



SURFACE VEHICLE RECOMMENDED PRACTICE

J2357™

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Application Guidelines for Electronically Driven
and/or Controlled Exterior Automotive Lighting Equipment

RATIONALE

- 2.1.1 moved SAE J1455 to 2.2.1
- 2.1.1 moved SAE J2139 to 2.2.1
- 2.1.1 removed SAE J1113-12
- 2.1.1 removed SAE J1113-26
- 2.1.1 removed SAE J1113-41 as this document is no longer used as a complete standard. IEC CISPR 25 is now the document used for measurement of component emissions.
- 2.1.1 removed SAE J2650
- 2.1.3 updated IEC-50 to IEC 60050
- 2.1.3 removed IEC 60801-2
- 2.1.3 updated reference to IEC CISPR 25 Edition 4.
- 2.1.3 removed IEC CISPR 16-1-1.
- 2.1.4 updated reference to ISO 10605.
- 2.1.4 updated reference to ISO 7637-2.
- 2.1.4 removed ISO 11451-1
- 2.1.4 removed ISO 11452-11
- 2.1.4 added ISO 11452-3 "Road vehicles - Component test methods for electrical disturbances from narrowband radiated electromagnetic energy - Part 3: Transverse electromagnetic (TEM) cell"
- 2.1.6 moved Federal Publications to 2.2.2

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Documents

Standard, visit Sharing Hub

- 2.2.1 moved SAE J1843 to 2.1.1
- 2.2.2 retitled section to Federal Publications
- 2.2.2 moved United Nations Publications to 2.2.3
- 2.2.3 added section and titled United Nations Publications
- 2.2.4 added section and titled European Union Publications
- 2.2.4 add EU Directive 2004/104/EC
- 3.1 added definition for absorber lined shielded enclosure (ALSE).
- 3.2 (formerly 3.5) updated title for ballast (automotive ballast).
- 3.5 removed definition for daytime running lamp system.
- 3.9 updated definition for electrostatic discharge (ESD).
- 3.16 removed life definition as document section references SAE J2009 where it is already defined.
- 5.1.1.1 updated conducted emissions procedures to CISPR 25 methodology.
- 5.1.1.2.2 removed radiated broadband emissions test because of industry non-applicability.
- 5.1.1.2.3 removed radiated narrowband emissions test because of industry non-applicability.
- Table 2 added corrections to figure references.
- 6.1.1.1 updated conducted emissions requirements to CISPR 25 Class 5.
- 6.1.1.2.2 removed radiated broadband emissions requirement.
- 6.1.1.2.3 removed radiated narrowband emissions requirement.

1. SCOPE

This SAE Recommended Practice is intended as a guide toward standard practice and is subject to change to keep pace with experience and technical advances. This document establishes performance requirements, design requirements, and design guidelines for electronic devices.

2. REFERENCES

2.1 Applicable Documents

The following publications form a part of this specification to the extent specified herein. Unless otherwise indicated, the latest issue of SAE publications shall apply.

2.1.1 SAE Publications

Available from SAE International, 400 Commonwealth Drive, Warrendale, PA 15096-0001, Tel: 877-606-7323 (inside USA and Canada) or +1 724-776-4970 (outside USA), www.sae.org.

SAE J387	Terminology - Motor Vehicle Lighting
SAE J575	Test Methods and Equipment for Lighting Devices for Use on Vehicles Less than 2032 mm in Overall Width
SAE J1113-1	Electromagnetic Compatibility Measurement Procedures and Limits for Components of Vehicles, Boats (up to 15 m), and Machines (Except Aircraft) (16.6 Hz to 18 GHz)
SAE J1113-4	Immunity to Radiated Electromagnetic Fields - Bulk Current Injection (BCI) Method
SAE J1113-11	Immunity to Conducted Transients on Power Leads
SAE J1113-13	Electromagnetic Compatibility Measurement Procedure for Vehicle Components - Part 13: Immunity to Electrostatic Discharge
SAE J1113-21	Electromagnetic Compatibility Measurement Procedure for Vehicle Components - Part 21: Immunity to Electromagnetic Fields, 30 MHz to 18 GHz, Absorber-Lined Chamber
SAE J1113-27	Electromagnetic Compatibility Measurements Procedure for Vehicle Components - Part 27 - Immunity to Radiated Electromagnetic Fields - Mode Stir Reverberation Method
SAE J1211	Handbook for Robustness Validation of Automotive Electrical/Electronic Modules
SAE J1383	Performance Requirements for Motor Vehicle Headlamps
SAE J1690	Flashers
SAE J1812	Function Performance Status Classification for EMC Immunity Testing
SAE J1843	Accelerator Pedal Position Sensor for Use with Electronic Controls in Medium- and Heavy-Duty Vehicle Applications - Truck and Bus
SAE J2009	Discharge Forward Lighting System and Subsystems

2.1.2 ANSI Accredited Publications

Copies of these documents are available online at <https://webstore.ansi.org/>.

ANSI Z535.4	Product Safety Signs and Labels
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2.1.3 IEC Publications

Available from IEC Central Office, 3, rue de Varembe, P.O. Box 131, CH-1211 Geneva 20, Switzerland, Tel: +41 22 919 02 11, www.iec.ch.

IEC 60050	International Electrotechnical Vocabulary
CISPR 25 Edition 4.0	Vehicles, boats and internal combustion engines - Radio disturbance characteristics - Limits and methods of measurement for the protection of on-board receivers

2.1.4 ISO Publications

Copies of these documents are available online at <https://webstore.ansi.org/>.

ISO 7637-2	Road Vehicles - Electrical disturbances from conduction and coupling - Part 2: Electrical Transient conduction along supply lines only
ISO 10605	Road Vehicles - Test Methods for electrical disturbances from electrostatic discharge
ISO 11452-1	Road vehicles - Component test methods for electrical disturbances from narrowband radiated electromagnetic energy - Part 1: General principals and terminology
ISO 11452-2	Road vehicles - Component test methods for electrical disturbances from narrowband electromagnetic energy - Part 2: Absorber-lined shielded enclosure
ISO 11452-3	Road vehicles - Component test methods for electrical disturbances from narrowband radiated electromagnetic energy - Part 3: Transverse electromagnetic (TEM) cell
ISO 11452-4	Road vehicles - Component test methods for electrical disturbances from narrowband radiated electromagnetic energy - Part 4: Harness excitation methods
ISO 11452-5	Road vehicles - Component test methods for electrical disturbances from narrowband electromagnetic energy - Part 5: Stripline
ISO 11452-7	Road vehicles - Component test methods for electrical disturbances from narrowband radiated electromagnetic energy - Part 7: Direct radio frequency (RF) power injection
ISO 11452-8	Road vehicles - Component test methods for electrical disturbances from narrowband radiated electromagnetic energy - Part 8: Immunity to magnetic fields
ISO 11452-10	Road vehicles - Component test methods for electrical disturbances from narrowband radiated electromagnetic energy - Part 10: Immunity to conducted disturbances in the extended audio frequency range

2.1.5 IEEE Publications

Available from IEEE Operations Center, 445 and 501 Hoes Lane, Piscataway, NJ 08854-4141, Tel: 732-981-0060, www.ieee.org.

IEEE 100 Standards Dictionary of Electrical and Electronics Terms

2.2 Related Publications

The following publications are provided for information purposes only and are not a required part of this SAE Technical Report.

2.2.1 SAE Publications

Available from SAE International, 400 Commonwealth Drive, Warrendale, PA 15096-0001, Tel: 877-606-7323 (inside USA and Canada) or +1 724-776-4970 (outside USA), www.sae.org.

SAE J1455	Recommended Environmental Practices for Electronic Equipment Design in Heavy-Duty Vehicle Applications
SAE J1889	LED Signal and Marking Lighting Devices
SAE J2139	Tests for Signal and Marking Devices Used on Vehicles 2032 mm or More in Overall Width

2.2.2 Federal Publications

Copies of these documents are available online at <https://www.ecfr.gov/>.

CFR 49 Part 564 Replaceable Light Source Information

CFR 49 Part 571.108 Lamps, Reflective Devices and Associated Equipment (FMVSS 108)

2.2.3 United Nations Publications

Available from United Nations Economic Commission for Europe, Palais des Nations, CH-1211, Geneva 10, Switzerland, Tel: +41-0-22-917-12-34, www.unece.org.

UN Regulation 10 Uniform provisions concerning the approval of vehicles with regard to electromagnetic compatibility

2.2.4 European Union Publications

Available from European Commission, https://ec.europa.eu/info/index_en.

EU Directive 2004/104/EC Relating to the radio interference (electromagnetic compatibility) of vehicles

3. DEFINITIONS

3.1 ABSORBER LINED SHIELDED ENCLOSURE (ALSE)

A shielded room with absorbing material on its internal ceiling and walls.

3.2 BALLAST (AUTOMOTIVE BALLAST)

A device for stabilizing the lighting characteristics of a discharge lamp. The ballast contains all the necessary circuitry to ignite a lamp and cause it to operate within a specified power profile range. It controls the required light output characteristics of the automotive discharge lighting system. The ballast may consist of one or more separate components.

3.3 CONDUCTED EMISSIONS

Conducted emissions are transients and/or other disturbances observed on the external terminals of a device during its normal operation (refer to SAE J1113-1).

3.4 ELECTRONIC DRIVER/LIGHTING DRIVER MODULE (LDM)

An electronic device that powers, controls, and regulates the output characteristics of its designed load.

3.5 DC TO AC CONVERTERS

A class of device used for conversion of a direct current input supply voltage to an alternating current output supply with a well-specified or controlled frequency and waveform.

3.6 DISCHARGE LIGHT SOURCE

A family of electric lamps that produces visible light by a stabilized arc (refer to SAE J387).

3.7 DUT

Abbreviation for Device Under Test.

3.8 ELECTROMAGNETIC COMPATIBILITY (EMC)

The ability of an equipment or system to function satisfactorily in its electromagnetic environment without introducing intolerable electromagnetic disturbance to anything in that environment (refer to IEC 60050-161-01-07).

3.9 ELECTROSTATIC DISCHARGE (ESD)

A transfer of electric charge between bodies of different electrostatic potential in proximity or through direct contact (refer to IEC 60050-161-01-22).

3.10 FLASHER

A device installed in a vehicle lighting system that has the primary function of causing lamps to flash when a switch is activated. Secondary functions may include the visible pilot indication for the signal system and an audible signal to indicate the flasher is operating. The most common classifications for flashers include turn, hazard warning, combination, and alternating flashers (refer to SAE J1690).

3.11 FORWARD LIGHTING SYSTEM

The system comprised of all the subsystems and components mounted on a vehicle in such a manner as to provide road illumination in front of the vehicle.

3.12 IMMUNITY (ELECTROMAGNETIC TO A DISTURBANCE)

The ability of a device, equipment, or system to perform without degradation in the presence of an electromagnetic disturbance (refer to IEC 60050).

3.13 IMMUNITY LEVEL

The maximum level of a given electromagnetic disturbance incident on a particular device, equipment, or system for which it remains capable of operating at a required degree of performance (refer to IEC 60050-161-03-14).

3.14 INTEGRAL LIGHTING ELECTRONIC CONTROL SYSTEM

A lighting system comprised of one or more electronic control modules that are integrated within the housing of the lamp assembly.

3.15 INTERFERENCE (ELECTROMAGNETIC)

Degradation of the performance of equipment, transmission channel, or system caused by an electromagnetic disturbance.

3.16 LIGHTING ELECTRONIC CONTROL MODULE

A unit containing electronic controlling elements, converters, regulators, or actuators that controls or modifies the parameters of a lighting system.

3.17 NON-INTEGRAL LIGHTING ELECTRONIC CONTROL SYSTEM

A lighting system in which the electronic control module is not contained in the lamp assembly.

3.18 PULSE WIDTH MODULATION (PWM) MODULE

A system of modulation where the duty cycle of discrete pulses are varied by the leading, trailing, or both edges to represent an output signal where the duty cycle of the pulse is proportional to the value represented (refer to SAE J1843).

3.19 RADIATION (ELECTROMAGNETIC)

The phenomenon by which energy in the form of electromagnetic waves emanates from a source in space.

3.20 SMART LIGHTING

A lighting system that is able to respond to an external stimulus and modify its lighting characteristics without interaction from the user.

3.21 SUSCEPTIBILITY (ELECTROMAGNETIC)

The inability of a device, equipment, or system to perform without degradation in the presence of an electromagnetic disturbance (refer to IEC 60050).

3.22 SYSTEM

An assembly of methods, procedures, or techniques united by regulated interaction to form an organized whole.

3.23 TEM (TRANSVERSE ELECTROMAGNETIC MODE) CELL

A chamber used to measure or inject RF (radio frequency) energy from or into a DUT to determine its RF radiation or susceptibility. This device operates on the TEM principle, which states the electric field vector is everywhere perpendicular to the direction of wave propagation.

3.24 VOLTAGE DIVIDER

A network that provides one or more voltages from a single voltage supply (refer to IEEE 100).

3.25 VOLTAGE REGULATOR

A device that accepts an unregulated input voltage and outputs a constant, controllable voltage that can be used as a supply voltage for other circuits or devices (refer to IEEE 100).

4. LIGHTING CODES AND MARKINGS

4.1 Lighting Codes

SAE J2357 may be referenced on lighting devices that comply with this recommended practice.

4.2 Marking

Lighting electronic control devices using colors to denote the level of safety shall comply with ANSI Z535.4.

5. TESTS

Table 1 defines the testing categories for integral and non-integral lighting electronic control modules. This is to be used as a guideline in determining the appropriate test schedule for systems under evaluation.