



# DATA SHEET

SEMICONDUCTOR

2SA812Q/R/S

## General Purpose Transistors

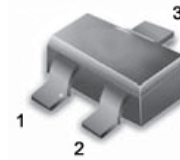
### FEATURE

- High Voltage:  $V_{CEO} = -50\text{ V}$ .
- Epitaxial planar type.
- NPN complement: 2SC1623
- We declare that the material of product compliance with RoHS requirements.
- S- Prefix for Automotive and Other Applications Requiring Unique Site and Control Change Requirements; AEC-Q101 Qualified and PPAP Capable.



### DEVICE MARKING AND ORDERING INFORMATION

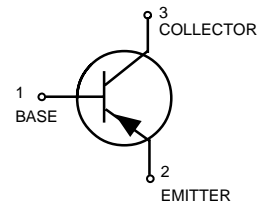
Device	Marking	Shipping
2SA812Q	M8	3000/Tape&Reel
2SA812Q	M8	10000/Tape&Reel
2SA812R	M6	3000/Tape&Reel
2SA812R	M6	10000/Tape&Reel
2SA812S	M7	3000/Tape&Reel
2SA812S	M7	10000/Tape&Reel



SOT-23

### MAXIMUM RATINGS

Rating	Symbol	L2SA812	Unit
Collector-Emitter Voltage	$V_{CEO}$	-50	V
Collector-Base Voltage	$V_{CBO}$	-60	V
Emitter-Base Voltage	$V_{EBO}$	-6	V
Collector current-continuoun	$I_c$	-150	mAdc



### THERMAL CHARATEERISTICS

Characteristic	Symbol	Max	Unit
Total Device Dissipation FR-5 Board, (1) $T_A=25^\circ\text{C}$ Derate above $25^\circ\text{C}$	$P_D$	200 1.8	mW mW/ $^\circ\text{C}$
Thermal Resistance, Junction to Ambient	$R_{\theta JA}$	556	$^\circ\text{C/W}$
Total Device Dissipation Alumina Substrate, (2) $T_A=25^\circ\text{C}$ Derate above $25^\circ\text{C}$	$P_D$	200 2.4	mW mW/ $^\circ\text{C}$
Thermal Resistance, Junction to Ambient	$R_{\theta JA}$	417	$^\circ\text{C/W}$
Junction and Storage Temperature	$T_j, T_{stg}$	-55 to +150	$^\circ\text{C}$

# DEVICE CHARACTERISTICS

## 2SA812Q/R/S

### ELECTRICAL CHARACTERISTICS (TA=25°C unless otherwise noted)

Characteristic	Symbol	Min	Typ	Max	Unit
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#### OFF CHARACTERISTICS

Collector-Emitter Breakdown Voltage (IC=-1mA)	V <sub>(BR)CEO</sub>	-50	-	-	V
Emitter-Base Breakdown Voltage (IE=-50 μA )	V <sub>(BR)EBO</sub>	-6	-	-	V
Collector-Base Breakdown Voltage (IC=-50 μA)	V <sub>(BR)CBO</sub>	-60	-	-	V
Collector Cutoff Current (V <sub>CB</sub> =-50V)	I <sub>CBO</sub>	-	-	-0.1	μA
Emitter Cutoff Current (V <sub>BE</sub> =-6V)	I <sub>EBO</sub>	-	-	-0.1	μA

#### ON CHARACTERISTICS

DC Current Gain (IC=-1mA, V <sub>CE</sub> =-6.0V)	h <sub>FE</sub>	120	-	560	
Collector-Emitter Saturation Voltage (IC=-100mA, IB=-10mA)	V <sub>CE(sat)</sub>	-	-0.18	-0.3	V
Base -Emitter On Voltage IE=-1.0mA, V <sub>CE</sub> =-6.0V)	V <sub>BE</sub>	-0.58	-0.62	-0.68	V

#### SMALL-SIGNAL CHARACTERISTICS

Current-Gain-Bandwidth Product (V <sub>CE</sub> =-6.0V, IE=-10mA)	F <sub>t</sub>	-	180	-	MHz
Output Capacitance(V <sub>CE</sub> = -10V, IE=0, f=1.0MHz)	C <sub>obo</sub>	-	4.5	-	pF

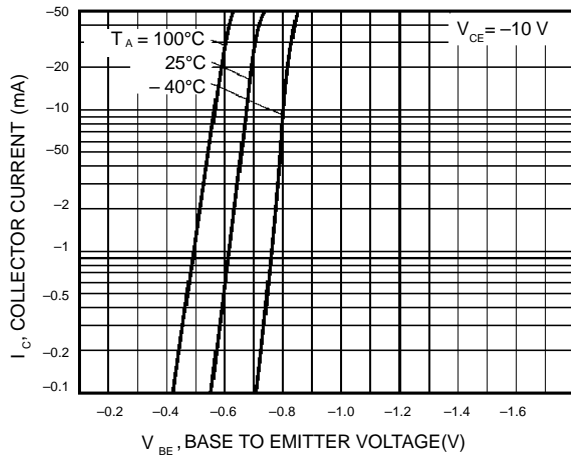
h<sub>FE</sub> Values are classified as follows

NOTE:	*	Q	R	S
	h <sub>FE</sub>	120~270	180~390	270~560

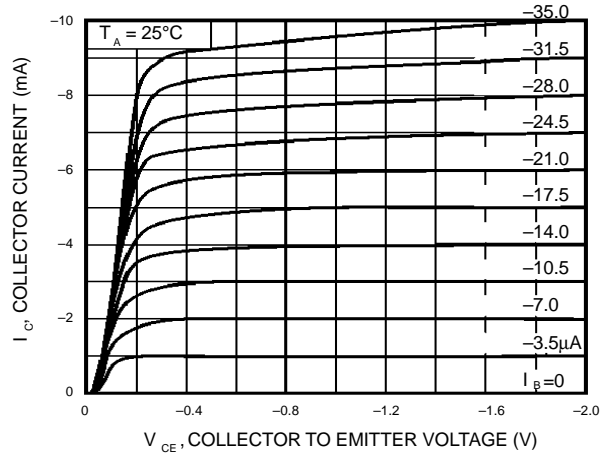
# DEVICE CHARACTERISTICS

## 2SA812Q/R/S

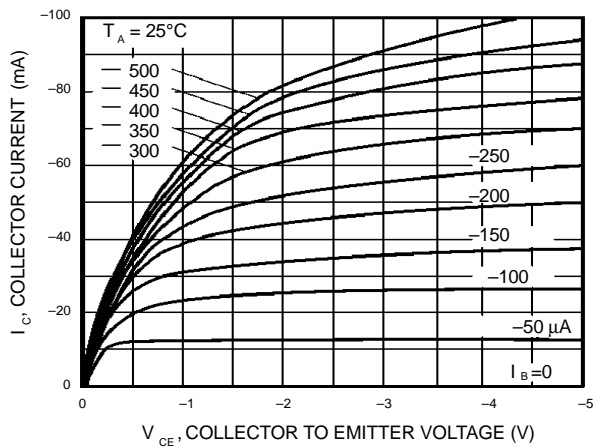
**Fig.1** Grounded emitter propagation characteristics



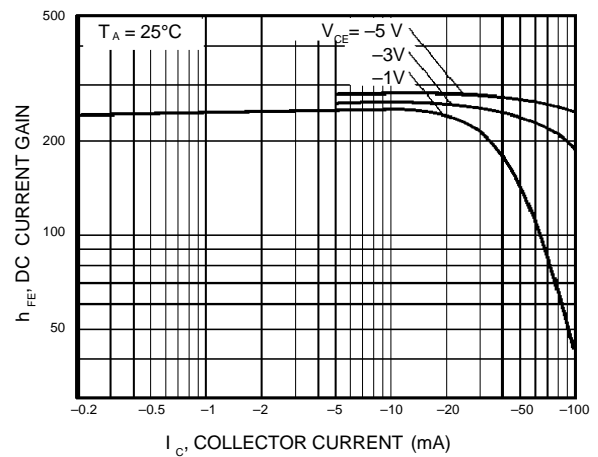
**Fig.2** Grounded emitter output characteristics(I)



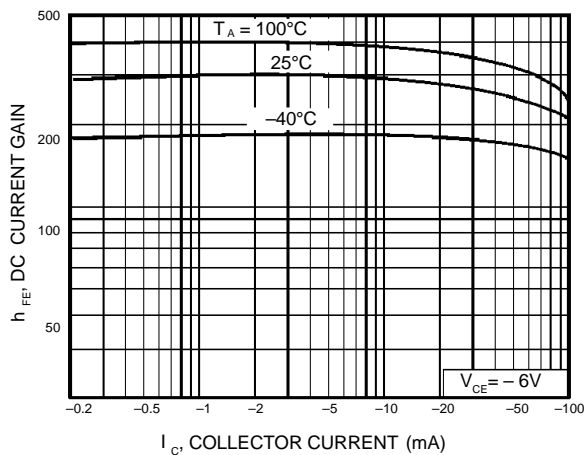
**Fig.3** Grounded emitter output characteristics(II)



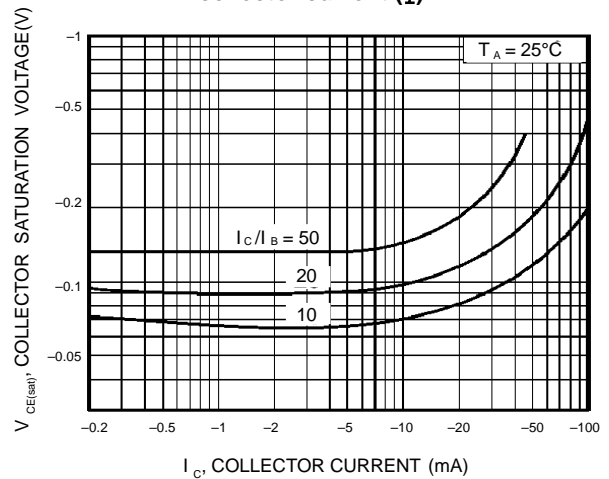
**Fig.4** DC current gain vs. collector current (I)



**Fig.5** DC current gain vs. collector current (II)



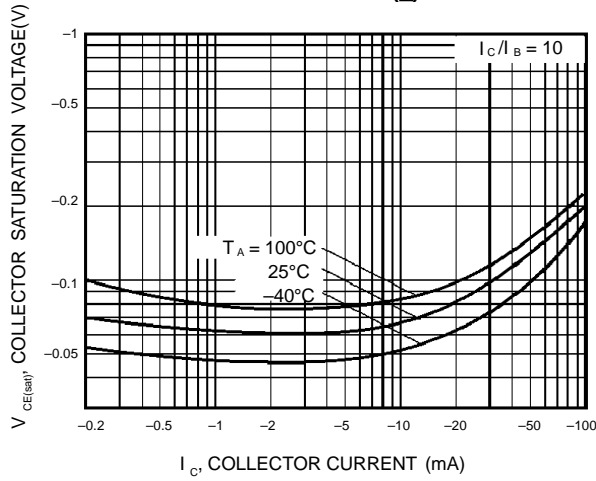
**Fig.6** Collector-emitter saturation voltage vs. collector current (I)



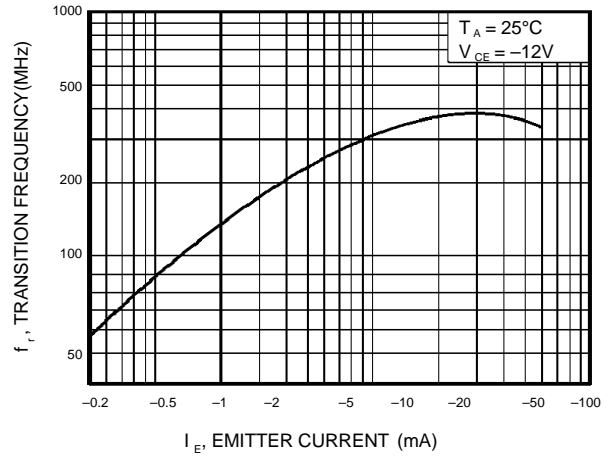
# PACKAGE OUTLINE & DIMENSIONS

## 2SA812Q/R/S

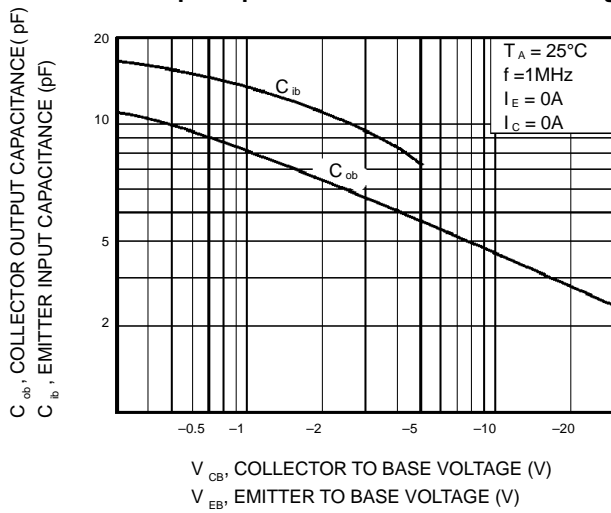
**Fig.7 Collector-emitter saturation voltage vs. collector current (II)**



**Fig.8 Gain bandwidth product vs. emitter current**



**Fig.9 Collector output capacitance vs. collector-base voltage  
Emitter input capacitance vs. emitter-base voltage**



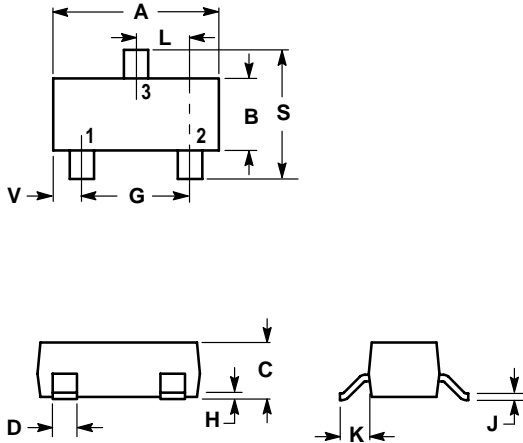
# PACKAGE OUTLINE & DIMENSIONS

## 2SA812Q/R/S

### SOT-23

**NOTES:**

1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M,1982
2. CONTROLLING DIMENSION: INCH.



DIM	INCHES		MILLIMETERS	
	MIN	MAX	MIN	MAX
A	0.1102	0.1197	2.80	3.04
B	0.0472	0.0551	1.20	1.40
C	0.0350	0.0440	0.89	1.11
D	0.0150	0.0200	0.37	0.50
G	0.0701	0.0807	1.78	2.04
H	0.0005	0.0040	0.013	0.100
J	0.0034	0.0070	0.085	0.177
K	0.0140	0.0285	0.35	0.69
L	0.0350	0.0401	0.89	1.02
S	0.0830	0.1039	2.10	2.64
V	0.0177	0.0236	0.45	0.60

