

**ELECTRICAL CHARACTERISTICS ( $T_A = 25^\circ\text{C}$ )**

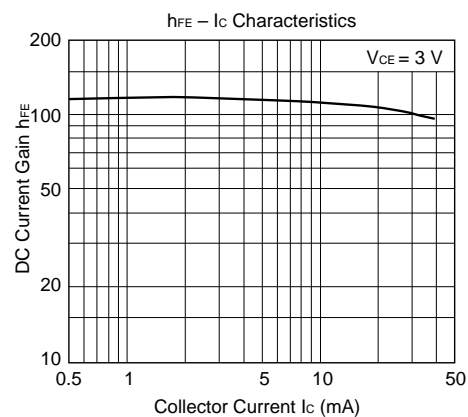
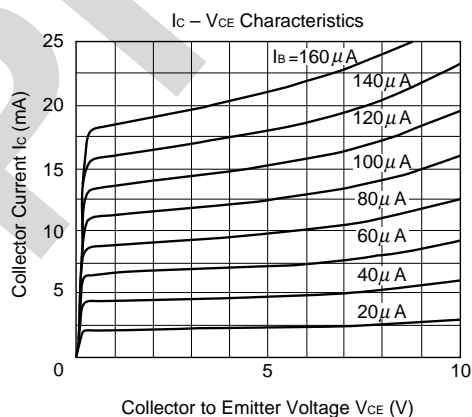
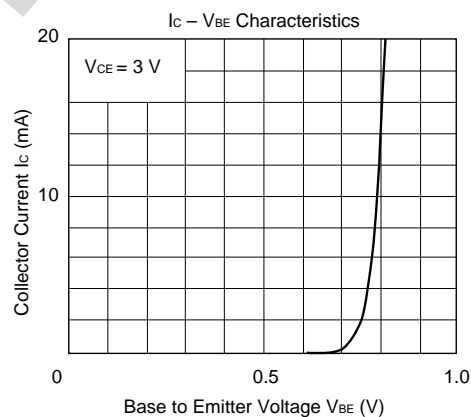
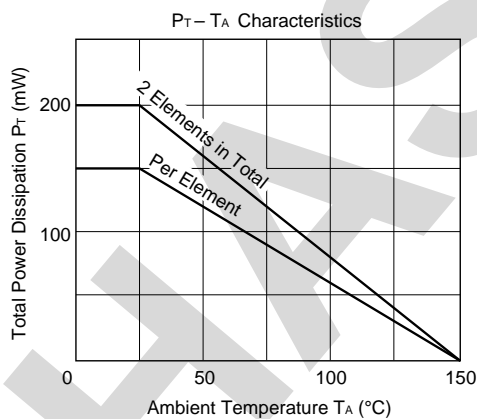
PARAMETER	SYMBOL	CONDITION	MIN.	TYP.	MAX.	UNIT
Collector Cutoff Current	$I_{CBO}$	$V_{CB} = 10\text{ V}, I_E = 0$			1	$\mu\text{A}$
Emitter Cutoff Current	$I_{EBO}$	$V_{EB} = 1\text{ V}, I_C = 0$			1	$\mu\text{A}$
DC Current Gain	$h_{FE}$	$V_{CE} = 3\text{ V}, I_C = 7\text{ mA}$ <sup>Note 1</sup>	70		250	
Gain Bandwidth Product	$f_T$	$V_{CE} = 3\text{ V}, I_C = 7\text{ mA}$	3.0	4.5		GHz
Feed-back Capacitance	$C_{re}$	$V_{CB} = 3\text{ V}, I_E = 0, f = 1\text{ MHz}$ <sup>Note 2</sup>		0.7	1.5	pF
Insertion Power Gain	$ S_{21e} ^2$	$V_{CE} = 3\text{ V}, I_C = 7\text{ mA}, f = 1\text{ GHz}$	7	9		dB
Noise Figure	NF	$V_{CE} = 3\text{ V}, I_C = 7\text{ mA}, f = 1\text{ GHz}$		1.2	2.5	dB
$h_{FE}$ Ratio	$h_{FE1}/h_{FE2}$	$V_{CE} = 3\text{ V}, I_C = 7\text{ mA}$ A smaller value among $h_{FE}$ of $h_{FE1} = Q1, Q2$ A larger value among $h_{FE}$ of $h_{FE2} = Q1, Q2$	0.85			

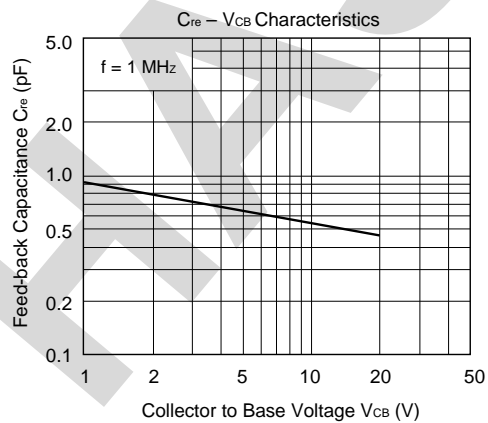
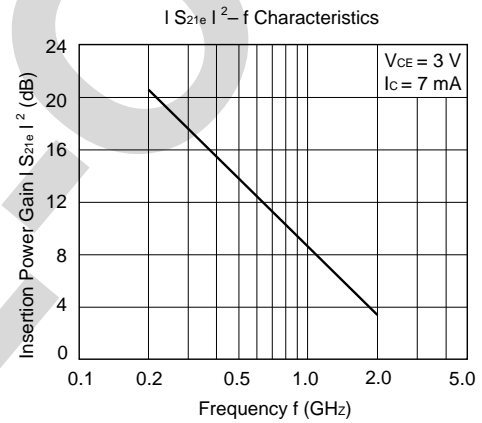
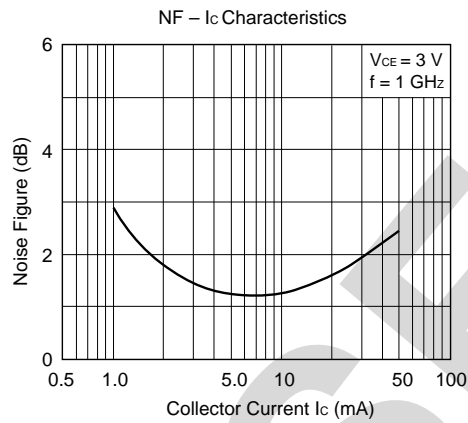
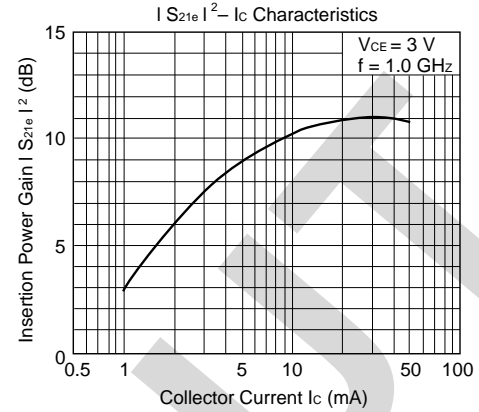
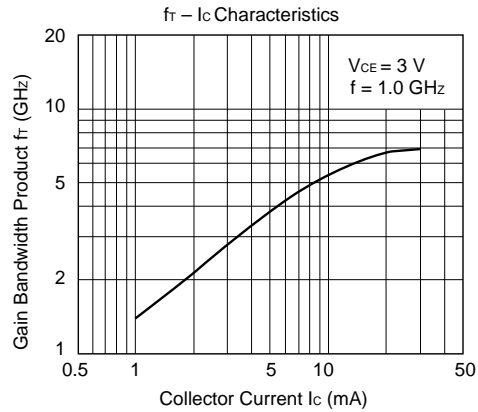
**Notes** 1. Pulse Measurement:  $P_w \leq 350\text{ }\mu\text{s}$ , Duty cycle  $\leq 2\%$

2. Measured with 3-pin bridge, emitter and case should be connected to guard pin of bridge.

 **$h_{FE}$  CLASSIFICATION**

Rank	FB	GB
Marking	24R	25R
$h_{FE}$ Value	70 to 140	125 to 250

**TYPICAL CHARACTERISTICS ( $T_A = 25^\circ\text{C}$ )**



**S-PARAMETERS** $V_{CE} = 3\text{ V}$ ,  $I_C = 1\text{ mA}$ 

FREQUENCY MHz	S <sub>11</sub>		S <sub>21</sub>		S <sub>12</sub>		S <sub>22</sub>	
	MAG	ANG	MAG	ANG	MAG	ANG	MAG	ANG
100.00	0.959	-26.1	3.680	162.0	0.045	77.2	0.983	-9.0
200.00	0.920	-48.3	3.305	146.4	0.080	63.8	0.937	-15.8
300.00	0.838	-69.2	2.972	131.3	0.111	50.1	0.863	-23.0
400.00	0.810	-85.6	2.612	121.4	0.128	43.5	0.815	-26.3
500.00	0.775	-100.0	2.367	110.9	0.137	34.7	0.745	-29.1
600.00	0.767	-115.0	2.149	104.1	0.147	30.8	0.724	-31.7
700.00	0.745	-127.0	1.986	93.8	0.147	25.1	0.693	-33.2
800.00	0.722	-137.7	1.854	87.9	0.150	21.5	0.682	-36.5
900.00	0.711	-146.4	1.655	80.0	0.143	20.5	0.668	-39.2
1000.00	0.715	-155.0	1.541	74.0	0.140	17.1	0.644	-43.7
1100.00	0.708	-163.2	1.414	69.2	0.136	19.0	0.623	-46.8
1200.00	0.697	-171.9	1.340	63.3	0.134	18.0	0.594	-50.1
1300.00	0.688	-177.1	1.271	59.5	0.132	18.5	0.577	-52.7
1400.00	0.675	178.8	1.174	54.4	0.122	20.1	0.559	-55.3
1500.00	0.706	173.6	1.119	49.8	0.118	21.9	0.559	-58.3
1600.00	0.725	168.7	1.058	47.5	0.111	29.5	0.549	-61.9
1700.00	0.723	161.1	1.007	43.9	0.114	33.2	0.547	-66.8
1800.00	0.718	156.4	0.998	40.8	0.119	40.8	0.537	-71.6
1900.00	0.702	152.5	0.957	36.2	0.126	44.1	0.526	-76.8
2000.00	0.716	149.8	0.943	31.1	0.137	47.1	0.514	-81.8

 $V_{CE} = 3\text{ V}$ ,  $I_C = 3\text{ mA}$ 

FREQUENCY MHz	S <sub>11</sub>		S <sub>21</sub>		S <sub>12</sub>		S <sub>22</sub>	
	MAG	ANG	MAG	ANG	MAG	ANG	MAG	ANG
100.00	0.878	-39.3	9.289	153.2	0.041	71.5	0.941	-17.3
200.00	0.788	-69.5	7.675	133.1	0.068	55.9	0.807	-28.4
300.00	0.685	-93.9	6.222	117.5	0.087	44.8	0.674	-36.5
400.00	0.634	-111.2	5.151	108.1	0.094	41.7	0.588	-39.0
500.00	0.603	-125.2	4.360	99.6	0.100	37.3	0.511	-40.5
600.00	0.591	-137.9	3.838	94.6	0.105	37.7	0.475	-41.3
700.00	0.573	-148.5	3.378	86.0	0.107	36.4	0.443	-41.5
800.00	0.566	-156.8	3.215	82.1	0.113	36.7	0.425	-43.2
900.00	0.563	-163.4	2.821	75.6	0.114	38.8	0.408	-45.0
1000.00	0.573	-170.3	2.594	70.7	0.118	38.3	0.385	-48.2
1100.00	0.577	-177.2	2.359	67.2	0.122	41.5	0.365	-50.7
1200.00	0.572	175.4	2.200	62.2	0.128	41.7	0.343	-53.3
1300.00	0.563	171.4	2.084	58.8	0.136	42.9	0.326	-55.1
1400.00	0.555	168.5	1.904	54.8	0.138	43.8	0.309	-57.1
1500.00	0.584	164.9	1.803	50.5	0.146	44.3	0.301	-59.6
1600.00	0.603	161.2	1.700	48.7	0.150	48.4	0.290	-62.8
1700.00	0.608	154.7	1.616	45.4	0.161	47.8	0.281	-67.3
1800.00	0.607	150.8	1.591	42.4	0.173	50.0	0.268	-72.3
1900.00	0.598	147.7	1.523	38.1	0.183	48.8	0.255	-77.4
2000.00	0.612	145.8	1.488	32.8	0.197	47.7	0.244	-82.6

**S-PARAMETERS** $V_{CE} = 3\text{ V}$ ,  $I_C = 5\text{ mA}$ 

FREQUENCY	S <sub>11</sub>		S <sub>21</sub>		S <sub>12</sub>		S <sub>22</sub>		
	MHz	MAG	ANG	MAG	ANG	MAG	ANG	MAG	ANG
100.00	0.803	-48.9	13.450	147.0	0.040	65.9	0.892	-23.3	
200.00	0.693	-83.5	10.285	124.9	0.059	54.1	0.705	-36.2	
300.00	0.594	-108.3	7.895	110.2	0.073	45.6	0.557	-43.4	
400.00	0.548	-125.1	6.305	101.7	0.080	44.7	0.468	-45.0	
500.00	0.528	-138.0	5.237	94.4	0.086	42.6	0.398	-45.4	
600.00	0.520	-149.3	4.554	90.4	0.092	45.2	0.363	-45.2	
700.00	0.508	-158.7	3.961	82.8	0.097	45.4	0.334	-44.8	
800.00	0.505	-165.6	3.624	79.1	0.106	46.4	0.317	-46.0	
900.00	0.505	-171.1	3.283	73.6	0.112	48.6	0.301	-47.1	
1000.00	0.519	-176.9	3.009	69.1	0.120	48.0	0.279	-49.9	
1100.00	0.527	177.0	2.729	66.0	0.127	50.1	0.262	-52.2	
1200.00	0.525	170.1	2.536	61.5	0.135	49.4	0.243	-54.7	
1300.00	0.518	166.6	2.399	58.3	0.147	49.9	0.227	-56.2	
1400.00	0.513	164.1	2.188	54.6	0.151	50.2	0.211	-57.7	
1500.00	0.539	161.2	2.067	50.6	0.162	49.5	0.202	-60.2	
1600.00	0.558	158.0	1.945	48.9	0.169	52.1	0.190	-63.7	
1700.00	0.565	152.1	1.847	46.0	0.181	50.8	0.179	-68.3	
1800.00	0.567	148.5	1.814	43.0	0.194	51.9	0.166	-74.4	
1900.00	0.561	145.6	1.737	38.9	0.205	49.8	0.152	-80.5	
2000.00	0.574	144.1	1.693	33.8	0.219	47.9	0.142	-86.6	

 $V_{CE} = 3\text{ V}$ ,  $I_C = 7\text{ mA}$ 

FREQUENCY	S <sub>11</sub>		S <sub>21</sub>		S <sub>12</sub>		S <sub>22</sub>		
	MHz	MAG	ANG	MAG	ANG	MAG	ANG	MAG	ANG
100.00	0.729	-58.5	17.087	141.0	0.037	66.1	0.838	-29.0	
200.00	0.612	-95.4	12.153	118.7	0.052	52.6	0.618	-42.2	
300.00	0.529	-119.9	9.023	105.1	0.064	47.7	0.467	-48.4	
400.00	0.492	-135.6	7.052	97.4	0.072	48.8	0.382	-49.2	
500.00	0.481	-147.4	5.805	91.0	0.078	49.2	0.321	-48.7	
600.00	0.476	-157.4	4.986	87.6	0.087	51.9	0.291	-47.9	
700.00	0.469	-166.0	4.341	80.7	0.094	52.3	0.265	-47.0	
800.00	0.469	-171.8	3.951	77.3	0.106	53.1	0.248	-47.6	
900.00	0.471	-176.4	3.408	71.8	0.112	54.6	0.233	-48.7	
1000.00	0.487	178.6	3.268	68.1	0.123	53.4	0.213	-51.0	
1100.00	0.497	172.9	2.959	65.2	0.132	55.1	0.197	-53.1	
1200.00	0.496	166.5	2.748	60.9	0.142	53.9	0.179	-55.6	
1300.00	0.490	163.3	2.598	57.8	0.155	54.0	0.164	-57.0	
1400.00	0.485	161.2	2.365	54.4	0.161	53.4	0.149	-59.0	
1500.00	0.513	158.7	2.230	50.5	0.172	52.0	0.140	-61.3	
1600.00	0.531	155.9	2.100	49.0	0.180	54.1	0.127	-65.2	
1700.00	0.539	150.3	1.990	46.2	0.194	52.2	0.115	-70.6	
1800.00	0.543	146.9	1.955	43.4	0.207	52.8	0.102	-78.3	
1900.00	0.539	144.2	1.867	39.4	0.218	50.2	0.088	-87.0	
2000.00	0.552	142.6	1.820	34.3	0.233	47.9	0.080	-95.5	

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