1.25 Gbps, 850 nm VCSEL Transmitters

Application Bulletin 223

OPV200 Series Reliability Data

The Optek Quality Assurance System provides a means to monitor, control and correct product quality on a real-time basis. Each product family that Optek produces is extensively tested prior to manufacturing release for quality and reliability. An ongoing commitment to quality and product improvement insures that reliability will continue to progress throughout the product's life cycle. The OPV200 series VCSEL transmitters were designed to provide the high a degree of performance with equal level of reliability. The data contained in this report serves to validate the reliability of these components and stands as Optek's commitment to continuous product improvement.

OPV200 Series
Demonstrated Performance

Test Name	Conditions	Total Units Tested	Total Device Hours	Failures
High Temperature Operating Life	T_A = 100 °C, I_F = 20mA $V_{F(AVG)}$ = 1.9 V	56	428,400	0

Predicted Failure Rate at If = 7.0 mA (typical)

Ambient Temp. (°C)	Junction Temp. (°C)	MTTF[1] (Hours)	FIT[2] (10^9 Hours)	Predicted Performance 90% Confidence MTTF (Hours)	Predicted Performance 90% Confidence FIT (10^9 Hours)	Predicted Performance 60% Confidence MTTF (Hours)	Predicted Performance 60% Confidence FIT (10^9 Hours)
70	77	7,447,250	134	3,230,911	310	8,094,837	124
60	67	14,747,789	68	6,398,173	156	16,030,205	62
50	57	30,440,397	33	13,206,246	76	33,087,388	30
40	47	65,743,644	15	28,522,188	35	71,460,483	14
30	37	149,225,412	7	64,739,875	15	162,201,535	6
25	32	229,401,216	4	99,523,304	10	249,349,148	4
20	27	357,747,876	3	155,205,152	6	388,856,387	3

Notes:
1. MTTF is mean time to failure in hours.
2. FIT is the number of failures per billion device-hours.
3. Life testing is ongoing.

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OPV200 Series
Mechanical and Environmental Tests

Application Bulletin 223

Examination or Test	Method	MIL-STD-883 (Unless otherwise stated) Details	LTPD	Results[3] Reject	Pass
Group 1		11 Parts	20		
Mechanical Shock	2002	1,500 G at 0.5ms, 5 times per axis			
Vibration	2007	Condition A 20-2,000 Hz, 4 min/cycle, 4 cycles/axis			
End point testing for Group 1				0	11
Group 2		11 Parts	20		
Thermal Shock	1011	0-100 °C			
Solderability	2003	Steam aging not required			
End point testing for Group 2				0	11
Group 3		10 parts			
Accelerated Aging Life Test (Central Office Rating)		Output power maintained at 1.1mW. T_C = 70°C (T_A may be adjusted to obtain T_C value.			
End point testing for Group 3		5,000 Hour read point		0	10
Group 4		25 parts			
Accelerated Aging Life Test (Uncontrolled Env. Rating)		Biased at rated power. T_C = 85°C , 1.1mW			
End point testing for Group 4		5,000 Hour read point		0	25
Group 5		11 Parts	20		
High Temp Storage	1008	T_A = 125°C (2,000 hours total)			
Mid point testing for Group 5		1,000 Hours		0	11
End point testing for Group 5		2,000 Hours		0	11
Group 6		11 Parts	20		
Low Temp Storage		T_A = -40°C (2,000 hours total)			
Mid point testing for Group 6		1,000 hour mid point		0	11
End point testing for Group 6		2,000 hour end point		0	11

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Mechanical and Environmental Tests

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Examination or Test	Method	MIL-STD-883 (Unless otherwise stated) Details	LTPD	Results[3] Reject	Pass
Group 7		11 Parts	20		
Temperature Cycling (Central office rating)	1011	-40 - 70 °C, 500 cycles			
End point testing for Group 7				0	11
Group 8		11 Parts	20		
Temperature Cycling (Uncontrolled Env. Rating)	1010	-40 - 85 °C, 500 cycles			
End point testing for Group 8		5,000 Hour read point		0	11
Group 9		11 Parts	20		
Damp Heat	103	MIL-STD-202 85°C/85% Relative Humidity; 1,000 hours			
End point testing for Group 9				0	11
Group 10		11 Parts	20		
Moisture Resistance		20 cycles with 10 sub-cycles			
End point testing for Group 10				0	11
Group 11		5 Parts	-		
Water Vapor Content	1004	5,000 PPM Max H_2O			
End point testing for Group 11				0	5

Notes:
1. MTTF is the total devices hours divided by either the number of failures or unity if there are no failures.
2. Failure in time (FIT) is equal to the number of failures expected in one billion device hours. For example, 1 FIT = 1 failure per 1,000,000,000 devices hours.
3. End point failure criteria is a catastrophic failure or when the product demonstrates a drop in optical power of greater than 2 dBm at I_F = 12mA.

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