

# 1.25Gbps, 850nm VCSEL Transmitters



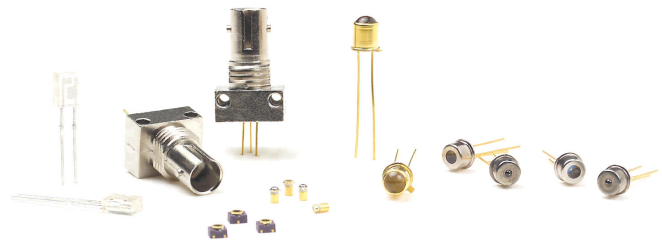
## Application Bulletin 223

### OPV200 Series Reliability Data

#### Description

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	$T_A = 100\text{ }^\circ\text{C}$ , $I_F = 20\text{mA}$ $V_{F(AVG)} = 1.9\text{ V}$	56	428,400	0

#### Predicted Failure Rate at $I_f = 7.0\text{ mA}$ (typical)

Ambient Temp. ( $^\circ\text{C}$ )	Junction Temp. ( $^\circ\text{C}$ )	Predicted Performance					
		MTTF <sup>1</sup> (Hours)	FIT <sup>2</sup> ( $10^9$ Hours)	90% Confidence MTTF (Hours)	90% Confidence FIT ( $10^9$ Hours)	60% Confidence MTTF (Hours)	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.

July 2003  
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## OPV200 Series Mechanical and Environmental Tests

## Application Bulletin 223

Examination or Test	Method	MIL-STD-883 (Unless otherwise stated)		Results <sup>3</sup>		
			Details	LTPD	Reject	Pass
<b>Group 1</b>		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
<b>Group 2</b>		11 Parts		20		
Thermal Shock	1011	0-100 °C				
Solderability	2003	Steam aging not required				
End point testing for Group 2					0	11
<b>Group 3</b>		10 parts				
Accelerated Aging Life Test (Central Office Rating)		Output power maintained at 1.1mW. $T_C = 70^\circ\text{C}$ ( $T_A$ may be adjusted to obtain $T_C$ value.				
End point testing for Group 3		5,000 Hour read point			0	10
<b>Group 4</b>		25 parts				
Accelerated Aging Life Test (Uncontrolled Env. Rating)		Biased at rated power. $T_C = 85^\circ\text{C}$ , 1.1mW				
End point testing for Group 4		5,000 Hour read point			0	25
<b>Group 5</b>		11 Parts		20		
High Temp Storage	1008	$T_A = 125^\circ\text{C}$ (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
<b>Group 6</b>		11 Parts		20		
Low Temp Storage		$T_A = -40^\circ\text{C}$ (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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			Details	LTPD	Reject	Pass
<b>Group 7</b>		11 Parts		20		
Temperature Cycling (Central office rating)	1011	-40 - 70 °C, 500 cycles				
End point testing for Group 7					0	11
<b>Group 8</b>		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
<b>Group 9</b>		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
<b>Group 10</b>		11 Parts		20		
Moisture Resistance		20 cycles with 10 sub-cycles				
End point testing for Group 10					0	11
<b>Group 11</b>		5 Parts		-		
Water Vapor Content	1004	5,000 PPM Max H <sub>2</sub> O				
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<sub>F</sub> = 12mA.

July 2003  
Issue 4.0