



Genesys Logic, Inc.

GL817

USB 2.0

MS / MS PRO / SD / MMC

Card Reader Controller

Datasheet

Preliminary Revision 1.0

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Revision History

Revision	Date	Description
1.0	01/24/2003	First draft release



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CHAPTER 1 GENERAL DESCRIPTION

The GL817 is a Bus Power certified USB 2.0 Flash Card Reader controller. It provides USB 2.0 High-Speed transmission to Memory Stick™ (MS), Memory Stick PRO™ (MS PRO), Secure Digital™ (SD), and Multi Media Card™ (MMC) interface in one chip. The GL817 integrates an advanced UTMI (USB 2.0 Transceiver Macrocell Interface) transceiver, SIE (Serial Interface Engine), FIFOs, 80C51, Control/status registers, and Secure Digital and Memory Stick hardware engine each.

The GL817 fully complies with Universal Serial Bus specification rev. 2.0, USB Storage Class specification ver.1.0, and flash card interface specification each. It can support MS/ MS PRO only, SD/ MMC only, and 2-in-1 flash card reader Applications. With only LQFP48 package, the GL817 is your best solution for low cost, high performance USB 2.0 MS/ SD/ MMC single flash card readers.



CHAPTER 2 FEATURES

- USB version 2.0 compliant
- Supports high speed (480 Mbps) and full speed (12 Mbps)
- Supports of Memory Stick card
- Driver-free feature for Windows Me/XP/2000, Mac OS, Linux
- Driver support for Windows 98/98SE
- Digital PLL creates 48 MHz clock from 12 MHz clock
- Integrated USB 2.0 Transceiver
- 8051 compatible 8-bit MCU core included
- Fully compliant with Secure Digital TM (SD) v1.0 Specification
- Fully compliant with Memory Stick TM (MS) v1.3 Specification
- Maximum packet size up to 512 bytes for USB bulk transfer
- Supports Suspend and Wake-up Resume
- Supports three types of transfer; control transfer, bulk transfer and interrupt transfer
- Bus-power USB 2.0 Device. Meets USB power specifications for bus-powered devices
- Built in 2K bytes + 256 bytes internal data RAM
- Built in 24K bytes internal ROM memory
- Supports VID and PID update
- 3.0 ~ 3.6 V supply
- 48 pin LQFP package is available

CHAPTER 3 BLOCK DIAGRAM

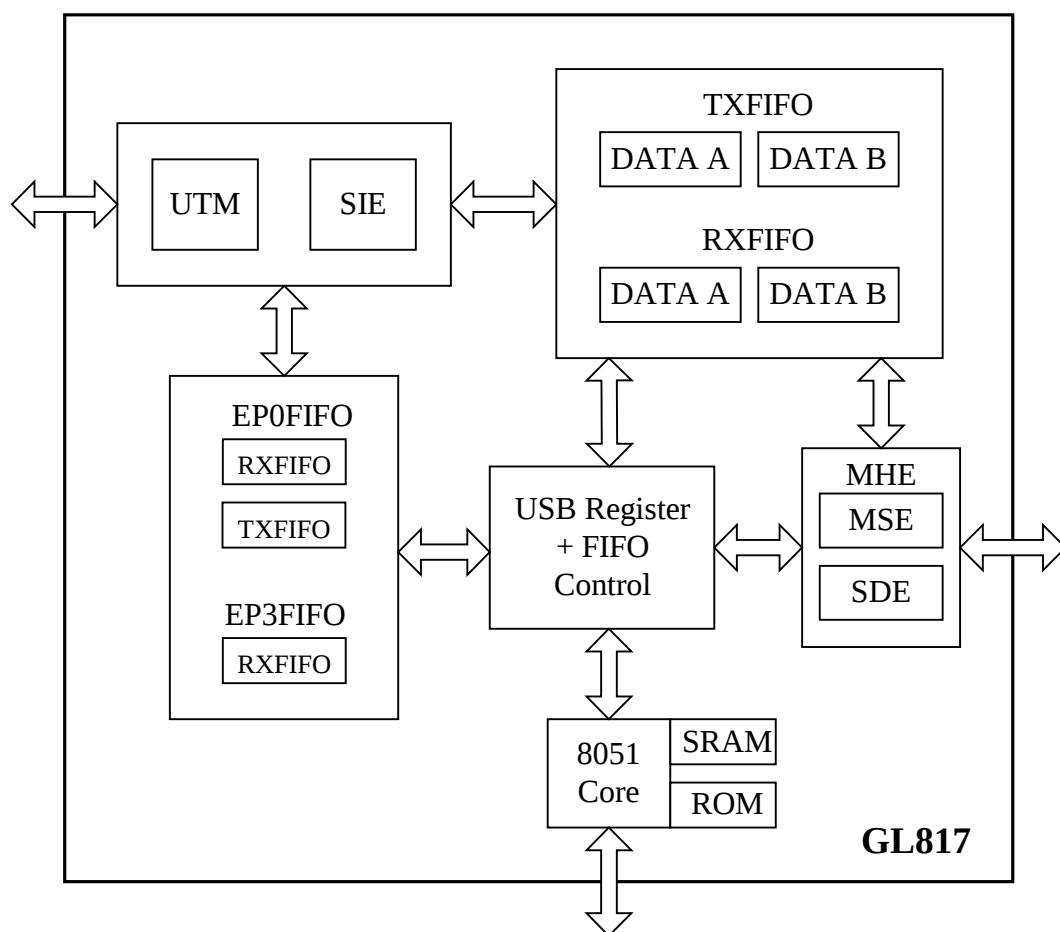


Figure 3.1 - Block Diagram

CHAPTER 4 PIN ASSIGNMENT

4.1 Pinouts

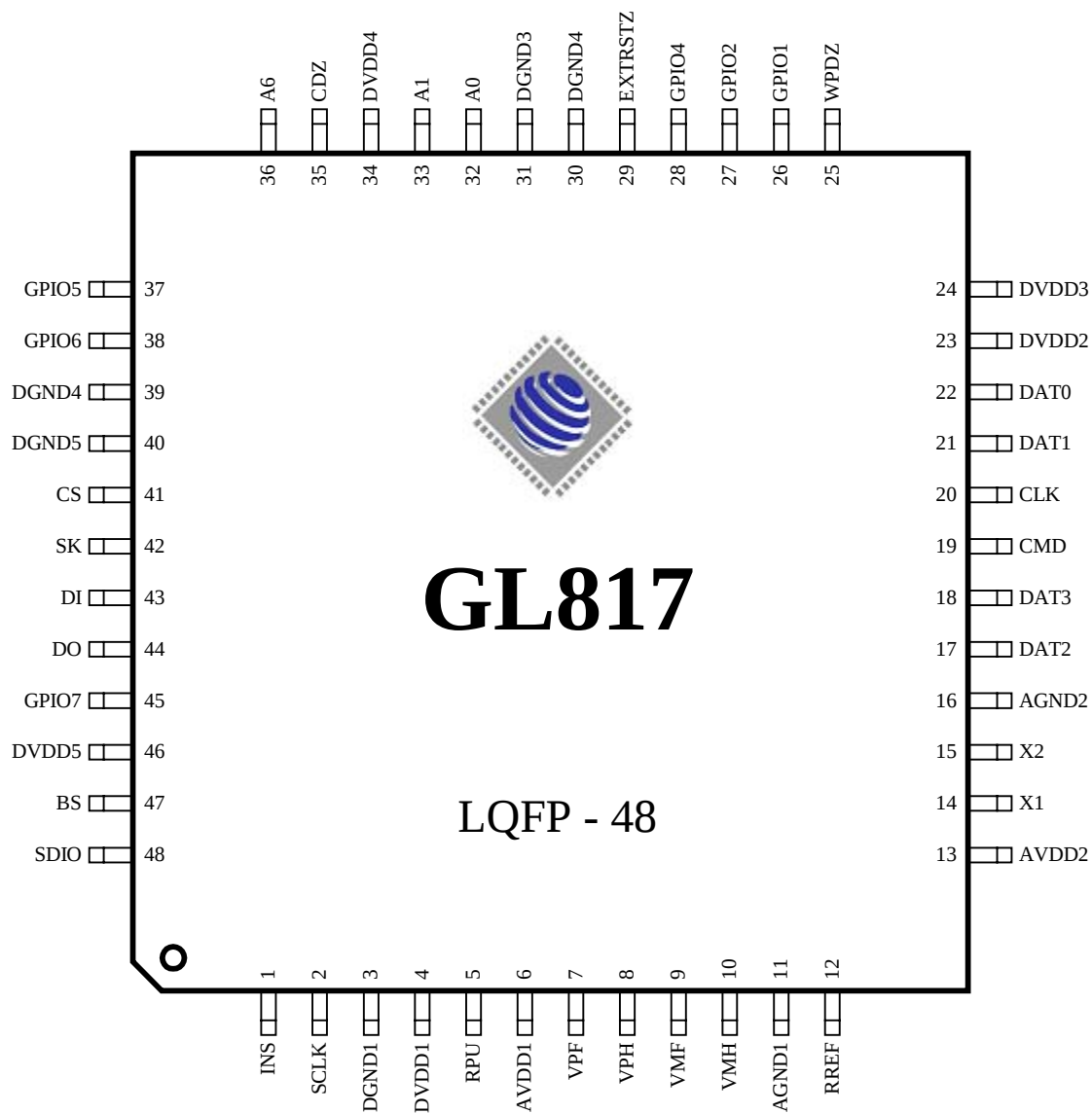


Figure 4.1 - Pinout Diagram

4.2 Pin List

Table 4.1 - Pin List

Pin#	Pin Name	Type	Pin#	Pin Name	Type	Pin#	Pin Name	Type	Pin#	Pin Name	Type
1	INS	B/I	13	AVDD2	P	25	WPDZ	B/I	37	GPIO5	B
2	SCLK	O	14	X1	I	26	GPIO1	B	38	GPIO6	B
3	PGND1	P	15	X2	B	27	GPIO2	B	39	DGND2	P
4	PVIO1	P	16	AGND2	P	28	GPIO4	B	40	DGND2	P
5	RPU	A	17	DAT2	B/S	29	EXTRST	I	41	CS	O
6	AVDD1	P	18	DAT3	B/S	30	DGND1	P	42	SK	O
7	VPF	B	19	CMD	B/S	31	PGND2	P	43	DI	O
8	VPH	B	20	CLK	O	32	A0		44	DO	I/SO
9	VMF	B	21	DAT1	B/S	33	A1	O	45	GPIO7	B
10	VMH	B	22	DAT0	B/S	34	PVIO2	P	46	DVDD2	P
11	AGND1	P	23	DVDD1	P	35	CDZ	B/I	47	BS	O
12	RREF	A	24	DVDD1	P	36	A6	O	48	SDIO	B

4.3 Pin Descriptions

Table 4.2 - Pin Descriptions

USB Interface			
Pin Name	Pin#	Type	Description
RPU	5	A	USB resistor pull up
VPF	7	B	FS D+
VPH	8	B	HS D+
VMF	9	B	FS D-
VMH	10	B	HS D-
RREF	12	A	Reference resistor
X1	14	I	Crystal input
X2	15	B	Crystal input
EXTRSTZ	29	I (pu)	External reset
A0	32	O	Address 0
A1	33	O	Address 1
A6	36	O	Address 6



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Memory Interface			
Pin Name	Pin#	Type	Description
INS	1	B/I (pu)	Memory Stick INS
SCLK	2	O	Memory Stick SCLK
DAT2	17	B/SO (pu)	SD DAT2
DAT3	18	B/SO (pu)	SD DAT3
CMD	19	B/SO (pu)	SD/MMC CMD
CLK	20	O	SD/MMC CLK
DAT1	21	B/SO (pu)	SD DAT1
DAT0	22	B/SO (pu)	SD/MMC DAT0
WPDZ	25	B/I (pu)	SD/MMC Write Protect Detect
CDZ	35	B/I (pu)	SD/MMC Card Detect
BS	47	O	Memory Stick BS
SDIO	48	B (pd)	Memory Stick SDIO

EEPROM Interface			
Pin Name	Pin#	Type	Description
CS	41	O	93C86 CS
SK	42	O	93C86 Clock
DI	43	O	93C86 Data in
DO	44	I/SO (pd)	93C86 Data out

Miscellaneous Interface			
Pin Name	Pin#	Type	Description
GPIO1	26	B (odpu)	GPIO1
GPIO2	27	B (odpu)	GPIO2
GPIO4	28	B (odpu)	GPIO4
GPIO5	37	B (odpu)	GPIO5
GPIO6	38	B (odpu)	GPIO6
GPIO7	45	B (odpu)	GPIO7



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Power / Ground			
Pin Name	Pin#	Type	Description
PGND1	3	P	GND #1
PVIO1	4	P	VDD #1
AVDD1	6	P	Analog VDD #1
AGND1	11	P	Analog GND #1
AVDD2	13	P	Analog VDD #2
AGND2	16	P	Analog GND #2
DVDD1	23,24	P	Digital VDD #1
DGND1	30	P	Digital GND #1
PGND2	31	P	GND #2
PVIO2	34	P	VDD #2
DGND2	39,40	P	Digital GND #2
DVDD2	46	P	Digital VDD #2

Notation:

Type	O	Output
	I	Input
	B	Bi-directional
	B/I	Bi-directional, default input
	B/O	Bi-directional, default output
	P	Power / Ground
	A	Analog
	SO	Automatic output low when suspend
	pu	Internal pull up
	pd	Internal pull down
	odpu	Open drain with internal pull up



CHAPTER 5 FUNCTIONAL DESCRIPTION

1. UTM (USB2.0 Transceiver Macro)

This block handles the low level USB protocol and signaling. This includes features such as; data serialization and deserialization, bit stuffing and clock recovery and synchronization.

2. SIE (Serial Interface Engine)

This block contains the USB PID and address recognition logic, and other sequencing and state machine logic to handle USB packets and transactions.

3. Control FIFO (Endpoint 0 FIFO) FIFO of control endpoint 0.

It is composed by TX0FIFO and RX0FIFO, each is 64-byte FIFO, and it is used for endpoint 0 data transfer.

4. Interrupt FIFO (Endpoint 3 FIFO) 8-byte depth FIFO of endpoint 3 for status interrupt

5. Bulk FIFO (TXFIFO, RXFIFO)

It is composed by TXFIFO and RXFIFO for transmit and receive, respectively, and supports different mode.

TXFIFO

- A. It contains DATA FIFO A, B (512 bytes each) for transmit data continuously.
- B. DATA-A, B can be directly accessed by uC.
- C. Normally SIE popes data, MHE pushes data for DATA A/B.
- D. Support transmit mode. SIE won't transmit data filled in TXFIFO before uC checks data integrity complete.

RXFIFO

- A. It contains DATA FIFO A, B (512 bytes each) for transmit data continuously.
- B. DATA-A and DATA-B can be directly accessed by uC
- C. Normally MHE popes data, SIE pushes data for DATA A/B

6. MHE (Media Interface)

MSE (Memory Stick Engine)
SDE (Secure Digital Engine)

7. 8051 Core

8051 compatible 8-bit MCU core.

8. USB Registers / FIFO Control

This is a register space to store information of status and to control the functions of GL817 by uC.



CHAPTER 6 ELECTRICAL CHARACTERISTICS

6.1 Absolute Maximum Ratings

Table 6.1 - Absolute Maximum Ratings

Parameter	Value
Ambient Temperature under bias (T_A)	0°C to 70°C
Supply Voltage	+3.0V to +3.6V
Ground Voltage	0V
FOSC	12 MHz $\pm$ 100ppm

6.2 DC Characteristics

Table 6.2 - DC Characteristics

Symbol	Parameter	Condition	Min.	Typ.	Max.	Unit
V_{CC}	Supply Voltage		3.0	3.3	3.6	V
V_{IH}	Input High Voltage		2.6		5	V
V_{IL}	Input Low Voltage		0.0		0.7	V
I_I	Input Leakage current	$0 < V_{IN} < V_{CC}$				μA
V_{OH}	Output High Voltage		3.0			V
V_{OL}	Output Low Voltage				0.2	V
I_{OH}	Output Current High					mA
I_{OL}	Output Current Low					mA
C_{IN}	Input Pin Capacitance				2.0	pF
I_{SUSP}	Suspend current	1.5K external pull-up included				μA
I_{CC}	Supply current	Connect to USB with 8051 operating				mA

6.3 AC Characteristics

6.3.1 Memory Stick

```

BS      | | r h h h h h h h h h h h h h h f | | | | | | | | | |
SCLK    | | | r f r f r f r f r f r f r f r f r f r f r f
SDIO    d d d d x d d d d d d d d d d d d d d x d d d d d d d d
  
```

Figure 6.1 - Timing Diagram of MS Interface

Parameter	Description	Mode	Typ	Unit	Remark
Fck	SCLK frequency	0	1.5M	Hz	
		1	6M		
		2	15M		
		3	24M		

6.3.2 Secure Digital / MultiMedia Card

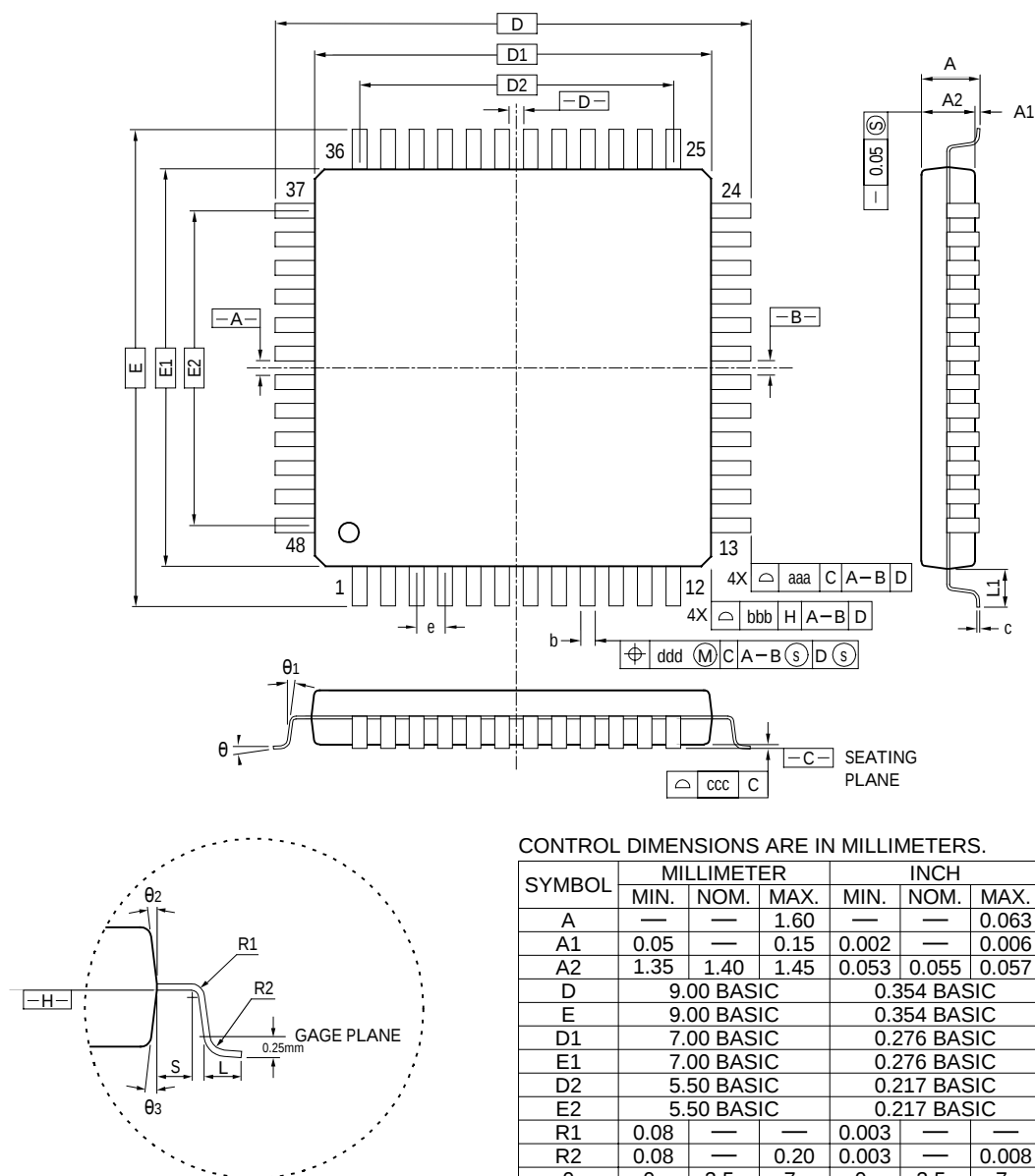
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CMD     d d d x d x d x d d d d d d d d d d d d d d x d d d d
CLK     r f r f r f r f r f r f r f r f r f r f r f r f
DAT     d d d d d d d d d d d d d x d d d d d d d d d d x d d d d
  
```

Figure 6.2 - Timing Diagram of SD / MMC Interface

Parameter	Description	Mode	Typ	Unit	Remark
Fck	CLK frequency	0	375K	Hz	
		1	6M		
		2	15M		
		3	24M		

CHAPTER 7 PACKAGE DIMENSION



NOTES :

1. DIMENSIONS D1 AND E1 DO NOT INCLUDE MOLD PROTRUSION. ALLOWABLE PROTRUSION IS 0.25 mm PER SIDE. D1 AND E1 ARE MAXIMUM PLASTIC BODY SIZE DIMENSIONS INCLUDING MOLD MISMATCH.
2. DIMENSION b DOES NOT INCLUDE DAMBAR PROTRUSION. ALLOWABLE DAMBAR PROTRUSION SHALL NOT CAUSE THE LEAD WIDTH TO EXCEED THE MAXIMUM b DIMENSION BY MORE THAN 0.08mm. DAMBAR CAN NOT BE LOCATED ON THE LOWER RADIUS OR THE FOOT. MINIMUM SPACE BETWEEN PROTRUSION AND AN ADJACENT LEAD IS 0.07mm.

CONTROL DIMENSIONS ARE IN MILLIMETERS.

SYMBOL	MILLIMETER			INCH		
	MIN.	NOM.	MAX.	MIN.	NOM.	MAX.
A	—	—	1.60	—	—	0.063
A1	0.05	—	0.15	0.002	—	0.006
A2	1.35	1.40	1.45	0.053	0.055	0.057
D	9.00 BASIC			0.354 BASIC		
E	9.00 BASIC			0.354 BASIC		
D1	7.00 BASIC			0.276 BASIC		
E1	7.00 BASIC			0.276 BASIC		
D2	5.50 BASIC			0.217 BASIC		
E2	5.50 BASIC			0.217 BASIC		
R1	0.08	—	—	0.003	—	—
R2	0.08	—	0.20	0.003	—	0.008
θ	0	3.5	7	0	3.5	7
θ ₁	0	—	—	0	—	—
θ ₂	11	12	13	11	12	13
θ ₃	11	12	13	11	12	13
c	0.09	—	0.20	0.004	—	0.008
L	0.45	0.60	0.75	0.018	0.024	0.030
L1	1.00 REF			0.039 REF		
S	0.20	—	—	0.008	—	—
b	0.17	0.20	0.27	0.007	0.008	0.011
e	0.50 BASIC			0.020 BASIC		
TOLERANCES OF FORM AND POSITION						
aaa	0.20			0.008		
bbb	0.20			0.008		
ccc	0.08			0.003		
ddd	0.08			0.003		

Figure 7.1 - GL817 48 Pin LQFP Package