

Fuji 7th Generation IGBT-IPM X Series



Application Manual

Warning:

This manual contains the product specifications, characteristics, data, materials, and structures as of October 2021.

The contents are subject to change without notice for specification changes or other reasons. When using a product listed in this manual, be sure to obtain the latest specifications.

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Cautions

(1) During transportation and storage

Keep locating the shipping carton boxes to suitable side up. Otherwise, unexpected stress might affect to the boxes. For example, bend the terminal pins, deform the inner resin case, and so on.

When you throw or drop the product, it gives the product damage.

If the product is wet with water, that it may be broken or malfunctions, please subjected to sufficient measures to rain or condensation.

Temperature and humidity of an environment during transportation are described in the specification sheet. There conditions shall be kept under the specification.

(2) Assembly environment

Since this power module device is very weak against electro static discharge, the ESD countermeasure in the assembly environment shall be suitable within the specification described in specification sheet. Especially, when the conducting pad is removed from control pins, the product is most likely to get electrical damage.

(3) Operating environment

If the product had been used in the environment with acid, organic matter, and corrosive gas (hydrogen sulfide, sulfurous acid gas), the product's performance and appearance can not be ensured easily.

Chapter 7 Troubleshooting

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This chapter describes the troubleshooting.

1. Troubleshooting

An IPM has various integrated protection functions (such as over current protection and over heating protection) unlike a standard IGBT module, it shuts down safely in the case of abnormal conditions. However, it may be destroyed depending on the abnormality of the failure that occurred. When the IPM has failed, it is necessary to take countermeasures upon clarification of the situation and find the root cause of the breakdown.

Failure tree analysis charts are shown in Figure 7-1. Carry out the investigation of the failure mode by using these charts. For the failure criteria, see Chapter 4, Section 2 [IGBT test procedures] of the IGBT Module Application Manual (RH984).

Furthermore, when an alarm signal output is generated from the IPM, investigation of the root cause by referring to the alarm factor analysis chart in Section 3 of this chapter can be done.

2. Failure tree analysis charts

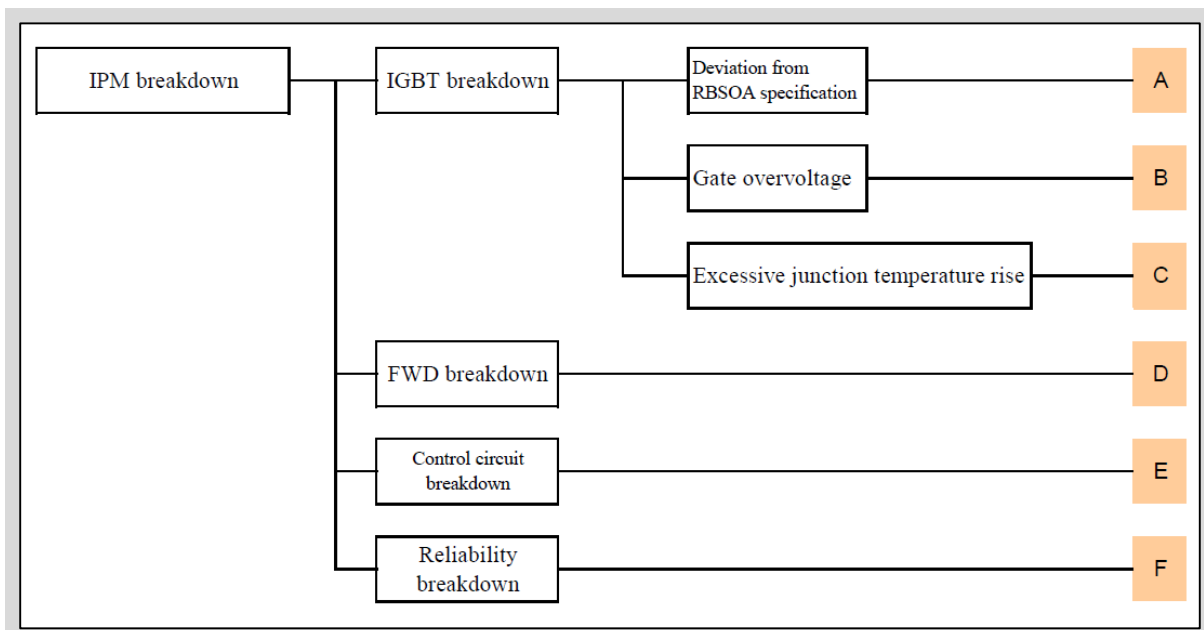
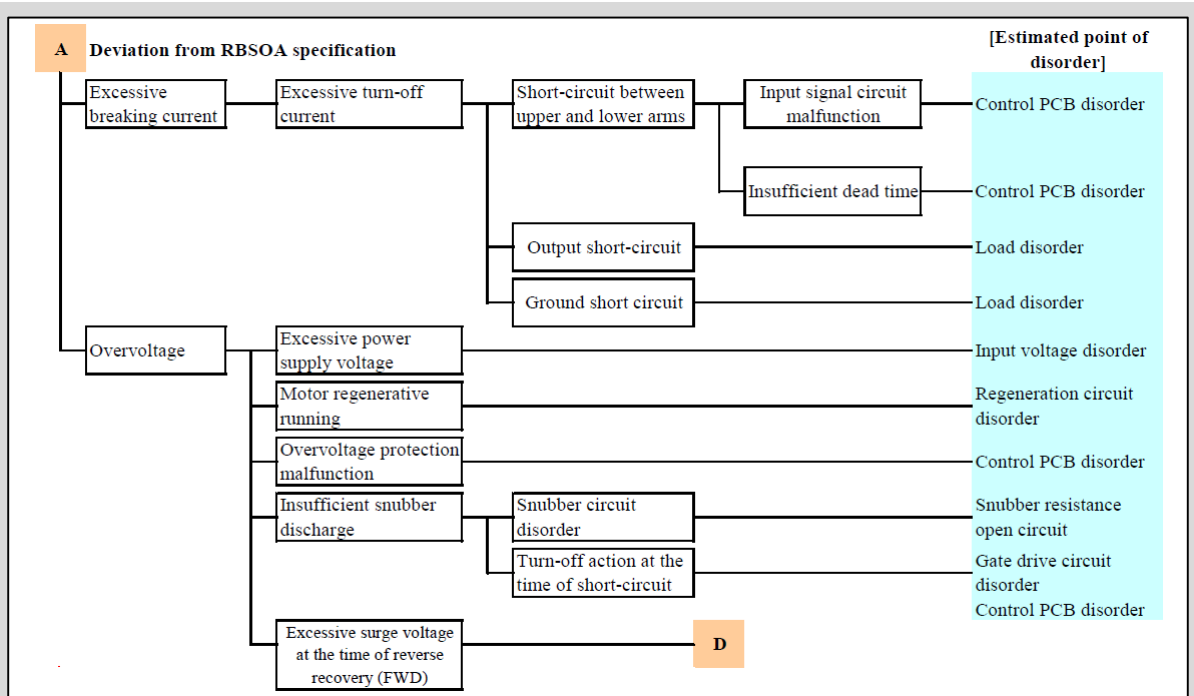
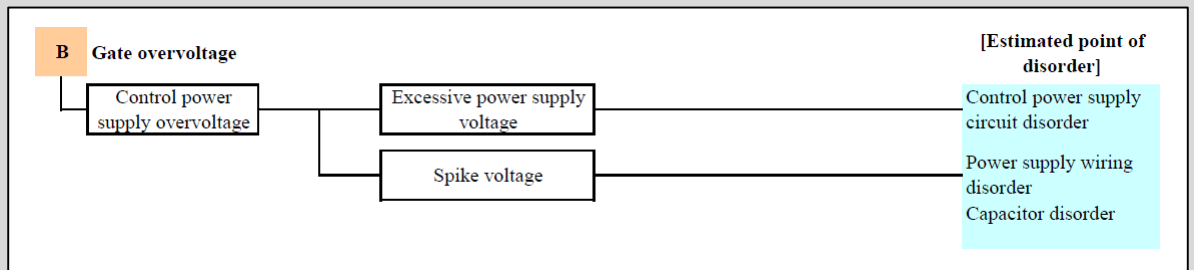


Fig.7-1 IPM failure tree analysis chart
(Symbols A to F are linked with those indicated in separate FTA pages.)

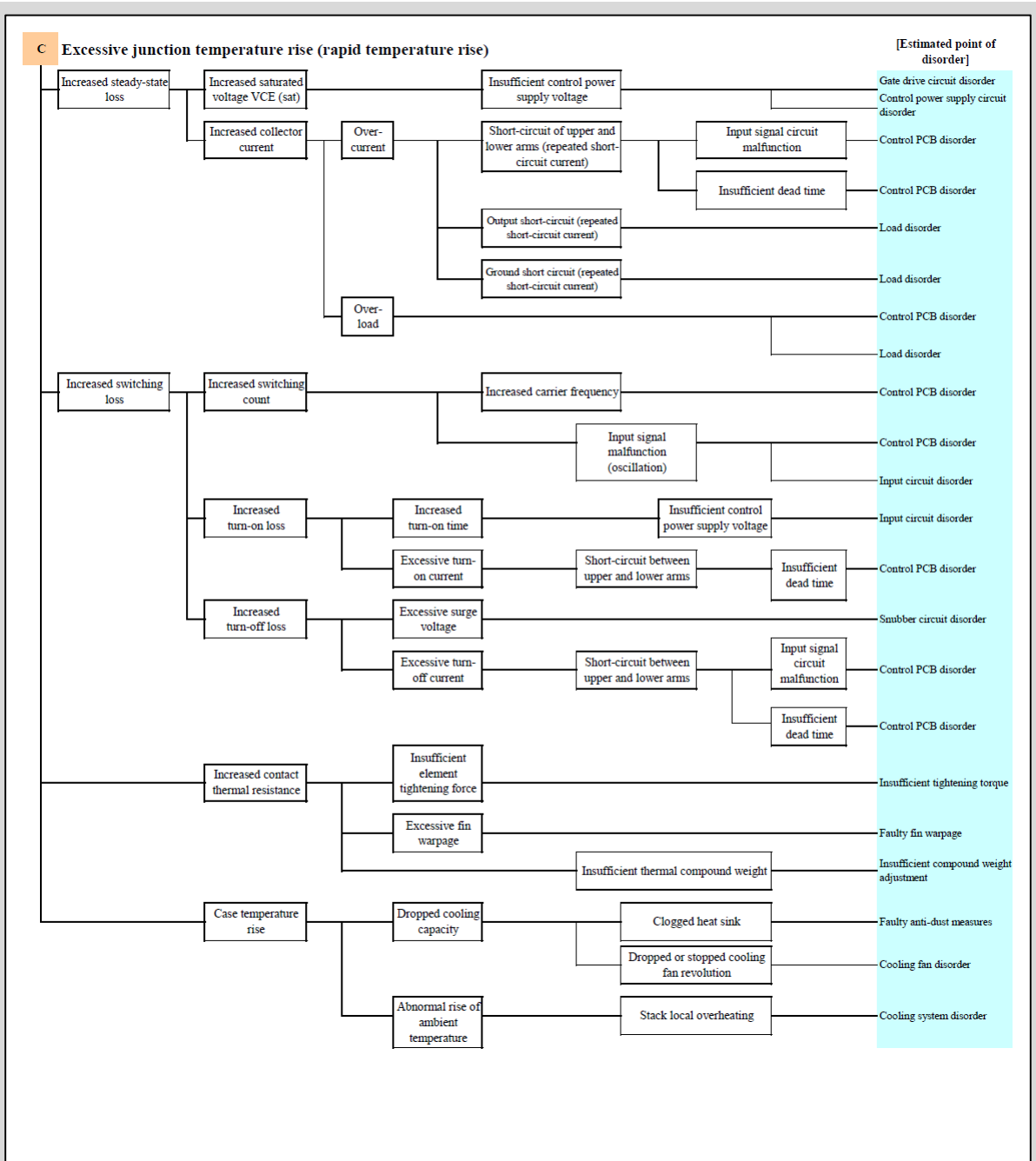


(a) Mode A: Deviation from RBSOA specification



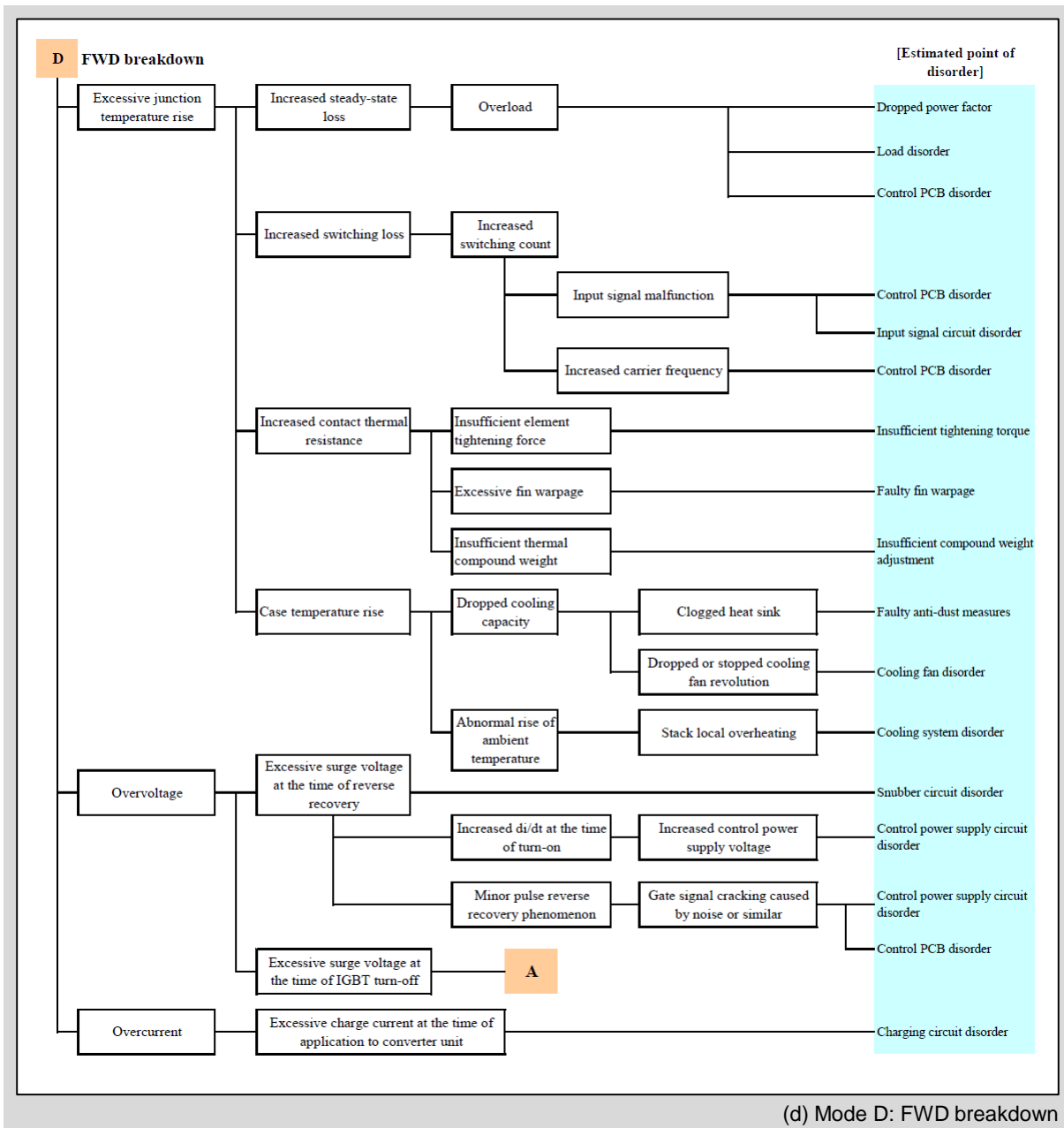
(b) Mode B: Gate overvoltage

Fig.7-1 IPM failure tree analysis chart



(c) Mode C: Excessive junction temperature rise

Fig.7-1 IPM failure tree analysis chart



(d) Mode D: FWD breakdown

Fig.7-1 IPM failure tree analysis chart

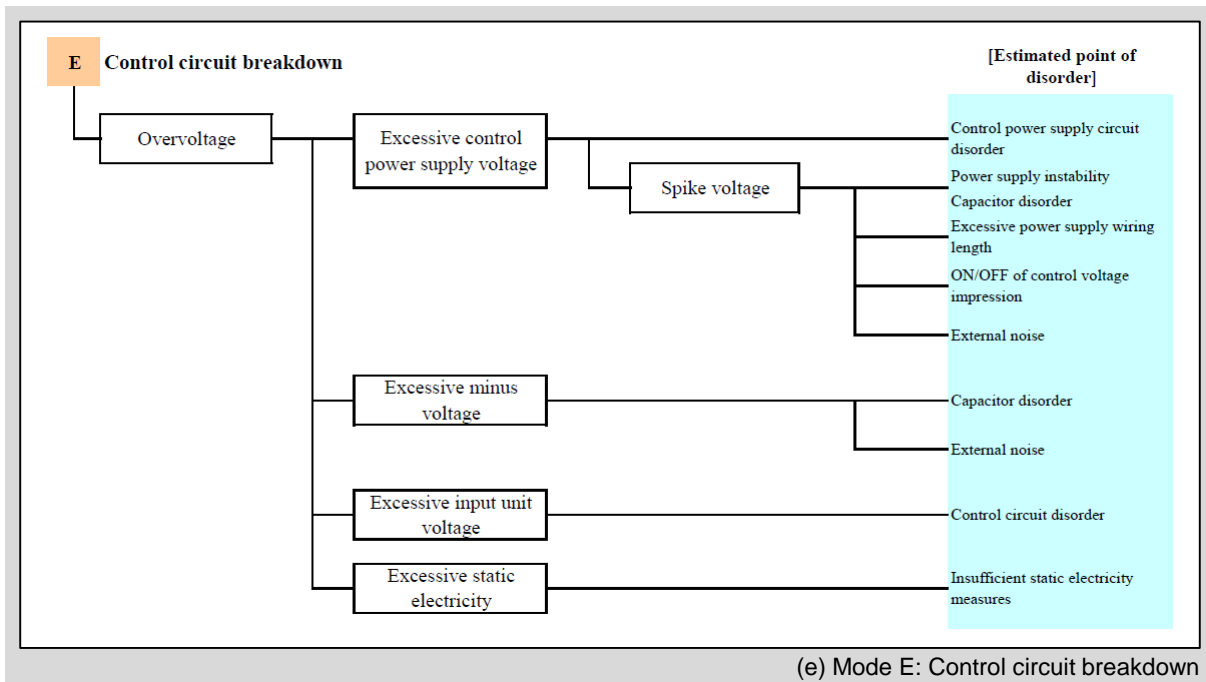
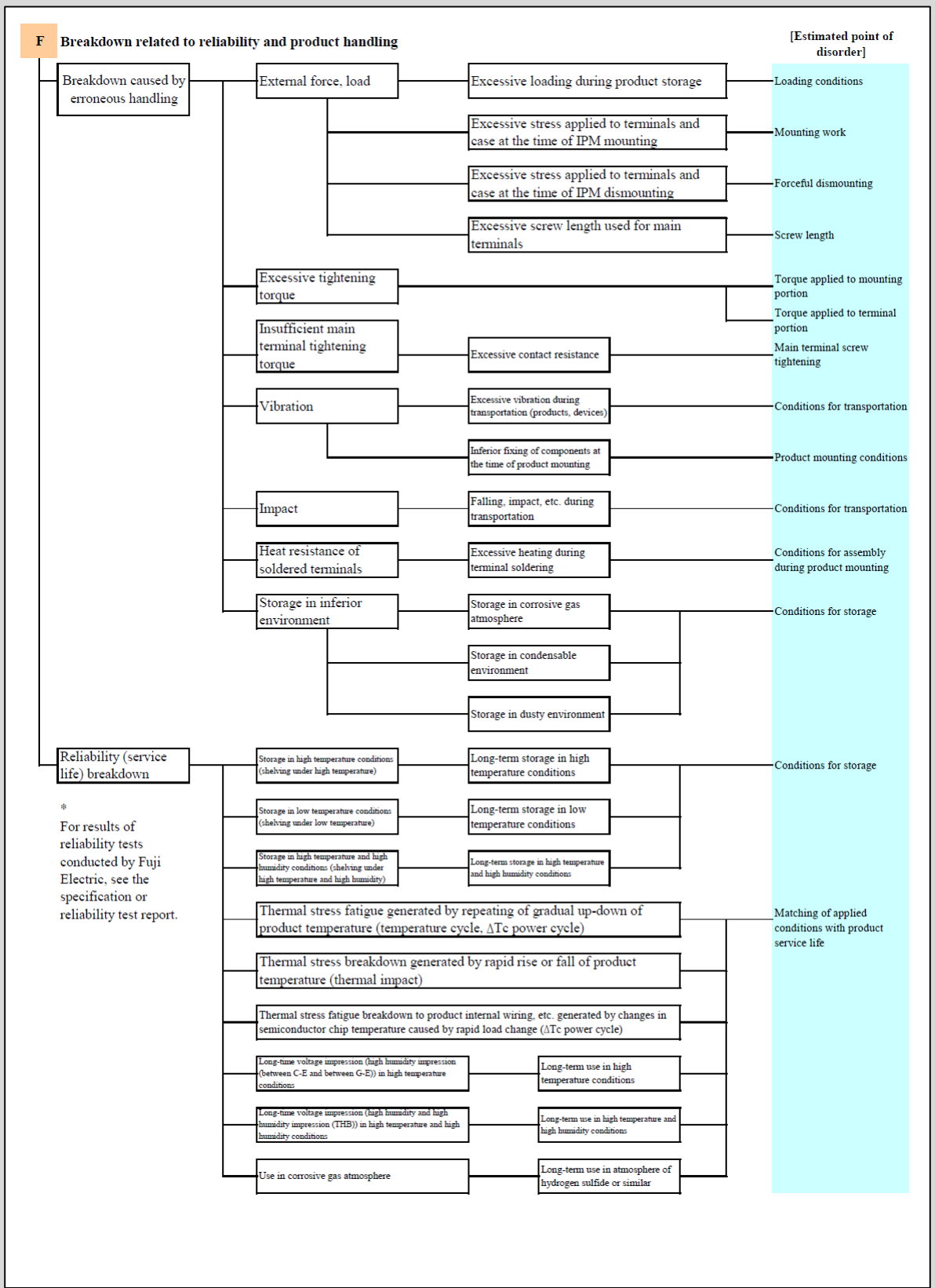


Fig.7-1 IPM failure tree analysis chart



(f) Mode F: Breakdown related to reliability and product handling

Fig.7-1 IPM failure tree analysis chart

3. Alarm factor tree analysis chart

When the system equipped with the IPM has stopped and an alarm signal is generated, first carry out investigations to identify whether the alarm signal was generated from the IPM or the device control circuit (other than the IPM).

If the alarm signal was generated from the IPM, identify the factor in accordance with the alarm factor analysis tree chart indicated in Figure 7-2.

Similar to V-IPM, it is possible to identify which protection function is activated by checking the alarm signal pulse width in X-IPM too. Therefore, the factor analysis time can be shortened.

In addition, the alarm signal output voltage can be easily measured by connecting a 1.3 K Ω resistor in series between the IPM alarm signal output terminal and the cathode terminal of the optocoupler.

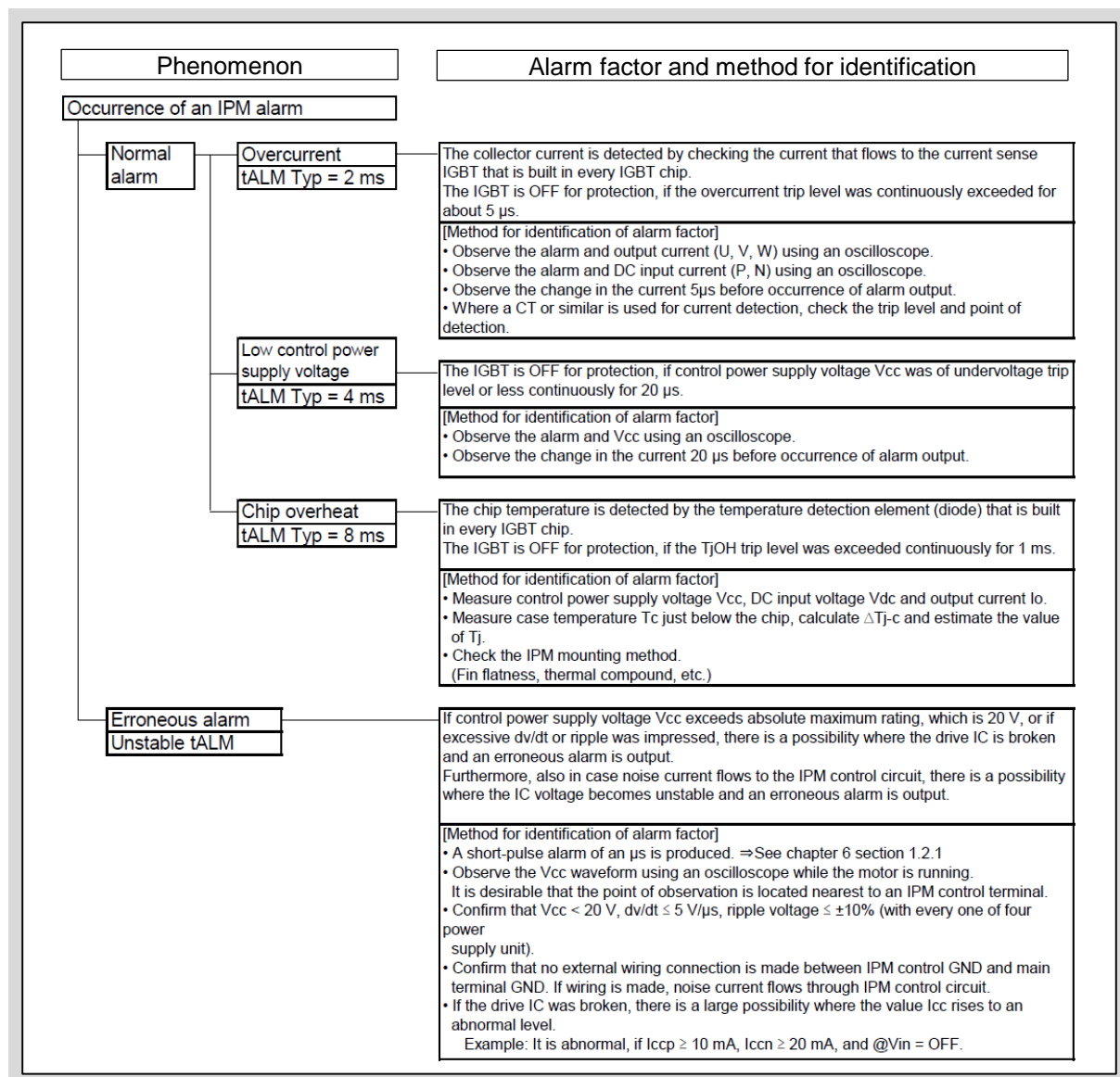


Fig.7-2 Alarm factor tree analysis chart