

# 3 Digit LED Counter

**NOTE: CAREFULLY READ ALL INSTRUCTIONS BEFORE STARTING TO BUILD AND OPERATE THE COUNTER KIT.**

## INTRODUCTION

The 3 Digit LED Counter has three large 7 segment LEDs that can be used to display a value from 0 to 999. The circuit has three inputs, clock, latch and reset, found at connector P1. There are four 4mm diameter corner mounting holes and four 3mm diameter mounting holes for the KiwiPatch PCB, where P1 connector locates directly below the P2 DIL connector on the KiwiPatch PCB.

There is the option to insert a resistor for any one of three decimal point LEDs.

The digits are 70mm high x 48mm wide with a total display area of 70mm high x 144.5mm wide.

The 3 Digit Counter operates on a supply 12Vdc to 15Vdc, operating at 15Vdc will give the maximum LED brightness.

The digits are driven in sequence with the total load current equivalent to one segment continuously displaying number 8.

Additional digits can be added by connecting S2 to S1 of consecutive kits to increase the display to 6 or 9 digits etc.

The 12 to 15Vdc power supply must be of sufficient power rating for the number of kits to be powered.

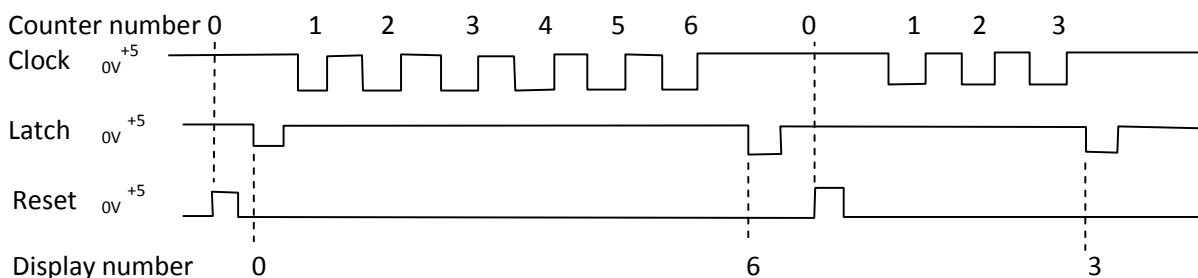
**Table 1 Power supply power rating**

PCBs	Number of Digits	Supply Voltage	Current rating	Power rating (Watts)	
1x	3 Digits	12Vdc	85mA	1W	VA
1x	3 Digits	15Vdc	190mA	2.8W	VA
2x	6 Digits	12Vdc	170mA	2W	VA
2x	6 Digits	15Vdc	380mA	5.7W	VA
3x	9 Digits	12Vdc	260mA	3.1W	VA
3x	9 Digits	15Vdc	570mA	8.5W	VA

The Digital Counter three logic level inputs Clock, Latch and Reset can be driven directly from a micro controller chip. The following table lists the logic state of each input.

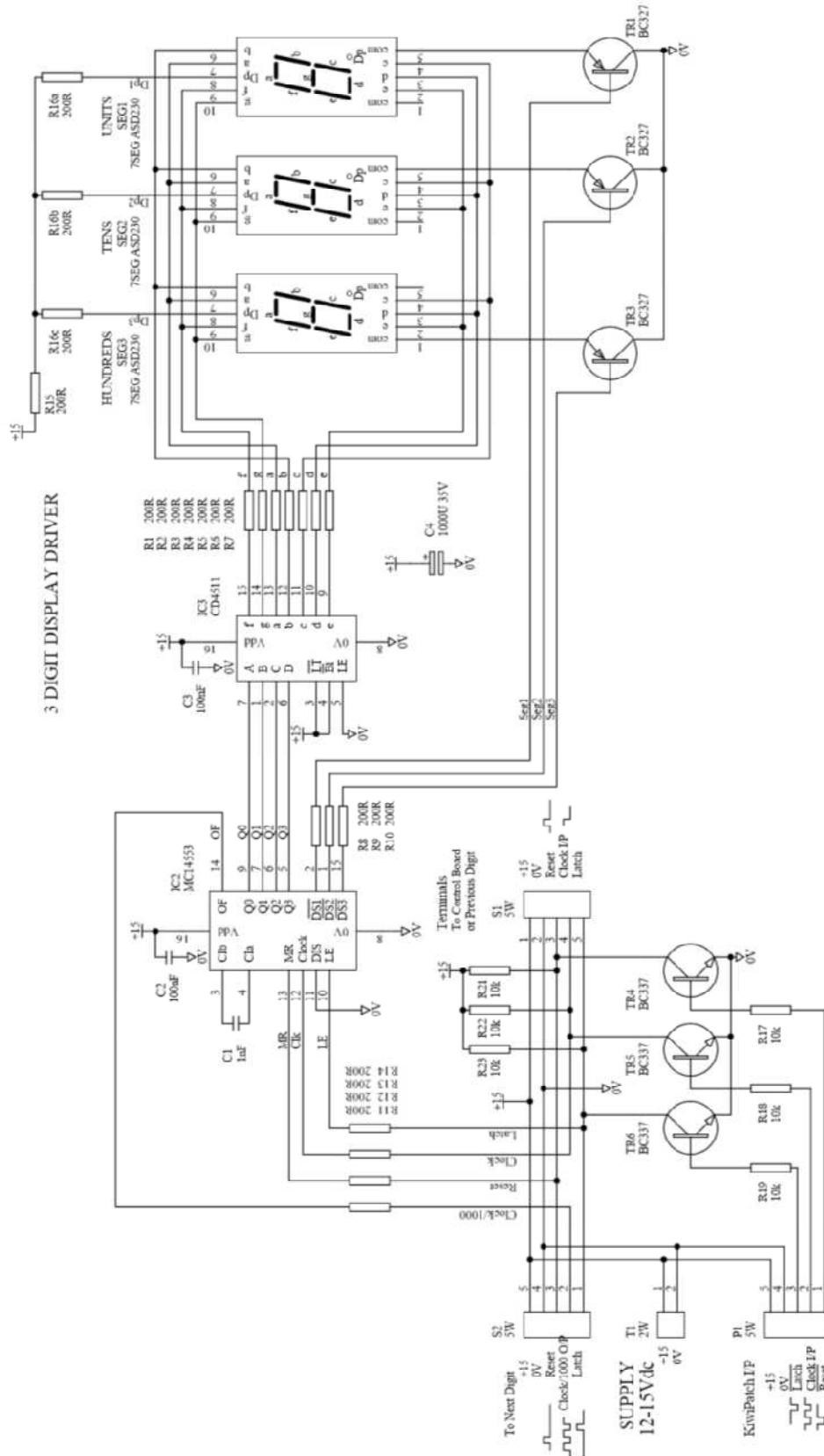
**Table 2 Input logic inputs**

Clock	Low to High -	Increment the counter by one count
	High to Low -	No change to the counter
Latch	Low state -	The counter number is continuously transferred into the display latch
	High state -	The counter number is locked into the display latch
Reset	High -	The counter is reset to zero. The display latch will retain the locked number
	Low -	The counter is enabled



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Circuit Diagram 1 3 Digit LED Counter



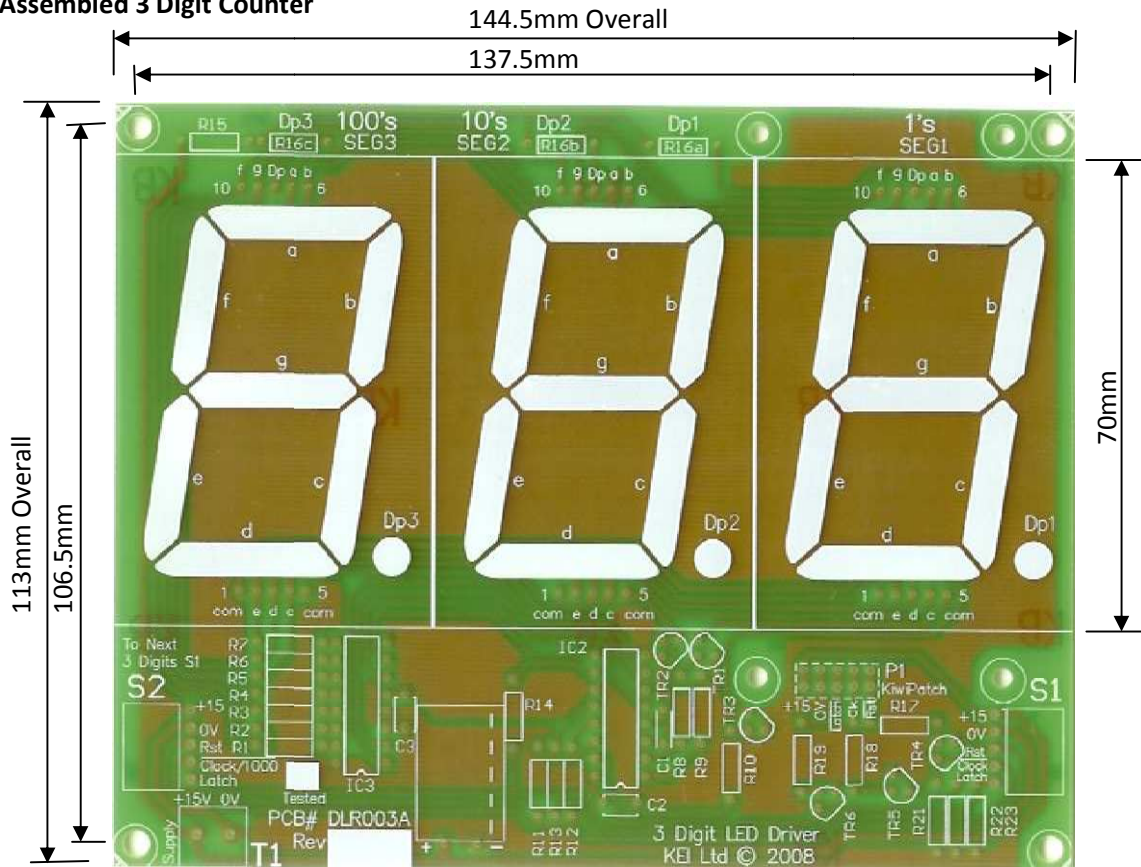
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**Table 3 Bill of Materials**

Used	Part Type	Designators	Description	Footprint
<b>Capacitors</b>				
1	1nF	C1	1nF 50V	5.2x2-0.2
2	100nF	C2 C3	100nF 50V	5X3.2-0.2
1	1000U 35V	C4	Electrolytic 100uF 35V	Ø13 x 25mm
<b>Resistors</b>				
15	200R	R1 R2 R3 R4 R5 R6 R7 R8 R9 R10 R11 R12 R13 R14 R15	Resistor 200 Ohm 0.6W	0.6W 0.4"
1	200R	R16a Fit for DP1 R16b Fit for DP2 R16c Fit for DP3	"000." Resistor 200 Ohm 0.6W "00.0" Resistor 200 Ohm 0.6W "0.00" Resistor 200 Ohm 0.6W	
6	10k	R17 R18 R19 R21 R22 R23	Resistor 10k Ohm 0.6W	0.6W 0.4"
<b>Transistors</b>				
3	BC327	TR1 TR2 TR3	Transistor BC327	TO92
3	BC337	TR4 TR5 TR6	Transistor BC327	TO92
<b>Integrated Chips</b>				
1	CD4511	IC3	IC BCD to 7 Segment driver	DIP16
1	MC14553	IC2	IC 3-Digit BCD Driver	DIP16
<b>LED Modules</b>				
3	ASD230CI7	SEG1, SEG2, L SEG3	7 segment 30mA 7.6V	LED-ASD-230CI7
<b>Connectors</b>				
1	2Way	T1	Screw Terminal	5mm pin-pin
2	5Way	S1 S2 <b>Optional</b>	Right Angle SIL Pin socket	2.54mm pin-pin
1	5Way	P1	SIL IC Socket	2.54mm pin-pin
1	5Way	P1	SIL Pin Header	2.54mm pin-pin
<b>Hardware</b>				
1	PCB	3 Digit LED Driver	PCB # DLR003	
1	KIWIPATCH PCB			
4	M3 Machine screws and nuts		KiwiPatch mounting screws	M3 x 12m Long
4	M3 mounting posts		Plastic mounting posts	M3 x 6mm Long
4	M4 Machine screws and nuts		DLR003 PCB mounting screws	M4 x 12m Long

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**Fig 1 Assembled 3 Digit Counter**

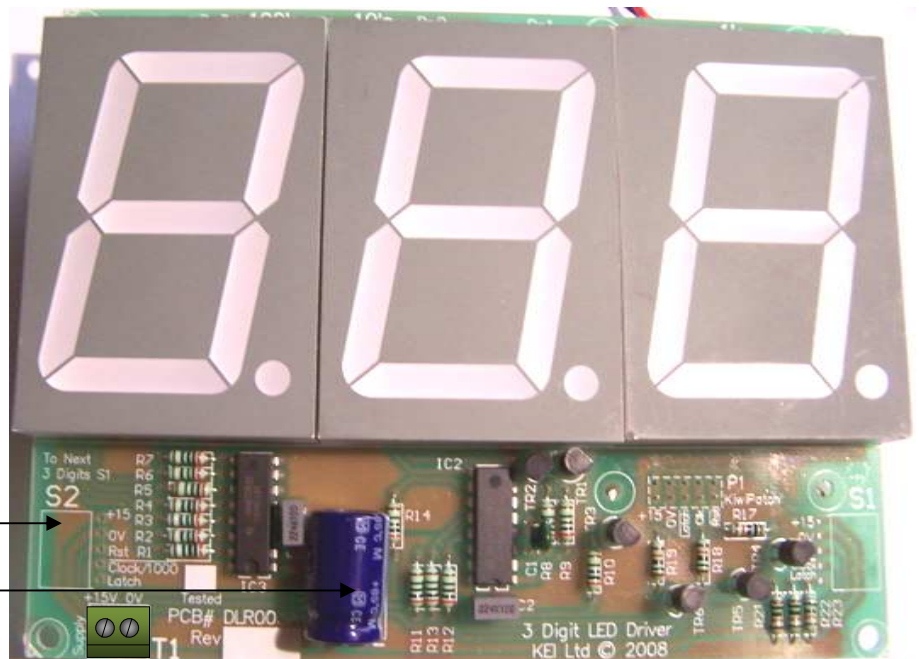


**Fig 2 3 Digit Counter PCB**

Assembled 3 Digit counter  
Display 144mm W x 70mm H

Inputs from Controller;  
TR4, TR5, TR6, R17, R18 &  
R19 are fitted for the PCB  
with first three Digits.

- S2  
Connects to next 3 Digit  
counter S1
- C4  
May be fitted to rear side  
Check Polarity (+) and (-)





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Project No. DLC003

Rev A

## Program 1 - COUNTER

'3 Digit LED Driver – This program is a counter from 000 to 999

```
SYMBOL RST_Pin = 0          'RST low
SYMBOL CLK_Pin = 1          'CLK high
SYMBOL LTH_Pin = 4          'Latch Low
    HIGH RST_Pin             'Clear counter reset
    HIGH LTH_Pin             'Set default for counter latch
    OUTPUT CLK_Pin           'Set clock pin as output
    LOW CLK_Pin              'Set clock pin default
    b0 = 0
Begin:  FOR B0 = 1 to 999
        PULSOUT CLK_Pin, 10
        PAUSE 100
        NEXT B0
        PULSOUT LTH_Pin, 200
        PULSOUT RST_Pin, 200
GOTO Begin
```

## Program 2 - COUNTDOWN TIMER

'3 Digit LED Driver – This program will count down from 999

```
SYMBOL RST_Pin = 0          'RST low
SYMBOL CLK_Pin = 1          'CLK high
SYMBOL LTH_Pin = 4          'Latch Low
    HIGH RST_Pin             'Clear counter reset
    LOW LTH_Pin              'Set default for counter latch
    OUTPUT CLK_Pin           'Set clock pin as output
    HIGH CLK_Pin             'Set clock pin default
    PULSOUT RST_Pin, 20     'Reset counter
    W0 = 0                   'Variable for the count number
    W1 = 0                   'Variable for the counter
Begin:  FOR W0 = 999 TO 0 STEP -1
        FOR W1 = 1 to W0
            PULSOUT CLK_Pin, 1 'Clock out one count into clock pin
            NEXT W1
        PULSOUT LTH_Pin, 20   'Latch in new number
        PULSOUT RST_Pin, 20   'Reset digit counter
        W2 = 999 - W0         'subtract difference for delay
        PAUSE W2
        NEXT W0
GOTO Begin
```

## Program 3 - ANALOGUE METER

**Note this program should include D1 Schottky diode BAT85 fitted as illustrated in Fig 7.**

'3 Digit LED Driver – This program will display the analogue value 0 to 999 read at input Pin 2.

```
SYMBOL RST_Pin = 0          'RST low
SYMBOL CLK_Pin = 1          'CLK high
SYMBOL LTH_Pin = 4          'Latch Low
    HIGH RST_Pin             'Clear counter reset
    LOW LTH_Pin              'Set default for counter latch
    OUTPUT CLK_Pin           'Set clock pin as output
    HIGH CLK_Pin             'Set clock pin default
    PULSOUT RST_Pin, 20     'Reset counter
    W0 = 0                   'Variable for the Analogue number
    W1 = 0                   'Variable for the counter
Begin:  Pause 500
        READADC10 2, W0      'Read analogue value at pin 2
        W0 = W0 MAX 999      'Limit value to 999
        GOSUB Update_Display 'Update the display with latest value
        GOTO Begin
Update_Display: IF W0 = 0 THEN Set_Display 'If value = 0 then set display to zero
                FOR W1 = 1 to W0          'Set counter to value
                    PULSOUT CLK_Pin, 1    'Clock out one count into clock pin
                NEXT W1
Set_Display:   PULSOUT LTH_Pin, 20        'Set new value to the display
                PULSOUT RST_Pin, 20       'Reset digit counter to zero
                RETURN
```