Winbond W55Fxxx

Serial Flash Memory

Data Sheet

Winbond
Electronics Corp.

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1. GENERAL DESCRIPTION

The W55Fxx is a serial flash memory series that is typically used as the contents upgradeable memory device of Internet toy applications, or applications with W51300 (*VoiceRecorder*^{TM} controller) for voice message storage device. Besides that, W55Fxx can still be the W551Cxxx (Serial Voice Memory) program or data emulator. The single voltage supply eliminates the need for an extra pump circuit during flash memory cells programming and erasing.

1.1 W55Fxx Product Selection Guide

W55Fxx Serial Flash Memory is used to store pre-determined data or contents need to be upgradeable applications. To communicate with W55Fxx in serial data mode, the connection interface total pin counts can be reduced to five pins only. The following table is shown the product selection guide of part number vs. memory density.

PART #	W55F01*	W55F01B*	W55F05B*	W55F10A	W55F10B*	W55F10BG	W55F20
Density	128K bits	128K bits	512K bits	1M bits	1M bits	1M bits	2M bits

Notice:

1. * indicated prohibits cascade application just for single chip application only.

2. W55F10BG is lead free package version.

3. Programming voltage: W55Fxxx for high voltage (5Vmin.).

2. FEATURES

2.1 W55Fxx Features Description

- Provides CLK, ADDR, and DATA connection interface pins to communicate with other controllers such as Winbond *PowerSpeech*[TM], *BandDirector*[TM], *ViewTalk*[TM], ……. Series.
- 128K/512K/1M/2M bits memory density available.
- Directly cascadable for longer duration applications (except for W55F01 and W55F05B).
- Fast frame-write operation
  - ➢ Frame (32 bits) program cycle time: **400 μS (typ.)**
- Fast whole-chip-erase duration: **50 mS (max.)**
- Read data access time: **500 nS (max.)**
- Program/erase cycles: **100,000 (typ.)**
- Programming voltage: 5V min.
- Data retention: **10 years (typ.)**
- Low power consumption:
  - ➢ Operating: **5 mA (typ.)**
  - ➢ Standby: **2 μA (typ.)**
- 8L PDIP Lead free package for W55F10A and W55F10B only.

2.2 W55Fxx Pin Configuration & Description

Pin Configuration

| EOP	1	8	MODE
CTRL	2	7	VDD
VSS	3	6	CLK
ADDR	4	5	DATA
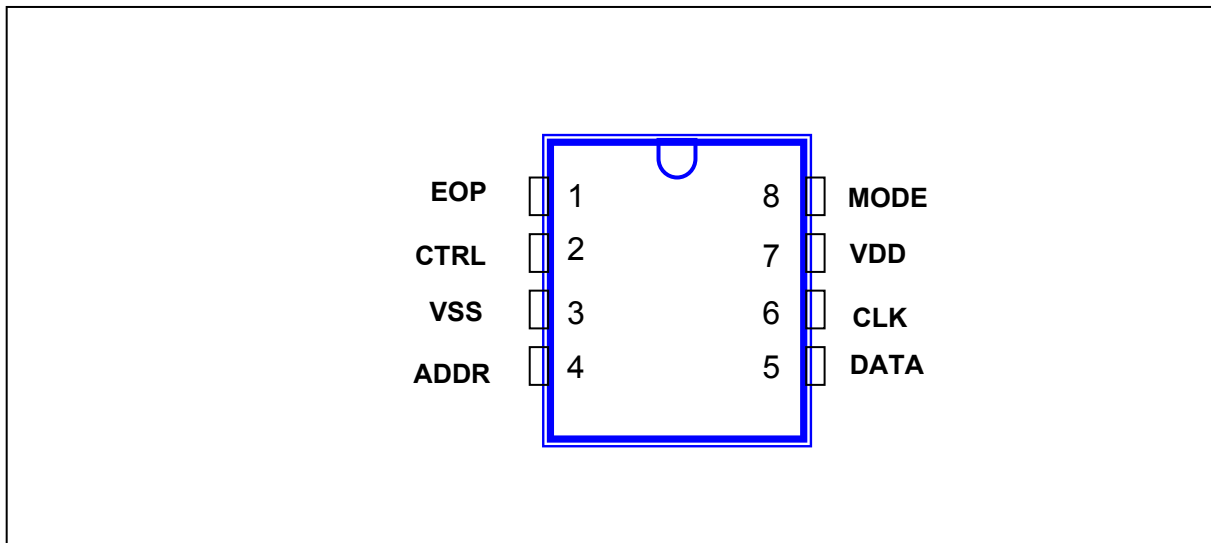
Pin Description

NO.	PIN NAME	I/O	DESCRIPTION
1	EOP	O	End of process signal output.
2	CTRL	I	Enable signal for program and erase operations when MODE = 0, Input clock for mode counter when MODE = 1.
3	VSS	I	Ground
4	ADDR	I	Input clock for start adress shift-in.
5	DATA	I/O	Bi-directional data line.
6	CLK	I	Input clock for data write-in and read-out.
7	VDD	I	Positive voltage supply.
8	MODE	I	Mode select control pin.

2.3   W55Fxx System Block Diagram

W55Fxx Block Diagram
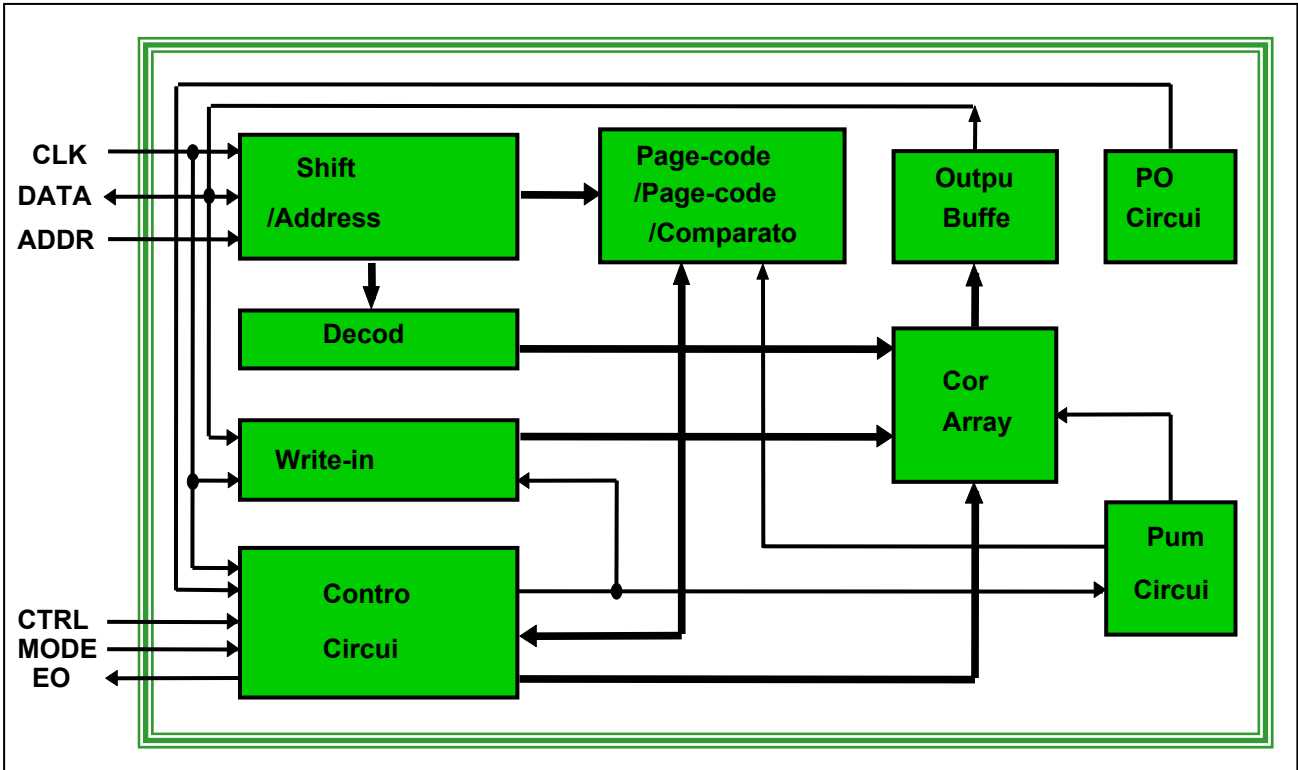
3. ELECTRICAL CHARACTERISTICS

3.1 W55Fxx Absolute Maximum Ratings

PARAMETER	SYMBOL	CONDITION	RATED VALUE	UNIT
Operating Temp.	TOPR	-	0 to +70	°C
Storage Temp.	TSTG	-	-65 to +150	°C
Power Supply	VDD−VSS	-	-0.3 to +7.0	V
Input DC Voltage	VDC	All pins	-0.5 to VDD +1.0	V
Transient Voltage (< 20 nS)	VTRAN	All pins	-1.0 to VDD +1.0	V

Note: Exposure to conditions beyond those listed under Absolute Maximum Ratings may adversely affect the life and reliability of the device.

3.2 W55Fxx DC Characteristics

(V_{DD} = 5V, VSS = 0V, TA = 25° C)

PARAMETER		SYMBOL	CONDITION	LIMITS			UNIT
				MIN.	TYP.	MAX.	
Operating voltage		VDD	Read mode	2.4	4.5	5.5	V
Programming voltage		VDD	Erase & Write Mode	5	-	5.5	V
Standby current		ISB	All inputs = GND DATA & EOP open	-	2	4	µA
Operating current		IOP	In read mode DATA & EOP open FOSC = 1 MHz	-	5	10	mA
Input voltage	High	VIH	All input pins	2.0		VDD	V
	Low	VIL		-0.3	-	0.8	V
Output current	Sink	IOL	VOL = 0.5V	2.5	5	-	mA
	Drive	IOH	VOH = 4.0V	-2.5	-5	-	mA
Input leakage current of CTRL, MODE		ILI1	VIN = 4.5V	-	-	4.5	µA
Input leakage current of DATA		ILI2	VIN = 0V	-	-	-4.5	µA

3.3 W55Fxx AC Characteristics

(VDD = 5V, VSS = 0V, TA = 25° C)

PARAMETER	SYMBOL	CONDITIONS	MIN.	TYP.	MAX.	UNIT
MODE pulse width	TMP	-	1	-	-	μS
CTRL pulse width	TWP	Page coding mode	400	-	2000	μS
Clock frequency of ADDR	FADDR	-	-	-	1	MHz
Clock frequency of CLK	FCLK	-	-	-	1	MHz
Clock frequency of CTRL	FCTRL	-	-	-	1	MHz
Interval between ADDR end & CLK begin	TI	Read/Write mode	1	-	-	μS
Interval between CLK & CTRL	TGCC	Write mode	1	-	-	μS
Interval between ADDR & CTRL	TGCA	Page coding mode	1	-	-	μS
Interval between addressing end & block-erase begin	TAE	Block erase mode	1	-	-	μS
Interval between MODE rising edge & CTRL clock begin	TMB	Mode selection	500	-	-	nS
Interval between CTRL clock end & MODE falling edge	TME	Mode selection	500	-	-	nS
Interval between MODE falling edge & another pin active	TGM	-	1	-	-	μS
Data access time	TRA	Read mode	-	-	500	nS
Data set up time	TWS	Write mode	250	-	-	nS
	TAS	-	250	-	-	nS
Data hold time	TRH	Read mode	0	-	-	nS
	TWH	Write mode	10	-	-	nS
	TAH	-	10	-	-	nS
Programming duration	TPR	Write mode	400	-	2000	μS
Whole-chip-erase time	TWE	Whole-chip-erase mode	45	-	50	mS
Block-erase time	TBE	Block-erase mode	40	-	45	mS

4. TIMING WAVEFORM

4.1 W55Fxx Timing Waveform

❑ **Read**

CLK

DATA

1/ CL

T_R T_R

❑ **Write**

CLK

DATA

1/ CL

T_W T_W

❑ **Address   Shift-in**

ADDR

DATA

1/ ADD

T_A T_A

❑ **Mode   Select**

MODE

CTRL

T_M   1/ CTRL   T_{ME}

❑ **Page-code Cell Read Out**

CTRL

DATA

1/ CTRL

T_R T_R

Note: The duty cycle of any clock is 50%.
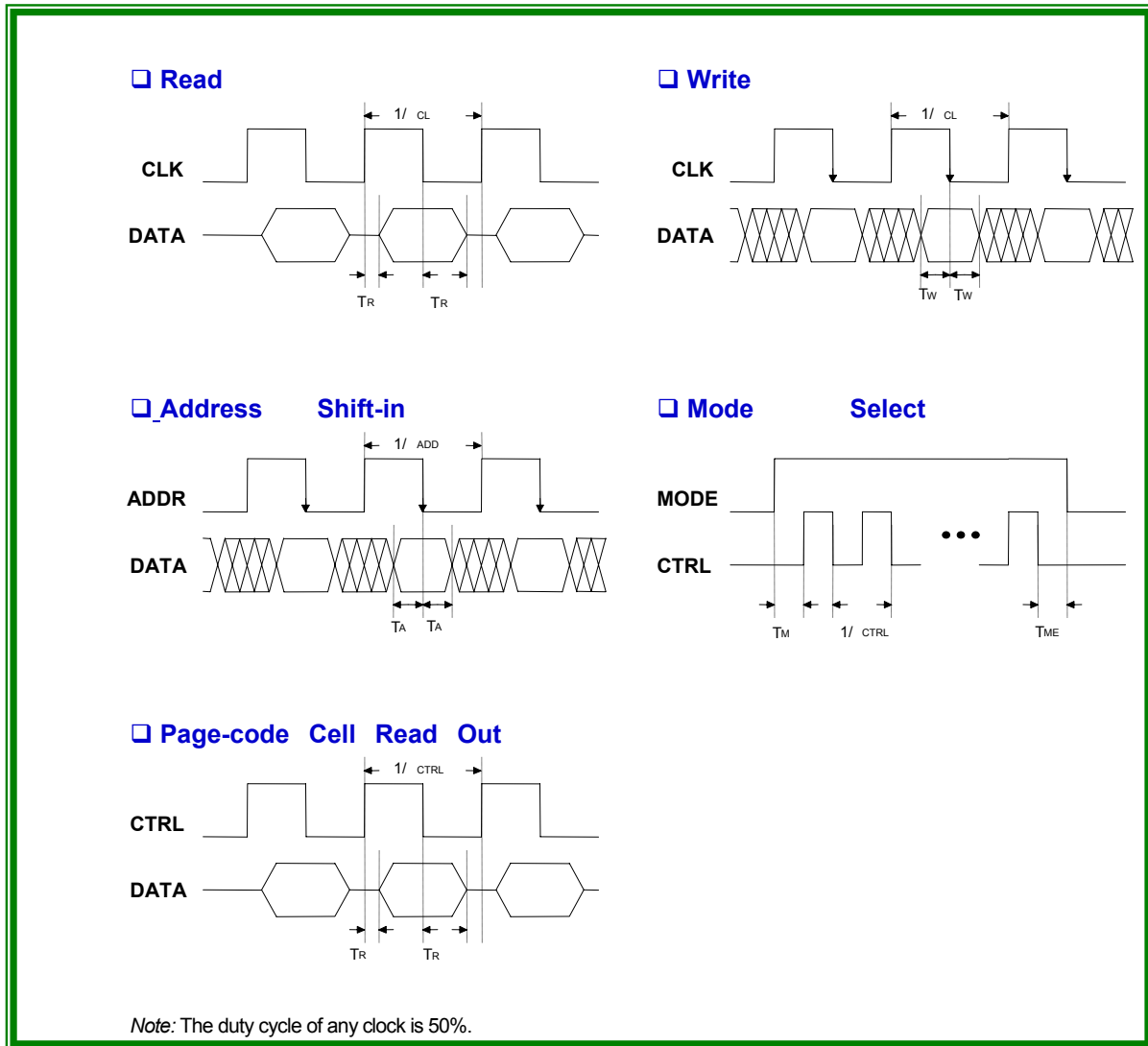
5. APPLICATIONS

5.1   W55Fxx Applications

☐ **Winbond e-mail Reminder & Downloader application:**

System Solution ☞ W55FC200+W55Fxx+W58300

➢ **e-mail Reminder:**

In-coming e-mail Indication & Reminder (W55FC200).

Upgradeable "Greeting words" or "Music" from web site.

➢ **Contents Downloader:**

Web site contents "Plug-&-Download" to Flash memory Card (W55Fxx).

Flash memory contents "Plug-&-Play" by *PowerSpeech* (W58300), *ViewTalk* (W536xxxx)

☐ **Winbond Voice Mail Loader:**

System Solution ☞ W55FC200+W55F20+W51300

➢ **Voice Mail Uploader:**

Message recording by "VoiceRecorder (W51300)", upload to PC & save as an e-mail file by "Uploader (W55FC200)".

Voice message sending by e-mail.

➢ **Voice Mail Downloader:**

Message download from PC by "Downloader (W55FC200)", message play back by "VoicePlayer (W51300)".

LED flashing indication for voice playing

5.2   W55Fxx Application Circuits

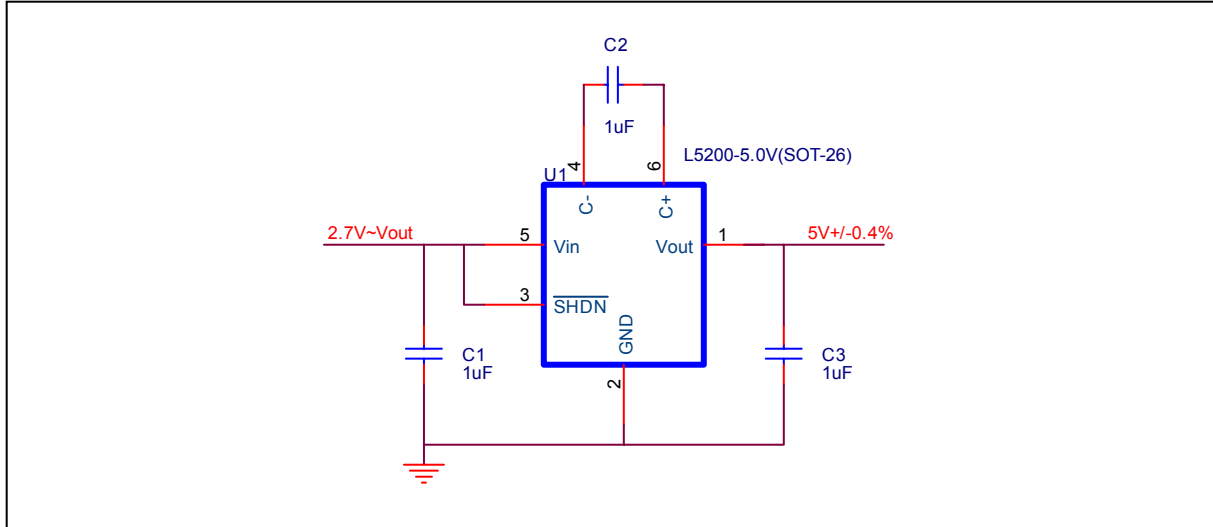**W55Fxx Application Circuits (for reference only)**
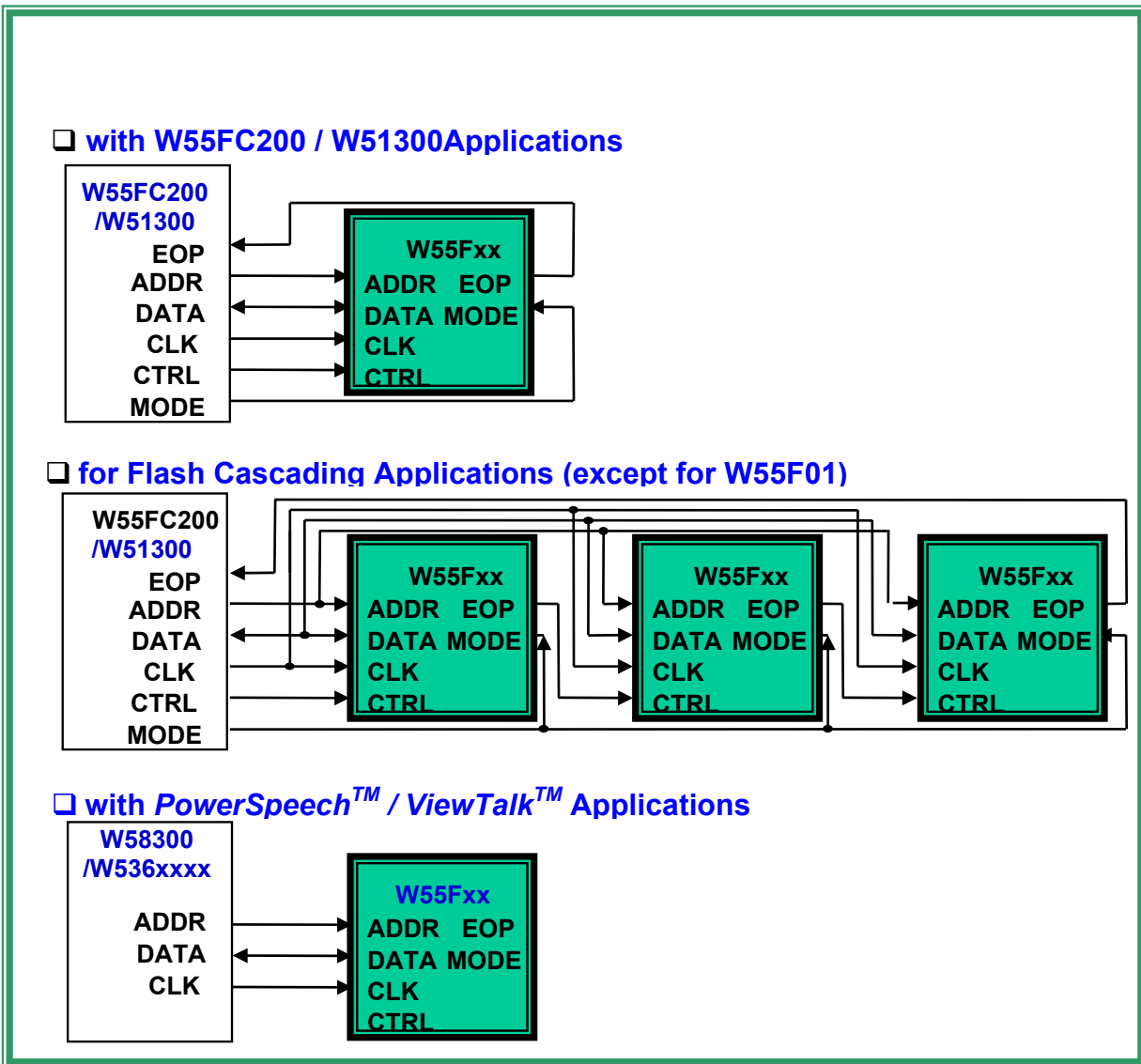
W55Fxx Programming Power Supply With DC/DC Application Circuit, (for reference only)

W55Fxx Data Sheet Version Change List

	DATE	VERSION	REMARK
1	05/17/2002	A	New creation
2	03/12/2004	B	Add new part number W55F10B
3	01/21/2005	C	Add lead-free package version
4	03/29/2005	D	Add new part number W55F01B.
5	07/04/2005	E	Change programming time period (TWP).
6	08/09/2005	F	1. Add W55FxxxL series for low voltage programming application. 2. Add programming voltage DC parameters definition. 3. Change programming time period (TPR).
7	08/24/2005	A1.6	Change revision number.
8	12/05/2005	A1.7	1. Modify programming operation voltage to 5.0 Voltage. 2. Add DC/DC circuit for programming supply power.
9	05/02/2006	A1.8	1. Modify programming operation voltage to 5.0 Voltage. 2. Add DC/DC circuit for programming supply power. 3. Add W55F10BG for lead free package.

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