



Term of Reference (TOR)

One Unit of Fast Digital Integrator

1. Introduction

Synchrotron Light Research Institute (SLRI) plans to construct the second synchrotron light source in Thailand (Siam Photon Source II, SPS-II) with the beam energy of 3.0 GeV. It is necessary to develop laboratories to support the development of main components of SPS-II machine. These includes high-field magnet laboratory, advance vacuum laboratory, high-precision alignment laboratory, high-frequency laboratory and accelerator laboratory. For the high-field magnet laboratory, various magnetic measurement systems are used for measurement of magnetic field and characterization of magnetic field quality, such as Hall probe measurement system and stretched wire measurement system.

Stretched wire measurement system is used for measurement of integrated multipole errors of accelerator magnets. The principle is based on the movement of a conducting wire in a magnetic field that induces voltage drop across the wire. The integrated induced voltage is proportional to the magnetic field strength being measured. A fast digital integrator is required for measurement of this integrated voltage, before the signal is used for analysis of the magnetic field.

2. Technical specification

FDI2056 Fast Digital Integrator

2.1 Digitizer

- 2.1.1 Gain: 0.1, 0.2, 0.4, 0.5, 1.0, 2, 4, 5, 10, 20, 40, 50, 100
- 2.1.2 Dynamic range: $\pm 10 \div \text{Gain V}$
- 2.1.3 Input overvoltage protection: $\pm 15 \div \text{Gain V}$
- 2.1.4 Maximum common mode voltage: $\pm 12 \div \text{Gain V}$
- 2.1.5 Maximum input bandwidth: 250 kHz @ Gain ≤ 10 ,
decreasing to 25 kHz @ Gain 100
- 2.1.6 Gain accuracy: 10 ppm
- 2.1.7 Digitizer resolution: 18 bits
- 2.1.8 Maximum sample rate: 500,000 per second

- 2.2 Integrator
 - 2.2.1 Timer resolution: 12.5 ns
 - 2.2.2 Time base stability over temperature: ± 0.075 ppm (0 to 60 °C)
 - 2.2.3 Time base stability over time: $< 5 \times 10^{-4}$ ppm (30 s), ± 0.7 ppm (1 year)
 - 2.2.4 Drift: 10^{-5} full scale per minute
- 2.3 Trigger sources: External, timer, encoder, software, multichannel
- 2.4 Trigger rate: 0.02 – 500 kHz
- 2.5 Number of channels: 2
- 2.6 Interfaces: Ethernet
- 2.7 Power input: 220 V 50 Hz
- 2.8 Memory capacity: 1 million partial integral
- 2.9 Including CD with user's manual and LabVIEW Application Programming Interface software

3. Delivery

Within 90 days of the purchase order

4. Warranty

5 years

Signature *Prapaiwan Sunwong* Purchaser
(Prapaiwan Sunwong)

Signature *Porntip Sudmuang*
(Porntip Sudmuang)

Chief, SPS-II Technology Development Division