

RFID 13.56MHz USER GUIDE

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			X	X	X
THALES			Internal reference: M10000010		

LIST OF MODIFICATIONS

Version	Date (dd/mm/yy)	Name	Object of Modification	Modification
0A	19/11/2008	C Raynal		Creation

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1. OBJECTIVES

The Module RFID 13.56 MHz complies with the standard ISO-14443.

The module is based on a power amplification RF to transmit electromagnetic typical power of 600mW to à 50-ohm load antenna connected on a UFL or HFL connector.

The reception is made by the device MFRC531 from NXP.

The board has 3 connectors of interface for the digital input/output and supply voltage.
The digital input/output allows easy connection to a microcontroller.

2. SPECIFICATIONS

2.1 ELÉCTRICAL SPECIFICATIONS

General DC Parameters	Symbol	Conditions	Min	Typ	Max	Unit
General supply voltage	12V		11.4	12.0	12.6	V
	5VR		4.5	5.0	5.5	V
	3V3		3.0	3.3	3.6	V
Digital input/output			3.3			V

2.2 SPECIFIC SPECIFICATIONS

Transmitter specifications	Symbol	Conditions	Min	Typ	Max	Unit
Frequency			13.553	13.56	13.567	MHZ
Output power		50 Ohms load	450	600	750	mW
Amplitude modulation depth		TYPE-MODE =0	0		100	%
		TYPE-MODE =1	8	11	14	%
Magnetic field with an antenna					7.5	A/m
Data	TX-SIGNAL			106		Kbit/s

2.3 DIGITAL INTERFACE

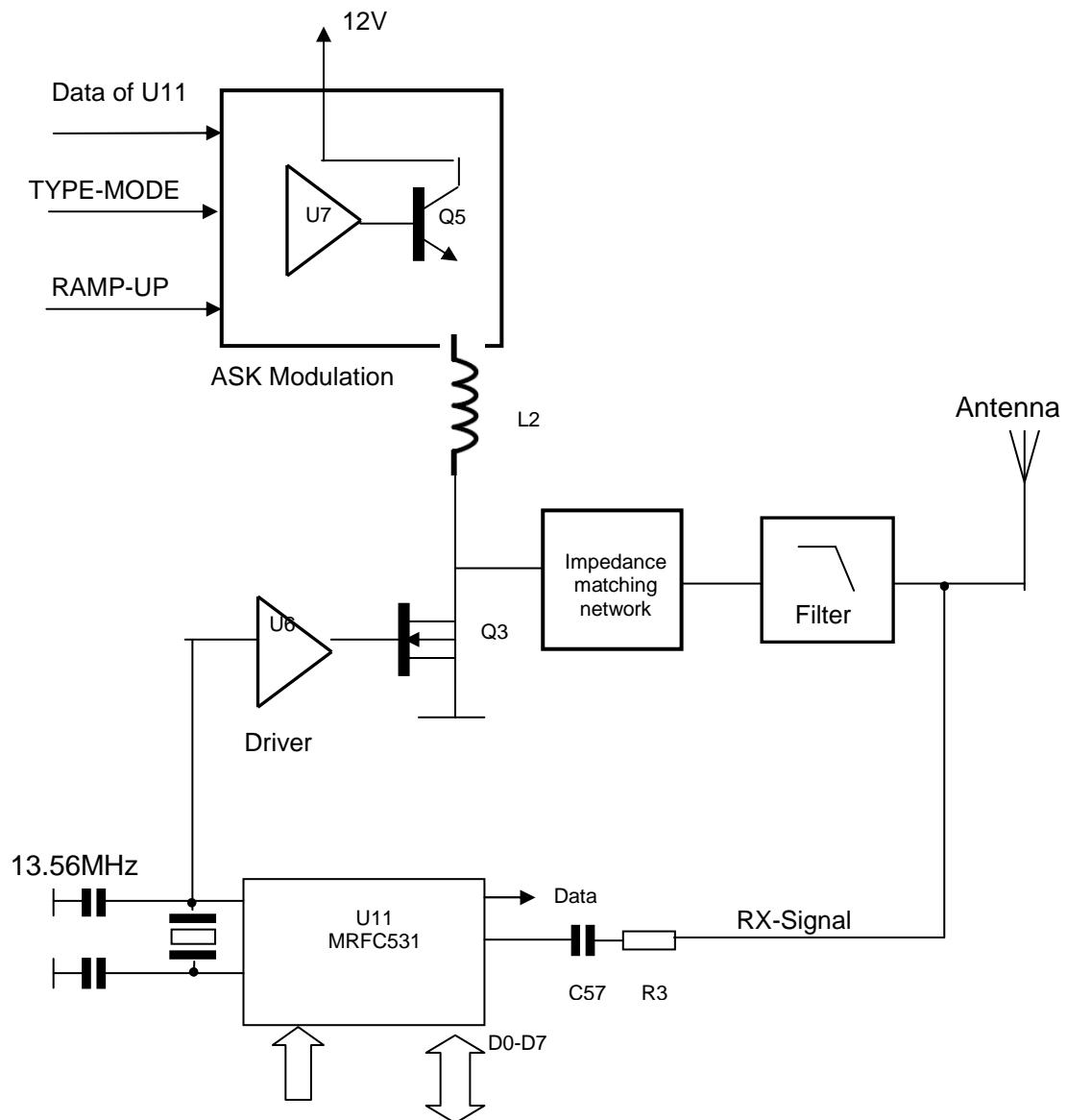
2.3.1.1 Nom du signal	I/O	Fonction
TX-SIGNAL	I	Data
TYPE-MODE	I	0 = Modulation d'amplitude 100% 1 = Modulation d'amplitude 11%
RAMP-UP	I	0 = Transmission ON 1 = Transmission OFF
D0-D7	I/O	8 Bit Bi-directional Data Bus
A0-A2	I	Address Line
CS-531	I	Not Chip Select
RAZ	I	Reset and Power Down
WE	I	Not Write
OE	I	Not Read

2.4 CONNECTION

Following table is the description of the pin number of the connectors.

Connector J11		Connector J12		Connector J13	
Name	Pin number	Name	Pin number	Name	Pin number
A0	2	12V	2,4	3V3	5,8,25,28
A1	3	5VR	6		
A2	6	3V3	3,5		
D0	10				
D1	11	RAMP-UP	38		
D2	14	TYPE-MODE	39		
D3	15				
D4	18				
D5	19				
D6	22				
D7	23				
CS-351	26				
WE	30				
OE	31				
RAZ	35				
GND	1,4,5,8,9,12, 13,16,17,20, 21,24,25,28, 29,32,33,36, 37,40	GND	1,4,5,8,9,12, 13,16,17,20, 21,24,25,28, 29,32,33,36, 37,40	GND	3,6,7,10,11, 14,15,18,19, 22,23,26,27, 30,31,35,39

3. BLOC DIAGRAM BLOC DIAGRAM BLOC DIAGRAM



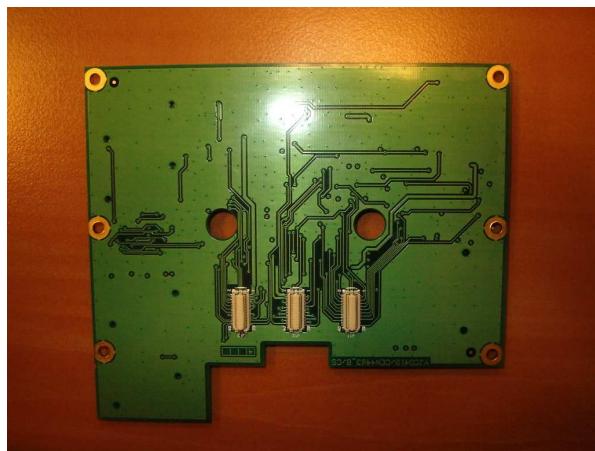
4. DESCRIPTION

The principle of the power amplifier is constituted by the transistor Q3 which works in class C.

The transistor Q3 is supplied by the ASK modulator.

The adaptive network of impedance converts the 50 ohms load into about 75 ohms seen from the drain of Q3.

A pass low filter eliminates the harmonics of the frequency of 13.56MHz.



4.1 ASK MODULATION

The ASK modulation modulates the tension of the supply applied to the Drain of Q3 dependent on following commands:

TYPE-MODE allows choosing the amplitude modulation depth of the data.

TYPE-MODE = 0 the amplitude modulation depth is 100 %.

TYPE-MODE = 1 the amplitude modulation depth is 11 %.

Remark: the rate of modulation cannot be modified by the user. It is fixed in factory.

RAMP-UP commands the power On/Off of the power amplifier.

RAMP6UP = 0 Transmission ON

RAMP-UP = 1 Transmission OFF.

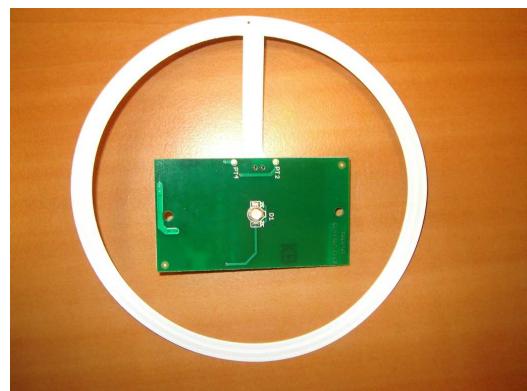
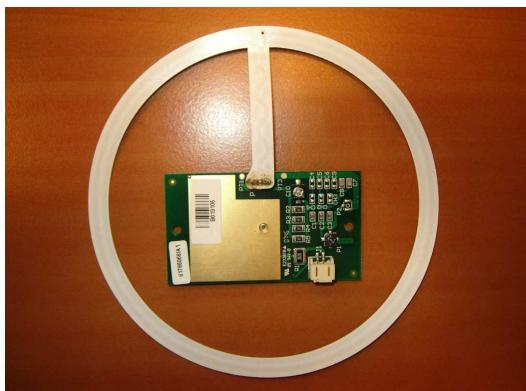
4.2 DRIVER

The driver transforms the signal of the oscillator at 13.56 MHz of U11 to apply it to the gate of Q3

4.3 ANTENNA

Three kind of antenna are used.

4.3.1 ANTENNA Tx STANDARD FILE NUMBER : 61785069



4.3.2 ANTENNA TX PEDESTAL FILE NUMBER : 61988246 (2447-613c300)



4.3.3 ANTENNA GATE NOSE FILE NUMBER : 2447-609-400



Each antenna is connected to the motherboard with a coaxial cable on HFL or UFL connectors

The antenna transforms power amplifier signal into a magnetic field.

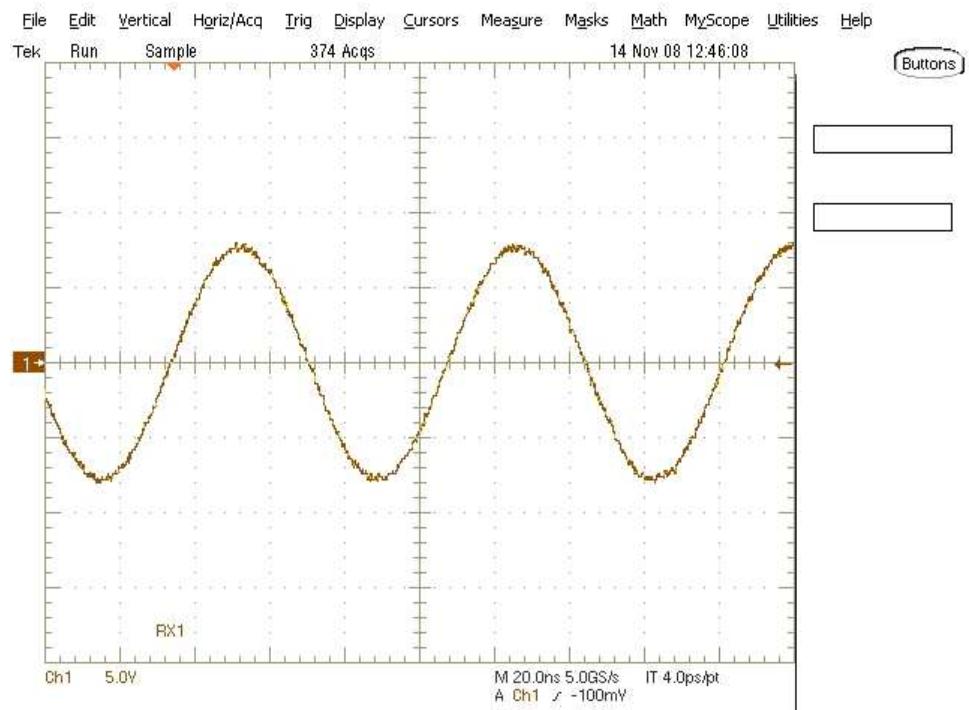
The maximal field strength is 7.5 A/m.

The matching impedance of the antenna is 50 ohm.

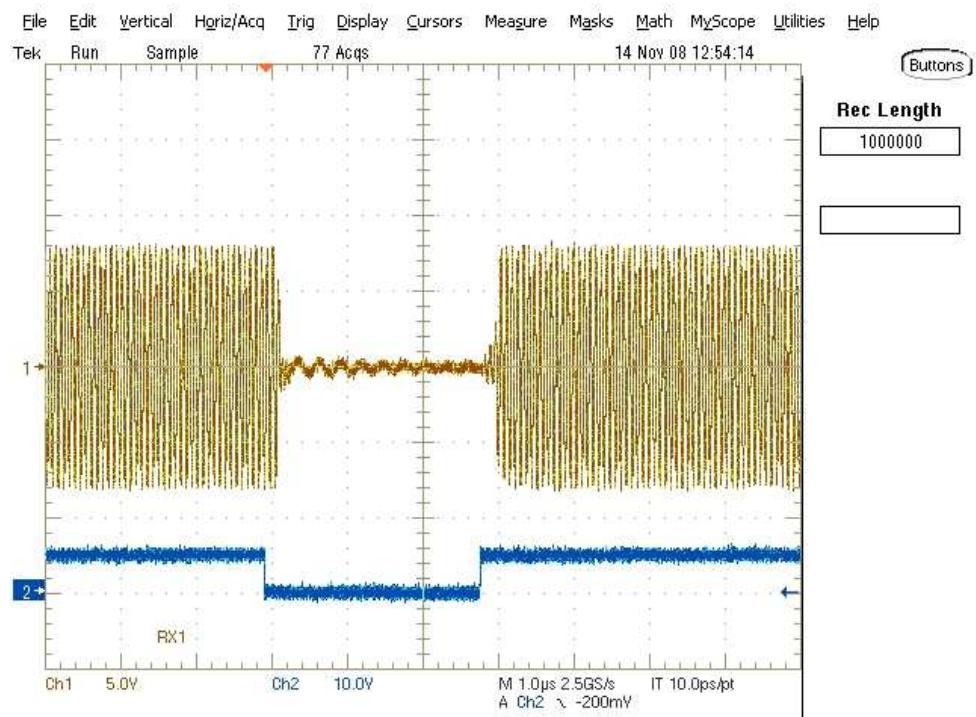
5. WAVEFORMS

All waveforms are recorded with the transmitter loaded with a pure resistive 50 Ohms load.

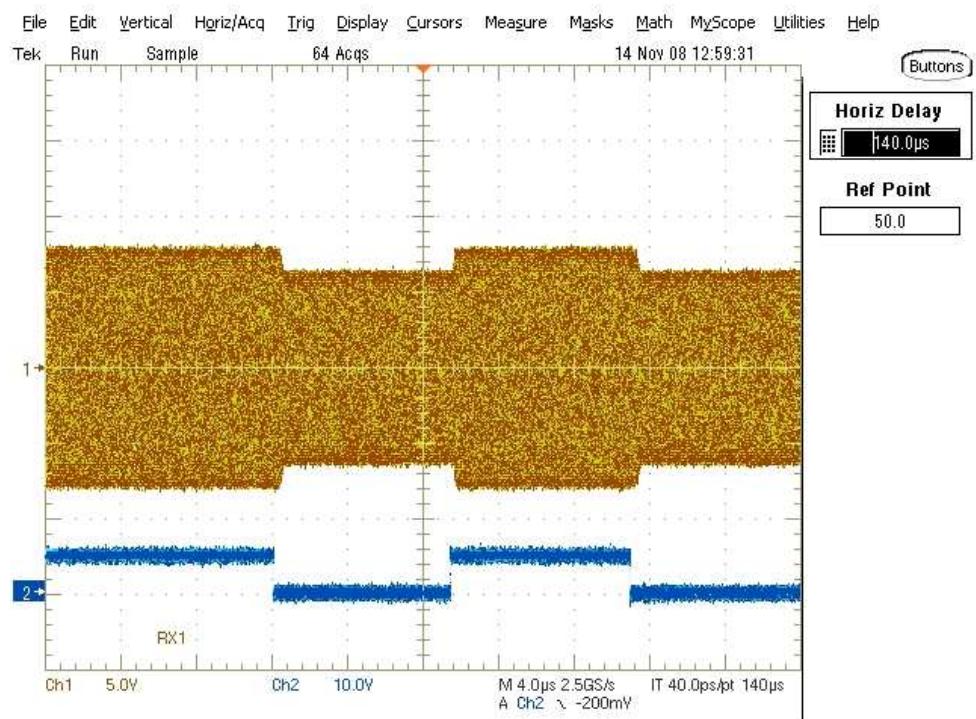
5.1 WAVEFORM AT OUTPUT



5.2 TRANSIENT PERFORMANCE AT OUTPUT WITH 100% MODULATION:



5.3 TRANSIENT PERFORMANCE AT OUTPUT WITH 11% MODULATION:



6. REMARCK

6.1 FEDERAL COMMUNICATION COMMISSION INTERFERENCE STATEMENT

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

FCC Caution: Any changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate this equipment.

The device is a sub assembly: the end product to integrate this module has to be clearly identified on the label that this end product contains an FCC approved RF module. The format of such statement could be:

“Contains FCC ID: V33TXV4READER
Contains IC: 7678A-TXV4READER”

6.2 WARNING!

6.2.1 FCC AND IC RF RADIATION EXPOSURE STATEMENT:

This module complies with FCC and Industry Canada RF radiation exposure limits set forth for general population/uncontrolled environment. To maintain compliance, this module must not be co-located or operating in conjunction with any other antenna or transmitter.

This transmitter module is used in ours equipements . Thales Transportation Systems S.A. still responsible for testing his product for compliance requirements required with this module installed (for example, digital device emissions, PC peripheral requirements, etc.).

Control of the end product integration :

The TXV4 READER module can only be installed by THALES in its end-devices. Marketing of this module to OEM or other 3rd party is prohibited.

To ensure the compliance of the integrated module in THALES end-devices, radiated emissions tests are performed on one of each kind of end-devices for both intentional and unintentional emissions.

Industry Canada

Operation is subject to the following two conditions :

- (1) *this device may not cause interference*
- (2) *this device must accept any interference, including interference that may cause undesired operation of the device.*

To reduce potential radio interference to other users, the antenna type and its gain should be so chosen that the equivalent isotropically radiated power (e.i.r.p.) is not more than that permitted for successful communication.

This device has been designed to operate **only** with the antennas listed below. Antennas not included in this list are strictly prohibited for use with this device. The required antenna impedance is 50 ohms.

List of acceptable antennas:

- Antenna 61785069 from THALES
- Antenna 61988246 from THALES
- Antenna 2447-609-400 from THALES