

# PEP Testing Laboratory

## 4. SYSTEM SCHEMATICS

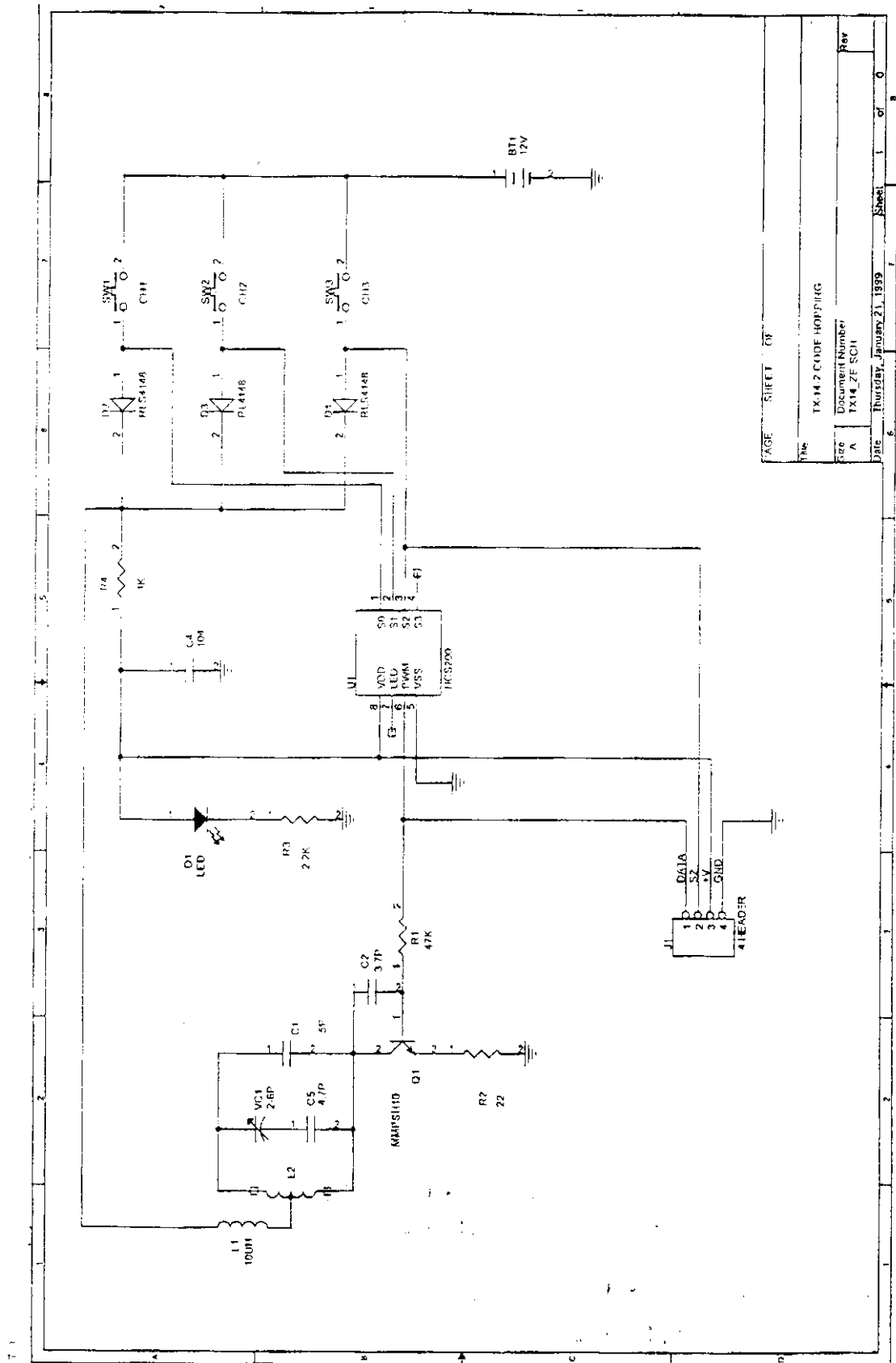


Figure 4.1 System Schematics

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## 5. RADIATED EMISSION DATA

### 5.1 Field Strength Calculation

The corrected field strength is automatically calculated by EMI Receiver using following:

$$FS = RA - AF - CF - AG$$

Where FS: Corrected Field Strength in dB  $\mu$  V/m

RA: Amplitude of EMI Receiver before correction in dB  $\mu$  V

AF: Antenna Factor in dB/m

CF: Cable Attenuation Factor in dB

AG: Built-in Preamplifier Gain in dB (Stored in receiver as part of the calibration data)

The pulse train timing plots are showed in figure 5.1, 5.2 and 5.3. The total time for each pulse train is **96.8 ms**, the long pulse is **750  $\mu$ s**, and short pulse is **370 $\mu$ s**. The maximum setting for high voltage is **26** long pulses and **33** short pulses.

$$[(0.75\text{ms} \times 26) + (0.37\text{ms} \times 33)] / 96.8 \text{ ms} = 0.328 = -20 \log 0.328 = -9.69 \text{ dB}$$

The maximum average field strength should be **0.328** of the peak field strength measured. So we use peak value minus **9.69dB** as calculated maximum average field strength.

### 5.2 Test Methods and Conditions

The EUT exercise program was loaded during the radiated emission test. The initial step in collecting radiated data is a EMC Receiver scan of the measurement range 30MHz – 5GHz using peak detector. IF bandwidth is 120kHz and video bandwidth is 300kHz for measuring 30MHz-1GHz. Both bandwidth are 1MHz for above 1GHz measurement.

### 5.3 Test Data

The following data lists the significant emission frequencies, polarity and position, peak reading of the EMI Receiver, calculated average reading, the FCC limit, and the difference between the peak reading and the limit. Explanation of the correction and calculation are given in section 5.1.

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## Radiated Test Data (測試數據)

| Frequency<br>(MHz)      | Polarity<br>[H or V]<br>Position<br>(X,Y,Z) | Antenna<br>Height<br>(m) | Azimuth<br>(Degree) | Peak<br>Reading<br>(dB $\mu$ V/m)<br><br>(a) | Calculated<br>Average<br>Reading<br>(dB $\mu$ V/m)<br><br>(b) | Antenna<br>Factor<br>(dB)<br><br>(c) | Cable<br>Loss<br>(dB)<br><br>(d) | Limit<br>(dB $\mu$<br>V / m)<br><br>(e) | Margin<br>(dB)<br><br>(f) |
|-------------------------|---------------------------------------------|--------------------------|---------------------|----------------------------------------------|---------------------------------------------------------------|--------------------------------------|----------------------------------|-----------------------------------------|---------------------------|
| 303.989 <sup>(3)</sup>  | H.X                                         | 2.7                      | 180                 | 62.25                                        | 52.56                                                         | 12.77                                | 2.1                              | 73.7                                    | - 6.82                    |
| 607.978 <sup>(4)</sup>  | H.X                                         | 1.9                      | 136                 | 38.23                                        | 28.54                                                         | 18.37                                | 3.2                              | 53.7                                    | - 3.59                    |
| 911.967 <sup>(4)</sup>  | H.X                                         | 1.4                      | 211                 | 25.96                                        | 17.27                                                         | 21.85                                | 4.4                              | 53.7                                    | -10.18                    |
| 1215.956 <sup>(2)</sup> | H.X                                         | 1.0                      | 42                  | 20.81                                        | 11.12                                                         | 24.90                                | 9.5                              | 54.0                                    | - 8.48                    |
| 303.989 <sup>(3)</sup>  | H.Y                                         | 2.9                      | 58                  | 59.89                                        | 50.20                                                         | 12.77                                | 2.1                              | 73.7                                    | - 8.63                    |
| 607.978 <sup>(4)</sup>  | H.Y                                         | 1.6                      | 114                 | 22.43                                        | 12.74                                                         | 18.37                                | 3.2                              | 53.7                                    | -19.39                    |
| 911.967 <sup>(4)</sup>  | H.Y                                         | 1.3                      | 167                 | 22.78                                        | 13.09                                                         | 21.85                                | 4.4                              | 53.7                                    | -14.36                    |
| 303.989 <sup>(3)</sup>  | H.Z                                         | 3.1                      | 174                 | 52.60                                        | 42.91                                                         | 12.77                                | 2.1                              | 73.7                                    | -15.92                    |
| 607.978 <sup>(4)</sup>  | H.Z                                         | 1.8                      | 301                 | 28.02                                        | 18.33                                                         | 18.37                                | 3.2                              | 53.7                                    | -13.80                    |
| 1215.956 <sup>(2)</sup> | H.Z                                         | 1.1                      | 124                 | 23.07                                        | 13.38                                                         | 24.90                                | 9.5                              | 54.0                                    | - 6.22                    |
| 303.989 <sup>(3)</sup>  | V. X                                        | 1.0                      | 27                  | 48.05                                        | 38.36                                                         | 12.77                                | 2.1                              | 73.7                                    | -20.47                    |
| 607.978 <sup>(4)</sup>  | V. X                                        | 1.0                      | 68                  | 23.34                                        | 13.65                                                         | 18.37                                | 3.2                              | 53.7                                    | -18.48                    |
| 911.967 <sup>(4)</sup>  | V. X                                        | 1.0                      | 152                 | 29.84                                        | 20.15                                                         | 21.85                                | 4.4                              | 53.7                                    | - 7.30                    |
| 303.989 <sup>(3)</sup>  | V. Y                                        | 1.0                      | 51                  | 61.11                                        | 51.42                                                         | 12.77                                | 2.1                              | 73.7                                    | - 7.41                    |
| 607.978 <sup>(4)</sup>  | V. Y                                        | 1.0                      | 204                 | 35.61                                        | 25.92                                                         | 18.37                                | 3.2                              | 53.7                                    | - 6.21                    |
| 911.967 <sup>(4)</sup>  | V. Y                                        | 1.0                      | 316                 | 29.24                                        | 19.55                                                         | 21.85                                | 4.4                              | 53.7                                    | - 7.90                    |
| 303.989 <sup>(3)</sup>  | V. Z                                        | 1.0                      | 272                 | 61.26                                        | 51.57                                                         | 12.77                                | 2.1                              | 73.7                                    | - 7.26                    |
| 607.978 <sup>(4)</sup>  | V. Z                                        | 1.0                      | 341                 | 31.50                                        | 21.81                                                         | 18.37                                | 3.2                              | 53.7                                    | -10.32                    |
| 911.967 <sup>(4)</sup>  | V. Z                                        | 1.0                      | 122                 | 29.09                                        | 19.40                                                         | 21.85                                | 4.4                              | 53.7                                    | - 8.05                    |

(1) See Figure 3.1, 3.2 and 3.3 for definition of position X, Y, Z .

(2) Restricted band.

(3) Fundamental limit is 3750-12500 microvolts/meter linear interpolations.

(4) Spurious limit is 375-1250 microvolts/meter linear interpolations.

(5) (b) = (a) - 9.69dB; (f) = (b) + (c) + (d) - (e)

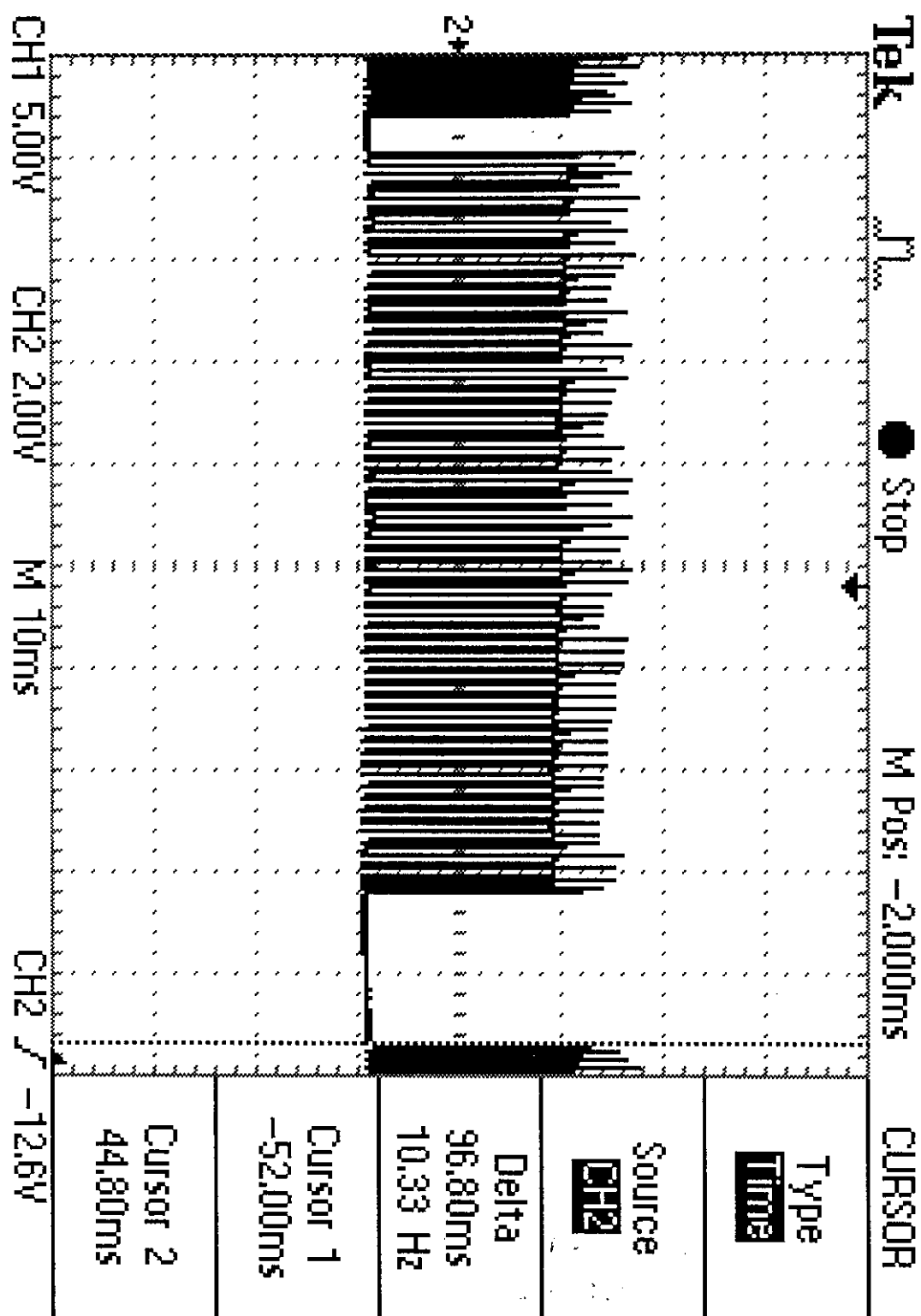
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## 5.4 Occupied Bandwidth

The bandwidth of the emission shall be no wider than 0.25% of the center frequency, in this case, **0.76 MHz** . Bandwidth is determined at the points 20dB down from the modulated carrier. Figure 5.4 shows the occupied bandwidth plot [ It's about **0.214 MHz** ] .

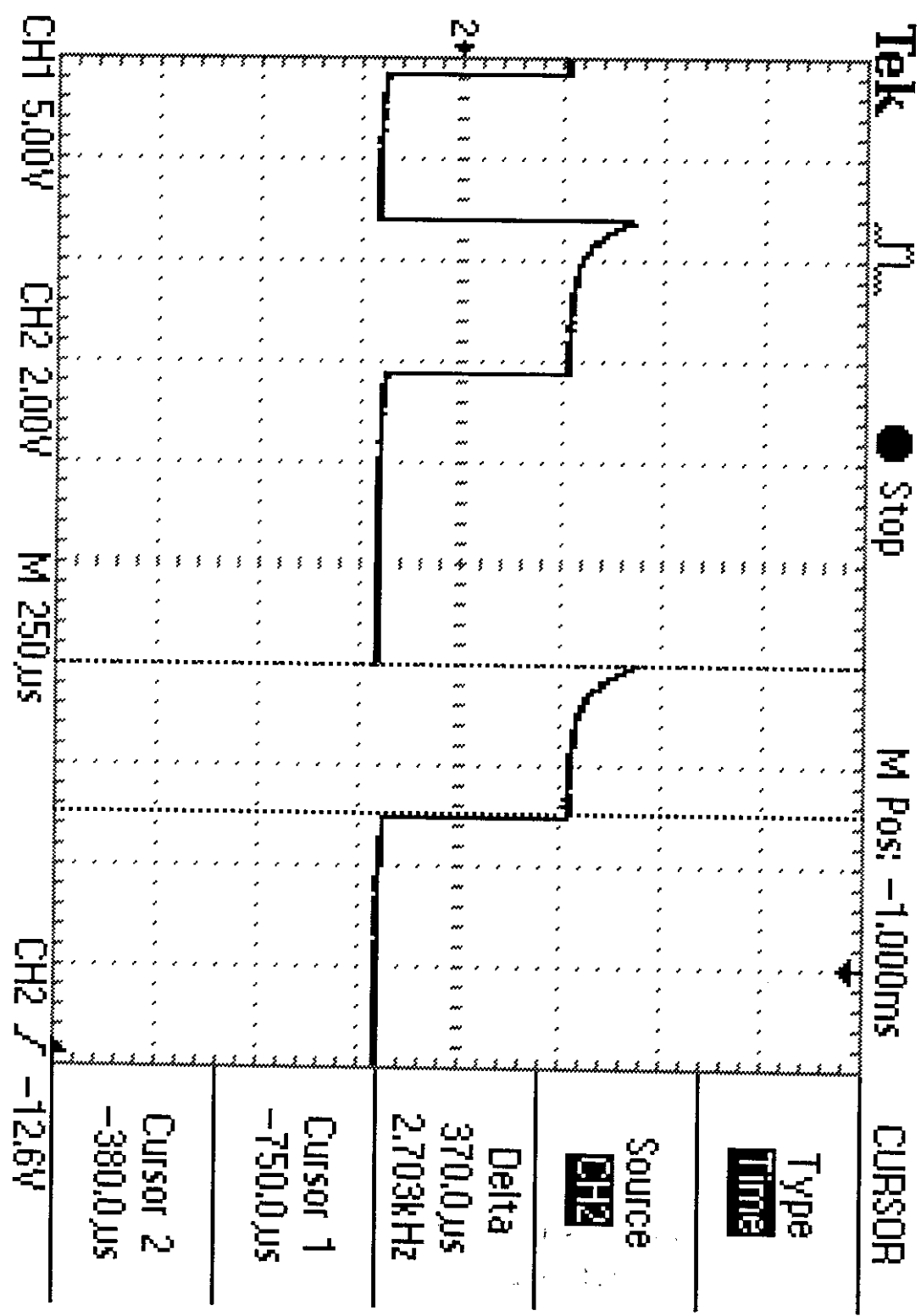
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Figure 5.1 Pulse Train Timing



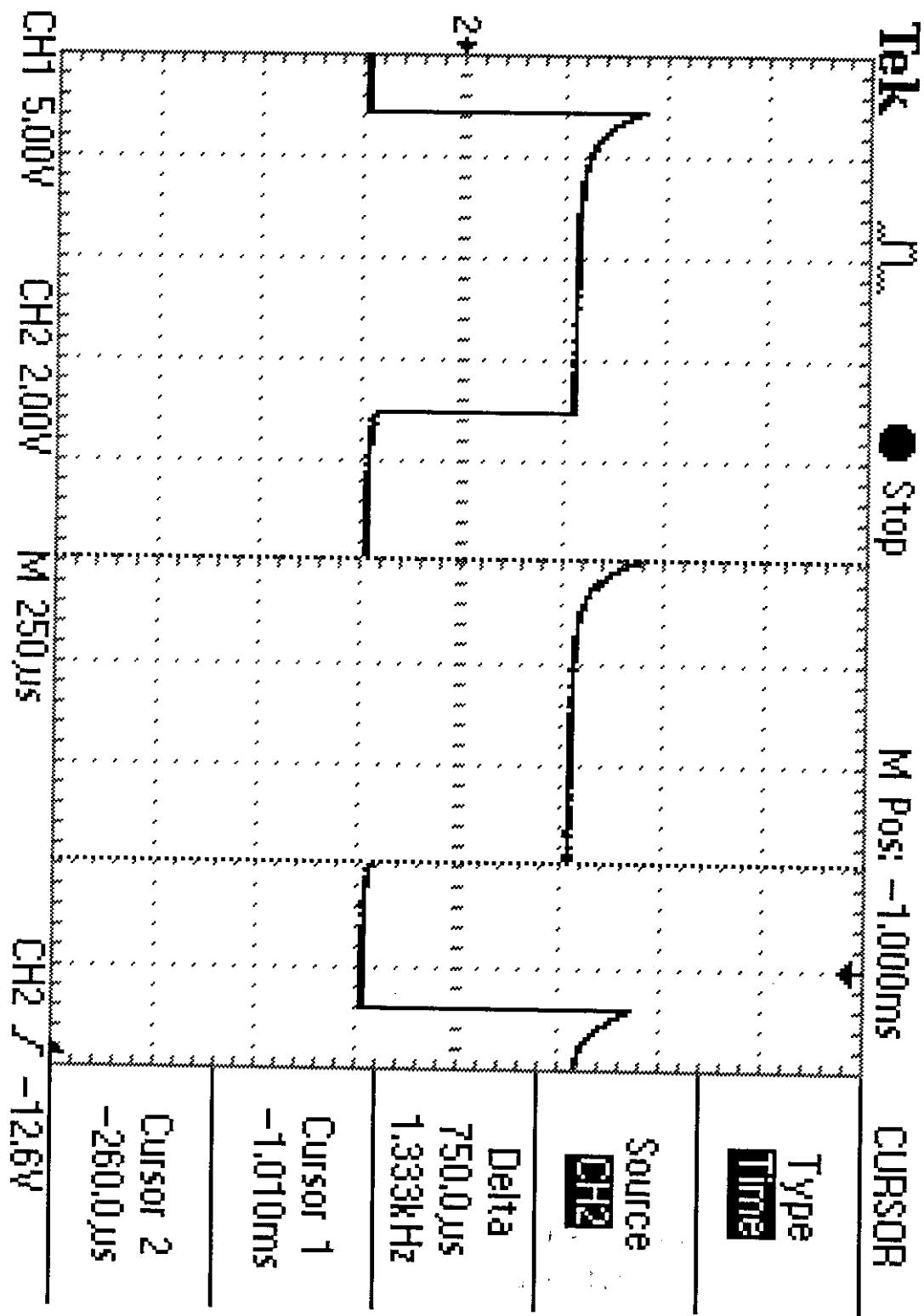
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Figure 5.2 Short Pulse Timing



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Figure 5.3 Long Pulse Timing



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Figure 5.4 Occupied Bandwidth

