

An examination of the effect of Power to Signal & of Signal to Power (Supplement for XV-4687C)

02-Dec-2009

Fujikura Ltd.

Test 1. The effect of Power to Signal

Test 2. The effect of Signal to Power

[Tested sample]

Assembly length ; $L = 1.0\text{m}$

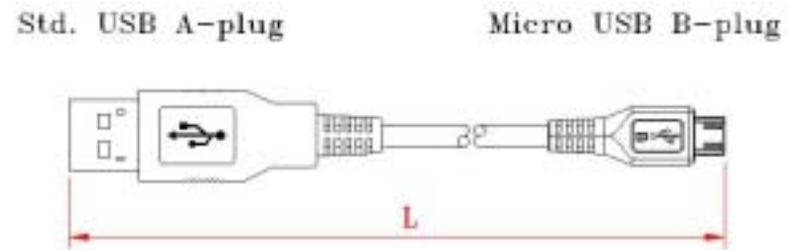
Cable ;

(A) Twisted type

Twisted signal AWG28 pair + Non twisted power AWG28 pair

(B) Quad type

Non twisted signal AWG28 pair + Non twisted power AWG28 pair



Test 1. The effect of Power to Signal

- Test method -

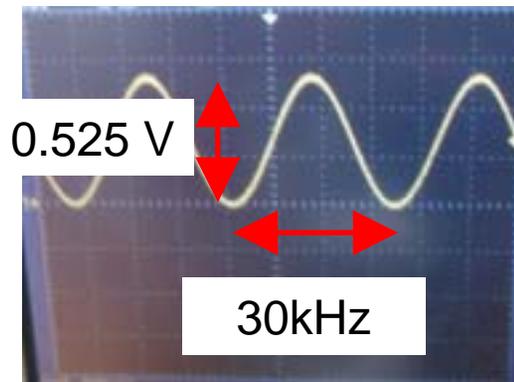
Apply 4 kinds of voltages to Vbus Line, and Measure Eye pattern

Test 1-1. Sine wave

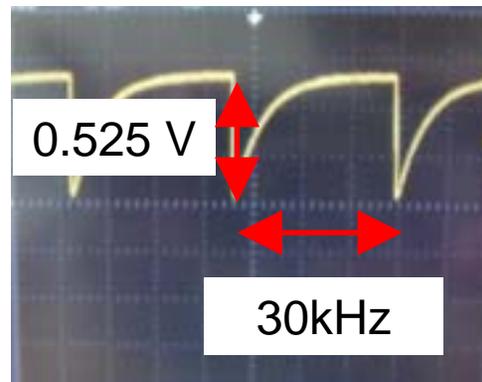
Test 1-2. Exponential rise

Test 1-3. Exponential fall

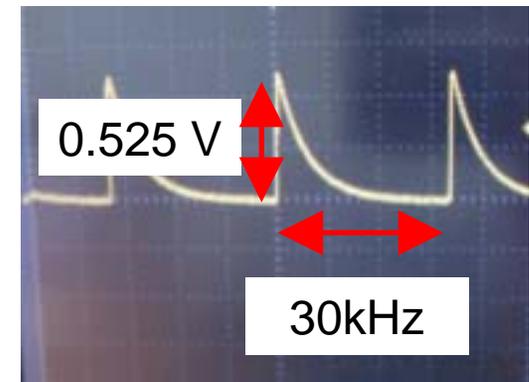
Test 1-4. DC (0.525V)



1. Sine wave



2. Exponential rise

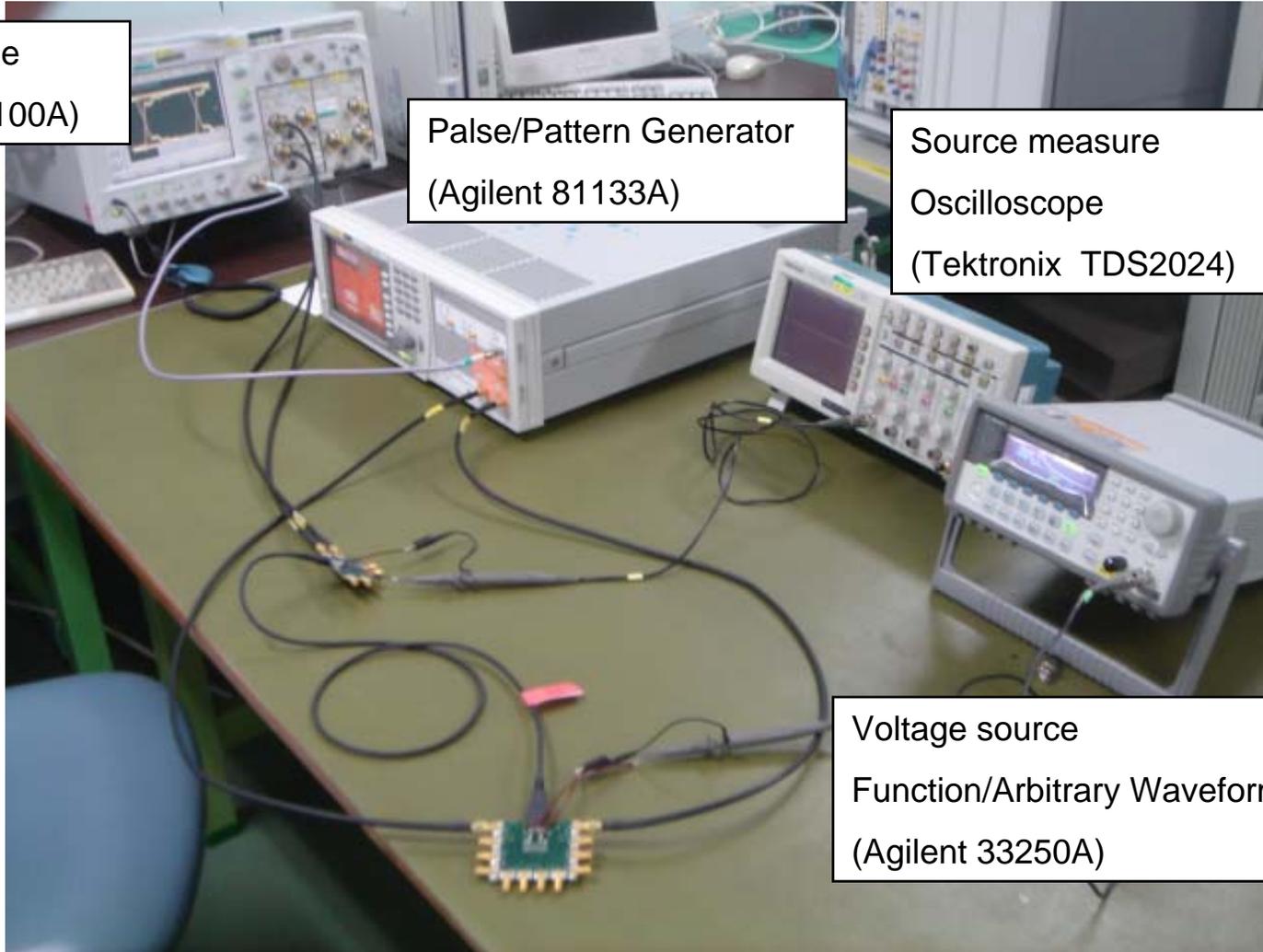


3. Exponential fall

Remark ; $0.525V = 1.5A$ (Charging) \times $0.35ohm$ (approx. resistance of assembly 1.0m)

Test 1. The effect of Power to Signal

- Test Equipment -



Oscilloscope
(Agilent 86100A)

Pulse/Pattern Generator
(Agilent 81133A)

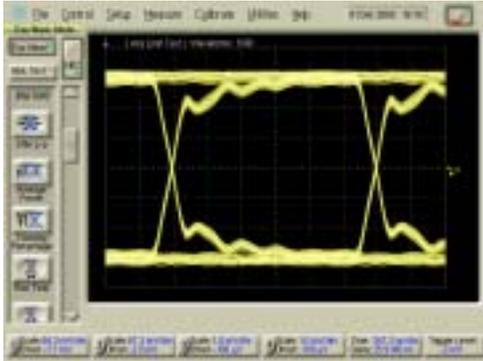
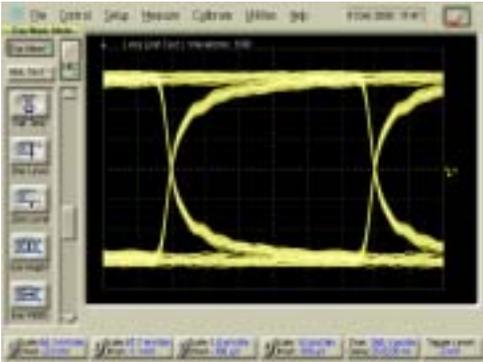
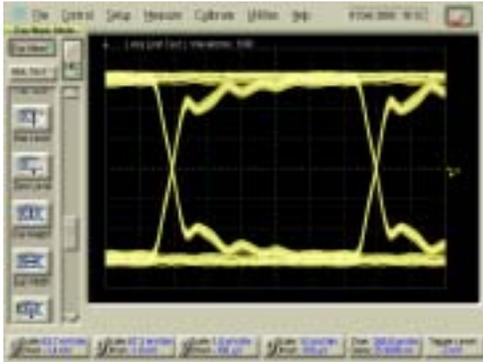
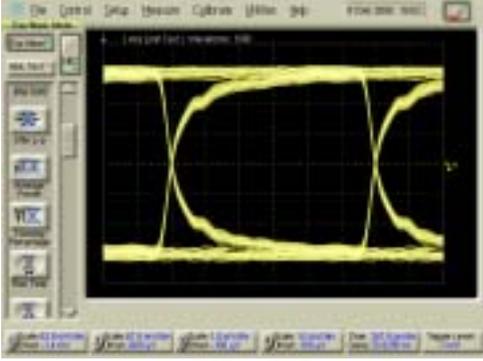
Source measure
Oscilloscope
(Tektronix TDS2024)

Voltage source
Function/Arbitrary Waveform Generator
(Agilent 33250A)

Test 1. The effect of Power to Signal

- Result, Test 1-1. the effect of Sine wave -

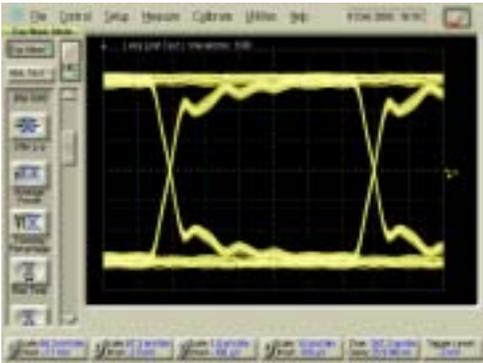
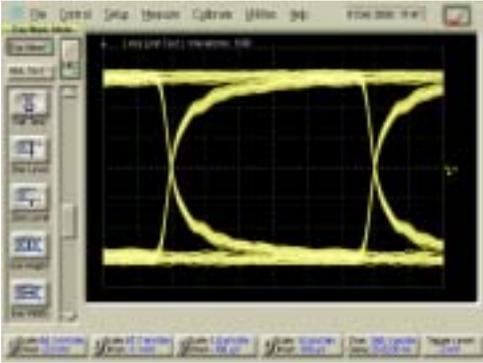
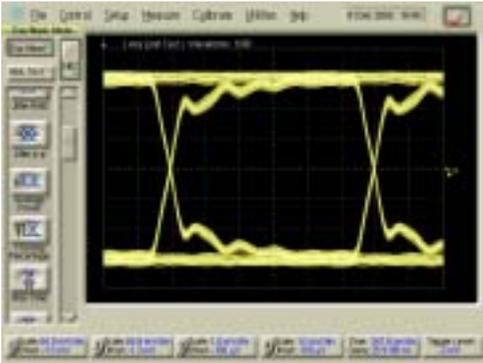
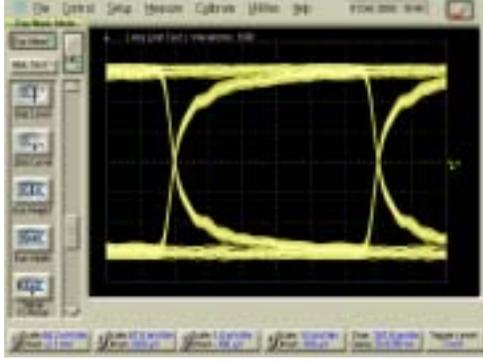
Eye Patterns and Jitter

		(A) Twisted type ; 1.0m		(B) Quad type ; 1.0m	
No power	Eye height	493 mV		471 mV	
	Jitter	0.015 UI		0.015 UI	
Sine wave	Eye height	493 mV		470 mV	
	Jitter	0.015 UI		0.015 UI	

Test 1. The effect of Power to Signal

- Result, Test 1-2. the effect of Exponential rise -

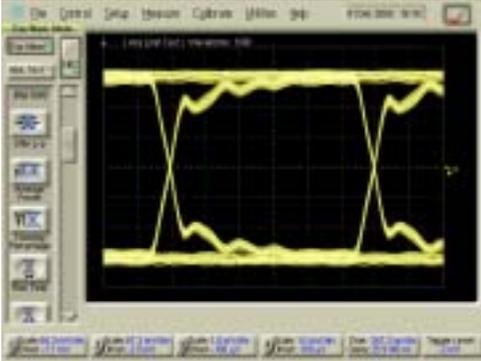
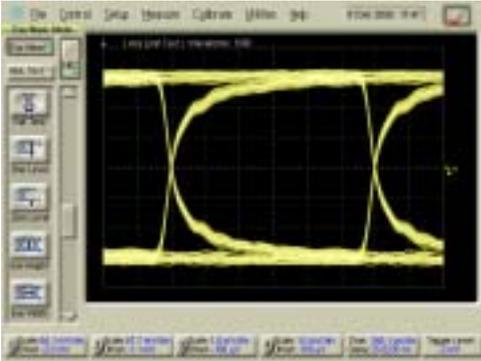
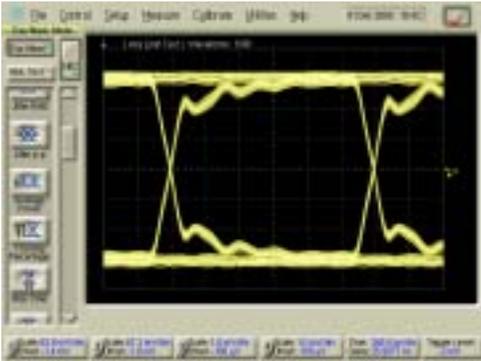
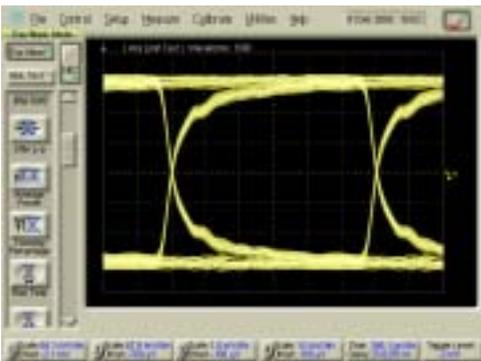
Eye Patterns and Jitter

		(A) Twisted type ; 1.0m		(B) Quad type ; 1.0m	
No power	Eye height	493 mV		471 mV	
	Jitter	0.015 UI		0.015 UI	
Exponential rise	Eye height	493 mV		470 mV	
	Jitter	0.015 UI		0.011 UI	

Test 1. The effect of Power to Signal

- Result, Test 1-3. the effect of Exponential fall -

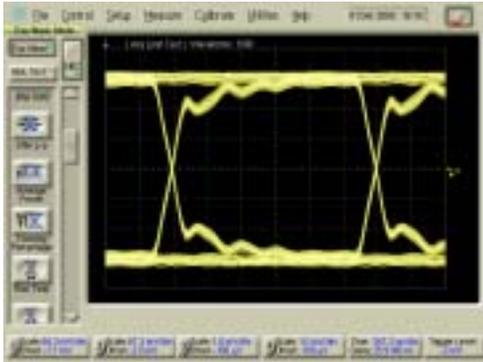
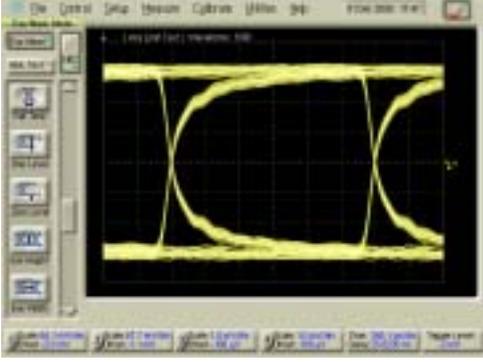
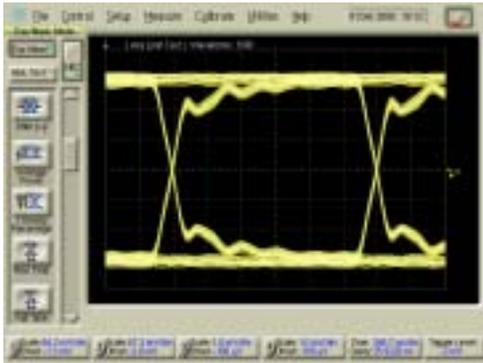
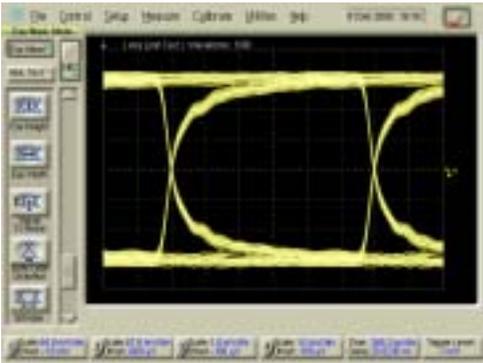
Eye Patterns and Jitter

		(A) Twisted type ; 1.0m		(B) Quad type ; 1.0m	
No power	Eye height	493 mV		471 mV	
	Jitter	0.015 UI		0.015 UI	
Exponential fall	Eye height	493 mV		471 mV	
	Jitter	0.011 UI		0.011 UI	

Test 1. The effect of Power to Signal

- Result, Test 1-4. the effect of DC (0.525V) -

Eye Patterns and Jitter

		(A) Twisted type ; 1.0m		(B) Quad type ; 1.0m	
No power	Eye height	493 mV		471 mV	
	Jitter	0.015 UI		0.015 UI	
DC	Eye height	493 mV		471 mV	
	Jitter	0.015 UI		0.015 UI	



Test 2. The effect of Signal to Power

- Test method -

1. Apply 5V or 0.5V to Vbus line and monitor the voltage.
2. Apply signal to D+/D- line as start/stop Eye pattern test.

Signal source 480Mbps, PRBS 2^7-1 , 600mV

3. Monitor the voltage and Watch transient fluctuations.

Sampling rate ; per 0.01sec

Test 2. The effect of Signal to Power

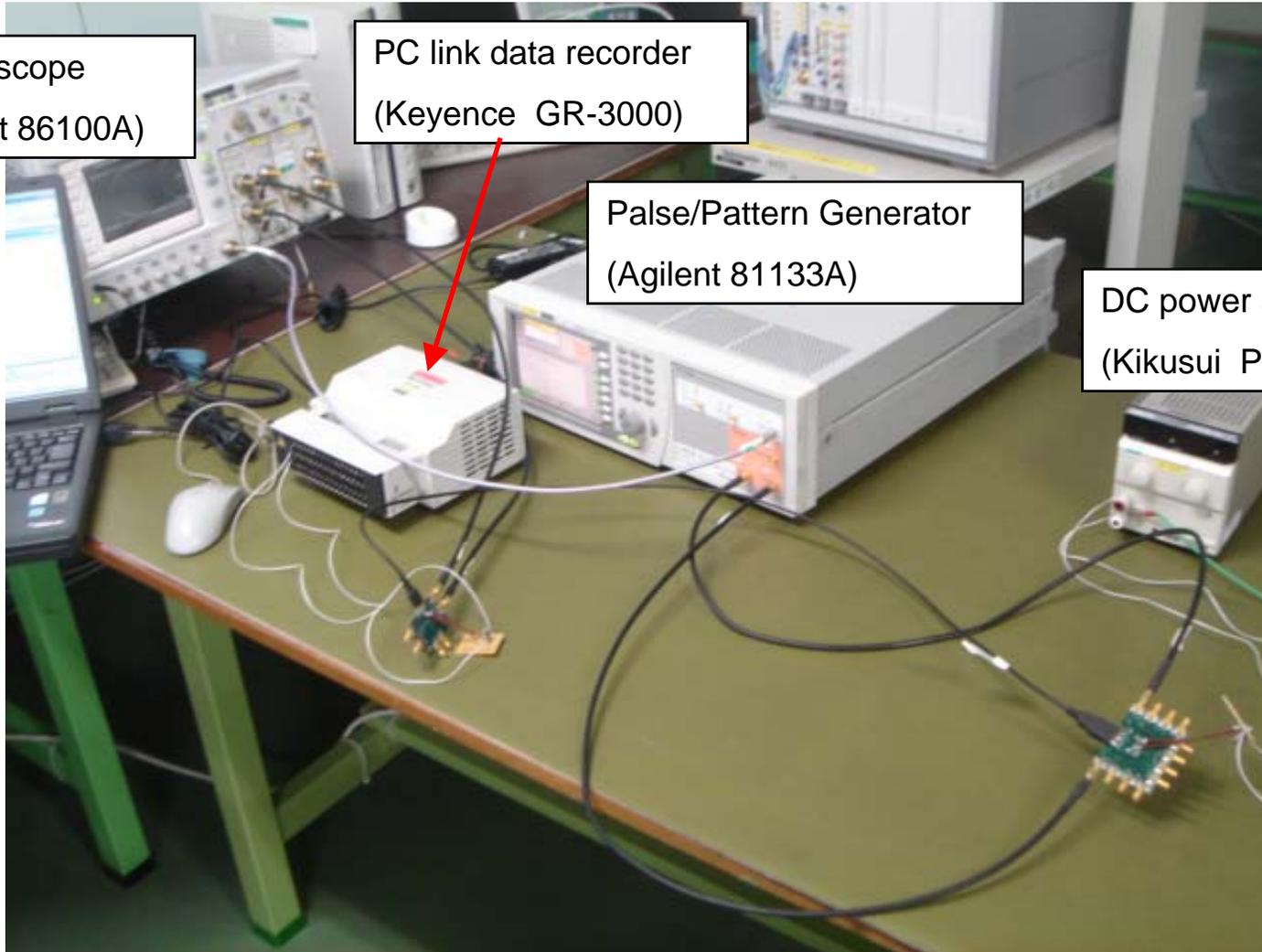
- Test Equipment -

Oscilloscope
(Agilent 86100A)

PC link data recorder
(Keyence GR-3000)

Pulse/Pattern Generator
(Agilent 81133A)

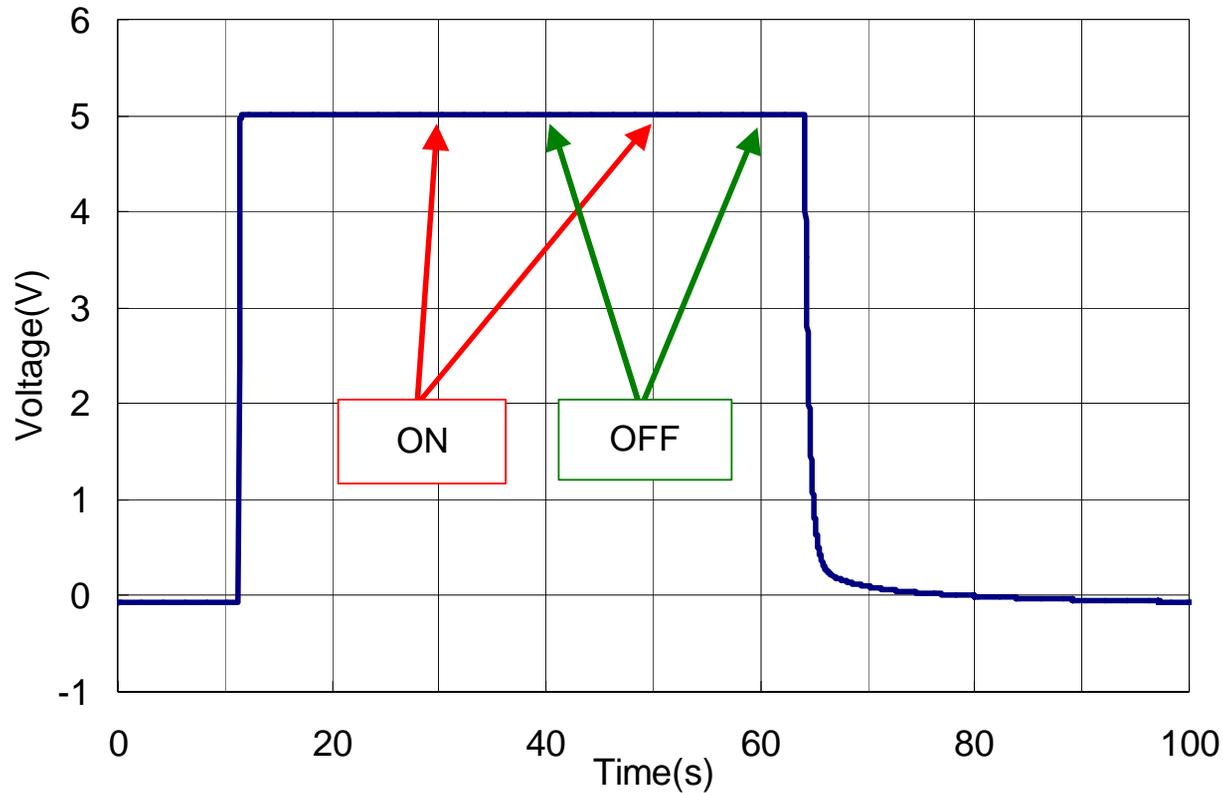
DC power supplies
(Kikusui PMC18-2A)



Test 2. The effect of Signal to Power

- Result of applying 5V -

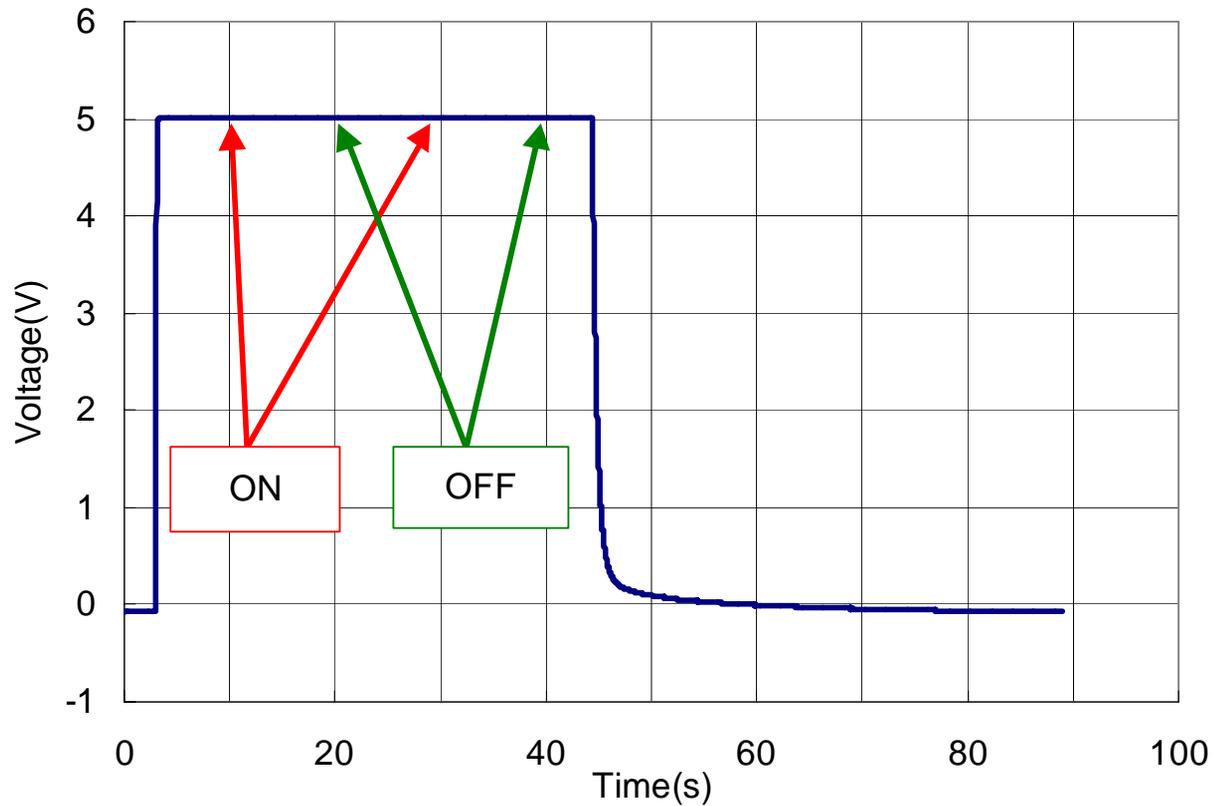
(A) Twisted type ; 1.0m



Test 2. The effect of Signal to Power

- Result of applying 5V -

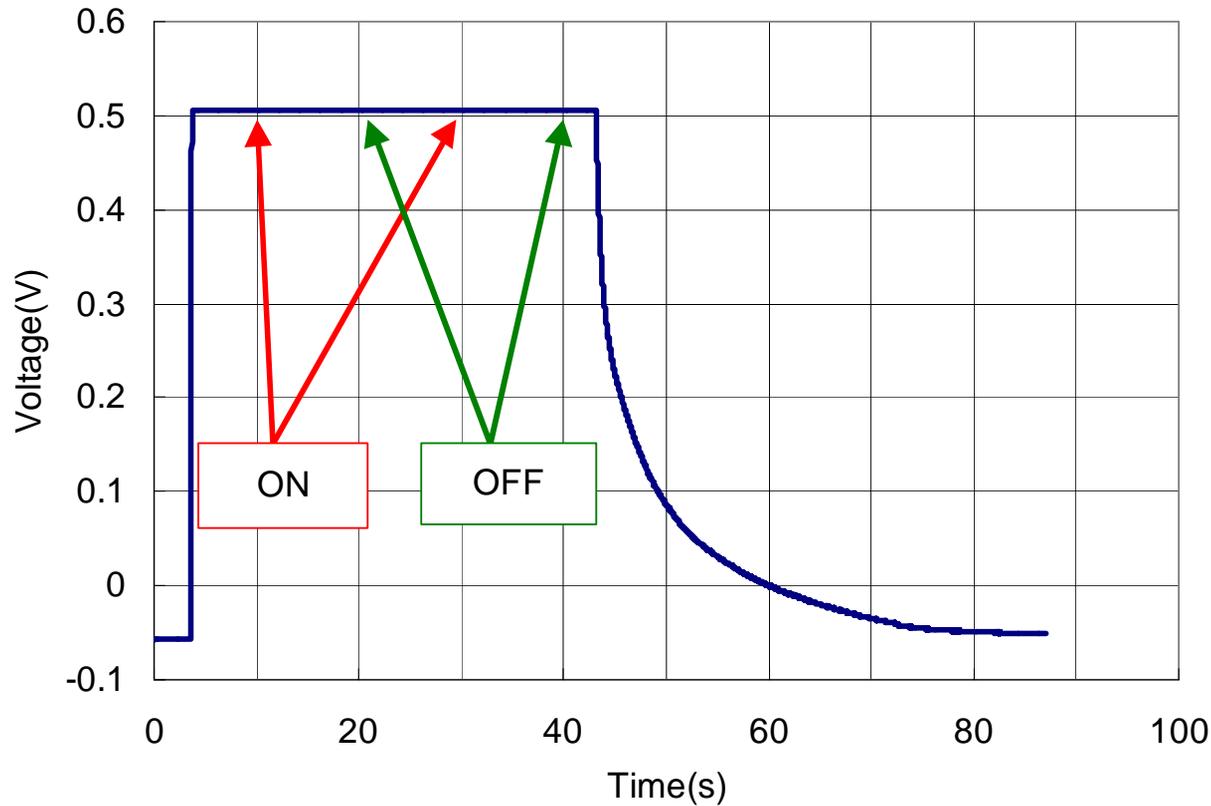
(B) Quad type ; 1.0m



Test 2. The effect of Signal to Power

- Result of applying 0.5V -

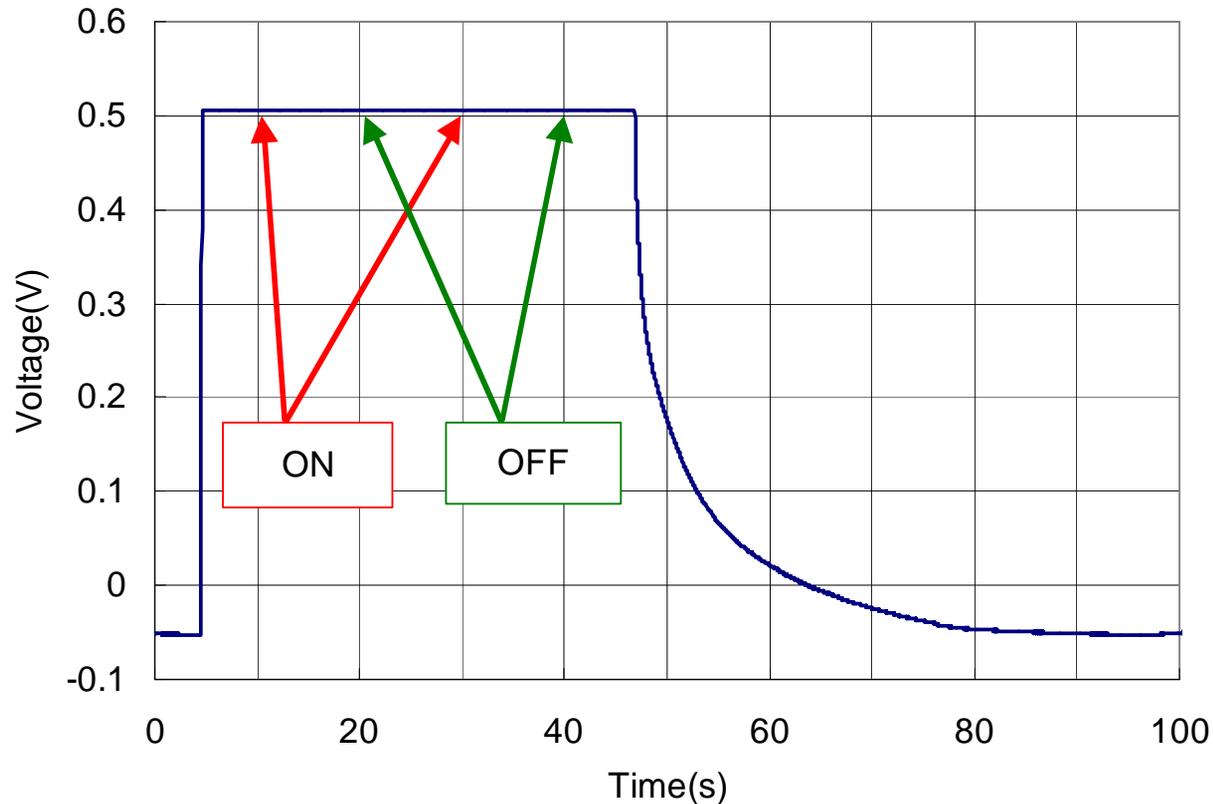
(A) Twisted type ; 1.0m



Test 2. The effect of Signal to Power

- Result of applying 0.5V -

(B) Quad type ; 1.0m





Conclusion

There is no particular influence in case of Quad type.

Quad type has no impact to current USB2.0 specification and system.

So any additional test or specification are not needed.

**Some performance of Quad type is lower than Twisted type
for example skew. And**

**Some performance of Quad type is better than Twisted type
for example attenuation and bending durability (flexibility)
as our report XV-4687C.**

So it is only necessary to keep current USB2.0 specification.