



# TP5208

## 64K SRAM Echo Processor

# *DataSheet*

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# TP5208

## 64K SRAM

### *Echo Processor*

### Description

The TP5208 is a developed for producing echo effects added to voice signals picked up by microphone for karaoke applications. The IC has the largest memory among the digital delay series. As its design is aimed at high performance, it is best suited to provide radio cassette tape recorders and miniature unit audio system with quality echo function.

Being pin compatible with the Mitsubishi M65831AP/FP, M65830CP/FP, and M65843AP/FP, the TP5208 is suitable for upgrading the series.

### Features

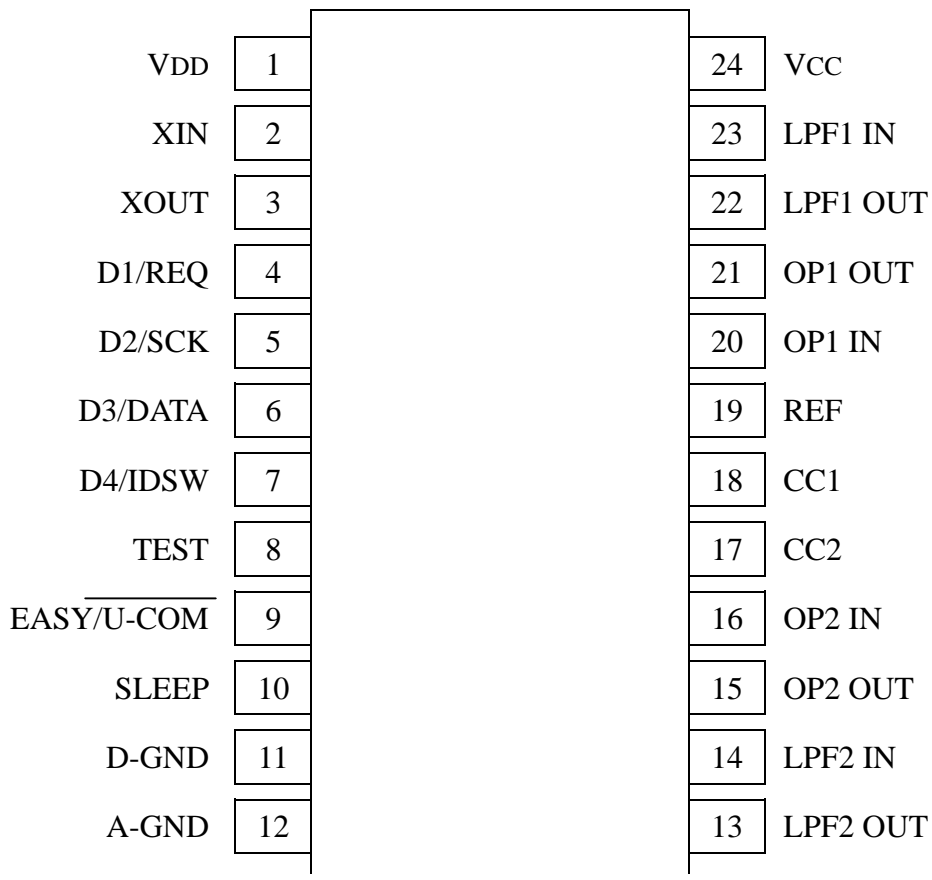
- Built-in input/output filters, A-D and D-A converters and memory realize a delay system with only a single chip
- Capable of composing low-noise and low-distortion delay system at low cost by ADM system (No= -88dB typ, THD=0.17% typ)
- Control mode selections available from 2 kinds: easy mode using parallel data and microcomputer mode using serial data
- Sleep mode can be selected to stop IC functions
- Built-in automatic reset circuit



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### Pin Configuration



24 PINS DIP/SOP

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#### Pin Description

No.	Symbol	Name	I/O	Function
1.	VDD	Digital VDD		Supply voltage
2.	XIN	Oscillator input	I	
3.	XOUT	Oscillator input	O	Connects to 2MHz ceramic filter
4.	D1/REQ	Delay1/Request	I	Easy mode: inputs D1 data U-COM mode: inputs request data
5.	D2/SCK	Delay2/Shift clock	I	Easy mode: inputs D2 data U-COM mode: inputs shift clock
6.	D3/DATA	Delay3/Serial data	I	Easy mode : inputs D3 data U-COM mode: inputs shift data
7.	D4/IDSW	Delay4/ID switch	I	Easy mode : inputs D4 data U-COM mode: controls ID code
8.	TEST	Test	I	L= normal mode
9.	EASY/U-COM	EASY/U-COM	I	H= Easy mode L= U-COM mode
10.	SLEEP	Sleep	I	H= sleep mode L= normal mode
11.	DGND	Digital GND		Connects to analog GND at one point
12.	AGND	Analog GND		Connects to analog GND
13.	LPF2 OUT	Low pass filter2 output	O	Forms low pass filter with external C, R
14.	LPF2 IN	Low pass filter2 input	I	
15.	OP2 OUT	OP-AMP2 output	O	Forms integrator with external C.R
16.	OP2 IN	OP-AMP2 input	I	
17.	CC2	Current control 2		
18.	CC1	Current control 1		
19.	REF	Reference		= 1/2 VCC
20.	OP1 IN	OP-AMP1 input	I	Forms integrator with external C, R
21.	OP1 OUT	OP-AMP1 output	O	
22.	LPF1 OUT	Low pass filter1 output	O	Forms low pass filter with external C, R
23.	LPF1 IN	Low pass filter1 input	I	
24.	VCC	Analog Vcc		Supply voltage



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### Operation

1) EASY Mode (EASY / U-COM =H)

D4	D3	D2	D1	fs	Td
L	L	L	L	666	12.3
L	L	L	H	666	24.6
L	L	H	L	666	36.9
L	L	H	H	666	49.2
L	H	L	L	666	61.4
L	H	L	H	666	73.7
L	H	H	L	666	86.0
L	H	H	H	666	98.3
H	L	L	L	333	110.6
H	L	L	H	333	122.9
H	L	H	L	333	135.2
H	L	H	H	333	147.5
H	H	L	L	333	159.7
H	H	L	H	333	172.0
H	H	H	L	333	184.3
H	H	H	H	333	196.6

f s : Sampling Frequenct (KHz)

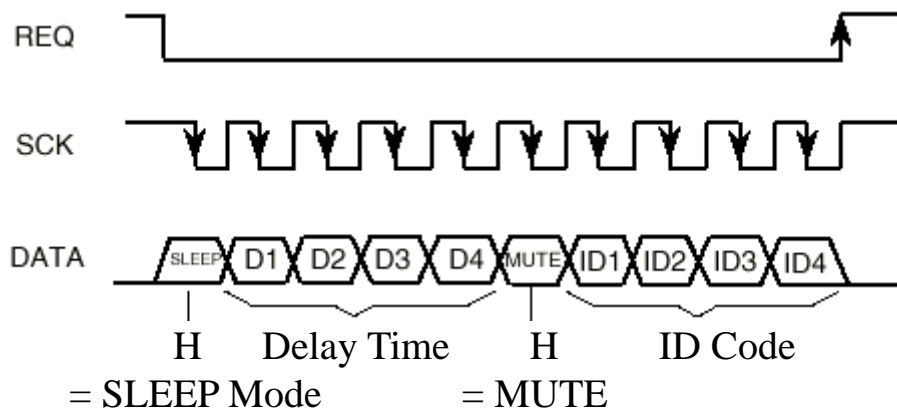
Td : Delay Time (msec)

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#### 2) U-COM Mode (EASY / U-COM =L)



This Timing chart shows that delay time is set by serial data from U-COM. DATA signal is latched at the falling edge of SCK signal, the last ten data are set at the rising edge of REQ signal when ID codes are satisfied.

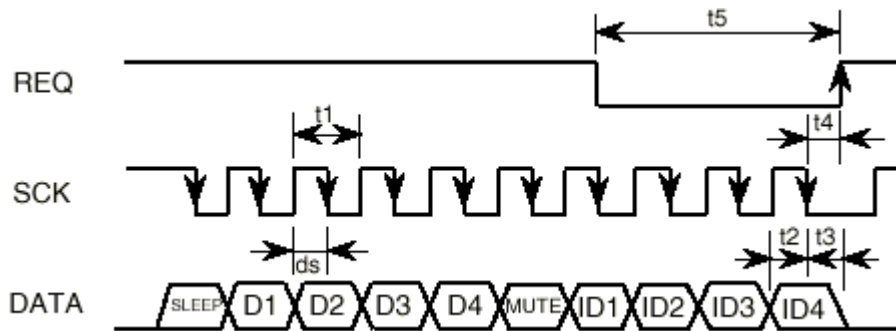
- ID1, ID3: L
- ID2 : H
- ID4 : equal to IDSW



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#### REQ, SCK, DATA Input Timing

Symbol	Parameter	Range			Units
		min	typ	max	
t1	SCK Pulse Width	250			ns
ds	SCK Pulse Duty		50		%
t2	DATA Setup Time	100	t1/2		ns
t3	DATA Hold Time	100	t1/2		ns
t4	REQ Hold Time	100			ns
t5	REQ Pulse Width	250			ns

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### 3) MUTING

#### (a) EASY mode

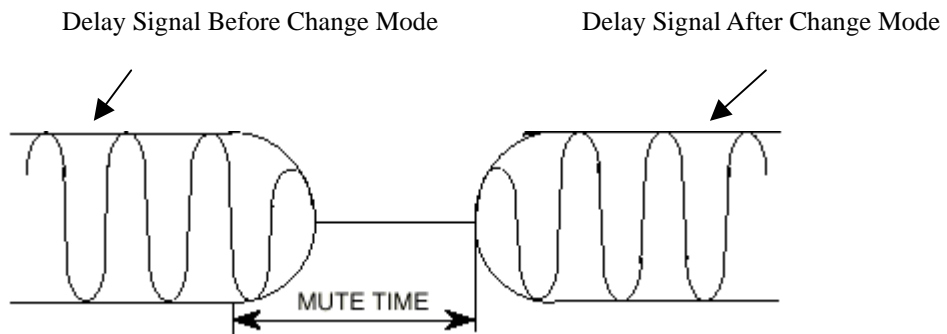
Automatic mute upon changing delay time, cancelling SLEEP mode and power-on.

#### (b) U-COM mode

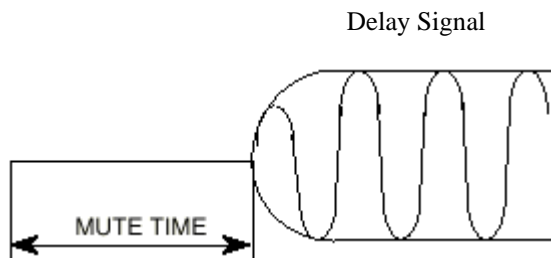
MUTE= H: mute

MUTE= L: automatic mute

### Automatic Mute:



#### (a) Upon Changing Delay Time



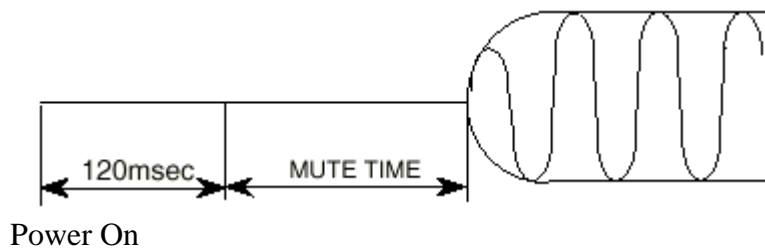
#### (b) Upon Cancelling SLEEP Mode

Delay Signal

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(c) Upon Power-On

#### 4) SLEEP Mode

SLEEP data is

H: clock and RAM stop to reduce circuit current (SLEEP mode)

L: normal operation

#### 5) System Reset

Automatically reset power-on. The reset time is about 120msec.

Delay time is set at 147.5msec.



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#### Absolute Maximum Ratings ( $T_a=25^\circ\text{C}$ , unless otherwise noted)

Symbol	Parameter	Ratings	Units
V <sub>cc</sub>	Supply Voltage	6.5	V
I <sub>cc</sub>	Supply Current	100	mA
P <sub>d</sub>	Power Dissipation	1.7	W
T <sub>opr</sub>	Operating Temperature	-20~75	
T <sub>stg</sub>	Storage Temperature	-25~125	

#### Recommended Operating Conditions

Symbol	Parameters	Range			Units
		Min	Typ	Max	
V <sub>CC</sub>	Supply Voltage	4.5	5	5.5	V
V <sub>DD</sub>	Supply Voltage	4.5	5	5.5	V
V <sub>CC-VDD</sub>	Difference Voltage	-0.3	0	0.3	V
f <sub>ck</sub>	Clock Frequency	1	2	3	MHz
V <sub>IH</sub>	High Input Voltage	0.7V <sub>DD</sub>			V
V <sub>IL</sub>	Low Input Voltage			0.3V <sub>DD</sub>	V



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#### Electrical Characteristics

( $V_{cc}=5.0V$  ,  $f_{in}=1KHz$  ,  $V_i=100mV_{rms}$  ,  $f_{ck}=2MHz$  ,  $T_a=25$  , unless otherwise noted)

Symbol	parameter	Test Conditions	Min	Typ	Max	Units
I <sub>cc</sub>	Circuit Current	No Signal		36	50	mA
G <sub>v</sub>	Voltage gain	R <sub>L</sub> =47KΩ		-0.5	2.5	dB
V <sub>omax</sub>	Maximum Output Voltage	THD=10%	1.0	1.6		V <sub>rms</sub>
THD	Output Distortion	30KHz		0.17	0.8	%
		L.P.F.	f <sub>s</sub> =666KHz		0.4	1.2
TMUTE	Mute Time	Upon Changing Delay Time 在四消音时间	508	528	548	ms
		Upon Cancelling Sleep Mode	508	528	548	ms
No	Output Noise Voltage	DIN-AUDIO(f <sub>s</sub> =333KHz)		-88	-80	dBV

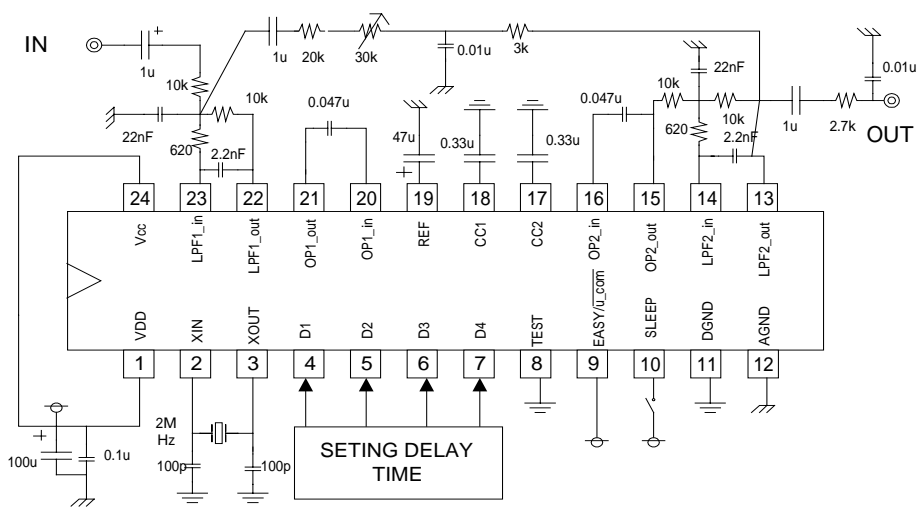
#### D.C. Characteristics

Symbol	Parameters	Range			Units
		Min	Typ	Max	
V <sub>cc</sub>	Supply Voltage	4.5	5	5.5	V
I <sub>cc</sub>	Supply Current		60	80	mA
V <sub>IH</sub>	High Input Voltage	0.7V <sub>DD</sub>			V
V <sub>IL</sub>	Low Input Voltage			0.3V <sub>DD</sub>	V

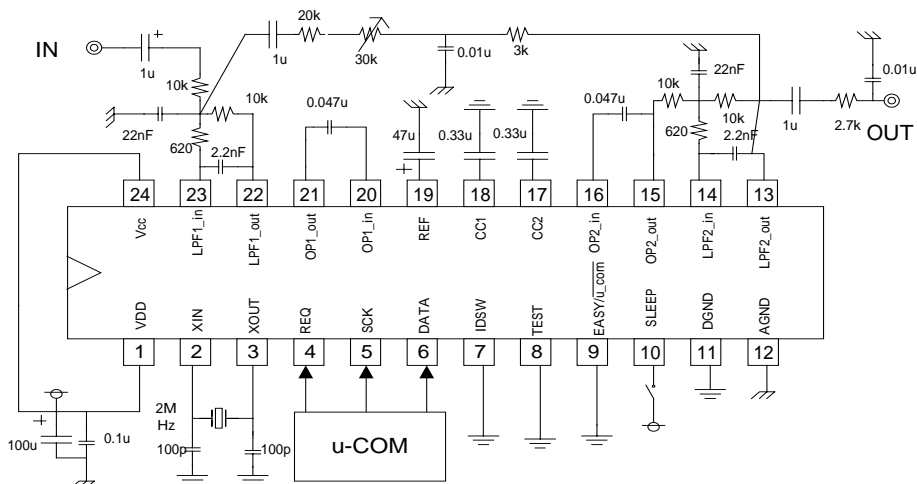
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### Application Circuit



### EASY Mode



### U-COM Mode



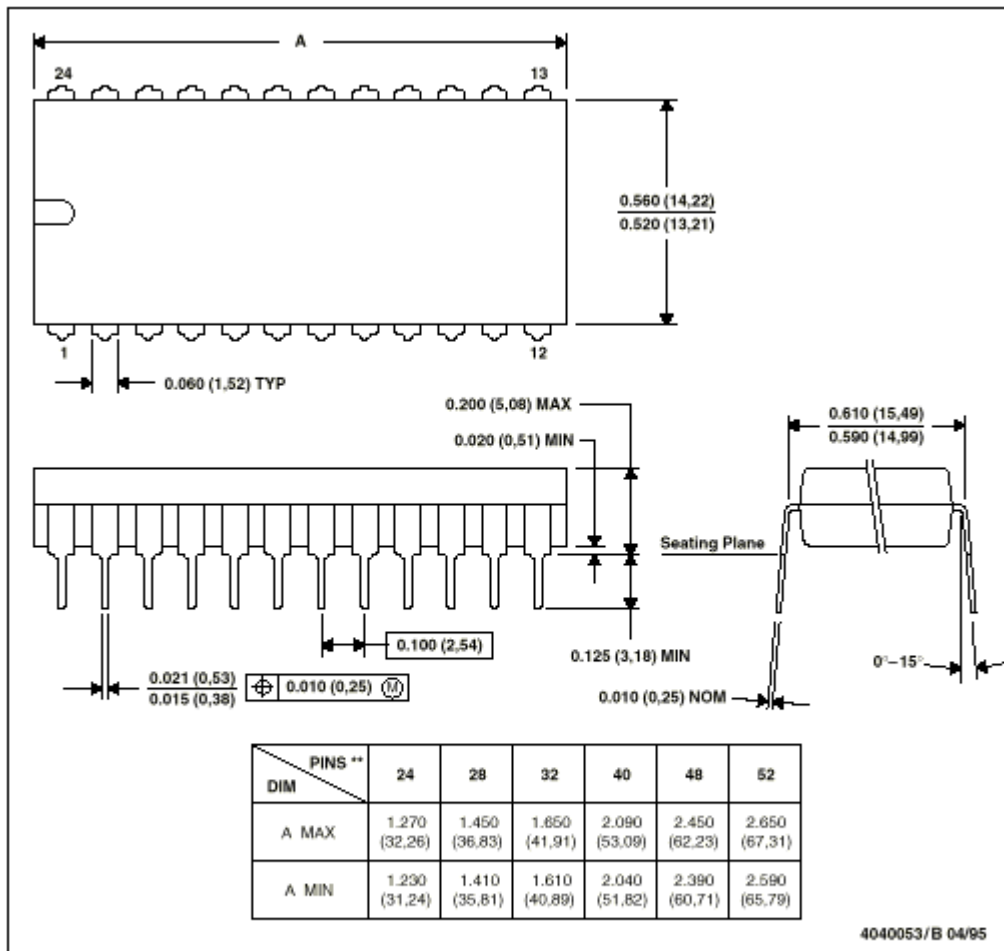
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### IC Package Information

#### TP5208P(24-DIP)



NOTES: A. All linear dimensions are in inches (millimeters).  
 B. This drawing is subject to change without notice.  
 C. Falls within JEDEC MS-011  
 D. Falls within JEDEC MS-015 (32 pin only)