全国高职高专教育“十一五”规划教材

电子信息类专业英语

冉利波 主 编

高等教育出版社
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内容简介

本书共15课，每课分为Passage A和Passage B。Passage A为教学用课文，Passage B为课后学生阅读材料。所有材料均节选自英文原文资料，其内容具有很强的专业性、实用性和技术先进性，且英文句型简单，难度不大，适合我国高职高专院校学生阅读学习，也可作为应用型本科院校的简明教材和电子信息技术工程技术人员的自学材料。通过本书的学习，不仅可使学生掌握电子信息技术专业词汇和术语，还有利于培养学生阅读电子信息技术科技文献的能力。每课课文后列出了生词、短语，对难句作了解析，结合课文对科技英语的语法特点、英译汉的技巧作了简单介绍。此外，还介绍了如何撰写科技论文英文摘要和英文求职信。每课课后均附有练习。为培养学生实际翻译能力，在练习中选入了英文说明书、广告等实用文体供学生翻译练习。书后附有课文参考译文及练习参考答案。

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前　言

自改革开放以来，中国经济逐步融入到全球经济之中。现在，许多外国公司在中国办厂、开店、设办事处，许多外国产品在中国销售。同时，一些中国企业也开始走出国门，参与国际竞争。这就要求中国学生具有更高的英语水平，以适应经济全球化的新形势。

专业英语的教学任务是在学生完成基础英语的学习之后进一步提高学生相关专业的英语阅读和写作能力。据在外资企业或中外合资企业工作的毕业生反映，在他们踏入这类企业的第一天就要用到专业英语，要阅读操作手册，要和外国管理人员交流，甚至机器上的部件标牌都是英文的。其他到国资企业的学生也常常需要阅读英文资料。可见，专业英语在他们的工作中有多重要。但要教好专业英语也不容易。首先，要使学生对它有兴趣。为此，就必须选择合适的教材。编者在教授专业英语的过程中注意到，近年来电子信息技术类专业英语教材已出版了不少，但适合于高职高专层次的教材不多。编者曾用本科教材代替，但效果甚差。因此，编者萌生了编写高职高专电子信息技术类专业英语教材的想法。在成都理工大学工程技术学院的鼓励和支持下，经过两年多的努力，并在本校试用了两个学期，最后完成了本书的编写工作。希望通过本书的教学能使学生掌握更多电子信息技术类英语词汇，大大提高电子信息技术类科技英语的阅读和翻译能力，主要是英译汉的能力。

我们已处在信息时代，电子信息技术已渗入现代人们生活的各个领域。家用电子产品，如电视、电话、计算机、因特网等，是纯电子产品，自不必说。其他如电冰箱、洗衣机、空调机、汽车等机电产品，也都采用了电子控制。今天的世界，电子信息技术无处不在。可见，电子信息技术实际上是一个宽口径专业，这就要求学生掌握电子信息领域各个方面的知识。本书各课均节选于英语原文资料，其内容具有很强的专业性、实用性和技术先进性，且英文句型简单，难度不大；在电子信息技术专业内容方面基本都是在学生所学的知识范围之内。

本教材共 15 课，每课分 Passage A 和 Passage B。Passage A 为课堂教学课文，大致需 2 学时教完。Passage A 文后附有生词和短语、难句解析和语法应用及翻译技巧简介。语法讲解着重于实用性，而不追求系统性和完整性。Passage B 为学生阅读材料，其后亦附有生词和短语。课后附有练习。为提高学生实际阅读翻译能力，在练习中选入了一些英文产品说明书和广告。本教材还介绍了如何撰写科技论文、英文摘要和英文求职简历。书后附有参考译文和练习答案，供教师和学生参考。

本书可作为高职高专院校电子信息技术类专业英语教材，可用 30 学时完成本书的教学内容。本书亦可作为一些应用型本科院校相关专业的简明教材和电子信息技术工程技术人员的自学材料。

本书由冉利波主编，安风华、胡翠华、穆丽伟参编。其中，安风华编写各课 Notes to Passage A 中的难句解析及第 12、13 课 Notes to Passage A 中英语的直译和意译；胡翠华和穆丽伟编写 Passage A 的参考译文，穆丽伟编写 Passage B 的参考译文，胡翠华编写了练习参考答案，冉利

波编写其余内容并统稿。

感谢成都理工大学工程技术学院和电子信息工程系领导的大力支持，感谢石坚提供了部分插图，感谢其他老师在本书撰写过程中和编者非常有益的讨论，衷心感谢沈阳工程学院刘然教授多次仔细审阅此书初稿并提出宝贵修改意见。

由于水平有限，书中难免有欠妥、不足之处，请读者提出宝贵意见，并将您的宝贵意见发到电子信箱 ranlibo@cdutetc.cn。

编　者

2008 年 8 月

目　　录

Semiconductor Devices

本课学习重点

- 掌握有关半导体器件如二极管、晶体管（三极管）的基本单词、词组和缩略语的基本含义及用法
- 培养阅读、翻译有关半导体器件特别是二极管、晶体管（三极管）的科技文献和产品说明书的能力，主要是英译汉的能力
- 学习科技英语特点及被动语态在科技英语中的使用，掌握其翻译方法

Passage A Diodes and Transistors

Diode

Diode is the simplest type of semiconductor device with only one PN junction, which is formed by joining together two pieces of semiconductor, one doped N-type, and the other doped P-type, resulting in a depletion zone to form around the junction (the join) between the two doped materials. This depletion zone controls the behaviours of the diode and permits current to flow predominantly in only one direction. When the P-type region of the PN junction is connected to the positive terminal of a power supply, current will flow and this is said to be forward bias. However, when the terminals of a power supply are reversed, there will be a tiny current through the diode and this is called reverse bias.

The current *I* passing through the diode depends upon the voltage *V* applied between the two leads and the *I-V* characteristic curve do not obey Ohm's Law but an exponential relationship of the general form $I = I_0(e^{eV/kT} - 1)$, schematically shown in Fig. 1-1, where I_0 is the leakage current in reverse bias, *e* is the electron charge, *V* is bias voltage, *k* is Boltzmann's constant, *T* is absolute temperature.

When a small voltage *V* is applied to the diode in the forward direction, there can be a small current to flow the diode and lead to a voltage drop V_{on} of about 0.6~1 V, which is often referred to as the diode's "forward voltage drop" and almost 0.7 V in the case of silicon diode. The forward voltage drop V_{on} has to be considered in a circuit as many diodes are used in series, and also, the amount of current passing through the diodes must be considered. When the diode is reverse biased, there will have a very large resistance, but a tiny current, i. e. leakage current, through the diode still exists, from several mA to just μA, normally that can be neglected. The limiting voltages and currents permissible must be considered in practical application. For example, when used for rectification, the diodes have to withstand a reverse voltage. If the diodes are not chosen properly, they will be broken down.

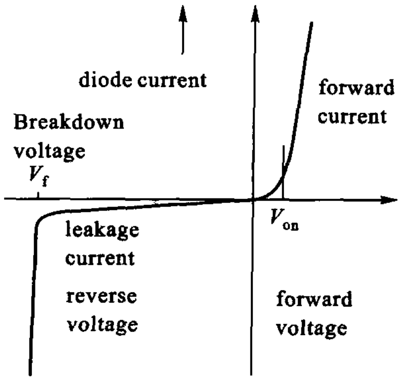

Fig. 1-1 Schematic *I-V* characteristic curve of a diode

There are many different types of semiconductor diodes, such as junction diode which commonly is used in switching applications; Zener diode which is used to regulate voltage by taking advantage of the fact that Zener diodes tend to stabilize at a certain voltage when that voltage is applied in the opposite direction; light emitting diode (LED) which can emit light when current flows through it in the forward direction; photosensitive diode across which the voltage drop depends on the amount of light that strikes it and which can be used to measure illumination; thyristor or SCR (Silicon Controlled Rectifier) which is simply a conventional rectifier controlled by a gate signal, etc..

Transistors

Transistors are one of the most common types of semiconductor and widely used in electronics and can be broadly grouped into Bipolar and Field Effect types. Silicon tends to be the preferred choice as it has much better characteristics and better thermal stability and repeatability than germanium, although germanium is still used sometimes. A bipolar transistor essentially consists of a pair of PN junction diodes that are joined back-to-back. This forms a sort of a sandwich where one kind of semiconductor, N-type or P-type, is placed in between two others. There are therefore two kinds of bipolar transistor, the NPN and PNP, depending on which type of silicon is used for the 'meat' in the sandwich. The bipolar transistor has three terminals, labeled base (B), collector (C) and emitter (E) respectively and the arrow on the component diagram usually shows the emitter terminal, shown in Fig. 1-2. The letters refer to the layers of semiconductor material made the transistor. The direction of the arrow indicates the direction of current and shows the transistor is NPN or PNP. The principle of operation of the two types of transistor is the same apart from the direction of current flow through the device.

The bipolar transistor is a current-controlled device, in which a small current applied to the base terminal will control a much larger current to flow from the collector to the emitter terminal with the relationship $I_C = \beta I_B$, where β is current gain, the values of which can be taken in the range 20 to 200 and is not a constant even for a given transistor. It increases for larger emitter currents because the larger number of electrons injected into the base exceeds the available holes for recombination so the fraction, which recombine to produce base current, declines even further.

A transistor in a circuit can have four working regions, schematically shown in Fig. 1-3, as following:

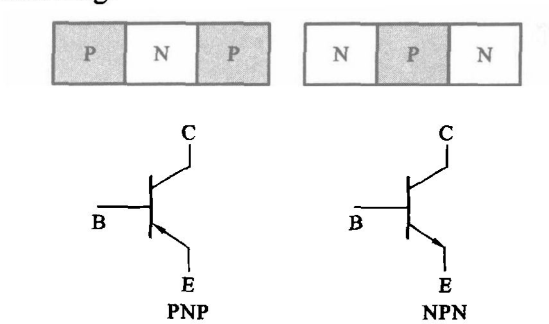

Fig. 1-2 Base,collector and emitter teminals in PNP and NPN bipolar transistors

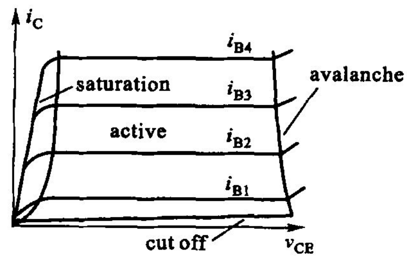

Fig. 1-3 Characteristic curve and working regions of a NPN transistor

① Cut off region (no collector current), useful for "switch off" operation.

② Active region (some collector current more than a few tenths of a volt above the emitter), useful for amplifier applications.

③ Saturation region (collector a few tenths of a volt above emitter), large current useful for "switch on" applications.

④ Avalanche breakdown region, transistor will be broken down.

Words and Expressions

avalanche ['ævəlɑːnʃ] n. 雪崩
bipolar [bai'pəulə] a. 有两极的；双极的
diode ['daiəud] n. 二极管
depletion [di'pliːʃən] n. 耗散
doping ['dəupiŋ] n.（半导体）掺杂（质）
electronics [ilek'trɔniks] n. 电子学
exponential [ˌekspəu'nenʃəl] a. 指数的
gain [gein] n. 增益；获得 v. 得到；增进
germanium [dʒəː'meiniəm] n. 锗
illumination [iˌljuːmi'neiʃən] n. 照明，光照度；阐释
material [mə'tiəriəl] n. 材料 a. 物质的
obey [ə'bei] v. 服从；听从
permissible [pə(ː)'misəbl] a. 可允许的
photosensitive [ˌfəutəu'sensitiv] a. 光敏的；感光性的
preferred [pri'fəːd] a. 首选的
predominantly [pri'dɔminəntli] ad. 优越地，卓越地；主要地
resistance [ri'zistəns] n. 阻力；电阻；阻抗

rectification [ˌrektifi'keiʃən] n. 整流
recombination ['ri:kɔmbi'neiʃən] n. 复合
repeatability [ripi:tə'biliti] n. 可重复性，反复性
saturation [ˌsætʃə'reiʃən] n. 饱和
sandwich ['sænwidʒ, -tʃ] n. 夹心结构，三明治；vt. 夹入中间
schematic [ski'mæ tik] a. 扼要的；图解的
semiconductor ['semikən'dʌktə] n. 半导体
silicon ['silikən] n. 硅
stabilize ['steibilaiz] v. 稳定
terminal ['tə:minl] n. 终端；接线端
thermal ['θə:məl] a. 热的，热量的
transistor [træ n'zistə] n. 晶体（三极）管
thyristor [θai'ristə] n.晶闸管
withstand [wið'stænd] v. 抵抗，对抗
base terminal 基极
bipolar transistor 双极晶体（三极）管
break down 击穿
collector terminal 集电极
depletion zone 耗尽层
emitter terminal 发射极
forward bias 正向偏置
in series 连续地，串联
leakage current 漏电流
LED（Light Emitting Diode） 发光二极管
photosensitive diode 光电二极管
P-type region P 型区
PN junction PN 结
reverse bias 反向偏置
SCR（Silicon Controlled Rectifier）晶闸管（可控硅整流器）
Zener Diode 齐纳二极管（稳压二极管）

Notes to Passage A

1. 难句解析

① When a small voltage V is applied to the diode in the forward direction, there can be a small current to flow the diode and lead to a voltage drop V_{on} of about 0.6~1 V, which is often referred to as the diode's "forward voltage drop" and almost 0.7 V <u>in the case of</u> silicon diode. 当一个小的电压 V 正向加到二极管时，就会有一个小的电流流过，并产生一个大约为 0.6~1 V 的电压降 V_{on}，这常

被认为是二极管的“正向电压降”，对于硅二极管，此值大约为 0.7 V。

in the case of 意为：就……来说，至于……例如：

In the case of him, he is qualified for the job. 就他的情况而言，他适合这个工作。

注意 in the case of 与 in case of 意义不同。in case of 意为：假使……，如果发生……，万一……。例如：

In case of fire, ring the alarm bell. 如遇火情，请按警铃。

② The limiting voltages and currents permissible must be considered in practical application. For example, when used for rectification, part of the time diodes will be required to withstand a reverse voltage. If the diodes are not chosen properly, they will break down. 在实际应用中，必须考虑二极管的容许电压和容许电流的大小。例如，当用二极管整流时，就要求二极管能够耐得住反向电压。若二极管选择不当，它们将会被击穿。

这里 permissible 是形容词用作后置定语，修饰前面的名词 currents，意为“容许电流”。一般来讲，形容词作定语常常放在名词之前，但有时也可后置，如：time enough，something important（修饰不定代词的形容词必须后置）。

③ Zener diode which is used to regulate voltage, by taking advantage of the fact that Zener diodes tend to stabilize at a certain voltage when that voltage is applied in the opposite direction.齐纳二极管，由于它具有加上反向电压时往往趋于稳定在某一电压这一特性，因此它常用来稳压。

• 注意与 use 固定搭配的用法：

be used to do（被用来做……），例如：

During the war the castle was used to keep prisoners in. 战争期间这座城堡被用来关囚犯。

be used as（被用作……），例如：

During the war the castle was used as a prison. 战争期间这座城堡被用作监狱。

be used for（被用于……），例如：

During the war the castle was used for keeping prisoners in. 战争期间这座城堡被用于关囚犯。

be used to doing/sth.（习惯于……），例如：

He is not used to hard manual work. 他不习惯于艰苦的体力劳动。

used to do（过去常常做……），例如：

He used to smoke heavily. 他过去吸烟很凶。

• that 引导的从句是同位语从句，修饰 fact。

④ The bipolar transistor is a current-controlled device. 双极晶体管是由电流控制的器件。

current-controlled 意为“由电流控制的”，是由“名词+动词过去分词”构成的复合形容词。例如：snow-covered road 大雪覆盖的马路；computer-controlled traffic lights 计算机控制的交通信号灯；points-based system 计点积分体系。也有由“副词+动词过去分词”构成的复合形容词，例如：widely-spread rumor 广为传播的谣言；well-prepared speech 准备充分的演讲；well-planned campus 规划有序的校园。

2．语法应用

（1）科技英语的特点

科技英语是用专业语言描述客观存在的事物或事实。科技英语与一般英语并没有本质的区

别，因而，在语法规则上与一般英语相同。但科技英语与用于文学、政论、商务、新闻等方面的英语有所不同，有其特殊性，其特点可简单归纳为如下几点。

① 大量使用科技专业词汇、复合词和缩略词。

② 科技文章以文字叙述为主，辅以数学公式、图形、表格等，因此科技英语文体主要使用陈述句和祈使句。在学术论文及科普文章、专著及教科书、技术总结报告及实验报告、技术函件、专利申请书及投标申请等文献中主要使用陈述句；而在用户手册、操作规程、技术说明书中，除使用陈述句外，还常使用祈使句。时态常用一般现在时及一般过去时，少用现在完成时及过去完成时。

③ 科技文章叙述内容要求客观、真实，因而，要求用词准确、逻辑性强、句式严整，且大量使用被动语态、名词化结构、It...that...句型、非谓语动词、形容词短语作后置定语、介词加动名词短语、分词及不定式短语、分词独立结构等。在分析和解释所观察到的各种现象时，有时要提出各种各样的假设，因而经常使用虚拟语气。纵观科技文献可看到科技英语复杂长句多、被动语态多、非谓语动词多。

上述这些特点将分别在以后各课中作介绍，本课则重点介绍被动语态在科技英语中的应用特点、语法规则及翻译特点。

（2）被动语态在科技英语中应用的特点

在科技文章里广泛使用被动语态，常常将主要信息或科学技术事实作为主语放在句首，而动作的执行者则由 by 引导，放在后面，且常常省略。这是由于科技英语主要是叙述科学技术事实，以客观陈述为主，强调动作的承受者，不强调动作的执行者。特别要注意的是在科技文献中动作的执行者常常是人，如人类、科技工作者自己等。如过多使用以 I、we、you 等词为主语的主动语态，会造成主观臆断的印象。因此，要尽量避免使用以 I、we、you 等人称代词为主语的主动语态，而用被动语态，且略去 I、we、you 等词。本文中的很多句子都是被动语态。例如：

The diode is the simplest type of semiconductor device with only one PN junction, <u>which is formed by joining together two pieces of semiconductor</u>, one doped N-type, and the other doped P-type. 二极管是最简单的、仅有一个 PN 结的半导体器件，此 PN 结由两块半导体结合在一起而形成，其中一片被掺杂成 N 型，而另一片被掺杂成 P 型。

其中的定语从句 which is formed by joining together two pieces of semiconductor 就是被动语态。这里 which 代表 PN junction，是动作的承受者，动名词短语 joining together two pieces of semiconductor 是动作的执行者，由 by 来引导，也可以理解为方法或手段。

（3）科技英语中被动语态翻译的特点

① 科技英语中由 by 引导的被动语态的动作执行者，译成汉语时，by 可译为“被”、“由……”、“给”、“使”等。例如：

When <u>the battery terminals are reversed</u>, the PN junction almost completely blocks the current flow and <u>this is called reverse bias</u>. 译为当电源两极接反时，PN 结几乎完全阻碍了电流的流动，这种状态被称为“反向偏置”。其中 the battery terminals are reversed 和 this is called reverse bias 都是被动语态。动作的承受者分别是 the battery terminals 和 this。

② 在某些情况下，科技英语的被动语态可译成汉语的主动语态，尤其是当被动语态的动作的执行者并未明确给出时。例如：

If the diodes are not chosen properly, they will be broken down.其中 diodes 是动作的承受者，动作的执行者虽未给出，但可以看出动作执行者是人，故翻译时可加上主语，“你”或“我们”，译成主动语态，即“若你选择二极管不当，它们将被击穿”。

③ 科技英语中常用 It is said that（“据说”）、It is reported that（“据报道”）、It is supposed that（“据推测”）、It must be pointed out that（“必须指出”）等特殊被动语态句型，这些被动语态句型可以翻译成无主语的汉语句子。例如：

It must be pointed out that if the diodes are not chosen properly, they will be broken down.必须指出，若二极管选择不当，它们将被击穿。

Passage B Field Effect Transistors

Field-effect transistor (FET) is one type of transistor, which can be used for weak-signal amplification and for analog or digital signal amplification (for example, for amplifying wireless signals), or switch DC or function as an oscillator.

In the FET, current moves in a channel, from the source, labeled S, to the drain, labeled D. A gate terminal, labeled G, generates an electric field that controls the current. The conductivity of the FET depends on the electrical diameter of the channel. A small change in gate voltage can cause a large variation in the current from the source to the drain. This is how the FET amplifies signals.

Field-effect transistors are classified as two major classifications, junction FET (JFET) and metal-oxide-semiconductor FET (MOSFET).

The junction FET has a channel consisting of N-type semiconductor (N-channel) or P-type semiconductor (P-channel) material; the gate is made up of the opposite semiconductor type. The symbols of N type and P type junction FET are shown in Fig. 1-4. In N-channel devices, electrons flow so the drain potential must be higher than that of the source ($V_{DS} > 0$). In P-channel devices, the flow of holes requires that $V_{DS} < 0$. However, under some conditions there is a small current through the junction during part of the input signal cycle. There is very little resistance in the absence of an electric field (no bias voltage). The drain-source resistance is between a few hundred ohms to less than an ohm. The output impedance of devices made with FETs is generally quite low.

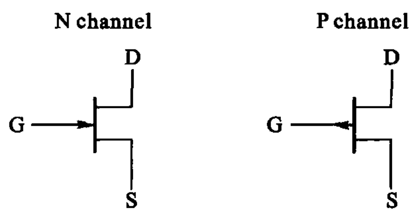

Fig. 1-4 Circuit symbol of N-channel and P-channel JFET

In the MOSFET, the channel can be either N-type or P-type semiconductor. The gate electrode is a piece of metal whose surface is oxidized and the oxide layer (such as silicon dioxide, SiO_2) electrically insulates the gate from the channel. For this reason, the MOSFET was originally called the insulated-gate FET (IGFET), but this term is now rarely used. Because the oxide layer acts as a dielectric, there is essentially never any current between the gate and the channel during any part of the signal cycle. This gives the MOSFET has extremely large input impedance, usually greater than 10^{12} Ohms (a million megohms). Because the oxide layer is extremely thin, the MOSFET is susceptible to destruction by electrostatic charges. Since MOSFETs can both deplete the channel, like the JFET, and enhance it, every N-type or P-type MOSFET can be enhancement mode or depletion mode. A depletion mode, device (also called a normally on MOSFET) has a channel in resting state that gets smaller as a reverse bias s applied; this device conducts current with no bias applied. An enhancement mode device (also called a normally off MOSFET) is built without a channel and does not conduct current when $V_{GS} = 0$; increasing forward bias forms a channel that conducts current.

The FET has some advantages and some disadvantages relative to the bipolar transistor. Field-effect transistors are preferred for weak-signal work, for example in wireless communications and broadcast receivers. They are also preferred in circuits and systems requiring high impedance. The FET is not, in general, used for high-power amplification, such as is required in large wireless communications and broadcast transmitters.

Words and Expressions

channel ['tʃænl] n. 沟道
classification [ˌklæsifi'keiʃən] n. 分类，分级
conductivity [ˌkɔndʌk'tiviti] n. 传导性，传导率
diameter [dai'æmitə] n. 直径
dielectric [ˌdaii'lektrik] n. 电介质，绝缘材料；a. 介电的，非传导性的
destruction [dis'trʌkʃən] n. 破坏，毁灭
source [sɔːs] n. 源
drain [drein] n. 漏
electrode [i'lektrəud] n. 电极
gate [geit] n. 栅，门
insulate ['insjuleit] v. 使……绝缘
impedance [im'piːdəns] n. 阻抗
oxidize ['ɔksiˌdaiz] v. 氧化，生锈
susceptible [sə'septəbl] a. 易受影响的，容许
FET（Field-Effect Transistor）场效应晶体管
insulated-gate FET 绝缘栅场效应晶体管
junction FET 结型场效应晶体管
MOS(Metal-Oxide-Semiconductor) 金属-氧化物-半导体

Practices

1. Translate the following English phrases into Chinese

① semiconductor device

② behaviour of the diode
③ exponential relationship
④ conventional rectifier
⑤ base terminal
⑥ field effect transistor
⑦ collector current
⑧ direction of the arrow

2. Translate the following Chinese phrases into English

① 电源的正极
② 一定数量的阻抗
③ 电压降
④ 几毫安甚至几微安的漏电流
⑤ 容许电压和容许电流
⑥ 电流控制器件
⑦ 集电极到发射极电流
⑧ 较好的热稳定性和重复性

3. Translate the following product specifications into Chinese

Philips Semiconductors Product Specifications

High-speed diodes
1N914; 1N914A; 1N914B

Features

- Hermetically sealed leaded glass SOD27 (DO-35) package
- High switching speed max 4 ns
- Continuous reverse voltage max 75 V
- Repetitive peak reverse voltage max 100 V
- Repetitive peak forward current max 225 mA

Applications

- High speed switching

Descriptions

The 1N914, 1N914A and 1N914B are high speed switching diodes fabricated in planar technology, and encapsulated in a hermetically sealed leaded glass SOD27 (DO-35) package

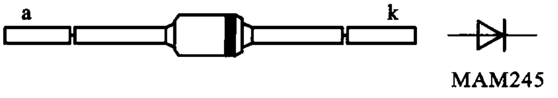

Fig.1-5 Simplified outline (SOD27; DO-35) and symbol
The diode is a type branded. The marking band indicate the cathode

Limiting Values

In accordance with the Absolute Maximum Rating System (IEC 60134)

Symbol	Parameter	Conditions	Min	Max	Unit
V_{RRM}	repetitive peak reverse voltage			100	V
V_R	continuous reverse voltage			75	V
I_F	continuous forward current	see note ①		75	mA
I_{FRM}	repetitive peak forward current			225	mA
I_{FSM}	non-repetitive peak forward current	Square wave; $T_j = 25$℃ prior to surge $t = 1$ μs $t = 1$ ms $t = 1$ s		 4 1 0.5	 A A A
P_{tot}	total power dissipation	$T_{amb} = 25$℃; note ①		250	mW
T_{stg}	storage temperature		−65	+200	℃
T_j	junction temperature			175	℃

Note①

Device mounted on an FR4 printed-circuit-board; lead length 10 mm.

Electrical characteristics

Symbol	Parameter	Conditions	Min	Max	Unit
V_F	forward voltage	$I_F = 10$ mA $I_F = 5$ mA $I_F = 100$ mA	— 0.62 —	1 0.72 1	V
I_R	reverse current	$V_R = 20$ V $V_R = 75$ V $V_R = 20$ V; $T_j = 150$℃	— — —	25 5 50	nA μA μA
C_d	diode capacitance	$f = 1$ MHz; $V_R = 0$	—	4	pF
t_{rr}	reverse recovery time	When switch from $I_F = 10$ mA to $I_R = 10$ mA; $R_L = 10\ \Omega$; measured at $I_R = 1$ mA	—	8	ns
t_{fr}	forward recovery time	When switch from $I_F = 50$ mA; $t_r = 20$ ns		2.5	ns

Thermal Characteristics

Symbol	Parameter	Conditions	Value	Unit
$R_{th,\ j\text{-}tp}$	thermal resistance from junction to tie-point	Lead length 10 mm	24	K/W
$R_{th,\ j\text{-}a}$	thermal resistance from junction to ambient	Lead length 10 mm; note ②	500	K/W

Note②

Device mounted on an a printed-circuit-board without metallization pad.

注：本产品说明书节选自 Philips Semiconductors Product Specifications.