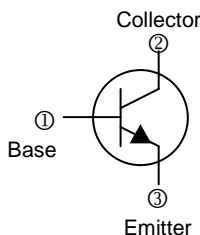


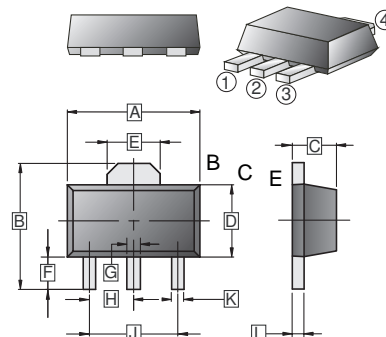
RoHS Compliant Product  
A suffix of "-C" specifies halogen & lead-free

## FEATURES

- Excellent Current-to-Gain Characteristics
- Low Collector Saturation Voltage,
- $V_{CE(SAT)}=0.5V(\text{Max.})$  for  $I_C / I_B=2A/0.1A$



## SOT-89



## MARKING

CFR

CFS

REF.	Millimeter		REF.	Millimeter	
	Min.	Max.		Min.	Max.
A	4.40	4.60	G	0.40	0.58
B	3.94	4.25	H	1.50	TYP
C	1.40	1.60	J	3.00	TYP
D	2.30	2.60	K	0.32	0.52
E	1.50	1.70	L	0.35	0.44
F	0.89	1.20			

## ABSOLUTE MAXIMUM RATINGS ( $T_A = 25^\circ\text{C}$ unless otherwise specified)

PARAMETER	SYMBOL	RATINGS	UNIT
Collector-Base Voltage	$V_{CBO}$	40	V
Collector-Emitter Voltage	$V_{CEO}$	20	V
Emitter-Base Voltage	$V_{EBO}$	6	V
Collector Current-Continuous	$I_C$	3	A
Collector Power Dissipation	$P_C$	500	mW
Junction & Storage Temperature	$T_J, T_{STG}$	150, -55~150	$^\circ\text{C}$

## ELECTRICAL CHARACTERISTICS ( $T_A = 25^\circ\text{C}$ unless otherwise specified)

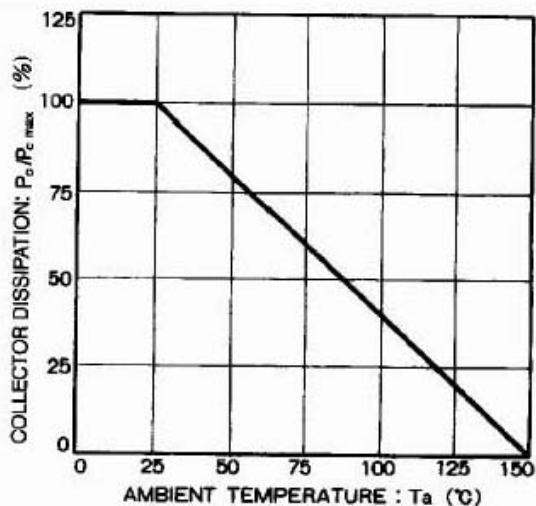
PARAMETER	SYMBOL	MIN.	TYP.	MAX.	UNIT	TEST CONDITIONS
Collector-base breakdown voltage	$V_{(BR)CBO}$	40	-	-	V	$I_C=50\mu\text{A}, I_E=0$
Collector-emitter breakdown voltage	$V_{(BR)CEO}$	20	-	-	V	$I_C=1\text{mA}, I_B=0$
Emitter-base breakdown voltage	$V_{(BR)EBO}$	6	-	-	V	$I_E=50\mu\text{A}, I_C=0$
Collector cut-off current	$I_{CBO}$	-	-	0.1	$\mu\text{A}$	$V_{CB}=30\text{V}, I_E=0$
Emitter cut-off current	$I_{EBO}$	-	-	0.1	$\mu\text{A}$	$V_{EB}=5\text{V}, I_C=0$
DC current gain	$h_{FE}^*$	180	-	560		$V_{CE}=2\text{V}, I_C=100\text{mA}$
Collector-emitter saturation voltage	$V_{CE(sat)}^*$	-	-	0.5	V	$I_C=2\text{A}, I_B=100\text{mA}$
Transition frequency	$f_T^*$	-	290	-	MHz	$V_{CE}=2\text{V}, I_C=500\text{mA}, f=100\text{MHz}$
Collector Output Capacitance	$C_{OB}$	-	25	-	pF	$V_{CB}=10\text{V}, I_E=0, f=1\text{MHz}$

\*Pulse test:  $t_p \leq 300\mu\text{S}, \delta \leq 0.02$

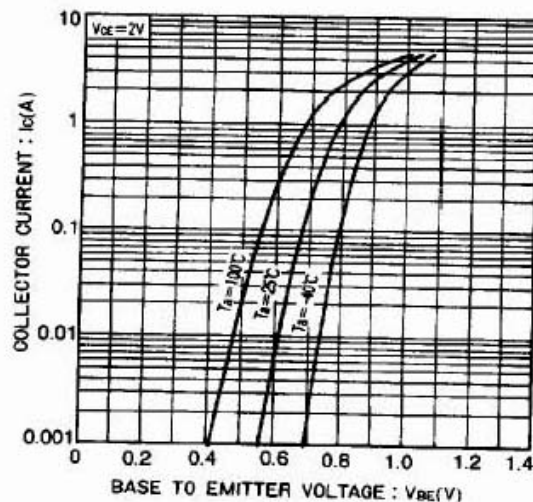
## CLASSIFICATION OF $h_{FE}$

Rank	R	S
Range	180-390	270-560
Marking	CFR	CFS

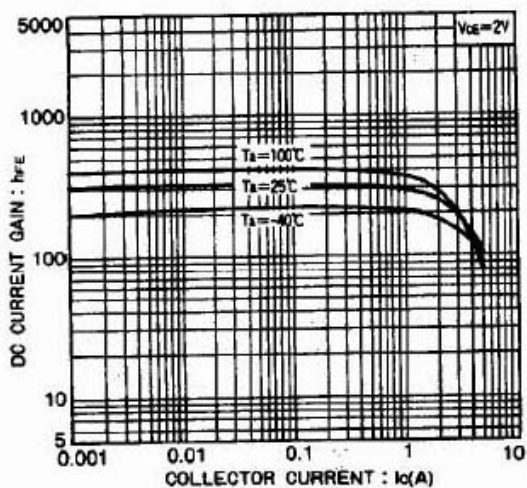
**CHARACTERISTIC CURVES**



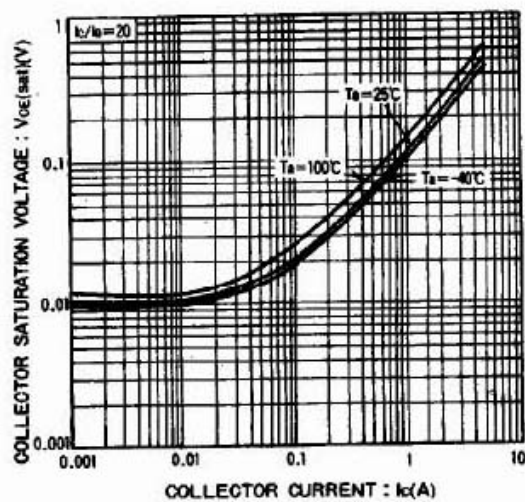
**Figure 1**



**Figure 2**



**Figure 3**



**Figure 4**