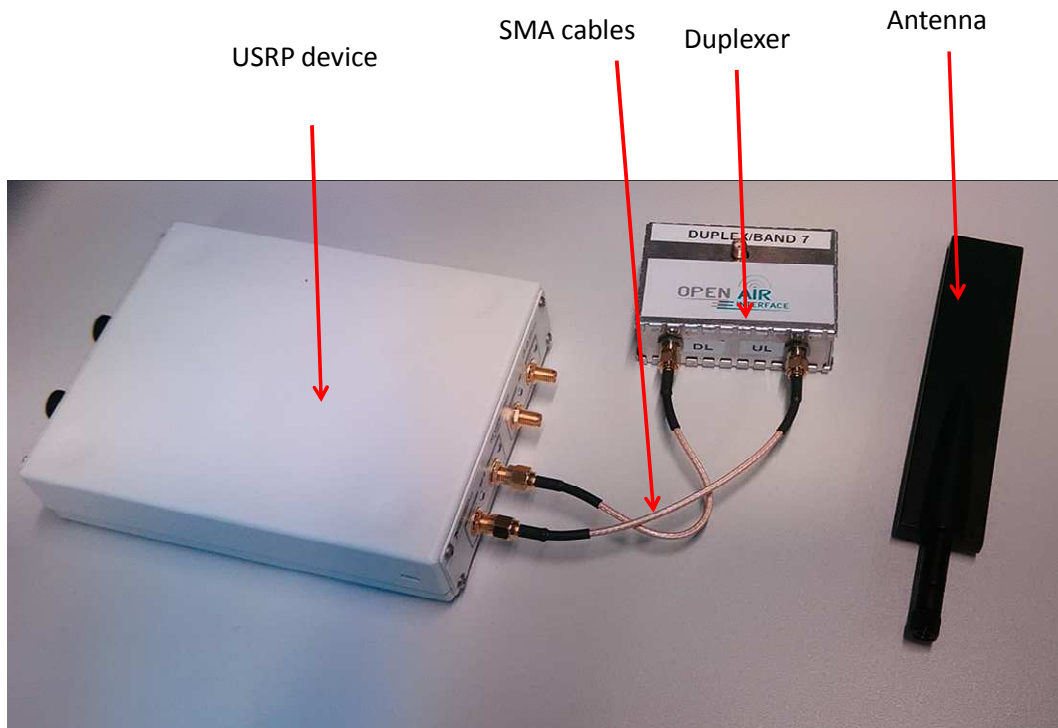


OAI duplexers and RF solutions for LTE

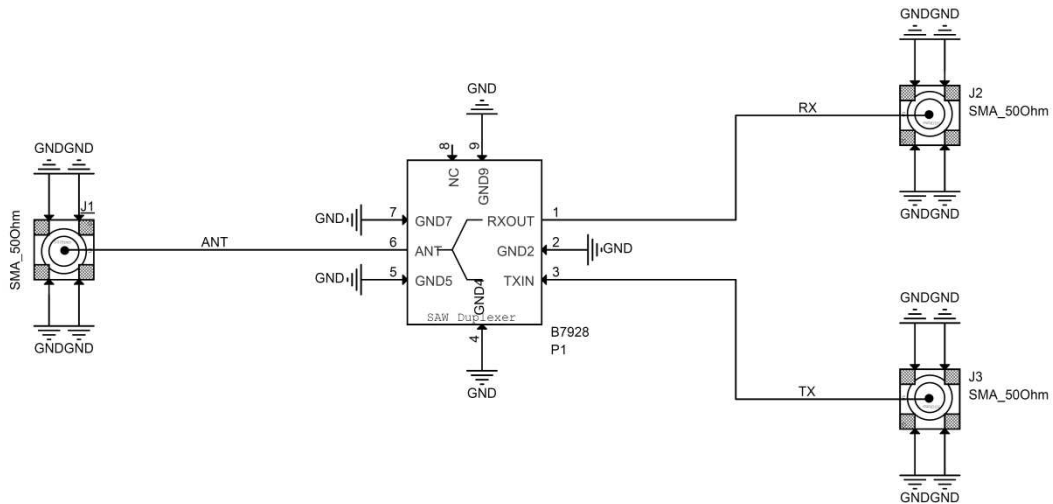
The OpenAirInterface team has developed 2 solutions in order to transmit/receive properly RF signals in various bands. We have a passive solution (ie a duplexer) and an active solution (with duplexers/switches and amplifiers). Those solutions are compatible with ExpressMIMO2 but also others Software Defined Radio hardware such as USRP (NI). The developed solutions are SISO, but of course can be added together for MIMO operation.

Passive solution

The overview of the setup is illustrated in the picture below (with an USRP device).



The duplexer contains a Printed Board Circuit with a duplexer from TDK. The schematic of the PCB is illustrated in the picture below. It has 3 ports : antenna, RX and TX (SMA connectors).



The available bands/chips are listed in the list below (TDK reference and function) :

B8660	Duplexer Band 7 UE
B7943	duplexer 2,6 GHz BS (B7)
B7928	duplexer B13 for UE (746-787 Mhz)
B8026	duplexer B4 BS (1732.50 / 2132.50)
B8642	duplexer B20 (847.0 / 806.0)

It can be noticed that a Duplexer can be used for BS (Base Station, eNodeB) and UE (User Equipment). If you use the duplexer B8026 (Band 4 BS), you have to connect the TX port of your USRP to the TX port of the duplexer at the BS side. If you are implementing the UE, you have to connect the TX port of your USRP to the RX port of the duplexer. The Printed Board Circuit is encased in a metallic box.

An antenna can be provided.

Datasheet

LTE Magnetic Antenna - SMAm - 2.5m

700 - 960MHz / 1710 - 2700 MHz

CEL 7027 M

Ord. Code

607 010-699

- Avoids permanent fixing, easily transferred
- Simple mouting : just place it on the car roof or on a metallic ground plane
- Strong magnet

Subject to Alterations

Technical data

Dimensions (mm)	100 ± 25 / Ø29 ± 5
Weight (g)	100 + 20
Materials	Nylon 6
Colour	Black
Temperature Range	-40° to +80°
Protection Class	IP54

LTE

Antenna type	1/4 λ Antenna
Frequency Range	700 - 960 Mhz 1710 - 2700 Mhz
Polarization	Vertical
Emission	Omnidirectionnal
Power	max. 20 W
V.S.W.R.	< 2.2
Impedence	50 Ohm
Gain	2,14 dBi
Rod section	1
Cable Type	RG 174
Cable length	L=2500 mm (others on request)
Connector	SMA m (others on request)

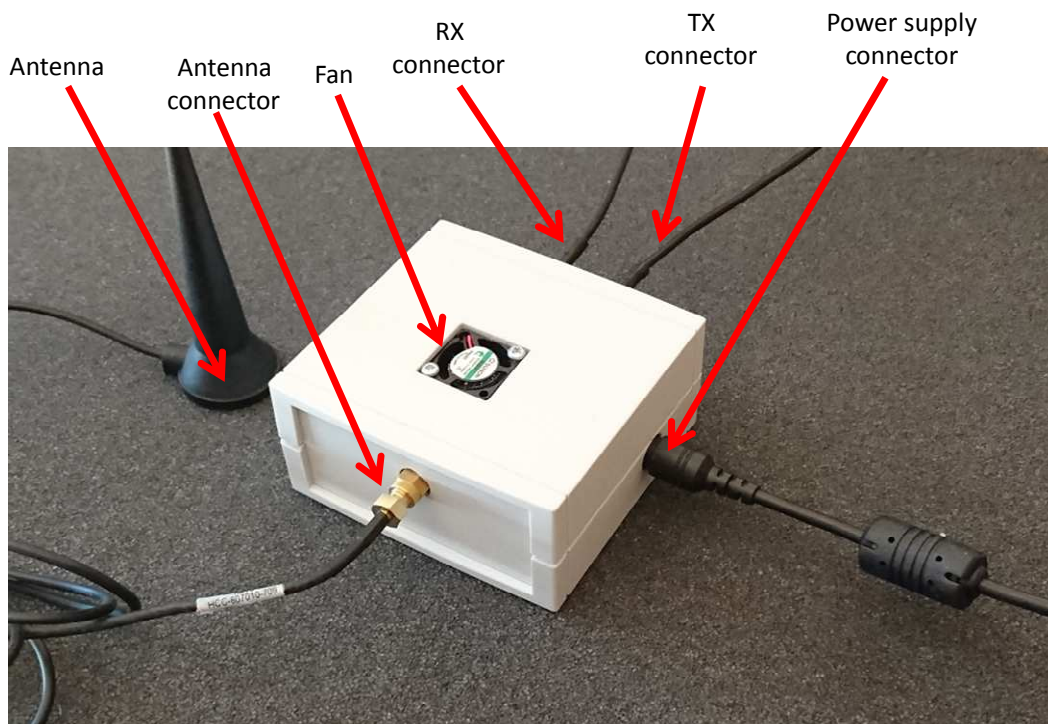


Active solution

In order to increase the RF performance (TX power, RX Noise Figure), an active RF stage is needed. We have designed an active solution with a maximum TX power of +25 dBm and a Noise Figure of 5 to 7 dB.

Important warning : our active solution is designed to transmit/receive in LTE official bands (currently band 7, 38, 42/43). In many countries those bands are only usable under an agreement with the local regulator. EURECOM (or TELMAT) is not responsible for the unauthorized use of the equipment.

The active solution is compatible with ExpressMIMO2 but also others Software Defined Radio hardware such as USRP (NI). The complete solution is depicted in the figures below.



The complete solution includes :

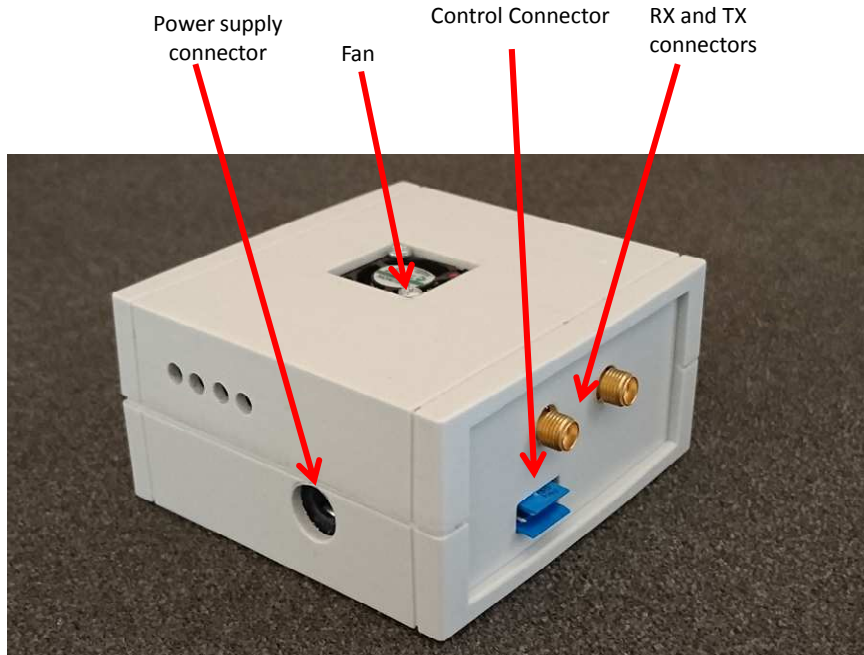
- An RF PCB (in a plastic housing)
- A 12 V power supply
- An antenna (same as for the passive solution)
- SMA cables can also be provided.

The following options are available (06/06/2016) :

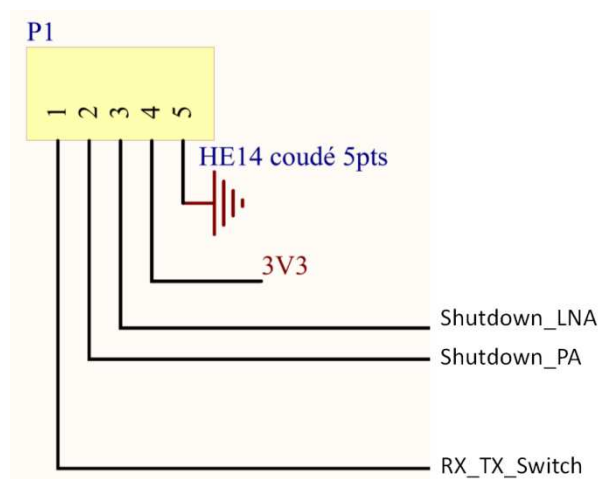
- LTE band 7 eNode B and User Equipment (Frequency Division Duplex, FDD)
- LTE band 38 (Time Division Duplex, TDD)
- LTE bands 42/43 (Time Division Duplex, TDD).

The interfaces are the following :

- An antenna connector (SMA)
- A RX connector (SMA) and a TX connector (SMA)
- Power supply connector
- A control connector



The goal of the Control connector is to disable the amplifiers if needed (Power Amplifier for the TX and Low Noise Amplifier for the RX), and to control the RX/TX switch for the TDD options.



The band 7 option is Frequency Division Duplex, so there is no need to control a switch. Only the amplifiers control is used. For band 38 and 42/43 ,the switch is used. The connector is a 5-pin HE14 connector.

Others devices

We can also provide the following pass band filters on evaluation boards (TDK reference).

Series/type	Description
AK57A	SAW Filter Band 42
B9623	SAW Filter Band 7 DL
B9868	SAW Filter Band 7UE
B9497	SAW Filter B38
E408	SAW Filter (B43)
B9496	SAW Filter B40

How to purchase:

TELMAT (www.telmat.com) is the official distributor of our RF solutions. To purchase, please contact José RUIZ (jose.ruiz@telmat.fr, +33 6 72 80 45 45).