

# MSG36E41

## SiGe HBT type

For low-noise RF amplifier

### ■ Features

- Compatible between high breakdown voltage and high cut-off frequency
- Low noise, high-gain amplification
- Two elements incorporated into one package (Each transistor is separated)
- Reduction of the mounting area and assembly cost by one half

### ■ Basic Part Number

- MSG33004 + MSG33001

### ■ Absolute Maximum Ratings $T_a = 25^\circ\text{C}$

Parameter		Symbol	Rating	Unit
Tr1	Collector-base voltage (Emitter open)	$V_{\text{CBO}}$	9	V
	Collector-emitter voltage (Base open)	$V_{\text{CEO}}$	6	V
	Emitter-base voltage (Collector open)	$V_{\text{EBO}}$	1	V
	Collector current	$I_{\text{C}}$	100	mA
Tr2	Collector-base voltage (Emitter open)	$V_{\text{CBO}}$	9	V
	Collector-emitter voltage (Base open)	$V_{\text{CEO}}$	6	V
	Emitter-base voltage (Collector open)	$V_{\text{EBO}}$	1	V
	Collector current	$I_{\text{C}}$	30	mA
Overall	Total power dissipation *	$P_{\text{T}}$	125	mW
	Junction temperature	$T_{\text{j}}$	125	$^\circ\text{C}$
	Storage temperature	$T_{\text{stg}}$	-55 to +125	$^\circ\text{C}$

Note) \*: Copper plate at the collector is 5.0 cm<sup>2</sup> on substrate at 10 mm × 12 mm × 0.8 mm.

### ■ Electrical Characteristics $T_a = 25^\circ\text{C} \pm 3^\circ\text{C}$

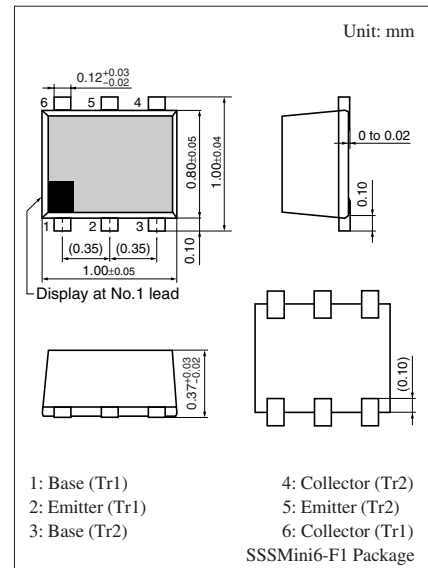
- Tr1

Parameter	Symbol	Conditions	Min	Typ	Max	Unit
Collector-base cutoff current (Emitter open)	$I_{\text{CBO}}$	$V_{\text{CB}} = 9\text{ V}, I_{\text{E}} = 0$			1	$\mu\text{A}$
Collector-emitter cutoff current (Base open)	$I_{\text{CEO}}$	$V_{\text{CE}} = 6\text{ V}, I_{\text{B}} = 0$			1	$\mu\text{A}$
Emitter-base cutoff current (Collector open)	$I_{\text{EBO}}$	$V_{\text{EB}} = 1\text{ V}, I_{\text{C}} = 0$			1	$\mu\text{A}$
Forward current transfer ratio	$h_{\text{FE}}$	$V_{\text{CE}} = 3\text{ V}, I_{\text{C}} = 15\text{ mA}$	100		220	—
Transition frequency *	$f_{\text{T}}$	$V_{\text{CE}} = 3\text{ V}, I_{\text{C}} = 30\text{ mA}, f = 2\text{ GHz}$		17		GHz
Forward transfer gain *	$ S_{21e} ^2$	$V_{\text{CE}} = 3\text{ V}, I_{\text{C}} = 30\text{ mA}, f = 2\text{ GHz}$	6.0	9.0		dB
Noise figure *	NF	$V_{\text{CE}} = 3\text{ V}, I_{\text{C}} = 15\text{ mA}, f = 2\text{ GHz}$		1.4	2.0	dB
Collector output capacitance (Common base, input open circuited) *	$C_{\text{ob}}$	$V_{\text{CB}} = 3\text{ V}, I_{\text{E}} = 0, f = 1\text{ MHz}$		0.6	0.9	pF

Note) 1. Measuring methods are based on JAPANESE INDUSTRIAL STANDARD JIS C 7030 measuring methods for transistors.

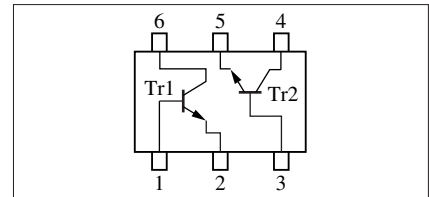
2. Observe precautions for handling. Electrostatic sensitive devices.

3. \*: Verified by random sampling



Marking Symbol: 6D

Internal Connection



## ■ Electrical Characteristics (continued) $T_a = 25^\circ\text{C} \pm 3^\circ\text{C}$

### • Tr2

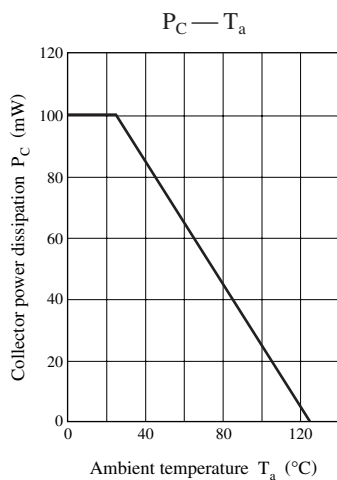
Parameter	Symbol	Conditions	Min	Typ	Max	Unit
Collector-base cutoff current (Emitter open)	$I_{\text{CBO}}$	$V_{\text{CB}} = 9 \text{ V}, I_{\text{E}} = 0$			1	$\mu\text{A}$
Collector-emitter cutoff current (Base open)	$I_{\text{CEO}}$	$V_{\text{CE}} = 6 \text{ V}, I_{\text{B}} = 0$			1	$\mu\text{A}$
Emitter-base cutoff current (Collector open)	$I_{\text{EBO}}$	$V_{\text{EB}} = 1 \text{ V}, I_{\text{C}} = 0$			1	$\mu\text{A}$
Forward current transfer ratio	$h_{\text{FE}}$	$V_{\text{CE}} = 3 \text{ V}, I_{\text{C}} = 3 \text{ mA}$	100		220	—
Transition frequency *	$f_{\text{T}}$	$V_{\text{CE}} = 3 \text{ V}, I_{\text{C}} = 10 \text{ mA}, f = 2 \text{ GHz}$		19		GHz
Forward transfer gain *	$ S_{21c} ^2$	$V_{\text{CE}} = 3 \text{ V}, I_{\text{C}} = 10 \text{ mA}, f = 2 \text{ GHz}$	9.0	11.0		dB
Noise figure *	NF	$V_{\text{CE}} = 3 \text{ V}, I_{\text{C}} = 3 \text{ mA}, f = 2 \text{ GHz}$		1.4	2.0	dB
Collector output capacitance (Common base, input open circuited) *	$C_{\text{ob}}$	$V_{\text{CB}} = 3 \text{ V}, I_{\text{E}} = 0, f = 1 \text{ MHz}$		0.3	0.6	pF

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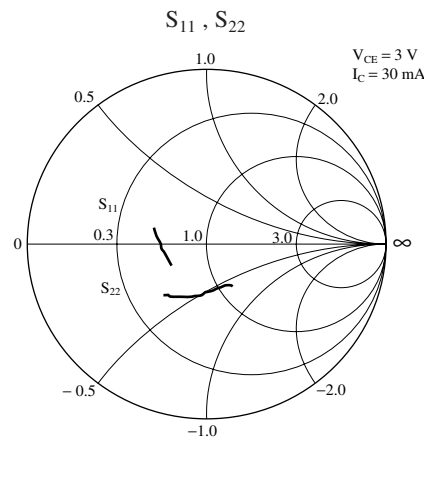
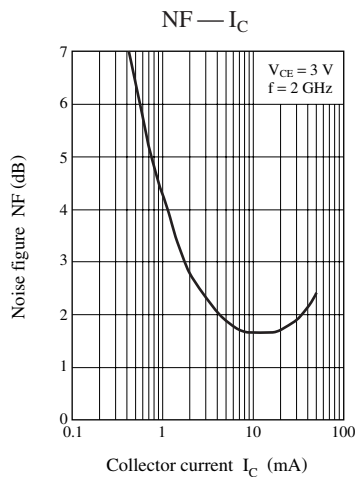
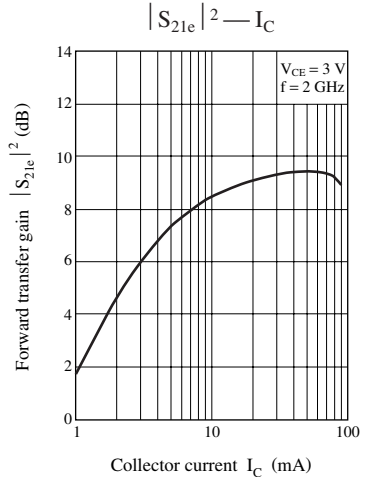
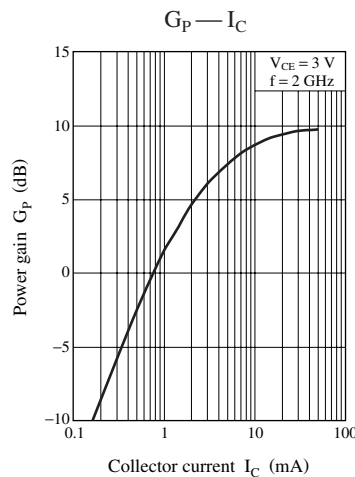
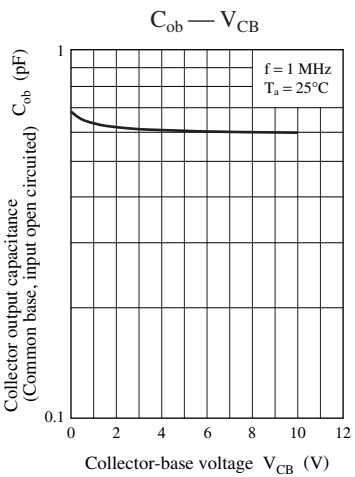
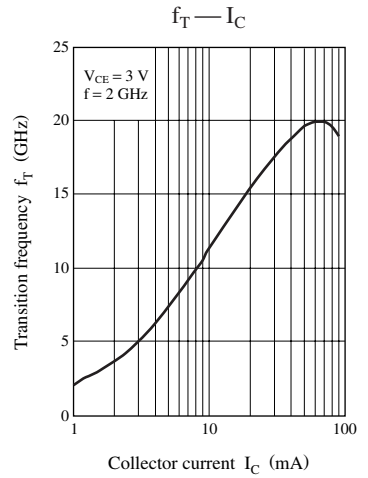
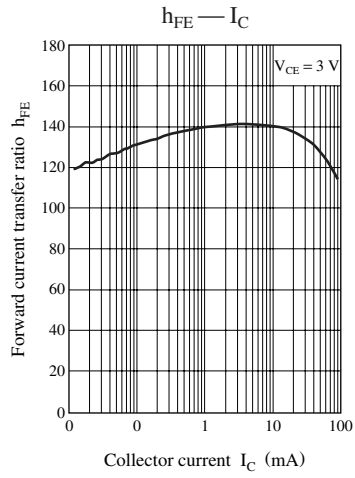
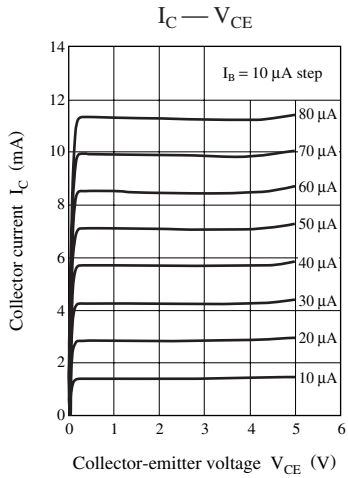
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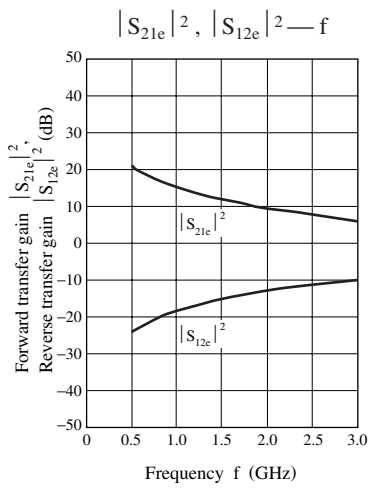
3. \*: Verified by random sampling

Common characteristics chart



Characteristics charts of Tr1





Characteristics charts of Tr2

