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# **GL823K**

## **USB 2.0 SD/MSPRO Card Reader Controller**

### **Datasheet**

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**Revision 1.03**  
**Dec. 17, 2014**



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## Revision History

Revision	Date	Description
1.00	06/13/2014	First formal release
1.01	06/18/2014	Add ordering information in Ch.7, p16
1.02	07/02/2014	Release for SSOP16 (150mil) package
1.03	12/17/2014	Modify Figure 3.1, p8 Add Ch5.3 DC Characteristics, p12

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## CHAPTER 1 GENERAL DESCRIPTION

The GL823K is a USB 2.0 Single-LUN card reader controller which can support SD/MMC/MSPRO Flash Memory Cards. It supports USB 2.0 high-speed transmission to Secure Digital<sup>™</sup> (SD), SDHC, SDXC, miniSD<sup>™</sup>, microSD<sup>™</sup>(T-Flash), MultiMediaCard<sup>™</sup> (MMC), RS MultiMediaCard<sup>™</sup> (RS MMC), MMCmicro , HS-MMC, MMCmobile, Memory Stick PRO<sup>™</sup> (MS PRO), Memory Stick PRO<sup>™</sup> Duo (MS PRO Duo), Memory Stick PRO-HG<sup>™</sup> (MS PRO-HG), MS Micro (M2) on one chip. As a single chip solution for USB 2.0 flash card reader, the GL823K complies with Universal Serial Bus specification rev. 2.0, USB Storage Class Specification ver.1.0, and each flash card interface specification.

The GL823K integrates a high speed 8051 microprocessor and a high efficiency hardware engine for the best data transfer performance between USB and flash card interfaces. Its pin assignment design fits to card sockets to provide easier PCB layout. Inside the chip, it integrates 5V to 3.3V regulator, 3.3V to 1.8V regulator and power MOSFETs and it enables the function of on-chip clock source (OCCS) which means no external 12MHz XTAL is needed and that effectively reduces the total BOM cost.

The GL823K implements USB disconnect function; it can be used for Mobile cable/ OTG reader/ PC card reader application

## **CHAPTER 2 FEATURES**

- USB specification compliance
  - Comply with 480Mbps Universal Serial Bus specification rev. 2.0
  - Comply with USB Storage Class specification rev. 1.0
  - Support one device address and up to four endpoints: Control (0)/Bulk Read (1)/Bulk Write (2)/Interrupt (3)
- Integrated USB building blocks
  - USB2.0 transceiver macro (UTM), Serial Interface Engine (SIE), Build-in power-on reset (POR) and low-voltage detector (LVD)
- Embedded 8051 micro-controller
  - Operate @ 60 MHz clock, 12 clocks per instruction cycle
  - Embedded mask ROM and internal SRAM
- Secure Digital™ (SD) and MultiMediaCard™ (MMC)
  - Supports SD specification v1.0 / v1.1 / v2.0 / SDHC (Up to 32GB)
  - Compatible with SDXC (Up to 2TB)
  - Supports MMC specification v3.x / v4.0 / v4.1 / v4.2
  - Supports 1 / 4 bit data bus
- Memory Stick PRO / Memory Stick PRO Duo / Memory Stick PRO-HG / MS Micro (M2)
  - Compliant with Memory Stick Series Specification: MS PRO v1.05, MS PRO-HG Duo 1.03, MS Micro (M2) v1.06
  - Support 4bit data bus
- Support boost mode for SD3.0 for better performance
- Support non-SD Card Detect pin, non-MS Insertion/Removal pin design to save BOM cost
- Support non-SD Write Protection pin design to save BOM cost
- Support LED function to indicate power and access status
- On chip clock source and no need of 12MHz Crystal Clock input
- On-Chip 5V to 3.3V and 3.3V to 1.8V regulators
- On-Chip power MOSFET for supplying flash media card power
- Support USB disconnection by memory card unplug or manual switch for Mobile cable/ OTG reader/ PC card reader application
- Available in SSOP16 package (150 mil)

## CHAPTER 3 PIN ASSIGNMENT

### 3.1 SSOP16 Pinout

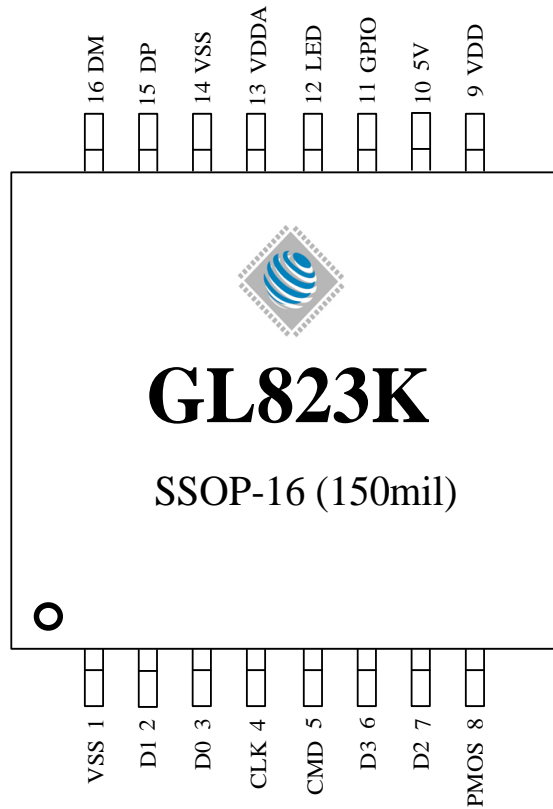


Figure 3.1– SSOP 16 Pinout Diagram



### 3.2 Pin Description

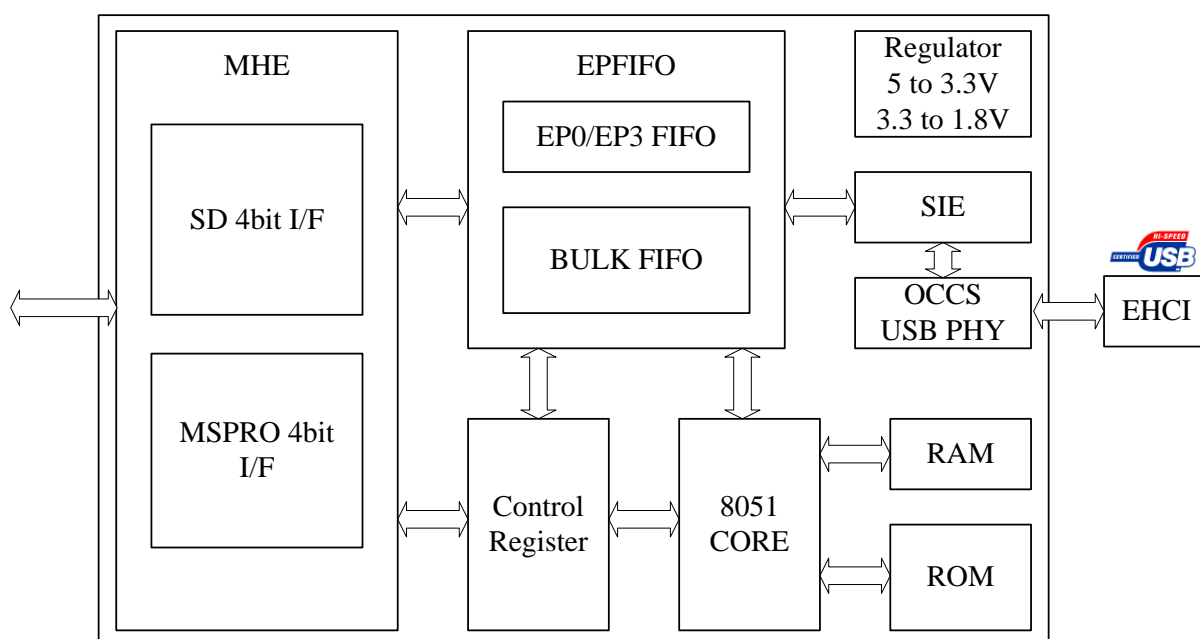
**Table 3.1– Pin Description**

Pin Name	PIN NO.	Type	Description
<b>Power/Ground</b>			
VDDA	13	P	USB2.0 PHY 3.3V power source.
VDD	9	P	Digital 3.3V power source
VSS	1,14	P	Power ground
5V	10	P	VBUS 5V input
PMOS	8	P	Card power 200mA
<b>USB PHY Interface</b>			
DP	15	A	USB 2.0 D+
DM	16	A	USB 2.0 D-
<b>Memory Card Interface</b>			
CLK	4	O	SD/MS clock signal
CMD	5	B	SD command/MS BS signal
D0	3	B	SD/MS data 0 signal
D1	2	B	SD/MS data 1 signal
D2	7	B	SD/MS data 2 signal
D3	6	B	SD/MS data 3 signal
<b>Others</b>			
GPIO	11	I, pu	General Purpose I/O
LED	12	O	Access LED

**Notation:**

<b>Type</b>	<b>O</b>	Output
	<b>I</b>	Input
	<b>B</b>	Bi-directional
	<b>pu</b>	internal pull-up when input
	<b>pd</b>	internal pull-down when input
	<b>P</b>	Power / Ground
	<b>A</b>	Analog

## CHAPTER 4 BLOCK DIAGRAM



**Table 4.1 – Functional Block Diagram**

### 4.1 OCCS USB PHY

The USB 2.0 Transceiver Macrocell is the analog circuitry that handles the low level USB protocol and signaling, and shifts the clock domain of the data from the USB 2.0 rate to one that is compatible with the general logic. On chip clock source and no need of 12MHz Crystal Clock input.

### 4.2 SIE

The Serial Interface Engine, which contains the USB PID and address recognition logic, and other sequencing and state machine logic to handle USB packets and transactions.

### 4.3 EPFIFO

Endpoint FIFO includes Control FIFO (FIFO0) and Bulk In/Out FIFO

- **EP0 FIFO** FIFO of control endpoint 0. It is 64-byte FIFO and used for endpoint 0 data transfer.
- **Interrupt FIFO** 64-byte depth FIFO of endpoint 3 for status interrupt
- **Bulk FIFO** It can be in the TX mode or RX mode:
  1. It contains ping-pong FIFO (512 bytes each bank) for transmit/receive data continuously.
  2. It can be directly accessed by micro-controller

### 4.4 MCU

8051 micro-controller inside.

- **8051 Core** Compliant with Intel 8051 high speed micro-controller
- **ROM** FW code on ROM
- **SRAM** Internal RAM area for MCU access

#### 4.5 MHE

- **MIF** Media Interface: SD/MMC
- **MCFIFO** It can access by MCU for memory card short data packet.

#### 4.6 Regulator

- **5V to 3.3V** Band Gap Regulator for stable voltage supply for USB PHY, PMOS
- **3.3V to 1.8V** For core logic and internal memory.

#### 4.7 PMOS

On-Chip power MOSFETs for memory card power

## CHAPTER 5 ELECTRICAL CHARACTERISTICS

### 5.1 Temperature Conditions

**Table 5.1 – Temperature Conditions**

Parameter	Value
Storage Temperature	-65°C to +150 °C
Operating Temperature	0°C to +70 °C

### 5.2 Operating Conditions

**Table 5.2 – Operating Conditions**

Parameter	Value
Supply Voltage	+4.75V to +5.25V
Ground Voltage	0V

### 5.3 DC Characteristics

**Table 5.3 - DC Characteristics**

Symbol	Parameter	Condition	Min.	Typ.	Max.	Unit
V5	Supply Voltage	5V power source	4.75	-	5.25	V
I <sub>NORMAL</sub>	Idle current		-	45	-	mA
I <sub>ACTIVE</sub>	Active current		-	50	-	mA
I <sub>SUS</sub>	Suspend current		-	0.3	-	mA
I <sub>CABLE</sub>	Cable mode current		-	0.15	-	mA

### 5.4 Memory Card Clock Frequency

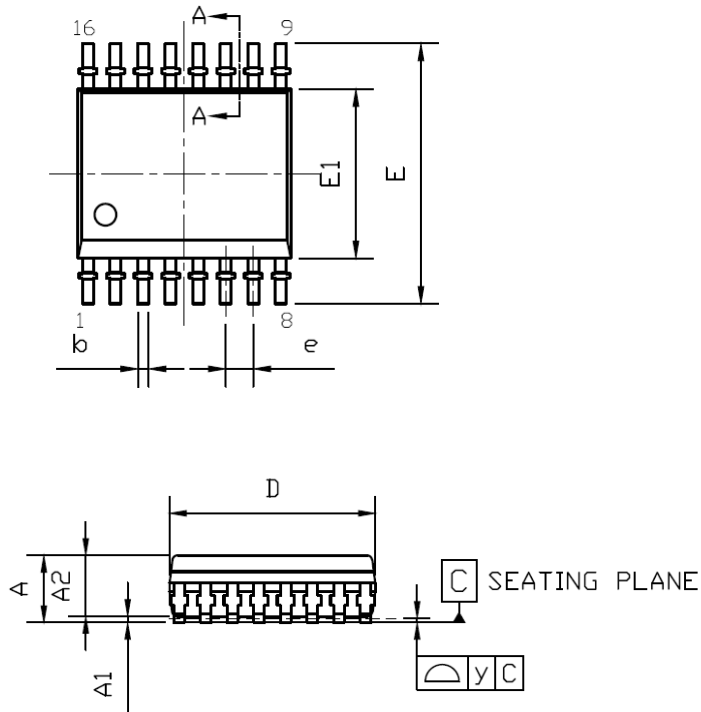
**Table 5.4 – SD/MMC Card Clock Frequency**

Parameter	Description	Max.	Unit
F <sub>ID</sub>	Clock frequency Identification Mode	187	KHz
F <sub>DS</sub>	Clock frequency Default Speed Mode	24	MHz
F <sub>HS</sub>	Clock frequency High Speed Mode	48	MHz
F <sub>UHS</sub>	Clock frequency Ultra High Speed Mode (SD only)	80	MHz

**Table 5.5 – MS PRO Card Clock Frequency**

<b>Parameter</b>	<b>Description</b>	<b>Max.</b>	<b>Unit</b>
F <sub>DS</sub>	Clock frequency Default Speed Mode	20	MHz
F <sub>MSP</sub>	Clock frequency MS PRO 4bit Mode	40	MHz
F <sub>MSPHG</sub>	Clock frequency MS PRO HG 4bit Mode	40	MHz

## CHAPTER 6 PACKAGE DIMENSION



SYMBOL	DIMENSION MM (MIL)		
	MIN.	NOM.	MAX.
A	---	---	1.75 (68.9)
A1	0.10 (3.9)	---	0.25 (9.8)
A2	1.30 (51.2)	1.40 (55.1)	1.50 (59.1)
b	0.20 (7.9)	---	0.30 (11.8)
b1	0.20 (7.9)	0.25 (9.8)	0.28 (11.0)
c	0.18 (7.1)	---	0.25 (9.8)
c1	0.18 (7.1)	---	0.23 (9.1)
D	4.90 (192.9) BSC		
e	0.635 (25.0) BSC		
E	6.00 (236.2) BSC		
E1	3.90 (153.5) BSC		
h	0.25 (9.8)	0.42 (16.5)	0.50 (19.7)
L	0.40 (15.7)	0.635 (25.0)	1.27 (50.0)
L1	1.05 (41.3) REF		
R1	0.15 (5.9)	0.20 (7.9)	0.25 (9.8)
R2	0.15 (5.9)	0.20 (7.9)	0.25 (9.8)
y	---	---	0.10 (3.9)
$\theta$	0°	4°	8°
$\theta1$	0°	---	---
$\theta2$	7° TYP		
$\theta3$	7° TYP		

NOTE: 1. REFER TO JEDEC MO-137  
2. ALL DIMENSIONS IN MILLIMETERS.

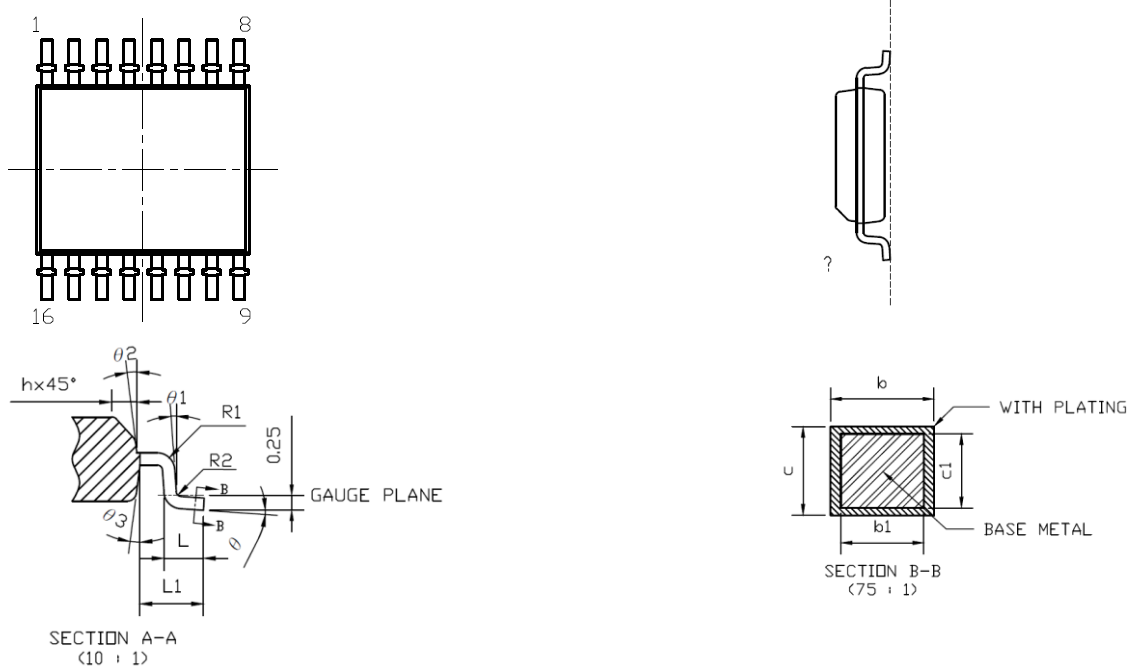


Figure 6.1 – SSOP 16 Pin Package (150 mil)



## CHAPTER 7 ORDERING INFORMATION

Table 7.1- Ordering Information

Part Number	Package	Green/Wire Material	Version	Status
GL823K-HCYXX	SSOP 16	Green Package + CU Wire	XX	Available