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Experimental results and EMC considerations on RFID location systems

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1. Introduction
2. RFID Location Systems
3. The RFID Radar positioning system
4. Performance evaluation based on experimental results
5. EMC Measurements
6. Conclusions

1. Introduction

- RFID Active / Passive
- Readers – microprocessor based
- Tags – memories
- Multiple frequency bands
- Standardized

2. RFID Location Systems

- Inertial systems – good for outdoor applications

- Indoor locations: triangulation / scene analysis / proximity

1. Specialized infrastructure
2. Using wireless networks signals and information
3. Mixed

- Many implementations

Active Badge, Cricket, MotionStar, MSR Radar,
RFID Radar, SmartFloor, SpotON

3. The RFID Radar positioning system

Catalog data:

Operating frequency: 870 MHz / 10kHz band

Max. range: 40 / 100 m

Passive / Active tags

5uW / 200uW tags

Passive TTF – Tag Talk First protocol

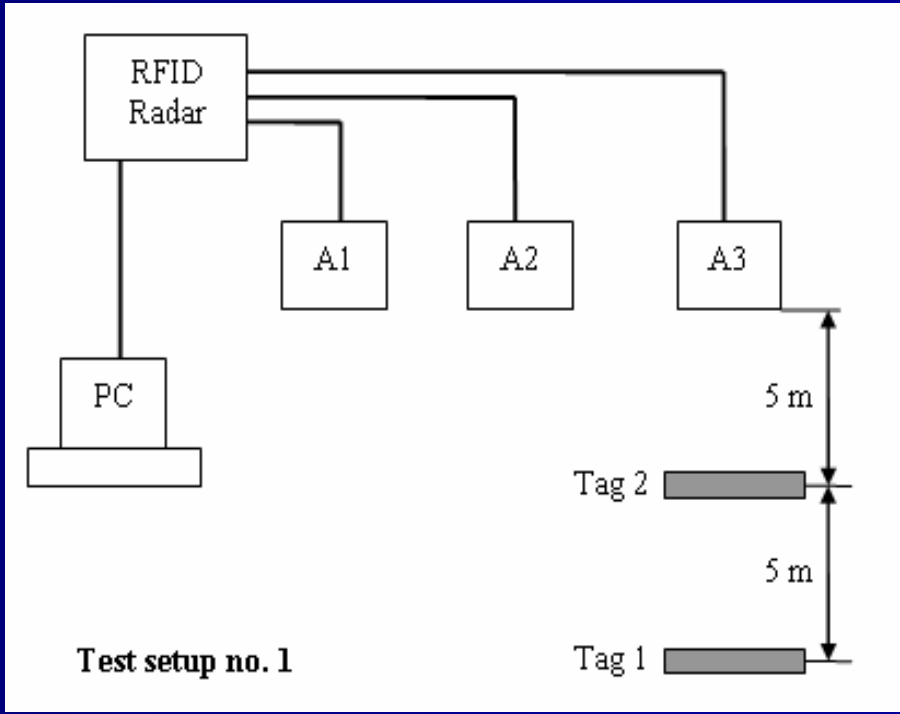
RS232 interface

Control software

4. Performance evaluation based on experimental results

Indoor test setup 1

Same setup for
1.000 measurements
3 different days



4. Performance evaluation based on experimental results

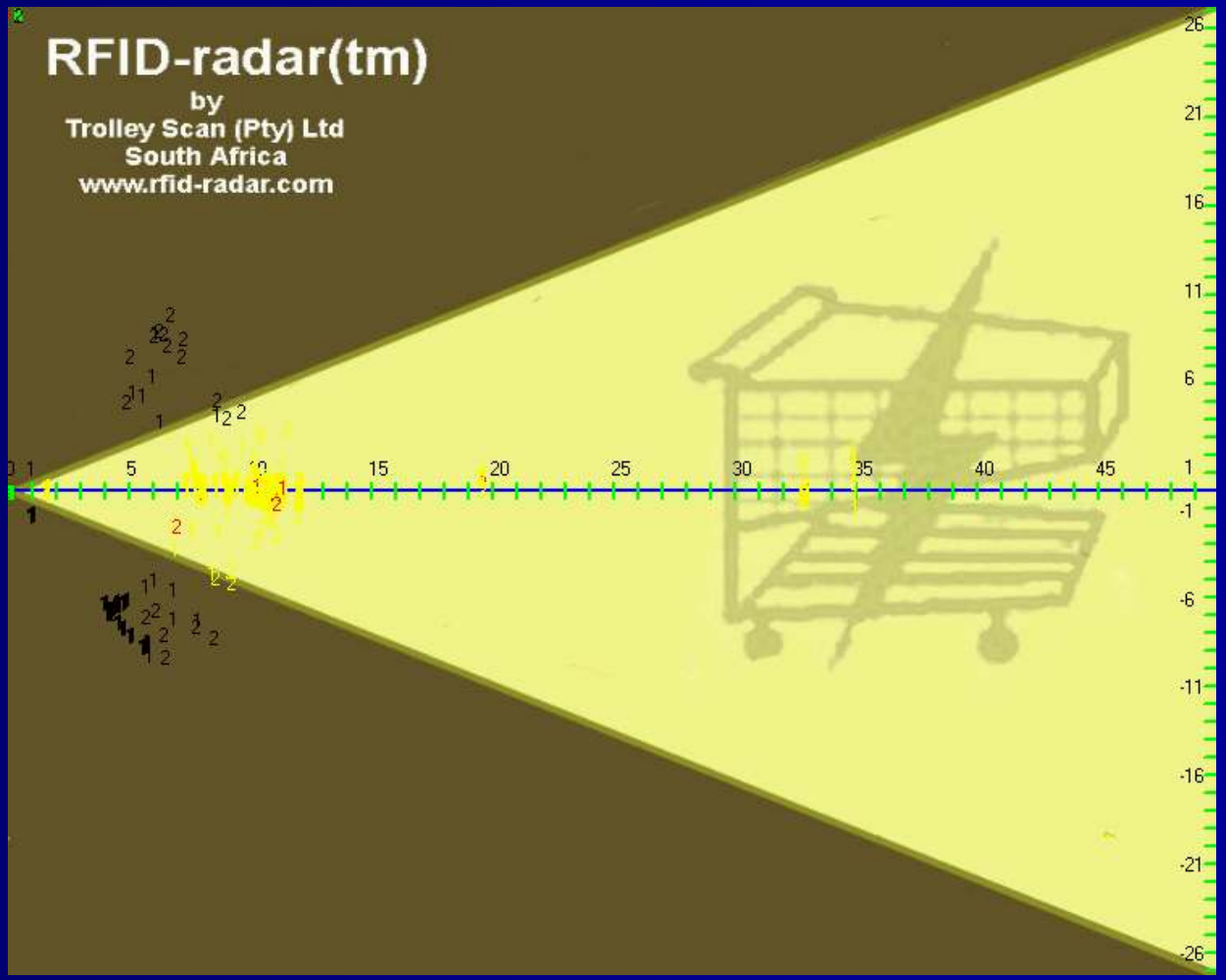
Results

65 % of total

Error < 10%

Tag 1 at 5m

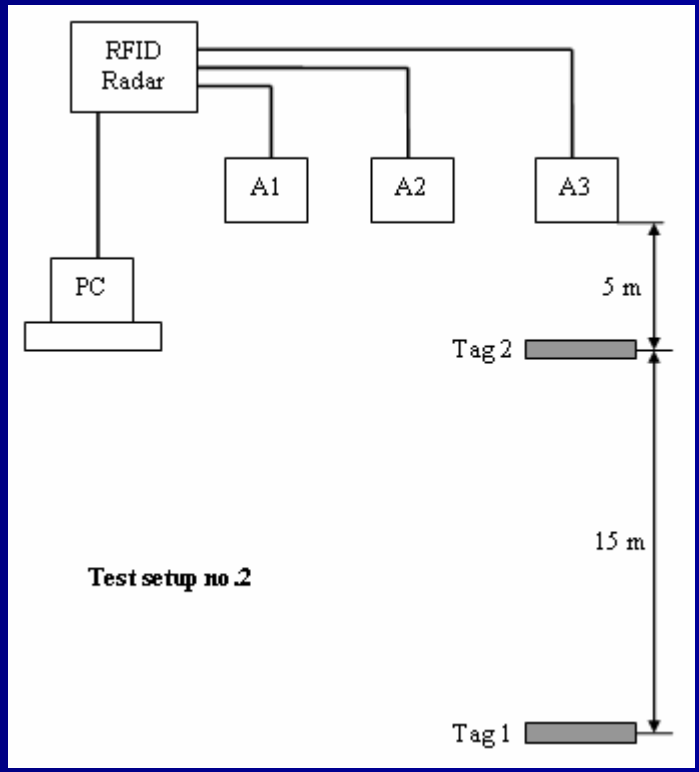
Tag 2 at 10 m



4. Performance evaluation based on experimental results

Indoor test setup 2

Same setup for
1.000 measurements
3 different days

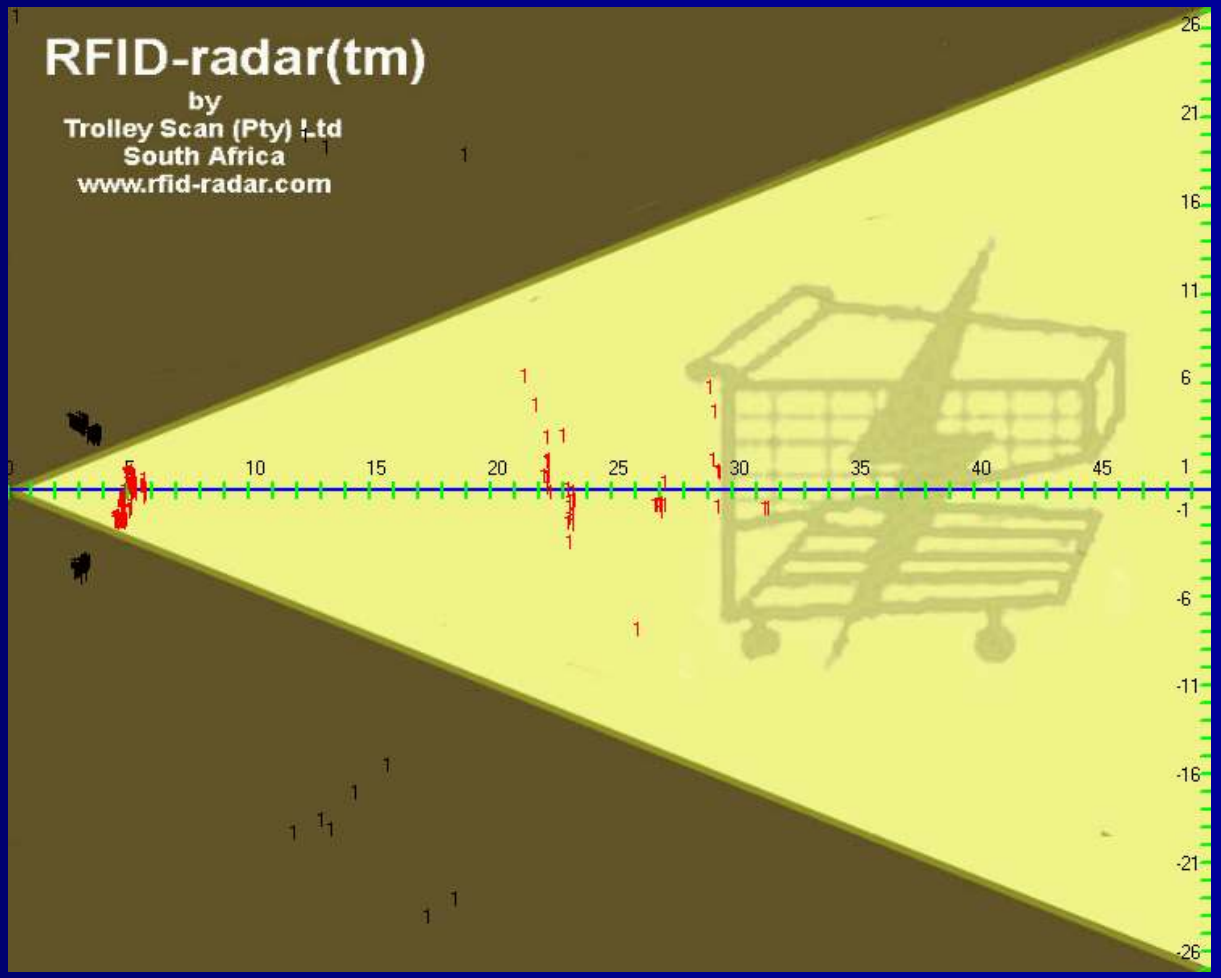


4. Performance evaluation based on experimental results

Results

35 % of total

Error < 10%



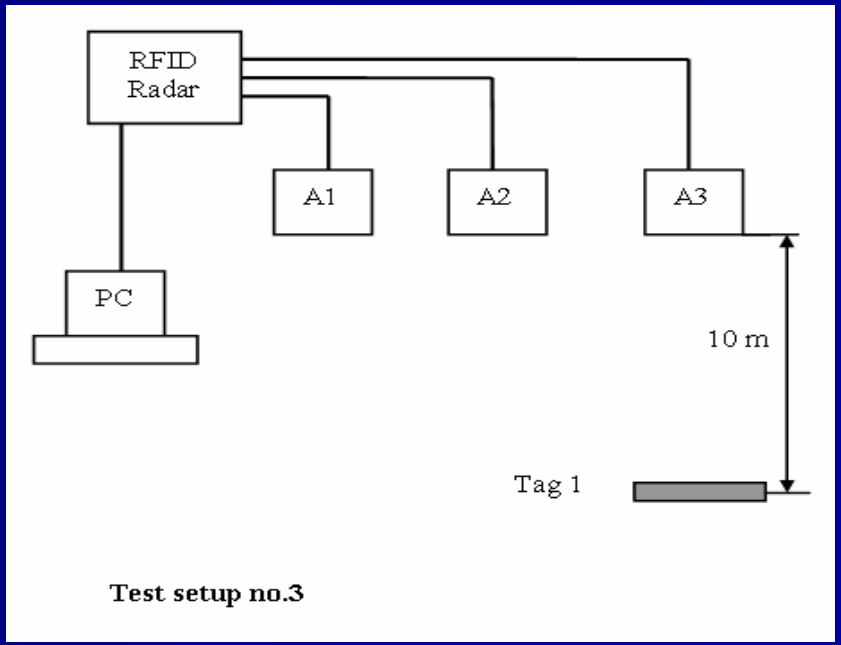
Tag 1 at 5m

Tag 2 at 10 m

4. Performance evaluation based on experimental results

Outdoor test setup 3

Same setup for
1.000 measurements
3 different days



Test setup no.3

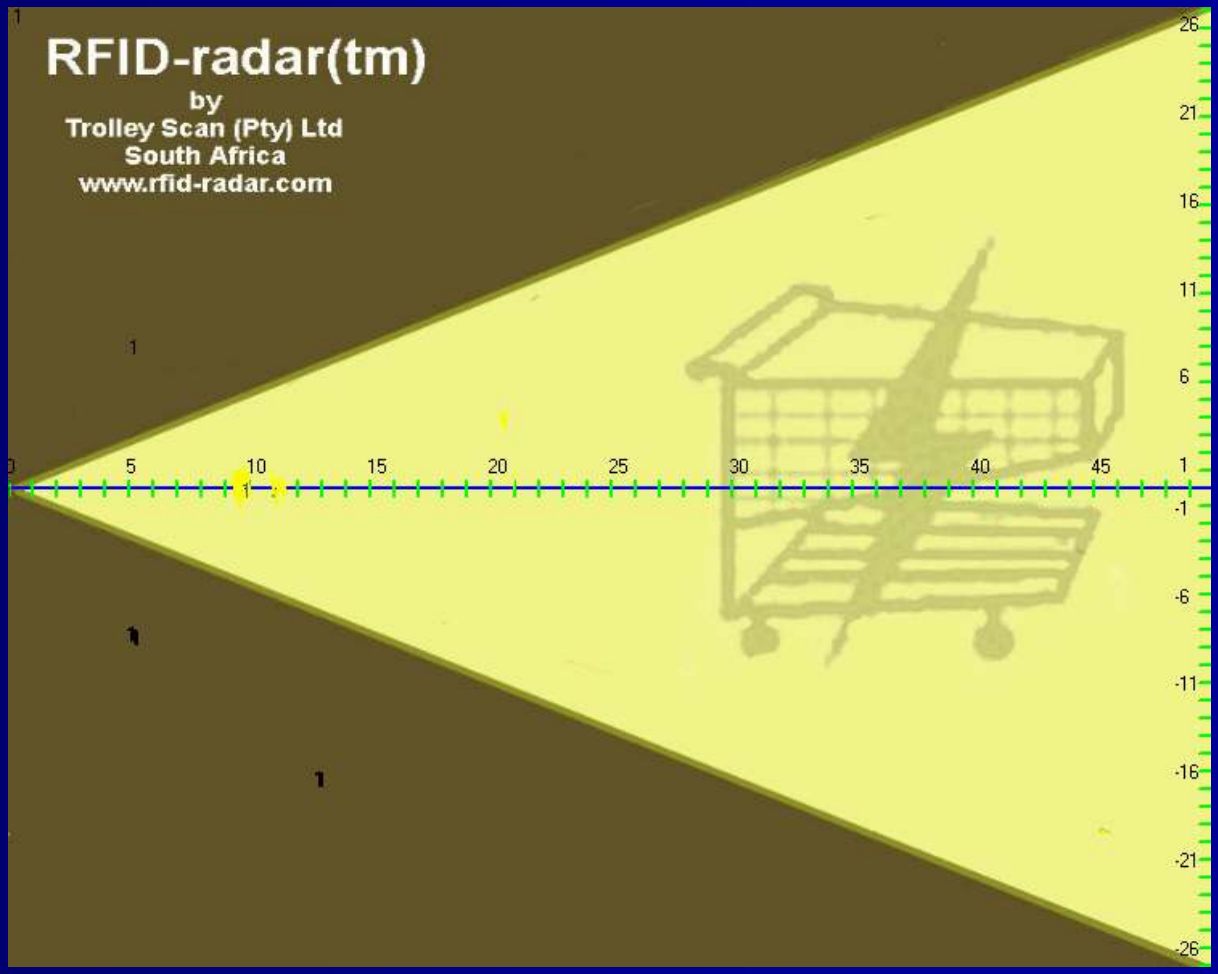
4. Performance evaluation based on experimental results

Results

6 % of total

Error > 10%

Tag 1 at 10 m

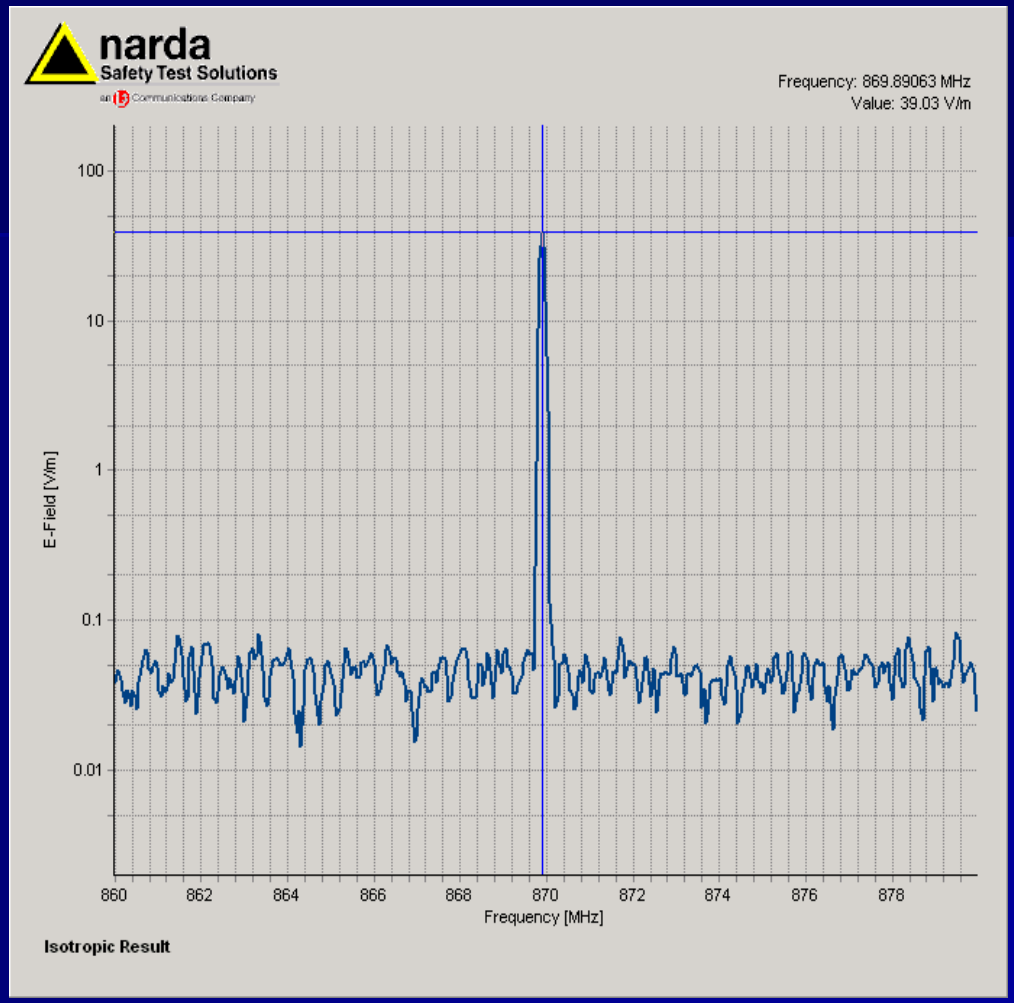


5. EMC Measurements

SRM-3000 NARDA

- ✓ Indoor / Outdoor measurements
- ✓ Noise floor 10 … 20 mV/m
- ✓ Frequency band 100 kHz – 3 GHz
- ✓ Isotropic Three-axis antenna (75 MHz – 3 GHz)

5. EMC Measurements

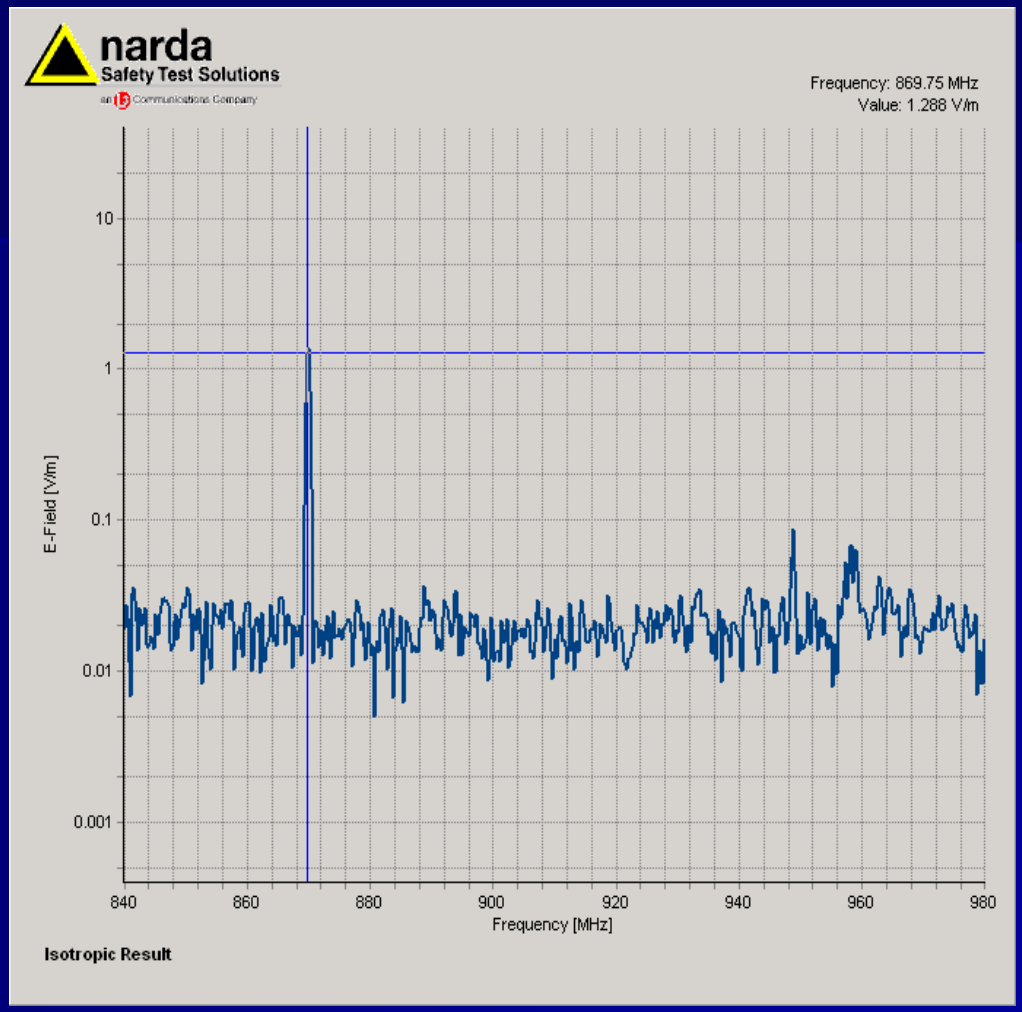


Central frequency = 869.89 MHz

Peak E value = 39.03 V/m

Electric field magnitude at 3m distance in front of the antenna

5. EMC Measurements



Central frequency = 869.75 MHz

Peak E value = 1.288 V/m

Electric field magnitude at 20 m distance in front of the antenna

CONCLUSIONS

Performances

1. **Performances greatly affected by interferences**
2. **Only 40 to 60 percent of total measurements under 10 % accuracy**
3. **Not suitable for high-precision applications**
4. **Small errors in open-areas – 93 % accuracy**

EMC aspects

1. **NOT suitable for indoor applications – high E field**
2. **Very good for long-range outdoor positioning applications**

A lot of work to do in the future !

Thank you !

Questions?