

1 Introduction

SafeFMEA is part of the **SafeSuite** family of products, a powerful tool for the development of projects meeting common industry's safety standards.

SafeFMEA provides a tool for Functional, Process, Quantitative and Qualitative FMEA, which is a bottom-up deductive analysis method in which failures at component-level are analyzed in a system approach.

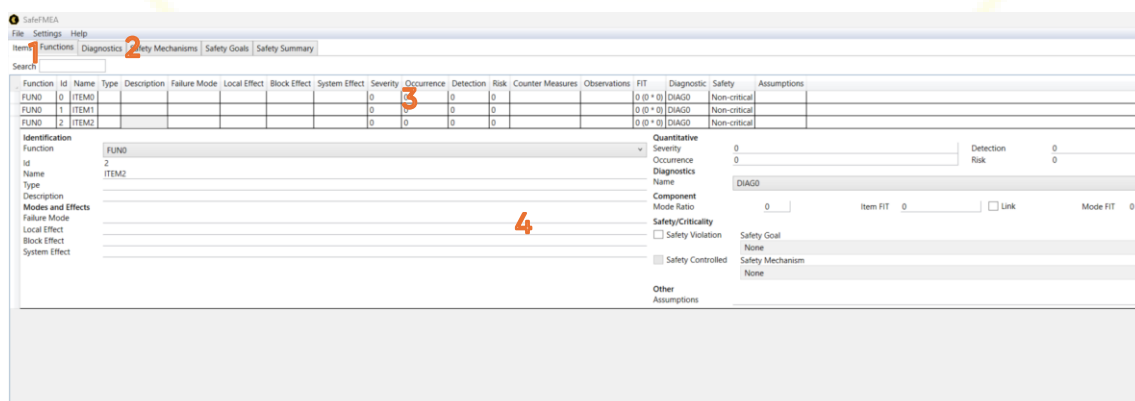
SafeFMEA is specially designed for ISO 26262, ISO 50126 and IEC 61508 derivative standards.

1.1 Features

- Support for Functional approach, Qualitative, Quantitative, Diagnostic, Safety (FMEA, FMEDA, FMECA)
- Safety Summary metrics automatic calculation (aimed for ISO 26262).
- Immediate failure rate apportion calculation.
- Imports FIT data value for electronic components from SAFEFIT.
- Export apportion FIT for analysis purposes (SAFETREE).
- Customized Report to PDF.

2 Usage

2.1 Application parts



The screenshot shows the SafeFMEA application window. The interface includes a menu bar (File, Settings, Help), a ribbon with tabs (Functions, Diagnostics, Safety Mechanisms, Safety Goals, Safety Summary), and a search bar. A table lists functions and items with columns for ID, Name, Type, Description, Failure Mode, Local Effect, Block Effect, System Effect, Severity, Occurrence, Detection, Risk, Counter Measures, Observations, FIT, Diagnostic, Safety, and Assumptions. On the left, a tree view shows the project structure. On the right, a detailed form for a selected item (ITEM2) is visible, including fields for Quantitative data (Severity, Occurrence, Detection, Risk), Diagnostics (Name, Component, Mode Ratio, Safety/Criticality, Safety Violation, Safety Controlled), and Safety (Safety Goal, Safety Mechanism, Other Assumptions). Numbered callouts are placed on the interface: 1 points to the menu bar, 2 points to the ribbon tabs, 3 points to the table, and 4 points to the detailed form on the right.

1. Menu

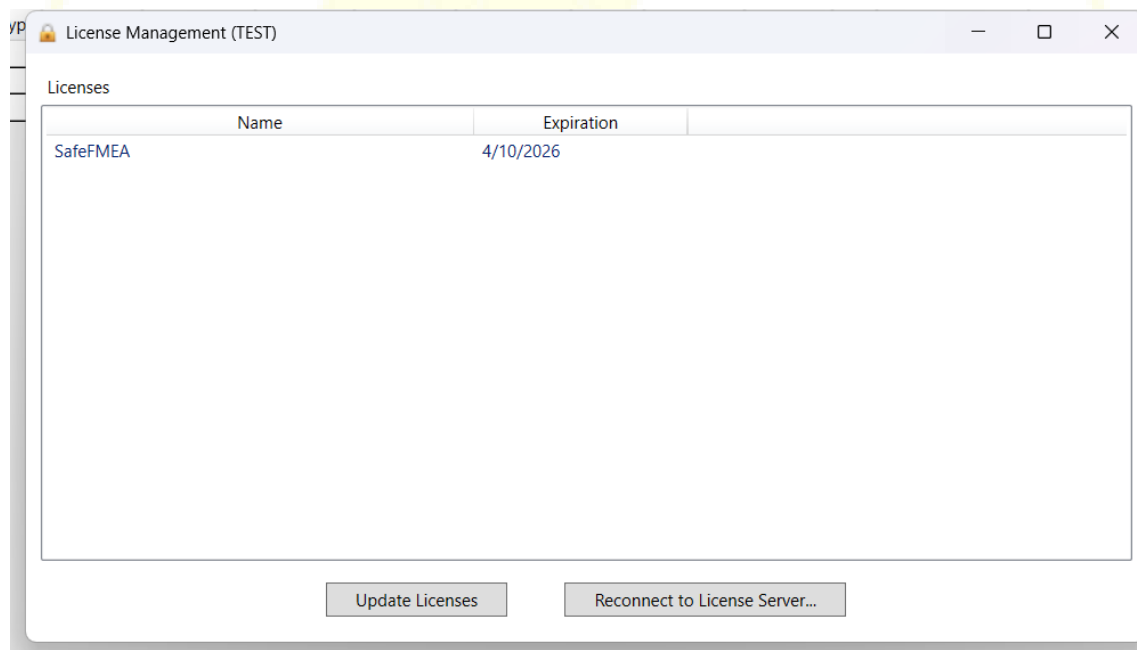
- a. File > (New | Save | Save as| Load | Export| Report | Exit)

- b. Settings
 - i. Items (Main view)
 - ii. Functions
 - iii. Diagnostics
 - iv. Safety Mechanisms
 - v. Safety Goals
 - vi. Safety Summary
 - c. Help > (About | License)
2. Context Panel (Tags)
 3. Main view
 4. Item view

2.2 Licensing

You cannot use the SAFEFMEA tool without a registered license. "No license" state blocks the Save, Import, Export features. Loading is still possible for demo purposes but severely limits the application's usability.

Your license status can be checked within the "Help > License Management" dialog. The dialog allows you to update your license, in case this is the first time you enter the application, or to reconnect to the license server in case the connection has been disabled.



In normal operation mode the application would reach the server by itself and thus your active license should appear on the dialog box.

NOTICE: Remember in any case that you will be requested to activate your license through email after your purchase.

2.3 License Activation Process (Node Lock)

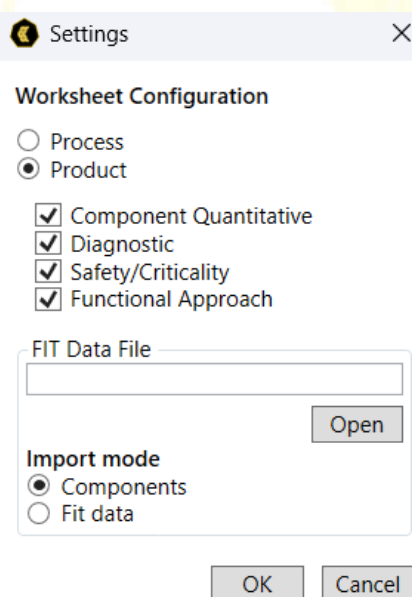
1. Obtain your license key or invitation email by purchase or contacting safesuite@cynoss.net
2. Log in to the License Manager through your browser.
3. Authenticate and activate.
4. Install and launch SafeTree, so your node data can be stored by the system.
5. Wait for your license to be assigned by the supervisor.

Now you are ready to use your SafeFMEA.

NOTICE: SafeFMEA licensing system uses the port https 7072 for monitoring purposes. Please be sure this is available for the application. We beg you to carefully read the EULA documentation for further details.

2.4 Settings

This menu is aimed at configuring the worksheet.



The screenshot shows a 'Settings' dialog box with a close button (X). It contains a 'Worksheet Configuration' section with radio buttons for 'Process' and 'Product' (selected), and four checked checkboxes: 'Component Quantitative', 'Diagnostic', 'Safety/Criticality', and 'Functional Approach'. Below this is a 'FIT Data File' section with a text input field and an 'Open' button. At the bottom is an 'Import mode' section with radio buttons for 'Components' (selected) and 'Fit data'. 'OK' and 'Cancel' buttons are at the bottom right.

Process / Product: Where the user can select an specific worksheet,

Product [Component Quantitative]: By selecting this check, the worksheet includes the FIT data value for the component and the apportion of the failure mode.

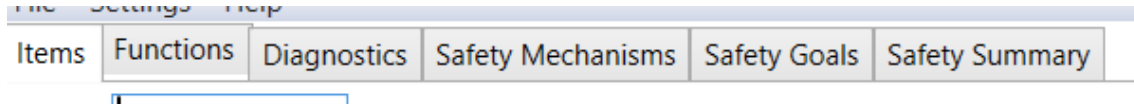
Product [Diagnostic]: Defines a DFMEA analysis, including the diagnostics to be applied to any failure mode.

Product [Safety/Criticality]: Defines a FMECA analysis, including in the worksheet the safety impact and the safety mechanisms to be applied.

Functional Approach: Defines the functional approach for the FMEA analysis. As a result, items belong to a selectable number of functions to be set on the Context Panel.

Import mode [Components/FIT data]: Defines whether the import is a full component set from SAFEFIT export or just a FIT values

2.5 Context panel (Tags)



This panel is composed of several tags, allowing them to define in every case the contextual data of the analysis.

NOTICE: The Tags appearing on this context menu depend on the settings of your worksheet

2.5.1 Functions

SafeFMEA (CMC.sfmea)

File Settings Help

Items	Functions	Diagnostics	Safety Mechanisms	Safety Goals	Safety Summary
Id	Name	Description	Lambda		
0	IMAGER	Imager area	1.3107100000000003E-08		
1	EEPROM	MEM Area	1.0291E-09		
2	LEDS	Lighting	2.7987000000000004E-08		
3	LED DRV	Power LED	2.5196949999999998E-07		
4	PMIC	Power distribution	1.5864000000000002E-08		
5	SERIALIZER	Image processing	3.3272340000000004E-08		

The definition encompasses an Id, the Function Name and a Description field. The "Lambda" value is automatically calculated, and it is the sum of the failure rates of the components involved in the function.

2.5.2 Diagnostics

SafeFMEA					
File Settings Help					
Items	Functions	Diagnostics	Safety Mechanisms	Safety Goals	Safety
Id	Name	Mechanism	Notification Time	Detection Time	
0	DIAG0	SW Reg. Polling	0.001	0.0001	
1	DIAG1	Hardware	1E-05	1E-06	

The Diagnostics list encompasses the following information:

- Identification (Id)
- Name
- Description of the Mechanism.
- Required Notification time.
- Required Detection time.

2.5.3 Safety Mechanisms

SafeFMEA

File Settings Help

Items	Functions	Diagnostics	Safety Mechanisms	Safety Goals	Safety Sumr
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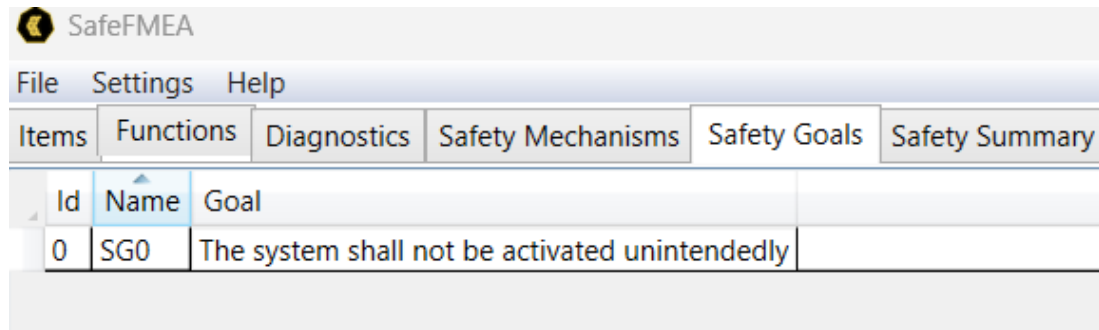
Id	Name	Mechanism	Diagnostic Coverage	
0	SM0	SW Reg. Polling	0.9	
1	SM1	Hardware	0.99	

The safety mechanism lists include the following information:

- Identification (Id)

- Name
- Description of the Mechanism.
- Required Notification time.
- Diagnostic Coverage of the safety mechanism.

2.5.4 Safety Goals



SafeFMEA

File Settings Help

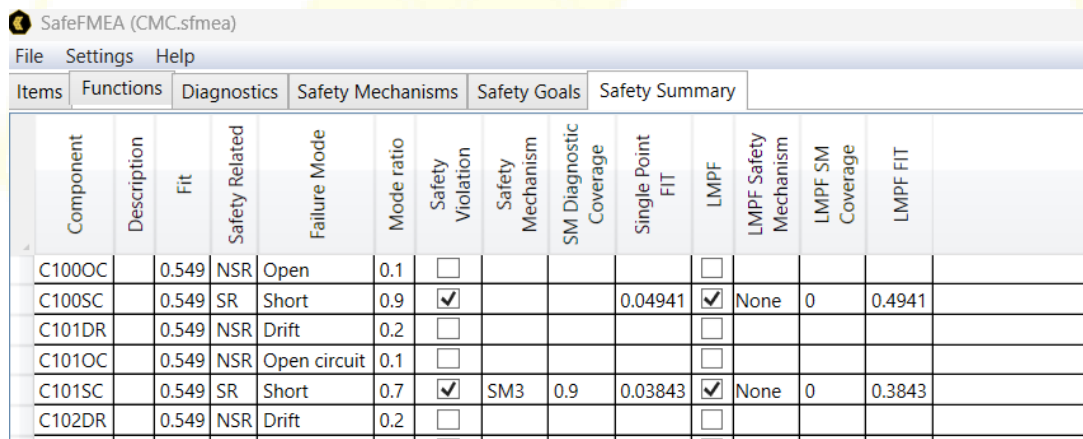
Items Functions Diagnostics Safety Mechanisms Safety Goals Safety Summary

Id	Name	Goal
0	SG0	The system shall not be activated unintendedly

This is the safety goal description, encompassing:

- Identification (Id)
- Name
- Description of the Goal.

2.5.5 Safety Summary



SafeFMEA (CMC.sfmea)

File Settings Help

Items Functions Diagnostics Safety Mechanisms Safety Goals Safety Summary

Component	Description	Fit	Safety Related	Failure Mode	Mode ratio	Safety Violation	Safety Mechanism	SM Diagnostic Coverage	Single Point FIT	LMPF	LMPF Safety Mechanism	LMPF SM Coverage	LMPF FIT
C100OC		0.549	NSR	Open	0.1	<input type="checkbox"/>				<input type="checkbox"/>			
C100SC		0.549	SR	Short	0.9	<input checked="" type="checkbox"/>			0.04941	<input checked="" type="checkbox"/>	None	0	0.4941
C101DR		0.549	NSR	Drift	0.2	<input type="checkbox"/>				<input type="checkbox"/>			
C101OC		0.549	NSR	Open circuit	0.1	<input type="checkbox"/>				<input type="checkbox"/>			
C101SC		0.549	SR	Short	0.7	<input checked="" type="checkbox"/>	SM3	0.9	0.03843	<input checked="" type="checkbox"/>	None	0	0.3843
C102DR		0.549	NSR	Drift	0.2	<input type="checkbox"/>				<input type="checkbox"/>			

The safety summary calculates automatically, according to the given information, the Single Point FIT for every failure mode at component level.

This sheet allows the expert user to calculate the latent metric point failure. For this is the result of an analysis this tool is not able to perform it automatically. To do that, the extra single mode coverage of the LMPF safety mechanism has to be written down as a result of this analysis.

The final part of the summary covers all the metrics to be calculated by an FMEA.

Metrics

Total Failure Rate	938.2
Total Safety Failure Rate	190.6
Total Non-Safety Failure Rate	747.6
Total Single Point Failure Rate	15.66
Total Latent Failure Rate	63.33
Single Point Faults Metric	91.79 %
Latent Faults Metric	63.8 %

NOTICE: Safety Sumamry Metrics is based on ISO 26262 standard calculations. It won't be difficult for the expert safety engineer to translate these metrics to the required standard.

2.6 Main View

The main screen offers a compact view of the items and allows to search, and sort by the columns in the structure (Function, Component...)

SafeFMEA (CNC-fmea)													
File Settings Help													
Items Functions Diagnostics Safety Mechanisms Safety Goals Safety Summary													
Search													
Function	ID	Name	Type	Description	Failure Mode	Local Effect	Block Effect	System Effect	Severity	Occurrence	Detection	Risk	Counter Measures
IMAGER	0	C3080C	Short Circuit	SC	V18 line short circuited	No V18 line input on imager	No V18 line input on imager	PMAC protection arises and no Video Output (Safety mode)	0	0	0	0	(0.3843 (0.549 + 0.7) Du
IMAGER	1	C3080C	Open Circuit	OC	V18 filter value changes (1/100f disappears)	Different filtering but V18 line is already filtered and clear from PMAC output	Different filtering but V18 line is already filtered and clear from PMAC output	None	0	0	0	0	(0.5549 (0.549 + 0.1) Du
IMAGER	2	C3080C	Drift	Drift	V18 filter value changes	Different filtering but V18 line is already filtered and clear from PMAC output	Different filtering but V18 line is already filtered and clear from PMAC output	None	0	0	0	0	(0.1098 (0.549 + 0.2) Du
IMAGER	107	C3080C	Drift	Drift	V18 filter value changes	Different filtering but V18 line is already filtered and clear from PMAC output	Different filtering but V18 line is already filtered and clear from PMAC output	None	0	0	0	0	(0.1098 (0.549 + 0.2) Du
IMAGER	117	C3125C	Short Circuit	SC	V12 line short circuited	No V12 line input on imager	No V12 line input on imager	PMAC protection arises and no Video Output (Safety mode)	0	0	0	0	(0.3843 (0.549 + 0.7) Du
IMAGER	118	C3140C	Drift	Drift	V12 filter value changes	Different filtering but V18 line is already filtered and clear from PMAC output	Different filtering but V18 line is already filtered and clear from PMAC output	None	0	0	0	0	(0.1098 (0.549 + 0.2) Du
IMAGER	114	C1102C	Drift	Drift	V18 filter value changes	Different filtering but V18 line is already filtered and clear from PMAC output	Different filtering but V18 line is already filtered and clear from PMAC output	None	0	0	0	0	(0.1098 (0.549 + 0.2) Du
IMAGER	115	C1110C	Drift	Drift	V18 filter value changes	Different filtering but V18 line is already filtered and clear from PMAC output	Different filtering but V18 line is already filtered and clear from PMAC output	None	0	0	0	0	(0.1098 (0.549 + 0.2) Du
IMAGER	116	C1120C	Drift	Drift	V18 filter value changes	Different filtering but V18 line is already filtered and clear from PMAC output	Different filtering but V18 line is already filtered and clear from PMAC output	None	0	0	0	0	(0.1098 (0.549 + 0.2) Du
IMAGER	111	C1100C	Open Circuit	OC	V18 filter changes (1000f disappears)	Different filtering but V18 line is already filtered and clear from PMAC output	Different filtering but V18 line is already filtered and clear from PMAC output	None	0	0	0	0	(0.5549 (0.549 + 0.1) Du
IMAGER	112	C1110C	Open Circuit	OC	V18 filter changes (1000f disappears)	Different filtering but V18 line is already filtered and clear from PMAC output	Different filtering but V18 line is already filtered and clear from PMAC output	None	0	0	0	0	(0.5549 (0.549 + 0.1) Du
IMAGER	113	C1120C	Open Circuit	OC	V18 filter changes (1000f disappears)	Different filtering but V18 line is already filtered and clear from PMAC output	Different filtering but V18 line is already filtered and clear from PMAC output	None	0	0	0	0	(0.5549 (0.549 + 0.1) Du
IMAGER	309	C3125C	Short Circuit	SC	V18 line short circuited	No V18 line input on imager	No V18 line input on imager	PMAC protection arises and no Video Output (Safety mode)	0	0	0	0	(0.3843 (0.549 + 0.7) Du
IMAGER	308	C3115C	Short Circuit	SC	V18 line short circuited	No V18 line input on imager	No V18 line input on imager	PMAC protection arises and no Video Output (Safety mode)	0	0	0	0	(0.3843 (0.549 + 0.7) Du
IMAGER	110	C3080C	Short Circuit	SC	V18 line short circuited	No V18 line input on imager	No V18 line input on imager	PMAC protection arises and no Video Output (Safety mode)	0	0	0	0	(0.3843 (0.549 + 0.7) Du
IMAGER	337	C3020C	Drift	Drift	V28 filter value changes	Different filtering but V28 line is already filtered and clear from PMAC output	Different filtering but V28 line is already filtered and clear from PMAC output	None	0	0	0	0	(0.1098 (0.549 + 0.2) Du
IMAGER	332	C1160C	Drift	Drift	V12 filter value changes	Different filtering but V18 line is already filtered and clear from PMAC output	Different filtering but V18 line is already filtered and clear from PMAC output	None	0	0	0	0	(0.1098 (0.549 + 0.2) Du
IMAGER	134	C1150C	Drift	Drift	V12 filter value changes	Different filtering but V18 line is already filtered and clear from PMAC output	Different filtering but V18 line is already filtered and clear from PMAC output	None	0	0	0	0	(0.1098 (0.549 + 0.2) Du
IMAGER	401	C1170C	Drift	Drift	V12 filter value changes	Different filtering but V18 line is already filtered and clear from PMAC output	Different filtering but V18 line is already filtered and clear from PMAC output	None	0	0	0	0	(0.1098 (0.549 + 0.2) Du
PMAC	383	C1100C	Drift	Drift	Output filter value change	V18 ripple	V18 ripple	None (filtered in cascade in all blocks)	0	0	0	0	(0.1098 (0.549 + 0.2) Du
IMAGER	152	C1120C	Drift	Drift	V12 filter value changes	Different filtering but V18 line is already filtered and clear from PMAC output	Different filtering but V18 line is already filtered and clear from PMAC output	None	0	0	0	0	(0.1098 (0.549 + 0.2) Du
IMAGER	326	C3140C	Open Circuit	OC	V12 filter changes (1000f disappears)	Different filtering but V18 line is already filtered and clear from PMAC output	Different filtering but V18 line is already filtered and clear from PMAC output	None	0	0	0	0	(0.5549 (0.549 + 0.1) Du
IMAGER	327	C3150C	Open Circuit	OC	V12 filter changes (1000f disappears)	Different filtering but V18 line is already filtered and clear from PMAC output	Different filtering but V18 line is already filtered and clear from PMAC output	None	0	0	0	0	(0.5549 (0.549 + 0.1) Du
PMAC	372	C3020C	Open Circuit	OC	Output signal SW1 open circuited	No V12 output	No V12 output	No video out	0	0	0	0	2.4 (1 + 0.8) Du
IMAGER	146	C3000C	Open Circuit	OC	V18 filter changes (1/100f disappears)	Different filtering but V28 line is already filtered and clear from PMAC output	Different filtering but V28 line is already filtered and clear from PMAC output	None	0	0	0	0	(0.5549 (0.549 + 0.1) Du
IMAGER	324	C3170C	Open Circuit	OC	V12 filter changes (1000f disappears)	Different filtering but V18 line is already filtered and clear from PMAC output	Different filtering but V18 line is already filtered and clear from PMAC output	None	0	0	0	0	(0.5549 (0.549 + 0.1) Du
IMAGER	325	C3160C	Open Circuit	OC	V12 filter changes (1000f disappears)	Different filtering but V18 line is already filtered and clear from PMAC output	Different filtering but V18 line is already filtered and clear from PMAC output	None	0	0	0	0	(0.5549 (0.549 + 0.1) Du
IMAGER	148	C3015C	Short Circuit	SC	V18 line short circuited	No V18 line input on imager	No V18 line input on imager	PMAC protection arises and no Video Output (Safety mode)	0	0	0	0	(0.3843 (0.549 + 0.7) Du
IMAGER	194	C3220C	Drift	Drift	Slight change of reference voltage	1. Does not affect / worst case if it affects, reference voltage check detects and stops the output	No video output	PMAC protection arises and no Video Output (Safety mode)	0	0	0	0	(0.1098 (0.549 + 0.2) Du
IMAGER	350	C3025C	Short Circuit	SC	V28 line short circuited	No V28 line input on imager	No V28 line input on imager	PMAC protection arises and no Video Output (Safety mode)	0	0	0	0	(0.3843 (0.549 + 0.7) Du
IMAGER	158	C3005C	Open Circuit	OC	V18 filter changes (1/100f disappears)	Different filtering but V28 line is already filtered and clear from PMAC output	Different filtering but V28 line is already filtered and clear from PMAC output	None	0	0	0	0	(0.5549 (0.549 + 0.1) Du
IMAGER	138	C3010C	Drift	Drift	V28 filter value changes	Different filtering but V28 line is already filtered and clear from PMAC output	Different filtering but V28 line is already filtered and clear from PMAC output	None	0	0	0	0	(0.1098 (0.549 + 0.2) Du

For detailed information and real worksheet the user must access the Item View.

2.7 Item View

The Item View is the actual worksheet. We show here the most complex possibility; according to the settings some spaces won't appear.

Identification Function: <input type="text" value="SERIALIZER"/> Id: 162 Name: C106SC Type: Description: Modes and Effects Failure Mode: Short Local Effect: No capacitor output Block Effect: No EMC filtering System Effect: high BER		Quantitative Severity: 0 Occurrence: 0 Detection Risk: 0 Occurrence Risk: 0
Diagnostics Name: Component Mode Ratio: 0.9 Item FIT: 0.549 Mode FIT: 0.4941000000000004		Name: DIAG0 Link: <input type="checkbox"/> Link Safety Goal: <input type="text" value="Safety Goal"/> Safety Mechanism: <input type="text" value="SMS (Serializer Safetymechanisms (CRC, video sequence number...))"/>
Safety/Criticality <input checked="" type="checkbox"/> Safety Violation <input checked="" type="checkbox"/> Safety Controlled		Other Assumptions:

The left part of the sheet defines the function involved, the identification of the failure mode and the effects at local, block and system level.

On the right side, the quantitative area allows us to define the risk in terms of numerical Severity, Detection and Occurrence. If diagnostics are selected, the next step is to select from the previous definition if some diagnostic is used to detect the failure mode.

In terms of component, in the next lines the user sets the FIT value and the mode ratio of the component (e.g. the apportion of the failure mode to the total FIT). If the component or the FIT values have been imported from SAFEFIT, the "Link" check should be tagged and the FIT would be selected.

After the FIT value, if FMECA has been selected (safety/critical) the user can select whether or not a safety goal has been violated and state which one; and to finish the criticality analysis, he can fix a safety mechanism to catch it.

Finally, spaces for assumptions and comments are provided.

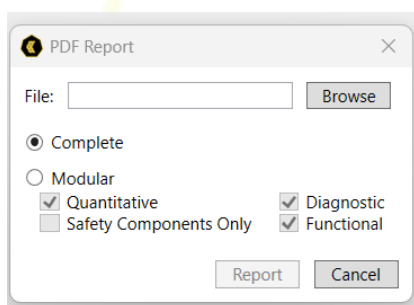
3 Export

By selecting **Export**, you can generate a CSV file containing the quantitative FIT data of all the defined failure modes under the "Name" column. This function is aimed at feeding the SafeTree application with specific data (e.g. → component XX + Failure Mode YY == FIT). Chek out how to use these values in SafeTree.

4 Reporting

A strong characteristic of SAFEFMEA is the reporting system.

By selecting "Report", we can determine what parts and components must be printed out into a report. A multiple selection menu appears which allows the user to define the parts of the report, and finally to store it as a .PDF file.



5 Tips, how to and more

There is a dedicated series of videos prepared to ease your job in our YouTube channel accessible through our Web Page www.cynoss.net

Nevertheless, do not hesitate to reach us at support@cynoss.net if you have any query. Remember that technical webinars are periodically scheduled by our technical team. We encourage you to log in to our user's community to keep in touch with the development team.

Explore additional tutorials, walkthroughs, and updates on our channel.

6 FAQs

check www.cynoss.net

What does "node-locked" mean?

You license is tied to a computer. So far SafeSuite licenses operate this way.

Can I transfer a license to another machine?

You can do it under request maximum 4 times

Is SafeFIT only an on-premised software?

Yes, so far it is. Being such a specific tool, it is easier for us to manage. Let us know if you'd like to have a cloud version.

Is there a free trial available?

Sure! Just ask as by clicking on the "Free Trial" button on the web page

Is there a usage limitation in the EULA?

You should have downloaded the document in the same package.

Do you offer academic or startup discounts?

We offer students fee. Willing to hear from you... just contact us.

Is technical support included in the license fee?

We have a complete set of documentation, including videos and shorts in YouTube. Nevertheless, if you miss something just contact support@cynoss.net. Specific training and hot line support do have a price.

Can I import my excel data?

You can import your data file in CSV format, by using the same output that generates SAFEFIT.

*Just set by this name the **Designator/FIT/Description/Type**. That should work. Just copy this format.*

But are you sure it isn't it easy to use SAFEFIT directly? Ask us for a complementary license.

Designator	FIT	Description	Type
R100	0,4801	RES-3-K-ohm-5%--50-mW-0603 (mm), 0201 (inches)-	11.1
C100	0,549	CAP-100-nF-10%--50-V-1005 (mm), 0402 (inches)- CAP-1-uF-10%-X7R-25-V-1608 (mm), 0603 (inches)-	10.2
C503	0,549	GCM188R71E105KA64D	10.2
D400	25,71	DI-PMEG4020ER	8.2.4
L202	3	IND-1-uH-20%--3.5-A-OTHER-	12.3
L400	3	IND-4.7-uH-20%--2.8-A-3226 (mm), 1210 (inches)-	12.3
Q401	37,29	TRT-60-V-0.3--210-mA-SOT-23 (SC-59, TO-236-3)-	8.(4 5).5
Q403	101,3	TRT--40-V-N/A---10-A-OTHER-	8.(4 5).5
U100	48,4	Serializer MAX96717	

U200	3,68	PMIC MPQ7928	
J100	10,98	CON-1-Pin Number-N/A--1-A-OTHER-	16.3

Can I change the company logo on the report?

You can name it as you wish. Once the final integration in the toolchain is finished, we will release this feature for you.

