

## System description of the Opel Immobilizer 2nd Generation Redesign

The immobilizer 2nd generation prevents drive away car theft powered by its own engine without having a valid key. It uses an inductive data transmission between transponder (mounted inside the key) and the control unit. This data link is working with a carrier frequency of 125 kHz and uses amplitude modulation for transmitting data to the transponder. For the direction from the transponder to the control unit damping modulation with pulse duration coding is used.

### Functional description

After switching on the ignition the immobilizer transmits a random number to the transponder. It calculates a result and transmits it back to the immobilizer. The result is checked and if it is correct, the engine will be released. After that, the immobilizer is switched off until another start is attempted. The longest period for transmitting 125 kHz is 3 seconds.

### Typical usage pattern (for Europe only)

15 operations in 24 hours with a transmission duration of 2 seconds.  
→ total transmission duration of 1.25 seconds within 1 hour

Transmitter ON	1.25	seconds / hour
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Transmitter OFF	3598.75	seconds / hour
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Duty Cycle:  $T_{ON} / T_{(ON+OFF)} \times 100\% = 1.25 / 3,600 \times 100\% = \underline{0.03\%}$

### Technical Data

Carrier frequency:	125 kHz $\pm$ 5kHz
Field strength:	< 40 dB $\mu$ A/m @ 10m
Type of modulation	ASK
Number of channels:	1
Power supply:	12 V DC
Type of battery:	car battery
Transmission range:	20 cm