Wireless Audio Link IC

BH1417F

The BH1417F is a FM stereo transmitter IC that transmits simple configuration. The IC consists of a stereo modulator for generating stereo composite signals and a FM transmitter for broadcasting a FM signal on the air. The stereo modulator generates a composite signal which consists of the MAIN, SUB, and pilot signal from a 38kHz oscillator.
The FM transmitter radiates FM wave on the air by modulating the carrier signal with a composite signal.
Frequency is set for North America.

●Applications

Wireless speakers, Personal computer(sound board), Game machine, CD changer, Car TV, Car navigation

●Features

1) It is possible to improve the timbre because it has the pre-emphasis circuit, limiter circuit, and the low-pass filter circuit.
2) Built-in pilot-tone system FM stereo modulator circuit.
3) The transmission frequency is stable because it has a PLL system FM transmitter circuit.
4) PLL controls data input in parallel (4bits, 14ch for North America).

●Absolute maximum ratings (Ta = 25°C, In measurement circuit.)

Parameter	Symbol	Limits	Unit	Conditions
Supply voltage	V_{CC}	+7.0	V	Pin8,12
Date input voltage	V_{IN-D}	–0.3~V_{CC}+0.3	V	Pin15,16,17,18
Phase comparator output voltage	V_{OUT-P}	–0.3~V_{CC}+0.3	V	Pin7
Power dissipation	Pd	450*	mW	
Storage temperature	Tstg	–55~+125	°C	

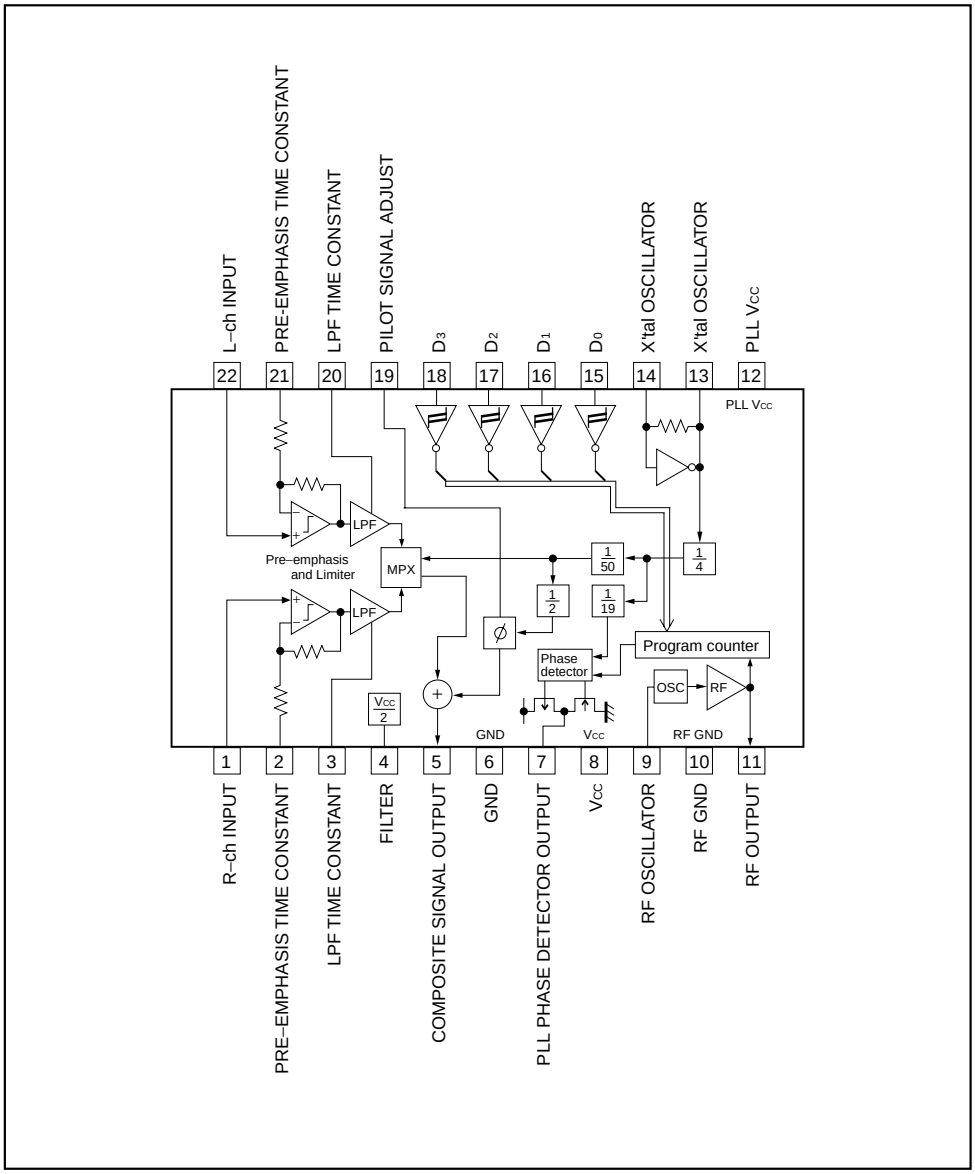
* Derating : 4.5mW/°C for operation above Ta=25°C.

●Recommended operating conditions (Ta = 25°C)

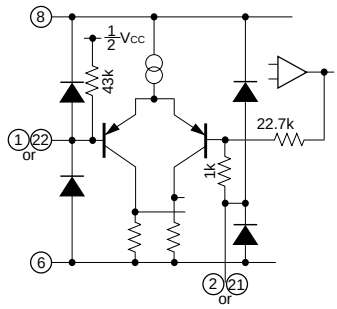
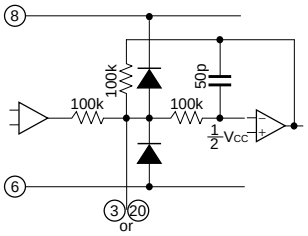
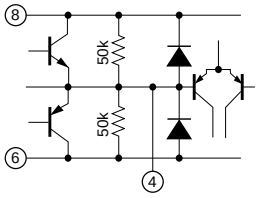
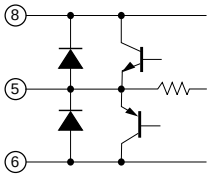
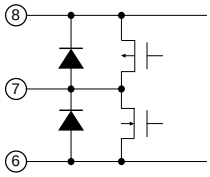
Parameter	Symbol	Min.	Typ.	Max.	Unit	Conditions
Operating supply voltage	V_{CC}	4.0	–	6.0	V	Pin8,12
Operating temperature	Topr	–40	–	+85	°C	
Audio input level	V_{IN-A}	–	–	–10	dBV	Pin1,22
Audio input frequency band	f_{IN-A}	20	–	15k	Hz	Pin1,22
Pre-emphasis time constant set up range	τ_{PRE}	–	–	155	µs	Pin2,21
Transmission frequency(200kHz step)	f_{TX}	87.7 106.7	–	88.9 107.9	MHz	Pin9,11
Control terminal "H" level input voltage	V_{IH}	0.8V_{CC}	–	V_{CC}	V	Pin15,16,17,18
Control terminal "L" level input voltage	V_{IL}	GND	–	0.2V_{CC}	V	Pin15,16,17,18

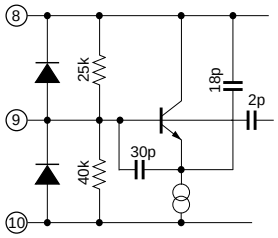
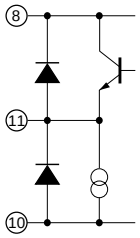
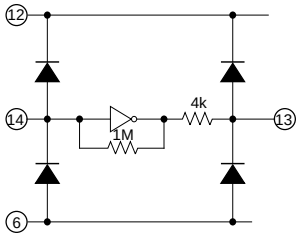
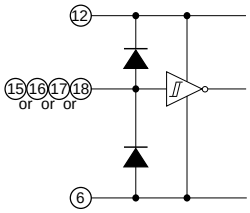
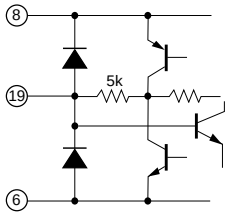
This datasheet has been downloaded from http://www.digchip.com at this page

●**Block diagram**



●Pin descriptions

Pin No.	Pin descriptions	Equivalent circuit	DC (V)
1	R–ch audio source input terminal It cuts DC with the capacitor and it inputs R-ch audio signal.		1/2Vcc
22	L–ch audio source input terminal It cuts DC with the capacitor and it inputs L-ch audio signal.		
2,21	Pre-emphasis time constant terminal It connects a capacitor for the time constant of pre-emphasis. τ=22.7kΩ×C		1/2Vcc
3,20	LPF time constant terminal This is 15kHz LPF. It connects a 150pF capacitor.		1/2Vcc
4	Filter terminal It is a ripple filter for the reference voltage of the audio part.		1/2Vcc
5	Composite signal output terminal It connects to the FM modulator.		1/2Vcc
6	GND		GND
7	PLL phase detector output terminal It connects to the PLL LPF circuit.		—
8	Power supply terminal		Vcc

Pin No.	Pin descriptions	Equivalent circuit	DC (V)
9	RF oscillator terminal This is the base terminal of the colpitts oscillator. It connects time constant of the oscillation.		$\frac{4}{7}$Vcc
10	RF GND		GND
11	RF transmission output terminal It connects to the antenna through BPF.		Vcc −1.9
12	PLL power supply terminal		Vcc
13,14	X'tal oscillator terminal It connects a 7.6MHz crystal oscillator.		—
15	Parallel data set up terminal D_0		—
16	Parallel data set up terminal D_1		
17	Parallel data set up terminal D_2		
18	Parallel data set up terminal D_3		
19	Pilot signal adjust terminal		$\frac{1}{2}$Vcc

●**Electrical characteristics** (Unless otherwise noted, Ta = 25°C, V_{CC} = 5.0V Signal source : f_{IN} = 400Hz)

Parameter	Symbol	Min.	Typ.	Max.	Unit	Conditions	Measurement circuit
Quiescent current	I_Q	14	20	28	mA		Fig.1
Channel separation	Sep	25	40	—	dB	V_{IN}=–20dBV L→R,R→L	Fig.2
Total harmonic distortion	THD	—	0.1	0.3	%	V_{IN}=–20dBV L+R	Fig.3
Channel balance	C.B	–2	0	+2	dB	V_{IN}=–20dBV L+R	Fig.2
Input output gain	Gv	–2	0	+2	dB	V_{IN}=–20dBV L+R	Fig.3
Pilot modulation rate	M_P	12	15	18	%	V_{IN}=–20dBV,L+R Pin5	Fig.3
Sub carrier rejection ratio	SCR	—	–30	–20	dB	V_{IN}=–20dBV L+R	Fig.3
Pre-emphasis time constant	τ_{PRE}	40	50	60	µs	V_{IN}=–20dBV L+R	Fig.3
Limiter input level	$V_{IN(LIM)}$	–16	–13	–10	dBV	Output level at 1dB gain compression	Fig.4
LPF cut off frequency	$f_{C(LPF)}$	12	15	18	kHz	V_O=–3dB Pin2,21 Open	Fig.5
Transmission output level	V_{TX}	96	99	102	dBµV	f_{TX}=107.9MHz	Fig.6
"H" level input current	I_{IH}	—	—	1.0	µA	Pin15,16,17,18 V_{IN}=5V	Fig.7
"L" level input current	I_{IL}	–1.0	—	—	µA	Pin15,16,17,18 V_{IN}=0V	Fig.7
"H" level output voltage	V_{OH}	V_{CC}—1.0	V_{CC}—0.15	—	V	Pin7 I_{OUT}=–1.0mA	Fig.8
"L" level output voltage	V_{OL}	—	0.15	1.0	V	Pin7 I_{OUT}=1.0mA	Fig.8
"off" level leak current1	I_{OFF1}	—	—	100	nA	Pin7 V_{OUT}=5V	Fig.9
"off" level leak current2	I_{OFF2}	–100	—	—	nA	Pin7 V_{OUT}=GND	Fig.9

●**Measurement circuits**

Quiescent current

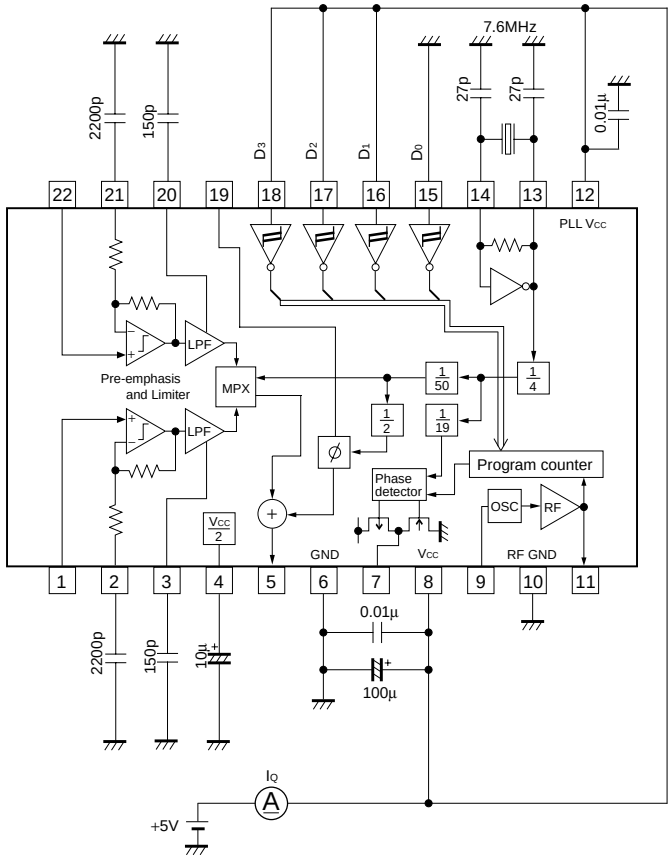


Fig.1

Channel separation
Channel balance

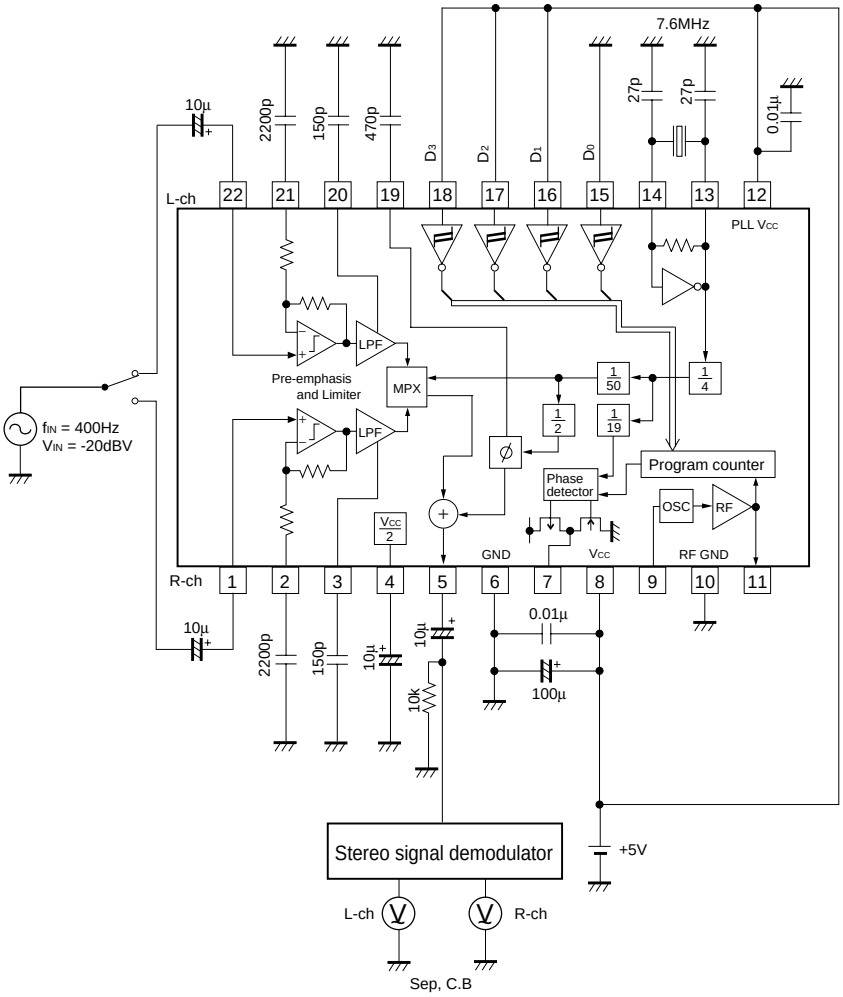
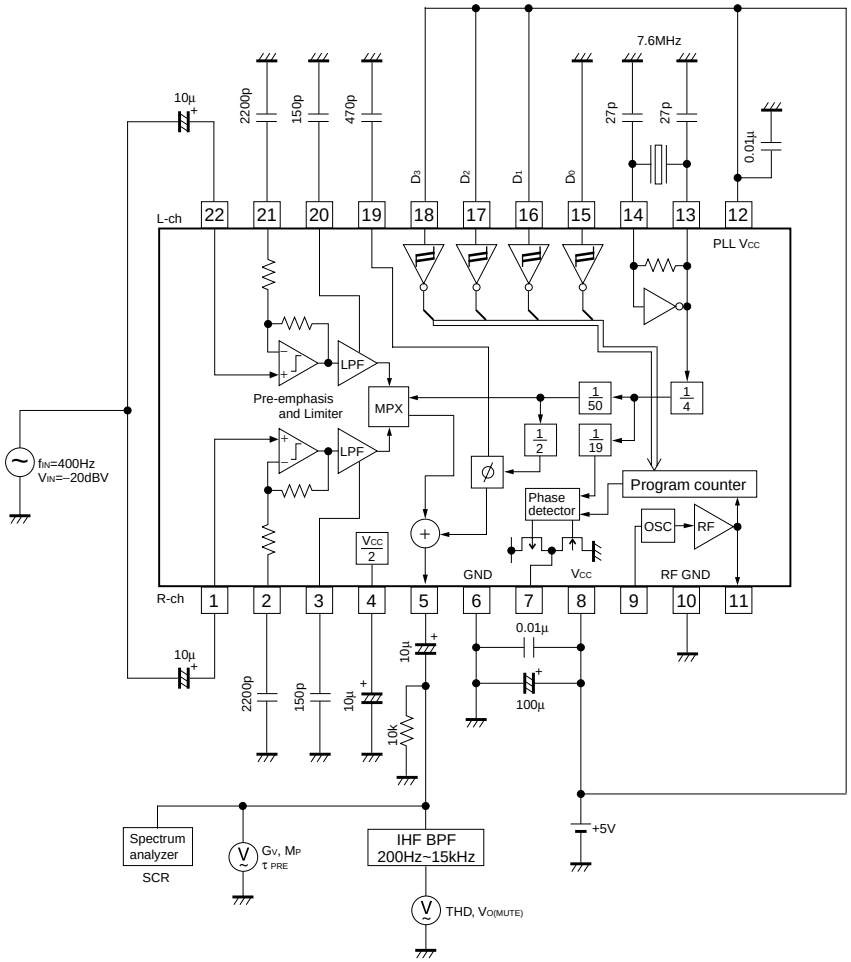


Fig.2

Total harmonic distortion
Input output gain
Pilot index of modulation
Sub carrier rejection ratio
Pre-emphasis time constant



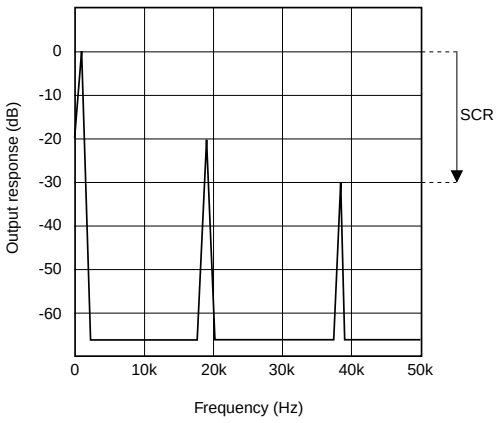
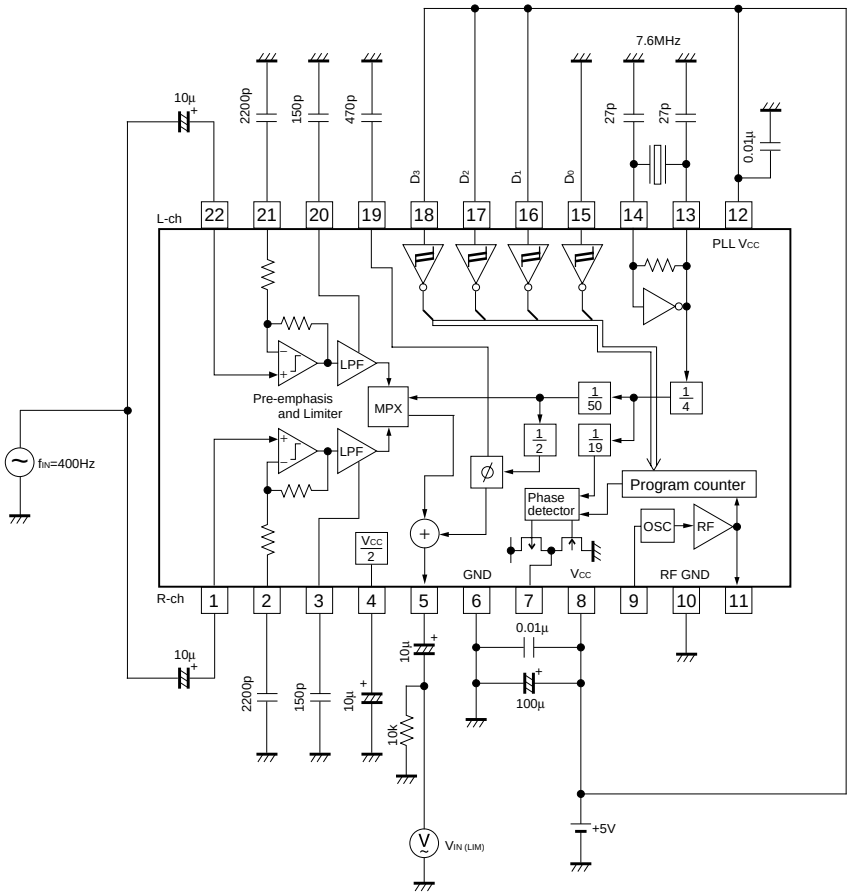


Fig.3

Limiter input level



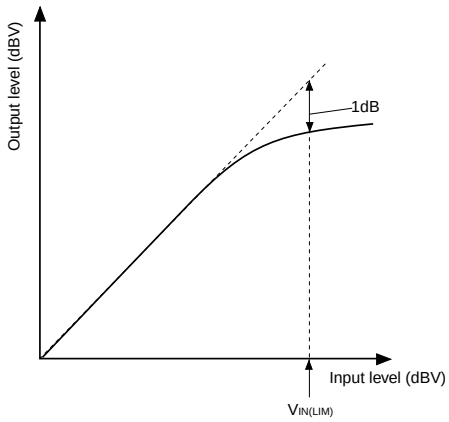


Fig.4

LPF cut off frequency

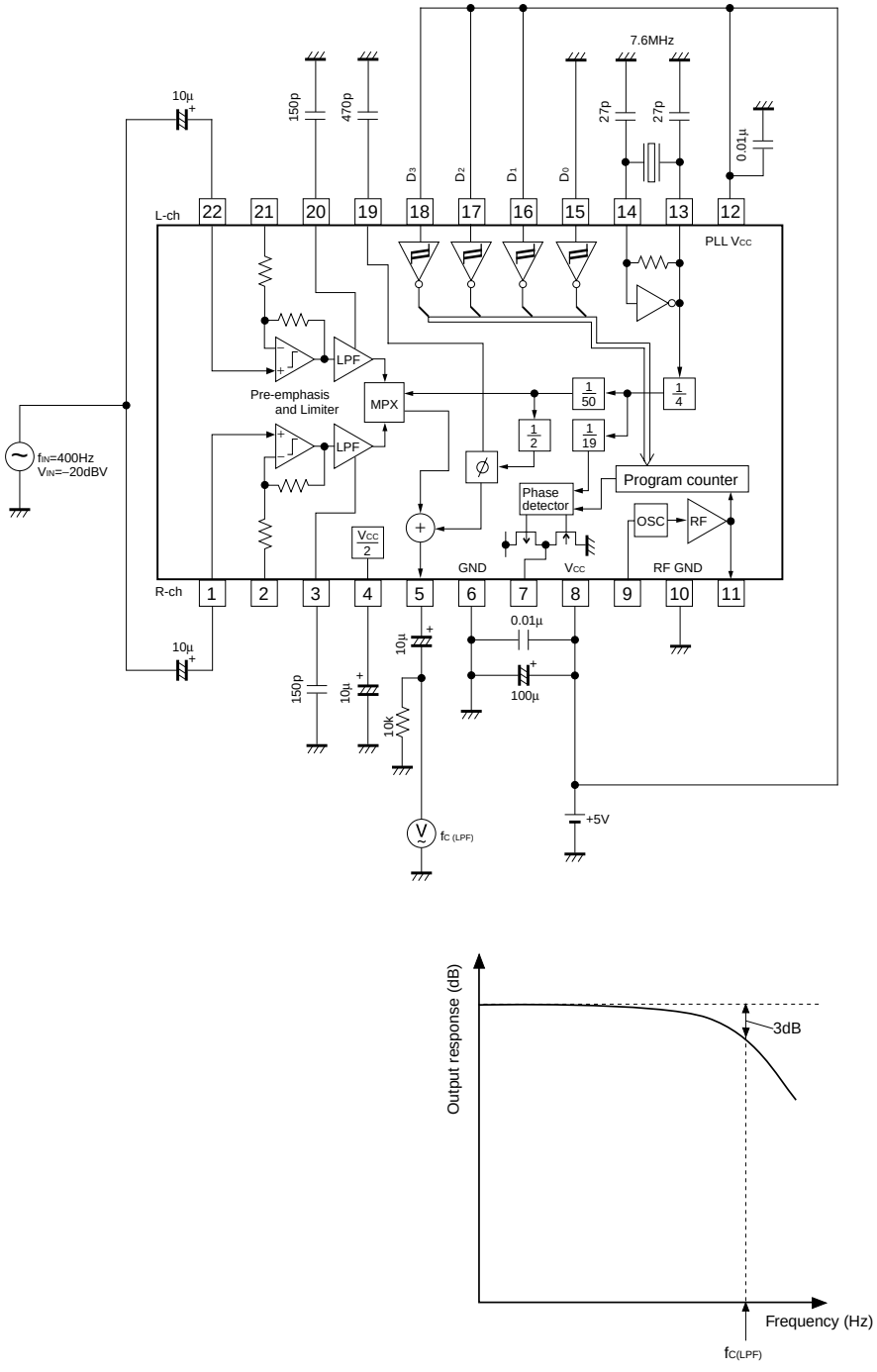


Fig.5

Transmission output level

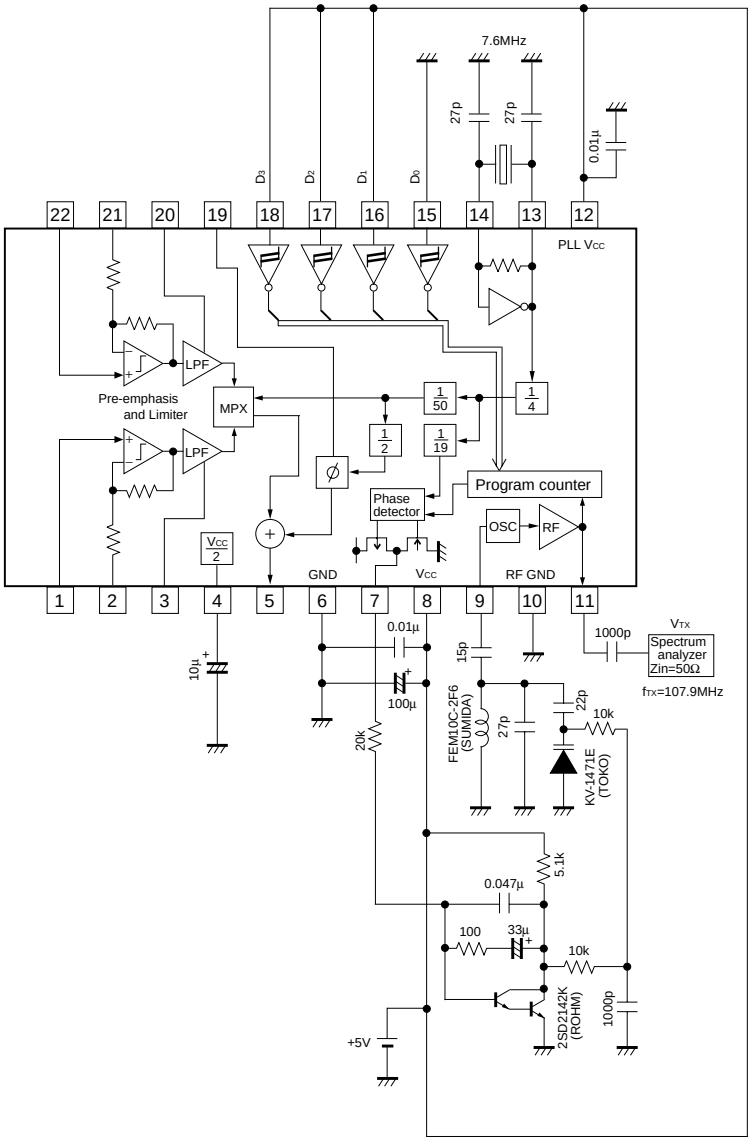


Fig.6

"H" level input current
"L" level input current

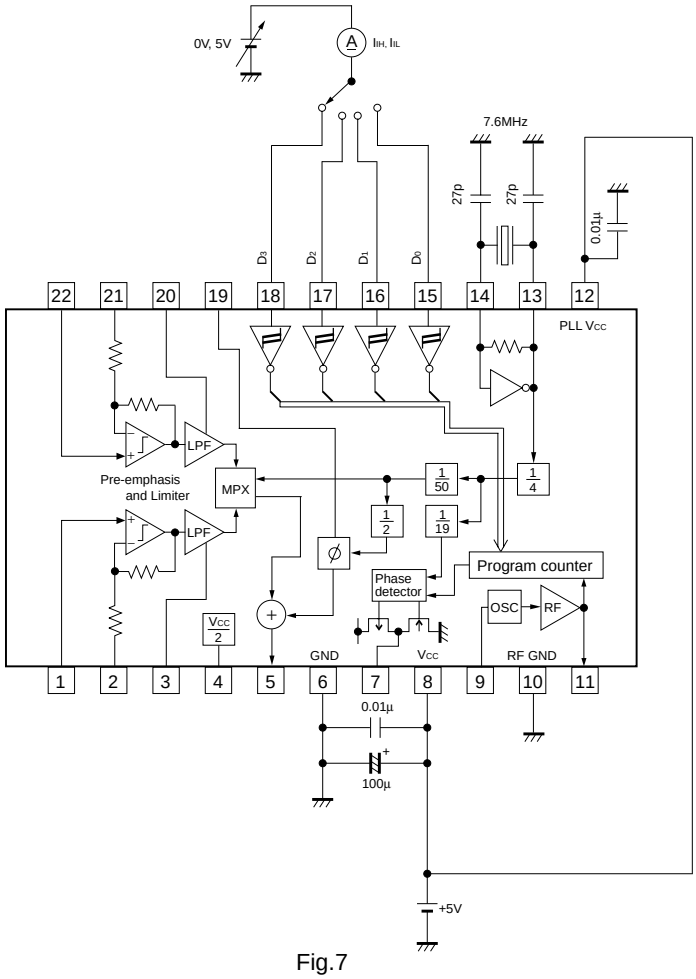


Fig.7

"H" level output voltage
"L" level output voltage

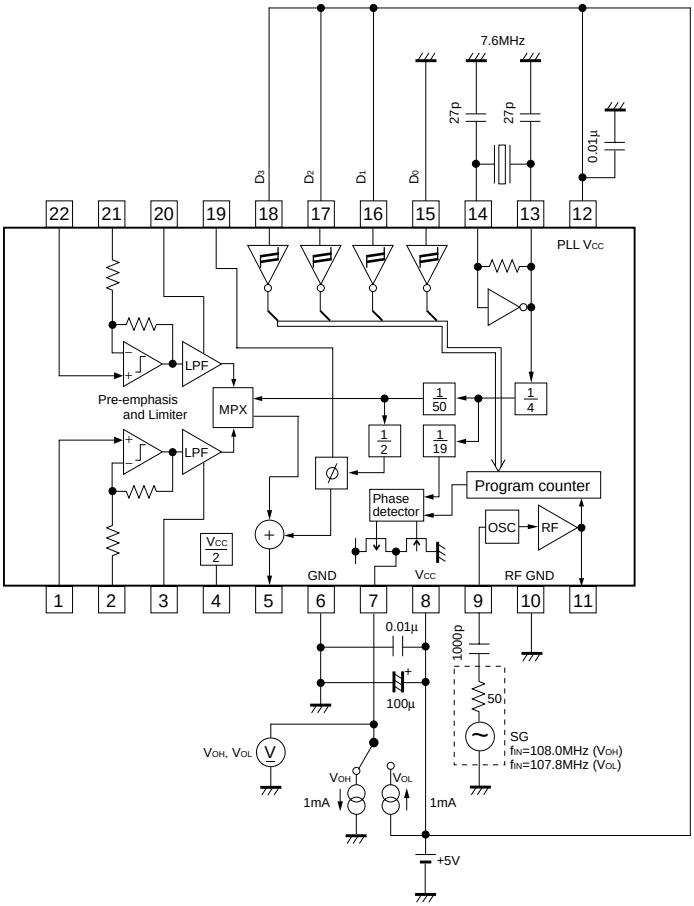


Fig.8

"off " level leak input current

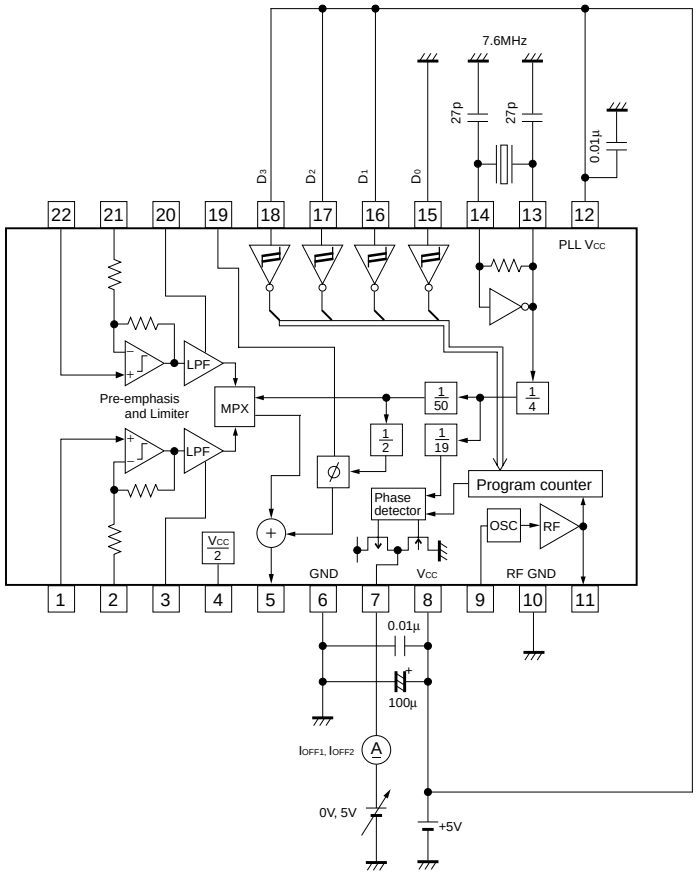


Fig.9

●Application circuit

US BAND (88.0MHz~89.2MHz)

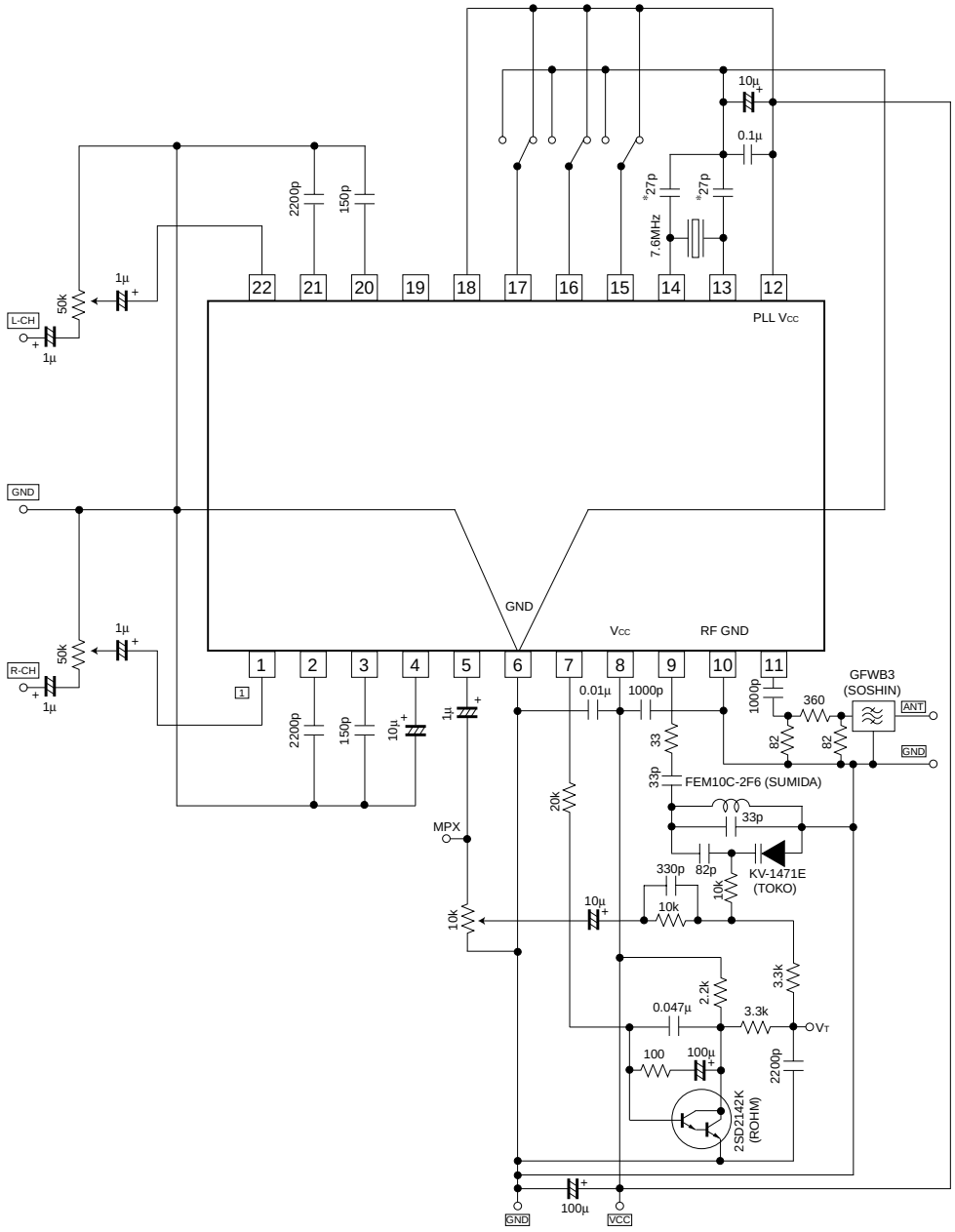


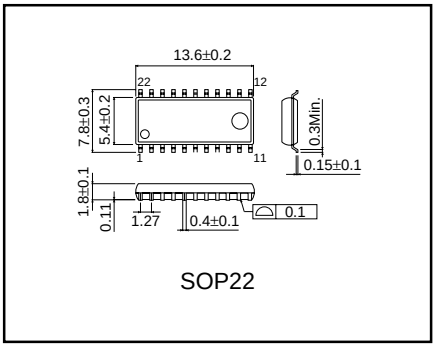
Fig.10

●**Circuit operation**

Parallel data

Control data				Frequency
D_0 (Pin15)	D_1 (Pin16)	D_2 (Pin17)	D_3 (Pin18)	
L	L	L	L	87.7MHz
H	L	L	L	87.9MHz
L	H	L	L	88.1MHz
H	H	L	L	88.3MHz
L	L	H	L	88.5MHz
H	L	H	L	88.7MHz
L	H	H	L	88.9MHz
H	H	H	L	PLL stops. Phase comparator terminal supports high impedance.
L	L	L	H	106.7MHz
H	L	L	H	106.9MHz
L	H	L	H	107.1MHz
H	H	L	H	107.3MHz
L	L	H	H	107.5MHz
H	L	H	H	107.7MHz
L	H	H	H	107.9MHz
H	H	H	H	PLL stops. Phase comparator terminal supports high impedance.

●**External dimensions** (Units : mm)



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