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ANSI C63.14-1998

American National Standard Dictionary for Technologies of Electromagnetic Compatibility (EMC), Electromagnetic Pulse (EMP), and Electrostatic Discharge (ESD)

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Secretariat

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Abstract: Terms associated with electromagnetic compatibility (EMC), electromagnetic pulse (EMP), and electrostatic discharge (ESD) are defined. Quantities, units, multiplying factors, symbols, and abbreviations are covered.

Keywords: electromagnetic compatibility (EMC), terms and definitions; electromagnetic pulse (EMP), terms and definitions; electrostatic discharge (ESD), terms and definitions.

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Introduction

[This introduction is not part of ANSI C63.14-1998, American National Standard Dictionary for Technologies of Electromagnetic Compatibility (EMC), Electromagnetic Pulse (EMP), and Electrostatic Discharge (ESD).]

This document defines is intended to serve as a Standard Dictionary of Terms and Definitions commonly used and related by usage to activities pertaining to electromagnetic compatibility (EMC), electromagnetic pulse (EMP), and electrostatic discharge (ESD).

Terms that may be considered to have special meaning in specific applications are recognized by a parenthetical note identifying the originating organization or specific application.

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American National Standard Dictionary for Technologies of Electromagnetic Compatibility (EMC), Electromagnetic Pulse (EMP), and Electrostatic Discharge (ESD)

1. Scope

This standard provides definitions of terms associated with electromagnetic compatibility (EMC), electromagnetic pulse (EMP), and electrostatic discharge (ESD). In addition to definitions, symbols and abbreviations are included.

2. References

This standard shall be used in conjunction with the following publications. If the following publications are superseded by an approved revision, the revision shall apply.

ANSI C63.4-1992, American National Standard Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz.¹

ANSI C63.7-1992, American National Standard Guide for Construction of Open-Area Test Sites for Performing Radiated Emission Measurements.

ESD-ADV 1.0-1994 Glossary.²

ESD ADV 2.0-1994, ESD Association Advisory for Protection and Sensitivity Testing of Electrostatic Discharge Susceptible Items.

FCC 47 CFR Part 15, Radio Frequency Devices (1990).³

¹ANSI publications are available from the Sales Department, American National Standards Institute, 11 West 42nd Street, 13th Floor, New York, NY 10036, USA.

²ESD publications are available from the Sales Department, ElectroStatic Discharge Association, P.O. Box 913, Rome, NY 13442-0913, USA.

³This document is available from the Superintendent of Documents, US Government Printing Office, Document Control Branch, Washington, DC 20402, USA.

IEC 60050-161 (1990-09), International Electrotechnical Vocabulary. Chapter 161: Electromagnetic compatibility.⁴

IEC 60050-604 (1987-03), International Electrotechnical Vocabulary. Chapter 604: Generation, transmission, and distribution of electricity—Operation.

IEC 60050-826 (1982-01), International Electrotechnical Vocabulary. Chapter 826: Electrical installations of buildings.

IEEE/ASTM SI 10-1997, Standard for Use of the International System of Units (SI)—The Modern Metric System.⁵

IEEE Std 100-1996, IEEE Standard Dictionary of Electrical and Electronics Terms.

IEEE Std 260.1-1993, American National Standard Letter Symbols for Units of Measurement (SI Units, Customary Inch-Point units, and Certain Other Units).

International vocabulary of basic and general terms in metrology [VIM], second edition, 1993. Edited in common by BIPM, IEC, ISO, and OIML.⁶

ISO/IEC Guide 2: 1996, Standardization and related activities—General vocabulary.⁷

ISO/IEC Guide 25: 1990, General requirements for the competence of calibration and testing laboratories.

ITU, International Telecommunication Union Radio Regulations, 1990 ed.⁸

MIL-HDBK-419A-1987, Grounding, Bonding, and Shielding for Electronic Equipments and Facilities. Volumes I (Basic Theory) and II (Applications).⁹

MIL-STD-464, Electromagnetic Environmental Effects—Requirements for Systems, 18 March 1997.

National Telecommunication and Information Administration (NTIA) Manual: Manual of Regulations and Procedures for Federal Radio Frequency Management. May, 1989, with Revisions dated January, 1991.¹⁰

NATO STANAG No. 3968-1988, NATO Glossary of Electromagnetic Terminology (Edition 2)(First Draft) (Undated); NATO AAP-6, NATO Glossary of Terms and Definitions (English and French).¹¹

SAE ARD 50040, (draft) High Intensity Radiated Field (HIRF) Advisory Circular, June 1992.¹²

⁴IEC publications are available from IEC Sales Department, Case Postale 131, 3, rue de Varembe, CH-1211, Genève 20, Switzerland/Suisse. IEC publications are also available in the United States from the Sales Department, American National Standards Institute, 11 West 42nd Street, 13th Floor, New York, NY 10036, USA.

⁵IEEE publications are available from the Institute of Electrical and Electronics Engineers, 445 Hoes Lane, P.O. Box 1331, Piscataway, NJ 08855-1331, USA.

⁶Copies can be obtained from Global Engineering, 15 Inverness Way East, Englewood, CO 80112-5704, USA, tel. (303) 792-2181.

⁷ISO publications are available from the ISO Central Secretariat, Case Postale 56, 1 rue de Varembe, CH-1211, Genève 20, Switzerland/Suisse. ISO publications are also available in the United States from the Sales Department, American National Standards Institute, 11 West 42nd Street, 13th Floor, New York, NY 10036, USA.

⁸ITU publications are available from the International Telecommunications Union, Place des Nations, CH-1211, Geneva 20, Switzerland.

⁹MIL publications are available from Customer Service, Defense Printing Service, 700 Robbins Ave., Bldg. 4D, Philadelphia, PA 19111-5094.

¹⁰This publication is available from the Superintendent of Documents, US Government Printing Office.

¹¹Information on the availability of NATO STANAGs can be obtained from Headquarters United States Air Force/XOXX-ISO, Washington, DC 20330-5058.

¹²SAE publications are available from the Society of Automotive Engineers, 400 Commonwealth Drive, Warrendale, PA 15096, USA.

3. Quantities, units, multiplying factors, symbols, and abbreviations

3.1 Quantities

The units and symbols listed in Table 1 shall be used to indicate the applicable quantity. The quantities, units, and unit symbols presented comply with the International System of Units (SI). (See IEEE Std 260.1-1993 and IEEE/ASTM SI 10-1997.) In case of variance, this standard takes precedence.

Table 1—Units of quantity

Quantity	SI Unit	Symbol of SI Unit
Capacitance	farad	F
Electric current	ampere	A
Electric field strength (E-vector)	volt per meter	V/m
Electric potential (Potential difference, electromotive force)	volt	V
Electric resistance	ohm	Ω
Energy	joule	J
Frequency	hertz	Hz
Inductance	henry	H
Length	meter	m
Magnetic field strength (H-vector)	ampere per meter	A/m
Magnetic flux	weber	Wb
Magnetic flux density (B-vector)	tesla	T
Power	watt	W
Pulse rise time (T_r)	second	s
Pulse fall time (T_f)	second	s
Pulse width time (T_w)	second	s
Time	second	s
Wavelength	meter	m

3.2 Multiplying factors and symbols

The symbols listed in Table 2 shall be used to indicate the applicable multiplier.

Table 2—Symbols of multiplying factors

Multiplier	Symbol
Tera (10^{12})	T
Giga (10^9)	G
Mega (10^6)	M
Kilo (10^3)	k
Hecto (10^2)	h
Deka (10^1)	da
Deci (10^{-1})	d
Centi (10^{-2})	c
Milli (10^{-3})	m
Micro (10^{-6})	—
Nano (10^{-9})	n
Pico (10^{-12})	p
Femto (10^{-15})	f
Atto (10^{-18})	a

3.3 Frequency spectrum designations and symbols

The symbols in Table 3 shall be used to indicate the applicable portion of the frequency spectrum.

Table 3—Symbols of frequency spectrum

Frequency subdivision	Frequency range
ELF (extremely low)	30 Hz–300 Hz
VF (voice)	300 Hz–3 kHz
VLF (very low)	3 kHz–30 kHz
LF (low)	30 kHz– 300kHz
MF (medium)	300 kHz–3000 kHz (3MHz)
HF (high)	3 MHz–30MHz
VHF (very high)	30 MHz–300MHz
UHF (ultra high)	300 MHz–3000 MHz (3 GHz)
SHF (super high)	3 GHz–30 GHz
EHF (extremely high)	30 GHz–300 GHz
(Undesignated)	300 GHz–3000 GHz (3 THz)

—From NTIA

3.4 Abbreviations and acronyms

AMN	Artificial Mains Network (See LISN)
ANSI	American National Standards Institute
BER	bit-error-rate
C-E	communication-electronic
CE	conducted emission
CI	conducted immunity
CISPR	International Special Committee on Radio Interference
CS	conducted susceptibility
dB	decibel
dB(A)	decibels referenced to 1 ampere
dBm	decibels reference to 1 milliwatt
dB(mV)	decibels referenced to 1 microvolt
dB(mV/m)	decibels referenced to 1 microvolt per meter
ECCM	electronic counter-countermeasure
ECM	electronic countermeasure
EFS	electric field strength
EIA	Electrical Industries Association
EIRP	equivalent isotropic radiated power
EM	electromagnetic
EMC	electromagnetic compatibility
EMCP	electromagnetic compatibility program
EMCS	electromagnetic compatibility standardization
EMI	electromagnetic interference
EMCM	electromagnetic compatibility margin
EMP	electromagnetic pulse
EMS	electromagnetic susceptibility
EMV	electromagnetic vulnerability
ERP	effective radiated power
ESD	electrostatic discharge
EUT	equipment under test
EW	electronic warfare
FCC	Federal Communications Commission
FDA	Food and Drug Administration
FIM	field-intensity meter
FSM	field-strength meter
FSVM	frequency-selective voltmeter
GHz	gigahertz
GTEM	gigahertz transverse electromagnetic cell
HERF	hazards of electromagnetic radiation to fuel
HERO	hazards of electromagnetic radiation to ordnance
HERP	hazards of electromagnetic radiation to personnel
HIRF	high intensity radiated field(s)
Hz	hertz
IBW	impulse bandwidth
IEEE	Institute of Electrical and Electronics Engineers
IF	intermediate frequency
IG	impulse generator
IEC	International Electrotechnical Commission
ISM	industrial, scientific, medical
ISO	International Organization for Standardization
kHz	kilohertz
l_e	antenna effective length for electric-field antennas

l_{em}	antenna effective length for magnetic-field antennas
LAN	local area network
LISN	line impedance stabilization network
MDS	minimum discernible signal
MFS	magnetic field strength
MHz	megahertz
MOV	metal oxide varistor
mW	milliwatt
ms	millisecond
NTIA	National Telecommunications and Information Administration
OATS	open area test site
P	power
PCS	personal communications services
POE	point of entry
ppm	parts per million
PSD	power spectral density
RADHAZ	radiation hazard
RBW	resolution bandwidth
RE	radiated emission
RF	radio frequency
RFI	radio-frequency interference
RI	radio immunity
rms	root mean square
RS	radiated susceptibility
Rx	receiver
TEM	transverse electromagnetic
Tx	transmitter
UPCS	unlicensed personal communications services
μs	microsecond
W	watt
WBTEM	wideband TEM

4. Definitions and terminology

The following definitions and terms are given for use in applicable situations and documents. They are intended to be applied to the general field of electromagnetic compatibility, and the fields related to the phenomena associated with electromagnetic pulse and electrostatic discharge. [See IEEE Std 100-1996, and IEC 60050-161 (1990-09), or latest editions thereof.] In case of variance, this standard takes precedence.

4.1 above deck. An area that is generally in the open air on a naval vessel. (NATO STANAG)

4.2 absorber. A material that causes the irreversible conversion of the energy of an electromagnetic wave into another form of energy (normally heat) as a result of its interaction with the absorber material. *See also:* **fire safety absorber.**

4.3 absorber performance. The ratio of absorbed energy to incident radiated energy impinging upon an absorber surface.

4.4 absorbing clamp. A measuring device, movable along the mains leads (or interface cables) of an appliance or similar device, intended to assess the maximum radio frequency power emitted by the appliance or device. [IEC 60050-161 (1990-09)]