Fast charging control chip for mobile power supply

describe

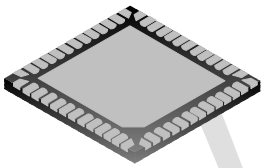
SD59D24BIt is a control chip used in mobile power supplies that can achieve4roadUSBPorts (up to twoC (port) fast charging protocol analysis. compatiblePD3.0, PPS, QC4.0+, FCP, SCP, SFCP, AFC, BC1.2, APPLE, VOOC Wait for fast charging protocol, built-in8The dead zone is controllablePWM Drive control to achieve dual-channel, bidirectional, step-up/step-down switching power supply conversion.

The chip can perform dual-channel current differential sampling, dual-channelHBridge port voltage sampling and battery voltage sampling, real-time monitoring of dual channelsDC-DCWorking state; has four load switch control signals, control terminal Port on and off switching.

Built-in chip32BitMCUProcessor core, the highest operating frequency can reach32MHz,built-in 64KByte FLASHand4KByte RAM. At the same time, it also has a wealth of auxiliary computing function units to meet various complex function computing functions.

Built-in chip16MHzHigh precisionRCoscillation,with a flexible clock system. Integrated multiple channels PWM,TIMER,ADC, can be applied to a variety of control applications. Built-in dedicatedSCPprotocol module andBMCProtocol modules, etc., suitable for a variety of fast charging protocols. It also integrates a wealth of communication interfaces, includingUART,I2C, can communicate with other chips. The chip also has digital tube control functions andledControl functions can be used for power display and lighting. The chip also has built-in overvoltage, overcurrent and overheating protection to ensure safe system operation.

Chip embeddedPMUandLDO,accomplish5Vpower supply and1.5VCore power supply. The chip has one high-speed and one low-speed oscillator built-in, which can save system costs. The chip as a whole also has various low-power working modes, which can adapt to various application needs.



QFN-60-7X7X0.75-0.4

application

Mobile power fast charger

main feature

supportPD3.0, PPS, QC4.0+, FCP, SCP, SFCP, AFC, BC1.2, APPLE, VOOC, VIVOWorking voltage range of batteries with fast charging protocol:3.3V~30V

support2rightCCmouth and4rightDDInterface protocol analysis 8The dead zone is controllablePWMDrive control dual current sampling and three voltage sampling

4Road load switch control

I2C/UARTcommunication

ledInstructions and digital tube display

Mobile phone access detection and removal detection

supportIDLE,STOPLow power consumption mode with built-in overvoltage protection, overcurrent protection, and overtemperature protection

Product specification classification

Order information form

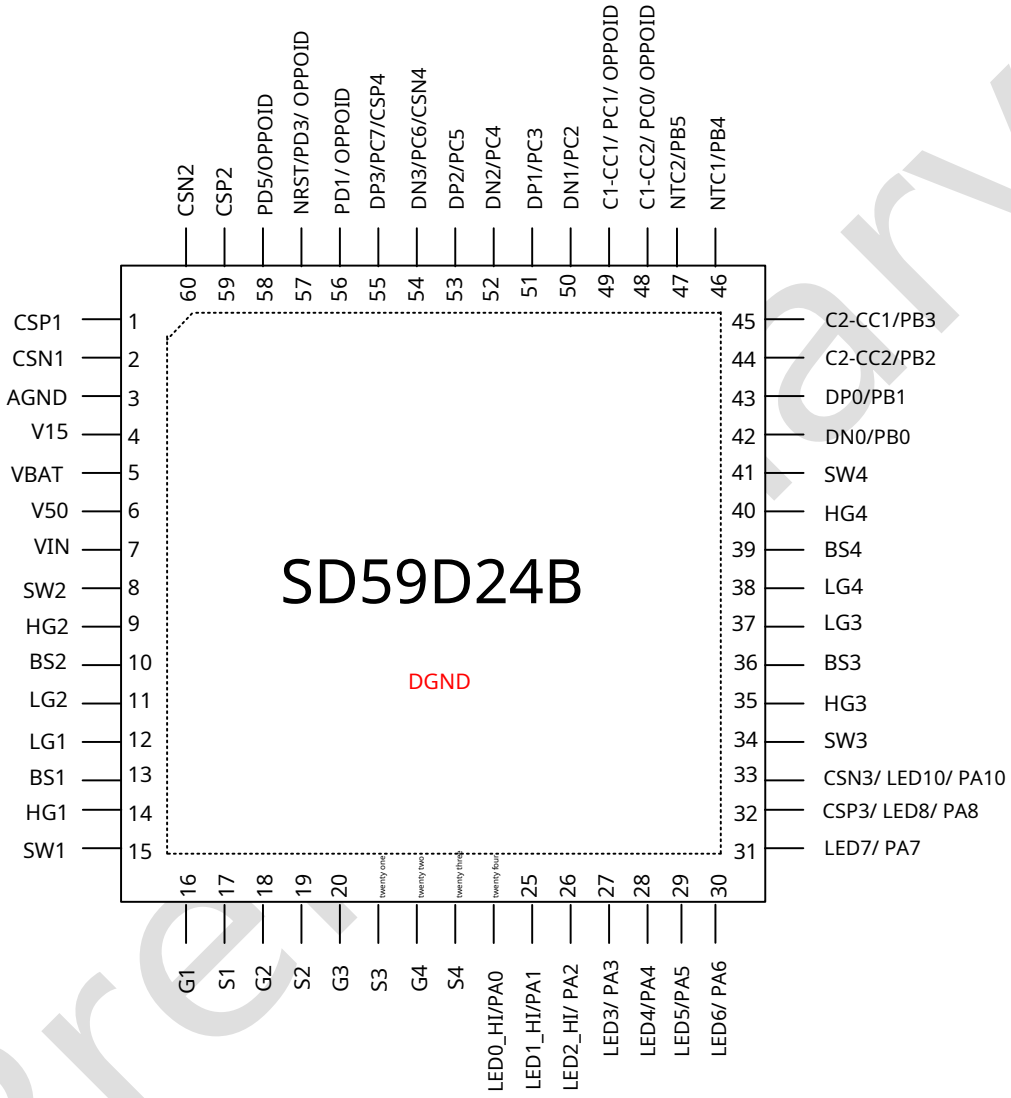
product name	Package form	Print name	Environmental protection level	Package
SD59D24B	QFN-60-7X7X0.75-0.4	SD59D24B	Halogen-free	Material tube

SD59D24BTR	QFN-60-7X7X0.75-0.4	SD59D24B	Halogen-free	braid

Resource comparison table

feature	SD59D24B
Encapsulation	QFN-60
FLASH	64K
RAM	4K
I/O	32
External Interrupt	2
T0	have
T1	have
T4	have
T5	have
PWM	have
KBI	4
UART	2
I2C	1
ADC	have
SCP	2
BMC	2
CCDD	have
CSAMP	2
INCHECK	2
RMCHECK	2
CP	4

Pin arrangement diagram



Pin description

Pin multiplexing

PAD	Analog function	AD channel	IO multiplexing 1	IO multiplexing 2	IO reuse 3	IO multiplexing 4	IO reuse 5	IO multiplexing 6	IO reuse 7
PA0	LED0	ANA20	IP_DO	SCL	T0/PWM		EXT_CLK		
PA1	LED1	ANA21		SDA	T1/PWM		TCK		
PA2	LED2	ANA22		TXD0					
PA3	LED3			RXD0					
PA4	LED4								
PA5	LED5	ANA23							
PA6	LED6	ANA24		TXD1			TCK		
PA7	LED7			RXD1					
PA8	LED8	ANA26		SCL	T4/PWM				
PA9	LED9	ANA27							
PA10	LED10	ANA25		SDA	T5/PWM				
PB0	DN0	ANA11	VOOC0_DAT	RXD0	SCL	T4/PWM	DD0_DO/RXD0	DD1_DO/RXD1	VOOC1_DAT
PB1	DP0	ANA10	VOOC0_CLK	TXD0	SDA	T5/PWM	TXD0	TXD1	VOOC1_CLK
PB2	C2-CC2			RXD1	SCL		TCK		
PB3	C2-CC1			TXD1	SDA				
PB4	NTC1	ANA8							
PB5	NTC2	ANA9							
PC0	C1-CC2	ANA19	VOOC0_ID	RXD0	SCL				VOOC1_ID
PC1	C1-CC1	ANA18	VOOC0_ID	TXD0	SDA				VOOC1_ID
PC2	DN1	ANA13	VOOC0_DAT	RXD0	T4/PWM		DD0_DO/RXD0	DD1_DO/RXD1	VOOC1_DAT
PC3	DP1	ANA12	VOOC0_CLK	TXD0	T5/PWM		TXD0	TXD1	VOOC1_CLK
PC4	DN2	ANA15	VOOC0_DAT	RXD1			DD0_DO/RXD0	DD1_DO/RXD1	VOOC1_DAT
PC5	DP2	ANA14	VOOC0_CLK	TXD1			TXD0	TXD1	VOOC1_CLK
PC6	DN3	ANA17	VOOC0_DAT	RXD1			DD0_DO/RXD0	DD1_DO/RXD1	VOOC1_DAT
PC7	DP3	ANA16	VOOC0_CLK	TXD1			TXD0	TXD1	VOOC1_CLK
PD0			VOOC0_ID						VOOC1_ID
PD1		ANA28	VOOC0_ID	IP_DO					VOOC1_ID
PD2		ANA29	VOOC0_ID						VOOC1_ID
PD3	nRST		VOOC0_ID						VOOC1_ID
PD4			VOOC0_ID						VOOC1_ID
PD5		ANA30	VOOC0_ID	IP_DO					VOOC1_ID

Pin description

I/O	Pin properties	Pin description
port		

I/O	Pin properties	Pin description
PA0-PA10	I/O	11bit bidirectionalI/Omouth
PB0-PB5	I/O	6bit bidirectionalI/Omouth
PC0-PC7	I/O	8bit bidirectionalI/Omouth
PD0-PD5	I/O	6bit bidirectionalI/Omouth
Burn		
PC3[TCLK0]	I	Programming clock input pin (PB5External pull-down resistor10K)
PC2[TDATA0]	I/O	Programming data input and output pins (PB5External pull-down resistor10K)
PC1[TCLK0]	I	Programming clock input pin (PB5External pull-up resistor10K)
PC0[TDATA0]	I/O	Programming data input and output pins (PB5External pull-up resistor10K)
system		
nRST	I	External reset pin, active low level
TCK	O	clock output
protocol		
DP0	I/O	DPport,PAD_DPNo.0Bit
DN0	I/O	DNport,PAD_DNNo.0Bit
DP1	I/O	DPport,PAD_DPNo.0Bit
DN1	I/O	DNport,PAD_DNNo.1Bit
DP1	I/O	DPport,PAD_DPNo.1Bit
DN2	I/O	DNport,PAD_DNNo.2Bit
DP2	I/O	DPport,PAD_DPNo.2Bit
DN3	I/O	DNport,PAD_DNNo.3Bit
DP3	I/O	DPport,PAD_DPNo.3Bit
C1_CC2	I/O	TYPE C1 CC2port,PAD_CC2No.0Bit
C1_CC1	I/O	TYPE C1 CC1port,PAD_CC1No.0Bit
C2_CC2	I/O	TYPE C1 CC2port,PAD_CC2No.1Bit
C2_CC1	I/O	TYPE C1 CC1port,PAD_CC1No.1Bit
MOSdrive		
SW1	O	No.1Road half bridge open pipe end
HG1	O	No.1Road half bridge upper tubeMOSdrive end
BS1	O	No.1Bootstrap end of road half bridge
LG1	O	No.1Road half bridge lower tubeMOSdrive end
SW2	O	No.2Road half bridge open pipe end
HG2	O	No.2Road half bridge upper tubeMOSdrive end
BS2	O	No.2Bootstrap end of road half bridge
LG2	O	No.2Road half bridge lower tubeMOSdrive end
SW3	O	No.3Road half bridge open pipe end
HG3	O	No.3Road half bridge upper tubeMOSdrive end
BS3	O	No.3Bootstrap end of road half bridge
LG3	O	No.3Road half bridge lower tubeMOSdrive end
SW4	O	No.4Road half bridge open pipe end

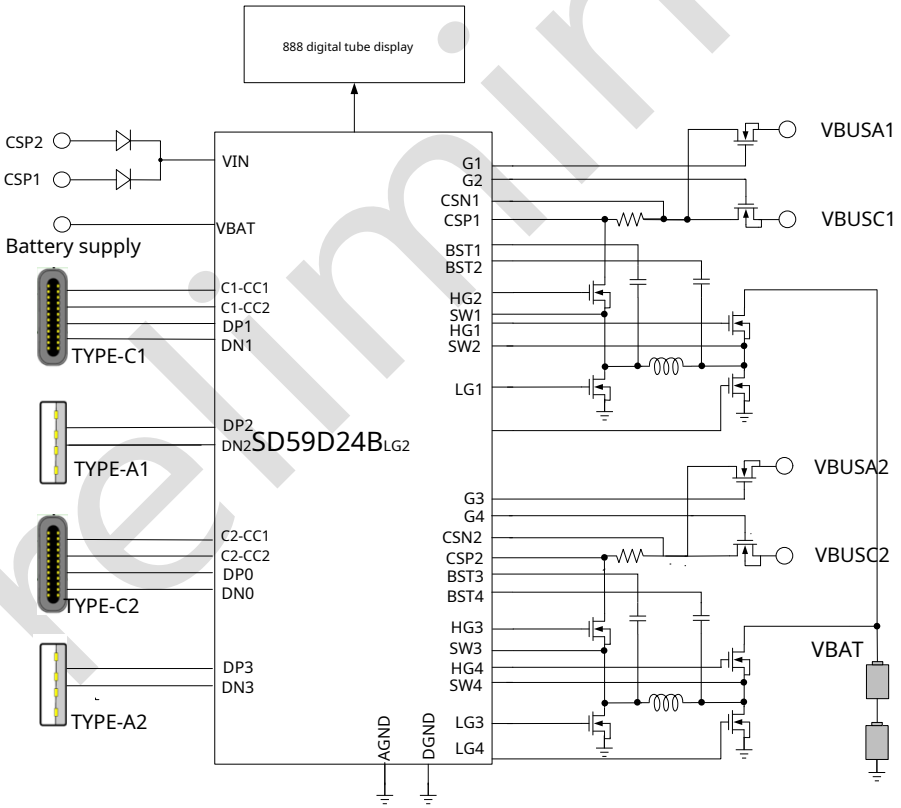
I/O	Pin properties	Pin description
HG4	O	No.4Road half bridge upper tubeMOSdrive end
BS4	O	No.4Bootstrap end of road half bridge
LG4	O	No.4Road half bridge lower tubeMOSdrive end
Isolator drive		
S1	I	No.1roadLoad SwitchSource
G1	O	No.1roadLoad SwitchGate terminal
S2	I	No.2roadLoad SwitchSource
G2	O	No.2roadLoad SwitchGate terminal
S3	I	No.3roadLoad SwitchSource
G3	O	No.3roadLoad SwitchGate terminal
S4	I	No.4roadLoad SwitchSource
G4	O	No.4roadLoad SwitchGate terminal
timer		
T0	I	T0External counting input
T1	I	T1External counting input
TOO	O	T0 PWMoutput
T1O	O	T1 PWMoutput
T4	I	T4External counting input
T5	I	T5External counting input
T4O	O	T4 PWMoutput
T5O	O	T5 PWMoutput
KBI		
KI0-KI3	I	PD0~PD3
Communication Interface		
TxD	O	UARTData output pin
RXD	I	UARTData input pin
SCL	I/O	I2Cserial clock pin
SDA	I/O	I2Cserial data pin
AD		
AD0~AD31	I	ADAnalog channel input
leddrive		
LED0~LED10	O	ledOutput, compatible with digital tube control
Power supply		
VBAT	P	battery voltage
VIN	P	Input voltage
V50	P	LDOOutput, power supply analog module
V15	P	LDOOutput, powering digital modules
AGND	G	Analogly
DGND	G	digitally

Note: In the pin attribute column,PRepresents the power pin,I/ORepresents general-purpose input/output pin,IIndicates the input pin,ORepresents the output pin.

Limit parameters (unless otherwise stated,**T amb=25-C**, the reference voltage is**VSS**)

ginseng number	symbol	Parameter range		unit
battery voltage	V_{BAT}	- 0.3 ~ +30.0		V
voltage	V_{IN}	- 0.3 ~ +40.0		V
Low voltage supply voltage	V_{50}	- 0.3~+6.0		V
Digital supply voltage	V_{15}	- 0.3~+1.65		V
Input voltage	V_I	- 0.3~V_{50}+0.3		V
Storage temperature range	T_{STG}	- 55 ~ 150		-C
range of working temperature	T_{OPR}	- 40 ~125		-C
ESD HBM	V_{HBM}	DP0~DP3/ DN0~DN3/ C1-CC1/ C1-CC2/ C2-CC1/ C2-CC2	4	KV
		Other pins	2	KV

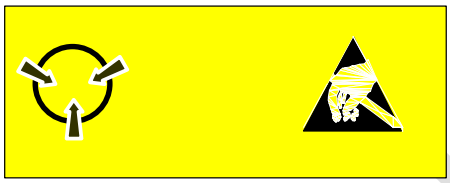
Application circuit diagram



Note: The above circuits and parameters are for reference only. For actual application circuits, please set parameters based on sufficient actual measurements.

Package outline drawing

QFN-60-7X7X0.75-0.4 unit:**mm**



MOSPrecautions for circuit operation:

Static electricity can be generated in many places. Taking the following preventive measures can effectively prevent it.MOSCircuit damage caused by electrostatic discharge:

- Operators should be grounded through an anti-static wrist strap.
- The equipment enclosure must be grounded.
- Tools used during assembly must be grounded.
- Must be packed or shipped in conductor packaging or antistatic material.

statement:

- **Silan reserves the right to change the instructions without prior notice! Customers should obtain the latest version of the information before placing an order and verify that the relevant information is complete and up-to-date.**
- **Any semiconductor product has a certain possibility of failure or malfunction under specific conditions. The buyer is responsible forSilanComply with safety standards and take safety measures during product system design and complete machine manufacturing to avoid potential failure risks that may cause personal injury or property damage! There is no end to product improvement, and our company**
- **will wholeheartedly provide customers with better products!**

product name:	SD59D24B	Document type:	manual
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Version Book: 0.1

Modification record:

1. First draft