

# Transceiver Reliability

## **TEST Report**

Model name : SFP28-25GLR-31-I

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## 1. Introduction

This report presents the reliability test results for 1310nm DFB laser based 25Gb/s SFP28 transceiver.

## 2. Purpose

The purpose of the test is to determine whether the O/E characteristics, mechanical integrity and endurance of 1310nm DFB laser based 25Gb/s SFP28 transceiver module meet the requirement of reliability.

## 3. Sample Description

The sample is 1310nm DFB laser based 25Gb/s SFP28 transceiver. The type is 25G LR-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
Output light Center Wavelength Range	$\lambda_c$	1295	1310	1325	nm
Launch Optical Power	$P_o$	-4.5	-	2	dBm
Extinction Ratio	EX	3.5	-	-	dB
Receiver Sensitivity	S	-	-	-11.4	dBm
Receive Light Center Wavelength Range	$\lambda_c$	1295	-	1325	nm
Operating Temperature Range	$T_c$	-40	-	85	°C
Storage Temperature Range	$T_s$	-45	-	85	°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

Optical/Electrical Performance	
<b>Test Sequence</b>	Group 1
	Group 2
	Group 3

### 4.3 Failure Criterion

Table 3: Failure Criterion

Heading	Test Program	Failure Criteria
Functional Verification	Optical/Electrical Performance	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. $\Delta P > 1.0\text{dB}$
Environmental Endurance	Temperature Cycle	
	Temperature Cycle(Power)	
	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	5016hrs
Low Temperature Storage	GR-468-CORE	-40°C, 72hours	11/0	Passed
High-temperature Storage	GR-468-CORE	85°C, 2000hours	11/0	Passed
Temperature Cycle	GR-468-CORE	-40°C to 85°C, 500 cycles	11/0	Passed
Temperature Cycle(Power)	GR-468-CORE	-40°C to 85°C, 3.3V, 500 cycles	11/0	Passed

Damp Heat	GR-468-CORE	85°C,85%RH, 500 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 fifty-five modules

No.	P <sub>o</sub> (dBm)	Sensitivity (dBm)	No.	P <sub>o</sub> (dBm)	Sensitivity (dBm)	No.	P <sub>o</sub> (dBm)	Sensitivity (dBm)
1	0.6	-17.8	20	0.6	-16.6	39	1.2	-17.1
2	0.1	-17.5	21	0.4	-17.8	40	0.2	-17.6
3	0.4	-16.9	22	-1.2	-18.5	41	0.6	-17.1
4	0.5	-16.5	23	0.2	-16.7	42	-0.5	-17.1
5	0.8	-17.6	24	0.9	-17.5	43	0.3	-17.2
6	0.9	-17.3	25	0.7	-17.2	44	0.7	-17.4
7	1.1	-16.8	26	0.7	-17.3	45	0.4	-17.1
8	0.6	-17.2	27	0.6	-17.5	46	0.5	-17.5
9	0.6	-17.1	28	0.4	-17.5	47	0.7	-17.3
10	0.1	-16.9	29	0.6	-17.2	48	-0.1	-17.5
11	0.6	-17.2	30	0.5	-17.7	49	0.9	-16.8
12	-0.2	-16.6	31	-0.1	-16.7	50	-1.1	-16.9
13	-0.4	-17.9	32	0.7	-17.2	51	-0.1	-17.7
14	-0.4	-18.2	33	0.5	-16.7	52	0.8	-17.3
15	-0.2	-18.5	34	-0.2	-17.3	53	-0.2	-17.2
16	0.2	-18.2	35	1.1	-17.1	54	0.6	-17.4
17	0.5	-17.8	36	0.4	-16.7	55	-0.5	-16.4
18	-0.5	-18.3	37	0.4	-16.3			
19	0.1	-17.9	38	0.7	-16.3			

## 5.2 Physical Dimensions

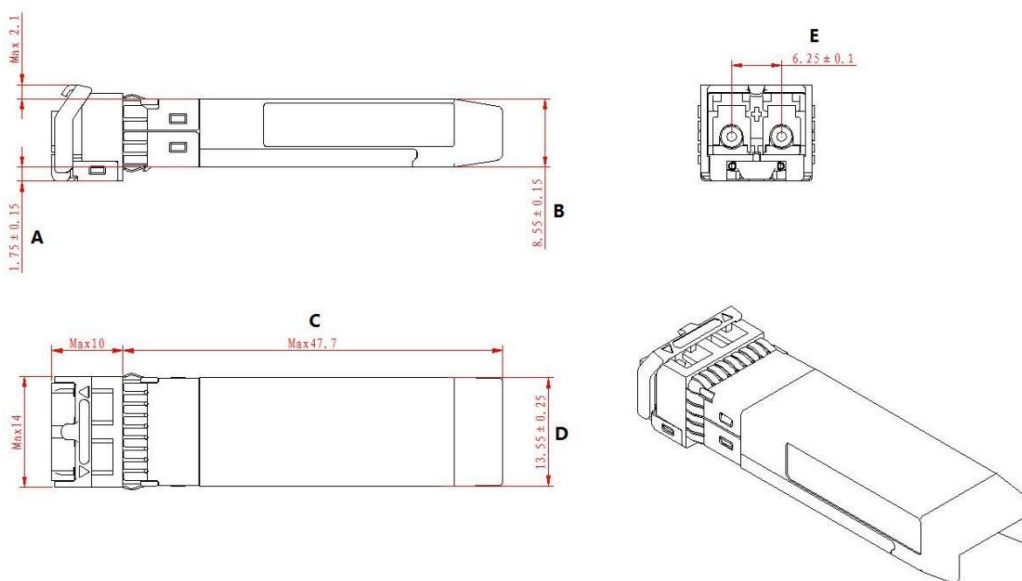


Figure 1: Package outline (unit: mm)

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

Projected Dimension	Designator				
	A	B	C	D	E
	1.75±0.15	8.55±0.15	Max47.7	13.55±0.25	6.25±0.1
1	1.72	8.65	47.64	13.46	6.28
2	1.78	8.50	47.68	13.52	6.20
3	1.84	8.46	47.62	13.70	6.32
4	1.68	8.62	47.65	13.66	6.18
5	1.65	8.54	47.58	13.62	6.24
6	1.74	8.58	47.60	13.74	6.26
7	1.82	8.60	47.64	13.65	6.30
8	1.75	8.48	47.62	13.58	6.21
9	1.70	8.52	47.68	13.44	6.29
10	1.64	8.46	47.66	13.56	6.25
11	1.82	8.49	47.63	13.72	6.27
Statistics					
AVE	1.74	8.54	47.64	13.60	6.25
SD	0.07	0.06	0.03	0.10	0.04
MAX	1.84	8.65	47.68	13.74	6.32
MIN	1.64	8.46	47.58	13.44	6.18



### 5.3 Low Temperature Storage

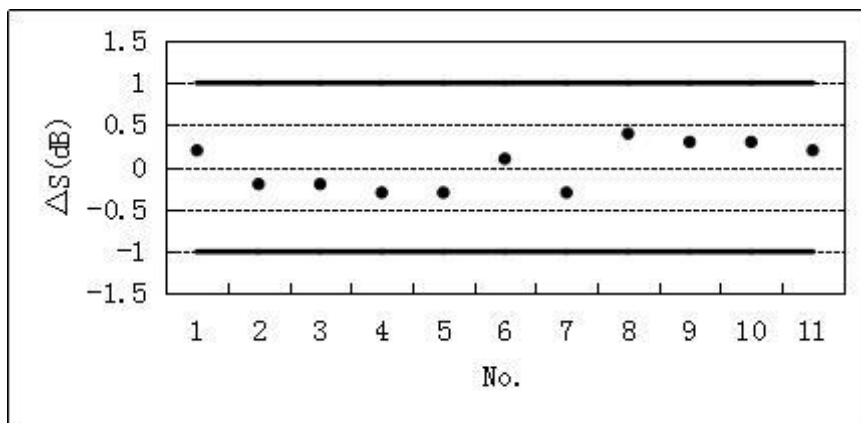


Figure 2: Optical Power Variation in Low Temperature Storage Test

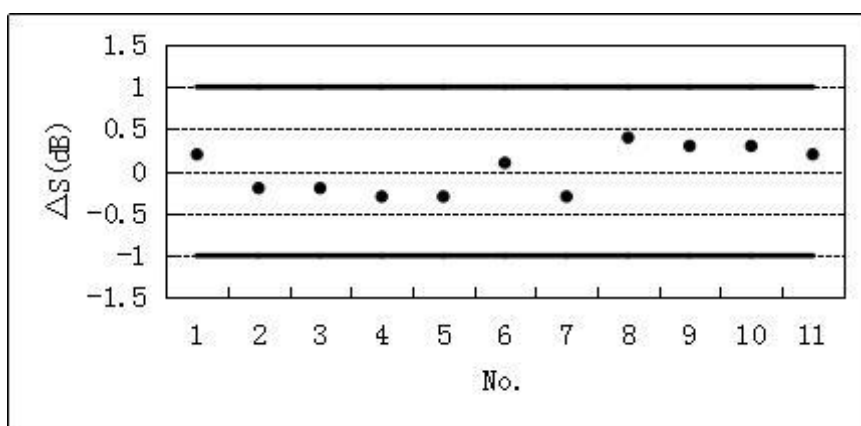


Figure 3: Receiver Sensitivity Variation in Low Temperature Storage Test

Table 7: Data of Low Temperature Storage Test

No.	Before Test		After Test		Before and after test Variation	
	$P_o$ (dBm)	Sensitivity (dBm)	$P_o$ (dBm)	Sensitivity (dBm)	$\Delta P_o$ (dB)	$\Delta S$ (dB)
1	0.6	-17.8	0.3	-17.6	-0.3	0.2
2	0.1	-17.5	0.2	-17.7	0.1	-0.2
3	0.4	-16.9	0.1	-17.1	-0.3	-0.2
4	0.5	-16.5	0.3	-16.8	-0.2	-0.3
5	0.8	-17.6	0.4	-17.9	-0.4	-0.3
6	0.9	-17.3	0.7	-17.2	-0.2	0.1
7	1.1	-16.8	0.9	-17.1	-0.2	-0.3

8	0.6	-17.2	0.8	-16.8	0.2	0.4
9	0.6	-17.1	0.7	-16.8	0.1	0.3
10	0.1	-16.9	0.4	-16.6	0.3	0.3
11	0.6	-17.2	0.5	-17.0	-0.1	0.2
Statistics						
AVE	0.6	-17.2	0.5	-17.1	-0.1	0.0
SD	0.3	0.4	0.2	0.4	0.2	0.3
MAX	1.1	-16.5	0.9	-16.6	0.3	0.4
MIN	0.1	-17.8	0.1	-17.9	-0.4	-0.3

#### 5.4 Temperature Cycle

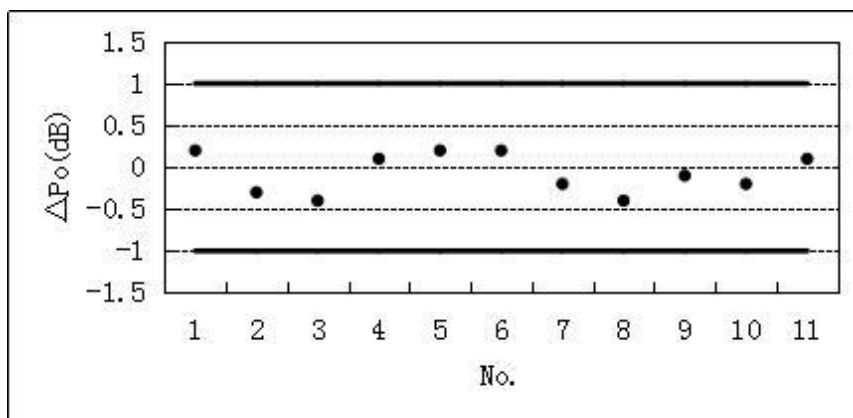


Figure 4: Optical Power Variation in Temperature Cycle Test

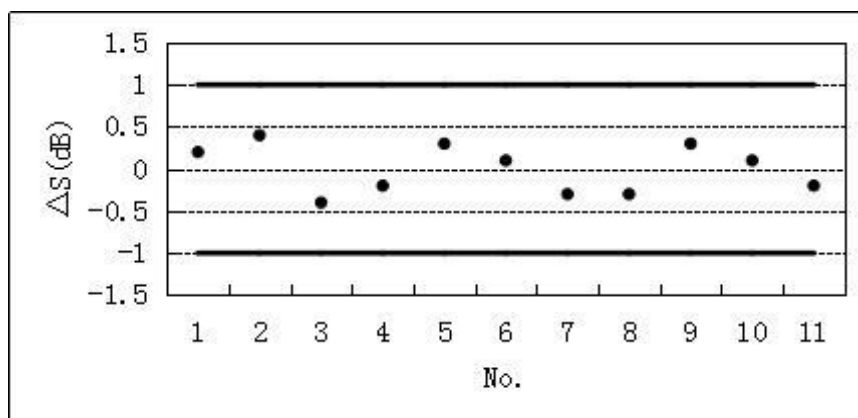


Figure 5: Receive Sensitivity Variation in Temperature Cycle Test

Table 8: Data of Temperature Cycle Test

No.	Before Test		After Test		Before and after test Variation	
	P <sub>o</sub> (dBm)	Sensitivity (dBm)	P <sub>o</sub> (dBm)	Sensitivity (dBm)	ΔP <sub>o</sub> (dB)	ΔS (dB)
1	0.3	-17.6	0.5	-17.4	0.2	0.2
2	0.2	-17.7	-0.1	-17.3	-0.3	0.4
3	0.1	-17.1	-0.3	-17.5	-0.4	-0.4
4	0.3	-16.8	0.4	-17.0	0.1	-0.2
5	0.4	-17.9	0.6	-17.6	0.2	0.3
6	0.7	-17.2	0.9	-17.1	0.2	0.1
7	0.9	-17.1	0.7	-17.4	-0.2	-0.3
8	0.8	-16.8	0.4	-17.1	-0.4	-0.3
9	0.7	-16.8	0.6	-16.5	-0.1	0.3
10	0.4	-16.6	0.2	-16.5	-0.2	0.1
11	0.5	-17.0	0.6	-17.2	0.1	-0.2
Statistics						
AVE	0.5	-17.1	0.4	-17.1	-0.1	0.0
SD	0.2	0.4	0.3	0.3	0.2	0.3
MAX	0.9	-16.6	0.9	-16.5	0.2	0.4
MIN	0.1	-17.9	-0.3	-17.6	-0.4	-0.4

### 5.5 Mechanical Shock /Vibration

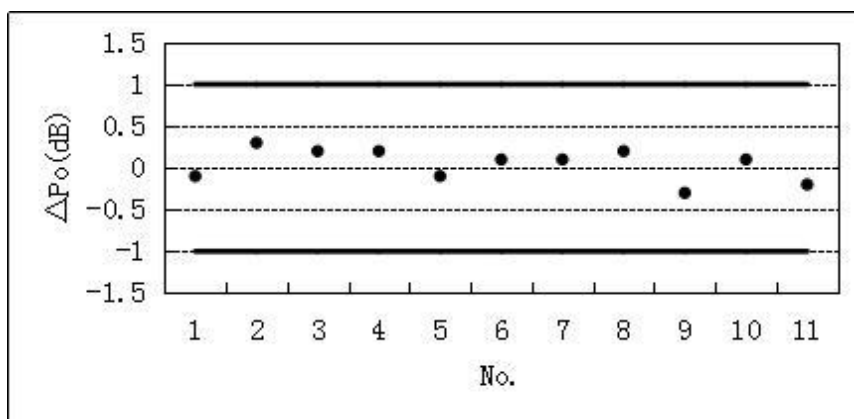


Figure 6: Optical Power Variation in Mechanical Shock /Vibration Test

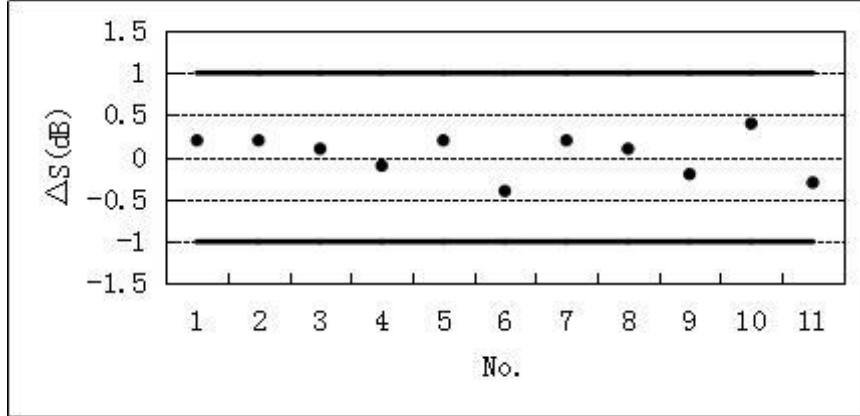


Figure 7: Receiver Sensitivity Variation in Mechanical Shock /Vibration Test

Table 9: Data of Mechanical Shock /Vibration Test

No.	Before Test		After Test		Before and after test Variation	
	P <sub>o</sub> (dBm)	Sensitivity (dBm)	P <sub>o</sub> (dBm)	Sensitivity (dBm)	ΔP <sub>o</sub> (dB)	ΔS (dB)
1	0.5	-17.4	0.4	-17.2	-0.1	0.2
2	-0.1	-17.3	0.2	-17.1	0.3	0.2
3	-0.3	-17.5	-0.1	-17.4	0.2	0.1
4	0.4	-17.0	0.6	-17.1	0.2	-0.1
5	0.6	-17.6	0.5	-17.4	-0.1	0.2
6	0.9	-17.1	1.0	-17.5	0.1	-0.4
7	0.7	-17.4	0.8	-17.2	0.1	0.2
8	0.4	-17.1	0.6	-17.0	0.2	0.1
9	0.6	-16.5	0.3	-16.7	-0.3	-0.2
10	0.2	-16.5	0.3	-16.1	0.1	0.4
11	0.6	-17.2	0.4	-17.5	-0.2	-0.3
Statistics						
AVE	0.4	-17.1	0.5	-17.1	0.0	0.0
SD	0.3	0.3	0.3	0.4	0.2	0.2
MAX	0.9	-16.5	1.0	-16.1	0.3	0.4
MIN	-0.3	-17.6	-0.1	-17.5	-0.3	-0.4

## 5.6 ESD Threshold

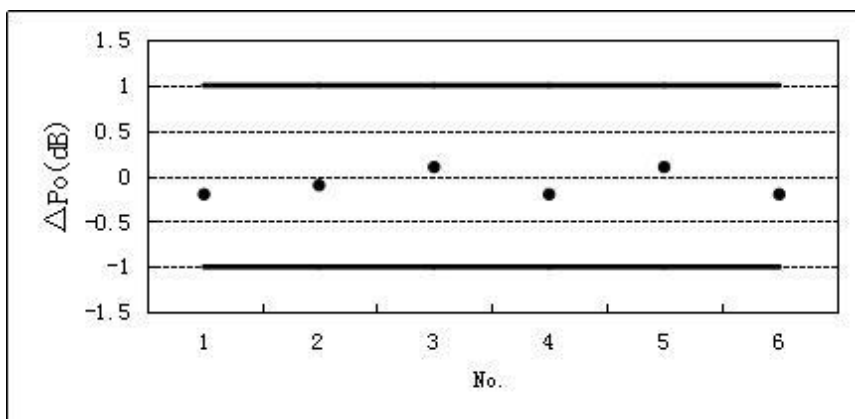


Figure 8: Optical Power Variation in ESD Threshold Test

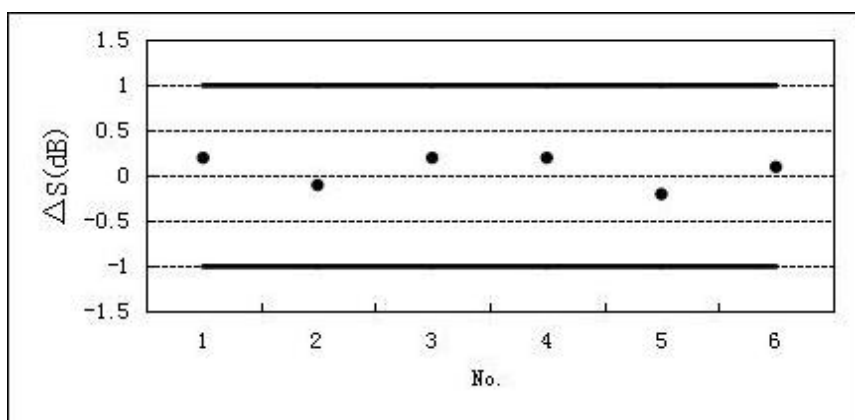


Figure 9: Receiver Sensitivity Variation in ESD Threshold Test

Table 10: Data of Damp Heat Test

No.	Before Test		After Test		Before and after test Variation	
	$P_o$ (dBm)	Sensitivity (dBm)	$P_o$ (dBm)	Sensitivity (dBm)	$\Delta P_o$ (dB)	$\Delta S$ (dB)
1	0.4	-17.2	0.2	-17.0	-0.2	0.2
2	0.2	-17.1	0.1	-17.2	-0.1	-0.1
3	-0.1	-17.4	0	-17.2	0.1	0.2
4	0.6	-17.1	0.4	-16.9	-0.2	0.2
5	0.5	-17.4	0.6	-17.6	0.1	-0.2
6	1.0	-17.5	0.8	-17.4	-0.2	0.1
Statistics						
AVE	0.4	-17.3	0.4	-17.2	-0.1	0.1

SD	0.3	0.2	0.3	0.2	0.1	0.2
MAX	1.0	-17.1	0.8	-16.9	0.1	0.2
MIN	-0.1	-17.5	0.0	-17.6	-0.2	-0.2

Note: Damp Heat reference resources MIL-STD-202 condition 85°C and 85% humidity, 1000 hrs.

### 5.7 ESD Immunity

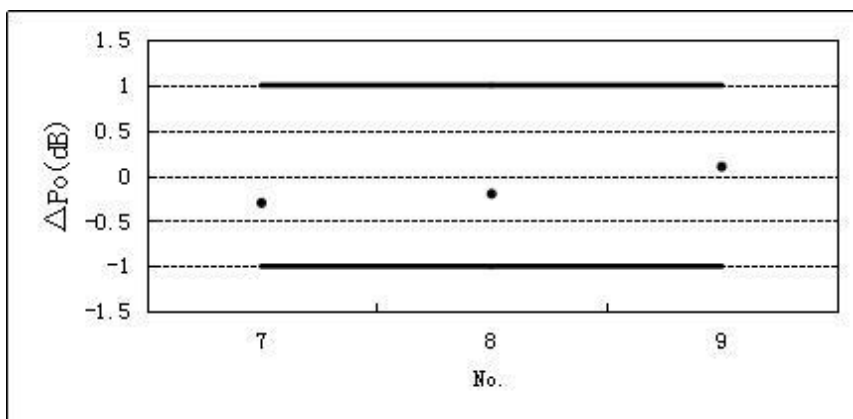


Figure 10: Optical Power Variation in ESD Immunity Test

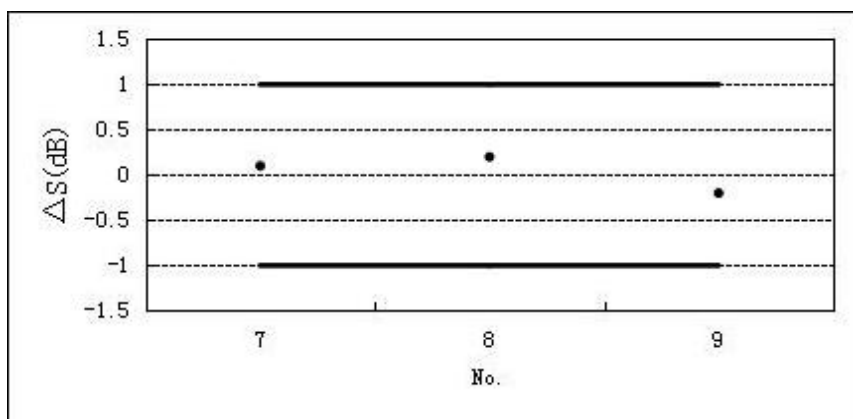


Figure 11: Receiver Sensitivity Variation in ESD Immunity Test

Table 11: Data of ESD Immunity Test (Class 4)

No.	Before Test		After Test		Before and after test Variation	
	P <sub>o</sub> (dBm)	Sensitivity (dBm)	P <sub>o</sub> (dBm)	Sensitivity (dBm)	ΔP <sub>o</sub> (dB)	ΔS (dB)
7	0.8	-17.2	0.5	-17.1	-0.3	0.1
8	0.6	-17.0	0.4	-16.8	-0.2	0.2
9	0.3	-16.7	0.4	-16.9	0.1	-0.2
Statistics						
AVE	0.6	-17.0	0.4	-16.9	-0.1	0.0
SD	0.2	0.2	0.0	0.1	0.2	0.2
MAX	0.8	-16.7	0.5	-16.8	0.1	0.2
MIN	0.3	-17.2	0.4	-17.1	-0.3	-0.2

## 5.8 Visual Inspection

Table 12: 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*

### 5.9 Damp Heat

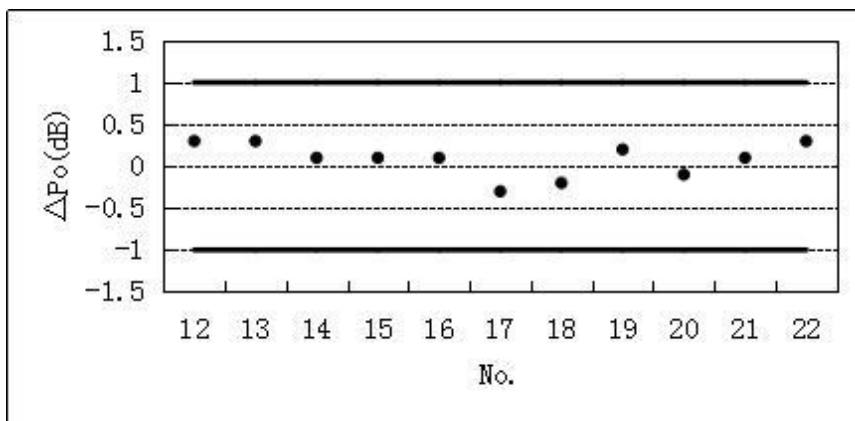


Figure 12: Optical Power variation in Damp Heat Test

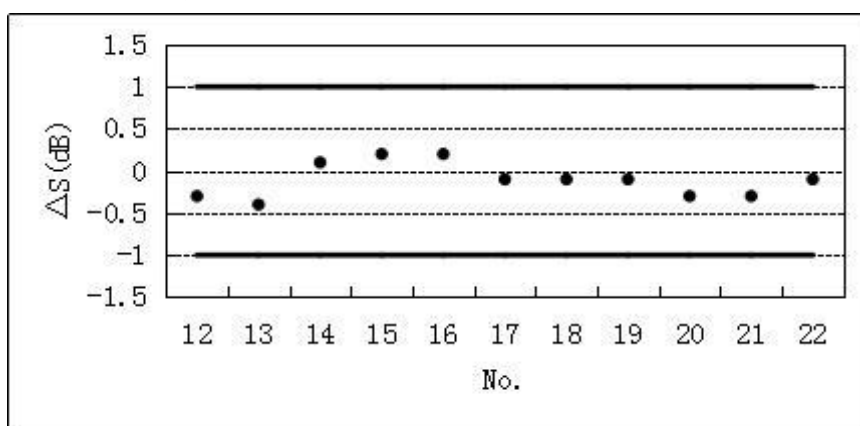


Figure 13: Receiver Sensitivity Variation in Damp Heat Test

Table 13: Data of Damp Heat Test

No.	Before Test		After Test		Before and after test Variation	
	P <sub>o</sub> (dBm)	Sensitivity (dBm)	P <sub>o</sub> (dBm)	Sensitivity (dBm)	ΔP <sub>o</sub> (dB)	ΔS (dB)
12	-0.2	-16.6	0.1	-16.9	0.3	-0.3
13	-0.4	-17.9	-0.1	-18.3	0.3	-0.4
14	-0.4	-18.2	-0.3	-18.1	0.1	0.1
15	-0.2	-18.5	-0.1	-18.3	0.1	0.2
16	0.2	-18.2	0.3	-18.0	0.1	0.2
17	0.5	-17.8	0.2	-17.9	-0.3	-0.1
18	-0.5	-18.3	-0.7	-18.4	-0.2	-0.1
19	0.1	-17.9	0.3	-18.0	0.2	-0.1
20	0.6	-16.6	0.5	-16.9	-0.1	-0.3



21	0.4	-17.8	0.5	-18.1	0.1	-0.3
22	-1.2	-18.5	-0.9	-18.6	0.3	-0.1
Statistics						
AVE	-0.1	-17.8	0.0	-18.0	0.1	-0.1
SD	0.5	0.6	0.4	0.5	0.2	0.2
MAX	0.6	-16.6	0.5	-16.9	0.3	0.2
MIN	-1.2	-18.5	-0.9	-18.6	-0.3	-0.4

### 5.10 Temperature Cycle (Power)

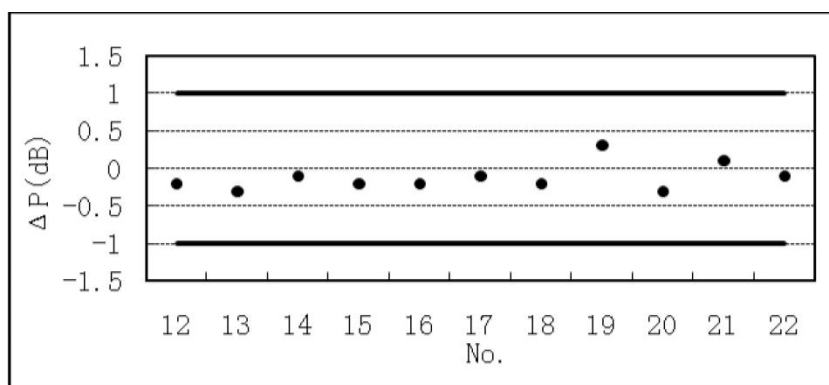


Figure 14: Optical Power Variation in High Temperature Cycle (Power) Test

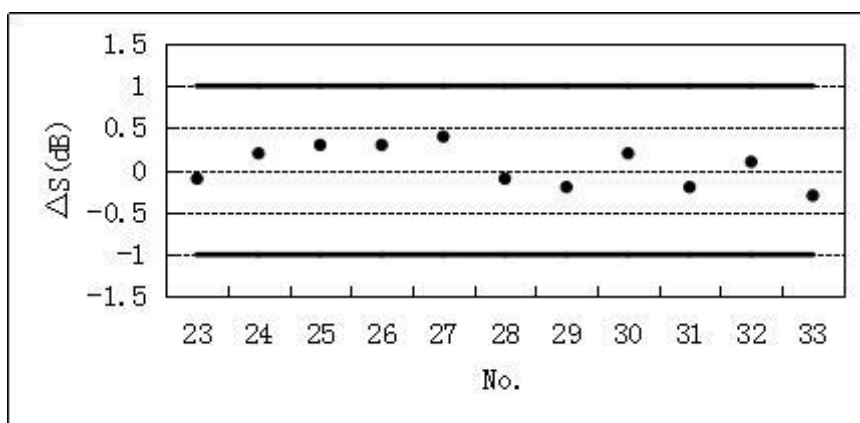


Figure 15: Receiver Sensitivity Variation in Temperature Cycle (Power) Test

Table 14: Data of Temperature Cycle (Power) Test

No.	Before Test		After Test		Before and after test Variation	
	P <sub>o</sub> (dBm)	Sensitivity (dBm)	P <sub>o</sub> (dBm)	Sensitivity (dBm)	ΔP <sub>o</sub> (dB)	ΔS (dB)
23	0.2	-16.7	-0.1	-16.8	-0.3	-0.1
24	0.9	-17.5	0.6	-17.3	-0.3	0.2
25	0.7	-17.2	0.5	-16.9	-0.2	0.3
26	0.7	-17.3	0.6	-17.0	-0.1	0.3
27	0.6	-17.5	0.4	-17.1	-0.2	0.4
28	0.4	-17.5	0.5	-17.6	0.1	-0.1
29	0.6	-17.2	0.4	-17.4	-0.2	-0.2
30	0.5	-17.7	0.6	-17.5	0.1	0.2
31	-0.1	-16.7	-0.2	-16.9	-0.1	-0.2
32	0.7	-17.2	0.3	-17.1	-0.4	0.1
33	0.5	-16.7	0.4	-17.0	-0.1	-0.3
Statistics						
AVE	0.5	-17.2	0.4	-17.1	-0.2	0.1
SD	0.3	0.3	0.3	0.3	0.1	0.2
MAX	0.9	-16.7	0.6	-16.8	0.1	0.4
MIN	-0.1	-17.7	-0.2	-17.6	-0.4	-0.3

### 5.11 Damp Heat(Power)

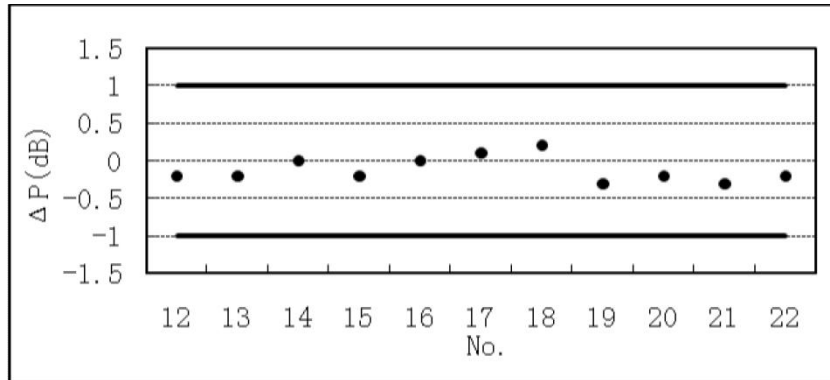


Figure 16: Optical Power variation in Damp Heat (Power) Test

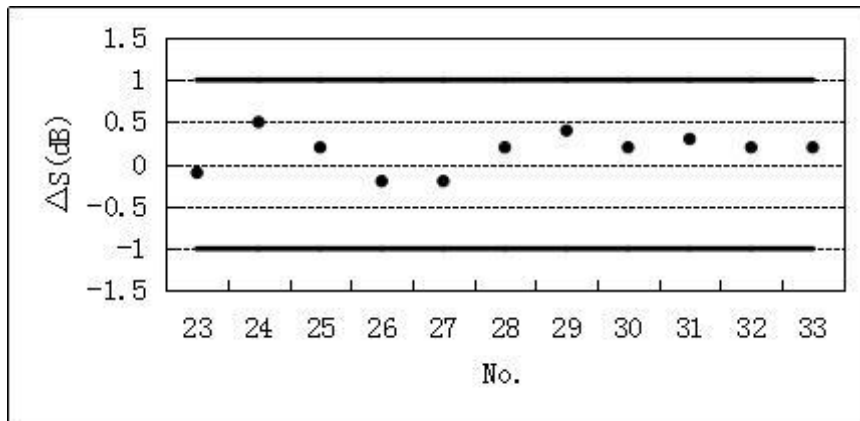


Figure 17: Receiver Sensitivity Variation in Damp Heat (Power) Test

Table 15: Data of Damp Heat (Power) Test

No.	Before Test		After Test		Before and after test Variation	
	P <sub>o</sub> (dBm)	Sensitivity (dBm)	P <sub>o</sub> (dBm)	Sensitivity (dBm)	ΔP <sub>o</sub> (dB)	ΔS (dB)
23	-0.1	-16.8	-0.3	-16.9	-0.2	-0.1
24	0.6	-17.3	0.3	-16.8	-0.3	0.5
25	0.5	-16.9	0.4	-16.7	-0.1	0.2
26	0.6	-17.0	0.4	-17.2	-0.2	-0.2
27	0.4	-17.1	0.5	-17.3	0.1	-0.2
28	0.5	-17.6	0.3	-17.4	-0.2	0.2
29	0.4	-17.4	0.1	-17.0	-0.3	0.4
30	0.6	-17.5	0.4	-17.3	-0.2	0.2
31	-0.2	-16.9	-0.4	-16.6	-0.2	0.3
32	0.3	-17.1	0.1	-16.9	-0.2	0.2
33	0.4	-17.0	0.2	-16.8	-0.2	0.2
Statistics						
AVE	0.4	-17.1	0.2	-17.0	-0.2	0.2
SD	0.3	0.3	0.3	0.3	0.1	0.2
MAX	0.6	-16.8	0.5	-16.6	0.1	0.5
MIN	-0.2	-17.6	-0.4	-17.4	-0.3	-0.2

### 5.12 High Temperature Storage

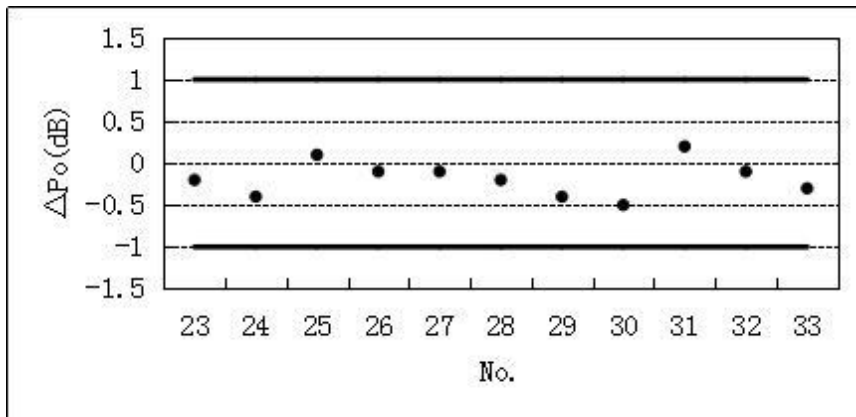


Figure 18: Optical Power Variation in Power Temperature cycling Test(500cycles)

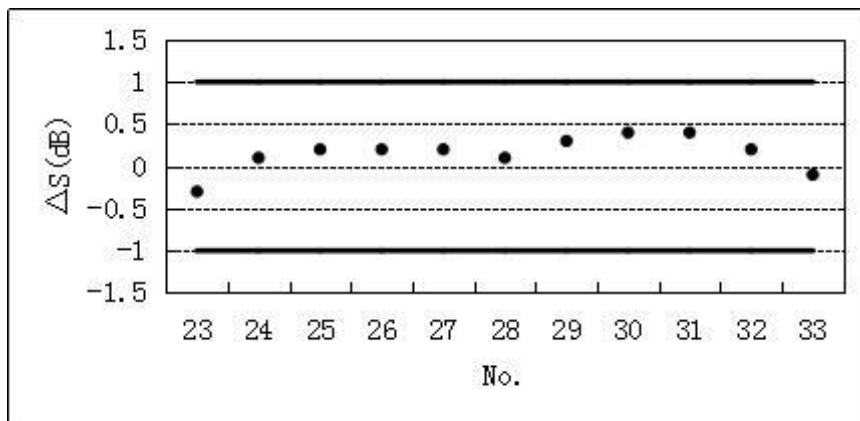


Figure 19: Receiver Sensitivity Variation in High-temperature Storage Test

Table 16: Data of High-temperature Storage Test

No.	Before Test		After Test		Before and after test Variation	
	P <sub>o</sub> (dBm)	Sensitivity (dBm)	P <sub>o</sub> (dBm)	Sensitivity (dBm)	ΔP <sub>o</sub> (dB)	ΔS (dB)
23	-0.3	-16.9	-0.5	-17.2	-0.2	-0.3
24	0.3	-16.8	-0.1	-16.7	-0.4	0.1
25	0.4	-16.7	0.5	-16.5	0.1	0.2
26	0.4	-17.2	0.3	-17.0	-0.1	0.2
27	0.5	-17.3	0.4	-17.1	-0.1	0.2
28	0.3	-17.4	0.1	-17.3	-0.2	0.1
29	0.1	-17.0	-0.3	-16.7	-0.4	0.3
30	0.4	-17.3	-0.1	-16.9	-0.5	0.4
31	-0.4	-16.6	-0.2	-16.2	0.2	0.4
32	0.1	-16.9	0	-16.7	-0.1	0.2
33	0.2	-16.8	-0.1	-16.9	-0.3	-0.1
Statistics						
AVE	0.2	-17.0	0.0	-16.8	-0.2	0.2
SD	0.3	0.3	0.3	0.3	0.2	0.2
MAX	0.5	-16.6	0.5	-16.2	0.2	0.4
MIN	-0.4	-17.4	-0.5	-17.3	-0.5	-0.3

### 5.13 Accelerating Aging

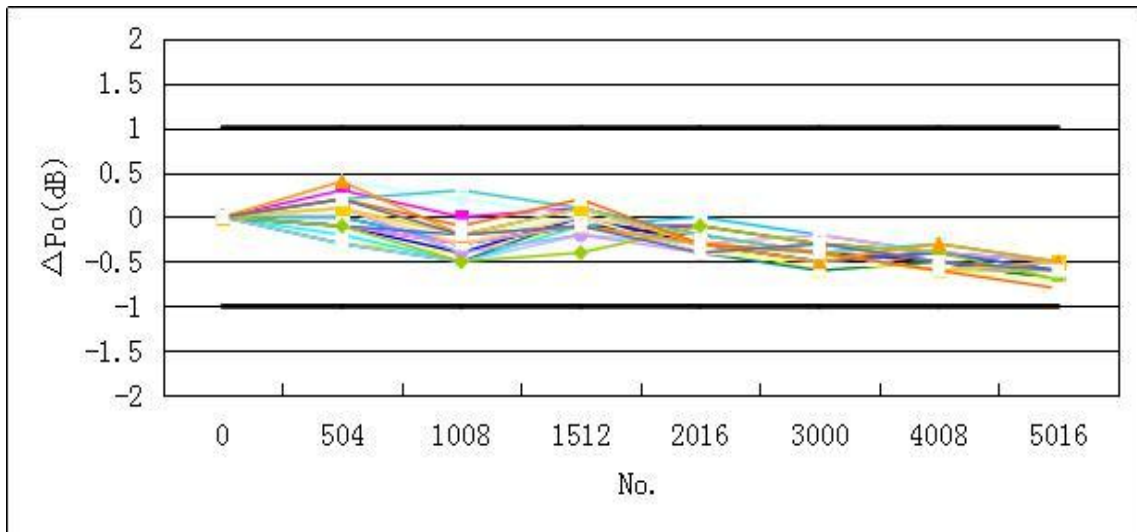


Figure 20: Optical Power Variation in Accelerating Aging Test

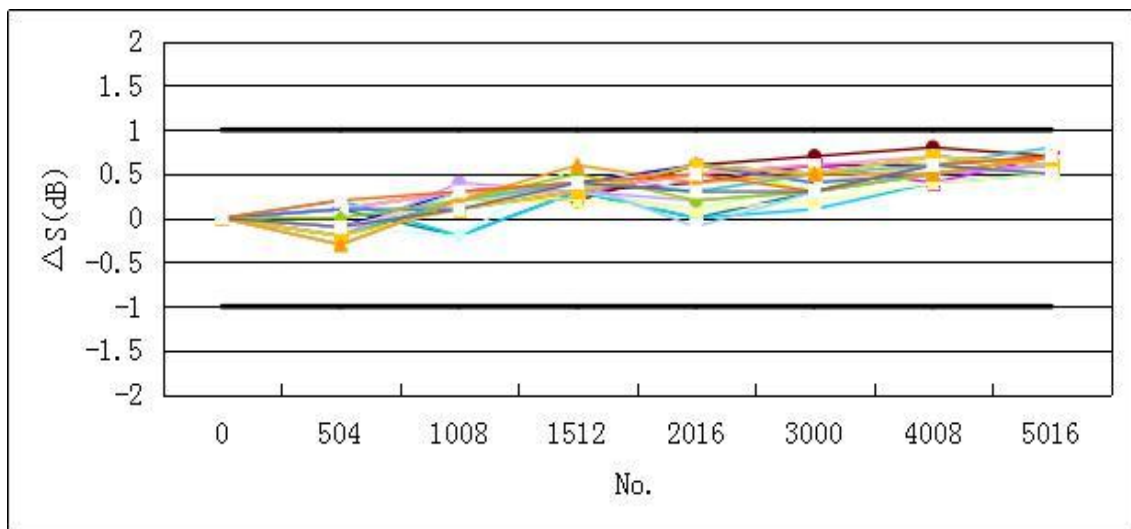


Figure 21: Receiver Sensitivity Variation in Accelerating Aging Test

Table 17: Optical Power of Accelerating Aging Test

Time (hrs)	34	35	36	37	38	39	40	41	42	43	44
0	-0.2	1.1	0.4	0.4	0.7	1.2	0.2	0.6	-0.5	0.3	0.7
504	0.1	0.8	0.2	0.3	0.7	0.9	0.1	0.6	-0.1	0.5	0.8
1008	-0.2	0.7	-0.1	0.1	0.4	0.7	-0.2	0.3	-0.3	0.1	0.4
1512	-0.1	1.0	0.3	0.3	0.6	1.2	0.2	0.5	-0.5	0.3	0.7
2016	-0.4	0.8	0.1	0.3	0.5	0.8	-0.1	0.6	-0.7	0.1	0.3
3000	-0.6	0.5	0	0.1	0.3	0.6	-0.3	0.4	-0.9	-0.1	0.2
4008	-0.8	0.6	-0.2	0	0.2	0.7	-0.2	0.2	-0.8	0	0.1
5016	-0.7	0.4	-0.2	-0.1	0	0.5	-0.4	0.1	-1.0	-0.2	0
Time (hrs)	45	46	47	48	49	50	51	52	53	54	55
0	0.4	0.5	0.7	-0.1	0.9	-1.1	-0.1	0.8	-0.2	0.6	-0.5
504	0.1	0.4	0.8	0	0.8	-0.9	-0.2	0.9	0.2	0.8	-0.3
1008	-0.1	0.2	0.3	-0.4	0.7	-0.8	-0.6	0.6	-0.4	0.5	-0.7
1512	0.2	0.4	0.5	-0.1	1.0	-1.0	-0.5	0.9	-0.3	0.8	-0.6
2016	0.1	0.2	0.3	-0.3	0.6	-1.3	-0.2	0.5	-0.5	0.3	-0.9
3000	0	0.3	0.4	-0.5	0.4	-1.5	-0.4	0.4	-0.7	0.2	-0.8
4008	-0.2	0.1	0.2	-0.7	0.5	-1.4	-0.5	0.2	-0.5	0	-1.0
5016	-0.1	0	0.1	-0.7	0.3	-1.6	-0.8	0.3	-0.7	-0.2	-1.1



Table 18: Receiver Sensitivity of Accelerating Aging Test

Time (hrs)	34	35	36	37	38	39	40	41	42	43	44
0	-17.3	-17.1	-16.7	-16.3	-16.3	-17.1	-17.6	-17.1	-17.1	-17.2	-17.4
504	-17.6	-17.3	-17.0	-16.5	-16.2	-17.0	-17.7	-16.9	-17.2	-17.5	-17.3
1008	-17.1	-16.9	-16.5	-16.1	-16.0	-17.3	-17.3	-17.3	-17.3	-17.0	-17.1
1512	-17.0	-16.9	-16.3	-16.0	-16.1	-16.8	-17.2	-16.8	-16.5	-16.9	-17.2
2016	-16.8	-16.5	-16.4	-15.9	-15.7	-17.1	-17.0	-17.1	-16.8	-17.1	-17.3
3000	-16.7	-16.8	-16.2	-15.7	-15.6	-16.8	-17.1	-17.0	-16.6	-16.8	-17.2
4008	-16.9	-16.4	-16.0	-15.7	-15.5	-16.6	-16.9	-16.7	-16.4	-16.6	-17.0
5016	-16.6	-16.5	-16.1	-15.6	-15.6	-16.5	-17.0	-16.6	-16.5	-16.7	-16.9
Time (hrs)	45	46	47	48	49	50	51	52	53	54	55
0	-17.1	-17.5	-17.3	-17.5	-16.8	-16.9	-17.7	-17.3	-17.2	-17.4	-16.4
504	-17.3	-17.4	-17.5	-17.6	-16.7	-17.1	-17.7	-17.5	-17.5	-17.2	-16.5
1008	-16.8	-17.2	-16.9	-17.3	-16.7	-16.7	-17.5	-17.2	-17.0	-17.1	-16.3
1512	-16.7	-17.2	-17.0	-17.2	-16.5	-16.5	-17.2	-17.0	-16.6	-17.0	-16.0
2016	-17.2	-17.0	-17.1	-16.9	-16.2	-16.6	-17.5	-16.7	-16.8	-16.9	-16.1
3000	-16.8	-16.9	-17.0	-17.1	-16.4	-16.4	-17.4	-16.8	-16.7	-17.1	-16.1
4008	-16.6	-16.8	-16.8	-16.9	-16.3	-16.3	-17.2	-16.6	-16.7	-16.8	-15.8
5016	-16.5	-16.9	-16.7	-17.0	-16.1	-16.1	-17.0	-16.7	-16.5	-16.7	-15.9