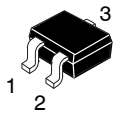
RF Transistor

10 V, 70 mA, f_T = 7 GHz, NPN Single MCP

2SC5226A



SC−70 / MCP3
CASE 419AJ

Features

- Low−noise: NF = 1.0 dB Typ (f = 1 GHz)
- High Gain: $|S21e|^2$ = 12 dB Typ (f = 1 GHz)
- High Cut−off Frequency: f_T = 7 GHz Typ
- This is a Pb−Free Device

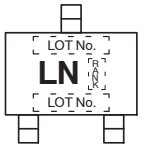
Specifications

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	2	V
I_C	Collector Current	70	mA
P_C	Collector Dissipation	150	mW
Tj	Junction Temperature	150	°C
Tstg	Storage Temperature	−55 to +150	°C

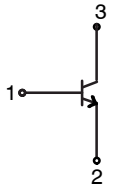
Stresses exceeding those listed in the Maximum Ratings table may damage the device. If any of these limits are exceeded, device functionality should not be assumed, damage may occur and reliability may be affected.

MARKING DIAGRAM



LN = Specific Device Code

ELECTRICAL CONNECTION



1: Base
2: Emitter
3: Collector

ORDERING INFORMATION

Device	Package	Shipping†
2SC5226A−4−TL−E	MCP3 (Pb−Free)	3,000 / Tape & Reel
2SC5226A−5−TL−E	MCP3 (Pb−Free)	3,000 / 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	–	–	1.0	μA
Emitter Cutoff Current	I_{EBO}	V_{EB} = 1 V, I_C = 0 A	–	–	10	μA
DC Current Gain	hFE	V_{CE} = 5 V, I_C = 20 mA	60*	–	270*	
Gain−Bandwidth Product	f_T	V_{CE} = 5 V, I_C = 20 mA	5	7	–	GHz
Output Capacitance	Cob	V_{CB} = 10 V, f = 1 MHz	–	0.75	1.2	pF
Reverse Transfer Capacitance	Cre		–	0.5	–	pF
Forward Transfer Gain	$|S21e|^2$1	V_{CE} = 5 V, I_C = 20 mA, f = 1 GHz	9	12	–	dB
	$|S21e|^2$2	V_{CE} = 2 V, I_C = 3 mA, f = 1 GHz	–	8	–	dB
Noise Figure	NF	V_{CE} = 5 V, I_C = 7 mA, f = 1 GHz	–	1.0	1.8	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.

* The 2SC5226A is classified by 20 mA hFE as follows:

Rank	3	4	5
h_{FE}	60 to 120	90 to 180	135 to 270

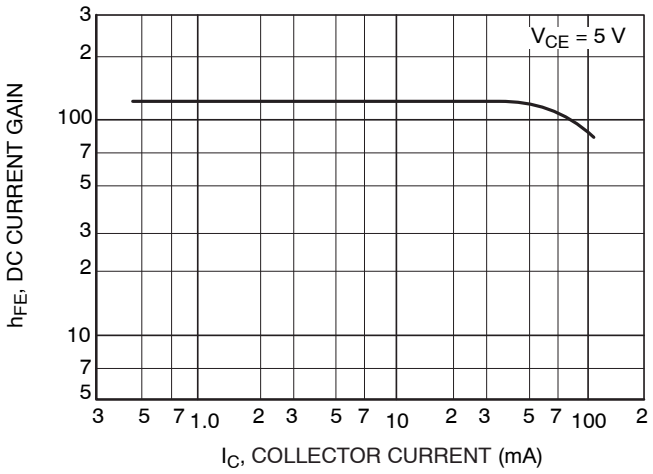


Figure 1. h_{FE} – I_C

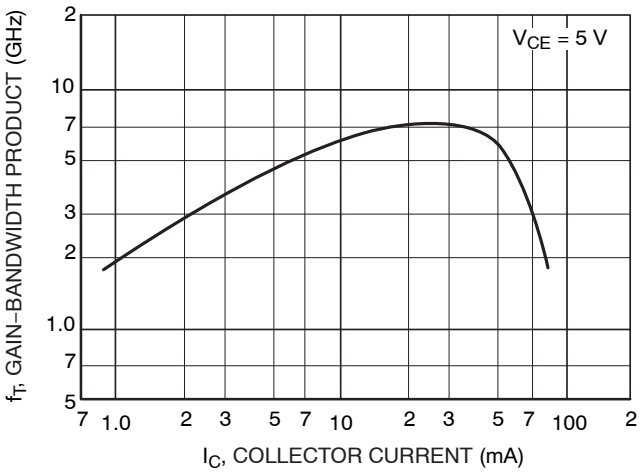


Figure 2. f_T – I_C

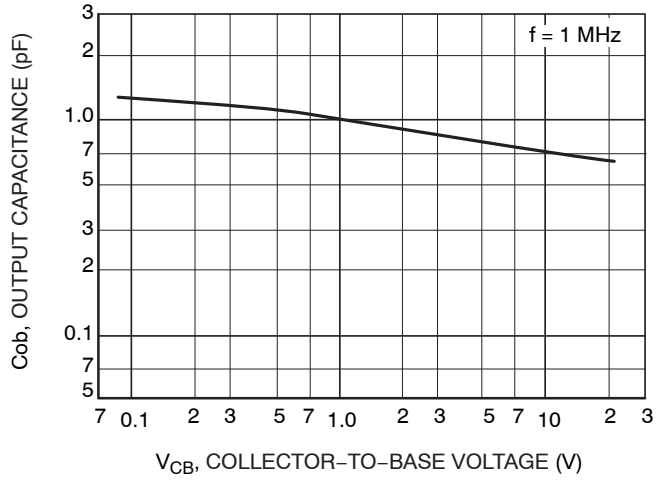


Figure 3. Cob – V_{CB}

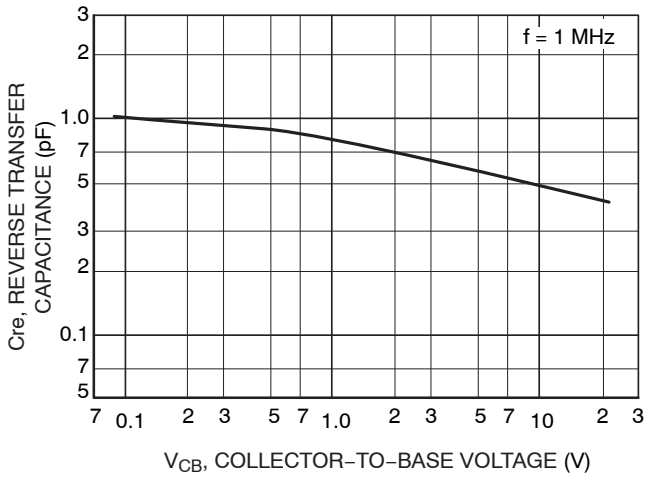


Figure 4. Cre – V_{CB}

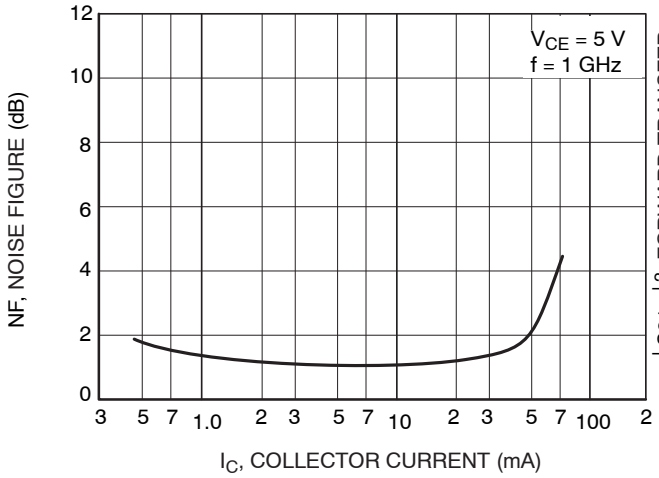


Figure 5. NF – I_C

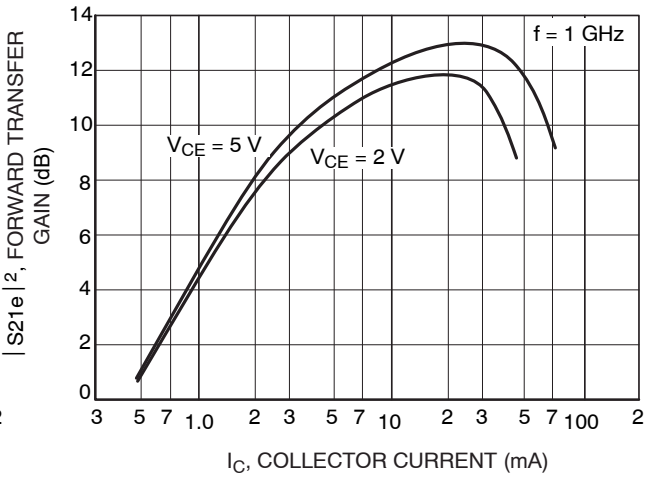


Figure 6. $|S21e|^2$ – I_C

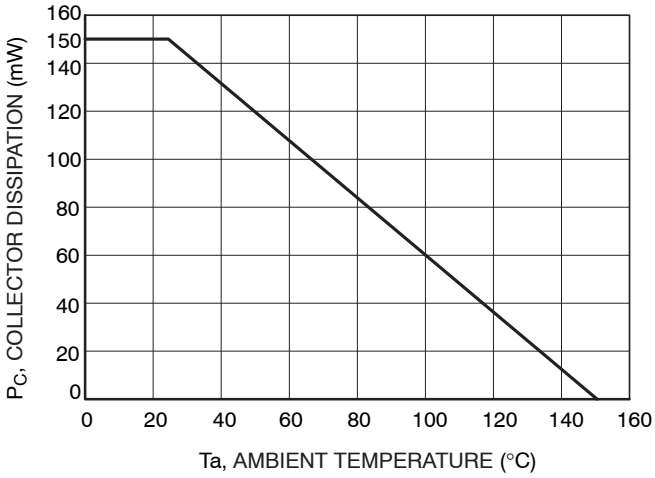
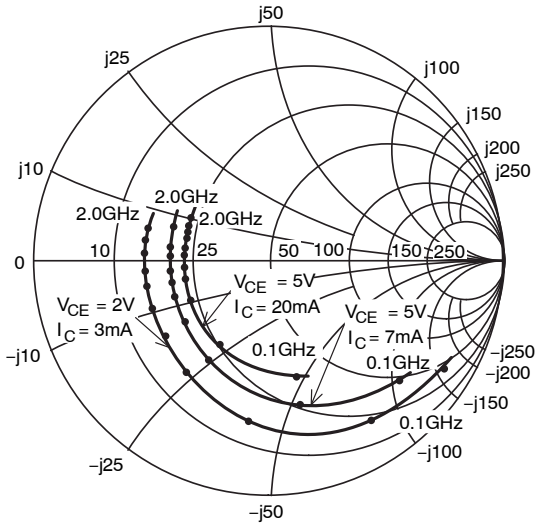
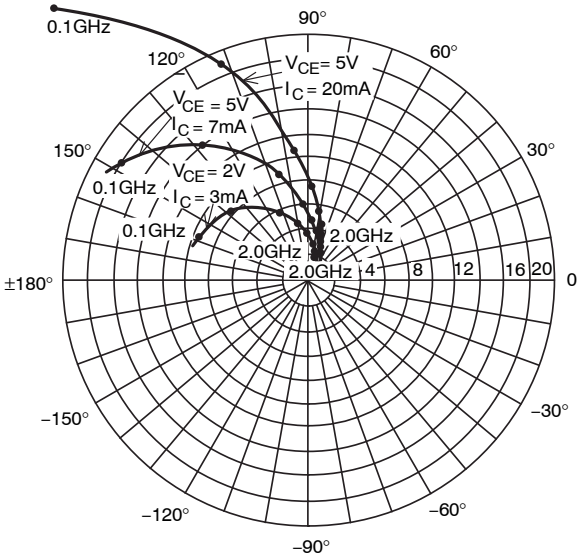


Figure 7. P_C – Ta



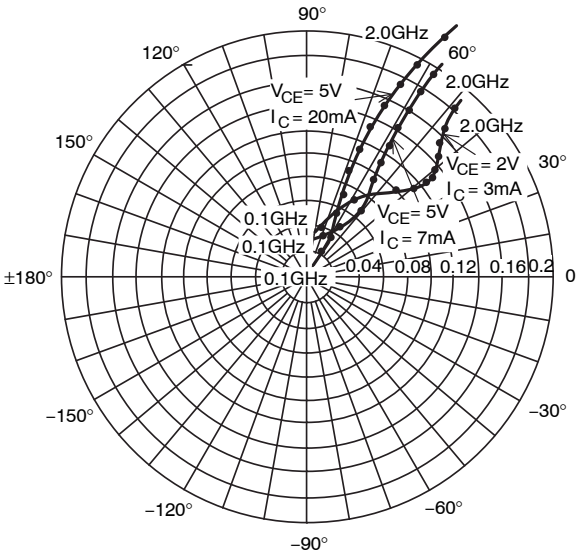
f = 100 MHz, 200 MHz to 2000 MHz (200 MHz Step)

Figure 8.



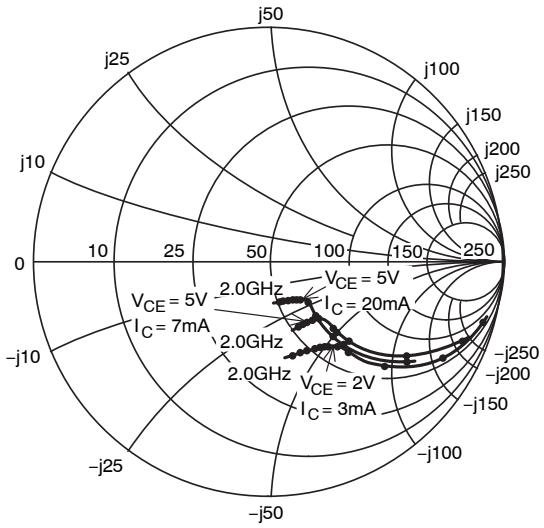
f = 100 MHz, 200 MHz to 2000 MHz (200 MHz Step)

Figure 9.



f = 100 MHz, 200 MHz to 2000 MHz (200 MHz Step)

Figure 10.



f = 100 MHz, 200 MHz to 2000 MHz (200 MHz Step)

Figure 11.

S Parameters (Common Emitter)

V_{CE} = 5 V, I_C = 7 mA, Z_O = 50 Ω

Freq(MHz)	|S11|	∠S11	|S21|	∠S21	|S12|	∠S12	|S22|	∠S22
100	0.720	−46.0	17.973	148.5	0.030	68.5	0.880	−23.6
200	0.612	−80.9	13.927	127.3	0.047	57.1	0.697	−37.6
400	0.497	−121.3	8.656	105.0	0.066	51.3	0.479	−47.6
600	0.456	−143.5	6.080	92.8	0.079	52.9	0.382	−50.5
800	0.440	−157.6	4.725	84.3	0.094	55.4	0.339	−51.8
1000	0.436	−167.5	3.864	77.0	0.110	56.8	0.323	−53.4
1200	0.434	−176.1	3.258	70.3	0.126	57.9	0.312	−55.8
1400	0.433	176.6	2.847	64.5	0.143	58.4	0.304	−58.3
1600	0.433	170.9	2.329	57.4	0.160	58.9	0.296	−62.0
1800	0.434	165.0	2.252	54.2	0.178	58.6	0.293	−65.0
2000	0.439	159.6	2.057	49.2	0.197	58.1	0.294	−68.1

V_{CE} = 5 V, I_C = 20 mA, Z_O = 50 Ω

Freq(MHz)	|S11|	∠S11	|S21|	∠S21	|S12|	∠S12	|S22|	∠S22
100	0.481	−78.8	29.795	132.9	0.022	63.9	0.707	−38.2
200	0.420	−119.2	19.008	112.2	0.033	60.8	0.470	−51.1
400	0.391	−151.6	10.416	95.4	0.052	64.7	0.296	−55.3
600	0.386	−166.4	7.084	86.6	0.071	67.2	0.236	−56.1
800	0.381	−175.9	5.407	80.1	0.092	68.4	0.213	−56.6
1000	0.382	178.2	4.401	74.1	0.114	67.8	0.208	−57.9
1200	0.385	172.1	3.701	68.5	0.134	66.8	0.204	−60.7
1400	0.388	166.7	3.217	63.6	0.156	65.6	0.202	−63.5
1600	0.390	162.1	2.839	58.8	0.176	64.0	0.199	−67.9
1800	0.391	156.7	2.534	54.3	0.197	62.4	0.197	−71.2
2000	0.394	152.1	2.319	50.1	0.219	60.6	0.197	−74.2

V_{CE} = 2 V, I_C = 3 mA, Z_O = 50 Ω

Freq(MHz)	|S11|	∠S11	|S21|	∠S21	|S12|	∠S12	|S22|	∠S22
100	0.858	−32.4	9.413	157.2	0.040	72.6	0.945	−16.5
200	0.782	−60.7	8.187	138.5	0.070	59.2	0.833	−29.3
400	0.653	−101.1	5.855	113.8	0.101	44.5	0.637	−43.2
600	0.588	−126.5	4.337	98.4	0.114	39.1	0.515	−50.0
800	0.557	−143.7	3.444	87.7	0.122	38.0	0.454	−53.8
1000	0.543	−156.3	2.871	78.5	0.130	38.6	0.426	−57.1
1200	0.536	−166.8	2.446	70.5	0.137	40.3	0.407	−60.3
1400	0.533	−175.5	2.145	63.5	0.146	42.5	0.393	−63.8
1600	0.527	177.0	1.904	57.1	0.155	45.0	0.382	−68.0
1800	0.525	170.3	1.714	51.7	0.168	47.3	0.379	−72.0
2000	0.528	163.8	1.564	45.9	0.183	49.2	0.378	−75.8

Land Pattern Example

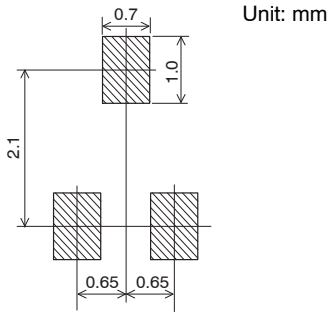


Figure 12. Land Pattern Example

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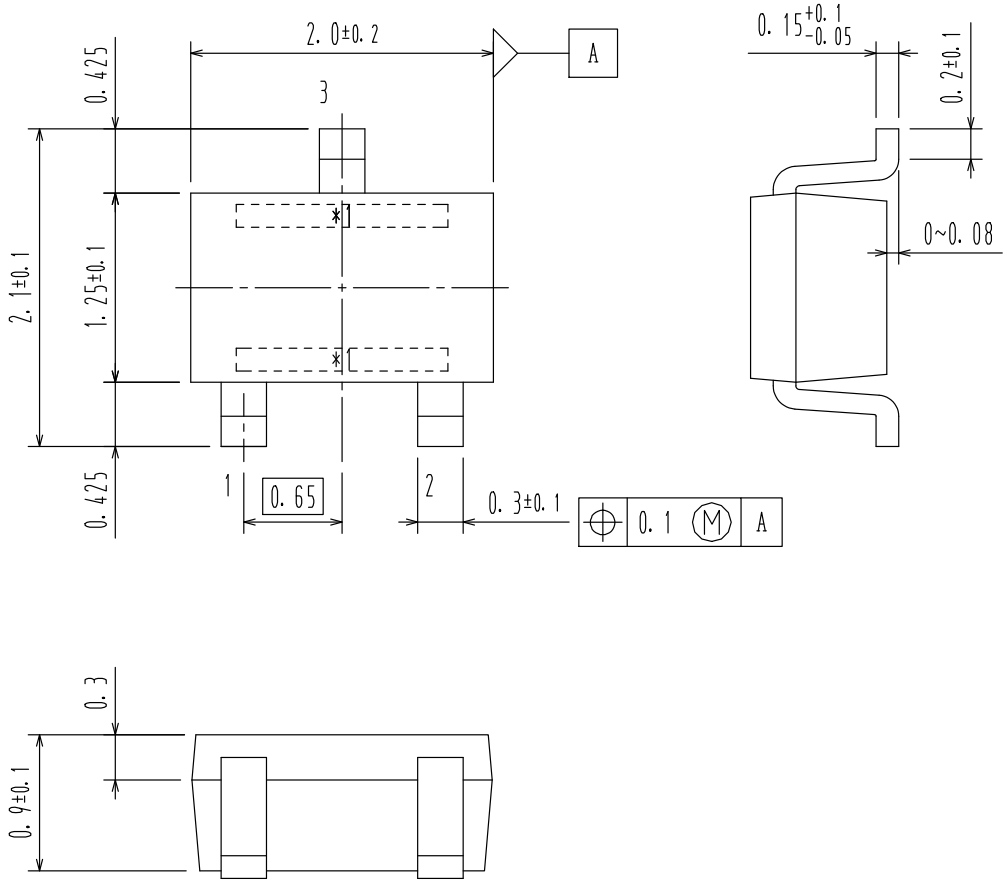

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