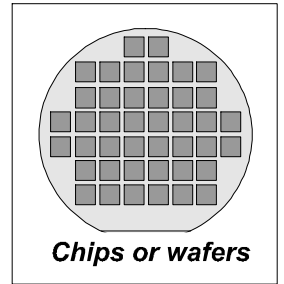




5-FUNCTION 4-DIGIT WATCH CIRCUIT WITH ALARM AND CHIME FOR DUPLEXED LCD

The Clock IC An8195 is a low-threshold-voltage, ion-implanted metal gate CMOS integrated circuit that provides signals to drive a 4-digit duplexed liquid crystal display with colon, PM/AM-Time mark and AL/CH mark.



FUNCTIONS

- ? 5 Functions: month, date, hour, minute, second.
- ? Setting alarm time with/without 4 ? 5 min Snooze.
- ? 30-second alarm sound.
- ? Chime on every hour.
- ? User selectable 12-hour/24-hour format.
- ? 4 year calendar.
- ? One-touch correction of time error within ?30 seconds.
- ? Alarm, Chime enable/disable operation.
- ? 2-switch sequential operation.
- ? LCD test.

FEATURES

- ? Single-chip CMOS construction
- ? Drives 4-digit duplexed LCD with PM/AM-Time, alarm mark and chime mark
- ? Colon display
- ? Direct drive of piezoelectric transducer
- ? Low power dissipation
- ? 32,768Hz crystal frequency
- ? On-chip oscillator, capacitor and resistors
- ? On-chip voltage doubler
- ? Single 1.5V battery operation
- ? Debounce circuitry on Switch inputs
- ? Protection against static discharge

ABSOLUTE MAXIMUM RATINGS

(Ta = 25°C)

Characteristic	Symbol	Value	Unit
Supply Voltage (0V – V _{CC})	V _{DS}	-0.3 ? +2.0	V
Supply Voltage (0V – V _{OCC2})	V _{DE}	-0.3 ? +4.0	V
Operating Temperature	Topr	-20 ? +75	°C
Storage Temperature	?stg	-55 ? +125	°C

- ? Voltage greater than above may result in damage the circuit.
- ? SUBSTRATE should be connected with Vdd



ELECTRICAL CHARACTERISTICS

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

Item	Conditions	Symbol	MIN.	TYP.	MAX.	Unit
Operation Voltage		V _{SS}	1.2	1.5	1.8	V
		V _{EE}	2.4	3.0	3.6	V
Supply Current	Without Load	I _{DD}		1.0	2.0	mA
Input High Voltage		V _{IH}	V _{DD} -0.3		V _{DD}	V
Input Low Voltage		V _{IL}	V _{SS}		V _{SS} +0.3	V
Switch Activation Current	V _{IN} =V _{DD}	I _{SW}	0.1	5.0	10.0	mA
Oscillator Start Voltage	Within 5 sec	V _{OSC}			1.45	V
Oscillator Stop Voltage		V _{OSP}			1.15	V
Alarm Drive Current	V _{SAT} = 0.5V (Both Direction)	I _{ALA}	0.5	2.0		mA
Oscillator Frequency		F _{OSC}		32.768		Hz
DC-DC Conversion Frequency	C1=C2=0.1µF	F _{CON}		1.024		Hz
LCD Frequency		F _D		32		Hz
Oscillator Input Capacitor		C _{IN}		20		pF
Time Stability	V _{SS} =-1.3 -1.8 (C _{OUT} =25pF)	T _{STB}		1	3	ppm
Switch Debauching Time		T _{DEB}			62.5	msec

LCD FORMAT

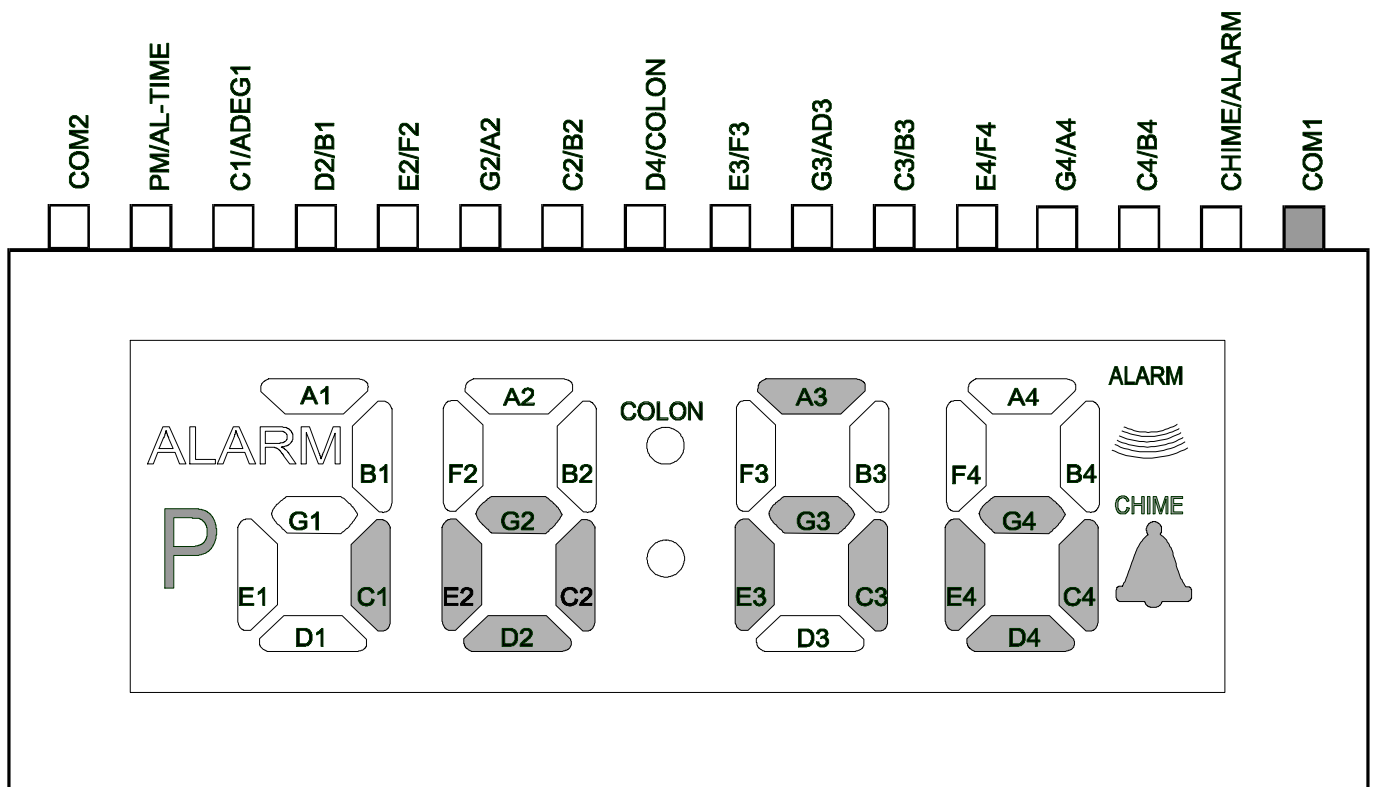


Fig. 1.



OPERATIONAL DIAGRAM

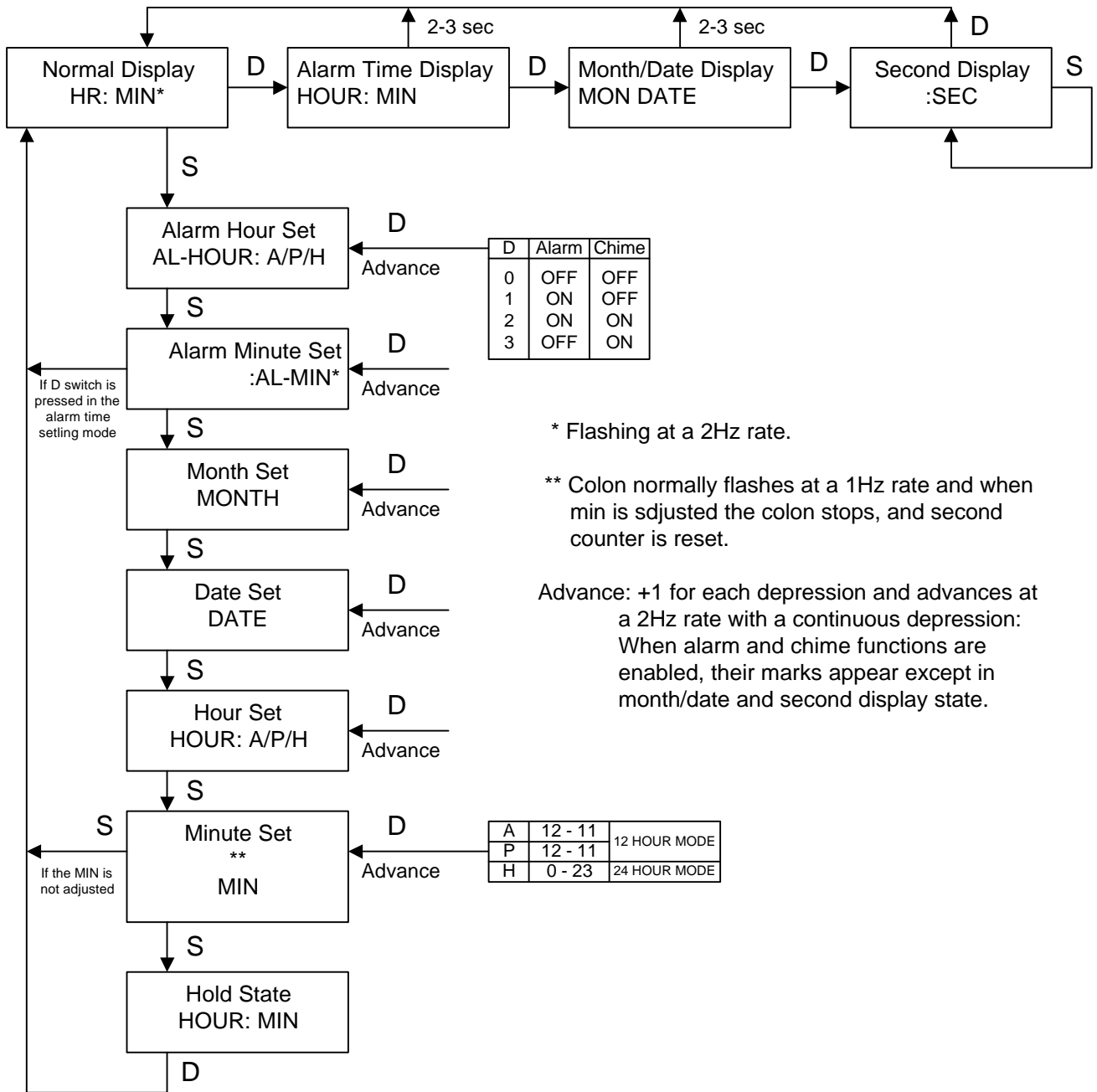


Fig. 2.



ALARM TIMING DIAGRAM IN THE SNOOZE MODE

In the existing version the SNOOZE function is executed when the ALARM mode is set (the ALARM icon is turned on). When the current time reaches a preset Alarm time a 30sec. Alarm sound is generated (period T1 in Fig.3). Pressing the D button during this period turns off the sound but after 5 minutes it will be heard again and this procedure repeats continuously every time the D button is pressed during the Alarm sound generation period T1 (see Fig.4). This is the way the SNOOZE function is implemented. Pressing the S button in the period of Alarm sound generation stops the sound that will not be repeated again. The watch changes to the Standby mode. If the Alarm sound is not interrupted (neither D nor S is pressed) it automatically stops after 30sec. and the watch changes to the Standby mode (see Fig.3). All the time the Alarm mode is set the ALARM icon is turned on. When the watch changes to the SNOOZE mode the ALARM icon starts flashing at a rate of 1 Hz (period T2 in Fig.4). The Alarm sound also stops if the Alarm mode is cleared (the ALARM icon is turned off).

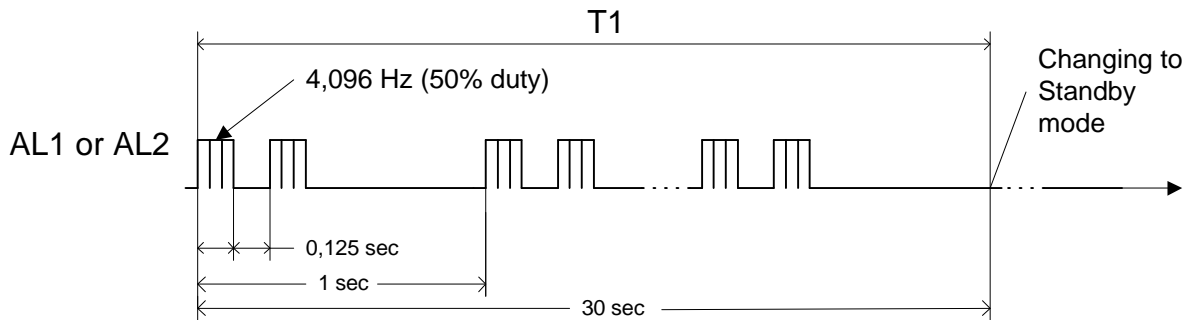
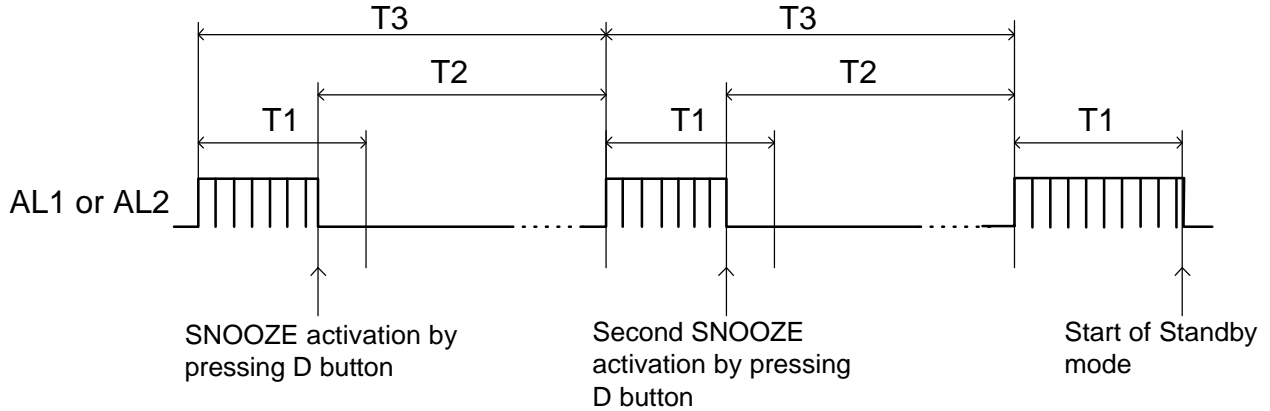


Fig. 3. Alarm timings Diagram



T1 = 30sec., Alarm sound duration
T2 = 4-5 min, time to next Alarm sound in the SNOOZE mode, ALARM icon flashing.
T3 = 5 min.

Fig.4. Alarm timings Diagram in the SNOOZE mode.

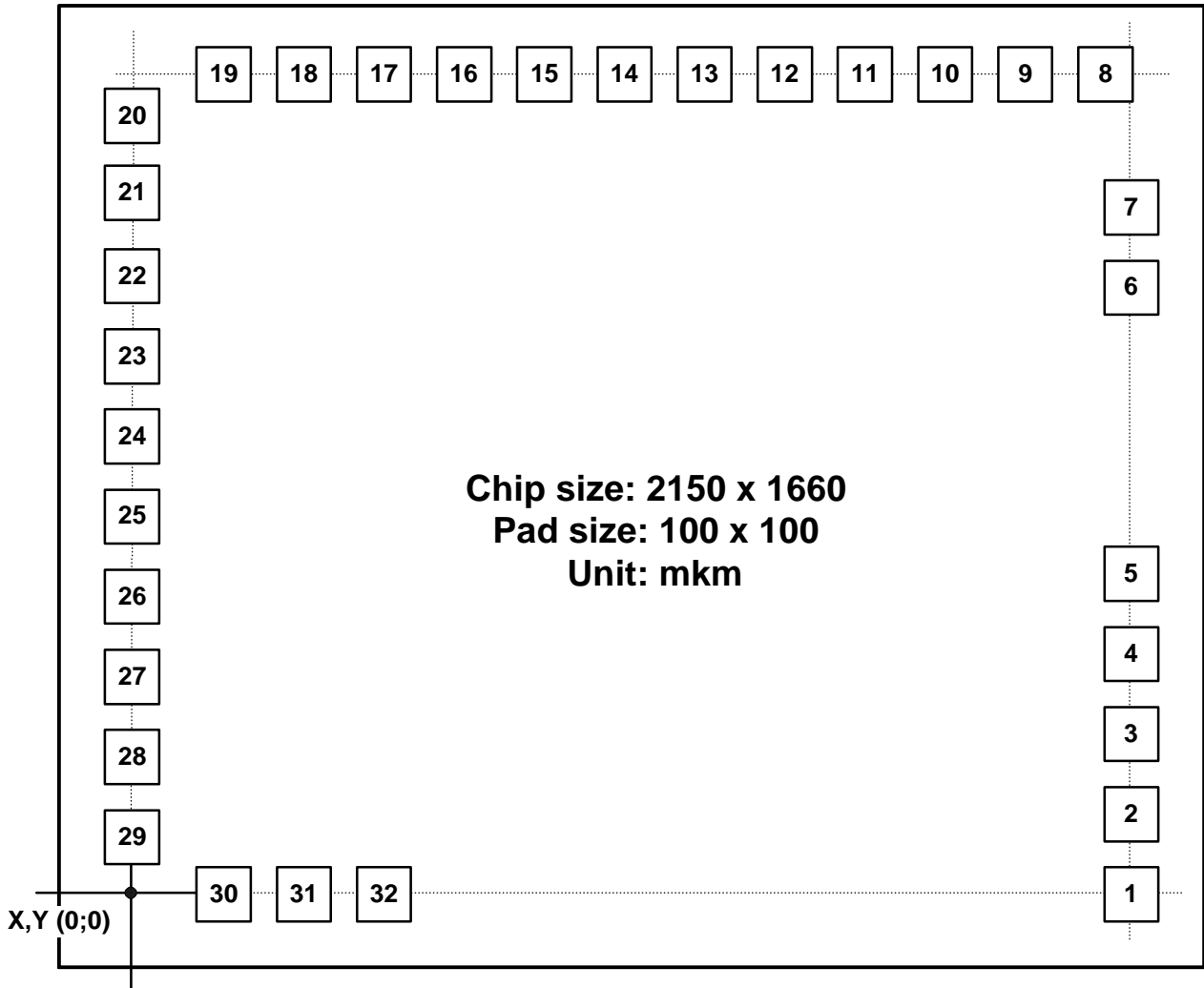


PAD DESCRIPTION

Pad Number	Description	Pad Number	Description
1	VOCC2	17	SEG10
2	OV	18	SEG11
3	VCC	19	SEG12
4	D	20	SEG13
5	AL2	21	SEG14
6	AL1	22	COM2
7	COM1	23	GOI
8	SEG1	24	GOO
9	SEG2	25	GOOT
10	SEG3	26	OV
11	SEG4	27	IKO
12	SEG5	28	CAP
13	SEG6	29	S
14	SEG7	30	T1
15	SEG8	31	T2
16	SEG9	32	T3



PAD DIAGRAM



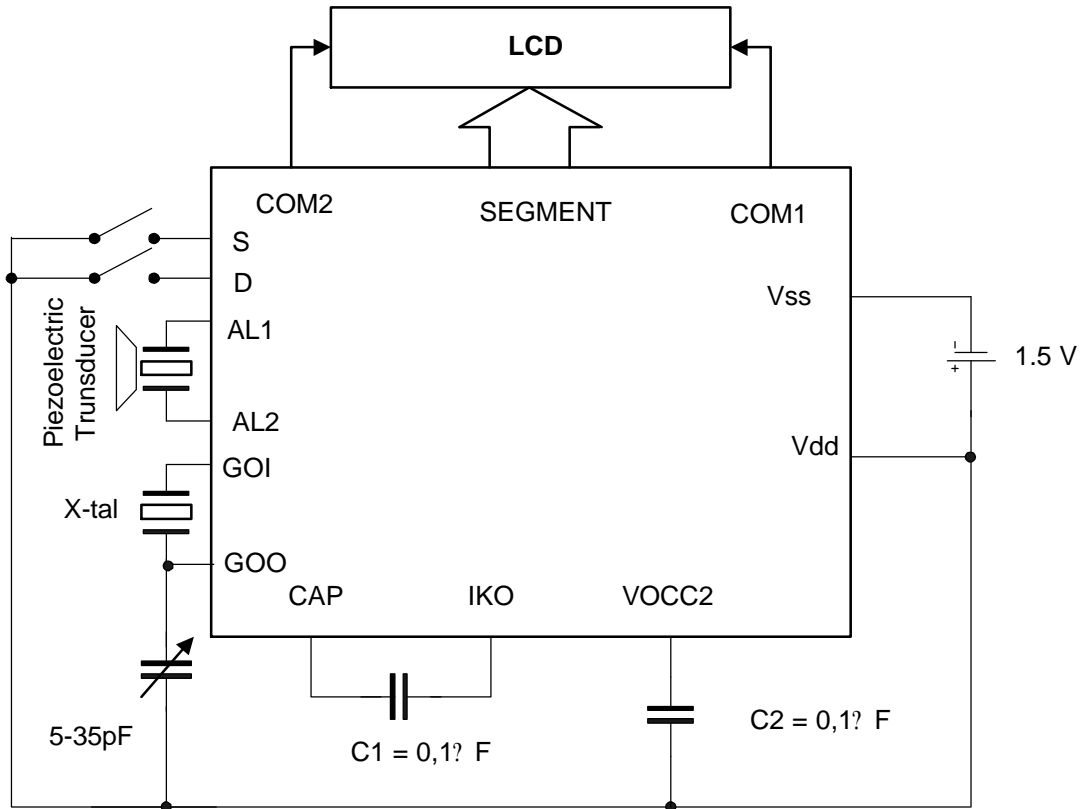


PAD LOCATION

Pad number	Pad name	X	Y	Pad number	Pad name	X	Y
1	VOCC2	1855	0	17	SEG10	566	1370
2	Vdd	1855	140	18	SEG11	426	1370
3	Vss	1855	280	19	SEG12	286	1370
4	D	1855	420	20	SEG13	0	1324
5	AL2	1855	560	21	SEG14	0	1184
6	AL1	1855	924	22	COM2	0	1044
7	COM1	1855	1064	23	GOI	0	886
8	SEG1	1826	1370	24	GOO	0	746
9	SEG2	1686	1370	25	GOOT	0	606
10	SEG3	1546	1370	26	OV	0	466
11	SEG4	1406	1370	27	IKO	0	327
12	SEG5	1266	1370	28	CAP	0	187
13	SEG6	1126	1370	29	S	0	46
14	SEG7	986	1370	30	T1	286	0
15	SEG8	846	1370	31	T2	426	0
16	SEG9	706	1370	32	T3	566	0



APPLICATION CIRCUIT (for use with external trimmer capacitor type)



* Quartz Crystal Parameter
Fp = 32.768 Hz
CL = 12.5 pF
C1 = 4 pF
C0 = 2.5 pF
Rs = 35 K?
Q = 35.000