

# US-Key

*New generation of High performances Ultrasonic device*



US-Key connected to a laptop computer

# US-Key

## Ultrasound device single channel

### Features

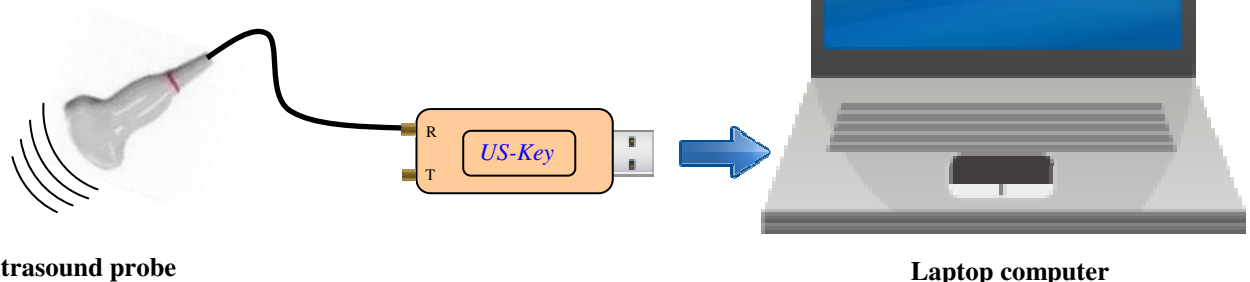
- USB2 High Speed connection
- Ultralow noise preamplifier :  $0.74 \text{ nV}/\sqrt{\text{Hz}}$
- - 6 dB bandwidth : 540 KHz to 18 MHz
- High voltage transmitting pulses
- $50 \Omega$  load drive
- Digitizer 12 bits at 80 MSPS
- Programmable gain : 0 to 80 dB
- DAC curve
- USB power supply 5 Volts
- Very small size : 70 x 36 mm
- Windows XP / Vista / Seven

### Applications

- Medical ultrasound imaging
- NDT metal flaw detection
- Research and university

### Typical Application

*US-Key plugged to a laptop computer by the USB connector*



**Ultrasound probe**

**Laptop computer**

### General Description

US-Key is our new generation ultrasound devices with a single channel to transmit and receive ultrasonic waves. Its very small size and its advanced technology allow to have an unique product for more applications like medical ultrasound imaging, the NDT and also for the research and university.

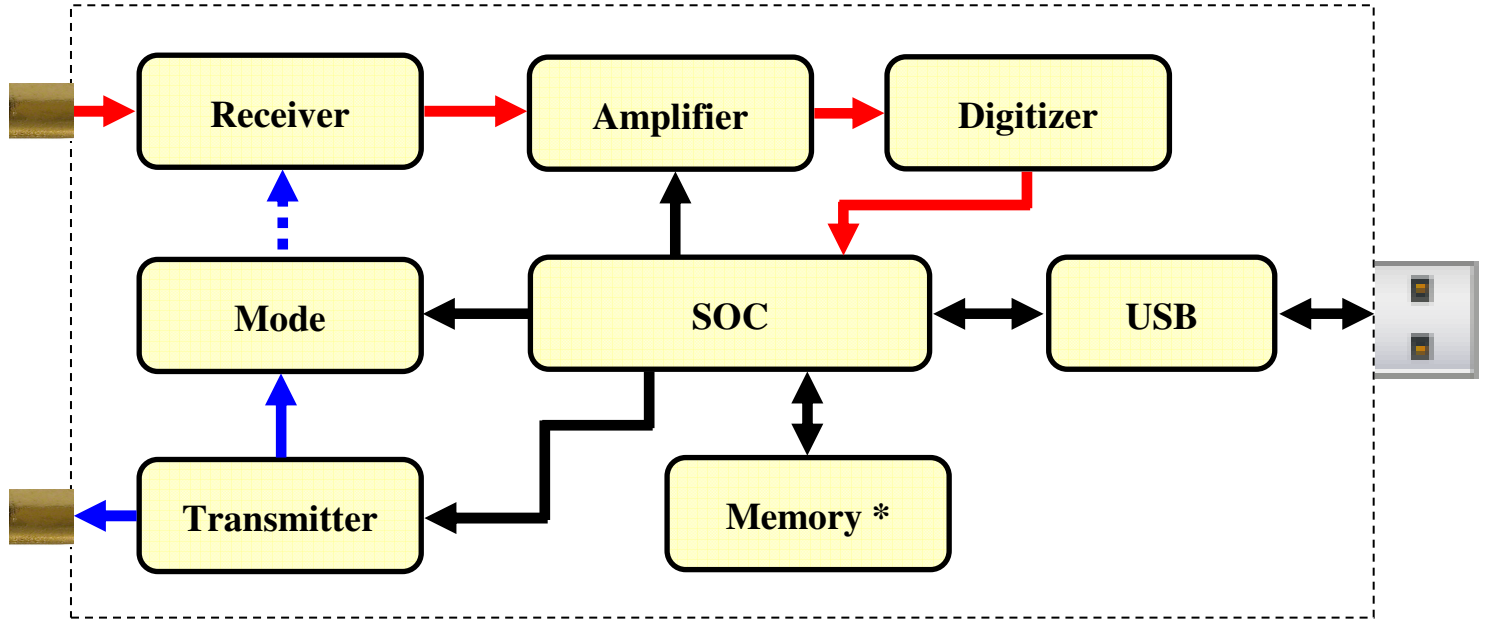
The transmitter can generate pulses with a voltage level and a width programmed by the user. A low noise preamplifier combined to a VGA gives a gain range between 0 and 80 dB, a DAC curve is also available. A 12 bits analog digital converter with a sampling frequency of 80 MHz is used to digitize ultrasound signals.

The device has 2 working modes : Transmission or Reflection. The power supply is delivered by the USB connector (5 VDC).

There are two versions available :

- one with I/O Sata connector
- one without it

## Block Diagram



SOC : System On Chip

\* : 4 Mbits memory option

## Absolute Maximum Ratings

Parameter	Value
Power Supply	+ 5.4V
High Voltage	- 230V
Synchro In / Out *	+ 5.4V

*Absolute Maximum Ratings are those values beyond damage to the device may occur. Functional operation under these conditions is not implied. Continuous operation of the device at the absolute rating level may affect device reliability. All voltages are referenced to device ground.*

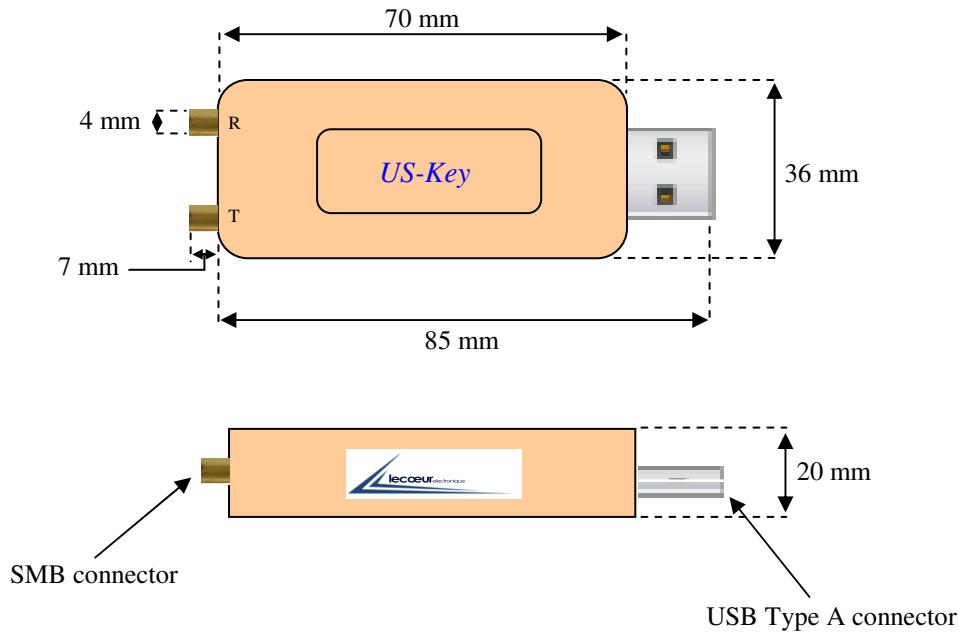
\* For the version with the Sata connector (inputs / outputs)

## Ordering Information

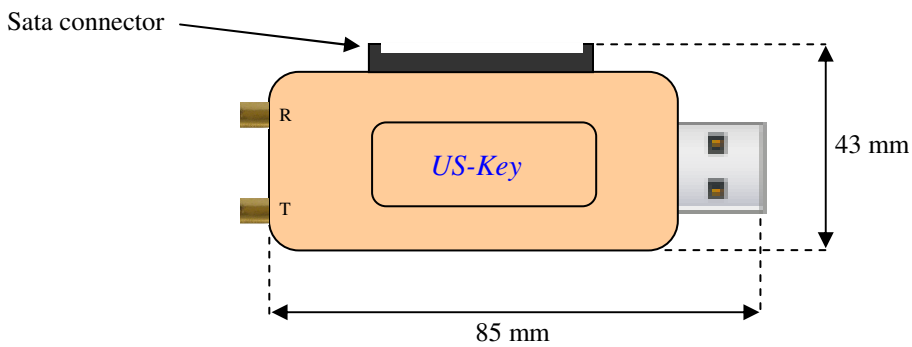
Type of Device	Standard
	Code
US-Key alone	US-Key_AL
US-Key with I/O connector	US-Key_IO

## Outline Dimensions

### US-Key\_AL (Without I/O connector)



### US-Key\_IO (With I/O connector)



## Operating Conditions

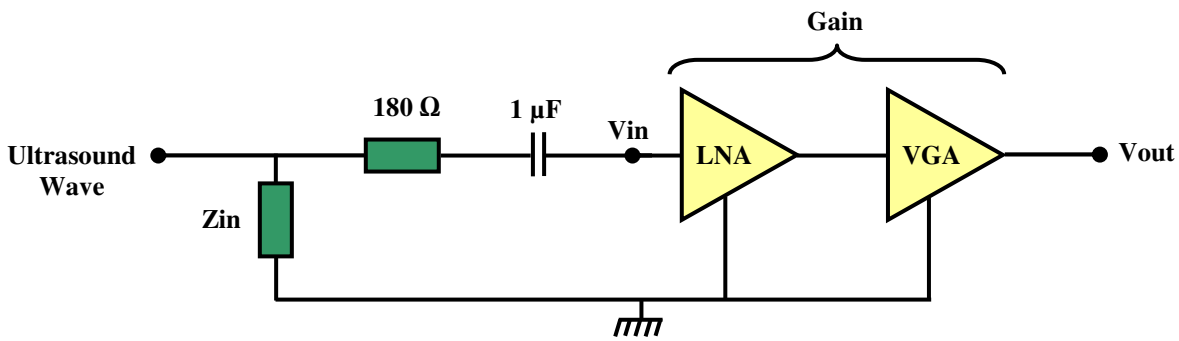
Parameter	Value
Power Supply	+ 5V
Synchro In / Out *	+ 5V

\* For the version with the Sata connector (inputs / outputs)

## Electrical Characteristics

(Over operating conditions unless otherwise specified)

Receiver / Amplifier			
Sym	Parameter	+25°C	Units
BW	Bandwidth to -6dB	0.54 to 18	MHz
F0	Central Frequency	3	MHz
Lin	Gain Linearity	+/- 0.5	dB
Gain	Gain Range	0 to 80	dB
Zin	Input Impedance (+/- 5%)	100	$\Omega$
Vin	Input Voltage Range	+/- 275	mV
Noise	Preamplifier noise	0.74	nV/ $\sqrt{\text{Hz}}$



Simplified Receiver / Amplifier Schematic

### Amplifier's components

- LNA : Low Noise Amplifier ( $\equiv$  Preamplifier)
- VGA : Variable Gain Amplifier

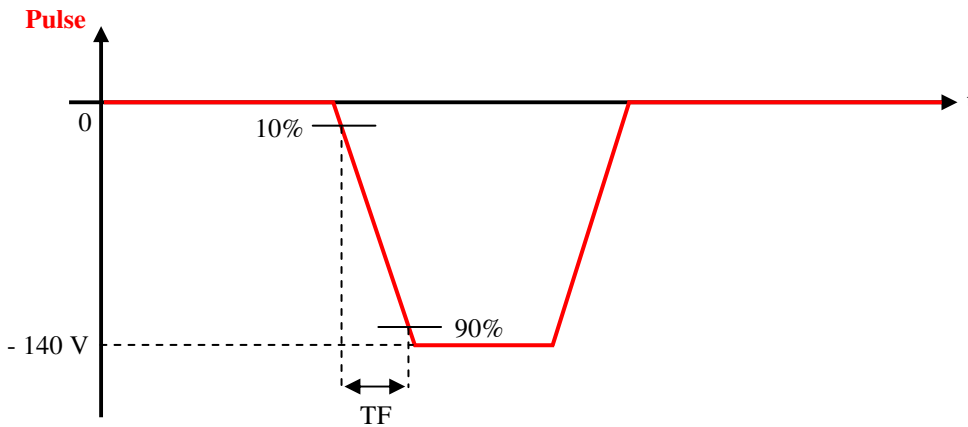
Digitizer			
Sym	Parameter	+25°C	Units
Resolution	ADC Resolution	12	Bits
Fs *	Sampling Frequency	80	MHz

\* Option to increase this value to 160 MHz.

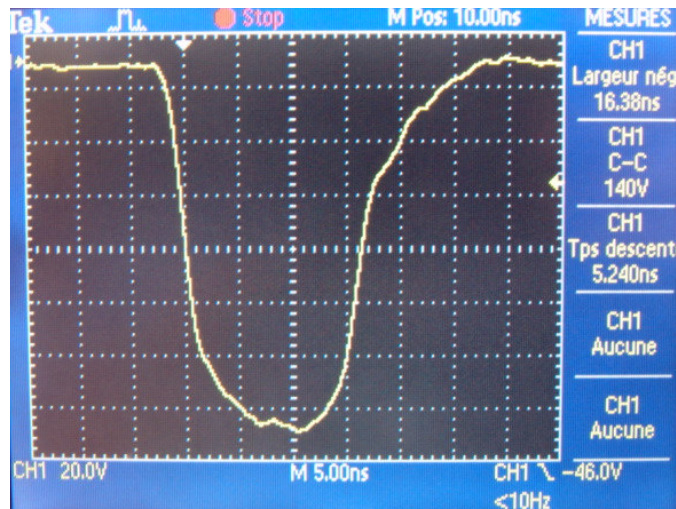
<b>Transmitter *</b>			
<b>Sym</b>	<b>Parameter</b>	<b>+25°C</b>	<b>Units</b>
<b>HV Min</b>	<b>High Voltage Min</b>	<b>- 30</b>	<b>V</b>
<b>HV Max</b>	<b>High Voltage Max</b>	<b>- 230</b>	<b>V</b>
<b>HV Step</b>	<b>High Voltage Variation Step</b>	<b>5</b>	<b>V</b>
<b>PW Min</b>	<b>Pulse Width Min (- 6dB)</b>	<b>16.6</b>	<b>ns</b>
<b>PW Max</b>	<b>Pulse Width Max (- 6dB)</b>	<b>480</b>	<b>ns</b>
<b>PW Mean Step</b>	<b>Pulse Width Variation Step</b>	<b>6</b>	<b>ns</b>
<b>TF **</b>	<b>Pulse Fall Time</b>	<b>5.2 to 7.8</b>	<b>ns</b>

\* These tests were carried out with a 50Ω load and at - 140 V for the widths.

\*\* Depend on the pulse width (5.2 ns for a width of 16.6 ns)



## Typical Performance Characteristic



Pulse with 50Ω load

## I/O Sata Connector

On this connector, many signals are available some of them are inputs : input synchronization and supply voltage + 5V.  
 Some other are outputs : alarms, output synchronization and supply voltage + 3.3V (Pls refer to the user's guide).

Pin Number	Function	Designation
1	User I/O	Used in specific applications
2	User I/O	Used in specific applications
3	User I/O	Used in specific applications
4	User I/O	Used in specific applications
5	User I/O	Used in specific applications
6	User I/O	Used in specific applications
7	User I/O	Used in specific applications
8	GND	Ground
9	+ 3.3V	Used to supply the I/O board
10	+ 5V	Can be used in sinking or sourcing
11	Analog_M1	Analog output for the Monitor N°1
12	Analog_M2	Analog output for the Monitor N°2
13	Analog_M3	Analog output for the Monitor N°3
14	Alarm_M1	Alarm output for the Monitor N°1
15	Alarm_M2	Alarm output for the Monitor N°2
16	Alarm_M3	Alarm output for the Monitor N°3
17	Synchro_Out	Output to synchronize an external device
18	Synchro_In	Input to synchronize the US-Key

## Options & Accessories

- 160 MHz Sampling frequency
- I/O Connector + I/O Board
- Bandwidth 30 MHz

## Software & DLL

- Delivered with an executable
- Graphical interface for the user
- DLL compatible with Labview, Matlab, Visual Basic, C, C++ and Visual C

**More informations on our web site :**  
**[www.lecoeur-electronique.com](http://www.lecoeur-electronique.com)**

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