

2SC460, 2SC461

Silicon NPN Epitaxial Planar

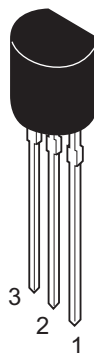
REJ03G0682-0200
 (Previous ADE-208-1046)
 Rev.2.00
 Aug.10.2005

Application

- 2SC460 high frequency amplifier, mixer
- 2SC461 VHF amplifier, mixer

Outline

RENESAS Package code: PRSS0003DA-C
 (Package name: TO-92 (2))



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

Absolute Maximum Ratings

(Ta = 25°C)

Item	Symbol	2SC460	2SC461	Unit
Collector to base voltage	V_{CBO}	30	30	V
Collector to emitter voltage	V_{CEO}	30	30	V
Emitter to base voltage	V_{EBO}	5	5	V
Collector current	I_C	100	100	mA
Collector power dissipation	P_C	200	200	mW
Junction temperature	T_j	150	150	°C
Storage temperature	T_{stg}	-55 to +150	-55 to +150	°C

Electrical Characteristics

(Ta = 25°C)

Item	Symbol	2SC460			2SC461			Unit	Test conditions
		Min	Typ	Max	Min	Typ	Max		
Collector to base breakdown voltage	$V_{(BR)CBO}$	30	—	—	30	—	—	V	$I_C = 10 \mu A, I_E = 0$
Collector to emitter breakdown voltage	$V_{(BR)CEO}$	30	—	—	30	—	—	V	$I_C = 1 \text{ mA}, R_{BE} = \infty$
Emitter to base breakdown voltage	$V_{(BR)EBO}$	5	—	—	5	—	—	V	$I_E = 10 \mu A, I_C = 0$
Collector cutoff current	I_{CBO}	—	—	0.5	—	—	0.5	μA	$V_{CB} = 18 \text{ V}, I_E = 0$
Emitter cutoff current	I_{EBO}	—	—	0.5	—	—	0.5	μA	$V_{EB} = 2 \text{ V}, I_C = 0$
Base to emitter voltage	V_{BE}	—	0.63	0.75	—	0.63	0.75	V	$V_{CE} = 12 \text{ V}, I_C = 2 \text{ mA}$
DC current transfer ratio	h_{FE}^{*1}	100	—	200	35	—	200		$V_{CE} = 12 \text{ V}, I_C = 2 \text{ mA}$
Collector to emitter saturation voltage	$V_{CE(sat)}$	—	0.6	1.1	—	0.6	1.1	V	$I_C = 10 \text{ mA}, I_B = 1 \text{ mA}$
Gain bandwidth product	f_T	—	230	—	—	230	—	MHz	$V_{CE} = 12 \text{ V}, I_C = 2 \text{ mA}$
Collector output capacitance	C_{ob}	—	1.8	3.5	—	1.8	3.5	pF	$V_{CB} = 10 \text{ V}, I_E = 0,$ $f = 1 \text{ MHz}$
10.7 MHz power gain	PG	26	29	—	—	—	—	dB	$V_{CE} = 6 \text{ V}, I_E = -1 \text{ mA}$ $f = 10.7 \text{ MHz}$
100 MHz power gain	PG	—	—	—	13	17	—	dB	$V_{CE} = 6 \text{ V}, I_E = -1 \text{ mA}$ $f = 100 \text{ MHz}$
Noise figure	NF	—	2.0	—	—	—	—	dB	$V_{CE} = 6 \text{ V}, I_E = -1 \text{ mA}$ $f = 1 \text{ MHz}$ $R_g = 500 \Omega$

Note: 1. The 2SC461 is grouped by h_{FE} as follows.

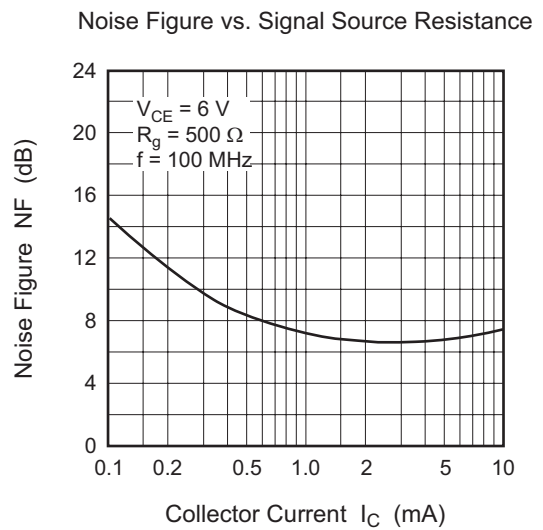
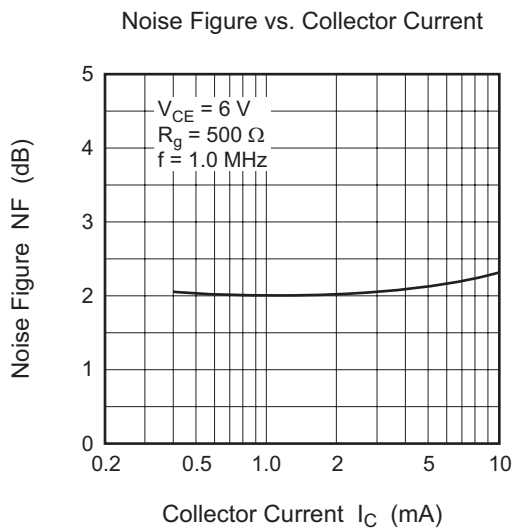
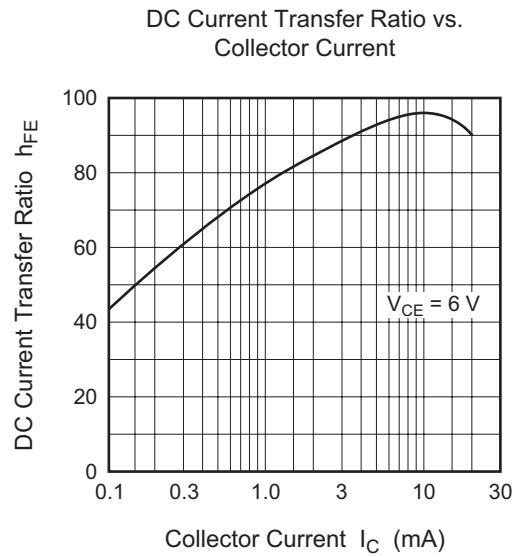
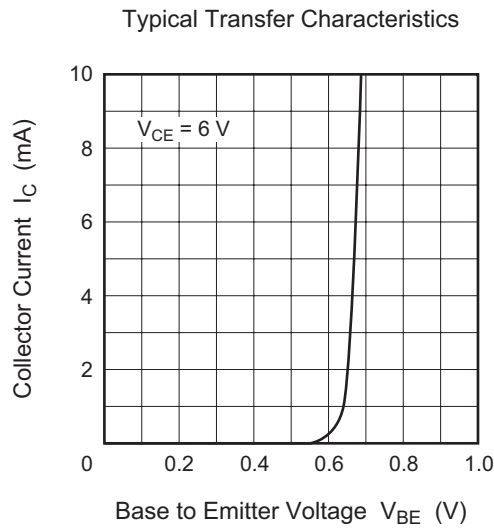
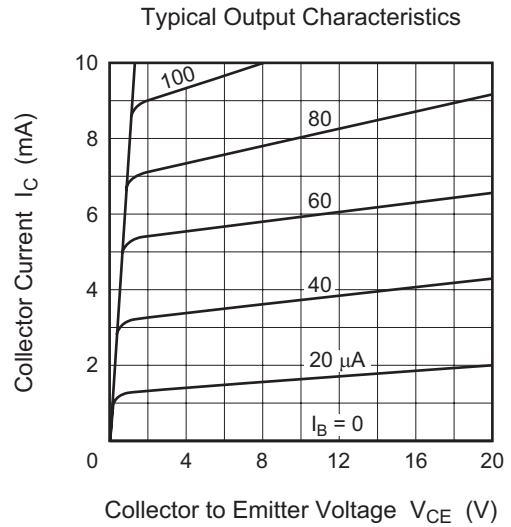
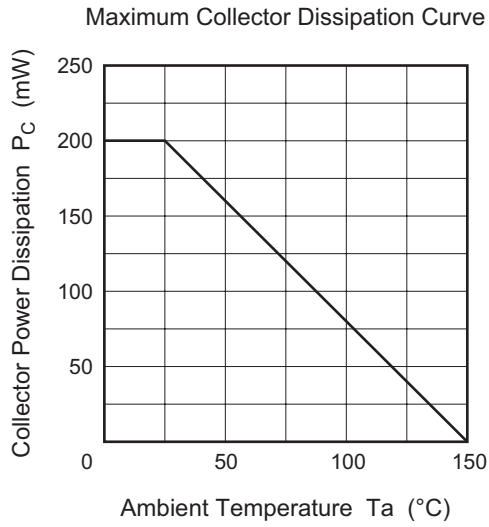
B	C
60 to 120	100 to 200

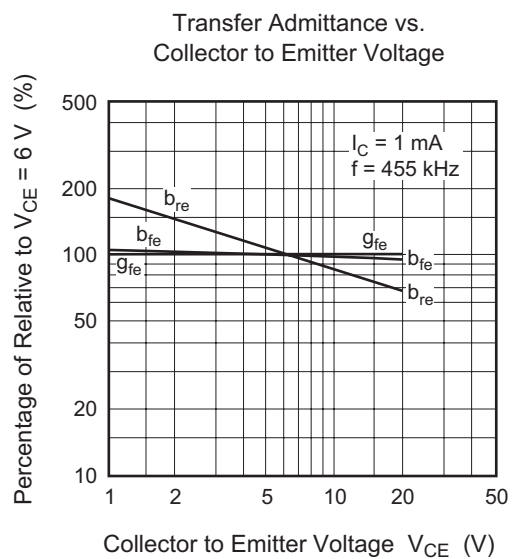
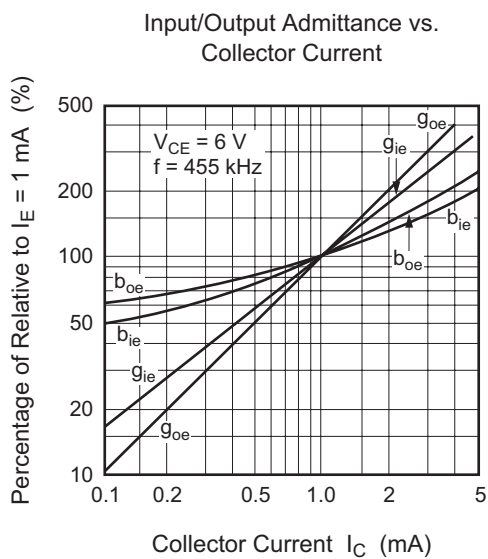
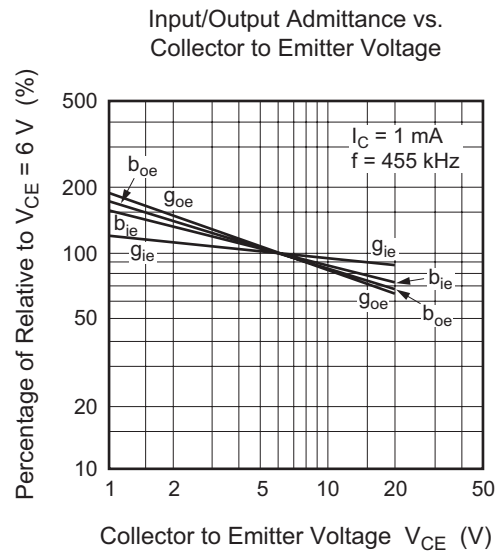
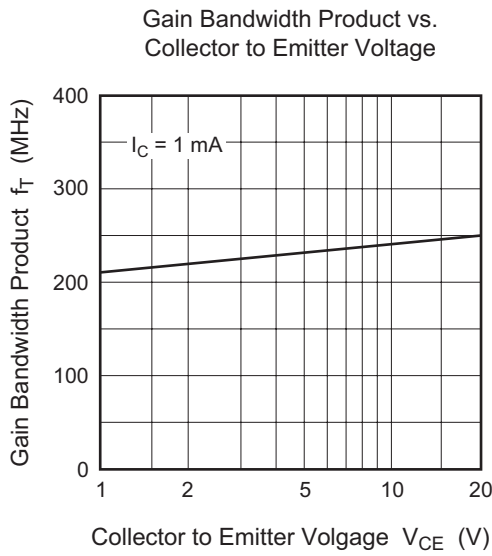
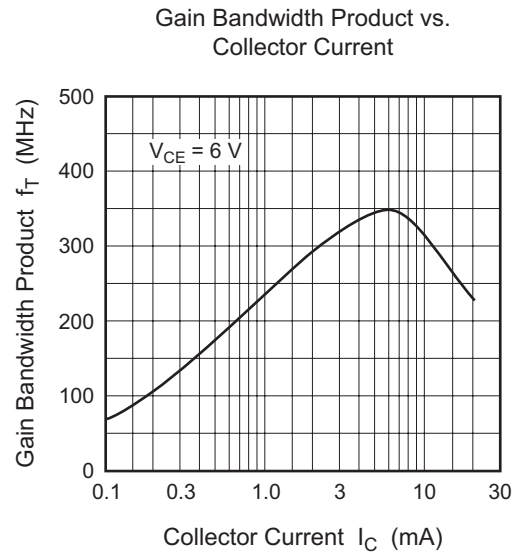
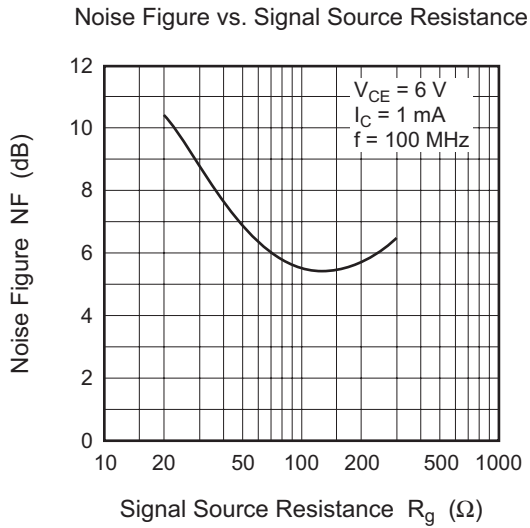
Small Signal y Parameters

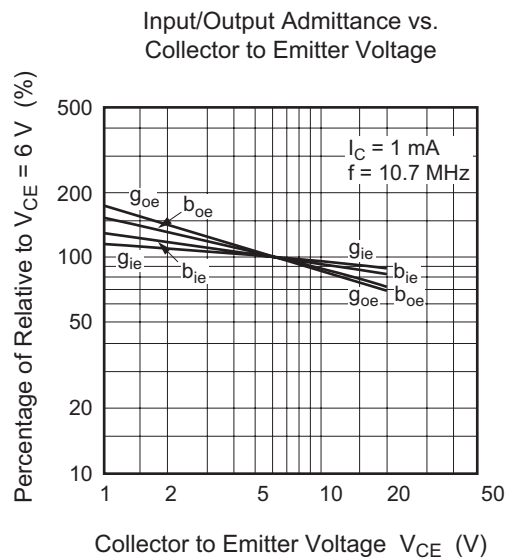
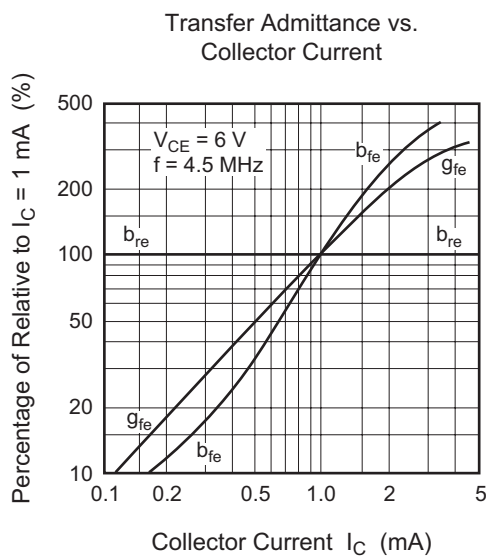
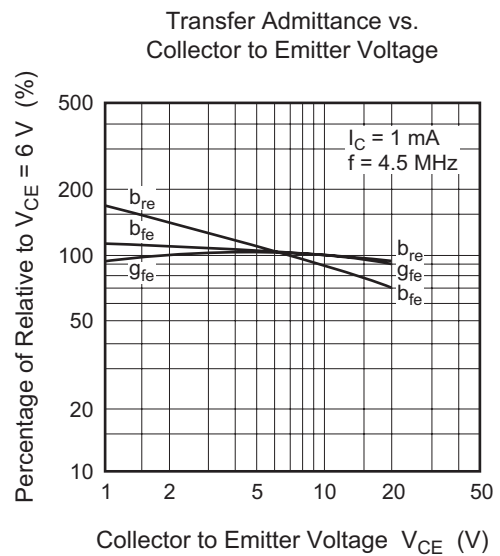
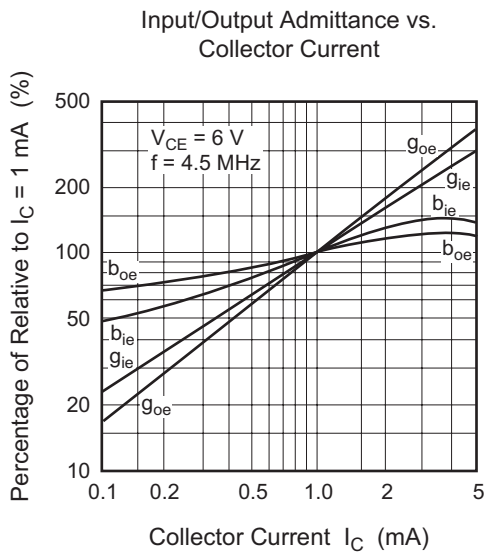
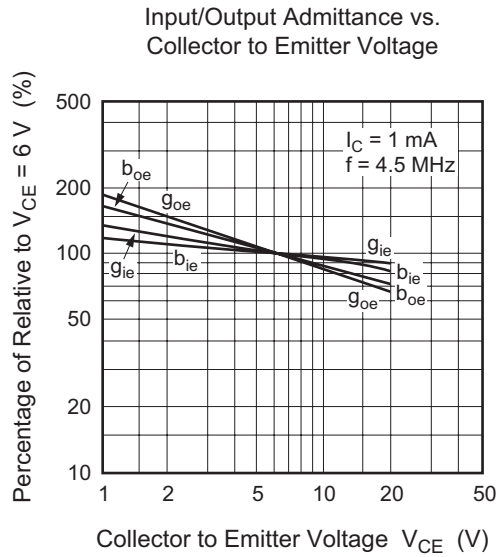
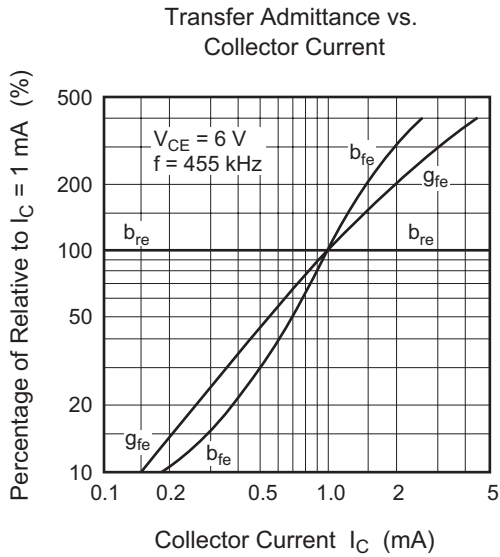
($V_{CE} = 6 \text{ V}, I_C = 1 \text{ mA}, \text{Emitter Common}$)

Item	Symbol	f	2SC460A, 2S461A	2SC460B, 2SC461B	2SC460C, 2SC461C	Unit
Input admittance	yie	455 kHz	$0.58 + j0.074$	$0.42 + j0.068$	$0.30 + j0.051$	mS
		4.5 MHz	$0.65 + j0.79$	$0.50 + j0.7$	$0.35 + j0.57$	
		10.7 MHz	$0.91 + j2.0$	$0.61 + j1.9$	$0.39 + j1.3$	
		100 MHz	$7.4 + j14$	$5.6 + j12$	$3.8 + j6.0$	
Reverse transfer admittance	yre	455 kHz	$-j0.003$	$-j0.003$	$-j0.003$	mS
		4.5 MHz	$-j0.04$	$-j0.04$	$-j0.04$	
		10.7 MHz	$-j0.13$	$-j0.13$	$-j0.13$	
		100 MHz	$-j1.0$	$-j1.0$	$-j1.0$	
Forward transfer admittance	yfe	455 kHz	$38 - j0.1$	$37 - j0.1$	$37 - j0.2$	mS
		4.5 MHz	$35 - j1.0$	$35 - j1.2$	$34 - j1.8$	
		10.7 MHz	$34 - j2.5$	$34 - j2.5$	$33 - j4.5$	
		100 MHz	$28 - j20$	$28 - j19$	$20 - j19$	
Output admittance	yoe	455 kHz	$0.0098 + j0.009$	$0.013 + j0.009$	$0.016 + j0.012$	mS
		4.5 MHz	$0.02 + j0.09$	$0.023 + j0.092$	$0.03 + j0.10$	
		10.7 MHz	$0.11 + j0.4$	$0.11 + j0.4$	$0.12 + j0.4$	
		100 MHz	$0.40 + j1.7$	$0.50 + j2.0$	$0.83 + j2.0$	

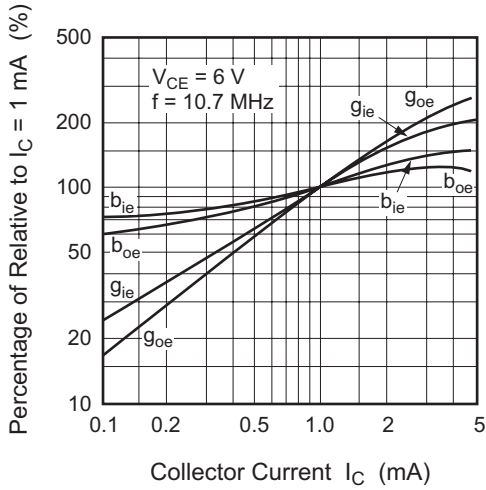
Main Characteristics



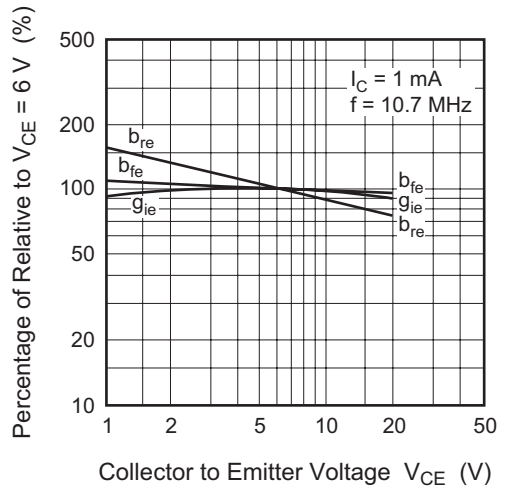




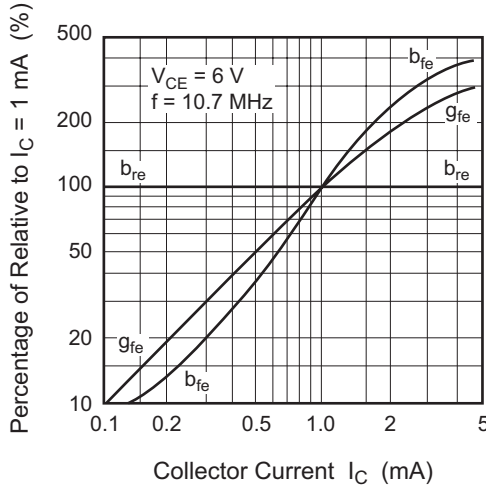
Input/Output Admittance vs. Collector Current



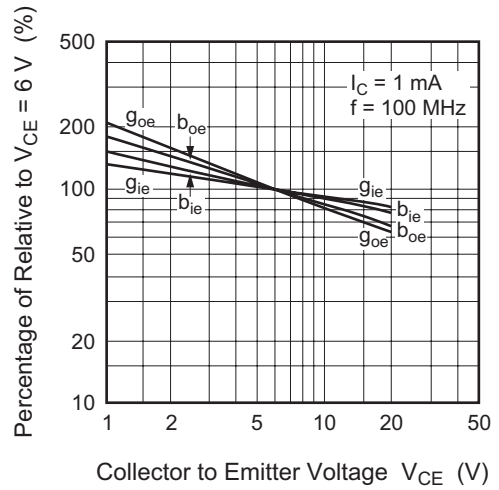
Transfer Admittance vs. Collector to Emitter Voltage



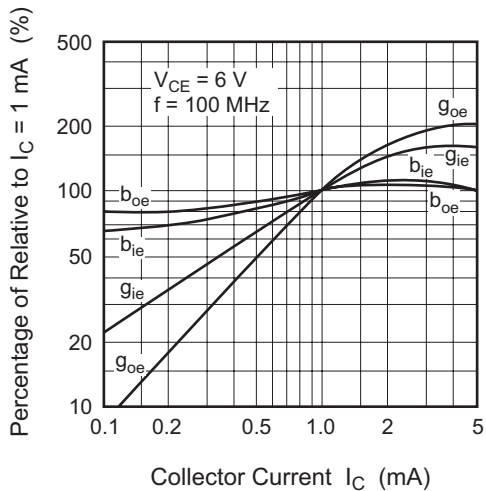
Transfer Admittance vs. Collector Current



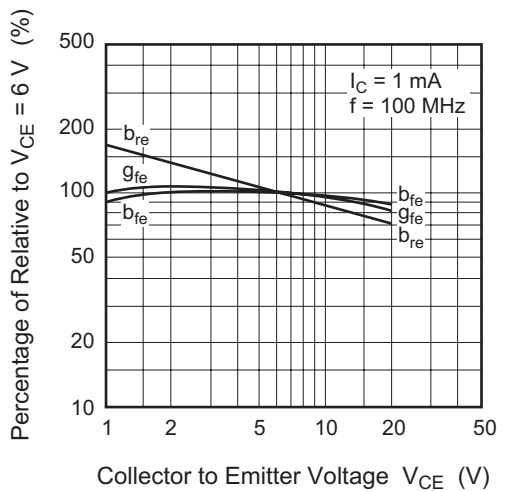
Input/Output Admittance vs. Collector to Emitter Voltage

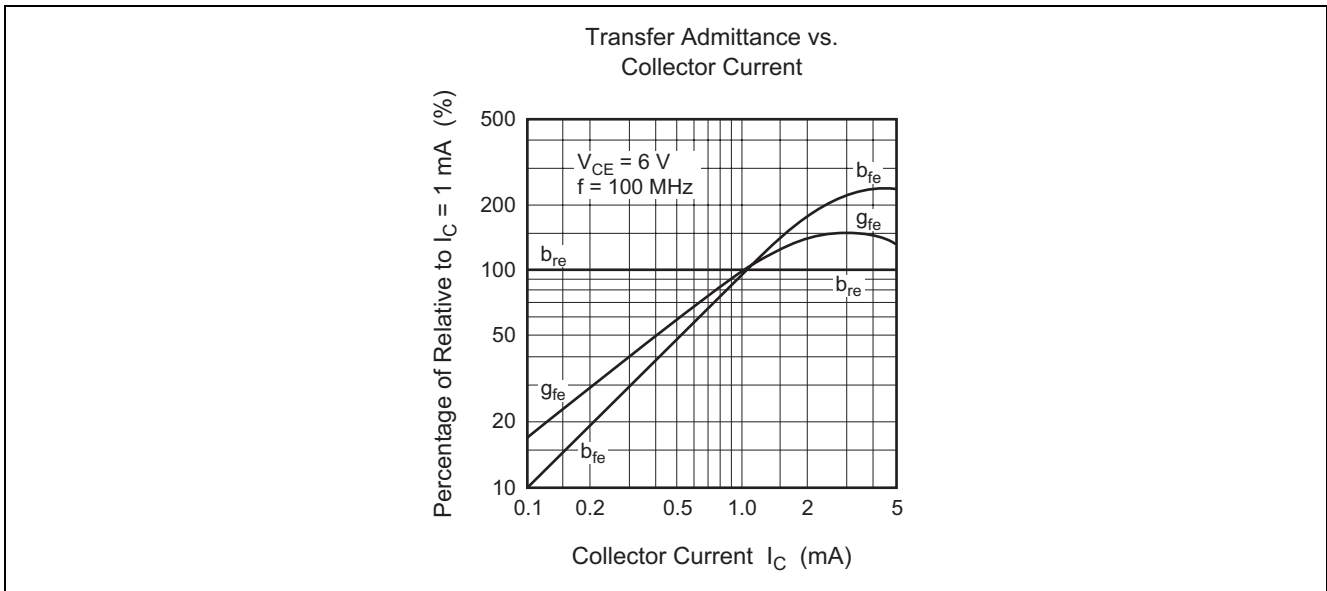


Input/Output Admittance vs. Collector Current

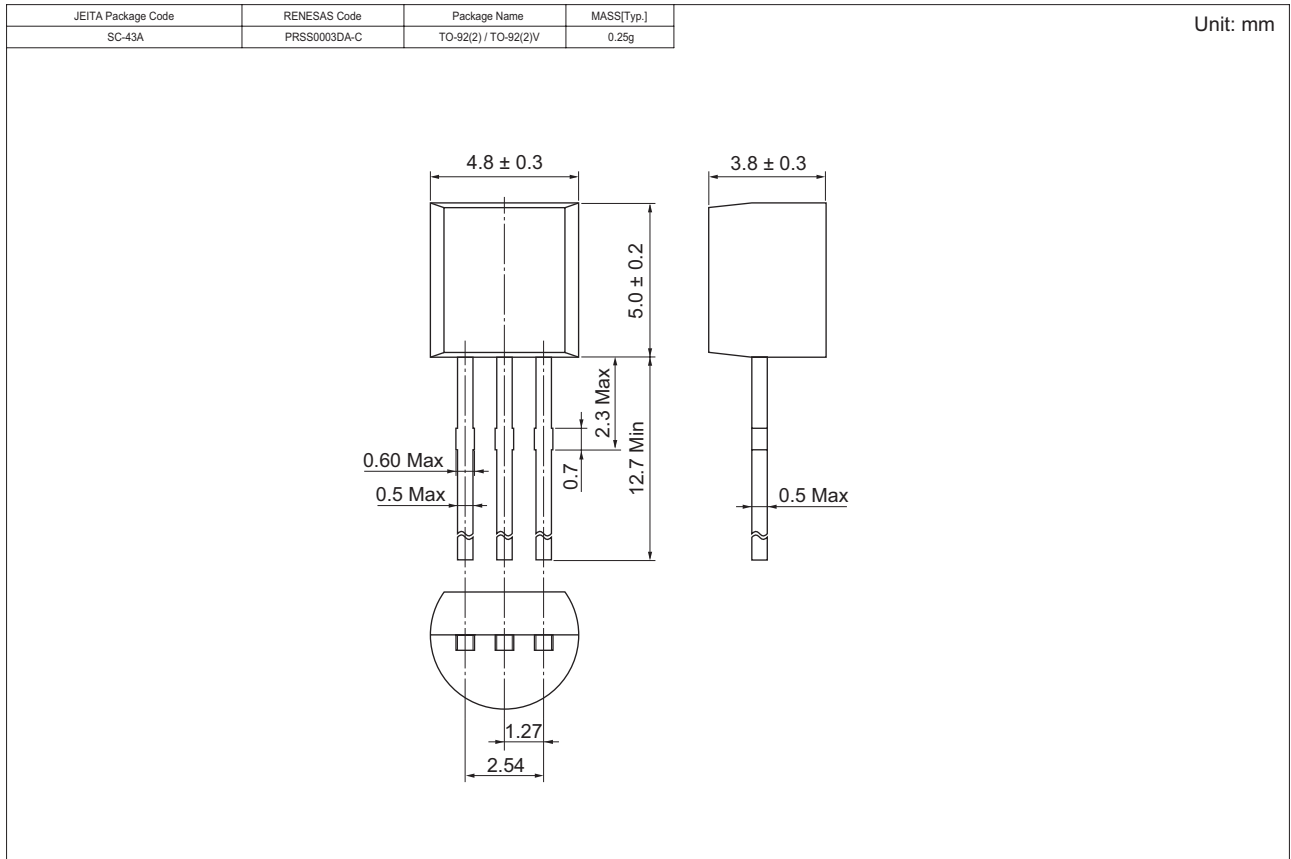


Transfer Admittance vs. Collector to Emitter Voltage





Package Dimensions



Ordering Information

Part Name	Quantity	Shipping Container
2SC460CTZ 2SC461BTZ 2SC461CTZ	2500	Hold Box, Radial Taping

Note: For some grades, production may be terminated. Please contact the Renesas sales office to check the state of production before ordering the product.

Renesas Technology Corp. Sales Strategic Planning Div. Nippon Bldg., 2-6-2, Ohte-machi, Chiyoda-ku, Tokyo 100-0004, Japan

Keep safety first in your circuit designs!

1. Renesas Technology Corp. 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 due consideration to safety when making your circuit designs, with appropriate measures such as (i) placement of substitutive, auxiliary circuits, (ii) use of nonflammable material or (iii) prevention against any malfunction or mishap.

Notes regarding these materials

1. These materials are intended as a reference to assist our customers in the selection of the Renesas Technology Corp. 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 Renesas Technology Corp. or a third party.
2. Renesas Technology Corp. assumes no responsibility for any damage, or infringement of any third-party's rights, originating in the use of any product data, diagrams, charts, programs, algorithms, or circuit application examples contained in these materials.
3. All information contained in these materials, including product data, diagrams, charts, programs and algorithms represents information on products at the time of publication of these materials, and are subject to change by Renesas Technology Corp. without notice due to product improvements or other reasons. It is therefore recommended that customers contact Renesas Technology Corp. or an authorized Renesas Technology Corp. product distributor for the latest product information before purchasing a product listed herein.
The information described here may contain technical inaccuracies or typographical errors.
Renesas Technology Corp. assumes no responsibility for any damage, liability, or other loss rising from these inaccuracies or errors.
Please also pay attention to information published by Renesas Technology Corp. by various means, including the Renesas Technology Corp. Semiconductor home page (<http://www.renesas.com>).
4. When using any or all of the information contained in these materials, including product data, diagrams, charts, programs, and algorithms, please be sure to evaluate all information as a total system before making a final decision on the applicability of the information and products. Renesas Technology Corp. assumes no responsibility for any damage, liability or other loss resulting from the information contained herein.
5. Renesas Technology Corp. semiconductors are not designed or manufactured for use in a device or system that is used under circumstances in which human life is potentially at stake. Please contact Renesas Technology Corp. or an authorized Renesas Technology Corp. product distributor when considering the use of a product contained herein for any specific purposes, such as apparatus or systems for transportation, vehicular, medical, aerospace, nuclear, or undersea repeater use.
6. The prior written approval of Renesas Technology Corp. is necessary to reprint or reproduce in whole or in part these materials.
7. 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.
8. Please contact Renesas Technology Corp. for further details on these materials or the products contained therein.



RENESAS SALES OFFICES

<http://www.renesas.com>

Refer to "<http://www.renesas.com/en/network>" for the latest and detailed information.

Renesas Technology America, Inc.

450 Holger Way, San Jose, CA 95134-1368, U.S.A
Tel: <1> (408) 382-7500, Fax: <1> (408) 382-7501

Renesas Technology Europe Limited

Dukes Meadow, Millboard Road, Bourne End, Buckinghamshire, SL8 5FH, U.K.
Tel: <44> (1628) 585-100, Fax: <44> (1628) 585-900

Renesas Technology Hong Kong Ltd.

7th Floor, North Tower, World Finance Centre, Harbour City, 1 Canton Road, Tsimshatsui, Kowloon, Hong Kong
Tel: <852> 2265-6688, Fax: <852> 2730-6071

Renesas Technology Taiwan Co., Ltd.

10th Floor, No.99, Fushing North Road, Taipei, Taiwan
Tel: <886> (2) 2715-2888, Fax: <886> (2) 2713-2999

Renesas Technology (Shanghai) Co., Ltd.

Unit2607 Ruijing Building, No.205 Maoming Road (S), Shanghai 200020, China
Tel: <86> (21) 6472-1001, Fax: <86> (21) 6415-2952

Renesas Technology Singapore Pte. Ltd.

1 Harbour Front Avenue, #06-10, Keppel Bay Tower, Singapore 098632
Tel: <65> 6213-0200, Fax: <65> 6278-8001

Renesas Technology Korea Co., Ltd.

Kukje Center Bldg. 18th Fl., 191, 2-ka, Hangang-ro, Yongsan-ku, Seoul 140-702, Korea
Tel: <82> 2-796-3115, Fax: <82> 2-796-2145

Renesas Technology Malaysia Sdn. Bhd.

Unit 906, Block B, Menara Amcorp, Amcorp Trade Centre, No.18, Jalan Persiaran Barat, 46050 Petaling Jaya, Selangor Darul Ehsan, Malaysia
Tel: <603> 7955-9390, Fax: <603> 7955-9510