

NEC

NPN SILICON HIGH FREQUENCY TRANSISTOR

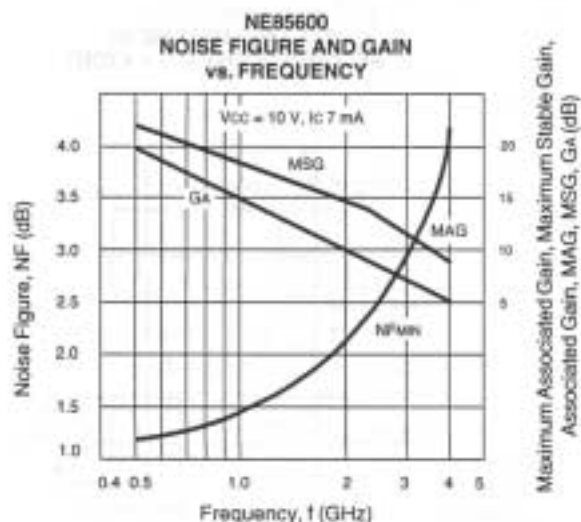
NE856 SERIES

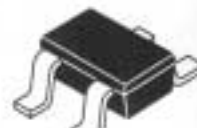
FEATURES

- **HIGH GAIN BANDWIDTH PRODUCT:**
 $f_T = 7 \text{ GHz}$
- **LOW NOISE FIGURE:**
1.1 dB at 1 GHz
- **HIGH COLLECTOR CURRENT:** 100 mA
- **HIGH RELIABILITY METALLIZATION**
- **LOW COST**

DESCRIPTION

The NE856 series of NPN epitaxial silicon transistors is designed for low cost amplifier and oscillator applications. Low noise figures, high gain, and high current capability equate to wide dynamic range and excellent linearity. The NE856 series offers excellent performance and reliability at low cost. This is achieved by NEC's titanium/platinum/gold metallization system and their direct nitride passivated base surface process. The NE856 series is available in chip form and a Micro-x package for high frequency applications. It is also available in 8 different low cost plastic package styles.



	
00 (CHIP)	35 (MICRO-X)
	
32 (TO-92)	34 (SOT 89 STYLE)
	
18 (SOT 343 STYLE)	19 (3 PIN ULTRA SUPER MINI MOLD)
	
30 (SOT 323 STYLE)	33 (SOT 23 STYLE)
	
39 (SOT 143 STYLE)	39R (SOT 143R STYLE)

Note: Also available in dual chip versions. See part number UPA801T on page 3-151, and UPA810T on page 3-157.

ELECTRICAL CHARACTERISTICS (T_A = 25°C)

PART NUMBER EIAJ ¹ REGISTERED NUMBER PACKAGE OUTLINE			NE85600 00 (CHIP)			NE85618 2SC5011 18			NE85619 2SC5006 19			NE85630 2SC4226 30			NE85632 2SC3355 32		
SYMBOLS	PARAMETERS AND CONDITIONS	UNITS	MIN	TYP	MAX	MIN	TYP	MAX	MIN	TYP	MAX	MIN	TYP	MAX	MIN	TYP	MAX
f _r	Gain Bandwidth Product at V _{CE} = 10 V, I _C = 20 mA V _{CE} = 3 V, I _C = 7 mA	GHz GHz		7.0			6.5			3.0	4.5			4.5			6.5
NF	Noise Figure at V _{CE} = 10 V, I _C = 7 mA, f = 1 GHz	dB		1.1			1.4			1.4			1.3				1.4
	V _{CE} = 10 V, I _C = 7 mA, f = 2 GHz	dB		2.1			2.1			2.2			2.2				
GA	Associated Gain at V _{CE} = 10 V, I _C = 7 mA, f = 1 GHz f = 2 GHz	dB					13			12.5			12				10
		dB		10			7			6.5			6				
S ₂₁ ²	Insertion Power Gain at V _{CE} = 10 V, I _C = 20 mA, f = 1 GHz f = 2 GHz	dB				11	13			12			12				9.5
		dB	7	9			7						6				
h _{FE}	Forward Current Gain ² at V _{CE} = 10 V, I _C = 20 mA V _{CE} = 3 V, I _C = 7 mA		50	120	300	50	120	300	80	120	160	40	110	250	50	120	300
I _{CBO}	Collector Cutoff Current at V _{CE} = 15 V, I _E = 0 mA	μA			1.0			1.0			1.0			1.0			1.0
I _{EO}	Emitter Cutoff Current at V _{EB} = 1 V, I _C = 0 mA	μA			1.0			1.0			1.0			1.0			1.0
C _{re}	Feedback Capacitance ³ at V _{CE} = 3 V, I _E = 0 mA, f = 1 MHz V _{CE} = 10 V, I _E = 0 mA, f = 1 MHz	pF								0.7	1.5		0.7	1.5			0.65
		pF		0.5	1.0		0.5	0.9									1.0
P _T	Total Power Dissipation	mW			700			150			100			150			600
R _{TH} (J-A)	Thermal Resistance (J-A)	°C/W						833			1000			833			210

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ELECTRICAL CHARACTERISTICS (T_A = 25°C)

PART NUMBER EIAJ ¹ REGISTERED NUMBER PACKAGE OUTLINE			NE85633 2SC3356 33			NE85634 2SC3357 34			NE85635 2SC3603 35			NE85639/39R 2SC4093 39		
SYMBOLS	PARAMETERS AND CONDITIONS	UNITS	MIN	TYP	MAX	MIN	TYP	MAX	MIN	TYP	MAX	MIN	TYP	MAX
f _r	Gain Bandwidth Product at V _{CE} = 10 V, I _C = 20 mA	GHz		7.0			6.5			7.0			9.0	
NF	Noise Figure at V _{CE} = 10 V, I _C = 7 mA, f = 1 GHz	dB		1.4	2.0		1.4						1.5	2.1
	f = 2 GHz	dB								2.1	3.4			
GA	Associated Gain at V _{CE} = 10 V, I _C = 7 mA, f = 1 GHz f = 2 GHz	dB		9									13.5	
		dB								10			8.5	
S ₂₁ ²	Insertion Power Gain at V _{CE} = 10 V, I _C = 20 mA, f = 1 GHz f = 2 GHz	dB		11.5			9.5						13	
		dB							7	9			7	
h _{FE}	Forward Current Gain ² at V _{CE} = 10 V, I _C = 20 mA		50	120	300	50	120	300	50	120	300	50	120	300
I _{CBO}	Collector Cutoff Current at V _{CE} = 15 V, I _E = 0 mA	μA			1.0			1.0			1.0			1.0
I _{EO}	Emitter Cutoff Current at V _{EB} = 1 V, I _C = 0 mA	μA			1.0			1.0			1.0			1.0
C _{re}	Feedback Capacitance ³ at V _{CE} = 10 V, I _E = 0 mA, f = 1 MHz	pF		0.55	1.0		0.65	1.0		0.5	1.0		0.5	0.9
		pF												
P _T	Total Power Dissipation	mW			200			2000 ⁴			580			200
R _{TH} (J-A)	Thermal Resistance (J to A)	°C/W			625			62.5 ⁴			590			500

Notes:

- Electronic Industrial Association of Japan.
- Pulse width ≤ 350 μs, duty cycle ≤ 2% pulsed.
- C_{re} measurement employs a three terminal capacitance bridge incorporating a guard circuit. The emitter terminal shall be connected to the guard terminal.
- With 2.5 cm² x 0.7 mm ceramic substrate (infinite heatsink).

NE856 SERIES

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	3.0
I_C	Collector Current	mA	100
T_J	Junction Temperature	$^\circ\text{C}$	150 ²
T_{STG}	Storage Temperature	$^\circ\text{C}$	-65 to +150

Notes:

- Operation in excess of any one of these parameters may result in permanent damage.
- Maximum T_J for the NE85600 and NE85635 is 200°C .

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

