

JEDEC STANDARD

Designation System for Semiconductor Devices

JESD370B

(Reaffirmation of EIA-370-B, formerly RS-370-B)

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JEDEC SOLID STATE TECHNOLOGY ASSOCIATION



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DESIGNATION SYSTEM FOR DISCRETE SEMICONDUCTOR DEVICES

(From EIA Standards Proposal No. 1383-A, formulated under the cognizance of EIA/JEDEC JC-10 Committee on Terms and Definitions.)

TYPE DESIGNATION SYSTEM

It shall be standard to use the following designation system for discrete semiconductor devices such as diodes, transistors, etc. See Figures 1-19 for examples of various combinations.

The type designation shall consist of (1) a first number symbol; (2) a letter symbol; and (3) a second number symbol. Additionally, if required, the type designation shall include (4) one or more suffix letter symbols; and (5) one or more additional suffix letter symbols.

1. Significance of Symbols

The first number symbol shall consist of one digit indicating the class and shall be assigned in accordance with the following rules:

- (a) The digit (n minus one) shall be used to identify (i) a device consisting of a single unit having n useful electrical connections, as in Figures 1 through 3, 9 through 11, and 15 through 18; or (ii) a device consisting of an integral group of such units as in Figures 4 through 6, 12 through 14, and 19.

Examples: Each device in Figure 3 and each unit of the device in Figure 6 has four useful electrical connections; hence, the first number symbol is three (four minus one).

- (b) The digit (n minus one) shall be used to identify a device consisting of an integral group of dissimilar units wherein n is the number of useful electrical connections of the unit having the largest number of useful connections.

Examples: In Figure 7, the unit with the largest number of useful electrical connections has three such connections; hence, the first number symbol is two (three minus one). In Figure 8, the largest number is four; hence, the first number symbol is three (four minus one).

- (c) When the above rules indicate that the first number symbol is four or higher, that symbol will be assigned the value four.

A single unit is defined as a single element (diode, transistor, or thyristor) by itself (Figures 1A, 1B, 2A, 2B, 3A, 3B, 9A, 9B, 10A, 10B, 11, 15A, 15B, and 16A); as a single element that is independently characterized and that can be used interchangeably with other similar elements, even though part of a combination (Figures 4, 5A, 5B, 6, 12A, 12B, 13A, 13B, 14, and 19); or as several elements interconnected in such a manner that the combination can be characterized as a single entity (Figures 2C, 3C, 3D, 10C, 15C, 16B, 17A, 17B, 17C, 17E, 18A, 18B, 18C, 18D and 18E).

A useful electrical connection is defined as an external electrical connection to the unit that is essential to the basic operation of the unit. Terminals connected only to the case are excluded.

2. The letter symbol shall have the following significance:

- (a) The letter N shall be used for registered devices.
- (b) The letter C is used (in place of N) to indicate an unregistered unencapsulated chip. This letter signifies that if the chip is properly mounted in the package of the registered device whose type designation differs only by the replacement of the letter N for the letter C, the resulting device will display characteristics similar to those of the registered device.

Example: If the chip designated 2C1234 is properly mounted in the package registered for the 2N1234, it will display characteristics similar to those of the 2N1234.

3. The second number symbol shall consist of two or more digits assigned consecutively, starting with the number 21 for each class of device designated by a specific first number symbol (unless otherwise specifically authorized by the JEDEC Council).

4. The suffix letter symbol shall have the following significance:

- (a) The letters A, B, C, D, E, F, G, H, J, and K, assigned in that order, indicate a later and modified version that can be substituted for any previous versions but not vice-versa.
- (b) A letter R is used to indicate a reverse-polarity diode in an asymmetrical package that is mechanically and electrically identical to a forward-polarity device. When the package has a mounting base (stud, flange or case mounting) that is used as one electrical connection, the following definitions for the polarity apply.
 - i. Rectifier Diodes: In forward-polarity devices, the mounting base shall be the cathode terminal; and in reverse-polarity devices, it shall be the anode terminal.
 - ii. Voltage Regulator Diodes and Voltage Reference Diodes: Definitions of forward polarity and reverse polarity for these groups have not been standardized.

4. (continued)

- iii. Microwave Diodes: The larger diameter terminal of the package shall be identified as the diode base. In forward-polarity devices, the diode base shall be the anode terminal; and in reverse-polarity devices, it shall be the cathode terminal.

NOTE: Diodes in symmetrical packages shall be considered forward-polarity devices for the purpose of registration.

5. The additional suffix letter symbols shall be limited to the letter S or L, and in the case of microwave diodes only, the letter M and letter combinations MR and RM*. The significance of these letters and letter combinations when used as additional suffix letter symbols is as follows:

- (a) The letter S is used to indicate a device that is manufactured with leads shorter than specified in the registered data of the device, but not shorter than .5 inch (12.7 mm). The letter L may be used to indicate a device whose leads are at least 1.5 inches (38.1 mm) long.
- (b) For microwave diodes only, the letter M is used to designate a pair of diodes that are identical in outline dimensions and polarity and that have matched electrical characteristics as described in the Appendix.
- (c) The letter combination MR as final suffix letters is used to designate a pair of microwave diodes identical in outline dimensions, with one diode having opposite polarity to the other diode and with matched electrical characteristics as described in the Appendix. A matched pair of reverse-polarity microwave diodes is designated by the suffix letters RM.

Examples, in which 1N23 is assumed to be a forward-polarity microwave diode, and 1N23A is a later version:

- i. 1N23AM is a matched pair of forward-polarity microwave diodes.
- ii. 1N23AMR is a matched pair of one forward-polarity microwave diode and one reverse-polarity microwave diode,
- iii. 1N23ARM is a matched pair of reverse-polarity microwave diodes.

NOTE: A proposed version of this standard included a "P" suffix intended to be used to indicate a variance in mechanical characterization of a device. Three families of rectifier devices, 1N7001P1, 1N7002P1, 1N7003P1, 1N7004P1, 1N7005P1, 1N7006P1, 1N7007P1, 1N7001P2, 1N7002P2, 1N7003P2, 1N7004P2, 1N7005P2, 1N7006P2, 1N7007P2, 1N8001P1, 1N8002P1, 1N8003P1, 1N8004P1, 1N8005P1, 1N8006P1, 1N8007P1, 1N8001P2, 1N8002P2, 1N8003P2, 1N8004P2, 1N8005P2, 1N8006P2, 1N8007P2, 1N9001P1, 1N9002P1, 1N9003P1, 1N9004P1, 1N9005P1, 1N9006P1, 1N9007P1, 1N9001P2, 1N9003P2, 1N9004P2, 1N9005P2, 1N9006P2, and 1N9007P2 have been registered using the "P" suffix, and they shall continue to be valid. No new registrations will use the "P" suffix.

Sequence of Symbols

Number and letter symbols shall appear in the following sequence, as applicable:

1. All Devices except Microwave Diodes

The first number symbol; the letter N; the second number symbol; R; one of the letters A, B, C, D, E, F, G, H, J, or K; S or L.

Examples: 1N9999RA, 1N9999AS, 1N9999RAS, and 1N9999AL.

2. Microwave Diodes

The number 1; the letter N; the second number symbol; one of the letters A, B, C, D, E, F, G, H, J, or K; and as appropriate R, M, MR or RM; S or L.

Examples: 1N9999AM, 1N9999AMR, 1N9999ARML, and 1N9999ALRM.

Matched Devices

1. All Devices except Microwave Diodes

To designate that two or more individual semiconductor devices already assigned their own type designations are matched, a completely new type designation shall be assigned to the group of matched units. The registration for the matched group shall describe the specification for matching the individual units.

2. Microwave Diodes

For matched microwave diodes see 5(b) and 5(c).

Device Marking

1. The suffix letter S or L need not be marked on individual devices.

2. In marking matched devices (other than microwave diodes), the original type designation shall be marked on individual units, while the type designation for the group shall be marked on the shipping envelope, tag, or package containing the individual units.

APPENDIX

Specification for Matched Pairs of Microwave Diodes

This Standard makes provisions for the assignment of a type designation to matched pairs of microwave diodes. To be eligible for the assignment of the designation, matched pairs must meet the following specifications:

1. Microwave Mixer Diodes

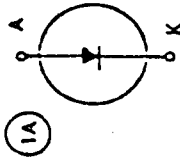
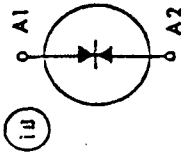
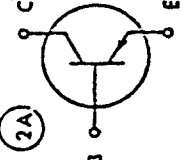
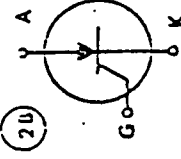
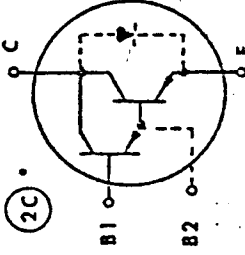
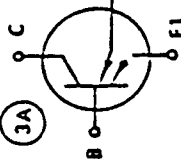
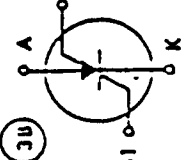
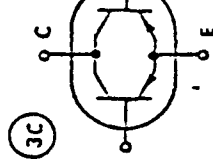
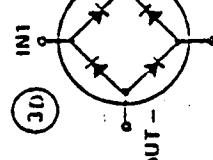
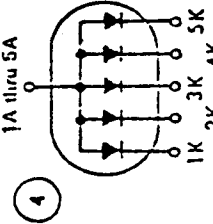
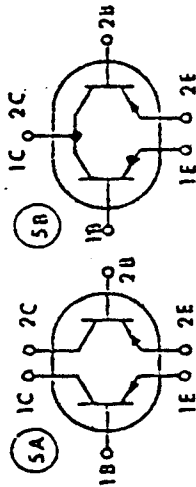
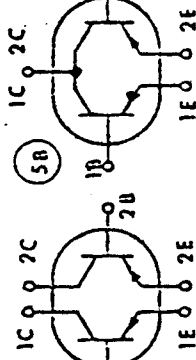
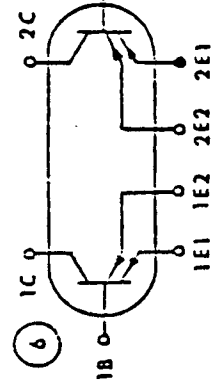
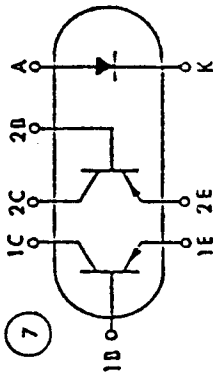
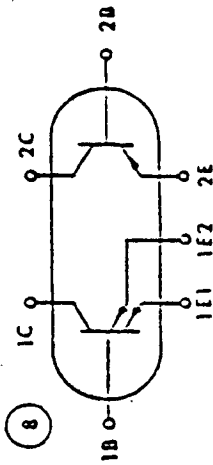
- (a) Conversion loss unbalance, 0.3 dB maximum.
- (b) If impedance unbalance, 25 ohms maximum.
- (c) Isolation of signal to local oscillator arm, 13 dB minimum.

2. Microwave Video Detector Diodes

- (a) Figure of merit unbalance, 1 dB maximum where $\text{unbalance} = 10 \log_{10} \frac{M_1}{M_2}$
 M_1 and M_2 are figures of merit, and $M_1 \geq M_2$ to make unbalance a positive number.
- (b) The video impedance of the diode with the lower impedance of the pair shall be within 20% of the video impedance of the other diode.

Test conditions for unbalance measurements shall be equivalent to those specified for the same parameter of the individual diode.

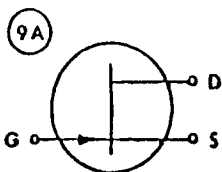
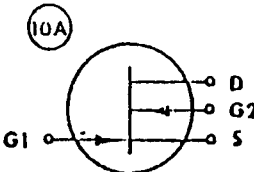
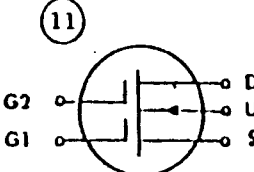
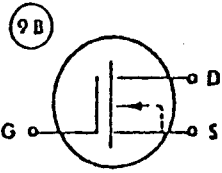
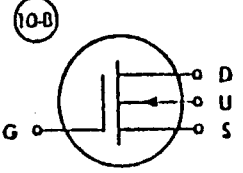
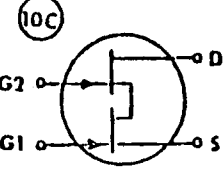
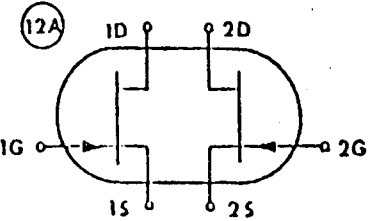
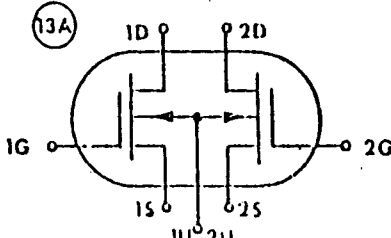
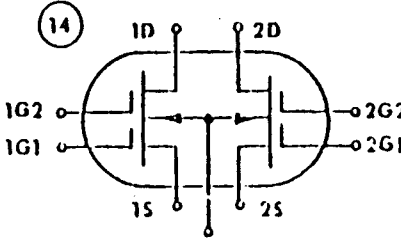
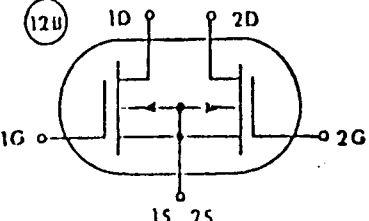
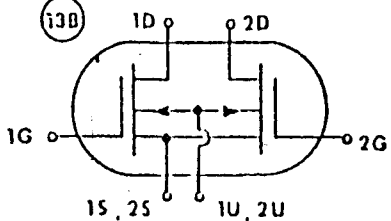
EXAMPLES OF THE METHOD FOR ASSIGNING THE FIRST
NUMERIC SYMBOL FOR TYPE DESIGNATION

	1N	2N	3N
SINGLE UNITS	<p>(1A) </p> <p>(1B) </p> <p>FIGURE 1</p>	<p>(2A) </p> <p>(2B) </p> <p>(2C) </p> <p>FIGURE 2</p>	<p>(3A) </p> <p>(3B) </p> <p>(3C) </p> <p>(3D) </p> <p>FIGURE 3</p>
INTEGRAL GROUP OF SIMILAR UNITS	<p>(4) </p> <p>FIGURE 4</p>	<p>(5A) </p> <p>(5B) </p> <p>FIGURE 5</p>	<p>(6) </p> <p>FIGURE 6</p>
INTEGRAL GROUP OF DISSIMILAR UNITS		<p>(7) </p> <p>FIGURE 7</p>	<p>(8) </p> <p>FIGURE 8</p>

*Dotted lines represent terminals or components whose presence or absence does not affect type assignment.

EXAMPLES OF THE METHOD FOR ASSIGNING THE FIRST NUMERIC SYMBOL FOR TYPE DESIGNATION

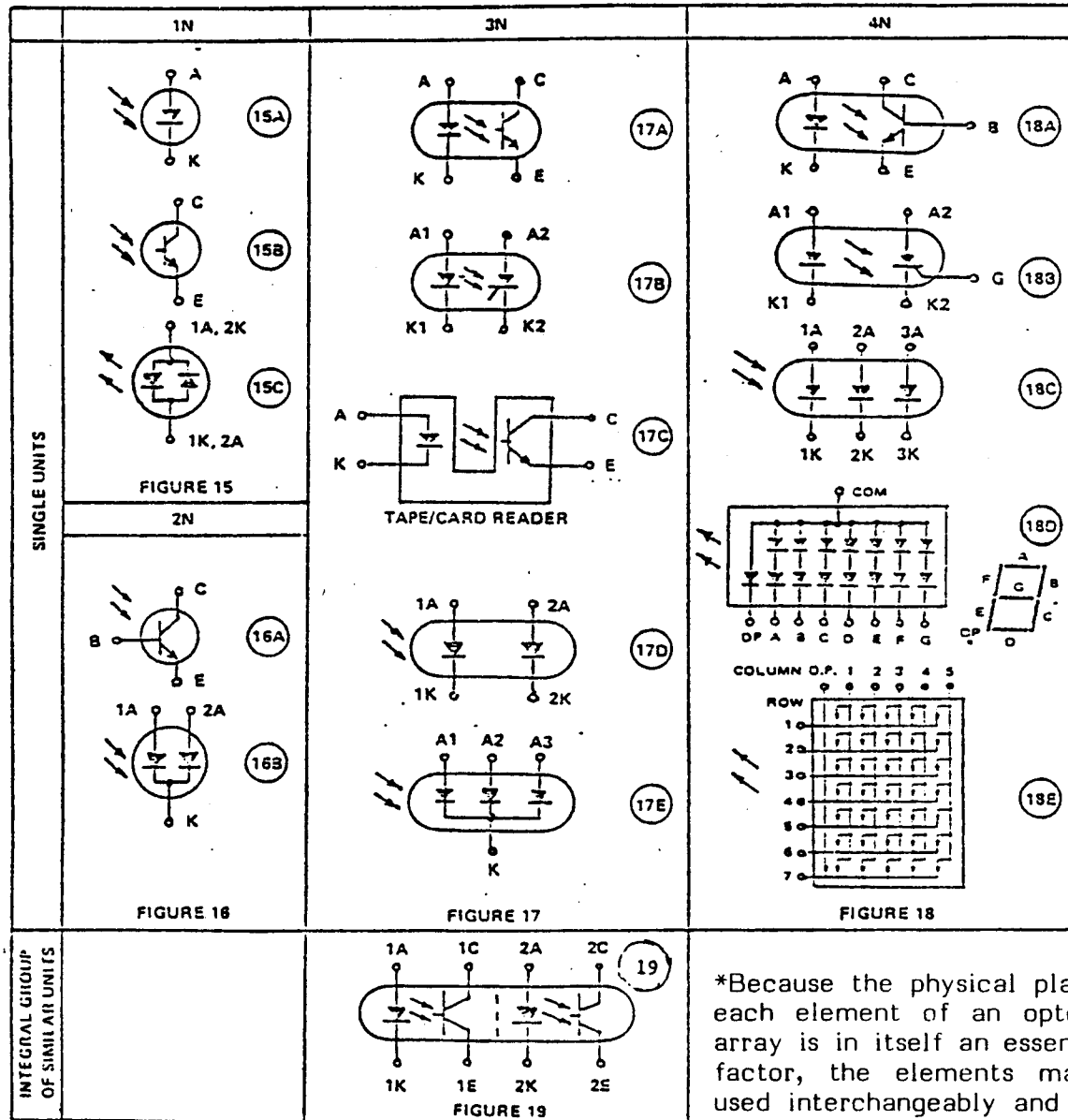
(Field-Effect Transistors)

	2N	3N	4N
SINGLE UNITS	 <p>(9A)</p>	 <p>(10A)</p>	 <p>(11)</p>
	 <p>(9B)</p>	 <p>(10B)</p>  <p>(10C)</p>	
	FIGURE 9	FIGURE 10	FIGURE 11
INTEGRAL GROUP OF SIMILAR UNITS	 <p>(12A)</p>	 <p>(13A)</p>	 <p>(14)</p>
	 <p>(12B)</p>	 <p>(13B)</p>	<p>1U, 2U</p> <p>FIGURE 14</p> <div data-bbox="1491 1258 1795 1404"> <p>U = Substrate Base D = Drain G = Gate S = Source</p> </div>
	FIGURE 12	FIGURE 13	

*Dotted line represents a connection whose presence or absence does not affect type assignment.

EXAMPLES OF THE METHOD FOR ASSIGNING THE FIRST NUMERIC SYMBOL FOR TYPE DESIGNATION

Optoelectronic Devices*



*Because the physical placement of each element of an optoelectronic array is in itself an essential design factor, the elements may not be used interchangeably and so the arrays must be considered as single units. This does not apply to multiple optocouplers of the type shown in Figure 19.

NOTE: Double arrows pointing toward an element indicate that the element is photosensitive; double arrows pointing from an element indicate that the element is a photo-emitting element. The examples would still be applicable if the arrows were reversed.



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The referenced clause number has proven to be:

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