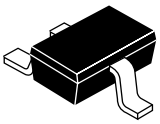
NEC

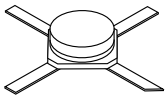
NPN SILICON GENERAL PURPOSE TRANSISTOR | NE734 SERIES

FEATURES

- **LOW NOISE FIGURE:** < 3 dB at 500 MHz
- **HIGH GAIN:** 15 dB at 500 MHz
- **HIGH GAIN BANDWIDTH PRODUCT:** 2 GHz (3 GHz for the NE73435)
- **SMALL COLLECTOR CAPACITANCE:** 1 pF
- **HIGH RELIABILITY METALLIZATION**



30 (SOT 323 STYLE)



35 (MICRO-X)

DESCRIPTION

The NE734 series of NPN silicon general purpose UHF transistors provide the designer with a wide selection of reliable transistors for high speed logic and wide-band low noise amplifier applications. The series uses NEC's highly reliable platinum-silicide, titanium, platinum, and gold metallization system to assure uniform performance and reliability. The NE73433 is in the plastic Mini-Mold package designed for high-speed automated assembly operations for large volume hybrid ICs. For hybrid MIC applications requiring more performance, the NE73435 is recommended. This device is packaged in the economical metal-ceramic, hermetic Micro-X package.

ELECTRICAL CHARACTERISTICS (T_A = 25°C)

PART NUMBER EIAJ[1] REGISTERED NUMBER PACKAGE OUTLINE			NE73430 2SC4185 30			NE73435 2SC2148 35		
SYMBOLS	**PARAMETERS AND CONDITIONS**	**UNITS**	**MIN**	**TYP**	**MAX**	**MIN**	**TYP**	**MAX**
f_T	Gain Bandwidth Product at V_{CE} = 10 V, I_C = 10 mA V_{CE} = 10 V, I_C = 5 mA	 GHz GHz		 2.3		 1.5	 3.0	
NF_{MIN}	Minimum Noise Figure[2] at V_{CE} = 10 V, I_C = 3 mA, f = 0.5 GHz V_{CE} = 10 V, I_C = 5 mA, f = 0.9 GHz	 dB dB		 4.0		 	 2.1 	 3.5
MAG	Maximum Available Gain[3] at V_{CE} = 10 V, I_C = 10 mA, f = 0.5 GHz f = 1 GHz	 dB dB		 17 		 	 18 13	
$\|S_{21E}\|^2$	Insertion Power Gain at V_{CE} = 10 V, I_C = 10 mA, f = 0.5 GHz f = 1 GHz	 dB dB		 8		 8	 16 9	
h_{FE}	Forward Current Gain Ratio at V_{CE} = 10 V, I_C = 10 mA V_{CE} = 10 V, I_C = 5 mA	 	 40	 100	 180	 25	 100	 200
I_{CBO}	Collector Cutoff Current at V_{CB} = 15 V, I_E = 0	µA			0.1			0.1
I_{EBO}	Emitter Cutoff Current at V_{EB} = 2 V, I_C = 0	µA						0.1
C_{CB}	Collector to Base Capacitance[4] at V_{CB} = 10 V, I_C = 0 mA, f = 1 MHz	 pF	 1.5	 	 0.75	 	 .55	 1.5
P_T	Total Power Dissipation	mW			150			250
R_{TH}	Thermal Resistance (Junction to Case)	°C/W			833			550

Notes:
1. Electronic Industrial Association of Japan.
2. Input and output are tuned for optimum noise figures.
3. Maximum Available Gain (MAG) is calculated

$MAG = \frac{|S_{21}|}{|S_{12}|}\left(K \pm \sqrt{K^2 - 1}\right)$. When K ≤ 1, MAG is undefined and MSG values are used. $MSG = \frac{|S_{21}|}{|S_{12}|}$, $K = \frac{1 + |\Delta|^2 - |S_{11}|^2 - |S_{22}|^2}{2\,|S_{12}\,S_{21}|}$, $\Delta = S_{11}\,S_{22} - S_{21}\,S_{12}$

4. C_{CB} measurement employs a three-terminal capacitance bridge incorporating a guard circuit. The emitter terminal shall be connected to the guard terminal.

ABSOLUTE MAXIMUM RATINGS[1] (T_A = 25°C)

SYMBOLS	PARAMETERS	UNITS	RATINGS
V_{CBO}	Collector to Base Voltage	V	30
V_{CEO}	Collector to Emitter Voltage	V	14
V_{EBO}	Emitter to Base Voltage	V	3
I_C	Collector Current	mA	50
T_J	Junction Temperature	°C	200[2]
T_{STG}	Storage Temperature	°C	-65 to +200[3]

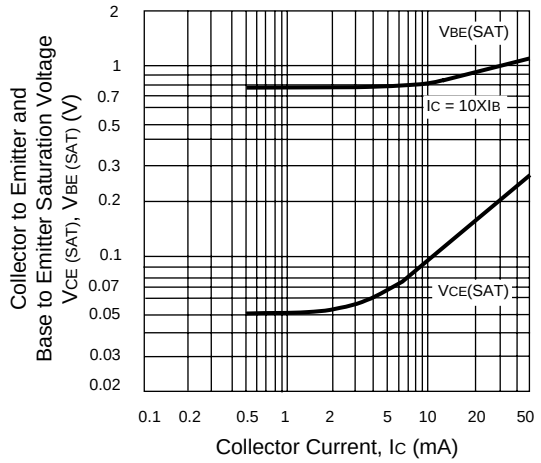
Notes:
1. Operation in excess of any one of these parameters may result in permanent damage.
2. Maximum Junction Temperature for the NE73430 is 150°C.
3. Maximum Storage Temperature for the NE73430 and the NE73435 Grade D is 150°C.

NE73435
TYPICAL NOISE PARAMETERS (T_A = 25°C)

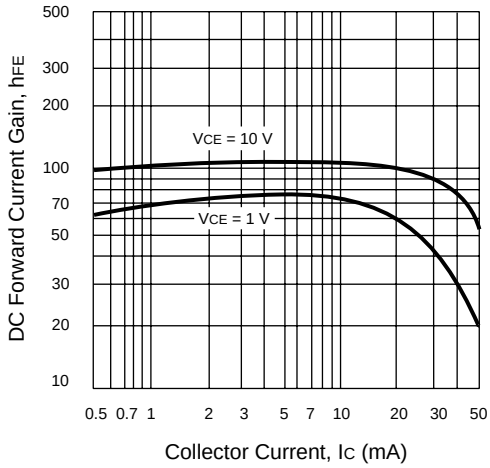
FREQ. (MHz)	NF_{OPT} (dB)	G_A (dB)	Γ_{OPT} MAG	Γ_{OPT} ANG	Rn/50
V_{CE} = 10 V, I_C = 3 mA					
500	2.0	16.1	0.30	80	0.63
1000	3.1	11.2	0.43	126	0.33
1500	4.2	9.2	0.54	168	0.19
2000	5.1	7.1	0.56	178	0.20
V_{CE} = 10 V, I_C = 15 mA					
500	3.3	17.5	0.34	120	0.36
1000	4.7	13.5	0.47	168	0.27
1500	6.5	10.8	0.67	-174	0.13
2000	7.4	9.2	0.64	-163	0.46

TYPICAL PERFORMANCE CURVES (T_A = 25°C)

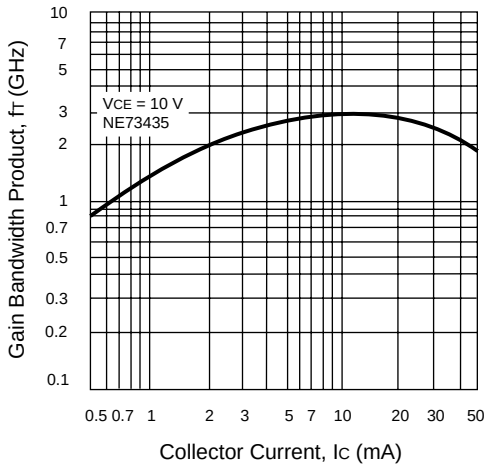
SATURATION VOLTAGE vs. COLLECTOR CURRENT



DC CURRENT GAIN vs. COLLECTOR CURRENT

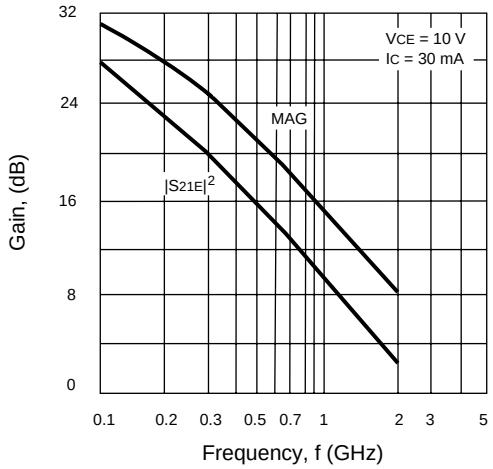


GAIN BANDWIDTH PRODUCT vs. COLLECTOR CURRENT

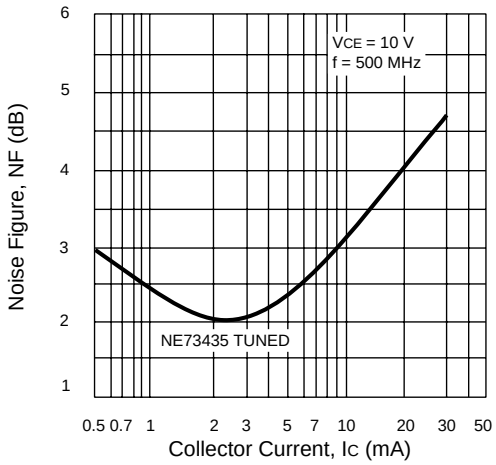


TYPICAL PERFORMANCE CURVES (T_A = 25°C)

NE73435
GAIN vs. FREQUENCY



NE73435
NOISE FIGURE vs.
COLLECTOR CURRENT

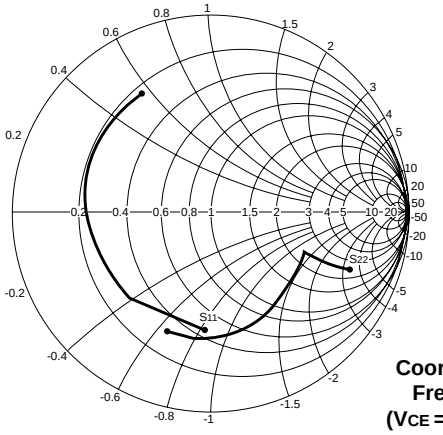


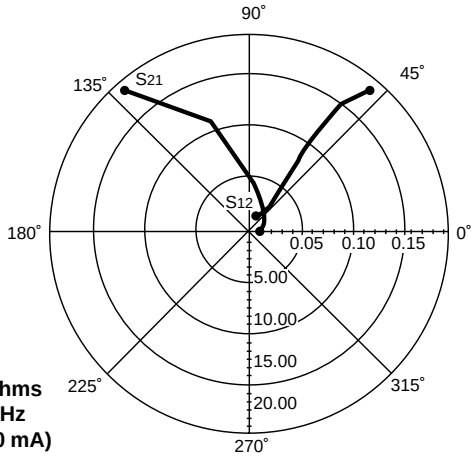
ORDERING INFORMATION

PART NUMBER	QUANTITY	PACKAGING
NE73430-T1	3000	Tape & Reel
NE73435	1	ESD Bag

Note:
1. Embossed tape 12 mm wide.

TYPICAL COMMON EMITTER SCATTERING PARAMETERS





Coordinates in Ohms
Frequency in GHz
(V_{CE} = 10 V, I_C = 20 mA)

NE73435

V_{CE} = 10 V, I_C = 3 mA

FREQUENCY	S_{11}		S_{21}		S_{12}		S_{22}		K	MAG[1]
(MHz)	MAG	ANG	MAG	ANG	MAG	ANG	MAG	ANG		(dB)
100	0.861	-28.4	6.880	157.0	0.026	70.5	0.960	-11.1	0.19	24.2
200	0.810	-55.0	6.206	139.8	0.047	56.9	0.865	-19.2	0.28	21.2
500	0.676	-115.5	4.323	104.1	0.070	37.3	0.689	-29.0	0.50	17.9
1000	0.616	-156.0	2.494	74.4	0.085	30.5	0.612	-38.3	0.84	14.7
1500	0.607	-175.1	1.709	55.6	0.095	32.2	0.612	-49.8	1.05	11.2
2000	0.610	171.3	1.317	39.0	0.107	32.2	0.616	-62.2	1.16	8.5
2500	0.613	160.0	1.071	25.3	0.118	33.9	0.632	-74.0	1.20	6.9
3000	0.618	149.5	0.896	13.0	0.132	33.5	0.649	-87.3	1.19	5.7
4000	0.630	128.9	0.647	-8.4	0.170	33.7	0.657	-112.9	1.20	3.1

V_{CE} = 10 V, I_C = 5 mA

100	0.798	-39.0	10.428	151.6	0.025	66.2	0.923	-14.4	0.22	26.2
200	0.733	-74.2	8.974	131.4	0.040	52.9	0.788	-22.4	0.31	23.5
500	0.628	-134.4	5.214	96.8	0.056	37.4	0.613	-28.4	0.62	19.7
1000	0.603	-166.4	2.797	70.8	0.073	37.1	0.563	-36.6	0.94	15.8
1500	0.605	178.1	1.893	53.1	0.088	39.9	0.572	-47.9	1.09	11.5
2000	0.613	166.2	1.442	37.6	0.102	39.9	0.582	-60.5	1.16	9.1
2500	0.621	155.9	1.161	24.2	0.117	41.0	0.604	-72.5	1.15	7.6
3000	0.628	146.0	0.967	12.0	0.133	40.6	0.628	-85.9	1.10	6.7
4000	0.644	126.0	0.690	-9.3	0.176	39.2	0.639	-111.8	1.09	4.1

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

100	0.687	-62.0	16.892	142.1	0.020	59.4	0.846	-19.1	0.26	29.3
200	0.635	-106.6	12.598	118.5	0.031	48.8	0.677	-24.6	0.40	26.1
500	0.603	-153.4	5.959	89.6	0.042	42.9	0.541	-25.9	0.81	21.5
1000	0.607	-175.8	3.063	67.1	0.061	47.2	0.521	-33.7	1.07	15.4
1500	0.621	171.8	2.039	50.5	0.080	48.7	0.541	-45.3	1.12	12.0
2000	0.633	161.4	1.532	35.2	0.096	48.3	0.559	-58.0	1.14	9.8
2500	0.646	151.8	1.220	22.4	0.112	48.3	0.586	-70.7	1.10	8.4
3000	0.652	142.4	1.009	10.4	0.132	47.9	0.612	-84.2	1.02	8.0
4000	0.672	122.6	0.712	-10.1	0.182	44.2	0.627	-111.0	0.96	5.9

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

100	0.584	-94.8	22.708	130.8	0.015	57.7	0.761	-21.6	0.32	31.8
200	0.594	-134.2	14.233	108.5	0.023	48.1	0.599	-23.0	0.55	27.9
500	0.613	-165.6	6.118	84.3	0.034	51.7	0.515	-22.0	0.95	22.6
1000	0.632	178.2	3.061	63.8	0.054	53.6	0.517	-30.8	1.13	15.3
1500	0.650	167.5	2.014	47.5	0.072	55.5	0.545	-43.4	1.14	12.2
2000	0.666	157.8	1.506	32.9	0.089	55.1	0.564	-56.8	1.12	10.2
2500	0.678	148.5	1.190	20.3	0.108	56.1	0.594	-69.8	1.02	9.6
3000	0.686	139.0	0.976	8.7	0.132	55.3	0.621	-83.9	0.91	8.7
4000	0.699	119.3	0.682	-11.2	0.190	49.2	0.634	-111.2	0.86	5.6

Note:

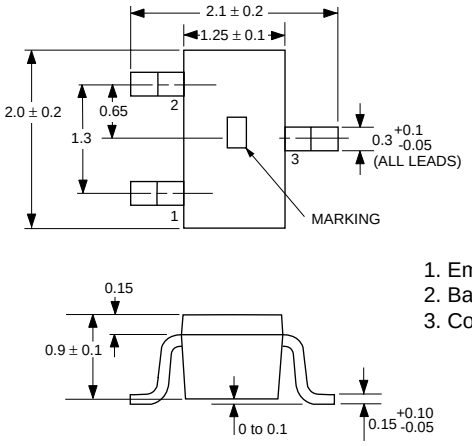
1. Gain Calculation:

MAG = $\frac{|S_{21}|}{|S_{12}|}\left(K \pm \sqrt{K^2 - 1}\right)$. When K ≤ 1, MAG is undefined and MSG values are used. MSG = $\frac{|S_{21}|}{|S_{12}|}$, K = $\frac{1 + |\Delta|^2 - |S_{11}|^2 - |S_{22}|^2}{2\,|S_{12}\,S_{21}|}$, $\Delta = S_{11}\,S_{22} - S_{21}\,S_{12}$

MAG = Maximum Available Gain MSG = Maximum Stable Gain

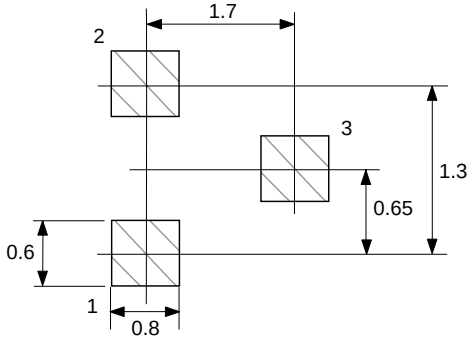
OUTLINE DIMENSIONS (Units in mm)

OUTLINE 30
(SOT-323)

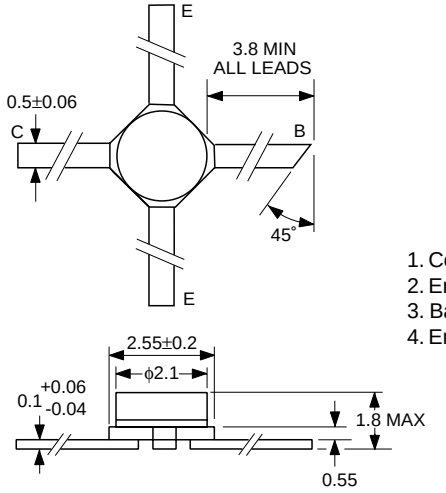


1. Emitter
2. Base
3. Collector

PACKAGE OUTLINE 30
RECOMMENDED P.C.B. LAYOUT



PACKAGE OUTLINE 35
(MICRO-X)



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