Datasheet of zener diode pdf

FROM THE MATTER – NO ALTERNATIVAL PART 1N4728A - 1N4761A 1.0W ZENER DIODE Features 1.0 Watt Power Dissipation 3.3V - 75V Nominal voltage Zener Standard VZ tolerance is 5% Unleaded finish, According to RoHS (Note 2) Mechanical data Case: DO-41 Case material: Glass. Ul Inflammability Rating 94V-0 Terminals: Termination - Sn96.5Ag3.5. Pasted on MIL-STD-202, Method 208 Polarity: Cathode tape Marking: Type number Weight: 0.35 grams (approximately) DO-41 Glass Dim Min Max A 26.0 60 All dimensions in mm Maximum ratings @TA = 25°C, unless otherwise specified Zener Current Feature (see table page 2) Deat power dissipation over 50°C (Note 1) Thermal resistance - Ambient air junction Forward voltage @ IF = 200 mA Operating symbol and storage temperature IZ Pd R?JA VF Tj, TSTG Value Pd / VZ 1.0 6.67 175 1.2 -65 to + 175 Notes: 1. Valid provided that the leads are kept at TL @ 50°C with lead length = 9.5 mm (3/8) from the housing. 2. Review of EC Directive 2002/95/EC (R? HS) 13.2.2003. Soldering exemptions for glass and high temperature shall apply, as appropriate, as set out in the Annex to EU Directive Notes 5 and 7. Unit mA W mW/°C °C/W V °C DS18007 Rev. 20 - 4 1 of 3 www.diodes.com 1N4728A - 1N4761A © Incorporated Diodes Package Size[mm] 2.9x2.4 (t=0.95) Mounting Surface Style Mounting Power Dissipation (PD)[mW] 250 Zener Voltage VZ (Min.)[V] 3.1 Zen Voltage Vz (max.)[V] 3.5 Storage Temperature (Min.)[°C] -65 Storage Temperature (Max.)[°C] 150 High ReliabilitySmall Mold Type Zener / Reference Diode Tutorial Includes: Zener Diode Zener Operating Diode Theory Zener Diode Datasheet specifications Zener diode circuits Other diodes: Types of diodes State data sheets a variety of different parameters or specifications for Zener diodes - these parameters define the performance of the diode within certain limits and their investigation is an integral part of any design process. When selecting a Zener voltage reference diode suitable for any given position in a circuit, it is necessary to ensure that it meets its requirements. Understanding datasheet specifications is essential for selecting an appropriate device. There are many different parameters that are seen in the Zener diode specifications presented in the datasheets. Some of the most important are presented below. Zener IV features Feature IV of the Zener/voltage reference diode is the key to its operation. In the forward direction, the diode works like any other, but is in the reverse direction where its specific performance parameters can be used. The voltage-current feature of the Zener diode has a normal feature before that the current increases after the initial activation voltage is reached. This is usually 0.6 volts for silicon diodes - virtually all Zener diodes are silicon. As the voltage rises in the reverse direction, there is initially very little current. Only after the reverse drop voltage is reached, the current flow in the chart. Once the reverse breakdown voltage is reached, the voltage remains relatively constant, regardless of the current flowing through the diode. Zener diode specifications When looking at the specification sheet for a Zener diode there are several parameters that will be included. Each details a different aspect of the performance of the Zener voltage reference diode. Looking at each different feature, it is possible to understand the performance of the diode and ensure that it will work correctly in any given circuit. Voltage Vz: Zener voltage or inverse voltage the specification of the diode is often designated by the letters Vz. Voltages are available on a wide range of values, normally following E12 and E24 intervals, although not all diodes are related to this convention. In some cases, E12 values may be slightly cheaper and may be more widely available. Values generally start at about 2.4 V, although not all ranges extend as low as this. The values below it are not available. Ranges can extend anywhere in the region from 47 V to 200 V, depending on the actual range of Zener diodes. Maximum voltages for SMD variants are often around 47 V. Zener diode voltage values in the E12 1.0 1.2 1.2 1.5 1.8 2.2 2.7 3.3 3.9 4.7 5.6 6.8 8.2 There are twice as many values available in the E24 range than in the E12 range, offering a much higher range of values. This may be beneficial in some cases, as more accurate values can be chosen, reducing the adjustment requirement if the exact value is not met. Zener diode voltage values in the E24 range 1.0 1.1 1.2 1.3 1.5 1.6 1.8 2.0 2.2 2.4 2.7 3.0 3.3 3.6 3.9 4.3 4.7 5.1 5.6 6.2 6.8 7.5 8.2 9.1 Current : Current, IZM, a Zener diode is the maximum current that can flow through a Zener diode at the nominal voltage, VZ. Usually, there is also a minimum current required for the operation of the diode. As a rule of

thumb, this can be around 5 to 10 mA for a typical 400 mW lead device. Below this current level, the diode does not decompose adequately to maintain its declared voltage. It is best to keep the Zener diode running above this minimum value by a certain margin, but without the likelihood that it will dissipate too much power when Zener needs to pass more current. Nominal power: All Zener diodes have a rated power that must not be exceeded. It defines the maximum power that can be dissipated by the package and is the product of the voltage over the diode multiplied by the current flowing through it. For example, many small lead devices have a dissipation of 400mW or 500 mW at 20°C, but larger varieties are available with much higher dissipation levels. Surface mounting varieties are also available, but generally have lower levels of dissipation, given the size of the packaging and their ability to remove Common power ratings for leaded devices include 400mW (most common), 500 mW, 1W, 3W, 5W and even 10W. 50W versions are even available, but they are often stud mounted to ensure that diode can be mounted on a radiator to remove dissipated heat. Values for surface mount devices can be about 200, 350, 500 mW with occasional devices that extend up to 1 W. Using high-power zeners will increase costs as a result of the larger devices themselves being more expensive, as well as the additional hardware needed to mount the devices and remove heat. This is on top of increased energy consumption. Sometimes alternative methods can be used, so less power zeners used and efficiency is improved, although it may be necessary to balance this against increases complexity. Zener Rz Resistance: Feature IV of zener diode is not completely vertical in the breakdown region. This means that for small changes in current, there will be a small change in voltage over the diode. The change in voltage for a certain change in current is the resistance of the diode. This resistance value, often referred to as resistance, is designated as the resistance of the rz diode. Zener Inverse of the indicated slope is called the dynamic resistance of the diode, and this parameter is often noted in the manufacturers' data sheets. Usually, the slope does not vary much for different current levels, provided that they are between about 0.1 and 1 times the nominal current Izt. Voltage tolerance: With diodes marked and sorted to meet the Value Ranges E12 or E24, the typical diode tolerance specifications are ±5%. Some datasheets can specify voltage as a typical voltage and then provide a maximum and minimum. Temperature stability: For many applications, Zener diode temperature stability is important. It is well known that the voltage of the diode varies according to temperature. In fact, the two mechanisms that are used to provide breakdown within these diodes have opposite temperature coefficients, and one effect dominates below about 5 Volts and the other above. Consequently, diodes with voltages around 5 V tend to provide the best temperature stability. The zener diode temperature characteristic Can be observed in the example, given that there is a noticeable difference between the specification for the inverse voltage of the Zener diode at 0°C and 50°C. This should be taken into account if the circuit and equipment in which the Zener diode is to be used are subject to temperature changes. Junction temperature specification: To ensure diode reliability, the diode junction temperature is essential. Even if the case may be cold enough, the active area may still be much hotter. As a result, some manufacturers specify the operating range for the junction itself. For normal design, an appropriate margin between the maximum temperature expected within the equipment and the junction shall normally be maintained. The internal temperature of the will again be higher than the outside temperature of the equipment. Care should be taken to ensure that individual items do not become too hot, despite the ambient temperature outside the equipment. Package: Zener diodes are specified in a variety of different packages. The main choice is between surface mounting and traditional lead devices. However, the chosen package will often define the level of dissipation of the package heat. The available options will be detailed in the Zener diode datasheet specification. Example the characteristics of the Zener diode datasheet To give an idea of the characteristics of the datasheet to be expected from a Zener diode, a real example is shown below. The main parameters that would be required in a circuit design are given. BZY88 Lead Edener Diode This diode is described as a miniature Zener diode for regulated power circuits, surge protection, arc suppression and other functions in a variety of areas. Version 5V1 (5.1 Volt) was taken as an example. Typical Features BZY88 Zener Diode Features / Specifications Typical Feature Value Unit Details DC Dissipation Power 400 mW @ Tl = 50°C: de-rate over 50°C 3.2 mW / °C Junction temperature -65 to +17 5 °C Voltage Vz @ 5mA 4.8 min5.1 typ5.4 max V Szt @5mA 76 Ohms IR @VR 1 @ 2.0 µA The data sheet parameters given for this common Zener diode give a useful indication of the specifications given for a Zener diode. Although they are only for a small diode, the same data types are given for other Zener diodes as well. 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