SH366006 上位机校准操作流程

一、简介

本工具用于 SH366006 智能电池管理系统的测试和参数设置。可读取并保存智能电池管 理系统的标准通讯协议相 关数据,导出或写入 SH366006 的 DataFlash 参数,校准 SH366006 的电压、电流和温度,并同步支持 Firmware Update 工具、SHA1 认证工具等。

软件界面如下图所示,下面将分别加以介绍。

🔩 SH366006pc_	V5.17_20230522				A. College of A									- 🗆 X
File Option	Tools Help 🛹 🛱	支单选项	į		🥭 页面	内容								
PID Config:														SubCMD Panel
0x8888	Clear Logs	Log All		Clear Sc	ans Scan All									DEVICE_TYPE
Config	Name	Value	Unit	Log S.	Name	Value	Unit	Log	S.	Name	Value	Unit L	og S 🔺	HW_VERSION
	Manufacture Access	0007	hex	~ ~	Real RemainingCapacity	3496	mAh	7	7	TS3 Temperature	-50.0	'C 🔽	7	EW VERSION
	Remaining Cap. Alarm	363	mAh	v	Real FullChargeCapacity	3496	mAh	~	~	TS4 Temperature	-50.0	'C 🔽		
SBS	Remaining Time Alarm	10	min		Run Time To Empty	8738	min	~	~	Cell Temperature	23.5	'C V		CHEM_ID
	Battery Mode	6080	hex		Average Time to Empty	65535	min		Ň	FEI Temperature	6.9	C V		SHUTDOWN
	At Rate Time To Full	65535	min	5 5	Charging Current	000000 512	mA	,	÷	Safety Status	00000000	hey V	-	IATASHUTDOWN
	At Rate Time To Empty	65535	min	~ ~	Charging Voltage	13050	mV	7	7	PF Alert	00000000	hex 🗸	7	
	At Rate OK	1		~ ~	Battery Status	00C0	hex	7	~	PF Status	00000000	hex 🔽	V	PFEI_TOGGLE
Flash	Temperature	23.5	'C	~ ~	Cycle Count	0		~	~	Operation Status	00000007	hex 🔽		CFET_TOGGLE
	Voltage	13126	mV	~ ~	State of Health	98	%	~	~	Charging Status	000808	hex 🔽	V	DEET TOGGLE
	Current	-24	mA		Cell Voltage 4	0	mV	~	~	Gauging Status	0800C0	hex 🗸	~	
	AverageCurrent	-22	mA		Cell Voltage 3	4374	mV	×	×	Manufacturing Status	0010	hex 🗸		FET_EN
Calibration	Max Error Relative State of Charge	100	96		Cell Voltage 2	43/8	mV	5	Ť	Gauge Update Index	00FE	hex V		LIFETIME_EN
	Absolute State of Charge	100	%	~ ~	Pack Voltage	47	mV	7	7	Thermal Temp	250	0.1°C 7	7	LT RESET
	RemainingCapacity	3635	mAh	~ ~	TS1 Temperature	23.5	'C	•	~	Rootfinding Load	-181	mA 🔽	V -	
	FullChargeCapacity	3635	mAh	~ ~	TS2 Temperature	6.9	'C	~	~	1				PF_EN
	Flags / Status Bits													PF_CLEAR
Pro	Battery Mode - SCAN	NING	1		Batt	ery Statu	is - SC	ANNI	VG					FUSE_EN
4	CapM ChgM AM	RSVD	RSVD	RSVD	PB CC OC		A RS	VD	OTA	TDA RSVD RCA	RTA			RESET
	Operation Status L - S	SCANNIN	G	Kovo	One	ration St	atus H	- SC4	NNTN	IG				SEAL
页面选项	RSVD XDSG XCH	G PF	SS	SDV	FAS SE RS	VD RSV	DRS	VD	СВ	RSVD RSVD RSVD	RSVD			
100%	WAKE RSVD FUSE	RSVD	PCHG	CHG	DSG PRES RS	VD RSV	D RS	VD F	SVD	RSVD RSVD RSVD	SDM			UNSEAL
	Temperature Rang - :	SCANNIN	IG		Cha	rging Sta	tus - S	CANN	IING					UNSEAL TO FA
	RSVD RSVD RSVD	D RSVD	RSVD	RSVD	RSVD RSVD RS	VD RSV	D RS	VD F	SVD	RSVD RSVD RSVD	RSVD			CMD Result
	RSVD OT HT	STH	RT	STL	LT UT VO	T MCH	G CH	SSU C	HGIN	HV MV LV	PV			0x0022 W N/A
	Gauging Status L - SC	CANNING			Gau	ging Stat	us H -	SCAN	NING	3				CHOOLE IT THAT
	RSVD RSVD RSVD	D RSVD	VOK	FMDIS	RSVD REST RS	VD RSV	D RS	VD F	ISVD	RSVD RSVD RSVD	RSVD			
0%	CF DSG EDV	RSVD	TC	TD	FC FD RS	VD RSV	DRS	VD IO	CVFF	LDMD FMU QMAX	RSVD			
Fuel Gauge	Manufacturing Status	- SCANN	ING	DOUD 1										子命令栏
100.0%	RSVD RSVD RSVD	N FET_EN	RSVD	DSG_T	CHG_T PCHG_T									
L L L L L L L L L L L L L L L L L L L	Common Flags			SS/PI	F Flags		s	tatic D	ata					Clear Log
	USB Connected										SBS Task	Progress:	44%	10:07:49

二、菜单说明

本上位机共有四个菜单选项,分别为 File, Option, Tool, Help。

2.1 File

如右图所示, File 包含四个子菜单。

Open All Flash Constants

从 AFI 文件导入所有 Data Flash 参数列表

Save All Flash Constants

导出所有 Data Flash 参数列表到 AFI 文件

Start Data Log

开始记录 SBS 界面扫描数据 Exit 退出本程序

4 SH366006pc_V5.17_20230522		
File Option Tools Help		
Open All Flash Constants		7
Save All Flash Constants)g All	
Save All Flash Constants(*xls)	alue	Ur
Start Data Log	007	he
	63	m/
Exit	D	mi
Dattery mode	080	he
At Rate 0)	m

2.2 Option

如右图所示, Option 包含两个子菜单。

Scan

设置是否允许本工具与 SH366006 通讯,

Off—通讯关闭

On—通讯开启(默认)

Set Scanning Time

设置智能电池参数 log 时间,最小时间间隔为 2S

ile	Option Tools Help					
PI	Scan	>		Off		
0	Set Logging Time		~	On		-
(Fusion Gauge Constants Update		nit	Log	S.	Name
	Chem ID Parameters Transform		ex Ah	~	~	Real Rer Real Full
	client to Parameters transionin		in	v	•	Run Time
	Battery Mode 60	080	hex	v	~	Average 1
	At Rate 0		mA	v	~	Average 1
	At Rate Time To Full 65	5535	min	~	~	Charging

Time Setting		×
Specify o in second	r select file logging tir I:	ne
2	•	
ОК	Cancel	

Bin File Cfg

Convert Bin File

Convert FS File

PEC Calculate

Firmware Update

Long Run and Special Test SHA1 Authentication <u>त त त त त त त </u>]

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File Option Tools Help

PID Config:

0x8888

Config

SBS

2.3 Tools

如右图所示, Tools 包含两个子菜单, 分别对应的是不同的工具模块。

Convert Bin File 与 Convert Bin File

文件转换功能

Firmware Update

程序升级工具

SHA1 Authentication SHA1

认证工具

PEC Calculate

验证工具

以上各个工具模块的具体使用说明见附录"SH366006 上位机的 Tools 使用说明"

2.4 Help

如右图所示, Help 包含两个子菜单

Help Contents

本帮助文档

SH366006pc_\	/5.17_2023052	22	
File Option T	ools Help		
PID Config: 0x8888		Help Contents About SmartBattery	c
Config	Name	Value	Unit Lo

本工具版本信息,包括版本、生成日期等

三、页面说明

About SmartBattery...

本工具共有四个页面选项,分别为 SBS, Flash, Calibration, Pro。

3.1 SBS

如下图所示, SBS 主要包括两部分, 上侧为智能电池标准通讯协议, 下侧为电池组特征信息和部分通讯数据的详细描述。各数据具体解释请参考 SH366006 User Guide。

其中下方 Show Flags 为电池组参数信息,相应 Scan 选中时默认每秒钟更新一次;下方 选 Show Static Data 为电池组特 征信息,在菜单 Option 下的 Scan 设置为 On 时定期更新。

左上侧有 Clear Logs、Log All、Clear Scans、Scan All 四个按钮。所有数据右侧有 Log、Scan 两个选项框。

Log 栏用于设置当 File 菜单中选择"Start Data Log"进行数据记录时,哪些栏的数据需要记录。

Scan 栏表示本工具对哪些参数进行扫描。

Clear Logs 按钮会清除所有 Log 栏,不影响 Scan 栏状态。

Log All 按钮会选中所有的 Log 栏,同时选中所有的 Scan 栏

Clear Scans 按钮会清除所有 Scan 栏,同时清楚所有的 Log 栏

Scan All 按钮会选择所有的 Scan 栏,不影响 Log 栏状态

备注: Log 栏选中时, Scan 栏自动选中; Scan 栏清除时, Log 栏自动清除。通过 File 开始记录数据后, Scan/Log 选择/失效。

当需要记录扫描数据时,可通过 File 菜单设置保存的位置和文件名称,记录数据的时间间隔等于扫描时间间隔,最小间隔为1秒。

Fuel Gauge 显示的是 RemainingCapacity 和 FullChargeCapacity 的比值。

Battery Status, Safety Status L/H, Operation Status, Charging Status, PF Status L/H, Battery Mode, Temperature Range 显示各个标志位的详细状况。

Name	Value	Unit	Log	S.	Name	Value	Unit	Log	S.	Name	Value	Unit	Log	S 4	•
Manufacture Access	0007	hex	•	▼	Real RemainingCapacity	3447	mAh	▼	$\overline{}$	TS3 Temperature	-50.0	'C	▼	◄	
Remaining Cap. Alarm	363	mAh	~	✓	Real FullChargeCapacity	3496	mAh	✓	✓	TS4 Temperature	-50.0	'C	✓	$\overline{}$	
Remaining Time Alarm	10	min	~	✓	Run Time To Empty	8653	min	✓	▼	Cell Temperature	23.4	'C	✓	▼	
Battery Mode	6080	hex	✓	~	Average Time to Empty	65535	min	v	•	FET Temperature	6.9	'C	✓	V	
At Rate	0	mA	✓	~	Average Time to Full	65535	min	v	•	Safety Alert	00000000	hex	✓	◄	
At Rate Time To Full	65535	min	~	✓	Charging Current	512	mA	V	✓	Safety Status	00000000	hex	✓	\checkmark	
At Rate Time To Empty	65535	min	₹	✓	Charging Voltage	13050	mV	✓	\checkmark	PF Alert	00000000	hex	✓	◄	
At Rate OK	1		✓	✓	Battery Status	00C0	hex	✓	\checkmark	PF Status	00000000	hex	✓	◄	
Temperature	23.4	'C	✓	~	Cycle Count	0		✓	\checkmark	Operation Status	0000007	hex	✓	◄	
Voltage	13125	mV	✓	~	State of Health	98	%	✓	•	Charging Status	808000	hex	✓	◄	
Current	-24	mA	₹	✓	Cell Voltage 4	0	mV	✓	\checkmark	Gauging Status	0800C0	hex	✓	◄	
AverageCurrent	-23	mA	₹	✓	Cell Voltage 3	4374	mV	✓	▼	Manufacturing Status	0010	hex	✓	◄	
Max Error	100	%	₹	✓	Cell Voltage 2	4377	mV	✓	\checkmark	Gauge Update Index	00FE	hex	✓	◄	
Relative State of Charge	99	%	✓	✓	Cell Voltage 1	4374	mV	✓	\checkmark	Gauge Update Status	0000	hex	✓	◄	
Absolute State of Charge	99	%	✓	✓	Pack Voltage	51	mV	✓	\checkmark	Thermal Temp	250	0.1'C	✓	◄	
RemainingCapacity	3584	mAh	₹	~	TS1 Temperature	23.4	'C	✓	•	Rootfinding Load	-181	mA	~	V .	,
FullChargeCapacity	3635	mAh	•	•	TS2 Temperature	6.9	'C	✓	•	•				►	

_																
ags / Sta	tus Bits-															
Battery	Mode -	SCANN	ING					Batt	erγ	Status -	- SCANN	IING				
CapM	ChgM	AM	RSVD	RSVD	RSVD	PB	CC	00	A	TCA	RSVD	OTA	TDA	RSVD	RCA	RTA
CF	RSVD	RSVD	RSVD	RSVD	RSVD	PBS	ICC	INI	Т	DSG	FC	FD	EC3	EC2	EC1	EC0
Operati	on Statu	s L - SC	CANNIN	G				Oper	ratio	on Statu	is H - SC	CANNIN	G			
RSVD	XDSG	XCHG	PF	SS	SDV	FAS	SE	RS	/D	RSVD	RSVD	CB	RSVD	RSVD	RSVD	RSVD
WAKE	RSVD	FUSE	RSVD	PCHG	CHG	DSG	PRES	RS	/D	RSVD	RSVD	RSVD	RSVD	RSVD	RSVD	SDM
Tempe	rature R	ang - Si	CANNIN	G				Cha	rgin	g Statu:	s - SCAN	INING				
RSVD	RSVD	RSVD	RSVD	RSVD	RSVD	RSVD	RSVD	RS	/D	RSVD	RSVD	RSVD	RSVD	RSVD	RSVD	RSVD
RSVD	ОТ	HT	STH	RT	STL	LT	UT	VC	Т	MCHG	CHGSU	CHGIN	HV	MV	LV	PV
Gaugin	g Status	L - SCA	ANNING					Gau	ging	Status	H - SCA	NNING				
RSVD	RSVD	RSVD	RSVD	VOK	FMDIS	RSVD	REST	RS	/D	RSVD	RSVD	RSVD	RSVD	RSVD	RSVD	RSVD
CF	DSG	EDV	RSVD	TC	TD	FC	FD	RS	/D	RSVD	RSVD	OCVER	LDMD	FMU	QMAX	RSVD
Manufa	cturing S	Status -	SCANN	ING												
RSVD	RSVD	RSVD	RSVD	RSVD	RSVD	RSVD	FUSE_EN									
RSVD	PF_EN	LF_EN	FET_EN	RSVD	DSG_T	CHG_T	PCHG_T									
mmon	Flage				SS/F	PE Flags			_		Static	Data				
	lays					lags			_			00.0				

ags / Status Bits		
Safety Alert L - SCANNING		Safety Alert H - SCANNING
RSVD RSVD OTD OTC SCDL R	SVD SCCL RSVD	RSVD RSVD RSVD RSVD UTD UTC OCPC RSVD
AOCDL RSVD OCD2 OCD1 OCC2 C	CC1 COV CUV	RSVD RSVD RSVD RSVD RSVD RSVD OTF
Safety status L - SCANNING		Safety status H - SCANNING
RSVD RSVD OTD OTC SCDL S	SCD SCCL SCC	RSVD RSVD RSVD RSVD UTD UTC OCPC RSVD
AOCDL AOCD OCD2 OCD1 OCC2 C	CC1 COV CUV	RSVD RSVD RSVD RSVD RSVD WDF OTF
PF Alert L - SCANNING		PF Alert H - SCANNING
RSVD RSVD RSVD RSVD CIM R	SVD RSVD RSVD	TS4 TS3 TS2 TS1 RSVD RSVD RSVD RSVD
RSVD SOTF RSVD SOTC SOCD S	OCC SOV SUV	RSVD PFIN AFEC RSVD RSVD RSVD DFETF CFETF
PF status L - SCANNING		PF status H - SCANNING
RSVD RSVD RSVD RSVD CIM R	SVD RSVD RSVD	TS4 TS3 TS2 TS1 RSVD DFF CMDPF IFC
RSVD SOTF RSVD SOTC SOCD S	OCC SOV SUV	RSVD PFIN AFEC AFER RSVD RSVD DFETF CFETF
ommon Flags	SS/PF Flags	Static Data

- Static Data -

Name	Value	Unit	
Design Capacity	3635	mAh	
Design Voltage	11250	mV	
Specification Info	0031	hex	
Manufacture Date	2019-6-6	-	
Serial Number	0001	hex	
Manufacturer Name	Sinowealth		
Device Name	SH366006	-	
Device Chemistry	LION	-	

3.2 Flash Flash

参数包括一级安全保护参数、二级安全保护参数、充电控制参数、系统数据、配置参数、 容量计量参数、校准参数,可通过修改参数来适应不同的电芯及应用场合。各个参数跟 SH366006 功能定义相关,详情请参考 SH366006 User Guide 。

1st Level Safety 2nd	Level Safety	Charg	ge Control System Data	Confi	iguration	Fusion Gauging Cal	ibration	
Name	Value	Unit	Name	Value	Unit	Name	Value	Uni
LT COV Threshold	4400	mV	OCC2 Time	2	Sec	AFE SC Dsg Cfg	C3	hex
LT COV Recovery	4200	mV	OCC Recovery	50	mA	SCD Recovery Time	5	Sec
STL COV Threshold	4400	mV	OCC Recovery Time	5	Sec	SCD Latch Limit	0	-
STL COV Recovery	4200	mV	OCD1 Threshold	-6000	mA	SCDL Counter Dec Delay	10	Sec
RT COV Threshold	4400	mV	OCD1 Time	5	Sec	SCDL Reset Time	15	Sec
RT COV Recovery	4200	mV	OCD2 Threshold	-7500	mA	Over Temp Chg	65.0	°C
STH COV Threshold	4400	mV	OCD2 Time	2	Sec	OTC Time	3	Sec
STH COV Recovery	4200	mV	OCD Recovery	-50	mA	OTC Recovery	45.0	°C
HT COV Threshold	4400	mV	OCD Recovery Time	5	Sec	Over Temp Dsg	73.0	°C
HT COV Recovery	4200	mV	AFE OC Dsg	07	hex	OTD Time	3	Sec
COV Time	2	Sec	AFE OC Dsg Time	0F	hex	OTD Recovery	55.0	°C
CUV Threshold	2800	mV	AOCD Recovery Time	5	Sec	OTF Temp Threshold	98.0	°C
CUV Time	2	Sec	AOCD Latch Limit	0	-	OTF Time	3	Sec
CUV Recovery	3100	mV	AOCDL Counter Dec Delay	10	Sec	OTF Recovery Temp	70.0	°C
OCPC Threshold	200	mA	AOCDL Reset Time	15	Sec	Under Temp Chg	-5.0	°C
OCPC Time	2	Sec	AFE SC Chg Cfg	F1	hex	UTC Time	3	Sec
OCPC Recovery	50	mA	SCC Recovery Time	5	Sec	UTC Recovery	5.0	°C
OCPC Recovery Time	8	Sec	SCC Latch Limit	0	-	Under Temp Dsg	-21.0	°C
OCC1 Threshold	5000	mA	SCCL Counter Dec Delay	10	Sec	UTD Time	3	Sec
OCC1 Time	5	Sec	SCCL Reset Time	15	Sec	UTD Recovery	-15.0	°C
OCC2 Threshold	6000	mA						

Read All	Write All							
1st Level Safety 2nd Level	Safety	Charge	e Control System Data	Config	guration	Fusion Gauging Ca	alibration	
Name	Value	Unit	Name	Value	Unit	Name	Value	Unit
SOV Threshold	4500	mV	SOC Dsg Time	5	Sec	PF Flags 2 High	0000	hex
SOV Time	5	Sec	SOT Cell	93.0	°C	PF Flags 2 Low	0000	hex
SUV Threshold	1500	mV	SOT Cell Time	5	Sec	PF Cell1 Voltage	0	mV
SUV Time	5	Sec	SOT FET	120.0	°C	PF Cell2 Voltage	0	mV
Cell Imbalance Check Voltage	3700	mV	SOT FET Time	5	Sec	PF Cell3 Voltage	0	mV
Cell Imbalance Current	10	mA	Thermistor Error Time	5	Sec	PF Cell4 Voltage	0	mV
Cell Imbalance Fail Voltage	1000	mV	CFET Fail Current	500	mA	PF Pack Voltage	0	mV
Cell Imbalance Time	5	Sec	CFET Fail Time	5	Sec	PF Current	0	mA
Battery Rest Time	1800	Sec	DFET Fail Current	-500	mA	PF TS1 Temperature	-273.1	°C
PFIN Detect Time	5	Sec	DFET Fail Time	5	Sec	PF TS2 Temperature	-273.1	°C
SOC Chg	9000	mA	AFE Fail Limit	10	-	PF TS3 Temperature	-273.1	°C
SOC Chg Time	5	Sec	PF Flags 1 High	0000	hex	PF TS4 Temperature	-273.1	°C
SOC Dsg	-10000	mA	PF Flags 1 Low	0000	hex			

		·							
1st Level Safety	2nd Level Safety	Charg	e Control	System Data	Conf	iguration	Fusion Gauging C	alibration	
Name	Value	Unit 🔺	Name		Value	Un 🔺	Name	Value	Unit 🔺
JT1	0.0	°C	LS1 Set C	/cleCount	150	-	Time RSOC Threshold 1	95	%
JT2	5.0	°C	LS2 Set C	cleCount	500	-	Time RSOC Threshold 2	90	%
JT5	15.0	°C	LS3 Set C	cleCount	800	-	Time RSOC Threshold 3	80	%
JT6	45.0	°C	LS1 Set R	untime	8760	hrs	Time RSOC Threshold 4	50	%
JT3	50.0	°C	LS2 Set R	untime	17520	hrs	Time RSOC Threshold 5	20	%
JT4	60.0	°C	LS3 Set R	untime	26280	hrs	Time RSOC Threshold 6	10	%
Temp Hys	10	0.1°C	CC Degra	de Threshold1	5	%	Time RSOC Threshold 7	5	%
LT Chg Voltage	4350	mV	CC Degra	de Threshold2	20	%	Cell1 Wire Res	0	mohm
LT Chg Current1	727	mA	CC Degra	de Threshold3	40	%	Cell2 Wire Res	0	mohm
LT Chg Current2	727	mA	CV Degrad	le Threshold1	50	m\	Cell3 Wire Res	0	mohm
LT Chg Current3	727	mA	CV Degrad	le Threshold2	100	m\	Cell4 Wire Res	0	mohm
STL Chg Voltage	4350	mV	CV Degrad	le Threshold3	300	m\	TempSwitchThreshold	25.0	°C
STL Chg Current1	727	mA	RSOC Kee	ping Exit Current	100	m/	Taper Current	182	mA
STL Chg Current2	727	mA	RSOC Kee	ping Exit Current2	20	m/	Taper Voltage	50	mV
STL Chg Current3	727	mA	RSOC Kee	ping Exit Time	30	Sec	TC Clear %	95	%
RT Chg Voltage	4350	mV	RSOC Kee	ping Time	96	hrs	FC Clear %	98	%
RT Chg Current1	3635	mA	Gauge Co	nfig	0002	hex	TD Set %	0	%
RT Chg Current2	3635	mA	FM Cell Te	rm Volt	2995	m\	TD Clear %	1	%
RT Chg Current3	3635	mA	Cell Term	Voltage	3000	m\	FD Set %	0	%
STH Chg Voltage	4100	mV	Pack Term	Delta Volt	0	m\	FD Clear %	1	%
STH Chg Current1	1817	mA	Adjust RS0	C	100	%	Init ChglSet	512	mA
STH Chg Current2	1817	mA	Adjust Volt	age	200	m\	SOC_Thres	50	%
STH Chg Current3	1817	mA	Min Cell D	eviation	700	S/m/	Max_CHG_V	4395	mV
HT Chg Voltage	4100	mV	Min RSOC	for Balancing	80	%	Max_CHG_V_Hys	20	mV
HT Chg Current1	1817	mA	Min Start B	alance Delta	3	m\	Delay_T_COVP	3	Sec
HT Chg Current2	1817	mA	Relax Bala	nce Interval	18000	Sei	Curr_Thres_COVP	500	mA
HT Chg Current3	1817	mA	Start RSO	C for Bal in Sleep	95	%	CC Step1 Drop	128	mA
Pre Chg Current	90	mA 🔻	End RSOC	for Bal in Sleep	60	% 🔻	CC Step2 Drop	64	mA 🔻
4		•	•			•	•		•

1st Level Safety 2nd L	evel Safety	Ch	arg	e Control System Data	Con	figuration	Fusion Gauging Cal	ibration		
Name	Value	Unit		Name	Value	Unit 🔺	Name	Value	Unit	
Cell1 Max Voltage	0	mV		Total FW Runtime	0	Sec	Manufacturer Info A Length	32	-	Г
Cell2 Max Voltage	0	mV		Time Spent In UT ROSC 1	0	Sec	Manufacturer Info Block A01	30	hex	E
Cell3 Max Voltage	0	mV		Time Spent In UT ROSC 2	0	Sec	Manufacturer Info Block A02	31	hex	E
Cell4 Max Voltage	0	mV		Time Spent In UT ROSC 3	0	Sec	Manufacturer Info Block A03	32	hex	E
Cell1 Min Voltage	32767	mV		Time Spent In UT ROSC 4	0	Sec	Manufacturer Info Block A04	33	hex	E
Cell2 Min Voltage	32767	mV		Time Spent In UT ROSC 5	0	Sec	Manufacturer Info Block A05	34	hex	E
Cell3 Min Voltage	32767	mV		Time Spent In UT ROSC 6	0	Sec	Manufacturer Info Block A06	35	hex	E
Cell4 Min Voltage	32767	mV		Time Spent In UT ROSC 7	0	Sec	Manufacturer Info Block A07	36	hex	E
Max Delta Cell Voltage	0	mV		Time Spent In UT ROSC 8	0	Sec	Manufacturer Info Block A08	37	hex	E
Max Charge Current	0	mA		Time Spent In LT ROSC 1	0	Sec	Manufacturer Info Block A09	38	hex	E
Max Discharge Current	0	mA		Time Spent In LT ROSC 2	0	Sec	Manufacturer Info Block A10	39	hex	E
Max Avg Dsg Current	0	mA		Time Spent In LT ROSC 3	0	Sec	Manufacturer Info Block A11	41	hex	E
Max Avg Dsg Power	0	cW		Time Spent In LT ROSC 4	0	Sec	Manufacturer Info Block A12	42	hex	E
Max Cell Temperature	-128	°C		Time Spent In LT ROSC 5	0	Sec	Manufacturer Info Block A13	43	hex	E
Min Cell Temperature	127	°C		Time Spent In LT ROSC 6	0	Sec	Manufacturer Info Block A14	44	hex	E
Max Delta Cell Temp	0	°C		Time Spent In LT ROSC 7	0	Sec	Manufacturer Info Block A15	45	hex	E
Max FET Temperature	-128	°C		Time Spent In LT ROSC 8	0	Sec	Manufacturer Info Block A16	46	hex	E
No Of COV Events	0	-		Time Spent In STL ROSC 1	0	Sec	Manufacturer Info Block A17	46	hex	E
Last COV Event	0	-		Time Spent In STL ROSC 2	0	Sec	Manufacturer Info Block A18	45	hex	E
No Of CUV Events	0	-		Time Spent In STL ROSC 3	0	Sec	Manufacturer Info Block A19	44	hex	E
Last CUV Event	0	-		Time Spent In STL ROSC 4	0	Sec	Manufacturer Info Block A20	43	hex	E
No Of OCD1 Events	0	-		Time Spent In STL ROSC 5	0	Sec	Manufacturer Info Block A21	42	hex	L
Last OCD1 Event	0	-		Time Spent In STL ROSC 6	0	Sec	Manufacturer Info Block A22	41	hex	
No Of OCD2 Events	0	-		Time Spent In STL ROSC 7	0	Sec	Manufacturer Info Block A23	39	hex	
Last OCD2 Event	0	-		Time Spent In STL ROSC 8	0	Sec	Manufacturer Info Block A24	38	hex	
No Of OCC1 Events	0	-		Time Spent In RT ROSC 1	0	Sec	Manufacturer Info Block A25	37	hex	
Last OCC1 Event	0	-		Time Spent In RT ROSC 2	0	Sec	Manufacturer Info Block A26	36	hex	
	•				•	•				-

ReadAll	Write A							
1st Level Safety 2nd Le	evel Safety	Charg	ge Control System [Data	Configuration	Fusion Gauging	Calibration	1
Name	Value	Unit	Name	Value	Unit	Name	Value	Unit
Operation Cfg A	0220	hex	Charger Present	5000	mV	Manuf Date	2019-6-6	date
Operation Cfg B	0C60	hex	Sleep Current	10	mA	Serial Number	0001	hex
Operation Cfg C	2301	hex	Sleep Wait Time	5	Sec	Cycle Count	0	num
Protection Cfg A	0000	hex	Wake Current Reg	00	hex	CC Percentage	85	%
Protection Cfg B	0000	hex	Term Voltage	9000	mV	Design Capacity	3635	mAh
PF Enable Cfg A	0000	hex	Rem Cap Alarm	363	mAh	Design Energy	4090	cWh
PF Enable Cfg B	0000	hex	Rem Energy Alarm	409	cWh	Device Chemistry	LION	ASCII
FuseBlow Cfg A	0000	hex	Rem Time Alarm	10	min	Manuf Name	Sinowealth	ASCII
FuseBlow Cfg B	0000	hex	Init Battery Mode	6000	hex	Device Name	SH366006	ASCII
Min Blow Fuse Voltage	3500	mV	Init Mfg Status	0010	hex	SPP Max C Rate	14	0.1C
Fuse Blow Time	40	Sec	Design Voltage	11250	mV	MPP Max C Rate	27	0.1C
Flash Update OK Voltage	5500	mV	Spec Info	0031	hex	Pack Resistance	30	mOhm
Shutdown Voltage	2600	mV				System Resistance	0	mOhm
Shutdown Time	5	Sec						

Read All	Write	AII						
1st Level Safety 2nd Level Safety Charge Control System Data Configuration Fusion Gauging Calibration								
Name	Value	Unit	Name	Value	Unit	Name	Value	Unit
Load Select	3	-	Dsg Current Threshold	50	mA	QCell0	3635	mAh
Load Mode	1	-	Chg Current Threshold	50	mA	QCell1	3635	mAh
User Rate-mA	2040	mA	Quit Current	20	mA	QCell2	3635	mAh
User Rate-mW	2250	cW	Dsg Relax Time	5	Sec	QCell3	3635	mAh
Reserve Cap-mAh	50	mAh	Chg Relax Time	2	Sec	FG Status	00	hex
Reserve Cap-mWh	15	cWh						

Read All Write All								
1st Level Safety 2nd Level Safety Charge Control System Data Configuration Fusion Gauging Calibration								
Name	Value	Unit	Name	Value	Unit	Name	Value	Unit
CC Gain	1.918213	-	AFE Pack Gain	1.030029	uV/cnt	Ext3 Temp Offset	0	0.1°C
Cell1 Voltage Gain	0.252899	-	Board Offset	4	-	Ext4 Temp Offset	0	0.1°C
Cell2 Voltage Gain	0.252655	-	Ext1 Temp Offset	0	0.1°C	Deadband	5	mA
Cell3 Voltage Gain	0.252563	-	Ext2 Temp Offset	0	0.1°C	CC Deadband Reg	02	hex
Cell4 Voltage Gain	0.252426	-						

3.3 Calibration

基于《SH366006 Communication Specification》中的校准协议定义,将校准操作可视化 设计在本工具中,便于客户使用,如下图所示。Calibration 共分为 Board Offset 校准、Cell 电压校准、温度校准和电流校准 四个部分。

<u>F</u> ile <u>O</u> ptio	n <u>T</u> ools <u>H</u> elp						
PID Confi	Board Offset Calibrat	on					
Config	Calibrate	Calibrate					
SBS	Cell Voltage Calibrati	on Measured voltage	Enter actual voltage				
	Cell Voltage 4 :	0 mV	0 mV	1			
	Cell Voltage 3 :	4373 mV	0 mV	voltage is stable and			
Flash	Cell Voltage 2 :	4377 mV	0 mV	no current is flowing			
	Cell Voltage 1 :	4374 mV	0 mV	Calibrate Cell Voltage			
Calibratio	Temperature Calibra	tion					
Cambratio		Measured temperatu	re Enter actual tempera	ture			
	TS1 Temperature :	23.4 'C	0 'C □ Ca	alibrate TS1 Temperature			
	TS2 Temperature :	6.9 'C	0 'C 🗆 C:	alibrate TS2 Temperature			
Pro	TS3 Temperature :	-50.0 'C	0 'C 🗆 Ca	alibrate TS3 Temperature			
	TS4 Temperature :	-50.0 'C	0 'C 🗆 Ca	alibrate TS4 Temperature			
100% ==	Current Calibration						
	Calibrate Current	Measured current	Enter actual current	Apply 2 Ampere discharge load. Discharge current is a negative value.			
0% Fuel Gaug	Calibrate						
98.4%							

3.3.1 Board Offset 校准

Board Offset 是一个系统性的偏差。由于各个器件失调及温度系数的不一致,各个电路 板之间的 Board Offset 并不一致。

为保证系统测量精度,每块电路板需单独做 Board Offset 校准。 为保证精确测量 Board Offset,建议在 PCB 连接电芯前进行校准。可以在 PACK+和 PACK-之间加电压,可保 证无 工作电流流经采样电阻,所测量的 Board Offset 最为精准。

保证无负载电流条件下,本工具支持"Board Offset"一键校准

Board Offset Calibratio	n	
Calibrate		Insure no load current is flowing

3.3.2 Cell 电压校准

SH366006 支持 Cell 电压校准,且必须多节电芯同步进行校准,

通过 Cell 电压校准可增加 Cell 电压测量精度。进行 Cell 电压校准时,根据电芯串数配置,在 VC1-VC5 各点之间加上任一已知的电压,具体步骤如下:

1)利用万用表,实测各节 Cell 的真实电压值,并填入"Enter actual voltage"栏下对应的输入框;

2) 选择 Calibrate Cell Voltage, 并点击"Calibrate"按钮, SH366006 将自动完成 Cell 电压校准

3.3.3 温度校准

SH366006 提供最大 4 路测温通道,且支持各个测温通道进行单独校准。

温度校准用于校准真实温度与 SH366006 各个测温通道之间的差值,具体校准步骤如下:

1)将 SH366006 放入温度稳定的环境下一段时间后,利用温度计测量当前的真实温度;

2) 勾选右侧需要校准的测温通道"Calibrate TSx Temperature",并将真实温度值填入"Enter actual temperature"栏下对应的输入框;

3)点击"Calibrate"按钮,SH366006自动完成各个测温回路的温度校准。

3.3.4 电流校准

电流校准采用的是放电电流进行校准,具体步骤如下:

Current Calibration	Measured current	Enter actual current	Apply 2 Ampere discharge load. Discharge current is a negative value.
Calibrate			

1)选用一个常规应用时的放电电流(建议-2A),利用万用表,测量当前真实电流值;

2)填入"Enter actual current"栏下对应的输入框,选择 Calibrate Current,点击"Calibrate"按钮, SH366006 自动完成电流校准

3.4 Pro

通过此页面可访问 SBS 标准指令和扩展命令,分为 Read/Write Word、Read/Write Block、 Combined Word Write,其中 Combined Word Write 用于解密操作,便于连续输入 4 bytes 的解 密密钥。

Read SMB Word SMB Command Read Result (hex)	
Write SMB Word SMB Command Word (hex) Write	
Write SMB Combined Word	□ NO PEC
SMB Command Word1 (hex) Word2 (hex) Write	
Read SMB Block	
SMB Command Read Result (hex)	
Write SMB Block	
SMB Command Block Data (hex) Write	

四、子指令栏说明

为了便于测试和生产, SH366006 ManufacturerAccess(0x00) /MaufacturerBlockAcces(0x44) 指令定义了许多的子指令,可以参照 SH366006 User Guide 进行了解。针对其中一些常用指令, 进行可视化设 计,收纳在"SubCMD Panel"中,如右图所示。

子指令栏分为上下两部分。上部分定义了常用子指令按钮;下部分定 义了指令记录列表,用于记录发送的子指令及结果,便于用户实时了解自 己的操作。现分别通过读写子指令来作进一步 说明,如下:

1)读子指令操作:点击"FW_VERSION"按钮,读取软件版本号,则指 令记录列表内显示 "0x0002 R 0x0303",其中 0x0002 为读取软件版本号的 子指令,R表示读取操作,0x0303 为 返回的版本号值 V3.03;

2) 写子指令操作:点击"FET_EN"按钮,开启软件控制 MOSFETs,则 指令记录列表内显示"0x0022 W N/A",其中 0x0022 为 FET 软件控制使能 子指令,W表示写入操作,N/A表示无返回值,即单纯的写操作。



附录 1: SH366006 上位机的 Tools 使用说明

一、概述

SH366006 上位机通过主界面 Tools 下拉菜单,选择相应的 Tool 进行不同的操作:

1) Firmware Update: 通过调用 BIN 文件,完成 Firmware 的更新;

2) SHA1 Authentication: SHA1 认证的相关操作

二、 Firmware Update

按照下图所示进行操作,打开 Firmware Update 工具。

File Option	<u>T</u> ools <u>H</u> elp		
PID Config:	Bin File Cfg		
0x8888	Convert Bin File	-	
Config	Convert FS File		
_	Firmware Update	R. C.	
SBS	Long Run and Special Test		
	SHA1 Authentication		
	PEC Calculate		
		Firmware	×
		Firmware Update	
		Bin File:	Load
			Start
		Export Firmware	
		Bin Path:	Set
			Export
		CycleTest CycleCount: 0	Error List
		Debug Tools	
		Enter and Out FU Mode PEC Select	
		0xF100 0xF200 0xFF00 (* PEC	C NO PEC
		FU Version Read FU Status	
		0x49 0x47 Breakpoint	0x0000
			1

2.1 调用 Bin 文件

进入 FU 程序更新界面,点击"Load"按钮,选择中颖提供的 Bin 文件,点击"Start"开始更新,更新要求 SH366006 处于全访问状态下(OperationStatus[FAS]=0)。

Firmware	×
Firmware Update	
Bin File: C:\Users\f0067.SINOHF\Desktop\SH366006 HW Firmware	1 Load 2 Start
Export Firmware	
Bin Path:	Set
	Export
CycleTest CycleCount	Error List
Debug Tools PEC Select	
0xF100 0xF200 0xFF00 (* PEC (*	NO PEC
FU Version Read FU Status 0x49 0x47 Breakpoint	0x0000

2.2 FU 更新

上位机实时显示更新过程,如下图所示,总共更新为2843 桢,目前更新到272 桢;更 新完成后弹出提示框如下图所示,弹出"Message"对话框,显示"UpdateSuccessfully!",提示 更新全部结束。

Firmware	×
Firmware Update	
Bin File: C:\Users\f0067.SINOHF\Desktop\SH366006 HW Firmware	Load
476/2843	Start
Firmware	×
Firmware Update	
Bin File: C:\Users\f0067.SINOHF\Desktop\SH366006 HW Firmware	Load
2843/2843	Start
2040/2040	
Export Firmware	
Bin Path:	Set
Message X	Export
CycleTest Cyc Cpebug Tools Update Successfully!	Error List
Enter and Out FU	
0xF100 (PEC (NO PEC
ОК	
UX49 Breakpoint	0x0000

 Ξ 、SHA1 Authentication

SH366006 上位机通过主界面 Tools 下拉菜单,进入 SHA1 Authentication 界面,如下图 所示。SHA1 Authentication 工 具由三部分组成,分别为: SHA1 Calculator, Authentication by SH366006, Change SHA1 Key。

ption I	ools <u>H</u> elp				
config:	Bin File Cfg				
88	Convert Bin File		=		
nfig	Convert FS File		-		
	Firmware Updat	te	2		
S	Long Run and S	pecial Test			
	SHA1 Authentica	ation	<u>-</u>		
	PEC Calculate		R		
	At Rate OK	1	5		
		SHA1 AUTHENTIC	CATION		×
		SHA1 Calculat	tor		
		Key(128bits):	0123456789ABCDEFFEDCBA9876543210	(Hex)	Show Digest
		Challenge:	E3A9AC282BA5F63EDF904EA561CCA38EBDF26AE3	(Hex)	New Challenge
		Digest		(Hex)	
		Authentication	by SH366006		
		Key(128bits):	0123456789ABCDEFFEDCBA9876543210	(Hex)	Authenticate
		Challenge:	E3A9AC282BA5F63EDF904EA561CCA38EBDF26AE3	(Hex)	
		Digest		(Hex)	
		Change SHA1	Key		
		Key(128bits):	0123456789ABCDEFFEDCBA9876543210	(Hex)	Change Key
		Challenge:		(Hex)	
		Digest		(Hex)	

3.1 SHA1 Calculator

SHA1 Calculator 供用户输入已知的 SHA1 Key 值和 Challenge 值,来计算对应的 Digest 值;同时,可以用于随机产生 20 bytes 的 New Challenge 值。如下图所示,先通过"New Challenge"产生一串 Challenge 值,然后点击"Show Digest" 按钮,获得一个 20bytes 的 Digest 值,如红框所示。

	tor		
HATCalcula			
ey(128bits):	0123456789ABCDEFFEDCBA9876543210	(Hex)	Show Digest
hallenge:	0AA8E4F494CC7C1EE9C5DD09EE80FFCFC78E78D2	(flox)	New Challenge
igest:		(Hex)	
Ithentication	by SH366006		
ey(128bits):	0123456789ABCDEFFEDCBA9876543210	(Hex)	Authenticate
hallenge:	0AA8E4F494CC7C1EE9C5DD09EE80FFCFC78E78D2	(Hex)	
igest:		(Hex)	
hange SHA1	Key		
(ey(128bits):	0123456789ABCDEFFEDCBA9876543210	(Hex)	Change Key
hallenge:		(Hex)	
Digest:		(Hex)	
Digest:		(Hex)	
Digest 1 AUTHENTIG	CATION	(Hex)	
Digest: 1 AUTHENTIG	CATION	(Hex)	
Digest: 1 AUTHENTIG SHA1 Calcula Gey(128bits):	CATION tor 0123456789ABCDEFFEDCBA9876543210	(Hex)	Show Digest
Digest: 1 AUTHENTIG 3HA1 Calcula (ey(128bits): 3hallenge:	CATION tor 0123456789ABCDEFFEDCBA9876543210 0AA8E4F494CC7C1EE9C5DD09EE80FFCFC78E78D2	(Hex) (Hex) (Hex)	Show Digest
Digest: 1 AUTHENTIG HA1 Calcula (ey(128bits): Challenge: Digest:	CATION tor 0123456789ABCDEFFEDCBA9876543210 0AA8E4F494CC7C1EE9C5DD09EE80FFCFC78E78D2 2FD7EA69298C70A1A61341A48F6604EFF82F922F	(Hex) (Hex) (Her) (Hex)	Show Digest New Challenge
Digest: A1 AUTHENTIG SHA1 Calcula Key(128bits): Challenge: Digest: uthentication	CATION tor 0123456789ABCDEFFEDCBA9876543210 0AA8E4F494CC7C1EE9C5DD09EE80FFCFC78E78D2 2FD7EA69298C70A1A61341A48F6604EFF82F922F by SH366006	(Hex) (Hex) (Hex) (Hex)	Show Digest New Challenge
Digest: A1 AUTHENTIG SHA1 Calcula Key(128bits): Challenge: Digest: uthentication Key(128bits):	CATION tor 0123456789ABCDEFFEDCBA9876543210 0AA8E4F494CC7C1EE9C5DD09EE80FFCFC78E78D2 2FD7EA69298C70A1A61341A48F6604EFF82F922F by SH366006 0123456789ABCDEFFEDCBA9876543210	(Hex) (Hex) (Hex) (Hex)	Show Digest New Challenge Authenticate
Digest: 1 AUTHENTIG 8HA1 Calcula Key(128bits): Challenge: Digest: uthentication Key(128bits): Challenge:	CATION tor 0123456789ABCDEFFEDCBA9876543210 0AA8E4F494CC7C1EE9C5DD09EE80FFCFC78E78D2 2FD7EA69298C70A1A61341A48F6604EFF82F922F by SH366006 0123456789ABCDEFFEDCBA9876543210 0AA8E4F494CC7C1EE9C5DD09EE80FFCFC78E78D2	(Hex) (Hex) (Hex) (Hex) (Hex)	Show Digest New Challenge Authenticate
Digest: A1 AUTHENTIG SHA1 Calcula Key(128bits): Challenge: Digest: uthentication Key(128bits): Challenge: Digest:	CATION tor 0123456789ABCDEFFEDCBA9876543210 0AA8E4F494CC7C1EE9C5DD09EE80FFCFC78E78D2 2FD7EA69298C70A1A61341A48F6604EFF82F922F by SH366006 0123456789ABCDEFFEDCBA9876543210 0AA8E4F494CC7C1EE9C5DD09EE80FFCFC78E78D2	(Hex) (Hex) (Hex) (Hex) (Hex) (Hex) (Hex)	Show Digest New Challenge Authenticate
Digest: 1 AUTHENTIG SHA1 Calcula Key(128bits): Challenge: Digest: Challenge: Challenge: Digest: Challenge: Digest: Challenge: Change SHA ⁺	CATION tor 0123456789ABCDEFFEDCBA9876543210 0AA8E4F494CC7C1EE9C5DD09EE80FFCFC78E78D2 2FD7EA69298C70A1A61341A48F6604EFF82F922F by SH366006 0123456789ABCDEFFEDCBA9876543210 0AA8E4F494CC7C1EE9C5DD09EE80FFCFC78E78D2 Key	(Hex) (Hex) (Hex) (Hex) (Hex) (Hex)	Show Digest New Challenge Authenticate
Digest: 1 AUTHENTIG HA1 Calcula (ey(128bits): Challenge: Digest: uthentication (ey(128bits): Challenge: Digest: Challenge: Chal	CATION tor 0123456789ABCDEFFEDCBA9876543210 0AA8E4F494CC7C1EE9C5DD09EE80FFCFC78E78D2 2FD7EA69298C70A1A61341A48F6604EFF82F922F by SH366006 0123456789ABCDEFFEDCBA9876543210 0AA8E4F494CC7C1EE9C5DD09EE80FFCFC78E78D2 Key 0123456789ABCDEFFEDCBA9876543210	(Hex) (Hex) (Hex) (Hex) (Hex) (Hex) (Hex)	Show Digest New Challenge Authenticate Change Key
Digest: 1 AUTHENTIG SHA1 Calcula Key(128bits): Challenge: Digest: uthentication Key(128bits): Challenge: Digest: Change SHA ⁴ Key(128bits): Challenge: Challenge:	CATION tor 0123456789ABCDEFFEDCBA9876543210 0AA8E4F494CC7C1EE9C5DD09EE80FFCFC78E78D2 2FD7EA69298C70A1A61341A48F6604EFF82F922F by SH366006 0123456789ABCDEFFEDCBA9876543210 0AA8E4F494CC7C1EE9C5DD09EE80FFCFC78E78D2 Key 0123456789ABCDEFFEDCBA9876543210	(Hex) (Hex) (Hex) (Hex) (Hex) (Hex) (Hex) (Hex)	Show Digest New Challenge Authenticate Change Key

3.2 Authentication by SH366006

.....

当已知 SH366006 的 SHA1 Key 时, Authentication by SH366006 用于对 SH366006 的 SHA1 认证结果进行比对验证:

1) 在 Key(128bits)输入框中,输入已知的 SH366006 SHA1 Key,目前均为默认值;

2) 在 Challenge 输入框中,输入一个 20bytes 的随机 Challenge 值,或者通过 SHA1 Calculator 中的"New Challenge" 按钮随机生成;

3) 点击"Authenticate"按钮,开始认证比对,结果一致时,显示认证成功;否则提示失败,并显示 SH366006 的 SHA1 计算结果值,分别如下图所示:

SHA1 Calculat	tor		
Key(128bits):	0123456789ABCDEFFEDCBA9876543210	(Hex)	Show Digest
Challenge:	0AA8E4F494CC7C1EE9C5DD09EE80FFCFC78E78D2	(Hex)	New Challenge
Digest	2FD7EA69298C70A1A61341A48F6604EFF82F922F	(Hex)	
Authentication	by SH366006		
Key(128bits):	0123456789ABCDEFFEDCBA9876543210	(Hex)	Authenticate
Challenge:	0AA8E4F494CC7C1EE9C5DD09EE80FFCFC78E78D2	(Hey)	
Digest	2FD7EA69298C70A1A61341A48F6604EFF82F922F	(Hex)	
Change Mess	sage	,	<
Key(1281			Change Key
Challeng	Authentication successed. SH366006 returned value th digest!	nat matches the	
Digest			
IN LOS		OK	

3.3 Change SHA1 Key

当 SH366006 处于全访问状态下(OperationStatus[FAS] = 0), Change SHA1 Key 用于对 SH366006 的 SHA1 Key 进行修改,并基于新的 SHA1 Key, 上位机和 SH366006 均会计算 全零 Challenge 值对应的 Digest 值, 然后比对二者是否一致, 来判断 SHA1 Key 是否修改 成功,如下图所示

GHA1 AUTHENTIC	ATION				\times
SHA1 Calculat	or				
Key(128bits):	0123456789ABCDEFFEDCBA9876543210			(Hex)	Show Digest
Challenge:	7CEA5C42919000D888BF73BA719A62B27	AE78	85D	(Hex)	New Challenge
Digest:	D4AF7A22 Message	×	-37	(Hex)	
Authentication	by SH3660				
Key(128bits):	01234567 Key change successed!			(Hex)	Authenticate
Challenge:	7CEA5C4		5D	(Hex)	
Digest	D4AF7A22 OK		37	(Hex)	
Change SHA1	Key				
Key(128bits):	0123456789ABCDEFFEDCBA9876543210			(Hex)	Change Key
Challenge:	000000000000000000000000000000000000000	00000	0	(Hex)	
Digest:	2FA27CEB5B616484620FE32217C29B0A8	E3CF	3F0	(Hex)	

附录 2: checksum 检查 (DF+CHEM ID)和指令

一、在 Manufacturer Access (MAC) 系统读写数据

备注:在 Pro 进行操作时,关闭扫描功能

e	Option Tools Help				
PI	Scan	>	\checkmark	Off	
0:	Set Logging Time			On	
_	Fusion Gauge Constants Update		ad		Result (hex
	Chem ID Parameters Transform				

1、通过 ManufacturerBlockAccess()指令, MAC 指令由 SMBus 块协议通过 ManufacturerBlockAccess()发送.

结果由 SMBus 块读取通过 ManufacturerBlockAccess()读取。

例 1:通过 ManufacturerBlockAccess()读取化学 ID (0x0006)。

a 发送化学 ID 子命令到 ManufacturerBlockAccess().

在 command 输入: 44 在 Block 输入: 06 00

然后点击 Write

SMB Command 44 Block Data (hex) Write	Write SMB Block				
	SMB Command 44 Blo (he	ock Data ex)	06 00	*	Write

b 从 ManufacturerBlockAccess()读取结果。

在 command 输入: 44 然后点击 Read

Read SMB Word	
SMB Command Result (hex)	
Write SMB Word	
SMB Command Word (hex) Write	
Write SMB Combined Word	NO PEC
SMB Command Word1 (hex) Word2 (hex) Write	
Read SMB Block	
SMB Command 44 Read (hex) 06 00 63 46	
Write SMB Block	
SMB Command 44 Block Data (hex) 06 00 Write	

c) 第一个两字节"06 00"是 MAC 命令, 第二个两字节 "63 46",是以低位优先返回化学 ID,化学 ID 是 0x4663

例 2:通过 ManufacturerBlockAccess()读取 StaticDFCheckSum(0x0005)。

过程同例1,

StaticDFCheckSum 的结果为 0x193A

Read SMB Block	Read (hex)	05 00 3A 19
Write SMB Block	Block Data (hex)	Write

2、通过 ManufacturerAccess() 和 ManufacturerData(). MAC 命令由 SMBus 写入字协议通过

ManufacturerAccess()发送指令,由 SMBus 块读取协议通过 ManufacturerData()返回数据。注意从 ManufacturerData()返回的结果包含 MAC 命令。

例 3:通过 ManufacturerAccess()读取化学 ID (0x0006)。

a. 发送化学 ID 子命令到 ManufacturerAccess().

SMBus 字写入。Command = 0x00. Data sent = 0006 (数据不是低位优先)

Read SMB Word	
SMB Command Read Result (hex)	
Write SMB Word	
SMB Command 00 Word (hex) 06 Write	
Write SMB Combined Word	□ NO PEC
SMB Command Word1 (hex) Word2 (hex) Write	

b.从 ManufacturerData()读取结果。

Read SMB Word	
SMB Command Read Result (hex)	
Write SMB Word	
SMB Command 00 Word (hex) 06 Write	
Write SMB Combined Word	NO PEC
SMB Command Word1 (hex) Word2 (hex) Write	
Read SMB Block	
SMB Command 23 Read (hex)	
Write SMB Block	
SMB Command Block Data (hex)	

SMBus 块读取。Command = 0x23 Data read = 63 46 (返回的数据都是低位优先). 化学 ID 是 0x4663。

ManufacturerAccess()和 ManufacturerBlockAccess()可内部转换。结果可以从 ManufacturerData()或 ManufacturerBlockAccess()读取,与 MAC 指令发送方式无关。

例 4:通过 ManufacturerAccess()读取化学 StaticDFCheckSum (0x0005)。 StaticDFCheckSum 的结果为 0x193A

Read SMB Word SMB Command Read Result (hex)	
Write SMB Word SMB Command 00 Word (hex) 05 Write	
Write SMB Combined Word	NO PEC
SMB Command Word1 (hex) Word2 (hex) Write	
Read SMB Block SMB Command 23 Read (hex)	
Write SMB Block SMB Command Block Data (hex) Write	

二、密钥读取/修改

安全密钥可以从 ManufacturerData() 或 ManufacturerBlockAccess()读取. SH366006 必须 在全解密模式读取安全密钥。密钥以如下的格 式 aaAAbbBBccCCddDD 返回, 定义如下:

码值	描述	默认值
AAaa	解密密钥的第一个 WORD	0x5678
BBbb	解密密钥的第二个 WORD	0x1234
CCcc	全解密密钥的第一个 WORD	0xCDEF
DDdd	全解密密钥的第二个 WORD	0x90AB
EEee	手动 PF 键的第一个字	0x2857
FFff	手动 PF 键的第二个字	0x2A98

密钥只能通过 ManufacturerBlockAccess()更改.

- 1, 密钥的读取
- 1), 关闭 scan: 调到 off
- 2) 输入 subcmd0x35: command 输入 00, word 输入 35, 点击 Write
- 3) 0x44 读取解密密钥和 PF key: command 输入 44, 点击 Read

Read SMB Word SMB Command Read Result (hex)	
Write SMB Word SMB Command 00 Word (hex) 35	
Write SMB Combined Word SMB Command Word1 (hex) Word2 (hex) Write	NO PEC
Read SMB Block 35 00 78 56 34 12 SMB Command 44 Read (hex)	
Write SMB Block SMB Command (hex) Write	

35 00 为 0x0035 的 MAC 指令,

78 56 34 12 为默认解密密钥

EF CD AB 90 为默认全解密密钥

57 28 98 2A 为默认的 PFkey

2, 更改解密密钥

更改解密密钥为 0x695A, 0xA596, 全解密密钥为默认值。 发送 SMBus 块写入命令 Command = 0x44。 Data = MAC 指令+ 新的解密密钥+ 新的全解密密钥+PFkey= 35 00 5A 69 96 A5 EF CD AB 90 56 28 98 2A

Write SMB Block SMB Command 44	Block Data (hex)	35 00 5A 69 96 A5 EF CD AB 90 57 28 98 2A	*	Write	

3,读取验证

Read SMB Word	
SMB Command Read Result (hex)	
Write SMB Word	
SMB Command 00 Word (hex) 35 Write	
Write SMB Combined Word	NO PEC
SMB Command Word1 (hex) Word2 (hex) Write	
Read SMB Block	
SMB Command 44 Read Result (hex) 35 00 5A 69 96 A5 EF CD AB 90 57 28 98 2A	
Write SMB Block	
SMB Command 44 Block Data (hex) 35 00 5A 69 96 A5 EF CD AB 90 57 28 98 2A Write	