

SEBT9012,9013,9014,9015,9016,9018

PNP Plastic-Encapsulate Transistors (9012, 9015)

NPN Plastic-Encapsulate Transistors (9013, 9014,9016, 9018) Revision: A

Feature

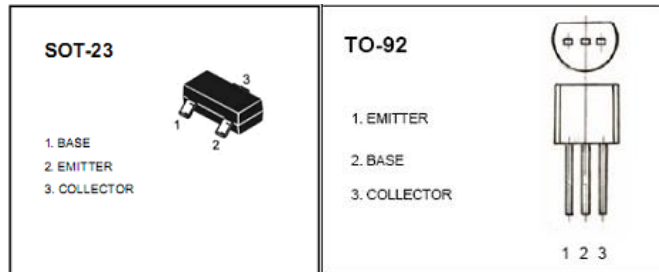
- AM/FM Amplifier, local oscillator of FM/VHF tuner
- High current gain bandwidth product

Applications

- Inverter, Interface, Driver

9012 is complementary to 9013

9014 is complementary to 9015



Absolute Maximum Ratings (TA=25°C)

Parameter	Symbol	9012	9013	9014	9015	9016	9018	Units
Collector-base voltage	V _{CBO}	-40	40	50	-50	30	30	V
Collector-emitter voltage	V _{CEO}	-25	25	45	-45	20	15	V
Emitter-base voltage	V _{EBO}	-5	5	5	-5	4	5	V
Collector current	I _C	-500	500	100	-100	25	50	mA
Collector power dissipation	P _C	300	300	200	200	200	200	mW
Junction temperature	T _J	150						°C
Storage temperature	T _{stg}	-55 to +150						°C

Thermal Characteristics

Thermal Resistance	R _{θJA}	416	625	°C/W
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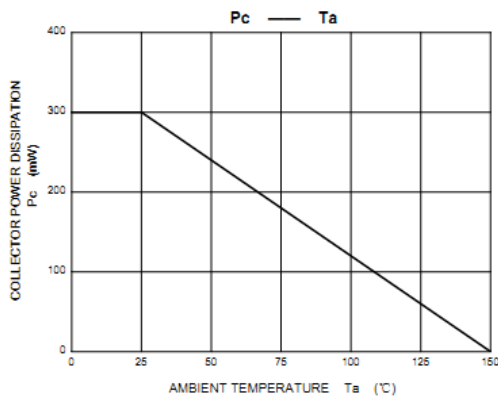
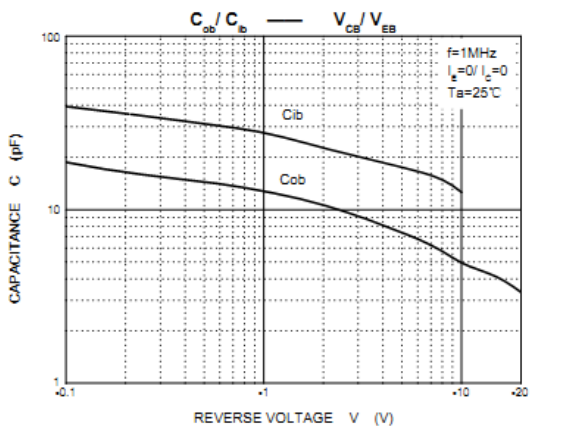
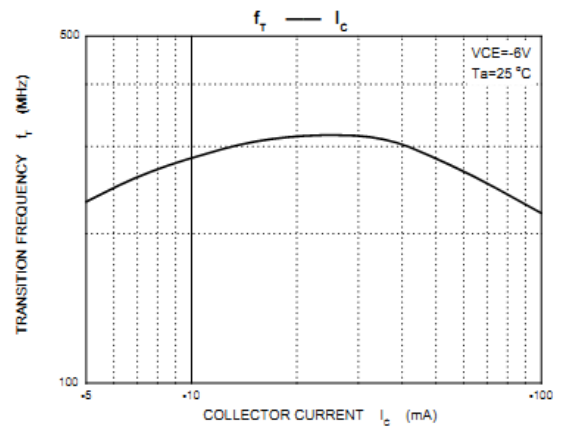
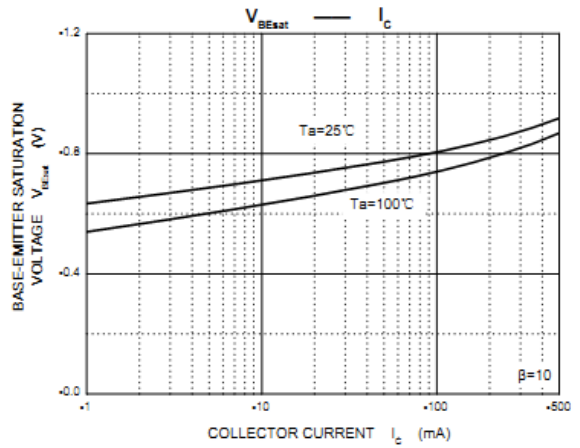
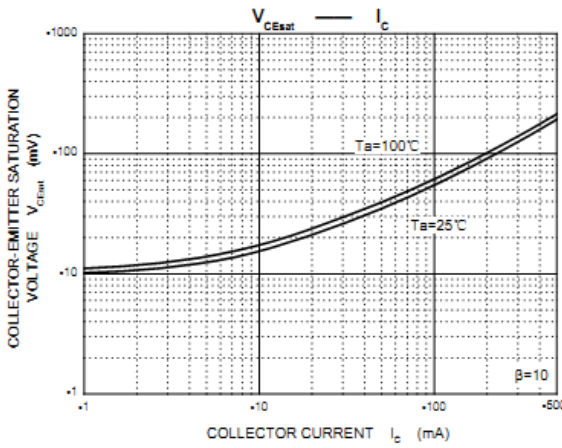
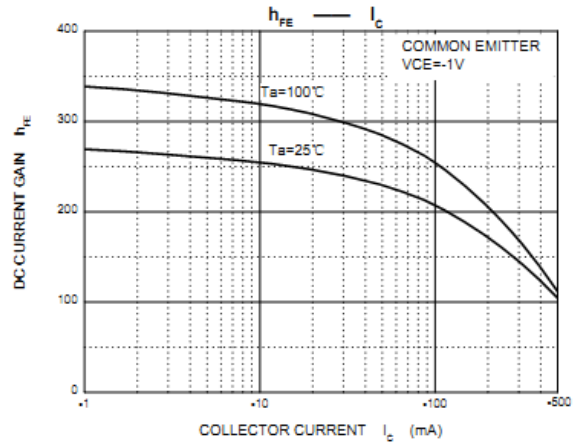
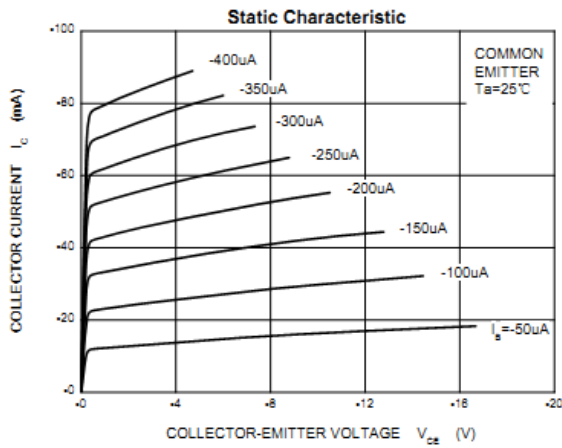
Electrical Characteristics (TA=25°C)

Parameter	Symbol	Conditions	PN	Min.	Typ.	Max.	Unit
Collector-base breakdown voltage	BV _{CBO}	IC=-100μA, IE=0	9012	-40			V
		IC=100μA, IE=0	9013	40			
		IC=-100μA, IE=0	9014	50			
		IC=-100μA, IE=0	9015	-50			
		IC=100μA, IE=0	9016	30			
		IC=100μA, IE=0	9018	30			
Collector-emitter breakdown voltage	BV _{CEO}	IC=-1mA, IB=0	9012	-25			V
		IC=1mA, IB=0	9013	25			
		IC=0.1mA, IB=0	9014	45			
		IC=-0.1mA, IB=0	9015	-45			
		IC=0.1mA, IB=0	9016	20			
		IC=1mA, IB=0	9018	15			

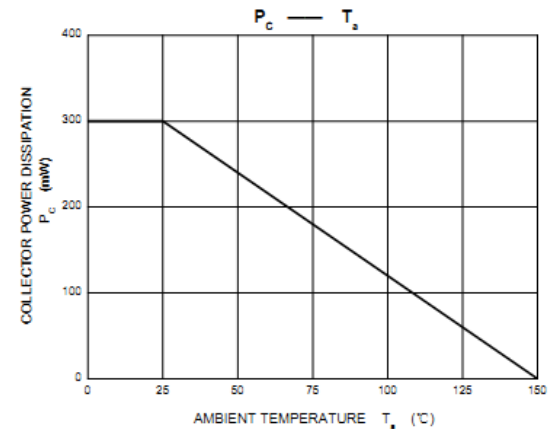
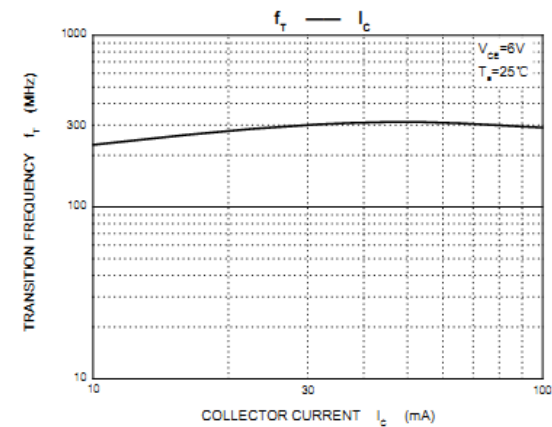
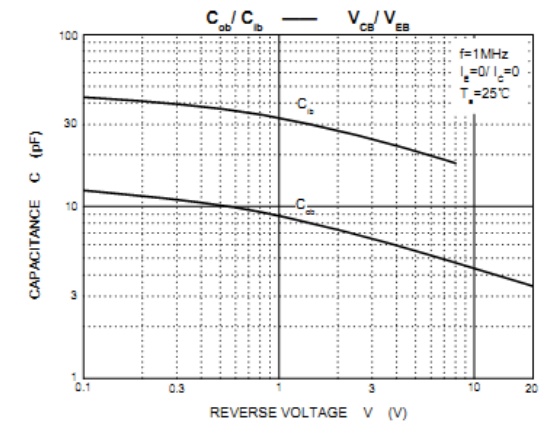
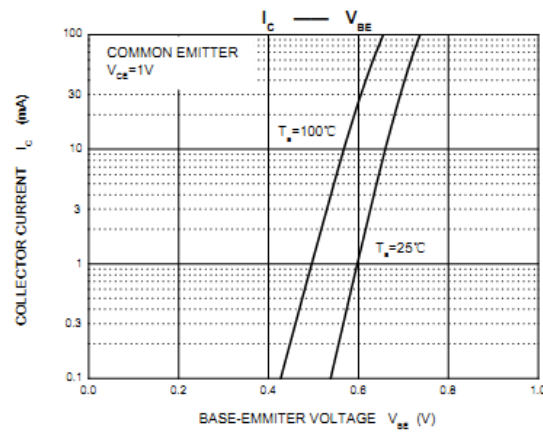
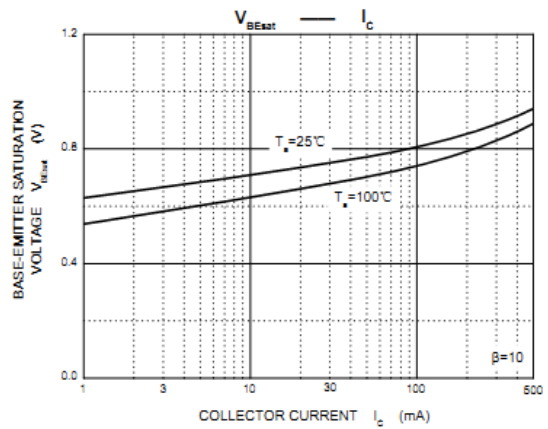
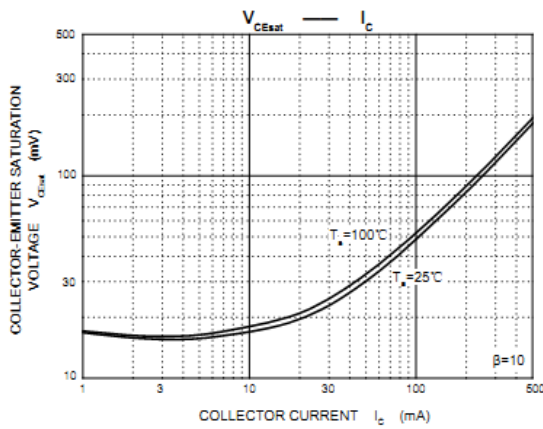
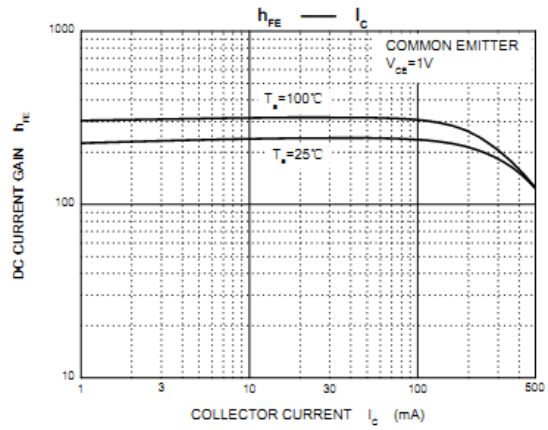
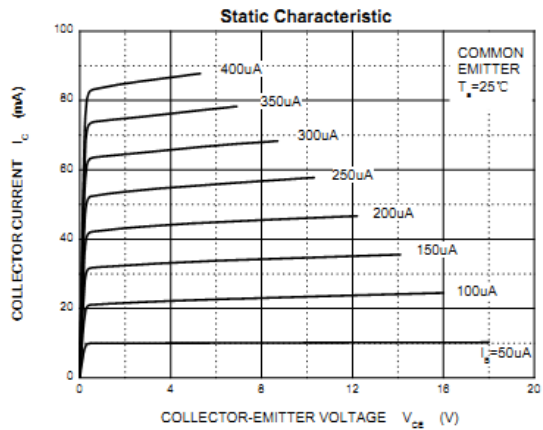
Parameter	Symbol	Conditions	PN	Min.	Typ.	Max.	Unit
Emitter-base breakdown voltage	BV _{EBO}	IE=-100μA, IC=0	9012	-5			V
		IE=100μA, IC=0	9013	5			
		IE=100μA, IC=0	9014	5			
		IE=-100μA, IC=0	9015	-5			
		IE=100μA, IC=0	9016	4			
		IE=100μA, IC=0	9018	5			
Collector cut-off current	I _{CBO}	VCB=-40V, IE=0	9012			-0.1	μA
		VCB=40V, IE=0	9013			0.1	
		VCB=50V, IE=0	9014			0.1	
		VCB=-50V, IE=0	9015			-0.1	
		VCB=30V, IE=0	9016			0.1	
		VCB=12V, IE=0	9018			0.05	
Collector cutoff current	I _{CEO}	VCE=-20V, IB=0	9012			-0.1	μA
		VCE=20V, IB=0	9013			0.1	
		VCE=35V, IB=0	9014			0.1	
		VCE=-35V, IB=0	9015			-0.1	
		VCE=30V, IB=0	9016			0.1	
		VCE=12V, IB=0	9018			0.1	
Emitter cut-off current	I _{EBO}	VEB=-5V, IC=0	9012			-0.1	μA
		VEB=5V, IC=0	9013			0.1	
		VEB=3V, IC=0	9014			0.1	
		VEB=-3V, IC=0	9015			-0.1	
		VEB=3V, IC=0	9016			0.1	
		VEB=3V, IC=0	9018			0.1	
Collector-emitter saturation voltage	V _{CE(sat)}	I _C =-500mA, I _B =-50mA	9012			-0.6	V
		I _C =500mA, I _B =50mA	9013			0.6	
		I _C =100mA, I _B =5mA	9014			0.3	
		I _C =-100mA, I _B =-50mA	9015			-0.3	
		I _C =10mA, I _B =1mA	9016			0.3	
		I _C =10mA, I _B =1mA	9018			0.5	
Base-emitter saturation voltage	V _{BE(sat)}	I _C =-500mA, I _B =-50mA	9012			-1.2	V
		I _C =500mA, I _B =50mA	9013			1.2	
		I _C =100mA, I _B =5mA	9014			1	
		I _C =-100mA, I _B =-50mA	9015			-1	
		I _C =10mA, I _B =1mA	9016			1.2	
		I _C =10mA, I _B =1mA	9018			1.4	

Parameter	Symbol	Conditions	PN	Min.	Typ.	Max.	Unit
DC current transfer ratio	hfe	VCE=-1V, IC=-50mA	9012	120		400	
		VCE=1V, IC=50mA	9013	120		400	
		VCE=5V, IC=1mA	9014	200		1000	
		VCE=-5V, IC=-1mA	9015	200		1000	
		VCE=5V, IC=1mA	9016	28		198	
		VCE=5V, IC=1mA	9018	70		190	
Transition frequency	fT	VCE=-6V, IC=-20mA, f=30MHz	9012	150			MHz
		VCE=6V, IC=20mA, f=30MHz	9013	150			
		VCE=5V, IC=10mA, f=30MHz	9014	150			
		VCE=-5V, IC=-10mA, f=30MHz	9015	150			
		VCE=5V, IC=1mA, f=400MHz	9016	400			
		VCE=5V, IC=5mA, f=400MHz	9018	800			

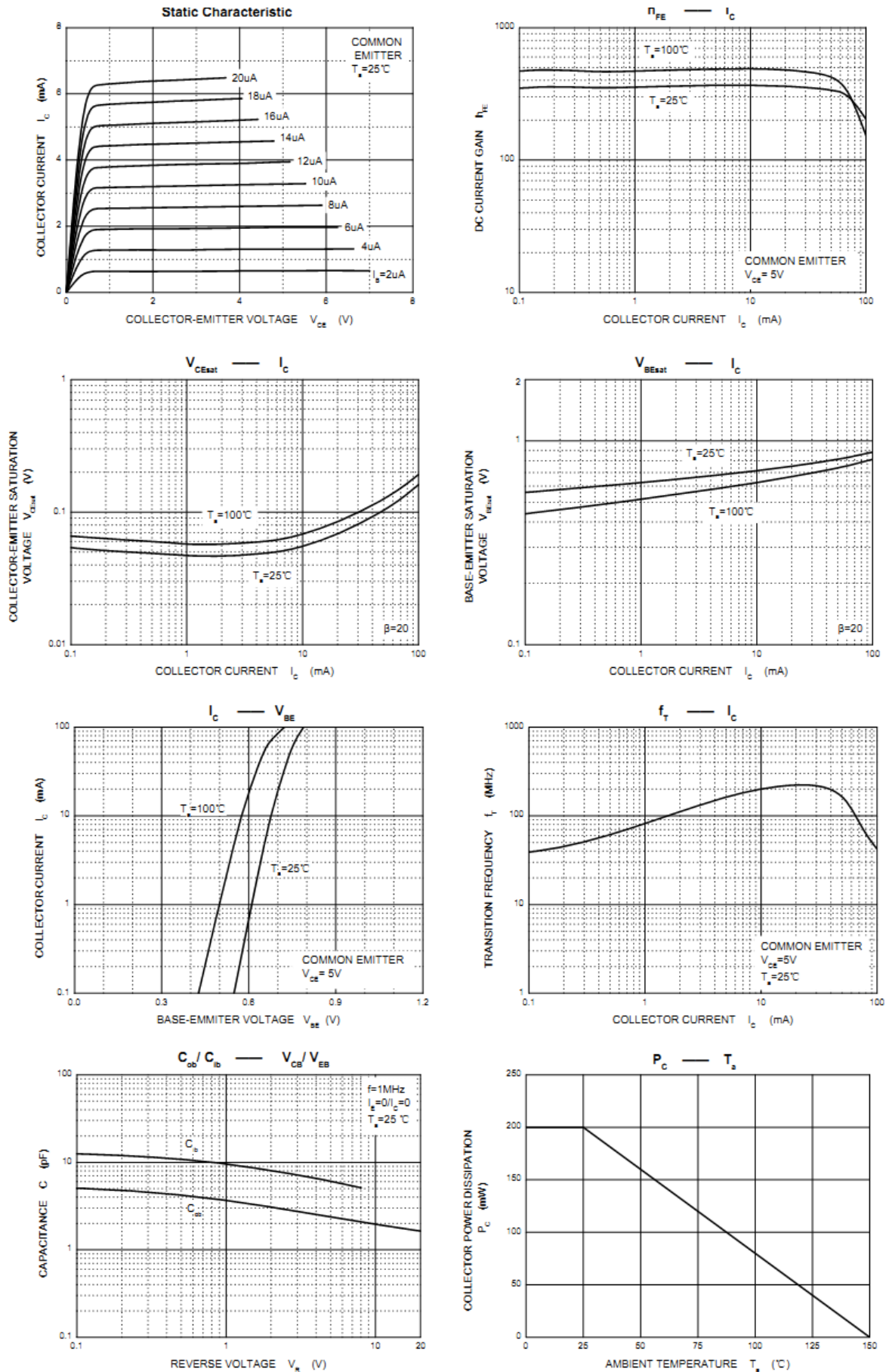
Typical Characteristics (SEBT9012)



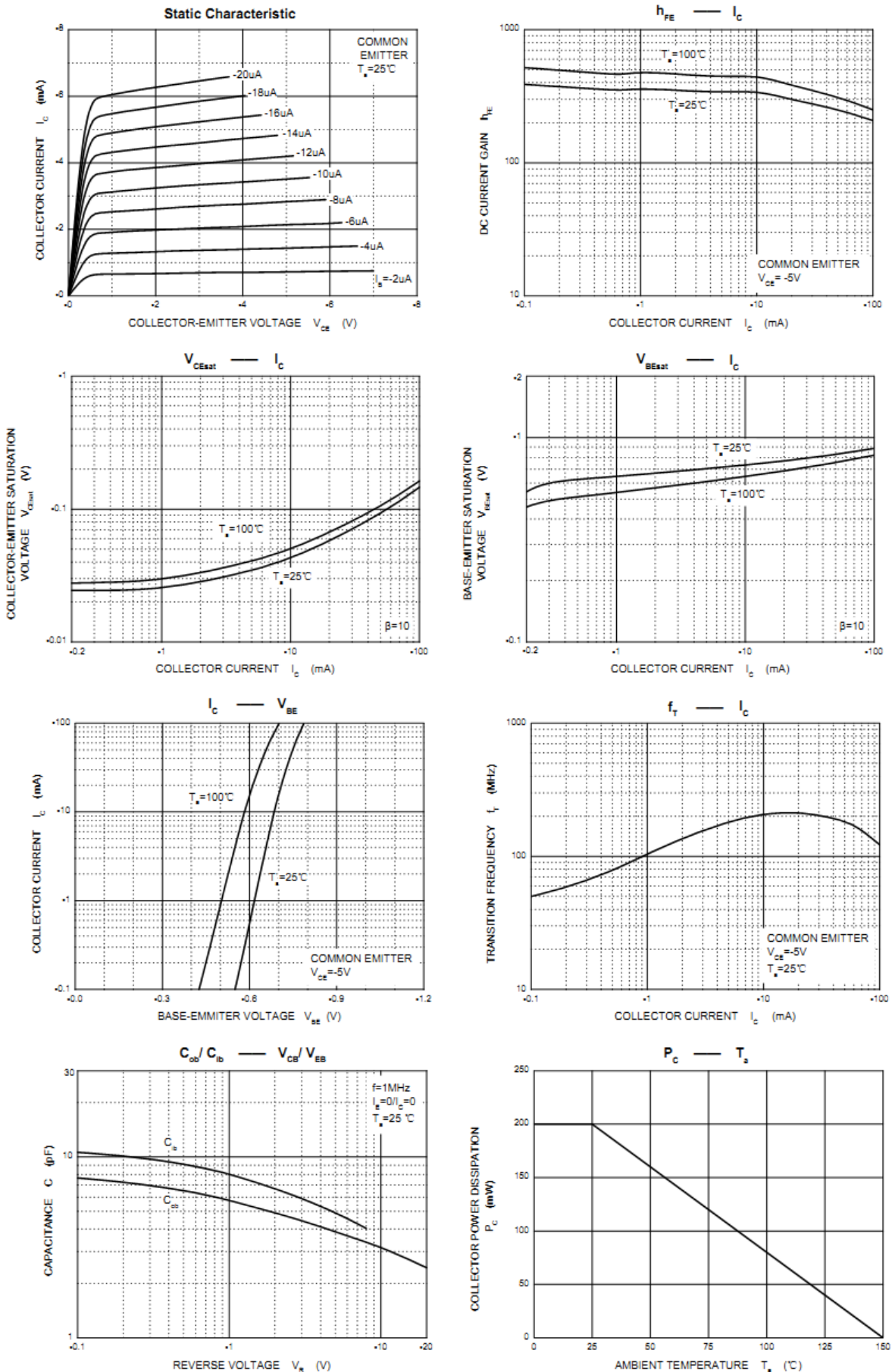
Typical Characteristics (SEBT9013)



Typical Characteristics (SEBT9014)



Typical Characteristics (SEBT9015)



Typical Characteristics (SEBT9016)

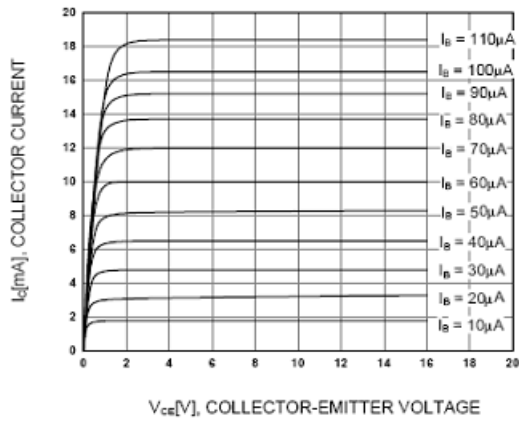


Figure 1. Static Characteristic

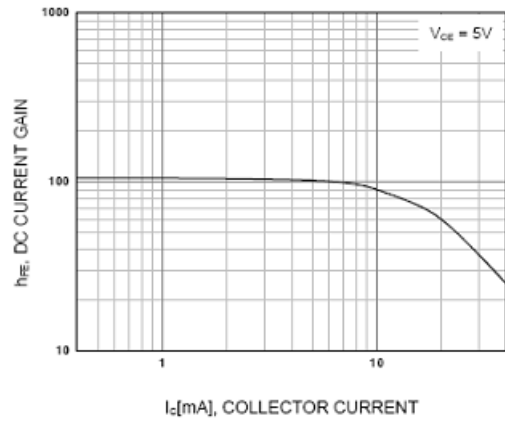


Figure 2. DC current Gain

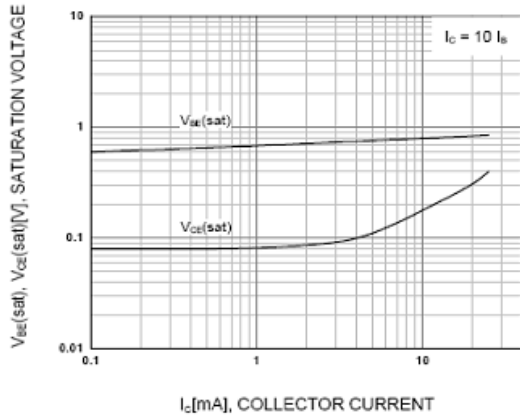


Figure 3. Base-Emitter Saturation Voltage
Collector-Emitter Saturation Voltage

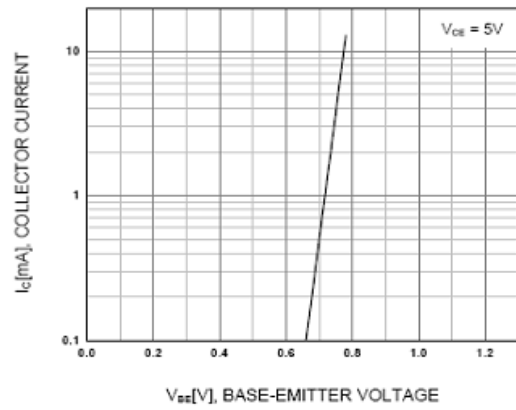


Figure 4. Base-Emitter On Voltage

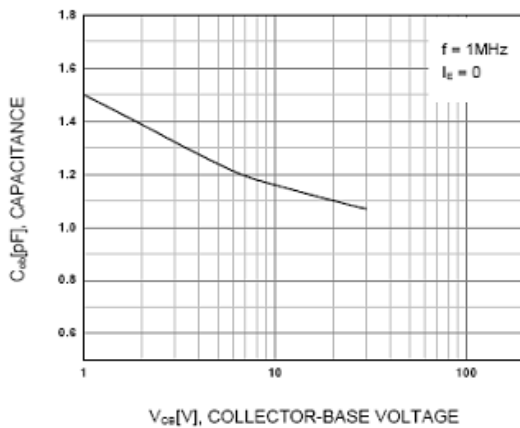


Figure 5. Collector Output Capacitance

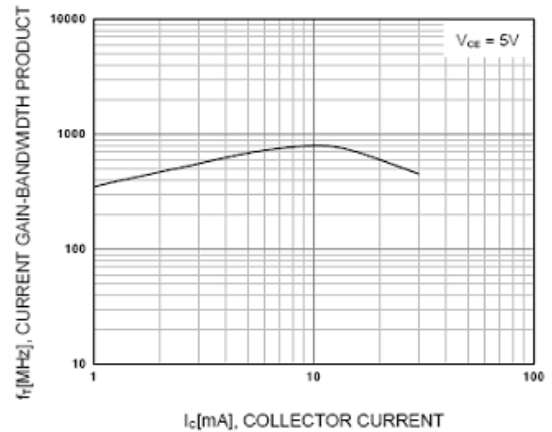
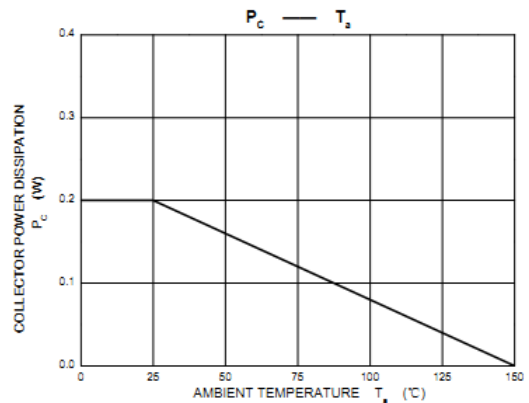
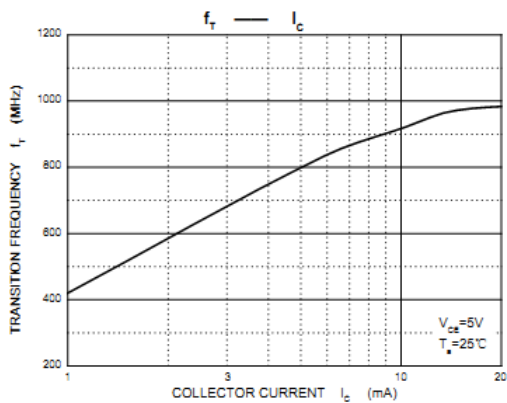
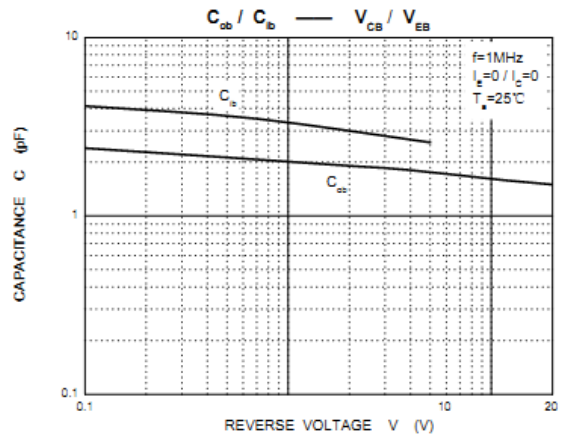
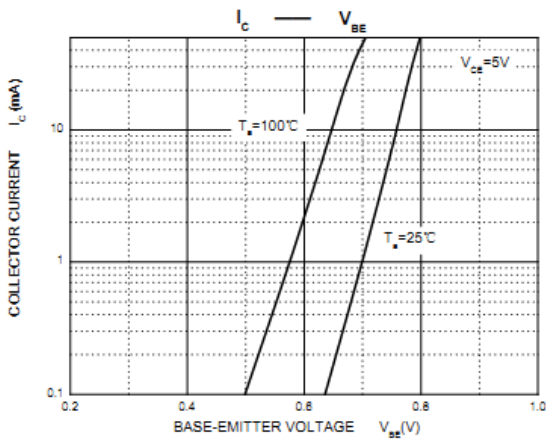
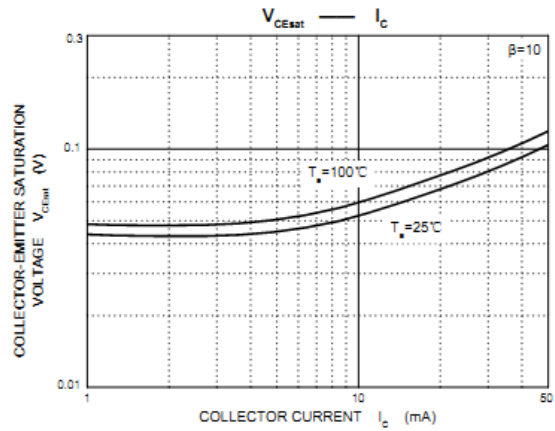
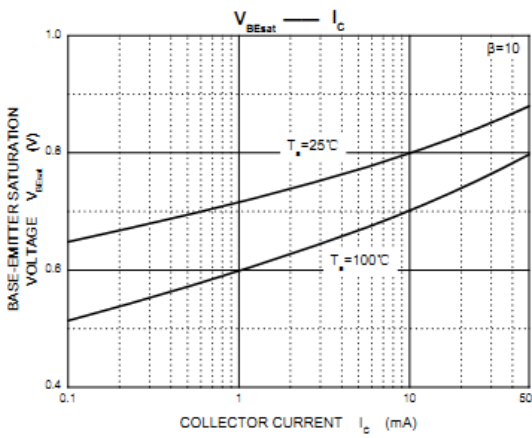
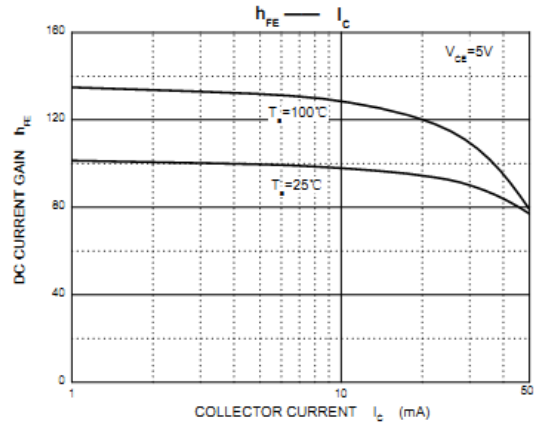
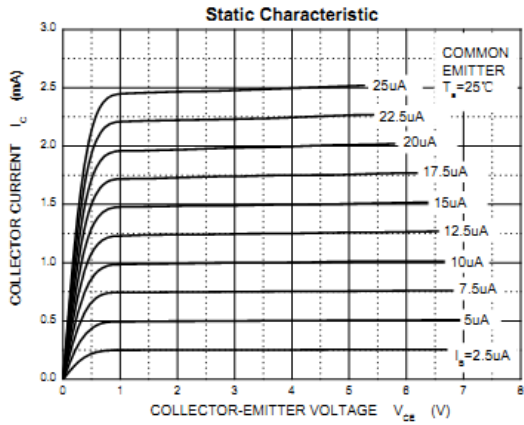


Figure 6. Current Gain Bandwidth Product

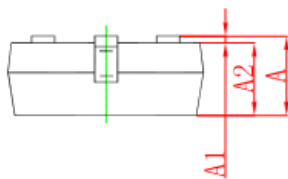
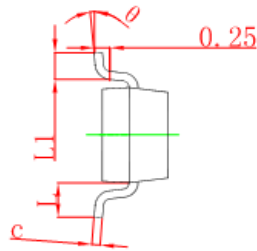
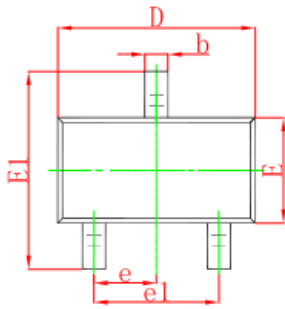
Typical Characteristics (SEBT9018)



SEBT90XX

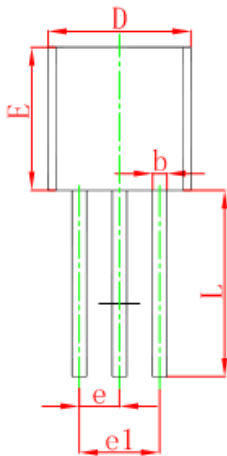
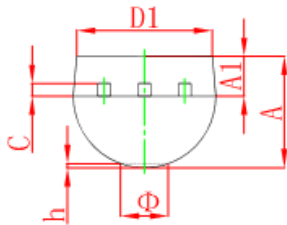
Package Information

SOT-23



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	0.900	1.150	0.035	0.045
A1	0.000	0.100	0.000	0.004
A2	0.900	1.050	0.035	0.041
b	0.300	0.500	0.012	0.020
c	0.080	0.150	0.003	0.006
D	2.800	3.000	0.110	0.118
E	1.200	1.400	0.047	0.055
E1	2.250	2.550	0.089	0.100
e	0.950 TYP		0.037 TYP	
e1	1.800	2.000	0.071	0.079
L	0.550 REF		0.022 REF	
L1	0.300	0.500	0.012	0.020
θ	0°	8°	0°	6°

TO-92



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

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SHANGHAI SINO-IC MICROELECTRONICS CO., LTD

Add: Building 3, Room 3401-03, No.200 Zhangheng Road,
ZhangJiang Hi-Tech Park, Pudong, Shanghai 201203, China

Phone: +86-21-33932402 33932403

33932405 33933508 33933608

Fax: +86-21-33932401

Email: webmaster@sino-ic.com

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