NEC'S NPN SILICON TRANSISTOR NE681M03

FEATURES

- NEW M03 PACKAGE:
 - Smallest transistor outline package available
 - · Low profile/0.59 mm package height
 - · Flat lead style for better RF performance
- HIGH GAIN BANDWIDTH PRODUCT: ft = 7 GHz
- LOW NOISE FIGURE: NF = 1.4 dB

OUTLINE DIMENSIONS (Units in mm)

PACKAGE OUTLINE M03





PIN CONNECTIONS

- 1. Emitter
- 2. Base
- 3. Collector

DESCRIPTION

NEC's NE681M03 transistor is ideal for low noise, high gain, and low cost amplifier applications. NEC's new low profile/ flat lead style "M03" 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.

ELECTRICAL CHARACTERISTICS (TA = 25°C)

PART NUMBER EIAJ ¹ REGISTERED NUMBER PACKAGE OUTLINE			NE681M03 2SC5433 M03			
SYMBOLS	PARAMETERS AND CONDITIONS	UNITS	MIN	ТҮР	MAX	
fτ	Gain Bandwidth at VCE = 3 V, IC = 7 mA, f = 1 GHz	GHz	4.5	7.0		
NF	Noise Figure at Vce = 3 V, Ic = 7 mA, f = 1 GHz	dB		1.4	2.7	
IS21El ²	Insertion Power Gain at Vce = 3 V, Ic = 7 mA, f = 1 GHz	dB	10	12		
hfe ²	Forward Current Gain at VCE = 3 V, IC = 7 mA		80		145	
Ісво	Collector Cutoff Current at VCB = 10 V, IE = 0	μΑ			0.8	
Іево	Emitter Cutoff Current at VEB = 1 V, IC = 0	μΑ			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 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	20
VCEO	Collector to Emitter Voltage	V	10
Vebo	Emitter to Base Voltage	V	1.5
Ic	Collector Current	mA	65
Рт	Total Power Dissipation	mW	125
TJ	Junction Temperature	°C	150
Tstg	Storage Temperature	°C	-65 to +150

ABSOLUTE MAXIMUM RATINGS¹ (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)

ORDERING INFORMATION

PART NUMBER	QUANTITY
NE681M03-A	
NE681M03-T1-A	



SCHEMATIC



BJT NONLINEAR MODEL PARAMETERS (1)

Parameters	Q1	Parameters	Q1
IS	239.6e-18	MJC	0.223
BF	125	XCJC	0
NF	0.9854	CJS	0
VAF	12	VJS	0.75
IKF	0.200	MJS	0
ISE	1.933e-6	FC	0.5
NE	50	TF	10e-12
BR	18.25	XTF	25
NR	0.9771	VTF	0.40
VAR	10	ITF	0.13
IKR	11.81e-3	PTF	43.1
ISC	1.55e-18	TR	0.3e-9
NC	1.860	EG	1.11
RE	0.870	XTB	0
RB	4.0	XTI	3
RBM	5.2	KF	0
IRB	1e-6	AF	1
RC	4.635		
CJE	1.2e-12		
VJE	0.77		
MJE	0.4844		
CJC	0.4e-12		
VJC	0.5275		

(1) Gummel-Poon Model

UNITS

Parameter	Units
time	seconds
capacitance	farads
inductance	henries
resistance	ohms
voltage	volts
current	amps

ADDITIONAL PARAMETERS

Parameters	681M03
Ссв	0.07e-12
CCE	0.01e-12
Lв	0.3e-9
LE	0.8e-9
Ссвркд	0.08e-12
Ссеркд	0.08e-12
Lвх	0.12e-9
Lcx	0.10e-9
LEX	0.12e-9

MODEL RANGE

 Frequency:
 0.1 to 5.0 GHz

 Bias:
 VCE = 2.5 V to 8 V, IC = 0.3 mA to 20 mA

 Date:
 12/98

 hFE = 124 at VCE = 3 V, IC = 7 mA

Life Support Applications

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This status is based on CEL's understanding of the EU Directives and knowledge of the materials that go into its products as of the date of disclosure of this information.

Restricted Substance per RoHS	Concentration Limit per RoHS (values are not yet fixed)	Concentratio in CEL	
Lead (Pb)	< 1000 PPM	-A Not Detected	-AZ (*)
Mercury	< 1000 PPM	Not Detected	
Cadmium	< 100 PPM	Not Detected	
Hexavalent Chromium	< 1000 PPM	Not Detected	
PBB	< 1000 PPM	Not Detected	
PBDE	< 1000 PPM	Not Detected	

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