

AN6474NFBQ

Cordless Telephone Speech Network IC Incorporating Cross-Point Switch

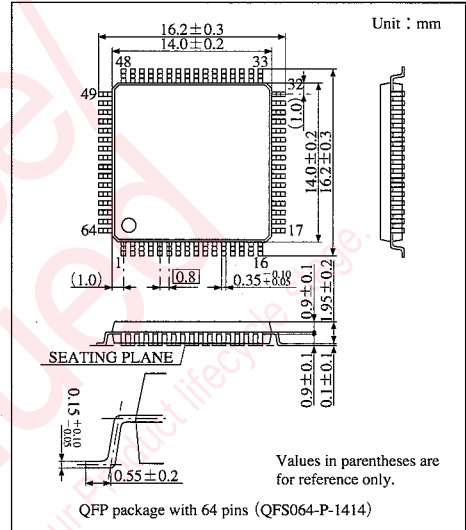
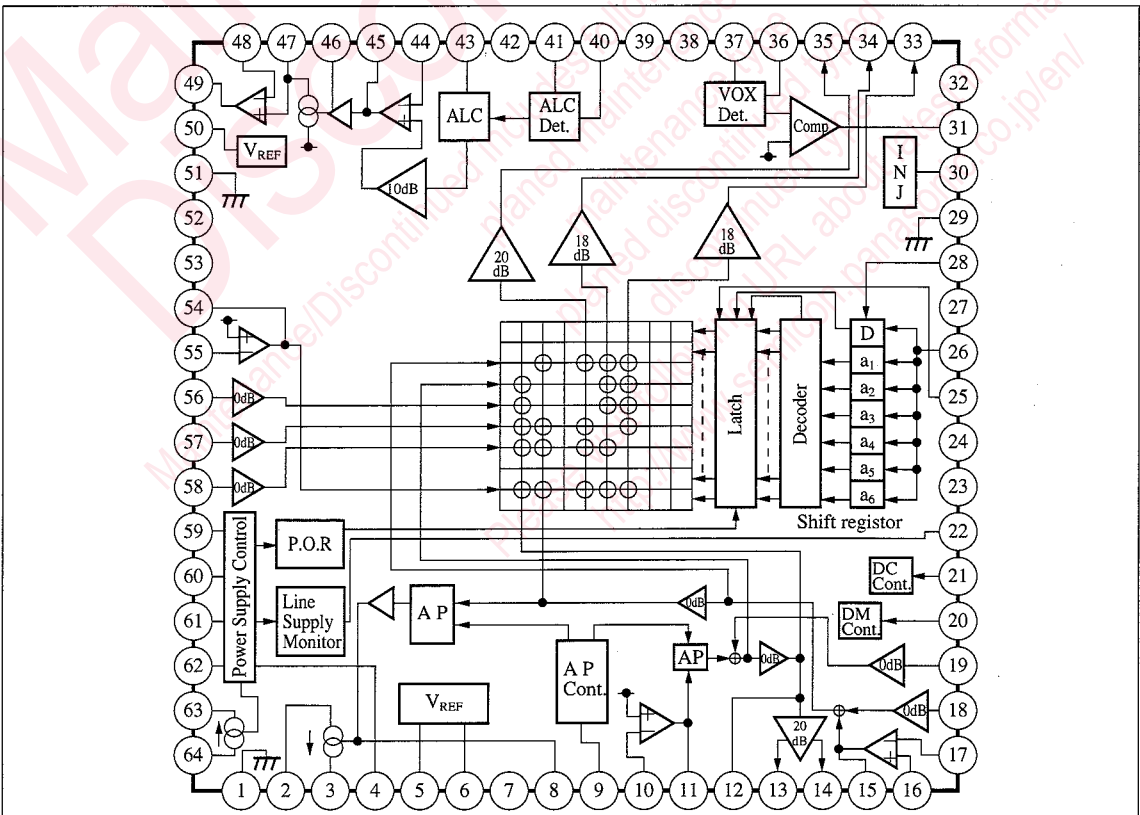
Overview

The AN6474NFBQ is a speech network IC most suitable for basic-type cordless telephones. It incorporates a cross-point switch controlled by serial input. It allows speech path switching and mixing, and provides for three- or four-person communication and other sophisticated functions. It also incorporates REC/PLAY amplifiers with VOX circuits.

Features

- The speech block can operate on line voltage, with no external power supply, and is operational even during a commercial power failure.
- Incorporates auto. PAD, dial mute, DC voltage regulation, and other basic speech functions.
- The cross-point switch can be operated independently.
- Each output of the cross-point switch can correspond to multiple inputs, allowing three- or four-person communication.
- The REC/PLAY amplifiers incorporate ALC and VOX circuits.
- Receiver volume can be increased by 6 dB or 9 dB.

Block Diagram



Pin Descriptions

Pin No.	Description	Pin No.	Description
1	Ground	33	RF2 link output
2	Line power (+) input	34	RF1 link output
3	Side-tone adjustment	35	Intercom link output
4	Line voltage control (1)	36	VOX detection control
5	Int. ref. voltage output (1)	37	VOX amp. input
6	Int. ref. voltage output (2)	38	No connection
7	No connection	39	No connection
8	Trans. preamp. output	40	ALC input
9	Auto. PAD control	41	ALC detection control
10	Rec. preamp. input	42	Loudspeaker link input
11	Rec. preamp. output	43	Recording input
12	Rec. amp. input	44	Recording inverse input
13	Rec. amp. output (1)	45	Recording preamp. output
14	Rec. amp. output (2)	46	Recording bias current control
15	MIC preamp. output	47	To recording head
16	MIC preamp. input (1)	48	EQ amp. inverse input
17	MIC preamp. input (2)	49	EQ amp. output
18	DTMF signal input	50	REC/PLAY int. ref. voltage output
19	BT signal input	51	Ground
20	Dial mute control	52	No connection
21	Line voltage control	53	No connection
22	Line interruption detector output	54	AUX preamp. output
23	No connection	55	AUX link input
24	No connection	56	Intercom link input
25	Strobe signal input	57	RF1 link input
26	Clock signal input	58	RF2 link input
27	No connection	59	Power-ON reset control
28	Data input	60	External supply voltage input
29	Ground	61	Internal supply voltage output
30	Logic power supply input	62	Circuit voltage control (2)
31	VOX detector output	63	Line current bypass (2)
32	No connection	64	Line current bypass (1)

Absolute Maximum Ratings (Ta = 25°C)

Parameter	Symbol	Rating	Unit
Supply voltage (1)	V _{CC}	7.0	V
Supply current (1)	I _{CC}	50	mA
Supply voltage (2)	V _L	12.0	V
Supply current (2)	I _L	135	mA
Power dissipation ^{Note)}	P _D	645	mW
Operating ambient temperature	T _{opr}	-20 to +75	°C
Storage temperature	T _{stg}	-55 to +150	°C

Note) In a free-air condition with Ta = 75°C.

Supply Voltage Range (Ta = 25°C)

Parameter	Symbol	Range
Operating supply voltage range (1)	V _{CC}	4.5V to 5.5V
Operating supply voltage range (2)	V _L	3.0V to 11.0V

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Recommended Operating Conditions ($T_a = -20^\circ\text{C} \sim +75^\circ\text{C}$)

Parameter		Symbol	Condition	min.	typ.	max.	Unit
Supply voltage		V_{CC}	—	4.5	5	5.5	V
Clock frequency		f_{CLK}	Input Duty 40% to 50%	—	—	250	kHz
Input pulse width	CLK (LOW)	$t_{WL}(CLK)$		1.6	—	2.0	μs
	CLK (HIGH)	$t_{WH}(CLK)$		2.0	—	2.4	μs
	STB	$t_{W}(STB)$		1.2	—	—	μs
Setup time	DATA	$t_{SU}(DATA)$		1.6	—	—	μs
	STB	$t_{SU}(STB)$		0.8	—	—	μs
Hold time	DATA	$t_h(DATA)$		1.6	—	—	μs
	STB	$t_h(STB)$		1.2	—	—	μs
Clock pulse rise time		$t_r(CLK)$		—	—	20	μs
Clock pulse fall time		$t_f(CLK)$		—	—	20	μs
Input voltage		V_i		0	—	V_{CC}	V

Electrical Characteristics ($T_a = 25 \pm 2^\circ\text{C}$)

Parameter		Symbol	Condition	min.	typ.	max.	Unit
Power supply characteristics during power failure							
Line DC voltage (I-1)	V_{L-I1}	$V-DCC=HIGH,$ $I_L=20\text{mA}, V_{CC}=0\text{V}$	3.3	3.6	3.9	V	
Line DC voltage (I-2)	V_{L-I2}	$V-DCC=HIGH,$ $I_L=60\text{mA}, V_{CC}=0\text{V}$	4.8	5.1	5.5	V	
Line DC voltage (I-3)	V_{L-I3}	$V-DCC=HIGH,$ $I_L=120\text{mA}, V_{CC}=0\text{V}$	7.0	7.4	7.9	V	
Line DC voltage H (I-1)	V_{LH-I1}	$V-DCC=LOW,$ $I_L=30\text{mA}, V_{CC}=0\text{V}$	5.25	5.75	6.25	V	
Line DC voltage H (I-2)	V_{LH-I2}	$V-DCC=LOW,$ $I_L=60\text{mA}, V_{CC}=0\text{V}$	6.55	7.05	7.55	V	
Line DC voltage H (I-3)	V_{LH-I3}	$V-DCC=LOW,$ $I_L=120\text{mA}, V_{CC}=0\text{V}$	8.9	9.6	10.3	V	
Internal supply voltage (I)	V_{reg-I}	$V-DCC=HIGH,$ $I_L=20\text{mA}, V_{CC}=0\text{V}$	1.8	2.0	2.2	V	
Internal ref. supply voltage (I)	V_{ref-I}	$V-DCC=HIGH,$ $I_L=20\text{mA}, V_{CC}=0\text{V}$	0.9	1.0	1.1	V	
Normal power supply characteristics							
Line DC voltage (E-1)	V_{L-E1}	$V-DCC=HIGH,$ $I_L=20\text{mA}, V_{CC}=5\text{V}$	3.2	3.5	3.9	V	
Line DC voltage (E-2)	V_{L-E2}	$V-DCC=HIGH,$ $I_L=60\text{mA}, V_{CC}=5\text{V}$	4.5	4.9	5.3	V	
Line DC voltage (E-3)	V_{L-E3}	$V-DCC=HIGH,$ $I_L=120\text{mA}, V_{CC}=5\text{V}$	6.5	7.0	7.5	V	
Line DC voltage H (E-1)	V_{LH-E1}	$V-DCC=LOW,$ $I_L=30\text{mA}, V_{CC}=5\text{V}$	4.8	5.35	5.9	V	
Line DC voltage H (E-2)	V_{LH-E2}	$V-DCC=LOW,$ $I_L=60\text{mA}, V_{CC}=5\text{V}$	5.9	6.55	7.2	V	
Line DC voltage H (E-3)	V_{LH-E3}	$V-DCC=LOW,$ $I_L=120\text{mA}, V_{CC}=5\text{V}$	8.1	8.8	9.5	V	
Internal supply voltage (E)	V_{reg-E}	$V-DCC=HIGH,$ $I_L=20\text{mA}, V_{CC}=5\text{V}$	4.6	4.85	5.0	V	
Internal ref. supply voltage (E)	V_{ref-E}	$V-DCC=HIGH,$ $I_L=20\text{mA}, V_{CC}=5\text{V}$	2.25	2.5	2.7	V	
Total circuit current	I_{total}	$V-DCC=HIGH,$ $I_L=20\text{mA}, V_{CC}=5\text{V}$	12	22	30	mA	
Power interruption detection (1)	V-HIT1	$V_L=2.7\text{V}, V_{CC}=5\text{V}$	0	0.1	0.6	V	
Power interruption detection (2)	V-HIT2	$V_L=1.5\text{V}, V_{CC}=5\text{V}$	4.4	4.95	5	V	

Electrical Characteristics (cont.) ($T_a = 25 \pm 2^\circ\text{C}$)

Parameter	Symbol	Condition	min.	typ.	max.	Unit
Receiver during power failure						
Rec. gain (I-1)	Gv-IR1	$I_L = 30\text{mA}$, $V_{CC} = 0\text{V}$ $V_{in} = -42\text{dBm}$	30.5	32.5	34.5	dB
Rec. gain (I-2)	Gv-IR2	$I_L = 80\text{mA}$, $V_{CC} = 0\text{V}$ $V_{in} = -42\text{dBm}$	27	29	31	dB
Rec. auto. PAD width (I) ^{Note 1)}	AP-IR	$I_L = 30\text{mA} - 80\text{mA}$, $V_{CC} = 0\text{V}$, $V_{in} = -42\text{dBm}$	2.3	3.3	4.8	dB
Rec. max. output (I)	Vo-IR	With $I_L = 30\text{mA}$, $V_{CC} = 0\text{V}$, and THD=5%	0	4	—	dBm
BT amp. gain (I)	Gv-IBT	$I_L = 30\text{mA}$, $V_{CC} = 0\text{V}$, $V - \text{DMC} = \text{LOW}$, $V_{in} = -30\text{dBm}$	19	21	23	dB
Receiver on external power supply						
Rec. gain (E-1)	Gv-ER1	$I_L = 30\text{mA}$, $V_{CC} = 5\text{V}$, $V_{in} = -42\text{dBm}$	30.5	32.5	34.5	dB
Rec. gain (E-2)	Gv-ER2	$I_L = 80\text{mA}$, $V_{CC} = 5\text{V}$, $V_{in} = -42\text{dBm}$	26.8	28.8	30.8	dB
Rec. auto. PAD width (E) ^{Note 1)}	AP-ER	$I_L = 30\text{mA} - 80\text{mA}$, $V_{CC} = 5\text{V}$, $V_{in} = -42\text{dBm}$	2.3	3.5	4.8	dB
Rec. max. output (E)	Vo-ER	With $I_L = 30\text{mA}$, $V_{CC} = 5\text{V}$, and THD=5%	4	12	—	dBm
Rec. digital volume (1) ^{Note 2)}	Gv-DV1	$I_L = 30\text{mA}$, $V_{CC} = 5\text{V}$, $V_{in} = -42\text{dBm}$, DV-1 ON	5	6	7	dB
Rec. digital volume (2) ^{Note 2)}	Gv-DV2	$I_L = 30\text{mA}$, $V_{CC} = 5\text{V}$, $V_{in} = -42\text{dBm}$, DV-1 & 2 ON	7.5	9	10.5	dB
BT amp. gain (E)	Gv-EBT	$I_L = 30\text{mA}$, $V_{CC} = 5\text{V}$, $V - \text{DMC} = \text{LOW}$, $V_{in} = -30\text{dBm}$	19.5	21.5	23.5	dB
Rec. gain difference	$\Delta G - R$	For $V_{CC} = 0\text{V}$ and $V_{CC} = 5\text{V}$ (between Gv-IR1 and Gv-ER1)	-1.2	-0.1	1.2	dB
Transmitter amp. during power failure						
Trans. gain (I-1)	Gv-IM1	$R = 27\ \Omega$ (Pin③), $I_L = 30\text{mA}$, $V_{CC} = 0\text{V}$, $V_{in} = -38\text{dBm}$	26.9	28.9	30.9	dB
Trans. gain (I-2)	Gv-IM2	$I_L = 80\text{mA}$, $V_{CC} = 0\text{V}$, $V_{in} = -38\text{dBm}$	23.9	25.9	27.9	dB
Trans. auto. PAD width (I) ^{Note 1)}	AP-IM	$I_L = 30\text{mA} - 80\text{mA}$, $V_{CC} = 0\text{V}$, $V_{in} = -38\text{dBm}$	1.7	3.0	4.2	dB
Trans. max. output (I-1)	Vo-IM1	With $I_L = 30\text{mA}$, $V_{CC} = 0\text{V}$, and THD=5%	0	3.5	—	dBm
Trans. max. output (I-2)	Vo-IM2	$I_L = 30\text{mA}$, $V_{CC} = 0\text{V}$, THD=5%, $V - \text{DCC} = \text{LOW}$	0	3.5	—	dBm
DTMF gain (I-1)	Gv-ID1	$I_L = 30\text{mA}$, $V_{CC} = 0\text{V}$, $V - \text{DMC} = \text{LOW}$, $V_{in} = -30\text{dBm}$	16.3	18.3	20.3	dB
DTMF gain (I-2)	Gv-ID2	$I_L = 80\text{mA}$, $V_{CC} = 0\text{V}$, $V - \text{DMC} = \text{LOW}$, $V_{in} = -30\text{dBm}$	13.1	15.1	17.1	dB
DTMF auto. PAD width (I) ^{Note 1)}	AP-IDT	$I_L = 30\text{mA} - 80\text{mA}$, $V_{CC} = 0\text{V}$, $V - \text{DMC} = \text{LOW}$, $V_{in} = -30\text{dBm}$	1.9	3.2	4.4	dB
DTMF max. output (I-1)	Vo-ID1	$I_L = 30\text{mA}$, $V_{CC} = 0\text{V}$, $V - \text{DMC} = \text{LOW}$, THD=5%	0	3.8	—	dBm
DTMF max. output (I-2)	Vo-ID2	$I_L = 30\text{mA}$, $V_{CC} = 0\text{V}$, THD=5%, $V - \text{DMC} = \text{LOW}$, $V - \text{DCC} = \text{LOW}$	0	3.5	—	dBm

Note) Unless otherwise specified, input signal $F_{in} = 1\text{ kHz}$, control voltage $V - \text{DOC} = \text{high}$, and control voltage $V - \text{DMC} = \text{high}$.

Note 1) Gain decrease when line current (I_L) is changed from 30 to 80 mA.

Note 2) Gain increase from receiver gain (E-1).

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■ Electrical Characteristics (cont.) (Ta = 25 ± 2°C)

Parameter	Symbol	Condition	min.	typ.	max.	Unit
Transmitter amp. on external power supply						
Trans. gain (E-1)	Gv-EM1	I _L = 30mA, V _{CC} = 5V, V _{in} = -38dBm	27.1	29.1	31.1	dB
Trans. gain (E-2)	Gv-EM2	I _L = 80mA, V _{CC} = 5V, V _{in} = -38dBm	23.4	25.4	27.4	dB
Trans. auto. PAD width (E) ^{Note 1)}	A _P -EM	I _L = 30mA-80mA, V _{CC} = 5V, V _{in} = -38dBm	2.4	3.7	4.9	dB
Trans. max. output (E-1)	V _o -EM1	With I _L = 30mA, V _{CC} = 5V, and THD = 5%	2	6	—	dBm
Trans. max. output (E-2)	V _o -EM2	I _L = 30mA, V _{CC} = 5V, THD = 5%, V-DCC = LOW	2	6	—	dBm
DTMF gain (E-1)	Gv-ED1	I _L = 30mA, V _{CC} = 5V, DM = ON, V _{in} = -30dBm	16.5	18.5	20.5	dB
DTMF gain (E-2)	Gv-ED2	I _L = 80mA, V _{CC} = 5V, V-DMC = LOW, V _{in} = -30dBm	12.6	14.6	16.6	dB
DTMF auto. PAD width (E) ^{Note 1)}	A _P -EDT	I _L = 30mA-80mA, V _{CC} = 5V, V-DMC = LOW, V _{in} = -30dBm	2.6	3.9	5.1	dB
DTMF max. output (E-1)	V _o -ED1	I _L = 30mA, V _{CC} = 5V, V-DMC = LOW, THD = 5%	2	6	—	dBm
DTMF max. output (E-2)	V _o -ED2	I _L = 30mA, V _{CC} = 5V, DM = ON, V-DMC = LOW, THD = 5%	2	6	—	dBm
Trans. gain difference (1)	ΔG-M1	For V _{CC} = 0V and V _{CC} = 5V (between Gv-IM1 and Gv-EM1)	-1.3	-0.2	0.9	dB
Trans. gain difference (2)	ΔG-M2	For V _{CC} = 0V and V _{CC} = 5V (between Gv-IM2 and Gv-EM2)	-0.6	0.5	1.6	dB
DTMF gain difference (1)	ΔG-MF1	For V _{CC} = 0V and V _{CC} = 5V (between Gv-ID1 and Gv-ED1)	-1.3	-0.2	0.9	dB
DTMF gain difference (2)	ΔG-MF2	For V _{CC} = 0V and V _{CC} = 5V (between Gv-ID2 and Gv-ED2)	-0.6	0.5	1.6	dB

Note) Unless otherwise specified, input signal Fin = 1 kHz, control voltage V-DOC = high, and control voltage V-DMC = high.
 Note 1) Gain decrease when line current (I_L) is changed from 30 to 80 mA.

■ Electrical Characteristics (cont.) (Ta = 25 ± 2°C)

Parameter	Symbol	Condition	min.	typ.	max.	Unit
Recording preamplifiers						
Rec. preamp. gain	Gv-RP	V _{in} = -60dBm, R _{in} = 0Ω	43	45	47	dB
Rec. preamp. output	V _o -RP	V _{in} = -45dBm, R _{in} = 10Ω	-13.4	-11.4	-9.4	dBm
Rec. preamp. output noise voltage	V _{no} -RP	DIN/AUDIO, R _g = 10kΩ	—	0.8	2.5	dBrms
Recording amplifier						
Head bias current	I-REC	L-SW (h07) = ON	145	180	215	μA
Head output	Gv-REC	L-SW (h07) = ON, V _{in} = -15dBm, R _L = 1kΩ	40.0	50.0	63.0	mVrms
Playing EQ amplifier						
EQ amp. gain	Gv-EQ	L-SW (h07) = ON, V _{in} = -40dBm	27.8	29.8	31.8	dB
EQ amp. output noise voltage	V _{no} -EQ	L-SW (h07) = ON, DIN/AUDIO, R _{in} = 1kΩ	—	0.45	1.2	mVrms
VOX detector						
VOX sensitivity (1)	VS1	I-VOX = 12.5 μA	3.5	4.8	—	V
VOX sensitivity (2)	VS2	I-VOX = 24.5 μA	—	0.025	0.5	V

Note) Unless otherwise specified, external supply voltage V_{CC} = 5V, line current I_L = 0mA, input signal frequency = 1 kHz, control voltage V-DOC = high, and control voltage V-DMC = high.

■ Electrical Characteristics (cont.) (Ta=25±2°C)

Parameter	Symbol	Condition	min.	typ.	max.	Unit
Link SW input amplifier						
AUX amp. gain	G _{v-AUX}	V _{in} = -36dBm	5	6	7	dB
Link SW output amplifier						
Intercom output gain ^{Note 1)}	G _{v-DHO}	Input AUX IN, V _{in} = -36dBm, L-SW (h3B) = ON	18.5	20	21.5	dB
RF1 output gain ^{Note 1)}	G _{v-RF10}	Input AUX IN, V _{in} = -36dBm, L-SW (h3C) = ON	16.5	18	19.5	dB
RF2 output gain ^{Note 1)}	G _{v-RF20}	Input AUX IN, V _{in} = -36dBm, L-SW (h3D) = ON	16.5	18	19.5	dB
Receiver output gain ^{Note 1)}	G _{v-RO}	Input AUX IN, V _{in} = -36dBm, L-SW (h38) = ON	19.9	21.4	22.9	dB
Line output gain ^{Note 1)}	G _{v-TO}	Input AUX IN, V _{in} = -36dBm, L-SW (h39) = ON	17.7	19.2	20.7	dB

Note) Unless otherwise specified, external supply voltage V_{CC} = 5V, line current I_L = 0mA, input signal frequency = 1 kHz, control voltage V-DCC = high, and control voltage V-DMC = high.

Note 1) Each amp. gain is measured from AUX OUT (Pin ②4) to its output (The AUX preamp. gain is not included in the calculation).

■ Electrical Characteristics (cont.) (Ta=25±2°C)

Parameter	Symbol	Condition	min.	typ.	max.	Unit
Link SW input						
MIC input gain ^{Note 1)}	G _{v-MI}	V _{in} = -38dBm, L-SW (h0C) = ON	-1	0	1	dB
Rec. input gain ^{Note 1)}	G _{v-RI}	V _{in} = -42dBm, L-SW (h14) = ON	-1	0	1	dB
Intercom input gain	G _{v-DHI}	V _{in} = -30dBm, L-SW (h1C) = ON	5	6	7	dB
RF1 input gain	G _{v-RF11}	V _{in} = -30dBm, L-SW (h25) = ON	-1	0	1	dB
RF2 input gain	G _{v-RF21}	V _{in} = -30dBm, L-SW (h2C) = ON	-1	0	1	dB
Link maximum output						
DH OUT max. output	V _{o-DH}	Input RF1 IN, THD = 5% L-SW (h23) = ON	0	4	—	dBm
RF1 OUT max. output	V _{o-RF1}	Input RF2 IN, THD = 5% L-SW (h2C) = ON	0	4	—	dBm
RF2 OUT max. output	V _{o-RF2}	Input RF1 IN, THD = 5% L-SW (h25) = ON	0	4	—	dBm

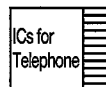
Note) Unless otherwise specified, external supply voltage V_{CC} = 5V, line current I_L = 0mA, input signal frequency = 1 kHz, control voltage V-DOC = high, and control voltage V-DMC = high.

Note 1) Each amp. gain is measured from MIC OUT (Pin ①5) or R PRE OUT (Pin ①1) to its output.

■ Electrical Characteristics (cont.) (Ta=25±2°C)

Parameter	Symbol	Condition	min.	typ.	max.	Unit
Controls						
Dial mute high level voltage	V _{DMC-H}		2	—	V _{CC} +0.2	V
Dial mute high level control current	I _{DMC-H}	V-DMC = 5V	15	38	80	μA
Dial mute low level voltage	V _{DMC-L}		-0.2	—	0.3	V
Dial mute low level control current	I _{DMC-L}	V-DMC = 0V	-40	-20	-10	μA
DC voltage control high level voltage	V _{DCC-H}		2	—	V _{CC} +0.2	V

Note) Unless otherwise specified, V_{CC} = 5V, and I_L = 20mA.



Electrical Characteristics (cont.) ($T_a = 25 \pm 2^\circ\text{C}$)

Parameter	Symbol	Condition	min.	typ.	max.	Unit
DC voltage control high level control current	$I_{\text{DCC-H}}$	$V - \text{DCC} = 5\text{V}$	10	25	50	μA
DC voltage control low level voltage	$V_{\text{DCC-L}}$		-0.2	—	0.4	V
DC voltage control low level control current	$I_{\text{DCC-L}}$	$V - \text{DCC} = 0\text{V}$	-2	-0.1	—	μA
Data input high level voltage	$V_{\text{DIN-H}}$		2	—	$V_{\text{CC}} + 0.2$	V
Data input high level control current	$I_{\text{DIN-H}}$	$V - \text{DIN} = 5\text{V}$	70	160	250	μA
Data input low level voltage	$V_{\text{DIN-L}}$		-0.2	—	0.3	V
Data input low level control current	$I_{\text{DIN-L}}$	$V - \text{DIN} = 0\text{V}$	-1	-0.1	—	μA

Power supply block

AC impedance (I)	$Z_{\text{AC-I}}$	$I_L = 80\text{mA}$, $V_{\text{CC}} = 0\text{V}$, $V_{\text{in}} = 200\text{mVrms}$, $F_{\text{in}} = 1\text{kHz}$	450	570	750	Ω
AC impedance (E)	$Z_{\text{AC-E}}$	$I_L = 80\text{mA}$, $V_{\text{CC}} = 5\text{V}$, $V_{\text{in}} = 200\text{mVrms}$, $F_{\text{in}} = 1\text{kHz}$	450	580	750	Ω

Input impedance

DTMF amp. input impedance	$Z_{\text{in-MF}}$	Pin $\text{\textcircled{18}}$ Input	8.5	9.5	10.5	$\text{k}\Omega$
BT amp. input impedance	$Z_{\text{in-BT}}$	Pin $\text{\textcircled{19}}$ Input	8.7	9.7	10.7	$\text{k}\Omega$
ALC amp. input impedance	$Z_{\text{in-ALC}}$	Pin $\text{\textcircled{20}}$ Input	8.5	9.5	10.5	$\text{k}\Omega$
Intercom preamp. input impedance	$Z_{\text{in-DH}}$	Pin $\text{\textcircled{55}}$ Input	8.5	9.5	10.5	$\text{k}\Omega$
RF1 preamp. input impedance	$Z_{\text{in-RF1}}$	Pin $\text{\textcircled{57}}$ Input	8.5	9.5	10.5	$\text{k}\Omega$
RF2 preamp. input impedance	$Z_{\text{in-RF2}}$	Pin $\text{\textcircled{58}}$ Input	8.5	9.5	10.5	$\text{k}\Omega$

Note) Unless otherwise specified, $V_{\text{CC}} = 5\text{V}$, and $I_L = 20\text{mA}$.

Electrical Characteristics (Design Values for Reference) (cont.) ($T_a = 25 \pm 2^\circ\text{C}$)

Parameter	Symbol	Condition	min.	typ.	max.	Unit
Speech block						
Rec. output noise voltage (I)	$V_{\text{n-IR}}$	$I_L = 30\text{mA}$, $V_{\text{CC}} = 0\text{V}$, DIN/AUDIO	—	0.3	—	mVrms
Rec. output noise voltage (E)	$V_{\text{n-ER}}$	$I_L = 30\text{mA}$, $V_{\text{CC}} = 5\text{V}$, DIN/AUDIO	—	0.3	—	mVrms
Trans. output noise voltage (I)	$V_{\text{n-IT}}$	$I_L = 30\text{mA}$, $V_{\text{CC}} = 0\text{V}$, DIN/AUDIO	—	0.3	—	mVrms
Trans. output noise voltage (E)	$V_{\text{n-ET}}$	$I_L = 30\text{mA}$, $V_{\text{CC}} = 5\text{V}$, DIN/AUDIO	—	0.3	—	mVrms
Dial mute trans. amp. Mute attenuation	M-T	$I_L = 30\text{mA}$, $V_{\text{CC}} = 5\text{V}$, $V_{\text{in}} = -30\text{dBm}$, $V - \text{DBM} = \text{H/L}$	—	75	—	dB
Rec. output mute attenuation	M-RO	$I_L = 30\text{mA}$, $V_{\text{in}} = -30\text{dBm}$, $V_{\text{CC}} = 5\text{V}$, $L_{\text{SW}} (\text{h27}) = \text{OFF/ON}$	—	50	—	dB
Rec. preamp. input impedance	$Z_{\text{in-R}}$	Pin $\text{\textcircled{10}}$ Input	—	500	—	$\text{k}\Omega$
MIC preamp. input impedance	$Z_{\text{in-M}}$	Pin $\text{\textcircled{6}}$, $\text{\textcircled{7}}$ Input	—	500	—	$\text{k}\Omega$

REC/PLAY block

ALC amp. ALC width	W-ALC	$I_L = 0\text{mA}$, $V_{\text{CC}} = 5\text{V}$, and ALC output distortion $\leq 2\%$	—	40	—	dB
ALC amp. ALC effect	ΔALC	$I_L = 0\text{mA}$, $V_{\text{CC}} = 5\text{V}$, $V_{\text{in}} = -45\text{dBm} \rightarrow -20\text{dBm}$	—	1	—	dB
Rec. amp. mute attenuation	M-REC	$V_{\text{CC}} = 5\text{V}$, $V_{\text{in}} = -10\text{dBm}$ $I_L = 0\text{mA}$, $L_{\text{SW}} (\text{h07}) = \text{ON/OFF}$	—	80	—	dB

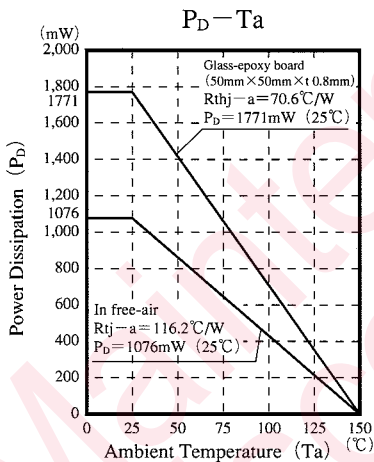
Note) The above design values are for reference only, and not guaranteed values.

■ Electrical Characteristics (Design Values for Reference) (cont.) (Ta=25±2°C)

Parameter	Symbol	Condition	min.	typ.	max.	Unit
EQ amp. mute attenuation	M-EQ	V _{CC} =5V, V _{in} =-30dBm I _L =0mA, LSW (h0F) = ON/OFF	—	80	—	dB
Recording preamp. input impedance	Z _{in-REC}	Pin④ Input	—	10	—	kΩ
EQ amp. input impedance	Z _{in-EQ}	Pin⑩, ⑪ Input	—	500	—	kΩ
VOX amp. input impedance	Z _{in-VOX}	Pin⑰ Input	—	500	—	Ω
Link switch						
Link SW mute attenuation	M-LS	V _{CC} =5V, I _L =30mA, AC output measured at link ON/OFF	—	75	—	dB
AUX preamp. input impedance	Z _{in-AUX}	Pin⑳ Input	—	500	—	kΩ

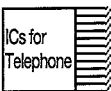
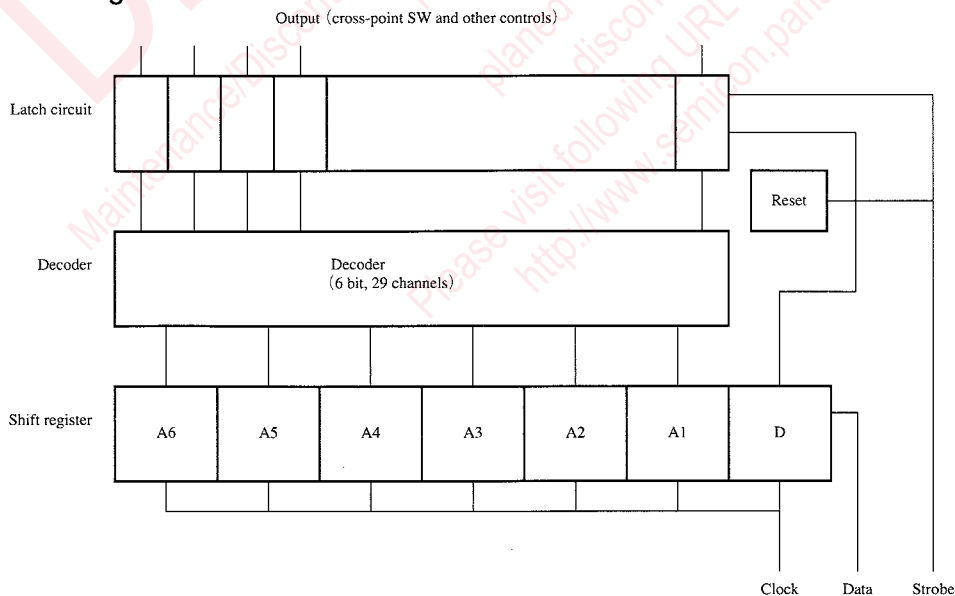
Note) The above design values are for reference only, and not guaranteed values.

■ Characteristics Curve

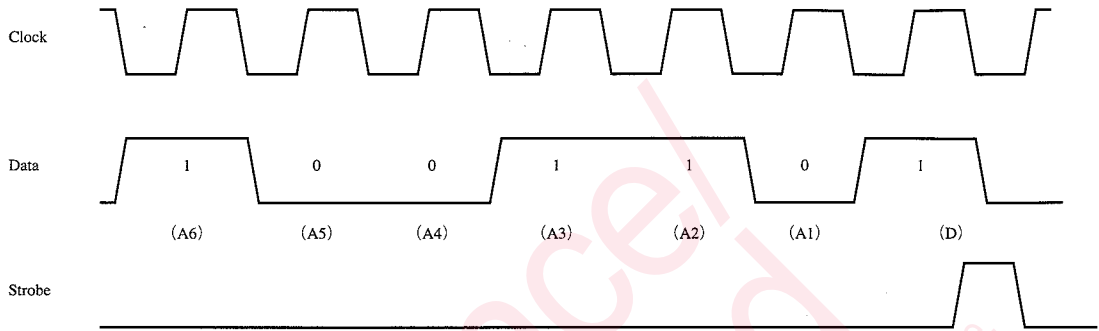


■ Logic Specifications

- Basic block diagrams



• Time Charts (assuming the address h26 latch is to be set)



1. Data is read into the shift register in synchronization with a rising edge of the clock, with the higher data being shifted sequentially on a first-come highest-bit basis.
2. When the strobe is low, data is shifted sequentially on the shift register in synchronization with the clock. Data on the latch circuit will not change.
3. When the strobe goes high, the latched data whose address is represented by the highest six bits of the shift register is updated. Latched data is set when the least significant bit is 1, and reset when the bit is 0.
4. Referring to 3 above, if the address is h00 (the highest six bits of the shift register are all 0s), the latch circuit is cleared (all reset) regardless of the data content.
5. At power-on (V_{CC} ON), the latch circuit is cleared (by power-ON reset).

• Logic Circuits Address Specifications

1. Cross-point switch

Input	Output	Handset rec.	Line output	Intercom	RF1	RF2
Microphone			09	0B	0C	0D
Receiver	10				14	15
Intercom	18				1C	1D
RF1	20	21	23			25
RF2	28	29	2B	2C		—
AUX	38	39	3B	3C	3C	3D

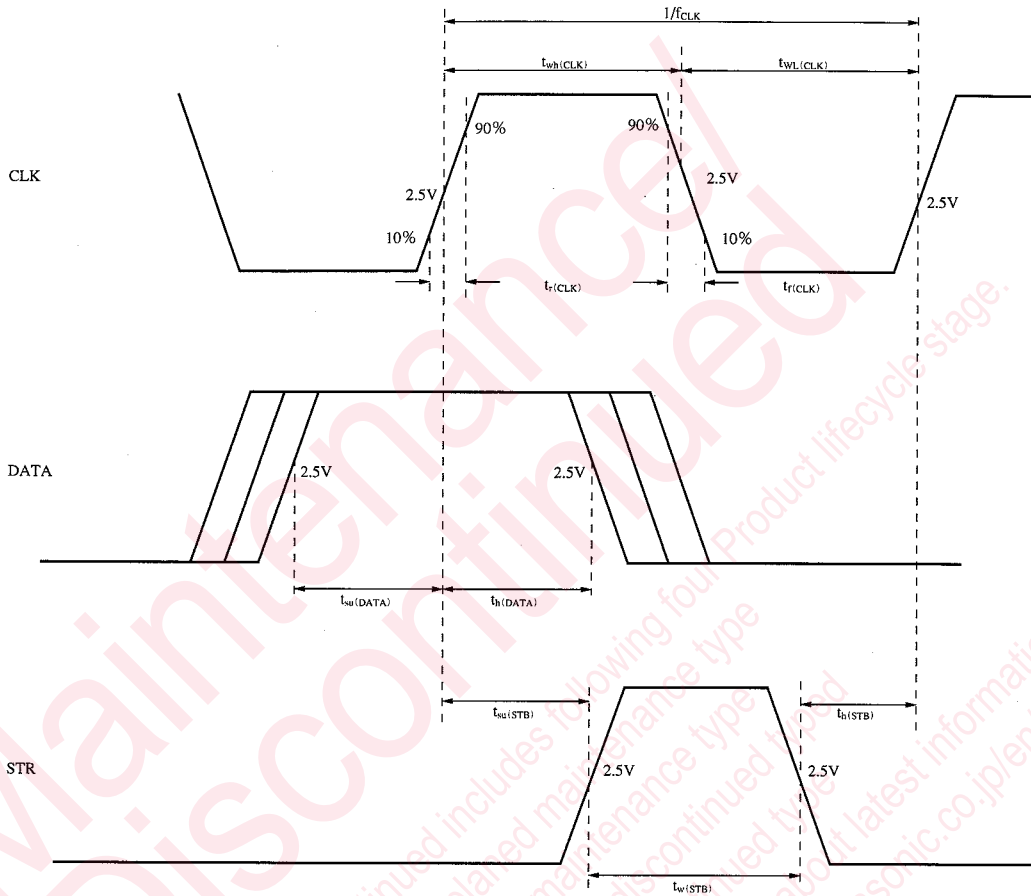
Note) Empty space means “not applicable.” Address is in hexadecimal.

2. Other control switches

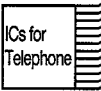
Address	Description
00	Cross-point SW all reset
07	Recording amp. ON
0F	Playing amp. ON
17	Receiver volume 6dB up
1F	Receiver volume 9dB up (when address 17 is ON)
27	Handset receiver amp. mute

Note) Address is in hexadecimal.

■ Timing Charts



Maintenance/Discontinued includes following four product lifecycle stage.
 planned maintenance type
 maintenance type
 planned discontinued type
 discontinued type
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