

PRELIMINARY DATA SHEET

NEC

NPN SILICON TRANSISTOR

NE688M23

FEATURES

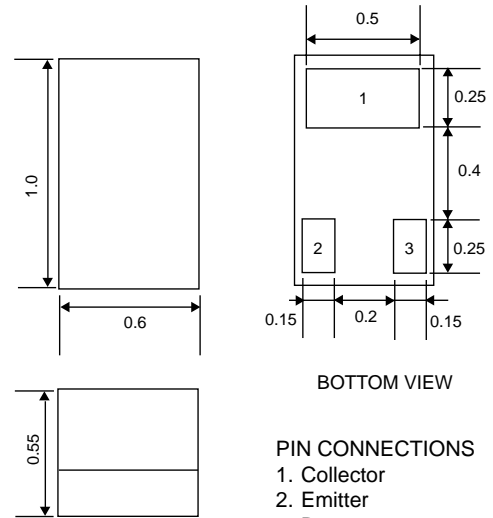
- **NEW MINIATURE M23 PACKAGE:**
 - World's smallest transistor package footprint — leads are completely underneath package body
 - Low profile/0.55 mm package height
 - Ceramic substrate for better RF performance
- **HIGH GAIN BANDWIDTH PRODUCT:**
 $f_T = 9.5 \text{ GHz}$
- **LOW NOISE FIGURE:**
 $NF = 1.7 \text{ dB at } 2 \text{ GHz}$
- **HIGH COLLECTOR CURRENT:**
 $I_C \text{ MAX} = 100 \text{ mA}$

DESCRIPTION

The NE688M23 transistor is designed for low cost amplifier and oscillator applications. Low noise figure, high gain and high current capability equate to wide dynamic range and excellent linearity. NEC's new low profile/ceramic substrate style "M23" package is ideal for today's portable wireless applications. The NE688 is also available in chip and six different low cost plastic surface mount package styles.

OUTLINE DIMENSIONS (Units in mm)

PACKAGE OUTLINE M03



BOTTOM VIEW

PIN CONNECTIONS

1. Collector
2. Emitter
3. Base

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

PART NUMBER EIAJ ¹ REGISTERED NUMBER PACKAGE OUTLINE		NE688M23 2SC5651 M23			
SYMBOLS	PARAMETERS AND CONDITIONS	UNITS	MIN	TYP	MAX
f_T	Gain Bandwidth at $V_{CE} = 1 \text{ V}$, $I_C = 3 \text{ mA}$, $f = 2 \text{ GHz}$	GHz	4	5	
NF	Noise Figure at $V_{CE} = 1 \text{ V}$, $I_C = 3 \text{ mA}$, $f = 2 \text{ GHz}$	dB		1.9	2.5
$ S_{21E} ^2$	Insertion Power Gain at $V_{CE} = 1 \text{ V}$, $I_C = 3 \text{ mA}$, $f = 2 \text{ GHz}$	dB	3	4	
h_{FE}^2	Forward Current Gain at $V_{CE} = 1 \text{ V}$, $I_C = 3 \text{ mA}$		80		145
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 $V_{CB} = 1 \text{ V}$, $I_E = 0$, $f = 1 \text{ MHz}$	pF		0.7	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.

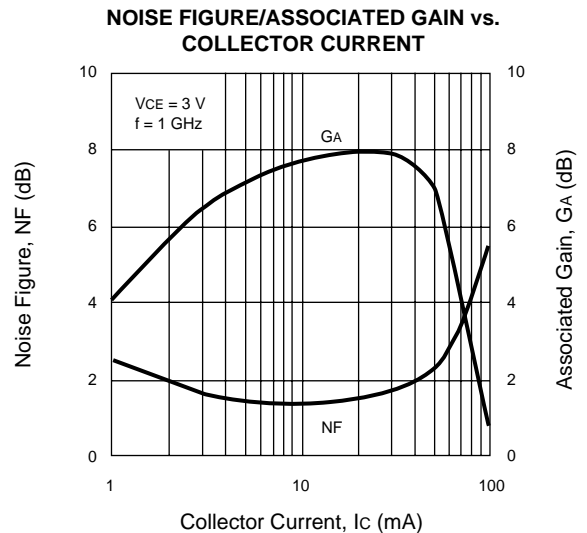
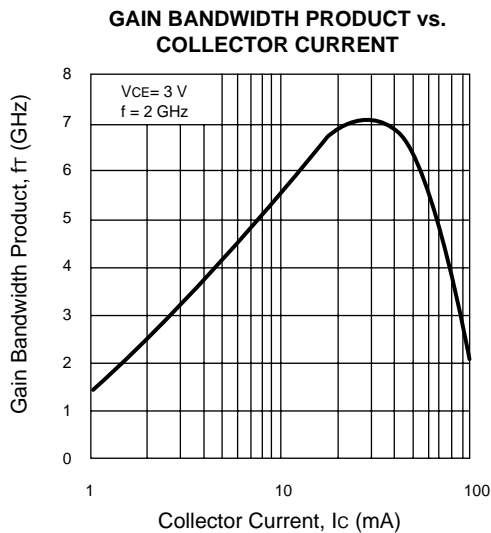
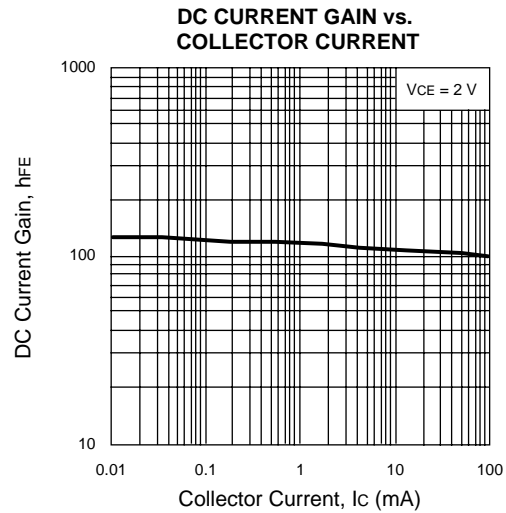
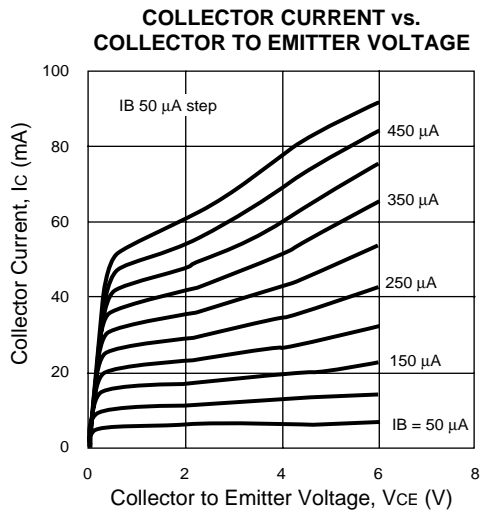
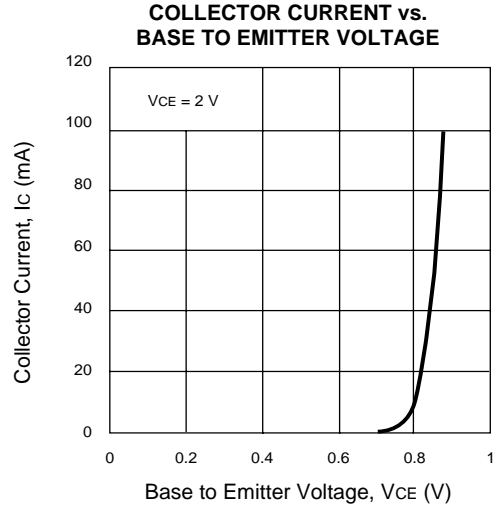
ABSOLUTE MAXIMUM RATINGS¹ (T_A = 25°C)

SYMBOLS	PARAMETERS	UNITS	RATINGS
V _{CB0}	Collector to Base Voltage	V	9
V _{CEO}	Collector to Emitter Voltage	V	6
V _{EB0}	Emitter to Base Voltage	V	2
I _C	Collector Current	mA	100
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)



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02/10/2000