# NPN SILICON TRANSISTOR

NE685M23

# **FEATURES**

#### • NEW MINIATURE M23 PACKAGE:

- World's smallest transistor package footprint leads are completely underneath package body
- Low profile/0.55 mm package height

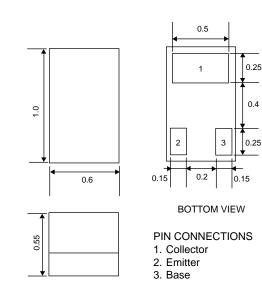
- Ceramic substrate for better RF performance
- HIGH GAIN BANDWIDTH PRODUCT: ft = 12 GHz
- LOW NOISE FIGURE: NF = 1.5 dB at 2 GHz

# DESCRIPTION

The NE685M23 transistor is designed for low noise, high gain, and low cost requirements. This high fT 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 NE685 is also available in six different low cost plastic surface mount package styles.

## OUTLINE DIMENSIONS (Units in mm)

#### PACKAGE OUTLINE M23



### ELECTRICAL CHARACTERISTICS (TA = 25°C)

PART NUMBER EIAJ <sup>1</sup> REGISTERED NUMBER PACKAGE OUTLINE			NE685M23 2SC5652 M23			
SYMBOLS	PARAMETERS AND CONDITIONS	UNITS	MIN	ТҮР	MAX	
fт	Gain Bandwidth at VcE = 3 V, Ic = 10 mA, f = 2 GHz	GHz		12		
NF	Noise Figure at Vce = 3 V, Ic = 10 mA, f = 2 GHz	dB		1.5	2.5	
S21E  <sup>2</sup>	Insertion Power Gain at VcE = 3 V, Ic = 7 mA, f = 2 GHz	dB	7	10		
hfe <sup>2</sup>	Forward Current Gain at Vce = 3 V, Ic = 10 mA		75		145	
Ісво	Collector Cutoff Current at VCB = 5 V, IE = 0	μA			0.1	
Іево	Emitter Cutoff Current at VEB = 1 V, IC = 0	μΑ			0.1	
Cre <sup>3</sup>	Feedback Capacitance at VcB = 3 V, IE = 0, f = 1 MHz	pF		0.4	0.7	

Notes:

1. Electronic Industrial Association of Japan.

2. Pulsed measurement, pulse width  $\leq$  350 µs, duty cycle  $\leq$  2 %.

3. Capacitance is measured with emitter and case connected to the guard terminal at the bridge.

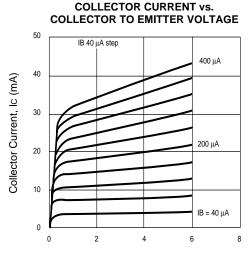
SYMBOLS	PARAMETERS	UNITS	RATINGS
Vсво	Collector to Base Voltage	V	9
VCEO	Collector to Emitter Voltage	V	5
Vebo	Emitter to Base Voltage	V	2
Ic	Collector Current	mA	30
Рт	Total Power Dissipation	mW	TBD
TJ	Junction Temperature	°C	150
Tstg	Storage Temperature	°C	-65 to +150

# ABSOLUTE MAXIMUM RATINGS<sup>1</sup> (TA = 25°C)

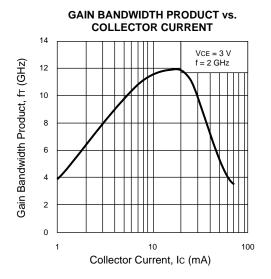
Note:

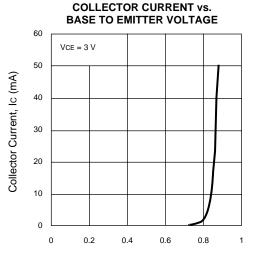
1. Operation in excess of any one of these parameters may result in permanent damage.

# TYPICAL PERFORMANCE CURVES (TA = 25°C)



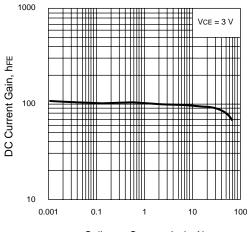
Collector to Emitter Voltage, VCE (V)





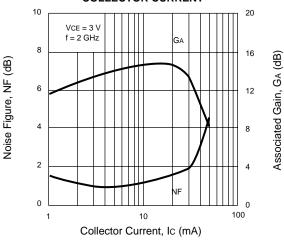
Base to Emitter Voltage, VCE (V)

DC CURRENT GAIN vs. COLLECTOR CURRENT



Collector Current, Ic (mA)

NOISE FIGURE/ASSOCIATED GAIN vs. COLLECTOR CURRENT



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