DEVICE SPECIFICATION FOR

RF UNIT FOR CORDLESS PHONE

(BASE SET)

MODEL NO.   R Y 3 G B 0 2 1

☐ CUSTOMER'S APPROVAL

DATE _____

BY _____

PRESENTED

BY

M I Y O S H I   Y A M A U C H I

GENERAL MANAGER

ENGINEERING DEPARTMENT 1

ELECTRONIC COMPONENTS DIVISION

ELECTRONIC COMPONENTS (ELECOM) GROUP

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Description : This specification covers RF UNIT intended for use in Cordless
Phone Base unit.

【1】 GENERAL SPECIFICATIONS

1- 1 Frequency range   Transmitting freq.

           926.9875MHz to 927.9625MHz

        Receiving, freq.

           902.9875MHz to 903.9625MHz

1- 2 Communication system   Duplex

1- 3 Number of channel   40 ch

1- 4 Nominal input and output   50 Ω

       impedance

1- 5 Intermediate frequency   1st IF 21.7MHz

                                   2nd IF 450 kHz

1- 6 Modulation system   Analog FM

1- 7 Operating voltage   3.3V to 5.0V

                                 (internal Regulator IC out:3.0V)

1- 8 Absolute maximum supply   6.0V

       voltage (Ta=25℃)

1- 9 Weight   26g

1-10 Block diagram   Figure 1

【2】 MECHANICAL SPECIFICATIONS

2- 1 Dimension and mounting details   Figure 2

2- 2 Terminal details   Table 1

2- 3 Measurement circuit connection   Figure 3

2- 4 Wrapping details   Figure 4

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【3】 ENVIRONMENT SPECIFICATIONS

    3- 1 Operating guarantee temperature   0℃ to 55℃

                                            (Guarantee items)

                                            •Transmitting freq. inaccuracy

                                            •Carrier detect time

                                              (adjacent channel select)

                                            •PLL lock up time

                                              (adjacent channel select)

    3- 2 Efficient guarantee temperature   25℃ +15/-10℃

                                            (Guarantee itmes)

                                            •Except 3-1 items

    3- 3 Storage temperature   -20℃ to 70℃

    3- 4 Operating humidity   Less than 85%

    3- 5 Storage humidity   Less than 90%

【4】 TESTING CONDITIONS

    4- 1 Supply voltage   5. 0V±0. 5V

    4- 2 Ambient temperature   25℃ +15/-10℃

    4- 3 Ambient humidity   20%~75%

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【5】 ELECTRICAL SPECIFICATIONS (Ta:25℃ +15/-10℃)

*5 -1~ 5-18, 5-21, 5-22 ── PLL IC : Normal operating mode
*5-10~5-13 ── Measured at connecting circuit figure 4 (COMPANDER Recommendation G162)
*5-4, 5, 8, 10, 11, 12, 13, 15, 16 ── CCITT : Measured with CCITT filter
(CCITT Recommendation P53A)

NO.	Item	Specification				Condition
		Min.	Typ	Max.	Unit	
		〈T X B L O C K〉				
5- 1	Transmitting freq. inaccuracy			±2.5	kHz	Ta:0℃ to 55℃
5- 2	Transmitting output power	5.0	8.0	11.0	dBm	
5- 3	Standard modulation level	100		240	mVrms	1KHz mod., 3KHz $_{o-p}$ dev. 600Ω term
5- 4	Modulation S/N	40			dB	CCITT
5- 5	Transmitting total distortion & noise	35	40		dB	CCITT
5- 6	Modulation frequency response					REF:1KHz
	at 300Hz	-1.0		+1.0	dB	
	at 3KHz	-1.0		+1.0		
5- 7	Spurious transmission					Point:TX output terminal
	at 0 ~ 1GHz			-50	dBm	
	at 1 ~ 4GHz			-36		
	at 87.5 ~ 108MHz			-77		
		〈R X B L O C K〉				
5- 8	Receiving sensitivity			-105	dBm	CCITT at SINAD 20dB point
5- 9	Radiation interference					Point:RX output terminal Transmitting circuits OFF (TX OFF)
	at 0 ~ 1GHz			-57	dBm	
	at 1 ~ 4GHz			-47		
	at 87.5 ~ 108MHz			-77		
5-10	Co-channel rejection	-14			dB	CCITT Desire input level:-102dBm fm:1kHz, dev:3kHz $_{o-p}$ Undesire input level :at SINAD 20dB point, fm:400Hz, dev:3kHz $_{o-p}$ Measured at connecting circuit figure 3.
5-11	Adjacent channel selectivity	40			dB	CCITT Desire input level:-102dBm fm:1kHz, dev:3kHz $_{o-p}$ Undesire input freq :fo±25kHz, input level :at SINAD 20dB point, fm:400Hz, dev:3kHz $_{o-p}$ Measured at connecting circuit figure 3.

5-12	Spurious response rejection	45			dB	CCITT Desire input level:-102dBm 　　　　fm:1kHz, 　　　　dev:3kHz $_{0-p}$ Undesire input freq 　　　　:30MHz to 2GHz, 　　　　fm:400Hz, 　　　　dev:3kHz $_{0-p}$ 　　　　input level 　　　　:at SINAD 20dB 　　　　　point Measured at connecing circuit figure 3.
5-13	Intermodulation rejection	40			dB	CCITT Desire input level:-102dBm, 　　　　fm:1kHz, 　　　　dev:3kHz $_{0-p}$ Undesire 1 . 　　　　input level:at SINAD 　　　　20dB point, 　　　　input freq:fo±25kHz Undesire 2 　　　　input level:at SINAD 　　　　20dB point, 　　　　input freq:fo±50kHz, 　　　　fm:400Hz, 　　　　dev:3kHz $_{0-p}$ Measured at connecting circuit figure 3.
		45				CCITT Desire input level: -102dBm 　　　　fm:1kHz 　　　　dev:3kHz$_{0-p}$ Undesire 1 　　　　input level:at SINAD 　　　　20dB point 　　　　input freq:fo±50kHz Undesire 2 　　　　input level:at SINAD 　　　　20dB point 　　　　input freq:fo±100kHz 　　　　fm:400Hz, 　　　　dev:3kHz $_{0-p}$ Measured at connecting circuit figure 3.

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		Min	Typ	Max	Unit	Conditions
5-14	Standard demodulation level	90		170	mVrms	Input level:-53dBm, LPF:30kHz,100kΩ term
5-15	Demodulation S/N	40			dB	Input level:-53dBm,CCITT
5-16	Receiving total distortion & noise	27			dB	Input level:-53dBm,CCITT
5-17	Demodulation frequency response at 500Hz	-2.0		+2.0	dB	Input level:-53dBm, LPF:30KHz REF:1kHz
	at 2.2KHz	-3.0		0		
5-18	Carrier detect level	-116	-113	-110	dBm	C/S:H→L
	hysterisys width		2	4	dB	fm:1kHz, dev:3kHz $_{0-p}$
5-19	Carrier detect time (adjacent channel select)		15	40	ms	PLL IC:High speed mode fm:1kHz, dev:3KHz $_{0-p}$ Ta:0℃ to 55℃
	〈TOTAL BLOCK〉					
5-20	PLL lock up time (adjacent channel select)		5	20	ms	PLL IC:High speed mode Ta:0℃ to 55℃
5-21	Current consumption Speech			125	mA	at PLL locked
	Stanby			60		

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【6】 PLL Channel selection operating data

6-1 Input data

(1)Setting RX-PLL division data

MSB   LSB

H	L	D_{16}	D_{15}	D_{14}	D_{13}	D_{12}	D_{11}	D_{10}	D_9	D_8	D_7	D_6	D_5	D_4	D_3	D_2	D_1	D_0

$N = D_{16} \times 2^{16} + D_{15} \times 2^{15} + D_{14} \times 2^{14} + \cdots + D_1 \times 2^1 + D_0 \times 2^0$

$= (f_{RX} - 21.7 \times 10^6) / 12.5 \times 10^3$

$= 70503 \sim 70581$

f_{RX}:Frequency of RX — 902.9875~903.9625MHz

(2)Setting TX-PLL division data

MSB   LSB

L	H	D_{16}	D_{15}	D_{14}	D_{13}	D_{12}	D_{11}	D_{10}	D_9	D_8	D_7	D_6	D_5	D_4	D_3	D_2	D_1	D_0

$N = D_{16} \times 2^{16} + D_{15} \times 2^{15} + D_{14} \times 2^{14} + \cdots + D_1 \times 2^1 + D_0 \times 2^0$

$= f_{TX} / 12.5 \times 10^3$

$= 74159 \sim 74237$

f_{TX}:Frequency of TX — 926.9875~927.9625MHz

【For example】

If setting TX-PLL division data at 926.9875MHz

$926.9875 \times 10^6 / 12.5 \times 10^3 = (74159)_{10} = (10010000110101111)_2$

L	H	D_{16}	D_{15}	D_{14}	D_{13}	D_{12}	D_{11}	D_{10}	D_9	D_8	D_7	D_6	D_5	D_4	D_3	D_2	D_1	D_0
L	H	H	L	L	H	L	L	L	L	H	H	L	H	L	H	H	H	H

(3)Setting Reference division data

MSB   LSB

H	H	D_{11}	D_{10}	D_9	D_8	D_7	D_6	D_5	D_4	D_3	D_2	D_1	D_0

$N = D_{11} \times 2^{11} + D_{10} \times 2^{10} + D_9 \times 2^9 + \cdots + D_1 \times 2^1 + D_0 \times 2^0$

$= 3400$ (Fixed)

【Setting】

$N = (3400)_{10} = (110101001000)_2$

H	H	D_{11}	D_{10}	D_9	D_8	D_7	D_6	D_5	D_4	D_3	D_2	D_1	D_0
H	H	H	H	L	H	L	H	L	L	H	L	L	L

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(4)Setting options

MSB

| L | L | D_{11} | D_{10} | D_9 | D_8 | D_7 | D_6 | D_5 | D_4 | D_3 | D_2 | D_1 | D_0 |

D_2, D_3, D_5, D_6 :Charge pump drive bits

D_6	D_5	RX-PLL Charge pump drive
L	L	$\pm100\mu A$
H	L	$\pm200\mu A$
L	H	$\pm400\mu A$
H	H	$\pm800\mu A$

D_3	D_2	TX-PLL Charge pump drive
L	L	$\pm100\mu A$
H	L	$\pm200\mu A$
L	H	$\pm400\mu A$
H	H	$\pm800\mu A$

D_{11} :RX loop filter control bit

D_{11}	Loop filter at RX
L	For high speed
H	For normal operating

*CAUTION:Setting options in the electrical specifications

Operating mode	D_{11}	D_6	D_5	D_3	D_2
High speed mode	L	H	H	H	H
Others	H	L	L	L	L

D_4, D_7, D_8 :Operating control bits

D_8	D_7	D_4	Reference	RX-PLL	TX-PLL
x	L	L	ON	ON	ON
x	L	H	ON	ON	STAND-BY
x	H	L	ON	STAND-BY	ON
L	H	H	ON	STAND-BY	STAND-BY
H	H	H	STAND-BY	STAND-BY	STAND-BY

D_0, D_1, D_9, D_{10} :Fixed bits

D_{10}	D_9	D_1	D_0
L	H	L	L

[For example]

If setting options for normal oprating mode

L	L	D_{11}	D_{10}	D_9	D_8	D_7	D_6	D_5	D_4	D_3	D_2	D_1	D_0
L	L	H	L	H	L	L	L	L	L	L	L	L	L

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6-2 Timing chart
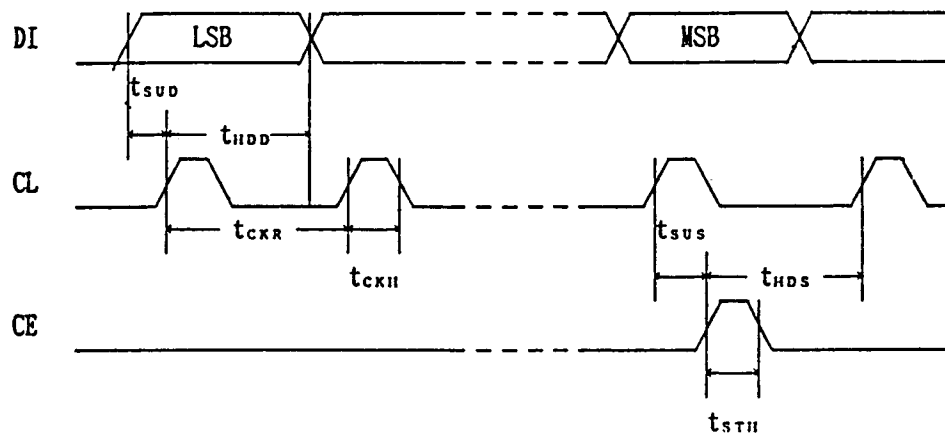
Items	Symbols	Electronic characteristics
Set up time of "DI"	t_{SUD}	$t_{SUD} \geq 0.1\ \mu s$
Hold time of "DI"	t_{HDD}	$t_{HDD} \geq 1.0\ \mu s$
Rate of "CL"	t_{CKR}	$t_{CKR} \geq 5.0\ \mu s$
High level time of "CL"	t_{CKH}	$t_{CKH} \geq 1.0\ \mu s$
Set up time of "CE"	t_{SUS}	$t_{SUS} \geq 0.1\ \mu s$
Hold time of "CE"	t_{HDS}	$t_{HDS} \geq 1.0\ \mu s$
High level time of "CE"	t_{STH}	$t_{STH} \geq 1.0\ \mu s$

6-3 Input voltage(DI, CL, CE)

Input	min.	max.
"H" level	2.5V	3.1V
"L" level	-0.2V	0.5V

7-1 Vibration test

This test is proceed on at least one hour in shelf after vibration test loaded one minute of 1.5mm amplitude toward X, Y and Z direction for two hours of one minute of 10 to 55 / one minute cycle of vibration.

After above testing, samples are left at normal temperature and humidity for 24hours. And then, they should be kept the normal operations according to the standard values of judgement (B) on Table 7

7-2 Drop test

This test is dropping from 1.0m high on wood board of 3cm in thick of 20 x 20cm, but not applied for the lead wire and also the drop from the box surface.

After above testing, samples are left at normal temperature and humidity for 24hours. And then, they should be kept the normal operations according to the standard values of judgement (B) on Table 7.

		(A)	(B)
(1)	Transmitting frequency inaccuracy	$\pm 2.5kHz$	$\pm 5.0kHz$
(2)	Transmitting output power	$8^{\pm 3.0}dBm$	$8^{\pm 5.0}dBm$
(3)	Receiving sensitivity	———	(initial value) $\pm 10dB$
(4)	Carrier detect time	30ms MAX.	(initial value) $\pm 20ms$
(5)	PLL lock up time	20ms MAX.	(initial value) $\pm 20ms$

Table 7　Standard values of judgement

Standard (A) is only applied to measurement of characteristics with temperature change. (operating range : 0~55℃)
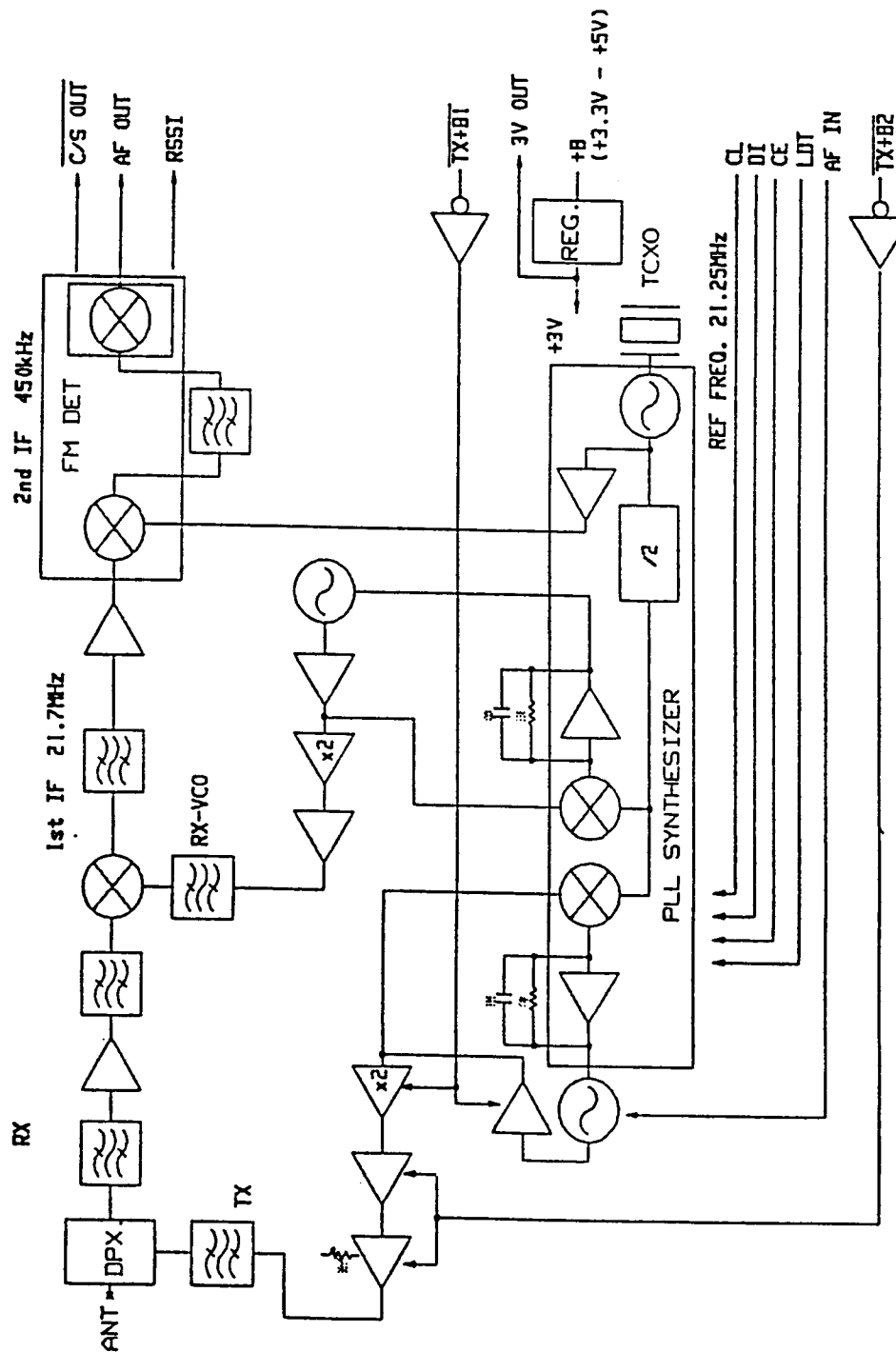
Figure 1   BLOCK DIAGRAM   ***BASE SET***

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《Outline drawing》

TCXO adj.

TX power output adj.

Demod. distortion adj.

Carrier sense adj.

diameter for 14-PIN — $\phi 0.9\pm0.1$

3 V OUT	① ②	+B	NC	③ ④	AF IN	CL	⑤ ⑥	DI	LDT	⑦ ⑧	CE	$\overline{TX+B1}$	⑨ ⑩	GND	$\overline{TX+B2}$	⑪ ⑫	RSSI	$\overline{C/S \ OUT}$	⑬ ⑭	AF OUT

(Top View)

Model Name

Altered No. (A~Z)
Day(01~31)
Month(1~9,0,N,D)
Year(4)
Plant

diameter for 2-PIN — $\phi 1.0\pm0.1$

ANT Ⓐ
GND Ⓑ
(Top View)

32.0±0.5
(0.4)
47.8±0.5
19.4
20.8
4.4
2.54
33.6±0.5
3.0
9.6±0.5
31.0
46.2
7.6
8.4±0.5
(4.2)
2.0
1.0
1.5
1.2

[Unit : mm]

Figure 2

* CAUTION
Please don't use 14-PIN or 2-PIN
socket(female) when this unit put on.

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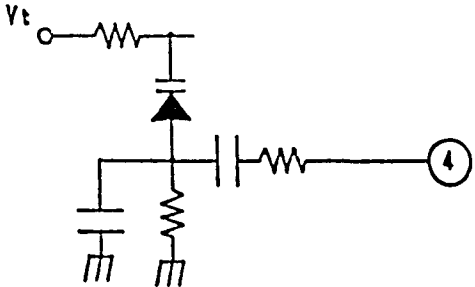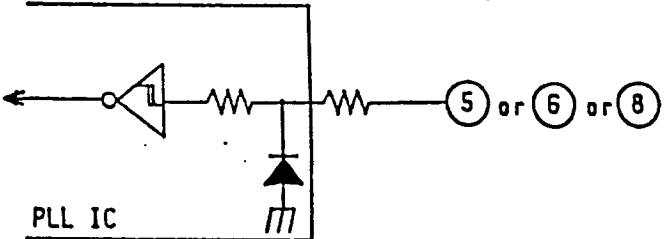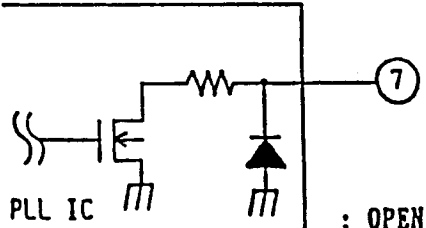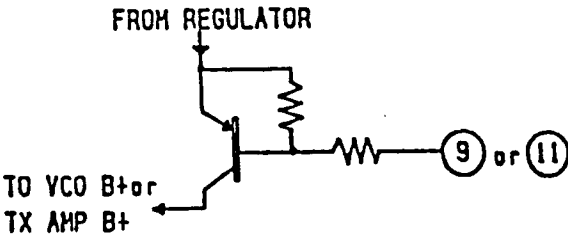
《 Terminal details 》

No.	Terminal Name	I/O	Note
1	3. 0V OUT	0	Regulator +3. 0V output
2	+B	I	Operating voltage input
3	NC	-	No connection
4	AF IN	I	Modulation voice input
5	CL	I	PLL control input (CLOCK)
6	DI	I	PLL control input (DATA)
7	LDT	0	TX lock detect output, acitve"H"
8	CE	I	PLL control input (ENABLE)
9	TX+B1	I	TX-VCO control input, active"L"
10	GND	-	COMMON GND
11	TX+B2	I	TX-Buffer Amp. control input, active"L"
12	RSSI	0	Receiving signal level detect output
13	C/S OUT	0	Carrier sense output, active"L"
14	AF OUT	0	Demodulation voice output

Table 1

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(Terminal interface references)

No.	Terminal Name	I/O	Interface
1.	3V OUT	O	+B ○—[REG.IC]—① :MAX OUTPUT CURRENT 5mA
2.	+B	I	←—[REG.IC]—②
4.	AF IN	I	Vt ○—〜〜—⊲ ... —‖—〜〜—④
5.	CL	I	
6.	DI		←—▷—〜〜—〜〜—⑤ or ⑥ or ⑧ PLL IC
8.	CE		
7.	LDT	O	〜〜—⑦ PLL IC : OPEN DRAIN
9.	$\overline{TX+B1}$	I	FROM REGULATOR 〜〜—⑨ or ⑪ TO VCO B+or TX AMP B+
11.	$\overline{TX+B2}$		

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12.	RSSI	0	
13.	C/S OUT	0	
14.	AF OUT	0	

FM DET IC

:OPEN COLLECTER

‡ Depend on "No." SHARP RF UNIT SPECIFICATION page 12 "Terminal details".
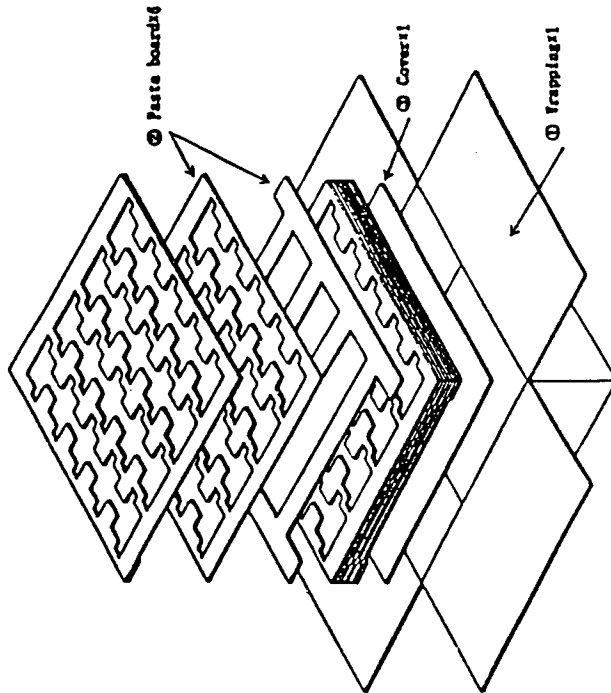
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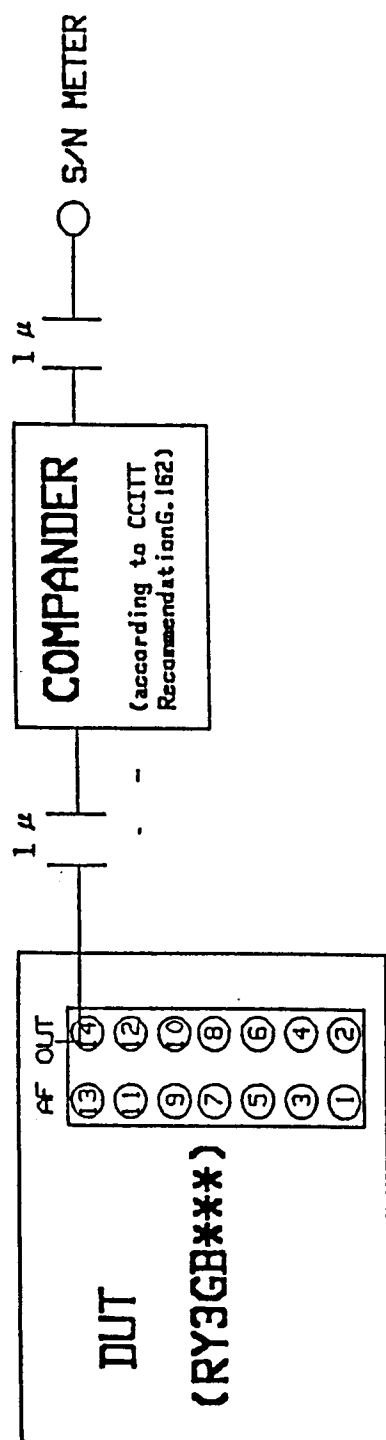
Figure 3   Connection circuit
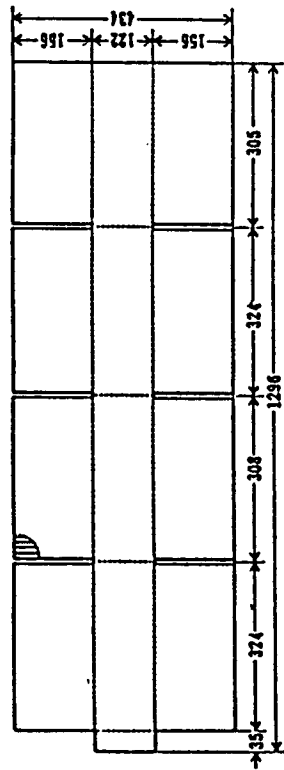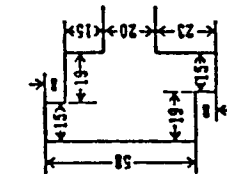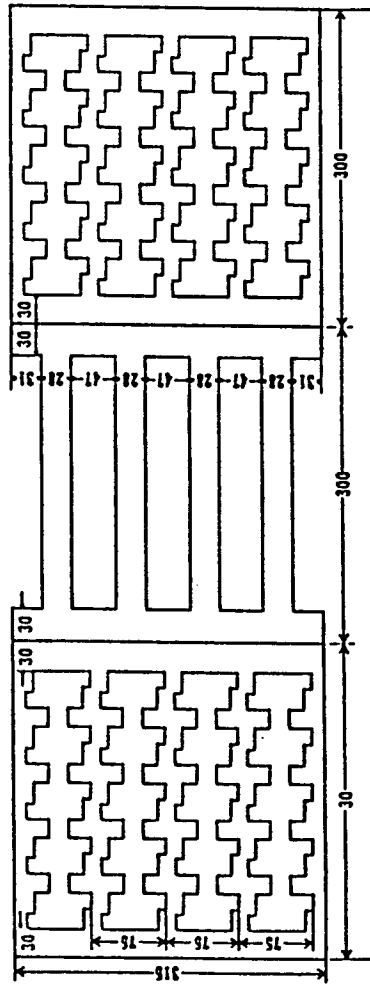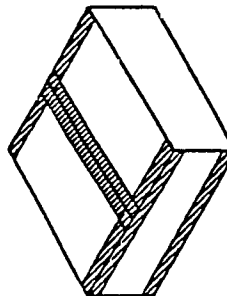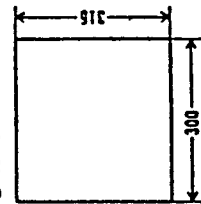
Figure 4

(Unit : mm)

Communication Unit, RY3GB021