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# 2SA1190, 2SA1191

Silicon PNP Epitaxial

# HITACHI

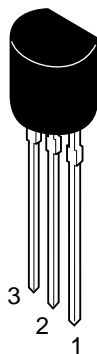
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## Application

- Low frequency low noise amplifier
- Complementary pair with 2SC2855 and 2SC2856

## Outline

TO-92 (1)



1. Emitter
2. Collector
3. Base

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## 2SA1190, 2SA1191

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### Absolute Maximum Ratings (Ta = 25°C)

Item	Symbol	2SA1190	2SA1191	Unit
Collector to base voltage	V <sub>CBO</sub>	−90	−120	V
Collector to emitter voltage	V <sub>CEO</sub>	−90	−120	V
Emitter to base voltage	V <sub>EBO</sub>	−5	−5	V
Collector current	I <sub>C</sub>	−100	−100	mA
Emitter current	I <sub>E</sub>	100	100	mA
Collector power dissipation	P <sub>C</sub>	400	400	mW
Junction temperature	T <sub>j</sub>	150	150	°C
Storage temperature	T <sub>stg</sub>	−55 to +150	−55 to +150	°C

## 2SA1190, 2SA1191

### Electrical Characteristics (Ta = 25°C)

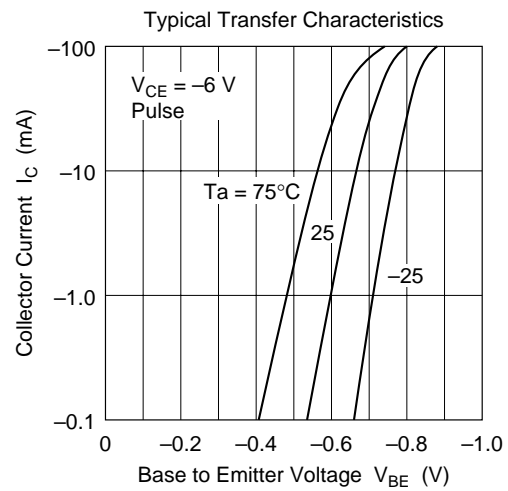
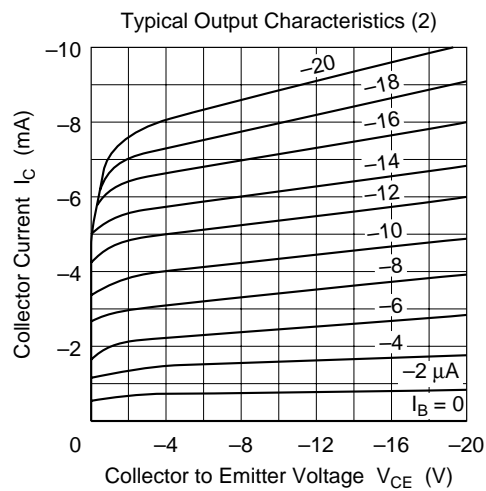
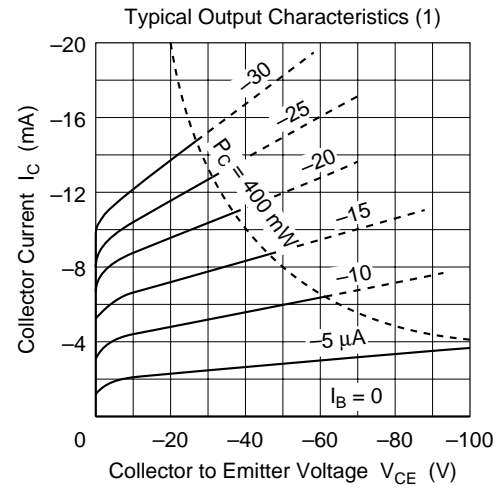
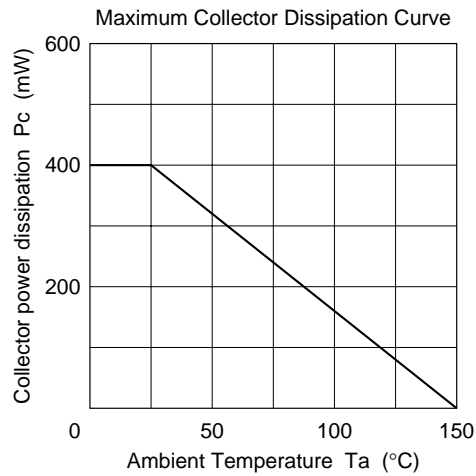
Item	Symbol	2SA1190			2SA1191			Unit	Test conditions
		Min	Typ	Max	Min	Typ	Max		
Collector to base breakdown voltage	$V_{(BR)CBO}$	-90	—	—	-120	—	—	V	$I_C = -10 \mu A, I_E = 0$
Collector to emitter breakdown voltage	$V_{(BR)CEO}$	-90	—	—	-120	—	—	V	$I_C = -1 \text{ mA}, R_{BE} = \infty$
Emitter to base breakdown voltage	$V_{(BR)EBO}$	-5	—	—	-5	—	—	V	$I_E = -10 \mu A, I_C = 0$
Collector cutoff current	$I_{CBO}$	—	—	-0.1	—	—	-0.1	$\mu A$	$V_{CB} = -70 \text{ V}, I_E = 0$
Emitter cutoff current	$I_{EBO}$	—	—	-0.1	—	—	-0.1	$\mu A$	$V_{EB} = -2 \text{ V}, I_C = 0$
DC current transfer ratio	$h_{FE}^{*1}$	250	—	800	250	—	800		$V_{CE} = -12 \text{ V}, I_C = -2 \text{ mA}^{*2}$
Collector to emitter saturation voltage	$V_{CE(sat)}$	—	-0.05	-0.15	—	-0.05	-0.15	V	$I_C = -10 \text{ mA}, I_B = -1 \text{ mA}^{*2}$
Base to emitter saturation voltage	$V_{BE(sat)}$	—	-0.7	-1.0	—	-0.7	-1.0	V	
Gain bandwidth product	$f_T$	—	130	—	—	130	—	MHz	$V_{CE} = -6 \text{ V}, I_C = -10 \text{ mA}$
Collector output capacitance	$C_{ob}$	—	3.2	—	—	3.2	—	pF	$V_{CB} = -10 \text{ V}, I_E = 0, f = 1 \text{ MHz}$
Noise figure	NF	—	0.15	1.5	—	0.15	1.5	dB	$V_{CE} = -6 \text{ V}, I_C = -0.1 \text{ mA}, R_g = 10 \text{ k}\Omega, f = 1 \text{ kHz}$
		—	0.2	2.0	—	0.2	2.0	dB	$V_{CE} = -6 \text{ V}, I_C = -0.1 \text{ mA}, R_g = 10 \text{ k}\Omega, f = 10 \text{ Hz}$
Noise voltage referred to input	$e_n$	—	0.7	—	—	0.7	—	nV/ $\sqrt{\text{Hz}}$	$V_{CB} = -6 \text{ V}, I_C = -10 \text{ mA}, R_g = 0, f = 1 \text{ kHz}$

Notes: 1. The 2SA1190 and 2SA1191 are grouped by  $h_{FE}$  as follows.

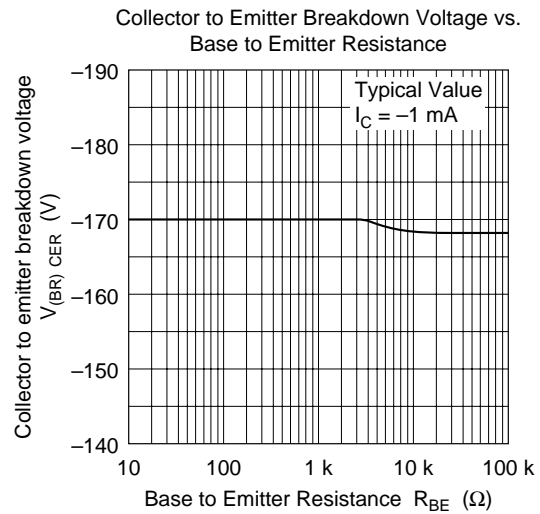
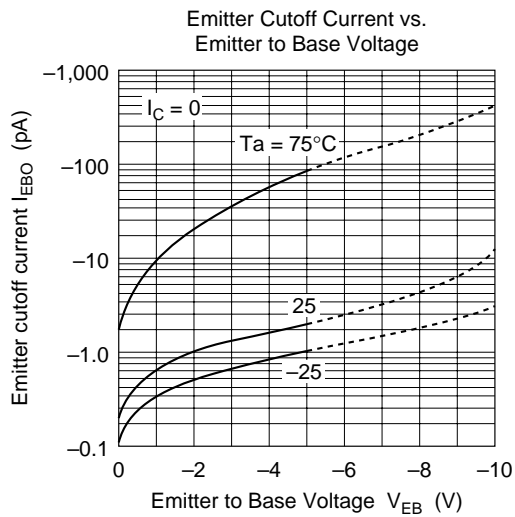
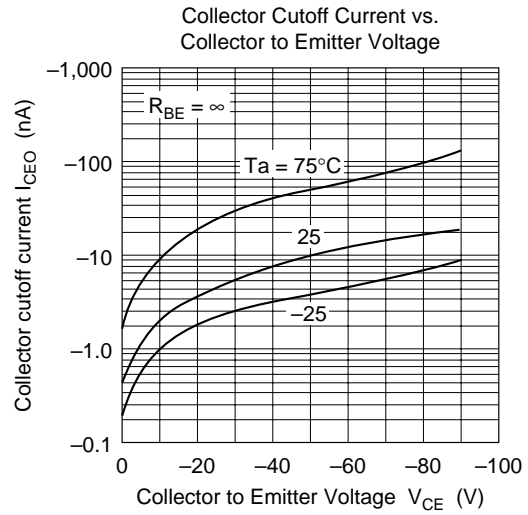
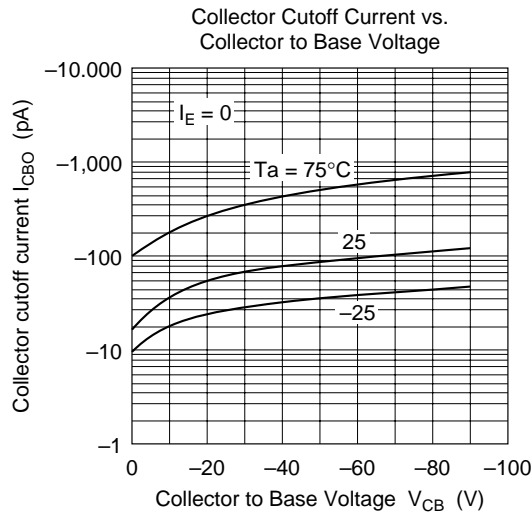
2. Pulse test

D	E
250 to 500	400 to 800

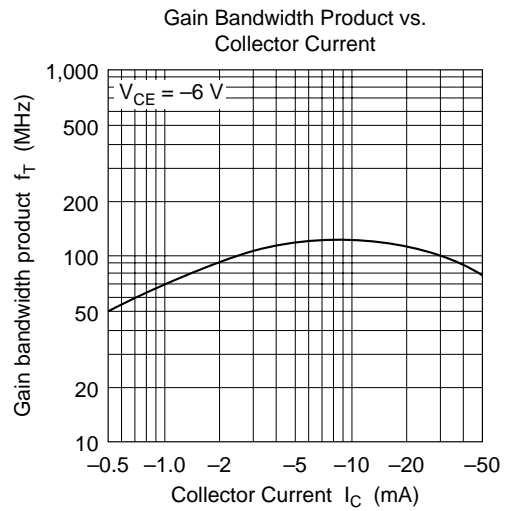
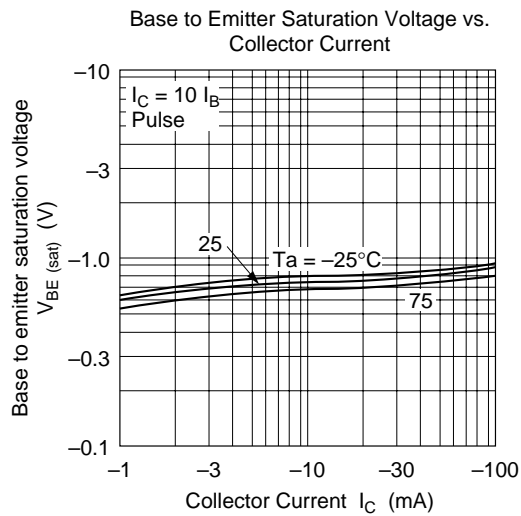
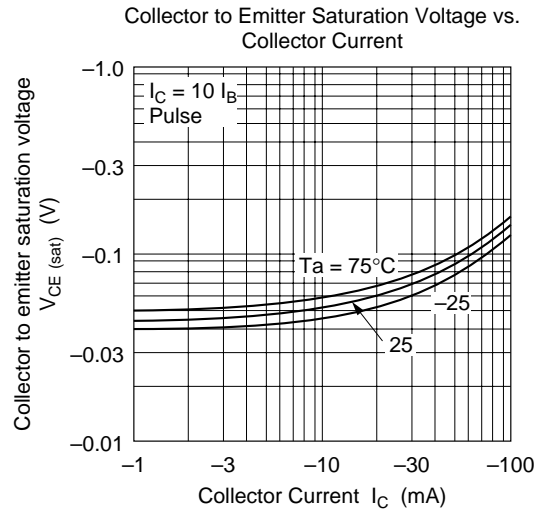
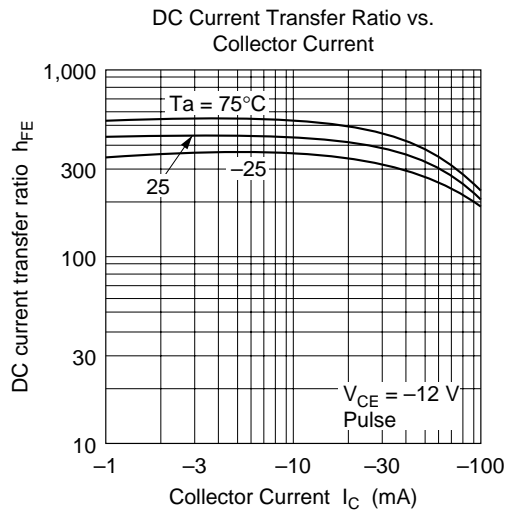
## 2SA1190, 2SA1191



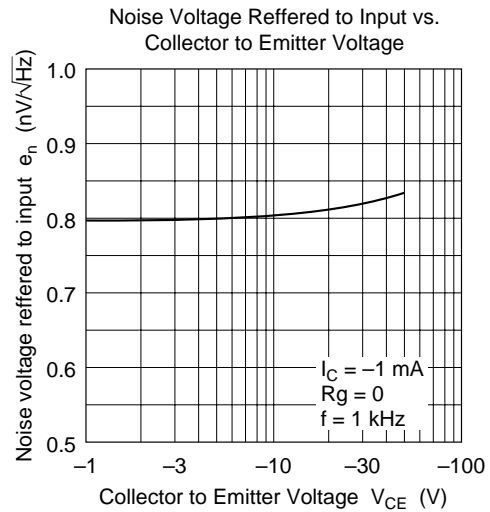
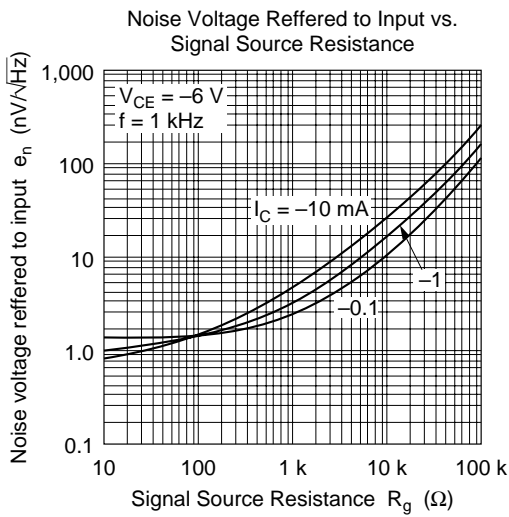
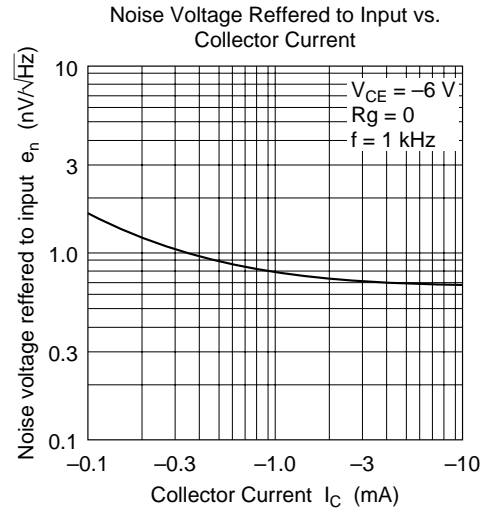
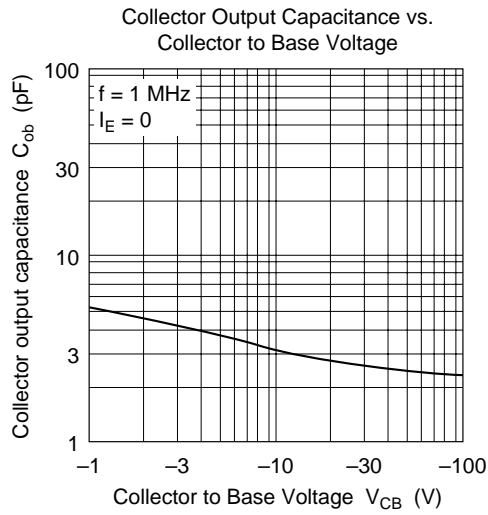
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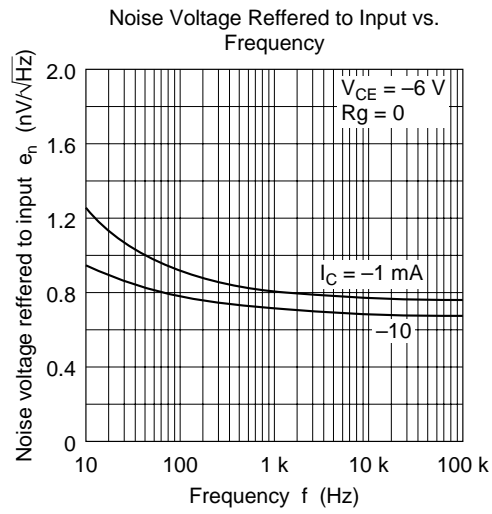
## 2SA1190, 2SA1191



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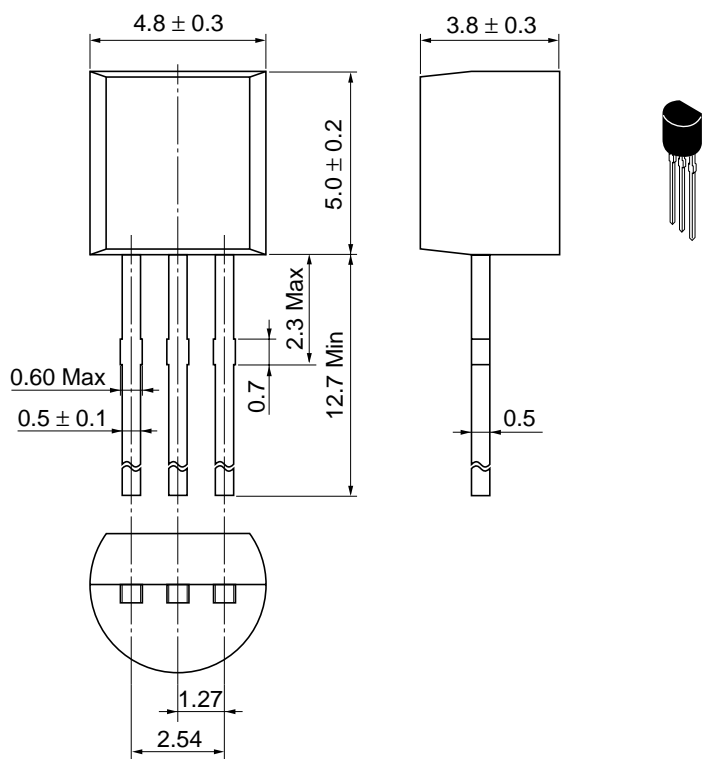
## 2SA1190, 2SA1191



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Unit: mm



Hitachi Code	TO-92 (1)
JEDEC	Conforms
EIAJ	Conforms
Weight (reference value)	0.25 g

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# HITACHI

## Hitachi, Ltd.

Semiconductor & Integrated Circuits.  
Nippon Bldg., 2-6-2, Ohte-machi, Chiyoda-ku, Tokyo 100-0004, Japan  
Tel: Tokyo (03) 3270-2111 Fax: (03) 3270-5109

URL      NorthAmerica      : <http://semiconductor.hitachi.com/>  
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## For further information write to:

Hitachi Semiconductor  
(America) Inc.  
179 East Tasman Drive,  
San Jose, CA 95134  
Tel: <1>(408) 433-1990  
Fax: <1>(408) 433-0223

Hitachi Europe GmbH  
Electronic components Group  
Domacher StraÙe 3  
D-85622 Feldkirchen, Munich  
Germany  
Tel: <49> (89) 9 9180-0  
Fax: <49> (89) 9 29 30 00  
  
Hitachi Europe Ltd.  
Electronic Components Group.  
Whitebrook Park  
Lower Cookham Road  
Maidenhead  
Berkshire SL6 8YA, United Kingdom  
Tel: <44> (1628) 585000  
Fax: <44> (1628) 778322

Hitachi Asia Pte. Ltd.  
16 Collyer Quay #20-00  
Hitachi Tower  
Singapore 049318  
Tel: 535-2100  
Fax: 535-1533  
  
Hitachi Asia Ltd.  
Taipei Branch Office  
3F, Hung Kuo Building, No.167,  
Tun-Hwa North Road, Taipei (105)  
Tel: <886> (2) 2718-3666  
Fax: <886> (2) 2718-8180

Hitachi Asia (Hong Kong) Ltd.  
Group III (Electronic Components)  
7/F., North Tower, World Finance Centre,  
Harbour City, Canton Road, Tsim Sha Tsui,  
Kowloon, Hong Kong  
Tel: <852> (2) 735 9218  
Fax: <852> (2) 730 0281  
Telex: 40815 HITEC HX

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