

Transistors NPN silicium Planar épitaxiaux

*NPN silicon transistors
Epitaxial planar*

* **2N 2192**
* **2N 2192 A**
* **2N 2193**
* **2N 2193 A**

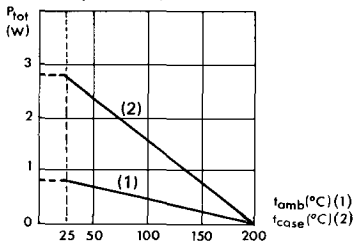
* Dispositif recommandé
Preferred device

- Amplification BF grands signaux
LF large signal amplification
- Commutation à moyen courant
Medium current switching

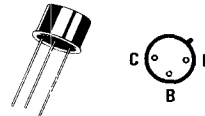
Données principales *Principal features*

V_{CEO}	{ 40 V	2N 2192,A
	{ 50 V	2N 2193,A
I_C	1 A	
h_{21E} (150 mA)	{ 100 - 300	2N 2192,A
	{ 40 - 120	2N 2193,A
V_{CEsat} (150 mA)	{ 0,35 V	2N 2192-2193
	{ 0,25 V	2N 2192A-2193A

Dissipation de puissance maximale
Maximum power dissipation



Boîtier TO - 39
Case



Le collecteur est relié au boîtier
Collector is connected to case

Valeurs limites absolues d'utilisation à $t_{amb} = 25^\circ\text{C}$

Absolute ratings (limiting values) (Sauf indications contraires)
(Unless otherwise specified)

Paramètre <i>Parameter</i>		2N 2192 2N 2192A	2N 2193 2N 2193A		
Tension collecteur-base <i>Collector-base voltage</i>	V_{CBO}	60	80	V	
Tension collecteur-émetteur <i>Collector-emitter voltage</i>	V_{CEO}	40	50	V	
Tension émetteur-base <i>Emitter-base voltage</i>	V_{EBO}	5	8	V	
Courant collecteur <i>Collector current</i>	I_C	1	1	A	
Dissipation de puissance <i>Power dissipation</i>	$\frac{t_{amb}=25^\circ\text{C} (1)}{t_{case}=25^\circ\text{C} (2)}$	P_{tot}	0,8	0,8	W
		P_{tot}	2,8	2,8	
Température de jonction <i>Junction temperature</i>	max.	t_j	200	200	$^\circ\text{C}$
Température de stockage <i>Storage temperature</i>	min. max.	t_{stg}	- 65 +200	- 65 +200	$^\circ\text{C}$

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2N 2192 A *
2N 2193 *
2N 2193 A *

Caractéristiques générales à $t_{amb} = 25^{\circ}\text{C}$
General characteristics
 (Sauf indications contraires)
 (Unless otherwise specified)

Caractéristiques statiques
Static characteristics

Paramètre Parameter	Conditions de mesure Test conditions		Min. Min.	Typ. Typ.	Max. Max.	
Courant résiduel collecteur-base Collector-base cut-off current	$I_E = 0$ $V_{CB} = 30\text{ V}$	2N 2192,A	I_{CBO}		10	nA
	$I_E = 0$ $V_{CB} = 60\text{ V}$	2N 2193,A			10	
	$I_E = 0$ $V_{CB} = 30\text{ V}$ $t_{amb} = 150^{\circ}\text{C}$	2N 2192,A			15	μA
	$I_E = 0$ $V_{CB} = 60\text{ V}$ $t_{amb} = 150^{\circ}\text{C}$	2N 2193,A			25	
Courant résiduel émetteur-base Emitter-base cut-off current	$I_C = 0$ $V_{EB} = 3\text{ V}$	2N 2192,A	I_{EBO}		50	nA
	$I_C = 0$ $V_{EB} = 5\text{ V}$	2N 2193,B				
Tension de claquage collecteur-base Collector-base breakdown voltage	$I_E = 0$ $I_C = 100\ \mu\text{A}$	2N 2192,A	$V_{(BR)CBO}$			V
		2N 2193,A				
Tension de claquage collecteur-émetteur Collector-emitter breakdown voltage	$I_B = 0$ $I_C = 25\text{ mA}$	2N 2192,A	$V_{(BR)CEO}^*$			V
		2N 2193,A				
Tension de claquage émetteur-base Emitter-base breakdown voltage	$I_C = 0$ $I_E = 100\ \mu\text{A}$	2N 2192,A	$V_{(BR)EBO}$			V
		2N 2193,A				

* Impulsions $t_p = 300\ \mu\text{s}$ $\delta < 2\%$
Pulsed

* **2N 2192**
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Caractéristiques générales à $t_{amb} = 25^{\circ}C$

General characteristics

(Sauf indications contraires)
 (Unless otherwise specified)

Caractéristiques statiques

Static characteristics

Paramètre <i>Parameter</i>	Conditions de mesure <i>Test conditions</i>		Min. <i>Min.</i>	Typ. <i>Typ.</i>	Max. <i>Max.</i>		
Valeur statique du rapport du transfert direct du courant <i>Static forward current transfer ratio</i>	$I_C = 0,1 \text{ mA}$ $V_{CE} = 10 \text{ V}$	2N 2192,A	15				
		2N 2193,A	15				
	$I_C = 10 \text{ mA}$ $V_{CE} = 10 \text{ V}$	2N 2192,A	75				
		2N 2193,A	30				
	$I_C = 150 \text{ mA}$ $V_{CE} = 10 \text{ V}$	2N 2192,A	100				300
		2N 2193,A	40				120
	$I_C = 500 \text{ mA}$ $V_{CE} = 10 \text{ V}$	2N 2192,A	35				
		2N 2193,A	20				
	$I_C = 1 \text{ A}$ $V_{CE} = 10 \text{ V}$	2N 2192,A	15				
		2N 2193,A	15				
$I_C = 10 \text{ mA}$ $V_{CE} = 10 \text{ V}$ $t_{amb} = -55^{\circ}C$	2N 2192,A	35					
	2N 2193,A	20					
Tension de saturation collecteur-émetteur <i>Collector-emitter saturation voltage</i>	$I_C = 150 \text{ mA}$ $I_B = 15 \text{ mA}$	2N 2192	V_{CEsat}	0,16	0,35	V	
		2N 2193			0,25		
Tension de saturation base-émetteur <i>Base-emitter saturation voltage</i>	$I_C = 150 \text{ mA}$ $I_B = 15 \text{ mA}$		V_{BEsat}		1,3	V	

* Impulsions $t_p = 300\mu s$ $\delta \leq 2\%$
Pulsed

Caractéristiques dynamiques (pour petits signaux)

Dynamic characteristics (for small signals)

Fréquence de transition <i>Transition frequency</i>	$I_C = 50 \text{ mA}$ $V_{CE} = 10 \text{ V}$ $f = 20 \text{ MHz}$		f_T	50			MHz
Capacité de sortie <i>Output capacitance</i>	$V_{CB} = 10 \text{ V}$ $I_E = 0$ $f = 1 \text{ MHz}$		C_{22b}		20		pF

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2N 2192 A *
2N 2193 *
2N 2193 A *

Caractéristiques générales à $t_{amb} = 25^{\circ}C$

General characteristics

Caractéristiques de commutation

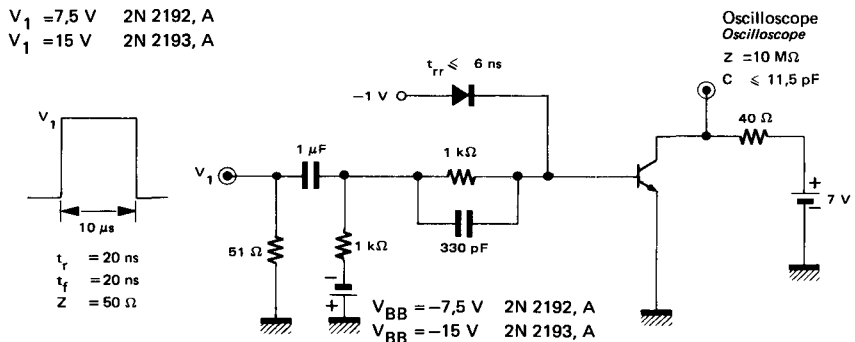
Switching characteristics

Paramètre Parameter	Conditions de mesure Test conditions		Min. Min.	Typ. Typ.	Max. Max.	
Temps de croissance Rise time	Figure 1 $V_1 = 7,5\text{ V}$ $V_{BB} = -7,5\text{ V}$	2N 2192,A			70	ns
		2N 2193,A				
Retard à la décroissance Storage time	Figure 1 $V_1 = 7,5\text{ V}$ $V_{BB} = -7,5\text{ V}$	2N 2192,A			150	ns
		2N 2193,A				
Temps de décroissance Fall time	Figure 1 $V_1 = 7,5\text{ V}$ $V_{BB} = -7,5\text{ V}$	2N 2192,A			50	ns
		2N 2193,A				

Schéma de mesure des temps de commutation

Switching times test circuit

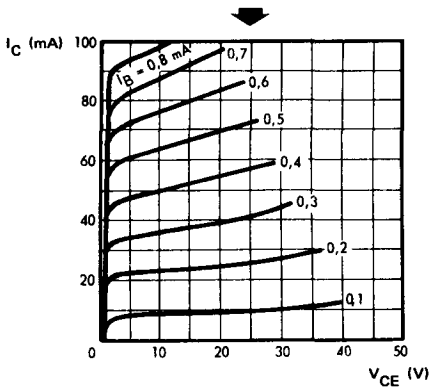
Figure 1



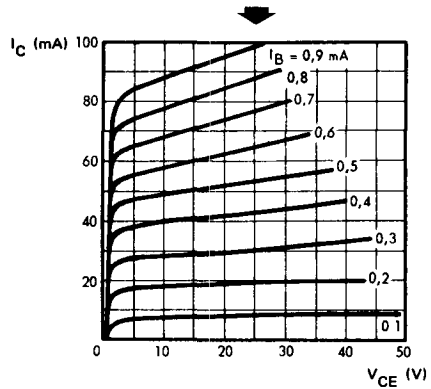
* **2N 2192**
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 * **2N 2193 A**

Caractéristiques statiques
Static characteristics

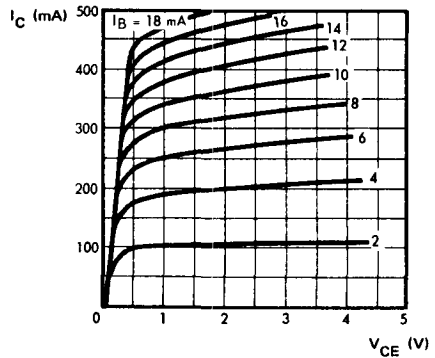
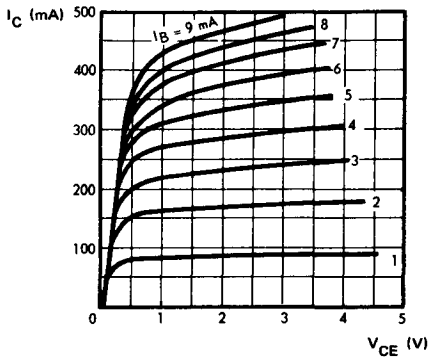
2N 2192
2N 2192 A



2N 2193
2N 2193 A



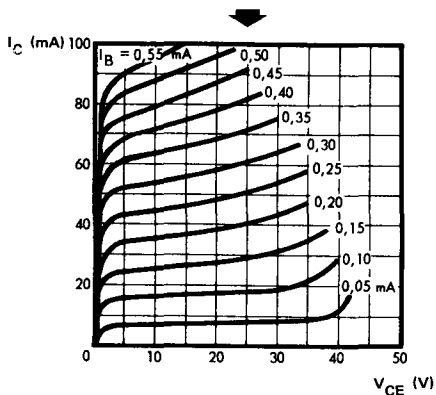
$t_{amb} = 25^\circ\text{C}$



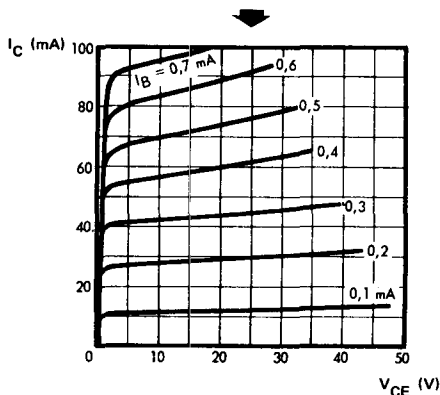
2N 2192 *
2N 2192 A *
2N 2193 *
2N 2193 A *

Caractéristiques statiques
Static characteristics

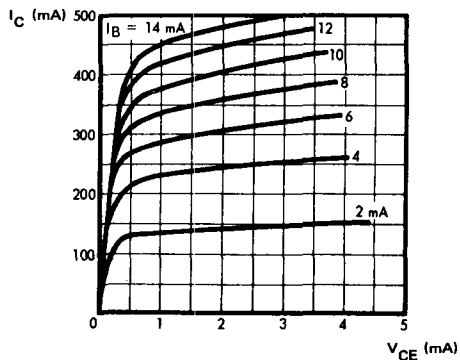
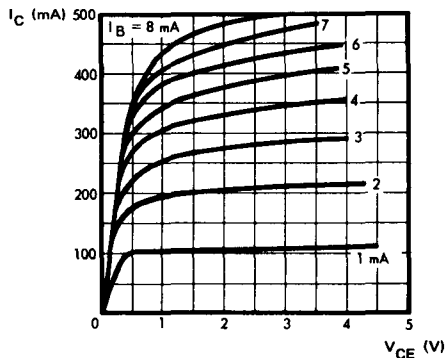
2N 2192
2N 2192 A



2N 2193
2N 2193 A



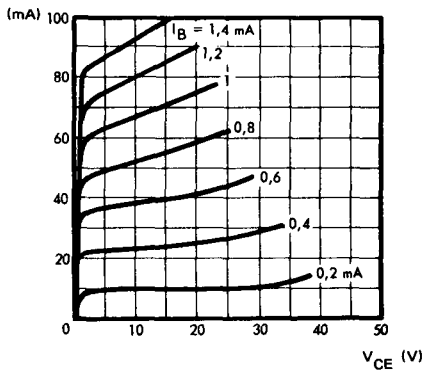
$t_{amb} = 100^\circ C$



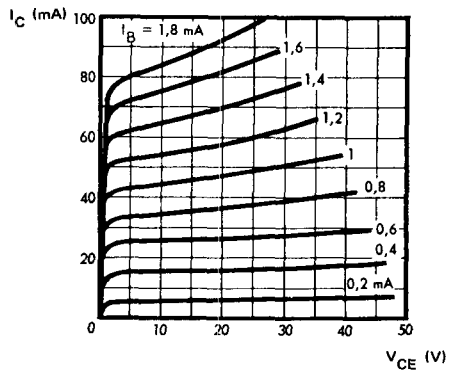
* **2N 2192**
 * **2N 2192 A**
 * **2N 2193**
 * **2N 2193 A**

Caractéristiques statiques
Static characteristics

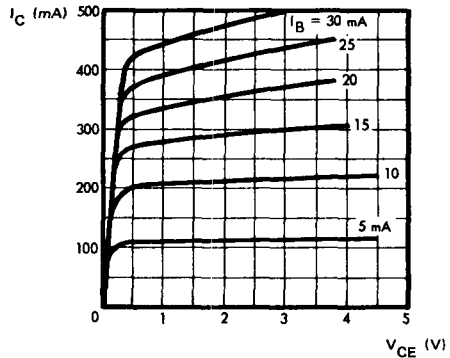
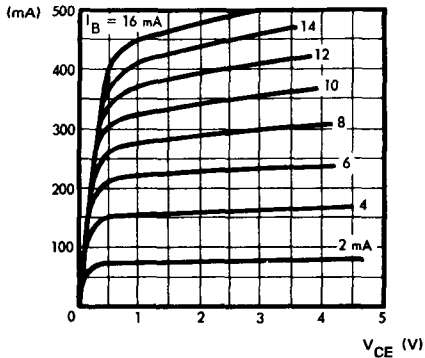
2N 2192
2N 2192 A



2N 2193
2N 2193 A



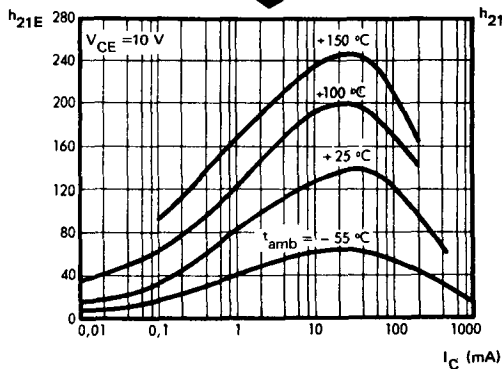
$t_{amb} = -55^\circ\text{C}$



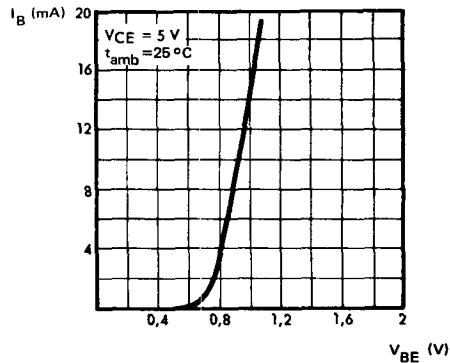
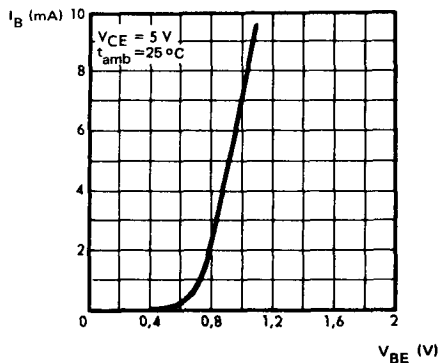
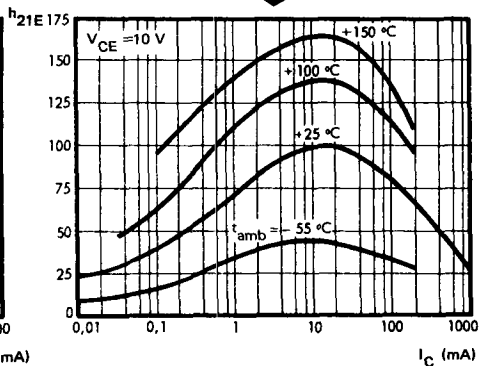
2N 2192 *
2N 2192 A *
2N 2193 *
2N 2193 A *

Caractéristiques statiques
Static characteristics

2N 2192
2N 2192 A

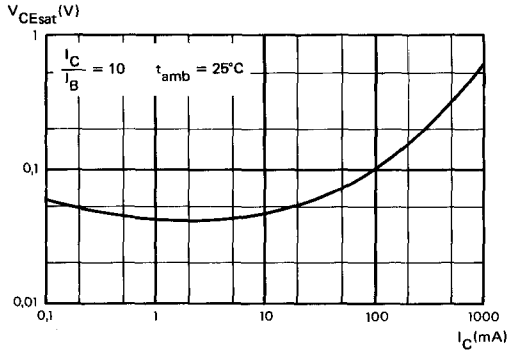


2N 2193
2N 2193 A

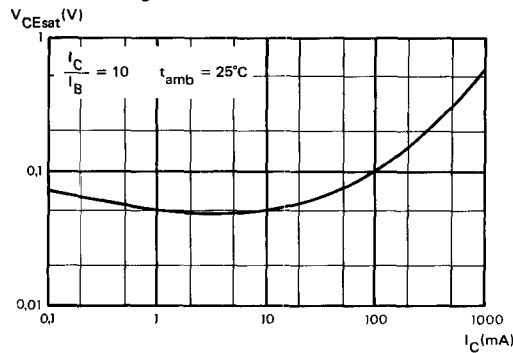


* **2N 2192**
 * **2N 2192 A**
 * **2N 2193**
 * **2N 2193 A**

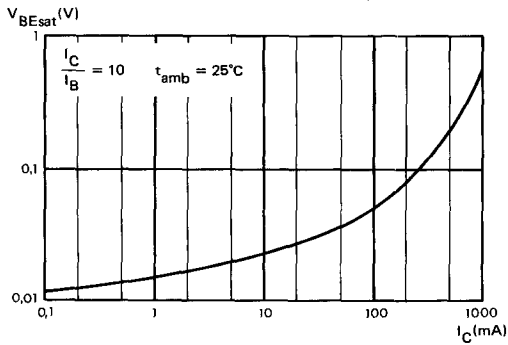
Caractéristiques statiques
Static characteristics



◀ **2N 2192, A**



2N 2193 A ▶



◀ **2N 2192, A**
2N 2193, A

2N 2192 *
2N 2192 A *
2N 2193 *
2N 2193 A *

Caractéristiques dynamiques
Dynamic characteristics

