

TOSHIBA BIPOLAR LINEAR INTEGRATED CIRCUIT SILICON MONOLITHIC

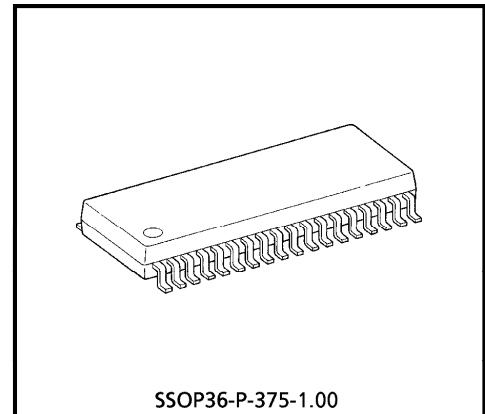
# TA1273F

## 6-CHANNEL RECORDING AMPLIFIER & PRE-AMPLIFIER FOR VCR

The TA1273F is a 6-channel recording amplifier for use in VCR. Since the recording amplifier uses a differential mechanism, it is particularly effective in reducing high-frequency even-ordered distortion. The pre-amplifier also has a differential mechanism and thus also reduces noise. Hi-Fi block built-in recoding AGC.

### FEATURES

- Differential drive type recording amplifier
- Differential input type pre-amplifier
- Built-in envelope detector for auto-tracking
- Built-in envelope comparator for special playback
- Built-in recording mute circuit
- Built-in recording AGC for Hi-Fi use
- Board patterns can easily be shared, due to the high pin compatibility with the TA1249F 2-channel recording amplifier and pre-amplifier, the TA1250F 4-channel recording amplifier and pre-amplifier.



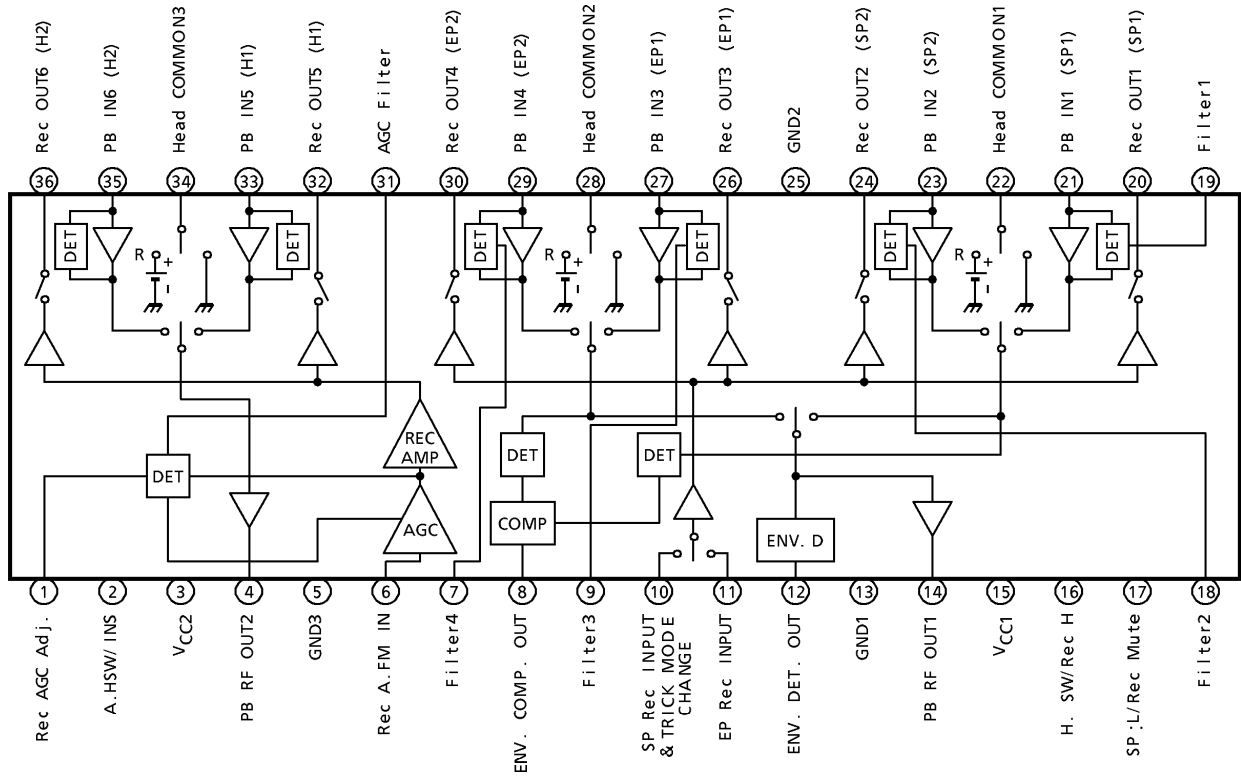
SSOP36-P-375-1.00

Weight : 0.72g (Typ.)

980508EBA1

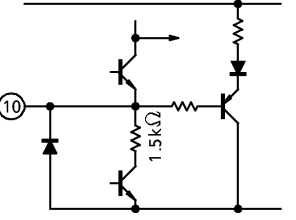
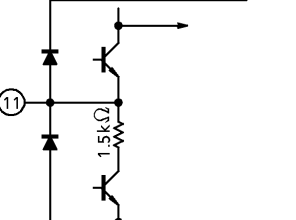
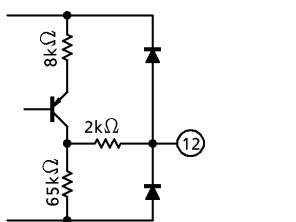
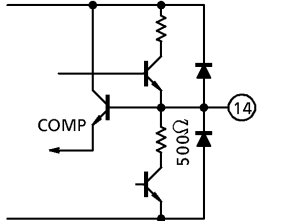
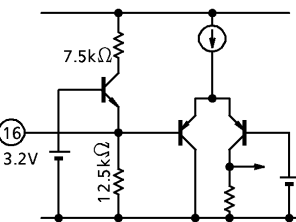
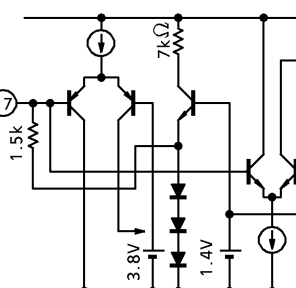
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BLOCK DIAGRAM



PIN FUNCTION ( $V_{CC} = 5.0V, T_a = 25^\circ C$ )

PIN No.	FUNCTION	TYPICAL DC VOLTAGE	INTERFACE CIRCUIT	NOTES
1	Rec AGC Adj.	1.3V		OUTSIDE RESISTANCE : 10kΩ Rec Current : 19mA <sub>p-p</sub> AGC Level change ±3dB by outside resistance.
2	A.HSW / INS	2.5V		Insert mode set when pin 2 (TP2) raised to H. And Rec current up (5dB).
3	VCC2	(5V)		
4	PB RF OUT2	1.9V		0.15mV <sub>p-p</sub> input ↓ 67dB 336mV <sub>p-p</sub> output
5	GND3	(0V)		
6	Rec A.FM IN	Rec : 2.9V PB : 2.3V		
7	Filter4	1.8V		DC return filter
9	Filter3			
18	Filter2			
19	Filter1			
8	ENV. COMP. OUT	2V		SP : 0V EP : 5V

PIN No.	FUNCTION	TYPICAL DC VOLTAGE	INTERFACE CIRCUIT	NOTES
10	SP Rec input & Trick mode change	0.9V		Current input type Trick mode set when pin 10 (TP10) raised to H.
11	EP Rec input	0.9V		Current input type
12	ENV. DET. OUT	—		
13	GND1	(0V)		
14	PB RF OUT1	2V		SP : 0.3mV <sub>p-p</sub> input ↓ 57dB 212mV <sub>p-p</sub> output EP : 0.3mV <sub>p-p</sub> input ↓ 60dB 300mV <sub>p-p</sub> output
15	VCC1	(5V)		
16	Head SW / Rec H	2.5V		Refer to the head switching table in the Control Tables. TP16→H Rec Mode
17	Mode SW / Rec Mute	—		V17 voltage→ L : SP H : EP TP17 voltage→ H : Rec Mute

PIN No.	FUNCTION	TYPICAL DC VOLTAGE	INTERFACE CIRCUIT	NOTES
20	Rec OUT1 (SP1)	Open collector		
24	Rec OUT2 (SP2)			
26	Rec OUT3 (EP1)			
30	Rec OUT4 (EP2)			
21	PB IN1 (SP1)	PB : 0.8V		
23	PB IN2 (SP2)			
27	PB IN3 (EP1)			
29	PB IN4 (EP2)			
22	Head COMMON1	Rec : 4.1V PB : 0.1V		
28	Head COMMON2			
25	GND2	(0V)		
31	AGC Filter	2.2V		
32	Rec OUT5 (H1)	Open collector		
36	Rec OUT6 (H2)			
33	PB IN5 (H1)	PB : 0.8V		
35	PB IN6 (H2)			
34	Head COMMON3	Rec : 4.1V PB : 0.1V		

**CONTROL TABLES**

HEAD switching

- Video system

During PB	V <sub>16</sub> voltage	SP HEAD	EP HEAD
	H	2ch	1ch
	L	1ch	2ch

(Note) The above setting are controlled by the input and output currents.  
Pin 16 (TP16) has function of Rec H too.

- Hi-Fi system

During PB	V <sub>2</sub> voltage	Hi-Fi HEAD
	H	2ch
	L	1ch

(Note) When pin 2 (TP2) is raised to H (V<sub>CC</sub>), Rec current of Hi-Fi head increase +5dB.

MODE switching

V <sub>17</sub> voltage	MODE
H	EP
L	SP

(Note) Pin 17 has function of Rec Mute too.  
When pin 17 (TP17) is raised to H (V<sub>CC</sub>), then Rec Mute mode is set.

- Trick mode is set by raising pin 10 (TP10) to H.

**EXAMPLES OF REC CURRENT SETTING**

- Video during MODE  
Input : 500mV<sub>p-p</sub>, 4MHz

MODE	INPUT RESISTANCE (kΩ)	REC CURRENT (SINGLE-CHANNEL OUTPUT) (mA)
SP	1.5	14.9
	2.0	11.2
EP	1.5	10.5
	2.0	7.9

## MAXIMUM RATINGS

CHARACTERISTIC	SYMBOL	RATING	UNIT
Power Supply Voltage	$V_{CC}$	7	V
Power Dissipation 1	$P_{D1}$ (Note 1)	1136	mW
Power Dissipation 2	$P_{D2}$ (Note 2)	1666	mW
Input Voltage	$V_{IN}$	$GND - 0.3V \sim V_{CC} + 0.3V$	V
Operating Temperature	$T_{opr}$	-20~75	°C
Storage Temperature	$T_{stg}$	-55~150	°C

(Note 1) Derated linearly above  $T_a = 25^\circ\text{C}$  in the proportion of  $9.1\text{mW}/^\circ\text{C}$ .

(Note 2) On the board mounting (Glass epoxy  $50 \times 50 \times 1.6\text{mm}$ , Area of copper : 30%)  
Derated linearly above  $T_a = 25^\circ\text{C}$  in the proportion of  $13.4\text{mW}/^\circ\text{C}$ .

## RECOMMENDED POWER SUPPLY VOLTAGE RANGE

Power supply voltage : 4.5V~5.5V, 5V (Typical)

**ELECTRICAL CHARACTERISTIC (V<sub>CC</sub> = 5V, Ta = 25°C)**

Video system

PB mode

CHARACTERISTIC	SYMBOL	TEST CIR-CUIT	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Power Supply Current	I <sub>ccp</sub>	—		45	60	75	mA
Voltage Gain (SP Mode)	G <sub>s1</sub>	—	Input (V <sub>21</sub> , V <sub>23</sub> , V <sub>27</sub> , V <sub>29</sub> ) : f = 1MHz, 0.3mV <sub>p-p</sub>	54	57	60	dB
	G <sub>s2</sub>						
Voltage Gain (EP Mode)	G <sub>e1</sub>						
	G <sub>e2</sub>						
Voltage Gain Difference	ΔG <sub>S</sub>	—	G <sub>s1</sub> – G <sub>s2</sub>	– 0.5	0	0.5	dB
	ΔG <sub>E</sub>	—	G <sub>e1</sub> – G <sub>e2</sub>				
Frequency Characteristic	G <sub>Fs1</sub>	—	Input (V <sub>21</sub> , V <sub>23</sub> , V <sub>27</sub> , V <sub>29</sub> ) : 0.3mV <sub>p-p</sub> Output ratio 8M / 1M	– 1.5	0.5	2.5	dB
	G <sub>Fs2</sub>						
	G <sub>Fe1</sub>						
	G <sub>Fe2</sub>						
Secondary Harmonic Distortion	H <sub>Ds1</sub>	—	Input (V <sub>21</sub> , V <sub>23</sub> , V <sub>27</sub> , V <sub>29</sub> ) : f = 4MHz, 0.3mV <sub>p-p</sub> Power ratio 8M / 4M		– 45	– 40	dB
	H <sub>Ds2</sub>						
	H <sub>De1</sub>						
	H <sub>De2</sub>						
Maximum Output Voltage	V <sub>oms1</sub>	—	Input (V <sub>21</sub> , V <sub>23</sub> , V <sub>27</sub> , V <sub>29</sub> ) : f = 1MHz Level when thirdly harmonic distortion of output reaches – 30dB	2	2.2		V <sub>p-p</sub>
	V <sub>oms2</sub>						
	V <sub>ome1</sub>						
	V <sub>ome2</sub>						
Crosstalk Between Channels	CRS12	—	Input (V <sub>21</sub> , V <sub>23</sub> , V <sub>27</sub> , V <sub>29</sub> ) : f = 4MHz, 0.3mV <sub>p-p</sub>		– 45	– 40	dB
	CRS21						
	CRE12						
	CRE21						
Crosstalk Between Modes	CRS1E1	—	Input (V <sub>21</sub> , V <sub>23</sub> , V <sub>27</sub> , V <sub>29</sub> ) : f = 4MHz, 0.3mV <sub>p-p</sub>		– 45	– 40	dB
	CRS1E2						
	CRS1H1						
	CRS1H2						
	CRS2E1						
	CRS2E2						
	CRS2H1						
	CRS2H2						
	CRE1S1						
	CRE1S2						
	CRE1H1						
	CRE1H2						
	CRE2S1						
	CRE2S2						
	CRE2H1						
	CRE2H2						



CHARACTERISTIC	SYMBOL	TEST CIR-CUIT	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Output DC Offset	$\Delta V_{s1s2}$	—	DC difference between outputs	- 15	0	15	mV
	$\Delta V_{s1e1}$						
	$\Delta V_{s1e2}$						
	$\Delta V_{s2e1}$						
	$\Delta V_{s2e2}$						
	$\Delta V_{e1e2}$						
Equated Input Noise	NS1	—	Measurement point : 4MHz RBW : 10kHz		0.1		$\mu V_{rms}$
	NS2						
	NE1						
	NE2						
ENV. Det. (SP Mode)	VENVS1	—	Input : f = 4MHz, $50\mu V_{p-p}$	0.7	1	1.3	V
	VENVS2		Input : f = 4MHz, $1mV_{p-p}$	3.2	3.5	3.8	
ENV. Det. (EP Mode)	VENVE1	—	Input : f = 4MHz, $50\mu V_{p-p}$	0.9	1.2	1.5	
	VENVE2		Input : f = 4MHz, $1mV_{p-p}$	3.5	3.8	4.1	
ENV. Comp	VCOM1	—	Selects SP head; pin17 low	0	0.1	0.3	V
	VCOM2	—	Selects EP head; pin17 high	4.7	4.9	5	

Rec mode (Input resistance :  $1.5k\Omega$ )

CHARACTERISTIC	SYMBOL	TEST CIR-CUIT	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Power Supply Current	I <sub>ccr</sub>	—		90	110	130	mA
Current Gain (SP Mode)	G <sub>rs1</sub>	—	Input : f = 1MHz, $500mV_{p-p}$	32.5	33	33.5	dB
	G <sub>rs2</sub>						
Current Gain (EP Mode)	G <sub>re1</sub>						
	G <sub>re2</sub>						
Frequency Characteristic	G <sub>rfs1</sub>	—	Input : $500mV_{p-p}$ Output ratio 8M / 1M	- 1.5	0	1.5	dB
	G <sub>rfs2</sub>						
	G <sub>rfe1</sub>						
	G <sub>rfe2</sub>						
Secondary Harmonic Distortion	HDR <sub>s1</sub>	—	Input : f = 4MHz, $500mV_{p-p}$ Output ratio 8M / 4M		- 45	- 40	dB
	HDR <sub>s2</sub>						
	HDR <sub>e1</sub>						
	HDR <sub>e2</sub>						

Control System

CHARACTERISTIC	SYMBOL	TEST CIR-CUIT	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Short SW ON Resistance	Rin	—			4		$\Omega$
Input Resistance	rin	—			650		$\Omega$
Rec Mute	Mute1	—	Mute ON (TP17)	4.2		5.0	V
	Mute2		Mute OFF (TP17)	0.0		3.4	
Rec / PB	R / P1	—	Rec (TP16)	3.8		5.0	V
	R / P2		PB (TP16)	0.0		2.8	
SP / EP	EPS1	—	SP (V17)	0.0		0.9	V
	EPS2		EP (V17)	1.7		5.0	
LCH / HCH	SWP1	—	LCH (V2, V16)	0.0		1.5	V
	SWP2		HCH (V2, V16)	3.5		5.0	
PB Normal / Trick	NT1	—	PB Normal (TP10)	0.0		0.4	V
	NT2		Trick (TP10)	1.0			
Hi-Fi / INS Mode	HINS1	—	Normal (TP2)	0.0		2.0	V
	HINS2		INS (TP2)	3.0		5.0	

Hi-Fi system

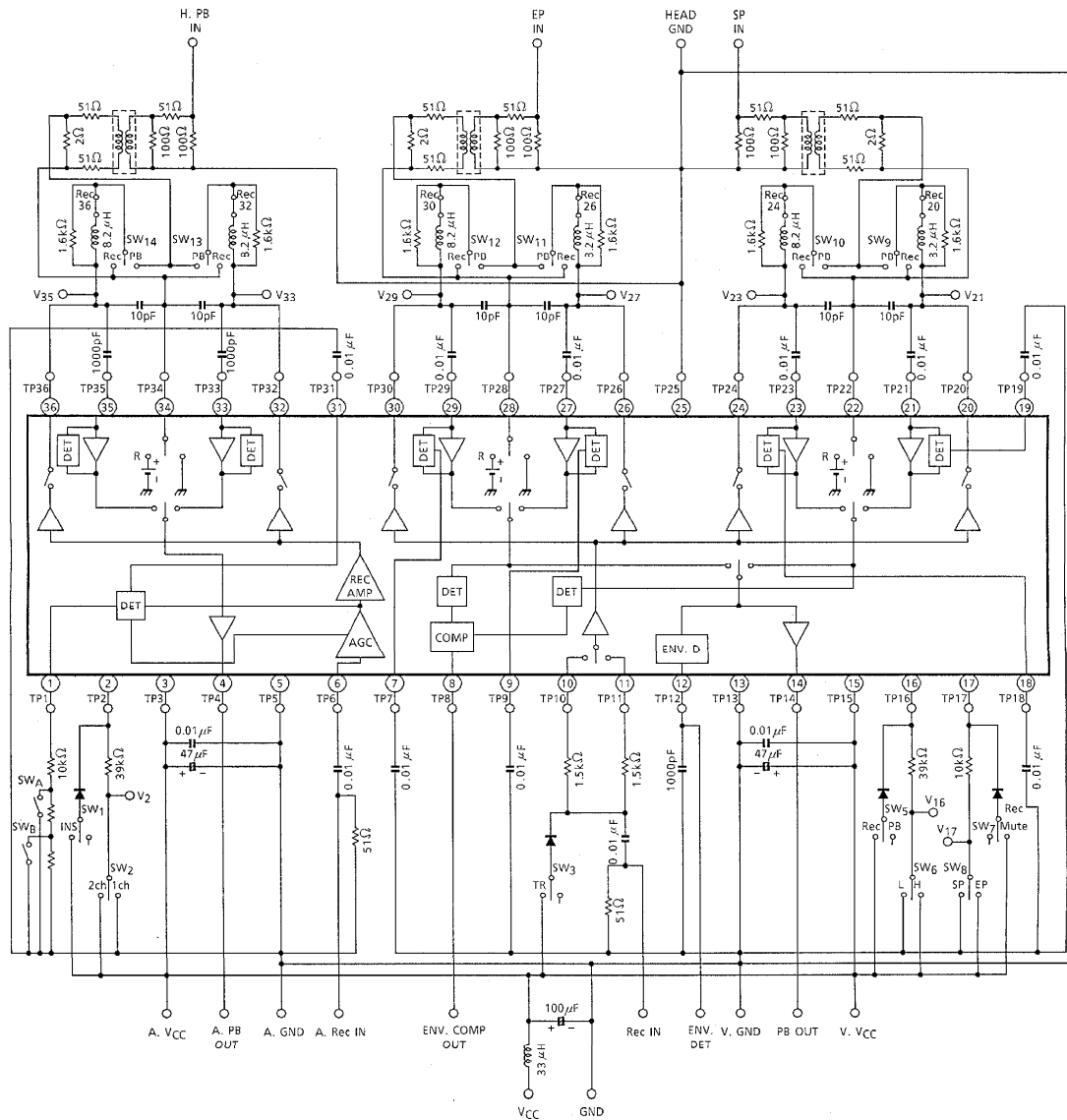
PB mode

CHARACTERISTIC	SYMBOL	TEST CIR-CUIT	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Voltage Gain	GHP1	—	Input (V33, V35) : f = 1MHz, 0.15mV <sub>p-p</sub>	64	67	70	dB
	GHP2						
Voltage Gain Difference	$\Delta$ GH	—		-0.5	0	0.5	dB
Frequency Characteristic	GHf1	—	Input (V33, V35) : 0.15mV <sub>p-p</sub> Output ratio 3M / 1M	-2.5	-0.5	1.5	dB
	GHf2						
Secondary Harmonic Distortion	HDf1	—	Input (V33, V35) : f = 2MHz, 0.15mV <sub>p-p</sub> Output ratio 4M / 2M		-50	-40	dB
	HDf2						
Crosstalk Between Channels	CRH1	—	Input (V33, V35) : f = 2MHz, 0.15mV <sub>p-p</sub> Level difference between channels.		-45	-40	dB
	CRH2						
Crosstalk Between Modes	CRH1S1	—	Input (V33, V35) : f = 2MHz, 0.15mV <sub>p-p</sub>		-45	-40	dB
	CRH1S2						
	CRH1E1						
	CRH1E2						
	CRH2S1						
	CRH2S2						
	CRH2E1						
CRH2E2							
Equated Input Noise	N1	—	Measurement point : 1MHz RBW : 10kHz		0.1		$\mu$ Vrms
	N2						
Output DC Offset	$\Delta$ V	—	DC difference between outputs	-50	0	50	mV

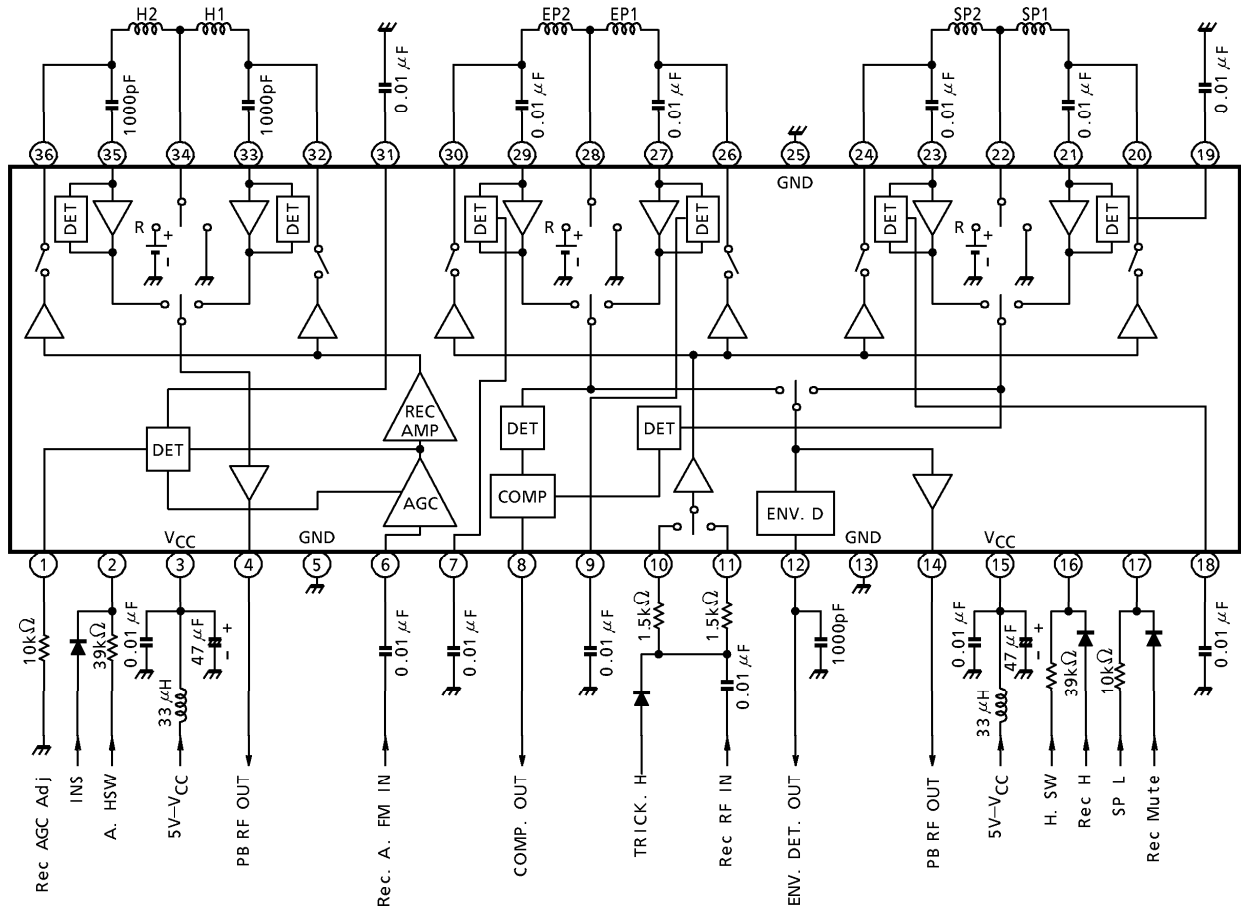
Rec mode (PIN1 : 10k $\Omega$ )

CHARACTERISTIC	SYMBOL	TEST CIR-CUIT	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Rec Current	HRi	—	Input : f = 2MHz, 500mV <sub>p-p</sub>	18	19	20	mA <sub>p-p</sub>
Frequency Characteristic	GHif1	—	Input : 500mV <sub>p-p</sub> Output ratio 3M / 1M	- 1.5	0	1.5	dB
	GHif2						
Secondary Harmonic Distortion	HDRi1	—	Input : f = 2MHz, 500mV <sub>p-p</sub> Output ratio 4M / 2M		- 45	- 40	dB
	HDRi2						
Intermodulation Distortion	CMD1	—	Input : 700mV <sub>p-p</sub> (R) + 221mV <sub>p-p</sub> (L) L : f = 1.3MHz, R : f = 1.7MHz, L/R ratio : - 10dB		- 50	- 40	dB
	CMD2						
AGC Control Bound	AINL	—	Input level (AGC Control)	200		1,200	mV
AGC Change Bound	AVV	—	Output change level for center level.	- 3		3	dB

TEST CIRCUIT

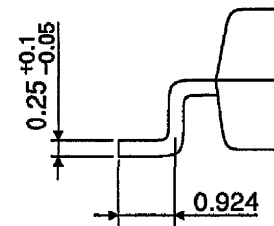
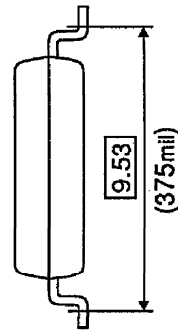
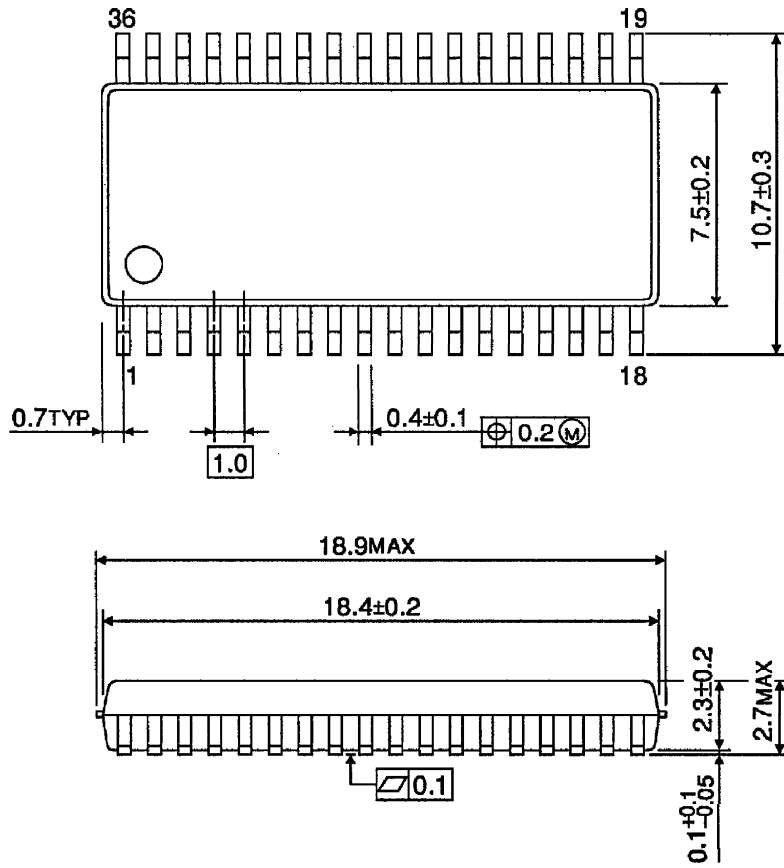


APPLICATION CIRCUIT



**OUTLINE DRAWING**  
SSOP36-P-375-1.00

Unit : mm



Weight : 0.72g (Typ.)