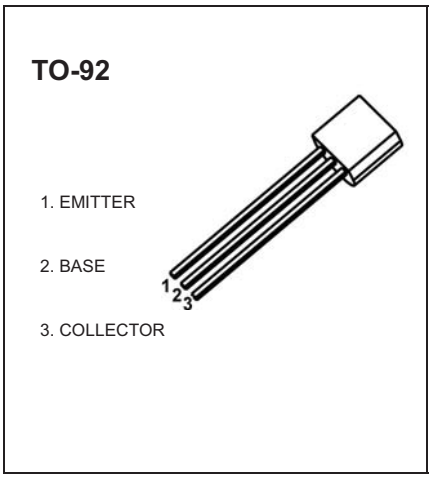
TO-92 Plastic-Encapsulate Transistors

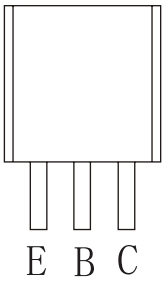
TRANSISTOR (NPN)



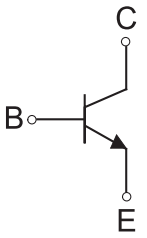
FEATURES

- Complementary to S9012
- Excellent h_{FE} linearity

MARKING



Equivalent Circuit



ORDERING INFORMATION

Part Number	Package	Packing Method	Pack Quantity
S9013	TO-92	Bulk	1000pcs/Bag
S9013-TA	TO-92	Tape	2000pcs/Box

MAXIMUM RATINGS (T_a=25℃ unless otherwise noted)

Symbol	Parameter	Value	Unit
V_{CBO}	Collector-Base Voltage	40	V
V_{CEO}	Collector-Emitter Voltage	25	V
V_{EBO}	Emitter-Base Voltage	5	V
I_C	Collector Current -Continuous	0.5	A
P_D	Collector Power Dissipation	625	mW
$R_{\theta JA}$	Thermal Resistance from Junction to Ambient	200	℃ /W
T_j	Junction Temperature	150	℃
T_{stg}	Storage Temperature	-55~+150	℃

ELECTRICAL CHARACTERISTICS

T_a=25℃ unless otherwise specified

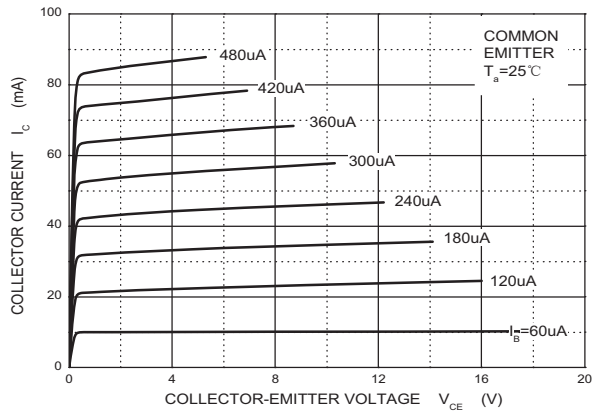
Parameter	Symbol	Test conditions	Min	Typ	Max	Unit
Collector-base breakdown voltage	$V_{(BR)CBO}$	I_C= 100μA , I_E=0	40			V
Collector-emitter breakdown voltage	$V_{(BR)CEO}$	I_C= 1mA , I_B=0	25			V
Emitter-base breakdown voltage	$V_{(BR)EBO}$	I_E= 100μA , I_C=0	5			V
Collector cut-off current	I_{CBO}	V_{CB}= 40V , I_E=0			0.1	μA
Collector cut-off current	I_{CEO}	V_{CE}=20V , I_E=0			0.1	μA
Emitter cut-off current	I_{EBO}	V_{EB}= 5V, I_C=0			0.1	μA
DC current gain	$h_{FE(1)}$	V_{CE}=1V, I_C=50mA	64		400	
	$h_{FE(2)}$	V_{CE}=1V, I_C= 500mA	40			
Collector-emitter saturation voltage	$V_{CE(sat)}$	I_C= 500mA, I_B= 50mA			0.6	V
Base-emitter voltage	$V_{BE(sat)}$	I_C= 500mA, I_B= 50mA			1.2	V
Transition frequency	f_T	V_{CE}=6V,I_C=20mA,f=30MHz	150			MHz

CLASSIFICATION OF $h_{FE(1)}$

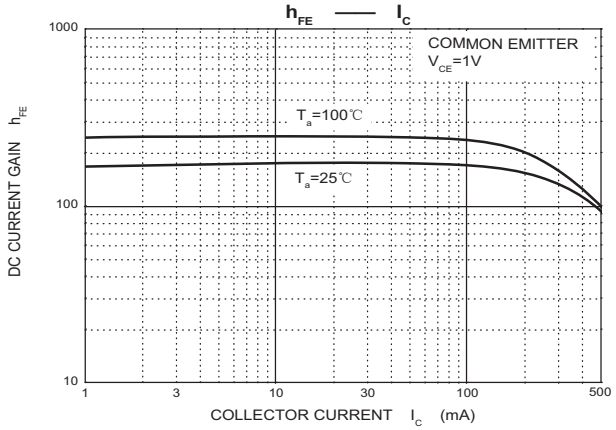
Rank	D	E	F	G	H	I	J
Range	64-91	78-112	96-135	112-166	144-202	190-300	300-400

Typical Characteristics

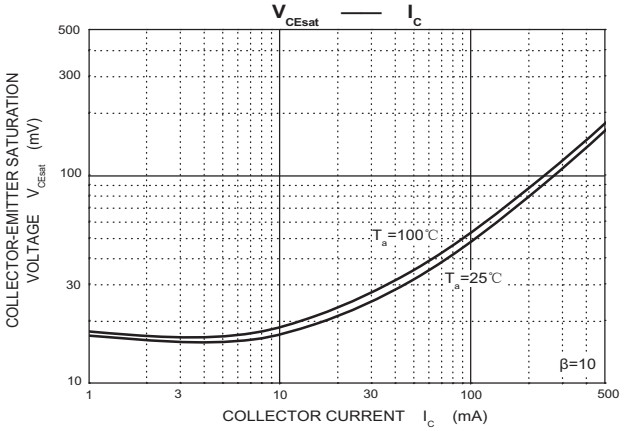
Static Characteristic



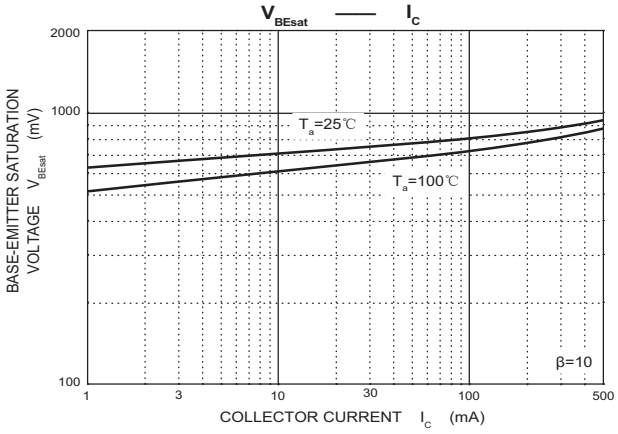
h_{FE} —— I_C



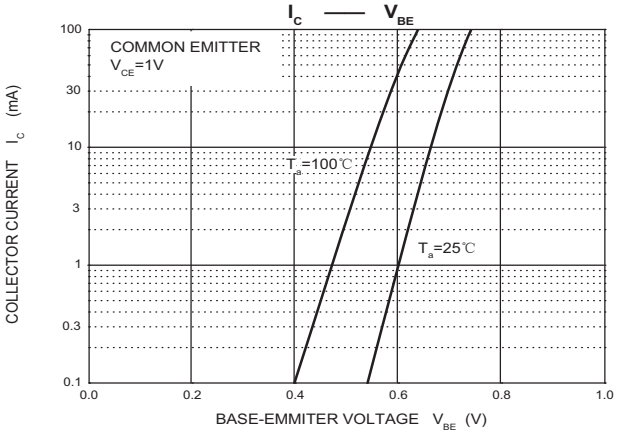
V_{CEsat} —— I_C



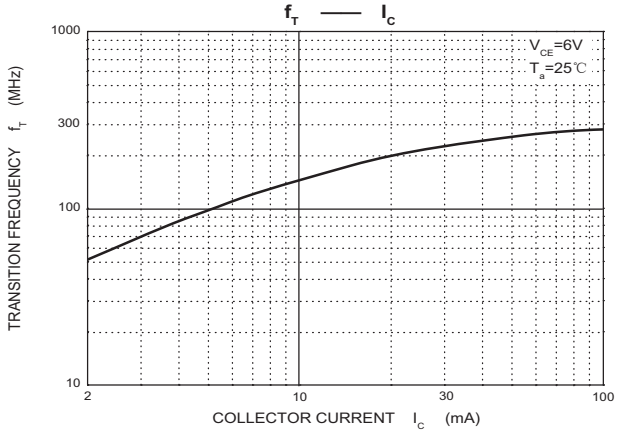
V_{BEsat} —— I_C



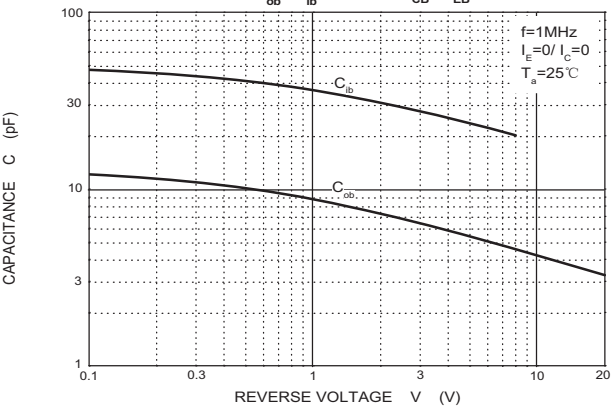
I_C —— V_{BE}



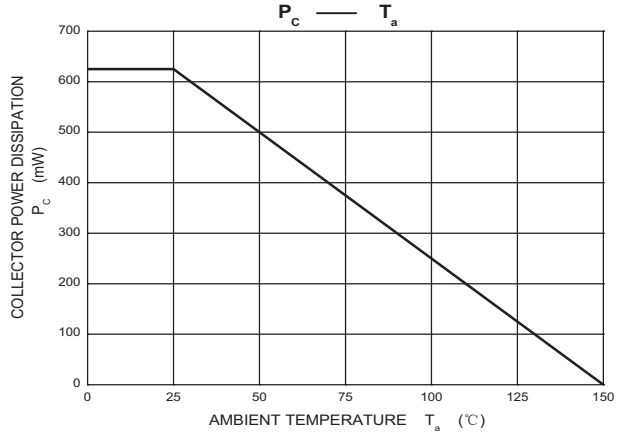
f_T —— I_C



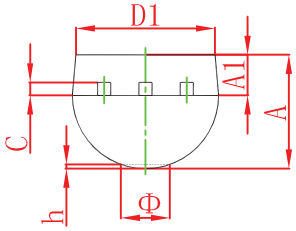
C_{ob}/ C_{ib} —— V_{CB}/ V_{EB}

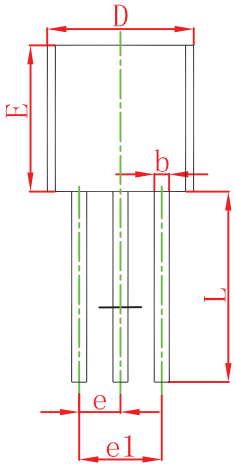


P_C —— T_a



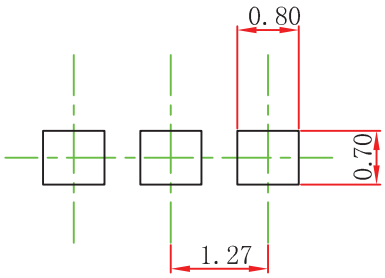
TO-92 Package Outline Dimensions





Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	3.300	3.700	0.130	0.146
A1	1.100	1.400	0.043	0.055
b	0.380	0.550	0.015	0.022
c	0.360	0.510	0.014	0.020
D	4.300	4.700	0.169	0.185
D1	3.430		0.135	
E	4.300	4.700	0.169	0.185
e	1.270 TYP		0.050 TYP	
e1	2.440	2.640	0.096	0.104
L	14.100	14.500	0.555	0.571
Φ		1.600		0.063
h	0.000	0.380	0.000	0.015

TO-92 Suggested Pad Layout



Note:
1.Controlling dimension:in millimeters.
2.General tolerance:± 0.05mm.
3.The pad layout is for reference purposes only.

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