



RC-032-PTE-13-100635-2-A

*"This report cancels and replaces the test report N° RC-032-PTE-13-100635-2-A Edition 0"*

**E.M.C Test Report**

**According to the standard:**  
FCC PART 15 : 2013

**Equipment under test:**  
Mini SPY Green with RF module at 902 MHz  
FCC ID : W4510255


**Company:**  
JRI Maxant

FCC listed: 910 701

DISTRIBUTION: Mr. PEYRICHOU

(Company: JRI Maxant)

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**TEST CERTIFICATION FOR:** FCC Certification

**NAME OF THE EQUIPMENT UNDER TEST:** SIRIUS BOX with RF module 902 MHz and GPRS Sierra wireless

**Serial number:** -

**NAME OF THE MANUFACTURER:** JRI Maxant

**ADDRESS OF THE APPLICANT:**

**Company:** JRI Maxant

**Address:** 116 quai de Bezons  
BP 20085  
95101 ARGENTEUIL Cedex

**Person in charge:** Mr PEYRICHOU

**DATES OF TESTS:** 04, 05 and 25/06/2013

**TESTS LOCATIONS:** Open area test site in Aunainville (28) - FRANCE  
EMITECH Laboratory in Montigny le Bretonneux (78) - France

**TESTS OPERATOR:** F. LHEUREUX

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## 1. INTRODUCTION

This document presents the results of Electromagnetic Compatibility tests performed on the equipments «Mini SPY Green» according to reference documents listed below.

## 2. REFERENCE DOCUMENTS

### ***FCC Part 15 : 2013***

Code of Federal Regulations  
Title 47- Telecommunication  
Chapter 1- Federal Communication Commission  
Part 15- Radio frequency devices

### ***ANSI C63.4 : 2003***

Methods of Measurement of Radio-Noise Emissions from Low-voltage Electrical and Electronics Equipment in the range of 9 kHz to 40 GHz.

## 3. PRODUCT DESCRIPTION

Operating frequency range:	From 902 MHz to 928 MHz
Number of channels:	1 for Mini SPY Green
Channel spacing:	-
Power source:	3.6 Vdc for Mini SPY Green 120 Vac / 60 Hz for SIRIUS BOX
Firmware application:	-

Power level, frequency range and channels characteristics are not user adjustable.  
The details pictures of the product and the circuit boards are joined with this file.

Modification of the equipment during the tests: No.

#### 4. TESTS AND CONCLUSION

The following tables summarize test results of the EUT.

Subpart B of the standard FCC part 15 – Unintentional radiators

Test procedure	Designation of test	Test results				Comments
		Pass	Fail	N.A.	N.P.	
15.107	Measurement of conducted emission on AC mains ports		X			
15.109	Radiated emission limits	X				
15.111	Antenna power conduction limits for receivers			X		

Subpart C of the standard FCC part 15 – Intentional radiators

Test procedure	Designation of test	Test results				Comments
		Pass	Fail	N.A.	N.P.	
15.203	Antenna requirement	X				
15.205	Restricted bands of operation	X				
15.207	Measurement of conducted emission on AC mains ports			X		
15.209	Radiated emission limits; general requirements	X				
15.212	Modular transmitters			X		
15.215	Additional provisions to the general radiated emission limitations					
	(a) Alternative to general radiated emission limits	X				
	(b) Unwanted emissions outside of § 15.249 frequency bands	X				
	(c) 20 dB bandwidth and band-edge compliance	X				
15.249	Intentional radiated emissions					
	a) Field strength fundamental + harmonics in the bands 902-928 MHz, 2400-2483.5 MHz, 5725-5875 MHz, and 24.0-24.25 GHz	X				
	b) Fixed point to point operation in the band 24.0-24.25 GHz					
	b) (1) Field strength			X		
	b) (2) Frequency tolerance for temperature variation and for variation voltage			X		
	b) (3) Gain antenna			X		
	c) Test at 3 m	X				
	d) Outside bands (spurious 50 dB or 15.209)	X				
	e) Possibility measurement in peak detector (> 1 GHz)	X				

N.A.: Not Applicable      N.P.: Not Performed

**Conclusion:**

The tested sample "**Mini SPY Green**" submitted to the tests complies with the requirements of the standard:

- FCC PART 15: 2013

According to the limits specified in this report.

## 5. INTENTIONAL RADIATED EMISSIONS

**Standard:** FCC PART 15 : 2013

**Section:** 15.249 (a)

### Test configuration:

The system is tested in an open area test site (OATS).

The test unit is placed on a rotating table, 0.8 m from a ground plane. Zero degree azimuth corresponds to the front of the equipment under test.

The level was maximised in antenna height, azimuth and polarization. The maximum level measured on the spectrum analyser was recorded.

**Distance of antenna:** 3 meters

### Instrumentation test list:

CATEGORY	BRAND	TYPE	N° EMITECH
Antenna	Schwarzbeck	UHALP 9108	3106
Antenna mast	Maturo	AM 4.0-O	7625
Antenna mast	Maturo	MCU	7626
Cable	Câbles & Connectiques	N-13m	2452
Cable	-	N-2m	2805
Cable	C&C	N-15m	10229
Open area test site	Emitech	Aunainville	0187
Power supply	Sodilec	SDR 60/10	0213
Receiver	Rohde & Schwarz	ESVS10	1216

### Equipment under test operating condition:

The equipments under test are in continuous transmission mode.

**Measure conditions:**

Ambient temperature (°C): 20

Relative humidity (%): 60

Resolution bandwidth: 120 kHz

**Results:**- For Mini SPY Green

Power source: 3.6 Vd.c

Polarization of test antenna: Vertical (height: 217 cm)

Position of equipment: Azimuth: 103°

(902.458 MHz)

		Electro-magnetic field (dB $\mu$ V/m)	Limit	
			dB $\mu$ V/m	$\mu$ V/m
Normal test conditions	Nominal power source (V): 3.6	84.1	94.0	50000

**Test conclusion:** Complies with modification.



## 6. ADDITIONAL PROVISIONS TO THE GENERAL RADIATED EMISSIONS LIMITATION

**Standard:** FCC PART 15 : 2013

**Section:** 15.215 (b) and 15.249 (d)

**Instrumentation test list:**

CATEGORY	BRAND	TYPE	N° EMITECH
Antenna	Schwarzbeck	UHALP 9108	3106
Antenna	Schwarzbeck	VHA 9103	0317
Antenna	Emco	3115	3374
Antenna mast	Maturo	AM 4.0-O	7625
Antenna mast	Maturo	MCU	7626
Cable	Câbles & Connectiques	N-13m	2452
Cable	-	N-2m	2805
Cable	Câbles & Connectiques	N-SMA	2864
Cable	C&C	N-5m	10029
Filter	Trilithic	6HC1300-2.5-KK	1097
Filter	Trilithic	5EHLX500-3-KK	1529
Filter	Micro-tronics	HPM 14758	4691
Open area test site	Emitech	Aunainville	0187
Power supply	Sodilec	SDR 60/10	0213
Preamplifier	MITEQ	AFS42-00102650-42-10P-42	3229
Receiver	Rohde & Schwarz	ESVS10	1216
Spectrum analyzer	Rohde & Schwarz	FSP40 (V 4.00SP1-V3.0-10-2)	5175

**Equipment under test arrangement:**

The system is tested in an open area test site (OATS).

The test unit is placed on a rotating table, 0.8 m from a ground plane. Zero degree azimuth corresponds to the front of the equipment under test.

**Frequency range:** from 30 MHz to harmonic 5 (highest frequency used = 902.458 MHz).

**Bandwidth:** 120 kHz (F<1 GHz)  
1 MHz (F>1 GHz)

**Detection mode:** Quasi-peak (F < 1 GHz)  
Average (F > 1 GHz)

**Distance of antenna:** 3 meters

**Antenna height:** 1 to 4 meters

**Antenna polarization:** vertical and horizontal, only the highest level is recorded.

**Operating mode during the test:**

The equipments under test are blocked in standby / reception mode.

**Results:**

Ambient temperature (°C): 20  
Relative humidity (%): 60

- For Mini SPY Green

Power source: 3.6 Vdc

No frequencies are observed between 30 MHz to 4.6 GHz for both polarizations

**Test conclusion:** Complies with the requirements of the standard.

## 7. 20 dB BANDWIDTH AND BAND-EDGE COMPLIANCE

Standard: FCC PART 15 : 2013

Section: 15.215 (c)

### Instrumentation test list:

CATEGORY	BRAND	TYPE	N° EMITECH
Antenna	Schwarzbeck	UHALP 9108	3106
Cable	-	N-2m	2805
Power supply	Sodilec	SDR 60/10	0213
Spectrum analyzer	Rohde & Schwarz	FSP40 (V 4.00SP1-V3.0-10-2)	5175

### Equipment under test arrangement:

Test realized in near field. All field strength measurements are correlated with the intentional radiated emissions.

### Operating mode during the test:

The equipments under test are blocked in continuous transmission mode.

### Results:

- For Mini SPY Green

Fundamental frequency (MHz)	Field Strength Level of fundamental (dB $\mu$ V/m)	Detector (Peak or Average)	Frequency of maximum Band-edges Emission (MHz)	Delta Marker (dB) *	Calculated Max Out of Band Emission Level (dB $\mu$ V/m)	Limits (dB $\mu$ V/m)	Margin (dB)
902.458	84.1	Peak	902.000	- 58.1	26.0	46.0	20.0
902.458	84.1	Peak	928.000	- 64.1	20.0	46.0	26.0

\* According to step 2 of Marker-Delta Method DA 00-705.

20 dB bandwidth curves are given in annex 2; band-edge curves are given in annex 3.

8. UNINTENTIONAL RADIATED EMISSIONS AND TRANSMITTER UNWANTED EMISSION IN THE BAND  
9 KHz – 9.5 GHz

Standard: FCC PART 15 : 2013

Section: 15.205; 15.209 and 15.249

Equipment under test arrangement:

The equipment under test (EUT) is placed on a non-conductive test table at 0.8 m above the horizontal metal ground plane.

For maximum meter reading at each frequency, the antenna height is adjusted between 1 m and 4 m above the ground plane. A 360 degrees rotation of the EUT is performed in vertical and horizontal polarization. The frequency azimuth and antenna height are presented in the table on the next pages.

The equipments under test are blocked in continuous transmission.

Frequency range: 9 kHz – 30 MHz  
30 MHz - 1 GHz  
1 GHz – 9.5 GHz

Detection mode: Quasi-peak for 9 kHz – 30 MHz  
Quasi-peak for 30 MHz - 1 GHz  
Average for 1 GHz – 9.5 GHz

Resolution bandwidth: 200 Hz for 9 kHz – 150 kHz  
9 kHz for 150 kHz – 30 MHz  
120 kHz for 30 MHz - 1 GHz  
1 MHz for 1 GHz – 9.5 GHz

Measurement distance: 30 meters from 9 kHz to 30 MHz  
3 meters from 30 MHz to 9.5 GHz

- Limit for emission radiated outside the frequency band, except the harmonics, shall be attenuated by at least 50 dB below the level of fundamental or the general radiated emission limits in § 15.249 (see table).

From 9 kHz to 30 MHz

Frequencies range	Limit $\mu\text{V/m}$
9 – 490 kHz	$2400/F$ (F in kHz) *
490 – 1705 kHz	$24000/F$ (F in kHz)
1.705 – 30 MHz	30

\* Limits in  $\mu\text{V/m}$  can be extrapolated to 30 m using 20 dB / decade.

From 30 MHz to 9.5 GHz

Frequencies range (MHz)	Limit	
	(dB $\mu\text{V/m}$ )	$\mu\text{V/m}$
30 to 88	40.0	100
88 to 216	43.5	150
216 to 960	46.0	200
Above 960	54.0	500

- Limit for field strength of harmonic: 54 dB $\mu\text{V/m}$  (500  $\mu\text{V/m}$ )

Instrumentation test list:

CATEGORY	BRAND	TYPE	N° EMITECH
Antenna	Schwarzbeck	UHALP 9108	3106
Antenna	Emco	3115	3374
Antenna	Schwarzbeck	VHA 9103	0317
Antenna	EMCO	6502	9579
Antenna mast	Maturo	AM 4.0-O	7625
Antenna mast	Maturo	MCU	7626
Cable	Câbles & Connectiques	N-13m	2452
Cable	-	N-2m	2805
Cable	C&C	N-8m	10228
Cable	C&C	N-15m	10229
Cable	Câbles & Connectiques	N-SMA	2864
Cable	Micro-Coax	N-13m	8063
Cable	-	N-30m	4359
Filter	Trilithic	6HC1300-2.5-KK	1097
Filter	Trilithic	5EHLX500-3-KK	1529
Filtre	Micro-tronics	HPM 14758	4691
Open area test site	Emitech	Aunainville	0187
Spectrum analyser	Rohde & Schwarz	FSP40	5175

Results:

- For Mini SPY Green:

Frequency (MHz)	Polarization	Azimut (degrees)	Antenna height (cm)	Measure (dB $\mu$ V/m)	Standard limit (dB $\mu$ V/m)	$\Delta$ (dB)
1804.73	Vertical	0	150	43.7	54	10.3
1804.73	Horizontal	170	125	51.2	54	2.8
2707.14	Vertical	185	120	44.7	54	9.3
2707.14	Horizontal	180	150	47.3	54	6.7
3609.50	Vertical	24	190	42.6	54	11.4
3609.50	Horizontal	75	115	42.0	54	12.0

« □□□ End of report, 6 annexes to be forwarded □□□ »

# ***ANNEX 1:***

**Antenna factors, insertion losses and  
amplifier values**

### BILL OF MATERIAL

The test antenna used for the radiated emission between 9 kHz and 30 MHz is the active loop antenna n°9579. Antenna factors are given in table 1.

The test antenna used for the radiated emission between 30 MHz and 200 MHz is the biconical antenna n°317. Antenna factors are given in table 2.

The test antenna used for the radiated emission between 200 MHz and 1 GHz is the log-periodic antenna n°3106. Antenna factors are given in table 3.

The measuring receiver n°1216 used in the frequency range 30 MHz to 1 GHz has an integrated preamplifier.

The spectrum analyzer n°5175 is used in the frequency range 1 GHz to 9.5 GHz.

The test cable used between 9 kHz and 30 MHz to connect the antennas to the receiver for measurements at a distance of 30 meters has losses given in table 5.

The test cable used between 30 MHz and 1 GHz to connect the antennas to the receiver for measurements at a distance of 3 meters has losses given in table 6.

The test antenna used for the radiated emission between 1 GHz and 9.5 GHz is the horn antenna n°3374. Factors are given in table 7.

The amplifier n°3229 used to connect the spectrum analyzer to the test cable has gain values given in the table 8.

The test cable used between 1 GHz and 9.5 GHz to connect the horn antenna to the amplifier for measurements at a distance of 3 meters has losses given in table 9.



Frequency (MHz)	Antenna factor (dB/m)	Frequency (MHz)	Antenna factor (dB/m)
0.009	19.6	0.8	10.0
0.01	18.8	1	9.9
0.015	15.8	1.5	9.9
0.02	13.9	2	9.9
0.03	12.1	3	9.9
0.05	10.8	5	9.8
0.08	10.3	8	9.7
0.1	10.2	10	9.5
0.15	10.1	15	9.1
0.2	10.1	20	8.3
0.3	10.0	25	7.3
0.5	10.0	30	5.6

TABLE 1 : ACTIVE LOOP ANTENNA

Frequency (MHz)	Antenna factor (dB/m)	Frequency (MHz)	Antenna factor (dB/m)
30	18.9	90	8.5
35	17.1	100	10.1
40	15.1	120	13.0
45	13.3	140	14.5
50	11.5	160	15.5
60	8.0	180	15.7
70	6.4	200	16.1
80	6.9	-	-

TABLE 2 : BICONICAL ANTENNA

Frequency (MHz)	Antenna factor (dB/m)	Frequency (MHz)	Antenna factor (dB/m)
200	22.8	700	20.7
300	14.2	800	21.4
400	16.4	900	21.5
500	17.9	1000	22.2
600	19.3	-	-

TABLE 3 : LOG-PERIODIC ANTENNA

Frequency (MHz)	loss (dB)	Frequency (MHz)	loss (dB)
0.009	0.0	6.000	0.5
0.020	0.0	7.000	0.5
0.050	0.0	8.000	0.5
0.100	0.0	9.000	0.6
0.500	0.1	10.00	0.6
1.000	0.2	15.00	0.7
2.000	0.2	20.00	0.8
3.000	0.3	25.00	1.0
4.000	0.4	30.00	1.1
5.000	0.4	-	-

TABLE 4 : TEST CABLE FOR 30M MEASUREMENT INTO 9 kHz AND 30 MHz

Frequency (MHz)	loss (dB)	Frequency (MHz)	loss (dB)
30	0.5	250	1.8
40	0.7	300	1.9
50	0.7	400	2.3
60	0.9	500	2.5
70	0.9	600	2.9
80	1.0	700	3.1
90	1.0	800	3.4
100	1.1	900	3.7
150	1.4	1000	3.8
200	1.6	-	-

TABLE 5 : TEST CABLE FOR 3M MEASUREMENT INTO 30 MHz AND 1 GHz

Frequency (GHz)	Antenna factor (dB/m)	Frequency (GHz)	Antenna factor (dB/m)
1.0	23.7	5.5	34.1
1.5	24.6	6.0	34.1
2.0	27.5	6.5	34.4
2.5	28.8	7.0	35.4
3.0	29.8	7.5	36.6
3.5	31.2	8.0	36.6
4.0	32.5	8.5	37.0
4.5	32.5	9.0	37.1
5.0	33.5	9.5	37.2

TABLE 6 : HORN ANTENNA

Frequency (GHz)	Gain value (dB)	Frequency (GHz)	Gain value (dB)
1.0	34.9	5.0	36.0
1.5	34.8	6.0	36.2
2.0	35.1	7.0	35.5
2.5	35.1	8.0	34.8
3.0	35.3	9.0	33.2
4.0	35.7	9.5	31.9

TABLE 7 : AMPLIFIER GAIN VALUE

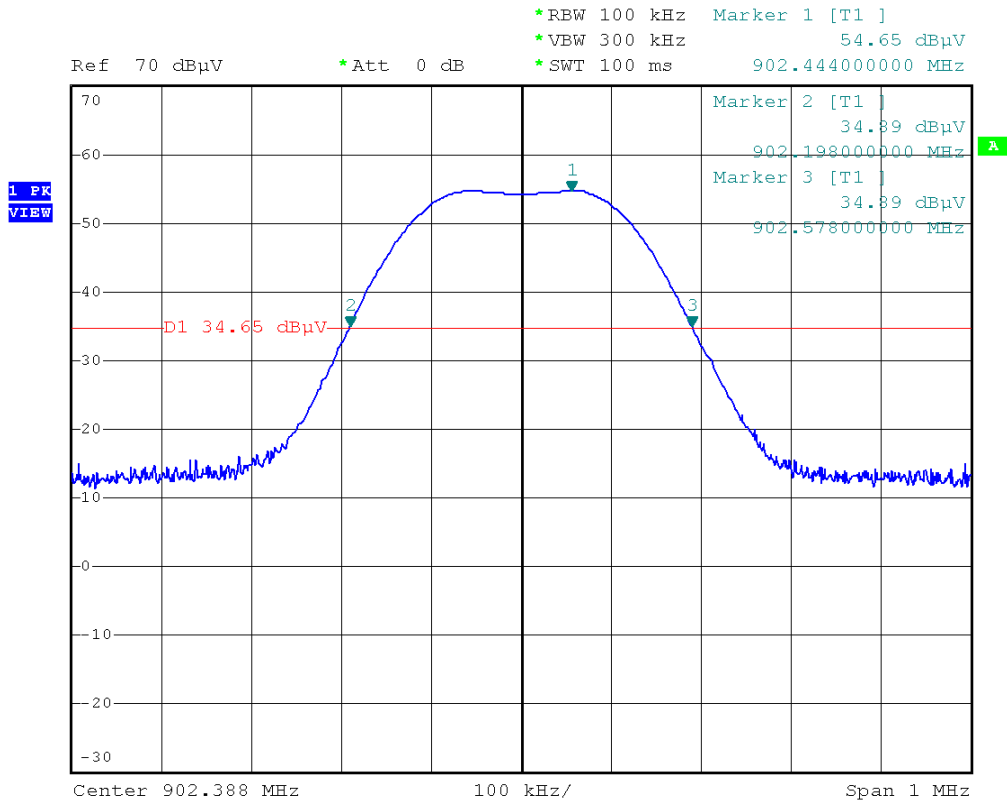
Frequency (GHz)	loss (dB)	Frequency (GHz)	loss (dB)
1.0	3.4	4.5	7.5
1.5	4.2	5	8.2
2.0	4.8	6	9.1
2.5	5.3	8	9.9
3.0	6.1	10	11.6
3.5	6.6	-	-

TABLE 8: TEST CABLE FOR 3M MEASUREMENT INTO 1 TO 9.5 GHz

# *ANNEX 2:*

20 dB bandwidth

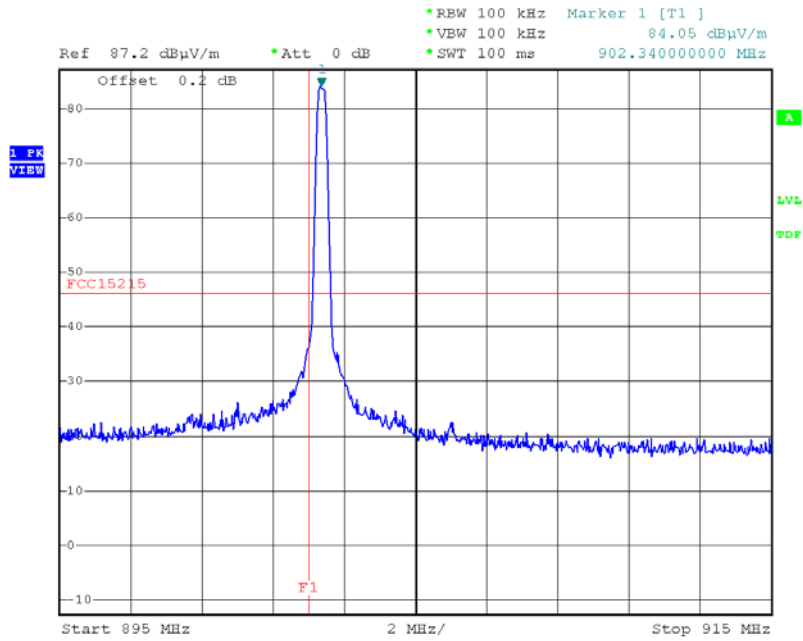
### Mini SPY Green



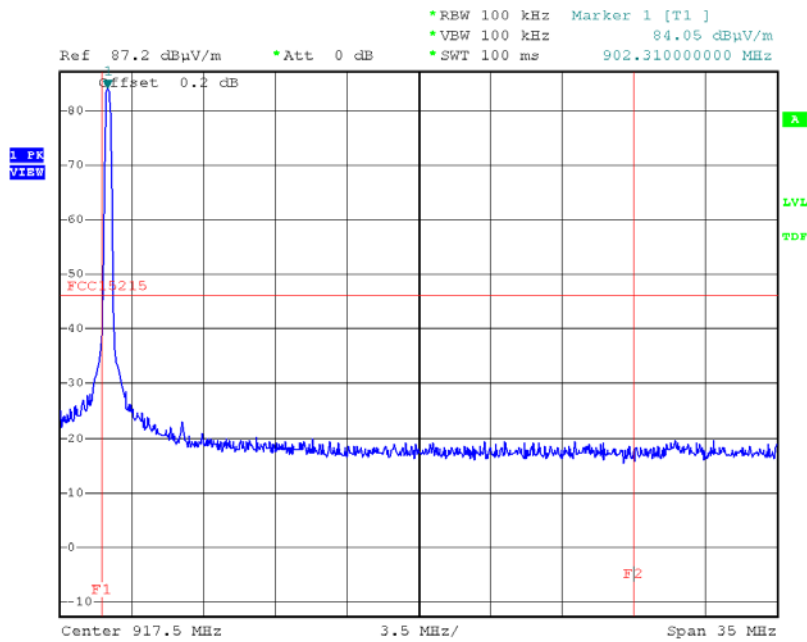
Date: 4.JUN.2013 12:22:16

***ANNEX 3:***  
**Band Edge**

### Mini SPY Green



Date: 4.JUN.2013 13:04:47



Date: 4.JUN.2013 13:06:34

***ANNEX 4:***  
**Calibration dates**



N° EMITECH	LAST CALIBRATION	CALIBRATION DUE DATE
1216	12/12/2011	12/02/2014
0187	20/08/2011	20/08/2013
3106	27/04/2012	27/04/2014
2452	24/10/2012	24/10/2014
2805	27/06/2011	27/06/2013
10028	11/02/2013	11/02/2015
10029	11/02/2013	11/02/2015
3374	08/02/2012	08/04/2016
2864	14/12/2011	14/02/2014
8063	06/08/2012	06/10/2014
1097	12/04/2011	12/06/2013
1529	12/04/2011	12/06/2013
4691	06/05/2011	06/07/2013
5175	27/03/2012	27/05/2014
9579	22/10/2012	22/10/2014
4359	07/03/2012	07/03/2014
0317	19/08/2010	19/08/2014
3229	25/10/2012	25/10/2013