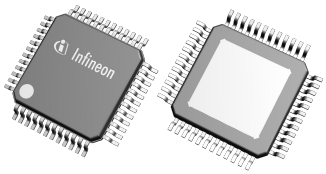
OPTIREG™ PMIC TLF35585QUS01

Functional safety PMIC

Order now | Technical documents | Simulation | Family overview | Support

AEC Qualified | RoHS | ISO 26262 compliant

Features



- High efficient power management integrated circuit (PMIC)
- Serial step up and step down pre-regulator for wide input voltage range from 3.0 V to 40 V with full performance and low overall power loss
- Low drop post regulator 5.0 V/600 mA for microcontroller main supply (QUC)
- Low drop post regulator 5.0 V/200 mA for communication supply (QCO)
- Voltage reference (±1%) 5.0 V/150 mA for ADC supply (QVR)
- Two trackers for sensor supply following voltage reference 150 mA current capability each (QT1 and QT2)
- Standby regulator 5.0 V/10 mA (QST)
- Enable, sync out signal and voltage monitoring of an optional external post regulator for core supply
- Independent voltage monitoring block and error pin monitoring
- Configurable window watchdog and functional watchdog
- Safe State Control with two safe state signals with programmable delay
- 16-bit SPI, interrupt and reset function
- High junction temperature operation up to 175°C
- PRO-SIL™ Features:
  - ISO 26262 Safety Element out of Context for requirements up to ASIL D
  - Safety documentation for ISO 26262 compliant system integration
- Green Product (RoHS compliant)

Potential applications

- Electric power steering
- Battery management
- Engine management
- Domain control
- Traction inverter

Product validation

Qualified for automotive applications with higher temperature requirements. Product validation according to AEC-Q100, Grade 0.

Description

The OPTIREG™ PMIC TLF35585QUS01 is a highly efficient Functional Safety PMIC (Power management integrated circuit) for safety-relevant applications.

The power supply includes a boost-buck pre-regulator supplying post regulator rails for microcontroller supply, communication supply and a precise voltage reference. In addition, two trackers following the voltage reference are available to supply off-board sensors.

The OPTIREG™ PMIC TLF35585QUS01 comes with a configurable window watchdog (time based trigger) and functional watchdog (question and answer based trigger), error pin monitoring and voltage monitoring functions as major supervision functions. For microcontroller interaction a 16-bit SPI, interrupt and reset function are provided.

The device has been developed according to ISO 26262 targeting systems up to ASIL D and supports an extended junction temperature range of up to 175°C.

Type	Package	Marking (Line1 / Line2)
TLF35585QUS01	PG-TQFP-48-10	TLF35585 / S01

Table of contents

Features 1
Potential applications 1
Product validation 1
Description 2
Table of contents 3
1 General product characteristics 4
1.1 Absolute maximum ratings 4
2 Application information 7
3 Package information 9
Disclaimer 10

1 General product characteristics

1.1 Absolute maximum ratings

Table 1 Absolute maximum ratings[1)]

T_j = -40°C to 175°C, all voltages with respect to ground, positive current flowing into pin (unless otherwise specified)

Parameter	Symbol	Values			Unit	Note or condition	Number
		Min.	Typ.	Max.			
Voltages							
Boost driver ground	V_{BSG}	-0.3	–	0.3	V	–	P_4.1.1
Input standby supply	V_{VST}	-0.3	–	40	V	2) 3)	P_4.1.2
Input voltage pin 1 (pre-regulator)	V_{VS1}	-0.3	–	40	V	2) 3)	P_4.1.3
External step up power stage, gate	V_{DRG}	-0.3	–	40	V	2)	P_4.1.4
External power stage, sense resistor high	V_{RSH}	-0.3	–	40	V	2)	P_4.1.5
External power stage, sense resistor low	V_{RSL}	-0.3	–	2.5	V	–	P_4.1.6
Enable input	V_{ENA}	-0.3	–	40	V	2)	P_4.1.7
Enable input	I_{ENA}	-5	–	–	mA	4)	P_4.1.8
Wake input	V_{WAK}	-0.3	–	40	V	2)	P_4.1.9
Wake input	I_{WAK}	-5	–	–	mA	4)	P_4.1.10
Reset output	V_{ROT}	-0.3	–	40.0	V	–	P_4.1.11
SPI chip select input	V_{SCS}	-0.3	–	40.0	V	–	P_4.1.12
SPI clock input	V_{SCL}	-0.3	–	40.0	V	–	P_4.1.13
SPI data in (MOSI) input	V_{SDI}	-0.3	–	40.0	V	–	P_4.1.14
SPI data out (MISO output)	V_{SDO}	-0.3	–	40.0	V	–	P_4.1.15
Interrupt output	V_{INT}	-0.3	–	40.0	V	–	P_4.1.16
Window watchdog trigger input	V_{WDI}	-0.3	–	40.0	V	–	P_4.1.17
Error pin input	V_{ERR}	-0.3	–	40.0	V	–	P_4.1.18
Safe state 1 output	V_{SS1}	-0.3	–	40.0	V	–	P_4.1.19
Safe state 2 output	V_{SS2}	-0.3	–	40.0	V	–	P_4.1.20
Output voltage reference supply	V_{QVR}	-0.3	–	6.0	V	–	P_4.1.21
Output tracker 2	V_{QT2}	-1.0	–	40	V	–	P_4.1.22

(table continues...)

Table 1 (continued) Absolute maximum ratings[1)]

T_j = -40°C to 175°C, all voltages with respect to ground, positive current flowing into pin (unless otherwise specified)

Parameter	Symbol	Values			Unit	Note or condition	Number
		Min.	Typ.	Max.			
Output tracker 1	V_{QT1}	-1.0	–	40	V	–	P_4.1.23
Output communication supply	V_{QCO}	-0.3	–	6.0	V	–	P_4.1.24
Output microcontroller main supply	V_{QUC}	-0.3	–	6.0	V	–	P_4.1.25
External core voltage monitor input	V_{VCI}	-0.3	–	6.0	V	–	P_4.1.26
HW config: ext. core voltage monitor	V_{SEC}	-0.3	–	6.0	V	–	P_4.1.27
Synchronization output	V_{SYN}	-0.3	–	40.0	V	–	P_4.1.28
Enable output for ext. core supply	V_{EVC}	-0.3	–	40.0	V	–	P_4.1.29
Step down feedback input 2	V_{FB2}	-0.3	–	8.0	V	–	P_4.1.30
Step down feedback input 1	V_{FB1}	-0.3	–	8.0	V	–	P_4.1.31
Step down power ground 2	V_{PG2}	-0.3	–	0.3	V	–	P_4.1.32
Step down power ground 1	V_{PG1}	-0.3	–	0.3	V	–	P_4.1.33
Step down switching node	V_{SW1}	-0.3	–	40	V	[3)]	P_4.1.34
HW config: step up pre-regulator	V_{STU}	-0.3	–	6.0	V	–	P_4.1.35
HW config: step down frequency	V_{FRE}	-0.3	–	6.0	V	–	P_4.1.36
Output standby supply	V_{QST}	-0.3	–	6.0	V	–	P_4.1.37
Input MPS	V_{MPS}	-0.3	–	20	V	–	P_4.1.38
Temperatures							
Junction temperature	T_j	-40	–	175	°C	–	P_4.1.39
Storage temperature	T_{stg}	-55	–	175	°C	–	P_4.1.40
ESD susceptibility							
ESD robustness to GND	V_{ESD}	-2	–	2	kV	HBM [5)]	P_4.1.41
ESD robustness to GND	V_{ESD}	-500	–	500	V	CDM [6)]	P_4.1.42
ESD robustness (corner pins) to GND	$V_{ESD,Corner}$	-750	–	750	V	CDM [6)]	P_4.1.43

1) Not subject to production test, specified by design.
2) Maximum rating is 60 V, if rising slewrate of voltage at the pin is lower than 6 V/ms , for an overall time of 1 hour during the lifetime of the product
3) Maximum rating is 43.5 V, for an overall time of 10 s (in the range of 40 V to 43.5 V) during the lifetime of the product independent from the rise time.
4) Consider external series resistor for negative voltages < -0.3 V to ensure maximum rating of current

5) Human body model (HBM) robustness according to ANSI/ESDA/JEDEC JS-001 (1.5 kΩ, 100 pF).
6) Charged device model (CDM) robustness according to ESDA STM5.3.1 or ANSI/ESD S.5.3.1.

***Note**: This thermal data was generated in accordance with JEDEC JESD51 standards. For more information visit www.jedec.org.*

2 Application information

The following figure describes how the IC is used in its environment.

***Note**: The following information is given as an example for the implementation of the device only and shall not be regarded as a description or warranty of a certain functionality, condition or quality of the device.*

- Please contact us for additional supportive documentation.
- For further information you may contact http://www.infineon.com/

***Note**: This figure is a simplified example of an application circuit. The function must be verified in the application.*

2 Application information

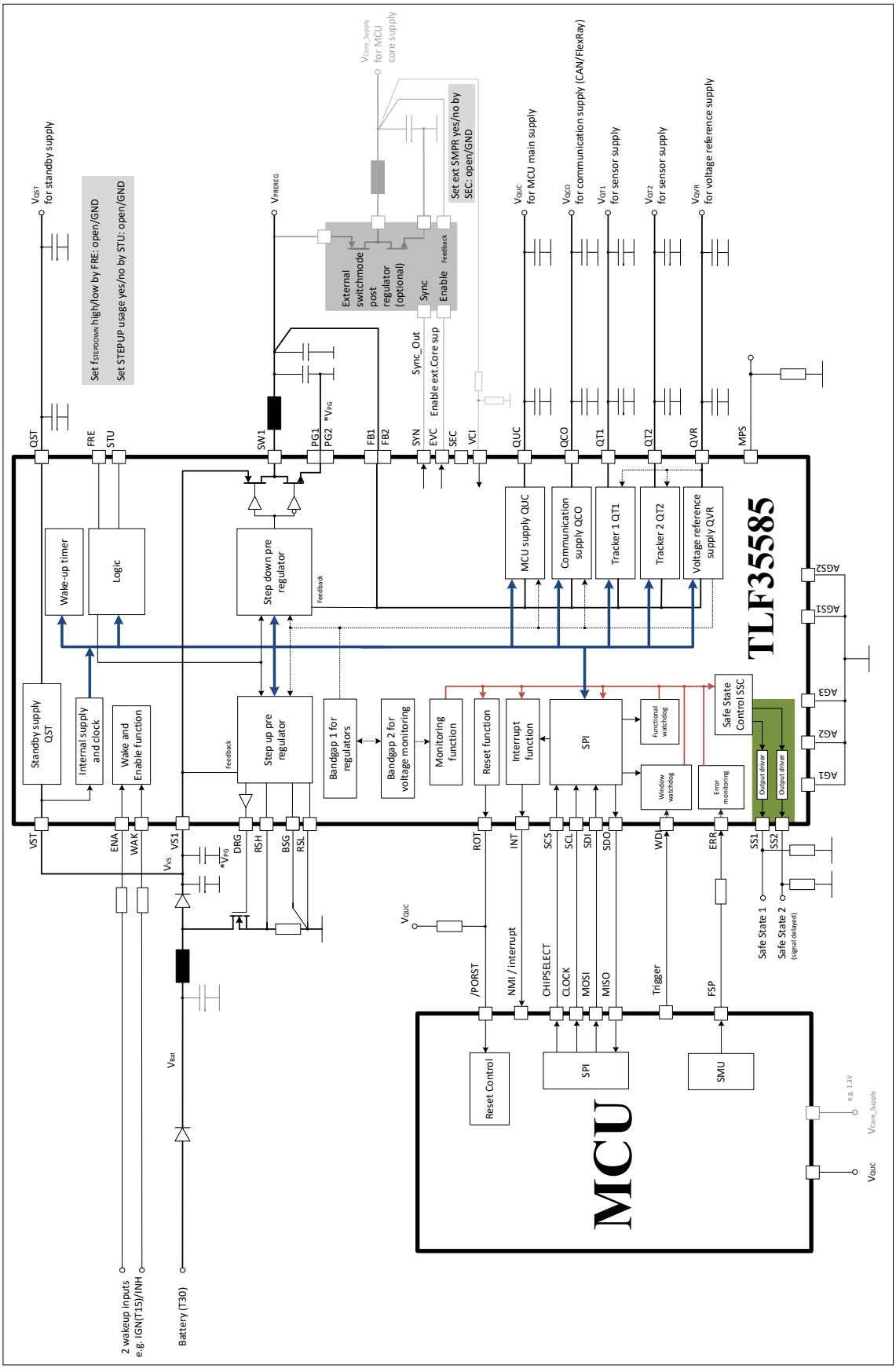


Figure 1 Application diagram

3 Package information

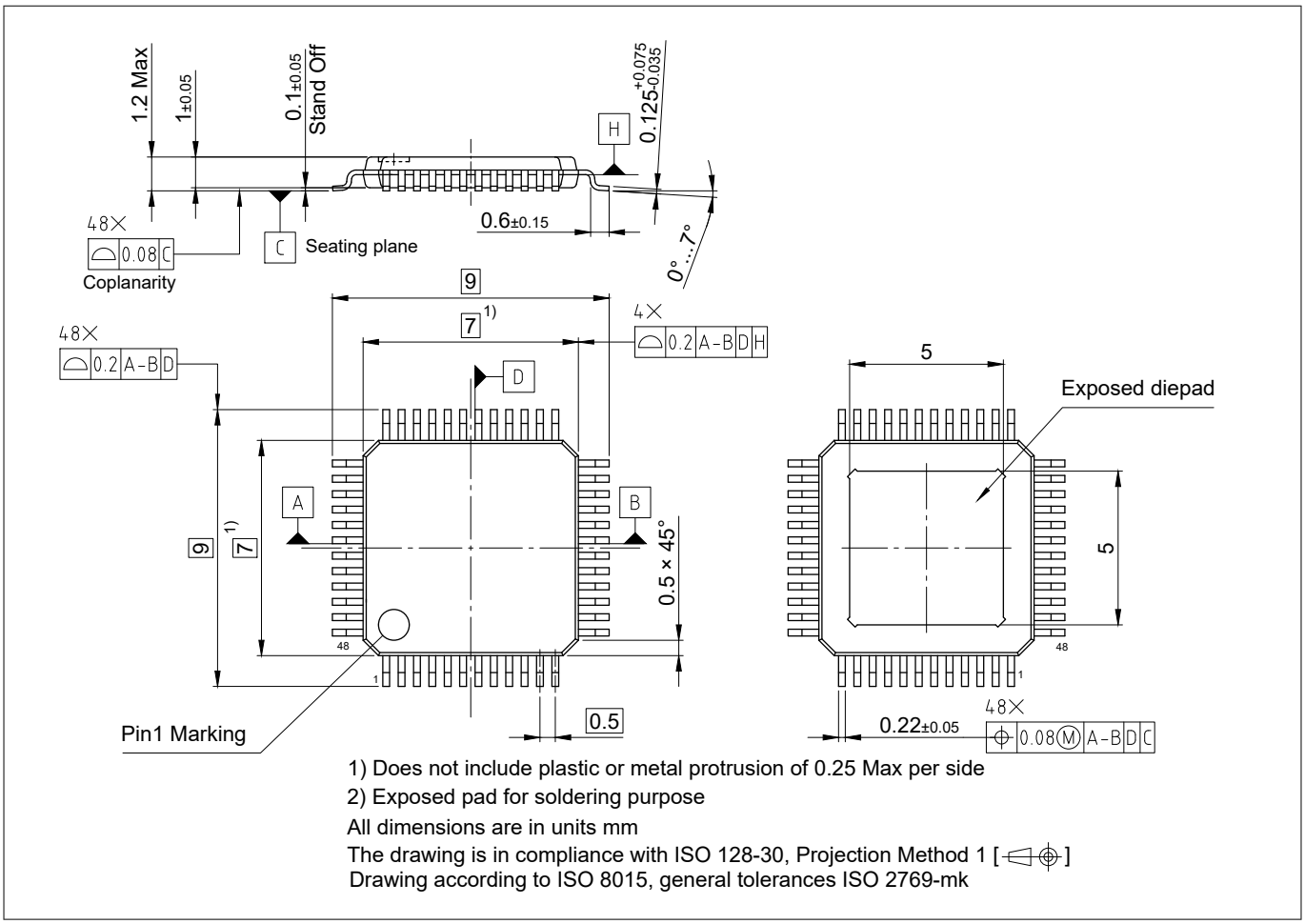


Figure 2 PG-TQFP-48-10

Green Product (RoHS compliant)

To meet the world-wide customer requirements for environmentally friendly products and to be compliant with government regulations the device is available as a Green Product. Green Products are RoHS compliant (Pb-free finish on leads and suitable for Pb-free soldering according to IPC/JEDEC J-STD-020).

Information on alternative packages

Please visit www.infineon.com/packages.

Trademarks

All referenced product or service names and trademarks are the property of their respective owners.

Edition 2024-09-23

Published by

Infineon Technologies AG

81726 Munich, Germany

© 2024 Infineon Technologies AG

All Rights Reserved.

Do you have a question about any aspect of this document?

Email: erratum@infineon.com

Document reference
IFX-ttc1659540890807 Z8F80326130

Important notice

The information given in this document shall in no event be regarded as a guarantee of conditions or characteristics ("Beschaffenheitsgarantie").

With respect to any examples, hints or any typical values stated herein and/or any information regarding the application of the product, Infineon Technologies hereby disclaims any and all warranties and liabilities of any kind, including without limitation warranties of non-infringement of intellectual property rights of any third party.

In addition, any information given in this document is subject to customer's compliance with its obligations stated in this document and any applicable legal requirements, norms and standards concerning customer's products and any use of the product of Infineon Technologies in customer's applications.

The data contained in this document is exclusively intended for technically trained staff. It is the responsibility of customer's technical departments to evaluate the suitability of the product for the intended application and the completeness of the product information given in this document with respect to such application.

Warnings

Due to technical requirements products may contain dangerous substances. For information on the types in question please contact your nearest Infineon Technologies office.

Except as otherwise explicitly approved by Infineon Technologies in a written document signed by authorized representatives of Infineon Technologies, Infineon Technologies' products may not be used in any applications where a failure of the product or any consequences of the use thereof can reasonably be expected to result in personal injury.