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# 2SA1190, 2SA1191

Silicon PNP Epitaxial

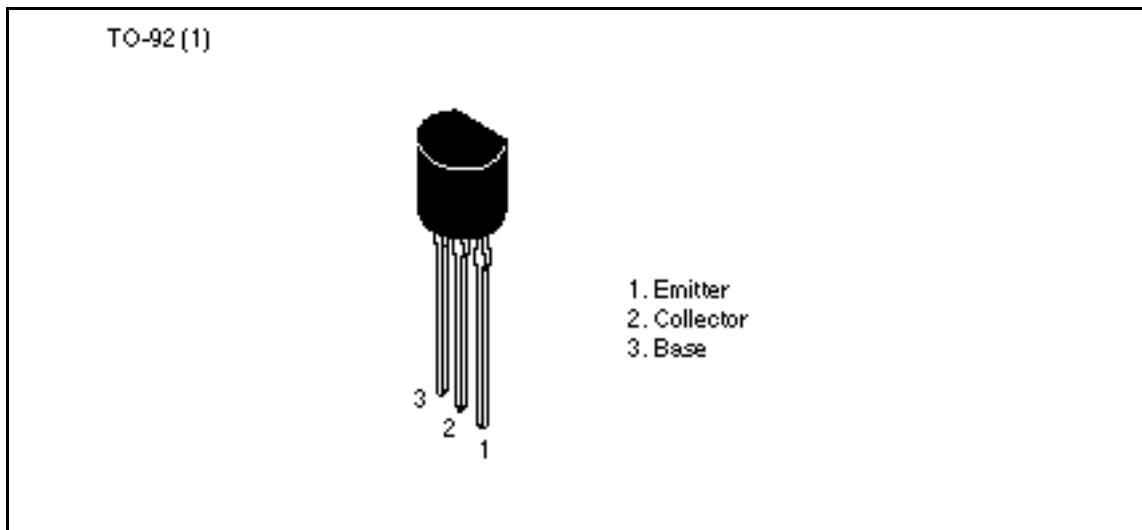
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## Application

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

## Outline



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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	$V_{CBO}$	-90	-120	V
Collector to emitter voltage	$V_{CEO}$	-90	-120	V
Emitter to base voltage	$V_{EBO}$	-5	-5	V
Collector current	$I_C$	-100	-100	mA
Emitter current	$I_E$	100	100	mA
Collector power dissipation	$P_C$	400	400	mW
Junction temperature	$T_j$	150	150	°C
Storage temperature	$T_{stg}$	-55 to +150	-55 to +150	°C

## 2SA1190, 2SA1191

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

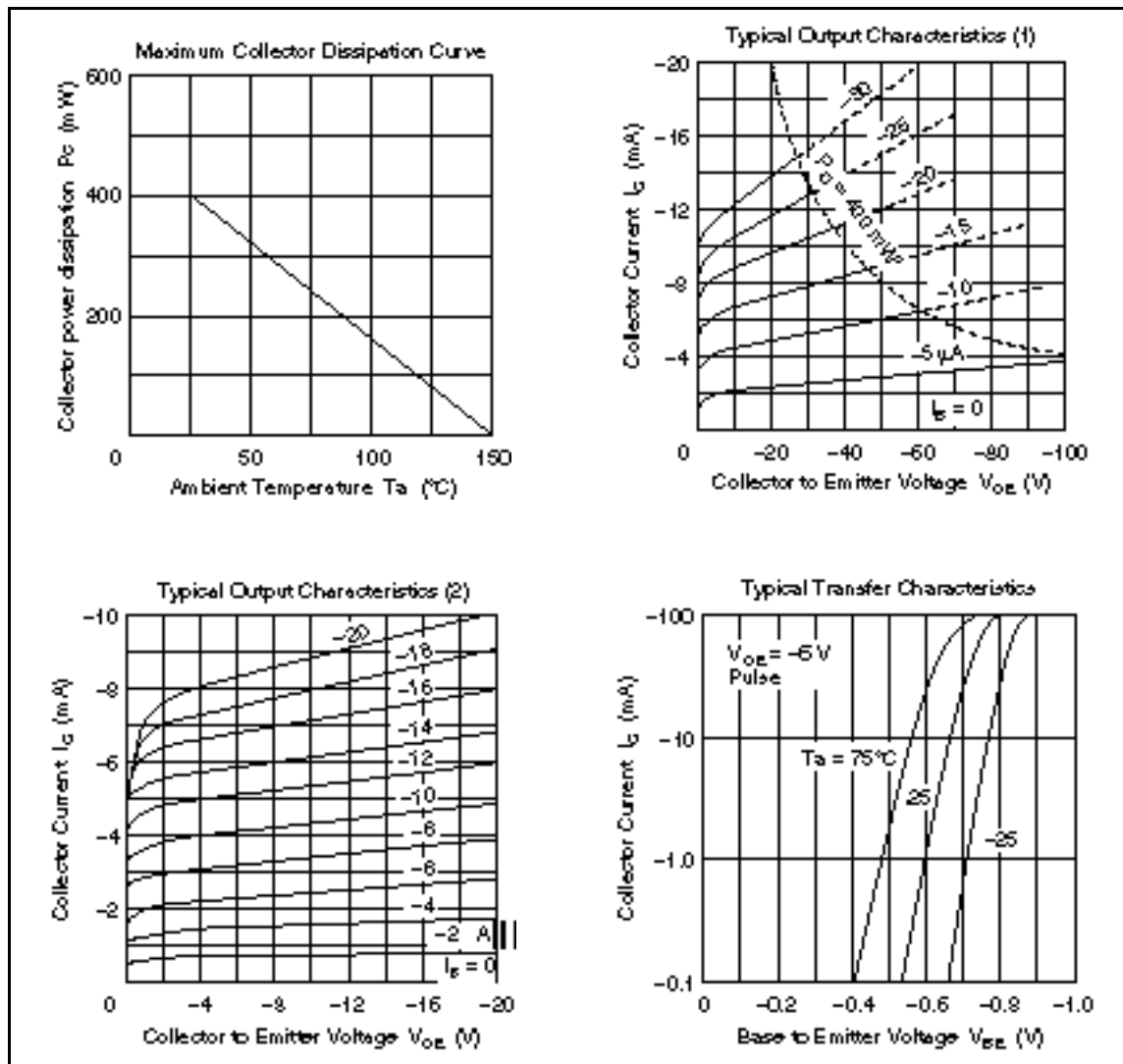
Item	Symbol	2SA1190			2SA1191			Unit	Test conditions
		Min	Typ	Max	Min	Typ	Max		
Collector to base breakdown voltage	$V_{(BR)CBO}$	-90	—	—	-120	—	—	V	$I_C = -10 \mu A, I_E = 0$
Collector to emitter breakdown voltage	$V_{(BR)CEO}$	-90	—	—	-120	—	—	V	$I_C = -1 \text{ mA}, R_{BE} =$
Emitter to base breakdown 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	$V_{CE} = -6 \text{ V},$ $I_C = -0.1 \text{ mA},$ $R_g = 10 \text{ k}$ $f = 1 \text{ kHz}$
		—	0.2	2.0	—	0.2	2.0	dB	$V_{CE} = -6 \text{ V},$ $I_C = -0.1 \text{ mA},$ $R_g = 10 \text{ k}$ $f = 10 \text{ Hz}$
Noise voltage referred to input	$e_n$	—	0.7	—	—	0.7	—	nV/ 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.

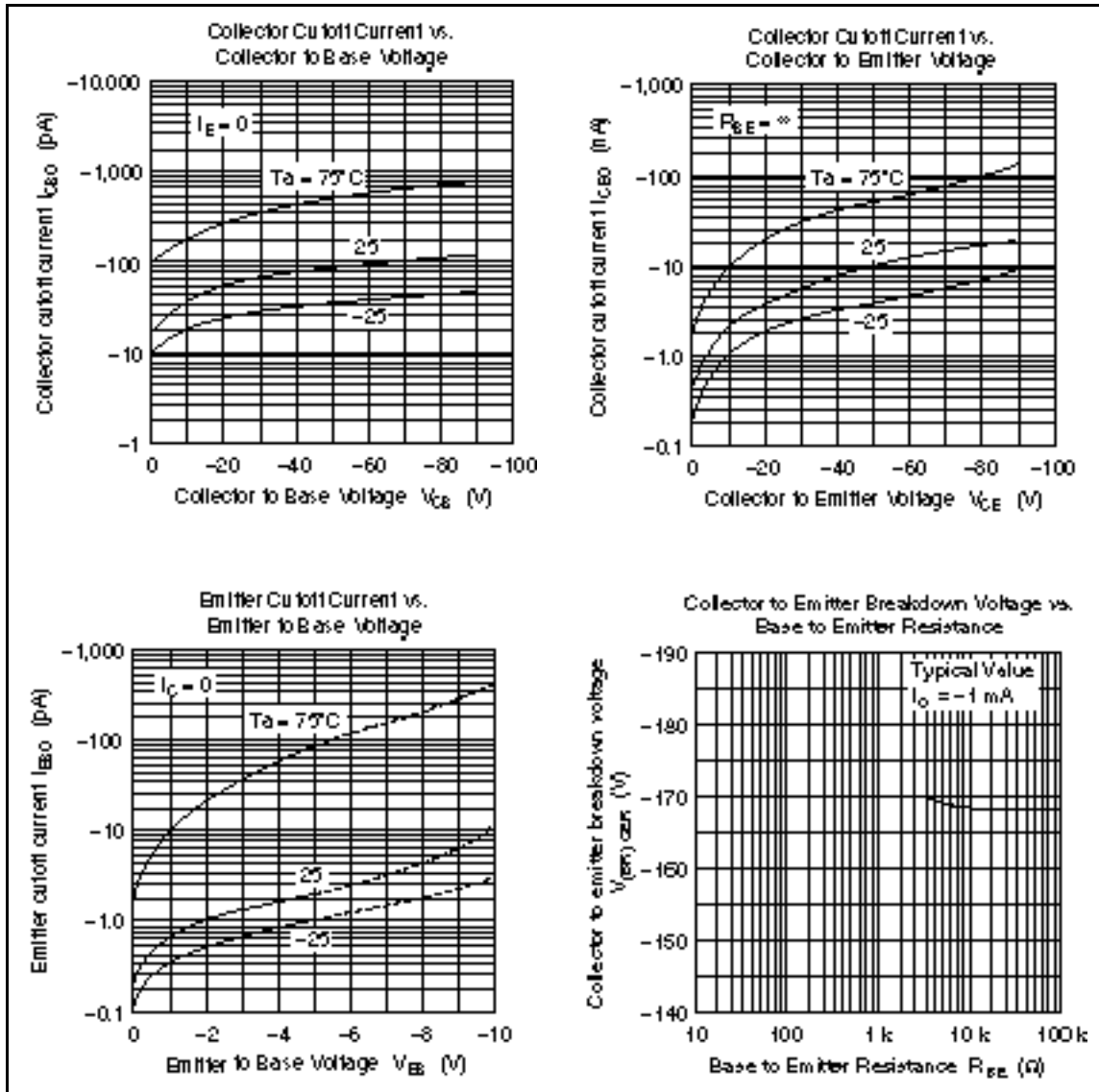
2. Pulse test

D	E
250 to 500	400 to 800

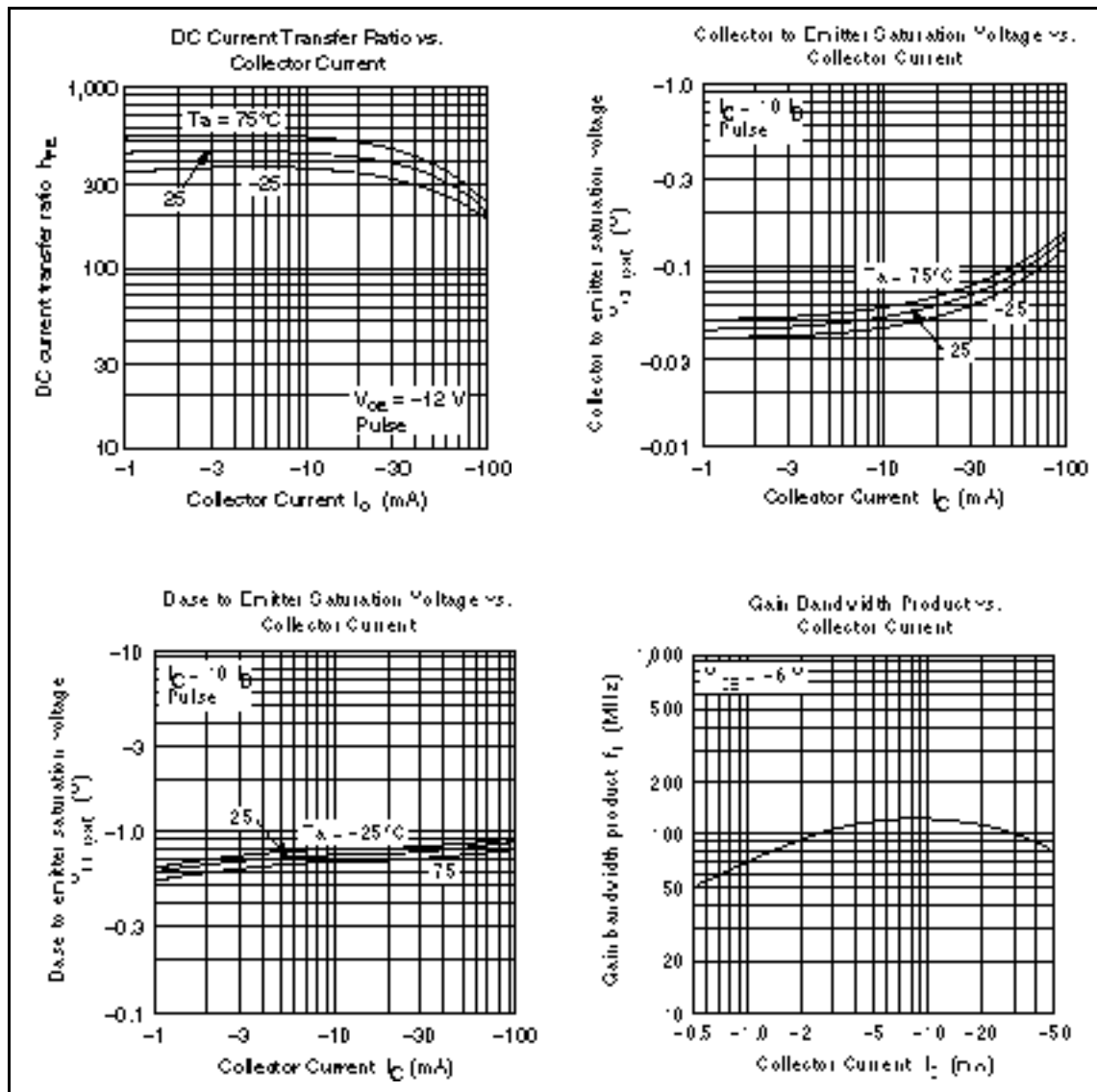
## 2SA1190, 2SA1191



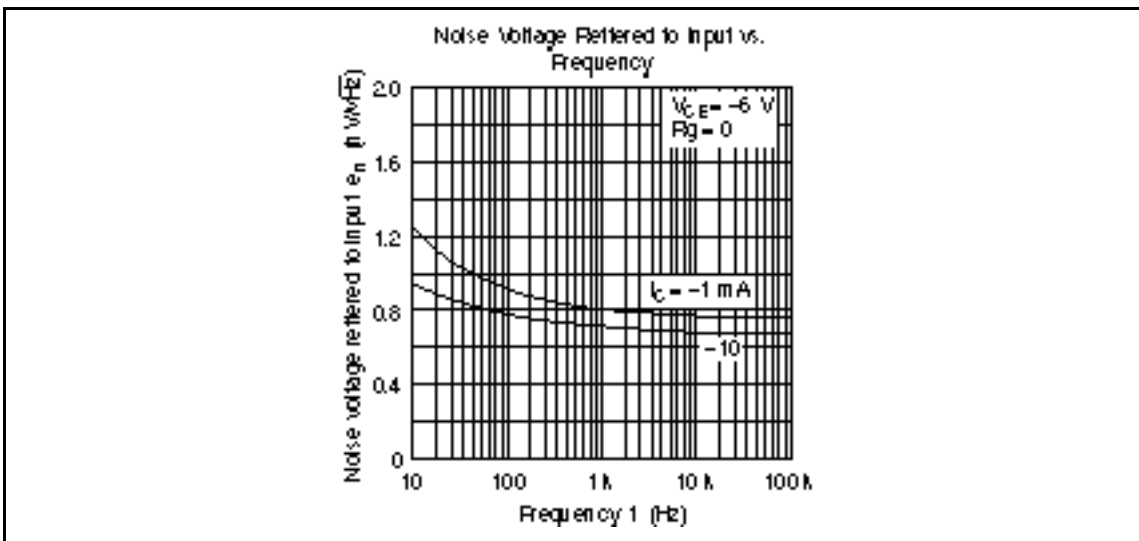
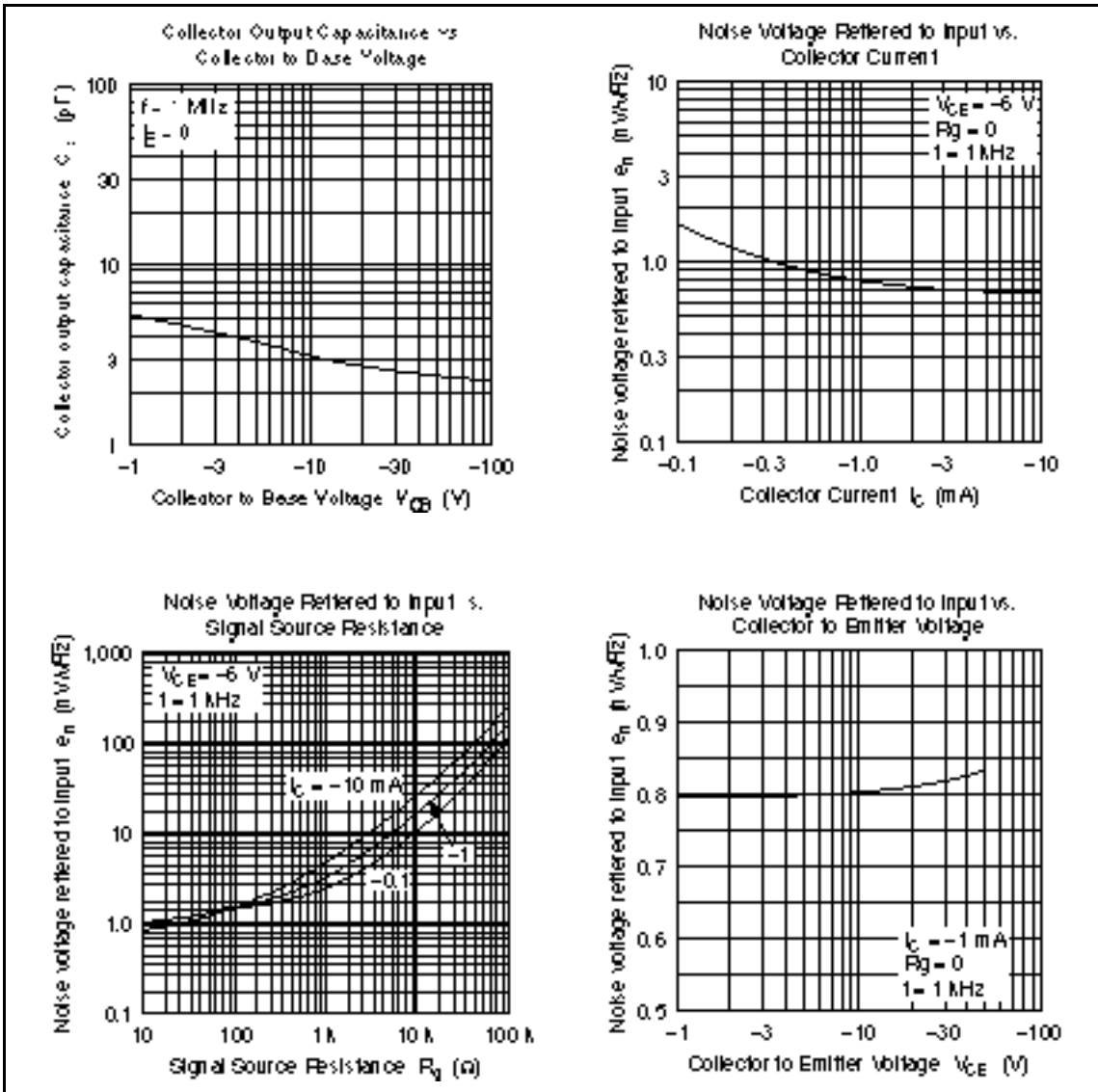
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## 2SA1190, 2SA1191



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## 2SA1190, 2SA1191

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