〈SMALL-SIGNAL TRANSISTOR〉

2SC5169

DUAL TRANSISTOR
FOR LOW NOISE DIFFERENTIAL AMPLIFY APPLICATION
SILICON NPN EPITAXIAL TYPE

DESCRIPTION

2SC5169 is a silicon NPN epitaxial type transistor. It is designed for low noise differential amplify application.

FEATURE

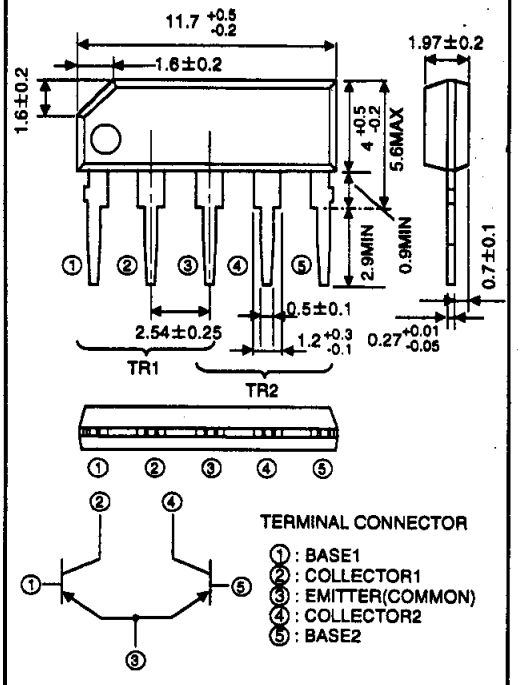
- ●High V_{CEO} V_{CEO}=100V
- ●Low noise NF=0.5dB typ NV=100mV typ
- ●High h_{FE} h_{FE}=250 to 1200
- ●Good two elements characteristics
  - h_{FE1}/h_{FE2}=0.98 typ
  - $|V_{BE1}-V_{BE2}|$=1mV typ

APPLICATION

For low noise differential amplify application.

OUTLINE DRAWING

Unit:mm



TERMINAL CONNECTOR

- ①: BASE1
- ②: COLLECTOR1
- ③: EMITTER(COMMON)
- ④: COLLECTOR2
- ⑤: BASE2

Note)
The dimension without tolerance represent central value.

MAXIMUM RATINGS (Ta=25℃)

Symbol	Parameter	Ratings	Unit
V_{CBO}	Collector to Base voltage	100	V
V_{EBO}	Emitter to Base voltage	5	V
V_{CEO}	Collector to Emitter voltage	100	V
I_C	Collector current	50	mA
P_C	Collector dissipation(Ta=25℃)	200	mW/unit
P_T	Total dissipation(Ta=25℃)	400	mW
T_j	Junction temperature	+125	℃
T_{stg}	Storage temperature	-55 to +125	℃

ELECTRICAL CHARACTERISTICS (Ta=25℃)

Symbol	Parameter		Test conditions	Limits			Unit
				Min	Typ	Max	
$V_{(BR)CEO}$	C to E break down voltage		I_C=100μA,R_{BE}=∞	100			V
I_{CBO}	Collector cut off current		V_{CB}=70V,I_E=0			0.1	μA
I_{EBO}	Emitter cut off current		V_{EB}=2V,I_C=0			0.1	μA
I_{CER}	Collector cut off current		V_{CE}=100V,R_{BE}=100kΩ			10	μA
h_{FE} *	DC forward current gain		V_{CE}=6V,I_C=1mA	250		1200	—
$V_{CE(sat)}$	C to E saturation voltage		I_C=10mA,I_B=1mA			0.6	V
$\|V_{BE1}-V_{BE2}\|$	B-E voltage differential		V_{CE}=6V,I_C=1mA		1	10	mV
h_{FE1}/h_{FE2}	DC forward current gain ratio		V_{CE}=6V,I_C=1mA	0.8	0.98	1.0	—
f_T	Gain band width product		V_{CE}=6V,I_E=-1mA		150		MHz
C_{ob}	Collector output capacitance		V_{CB}=6V,I_E=0,f=1MHz		1.8		pF
NF	Noise figure		V_{CE}=6V,I_E=-0.1mA,f=1kHz,R_G=10kΩ		0.5		dB
NV	Low frequency broadband noise voltage	effective value	V_{CE}=10V,I_E=-1mA,R_G=100kΩ,Gv=80dB,		100		mV
NV_M		peaked value	(Refer to test circuit)		0.5		V

* : It shows h_{FE} (element 1) classification in right table.

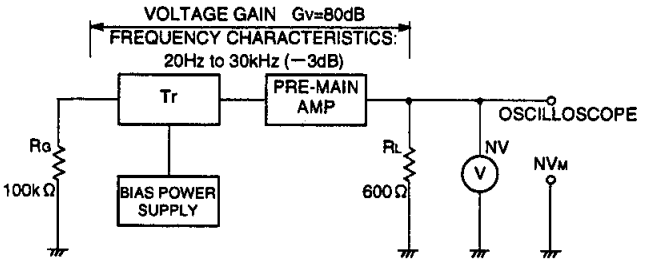
Item	F	G	H
h_{FE}	250 to 500	400 to 800	600 to 1200

2SC5169

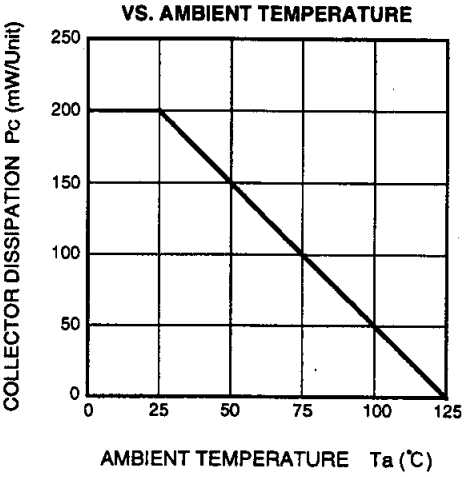
DUAL TRANSISTOR
FOR LOW NOISE DIFFERENTIAL AMPLIFY APPLICATION
SILICON NPN EPITAXIAL TYPE

TYPICAL CHARACTERISTICS

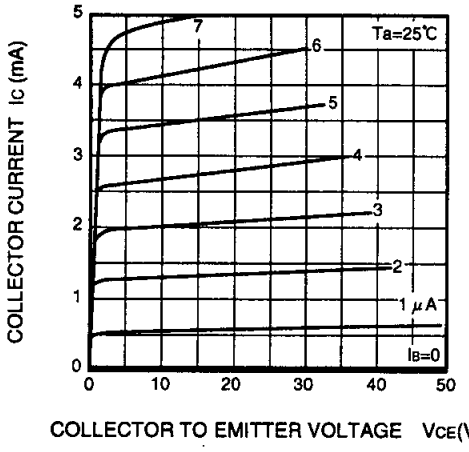
LOW FREQUENCY WIDE BAND NOISE VOLTAGE TEST CIRCUIT



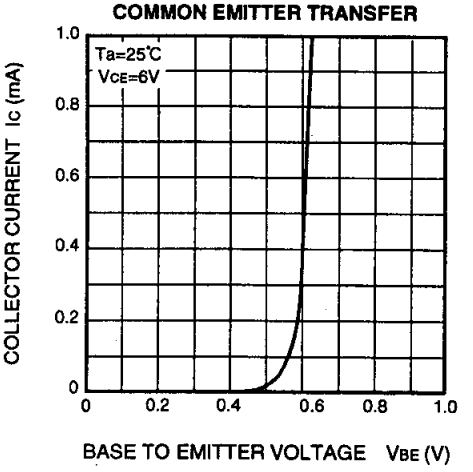
COLLECTOR DISSIPATION VS. AMBIENT TEMPERATURE



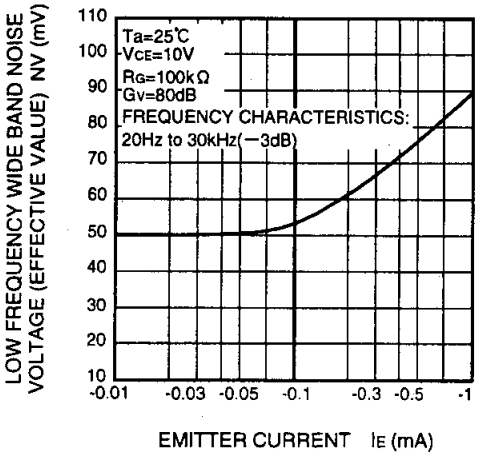
COMMON EMITTER OUTPUT



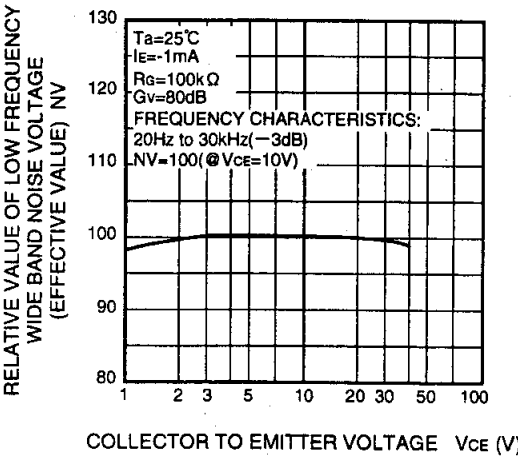
COMMON EMITTER TRANSFER



LOW FREQUENCY WIDE BAND NOISE VOLTAGE (EFFECTIVE VALUE) VS. EMITTER CURRENT



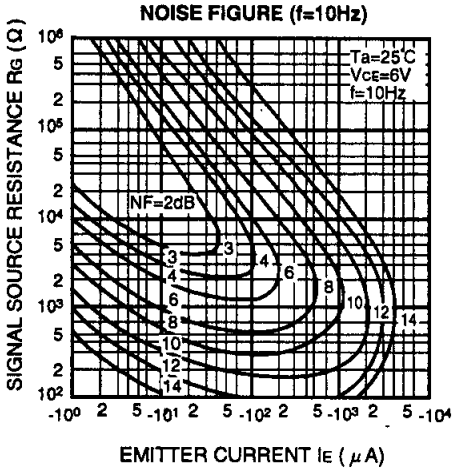
LOW FREQUENCY WIDE BAND NOISE VOLTAGE (EFFECTIVE) VS. COLLECTOR TO EMITTER VOLTAGE



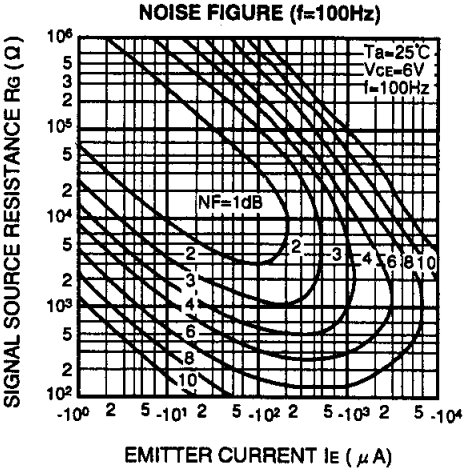
2SC5169

DUAL TRANSISTOR
FOR LOW NOISE DIFFERENTIAL AMPLIFY APPLICATION
SILICON NPN EPITAXIAL TYPE

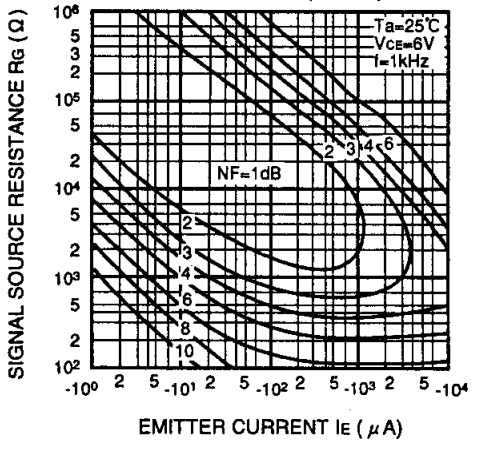
NOISE FIGURE (f=10Hz)



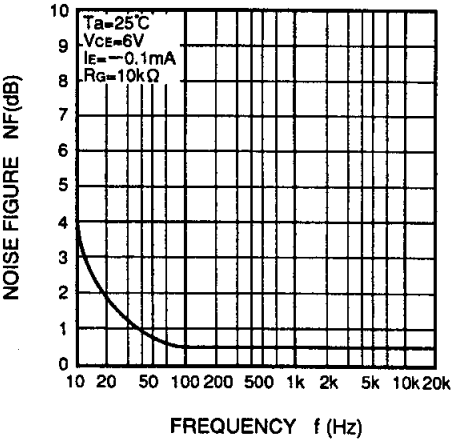
NOISE FIGURE (f=100Hz)



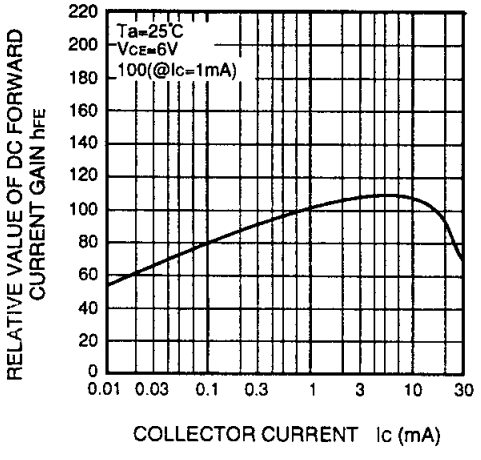
NOISE FIGURE (f=1kHz)



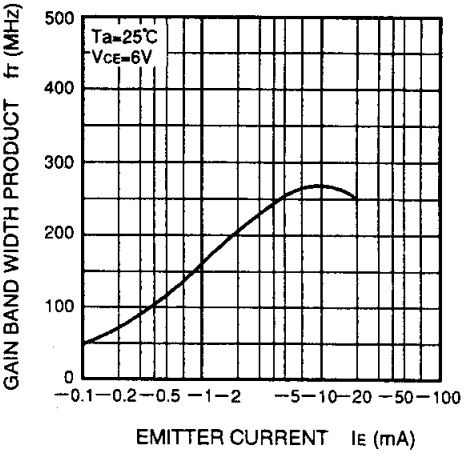
NOISE FIGURE VS.FREQUENCY



DC FORWARD CURRENT GAIN VS. COLLECTOR CURRENT



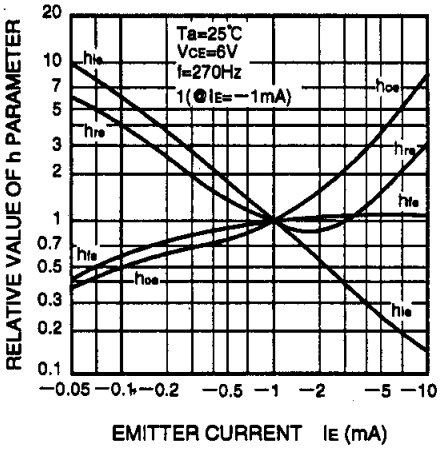
GAIN BAND WIDTH PRODUCT VS. EMITTER CURRENT



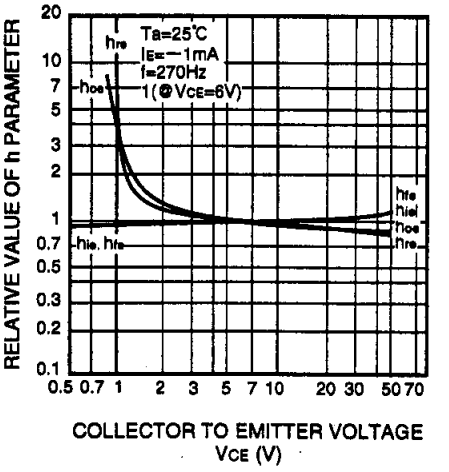
2SC5169

DUAL TRANSISTOR
FOR LOW NOISE DIFFERENTIAL AMPLIFY APPLICATION
SILICON NPN EPITAXIAL TYPE

h PARAMETER VS. EMITTER CURRENT



h PARAMETER VS. COLLECTOR TO EMITTER VOLTAGE



COMMON EMITTER h PARAMETER (TYPICAL VALUE)

Symbol	Parameter	Test conditions	Limits	Unit
hie	Closed loop small signal input impedance	Ta=25℃ VCE=6V IE=-1mA f=270Hz	18	kΩ
hre	Open loop small signal reverse voltage amplification factor		0.08	$\times 10^{-3}$
hfe	Closed loop small signal forward current amplification factor		600	—
hoe	Open loop small signal output admittance		10	μS

ISAHAYA ELECTRONICS CORPORATION

http://www.idc-com.co.jp
6-41, TSUKUBA, ISAHAYA, NAGASAKI, 854-0065, JAPAN

Keep safety in your circuit designs !

·Isahaya Electronics Corporation puts the maximum effort into making semiconductor products better and more reliable, but there is always the possibility that trouble may occur with them. Trouble with semiconductors may lead to personal injury, fire or property damage.Remember to give consideration to safety when making your circuit designs, with appropriate measures such as (i) placement of substitutive, auxiliary circuits, (ii) use of non-flammable material or (iii) prevention against any malfunction or mishap.

Notes regarding these materials

·These materials are intended as reference to assist out customers in the selection of the Isahaya semiconductor product best suited to the customer's application, they do not convey any license under any intellectual property rights, or any other rights, belonging to Isahaya Electronics Corporation or a third party.
·Isahaya Electronics Corporation assumes no responsibility for any damage, or infringement of any third-party rights, originating in the use of any product data, diagrams,charts or circuit application examples contained in the materials.
·All information contained in these materials, including product data, diagrams and charts, represent information on products at the time of publication of these materials, and are subject to change by Isahaya Electronics Corporation without notice due to product improvements or other reasons. It is therefore recommended that customers contact Isahaya Electronics Corporation or authorized Isahaya Semiconductor product distributor for the latest product information before purchasing a product listed herein.
·The prior written approval of Isahaya Electronics Corporation is necessary to reprint or reproduce in whole or in part these materials.
·If these products or technologies are subject to the Japanese export control restrictions, they must be exported under a license from the Japanese government and cannot be imported into a country other than the approved destination.
Any diversion or reexport contrary to the export control laws and regulations of Japan and/or the country of destination is prohibited.
·Please contact Isahaya Electronics Corporation or an authorized Isahaya Semiconductor product distributor for further details on these materials or the products contained therein.