ısistor Specifications Explained

ıary or tutorial explaining the basic transistor specifications with definitions different parameters and what they mean.

ɔr Tutorial Includes:

r basics Gain: Hfe, hfe & Beta Transistor specifications Transistor and diode numbering codes replacement transistors

a huge number of transistors available which have been designed to fulfil a variety of different ɔns. In order to define the parameters of a transistor there is a variety of different specifications that These transistor specifications define an aspect of the performance of a transistor.

r manufacturers issue specification sheets for their transistors. These transistor specification sheets vailable on the Internet, or they may be found in transistor manuals issued by the manufacturers over . Today, most of the transistor data is available on the manufacturers' Internet sites as paper based ks are expensive to produce and not as easy to disseminate.

2N3553 transistor in a TO39 metal can

oosing a transistor using the transistor specification or data sheets, it is necessary to be able to nd what the different transistor specifications mean.

sistor specification parameters

e a number of standard parameters with abbreviations that are used to define the performance of a . The definitions of these parameters are outlined in the table below:

The type number of the device is a unique identifier given to each type of transistor. There are three international schemes that are widely used: European Pro-Electron scheme; US JEDEC (numbers start with 2N for transistors); and the Japanese system (numbers start with 2S). [see the page on Transistor and Diode Numbering Codes].

There is a wide variety of case styles. They often start with TOxx for leaded devices or SOTxxx for surface mount devices.

There are two types of transistor: NPN and PNP. It is important to choose the correct type otherwise all the circuit polarities will be wrong.

24 SEPTEMBER 2017

Fact of the day: It was on this day 1908 that the first Model T Ford automobile was built.

Quote: *Science can amuse and fascinate us all, but it is engineering that changes the world.* Isaac Asimov

Fact: The first mechanical calculator capable of directly multiplying numbers was invented in 1894 by Otto Steiger.

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The two main types of material used for transistors are germanium and silicon. Other materials are used, but in very specialised transistors. A knowledge of the type of material used is important because it affects many properties, e.g. forward bias for the base emitter junction is 0.2 - 0.3 V for germanium and ~0.6 V for silicon.

Collector to Emitter breakdown voltage. This is the maximum voltage that can be placed from the collector to the emitter. It is normally measured with the base open circuit - hence the letter "0" in the abbreviation. The value should not be exceeded in the operation of the circuit otherwise damage may occur. Note that for circuits using inductors in the collector circuit, the collector voltage may rise to twice the rail voltage.

Collector to base breakdown voltage. This is the maximum collector base voltage - gain it is generally measured with the emitter left open circuit. This value should not be exceeded in the operation of the circuit.

Collector current, normally defined in milliamps, but high power transistors may be quoted in amps. The important parameter is the maximum level of collector current. This figure should not be exceeded otherwise the transistor may be subject to damage.

The collector emitter saturation voltage, i.e. the voltage across the transistor (collector to emitter) when the transistor is turned hard on. It is normally quoted for a particular base and collector current values.

This is the current gain of the transistor. It is effectively the same as β.

Frequency Transition - the frequency where current gain falls to unity. The transistor should normally be operated well below this frequency.

Total power dissipation for the device. It is normally quoted for an ambient external temperature of 25C unless other wise stated. The actual dissipation across the device is the current flowing through the collector multiplied by the voltage across the device itself.

mary

there are many different elements to transistor specifications, and there is a huge variety of rs from which to choose, it is still relatively easy to choose a transistor when using a basic knowledge ferent transistor specifications and parameters. Also the popular transistors tend to appear in designs en and for many general-purpose applications, it is very easy to use the transistor specifications and ers to make a choice. It only becomes more difficult when the applications become more specialised. eful study needs to be made of all the transistor specifications to ensure that the transistor will meet ements and work in the final circuit.

PREVIOUS PAGE NEXT PAGE

ctronic Components:
Capacitors Quartz crystals, xtals Diodes Transistor FET Memory types & technologies / SCR Connectors Valves / Tubes Battery technology
to Components menu . . .

▶ Capacitors - the different types
▶ What is a Spectrum Analyzer?