Time Interval Jitter Meter KJM6335

Adopting the time-interval method in CD jitter measurements
Incorporating the symmetry follow-up circuit, PLL clock regeneration circuits, and phase-difference correction circuit
Displaying jitter distribution in luminance using an LED monitor
Supporting double-, quad-, and octuple- CD speeds
Capable of performing full remote control and readback through GPIB (optional)

KIKUSUI

KJM6335 CD time interval jitter meter

Equipped with double-, quad-, and octuple-speed PLL clock regeneration circuits as standard!

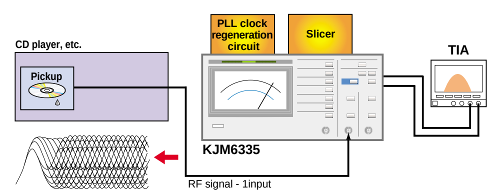
The KJM6335 is a dedicated time-interval jitter meter for CD players. As the market for DVD players expands, the demand for measurement by the time-interval method rather than the 3T or 22T method based on the current CD jitter measurement principle is beginning to increase. In addition, as the response characteristics of PLL clock regeneration circuits have been added to the "Compact-Disk Reference Measurement Methods Specification Guidelines Ver. 1.0, May 1999" that were revised in May 1999, we have developed the KJM6335. Unlike conventional methods (3T and 22T methods), the time-interval method measures the jitter distribution generated between an RF signal and a regenerated clock signal, and is thus especially useful for inspections placing emphasis on correlation with error rates, or bottom adjustments. Moreover, a clock signal is output from the rear terminal via the built-in PLL clock regeneration circuits. Connecting this signal and a sliced RF signal to an external time-interval analyzer or digital oscilloscope also allows the analysis of jitter distribution with the clock signal at the center. This could not be achieved with the conventional method (3T or 22T method). For media speed, as the KJM6335 is equipped with double-, quad-, and octuple-speed PLL clock regeneration circuits in addition to the standard-speed PLL clock regeneration circuit, measurements in the double-, quad-, or octuple-speed mode can be performed* (a clock signal is output from the rear terminal in the same way). The KJM6335 is also equipped with an INHIBIT INPUT terminal, it is capable of making optimum jitter measurement during track jumps or through the input of a missing part of data as a signal. Moreover, use of the optional GPIB interface (full remote control and readback) allows the KJM6335 to handle an automatic inspection system as well.

* A PLL clock regeneration circuit other than the double-, quad-, and octuple-speed PLL clock regeneration circuits may be added by custom order. Consult with Kikusui.

- Supports double-, quad-, and octuple- CD speeds
- For the evaluation criteria of disks
- For the adjustment or evaluation of pickups or tilt
- For evaluation criteria during the supply of OEM
- Reduces the cycle time in the production lines of CD players
- For comparison with semiconductors
- For evaluation of a signal using a servo system
- In place of jigs
- For the development of RF systems with which TIA measurement equipment handly be used.
- For a sudden requirement to check an actual unit
- Optimal for service stations

Measurement Methods Using the KJM6335

1 Measurement of an RF signal using an optical pickup



To change from the current 3T- or 22T-method-based measurement to measurement using the KJM6335, this measurement method should be applied. Note that because the measurement principle differs from that of the 3T or 22T method, the amount of jitter indicated differs from the conventional amount. In addition, the same measurement method is available at double-, quad-, or octuple- CD speeds.

MEDIA key

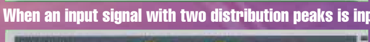
Selects the media to be measured

PHASE MONITOR

This monitor displays the phase difference between RF and clock signals, and the jitter distribution. The leftmost part of the monitor shows a phase difference of 0°, and the rightmost part indicates 360°. As the monitor allows the frequency distribution of jitter or the average phase difference between RF and clock signals to be monitored at a glance, operation efficiency will be improved in the bottom adjustments of pickups and other cases. For example, the pickup prior to bottom adjustment features jitter with a large frequency distribution, resulting in distributed LED indication. On the other hand, the pickup following bottom adjustment features jitter with a small frequency distribution, causing the LED indication to be concentrated at the center and increase in sharpness.

- **General jitter measurement condition (phase difference of 180°)**

- **When an input signal with two distribution peaks is input**

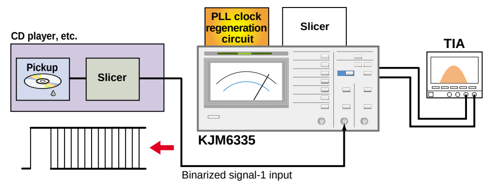


- **When measurement cannot be performed correctly at a phase difference of 0°**

front view

TIME INTERVAL JITTER METER
KJM6335

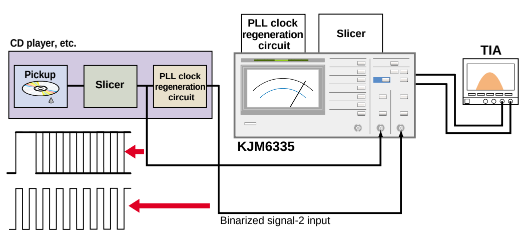
2 Measurement using a binarized signal obtained after slicing signals



This measurement method uses only the PLL clock regeneration circuits built into the KJM6335. In some semiconductors, a PLL clock regeneration signal cannot be output externally, but is fed back to the servo system directly. In such cases, the PLL clock regeneration circuits inside the KJM6335 operate to their full capabilities. For example, in the evaluation of disks, the base on the drive side must be maintained in a certain condition. In such a case, the PLL clock regeneration circuits' adherence to the CD measurement method provides advantages in the evaluation of disks. Moreover, the same measurement method may also be used at double-, quad-, or octuple- CD speeds.

Note: To measure a binarized signal, the SYMMETRY mode of the KJM6335 must be set to MANUAL.

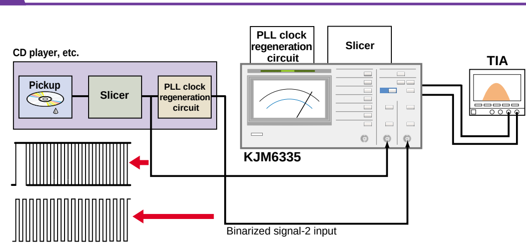
3 Measurement using a binarized signal obtained after slicing signals and a clock signal



If a time-interval analyzer (TIA) is replaced with the KJM6335, this method is used to measure jitter. In such a case, the signal slicer and all PLL clock regeneration circuits become dependant on the player or jig side. As the KJM6335 has a sufficient correlation with TIA-based jitter measurement, if the amount of jitter measured in (3) differs from that measured in (1) and (2), the slice level is not that specified in the CD measurement method.

Note: To measure a binarized signal, the SYMMETRY mode of the KJM6335 must be set to MANUAL.

4 Supporting a wide range of clock signals



This measurement method is the same as that in (3), but supports a wide range of clock signals to enable multi-times CD speeds to be handled, as there is a trend toward measurement at double to octaple CD speeds.

● Clock frequency: 4.1 MHz to 36 MHz

Note: To measure a binarized signal, the SYMMETRY mode of the KJM6335 must be set to MANUAL.

Specifications

Input			
Number of input channels		3(RF, CLOCK, INHIBIT)	
RF INPUT	Input signal	EFM Minimum pulse width:15 ns	
	Signal voltage range	0.2 V to 2 Vp-p	
	Input impedance	1 MΩ(18 pF ± 3 pF), 50Ω selectable	
	Maximum input voltage	4 Vpeak(DC + AC)	
	Input connector	BNC	
CLOCK INPUT	Input signal	Clock frequency	CDx1 :4.1 MHz to 25 MHz CDx8: 25 MHz to 36 MHz
		Duty ratio	45:55 to 50:50
	Signal voltage range	0.2 V to 2 Vp-p	
	Input impedance	1 MΩ, 18 pF ± 3 pF, 50Ω selectable	
	Maximum input voltage	4 Vpeak(DC + AC)	
	Input connector	BNC	
INHIBIT INPUT	Input level	H level	4.0 V to 5.0 V
		L level	0 to 1.0 V
	Minimum inhibit period	500 µs	
	Maximum inhibit time (in measurement of a single signal)	15 ms(at an inhibit period of 20 ms or more)	
		75 % of inhibit period (at an inhibit period of 1 ms to 20 ms)	
		Inhibit period - 250 µs (at an inhibit period of 500 µs to 1 ms)	
	Maximum inhibit time (in measurement of two signals)	10 ms(at an inhibit period of 13.3 ms or more)	
		75 % of inhibit period (at a n inhibit period of 1 ms to 13.3 ms)	
		Inhibit period - 250 µs (at an inhibit period of 500 µs to 1 ms)	
	Maximum input voltage	10 Vpeak(DC + AC)	
	Input connector	BNC	
Measurement			
Measuring range		0 to 20 %, 0 to 50 ns	
Specification assured range		% indication	2 to 15 %
		ns indication	2 % to 15 % of clock period
Measuring accuracy		% indication	±5 % of FS
		ns indication	±2 % of clock period + ±2 % of FS
Residual jitter		% indication	2 % or less
		ns indication	2 % of clock period or less
Time constant for conversion into rms value		30 ms, 100 ms, 300 ms, 1 s	
Indicating			
Indicator		Analog meter	
Unit		%, ns	
Scale (FS)		10 %, 20 % 1.5 ns, 5 ns, 15 ns, 50ns	
GO or NO GO judgment		Two LEDs, red(NO GO) and green(GO), indication	
PHASE MONITOR		Indicates the phase difference between the RF signal and clock signals and the distribution of jitter. The distribution of jitter frequency is indicated by the brightness on the meter.	
Trigger			
Symmetry follow-up		AUTO, OFFSET, MANUAL CD: The response characteristics of AUTO comply with those given in the Compact Disc Reference Measuring Methods Specification Guideline Ver.1.0, May 1999.	
Trigger edge	RF	Rising edge, falling edge and both edges selectable	
	CLOCK	Rising edge and falling edge selectable	
Delay circuit		Clock signal is delayed to adjust the phase of an RF signal.AUTO/MANUAL selectable Phase adjusting range in MANUAL mode: 0 to 360°	

Specifications

PLL clock-regeneration circuit

Frequency response characteristics is mentioned by open-loop characteristics. However, frequency response characteristics of the KJM6335 is managed by close-loop characteristics equivalent to open-loop characteristics.

Frequency response characteristics can be valid at reference clock of 4.3 MHz (CD standard speed mode).

Synchronizing available signal	CD standard speed mode	EFM signal that channel clock is equivalent to 4.1 MHz to 4.5 MHz
	CD double-speed mode	EFM signal that channel clock is equivalent to 8.2 MHz to 9.0 MHz
	CD quadruple-speed mode	EFM signal that channel clock is equivalent to 16.4 MHz to 18.0 MHz
	CD octuple-speed mode	EFM signal that channel clock is equivalent to 32.8 MHz to 36.0 MHz
Frequency response characteristics (Closed loop characteristics, reference is 100Hz) Complied with the Compact Disk Reference Measuring Methods Specification Guidline Ver.1.0 May 1999. It is the frequency response characteristics of each speed that was scaled the characteristics of the standard speed mode up by each magnification.	CD standard speed mode	5 kHz : -0.2±1.7 dB 10 kHz : -1.2±1.7 dB 15 kHz : -2.5±1.7 dB 20 kHz : -3.8±1.7 dB 25 kHz : -5.1±1.7 dB
	CD double-speed mode	10 kHz : -0.2±1.7 dB 20 kHz : -1.2±1.7 dB 30 kHz : -2.5±1.7 dB 40 kHz : -3.8±1.7 dB 50 kHz : -5.1±1.7 dB
	CD quadruple-speed mode	20 kHz : -0.2±1.7 dB 40 kHz : -1.2±1.7 dB 60 kHz : -2.5±1.7 dB 80 kHz : -3.8±1.7 dB 100 kHz : -5.1±1.7 dB
	CD octuple-speed mode	40 kHz : -0.2±1.7 dB 80 kHz : -1.2±1.7 dB 120 kHz : -2.5±1.7 dB 160 kHz : -3.8±1.7 dB 200 kHz : -5.1±1.7 dB
All mode common	Lock-up time	Within 700 ms
	Synchronizing available jitter range	5 % to 17 %
	Residual jitter	0.7% or less

Output(Rear)

RF MONITOR	Output amplitude	Approx. 1/10(terminated with 50Ω) of input amplitude
	Output impedance	Approx. 50Ω
	Output connector	BNC
CLOCK MONITOR	Output amplitude	Approx. 1/10(terminated with 50Ω) of input amplitude
	Output impedance	Approx. 50Ω
	Output connector	BNC
SLICED RF OUT	Output amplitude	Approx. 0.2 V to 0.3 V(terminated with 50Ω)
	Output impedance	Approx. 50Ω
	Output connector	BNC
DELAYED CLOCK OUT	Output amplitude	Approx. 0.2 V to 0.3 V(terminated with 50Ω)
	Output impedance	Approx. 50Ω
	Output connector	BNC
DC OUT	Output amplitude	0.2 V/%, accuracy of ± 0.15 V
	Output impedance	Approx. 600Ω
	Output connector	BNC
JITTER OUT	Output amplitude	Approx. 20 mV/%
	Output impedance	Approx. 600Ω
	Output connector	BNC

EXT I / O Interface

PO0 to PO3	Four-bit parallel output ports. Settable via GPIB
PI0 to PI3	Four-bit parallel input ports. They can be read out via GPIB.
IN MEAS RANGE	"H" output when the measured value is within 20 %
GO OUT	"H" output when the JUDGE level is GO
NOGO OUT	"H" output when the JUDGE level is NOGO
INC	Setup memory address is incremented by 1 at "L" input.
DEC	Setup memory address is decremented by 1 at "L" input.
RTN	Setup memory address returns to "1" at "L" input.
MEM 1 to 4	The bit representing of a selected setup memory address number is output in "H".

EXT I / O Common Specifications

Input voltage range	H:4.0 V to 5.0 V, L:0 to 1.0 V
Maximum input voltage	-0.5 V to 5.5 V
Output voltage range	H:3.9 V to 5.0 V, L:0 to 0.4 V
Output impedance	240Ω to 290Ω
Maximum output current	10 mA
Input/output connector	25-pin D-sub connector (female)
Signal level	TTL

GPIB interface (optional)

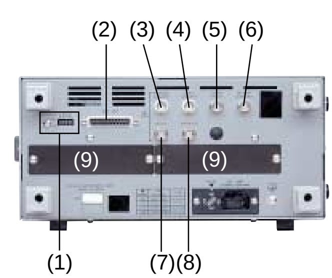
Complies with IEEE Std. 488-1978.
SH1, AH1, T6, L4, SR1, RL1, PP0, DC1, DT0, C0, E1
Operated in address mode.
Allows you to set the function of each panel other than the POWER and KEYLOCK switches, read the setting condition of a function, and read out a measured value.

General specifications

Warm-up time	30 minutes or more		
Allowable range of supplied voltage	90 V to 110 V, 104 V to 126 V 194 V to 236 V, 207 V to 250 V AC		
Allowable power frequency range	45 Hz to 65 Hz		
Maximum power consumption	Maximum: 75 VA		
Insulation resistance	50 MΩ or more (500 V DC)		
Withstand voltage	1500 V AC for one minute		
Specification guaranteed temperature and humidity ranges	Temperature:15 °C to 35 °C Humidity: 20 % to 85 % R.H. (no condensation)		
Operating temperature and humidity ranges	Temperature:0 to 40 °C Humidity: 20 % to 85 % R.H. (no condensation)		
Storage temperature and humidity range	Temperature: -20 °C to 60 °C Humidity: 90 % or less R.H. (no condensation)		
Earth continuity	25 A AC/0.1 Ω max.		
Dimensions (mm)	Approx. 280(W) x 132(H) x 270(D) mm Maximum: approx. 300(W) x 150(H) x 320(D) mm		
Weight	Approx. 5.5 kg		
Battery life	Approx. three years		
Battery backup	Setup data is backed up.		
Accessories	Power code		1
	Operation Manual		1
	Fuse*1	90V to 110V 1A (T)	1
		104V to 126V 0.5A (T)	2
		194V to 236V 1A (T)	2
		207V to 250V 0.5A (T)	1

*1: A total of three fuses are provided with the instrument. The breakdown voltage of the fuses depends on the setting of the line voltage range upon shipment from the at factory.
The fuse holder is equipped with 1 A fuses for 90 to 110 V / 110 to 126 V or 0.5 A fuses for 194 to 236 V / 207 to 250 V for shipment.

rear view



(1) DIP switch
(2) EXT I/O connector
(3) RF SIGNAL MONITOR terminal
(4) CLOCK MONITOR terminal
(5) SLICED RF OUT terminal
(6) DELAYED CLOCK OUT terminal
(7) DC OUT terminal
(8) JITTER OUT terminal
(9) SLOTS FOR OPTIONAL CARDS (EX.GPIB)

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