



Agilent HFBR-5208M/EM/FM 1300 nm 1x9 Transceiver

Reliability Data Sheet

Description

This reliability data sheet describes a General Purpose Transceiver for 155-650 Mb/s and ATM SONET/SDH 622 Mb/s.

Life Test

The following demonstrated data represents information based upon the High Temperature Operating Life tests on HFBR-5208M/EM/FM transceivers.

Definition of Failure

Product failure has occurred when the unit fails catastrophically or when light output power decreases by 3 dB or more.

A. Demonstrated Performance

Test Name	Stress Test Conditions	Total Units Tested	Total Device Hours	No. of Failed Units	Demonstrated MTBF at $T_A = 100^\circ\text{C}$	Demonstrated FITS at $T_A = 100^\circ\text{C}$
High Temperature Operating Life	$V_{CC} = 5.25 \text{ Vdc}$ $T_A = 100^\circ\text{C}$ See note 1	43	64,000	0	64,000	15,625

Failure Rate Prediction

The Demonstrated Point MTBF given on this data sheet is on device performance at maximum allowed stress conditions. Temperature is an alterable stress. The failure rate will have a direct

relationship to the life stress. MIL-HDBK-217 uses, for this type of product (hybrid packaging), a 0.43 electron volt activation energy which represents the most conservative

temperature acceleration reported. Estimates for typical equipment use temperatures are as follows:

Ambient Temp. ($^\circ\text{C}$)	Point Typical Performance MTF	90% Confidence MTF	60% Confidence MTF	Point Typical Performance FITS	90% Confidence FITS	60% Confidence FITS
85	112,000	48,600	122,400	8,928	20,576	8,170
80	136,400	59,200	149,100	7,330	16,892	6,707
75	167,100	72,500	182,600	5,985	13,793	5,476
70	205,900	89,300	225,000	4,857	11,198	4,444
65	255,200	110,700	278,900	3,918	9,033	3,586
60	318,500	138,200	348,000	3,140	7,236	2,874
55	400,000	173,600	437,200	2,500	5,760	2,287
50	506,100	219,600	553,100	1,976	4,554	1,808
45	645,000	279,800	704,900	1,550	3,574	1,419
40	828,500	359,400	905,400	1,207	2,782	1,104
35	1,072,800	465,400	1,172,400	932	2,149	853
30	1,401,000	607,800	1,531,100	714	1,645	653
25	1,846,100	800,900	2,017,600	542	1,249	496



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2. Mechanical and Environmental Tests

Test	Conditions	Duration	Sample Size	Failure
Temp. Cycle	-40°C to 100°C, 15 min. dwell, 5 min. transfer	2000 cycles	22	0
85/85 Biased	T _A = 85°C, 85% RH, V _{CC} = +5.25 V. See note 1	1,000 hours	11	0
Mechanical Shock	MIL-STD-883 Method 2002B, 1,500 g, 6 Directions		5	0
Mechanical Vibration	MIL-STD-883 Method 2007A 20-2000 Hz, 20g		5	0
Wave Soldering	2 sec. on 260°C Solder; 5 min. Wash in 60-70°C DI water under 40 psi; 20 min. Bake @ 70°C	3 Times	65	0

2. Mechanical and Environmental Tests (continued)

(Testing done on a constructional basis)

Test	Conditions	Duration	Sample Size	Results
Hand Soldering and Resistance to Solvents	315°C-10 sec. Hand Soldering, followed by Resistance to Solvents per MIL-STD-883, Method 2015.7		5 (HFBR-5207)	0
Lead/Terminal Strength	MIL-STD-883, Method 2004.5. 1 kg tensile pull for 10 sec. / 1 kg bending pull for 3 sec. at 30 deg.	1 kg tensile pull applied to each lead for 10 sec., then bend lead 30° while under pull for 3 sec., 3 bendings each lead.	10 (HFBR-5103)	0
Solder Post Pullout	Lift housing from PCB and measure "break" force		2 (HFBR-5103T)	Min. force: 4 kg Max. force: >10 kg
Side Load	With connector inserted, each D.U.T. was pulled (on the connector) to the Right and then to the Left with 10 lb force and held for 60 sec. per Digital A-PS2400001-GS, section 3.1.8	Each transceiver received 6 pulls, 3 on the right and 3 on the left	4 (HFBR-5208)	0

(continues)

2. Mechanical and Environmental Tests (continued)**(Testing done on a constructional basis)**

Test	Conditions	Duration	Sample Size	Results
500 Reconnects Port Wear Test 1	T _A = 25°C 500 insertions performed on each transceiver paired with one each connected cable.	Electrical and optical measurements performed on all transceivers at 100, 200, 300, 400 and 500 insertions.	4 each HFBR-5103's paired with 4 connected cables of different manufacturers. Test results applicable to HFBR-5208M/EM/FM.	"Pt Av" variation: -0.33 dB max.; "Pr mid 4.0" variation: -0.06 dB max.
500 Reconnects Port Wear Test 2	T _A = 25°C 500 insertions performed on each transceiver paired with one each connected cable. Live monitoring the optical output power, "Pt Av."	Electrical and optical measurements performed on all transceivers at 100, 200, 300, 400 and 500 insertions.	4 each HFBR-5103's paired with 2 each connected cables of different manufacturers (one cable paired with 2 transceivers). Results applicable to HFBR-5208M/EM/FM package.	"Pt Av" variation: -0.19 dB max.

3. Electrostatic Discharge Information**(Testing done on a constructional basis)**

Test	Conditions	Duration	Sample Size	Failure
ESD 1	MIL-STD-883 Method 3015.4 (Human Body Model)	Apply (5)+ then (5)- voltage pulses to each pin & GND at each voltage level. 2,000 V max. (Class 1)	6	0
ESD 2	EIAJ#1988.3.2B, Version.2, C = 200 pF, R = 0 (Machine model)	Apply (5)+ then (5)- voltage pulses to each pin & GND at each voltage level. 200 volts max.	6	0

Note 1: Both the Transmitter and Receiver of each transceiver were connected by a loop-back connected cable in this test and operated in a self-oscillation mode.

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Data subject to change.

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