
2SC460, 2SC461

Silicon NPN Epitaxial Planar

HITACHI

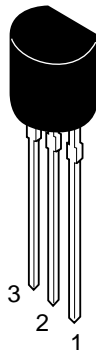
ADE-208-1046 (Z)
1st. Edition
Mar. 2001

Application

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

Outline

TO-92 (2)



1. Emitter
2. Collector
3. Base

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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}	35	—	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	$V_{CE} = 6 \text{ V}, I_E = -1 \text{ mA}$ $f = 1 \text{ MHz}$ $R_g = 500 \Omega$

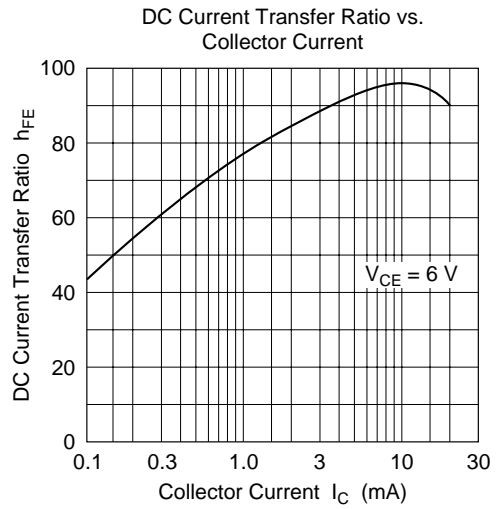
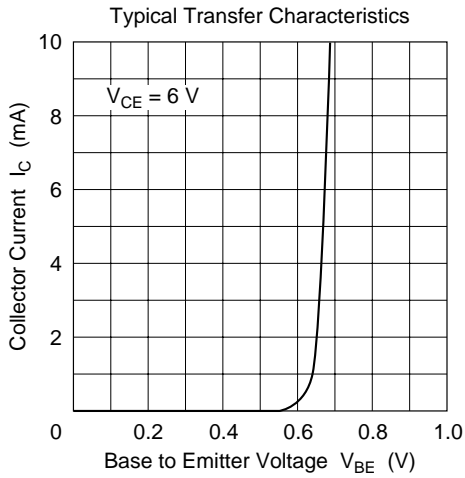
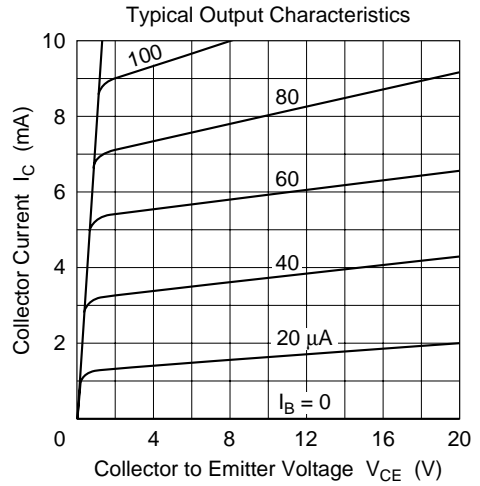
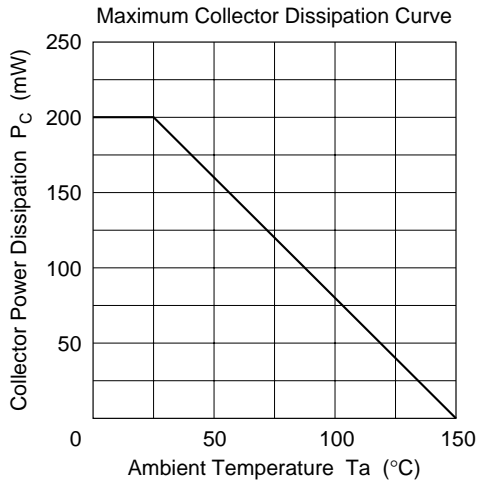
Note: 1. The 2SC460 and 2SC461 are grouped by h_{FE} as follows.

A	B	C
35 to 70	60 to 120	100 to 200

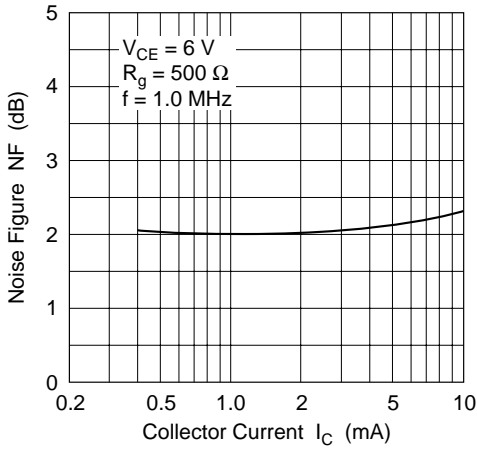
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Small Signal y Parameters ($V_{CE} = 6\text{ V}$, $I_C = 1\text{ mA}$, Emitter Common)

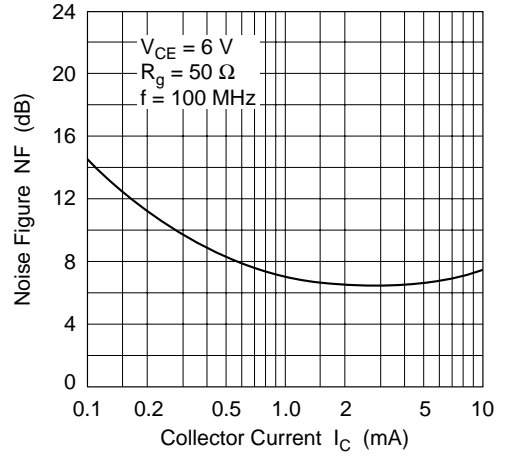
Item	Symbol	f	2SC460A, 2SC461A	2SC460B, 2SC461B	2SC460C, 2SC461C	Unit
Input admittance	y _{ie}	455 kHz	0.58 + j0.074	0.42 + j0.068	0.30 + j0.051	mS
		4.5 MHz	0.65 + j0.79	0.50 + j0.7	0.35 + j0.57	
		10.7 MHz	0.91 + j2.0	0.61 + j1.9	0.39 + j1.3	
		100 MHz	7.4 + j14	5.6 + j12	3.8 + j6.0	
Reverse transfer admittance	y _{re}	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	y _{fe}	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	y _{oe}	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	



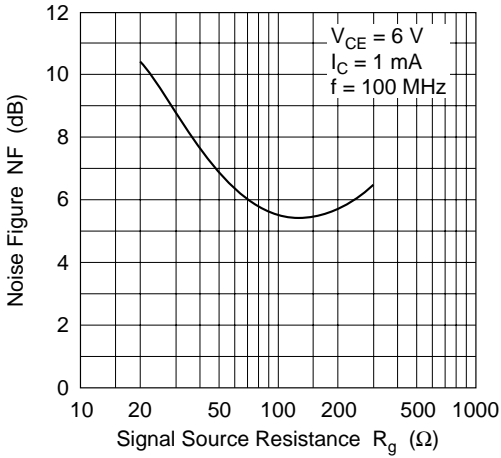
Noise Figure vs. Collector Current



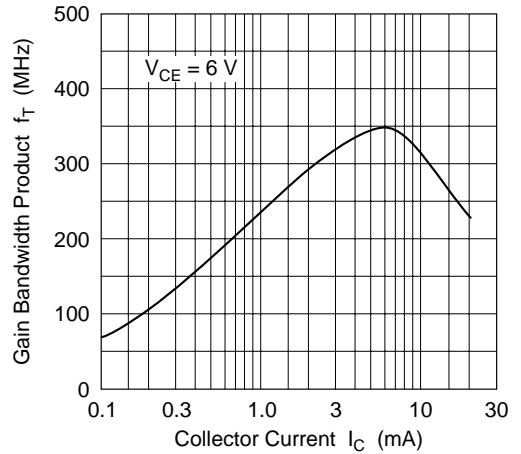
Noise Figure vs. Collector Current



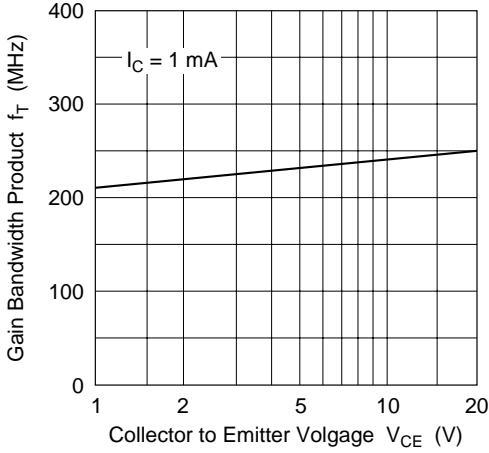
Noise Figure vs. Signal Source Resistance



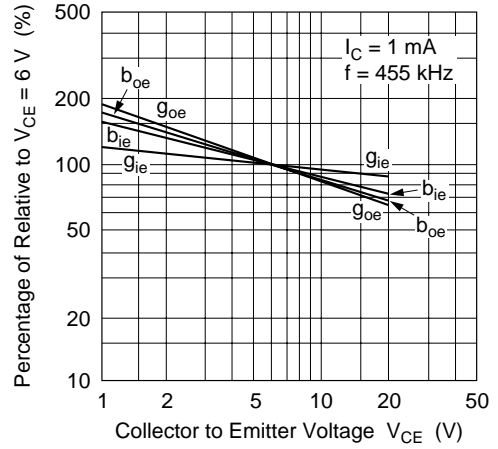
Gain Bandwidth Product vs. Collector Current



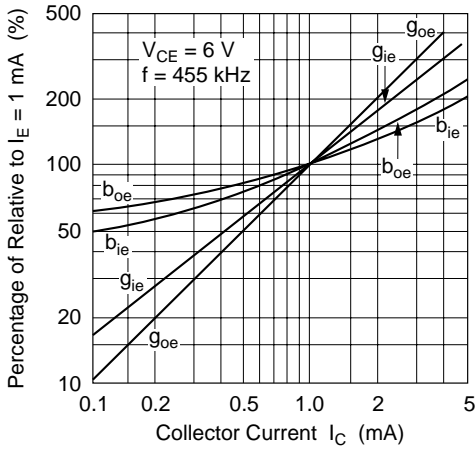
Gain Bandwidth Product vs. Collector to Emitter Voltage



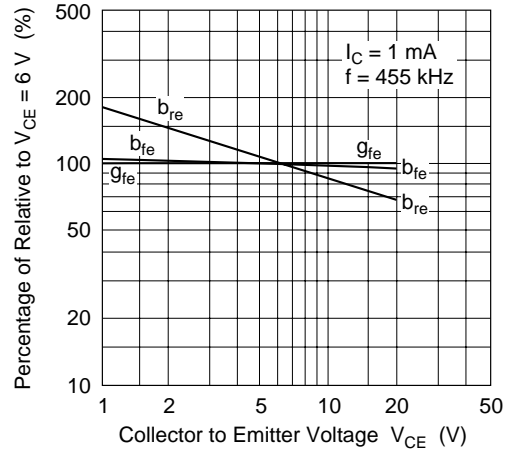
Input/Output Admittance vs. Collector to Emitter Voltage



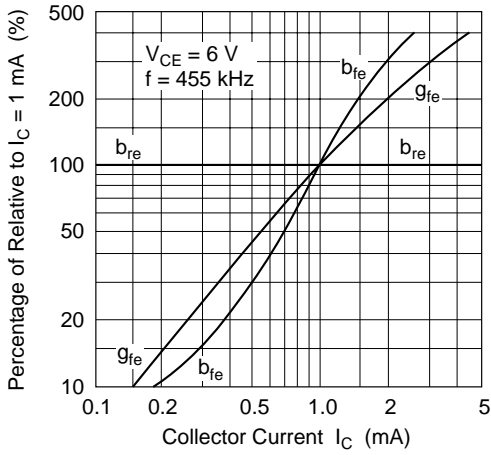
Input/Output Admittance vs. Collector Current



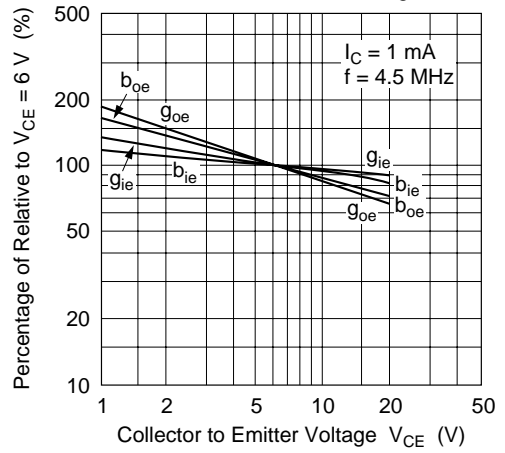
Transfer Admittance vs. Collector to Emitter Voltage



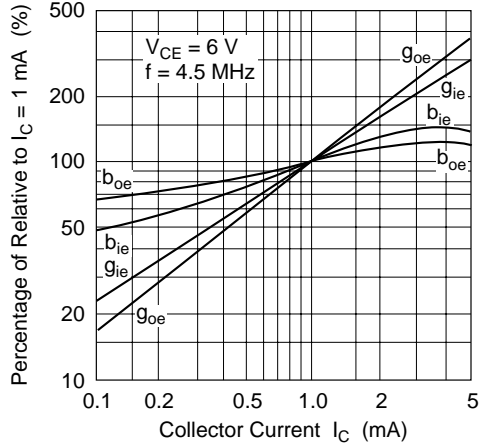
Transfer Admittance vs. Collector Current



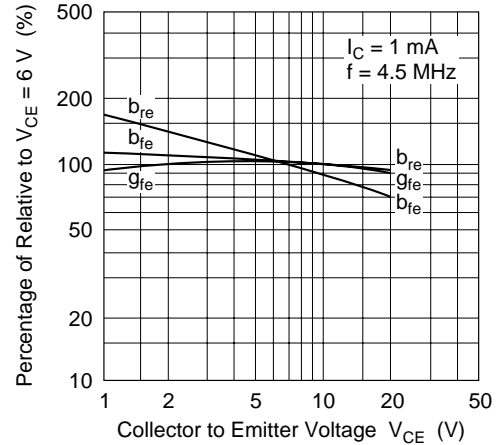
Input/Output Admittance vs. Collector to Emitter Voltage

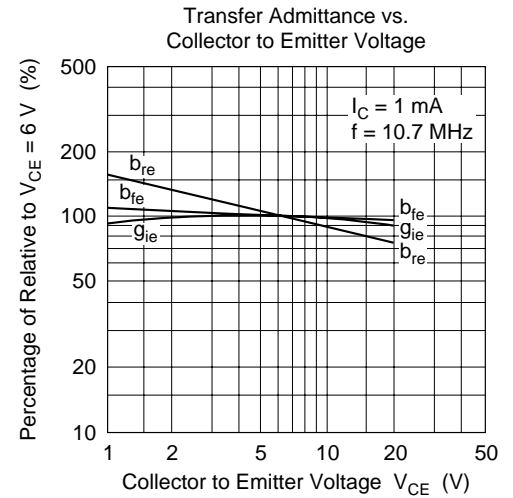
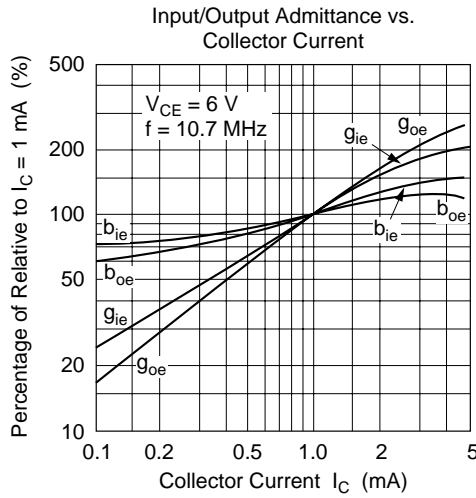
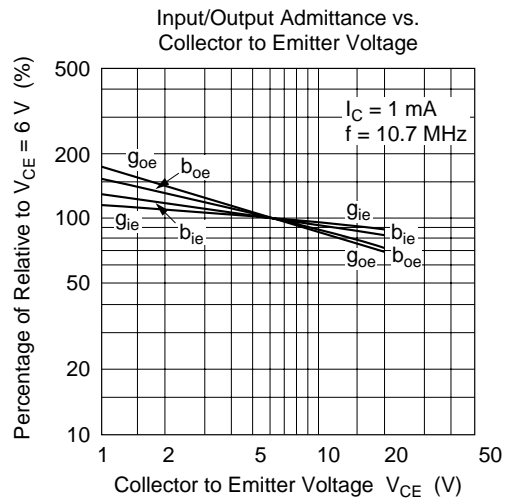
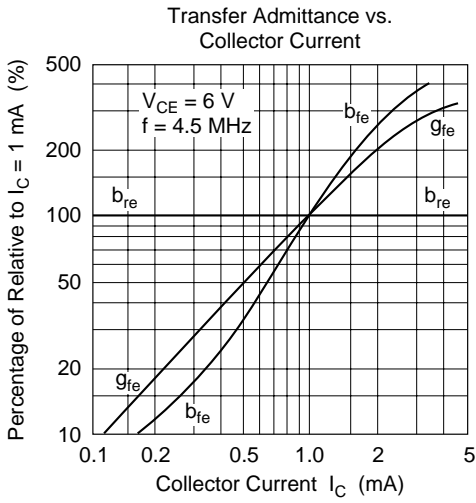


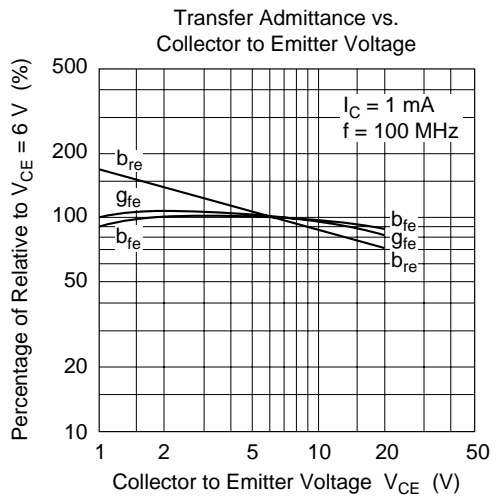
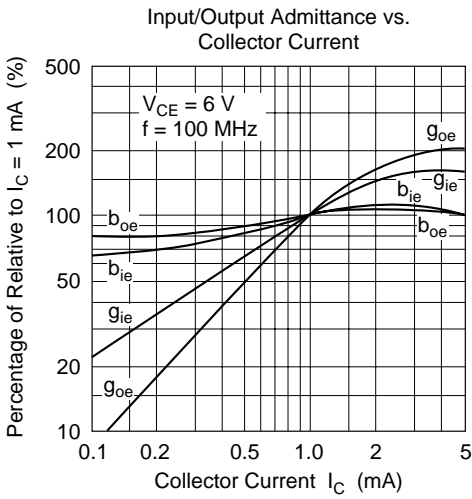
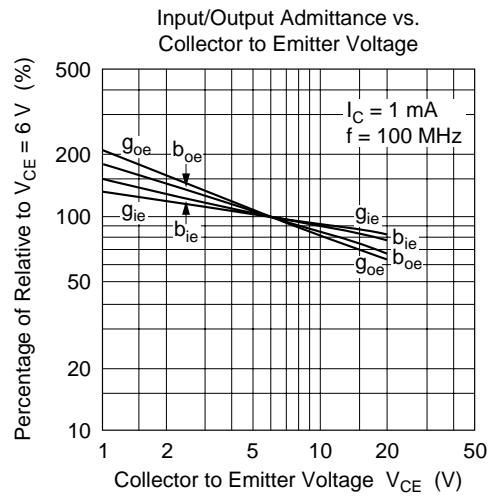
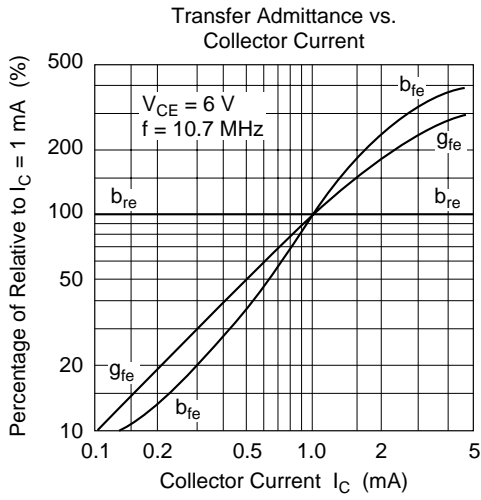
Input/Output Admittance vs. Collector Current

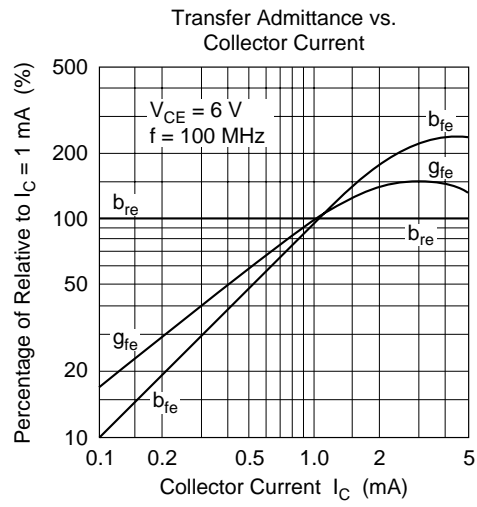


Transfer Admittance vs. Collector to Emitter Voltage





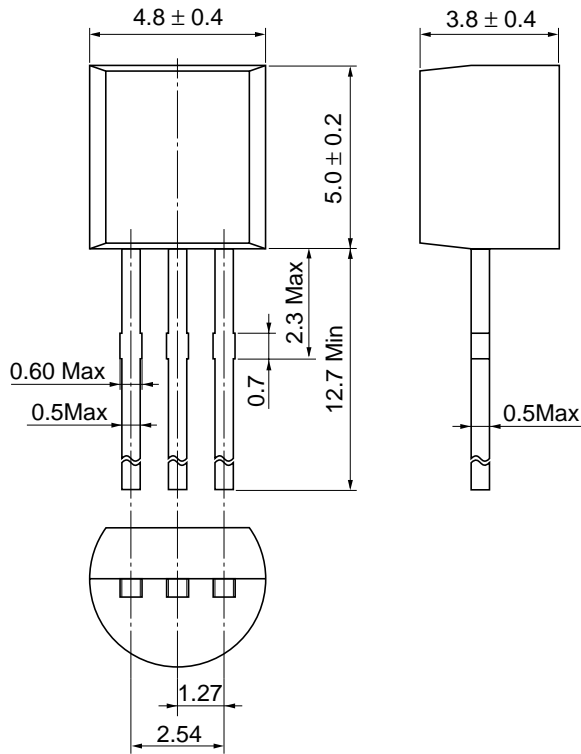




2SC460, 2SC461

Package Dimensions

As of January, 2001
Unit: mm



Hitachi Code	TO-92 (2)
JEDEC	Conforms
EIAJ	Conforms
Mass (reference value)	0.25 g

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