

# 6 Functions 6 Digit Alarm- Chronograph Duplexed LCD Watch Circuit

Revised October 1999

## Features

- Single chip CMOS construction
- Drives 6 digit duplexes 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
- 32,768 Hz Crystal frequency
- On-chip oscillator and resistors
- On-chip voltage doubler
- Single 1.5 V battery operation
- Low power dissipation
- Debounce circuitry on switch inputs
- Protection against static discharge
- Trimmer capacitor included

## 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
- User seletable 12 hour/24 hour format
- Alarm output for melody IC (KS5310, KS5381, KS5318 series)
- 4 Year calendar
- One touch correction of time error within  $\pm 30$  seconds
- Fast advance for time and alarm time set
- Chime on every hour

## Electrical Characteristics

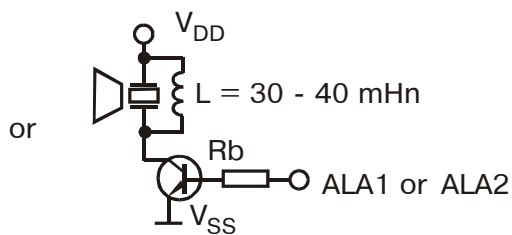
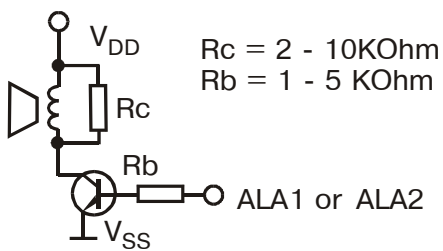
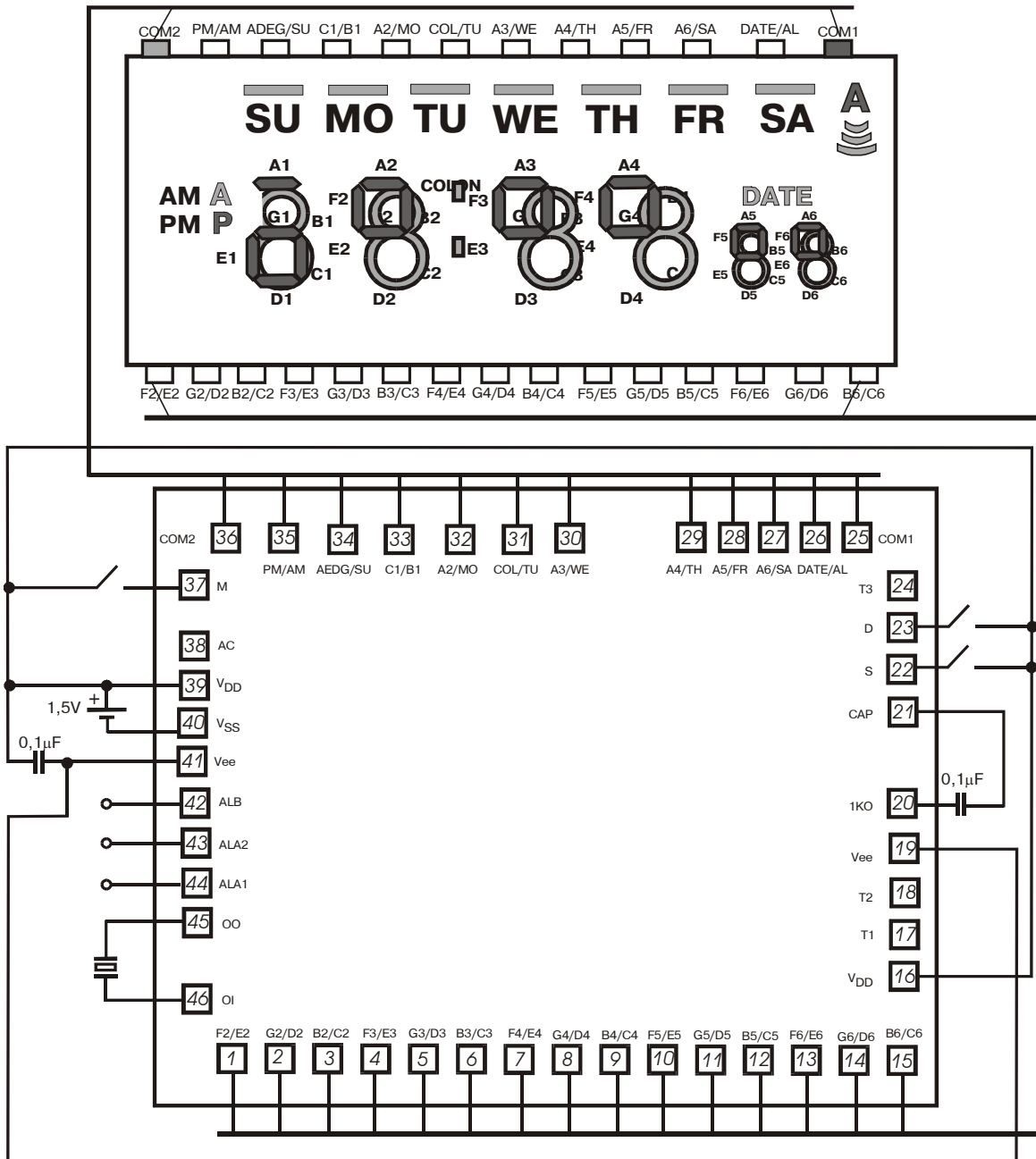
( $T_a = 25^\circ\text{C}$ ,  $V_{DD} = 0\text{ V}$ ,  $V_{SS} = -1.5\text{ V}$ ; unless otherwise specified)

Parameter	Symbol	Test Condition	Min	Typ	Max	Unit
Operating Voltage	$V_{SS}$		1.2	1.5	1.8	V
	$V_{EE}$		2.4	3.0	3.6	V
Supply Current	$I_{DD}$	Without Load $V_{SS} = -1.5$		-	2.0	$\mu\text{A}$
Input High Voltage	$V_{IH}$		$V_{DD} - 0.3$		$V_{DD}$	V
Input Low Voltage	$V_{IL}$		$V_{SS}$		$V_{SS} + 0.3$	
Oscillator Start Voltage	$V_{OSC}$	Within 5 sec			1.45	V
Alarm Driver Current	$I_{ala}$	$V_{sat} = 0.5\text{ V}$ (Both Direction)	0.5	-		mA
	$I_{alb}$	$V_{sat} = 0.5\text{ V}$	10	-		$\mu\text{A}$
DC-DC Conversion Frequency	$F_{CON}$	$C_1 = C_2 = 0.1\ \mu\text{F}$		1,024		KHz
LCD Frequency	$F_d$			32		Hz
Time Stability	$T_{stb}$	$V_{SS} = -1.3 \sim -1.8\text{ V}$		-	3	ppm
Switch Debouncing Time	$T_{deb}$				31.25	msec

Quartz Crystal Parameters:  $F_p = 32768\text{ Hz}$ ,  $C_L = 12.5\text{ pF}$ ,  $C_0 = 1.2\text{ pF}$ ,  $C_1 = 3.0\text{ fF}$ ,  $R_f = 35\text{ K}\Omega$

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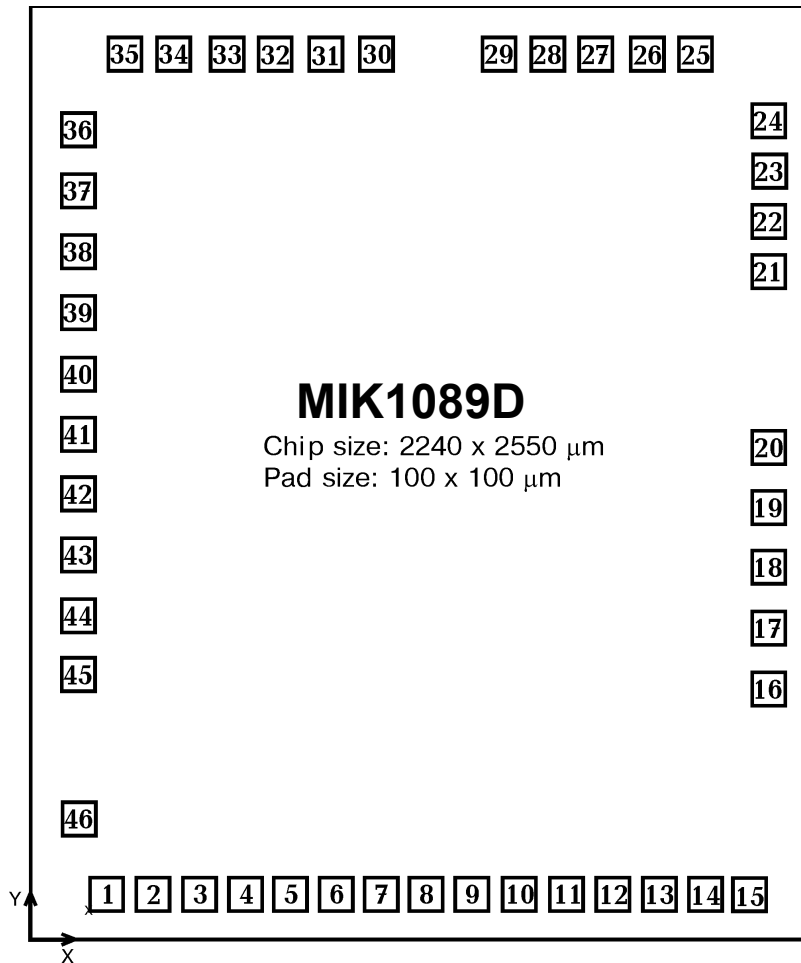
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## Pad location



Pad	Pad name	X	Y	Pad	Pad name	X	Y	Pad	Pad name	X	Y
1	F2/E2	160	140	17	T1	2120	920	33	C1/B1	520	2410
2	G2/D2	300	140	18	T2	2120	1130	34	ADEG/SU	380	2410
3	B2/C2	440	140	19	V <sub>EE</sub>	2120	1310	35	PM/AM	240	2410
4	F3/E3	580	140	20	1KO	2120	1470	36	COM2	120	2250
5	G3/D3	720	140	21	CAP	2120	1840	37	M	120	2110
6	B3/C3	860	140	22	S	2120	1980	38	AC	120	1970
7	F4/E4	1000	140	23	D	2120	2120	39	V <sub>DD</sub>	120	1790
8	G4/D4	1140	140	24	T3	2120	2260	40	V <sub>SS</sub>	120	1650
9	B4/C4	1280	140	25	COM1	2030	2410	41	V <sub>EE</sub>	120	1510
10	F5/E5	1420	140	26	DATE/AL	1890	2410	42	ALB	120	1370
11	G5/D5	1560	140	27	A6/SA	1750	2410	43	ALA2	120	1230
12	B5/C5	1700	140	28	A5/FR	1610	2410	44	ALA1	120	1090
13	F6/E6	1840	140	29	A4/TH	1470	2410	45	OO	120	950
14	G6/D6	1980	140	30	A3/WE	940	2410	46	OI	120	330
15	B6/C6	2120	140	31	COL/TU	800	2410				
16	V <sub>DD</sub>	2120	750	32	A2/MO	660	2410				