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**CISPR 22 / 24 TESTS ON THE  
 SOFTCON CR391 / BB ACCESS  
 CONTROL SYSTEM DEVICES**

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**CONFIGURATION CONTROL**

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## ACRONYMS AND ABBREVIATIONS

AVE	Average
C	Circular
CSIR	Council for Scientific and Industrial Research
E-Fields	Electric Fields
EFT	Electrical Fast Transients
EMC	Electromagnetic Compatibility
EMI	Electromagnetic Interference
ESD	Electrostatic Discharge
EUT	Equipment Under Test
H	Horizontal
HCP	Horizontal Coupling Plane
NIST	National Institute of Science and Technology
OATS	Open Area Test Site
PC	Personal Computer
QP	Quasi-Peak
RF	Radio Frequency
SANAS	South African National Accreditation System
V	Vertical
VCP	Vertical Coupling Plane

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## 1. INTRODUCTION

The Softcon Software Services CR391 / BB, henceforth referred to as Equipment Under Test (EUT), was tested for compliance on 18/05/2015 at the premises of ITC Services (Pty) Ltd to the following specifications:

- SANS 222 (2009) / CISPR22 (2008): 'Information technology equipment - Radio disturbance characteristics - Limits and methods of measurement'
- SANS 224 (2010) / CISPR 24 (2010): 'Information technology equipment - Immunity characteristics - Limits and methods of measurement'
  - SANS 61000-3-3 (2009) / IEC 61000-3-3 (2008) : Limits – Limitation of voltage changes, voltage fluctuations and flicker in public low-voltage supply systems – Equipment with rated current  $\leq 16$  A per phase
  - SANS 61000-4-2 (2009) / IEC 61000-4-2 (2008): Testing and measurement techniques – Electrostatic discharge immunity test
  - SANS 61000-4-3 (2008) / IEC 61000-4-3 (2010): Testing and measurement techniques – Radiated, radio-frequency, electromagnetic field immunity test
  - SANS 61000-4-4 (2011) / IEC 61000-4-4 (2011): Testing and measurement techniques – Electrical Fast Transient / Burst
  - SANS 61000-4-5 (2006) / IEC 61000-4-5 (2005): Testing and measurement techniques – Surge immunity test
  - SANS 61000-4-6 (2009) / IEC 61000-4-6 (2008): Testing and measurement techniques – Immunity to conducted disturbances, induced by radio-frequency fields
  - SANS 61000-4-11 (2005) / IEC 61000-4-11(2004): Testing and measurement techniques – Voltage Dips, Short Interruptions and voltage variations immunity test.

## 2. TEST RESULT SUMMARY

CISPR 22 Radiated Emissions	Pass Class B
CISPR 22 Conducted Emissions (Power Leads)	Pass Class B
CISPR 22 Conducted Emissions (LAN port) - CR391 BB only	Pass Class A
IEC 61000-3-3: Voltage changes, voltage fluctuations and flicker	Pass
IEC 61000-4-2 Electrostatic discharge immunity test	Pass Criterion B
IEC 61000-4-3: Radiated, radio-frequency, electromagnetic field immunity test	Pass Criterion A
IEC 61000-4-4: Electrical Fast Transient / Burst	Pass Criterion A
IEC 61000-4-5: Surge immunity test	Pass Criterion A
IEC 61000-4-6: Immunity to conducted disturbances, induced by radio-frequency fields	Pass Criterion A
IEC 61000-4-11: Voltage dips	Pass Criterion A
IEC 61000-4-11: Voltage interruptions	Pass Criterion A

### 2.1 EMISSION CLASSES AND IMMUNITY CRITERIA

#### 2.1.1 Emissions

**CISPR 22 Classifies ITE as either Class A or Class B.**

**Class B ITE** is a category of apparatus which satisfies the class B ITE disturbance limits.

Class B ITE is intended primarily for use in the domestic environment and may include:

- Equipment with no fixed place of use; for example, portable equipment powered by built-in batteries;
- Telecommunication terminal equipment powered by a telecommunication network;
- Personal computers and auxiliary connected equipment.

NOTE The domestic environment is an environment where the use of broadcast radio and television receivers may be expected within a distance of 10 m of the apparatus concerned.

**Class A ITE** is a category of all other ITE which satisfies the class A ITE limits but not the class B ITE limits. Such equipment should not be restricted in its sale but the following warning shall be included in the instructions for use:

**Warning**

This is a class A product. In a domestic environment this product may cause radio interference in which case the user may be required to take adequate measures.

### 2.1.2 Immunity

The Criteria set-out above are defined as follows:

**Criterion A:** normal performance within limits specified by the manufacturer, requestor or purchaser;

**Criterion B:** temporary loss of function or degradation of performance which ceases after the disturbance ceases, and from which the equipment under test recovers its normal performance, without operator intervention;

**Criterion C:** temporary loss of function or degradation of performance, the correction of which requires operator intervention;

## 3. TEST METHODOLOGY

### 3.1 ENVIRONMENTAL CONDITIONS DURING TEST:

- Temperature: 21°C
- Relative Humidity: 41%

## 4. CALIBRATION OF EQUIPMENT

The computer controlled EMI Measuring system is checked for amplitude and frequency accuracy with a signal generator (calibrated by a SANAS accredited laboratory and is traceable to the national standards maintained by the NMISA) on a monthly basis. The calibration of the equipment is performed by Inala Technology. All equipment Calibration Certificates are available on request.

## 5. MEASUREMENT OF UNCERTAINTY

The uncertainty budget is calculated according to the guidelines of LAB34 and CISPR16-4

### 5.1 RADIATED EMISSIONS

- Compliance is deemed to occur if all measured disturbances are below the CISPR 22 limit.
- Non-compliance is deemed to occur if any measured disturbance exceeds the CISPR 22 limit.

### 5.2 RADIATED IMMUNITY

- Compliance is deemed to occur for 3 & 10V/m when EUT can withstand  $xV/m \times 1.1$



### 5.3 CONDUCTED IMMUNITY

- Compliance is deemed to occur for 3 & 10V with BCI when EUT can withstand  $xV \times 1.26$
- Compliance is deemed to occur for 3 & 10V with CDN when EUT can withstand  $xV \times 1.17$

## 6. TEST SAMPLE DESCRIPTION AND TEST SETUP DETAILS

The specific test methodology will be discussed under each relevant test if different to the general set-up guidelines below.

The **EUT** was subjected to all tests in the following way:

- The EUT was switched on and operated in accordance with the manufacturer instructions.
- Continuous operation was monitored with a laptop positioned outside of the test chamber.
- Tests were performed while the unit was fully operational.
- Deviations from the above set-up will be noted in each specific case.

## 7. SETUP IMAGES



**CR391: Top view**



**SANS / IEC 61000-4-2: Electro Static Discharge immunity test set-up**



**SANS / IEC 61000-4-6: Conducted immunity test set-up**

## 8. EMISSIONS

### 8.1 SET-UP

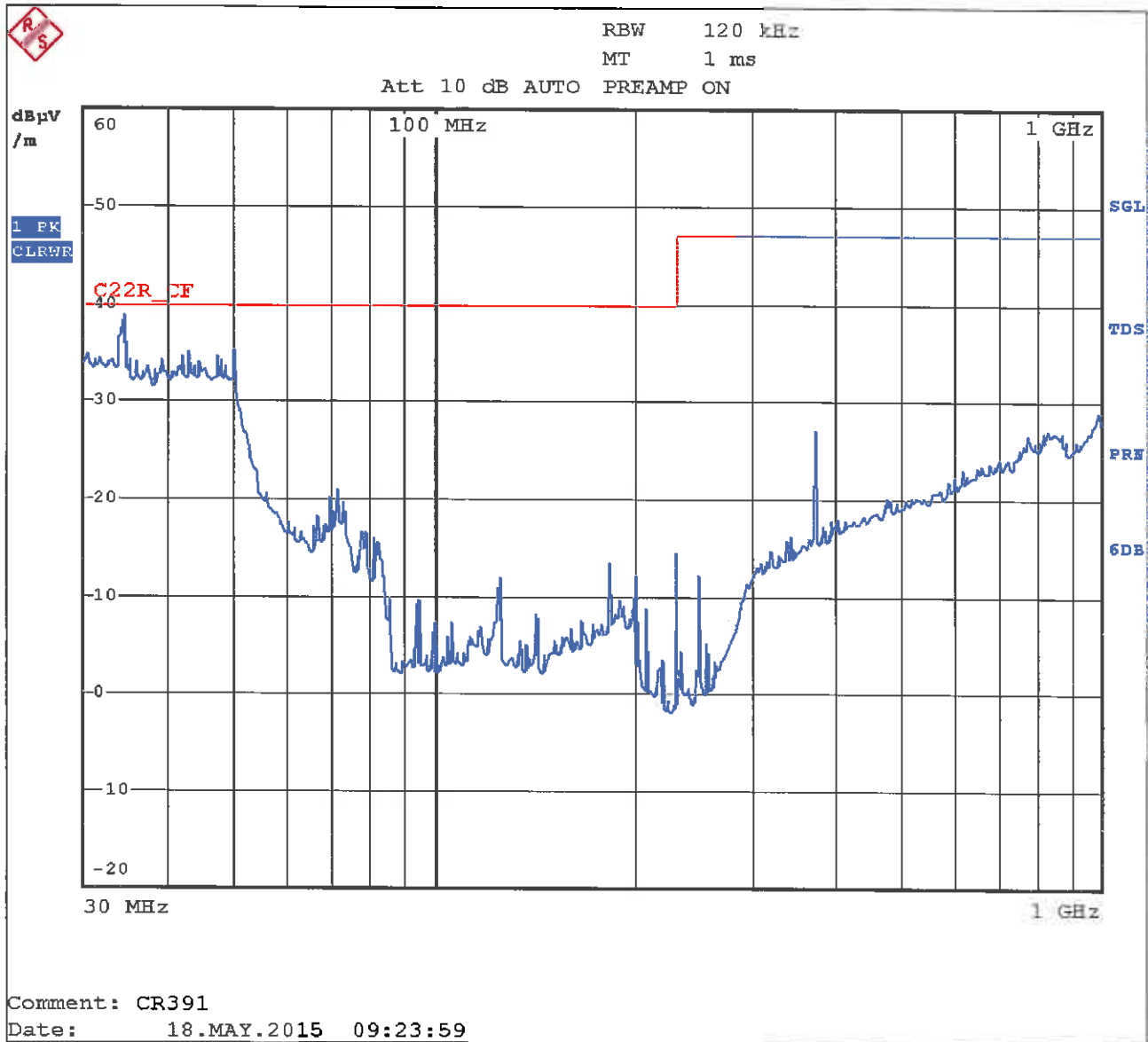
- The EUT was switched on and operated in accordance with the manufacturer instructions.
- Automated scans in the frequency band 30MHz to 6000MHz (radiated emissions) were done in order to determine compliance emission results for the EUT.
- The worst case emissions were obtained in the horizontal polarization.

**Table 8.1-1: Test equipment used for Conducted and Radiated Emission Measurements**

EQUIPMENT	SERIAL NO
IBM Compatible PC	Ser No : None
Rohde & Schwarz ESPI	Ser No: 100186
BIA 30 Biconical antenna	Ser No : 3568
EM 6950 Log-P Antenna	Ser No: ITC001
EM 6961 Ridge horn antenna	Ser No: 6248

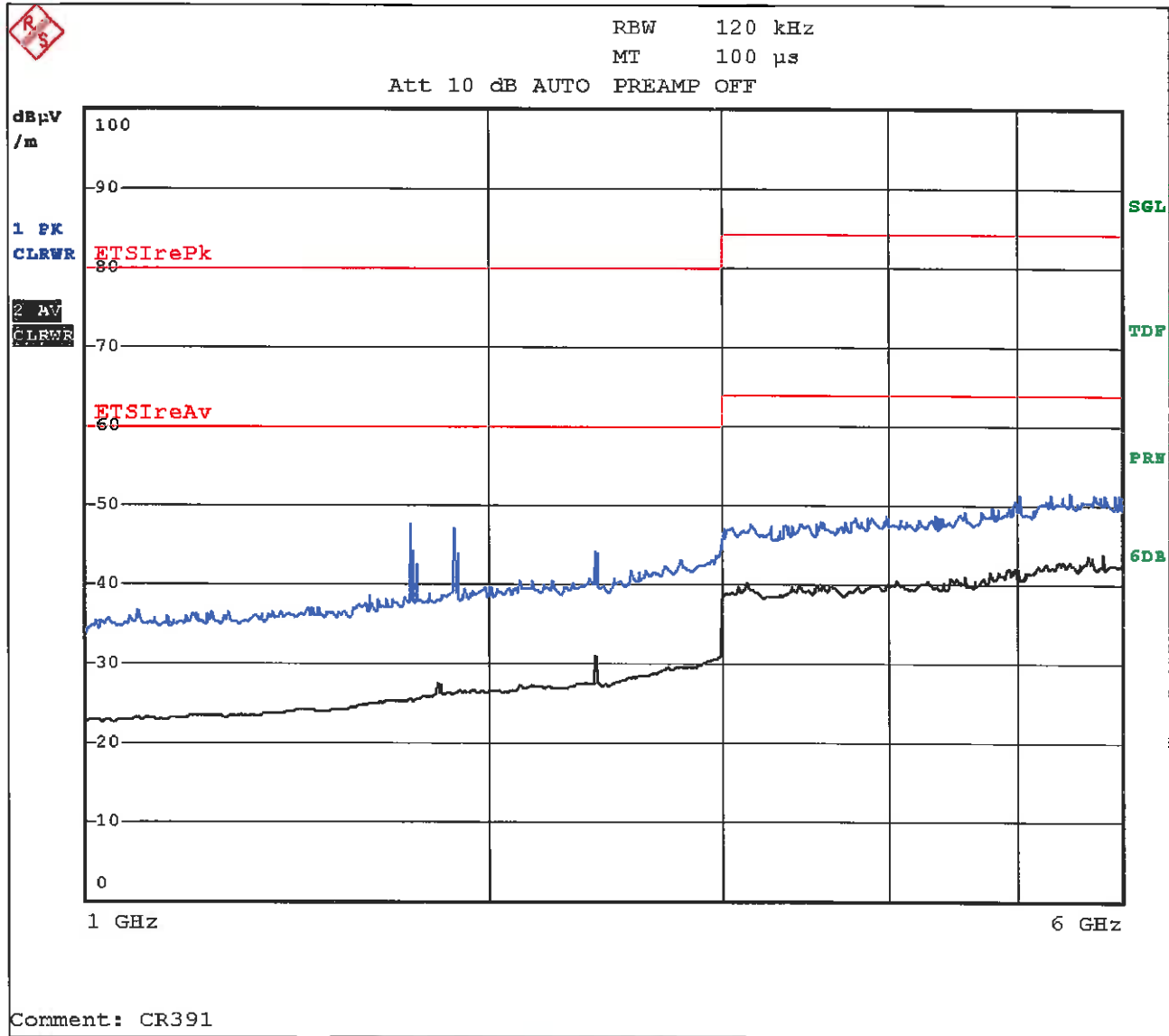
**8.1.1 Radiated Emission Results: 30 – 1000MHz**

Graph 1: Represents peak radiated emissions measured from the EUT. Emission levels were below the Class B limit. Note that the test distance was 3m. The limit line was adjusted accordingly. The test was performed with the antennas in the Horizontal polarization.



### 8.1.2 Radiated Emission Results: 1000 – 6000MHz

Graph 2: Represents peak radiated emissions measured from the EUT. Emission levels were below the Class B limit. Note that the test distance was 1m. The test was performed with the antennas in the Horizontal polarization.

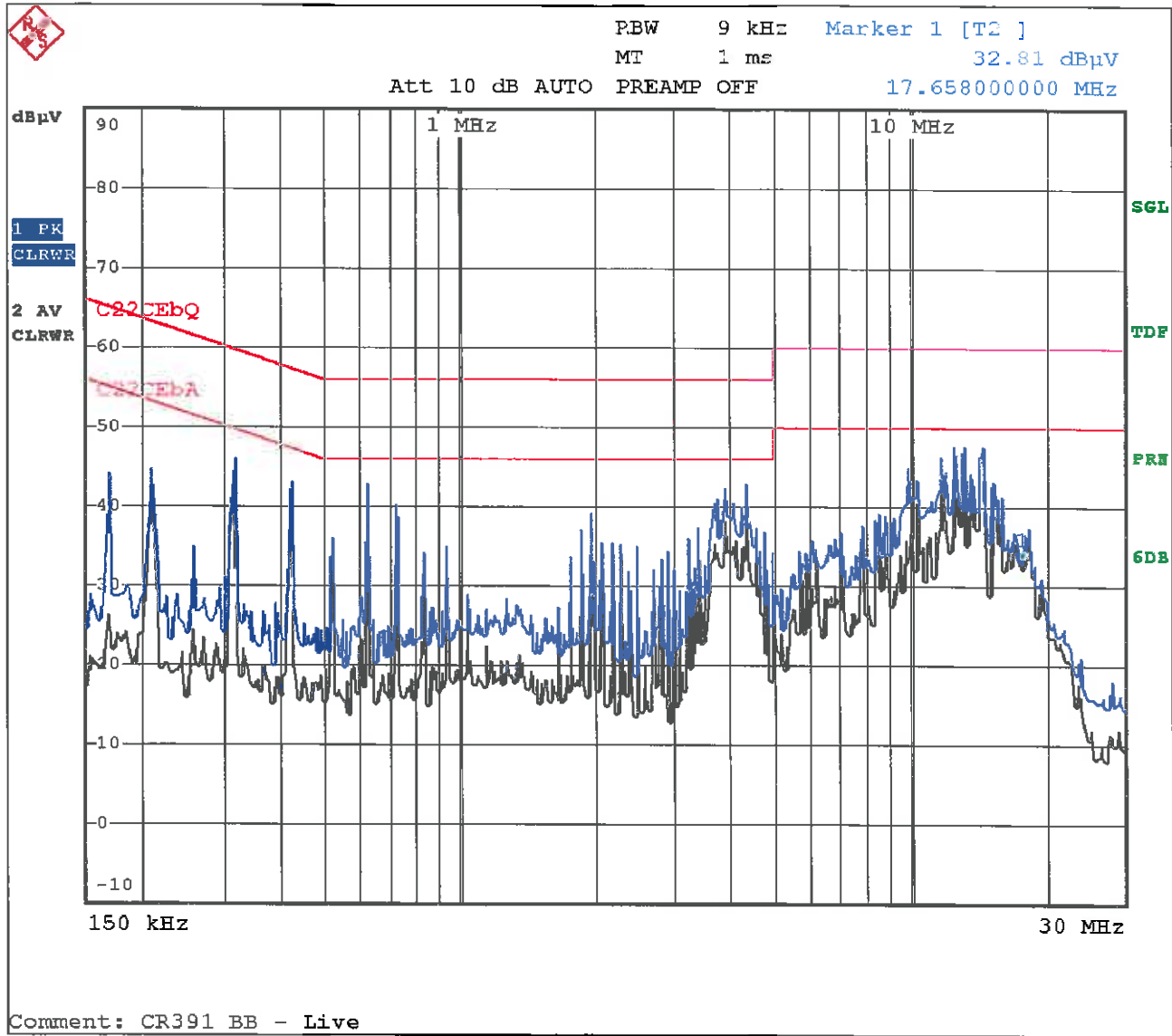


### 8.1.3 Conclusion

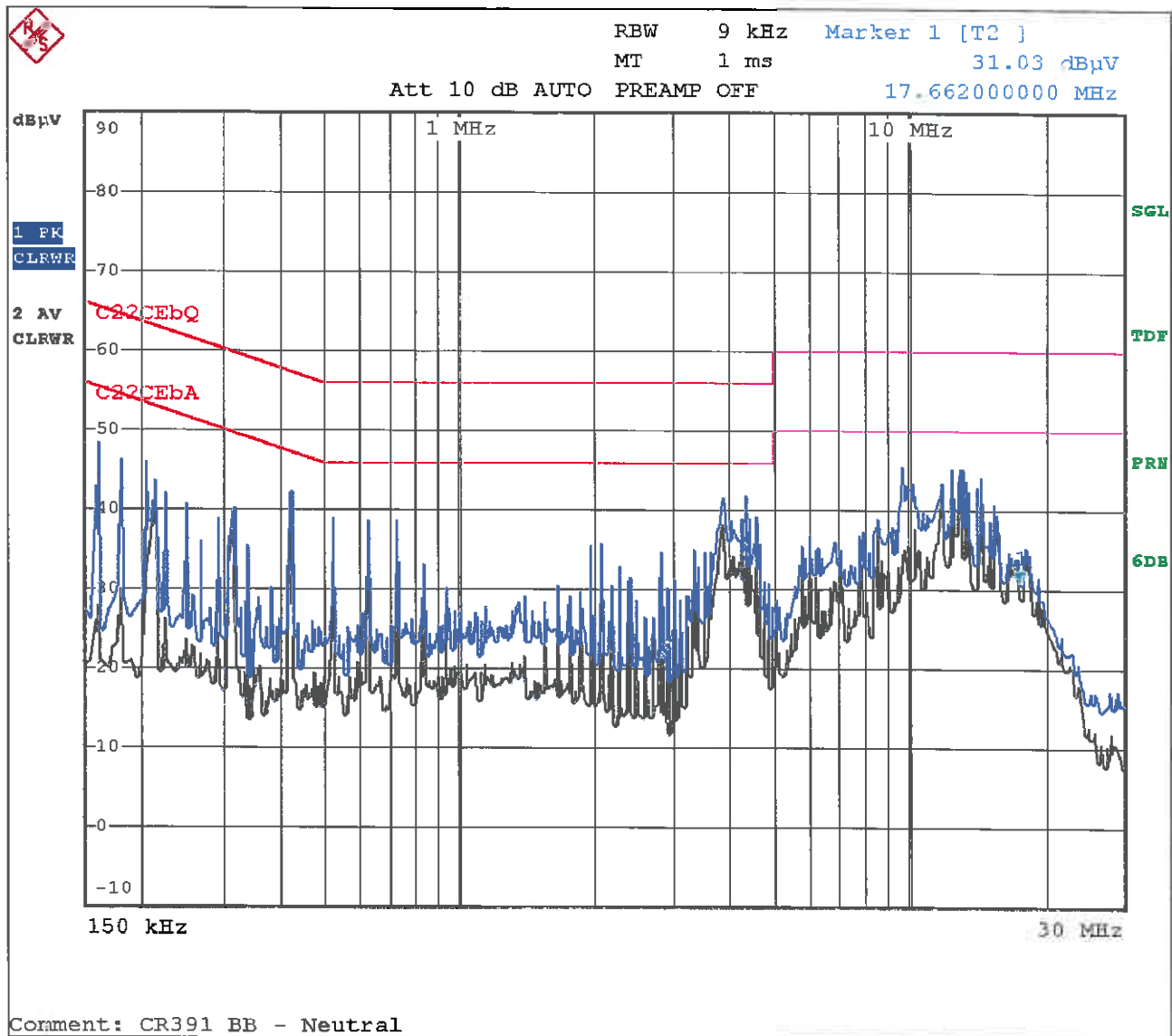
The EUT complies with the radiated emissions requirements of SANS 222 / CISPR 22 Class B.

### 8.1.4 Conducted Emission Results

Graph CE1: Peak and Average Conducted emissions measured on the live lead of the EUT was below the Class B quasi peak and Average limit. The device was powered and fully operational.



Graph CE2: Peak and Average Conducted emissions measured on the Neutral lead of the EUT was below the Class B quasi peak and Average limit. The device was powered and fully operational.

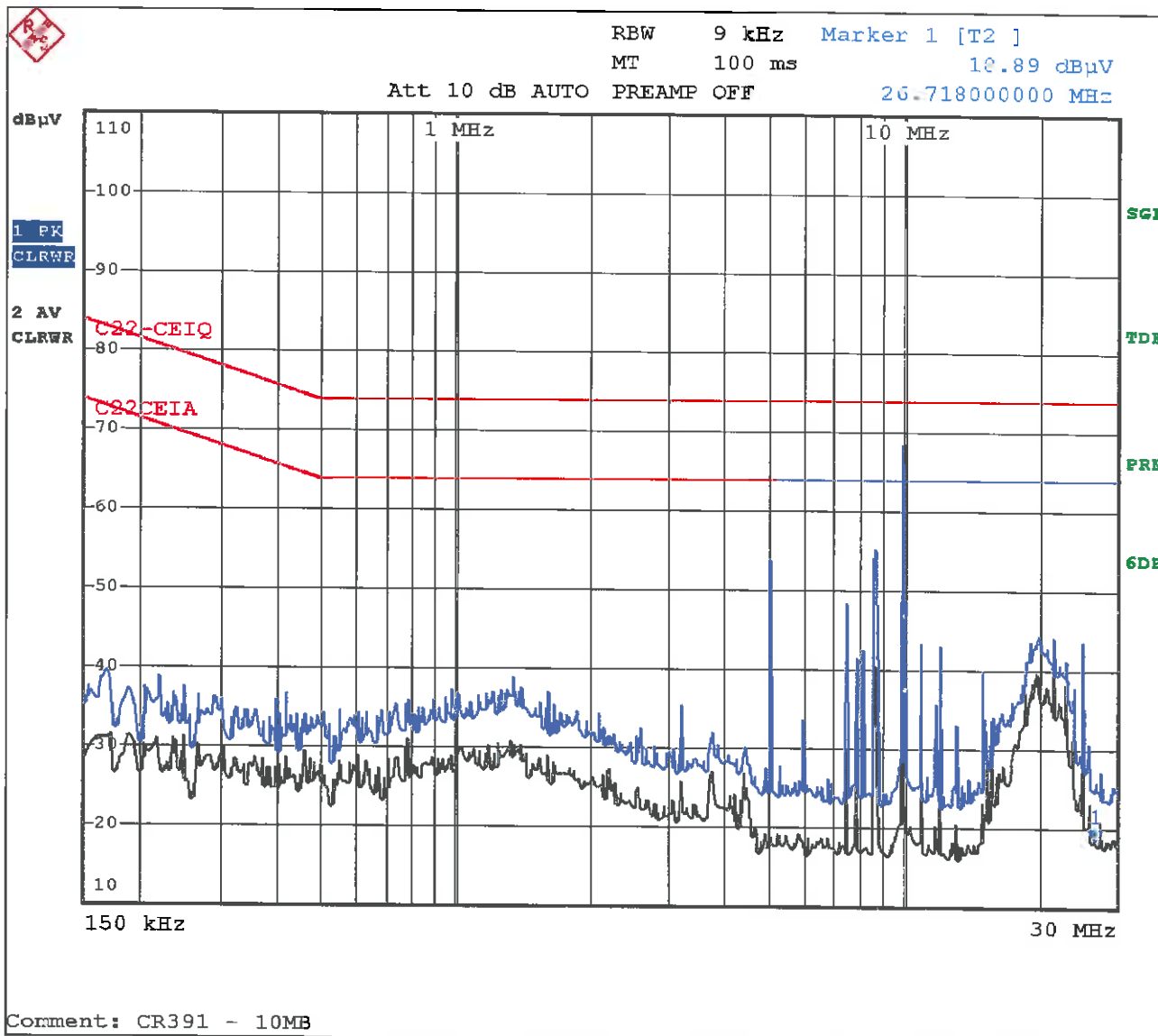


### 8.1.5 Conclusion

The EUT complies with the conducted emissions requirements for power input lines of SANS 222 / CISPR 22 Class B.

### 8.1.6 Conducted Emission Results (LAN Communication line)

Graph CELi1: Peak and Average Conducted emissions measured on the LAN communications line of the EUT was below the Class A Quasi peak and Average limit.



### 8.1.7 Conclusion

The EUT complies with the conducted communications lines emissions requirements of SANS 222 / CISPR 22 Class B.



## 9. IMMUNITY

### 9.1 ELECTRICAL FAST TRANSIENTS

- The EUT was supplied with the required voltage and subjected to a direct injected 5 kHz repetition rate 5/50nS wave interference signal.
- The EUT was tested as table top equipment.
- The interference signal was applied in the following sequence:
  - **AC Power Ports**
    - a. Live to Neutral: Tests were executed with +1kV and -1kV interference signal amplitudes for a 60 second period for each polarity.
    - b. Live and Neutral to Ground Reference: Tests were executed with +1kV and -1kV interference signal amplitudes for a 60 second period for each polarity.
    - c. Live to Earth: Tests were executed with +1kV and -1kV interference signal amplitudes for a 60 second period for each polarity.
    - d. Neutral to Earth: Tests were executed with +1kV and -1kV interference signal amplitudes for a 60 second period for each polarity.
  - **I/O Ports**
    - a) Capacitive coupled + 0.5 kV and - 0.5 kV interference signal applied to the LAN cable.

**Table 9.1-1 Test equipment used for Electrical Fast Transients**

EQUIPMENT	SERIAL NO/ REFERENCE NUMBER
TESEQ NSG 3040	Ser No: 1856

#### 9.1.1 Results

AC power port:

- The EUT was resilient to the applied fast transients
- The EUT functioned normally during and after the test.

I/O ports:

- The EUT was resilient to the capacitive coupled + 0.5 kV and - 0.5 kV interference signal applied to the LAN cable individually.
- The EUT functioned normally during and after the test.

#### 9.1.2 Conclusion

The EUT comply with criterion A of SANS / IEC 61000-4-4.

**(Criterion A:** normal performance within limits specified by the manufacturer, requestor or purchaser)

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## 9.2 ELECTROSTATIC DISCHARGE

### 9.2.1 Set-up

- The EUT was tested while unpowered as it will not be accessible after installation.
- 10 positive and 10 negative contact discharges were applied to the VCP and HCP respectively.
- 10 positive and 10 negative contact discharges were made to the enclosure of the CR391 system.

**Table 9.2-1 Test equipment used for ESD**

EQUIPMENT	SERIAL NO/ REFERENCE NUMBER
TESEQ NSG 3040	Ser No: 1856
TESEQ NSG 435 ESD gun	Ser No: 6555
Contact discharge tip	None
Vertical Coupling Plane	None

**Table 9.2-2 Results of ESD (Contact discharge)**

POSITION ON EUT	VOLTAGE	NUMBER OF DISCHARGES	RESULT	VERDICT
VCP (Vertical)	± 4kV	10	Not susceptible	Comply (A)
HCP (Horizontal)	± 4kV	10	Not susceptible	Comply (A)
Enclosure	± 4kV	10	Not susceptible	Comply (A)

### 9.2.2 Results

- The EUT was resilient to the interfering ESD pulses when applied to the enclosure of the device and on the coupling planes.
- The EUT functioned as intended during and after application of the ESD pulses

### 9.2.3 Conclusion

The EUT complies with the criterion A of SANS / IEC 61000-4-2.

**(Criterion A:** normal performance within limits specified by the manufacturer, requestor or purchaser)

### 9.3 SURGES

#### 9.3.1 Set-up

- The EUT was supplied with the required voltage.
- Five positive and five negative 1.2/50 $\mu$ s pulses were directly injected into the supply at 60 second intervals between surges at 0°, 90°, 180° and 270° angles. The pulses were applied in the following sequence:

- **AC Power Port**

- a. Live to Neutral  $\pm 1$ kV
- b. Live to Safety earth (  $\pm 2$ kV)
- c. Neutral to Safety earth ( $\pm 2$ kV)

**Table 9.3-1 Test equipment used for Surges**

EQUIPMENT	SERIAL NO/ REFERENCE NUMBER
TESEQ NSG 3040	Ser No: 1856

#### 9.3.2 Results

- The EUT was resilient to the surges applied

#### 9.3.3 Conclusion

The EUT complies with criterion A of the relevant section of SANS / IEC 61000-4-5.

(**Criterion A:** normal performance within limits specified by the manufacturer, requestor or purchaser)

## 9.4 VOLTAGE DIPS AND INTERRUPTIONS

### 9.4.1 Set-up

- The EUT was switched on and operated in accordance with the manufacturer instructions.
- The EUT was subjected to the following voltage dips and interruptions applied to the AC power port of the EUT:
  - a) 100 % reduction in supply voltage for 1 cycle :Comply criterion A
  - b) 40 % reduction in supply voltage for 10 cycles :Comply criterion A
  - c) 70 % reduction in supply voltage for 25 cycles :Comply criterion A
  - d) 100 % reduction in supply voltage for 250 cycles :Comply criterion A

**Table 9.4-1 Test equipment used for Voltage Dips and Interruptions**

EQUIPMENT	SERIAL NO/ REFERENCE NUMBER
Pacific AC Power source Model 140-AMX	0362
TESEQ NSG 3040	Ser No: 1856

### 9.4.2 Results

- The EUT switched over to battery backup during application of the 100% reduction in supply for 250 cycles. The EUT continued normal operation during and after application of the reduction in supply.

### 9.4.3 Conclusion

The EUT complies with criterion A of the relevant sections of SANS / IEC 61000-4-11

(Criterion A: normal performance within limits specified by the manufacturer, requestor or purchaser)

## 9.5 RADIATED IMMUNITY

### 9.5.1 Set-up

- The EUT was switched on and operated in accordance with the manufacturer instructions.
- The test was performed in an anechoic chamber in the frequency band 80 MHz to 1000 MHz with 80 % AM 1kHz, at a level of 3 V/m according to IEC 61000-4-3 Clause 8 (Frequency step and dwell method).
- The test was repeated at the following discrete frequencies: 80, 120, 150, 230, 434, 460, 600, 863 and 900 MHz while the unit was active.

**Table 9.5-1 Test equipment used for Radiated Susceptibility.**

EQUIPMENT	SERIAL NO/ REFERENCE NUMBER
Olivetti Personal Computer Model PCS 286	Ser No : 00074333
RF Signal Generator HP Model 8657A	Ser No: 2819UO4767
Log Periodic Antenna Model EM6950	Ser No : 1001
RF Amplifier EM Model 4248-1	Ser No : None
Field Strength Meter AR Model FM2000	Ser No: 14021

### 9.5.2 Results

- The EUT was resilient to the 80% AM 1kHz signal applied at a level of 3 V/m.

### 9.5.3 Conclusion

The EUT complies with criterion A of SANS / IEC 61000-4-3.

(**Criterion A:** normal performance within limits specified by the manufacturer, requestor or purchaser)

## 9.6 CONDUCTED IMMUNITY

### 9.6.1 Set-up

- The EUT was switched on and operated in accordance with the manufacturer instructions.
- The test was performed in a shielded enclosure in the frequency band 150kHz to 80 MHz with 80 % AM 1kHz, at a level of 3V (un-modulated) on the input power and LAN cable according to SANS / IEC 61000-4-6.
- The test was repeated at the following discrete frequencies: 0.2, 1, 7.1, 13.56, 21, 27.12 and 40.68 MHz.

**Table 9.6-1 Test equipment used for Conducted Immunity.**

EQUIPMENT	SERIAL NO/ REFERENCE NUMBER
RF Signal Generator HP Model 8657A	Ser No: 2819UO4767
BCI Probe FCC Model F-120-3	Ser No : 52
RF Amplifier EM Model 4248-1	Ser No : None
Lüthi Coupling decoupling network	Ser No : 2555

### 9.6.2 Results

- The EUT was resilient to the 80% AM 1kHz signal applied at a level of 3V on the input power cable.
- The EUT was resilient to the 80% AM 1kHz signal applied at a level of 3V on the LAN cable.

### 9.6.3 Conclusion

The EUT complies with criterion A of the relevant section of SANS / IEC 61000-4-6.

(Criterion A: normal performance within limits specified by the manufacturer, requestor or purchaser)

## 9.7 VOLTAGE FLUCTUATIONS & FLICKERS

### 9.7.1 Setup

- The EUT was switched on and operated in accordance with the manufacturer instructions.

**Table 9.7-1 Voltage Fluctuations & Flicker test results**

HA-PC Link Plus. Software v2.02. Firmware v2.81		
Report Number	:	17
Tested On	:	18 May 2015 13:25 for 600 Seconds.
Equipment Under Test	:	CR391
Serial Number	:	
Tested by	:	Johan
Supply Voltage	:	230.6 to 230.8 Vrms 326.4 Vpk Frequency : 50.00 Hz
Load Current	:	5.5 to 7.9 Arms 5.6 to 8.0 Apk Crest Factor: 1.015
Test Method: EN61000-3-3:2008		
Max d(c) Between Adjacent:	0.00%	PASS
Voltage Variations :		
Highest Level:	+1.25%	
Lowest Level:	-1.25%	
d(max):	2.49%	PASS
Highest d(t) of 500ms:	1.23%	PASS
Present d(t) over 3.33%:	0.00 Seconds	
Longest d(t) over 3.33%:	0.02 Seconds	
Highest Steady State:	-0.01%	
Lowest Steady State:	-0.01%	
Max d(c) Between Adjacent:	0.00%	PASS
Max d(c) Between Any:	0.00%	
Short Term Flicker Pst:	0.05	PASS

### 9.7.2 Conclusion

The EUT complies with the voltage fluctuations and flicker requirements of SANS / IEC 61000-3-3.

## 10. COMPLIANCE STATEMENT

The EUT complies with the requirements of the specifications listed in 11 below.

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## 11. CONCLUSION

The Softcon Software Services CR391 / BB Access Control System (In the configuration tested) meets the requirements of the following specifications:

- SANS 222 (2009) / CISPR22 (2008): *'Information technology equipment - Radio disturbance characteristics - Limits and methods of measurement'*
- SANS 224 (2010) / CISPR 24 (2010): *'Information technology equipment - Immunity characteristics - Limits and methods of measurement'*
- SANS 61000-3-3 (2009) / IEC 61000-3-3 (2008) : *Limits – Limitation of voltage changes, voltage fluctuations and flicker in public low-voltage supply systems – Equipment with rated current ≤16 A per phase*
- SANS 61000-4-2 (2009) / IEC 61000-4-2 (2008): *Testing and measurement techniques – Electrostatic discharge immunity test*
- SANS 61000-4-3 (2008) / IEC 61000-4-3 (2010): *Testing and measurement techniques – Radiated, radio-frequency, electromagnetic field immunity test*
- SANS 61000-4-4 (2011) / IEC 61000-4-4 (2011): *Testing and measurement techniques – Electrical Fast Transient / Burst*
- SANS 61000-4-5 (2006) / IEC 61000-4-5 (2005): *Testing and measurement techniques – Surge immunity test*
- SANS 61000-4-6 (2009) / IEC 61000-4-6 (2008): *Testing and measurement techniques – Immunity to conducted disturbances, induced by radio-frequency fields*
- SANS 61000-4-11 (2005) / IEC 61000-4-11 (2004): *Testing and measurement techniques – Voltage Dips, Short Interruptions and voltage variations immunity test.*