

Hard disk protection diode?

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Discussion in 'Electronic Repair' started by pimpom, Jan 25, 2009.

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Jan 25, 2009

#1



pimpom
Guest

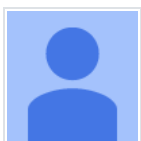
Does anyone have specific information about the protection device at the power supply inputs of hard disks?

I assume that it's a zener diode or something similar in action such as an IC that acts like a precision zener diode. It's not difficult to see how such a device would provide protection against spikes, over-voltage and reverse voltage by shorting the power rail to ground and thereby triggering PSU shutdown.

Devices in the BUX C*** series seem to be widely used, but I have not been able to find a datasheet or other detailed info. Can anybody shed some light on the matter?

Jan 25, 2009

#2



William

I know I'm not directly answering your question, but...

The socket and power cords are polarized. It would be extremely difficult to insert the plug the wrong way.

Sommerwerck
Guest

Jan 25, 2009

#3



pimpom
Guest

William said:

I know I'm not directly answering your question, but...

The socket and power cords are polarized. It would be extremely difficulty to insert the plug the wrong way.

Thanks for the reply. Yes, I expect that reverse voltage protection would be a secondary consideration. Its primary function would be protection against over-voltage, transient or sustained. Something like a crowbar or TVS device, but without the need for very low capacitance. A datasheet or identifying the manufacturer would be a big help.

Jan 25, 2009

#4



whit3rd
Guest

Does anyone have specific information about the protection device at the power supply inputs of hard disks?


The most important reason a hard disk would need a protection device, is that the two power connections (motor power, 12V, and logic power, 5V) have a sequence condition requirement.

So, the diode might clamp +12 to +5V so that a drop in the motor power (like, normal power turnoff) doesn't result in any short time during which the "+12" is actually at lower voltage than the "+5". Or, it might ensure that the +12 supply never goes negative (which could happen if a motor is active when power is removed).

Probably this diode is NOT a Zener type, which is relatively important: high current Zeners often fail short-circuit (which would halt the computer until disconnected).

Jan 26, 2009

#5



Arfa Daily
Guest

pimpom said:

Does anyone have specific information about the protection device at the power supply inputs of hard disks?

I assume that it's a zener diode or something similar in action such as an IC that acts like a precision zener diode. It's not difficult to see how such a device would provide protection against spikes, over-voltage and reverse voltage by shorting the power rail to ground and thereby triggering PSU shutdown.


*Devices in the BUX C*** series seem to be widely used, but I have not been able to find a datasheet or other detailed info. Can anybody shed some light on the matter?*

BUX * devices are usually high voltage transistors

Arfa

Jan 26, 2009

#6



Jim Yanik
Guest

*BUX * devices are usually high voltage transistors*


Arfa

the PSU itself usually has overvoltage protection,where it really counts;on the +5 volt supply. The +12 is loosely regulated,and only runs the motor drive.some have "balance" nodes,that trigger SD if one or more of the supplies go too far outside a window.

Then you don't need the expense of OV protection on every hard drive.

Jan 26, 2009

#7



Franc Zabkar

Guest

Does anyone have specific information about the protection device at the power supply inputs of hard disks?

I assume that it's a zener diode or something similar in action such as an IC that acts like a precision zener diode.

Is it a transient voltage suppression diode?

http://en.wikipedia.org/wiki/Transient_voltage_suppression_diode

- Franc Zabkar

Jan 26, 2009

#8



Franc Zabkar
Guest

I know I'm not directly answering your question, but...

The socket and power cords are polarized. It would be extremely difficult to insert the plug the wrong way.

It would require a very heavy hand, but I **have** seen it done.

- Franc Zabkar

Jan 26, 2009

#9



pimpom
Guest

whit3rd said:

The most important reason a hard disk would need a protection device, is that the two power connections (motor power, 12V, and logic power, 5V) have a sequence condition requirement.

So, the diode might clamp +12 to +5V so that a drop in the motor power (like, normal power turnoff) doesn't result in any short time during which the "+12" is actually at lower voltage than the "+5". Or, it might ensure that the +12 supply never goes negative (which could happen if a motor is active when power is removed).

Probably this diode is NOT a Zener type, which is relatively important: high current Zeners often fail short-circuit (which would halt the computer until disconnected).

I rather expect that it is similar to a zener diode in action but more sophisticated than a simple discrete zener, perhaps with more precise breakdown voltage, lower dynamic resistance and more surge current capacity. And a shorted device is not uncommon.

Jan 26, 2009

#10



pimpom
Guest

Franc said:

*It would require a very heavy hand, but I *have* seen it done.*

In any case, reversing a 4-pin Molex connector will not reverse the polarity. It will just juxtapose the +5 and +12V lines.

Jan 26, 2009

#11



pimpom
Guest

Arfa said:


*BUX * devices are usually high voltage transistors*

Yes. But transistors have the BUX followed by numeric characters.

These devices have a "C" before numerals.

Jan 26, 2009

#12



pimpom
Guest


Franc said:

Is it a transient voltage suppression diode?
http://en.wikipedia.org/wiki/Transient_voltage_suppression_diode

Could be. In fact, I mentioned that in my second post. What I find surprising and frustrating is that I have not been able to find any data on the BUX C*** series.

Jan 26, 2009

#13



Franc Zabkar
Guest

*Could be. In fact, I mentioned that in my second post. What I find surprising and frustrating is that I have not been able to find any data on the BUX C*** series.*

This forum discussion is about TVS devices in hard drives:

<http://forum.hddguru.com/seagate-barracuda-7200-st3300622a-300gb-ide-t9356.html>

The above discussion refers to this photo of a Seagate HDD with two

TVS devices made by ON Semiconductor:

<http://forum.hddguru.com/download/file.php?id=562>

The parts have the following markings:

ON logo QE

R617

ON logo 620

LEM .

I can't find exactly the same parts in ON's datasheets, but here are a

few similar looking devices:

Unidirectional Zener TVS 13V 600W (marking = LEN):

<http://www.onsemi.com/pub/Collateral/NSB13AN-D.PDF>

Zener Transient Voltage Suppressor 12V 600W (marking =

LEK):

<http://www.onsemi.com/pub/Collateral/NSB12A-D.PDF>

400W Peak Power Zener Transient Voltage Suppressor 5V (marking = QA):

<http://www.onsemi.com/pub/Collateral/NSA5.0A-D.PDF>

600 Watt Peak Power Zener Transient Voltage Suppressor 5V

(marking =

6QE):

<http://www.onsemi.com/pub/Collateral/NS6A5.0A-D.PDF>

Here is a Vishay patent that discusses TVS devices with particular

reference to their application in hard drives:

<http://www.freepatentsonline.com/WO2008002421.html>

- Franc Zabkar

Jan 26, 2009



Franc Zabkar
Guest

#14

The above discussion refers to this photo of a Seagate HDD with two TVS devices made by ON Semiconductor:
<http://forum.hddguru.com/download/file.php?id=562>

The parts have the following markings:

ON logo QE
R617

ON logo 620
LEM .

600 Watt Peak Power Zener Transient Voltage Suppressor, 12V,

Unidirectional, p/n SMBJ12AON (marking = LEM):

http://www.icbase.com/English/ic_search/just.asp?urlftp=/ONS/ONS26380605.pdf

The "QE" marking belongs to a 1SMA5.0AT3, 400 Watt Peak Power Zener

Transient Voltage Suppressor:

<http://www.datasheetarchive.com/pdf-datasheets/Datasheets-23/DSA-454313.html>

ON TVS/Zener Device Data Book:

http://www.mosaico-eng.com.br/arquivos/Data-Sheet_Zener.pdf

- Franc Zabkar

Jan 26, 2009



Franc Zabkar
Guest

#15

*Yes. But transistors have the BUX followed by numeric characters.
These devices have a "C" before numerals.*

The BU? marking code appears to be used by ST Microelectronics in their SMBJ series 600W Transil (TVS) range.

See page 2 of the datasheet:

<http://www.st.com/stonline/products/literature/ds/5616.pdf>

The BUX marking isn't listed, but it would appear that the "U" designates a unidirectional device.

The "C" appears to be the manufacturing location, followed by a numeric YWW date code.

- Franc Zabkar

Jan 28, 2009

#16



Guest

I know I'm not directly answering your question, but...

The socket and power cords are polarized. It would be extremely difficult to insert the plug the wrong way.

I have come across these shorted protection diodes on 2 occasions now, both on Digital Audio Recorders powered by external wall warts. If the wrong polarity wall wart is used, you can get the wrong polarity 12Volts to the Hard Drive. This is shorted out by the diode, which eventually burns to a dead short protecting the drive. On both occasions replacing the diode restored the unit to fully operational. Good job they are there IMHO.

Gareth.

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