

**FEATURES**

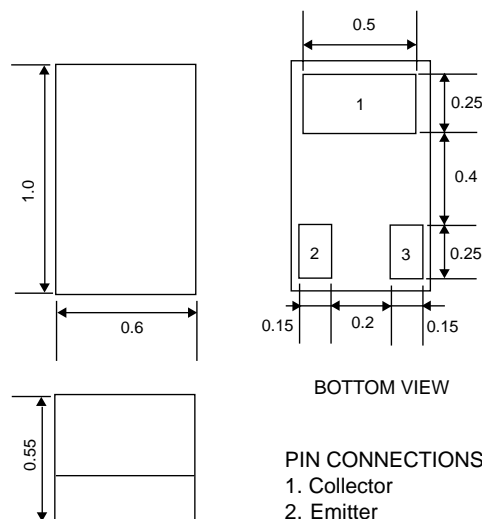
- **NEW MINIATURE M23 PACKAGE:**
  - World's smallest transistor package footprint — leads are completely underneath package body
  - Low profile/0.55 mm package height
  - Ceramic substrate for better RF performance
- **HIGH GAIN BANDWIDTH PRODUCT:**  
 $f_T = 7$  GHz
- **LOW NOISE FIGURE:**  
 $NF = 1.4$  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 <sup>1</sup> REGISTERED NUMBER PACKAGE OUTLINE		NE681M23 2SC5650 M23			
SYMBOLS	PARAMETERS AND CONDITIONS	UNITS	MIN	TYP	MAX
$f_T$	Gain Bandwidth at $V_{CE} = 3$ V, $I_C = 7$ mA, $f = 1$ GHz	GHz	4.5	7	
NF	Noise Figure at $V_{CE} = 3$ V, $I_C = 7$ mA, $f = 1$ GHz	dB		1.4	2.7
$ S_{21E} ^2$	Insertion Power Gain at $V_{CE} = 3$ V, $I_C = 7$ mA, $f = 1$ GHz	dB	10	12	
$h_{FE}^2$	Forward Current Gain at $V_{CE} = 3$ V, $I_C = 7$ mA		80		145
$I_{CBO}$	Collector Cutoff Current at $V_{CB} = 10$ V, $I_E = 0$	$\mu\text{A}$			0.8
$I_{EBO}$	Emitter Cutoff Current at $V_{EB} = 1$ V, $I_C = 0$	$\mu\text{A}$			0.8
$CRE^3$	Feedback Capacitance at $V_{CB} = 3$ V, $I_E = 0$ , $f = 1$ 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.

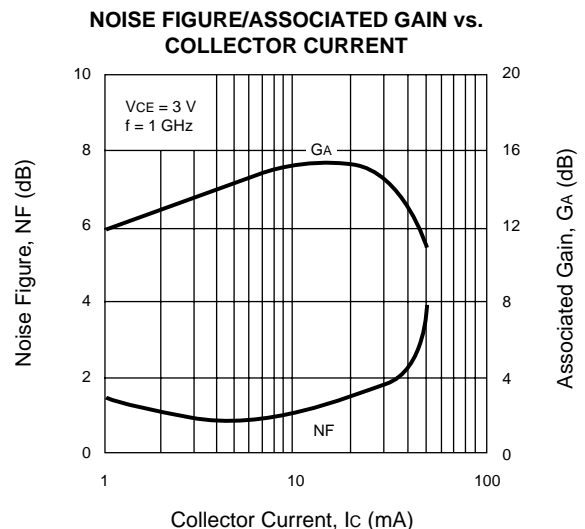
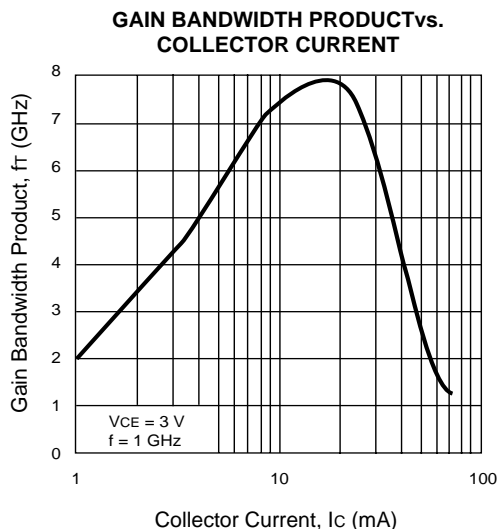
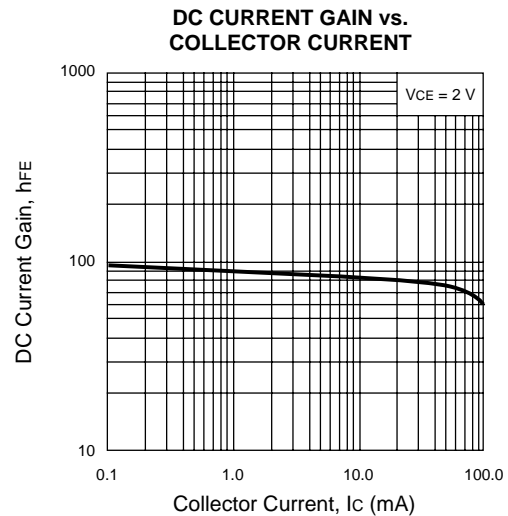
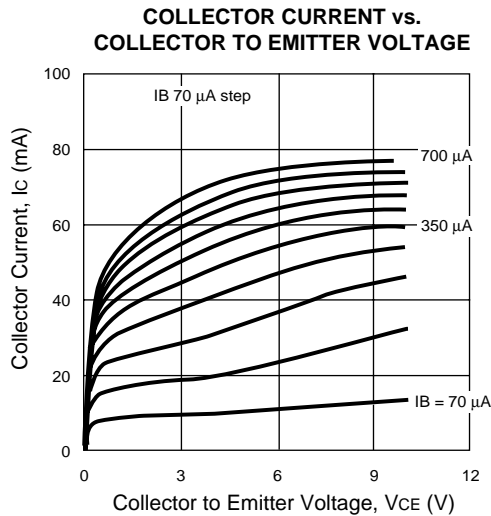
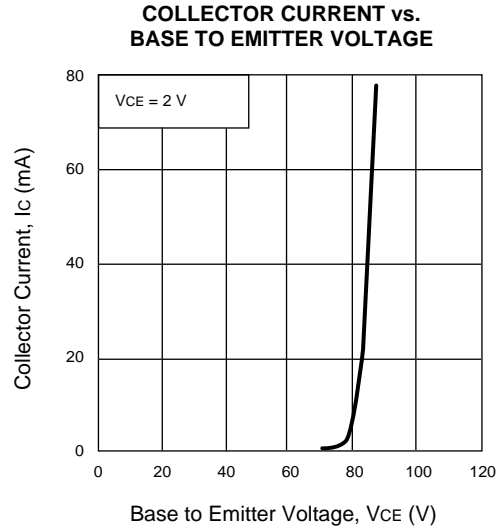
**ABSOLUTE MAXIMUM RATINGS<sup>1</sup>** (T<sub>A</sub> = 25°C)

SYMBOLS	PARAMETERS	UNITS	RATINGS
V <sub>CB0</sub>	Collector to Base Voltage	V	20
V <sub>CE0</sub>	Collector to Emitter Voltage	V	10
V <sub>EB0</sub>	Emitter to Base Voltage	V	1.5
I <sub>C</sub>	Collector Current	mA	65
P <sub>T</sub>	Total Power Dissipation	mW	TBD
T <sub>J</sub>	Junction Temperature	°C	150
T <sub>STG</sub>	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<sub>A</sub> = 25°C)



EXCLUSIVE NORTH AMERICAN AGENT FOR **NEC** RF, MICROWAVE & OPTOELECTRONIC SEMICONDUCTORS

**CEL** CALIFORNIA EASTERN LABORATORIES • Headquarters • 4590 Patrick Henry Drive • Santa Clara, CA 95054-1817 • (408) 988-3500 • Telex 34-6393 • FAX (408) 988-0279  
 24-Hour Fax-On-Demand: 800-390-3232 (U.S. and Canada only) • Internet: <http://WWW.CEL.COM>

DATA SUBJECT TO CHANGE WITHOUT NOTICE

02/10/2000