

CEL

NEC's NPN SILICON EPITAXIAL TRANSISTOR 3 PINS ULTRA SUPER MINI MOLD

NE58219

FEATURES

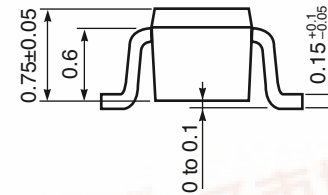
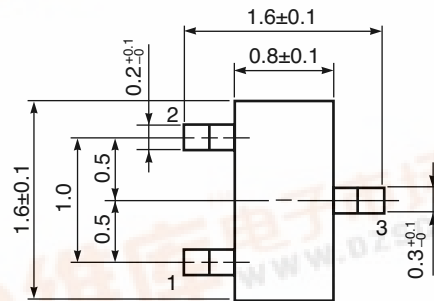
- **HIGH f_T :** 5 GHz TYP at $V_{CE} = 5\text{ V}$, $I_C = 5\text{ mA}$, $f = 1\text{ GHz}$
- **LOW C_{re} :** 0.9 pF TYP at $V_{CB} = 5\text{ V}$, $I_E = 0$, $f = 1\text{ MHz}$
- **ULTRA SUPER MINI MOLD PACKAGE:** 1.6 x 0.8 mm

DESCRIPTION

NEC's NE58219 is a low supply voltage transistor designed for UHF Mixer and oscillator applications. The 3 pin ultra super mini mold package makes this device ideally suited for high density surface mount assembly.

OUTLINE DIMENSIONS (Units in mm)

PACKAGE OUTLINE 19



PIN CONNECTIONS

1. Emitter
2. Base
3. Collector

ELECTRICAL CHARACTERISTICS ($T_A = 25^\circ\text{C}$)

PART NUMBER EIAJ ¹ REGISTERED NUMBER PACKAGE OUTLINE		NE58219 2SC5004 19			
SYMBOLS	PARAMETERS AND CONDITIONS	UNITS	MIN	TYP	MAX
I_{CBO}	Collector Cutoff Current at $V_{CB} = 15\text{ V}$, $I_E = 0$	μA			0.1
I_{EBO}	Emitter Cutoff Current at $V_{EB} = 1\text{ V}$, $I_C = 0$	μA			0.1
$V_{CE(sat)}$	Collector Saturation Voltage at $h_{FE} = 10$, $I_C = 5\text{ mA}$	V			0.5
h_{FE}	DC Current Gain at $V_{CE} = 5\text{ V}$, $I_C = 5\text{ mA}^2$		60		120
f_T	Gain Bandwidth at $V_{CE} = 5\text{ V}$, $I_C = 5\text{ mA}$	GHz	3.0	5.0	
C_{RE}	Feedback Capacitance at $V_{CB} = 5\text{ V}$, $I_E = 0$, $f = 1\text{ MHz}^3$	pF		0.9	1.2
$ S_{21E} ^2$	Insertion Power Gain at $V_{CE} = 5\text{ V}$, $I_C = 5\text{ mA}$, $f = 1\text{ GHz}$	dB	5.0		

Notes:

1. Electronic Industrial Association of Japan
2. Pulsed measurement, pulse width $\leq 350\text{ }\mu\text{s}$, Duty Cycle $\leq 2\%$.
3. The emitter terminal and the case shall be connected to the guard terminal of the three-terminal capacitance bridge.

ABSOLUTE MAXIMUM RATINGS¹ ($T_A = 25^{\circ}\text{C}$)

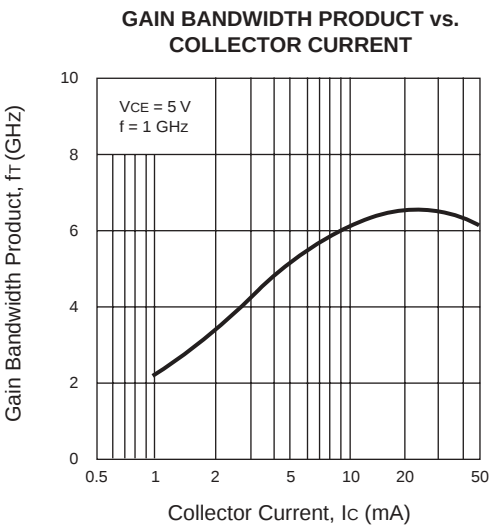
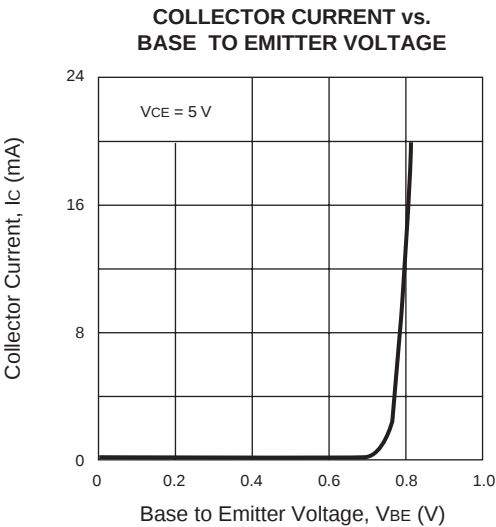
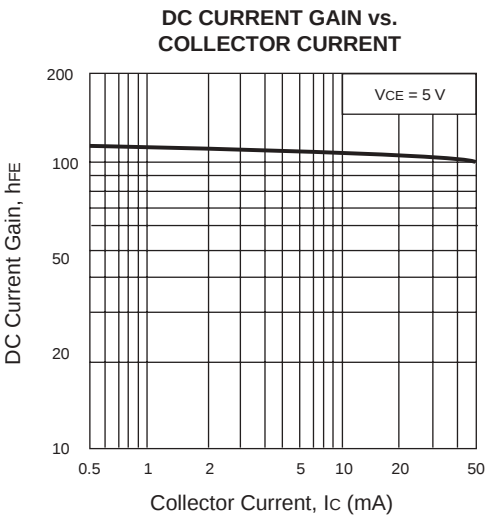
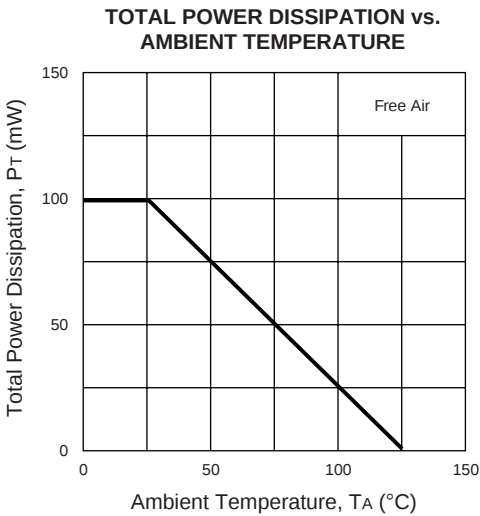
SYMBOLS	PARAMETERS	UNITS	RATINGS
V_{CB0}	Collector to Base Voltage	V	20
V_{CE0}	Collector to Emitter Voltage	V	12
V_{EB0}	Emitter to Base Voltage	V	3
I_C	Collector Current	mA	60
P_T	Total Power Dissipation	mW	100
T_J	Junction Temperature	$^{\circ}\text{C}$	125
T_{STG}	Storage Temperature	$^{\circ}\text{C}$	-55 to +125

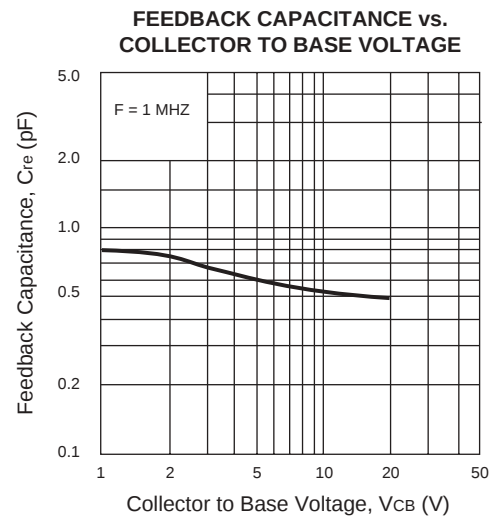
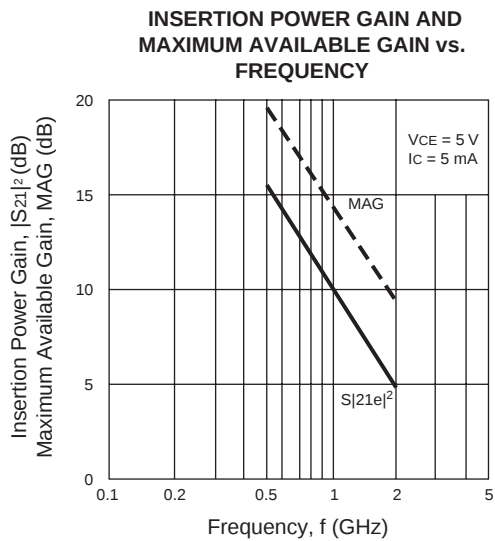
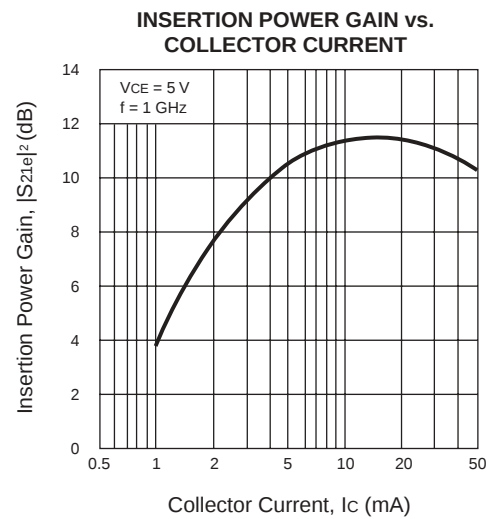
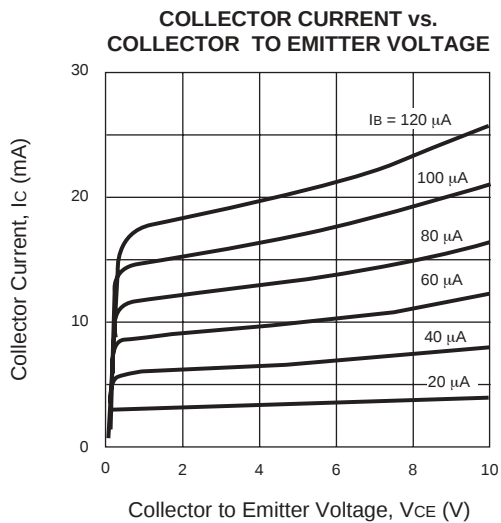
- Notes:
1. Operation in excess of any one of these parameters may result in permanent damage.

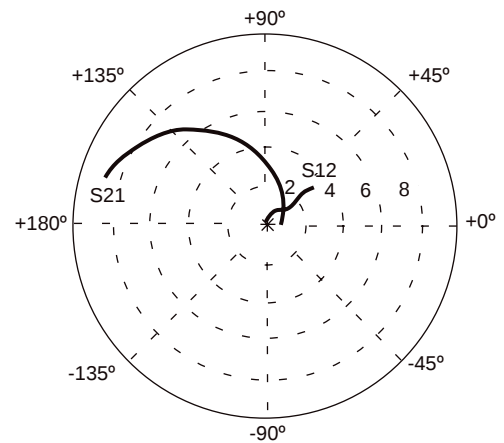
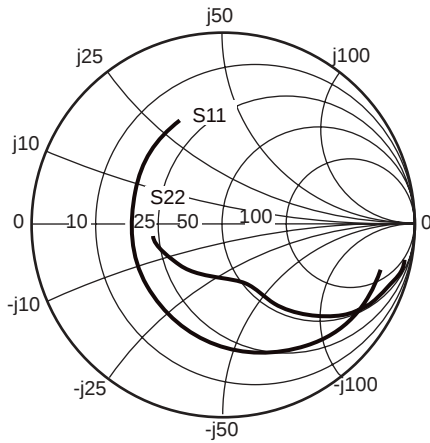
ORDERING INFORMATION

PART NUMBER	QUANTITY	PACKAGING
NE58219-T1	3000 pcs./reel	Embossed tape 8mm wide. Pin 3 (collector) face to perforation side of tape.

TYPICAL PERFORMANCE CURVES ($T_A = 25^{\circ}\text{C}$)



TYPICAL PERFORMANCE CURVES ($T_A = 25^\circ\text{C}$)

SCATTERING PARAMETERS ($T_A = 25^\circ\text{C}$)

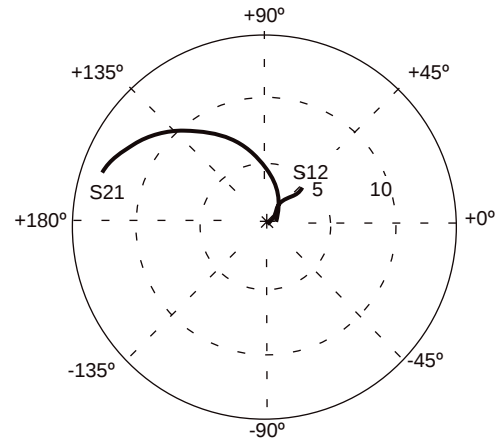
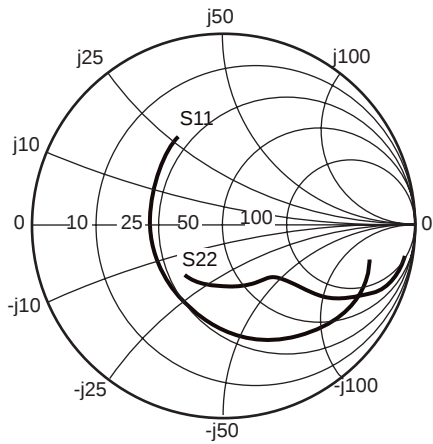
NE58219

Vc = 1 V, Ic = 3 mA

FREQUENCY (GHz)	S11		S21		S22		S12		K (unitless)	MAG (dB)
	MAG	ANG	MAG	ANG	MAG	ANG	MAG	ANG		
0.050	0.84	-16.28	8.69	162.16	0.95	-11.12	0.03	71.19	0.31	25.05
0.100	0.84	-33.14	8.22	155.75	0.93	-20.33	0.05	70.75	0.12	22.03
0.200	0.74	-61.59	7.05	136.55	0.79	-34.69	0.09	57.41	0.24	19.10
0.300	0.65	-84.29	5.92	122.15	0.66	-44.45	0.11	48.65	0.36	17.38
0.400	0.59	-102.61	5.00	111.38	0.57	-51.15	0.12	43.53	0.45	16.14
0.500	0.55	-117.08	4.28	102.97	0.50	-55.78	0.13	40.52	0.55	15.15
0.600	0.53	-129.02	3.72	96.03	0.44	-59.22	0.14	38.95	0.64	14.29
0.700	0.51	-138.97	3.29	90.09	0.40	-62.35	0.14	38.03	0.72	13.57
0.800	0.49	-147.58	2.94	84.92	0.37	-64.76	0.15	37.73	0.79	12.91
0.900	0.49	-155.03	2.66	80.24	0.35	-67.47	0.16	37.81	0.85	12.33
1.000	0.48	-161.81	2.44	75.92	0.33	-70.19	0.16	37.99	0.91	11.78
1.100	0.48	-167.71	2.25	71.90	0.32	-72.91	0.17	38.27	0.96	11.28
1.200	0.48	-173.05	2.09	68.18	0.31	-75.58	0.17	38.83	1.00	10.69
1.300	0.48	-177.95	1.95	64.62	0.30	-78.51	0.18	39.27	1.04	9.20
1.400	0.48	-177.41	1.83	61.29	0.29	-81.48	0.19	39.74	1.07	8.34
1.500	0.48	173.15	1.73	58.09	0.28	-84.48	0.19	40.16	1.10	7.66
1.600	0.48	168.99	1.64	55.02	0.28	-87.73	0.20	40.55	1.12	7.10
1.700	0.49	165.21	1.56	52.11	0.28	-91.11	0.21	40.82	1.13	6.60
1.800	0.49	161.56	1.49	49.31	0.27	-94.65	0.21	41.19	1.14	6.16
1.900	0.49	158.14	1.43	46.56	0.27	-98.18	0.22	41.44	1.15	5.77
2.000	0.50	154.96	1.37	43.96	0.27	-101.84	0.23	41.49	1.16	5.41
2.100	0.50	152.01	1.32	41.45	0.27	-105.68	0.24	41.65	1.16	5.10
2.200	0.51	149.18	1.27	38.97	0.28	-109.36	0.24	41.72	1.15	4.81
2.300	0.51	146.47	1.23	36.71	0.28	-113.26	0.25	41.69	1.15	4.56
2.400	0.52	143.90	1.19	34.45	0.28	-117.01	0.26	41.63	1.15	4.30
2.500	0.52	141.49	1.16	32.27	0.29	-120.76	0.27	41.48	1.14	4.06
2.600	0.53	139.05	1.12	30.21	0.29	-124.41	0.28	41.14	1.14	3.83
2.700	0.53	136.85	1.09	28.21	0.29	-128.09	0.29	40.97	1.13	3.64
2.800	0.54	134.56	1.06	26.30	0.30	-131.59	0.29	40.70	1.12	3.47
2.900	0.54	132.43	1.03	24.45	0.31	-135.17	0.30	40.33	1.11	3.28
3.000	0.55	130.33	1.01	22.68	0.31	-138.54	0.31	39.92	1.11	3.11
3.100	0.55	128.52	0.98	20.96	0.32	-141.89	0.32	39.46	1.10	2.98
3.200	0.56	126.66	0.96	19.34	0.32	-145.28	0.33	38.97	1.09	2.84
3.300	0.56	124.92	0.94	17.77	0.33	-148.51	0.34	38.44	1.08	2.72
3.400	0.57	123.18	0.92	16.22	0.34	-151.84	0.35	37.80	1.07	2.59
3.500	0.57	121.66	0.90	14.75	0.34	-154.93	0.36	37.19	1.06	2.52
3.600	0.58	120.12	0.88	13.34	0.35	-158.22	0.37	36.50	1.05	2.39
3.700	0.58	118.56	0.87	12.03	0.36	-161.09	0.38	35.74	1.05	2.30
3.800	0.58	117.13	0.85	10.73	0.36	-164.14	0.39	35.00	1.04	2.19
3.900	0.59	115.69	0.84	9.51	0.37	-166.91	0.40	34.23	1.03	2.11
4.000	0.59	114.19	0.83	8.33	0.38	-169.73	0.41	33.42	1.03	2.03

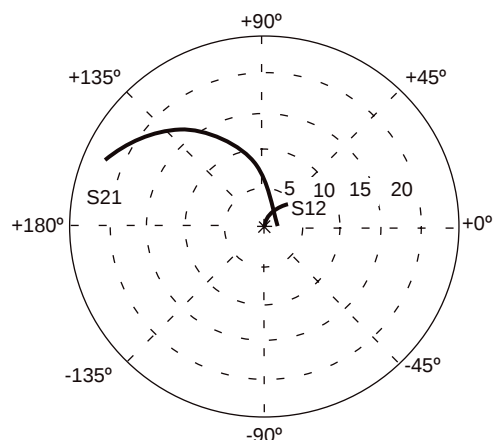
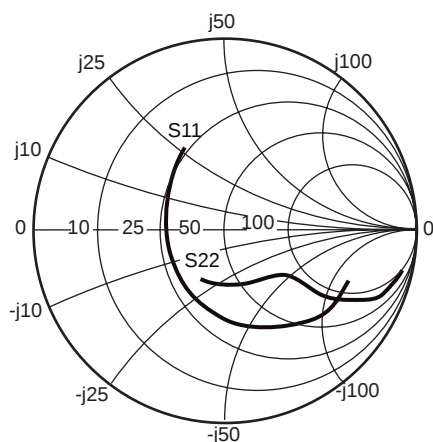
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SCATTERING PARAMETERS (TA = 25°C)



NE58219
Vc = 5 V, Ic = 5 mA

FREQUENCY (GHz)	S11		S21		S22		S12		K (unitless)	MAG (dB)
	MAG	ANG	MAG	ANG	MAG	ANG	MAG	ANG		
0.050	0.78	-15.97	13.43	162.03	0.95	-9.31	0.01	80.11	0.23	29.98
0.100	0.78	-32.63	12.68	155.23	0.93	-16.92	0.03	71.25	0.18	26.35
0.200	0.67	-60.08	10.68	136.09	0.79	-27.63	0.05	61.51	0.32	23.37
0.300	0.57	-81.72	8.83	122.20	0.68	-33.64	0.06	55.73	0.45	21.52
0.400	0.51	-99.23	7.37	112.16	0.59	-36.97	0.07	52.31	0.57	20.14
0.500	0.46	-113.17	6.27	104.46	0.53	-38.75	0.08	51.51	0.67	19.02
0.600	0.43	-125.01	5.42	98.23	0.49	-39.79	0.09	51.49	0.75	18.03
0.700	0.41	-134.99	4.76	92.93	0.46	-40.85	0.09	51.76	0.83	17.15
0.800	0.39	-143.77	4.24	88.36	0.44	-41.52	0.10	52.53	0.89	16.35
0.900	0.38	-151.46	3.83	84.26	0.42	-42.56	0.11	53.26	0.93	15.61
1.000	0.38	-158.46	3.49	80.48	0.40	-43.81	0.11	53.98	0.97	14.94
1.100	0.38	-164.56	3.21	76.95	0.39	-45.13	0.12	54.45	1.00	13.91
1.200	0.37	-170.14	2.97	73.66	0.38	-46.52	0.13	55.14	1.03	12.72
1.300	0.37	-175.24	2.77	70.53	0.37	-48.11	0.13	55.52	1.05	11.85
1.400	0.37	-180.00	2.60	67.57	0.37	-49.82	0.14	55.92	1.06	11.14
1.500	0.38	175.58	2.44	64.71	0.36	-51.66	0.15	56.20	1.07	10.50
1.600	0.38	171.25	2.31	61.94	0.35	-53.64	0.16	56.38	1.08	9.95
1.700	0.38	167.32	2.19	59.30	0.35	-55.69	0.17	56.44	1.08	9.46
1.800	0.39	163.57	2.09	56.73	0.34	-58.05	0.17	56.48	1.09	9.03
1.900	0.39	160.04	2.00	54.20	0.34	-60.48	0.18	56.51	1.09	8.62
2.000	0.40	156.80	1.91	51.76	0.33	-63.18	0.19	56.29	1.08	8.27
2.100	0.40	153.84	1.84	49.40	0.33	-65.85	0.20	56.10	1.08	7.96
2.200	0.41	151.04	1.77	47.03	0.33	-68.79	0.21	55.83	1.08	7.64
2.300	0.42	148.44	1.71	44.86	0.32	-71.69	0.22	55.65	1.07	7.41
2.400	0.42	145.82	1.65	42.67	0.32	-74.76	0.22	55.31	1.06	7.15
2.500	0.43	143.48	1.59	40.50	0.32	-77.76	0.23	54.82	1.05	6.96
2.600	0.43	141.09	1.54	38.43	0.32	-80.98	0.24	54.43	1.05	6.74
2.700	0.44	138.92	1.50	36.38	0.32	-84.11	0.25	54.02	1.04	6.56
2.800	0.45	136.72	1.46	34.42	0.32	-87.35	0.26	53.50	1.03	6.42
2.900	0.45	134.69	1.42	32.47	0.31	-90.64	0.27	52.95	1.02	6.31
3.000	0.46	132.66	1.38	30.58	0.31	-93.92	0.28	52.41	1.01	6.24
3.100	0.47	130.89	1.35	28.73	0.31	-97.19	0.29	51.85	1.00	6.35
3.200	0.47	129.12	1.31	26.92	0.32	-100.72	0.30	51.17	0.99	6.45
3.300	0.48	127.48	1.28	25.16	0.32	-103.97	0.31	50.59	0.98	6.21
3.400	0.48	125.87	1.25	23.43	0.32	-107.52	0.32	49.80	0.98	5.98
3.500	0.49	124.41	1.23	21.73	0.32	-110.78	0.33	49.17	0.96	5.75
3.600	0.50	122.98	1.20	20.08	0.32	-114.26	0.34	48.41	0.96	5.53
3.700	0.50	121.52	1.18	18.49	0.32	-117.44	0.35	47.56	0.95	5.31
3.800	0.51	120.14	1.15	16.93	0.33	-120.69	0.36	46.79	0.94	5.11
3.900	0.51	118.81	1.13	15.44	0.33	-123.76	0.37	46.00	0.93	4.90
4.000	0.52	117.39	1.11	13.94	0.33	-126.88	0.38	45.16	0.93	4.70

SCATTERING PARAMETERS (T_A = 25°C)

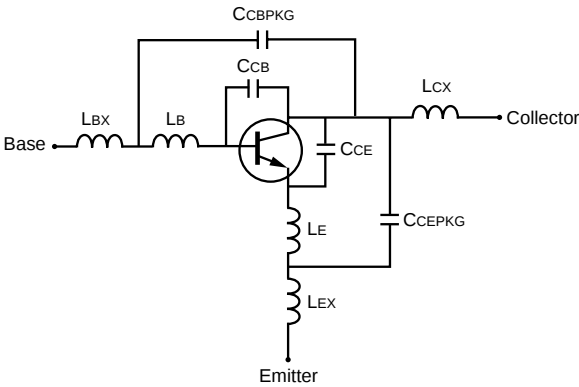
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V_C = 8 V, I_C = 10 mA

FREQUENCY (GHz)	S ₁₁		S ₂₁		S ₂₂		S ₁₂		K (unitless)	MAG (dB)
	MAG	ANG	MAG	ANG	MAG	ANG	MAG	ANG		
0.050	0.67	-21.79	22.12	157.69	0.91	-12.56	0.01	73.96	0.35	32.88
0.100	0.66	-44.79	20.12	147.32	0.87	-21.76	0.02	70.10	0.26	29.06
0.200	0.51	-77.37	15.18	126.02	0.69	-31.47	0.04	60.88	0.47	26.10
0.300	0.42	-100.22	11.62	113.06	0.56	-34.70	0.05	58.80	0.65	24.07
0.400	0.38	-117.42	9.27	104.45	0.50	-35.60	0.05	59.12	0.76	22.36
0.500	0.35	-130.39	7.68	98.13	0.45	-35.57	0.06	60.14	0.85	20.95
0.600	0.33	-141.10	6.54	93.02	0.42	-35.42	0.07	61.41	0.91	19.73
0.700	0.32	-149.97	5.69	88.66	0.40	-35.64	0.08	62.39	0.95	18.64
0.800	0.32	-157.65	5.03	84.86	0.38	-35.80	0.09	63.19	0.99	17.68
0.900	0.31	-164.24	4.52	81.42	0.37	-36.49	0.09	63.82	1.01	16.11
1.000	0.31	-170.13	4.10	78.23	0.36	-37.57	0.10	64.03	1.03	15.00
1.100	0.31	-175.32	3.76	75.21	0.35	-38.79	0.11	64.23	1.04	14.04
1.200	0.32	-179.93	3.47	72.37	0.35	-40.04	0.12	64.39	1.05	13.28
1.300	0.32	-175.70	3.23	69.64	0.34	-41.54	0.13	64.33	1.05	12.60
1.400	0.32	-171.61	3.02	67.04	0.34	-43.13	0.14	64.13	1.06	11.95
1.500	0.33	-167.86	2.84	64.50	0.33	-44.89	0.15	63.73	1.06	11.37
1.600	0.33	-164.10	2.68	62.04	0.32	-46.84	0.16	63.50	1.06	10.86
1.700	0.34	-160.72	2.54	59.66	0.32	-48.78	0.16	63.15	1.06	10.41
1.800	0.34	-157.44	2.42	57.31	0.31	-51.02	0.17	62.67	1.06	10.00
1.900	0.35	-154.45	2.31	55.02	0.31	-53.26	0.18	62.20	1.05	9.61
2.000	0.35	-151.60	2.21	52.78	0.31	-55.77	0.19	61.72	1.05	9.27
2.100	0.36	-149.09	2.12	50.62	0.30	-58.30	0.20	61.09	1.04	8.96
2.200	0.37	-146.67	2.03	48.40	0.30	-61.15	0.21	60.51	1.04	8.67
2.300	0.37	-144.44	1.96	46.40	0.30	-63.92	0.22	59.93	1.03	8.45
2.400	0.38	-142.19	1.90	44.33	0.29	-66.93	0.23	59.21	1.03	8.23
2.500	0.39	-140.17	1.83	42.27	0.29	-69.77	0.24	58.48	1.02	8.03
2.600	0.39	-138.05	1.78	40.31	0.29	-72.71	0.24	57.78	1.02	7.83
2.700	0.40	-136.26	1.72	38.37	0.28	-75.76	0.25	57.18	1.01	7.77
2.800	0.41	-134.26	1.67	36.47	0.28	-78.87	0.26	56.42	1.00	7.79
2.900	0.41	-132.45	1.63	34.60	0.28	-82.00	0.27	55.66	1.00	7.78
3.000	0.42	-130.63	1.59	32.76	0.28	-85.10	0.28	54.91	0.99	7.52
3.100	0.43	-129.18	1.55	30.95	0.28	-88.23	0.29	54.16	0.98	7.27
3.200	0.43	-127.63	1.51	29.18	0.28	-91.56	0.30	53.38	0.97	7.03
3.300	0.44	-126.18	1.47	27.44	0.28	-94.82	0.31	52.59	0.96	6.80
3.400	0.45	-124.79	1.44	25.71	0.28	-98.34	0.32	51.79	0.96	6.57
3.500	0.45	-123.57	1.41	24.03	0.28	-101.39	0.33	50.96	0.95	6.34
3.600	0.46	-122.30	1.38	22.35	0.28	-104.84	0.34	50.13	0.94	6.14
3.700	0.47	-121.00	1.35	20.74	0.28	-107.86	0.35	49.29	0.93	5.93
3.800	0.47	-119.87	1.33	19.15	0.28	-111.10	0.35	48.43	0.93	5.73
3.900	0.48	-118.69	1.30	17.61	0.28	-113.87	0.36	47.61	0.92	5.54
4.000	0.48	-117.43	1.28	16.07	0.29	-117.00	0.37	46.74	0.91	5.35

NONLINEAR MODEL

SCHEMATIC



BJT NONLINEAR MODEL PARAMETERS (1)

Parameters	Q1	Parameters	Q1
IS	2.3e-16	MJC	0.28
BF	100.3	XCJC	0.2
NF	0.9917	CJS	0
VAF	31.6	VJS	0.75
IKF	2.2	MJS	0
ISE	3.5e-11	FC	0.7
NE	30	TF	12e-12
BR	13.5	XTF	4
NR	0.9899	VTF	4
VAR	3.9	ITF	0.01
IKR	0.05	PTF	50
ISC	15.4e-12	TR	1.0e-9
NC	30	EG	1.11
RE	1.4	XTB	0
RB	14	XTI	3
RBM	9	KF	0
IRB	0.003	AF	1
RC	1.6		
CJE	1.3e-12		
VJE	0.87		
MJE	0.36		
CJC	0.6e-12		
VJC	0.59		

(1) Gummel-Poon Model

ADDITIONAL PARAMETERS

Parameters	NE58219
CCB	0.03e-12
CCE	0.2e-12
LB	0.75e-9
LE	0.65e-9
CCBPKG	0.17e-12
CCEPKG	0.15e-12
LBX	0.19e-9
LCX	0.7e-9
LEX	0.19e-9

MODEL RANGE

Frequency: 0.05 to 4 GHz
Bias: VCE = 1 V to 8 V, IC = 3 mA to 10 mA
Date: 2/2002

Life Support Applications
These NEC products are not intended for use in life support devices, appliances, or systems where the malfunction of these products can reasonably be expected to result in personal injury. The customers of CEL using or selling these products for use in such applications do so at their own risk and agree to fully indemnify CEL for all damages resulting from such improper use or sale.