

NEC[®]**NPN MEDIUM POWER
MICROWAVE TRANSISTOR**T-33-05
**NE64300
NE64310****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), and in a low inductance TO-46 can (NE64310). 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.

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

SYMBOLS	PARAMETERS	UNITS	RATINGS
V _{CB0}	Collector to Base Voltage	V	40
V _{CE0}	Collector to Emitter Voltage	V	20*
V _{EB0}	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** ($T_A = 25^\circ\text{C}$)

PART NUMBER EIAJ ¹ REGISTERED NUMBER		NE64310 V020			
PACKAGE OUTLINE		10 (TO-46)			
SYMBOLS	PARAMETERS AND CONDITIONS	UNITS	MIN	TYP	MAX
I _{CB0}	Collector Cutoff Current at V _{CB} = 20 V, I _E = 0	μA			50
I _{EB0}	Emitter Cutoff Current at V _{EB} = 2 V, I _C = 0	μA			100
h _{FE}	Forward Current Gain ^{2,3} at V _{CE} = 10 V, I _C = 70 mA		15	80	200
C _{CB}	Collector to Base Capacitance ⁴ at V _{CB} = 10 V, I _C = 0 mA, f = 1 MHz	pF		2	3
R _{TH}	Thermal Resistance (Junction-to-Case)	°C/W			70 ⁴
P _T	Total Device Dissipation (T _C = 25°C)	W			2

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_{θJC} 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.

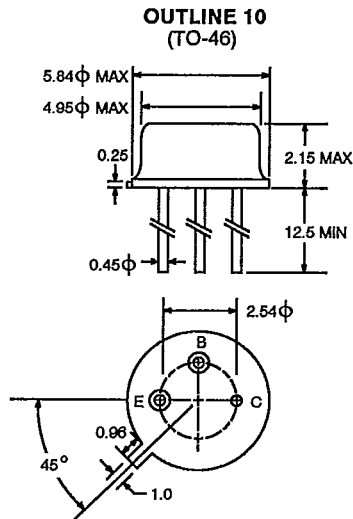
PERFORMANCE SPECIFICATIONS (TA = 25°C)

PART NUMBER EIAJ' REGISTERED NUMBER PACKAGE OUTLINE		NE64310 V020 10 (TO-46)			
SYMBOLS	PARAMETERS AND CONDITIONS	UNITS	MIN	TYP	MAX
fr	Gain Bandwidth Product at VCE = 10 V, IC = 70 mA	GHz	1.8	2	
S21E ²	Insertion Power Gain at VCE = 10 V, IC = 60 mA f = 0.5 GHz f = 1.0 GHz	dB dB		10.5 5	
MAG	Maximum Available Gain at VCE = 10 V, IC = 60 mA PIN = 24 dBm, f = 1.0 GHz f = 2.0 GHz	dB dB		8 3	
Posc	Oscillator Output Power at VCC = 18 V, IC = 100 mA f = 2.0 GHz	mW		300	

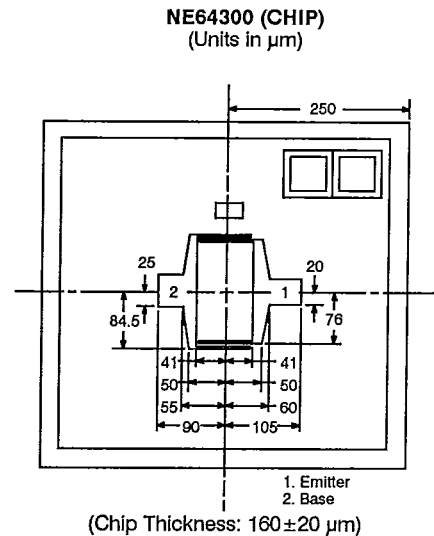
Notes:

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

OUTLINE DIMENSIONS (Units in mm)

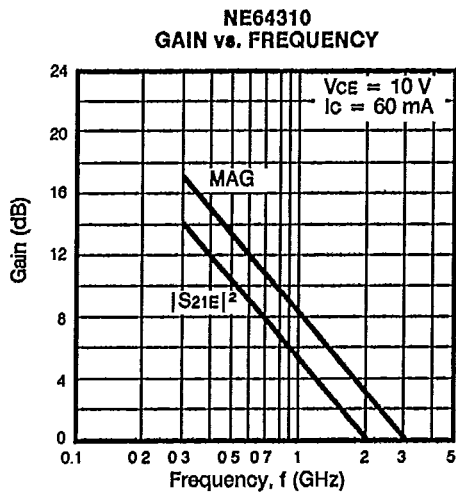
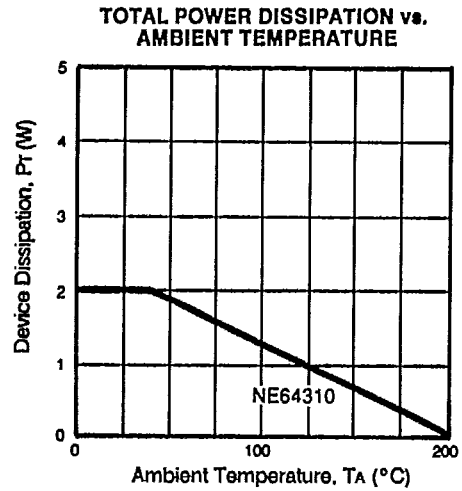
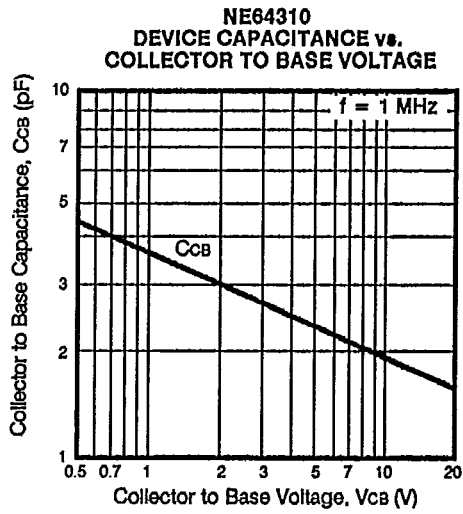


Collector is connected to case.

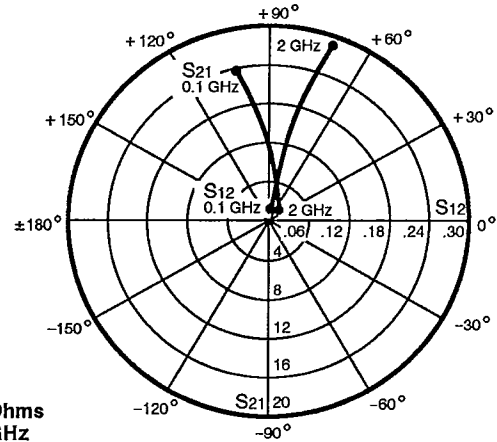
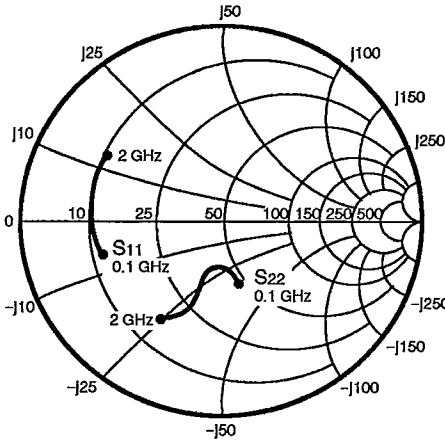


NE64300, NE64310

TYPICAL PERFORMANCE CHARACTERISTICS (TA = 25°C)



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

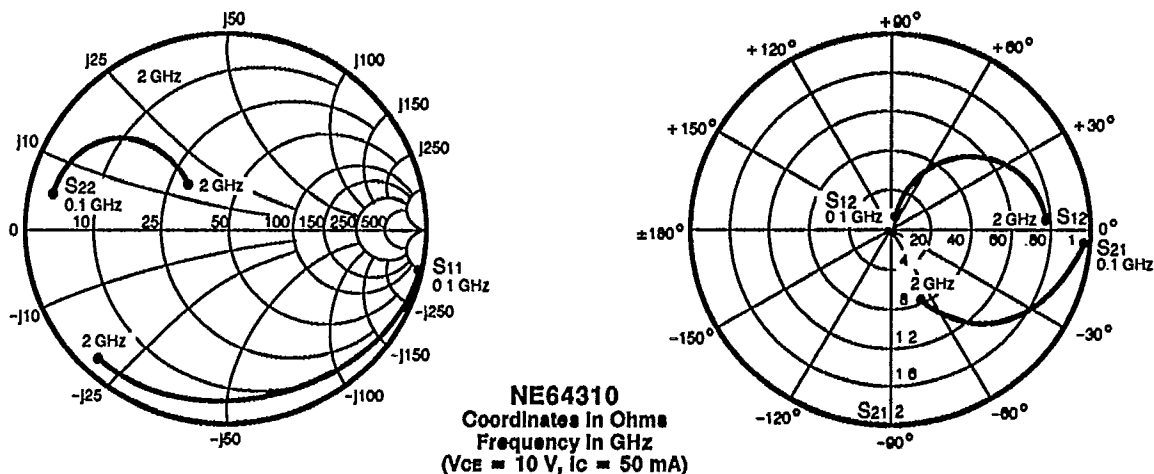
100	.60	-163	15.91	102	.02	65	.32	-75
200	.63	-172	8.33	91	.03	66	.24	-88
400	.63	180	4.30	79	.07	74	.22	-95
600	.65	174	2.92	72	.10	74	.26	-102
800	.65	169	2.21	64	.13	73	.30	-107
1000	.65	166	1.81	57	.16	74	.34	-109
1200	.64	163	1.55	52	.19	74	.39	-110
1400	.65	159	1.35	47	.22	73	.44	-114
1600	.64	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

NE64300, NE64310

TYPICAL COMMON COLLECTOR SCATTERING PARAMETERS



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