

PRELIMINARY DATA SHEET

NEC

NPN SILICON TRANSISTOR

NE687M23

FEATURES

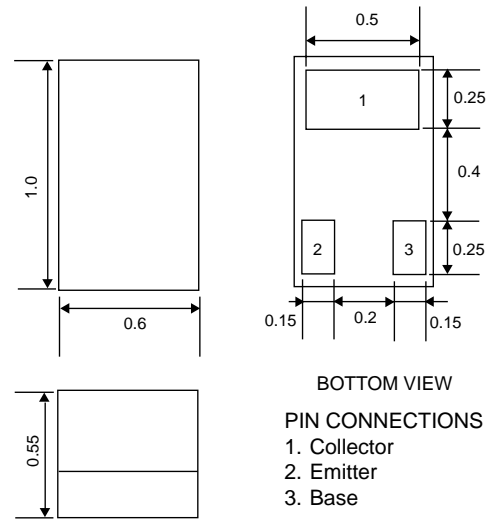
- **NEW MINIATURE M23 PACKAGE:**
 - World's smallest transistor package footprint — leads are completely underneath package body
 - Low profile/0.55 mm package height
 - Ceramic substrate for better RF performance
- **HIGH GAIN BANDWIDTH PRODUCT:**
 $f_t = 5.5 \text{ GHz}$
- **LOW NOISE FIGURE:**
 $NF = 1.5 \text{ dB at } 2 \text{ GHz}$

DESCRIPTION

The NE687M23 transistor is designed for low noise, high gain, and low cost requirements. This high f_t part is well suited for very low voltage/low current designs for portable wireless communications and cellular radio applications. NEC's new low profile/ceramic substrate style "M23" package is ideal for today's portable wireless applications. The NE687 is also available in six different low cost plastic surface mount package styles.

OUTLINE DIMENSIONS (Units in mm)

PACKAGE OUTLINE M23



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

PART NUMBER EIAJ ¹ REGISTERED NUMBER PACKAGE OUTLINE		NE687M23 2SC5653 M23			
SYMBOLS	PARAMETERS AND CONDITIONS	UNITS	MIN	TYP	MAX
f_t	Gain Bandwidth at $V_{CE} = 1 \text{ V}$, $I_C = 5 \text{ mA}$, $f = 2 \text{ GHz}$	GHz		5.5	
NF	Noise Figure at $V_{CE} = 1 \text{ V}$, $I_C = 5 \text{ mA}$, $f = 2 \text{ GHz}$	dB		1.5	
$ S_{21E} ^2$	Insertion Power Gain at $V_{CE} = 1 \text{ V}$, $I_C = 5 \text{ mA}$, $f = 2 \text{ GHz}$	dB		4.5	
h_{FE}^2	Forward Current Gain at $V_{CE} = 2 \text{ V}$, $I_C = 20 \text{ mA}$		70		130
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
C_{RE}^3	Feedback Capacitance at $V_{CB} = 0.5 \text{ V}$, $I_E = 0$, $f = 1 \text{ MHz}$	pF		0.8	

Notes:

1. Electronic Industrial Association of Japan.
2. Pulsed measurement, pulse width $\leq 350 \mu\text{s}$, duty cycle $\leq 2\%$.
3. Capacitance is measured with emitter and case connected to the guard terminal at the bridge.

ABSOLUTE MAXIMUM RATINGS¹ (T_A = 25°C)

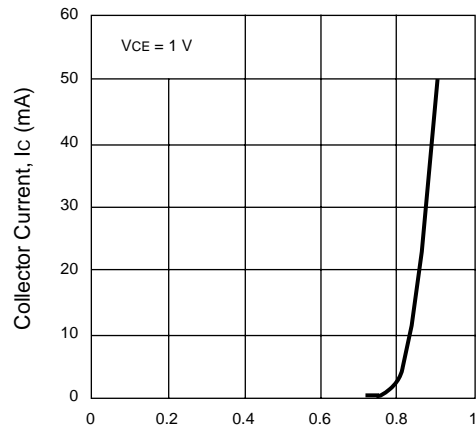
SYMBOLS	PARAMETERS	UNITS	RATINGS
V _{CBO}	Collector to Base Voltage	V	5
V _{CEO}	Collector to Emitter Voltage	V	3
V _{EBO}	Emitter to Base Voltage	V	2
I _C	Collector Current	mA	30
P _T	Total Power Dissipation	mW	TBD
T _J	Junction Temperature	°C	150
T _{STG}	Storage Temperature	°C	-65 to +150

Note:

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

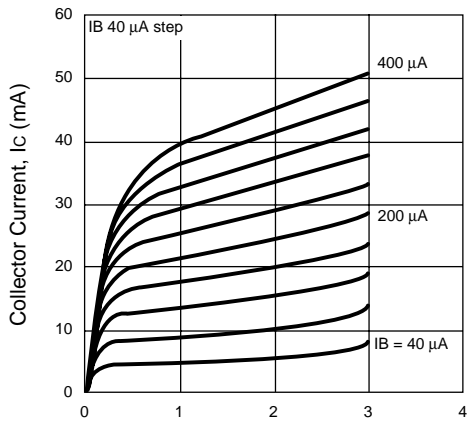
TYPICAL PERFORMANCE CURVES (T_A = 25°C)

COLLECTOR CURRENT vs. BASE TO EMITTER VOLTAGE



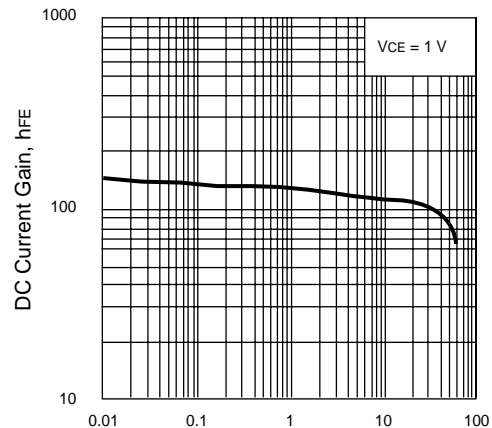
Base to Emitter Voltage, V_{CE} (V)

COLLECTOR CURRENT vs. COLLECTOR TO EMITTER VOLTAGE



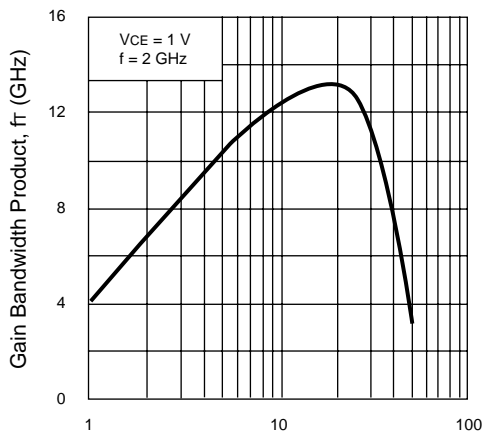
Collector to Emitter Voltage, V_{CE} (V)

DC CURRENT GAIN vs. COLLECTOR CURRENT



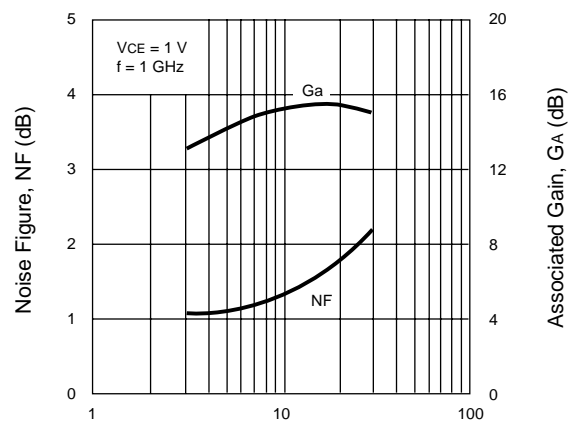
Collector Current, I_C (mA)

GAIN BANDWIDTH PRODUCT vs. COLLECTOR CURRENT



Collector Current, I_C (mA)

NOISE FIGURE/ASSOCIATED GAIN vs. COLLECTOR CURRENT



Collector Current, I_C (mA)

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