

Symbols & Definitions

DIODES

Symbols and definitions

SYMBOLS (According IEC 147 and IEC 747-2)

C_d , Diode Capacitance

Total capacitance between the diode terminals due to case, junction and parasitic capacitance.

C_j , Junction Capacitance

Capacitance due to a p-n junction of the diode. It increases with increasing reverse voltage.

C_L , Capacitance of Load Capacitor

Value of the capacitor connected to the output of a bridge rectifier.

E_{RSM} , Maximum non Repetitive Peak Reverse Avalanche Energy

Maximum value of the reverse pulse energy that a device can withstand without damage or change in the electrical characteristics.

f , Frequency

Frequency of the waveform or pulse.

I_{BR} , Test Current for Measuring Breakdown Voltage

Test current for measuring Breakdown Voltage (V_{BR}).

I_F , Forward Current

The current flowing through the diode in the direction of lower resistance.

$I_{F(AV)}$, Average Rectified Output Current

The average value of the forward current when using the diode as a rectifier. The maximum allowable average rectified output current depends upon the peak value of the applied reverse voltage during the time interval at which no current is flowing. The value of the forward current averaged over the full cycle.

I_{FRM} , Recurrent Peak Forward Current

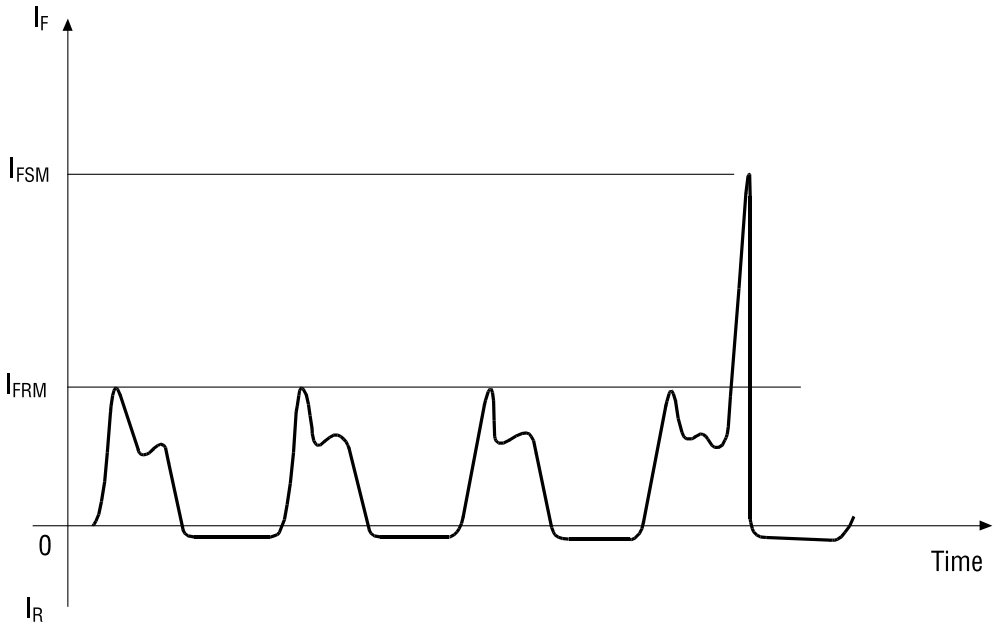
The peak value of the forward current including all repetitive transient currents.

I_{FSM} , Peak Forward Surge Current

The maximum allowable surge current in forward direction having a specified wave-form with short specified time interval (i.e. 10 ms) unless otherwise specified. It is not an operating value. By frequent repetitions, there is a possibility of change in the device characteristic.

It is a current the application of which causes the maximum rated virtual temperature to be exceeded, but which is assumed to occur rarely and with a limited number of such occurrences during the service life of the device and to be a consequence of unusual circuit conditions (e.g. fault conditions).

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I_{pp} , Peak Pulse Current

Peak pulse current of a time and a determinate wave amplitude (Usually, exponential pulse 10/1000 μ s).

I_R , Reverse Current (leakage current)

The current which flows when reverse bias is applied to a semiconductor junction.

I_{RM} , Peak Reverse Current

Maximum reverse leakage current for a given V_{RM} .

I_{RR} , Reverse Recovery Current

That part of the reverse current which occurs during the reverse recovery time.

I^2_t , Rating for Fusing

The maximum forward non-repetitive overcurrent capability. Usually specified for one-half cycle of 60 Hz operation.

I_z , Operating Current

Reverse current flowing in an allowable area of the breakdown region of a Zener diode.

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I_{ZM} , Maximum Regulator Current

Maximum regulation current defined for a zener diode without causing damage or change in its electrical characteristics.

I_{Zs} , Non Repetitive Surge Regulation Current

Maximum non-repetitive reverse regulation current. Usually defined as a single pulse of 8.3 ms duration.

I_{ZK} , Regulation Current in the Breakdown Knee Region

Low level of regulation current, normally in the knee region, used to measure the zener impedance in this area of the reverse characteristic.

I_{ZT} , Regulation Voltage Test Current

The value given in a technical data serves as a measuring condition for the operating voltage, V_Z , dynamic impedance, Z_{ZT} and temperature coefficient of the operating voltage.

P_F , Forward Power Dissipation

The power which is dissipated within the diode when it is operating in the forward direction.

$P_{M(AV)}$ Steady State Power Dissipation

The power capability of a Transient Voltage Suppressor diode when it works as a voltage regulator.

P_{PP} , Peak Pulse Power

It is the product $I_{PP} \times V_{CL}$.

P_{tot} , Power Dissipation

An electrical power converted into heat. Unless otherwise specified, this value is given in the data sheets under absolute maximum rating, with $T_{amb} = 25^\circ\text{C}$ at a specified distance from the case (both ends).

P_{ZSM} , Non Repetitive Peak Zener Dissipation

Maximum non-repetitive reverse power dissipation. Usually defined as a single pulse of 10 ms or 8.3 ms duration.

Q_r , Recovered Charge

The total charge recovered from the diode after switching from a specified forward current condition to a specified reverse condition.

The charge includes components due to both carrier storage and depletion layer capacitance.

R_s , Series Resistance

Value of the resistance in series with a bridge rectifier in order to limit the current flowing through the bridge.

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R_{th} , Thermal Resistance

Quotient of: The difference between the virtual temperature of a device and the temperature of a specified external reference point and the steady state power dissipation in the semiconductor device.

The thermal Resistance is usually expressed in $^{\circ}\text{C}/\text{W}$.

R_{th-j-a} , Junction-Ambient Thermal Resistance

Thermal resistance between junction and ambient.

R_{th-j-c} , Junction-Case Thermal Resistance

Thermal resistance between junction and case.

T_c , Case Temperature

The temperature at a specified point on the case of a semiconductor device.

T_j , Junction Temperature

The temperature of the junction of a semiconductor device.

T_L , Lead Temperature

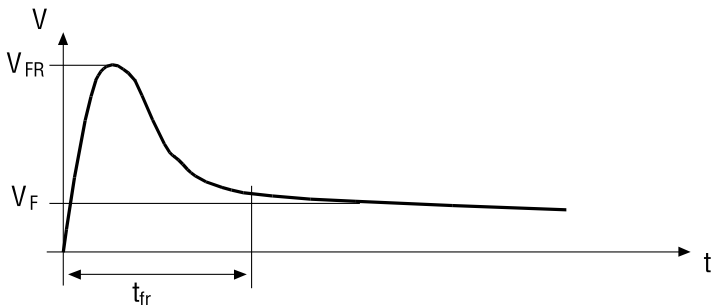
The temperature at a specified point on the lead of a semiconductor device.

T_{stg} , Storage Temperature

The temperature at which the device is stored without any voltage applied.

t_{fr} , Forward Recovery Time

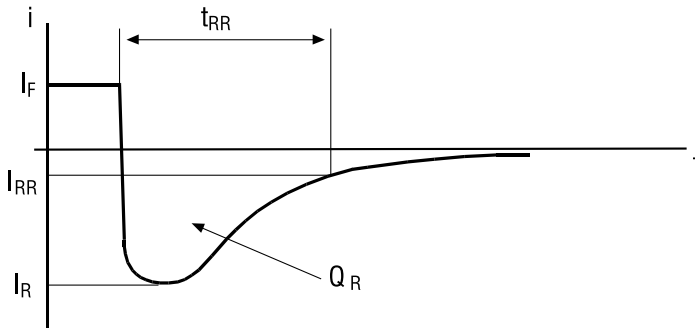
The time required for the voltage to reach a specified value after instantaneous switching from zero or a specified reverse voltage to a specified forward biased condition. This recovery time is specially noticeable when higher currents are to be switched within a short time. The reason is that the forward resistance during the turn-on time could be higher than for the current (inductive behaviour). This can result in the destruction of a diode because of high instantaneous power loss if constant current control is used.



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t_{rr} , Reverse Recovery Time

The time required for the current to reach a specified reverse current, I_{RR} , after instantaneous switching from a specified forward condition (I_F) to a specified reverse bias condition (I_R).



The actual time required for recovery will vary depending on the amount of forward current passed before switching, frequency of switching, waveform (sine, sawtooth, square), impedance of recovery current loop, reverse voltage applied, temperature, and most important, the type of rectifier used in the circuit.

V_{BR} , Breakdown Voltage

Reverse voltage value above which a small increase in voltage results in a sharp rise of reverse current.

V_{DC} , Maximum DC Blocking Voltage

The maximum DC blocking voltage allowed across a semiconductor rectifier.

V_{DIS} , Dielectric strength

Voltage insulation between the terminals and the case (usually applied to bridge components).

V_{CL} , Clamping Voltage

Maximum protection voltage a pulse with a I_{PP} peak value.

V_F , Forward Voltage

The voltage across the diode's terminals which results from the flow of current in the forward direction.

V_{FR} , Forward Recovery Voltage

The varying voltage occurring during the forward recovery time after instantaneous switching from zero or a specified reverse voltage to a specified forward current.

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V_R , Reverse Voltage

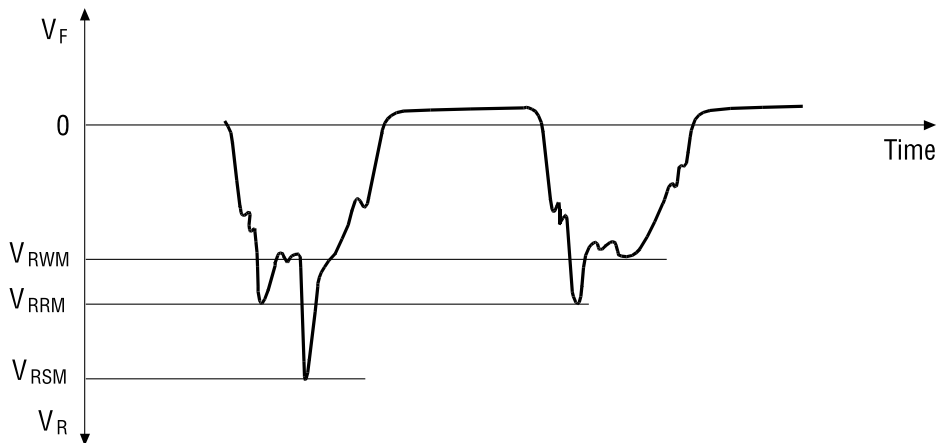
The voltage applied across the diode terminals due to the application. The voltage across a junction or a diode when biased in the direction corresponding to the higher resistance (reverse direction).

V_{RM} , Maximum Recommended Stand-off Voltage

At this voltage the diode does not conduct.

V_{RMS} , Maximum RMS Voltage

The maximum RMS blocking voltage allowed across a semiconductor device.



V_{RRM} , Peak Recurrent Reverse Voltage

Maximum value of repetitive reverse voltage pulses, with half-wave sinusoidal waveform, whose duration and repetition rate have to be specified. (this duration must be chose from: 10 ms, 8.3 ms, 1 ms and 0.1 ms).

It is defined as well as the highest instantaneous value of reverse voltage which occurs across a semiconductor rectifier diode, including all repetitive transient voltages, but excluding all non-repetitive transient voltages.

V_{RSM} , Peak Surge Reverse Voltage

The maximum allowable surge voltage applied in a reverse direction. It is not an operating value. By frequent repetitions, there is a possibility of change in the device characteristic. It could be considered also as the maximum value of a pulse of reverse voltage with a half-wave sinusoidal waveform, the duration of which has to be specified. (This duration must be chosen from: 10 ms, 8.3 ms, 1 ms and 0.1 ms).

It is the highest instantaneous value of any non-repetitive transient voltage which occurs across a semiconductor rectifier diode.

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V_{RWM} , Maximum Peak Working Voltage

Maximum value of a repetitive reverse voltage having a half-wave sinusoidal waveform at mains frequency, usually 50 or 60 Hz (duration 8.3 or 10 ms).

This is the highest instantaneous value of the reverse voltage which occurs across a semiconductor rectifier diode, excluding all repetitive and non-repetitive transient voltages.

V_Z , Reverse Voltage in the Breakdown Region

Voltage across the terminals of Zener diode for a specified value of reverse current in the breakdown region.

Z_{ZK} , Small signal Resistance in the Breakdown Knee Region

Value of the impedance measured in the knee region (bottom part) of a zener or TVS device (specified in W).

Z_{ZT} , Small signal Resistance for the Test Reverse Current

Value of the impedance measured at the test current (working region) of a zener or TVS device (specified in W).