Fully Integrated Power MOS, 30V OVP, Automatic Application for Fast Charging Input, Supporting, I²C Interface, 3A, 1~4 Lithium Batteries, Buck–Boost Charger

General Description

IU5200D is an automatic fast charging input, switch mode boost and boost charging management IC, used for 1~4 lithium-ion and lithium-polymer batteries, as well as 1~5 lithium iron phosphate batteries. The chip integration includes a 4-switch MOSFET, input and charging current sensing circuits, batteries, and loop compensation for the buck-boost converter. The chip has a charging current capacity of 3A, and the charging current can be flexibly adjusted through external resistors.

The IU5200D has four built-in loops to control the charging process, namely a constant current (CC) loop, a constant voltage (CV) loop, a chip temperature adjustment loop, and an intelligently adjustable charging current to prevent the output of the adapter from collapsing. It is matched with the input adaptive loop of all adapters, and its input adaptive point is flexibly adjustable through an external voltage divider resistor.

IU5200D adjusts the voltage sharing ratio of the external feedback resistor of the battery to obtain different constant voltage charging voltage values, thereby adapting to different sections and specifications of lithium batteries. The IU5200D supports the I²C interface to control various detailed parameters of the charging process, including the number and specifications of battery cells.

Features

- Fully Integrated Switch Mode Buck-Boost Charger
- Operating Voltage 3.6~21V, BAT Terminal withstand Voltage 30V, Integrated High-Voltage Transistor
- Maximum 3A Charging Current, Adjustable External Resistance for Charging Current
- Automatically Apply for Fast Charging Input to Improve Charging Efficiency
- Supports I²C Interface
- NTC Function
- Input Current Adaptive Function, with Externally
- Adjustable Adaptive Points
- Support LED Charging Status Indication
- 500KHz Switching Frequency
- Output Overvoltage, Short Circuit Protection
- Integrated 30V OVP Function
- Chip Temperature Adaptive adjustment
- Chip over Temperature Protection

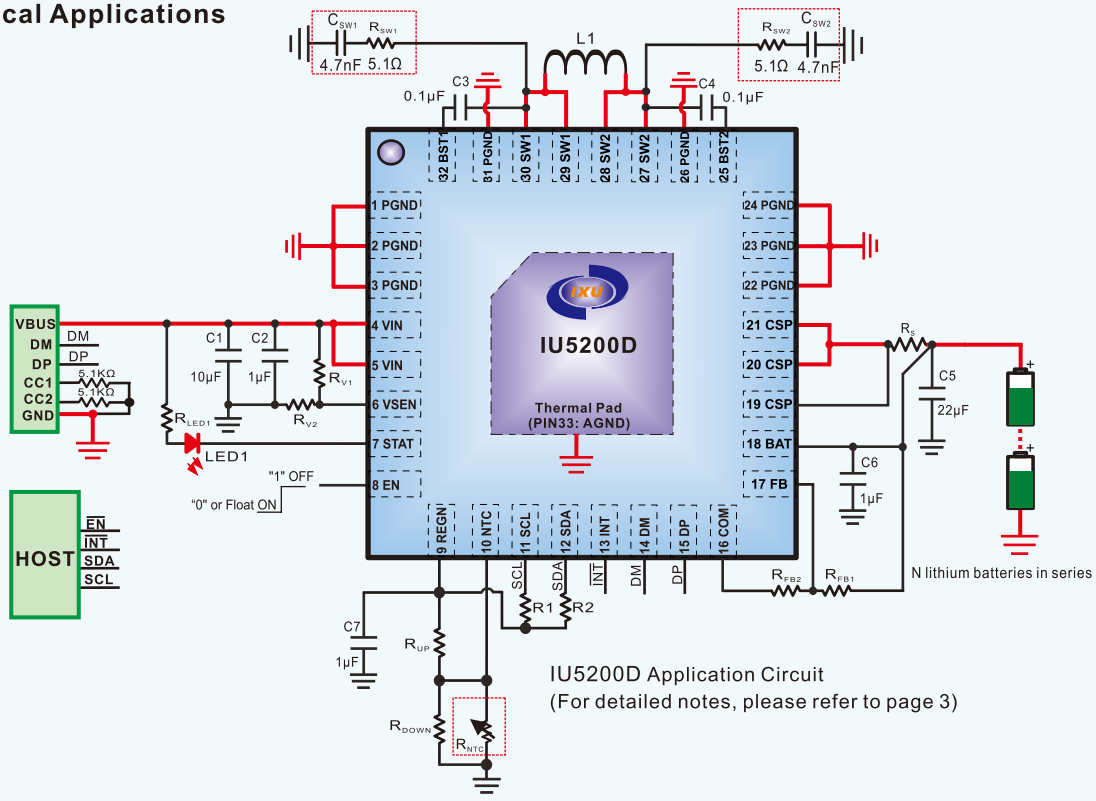
Applications

- Toy
- Walkie-Talkie
- Electronic Cigarette
- Bluetooth Speaker
- Lithium Iron Phosphate Battery Pack
- 4.2V/4.3V/4.35V/4.4V lithium Battery Pack

Package

- QFN4X4_32L

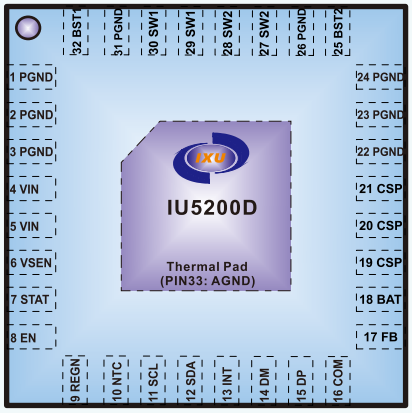
Typical Applications



IU5200D Application Circuit
(For detailed notes, please refer to page 3)

PIN Configuration and Functions

QFN4X4_32L IU5200D
TOP VIEW



PIN	NAME	I/O	DESCRIPTION
1~3, 22~24, 26, 31	PGND	-	Power ground
4, 5	VIN	P	Input power supply
6	VSEN	I	VIN voltage detection input adaptive point port
7	STAT	O	Charging status indicator port
8	EN	I	Enabling PIN
9	REGN	P	Internal low side power transistor power supply
10	NTC	I	The input terminal of the thermistor detects the battery temperature through an external thermistor
11	SCL	I	I^2C interface clock
12	SDA	I/O	I^2C interface data
13	INT	O	Open drain interrupt output
14	DM	I/O	USB DM
15	DP	I/O	USB DP
16	COM	O	Battery voltage detection resistor and internal switch tube connection terminal of the chip
17	FB	I	Battery voltage feedback terminal
18	BAT	P	Battery connection PIN
19~21	CSP	I	Battery charging current detection positive input terminal
25	BST2	P	Output high side power MOSFET gate driver power supply
27, 28	SW2	I	Step-up side half bridge switch node
29, 30	SW1	I	Step-down side half bridge switch node
32	BST1	P	Input high side power MOSFET gate driver power supply
Thermal PAD	AGND	-	Analog ground

Notes:

(1) The saturation current value of the power inductor L1 must be carefully confirmed, and a sufficient margin should be reserved.
(2) For 1 to 2 battery cells, an inductor L1 of 4.7uH is recommended; for 3 to 4 battery cells, an inductor L1 of 6.8uH is recommended.
(3) The power resistor RS is used to set the charging current value, and the tapping must be made close to its two ends.
(4) The BAT tapping of the power resistor RS is close to and passes through its sampling capacitor (C5 must be close to the port of the RS resistor), and it should be kept away from the inductor.
(5) The surface-mounted capacitors of other pins should be laid out as close as possible to the pins of the chip.
(6) The EN pin of the chip is a low-voltage pin, and there is a 500KΩ pull-down resistor inside.
(7) In order to reduce the spike noise and optimize the EMI, add RC wave-absorbing circuits to SW1 and SW2 respectively.
(8) The battery voltage line connected to the FB pin of the chip can also be tapped and sampled separately from the true anode of the battery to reduce the line loss error.
(9) When the DM, DP, and INT pins in the diagram are not in use, they should be left floating directly. When the SCL and SDA pins are not in use, pull-up resistors must be connected.
(10) When the output of the main control is in the open-drain OD structure, pull-up resistors R1 and R2 must be added.
(11) The SDA pin in the diagram is an IO port with an open-drain OD structure, and the INT pin is an output port with an open-drain OD structure.
(12) When the chip works in high voltage and high current charging for a long time, its heat dissipation must be optimized and strengthened. Otherwise, the input voltage and charging current should be appropriately reduced for use.
(13) The red solid line in the diagram is the path for large current flow.

Absolute Maximum Ratings [1]

SYMBOL	PARAMETER	VALUE	UNIT
VMAX	VIN, BST1, BST2, SW1, SW2, CSP, BAT, FB, COM, NTC, STAT, VSEN	-0.3~30	V
	REGN, EN, DM, DP, SCL, SDA, INT	-0.3~6	V
T_J	Junction operating temperature range	-40~150	℃
T_{STG}	Storage temperature range	-55~150	℃
T_{SDR}	Lead temperature (Soldering, 10 sec.)	260	℃

Recommended Operating Conditions

SYMBOL	PARAMETER	VALUE	UNIT
V_{IN}	Input power supply voltage	3.6~21	V
T_J	Junction operating temperature range	-40~125	℃
T_A	Ambient temperature range	-40~85	℃

Thermal Information [2]

SYMBOL	PARAMETER	VALUE	UNIT
θ_{JA}	Package thermal resistance - chip to environment thermal resistance	52	℃/W

Ordering Information

Device	Package Type	Device Marking	Package size	Tape Width	Quantity
IU5200D	QFN4X4_32L		13”	12mm	3000 units

ESD Ratings

HBM (Human Body Model) ---------- ±2kV
MM (Machine model) ---------- ±200V

1. The above parameters are only the limit values of device operation. It is not recommended that the working conditions of the device exceed the limit values. Otherwise, the reliability and life of the device will be affected, and even permanent damage will be caused.
2. Where the PCB board is placed in IU5200D, a heat dissipation design is needed. The heat sink at the bottom of IU5200D is connected with the heat sink area of PCB board.

Electrical Characteristics (VIN=5V , R_s=50mΩ , L=4.7uH , unless otherwise noted)

SYMBOL	PARAMETER	TEST CONDITIONS	MIN	TYP	MAX	UNIT
VIN	Supply voltage		3. 6		21	V
VIN_{UVLO}	VIN under voltage lockout threshold	VIN Falling		3.6		V
ΔVIN_{UVLO}	VIN under voltage lockout hysteresis			200		mV
VIN_{OVP}	VIN over voltage protection	VIN Rising		23		V
ΔVIN_{OVP}	VIN over voltage protection hysteresis			1.28		V
I_Q	Input quiescent current	VIN=12V, V_{BAT}=8.4V		0.7		mA
I_{SD}	Input shutdown current	VIN=12V, V_{BAT}=8.4V, V_{EN}=5V		50		μA
I_{BAT}	Battery leakage current	Unplug charger, V_{BAT}=8.4V		6		μA
		Plug charger, V_{EN}=5V VIN>V_{BAT}, V_{BAT}=8.4V		0.5		
		Plug charger, V_{EN}=5V VIN<V_{BAT}, V_{BAT}=8.4V		6		
		Plug charger, R_{FB1}=740KΩ, R_{FB2}=100KΩ VIN>V_{BAT}, V_{BAT}=8.4V		25		
		Plug charger, R_{FB1}=740KΩ, R_{FB2}=100KΩ VIN<V_{BAT}, V_{BAT}=8.4V		640		

Electrical Characteristics (VIN=5V , R_S=50mΩ , L=4.7uH , unless otherwise noted)

SYMBOL	PARAMETER	TEST CONDITIONS	MIN	TYP	MAX	UNIT
V_{VSEN}	VSEN pin modulation voltage			1		V
V_{FB}	Feedback voltage modulation threshold		0.99	1	1.01	V
V_{CV}	Terminal battery voltage (room temperature)	$K=1+R_{B1}/R_{B2}$		$K*V_{FB}$		V
V_{CV-HOT}	Terminal battery voltage (high temperature)	$V_{NTC}<V_{warm}$ & JEITA		$0.975V_{CV}$		V
V_{RCH}	Recharge voltage (default value)	V_{BAT} Falling		$0.975V_{CV}$		V
V_{TRK}	TC charge mode battery voltage threshold	V_{BAT} Rising		$0.667V_{CV}$		V
V_{SHORT}	Battery short threshold	V_{BAT} Falling		$0.25V_{CV}$		V
V_{OVPB}	BAT over voltage threshold	V_{BAT} Rising		$1.07V_{CV}$		V
V_{SENSE}	Maximum current detection voltage			50		mV
I_{CC}	CC charge mode current (default value)	R_S=25mΩ	1.8	2	2.2	A
I_{TC}	TC charge mode current (default value)			10%		ICC
I_{BF}	Terminate charge current (default value)			10%		ICC
V_{cold}	NTC low temperature falling threshold	Percentage of V_{REGN}		70		%
V_{cold_hys}	NTC Low temperature protection hysteresis	Percentage of V_{REGN}		0.83		%

Electrical Characteristics (VIN=5V , R_s=50mΩ , L=4.7uH , unless otherwise noted)

SYMBOL	PARAMETER	TEST CONDITIONS	MIN	TYP	MAX	UNIT
V_{hot}	NTC high temperature rising threshold	Percentage of V_{REGN}		47.5		%
V_{hot_hys}	NTC high temperature protection hysteresis	Percentage of V_{REGN}		1.67		%
V_{cool}	NTC low-temperature current halving threshold	Percentage of V_{REGN}		67.5		%
V_{warm}	NTC high-temperature float charging reduces threshold	Percentage of V_{REGN}		55		%
V_{REGN}	REGN output voltage (default value)			5		V
V_{ENH}	EN Enable High Level Threshold		1.5			V
V_{ENL}	EN Enable Low Level Threshold				0.4	V
V_{SCL/SDA_H}	SCL/SDA high-level threshold		3			V
V_{SCL/SDA_L}	SCL/SDA low-level threshold				0.7	V
F_{SW}	Maximum switching frequency			500		KHz
TMR_{TC}	Trick charge time limit			2		Hour
$TMR_{CC/CV}$	CC/CV charge time limit			20		Hour
T_{REG}	Thermal regulation threshold			120		℃
T_{SD}	Thermal shutdown temperature			150		℃
ΔT	Thermal shutdown temperature hysteresis			40		℃

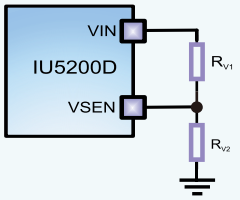
IU5200D Application Points

1. Charge Process

The IU5200D adopts a complete TC/CC/CV charging process. When the voltage of the battery is less than the trickle point, the system charges at 10%*I_{CC} charging current; When the voltage of the battery is greater than the trickle point, the system charges with I_{CC} charging current; When the battery voltage approaches the set float charging voltage, the system enters constant voltage charging, and the charging current continues to decrease. When the charging current is less than 10%* I_{CC}, the system will stop charging; When the battery is fully charged and the battery voltage drops to the set recharge voltage due to self discharge or load consumption, the system will restore the charging state.

2. Adaptive Input Current Limit Function

The IU5200D has a special built-in loop that can automatically adjust the charging current to prevent the input DC power from entering an overdrive state, thereby preventing any improper setting that may cause the adapter to collapse. The input adaptation function of IC determines the lowest value VIN_{AJ} to which the power input pin of the chip can be reduced by selecting two resistors, R_{V1} and R_{V2}. When the input reaches this value, the chip will actively reduce the appropriate charging current to adapt to the capacity of the input power supply, thereby avoiding further weakening of the input power supply. The calculation formula is as follows:



$$VIN_{AJ}=\frac{1*(R_{V1}+R_{V2})}{R_{V2}}$$

If the pin is connected to a VIN, this function is disabled; If grounded, charging is prohibited.

3. Protection Function

IU5200D has comprehensive battery charging protection function. When the chip experiences input overvoltage, output overvoltage, or chip overheating, the system charging will be prohibited until the protection state is released; When the battery voltage is below V_{SHORT}, the output short circuit protection function is activated; When the input voltage is lower than the undervoltage protection threshold, all main functional modules of the chip will be turned off to avoid misoperation of the system due to low power supply voltage; In addition, the system has a protection function for charging timeout. If there is a problem with a lithium battery, it will cause the charging time to be too long. When the TC stage charging time is greater than 2 hours or the CC charging time is greater than 20 hours, the charging expiration protection function will be activated and the charging process will be forcibly terminated. Only when the system is powered on again or the battery status changes will the timer be reset.

4. Charging Indication Function

The STATpin of the chip is status indicator pin that output 0 level or high resistance state. If the LED light is not connected, but directly connected to the main control, there must be a pull-up resistor to convert the high resistance state into the exact high level.

(1) Charging process:

The STAT port outputs a low level and the LED light is constantly on.

（2) Charging completed:

The STAT port outputs a high resistance state and the LED light is constantly off.

(3) In cases of battery overvoltage, battery short circuit, NTC port detecting abnormal battery temperature, chip overheating, and charging timeout, the LED light flash at a frequency of 1.5Hz.

(4) When the input VIN terminal is under voltage or the chip is in non enable mode, the port output a high resistance state and the LED light is off.

(5) If there is no battery detected after the system is powered on, the LED light will flash and then turn off.

5. Charging Current Setting

The constant current charging current can be set through resistance R_s, and the specific calculation formula is as follows:

$$I_{CC}=\frac{VICC(mV)}{R_s(m\Omega)}=\frac{50mV}{R_s(m\Omega)}(A)$$

If you need to obtain a charging current of 2A I_{CC}, you only need to select a detection resistor R_s with a resistance value of 25mΩ. Thus, the charging current I_{TC} of the TC stage is determined by the following formula:

$$I_{TC}=10\%I_{CC}=\frac{VITC(mV)}{R_s(m\Omega)}=\frac{5mV}{R_s(m\Omega)}(A)$$

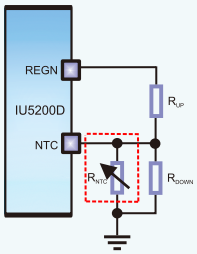
This value can be adjusted through I^2C, with a range of 25%*I_{TC}~4*I_{TC}.The set constant current charging current will flow through the corresponding R_s resistor. Therefore, it is necessary to select an R_s resistor with sufficient rated power. It should be particularly noted that when the chip works in high voltage and high current charging for a long time, its heat dissipation must be optimized and strengthened. Otherwise, the input voltage and charging current should be appropriately reduced for use.

6. Chip Temperature Adaptive Adjustment Function

The chip is equipped with a temperature adaptive adjustment loop. When the chip is in the charging process, if the temperature rises to 120℃, the temperature control loop begins to work. The charging current gradually decreases, and the chip temperature will decrease accordingly. Finally, the chip temperature will stabilize at the set value, thereby protecting the chip.

7. NTC Resistor Setting

Battery charging supports NTC protection function, and the temperature of the battery is detected through the NTC pin. When NTC detects that the battery temperature is within the set temperature window range, it charges normally; When NTC detects that the battery temperature is below the set low temperature protection point or above the set high temperature protection point, it stops charging and alarms. If the NTC function is not used, the pin must be grounded. The following figure shows the high-temperature reference points and low-temperature reference points set internally through voltage divider resistors, with the low-temperature reference point being V_{REGN}*70% and the high-temperature reference point being V_{REGN}*47.5%. Set the temperature range for normal operation of NTC by selecting appropriate external resistors.



$$\frac{R_{DOWN}//R_{NTC\_Cold}}{R_{UP}+R_{DOWN}//R_{NTC\_Cold}}=70\%$$

$$\frac{R_{DOWN}//R_{NTC\_Hot}}{R_{UP}+R_{DOWN}//R_{NTC\_Hot}}=47.5\%$$

In the above equation, R_{NTC_Cold} is the resistance value corresponding to the NTC resistor at the set low temperature point, and R_{NTC_Hot} is the resistance value corresponding to the NTC resistor at the set high temperature point. Due to the fact that R_{DOWN} and R_{UP} resistors can be independently set for low and high temperature windows, This enables the chip to meet most NTC resistor models, which brings great convenience to applications. The relationship between resistance R_{DOWN}, R_{UP}, and NTC resistance can be given by the following formula based on the above definition:

$$R_{UP}=\frac{90*R_{NTC\_Hot}*R_{NTC\_Cold}}{133*(R_{NTC\_Cold}-R_{NTC\_Hot})}$$

$$R_{DOWN}=\frac{30*R_{NTC\_Hot}*R_{NTC\_Cold}}{19*R_{NTC\_Cold}-49*R_{NTC\_Hot}}$$

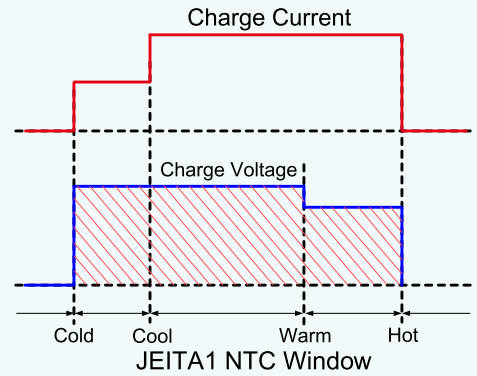
The NTC function of the chip does not enable JEITA charging specifications by default. If the JEITA charging specification is enabled through I²C, there are two JEITA options to choose from:

(1) JEITA1 :

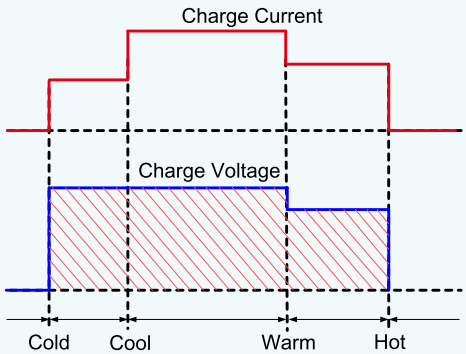
- When V_{NTC}>V_{cool}, the constant current charging current is 50%*I_{CC};
- When V_{NTC}<V_{warm}, the float charging voltage is V_{CV-HOT};

(2) JEITA2 :

- When V_{NTC}>V_{cool}, the constant current charging current is 50%*I_{CC};
- When V_{NTC}<V_{warm}, the float charging voltage is V_{CV-HOT}, and the constant current charging current is 60%*I_{CC};



JEITA1 NTC Window



JEITA2 NTC Window

8. Battery Floating Charging Voltage Setting

The internal clamping voltage threshold corresponding to the FB pin of the chip is 1V. Based on this voltage and the two external voltage divider resistors R_{FB1} and R_{FB2}, the float charging voltage value for battery charging can be set. The specific formula is as follows:

$$V_{CV}=\frac{1*(R_{FB1}+R_{FB2})}{R_{FB2}}$$

If the JEITA charging specification is enabled on the chip, then when the NTC port V_{NTC}<V_{warm}, the float charging voltage is V_{CV-HOT}=0.975 * V_{CV}.

9. Charging Termination Current Setting

The default value of the charging termination current I_{BF} for the IU5200D chip is determined by the following formula:

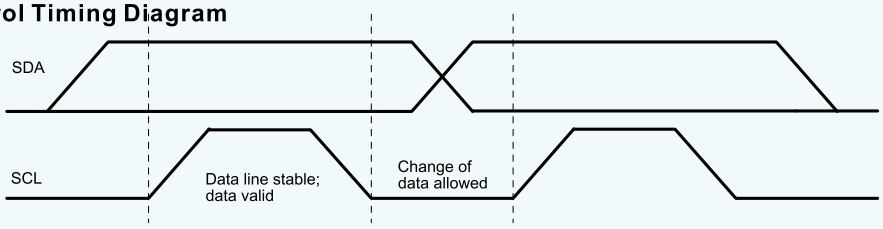
$$I_{BF}=10\%I_{CC}=\frac{VIBF(mV)}{R_s(m\Omega)}=\frac{5mV}{R_s(m\Omega)}(A)$$

This value can be adjusted through I²C, with a range of 25%*I_{BF}~4*I_{BF}. If the chip detects a decrease in charging current to I_{BF}, it stops charging. Whether the charging termination function is enabled or not can be selected through I²C, and it is enabled by default.

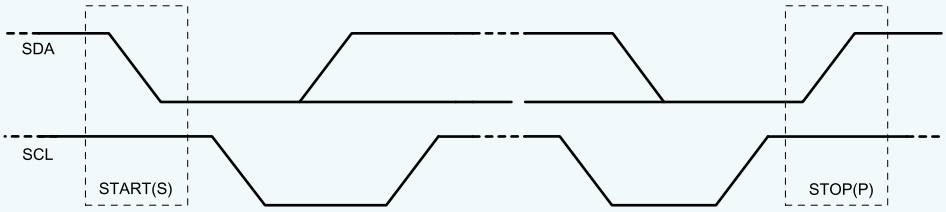
10. Input Fast Charging Request

The chip applies for a voltage input of 12V (or 9V if there is no 12V in the front-end adapter protocol) through DP/DM. If the application is unsuccessful, it will continue to charge at 5V input.

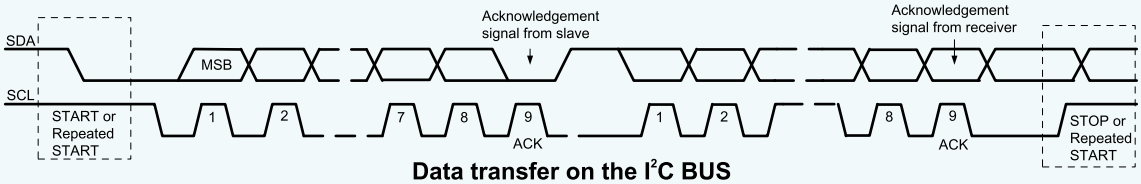
11. I²C Control Timing Diagram



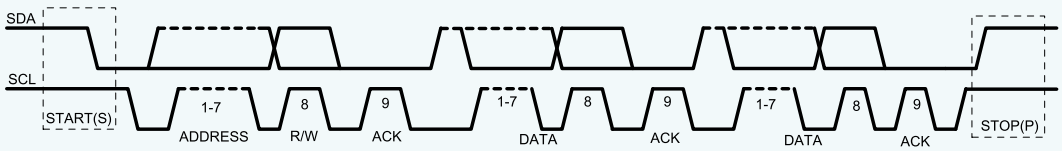
Bit Transfer on the I²C Bus



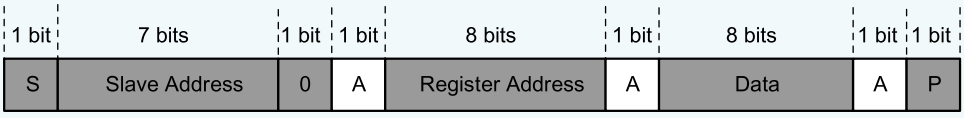
START and STOP Conditions



Data transfer on the I²C BUS

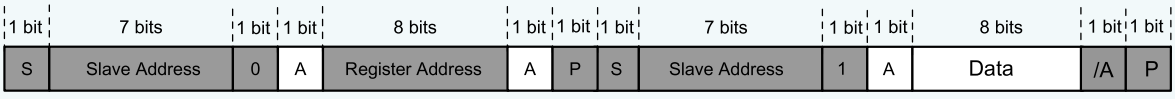


Complete Data Transfer



From Mater to Slave From Slave to Master A = Acknowledge (SDA LOW) S = Start P = Stop

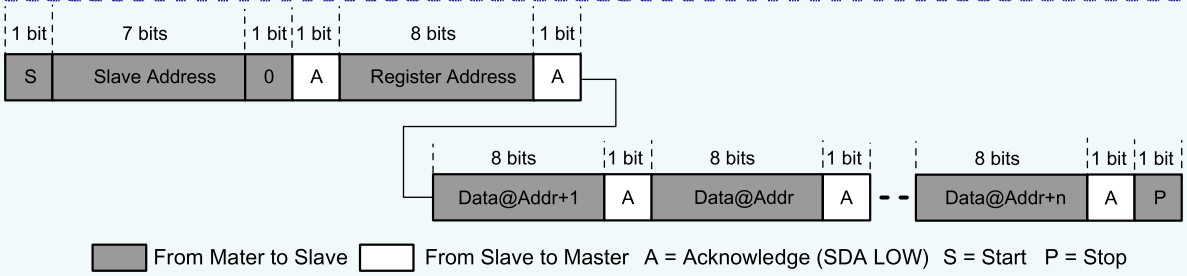
Single Write



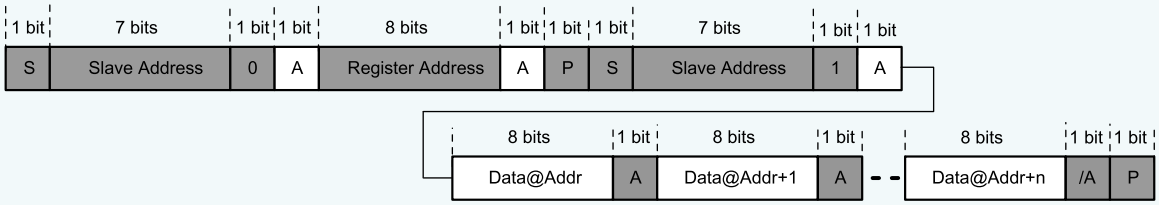
From Mater to Slave A = Acknowledge (SDA LOW) S = Start

From Slave to Master /A = not Acknowledge (SDA HIGH) P = Stop

Single Read



Multi Write



Multi Read

I²C Register MAP

IC Address：0x4C

Register Name	Address	R/W	Description	Default
REG[0]	0x00	R	System status indication (with INT)	0000_0000
REG[1]	0x01	R		0000_0000
REG[2]	0x02	R	System status indication (without INT)	0000_0000
REG[3]	0x03	R	Reserved	0000_0000
REG[4]	0x04	R	Reserved	0000_0000
REG[5]	0x05	R	Reserved	0000_0000
REG[6]	0x06	R	Reserved	0000_0000
REG[7]	0x07	R	Reserved	0000_0000
REG[8]	0x08	R/W	Charging termination current setting, Trickle charging current setting	0011_0011
REG[9]	0x09	R/W	Battery voltage internal/external selection, Battery section selection, CV voltage setting	0001_1011
REG[A]	0x0A	R/W	REGN voltage setting, NTC and battery free LED status setting	0001_0000
REG[B]	0x0B	R/W	ICC charging current setting, VTC trickle current constant voltage setting	1111_0011
REG[C]	0x0C	R/W	Frequency jitter enable, Charging enable, Charging cutoff enable, Recharge hysteresis voltage selection, Charging timeout enable and Charging timeout time setting	0000_0011
REG[D]	0x0D	R/W	VSEN internal/external selection, VIN voltage setting and VSEN voltage setting	0000_1011
REG[E]	0x0E	R/W	Reserved	0000_0000
REG[F]	0x0F	R/W	Reserved	0000_0000

Reg[0]:(Address: 0x00,Default: 0000_0000)

Bit	Name	INT	R/W	Description
7		Yes	R	Reserved
6		Yes	R	Reserved
5		Yes	R	Reserved
4	TIMEOUTH	Yes	R	System charging timeout
3	OTPH	Yes	R	System over temperature protection
2	TEMPH	Yes	R	System temperature loop operation
1	VINOVPH	Yes	R	Input overvoltage
0	VINUVLOH	Yes	R	Input undervoltage

Reg[1]:(Address: 0x01,Default: 0000_0000)

Bit	Name	INT	R/W	Description
7	COOLH	Yes	R	Low battery temperature
6	WARMH	Yes	R	High battery temperature
5	NTCH	Yes	R	Battery temperature abnormal protection
4	BOVPH	Yes	R	Battery overvoltage
3	BFH	Yes	R	Battery fully charged state
2	RECHARH	Yes	R	Battery Recharge State
1	TRICKH	Yes	R	Battery trickle state
0	BSCPH	Yes	R	Battery short circuit state

Reg[2]:(Address: 0x02,Default: 0000_0000)

Bit	Name	INT	R/W	Description
7	CCH	No	R	Battery constant current charging state
6	BSTOKH	No	R	Whether the system BST voltage is normal or not indicates
5	VOH_H	No	R	Output higher than input indication
4	ASYNH	No	R	Asynchronous working status of the system
3		No	R	Reserved
2	VDROPH	No	R	System input adaptive loop operation
1	ILOOPH	No	R	System current loop operation
0	VLOOPH	No	R	System voltage loop operation

Reg[8]:(Address: 0x08,Default: 0011 _0011)

Bit	Name	Default	R/W	Description	Comment
7	VIBF[3]	0	R/W	10.0mV	Adjustment of charging termination current reference voltage (VIBF): Offset: 1.25mV(0000) Step: 1.25mV Range: 1.25mV~20mV Default: 5mV(0011) IBF = VIBF/Rs
6	VIBF[2]	0	R/W	5.0mV	
5	VIBF[1]	1	R/W	2.5mV	
4	VIBF[0]	1	R/W	1.25mV	
3	VITC[3]	0	R/W	10.0mV	Trickle charging current reference voltage (VITC) regulation: Offset: 1.25mV(0000) Step: 1.25mV Range: 1.25mV~20mV Default: 5mV(0011) ITC = VITC/Rs
2	VITC[2]	0	R/W	5.0mV	
1	VITC[1]	1	R/W	2.5mV	
0	VITC[0]	1	R/W	1.25mV	

Reg[9]:(Address: 0x09,Default: 0001_1011)

Bit	Name	Default	R/W	Description	Comment
7	CVCT	0	R/W		Selection of battery voltage internal and external settings: 0: External setting(Default) 1: I²C Internal Adjustment
6	CELL[1]	0	R/W		Battery section selection: 00: 1 section(Default) 01: 2 section 10: 3 section 11: 4 section
5	CELL[0]	0	R/W		
4	VCV[4]	1	R/W	800mV	CV voltage regulation(For 1 Cell) Offset: 2.65V(00000) Step: 50mV Range: 2.65V~3V(00000~00111) 3.25V~4.4V(01000~11111) Default: 4.2V(11011)
3	VCV[3]	1	R/W	400mV	
2	VCV[2]	0	R/W	200mV	
1	VCV[1]	1	R/W	100mV	
0	VCV[0]	1	R/W	50mV	

Reg[A]:(Address: 0x0A,Default: 0001_0000)

Bit	Name	Default	R/W	Description	Comment
7		0	R/W		Reserved
6		0	R/W		Reserved
5	REGN[1]	0	R/W		REGN voltage selection: 00: 4.6V 01: 5.0V(Default) 10: 5.2V 11: 5.5V
4	REGN[0]	1	R/W		
3	STAT_LED[1]	0	R/W		LED status without battery connection: X0: Always off after flashing(Default) 01: Always on after flashing 11: Always flashing
2	STAT_LED[0]	0	R/W		
1	NTC[1]	0	R/W		NTC function selection: 00: No JEITA(Default) 01: JEITA1 10: JEITA2 11: No NTC
0	NTC[0]	0	R/W		

Reg[B]:(Address: 0x0B,Default: 1111_0011)

Bit	Name	Default	R/W	Description	Comment
7	VICC[4]	1	R/W	24mV	Selection of constant current reference voltage (VICC): Offset: 5mV(00000) Step: 1.5mV Range: 5mV~51.5mV Default: 50mV(11110) ICC = VICC/Rs
6	VICC[3]	1	R/W	12mV	
5	VICC[2]	1	R/W	6mV	
4	VICC[1]	1	R/W	3mV	
3	VICC[0]	0	R/W	1.5mV	
2	VTC[2]	0	R/W	10%*VCV	Trickle current to constant current voltage point selection: Offset: 59.5%(000) Step: 2.5% Range: (59.5%~77%)*VCV Default: 67%(011)
1	VTC[1]	1	R/W	5%*VCV	
0	VTC[0]	1	R/W	2.5%*VCV	

Reg[C]:(Address: 0x0C,Default: 0000_0011)

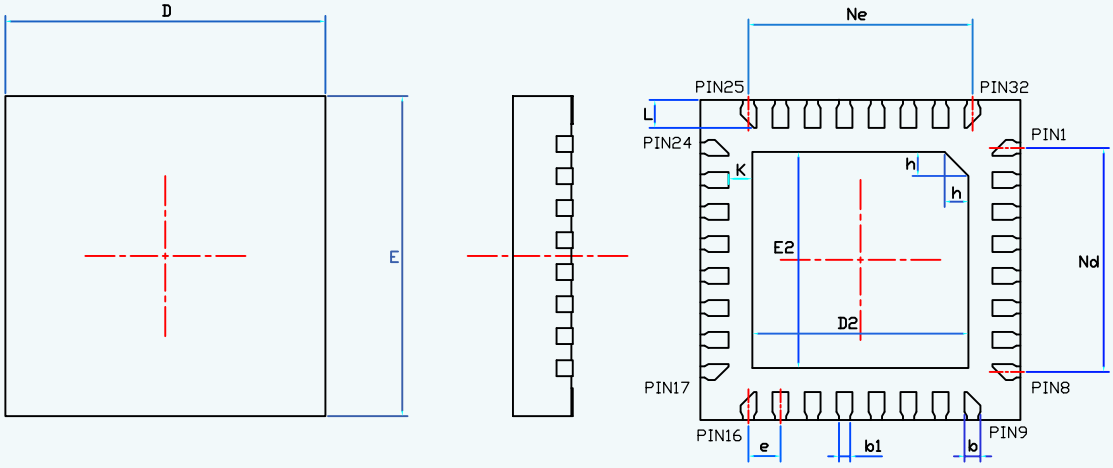
Bit	Name	Default	R/W	Description	Comment
7	JITTER	0	R/W		frequency jitter enable selection： 0: frequency jitter enable(Default) 1: frequency jitter disable
6	CHGEN	0	R/W		Charging enable selection: 0: Charging enable (Default) 1: Charging disable
5		0	R/W		Reserved
4	TDH	0	R/W		Selection of charging termination function: 0: Charge termination enable(Default) 1: Charging termination disable
3	RECHA100	0	R/W		Recharge voltage threshold selection: 0: 0.975V_{CV}(Default) 1: 0.95V_{CV}
2	TIMOUTCT	0	R/W		Charging timeout enable selection: 0: Charging timeout enable(Default) 1: Charging timeout disable
1	TIMOUT[1]	1	R/W		Charging timeout time selection TC/(CC+CV)： 00: 5H/0.6H 01: 10H/1.2H 10: 15H/1.5H 11: 20H/2H(Default)
0	TIMOUT[0]	1	R/W		

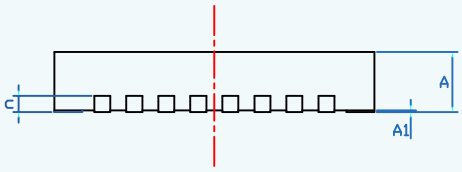
Reg[D]:(Address: 0x0D,Default: 0000_1011)

Bit	Name	Default	R/W	Description	Comment
7		0	R/W		Reserved
6	VSENCT	0	R/W		VSEN voltage control internal/external selection: 0: External settings(Default) 1: Internal regulation
5	VINSET[1]	0	R/W		Input voltage selection: 00: 5V(Default) 01: 9V 10: 12V 11: 18V
4	VINSET[0]	0	R/W		
3	VSEN[3]	1	R/W	8%*VINSET	VSEN voltage setting: Offset: 78%*VINSET (0000) Step: 1%*VINSET Range: (78%~93%)*VINSET Default: 90%*VINSET (1011)
2	VSEN[2]	0	R/W	4%*VINSET	
1	VSEN[1]	1	R/W	2%*VINSET	
0	VSEN[0]	1	R/W	1%*VINSET	

Package Information

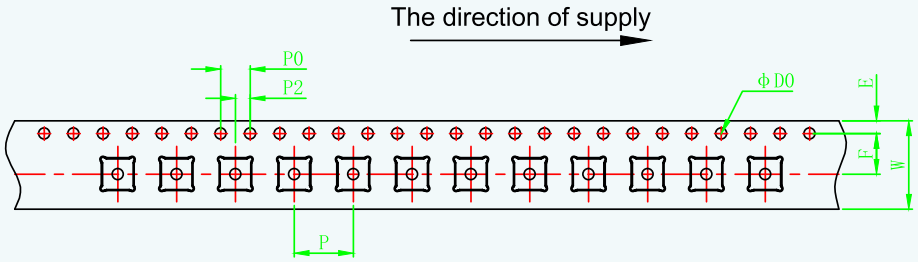
IU5200D QFN4X4_32L PACKAGE OUTLINE DIMENSIONS (units:mm)



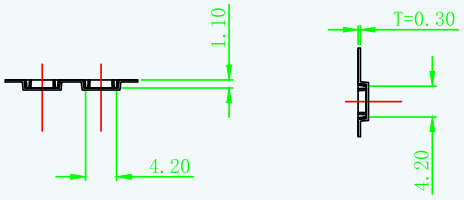


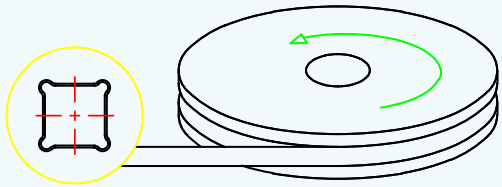
SYMBOL	MILLMETER		
	MIN	NOM	MAX
A	0.70	0.75	0.80
A1	0	0.02	0.05
b	0.15	0.20	0.25
b1		0.14REF	
c		0.203REF	
D	3.90	4.00	4.10
D2	2.60	2.70	2.80
e		0.40BSC	
Ne		2.80BSC	
Nd		2.80BSC	
E	3.90	4.00	4.10
E2	2.60	2.70	2.80
L	0.30	0.35	0.40
h	0.25	0.30	0.35
K	0.25	0.30	0.35

TAPE AND REEL INFORMATION



W	12.00±0.30	P0	4.00±0.10
S	---	A0	4.20±0.10
P	8.00±0.10	A1	
E	1.75±0.10	B0	4.20±0.10
F	5.50±0.10	B1	
P2	2.00±0.10	K0	1.10±0.10
D0	1.50+0.10/-0.00	K1	
D1		t	0.30±0.05





330*100*12

Note:
1.Pitch Tolerance Over Any 10 Picth ±0.20.
2.Material: Conductive Polystyrene
Thickness:0.30±0.05mm.
3.Surface resistance: ≤10^{11} Ohm.
4.Packing Length Per 13" Reel: Meters.
5.Component Load Per 13" Reel: Pcs.
6.All dimensions meet EIA-481 requirements.

Precautions for MOS Circuit Operation:

Static electricity can be generated in many places. The following precautions can effectively prevent MOS circuit from being damaged due to the sound of electrostatic discharge:

- Operators shall be grounded through anti-static wrist strap.
- The equipment enclosure must be grounded.
- Tools used during assembly must be grounded.
- Conductor packaging or anti-static materials must be used for packaging or transportation.

Declaration:
•Shanghai IXU Micro-electronics Co., Ltd. reserves the right to make changes to the manual without prior notice! Customers should obtain the latest version of the material before use and verify whether the relevant information is complete and up-to-date.
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