

TPS7A16xx-Q1 Fault Tree Analysis (FTA)

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AIP Car Audio

ABSTRACT

Need abstract

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1 Introduction

1.1 Abbreviations

AMP	Amplifier
BG	Bandgap
BVDSS	Drain Source Breakdown Voltage
BW	Bond Wire
COMP	Comparator
EPB	Electronic Park Brake
IDDQ	Quiescent Supply Current
OVST	Over Voltage Stress Test
PT	Production Test
PTAT	Proportional to Absolute Temperature
REF	Reference
REG	Regulator
S/C	Short Circuit
SOA	Safe Operating Area
URA	Unintended Relay Actuation
V5AOV	V5A Regulator Over Voltage
V5OV	V5 Regulator Over Voltage

1.2 Diagrams

Figure 1 through Figure 5 include the block diagram and several fault tree illustrations for this document.

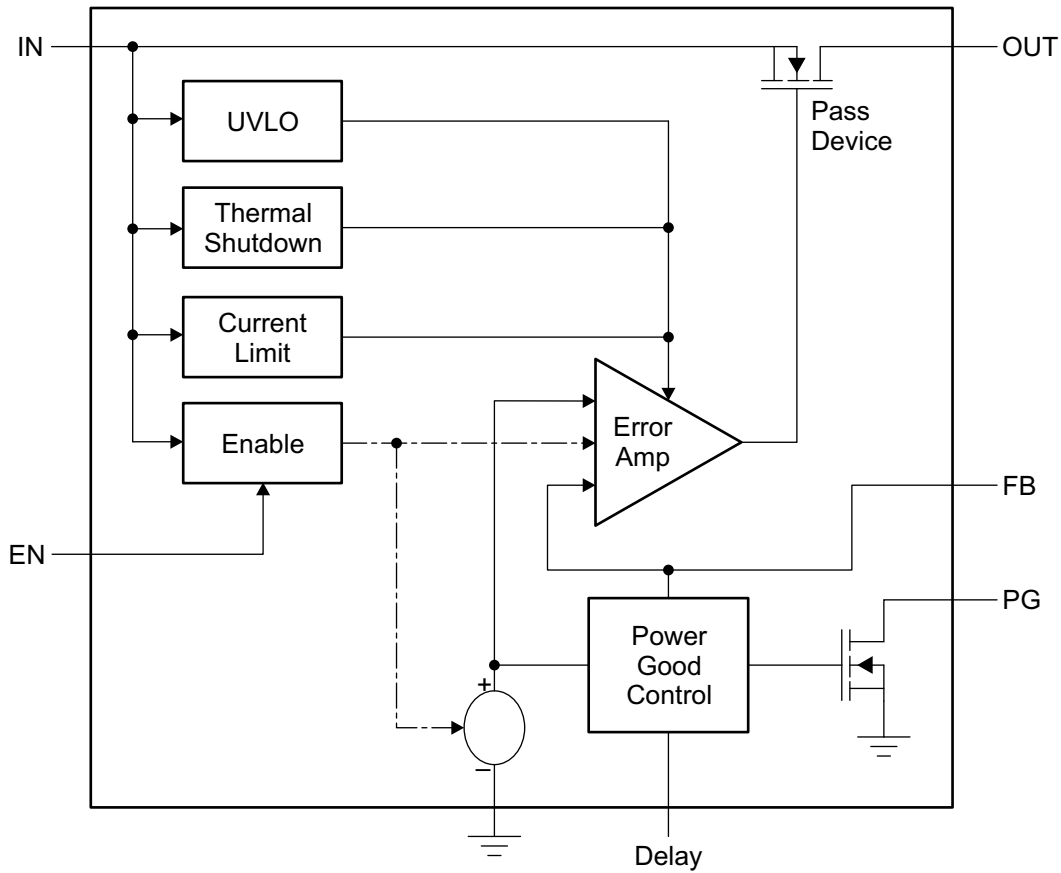


Figure 1. Device Block Diagram

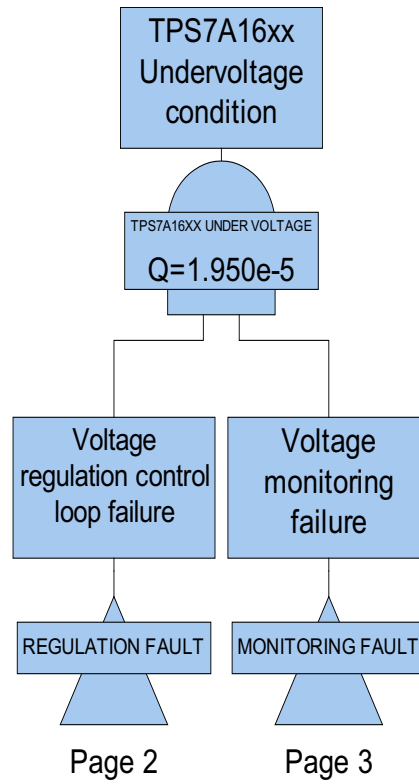
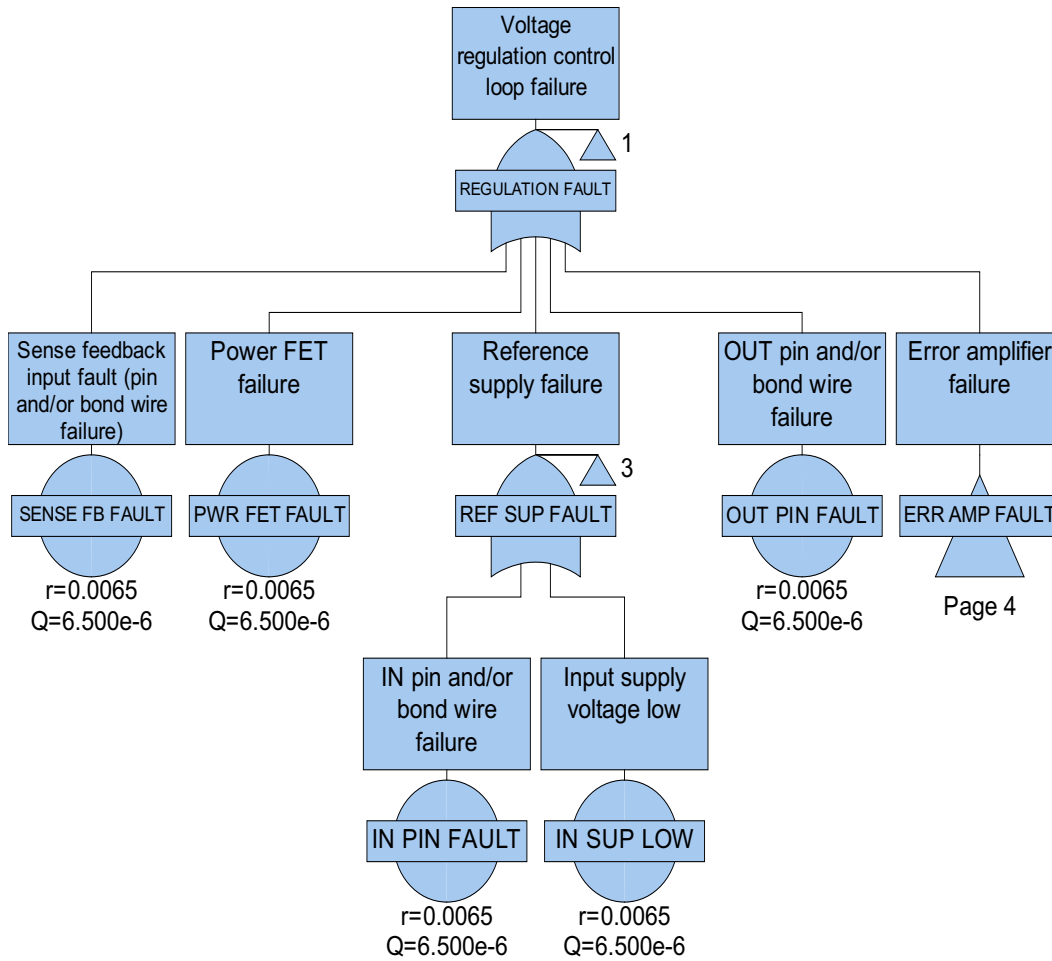


Figure 2. TPS7A16xx Undervoltage Fault Tree



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Figure 3. Voltage Regulation Fault Tree

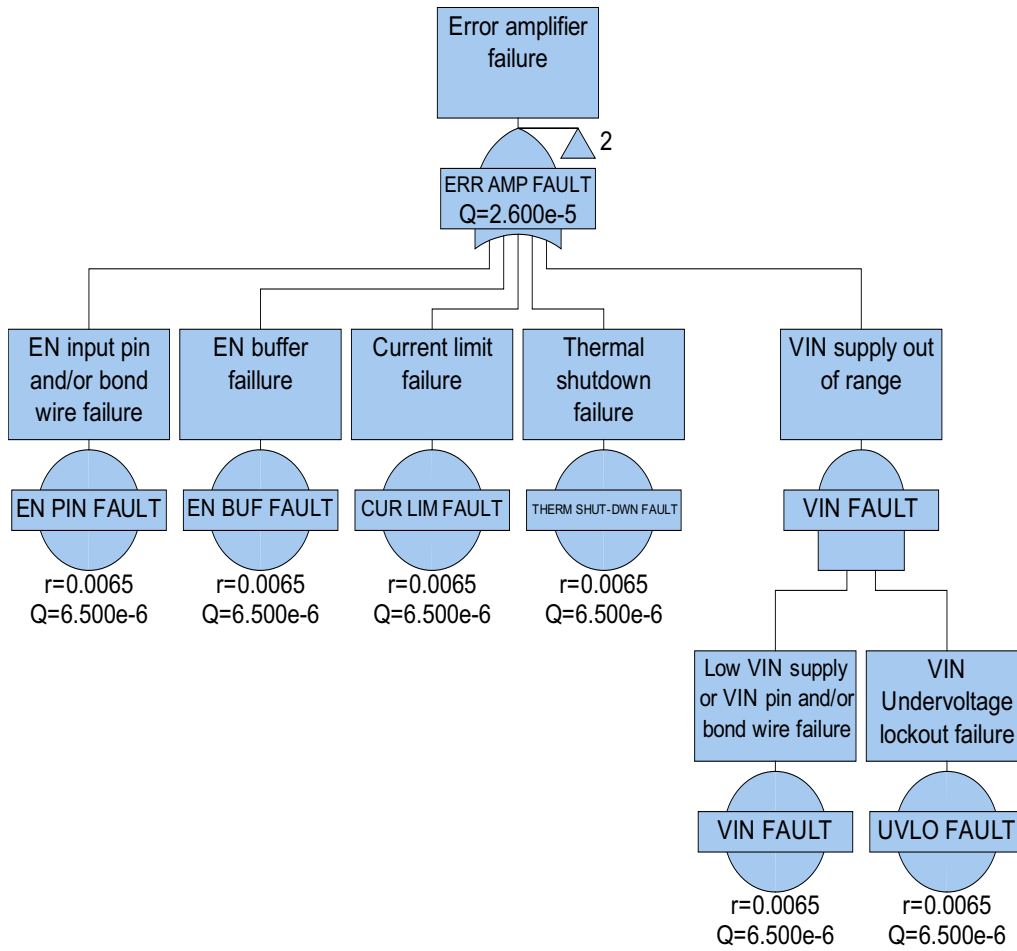


Figure 4. Error Amplifier Fault Tree

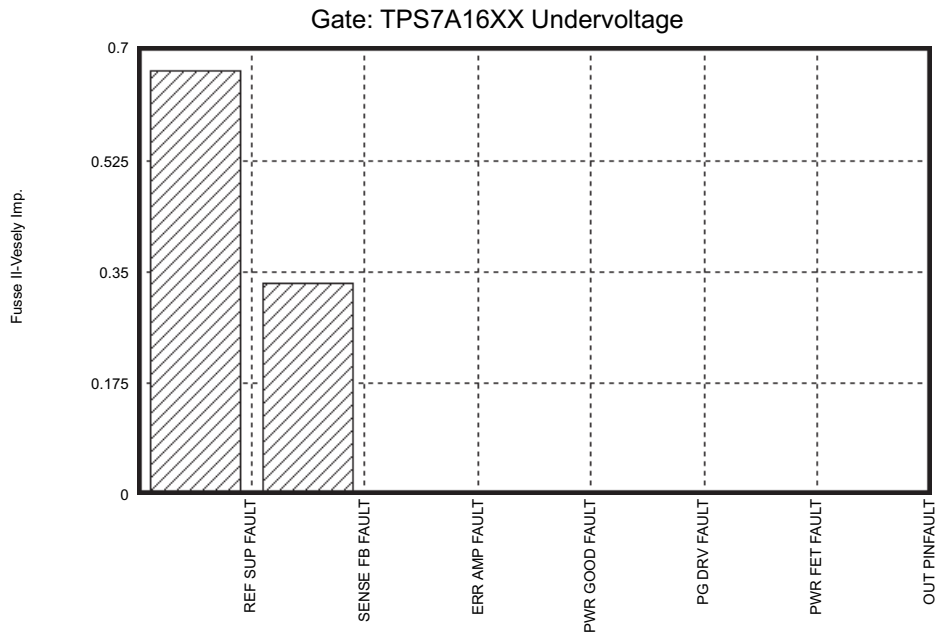


Figure 5. TPS7A16xx Fault Tree Importance Diagram

2 Scope

The scope of this analysis is ASIC-level FTA used in automotive applications in cabin-temperature environment. FTA analysis was completed from the perspective of faults causing hazard, regardless of the time when they occurred. This could be from time $t = 0$ onward.

3 Hazards

The possible hazard is a faulty LDO regulator leading to an undervoltage condition.

4 Analysis

This section contains descriptions of cut sets and information on faulty switch regulator cut sets.

4.1 Description

Cut Set: A group of events which will cause system failure when occurring together.

1st Order Cut Set: Single event failure causing a hazard.

2nd Order Cut Set: Two failing events causing a hazard.

3rd Order Cut Set: Three failing events causing a hazard.

4th Order Cut Set: Four failing events causing a hazard.

Base Event: Description of base events in associated fault tree diagram. Base events and their description referenced to TI's design database.

4.2 Faulty Switch Regulator Cut Sets

Hazard: Faulty LDO regulator leading to undervoltage condition.

For this hazard a total of 18 individual cut sets have been analyzed.

5 References

TPS7A16xx-Q1 specification ([SBVS188](#))

6 Conclusion

ASIC-level hazard FTA completed. LDO regulator, proactive system-level monitoring, and protection considerations were included.

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