

TLV1805-Q1 Functional Safety FIT Rate and FMD

1 Overview

This document contains information for TLV1805-Q1 (DBV package) to aid in a functional safety system design. Information provided are:

- Functional Safety Failure In Time (FIT) rates of the semiconductor component estimated by the application of industry reliability standards

Figure 1 shows the device functional block diagram for reference.

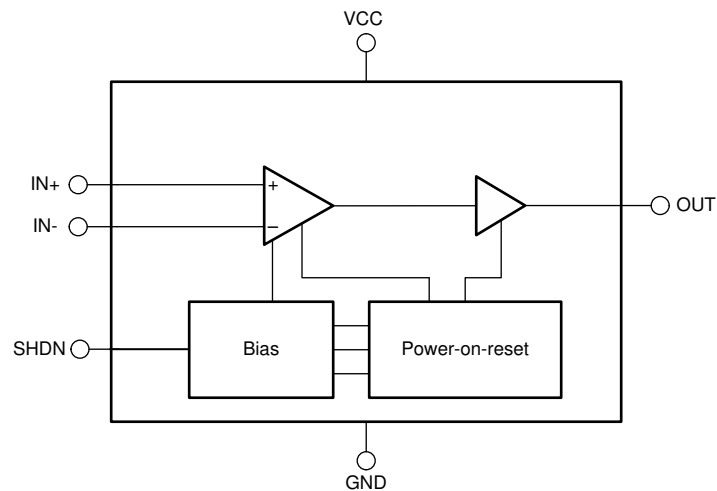


Figure 1. Functional Block Diagram

TLV1805-Q1 was developed using a quality-managed development process, but was not developed in accordance with the IEC 61508 or ISO 26262 standards.

2 Functional Safety Failure In Time (FIT) Rates

This section provides Functional Safety Failure In Time (FIT) rates for TLV1805-Q1 based on two different industry-wide used reliability standards:

- [Table 1](#) provides FIT rates based on IEC TR 62380 / ISO 26262 part 11
- [Table 2](#) provides FIT rates based on the Siemens Norm SN 29500-2

Table 1. Component Failure Rates per IEC TR 62380 / ISO 26262 Part 11

FIT IEC TR 62380 / ISO 26262	FIT (Failures Per 10 ⁹ Hours)
Total Component FIT Rate	16
Die FIT Rate	4
Package FIT Rate	12

The failure rate and mission profile information in [Table 1](#) comes from the Reliability data handbook IEC TR 62380 / ISO 26262 part 11:

- Mission Profile: Motor Control from Table 11
- Power dissipation: 1.0 mW/TBD mW
- Climate type: World-wide Table 8
- Package factor lambda 3 Table 17b
- Substrate Material: FR4
- EOS FIT rate assumed: 0 FIT

Table 2. Component Failure Rates per Siemens Norm SN 29500-2

Table	Category	Reference FIT Rate	Reference Virtual T _J
4	BICMOS Op Amps, Comparators	8 FIT	45°C

The Reference FIT Rate and Reference Virtual T_J (junction temperature) in [Table 2](#) come from the Siemens Norm SN 29500-2 tables 1 through 5. Failure rates under operating conditions are calculated from the reference failure rate and virtual junction temperature using conversion information in SN 29500-2 section 4.

3 Failure Mode Distribution (FMD)

The failure mode distribution estimation for in [Table 3](#) comes from the combination of common failure modes listed in standards such as IEC 61508 and ISO 26262, the ratio of sub-circuit function size and complexity and from best engineering judgment.

The failure modes listed in this section reflect random failure events and do not include failures due to misuse or overstress.

Table 3. Die Failure Modes and Distribution

Die Failure Modes	Failure Mode Distribution (%)
OUT open HiZ	25%
OUT Stuck at high, low	25%
OUT functional out of specification voltage	45%
Pin to Pin short any two pins	5%

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