Hardware differences between GE864-QUAD, GE864-QUAD V2, GE864-QUAD Automotive and GE864-QUAD Automotive V2

Application Note

80000NT10024a Rev. 3 – 2009-12-14

Making machines talk.

DISCLAIMER

The information contained in this document is the proprietary information of Telit Communications S.p.A. and its affiliates ("TELIT").

The contents are confidential and any disclosure to persons other than the officers, employees, agents or subcontractors of the owner or licensee of this document, without the prior written consent of Telit, is strictly prohibited.

Telit makes every effort to ensure the quality of the information it makes available. Notwithstanding the foregoing, Telit does not make any warranty as to the information contained herein, and does not accept any liability for any injury, loss or damage of any kind incurred by use of or reliance upon the information.

Telit disclaims any and all responsibility for the application of the devices characterized in this document, and notes that the application of the device must comply with the safety standards of the applicable country, and where applicable, with the relevant wiring rules.

Telit reserves the right to make modifications, additions and deletions to this document due to typographical errors, inaccurate information, or improvements to programs and/or equipment at any time and without notice.

Such changes will, nevertheless be incorporated into new editions of this document.

Copyright: Transmittal, reproduction, dissemination and/or editing of this document as well as utilization of its contents and communication thereof to others without express authorization are prohibited. Offenders will be held liable for payment of damages. All rights are reserved.

Copyright © Telit Communications S.p.A. 2010.

This document is related to the following products:

APPLICABLE PRODUCTS

PRODUCT	Applicable P/N
GE864-QUAD	GE864QUD7xx-yy
GE864-PY	GE864PYT7xx-yyy
GE864-QUAD V2	GE864Q2D00xTyyy
GE864-QUAD Automotive	GE864AUT73x-yyy
GE864-QUAD Automotive V2	GE864AUT00x-yyy

Contents

1.   Introduction

1.1.   Scope

This application note is intended to highlight the differences from the hardware point of view, between the GE864-QUAD/PY, GE864-QUAD V2, GE864-QUAD Automotive and the GE864-QUAD Automotive V2, with the aim to help the system integrator in the design an host application and therefore a PCB, which might host all the GE864 variants. However, this option might require a minimum part list change of the host PCB.

Moreover, this document might help also the system integrator to migrate its application from the use of one version of GE864 to another, for instance from the GE864-QUAD to GE864-QUAD V2.

1.2.   Contact Information, Support

For general contact, technical support, to report documentation errors and to order manuals, contact Telit's Technical Support Center (TTSC) at:

TS-EMEA@telit.com
TS-NORTHAMERICA@telit.com
TS-LATINAMERICA@telit.com
TS-APAC@telit.com

Alternatively, use:
http://www.telit.com/en/products/technical-support-center/contact.php
For detailed information about where you can buy the Telit modules or for recommendations on accessories and components visit:
http://www.telit.com
To register for product news and announcements or for product questions contact
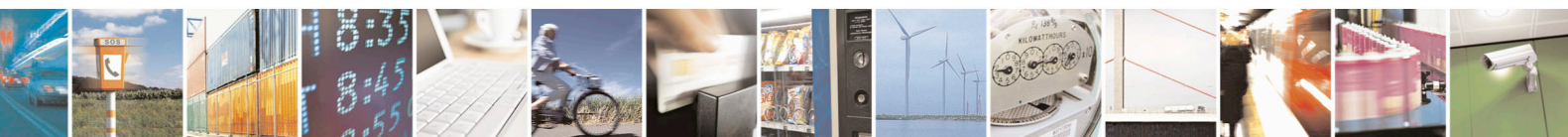Telit's Technical Support Center (TTSC).
Our aim is to make this guide as helpful as possible. Keep us informed of your comments and suggestions for improvements.
Telit appreciates feedback from the users of our information.

1.3.   Text Conventions

Danger – This information MUST be followed or catastrophic equipment failure or bodily injury may occur.

Caution or Warning – Alerts the user to important points about integrating the module, if these points are not followed, the module and end user equipment may fail or malfunction.

Tip or Information – Provides advice and suggestion that may be useful when integrating the module.

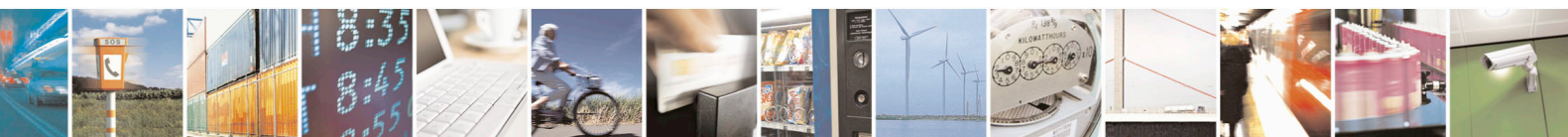All dates are in ISO 8601 format, i.e. YYYY-MM-DD.

1.4.   Related Documents

The following documents are related to:

- GE864-QUAD/PY Hardware User Guide, 1vv0300694
- GE864-QUAD Automotive Hardware User Guide, 1vv0300779
- GE864-QUAD V2 Hardware User Guide

1.5.   Document History

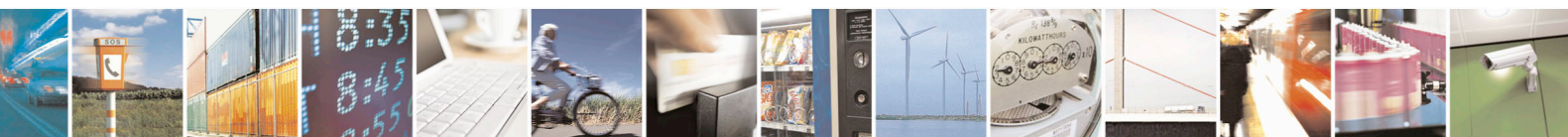| Revision	Date	Changes	Location
0	2009-03-24	First issue	Trieste
1	2009-08-26	Added the GE864-QUAD V2 and GE864-QUAD Automotive new version	Trieste
2	2009-09-09	Merge of the pin-out table into a single table, highlighting only the differences.	Trieste
3	2009-12-14	Separated the GE864-QUAD V2 into a independent column of the comparison table.	

2.   General considerations

Before start with a design of an application that makes use of the GE864-QUAD/PY, GE864-QUAD V2, GE864-QUAD Automotive or GE864-QUAD Automotive V2, all the contents of the HW User Guides of the relevant products must be known. This application note is intended to highlight only the differences between those products, and help on some project aspects.

3.   Comparison table

The following table highlights ONLY the differences in the pin-out functions between the GE864-QUAD/PY, the GE864-QUAD V2, the GE864-QUAD Automotive and the GE864-QUAD Automotive V2. All other pins/balls that are not mentioned in the table, have maintained exactly the same function on all the product variants. For a complete pin-out table of each product, please consult the relevant Hardware User Guide.

The yellow color highlights pins that have common features on all the products, but that have lower tolerance on GE864-QUAD V2, GE864-QUAD Automotive and GE864-QUAD Automotive V2 products against the CMOS high level input as described in the paragraph 3.1.

The green color highlights pins that have features that are missing, or might have different feature (e.g. different GPIO #) on the GE864-QUAD V2 or GE864-QUAD Automotive or GE864-QUAD Automotive V2 products. Those pins have lower tolerance against the CMOS high level input as described in the paragraph 3.1.

The blue color highlights the signals/features that are missing on the GE864-QUAD V2, GE864-QUAD Automotive and GE864-QUAD Automotive V2 products.

The red color highlights that the 32KHz input signal (F3) that is not required on the GE864-QUAD neither on the GE864-QUAD Automotive, P/N GE864AUT00x-yyy, and on the GE864-QUAD V2, but is required on the GE864-QUAD Automotive P/N GE864AUT73x-yyy. The external 32KHz input signal, must be connected ONLY IF the Idle power saving status is required (see para 3.2).

Functions						GE864-QUAD	GE864-QUAD-V2	GE864-QUAD Automotive, (P/N GE864AUT73x-yyy)	GE864-QUAD Automotive V2 (GE864AUT00x-yyy)
Ball	Signal	I/O	Description	Internal PULL UP	Type				
Audio									
F9	AXE	I	Handsfree switching	100K	CMOS 2.8V	available	available	available	available
Trace									
D11					CMOS 2.8V	TX Data for debug monitor / DVI1_CLK (Digital Voice Interface)	TX Data for debug monitor	TX Data for debug monitor	TX Data for debug monitor
F10					CMOS 2.8V	RX Data for debug monitor / DVI1_WA (Digital Voice Interface)	RX Data for debug monitor	RX Data for debug monitor	RX Data for debug monitor
Prog. / Data + HW Flow Control									
E7	C103 / TXD	I	Serial data input (TXD) from DTE		CMOS 2.8V	available	available	available	available
H8	C104 / RXD	O	Serial data output to DTE		CMOS 2.8V	available	available	available	available
B7	C108 / DTR	I	Input for Data terminal ready signal (DTR) from DTE		CMOS 2.8V	available	available	available	available
F7	C105 / RTS	I	Input for Request to send signal (RTS) from DTE		CMOS 2.8V	available	available	available	available
F6	C106 / CTS	O	Output for Clear to send signal (CTS) to DTE		CMOS 2.8V	available	available	available	available
D9	C109 / DCD	O	Output for Data carrier detect signal (DCD) to DTE		CMOS 2.8V	available	available	available	available
E11					CMOS 2.8V	C107 / DSR / DVI1_RX (Digital Voice Interface)	C107 / DSR	C107 / DSR	C107 / DSR
B6	C125 / RING	O	Output for Ring indicator signal (RI) to DTE		CMOS 2.8V	available	available	available	available
DAC and ADC									
G11						ADC_IN3, Analog / Digital converter input	RESERVED	RESERVED	RESERVED
Miscellaneous Functions									

Functions					GE864-QUAD	GE864-QUAD-V2	GE864-QUAD Automotive, (P/N GE864AUT73x-yyy)	GE864-QUAD Automotive V2 (GE864AUT00x-yyy)
Ball	Signal	I/O	Description	Internal PULL UP	Type			
F3						RESERVED	RESERVED	32K_IN, CMOS 1.8V, external 32.768 KHz Square Wave source input. Must be connected only if the power saving function is required	RESERVED
G1						CHARGE, Charger input	RESERVED	RESERVED	RESERVED
G2						CHARGE, Charger Input	RESERVED	RESERVED	RESERVED
D5						VAUX1	RESERVED	RESERVED	RESERVED
L8	PWRMON	O	Power ON Monitor		CMOS 2.8V	available	available	available	available
D7		-			CMOS 2.8	DVI2_CLK with internal PULL UP 4.7K	DVI_CLK no internal PULL UP	DVI_CLK / GPIO_09 no internal PULL UP	DVI_CLK / GPIO_09 no internal PULL UP
C6						DVI1_TX with internal PULL UP 4.7K	RESERVED	RESERVED	RESERVED
GPIO									
G4						GPIO_12 Configurable, CMOS 2.8V	RESERVED	RESERVED	RESERVED
C2						GPIO_03 Configurable, CMOS 2.8V	GPIO_03 Configurable, CMOS 2.8V	RESERVED	RESERVED
B3	TGPIO_04	I/O	GPIO_04 Configurable / RF Transmission Control		CMOS 2.8V	available	available	available	available
C3						GPIO_20 Configurable, CMOS 2.8V	RESERVED	RESERVED	RESERVED
B4						GPIO_14 Configurable, CMOS 2.8V	RESERVED	RESERVED	RESERVED
D1						GPIO_11 Configurable, CMOS 2.8V	RESERVED	RESERVED	RESERVED
B1						GPIO_19 Configurable, CMOS 2.8V	RESERVED	RESERVED	RESERVED

		Functions				GE864-QUAD	GE864-QUAD-V2	GE864-QUAD Automotive, (P/N GE864AUT73x-yyy)	GE864-QUAD Automotive V2 (GE864AUT00x-yyy)
Ball	Signal	I/O	Description	Internal PULL UP	Type				
C1						GPIO_01 Configurable, CMOS 2.8V	GPIO_01 Configurable, CMOS 2.8V	RESERVED	RESERVED
K7		I/O			CMOS 2.8V	GPIO_18 Configurable / DVI2_RX	DVI_RX	GPIO_03 Configurable / DVI_RX	GPIO_03 Configurable / DVI_RX
H5		I/O			CMOS 2.8V	GPIO_17 Configurable / DVI2_WA	DVI_WA	GPIO_02 Configurable / DVI_WA	GPIO_02 Configurable / DVI_WA
F5						GPIO_15 Configurable CMOS 2.8V	RESERVED	RESERVED	RESERVED
K11						GPIO_08 Configurable CMOS 2.8V	GPIO_08 Configurable CMOS 2.8V	RESERVED	RESERVED
B5	TGPIO_06 / ALARM	I/O	GPIO_06 Configurable / ALARM		CMOS 2.8V	available	available	available	available
C9						GPIO_09 Configurable, CMOS 2.8V	GPIO_09 Configurable, CMOS 2.8V	RESERVED	RESERVED
E6		I/O			CMOS 2.8V	GPIO_02 / Jammer detect report	GPIO_02 / Jammer detect report	GPIO_01 / Jammer detect report	GPIO_01 / Jammer detect report
L9	TGPIO_07 / BUZZER	I/O	GPIO_07 Configurable / Buzzer		CMOS 2.8V	available	available	available	available
H6						GPIO_16 Configurable, CMOS 2.8V	RESERVED	RESERVED	RESERVED
K10						GPIO_13 Configurable, CMOS 2.8V	RESERVED	RESERVED	RESERVED
K8	TGPIO_05 / RFTXMON	I/O	GPIO_05 Configurable / Transmitter ON monitor		CMOS 2.8V	available	available	available	available
L10						GPIO_21 Configurable, CMOS 2.8V	RESERVED	RESERVED	RESERVED
E8						GPIO_22 Configurable, CMOS 1.8V (not 2.8V !!)	RESERVED	RESERVED	RESERVED
H3		I/O			CMOS 2.8V	GPIO_10 Configurable / DVI2_TX	GPIO_10 Configurable / DVI_TX	GPIO_08 Configurable / DVI_TX	GPIO_08 Configurable / DVI_TX

NOTE:

For a compatible design, all the balls corresponding to "RESERVED" MUST NOT be connected.

3.1. GPIO Logic levels

The GE864-QUAD V2, GE864-QUAD Automotive and GE864-QUAD Automotive V2 have a lower tolerance against the high level input compared to the GE864-QUAD, which are highlighted in red in the following subparagraphs. **The same levels must be applied on the serial port pins also.**

3.1.1. GE864-QUAD V2, GE864-QUAD Automotive and GE864-QUAD Automotive V2

Where not specifically stated, all the interface circuits work at 2.8V CMOS logic levels.
The following table shows the logic level specifications used in the GE864-QUAD Automotive/ Automotive V2 and GE864-QUAD V2 interface circuits:

Absolute Maximum Ratings - Not Functional

Parameter	Min	Max
Input level on any digital pin when on	-0.3V	+3.1V
Input voltage on analog pins when on	-0.3V	+3.0 V

Operating Range - Interface levels (2.8V CMOS)

Level	Min	Max
Input high level	2.1V	3.1V
Input low level	0V	0.5V
Output high level	2.2V	3.0V
Output low level	0V	0.35V

Operating Range - Interface levels (1.8V CMOS)

Level	Min	Max
Input high level	1.6V	2.2V
Input low level	0V	0.4V
Output high level	1,65V	2.2V
Output low level	0V	0.35V

3.1.2.   GE864-QUAD / PY

Where not specifically stated, all the interface circuits work at 2.8V CMOS logic levels. The following table shows the logic level specifications used in the GE864-QUAD / PY interface circuits:

Absolute Maximum Ratings -Not Functional
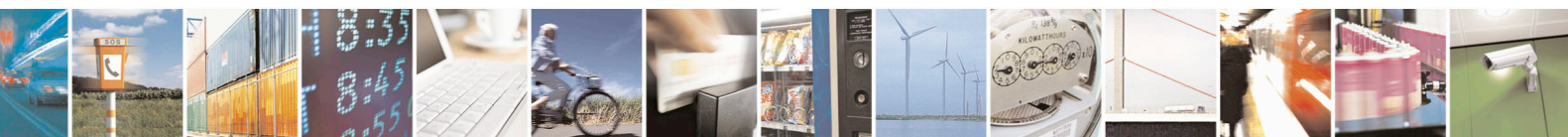
Parameter	Min	Max
Input level on any digital pin when on	-0.3V	+3.6V
Input voltage on analog pins when on	-0.3V	+3.0 V

Operating Range - Interface levels (2.8V CMOS)

Level	Min	Max
Input high level	2.1V	3.3V
Input low level	0V	0.5V
Output high level	2.2V	3.0V
Output low level	0V	0.35V

Operating Range - Interface levels (1.8V CMOS)

Level	Min	Max
Input high level	1.6V	2.2V
Input low level	0V	0.4V
Output high level	1,65V	2.2V
Output low level	0V	0.35V

NOTE:
For a compatible design, the narrower logic levels of the GE864-QUAD Automotive / Automotive V2 / GE864-QUAD V2 MUST be chosen; otherwise there is the risk to damage the unit.

3.2. External 32KHz oscillator

With the **GE864-QUAD Automotive,** only P/N GE864AUT73x-yyy, if the host application requires putting the module into 'power saving' mode or requires the 'Real Time Clock' functionalities, an external 32.768 KHz signal is needed and must be connected to ball F3.
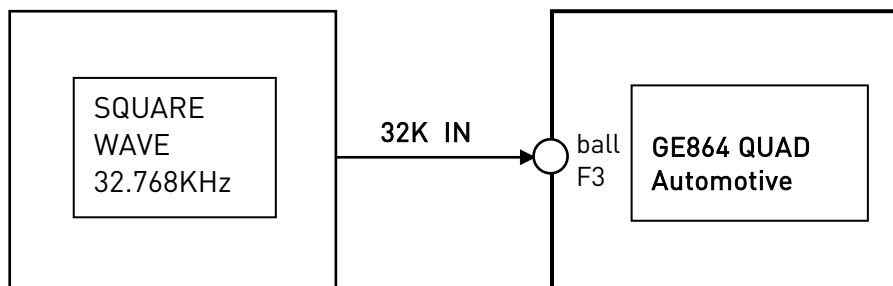
This signal must be a **square wave** with the following specifications:

	Minimum	Maximum	Unit
L-input voltage	-0.25	+0.2	V
H-input voltage	1.8	2.2	V
Input impedence	> 10K		Ω

If 'power saving' and 'Real Time Clock' features are not required, the signal 32K_IN (ball F3) MUST be connected to ground.

> **NOTE:**
> Connecting the F3 pin of the GE864-QUAD/PY or the GE864-QUAD Automotive (P/N GE864AUT00x-yyy) or the GE864-QUAD V2 to ground, does not damage the unit.

> **NOTE:**
> The 32KHz function is internally supplied in the GE864-QUAD/PY, in the GE864-QUAD Automotive V2, P/N GE864AUT00x-yyy and in the GE864-QUAD V2.

3.3.   Application SW GPIO configuration

According to the pin-outs of the products, (see paragraphs 3), the name of GPIO pins are not the same between the products. Therefore, Telit recommends managing this diversity making use of two different initialization files implemented in the software application running on the host PCB.