NEC

NPN SILICON TRANSISTOR | NE687M23

FEATURES

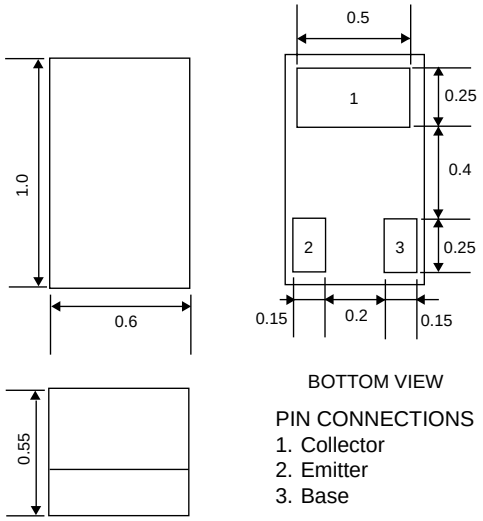
- **NEW MINIATURE M23 PACKAGE:**
  - – World's smallest transistor package footprint — leads are completely underneath package body
  - – Low profile/0.55 mm package height
  - – Ceramic substrate for better RF performance
- **HIGH GAIN BANDWIDTH PRODUCT:**
  f_T = 5.5 GHz
- **LOW NOISE FIGURE:**
  NF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



BOTTOM VIEW

PIN CONNECTIONS
1. Collector
2. Emitter
3. Base

ELECTRICAL CHARACTERISTICS (T_A = 25°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 V, I_C = 5 mA, f = 2 GHz	GHz		5.5	
NF	Noise Figure at V_{CE} = 1 V, I_C = 5 mA, f = 2 GHz	dB		1.5	
$\|S_{21E}\|^2$	Insertion Power Gain at V_{CE} = 1 V, I_C = 5 mA, f = 2 GHz	dB		4.5	
h_{FE}[2]	Forward Current Gain at V_{CE} = 2 V, I_C = 20 mA		70		130
I_{CBO}	Collector Cutoff Current at V_{CB} = 5 V, I_E = 0	μA			0.1
I_{EBO}	Emitter Cutoff Current at V_{EB} = 1 V, I_C = 0	μA			0.1
C_{RE}[3]	Feedback Capacitance at V_{CB} = 0.5 V, I_E = 0, f = 1 MHz	pF		0.8	

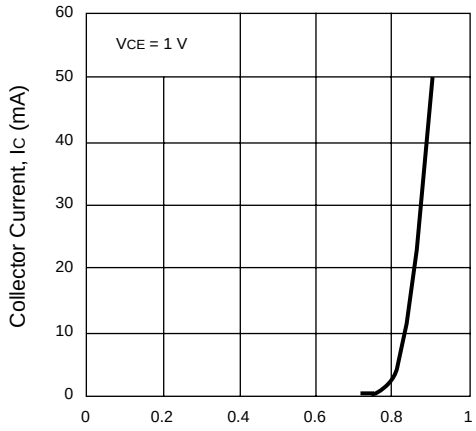
Notes:
1. Electronic Industrial Association of Japan.
2. Pulsed measurement, pulse width ≤ 350 μs, duty cycle ≤ 2 %.
3. Capacitance is measured with emitter and case connected to the guard terminal at the bridge.

ABSOLUTE MAXIMUM RATINGS[1] (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

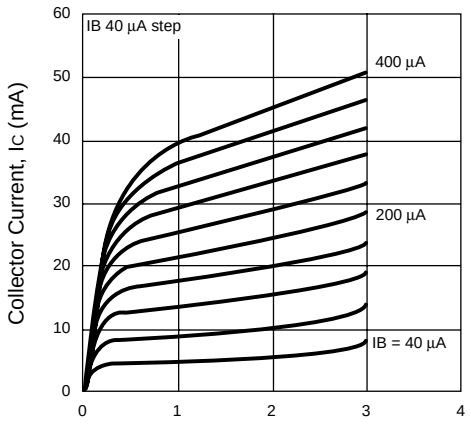
Note:
1. Operation in excess of any one of these parameters may result in permanent damage.

COLLECTOR CURRENT vs. BASE TO EMITTER VOLTAGE

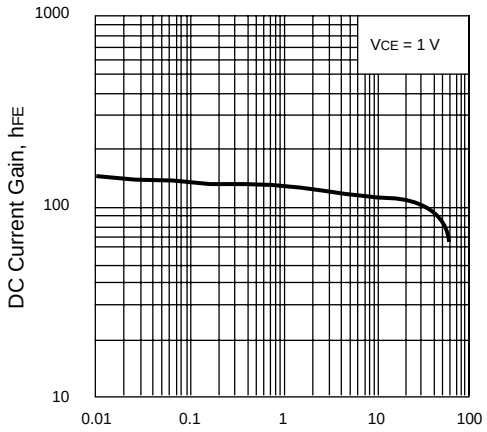


TYPICAL PERFORMANCE CURVES (T_A = 25°C)

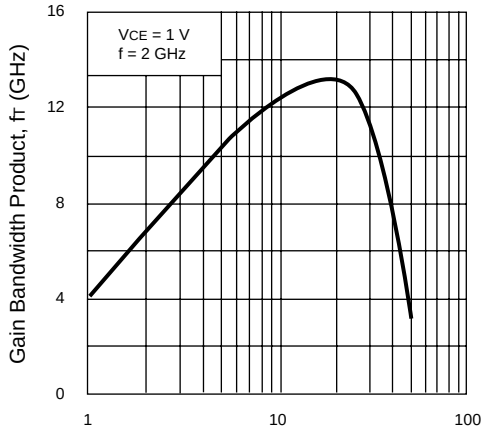
COLLECTOR CURRENT vs. COLLECTOR TO EMITTER VOLTAGE



DC CURRENT GAIN vs. COLLECTOR CURRENT



GAIN BANDWIDTH PRODUCT vs. COLLECTOR CURRENT



NOISE FIGURE/ASSOCIATED GAIN vs. COLLECTOR CURRENT