

# IS903

## USB3.0 Flash Disk Controller

# Specification



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# 1. Description

IS903 is the USB-3.0 interface Nand Flash Controller. With flexible firmware code supporting, IS903 can support various flash technology including 4k / 8k / 16k page SLC / MLC by different 2xnm / 2ynm / 1xnm process for major flash vendors.

## 2. Features

### 2.1 Flash support

- 2xnm, 2ynm, 1xnm process Flash from various vendors
- One Channel / two channel data bus by small footprint package
- Up to 4 CEs per channel to support max. 8 Flash CEs
- SLC / MLC types Nand Flash supported
- ONFI 2.1 spec. interface supported
- Toggle DDR interface supported

### 2.2 USB interface

- Compliant with USB 3.0 spec. version 1.0
- Compliant with USB 2.0 spec. backward compatible with USB1.1
- Compliant with USB Mass Storage Class spec. version 1.0

### 2.3 ECC protect 43 bit by 1K bytes

### 2.4 High performance 1T 8051 with hardware acceleration DMA

### 2.5 F/W off-load engine embedded

### 2.6 1.2V low power consumption design

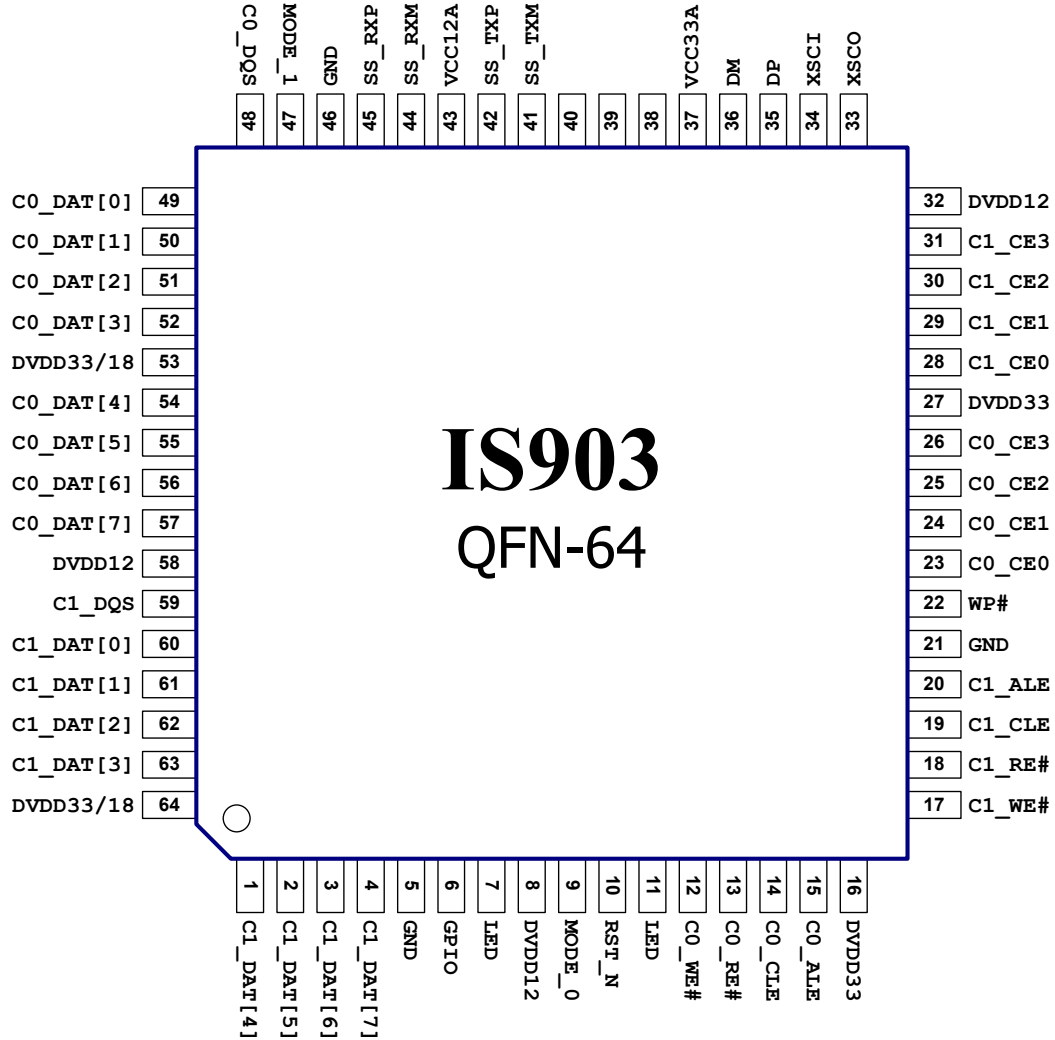
### 2.7 LED indicator to show link status and r/w traffic

### 2.8 Customized VID/ PID with serial number

### 2.9 30Mhz Crystal

# 3. Pin Assignment

## 3.1 QFN-64 Pin Assignment



## Pin Descriptions ( QFN-64 )

Pin Name	Pin# (62)	Pin# (64)	Pull up/down	Attribute	Description
C1_DAT[4]	C2	1	down*1	I/O	Flash Channel-1 data
C1_DAT[5]	D1	2	down*1	I/O	Flash Channel-1 data
C1_DAT[6]	E2	3	down*1	I/O	Flash Channel-1 data
C1_DAT[7]	F1	4	down*1	I/O	Flash Channel-1 data
GND	G2	5		GND	GND
GPIO	H1	6	None	O	reserved
LED_1	-	7	None	O	LED to show link status and r/w traffic
DVDD12	J2	8		PWR	1.2V core power supply
MODE0	K1	9	down	I	Test mode pin, tie to GND
RST_N	L2	10	up	I	Chip reset, low active
LED_0	M1	11	None	O	LED to show link status and r/w traffic
C0_WE#	N2	12	None	O	Flash Channel-0 WE#
C0_RE#	P1	13	None	O	Flash Channel-0 RE#
C0_CLE	R2	14	None	O	Flash Channel-0 Command latch
C0_ALE	T1	15	None	O	Flash Channel-0 Address latch
DVDD33	U2	16		PWR	3.3V IO power supply
C1_WE#	V3	17	None	O	Flash Channel-1 WE#
C1_RE#	U4	18	None	O	Flash Channel-1 RE#
C1_CLE	V5	19	None	O	Flash Channel-1 Command latch
C1_ALE	U6	20	None	O	Flash Channel-1 Address latch
GND	-	21		GND	GND
WP#	V7	22	None	O	Flash write protection
C0_CE0	U8	23	None	O	Flash Channel-0 chip enable 0
C0_CE1	V9	24	None	O	Flash Channel-0 chip enable 1
C0_CE2	U10	25	None	O	Flash Channel-0 chip enable 2
C0_CE3	V11	26	None	O	Flash Channel-0 chip enable 3
DVDD33	U12	27		PWR	3.3V IO power supply
C1_CE0	V13	28	None	O	Flash Channel-1 chip enable 0

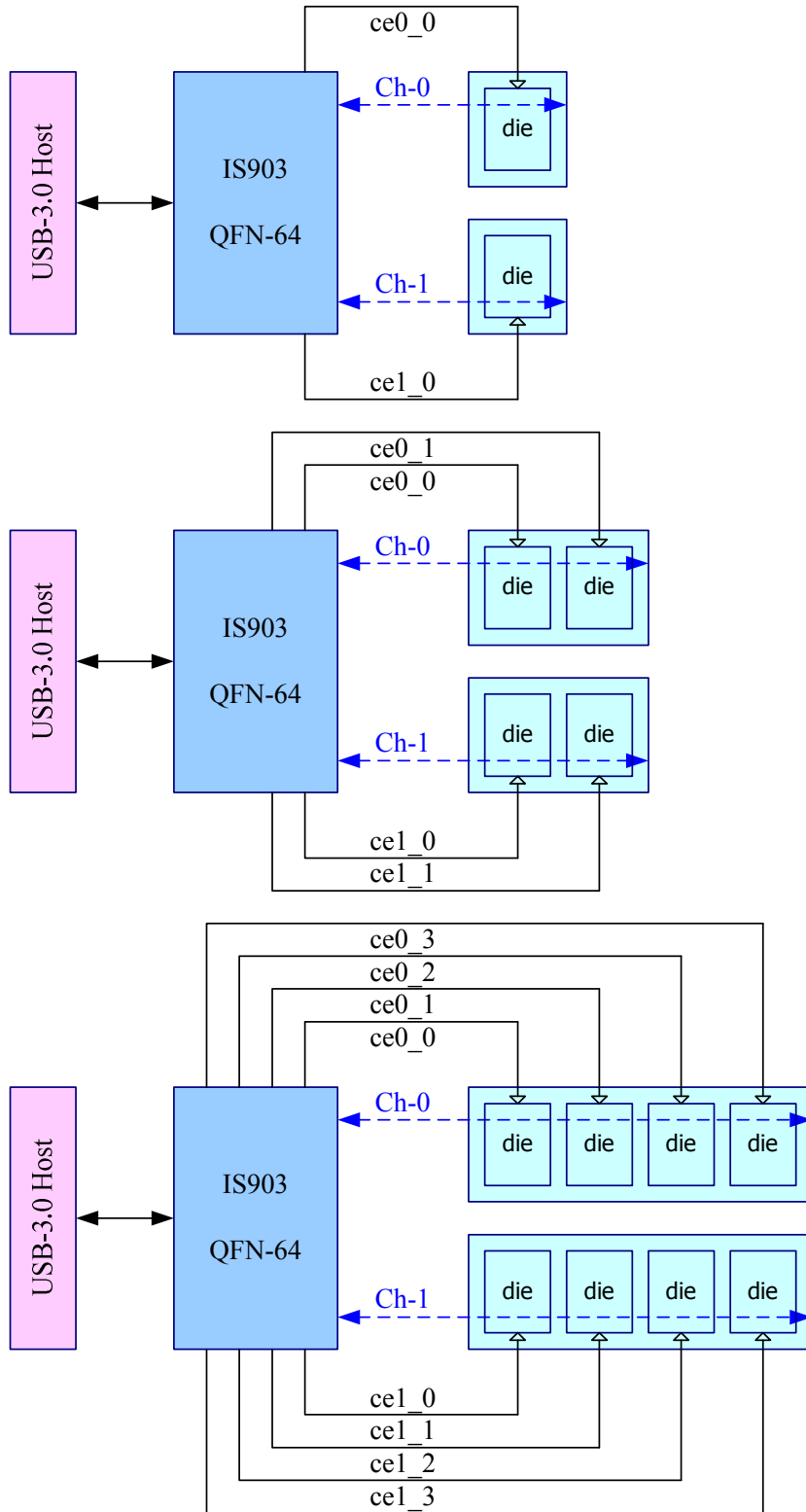
C1_CE1	V15	29	None	O	Flash Channel-1 chip enable 1
C1_CE2	U14	30	None	O	Flash Channel-1 chip enable 2
C1_CE3	V17	31	None	O	Flash Channel-1 chip enable 3
DVDD12	U16	32		PWR	1.2V core power supply
XSCO	U18	33		O	Crystal 30Mhz output
XSCI	T17	34		I	Crystal 30Mhz input
DP	R18	35		I/O	USB 2.0 differential pin plus
DM	P17	36		I/O	USB 2.0 differential pin minus
VCC33A	N18	37		PWR	3.3V analog power supply
RREF	M17	38		I	Connect the external reference resistor (12.1 k $\Omega$ $\pm$ 1%) to the analog ground
SSCAP	L18	39		I	Connect to a 2.2nF capacitor, with proper low noise handle
VCC128	K17	40		I	Connect to a 4.7uF capacitor, with proper low noise handle
SS_TXM	J18	41		O	USB 3.0 differential transmit pin negative
SS_TXP	H17	42		O	USB 3.0 differential transmit pin positive
VCC12A	G18	43		PWR	1.2V analog power supply
SS_RXM	F17	44		I	USB 3.0 differential receive pin negative
SS_RXP	E18	45		I	USB 3.0 differential receive pin positive
GND	D17	46		GND	GND
MODE1	C18	47	down	I	Test mode pin, tie to GND
C0_DQS	B17	48	down*1	I/O	Flash Channel-0 strobe data
C0_DAT[0]	A16	49	down*1	I/O	Flash Channel-0 data
C0_DAT[1]	B15	50	down*1	I/O	Flash Channel-0 data
C0_DAT[2]	A14	51	down*1	I/O	Flash Channel-0 data
C0_DAT[3]	B13	52	down*1	I/O	Flash Channel-0 data
DVDD33	A12	53		PWR	3.3V IO power supply
C0_DAT[4]	B11	54	down*1	I/O	Flash Channel-0 data
C0_DAT[5]	A10	55	down*1	I/O	Flash Channel-0 data
C0_DAT[6]	B9	56	down*1	I/O	Flash Channel-0 data

C0_DAT[7]	A8	57	down*1	I/O	Flash Channel-0 data
DVDD12	B7	58		PWR	1.2V core power supply
C1_DQS	A6	59	down*1	I/O	Flash Channel-1 strobe data
C1_DAT[0]	B5	60	down*1	I/O	Flash Channel-1 data
C1_DAT[1]	A4	61	down*1	I/O	Flash Channel-1 data
C1_DAT[2]	B3	62	down*1	I/O	Flash Channel-1 data
C1_DAT[3]	A2	63	down*1	I/O	Flash Channel-1 data
DVDD33	B1	64		PWR	3.3V IO power supply

Note - \*1 : Default as pull-down , but it is released when R/W operating .

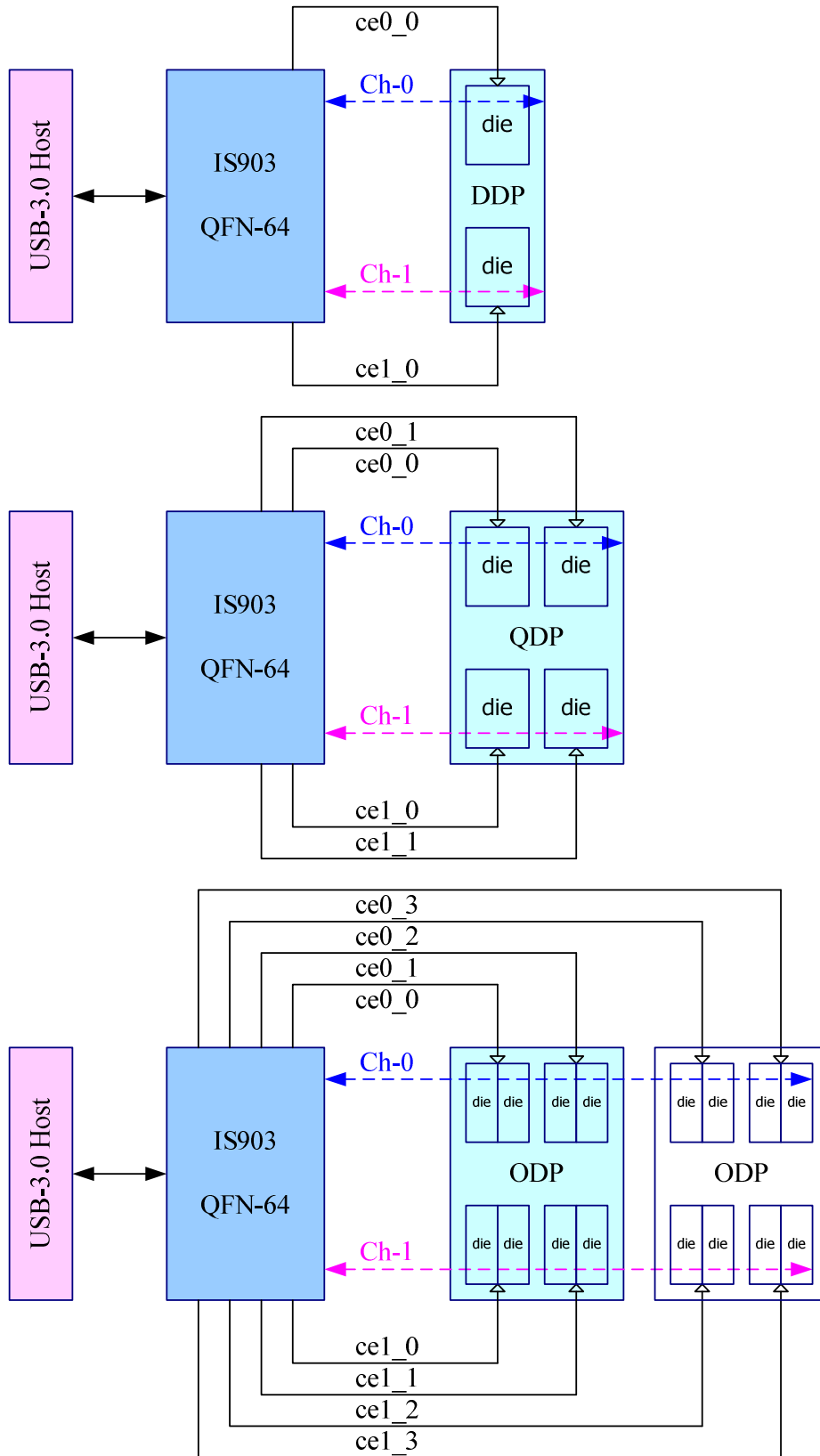
# 4. System Application Configurations

## 4.1 QFN-64 configuration example





## 4.2 QFN-64 configuration examples



## 5. Electrical Characteristics

### 5.1 Absolute Maximum Ratings

Parameter	Symbol	Min.	Max.	Unit
Storage Temperature	T <sub>storage</sub>	-40	150	C
3.3V supply power	V <sub>in33</sub>	-0.3	3.63	V
1.2V supply power	V <sub>in12</sub>	-0.3	1.32	V

### 5.2 Operating Conditions

Parameter	Symbol	Min.	Max.	Unit
Operating Temperature	T <sub>operating</sub>	0	70	C
USB VBUS	VBUS	3.3	5.5	V
Analog 3.3V power	VCC33A	3.15	3.45	V
Analog 1.2V power	VCC12A	1.14	1.26	V
Digital 3.3V power	DVDD33	2.97	3.63	V
Digital 1.2V power	DVDD12	1.08	1.32	V

### 5.3 Reference Clock Source and Crystal

#### Specification

Parameter	Symbol	Min.	Typ.	Max.	Unit
Reference clock	XSCI		30		Mhz
Crystal freq. tolerance		-50		+50	ppm
USB reference resistor	RREF	-1%	12.1	+1%	KΩ

## 5.4 DC Characteristics

Parameter	Symbol	Min.	Typ.	Max.	Unit
USB bus power	VBUScurrent			900	mA
Analog 3.3V power U3	V33A_cur_u3		TBD		mA
Analog 1.2V power U3	V12A_cur_u3		TBD		mA
Analog 3.3V power U2	V33A_cur_u3		TBD		mA
Analog 1.2V power U2	V12A_cur_u3		TBD		mA
Analog 3.3V Suspend	V33A_cur_sus		TBD		mA
Analog 1.2V Suspend	V12A_cur_sus		TBD		mA
Digital 3.3V power	DVDD33_cur		TBD		mA
Digital 1.2V power	DVDD12_cur		TBD		mA

## 5.5 DC Characteristics of 3.3V IO

Parameter	Symbol	Min.	Typ.	Max.	Unit
Digital 3.3V power	DVDD33	2.97	3.3	3.63	mA
Input low voltage	Vil			0.8	V
Input high voltage	Vih	2.0			V
Output low voltage	Vol			0.4	V
Output high voltage	Voh	2.4			V
Pull-up resistance	Rpu	40	75	190	KΩ
Pull-down resistance	Rpd	30	75	190	KΩ

# 7. Package Information

## 7.1 QFN-64 package outline dimension

