DATA SHEET

Part No.	AN13208A
Package Code No.	ULGA020-L-0404

Contents

AN13208A

3-ch. video driver IC supporting HD with charge pump

■ Overview

AN13208A is a 75 Ω video driver IC supporting HD (high-definition) which can operate by 3.25 V of supply voltage.

Negative voltages generated by built-in charge pump circuit enable DC direct output, and output capacitor which is needed previously is not required. Also, it improves the output dynamic range which was difficult by a single supply.

Furthermore, it incorporates various filters for D pin outputs and control switches, which allows 75 Ω driving by 3 output systems of Cy, Cb, Cr or Py, Pb, Pr.

■ Features

- Supply voltage 3.25 V, 75 Ω driver for 3-ch. video
- 3 output systems of Cy, Cb, Cr or Py, Pb, Pr
- Supports D4 (720P)
- 3 modes of filter selector switches
- Built-in stand-by mode
- Output capacitor is unnecessary by generating negative voltage from charge pump circuit.
- Wide output dynamic range

■ Applications

- Video output for portable equipments such as DSC and DVC

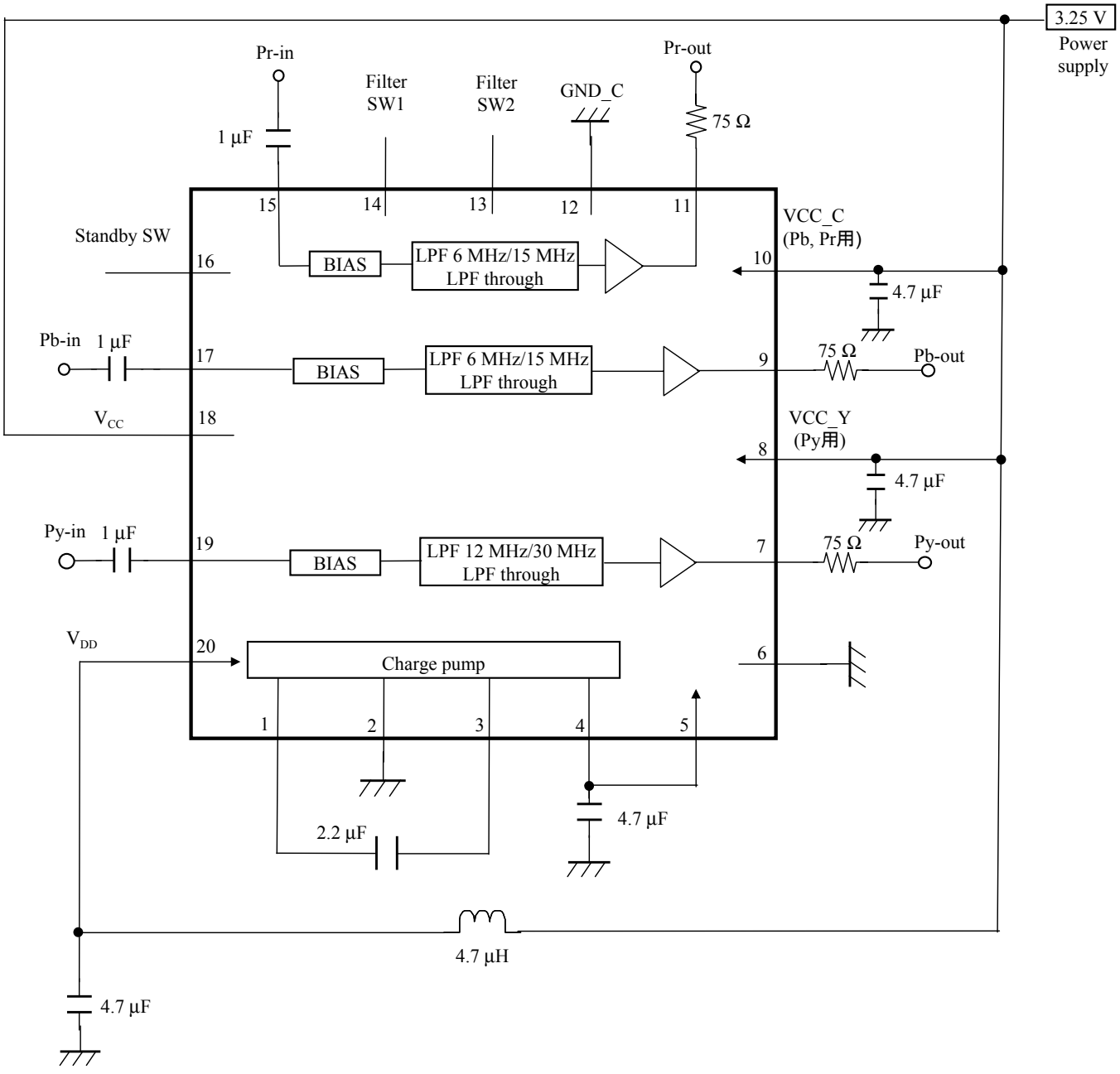
■ Package

- 20 pin fine pitch land grid array package (LGA type)

■ Type

- Bi-CMOS IC

■ Application Circuit Example (Block Diagram)



■ Pin Descriptions

Pin No.	Pin name	Type	Description
1	CLKP	Output	Clock output pin (+)
2	GND_PUMP	Ground	GND (for charge pump)
3	CLKN	Output	Clock output pin (–)
4	V_{SS}	Output	Negative voltage generation pin
5	SUB	Input	SUB potential
6	GND_Y	Ground	GND (for Py)
7	Py-out	Output	Output pin for Py
8	VCC_Y	Power supply	V_{CC} (for Py)
9	Pb-out	Output	Output pin for Pb
10	VCC_C	Power supply	V_{CC} (for Pb/Pr)
11	Pr-out	Output	Output pin for Pr
12	GND_C	Ground	GND (for Pb/Pr)
13	Filter SW2	Input	Filter selector switch2
14	Filter SW1	Input	Filter selector switch1
15	Pr-in	Input	Input pin for Pr
16	Standby SW	Input	ON/OFF selector switch
17	Pb-in	Input	Input pin for Pb
18	V_{CC}	Power supply	V_{CC}
19	Py-in	Input	Input pin for Py
20	V_{DD}	Power supply	V_{DD} (for charge pump)

■ Absolute Maximum Ratings

A No.	Parameter	Symbol	Rating	Unit	Note
1	Supply voltage	V_{CC}	4.1	V	*1
2	Supply current	I_{CC}	—	A	—
3	Power dissipation	P_D	137	mW	*2
4	Operating ambient temperature	T_{opr}	–20 to +75	°C	*3
5	Storage temperature	T_{stg}	–55 to +125	°C	*3

Note) *1: The range under absolute maximum ratings, power dissipation.

*2: Power dissipation shows the value of only package at T_a = 75°C.
When using this IC, refer to the • P_D – T_a diagram in the ■ Technical Data and use under the condition not exceeding the allowable value.

*3: Expect for the storage temperature and operating ambient temperature, all ratings are for T_a = 25°C.

■ Operating Supply Voltage Range

Parameter	Symbol	Range	Unit	Note
Supply voltage range	V_{CC}	2.7 to 3.6	V	—

Note) The values under the condition not exceeding the above absolute maximum ratings and the power dissipation.

■ Electrical Characteristics at V_{CC} = 3.25 V

Note) T_a = 25°C±2°C unless otherwise specified.

B No.	Parameter	Symbol	Conditions	Limits			Unit	Note
				Min	Typ	Max		
Circuit current								
1	Circuit current at non-signal (Wide mode)	Icc1	—	—	50	70	mA	—
2	Circuit current in power saving mode	ICCST	$V_{13} = V_{14} = V_{16} = 0$ V	—	—	10	µA	—
Mode control								
3	Low state hold voltage range for filter selector switch1	SWL1	—	0	—	0.6	V	—
4	High state hold voltage range for filter selector switch1	SWH1	—	2.1	—	3.25	V	—
5	Low state hold voltage range for filter selector switch2	SWL2	—	0	—	0.6	V	—
6	High state hold voltage range for filter selector switch2	SWH2	—	2.1	—	3.25	V	—
7	Stand-by OFF hold voltage	VthST	—	0	—	0.6	V	—
8	Stand-by ON hold voltage	VthON	—	2.1	—	3.25	V	—
Driver characteristics: Wide mode								
9	Input/output gain (Py, wide mode)	Py1	f = 3.58 MHz	5.65	6.15	6.65	dB	—
10	Pb output gain difference (Pb-Py, wide mode)	Pb1	f = 3.58 MHz	– 0.5	0	0.5	dB	—
11	Pr output gain difference (Pr-Py, wide mode)	Pr1	f = 3.58 MHz	– 0.5	0	0.5	dB	—
Driver characteristics: Narrow mode								
12	Input/output gain (Py, narrow mode)	Py1	f = 3.58 MHz	5.65	6.15	6.65	dB	—
13	Pb output gain difference (Pb-Py, narrow mode)	Pb1	f = 3.58 MHz	– 0.5	0	0.5	dB	—
14	Pr output gain (Pr-Py, narrow mode)	Pr1	f = 3.58 MHz	– 0.5	0	0.5	dB	—
Py frequency characteristics								
15	Pya frequency character 1 (Wide mode)	Pya-f1	f = 30 MHz /3.58 MHz	–3.5	– 0.3	1.5	dB	—
16	Pya frequency character 2 (Wide mode)	Pya-f2	f = 50 MHz /3.58 MHz	—	–13	– 4.5	dB	—
17	Pyb frequency character 1 (Narrow mode)	Pyb-f1	f = 15 MHz /3.58 MHz	–4	– 1	1	dB	—
18	Pyb frequency character 2 (Narrow mode)	Pyb-f2	f = 27 MHz /3.58 MHz	—	–20	–8	dB	—

■ Electrical Characteristics at V_{CC} = 3.25 V (continued)

Note) T_a = 25°C±2°C unless otherwise specified.

B No.	Parameter	Symbol	Conditions	Limits			Unit	Note
				Min	Typ	Max		
Pb frequency characteristics								
19	Pba frequency character 1 (Wide mode)	Pba-f1	f = 15 MHz /3.58 MHz	–4	0	1	dB	—
20	Pba frequency character 2 (Wide mode)	Pba-f2	f = 37 MHz /3.58 MHz	—	–25	–8	dB	—
21	Pbb frequency character 1 (Narrow mode)	Pbb-f1	f = 8 MHz /3.58 MHz	–4	– 0.2	1	dB	—
22	Pbb frequency character 2 (Narrow mode)	Pbb-f2	f = 18 MHz /3.58 MHz	—	–16	–6	dB	—
Pr frequency characteristics								
23	Pra frequency character 1 (Wide mode)	Pra-f1	f = 15 MHz /3.58 MHz	–4	0	1	dB	—
24	Pra frequency character 2 (Wide mode)	Pra-f2	f = 37 MHz /3.58 MHz	—	–25	–8	dB	—
25	Prb frequency character 2 (Narrow mode)	Prb-f2	f = 8 MHz /3.58 MHz	–4.0	– 0.2	1	dB	—
26	Prb frequency character 2 (Narrow mode)	Prb-f2	f = 18 MHz /3.58 MHz	—	–16	–6	dB	—

■ Electrical Characteristics (Reference values for design) at V_{CC} = 3.25 V

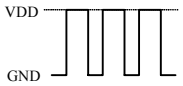
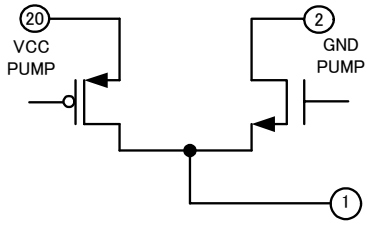
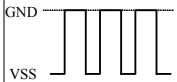
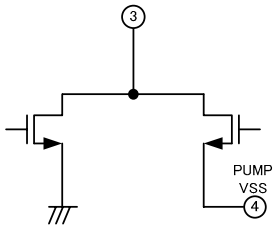
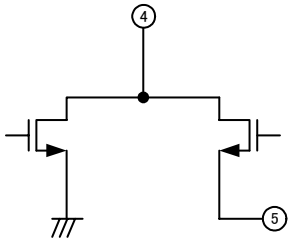
Note) T_a = 25°C±2°C unless otherwise specified.
The characteristics listed below are reference values for design of the IC and are not guaranteed by inspection.
If a problem does occur related to these characteristics, Panasonic will respond in good faith to user concerns.

B No.	Parameter	Symbol	Conditions	Limits			Unit	Note
				Min	Typ	Max		
Py, Pb, Pr frequency characteristics								
27	Pya frequency character 3 (Wide mode)	Pya-f3	f = 74 MHz /3.58 MHz	—	–40	–30	dB	—
28	Pyb frequency character 3 (Narrow mode)	Pyb-f3	f = 54 MHz /3.58 MHz	—	–50	–30	dB	—
29	Pba frequency character 3 (Wide mode)	Pba-f3	f = 54 MHz /3.58 MHz	—	–40	–30	dB	—
30	Pbb frequency character 3 (Narrow mode)	Pbb-f3	f = 54 MHz /3.58 MHz	—	–45	–30	dB	—
31	Pra frequency character 3 (Wide mode)	Pra-f3	f = 54 MHz /3.58 MHz	—	–40	–30	dB	—
32	Prb frequency character 3 (Narrow mode)	Prb-f3	f = 54 MHz /3.58 MHz	—	–45	–30	dB	—
Py, Pb, Pr output characteristics								
33	Py output 2nd distortion	Py-Dis2	V_{IN} = 1.0 V[p-p], f = 3.58 MHz	—	–45	–40	dB	—
34	Py output 3rd distortion	Py-Dis3	V_{IN} = 1.0 V[p-p], f = 3.58 MHz	—	–60	–40	dB	—
35	Pb output 2nd distortion	Pb-Dis2	V_{IN} = 1.0 V[p-p], f = 3.58 MHz	—	–45	–40	dB	—
36	Pb output 3rd distortion	Pb-Dis3	V_{IN} = 1.0 V[p-p], f = 3.58 MHz	—	–60	–40	dB	—
37	Pr output 2nd distortion	Pr-Dis2	V_{IN} = 1.0 V[p-p], f = 3.58 MHz	—	–45	–40	dB	—
38	Pr output 3rd distortion	Pr-Dis3	V_{IN} = 1.0 V[p-p], f = 3.58 MHz	—	–60	–40	dB	—
39	S/N	SNR	white50%, 100 kHz-4.2 MHz, Trap = off	60	—	—	dB	—
40	DG	DG	V_{IN} = 1.0 V[p-p], 10 STEP	—	1	—	%	—
41	DP	DP	V_{IN} = 1.0 V[p-p], 10 STEP	—	1	—	DEG	—
42	Cross talk	CT	5 MHz	—	—	–50	dB	—
43	Output D-range	DROUT	f = 1 MHz	—	4.0	—	V	—
44	Input D-range	DRIN	f = 1 MHz	—	2.0	—	V	—

■ Technical Data

- I/O block circuit diagrams and pin function descriptions

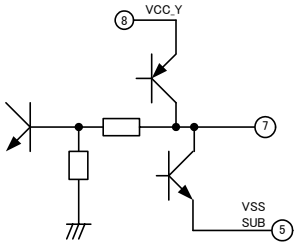
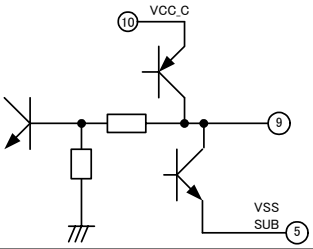
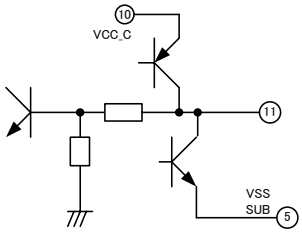
Note) The characteristics listed below are reference values based on the IC design and are not guaranteed.

Pin No.	Waveform and voltage	Internal circuit	Impedance	Description
1			—	Generated negative voltage output pin 1
2	GND	—	—	GND for charge pump
3			—	Generated negative voltage output pin 2
4	V_{SS}		—	Negative voltage generation pin
5	V_{SS}	—	—	SUB potential
6	GND	—	—	GND (for Py)

■ Technical Data (continued)

- I/O block circuit diagrams and pin function descriptions (continued)

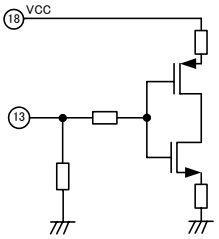
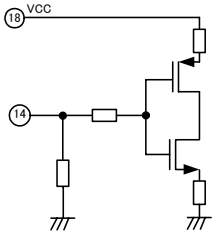
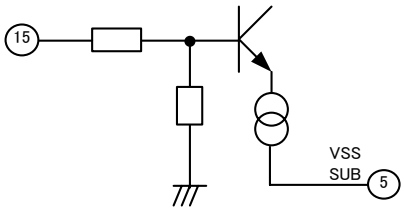
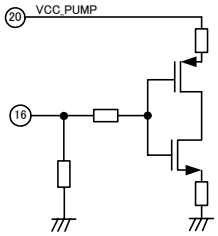
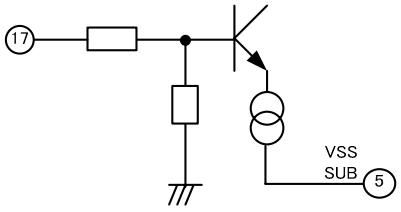
Note) The characteristics listed below are reference values based on the IC design and are not guaranteed.

Pin No.	Waveform and voltage	Internal circuit	Impedance	Description
7			During operation 10 Ω or less	Py-out
8	V_{CC}	—	—	V_{CC} (for Py)
9			During operation 10 Ω or less	Pb-out
10	V_{CC}	—	—	V_{CC} (for Pb/Pr)
11			During operation 10 Ω or less	Pr-out
12	GND	—	—	GND (for Pb/Pr)

■ Technical Data (continued)

• I/O block circuit diagrams and pin function descriptions (continued)

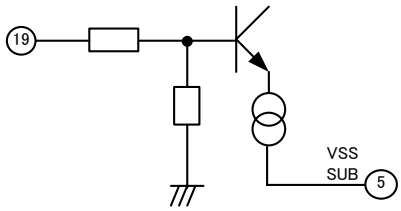
Note) The characteristics listed below are reference values based on the IC design and are not guaranteed.

Pin No.	Waveform and voltage	Internal circuit	Impedance	Description
13	V_{CC} / GND		200 kΩ	Filter control switch 2
14	V_{CC} / GND		200 kΩ	Filter control switch 1
15			130 kΩ	Pr-in
16	V_{CC} / GND		200 kΩ	Stand-by control switch 1
17			130 kΩ	Pb-in
18	V_{CC}	—	—	V_{CC}

■ Technical Data (continued)

• I/O block circuit diagrams and pin function descriptions (continued)

Note) The characteristics listed below are reference values based on the IC design and are not guaranteed.

Pin No.	Waveform and voltage	Internal circuit	Impedance	Description
19			130 kΩ	Py-in
20	V_{CC}	—	—	V_{DD} (for charge pump)

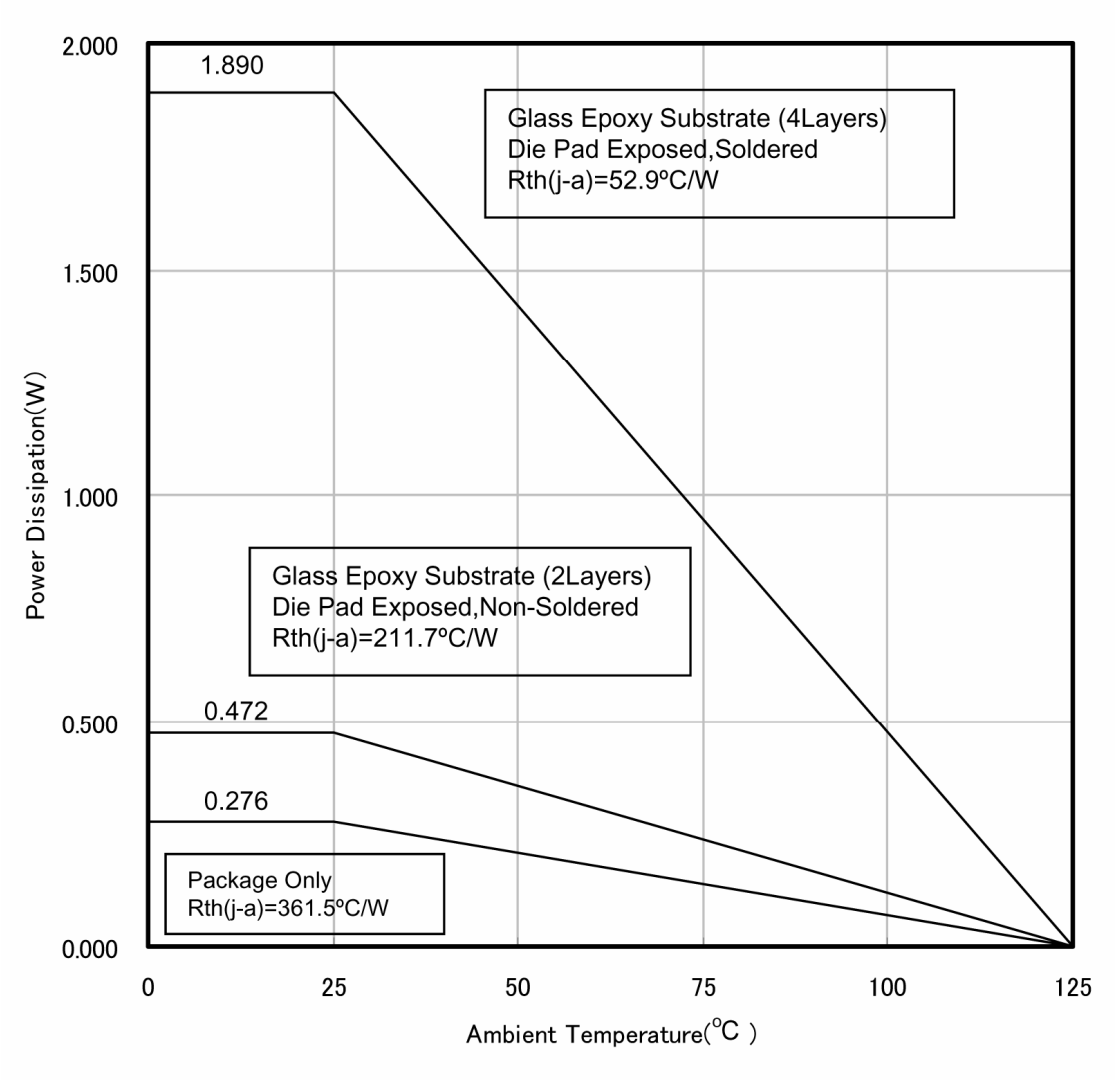
■ Technical Data (continued)

• Operation table (LPFs)

Pin setting			Operating conditions
Pin 16 Standby SW	Pin 14 Filter SW1	Pin 13 Filter SW2	
0	0	0	Stand-by (normal)
		1	(Stand-by)
	1	0	(Stand-by)
		1	(Stand-by)
1	0	0	Circuit operation (LPF1: Wide)
		1	Circuit operation (LPF2: Narrow)
	1	0	Circuit operation (Through: Filter through mode)
		1	Circuit operation (Through: Filter through mode)

■ Technical Data (continued)

• P_D — T_a diagram



■ Usage Notes

1. Carry out the thermal design with sufficient margin such that the power dissipation will not be exceeded, based on the conditions of power supply, load and ambient temperature. The absolute maximum ratings are values which should not be exceeded in any use or test conditions.

2. Pay attention in the pattern layout in order to prevent damage due to short circuit between pins. In addition, refer to the ■ Pin Description for the pin configuration.

3. Be sure not to mount the LSI in the reverse direction onto the PCB. It might be damaged when the electricity is turned on.

4. Perform a visual inspection on the PCB before turning on the power supply, otherwise damage might happen due to problems such as a solder-bridge between the pins of the semiconductor device. Also, perform a full technical verification on the assembly quality, because the same damage possibly can happen due to conductive substances, such as solder ball, that adhere to the LSI during transportation.

5. Take notice in the use of this product that it might break or occasionally smoke when an abnormal state occurs such as power fault, i.e., output pins, Pin4 (CP negative voltage output), or Pin5 (SUB potential) short to the power supplies. And, safety measures such as an installation of fuses are recommended because the extent of the above-mentioned damage and smoke emission will depend on the current capability of the power supply.

6. When using the LSI for model deployment or new products, perform fully safety verification including the long-term reliability for each product.

7. This IC has a built-in charge pump which generates PCB voltage (negative voltage) inside the IC. As the fin of this IC is connected to the PCB, it might be damaged or emit smoke when a voltage including GND is applied.

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(6) Comply with the instructions for use in order to prevent breakdown and characteristics change due to external factors (ESD, EOS, thermal stress and mechanical stress) at the time of handling, mounting or at customer's process. When using products for which damp-proof packing is required, satisfy the conditions, such as shelf life and the elapsed time since first opening the packages.

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