

Contents

Special Report Notice of Disclaimer iii

1 Introduction

2 Scope

3 Background

4 Component Reliability Requirements

5 Generic Reliability Concerns

5.1 Materials 5-1

5.1.1 Compatibility 5-1

5.1.2 Durability 5-1

5.1.3 Electrolytic Corrosion 5-1

5.1.4 Fungus Resistance 5-1

5.1.5 Industrial Atmosphere Corrosion 5-1

5.1.6 Toxic Substances 5-2

5.1.7 Solvent Resistance 5-2

5.1.8 Termination Surface Finish 5-2

5.1.9 Silicones 5-2

5.1.10 Silver Plating 5-2

5.1.11 Pressure Contacts 5-2

5.1.12 Flammability 5-2

5.1.13 Adhesives 5-3

5.1.14 Semiconductors 5-3

5.1.14.1 Bulk Considerations 5-3

5.1.14.2 Surface Considerations 5-4

5.1.14.3 Oxide Considerations 5-4

5.1.14.4 Diffusion Considerations 5-4

5.1.14.5 Metallization Considerations 5-5

5.1.14.6 Wirebond Considerations 5-5

5.1.15 Packages 5-6

5.2 Transmitters 5-6

5.2.1 Facet Damage 5-6

5.2.2 Facet Oxidation 5-6

5.2.3 Dark Region Defects 5-7

5.2.4 Current-Steering (Confining) Junction Degradation 5-7

5.2.5 Die-Bond Degradation 5-8

5.2.6 Laser-Fiber Decoupling 5-8

5.2.7 Thermoelectric Cooler 5-9

5.3 Receivers 5-10

5.3.1 Plated Contacts 5-10

5.3.2	Moisture Ingress	5-10
5.3.3	Mobile Ions	5-10
5.3.4	Heat Sinking	5-11
5.4	Optical Fiber Amplifiers	5-11
5.4.1	Pump Failure	5-11
5.4.2	Hydrogen Contamination	5-11
5.4.3	Fiber Breakage	5-11
5.4.4	Self Destruction	5-11
5.4.5	Sub-System Failure	5-12
5.4.6	Moisture Absorption	5-12
5.5	Fiber and Cable	5-12
5.5.1	Bending	5-12
5.5.2	Surface Flaws	5-12
5.5.3	Terminations	5-13
5.5.4	Flaw Growth	5-13
5.5.5	Handling	5-13
5.6	Splices	5-13
5.6.1	Fiber Stripping	5-13
5.6.2	Clamping Mechanisms	5-13
5.6.3	Matching Materials	5-14
5.6.4	intermittency	5-14
5.6.5	Thermal Mismatch	5-14
5.6.6	Temperature Variation	5-14
5.6.7	Protective Sleeve	5-14
5.7	Separable Connectors	5-15
5.7.1	Fiber Stripping	5-15
5.7.2	Degraded Epoxy	5-15
5.7.3	Ceramic Sleeves	5-15
5.7.4	Thermal Wear and Deformation	5-15
5.7.5	Mechanical Wear	5-16
5.7.6	Cleaning	5-16
5.7.7	Spring Force	5-16
5.7.8	Dust Exclusion	5-16
5.7.9	Chemical Problems	5-16
5.7.10	Fungus Resistance	5-16
5.7.11	Corrosion Resistance	5-16
5.7.12	Generated Debris	5-16
5.8	Isolators	5-17
5.8.1	Epoxy	5-17
5.8.1.1	Moisture	5-17
5.8.1.2	Glass Transition Temperature	5-17
5.8.1.3	Outgassing	5-17
5.8.2	Solder Creep	5-17
5.8.3	Magnet Integrity	5-18
5.8.4	Endurance Tests	5-18
5.9	Branching Components	5-18
5.9.1	Coupling Region Integrity	5-18

5.9.2 Coupling Region Fragility	5-19
5.9.3 Contamination	5-19
5.9.4 Adhesives	5-19
5.9.5 Fiber Stripping	5-19
5.10 Interconnections	5-19
5.10.1 Level 1	5-20
5.10.2 Level 2	5-20
5.10.3 Level 3: Motherboard/Daughterboard	5-21
5.10.4 Levels 3-6: Backplane Inter-Connections	5-21
5.11 Other Optical Devices	5-21

6 Conclusions

7 Acknowledgments

8 References

Note	8-4
To Contact Telcordia Customer Service or to Order Documents	8-4
To Order Documents From Within Telcordia (Employees Only)	8-4