



**TEST REPORT CONCERNING THE COMPLIANCE OF A  
TRANSMITTER FOR A  
REMOTE KEYLESS ENTRY SYSTEM (RKE),  
BRAND TRW, MODEL 29T  
WITH 47 CFR PART 15 (JULY 10, 2008).**

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June 09, 2010**

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R&TTE, LVD, EMC Notified Body : 1856

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## MEASUREMENT/TECHNICAL REPORT

**Brand: TRW Automotive**  
**Model : 29T**  
**FCC ID: GQ4-29T**

June 09, 2010

This report concerns: <del>Original grant/certification</del> Class 2 Permissive Change <del>Verification</del>		
Equipment type: Transmitter for a Remote Keyless Entry System (RKE)		
Report prepared by:		
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The data taken for this test and report herein was done in accordance with 47 CFR Part 15 (july 10, 2008) and the measurement procedures of ANSI C63.4-2003. TÜV Rheinland EPS B.V. at Niekerk, The Netherlands, certifies that the data is accurate and contains a true representation of the emission profile of the Equipment Under Test (EUT) on the date of the test as noted in the test report. I have reviewed the test report and find it to be an accurate description of the test(s) performed and the EUT so tested.

Date: June 09, 2010

Signature:



O. Hoekstra  
Senior Engineer Telecom TÜV Rheinland EPS B.V.

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**Description of test item**

Test item (EUT) : Transmitter for a Remote Keyless Entry System (RKE)  
Manufacturer : TRW Automotive  
Brand : TRW  
Model(s) : 29T  
Serial number(s) : --  
Receipt date : June 02 , 2010

**Applicant information**

Applicant's representative : Mr. R. Tiné  
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**Test(s) performed**

Location : Niekerk  
Test(s) started : June 08, 2010  
Test(s) completed : June 08, 2010  
Purpose of test(s) : Equipment Authorization (Class 2 Permissive Change)  
Test specification(s) : 47 CFR Part 15 (July 10, 2008)

Test engineer(s) : R. van der Meer



Report written by : R. van der Meer



Report date : June 09, 2010

This report is in conformity with NEN-EN-ISO/IEC 17025: 2005  
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The test results relate only to the item(s) tested.

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## 1 General information.

### 1.1 Product description.

#### 1.1.1 Introduction.

The EUT is a Radio Frequency (RF) Remote Keyless Entry System (RKE) that allows the driver to remotely control the door locking and unlocking of his vehicle. The EUT operates on a frequency of 315 MHz and is battery powered.

The content of this report and measurement results have not been changed other than the way of presenting the data.

### 1.2 Related submittal(s) and/or Grant(s).

#### 1.2.1 General.

This test report supports the Class 2 Permissive Change in equipment authorization files under registration number.  
**FCC ID: GQ4-29T.**

### 1.3 Tested system details.

Details and an overview of the system and all of its components, as it has been tested, may be found below.

EUT	:	Transmitter for a Remote Keyless Entry System (RKE)
Manufacturer	:	TRW Automotive
Brand	:	TRW
Model	:	29T
Serial number	:	--
Voltage input rating	:	3 VDC (battery type CR2025)
Voltage output rating	:	n.a.
Current input rating	:	--
Antenna	:	Internal
Operating frequency	:	315 MHz (314.96 – 315.04 MHz)
Remarks	:	n.a.



Photo 1 & 2: Key with transmitter

### 1.3.1 Description of input and output ports.

The EUT is battery operated only and there are no actual input and output ports present.

### 1.4 Test methodology.

The test methodology used is based on the requirements of 47 CFR Part 15 (july 10, 2008), sections 15.31, 15.35, 15.205, 15.209 and 15.231.

The test methods, which have been used, are based on ANSI C63.4: 2003.

Radiated emission tests above 30 MHz were performed at a measurement distance of 3 meters.

Radiated emission tests below 30 MHz were performed at a measurement distance of 3 meters.

To calculate the field strength level from these results to the appropriate distance at which the limit is specified, the appropriate extrapolation factor is used.

The receivers are switching automatically to the right bandwidth in accordance with CISPR 16. This is implemented in the receiver. The antenna factors are programmed in the test receiver. The receiver automatically calculates the appropriate correction factor for the utilized antenna and also the appropriate antenna factor for the cable loss. The total correction is automatically added to the measured value.

### 1.5 Test facility.

The Federal Communications Commission and Industry Canada has reviewed the technical characteristics of the test facilities at TÜV Rheinland EPS B.V., located in Niekerk, 9822 TL Smidshornerweg 18, The Netherlands, and has found these test facilities to be in compliance with the requirements of 47 CFR Part 15, section 2.948(10-1-06 edition).

The description of the test facilities has been filed at the Office of the Federal Communications Commission under registration number 90828. The facility has been added to the list of laboratories performing these test services for the public on a fee basis.

The description of the test facilities has been filed to Industry Canada under registration number 2932G-1. The facility has been added to the list of laboratories performing these test services for the public on a fee basis.

### 1.6 Test conditions.

Normal test conditions:

Temperature (*)	: +15°C to +35°C
Relative humidity(*)	: 20 % to 75 %
Supply voltage	: not applicable, the equipment under test is battery operated
Air pressure	: 950 – 1050 hPa

When is was impracticable to carry out the tests under these conditions, a note to this effect stating the ambient temperature and relative humidity during the tests are stated separately.

## **2 System test configuration.**

### **2.1 Justification.**

An EUT was supplied with modifications which enabled a constant transmit mode for testing purposes. All tests were done with a new fully loaded battery.

The justification and manipulation of cables and equipment in order to simulate a worst-case behavior of the test setup has been carried out as prescribed in ANSI C63.4: 2003.

### **2.2 EUT mode of operation.**

The EUT has been tested in modulated transmit mode, i.e. the EUT is transmitting while continuously transmitting data. All test set ups have been documented in pictures in the documentation package which will be submitted to the Commission.

### **2.3 Special accessories.**

No special accessories are used and/or needed to achieve compliance.

### **2.4 Equipment modifications.**

No modifications have been made to the equipment in order to achieve compliance.

### **2.5 Product Labeling**

The product labeling information is available in the technical documentation package.

### **2.6 Block diagram of the EUT.**

The block diagram is available in the technical documentation package.

### **2.7 Schematics of the EUT.**

The schematics are available in the technical documentation package.

### **2.8 Part list of the EUT.**

The part list is available in the technical documentation package.

### 3 Radiated emission data.

#### 3.1 Radiated field strength measurements (30 MHz – 3.15 GHz, E-field), Average values

Frequency (MHz)	Measurement results @3m Vertical (dBuV)	Measurement results @3m Horizontal (dBuV)	Correction factor (dB)	Results after correction Vertical (dBuV/m)	Results after correction Horizontal (dBuV/m)	Limits @3m (dBuV/m)	Pass/Fail
315 (fundamental)	36.03	41.03	18.2			75.6	Pass
630	19.73	21.23	27.4	47.13	48.63	55.6	Pass
945	9.43	9.63	34.6	44.03	44.23	55.6	Pass
1260	16.73	17.33	30.9	47.63	48.23	55.6	Pass
1575	13.93	15.23	32.0	45.93	47.23	54.0	Pass
1890	-0.97	-0.27	33.6	32.63	33.33	55.6	Pass
2205	-1.47	-0.47	33.6	32.13	33.13	54.0	Pass
2502	13.53	14.93	34.3	47.80	49.23	55.6	Pass
2835	4.03	5.33	34.3	38.33	39.63	54.0	Pass
3150	2.83	5.53	34.3	37.13	39.83	55.6	Pass

Table 1 Radiated emissions of the EUT, average values

The results of the radiated emission tests, carried out in accordance with 47 CFR Part 15 section 15.205, 15.209 and 15.231 are depicted in Table 1.

#### Notes:

- Table 1 show calculated average values from the pulsed emissions measurement data from section 3.2 Peak values, corrected with the worst case duty cycle factor over 100 msec.
- Field strength values of radiated emissions at frequencies not listed in the table above are more than 20 dB below the applicable limit.
- The values noted in Table 1 are after application of a duty cycle correction of -12.57 dB. Duty cycle calculated from: Duty cycle correction (dB) =  $20 \log(23.52 \text{ msec} / 100 \text{ msec}) = -12.57 \text{ dB}$  obtained from the original certification.
- The frequencies of 1575 MHz, 2205 MHz and 2835 MHz fall within a restricted band as specified in section 15.205. Therefore the limit specified in section 15.209 has been applied.
- Up to the 10th harmonic of the transmit frequency of 315 MHz.

Test engineer

Signature :



Name : Richard van der Meer

Date : June 08, 2010

### 3.2 Radiated field strength measurements (30 MHz – 3.15 GHz, E-field), Peak values

Frequency (MHz)	Measurement results @3m Vertical (dBuV)	Measurement results @3m Horizontal (dBuV)	Correction factor (dB)	Results after correction Vertical (dBuV/m)	Results after correction Horizontal (dBuV/m)	Limits @3m (dBuV/m)	Pass/Fail
315 (fundamental)	48.6	53.6	18.2	66.8	71.6	95.6	Pass
630	32.3	33.8	27.4	59.7	61.2	75.6	Pass
945	22.0	22.2	34.6	56.6	56.8	75.6	Pass
1260	29.3	29.9	30.9	60.2	60.8	75.6	Pass
1575	26.5	27.8	32.0	58.5	59.8	74.0	Pass
1890	11.6	12.3	33.6	45.2	45.9	75.6	Pass
2205	11.1	12.1	33.6	44.7	45.7	74.0	Pass
2502	26.1	27.5	34.3	60.4	61.8	75.6	Pass
2835	16.6	17.9	34.3	50.9	52.2	74.0	Pass
3150	15.4	18.1	34.3	49.7	52.4	75.6	Pass

Table 2 Radiated emissions of the EUT

The results of the radiated emission tests, carried out in accordance with 47 CFR Part 15 section 15.35, 15.205, 15.209 and 15.231 are depicted in Table 2.

**Notes:**

1. Field strength values of radiated emissions at frequencies not listed in the table above are more than 20 dB below the applicable limit.
2. Measurement uncertainty is  $\pm 5.0$  dB
3. The reported field strength values are the worst case values at the indicated frequency. The receiving antenna was varied in horizontal and vertical orientations and also in height (between 1m and 4m).
4. The EUT was tested in horizontal and vertical orientations but showed no difference between these orientations. Worst case values noted. Refer to the Testsetup photographsreport for testpositions.
5. A peak detector was used with a resolution bandwidth of 120 kHz.
6. Above 1000 MHz a peak detector was used with a bandwidth of 1 MHz.
7. The frequencies of 1575 MHz, 2205 MHz and 2835 MHz fall within a restricted band as specified in section 15.205. Therefore the limit specified in section 15.209 has been applied.
8. Up to the 10th harmonic of the transmit frequency of 315 MHz.

Test engineer

Signature : 

Name : Richard van der Meer  
 Date : June 08, 2010

### 3.3 Radiated field strength measurements (frequency range of 0.009-30 MHz, H-field).

Frequency (MHz)	(a) Measurement results (dB $\mu$ V)	Detector	(b) Antenna factor	(c) Cable loss	(d) Distance Extrapolation factor	Measurement results (calculated a+b+c-d) dB( $\mu$ V)/m	Limits dB( $\mu$ V)/m
	3 meters		dB	dB	dB		
0.68	15	Qp	19.7	1	40	-4.3	30.1 @30m
1.10	15	Qp	19.7	1	40	-4.3	27.6 @30m
2.31	15	Qp	19.5	1	40	-4.5	40 @30m
5.90	15	Qp	19.6	1	40	-4.4	40 @30m
6.09	15	Qp	19.6	1	40	-4.4	40 @30m
9.18	15	Qp	19.6	1	40	-4.4	40 @30m

Table 3 Radiated emissions of the EUT, in the frequency range 0.009 – 30 MHz

The results of the radiated emission tests in the frequency range 0.009 – 30 MHz, carried out in accordance with 47 CFR Part 15 section 15.209 are depicted in Table 3.

#### Notes:

1. Calculated measurement results are obtained by using the 40dB/decade factor (antenna factor and cable loss is included). i.e at 9.18 MHz: 15 dBuV + 19.6dB + 1dB - 40dB= -4.4 dBuV/m.
2. A resolution bandwidth of 9kHz was used during testing
3. No EUT related emissions detected, only ambient noise detected which are given in Table 3.
4. Field strength values of radiated emissions at frequencies not listed in Table 3 are more than 20 dB below the applicable limit
5. The loop antenna was varied in horizontal and vertical orientations and also around it's axis. The reported value is the worst case found at the reported frequency.
6. The EUT was tested in horizontal and vertical orientations but showed no difference between these orientations. Worst case values noted.
7. Measurement uncertainty is  $\pm 5.0$ dB

Test engineer

Signature :



Name : R. van der Meer

Date : June 08, 2010

## **4 Conducted emission data.**

### **4.1 Conducted emission data of the EUT (full configuration).**

Not applicable, the EUT is battery operated only.

## **5 Carrier stability under special conditions.**

### **5.1.1 At 85% and 115% of rated voltage supply level**

Not applicable, battery operated.





### **6.3 RF On time in 100 msec**

The RF On time in 100 msec is: 23.52 msec (obtained from the original certification).

## 7 List of utilized test equipment.

Inventory number	Description	Brand	Model	Last cal.	Next cal.
12483	Guide horn antenna	Emco	3115	04/2010	04/2011
15453	Active loopant. 60 cm	Chase	HLA6120	05/2010	05/2011
15633	Biconilog Testantenna	Chase	CBL 6111B	02/2010	02/2011
99069	Coax 5m RG213 OATS	NMi Certin B.V.	CABLE 5M OATS	11/2009	11/2010
99070	Coax 15m RG213 OATS	NMi Certin B.V.	CABLE 15M OATS	11/2009	11/2010
99071	Coax OATS ground	NMi Certin B.V.	CABLE OATS	11/2009	11/2010
99107	Controller OATS	Heinrich Deisel	4630-100	NA	NA
99547	Temperature-Humiditymeter	Europe supplies	WS-7082	10/2009	10/2010
99580	OATS	Comtest	FCC listed: 90828	08/2008	08/2011
99608	Controller (OATS)	EMCS	DOC202	NA	NA
99609	Antenna mast	EMCS	AP-4702C	NA	NA
99699	Measuring receiver	R&S	ESCI	12/2009	12/2010

NA= Not Applicable