

RamanGEM-3311

Portable Raman spectrometer



EPCC / PRODUCTS / APPLICATION / SOFTWARE / ACCESSORIES / CONSUMABLES / SERVICES

Analytical Technologies Limited

An ISO 9001 Certified Company

www.analyticalgroup.net

GEM-3311 Portable Raman Spectrometer is TE-cooled, high sensitivity, enhanced designed for broadband ranges. All of optical path, PCB, signal processing method have been made optimized processed to obtain >15 times higher SNR than GEM-3200, nearly 100 times higher than 2000cm⁻¹.

GEM-3311 employs low noise CCD signal process circuit, noise < 3 counts.

GEM-3311 employs 110/220V power supply, DC supply via 5V adaptor. Easy to take and field operation.

PN	Wavelength /nm	Wavenumber range/cm ⁻¹
GEM-3311-473	473	150-4000
GEM-3311-532	532	150-4000
GEM-3311-785-27	785	250-2700
GEM-3311-785-40		150-4000
GEM-3311-830	830	150-4000
GEM-3311-1064	1064	150-4000
Available in custom wavelength		

►► Features:

- Ultra-high sensitivity FFT-CCD TE-cooled;
- low noise circuit;
- Powerful embedded software;
- Fluorescent background eliminate;
- Peak finding and display;
Win 10 operation system;
- USB 2.0;
- User friendly human-machine interface;
- Remote control via LAN;

►► Application

- Biological science
- Pharmaceutical engineering
- Forensic analysis
- Agriculture and food safety
- Gemstone
- Environmental science

►► Remark

- Measuring method is based on ASTM E2529-06;
- Available in custom design, resolution can be increased by around 1/3, resulting in lower sensitivity;

GEM-3311 System				
Operating system	Windows			
Integration time	1ms - 120s			
Power voltage	DC 5V(+/-5%)			
Operating Temp	-10~50°C			
Operating humidity	< 95%			
Dimension(L*W*H)	40×30×18 cm³			
Weight	7.5 Kg			
Reliability				
Spectral stability	σ/μ < 0.5% (COT 8 hours)			
Temp stability	Spectral shift $\leq 1\text{ cm}^{-1}$ (10-40°C)			
Variation of intensity (in 5 ~ 40°C)	<±5%			
Optical parameters				
Spectral range (cm ⁻¹)	150-2700	250-2700	200-3500	200-4300
Resolution (cm ⁻¹)	3	6	8	10
SNR	>3000:1 (918 cm ⁻¹ of Acetonitrile, 10s accumulation, 200mW)			
Entrance slit	50 μm			
Optical system	f/4 C-T crossed optical path			
focusing	98 mm for incidence and output			
Detector				
Item	Ultra-high sensitivity, quick cooling CCD			
Detector cooled down to	-10°C			
Detecting range	200-1100 nm			
Effective pixels	2048*64			
Dynamic range	50000: 1			
Pixel size	14μm×200μm			
Exciting Laser				
Central wavelength	785nm (+/-1nm)			
FWHM	0.08 nm			
Power output	≥500 mW			
Power stability	σ/μ <±0.2%			

Raman probe	
Operating distance	6 mm
Rayleigh scattering resistance	OD>8
Numerical Aperture	0.3
Aperture	7mm

►► 2. Optical performance

►► 2.1 General spectral performance

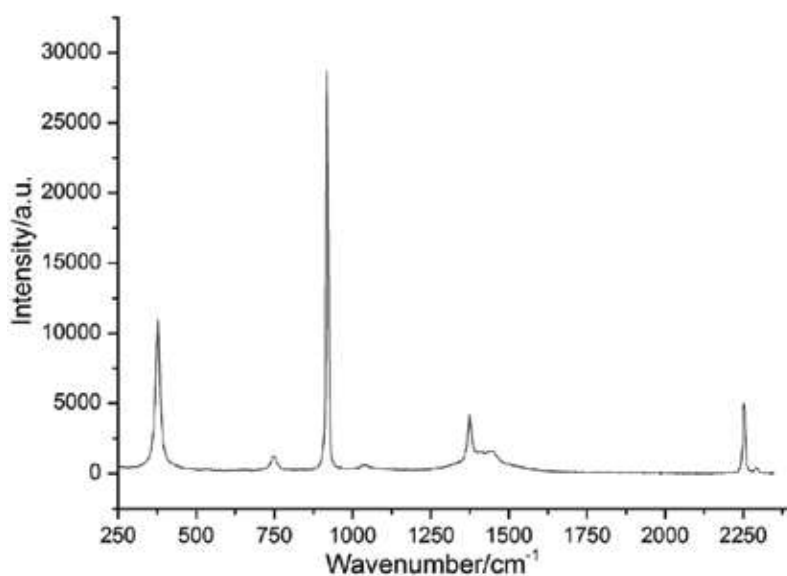


Figure 1 Raman spectra of acetonitrile

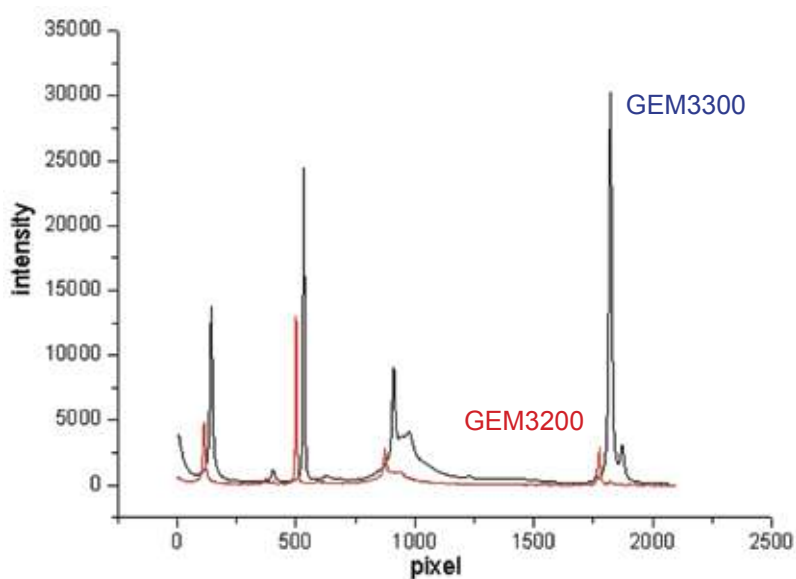


Figure 2 Sensitive of GEM3300 vs GEM3200

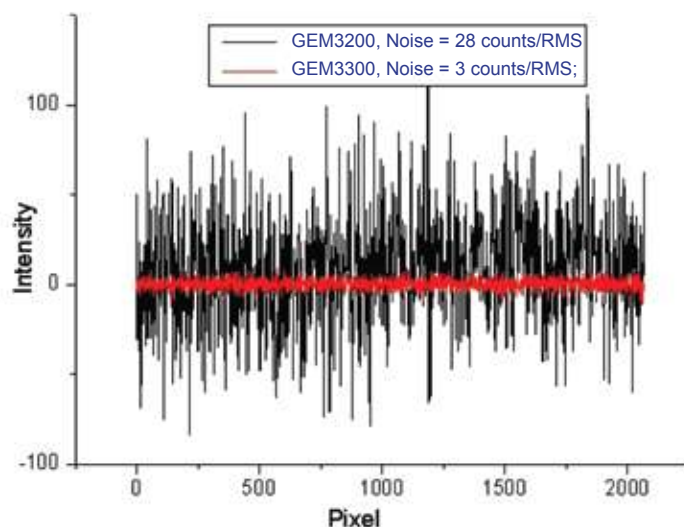


Figure 3 Noise of GEM3300 vs GEM3200

►► 2.2 Spectral Resolution

►► 2.2.1 Raman spectral of Tylenol

Power output: 200 mW
Integration time: 10 s
Filter level 1

Raman spectra of Tylenol showed the resolution condition in the long wavelength region. That is better than 6 cm^{-1} .

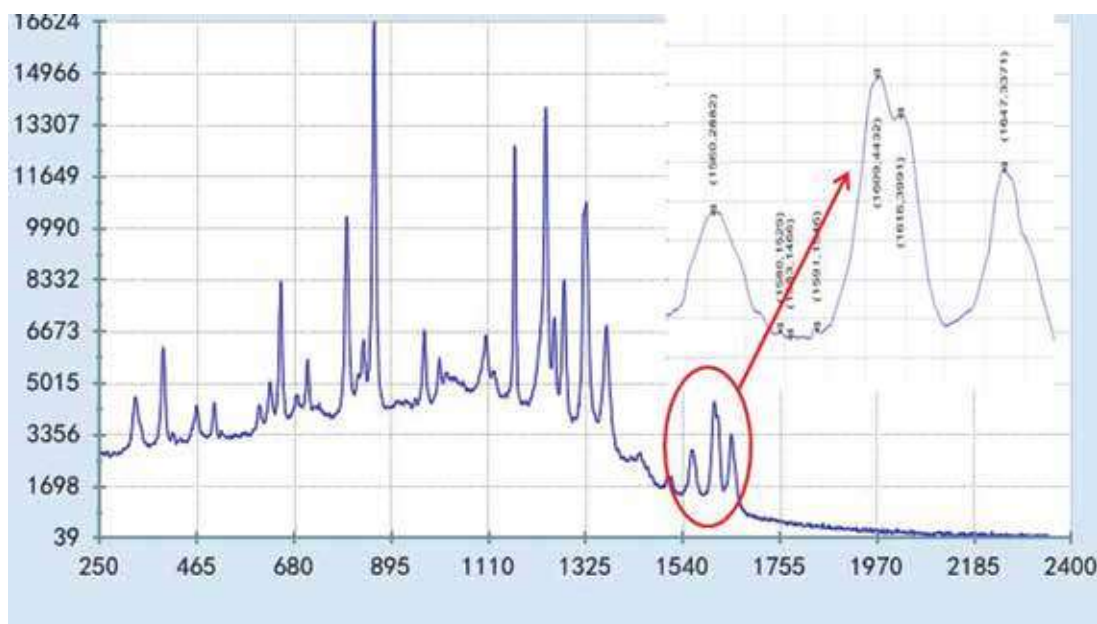


Fig.2.2 Raman spectrum of Tylenol, the vibration mode $1610/1615\text{ cm}^{-1}$ can be resolved.

►► 2.2.2 Raman spectral of petrol

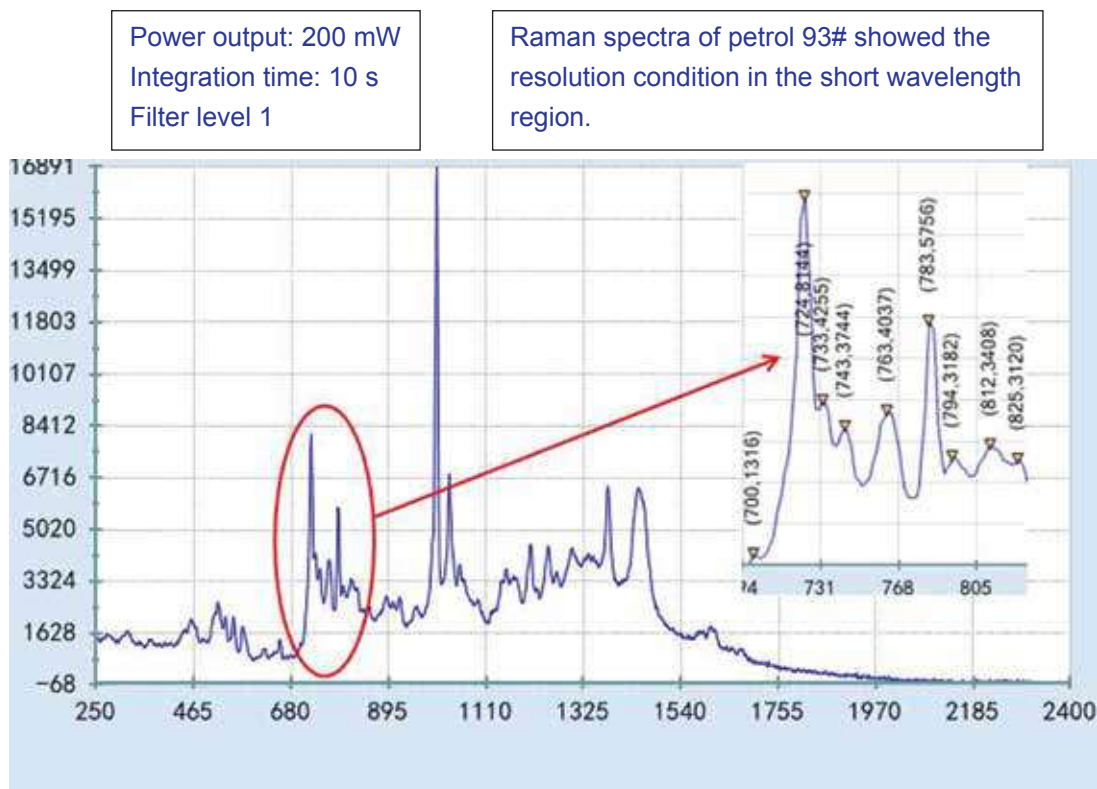


Fig.2.3 Raman spectrum of petrol 93#, the vibration mode 723/732/742cm⁻¹ can be resolved.

►► 3 Reliability

Figure 3.1 and Figure 3.2 showed the temperature reliability testing results of fives GEM3300 portable Raman spectrometers. The testing temperature range was from 5°C to 40°C. The spectrometer was kept more than 1 hour at every temperature spots. Acetonitrile was used as the standard sample in the testing. The testing results were calculated using 918 cm⁻¹ of acetonitrile. The wavenumber shift was 1 cm⁻¹ or less(as show in Fig. 3.1). The peak intensity variation was less than 10% (as show in Fig. 4).

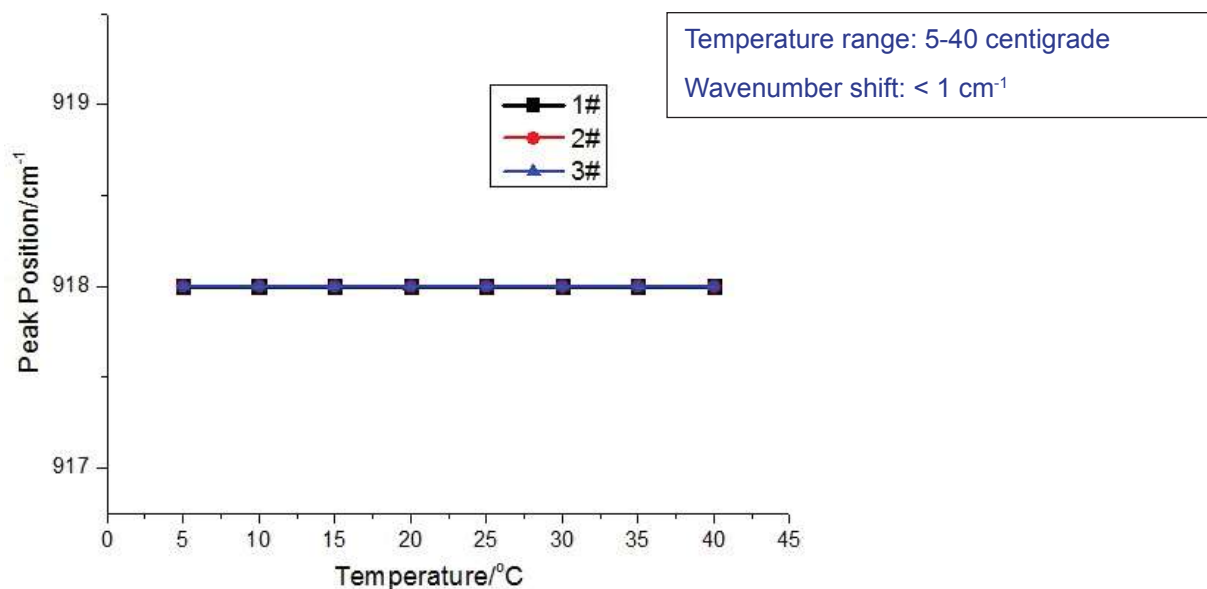


Fig. 3.1 Wavenumber shift results testing from 5°C to 40°C of fives GEM3300 portable Raman spectrometers

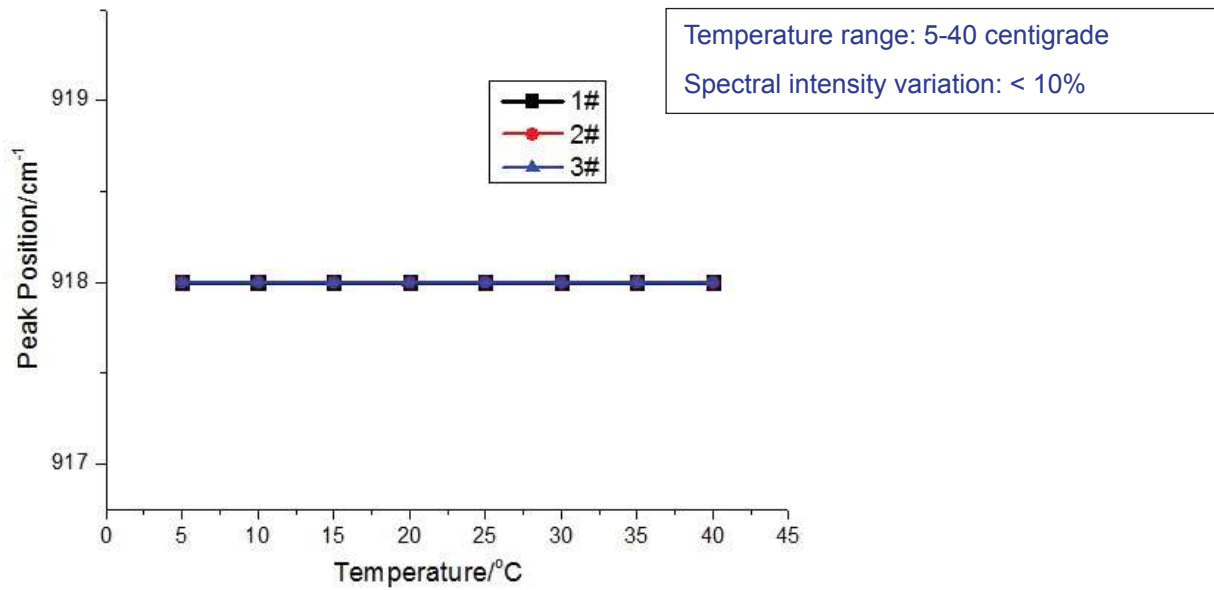


Figure 4 Intensity variation testing from 5°C to 40°C of three GEM3300 portable Raman spectrometers

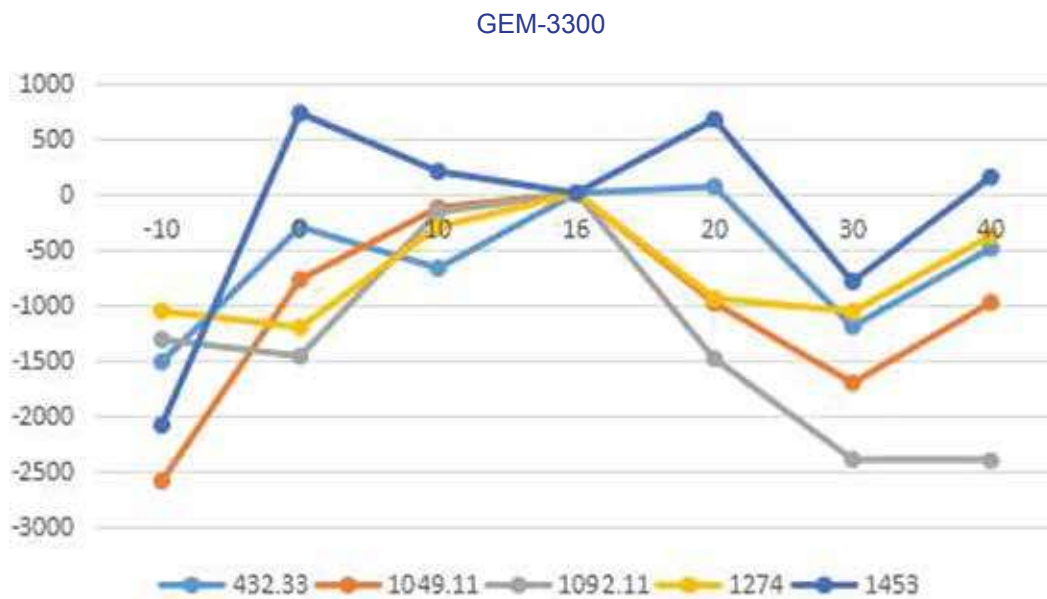


Figure 4 Intensity variation -10°C to 40°C of GEM3300 portable Raman spectrometers, sample is alcohol.

►► 2. Measuring accessories



Fig 2 Solid, powder measuring probe



Fig 1 Fluid sample cell (Thermo bottle)



Fig 2 Fluid sample cell (Liquid chromatography bottle) (Optional)



Fig 5 Raman probe gun (optional)



Fig 6 Measuring adjustable holder (Optional)

►► 3. Other excitation wavelength:

ITEM No.	Excitation Wavelength (nm)	Maximum laser power (mW)	Spectral range (cm ⁻¹)	Resolution (cm ⁻¹)	Feature
GEM-3311-40	785	550	150-2700	3	Available for most application
GEM-3311-27			250-2700	6	
GEM-3311-35			200-2500	8	
GEM-3311-43			200-4300	10	
GEM-3311-1064	1064	500	200-2600	13	Fluorescence-free, nondestructive, high-sensitivity, highSNR, Available samples: dark-color samples, fluorescence sample, biology sample, bacteria, plastic, fuel, petroleum product, vegetableoil, explosive etc.
GEM-3311-830	830	550	200-3300	7	higher skin permeance suit to biological samples, eg.Noninvasive blood glucose, early cancer diagnosis
GEM-3311-266	266	50	200-3000	25	
GEM-3311-532	532	100	200-3200	10	
GEM-3311-633	633	80	200-3200	10	

Regulatory compliances



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2. Improving quality of life by offering YOGA Training courses, Work shops/Seminars etc.

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