DATASHEET

V1.2 Aug.8 2011

AXP192

Enhanced single Cell Li-Battery and Power System Management IC

X-Powers

© 2010 X-Powers Limited - All rights reserved

table of Contents

1. Overview (Summary) 3

2. Characteristics (Feature) 4

3. Typical applications (Typical Application) 5

4. Limit parameter (Absolute Maximum Ratings) 6

5. Electrical characteristics (Electrical Characteristics) 6

6. Typical characteristics (Typical Characteristics) 9

7. Pin definitions (Pin Description) 13

8. Functional Block Diagram (Functional Block Diagram) 15

9. Operation and control (Control and Operating) 16

9.1 operating mode and Reset (Power On / Off & Reset) 16

9.2 Power Management passage (IPS) 19

9.3 adaptive charger (Adaptive Charger) ..... twenty one

9.4 backup battery (Backup Batttery) ..... twenty four

Over 9.5 channel power output (Multi-Power Outputs) ..... twenty four

The default setting voltage 9.6 / start timing (Default Voltage / Timing Setting) 25

9.7 The signal acquisition system (Signal Capture) 26

9.8 Multifunction Pin Description (Multi-Function Pin Description) 26

9.9 Timer (Timer) 27

9.10 HOST port and interrupt (TWSI and IRQ) 28

9.11 register (Registers) 29

10. Package (Package) 52

1. Overview (Summary)

AXP192 System is highly integrated power management chip, for single-cell lithium battery (lithium ion or lithium polymer) and requires multiple output power conversion applications, to provide easy to use yet flexible configuration complete power solution that fully meet the current increasingly complex applications processor system to the relatively complex and precise power control requirements.

AXP192 An adaptive internal integration USB-Compatible Charger, 3 Down converters (Buck DC-DC converter) , 4 Linear regulators (LDO) The voltage / current / temperature surveillance multiplexer 12-Bit ADC . To ensure the security and stability of the power system,
AXP192 Also incorporates over / under voltage (OVP / UVP) , Over temperature (OTP) , Overcurrent (OCP) Protection circuit.

AXP192 Wisdom energy balance (Intelligent Power Select, IPS ™) In the circuit may be USB And an external AC adapter, lithium batteries, and application security transparent distribution of electrical energy between the load and only in the case where the external input power source without a battery (or a battery discharge / damage) may also make the system work properly applied.

AXP192 And it has an external adapter USB And a three-input capability such as a battery, a rechargeable battery backup support.

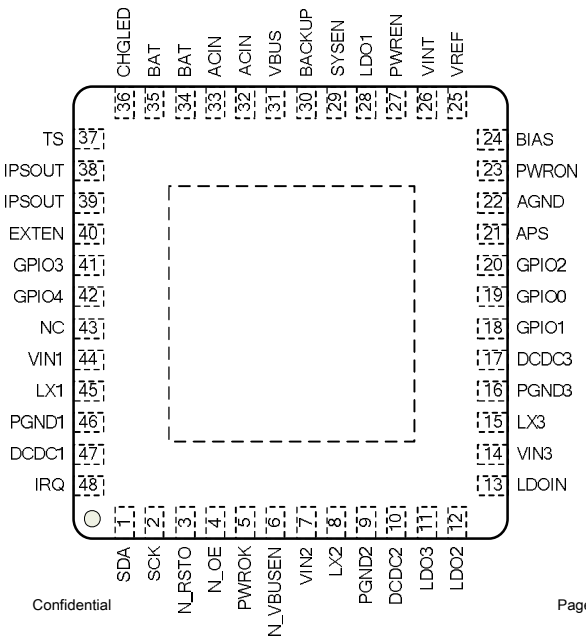
AXP192 It provides a communication with the host two-wire serial communication interface: Two Wire Serial Interface (TWSI) , The application processor may turn on or off some of the power to the output voltage thereof is provided by this interface, access to internal registers and the plurality of measurement data (including Fuel Gauge) . Precision (0.5%) Power measurement data to facilitate consumers a clearer grasp of the real-time power usage, giving consumers unprecedented power equipment experience.

AXP192 provide 6mm x 6mm 48-pin QFN Package.

Applications

- Handheld mobile devices smart mobile phone, PMP / MP4, Digital cameras, Digital cameras, handheld navigation devices GPS, PDA, Handheld digital television broadcast receivers
- Mobile Internet Devices MID
- Digital photo frames, portable DVD Players, ultra mobile PCs UMPC and UMPC-like ,leaning machine
- The application processor circuitry Application Processor systems
- Other battery systems and multiple supply applications

Pin definitions



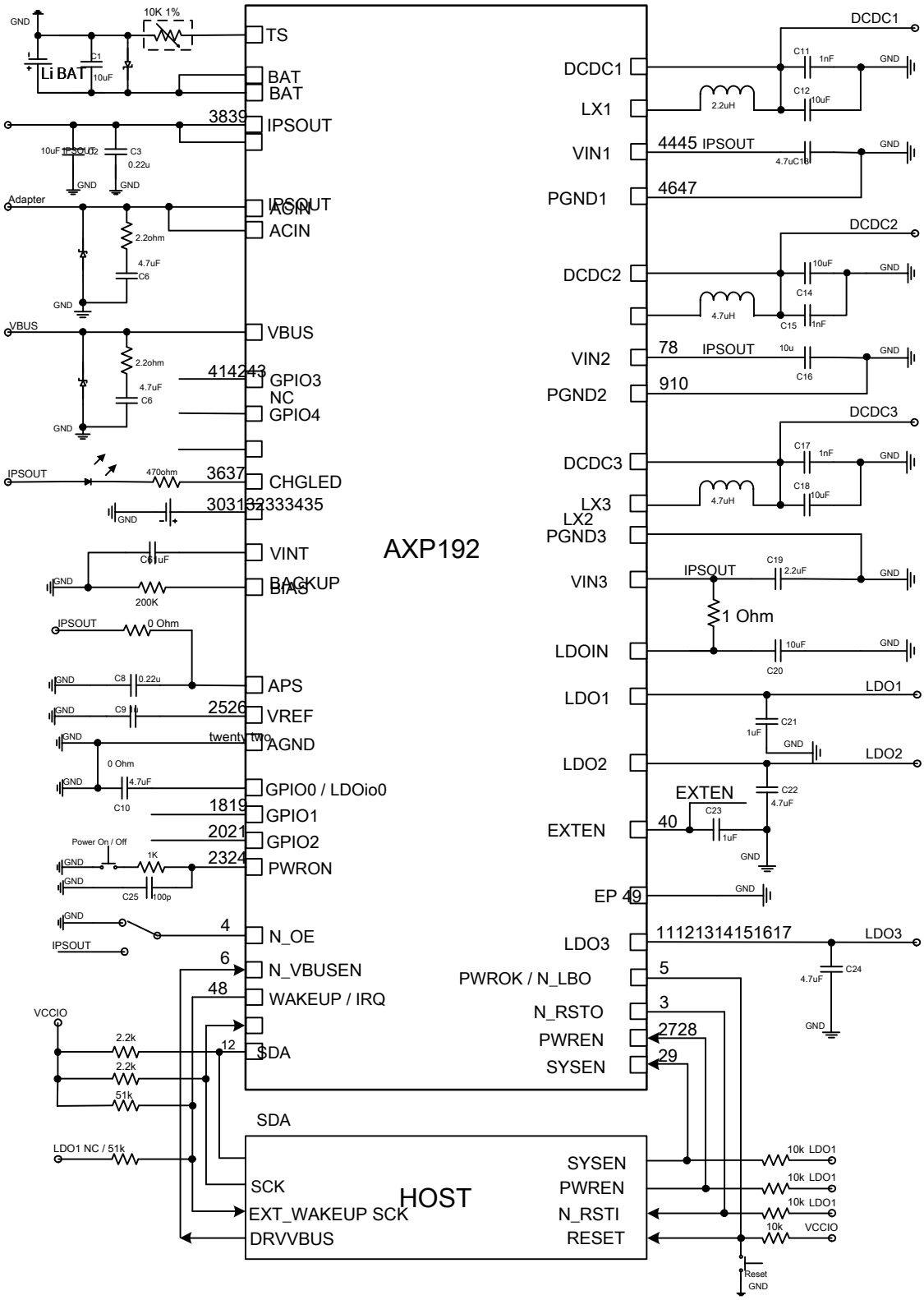
2. Characteristics (Feature)

- **Power Management (IPS)**
  - o Wide input voltage range:
    2.9V ~ 6.3V (AMR : - 0.3V ~ 11V)
  - o Configurable efficient power balance wisdom "IPS ™" system
  - o Adaptive USB Or AC adapter current limiting pressure limiting
    (4.4V / 500mA / 100mA)
  - o Equivalent internal resistance is less than ideal diode 100mΩ
- **Fully integrated charger (Charger)**
  - o Internal MOSFET The maximum charging current of up to 1.4A
  - o Support battery temperature monitoring
  - o Full support USB Charging, with the specification
  - o High charging accuracy error is less than 0.5%
  - o stand by 4.1V / 4.15V / 4.2V / 4.36V Other battery
  - o Automatically controlled charging process
  - o Direct drive led Indicating the state of charge
  - o The system automatically adjusts the charging current load
- **spare battery (Backup Battery)**
  - o Backup battery may be used to RTC Power supply module
  - o Supporting a spare battery, the charging current may be provided
- **3 Road synchronous buck converter (DC-DC)**
  - o DC-DC1 : Can 0.7V ~ 3.5V Between regulation,
    25mV / step, Drive capability 1.2A
  - o DC-DC2 : Can 0.7-2.275V Between regulation,
    25mV / step, Drive capability 1.6A, stand by VRC
  - o DC-DC3 : Can 0.7-3.5V Between regulation,
    25mV / step, Drive capability 0.7A
- **4 Linear regulators (LDO)**
  - o LDO1 : 30mA Always Effective
  - o LDO2 : Low Noise LDO , 1.8V ~ 3.3V adjustable,
    100mV / step, Drive capability 200mA
  - o LDO3 : Low Noise LDO, 1.8-3.3V adjustable,
    100mV / step, Drive capability 200mA
  - o LDO IO0 : Low Noise LDO, 1.8-3.3V adjustable,
    100mV / step, Drive capability 50mA

  Note: VRC , Voltage Ramp Control , Voltage slope control.

- **The signal acquisition system (Signal Capture)**
  - o Built-in 16 road 12 Bit ADC
  - o accept 4 Road external signal input
  - o Providing a battery and the external input supply current and voltage
    data
  - o Built Precision Coulomb Counter and Fuelgauge system
  - o Power management provides a wealth of information, such as instantaneous power
    (MA or mW) , Remaining battery power (% or mAh) , charging(%) And
    the remaining battery time or charging time
  - o Low battery warning and protection
  - o Provide chip temperature information
- **Application Processor Interface (Host Interface)**
  - o Host able to pass TWSI Interface for data exchange
  - o Interrupt management can be flexibly configured
  - o Flexible pin feature set, multi-channel GPIO Respectively set to IO , PWM
    Other functions
  - o Built-in timer
  - o Provides four registers can be used for data storage during the
    system shutdown
- **System Management(System Management)**
  - o Soft Reset Hard Reset or may
  - o Support soft shutdown or a hard shutdown, support external wake-up
    boot
  - o It supports output voltage monitoring, self-diagnosis function
  - o PWROK Reset or a system shutdown instruction
  - o Detecting an external power source (insertion / removal / insufficient driving capability)
  - o All output voltages are supported by soft start
  - o Over / under voltage protection (OVP / UVP)
  - o Overcurrent protection (OCP)
  - o Over-temperature protection (OTP)
  - o stand by OTG VBUS Power status / monitor
- **High integration (Fully Integration)**
  - o Generating an internal precision voltage reference (0.5%)
  - o Internal MOSFET
  - o The timing and the output voltage can be customized

3. Typical applications (Typical Application)



In On/off Manner A,5/48PIN pull high to IO power,29PIN pull high to LDO1,27PIN connect to LDO1 or HOST control signal
In On/off Manner B,5/48PIN pull high to LDO1,27/29PIN connect to HOST control signal

4. Limit parameter (Absolute Maximum Ratings)

Symbol	Description	Value	Units
ACIN	Input Voltage Input voltage	-0.3 to 11	V
VBUS	Input Voltage Input voltage	-0.3 to 11	V
T_J	Operating Temperature Range Operating temperature	- 40 to 130	℃
Ts	Storage Temperature Range Storage temperature	- 40 to 150	℃
T_{LEAD}	Maximum Soldering Temperature (at leads , 10sec) Soldering temperature	300	℃
V_{ESD}	Maximum ESD stress voltage , Human Body Model Antistatic ability	> 4000	V
P_D	Internal Power Dissipation Internal power consumption tolerance	2100	mW

5. Electrical characteristics (Electrical Characteristics)

V_{IN} = 5V , BAT = 3.8V , T_A = 2 5 ℃

SYMBOL	DESCRIPTION	CONDITIONS	MIN	TYP	MAX	UNITS
ACIN						
V_{IN}	ACIN Input Voltage		3.8		6.3	V
I_{OUT}	V_{OUT} Current Available Before Loading BAT	500mV Voltage Drop		2000		mA
V_{UVLO}	ACIN Under Voltage Lockout			3.8		V
V_{OUT}	IPS Output Voltage		2.9		5.0	V
R_{ACIN}	Internal Ideal Diode On Resistance	PIN to PIN, ACIN to IPSOUT			200	mΩ
VBUS						
V_{IN}	VBUS Input Voltage		3.8		6.3	V
I_{OUT}	V_{OUT} Current Available Before Loading BAT	400mV Voltage Drop		500	900	mA
V_{UVLO}	VBUS Under Voltage Lockout			3.8		V
V_{OUT}	IPS Output Voltage		2.9		5.0	V
R_{VBUS}	Internal Ideal Diode On Resistance	PIN to PIN, VBUS to IPSOUT			300	mΩ
Battery Ch arger						
V_{TRGT}	BAT Charge Target Voltage		-0.5% 4.2		+0.5%	V
I_{CHRG}	Charge Current			780	1320	mA
I_{TRKL}	Trickle Charge Current			10%		I_{CHRG}

						mA
V_{TRKL}	Trickle Charge Threshold Voltage			3.0		V
ΔV_{RECHG} Recharge Battery Threshold Voltage		Threshold Voltage Relative to V_{TARGET}		--100		mV
T_{TIMER1}	Charger Safety Timer Termination Time	Trickle Mode		40		Min
T_{TIMER2}	Charger Safety Timer Termination Time	CC Mode		480		Min
I_{END}	End of Charge Indication Current Ratio	CV Mode		10% 15%		I_{CHRG} mA
Backup Battery						
V_{TRGT}	Backup Battery Charge Target Voltage		2.5	3.0	3.1	V
I_{CHRG}	Backup Battery Charge Current		50	200	400	uA
I_{Backup}	Current when use Backup Battery			10	15	uA
NTC						
V_{TL}	Cold Temperature Fault Threshold Voltage	Charge	0	2.112	3.264	V
		Discharge		3.226		
V_{TH}	Hot Temperature Fault Threshold Voltage	Charge	0	0.397	3.264	V
		Discharge		0.282		
V_{TE}	NTC Disable Threshold Voltage	Falling Threshold Hysteresis		0.2		V
Ideal Diode						
$R_{ds(on)}$	Internal Ideal Diode On Resistance (BAT to IPSOUT)				100	mΩ

SYMBOL	DESCRIPTION	CONDITIONS	MIN	TYP	MAX		UNITS
Off Mode Current							
I_{BATOFF}	OFF Mode Current	BAT = 3.8V		27			μA
$I_{SUSPEND}$	USB VBUS suspend Mode current	BAT = 3.8V , VBUS = 5V , N_VBUSEN = 1		86			μA
Logic							
V_{IL}	Logic Low Input Voltage			0.3			V
V_{IH}	Logic High Input Voltage			2			V
TWSI							
V_{CC}	Input Supply Voltage			3.3			V
ADDRESS	TWSI Address			0x68			
f_{SCK}	Clock Operating Frequency			400		1200	kHZ

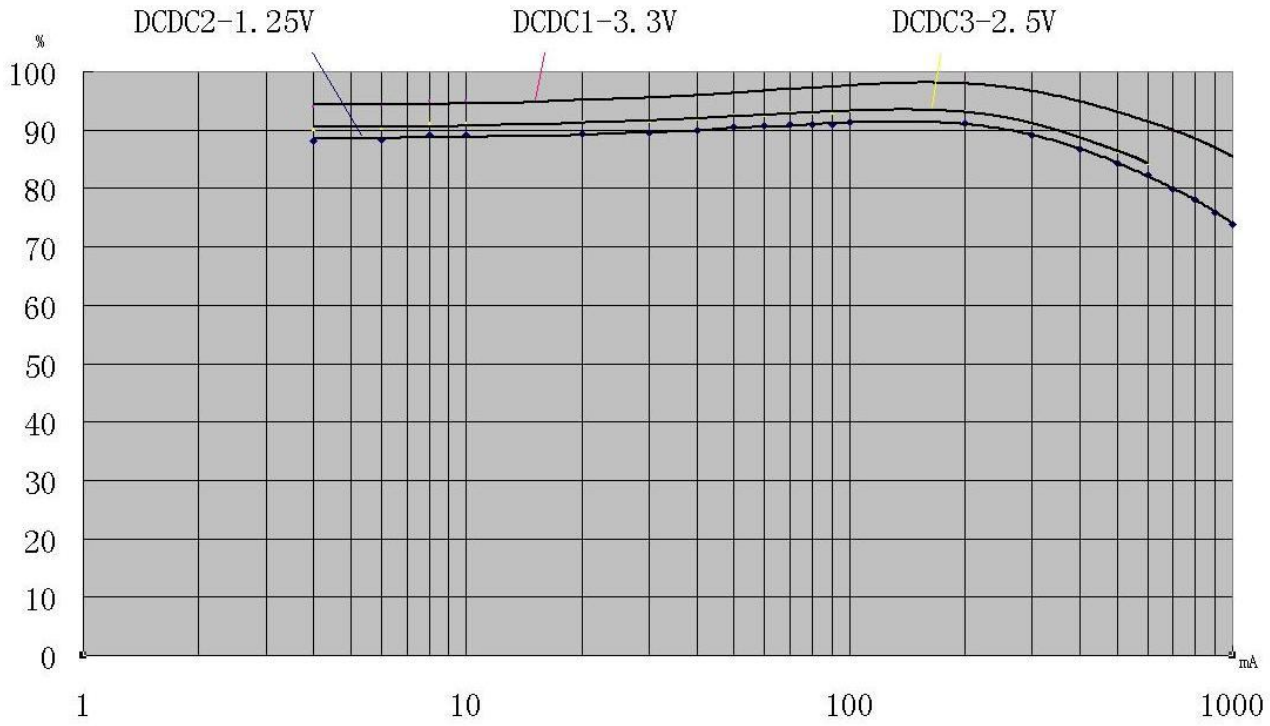
t_f	Clock Data Fall Time	2.2Kohm Pull High		60		ns
t_r	Clock Data Rise Time	2.2Kohm Pull High		100		ns
DCDC						
f_{OSC}	Oscillator Frequency	Default		1.5		MHz
DCDC1						
I_{VIN1}	Input Current	PFM Mode I_{DC1OUT} = 0		26		μA
I_{LIM1}	PMOS Switch Current Limit	PWM Mode		1600		mA
I_{DC1OUT}	Available Output Current	PWM Mode		1200		mA
V_{DC1OUT}	Output Voltage	Default	0.7	3.3	3.5	V
DCDC2						
I_{VIN2}	Input Current	PFM Mode I_{DC2OUT} = 0		20		μA
I_{LIM2}	PMOS Switch Current Limit	PWM Mode		2300		mA
I_{DC2OUT}	Available Output Current	PWM Mode		1600		mA
V_{DC2OUT}	Output Voltage Range		0.7	1.25	2.275	V
DCDC3						
I_{VIN3}	Input Current	PFM Mode I_{DC3OUT} = 0		20		uA
I_{LIM3}	PMOS Switch Current Limit	PWM Mode		1000		mA
I_{DC3OUT}	Available Output Current	PWM Mode		700		mA
V_{DC3OUT}	Output Voltage Range		0.7	2.5	3.5	V

SYMBOL	DESCRIPTION	CONDITIONS	MIN	TYP	MAX	UNITS
LDO1						
V_{LDO1}	Output Voltage	I_{LDO1} = 1mA	- 1%	1.25 1.8 2.5 3.3	1%	V
I_{LDO1}	Output Current			30		mA
LDO2						
V_{LDO2}	Output Voltage	I_{LDO2} = 1mA	- 1%	3	1%	V
I_{LDO2}	Output Current			200		mA
I_Q	Quiescent Current			100		μA
PSRR	Power Supply Rejection Ratio	I_{LDO2} = 60mA , 1KHz		TBD		dB
e_N	Output Noise, 20-80KHz	Vo = 3V, Io = 150mA		28		μV_{RMS}
LDO3						
V_{LDO3}	Output Voltage	I_{LDO3} = 1mA	- 1%	3.3	1%	V
I_{LDO3}	Output Current			200		mA
I_Q	Quiescent Current			100		μA
PSRR	Power Supply Rejection Ratio	I_{LDO3} = 10mA , 1KHz		TBD		dB

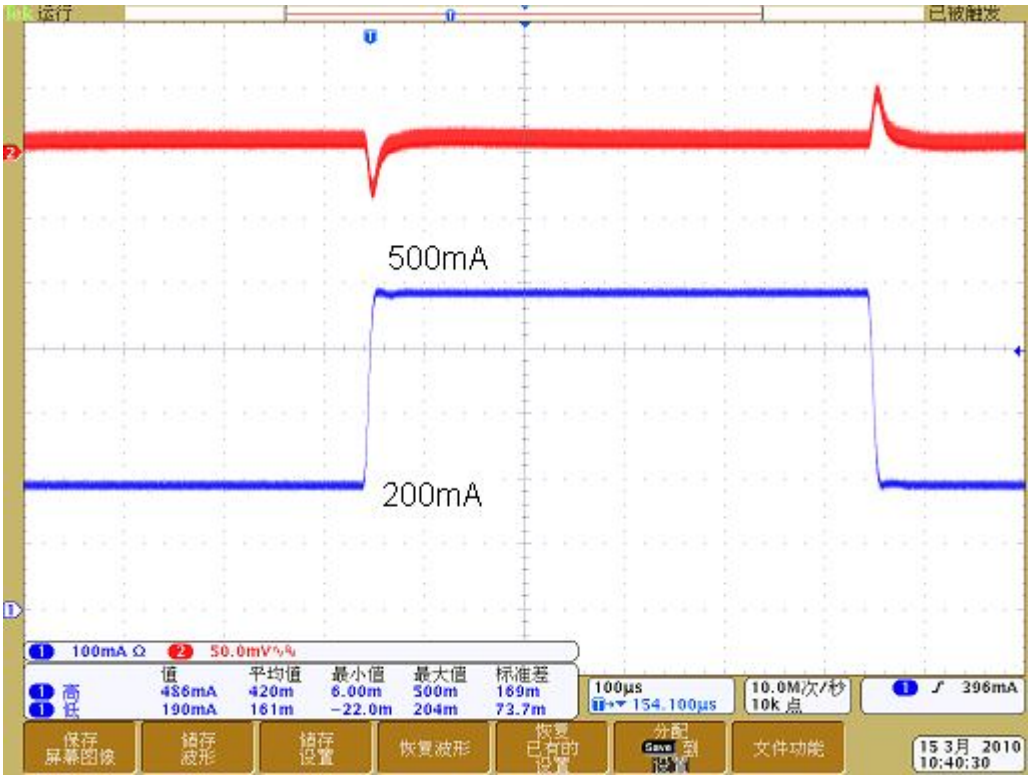
e_N	Output Noise, 20-80KHz	Vo = 1.8V, Io = 150mA		18		μV RMS
LDO IO0						
V_{LDOIO0}	Output Voltage	I_{LDOIO0} = 1mA	- 1%	3.3 1%		V
I_{LDOIO0}	Output Current			50		mA
I_Q	Quiescent Current			90		μA
PSRR	Power Supply Rejection Ratio	I_{LDOIO0} = 10mA , 1KHz		TBD		dB
e_N	Output Noise, 20-80KHz	Vo = 1.8V, Io = 30mA		18		μV RMS

6. Typical characteristics (Typical Characteristics)

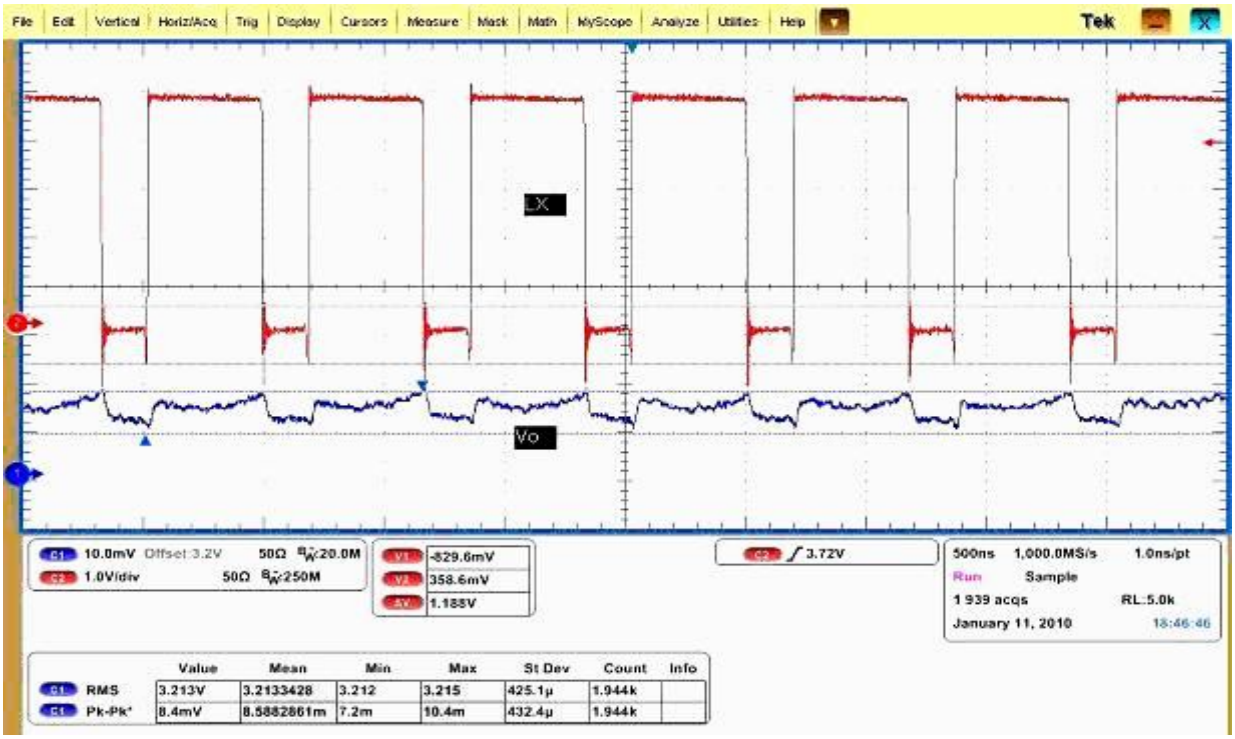
DC-DC Efficiency vs. Load (3.8Vin)



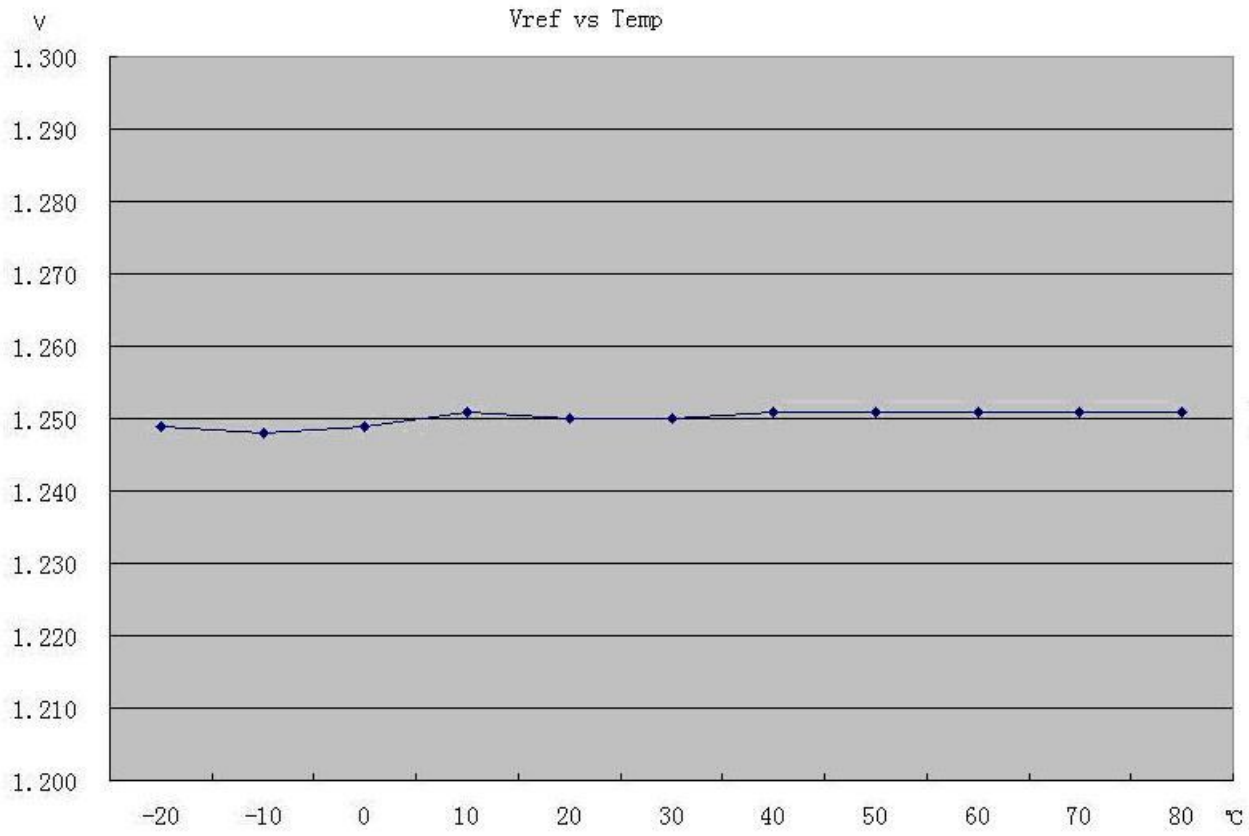
DC-DC Load Transient (Typical)



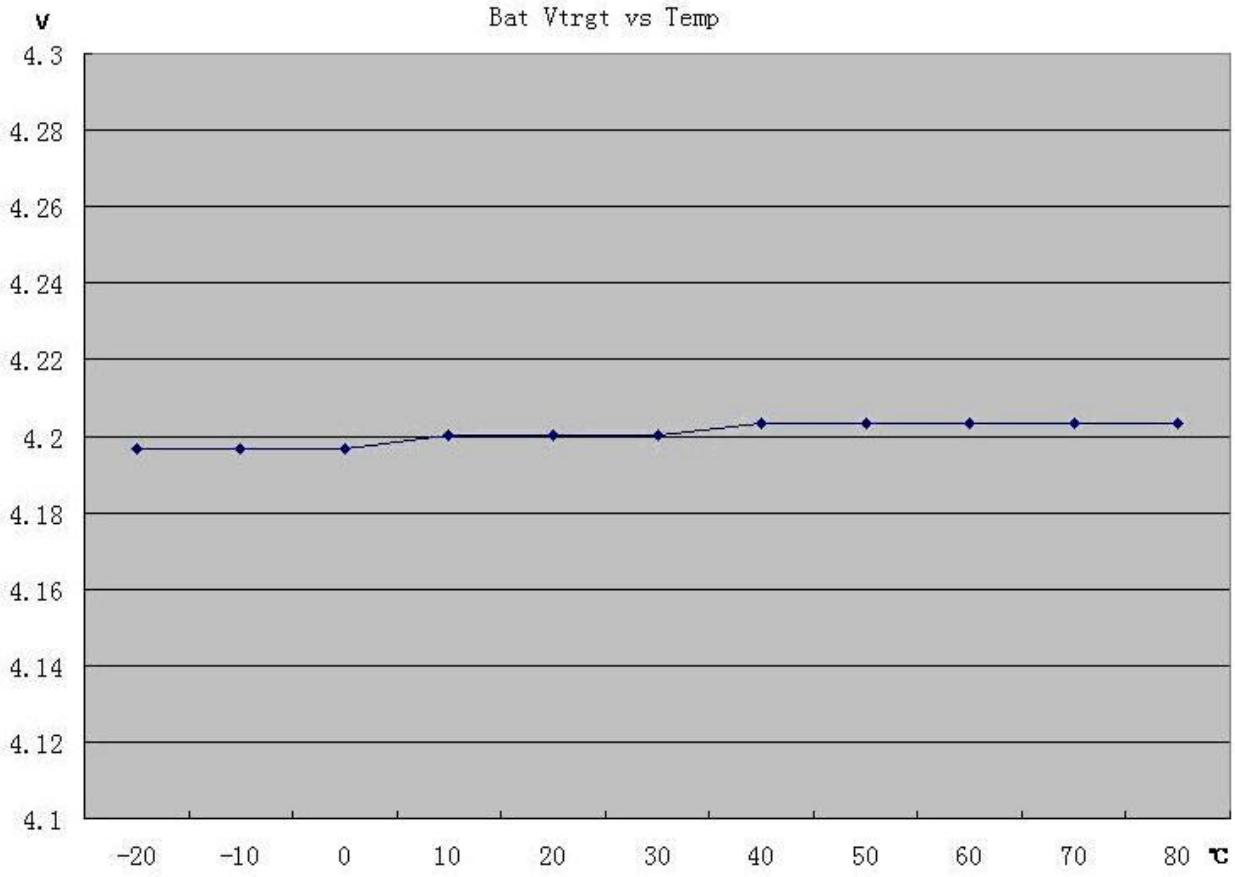
DC-DC Ripple



V_{REF} vs Temperature



V_{TRGT} vs Temperature



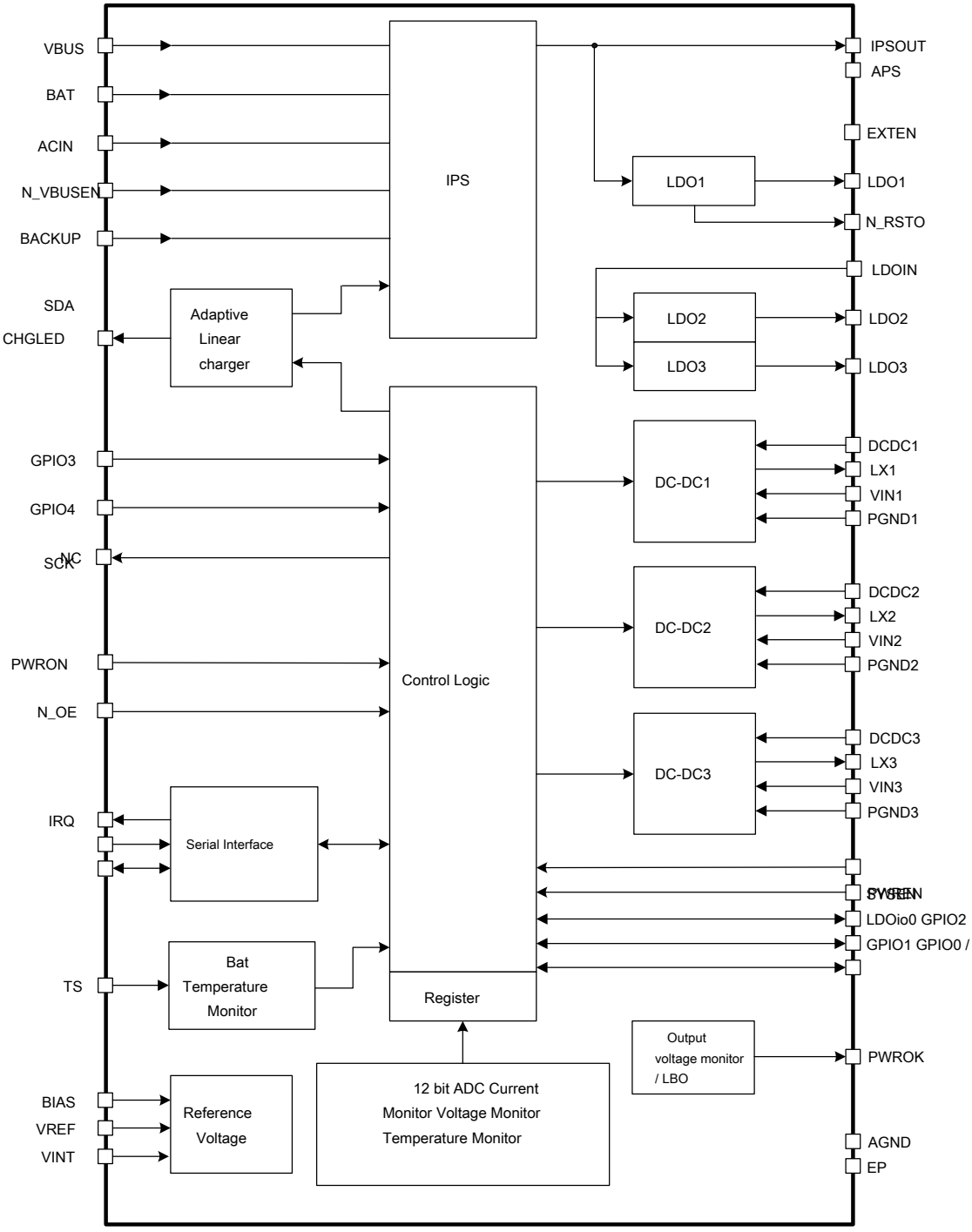
Off Mode Current vs V_{BAT}

7. Pin definitions (Pin Description)

Num	Name	Type	Condition	Function Description
1	SDA	IO		Data pin for serial interface, normally it connect a 2.2K resistor to 3.3VI / O power
2	SCK	I		it is the Clock pin for serial interface, normally it connect a 2.2K resistor to 3.3VI / O power
3	N_RSTO	IO	REG9EH [7]	LDO1 Reset output GPIO [5]
4	N_OE	I		Power output on / off switch GND: on ; IPSOUT: off
5	PWROK / N_LBO	O	SYSEN = LDO1 Power good indication Low power detect output	
6	N_VBUSEN	I		VBUS to IPSOUT Selection GND: IPSOUT select VBUS High: IPSOUT do not select VBUS
7	VIN2	PI		DCDC2 input source
8	LX2	IO		Inductor Pin for DCDC2
9	PGND2	G		NMOS Ground for DCDC2
10	DCDC2	I		DC-DC2 feedback pin
11	LDO3	O		Output Pin of LDO3
12	LDO2	O		Output Pin of LDO2
13	LDOIN	PI		Input to LDO2 and LDO3
14	VIN3	PI		DCDC3 input source
15	LX3	IO		Inductor Pin for DCDC3
16	PGND3	G		NMOS GND for DCDC3
17	DCDC3	I		Feed back to DCDC3
18	GPIO1	IO	REG 93H [2: 0]	GPIO 2 PWM 2 ADC Input
19	GPIO0	IO	REG 90H [2: 0]	GPIO 0 Low noise LDO ADC Input
20	GPIO2	IO	REG 92H [2: 0]	GPIO 1 PWM 1 ADC Input
twenty one	APS	PI		Internal Power Input
twenty two	AGND	G		Analog Ground

twenty three	PWRON	I		Power On-Off key input , Internal 100k pull high to APS
twenty four	BIAS	IO		External 200Kohm 1% resistor
25	VREF	O		Internal reference voltage
26	VINT	PO		Internal logic power, 2.5V
27	PWREN	IO		it is the Low-voltage Power domain enable signal
28	LDO1	O		LDO1 output , for Host RTC block
29	SYSEN	IO		it is the High-voltage Power domain enable signal
30	BACKUP	IO		Backup battery pin
31	VBUS	PI		USB VBUS input
32 , 33	ACIN	PI		Adapter input
34 , 35	BAT	IO		Main Battery
36	CHGLED	O		charger status indication
37	TS	I		Battery Temperature sensor input or an external ADC input
38 , 39	IPSOUT	PO		System power source
40	EXTEN	O		External power module Enable
41	GPIO3	I	REG95H [7]	GPIO3
42	GPIO4	I		GPIO4
43	NC	O		NC
44	VIN1	PI		DCDC1 input source
45	LX1	IO		Inductor Pin for DCDC1
46	PGND1	G		NMOS Ground for DCDC1
47	DCDC1	I		DCDC1 feedback pin
48	IRQ / WAKEUP	IO		IRQ output or wakeup
49	EP	G		Exposed Pad, need to connect to system ground

8. Functional Block Diagram (Functional Block Diagram)



9. Operation and control (Control and Operating)

when AXP192 when working, TWSI interface SCK / SDA Pulled the pin on the system IO Power, the Host Through this interface AXP192 Flexible working state of adjustment and monitoring, and to get a wealth of information.

Note:" Host "Refers to a host processor application system NOTE: as meaning" external power supply "comprising ACIN and VBUS Input.

9.1 operating mode and Reset (Power On / Off & Reset)

Operating mode button (PEK)

AXP192 of PWRON To pin GND It can be connected between a key, as an independent key switch Power Enable Key (PEK) Or sleep / wake button. AXP192 This key can automatically identify the "long press" and a "short press" and react accordingly.

Several Power Source (Power on Source)

1 , ACIN , VBUS And a battery access.

2 , N_OE From high to low.

3 , PEK .

Power (Power On) - A way

when SYSEN Pin and LDO1 Connected together, AXP192 In switch mode A .

N_OE When low, when the main power supply to meet the requirements (ACIN or VBUS> 3.8V When the battery voltage is higher than the shutdown voltage) access, AXP192 Automatically switched (rewritable whether to automatically start an external access to the external power supply demand).

In the N_OE Is low and turned off, the power required by the operation PEK Operation to complete. In the case where the external power source or a battery, N_OE Changes from high to low can lead to AXP192 Boot.

AXP192 It can be made PEK (Button for more than " ONLEVEL ") Is switched on. In practical applications, Host Timing(Alarm) The output signal may also be connected to PWRON -versus PEK in parallel, Alarm When equivalent is active (low) signal PEK Press, can also AXP192 Boot.

When turned on, DC-DC with LDO The soft-start in time series is set after startup is completed by Host Or through PWREN Pin opening / closing the respective power supply.

Shutdown (Power Off) - A way

PEK "Long press" time is greater than IRQLEVEL When, in PEK The interrupt service routine, Host Can "register REG32H [7] "Write" 1 "To inform AXP192 Into shutdown state. AXP192 It will be turned off except when entering shutdown state LDO1 All power output beyond.

In the following cases, AXP192 It will automatically shut down:

1 , Input voltage is too low, the low voltage protection;

2 , Overload due to low power supply output voltage, overload protection;

3 , Input voltage is too high, the overvoltage protection (details see "Power Management passage" section);

4 , N_OE Changes from low to high, without shutting down the set time;

5 , PEK more than the OFFLEVEL (Default 6S) In addition to the system automatically shut down LDO1 Other than the output;

AXP192 Automatic protection mechanism to avoid the occurrence of abnormal applications are irretrievably damaged when the power supply device, thereby protecting the entire system.

Power (Power On) - Version B

when SYSEN Non-pins and LDO1 Connected together, AXP192 In switch mode B .

In boot mode B , The output of each power supply SYSEN / PWREN Control when SYSEN / PWREN Is high, the output of the corresponding power supply path is opened, otherwise the output will be off.

The way A The difference is, it will only happen when each boot source WAKEUP It generates a low pulse on the pin, in order to notify HOST Pulled SYSEN / PWREN Boot.

Note: this mode contemplated for use PXA Similar series processor and power management applications.

Shutdown (Power Off) - Version B

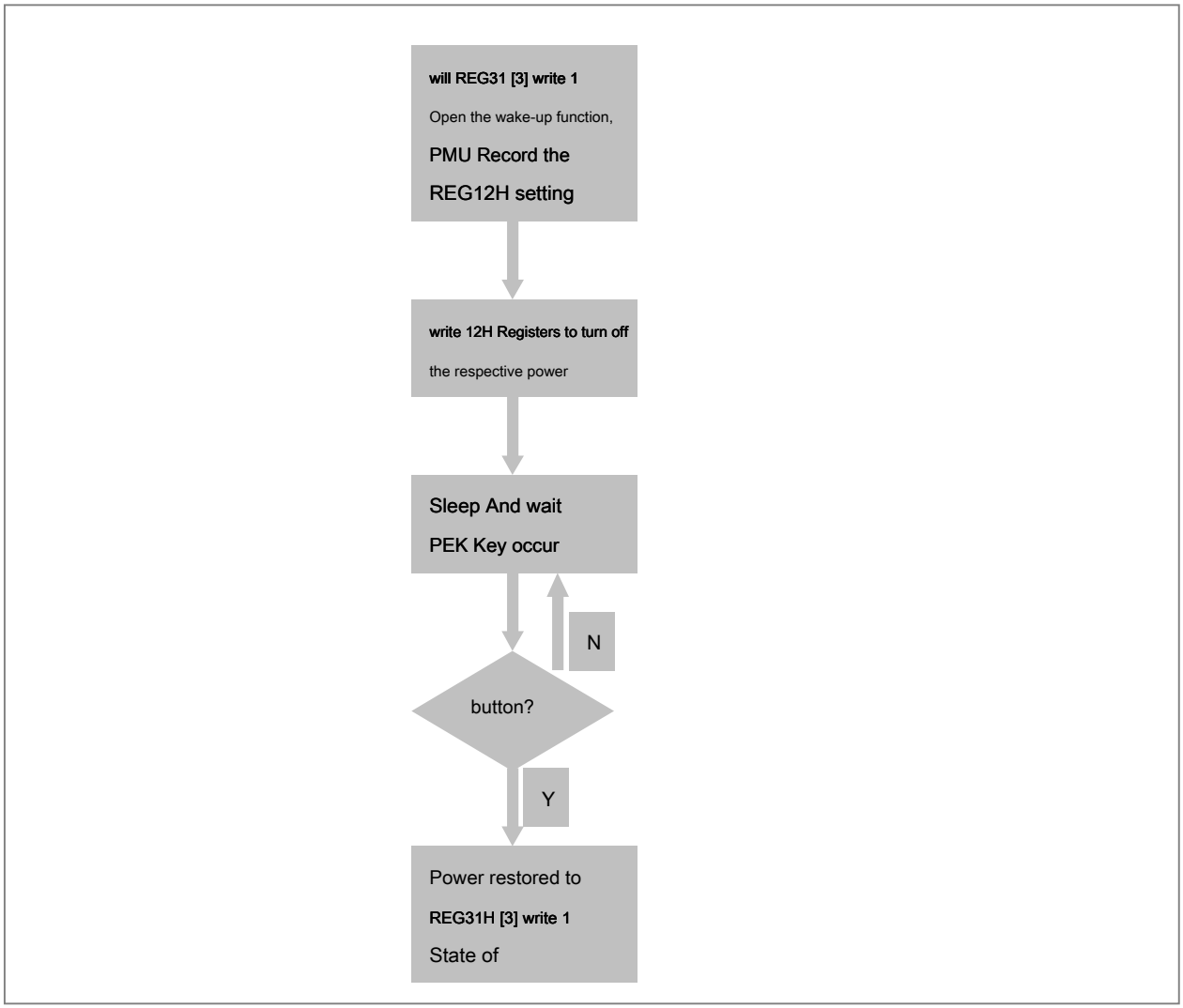
Such as shutdown mode A Shutdown source described, each embodiment does not immediately shut off directly AXP192 Output, but in N_LBO It generates a low signal on the pin, in order to inform the system down SYSEN / PWREN Into shutdown mode; if 2S Within the system is not down SYSEN / PWREN ,then AXP192 Automatic shutdown; of course, HOST It can also be directly down SYSEN / PWREN Into the corresponding shutdown mode.

Note: As the boot mode B , Shutdown mode B Also envisaged for PXA Similar series processor and power management applications. Note: Some processor into sleep (Sleep , SYSEN / PWREN All the way to low, all the way to high) and deep sleep (Deep Sleep , SYSEN / PWREN They are low, except LDO1 All external output off) modes.

Sleep and wake (Sleep and wakeup)

in MannerA And with the power on, if the system needs to enter Sleep Mode, and wherein one or several passage way power off, it can be made REG31 [3] Control, decide whether the PEK Press the trigger signal wakeup ,Let PMU Each output power is restored to the REG31 [3] It is set 1 State, and the brightest the power is turned off on power-up timing sequence according to stipulated.

As follows Sleep with wakeup Mode control flow thereof.



The system reset function and an output monitoring function (PWROK / N_LBO)

In the switch mode A under:

AXP192 of PWROK It can be applied as a reset signal system. in AXP192 Boot process, PWROK Output low, when the output voltage of each power supply reaches a preset value is stable, PWROK It will be pulled in order to achieve power-on reset applications.

During normal operation of the application system, AXP192 Constantly monitors the output voltage from various quarters and load conditions, and in the case of overload or under-voltage, PWROK Output low immediately reset applications, prevent malfunction and possible data errors.

In the switch mode B Next: this pin as N_LBO Signal, which indicates whether the system needs to enter a low power off mode. Specific functions as shutdown mode B description.

9.2 Power Management passage (IPS)

AXP192 Power input from the lithium battery can be BAT , USB VBUS Input, the external power source ACIN (For example, AC adapter AC Adapter) , IPS The state of the external power source and to select the appropriate lithium battery power distribution.

o When only access lithium battery, no external power input, using the lithium battery;

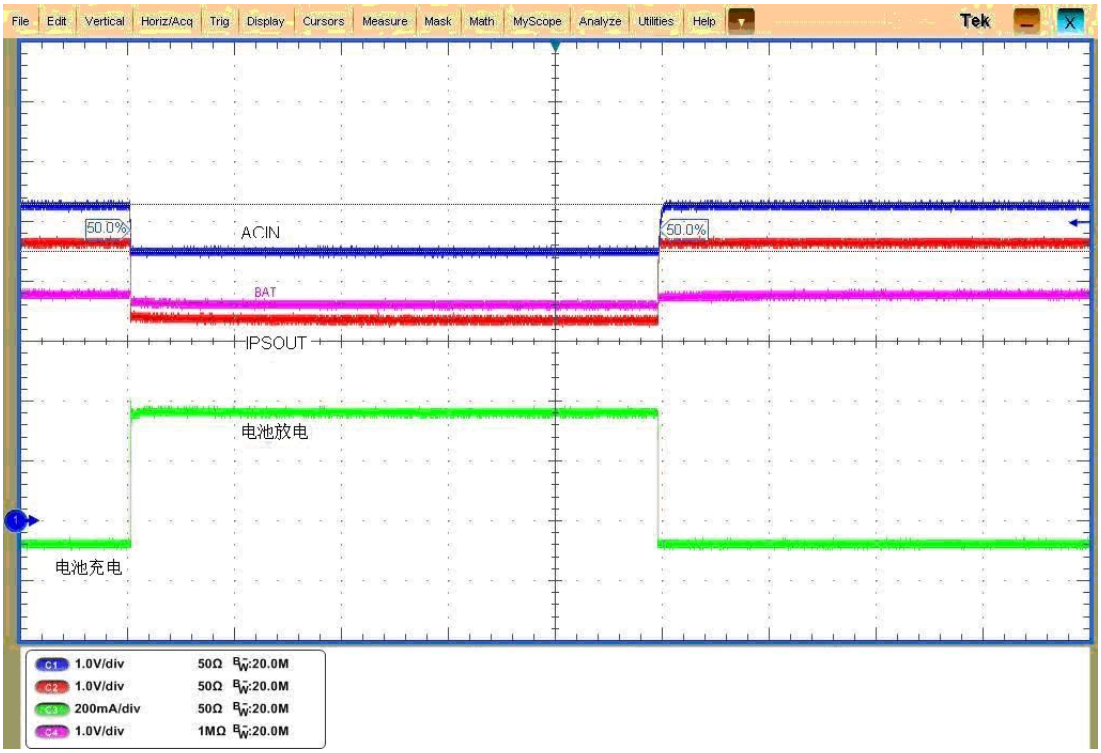
o When an external supply (VBUS or ACIN) , Preferentially using an external power supply;

o When the battery is connected, the external power is removed, and immediately "seamless" switch lithium battery;

o when VBUS with ACIN Both the access priority use ACIN Power supply, and charging the lithium battery;

o If at this time ACIN When driving ability is not enough, will timely open VBUS Path, to achieve ACIN / VBUS Common power supply;

o If the drive capacity is still insufficient, the charging current will be reduced until 0 And then supplemented with a battery-powered; see the following illustration:



As shown above, when ACIN Insufficient load capacity, IPSOUT Voltage drop, BAT Original is charged into and discharged ACIN Together with the load current.

Host able to pass TWSI access AXP192 The internal register set IPS Its parameters and reading information feedback.

Limit voltage / current mode and the direct mode

In order not to affect USB communication, VBUS The default path work " VBUS Pressure limiting mode. "In this mode, AXP192 Will VBUS Voltage is maintained at a reference voltage can be set V_{HOLD} Above, in order to meet USB specification. V_{HOLD} The default is 4.4V , May register Reg30H [5: 3] Adjustment.

If the system from USB VBUS The magnitude of the current drawn is limited demand, provides a current limiting modes to choose from (see Register REG30H [1]) The current limit optional 500mA / 100mA (register Reg30H [0]) .

If you only use the system USB Power supply and do not mind USB Communications, or use USB Power adapter, can modify registers REG30H [6] will AXP192 Set to " VBUS Thru Mode ", this time AXP192 It will give priority to meet the electricity needs of the application system. when USB Host A drive system power too weak or too strong, the VBUS Voltage is lower than V_{HOLD} , AXP192 Will be issued IRQ ,inform Host VBUS Weak power, indicating USB Communication may be affected by subsequent action Host Software decision.

When the external power supply into the reaction AXP192

AXP192 Insertion operation can automatically detect the external power source. when AXP192 Detected after insertion into an external power, the external power supply will automatically determine whether or not available, and the result is set in the corresponding registers, also issued IRQ ,Notice Host .

Storage on an external power source Status bits and their meanings in the table below:

Status bit register	meaning
register REG00H [7]	Indicates an external power supply adapter ACIN does it exist
register REG00H [6]	Indicates an external power supply adapter ACIN it's usable or not
register REG00H [5]	Indicates the external power source VBUS does it exist
register REG00H [4]	Indicates the external power source VBUS it's usable or not
register REG00H [3]	Indicates an external supply VBUS Time, VBUS The voltage is higher than V_{HOLD}
register REG00H [1]	Indicates the external power source ACIN / VBUS Whether PCB Shorting
register REG00H [0]	Indicate whether the system by the ACIN / VBUS Trigger Power

"Indicates an external supply VBUS Time, VBUS The voltage is higher than V_{HOLD} "This flag allows Host Receipt IRQ7

When (finger VBUS Weak power supply), it is determined VBUS Because the system load or access is pulled low because the voltage is lower than the external power supply itself V_{HOLD} So easy Host Software decide whether to continue to work in the voltage-limiting mode or changed through mode.

That the choice of an input power source VBUS

AXP192 Whether the choice VBUS As input The power supply, By N_VBUSEN And register REG30H [7] To decide:

N_VBUSEN REG30H [7] Input Power			meaning
Low	0	VBUS	VBUS And no effective ACIN The selection
Low	1	VBUS	VBUS Can be effective when VBUS As the input power
High	1	VBUS	
High	0	ACIN / BAT	Do not use VBUS

Low battery warning and low voltage protection (automatic shutdown)

AXP192 You can set two low voltage warning $V_{WARNING}$ And automatic shutdown voltage V_{OFF} And APS Compared. Once found APS Lower than $V_{WARNING}$, On the issue of IRQ19 . in case APS Lower than V_{OFF} , AXP192 Automatically enters shutdown mode, in addition to close LDO1 All output outside.

$V_{WARNING}$ Can be set LEVEL1 / LEVEL2 , when APS Voltage drops below LEVEL2 After issuing IRQ30 , APS Voltage to rise again LEVEL1 Automatically cleared after this IRQ .

V WARNING with V OFF Default values may register REG3AH , REG3BH with REG31H Bit [2: 0] Settings.

Overvoltage protection

When the external power supply voltage exceeds 6.3V Time, APX19x issue IRQ1 / 4 , Suggesting an external power supply overvoltage. When the external power source exceeds 7V , AXP192 Automatic shut-down.

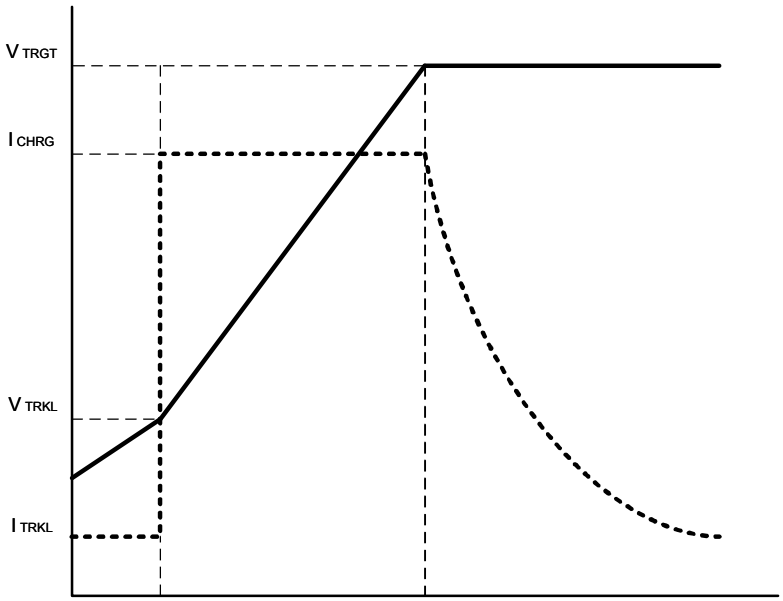
9.3 adaptive charger (Adaptive Charger)

AXP192 Incorporates a constant-current / constant-voltage charger, the charge cycle can be automatically controlled, secure clocks can be built automatically stop charging without processor intervention. This can automatically adjust the power consumption of the charger system charging current, battery detection, activation and trickle charge, built-in temperature detection circuit may automatically reduce the charging current when the temperature is too high or too low.

Start adaptive charging process

The default state of the charger is enabled (can be disabled by setting the register, refer to "Register REG33H "). When the external access after the power supply, AXP192 Is first determined whether the external power source for charging, when the external power source is available to meet the conditions, and at this time the charging function is turned **on, AXP192 Automatically start the charging process, the Host issue IRQ Indicating the charging process begins. Simultaneously, CHGLED Pin output low, may drive an external LED** indicates the state of charge.

A schematic view of the charging voltage and current process



Two voltage sign

V_{TRGT} , The target charging voltage. V_{TRGT} By a register set, the default is 4.2V (See "Register REG33H [6: 5] "). Meanwhile, when the external supply voltage is low, AXP192 Automatically adjust the charging target voltage.

V_{RCH} , Automatic recharge voltage. V_{RCH} - V_{TRGT} - 0.1V .

recharging current

The charging current can register REG33H [3: 0] Set the default value 450mA or 780mA .

Charging Process

If the battery voltage is below 3.0V , Charger automatically enters the pre-charging mode, charging current to the preset value 1/10 . in case 40 Within minutes (this time is adjustable, see "Register REG34H "), The battery voltage can not reach 3.0V , Battery charger automatically enter the active mode. Specific details see "Battery active mode."

Once the battery voltage is higher than 3.0V , Entered the charger constant current mode. If the charging current is less than the preset value 65% When the system issues IRQ17 This is a confirmation "insufficient ability to drive an external power source, when the charge current has not reached the set value, which will extend the charging time, if you want faster fully charged, the proposed replacement of a stronger power supply or turn off the power-hungry functions."

When the battery voltage reaches the target voltage V_{TRGT} After the charger enters the constant voltage mode from the constant current mode, the charge current decreases.

When the charging current below a predetermined value 10% or 15% When (can be set, refer to "Register REG33H "), The end of the charge cycle, the charging is stopped, the end of charge, AXP192 Will be issued IRQ18 , CHGLED Stop pin indicates the state of charge. When the battery voltage drops below the lower V_{RCH}
When, it will automatically begin recharging, also issued IRQ17 .

In the non pre-charging mode, if the 480 Within minutes (this time can be adjusted, refer to "Register REG34H "), The charge cycle is not over, the battery charger will automatically enter the active mode.

Battery mode is activated

Whether from the pre-charging mode or the battery enters an active mode from the constant current charging mode (the timer has timed out), AXP192 Will be issued IRQ10 Indicating that the battery may be damaged.

In the active mode the battery, Charger Always a small charging current to the battery, if the battery voltage reached can be V_{RCH} , Then exit the active mode, also issued IRQ11 .

AXP192 In the register REG01H It indicates the battery charger is in the active mode.

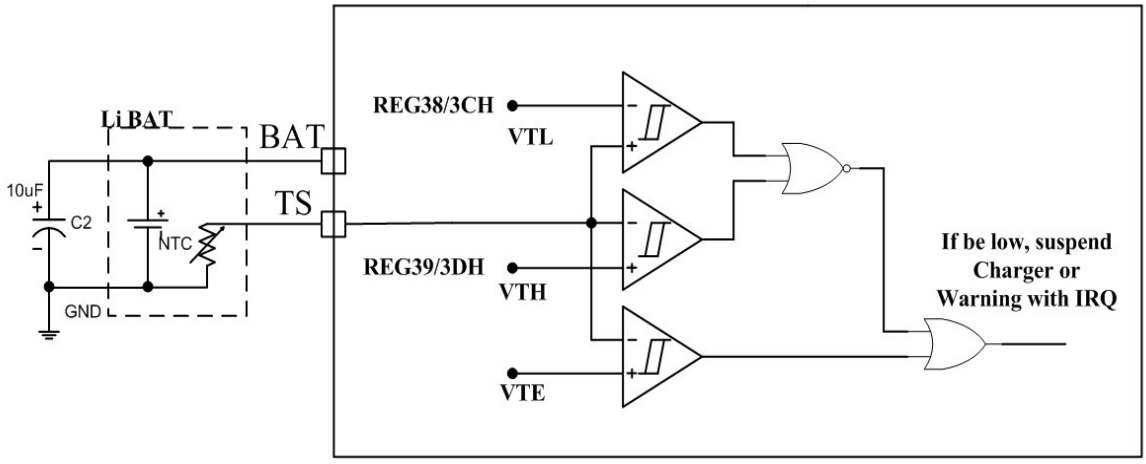
CHGLED

CHGLED Pin indicates the state of charge and alarm, it has four states: charging, not charging, the battery and the external power supply abnormality alarm overvoltage alarm. CHGLED Yes NMOS Open Drain (Open drain type) output, four states may be displayed by a current limiting resistor to directly drive a light emitting diode. Its performance in each state shown in the following table:

status	which performed	Note
Charging Low		
Not charging High	resistance	
Battery abnormal	25% duty 1Hz Jump	Battery charger enters the active mode, the battery temperature is too high or too low
Overvoltage	25% duty 4Hz Jump	External power supply input voltage is too high

Battery temperature detection

In the charging / use, AXP192 By the TS A pin external temperature sensitive resistor to monitor the temperature of the battery. A schematic circuit of FIG follows:



In the figure above, VTH / VTL High and low temperature thresholds are set, respectively, through the register REG38H / 39H / 3CH / 3DH Set,

VTE = 0.2V . Recommended temperature sensitive resistor selection 25 When ℃ is 10Kohm , Precision 1% of NTC Temperature sensitive resistor. AXP192 will be TS The constant current feeding pin, this current can be set 20uA , 40uA , 60uA , 80uA Four kinds (see register REG84H) To adapt to different NTC resistance. This current flows through the temperature-sensitive resistor, to obtain a detection voltage, AXP192 by ADC And the measured voltage value is compared with the setting value, to emit a corresponding IRQ Or be suspended.

If the temperature sensitive resistor is too large or too small, it can be connected in parallel or in series with the additional resistor on its path, in order to expand the detection range.

If the battery temperature sensitive resistor, can TS Pin to ground at this time AXP192 Battery temperature monitoring function is automatically disabled.

Battery Testing

AXP192 Automatically detects whether the battery is present and the identity register (see Register REG01H) And issued IRQ13 , IRQ14 .

Battery detection function can be Host Control opened or closed (see Register REG32H) .

9.4 backup battery (Backup Batttery)

AXP192 Support the use of rechargeable backup battery and, when there is no main power supply (BAT / ACIN / VBUS) There is, LDO1 Input source selection backup battery, an output system for maintaining real-time clock circuit portion.

When the main power is present, by setting REG35H [7] Backup battery charge, which is the default target voltage 3.0V (accessible REG35H [6: 5] Setting), the default charging current is 200uA (Also through REG35H [1: 0] Settings).

Over 9.5 channel power output (Multi-Power Outputs)

AXP192 of Provide more road Output voltage and function List is as follows:

Output path	Types of	The default voltage	Application examples	Drive capability
DCDC1	BUCK	Can be set	3.3Vl / O	1200 mA
DCDC2	BUCK	Can be set	1.25Vcore	1600 mA
DCDC3	BUCK	Can be set	2.5Vddr	700 mA
LDO1	LDO	Can be set	RTC	30 mA
LDO2	LDO	Can be set Analog / FM		200 mA
LDO3	LDO	Can be set	1.8V HDMI	200 mA
LDO IO0	LDO	Can be set	Vmic	50 mA

AXP192 contain 3 Road synchronous buck DC-DC , 4 road LDO , Various promoters timing and control. DC-DC The operating frequency of default 1.5MHz , Can be adjusted by setting the registers, the peripheral may be the use of small inductive and capacitive elements. 3 More DC-DC It can be set to PWM Mode or automatic mode (by the AXP192 Automatic switching), see "The size of the load register REG80H . "

DC-DC1 / 2/3

DCDC1 / 3 Output voltage range 0.7-3.5V , DCDC2 Output voltage 0.7-2.275V , May register set (see "Register REG23H 26H 27H 29H ").

DCDC1 / 2/3 The output capacitor is recommended 10uF X7R Little more than ESR Ceramic capacitors; when the output voltage is set to 2.5V When the above recommended 2.2uH Inductance, in 2.5V When the following is recommended 4.7uH Inductor, wherein the inductor saturation current greater than this required power demand for the maximum current path 50% the above.

The following is a list of recommended LC:

Inductor		
models	Current specifications	DC resistance
Murata LQH55PN2R2NR0	2100mA@2.2uH	30mOhm
Murata LQH55PN4R7NR0	1400mA@4.7uH	60mOhm
Murata LQH44PN2R2MP0	2000mA@2.2uH	49mOhm
Murata LQH44PN4R7MP0	1700mA@2.2uH	80mOhm
TDK VLF5010ST-2R2M2R3	2700mA@2.2uH	41mOhm

TDK VLF5014ST-4R7M1R7	1700mA@4.7uH	98mOhm
TDK SLF6045T-4R7N2R4-3PF	2400mA@4.7uH	27mOhm
Capacitance		
model	**Temperature characteristics**	**Tolerance**
TDK C2012X5R0J475K	X5R / X7R	10%@4.7uF
TDK C2012X5R0J106K	X5R / X7R	10% @ 10uF
Murata GRM31E71A475K	X7R	10%@4.7uF
Murata GRM21E71A106K	X7R	10% @ 10uF
Murata GRM31E71A106K	X7R	10% @ 10uF

LDO1

LDO1 Always on, you can use the system for the real time clock circuit (RTC) Provide uninterrupted power supply, its drive capability 30mA .

LDO2 / 3

LDO2 / 3 Using a low-noise design can provide power to analog circuitry applications, which drive capability 200mA .

LDO IO0

LDO IO0 Also used design, low-noise output drive capability is 50mA .

Soft start (Soft Start)

all DC-DC with LDO Support the establishment of output soft-start mode, avoid sudden changes starting current impact on the input path.

Self-diagnosis: load monitoring and limiting protection

all DC-DC with LDO It has load monitoring and limiting function, when the load current exceeds the drive capability, output voltages are lowered to protect the internal circuitry. Three DC-DC Output voltage is lower than the set voltage 85% Time, AXP192 Automatic shut-down. DETAILED while the internal system automatically records which output voltage is too low due to a shutdown (see Register REG46H [5: 2]) And issue the appropriate IRQ .

all DC-DC No external Schottky diode and the resistor divider feedback circuit. If the application does not require use of a DC-DC , Just to corresponding LX Pin not connected to.

The default setting voltage 9.6 / start timing (Default Voltage / Timing Setting)

AXP192 Customizable default voltage of each power supply, start-up sequence and so on.

Start timing: contains 8 Class started, namely 0-7 , The first of which 7 The default level when the power supply does not start this way. other 0-6 The first level, respectively 1-7 Step start this way power. Each step can be set from the start time interval, the range of selectable 1 , 4 , 16mS .

The default voltage setting: each channel DCDC / LDO May be selected from a set range including the lowest voltage to the highest voltage. About this part, see "Default Configuration instructions" document.

9.7 The signal acquisition system (Signal Capture)

General battery monitor battery power is typically estimated by measuring the battery voltage, and AXP192 Multi-channel 12Bit ADC In addition to measuring the battery voltage, it can also measure the battery current and the external power supply voltage, current, and battery charge and discharge internal integrated coulometer. Host It can be more accurately calculated based on these data the battery, in addition, may also be calculated out extensive real-time system power consumption information, remaining battery capacity, the battery charged, remaining battery life and the remaining fill time.

Separate ways ADC It enables control register and the sampling rate can be REG82H , 83H , 84H Set in the corresponding registers, the register descriptions refer to the sampling result is stored ADC Data class. among them GPIO [3: 0] Register input range by REG85H Settings. Battery current flow is charged or discharged by the register REG00H [2] Indicated.

Channel	000H	STEP	FFFH
Battery Voltage	0mV	1.1mV	4.5045V
Bat discharge current	0mA	0.5mA	4.095A
Bat charge current	0mA	0.5mA	4.095A
ACIN volatge	0mV	1.7mV	6.9615V
ACIN current	0mA	0.625mA	2.5594A
VBUS voltage	0mV	1.7mV	6.9615V
VBUS current	0mA	0.375mA	1.5356A
Internal temperature	-144.7 ℃	0.1 ℃	264.8 ℃
APS voltage	0mV	1.4mV	5.733V
TS pin input	0mV	0.8mV	3.276V
GPIO0	0 / 0.7V	0.5mV	2.0475 / 2.7475V
GPIO1	0 / 0.7V	0.5mV	2.0475 / 2.7475V
GPIO2	0 / 0.7V	0.5mV	2.0475 / 2.7475V
GPIO3	0 / 0.7V	0.5mV	2.0475 / 2.7475V

9.8 Multifunction Pin Description (Multi-Function Pin Description)

GPIO [4: 0]

can be used as GPIO [4: 0] , ADC Input (External signal monitoring), LDO , PWM And other details, see REG90H-96H Instructions.

N_RSTO

LDO1 Pulled state monitoring signals (on LDO1) Or GPIO5 , See use REG9EH Instructions.

CHGLED

Indicates the state of charge, over-temperature and over-pressure alarm, etc. GPO Function, see use REG32H Instructions.

IRQ (WAKEUP)

when AXP192 In switch mode A When this pin as IRQ Status indication pin, when an interrupt occurs, the output down notification HOST Interrupt handling, pulled up system IO power supply.

when AXP192 In switch mode B When this pin as WAKEUP Trigger signal indication, pulled up LDO1 Its specific functions refer to the boot mode B Instructions.

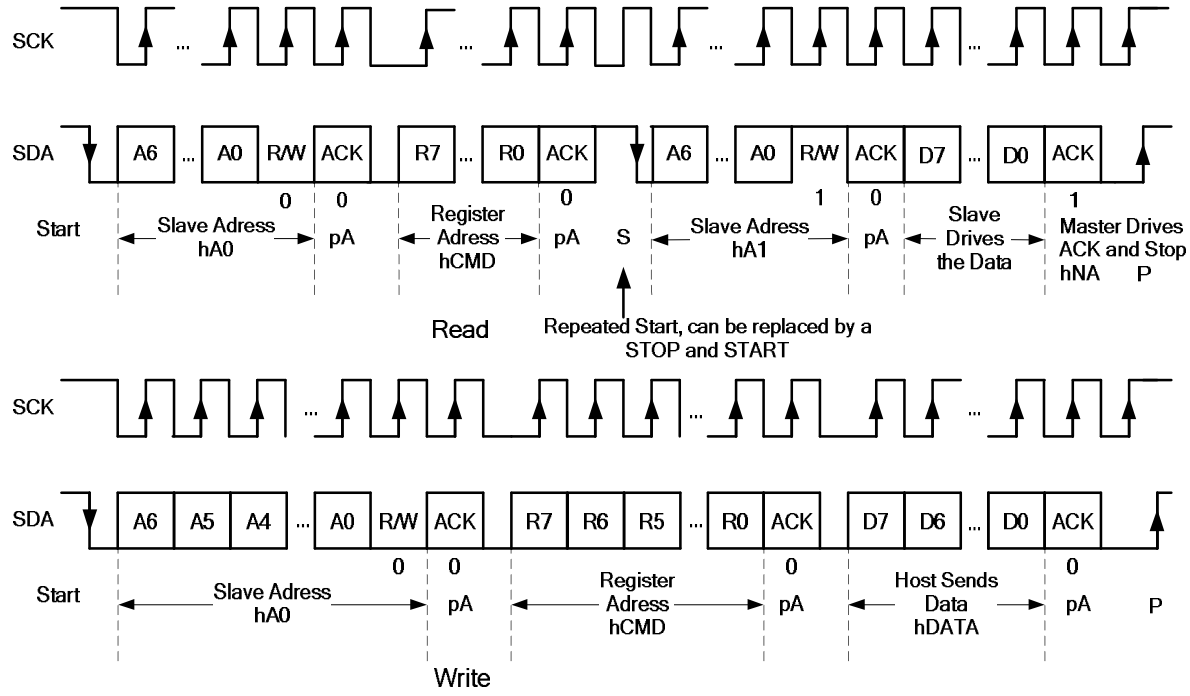
PWROK (N_LBO)

A system reset signal (power supply IO pulled System) mode when the switch unit A, power-off indication signal (LDO1 pulled in) at a switch mode B, see "9.2 reset switch and" the "system reset function, and output monitoring. "

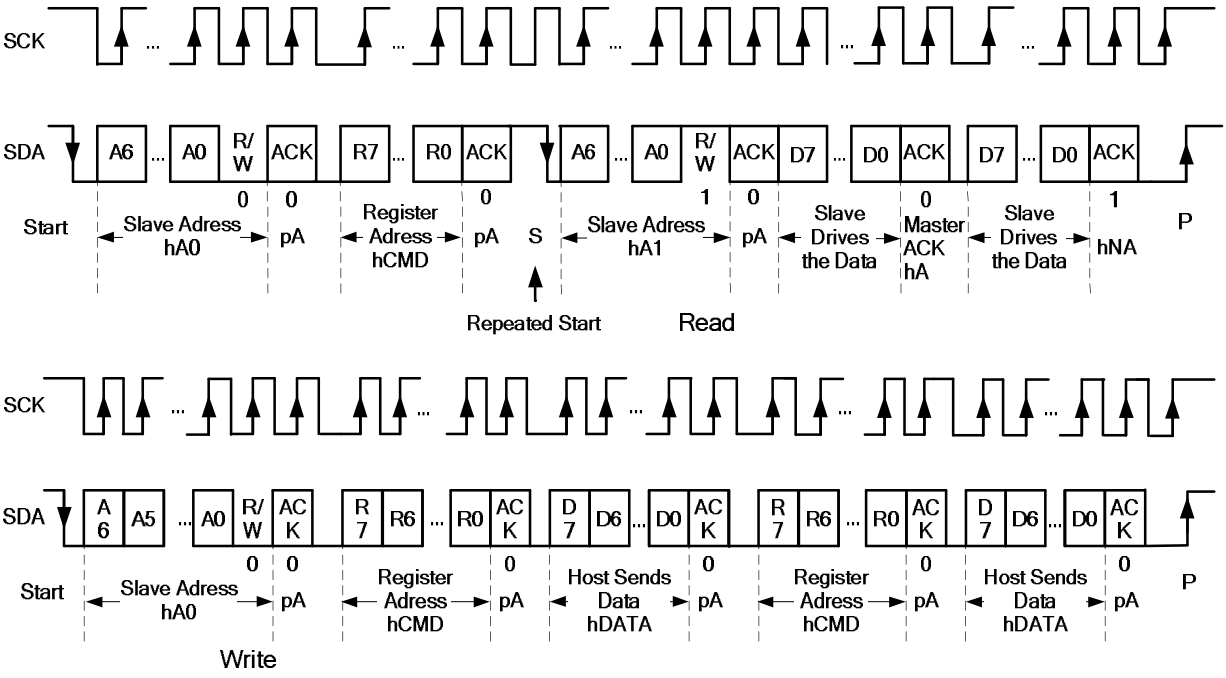
9.9 Timer (Timer)

AXP192 It comprises an internal timer, by setting register REG8AH [6: 0] It may change timer value, the minimum resolution of minutes (Minute) , Will set the timer expires REG8AH [7] .

9.10 HOST port and interrupt (TWSI and IRQ)



Map 1: Single Read and Write



Map 2: Multi Read and Write

Host able to pass TWSI Access Interface AXP192 Register, the operation timing shown above, supports standard 100KHz or

400KHz Frequency at speeds up 1.2MHz , While supporting tonal / write operation, the device address 69H (Read) and 68H (write).

When certain events occur, AXP192 By pulling IRQ Interrupt mechanism to alert Host And interrupt status stored in the interrupt status register (see Register REG44H ,register REG45H ,register REG46H ,register REG47H) , To write the corresponding status register bit 1 Clear the corresponding interrupt, when there is no interruption event, IRQ Output pulled (by an external pull 51K resistance). Each of the interrupt can be masked (see registers Interrupt Control Register REG40H ,register REG41H ,register REG42H ,register REG43H) .

position	Interrupt number	meaning	position	Interrupt number	meaning
register 44H [7]	IRQ1	power supply ACIN Overpressure	register 46H [7]	IRQ16	IC Internal over-temperature
register 44H [6]	IRQ2	power supply ACIN Insert	register 46H [6]	IRQ17	Charging current inadequate
register 44H [5]	IRQ3	power supply ACIN Removing	register 46H [5]	IRQ18	DCDC1 Voltage is too low
register 44H [4]	IRQ4	power supply VBUS Overpressure	register 46H [4]	IRQ19	DCDC2 Voltage is too low
register 44H [3]	IRQ5	power supply VBUS Insert	register 46H [3]	IRQ20	DCDC3 Voltage is too low
register 44H [2]	IRQ6	power supply VBUS Removing	register 46H [2]	Retention	
register 44H [1]	IRQ7	VBUS Voltage is less than V_{HOLD}	register 46H [1]	IRQ22	PEK dog
register 44H [0]	Retention		register 46H [0]	IRQ23	PEK Press
register 45H [7]	IRQ8	Battery access	register 47H [7]	IRQ24	N_OE Power
register 45H [6]	IRQ9	Battery removal	register 47H [6]	IRQ25	N_OE Shutdown
register 45H [5]	IRQ10	Battery enters active mode	register 47H [5]	IRQ26	VBUS effective
register 45H [4]	IRQ11	Battery exit active mode	register 47H [4]	IRQ27	VBUS invalid
register 45H [3]	IRQ12	Charging	register 47H [3]	IRQ28	VBUS Session Valid
register 45H [2]	IRQ13	finished charging	register 47H [2]	IRQ29	VBUS Session End
register 45H [1]	IRQ14	Battery temperature	register 47H [1]	Retention	
register 45H [0]	IRQ15	The battery temperature is too low	register 47H [0]	IRQ30	Low battery warning

9.11 register (Registers)

The first 1 Group, based power control

address	Register Description	R / W	Defaults
00	Power Status Register	R	
01	Mode power / charge status register	R	
04	OTG VBUS Status Register	R	
06-0B	Data buffer register 0-5	R / W	F0 / 0F / 00 / FF / 00/00
10	EXTEN & DC-DC2 Switch control register	R / W	X5H
12	DC-DC1 / 3 & LDO2 / 3 Switch control register	R / W	XFH
twenty three	DC-DC2 Voltage setting register	R / W	16H
25	DC-DC2 Voltage slope parameter setting register	R / W	00H

26	DC-DC1 Voltage setting register	R / W	68H
27	DC-DC3 Voltage setting register	R / W	48H
28	LDO2 / 3 Voltage setting register	R / W	CFH
30	VBUS-IPSOUT Path setting register	R / W	60H
31	V OFF Shutdown voltage setting register	R / W	X3H
32	Off, battery detection, CHGLED Control register	R / W	46H
33	Charge control register 1	R / W	C8H
34	Charge control register 2	R / W	41H
35	Backup battery charging control register	R / W	22H
36	PEK Parameter setting register	R / W	5DH
37	DCDC Converter operating frequency setting register	R / W	08H
38	Low battery charge warning setting register	R / W	A5H
39	Battery charging high temperature alarm setting register	R / W	1FH
3A	APS Low Level1 Setting register	R / W	68H
3B	APS Low Level2 Setting register	R / W	5FH
3C	Low battery discharge alarm setting register	R / W	FCH
3D	Battery discharge high temperature alarm setting register	R / W	16H
80	DCDC Operation mode setting register	R / W	E0H
82	ADC Enable setting register 1	R / W	83H
83	ADC Enable setting register 2	R / W	80H
84	ADC Sample rate, TS pin Control register	R / W	32H
85	GPIO [3: 0] Input range setting register	R / W	X0H
86	GPIO1 ADC IRQ Rising threshold setting	R / W	FFH
87	GPIO1 ADC IRQ Falling threshold setting	R / W	00H
8A	Timer control register	R / W	00H
8B	VBUS Monitoring setting register	R / W	00H
8F	Over-temperature shutdown control register	R / W	01H

The first 2 group, GPIO control Class system

address	Register Description	R / W	Defaults
90	GPIO0 Control register	R / W	07H
91	GPIO0 LDO Mode setting register output voltage	R / W	A0H
92	GPIO1 Control register	R / W	07H
93	GPIO2 Control register	R / W	07H
94	GPIO [2: 0] Signal Status Register	R / W	00H
95	GPIO [4: 3] Function control register	R / W	00H
96	GPIO [4: 3] Signal Status Register	R / W	00H
97	GPIO [2: 0] Pull-down control registers	R / W	00H
98	PWM1 The frequency setting register	R / W	00H
99	PWM1 Duty cycle setting register 1	R / W	16H
9A	PWM1 Duty cycle setting register 2	R / W	0BH

9B	PWM2 The frequency setting register	R / W	00H
9C	PWM2 Duty cycle setting register 1	R / W	16H
9D	PWM2 Duty cycle setting register 2	R / W	0BH
9E	N_RSTO (GPIO5) Control register	R / W	20H

The first 3 Group, interrupt control class

address	Register Description	R / W	Defaults
40	IRQ Enable Control Register 1	R / W	D8H
41	IRQ Enable Control Register 2	R / W	FFH
42	IRQ Enable Control Register 3	R / W	3BH
43	IRQ Enable Control Register 4	R / W	C1H
4A	IRQ Enable Control Register 5	R / W	00H
44	IRQ Status Register 1	R / W	00H
45	IRQ Status Register 2	R / W	00H
46	IRQ Status Register 3	R / W	00H
47	IRQ Status Register 4	R / W	00H
4D	IRQ Status Register 5	R / W	00H

The first 4 group, ADC number According to class

address	Register Description	R / W
56	ACIN Voltage ADC High data 8 Place	R
57	ACIN Voltage ADC Low data 4 Place	R
58	ACIN Electric current ADC High data 8 Place	R
59	ACIN Electric current ADC Low data 4 Place	R
5A	VBUS Voltage ADC High data 8 Place	R
5B	VBUS Voltage ADC Low data 4 Place	R
5C	VBUS Electric current ADC High data 8 Place	R
5D	VBUS Electric current ADC Low data 4 Place	R
5E	AXP192 Internal temperature monitoring ADC High data 8 Place	R
5F	AXP192 Internal temperature monitoring ADC Low data 4 Place	R
62	TS Entry ADC High data 8 Bits, the default monitoring battery temperature	R
63	TS Entry ADC Low data 4 Bits, the default monitoring battery temperature	R
64	GPIO0 Voltage ADC High data 8 Place	R
65	GPIO0 Voltage ADC Low data 4 Place	R
66	GPIO1 Voltage ADC High data 8 Place	R
67	GPIO1 Voltage ADC Low data 4 Place	R
68	GPIO2 Voltage ADC High data 8 Place	R
69	GPIO2 Voltage ADC Low data 4 Place	R
6A	GPIO3 Voltage ADC High data 8 Place	R
6B	GPIO3 Voltage ADC Low data 4 Place	R

70	High instantaneous power battery 8 Place	R
71	Instantaneous power in the battery 8 Place	R
72	Low battery instantaneous power 8 Place	R
78	The battery voltage is high 8 Place	R
79	Low battery voltage 4 Place	R
7A	Battery charging current is high 8 Place	R
7B	Low battery charging current 5 Place	R
7C	Battery discharge current is high 8 Place	R
7D	Battery discharge current is low 5 Place	R
7E	APS High Voltage 8 Place	R
7F	APS Low voltage 4 Place	R

NOTE: battery power is calculated as

Pbat = Register values * Voltage LSB * Electric current LSB / 1000 . Wherein the voltage LSB for 1.1mV Current LSB for 0.5mA The calculated results for the unit mW .

address	Register Description	R / W	Defaults
B0	Battery charging coulomb counter data register [31:24]	R / W	00H
B1	Battery charging coulomb counter data register [23:16]	R / W	00H
B2	Battery charging coulomb counter data register [15: 8]	R / W	00H
B3	Battery charging coulomb counter data register [7: 0]	R / W	00H
B4	Battery discharge coulomb counter data register [31:24]	R / W	00H
B5	Battery discharge coulomb counter data register [23:16]	R / W	00H
B6	Battery discharge coulomb counter data register [15: 8]	R / W	00H
B7	Battery discharge coulomb counter data register [7: 0]	R / W	00H
B8	Coulomb Counter Control Register	R / W	00H

Coulomb calculation method: C = 65536 * Electric current LSB * (Coulomb counter value charge - discharge coulomb counter value) / 3600 / ADC Sampling Rate. among them: ADC Reference sample rate REG84H Set; current LSB for 0.5mA ; Calculation unit mAh .

REG 00H: Input power status

Bit	description	R / W
7	ACIN There is an indication 0: ACIN does not exist; 1: ACIN presence	R
6	Instruction ACIN it's usable or not	R
5	VBUS There is an indication 0: VBUS does not exist; 1: VBUS presence	R
4	Instruction VBUS it's usable or not	R
3	Instruction VBUS Before using the access is greater than V_{HOLD}	R
2	Indicates that the battery current direction 0: In the discharge cell; 1: The battery is charged	R

1 Instruction ACIN with VBUS Whether the input PCB Shorted		R
0 Indicating whether the source start ACIN or VBUS 0: Non-source start ACIN / VBUS ; 1: Start source ACIN / VBUS		R

REG 01H: power mode of operation and the state of charge indication

Bit	description	R / W
7 Instruction AXP192 Whether over-temperature 0: Not too warm; 1: Overtemperature		R
6 Charging indicator 0: No charging or charging has been completed; 1: Charging		R
5 Battery status indication exists 0: No battery is connected to AXP192 ; 1: Connected to the battery AXP192		R
4 Reservations can not be changed		R
3 It indicates whether the cell enters active mode 0: The battery does not enter an active mode; 1: Battery has entered the active mode		R
2 Indicating whether the charging current is less than desired current 0: The actual charge current is equal to the desired current; 1: The actual charge current is less than desired current		R
1	AXP192 Switch mode indication 0: the way A ; 1: the way B	R
0 Reservations can not be changed		R

REG 02H: USB OTG VBUS status indicator

Bit	description	R / W
7-3 Reservations can not be changed		
2 Instruction VBUS is it effective, 1 Effective representation		R
1 Instruction VBUS Session A / B is it effective, 1 Effective representation		R
0 Instruction Session End status, 1 Effective representation		R

REG 06-0BH: data cache

NOTE: As long as an external power source, a battery or a battery backup power sources exist, the data would have been saved, not switch. The default value F0 / 0F / 00 / FF / 00 / 00H

REG 10H: EXTEN & DC-DC2 output control

default value: XXH

Bit	description		R / W	Defaults
7-3	Reservations can not be changed			
2	EXTEN Switch control	0: shut down; 1: turn on	RW	X
1	Reservations can not be changed			
0	DC-DC2 Switch control	0: shut down; 1: turn on	RW	X

Note: X Custom represented by the circumstances, the following value X Part with this.

REG 12H: control the power supply output

default value: XXH

Bit	description		R / W	Defaults
7	Reservations can not be changed		RW	X
6	EXTEN Switch control	0: shut down; 1: turn on	RW	X
5	Reservations can not be changed		RW	X
4	DC-DC2 Switch control	0: shut down; 1: turn on	RW	X
3	LDO3 Switch control		RW	X
2	LDO2 Switch control		RW	X
1	DC-DC3 Switch control		RW	X
0	DC-DC1 Switch control		RW	X

Note: REG12Hbit6 / 4 Respectively REG10Hbit2 / 0 .

REG 23H: DC-DC2 output voltage setting

default value: 16H

Bit	description		R / W	Defaults
7-6	Reservations can not be changed			
5	DC-DC2 Setting the output voltage Bit5	0.7-2.275V , 25mV / step	RW	X
4	DC-DC2 Setting the output voltage Bit4		RW	X
3	DC-DC2 Setting the output voltage Bit3		RW	X
2	DC-DC2 Setting the output voltage Bit2		RW	X
1	DC-DC2 Setting the output voltage Bit1		RW	X
0	DC-DC2 Setting the output voltage Bit0		RW	X

REG 25H: DC-DC2 dynamic voltage scaling parameters

default value: 00H

Bit	description		R / W	Defaults
7-3	Reservations can not be changed			
2	DC-DC2 VRC Enable Control 0: turn on; 1: shut down		RW	0
1	Reservations can not be changed		RW	0
0	DC-DC2 VRC Voltage rising slope control 0: 25mV / 15.625us = 1.6mV / us	1: 25mV / 31.250us = 0.8mV / us	RW	0

REG 26H: DC-DC1 setting the output voltage

default value: 68H

Bit	description		R / W	Defaults
7	Reservations can not be changed			
6	DC-DC1 Setting the output voltage Bit6	0.7-3.5V , 25mV / step	RW	X
5	DC-DC1 Setting the output voltage Bit5		RW	X
4	DC-DC1 Setting the output voltage Bit4		RW	X
3	DC-DC1 Setting the output voltage Bit3		RW	X
2	DC-DC1 Setting the output voltage Bit2		RW	X
1	DC-DC1 Setting the output voltage Bit1		RW	X
0	DC-DC1 Setting the output voltage Bit0		RW	X

REG 27H: DC-DC3 setting the output voltage

default value: 48H

Bit	description		R / W	Defaults
7	Reservations can not be changed			
6	DC-DC3 Setting the output voltage Bit6	0.7-3.5V , 25mV / step	RW	X
5	DC-DC3 Setting the output voltage Bit5		RW	X
4	DC-DC3 Setting the output voltage Bit4		RW	X
3	DC-DC3 Setting the output voltage Bit3		RW	X
2	DC-DC3 Setting the output voltage Bit2		RW	X
1	DC-DC3 Setting the output voltage Bit1		RW	X
0	DC-DC3 Setting the output voltage Bit0		RW	X

REG 28H: LDO2 / 3 output voltage setting

default value: CFH

Bit	description		R / W	Defaults
7	LDO2 Setting the output voltage Bit3	1.8-3.3V , 100mV / step	RW	X
6	LDO2 Setting the output voltage Bit2		RW	X
5	LDO2 Setting the output voltage Bit1		RW	X
4	LDO2 Setting the output voltage Bit0		RW	X
3	LDO3 Setting the output voltage Bit3	1.8-3.3V , 100mV / step	RW	X
2	LDO3 Setting the output voltage Bit2		RW	X
1	LDO3 Setting the output voltage Bit1		RW	X
0	LDO3 Setting the output voltage Bit0		RW	X

REG 30H: VBUS-IPSOUT path management

default value: 6XH

Bit	description		R / W	Defaults
7	VBUS Available VBUS-IPSOUT Channel selection control signal 0: by N_VBUSEN pin Decide whether to open this path 1: VBUS-IPSOUT Open access can be selected, regardless of N_VBUSEN status		RW	0
6	VBUS V_{HOLD} Pressure limiting control 0: Any pressure; 1: Pressure limiting		RW	1
5	V_{HOLD} Set up Bit 2	000: 4.0V ; 001: 4.1V ; 010: 4.2V 011: 4.3V ; 100 : 4.4V ; 101: 4.5V 110: 4.6V ; 111: 4.7V	RW	1
4	V_{HOLD} Set up Bit 1		RW	0
3	V_{HOLD} Set up Bit 0		RW	0
2	Reservations can not be changed			
1	VBUS Limiting control enable signal 0: shut down; 1: turn on		RW	X
0	VBUS Limit control open time stream selection 0: 500mA ; 1: 100mA		RW	0

REG 31H: V_{OFF} Off voltage setting

default value: X3H

Bit	description	R / W	Defaults
7-4	Reservations can not be changed		
3	Sleep Mode PWRON Press wakeup enable settings:		

	0 : Short press to wake up close function 1 : Short press Open this wake-up function bit Automatic Clearing After writing 0 , So each into Sleep Former mode needs to write again 12			
	V OFF Set up Bit2	000-2.6V ; 001-2.7V ; 010-2.8V ;	RW	0
1	V OFF Set up Bit1	011-2.9V ; 100-3.0V ; 101-3.1V ;	RW	1
0	V OFF Set up Bit0	110-3.2V ; 111-3.3V	RW	1

REG 32H: set off, and the battery detection control pin CHGLED

default value: 46H

Bit	description		R / W	Defaults
7	the way A Shutdown control This bit 1 Closes AXP192 Output		RW	0
6	Battery monitoring Set bit: 0: shut down; 1: turn on		RW	1
5-4	CHGLED Pin feature set	00: High resistance 01: 25% 1Hz flicker 10: 25% 4Hz flicker 11: Output low	RW	00
3	CHGLED Pin control settings	0: Controlled by the charging function 1: From the register REG 32HBit [5: 4] control	RW	0
2	Reservations can not be changed			
1-0	N_OE After the low to high AXP192 Shutdown delay Delay time	00: 0.5S ; 01: 1S ; 10: 2S ; 11: 3S	RW	10

REG 33H: charging control 1

default value: C8H

Bit	description	R / W	Defaults
7	Charging enable control bit, the outer channel and the inner channel comprising 0: shut down, 1: turn on	RW	1
6: 5	Charging the target voltage setting 00: 4.1V ; 01: 4.15V ; 10: 4.2V ; 11: 4.36V	RW	10
4	Charging end current setting 0: The charging current is less than 10% When the end of charging set value 1: The charging current is less than 15% When the end of charging set value	RW	0
3-0	Charging current setting internal passage 0000: 100mA ; 0001: 190mA ; 0010: 280mA ; 0011: 360mA ; 0100: 450mA ; 0101: 550mA ; 0110: 630mA ; 0111: 700mA ;	RW	1000

	1000: 780mA ; 1001: 880mA ; 1010: 960mA ; 1011: 1000mA ; 1100: 1080mA ; 1101: 1160mA ; 1110: 1240mA ; 1111: 1320mA		

REG 34H: charging control 2

default value: 41H

Bit	description	R / W	Defaults
7 Precharge timeout setting Bit1	00: 30 min ; 01: 40min ;	RW	0
6 Precharge timeout setting Bit0	10: 50min ; 11: 60min	RW	1
5-3 External access charging current setting range 300-1000mA , 100mA / step , Defaults 300mA		RW	000
2 Enable external charging passage provided 0: shut down; 1: turn on		RW	0
1 Timeout setting the constant current mode Bit1	00: 7Hours ; 01: 8Hours ;	RW	0
0 Timeout setting the constant current mode Bit0	10: 9Hours ; 11: 10Hours	RW	1

REG 35H: backup battery charging control

default value: 22H

Bit	description	R / W	Defaults
7 A spare battery enable control 0: shut down; 1: turn on		RW	0
6: 5 Backup battery charging target voltage setting 00: 3.1V ; 01: 3.0V ; 10: 3.0V ; 11: 2.5V		RW	01
4-2 Reservations can not be changed			
1: 0 Backup battery charging current setting	00: 50uA ; 01: 100uA ; 10: 200uA ; 11: 400uA	RW	10

REG 36H: PEK Key parameters

default value: 5DH

Bit	description	R / W	Defaults
7 Boot time settings Bit1	00: 128mS ; 01: 512mS ;	RW	0
6 Boot time settings Bit0	10: 1S ; 11: 2S.	RW	1
5 Long time setting key Bit1	00: 1S ; 01: 1.5S ;	RW	0
4 Long time setting key Bit0	10: 2S ; 11: 2.5S.	RW	1

3 Automatic shutdown function is set longer than the time duration shutdown button 0: shut down; 1: turn on			RW	1
2 After power-up complete PWROK Signal Delay 0: 32mS ; 1: 64mS			RW	1
1 Long set off Bit1		00: 4S ; 01: 6S ;	RW	0
0 Long set off Bit0		10: 8S ; 11: 10S.	RW	1

REG 37H: DC-DC operating frequency is provided

default value: 08H

Bit	description		R / W	Defaults
7-4 Reservations can not be changed				
3	DC-DC Switching frequency setting Bit 3	Each level change 5% ,Defaults 1.5MHz	RW	1
2	DC-DC Switching frequency setting Bit 2		RW	0
1	DC-DC Switching frequency setting Bit 1		RW	0
0	DC-DC Switching frequency setting Bit 0		RW	0

REG 38H: $V_{LTF\text{-}charge}$ Low battery charge threshold setting

default value: A5H

Bit	description		R / W	Defaults
7-0 When charging the battery low threshold setting, M		M * 10H , when M = A5H When the corresponding 2.112V ; Voltage may correspond to 0V ~ 3.264V	RW	A5H

$V_{LTF\text{-}charge} = M * 10H * 0.0008V$

REG 39H: $V_{HTF\text{-}charge}$ Charging the battery temperature threshold setting

default value: 1FH

Bit	description		R / W	Defaults
7-0 When charging the battery temperature threshold setting, N		N * 10H , when N = 1FH ,correspond 0.397V ; Voltage may correspond to 0V ~ 3.264V	RW	1FH

$V_{HTF\text{-}charge} = N * 10H * 0.0008V$

REG 3AH: APS low level 1

default value: 68H

Bit	description	R / W	Defaults

7-0	APS Low-level settings 1	RW	68H

REG 3BH: APS low level 2

default value: 5FH

Bit	description	R / W	Defaults
7-0	APS Low-level settings 2	RW	5FH

REG3AH , REG3BH corresponding APS Voltage is set to the following relationship (assumed that the register value n):

Vwarning = 2.8672 + 1.4mV * n * 4

REG 3CH: $V_{LTF\text{-}discharge}$ Battery discharge cold threshold setting

default value: FCH

Bit	description		R / W	Defaults
7-0	When the discharge of the battery low threshold setting, M	M * 10H , when M = FCH When the corresponding 3.226V ; Voltage may correspond to 0V ~ 3.264V	RW	FCH

$V_{LTF\text{-}discharge} = M * 10H * 0.0008V$

REG 3DH: $V_{HTF\text{-}discharge}$ Battery discharge threshold setting temperature

default value: 16H

Bit	description		R / W	Defaults
7-0	When the discharge of the battery temperature threshold setting, N	N * 10H , when N = 16H ,correspond 0.282V ; Voltage may correspond to 0V ~ 3.264V	RW	16H

$V_{LTF\text{-}discharge} = N * 10H * 0.0008V$

REG 80H: DC-DC mode selection

default value: E0H

Bit	description		R / W	Defaults
7-4	Reservations can not be changed			
3	DC-DC1 Operating mode control	0: PFM / PWM Automatically switch 1: fixed PWM	RW	0
2	DC-DC2 Operating mode control		RW	0
1	DC-DC3 Operating mode control		RW	0
0	Reservations can not be changed			

REG 82H: ADC Enable 1

default value: 83H

Bit	description		R / W	Defaults
7	battery voltage ADC Enable	0: shut down, 1: turn on	RW	1
6	Battery current ADC Enable		RW	0
5	ACIN Voltage ADC Enable		RW	0
4	ACIN Electric current ADC Enable		RW	0
3	VBUS Voltage ADC Enable		RW	0
2	VBUS Electric current ADC Enable		RW	0
1	APS Voltage ADC Enable		RW	1
0	TS Pin ADC Enable function		RW	1

REG 83H: ADC Enable 2

default value: 80H

Bit	description		R / W	Defaults
7	AXP192 Internal temperature monitoring ADC Enable 0: shut down, 1: turn on		RW	1
6-4	Reservations can not be changed			
3	GPIO0 ADC Enable function	0: shut down, 1: turn on	RW	0
2	GPIO1 ADC Enable function		RW	0
1	GPIO2 ADC Enable function		RW	0
0	GPIO [3] ADC Enable function		RW	0

REG 84H: ADC setting the sample rate, TS pin control

default value: 32H

Bit	description		R / W	Defaults
7	ADC Setting the sample rate Bit 1	$25 \times 2_n$	RW	0
6	ADC Setting the sample rate Bit 0	Sampling rates were 25 , 50 , 100 , 200Hz	RW	0
5-4	TS Output current setting pin: 00: 20uA ; 01: 40uA ; 10: 60uA ; 11: 80uA		RW	11
3	Reservations can not be changed			
2	TS Pin function selection 0: Battery temperature monitoring function, 1: External independent ADC Input path		RW	0
1-0	TS Current output pin disposed	00: shut down	RW	1
		01: Output current charging	RW	0

		10: ADC Input samples, can power 11: Has been opened		

REG 85H: ADC input range

default value: X0H

Bit	description		R / W	Defaults
7-4	Reservations can not be changed			
3	GPIO3 ADC Input range	0: 0-2.0475V 1:	RW	0
2	GPIO2 ADC Input range	0.7-2.7475V	RW	0
1	GPIO1 ADC Input range		RW	0
0	GPIO0 ADC Input range		RW	0

REG 86H: GPIO1 ADC IRQ rising threshold settings

default value: FFH

Bit	description	R / W	Defaults
7-0	One LSB for 8mV	RW	FF

REG 87H: GPIO1 ADC IRQ falling threshold settings

default value: 00H

Bit	description	R / W	Defaults
7-0	One LSB for 8mV	RW	00

REG 8AH: Timer control

default value: 00H

Bit	description	R / W	Defaults
7	Timer expires. write 1 Clear this state	RW	0
6-0	Set the timer time in minutes Write all 0 This timer is turned off	RW	0000000

REG 8BH: VBUS pin function control monitoring SRP

default value: 00H

Bit	description	R / W	Defaults
7-6	Reservations can not be changed		
5-4	VBUS The effective voltage setting 00: 4.0V ; 01: 4.15V ; 10: 4.45V ; 11: 4.55V	RW	00
3	VBUS Valid Detection feature set: 0: shut down, 1: turn on	RW	0
2	VBUS Session Detection feature set: 0: shut down, 1: turn on	RW	0
1	Discharge VBUS Discharge function provided 0: shut down VBUS A discharging resistor; 1: use VBUS A discharging resistor	RW	0
0	Charge VBUS Charging function provided 0: disconnect VBUS A charging resistor; 1: use VBUS A charging resistor VBUS Charging	RW	0

REG 8FH: over-temperature shutdown feature set

default value: 01H

Bit	description	R / W	Defaults
7-3	Reservations can not be changed	RW	0
2	AXP192 Internal over-temperature shutdown feature set 0: Do not shut down; 1: Shutdown	RW	0
1-0	Reservations can not be changed		

REG 90H: GPIO0 feature set

default value: 07H

Bit	description		R / W	Defaults
7-3	Reservations can not be changed		RW	0
2	GPIO0 Pin feature set Bit 2	000: NMOS Open-drain output 001: Universal input function 010: Low Noise LDO 011: Retention 100: ADC Entry 101: Output Low 11X: Floating	RW	1
1	GPIO0 Pin feature set Bit 1		RW	1
0	GPIO0 Pin feature set Bit 0		RW	1

When the output voltage is set to GPIO0 LDO mode: REG 91H

default value: A0H

Bit	description	R / W	Defaults
7-4	GPIO0 LDO Output voltage setting mode 0000: 1.8V ; 0001: 1.9V ; 0010: 2.0V ; 0011: 2.1V ; 0100: 2.2V ; 0101: 2.3V ; 0110: 2.4V ; 0111: 2.5V ; 1000: 2.6V ; 1001: 2.7V ; 1010: 2.8V ; 1011: 2.9V ; 1100: 3.0V ; 1101: 3.1V ; 1110: 3.2V ; 1111: 3.3V	RW	1010
3-0	Reservations can not be changed		

REG 92H: GPIO1 feature set

default value: 07H

Bit	description		R / W	Defaults
7-3	Reservations can not be changed		RW	0
2	GPIO1 Pin feature set Bit 2	000: NMOS Open-drain output 001: Universal input function 010: PWM1 Output, high level VINT , Not less than plus 100K Pull-down resistor 011: Retention 100: ADC Entry 101: Output Low 11X: Floating	RW	1
1	GPIO1 Pin feature set Bit 1		RW	1
0	GPIO1 Pin feature set Bit 0		RW	1

REG 93H: GPIO2 feature set

default value: 07H

Bit	description		R / W	Defaults
7-3	Reservations can not be changed		RW	0
2	GPIO2 Pin feature set Bit 2	000: NMOS Open-drain output 001: Universal input function 010: PWM2 Output, high level VINT , Not less than plus 100K Pull-down resistor 011: Retention 100: ADC Entry 101: Output Low 11X: Floating	RW	1
1	GPIO2 Pin feature set Bit 1		RW	1
0	GPIO2 Pin feature set Bit 0		RW	1

REG 94H: GPIO [2: 0] signal state and monitoring

default value: 00H

Bit	description		R / W Defaults	
7 Reservations can not be changed			R	
6	GPIO2 Input Status	0: Input low 1: Input High	R	
5	GPIO1 Input Status		R	
4	GPIO0 Input Status		R	
3 Reservations can not be changed				
2	GPIO2 Output Settings	0: Output low, ground NMOS turn on	RW	0
1	GPIO1 Output Settings	1: Output floating ground NMOS shut down	RW	0
0	GPIO0 Output Settings		RW	0

REG 95H: GPIO [4: 3] Function Set Pin

default value: 00H

Bit	description		R / W Defaults	
7	GPIO [4: 3] control: 1 : GPIO Features		RW	0
6-4 Reservations can not be changed			RW	0
3: 2 GPIO4 Pin feature set Bit 1-0		00: External charging control 01: NMOS Open-drain output 410: Universal Input 411: Undefined	RW	00
1: 0 GPIO3 Pin function set Bit1-0		00: External charging control 01: NMOS Open-drain output 310: Universal Input 3 11: ADC Entry	RW	00

REG 96H: GPIO [4: 3] and the signal state monitoring

default value: 00H

Bit	description	R / W Defaults	
7-6 Reservations can not be changed		R	

5	GPIO4 Input Status	0: Input low	R	
4	GPIO3 Input Status	1: Input High	R	
3-2	Reservations can not be changed			
1	GPIO4 Output Settings	0: Output low, NMOS turn on	RW	0
0	GPIO3 Output Settings	1: Floating, NMOS shut down	RW	0

REG 97H: GPIO [2: 0] is provided as input pulled down

default value: 00H

Bit	description		R / W	Defaults
7-3	Reservations can not be changed			
2	GPIO2 As the pull-down resistor when the input control	0: Close down resistor	RW	0
1	GPIO1 As the pull-down resistor when the input control	1: Using pull-down resistor	RW	0
0	GPIO0 As the pull-down resistor when the input control		RW	0

REG 98H: PWM1 output frequency

default value: 00H

Bit	description	R / W	Defaults
7-0	PWM1 Output frequency X	RW	00H

REG 99H: PWM1 Duty Cycle 1

default value: 16H

Bit	description	R / W	Defaults
7-0	PWM1 Duty setting Y1	RW	16H

REG 9AH: PWM1 Duty Cycle 2

default value: 0BH

Bit	description	R / W	Defaults
7-6	PWM1 Duty setting Y2	RW	0BH

REG 9BH: PWM2 output frequency

default value: 00H

Bit	description	R / W	Defaults
7-0	PWM2 Output frequency X	RW	00H

REG 9CH: PWM2 Duty Cycle 1

default value: 16H

Bit	description	R / W	Defaults
7-0	PWM2 Duty setting Y1	RW	16H

REG 9DH: PWM2 Duty Cycle 2

default value: 0BH

Bit	description	R / W	Defaults
7-6	PWM2 Duty setting Y2	RW	0BH

Note: PWM Output frequency = 2.25MHz / (X + 1) / Y1 PWM Output

duty cycle = Y2 / Y1

REG 9EH: N_RSTO (GPIO5) pin function settings

default value: 20H

Bit	description	R / W	Defaults
7	N_RSTO Pin feature set 0: N_RSTO , LDO1 Condition monitoring; 1: Universal input and output ports 5	RW	0
6	N_RSTO As general-purpose input and output ports 5 Set up 0: NMOS Open-drain output; 1: Universal input function	RW	0
5	N_RSTO As the output port 5 Settings when 0: Output low, NMOS turn on; 1: Floating, NMOS shut down	RW	1
4	N_RSTO As an input port 5 State of 0: Input low; 1: Input High	R	
3-0	Reservations can not be changed	RW	0000

REG 40H: IRQ Enable 1

default value: D8H

Bit	description	R / W	Defaults
7	ACIN Overvoltage IRQ Enable	RW	1
6	ACIN Access IRQ Enable	RW	1
5	ACIN Out of IRQ Enable	RW	0
4	VBUS Overvoltage IRQ Enable	RW	1
3	VBUS Access IRQ Enable	RW	1
2	VBUS Out of IRQ Enable	RW	0
1	VBUS But less than the available V_{HOLD} IRQ Enable	RW	0
0	Reservations can not be changed	RW	0

REG 41H: IRQ Enable 2

default value: FFH

Bit	description	R / W	Defaults
7	Battery access IRQ Enable	RW	1
6	Battery removal IRQ Enable	RW	1
5	Battery mode is activated IRQ Enable	RW	1
4	Exit Battery mode activated IRQ Enable	RW	1
3	Charging IRQ Enable	RW	1
2	finished charging IRQ Enable	RW	1
1	Battery over-temperature IRQ Enable	RW	1
0	Battery low temperatures IRQ Enable	RW	1

REG 42H: IRQ enable 3

default value: 3BH

Bit	description	R / W	Defaults
7	AXP192 Internal over-temperature IRQ Enable	RW	0
6	The charging current is less than a set current IRQ Enable	RW	0
5	DC-DC1 Output voltage is less than the set value IRQ Enable	RW	1
4	DC-DC2 Output voltage is less than the set value IRQ Enable	RW	1
3	DC-DC3 Output voltage is less than the set value IRQ Enable	RW	1
2	Reservations can not be changed		
1	Short keys IRQ Enable	RW	1

0	Long Key IRQ Enable	RW	1

REG 43H: IRQ enable 4

default value: C1H

Bit	description	R / W	Defaults
7	N_OE Power IRQ Enable	RW	1
6	N_OE Shutdown IRQ Enable	RW	1
5	VBUS effective IRQ Enable	RW	0
4	VBUS invalid IRQ Enable	RW	0
3	VBUS Session A / B IRQ Enable	RW	0
2	VBUS Session End IRQ Enable	RW	0
1	Reservations can not be changed	RW	1
0	APS Low pressure IRQ Enable	RW	1

REG 4AH: IRQ enable 5

default value: 00H

Bit	description	R / W	Defaults
7	Timer expires IRQ Enable	RW	0
6-3	Reservations can not be changed	RW	0
2	GPIO2 Edge-triggered inputs IRQ Enable	RW	0
1	GPIO1 Edge-triggered inputs IRQ Enable	RW	0
0	GPIO0 Edge-triggered inputs IRQ Enable	RW	0

REG 44H: IRQ status 1

default value: 00H

Bit	description	R / W	Defaults
7	ACIN Overvoltage IRQ status	RW	0
6	ACIN Access IRQ status	RW	0
5	ACIN Out of IRQ status	RW	0
4	VBUS Overvoltage IRQ status	RW	0
3	VBUS Access IRQ status	RW	0
2	VBUS Out of IRQ status	RW	0
1	VBUS But less than the available V_{HOLD} IRQ status	RW	0
0	Reservations can not be changed	RW	0

REG 45H: IRQ state 2

default value: 00H

Bit	description	R / W	Defaults
7	Battery access IRQ status	RW	0
6	Battery removal IRQ status	RW	0
5	Battery mode is activated IRQ status	RW	0
4	Exit Battery mode activated IRQ status	RW	0
3	Charging IRQ status	RW	0
2	finished charging IRQ status	RW	0
1	Battery over-temperature IRQ status	RW	0
0	Battery low temperatures IRQ status	RW	0

REG 46H: IRQ status 3

default value: 00H

Bit	description	R / W	Defaults
7	AXP192 Internal over-temperature IRQ status	RW	0
6	The charging current is less than a set current IRQ status	RW	0
5	DC-DC1 Output voltage is less than the set value IRQ status	RW	0
4	DC-DC2 Output voltage is less than the set value IRQ status	RW	0
3	DC-DC3 Output voltage is less than the set value IRQ status	RW	0
2	Reservations can not be changed		
1	Short keys IRQ status	RW	0
0	Long Key IRQ status	RW	0

REG 47H: IRQ status 4

default value: 00H

Bit	description	R / W	Defaults
7	N_OE Power IRQ status	RW	0
6	N_OE Shutdown IRQ status	RW	0
5	VBUS effective IRQ status	RW	0
4	VBUS invalid IRQ status	RW	0
3	VBUS Session A / B IRQ status	RW	0
2	VBUS Session End IRQ status	RW	0

1	Reservations can not be changed	RW	0
0	APS Low pressure IRQ status, APS Voltage is lower than Warning Leve2 After the set, more than Warning Level1 After clearing 0	RW	0

REG 4DH: IRQ status 5

default value: 00H

Bit	description	R / W	Defaults
7	Timer expires IRQ status	RW	0
6-3	Reservations can not be changed	RW	0
2	GPIO2 Edge-triggered inputs IRQ status	RW	0
1	GPIO1 Edge-triggered inputs IRQ status	RW	0
0	GPIO0 Edge-triggered inputs IRQ status	RW	0

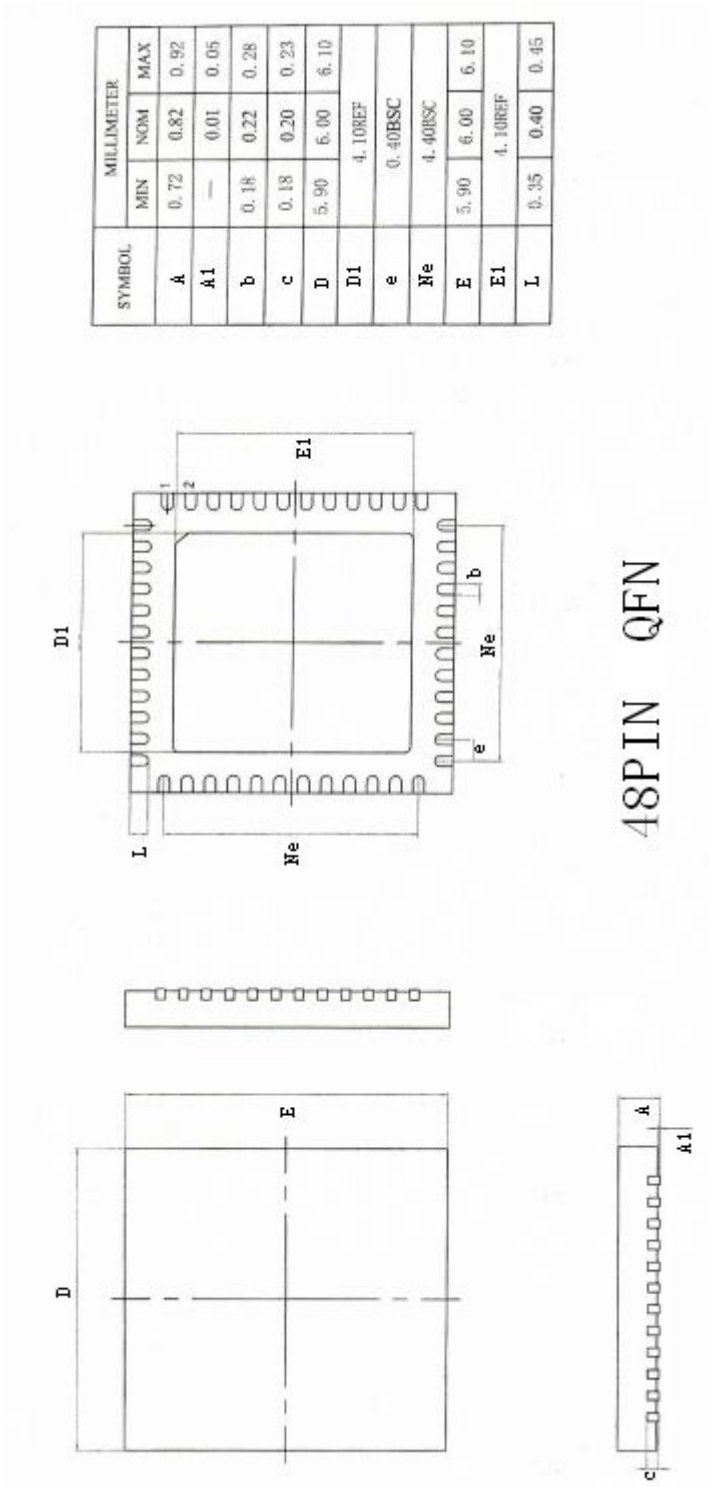
Note: All IRQ Write the corresponding status register bit 1 Clears the corresponding status.

REG B8H: Coulomb gauge control

default value: 00H

Bit	description	R / W	Defaults
7	Switching control coulometer	RW	0
6	Coulometer pause control, this bit 1 Coulomb counting will be suspended, While this bit will be cleared from	RW	0
5	Clear Coulomb meter control, this bit 1 Coulomb Counter will be cleared, While this bit will be cleared from	RW	0
4-0	Reservations can not be changed	RW	0

10. Package (Package)



© 2011 X-Powers Limited - All rights reserved

X-Powers can not assume responsibility for use of any circuitry other than circuitry entirely embodied in a X-Powers product. No circuit patent licenses , copyrights , or other intellectual property rights are implied. X-Powers reserves the right to make changes to the specifications and products at any time without notice.