AFCT-5725PZ

1.25GBd Ethernet, 1310nm, 1000Base-LX
SFP Transceiver

Reliability Data Sheet

Introduction

Avago Technologies Quality System includes an on-going Reliability Monitoring program to generate a database from which this reliability datasheet is published.

Description

The AFCT-5725PZ optical transceiver is compliant with the specifications set forth in both the IEEE802.3 (1000BASE-LX), and the Small Form-Factor Pluggable (SFP) Multi-Source Agreement (MSA). Its primary application is servicing Gigabit Ethernet links between optical networking equipment. It offers system cost, upgrade, and reliability benefits by virtue of being hot-pluggable. Furthermore, it incorporates the latest 3.3 VDC compatible transceiver technology including a 1310nm FP laser transmitter as well as a convenient LC-Duplex optical interface.

FIT Rate Summary

The FIT rate for AFCT-5725PZ is calculated to be 127.4.

The details of this calculation are included on page 2 of this report. Reliability prediction follows the parts count method of Telcordia-SR-332 Issue 3.

Random Failure Rate (FIT) Calculation

Failure in time rate, or FIT, is defined as the number of failures per billion device hours. In the product useful life region, the random failure rate is considered as a constant failure rate. In this region MTTF, Mean Time to Failure, is defined as MTTF = 1/FIT.

FIT Prediction Based on Telcordia SR-332 Parts Count Procedure

The Telcordia parts count method assumes that the module failure rate is equal to the sum of the device component failure rates. Modifiers are included to take into consideration variations in module operation environments, device quality requirements, temperature, and stress. The table that follow show the FIT for the components used in the modules and the total FIT which have been calculated for an operating ambient temperature of 40°C

Table 1a. FIT rate for AFCT-5725PZ

Reliability Prediction Based On Telecordia SR-332 Issue 3 - Parts Count Method		Temperature Factor @ 40°C			1
		Stress Factor at 50%			1
		Enviromental Factor			1
Component	**Telecordia Information Data Source"**	**Quantity**	**Component Base Rate (FITs)**	**Quality Factor**	**Total Component Failure Rate (FITs)**
Laser	Avago Data	1	4	0.8	3.2
Monitor diode	Telcordia	1	7.7	0.8	6.16
Photodiode	Telcordia	1	7.7	0.8	6.16
TIA	Telcordia	1	23	1	23
Micro-controller	Supplier Data	1	8	1	8
Digital IC	Telcordia	1	7.02	1	7.02
Transceiver IC	Telcordia	1	23	1	23
Laser driver IC	Telcordia	1	23	1	23
CMOS IC	Telcordia	1	2.04	1	2.04
Inductor	Telcordia	1	2.04	1	2.04
EEPROM	Supplier Data	1	1.3	1	1.3
Crystal	Telcordia	1	3.2	1	3.2
Resistors	Telcordia	14	0.51	1	7.14
Capacitors	Telcordia	30	0.2	1	6
Ferrite	Supplier Data	7	0.5	1	3.5
Edge connector	Telcordia	20	0.13	1	2.6
			SFCT-5725PZ Module Failure @ 40°C (Total FITs)		127.4
				MTTF @ 40°C (Hours)	7.85E+06

Note: Component Base Rate (FITs) is obtained from SR-332 Issue 3 table.

FITs at other temperatures can be derived following the procedure of Telcordia SR-332, assuming activation energy, Ea, of 0.35eV to determine the component temperature factor πT. The following table shows FITs at different temperature for the transceiver.

Table 1b. FIT rates at different operating ambient temperatures, following Telcordia Parts Count Method

Tcase (°C)	AFCT-5725PZ (FITs)
40	127.4
45	152.8
50	191.0
55	229.2
60	280.2
65	331.1
85	649.5

The limitations of the FIT prediction based on the Parts Count method include the fact that the piece part failure rates are mostly obtained from Telcordia database, which may not be exhaustive for state-of-the-art piece parts, and that the results are independent of true module environmental stress tests. Nevertheless, the information obtained from the Parts Count method is a useful reference during design-in and evaluation. Whenever possible, Avago will substitutes internal data for the FIT rates of individual components, and predictions will be updated as more current data becomes available.

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