PRIVATE CIRCULATION
EPL/501_17_0006
For comment/vote - Action Due Date: 2017/03/01

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Date: 9 January 2017

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Dear Member

IEC COMMITTEE DRAFT (CD)

REPLY TO CSC@BSIGROUP.COM BEFORE 1 MARCH 2017

Please find attached:

91/1421/CD - IEC 60194-2 ED1: Printed boards design, manufacture and assembly - Vocabulary – Part 2: Common usage in electronic technologies as well as printed board and electronic assembly technologies

IEC National Committees have been invited to comment on the above document. As a member of the responsible BSI committee you are asked to give your comments on the document. Please send any comments that you wish to be considered for submission as UK comments to IEC by the above date.

When submitting comments please ensure that they are entered into the IEC comments template. If you have any queries in how to use the template then please do not hesitate to contact the Committee Service Centre.

It should be noted that this is often the final stage for the submission of major technical comment on the standard, as the national comments submitted to IEC determine whether this standard can progress to the next stage, i.e. circulation as a draft international standard (CDV).

Please also bear in mind that acceptance of a draft IEC standard means agreement in principle to it being the basis of a new British Standard, as it is BSI policy to implement all IEC projects as BS IEC standards unless any of the following situations apply:

- UK voted negatively at the FDIS stage.
- There is a current BS which covers the scope of the international standard and the BS continues to be the preferred document at the national level.
- There is an implemented EN standard covering the scope of the international publication.
- The International standard is subsequently agreed for UAP procedure in CLC and publication of the EN is expected within 12 months of the availability of the IEC publication.

If we do not hear from you by the above date we will submit 'no comment' to the IEC.

Yours sincerely,

Committee Service Centre

91/1421/CD

COMMITTEE DRAFT (CD)

PROJECT NUMBER:	
IEC 60194-2 ED1	
DATE OF CIRCULATION:	CLOSING DATE FOR COMMENTS:
2017-01-06	**2017-03-31**
SUPERSEDES DOCUMENTS:	
91/1420/RR	

IEC TC 91 : ELECTRONICS ASSEMBLY TECHNOLOGY	
SECRETARIAT:	SECRETARY:
Japan	Mr Masahide Okamoto
OF INTEREST TO THE FOLLOWING COMMITTEES:	PROPOSED HORIZONTAL STANDARD:
TC 40,TC 47,SC 47A,SC 47D	☐
	Other TC/SCs are requested to indicate their interest, if any, in this CD to the secretary.

FUNCTIONS CONCERNED:

☐ EMC ☐ ENVIRONMENT ☐ QUALITY ASSURANCE ☐ SAFETY

This document is still under study and subject to change. It should not be used for reference purposes.

Recipients of this document are invited to submit, with their comments, notification of any relevant patent rights of which they are aware and to provide supporting documentation.

TITLE:

Printed boards design, manufacture and assembly - Vocabulary – Part 2: Common usage in electronic technologies as well as printed board and electronic assembly technologies

NOTE FROM TC/SC OFFICERS:

This document is the revision of IEC 60194:2015 Printed board design, manufacture and assembly - Terms and definitions, which defines the terminology used in the field of printed circuit boards and printed circuit board assembly products. It is agreed to split the new revision into two separate documents. This draft is the second part of the revision. It is composed of terms and definitions related with TC91 technology as well as other technologies. In addition, the title was changed to ‘Printed Boards design, manufacture and assembly - Vocabulary – Part 2: Common usage in electronic technologies as well as printed board and electronic assembly technologies’. It was approved at TC91 Plenary meeting in Frankfurt on 2016-10-14.

CONTENTS

INTERNATIONAL ELECTROTECHNICAL COMMISSION

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PRINTED BOARDS DESIGN, MANUFACTURE AND ASSEMBLY - VOCABULARY
PART 2: COMMON USAGE IN ELECTRONIC TECHNOLOGIES AS WELL AS PRINTED BOARD AND ELECTRONIC ASSEMBLY TECHNOLOGIES

FOREWORD

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International Standard IEC 60194 has been prepared by IEC technical committee 91: Electronics assembly technology.

The committee decided to split the seventh edition into two separate documents. This draft is the second part of the seventh edition. It is composed of terms and definitions related with TC91 technology as well as other technologies

This document together with Part 1 of IEC 60194 will replace IEC 60194 Ed.6.0 published in 2015-04 and constitutes technical and editorial revisions. The main changes from the previous edition are as follows:

– Exclusion of 32 general terms better served by other TCs
– Exclusion of 47 terms no longer used by electronic assembly industry
– Inclusion of 13 new terms related with device embedded substrate technology
– Removal of identification codes for terms as well as Annex

The text of this International Standard is based on the following documents:

FDIS	Report on voting
XX/XX/FDIS	XX/XX/RVD

Full information on the voting for the approval of this International Standard can be found in the report on voting indicated in the above table.

This document has been drafted in accordance with the ISO/IEC Directives, Part 2.

The committee has decided that the contents of this document will remain unchanged until the stability date indicated on the IEC website under "http://webstore.iec.ch" in the data related to the specific document. At this date, the document will be

- reconfirmed,
- withdrawn,
- replaced by a revised edition, or
- amended.

The National Committees are requested to note that for this document the stability date is 2023.

THIS TEXT IS INCLUDED FOR THE INFORMATION OF THE NATIONAL COMMITTEES AND WILL BE DELETED AT THE PUBLICATION STAGE.

PRINTED BOARDS DESIGN, MANUFACTURE AND ASSEMBLY - VOCABULARY
PART 2: COMMON USAGE IN ELECTRONIC TECHNOLOGIES AS WELL AS PRINTED BOARD AND ELECTRONIC ASSEMBLY TECHNOLOGIES.

1 Scope

This part of IEC 60194 covers terms and definitions related with TC91 technology as well as other technologies.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

IEC 60050, *International Electrotechnical Vocabulary*

3 Terms and definitions

For the purposes of electronics assembly technology the following terms and definitions apply.

4 A

abrasive trimming
adjusting the value of a film component by notching it with a finely adjusted stream of an abrasive material against the resistor surface

accelerated ageing
accelerated life test
test in which the parameters such as voltage and temperature are increased above normal operating values to obtain observable or measurable deterioration in a relatively short period of time

accelerated test
test to check the life expectancy of an electronic component or electronic assembly in a short period of time by applying physically severe condition(s) to the unit under test

acceleration factor
AF
ratio of stress in reliability testing to the normal operating condition

acceptance inspection
<criterion> inspection that determines conformance of a product to design specifications as the basis for acceptance

acceptance quality level
AQL
number of defects (in %) within a population (lot) at which the lot has the chance to be accepted with an acceptance probability of about 90 % when testing a sample

acceptance tests
tests deemed necessary to determine the acceptability of a product as agreed to by both purchaser and vendor

accuracy
degree to which the result of a measurement or calculation agrees with the true value

active device
electronic component whose basic character changes while operating on an applied signal

Note 1 to entry: This includes diodes, transistors, thyristors, and integrated circuits that are used for the rectification, amplification, switching, etc., of analog or digital circuits in either monolithic or hybrid form.

add-on component
discrete or integrated packaged or chip components that are attached to a film circuit in order to complete the circuit's function

adhesive
non-metallic materials that can join solids by surface bonding and internal strength (adhesion and cohesion)

Note 1 to entry: In surface mounting, an epoxy adhesive is used to adhere SMDs to the substrate.

(SOURCE:IEC 60050-212:2010, 212-15-44)

all metal package
hybrid circuit package made solely of metal, without glass or ceramic

allowable temperature
temperature range in which an electronic circuit or component can perform its intended functions

alphanumerical
pertaining to data that contain the letters of an alphabet, the decimal digits, and may contain control characters, special characters and the space character

alpha particle
He^4 nucleus generated from a nuclear decay that is capable of generating hole-electron pairs in microelectronic devices and switching cells causing soft errors in some devices

alternating current
AC
electric current that is a periodic function of time with a zero direct component or, by extension, a negligible direct component

Note 1 to entry: For the qualifier AC, see IEC 60050-151.

(SOURCE:IEC 60050-131:2002, 131-11-24)

ambient
surrounding environment coming into contact with the system or component in question

amplitude
<voltage> maximum value of a voltage of an alternating voltage within one period

analog circuit
electrical circuit that provides a continuous relationship between its input and output

anisotropy
condition for a substance having differing values for properties, such as permittivity, depending on the direction within the material

anode
BGA
electrode capable of emitting positive charge carriers to and/or receiving negative charge carriers from the medium of lower conductivity

Note 1 to entry: The direction of electric current is from the external circuit, through the anode, to the medium of lower conductivity.

Note 2 to entry: In some cases (e.g. electrochemical cells), the term "anode" is applied to one or another electrode, depending on the electric operating condition of the device. In other cases (e.g. electronic tubes and semiconductor devices), the term "anode" is assigned to a specific electrode.

(SOURCE:IEC 60050-151:2001, 151-13-02)

application specific integrated circuit
ASIC
integrated circuit designed for specific applications

(SOURCE:IEC 60050-521:2002, 521-11-18)

area array package
package that has terminations arranged in a grid on the bottom of the package and contained within the package outline

assembly
assembled board
number of parts, subassemblies or combinations thereof joined together

Note 1 to entry: This term can be used in conjunction with other terms listed herein, for example, "printed board assembly.".

attenuation
the decrease of the energy of an electromagnetic wave during its propagation, represented quantitatively by the ratio of the power flux densities at two specified points

Note 1 to entry: Attenuation is generally expressed in decibels.

(SOURCE:IEC 60050-705:1995, 705-02-05)

5 B

backfill
filling a hybrid circuit package with a dry inert gas prior to hermetic sealing

backplane
backpanel
an interconnection device used to provide point-to-point electrical interconnections

Note 1 to entry: It is usually a printed board that has discrete wiring terminals on one side and connector receptacles on the other side.

Note 2 to entry: See also “mother board”.

backward crosstalk
near-end crosstalk
noise induced into an adjacent line, as seen at that end of the adjacent line which is closest to the signal source, when this line has been placed near an active line

Note 1 to entry: See also “forward crosstalk”.

balanced transmission line
transmission line that has distributed inductance, capacitance, resistance, and conductance elements that are equally distributed between its conductors

ball
raised metal (or other conductive material) feature on a package substrate used to facilitate bonding to the next level of interconnect

ball grid array
BGA
surface-mount package wherein the bumps for terminations are formed in a grid on the bottom of a package

SEE: Figure 1.

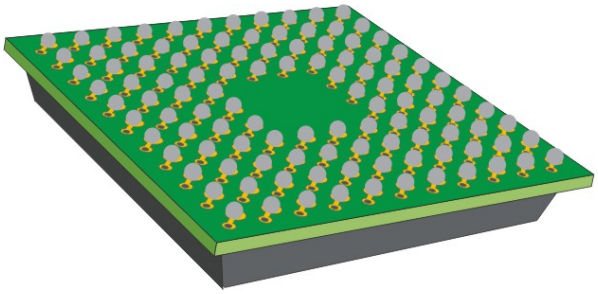

Figure 1 – Ball grid array (BGA)

barcode
linear arrangement of bars and spaces in a predetermined pattern

barcode marking
identification code consisting of a pattern of vertical bars whose width and spacing identifies the item marked

barcode symbol
print of photographically reproduced barcode composed of parallel bars and spaces of various widths

Note 1 to entry: A barbarcode symbol contains a leading quiet zone, a start character, data characters, a stop character, and a trailing quiet zone; in some cases, a check character is included.

bare die
unpackaged discrete semiconductor or integrated circuit with pads on the upper surface suitable for interconnection to the substrate or package

base film
<relating to flexible circuits> film that is the base material for the flexible printed wiring board and on the surface of which the conductive pattern can be formed

Note 1 to entry: When the heat resistance is required, polyimide film is mostly used, and polyester film is usually used when the heat resistance is not required.

base material
substrate
the insulating material upon which a conductive pattern may be formed

Note 1 to entry: The base material may be rigid or flexible, or both. It may be a dielectric or insulated metal sheet.

base material thickness
thickness of the base material excluding conductive foil or material deposited on the surfaces

base plane
plane that includes the lowest point of the mounting surface of the package, except for packages using stand-offs

basic specification
BS
document that describes the common elements for a set, family or group of products, materials, or services

bending resistance
ability of a material to withstand repeated bending to specified parameters without producing cracks and breaks in excess of the specification allowance

bias
<fabric> filling yarn that is off-square with the warp ends of a fabric

bipolar device
device in which both majority and minority carriers are present

Note 1 to entry: Bi-polar and Metal-Oxide Semi-conductor (MOS) are the two most common device types.

bond
interconnection that performs a permanent electrical and/or mechanical function

bond pads
metallised areas on the die that are used for temporary or permanent electrical connection (bonding)

bond strength
pull strength
force perpendicular to a board's surface required to separate two adjacent layers of the board

Note 1 to entry: Bond strength is expressed as force per unit area.

bonding pad
<IC> area of metallization on an integrated circuit die that permits connection of fine wires or a circuit element to the die

bonding wire
gold or aluminum wire used for making electrical connections between lands, lead frames, and terminals

bow
warp
<fabric> filling yarn that lies in an arc across the width of a fabric

break-down voltage
voltage at which the insulation between two conductors ruptures

bridging
<electrical>unintentional formation of a conductive path between conductors

Note 1 to entry: See also “solder bridging”.

bulk packaging
method for packaging loose parts, into a bag or case

bumped die
semiconductor die with raised metal features that facilitate inner-lead bonding. (See Figure 2).

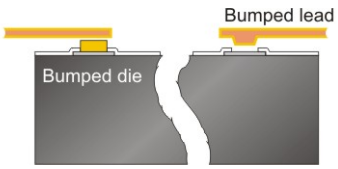

Figure 2 – Bumped Die

burn-in
process of electrically stressing a device at an elevated temperature, for a sufficient amount of time to cause the failure of marginal devices (infant mortality)

burn-in
<dynamic>burn-in at high temperatures that simulates the effects of actual or simulated operating conditions

burn-in
<static>burn-in at high temperatures with unvarying voltage, either forward or reverse bias

6 C

capacitance
measure of the ability of two adjacent conductors separated by an insulator to hold a charge when a voltage is impressed between them

(SOURCE:IEC 60050-131:2008, 131-12-13)

capacitive coupling
electrical interaction between two conductors that is caused by the capacitance between them

ceramic dual-in-line package
CERDIP
dual in-line-package that has a package body of ceramic material and is hermetically sealed by a glass

Note 1 to entry: See also “dual-in-line package”.

ceramic pin grid array
ceramic PGA
pin grid array package (PGA) made of a ceramic material, hermetically sealed by metal, with leads formed on a grid extending from the bottom of the package

ceramic quad flat package
CQFP
quad flat package (QPF) made of a ceramic material, hermetically sealed by metal, with leads extending from all four sides

certification
verification that specified training or testing has been performed and that required proficiency or parameter values have been attained

characteristic impedance
a quantity defined for a mode of propagation at a given frequency in a specific uniform transmission line or uniform waveguide by one of the three following relations:

$Z1=S/|I|2$
$Z2=|U|2/S$
$Z3 =U / I$

where Z is the complex characteristic impedance, S the complex power and U and I are the values, usually complex, respectively of a voltage and a current conventionally defined for each type of mode by analogy with transmission line equations

Examples:

1. — For a parallel-wire transmission line, U and I can be uniquely defined and the three equations are consistent. If the transmission line is lossless, the characteristic impedance is real.

2. — For a waveguide, the conventional definitions for U and I depend on the type of mode and generally lead to three different values of the characteristic impedance.

3. — For a circular waveguide in the dominant mode TE11, U = r.m.s. voltage along the diameter where the magnitude of the electric field strength vector is a maximum, I = the r.m.s. longitudinal current.

4. — For a rectangular waveguide in the dominant mode TE10, U = the r.m.s. voltage between midpoints of the two conductor faces normal to the electric field strength vector, I = the r.m.s. longitudinal current following on one surface normal to the electric field strength vector.

(SOURCE:IEC 60050-726:1982, 726-07-01)

chemical vapour deposition
process in which vapours and gases react chemically to produce deposits at the surface of a substrate

(SOURCE:IEC 60050-841:2004, 841-22-07)

chip
see “die”

Note 1 to entry: Common parlance for die.

chip carrier
low-profile, usually square, surface-mount component semiconductor package whose die cavity or die mounting area is a large fraction of the package size and whose external connections are usually on all four sides of the package

Note 1 to entry: It may be leaded or leadless.

chip-on-board
COB
printed board assembly technology that places unpackaged semiconductor dices and interconnects them by wire bonding or similar attachment techniques

SEE: Figure 3.

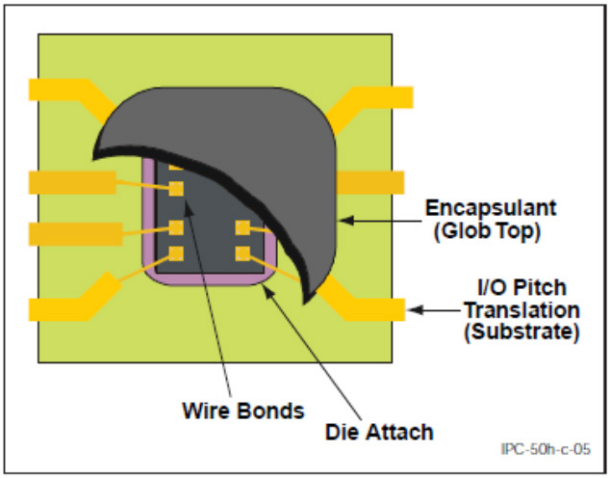

Figure 3 – Chip on board (COB)

Note 1 to entry: The silicon area density is usually smaller than the density of the printed board.

Note 2 to entry: A mounting and attachment technique where the die is mounted onto a substrate, often a printed-circuit board.

chip-on-flex
COF
semiconductor chip mounted directly onto a flexible printed board

chip-on-glass
COG
assembly technology that uses an unpackaged semiconductor die mounted directly on a glass substrate such as a glass plate for liquid crystal display (LCD)

chip scale package
CSP
generic term for packaging technologies that result in a packaged part that is only marginally larger than the internal die

circuit
number of electrical elements and devices that have been interconnected to perform a desired electrical function

CMOS
complementary metal oxide semiconductor
fabrication technology that results in the creation of both NMOS and PMOS FET devices

coaxial cable
cable in the form of a central wire surrounded by a conductor tubing or sheathing that serves as a shield and return

compensation circuit
electrical circuit that alters the functioning of another circuit to which it is applied to achieve a desired performance

component
individual part or combination of parts that, when together, perform (a) design function(s)

Note 1 to entry: (See also "discrete component".

component mounting site
location on a packaging and interconnecting structure (P&I) that consists of a land pattern and conductor fan-out to additional lands for testing or vias that are associated with the mounting of a single component

compression seal
tight joint made between a component package and its leads that is formed as heated metal cools and shrinks around a glass insulator

computer-aided design
CAD
interactive use of computer systems, programs, and procedures in the design process wherein, the decision-making activity rests with the human operator and a computer provides the data manipulation function

conditioning
subjection of a specimen for a specified duration to specific climatic conditions (usually a specified temperature and a specified relative humidity) or to an atmosphere of specified relative humidity or to complete immersion in water or other liquid

(SOURCE:IEC 60050-212:2010, 212-12-01)

conductance
for a resistive two-terminal element or two-terminal circuit with terminals A and B, quotient of the electric current i in the element or circuit by the voltage uAB (131-11-56) between the terminals

$$G = \frac{i}{u_{AB}}$$

where the electric current is taken positive if its direction is from A to B and negative if its direction is from B to A

Note 1 to entry: The conductance of an element or circuit is the inverse of its resistance.

Note 2 to entry: The term "conductance" is also a short term for “conductance to alternating current” (131-12-53).

Note 3 to entry: The coherent SI unit of conductance is siemens, S.

(SOURCE:IEC 60050-131:2013, 131-12-06)

conductive ink
liquid medium with a suspended powder of an electrically conductive material

conductive medium
material with a suspended powder of an electrically conductive material

Note 1 to entry: See also conductive paints, inks, pastes.

conductive pattern
conductor pattern
configuration formed by the electrically conductive material of a printed board

(SOURCE:IEC 60050-514:1900, 541-01-04)

conductivity
<electrical>ability of a substance or material to conduct electricity

conductivity
<thermal>ability of a substance or material to conduct heat

conductor
conductor line
conductor path
conductor track
line

electrical path
trace
track
single conductive path in a conductive pattern

(SOURCE:IEC 60050-541:1990, 541-01-20)

constraining core
supporting plane that is internal to a packaging and interconnecting structure

controlled collapse soldering
controlled collapse <component connection>
technique for soldering a component (i.e., flip chip, chip scale package, BGA) to a substrate, where the component connection surface tension forces of the liquid solder supports the weight of the component and controls the height of the joint

coplanar leads
flat beam leads of a component package that have been formed so that they can simultaneously contact one plane of a base material

corona
electrical discharge brought on by the ionization of a liquid surrounding a conductor, which occurs when the potential gradient exceeds a certain value, but conditions are insufficient to cause complete electrical breakdown or arcing

creel
device used as a yarn package rack to hold warp ends for a section beam

critical defect
any anomaly specified as being unacceptable

crosstalk
spurious signal
undesirable transfer of electrical energy between neighbouring conductors (coupling) by mutual inductance and capacitance

Note 1 to entry: See also "backward crosstalk" and "forward crosstalk".

cupping
<BGA> condition of a ball grid array package after reflow where the corners turn up and away from the printed board laminate surface

Note 1 to entry: This condition in the worst case causes the balls on the outside row to be in tension and the balls in the centre to be in compression.

Note 2 to entry: Opposite of “doming (BGA)”.

current
flow or movement of electrons in a conductor as the result of a voltage difference between the ends of the conductive path

current-carrying capacity
maximum electrical current that can be carried continuously by a conductor, under specified conditions, without causing objectable degradation of electrical and mechanical properties of the product

customer detail specification
CDS
document that establishes the specific requirements, identified in a detailed specification, in order to tailor these to meet the needs of a custom product, material, or service

7 D

damage
result of an event that degrades a product, for example, component, printed board, module, etc., beyond the form, fit and function limits of the governing document

data capture
automatic collection of information from a given machine or other information source

database
comprehensive collection of information that is structured in such a way that some or all of its data may be used to create queries about related items contained within it

dead-bug
orientation of a package with the terminations facing up

decoupling
absorbing of noise pulses in power supply lines, that were generated by switching logic devices, so as to prevent the lines from disturbing other logic devices in the same power-supply circuit

defect
nonconformance or other risk factors as identified by the manufacturer

Note 1 to entry: A process and/or material non-conformance that could result in a reduction of functional capability, design life or reliability.

degradation
an undesired departure in the operational performance of any device, equipment or system from its intended performance

Note 1 to entry: The term "degradation" can apply to temporary or permanent failure.

(SOURCE:IEC 60050-161:1990, 161-01-19)

detail specification
detailed written description of a part or a process

dice
two or more die

dicing
separating of semi-conductor wafers into individual die

die
chip
leadless device
separated part (or whole) of a wafer intended to perform a function or functions in a device

(SOURCE:IEC 60050-521:2002, 521-05-30)

die bonding
attachment of a die to base material

die device
bare die, with or without connection structures, or a minimally packaged die

dielectric strength
maximum voltage that a dielectric can withstand under specified conditions without a voltage breakdown

Note 1 to entry: Dielectric strength is usually expressed as volts per unit dimension

digital circuit
electrical circuit that provides two (binary) or three distinct relationships (states) between its input and output

direct current
DC
electric current that is time-independent or, by extension, periodic current the direct component of which is of primary importance

Note 1 to entry: For the qualifier DC, see IEC 60050-151.

(SOURCE:IEC 60050-131:2002, 131-11-22)

discrete component
separate part of a printed board assembly that performs a circuit function (For example, a resistor, a capacitor, a transistor, etc.)

doming
<BGA> condition of a ball grid array package after reflow where the corners turn down and toward the printed board laminate surface

Note 1 to entry: This condition in the worst case causes the balls on the outside row to be compressed and the balls in the centre to be in tension.

Note 2 to entry: Opposite of “cupping BGA”.

doping
addition of a specific impurity to a slice of silicon monocrystal to alter the conductivity of the crystal in a specified manner in order to produce semiconductor devices from this crystal

double-sided assembly
packaging and interconnecting structure with components mounted on both the primary and secondary sides

Note 1 to entry: See also "single-sided assembly”.

dry pack
container that maintains the moisture content of the packages of die devices within specified limits

dual-inline package
DIP
basically rectangular component package that has a row of leads extending from each of the longer sides of its body that are formed at right angles to a plane and parallel to the base of its body

8 E

edge-transmission attenuation
loss of a logic signal's switching-edge sharpness that has been caused by the absorption of the highest-frequency components by the transmission line

Note 1 to entry: See also “attenuation”.

electrical characteristics
distinguishing electrical traits or properties of a component or assembly

electromagnetic compatibility
EMC
ability of a device to function properly in its operating environment without causing electromagnetic interference to other equipment, or itself being susceptible to external interference

electromagnetic interference
EMI
degradation of the performance of an equipment, transmission channel or system caused by an electromagnetic disturbance

Note 1 to entry: In French, the terms “perturbation électromagnétique” and “brouillage électromagnétique” designate respectively the cause and the effect, and should not be used indiscriminately.

Note 2 to entry: In English, the terms “electromagnetic disturbance” and “electromagnetic interference” designate respectively the cause and the effect, but they are often used indiscriminately.

(SOURCE:IEC 60050-161:1990, 161-01-06)

electrostatic discharge
ESD
a transfer of electric charge between bodies of different electrostatic potential in proximity or through direct contact

(SOURCE:IEC 60050-161:1990, 161-01-22)

9 F

farad
unit of electrical capacitance

far-end crosstalk
see “forward crosstalk”

fault
any condition that causes a device or circuit to fail to operate in a proper manner

film conductor
conductor formed in place on a base material by depositing a conductive material using screening, plating or evaporating techniques

film network
electrical network composed of thin-film and/or thick-film components on a base material

final inspection
delivery inspection
evaluation of quality characteristics relating to a standard, specification, or design drawing prior to shipping to the customer

final seal
manufacturing process that completes the enclosure of a microcircuit so that further internal processing cannot be performed without removing a lid or otherwise disassembling the package

fine leak
leak in a sealed package that is less than 0,000 01 cm^3/s at one atmosphere of differential air pressure

fine pitch QFP
quad flat pack (QFP) package whose lead pitch centres at 0,635 mm or less centre

flat pack
rectangular component package that has a row of leads extending from each of the longer sides of its body that are parallel to the base of its body

flexible double-sided printed board
double-sided flexible printed wiring board
double-sided printed board using a flexible base material only

(SOUCE:IEC 60050-541:1990, 541-01-14)

flexible material interconnect construction
FMIC
integration of passive and active components with mechanical components (including switches and connectors) on a flexible or thin base material, i.e., flexible printed board, in order to produce an electronic assembly

flexible multilayer printed board
multilayer printed board using a flexible base material only

Note 1 to entry: Different areas of the flexible multilayer printed board may have different numbers of layers and different thicknesses and consequently different flexibility.

(SOURCE:IEC 60050-541:1990, 541-01-05)

flexible printed board
a printed board using a flexible base material only

Note 1 to entry: It may be partially provided with electrically non-functional stiffeners and/or coverlayers

(SOURCE:IEC 60050-541:1990, 541-01-12).

flexible printed circuit
patterned arrangement of printed circuitry and components that utilizes flexible base material with or without flexible coverlayer

flexible printed wiring
patterned arrangement of printed wiring that utilizes flexible base material with or without flexible coverlayer

flexible single-sided printed board
single-sided printed board using a flexible base material only

(SOURCE:IEC 60050-514:1990, 541-01-13)

flex-rigid double-sided printed board
See “rigid-flex double sided printed board”

flex-rigid printed board
See “rigid-flex printed board”

flip chip
leadless monolithic circuit element structure that electrically and mechanically interconnects to a printed board by conductive bumps

SEE: Figure 4.

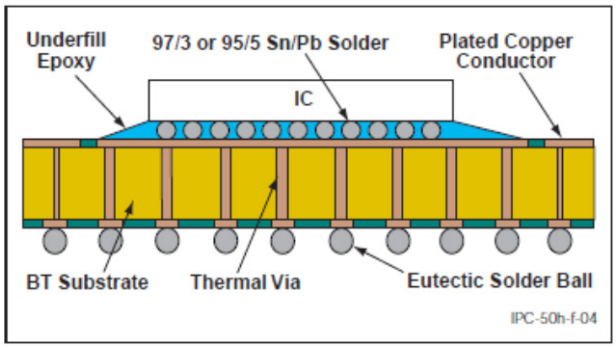

Figure 4 – Flip chip

forward crosstalk
far-end crosstalk
noise induced into a adjacent line, as seen at the end of the adjacent line that is the farthest from the signal source, because the adjacent line has been placed next to an active line

Note 1 to entry: See also "backward crosstalk".

frequency
<electrical current> number of cycles (hertz) or completed alterations per second

fully additive process
fully electroless process
additive process wherein the entire thickness of electrically isolated conductors is obtained by the use of electroless deposition

Note 1 to entry: See also: "semi-additive process".

10 G

generic specification
GS
document that describes as many general requirements as possible, pertaining to a set, family or group of products, materials, or service

go/no-go test
testing process that yields only a pass or a fail condition

gross leak
leak in a sealed package that is greater than 0,000 01 cm^3/s at 1 atm of differential air pressure

ground
common reference point for electrical circuit returns, shielding, or heat sinking

ground plane
conductor layer, or portion thereof, that serves as a common reference for electrical circuit returns, shielding, or heat sinking

Note 1 to entry: See also "signal plane" and "voltage plane".

11 H

header
<module> base of an electronic component package that contains leads

heatsink
thermal shunt
mechanical device that is made of a high thermal conductivity and low specific heat material that dissipates heat generated by a component or assembly

hermetic
<sealing> condition of sealing a component from incoming gases to a specific of inward diffusion normally less than 1×10^{-6} cm^3/s

histogram
graph that depicts values that were obtained by dividing the range of a data set into equal intervals and that plots the number of data points in each interval

SEE: Figure 5

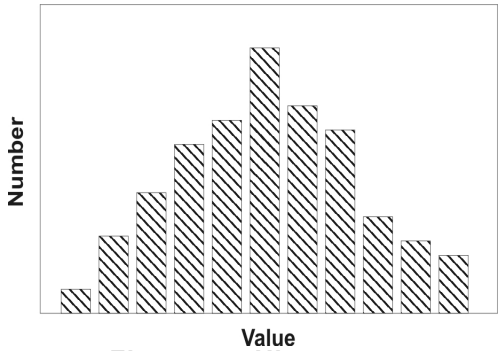

Figure 5 – Histogram

horn
cone-shaped object that transmits ultrasonic energy from a transducer to a bonding tool

hybrid circuit
circuit comprising insulating of base material with various combinations of interconnected film conductors, film components, semiconductor die(s), passive components and bonding wire

Note 1 to entry: See also multi-chip module and multi-chip package.

hybrid integrated circuit
circuit comprising insulating base material with various combinations of interconnected film conductors, film components, semiconductor dice, passive components and bonding wire that perform the same function as a monolithic semiconductor integrated circuit

hybrid microcircuit
circuit comprising insulating base material with various combinations of interconnected film conductors, film components, semiconductor dice, passive components and bonding wire

12 I

immersion conditions
test conditions resulting when surface-mounting device package leads are immersed into a solder bath to check their resistance to soldering temperatures

impedance
resistance set against the flow of a current in a conductor, represented by an electrical network of combined ohmic resistance, capacitance and inductance, at applying an a.c. source

Note 1 to entry: The unit for impedance is ohm, and in principle, it is equal to the square root of the sum of the squares of ohmic resistance, reactance and inductance.

inductance
property of a conductor that allows it to store energy in a magnetic field induced by a current flowing through it

Note 1 to entry: The unit of measure is henry (H).

input vector
set of logic values to be applied to the complete set of input test points at any one point in time

insertion loss
ratio of transmitted electromagnetic power to incident power

Note 1 to entry: This loss of power includes losses by conversion to heat in the dielectric and in the conductors.

Note 2 to entry: The insertion loss is usually expressed in decibel (dB).

inspection lot
collection of product units that are identified and treated as a unique entity from which a sample is drawn and inspected in order to determine conformance with acceptability criteria

integrated circuit
combination of inseparable associated circuit elements that are formed in place and interconnected on or within a single base material to perform a particular electrical function

integrated passive component
multiple passive components that share a substrate and package

Note 1 to entry: Integrated passive components may be housed inside the layers of the primary interconnect substrate, and thus become embedded passive components. Alternately, these components may be on the surface of a separate substrate that is then placed in an enclosure and surface mounted on the primary interconnect substrate, thus become passive arrays or passive networks.

interconnection
joining of electrical devices to complete a circuit

13 J

jisso
total solution for interconnecting, assembling, packaging, mounting, and integrating system design

Note 1 to entry: A term from Japanese.

J-leads
preferred surface mount lead form used on PLCCs (Plastic Leaded Chip Carrier), so named because the lead departs the package body near its Z axis centreline, is formed down then rolled under the package

Note 1 to entry: Leads so formed are shaped like the letter "J."

junction temperature
temperature of the region of a transition between the p-type and n-type semiconductor material in a transistor or diode element during operation

14 K

known good die
KGD
die-form semiconductor product that provides assurance of equivalent quality and reliability as its conventionally packaged counterparts

known tested die
KTD
die-form semiconductor product functionally verified by probing tests equal to the expected performance of the packaged product, without full quality assurance by supplier(s)

Note 1 to entry: The testing requirements are AABUS.

15 L

land grid array
LGA
square package with termination lands located in a grid pattern on the bottom of the package

large-scale integration
LSI
integrated circuit with over 100 gates

lay-up
process of combining one or more innerlayers, and pre-preg or adhesive layer(s) into a lamination package

Note 1 to entry: The package may consist of innerlayers, outerlayers and copper foil.

lead frame
metallic portion of the device package on which the integrated circuit die is mounted and connected from the die or dice bonding sites to the structure that becomes the outer leads of the package

lead-free solder
alloy that does not contain more than 0,1 % lead (Pb) by weight and that is used for joining components to substrates or for coating surfaces

leaded chip carrier
a chip carrier whose external connections consist of leads that are around and down the side of the package

Note 1 to entry: See also "leadless chip carrier".

leaded surface-mount component
surface-mount component for which external connections consist of leads that are around and down the side of the package

SEE: Figure 6.

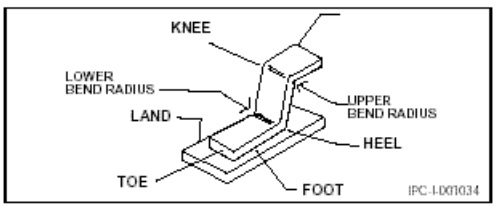

Figure 6 – Leaded surface-mount component – Gull wing shaped lead

Note 1 to entry: See also "leadless surface-mount component".

leadless surface-mount component
leadless component
leadless device

surface-mount component whose external connections consist of metallized terminations that are integral part of the component body

Note 1 to entry: See also "leaded surface-mount component".

leakage current
undesired flow of an electrical current at the surface or through the inside of an insulator

line coupling
interaction between two transmission lines that is caused by their mutual inductance and the

load capacitance
capacitance seen by the output of a logic circuit or other signal source

logic circuit
functional digital circuits used to perform computational functions

logic diagram
drawing that depicts the multistate device implementation of logic functions with logic symbols and supplementary notations that show the details of signal flow and control, but not necessarily the point-to- point wiring

logic family
collection of logic functions using the same form of electronic circuit, for example, emitter-coupled logic (ECL), transistor-transistor logic (TTL), complementary metal-oxide semiconductor logic (CMOS)

lot accept number
maximum number of devices which may fail a sample test without causing rejection of the lot

lot reject number
for a sample test, the number of failed devices which will cause lot rejection

lot size
batch size
collection of units produced in one continuous, uninterrupted fabrication run

luminance
brightness
quantity defined by the formula

$$L_v = \frac{d\Phi_v}{dA \cdot \cos\theta \cdot d\Omega},$$

Where:
dΦv is the luminous flux transmitted by an elementary beam passing through the given point and propagating in the solid angle dΩ containing the given direction; dA is the area of a section of that beam containing the given point; θ is the angle between the normal to that section and the direction of the beam

unit: cd • m-2 = lm • m-2 • sr -1

(SOURCE:IEC 60050-845:1987, 845-01-35)

luminous energy
time integral of the luminous flux

Note 1 to entry: Luminous energy is measured in lms (lumen second).

luminous flux
a magnitude defined by

$$\Phi = K_m \int_0^\infty V(\lambda)\, P(\lambda)\, d\lambda$$

Where:
P(λ) is the power spectral density radiated by the source at wavelength λ ;

V(λ) is the spectral luminous efficiency for photopic vision;
Km is a constant

Note 1 to entry: In the SI system of units, where P(λ) is expressed in watts per metre, the luminous flux Φ is expressed in lumens, and Km = 683 lm/W.

(SOURCE:IEC 60050-723:1997, 723-08-27)

16 M

major defect
defect that is likely to result in a failure of a unit or product or that materially reduces its usability for its intended purpose

metal oxide semiconductor
MOS
fabrication technology, resulting in the creation of FET devices

microcircuit
relatively high density combination of equivalent circuit elements that are interconnected so as to perform as an indivisible electronic circuit component

microcircuit module
combination of microcircuits and discrete components that are interconnected so as to perform as an indivisible circuit assembly

microelectronics
area of electronic technology with, or applied to, the realization of electronic systems from extremely-small electronic elements, devices or parts

microwave integrated circuit
integrated circuit that performs at microwave frequencies

microwaves
radio waves in the frequency range of 1 GHz to 100 GHz

Note 1 to entry: The term microwave generally refers to the frequency range where circuits and device interconnects are described as distributed elements instead of lumped elements.

minimally-packaged die
MPD
die to which some exterior packaging medium and interconnection structure has been added for protection purposes and ease of handling

Note 1 to entry: This definition includes such packaging technologies as chip scale packages (CSP) in which the area of the package is not significantly greater than the area of the bare die.

minor defect
defect that is not likely to result in a failure of a unit or product or that does not materially reduce its usability for its intended purpose

mixed component mounting technology
component mounting technology that uses both through-hole and surface-mounting technologies on the same packaging and interconnecting structure

module
separable unit in a packaging scheme

moisture barrier bag
MBB
bag that is safe from electrostatic discharge (ESD) and is designed to restrict the ingress of water vapour used to package moisture-sensitive devices

molded interconnection device
combination of molded plastic substrate and conductive patterns that provide both the mechanical and electrical functions of an electronic interconnection package

monolithic integrated circuit
integrated circuit in the form of a monolithic structure

multi-chip module
MCM
Module that contains two or more die(s) and/or minimally packaged dies

Note 1 to entry: Also see "hybrid" and "multi-chip package".

multi-chip package
MCP
package that contains two or more die(s) and/or minimally-packaged dies

Note 1 to entry: Also see "hybrid" and "multi-chip package".

multichip module
MCM
Multichip integrated circuit
Multichip microcircuit
microchip module consisting primarily of closely-spaced integrated circuit dies that have a silicon area density of 30 % or more

17 N

nominal
design target dimension for a physical characteristic of a product or a feature to which a tolerance may be applied that establishes the limits of variation from the target that are acceptable

nominal value
centre value between a minimum and maximum allowance

18 O

output vector
set of logic values, either expected or measured, for all output points at a particular test step of a unit under test

19 P

package
total assembly which protects one or more electronic components from mechanical, environmental and electrical damage throughout its operational life and which provides means of interconnection

package cap
cuplike package cover

package cover
cover that encloses the contents in the cavity of a package in the final sealing operation

package lid
flat package cover

packaging
process of assembling one or more electronic components into a package

Note 1 to entry: The use of “packaging” as a participle (For example “When packaging ICs into dual-in-line packages …”) is deprecated.

packaging and interconnecting assembly
assembly that has components mounted on either or both sides of a packaging and interconnecting structure

Note 1 to entry: Packaging and interconnecting assembly is a general term.

package cracking
cracks in a plastic integrated circuit package caused by stress that results from exposure to reflow solder temperature

Note 1 to entry: These cracks may propagate from the die or die pad to the surface of the package, or only extend part way to the surface of lead fingers.

passive array
comprises multiple passive components of similar function, which are formed on the surface of a separate substrate and packaged in a single SMT case and mounted on the primary interconnect substrate

SEE: Figure 7.

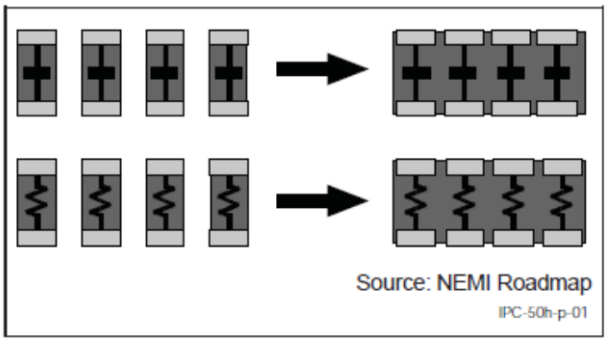

Figure 7 – Passive array

Note 1 to entry: Examples include an array of capacitors or resistors.

passive component
<element> discrete electronic device whose basic character does not change while it processes an applied signal

Note 1 to entry: Passive components include components such as resistors, capacitors, and inductors.

passive network
multiple passive components which have more than one function and are formed on the surface of a separate substrate and packaged in a single SMT case

Note 1 to entry: The case is then mounted on the primary interconnected substrate of the system.

Note 2 to entry: Passive networks typically have several internal connections to form simple functions such as terminations or filters.

peak package body temperature
Tp
the highest temperature that an individual package body reaches during moisture sensitivity level (MSL) classification

peeling
perimeter sealing area
surface on the perimeter of a package cavity that is used as attachment to the package cover

photometry
light measurement where the luminous intensity is compared with that of the light source to be measured by measurable attenuation

Note 1 to entry: Photometry consists of/comprises visual, physical and photographic photometry. For the visual photometry the eye is the receiver.

pick-up force
force required to pick up a surface-mount component from its packaging medium for placement on a substrate

pick-up tool
tool used to pick up surface-mount components from a packaging medium for placement on a substrate and which may be hand activated or a part of a pick-and-place machine

pin grid array
PGA
square or rectangular component package with pins protruding from the bottom surface with a pitch perpendicular to the plane of the package

SEE: Figure 8.

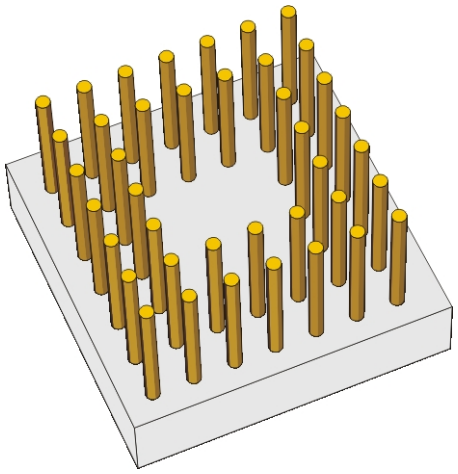

Figure 8 – Pin grid array

plastic ball grid array
PBGA
polymer based package with interconnects formed of tin-lead solder spheres

Note 1 to entry: The solder interconnects are located in an array area on board side of package.

plastic device
semiconductor component wherein the package or encapsulant is plastic

plastic leaded chip carrier
PLCC
surface-mount family of integrated circuit packages with leads exiting from all four sides of the package, generally with a 1,27 mm lead-to-lead pitch

plastic quad flat pack
PQFP
surface-mount family of integrated circuit packages, bounded on all four sides by bumpers, with leads exiting from all four sides of the package and formed into a “gullwing” lead format

power dissipation
energy used by an electronic device in the performance of its function

power plane inductance
inductance in response to AC noise, seen on a DC backplane system

primary side
component side
side of a packaging and interconnecting structure that is defined as such on the master drawing

Note 1 to entry: It is usually the side that contains the most complex or the highest number of components.

printed board
PB
board
card
circuit card
finished board
completely processed printed circuit and printed wiring configurations

Note 1 to entry: This includes single-sided, double-sided and multilayer boards with rigid, flexible, and rigid-flex base materials.

Note 2 to entry: Printed board is a general term.

printed board assembly
assembly that uses a printed board for component mounting and interconnecting purposes

Note 1 to entry: Printed board assembly is a general term.

printed circuit
circuit board
conductive pattern that is composed of printed components, printed wiring, discrete wiring, or a combination there of, that is formed in a predetermined arrangement on a common base

Note 1 to entry: This is also a generic term that is used to describe a printed board that is produced by any of a number of techniques.

printed circuit board
printed board that provides both point-to-point connections and printed components in a predetermined arrangement on a common base

Note 1 to entry: See also "printed wiring board".

printed component
a part (such as an inductor, resistor, capacitor, or transmission line) that is formed as part of the conductive pattern of a printed board

printed component
<conductive inks> component (For example printed inductor, resistor, capacitor or transmission line) forming part of the pattern of a printed circuit

printed contact
portion of a conductive pattern that serves as one part of a contact system

printed electronics sheet board
sheet (board) of forming an electronically functional pattern and/or devices on a large-scale by printing of conductive materials

Note 1 to entry: Applications of a printed electronics sheet may include sensors of various types including image and pressure, thin film secondary battery, smart card, RF-IC, etc.

printed wiring
conductive pattern that provides point-to-point connections but not printed components in a predetermined arrangement on a common base

Note 1 to entry: See also "printed circuit".

printed wiring board
printed board that provides point-to-point connections but not printed components in a predetermined arrangement on a common base

Note 1 to entry: See also "printed circuit board".

printing
act of reproducing a pattern on a surface by any process

propagation delay
time from output to input required for a signal to travel along a transmission line, or the time required for a logic device to receive an input stimulus, perform its function, and present a signal at its output

pulse
<digital>logic signal that switches from one digital state to the other and back again in a short period of time, and that remains in the original state for most of the time

20 Q

QFP with bumper
BQFP
QFP package with a guarding bumper

quad flat J-lead
QFJ
generic rectangular component package, containing an electronic device, with leads on all four sides that are formed in a “J” shape

quad flat no-lead
QFN
generic rectangular component package outline wherein the metal pad terminations are formed on four sides of the bottom of a package

quad flat pack
QFP
Plastic QFP
PQFP
generic square or rectangular component package, containing a semiconductor die, with leads on all four sides that are formed in a “gullwing” shape

qualification testing
demonstration of the ability to meet all of the requirements specified for a product

quality conformance testing
qualification testing that is performed on a regularly scheduled basis in order to demonstrate the continued ability of a product to meet all of the quality requirements specified

21 R

radiant flux
power emitted, transmitted or received in the form of radiation
unit : W

(SOURCE:IEC 60050-845:1987, 845-01-24)

radiant intensity
power of source
quotient of the radiant flux dΦe leaving the source and propagated in the element of solid angle dΩ containing the given direction, by the element of solid angle

$$I_e = \frac{d\Phi_e}{d\Omega}$$

unit : W • sr -1

(SOURCE:IEC 60050-845:1987, 845-01-30)

radiation
<infrared>thermal radiation emitted in the infrared region of the electromagnetic spectrum

radiation
<long wave infrared>infrared energy that is radiated at a wavelength that is between 5 microns and 100 microns

radiation
<medium wave infrared>infrared energy that is radiated at a wavelength that is between 2,5 microns and 5 microns

radiation
<re-emitted infrared>portion of thermal energy absorbed by a media that is in turn emitted in the infrared portion of the electromagnetic spectrum

radiation
near infrared radiation
<short wave infrared>infrared energy that is radiated at a wave length that is between 0,78 microns and 2,5 microns

radiometry
measurement of radiation in the optical spectrum

Note 1 to entry: This includes infrared (IR), ultraviolet (UV), and visible.

random sample
set of individuals that is taken from a population in such a way that each possible individual in the population has an equal chance of being selected

reflection
<signal propagation> fraction of a propagating signal that is reflected back toward its source after the signal has encountered a discontinuity in the electrical impedance of the transmission line on which it is traveling

reflection coefficient
ratio of the power or voltage of a microwave signal reflected from a load resistance that is attached to a circuit or transmission line to the power of the incoming signal

relative permittivity
ϵ_r
ratio of the permittivity of a material to that of free space

reliability
probability that a component, device, or assembly functions properly for a definite period of time under the influence of specific environmental and operational conditions

return loss
level of the reflected signal which is a result of a mismatch between a load and a source

Note 1 to entry: It is usually expressed as the ratio of reflected power to incident power in dB.

rigid-flex double-sided printed board
flex-rigid double-sided printed board
flex-rigid printed board with conductive patterns on two sides comprising one conductive pattern on the flexible base material and the other on the rigid base material

(SOURCE:IEC 60050-541:1990, 541-01-17)

rigid-flex printed board
flex-rigid printed board
flex-rigid printed wiring board
printed board using a flexible base material and a combination of flexible and rigid base materials in different areas

Note 1 to entry: Both the flexible and the rigid base material bear conductive patterns which are normally interconnected in the combined area

(SOURCE:IEC 60050-541:1990, 541-01-16)

rise time
the interval of time between the instants at which the instantaneous value of a pulse first reaches a specified lower value and then a specified upper value

Note 1 to entry: Unless otherwise specified, the lower and upper values are fixed at 10 % and 90 % of the pulse magnitude.

(SOURCE:IEC 60050-161:1990, 161-02-05)

22 S

sampling plan
statistically derived set of sample sizes, accept numbers, and/or reject number which will confirm that a given lot of materials meets established AQLs or LTPDs

schematic diagram
drawing that shows, by means of graphic symbols, the electrical connections, components and functions of a specific circuit arrangement

screen printing
silkscreening
transferring of an image to a surface by forcing a suitable screen printing ink with a squeegee through an imaged-screen mesh

secondary side
tside of a packaging and interconnecting structure which is opposite the primary side

Note 1 to entry: It is the same as the "solder side" on printed boards for through-hole mounting technology.

Note 2 to entry: See also “primary side”.

section beam
flanged cylinder onto which yarn is drawn and accumulated from the yarn bobbins or packages

sectional specification
SS
document that describes the specific requirements pertaining to a portion of a set, family, or group of products, materials, or services

semiconductor
solid material, such as silicon, that has a resistivity that is midway between that of a conductor and of a resistor

semiconductor carrier
package for semiconductor die

sheet resistance
electrical resistance of a planar film of a resistive material with uniform thickness as measured across opposite sides of a unit square pattern

Note 1 to entry: Sheet resistance is expressed in ohms per square.

shelf life
duration of the time interval a raw material or semi-finished product may be stored under specified conditions without changing any important properties

(SOURCE:IEC 60050-212:2010, 212-13-15)

shielding
<electronic> physical barrier, that is usually electrically conductive, that reduces the interaction of electric or magnetic fields upon devices, circuits, or portions of circuits

shrink sop
SSOP
family of component packages with four sizes, each having the ability to provide lead pitches between 0,625 mm (0,002 5 in) and 0,3 mm (0,012 in)

signal
electrical impulse of a predetermined voltage, current, polarity and pulse form representing information to be transmitted

signal conductor
individual conductor that is used to transmit an impressed electrical signal

signal line
conductor used to transmit a logic signal from one part of a circuit to another

silicon on insulator
SOI
fabrication technology that uses an insulating material as the bulk material instead of silicon, which may be sapphire (SOS)

Note 1 to entry: Silicon on insulator is a general term.

silicon on sapphire
SOS
specific fabrication technology that uses sapphire, a variety of corundum (Al_2O_3), as the bulk material instead of silicon

single chip package
SCP
integrated circuit package containing only one semiconductor die

single-inline package
SIP
component package with one straight row of pins or wire leads

single-sided assembly
packaging and interconnecting structure with components mounted only on one side

Note 1 to entry: See also "double-sided assembly".

small outline J-lead
SOJ
generic rectangular component package, whose chip cavity or mounting area occupies a major portion of the package area, with leads on two opposite sides that are formed in a “J” shape

small outline no-lead
SON
generic rectangular component package outline wherein the metal pad terminations are formed on two sides of the bottom of the package

small outline package
SOP
generic rectangular component package, whose chip cavity or mounting area occupies a major portion of the package area, with leads or metal pad surfaces on two opposite sides

solderability
ability of a metal to be wetted by molten solder

soldering ability
ability of a specific combination of components to facilitate the formation of a proper solder joint

Note 1 to entry: See “solderability”.

solid-tantalum chip component
capacitor in a leadless package whose dielectric material is solid tantalum

substrate bending test
test applied to a substrate to determine its resistance to bending and the effects of bending to the substrate and any components mounted on the substrate

support ring
omnibus ring
ring made of a dielectric material that is used to hold beam leads in place relative to one another outside of a packaged device

supporting plane
planar structure that is a part of a packaging and interconnecting structure in order to provide mechanical support, thermo-mechanical constraint, thermal conduction and/or electrical characteristics

Note 1 to entry: It may be either internal or external to the packaging and interconnecting structure.

Note 2 to entry: See also "constraining core".

system in package
SiP
multi-chip package (MCP) that performs a system function

23 T

tape carrier package
TCP
semiconductor package that has the TAB connection and is coated by a resin

termination
end of a conductor that connects the conductor to a terminal, distributing frame, switch or matrix

thick-film circuit
microcircuit in which passive components of a ceramic-metal composition are formed on base material by screening and firing

thin film
film, less than 0,1 mm thick, deposited by accretion process, such as vacuum or pyrolytic deposition

thin-film hybrid circuit
hybrid circuit with thin-film components and interconnections

Note 1 to entry: See also "hybrid circuit".

thin-film integrated circuit
hybrid integrated circuit comprised only of thin-film components and interconnections

Note 1 to entry: See also "hybrid integrated circuit".

thin QUAD flat pack
TQFP
surface-mount family of integrated circuit packages with a thin polymer body

thin small outline package
TSOP
package that has the same features as the SOP package except that its thickness is reduced to 0,8 mm to 1,2 mm

traceability
tracking of the manufacturer at a minimum or the manufacturing process of each element used in a unit

transmission line
device for guiding or conducting electromagnetic energy from one point to another

Note 1 to entry: A transmission line consists of two or more parallel conductors each separated by a dielectric.

Note 2 to entry: See also "balanced transmission line," "microstrip" "stripline," and "unbalanced transmission line."

tri-state
high-impedance state
high-impedance state of an electronic device that effectively disconnects the device output from all other circuitry

24 U

unbalanced transmission line
transmission line that has distributed inductance, capacitance, resistance, and conductance elements that are not equally distributed between its conductors

uncased device
component without a package

unfil
device attached to the loom which automatically winds yarn onto quills from yarn packages and maintains a supply of quills for the shuttle

user
individual, organization, company or agency responsible for the procurement of electrical/ electronic hardware, and having the authority to define the class of equipment and any variation or restrictions (i.e., the originator/custodian of the contract detailing these requirements)

25 V

very large scale integration
VLSI
integrated circuits with more than 80 000 transistors on a single die that are interconnected with conductors that are 1 micron or less in width

visible light
<band> electromagnetic radiation that occurs at wavelengths between 0,39 microns and 0,78 microns

26 W

Wafer
Slice
slice or a flat disc, either of semiconductor material or of such a material deposited on a substrate, in which one or more circuits or devices can be processed

(SOURCE:IEC 60050-521:2002, 521-05-29)

wafer level package
WLP
technique of partial encapsulation and protection of die while still on the wafer and before the wafer is divided into singulated dies

wafer-level package
<chip-scale package> A chip-scale package whose size is generally equal to the size of the semiconductor device it contains and that is formed by processing on a complete wafer rather than on an individual device.

NOTE 1 Because of the wafer-level processing, the size of a wafer-level package may be defined by finer dimensions and tighter tolerances than those for a similar non-wafer-level package.

NOTE 2 The package size will change with changes in the size of the die.

waveguide
a transmission line consisting of a system of material boundaries or structures for guiding electromagnetic waves

Note 1 to entry: Common forms of waveguide include metallic tubes, dielectric rods and mixed structures of conducting and dielectric materials.

(SOURCE:IEC 60050-704:1993, 704-02-06)

wavelength
distance in the direction of propagation of a periodic wave between two successive points at which the phase is the same distance in the direction of propagation of a periodic wave between two successive points at which the phase is the same. unit: m

Note 1 to entry: The wavelength in a medium is equal to the wavelength in vacuo divided by the refractive index of the medium. Unless otherwise stated, values of wavelength are generally those in air. The refractive index of standard air (for spectroscopy : t = 15 °C, p = 101 325 Pa) lies between 1.000 27 and 1.000 29 for visible radiations.

Note 2 to entry: $\lambda = v/f$, where λ is the wavelength in a medium, v is the phase velocity in that medium, and f the frequency.

(SOURCE:IEC 60050-845:1987, 845-01-14)

wire bond
completed wire connection that provides electrical continuity between the die and a terminal

wire bonding
microbonding between a die and base material, lead frame, etc.

27 Z

zigzag in-line package
package with in-line leads on one side which are arranged in zigzag fashion