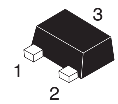
RF Transistor

10 V, 70 mA, f_T = 5.5 GHz, NPN Single SSFP

55GN01FA



SOT−623 / SSFP
CASE 631AC

Features

- High Cut−off Frequency: f_T = 5.5 GHz Typ
- High Gain: $|S21e|^2$ = 11 dB Typ (f = 1 GHz)
  $|S21e|^2$ = 19 dB Typ (f = 400 MHz)
- Ultrasmall Package Permitting Applied Sets to be Small and Slim
- This Device is Pb−Free and Halide Free

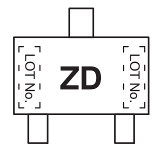
Specification

ABSOLUTE MAXIMUM RATINGS (T_a = 25°C)

Symbol	Parameter	Value	Unit
V_{CBO}	Collector−to−Base Voltage	20	V
V_{CEO}	Collector−to−Emitter Voltage	10	V
V_{EBO}	Emitter−to−Base Voltage	3	V
I_C	Collector Current	70	mA
P_C	Collector Dissipation	250	mW
Tj	Junction Temperature	150	°C
Tstg	Storage Temperature	−55 to +150	

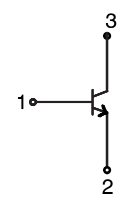
Stresses exceeding those listed in the Maximum Ratings table may damage the device. If any of these limits are exceeded, device functionality should not be assumed, damage may occur and reliability may be affected.

MARKING DIAGRAM



ZD = Specific Device Code

ELECTRICAL CONNECTION



ORDERING INFORMATION

Device	Package	Shipping†
55GN01FA−TL−H	SOT−623 / SSFP (Pb−Free, Halide Free)	8000 / Tape & Reel

†For information on tape and reel specifications, including part orientation and tape sizes, please refer to our Tape and Reel Packaging Specification Brochure, BRD8011/D.

ELECTRICAL CHARACTERISTICS (T_A = 25°C)

Parameter	Symbol	Test Condition	Min	Typ	Max	Unit
Collector Cutoff Current	I_{CBO}	V_{CB} = 10 V, I_E = 0 A	–	–	0.1	μA
Emitter Cutoff Current	I_{EBO}	V_{EB} = 2 V, I_C = 0 A	–	–	1	μA
DC Current Gain	hFE	V_{CE} = 5 V, I_C = 10 mA	100	–	160	
Gain−Bandwidth Product	f_T1	V_{CE} = 3 V, I_C = 5 mA	3.0	4.5	–	GHz
	f_T2	V_{CE} = 5 V, I_C = 20 mA	–	5.5	–	GHz
Output Capacitance	Cob	V_{CB} = 10 V, f = 1 MHz	–	0.95	1.2	pF
Reverse Transfer Capacitance	Cre		–	0.6	–	pF
Forward Transfer Gain	$\vert S21e \vert^2 1$	V_{CE} = 5 V, I_C = 20 mA, f = 1 GHz	8	11	–	dB
	$\vert S21e \vert^2 2$	V_{CE} = 5 V, I_C = 20 mA, f = 400 MHz	16	19	–	dB
Noise Figure	NF	V_{CE} = 3 V, I_C = 5 mA, f = 1 GHz, $Z_S = Z_L$ = 50 Ω	–	1.9	–	dB

Product parametric performance is indicated in the Electrical Characteristics for the listed test conditions, unless otherwise noted. Product performance may not be indicated by the Electrical Characteristics if operated under different conditions.

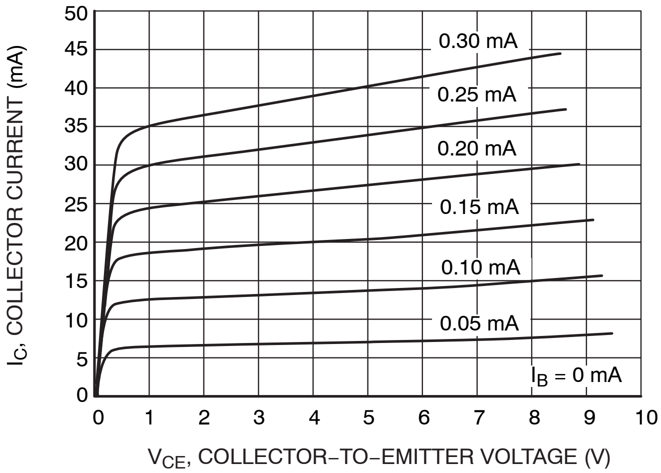


Figure 1. I_C – V_{CE}

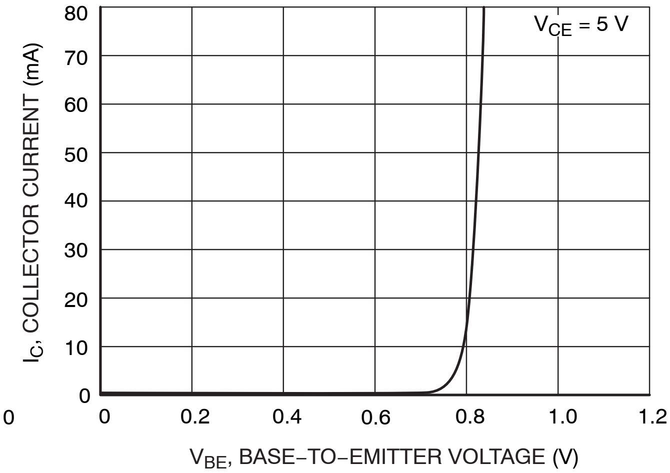


Figure 2. I_C – V_{BE}

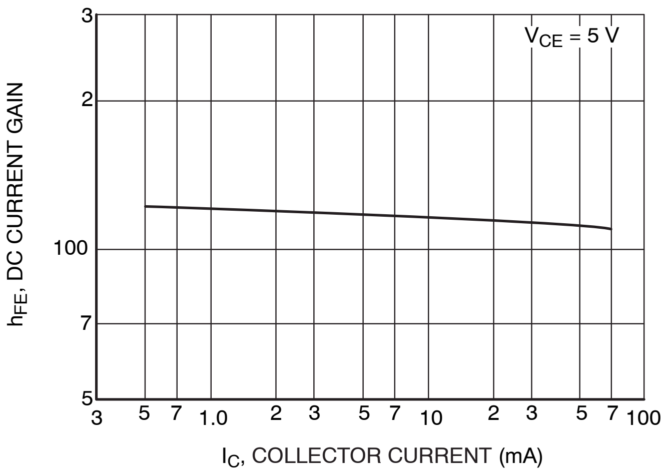


Figure 3. h_{FE} – I_C

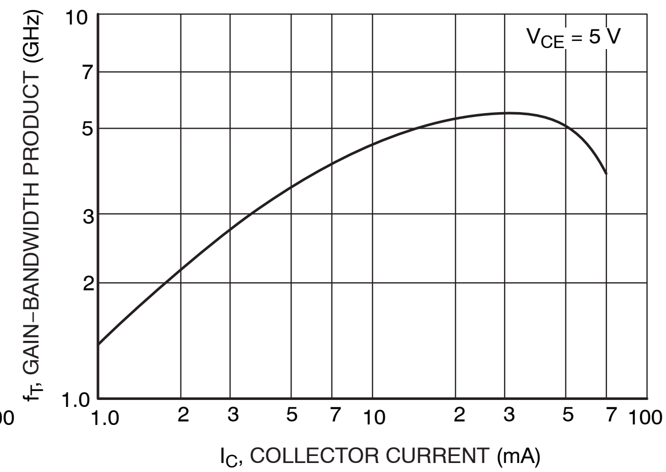


Figure 4. f_T – I_C

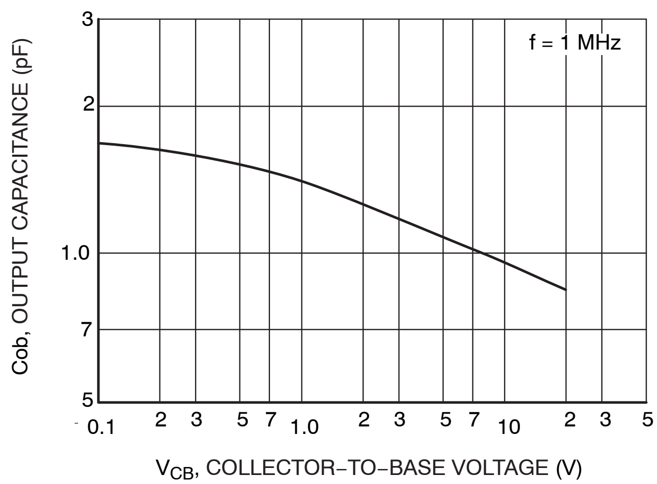


Figure 5. Cob – V_{CB}

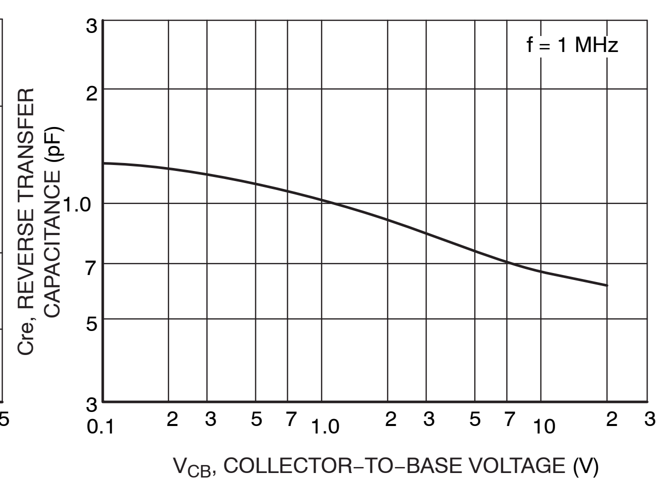


Figure 6. Cre – V_{CB}

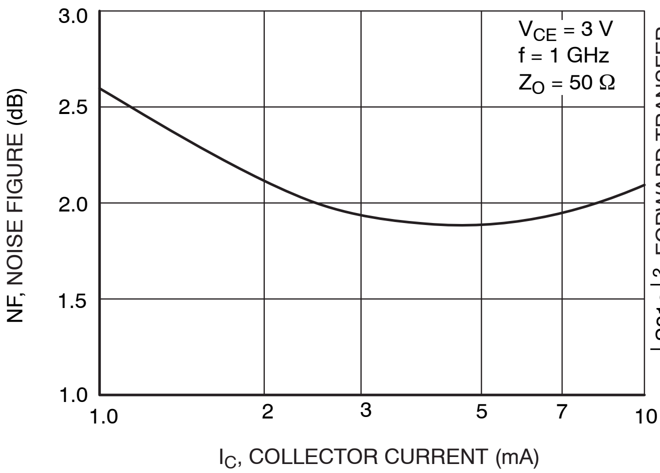


Figure 7. NF – I_C

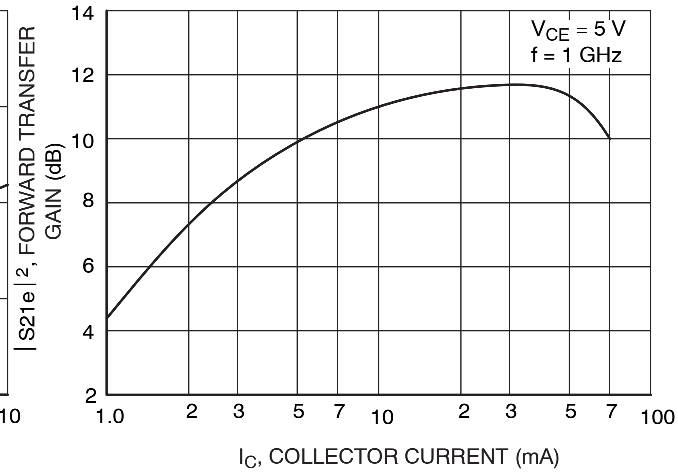


Figure 8. | S21e | 2 – I_C

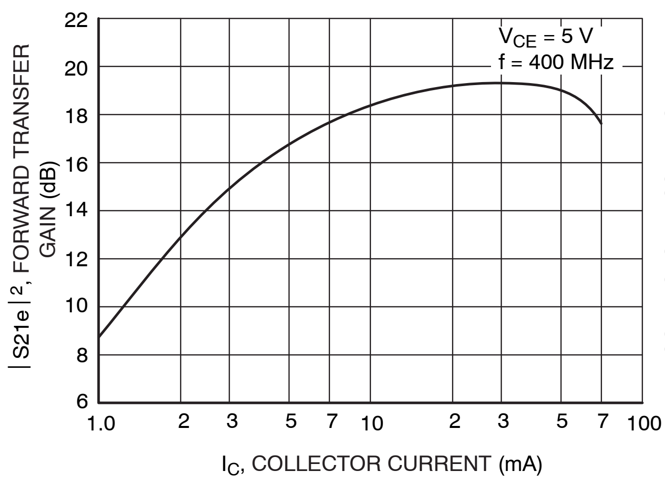


Figure 9. | S21e | 2 – I_C

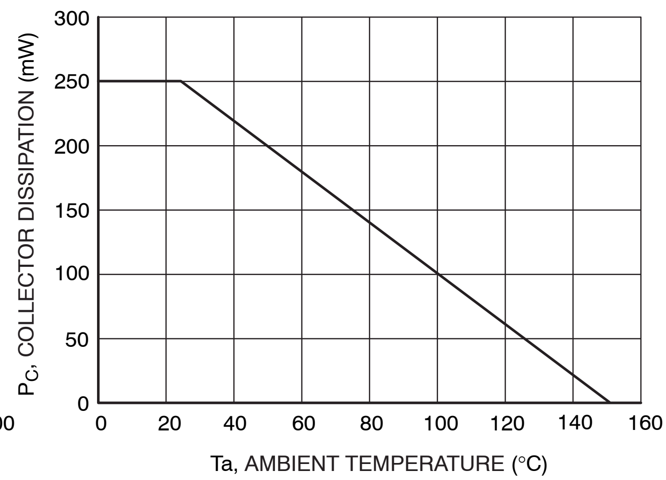


Figure 10. P_C – Ta

S Parameters (Common Emitter)

V_{CE} = 5 V, I_C = 1mA, Z_O= 50 Ω

Freq (MHz)	|S11|	∠S11	|S21|	∠S21	|S12|	∠S12	|S22|	∠S22
100	0.960	−21.33	3.404	164.99	0.046	77.57	0.986	−9.38
200	0.943	−40.21	3.215	151.43	0.085	64.91	0.938	−18.56
400	0.888	−72.87	2.700	128.23	0.139	46.91	0.838	−31.44
600	0.853	−97.36	2.288	110.64	0.167	34.66	0.757	−40.30
800	0.816	−115.67	1.926	96.26	0.179	26.17	0.706	−46.95
1000	0.788	−129.19	1.659	84.81	0.180	19.95	0.676	−52.20
1200	0.767	−140.35	1.451	74.89	0.174	16.50	0.664	−56.92
1400	0.749	−149.12	1.286	66.48	0.168	14.89	0.662	−61.86
1600	0.734	−156.38	1.162	59.19	0.160	14.19	0.668	−66.10
1800	0.719	−163.17	1.061	52.60	0.149	15.77	0.677	−70.98
2000	0.705	−169.31	0.977	46.28	0.141	19.10	0.683	−75.24
2200	0.694	−174.71	0.893	41.12	0.136	24.16	0.695	−79.81
2400	0.683	179.60	0.825	36.38	0.135	30.74	0.705	−84.33
2600	0.675	174.53	0.765	32.38	0.141	38.01	0.717	−88.85
2800	0.664	169.68	0.709	29.26	0.149	45.42	0.729	−93.41
3000	0.653	165.11	0.667	26.87	0.163	51.07	0.737	−97.77

V_{CE} = 5 V, I_C = 3mA, Z_O= 50 Ω

Freq (MHz)	|S11|	∠S11	|S21|	∠S21	|S12|	∠S12	|S22|	∠S22
100	0.897	−35.17	8.858	157.25	0.044	71.22	0.940	−17.73
200	0.846	−64.07	7.795	138.86	0.073	55.30	0.816	−31.57
400	0.761	−104.22	5.532	114.15	0.100	39.30	0.626	−45.72
600	0.727	−127.47	4.177	99.10	0.110	33.80	0.530	−52.62
800	0.698	−142.65	3.306	87.99	0.115	31.00	0.483	−57.50
1000	0.681	−152.69	2.715	79.36	0.120	30.86	0.461	−61.55
1200	0.670	−160.54	2.308	72.11	0.121	33.53	0.456	−65.03
1400	0.656	−166.79	2.012	65.45	0.124	35.60	0.461	−69.34
1600	0.647	−172.10	1.793	59.66	0.130	38.30	0.468	−72.55
1800	0.635	−176.87	1.621	54.21	0.135	41.86	0.479	−76.57
2000	0.628	178.54	1.481	48.73	0.144	45.68	0.490	−80.11
2200	0.616	173.99	1.351	44.05	0.153	48.13	0.501	−83.71
2400	0.611	169.80	1.246	39.67	0.167	50.77	0.518	−87.42
2600	0.601	166.00	1.157	35.62	0.178	53.54	0.528	−91.49
2800	0.597	162.06	1.079	32.28	0.196	55.92	0.543	−95.09
3000	0.588	158.02	1.015	29.15	0.215	56.86	0.555	−98.59

V_{CE} = 5 V, I_C = 5mA, Z_O= 50 Ω

Freq (MHz)	|S11|	∠S11	|S21|	∠S21	|S12|	∠S12	|S22|	∠S22
100	0.842	−46.44	13.174	151.15	0.040	64.28	0.891	−24.16
200	0.777	−81.34	10.723	130.44	0.062	50.01	0.716	−39.59
400	0.699	−121.57	6.861	106.89	0.080	39.73	0.508	−52.96
600	0.679	−141.39	4.942	94.02	0.089	37.45	0.424	−58.67
800	0.661	−153.84	3.830	84.43	0.096	38.27	0.390	−62.90
1000	0.648	−162.04	3.117	77.09	0.103	40.59	0.376	−66.27
1200	0.641	−168.02	2.643	70.51	0.111	43.94	0.374	−69.52
1400	0.629	−173.53	2.286	64.60	0.120	46.56	0.382	−73.45
1600	0.620	−177.70	2.039	59.33	0.130	48.48	0.390	−76.69
1800	0.610	177.97	1.841	54.24	0.139	50.63	0.400	−79.97
2000	0.603	173.76	1.676	49.26	0.153	53.08	0.413	−83.21
2200	0.594	169.87	1.528	44.84	0.167	53.92	0.426	−86.71
2400	0.588	166.14	1.413	40.43	0.181	55.16	0.441	−89.93
2600	0.580	162.49	1.313	36.57	0.195	56.19	0.453	−93.54
2800	0.576	158.82	1.231	33.47	0.213	57.85	0.466	−96.88
3000	0.565	155.09	1.156	30.12	0.232	57.84	0.481	−99.87

V_{CE} = 5 V, I_C = 10mA, Z_O= 50 Ω

Freq (MHz)	|S11|	∠S11	|S21|	∠S21	|S12|	∠S12	|S22|	∠S22
100	0.739	−68.53	20.705	140.20	0.033	59.97	0.784	−35.06
200	0.678	−107.92	14.465	118.48	0.048	46.54	0.555	−51.65
400	0.639	−142.44	8.256	98.88	0.060	44.77	0.362	−62.32
600	0.636	−156.46	5.721	88.62	0.070	47.35	0.306	−66.66
800	0.628	−165.41	4.393	80.84	0.082	51.17	0.286	−70.68
1000	0.620	−171.30	3.549	74.44	0.094	53.84	0.280	−73.86
1200	0.615	−176.02	2.981	68.87	0.108	55.37	0.285	−76.55
1400	0.606	179.70	2.584	63.58	0.121	57.13	0.297	−80.44
1600	0.599	176.38	2.298	58.72	0.134	58.54	0.307	−83.02
1800	0.589	173.12	2.065	54.21	0.149	58.63	0.319	−86.36
2000	0.586	169.27	1.889	49.40	0.165	59.48	0.329	−88.76
2200	0.573	165.75	1.719	45.30	0.179	59.22	0.344	−91.59
2400	0.567	162.49	1.589	41.42	0.195	59.66	0.362	−94.36
2600	0.562	158.91	1.481	37.55	0.211	59.11	0.374	−97.29
2800	0.558	155.91	1.385	34.30	0.229	59.13	0.388	−100.28
3000	0.548	152.46	1.310	31.07	0.248	58.50	0.400	−102.49

V_{CE} = 5 V, I_C = 15mA, Z_O= 50 Ω

Freq (MHz)	|S11|	∠S11	|S21|	∠S21	|S12|	∠S12	|S22|	∠S22
100	0.680	−83.50	24.897	133.56	0.029	56.21	0.704	−41.82
200	0.639	−122.13	16.056	112.77	0.040	47.85	0.468	−57.53
400	0.621	−151.34	8.769	95.48	0.052	50.10	0.300	−67.15
600	0.623	−162.54	6.015	86.49	0.064	53.63	0.258	−70.98
800	0.620	−170.29	4.606	79.25	0.079	57.27	0.244	−74.71
1000	0.611	−175.21	3.708	73.36	0.093	58.61	0.243	−78.49
1200	0.606	−179.14	3.121	67.87	0.107	60.22	0.249	−80.66
1400	0.599	176.96	2.697	63.02	0.122	61.45	0.262	−84.17
1600	0.593	174.14	2.394	58.44	0.138	61.14	0.275	−86.76
1800	0.584	170.85	2.158	54.02	0.153	61.15	0.287	−89.61
2000	0.577	167.75	1.973	49.36	0.168	61.74	0.298	−91.80
2200	0.569	164.22	1.790	45.54	0.184	61.18	0.314	−94.29
2400	0.564	160.80	1.659	41.46	0.201	60.23	0.330	−97.05
2600	0.556	157.53	1.542	37.83	0.216	60.12	0.342	−99.52
2800	0.552	154.68	1.446	34.40	0.234	59.34	0.352	−101.94
3000	0.543	151.47	1.361	31.44	0.253	58.86	0.366	−103.99

V_{CE} = 5 V, I_C = 20mA, Z_O= 50 Ω

Freq (MHz)	|S11|	∠S11	|S21|	∠S21	|S12|	∠S12	|S22|	∠S22
100	0.641	−94.49	27.471	128.94	0.027	55.26	0.649	−46.11
200	0.620	−130.76	16.818	109.44	0.036	46.79	0.413	−61.30
400	0.615	−156.41	9.019	93.57	0.048	53.11	0.265	−70.11
600	0.619	−165.97	6.162	85.24	0.062	57.92	0.228	−73.77
800	0.615	−172.83	4.701	78.51	0.078	61.14	0.223	−77.54
1000	0.608	−177.23	3.787	72.80	0.092	61.33	0.223	−81.02
1200	0.605	179.19	3.189	67.44	0.108	63.68	0.231	−83.24
1400	0.597	175.70	2.755	62.79	0.123	63.07	0.245	−86.33
1600	0.590	172.88	2.442	58.12	0.138	62.89	0.255	−88.33
1800	0.581	169.98	2.201	53.81	0.156	63.03	0.272	−91.87
2000	0.578	166.61	2.013	49.41	0.172	62.58	0.281	−93.44
2200	0.567	163.21	1.834	45.29	0.187	61.81	0.298	−95.50
2400	0.564	160.39	1.691	41.48	0.204	61.15	0.311	−98.00
2600	0.556	157.07	1.572	37.96	0.218	61.01	0.326	−100.45
2800	0.552	153.99	1.478	34.76	0.239	59.99	0.337	−102.57
3000	0.544	151.04	1.389	31.49	0.256	58.80	0.349	−104.89

V_{CE} = 5 V, I_C = 30mA, Z_O= 50 Ω

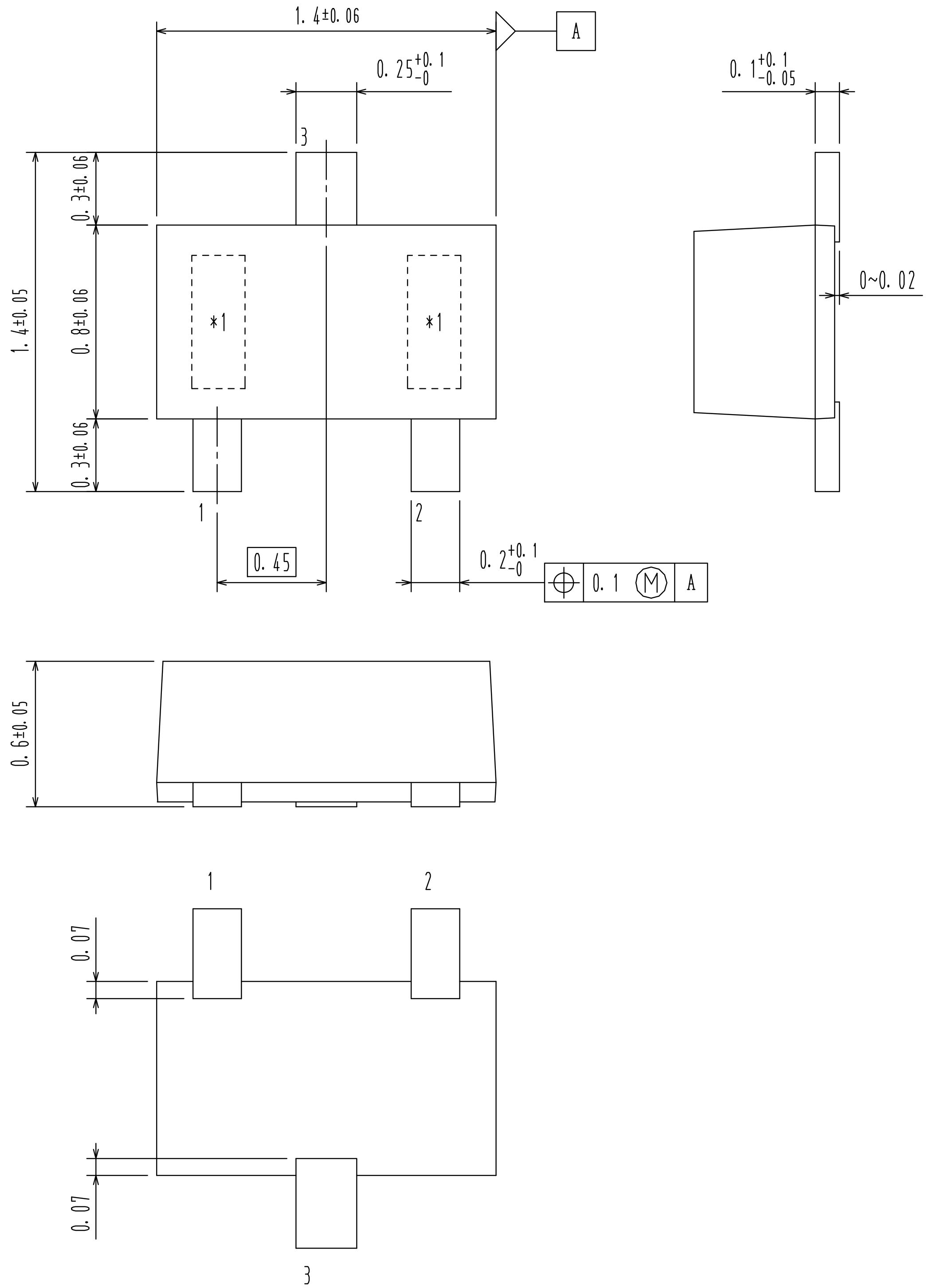
Freq (MHz)	|S11|	∠S11	|S21|	∠S21	|S12|	∠S12	|S22|	∠S22
100	0.606	−108.75	29.954	123.54	0.022	52.56	0.574	−51.26
200	0.604	−140.73	17.448	105.68	0.031	50.23	0.355	−64.86
400	0.610	−161.95	9.185	91.52	0.044	57.91	0.229	−71.81
600	0.617	−169.73	6.244	83.80	0.061	62.49	0.202	−74.91
800	0.612	−175.60	4.752	77.41	0.077	64.49	0.201	−79.23
1000	0.608	−179.42	3.833	71.88	0.091	66.02	0.204	−82.01
1200	0.604	177.51	3.213	66.72	0.108	65.81	0.214	−84.26
1400	0.598	174.16	2.786	62.07	0.124	64.91	0.229	−87.74
1600	0.591	171.45	2.465	57.60	0.141	64.74	0.242	−89.81
1800	0.584	168.71	2.221	53.24	0.156	64.27	0.255	−92.03
2000	0.582	165.57	2.027	48.84	0.173	63.95	0.266	−93.76
2200	0.569	162.47	1.842	44.77	0.189	62.96	0.281	−96.01
2400	0.566	159.27	1.707	41.02	0.205	62.39	0.298	−98.15
2600	0.560	156.39	1.589	37.71	0.221	61.62	0.312	−100.74
2800	0.555	153.39	1.489	34.29	0.241	60.71	0.324	−103.01
3000	0.546	150.41	1.401	31.06	0.260	59.58	0.339	−104.84

V_{CE} = 5 V, I_C = 50mA, Z_O= 50 Ω

Freq (MHz)	|S11|	∠S11	|S21|	∠S21	|S12|	∠S12	|S22|	∠S22
100	0.587	−124.93	30.667	118.01	0.020	53.81	0.493	−53.52
200	0.607	−151.01	17.135	101.95	0.027	56.26	0.302	−62.86
400	0.618	−167.42	8.863	89.36	0.042	61.87	0.204	−65.99
600	0.625	−173.36	6.015	82.09	0.057	67.05	0.188	−69.08
800	0.625	−178.39	4.579	75.84	0.073	68.51	0.192	−73.08
1000	0.621	178.24	3.676	70.38	0.090	67.50	0.200	−76.57
1200	0.617	175.49	3.102	65.41	0.106	67.96	0.213	−79.88
1400	0.611	172.50	2.675	60.74	0.123	67.75	0.228	−83.13
1600	0.605	170.02	2.371	56.11	0.138	67.29	0.245	−85.73
1800	0.598	167.32	2.131	51.76	0.155	65.91	0.261	−88.36
2000	0.594	164.43	1.944	47.33	0.173	65.72	0.273	−90.18
2200	0.587	161.08	1.771	43.20	0.189	64.76	0.291	−93.08
2400	0.582	158.20	1.636	39.59	0.204	63.82	0.308	−95.85
2600	0.575	155.22	1.517	36.00	0.222	63.08	0.325	−98.58
2800	0.571	151.88	1.420	32.74	0.241	62.62	0.341	−100.91
3000	0.564	149.04	1.345	29.50	0.259	61.30	0.351	−102.73

SOT−623 / SSFP
CASE 631AC
ISSUE O

DATE 29 FEB 2012



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DESCRIPTION:	SOT−623 / SSFP	PAGE 1 OF 1

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