6 FUNCTION 6 DIGIT ALARM-CHRONOGRAPH DUPLEXED LCD WATCH CIRCUIT

The KS5190 is a CMOS 6 function watch circuit with alarm and autoranging chronograph function; designed to be used with a 6 digit duplexed liquid crystal display, 7 day mark, date mark, AM/PM mark, and colon.

FUNCTIONS

- 6 Function: Month, Date, Day-of-Week, Hour, Minute, Second
- Alarm function with 4 to 5 minute snooze
- 6 digit Chronograph: Autoranging after 30 minutes to hour, minute; second.
- Use selectable 12 hour/24 hour format
- Alarm output for melody IC (KS5310 Series)
- 4 year calendar
- One touch correction of time error within ±30 seconds.
- Fast advance for time and alarm time set
- · Chime on every hour
- 3 Switch sequential operation
- LCD test

FEATURES

- Single chip CMOS construction
- Drives 6 digit duplexed LCD with 7 day mark, AM/PM mark, date mark and alarm mark
- Colon display
- Direct drive of piezoelectric transducer at 3 volt peak to peak
- 32,768Hz crystal frequency
- On-chip oscillator and resistors
- On-chip voltage doubler
- . Single 1.5V battery operation
- · Low power dissipation
- Debounce circuitry on switch inputs
- Protection against static discharge

ABSOLUTE MAXIMUM RATINGS (Ta = 25°C)

Characteristic	Symbol	Value	Unit		
Supply Voltage (Vpp - Vss)	V _{DS}	-0.3 ~ + 2.0	V		
Supply Voltage (V _{DD} - V _{EE})	V _{DE}	$-0.3 \sim +4.0$	V		
Operating Temperature	Topr	- 20 ~ + 7 5	°C		
Storage Temperature	T _{stg}	- 55 ~ + 125	°C		

^{*} Voltage greater than above may result in damage to the circuit.



CMOS DIGITAL INTEGRATED CIRCUIT

ELECTRICAL CHARACTERISTICS ($T_a = 25$ °C, $V_{DD} = 0V$, $V_{SS} = -1.5V$; unless otherwise specified)

Characteristic	Symbol	Test Condition	Min	Тур	Max	Unit	
	V _{ss}		1.2	1.5	1.8	V	
Operating Voltage	V _{EE}		2.4	3.0	3.6	V	
Supply Current	I _{DD}	Without Load		1.0	2.0	μΑ	
Input High Voltage	V _{tH}		V _{DD} - 0.3		V _{DD}	٧	
Input Low Voltage	VIL		Vss		$V_{ss} + 0.3$	V	
Switch Activation Current	Isw	$V_{in} = V_{DD}$	0.1	0.5	3	μΑ	
Oscillator Start Voltage	V _{osc}	Within 5 Sec			1.45	V	
Oscillator Stop Voltage	Vose				1.15	V	
Alarm Drive Current	l _{ala}	V _{sat} = 0.5V (Both Direction)	0.5	2.0		mA	
Alaini Dilve Cuitent	I _{alb}	V _{sat} = 0.5V	10	20		μΑ	
Oscillator Frequency	Fosc			32,768		Hz	
DC-DC Conversion Frequency	F _{CON}	$C1 = C2 = 0.1 \mu F$		1,024		Hz	
LCD Frequency	F₫			32		Hz	
Oscillator Input Capacitor	Cin			25		pF	
Time Stability	T _{stb}	$\triangle V_{DD} = 0.5V$ ($C_{out} = 25pF$)			1	ppm	
Switch Debouncing Time	T _{deb}				31.25	mSEC	

LCD FORMAT

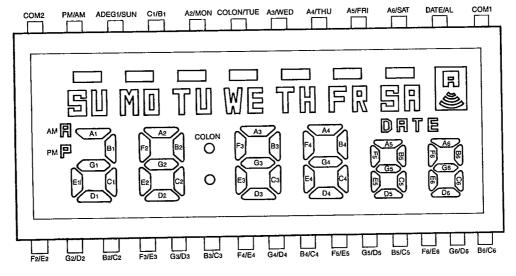


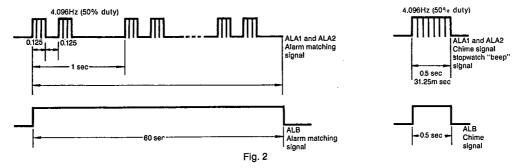
Fig. 1





CMOS DIGITAL INTEGRATED CIRCUIT

ALARM OUTPUT WAVEFORMS



APPLICATION CIRCUIT

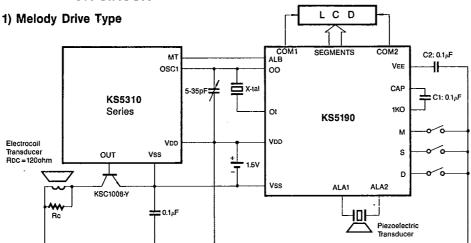
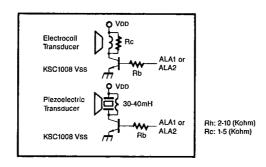


Fig. 3-1. Typical Application Circuit with Melody IC



CMOS DIGITAL INTEGRATED CIRCUIT

2) Piezo Drive Type

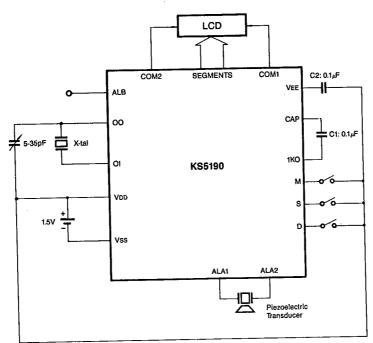


Fig. 3-2. Typical Application Circuit

* Quartz Crystal Parameter

Fp = 32,768Hz

CL = 12.5pF

C1 = 4 fFCO = 2.5pF

 $Rs = 35K\Omega$

Q = 35,000





SETTING SEQUENCE AND SWITCH OPERATION

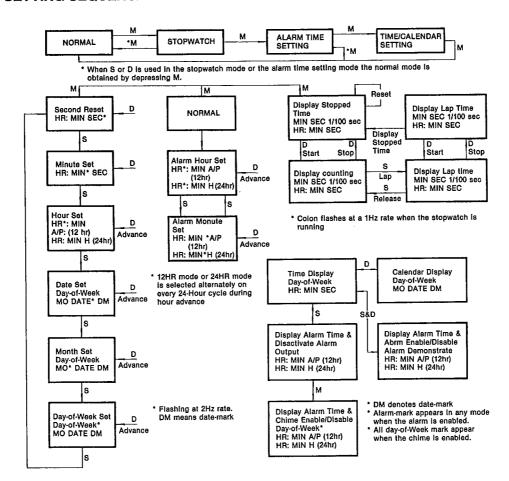
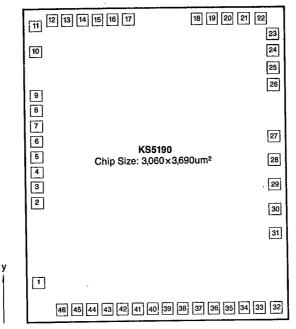


Fig. 4

CMOS DIGITAL INTEGRATED CIRCUIT

PAD DIAGRAM

(3,060, 3,690)



(0, 0) _____ x

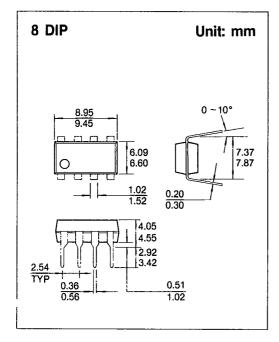
KS5190 PAD LOCATION

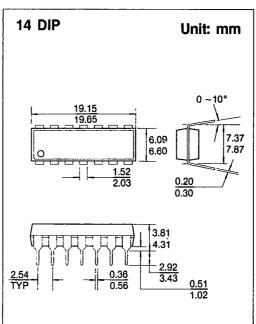
Pad No.	Pad Name	Coordinates		Pad	Pad	Coordinates		Pad	Pad	Coordinates		Pad	Pad	Coordinates	
		Х	Y	No.	Name	Х	Υ	No.	Name	Х	Y	No.	Name	X	Υ
1	OI	135	450	13	A1/SUN	513	3554	25	S	2924	2959	37	F5/E5	1993	134
2	00	135	1411	14	C1/B1	693	3554	25	CAP	2324	2777	38	B4/C4	1818	134
3	ALA1	135	1600	15	A2/MON	873	3554	27	1KO	2924	2154	39	G4/D4	1538	134
4	ALA2	135	1730	16	CL/TUE	1053	3554	28	VEE	2924	1879	40	F4/E4	1458	134
5	ALB	125	1960	17	A3/WED	1233	3554	29	[*] T2	2924	1591	41	B3/C3	1273	134
6	V _{EE}	135	2140	18	A4/THU	2052	3554	30	T1	2924	1294	42	G3/D3	1098	134
7	V _{SS}	135	2320	19	A5/FRI	2232	3554	31	V _{DD}	2924	1008	43	F3/E3	918	134
8	V _{DD}	135	2500	20	A6/SAT	2412	3554	32	B6/C6	2398	134	44	B2/C2	738	134
9	AC	135	2680	21	DTE/AL	2592	3554	33	C6/D6	2718	134	45	G2/G2	553	134
10	М	135	3202	22	COM1	2739	3554	34	F6/E6	2538	134	46	F2/E2	378	134
11	COM2	135	3507	23	Т3	2024	3364	35	B5/C5	2353	134	—	_		_
12	PM/AM	333	3554	24	D	2024	3184	35	G5/D5	2173	134	Ī. <u> —</u>	_		

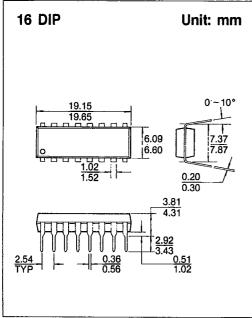


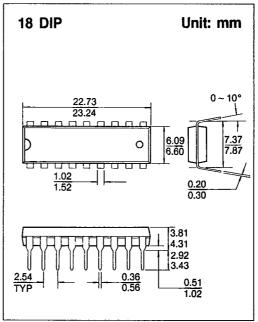


PACKAGE DIMENSIONS



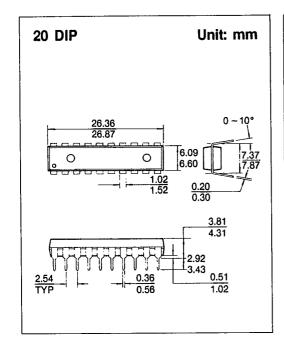


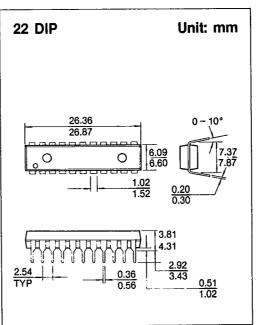


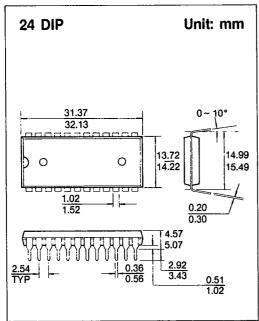


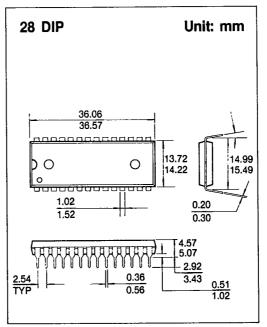
SAMSUNG SEMICONDUCTOR A-07 0894

255

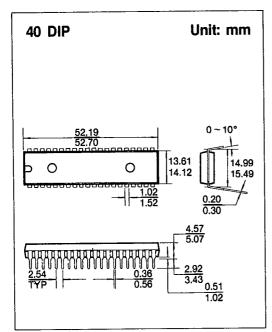


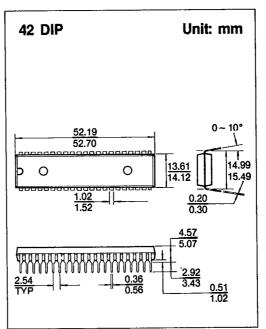


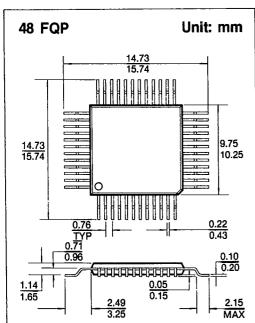


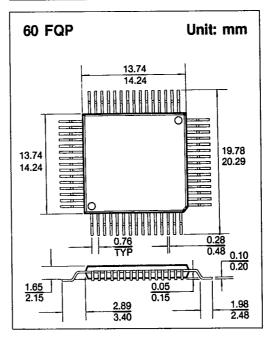


PACKAGE DIMENSIONS









PACKAGE DIMENSIONS

