

WSTL-2

(2-channel Laser Source)

WRTL-2

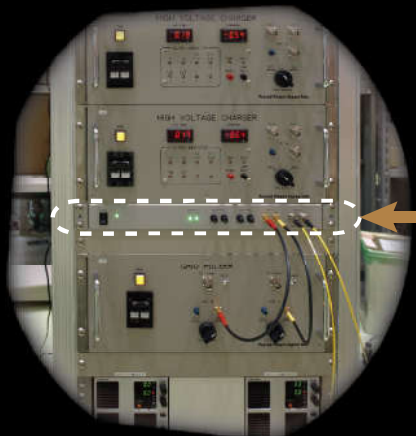
(2-channel Optical Receiver)

We regret to tell you that the LD we had employed in our product has been discontinued. If you are interested in purchasing the product, could you please let us know your desirable specifications to discuss the feasibility.

Optical link system transmitting TTL pulse to trigger DR Kicker of SuperKEKB accelerator

Graviton has developed the optical link system for TTL pulse consisting of WSTL-2 (2-channel Laser source) and WRTL-2(2-channel optical receiver) for use in SuperKEKB*1.

This optical link system transmits TTL pulse signal to trigger the discharge of the damping ring kicker*2 power supply for SuperKEKB accelerator.



- WSTL-2 (2-channel Laser Source) : E/O converting unit
This unit transmits ultra-low duty cycle TTL signals (pulse width: several μ sec and frequency: 0~50Hz) through SM optical fiber cables. The Jitter of the trigger signal, which varies in a range of 0 to 50 Hz, should be controlled to be 100 ps (p-p). And both rise and fall times of the optical output from E/O unit and the electrical output from O/E unit should be 2ns or less.

- WRTL-2 (2-channel Optical Receiver): O/E converting unit
By using with WSTL-2 unit together, this unit realizes the performance mentioned above.

Photo : Pulsed Power Japan Laboratory, Ltd.
Model Name : High Voltage Charger Grid Pulser

The system used in KEK
The optical link system Graviton developed



Image of the TTL pulse optical link system
Upper row : 2-channel Optical Receiver (WRTL-2)
Lower row : 2-channel Laser Source (WSTL-2)

- *1) SuperKEKB accelerator
Super KEKB accelerator is the one which was built in the factory B of KEK (HIGH ENERGY ACCELERATOR RESEARCH ORGANIZATION). The KEKB accelerator and the Belle detector have brought many achievements and demonstrated the violation of CP asymmetry proposed by Dr. Makoto Kobayashi and Dr. Toshihide Maskawa, who received the 2008 Nobel Prize in Physics. SuperKEKB has upgraded KEKB to try to achieve almost 40-time greater luminosity.
- *2) Damping Ring (DR)
In SuperKEKB, it is required to reduce the emittance to the minimum to increase the luminosity at the collision point by making the beam squeezed. Thus, the emittance of the incident beam should be reduced as well. The electron beam generated by the newly developed RF electron gun can fulfill this requirement. Meanwhile, when the positron beam hits the target, the electromagnetic shower produces, from where the emittance of the positron beam increases magnificently by capture collection. Damping ring reduces the emittance produced by the positron beam from the positron generator by 1/50 to 1/500.

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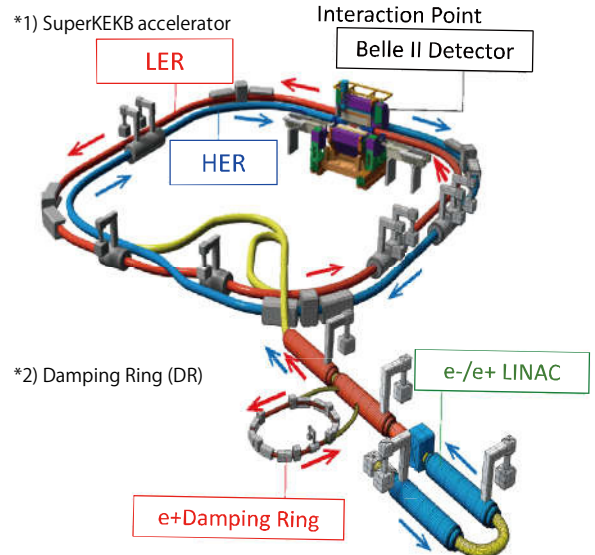
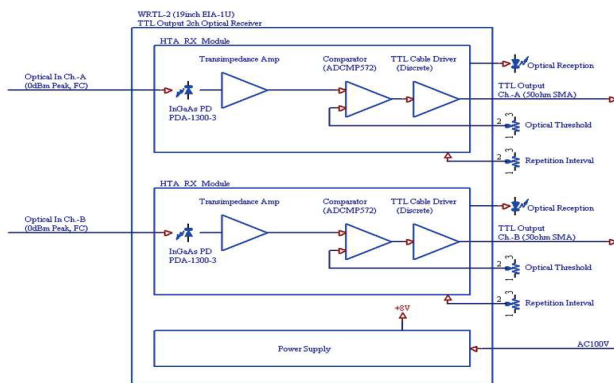


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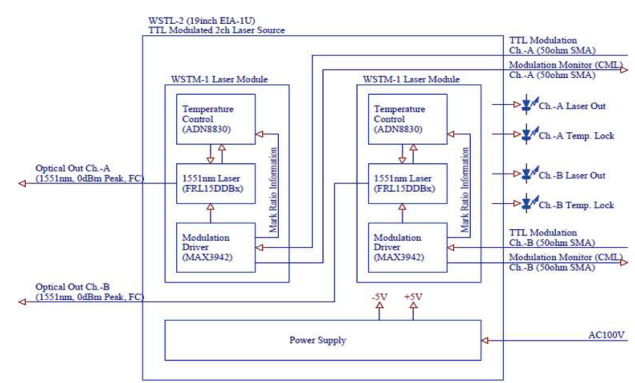


Upper row: 2-channel Optical Receiver (WRTL-2)
Lower row: 2-channel Laser Source (WSTL-2)

Block diagram of WRTL-2



Block diagram of WSTL-2



WRTL-2 Specification

Item	Description	Remark
Model name	WRTL-2	
Function	Optical receiver for TTL output	
Jitter characteristics	Every edge of the trigger signal which varies in a range of 0 to 50 Hz is controlled to be 100 ps (p-p).	In case of the combination with WSTL-2
Light receiving diode	InGaAs PIN Photodiode	
Receiving wavelength	900nm to 1650nm	
Number of light receiving diode	2	
Number of light input channel	2 channels	
Maximum light output level	+10dB	
Available optical fiber	Single-mode quartz optical fiber	
Light input connector	FC receptacle on the front panel	
Optical signal detection	To detect the binary output corresponding to the light intensity using Q/E converter and comparator	Threshold of the comparator is variable.
Receiving frequency bandwidth	DC to 200MHz	
Number of output channel	2 channels	
Receiving signal output level	TTL compatible, Logic 1: 4.5V or greater, Logic 0: 0V	When terminated with 50Ω (No output can be obtain)
Receiving output impedance	50Ω, DC coupling	
Receiving output connector	SMA receptacle on the front panel	
Polarity of receiving signal	Output H level: when the optical light with threshold or greater is input Output L level: when the optical light	
Adjusting function of logical threshold	Light input threshold value for output logic judgement can be set up by the knob on	Setting range from 0.6mW to 3.4mW, Continuously variable
Double pulse prohibited function	Enables you to set up the repetition interval time, which prohibits the output to go to H level again immediately after the output transits from H to L level.	Available to set up in a range of Min (no interval time) to 20ms
Supply voltage and current	AC 100V, Max 500mA	
Dimensions	430mm(W)x260mm(D)x44mm(H) for EIA-1U	Excluding protruding parts, such as connectors, brackets, Rubber legs, etc.

WSTL-2 Specification

Item	Description	Remark
Model name	WSTL-2	
Function	Laser light source with TTL modulation function	
Jitter characteristics	Every edge of the trigger signal which varies in a range of 0 to 50 Hz is controlled to be 100 ps (p-p).	In case of the combination with WRTL-2
Light emitting diode	DFB Laser with built-in Pelche (Butterfly type LD module)	
Light emitting wavelength	1551nm	
Number of light emitting diode	2	
Number of light output channel	2 channels	
Light output level	Logic 1: +5.3 dBm, Logic 0: -2.2dBm	The center of the wave height: +3dBm
Available optical fiber	Single-mode quartz optical fiber	
Light output connector	FC receptacle on the front panel	
Light intensity modulation	Direct modulation by the modulation of driving current of Laser	Wave-shaping to square wave by internal circuit
Rise time of modulation	500ps or less (10% to 90%)	
Modulation frequency bandwidth	DC to 1GHz	
Number of modulation input channel	2 channels	
Modulation input level	TTL compatible	Threshold: about 1.3V
Modulation input impedance	50Ω, 0V termination, DC coupling	
Modulation input connector	SMA type receptacle on the front panel	
Polarity of modulation signal	Light intensity increases at the falling voltage of modulation input signal, while decreases at the rising voltage.	
Extinction ratio of optical modulation	7dB or greater (when modulating at 1.25Gbps PRBS)	
Output stabilizing method	Monitoring the current of the PD built-in the Laser diode, it is feedback to the LD driving current.	
Monitoring modulation signal	After wave-shaping the signal which is input to modulation input terminal, it can be output for use of an external monitor through this terminal.	CML output
Polarity of monitor signal	Antiphase to modulation input signal	
Output impedance of modulated monitor signal	50Ω, DC coupling	
Output level of modulated monitor signal	350mVp-p or greater	When terminated with 5Ω
Output connector for modulated monitor signal	SMA type receptacle on the front panel	