Vehicles and Telecommunication - EMC Standards and Regulations

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Summary

- Vehicle / Telecommunication Main EMC interactions
- International Standardization
- Immunity to external sources
- Immunity to on-board transmitters
- Voltage received by an antenna
- Radiated Field Emission
- Health protection
- Vehicle European Directive
- Conclusion
Vehicle / Telecommunication Main EMC interactions

- Immunity to external sources
- Health Protection
- Immunity to on-board transmitters
- Radiated emission
- Voltage received by an antenna

ITU-T 2005, March 4th
International Standardization

ISO/TC22/SC3/WG3

Road vehicles/Electrical and electronic equipment/Electromagnetic compatibility

Many Organisations

CENELEC

Electromagnetic disturbances related to electric/electronic equipment on vehicles and internal combustion engine powered devices

A.LECCA
Immunity to external sources


1. 10 kHz - 18 GHz frequency range
2. Use of absorber-lined shielded enclosure
3. Substitution method (forward power)
4. Single sensor / 4 sensors calibration
5. CW, AM, PM signals with peak conservation
6. Field uniformity and harmonics requirements
Immunity to on-board transmitters


1. 1.8 MHz - 18 GHz frequency range
2. Use of absorber-lined shielded enclosure
3. Transmitters with antenna outside (OEM or reference) and inside the vehicle (simulated or commercial handy)
4. Closed-loop on forward/net power
5. Representative signals and power levels
Voltage received by an antenna

- CISPR 25: Radio disturbances characteristics for the protection of receivers used on board vehicles, boats and on devices - Limits and methods of measurements - Clauses 1 to 5 - 2nd ed - 08/2002 (3rd in progress - CD stage)

1. 150 kHz - 1 GHz frequency range (including new services bands up to 2.5 GHz)
2. Use of absorber-lined shielded enclosure
3. Vehicle and/or reference antenna
4. NB / BB discrimination (Peak/Average) - Use of Average and Quasi-peak detectors and limits
Radiated Field Emission

CISPR 12: Limits and methods of measurements for the protection of receivers except those installed in the vehicle/boat/devices itself or in adjacent vehicle/boat/devices - 5th ed - 09/2001

1. 30 MHz - 1 GHz frequency range
2. Use of OATS (or absorber-lined shielded enclosure)
3. 10 m / 3 m measurement
4. Vertical and Horizontal polarization
5. Running engine conditions
6. NB / BB discrimination (Peak/Average)
Health protection

- 1999/519/EC Recommandation: Limitation of exposure of the general public to electromagnetic fields (0 Hz to 200 GHz)
- 2004/40/EC Directive: Minimum health and safety requirements regarding the exposure of workers to the risks arising from physical agents (electromagnetic fields)

1. Main concern is on-board transmitter radiated electric field in vehicle compartment (driver, passenger places)
Vehicle European Directive (1)

- EMC directive 2004/104/EC (« revised » 95/54/EC) -
  1. 01/07/2006 for vehicle/equipment new type, 01/01/2009 for all types
  2. Extended definitions of immunity related functions
  3. Extension of test frequencies and of frequency range up to $2 \text{ GHz}$, Introduction of transient immunity and emission requirements, Reference to ISO and CISPR standards, Quality requirements (ISO 17025) for laboratories
4. Vehicle manufacturer statement regarding on-board transmitters characteristics (frequency bands, power levels, antenna positions and installation provisions)

5. Aftermarket equipment intended for installation in vehicles need no type-approval if not related to immunity related functions: Declaration of Conformity according to the procedures of Directives 89/336/EEC or 1999/5/EC must be issued stating that the ESA fulfils the limits defined in paragraphs 6.5, 6.6, 6.8 and 6.9 of Annex I of the Directive
Conclusion

EMC standards and regulations are one of the necessary steps towards a successful vehicle / telecommunication functional synergy.