

## Épreuve de DNL Anglais Physique-Chimie

## Sujet n°1 – Série Technologique

Durée de l'épreuve : 40 minutes

- 20 minutes de préparation
- 10 minutes de présentation et 10 minutes d'échange avec le jury

**ULTRASONIC SENSORS for VEHICLE PARKING**

For years, ultrasonic sensors have been used in a wide range of applications including fish finders, parking sensors in cars and burglar alarms.

Ultrasound has several characteristics which make it so useful and that have led to its use in many electronics applications. Firstly, it is inaudible to humans and therefore undetectable by the user. Secondly, ultrasound waves can be produced with high directivity. Thirdly, they are a compressional vibration of matter (usually air). Finally, they have a lower propagation speed than light or radio waves.(...)

Parking sensors use a type of sonar. The term sonar is an acronym for sound navigation and radar; it's used for calculating the distance and/or direction of an object from the time it takes for a sound wave to travel to the target and back. An ultrasonic sensor is a speaker or microphone that emits or receives ultrasound. There is also a type that can handle both emission and reception. Vehicle parking sensors are equipped with this type of sensor. Ultrasound sensors initially found use in vehicles for detecting obstacles when parking (Figure1) but it is now evolving into an automatic parking system.

Narrower directivity can be achieved at higher frequency. Difference in detection distance with varying frequency at the same size is indicated in Figure 2.

Figure 1

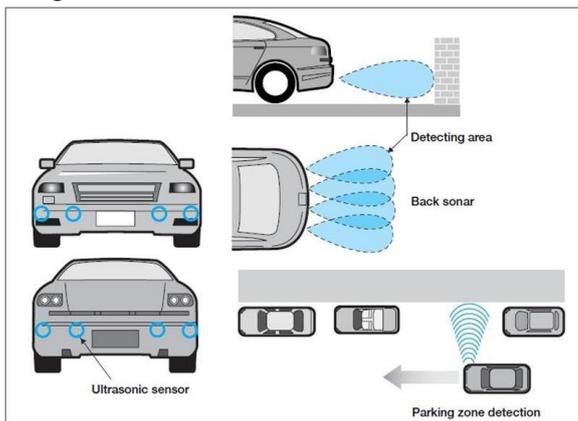
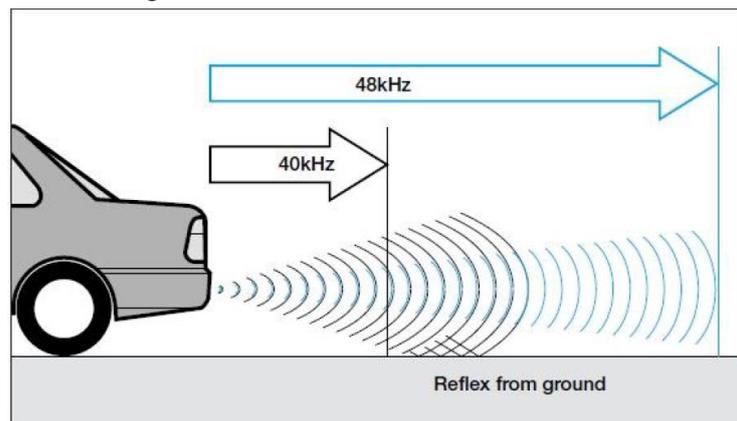


Figure 2



<http://www.newelectronics.co.uk/electronics-technology/an-introduction-to-ultrasonic-sensors-for-vehicle-parking/24966/>

**Help :**

Directivity of an ultrasonic sensor corresponds to the size and shape of the vibrating surface (that is emitting the ultrasound) and the frequency at which it vibrates.(...)

## **TASKS :**

- Present the document, giving the characteristics of an ultrasound and describing how vehicle parking sensors work.
- Discuss the consequences of the characteristics which are described in the text from line 4 to line 7.
- Give the link between energy and frequency. Comment and explain figure2
- Imagine the car of tomorrow.