

M65831P,FP

DIGITAL ECHO (DIGITAL DELAY)

DESCRIPTION

The M65831 is an IC 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 systems with quality echo function.

Being pin compatible with the M65830AP, AFP and M65843P, FP, the M65831P, FP 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
(No = -92dB typ, THD = 0.5% typ)
- Capable of composing low-noise and low-distortion delay system at low cost by ADM system
- 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



Outline 24P4(P)

2.54mm pitch 600mil DIP
(13.0mm × 31.1mm × 3.8mm)



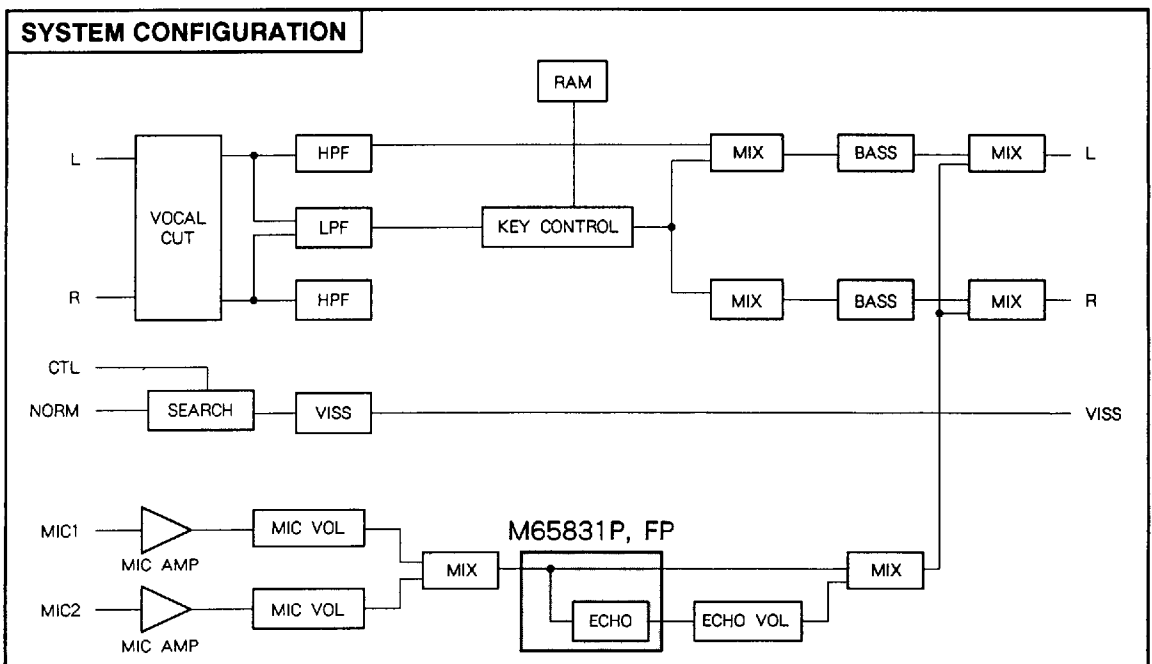
Outline 24P2W-A(FP)

1.27mm pitch 450mil SOP
(8.4mm × 15.0mm × 2.0mm)

RECOMMENDED OPERATING CONDITIONS

Supply voltage range.....V_{CC}, V_{DD} = 4.5~5.5V

Rated supply voltage.....V_{CC}, V_{DD} = 5.0V

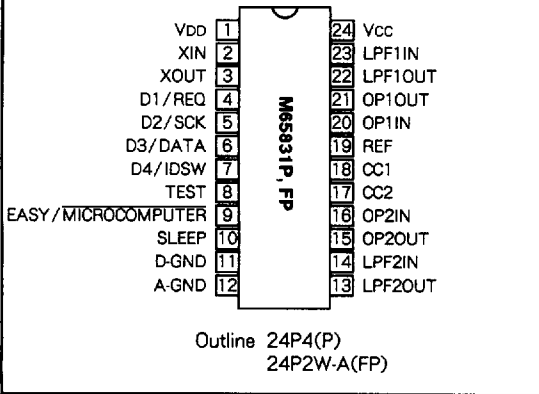


6249826 0018251 182

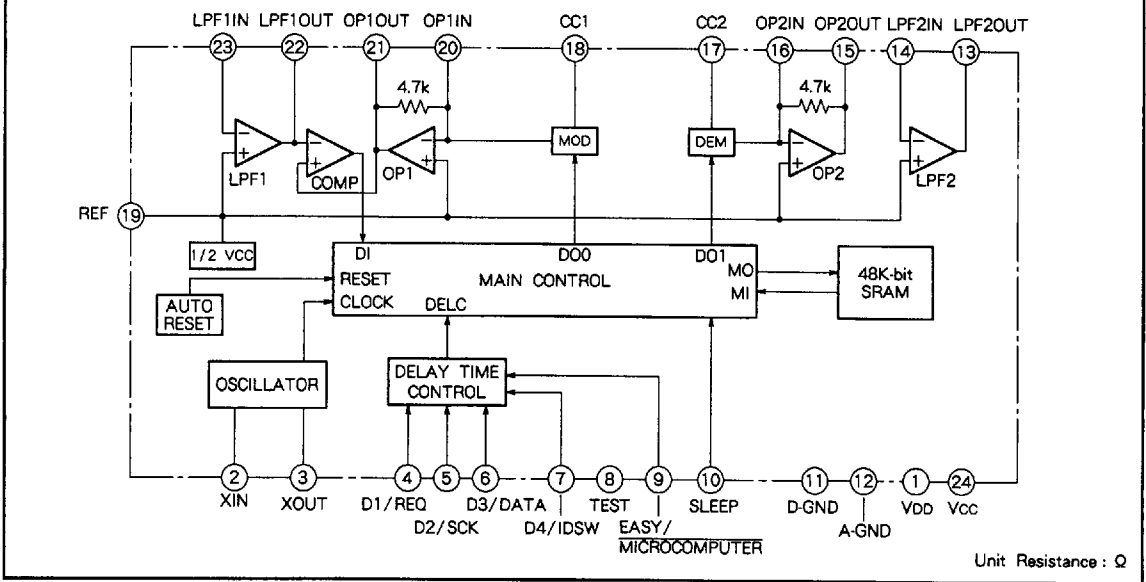
M65831P,FP

DIGITAL ECHO (DIGITAL DELAY)

PIN CONFIGURATION



IC INTERNAL BLOCK DIAGRAM



PIN DESCRIPTION

Pin No.	Symbol	Name	I/O	Function
①	V _{DD}	Digital V _{DD}	-	Supply voltage
②	X _{IN}	Oscillator input	I	Connects to 2MHz ceramic filter or inputs an external clock
③	X _{OUT}	Oscillator output	O	Connects to 2MHz ceramic filter
④	D1/REQ	Delay1/Request	I	Easy mode : inputs D1 data Microcomputer mode : inputs request data
⑤	D2/SCK	Delay2/Shift clock	I	Easy mode : inputs D2 data Microcomputer mode : inputs shift clock
⑥	D3/DATA	Delay3/Serial data	I	Easy mode : inputs D3 data Microcomputer mode : inputs serial data
⑦	D4/IDSW	Delay4/ID switch	I	Easy mode : inputs D4 data Microcomputer mode : controls ID code
⑧	TEST	Test	I	L = normal mode
⑨	EASY/ Microcomputer	Easy/Microcomputer	I	H = easy mode L = Microcomputer mode
⑩	SLEEP	Sleep	I	H = sleep mode L = normal mode
⑪	D GND	Digital GND	-	Connects to analog GND at one point
⑫	A GND	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	-	= 1/2V _{CC}
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	V _{CC}	Analog V _{CC}	-	Supply voltage

M65831P,FP

DIGITAL ECHO (DIGITAL DELAY)

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

Symbol	Parameter	Conditions	Ratings	Unit
Vcc	Supply voltage		6.5	V
Icc	Circuit current		100	mA
Pd	Power dissipation	M65831P	1	W
		M65831FP	650	mW
Topr	Operating temperature		-20~+75	°C
Tstg	Storage temperature		-40~+125	°C

RECOMMENDED OPERATING CONDITIONS

Symbol	Parameter	Test conditions	Limits			Unit
			Min	Typ	Max	
Vcc	Supply voltage		4.5	5	5.5	V
fck	Clock frequency		1	2	3	MHz
VIH	High input voltage		0.7VDD	-	VDD	V
VIL	Low input voltage		0	-	0.3VDD	V

ELECTRICAL CHARACTERISTICS (Vcc = 5V, f = 1kHz, Vi = 100mVrms, Ta = 25 °C, unless otherwise noted)

Symbol	Parameter	Test conditions	Limits			Unit	
			Min	Typ	Max		
Icc	Circuit current		-	16.0	40.0	mA	
Gv	Voltage gain	RL = 47k Ω	-3.5	-0.5	2.5	dB	
Vomax	Maximum output voltage	THD = 10 %	0.7	1	-	Vrms	
THD	Output distortion	30kHz LPF	fs = 500kHz	-	0.3	1.0	%
			fs = 250kHz	-	0.5	1.5	
No	Output noise voltage	DIN-AUDIO (Low sampling)	-	-92	-75	dBV	
SVRR	Supply voltage rejection ratio	Vcc = -20dBV, f = 100Hz	-	-40	-25	dB	
TMUTE	Mute time	Upon changing delay time	508	528	548	ms	
		Upon cancelling sleep mode	508	528	548		
Iccs	Circuit current (Sleep mode)	Sleep mode	-	12.0	30.0	mA	

TEST CONDITION

SWITCH CONDITIONS

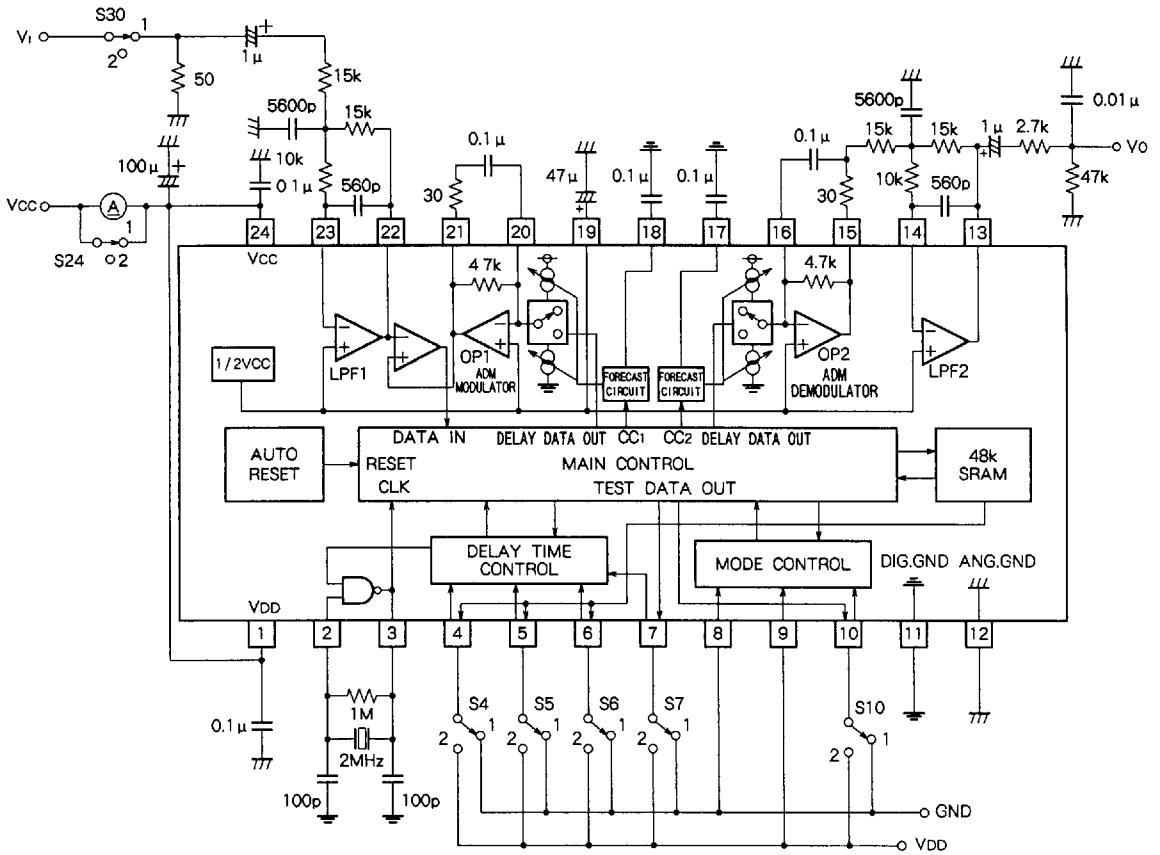
*...1 or 2

Symbol	Parameter	Sampling frequency	S 4	S 5	S 6	S 7	S 10	S 24	S 30	Remark
I _{cc}	Circuit current	—	1	1	1	1	1	2	2	No signal
G _{v1}	Voltage gain	500kHz	*	*	*	1	1	1	1	G _v = 20log(V _o /V _i)
G _{v2}		250kHz	*	*	*	2	1	1	1	
T _{da}	Delay time	500kHz	1	1	1	1	1	1	1	
T _{db}			2	1	1	1	↓	↓	↓	
T _{dc}			1	2	1	1	↓	↓	↓	
T _{dd}			2	2	1	1	↓	↓	↓	
T _{de}			1	1	2	1	↓	↓	↓	
T _{df}			2	1	2	1	↓	↓	↓	
T _{dg}			1	2	2	1	↓	↓	↓	
T _{dh}			2	2	2	1	↓	↓	↓	
T _{di}		250kHz	1	1	1	2	↓	↓	↓	
T _{dj}			2	1	1	2	↓	↓	↓	
T _{dk}			1	2	1	2	↓	↓	↓	
T _{dl}			2	2	1	2	↓	↓	↓	
T _{dm}			1	1	2	2	↓	↓	↓	
T _{dn}			2	1	2	2	↓	↓	↓	
T _{do}			1	2	2	2	↓	↓	↓	
T _{dp}			2	2	2	2	1	1	1	
V _{omax1}	Maximum output voltage	500kHz	*	*	*	1	1	1	1	30kHz L. P. F THD = 10 %
V _{omax2}		250kHz	*	*	*	2	1	1	1	
THD1	Total harmonic distortion	500kHz	*	*	*	1	1	1	1	30kHz L. P. F THD = 10 %
THD2		250kHz	*	*	*	2	1	1	1	
N _{o1}	Output noise voltage	500kHz	*	*	*	1	1	1	2	DIN AUDIO R _g = 50 Ω V _i = 0mVrms
N _{o2}		250kHz	*	*	*	2	1	1	2	
SVRR	Supply voltage rejection ratio	—	*	*	*	*	1	1	2	ΔV _{cc} = -20dBv, f = 100Hz
MUTE T	Mute time	—	2 ↓ 1	*	*	*	1	1	1	Upon changing delay time
MUTE S		—	*	*	*	*	2 ↓ 1	1	1	Upon cancelling sleep mode

M65831P,FP

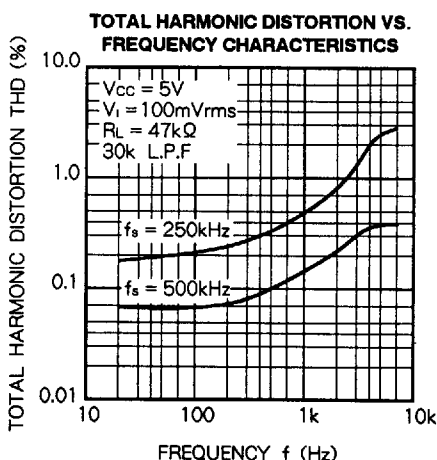
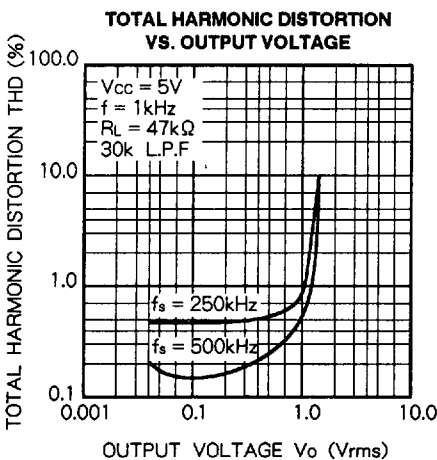
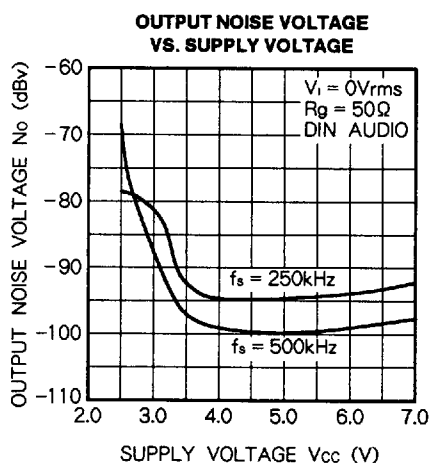
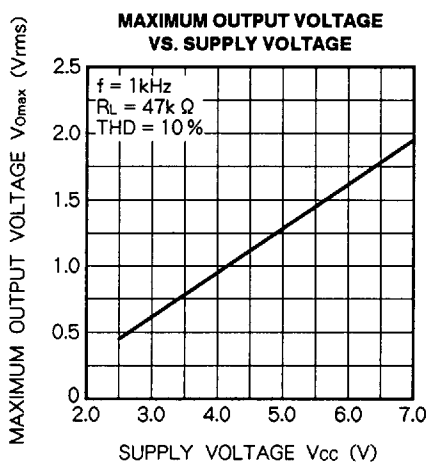
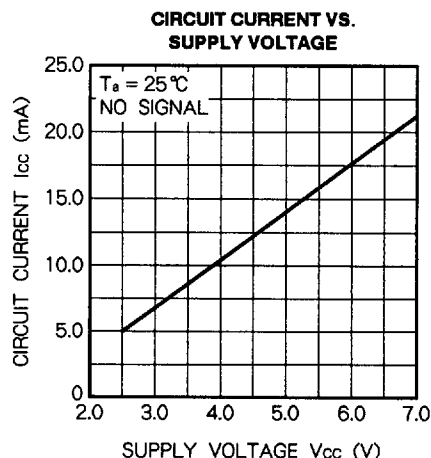
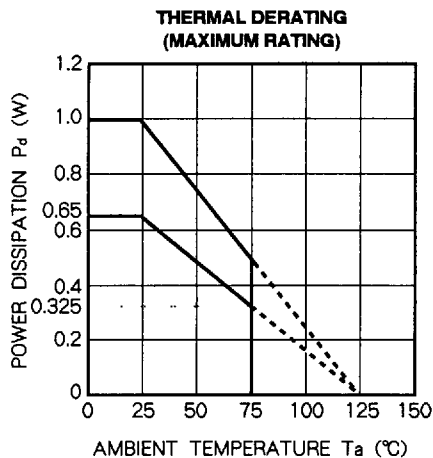
DIGITAL ECHO (DIGITAL DELAY)

TEST CONDITION



Units Resistance : Ω
Capacitance : F

TYPICAL CHARACTERISTICS



OPERATION

1. DELAY TIME

D4	D3	D2	D1	fs	T _d
L	L	L	L	500	12.3
			H		24.6
		H	L		36.9
			H		49.2
	H	L	L		61.4
			H		73.7
		H	L		86.0
			H		98.3
H	L	L	L	250	110.6
			H		122.9
		H	L		135.2
			H		147.5
	H	L	L		159.7
			H		172.0
		H	L		184.3
			H		196.6

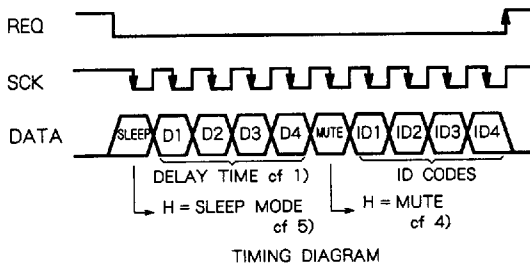
fs = sampling frequency (kHz)
T_d = delay time (msec)

2. EASY MODE (EASY/Microcomputer = H)

D1, D2, D3, D4 and SLEEP are for easy mode



3. MICROCOMPUTER MODE (EASY/Microcomputer = L)



This Timing chart shows that delay time is set by serial data from Microcomputer.

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

4. MUTING

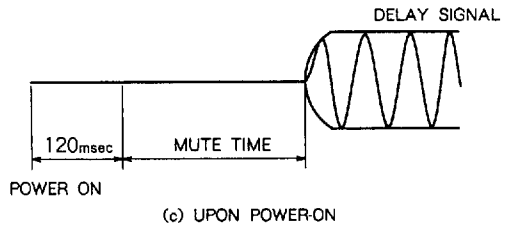
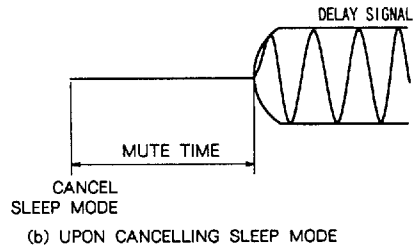
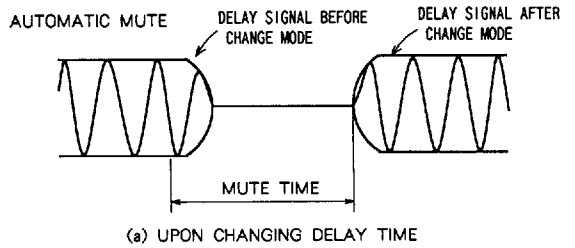
(1) Easy mode

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

(2) Microcomputer mode

MUTE = H : mute

MUTE = L : automatic mute



5. SLEEP MODE

Sleep data is

- { H : clock and RAM stop to reduce circuit current (sleep mode)
- { L : normal operation

6. SYSTEM RESET

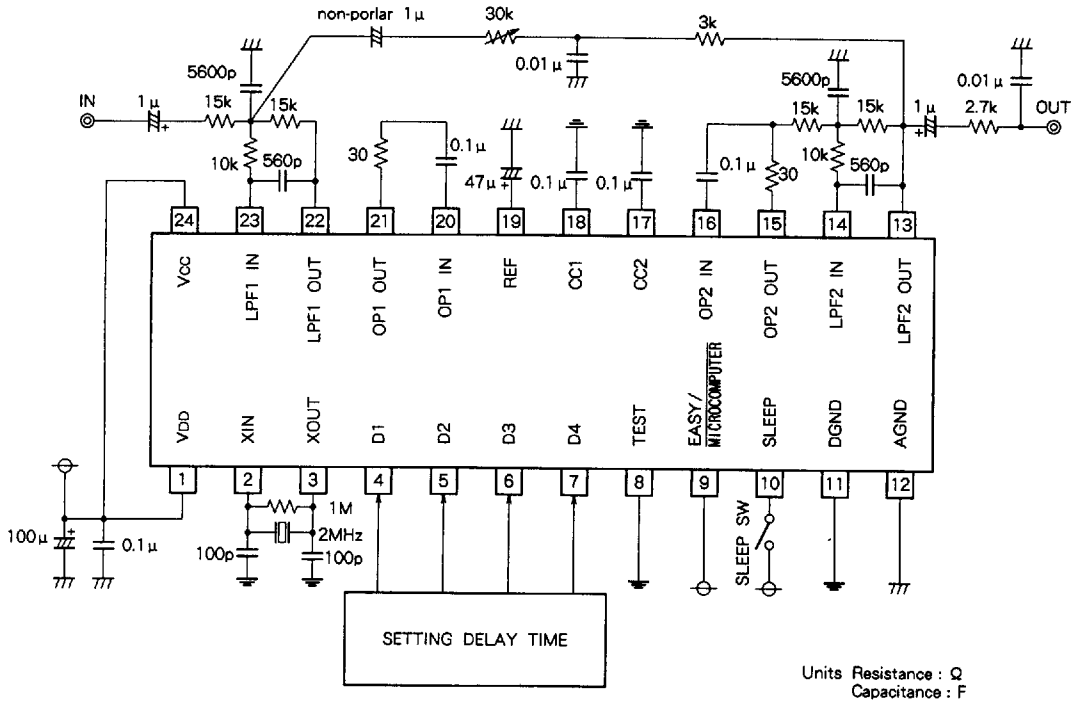
Automatically reset power-on. The reset time is about 120msec. Delay time is set at 147.5msec.

M65831P,FP

DIGITAL ECHO (DIGITAL DELAY)

APPLICATION EXAMPLE

1. EASY MODE



2. MICROCOMPUTER MODE

