

FEATURES

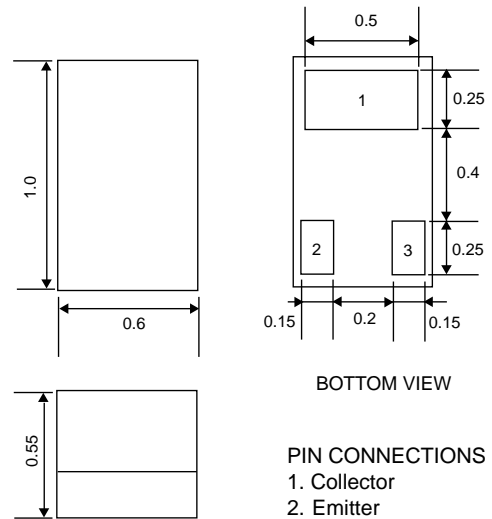
- **NEW MINIATURE M23 PACKAGE:**
 - World's smallest transistor package footprint — leads are completely underneath package body
 - Low profile/0.55 mm package height
 - Ceramic substrate for better RF performance
- **HIGH GAIN BANDWIDTH PRODUCT:**
 $f_T = 7 \text{ GHz}$
- **LOW NOISE FIGURE:**
 $NF = 1.4 \text{ dB}$

DESCRIPTION

The NE681M23 transistor is ideal for low noise, high gain, and low cost amplifier applications. NEC's new low profile/ceramic substrate style "M23" package is ideal for today's portable wireless applications. The NE681 is also available in chip, Micro-x, and six different low cost plastic surface mount package styles.

OUTLINE DIMENSIONS (Units in mm)

PACKAGE OUTLINE M23



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		NE681M23 2SC5650 M23			
SYMBOLS	PARAMETERS AND CONDITIONS	UNITS	MIN	TYP	MAX
f_T	Gain Bandwidth at $V_{CE} = 3 \text{ V}$, $I_C = 7 \text{ mA}$, $f = 1 \text{ GHz}$	GHz	4.5	7	
NF	Noise Figure at $V_{CE} = 3 \text{ V}$, $I_C = 7 \text{ mA}$, $f = 1 \text{ GHz}$	dB		1.4	2.7
$ S_{21E} ^2$	Insertion Power Gain at $V_{CE} = 3 \text{ V}$, $I_C = 7 \text{ mA}$, $f = 1 \text{ GHz}$	dB	10	12	
h_{FE}^2	Forward Current Gain at $V_{CE} = 3 \text{ V}$, $I_C = 7 \text{ mA}$		80		145
I_{CBO}	Collector Cutoff Current at $V_{CB} = 10 \text{ V}$, $I_E = 0$	μA			0.8
I_{EBO}	Emitter Cutoff Current at $V_{EB} = 1 \text{ V}$, $I_C = 0$	μA			0.8
C_{RE}^3	Feedback Capacitance at $V_{CB} = 3 \text{ V}$, $I_E = 0$, $f = 1 \text{ MHz}$	pF			0.9

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)

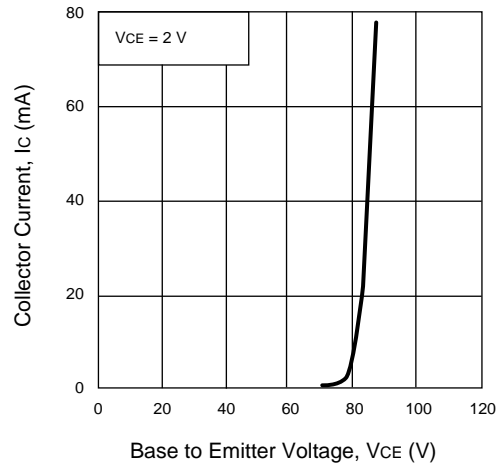
SYMBOLS	PARAMETERS	UNITS	RATINGS
V _{CB0}	Collector to Base Voltage	V	20
V _{CE0}	Collector to Emitter Voltage	V	10
V _{EB0}	Emitter to Base Voltage	V	1.5
I _C	Collector Current	mA	65
P _T	Total Power Dissipation	mW	TBD
T _J	Junction Temperature	°C	150
T _{STG}	Storage Temperature	°C	-65 to +150

Note:

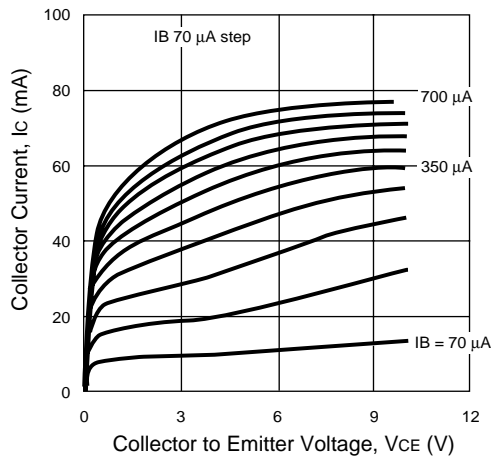
1. Operation in excess of any one of these parameters may result in permanent damage.

TYPICAL PERFORMANCE CURVES (T_A = 25°C)

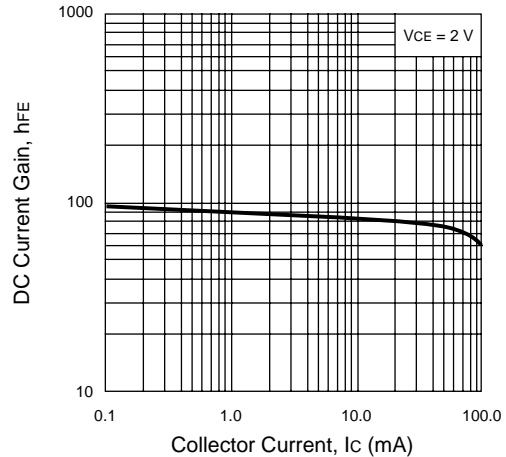
COLLECTOR CURRENT vs. BASE TO EMITTER VOLTAGE



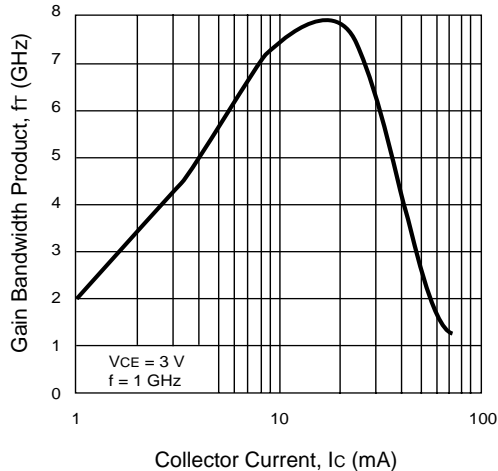
COLLECTOR CURRENT vs. COLLECTOR TO EMITTER VOLTAGE



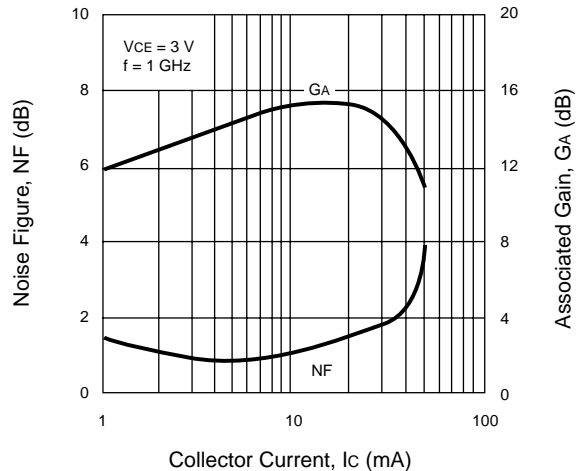
DC CURRENT GAIN vs. COLLECTOR CURRENT



GAIN BANDWIDTH PRODUCT vs. COLLECTOR CURRENT



NOISE FIGURE/ASSOCIATED GAIN vs. COLLECTOR CURRENT



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