



Product Service

CERTIFICATE

No. Z10 15 12 84071 010

Holder of Certificate: Texas Instruments Incorporated13905 University Blvd.
Sugar Land TX 77479
USA**Factory(ies):** 89040**Certification Mark:****Product:** Safety components
Safety MCU**Model(s):** RM46x
For nomenclature see attachment**Parameters:** Up to SIL3

The Report referenced below and the user documentation in the currently valid revision are mandatory part of this certificate. The product complies with the following listed safety requirements only if the specifications documented in the currently valid revisions of this report are met.

Tested according to: IEC 61508-1(ed.2)
IEC 61508-2(ed.2)

The product was tested on a voluntary basis and complies with the essential requirements. The certification mark shown above can be affixed on the product. It is not permitted to alter the certification mark in any way. In addition the certification holder must not transfer the certificate to third parties. See also notes overleaf.

Test report no.: TH87712C**Valid until:** 2020-12-07**Date,** 2015-12-08 (Peter Weiss)

Page 1 of 3





ATTACHMENT TO CERTIFICATE
No. Z10 15 12 84071 010

Nomenclature of Product type RM46x

Orderable Part Number	Part Number
RM46L430PGET	RM46L430
RM46L430ZWTT	RM46L430
RM46L440PGET	RM46L440
RM46L440ZWTT	RM46L440
RM46L450PGET	RM46L450
RM46L450ZWTT	RM46L450
RM46L830PGET	RM46L830
RM46L830ZWTT	RM46L830
RM46L840PGET	RM46L840
RM46L840ZWTT	RM46L840
RM46L850PGET	RM46L850
RM46L850ZWTT	RM46L850
RM46L852PGET	RM46L852
RM46L852ZWTT	RM46L852
RM46L430CPGET	RM46L430
RM46L430CPGETR	RM46L430
RM46L430CZWTT	RM46L430
RM46L430CZWTTTR	RM46L430
RM46L440CPGET	RM46L440
RM46L440CPGETR	RM46L440
RM46L440CZWTT	RM46L440
RM46L440CZWTTTR	RM46L440
RM46L450CPGET	RM46L450
RM46L450CPGETR	RM46L450
RM46L450CZWTT	RM46L450
RM46L450CZWTTTR	RM46L450
RM46L830CPGET	RM46L830
RM46L830CPGETR	RM46L830
RM46L830CZWTT	RM46L830
RM46L830CZWTTTR	RM46L830
RM46L840CPGET	RM46L840
RM46L840CPGETR	RM46L840
RM46L840CZWTT	RM46L840
RM46L840CZWTTTR	RM46L840
RM46L850CPGET	RM46L850
RM46L850CPGETR	RM46L850
RM46L850CZWTT	RM46L850
RM46L850CZWTTTR	RM46L850



Product Service

**ATTACHMENT TO CERTIFICATE
No. Z10 15 12 84071 010**

RM46L852CPGET	RM46L852
RM46L852CPGETR	RM46L852
RM46L852CZWTT	RM46L852
RM46L852CZWTR	RM46L852



Report
on the
Certificate
Z10 15 12 84071 010

Manufacturer:

Texas Instruments Incorporated
13905 University Blvd.
Sugar Land TX 77479
USA

Report no. TH87712C
Revision 1.1 of 2015-12-02

Test Body
TÜV SÜD Rail GmbH
Generic Safety Systems
D-80339 Munich

Certification Body
TÜV SÜD Product Service GmbH

D-80339 Munich



TABLE OF CONTENTS

1	PURPOSE AND SCOPE	3
2	TARGET OF EVALUATION	3
2.1	DESCRIPTION	3
2.2	IDENTIFICATION.....	3
3	CERTIFICATION REQUIREMENTS	5
3.1	BASIS OF CERTIFICATION	5
3.2	CERTIFICATION DOCUMENTATION	5
3.3	FUNCTIONAL SAFETY	6
4	RESULTS	7
4.1	FUNCTIONAL SAFETY	7
4.2	GENERAL CONDITIONS AND RESTRICTIONS	7
5	CERTIFICATE NUMBER	8

Revision

Version	Status	Date	Author	Changed chapters	Reason of change
1.0	Final	2014-11-14	Matthias Ramold	Initial	
1.1	Final	2015-12-02	Axel Köhnen	all	Modification, based on TH86222C

Table 1: Revision



1 Purpose and Scope

In July 2015 the company Texas Instruments Incorporated assigned TÜV SÜD for testing and certifying the Safety MCU RM46x according to SIL 3 of IEC 61508:2010. The project number related to these activities was: 717511330. This project is a modification project based on Champion Rev B. The report on the certificate gives an overview related to the results of the certification process and the general safety relevant conditions and restrictions related to the use of the Safety MCU RM46x.

2 Target of evaluation

2.1 Description

The target of evaluation is a generic safety microcontroller device based on the Hercules TMS570LSx and RM4x platform architecture. The assessment is based on a tailored safety lifecycle for compliant items according to IEC 61508:2010.

2.2 Identification

This report is valid for the silicon revision C and B. The models covered by the certificate are listed in the following table:

Orderable Part Number	Part Number
RM46L430PGET	RM46L430
RM46L430ZWTT	RM46L430
RM46L440PGET	RM46L440
RM46L440ZWTT	RM46L440
RM46L450PGET	RM46L450
RM46L450ZWTT	RM46L450
RM46L830PGET	RM46L830
RM46L830ZWTT	RM46L830
RM46L840PGET	RM46L840
RM46L840ZWTT	RM46L840
RM46L850PGET	RM46L850
RM46L850ZWTT	RM46L850
RM46L852PGET	RM46L852
RM46L852ZWTT	RM46L852
RM46L430CPGET	RM46L430
RM46L430CPGETR	RM46L430
RM46L430CZWTT	RM46L430
RM46L430CZWTTTR	RM46L430
RM46L440CPGET	RM46L440
RM46L440CPGETR	RM46L440
RM46L440CZWTT	RM46L440
RM46L440CZWTTTR	RM46L440



RM46L450CPGET	RM46L450
RM46L450CPGETR	RM46L450
RM46L450CZWTT	RM46L450
RM46L450CZWTTTR	RM46L450
RM46L830CPGET	RM46L830
RM46L830CPGETR	RM46L830
RM46L830CZWTT	RM46L830
RM46L830CZWTTTR	RM46L830
RM46L840CPGET	RM46L840
RM46L840CPGETR	RM46L840
RM46L840CZWTT	RM46L840
RM46L840CZWTTTR	RM46L840
RM46L850CPGET	RM46L850
RM46L850CPGETR	RM46L850
RM46L850CZWTT	RM46L850
RM46L850CZWTTTR	RM46L850
RM46L852CPGET	RM46L852
RM46L852CPGETR	RM46L852
RM46L852CZWTT	RM46L852
RM46L852CZWTTTR	RM46L852

Table 1: Identification



3 Certification Requirements

3.1 Basis of Certification

The certification of the Safety MCU was performed according to the standards listed in clause 3.3 of this document. The basis of the certification was the successful completion of the following test segments:

- I. Functional Safety
 - Functional Safety management (FSM) and safety life-cycle
 - Avoidance of systematic faults
 - Hardware safety requirements (assumptions of use)
 - Analysis of the device structure (IP FMEAs, DFA)
 - Quantitative analysis of the hardware (FMEDA)
 - Fault injection and simulation
 - Hardware functional test and design verification
 - Hardware qualification
 - Development tool qualification
- II. Safety information in the product documentation (Safety manual, operating instructions)
- III. Product-related Quality Management in manufacturing

Certification is dependent on successful completion of all above listed test segments. The testing follows the basic certification scheme for Safety Components of TÜV SÜD Rail GMBH.

3.2 Certification Documentation

The detailed technical evaluation is documented in the technical report N^o TH87433T and TH86222T.



3.3 Functional Safety

The testing for Functional Safety is to be performed using the following standards:

No.	Standard	Title
[N1]	IEC 61508-1: 2010 (SIL 3)	Functional safety of electrical/electronic/programmable electronic safety-related systems Part 1: General requirements
[N2]	IEC 61508-2: 2010 (SIL 3)	Functional safety of electrical/electronic/programmable electronic safety-related systems Part 2: Requirements for electrical/electronic/ programmable electronic safety-related systems

Table 2: Functional Safety



4 Results

4.1 Functional Safety

The tests performed and quality assurance measures implemented by the manufacturer have shown that the Safety MCU complies with the tailored testing criteria specified in clause 3.3. The Safety MCU provides different safety features implemented on-chip and requires additional safety mechanism to be implemented by the system integrator as software measures and external measures on system level. By using the different safety mechanism the MCU can be used to support safety functions up to SIL 3 according to IEC 61508:2010.

4.2 General Conditions and Restrictions

The use of the Safety MCU shall comply with the current version of the safety relevant parts of the user documentation. The following list describes the main conditions and restrictions of use:

- The guidelines and requirements specified in the user documentation shall be followed. Especially the requirements of the system integration section of the Safety manual have to be regarded.
- The impact on the overall safety concept and the safety function has to be well understood and analysed if a safety mechanism described in the Safety Manual is not used.
- All safety mechanism implemented by the system integrator have to be developed and verified according to the targeted safety standards
- All specific required characteristics and behaviour of the Safety MCU required by the final safety function have to be developed and verified according to the targeted safety standards. This includes also timing aspects like reaction times, test intervals or test execution times.
- The system integrator has to be sure of the understanding related to the conditions and restrictions defined in the documentation of the Safety MCU.



5 Certificate Number

This report defined conditions and restrictions required for the application of the Safety MCU to the certificate:

Z10 15 12 84071 010

Munich, 2015-12-02

TÜV SÜD Rail GmbH
Embedded Systems

A handwritten signature in blue ink, appearing to read 'Peter Weiß'.

Peter Weiß
(Technical Certifier)

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