The Engineering Society For Advancing Mobility Land Sea Air and Space®
INTERNATIONAL
400 Commonwealth Drive, Warrendale, PA 15096-0001

SURFACE VEHICLE STANDARD

SAE J551-1 REV. APR2002

Issued 1994-03
Revised 2002-04

Superseding J551/1 JUN1996

(R) Performance Levels and Methods of Measurement of Electromagnetic Compatibility of Vehicles, Boats (up to 15 m), and Machines (50 Hz TO 18 GHz)

Foreword—This document brings together methodology for testing the electromagnetic emissions and immunity characteristics of vehicles and devices. The writers of this document have participated extensively in the drafting of CISPR Subcommittee D and ISO TC 22 Subcommittee 3 Working Group 3 documents.

By intent, the methods and limits of this document closely resemble the counterpart international standards. The SAE J551 series consists of the following parts:

SAE J551–1 General and Definitions
SAE J551–2 Limits and Methods of Measurement of Radio Disturbance Characteristics of Vehicles, Motorboats and Spark-ignited Engine-driven Devices
[Part 3 reserved for future use]
SAE J551–4 Test Limits and Methods of Measurement of Radio Disturbance Characteristics of Vehicles and Devices, Broadband and Narrowband, 150 kHz to 1000 MHz
SAE J551–5 Performance Levels and Methods of Measurement of Magnetic and Electric Field Strength from Electric Vehicles, Broadband, 9 kHz to 30 MHz
[Parts 6 through 10 reserved for future use]
SAE J551–11 Vehicle Electromagnetic Immunity—Off-vehicle Source
SAE J551–12 Vehicle Electromagnetic Immunity—On-board Transmitter Simulation
SAE J551–13 Vehicle Electromagnetic Immunity—Bulk Current Injection (BCI)
SAE J551–14 Vehicle Electromagnetic Immunity—Reverberation Chamber [Draft Only]
SAE J551–15 Vehicle Electromagnetic Immunity—Electrostatic Discharge (ESD)
SAE J551-17 Vehicle Electromagnetic Immunity – Power Line Magnetic Fields

1. ***Scope***—This SAE Standard covers the measurement of radio frequency radiated emissions and immunity. Each part details the requirements for a specific type of electromagnetic compatibility (EMC) test and the applicable frequency range of the test method.

   The methods are applicable to a vehicle or device powered by an internal combustion engine or electric motor. Operation of all engines (main and auxiliary) of a vehicle or device is included. All equipment normally operating when the engine is running is included. Operator controlled equipment is included or excluded as specified in the individual document parts.

   The recommended levels apply only to complete vehicles in their final manufactured form. Vehicle–mounted rectifiers used for charging in electric vehicles are included in Part 2 of this document when operated in their charging mode.

Emissions from intentional radiators are not controlled by this document. (See applicable, appropriate regulatory documents.) The immunity of commercial mains powered equipment to overvoltages and line transients is not covered by this document.

2. *References*

2.1 Applicable Publications—The following publications form a part of this specification to the extent specified herein. Unless otherwise indicated, the latest version of SAE publications shall apply.

2.1.1 SAE PUBLICATION—Available from SAE, 400 Commonwealth Drive, Warrendale, PA 15096-0001.

SAE J551-2—Limits and Methods of Measurement of Radio Disturbance Characteristics of Vehicles, Motorboats and Spark-ignited Engine-driven Devices [Part 3 reserved for future use]
SAE J551-4—Test Limits and Methods of Measurement of Radio Disturbance Characteristics of Vehicles and Devices, Broadband and Narrowband, 150 kHz to 1000 MHz
SAE J551-5—Performance Levels and Methods of Measurement of Magnetic and Electric Field Strength from Electric Vehicles, Broadband, 9 kHz to 30 MHz [Parts 6 through 10 reserved for future use]
SAE J551-11—Vehicle Electromagnetic Immunity—Off-vehicle Source
SAE J551-12—Vehicle Electromagnetic Immunity—On-board Transmitter Simulation
SAE J551-13—Vehicle Electromagnetic Immunity—Bulk Current Injection (BCI)
SAE J551-14—Vehicle Electromagnetic Immunity—Reverberation Chamber [Draft Only]
SAE J551-15—Vehicle Electromagnetic Immunity—Electrostatic Discharge (ESD)
SAE J551-17—Vehicle Electromagnetic Immunity – Power Line Magnetic Fields
SAE J1812—Function Performance Status Classification for EMC Immunity Testing

2.1.2 ANSI PUBLICATIONS—Available from ANSI, 25 West 43rd Street, New York, NY 10036-8002 or IEEE, 445 Hoes Lane, P.O. Box 1331, Piscataway, NJ 08855-1331.

ANSI C63.2–1996—American National Standard for Instrumentation—Electromagnetic Noise and Field Strength, 10 kHz to 40 GHz - Specifications
ANSI C63.4–1992—American National Standard for Methods of Measurement of Radio–Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the range of 9 kHz to 40 GHz
ANSI C95.1–1999—American National Standard for Safety Levels with Respect to Human Exposure to Radio Frequency Electromagnetic Fields, 3 kHz to 300 GHz
ANSI/IEEE STD 100–1993—Standard Dictionary of Electrical and Electronic Terms
ANSI/IEEE Dictionary of Technological Terms

2.1.3 CISPR PUBLICATIONS—Available from ANSI, 11 West 42nd Street, New York, NY 10036-8002.

CISPR 12 5th Edition—Limits and methods of measurement of radio disturbance characteristics of vehicles, motorboats, and spark-ignited engine-driven devices
CISPR 16–1: Edition 1.1 1998—Specification for radio disturbance and immunity measuring apparatus and methods–Part 1: Radio disturbance and immunity measuring apparatus
CISPR 25:1995 Limits and methods of measurement of radio disturbance characteristics for the protection of receivers used on-board vehicles

2.1.4 IEC PUBLICATIONS—Available from ANSI, 11 West 42nd Street, New York, NY 10036-8002.

IEC Publication 60050(161)—International Electrotechnical Vocabulary—Electromagnetic Compatibility
IEC Publication 60050(726)—International Electrotechnical Vocabulary Transmission Lines and Waveguides

2.1.5 IEEE PUBLICATION—Available from IEEE, Inc., 445 Hoes Lane, PO Box 1331, Piscataway NJ 08855-1331.

IEEE STD 291–1991 IEEE—Standard Methods for Measuring Electromagnetic Field Strength of Sinusoidal Continuous Waves, 30 Hz to 30 GHz

2.1.6 ISO PUBLICATIONS—Available from ANSI, 11 West 42nd Street, New York, NY 10036-8002.

ISO 10605:1992 Road vehicles—Electrical disturbances from electrostatic discharges
ISO 11451:1997 Road vehicles—Electrical disturbances by narrowband radiated electromagnetic energy—Vehicle test methods
ISO 11451-1—Road vehicles—Component test methods for electrical disturbances from narrowband radiated electromagnetic energy—Part 1: General and definitions
ISO 11451-2—Road vehicles—Electrical disturbances by narrowband radiated electromagnetic energy—Component test methods—Part 2: Absorber-lined chamber
ISO 11451-3—Road vehicles—Component test methods for electrical disturbances from narrowband radiated electromagnetic energy—Part 3: Transverse electromagnetic mode (TEM) cell
ISO 11451-4—Road vehicles—Components test methods for electrical disturbances from narrowband radiated electromagnetic energy—Part 4: Bulk current injection (BCI)
ISO 11451-6—Road vehicles—Electrical disturbances by narrowband radiated electromagnetic energy—Component test methods—Part 6: Parallel plate antenna

2.1.7 NCRP PUBLICATIONS—Available from The National Council on Radiation Protection (NCRP), ?????

MENTIONS IN TEXT ABOUT A STANDARD BUT NO NUMBER IS GIVEN.

2.1.8 UL PUBLICATIONS—Available from Underwriters Laboratories, 333 Pfingsten Road, Northbrook, IL 60062-2096.

IT MENTIONS UL STANDARDS IN THE TEXT BUT DOES NOT GIVE ANY NUMBERS.

2.2 Related Publications—The following publications are for information purposes only and are not a required part of this specification.

2.2.1 SAE PUBLICATIONS—Available from SAE, 400 Commonwealth Drive, Warrendale, PA 15096-0001.

HS–3600 –1999 Edition—SAE Surface Vehicle Electromagnetic Compatibility (EMC) Standards Manual
SAE paper 810333, "Implementation of EMC Testing of Automotive Vehicles," Kinderman, J.C., et al., February 1981
SAE paper 831011, "An Indoor 60 Hz to 40 GHz Facility for Total Vehicle EMC Testing," Vrooman, June 1983

2.2.2 ANSI PUBLICATIONS—Available from ANSI, 25 West 43rd Street, New York, NY 10036-8002 or IEEE, 445 Hoes Lane, P.O. Box 1331, Piscataway, NJ 08855-1331.

ANSI C63.5–1998—American National Standard for Electromagnetic Compatibility–Radiated Emissions Measurements in Electromagnetic Interference (EMI) Control–Calibration of Antennas (9 kHz to 40GHz)
ANSI C63.14–1998—Standard Dictionary for Technologies of Electromagnetic Compatibility (EMC), Electromagnetic Pulse (EMP), and Electrostatic Discharge (ESD)
ANSI C63.16–1993—American1 National Standard Guide for Electrostatic Discharge Test Methodologies and Criteria for Electronic Equipment