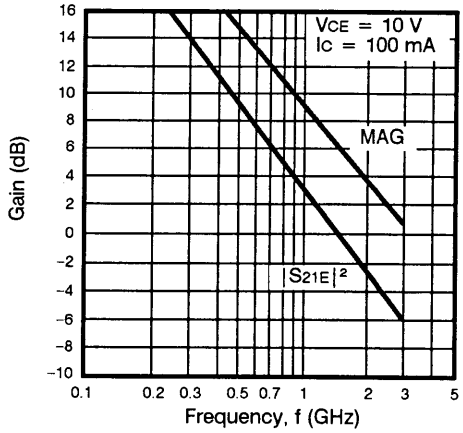


TYPICAL PERFORMANCE CHARACTERISTICS (T_A = 25°C)

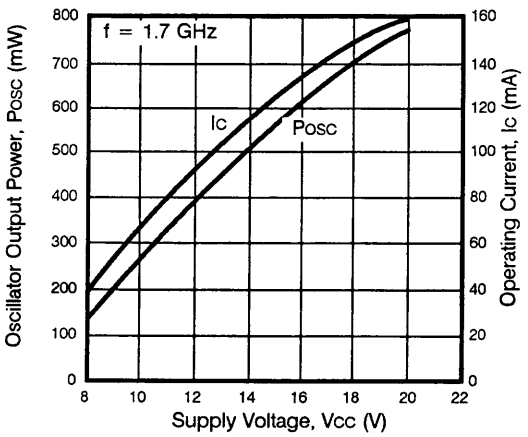
POWER DERATING CURVES



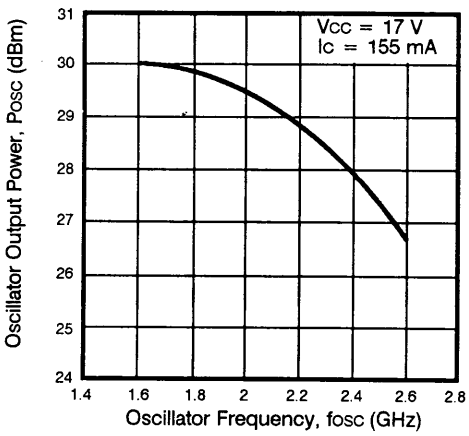
INSERTION GAIN AND MAXIMUM AVAILABLE GAIN vs. FREQUENCY



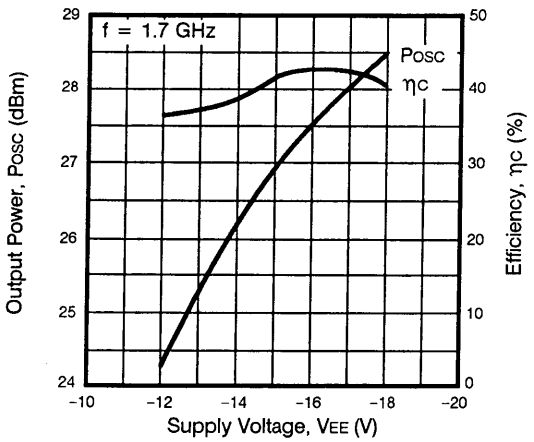
NE57510 OSCILLATOR OUTPUT POWER vs. COLLECTOR VOLTAGE AND COLLECTOR CURRENT



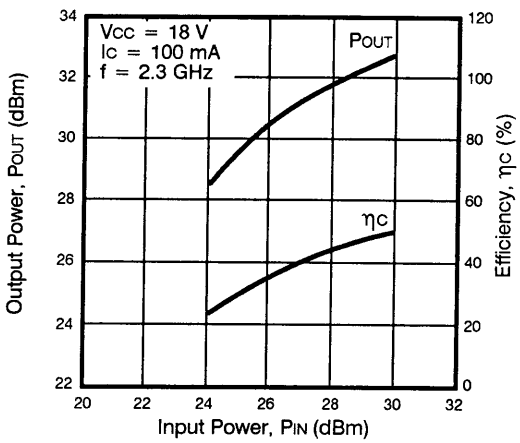
NE57520 OSCILLATOR OUTPUT POWER vs. FREQUENCY



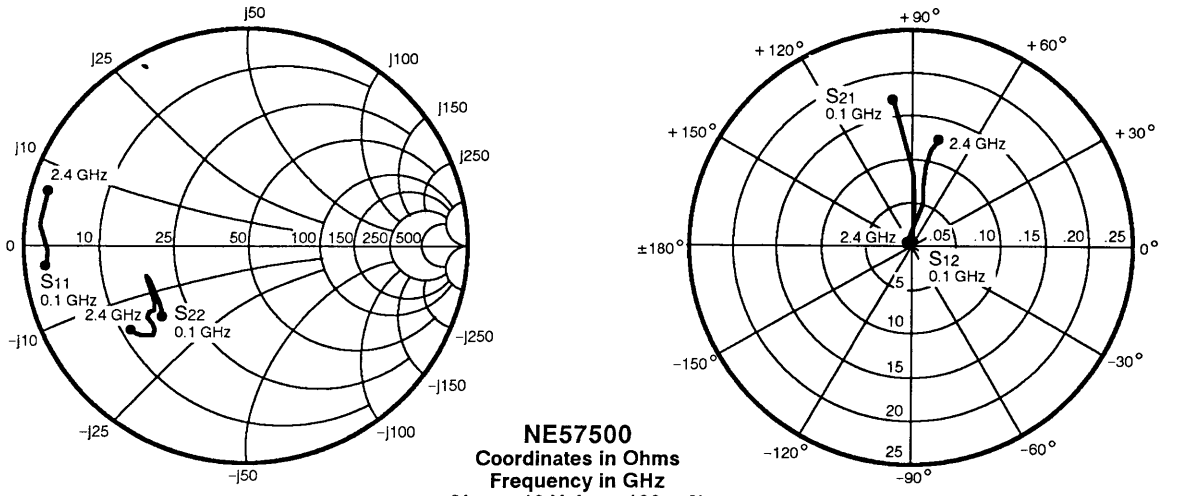
NE57510 OSCILLATOR POWER AND COLLECTOR EFFICIENCY vs. SUPPLY VOLTAGE



NE57520 POWER OUTPUT AND EFFICIENCY vs. INPUT POWER



TYPICAL COMMON EMITTER SCATTERING PARAMETERS



NE57500
Coordinates in Ohms
Frequency in GHz
(V_{CE} = 10 V, I_C = 100 mA)

S-MAGN AND ANGLES:

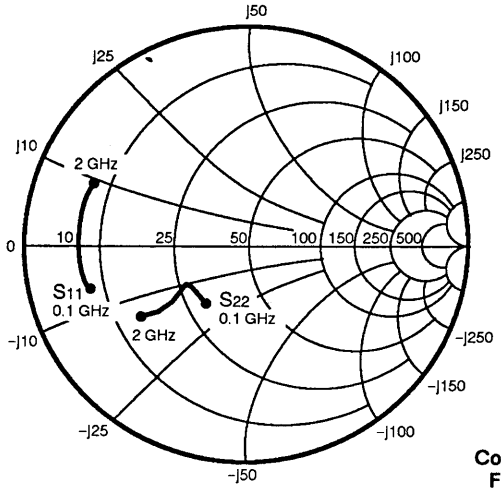
V_{CE} = 10 V, I_C = 50 mA

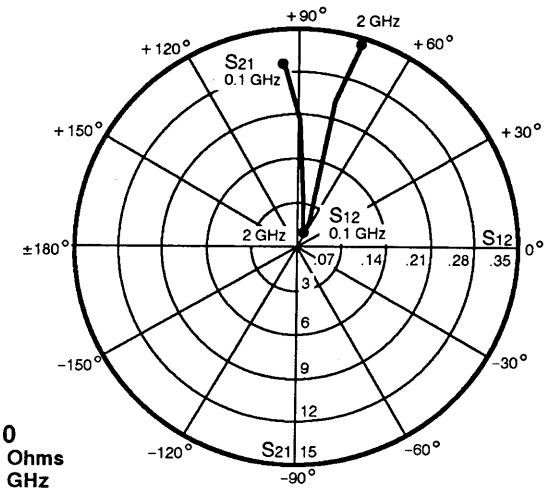
FREQUENCY (MHz)	S_{11}		S_{21}		S_{12}		S_{22}		K	Gma (dB)
100	.88	-167	15.65	98	.004	9	.29	-124	1.64	31.5
200	.87	-174	7.98	91	.006	34	.25	-142	2.27	24.8
400	.89	-178	3.97	81	.020	59	.26	-151	1.40	19.2
600	.88	179	2.68	75	.031	64	.26	-152	1.39	15.6
800	.87	177	1.97	69	.035	66	.29	-141	1.68	12.7
1000	.88	176	1.60	63	.049	70	.30	-141	1.41	11.3
1200	.88	175	1.35	58	.064	74	.29	-139	1.28	10.0
1400	.87	173	1.16	54	.076	74	.33	-136	1.25	8.8
1600	.87	172	1.03	48	.088	76	.35	-137	1.20	8.0
1800	.87	170	.89	45	.098	77	.39	-137	1.23	6.7
2000	.87	167	.83	38	.108	77	.39	-137	1.15	6.5
2200	.90	165	.75	36	.117	74	.41	-140	.94	8.1
2400	.89	164	.66	32	.130	75	.43	-143	1.03	5.9

V_{CE} = 10 V, I_C = 100 mA

100	.88	-171	16.02	96	.004	13	.29	-138	1.66	31.7
200	.88	-176	8.13	90	.006	45	.26	-152	2.39	24.9
400	.89	-179	4.05	81	.013	69	.28	-158	1.95	19.2
600	.88	178	2.73	75	.029	71	.27	-160	1.49	15.5
800	.88	176	2.01	69	.042	72	.28	-148	1.43	13.0
1000	.87	176	1.64	64	.054	75	.29	-148	1.43	11.2
1200	.88	175	1.37	59	.068	75	.28	-145	1.19	10.4
1400	.88	173	1.19	55	.077	77	.31	141	1.24	8.9
1600	.87	171	1.05	48	.089	77	.33	-141	1.21	7.9
1800	.87	170	.92	45	.100	77	.36	-140	1.24	6.7
2000	.87	167	.85	38	.109	77	.37	-139	1.15	6.6
2200	.90	165	.76	36	.119	74	.38	-142	.93	8.1
2400	.89	164	.68	31	.131	75	.41	-144	1.06	5.6

TYPICAL COMMON EMITTER SCATTERING PARAMETERS





NE57510
Coordinates in Ohms
Frequency in GHz
(V_{CE} = 10 V, I_C = 50 mA)

S-MAGN AND ANGLES:

VCE = 10 V, IC = 25 mA

FREQUENCY (MHz)	S11		S21		S12		S22	
100	.73	-157	11.48	98	.03	43	.32	-107
200	.74	-169	5.93	88	.04	50	.28	-127
400	.74	-178	3.05	78	.07	66	.28	-133
600	.75	177	2.08	69	.11	67	.32	-135
800	.75	174	1.58	62	.14	71	.37	-135
1000	.76	171	1.32	54	.17	74	.41	-136
1200	.74	167	1.13	50	.20	75	.45	-136
1400	.75	165	.99	47	.24	75	.50	-137
1600	.75	162	.89	42	.27	75	.55	-139
1800	.74	159	.81	40	.29	74	.59	-142
2000	.74	157	.76	40	.33	74	.61	-144

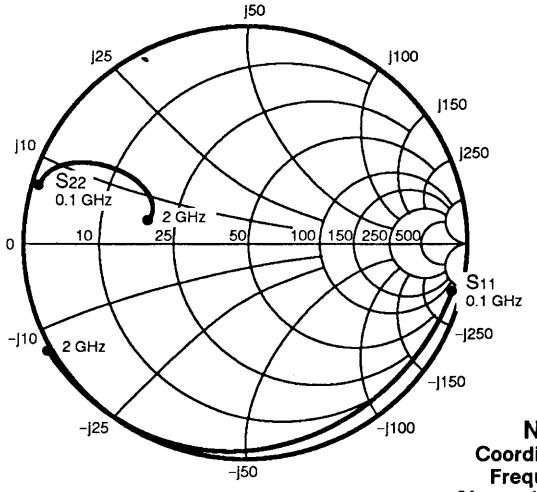
VCE = 10 V, IC = 50 mA

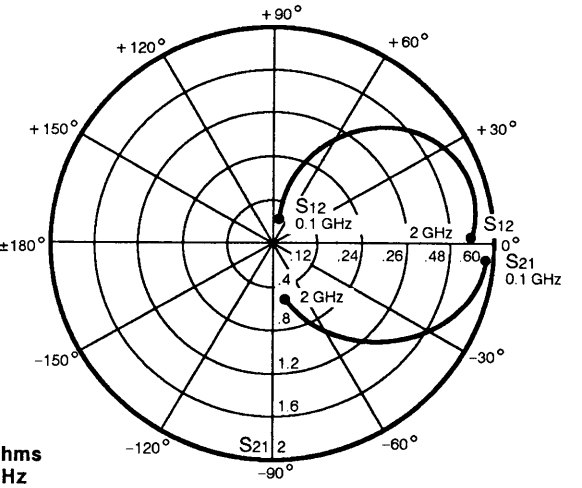
100	.72	-163	12.32	96	.03	46	.32	-125
200	.72	-173	6.35	87	.04	58	.30	-142
400	.73	-179	3.26	78	.08	67	.31	-148
600	.74	176	2.22	70	.11	71	.33	-148
800	.74	172	1.70	63	.15	72	.36	-147
1000	.74	169	1.43	56	.18	72	.39	-145
1200	.73	167	1.25	52	.22	74	.42	-143
1400	.73	164	1.09	48	.25	73	.46	-142
1600	.73	162	.98	43	.28	73	.50	-143
1800	.72	160	.90	40	.30	72	.54	-144
2000	.71	157	.84	40	.33	72	.56	-145

VCE = 10 V, IC = 100 mA

100	.73	-166	12.22	94	.02	52	.31	-133
200	.73	-174	6.28	86	.03	62	.30	-147
400	.73	180	3.23	77	.08	71	.30	-152
600	.74	175	2.20	69	.12	72	.31	-151
800	.74	172	1.70	63	.15	73	.35	-149
1000	.74	169	1.41	55	.18	73	.37	-147
1200	.73	166	1.23	51	.22	72	.40	-144
1400	.72	164	1.08	46	.25	73	.44	-142
1600	.72	162	.96	42	.28	73	.48	-143
1800	.73	160	.88	38	.30	72	.53	-144
2000	.71	156	.83	37	.33	71	.55	-144

TYPICAL COMMON COLLECTOR SCATTERING PARAMETERS





NE57510
Coordinates in Ohms
Frequency in GHz
(V_{CE} = 10 V, I_C = 50 mA)

S-MAGN AND ANGLES:

V_{CE} = 10 V, I_C = 25 mA

FREQUENCY (MHz)	S_{11}		S_{21}		S_{12}		S_{22}	
100	.98	-15	1.87	-7	.08	68	.92	173
200	.97	-31	1.80	-17	.19	68	.90	167
400	.97	-58	1.60	-30	.35	56	.81	158
600	.95	-79	1.41	-41	.46	44	.70	151
800	.94	-97	1.21	-50	.52	33	.60	148
1000	.94	-111	1.03	-56	.56	24	.51	151
1200	.97	-120	.89	-60	.59	16	.43	155
1400	.99	-130	.76	-66	.58	10	.40	165
1600	.99	-137	.68	-71	.57	3	.38	175
1800	.98	-144	.56	-77	.55	-6	.40	-178
2000	1.00	-150	.47	-78	.53	-8	.45	-175

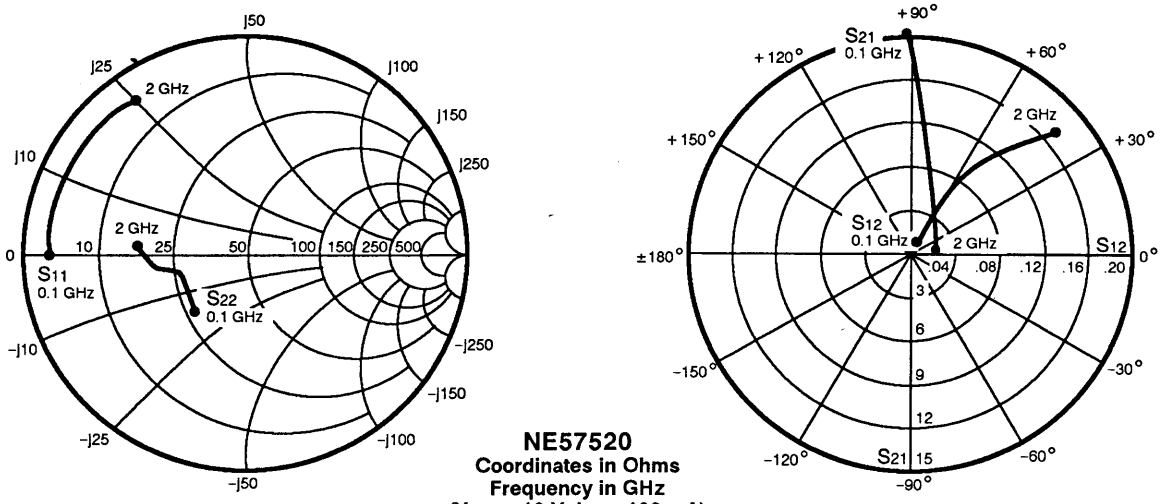
V_{CE} = 10 V, I_C = 50 mA

100	.99	-14	1.90	-7	.06	68	.94	174
200	.97	-30	1.82	-16	.15	70	.93	169
400	.98	-55	1.65	-29	.29	60	.87	162
600	.97	-76	1.46	-40	.34	50	.78	155
800	.96	-94	1.28	-50	.46	41	.70	151
1000	.97	-109	1.09	-56	.51	31	.61	150
1200	1.00	-119	.94	-61	.55	24	.53	151
1400	1.01	-129	.80	-68	.55	18	.47	156
1600	1.02	-137	.71	-74	.56	11	.42	162
1800	1.01	-144	.59	-79	.55	2	.41	169
2000	1.02	-150	.49	-81	.54	1	.44	173

V_{CE} = 10 V, I_C = 100 mA

100	.99	-15	1.90	-7	.06	70	.95	175
200	.97	-30	1.83	-16	.15	71	.95	170
400	.98	-57	1.65	-29	.28	62	.89	162
600	.97	-78	1.46	-41	.39	51	.81	156
800	.96	-96	1.26	-51	.47	42	.73	151
1000	.97	-111	1.08	-57	.52	33	.65	150
1200	1.01	-120	.91	-62	.56	25	.55	149
1400	1.02	-131	.78	-69	.56	19	.49	154
1600	1.01	-139	.68	-74	.57	12	.43	158
1800	1.00	-145	.56	-80	.56	2	.40	166
2000	1.00	-152	.46	-81	.56	-0	.43	171

TYPICAL COMMON EMITTER SCATTERING PARAMETERS



NE57520
Coordinates in Ohms
Frequency in GHz
(V_{CE} = 10 V, I_C = 100 mA)

S-MAGN AND ANGLES:

V_{CE} = 10 V, I_C = 60 mA

FREQUENCY (MHz)	S_{11}		S_{21}		S_{12}		S_{22}	
100	.85	-177	14.88	92	.02	36	.33	-126
200	.86	176	7.63	82	.02	46	.27	-148
400	.86	167	3.80	69	.03	56	.26	-160
600	.85	161	2.51	58	.04	59	.28	-163
800	.85	155	1.87	47	.06	56	.30	-165
1000	.85	150	1.50	37	.08	56	.34	-167
1200	.85	144	1.27	29	.10	54	.37	-169
1400	.85	141	1.10	21	.11	54	.40	-172
1600	.86	135	.95	13	.13	47	.44	-175
1800	.87	131	.85	7	.15	47	.47	-178
2000	.87	126	.77	0	.17	43	.50	178

V_{CE} = 10 V, I_C = 100 mA

100	.85	180	15.48	91	.01	44	.34	-136
200	.87	174	7.92	81	.01	61	.30	-157
400	.86	166	3.94	69	.03	62	.29	-168
600	.85	160	2.60	58	.05	59	.31	-171
800	.85	154	1.94	47	.07	59	.32	-173
1000	.85	150	1.56	38	.08	58	.34	-175
1200	.85	144	1.32	30	.10	55	.37	-176
1400	.85	141	1.15	22	.12	54	.39	-178
1600	.86	135	1.00	14	.13	48	.43	-180
1800	.87	131	.90	8	.15	47	.45	178
2000	.87	126	.82	1	.17	43	.48	175

V_{CE} = 10 V, I_C = 150 mA

100	.86	178	15.58	90	.01	50	.35	-141
200	.87	173	7.97	81	.01	63	.31	-160
400	.86	165	3.96	69	.03	65	.30	-172
600	.86	160	2.62	58	.05	60	.31	-175
800	.84	154	1.96	47	.07	58	.32	-176
1000	.85	149	1.58	38	.09	57	.34	-177
1200	.85	144	1.33	30	.10	55	.36	-178
1400	.85	140	1.16	22	.12	53	.38	-180
1600	.86	135	1.01	14	.14	49	.42	179
1800	.87	131	.90	8	.15	47	.44	177
2000	.87	126	.83	1	.17	42	.47	175

NEC®

NPN MEDIUM POWER MICROWAVE TRANSISTOR

NE64300 NE64310 NE64320

FEATURES

- **HIGH OUTPUT POWER:** 900 mW at 2 GHz
- **HIGH GAIN:** 11 dB at 1 GHz
- **RELIABILITY:** Platinum - Gold Metallization

DESCRIPTION AND APPLICATIONS

The NE643 series of NPN silicon medium power transistors is designed to operate in amplifiers and oscillators up to 2 GHz with supply voltages up to 18 volts. The series is available in chip form (NE64300), in a low inductance TO-46 can (NE64310), and an economical stud-stripline package (NE64320). NEC's stringent quality control, with its titanium, platinum, and gold metallization system, provides the utmost in reliability and uniformity. This unique metallization system eliminates many of the problems associated with aluminum and moly-gold and allows high temperature operation (100°C) at rated dissipation. The NE64320 (2SC1041) is processed and screened to NEC's Grade C level of reliability which is patterned after MIL-S-19500.

ABSOLUTE MAXIMUM RATINGS (T_A = 25°C)

SYMBOLS	PARAMETERS	UNITS	RATINGS
V_{CBO}	Collector to Base Voltage	V	40
V_{CEO}	Collector to Emitter Voltage	V	20*
V_{EBO}	Emitter to Base Voltage	V	3
$I_{C(DC)}$	Collector Current (DC)	mA	150
$I_{C(Peak)}$	Collector Current (Peak)	mA	450
T_J	Junction Temperature	°C	200
T_{STG}	Storage Temperature	°C	-65 to +200

*Typical V_{CER} = 30 V for R ≤ 300 Ω

ELECTRICAL CHARACTERISTICS (T_A = 25°C)

PART NUMBER EIAJ[1] REGISTERED NUMBER PACKAGE OUTLINE			NE64310 V020 10 (TO-46)			NE64320 2SC1041 - Grd C 2SC1593 - Grd D 20		
SYMBOLS	PARAMETERS AND CONDITIONS	UNITS	MIN	TYP	MAX	MIN	TYP	MAX
I_{CBO}	Collector Cutoff Current at V_{CB} = 20 V, I_E = 0	μA			50			50
I_{EBO}	Emitter Cutoff Current at V_{EB} = 2 V, I_C = 0	μA			100			100
h_{FE}	Forward Current Gain[2,3] at V_{CE} = 10 V, I_C = 70 mA		15	80	200	15	80	200
C_{CB}	Collector to Base Capacitance[5] at V_{CB} = 10 V, I_C = 0 mA, f = 1 MHz	pF		2	3		2.5	3.5
R_{TH}	Thermal Resistance (Junction-to-Case)	°C/W			70[4]			40
P_T	Total Device Dissipation (T_C = 25°C)	W			2			3.75

Notes:

1. Electronic Industrial Association of Japan.
2. Pulse width ≤ 350 μs, duty cycle ≤ 2%/pulse.
3. h_{FE} temperature coefficient = 0.6% per °C.
4. Standard steel header, $R\theta_{JC}$ for Kovar header is 85° C/W
5. C_{CB} measurement employs a three terminal bridge incorporating a guard circuit. The emitter terminal shall be connected to the guard terminal.

PERFORMANCE SPECIFICATIONS (T_A = 25°C)

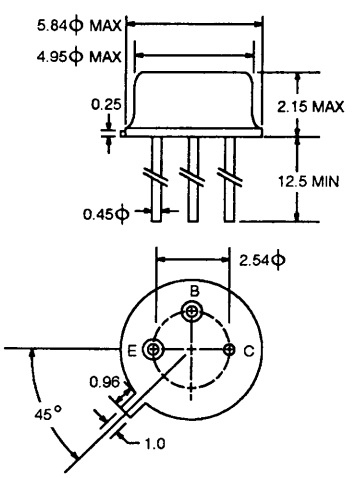
PART NUMBER EIAJ[1] REGISTERED NUMBER PACKAGE OUTLINE			NE64310 V020 10 (TO-46)			NE64320 2SC1041 - Grd C 2SC1593 - Grd D 20		
SYMBOLS	PARAMETERS AND CONDITIONS	UNITS	MIN	TYP	MAX	MIN	TYP	MAX
f_T	Gain Bandwidth Product at V_{CE} = 10 V, I_C = 70 mA	GHz	1.8	2		1.8	2	
$\|S_{21E}\|^2$	Insertion Power Gain at V_{CE} = 10 V, I_C = 60 mA, f = 0.5 GHz f = 1 GHz	 dB dB		 10.5 5			 12.5 6.5	
MAG	Maximum Available Gain at V_{CE} = 10 V, I_C = 60 mA P_{IN} = 24 dBm, f = 1 GHz f = 2 GHz	 dB dB		 8 3		 5	 11 5.6	
P_{OSC}	Oscillator Output Power at V_{CC} = 18 V, I_C = 100 mA, f = 2 GHz	 mW		 300			 500	
P_{OUT}	Power Output at V_{CC} = 18 V, I_C = 60 mA, P_{IN} = 250 mW, f = 2 GHz	 mW				 800	 900	

Notes:

1. Electronic Industrial Association of Japan.
2. Pulse width ≤ 350 μs, duty cycle ≤ 2%/pulse.

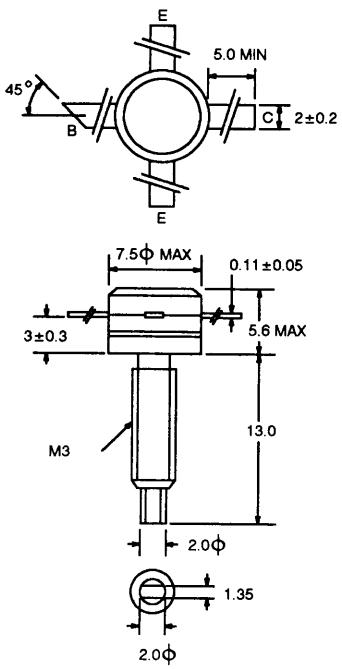
OUTLINE DIMENSIONS (Units in mm)

OUTLINE 10
(TO-46)

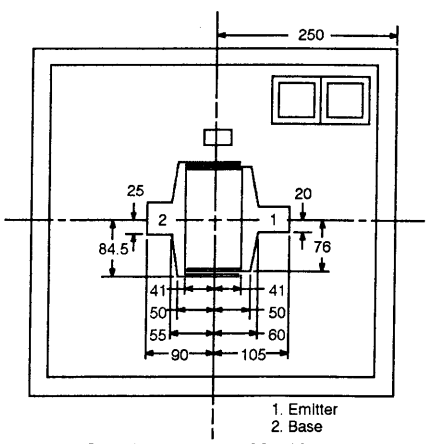


Collector is connected to case.

OUTLINE 20



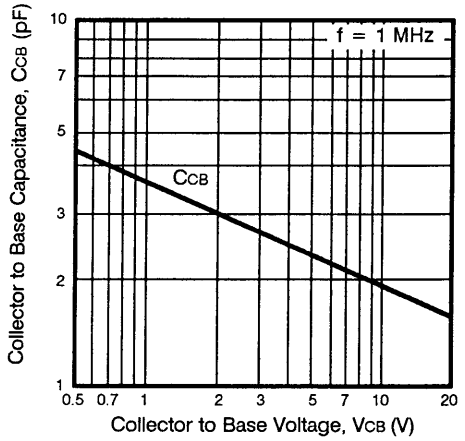
NE64300 (CHIP)
(Units in μm)



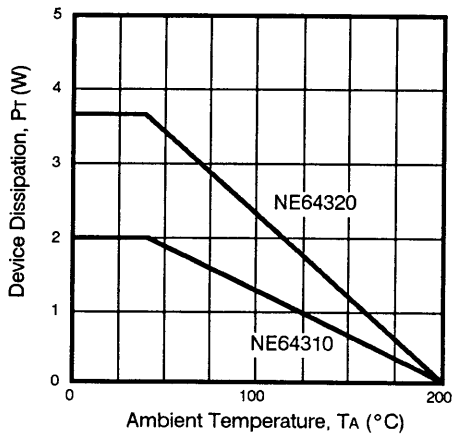
(Chip Thickness: 160±20 μm)

TYPICAL PERFORMANCE CHARACTERISTICS (T_A = 25°C)

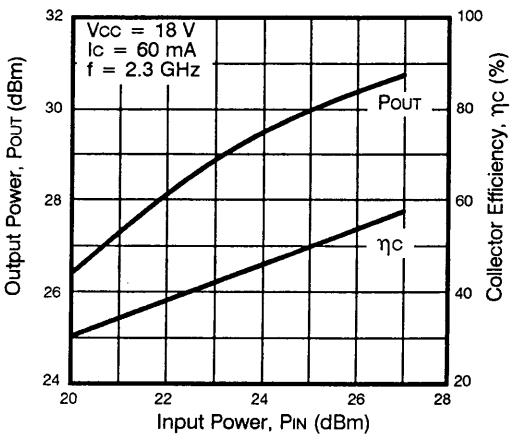
NE64310, NE64320
DEVICE CAPACITANCE vs.
COLLECTOR TO BASE VOLTAGE



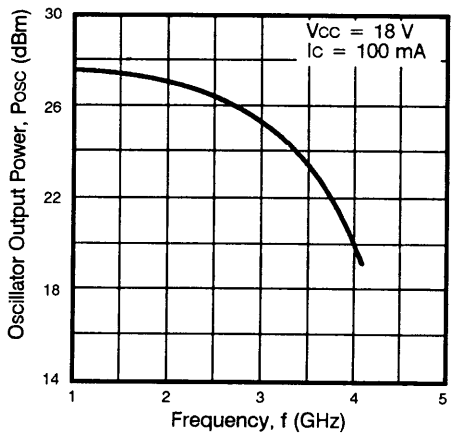
TOTAL POWER DISSIPATION vs.
AMBIENT TEMPERATURE



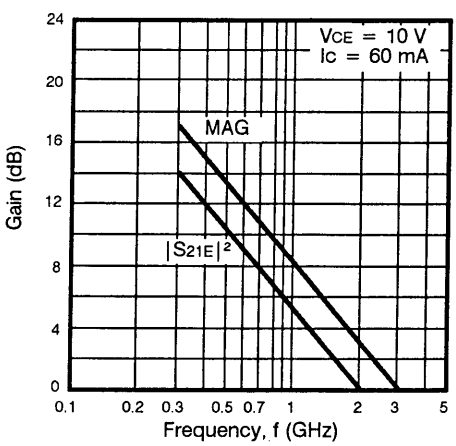
NE64320
OUTPUT POWER AND
EFFICIENCY vs. INPUT POWER



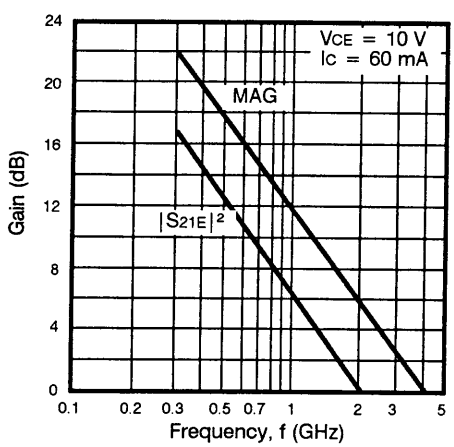
NE64320
OSCILLATOR OUTPUT POWER
vs. FREQUENCY



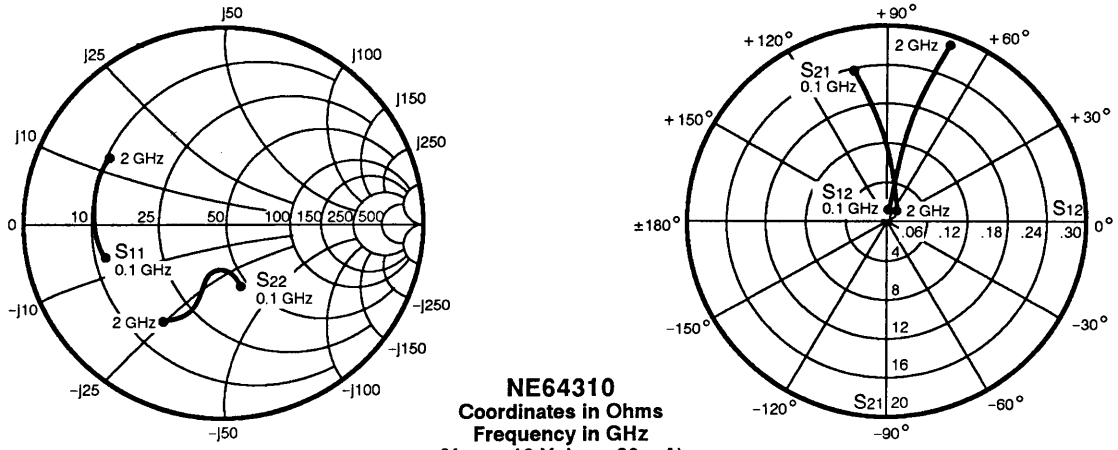
NE64310
GAIN vs. FREQUENCY



NE64320
GAIN vs. FREQUENCY



TYPICAL COMMON EMITTER SCATTERING PARAMETERS



NE64310
Coordinates in Ohms
Frequency in GHz
(V_{CE} = 10 V, I_C = 60 mA)

S-MAGN AND ANGLES:

V_{CE} = 10 V, I_C = 20 mA

FREQUENCY (MHz)	S_{11}		S_{21}		S_{12}		S_{22}	
100	.59	-146	14.33	107	.03	50	.43	-64
200	.64	-163	7.66	94	.03	52	.31	-75
400	.64	-175	3.97	80	.07	66	.27	-84
600	.65	178	2.70	72	.10	68	.30	-93
800	.66	172	2.04	64	.12	72	.35	-100
1000	.66	168	1.68	57	.15	72	.39	-105
1200	.65	164	1.43	51	.18	75	.44	-108
1400	.65	160	1.23	47	.21	73	.50	-113
1600	.65	157	1.09	42	.24	74	.54	-116
1800	.66	153	1.01	39	.25	73	.57	-120
2000	.65	149	.93	37	.28	72	.60	-123

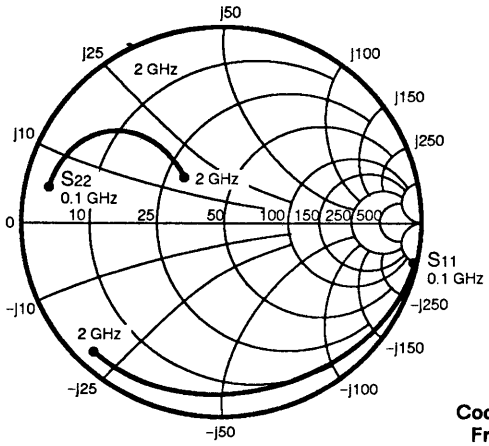
V_{CE} = 10 V, I_C = 60 mA

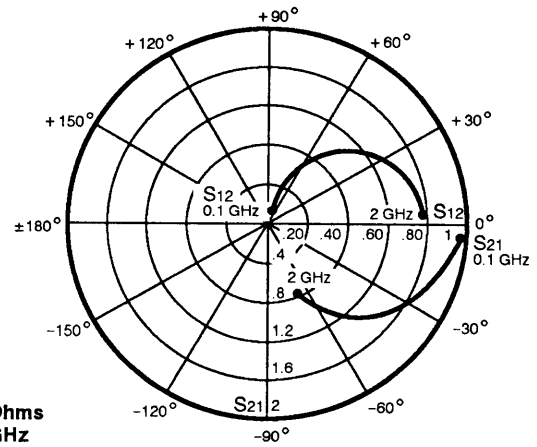
100	.60	-163	15.91	102	.02	65	.32	-75
200	.63	-172	8.33	91	.03	66	.24	-88
400	.63	180	4.30	79	.07	74	.22	-95
600	.65	174	2.92	72	.10	74	.26	-102
800	.65	169	2.21	64	.13	73	.30	-107
1000	.65	166	1.81	57	.16	74	.34	-109
1200	.64	163	1.55	52	.19	74	.39	-110
1400	.65	159	1.35	47	.22	73	.44	-114
1600	.64	156	1.19	41	.25	72	.48	-116
1800	.63	153	1.11	37	.26	71	.52	-120
2000	.64	149	1.02	35	.29	70	.56	-122

V_{CE} = 10 V, I_C = 100 mA

100	.65	-169	12.93	100	.02	72	.31	-54
200	.67	-176	6.81	90	.03	70	.26	-63
400	.67	177	3.59	78	.06	77	.27	-76
600	.69	173	2.45	71	.10	76	.31	-87
800	.69	169	1.87	62	.13	77	.35	-95
1000	.68	166	1.53	54	.16	76	.40	-101
1200	.69	162	1.30	48	.18	78	.45	-105
1400	.69	158	1.12	43	.22	76	.50	-110
1600	.69	155	.99	38	.24	75	.55	-114
1800	.68	151	.89	36	.26	75	.58	-119
2000	.69	147	.83	34	.29	73	.61	-122

TYPICAL COMMON COLLECTOR SCATTERING PARAMETERS





NE64310
Coordinates in Ohms
Frequency in GHz
(V_{CE} = 10 V, I_C = 50 mA)

S-MAGN AND ANGLES:

VCE = 10 V, IC = 25 mA

FREQUENCY (MHz)	S11		S21		S12		S22	
100	.97	-11	1.87	-5	.07	61	.91	174
200	.95	-22	1.81	-12	.17	66	.91	168
400	.94	-42	1.69	-23	.31	61	.85	158
600	.91	-60	1.57	-32	.44	52	.78	148
800	.87	-75	1.42	-40	.53	43	.71	140
1000	.86	-90	1.27	-45	.60	34	.62	136
1200	.89	-99	1.15	-49	.67	26	.51	130
1400	.90	-110	1.05	-55	.69	20	.43	129
1600	.88	-118	.98	-59	.71	12	.33	127
1800	.86	-125	.86	-63	.74	3	.26	129
2000	.88	-133	.78	-66	.76	0	.24	137

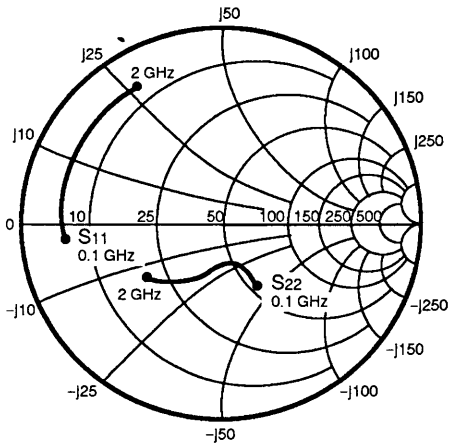
VCE = 10 V, IC = 50 mA

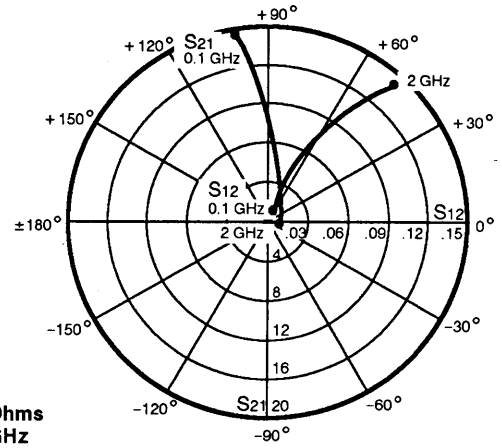
100	.97	-11	1.89	-5	.05	61	.92	174
200	.96	-21	1.83	-12	.15	68	.92	169
400	.96	-41	1.72	-22	.29	63	.88	160
600	.92	-58	1.61	-32	.41	55	.82	150
800	.90	-74	1.47	-40	.50	47	.76	143
1000	.89	-89	1.31	-46	.58	38	.68	137
1200	.91	-99	1.19	-50	.66	30	.58	129
1400	.92	-110	1.08	-57	.68	24	.49	128
1600	.91	-118	1.00	-61	.71	16	.40	124
1800	.89	-125	.87	-65	.75	6	.31	122
2000	.90	-133	.78	-68	.77	3	.28	128

VCE = 10 V, IC = 100 mA

100	.95	-16	1.86	-7	.13	61	.92	172
200	.89	-30	1.76	-16	.26	59	.92	166
400	.85	-53	1.57	-26	.43	50	.83	155
600	.80	-72	1.41	-35	.55	40	.74	144
800	.77	-88	1.25	-42	.64	31	.66	136
1000	.75	-102	1.09	-47	.71	22	.55	131
1200	.76	-111	.98	-50	.76	14	.43	125
1400	.77	-122	.87	-54	.77	8	.33	127
1600	.76	-129	.80	-57	.77	0	.23	129
1800	.75	-135	.71	-59	.79	-8	.16	142
2000	.76	-142	.65	-60	.80	-12	.16	163

TYPICAL COMMON EMITTER SCATTERING PARAMETERS





NE64320
Coordinates in Ohms
Frequency in GHz
(V_{CE} = 10 V, I_C = 60 mA)

S-MAGN AND ANGLES:

V_{CE} = 10 V, I_C = 20 mA

FREQUENCY (MHz)	S_{11}		S_{21}		S_{12}		S_{22}	
100	.74	-155	16.60	106	.02	35	.48	-50
200	.79	-174	8.96	89	.02	35	.34	-54
400	.80	171	4.54	72	.03	41	.28	-59
600	.80	163	2.30	60	.04	46	.29	-70
800	.79	156	2.26	49	.05	49	.31	-85
1000	.81	151	1.78	38	.06	53	.34	-96
1200	.82	144	1.48	29	.07	53	.38	-108
1400	.81	140	1.29	19	.08	51	.42	-118
1600	.81	134	1.11	10	.10	49	.46	-127
1800	.82	128	.96	3	.12	50	.48	-136
2000	.83	123	.86	-3	.14	46	.53	-142

V_{CE} = 10 V, I_C = 60 mA

100	.76	-174	19.71	100	.01	47	.36	-63
200	.79	177	10.38	86	.01	62	.23	-70
400	.79	166	5.19	71	.03	61	.18	-74
600	.79	160	3.44	60	.04	62	.19	-84
800	.79	154	2.57	50	.05	62	.22	-97
1000	.80	149	2.04	39	.07	59	.25	-104
1200	.81	143	1.70	30	.08	56	.29	-115
1400	.80	138	1.47	20	.09	53	.32	-124
1600	.81	133	1.28	11	.11	50	.37	-131
1800	.81	128	1.12	5	.12	49	.40	-138
2000	.82	122	1.01	-3	.14	46	.45	-144

V_{CE} = 10 V, I_C = 100 mA

100	.78	-178	19.87	98	.01	63	.33	-64
200	.79	174	10.39	85	.01	67	.21	-69
400	.80	165	5.19	70	.03	63	.17	-74
600	.80	159	3.43	59	.04	64	.18	-83
800	.79	153	2.57	49	.06	62	.21	-96
1000	.81	148	2.04	38	.07	63	.24	-103
1200	.80	142	1.69	29	.08	58	.28	-114
1400	.80	138	1.47	19	.09	55	.31	-123
1600	.81	132	1.27	10	.11	50	.36	-130
1800	.82	127	1.11	4	.12	50	.40	-137
2000	.82	122	.99	-4	.14	47	.44	143