DATA SHEET

NEC

NPN SILICON RF TRANSISTOR
2SC5433

NPN EPITAXIAL SILICON TRANSISTOR FOR HIGH-FREQUENCY LOW-NOISE AMPLIFICATION FLAT-LEAD 3-PIN THIN-TYPE ULTRA SUPER MINIMOLD

FEATURES

- Contains same chip as 2SC5007
- Flat-lead 3-pin thin-type ultra super minimold package

★ ORDERING INFORMATION

Part Number	Quantity	Supplying Form
2SC5433	50 pcs (Non reel)	• 8 mm wide embossed taping
2SC5433-T1	3 kpcs/reel	• Pin 3 (collector) face the perforation side of the tape

Remark To order evaluation samples, contact your nearby sales office.
The unit sample quantity is 50 pcs.

ABSOLUTE MAXIMUM RATINGS (T_A = +25°C)

Parameter	Symbol	Ratings	Unit
Collector to Base Voltage	V_{CBO}	20	V
Collector to Emitter Voltage	V_{CEO}	10	V
Emitter to Base Voltage	V_{EBO}	1.5	V
Collector Current	I_C	65	mA
Total Power Dissipation	P_{tot} Note	125	mW
Junction Temperature	T_j	150	°C
Storage Temperature	T_{stg}	−65 to +150	°C

Note Free air

Because this product uses high-frequency technology, avoid excessive static electricity, etc.

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The mark ★ shows major revised points.

ELECTRICAL CHARACTERISTICS (T_A = +25°C)

Parameter	Symbol	Test Conditions	MIN.	TYP.	MAX.	Unit
Collector Cut-off Current	I_{CBO}	V_{CB} = 10 V, I_E = 0 mA	–	–	800	nA
Emitter Cut-off Current	I_{EBO}	V_{EB} = 1 V, I_C = 0 mA	–	–	800	nA
DC Current Gain	h_{FE} Note 1	V_{CE} = 3 V, I_C = 7 mA	80	–	145	–
Gain Bandwidth Product	f_T	V_{CE} = 3 V, I_C = 7 mA, f = 1 GHz	4.5	7.0	–	GHz
Insertion Power Gain	$\lvert S_{21e} \rvert^2$	V_{CE} = 3 V, I_C = 7 mA, f = 1 GHz	10.0	12.0	–	dB
Noise Figure	NF	V_{CE} = 3 V, I_C = 7 mA, f = 1 GHz	–	1.4	2.7	dB
Reverse Transfer Capacitance	C_{re} Note 2	V_{CB} = 3 V, I_E = 0 mA, f = 1 MHz	–	–	0.9	pF

Notes 1. Pulse measurement: PW ≤ 350 μs, Duty Cycle ≤ 2%

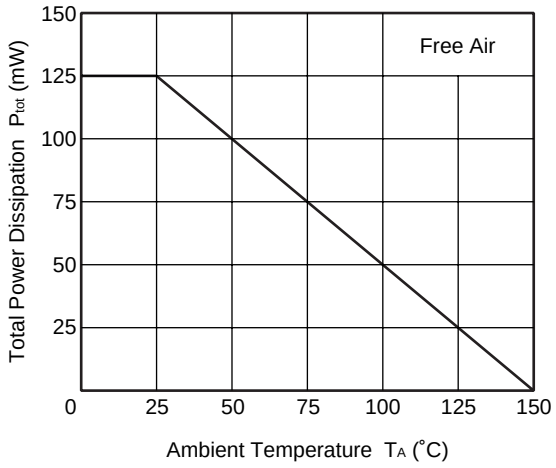
2. Collector to base capacitance when the emitter grounded

h_{FE} CLASSIFICATION

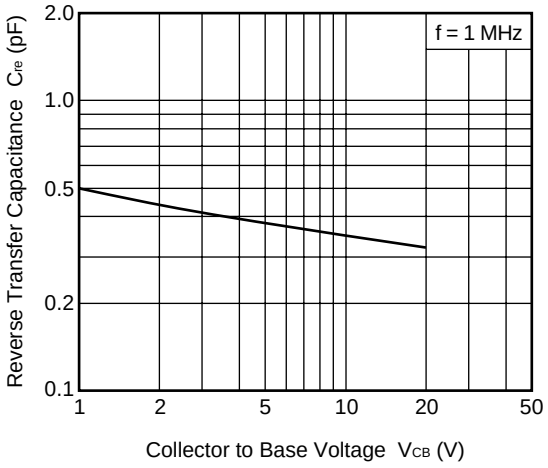
Rank	EB	FB
Marking	TE	TF
h_{FE} Value	80 to 110	100 to 145

TYPICAL CHARACTERISTICS (Unless otherwise specified, T_A = +25°C)

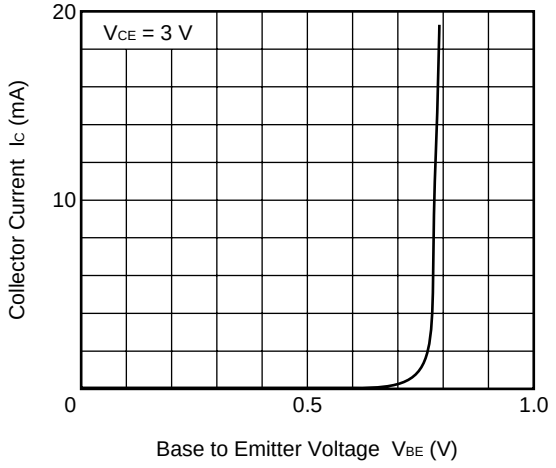
TOTAL POWER DISSIPATION vs. AMBIENT TEMPERATURE



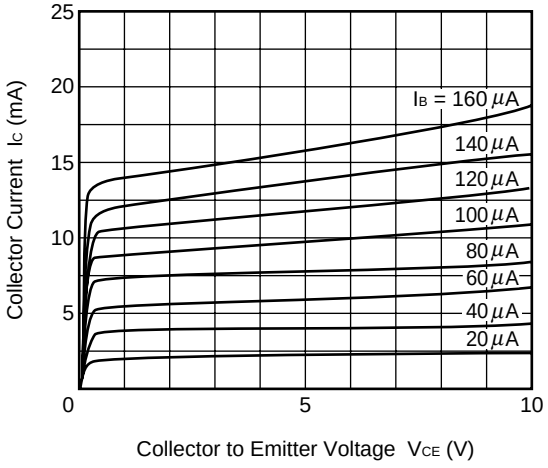
REVERSE TRANSFER CAPACITANCE vs. COLLECTOR TO BASE VOLTAGE



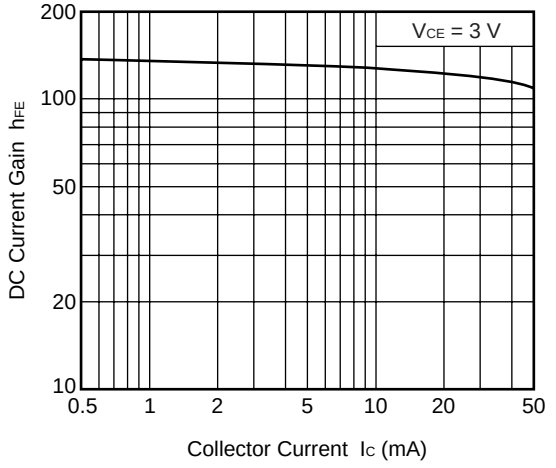
COLLECTOR CURRENT vs. BASE TO EMITTER VOLTAGE



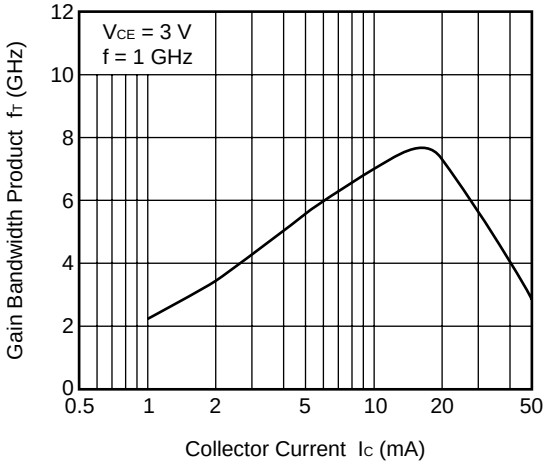
COLLECTOR CURRENT vs. COLLECTOR TO EMITTER VOLTAGE



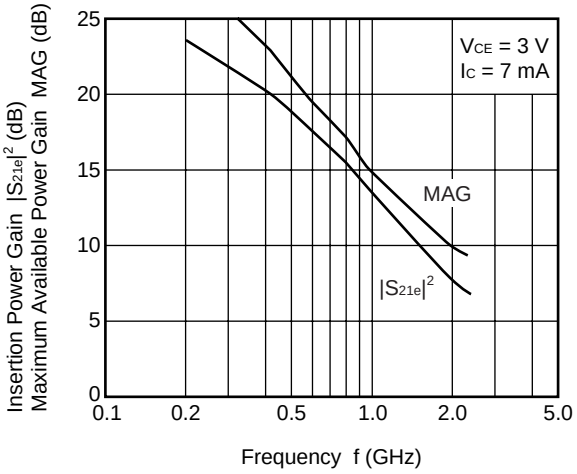
DC CURRENT GAIN vs. COLLECTOR CURRENT



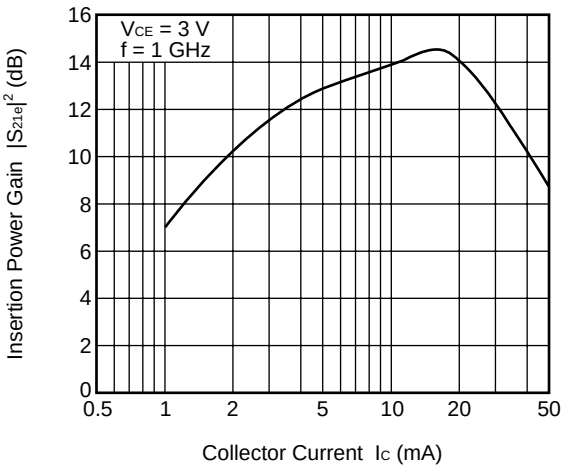
GAIN BANDWIDTH PRODUCT vs. COLLECTOR CURRENT



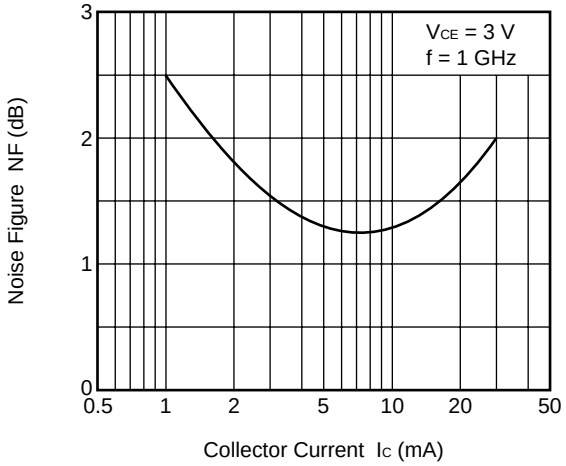
INSERTION POWER GAIN, MAG
vs. FREQUENCY



INSERTION POWER GAIN
vs. COLLECTOR CURRENT



NOISE FIGURE vs. COLLECTOR CURRENT



Remark The graphs indicate nominal characteristics.

S-PARAMETERS

V_{CE} = 1 V, I_C = 1 mA, Z_O = 50 Ω

Frequency	S_{11}		S_{21}		S_{12}		S_{22}	
(GHz)	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)
0.2	0.947	–26.7	3.453	158.0	0.068	72.9	0.967	–11.9
0.4	0.835	–52.6	2.996	138.7	0.123	57.4	0.863	–22.3
0.6	0.787	–77.5	2.609	121.6	0.161	45.7	0.757	–32.9
0.8	0.738	–95.9	2.363	108.5	0.178	36.8	0.699	–40.9
1.0	0.692	–112.1	2.118	98.6	0.192	29.0	0.654	–44.9
1.2	0.656	–126.6	1.853	89.4	0.200	24.3	0.602	–47.4
1.4	0.648	–138.2	1.663	79.7	0.201	22.9	0.554	–50.7
1.6	0.629	–148.0	1.528	72.7	0.194	21.7	0.513	–55.0
1.8	0.603	–158.4	1.385	66.6	0.182	20.6	0.490	–59.6
2.0	0.606	–169.1	1.247	60.9	0.173	18.5	0.472	–64.2
2.2	0.629	–176.8	1.156	53.8	0.169	19.6	0.448	–69.6
2.4	0.643	177.7	1.100	48.3	0.163	22.6	0.437	–77.1
2.6	0.649	172.8	1.039	45.1	0.159	26.0	0.445	–84.3
2.8	0.656	167.8	0.945	41.3	0.153	31.0	0.452	–89.8
3.0	0.672	163.6	0.886	35.9	0.151	35.5	0.444	–95.4

V_{CE} = 1 V, I_C = 3 mA, Z_O = 50 Ω

Frequency	S_{11}		S_{21}		S_{12}		S_{22}	
(GHz)	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)
0.2	0.829	–45.4	8.382	146.5	0.061	64.5	0.878	–23.6
0.4	0.673	–82.9	6.392	123.5	0.097	49.0	0.662	–39.2
0.6	0.619	–109.4	5.005	106.9	0.115	41.6	0.521	–50.1
0.8	0.568	–127.9	4.115	96.8	0.122	38.0	0.444	–56.0
1.0	0.542	–143.0	3.493	89.2	0.130	36.2	0.387	–58.3
1.2	0.540	–154.9	3.029	82.2	0.138	36.4	0.340	–59.8
1.4	0.543	–162.7	2.607	75.3	0.146	38.7	0.301	–63.0
1.6	0.529	–170.3	2.338	70.4	0.149	41.4	0.271	–67.1
1.8	0.522	–179.2	2.072	65.8	0.153	43.4	0.251	–71.8
2.0	0.540	173.2	1.850	61.3	0.156	43.6	0.234	–76.9
2.2	0.563	168.2	1.692	55.5	0.165	44.5	0.215	–84.6
2.4	0.577	164.4	1.598	51.0	0.176	45.8	0.209	–93.4
2.6	0.586	160.6	1.511	48.4	0.188	47.7	0.213	–101.4
2.8	0.600	157.1	1.382	45.4	0.195	49.7	0.216	–108.0
3.0	0.616	154.4	1.288	40.7	0.199	50.6	0.217	–114.8

V_{CE} = 1 V, I_C = 5 mA, Z_O = 50 Ω

Frequency	S_{11}		S_{21}		S_{12}		S_{22}	
(GHz)	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)
0.2	0.732	–59.6	11.569	138.4	0.055	60.0	0.790	–31.6
0.4	0.588	–101.6	8.006	115.1	0.081	47.5	0.536	–48.4
0.6	0.543	–126.5	5.948	100.2	0.094	44.0	0.403	–58.2
0.8	0.511	–143.6	4.748	91.7	0.102	43.7	0.334	–63.0
1.0	0.501	–156.8	3.960	85.6	0.112	44.2	0.283	–64.7
1.2	0.511	–166.4	3.400	79.2	0.123	45.5	0.243	–66.6
1.4	0.516	–172.5	2.936	73.0	0.135	47.9	0.213	–70.5
1.6	0.505	–179.0	2.602	69.1	0.145	50.7	0.189	–75.6
1.8	0.506	173.1	2.296	65.0	0.153	52.4	0.170	–81.5
2.0	0.527	166.8	2.047	61.0	0.161	52.3	0.157	–88.6
2.2	0.548	162.8	1.865	55.7	0.173	52.1	0.144	–99.3
2.4	0.564	159.5	1.761	51.5	0.186	52.1	0.144	–110.9
2.6	0.574	156.2	1.661	49.1	0.202	53.0	0.150	–119.7
2.8	0.588	153.1	1.521	46.6	0.210	54.2	0.156	–127.5
3.0	0.605	151.0	1.415	42.1	0.217	54.2	0.163	–134.9

V_{CE} = 3 V, I_C = 1 mA, Z_O = 50 Ω

Frequency	S_{11}		S_{21}		S_{12}		S_{22}	
(GHz)	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)
0.2	0.955	–23.9	3.465	160.1	0.053	73.5	0.977	–9.3
0.4	0.852	–47.2	3.060	142.4	0.097	60.6	0.894	–17.6
0.6	0.803	–71.0	2.702	126.3	0.130	49.7	0.802	–26.5
0.8	0.759	–88.9	2.480	113.4	0.147	41.4	0.754	–33.8
1.0	0.710	–104.8	2.263	103.8	0.159	34.0	0.723	–37.4
1.2	0.667	–119.3	1.995	95.1	0.167	29.3	0.677	–39.2
1.4	0.653	–131.7	1.791	85.4	0.169	27.8	0.630	–41.7
1.6	0.632	–141.9	1.654	78.2	0.164	27.1	0.589	–45.0
1.8	0.602	–152.6	1.508	72.1	0.154	26.6	0.565	–49.1
2.0	0.599	–163.9	1.359	66.4	0.147	25.0	0.549	–53.3
2.2	0.621	–172.4	1.256	59.2	0.143	26.8	0.529	–57.3
2.4	0.635	–178.4	1.200	53.7	0.139	30.1	0.511	–63.4
2.6	0.639	176.3	1.137	50.5	0.138	34.9	0.513	–70.0
2.8	0.645	171.0	1.038	46.5	0.136	41.1	0.522	–75.1
3.0	0.659	166.4	0.976	41.4	0.135	46.7	0.512	–79.8

V_{CE} = 3 V, I_C = 3 mA, Z_O = 50 Ω

Frequency	S_{11}		S_{21}		S_{12}		S_{22}	
(GHz)	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)
0.2	0.849	–39.1	8.593	149.9	0.049	67.9	0.910	–18.1
0.4	0.690	–72.9	6.799	128.1	0.078	53.3	0.728	–30.3
0.6	0.626	–99.3	5.461	111.5	0.096	46.0	0.595	–39.2
0.8	0.565	–117.8	4.546	101.0	0.104	42.3	0.525	–44.2
1.0	0.528	–133.4	3.893	93.5	0.111	40.7	0.478	–45.5
1.2	0.515	–146.4	3.387	86.5	0.118	40.9	0.433	–45.6
1.4	0.515	–155.4	2.949	79.2	0.126	43.1	0.394	–47.1
1.6	0.500	–163.5	2.631	74.4	0.130	46.1	0.360	–49.6
1.8	0.490	–172.8	2.342	69.8	0.134	48.8	0.339	–53.2
2.0	0.505	178.7	2.095	65.4	0.137	49.3	0.322	–56.7
2.2	0.528	173.1	1.910	59.7	0.146	50.5	0.302	–60.7
2.4	0.543	168.9	1.808	54.9	0.156	51.9	0.287	–66.9
2.6	0.553	164.9	1.713	52.3	0.169	53.8	0.283	–73.6
2.8	0.566	161.0	1.571	49.3	0.177	56.6	0.284	–79.0
3.0	0.583	158.0	1.464	44.8	0.182	57.8	0.276	–84.0

V_{CE} = 3 V, I_C = 5 mA, Z_O = 50 Ω

Frequency	S_{11}		S_{21}		S_{12}		S_{22}	
(GHz)	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)
0.2	0.759	–50.6	12.082	142.5	0.045	62.8	0.844	–24.2
0.4	0.593	–89.5	8.740	119.7	0.067	51.4	0.615	–36.8
0.6	0.533	–115.2	6.641	104.4	0.080	47.9	0.483	–44.2
0.8	0.487	–132.9	5.367	95.5	0.088	47.5	0.418	–47.3
1.0	0.467	–147.3	4.496	89.2	0.097	48.2	0.376	–47.5
1.2	0.468	–158.3	3.871	83.0	0.107	49.6	0.338	–46.9
1.4	0.473	–165.5	3.337	76.7	0.118	52.2	0.306	–48.2
1.6	0.462	–172.6	2.925	72.2	0.127	55.0	0.277	–50.6
1.8	0.460	179.1	2.585	68.2	0.135	57.1	0.258	–54.1
2.0	0.479	171.9	2.349	64.7	0.142	57.2	0.241	–57.8
2.2	0.502	167.4	2.139	59.5	0.154	57.4	0.224	–62.4
2.4	0.518	163.9	2.017	55.1	0.166	57.3	0.209	–69.5
2.6	0.529	160.4	1.908	52.8	0.182	58.6	0.204	–76.9
2.8	0.544	157.1	1.752	50.1	0.192	60.3	0.202	–83.4
3.0	0.562	154.8	1.631	45.8	0.198	60.5	0.195	–89.3

V_{CE} = 3 V, I_C = 7 mA, Z_O = 50 Ω

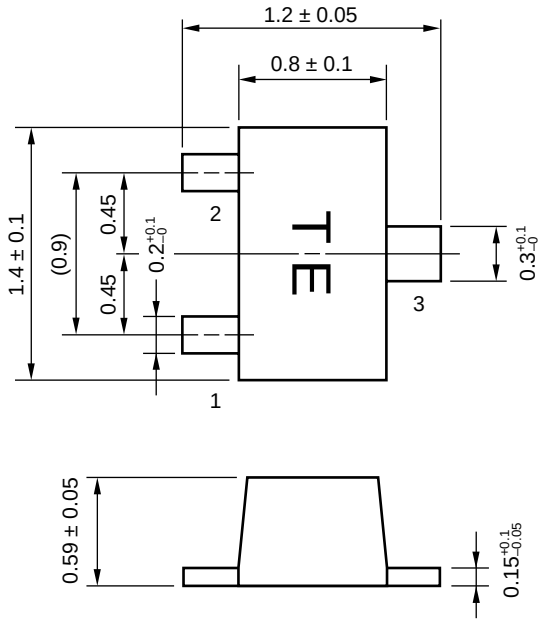
Frequency	S_{11}		S_{21}		S_{12}		S_{22}	
(GHz)	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)
0.2	0.673	–61.7	14.941	136.5	0.040	61.6	0.773	–29.2
0.4	0.523	–103.4	10.008	113.4	0.058	51.9	0.527	–41.0
0.6	0.474	–127.5	7.335	99.6	0.070	51.2	0.406	–46.4
0.8	0.444	–144.1	5.814	91.9	0.080	52.6	0.349	–48.3
1.0	0.435	–157.2	4.839	86.4	0.091	54.3	0.313	–47.9
1.2	0.444	–166.4	4.135	80.8	0.102	56.2	0.281	–47.0
1.4	0.450	–172.3	3.562	75.0	0.116	58.0	0.254	–47.9
1.6	0.442	–178.6	3.109	71.0	0.128	60.2	0.228	–50.6
1.8	0.445	173.9	2.741	67.5	0.137	62.2	0.211	–54.4
2.0	0.466	167.7	2.474	63.9	0.146	61.8	0.195	–58.5
2.2	0.489	163.8	2.266	59.2	0.159	61.1	0.178	–63.8
2.4	0.505	160.7	2.136	55.1	0.173	60.3	0.164	–72.0
2.6	0.518	157.7	2.021	53.0	0.190	61.0	0.159	–80.7
2.8	0.534	154.6	1.855	50.6	0.201	62.2	0.157	–88.3
3.0	0.551	152.6	1.722	46.5	0.207	61.9	0.153	–95.5

V_{CE} = 3 V, I_C = 10 mA, Z_O = 50 Ω

Frequency	S_{11}		S_{21}		S_{12}		S_{22}	
(GHz)	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)
0.2	0.593	–73.5	17.349	130.6	0.036	58.5	0.701	–33.6
0.4	0.470	–115.9	10.897	108.5	0.051	53.7	0.454	–43.4
0.6	0.435	–138.3	7.822	95.9	0.063	55.3	0.348	–47.0
0.8	0.418	–153.3	6.134	89.3	0.075	57.9	0.300	–48.0
1.0	0.418	–165.0	5.060	84.4	0.087	59.6	0.270	–46.9
1.2	0.431	–172.7	4.321	79.2	0.100	61.1	0.243	–45.7
1.4	0.438	–177.4	3.713	73.9	0.115	62.5	0.219	–46.7
1.6	0.432	176.8	3.234	70.3	0.129	63.8	0.196	–49.6
1.8	0.438	170.0	2.853	66.8	0.139	65.3	0.179	–53.7
2.0	0.461	164.5	2.564	63.4	0.150	64.6	0.164	–58.5
2.2	0.483	161.1	2.350	59.0	0.162	63.6	0.148	–64.3
2.4	0.499	158.4	2.213	55.1	0.178	62.5	0.134	–73.7
2.6	0.512	155.5	2.095	52.9	0.195	62.6	0.130	–83.7
2.8	0.529	152.8	1.922	50.8	0.207	63.5	0.127	–92.6
3.0	0.547	151.0	1.785	46.8	0.213	63.1	0.125	–101.2

★ **PACKAGE DIMENSIONS**

FLAT-LEAD 3-PIN THIN-TYPE ULTRA SUPER MINIMOLD (UNIT: mm)



PIN CONNECTIONS

1. Emitter
2. Base
3. Collector

- **The information in this document is current as of February, 2002. The information is subject to change without notice. For actual design-in, refer to the latest publications of NEC's data sheets or data books, etc., for the most up-to-date specifications of NEC semiconductor products. Not all products and/or types are available in every country. Please check with an NEC sales representative for availability and additional information.**
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▶**Business issue**

NEC Compound Semiconductor Devices, Ltd.
5th Sales Group, Sales Division TEL: +81-3-3798-6372 FAX: +81-3-3798-6783 E-mail: salesinfo@csd-nec.com

NEC Compound Semiconductor Devices Hong Kong Limited
Hong Kong Head Office TEL: +852-3107-7303 FAX: +852-3107-7309
Taipei Branch Office TEL: +886-2-8712-0478 FAX: +886-2-2545-3859
Korea Branch Office TEL: +82-2-528-0301 FAX: +82-2-528-0302

NEC Electron Devices European Operations http://www.nec.de/
TEL: +49-211-6503-101 FAX: +49-211-6503-487

California Eastern Laboratories, Inc. http://www.cel.com/
TEL: +1-408-988-3500 FAX: +1-408-988-0279

▶**Technical issue**

NEC Compound Semiconductor Devices, Ltd. http://www.csd-nec.com/
Sales Engineering Group, Sales Division
E-mail: techinfo@csd-nec.com FAX: +81-44-435-1918