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Optical Reference Receivers (SONET/SDH)

ORR24

Features & Benefits

- Supports SONET/SDH 2.488 Gb/s Data Rate
- Reference Receiver Performance Compliant with ITU-T G.957
- Built-in 4th Order Bessel-Thompson Frequency Response
- 2.0 GHz Bandwidth for Analyzing Communication Eye-patterns or General Purpose Optical Signals
- Amplified Design for Accurate and Repeatable Measurements
- Plug-in Form Factor That Is Compatible with 11800/CSA803 Series Sampling Scopes
- Optional External Power Supply (016-1609-00) for Stand Alone Operation

Applications

- Standards Compliance: SONET/SDH 2.488 Gb/s
- Accurate Extinction Ratio Measurements
- Eye-pattern and Pulse Shape Measurements

Verification of SONET/SDH Signals

The Synchronous Digital Hierarchy (SDH) and the Synchronous Optical Network (SONET) standards are the cornerstones of today's high-speed digital telecommunications systems. The Tektronix ORR24 optical reference receiver provides an important interface for compliance testing of SDH/SONET optical transmission products or components.

The amplified design of the ORR24 converts the incoming optical light into a high gain, low noise electrical signal. This allows easy testing of optical designs as well as repeatable measurements. The ORR24 is DC coupled which is required for accurate extinction ratio measurements.

The controlled frequency design of the ORR24 optical reference receiver ensures that the measurements correctly represent the true transmitted signal for the purpose of pulse shape analysis or eye-pattern measurements. A certificate of calibration and a performance response graph are supplied with the ORR24 for performance documentation. The compact SDxx form factor enables the ORR24 to conveniently plug into the Tektronix 11800 or CSA803 Series sampling oscilloscopes for complete compliance testing. An optional power supply is available for other instrument applications.

Nominal Frequency Performance Values for an Optical Reference Receiver

SDH/SONET recommendations define the nominal transfer

function for an optical reference receiver as being a fourth-order Bessel-Thompson response. The following table lists the corresponding attenuation at various frequencies, f . In this table f_o is the transmitted data rate and f_r is the 3 dB cutoff, which is defined as $f_r = 0.75f_o$.

f/f_o	f/f_r	Attenuation (dB)	f/f_o	f/f_r	Attenuation (dB)
0.15	0.2	0.1	1	1.33	5.7
0.3	0.4	0.4	1.05	1.4	6.4
0.45	0.6	1	1.2	1.6	8.5
0.6	0.8	1.9	1.35	1.8	10.9
0.75	1	3	1.5	2	13.4
0.9	1.2	4.5	2	2.67	21.5

Note: Allowable deviation from the nominal attenuation in the table is very tightly specified in the SDH/SONET recommendations. The actual allowable deviation values depend on f/f_r and the bit rate. These values run as low as ± 0.5 dB.



ORR24 with standard accessories and optional power supply.

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Optical Reference Receivers (SONET/SDH)

ORR24

Characteristics

Wavelength Range - 1100 nm to 1650 nm.

Bandwidth*1 - DC to 2.0 GHz.

Rise Time - 205 ps.

Conversion Gain (typical) - ≥ 0.7 V/mW (1310 nm/1550 nm).

Maximum Input Optical Power - Maximum average linear response power: 100 μ W (-10 dBm).

Maximum average nondestruct power: 5 mW (7 dBm).

Maximum peak nondestruct power: 10 mW (10 dBm).

Noise Equivalent Power - ≤ 15 pW per square root of Hz.

Max Output Modulation Depth for Reference Receiver Performance - ≤ 200 mV_{p-p}*4.

Aberrations - $\leq 5\%$ mV_{p-p}.

Optical Return Loss*2 - ≥ -30 dB.

Output Termination Impedance - $50 \Omega \pm 4\%$.

Internal Fiber Size - 9 μ m.

Environmental Characteristics

Operating Temperature (Class VI)*3 - +10 °C to +40 °C.

Nonoperating Temperature (Class VI) - -40 °C to +70 °C.

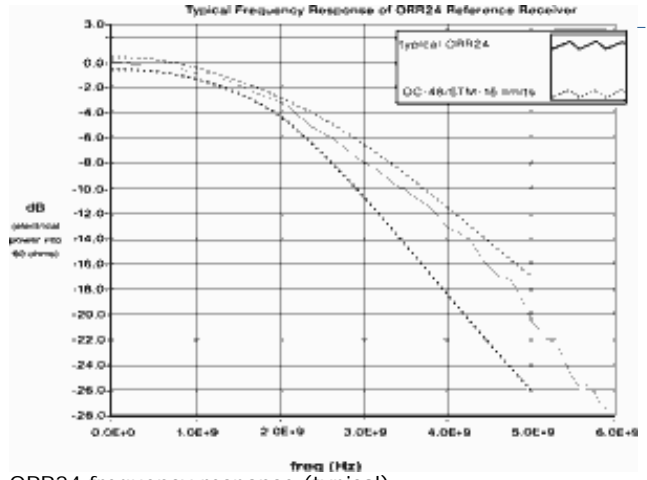
Humidity - 75% noncondensing.

*1 Optical bandwidth (-6 dB electrical power).

*2 Single-mode fiber input.

*3 Reference receiver performance over 25 °C \pm 10 °C.

*4 Dependent on conversion gain of wavelength.



ORR24 frequency response (typical).

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