M50197P,FP

SINGLE CHIP DIGITAL ECHO

DESCRIPTION

The M50197P, FP is a single chip digital echo IC fabricated with silicon-gate CMOS techpology.

The M50197P, FP converts an input analog signal and writes it external memory. After a delay it reads out the digital signal from memory and then converts to an analog signal again.

FEATURES

- Includes an A-D D-A converter (Adaptive Delta Modulation), two low pass filters and a 20K-bit SRAM, making it possible to form a low cost digital delay system.
- Low noise, Low distortion
  Surround mode : Noise(−90dBV typ), Distortion(0.3% typ)
  Echo mode : Noise(−90dBV typ), Distortion(1.8% typ)
- Delay times : Surround mode···From 4.1 msec to 41 msec by 5 msec (eight steps)
  Echo mode···From 20.5 msec to 163.8 msec (eight steps)
- Delay time and mode can be controlled by μ-COM or manual setting
- Includes auto mute circuit, to protest sound from digital noise caused by delay time mode change or power
- Two control mode can be selected for delay time and mode setting, Easy mode contol by 4-bit parallel data and μ-COM mode control by serial data
- Includes auto reset circuit

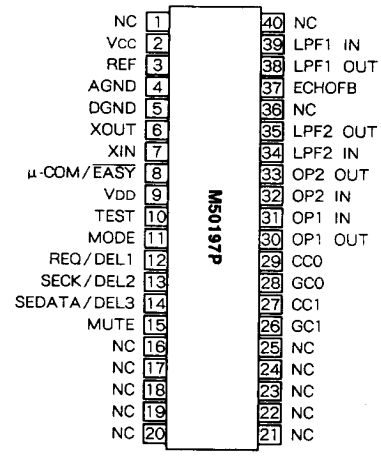
APPLICATION

Karaoke, TV, VCR, Surround processor, Electronic instrument

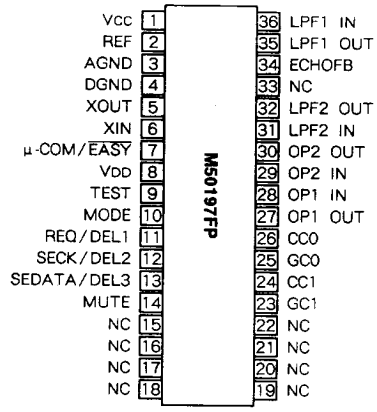
RECOMMENDED OPERATING CONDITIONS

Supply voltage range ····· 4.5~5.5V
Rated supply voltage ····· 5V

PIN CONFIGURATION (TOP VIEW)



Outline 40P4B

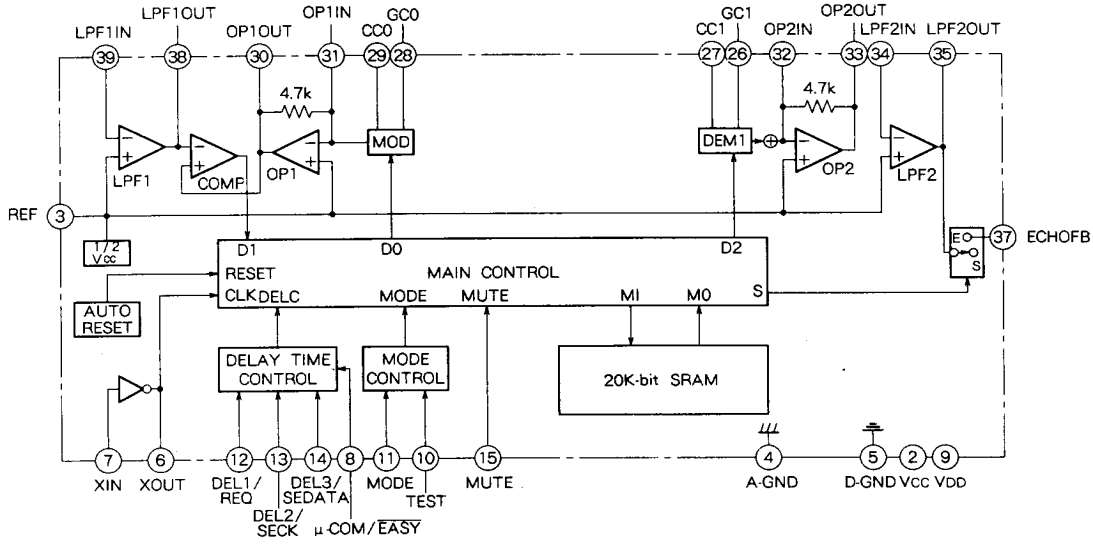


Outline 36P2R-A

NC : NO CONNECTION

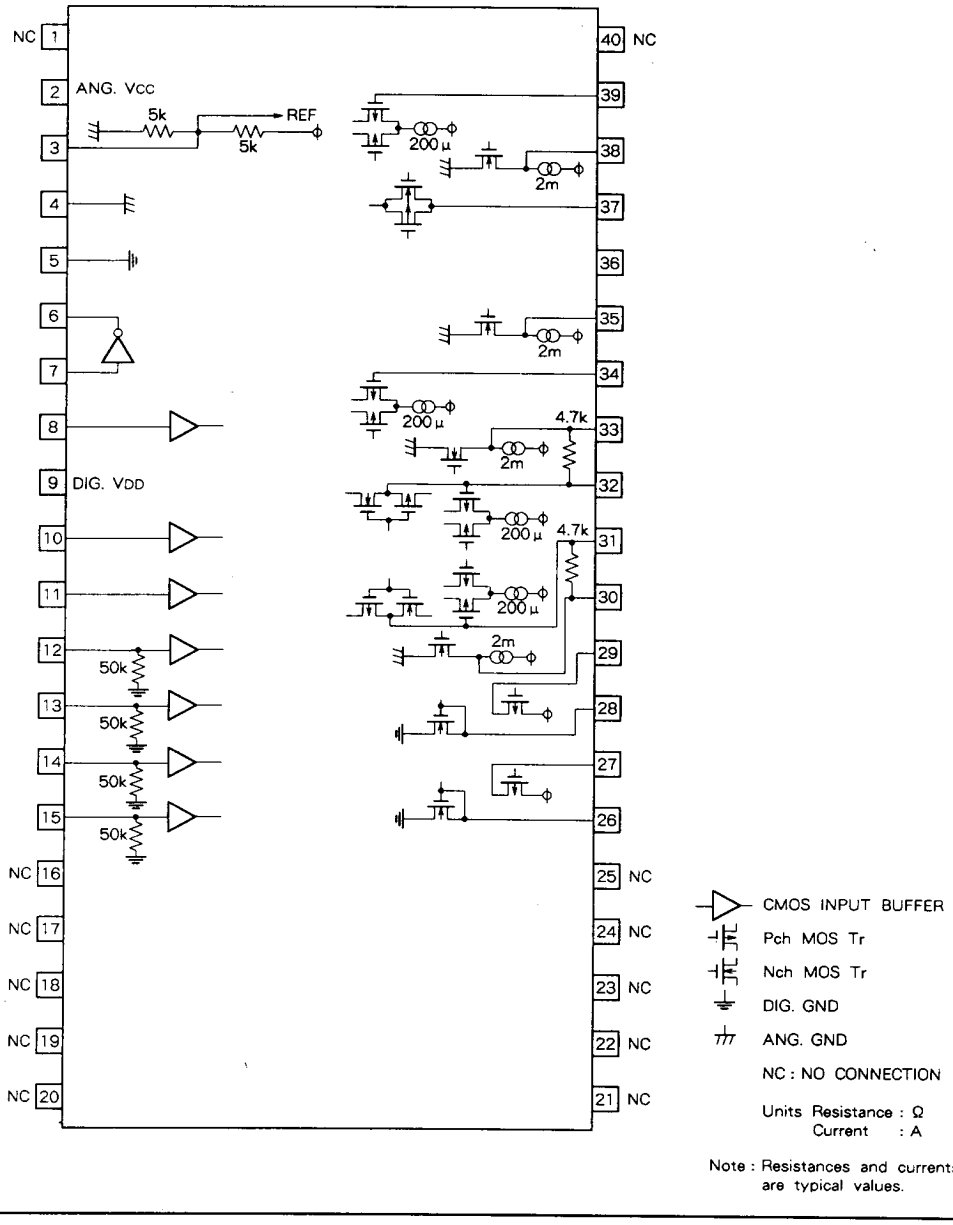
MITSUBISHI ELECTRIC

BLOCK DIAGRAM (M50197P)



Unit Resistance : Ω

M50197P I/O INTERFACE



ABSOLUTE MAXIMUM RATINGS (Ta = 25℃, unless otherwise noted)

Symbol	Parameter	Conditions	Ratings	Unit
V_{CC}	Supply voltage		6.5	V
I_{CC}	Circuit current		150	mA
P_d	Power dissipation		1.7	W
T_{opr}	Operating temperature		−20～+75	℃
T_{stg}	Storage temperature		−40～+125	℃

RECOMMENDED OPERATING CONDITIONS

Symbol	Parameter	Conditions	Limits			Unit
			Min	Typ	Max	
V_{CC}	Supply voltage		4.5	5	5.5	V
f_{ck}	Clock frequency		3	4	6	MHz
V_{IH}	High input voltage		0.7V_{DD}		V_{DD}	V
V_{IL}	Low input voltage		0		0.3V_{DD}	V

ELECTRICAL CHARACTERISTICS (V_{CC} = 5V, f = 1kHz, V_i = 100mVrms, f_{ck} = 4MHz, Ta = 25℃, unless otherwise noted)

Symbol	Parameter	Test conditions		Limits			Unit
				Min	Typ	Max	
I_{CC}	Circuit current				65	100	mA
G_V	Voltage gain	R_L = 47kΩ		−3.5	−0.5	2.5	dB
V_{Omax}	Maximum output voltage	THD = 10%		0.7	1.4		Vrms
THD	Output distortion	30kHz L.P.F	Echo mode		1.8	3	%
			Surround mode		0.3	1	
No	Output noise voltage	DIN Audio	Echo mode		−90	−70	dBV
			Surround mode		−90	−75	
SVRR	Supply voltage rejection ratio	△Vcc = −20dBv, f = 100Hz			−40	−25	dB
TMUTE	Mute time	Echo mode		515		525	ms
		Surround mode		122		132	

DELAY TIME

1. MODE

Mode	Mode	Echofb output
L	Surround mode	OFF
H	Echo mode	ON

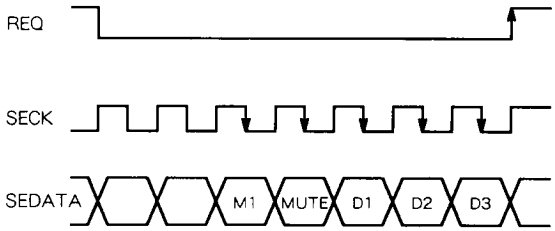
2. EASY MODE (Parallel Data Input) μ-COM/$\overline{\text{EASY}}$=L (fck=4.0MHz)

Pin name (Note1)				Surround mode		Echo mode	
μ-COM/$\overline{\text{EASY}}$	DEL1	DEL2	DEL3	fs	Td	fs	Td
L	L	L	L	500	4.1	250	20.5
	H	H	L		10.2		41.0
	H	L	L		14.3		61.4
	L	H	L		20.5		81.9
	H	L	H	500	24.6	125	98.3
	L	L	H		30.7		122.9
	L	H	H		34.8		139.3
	H	H	H		41.0		163.8

fs = Sampling frequency (kHz), Td = Delay time (msec)
Note 1. DEL1, DEL2, DEL3, and MUTE are input pins with pull-down.

3. μ-COM MODE (Serial Data Input)

TIMING DIAGRAM (μ-COM/$\overline{\text{EASY}}$=H)



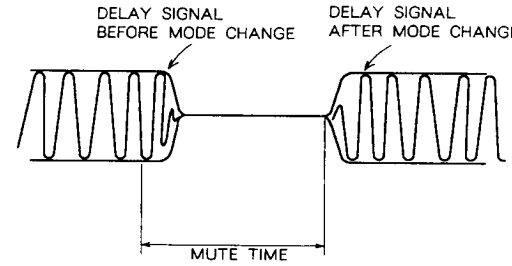
D1 = DEL1
D2 = DEL2
D3 = DEL3

M1 = MODE
Mute (H = Mute)

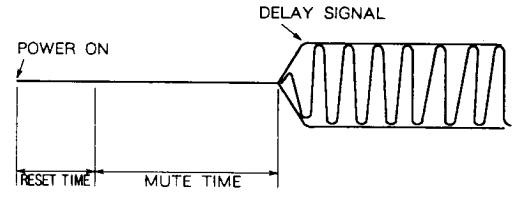
The time chart shown is μ-COM mode.

When REQ signal is low-level, SEDATA signal is latched at the falling edge of the SECK signal, and the last 5-delay time mode data are set at the rising edge of the REQ signal.

MUTING



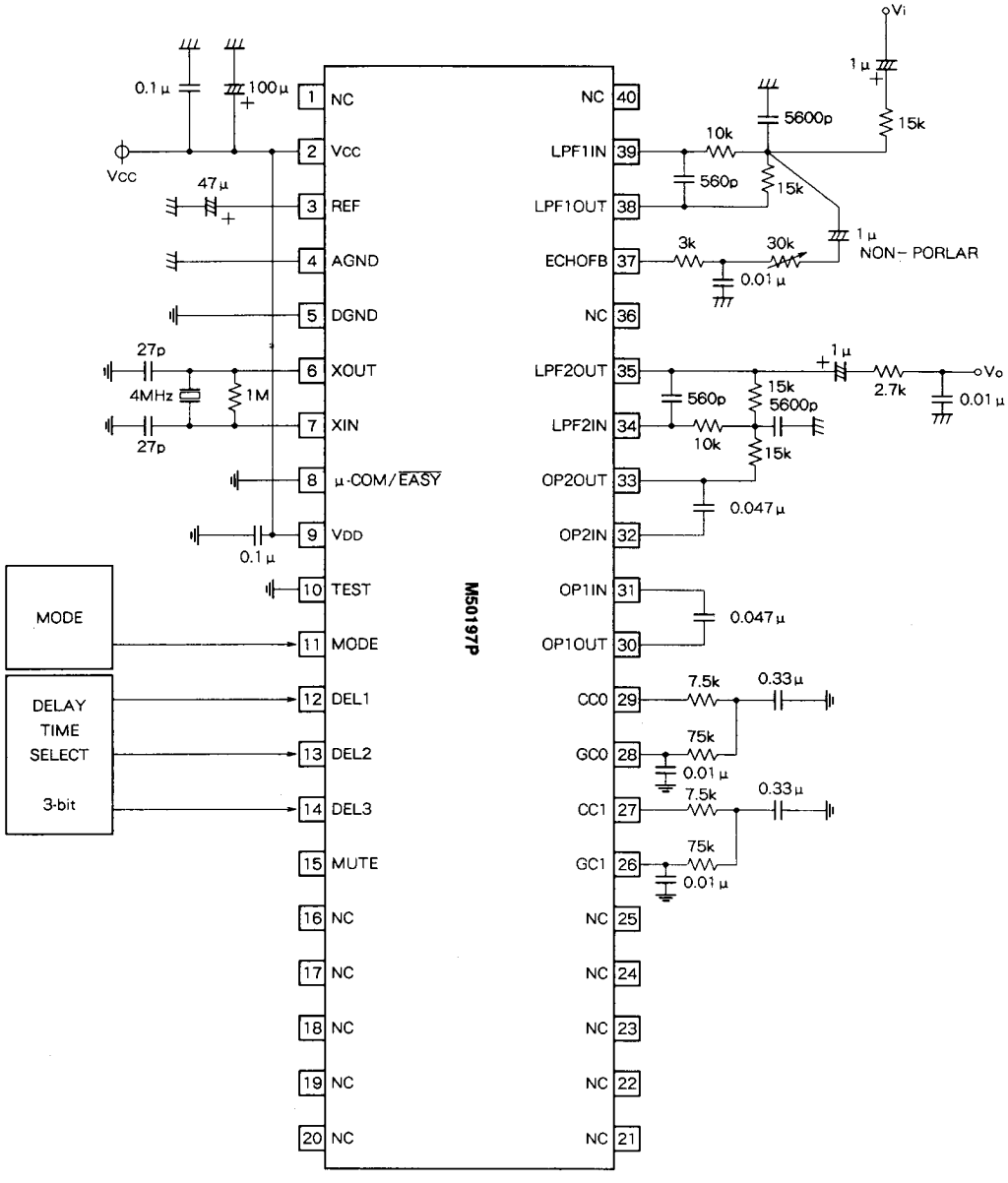
Waveforms of the signal upon change of delay time mode



Waveforms of the signal at power-on

Pin name / Mode	Mute mode	Mute time (msec)
L	Surround	132.0
H	Echo	525.0

APPLICATION EXAMPLE (M50197P)



Units Resistance : Ω
Capacitance : F