TOSHIBA

TOSHIBA BIPOLAR LINEAR INTEGRATED CIRCUIT SILICON MONOLITHIC

## **TA1217AN,TA1217AF**

#### TV-SOUND PROCESSOR

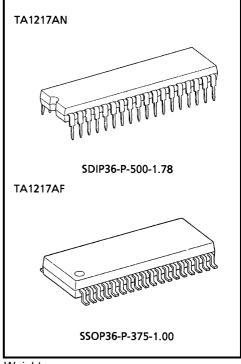
TA1217AN incorporates the following circuits:

- Four sound processor circuit channels Sound processor circuit for left channel of stereo Sound processor circuit for right channel of stereo Sound processor circuit for center channel of stereo Sound processor circuit for woofer channel of stereo
- I / O ports for controlling multiplex sound demodulation IC
- I / O ports for controlling sound IC

The IC comes in a 36-pin shrink DIP or 36-pin shrink SOP.

#### **FEATURES**

- Sound processor:
  - Volume control
  - Balance adjustment
  - Bass adjustment
  - · Treble adjustment
  - · Built-in woofer low-pass filter
- I / O port circuits :
  - · Circuit for controlling IC used to demodulate
  - I<sup>2</sup>C bus line multiplex sound
  - Adjusts filters using bus line method
  - Circuit for controlling sound IC



SDIP36-P-500-1.78 : 2.98 g (Typ.) SSOP36-P-375-1.00: 0.72 g (Typ.)

The information contained herein is subject to change without notice.

TOSHIBA is continually working to improve the quality and reliability of its products. Nevertheless, semiconductor devices in general can malfunction or fail due to their inherent electrical sensitivity and vulnerability to physical stress. It is the responsibility of the buyer, when utilizing TOSHIBA products, to comply with the standards of safety in making a safe design for the entire system, and to avoid situations in which a malfunction or failure of such TOSHIBA products could cause loss of human life, bodily injury or

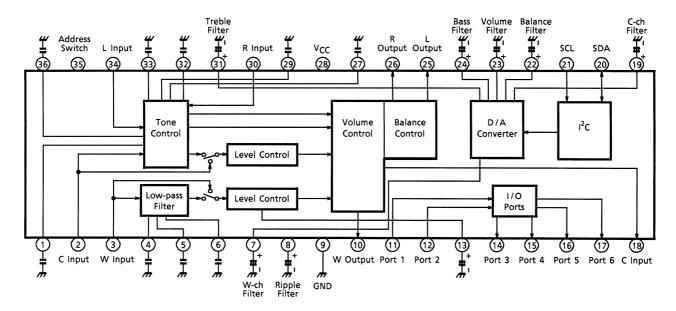
to avoid situations in which a malfunction or failure of such TOSHIBA products could cause loss of human life, bodily injury or damage to property.

In developing your designs, please ensure that TOSHIBA products are used within specified operating ranges as set forth in the most recent TOSHIBA products specifications. Also, please keep in mind the precautions and conditions set forth in the "Handling Guide for Semiconductor Devices," or "TOSHIBA Semiconductor Reliability Handbook" etc..

The TOSHIBA products listed in this document are intended for usage in general electronics applications (computer, personal equipment, office equipment, measuring equipment, industrial robotics, domestic appliances, etc.). These TOSHIBA products are neither intended nor warranted for usage in equipment that requires extraordinarily high quality and/or reliability or a malfunction or failure of which may cause loss of human life or bodily injury ("Unintended Usage"). Unintended Usage include atomic energy control instruments, airplane or spaceship instruments, transportation instruments, traffic signal instruments, combustion control instruments, medical instruments, all types of safety devices, etc.. Unintended Usage of TOSHIBA products listed in this document shall be made at the customer's own risk shall be made at the customer's own risk.

The products described in this document are subject to the foreign exchange and foreign trade laws.
 The information contained herein is presented only as a guide for the applications of our products. No responsibility is assumed by TOSHIBA CORPORATION for any infringements of intellectual property or other rights of the third parties which may result from its use. No license is granted by implication or otherwise under any intellectual property or other rights of TOSHIBA CORPORATION or others

## **BLOCK DIAGRAM**



## **TERMINAL FUNCTION**

PIN No.	PIN NAME	FUNCTION	INTERFACE CIRCUIT
1	C-ch LPF	Capacitor connecting pin for LPF for center channel bass. Connect capacitor between this pin and GND.	V <sub>CC</sub> (9 V)
27	R-ch LPF	Capacitor connecting pin for LPF for right channel bass. Connect capacitor between this pin and GND.	32 22 kΩ C 22 kΩ C 22 kΩ C 22 kΩ C 22 kΩ C 22 kΩ C
32	L-ch LPF	Capacitor connecting pin for LPF for left channel bass. Connect capacitor between this pin and GND.	
2	C-ch Input	Input pin for center channel signal.	V <sub>CC</sub> (9 V)
30	R-ch Input	Input pin for right channel signal.	30 24 kΩ 24 kΩ 24 kΩ
34	L-ch Input	Input pin for left channel signal.	\( \begin{picture}(100,0) \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\
3	W-ch Input	Input pin for woofer channel signal. Connect 1000pF capacitor between this pin and GND. Capacitor is for preventing oscillation.	3 100 U ACC (a A)
4 5 6	W-ch LPF	Input pins for woofer channel LPF. Connect capacitors between pin 4 and GND, 5 and GND, and 6 and GND.	V <sub>CC</sub> (9 V)

PIN No.	PIN NAME	FUNCTION	INTERFACE CIRCUIT
7	W-ch Filter	Capacitor connecting pin for controlling current waveform smoothing. Connect capacitor between this pin and GND. Current on this pin is used to adjust woofer channel.	V <sub>CC</sub> (9 V)
19	C-ch Filter	Capacitor connecting pin for control current waveform smoothing. Connect capacitor between this pin and GND. Current on this pin is used to adjust center channel.	7 19 23 Control  Good
23	Volume Filter	Capacitor connecting pin for control current waveform smoothing. Connect capacitor between this pin and GND. Current on this pin is used to adjust volume filter.	
8	Ripple Filter	Capacitor connecting pin used to reject ripples in supply voltage (9 V). Connect capacitor between this pin and GND.	8 100 Ω Ω W W W W W W W W W W W W W W W W W
9	GND	GND pin	
10	W-ch Output	Output pin for woofer channel signal.	Vcc (9 V)
18	C-ch Output	Output pin for center channel signal.	10
25	L-ch Output	Output pin for left channel signal.	18 25 26
26	R-ch Output	Output pin for right channel signal.	<u> </u>

PIN No.	PIN NAME	FUNCTION	INTERFACE CIRCUIT
11 12	Port 1 Port 2	Input pins (input ports) for peripheral IC control signals (digital signals). Apply (supply) to this pin output returned from peripheral ICs which are controlled by microcontroller via this IC. The return output contains data on operating status of peripheral ICs controlled by microcontroller (eg, operating status and operating mode set by microcontroller).	V <sub>CC</sub> (9 V)
13	W-ch Offset	Rejects offset of woofer channel direct current bias voltage. Connect capacitor between this pin and GND.	V <sub>CC</sub> (9 V)  17 kΩ  30kΩ  30kΩ
14 15 16	Port 3 Port 4 Port 5	Output pins (output ports) for peripheral IC control signals (digital signals). Output microcontrol signals (I <sup>2</sup> C bus line signals) to peripheral ICs from these pins. Microcontroller sets operating status (eg, operating mode) of peripheral ICs using these output signals. Pins are open-collector; output levels are H and L.	V <sub>CC</sub> (9 V)  14 15 100 Ω 1 <sup>2</sup> C Bus Control
17	Port 6	Functions same as port 3 (pin 14), port 4 (pin 15) and port 5 (pin 16). Output levels are H, M and L.	V <sub>CC</sub> (9 V)  100 Ω  17  100 Ω  12C Bus Control

PIN No.	PIN NAME	FUNCTION	INTERFACE CIRCUIT
20	SDA	Input / output pin for I <sup>2</sup> C bus line (SDA)	V <sub>CC</sub> (9 V)
21	SCL	Input pin for I <sup>2</sup> C bus line (SCL)	V <sub>CC</sub> (9 V)
22	Balance Filter	Capacitor connecting pin for controlling current waveform smoothing. Connect capacitor between this pin and GND. Current on this pin adjusts balance.	V <sub>CC</sub> (9 V)  12 Bus Control  100 Ω  100 Ω  100 Ω  100 Ω
24	Bass Filter	Capacitor connecting pin for control current waveform smoothing. Connect capacitor between this pin and GND. Current on this pin adjusts bass filter.	V <sub>CC</sub> (9 V)  I <sup>2</sup> C Bus Control  100 Ω
31	Treble Filter	Capacitor connecting pin for control current waveform smoothing. Connect capacitor between this pin and GND. Current on this pin adjusts treble filter.	31 T T T T T T T T T T T T T T T T T T T

PIN No.	PIN NAME	FUNCTION	INTERFACE CIRCUIT
28	V <sub>CC</sub>	Power supply pin. Apply (supply) externally direct voltage of 9 V $\pm$ 0.9 V.	
36	C-ch HPF	Capacitor connecting pin for HPF for center channel treble. Connect capacitor between this pin and GND.	V <sub>CC</sub> (9 V)  29  33  11 kΩ  22 kΩ
29	R-ch HPF	Capacitor connecting pin for HPF for right channel treble. Connect capacitor between this pin and GND.	22 kΩ 22 kΩ 22 kΩ 22 kΩ 3
33	L-ch HPF	Capacitor connecting pin for HPF for left channel treble. Connect capacitor between this pin and GND.	
35	Address Switch	Input pin for slave address switch signal.Slave addresses of this IC are 80H and 82H.  To set slave address to 80H, connect this pin to GND or leave pin open (not connected). To set slave address to 82H, connect this pin to V <sub>CC</sub> .	V <sub>CC</sub> (9 V)

## I<sup>2</sup>C BUS LINE CONTROL SIGNAL MAP

Listed below is a map of IC control signals transmitted from microcontroller via  ${\rm I}^2{\rm C}$  bus line.

Control signal map in write mode

The control signals used to write (transmit) control data to this IC from the microcontroller are as mapped below.

SLAVE	SUB		CO	NTROL:	SIGNAL	ARRAY C	CONTEN	ΓS		INITIAL VALUE
ADDRESS	ADDRESS	7	6	5	4	3	2	1	0	INITIAL VALUE
	00H	*	Bass adj	ustment			32H (center of adjustment range)			
	01H	*	Treble ad	djustmer		32H (center of adjustment range)				
80H	02H	*	Volume a	adjustme	00H (smallest in adjustment range)					
(pin 35 = L) or 82H	03H	*	C-ch volu	ume leve	00H (smallest in adjustment range)					
(pin 35 = H)	04H	*	W-ch vol	ume leve	00H (smallest in adjustment range)					
	05H	*	Right and				32H (center of adjustment range)			
	06H	*	*	Po	rt 6	Port 5	Port 4	Port 3	*	20H
	07H	*	*	W	FC	CTS	WLS	MT2	MT1	10H

<sup>\*:</sup> Unusable, H: hexadecimal

## Details of sub addresses 06H and 07H

SYMBOL		CO	CONTROL SIGNAL (SLAVE ADDRESS : 80H OR 82H)								
IN ABOVE	CONTROLLED DATA	SUB ADDRESS	CONTROL SIGNAL ARRAY CONTENTS								
TABLE			7	6	5	4	3	2	1	0	
Port 3	Port 3 (pin 14) output = L		*	*					1	*	
1 011 0	Port 3 (pin 14) output = H		*	*					0	*	
Port 4	Port 4 (pin 15) output = L		*	*				1		*	
	Port 4 (pin 15) output = H		*	*				0		*	
Port 5	Port 5 (pin 16) output = L	06H	*	*			1			*	
Poit 5	Port 5 (pin 16) output = H		*	*			0			*	
	Port 6 (pin 17) output = 2.5 V		*	*	0	1				*	
Port 6	Port 6 (pin 17) output = 0.5 V		*	*	1	0				*	
	Port 6 (pin 17) output = 5.0 V		*	*	1	1				*	
	Woofer fo control : fo = 60 Hz		*	*	0	0					
WFC	Woofer fo control : fo = 80 Hz	07H	*	*	0	1					
VVFC	Woofer fo control : fo = 100 Hz	0/11	*	*	1	0					
	Woofer fo control : fo = 120 Hz		*	*	1	1					

SYMBOL		CONTROL SIGNAL (SLAVE ADDRESS : 80H OR 82H)									
IN ABOVE	CONTROLLED DATA	SUB	CONTROL SIGNAL ARRAY CONTENTS								
TABLE		ADDRESS	7	6	5	4	3	2	1	0	
CTS	Center channel tone control off		*	*			1				
013	Center channel tone control on		*	*			0				
WLS	Woofer LPF off		*	*				1			
WLS	Woofer LPF on		*	*				0			
MT1	All-channel mute	07H	*	*						1	
IVIII	All-channel mute off		*	*						0	
MT2	Center-channel mute Woofer-channel mute		*	*					1		
IVITZ	Center-channel mute off Woofer-channel mute off		*	*					0		

<sup>\* :</sup> Unusable

## **CONTROL SIGNAL MAP IN READ MODE**

The control signals used to return operating status (eg, operating mode) of the peripheral ICs to the microcontroller are as mapped below.

SLAVE	SUB	CONTROL SIGNAL ARRAY CONTENTS								INUTIAL MALLIE
ADDRESS	ADDRESS	7	6	5	4	3	2	1	0	INITIAL VALUE
81H (pin 35 = L) or 83H (pin 35 = H)		POR	*	*	*	*	*	Port 2	Port 1	

<sup>\*:</sup> Unusable

SYMBOL	CONTROLLED DATA	CONTROL SIGNAL (SLAVE ADDRESS : 80H OR 82H)								
IN ABOVE		SUB ADDRESS	CONTROL SIGNAL ARRAY CONTENTS							
TABLE			7	6	5	4	3	2	1	0
POR	Power-on-reset		1	*	*	*	*	*		
Port 2	Port 2 (pin 12) output = H			*	*	*	*	*	0	
FOIL 2	Port 2 (pin 12) output = L			*	*	*	*	*	1	
Port 1	Port 1 (pin 11) output = H			*	*	*	*	*		0
POILI	Port 1 (pin 11) output = L			*	*	*	*	*		1

<sup>\*:</sup> Unusable

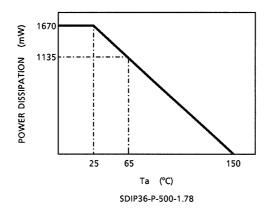


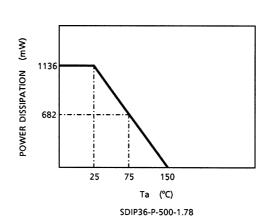
## **MAXIMUM RATINGS (TA1217AN)**

CHARACTERISTIC	SYMBOL	RATING	UNIT
Supply Voltage	V <sub>CCMax</sub> .	14.0	V
Power Dissipation	PD	1670	mW
Operating Temperature	T <sub>opr</sub>	-20~65	°C
Storage Temperature	T <sub>stg</sub>	-55~150	°C

## **MAXIMUM RATINGS (TA1217AF)**

CHARACTERISTIC	SYMBOL	RATING	UNIT
Supply Voltage	V <sub>CCMax</sub> .	14.0	V
Power Dissipation	P <sub>D</sub>	1136	mW
Operating Temperature	T <sub>opr</sub>	-20~75	°C
Storage Temperature	T <sub>stg</sub>	-55~150	°C





## **RECOMMENDED OPERATING CONDITIONS (pin 28)**

CHARACTERISTIC	SYMBOL	MIN	TYP.	MAX	UNIT	REMARKS
Supply Voltage	V <sub>CC</sub>	8.9	9.0	9.9	V	_
Current Consumption	Icc	35	48	65	mA	At power-on-reset
Power Consumption	Pc	315	434	585	mW	At power-on-reset

# ELECTRICAL CHARACTERISTICS DC CHARACTERISTICS Pin voltage

PIN No.	PIN NAME	SYMBOL	TEST CIR- CUIT	MIN	TYP.	MAX	UNIT	REMARKS
1	C-ch LPF	V1	_	4.4	4.9	5.4		_
2	C-ch Input	V2	_	4.4	4.9	5.4		_
3	Woofer Input	V3	_	4.4	4.9	5.4		_
4	W-ch LPF	V4	_	5.1	5.6	6.1		_
5	W-ch LPF	V5	_	5.1	5.6	6.1		_
6	W-ch LPF	V6	_	5.1	5.6	6.1		_
7	Woofer Filter	V7	_	_	0.0	_		When W-ch level = 00H
8	Ripple Filter	V8	_	5.1	5.6	6.1		_
9	GND	V9	_	_	_	_		_
10	Woofer Output	V10		3.7	4.2	4.7		At power-on-reset
11	Port 1	V11	_	_	_	_		_
12	Port 2	V12	_		_			
13	W-ch Offset Filter	V13	_	4.4	4.9	5.4		_
14	Port 3	V14	_	_	_	_		Open-collector output
15	Port 4	V15	_	_	_	_		Open-collector output
16	Output Port	V16	_	_	_	_		Open-collector output
17	Output Port	V17	_	_	_	0.5		3-value output (at low output)
18	C-ch Output	V18	_	3.7	4.2	4.7	V	At power-on-reset
19	C-ch Filter	V19	_	_	0.0	_	<b>"</b>	When C-ch level = 00H
20	SDA	V20	_	1	_	-		_
21	SCL	V21	_	١	_	١		_
22	Balance Filter	V22	_	4.4	4.9	5.4		When balance = 32H
23	Volume Filter	V23	_	1	0.0	1		When volume = 00H
24	Bass Filter	V24	_	4.4	4.9	5.4		When bass = 32H
25	L-ch Output	V25	_	3.7	4.2	4.7		At power-on-reset
26	R-ch Output	V26	_	3.7	4.2	4.7		At power-on-reset
27	R-ch LPF	V27	_	4.4	4.9	5.4		
28	V <sub>CC</sub>	V28	_	-	9.0	_		_
29	R-ch HPF	V29	_	4.4	4.9	5.4		_
30	R-ch Input	V30	_	4.4	4.9	5.4		_
31	Treble Filter	V31	_	4.4	4.9	5.4		When treble = 32H
32	L-ch LPF	V32	_	4.4	4.9	5.4		_
33	L-ch HPF	V33	_	4.4	4.9	5.4		
34	L-ch Input	V34	_	4.4	4.9	5.4		_
35	Address Switch	V35	_	_	_	_		Slave address switching pin
36	C-ch HPF	V36	_	4.4	4.9	5.4		_



## **AC CHARACTERISTICS**

CHARACTE	RISTIC	SYMBOL	TEST CIR- CUIT	TEST CONDITION	TEST PIN	MIN	TYP.	MAX	UNIT	
		Gv.L			Pin 25					
Gain		Gv.R	2	(Note 1)	Pin 26	-0.2	1.8	3.8	dB	
Can		Gv.C		(Note 1)	Pin 18				_ ub	
	•	Gv.W			Pin 10	9.0	12.0	15.0		
		THD.L			Pin 25					
Total Harmonic Distor	tion	THD.R	2	(Note 2)	Pin 26		0.25	1.1	%	
Total Harmonic Distor	tion	THD.C		(Note 2)	Pin 18		0.23	1.1	70	
		THD.W			Pin 10					
		SN.L			Pin 25			-70		
S/N	•	SN.R	2	(Note 2)	Pin 26		_		dB	
5 / N	•	SN.C	7	(Note 3)	Pin 18	_				
	•	SN.W			Pin 10					
		V <sub>NO</sub> .L			Pin 25				μV <sub>p-p</sub>	
Residual Noise	•	V <sub>NO</sub> .R	2	(Note 4)	Pin 26		_	50		
Residual Noise	•	V <sub>NO</sub> .C		(Note 4)	Pin 18	_				
	•	V <sub>NO</sub> .W			Pin 10					
		FC <sub>L</sub> .L			Pin 25					
Frequency Characteri (100Hz)	stic	FC <sub>L</sub> .R	2	(Note 5)	Pin 26	-2	0	2	dB	
(1001)	•	FC <sub>L</sub> .C			Pin 18					
		FC <sub>H</sub> .L			Pin 25		0	2		
Frequency Characteri (10kHz)	stic	FC <sub>H</sub> .R	2	(Note 6)	Pin 26	-2			dB	
(10.11.12)	•	FC <sub>H</sub> .C			Pin 18					
	fc = 60Hz	FCo.W1				-11	-7	-4		
LPF Frequency	fc = 80Hz	FCo.W2	1	(NIata 7)	Dia 40	-8	-5	-2	40	
Characteristic (160Hz)	fc = 100Hz	FCo.W3	2	(Note 7)	Pin 10	-7	-4	-1	dB	
	fc = 120Hz	FCo.W4				-16	-9	-1		
Balance Center	•	ΔV <sub>L-R</sub>	2	(Note 8)	Pin 25, Pin 26	-2	0	2	dB	
Balance Minimum		$V_{LMIN}$	2	(Note 9)	Pin 25			-60	dB	
Daiance Willing	·	$V_{RMIN}$	7	(Note 9)	Pin 26		_	-00	ub	
		$V_{TMAX}L$			Pin 25					
Treble Maximum	V <sub>TMAX</sub> R	2	(Note 10)	Pin 26	6.0	8.0	10.0	dB		
					Pin 18					
					Pin 25					
Treble Minimum	•	V <sub>TMIN</sub> R	2	(Note 11)	Pin 26	-10.0	-8.0	-6.0	dB	
	•	V <sub>TMIN</sub> C	1		Pin 18	1				

CHARACTERISTIC	SYMBOL	TEST CIR- CUIT	TEST CONDITION	TEST PIN	MIN	TYP.	MAX	UNIT
	V <sub>BMAX</sub> L			Pin 25				
Bass Maximum	V <sub>BMAX</sub> R	2	(Note 12)	Pin 26	6.0	8.0	10.0	dB
	V <sub>BMAX</sub> C			Pin 18				
	V <sub>BMIN</sub> L			Pin 25			-6.0	
Bass Minimum	V <sub>BMIN</sub> R	2	(Note 13)	Pin 26	-10.0	-8.0		dB
	V <sub>BMIN</sub> C			Pin 18				
	V <sub>VCEN</sub> L			Pin 25				
Valuma Cantar	V <sub>VCEN</sub> R	2	(Note 14)	Pin 26	10	16	10	dB
Volume Center	V <sub>VCEN</sub> C		(Note 14)	Pin 18	-18	-16	-13	uБ
	V <sub>VCEN</sub> W			Pin 10				
Level Center	V <sub>LCEN</sub> C	2	(Note 15)	Pin 18	-9.0	-7.0	-5.0	dB
Level Certier	V <sub>LCEN</sub> W		(Note 15)	Pin 10	-9.0	-7.0	-5.0	uБ
	V <sub>M</sub> .L			Pin 25			100	
Decidual Naine	V <sub>M</sub> .R		(Nata 40)	Pin 26	_	_		μV <sub>p-p</sub>
Residual Noise	V <sub>M</sub> .C	2	(Note 16)	Pin 18				
	V <sub>M</sub> .W			Pin 10				
	CR <sub>L-R</sub>			Pin 26				
	CR <sub>R-L</sub>			Pin 25				
	CR <sub>L-C</sub>		01.1.47	Pin 18	- - -			dB
	CR <sub>R-C</sub>			Pin 18			80	
	CR <sub>C-L</sub>			Pin 25		_	80	
O T-II-	CR <sub>C-R</sub>			Pin 26				
Cross Talk	CR <sub>L-W</sub>	2	(Note 17)	Pin 10				
	CR <sub>R-W</sub>			Pin 10				
	CR <sub>C-W</sub>			Pin 10	_	_	60	
	CR <sub>W-L</sub>			Pin 25				
	CR <sub>W-R</sub>			Pin 26	_	_	80	
	CR <sub>W-C</sub>			Pin 18				
	RR.L			Pin 25				
Ripple Rejection Ratio (Minimum Volume)	RR.R	2	(Note 18)	Pin 26	_	_	-30	dB
()	RR.C			Pin 18				
	RR' L			Pin 25				
Ripple Rejection Ratio (Maximum Volume)	RR'.R	2	(Note 19)	Pin 26	1 —	_	-30	dB
(	RR'.C	1		Pin 18	1			
	V <sub>OUT</sub> .L			Pin 25				
Outsid Days 1 D	V <sub>OUT</sub> .R	1	(1) ( 60)	Pin 26	1 , -	_	_	V
Output Dynamic Range	V <sub>OUT</sub> .C	2	(Note 20)	Pin 18	6.5			
	V <sub>OUT</sub> .W	1		Pin 10	1			

CHARACTERISTICS	SYMBOL	TEST CIR- CUIT	TEST CONDITION	TEST PIN	MIN	TYP.	MAX	UNIT
	V <sub>IN</sub> .L			Pin 34				
Innut Dunamia Danga	V <sub>IN</sub> .R	2	(Note 21)	Pin 30	5.0	5.4	_	V
nput Dynamic Range	V <sub>IN</sub> .C		(Note 21)	Pin 2				V
	V <sub>IN</sub> .W			Pin 3	3.5	4.4	_	
	ΔV <sub>BAS</sub>							
	ΔV <sub>TRB</sub>			Pin 25, Pin26				
Offset	ΔV <sub>VCL</sub>	2	(Note 22)			110	350	m\/
Oliset	ΔV <sub>CL</sub>		(Note 22)	Pin 18		110	330	mV
	$\Delta V_{WL}$			Pin 10				
	$\Delta V_{BAL}$			Pin 25, Pin26				
	MU.M			Pin 25				
Mute Residual Sound	MU.C	2	(Note 23)	Pin 18	_	_	100	µVр-р
	MU.W			Pin 10				
LPF Off Mode	SW. <sub>L</sub>	2	(Note 24)	Pin 10	-2	0	2	dB
Port 1, Port 2 Low-Level Input	V <sub>1L</sub>	2	(Note 25)	Pin 11			1.0	V
Voltage	V1L		(Note 25)	Pin 12	_	_	1.0	v
Port 1, Port 2 High-Level Input	V <sub>1H</sub>	2	(Note 26)	Pin 11	3.5	_	V <sub>CC</sub>	V
Voltage	<b>V</b> 1H		(Note 20)	Pin 12	_	_	_	v
Port 6 Low-Level Output Voltage	V <sub>6Lo</sub>	2	(Note 27)	Pin 17	_	_	0.5	V
Port 6 Medium-Level Output Voltage	V <sub>6Mid</sub>	2	(Note 28)	Pin 17	2.0	2.5	3.0	V
Port 6 High-Level Output Voltage	V <sub>6Hi</sub>	2	(Note 29)	Pin 17	4.5	5.0	_	V
Port 6 Source Current	I <sub>HiP6</sub>	2	(Note 30)	Pin 17	_	_	2	mA
Port 6 Sink Current	I <sub>LoP6</sub>	2	(Note 31)	Pin 17	_	_	300	μΑ
Port 3, Port 4, Port 5 Sink Current	ILo	2	(Note 32)	Pin 14, Pin 15, Pin 16	_	_	1	mA

## **TEST CONDITION**

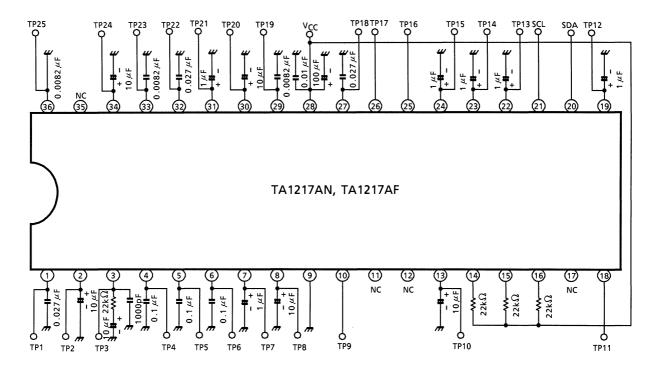
NOTE	CHARACTE	FRIST	IC.		SET		E OF M I2C			DATA		INPUT	TEST METHOD
No.	011/11/01/01/1		10	00H	01H	02H		04H	05H	06H	07H	SIGNAL	TEOT METHOD
1	Gain		L-ch	32H	32H	64H	64H	64H	32H	20H	10H	1kHz, 500mV	Measure gain
			R-ch										between input and output.
			C-ch										
			W-ch									80Hz, 500mV	
2	Total Harmonic		L-ch	1	1	<b></b>	<b>↑</b>	<b>↑</b>	$\uparrow$	1	1	1kHz, 500mV	Measure distortion
	Distortion		R-ch										ratio.
			C-ch										
			W-ch									80Hz, 500mV	
3	S/N		L-ch	1	1	<b>↑</b>	1	1	<b>↑</b>	1	1	1kHz, 500mV	When signal level is A
			R-ch										and non-signal level is B, determine
			C-ch										20 ℓog (A / B).
			W-ch									80Hz, 500mV	Use 15 kHz LPF.
4	Residual Noise		L-ch	1	1	<b></b>	<b>↑</b>	00H	$\uparrow$	1	1	AC ground	Use LPF of 15 kHz,
			R-ch									(non-signal)	noise level at minimum volume.
			C-ch										
			W-ch										
5	Frequency		L-ch	1	1	<b></b>	<b>↑</b>	64H	$\uparrow$	1	1	100Hz,	Output level is 0dB
	Characteristic (100Hz)		R-ch									500mV	when 1 kHz signal is input.
			C-ch										
6	Frequency		L-ch	1	1	<b>↑</b>	<b>↑</b>	<b>↑</b>	$\uparrow$	1	1	10kHz,	Ditto
	Characteristic (10kHz)		R-ch									500mV	
			C-ch										
7	LPF Frequency	fc =	60Hz	1	1	<b></b>	1	<b>↑</b>	$\rightarrow$	1	00H	500mV	Difference from fo = 80Hz
	Characteristic (160 Hz)	fc =	80Hz								10H		Difference from fo = 100Hz
		fc =	100Hz								20H		Difference from fo = 120Hz
		fc =	120Hz								30H		Difference from LPF off
8	8 Balance Center		1	1	<b>↑</b>	1	1	1	1	10H	1kHz, 500mV	Measure gain difference between L and R.	
9	Balance Minimum L-ch		L-ch	1	1	<b>↑</b>	<b>↑</b>	<b>↑</b>	64H	1	1	1kHz, 500mV	Measure residual sound at minimum
			R-ch						00H				balance. Use 1kHz BPF.

NOTE				SET			CONT		INPUT			
No.	CHARACTERIS	STIC	00H	01H	FRC 02H	03H	BUS I	INE 05H	06H	07H	SIGNAL	TEST METHOD
10	Treble Maximum	L-ch	1	64H	1	1	1	32H	↑	↑	10kHz,	Output level is 0dB
		R-ch	'		'	'	'		'	'	500mV	when 1 kHz signal is input with tone flat.
		C-ch										input with tone hat.
11	Treble Minimum	L-ch	32H	00H	64H	64H	64H	32H	20H	10H	10kHz,	Output level is 0dB
		R-ch									500mV	when 1 kHz signal is input with tone flat.
		C-ch										
12	Bass Maximum	L-ch	64H	32H	1	1	1	1	<b>↑</b>	1	100Hz,	
		R-ch									500mV	Ditto
		C-ch										
13	Bass Minimum	L-ch	00H	1	1	1	1	1	<b>↑</b>	<b></b>	100Hz,	
		R-ch									500mV	Ditto
		C-ch									0001114	
14	Volume Center	L-ch	32H	1	32H	1	1	1	<b>↑</b>	1	80Hz, 500mV	0 dB at maximum volume.
		R-ch										volume.
		C-ch									80Hz, 500mV	
		W-ch										
15	Level Center	C-ch	1	1	64H	32H	32H	1	<b>↑</b>	<b>↑</b>	1kHz, 500mV	0 dB at maximum level.
		W-ch										icvoi.
16	Residual Noise	L-ch	1	1	00H	00H	00H	1	<b>↑</b>	1	80Hz, 500mV	Measure output amplitude at
		R-ch										ampilitude at
		C-ch										minimum volume.
		W-ch										
17	Cross Talk	L→R	1	1	64H	64H	64H	1	<b>↑</b>	<b>↑</b>	1kHz, 500mV	R output at L input.
		R→L										L output at R input
		L→C										C output at L input
		R→C									80Hz, 500mV	C output at R input
		C→L										L output at C input
		C→R										R output at C input
		L→W										W output at L input
		R→W										W output at R input.
		C→W										W output at L input
		W→L										L output at W input
		W→R										R output at W input
		W→C										C output at W input
18	Ripple Rejection Ratio (Minimum Volume)	L-ch	1	1	1	1	1	1	<b>↑</b>	<b>↑</b>	60Hz, 500mV	Apply $V_{CC}$ via 51 $\Omega$ and input signal from pin 28.
	, , , , , , , , , , , , , , , , , , , ,	R-ch										
		C-ch										

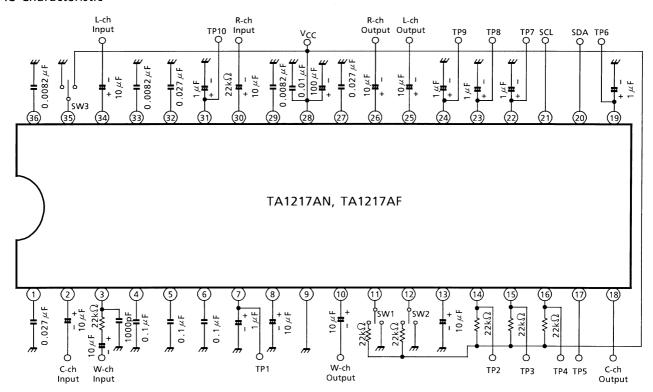
NOTE					SET	VALU	E O.F (	CONT	ROL D	ATA		INPUT	
No.	CHARACTE	ERIST	TC	00H	01H	FRO 02H	M I <sup>2</sup> C 03H		_INE 05H	06H	07H	SIGNAL	TEST METHOD
19	Ripple Rejection		L-ch	32H	32H	64H	64H	64H	32H	20H	10H	60 Hz, 500 mV	Apply V <sub>CC</sub> via 51Ω
	Ratio												and input signal from pin 28.
	(Maximum Volum	e)	C-ch										,
			W-ch										
20	Output Dynamic		L-ch	64H	64H	1	1	1	1	1	1	100 Hz, 10kHz	Output amplitude at
	Range		R-ch										output distortion
			C-ch										(THD = 1%)
			W-ch									80 Hz	
21	Input Dynamic		L-ch	32H	32H	32H	1	1	1	1	1	1 kHz	Input amplitude at
	Range		R-ch										output distortion
			C-ch										(THD = 1%)
			W-ch									80 Hz	
22	Offset	BAS	3	*						1	1	AC ground	DC change
		TRB	3		*								according to bass control.
		VOL	-			*							* : Arbitrary data
		C LEV					*						
		W L	EV					*					
		BAL							*				
23	Mute Residual So	ound	L-ch	32H	32H	64H	64H	64H	32H	1	11H	1kHz, 500mV	_
			C-ch								12H		
			W-ch									80Hz, 500mV	
24	LPF Off Mode		W-ch	1	1	1	1	1	1	1	14H	1kHz, 500mV	_
25	Port1, Port2 Low- Level Input Voltag		_	_	_	ı	ı	l	_	_	_	1	_
26	Port 1, Port 2 Hig Level Input Voltag		_	_	_	-	-	-	_	_	_		_
27	Port 6 Low-Level Output Voltage		_	_	_	_	_	_	20H	_	_	_	_
28	Port 6 Medium-Le Output Voltage	evel	_	_	_	_	_	_	10H	_	_	_	_
29	Port 6 High-Level Output Voltage		_	_	_	_	_	_	30H	_	_	_	_
30	Port 6 Source Current		_	_	_	_	_	_	20H	_	_	_	_
31	Port 6 Sink Curre	nt	_	_	_	_	_	_	10H	_	_	_	_
32	Port 3, Port 4, P Sink Current	ort 5	_	_	_	_	_	_	1FH	_	_	_	_

#### **TEST CIRCUIT**

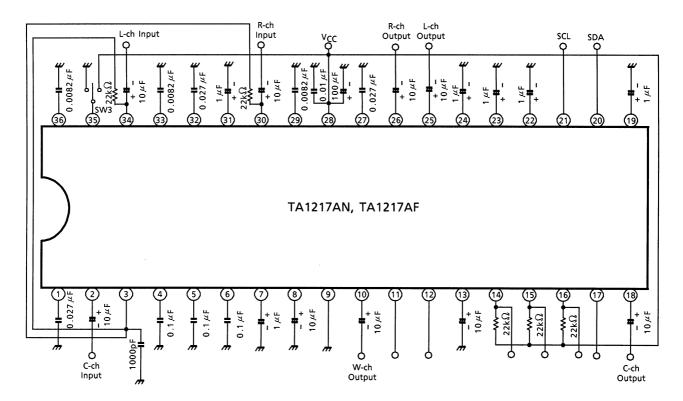
#### DC Characteristic



#### AC Characteristic



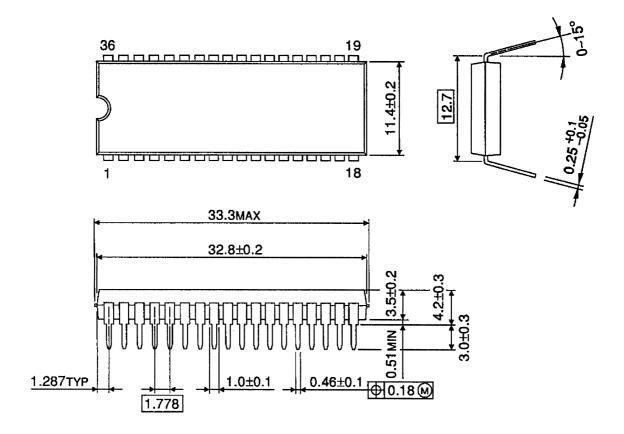
## **APPLICATION CIRCUIT**





## **PACKAGE DIMENSIONS**

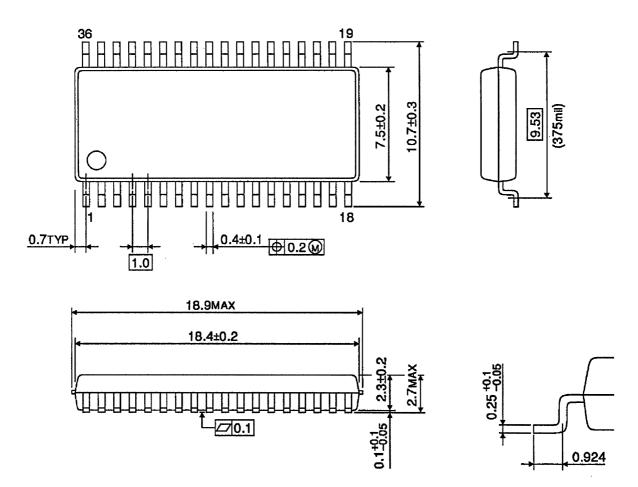
SDIP36-P-500-1.78 Unit: mm



Weight: 2.98g (Typ.)

## **PACKAGE DIMENSIONS**

SSOP36-P-375-1.00 Unit: mm



Weight: 0.72 g (Typ.)