

Transceiver Reliability TEST Report

Model name : SFP28-25GSR-85-I

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1. Introduction

This report presents the reliability test results for 25Gb/s SFP28 transceivers.

2. Purpose

The purpose of the test is to determine whether the O/E characteristics, mechanical integrity and endurance of 25Gb/s 850nm SFP28 transceiver module meet the requirement of reliability.

3. Sample Description

The sample is 25Gb/s SFP28 transceivers. The type is 25G SR-I. The module' s specification should fit the data in the Table 1.

Table 1: Specification

Parameter	Symbol	Specification			Unit
		Min.	Typ.	Max	
Operating Voltage	V_{CC}	+3.135	+3.3	+3.465	V
Center Wavelength Range	λ_c	840	850	860	nm
Launch Optical Power	P_O	-6	-	+2.4	dBm
Extinction Ratio	EX	2	-	-	dB
Receiver Sensitivity	S	-	-	-10.2	dBm
Receive Light Center Wavelength Range	λ_c	840	850	860	nm
Operating Temperature Range	T_C	-40	-	+85	°C
Storage Temperature Range	T_S	-45	-	+100	°C

4. Procedure

4.1 Sampling

All the samples are selected randomly from storeroom.

4.2 Sample Grouping and Test Sequence

Table 2: Sample Grouping and Test Sequence

Test Sequence	O/E Characteristics	
	Group 1	Physical Dimensions Low-temperature Storage Mechanical Shock/Vibration Temperature Cycle Damp Heat ESD Threshold ESD Immunity Visual Inspection
	Group 2	Damp Heat
	Group 3	High-Temperature Storage
	Group 4	Accelerating Aging

4.3 Failure Criterion

Table 3: Failure Criterion

Heading	Test Program	Failure Criteria
Functional Verification	O/E Characteristics	Any key parameter is out of the specification Table 1.
	Visual Inspection	
	Physical Dimensions	
Mechanical Endurance	Mechanical Shock/Vibration	1. Any key parameter is out of the specification Table 1. 2. $ \Delta S > 1.0\text{dB}$ 3. $ \Delta P > 1.0\text{dB}$ 4. $ \Delta ER > 1.0\text{dB}$
Environmental Endurance	Temperature Cycle	
	Damp Heat	
	Damp Heat(Power)	
	Low-Temperature Storage	
	High-Temperature Storage	
Accelerating Aging		
Special Tests	ESD Immunity	
	ESD Threshold	

4.4 Test Plan and Status

Table 4: Test Plan and Status

Test	Reference	Condition	SS/C	Status
Optical/Electrical Performance	Specifications	Specifications	55/0	Passed
Mechanic Shock	MIL-STD-883	1500g, 0.5ms, 5times/direction	11/0	Passed
Vibration	MIL-STD-883	20g,20-2000Hz, 4minutes/cycle, 4cycles/axis	11/0	Passed
Accelerating Aging	GR-468-CORE	85°C,3.3V, >5000hrs	22/0	2016hrs
Low-Temperature Storage	GR-468-CORE	-40°C, 72hrs	11/0	Passed
High-Temperature Storage	GR-468-CORE	85°C, 2000hrs	11/0	Passed
Temperature Cycle	GR-468-CORE	-40°C to 85°C, 500 cycles	11/0	Passed
Damp Heat	GR-468-CORE	100°C,85%RH, 2000 hours	11/0	Passed
Damp Heat(Power)	GR-468-CORE	85°C,85%RH, 3.3V, 1000 hours	11/0	Passed
ESD Immunity	IEC61000-4-2	4 Class, air discharge 15KV, contact discharge 8KV	3/0	Class 4
ESD Threshold	MIL-STD-883	HBM, least 500V, three positive pulses, three negative pulses, test to failure. Beside Signal PIN:±2KV Signal PIN:±1KV	6/0	Passed
Physical Dimensions	MIL-STD-883	Micrometers, calipers, gauges, contour projectors	11/0	Passed
Visual Inspection	MIL-STD-883	1.5X to 10X(Devices)	11/0	Passed

5. Test Results

5.1 O/E Characteristic

Table 5: Optical/Electrical Characterization of Thirty-Three Modules

No.	P _o (dBm)	Sensitivity (dBm)	ER (dB)	No.	P _o (dBm)	Sensitivity (dBm)	ER (dB)
1	0.5	-12.4	4.7	29	0.9	-12.2	5.4
2	0.8	-12.4	4.3	30	0.6	-11.6	5.1
3	0.9	-11.6	5.3	31	0.7	-12.1	5.4
4	0.8	-11.9	5.0	32	0.7	-12.3	5.2
5	0.5	-11.6	5.0	33	0.5	-11.6	4.9
6	0.8	-12.3	4.4	34	0.6	-11.6	4.9
7	0.7	-11.5	5.1	35	0.6	-11.5	5.0
8	0.7	-12.2	4.5	36	0.6	-11.6	4.6
9	0.8	-11.7	5.1	37	0.9	-12.2	5.3
10	0.7	-12.5	5.4	38	0.7	-12.5	4.7
11	0.7	-12.2	4.4	39	1.0	-12.3	5.0
12	0.8	-12.0	5.2	40	0.7	-12.5	5.4
13	0.5	-11.5	5.2	41	0.6	-12.0	4.4
14	0.8	-11.7	4.4	42	1.0	-11.7	5.1
15	0.7	-12.3	4.6	43	0.7	-12.1	5.2
16	0.9	-12.2	5.4	44	0.6	-11.6	4.6
17	0.5	-12.0	4.9	45	0.8	-12.5	5.4
18	0.7	-11.6	5.3	46	0.6	-12.5	5.2
19	0.5	-12.4	5.3	47	0.7	-11.9	4.5
20	0.8	-11.6	4.7	48	0.7	-12.3	4.5
21	0.6	-11.9	5.0	49	0.8	-12.1	5.0
22	0.6	-12.4	4.2	50	0.8	-11.8	4.5
23	0.7	-12.3	4.7	51	0.7	-12.0	5.4
24	0.8	-11.8	4.6	52	0.7	-12.1	4.9
25	0.6	-11.8	4.5	53	0.7	-11.5	5.1
26	0.8	-12.3	4.9	54	0.8	-12.0	5.3

27	0.7	-11.8	5.1	55	0.9	-11.7	4.3
28	0.8	-12.0	5.4				

5.2 Physical Dimensions

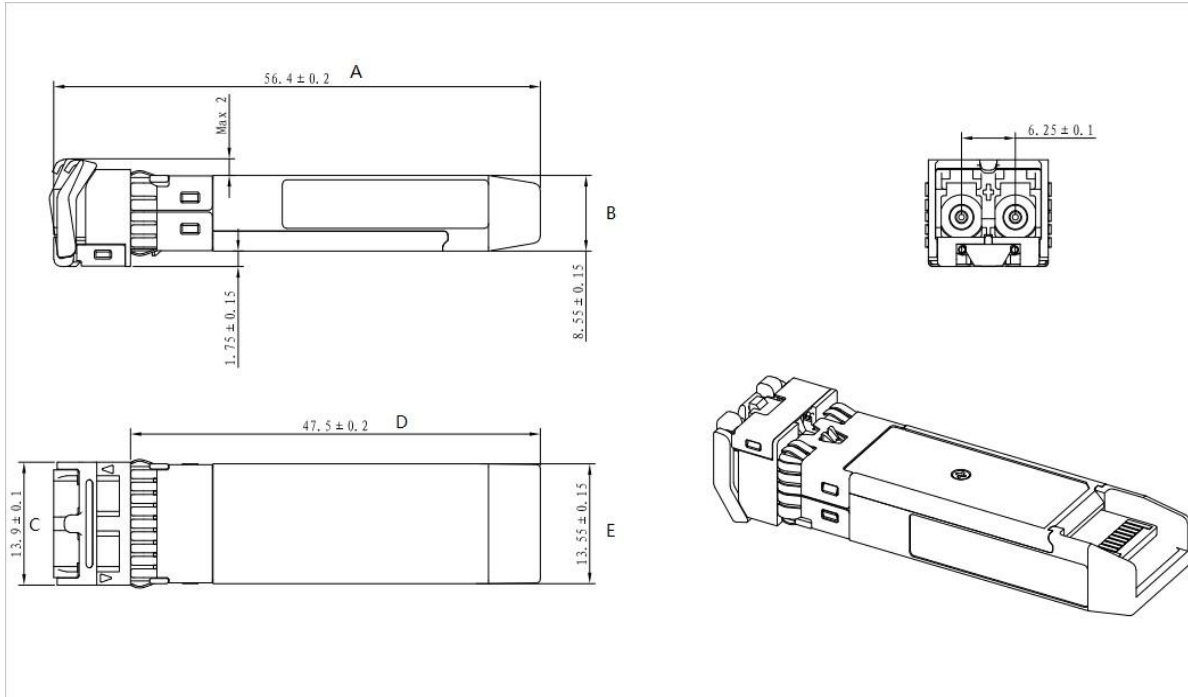


Figure 1: Package Outline(unit: mm)

Table 6: Data of Dimension Test(unit: mm)

Projected Dimension	Designator				
	A	B	C	D	E
	56.4±0.2	8.55±0.15	13.90±0.1	47.50±0.2	13.55±0.15
1	56.43	8.52	13.92	47.51	13.54
2	56.42	8.56	13.92	47.53	13.56
3	56.45	8.59	13.92	47.50	13.53
4	56.41	8.57	13.86	47.47	13.60
5	56.37	8.54	13.87	47.46	13.59
6	56.38	8.56	13.88	47.46	13.55
7	56.36	8.57	13.92	47.50	13.51
8	56.45	8.54	13.89	47.50	13.56
9	56.42	8.56	13.90	47.52	13.58
10	56.37	8.53	13.89	47.49	13.57
11	56.43	8.51	13.91	47.52	13.57
Statistics					
AVE	56.39	8.55	13.90	47.50	13.56
SD	0.03	0.02	0.02	0.02	0.03
MAX	56.44	8.59	13.92	47.53	13.60
MIN	56.35	8.51	13.86	47.46	13.51

5.3 Low Temperature Storage

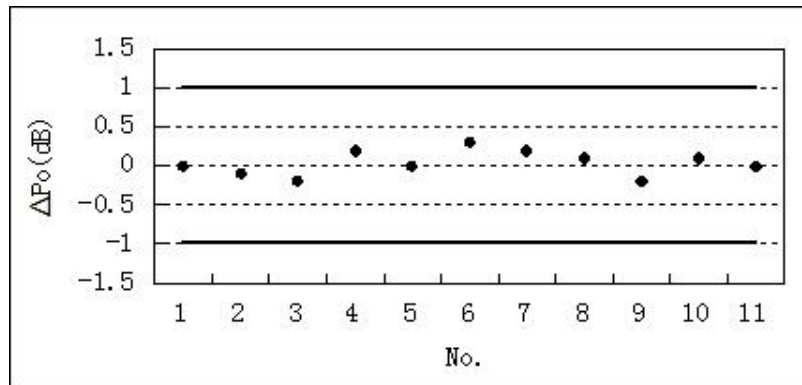


Figure 2: Optical Power Variation in Low Temperature Storage Test

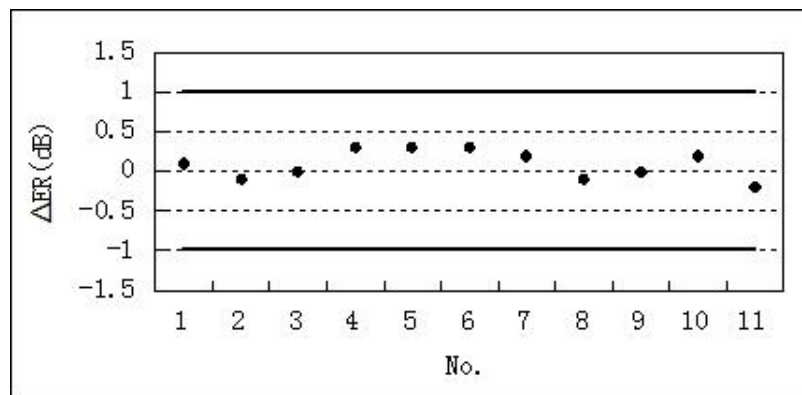


Figure 3: Receiver Sensitivity Variation in Low Temperature Storage Test

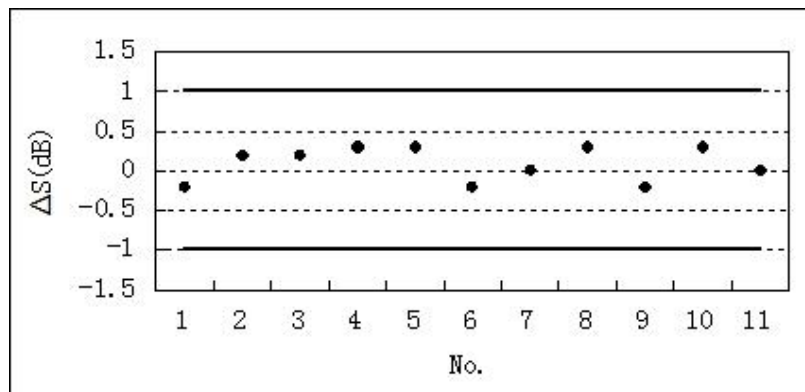


Figure 4: Extinction Ratio Variation in Low Temperature Storage Test

Table 7: Data of Low Temperature Storage Test

No.	Before Test			After Test			Before and After Test Variation		
	P _o (dBm)	Sensitivity (dBm)	ER (dB)	P _o (dBm)	Sensitivity (dBm)	ER (dB)	ΔP _o (dB)	ΔS (dB)	ΔER (dB)
1	2.5	-17.1	4.8	0.8	-12.1	4.9	0.0	-0.2	0.1
2	1.3	-17.0	5.1	0.5	-11.6	5	-0.1	0.2	-0.1
3	1.0	-17.2	4.6	0.6	-11.7	4.6	-0.2	0.2	0.0
4	2.8	-16.8	4.3	1	-11.9	4.6	0.2	0.3	0.3
5	1.3	-16.8	5.5	0.9	-11.4	5.8	0.0	0.3	0.3
6	1.3	-16.6	5.1	1.1	-12.5	5.4	0.3	-0.2	0.3
7	1.5	-17.3	5.4	1.1	-12.2	5.6	0.2	0.0	0.2
8	1.1	-17.4	4.3	0.6	-11.8	4.2	0.1	0.3	-0.1
9	2.7	-17.1	4.7	0.7	-12.2	4.7	-0.2	-0.2	0.0
10	1.2	-17.2	5.4	1	-11.6	5.6	0.1	0.3	0.2
11	1.4	-16.7	4.8	0.6	-11.7	4.6	0.0	0.0	-0.2
Statistics									
AVE	0.77	-11.97	4.91	0.81	-11.88	5.00	0.04	0.09	0.09
SD	0.14	0.20	0.41	0.21	0.32	0.50	0.16	0.21	0.17
MAX	0.90	-11.70	5.50	1.10	-11.40	5.80	0.30	0.30	0.30
MIN	0.50	-12.30	4.30	0.50	-12.50	4.20	-0.20	-0.20	-0.20

5.4 Temperature Cycle

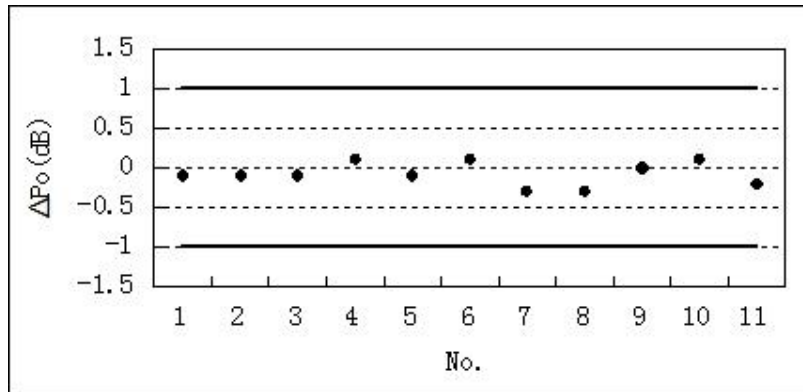


Figure 5: Optical Power Variation in Temperature Cycle Test

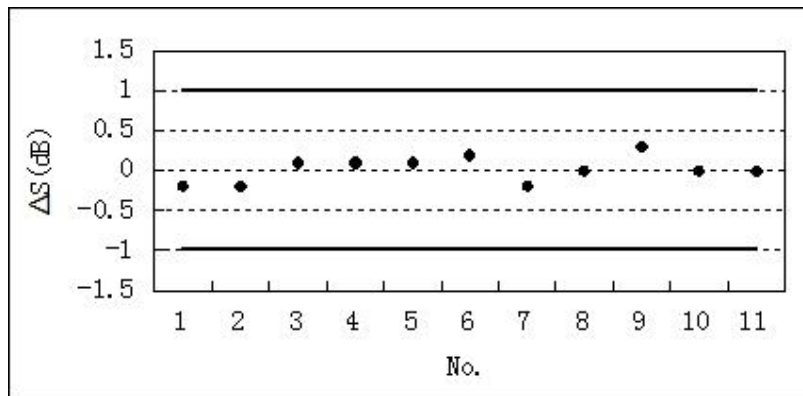


Figure 6: Receive Sensitivity Variation in Temperature Cycle Test

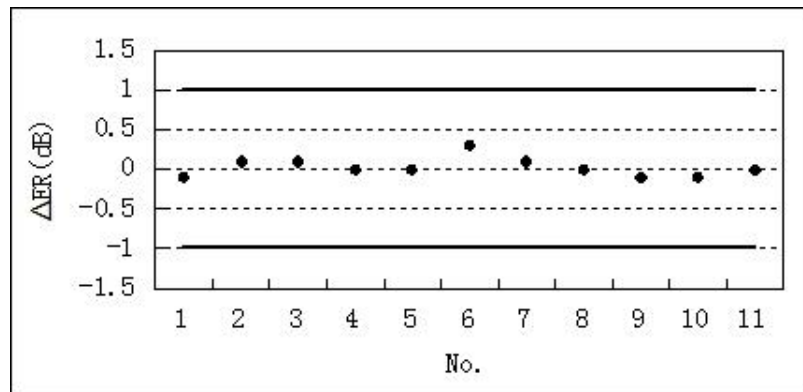


Figure 7: Extinction Ratio Variation in Temperature Cycle Test

Table 8: Optical Output Power in Temperature Cycle Test

No.	Before Test			After Test			Before and After Test Variation		
	P _o (dBm)	Sensitivity (dBm)	ER (dB)	P _o (dBm)	Sensitivity (dBm)	ER (dB)	ΔP _o (dB)	ΔS (dB)	ΔER (dB)
1	0.8	-12.1	4.9	0.7	-12.3	4.8	-0.1	-0.2	-0.1
2	0.5	-11.6	5	0.4	-11.8	5.1	-0.1	-0.2	0.1
3	0.6	-11.7	4.6	0.5	-11.6	4.7	-0.1	0.1	0.1
4	1	-11.9	4.6	1.1	-11.8	4.6	0.1	0.1	0.0
5	0.9	-11.4	5.8	0.8	-11.3	5.8	-0.1	0.1	0.0
6	1.1	-12.5	5.4	1.2	-12.3	5.7	0.1	0.2	0.3
7	1.1	-12.2	5.6	0.8	-12.4	5.7	-0.3	-0.2	0.1
8	0.6	-11.8	4.2	0.3	-11.8	4.2	-0.3	0.0	0.0
9	0.7	-12.2	4.7	0.7	-11.9	4.6	0.0	0.3	-0.1
10	1	-11.6	5.6	1.1	-11.6	5.5	0.1	0.0	-0.1
11	0.6	-11.7	4.6	0.4	-11.7	4.6	-0.2	0.0	0.0
Statistics									
AVE	0.81	-11.88	0.73	-11.86	-0.08	0.02	-0.08	0.02	0.03
SD	0.21	0.32	0.30	0.33	0.14	0.16	0.14	0.16	0.11
MAX	1.10	-11.40	1.20	-11.30	0.10	0.30	0.10	0.30	0.30
MIN	0.50	-12.50	0.30	-12.40	-0.30	-0.20	-0.30	-0.20	-0.10

5.5 Mechanical Shock /Vibration

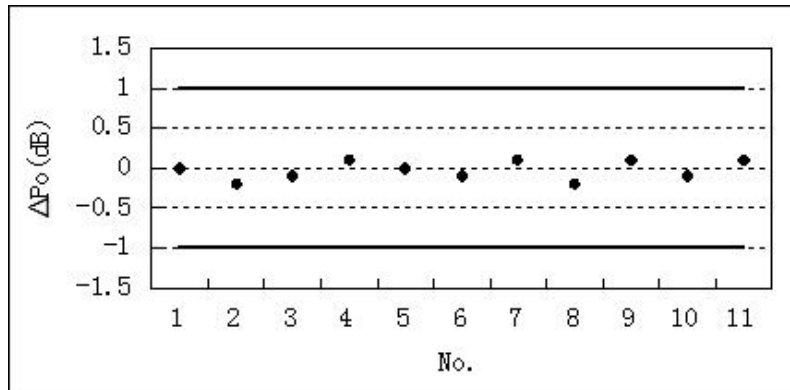


Figure 8: Optical Power Variation in Mechanical Shock /Vibration

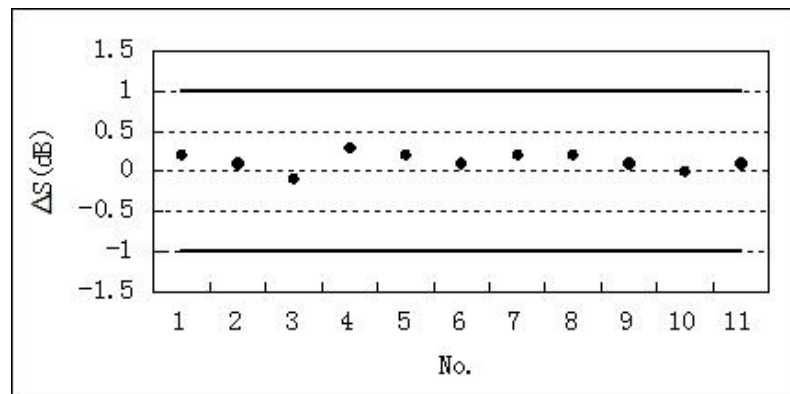


Figure 9: Receiver Sensitivity Variation in Mechanical Shock /Vibration Test

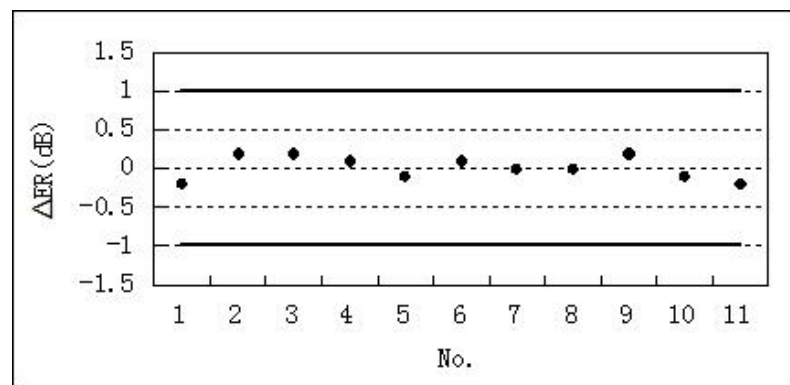


Figure 10: Extinction Ratio Variation in Mechanical Shock /Vibration Test

Table 9: Data of Mechanical Shock /Vibration Test

No.	Before Test			After Test			Before and After Test Variation		
	P _o (dBm)	Sensitivity (dBm)	ER (dB)	P _o (dBm)	Sensitivity (dBm)	ER (dB)	ΔP _o (dB)	ΔS (dB)	ΔER (dB)
1	0.7	-12.3	4.8	0.7	-12.1	4.6	0.0	0.2	-0.2
2	0.4	-11.8	5.1	0.2	-11.7	5.3	-0.2	0.1	0.2
3	0.5	-11.6	4.7	0.4	-11.7	4.9	-0.1	-0.1	0.2
4	1.1	-11.8	4.6	1.2	-11.5	4.7	0.1	0.3	0.1
5	0.8	-11.3	5.8	0.8	-11.1	5.7	0.0	0.2	-0.1
6	1.2	-12.3	5.7	1.1	-12.2	5.8	-0.1	0.1	0.1
7	0.8	-12.4	5.7	0.9	-12.2	5.7	0.1	0.2	0.0
8	0.3	-11.8	4.2	0.1	-11.6	4.2	-0.2	0.2	0.0
9	0.7	-11.9	4.6	0.8	-11.8	4.8	0.1	0.1	0.2
10	1.1	-11.6	5.5	1	-11.6	5.4	-0.1	0.0	-0.1
11	0.4	-11.7	4.6	0.5	-11.6	4.4	0.1	0.1	-0.2
Statistics									
AVE	0.73	-11.86	5.03	0.70	-11.74	5.05	-0.03	0.13	0.02
SD	0.30	0.33	0.53	0.34	0.31	0.53	0.11	0.11	0.15
MAX	1.20	-11.30	5.80	1.20	-11.10	5.80	0.10	0.30	0.20
MIN	0.30	-12.40	4.20	0.10	-12.20	4.20	-0.20	-0.10	-0.20

5.6 Damp Heat(Power)

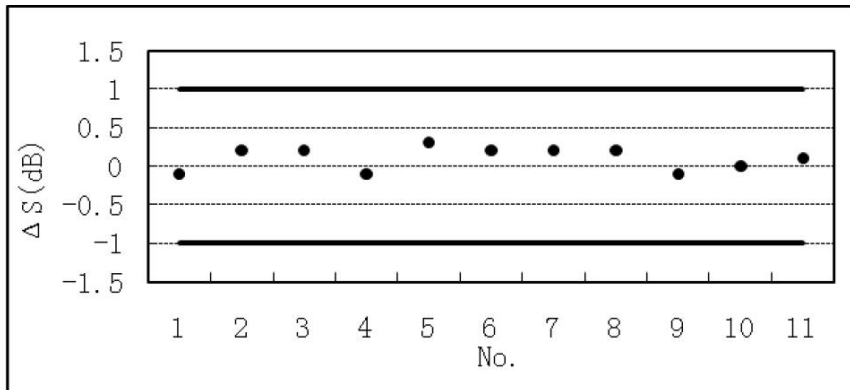


Figure 11: Optical Power Variation in Damp Heat Test (Power)

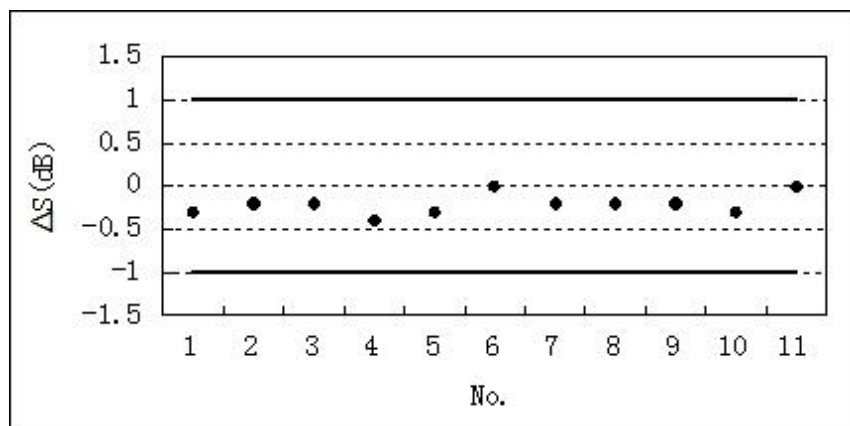


Figure 12: Receiver Sensitivity Variation in Damp Heat Test (Power)

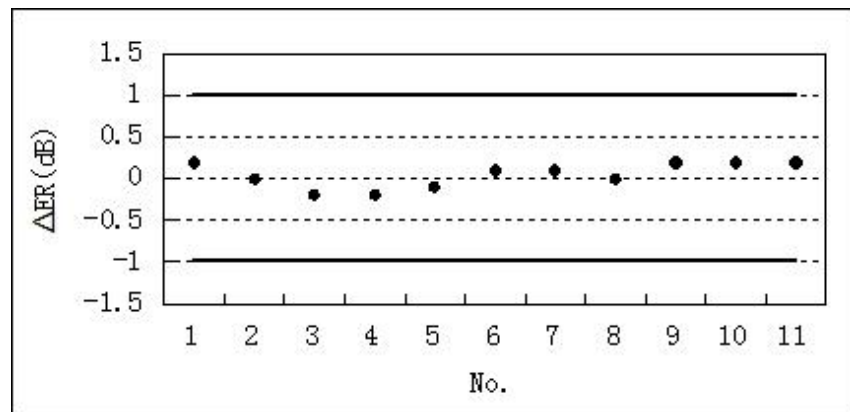


Figure 13: Extinction Ratio Variation in Damp Heat Test (Power)

Table 10: Data of Damp Heat Test(Power)

No.	Before Test			After Test			Before and After Test Variation		
	P _o (dBm)	Sensitivity (dBm)	ER (dB)	P _o (dBm)	Sensitivity (dBm)	ER (dB)	ΔP _o (dB)	ΔS (dB)	ΔER (dB)
1	0.7	-12.1	4.6	0.6	-12.4	4.8	-0.1	-0.3	0.2
2	0.2	-11.7	5.3	-0.1	-11.9	5.3	-0.3	-0.2	0.0
3	0.4	-11.7	4.9	0.2	-11.9	4.7	-0.2	-0.2	-0.2
4	1.2	-11.5	4.7	1.1	-11.9	4.5	-0.1	-0.4	-0.2
5	0.8	-11.1	5.7	0.6	-11.4	5.6	-0.2	-0.3	-0.1
6	1.1	-12.2	5.8	0.8	-12.2	5.9	-0.3	0.0	0.1
7	0.9	-12.2	5.7	0.8	-12.4	5.8	-0.1	-0.2	0.1
8	0.1	-11.6	4.2	0	-11.8	4.2	-0.1	-0.2	0.0
9	0.8	-11.8	4.8	0.7	-12	5	-0.1	-0.2	0.2
10	1	-11.6	5.4	1.1	-11.9	5.6	0.1	-0.3	0.2
11	0.5	-11.6	4.4	0.2	-11.6	4.6	-0.3	0.0	0.2
Statistics									
AVE	0.70	-11.74	5.05	0.55	-11.95	5.09	-0.15	-0.21	0.05
SD	0.34	0.31	0.53	0.40	0.29	0.55	0.12	0.12	0.15
MAX	1.20	-11.10	5.80	1.10	-11.40	5.90	0.10	0.00	0.20
MIN	0.10	-12.20	4.20	-0.10	-12.40	4.20	-0.30	-0.40	-0.20

5.7 ESD Threshold

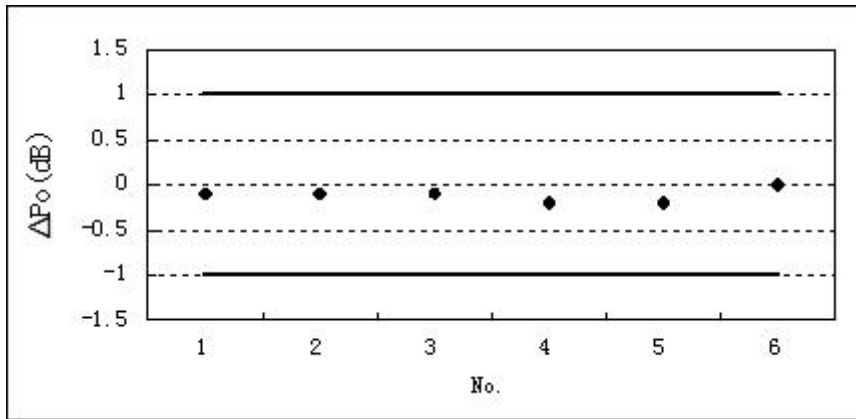


Figure 14: Optical Power Variation in ESD Threshold Test

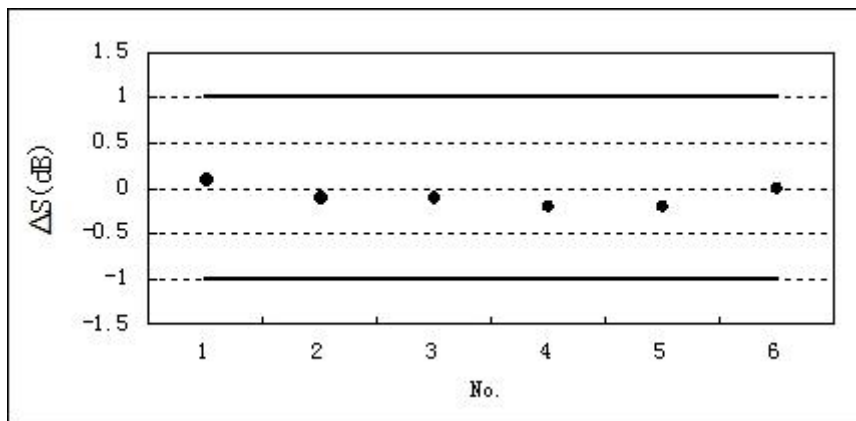


Figure 15: Receiver Sensitivity Variation in ESD Threshold Test

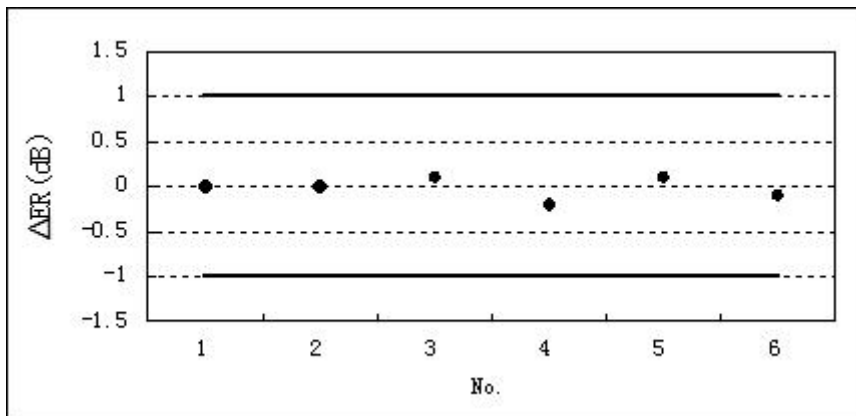


Figure 16: Extinction Ratio Variation in ESD Threshold Test

Table 11: Data of ESD Threshold Test

No.	Before Test			After Test			Before and After Test Variation		
	P _o (dBm)	Sensitivity (dBm)	ER (dB)	P _o (dBm)	Sensitivity (dBm)	ER (dB)	ΔP _o (dB)	ΔS (dB)	ΔER (dB)
1	0.6	-12.4	4.8	0.5	-12.3	4.8	-0.1	0.1	0.0
2	-0.1	-11.9	5.3	-0.2	-12	5.3	-0.1	-0.1	0.0
3	0.2	-11.9	4.7	0.1	-12	4.8	-0.1	-0.1	0.1
4	1.1	-11.9	4.5	0.9	-12.1	4.3	-0.2	-0.2	-0.2
5	0.6	-11.4	5.6	0.4	-11.6	5.7	-0.2	-0.2	0.1
6	0.8	-12.2	5.9	0.8	-12.2	5.8	0.0	0.0	-0.1
Statistics									
AVE	0.53	-11.95	5.13	0.42	-12.03	5.12	-0.12	-0.08	-0.02
SD	0.39	0.31	0.51	0.38	0.22	0.53	0.07	0.11	0.11
MAX	1.10	-11.40	5.90	0.90	-11.60	5.80	0.00	0.10	0.10
MIN	-0.10	-12.40	4.50	-0.20	-12.30	4.30	-0.20	-0.20	-0.20

5.8 ESD Immunity

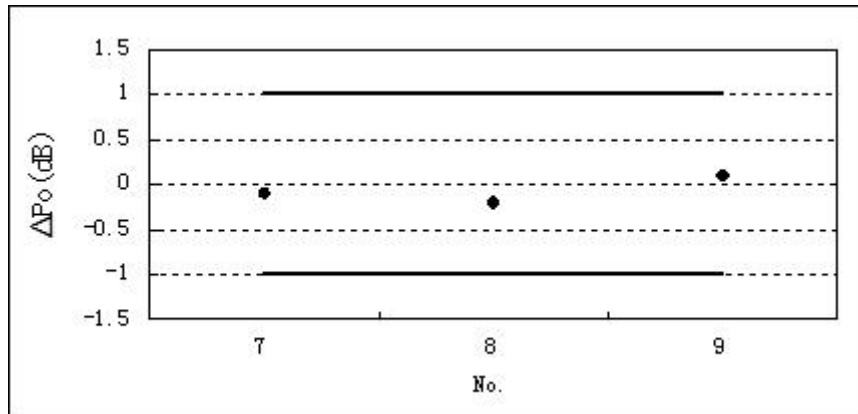


Figure 17: Optical Power Variation in ESD Immunity Test

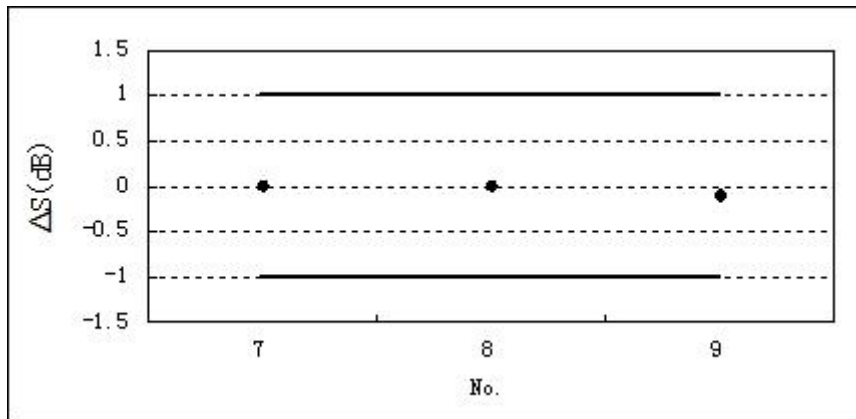


Figure 18: Receiver Sensitivity Variation in ESD Immunity Test

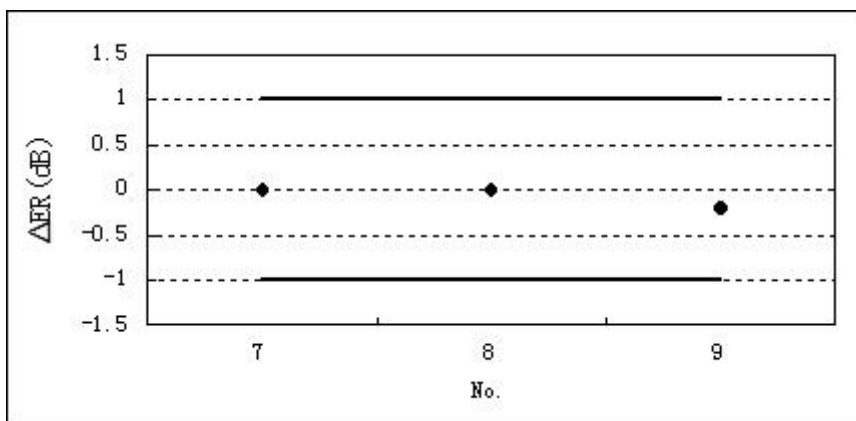


Figure 19: Extinction Ratio Variation in ESD Immunity Test

Table 12: Data of ESD Immunity Test (Class 4)

No.	Before Test			After Test			Before and After Test Variation		
	P _o (dBm)	Sensitivity (dBm)	ER (dB)	P _o (dBm)	Sensitivity (dBm)	ER (dB)	ΔP _o (dB)	ΔS (dB)	ΔER (dB)
7	0.8	-12.4	5.8	0.7	-12.4	5.8	-0.1	0.0	0.0
8	0	-11.8	4.2	-0.2	-11.8	4.2	-0.2	0.0	0.0
9	0.7	-12	5	0.8	-12.1	4.8	0.1	-0.1	-0.2
Statistics									
AVE	0.50	-12.07	5.00	0.43	-12.10	4.93	-0.07	-0.03	-0.07
SD	0.36	0.25	0.65	0.45	0.24	0.66	0.12	0.05	0.09
MAX	0.80	-11.80	5.80	0.80	-11.80	5.80	0.10	0.00	0.00

MIN	0.00	-12.40	4.20	-0.20	-12.40	4.20	-0.20	-0.10	-0.20
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5.9 Visual Inspection

Table 13: Data of Visual Inspection Test

No.	01	02	03	04	05	06	07	08	09	10	11
End Inspection	OK*	OK*	OK*	OK*	OK*	OK*	OK*	OK*	OK*	OK*	OK*

5.10 Damp Heat

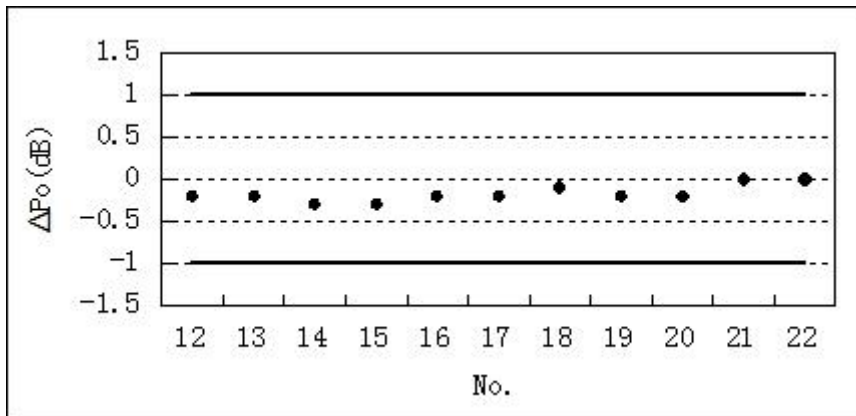


Figure 20: Optical Power variation in Damp Heat Test

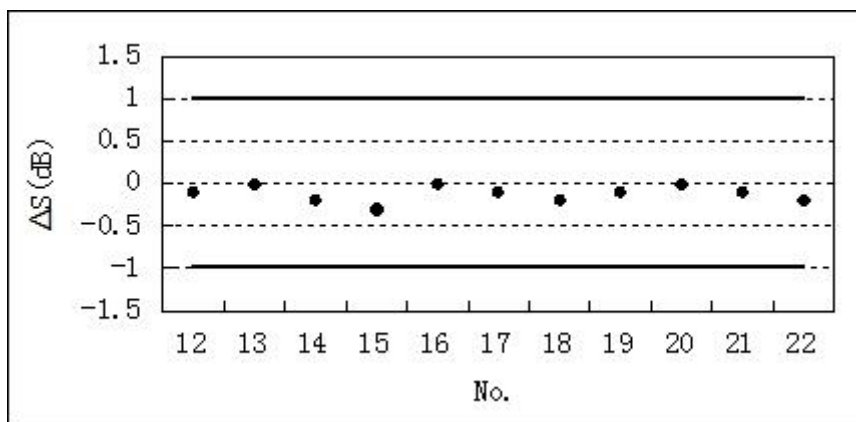


Figure 21: Receiver Sensitivity Variation in Damp Heat Test

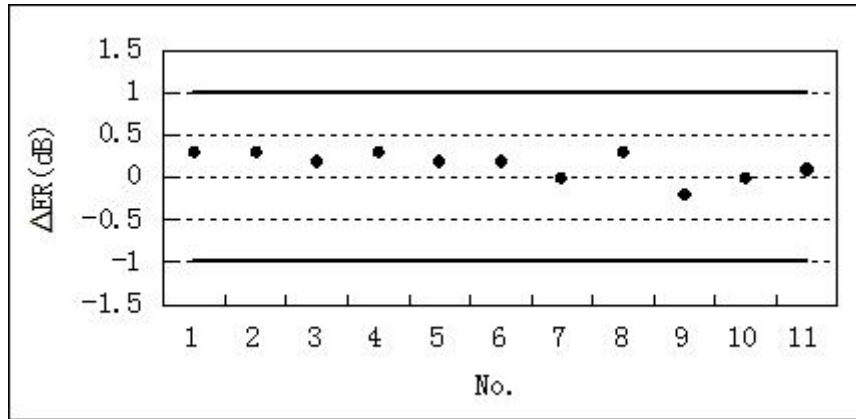


Figure 22: Extinction Ratio Variation in Damp Heat Test

Table 14: Data of Damp Heat Test

No.	Before Test			After Test			Before and After Test Variation		
	P _o (dBm)	Sensitivity (dBm)	ER (dB)	P _o (dBm)	Sensitivity (dBm)	ER (dB)	ΔP _o (dB)	ΔS (dB)	ΔER (dB)
12	0.8	-12	5.2	0.6	-12.1	5.5	-0.2	-0.1	0.3
13	0.5	-11.5	5.2	0.3	-11.5	5.5	-0.2	0.0	0.3
14	0.8	-11.7	4.4	0.5	-11.9	4.6	-0.3	-0.2	0.2
15	0.7	-12.3	4.6	0.4	-12.6	4.9	-0.3	-0.3	0.3
16	0.9	-12.2	5.4	0.7	-12.2	5.6	-0.2	0.0	0.2
17	0.5	-12	4.9	0.3	-12.1	5.1	-0.2	-0.1	0.2
18	0.7	-11.6	5.3	0.6	-11.8	5.3	-0.1	-0.2	0.0
19	0.5	-12.4	5.3	0.3	-12.5	5.6	-0.2	-0.1	0.3
20	0.8	-11.6	4.7	0.6	-11.6	4.5	-0.2	0.0	-0.2
21	0.6	-11.9	5	0.6	-12	5	0.0	-0.1	0.0
22	0.6	-12.4	4.2	0.6	-12.6	4.3	0.0	-0.2	0.1
Statistics									
AVE	0.67	-11.96	4.93	5.08	-12.08	4.81	0.15	-0.12	-0.12
SD	0.14	0.32	0.38	0.44	0.36	0.42	0.16	0.09	0.08
MAX	0.90	-11.50	5.40	5.60	-11.50	5.40	0.30	0.00	0.00
MIN	0.50	-12.40	4.20	4.30	-12.60	4.00	-0.20	-0.30	-0.20

5.11 High-temperature Storage

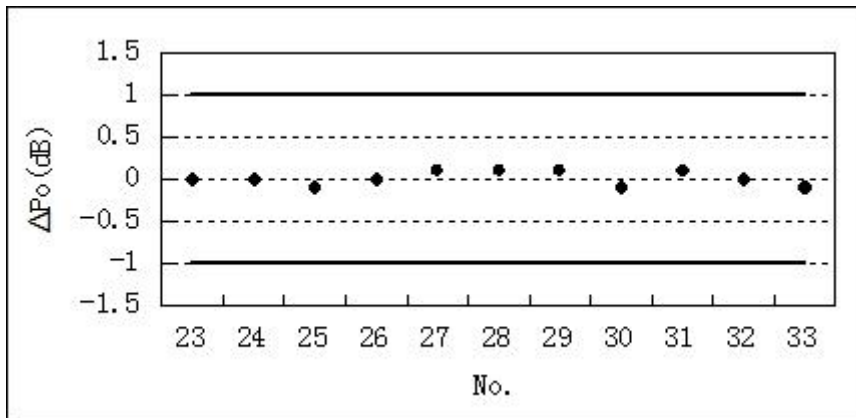


Figure 23: Optical Power Variation in High-Temperature Storage Test

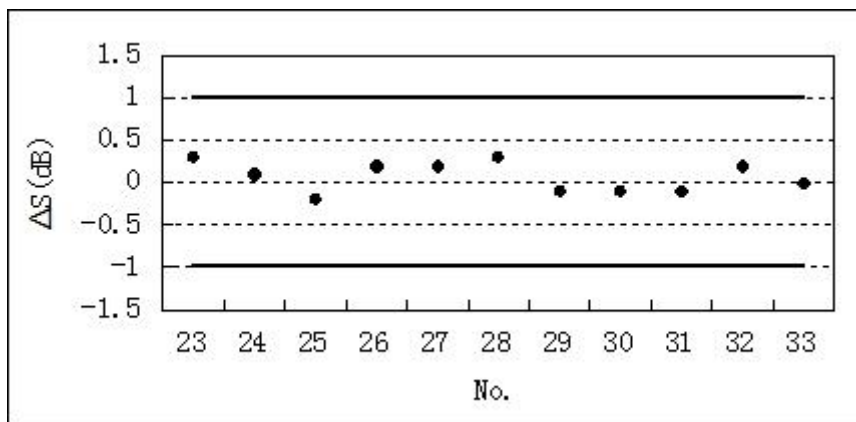


Figure 24: Receiver Sensitivity Variation in High-Temperature Storage Test

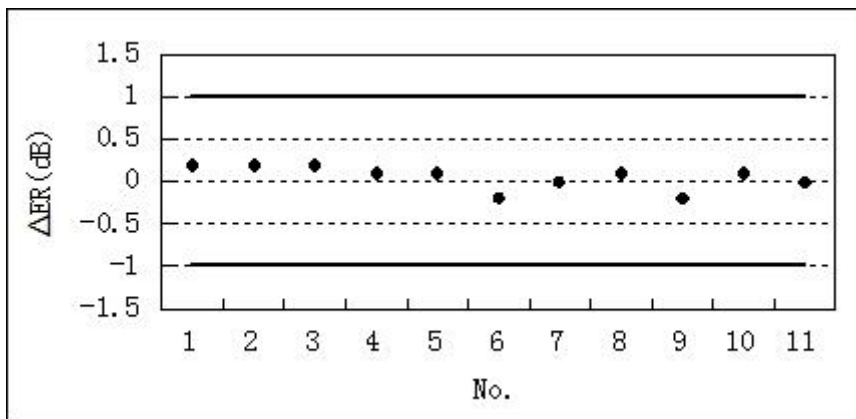


Figure 25: Extinction Ratio Variation in High-Temperature Storage Test

Table 15: Data of High-Temperature Storage Test

No.	Before Test			After Test			Before and After Test Variation		
	P _o (dBm)	Sensitivity (dBm)	ER (dB)	P _o (dBm)	Sensitivity (dBm)	ER (dB)	ΔP _o (dB)	ΔS (dB)	ΔER (dB)
23	0.7	-12.3	4.7	0.7	-12	4.9	0.0	0.3	0.2
24	0.8	-11.8	4.6	0.8	-11.7	4.8	0.0	0.1	0.2
25	0.6	-11.8	4.5	0.5	-12	4.7	-0.1	-0.2	0.2
26	0.8	-12.3	4.9	0.8	-12.1	5	0.0	0.2	0.1
27	0.7	-11.8	5.1	0.8	-11.6	5.2	0.1	0.2	0.1
28	0.8	-12	5.4	0.9	-11.7	5.2	0.1	0.3	-0.2
29	0.9	-12.2	5.4	1	-12.3	5.4	0.1	-0.1	0.0
30	0.6	-11.6	5.1	0.5	-11.7	5.2	-0.1	-0.1	0.1
31	0.7	-12.1	5.4	0.8	-12.2	5.2	0.1	-0.1	-0.2
32	0.7	-12.3	5.2	0.7	-12.1	5.3	0.0	0.2	0.1
33	0.5	-11.6	4.9	0.4	-11.6	4.9	-0.1	0.0	0.0
Statistics									
AVE	0.71	-11.98	5.02	0.72	-11.91	5.07	0.01	0.07	0.05
SD	0.11	0.26	0.31	0.17	0.24	0.21	0.08	0.17	0.14
MAX	0.90	-11.60	5.40	1.00	-11.60	5.40	0.10	0.30	0.20
MIN	0.50	-12.30	4.50	0.40	-12.30	4.70	-0.10	-0.20	-0.20

5.12 Accelerating Aging

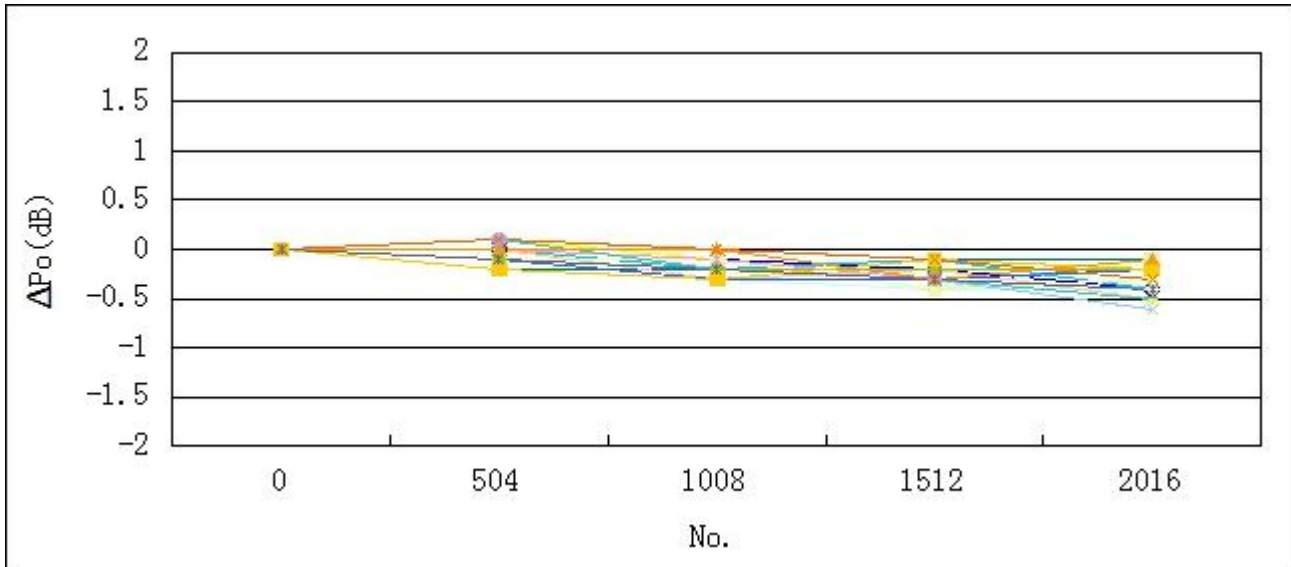


Figure 26: Optical Power Variation in Accelerating Aging Test

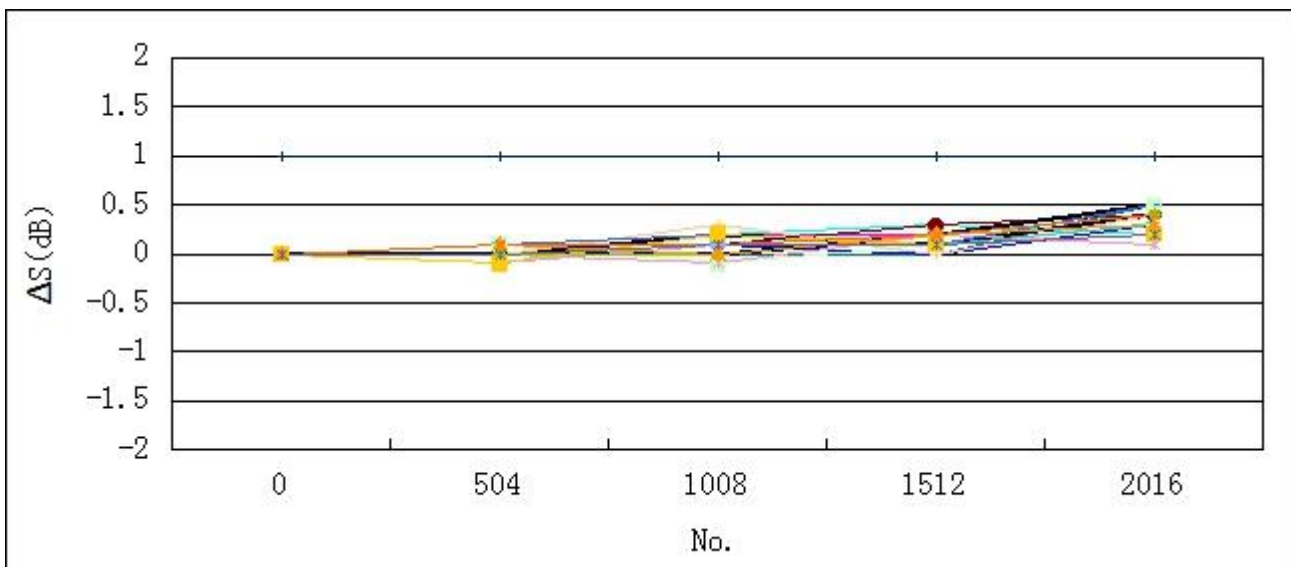


Figure 27: Receiver Sensitivity Variation in Accelerating Aging Test

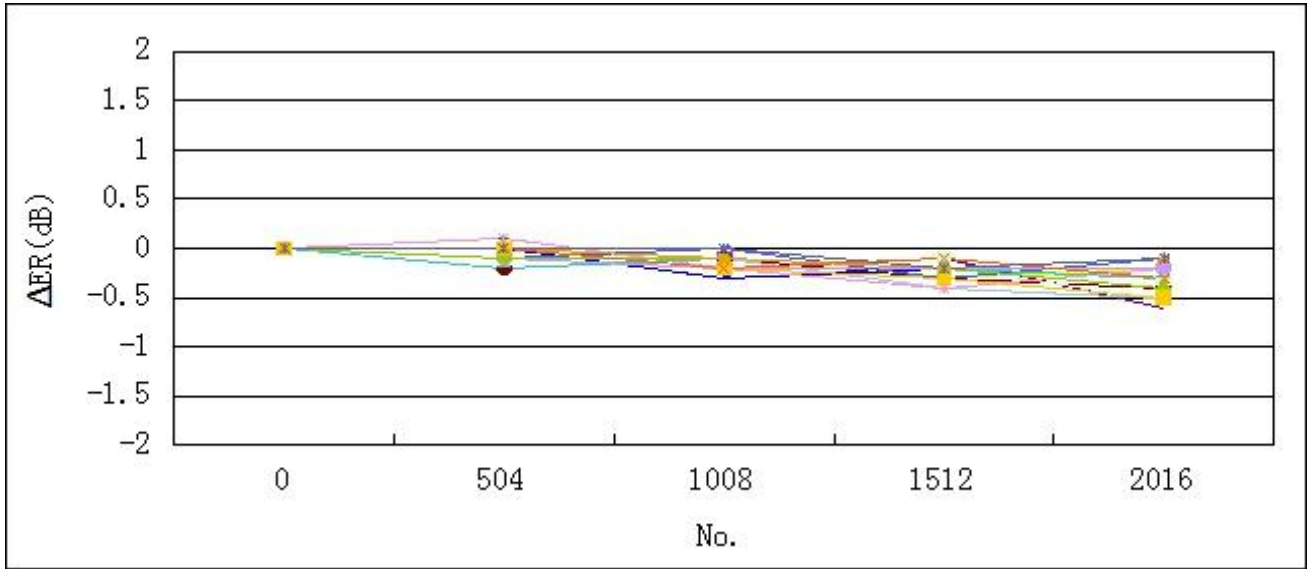


Figure 28: Extinction Ratio Variation in Accelerating Aging Test

Table 16: Optical Power of Accelerating Aging Test

Time (hrs)	34	35	36	37	38	39	40	41	42	43	44
0	0.6	0.6	0.6	0.9	0.7	1	0.7	0.6	1	0.7	0.6
504	0.6	0.7	0.5	0.8	0.7	0.8	0.6	0.6	0.9	0.6	0.5
1008	0.4	0.5	0.4	0.8	0.6	0.8	0.6	0.4	0.7	0.6	0.5
1512	0.4	0.4	0.3	0.6	0.3	0.9	0.5	0.5	0.6	0.3	0.2
2016	0.4	0.1	0.1	0.5	0.3	0.9	0.3	0.2	0.6	0.6	0.3
Time (hrs)	45	46	47	48	49	50	51	52	53	54	55
0	0.8	0.6	0.7	0.7	0.8	0.8	0.7	0.7	0.7	0.8	0.9
504	0.7	0.6	0.8	0.7	0.7	0.9	0.6	0.5	0.7	0.9	0.8
1008	0.6	0.5	0.5	0.4	0.5	0.6	0.5	0.4	0.7	0.8	0.7
1512	0.5	0.3	0.4	0.5	0.5	0.5	0.5	0.6	0.4	0.7	0.6
2016	0.2	0.4	0.5	0.2	0.6	0.3	0.5	0.5	0.6	0.5	0.5

Table 17: Receiver Sensitivity of Accelerating Aging Test

Time (hrs)	34	35	36	37	38	39	40	41	42	43	44
0	-11.6	-11.5	-11.6	-12.2	-12.5	-12.3	-12.5	-12	-11.7	-12.1	-11.6
504	-11.5	-11.6	-11.5	-12.1	-12.4	-12.3	-12.6	-12.1	-11.6	-12	-11.6
1008	-11.4	-11.3	-11.4	-12	-12.4	-12.3	-12.4	-11.9	-11.7	-12.2	-11.4
1512	-11.4	-11.2	-11.3	-12.1	-12.2	-12.3	-12.5	-11.9	-11.5	-12	-11.5
2016	-11.1	-11.3	-11.4	-11.9	-12.1	-11.8	-12.2	-11.6	-11.4	-11.6	-11.2
Time (hrs)	45	46	47	48	49	50	51	52	53	54	55
0	-12.5	-12.5	-11.9	-12.3	-12.1	-11.8	-12	-12.1	-11.5	-12	-11.7
504	-12.5	-12.5	-12	-12.3	-12	-11.7	-12	-12.2	-11.4	-11.9	-11.7
1008	-12.5	-12.6	-11.8	-12	-11.9	-11.7	-12	-11.9	-11.5	-11.9	-11.6
1512	-12.3	-12.3	-11.8	-12.3	-12	-11.7	-11.8	-12	-11.3	-11.8	-11.6
2016	-12	-12.4	-11.7	-11.9	-11.6	-11.5	-11.6	-11.9	-11.2	-11.6	-11.5

Table 18: Extinction Ratio of Accelerating Aging Test

Time (hrs)	34	35	36	37	38	39	40	41	42	43	44
0	4.9	5	4.6	5.3	4.7	5	5.4	4.4	5.1	5.2	4.6
504	4.9	5	4.6	5.3	4.5	5.1	5.4	4.2	5.1	5.1	4.5
1008	4.8	4.8	4.5	5.1	4.6	4.8	5.1	4.3	5	5	4.4
1512	4.7	4.7	4.2	5.2	4.4	4.8	5.2	4.2	4.9	5.1	4.4
2016	4.4	4.8	4.4	4.7	4.3	4.6	4.9	4.2	4.6	4.9	4.4
Time (hrs)	45	46	47	48	49	50	51	52	53	54	55
0	5.4	5.2	4.5	4.5	5	4.5	5.4	4.9	5.1	5.3	4.3
504	5.3	5.3	4.4	4.5	4.9	4.3	5.3	4.9	5.1	5.3	4.3
1008	5.3	5	4.3	4.4	5	4.4	5.3	4.7	5	5.1	4.3
1512	5	4.8	4.3	4.3	4.7	4.3	5.2	4.6	4.9	5.2	4.1
2016	4.9	5	4.3	4.2	4.9	4.2	5	4.4	5	5	4.2