



SANYO Semiconductors

DATA SHEET

55GN01NA

NPN Epitaxial Planar Silicon Transistor

UHF Wide-band Low-noise Amplifier Applications

Features

- High cutoff frequency : $f_T = 5.5\text{GHz}$ typ.
- High gain : $|S_{21e}|^2 = 7\text{dB}$ typ ($f = 1\text{GHz}$).
=13dB typ ($f = 400\text{MHz}$).

Specifications

Absolute Maximum Ratings at $T_a = 25^\circ\text{C}$

Parameter	Symbol	Conditions	Ratings	Unit
Collector-to-Base Voltage	V_{CBO}		20	V
Collector-to-Emitter Voltage	V_{CEO}		10	V
Emitter-to-Base Voltage	V_{EBO}		3	V
Collector Current	I_C		70	mA
Collector Dissipation	P_C		400	mW
Junction Temperature	T_j		150	$^\circ\text{C}$
Storage Temperature	T_{stg}		-55 to +150	$^\circ\text{C}$

Electrical Characteristics at $T_a = 25^\circ\text{C}$

Parameter	Symbol	Conditions	Ratings			Unit
			min	typ	max	
Collector Cutoff Current	I_{CBO}	$V_{CB} = 10\text{V}, I_E = 0\text{A}$			0.1	μA
Emitter Cutoff Current	I_{EBO}	$V_{EB} = 2\text{V}, I_C = 0\text{A}$			1	μA
DC Current Gain	h_{FE}	$V_{CE} = 5\text{V}, I_C = 10\text{mA}$	100		180	
Gain-Bandwidth Product	f_T	$V_{CE} = 5\text{V}, I_C = 20\text{mA}$	3.5	5.5		GHz
Output Capacitance	C_{ob}	$V_{CB} = 10\text{V}, f = 1\text{MHz}$		1.2	1.4	pF
Reverse Transfer Capacitance	C_{re}	$V_{CB} = 10\text{V}, f = 1\text{MHz}$		0.8		pF

Marking : ZD

Continued on next page.

- Any and all SANYO Semiconductor Co.,Ltd. products described or contained herein are, with regard to "standard application", intended for the use as general electronics equipment (home appliances, AV equipment, communication device, office equipment, industrial equipment etc.). The products mentioned herein shall not be intended for use for any "special application" (medical equipment whose purpose is to sustain life, aerospace instrument, nuclear control device, burning appliances, transportation machine, traffic signal system, safety equipment etc.) that shall require extremely high level of reliability and can directly threaten human lives in case of failure or malfunction of the product or may cause harm to human bodies, nor shall they grant any guarantee thereof. If you should intend to use our products for applications outside the standard applications of our customer who is considering such use and/or outside the scope of our intended standard applications, please consult with us prior to the intended use. If there is no consultation or inquiry before the intended use, our customer shall be solely responsible for the use.
- Specifications of any and all SANYO Semiconductor Co.,Ltd. products described or contained herein stipulate the performance, characteristics, and functions of the described products in the independent state, and are not guarantees of the performance, characteristics, and functions of the described products as mounted in the customer's products or equipment. To verify symptoms and states that cannot be evaluated in an independent device, the customer should always evaluate and test devices mounted in the customer's products or equipment.

55GN01NA

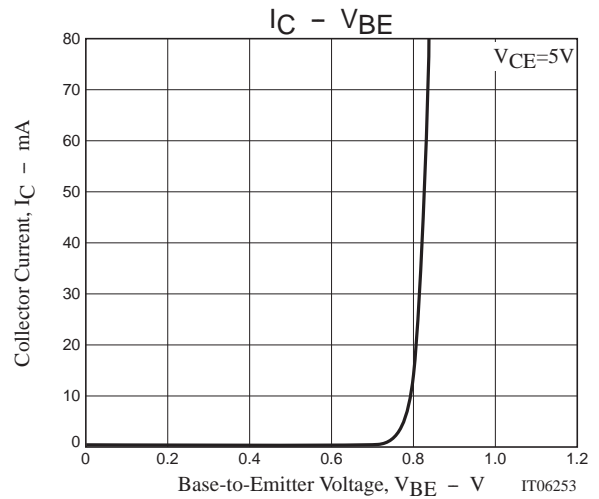
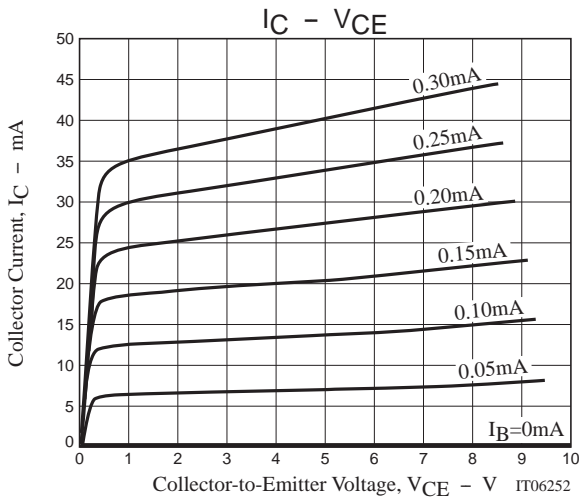
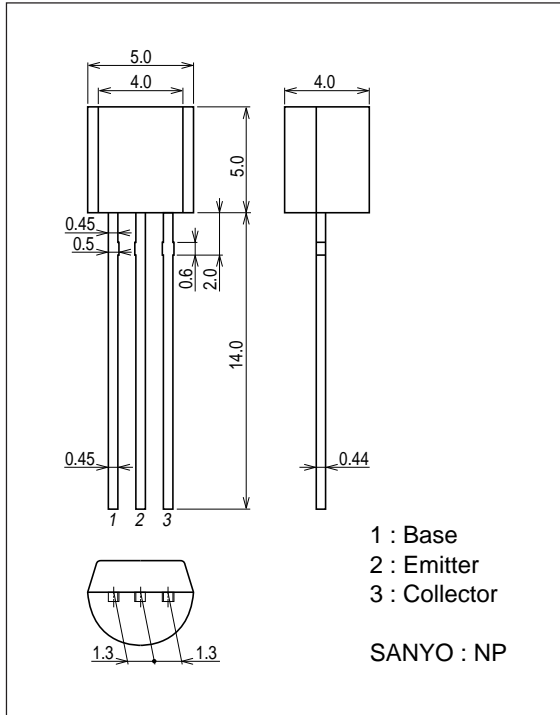
Continued from preceding page.

Parameter	Symbol	Conditions	Ratings			Unit
			min	typ	max	
Forward Transfer Gain	S _{21e} ²¹	V _{CE} =5V, I _C =20mA, f=1GHz	5	7		dB
	S _{21e} ²²	V _{CE} =5V, I _C =20mA, f=400MHz	10	13		dB
Noise Figure	NF	V _{CE} =3V, I _C =5mA, f=1GHz, Z _S =Z _L =50Ω		1.9		dB

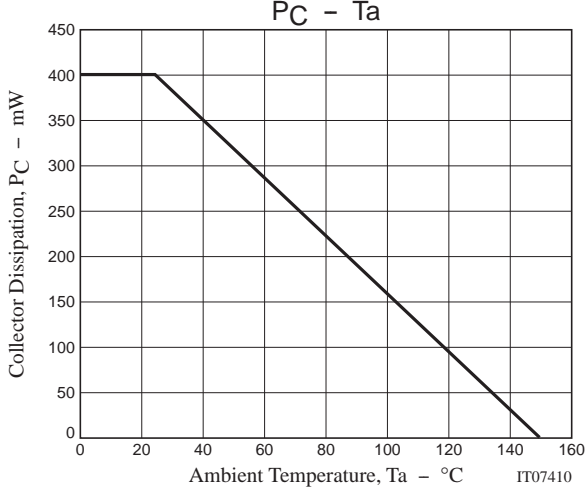
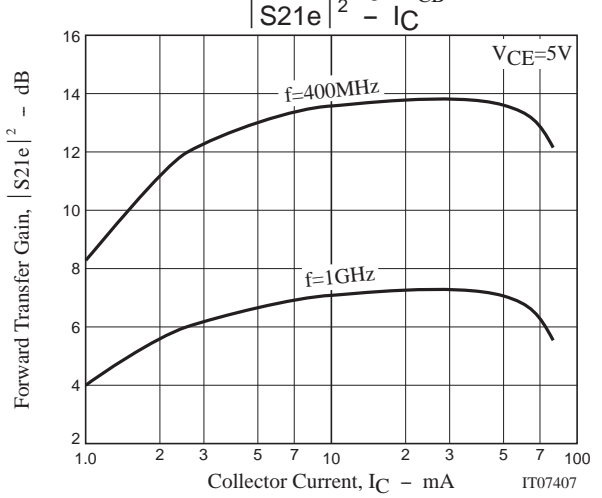
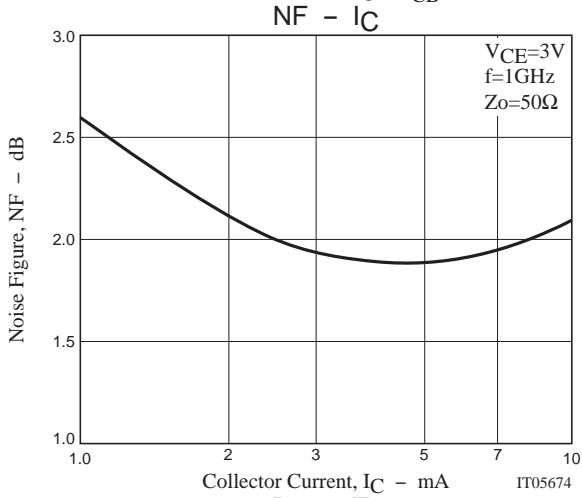
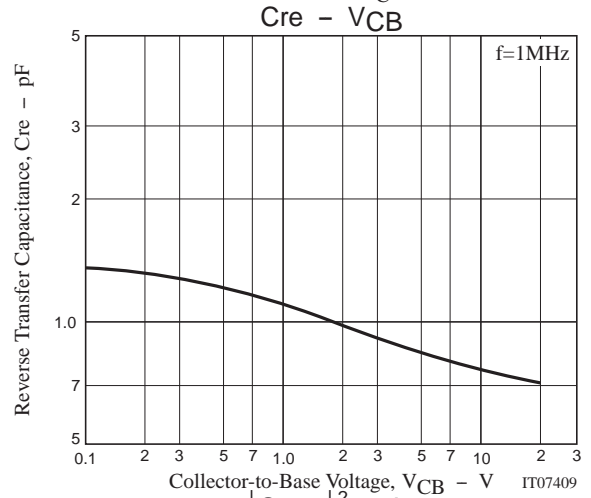
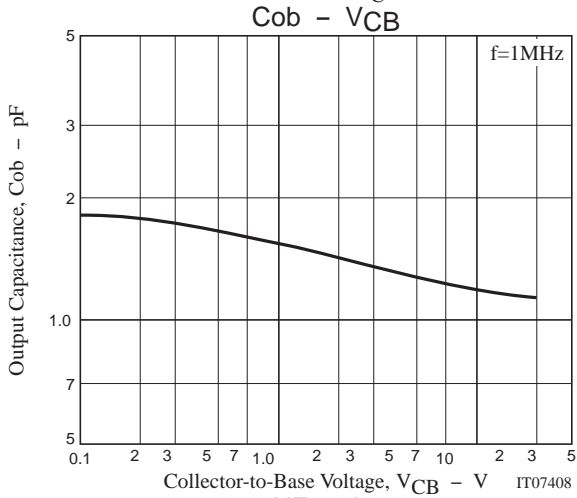
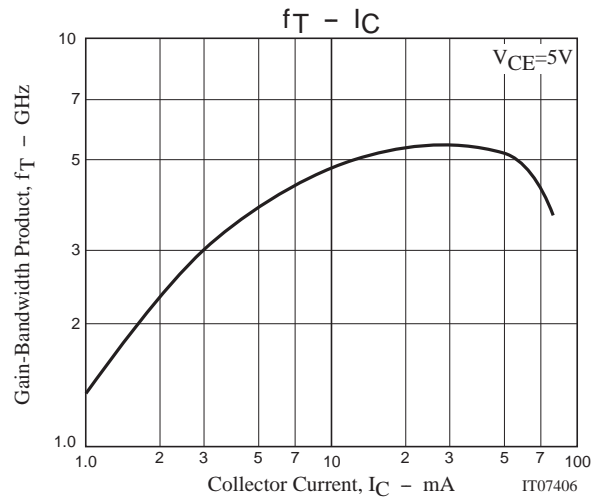
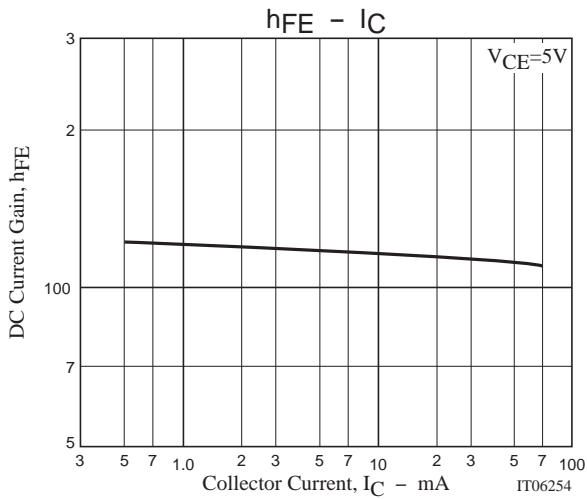
Package Dimensions

unit : mm (typ)

7522-003



55GN01NA



55GN01NA

S Parameters (Common emitter)

$V_{CE}=5V, I_C=1mA, Z_O=50\Omega$

Freq(MHz)	$ S_{11} $	$\angle S_{11}$	$ S_{21} $	$\angle S_{21}$	$ S_{12} $	$\angle S_{12}$	$ S_{22} $	$\angle S_{22}$
100	0.943	-21.54	3.196	157.89	0.049	75.41	0.976	-12.26
200	0.859	-42.64	3.033	137.45	0.089	62.59	0.918	-23.34
400	0.621	-84.31	2.581	101.05	0.141	42.68	0.765	-40.98
600	0.398	-128.72	2.188	70.15	0.163	34.48	0.643	-53.98
800	0.293	175.87	1.845	43.99	0.186	31.55	0.557	-67.68
1000	0.321	128.34	1.586	21.39	0.224	30.55	0.476	-85.66
1200	0.412	98.48	1.387	1.15	0.286	25.00	0.402	-111.30
1400	0.506	79.14	1.203	-17.54	0.360	14.93	0.338	-149.61
1600	0.608	63.42	1.041	-34.64	0.428	1.54	0.338	162.40
1800	0.682	49.93	0.880	-48.35	0.479	-13.03	0.409	121.17
2000	0.730	37.12	0.746	-59.47	0.510	-27.54	0.507	91.78

$V_{CE}=5V, I_C=3mA, Z_O=50\Omega$

Freq(MHz)	$ S_{11} $	$\angle S_{11}$	$ S_{21} $	$\angle S_{21}$	$ S_{12} $	$\angle S_{12}$	$ S_{22} $	$\angle S_{22}$
100	0.804	-32.40	8.238	142.84	0.045	73.04	0.893	-19.66
200	0.585	-55.65	6.453	116.32	0.073	62.58	0.746	-30.06
400	0.290	-84.97	4.082	82.70	0.123	54.56	0.584	-41.23
600	0.130	-115.59	2.993	59.77	0.168	48.90	0.499	-51.80
800	0.085	161.69	2.401	40.03	0.223	40.68	0.418	-66.00
1000	0.175	112.07	2.029	21.35	0.280	31.13	0.324	-84.62
1200	0.293	91.78	1.768	3.22	0.336	20.03	0.227	-112.98
1400	0.412	77.04	1.538	-14.06	0.389	7.76	0.157	-164.54
1600	0.531	63.46	1.337	-30.59	0.433	-5.27	0.199	134.30
1800	0.621	50.74	1.147	-45.02	0.466	-17.84	0.303	100.00
2000	0.685	38.34	0.990	-57.83	0.491	-30.60	0.411	79.31

$V_{CE}=5V, I_C=5mA, Z_O=50\Omega$

Freq(MHz)	$ S_{11} $	$\angle S_{11}$	$ S_{21} $	$\angle S_{21}$	$ S_{12} $	$\angle S_{12}$	$ S_{22} $	$\angle S_{22}$
100	0.682	-38.10	11.302	132.99	0.040	71.69	0.817	-22.99
200	0.442	-56.42	7.763	106.10	0.068	65.81	0.660	-30.32
400	0.208	-71.35	4.460	77.25	0.121	59.57	0.531	-39.30
600	0.088	-86.87	3.190	57.12	0.176	52.06	0.459	-50.11
800	0.034	149.18	2.542	39.04	0.235	42.45	0.378	-65.34
1000	0.140	104.71	2.150	21.30	0.295	30.94	0.279	-84.88
1200	0.266	89.28	1.863	3.90	0.350	18.79	0.177	-116.24
1400	0.390	75.83	1.622	-12.95	0.401	5.97	0.121	179.23
1600	0.510	63.13	1.413	-28.93	0.438	-6.84	0.192	118.31
1800	0.602	50.55	1.219	-43.09	0.467	-19.34	0.299	90.37
2000	0.668	38.16	1.055	-55.85	0.490	-31.84	0.403	72.89

$V_{CE}=5V, I_C=10mA, Z_O=50\Omega$

Freq(MHz)	$ S_{11} $	$\angle S_{11}$	$ S_{21} $	$\angle S_{21}$	$ S_{12} $	$\angle S_{12}$	$ S_{22} $	$\angle S_{22}$
100	0.485	-41.64	15.144	118.22	0.036	72.52	0.696	-25.07
200	0.302	-47.04	8.855	95.57	0.063	71.31	0.571	-27.92
400	0.173	-47.23	4.759	72.34	0.123	63.65	0.483	-36.07
600	0.093	-47.78	3.367	54.88	0.184	54.28	0.422	-48.07
800	0.016	30.84	2.673	38.26	0.246	42.91	0.342	-64.25
1000	0.113	95.22	2.252	21.35	0.309	30.98	0.237	-85.29
1200	0.241	86.37	1.949	4.47	0.363	17.56	0.132	-122.60
1400	0.369	74.46	1.689	-11.79	0.410	4.53	0.105	153.44
1600	0.493	62.03	1.477	-27.39	0.444	-8.58	0.202	103.83
1800	0.588	50.01	1.273	-40.99	0.468	-21.13	0.313	81.36
2000	0.656	37.87	1.111	-53.67	0.489	-33.27	0.409	66.66

55GN01NA

S Parameters (Common emitter)

$V_{CE}=5V, I_C=15mA, Z_O=50\Omega$

Freq(MHz)	$ S_{11} $	$\angle S_{11}$	$ S_{21} $	$\angle S_{21}$	$ S_{12} $	$\angle S_{12}$	$ S_{22} $	$\angle S_{22}$
100	0.393	-39.40	16.513	111.47	0.034	76.73	0.638	-24.75
200	0.262	-38.91	9.160	91.74	0.063	73.11	0.540	-25.92
400	0.173	-37.43	4.855	70.51	0.125	65.36	0.468	-34.48
600	0.104	-38.16	3.423	54.12	0.187	55.16	0.409	-47.14
800	0.028	7.07	2.718	37.90	0.252	43.45	0.329	-63.84
1000	0.106	91.07	2.289	21.31	0.314	30.76	0.221	-85.01
1200	0.234	85.64	1.977	4.65	0.369	17.31	0.117	-126.09
1400	0.364	74.15	1.712	-11.33	0.414	3.76	0.106	143.44
1600	0.488	61.92	1.493	-26.87	0.447	-9.20	0.213	99.23
1800	0.582	49.99	1.298	-40.45	0.470	-21.60	0.321	78.78
2000	0.651	37.88	1.128	-52.86	0.488	-33.58	0.415	64.58

$V_{CE}=5V, I_C=20mA, Z_O=50\Omega$

Freq(MHz)	$ S_{11} $	$\angle S_{11}$	$ S_{21} $	$\angle S_{21}$	$ S_{12} $	$\angle S_{12}$	$ S_{22} $	$\angle S_{22}$
100	0.346	-36.01	17.139	107.73	0.033	76.49	0.608	-23.92
200	0.246	-33.91	9.298	89.56	0.063	75.27	0.526	-24.72
400	0.173	-32.88	4.887	69.69	0.125	66.04	0.463	-33.79
600	0.108	-33.77	3.442	53.42	0.189	55.58	0.403	-46.59
800	0.034	7.28	2.732	37.56	0.255	43.56	0.321	-63.41
1000	0.104	89.49	2.301	21.18	0.315	30.73	0.213	-85.68
1200	0.232	85.18	1.991	4.67	0.371	17.24	0.110	-127.83
1400	0.363	73.90	1.721	-11.37	0.413	3.77	0.107	139.24
1600	0.486	61.86	1.504	-26.71	0.447	-9.38	0.216	97.22
1800	0.582	49.85	1.298	-40.20	0.469	-21.77	0.324	77.62
2000	0.652	37.81	1.132	-52.56	0.488	-33.82	0.417	63.99

$V_{CE}=5V, I_C=30mA, Z_O=50\Omega$

Freq(MHz)	$ S_{11} $	$\angle S_{11}$	$ S_{21} $	$\angle S_{21}$	$ S_{12} $	$\angle S_{12}$	$ S_{22} $	$\angle S_{22}$
100	0.293	-31.14	17.643	103.73	0.033	80.19	0.576	-22.37
200	0.228	-27.21	9.367	87.38	0.063	75.47	0.511	-23.14
400	0.169	-27.83	4.896	68.61	0.125	66.51	0.455	-32.68
600	0.107	-29.09	3.448	52.73	0.190	55.90	0.397	-45.90
800	0.039	15.22	2.739	36.98	0.255	43.60	0.316	-62.93
1000	0.110	88.31	2.302	20.77	0.316	30.46	0.206	-85.04
1200	0.238	84.51	1.989	4.29	0.371	17.10	0.102	-127.75
1400	0.367	73.61	1.719	-11.62	0.415	3.59	0.106	134.87
1600	0.491	61.74	1.503	-26.98	0.448	-9.46	0.219	95.38
1800	0.584	49.63	1.295	-40.37	0.470	-21.95	0.327	76.66
2000	0.654	37.73	1.133	-52.81	0.488	-33.87	0.418	62.92

$V_{CE}=5V, I_C=50mA, Z_O=50\Omega$

Freq(MHz)	$ S_{11} $	$\angle S_{11}$	$ S_{21} $	$\angle S_{21}$	$ S_{12} $	$\angle S_{12}$	$ S_{22} $	$\angle S_{22}$
100	0.234	-26.34	17.554	100.28	0.033	79.67	0.552	-20.20
200	0.190	-22.28	9.191	85.28	0.063	77.35	0.504	-21.25
400	0.141	-22.30	4.777	67.06	0.126	66.81	0.454	-31.75
600	0.085	-19.60	3.367	51.37	0.189	55.97	0.397	-45.02
800	0.045	52.54	2.670	35.54	0.255	43.62	0.315	-62.21
1000	0.136	89.35	2.250	19.09	0.317	30.77	0.206	-83.77
1200	0.261	83.49	1.943	2.65	0.371	17.07	0.101	-126.95
1400	0.390	72.58	1.678	-13.25	0.413	3.62	0.102	135.16
1600	0.510	60.71	1.460	-28.69	0.448	-9.60	0.217	95.69
1800	0.600	48.78	1.265	-42.00	0.469	-21.99	0.323	76.16
2000	0.667	37.06	1.104	-54.45	0.489	-34.03	0.415	63.17

- SANYO Semiconductor Co.,Ltd. assumes no responsibility for equipment failures that result from using products at values that exceed, even momentarily, rated values (such as maximum ratings, operating condition ranges, or other parameters) listed in products specifications of any and all SANYO Semiconductor Co.,Ltd. products described or contained herein.
- SANYO Semiconductor Co.,Ltd. strives to supply high-quality high-reliability products, however, any and all semiconductor products fail or malfunction with some probability. It is possible that these probabilistic failures or malfunction could give rise to accidents or events that could endanger human lives, trouble that could give rise to smoke or fire, or accidents that could cause damage to other property. When designing equipment, adopt safety measures so that these kinds of accidents or events cannot occur. Such measures include but are not limited to protective circuits and error prevention circuits for safe design, redundant design, and structural design.
- In the event that any or all SANYO Semiconductor Co.,Ltd. products described or contained herein are controlled under any of applicable local export control laws and regulations, such products may require the export license from the authorities concerned in accordance with the above law.
- No part of this publication may be reproduced or transmitted in any form or by any means, electronic or mechanical, including photocopying and recording, or any information storage or retrieval system, or otherwise, without the prior written consent of SANYO Semiconductor Co.,Ltd.
- Any and all information described or contained herein are subject to change without notice due to product/technology improvement, etc. When designing equipment, refer to the "Delivery Specification" for the SANYO Semiconductor Co.,Ltd. product that you intend to use.
- Information (including circuit diagrams and circuit parameters) herein is for example only; it is not guaranteed for volume production.
- Upon using the technical information or products described herein, neither warranty nor license shall be granted with regard to intellectual property rights or any other rights of SANYO Semiconductor Co.,Ltd. or any third party. SANYO Semiconductor Co.,Ltd. shall not be liable for any claim or suits with regard to a third party's intellectual property rights which has resulted from the use of the technical information and products mentioned above.

This catalog provides information as of April, 2009. Specifications and information herein are subject to change without notice.