5. Evaluation Board Parts Table

Applicable circuit example of "4.5 BH1417F US Band (87.7MHz-88.9MHz)"

Symbol	Part Name	Product Number	Manufacturer	Qty.	Shapes, Size, Type
PCB	BH1415F/16F/17F Evaluation Board	PCB-0117B	ROHM	1	90x90mm, Single Layer
IC	LSI	BH1417F	ROHM	1	SMD (SOP22)
TR	Transistor	2SD2142K-T146	ROHM	1	SMD (SMT3)
VC	Varactor Diode	KV1471E (Rank2)	TOKO	1	SMD (URD)
XTAL	Crystal Resonator (7.6MHz)	AT-49	KDS	1	Lead
L1	Coil	FEM10C-2F6	SUMIDA	1	Lead (Bobbin)
BPF	Printed Filter (Wide Band, Z=75Ω)	GFWB3	SOSHIN	1	Lead
VR1,VR24	Variable Resistor (50KΩ ±25%)	CT-6P (50kΩ)	COPAL	2	Lead
VR5	Variable Resistor (10KΩ ±25%)	CT-6P (10kΩ)	COPAL	1	Lead
C8B,C10F	Electrolytic Capacitor (25V 100μF ±10%)	25WV100MFD	RUBICON	2	Lead
C1A,C1B,C4,C5,C10C, C13B,C24A,C24B	Electrolytic Capacitor (25V 10μF ±10%)	25WV10MFD	RUBICON	8	Lead
C13A	Multi-Layer Ceramic Capacitor (25V 0.1μF ±10%)	RPER11H104K2P2A01B	MURATA	1	Lead
C10E	Ceramic Capacitor (25V 0.047μF ±10%)	DD110-63F473Z50	MURATA	1	Lead
C8A	Ceramic Capacitor (50V 0.01μF ±10%)	DD111-63B103K50	MURATA	1	Lead
C2,C10D,C23	Ceramic Capacitor (50V 2200pF ±10%)	DD106-63B222K50	MURATA	3	Lead
C8C,C12	Ceramic Capacitor (50V 1000pF ±10%)	DD112-63SL102J50	MURATA	2	Lead
C10H	Ceramic Capacitor (50V 330pF ±5%)	DD109-63CH331J50	MURATA	1	Lead
C3,C22	Ceramic Capacitor (50V 150pF ±5%)	DD108-63CH151J50	MURATA	2	Lead
C10B	Ceramic Capacitor (50V 82pF ±5%)	DD106-63CH820J50	MURATA	1	Lead
C10A,C10G	Ceramic Capacitor (50V 33pF ±5%)	DD104-63CH330J50	MURATA	2	Lead
C14,C15	Ceramic Capacitor (50V 27pF ±5%)	DD104-63CH270J50	MURATA	2	Lead
R7	Resistor (20KΩ ±5%)	R25XT-29J203	ROHM	1	Lead
R10A,R10B	Resistor (10KΩ ±5%)	R25XT-29J103	ROHM	2	Lead
R10C,R10D	Resistor (3.3KΩ ±5%)	R25XT-29J332	ROHM	2	Lead
R10E	Resistor (2.2KΩ ±5%)	R25XT-29J222	ROHM	1	Lead
R12B	Resistor (360Ω ±5%)	R25XT-29J361	ROHM	1	Lead
R10F	Resistor (100Ω ±5%)	R25XT-29J101	ROHM	1	Lead
R12A,R12C	Resistor (82Ω ±5%)	R25XT-29J820	ROHM	2	Lead
R10	Resistor (33Ω ±5%)	R25XT-29J330	ROHM	1	Lead
R5,J0,J1,J2,J3,J4	Jumper	R25XT-29J000	ROHM	6	Lead
D0,D1,D2,D3	Toggle Switch	ATE1D-2M3-10	FUJISOKU	4	Lead

Other recommended parts

Symbol	Part Name	Product Number	Manufactuer	Shapes, Size, Type
VC	Varactor Diode	KV1471K	TOKO	SMD (1208)
		MA27V05	Panasonic	SMD (1006)
L1	Coil (82nH ± 2%)	LLQ2012-F82NG	TOKO	SMD (2012)
		LLQ1608-F82NG	TOKO	SMD (1608)
		ELJNJ82NG	Panasonic	SMD (1608)
		LQW18AN82NG00	Murata	SMD (1608)
		0603CS-82NXGBW	Coilcraft	SMD (1608)

Changing the type of varactor diode or coil changes distortion factor or characteristics of control voltage Vt. If the values of other parts are same as those of the table above, satisfactory characteristics may not be obtained. In such event, redesign values of each part.

6. Precautions on Substrate Pattern Layout

6.1 Substrate pattern example (BH1415F/BH1416F/BH1417F)

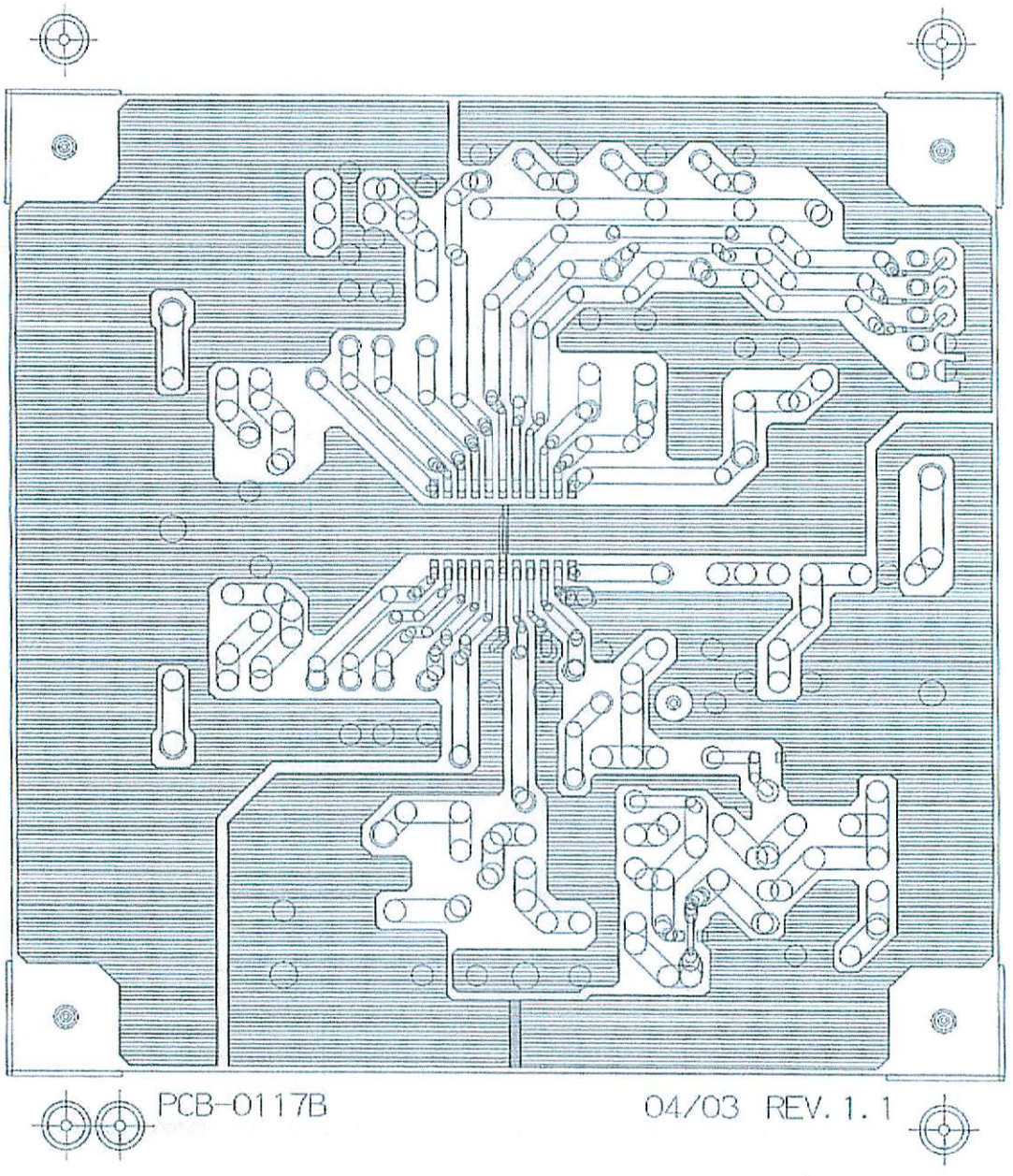

Fig. 31 Evaluation board, soldered surface pattern (as viewed from soldered surface)

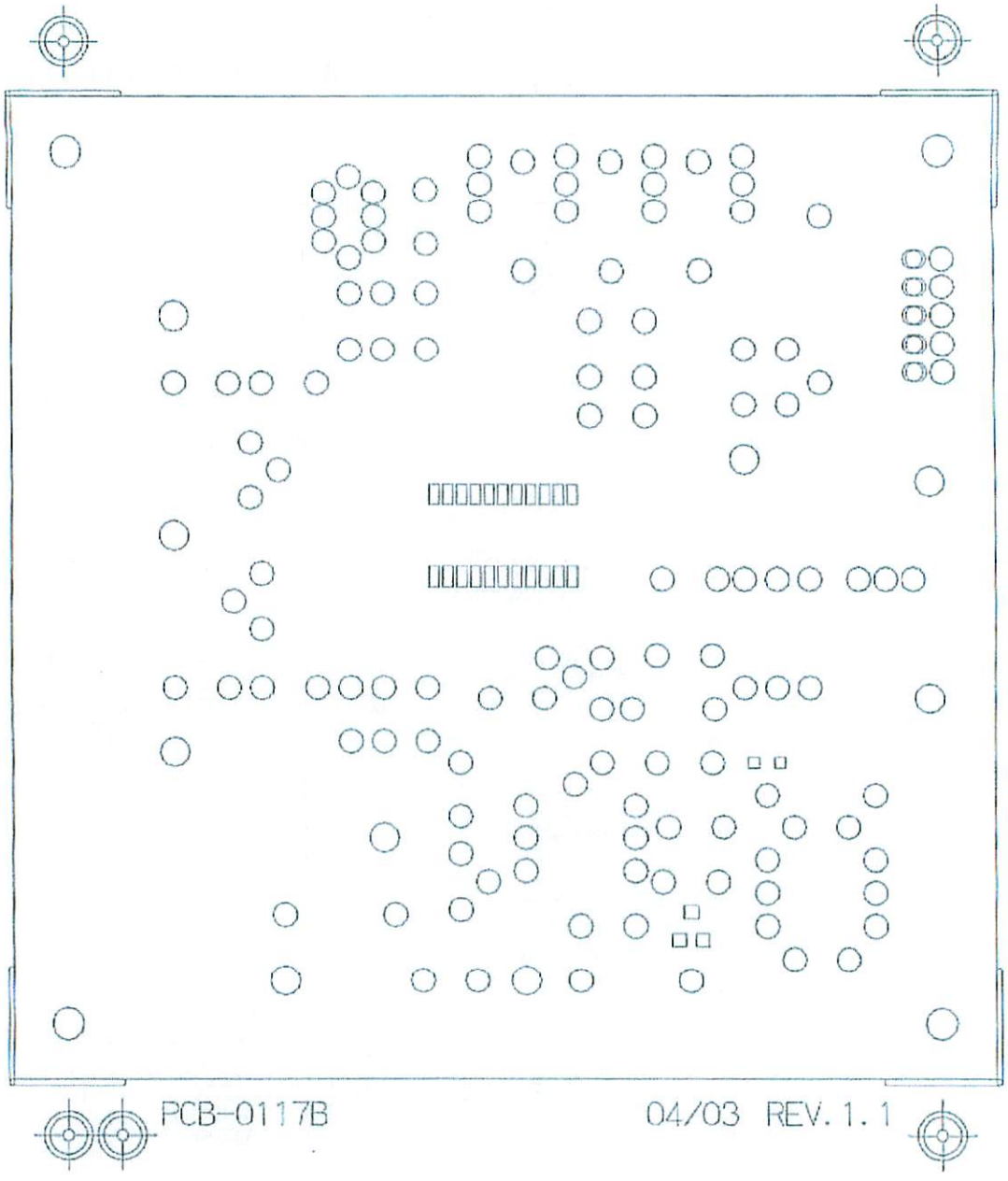

Fig. 32 Evaluation board, Soldered surface resist (as viewed from soldered surface)

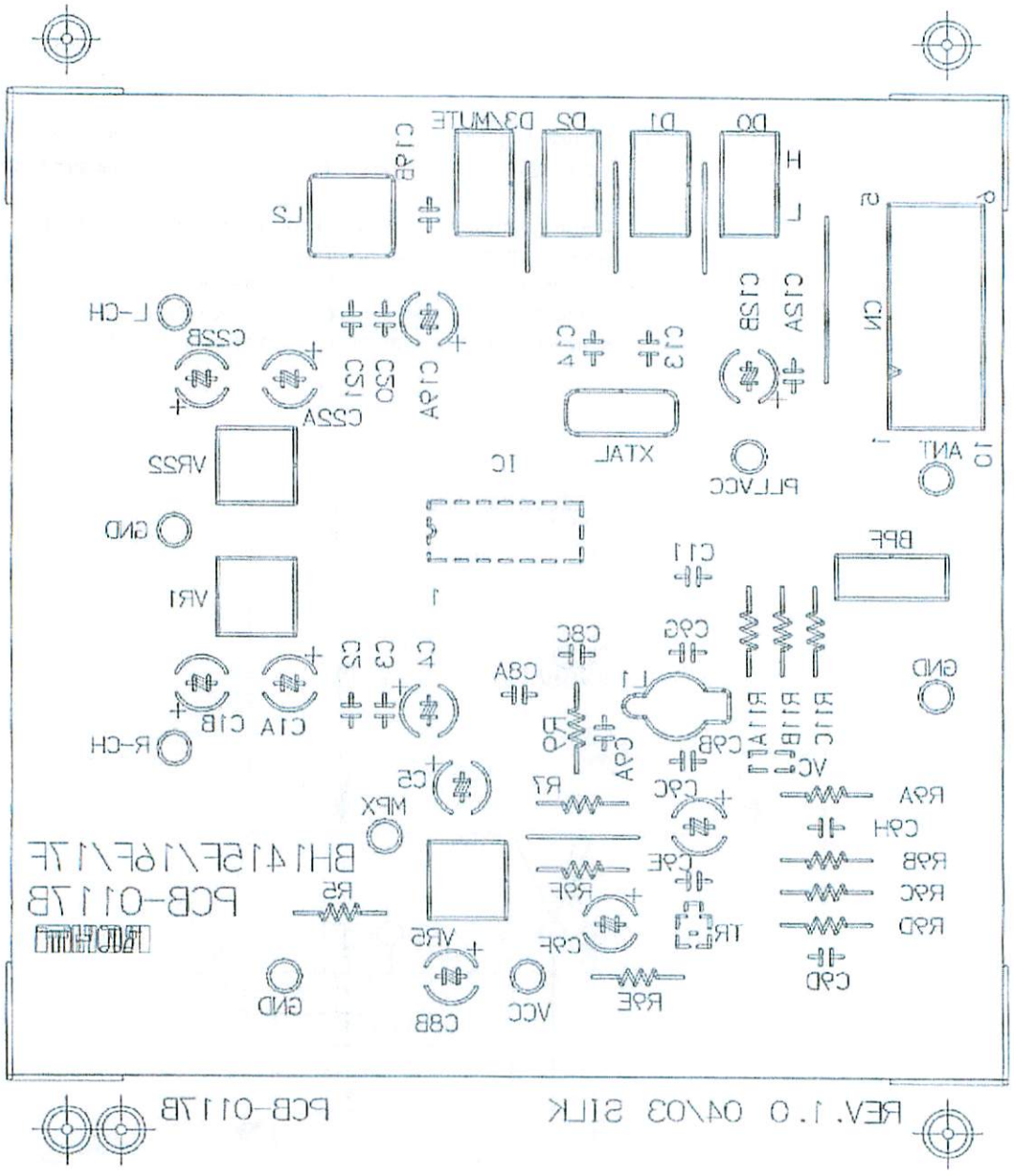

Fig. 33 Evaluation board, Part surface silk (as viewed from soldered surface)

6.2 Attention

GND is generally classified into 5 systems, namely, audio input system, audio output system, high-frequency system, digital system, and PLL LPF system. Do the layout in such a manner that GNDs do not have any common impedance.

In particular, use a full-ground-plane for high-frequency system GND to minimize performance degradation caused by integrating high-frequency system GND into a PC board. In addition, never use jumper cables for high-frequency system GND.

If a double-sided PC board is used, make the parts surface full-ground-plane. This achieves ideal packaging from the viewpoint of high frequency. Because ground is provided on the parts surface, no ground surface is set for the film surface. Providing the ground surface to the film surface increases stray capacitance and degrades characteristics. When parts are mounted on the film surface and grounding is provided for the parts surface, throughhole portions work as stray inductance and unstable operation may result. Increase the size or the number of throughholes.

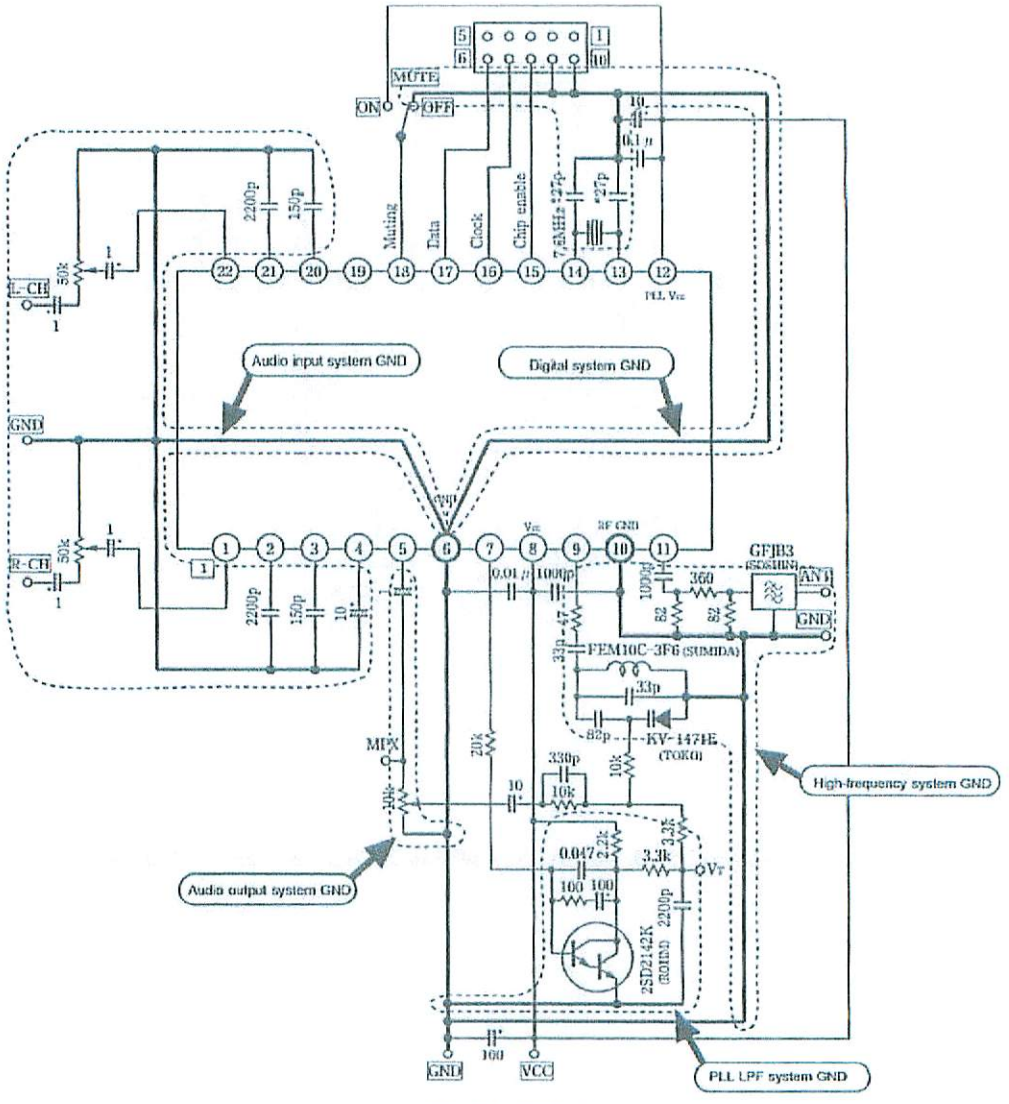

Fig. 34 Note 1

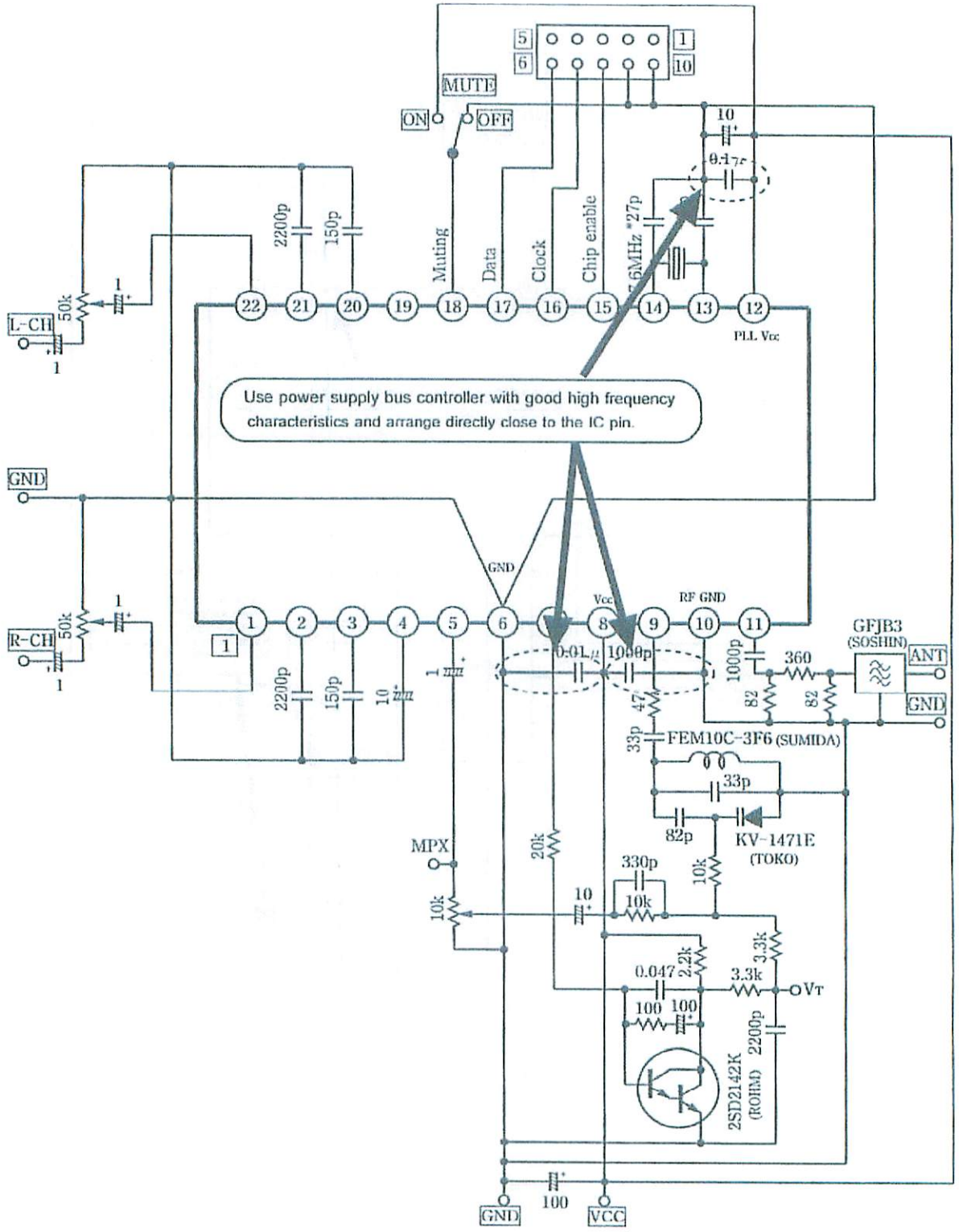
MUTE
ON
OFF
L-CH
R-CH
50k
2200p
150p
Muting
Data
Clock
Chip enable
27p
PLL Vcc
Use power supply bus controller with good high frequency characteristics and arrange directly close to the IC pin.
GND
Vcc
RF GND
0.01μ
1000p
360
82
47
33p
FEM10C-3F6 (SUMIDA)
GFJB3
(SOSHIN)
ANT
MPX
20k
330p
10k
82p
KV-1471E
(TOKO)
0.047
2.2k
3.3k
VT
100
2SD2142K
(ROHM)
VCC

Fig. 35 Note 2

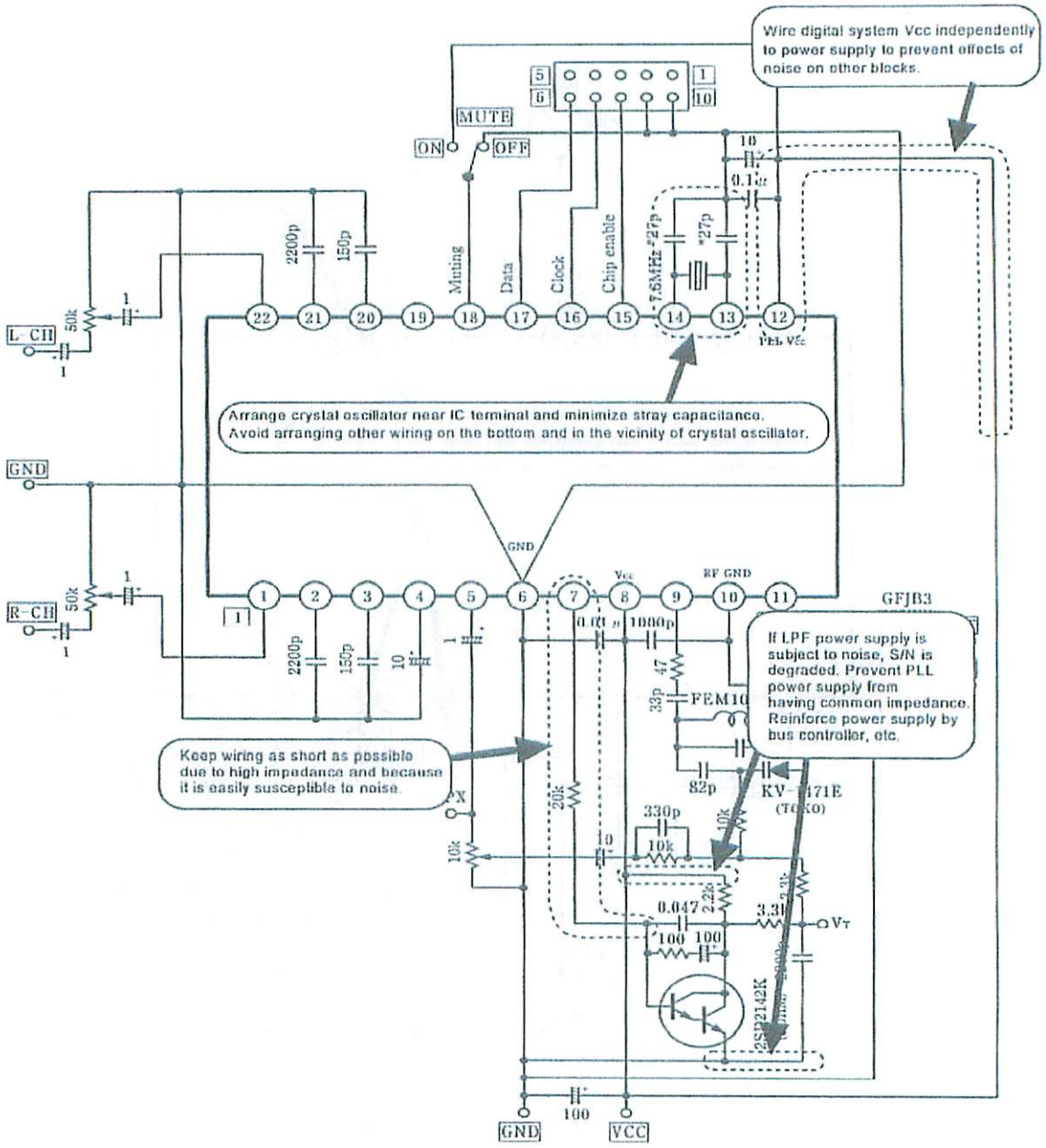
Wire digital system Vcc independently to power supply to prevent effects of noise on other blocks.
MUTE
ON
OFF
Muting
Data
Clock
Chip enable
7.6MHz
L-CH
R-CH
GND
Vcc
RF GND
Arrange crystal oscillator near IC terminal and minimize stray capacitance. Avoid arranging other wiring on the bottom and in the vicinity of crystal oscillator.
If LPF power supply is subject to noise, S/N is degraded. Prevent PLL power supply from having common impedance. Reinforce power supply by bus controller, etc.
Keep wiring as short as possible due to high impedance and because it is easily susceptible to noise.
GFJB3
KV-1471E
2SD2142K
VT
VCC

Fig. 36 Note 3

For wiring of high-frequency system parts that connect to pins 9, 10, 11, make pattern width not less than 1.0mm and as thick and short as possible to prevent generation of stray inductance.

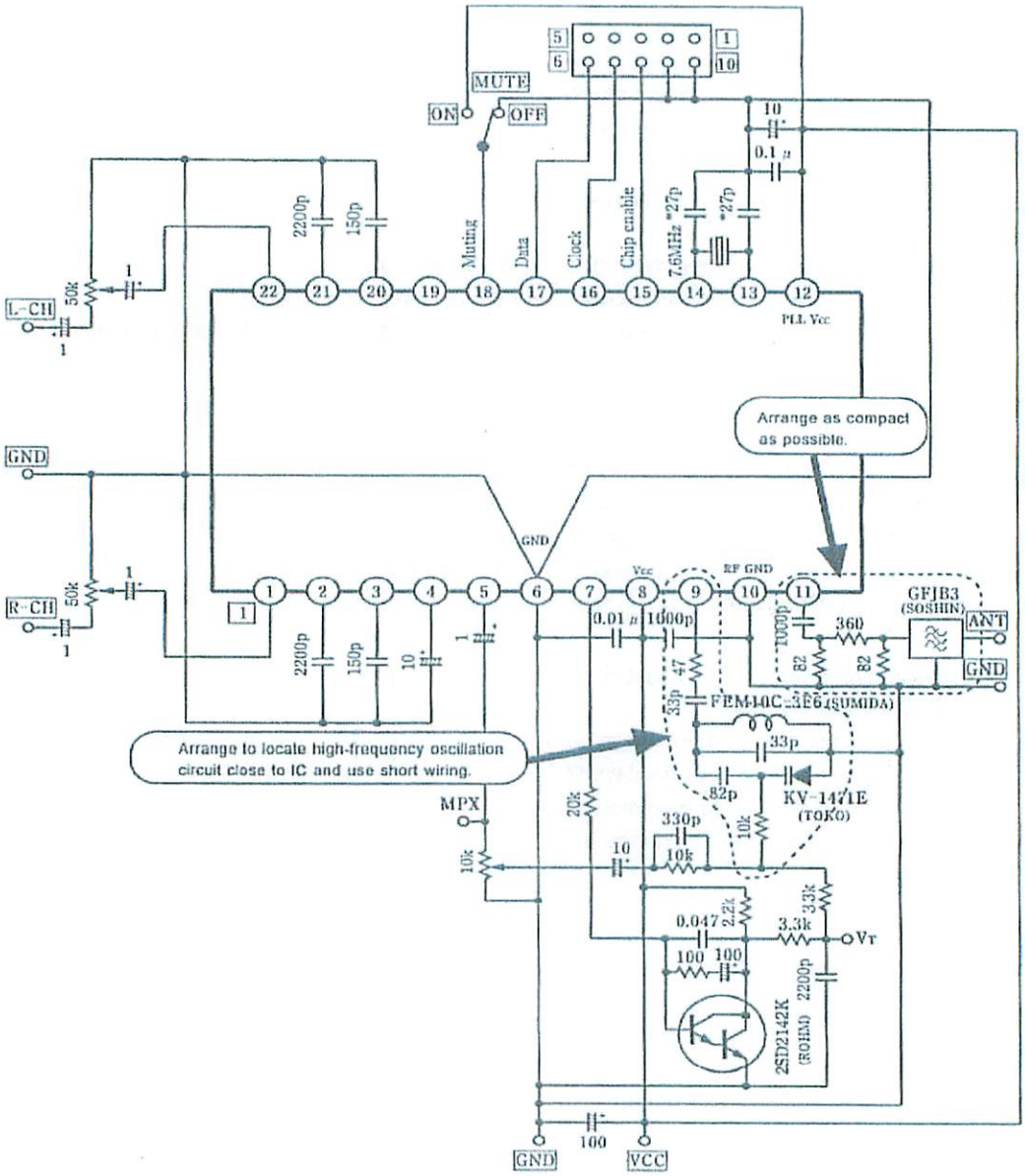

Fig. 37 Note 4

7. Check Sheet before Design Evaluation

This check sheet is prepared to check important items for the application. Use the check sheet to check before and after the power supply is turned on when a prototype circuit is completed.

Basic Check

☐Is solder shorted across adjacent pins?
☐Is IC inserted in the correct direction?

Check before Power Supply is Turned ON

<Power Supply>

☐Is the power supply correctly connected (not reversely connected)?
☐Is IC power supply voltage within the operating power supply voltage range?
☐Does power supply voltage exceed the absolute maximum rating of IC even in a second when the power supply is turned on?
☐Is input signal on proper level?

<Externally mounted parts and their setting>

☐Is capacitor added closely across Vcc-GND pins of IC?
☐Does GND of high-frequency circuit block adopt full-ground-plane?
In addition, is any jumper cable used for GND?
☐Is correct constant used?

Check after power supply is turned on

☐Is circuit current normal?
☐Is serial data inputted from microcontroller?
☐Is output waveform correctly displayed?
☐Is it susceptible to noise from microcontroller?
☐Does it support temperature change, too?