注文コード No. N 7 4 1 0

SANYO 三洋半導体ニューズ

No. N 7 4 1 0

62503

新

SBFP405D — NPN エピタキシャルプレーナ型シリコントランジスタ UHF ～ C バンド低雑音増幅、発振用

特長
- 低雑音である：NF=1.25dB typ(f=1.8GHz)。
- しゃ断周波数が高い：f_T=25GHz typ(V_{CE}=3V)。
- 低電圧動作。
- 高利得である：$|S21e|^2$=18dB typ(f=1.8GHz)。

絶対最大定格 Absolute Maximum Ratings / Ta=25℃

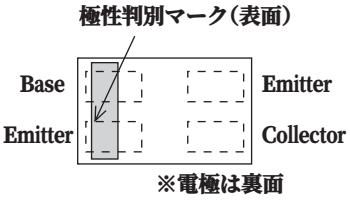
			unit
コレクタ・ベース電圧	V_{CBO}	15	V
コレクタ・エミッタ電圧	V_{CEO}	4.5	V
エミッタ・ベース電圧	V_{EBO}	1.5	V
コレクタ電流	I_C	12	mA
コレクタ損失	P_C	55	mW
接合部温度	Tj	150	℃
保存周囲温度	Tstg	－55～＋150	℃

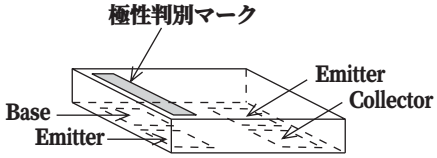
電気的特性 Electrical Characteristics / Ta=25℃

			min	typ	max	unit
コレクタしゃ断電流	I_{CBO}	V_{CB}=5V, I_E=0			150	nA
エミッタしゃ断電流	I_{EBO}	V_{EB}=1.5V, I_C=0			15	μA
直流電流増幅率	h_{FE}	V_{CE}=4V, I_C=5mA	50		150	
利得帯域幅積	f_T	V_{CE}=3V, I_C=10mA	18	25		GHz
帰還容量	Cre	V_{CB}=1V, f=1MHz		0.13	0.23	pF
順方向伝達利得	$\|S21e\|^2$	V_{CE}=2V, I_C=5mA, f=1.8GHz	14	18		dB
雑音指数	NF	V_{CE}=2V, I_C=2mA, f=1.8GHz		1.25	1.65	dB

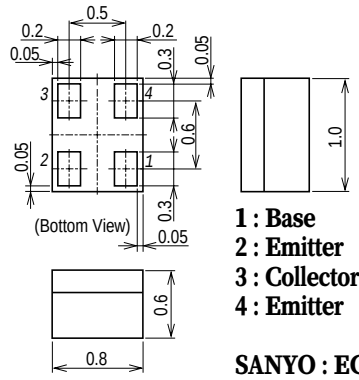
単体品名表示：AB

電気的接続図 (Top view)





外形図　2215
(unit : mm)



1 : Base
2 : Emitter
3 : Collector
4 : Emitter

SANYO : ECSP1008-4

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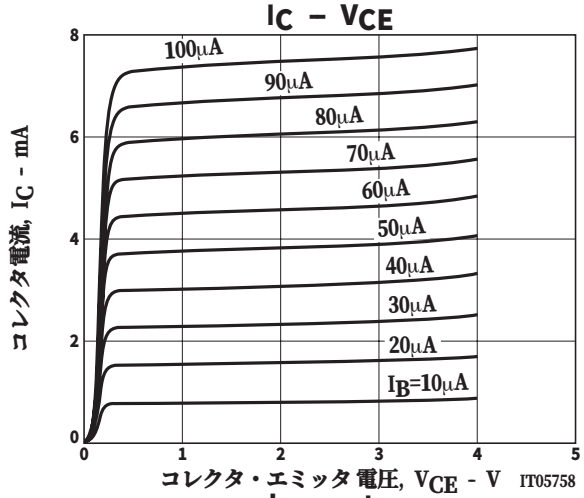
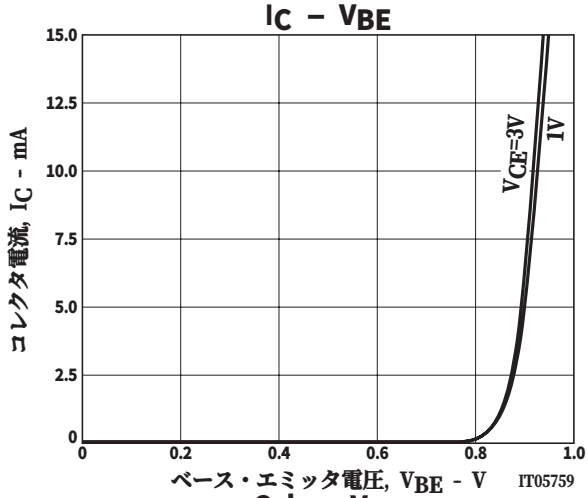
〒370-0596 群馬県邑楽郡大泉町坂田一丁目1番1号　三洋電機株式会社 セミコンダクター カンパニー

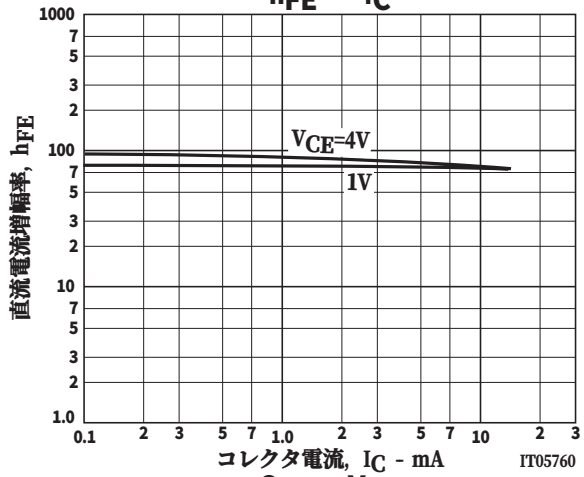
$I_C - V_{CE}$



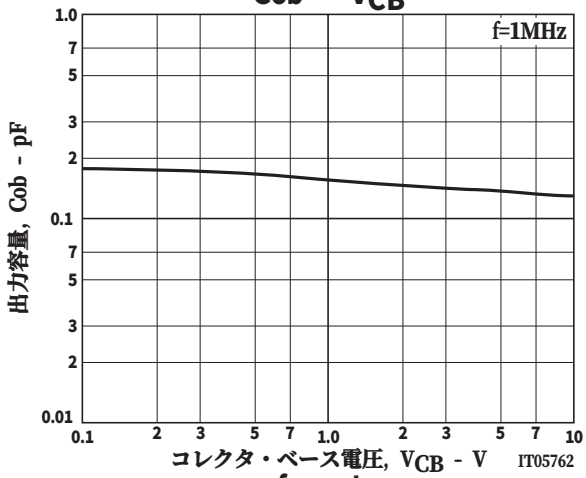
$I_C - V_{BE}$



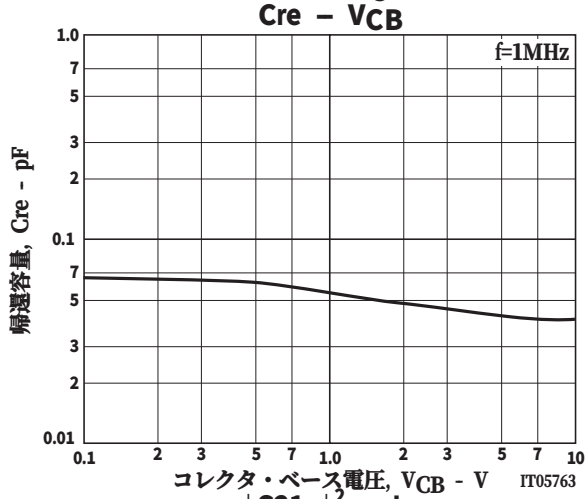
$h_{FE} - I_C$



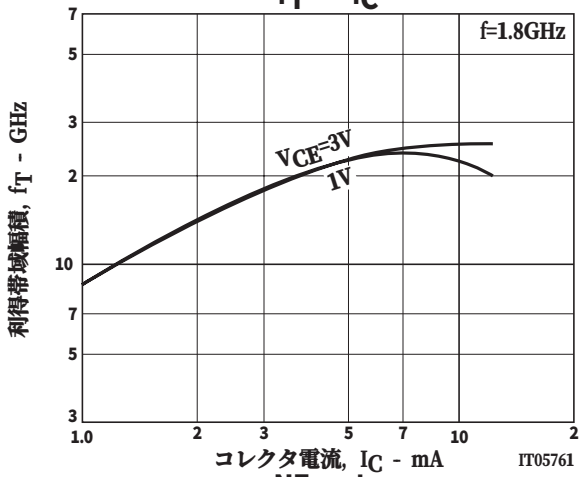
$Cob - V_{CB}$



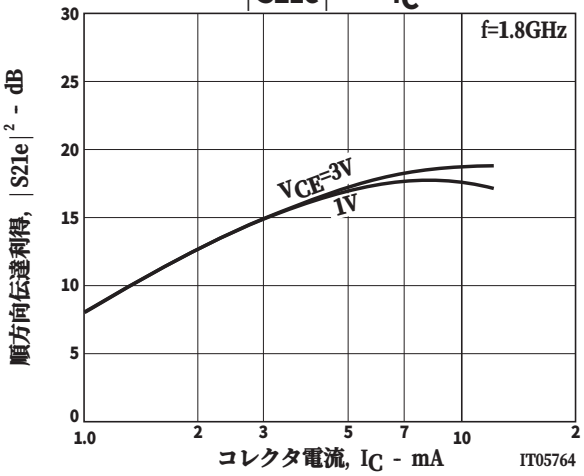
$Cre - V_{CB}$



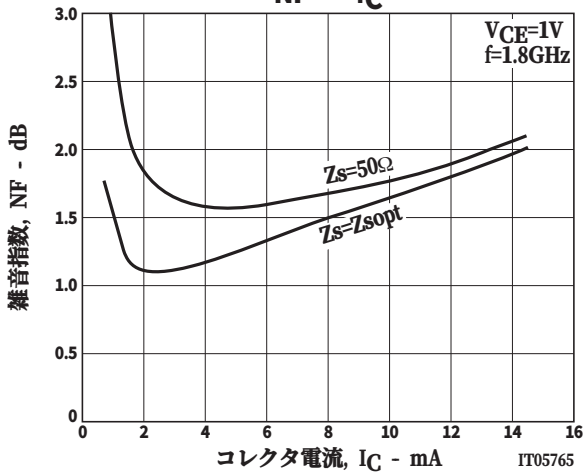
$f_T - I_C$

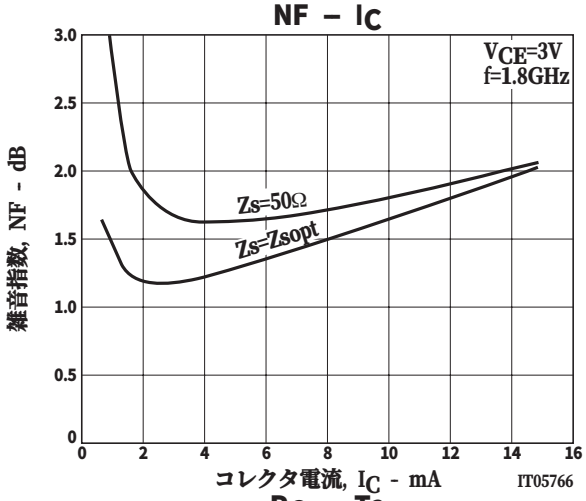


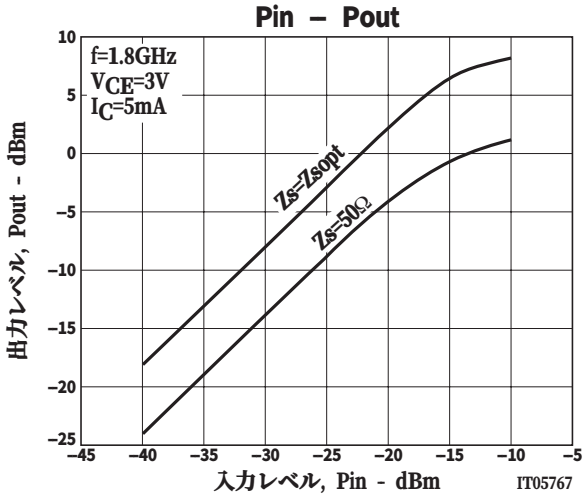
$|S21e|^2 - I_C$

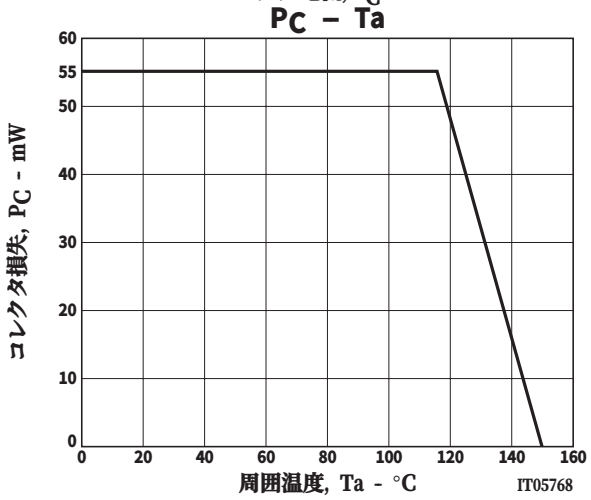


$NF - I_C$




NF – IC
VCE=3V
f=1.8GHz
Zs=50Ω
Zs=Zsopt
雑音指数, NF - dB
コレクタ電流, IC - mA
IT05766


Pin – Pout
f=1.8GHz
VCE=3V
IC=5mA
Zs=Zsopt
Zs=50Ω
出力レベル, Pout - dBm
入力レベル, Pin - dBm
IT05767


PC – Ta
コレクタ損失, PC - mW
周囲温度, Ta - °C
IT05768

S パラメータ（エミッタ接地）

V_{CE}=1V, I_C=1mA, Z_O=50Ω

Freq(MHz)	$\|S_{11}\|$	$\angle S_{11}$	$\|S_{21}\|$	$\angle S_{21}$	$\|S_{12}\|$	$\angle S_{12}$	$\|S_{22}\|$	$\angle S_{22}$
200	0.965	-4.8	2.574	173.7	0.008	99.9	0.998	-2.8
400	0.966	-9.4	2.284	168.3	0.016	83.0	0.992	-5.7
600	0.958	-14.1	2.341	163.2	0.025	79.4	0.984	-8.4
800	0.944	-19.6	2.615	157.8	0.032	78.0	0.973	-11.2
1000	0.938	-22.9	2.153	151.5	0.040	76.2	0.964	-13.7
1200	0.917	-29.4	2.609	148.4	0.047	72.7	0.948	-16.2
1400	0.908	-33.8	2.460	144.2	0.055	70.3	0.935	-18.5
1600	0.896	-37.5	2.258	139.8	0.061	66.6	0.920	-21.1
1800	0.865	-43.9	2.510	134.5	0.068	64.5	0.899	-23.1
2000	0.855	-47.1	2.258	130.5	0.074	61.6	0.884	-25.3
2200	0.830	-53.5	2.417	127.1	0.079	59.3	0.863	-27.1
2400	0.808	-58.4	2.397	123.1	0.085	57.4	0.848	-28.7
2600	0.800	-61.0	2.159	119.3	0.090	54.4	0.830	-30.8
2800	0.760	-67.8	2.332	114.7	0.093	52.5	0.811	-32.5
3000	0.753	-71.1	2.171	111.8	0.098	50.5	0.797	-34.0
3200	0.724	-76.7	2.219	108.2	0.102	48.4	0.778	-35.6
3400	0.696	-81.9	2.227	104.3	0.105	46.5	0.763	-36.9
3600	0.687	-84.5	2.069	101.2	0.109	44.4	0.749	-38.6
3800	0.653	-90.8	2.149	97.4	0.112	42.9	0.732	-39.8
4000	0.635	-95.1	2.092	94.3	0.114	41.6	0.720	-40.9
4200	0.616	-99.2	2.031	91.2	0.117	40.1	0.706	-42.3
4400	0.579	-105.2	2.076	86.8	0.119	39.1	0.691	-43.3
4600	0.573	-108.0	1.954	84.2	0.122	37.5	0.680	-44.5
4800	0.545	-113.8	1.975	80.7	0.123	36.6	0.668	-45.8
5000	0.524	-118.6	1.930	77.7	0.126	35.6	0.658	-46.8
5200	0.514	-122.0	1.863	75.2	0.127	34.4	0.647	-48.1
5400	0.488	-127.1	1.859	71.8	0.128	33.3	0.635	-49.3
5600	0.475	-131.3	1.806	69.2	0.130	32.6	0.624	-50.3
5800	0.453	-136.5	1.792	66.2	0.132	31.9	0.613	-51.4
6000	0.438	-140.9	1.755	63.3	0.134	31.2	0.606	-52.4

S パラメータ（エミッタ接地）

V_{CE}=1V, I_C=3mA, Z_O=50Ω

Freq(MHz)	$\|S_{11}\|$	$\angle S_{11}$	$\|S_{21}\|$	$\angle S_{21}$	$\|S_{12}\|$	$\angle S_{12}$	$\|S_{22}\|$	$\angle S_{22}$
200	0.904	-7.4	6.859	170.4	0.006	117.0	0.987	-4.2
400	0.898	-13.9	6.054	162.6	0.015	78.5	0.977	-8.3
600	0.872	-21.4	6.220	155.7	0.023	77.9	0.956	-12.2
800	0.838	-29.2	6.500	148.6	0.029	72.6	0.930	-15.8
1000	0.821	-33.2	5.498	141.6	0.036	70.8	0.905	-19.1
1200	0.765	-43.6	6.278	135.6	0.041	66.7	0.873	-22.0
1400	0.741	-49.0	5.781	130.7	0.046	65.5	0.846	-24.4
1600	0.711	-55.1	5.510	125.8	0.050	62.6	0.814	-27.1
1800	0.656	-62.8	5.556	119.5	0.055	61.2	0.785	-28.7
2000	0.632	-67.3	5.114	115.3	0.059	59.0	0.760	-30.7
2200	0.579	-75.2	5.138	109.8	0.063	58.2	0.734	-32.1
2400	0.549	-80.4	4.873	105.8	0.067	56.9	0.713	-33.3
2600	0.524	-85.0	4.594	102.1	0.070	55.5	0.691	-34.8
2800	0.479	-91.3	4.481	97.5	0.073	54.5	0.671	-35.8
3000	0.460	-95.5	4.225	94.3	0.077	54.2	0.654	-36.9
3200	0.423	-101.4	4.119	90.4	0.080	53.4	0.637	-37.8
3400	0.399	-106.1	3.937	87.1	0.083	52.4	0.621	-38.7
3600	0.380	-110.5	3.763	84.1	0.086	51.5	0.609	-39.7
3800	0.355	-115.6	3.637	80.9	0.089	51.4	0.596	-40.4
4000	0.340	-120.1	3.484	78.1	0.092	51.0	0.584	-41.2
4200	0.320	-124.9	3.358	75.2	0.096	50.3	0.574	-42.0
4400	0.303	-129.9	3.243	72.3	0.099	50.0	0.563	-43.0
4600	0.292	-134.1	3.111	69.8	0.102	49.3	0.554	-43.8
4800	0.277	-139.2	3.013	67.1	0.106	48.7	0.544	-44.7
5000	0.267	-143.9	2.899	64.8	0.109	48.0	0.536	-45.6
5200	0.256	-148.6	2.807	62.3	0.112	47.6	0.528	-46.4
5400	0.246	-153.4	2.721	60.0	0.115	46.6	0.521	-47.3
5600	0.237	-158.4	2.635	57.7	0.119	46.3	0.513	-48.0
5800	0.229	-163.4	2.556	55.4	0.112	45.9	0.505	-49.0
6000	0.224	-168.4	2.479	53.1	0.126	45.1	0.499	-50.0

S パラメータ（エミッタ接地）

V_{CE}=1V, I_C=5mA, Z_O=50Ω

Freq(MHz)	$\|S_{11}\|$	$\angle S_{11}$	$\|S_{21}\|$	$\angle S_{21}$	$\|S_{12}\|$	$\angle S_{12}$	$\|S_{22}\|$	$\angle S_{22}$
200	0.845	-9.9	10.216	168.0	0.007	81.9	0.984	-5.1
400	0.832	-18.4	8.970	158.3	0.014	84.3	0.961	-10.3
600	0.792	-27.9	9.214	150.2	0.022	75.9	0.927	-14.5
800	0.743	-37.2	9.227	142.1	0.028	71.8	0.890	-18.3
1000	0.714	-42.6	7.977	135.1	0.033	69.5	0.854	-21.7
1200	0.637	-54.2	8.507	127.2	0.037	66.8	0.815	-24.2
1400	0.604	-60.6	7.778	121.7	0.042	63.8	0.782	-26.3
1600	0.557	-68.2	7.394	115.9	0.045	63.3	0.747	-28.5
1800	0.506	-75.1	7.048	110.1	0.049	62.3	0.719	-29.8
2000	0.472	-80.8	6.528	105.7	0.053	61.2	0.693	-31.3
2200	0.428	-87.5	6.218	100.7	0.057	60.2	0.670	-32.3
2400	0.400	-92.6	5.816	96.9	0.060	59.7	0.649	-33.4
2600	0.373	-97.8	5.462	93.3	0.064	59.6	0.630	-34.3
2800	0.343	-103.2	5.172	89.6	0.067	58.9	0.613	-35.1
3000	0.322	-107.8	4.870	86.6	0.070	58.9	0.599	-35.9
3200	0.298	-113.2	4.641	83.3	0.074	58.6	0.584	-36.7
3400	0.281	-118.1	4.405	80.5	0.078	57.7	0.572	-37.4
3600	0.265	-122.8	4.189	77.8	0.081	57.5	0.561	-38.2
3800	0.250	-127.9	4.004	75.1	0.084	56.9	0.551	-38.8
4000	0.238	-132.7	3.824	72.6	0.088	56.0	0.542	-39.5
4200	0.255	-137.8	3.664	70.0	0.093	56.0	0.532	-40.3
4400	0.215	-142.9	3.516	67.6	0.096	55.1	0.524	-41.1
4600	0.207	-147.7	3.373	65.3	0.100	54.7	0.517	-41.9
4800	0.199	-153.1	3.247	62.9	0.104	53.8	0.509	-42.9
5000	0.192	-158.1	3.122	60.7	0.108	53.2	0.502	-43.7
5200	0.186	-163.7	3.015	58.5	0.112	52.6	0.495	-44.4
5400	0.181	-168.9	2.910	56.4	0.116	51.9	0.488	-45.2
5600	0.177	-173.7	2.816	54.3	0.119	50.9	0.482	-46.0
5800	0.174	-179.2	2.728	52.3	0.124	50.2	0.474	-46.9
6000	0.171	175.5	2.640	50.2	0.127	49.4	0.469	-47.9

S パラメータ（エミッタ接地）

V_{CE}=1V, I_C=7mA, Z_O=50Ω

Freq(MHz)	$\|S_{11}\|$	$\angle S_{11}$	$\|S_{21}\|$	$\angle S_{21}$	$\|S_{12}\|$	$\angle S_{12}$	$\|S_{22}\|$	$\angle S_{22}$
200	0.797	-12.6	12.594	165.6	0.008	80.8	0.975	-5.8
400	0.766	-23.9	10.931	154.2	0.015	77.1	0.946	-11.4
600	0.715	-34.8	11.250	145.4	0.020	71.3	0.903	-16.0
800	0.660	-44.6	10.950	136.8	0.026	70.7	0.858	-19.7
1000	0.618	-52.0	9.601	129.4	0.031	67.3	0.816	-22.7
1200	0.539	-63.0	9.676	121.1	0.035	66.8	0.775	-25.0
1400	0.502	-70.1	8.786	115.3	0.039	65.4	0.741	-26.8
1600	0.453	-77.6	8.204	109.6	0.042	64.2	0.708	-28.5
1800	0.411	-84.0	7.639	104.4	0.046	63.1	0.681	-29.6
2000	0.378	-90.2	7.036	100.1	0.049	62.8	0.657	-30.8
2200	0.345	-96.2	6.587	95.8	0.054	62.5	0.636	-31.6
2400	0.320	-101.4	6.125	92.2	0.056	62.7	0.618	-32.5
2600	0.297	-106.9	5.720	88.8	0.060	61.9	0.602	-33.3
2800	0.274	-112.0	5.377	85.6	0.063	62.3	0.586	-34.0
3000	0.257	-117.3	5.047	82.7	0.068	61.9	0.573	-34.7
3200	0.240	-122.5	4.780	79.9	0.072	61.1	0.561	-35.4
3400	0.226	-127.8	4.523	77.2	0.076	61.1	0.551	-36.0
3600	0.214	-132.9	4.298	74.7	0.079	60.4	0.541	-36.8
3800	0.204	-138.3	4.093	72.2	0.084	59.8	0.532	-37.5
4000	0.195	-143.2	3.905	69.9	0.087	59.4	0.524	-38.3
4200	0.187	-148.9	3.734	67.5	0.092	58.5	0.516	-38.9
4400	0.179	-154.2	3.578	65.2	0.095	57.8	0.509	-39.8
4600	0.175	-159.4	3.431	63.0	0.100	57.2	0.502	-40.4
4800	0.169	-165.1	3.297	60.7	0.103	56.6	0.494	-41.4
5000	0.166	-170.3	3.169	58.8	0.108	55.6	0.489	-42.2
5200	0.164	-175.9	3.055	56.6	0.112	55.3	0.482	-43.0
5400	0.160	178.7	2.948	54.6	0.116	54.2	0.475	-43.7
5600	0.159	173.7	2.852	52.6	0.120	53.3	0.470	-44.6
5800	0.158	168.3	2.759	50.6	0.124	52.5	0.463	-45.6
6000	0.157	163.4	2.670	48.6	0.128	51.6	0.458	-46.5

S パラメータ（エミッタ接地）

V_{CE}=1V, I_C=10mA, Z_O=50Ω

Freq(MHz)	$\|S_{11}\|$	$\angle S_{11}$	$\|S_{21}\|$	$\angle S_{21}$	$\|S_{12}\|$	$\angle S_{12}$	$\|S_{22}\|$	$\angle S_{22}$
200	0.706	-19.6	15.145	161.4	0.008	94.0	0.963	-6.7
400	0.649	-36.5	12.907	147.4	0.014	78.8	0.920	-12.9
600	0.588	-50.2	13.039	137.1	0.019	71.1	0.862	-17.4
800	0.529	-61.0	12.097	128.0	0.024	69.6	0.810	-20.7
1000	0.471	-71.1	10.682	120.1	0.028	67.1	0.765	-23.1
1200	0.413	-80.6	10.062	112.8	0.032	66.0	0.725	-24.9
1400	0.379	-88.6	9.033	107.0	0.036	66.0	0.693	-26.1
1600	0.342	-95.5	8.299	102.0	0.039	65.9	0.665	-27.5
1800	0.311	-101.5	7.624	97.7	0.043	65.9	0.642	-28.2
2000	0.287	-108.4	6.979	93.7	0.046	65.3	0.621	-29.2
2200	0.265	-114.7	6.482	90.1	0.050	65.1	0.604	-29.9
2400	0.248	-120.2	6.009	86.9	0.054	64.6	0.589	-30.5
2600	0.233	-126.1	5.590	83.9	0.057	65.3	0.576	-31.2
2800	0.218	-132.0	5.235	81.0	0.062	64.9	0.563	-31.9
3000	0.208	-137.6	4.904	78.3	0.065	65.2	0.553	-32.5
3200	0.198	-143.4	4.631	75.8	0.069	64.2	0.542	-33.3
3400	0.190	-149.1	4.375	73.4	0.074	63.9	0.534	-33.8
3600	0.185	-154.8	4.153	71.0	0.077	63.4	0.525	-34.7
3800	0.179	-160.6	3.949	68.7	0.082	62.7	0.518	-35.4
4000	0.176	-165.4	3.768	66.5	0.086	62.0	0.511	-36.1
4200	0.173	-171.2	3.599	64.3	0.091	61.4	0.504	-36.9
4400	0.170	-176.5	3.442	62.1	0.095	60.8	0.498	-37.8
4600	0.169	178.6	3.303	60.0	0.098	60.1	0.492	-38.4
4800	0.168	173.1	3.169	57.9	0.103	59.1	0.486	-39.4
5000	0.168	168.4	3.049	56.0	0.107	58.2	0.480	-40.2
5200	0.169	163.3	2.938	53.9	0.111	57.4	0.474	-41.2
5400	0.170	158.6	2.830	52.0	0.115	56.6	0.469	-42.0
5600	0.172	154.8	2.739	50.1	0.120	56.0	0.464	-42.9
5800	0.173	150.3	2.651	48.2	0.124	54.4	0.458	-43.9
6000	0.174	146.0	2.565	46.2	0.128	53.8	0.452	-44.8

S パラメータ（エミッタ接地）

V_{CE}=3V, I_C=1mA, Z_O=50Ω

Freq(MHz)	$\|S_{11}\|$	$\angle S_{11}$	$\|S_{21}\|$	$\angle S_{21}$	$\|S_{12}\|$	$\angle S_{12}$	$\|S_{22}\|$	$\angle S_{22}$
200	0.970	-4.3	2.491	174.5	0.007	85.4	0.998	-2.1
400	0.968	-8.4	2.216	169.5	0.013	84.3	0.994	-4.4
600	0.961	-13.0	2.270	164.7	0.019	81.0	0.989	-6.7
800	0.947	-18.1	2.556	159.6	0.024	80.4	0.983	-9.0
1000	0.944	-21.1	2.097	153.7	0.030	78.2	0.975	-11.0
1200	0.922	-27.4	2.553	150.7	0.036	75.4	0.966	-13.2
1400	0.917	-31.5	2.420	146.7	0.043	73.0	0.955	-15.2
1600	0.905	-34.9	2.209	142.4	0.048	70.0	0.944	-17.6
1800	0.878	-40.9	2.480	137.4	0.053	68.3	0.929	-19.2
2000	0.868	-44.0	2.226	133.5	0.057	65.8	0.916	-21.2
2200	0.845	-50.0	2.387	130.3	0.062	63.7	0.900	-22.9
2400	0.823	-54.6	2.382	126.4	0.066	61.7	0.886	-24.4
2600	0.818	-57.0	2.129	122.7	0.070	59.4	0.872	-26.1
2800	0.778	-63.5	2.322	118.3	0.074	57.0	0.856	-27.7
3000	0.722	-66.7	2.161	115.5	0.079	55.4	0.843	-29.1
3200	0.743	-71.9	2.205	111.9	0.081	53.3	0.828	-30.6
3400	0.715	-77.0	2.234	108.1	0.085	51.9	0.815	-31.8
3600	0.709	-79.4	2.064	105.0	0.088	49.0	0.803	-33.3
3800	0.673	-85.6	2.155	101.4	0.089	48.4	0.788	-34.5
4000	0.655	-89.8	2.108	98.4	0.093	47.2	0.780	-35.6
4200	0.640	-93.6	2.034	95.4	0.095	45.9	0.766	-36.9
4400	0.599	-99.3	2.095	91.1	0.096	45.4	0.754	-37.8
4600	0.594	-102.0	1.966	88.5	0.099	43.8	0.743	-38.9
4800	0.563	-107.6	1.998	85.0	0.101	42.9	0.733	-40.2
5000	0.540	-112.1	1.964	82.2	0.103	42.1	0.724	-41.0
5200	0.531	-115.6	1.885	79.6	0.104	40.8	0.713	-42.4
5400	0.502	-120.7	1.887	76.1	0.105	40.0	0.702	-43.4
5600	0.492	-124.7	1.836	73.5	0.107	39.5	0.694	-44.4
5800	0.466	-129.7	1.823	70.5	0.109	38.8	0.684	-45.4
6000	0.448	-133.9	1.792	67.5	0.111	37.7	0.675	-46.4

S パラメータ（エミッタ接地）

V_{CE}=3V, I_C=3mA, Z_O=50Ω

Freq(MHz)	$\|S_{11}\|$	$\angle S_{11}$	$\|S_{21}\|$	$\angle S_{21}$	$\|S_{12}\|$	$\angle S_{12}$	$\|S_{22}\|$	$\angle S_{22}$
200	0.909	-6.3	6.617	171.4	0.006	76.4	0.993	-3.0
400	0.905	-12.3	5.865	164.3	0.011	82.5	0.984	-6.2
600	0.885	-19.0	6.017	157.7	0.017	78.2	0.970	-9.3
800	0.851	-26.4	6.363	151.0	0.022	75.1	0.953	-12.1
1000	0.839	-30.0	5.366	144.4	0.027	74.0	0.936	-14.8
1200	0.783	-39.6	6.177	138.6	0.031	70.5	0.912	-17.2
1400	0.764	-44.7	5.728	133.8	0.036	69.8	0.890	-19.3
1600	0.737	-50.0	5.425	129.2	0.040	66.8	0.867	-21.7
1800	0.683	-57.4	5.553	123.0	0.043	64.8	0.844	-23.1
2000	0.661	-61.4	5.104	119.0	0.046	63.5	0.823	-24.8
2200	0.607	-69.0	5.178	113.5	0.049	62.1	0.802	-26.2
2400	0.575	-73.9	4.935	109.5	0.053	61.8	0.785	-27.5
2600	0.554	-77.9	4.638	106.0	0.056	61.1	0.765	-28.7
2800	0.505	-84.0	4.567	101.2	0.058	60.9	0.749	-29.7
3000	0.486	-88.0	4.311	98.1	0.061	59.3	0.733	-30.8
3200	0.446	-93.5	4.213	94.0	0.064	58.7	0.718	-31.8
3400	0.419	-98.1	4.049	90.7	0.067	58.2	0.706	-32.6
3600	0.400	-102.1	3.868	87.8	0.069	58.1	0.694	-33.7
3800	0.372	-107.1	3.750	84.4	0.071	57.4	0.682	-34.5
4000	0.355	-111.1	3.598	81.7	0.075	56.8	0.673	-35.3
4200	0.334	-115.5	3.473	78.8	0.078	56.2	0.663	-36.1
4400	0.313	-119.8	3.352	75.9	0.081	56.1	0.654	-37.0
4600	0.301	-123.9	3.219	73.5	0.084	55.3	0.645	-37.7
4800	0.282	-128.6	3.123	70.7	0.087	55.0	0.636	-38.7
5000	0.269	-132.7	3.005	68.5	0.090	54.6	0.630	-39.4
5200	0.257	-137.7	2.910	65.9	0.093	53.9	0.621	-40.4
5400	0.243	-142.4	2.820	63.5	0.096	53.5	0.614	-41.2
5600	0.235	-146.8	2.735	61.3	0.099	52.8	0.608	-42.1
5800	0.244	-151.7	2.652	59.0	0.102	52.5	0.600	-43.0
6000	0.214	-156.1	2.572	56.8	0.105	51.9	0.593	-43.8

S パラメータ（エミッタ接地）

V_{CE}=3V, I_C=5mA, Z_O=50Ω

Freq(MHz)	$\|S_{11}\|$	$\angle S_{11}$	$\|S_{21}\|$	$\angle S_{21}$	$\|S_{12}\|$	$\angle S_{12}$	$\|S_{22}\|$	$\angle S_{22}$
200	0.855	-8.4	10.168	169.2	0.005	65.5	0.989	-3.7
400	0.846	-15.7	9.044	160.6	0.011	79.1	0.973	-7.6
600	0.809	-24.5	9.220	152.6	0.016	77.5	0.950	-10.9
800	0.759	-33.4	9.325	114.7	0.020	75.2	0.924	-13.9
1000	0.738	-38.0	8.063	138.0	0.025	70.8	0.897	-16.5
1200	0.659	-49.0	8.655	130.2	0.028	70.5	0.868	-18.7
1400	0.629	-54.9	7.976	124.8	0.032	68.6	0.843	-20.5
1600	0.583	-61.7	7.572	119.2	0.035	66.9	0.816	-22.5
1800	0.529	-68.5	7.284	113.3	0.038	67.1	0.793	-23.7
2000	0.496	-73.4	6.753	108.9	0.041	66.4	0.772	-25.0
2200	0.448	-79.8	6.470	103.8	0.044	65.9	0.752	-26.1
2400	0.417	-84.5	6.059	100.0	0.047	65.6	0.735	-27.2
2600	0.390	-89.1	5.698	96.4	0.050	64.7	0.718	-28.1
2800	0.356	-94.2	5.410	92.6	0.053	64.6	0.704	-28.9
3000	0.334	-98.3	5.099	89.5	0.056	64.9	0.691	-29.8
3200	0.307	-102.9	4.862	86.2	0.058	64.5	0.678	-30.7
3400	0.287	-107.4	4.617	83.4	0.062	63.9	0.668	-31.4
3600	0.270	-111.8	4.399	80.7	0.065	63.0	0.658	-32.2
3800	0.252	-116.4	4.202	77.9	0.068	63.1	0.647	-32.9
4000	0.239	-120.6	4.017	75.4	0.071	62.5	0.641	-33.7
4200	0.224	-125.2	3.851	72.9	0.075	62.0	0.632	-34.5
4400	0.210	-129.6	3.693	70.5	0.078	61.5	0.625	-35.2
4600	0.200	-134.2	3.543	68.3	0.082	61.0	0.618	-36.0
4800	0.188	-139.1	3.412	65.8	0.085	60.2	0.610	-36.9
5000	0.179	-143.6	3.280	63.8	0.089	60.0	0.606	-37.7
5200	0.172	-149.5	3.168	61.6	0.092	59.3	0.597	-38.6
5400	0.163	-154.7	3.057	59.4	0.096	58.6	0.592	-39.4
5600	0.159	-159.7	2.959	57.4	0.099	58.3	0.586	-40.3
5800	0.153	-165.2	2.862	55.3	0.102	57.0	0.579	-41.1
6000	0.146	-170.3	2.773	53.3	0.106	56.4	0.573	-42.0

S パラメータ（エミッタ接地）

V_{CE}=3V, I_C=7mA, Z_O=50Ω

Freq(MHz)	$\|S_{11}\|$	$\angle S_{11}$	$\|S_{21}\|$	$\angle S_{21}$	$\|S_{12}\|$	$\angle S_{12}$	$\|S_{22}\|$	$\angle S_{22}$
200	0.809	-9.9	13.020	167.7	0.007	82.9	0.986	-4.2
400	0.791	-18.9	11.613	157.8	0.011	79.9	0.965	-8.4
600	0.740	-29.3	11.705	148.5	0.015	74.8	0.933	-11.9
800	0.682	-39.1	11.441	139.8	0.019	73.5	0.901	-14.9
1000	0.648	-45.1	10.083	132.8	0.023	71.5	0.868	-17.3
1200	0.564	-55.9	10.150	124.3	0.026	69.1	0.840	-19.2
1400	0.526	-62.2	9.285	118.6	0.030	69.1	0.812	-20.8
1600	0.476	-69.1	8.659	112.7	0.032	69.1	0.786	-22.4
1800	0.429	-75.2	8.090	107.4	0.035	68.7	0.764	-23.5
2000	0.396	-80.4	7.472	103.0	0.038	67.9	0.745	-24.6
2200	0.358	-86.3	6.997	98.6	0.041	68.3	0.727	-25.5
2400	0.330	-90.9	6.511	94.9	0.045	67.4	0.712	-26.6
2600	0.306	-95.4	6.088	91.6	0.047	68.0	0.697	-27.3
2800	0.280	-100.1	5.717	88.3	0.050	68.1	0.685	-28.1
3000	0.260	-104.4	5.378	85.4	0.053	67.2	0.672	-28.8
3200	0.240	-109.2	5.088	82.4	0.057	67.5	0.661	-29.7
3400	0.223	-113.8	4.821	79.9	0.060	66.6	0.652	-30.3
3600	0.210	-118.3	4.577	77.2	0.064	66.8	0.642	-31.1
3800	0.196	-123.2	4.362	74.8	0.067	65.8	0.634	-31.9
4000	0.185	-127.6	4.159	72.4	0.071	65.9	0.628	-32.7
4200	0.175	-132.6	3.979	70.1	0.074	65.1	0.620	-33.5
4400	0.164	-137.5	3.809	67.8	0.078	64.1	0.615	-34.3
4600	0.156	-142.5	3.652	65.7	0.081	63.9	0.608	-35.0
4800	0.148	-148.4	3.509	63.4	0.084	63.1	0.601	-36.0
5000	0.141	-153.4	3.374	61.5	0.089	62.4	0.597	-36.7
5200	0.137	-159.6	3.254	59.4	0.092	61.9	0.590	-37.6
5400	0.131	-165.7	3.138	57.3	0.096	61.2	0.584	-38.4
5600	0.129	-170.7	3.035	55.4	0.099	60.1	0.579	-39.2
5800	0.126	-177.0	2.935	53.4	0.102	59.2	0.572	-40.1
6000	0.122	177.3	2.839	51.5	0.106	58.7	0.567	-41.1

S パラメータ（エミッタ接地）

V_{CE}=3V, I_C=10mA, Z_O=50Ω

Freq(MHz)	$\|S_{11}\|$	$\angle S_{11}$	$\|S_{21}\|$	$\angle S_{21}$	$\|S_{12}\|$	$\angle S_{12}$	$\|S_{22}\|$	$\angle S_{22}$
200	0.744	-12.4	16.473	165.7	0.004	84.1	0.979	-4.8
400	0.713	-23.6	14.723	154.1	0.011	81.9	0.951	-9.3
600	0.648	-35.9	14.478	143.3	0.015	74.5	0.913	-12.9
800	0.580	-46.5	13.572	133.7	0.018	71.6	0.874	-15.6
1000	0.533	-54.2	12.081	126.1	0.021	72.1	0.839	-17.6
1200	0.458	-63.7	11.356	118.0	0.024	71.6	0.809	-19.3
1400	0.418	-70.4	10.263	112.2	0.027	71.4	0.783	-20.6
1600	0.374	-77.0	9.371	106.7	0.030	70.4	0.760	-21.9
1800	0.336	-82.7	8.592	102.0	0.033	71.4	0.741	-22.8
2000	0.306	-88.1	7.889	97.9	0.036	71.7	0.723	-23.8
2200	0.278	-93.8	7.295	94.0	0.039	71.8	0.709	-24.7
2400	0.255	-98.4	6.751	90.6	0.042	71.0	0.693	-25.6
2600	0.235	-103.2	6.283	87.5	0.045	70.9	0.681	-26.3
2800	0.215	-108.1	5.873	84.5	0.049	71.3	0.670	-27.0
3000	0.200	-113.0	5.509	81.8	0.052	70.5	0.659	-27.8
3200	0.184	-117.9	5.194	79.2	0.055	70.5	0.649	-28.6
3400	0.172	-123.3	4.904	76.8	0.059	69.9	0.642	-29.2
3600	0.162	-128.4	4.654	74.4	0.062	69.2	0.633	-30.1
3800	0.152	-133.8	4.422	72.0	0.066	69.3	0.626	-30.8
4000	0.144	-138.8	4.215	69.8	0.070	68.1	0.620	-31.6
4200	0.138	-144.7	4.027	67.7	0.074	67.7	0.613	-32.4
4400	0.130	-150.1	3.847	65.5	0.077	67.1	0.608	-33.2
4600	0.126	-155.6	3.691	63.5	0.080	66.2	0.602	-34.0
4800	0.120	-162.8	3.543	61.3	0.084	65.3	0.595	-34.9
5000	0.117	-168.5	3.404	59.4	0.088	64.5	0.592	-35.7
5200	0.115	-175.1	3.282	57.5	0.092	63.7	0.585	-36.6
5400	0.112	178.4	3.162	55.5	0.096	63.0	0.580	-37.4
5600	0.113	173.8	3.056	53.6	0.099	62.3	0.576	-38.3
5800	0.113	167.0	2.955	51.7	0.103	61.2	0.569	-39.2
6000	0.111	161.4	2.857	49.8	0.107	60.6	0.564	-40.1