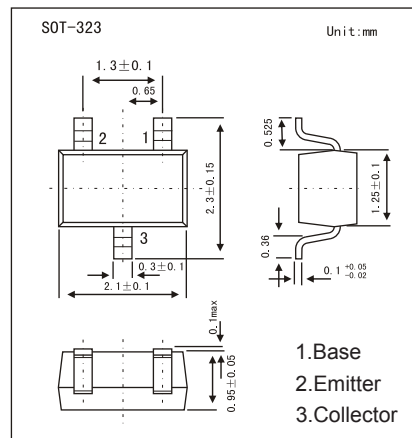


NPN Transistors

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■ Features

- Collector Current Capability $I_C=40\text{mA}$
- 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	40	mA
Base Current	I_B	20	
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}	$I_C = 10\ \text{mA}, I_B = 0$	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	$V_{CE(sat)}$	$I_C = 40\text{mA}, I_B = 4\text{mA}$			0.5	V
Base - emitter saturation voltage	$V_{BE(sat)}$	$I_C = 40\text{mA}, I_B = 4\text{mA}$			1.2	
DC current gain	h_{FE}	$V_{CE} = 8\text{V}, I_C = 20\text{mA}$	50		250	
Insertion Power Gain	$ S_{21e} ^2$	$V_{CE} = 8\text{V}, I_C = 20\ \text{mA}, f = 1\text{GHz}$	10			dB
		$V_{CE} = 8\text{V}, I_C = 20\ \text{mA}, f = 2\text{GHz}$		7		
Noise Figure	NF	$V_{CE} = 8\text{V}, I_C = 5\ \text{mA}, f = 1\text{GHz}$			2.5	
		$V_{CE} = 8\text{V}, I_C = 5\ \text{mA}, f = 2\text{GHz}$		1.7		
Reverse transfer capacitance	C_{re}	$V_{CB} = 10\text{V}, I_E = 0, f = 1\text{MHz}$			0.9	pF
Collector output capacitance	C_{ob}	$V_{CB} = 10\text{V}, I_E = 0, f = 1\text{MHz}$		0.65		pF
Transition frequency	f_T	$V_{CE} = 8\text{V}, I_C = 20\text{mA}$	7			GHz

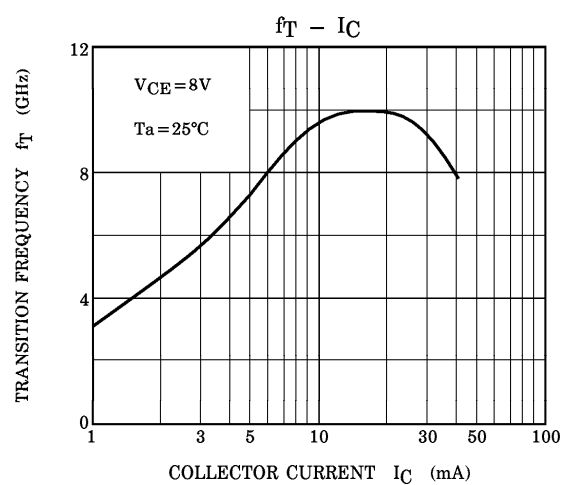
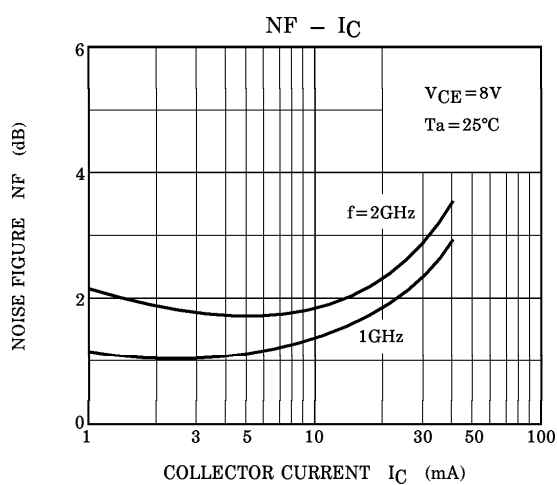
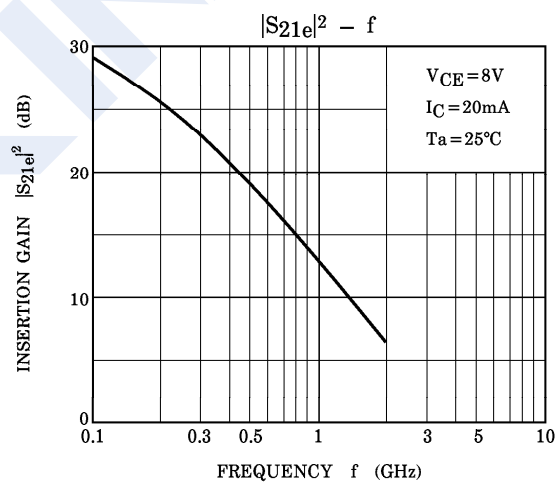
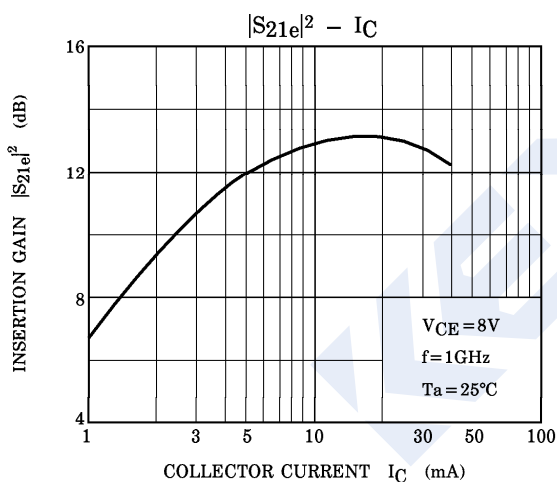
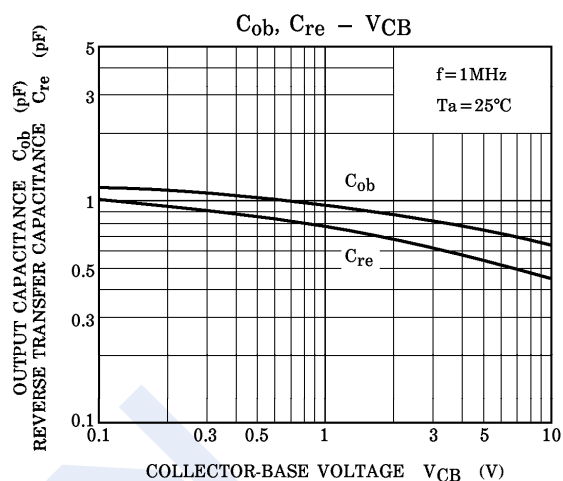
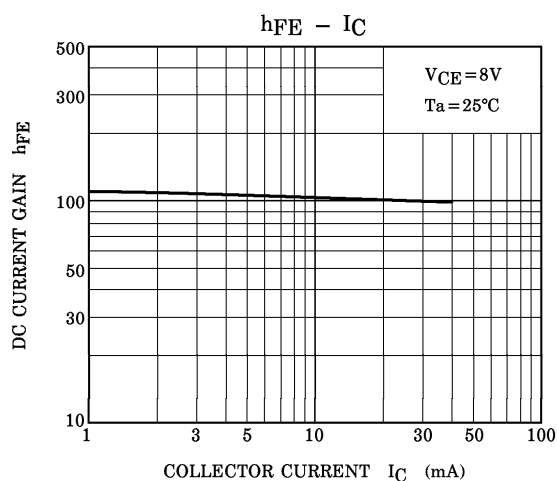
■ Marking

Marking	MN
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NPN Transistors

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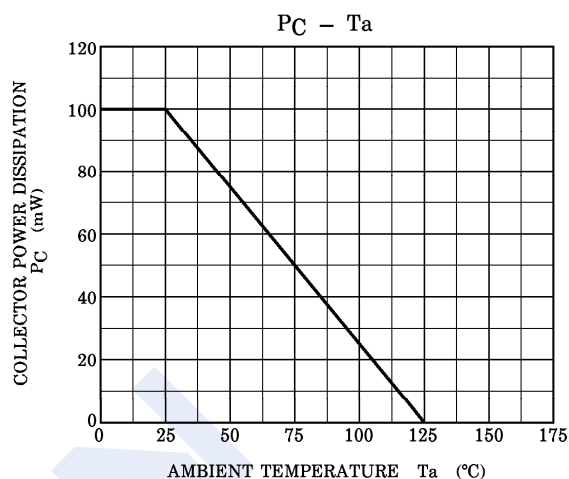
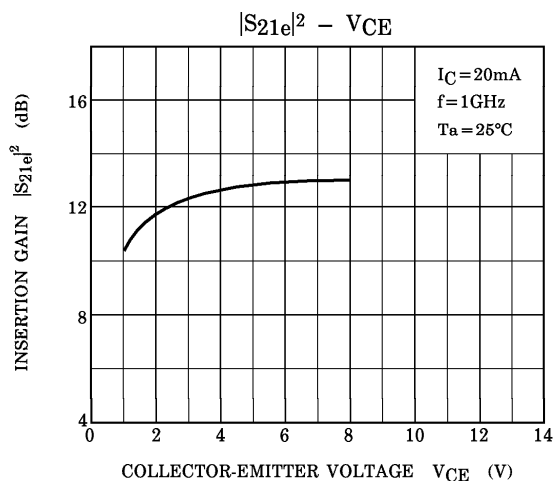
■ Typical Characteristics



NPN Transistors

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■ Typical Characteristics



S-PARAMETER $Z_O = 50\Omega$, $T_a = 25^\circ\text{C}$
 $V_{CE} = 8\text{V}$, $I_C = 5\text{mA}$

FREQUENCY		S11		S21		S12		S22	
MHz	MAG	ANG	MAG	ANG	MAG	ANG	MAG	ANG	
200	0.680	-49.6	11.448	140.0	0.048	67.0	0.820	-28.4	
400	0.478	-83.2	8.076	116.6	0.073	59.6	0.613	-41.1	
600	0.353	-108.3	5.992	102.7	0.092	59.1	0.495	-46.2	
800	0.281	-129.2	4.711	93.0	0.109	60.1	0.428	-48.9	
1000	0.240	-149.0	3.875	85.8	0.127	61.1	0.389	-51.0	
1200	0.216	-169.1	3.294	79.6	0.146	62.1	0.364	-53.3	
1400	0.202	-175.1	2.876	73.8	0.166	62.6	0.350	-55.6	
1600	0.194	-158.9	2.572	69.0	0.186	62.6	0.339	-58.4	
1800	0.193	-142.9	2.349	64.5	0.207	62.4	0.332	-61.7	
2000	0.202	-130.9	2.128	61.1	0.227	62.3	0.325	-65.7	

$V_{CE} = 8\text{V}$, $I_C = 20\text{mA}$

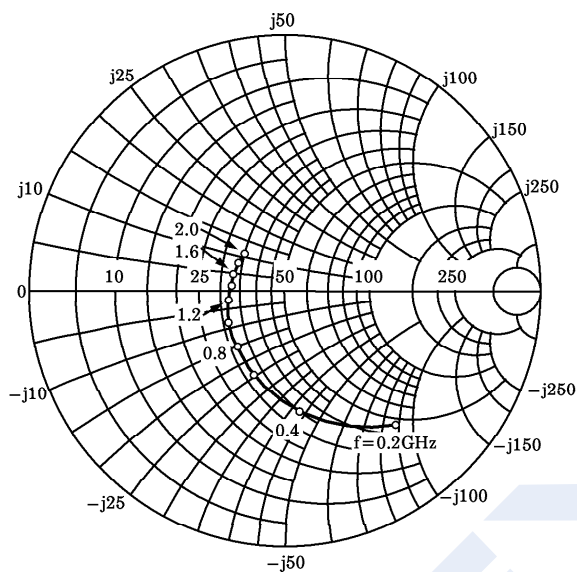
FREQUENCY		S11		S21		S12		S22	
MHz	MAG	ANG	MAG	ANG	MAG	ANG	MAG	ANG	
200	0.332	−83.7	18.406	118.0	0.034	68.8	0.565	−38.2	
400	0.212	−123.3	10.378	100.0	0.057	71.1	0.393	−39.9	
600	0.173	−150.7	7.130	90.7	0.080	73.0	0.336	−39.3	
800	0.157	−175.3	5.442	84.3	0.104	73.0	0.309	−39.6	
1000	0.161	167.5	4.394	79.1	0.128	72.4	0.295	−41.0	
1200	0.162	149.7	3.728	74.3	0.152	71.7	0.285	−43.2	
1400	0.169	138.2	3.240	69.5	0.175	70.5	0.280	−46.0	
1600	0.177	125.9	2.877	65.7	0.200	68.9	0.278	−48.9	
1800	0.178	113.5	2.595	61.8	0.223	67.4	0.279	−53.0	
2000	0.190	104.3	2.352	58.6	0.246	65.8	0.275	−57.8	

NPN Transistors

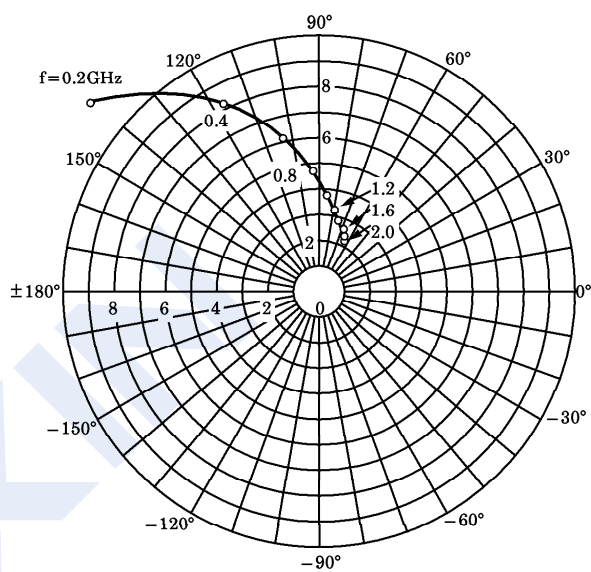
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■ Typical Characteristics

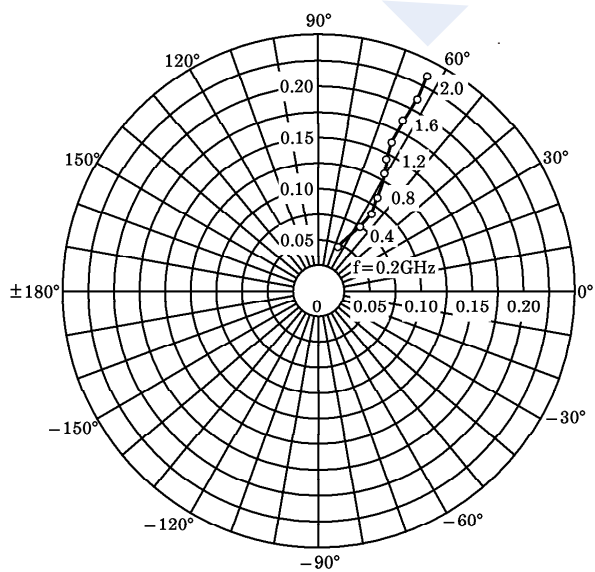
S_{11e}
 $V_{CE}=8V$
 $I_C=5mA$
 $T_a=25^\circ C$
 (UNIT : Ω)



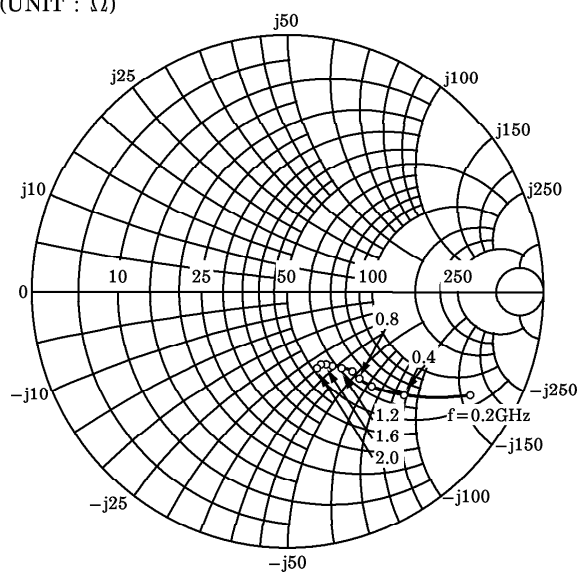
S_{21e}
 $V_{CE}=8V$
 $I_C=5mA$
 $T_a=25^\circ C$



S_{12e}
 $V_{CE}=8V$
 $I_C=5mA$
 $T_a=25^\circ C$



S_{22e}
 $V_{CE}=8V$
 $I_C=5mA$
 $T_a=25^\circ C$
 (UNIT : Ω)

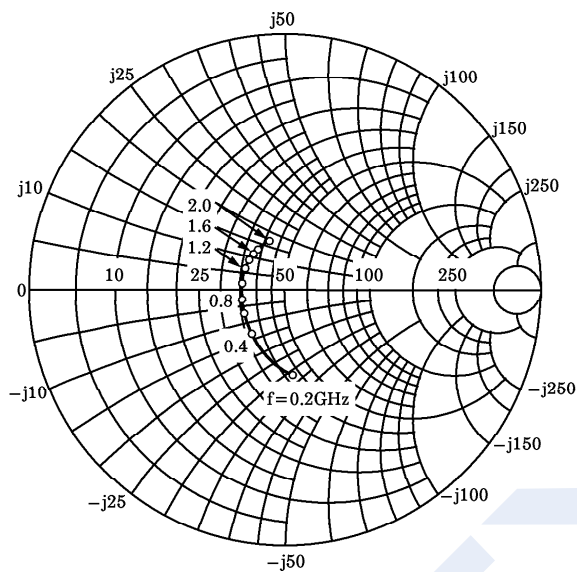


NPN Transistors

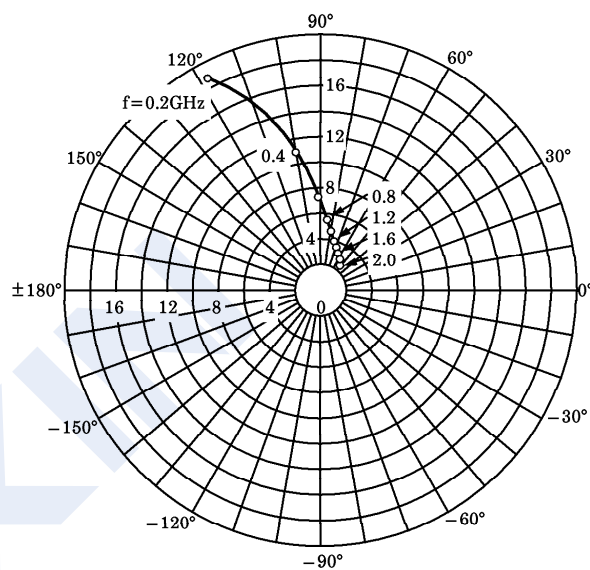
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■ Typical Characteristics

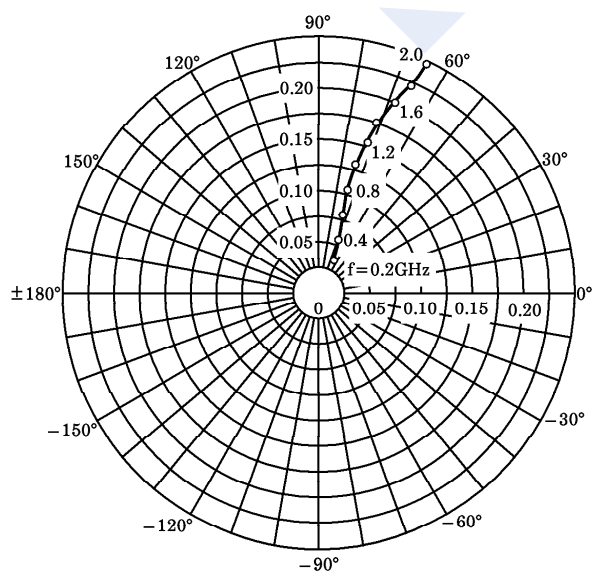
S_{11e}
 $V_{CE} = 8V$
 $I_C = 20mA$
 $T_a = 25^\circ C$
 (UNIT : Ω)



S_{21e}
 $V_{CE} = 8V$
 $I_C = 20mA$
 $T_a = 25^\circ C$



S_{12e}
 $V_{CE} = 8V$
 $I_C = 20mA$
 $T_a = 25^\circ C$



S_{22e}
 $V_{CE} = 8V$
 $I_C = 20mA$
 $T_a = 25^\circ C$
 (UNIT : Ω)

