

IN5732

4BIT SINGLE CHIP MICROCOMPUTER

The IN5732 is a CMOS 4-bit single chip microcomputer that operate on low voltage, very low current and contain LCD drivers. They also contain a 4 bit parallel processing ALU, a program memory ROM, many LCD segment outputs, a prescaler, an oscillator. The IN5732 is especially suited for use in high-grade timepieces, time controllers, electronic calculators, LCD games with timepiece. The IN5732 is especially suited for use in audio equipment, copiers, facsimiles with LCD and sub CPU applications.

FEATURES

Supply voltage	1.5V or 3V (Mask option-selectable)	
Current dissipation	3.0 μ A Typ. (Ag Battery version, 32KHz crystal oscillation, during timekeeping operation) 1.5 μ A Typ. (Li Battery version, 32KHz crystal oscillation, during timekeeping operation)	
Oscillation	Crystal oscillation for timekeeping (32.768 KHz); or CR oscillator.	
Output pins for LCD drive	27 pins	
	Drivable LCD panel	Number of Drivable LCD segment
	1/2 bias 1/3 duty	81 segments
	1/2 bias 1/2 duty	54 segments
	Static	27 segments
On chip melody function	3 octaves (the melody length is software-controlled. One Musical note requires one byte.)	
Number of input pins	8	
Number of out pins	3 pins (Output dedicated to alarm: 2 pins, general-purpose output: 1 pin).	
Possible to use LCD panel drive output pins as output pin-only ports (Mask option-selectable)		
ROM	2048 X 8 bits	
RAM	48 X 4 bits	
Cycle Time	CR oscillation at 65 Hz	60us
	32.768 KHz crystal	122us
On chip step-up / step down circuit		
Instruction set	92 instructions	
Table read instruction		
1 level subroutine nesting on-chip 15 bit divider for timekeeping (delivers an overflow single every 64ms/500ms when a 32.768 KHz crystal is used).		
HALT function		

IN5732

ABSOLUTE MAXIMUM RATINGS at Ta=25 ,V_{DD}=0V

Parameter	Sign.	Pins and Conditions	Value	Unit
Maximum Supply Voltage	V _{SS1} V _{SS2}		-4.0 to +0.3 -4.0 to +0.3	V
Maximum Input Voltage	V _{IN}	S1-4, M1-4, 32Hz, TEST, 10P, OSCIN, RES	V _{SS1} -0.3 to +0.3	V
Maximum Output Voltage	V _{OUT1}	32Hz, CUP2, OSCOUT, ALM1, ALM2, LIGHT	V _{SS1} -0.3 to +0.3	V
	V _{OUT2}	SEGOUT, COM1, COM2, COM3, CUP1	V _{SS2} -0.3 to +0.3	V
Operating Temperature	Topg		-10 to +65	°C
Storage Temperature	Tstg		-30 to +125	°C

ALLOWABLE OPERATING CONDITIONS at Ta=25 + 2°C, V_{DD}=0V

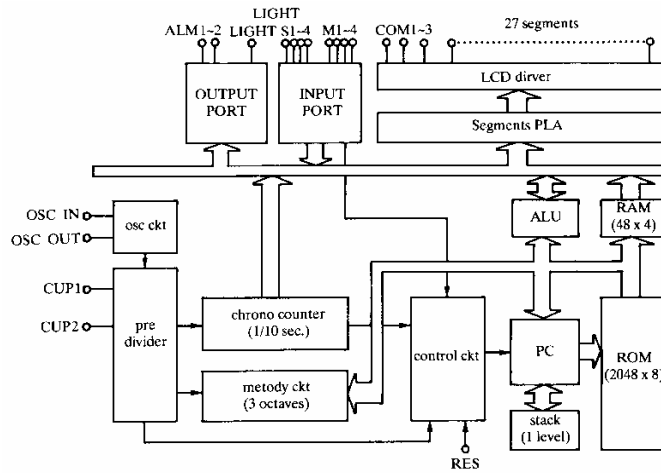
Parameter	Sign.	Pins and Conditions	min	typ	max	Unit
Supply Voltage	V _{SS1}		-1.65		-1.30	V
	V _{SS2}		-3.3		-2.4	V
Input 'H'-Level Voltage	V _{IH}	S1-4, M1-4, RES	-0.2		0	V
Input 'L'-Level Voltage	V _{IL}	S1-4, M1-4, RES	V _{SS1}		V _{SS1} +0 .2	V
Operating Frequency	fopgl	Ta=-10 to + 65 °C, crystal OSC	32	32.	33	kHz
	fopg2	Ta=-10 to + 65 °C, CR OSC		768		kHz

ELECTRICAL CHARACTERISTICS at Ta=25 +0.2°C V_{DD}=0V

Parameter	Sign.	Pins and Conditions	min	typ	max	Unit
Input Resistance	R _{INIA}	V _{SS1} =-1.55V, V _{IL} =V _{SS1} +0.2V, 'L'level hold tr, *1	200		2000	kΩ
	R _{INIB}	V _{SS1} =-1.55V, 'L'level pull-in tr, *1	200		2000	kΩ
	R _{IN2}	V _{SS1} =-1.55V, TEST, RES	10		300	kΩ
Output 'H'-Level Voltage	V _{OH1}	V _{SS1} =-1.55V, I _{OH} =-0.4uA, *2	-0.2			V
Output 'L'-Level Voltage	V _{OL1}	V _{SS1} =-1.55V, I _{OL} =0.4uA, *2			V _{SS2} +0.2	V
Output 'H'-Level Voltage	V _{OH2}	V _{SS1} =-1.55V, I _{OH} =-4uA, COM1, COM2, COM3	-0.2			V
Output 'H'-Level Voltage	V _{OH3}	V _{SS1} =-1.35V, I _{OH} =-250uA, ALM1, ALM2, LIGHT	-0.65		-1.30	V
Oscillation Start Time	t _{ST}	C _O =C _G =20pF, crystal OSC (C _I ≤25kΩ)			10	sec
Oscillation Compensation Capacitance	10P	External pin	8	10	12	pF

IN5732

BLOCK DIAGRAM



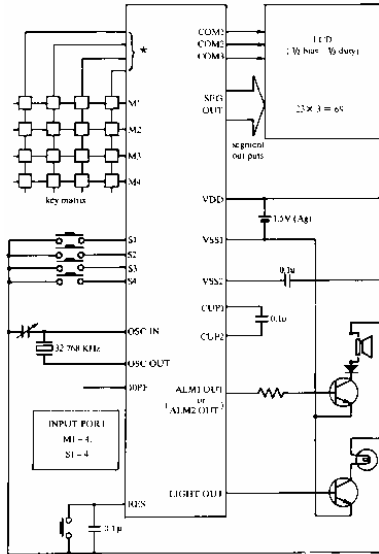
PIN DESCRIPTION

Pad No.	Pin Name	Input/Output	Function
33	OSCIN	Input	Crystal OSC mode 32.768kHz crystal is connected across OSCIN and OSCOUT for oscillation. Used as reference clock for timepiece and system clock. CR OSC mode
35	OSCOUT	Output	R and C are connected across OSCIN and OSCOUT for oscillation. Used as system clock.
34	10P		Connected to OSCOUT and used as OSC phase compensation capacitor.
31 30 3 2	S1 S2 S3 S4	Input	Input-only port. LSI system is reset by applying V" to S1 to S4 simultaneously.
4 5 6 7	M1 M2 M3 M4	Input	Input pins for placing data in RAM.
32	RES	Input	Input pin for resetting LSI system.
57	BAK		(-) power supply pin for logic unit inside the LSI. For Li battery version, a capacitor must be connected across BAK and V" to prevent logic unit from malfunctionin .
52	LIGHT	Output	Output-only pin Suited for delivering signal to drive transistor for light.
53 54	ALM1 ALM2	Output	Output-only pin Used to deliver *4kHz, 2kHz, 1kHz modulation signal with instruction. Also used to deliver non-modulation signal. Used to deliver melody signal of 3 octaves with instruction.
1	V _{DD}		(+) power supply pin.
55 56	V _{SS2} V _{SS1}		(-) power supply pin. Ag battery version, Li battery version, EXT-V version: mask option selectable. Also used as power supply for LCD drive.
28 29	CUP1 CUP2		Pins for connecting voltage step-up (step-down) capacitor.
25 37 51	COM1 COM2 COM3	Output	Output pins for LCD panel common plate.
19 - 23		Output	Segment driver
38 - 50		Output	Output pins for LCD panel segments. Mask option permits Seg 14 to Seg 27 (pad No.10 to 23)to be used as output ports.
27 36 26 8 9	32Hz T3 TEST TEST TEST	Test	Test pins (not used by user)

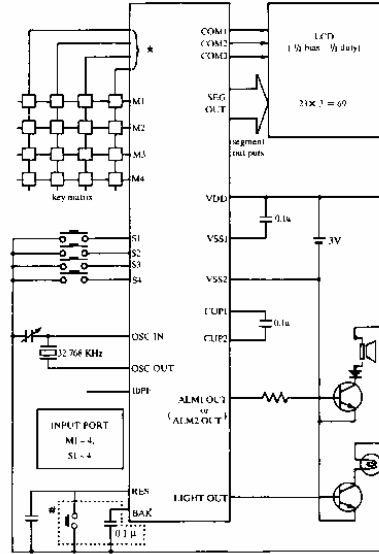
SAMPLE APPLICATION CIRCUITS

(1) Ag battery used application (1/2 bias 1/3 duty): * 4 segment outputs are used for output ports.

(2) Li battery used application or EXT-V Used application (1/2 bias 1/3 duty): * 4 segment outputs are used for output ports.



Crystal OSC (Power supply: Ag battery version)



Crystal OSC (Power supply: Li battery version) # Components inside the dot line can be disconnected for EXT- V application.