

### 5 FUNCTIONS 4 DIGITS ALARM

The DL9054 is a CMOS IC with alarm function that provides to drive a 4 digit duplexed LCD with Colon, PM-Time and Snooze Mark.

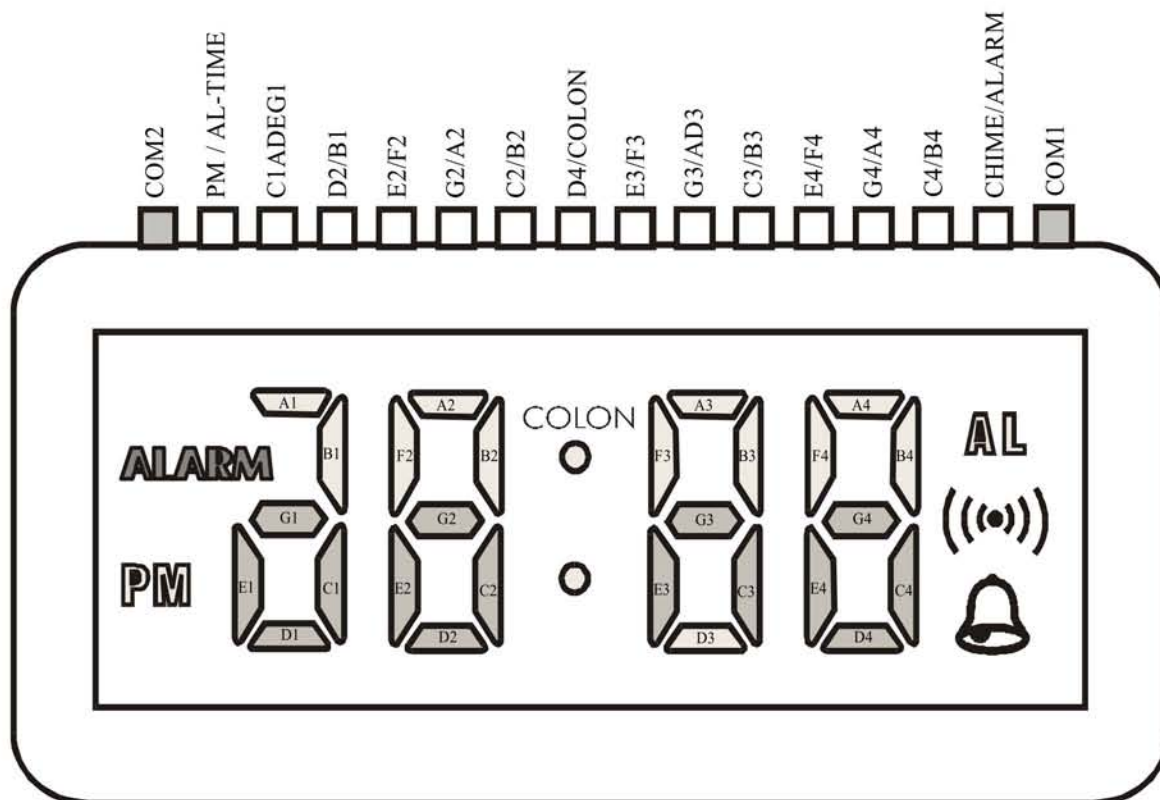
#### FEATURES

- Single-chip CMOS construction
- Drives 4-digit duplexed LCD with PM/AL-Time, Alarm and Chime mark
- Colon display
- On-chip oscillator, capacitor, resistor and voltage doubler
- 32,768Hz crystal frequency
- Direct drive of piezoelectric transducer
- Single 1.5V battery operation

#### FUNCTIONS

- 5 Functions: Month, Date, Hour, Minute, Second
- 30 second alarm sound
- Chime on every hour
- Selectable 12/24-hour format
- 4-year calendar
- One-touch correction of time error withing 30 seconds
- Alarm, Chime enable/disable
- 2-switch sequential operation
- LCD test

#### LCD FORMAT



# DL9054

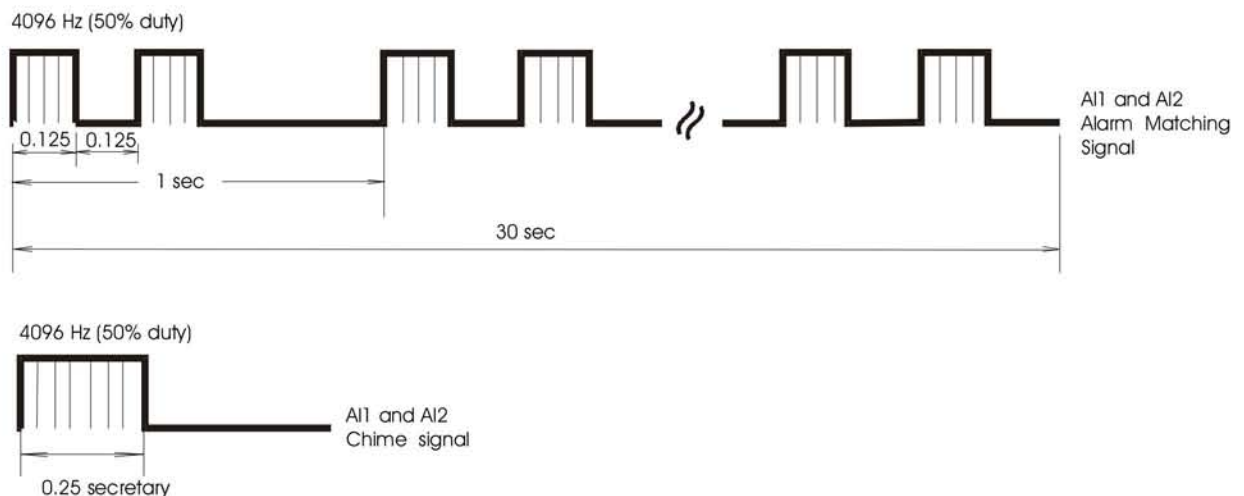
## ABSOLUTE MAXIMUM RATINGS

Characteristic	Symbol	Value	Unit
Supply Voltage ( $V_{DD1} - V_{SS}$ )	$V_{DS1}$	- 0.3 ~ + 2.0	V
Supply Voltage ( $V_{DD2} - V_{SS}$ )	$V_{DS2}$	- 0.3 ~ + 4.0	V
Operating Temperature	$T_a$	- 20 ~ + 75	°C
Storage Temperature	$T_{stg}$	- 40 ~ + 125	°C

## ELECTRICAL CHARACTERISTICS ( $T_a = 25^\circ\text{C}$ , $V_{SS} = 0\text{ V}$ , $V_{DD1} = 1.5\text{ V}$ unless otherwise specified)

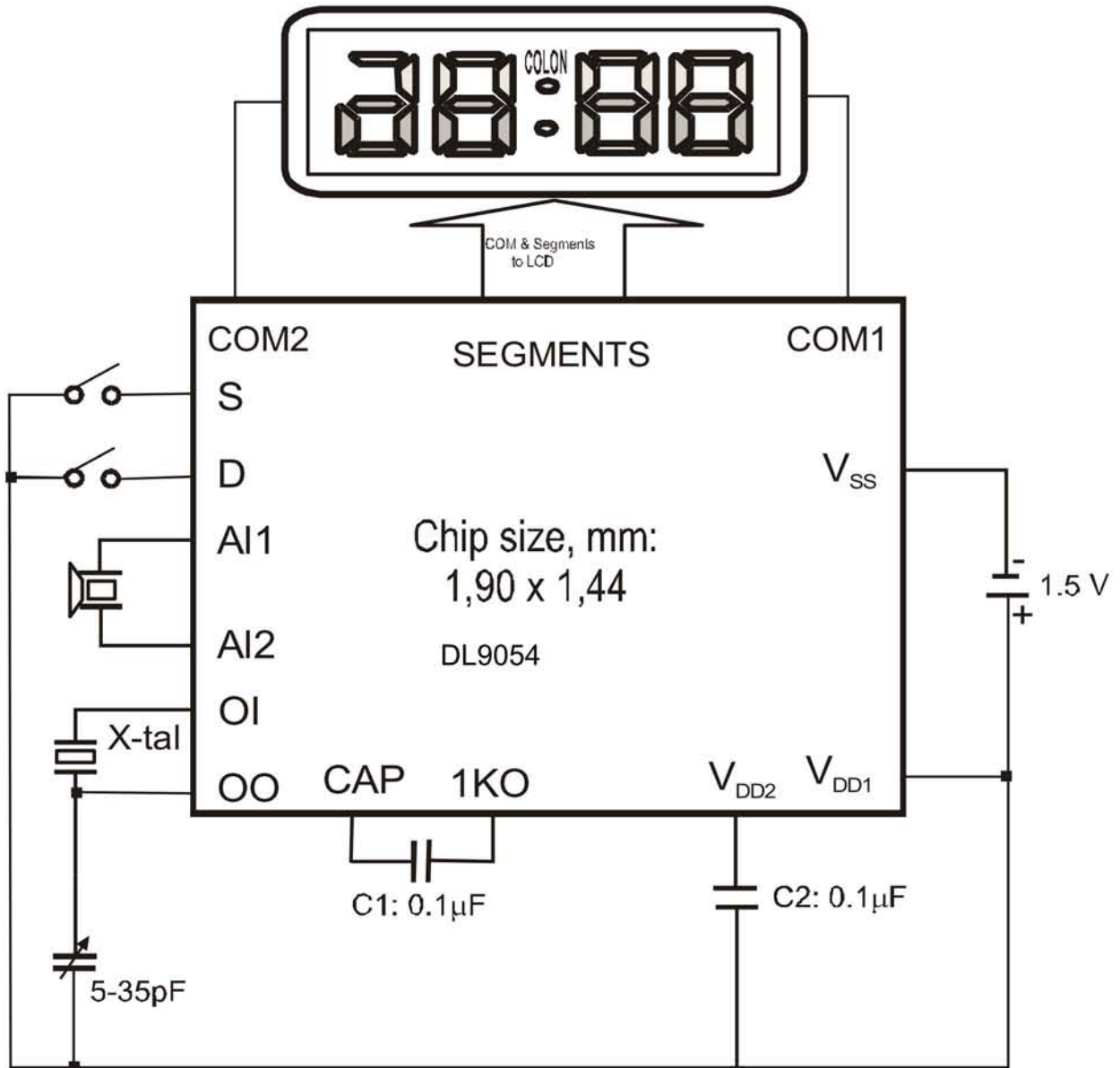
Characteristic	Symbol	Test Condition	Min	Typ	Max	Unit
Operating Voltage	$V_{DD1}$		1.2	1.5	1.8	V
	$V_{DD2}$		2.4	3.0	3.6	V
Supply Current	$I_{DD}$	Without load		1.0	2.0	$\mu\text{A}$
Input High Voltage	$V_{IH}$		$V_{DD} - 0.3\text{V}$		$V_{DD}$	V
Input Low Voltage	$V_{IL}$		$V_{SS}$		$V_{SS} + 0.3\text{V}$	V
Switch Activation Current	$I_{SW}$	$V_{IH} = V_{DD}$	0.1	1.0	3.0	$\mu\text{A}$
Oscillator Start Voltage	$V_{OSC}$	Withing 5 Sec			1.45	V
Oscillator Stop Voltage	$V_{OSP}$				1.45	V
Alarm Drive Current	$I_{ALA}$	$V_{sat} = 0.5\text{V}$ (Both Direction)	0.5	2.0		mA
Oscillator Frequency	$F_{OSC}$			32,768		Hz
DC-DC Conversion Frequency	$F_{CON}$	$C1 = C2 = 0.1\mu\text{F}$		1,024		Hz
LCD Frequency	$F_D$			32		Hz
Oscillator Input Capacitor	$C_{IN}$			20		pF
Time Stability	$T_{stb}$	$V_{DD} = 1.3 \div 1.8\text{V}$		1	3	ppm
Switch Debouncing Time	$T_{deb}$				62.5	mSec

## ALARM OUTPUT WAVEFORM



# DL9054

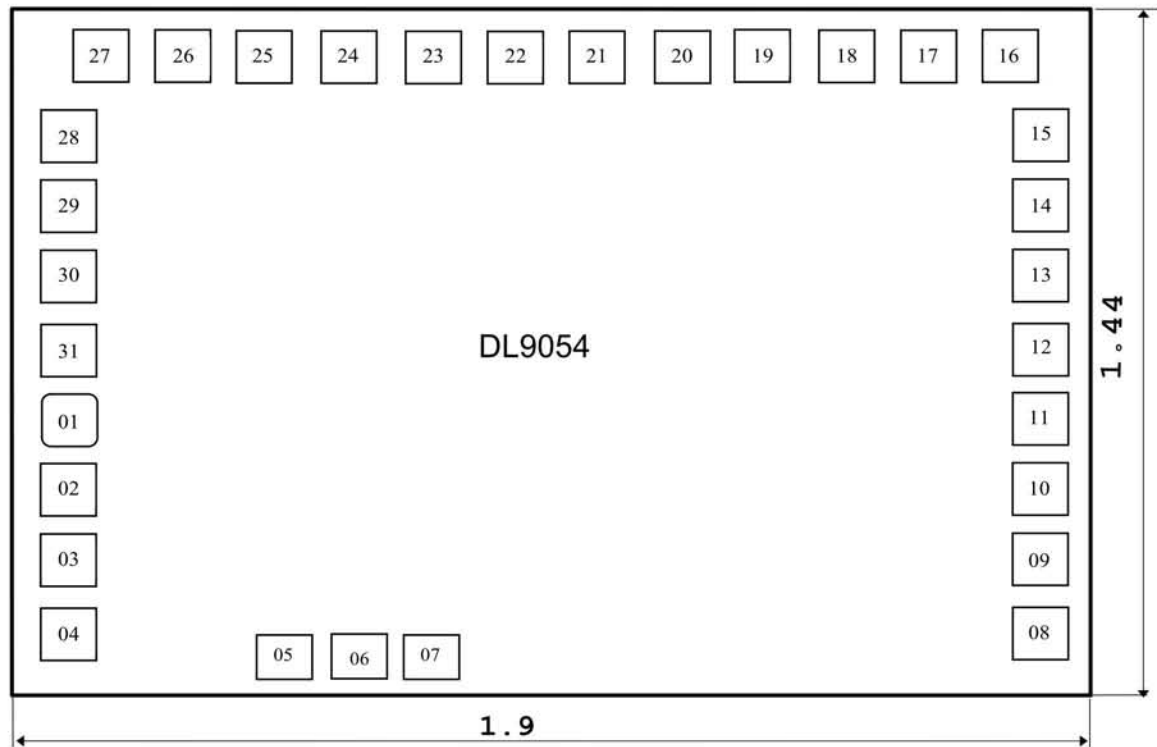
## APPLICATION CIRCUIT



\* Quartz Crystal Parameter  
Fp = 32,768 Hz  
CL = 12.5 pF  
C1 = 4 pF  
C2 = 2.5 pF  
Rc = 35 KΩ  
Q = 35,000

# DL9054

## PAD DIAGRAM



## PAD LOCATION (Left lower corner)

Pad No	Pad Name	X	Y	Pad No	Pad Name	X	Y
1	V <sub>DD1</sub>	0.080	0.520	17	G4/A4	1.530	1.260
2	1KO	0.080	0.380	18	E4/F4	1.390	1.260
3	CAP	0.080	0.240	19	C3/B3	1.250	1.260
4	S	0.080	0.100	20	G3/D3	1.110	1.260
5	T1	0.490	0.075	21	E3/F3	0.970	1.260
6	T2	0.640	0.075	22	D4/COL	0.830	1.260
7	T3	0.788	0.075	23	C2/B2	0.690	1.260
8	V <sub>DD2</sub>	1.720	0.100	24	G2/A2	0.550	1.260
9	V <sub>DD1</sub>	1.720	0.240	25	E2/F2	0.410	1.260
10	V <sub>SS</sub>	1.720	0.380	26	D2/B1	0.270	1.260
11	D	1.720	0.520	27	C1/ADEG1	0.130	1.260
12	AL2	1.720	0.660	28	PM/AL TIME	0.080	1.080
13	AL1	1.720	0.800	29	COM2	0.080	0.940
14	COM1	1.720	0.940	30	OI	0.080	0.800
15	CHIME ALM	1.720	1.080	31	OO	0.080	0.660
16	C4/B4	1.670	1.260				