

# SILICON TRANSISTORS

## 2SC2148, 2SC2149

### MICROWAVE LOW NOISE AMPLIFIER NPN SILICON EPITAXIAL TRANSISTOR

#### DESCRIPTION

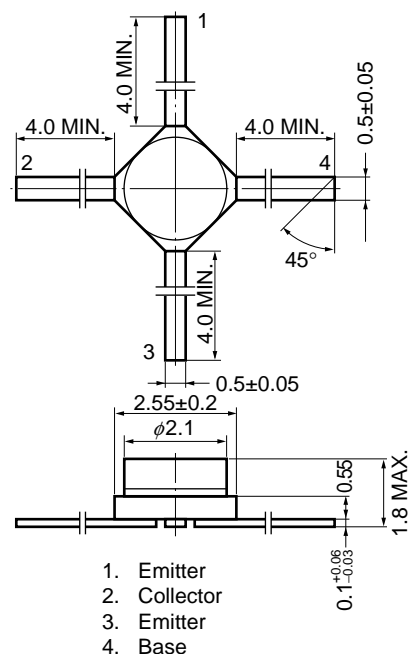
The 2SC2148, 2SC2149 are economical microwave transistors encapsulated into new hermetic stripline packages, "micro X". These are designed for small signal amplifier, low noise amplifier, and oscillator applications in the L to C band, and CML circuit use.

#### FEATURES

2SC2148 NF: 2.1 dB TYP. @f = 500 MHz

2SC2149 NF: 2.6 dB TYP. @f = 2.0 GHz

#### PACKAGE DIMENSIONS (Unit : mm)

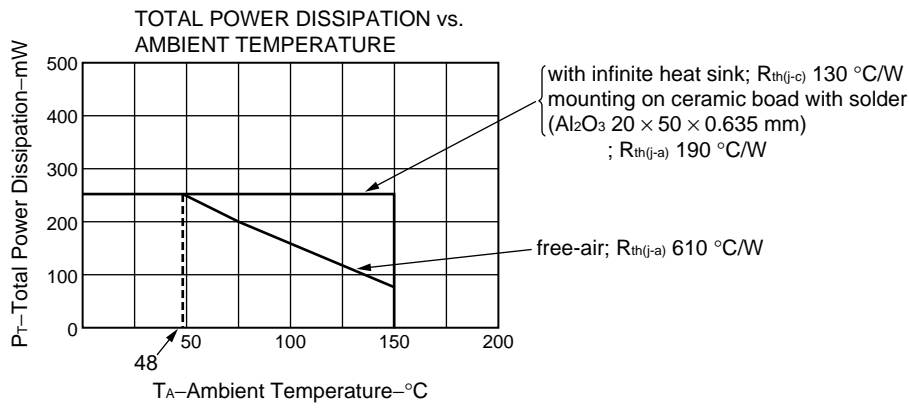


#### Derating curves of the 2SC2148, 2SC2149.

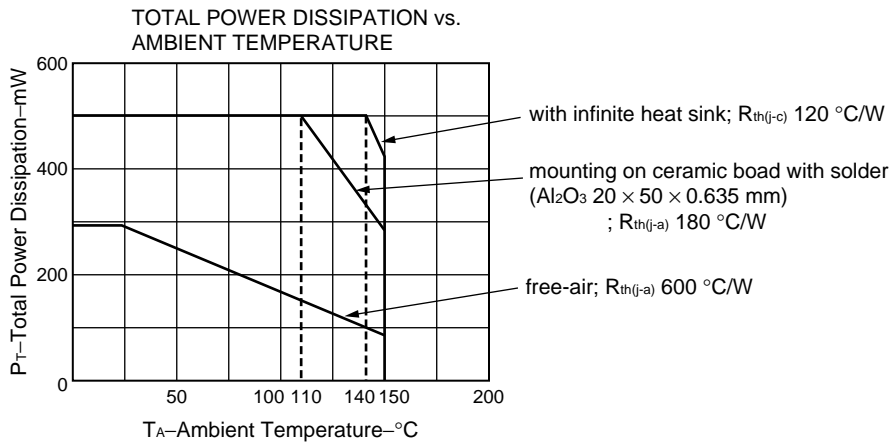
The maximum junction temperature of these transistors is allowed up to 200 °C, but the ambient or storage temperature is limited to 150 °C. The operating junction temperature is estimated with power consumption ( $P_T$ ) and thermal resistance mentioned on these derating curves.

The information in this document is subject to change without notice.

2SC2148



2SC2149



**2SC2148**

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

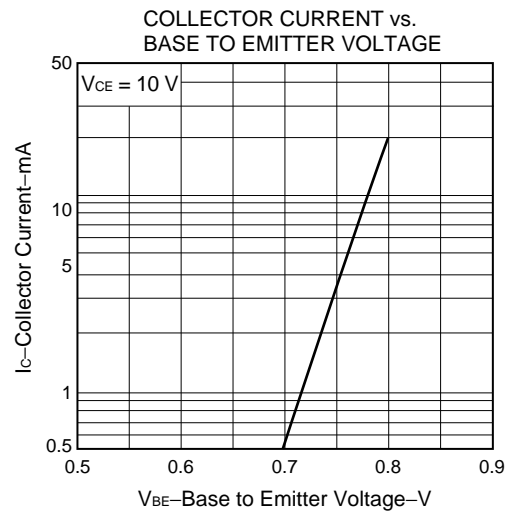
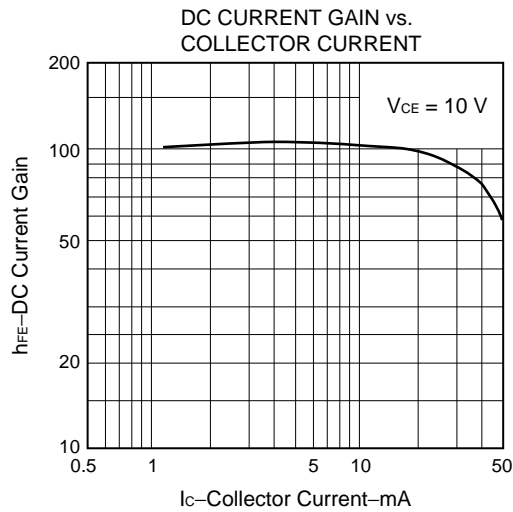
Collector to Base Voltage	V <sub>CB0</sub>	30	V
Collector to Emitter Voltage	V <sub>CEO</sub>	14	V
Emitter to Base Voltage	V <sub>EBO</sub>	3.0	V
Collector Current	I <sub>c</sub>	50	mA
Total Power Dissipation	P <sub>T(T<sub>A</sub> = 48 °C)</sub>	250	mW
Total Power Dissipation	P <sub>T(T<sub>C</sub> = 150 °C)</sub>	250	mW
Junction Temperature	T <sub>j</sub>	200	°C
Storage Temperature	T <sub>stg</sub>	-65 to +150	°C

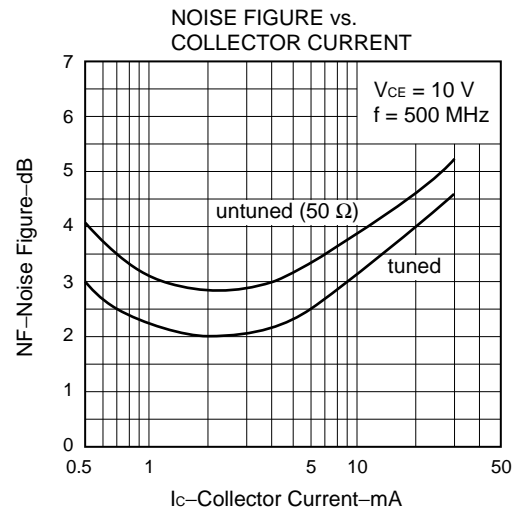
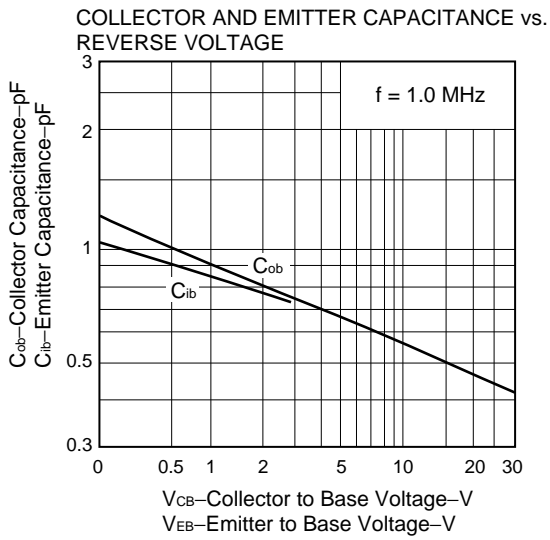
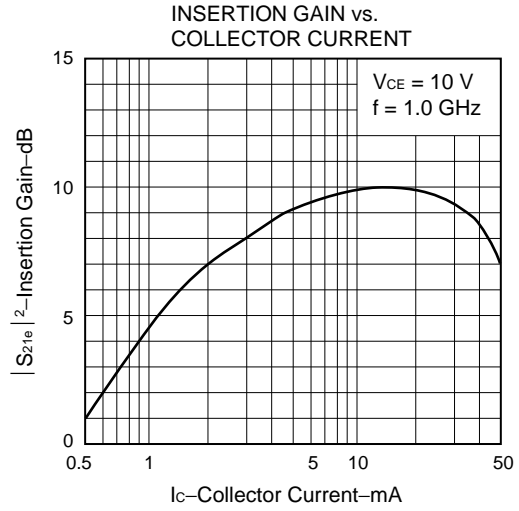
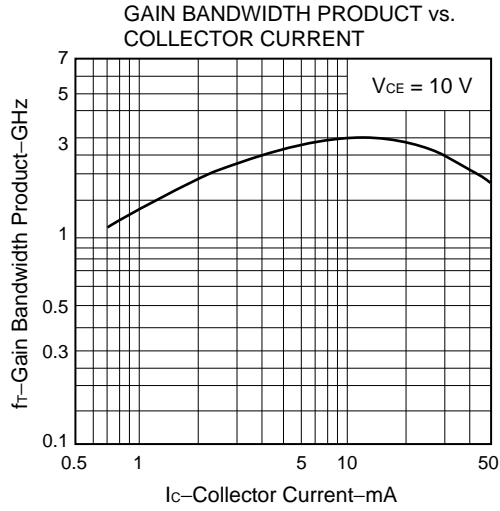
**ELECTRICAL CHARACTERISTICS (T<sub>A</sub> = 25 °C)**

CHARACTERISTIC	SYMBOL	MIN.	TYP.	MAX.	UNIT	TEST CONDITIONS
Collector Cutoff Current	I <sub>CB0</sub>			0.1	μA	V <sub>CB</sub> = 15 V, I <sub>E</sub> = 0
Emitter Cutoff Current	I <sub>EBO</sub>			0.1	μA	V <sub>EB</sub> = 2.0 V, I <sub>C</sub> = 0
DC Current Gain	h <sub>FE</sub>	30	80	200		V <sub>CE</sub> = 10 V, I <sub>C</sub> = 10 mA
Gain Bandwidth Product	f <sub>r</sub>		3.0		GHz	V <sub>CE</sub> = 10 V, I <sub>C</sub> = 10 mA
Output Capacitance *	C <sub>ob</sub>		0.55		pF	V <sub>CB</sub> = 10 V, I <sub>E</sub> = 0, f = 1.0 MHz
Insertion Gain	S <sub>21e</sub>   <sup>2</sup>	7.5	9.3		dB	V <sub>CE</sub> = 10 V, I <sub>C</sub> = 10 mA, f = 1.0 GHz
Noise Figure	NF		2.1	3.5	dB	V <sub>CE</sub> = 10 V, I <sub>C</sub> = 3.0 mA, f = 500 MHz
Maximum Available Gain	MAG		13.3		dB	V <sub>CE</sub> = 10 V, I <sub>C</sub> = 10 mA, f = 1.0 GHz

\* The emitter terminal should be connected to the guard terminal of the three-terminal capacitance bridge.

**TYPICAL CHARACTERISTICS (T<sub>A</sub> = 25 °C)**





**2SC2149**

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

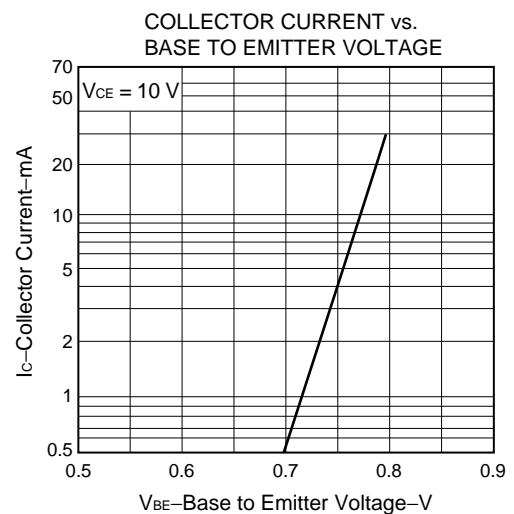
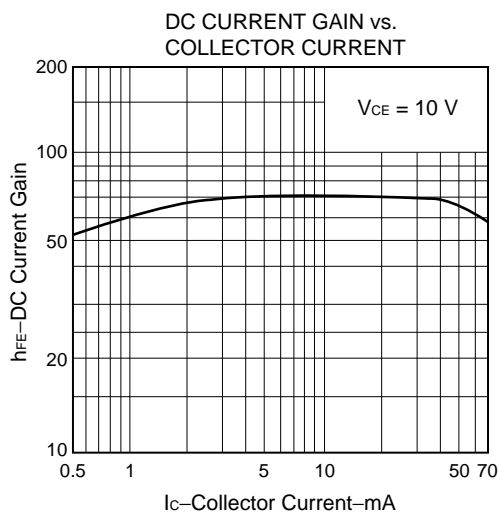
Collector to Base Voltage	V <sub>CB0</sub>	25	V
Collector to Emitter Voltage	V <sub>CEO</sub>	12	V
Emitter to Base Voltage	V <sub>EBO</sub>	3.0	V
Collector Current	I <sub>c</sub>	70	mA
Total Power Dissipation	P <sub>T(T<sub>A</sub> = 25 °C)</sub>	290	mW
Total Power Dissipation	P <sub>T(T<sub>C</sub> = 140 °C)</sub>	500	mW
Junction Temperature	T <sub>j</sub>	200	°C
Storage Temperature	T <sub>stg</sub>	-65 to +150	°C

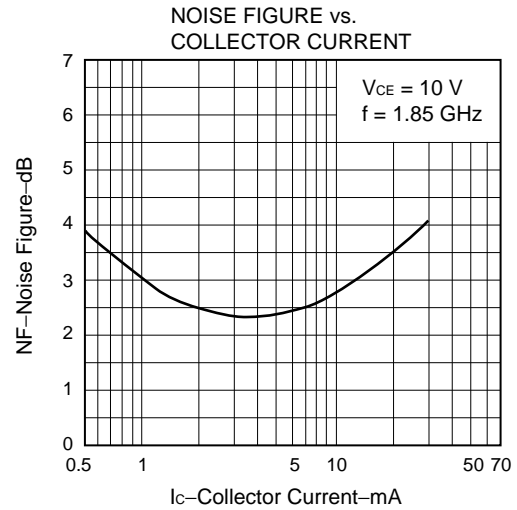
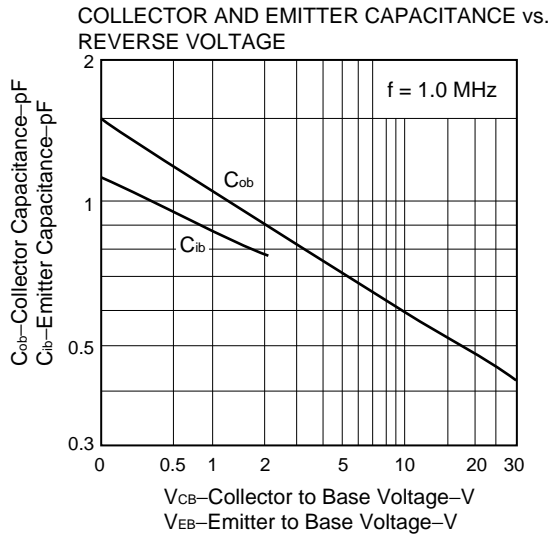
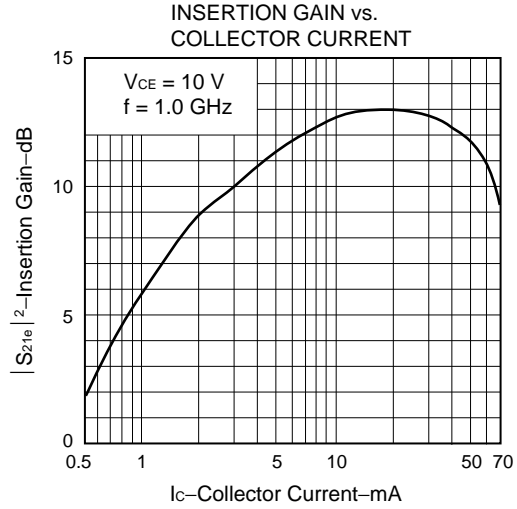
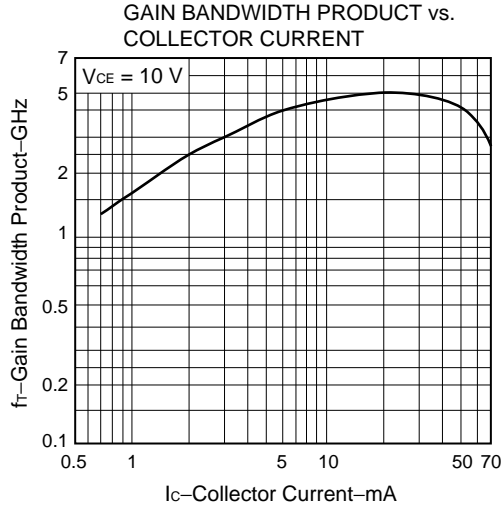
**ELECTRICAL CHARACTERISTICS (T<sub>A</sub> = 25 °C)**

CHARACTERISTIC	SYMBOL	MIN.	TYP.	MAX.	UNIT	TEST CONDITIONS	
Collector Cutoff Current	I <sub>CB0</sub>			0.1	μA	V <sub>CB</sub> = 15 V, I <sub>E</sub> = 0	
Emitter Cutoff Current	I <sub>EBO</sub>			0.1	μA	V <sub>EB</sub> = 2.0 V, I <sub>C</sub> = 0	
DC Current Gain	h <sub>FE</sub>	30	70	200		V <sub>CE</sub> = 10 V, I <sub>C</sub> = 20 mA	
Gain Bandwidth Product	f <sub>r</sub>		5.0		GHz	V <sub>CE</sub> = 10 V, I <sub>C</sub> = 20 mA	
Output Capacitance *	C <sub>ob</sub>		0.6		pF	V <sub>CB</sub> = 10 V, I <sub>E</sub> = 0, f = 1.0 MHz	
Insertion Gain	S <sub>21e</sub>   <sup>2</sup>		12.7		dB	V <sub>CE</sub> = 10 V, I <sub>C</sub> = 20 mA	f = 1.0 GHz
		5.0	6.7		dB		f = 2.0 GHz
Noise Figure	NF		1.7		dB	V <sub>CE</sub> = 10 V, I <sub>C</sub> = 5.0 mA	f = 1.0 GHz
			2.6	4.0	dB		f = 2.0 GHz
Maximum Available Gain	MAG		17		dB	V <sub>CE</sub> = 10 V, I <sub>C</sub> = 20 mA	f = 1.0 GHz
			11		dB		f = 2.0 GHz

\* The emitter terminal should be connected to the guard terminal of the three-terminal capacitance bridge.

**TYPICAL CHARACTERISTICS (T<sub>A</sub> = 25 °C)**





[MEMO]

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Anti-radioactive design is not implemented in this product.