

3.5DIGIT COUNTDOWN/UP TIMER

FEATURES

- 3.5 digit LCD display
- Maximum countdown time 20 hours
- Count-up cycle time 20 minutes
- Count-down timer repeat function by bonding option
- Hours and minutes set independently
- Timer reset when depressing MSET and HEST simultaneously

FUNCTIONS

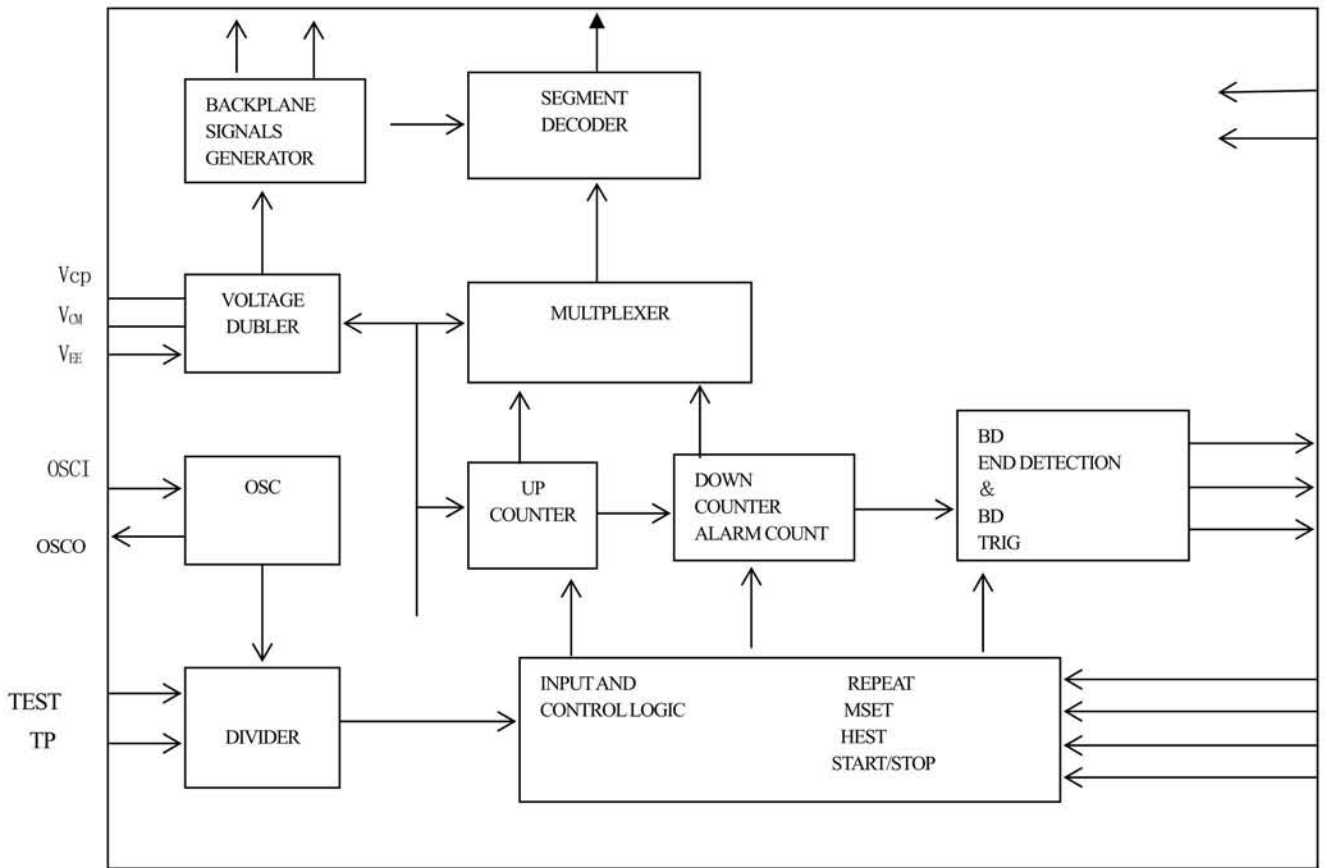
- Directly drives piezoelectric buzzer
- Special alarm trigger output for switch control or for driving another melody IC
- 5-minute and 10-minute pre-alarm function
- Internal voltage doubler
- 32,768Hz quartz crystal time base
- Single 1.5V battery operation

DESCRIPTION

The **IDL8717** is an Up/Down IC. It can directly drive a standard 3.5 digit LCD. Maximum countdown time is 20 hours and count up cycle time is 20 minutes. Feasible input options and universal functions give this chip many uses such as parking alarm timer, pillbox timer, kitchen timer, etc.

BLOCK DIAGRAM

SUNSTAR单片机专用电路 <http://www.icasic.com/> TEL: 0755-83387030 FAX:0755-83376182 E-MAIL:szss20@163.com



ABSOLUTE MAXIMUM RATINGS (Ta=25°C)

Characteristic	Symbol	Value	Unit
Supply Voltage	$V_{DD}-V_{SS}$	-0.3~3.0	V
Input Voltage	V_{IN}	V_{SS} to V_{DD}	V
Operating Temperature	T_A	-20~+60	°C
Storage Temperature	T_{stg}	-40~+70	°C

ELECTRICAL CHARACTERISTICS (Ta =25°C, VDD=0V, VSS=-1.5V, FOSC=32768HZ, unless otherwise specified)

Characteristic	Symbol	Test Condition	Min	Typ	Max	Unit
Operating Voltage	V_{CC}		-1.8	-1.5	-1.2	V
	GROUND		-3.6	-3.0	-2.4	
Supply Current	I_{DD}	Without Load		1.5	3	μA
Buzzer Driving Current	I_{BD}	$V_{BD}=1V$	200			μA
TRIG Driving Current	I_T	$V_{OH}=1.2V$	200			μA

Frequency Stability	$\Delta f/f$	$V_{SS} = -1.35V$ to $-1.65V$			1	ppm
Oscillator Built-in Capacitor	C_D			20		pF
Alarm Output Frequency	F_{BD}		4096×8×1			HZ
LCD Driving Current	I_{LCD}		0.1			μA
Oscillator Start up Time	T_{OS}	$V_{SS} = -1.2V$			2	sec

PIN DESCRIPTION

HEST-Hour Setting Input

This pin sets the hour for countdown mode. The setting function will only be effective when the countdown mode has been stopped or reset. If this pin is pulled high with the MSET pin simultaneously, the Timer will be reset. This pin has been internally pulled low.

MEST-Minute Setting Input

This pin sets minute time for the countdown mode. Like the HSET pin, the minute setting function can be carried out only when the countdown mode has been stopped or reset. This pin is used, with the HSET pin, to execute the reset function. It has been internally pulled low.

START/STOP-Start or stop Input

This pin acts as Start/Stop function for the UP/Down timer. After power-on or reset, Timer will be in a stop state. When it is triggered, the Timer will be enable, and another trigger will stop the Timer. It has been internally pulled low.

BD, BD-Piezo Buzzer Driving Output

This two pins are used to drive the Piezo buzzer directly.

TRIG-Trigger Output

This output pin sends out a high level signal in normal condition, including countdown, count-up and standby. If countdown time reaches zero, a low level output appears in this 1-minute alarm interval, then goes back to high level while alarm stops or START/STOP key is pressed

OTP-Repeat Control Input

This input pin controls the repeat function. If this pin is connected to V_{SS} , the chip won't execute the repeat function. A trigger of the Start/Stop pin will start the count up timer after countdown time has reached zero. If this pin is connected to V_{DD} , the countdown timer will operate repeatedly by triggering the Start/Stop pin when the countdown timer is zero. (When countdown timer has reached zero, a simulation of Start/Stop makes the countdown timer start to count from the time previously) To execute the count up function when the Repeat pin is high, a reset (depressing HEST and MEST simultaneously) has to be carried out first.

V_{DD} V_{SS} & V_{EE} -Power pins for positive power supply- V_{SS} ground- V_{DD} and voltage double supply- V_{EE}

V_{CP} & V_{CM} -Voltage Doubler Capacitor

A capacitor should be connected between these pins

OSCI & OSCO – Oscillator Input and Output

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A 32,768HZ quartz crystal oscillator is connected to these pins.

K/D1, A1/G1, B1/C1, COL/D3, F2/E2, A2D2/G2, B2/C2, F3/E3, A3/G3, & B3/C3 – LCD Segments Driving Pins

COM1 and COM2 – LCD Back plane Pins

TP and TEST – Test1 and Test2 Input Pins

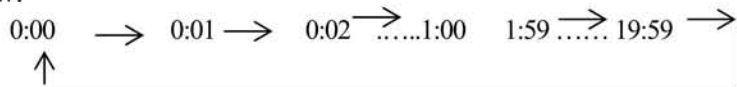
FUNCTIONAL DESCRIPTION

Countdown Timer Mode

1. After power – on, LCD will display 18:88 for about one second and then return to 0:00
2. Time is set by the HEST and MEST pins. Time setting is only effective in this mode and the timer must be in the stop or reset state. Each depression of these pins will makes the timer count advance one digit and if it is depressed more than two seconds, the timer will count one digit for every 1/4 second. The hour and minute setting are independent. Colon will be on but not flash during the setting.
3. The timer will reset to 0:00 and generate an alarm test, if HEST and MEST are depressed simultaneously. This alarm signal will be on as long as these pins are depressed.
4. After the time has been set, triggering the Start/Stop pin will start the timer and colon will begin to flash (0.5 sec on, 0.5 sec off)
5. When the timer is counting, it will be stopped by another triggering of the Start/Stop pin. In this stop state, the colon will be on, but not flash. The timer can also be set during this state. An additional trigger to Start/Stop will terminate this state and start to count from the time which it displays.
6. As countdown time remains 10 minutes and 5 minutes, BD & BD will send out the pre-alarm signal which is described in the pin description. A trigger of Start/Stop, or depressing HEST & MEST at the same time during this output period, will truncate the output
7. When countdown time is reached, the LCD displays 0:00 and the colon will be on but not flash. At this moment, BD & BD will send out a 4k×8×1 signal for one minute. During this alarm period, triggering Start/Stop or triggering reset (depress MEST and HEST) will stop the output. If the repeat function is enabled, the triggering of Start/Stop will restart the countdown timer from the previous setting time. In no repeat mode, Start/Stop trigger will only stop the output.
8. When the countdown timer reaches zero and the alarm signal ends (one minute), time can be set. If these is repeat function, the timer reaches zero and alarm for one minute, a trigger of Start/Stop will execute previous setting. If no repeat function ,a trigger of Start/Stop will start the count-up timer.
9. When this chip is in countdown timer mode, DCO will send out a DC high level signal and can not be stopped until the timer reaches zero or reset is triggered.

Count up Timer Mode

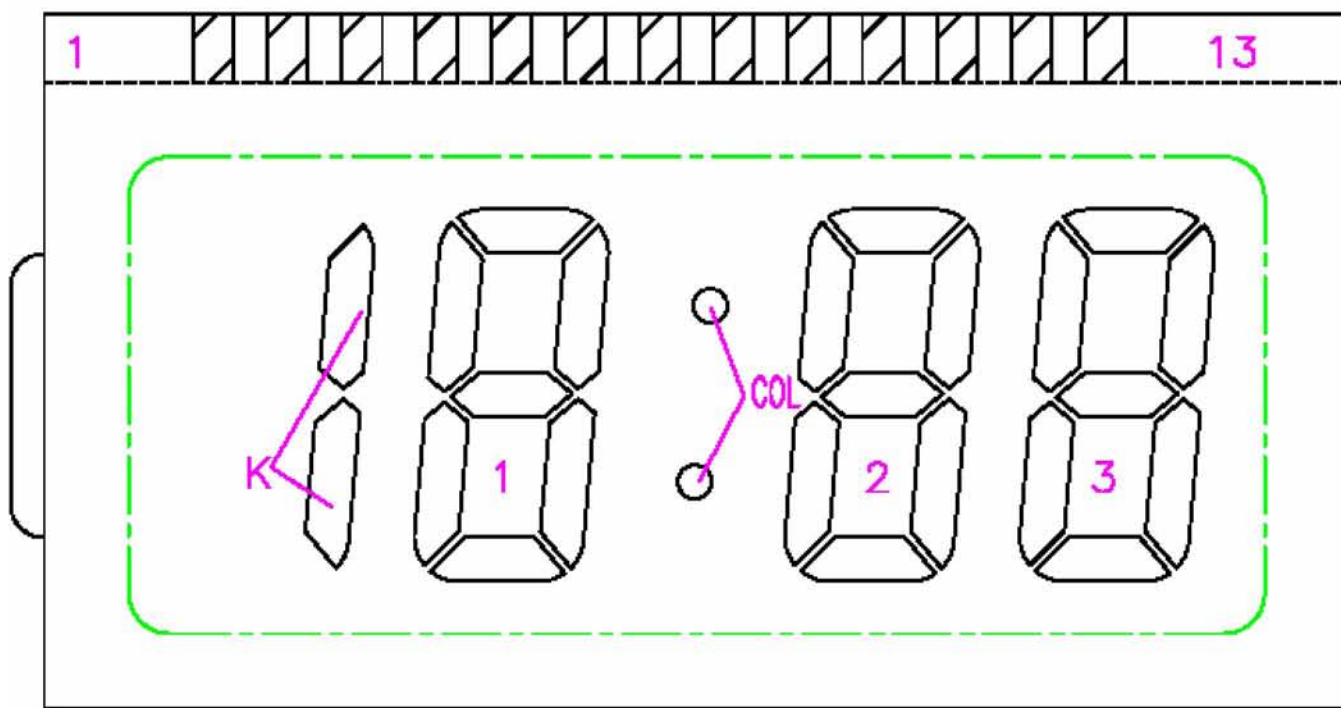
1. If repeat function exists, count-up timer start only when the chip has been reset and powered on without a set time. If there is no repeat function depressing Start/Stop key will start the count-up timer when the countdown time reached zero and the alarm output has finished. However, the count up timer will start by triggering Start/Stop after reset. One special case, if you set time to 0:00 after reset or the countdown timer reaches zero with no repeat function, a trigger of the Start/Stop count-up timer start.
2. The count-up timer has a cyclical count of 20 minutes after being started. The counting sequences are listed blow:



In this mode, it will always display minutes and seconds. In addition, colon is always on and not flashing.

3. When the count up timer is counting, depressing the Start/Stop key will stop it . Another trigger of Start/Stop will start the timer continuously counting.
4. When the chip is in count up timer mode, the chip can change to count down timer mode after the countup timer is reset by depressing MEST and HEST at the same time

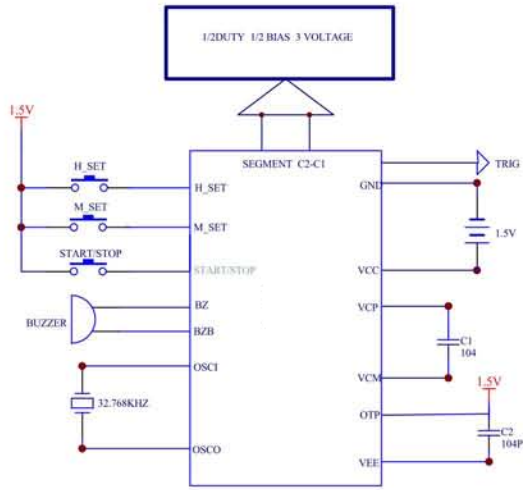
3.5-DIGIT LCD FORMAT (1/2DUTY, 1/2BIAS, 3V)



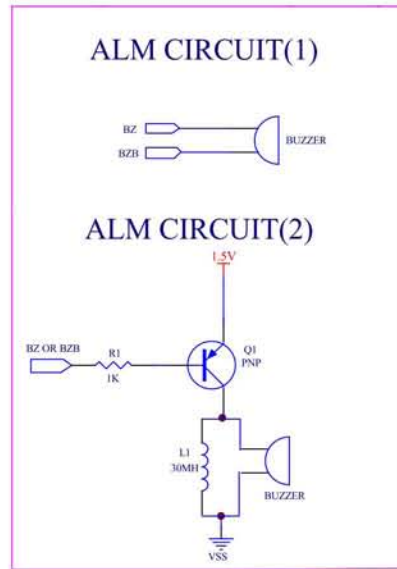
PIN	1	2	3	4	5	6	7	8	9	10	11	12	13
COM1	/	1D	1E	1G	1C	3D	2E	2G	2C	3E	3G	3C	COM1
COM2	COM2	K	1F	1A	1B	COL	2F	2AD	2B	3F	3A	3B	/

APPLICATION CIRCUIT

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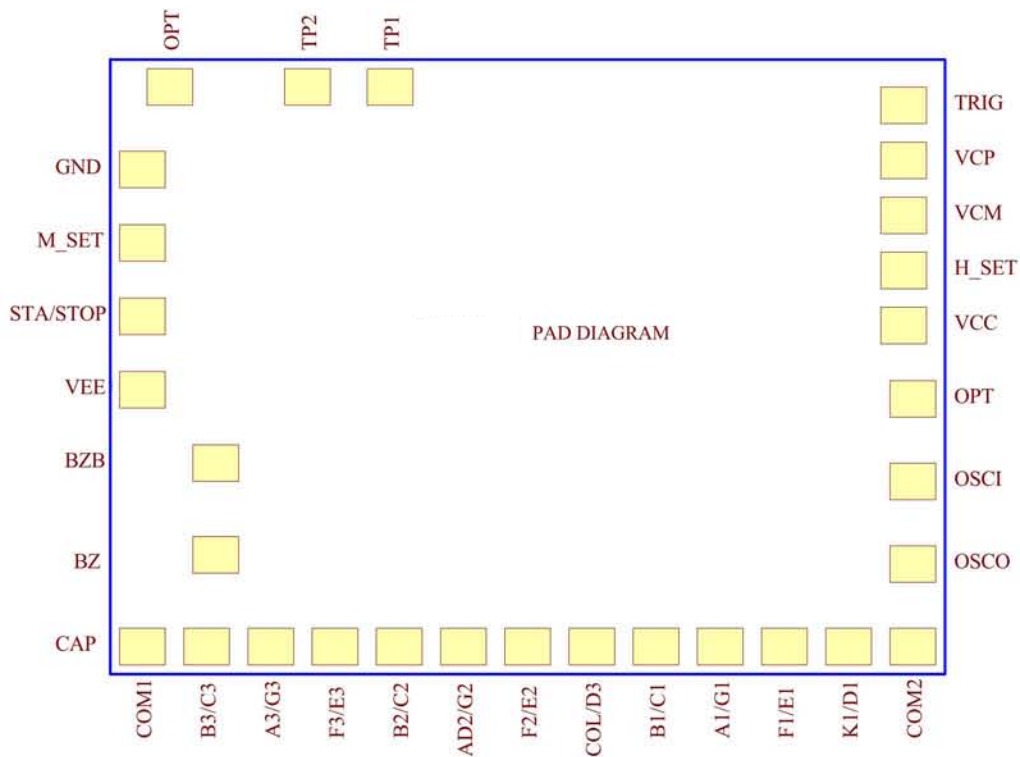


Substrate connect to VCC



PAD LAYOUT

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Chip size: 2220 uM X 2050 uM