

T-31-17  
T-31-21  
T-33-05



# NPN MEDIUM POWER UHF-VHF TRANSISTOR

# NE416 SERIES

## FEATURES

- **LOW NOISE FIGURE:** 1 dB at 70 MHz
- **HIGH RELIABILITY METALLIZATION**
- **LINEAR POWER OUTPUT:** 200 mW at 2 GHz
- **LOW COST**

## DESCRIPTION AND APPLICATIONS

The NE416 series of NPN silicon transistors is one of the most versatile and widely used of NEC's microwave transistors. The series provides economical solutions to a wide range of amplifier and oscillator problems. Low noise figures, high gain and high current capability achieve wide dynamic range and excellent linearity. The NE416 series is available in a wide selection of package styles and in chip form for thin and thick film circuits. Most package styles are available with Grade C (JANTXV equivalent) and Grade CX (JANTX equivalent) screening. The NE41615 and NE41603 have been space qualified. The series is volume produced, using the latest techniques and production controls patterned after MIL-S-19500. Of special importance is the use of NEC's high reliability metallization system (Pt-Si-Ti-Pt-Au) which offers the utmost in performance, reliability, and permits high temperature operation (100°C) at rated dissipation. The NE416 series offers superior performance and reliability at prices usually lower than less reliable moly-gold or aluminum transistors.

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

SYMBOLS	PARAMETERS	UNITS	RATINGS
V <sub>CB0</sub>	Collector to Base Voltage	V	35
V <sub>CE0</sub>	Collector to Emitter Voltage	V	18
V <sub>EB0</sub>	Emitter to Base Voltage	V	3
I <sub>C</sub>	Collector Current	mA	100
T <sub>J</sub>	Junction Temperature	°C	200*
T <sub>STG</sub>	Storage Temperature	°C	-65 to +200**

\*Maximum Junction Temperature for NE41632 is 150°C.

\*\*Maximum Storage Temperature (T<sub>STG</sub>) for the NE41632 and NE41635 is -65°C to 150°C. The leads of the NE41635 are Sn plated and may tarnish above 150°C. Once soldered into a circuit, the unit can be stored at 200°C.

## NE41635 TYPICAL NOISE PARAMETERS

V<sub>CE</sub> = 10 V, I<sub>C</sub> = 5 mA

FREQUENCY (MHz)	NF min (dB)	Ga/dB	OPT SOURCE	RN/50 Ω
500	1.8	15.3	.40 ∠ 128°	.17
1000	3.0	11.1	.58 ∠ 171°	.10
1500	4.2	8.3	.69 ∠ -174°	.14
2000	4.8	6.7	.68 ∠ -162°	.26

V<sub>CE</sub> = 10 V, I<sub>C</sub> = 20 mA

500	2.4	17.5	.42 ∠ 159°	.13
1000	3.6	12.7	.59 ∠ 180°	.10
1500	4.9	9.8	.67 ∠ -169°	.15
2000	5.6	8.8	.73 ∠ -159°	.50



PERFORMANCE SPECIFICATIONS (TA = 25°C)

NE PART NUMBER		NE41603		NE41607		NE41612-1 <sup>2</sup>		NE41615		NE41620		NE41632-1		NE41635			
EIAJ <sup>1</sup> REGISTERED NUMBER		2SC1949 (Grd C)		07		NE41612-1 <sup>2</sup>		2SC1426 (Grd Cx)		2SC1255 (Grd C)		NE41632-2		NE41635			
PACKAGE OUTLINE		03		07		12 (TO-72)		15 (TO-39)		20		32 (TO-92)		35 (MICRO-X)			
SYMBOLS	PARAMETERS AND CONDITIONS	UNITS	MIN	TYP	MAX	MIN	TYP	MAX	MIN	TYP	MAX	MIN	TYP	MAX	MIN	TYP	MAX
ICBO	Collector Cutoff Current at VCB = 20 V, IE = 0	μA		0.1		0.1			0.1			0.1			0.1		
IEBO	Emitter Current Gain at VEB = 2 V, IC = 0	μA		0.1		0.1			0.1			0.1			0.1		
hFE	Forward Current Gain <sup>4</sup> at VCB = 5 V, IC = 25 mA VCB = 10 V, IC = 50 mA		30	100	200	30	100	200	30	100	200	30	100	200	30	100	200
CCB	Collector to Base Capacitance <sup>5</sup> at VCB = 5 V, IE = 0, f = 1 MHz VCB = 10 V, IE = 0, f = 1 MHz	pF		1.5		1.3		2		1		2		1		2	
RTH	Thermal Resistance (Junction-to-Case)	°C/W		50		50			50			50		130		50	
PT	Total Power Dissipation (TA = 25°C)	W		.58		.58			3.5			3.5		.80		3.5	

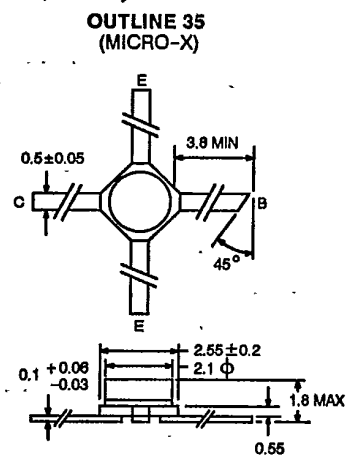
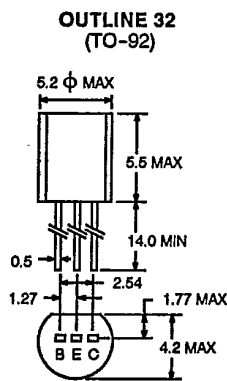
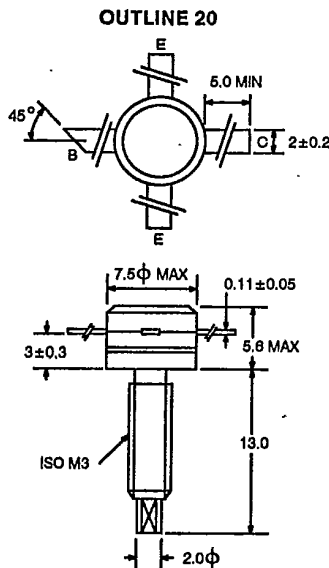
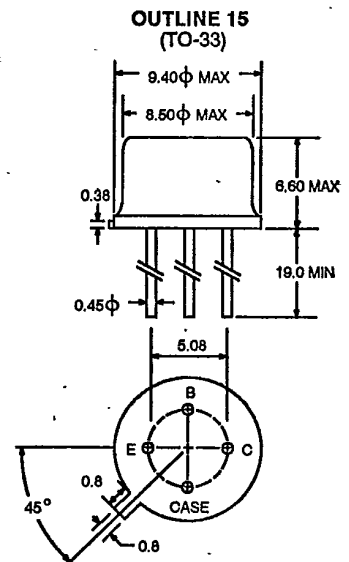
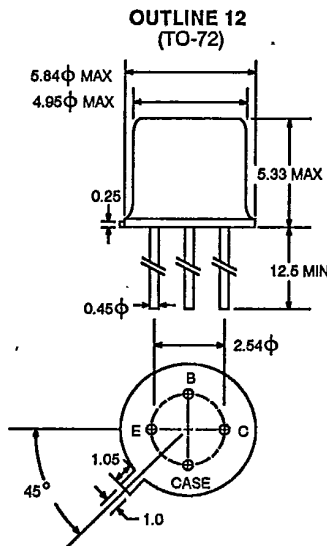
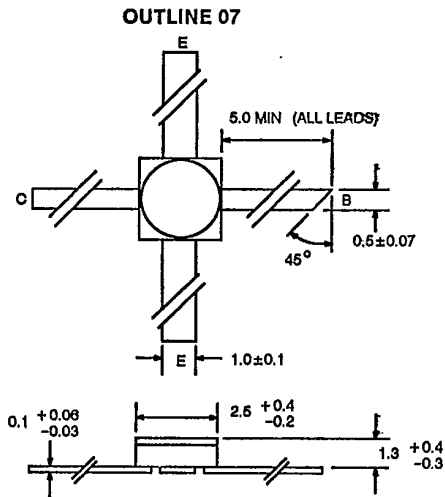
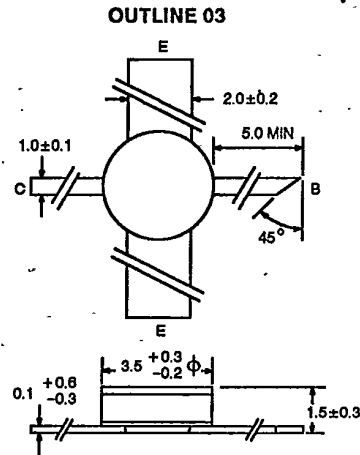
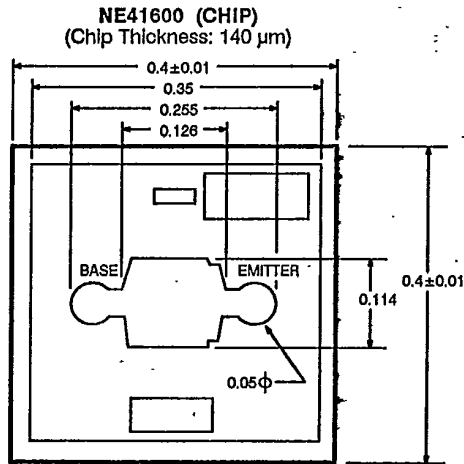
ELECTRICAL CHARACTERISTICS (TA = 25°C)

NE PART NUMBER		NE41603		NE41607		NE41612-1 <sup>2</sup>		NE41615		NE41620		NE41632-1		NE41635			
EIAJ <sup>1</sup> REGISTERED NUMBER		2SC1949 (Grd C)		07		NE41612-1 <sup>2</sup>		2SC1426 (Grd Cx)		2SC1255 (Grd C)		NE41632-2		NE41635			
PACKAGE OUTLINE		03		07		12 (TO-72)		15 (TO-39)		20		32 (TO-92)		35 (MICRO-X)			
SYMBOLS	PARAMETERS AND CONDITIONS	UNITS	MIN	TYP	MAX	MIN	TYP	MAX	MIN	TYP	MAX	MIN	TYP	MAX	MIN	TYP	MAX
f <sub>T</sub>	Gain Bandwidth Product at VCE = 5 V, IC = 25 mA VCE = 10 V, IC = 50 mA	GHz	2	3.5		1.5	2.7		2	3.5		2	3.5		2	3.5	
S <sub>21E</sub>   <sup>2</sup>	Insertion Power Gain at VCE = 10 V, IC = 30 mA, f = 0.5 GHz f = 1 GHz VCE = 10 V, IC = 50 mA, f = 0.2 GHz f = 0.5 GHz	dB	7	9.5		13	8		18	8.5		15	8.5		18	8.5	
NFMIN	Minimum Noise Figure at VCE = 10 V, IC = 5 mA, RG = 50 Ω f = 0.2 GHz f = 0.5 GHz f = 1 GHz VCE = 5 V, IC = 2 mA, RG = 200 Ω f = 70 MHz (NE41612-1)	dB		1.2		2.3	4		1.2	1.5		2.4	4 <sup>3</sup>		1.5	3.5	
MAG	Maximum Available Gain <sup>6</sup> at VCE = 10 V, IC = 30 mA, f = 0.5 GHz f = 1 GHz VCE = 10 V, IC = 50 mA, f = 0.2 GHz f = 0.5 GHz	dB		20		15.5	10		20	14		22.5	15		21	14	
GP	Power Gain at VCE = 15 V, IC = 50 mA, PIN = 10 dBm, f = 2 GHz	dB							9	10							
POUT	Power Output at VCE = 15 V, IC = 50 mA, PIN = 15 dBm, f = 2 GHz	dBm							22	23							
	VCE = 12.6 V, PIN = 7 dBm, f = 0.5 GHz	dBm															

Notes:

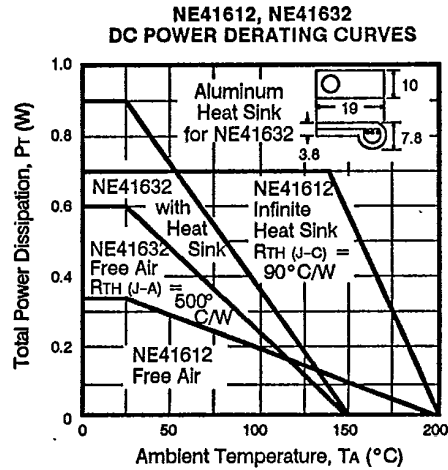
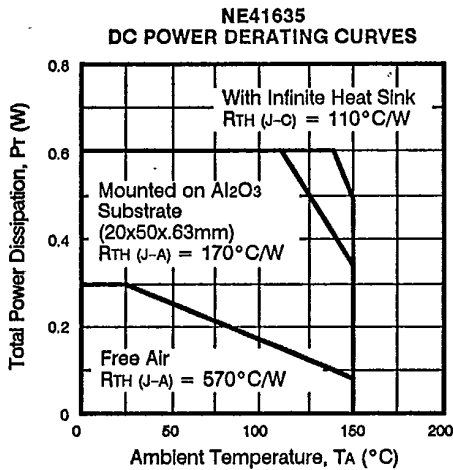
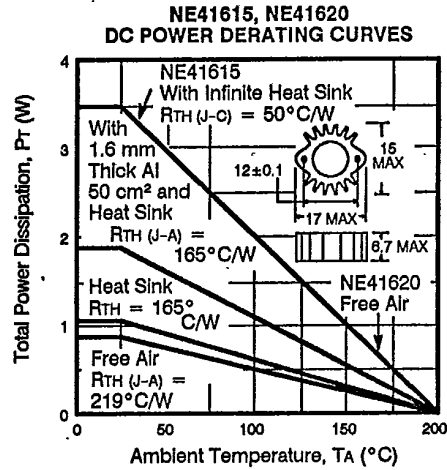
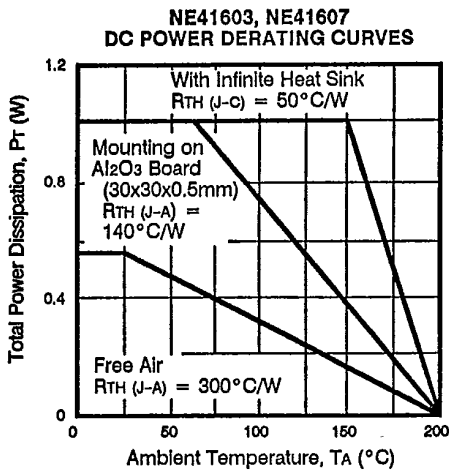
- Electronic Industrial Association of Japan
- NE41612-1 (NC921) is selected for low noise
- NE41632-1 (2SC2407) is selected for power and the NE41632-2 (2SC2408) is selected for small signal applications.
- Pulse measurement Duty Cycle ≤ 2%, PW ≤ 30 ns
- CCB measurement employs a three-terminal capacitance bridge incorporating a guard circuit. The emitter terminal shall be connected to the guard terminal.
- MAG = |S<sub>21E</sub>|<sup>2</sup> |1 - S<sub>22E</sub>|<sup>2</sup>

OUTLINE DIMENSIONS (Units in mm)

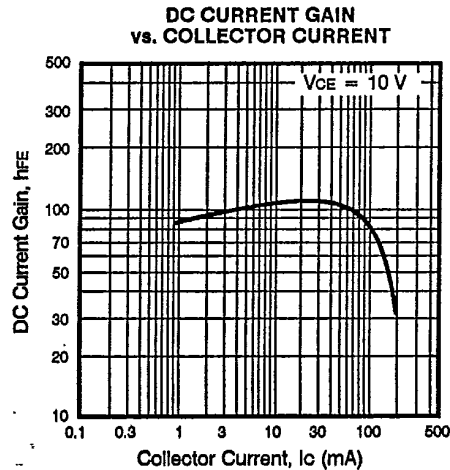
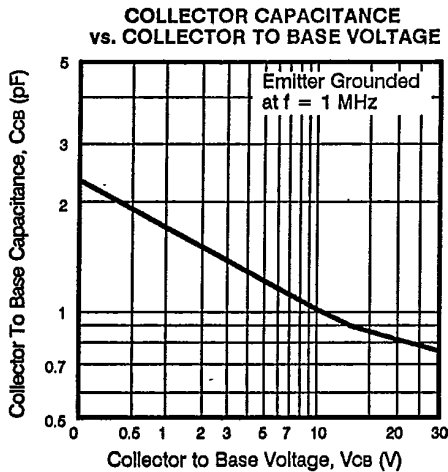


32B is available with center lead the base.

TYPICAL DEVICE CHARACTERISTICS (TA = 25°C)



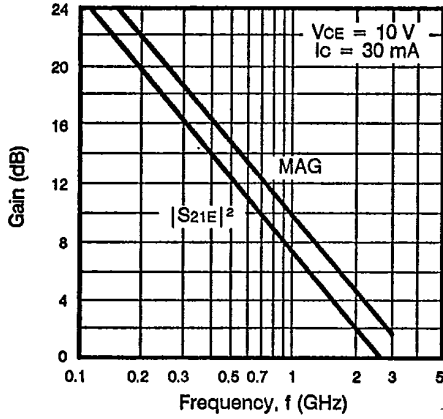
TYPICAL PERFORMANCE CHARACTERISTICS (TA = 25°C)



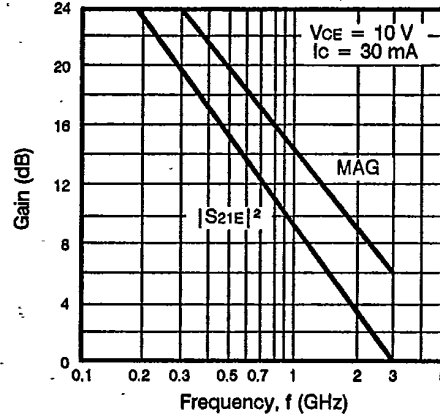
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TYPICAL PERFORMANCE CHARACTERISTICS (TA = 25°C)

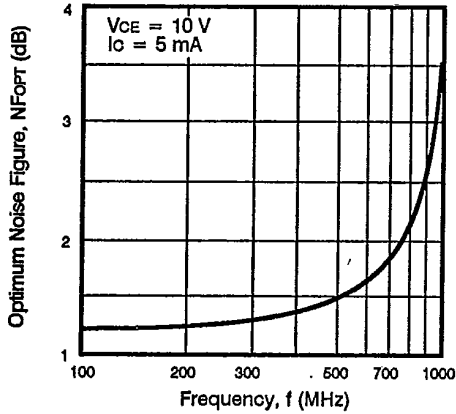
NE41612, NE41615 AND NE41632-2  
FORWARD INSERTION GAIN  
AND MAXIMUM AVAILABLE GAIN  
vs. FREQUENCY



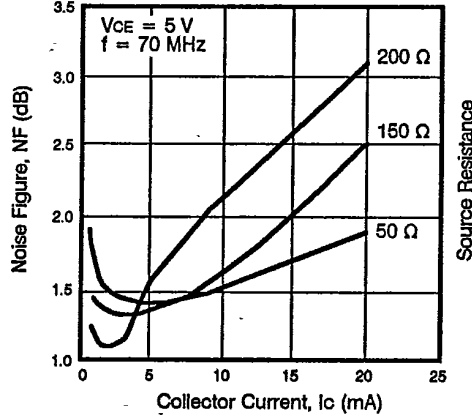
NE41603 AND NE41607  
FORWARD INSERTION GAIN  
AND MAXIMUM AVAILABLE GAIN  
vs. FREQUENCY



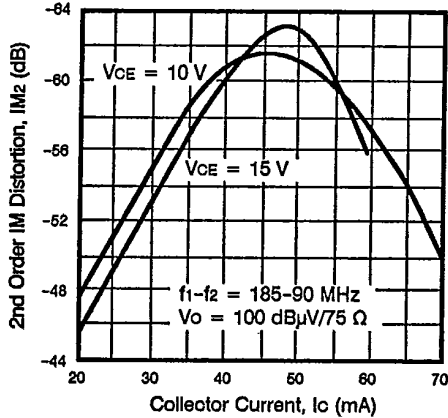
NE41603, NE41607 AND NE41632-2  
NOISE FIGURE vs. FREQUENCY



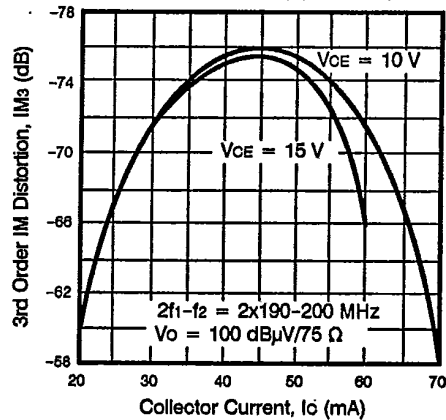
NE41612-1  
NOISE FIGURE vs.  
COLLECTOR CURRENT AND  
SOURCE RESISTANCE



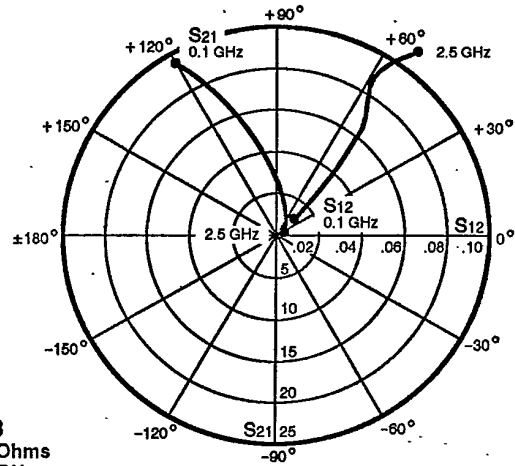
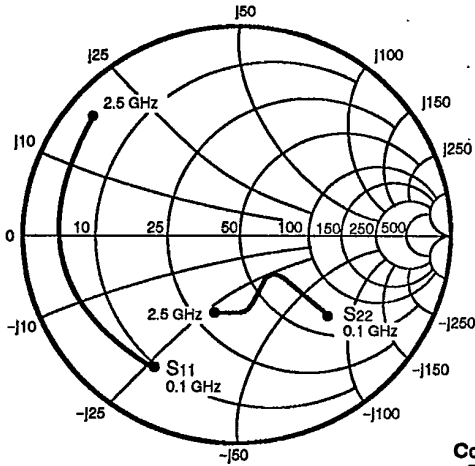
NE41615  
SECOND ORDER IM DISTORTION  
vs. COLLECTOR CURRENT



NE41615  
THIRD ORDER IM DISTORTION  
vs. COLLECTOR CURRENT



TYPICAL COMMON EMITTER SCATTERING PARAMETERS



NE41603  
Coordinates in Ohms  
Frequency in GHz  
(V<sub>CE</sub> = 10 V, I<sub>C</sub> = 20 mA)

S-MAGN AND ANGLES:

V<sub>CE</sub> = 10 V, I<sub>C</sub> = 5 mA

FREQUENCY (MHz)

	S <sub>11</sub>		S <sub>21</sub>		S <sub>12</sub>		S <sub>22</sub>	
100	.82	-73	12.33	139	.03	57	.84	-24
500	.79	-160	4.01	87	.07	24	.47	-36
1000	.78	178	2.08	63	.06	24	.44	-49
1500	.79	166	1.40	45	.07	30	.49	-65
2000	.80	155	1.03	31	.08	40	.52	-81
2500	.81	143	.80	16	.10	42	.53	-100

V<sub>CE</sub> = 10 V, I<sub>C</sub> = 10 mA

100	.75	-99	18.56	129	.02	50	.72	-32
500	.77	-171	4.95	84	.04	32	.35	-38
1000	.77	172	2.51	63	.05	39	.33	-51
1500	.78	162	1.69	46	.07	42	.38	-67
2000	.79	152	1.25	32	.09	49	.43	-81
2500	.81	142	.97	19	.10	48	.43	-101

V<sub>CE</sub> = 10 V, I<sub>C</sub> = 20 mA

100	.72	-125	23.98	119	.01	46	.57	-41
500	.78	-177	5.62	82	.03	44	.24	-42
1000	.78	169	2.83	63	.05	52	.23	-54
1500	.79	160	1.90	47	.07	52	.28	-69
2000	.80	152	1.40	34	.09	55	.34	-83
2500	.82	142	1.10	21	.11	53	.36	-101

V<sub>CE</sub> = 10 V, I<sub>C</sub> = 30 mA

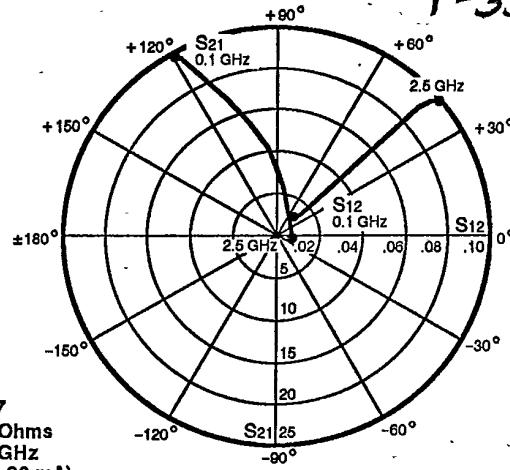
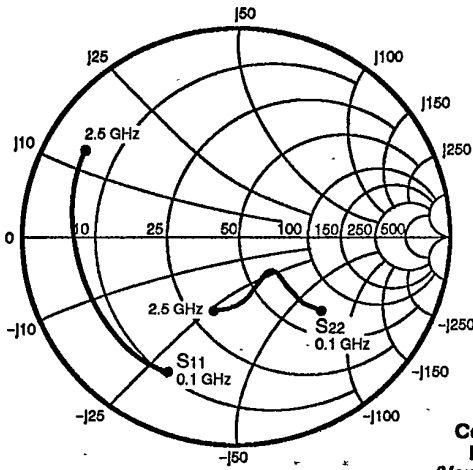
100	.72	-137	26.27	115	.01	47	.51	-45
500	.78	-180	5.87	81	.03	52	.20	-44
1000	.78	169	2.95	62	.05	55	.20	-55
1500	.79	160	1.97	48	.07	55	.25	-70
2000	.81	152	1.46	35	.09	58	.31	-84
2500	.82	140	1.14	20	.11	55	.33	-101

V<sub>CE</sub> = 10 V, I<sub>C</sub> = 50 mA

100	.72	-150	27.80	110	.01	49	.44	-47
500	.79	178	5.96	80	.02	60	.18	-42
1000	.79	168	2.98	62	.05	61	.19	-54
1500	.80	159	1.99	47	.07	59	.24	-68
2000	.81	151	1.47	35	.09	61	.30	-83
2500	.83	141	1.14	22	.11	58	.32	-103

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TYPICAL COMMON EMITTER SCATTERING PARAMETERS



NE41607  
Coordinates in Ohms  
Frequency in GHz  
(VCE = 10 V, IC = 20 mA)

S-MAGN AND ANGLES:

VCE = 10 V, IC = 5 mA

FREQUENCY (MHz)

	S11		S21		S12		S22	
100	.86	-68	12.47	139	.03	59	.84	-25
500	.76	-154	4.15	87	.07	24	.44	-41
1000	.76	-175	2.16	62	.08	20	.42	-57
1500	.76	175	1.46	43	.09	22	.47	-73
2000	.77	167	1.08	27	.09	22	.51	-91
2500	.78	157	.83	11	.10	22	.55	-106

VCE = 10 V, IC = 10 mA

100	.79	-92	18.90	129	.02	51	.71	-35
500	.76	-165	5.11	84	.05	31	.30	-46
1000	.76	179	2.60	62	.06	34	.30	-59
1500	.76	171	1.76	44	.08	32	.35	-75
2000	.77	164	1.30	29	.09	34	.40	-91
2500	.78	155	1.01	14	.10	30	.46	-106

VCE = 10 V, IC = 20 mA

100	.75	-117	24.58	119	.01	45	.57	-45
500	.76	-172	5.80	81	.03	40	.20	-51
1000	.77	176	2.92	62	.06	44	.21	-63
1500	.77	169	1.97	46	.08	42	.27	-77
2000	.78	162	1.45	31	.09	43	.32	-94
2500	.79	151	1.13	16	.10	36	.39	-107

VCE = 10 V, IC = 30 mA

100	.73	-130	26.90	114	.01	47	.50	-49
500	.76	-175	6.05	80	.03	45	.17	-53
1000	.77	175	3.02	62	.05	48	.18	-64
1500	.78	168	2.03	46	.07	44	.25	-78
2000	.79	162	1.50	32	.09	45	.30	-95
2500	.79	150	1.16	17	.10	40	.37	-109

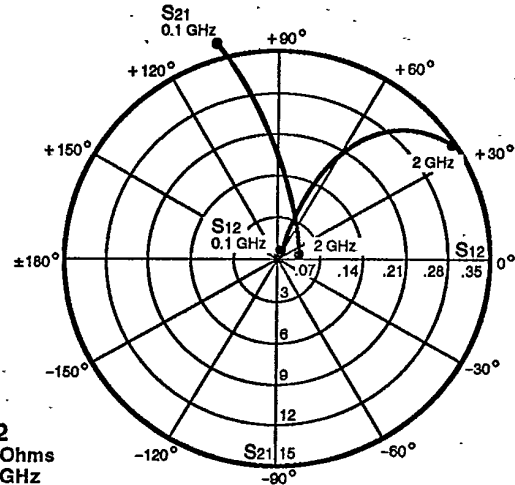
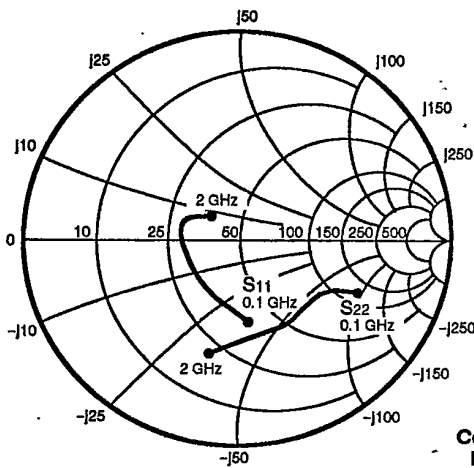
VCE = 10 V, IC = 50 mA

100	.73	-142	27.99	110	.01	43	.43	-50
500	.78	-178	6.03	79	.02	53	.16	-49
1000	.78	173	3.00	61	.05	51	.18	-62
1500	.79	167	2.01	46	.07	49	.24	-77
2000	.81	160	1.49	32	.08	50	.30	-94
2500	.81	151	1.16	19	.10	45	.36	-110





TYPICAL COMMON EMITTER SCATTERING PARAMETERS



**NE41612**  
Coordinates in Ohms  
Frequency in GHz  
(VCE = 10 V, IC = 20 mA)

**S-MAGN AND ANGLES:**

VCE = 5 V, IC = 2 mA

FREQUENCY (MHz)

	S11		S21		S12		S22	
100	.83	-52	6.06	141	.05	58	.89	-20
200	.69	-87	4.45	118	.09	49	.76	-31
500	.52	-143	2.25	81	.12	39	.59	-46
1000	.49	172	1.31	49	.16	54	.55	-69
1500	.44	139	.97	28	.25	59	.59	-92
2000	.35	108	.82	12	.36	48	.60	-115

VCE = 10 V, IC = 5 mA

100	.68	-60	10.41	132	.03	62	.80	-22
200	.51	-95	6.94	110	.06	54	.65	-30
500	.37	-148	3.24	79	.10	57	.53	-40
1000	.34	170	1.79	52	.17	61	.51	-59
1500	.30	145	1.32	30	.25	58	.55	-82
2000	.22	122	1.05	9	.32	46	.60	-104

VCE = 10 V, IC = 10 mA

100	.52	-73	13.86	122	.02	62	.69	-25
200	.38	-105	8.38	102	.05	59	.56	-31
500	.29	-155	3.71	77	.11	63	.46	-39
1000	.27	169	2.02	51	.19	61	.45	-57
1500	.24	149	1.48	30	.26	53	.50	-80
2000	.17	135	1.18	9	.32	41	.56	-100

VCE = 10 V, IC = 20 mA

100	.39	-83	16.25	114	.02	62	.60	-27
200	.29	-114	9.23	98	.04	65	.49	-30
500	.25	-159	3.97	75	.11	67	.42	-38
1000	.24	168	2.15	51	.20	60	.41	-56
1500	.20	152	1.57	30	.28	51	.46	-78
2000	.14	145	1.24	9	.33	37	.53	-98

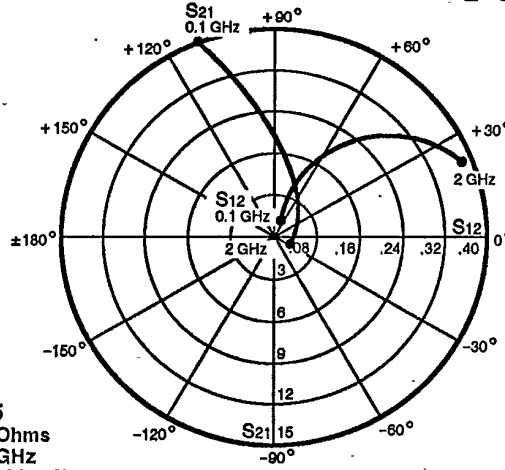
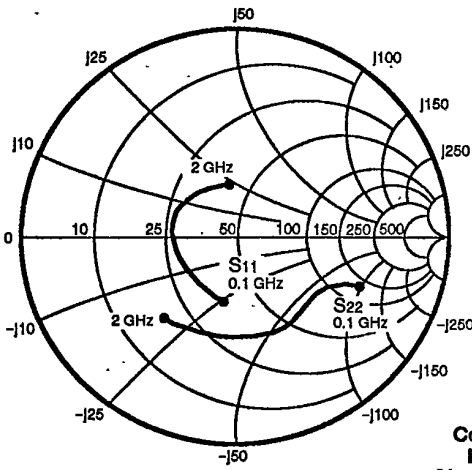
VCE = 10 V, IC = 30 mA

100	.34	-89	16.82	111	.02	65	.56	-27
200	.26	-119	9.37	96	.04	66	.47	-28
500	.24	-162	4.00	74	.11	68	.41	-37
1000	.23	167	2.16	51	.20	61	.41	-56
1500	.20	152	1.57	30	.28	51	.45	-78
2000	.14	145	1.24	8	.33	36	.52	-98



TYPICAL COMMON EMITTER SCATTERING PARAMETERS

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**NE41615**  
Coordinates in Ohms  
Frequency in GHz  
(VCE = 10 V, IC = 20 mA)

**S-MAGN AND ANGLES:**

VCE = 10 V, IC = 5 mA

FREQUENCY (MHz)

	S11	S21	S12	S22
100	.59 -74	9.98 126	.03 58	.78 -22
200	.46 -112	6.28 103	.05 52	.66 -30
500	.39 -160	2.91 72	.09 57	.59 -46
1000	.37 164	1.71 39	.17 57	.62 -78
1500	.36 133	1.30 10	.27 46	.62 -109
2000	.31 91	1.07 -16	.38 31	.59 -136

VCE = 10 V, IC = 10 mA

100	.42 -89	13.14 116	.02 60	.68 -25
200	.33 -124	7.57 97	.04 61	.57 -29
500	.31 -165	3.33 70	.10 65	.53 -46
1000	.31 164	1.93 39	.19 55	.56 -78
1500	.31 135	1.47 10	.28 41	.56 -107
2000	.26 96	1.20 -16	.38 27	.54 -133

VCE = 10 V, IC = 20 mA

100	.29 -104	15.31 110	.02 63	.59 -26
200	.25 -135	8.44 93	.04 68	.51 -18
500	.27 -167	3.64 69	.11 67	.48 -46
1000	.28 165	2.09 39	.20 53	.51 -78
1500	.27 138	1.57 11	.29 39	.52 -106
2000	.22 98	1.29 -16	.38 23	.50 -131

VCE = 10 V, IC = 30 mA

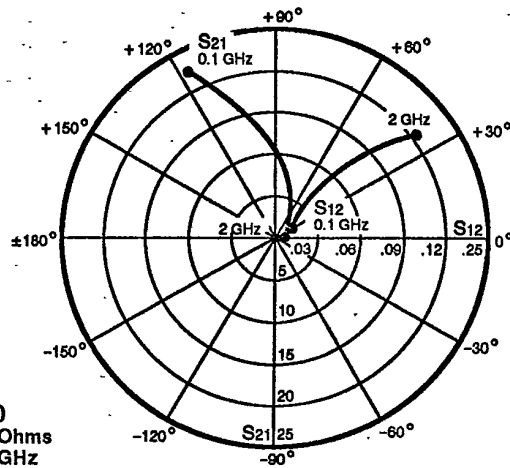
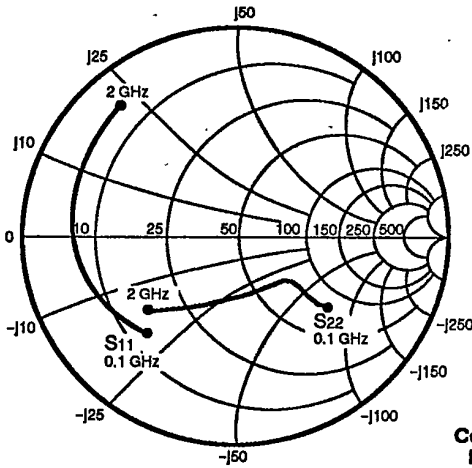
100	.24 -112	16.22 107	.01 69	.56 -25
200	.22 -140	8.77 92	.04 73	.49 -28
500	.25 -168	3.76 69	.11 67	.46 -46
1000	.26 167	2.14 39	.21 53	.49 -78
1500	.26 139	1.61 11	.30 38	.50 -106
2000	.21 100	1.32 -15	.38 22	.48 -130

VCE = 10 V, IC = 50 mA

100	.19 -126	16.89 104	.01 72	.53 -25
200	.20 -148	8.99 90	.04 73	.47 -27
500	.24 -170	3.83 68	.11 68	.45 -46
1000	.26 166	2.18 39	.21 52	.48 -78
1500	.26 139	1.63 11	.30 37	.48 -106
2000	.20 99	1.34 -16	.38 21	.47 -129



TYPICAL COMMON EMITTER SCATTERING PARAMETERS



**NE41620**  
Coordinates in Ohms  
Frequency in GHz  
(Vce = 10 V, Ic = 20 mA)

**S-MAGN AND ANGLES:**

VCE = 10 V, IC = 10 mA

FREQUENCY (MHz)	S11		S21		S12		S22	
100	.71	-104	17.66	125	.03	51	.69	-36
200	.72	-142	10.59	103	.03	33	.49	-41
500	.75	-177	4.49	74	.04	32	.37	-52
1000	.75	159	2.29	45	.05	40	.38	-79
1500	.78	143	1.50	21	.08	36	.44	-106
2000	.78	130	1.10	-1	.12	35	.53	-132

VCE = 10 V, IC = 20 mA

100	.66	-130	22.48	116	.02	42	.56	-43
200	.72	-158	12.57	97	.02	30	.38	-45
500	.75	176	5.11	72	.04	47	.28	-53
1000	.75	156	2.60	45	.06	49	.31	-81
1500	.77	142	1.70	22	.09	42	.37	-108
2000	.78	129	1.27	0	.12	38	.46	-132

VCE = 10 V, IC = 30 mA

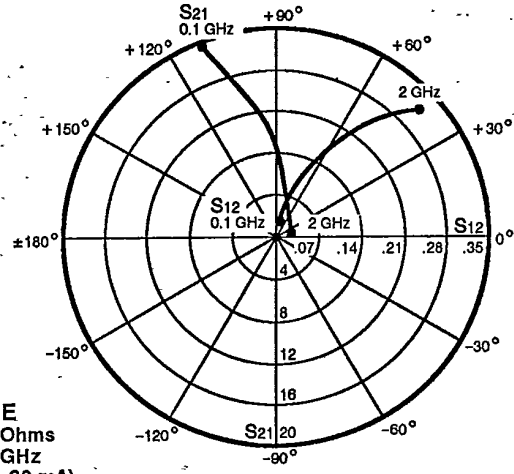
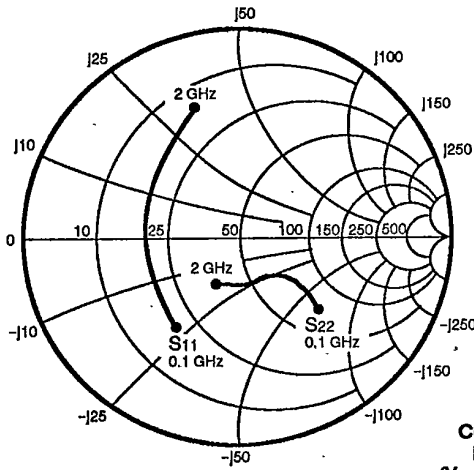
100	.67	-143	24.33	112	.02	58	.49	-46
200	.71	-165	13.33	95	.02	49	.33	-46
500	.75	174	5.36	71	.04	53	.25	-55
1000	.75	155	2.72	45	.06	62	.27	-81
1500	.77	141	1.78	22	.08	44	.34	-108
2000	.78	129	1.31	2	.12	39	.43	-132

VCE = 10 V, IC = 50 mA

100	.67	-153	25.61	108	.02	64	.43	-47
200	.72	-171	13.75	92	.02	47	.29	-46
500	.76	172	5.46	70	.03	54	.23	-52
1000	.76	154	2.76	45	.06	56	.26	-80
1500	.78	141	1.80	22	.09	47	.33	-108
2000	.79	128	1.34	1	.12	40	.42	-131

**TYPICAL COMMON EMITTER SCATTERING PARAMETERS**

**T-31-21**  
**T-33-05**



**NE41632E**  
Coordinates in Ohms  
Frequency in GHz  
(VCE = 10 V, IC = 20 mA)

**S-MAGN AND ANGLES:**

VCE = 10 V, IC = 5 mA  
FREQUENCY (MHz)

	S11		S21		S12		S22	
100	.72	-73	11.39	132	.04	59	.78	-28
200	.58	-117	7.45	109	.06	43	.58	-38
500	.54	-167	3.51	79	.09	48	.40	-48
1000	.57	156	1.90	49	.14	55	.37	-65
1500	.62	130	1.37	27	.21	56	.36	-89
2000	.70	108	1.11	8	.30	47	.36	-117

VCE = 10 V, IC = 10 mA

100	.59	-97	15.52	121	.03	57	.64	-35
200	.50	-139	9.01	101	.04	49	.44	-41
500	.50	-178	4.00	76	.09	59	.32	-48
1000	.54	151	2.14	49	.16	58	.30	-64
1500	.60	127	1.54	28	.23	54	.28	-89
2000	.66	107	1.25	8	.31	45	.30	-118

VCE = 10 V, IC = 20 mA

100	.49	-125	18.93	111	.02	60	.50	-40
200	.46	-159	10.20	95	.03	58	.34	-41
500	.48	173	4.35	74	.09	67	.25	-47
1000	.52	147	2.31	49	.17	60	.24	-63
1500	.58	126	1.66	28	.24	54	.23	-89
2000	.65	107	1.35	9	.32	43	.24	-118

VCE = 10 V, IC = 30 mA

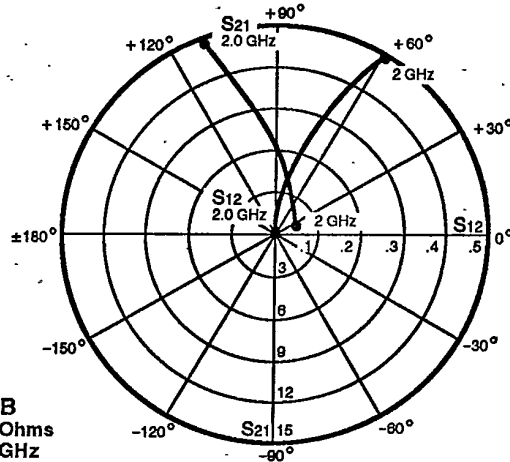
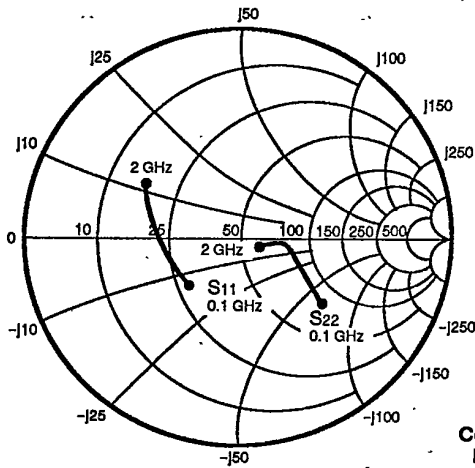
100	.46	-139	20.01	107	.01	66	.45	-40
200	.46	-166	10.52	93	.02	63	.30	-40
500	.48	171	4.45	73	.09	70	.23	-46
1000	.51	146	2.34	49	.17	62	.23	-63
1500	.56	126	1.67	29	.25	55	.22	-91
2000	.64	107	1.36	10	.33	44	.24	-118

VCE = 10 V, IC = 50 mA

100	.45	-152	20.48	104	.01	68	.40	-38
200	.46	-173	10.53	90	.03	69	.28	-36
500	.48	169	4.44	72	.09	72	.23	-43
1000	.52	145	2.33	48	.17	63	.23	-61
1500	.57	125	1.66	28	.25	56	.22	-88
2000	.65	107	1.34	9	.33	45	.24	-116



TYPICAL COMMON BASE SCATTERING PARAMETERS



NE41632B  
Coordinates in Ohms  
Frequency in GHz  
(V<sub>cb</sub> = 10 V, I<sub>c</sub> = 20 mA)

S-MAGN AND ANGLES:

V<sub>CB</sub> = 10 V, I<sub>C</sub> = 5 mA  
FREQUENCY (MHz)

	S <sub>11</sub>		S <sub>21</sub>		S <sub>12</sub>		S <sub>22</sub>	
100	.55	-81	9.59	128	.04	59	.74	-28
200	.47	-122	6.03	106	.06	52	.55	-33
500	.45	-160	2.83	80	.12	68	.38	-29
1000	.45	176	1.64	55	.22	75	.30	-31
1500	.48	160	1.29	40	.35	73	.20	-40
2000	.51	146	1.17	27	.49	65	.13	-57

V<sub>CB</sub> = 10 V, I<sub>C</sub> = 10 mA

100	.41	-109	12.53	118	.03	66	.61	-32
200	.38	-144	7.12	100	.05	64	.44	-32
500	.40	-168	3.18	77	.13	75	.31	-23
1000	.41	172	1.81	55	.24	74	.26	-20
1500	.44	160	1.42	39	.36	69	.20	-23
2000	.48	148	1.27	26	.49	62	.14	-33

V<sub>CB</sub> = 10 V, I<sub>C</sub> = 20 mA

100	.33	-136	14.61	111	.02	72	.51	-34
200	.34	-160	7.85	95	.05	74	.36	-30
500	.36	-173	3.41	76	.13	78	.27	-17
1000	.38	171	1.93	55	.26	73	.24	-11
1500	.42	161	1.50	40	.37	67	.20	-11
2000	.46	150	1.34	26	.48	60	.15	-18

V<sub>CB</sub> = 10 V, I<sub>C</sub> = 30 mA

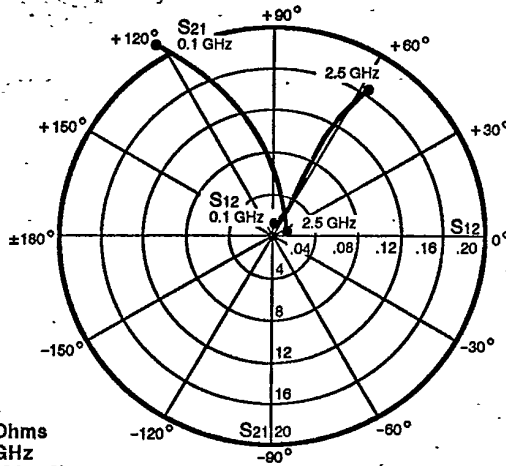
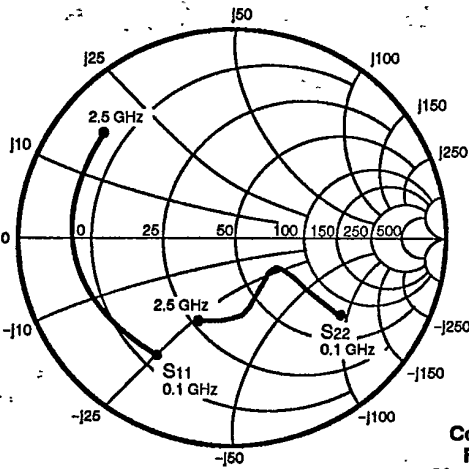
100	.31	-151	15.38	108	.02	78	.46	-34
200	.33	-168	8.10	94	.05	78	.33	-29
500	.35	-176	3.50	75	.14	79	.25	-14
1000	.37	170	1.98	55	.26	73	.24	-7
1500	.41	161	1.53	40	.37	66	.20	-6
2000	.46	151	1.37	25	.48	60	.16	-14

V<sub>CB</sub> = 10 V, I<sub>C</sub> = 50 mA

100	.32	-163	15.78	105	.02	79	.43	-33
200	.34	-175	8.21	92	.05	80	.32	-27
500	.35	-178	3.52	75	.14	80	.25	-11
1000	.37	169	1.99	54	.26	73	.24	-4
1500	.41	161	1.54	39	.37	66	.21	-4
2000	.46	150	1.37	25	.48	59	.16	-13

T-31-21  
T-33-05

TYPICAL COMMON EMITTER SCATTERING PARAMETERS



NE41635  
Coordinates in Ohms  
Frequency in GHz  
(V<sub>CE</sub> = 10 V, I<sub>C</sub> = 20 mA)

S-MAGN AND ANGLES:

V<sub>CE</sub> = 10 V, I<sub>C</sub> = 5 mA  
FREQUENCY (MHz)

	S <sub>11</sub>		S <sub>21</sub>		S <sub>12</sub>		S <sub>22</sub>	
100	.76	-72	11.56	140	.03	59	.85	-23
500	.75	-161	3.86	88	.06	27	.48	-38
1000	.75	178	2.00	62	.07	33	.45	-54
1500	.76	162	1.36	44	.08	44	.48	-72
2000	.77	151	1.01	31	.10	54	.52	-87
2500	.79	138	.80	17	.15	56	.51	-110

V<sub>CE</sub> = 10 V, I<sub>C</sub> = 10 mA

100	.70	-102	17.26	129	.02	53	.73	-32
500	.76	-171	4.68	85	.04	36	.36	-41
1000	.76	171	2.39	63	.06	45	.35	-56
1500	.76	161	1.61	47	.08	52	.39	-73
2000	.78	151	1.21	33	.11	58	.43	-89
2500	.78	137	.96	18	.23	63	.42	-110

V<sub>CE</sub> = 10 V, I<sub>C</sub> = 20 mA

100	.65	-125	21.75	120	.01	51	.62	-37
500	.73	-178	5.24	82	.03	52	.28	-42
1000	.73	167	2.65	61	.06	60	.26	-57
1500	.75	157	1.80	45	.09	60	.30	-74
2000	.76	147	1.35	33	.12	62	.35	-88
2500	.77	135	1.07	18	.16	58	.37	-110

V<sub>CE</sub> = 10 V, I<sub>C</sub> = 30 mA

100	.65	-137	23.60	117	.01	53	.55	-41
500	.73	179	5.45	81	.04	57	.24	-42
1000	.73	166	2.75	61	.07	63	.24	-57
1500	.74	156	1.86	45	.10	62	.28	-74
2000	.76	147	1.39	33	.13	62	.32	-88
2500	.78	136	1.10	19	.17	58	.34	-110

