
Product Technical Brief

Reading and Writing Waveforms on the CS61584A

The Arbitrary Waveform Generator (AWG) is a unique feature of Crystal LIU's that allows the customization of the output waveform for non-standard terminations. The function of the AWG on the CS61584A is described in the CS61584A datasheet (DS261PP4). The following note describes the procedure for accessing the waveform memory. Note that the memory access function is only available in Host mode.

1. The first step is to set up the pulse shape measuring equipment according to the applications note, "Measurement and Evaluation of Pulse Shapes in T1/E1 Systems" (AN07REV2). Only after this has been done can the user get a picture of the true pulse shape.
2. The fastest way to arrive at an ideal pulse shape is to start with one of the pulse shapes that already exist in ROM. To read the ROM data, first set the CON[3:0] bits to match the impedance and line length conditions that are closest to the given application. This is done with a write to the Control B register for Channel 1 (address 0x16 using the serial port, or 0x06 with the parallel port). The four least significant bits of the data are set to the desired line configuration (see Table 1 in the data sheet). For a more complete description of the input timing, please refer to timing diagrams in the beginning of the datasheet.
3. Reading a byte from the ROM takes two accesses; the first is a memory read that tells the device that the ROM is being accessed, and the next one fetches the data. The ROM address is 0x1A on the serial port, and 0x0A on the parallel port. This is followed by another read, which has the desired cell number (0x00 to 0x29) for its address. The data read back is the value of that cell. It's best to read and save the contents of all 42 cells for a given pulse shape before making any modifications.
4. Now the shape of the output pulse can be modified. The conversion from the value of a cell to a voltage depends on the setting of the CON[3:0] bits. The conversion factors are given in the section titled, "Arbitrary Waveform Registers" in the data sheet. The pulse shape values are 7 bit, two's complement numbers. The device uses the same stored pulse for both positive and negative pulses. The entire stored pulse shape is inverted for a negative pulse. Negative values in the memory are for negative overshoot on a positive pulse.

When adjusting the values, note that the output amplifier is slew rate limited. It will take two cells for the output pulse to go from 0V to positive or negative full scale. Making large changes in the pre-stored waveform should be avoided, since the results may be hard to predict. If large changes are necessary, it's better to start with a different waveform.

5. Write the new data into the AWG RAM. This is a single port RAM, so it can't be used to drive the output pulse while it is being modified. To ensure that there are no memory conflicts, the LIU must be configured to use one of the ROM waveforms while the AWG RAM is being accessed (e.g., CON[3:0] = 0000).

Writing a byte to the RAM also takes two accesses; the first is a write with the Address/Command Byte set to indicate a RAM access. Using the serial port, the Address/Command Byte is 0x18 for channel 1 and 0x19 for channel 2. If the parallel port is being used, then the address is 0x08 for channel 1 and 0x09 for channel 2. This is followed by another write, which has the desired cell number (0x00 to 0x29) for its address, and the new cell value for the data.

6. Select the RAM for output. This is done by setting the CON[3:0] bits to the Arbitrary Waveform setting for E1/75Ω, E1/120Ω, DSX-1 or DS-1 (see Table 1 of the datasheet). The output waveform will now be driven by the AWG RAM. The pulse shape can be modified further by repeating steps 4 through 6.

Once the new output pulse shape is defined, the AWG RAM can be loaded after power up by repeating step 5 and 6 with the predefined values.

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