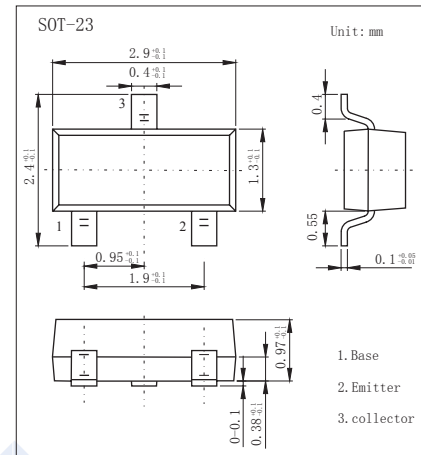


NPN Transistors

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■ Features

- Collector Current Capability $I_C=40\text{mA}$
- Collector Emitter Voltage $V_{CE0}=10\text{V}$

■ 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	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	$V_{CE(sat)}$	$I_C = 40\text{mA}, I_B = 4\text{mA}$			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

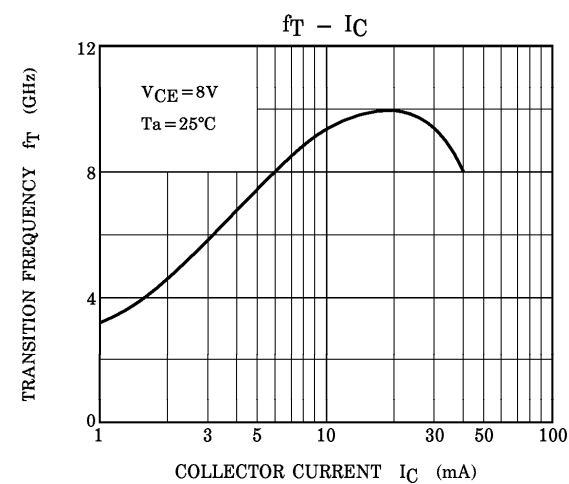
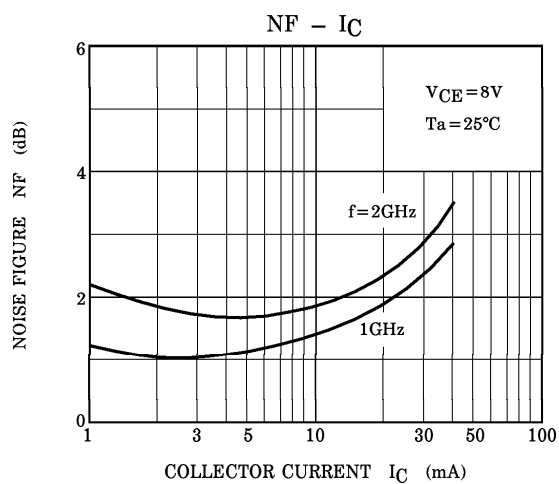
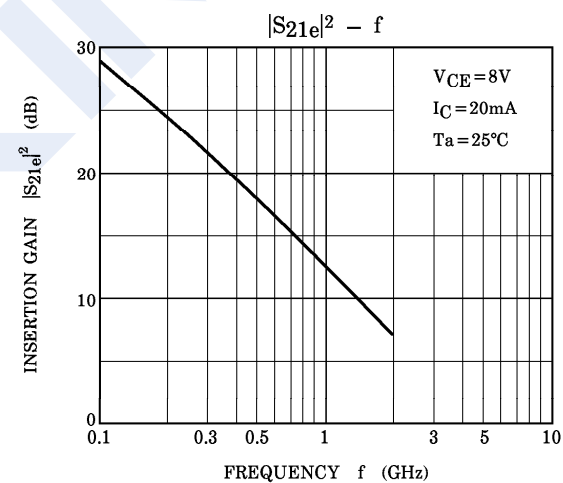
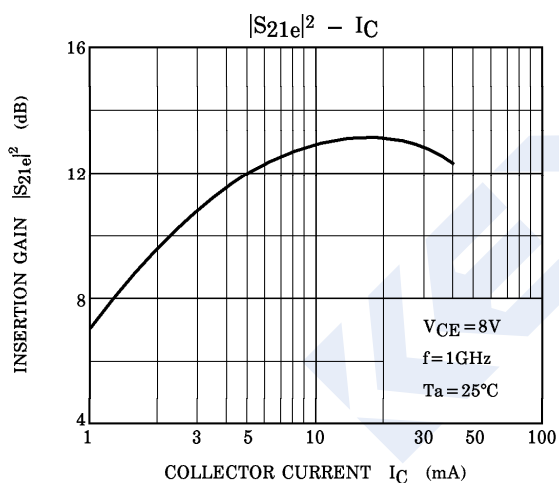
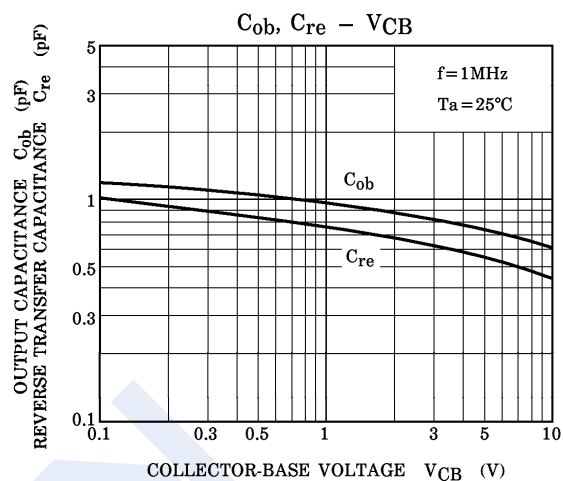
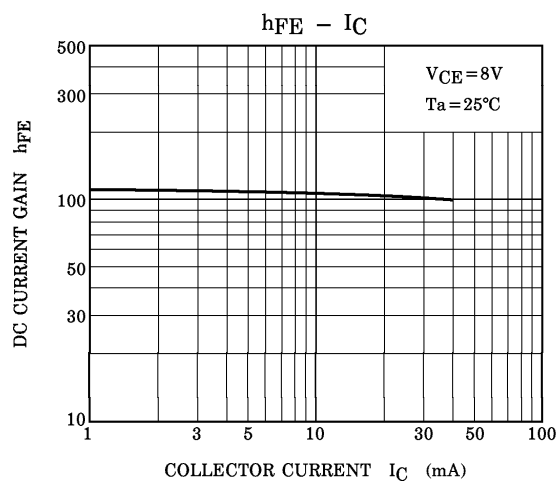
■ Marking

Marking	MN
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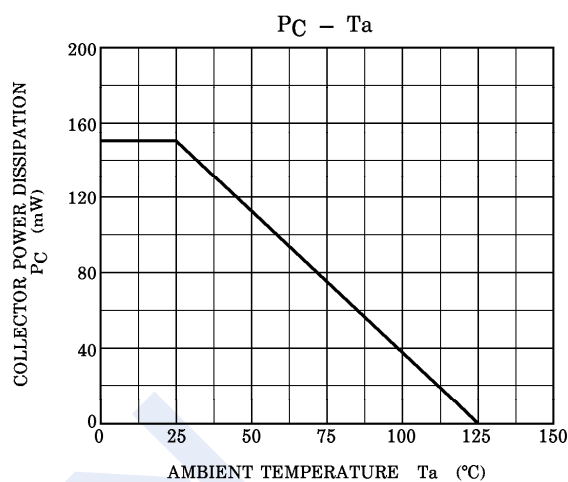
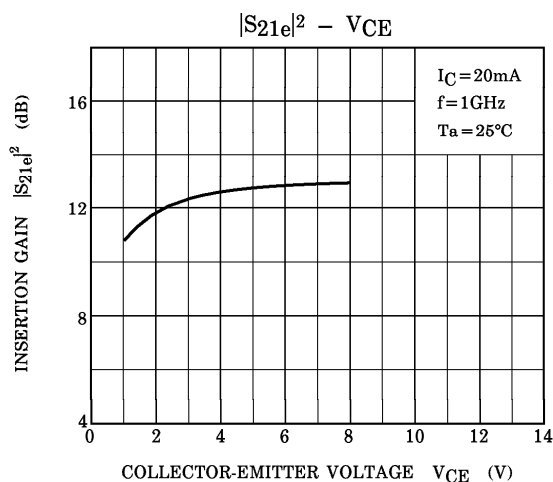
■ Typical Characteristics



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■ Typical Characteristics



S-PARAMETER $Z_0 = 50\Omega$, $T_a = 25^\circ\text{C}$
 $V_{CE} = 8\text{V}$, $I_C = 5\text{mA}$

FREQUENCY			S11		S21		S12		S22	
MHz	MAG	ANG	MAG	ANG	MAG	ANG	MAG	ANG	MAG	ANG
200	0.649	-46.9	11.454	139.7	0.044	67.8	0.823	-26.1		
400	0.426	-78.5	8.028	116.2	0.068	61.0	0.623	-36.4		
600	0.282	-100.9	5.965	102.6	0.085	60.4	0.513	-39.5		
800	0.192	-122.5	4.688	92.7	0.103	61.5	0.452	-40.3		
1000	0.131	-147.7	3.856	85.4	0.121	62.6	0.422	-41.1		
1200	0.099	-175.5	3.308	78.9	0.140	63.2	0.406	-42.0		
1400	0.096	-145.6	2.871	72.7	0.159	63.2	0.404	-43.5		
1600	0.091	-116.0	2.562	68.0	0.179	63.0	0.402	-45.9		
1800	0.111	-93.4	2.341	62.9	0.199	62.5	0.406	-49.1		
2000	0.115	-78.3	2.106	59.5	0.218	62.0	0.409	-53.1		

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

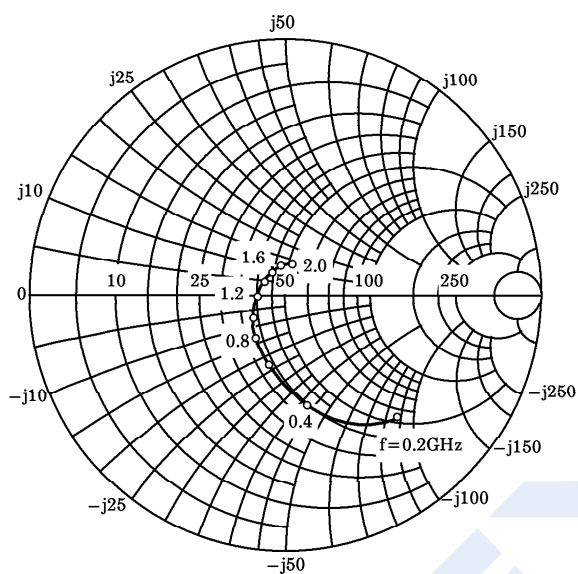
FREQUENCY			S11		S21		S12		S22	
MHz	MAG	ANG	MAG	ANG	MAG	ANG	MAG	ANG	MAG	ANG
200	0.278	-78.9	18.400	118.0	0.031	71.1	0.586	-33.3		
400	0.138	-120.1	10.350	99.6	0.053	73.5	0.426	-32.4		
600	0.088	-159.6	7.137	90.4	0.076	74.1	0.379	-30.1		
800	0.084	-157.2	5.433	83.4	0.100	73.9	0.361	-29.1		
1000	0.096	-122.5	4.401	78.0	0.123	73.1	0.356	-29.7		
1200	0.117	-99.7	3.719	73.0	0.147	71.5	0.357	-31.3		
1400	0.141	-84.9	3.216	67.9	0.170	69.9	0.364	-33.6		
1600	0.152	-69.0	2.849	63.9	0.192	68.3	0.372	-37.0		
1800	0.167	-59.2	2.577	59.6	0.215	66.3	0.381	-41.3		
2000	0.169	-49.4	2.304	56.3	0.235	64.7	0.386	-46.3		

NPN Transistors

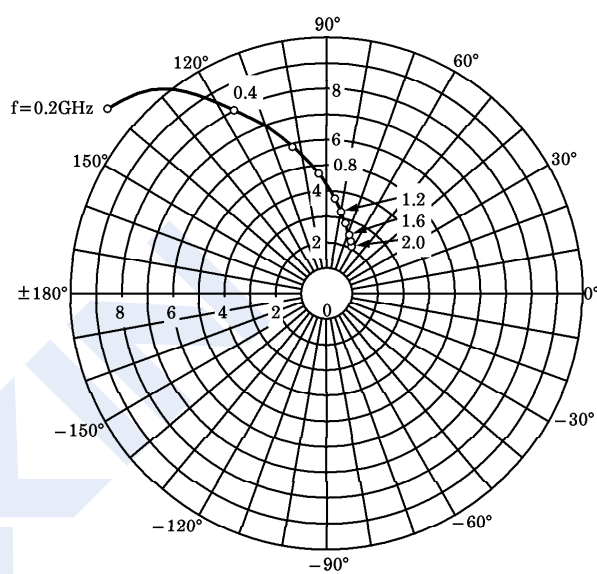
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■ Typical Characteristics

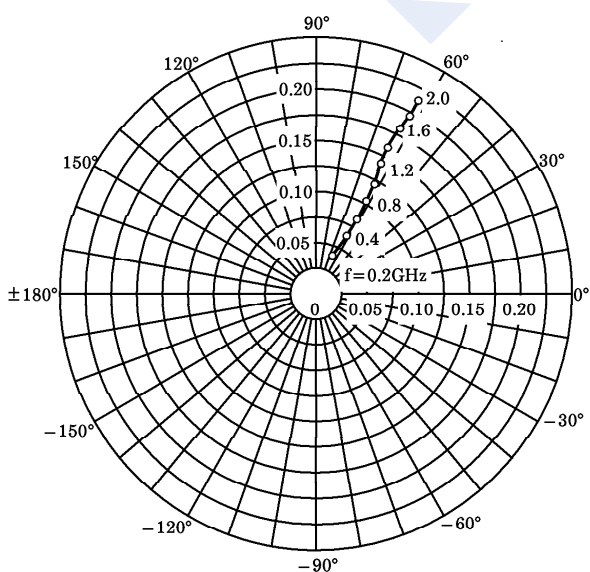
S_{11e}
 $V_{CE}=8V$
 $I_C=5mA$
 $T_a=25^\circ C$
 (UNIT : Ω)



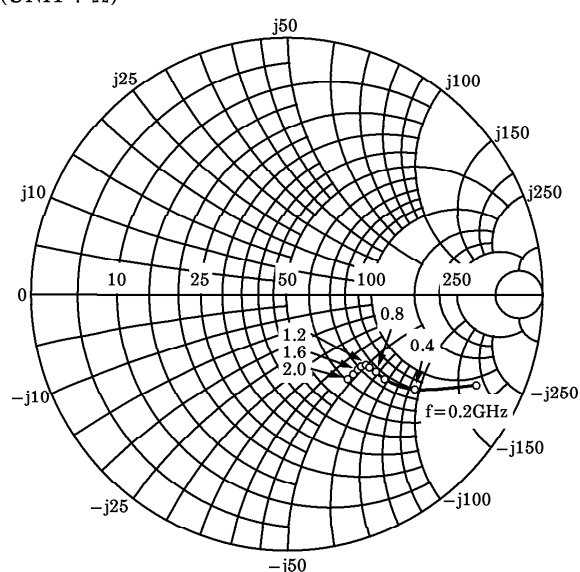
S_{21e}
 $V_{CE}=8V$
 $I_C=5mA$
 $T_a=25^\circ C$



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)

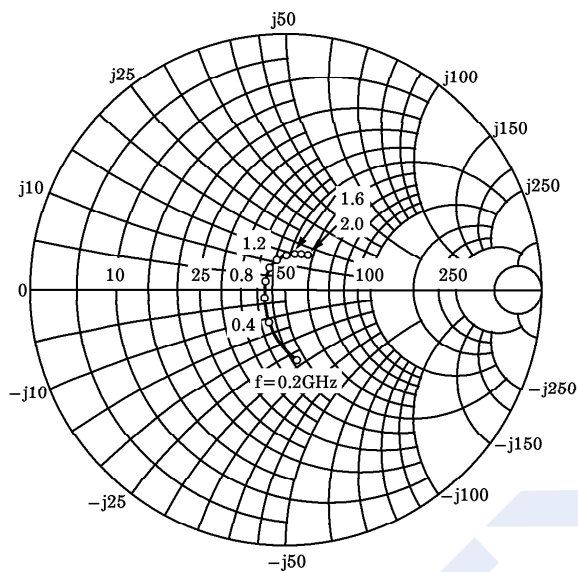


NPN Transistors

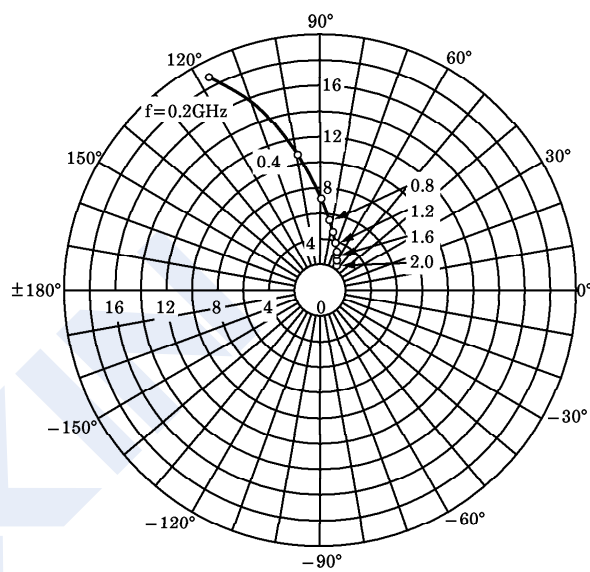
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■ Typical Characteristics

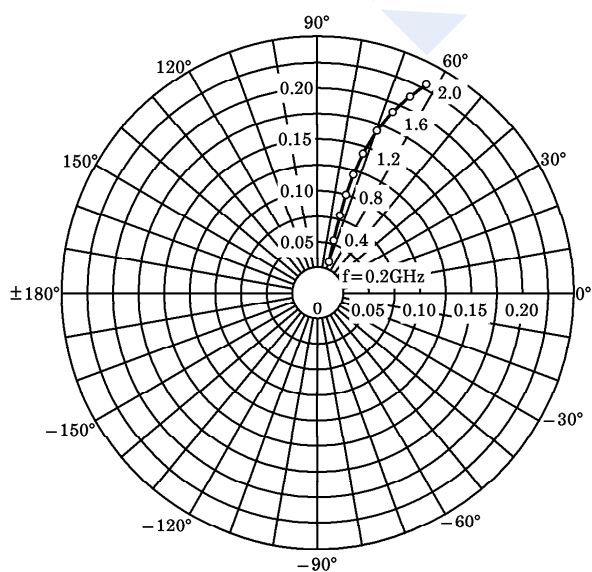
S_{11e}
 $V_{CE}=8V$
 $I_C=20mA$
 $T_a=25^\circ C$
 (UNIT : Ω)



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)

