



Product Service

# CERTIFICATE

No. Z10 15 12 84071 011

**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):** TMS570LS12x/11x  
For nomenclature see attachment**Parameters:** Up to SIL3  
Up to ASIL D

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)  
ISO 26262-2:2011  
ISO 26262-5:2011

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.:** TH87713C**Valid until:** 2020-12-07**Date,** 2015-12-08 (Peter Weiss)

Page 1 of 3



**ATTACHMENT TO CERTIFICATE  
No. Z10 15 12 84071 011**

**Nomenclature of Product type TMS570LS12x/11x**

Orderable Part Number	Part Number
TMS5700812BPGEQQ1	TMS570LS0812
TMS5700815BPGEQQ1	TMS570LS0815
TMS5701112BPGEQQ1	TMS570LS1112
TMS5701113BPGEQQ1	TMS570LS1113
TMS5701113BPGETQ1	TMS570LS1113
TMS5701114BPGEQQ1	TMS570LS1114
TMS5701114BZWTQQ1	TMS570LS1114
TMS5701115BPGEQQ1	TMS570LS1115
TMS5701115BZWTQQ1	TMS570LS1115
TMS5701203BPGEQQ1	TMS570LS1203
TMS5701203BZKBQQ1	TMS570LS1203
TMS5701213BZWTQQ1	TMS570LS1213
TMS5701213BZWTSQ1	TMS570LS1213
TMS5701224BPGEQQ1	TMS570LS1224
TMS5701224BZWTQQ1	TMS570LS1224
TMS5701225BPGEQQ1	TMS570LS1225
TMS5701225BZWTQQ1	TMS570LS1225
TMS5701225BZWTSQ1	TMS570LS1225
TMS5701227BPGEQQ1	TMS570LS1227
TMS5701227BZWTQQ1	TMS570LS1227
TMS5700812CPGEQQ1	TMS570LS0812
TMS5700812CPGEQQ1R	TMS570LS0812
TMS5700815CPGEQQ1	TMS570LS0815
TMS5700815CPGEQQ1R	TMS570LS0815
TMS5701112CPGEQQ1	TMS570LS1112
TMS5701112CPGEQQ1R	TMS570LS1112
TMS5701113CPGETQ1	TMS570LS1113
TMS5701113CPGETQ1R	TMS570LS1113
TMS5701114CPGEQQ1	TMS570LS1114
TMS5701114CPGEQQ1R	TMS570LS1114
TMS5701114CZWTQQ1	TMS570LS1114
TMS5701114CZWTQQ1R	TMS570LS1114
TMS5701115CPGEQQ1	TMS570LS1115
TMS5701115CPGEQQ1R	TMS570LS1115
TMS5701115CZWTQQ1	TMS570LS1115
TMS5701115CZWTQQ1R	TMS570LS1115
TMS5701203CPGEQQ1	TMS570LS1203
TMS5701203CPGEQQ1R	TMS570LS1203



**ATTACHMENT TO CERTIFICATE**  
**No. Z10 15 12 84071 011**

TMS5701205CPGEEQQ1	TMS570LS1205
TMS5701205CPGEEQQ1R	TMS570LS1205
TMS5701213CZWTQQ1	TMS570LS1213
TMS5701213CZWTQQ1R	TMS570LS1213
TMS5701213CZWTSQ1	TMS570LS1213
TMS5701213CZWTSQ1R	TMS570LS1213
TMS5701224CPGEEQQ1	TMS570LS1224
TMS5701224CPGEEQQ1R	TMS570LS1224
TMS5701224CZWTQQ1	TMS570LS1224
TMS5701224CZWTQQ1R	TMS570LS1224
TMS5701225CPGEEQQ1	TMS570LS1225
TMS5701225CPGEEQQ1R	TMS570LS1225
TMS5701225CZWTQQ1	TMS570LS1225
TMS5701225CZWTQQ1R	TMS570LS1225
TMS5701225CZWTSQ1	TMS570LS1225
TMS5701225CZWTSQ1R	TMS570LS1225
TMS5701227CPGEEQQ1	TMS570LS1227
TMS5701227CPGEEQQ1R	TMS570LS1227
TMS5701227CZWTQQ1	TMS570LS1227
TMS5701227CZWTQQ1R	TMS570LS1227



**Report**  
on the  
**Certificate**  
**Z10 15 12 84071 011**

**Manufacturer:**

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

**Report no. TH87713C**  
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

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

## 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 TH86240C

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 TMS570LS12x/11x according to ASIL D of ISO 26262:2011 and 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 TMS570LS12x/11x.

## 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 safety elements out of context (SEooC) according to ISO 26262:2011 and 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
TMS5700812BPGEQQ1	TMS570LS0812
TMS5700815BPGEQQ1	TMS570LS0815
TMS5701112BPGEQQ1	TMS570LS1112
TMS5701113BPGEQQ1	TMS570LS1113
TMS5701113BPGETQ1	TMS570LS1113
TMS5701114BPGEQQ1	TMS570LS1114
TMS5701114BZWTQQ1	TMS570LS1114
TMS5701115BPGEQQ1	TMS570LS1115
TMS5701115BZWTQQ1	TMS570LS1115
TMS5701203BPGEQQ1	TMS570LS1203
TMS5701203BZKBQQ1	TMS570LS1203
TMS5701213BZWTQQ1	TMS570LS1213
TMS5701213BZWTSQ1	TMS570LS1213
TMS5701224BPGEQQ1	TMS570LS1224
TMS5701224BZWTQQ1	TMS570LS1224
TMS5701225BPGEQQ1	TMS570LS1225
TMS5701225BZWTQQ1	TMS570LS1225
TMS5701225BZWTSQ1	TMS570LS1225
TMS5701227BPGEQQ1	TMS570LS1227
TMS5701227BZWTQQ1	TMS570LS1227



TMS5700812CPGEQQ1	TMS570LS0812
TMS5700812CPGEQQ1R	TMS570LS0812
TMS5700815CPGEQQ1	TMS570LS0815
TMS5700815CPGEQQ1R	TMS570LS0815
TMS5701112CPGEQQ1	TMS570LS1112
TMS5701112CPGEQQ1R	TMS570LS1112
TMS5701113CPGETQ1	TMS570LS1113
TMS5701113CPGETQ1R	TMS570LS1113
TMS5701114CPGEQQ1	TMS570LS1114
TMS5701114CPGEQQ1R	TMS570LS1114
TMS5701114CZWTQQ1	TMS570LS1114
TMS5701114CZWTQQ1R	TMS570LS1114
TMS5701115CPGEQQ1	TMS570LS1115
TMS5701115CPGEQQ1R	TMS570LS1115
TMS5701115CZWTQQ1	TMS570LS1115
TMS5701115CZWTQQ1R	TMS570LS1115
TMS5701203CPGEQQ1	TMS570LS1203
TMS5701203CPGEQQ1R	TMS570LS1203
TMS5701205CPGEQQ1	TMS570LS1205
TMS5701205CPGEQQ1R	TMS570LS1205
TMS5701213CZWTQQ1	TMS570LS1213
TMS5701213CZWTQQ1R	TMS570LS1213
TMS5701213CZWTSQ1	TMS570LS1213
TMS5701213CZWTSQ1R	TMS570LS1213
TMS5701224CPGEQQ1	TMS570LS1224
TMS5701224CPGEQQ1R	TMS570LS1224
TMS5701224CZWTQQ1	TMS570LS1224
TMS5701224CZWTQQ1R	TMS570LS1224
TMS5701225CPGEQQ1	TMS570LS1225
TMS5701225CPGEQQ1R	TMS570LS1225
TMS5701225CZWTQQ1	TMS570LS1225
TMS5701225CZWTQQ1R	TMS570LS1225
TMS5701225CZWTSQ1	TMS570LS1225
TMS5701225CZWTSQ1R	TMS570LS1225
TMS5701227CPGEQQ1	TMS570LS1227
TMS5701227CPGEQQ1R	TMS570LS1227
TMS5701227CZWTQQ1	TMS570LS1227
TMS5701227CZWTQQ1R	TMS570LS1227

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<sup>o</sup> 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
[N3]	ISO 26262-2:2011 (ASIL D)	Road vehicles — Functional safety — Part 2: Management of functional safety
[N4]	ISO 26262-5:2011 (ASIL D)	Road vehicles — Functional safety — Part 5: Product development at the hardware level

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 and ASIL D according to ISO 26262:2011.

### 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 011

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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