WWVB Test Signal Generator

(Spec Version 1.1 12/06/2010)

1 General Description

The WWVBG device can be used in conjunction with an LCD module and a 60 KHz tuned ferrite antenna to generate an RF signal for testing WWVB-slaved clocks. WWVB parameters can be set to desired values using three momentary pushbutton switches. Once set, the time values should increment at the normal rate, and should be as accurate as the crystal oscillator. Although the generator uses a crystal as its timebase, the timekeeping error can be as much as one second every 9 hours and still be within the spec for the crystal, so it's nowhere near accurate enough to be used as a timekeeping device.

1.1 Applications

This device was designed to be used for testing WWVB-slaved clocks.

1.2 Device Pinout

See schematic diagram

1.3 Pin Description

VDD	14	Positive power supply voltage input
VSS	5	Negative power supply voltage input (Ground)
60KHZOUT	6	60 KHz clock output (unmodulated RF carrier)
MODOUT	7	Output, amplitude modulating signal. Either 0V or high-impedance.
WWVBMON	9	WWVB logic level output, for monitoring data stream. Active-low
T0SYNC	11	Output, pulse indicates start of 60-second WWVB data frame.
FLDSELSW	4	Pushbutton switch input for selecting WWVB data field to adjust (Requires 10K pullup, and momentary switch to gnd)
INCRSW	12	Pushbutton switch input for increasing selected data (Requires 10K pullup, and momentary switch to gnd)
DECRSW	13	Pushbutton switch input for decreasing selected data (Requires 10K pullup, and momentary switch to gnd)
LCDRWb	8	Output, Read/Write-bar signal to LCD module
LCDENAB	10	Output , active-high enable to LCD module
LCDRS	3	Output, register/data select signal for LCD module
LCDD0	17	Output, least significant LCD module data bus bit (connect to D4 of LCD module)
LCDD1	18	Output, LCD module data bus bit (connect to D5 of LCD module)
LCDD2	1	Output, LCD module data bus bit (connect to D6 of LCD module)
LCDD3	2	Output, most significant LCD module data bus bit (connect to D7 of LCD module)
OSC2	15	6MHz crystal oscillator output signal

OSC1   16   6 MHz crystal oscillator input signal

2 Device Operation

2.1 Adjusting parameters

Use the field select pushbutton to select the parameter to adjust, then use up/incr and down/decr pushbuttons to adjust parameter. After five seconds with no switch pressed, display will revert to normal mode. Time seconds value is reset whenever buttons are pressed. To set seconds value to 0, set hour and minutes value, then press and hold field select until you want to reset the seconds value, then release it. Six seconds later, display will revert to normal, and seconds value of 6 will be displayed. Seconds value will increment normally after that. Another option for setting the seconds value is to momentarily tap the decrement pushbutton switch when not in parameter adjust mode. This will set the seconds value to 30.

2.2 Parameter Display

In normal operating mode, seconds and time values are always displayed. The right portion of the display rotates through the remaining WWVB parameters, displaying each for 10 seconds.

2.2 Monitor Output

The monitor output is active-low, to be similar to the outputs of some WWVB receiver modules. On this signal you can see low pulses of 200, 500, or 800mS corresponding to the data bits present in the WWVB stream.

3 Operating Voltage, Output current

3.1 Detailled hardware specs on the chip

        Because this device is implemented using a PIC16LF87 chip, the data sheet for that device (available at www.microchip.com) should be consulted if more information is needed.