

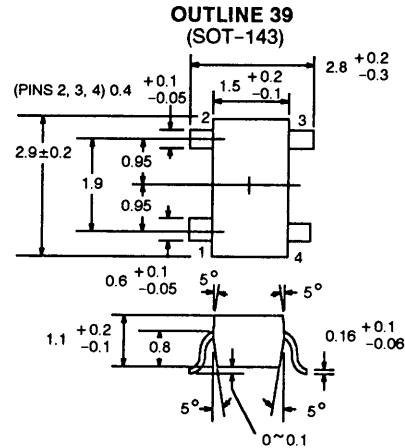
FEATURES

- SURFACE MOUNT COMMON EMITTER PACKAGE
- HIGH GAIN BANDWIDTH PRODUCT: $f_r = 9$ GHz
- LOW NOISE FIGURE: 1.2 dB at 1 GHz
- HIGH INSERTION GAIN: 15 dB at 1 GHz
- AVAILABLE IN TAPE & REEL OR BULK

DESCRIPTION

The NE68139 is an NPN silicon transistor designed for low noise and high gain amplifier applications and utilizes surface mount technology. It offers excellent performance and reliability at low cost. This device has two emitter leads to reduce emitter inductance and provide high gain at high frequencies.

OUTLINE DIMENSIONS (Units in mm)



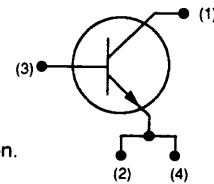
ABSOLUTE MAXIMUM RATINGS (T_A = 25°C)

SYMBOLS	PARAMETERS	UNITS	RATINGS
V _{CB0}	Collector to Base Voltage	V	20
V _{CE0}	Collector to Emitter Voltage	V	10
V _{EB0}	Emitter to Base Voltage	V	1.5
I _C	Collector Current	mA	65
P _T	Total Power Dissipation	mW	200
T _J	Junction Temperature	°C	150
T _{STG}	Storage Temperature	°C	-65 to +150

PIN CONNECTIONS

1. Collector
2. Emitter
3. Base
4. Emitter

Note: Pin 1 is used for orientation.



ELECTRICAL CHARACTERISTICS (T_A = 25°C)

PART NUMBER PACKAGE OUTLINE			NE68139 39		
SYMBOLS	PARAMETERS AND CONDITIONS	UNITS	MIN	TYP	MAX
I _{CBO}	Collector Cutoff Current at V _{CB} = 10 V, I _E = 0	μA			1.0
I _{EBO}	Emitter Cutoff Current at V _{EB} = 1 V, I _C = 0	μA			1.0
h _{FE}	Forward Current Gain at V _{CE} = 8 V, I _C = 20 mA		50	100	250
NF	Noise Figure at V _{CE} = 8 V, I _C = 7 mA, f = 1 GHz	dB		1.2	
GA	Associated Gain at V _{CE} = 8 V, I _C = 7 mA, f = 1 GHz	dB		13.0	
S _{21E} ²	Insertion Power Gain at V _{CE} = 8 V, I _C = 20 mA, f = 1 GHz	dB		15.0	
MAG	Maximum Available Gain at V _{CE} = 6 V, I _C = 10 mA, f = 2 GHz	dB		17.0	
C _{RE}	Feedback Capacitance at V _{CB} = 10 V, I _E = 0, f = 1 MHz	pF		0.3	
R _{TH}	Thermal Resistance (Junction-to-Ambient)	°C/W			500
f _r	Gain Bandwidth Product at V _{CE} = 8 V, I _C = 20 mA	GHz		9.0	

TYPICAL COMMON EMITTER SCATTERING PARAMETERS

S-MAGN AND ANGLES:

VCE = 8 V, IC = 3 mA

FREQUENCY (MHz)

	S ₁₁		S ₂₁		S ₁₂		S ₂₂	
200	.86	-37	8.52	154	.034	67	.94	-15
400	.77	-73	7.53	129	.056	54	.82	-25
600	.66	-104	6.36	169	.070	44	.71	-31
800	.57	-129	5.00	94	.077	40	.66	-34
1000	.52	-153	4.15	81	.083	35	.60	-34
1200	.50	-169	3.51	72	.088	35	.57	-40
1400	.47	173	2.95	63	.088	33	.54	-44
1600	.48	160	2.61	55	.096	33	.52	-47
1800	.49	150	2.30	49	.100	32	.50	-52
2000	.50	143	2.15	45	.106	36	.49	-54

VCE = 8 V, IC = 5 mA

200	.77	-48	12.69	147	.031	65	.88	-19
400	.63	-59	9.95	119	.048	53	.72	-30
600	.52	-121	7.81	101	.058	46	.61	-33
800	.46	-145	5.97	98	.067	44	.56	-35
1000	.43	-167	4.84	77	.074	44	.52	-38
1200	.42	178	4.07	69	.083	44	.49	-40
1400	.42	163	3.41	61	.087	41	.46	-44
1600	.43	153	3.04	54	.098	42	.44	-46
1800	.44	142	2.66	48	.103	40	.43	-51
2000	.46	137	2.48	44	.114	43	.41	-54

VCE = 8 V, IC = 10 mA

200	.62	-66	18.46	135	.027	61	.78	-25
400	.47	-112	12.38	108	.039	57	.60	-32
600	.40	-142	9.06	93	.050	55	.51	-33
800	.37	-165	6.77	82	.058	54	.48	-33
1000	.36	177	5.40	73	.069	53	.44	-36
1200	.36	165	4.05	66	.083	55	.42	-38
1400	.37	151	3.82	59	.091	51	.39	-42
1600	.39	143	3.38	53	.103	50	.38	-44
1800	.41	134	2.97	47	.113	46	.37	-50
2000	.43	130	2.77	44	.123	47	.35	-52

VCE = 8 V, IC = 20 mA

200	.46	-90	23.33	122	.021	61	.67	-28
400	.36	-136	13.50	99	.033	61	.51	-31
600	.34	-163	9.54	86	.046	62	.45	-30
800	.33	178	7.08	78	.056	62	.43	-30
1000	.33	163	5.60	69	.070	60	.40	-33
1200	.34	154	4.72	64	.084	60	.39	-35
1400	.36	143	3.98	57	.091	55	.36	-40
1600	.39	136	3.52	51	.104	55	.35	-42
1800	.40	128	3.09	46	.116	50	.34	-47
2000	.42	125	2.88	43	.127	51	.32	-51

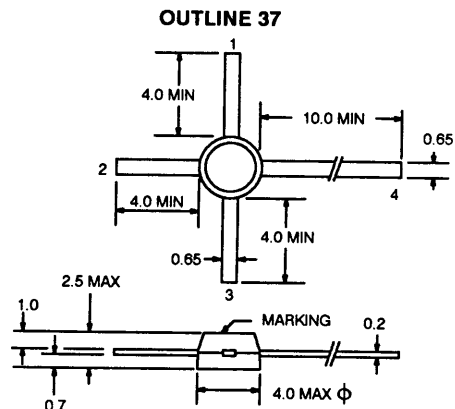
FEATURES

- LOW OPERATING VOLTAGE
- LOW POWER CONSUMPTION
- HIGH INPUT IMPEDANCE

DESCRIPTION AND APPLICATIONS

The NE68337 is designed primarily for use in low voltage and low current applications up to 2 GHz. The NE68337 is ideal for pagers, electro-optic detector post-amplifier applications, and other battery powered systems.

OUTLINE DIMENSIONS (Units in mm)



ABSOLUTE MAXIMUM RATINGS (TA = 25°C)

SYMBOLS	PARAMETERS	UNITS	RATINGS
V _{CB0}	Collector to Base Voltage	V	15
V _{CE0}	Collector to Emitter Voltage	V	8
V _{EB0}	Emitter to Base Voltage	V	2
I _c	Collector Current	mA	5
T _J	Junction Temperature	°C	150
T _{STG}	Storage Temperature	°C	-65 to +150

PIN CONNECTIONS

1. Emitter
2. Base
3. Emitter
4. Collector

PERFORMANCE SPECIFICATIONS (TA = 25°C)

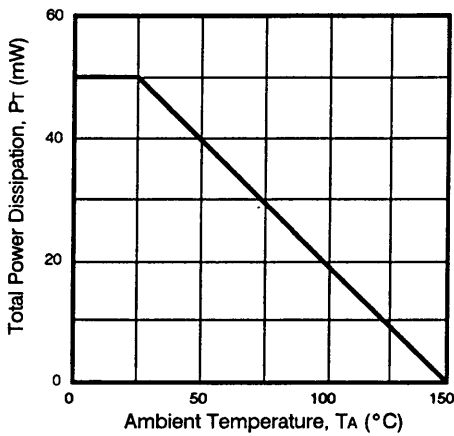
PART NUMBER PACKAGE OUTLINE			NE68337 37		
SYMBOLS	PARAMETERS AND CONDITIONS	UNITS	MIN	TYP	MAX
f _r	Gain Bandwidth Product at V _{CE} = 1 V, I _c = 1 mA	GHz		4.0	
S _{21E} ²	Insertion Power Gain at V _{CE} = 1 V, I _c = 1 mA, f = 1 GHz	dB	5.5	7.5	
MAG	Maximum Available Gain at V _{CE} = 1 V, I _c = 1 mA, f = 1 GHz	dB	13.0	14.5	
NF	Noise Figure at V _{CE} = 1 V, I _c = 0.25 mA, f = 1 GHz	dB		3.0	4.5
GA	Associated Gain at Optimum Noise Figure, V _{CE} = 1 V, I _c = 0.25 mA, f = 1 GHz	dB		6.5	

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

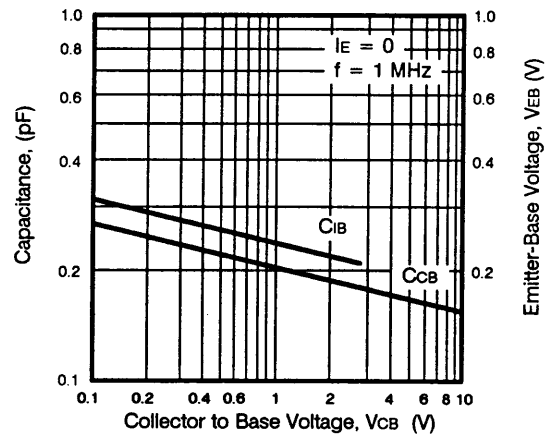
PART NUMBER PACKAGE OUTLINE			NE68337 37		
SYMBOLS	PARAMETERS AND CONDITIONS	UNITS	MIN	TYP	MAX
I_{CBO}	Collector Cutoff Current at $V_{CB} = 5\text{ V}$, $I_E = 0$	μA			0.1
I_{EBO}	Emitter Cutoff Current at $V_{EB} = 1\text{ V}$, $I_C = 0$	μA			0.1
h_{FE}	Forward Current Gain at $V_{CE} = 1\text{ V}$, $I_C = 250\ \mu\text{A}$		50	100	250
C_{CB}	Collector to Base Capacitance at $V_{CB} = 1\text{ V}$, $I_E = 0$, $f = 1\text{ MHz}$	pF		0.2	0.3
P_T	Total Power Dissipation	mW			50

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

POWER DERATING CURVE

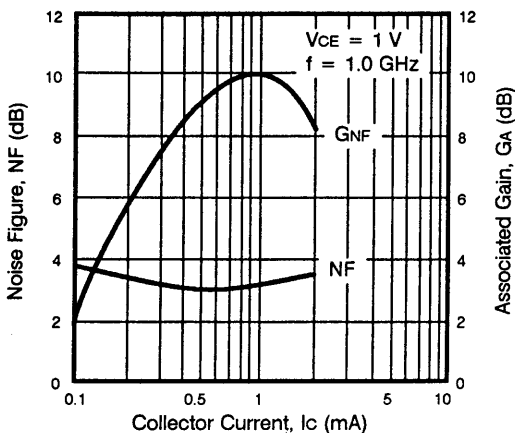


DEVICE CAPACITANCE

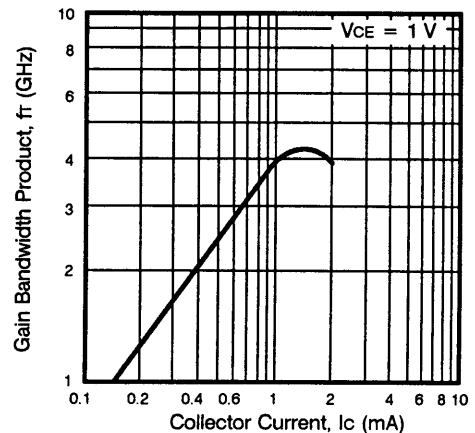


TYPICAL PERFORMANCE CHARACTERISTICS ($T_A = 25^\circ\text{C}$)

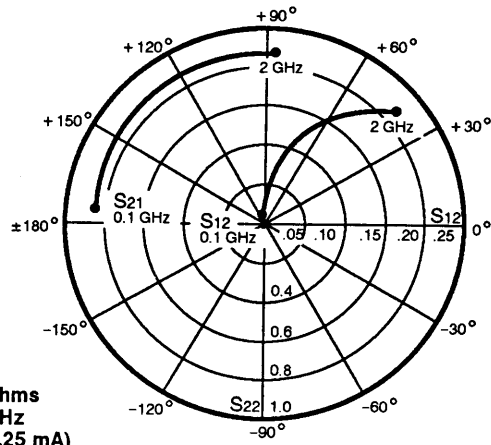
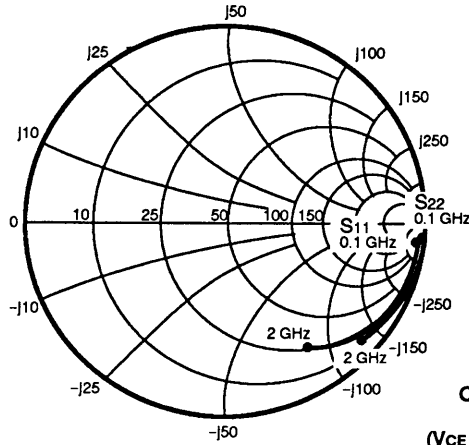
NOISE FIGURE AND ASSOCIATED GAIN vs. COLLECTOR CURRENT



GAIN BANDWIDTH PRODUCT vs. COLLECTOR CURRENT



TYPICAL COMMON EMITTER SCATTERING PARAMETERS



NE68337
Coordinates in Ohms
Frequency in GHz
(V_{CE} = 1.0 V, I_C = 0.25 mA)

S-MAGN AND ANGLES:
V_{CE} = 1.0 V, I_C = 0.25 mA

FREQUENCY (MHz)	S ₁₁		S ₂₁		S ₁₂		S ₂₂	
100	0.99	-3	0.82	174	0.01	92	1.00	-2
200	0.99	-6	0.84	171	0.02	84	1.00	-4
400	0.99	-10	0.82	162	0.05	82	1.00	-9
600	0.99	-16	0.85	153	0.08	75	1.00	-12
800	0.96	-21	0.86	142	0.10	70	0.99	-16
1000	0.94	-28	0.86	132	0.13	65	0.97	-22
1200	0.89	-35	0.86	123	0.15	59	0.97	-26
1400	0.87	-40	0.88	112	0.17	55	0.95	-30
1600	0.83	-45	0.87	104	0.19	51	0.92	-34
1800	0.79	-50	0.88	95	0.20	46	0.92	-39
2000	0.74	-56	0.87	88	0.22	42	0.89	-42

V_{CE} = 1.0 V, I_C = 0.5 mA

100	0.99	-3	1.57	173	0.01	87	1.00	-2
200	0.98	-8	1.60	169	0.02	86	1.00	-5
400	0.97	-13	1.54	159	0.05	80	1.00	-10
600	0.96	-19	1.57	149	0.08	73	0.99	-14
800	0.91	-26	1.53	138	0.10	69	0.97	-18
1000	0.87	-33	1.51	128	0.12	63	0.94	-24
1200	0.80	-40	1.47	117	0.14	57	0.93	-28
1400	0.76	-45	1.46	107	0.16	53	0.90	-32
1600	0.71	-50	1.40	99	0.17	50	0.86	-36
1800	0.66	-54	1.37	89	0.19	44	0.86	-40
2000	0.61	-59	1.32	83	0.20	42	0.83	-43

V_{CE} = 1.0 V, I_C = 0.75 mA

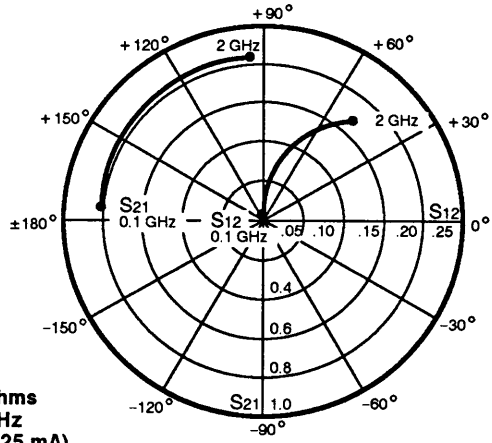
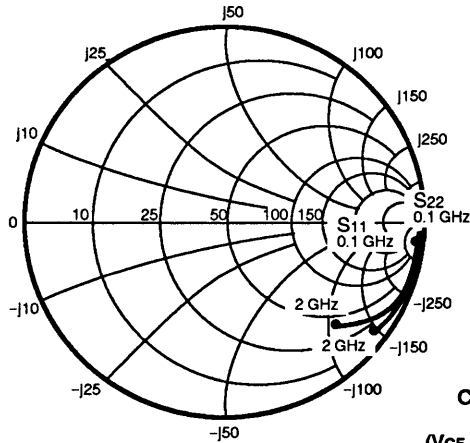
100	0.98	-4	2.27	172	0.01	84	1.00	-3
200	0.97	-9	2.30	167	0.02	84	0.99	-5
400	0.95	-15	2.17	156	0.05	77	0.98	-11
600	0.92	-22	2.19	145	0.07	72	0.96	-16
800	0.85	-29	2.10	132	0.10	66	0.93	-20
1000	0.80	-37	2.02	122	0.11	61	0.90	-26
1200	0.72	-44	1.92	111	0.13	56	0.88	-30
1400	0.67	-48	1.85	101	0.15	52	0.85	-33
1600	0.61	-53	1.74	93	0.16	49	0.82	-36
1800	0.56	-56	1.66	84	0.17	45	0.81	-41
2000	0.51	-60	1.57	77	0.19	43	0.78	-43

V_{CE} = 1.0 V, I_C = 1.0 mA

100	0.97	-4	2.93	171	0.01	88	1.00	-3
200	0.96	-10	2.95	165	0.02	81	0.99	-6
400	0.93	-17	2.75	152	0.05	76	0.98	-12
600	0.88	-25	2.72	140	0.07	70	0.95	-17
800	0.80	-32	2.55	127	0.09	64	0.91	-21
1000	0.73	-40	2.39	116	0.11	60	0.87	-26
1200	0.65	-46	2.24	106	0.13	55	0.85	-30
1400	0.59	-50	2.11	96	0.14	52	0.82	-33
1600	0.54	-53	1.97	88	0.15	50	0.78	-37
1800	0.49	-55	1.85	80	0.17	47	0.77	-40
2000	0.45	-59	1.72	73	0.18	45	0.75	-43



TYPICAL COMMON EMITTER SCATTERING PARAMETERS



NE68337
Coordinates in Ohms
Frequency in GHz
(VCE = 5.0 V, IC = 0.25 mA)

S-MAGN AND ANGLES:

VCE = 5.0 V, IC = 0.25 mA

FREQUENCY (MHz)

	S ₁₁		S ₂₁		S ₁₂		S ₂₂	
100	0.99	-2	0.80	174	0.00	89	1.00	-2
200	0.99	-5	0.82	172	0.01	87	1.00	-3
400	1.00	-9	0.80	164	0.03	82	1.00	-7
600	1.00	-14	0.83	156	0.06	79	1.00	-10
800	0.97	-19	0.83	146	0.08	73	1.00	-14
1000	0.96	-25	0.84	137	0.09	69	1.00	-18
1200	0.91	-31	0.83	128	0.11	63	1.00	-22
1400	0.89	-35	0.85	118	0.13	59	0.98	-26
1600	0.86	-40	0.84	111	0.14	56	0.96	-29
1800	0.84	-45	0.85	102	0.15	51	0.95	-34
2000	0.79	-50	0.84	95	0.17	48	0.95	-37

VCE = 5.0 V, IC = 0.5 mA

100	0.98	-3	1.54	174	0.01	93	1.00	-2
200	0.99	-7	1.58	170	0.01	81	1.00	-3
400	0.97	-11	1.52	161	0.03	80	1.00	-8
600	0.97	-17	1.56	152	0.05	76	1.00	-12
800	0.93	-22	1.52	141	0.07	72	1.00	-15
1000	0.89	-30	1.50	132	0.09	67	0.96	-20
1200	0.84	-36	1.45	122	0.11	61	0.96	-23
1400	0.80	-40	1.46	112	0.12	58	0.94	-27
1600	0.76	-44	1.40	105	0.13	55	0.92	-30
1800	0.71	-49	1.38	95	0.14	51	0.91	-35
2000	0.66	-53	1.32	89	0.15	49	0.90	-37

VCE = 5.0 V, IC = 0.75 mA

100	0.97	-3	2.26	173	0.01	83	1.00	-2
200	0.97	-7	2.30	168	0.01	81	1.00	-4
400	0.96	-13	2.18	158	0.03	80	0.99	-9
600	0.93	-19	2.20	148	0.05	73	0.98	-13
800	0.88	-26	2.11	136	0.07	70	0.96	-17
1000	0.83	-33	2.04	126	0.09	65	0.94	-21
1200	0.77	-39	1.94	116	0.10	61	0.93	-25
1400	0.72	-43	1.89	106	0.11	58	0.91	-28
1600	0.67	-46	1.78	98	0.12	55	0.88	-31
1800	0.62	-49	1.70	90	0.13	52	0.88	-35
2000	0.58	-53	1.61	83	0.15	50	0.86	-38

VCE = 5.0 V, IC = 1.0 mA

100	0.97	-3	2.90	172	0.01	89	1.00	-2
200	0.97	-9	2.93	166	0.01	84	1.00	-4
400	0.94	-15	2.76	155	0.03	80	1.00	-10
600	0.90	-21	2.73	144	0.05	73	0.98	-13
800	0.83	-28	2.58	131	0.07	70	0.95	-17
1000	0.78	-35	2.45	121	0.08	65	0.92	-22
1200	0.70	-40	2.29	111	0.10	61	0.91	-25
1400	0.65	-43	2.19	101	0.11	57	0.88	-28
1600	0.60	-46	2.03	94	0.12	56	0.86	-31
1800	0.56	-49	1.92	85	0.13	53	0.85	-35
2000	0.52	-52	1.79	79	0.14	51	0.83	-37

FEATURES

- LOW OPERATING VOLTAGE
- LOW POWER CONSUMPTION
- LOW NOISE FIGURE
3.0 dB at 1 GHz (TYP)
- HIGH ASSOCIATED GAIN
5.5 dB at 1 GHz (TYP)
- HIGH GAIN BANDWIDTH PRODUCT
4.0 GHz (TYP)
- SURFACE MOUNT COMMON BASE OR COMMON EMITTER PACKAGE
- AVAILABLE IN TAPE & REEL AND BULK
- HIGH RELIABILITY METALLIZATION
- LOW COST

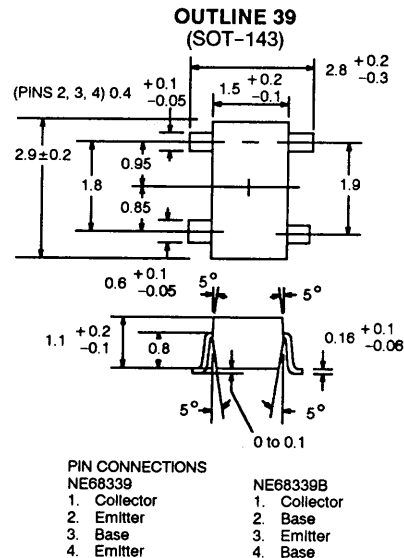
ABSOLUTE MAXIMUM RATINGS (TA = 25°C)

SYMBOLS	PARAMETERS	UNITS	RATINGS
Vcbo	Collector to Base Voltage	V	15
Vceo	Collector to Emitter Voltage	V	8
Vebo	Emitter to Base Voltage	V	2
Ic	Collector Current	mA	5
Pt	Total Power Dissipation	mW	50
Tj	Junction Temperature	°C	150
Tstg	Storage Temperature	°C	-65 to +150

DESCRIPTION AND APPLICATIONS

The NE68339 and NE68339B are NPN silicon high frequency transistors designed primarily for use in low voltage and low current applications up to 2 GHz. These devices are ideal for pagers, electro-optic detector post amplifier applications, and other battery powered or low current solar powered systems. The 4-leaded mini mold package provides superior mechanical stability and is available either individually or on tape & reel in two configurations. The NE68339 has two emitter leads to help reduce emitter inductance and the NE68339B has two base leads making it a superior choice for oscillator applications.

OUTLINE DIMENSIONS (Units in mm)



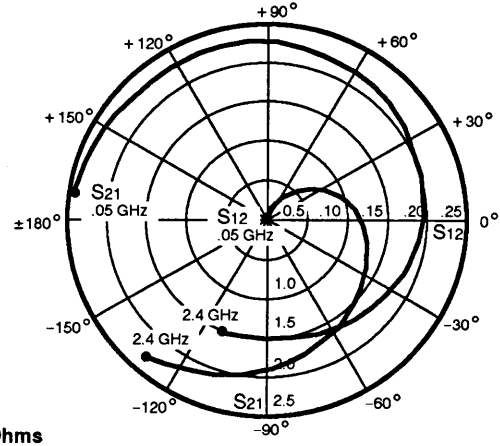
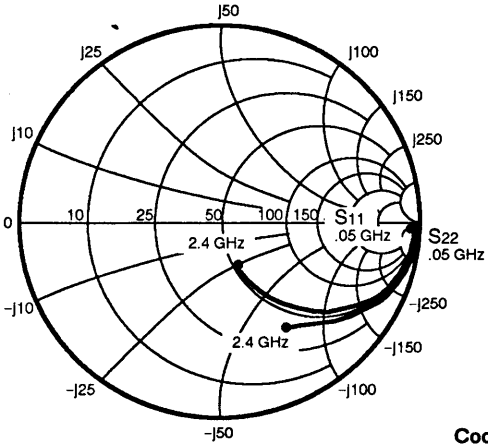
ELECTRICAL CHARACTERISTICS (TA = 25°C)

PART NUMBER EIAJ* REGISTERED NUMBER PACKAGE OUTLINE			NE68339 2SC4091 39			NE68339B 2SC4088 39B		
SYMBOLS	PARAMETERS AND CONDITIONS	UNITS	MIN	TYP	MAX	MIN	TYP	MAX
Icbo	Collector Cutoff Current at Vcb = 5 V, IE = 0	μA			0.1			0.1
Iebo	Emitter Cutoff Current at VEB = 1 V, Ic = 0	μA			0.1			0.1
hFE	Forward Current Gain at VCE = 1 V, Ic = 250 μA		50	100	250	50	100	250
fr	Gain Bandwidth Product at VCE = 1 V, Ic = 1 mA	GHz		4			4	
S21E ²	Insertion Power Gain at VCE = 1 V, Ic = 1 mA, f = 1 GHz	dB		8.5				
MAG	Maximum Available Gain at VCE = 1 V, Ic = 1 mA, f = 1 GHz	dB		14.5				
NF	Noise Figure at VCE = 1 V, Ic = 250 μA, f = 1 GHz	dB		3.0				
GA	Associated Gain at Optimum Noise Figure at VCE = 1 V, Ic = 250 μA, f = 1 GHz	dB		5.5				
CoB	Output Capacitance** at Vcb = 1 V, IE = 0, f = 1 MHz	pF		0.4			0.5	1

*Electronic Industrial Association of Japan

**Measured with three connection bridge with emitter pin connected to bridge ground.

TYPICAL COMMON EMITTER SCATTERING PARAMETERS



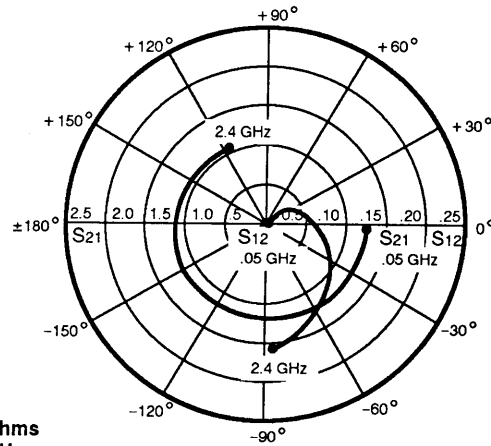
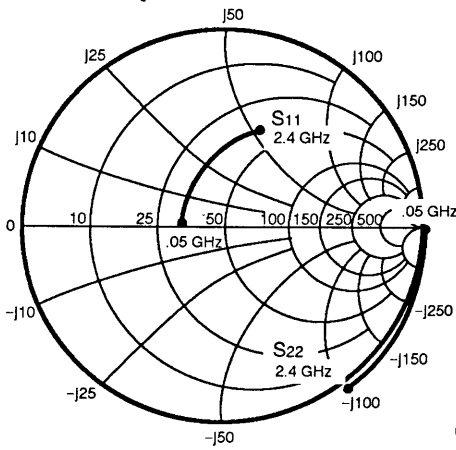
NE68339
Coordinates in Ohms
Frequency in GHz
(V_{CE} = 1 V, I_C = 1 mA)

S-MAGN AND ANGLES:

V_{CE} = 1 V, I_C = 1 mA

FREQUENCY (MHz)	S ₁₁		S ₂₁		S ₁₂		S ₂₂	
50	.97	-2	2.43	172	.007	85	1.00	-2
100	.96	-5	2.49	164	.015	79	1.00	-3
200	.95	-9	2.41	149	.029	68	0.99	-7
300	.93	-14	2.36	135	.044	58	0.98	-10
400	.90	-18	2.39	121	.057	47	0.96	-13
500	.87	-22	2.30	108	.070	37	0.94	-16
600	.84	-27	2.30	95	.081	27	0.93	-19
700	.81	-31	2.27	82	.092	17	0.90	-22
800	.77	-34	2.18	69	.103	8	0.88	-24
900	.72	-38	2.19	57	.113	-1	0.86	-27
1000	.69	-41	2.10	44	.122	-11	0.84	-29
1100	.64	-45	2.09	32	.131	-19	0.82	-31
1200	.60	-48	2.04	20	.139	-29	0.79	-33
1300	.57	-51	1.98	8	.148	-37	0.70	-35
1400	.52	-54	1.94	-4	.156	-46	0.76	-37
1500	.49	-56	1.88	-15	.163	-55	0.75	-39
1600	.45	-59	1.84	-26	.171	-63	0.73	-41
1700	.42	-61	1.79	-38	.178	-71	0.72	-43
1800	.39	-63	1.74	-48	.186	-80	0.71	-45
1900	.36	-65	1.69	-59	.193	-88	0.69	-47
2000	.32	-67	1.65	-70	.200	-97	0.68	-49
2100	.30	-69	1.60	-80	.207	-105	0.66	-51
2200	.27	-71	1.57	-91	.214	-114	0.65	-53
2300	.25	-73	1.54	-101	.221	-122	0.64	-55
2400	.22	-75	1.50	-112	.227	-130	0.63	-57

TYPICAL COMMON BASE SCATTERING PARAMETERS



NE68339B
Coordinates in Ohms
Frequency in GHz
(V_{CB} = 1 V, I_c = 1 mA)

S-MAGN AND ANGLES
V_{CB} = 1 V, I_c = 1 mA

FREQUENCY (MHz)

FREQUENCY (MHz)	S ₁₁		S ₂₁		S ₁₂		S ₂₂	
50	.21	175	1.20	-5	.002	70	1.00	-5
100	.22	172	1.20	-10	.004	75	1.00	-1
200	.22	163	1.20	-20	.009	72	1.00	-3
300	.23	155	1.20	-30	.013	67	1.00	-4
400	.24	148	1.20	-40	.017	61	1.00	-6
500	.25	141	1.19	-50	.022	55	1.00	-8
600	.26	135	1.19	-60	.027	48	1.01	-10
700	.28	129	1.19	-70	.031	42	1.00	-11
800	.29	123	1.19	-80	.036	35	1.01	-13
900	.31	118	1.18	-90	.042	28	1.01	-14
1000	.32	114	1.18	-100	.047	21	1.01	-16
1100	.34	110	1.17	-110	.053	14	1.01	-18
1200	.36	106	1.17	-120	.058	7	1.01	-20
1300	.37	102	1.17	-130	.065	-7	1.02	-22
1400	.39	99	1.16	-140	.071	-8	1.02	-24
1500	.41	96	1.15	-150	.078	-16	1.02	-26
1600	.42	92	1.14	-160	.085	-23	1.03	-28
1700	.44	89	1.14	-170	.092	-31	1.03	-30
1800	.45	86	1.13	180	.100	-39	1.03	-32
1900	.47	84	1.12	169	.107	-47	1.03	-35
2000	.48	80	1.11	159	.116	-55	1.04	-37
2100	.49	78	1.10	149	.124	-63	1.04	-39
2200	.51	75	1.10	139	.133	-71	1.04	-41
2300	.52	73	1.09	129	.142	-79	1.05	-44
2400	.53	70	1.08	118	.152	-88	1.06	-47

