FC-SANOS-15XX-TEC

Data sheet of fiber-coupled SANOS @ λ = 1530 … 1560 nm with TEC

SANOS – Saturable noise suppressor

SANOS applications

- Suppression of noise (ASE – amplified spontaneous emission) after an optical amplifier (passive optical signal regeneration)
- All-optical wavelength conversion of pulsed optical signals

Main SANOS data

Resonance wavelength	λ = 1530 nm, 1535 nm, … ,1555 nm, 1560 nm in steps of Δλ = 5 nm
	temperature dependent resonance wavelength shift of Δλ = 6 nm
Full width at half maximum	FWHM = 16 nm
Low intensity transmittance	3 %
High intensity transmittance	45 %
Noise suppression factor	6 … 18 (dependent on the input signal/noise ratio)
Insertion loss	3 dB
Pulse fluence	F = 100 µJ/cm^2
Relaxation time constant	τ ~ 5 ps
Maximum mean input power	P_{max} = 0.5 W
Directivity	≥ 50 dB
Fiber connector type	FC/PC, other on request
Thermoelectric cooler/heater	– 2 °C … + 80 °C

SANOS description

A SANOS is a resonant saturable absorber mirror (RSAM), mounted on a circulator. The RSAM has a strong non-linear reflectance. For a low input signal level the transmittance of the FC-SANOS is only 3% (97% loss), whereas high intensity pulses are transmitted with a lower loss of 50%. The needed peak pulse power for saturation is about 500 mW. Because the RSAM is a resonant device, the noise is only suppressed at the resonance wavelength. The input isolation is better than 50 dB. The RSAM is temperature regulated using a thermoelectric cooler/heater (TEC) for fine tuning of the resonance wavelength with a maximum shift of 6 nm.

Order information

FC-SANOS-15XX-TEC:	Fiber coupled SANOS with resonance wavelength of 15XX nm and thermoelectric cooler SANOS with resonance wavelengths between 1530 nm and 1560 nm are available

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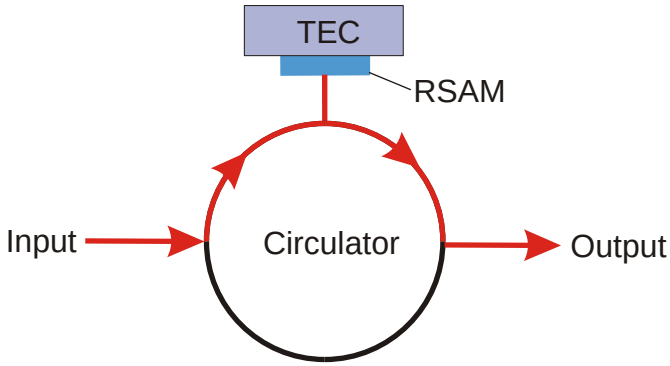

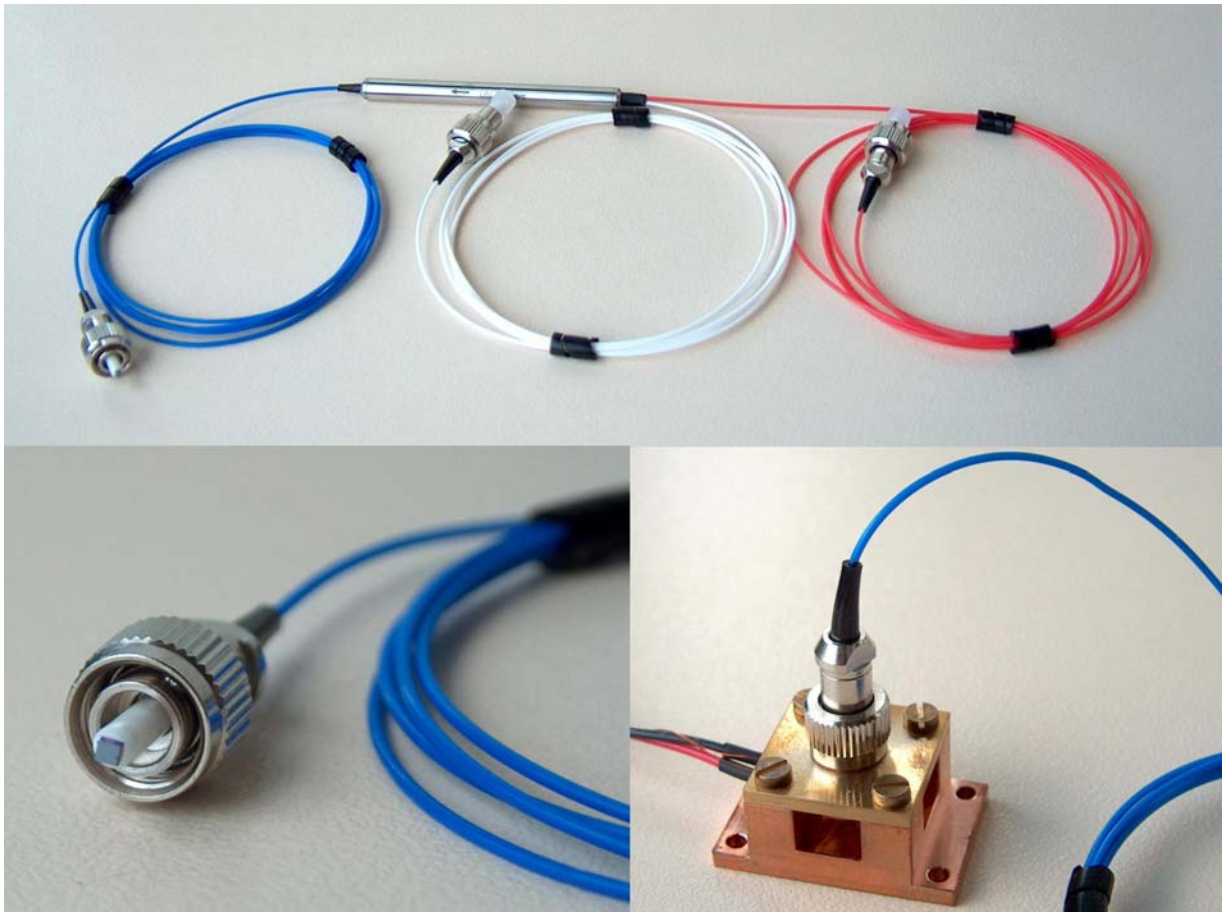

Fig: Fiber coupled SANOS with TEC

top: circulator with mounted RSAM (on blue cable)
bottom, left: RSAM on the ferrule
bottom, right: TEC with fiber coupled RSAM

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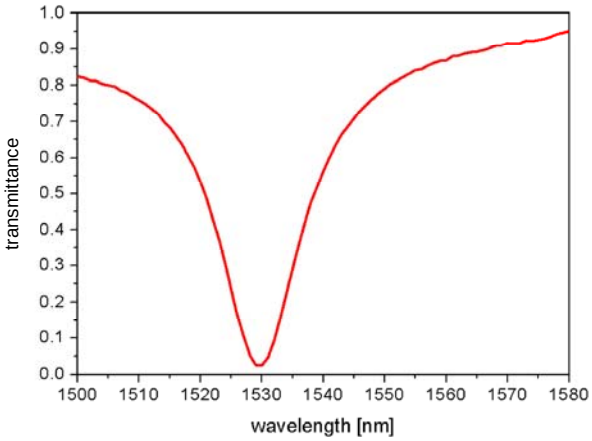
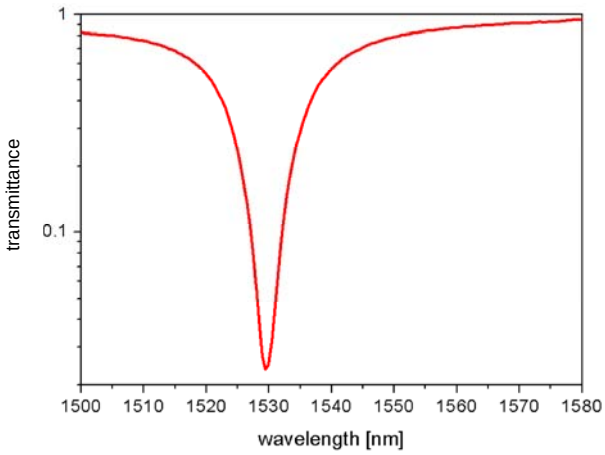
Spectral transmittance I_{out}/I_{in}

Low intensity (unsaturated) transmittance of a FC-SANOS-1530

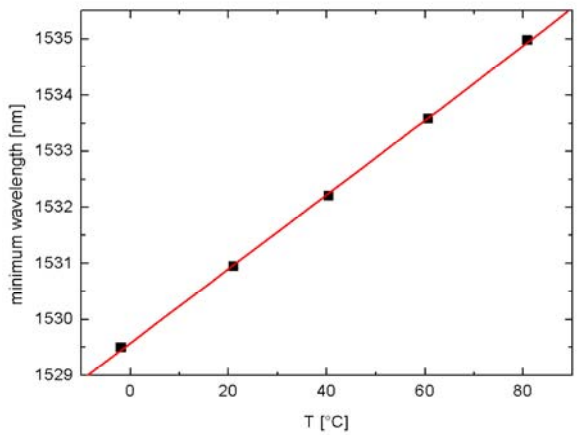
linear scale



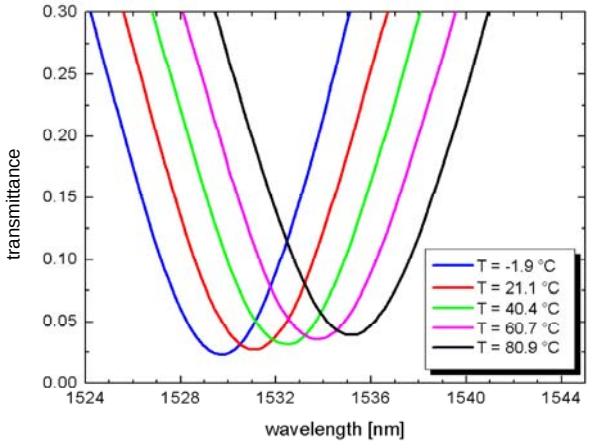
logarithmic scale



1530 nm FC-SANOS-1550-TEC
Temperature dependency of the resonance



Shift of the resonance wavelength using TEC
Low intensity (unsaturated) transmittance



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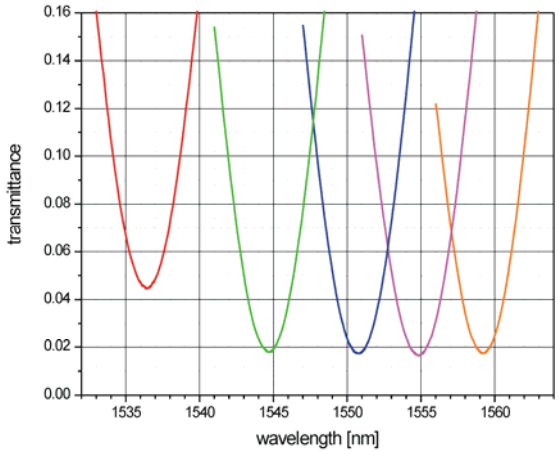
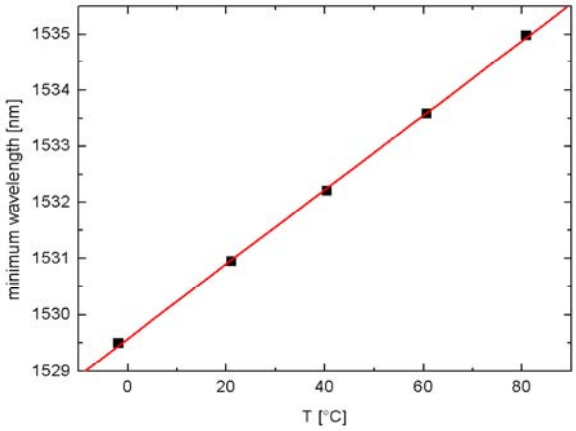
Resonance wavelength of FC-SANOS-15XX with different RSAMs



Temperature dependency of a 1530 nm SANOS



The temperature shift of the resonance wavelength λ is given by

$$\lambda(T) = \lambda(T_0)\left[1 + \frac{1}{n}\frac{dn}{dT}(T - T_0)\right]$$

with

temperature coefficient $\frac{1}{n}\frac{dn}{dT} \approx 4.4 \cdot 10^{-5} K^{-1}$

T_0 - reference temperature

T – working temperature.

Noise suppression factor

The noise suppression factor (improving factor of the signal to noise ratio) depends on the signal to noise ratio (S/N) of the input signal. If the noise level of the input signal is low, the noise suppression ratio is high and vice versa. The reason for this dependency is the partly saturation of the RSAM in case of a high noise level.

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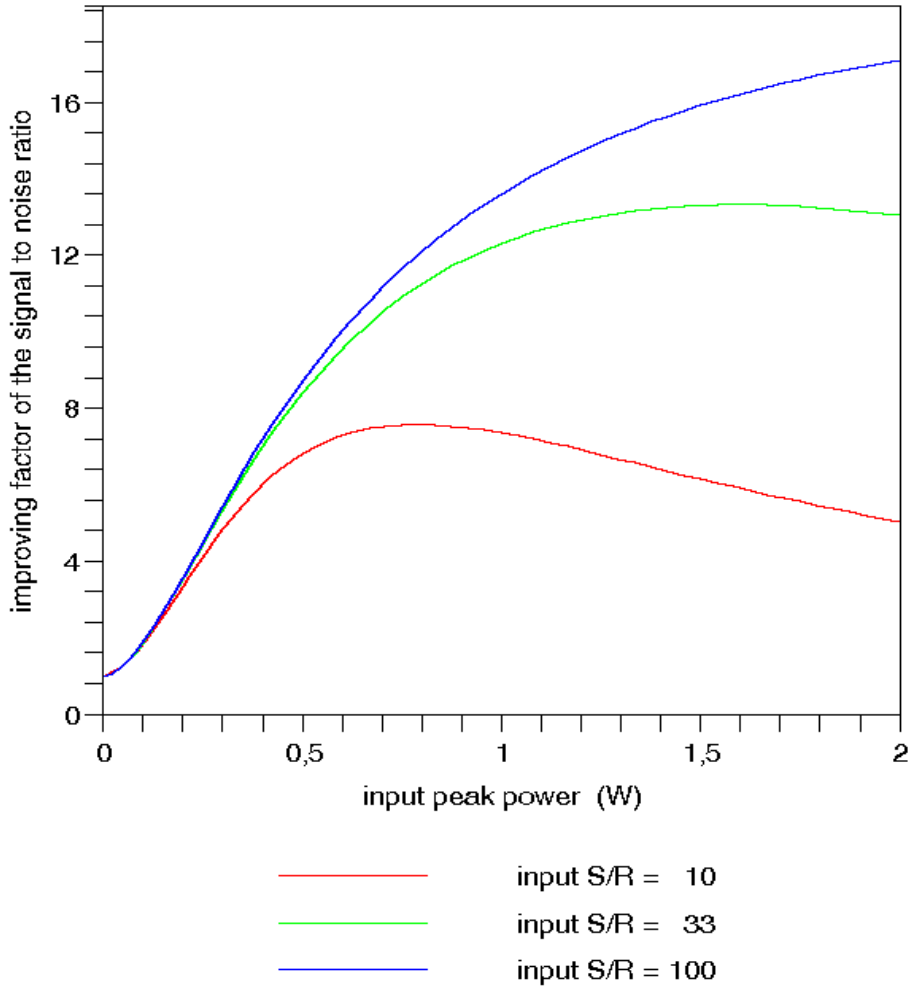

TEC – thermoelectric cooler/heater

The SANOS is mounted on a TEC to fine tune the resonance wavelength. The copper baseplate has to be mounted on a heat sink with good thermal conductivity.

polarity for SANOS cooling	red wire +/ black wire -
maximum ratings for cooling	current 1.3 A/ voltage 1.3 V ⇒ ~ -2°C at 20°C base plate temperature
polarity for SANOS heating	black wire +/ red wire -
maximum ratings for heating	current 0.8 A/ voltage 0.85 V ⇒ 78°C at 20°C base plate temperature

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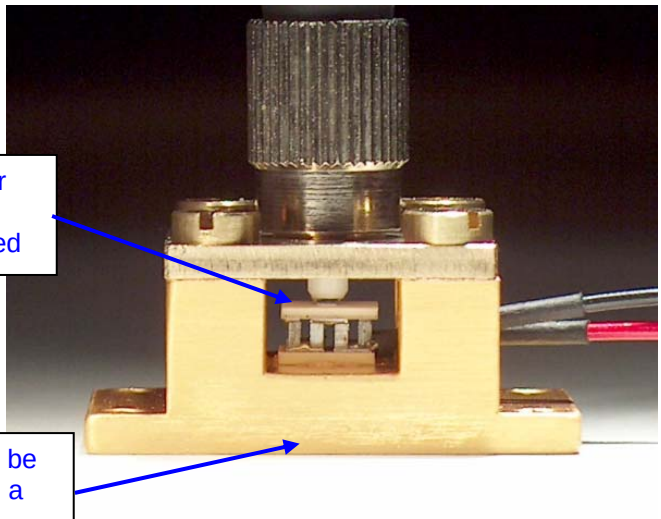
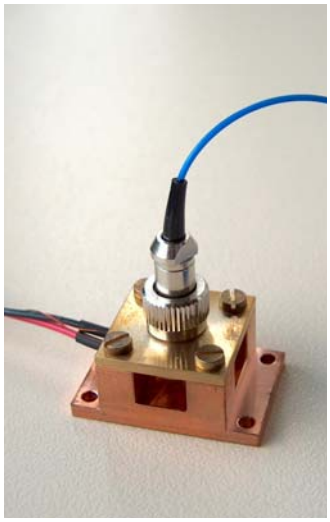
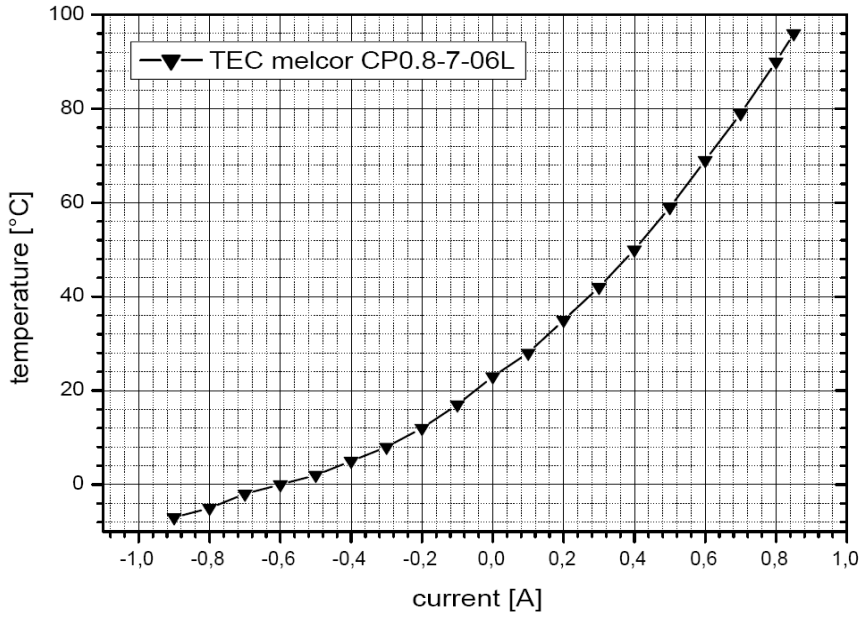


At this position a thermistor for temperature measurement can be placed

The copper baseplate has to be mounted on a heat sink with a good thermal conductivity.



TEC current – temperature characteristic



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