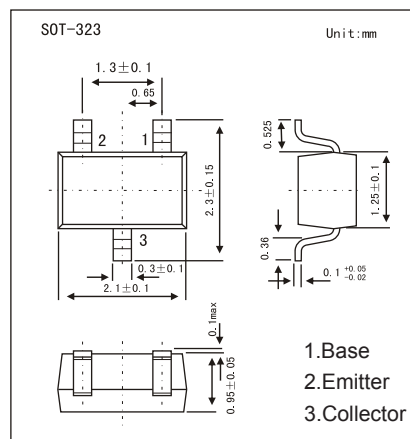


NPN Transistors

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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	100	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}	$I_C = 1\ \text{mA}, I_B = 0$	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

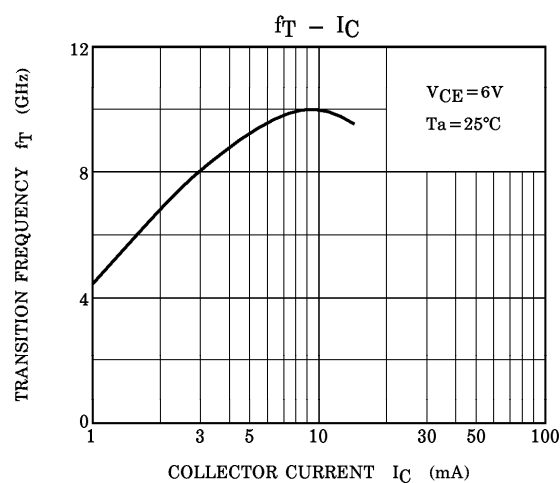
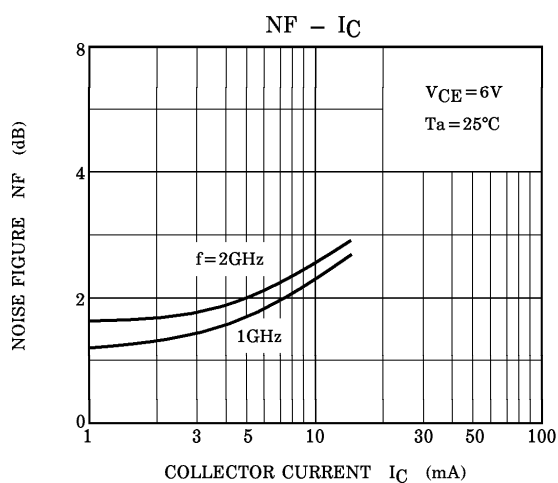
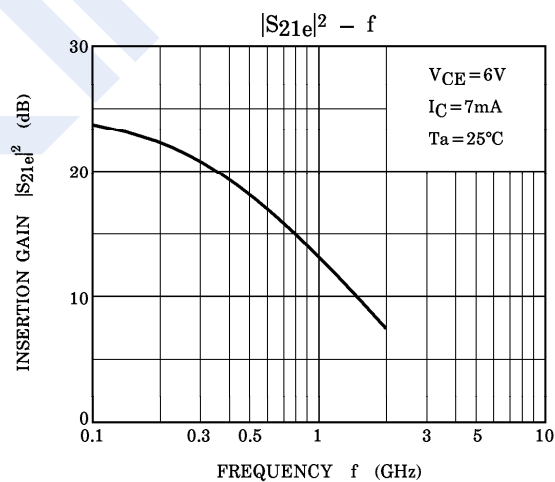
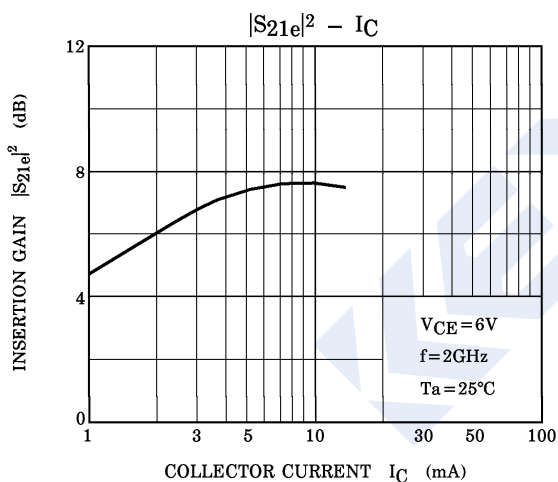
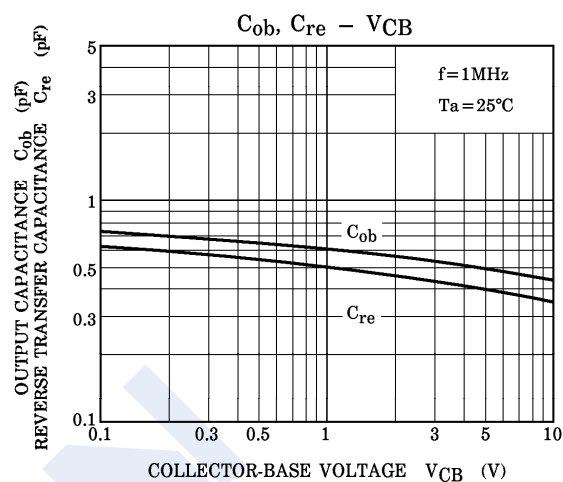
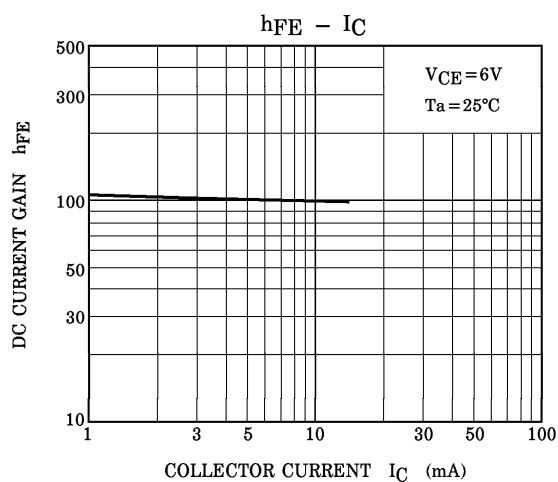
■ Marking

Marking	MO
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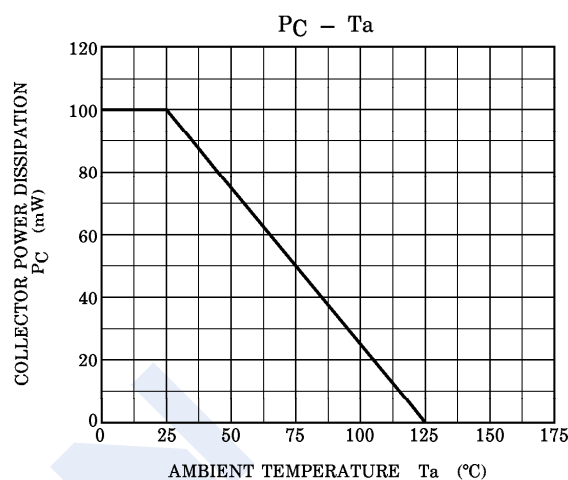
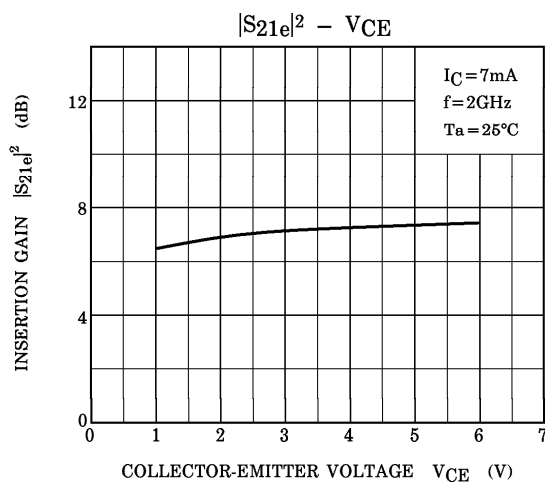
■ Typical Characteristics



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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	0.778	−27.1	7.781	154.1	0.043	75.7	0.932	−18.5	
400	0.641	−49.4	6.538	133.4	0.075	66.5	0.800	−31.9	
600	0.500	−67.1	5.409	118.1	0.097	61.9	0.683	−40.4	
800	0.394	−80.5	4.508	106.6	0.115	59.9	0.595	−45.8	
1000	0.311	−93.1	3.809	97.9	0.132	59.4	0.536	−49.6	
1200	0.238	−103.0	3.314	90.6	0.149	59.3	0.492	−52.7	
1400	0.194	−114.5	2.909	84.0	0.165	59.3	0.465	−55.3	
1600	0.146	−122.2	2.619	78.7	0.183	59.4	0.444	−57.9	
1800	0.102	−135.3	2.409	73.5	0.199	59.4	0.428	−60.8	
2000	0.074	−150.4	2.188	70.0	0.216	59.6	0.415	−64.2	

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

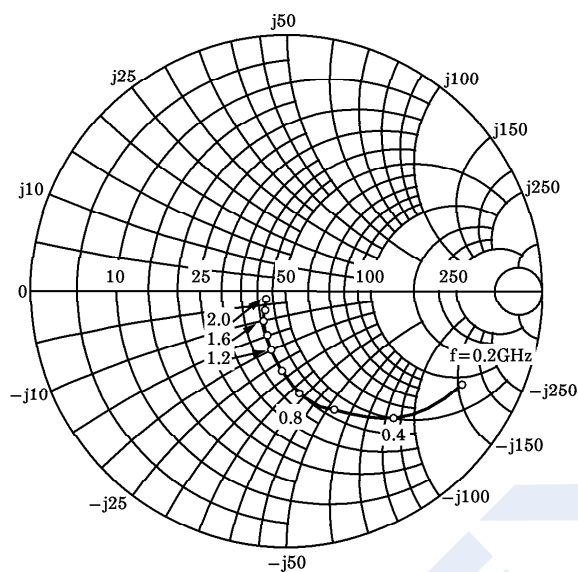
FREQUENCY		S11		S21		S12		S22	
MHz	MAG	ANG	MAG	ANG	MAG	ANG	MAG	ANG	
200	0.581	−39.7	12.614	141.9	0.037	73.0	0.842	−24.8	
400	0.397	−64.8	9.040	119.2	0.061	67.7	0.652	−36.1	
600	0.278	−82.1	6.744	105.5	0.081	67.3	0.541	−40.4	
800	0.194	−94.9	5.328	96.2	0.101	67.7	0.477	−42.6	
1000	0.137	−109.4	4.364	89.2	0.121	67.8	0.440	−44.3	
1200	0.096	−123.2	3.733	83.2	0.141	67.8	0.417	−46.4	
1400	0.062	−140.8	3.254	77.9	0.162	67.1	0.403	−48.5	
1600	0.041	−169.5	2.899	73.4	0.183	66.6	0.394	−50.9	
1800	0.030	137.0	2.634	68.9	0.203	65.6	0.389	−54.0	
2000	0.038	99.1	2.377	66.1	0.222	65.1	0.382	−57.6	

NPN Transistors

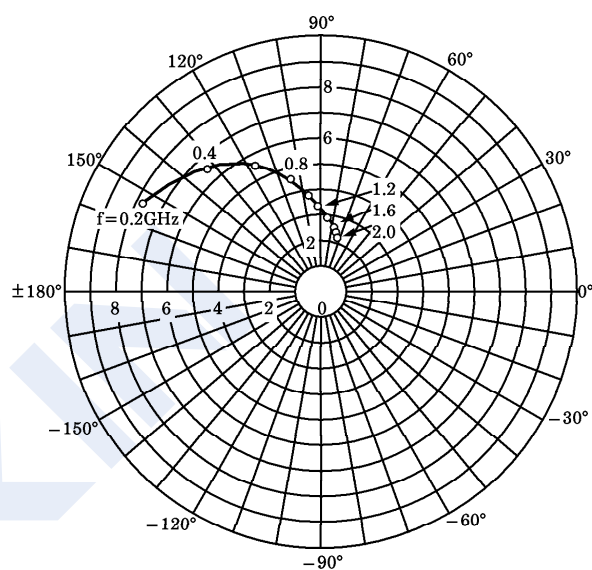
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■ Typical Characteristics

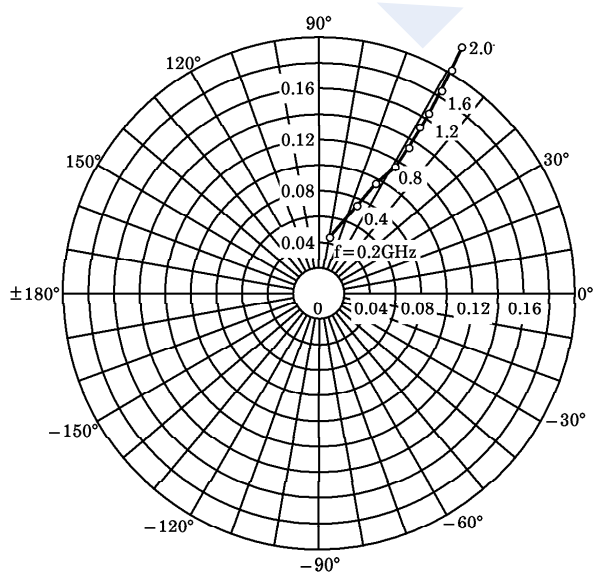
S_{11e}
 $V_{CE} = 6V$
 $I_C = 3mA$
 $T_a = 25^\circ C$
 (UNIT : Ω)



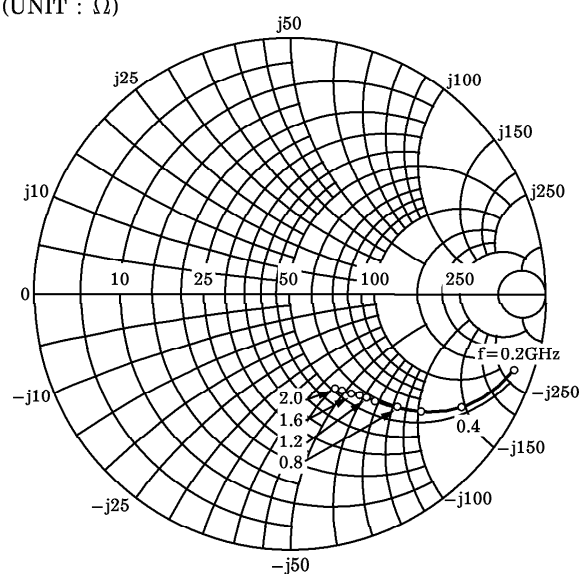
S_{21e}
 $V_{CE} = 6V$
 $I_C = 3mA$
 $T_a = 25^\circ C$



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)

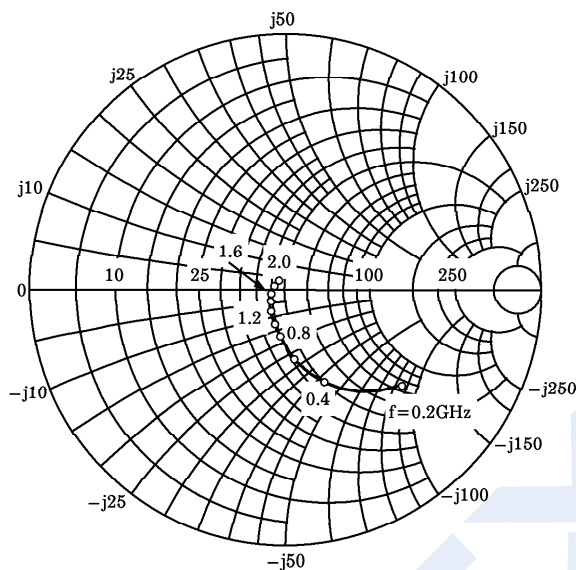


NPN Transistors

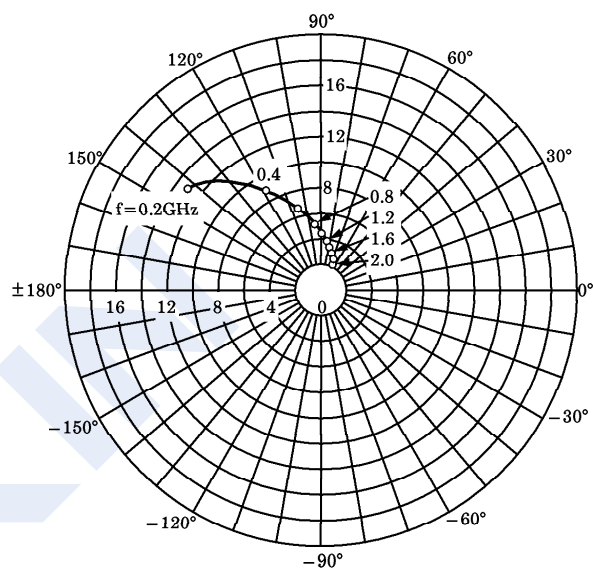
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■ Typical Characteristics

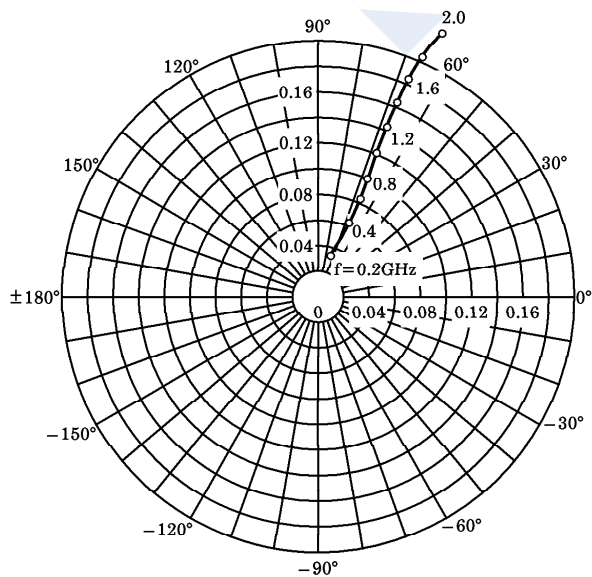
S_{11e}
 $V_{CE} = 6V$
 $I_C = 7mA$
 $T_a = 25^\circ C$
 (UNIT : Ω)



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)

