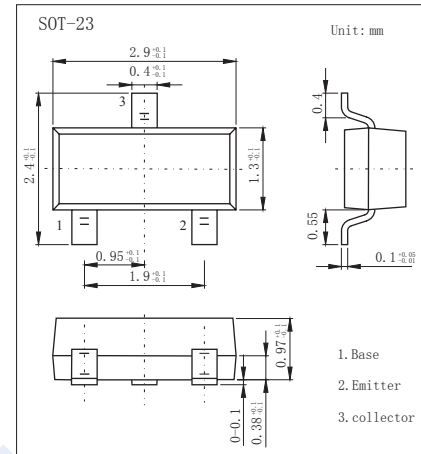


NPN Transistors

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■ Features

- Collector Current Capability $I_C=15\text{mA}$
- Collector Emitter Voltage $V_{CEO}=10\text{V}$

■ Absolute Maximum Ratings $T_a = 25^\circ\text{C}$

Parameter	Symbol	Rating	Unit
Collector - Base Voltage	V_{CBO}	20	V
Collector - Emitter Voltage	V_{CEO}	10	
Emitter - Base Voltage	V_{EBO}	1.5	
Collector Current - Continuous	I_C	15	mA
Base Current	I_B	7	
Collector Power Dissipation	P_C	150	mW
Junction Temperature	T_J	125	$^\circ\text{C}$
Storage Temperature Range	T_{stg}	-55 to 125	

■ Electrical Characteristics $T_a = 25^\circ\text{C}$

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
Collector- base breakdown voltage	V_{CBO}	$I_C = 100\ \mu\text{A}, I_E = 0$	20			V
Collector- emitter breakdown voltage	V_{CEO}	$I_C = 10\ \text{mA}, I_B = 0$	10			
Emitter - base breakdown voltage	V_{EBO}	$I_E = 100\ \mu\text{A}, I_C = 0$	1.5			
Collector-base cut-off current	I_{CBO}	$V_{CB} = 10\text{V}, I_E = 0$			1	μA
Emitter cut-off current	I_{EBO}	$V_{EB} = 1\text{V}, I_C = 0$			1	
Collector-emitter saturation voltage	$V_{CE(sat)}$	$I_C = 15\text{mA}, I_B = 1.5\text{mA}$			0.5	V
Base - emitter saturation voltage	$V_{BE(sat)}$	$I_C = 15\text{mA}, I_B = 1.5\text{mA}$			1.2	
DC current gain	h_{FE}	$V_{CE} = 6\text{V}, I_C = 7\text{mA}$	50		250	
Insertion Power Gain	$ S_{21e} ^2$	$V_{CE} = 6\text{V}, I_C = 7\ \text{mA}, f = 1\text{GHz}$		13		dB
		$V_{CE} = 6\text{V}, I_C = 7\ \text{mA}, f = 2\text{GHz}$	4.5			
Noise Figure	NF	$V_{CE} = 6\text{V}, I_C = 3\ \text{mA}, f = 1\text{GHz}$		1.4		
		$V_{CE} = 6\text{V}, I_C = 3\ \text{mA}, f = 2\text{GHz}$			3	
Reverse transfer capacitance	C_{re}	$V_{CB} = 10\text{V}, I_E = 0, f = 1\text{MHz}$			0.8	pF
Collector output capacitance	C_{ob}	$V_{CB} = 10\text{V}, I_E = 0, f = 1\text{MHz}$		0.45		pF
Transition frequency	f_T	$V_{CE} = 6\text{V}, I_C = 7\text{mA}$	7			GHz

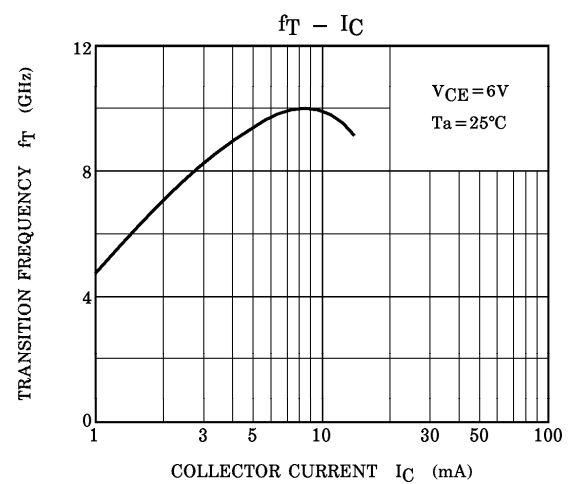
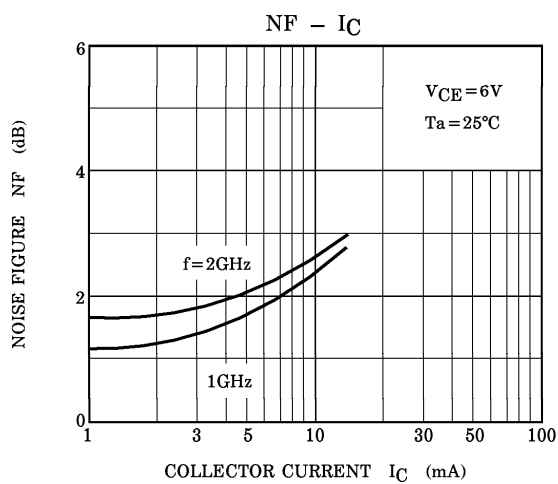
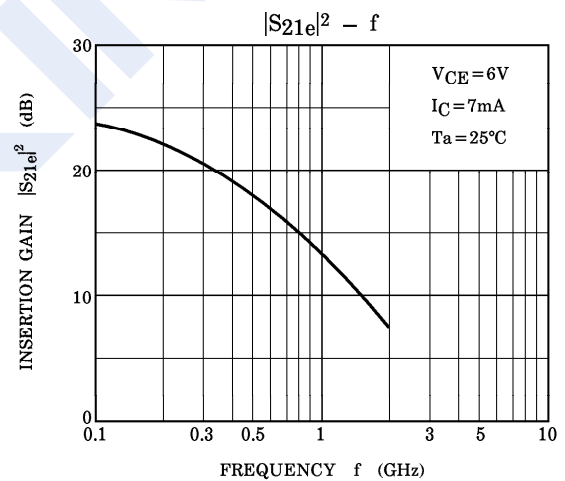
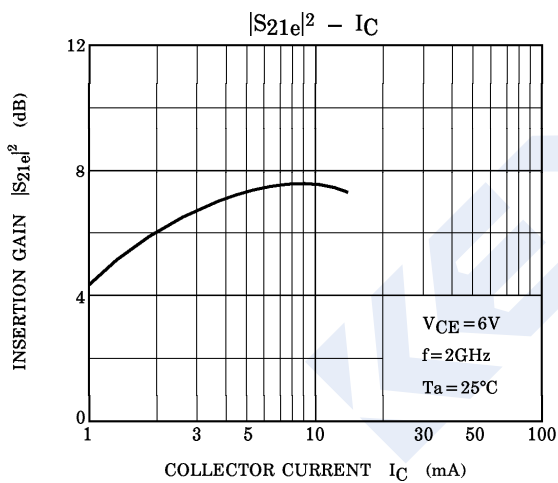
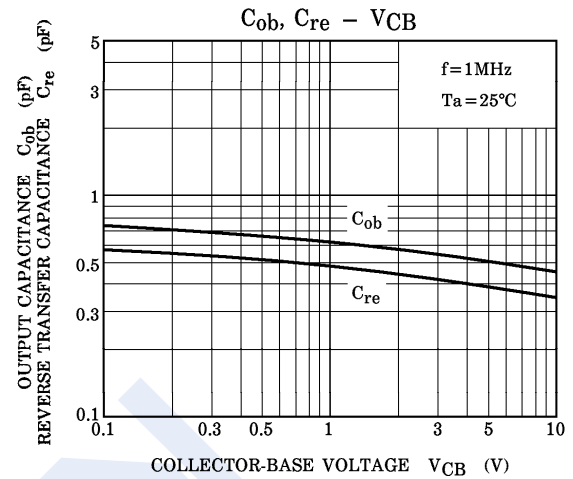
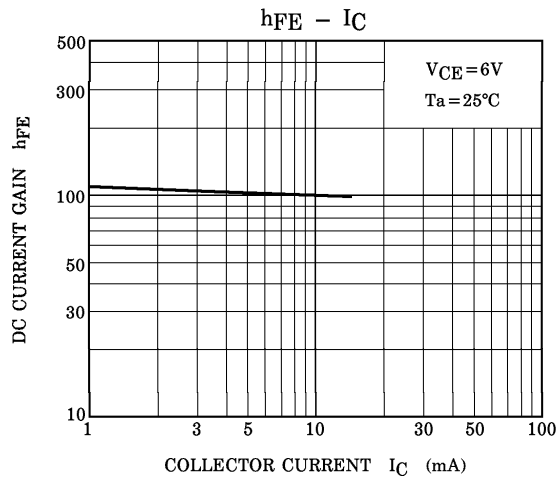
■ Marking

Marking	MO
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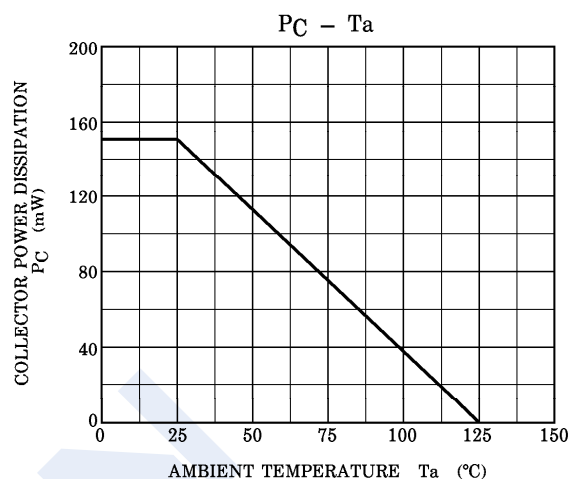
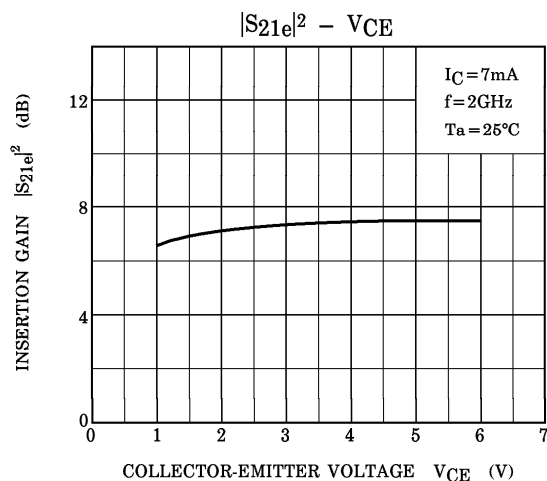
■ Typical Characteristics



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■ Typical Characteristics



S-PARAMETER $Z_0 = 50\Omega$, $T_a = 25^\circ\text{C}$
 $V_{CE} = 6\text{V}$, $I_C = 3\text{mA}$

FREQUENCY	S11		S21		S12		S22	
MHz	MAG	ANG	MAG	ANG	MAG	ANG	MAG	ANG
200	0.764	-25.0	7.758	153.8	0.037	76.2	0.934	-16.4
400	0.613	-44.9	6.493	132.9	0.065	67.0	0.808	-27.7
600	0.473	-57.9	5.331	117.9	0.085	62.8	0.702	-34.3
800	0.356	-66.9	4.433	106.2	0.102	61.2	0.623	-38.0
1000	0.261	-70.4	3.738	97.7	0.117	60.4	0.575	-40.6
1200	0.198	-71.7	3.266	90.1	0.132	60.2	0.544	-42.4
1400	0.147	-66.3	2.853	83.0	0.147	60.1	0.529	-44.1
1600	0.129	-54.9	2.555	78.2	0.163	60.3	0.519	-46.4
1800	0.114	-41.8	2.348	72.8	0.179	60.0	0.514	-49.0
2000	0.124	-34.5	2.108	69.2	0.192	60.1	0.513	-52.4

$V_{CE} = 6\text{V}$, $I_C = 7\text{mA}$

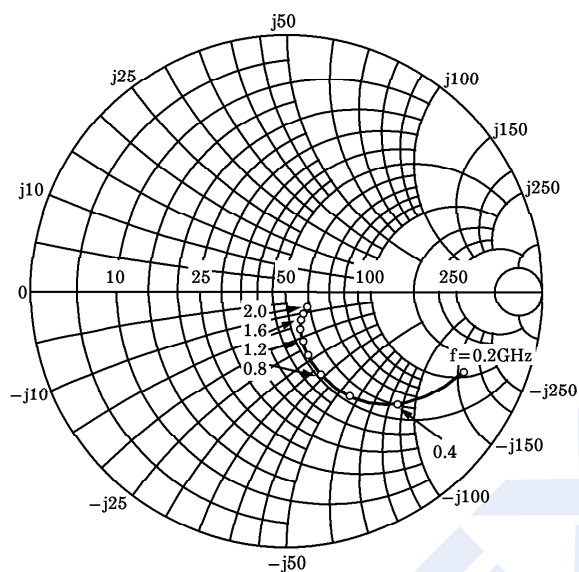
FREQUENCY	S11		S21		S12		S22	
MHz	MAG	ANG	MAG	ANG	MAG	ANG	MAG	ANG
200	0.560	-35.3	12.525	142.0	0.032	74.2	0.853	-21.5
400	0.367	-54.1	8.958	118.8	0.055	69.5	0.678	-30.1
600	0.248	-63.4	6.693	105.3	0.073	68.4	0.581	-32.7
800	0.158	-62.4	5.270	95.5	0.091	68.6	0.530	-33.6
1000	0.101	-47.8	4.319	88.5	0.110	68.4	0.506	-34.7
1200	0.088	-27.3	3.687	82.1	0.128	67.9	0.493	-36.0
1400	0.099	-4.3	3.188	76.2	0.146	67.0	0.491	-37.8
1600	0.131	-0.7	2.813	71.9	0.165	66.2	0.492	-40.5
1800	0.152	0.4	2.563	67.4	0.183	65.2	0.498	-43.7
2000	0.167	-1.7	2.276	64.5	0.198	64.5	0.500	-47.5

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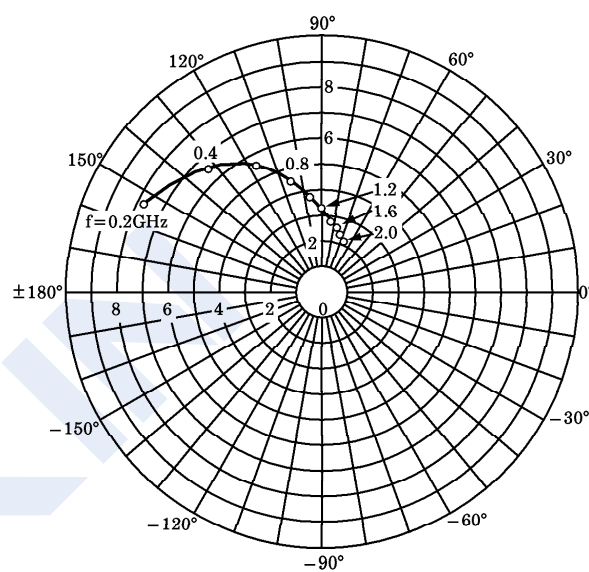
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■ Typical Characteristics

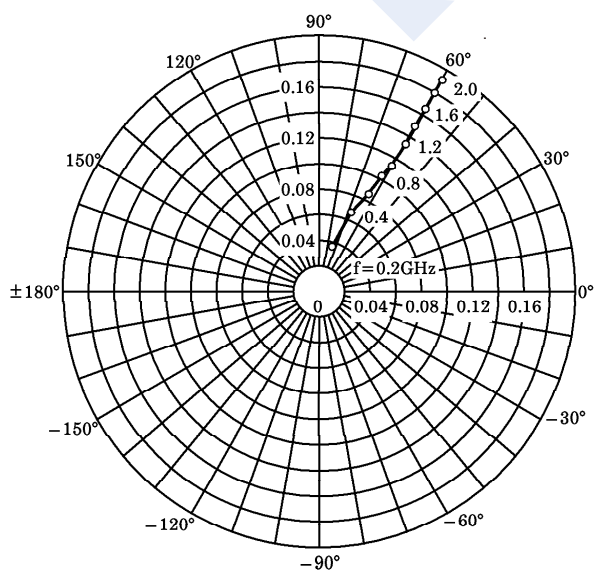
S_{11e}
 $V_{CE}=6V$
 $I_C=3mA$
 $T_a=25^\circ C$
 (UNIT : Ω)



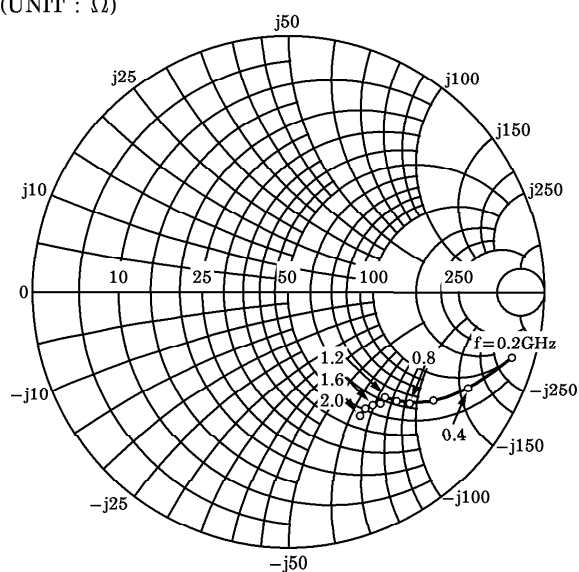
S_{21e}
 $V_{CE}=6V$
 $I_C=3mA$
 $T_a=25^\circ C$



S_{12e}
 $V_{CE}=6V$
 $I_C=3mA$
 $T_a=25^\circ C$



S_{22e}
 $V_{CE}=6V$
 $I_C=3mA$
 $T_a=25^\circ C$
 (UNIT : Ω)

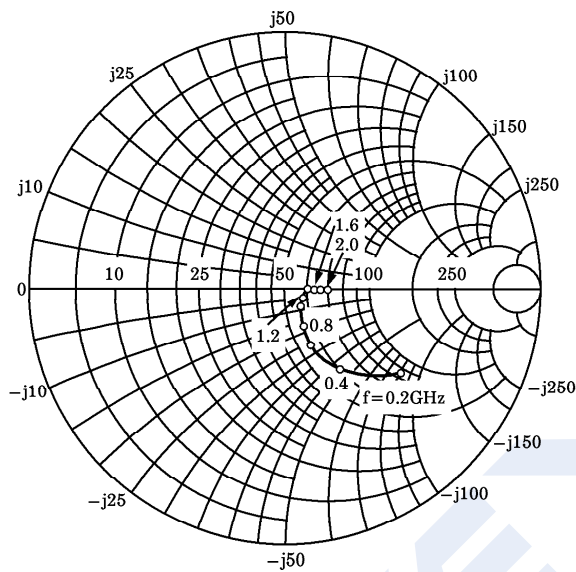


NPN Transistors

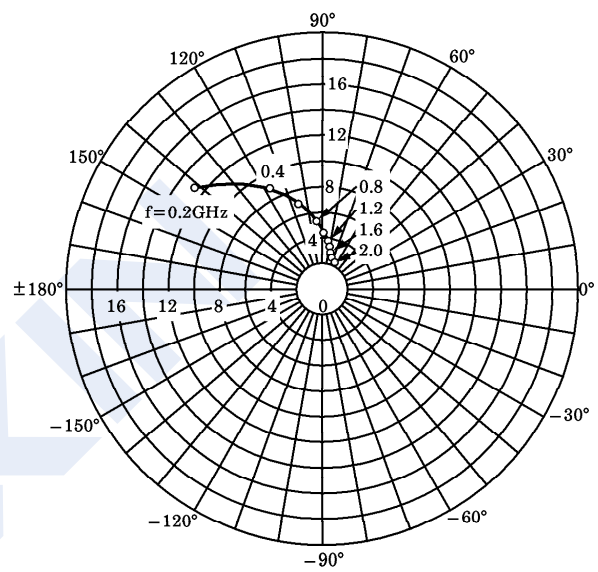
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■ Typical Characteristics

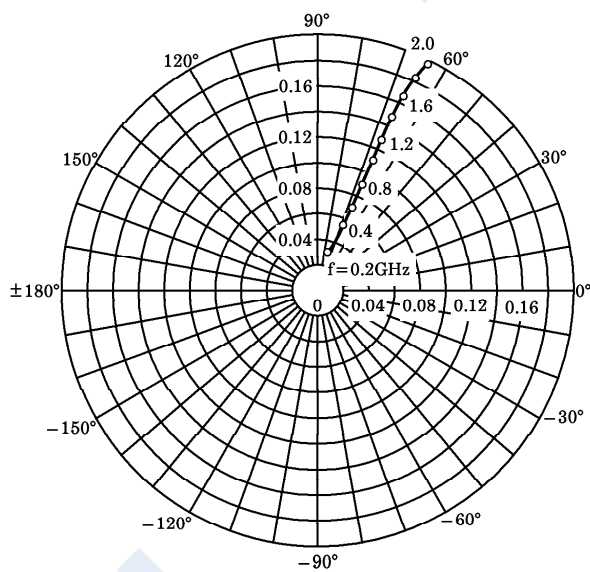
S_{11e}
 $V_{CE}=6V$
 $I_C=7mA$
 $T_a=25^\circ C$
 (UNIT : Ω)



S_{21e}
 $V_{CE}=6V$
 $I_C=7mA$
 $T_a=25^\circ C$



S_{12e}
 $V_{CE}=6V$
 $I_C=7mA$
 $T_a=25^\circ C$



S_{22e}
 $V_{CE}=6V$
 $I_C=7mA$
 $T_a=25^\circ C$
 (UNIT : Ω)

