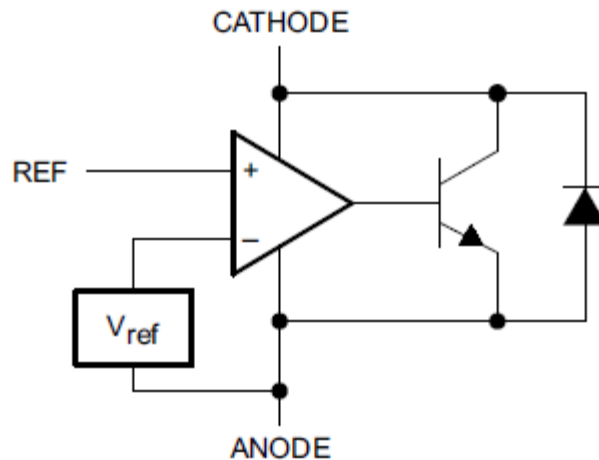


# Functional Safety FIT Rate, Failure Mode Distribution TL431LI-Q1 / TL432LI-Q1

Programmable Shunt Regulator With Optimized Reference Current

## Functional Block Diagram



FIT IEC TR 62380 / ISO 26262-11 (1)		Per 10 <sup>9</sup> Hours (FIT)
Total FIT Rate		6
Die FIT Rate		4
Package FIT Rate		2

FIT Siemens Norm SN29500 (2)			
Table	Category	Ref FIT $\lambda_{ref}$	Ref Virtual Tj $\theta_{vj,1}$
Table 4	Simple Analog / HF	3 FIT	45 C

Failure Modes	Failure Mode Distribution (%)
Cathode or Anode open (HIZ)	25%
Cathode to Anode short	35%
Cathode not in specification voltage or current	40%

## **(1) Failure Rate, Mission Profile and Failure Modes Distribution**

The failure rate and mission profile information come from reliability modeling for Integrated circuits in Reliability data handbook IEC TR 62380 and ISO 26262 Part 11

Mission Profile: Motor Control from Table 11

Power dissipation 50.0 mW

Climate type: World-wide Table 8

Package factor lambda 3 Table 17b

Substrate Material: FR4

EOS FIT rate assumed = 0

## **(2) Reference failure rate, Virtual (equivalent) junction temperature**

The reference failure rate and virtual junction temperature come from Siemens Norm SN29500-2 tables 1-5. Failure rate for user mission profile is calculated using the reference failure rate and virtual junction temperature and following the calculation information in SN29500-2 section 4.

The failure mode distribution estimation 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 rates listed reflect random failure events and do not include failures due to misuse or over stress.

TL431LI-Q1, TL432LI-Q1 are catalog product and not compliant to ISO-26262 standards.

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