Reliability Test Report

1550nm Polarization Maintaining PM1550 Fused Coupler - 2*2, 50/50

[January 25, 2022]

[Reference No.: ORT-08-0070]

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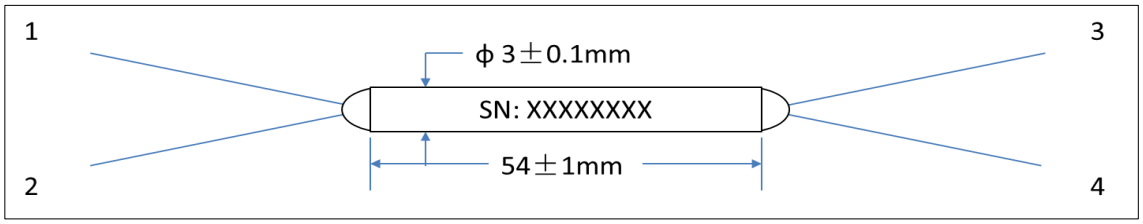
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1.0 Introduction

This report is intended to evaluate the environmental reliability performance of 1550nm Polarization Maintaining PM1550 Fused Coupler - 2*2, 50/50 in Opneti Communications. The conditional qualification test Data and analysis are provided herein.



* 1550nm Polarization Maintaining PM1550 Fused Coupler - 2*2, 50/50

2.0 Reference Documents

Telcordia™ Technologies Specification GR-1221-CORE, ISSUE 2

3.0 Scope

The report covers results on the following tests:

- Impact Test
- Vibration Test
- Fiber Pull
- Thermal shock test
- High temperature storage test (Dry Heat)
- High temperature storage test (Damp Heat)
- Low temperature storage test
- Temperature cycling test

4.0 Test Conditions

No.	Test Titles	Test Conditions
1	Impact test	5 times per direction for 6 directions(on 3 axes) ; 500G ; 1ms
2	Vibration	20G maximum acceleration, 20-2000Hz, 4 min per cycle and 4 cycles per axis
3	Fiber Pull	0.45kg, 1 min
4	Thermal Shock	Temp range: delta T = 100℃(within the operation temp range of device under test), Dwell time at extremes: >/=30minutes, Transfer time: </=2minutes, 20 cycles
5	High Temp(Dry Heat)	Temp: 85℃(±2)℃, Humidity: ＜40%RH, 168,500,1000,2000hrs
6	High Temp(Damp Heat)	Temp: 85℃(±2)℃, Humidity: 85%(±5%)RH, 168,500,1000,2000 hrs
7	Low Temp Storage	Temp: -40℃(±5℃), Humidity: uncontrolled, 168,500,1000,2000 hrs
8	Temp cycling	-40℃ to 85℃(±2℃), 2℃/ min, dwell time at extremes: >/=15minutes, 100, 500 cycles

5.0 Pass/Fail Criteria

Parameters	Max./Min. allowable value
△IL	≤0.5 dB
Insertion Loss	⩽3.4 dB
PER	⩾18 dB
RL	≥50 dB

6.0 Test Result

1550nm Polarization Maintaining PM1550 Fused Coupler - 2*2, 50/50 Reliability Test Results.

Test Item	Date Completed	Sample Qty	Number of Failures	Test Passed
Mechanical Shock(Impact Test)	9-01-2022	11EA	0EA	Pass
Vibration	11-01-2022	11EA	0EA	Pass
Thermal Shock	3-01-2022	11EA	0EA	Pass
High Temp Storage(Dry)	15-01-2022	11EA	0EA	Pass
High Temp Storage(Damp)	15-01-2022	11EA	0EA	Pass
Low Temp Storage	15-01-2022	11EA	0EA	Pass
Temp Cycling	12-01-2022	11EA	0EA	Pass

7.0 Original Data

Table 1 Impact Test

Sample	Phase	IL@1550nm				PER@1550				RL1	RL2	RL3	RL4	Pass or Fail
		1->3	1->4	2->3	2->4	1->3	1->4	2->3	2->4					
1	△	0.01	0.02	0.02	0.01	0	0	0	1	2	2	0	1	Pass
	After	3.4	3.2	3.32	3.15	23	24	21	22	56	58	59	60	
	Before	3.39	3.22	3.3	3.16	23	24	21	21	54	56	59	59	
2	△	0.04	0.02	0.04	0.04	1	0	1	0	1	2	0	2	Pass
	After	3.34	3.31	3.28	3.22	22	28	21	23	56	55	56	59	
	Before	3.3	3.33	3.24	3.26	21	28	20	23	57	53	56	57	
3	△	0.03	0.01	0.04	0.01	1	1	1	0	1	0	2	1	Pass
	After	3.26	3.21	3.36	3.35	26	25	19	22	55	56	54	59	
	Before	3.23	3.2	3.32	3.36	27	24	20	22	54	56	56	58	
4	△	0.02	0.02	0.02	0.01	1	1	1	1	1	1	1	2	Pass
	After	3.32	3.32	3.09	3.23	27	20	25	25	55	60	52	57	
	Before	3.34	3.34	3.11	3.24	26	21	24	26	56	59	53	55	
5	△	0.04	0.00	0.03	0.04	1	1	0	1	2	1	2	0	Pass
	After	3.4	3.38	3.34	3.18	19	18	22	25	55	53	58	59	
	Before	3.36	3.38	3.37	3.22	20	19	22	24	57	54	56	59	
6	△	0.03	0.04	0.02	0.02	1	1	0	0	0	0	1	2	Pass
	After	3.42	3.34	3.32	3.23	21	26	19	25	57	57	54	57	
	Before	3.39	3.3	3.34	3.25	22	25	19	25	57	57	53	59	

7	△	0.03	0.04	0.03	0.00	1	0	0	1	2	2	1	1	Pass
	After	3.22	3.43	3.14	3.28	25	21	22	24	60	58	53	56	
	Before	3.19	3.39	3.11	3.28	24	21	22	25	58	56	54	55	
8	△	0.01	0.02	0.03	0.02	1	1	1	1	1	1	1	0	Pass
	After	3.28	3.09	3.12	3.31	26	25	19	19	57	56	59	59	
	Before	3.29	3.11	3.15	3.33	25	26	20	20	58	57	58	59	
9	△	0.01	0.04	0.04	0.04	0	0	1	1	0	1	1	1	Pass
	After	3.33	3.34	3.31	3.16	19	28	25	26	57	57	60	59	
	Before	3.34	3.38	3.27	3.12	19	28	26	27	57	58	59	58	
10	△	0.04	0.04	0.01	0.01	1	1	0	0	1	1	1	2	Pass
	After	3.26	3.19	3.26	3.38	24	19	27	21	55	52	53	51	
	Before	3.22	3.15	3.25	3.37	25	20	27	21	54	53	54	53	
11	△	0.02	0.04	0.01	0.04	0	0	0	1	1	2	2	2	Pass
	After	3.31	3.26	3.1	3.35	22	28	25	25	58	52	52	61	
	Before	3.29	3.3	3.11	3.31	22	28	25	26	59	54	54	59	

Table 2 Vibration Test

Sample	Phase	IL@1550nm				PER@1550				RL1	RL2	RL3	RL4	Pass or Fail
		1->3	1->4	2->3	2->4	1->3	1->4	2->3	2->4					
1	△	0.01	0.03	0.03	0.03	1	1	1	1	1	2	0	1	Pass
	After	3.14	3.34	3.22	3.12	21	20	29	21	59	51	54	60	
	Before	3.15	3.31	3.19	3.15	22	21	28	20	58	53	54	59	
2	△	0.04	0.03	0.04	0.03	1	1	0	0	2	1	0	0	Pass
	After	3.23	3.39	3.22	3.25	28	21	22	28	51	58	59	55	
	Before	3.27	3.36	3.18	3.28	27	22	22	28	53	57	59	55	
3	△	0.03	0.04	0.01	0.02	1	1	1	1	1	0	2	1	Pass
	After	3.15	3.31	3.37	3.31	29	21	19	27	58	59	61	52	
	Before	3.18	3.35	3.38	3.33	28	20	20	28	57	59	59	53	
4	△	0.00	0.04	0.03	0.02	1	1	0	1	1	2	1	0	Pass
	After	3.12	3.21	3.31	3.15	24	20	20	24	59	55	58	54	
	Before	3.12	3.17	3.28	3.17	25	19	20	23	58	53	59	54	
5	△	0.01	0.04	0.01	0.04	1	1	0	1	1	0	2	2	Pass
	After	3.18	3.1	3.26	3.17	29	25	19	25	59	53	61	61	
	Before	3.17	3.14	3.25	3.13	28	26	19	24	58	53	59	59	
6	△	0.00	0.04	0.00	0.01	1	1	1	0	0	1	2	2	Pass
	After	3.3	3.35	3.2	3.25	19	27	19	21	54	54	55	60	
	Before	3.3	3.31	3.2	3.26	20	28	20	21	54	55	53	58	
7	△	0.00	0.00	0.04	0.04	1	0	1	1	0	1	2	0	Pass
	After	3.37	3.14	3.18	3.27	24	24	24	22	54	53	51	56	
	Before	3.37	3.14	3.22	3.23	25	24	23	23	54	54	53	56	
8	△	0.03	0.00	0.01	0.01	1	1	1	0	2	1	1	2	Pass
	After	3.14	3.1	3.33	3.32	26	23	25	28	55	60	58	55	
	Before	3.11	3.1	3.34	3.31	27	24	26	28	53	59	57	53	
9	△	0.00	0.03	0.02	0.01	1	0	0	1	2	1	1	2	Pass
	After	3.21	3.28	3.13	3.13	20	24	20	22	56	57	58	59	

	Before	3.21	3.31	3.15	3.12	19	24	20	23	54	56	59	57	
10	△	0.02	0.03	0.03	0.02	0	0	1	1	1	2	2	1	Pass
	After	3.33	3.29	3.18	3.24	25	25	27	24	57	59	52	53	
	Before	3.31	3.26	3.21	3.26	25	25	28	23	58	57	54	54	
11	△	0.02	0.02	0.00	0.02	0	0	0	1	1	1	2	2	Pass
	After	3.19	3.22	3.27	3.34	25	19	20	20	58	60	58	57	
	Before	3.21	3.2	3.27	3.32	25	19	20	19	59	59	56	59	

Table 3 Fiber Pull

Sample	Phase	IL@1550nm				PER@1550				RL1	RL2	RL3	RL4	Pass or Fail
		1->3	1->4	2->3	2->4	1->3	1->4	2->3	2->4					
1	△	0.02	0.02	0.01	0.00	0	1	1	1	2	1	2	1	Pass
	After	3.22	3.21	3.23	3.32	24	20	28	23	52	60	54	54	
	Before	3.24	3.19	3.22	3.32	24	21	27	22	54	59	56	53	
2	△	0.00	0.04	0.04	0.03	0	1	1	1	1	0	1	1	Pass
	After	3.36	3.16	3.26	3.14	28	26	23	21	59	56	59	58	
	Before	3.36	3.12	3.3	3.11	28	25	24	20	58	56	58	57	
3	△	0.04	0.04	0.03	0.02	0	1	1	1	1	2	1	0	Pass
	After	3.08	3.3	3.24	3.35	25	23	27	23	56	61	55	57	
	Before	3.12	3.26	3.21	3.37	25	22	26	24	55	59	54	57	
4	△	0.03	0.04	0.02	0.00	1	1	0	1	1	1	2	1	Pass
	After	3.41	3.25	3.31	3.3	19	20	21	18	58	57	55	52	
	Before	3.38	3.21	3.33	3.3	20	21	21	19	57	58	53	53	
5	△	0.04	0.02	0.02	0.01	0	0	0	0	0	2	1	0	Pass
	After	3.3	3.16	3.33	3.11	21	22	24	25	54	55	57	56	
	Before	3.34	3.14	3.31	3.12	21	22	24	25	54	57	58	56	
6	△	0.01	0.03	0.01	0.02	1	1	1	0	1	2	1	1	Pass
	After	3.38	3.2	3.17	3.25	22	21	22	25	53	55	52	57	
	Before	3.39	3.23	3.18	3.27	21	20	23	25	54	57	53	58	
7	△	0.00	0.02	0.01	0.01	1	1	1	0	0	1	2	2	Pass
	After	3.32	3.21	3.21	3.24	26	20	29	23	59	57	55	55	
	Before	3.32	3.23	3.22	3.23	27	19	28	23	59	58	57	57	
8	△	0.02	0.03	0.02	0.02	1	1	1	1	1	1	2	1	Pass
	After	3.4	3.13	3.33	3.2	24	29	23	18	57	58	55	53	
	Before	3.38	3.16	3.31	3.22	25	28	22	19	56	57	57	54	
9	△	0.01	0.00	0.02	0.04	1	0	1	1	2	1	2	2	Pass
	After	3.12	3.11	3.36	3.13	24	28	24	21	51	57	52	61	
	Before	3.13	3.11	3.34	3.17	23	28	25	22	53	58	54	59	
10	△	0.02	0.02	0.04	0.02	0	1	0	0	1	0	2	1	Pass
	After	3.15	3.27	3.35	3.36	23	25	25	22	58	59	51	60	
	Before	3.13	3.25	3.39	3.34	23	24	25	22	57	59	53	59	
11	△	0.01	0.02	0.04	0.03	0	1	1	1	1	2	2	0	Pass
	After	3.34	3.13	3.23	3.29	21	24	21	27	58	59	59	56	
	Before	3.35	3.15	3.27	3.32	21	23	22	26	59	57	57	56	

Table 4 Thermal Shock Test

Sample	Phase	IL@1550nm				PER@1550				RL1	RL2	RL3	RL4	Pass or Fail
		1->3	1->4	2->3	2->4	1->3	1->4	2->3	2->4					
1	△	0.01	0.03	0.02	0.03	1	0	1	1	1	2	1	1	Pass
	After	3.4	3.22	3.33	3.31	21	27	22	21	56	56	58	58	
	Before	3.39	3.19	3.35	3.28	22	27	21	22	55	58	57	57	
2	△	0.03	0.04	0.01	0.01	1	1	1	1	1	1	2	0	Pass
	After	3.37	3.15	3.28	3.31	27	26	18	20	56	58	53	53	
	Before	3.34	3.19	3.27	3.32	26	25	19	19	57	57	55	53	
3	△	0.00	0.04	0.04	0.02	1	1	1	1	2	1	1	1	Pass
	After	3.13	3.22	3.23	3.13	19	27	20	23	56	55	56	54	
	Before	3.13	3.26	3.27	3.11	20	26	19	24	58	54	55	53	
4	△	0.02	0.02	0.03	0.01	1	0	1	0	2	2	2	1	Pass
	After	3.32	3.27	3.28	3.21	22	25	27	24	55	51	60	56	
	Before	3.3	3.29	3.25	3.2	23	25	26	24	53	53	58	55	
5	△	0.03	0.03	0.01	0.02	1	1	1	0	1	2	1	1	Pass
	After	3.35	3.14	3.32	3.15	19	23	22	24	58	58	54	54	
	Before	3.32	3.11	3.31	3.17	20	22	23	24	59	56	53	53	
6	△	0.04	0.01	0.01	0.00	1	1	0	0	1	2	1	2	Pass
	After	3.26	3.3	3.25	3.18	22	23	25	20	55	57	54	54	
	Before	3.3	3.31	3.24	3.18	21	22	25	20	56	59	55	56	
7	△	0.04	0.04	0.04	0.04	1	1	1	1	2	1	1	2	Pass
	After	3.19	3.21	3.15	3.27	21	24	25	22	53	54	57	60	
	Before	3.23	3.25	3.11	3.23	20	25	24	23	55	53	56	58	
8	△	0.03	0.01	0.00	0.02	1	0	0	1	0	2	1	2	Pass
	After	3.38	3.28	3.39	3.38	26	22	27	21	57	56	59	56	
	Before	3.35	3.27	3.39	3.36	27	22	27	22	57	58	58	54	
9	△	0.03	0.02	0.03	0.03	1	1	1	1	2	2	1	1	Pass
	After	3.26	3.22	3.24	3.22	20	21	23	24	54	54	54	57	
	Before	3.23	3.2	3.21	3.19	21	22	22	23	56	56	55	56	
10	△	0.03	0.03	0.02	0.04	0	1	1	0	0	1	2	2	Pass
	After	3.16	3.23	3.34	3.28	28	19	20	23	54	54	52	56	
	Before	3.13	3.2	3.36	3.24	28	20	21	23	54	53	54	54	
11	△	0.01	0.04	0.04	0.03	1	1	1	0	1	2	0	2	Pass
	After	3.34	3.14	3.33	3.14	25	27	21	25	54	55	57	59	
	Before	3.35	3.18	3.37	3.17	26	28	20	25	55	57	57	57	

Table 5 High Temperature Storage (Dry Heat) Test

Sample	Phase	IL@1550nm				PER@1550				RL1	RL2	RL3	RL4	Pass or Fail
		1->3	1->4	2->3	2->4	1->3	1->4	2->3	2->4					
	2000△	0.06	0.07	0.08	0.07	2	1	2	1	4	4	2	3	
	1000△	0.06	0.06	0.06	0.06	2	1	1	1	4	4	2	3	
	500△	0.04	0.04	0.06	0.06	2	1	0	0	4	2	2	2	
	168△	0.03	0.04	0.04	0.02	1	1	0	0	2	2	2	2	

1	2000	3.25	3.27	3.34	3.14	28	24	18	25	53	55	59	55	Pass
	1000	3.19	3.26	3.40	3.10	29	24	20	25	57	51	59	58	
	500	3.21	3.21	3.36	3.07	29	23	19	24	53	53	57	57	
	168	3.25	3.20	3.42	3.13	27	24	19	24	57	55	57	55	
	Before	3.22	3.24	3.38	3.11	28	23	19	24	55	53	59	57	
2	2000△	0.07	0.02	0.06	0.04	2	2	1	1	4	2	2	3	Pass
	1000△	0.07	0.02	0.05	0.04	2	2	1	0	4	2	2	3	
	500△	0.06	0.01	0.05	0.04	2	2	0	0	3	2	2	3	
	168△	0.03	0.01	0.01	0.03	1	1	0	0	1	2	1	2	
	2000	3.35	3.09	3.29	3.13	27	26	19	21	53	54	59	52	
	1000	3.30	3.09	3.34	3.12	27	25	20	22	57	54	57	53	
	500	3.37	3.10	3.35	3.12	27	24	19	22	53	53	59	52	
	168	3.31	3.10	3.30	3.13	25	26	19	22	56	55	58	55	
	Before	3.34	3.11	3.31	3.16	26	25	19	22	55	53	57	53	
3	2000△	0.08	0.07	0.07	0.06	2	2	1	2	4	3	3	4	Pass
	1000△	0.08	0.07	0.04	0.04	1	2	1	2	4	1	3	4	
	500△	0.06	0.07	0.04	0.03	1	2	0	2	4	1	1	2	
	168△	0.04	0.04	0.01	0.02	1	1	0	1	2	1	0	2	
	2000	3.10	3.15	3.19	3.27	22	25	27	24	60	56	54	57	
	1000	3.08	3.13	3.14	3.21	21	24	26	23	57	58	55	60	
	500	3.10	3.18	3.12	3.22	21	24	27	22	61	59	52	57	
	168	3.16	3.11	3.15	3.23	20	26	27	24	57	59	53	56	
	Before	3.12	3.15	3.16	3.25	21	25	27	23	59	58	53	58	
4	2000△	0.02	0.04	0.05	0.08	2	1	2	2	3	4	2	4	Pass
	1000△	0.02	0.03	0.05	0.06	2	1	1	2	3	2	2	4	
	500△	0.02	0.03	0.05	0.05	2	1	1	1	3	1	2	2	
	168△	0.02	0.03	0.02	0.03	1	1	1	1	1	1	0	2	
	2000	3.17	3.11	3.19	3.21	23	20	26	20	58	57	55	55	
	1000	3.17	3.13	3.23	3.13	23	19	25	20	56	53	54	56	
	500	3.17	3.12	3.23	3.19	21	19	25	18	59	55	54	52	
	168	3.19	3.12	3.18	3.14	23	20	24	18	56	54	56	52	
	Before	3.17	3.15	3.20	3.17	22	19	25	19	57	55	56	54	
5	2000△	0.04	0.05	0.06	0.04	2	2	1	2	3	3	3	3	Pass
	1000△	0.04	0.04	0.06	0.04	1	2	1	2	3	3	2	2	
	500△	0.04	0.03	0.05	0.04	1	2	1	2	2	2	2	1	
	168△	0.02	0.01	0.03	0.03	1	1	1	1	2	1	1	0	
	2000	3.36	3.33	3.13	3.23	24	25	21	24	57	56	59	55	
	1000	3.38	3.32	3.08	3.25	26	24	20	24	56	59	56	54	
	500	3.38	3.28	3.09	3.26	25	24	20	24	59	58	56	52	
	168	3.34	3.31	3.14	3.25	26	26	21	22	59	56	58	53	
	Before	3.36	3.30	3.11	3.22	25	25	20	23	57	57	57	53	
6	2000△	0.07	0.05	0.05	0.05	2	2	0	2	2	4	2	1	Pass
	1000△	0.03	0.05	0.02	0.03	1	2	0	2	2	4	1	1	
	500△	0.03	0.02	0.02	0.03	1	2	0	2	1	2	1	1	
	168△	0.03	0.02	0.01	0.02	1	1	0	1	0	2	0	1	
	2000	3.17	3.33	3.31	3.36	20	20	26	23	54	59	53	58	

	1000	3.12	3.36	3.34	3.39	22	19	26	21	56	56	55	57	
	500	3.12	3.32	3.36	3.41	22	18	26	23	55	60	55	58	
	168	3.10	3.31	3.34	3.40	22	20	26	21	54	60	54	58	
	Before	3.13	3.33	3.35	3.38	21	19	26	22	54	58	54	57	
7	2000△	0.08	0.08	0.06	0.08	1	2	1	2	1	4	4	2	Pass
	1000△	0.04	0.08	0.06	0.08	1	2	1	2	1	4	2	1	
	500△	0.04	0.04	0.05	0.04	1	1	1	2	1	4	1	1	
	168△	0.00	0.04	0.02	0.00	1	1	0	1	1	2	0	1	
	2000	3.20	3.12	3.21	3.34	21	20	26	27	54	55	58	56	
	1000	3.28	3.11	3.19	3.40	21	21	27	29	55	51	54	58	
	500	3.28	3.16	3.20	3.32	21	19	26	29	54	55	55	58	
	168	3.24	3.19	3.25	3.36	21	19	27	27	54	51	56	57	
	Before	3.24	3.15	3.23	3.36	20	20	27	28	55	53	56	58	
8	2000△	0.05	0.04	0.04	0.04	1	1	1	2	3	3	3	2	Pass
	1000△	0.05	0.04	0.04	0.02	1	1	1	1	3	3	3	2	
	500△	0.05	0.04	0.03	0.02	1	0	1	1	1	2	2	1	
	168△	0.02	0.00	0.03	0.01	1	0	1	1	0	1	2	1	
	2000	3.21	3.08	3.19	3.22	28	19	24	24	53	55	58	52	
	1000	3.20	3.10	3.22	3.20	27	18	24	26	56	55	58	54	
	500	3.25	3.08	3.19	3.20	27	19	24	26	53	58	61	52	
	168	3.20	3.12	3.18	3.18	27	19	25	26	54	57	61	52	
	Before	3.22	3.12	3.21	3.19	28	19	24	25	54	56	59	53	
9	2000△	0.04	0.02	0.05	0.06	1	2	2	1	2	4	3	2	Pass
	1000△	0.02	0.02	0.02	0.06	1	1	2	1	2	3	1	2	
	500△	0.01	0.00	0.02	0.06	1	1	1	1	2	3	0	2	
	168△	0.00	0.00	0.02	0.03	0	1	0	1	2	2	0	2	
	2000	3.31	3.27	3.28	3.27	19	24	22	24	54	60	57	56	
	1000	3.27	3.27	3.23	3.28	19	26	24	24	56	56	60	58	
	500	3.29	3.25	3.23	3.33	19	26	22	24	55	59	59	56	
	168	3.28	3.25	3.23	3.27	20	26	23	24	56	56	59	58	
	Before	3.28	3.25	3.25	3.30	20	25	23	23	54	58	59	56	
10	2000△	0.06	0.04	0.07	0.04	1	2	2	2	4	2	4	2	Pass
	1000△	0.06	0.04	0.04	0.04	1	2	2	2	4	2	4	2	
	500△	0.03	0.03	0.03	0.04	1	1	1	1	4	1	3	1	
	168△	0.02	0.03	0.03	0.04	1	0	1	0	2	1	1	0	
	2000	3.38	3.16	3.25	3.20	27	23	18	26	59	59	52	58	
	1000	3.35	3.19	3.32	3.19	28	23	18	24	56	58	52	58	
	500	3.38	3.15	3.31	3.20	27	21	19	26	55	59	56	56	
	168	3.41	3.15	3.31	3.18	27	22	20	25	59	60	53	57	
	Before	3.39	3.18	3.28	3.22	28	22	19	25	57	59	54	57	
11	2000△	0.05	0.07	0.04	0.04	2	2	2	2	3	4	4	2	Pass
	1000△	0.02	0.06	0.04	0.04	1	2	2	1	3	2	4	2	
	500△	0.01	0.04	0.04	0.04	1	2	2	1	1	2	4	1	
	168△	0.01	0.04	0.02	0.02	1	1	1	1	1	2	2	1	
	2000	3.33	3.20	3.16	3.15	19	23	27	21	54	53	57	58	
	1000	3.38	3.21	3.16	3.14	20	25	28	19	54	55	57	58	

	500	3.37	3.25	3.18	3.15	20	25	28	19	57	57	59	59	
	168	3.37	3.27	3.16	3.11	21	23	26	19	57	57	55	60	
	Before	3.36	3.23	3.14	3.13	20	24	27	20	56	55	57	59	

Table 6 High Temperature Storage (Damp Heat) Test

Sample	Phase	IL@1550nm				PER@1550				RL1	RL2	RL3	RL4	Pass or Fail
		1->3	1->4	2->3	2->4	1->3	1->4	2->3	2->4					
1	2000△	0.05	0.04	0.04	0.07	1	1	2	2	2	2	2	3	Pass
	1000△	0.02	0.04	0.04	0.07	1	1	2	1	2	2	2	2	
	500△	0.02	0.04	0.04	0.03	0	1	2	1	2	2	2	2	
	168△	0.01	0.02	0.04	0.03	0	1	1	1	1	1	2	1	
	2000	3.42	3.19	3.34	3.39	28	19	19	26	59	55	56	51	
	1000	3.37	3.19	3.35	3.33	27	19	21	25	60	54	58	54	
	500	3.39	3.22	3.38	3.40	28	18	19	24	60	55	58	52	
	168	3.37	3.18	3.34	3.40	28	18	21	24	59	53	58	54	
	Before	3.38	3.20	3.38	3.37	28	19	20	25	58	54	56	53	
2	2000△	0.02	0.04	0.07	0.07	1	1	1	2	2	2	3	3	Pass
	1000△	0.02	0.01	0.06	0.07	1	1	1	1	1	2	3	3	
	500△	0.01	0.01	0.05	0.07	0	1	1	1	1	1	2	2	
	168△	0.00	0.01	0.02	0.04	0	1	1	1	0	1	0	1	
	2000	3.32	3.29	3.18	3.34	21	22	21	22	52	56	53	53	
	1000	3.32	3.25	3.11	3.35	20	23	22	20	54	58	55	51	
	500	3.34	3.25	3.12	3.33	21	22	22	20	53	56	52	52	
	168	3.33	3.25	3.17	3.40	21	22	22	20	54	56	54	54	
	Before	3.33	3.26	3.15	3.36	21	23	21	21	54	57	54	53	
3	2000△	0.08	0.05	0.08	0.05	1	2	1	2	2	4	2	3	Pass
	1000△	0.07	0.05	0.07	0.05	1	1	1	2	1	4	2	3	
	500△	0.03	0.04	0.05	0.05	0	1	1	1	1	3	2	2	
	168△	0.03	0.04	0.04	0.04	0	0	1	1	1	1	1	2	
	2000	3.37	3.30	3.18	3.27	25	23	28	27	52	59	52	54	
	1000	3.29	3.30	3.19	3.23	25	25	27	27	53	60	54	56	
	500	3.36	3.25	3.21	3.23	24	25	28	26	54	56	52	53	
	168	3.36	3.25	3.26	3.28	24	24	27	25	54	59	54	53	
	Before	3.33	3.29	3.22	3.24	24	24	28	26	53	58	53	55	
4	2000△	0.06	0.06	0.07	0.08	2	2	1	2	3	4	2	3	Pass
	1000△	0.06	0.04	0.07	0.08	2	2	1	2	2	3	2	3	
	500△	0.06	0.04	0.04	0.08	2	1	1	2	2	2	2	2	
	168△	0.03	0.00	0.04	0.04	1	0	0	1	1	2	1	1	
	2000	3.19	3.33	3.31	3.27	23	20	18	26	61	55	53	55	
	1000	3.19	3.28	3.37	3.30	22	18	18	27	59	54	54	55	
	500	3.21	3.27	3.33	3.33	22	20	18	26	60	52	54	52	
	168	3.15	3.31	3.30	3.25	24	19	19	28	58	51	52	54	
	Before	3.18	3.31	3.34	3.29	23	19	19	27	59	53	53	53	
	2000△	0.05	0.04	0.07	0.07	1	2	2	2	2	3	3	2	
	1000△	0.03	0.04	0.03	0.04	1	1	2	2	2	3	2	2	

5	500△	0.01	0.04	0.01	0.04	0	1	2	1	2	3	1	2	Pass
	168△	0.01	0.04	0.01	0.04	0	0	1	1	0	1	1	2	
	2000	3.27	3.26	3.29	3.19	19	23	27	26	59	51	56	58	
	1000	3.22	3.27	3.36	3.22	19	22	25	24	59	52	55	58	
	500	3.24	3.28	3.33	3.22	20	21	27	26	61	51	53	57	
	168	3.24	3.30	3.34	3.26	20	22	25	26	59	54	53	56	
	Before	3.25	3.26	3.33	3.22	20	22	26	25	59	53	54	58	
6	2000△	0.07	0.08	0.03	0.04	1	2	2	2	1	4	4	4	Pass
	1000△	0.04	0.06	0.02	0.04	1	1	2	2	1	4	4	3	
	500△	0.01	0.06	0.02	0.02	1	1	1	1	1	4	4	3	
	168△	0.01	0.02	0.01	0.02	1	0	1	1	1	2	2	2	
	2000	3.20	3.33	3.28	3.28	20	18	24	23	58	59	56	56	
	1000	3.13	3.38	3.26	3.29	21	20	24	25	58	59	57	53	
	500	3.16	3.41	3.27	3.27	20	20	23	23	57	57	53	55	
	168	3.16	3.35	3.25	3.27	20	19	22	23	58	61	57	52	
	Before	3.17	3.37	3.26	3.25	21	19	23	24	57	59	55	54	
7	2000△	0.06	0.07	0.03	0.07	2	2	1	1	2	3	4	3	Pass
	1000△	0.06	0.07	0.02	0.06	2	2	1	1	2	3	4	2	
	500△	0.02	0.04	0.02	0.04	2	1	1	1	1	3	4	2	
	168△	0.01	0.04	0.02	0.01	1	1	0	1	1	1	2	1	
	2000	3.27	3.34	3.20	3.18	21	22	28	24	52	53	55	53	
	1000	3.24	3.34	3.21	3.17	20	22	27	24	51	55	51	56	
	500	3.30	3.27	3.23	3.11	19	24	27	24	52	52	55	56	
	168	3.29	3.27	3.23	3.14	21	24	28	24	52	55	51	55	
	Before	3.28	3.31	3.21	3.15	20	23	28	25	53	54	53	54	
8	2000△	0.03	0.03	0.02	0.04	1	1	1	2	3	4	3	3	Pass
	1000△	0.03	0.03	0.02	0.03	0	1	1	2	1	4	1	3	
	500△	0.02	0.03	0.02	0.03	0	1	1	2	0	4	1	2	
	168△	0.00	0.03	0.01	0.02	0	1	1	1	0	2	1	2	
	2000	3.30	3.19	3.19	3.16	24	26	22	25	55	57	59	54	
	1000	3.30	3.18	3.19	3.15	23	27	23	24	52	60	56	54	
	500	3.31	3.19	3.18	3.15	23	27	23	24	53	60	56	56	
	168	3.33	3.20	3.20	3.14	23	26	23	26	53	56	56	57	
	Before	3.33	3.17	3.19	3.12	23	27	22	25	53	58	57	55	
9	2000△	0.05	0.06	0.04	0.03	2	1	1	2	3	2	2	4	Pass
	1000△	0.05	0.06	0.03	0.03	2	1	1	1	3	2	2	4	
	500△	0.05	0.04	0.03	0.00	2	1	0	1	2	2	2	4	
	168△	0.01	0.04	0.03	0.00	1	1	0	1	0	2	2	2	
	2000	3.19	3.28	3.27	3.29	27	22	27	19	56	59	52	58	
	1000	3.19	3.25	3.28	3.30	29	21	28	21	53	59	53	57	
	500	3.19	3.30	3.28	3.27	27	21	27	21	56	59	52	58	
	168	3.24	3.31	3.31	3.27	29	22	27	21	54	57	51	54	
	Before	3.23	3.27	3.28	3.27	28	21	27	20	54	59	53	56	
	2000△	0.05	0.07	0.06	0.07	1	2	2	1	4	2	3	2	
	1000△	0.05	0.05	0.06	0.06	1	2	1	1	4	2	3	2	
	500△	0.02	0.04	0.03	0.04	1	2	1	1	4	2	2	1	

10	168△	0.02	0.03	0.03	0.04	0	1	0	0	2	1	2	1	Pass
	2000	3.34	3.28	3.27	3.25	25	26	24	24	59	58	56	58	
	1000	3.39	3.26	3.32	3.26	26	26	25	24	61	58	56	59	
	500	3.34	3.25	3.26	3.29	25	26	26	25	61	58	59	57	
	168	3.34	3.21	3.26	3.32	26	28	25	24	57	60	59	57	
	Before	3.36	3.24	3.29	3.28	26	27	25	24	59	59	57	58	
11	2000△	0.05	0.08	0.05	0.05	1	2	2	1	2	4	4	4	Pass
	1000△	0.05	0.08	0.04	0.04	1	2	2	1	1	3	3	4	
	500△	0.05	0.04	0.04	0.04	1	1	1	1	1	2	3	3	
	168△	0.04	0.01	0.04	0.04	1	0	0	1	1	2	2	2	
	2000	3.21	3.19	3.17	3.22	22	24	23	21	56	56	51	54	
	1000	3.19	3.17	3.12	3.24	21	22	21	20	57	55	52	57	
	500	3.18	3.25	3.13	3.25	21	24	23	21	57	53	52	56	
	168	3.23	3.22	3.12	3.27	21	23	22	20	58	52	55	53	
	Before	3.19	3.21	3.16	3.23	22	23	22	21	57	54	53	55	

Table 7 Low Temperature Storage Test

Sample	Phase	IL@1550nm				PER@1550				RL1	RL2	RL3	RL4	Pass or Fail
		1->3	1->4	2->3	2->4	1->3	1->4	2->3	2->4					
1	2000△	0.05	0.04	0.05	0.04	1	2	1	2	1	3	0	1	Pass
	1000△	0.05	0.04	0.05	0.04	1	2	1	2	1	1	0	1	
	500△	0.03	0.04	0.05	0.04	1	1	1	2	1	1	0	1	
	168△	0.03	0.01	0.03	0.02	1	1	1	1	1	1	0	0	
	2000	3.22	3.34	3.10	3.41	24	27	23	21	54	57	53	59	
	1000	3.18	3.37	3.11	3.42	25	27	24	21	53	55	53	59	
	500	3.20	3.37	3.10	3.43	25	26	24	22	54	55	53	59	
	168	3.23	3.33	3.15	3.41	25	25	24	20	54	54	53	58	
	Before	3.20	3.34	3.12	3.39	24	26	23	21	53	55	53	58	
2	2000△	0.03	0.04	0.06	0.04	2	1	2	2	4	3	2	4	Pass
	1000△	0.02	0.04	0.04	0.04	2	1	2	2	4	3	2	3	
	500△	0.01	0.04	0.02	0.03	1	1	2	1	4	2	2	2	
	168△	0.01	0.04	0.02	0.03	0	1	1	0	2	1	1	2	
	2000	3.29	3.19	3.23	3.38	27	24	24	23	59	56	56	61	
	1000	3.30	3.18	3.29	3.40	27	25	26	25	56	58	58	60	
	500	3.31	3.18	3.25	3.38	29	24	24	23	56	55	58	57	
	168	3.32	3.19	3.25	3.39	28	25	26	24	60	56	57	57	
	Before	3.31	3.15	3.27	3.36	28	24	25	24	58	57	56	59	
3	2000△	0.06	0.06	0.07	0.03	2	1	2	2	3	3	3	2	Pass
	1000△	0.06	0.04	0.07	0.03	2	1	2	1	3	3	3	2	
	500△	0.06	0.04	0.06	0.03	2	1	1	1	3	1	2	1	
	168△	0.02	0.04	0.02	0.03	1	1	0	1	1	0	1	1	
	2000	3.39	3.35	3.34	3.24	21	27	25	21	59	56	52	59	
	1000	3.41	3.32	3.29	3.24	22	27	25	22	58	59	55	60	
	500	3.35	3.32	3.36	3.27	23	28	23	23	57	56	52	58	
	168	3.41	3.29	3.30	3.27	21	28	24	23	60	57	53	59	

	Before	3.39	3.33	3.32	3.24	22	27	24	22	59	57	54	58	
4	2000△	0.04	0.04	0.04	0.07	1	2	2	2	4	3	2	2	Pass
	1000△	0.04	0.04	0.02	0.07	1	1	2	2	3	2	2	1	
	500△	0.04	0.04	0.02	0.07	1	1	2	2	3	2	2	1	
	168△	0.04	0.00	0.01	0.03	1	1	1	1	2	1	2	1	
	2000	3.12	3.25	3.07	3.26	20	20	18	27	57	55	58	59	
	1000	3.11	3.26	3.11	3.24	21	19	20	26	54	53	57	58	
	500	3.12	3.27	3.09	3.29	21	18	18	25	56	54	56	57	
	168	3.14	3.23	3.10	3.22	21	18	20	27	53	52	58	58	
	Before	3.10	3.23	3.11	3.25	20	19	19	26	55	53	56	57	
5	2000△	0.06	0.04	0.04	0.05	2	2	2	1	3	4	2	4	Pass
	1000△	0.06	0.04	0.04	0.04	2	2	2	1	2	4	2	4	
	500△	0.06	0.01	0.01	0.04	1	1	2	0	2	3	1	2	
	168△	0.03	0.01	0.00	0.04	1	1	1	0	2	1	0	0	
	2000	3.24	3.38	3.20	3.37	25	26	21	27	57	57	58	60	
	1000	3.30	3.38	3.24	3.42	26	28	20	28	56	53	57	56	
	500	3.24	3.34	3.21	3.40	24	27	20	27	55	57	59	60	
	168	3.30	3.35	3.20	3.42	24	26	22	27	54	54	58	58	
	Before	3.27	3.34	3.20	3.38	25	27	21	27	56	55	58	58	
6	2000△	0.06	0.05	0.07	0.07	2	2	1	2	3	3	4	3	Pass
	1000△	0.03	0.05	0.03	0.07	1	1	1	1	2	2	4	2	
	500△	0.03	0.02	0.03	0.04	1	1	1	1	1	2	4	2	
	168△	0.03	0.00	0.03	0.00	1	0	1	1	1	2	2	1	
	2000	3.36	3.30	3.30	3.15	24	21	22	25	57	54	56	57	
	1000	3.41	3.34	3.34	3.09	25	20	23	23	54	55	56	54	
	500	3.42	3.29	3.37	3.16	26	19	22	24	55	57	59	56	
	168	3.42	3.31	3.37	3.12	26	20	22	23	56	57	55	54	
	Before	3.39	3.31	3.34	3.12	25	20	23	24	55	55	57	55	
7	2000△	0.06	0.04	0.04	0.04	2	1	2	2	3	3	3	1	Pass
	1000△	0.04	0.02	0.04	0.04	1	1	2	2	3	2	3	1	
	500△	0.02	0.02	0.03	0.04	1	1	2	1	1	2	1	1	
	168△	0.01	0.02	0.03	0.00	1	1	1	1	0	2	1	1	
	2000	3.27	3.21	3.35	3.27	19	22	20	19	58	56	56	52	
	1000	3.25	3.19	3.35	3.27	20	21	20	18	57	57	53	53	
	500	3.21	3.17	3.38	3.24	21	22	20	19	60	58	55	52	
	168	3.22	3.17	3.39	3.28	21	21	22	20	59	59	56	52	
	Before	3.23	3.19	3.36	3.28	20	22	21	19	59	57	55	53	
8	2000△	0.05	0.02	0.06	0.03	1	2	2	1	4	3	3	3	Pass
	1000△	0.02	0.02	0.06	0.03	1	2	2	1	4	2	3	3	
	500△	0.01	0.02	0.06	0.02	1	1	2	1	2	2	3	2	
	168△	0.00	0.02	0.04	0.02	1	1	1	0	0	1	2	1	
	2000	3.18	3.25	3.41	3.22	19	25	18	21	57	55	57	51	
	1000	3.15	3.25	3.36	3.20	20	25	18	21	60	58	58	51	
	500	3.13	3.24	3.41	3.21	20	26	20	21	56	58	59	52	
	168	3.14	3.26	3.35	3.21	19	27	18	22	58	56	56	54	
	Before	3.14	3.24	3.39	3.23	20	26	19	22	58	57	58	53	

9	2000△	0.04	0.07	0.05	0.06	1	1	2	2	3	4	4	3	Pass
	1000△	0.04	0.07	0.04	0.06	1	1	2	2	3	2	4	2	
	500△	0.04	0.05	0.03	0.06	1	1	1	2	2	2	3	1	
	168△	0.04	0.04	0.01	0.02	1	1	1	1	2	2	2	0	
	2000	3.13	3.28	3.24	3.19	22	23	22	23	54	52	59	57	
	1000	3.12	3.25	3.19	3.14	22	23	22	23	56	56	55	60	
	500	3.13	3.27	3.23	3.13	23	23	23	21	54	55	56	58	
	168	3.10	3.32	3.21	3.19	22	24	24	23	53	56	59	59	
	Before	3.14	3.28	3.20	3.17	23	23	23	22	55	54	57	59	
10	2000△	0.05	0.04	0.06	0.06	2	1	0	2	4	3	2	4	Pass
	1000△	0.05	0.04	0.05	0.06	1	1	0	2	4	2	2	2	
	500△	0.03	0.01	0.05	0.05	0	1	0	2	2	2	2	2	
	168△	0.03	0.01	0.03	0.02	0	1	0	1	1	0	0	2	
	2000	3.16	3.16	3.14	3.14	28	23	24	28	54	57	59	57	
	1000	3.16	3.12	3.08	3.12	26	23	24	27	55	55	58	61	
	500	3.20	3.15	3.13	3.13	27	23	24	26	51	54	60	61	
	168	3.21	3.15	3.08	3.18	27	22	24	28	52	56	58	61	
	Before	3.18	3.16	3.11	3.16	27	23	24	27	53	56	58	59	
11	2000△	0.03	0.05	0.03	0.04	2	2	2	2	2	1	3	2	Pass
	1000△	0.03	0.05	0.03	0.02	2	1	2	1	2	1	3	2	
	500△	0.01	0.01	0.03	0.02	2	1	1	1	2	1	1	2	
	168△	0.00	0.01	0.02	0.00	1	1	1	1	2	1	1	2	
	2000	3.35	3.24	3.34	3.20	22	24	27	29	53	55	56	54	
	1000	3.33	3.19	3.32	3.23	22	25	29	28	53	56	59	53	
	500	3.36	3.24	3.35	3.22	21	25	28	28	52	55	57	53	
	168	3.35	3.24	3.34	3.24	23	26	27	27	51	56	56	53	
	Before	3.35	3.23	3.32	3.24	22	25	28	28	53	55	57	55	

2 Table 8 Temperature Cycling Test

Sample	Phase	IL@1550nm				PER@1550				RL1	RL2	RL3	RL4	Pass or Fail
		1->3	1->4	2->3	2->4	1->3	1->4	2->3	2->4					
1	500△	0.05	0.04	0.01	0.04	1	1	1	1	2	2	3	3	
	100△	0.04	0.04	0.00	0.00	0	0	1	1	2	1	2	2	
	500	3.29	3.13	3.25	3.10	21	27	18	27	58	51	55	57	
	100	3.24	3.15	3.24	3.14	22	26	18	26	58	52	58	60	
	Before	3.28	3.11	3.24	3.14	22	26	19	27	56	53	56	58	
2	500△	0.01	0.02	0.01	0.04	2	1	1	1	3	3	4	2	Pass
	100△	0.01	0.01	0.00	0.04	1	0	1	0	2	1	2	2	
	500	3.23	3.14	3.30	3.30	25	18	23	18	56	53	52	54	
	100	3.22	3.16	3.29	3.33	27	19	23	19	53	56	56	53	
	Before	3.23	3.15	3.29	3.29	26	19	24	19	55	55	54	55	
3	500△	0.04	0.04	0.04	0.01	1	2	1	1	0	2	2	2	Pass
	100△	0.02	0.02	0.02	0.01	1	1	0	1	0	2	2	2	
	500	3.31	3.30	3.14	3.29	24	18	22	26	54	59	53	57	
	100	3.29	3.32	3.18	3.28	23	20	21	26	54	60	51	58	

	Before	3.27	3.34	3.16	3.29	24	19	21	25	54	58	53	56	
4	500△	0.05	0.03	0.02	0.06	1	0	0	1	4	2	3	1	Pass
	100△	0.03	0.02	0.02	0.02	0	0	0	1	2	2	1	0	
	500	3.11	3.22	3.23	3.24	27	26	19	23	61	58	55	52	
	100	3.16	3.21	3.23	3.30	28	26	19	23	57	56	52	53	
	Before	3.13	3.19	3.25	3.28	28	26	19	24	59	58	53	53	
5	500△	0.03	0.03	0.07	0.04	1	1	1	1	2	2	3	2	Pass
	100△	0.03	0.02	0.03	0.02	1	0	1	1	1	2	2	1	
	500	3.18	3.21	3.18	3.12	18	22	27	22	57	56	54	59	
	100	3.18	3.20	3.25	3.16	18	21	26	22	55	56	57	58	
	Before	3.15	3.18	3.22	3.14	19	21	27	21	56	54	55	57	
6	500△	0.06	0.03	0.05	0.02	1	1	1	2	2	4	2	2	Pass
	100△	0.02	0.01	0.03	0.02	0	0	1	1	2	2	2	2	
	500	3.31	3.30	3.31	3.31	18	28	18	28	54	51	58	59	
	100	3.25	3.32	3.26	3.32	19	27	18	26	55	55	60	61	
	Before	3.27	3.33	3.29	3.30	19	27	19	27	53	53	58	59	
7	500△	0.04	0.04	0.04	0.04	1	1	1	1	2	2	1	2	Pass
	100△	0.02	0.04	0.03	0.03	1	0	0	1	1	0	1	2	
	500	3.13	3.26	3.20	3.12	23	19	24	20	56	57	57	53	
	100	3.17	3.30	3.16	3.13	23	20	23	20	55	55	57	51	
	Before	3.15	3.26	3.19	3.16	24	20	23	19	54	55	58	53	
8	500△	0.06	0.04	0.03	0.03	0	1	1	1	2	2	2	2	Pass
	100△	0.03	0.04	0.00	0.00	0	1	1	1	2	2	2	1	
	500	3.17	3.27	3.15	3.36	20	29	26	20	59	53	57	54	
	100	3.23	3.26	3.18	3.39	20	29	25	20	59	55	57	56	
	Before	3.20	3.30	3.18	3.39	20	28	26	21	57	53	59	55	
9	500△	0.03	0.02	0.05	0.04	2	1	2	0	3	4	3	3	Pass
	100△	0.00	0.02	0.02	0.04	1	1	1	0	1	2	2	2	
	500	3.30	3.15	3.23	3.40	29	28	23	23	58	55	52	55	
	100	3.33	3.13	3.28	3.40	27	29	25	23	55	51	55	52	
	Before	3.33	3.15	3.26	3.36	28	28	24	23	56	53	53	54	
10	500△	0.06	0.04	0.02	0.03	2	1	2	1	2	2	2	2	Pass
	100△	0.04	0.04	0.01	0.01	1	1	1	1	2	2	2	2	
	500	3.37	3.32	3.19	3.36	26	20	18	25	53	55	59	58	
	100	3.31	3.29	3.21	3.39	28	20	20	25	53	57	60	60	
	Before	3.35	3.33	3.20	3.38	27	21	19	24	55	55	58	58	
11	500△	0.04	0.04	0.04	0.03	1	2	2	0	3	3	2	1	Pass
	100△	0.04	0.01	0.04	0.01	1	1	1	0	1	2	1	1	
	500	3.38	3.16	3.14	3.18	21	27	29	24	61	54	55	53	
	100	3.34	3.12	3.14	3.16	20	29	27	24	58	51	53	54	
	Before	3.38	3.13	3.18	3.15	21	28	28	24	59	53	54	53	

8.0 **Conclusion**

The 1550nm Polarization Maintaining PM1550 Fused Coupler - 2*2, 50/50 in Agiltron Inc. has passed the conditional qualification test and met the requirements in GR-1221-CORE.