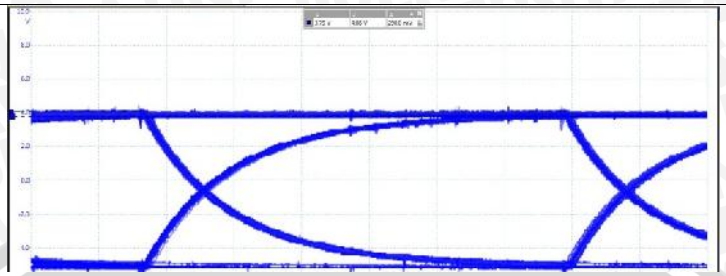
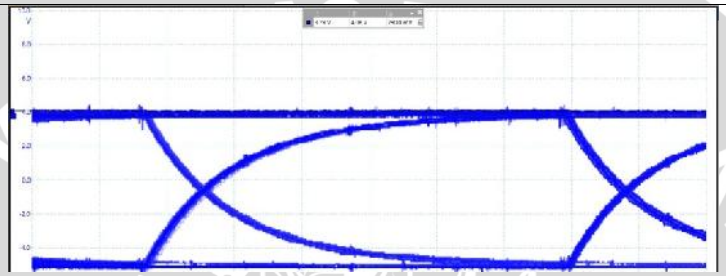
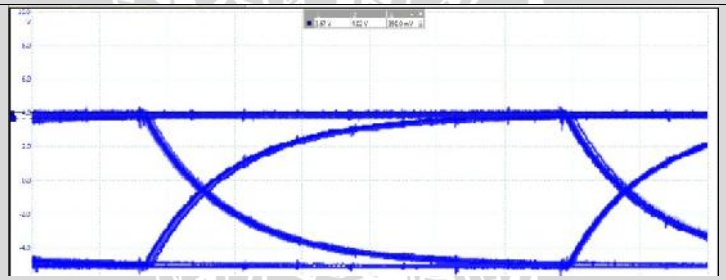
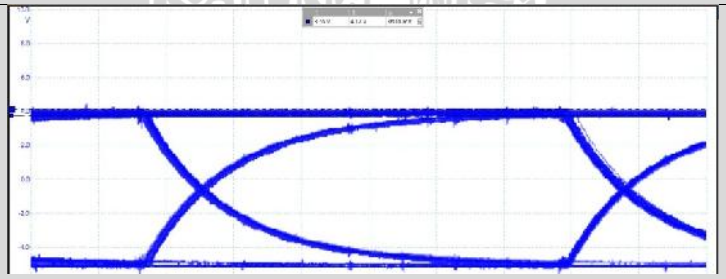
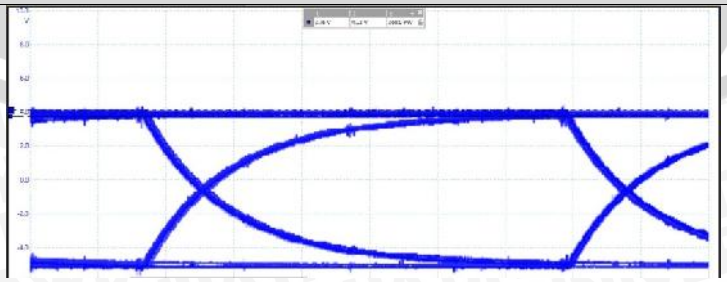
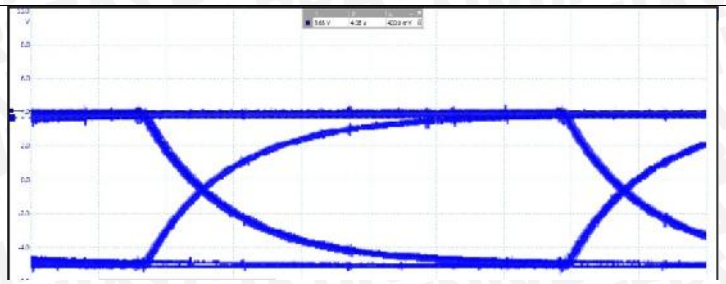
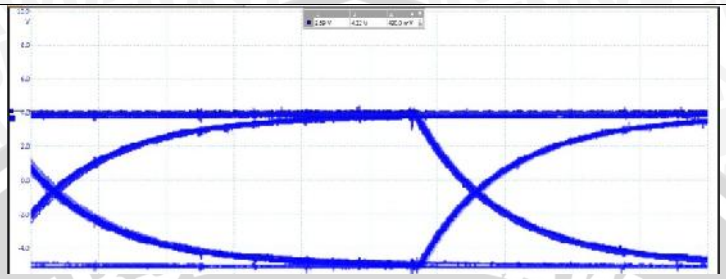
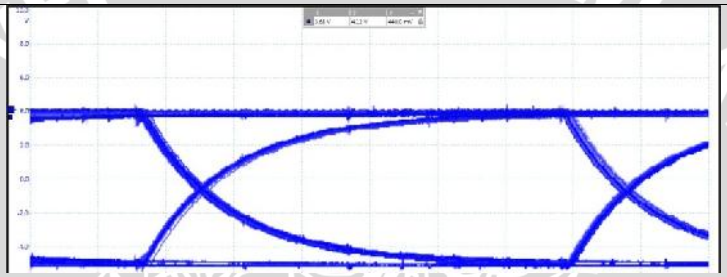
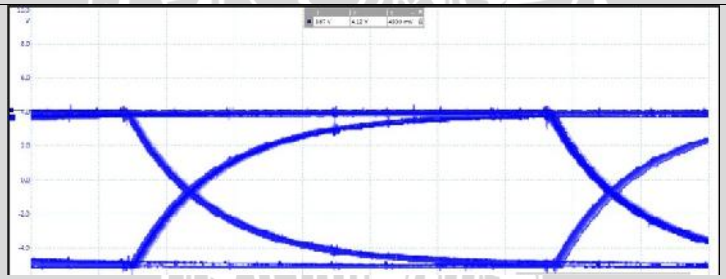
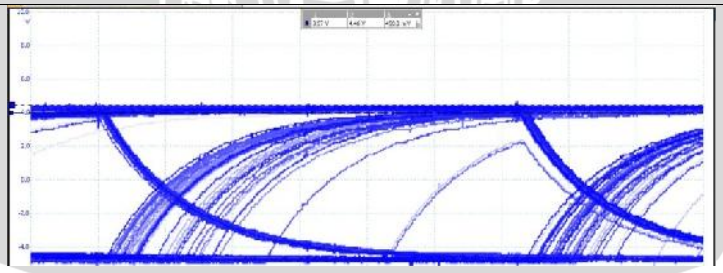
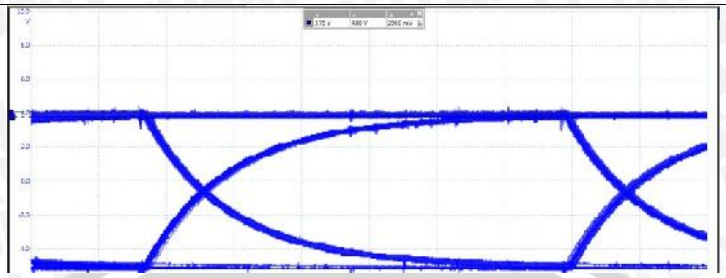
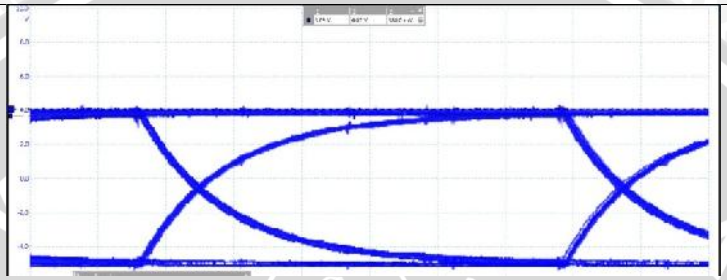
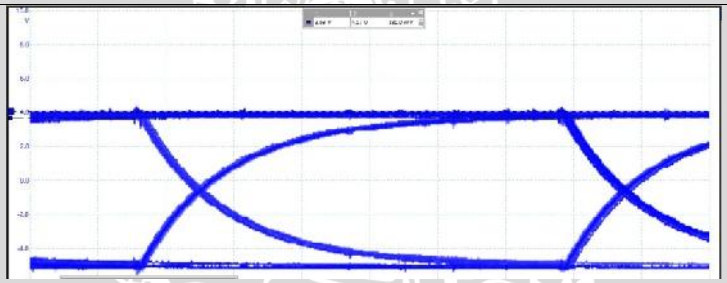
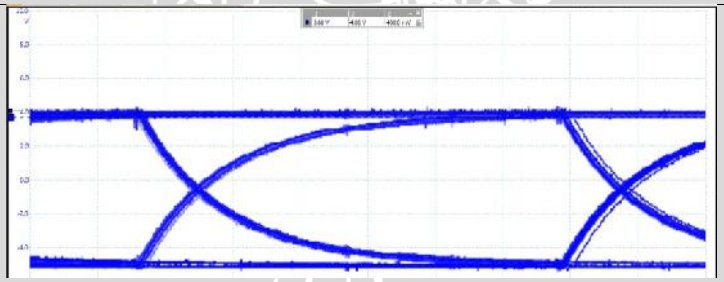
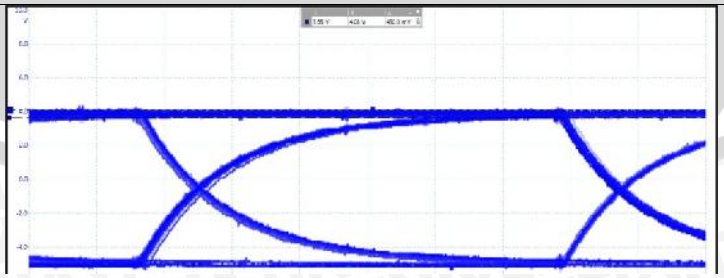
Lampiran 1. Pengukuran *Noise Margin* Pada *Eye Diagram*

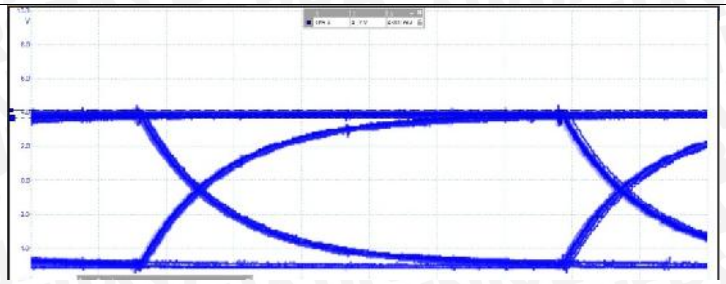
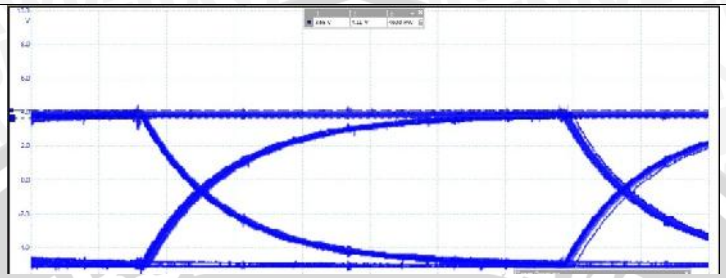
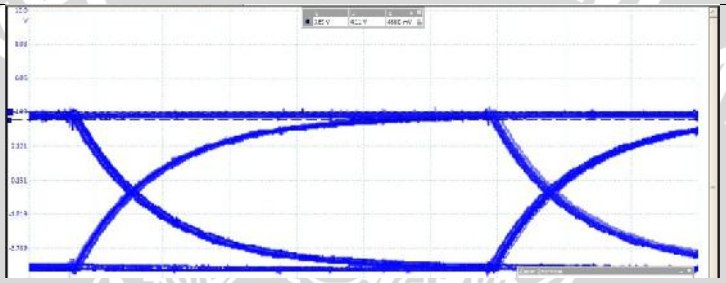
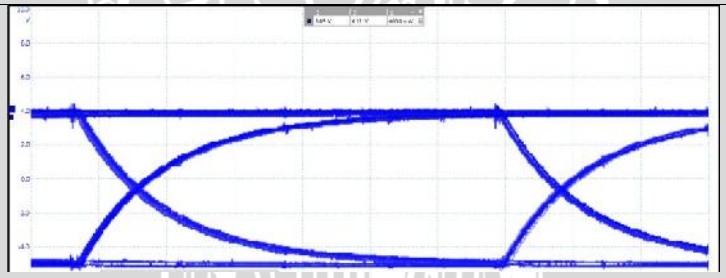
1. *Lateral Misalignment*

No.	Pergeseran (µm)	Pengukuran *Noise Margin* Pada *Eye Diagram*
1	0	
2	15	
3	20	
4	25	
5	30	

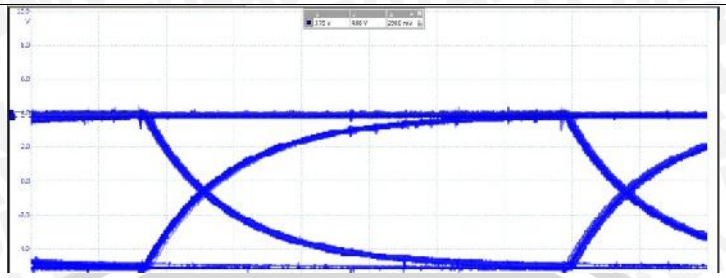
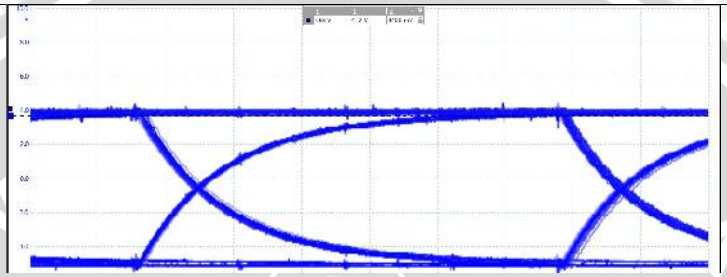
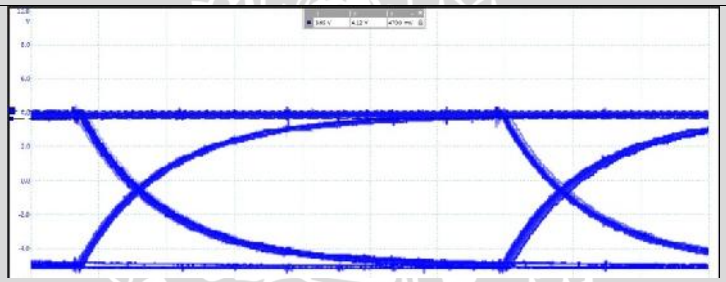
6	35	
7	40	
8	45	
9	50	
10	55	
11	60	

2. *Longitudinal Misalignment*

No.	Jarak Celah (µm)	Pengukuran *Noise Margin* Pada *Eye Diagram*
1	0	
2	55	
3	60	
4	90	
5	95	

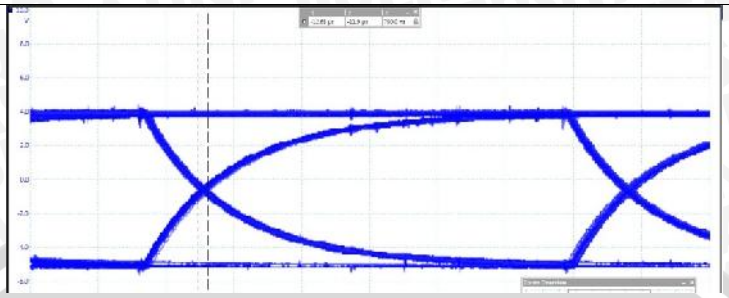
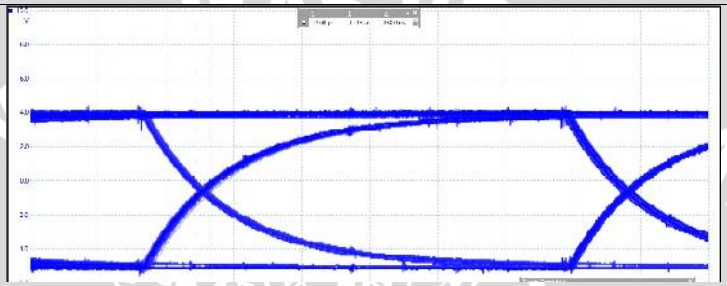
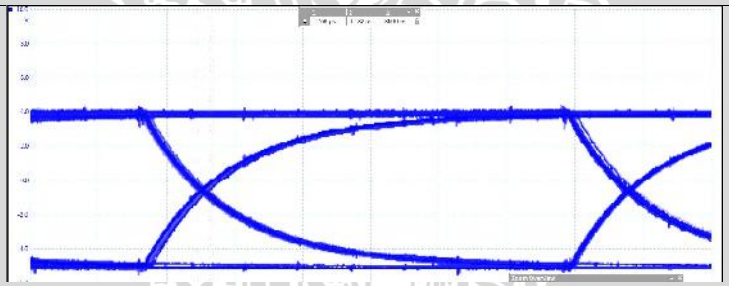
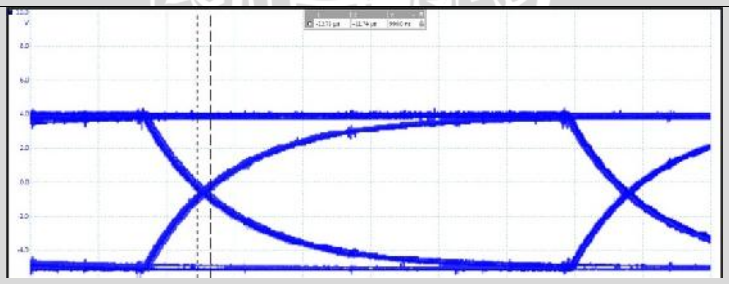
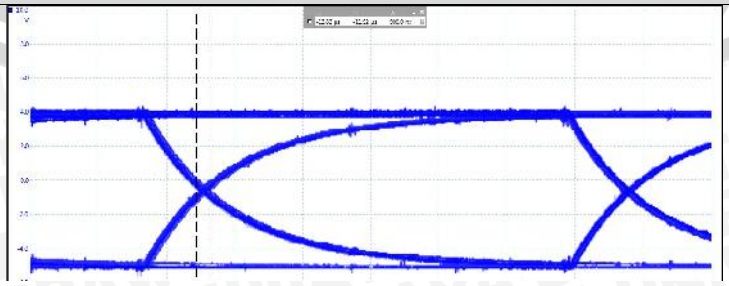
6	110	
7	125	
8	145	
9	150	
10	155	

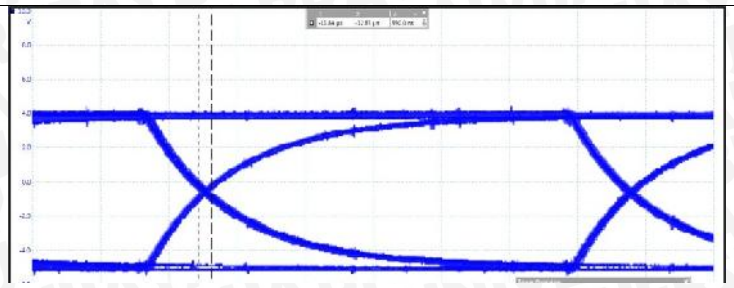
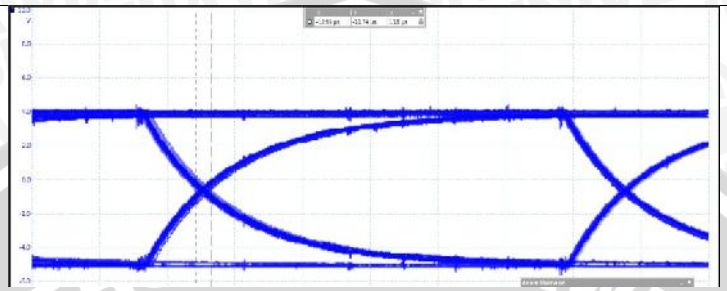
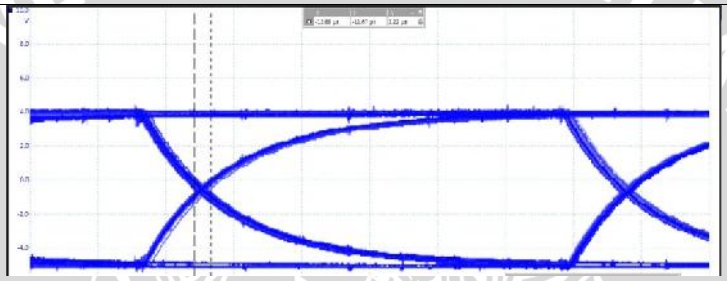
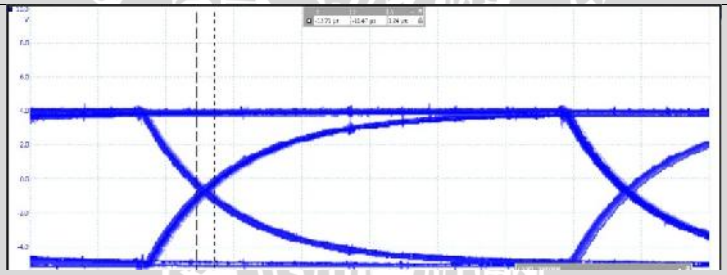
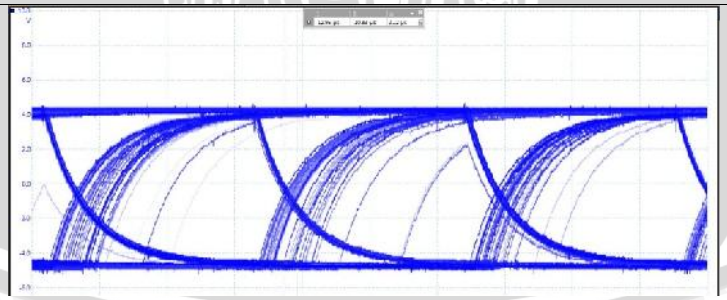
3. *Angular Misalignment*

No.	Jarak Celah (µm)	Pengukuran *Noise Margin* Pada *Eye Diagram*
1	0	
2	10	
3	15	
4	20	

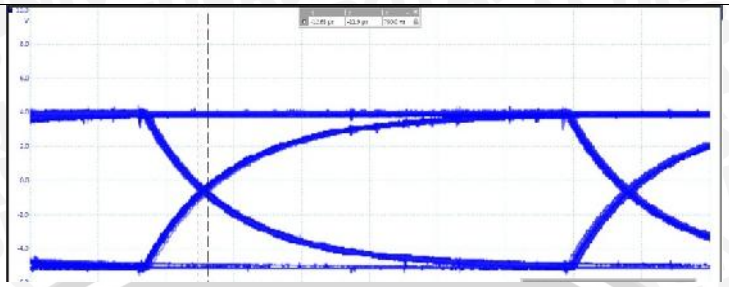
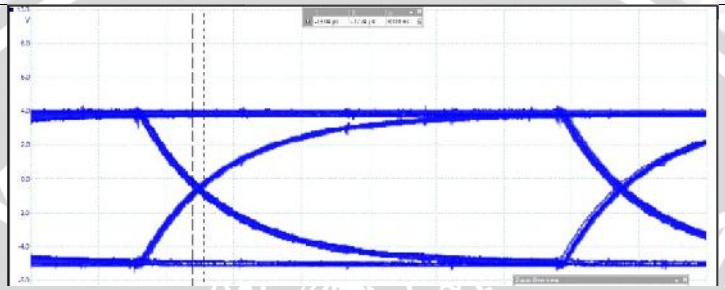
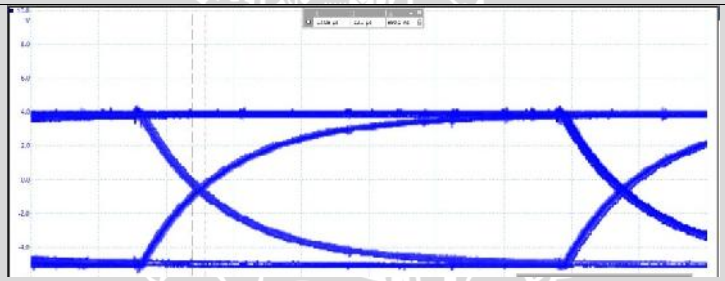
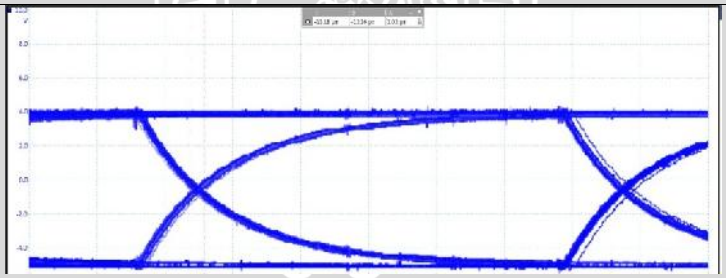
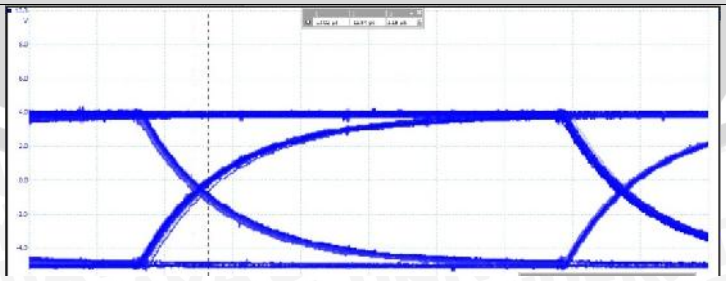
Lampiran 2. Pengukuran Distorsi Waktu Pada *Eye Diagram*

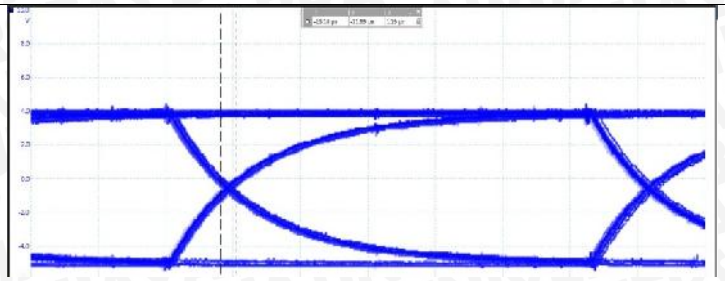
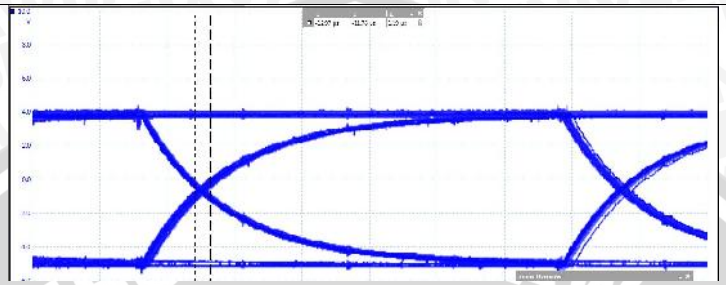
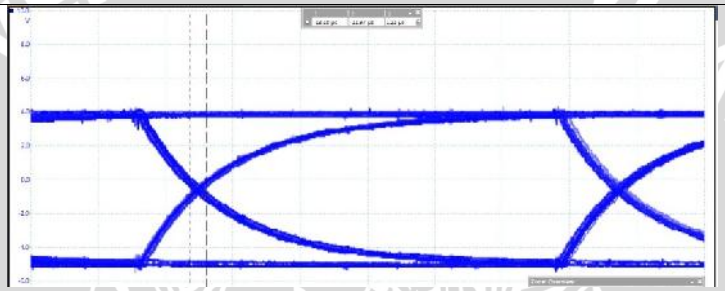
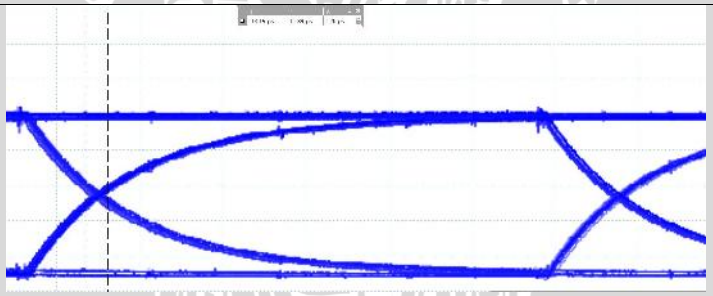
1. *Lateral Misalignment*

No.	Pergeseran (µm)	Pengukuran Distorsi Waktu Pada *Eye Diagram*
1	0	
2	15	
3	20	
4	25	
5	30	

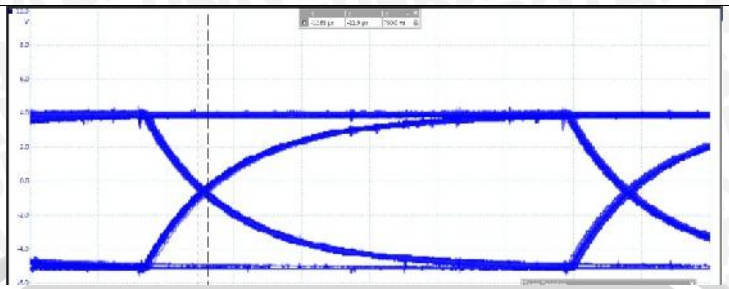
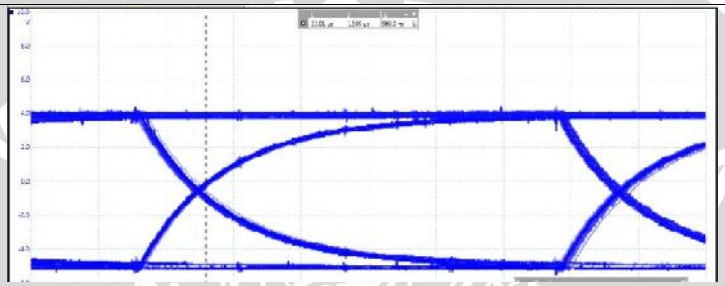
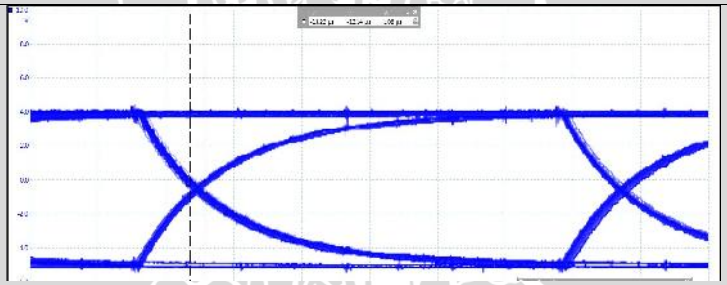
6	35	
7	40	
8	45	
9	50	
10	55	
11	60	

2. *Longitudinal Misalignment*

No.	Jarak Celah (µm)	Pengukuran Distorsi Waktu Pada *Eye Diagram*
1	0	
2	55	
3	60	
4	90	
5	95	

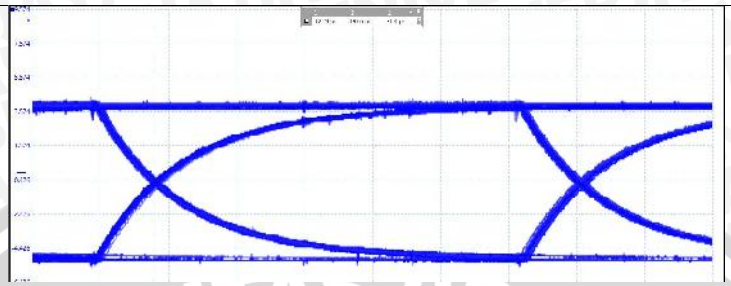
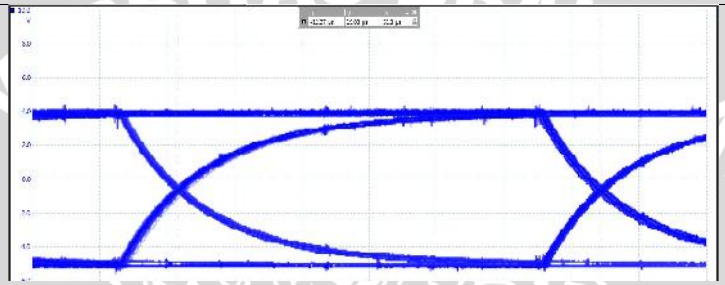
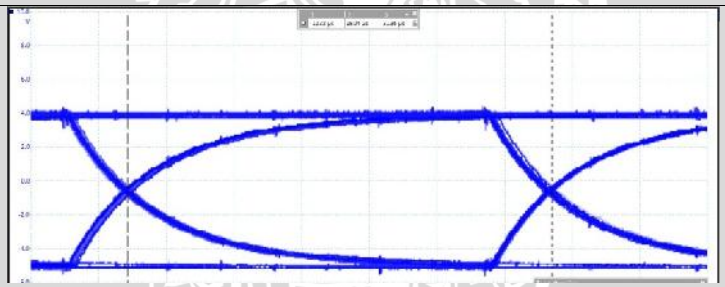
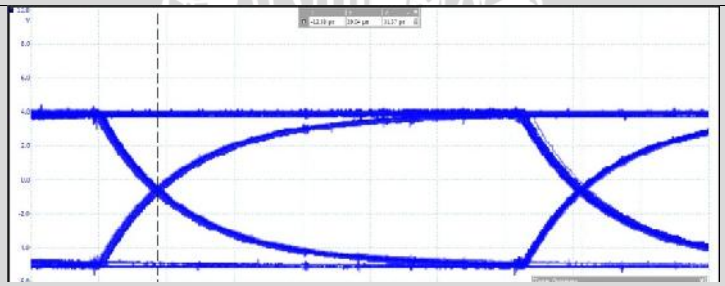
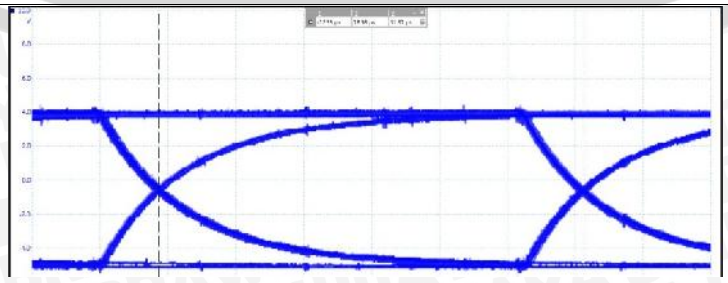
6	110	
7	125	
8	145	
9	150	
10	155	

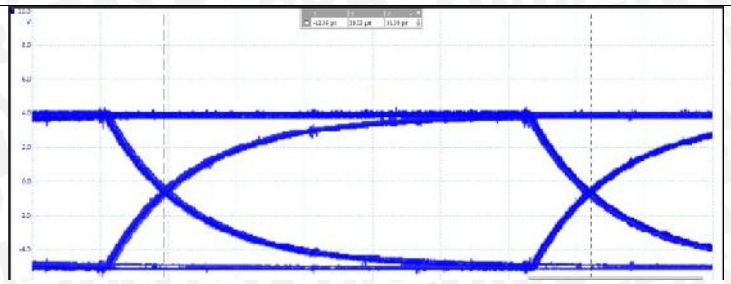
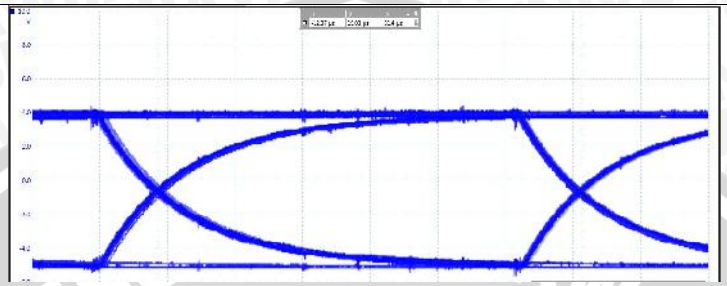
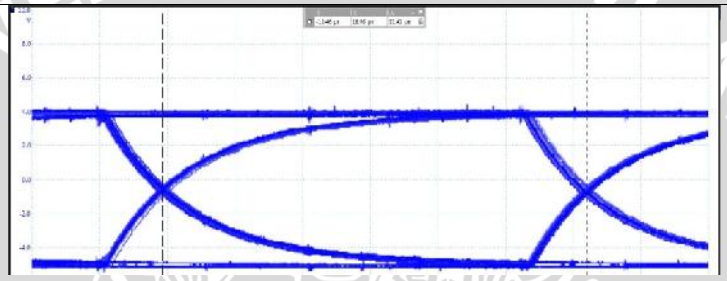
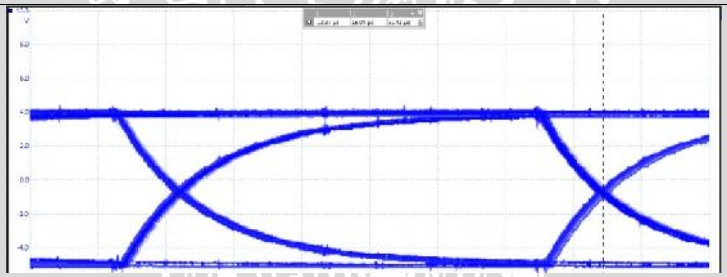
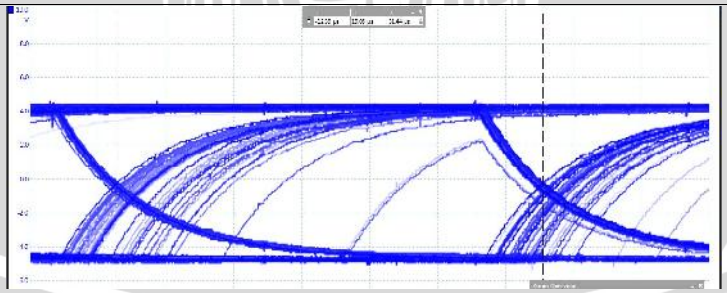
3. *Angular Misalignment*

No.	Jarak Celah (µm)	Pengukuran Distorsi Waktu Pada *Eye Diagram*
1	0	
2	10	
3	15	
4	20	

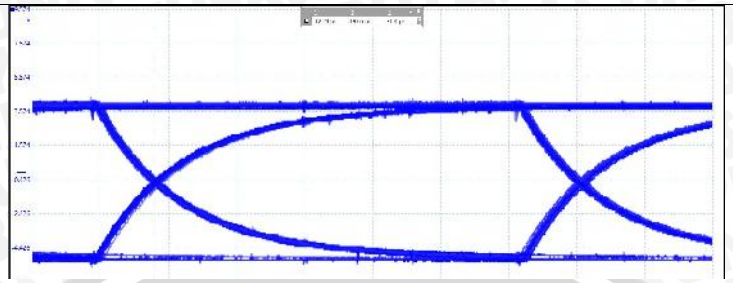
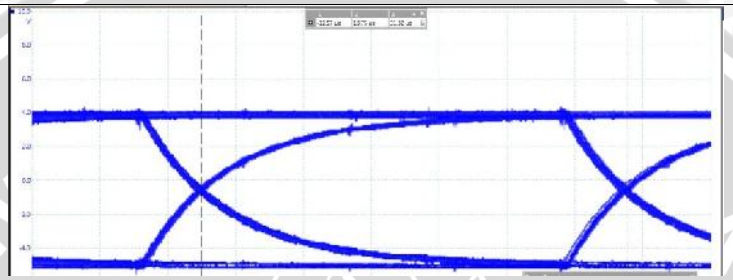
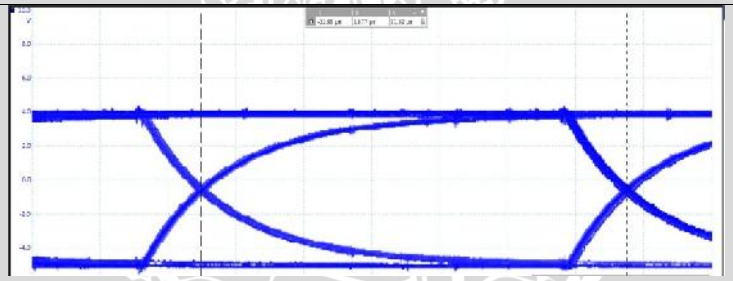
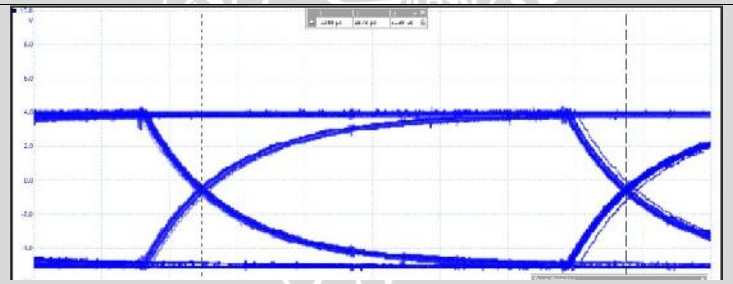
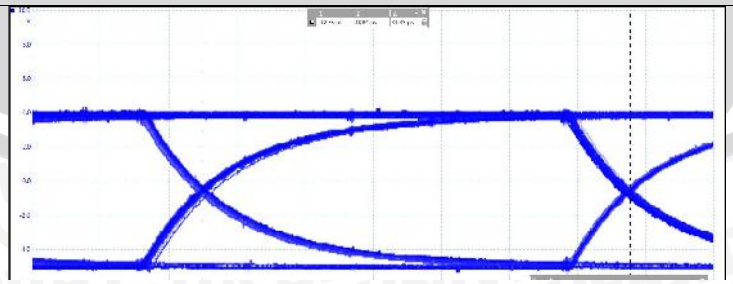
Lampiran 3. Pengukuran *Bit Period* Pada *Eye Diagram*

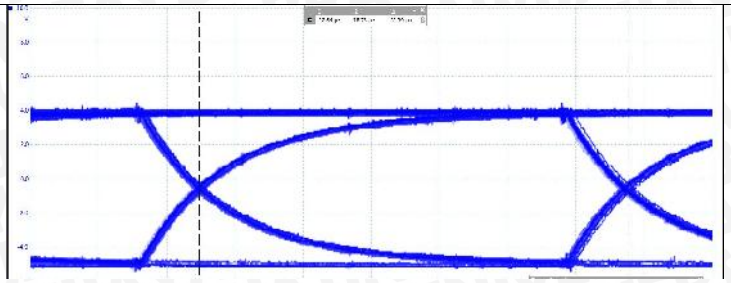
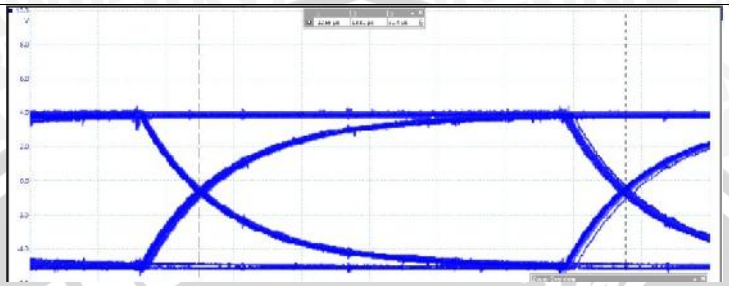
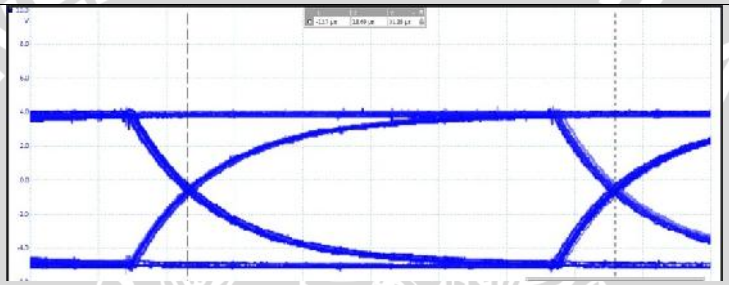
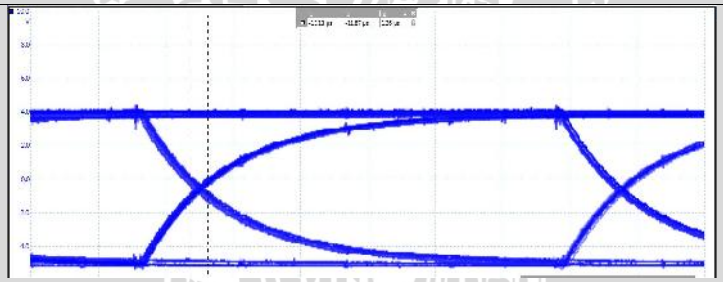
1. *Lateral Misalignment*

No.	Pergeseran (µm)	Pengukuran *Bit Period* Pada *Eye Diagram*
1	0	
2	15	
3	20	
4	25	
5	30	

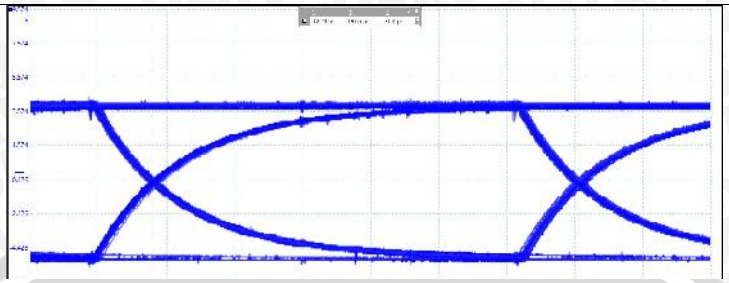
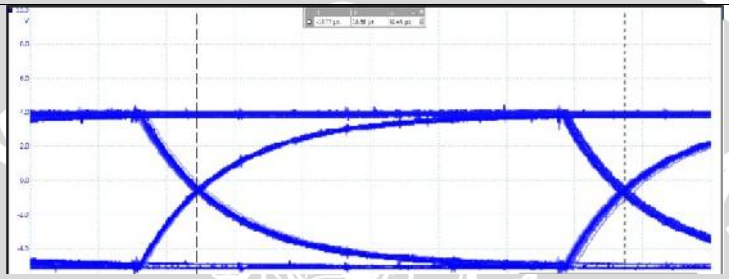
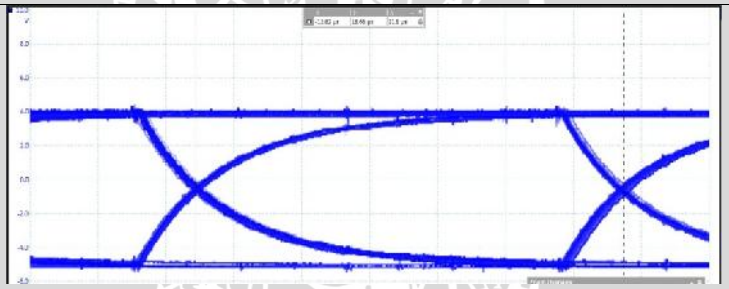
6	35	
7	40	
8	45	
9	50	
10	55	
11	60	

2. *Longitudinal Misalignment*

No.	Jarak Celah (µm)	Pengukuran *Bit Period* Pada *Eye Diagram*
1	0	
2	55	
3	60	
4	90	
5	95	

6	110	
7	125	
8	145	
9	150	
10	155	

3. *Angular Misalignment*

No.	Jarak Celah (µm)	Pengukuran *Bit Period* Pada *Eye Diagram*
1	0	
2	10	
3	15	
4	20	

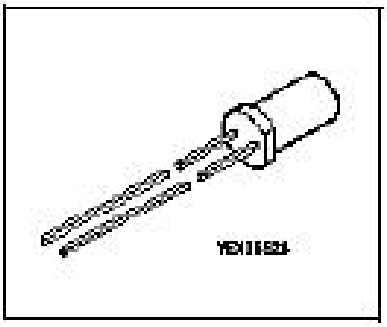
Lampiran 4. ***Transmitter Diode***

Fiber Optics

Plastic Fiber Optic Transmitter Diode **SFH756**
Plastic Connector Housing **SFH756V**

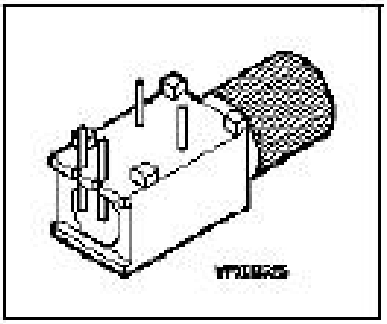
Features

- 2.2 mm Aperture holds Standard 1000 Micron Plastic Fiber
- No Fiber Stripping Required
- Good Linearity (Forward current > 2 mA)
- Molded Microlens for Efficient Coupling



Plastic Connector Housing

- Mounting Screw Attached to the Connector
- Interference Free Transmission from light-Tight Housing
- Transmitter and Receiver can be flexibly positioned
- No Cross Talk
- Auto insertable and Wave solderable
- Supplied in Tubes



Applications

- Household Electronics
- Power Electronics
- Optical Networks
- Light Barriers

Type	Ordering Code
SFH756	Q62702-P1716
SFH756V	Q62702-P1715

Technical Data

Absolute Maximum Ratings

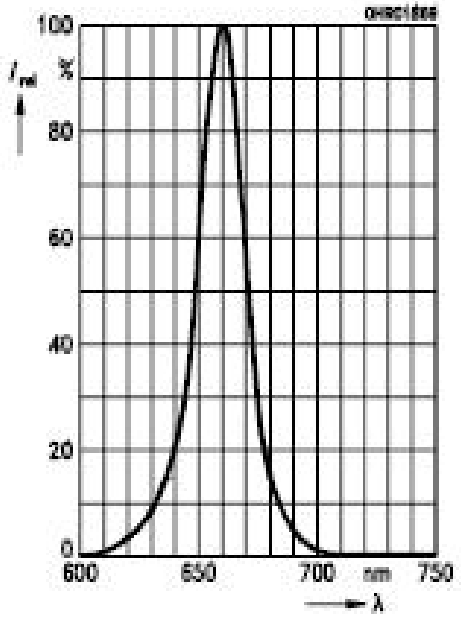
Parameter	Symbol	Limit Values		Unit
		min.	max.	
Operating Temperature Range	T_{OP}	–40	+85	°C
Storage Temperature Range	T_{STG}	–40	+100	°C
Junction Temperature	T_J		100	°C
Soldering Temperature (2 mm from case bottom, $t \leq 5$ s)	T_S		260	°C
Reverse Voltage	V_R		3	V
Forward Current	I_F		50	mA
Surge Current ($t \leq 10$ µs, $D = 0$)	I_{FSM}		1	A
Power Dissipation	P_{TOT}		120	mW
Thermal Resistance, Junction/Air	R_{thJA}		450	K/W

Characteristics (T_A = 25°C)

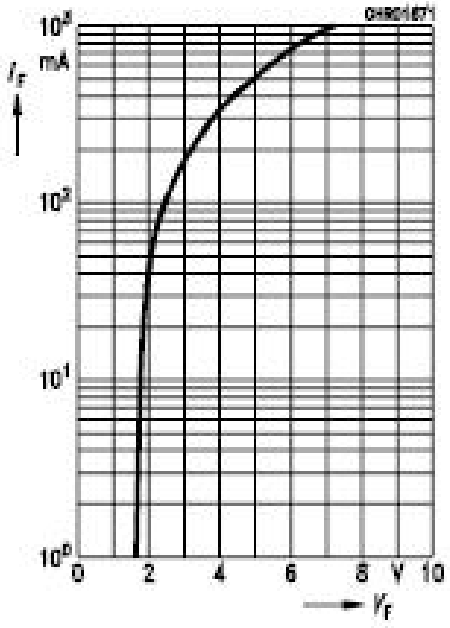
Parameter	Symbol	Value	Unit
Peak Wavelength	λ_{Peak}	660	nm
Spectral Bandwidth	$\Delta\lambda$	25	nm
Switching Times (R_G = 50 Ω), $I_{F(LOW)}$ = 0.1 mA, $I_{F(HIGH)}$ = 50 mA) 10% to 90% 90% to 10%	 t_R t_F	 0.1 0.1	µs
Capacitance (f = 1 MHz, V_R = 0 V)	C_O	30	pF
Forward Voltage (I_F = 50 mA)	V_F	2.1 (≤2.8)	V
Output Power Coupled Into Plastic Fiber (I_F = 10 mA)[1]	Φ_{IN}	200 (≥ 100)	µW
Temperature Coefficient Φ_{IN}	TC_Φ	–0.4	%/K
Temperature Coefficient V_F	TC_V	–3	mV/K
Temperature Coefficient λ_{Peak}	TC_λ	0.16	nm/K

[1] The output power coupled into plastic fiber is measured with a large area detector after a short fiber (about 30 cm). This value must not used for calculating the power budget for a fiber optic system with a long fiber because the numerical aperture of plastics fibers is decreasing on the first meters. Therefore the fiber seems to have compared with the specified value a higher attenuation on the first meters.

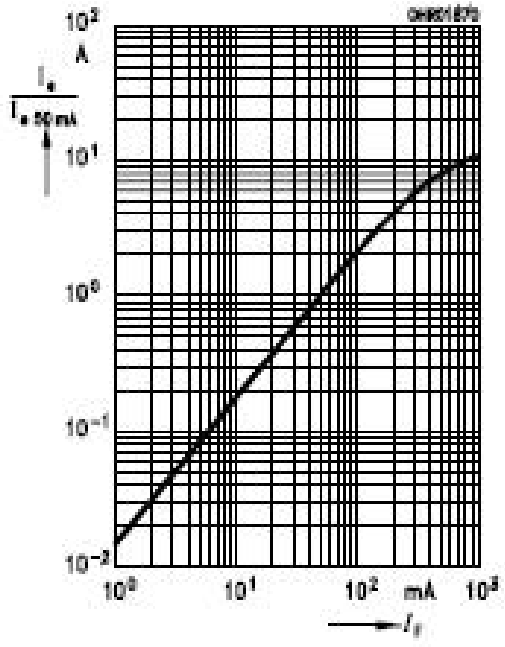
Relative Spectral Emission $I_{rel} = f(\lambda)$



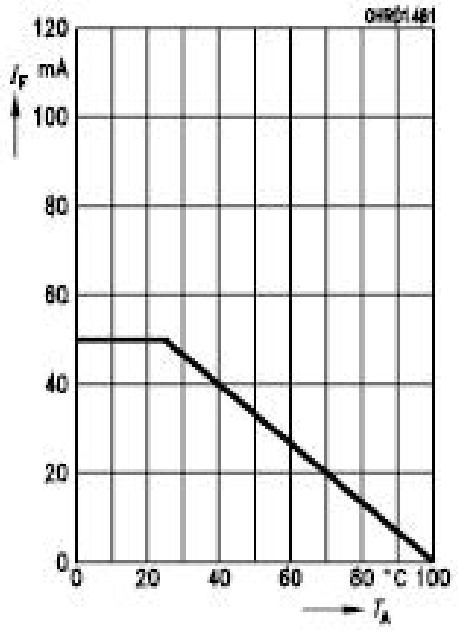
Forward Current $I_F = f(V_F)$
single pulse, duration = 20 µs



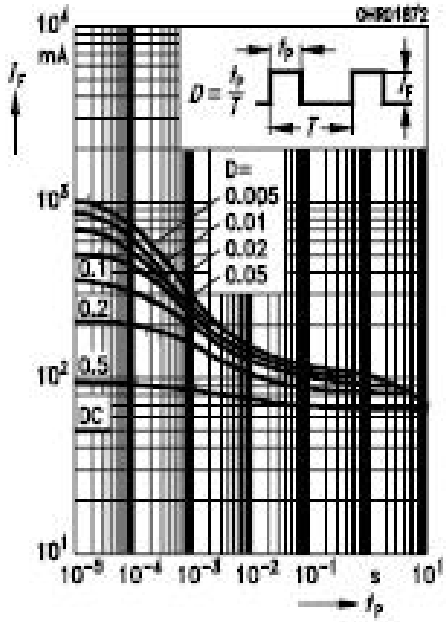
Relative Output Power $I_e/I_{e(50\,mA)} = f(I_F)$
single pulse, duration = 20 µs



Maximum Permissible Forward Current
$I_F = f(T_A)$, $R_{thJA} = 450$ K/W



Permissible Pulse Handling Capability
$I_F = f(t_P)$, duty cycle D = parameter,
$T_A = 25°C$



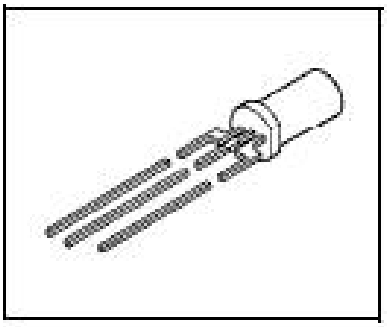
Lampiran 5. ***Photo Detector***

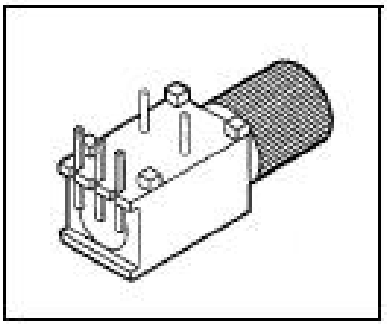
Fiber Optics

Integrated Photo Detector Receiver for Plastic Fiber — **SFH551/1-1**
Plastic Connector Housing — **SFH551/1-1V**

Features

- Bipolar IC with open-collector output
- Digital output, TTL compatible
- Sensitive in visible and near IR range
- Low switching threshold
- Transfer rate ≤ 5 Mbit/s
- 2.2 mm aperture holds standard 1000 micron plastic fiber
- No fiber stripping required
- Molded microlens for efficient coupling





Plastic Connector Housing

- Mounting screw attached to the connector
- Interference-free transmission from light-tight housing
- Transmitter and receiver can be flexibly positioned
- No cross talk
- Auto insertable and wave solderable
- Supplied in tubes

Applications

- Household electronics
- Power electronics
- Optical networks

Type	Ordering Code
SFH551/1-1	Q62702-P3180
SFH551/1-1V	Q62702-P3181

Block Diagram

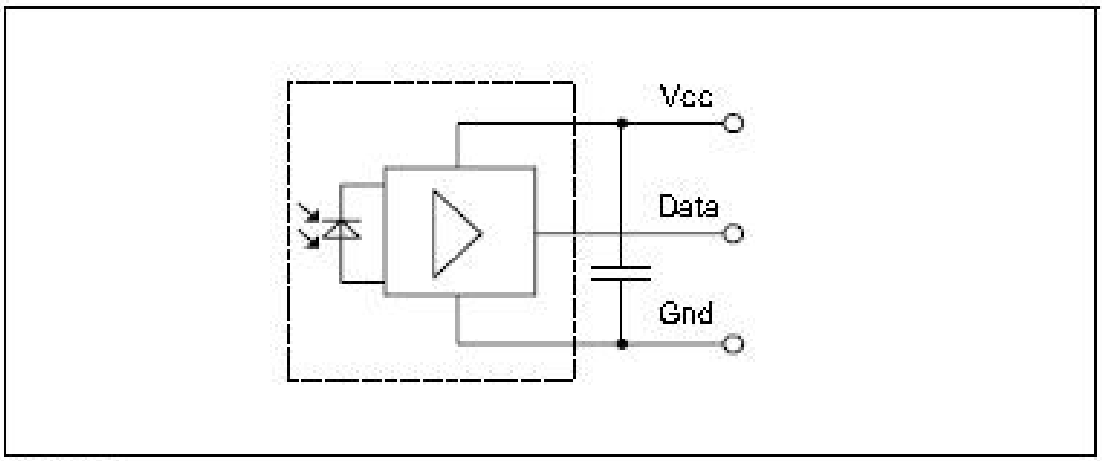


Figure 1

A bypass capacitor (100 nF) near the device (distance ≤ 3 cm) is necessary between ground and V_{CC}. In critical applications the distance may be shorter.

Description

The SFH551/1V is a transimpedance amplifier with digital TTL open collector output stage and integrated photodiode. The active area of the detector in connection with the molded microlens gives an efficient coupling from the end of a plastic fiber.

The receiver is fully DC coupled and therefore no line code is needed.

The SFH551/1V includes a Schmitt trigger function to provide stable output states over the whole dynamic range. For optical input power levels above 6 µW typically the electrical output will be logical "low" and vice versa. With noise free V_{CC} and GND no undefined output signal is possible. SFH551/1 must not be used without shielding the ambient light, because ambient light causes malfunction when reaching the threshold level, noise or complete switching the output. Interference free transmission is possible by using the SFH551/1V with the black plastic connector housing.

Technical Data

Absolute Maximum Ratings

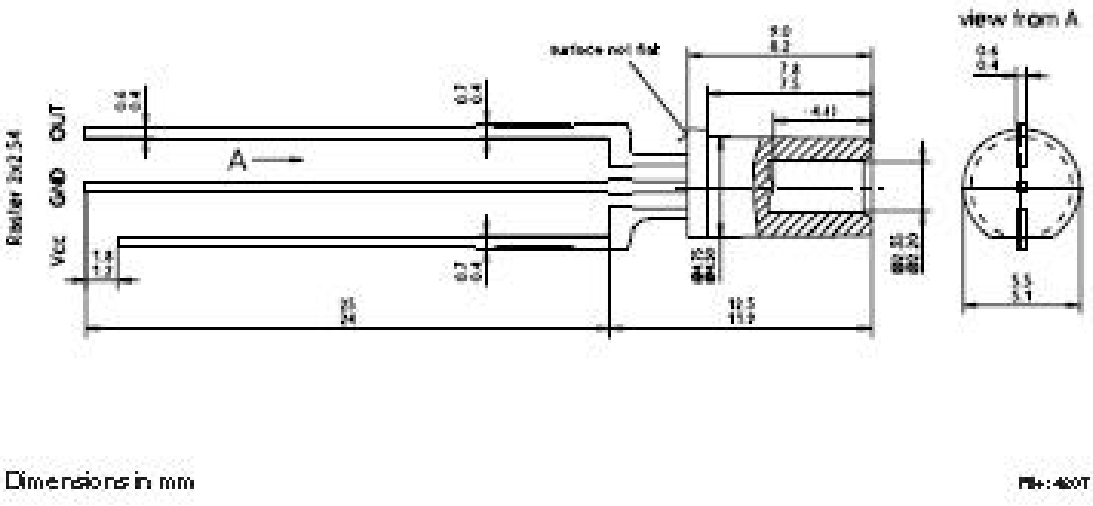
Parameter	Symbol	Limit Values		Unit
		min.	max.	
Operating Temperature Range	T_{OP}	–40	+85	°C
Storage Temperature Range	T_{STG}	–40	+100	°C
Soldering Temperature (2 mm from case bottom, $t \leq 5$ s)	T_S		260	°C
Supply Voltage Range without Damage	V_{CC}	–0.5	15	V
Recommended and Guaranteed Maximum Voltage			5.5	V
Minimum Supply Voltage for Function	V_{CCmin}	4		V
Minimum Pull-up Resistance (V_{CC} = 5 V)	R_{outmin}	330		Ω
Output Voltage	V_O	–0.5	15	V
Output Current	I_O		50	mA
Power Dissipation (output)	P_O		100	mW

Characteristics (T_A = 25°C, V_{CC} = 4.75 to 5.25 V)

Parameter	Symbol	Values			Unit
		min.	typ.	max.	
Maximum Photosensitivity Wavelength	λ_{Smax}		700		nm
Photosensitivity Spectral Range (S = 80% S_{max})	λ	600		780	nm
SFH551/1-1 Optical Threshold Power (λ = 660 nm) for Output Low	Φ_{INth}		≥ 6 ≥ –22		µW dBm
Maximum Optical Power (λ = 660 nm) Maximum Value of t_{PLH} at Maximum Power	Φ_{INL}		1000 0		µW dBm
Optical Power for Output High without Errors (λ = 660 nm)	Φ_{INH}		≤ 0.1 ≤ –40		µW dBm
Propagation Delay (optical input to electrical output, with fast optical pulse)	t_{PHL} t_{PLH}		< 100 < 250		ns
Current Consumption (without output current)	I_{CC}		4		mA

Package Outlines

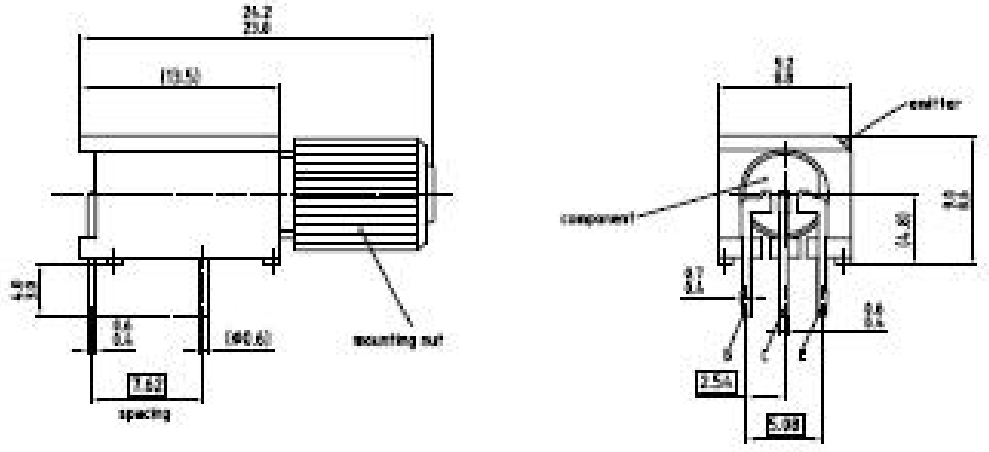
SFH551/1-1



Dimensions in mm

Figure 2

SFH551/1-1V



Dimensions in mm

Figure 3