Response to Reviewer 3 Comments

Point 1: It is not clear how the authors calculated the loss tangent, which is shown in Fig. 8. From the text we can conclude that only the reflection coefficient was measured. It is not clear how the loss tangent could be calculated from the reflection coefficient measurements. From only the reflection coefficient, such information is difficult to extract.

Response 1: We are thankful to the reviewer for this technical suggestion. This suggestion is also given by another reviewer. We have added the following Table 1 in the updated version of manuscript (as Table 5), which contains the complex and real part of permittivities used in these simulations. The permittivity data taken from [26] gives permittivity values for different gasoline samples at 20ºC only.
The complex permittivity values were measured using N1501A permittivity measuring kit. Since loss-tangent is the ratio of complex permittivity ε" and real permittivity ε, it is calculated using the following Table 1 and plotted in the Figure 1.

-Revised paper: Line (198)
The ratio tanδ quantifies the loss of power due to the propagation in a conductor. To analyze this loss of power, we performed experiments with the proposed sensor on gasoline samples with different permittivities as shown in Figure 9 using Table 5. The complex permittivity values were measured using N1501A permittivity measuring kit.

Table 1. Measured real and complex values of permittivity for different gasoline samples

Gasoline Sample	Permittivity Real (ε)	Permittivity Complex (ε'')
Tier2	2.018	0.0764
Cold CO	2.072	0.073
Euro4	2.134	0.066
Tier3	2.289	0.0087
LEV3	2.324	0.0385

Point 2: The measurement accuracy of the resonant frequency at different permittivity values is also questionable. As I understand, the change of permittivity will change not only the resonance frequency, but also the loaded quality factor of the resonator (which, in turn, also will shift the resonance frequency). This situation is confirmed by blurring of the peaks of the reflection coefficient.
Authors should try to separate these two factors one from another.

Response 2: The experiment using the resonator was measured five times each, and the measurement error of all experiments including 0°C of LEV3, which has the lowest quality factor, has an error of less than 500 KHz. Samples with different dielectric constants in experimental measurements show various quality factors. However, since the measurement error of all samples is 0.5 MHz, which is smaller than the minimum resonant frequency difference 29 MHz between samples, it is possible to distinguish between samples even considering the error due to the quality factor. This explanation is also added in the revised version of manuscript in “Results and Discussion”.

-Revised paper: Line (240)

All the measurements were repeated five times with the same sample and their average value is considered. The measurement error of all experiments including 0◦C of LEV3, which has the lowest quality factor, has an error of less than 0.5 MHz. Samples with different dielectric constants in experimental measurements show various quality factors. However, since the measurement error of all samples is 0.5MHz, which is smaller than the minimum resonant frequency difference 29MHz between samples, it is possible to distinguish between samples even considering the error due to the quality factor.

Point 3: The sentence in lines 163-164 is not clear:
"Also, it can be easily observed that resonance frequency has a negative relationship with permittivity and the resonance frequency".
Apparently, the resonance frequency is negatively interconnected with itself.
Response 3: Thank you for bringing this to our attention. The sentence is a writing mistake, which has been corrected in the updated manuscript.

Point 4: Figures 2 and 7a have the same sense. Do the authors really need to demonstrate both figures?
Response 4: The following Figure 1 of the experimental setup was added in the Section 2 "Sensor Modeling and Design". The purpose of the picture is to give an idea about the basic connections of sensor and how it works while describing the structure of sensor. This figure also gives a clear view as compared to the later one, which does not show the placement of thermostatic bathing chamber

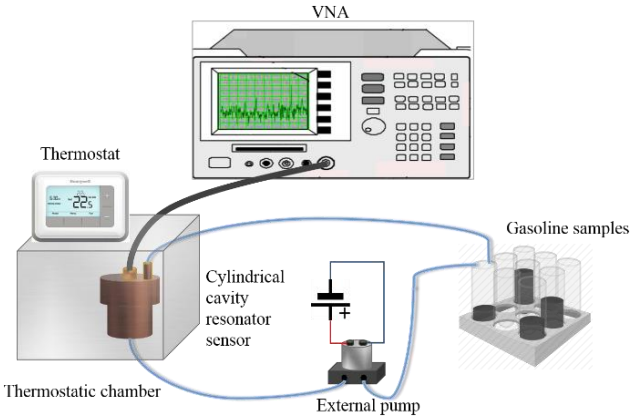

Figure 1. Experimental schematics of microwave cavity resonator for measuring permittivity of different gasoline samples

The following Figure 2 was added in the Section 4 "Experimental Setup and Discussions" manuscript to support the described experimental installation.

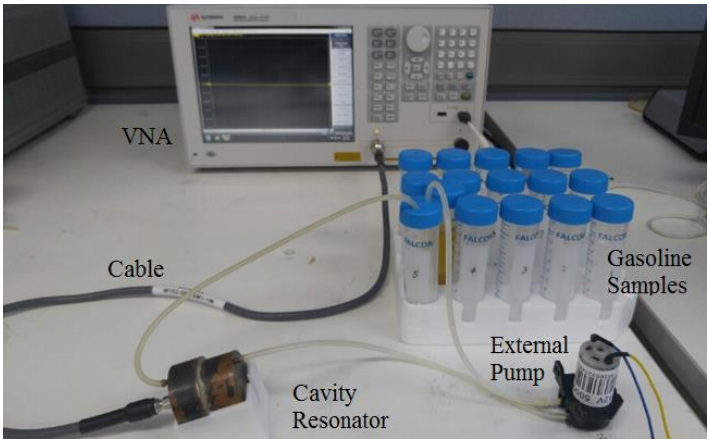

Figure 2. Actual experimental installation