# MM8118G01RFE Eval Board



MM8118G01 Eval Board is an evaluation board for the purpose of remaining capacity evaluation for Li-ion battery. A current sense resistor and a thermistor is mounted on this board. By using Interface Box and "EvaTool" software for MM8118G01 at the evaluation of Li-ion battery, the user can get Log such as voltage, current and remaining capacity etc., and write the battery parameter and set the other general settings.

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## 1. Feature

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Intelligent Gauge5 (=Remaining capacity estimation algorithm) installed Eval Board
 Eval Board is able to check and record Remaining capacity easily by the software

## 1.1 Eval Board Information

#### Table 1. Supported Battery

Name	Configuration	Battery type	Battery Capacity
MM8118G01 Eval Board	1 Cell	Li-ion	16000mAh or less

## 1.2 Eval Board Specification

Table 2. Eval Board Specification

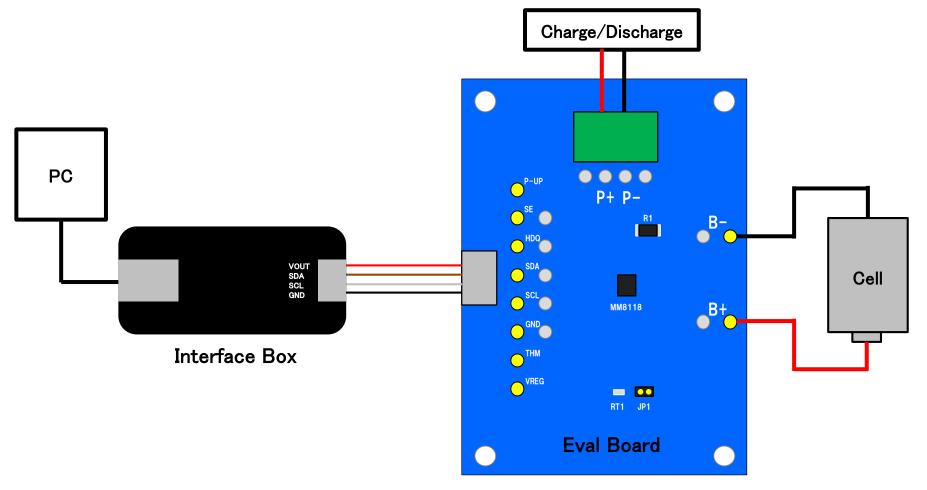
Parameter	MIN.	ТҮР.	MAX.
Input voltage B+ to B- and P+ to P-	2.5V	-	5.5V
Input voltage range of I/O pin (SDA/SCL/HDQ)	-0.3V	-	VDD+0.3V
Charge / Discharge current P+ to P-	0.0A	1.0A	3.0A
Current sense resistor	-	$5 \mathrm{m}\Omega$	-



# 2. Eval Board Connections

2. Eval Board Connections

2.1 Connection example to Eval Board







## 2. Eval Board Connections

### 2.2 Pin Descriptions

Table	3.	Eval	Board	Pin
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Name	Description
B+	Cell+ terminal
B-	Cell- terminal
P+	Pack+ terminal
P-	Pack- terminal
VREG	Regulator output terminal
THM	Thermistor input terminal
SDA	I2C data input/output terminal
SCL	I2C clock input/output terminal
HDQ	General purpose output terminal
SE	General purpose output terminal
	External power input terminal for pull-up
P-UP	Xif you use External power for Pull−up, please mount 1KΩ resistor on R13 (HDQ) or R14 (SE).
	mount IN & resistor on R13 (HDQ) or R14 (SE).

Please refer to MM8118G01RFE specification for each terminal ratings.



# 3. Eval Board Layout

Eval Board Layout
 Layout and Bill of Materials

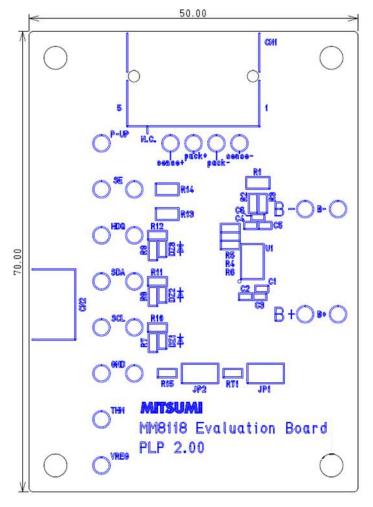


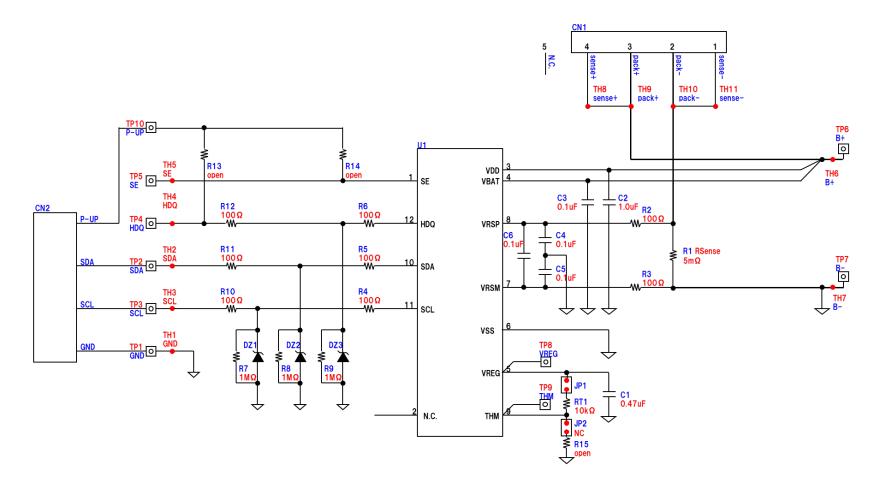
Table 4. Bill of Materials

Symbol	Value
C1	0.47µF
C2	1.0µF
C3,C4,C5,C6	0.1µF
R1	$5 \mathrm{m} \Omega$
R2,R3,R4,R5,R6 R10,R11,R12,	100Ω
R7,R8,R9	1ΜΩ
RT1	10kΩ
DZ1,DZ2,DZ3	Breakdown voltage Min. 5.8V

Figure 2. Eval Board Layout

## 3. Eval Board Layout

### 3.2 Eval Board Schematic



#### Figure 3. Eval Board Schematic



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### 4. Software 4.1 EvaTool

The user can evaluate easily by using the software (EvaTool) which controls MM8118G01 to check the voltage/current/remaining capacity/etc. of MM8118G01 and to store Log data and to execute each sensor Calibration.

Please contact us to obtain EvaTool.

### 4.2 Ready to use EvaTool

- 1. Download VCP driver of FTDI Chip, and install it to the PC.
- 2. Connect the USB cable to the Interface Box and the PC.
- 3. Run EvaTool.

Passion to Create Value through Different

- 4. Select [MM8118G01\_EvaTool] in [Target Selection Wizard] window. (Figure 4)
- 5. The main screen of EvaTool appears. (Figure 5)

			Refresh	Start Logging	Stop Logging	C Keep					
Selection Wizard	- 🗆 X	0 0	Name	coyying	Value	unit Loc	Scan	Name	v	/alue unit	Log Sc
		1	Control			NA 🗹	N N	8TPSOC1Set		mAh	
lect a target		FG Data	AtRate Unfiltered			mA ⊠ % ⊠	N	8TPSOC1Clear InternalTempera	200	mAh degC	
EvaTool	1	and the second s	Temperat			degC 🗹		DycleCount	ture	Count	
vaTool			Voltage			mV 🖂		StateOfCharge		55	
		Parameter	Flags			NA 🗹		StateOfHealth		55	Ø
		6	FullAvalab	alableCapacity		mAh 🗹		ChargeVoltage ChargeCurrent		mV mA	N
			Remaining			mAh 🗹	NN	PassedCharge		mAb	NO
		I2C Pro	Fulkharge			mAh 🖂		DOD0		NA	
			AverageO			mA 🖸 min 🗹		SelfDischargeCur PackConfig	rent	mA	
		mmEASY	Average T FiberedFC	meToEmpty C		min 🗹 mAh 🗹		PackConfig DesignCapacity		Hex	
		mimeAST	SafetySta	tus		NA 🖂	8	ProductInformat		NA	2
			Unfiltered			máh 🗹	NNN	ProductInformat	ion	NA	S
			MaxLoadC Unfiltered			mAh 🗹	M	FGCondition Current		NA mA	
			FilteredRM			máh 🗹	N N	cuseoc			
			22.3	RSVD	FAS	55	CALMODE	RSVD	RSVD	QMAXUPDATE	RSVD
			Control	SHUTDOWN	HIBERNATE	FULLSLEEP	SLEEP	LDMD	DNR	VOK	QEN
		100%	Flags	OTC	OTD	BATHI	BATLOW	CHG_INH	RSVD	FC	CHG
			rags	OCVTAKEN	000	ODC	OT	UT	SOCI	SOCF	DSG
Emish	Cancel		Pack	RSVD	INTPol	INTSel	RSVD	RSVD	RSVD	RSVD	RSVD
second second second second second		12	Config	RSVD	RSVD	SLEEP	RSVD	RSVD	RSVD	RSVD	TEMPS
		1000	Safety	RSVD	RSVD	RSVD	RSVD	RSVD	RSVD	OVP	UVP
	tion Wizard	0% Fuel Gauge	Status	2340	~340	~340	2300	8340	8340	OVP	OVE

#### Figure 5. EvaTool main screen

## 4.3 Communication to Eval Board

- 1. Connect Interface Box and Eval Board. (refer to P.4)
- Click [I2C Pro] =>[Port Scan] in order and select the COM number, then click [Connect]. (Figure 6)
- 3. Click [FG Data] = > [Refresh] in order.

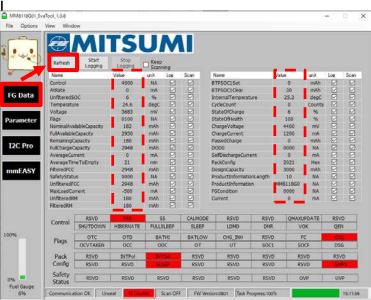
4. When the communication is successful, the current data is displayed in Value. (Figure 7) %Refer to the document below for more detail. [MM8118\_AN030\_StandardEvaluationKit\_QuickStartGui de\_rev1.●.pdf]

## 4.4 EvaTool Basic Operation

Refresh	: update data once
Start Logging	: start to save Log continuously with
	any interval
Stop Logging	: stop to save Log
Keep Scanning	: update data continuously with any
	interval
「Option」 => 「S	et Scan And Logging Interval
-	: set the interval of data update
	[0ms~600000ms]



### Figure 6. I2C Pro screen



### Figure 7. FG Data screen

### 4.5 Check Battery Parameter Data

- 1. Click [Parameter] => [Read All] in order
- 2. Battery Parameter data which is written in MM8118G01 is displayed in Value column.

## 4.6 Make Battery Parameter

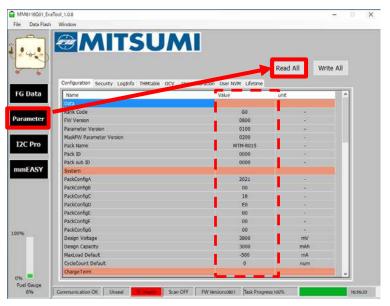
If the actual use battery and battery parameter condition is different in MM8118G01, the accuracy of remaining capacity gets worse.

The user can make battery parameter easily by using the software [ParameterEditor] from the basic data of the use battery.

The accuracy of remaining capacity improves by writing the made battery parameter to MM8118G01 using EvaTool.

Please contact us to obtain [ParameterEditor] and please refer the document below for [ParameterEditor] usage.

[MM8118\_AN031\_ParameterEditorToolGuide\_rev 1.●.pdf].



#### Figure 8. Battery Parameter data check

please note that if the battery chi	aracteristics diff	8118 Parameter Editor are based on typical battery characteristics, er from those of the battery actually used.	
the expected accuracy may not b	e satisfied.	Model	
MM8118G		- Proves	
		Setting Items	
Create Read Battery Capacity(mAh)	7000	Input range=5000-16000	
	4400 0	Second	
Charge Voltage[mV]		Input range=4150-4500	
Cut-off Charge Current[mA]	300	Input range=10-1000	
Low Limit Voltage(mV)	3400 🛊	Input range=3000-3500	
Sense Resistor(mΩ)	5.0 🛊	Input range=1.0-20.0	
Number of parallel cells	2 🔄	Input range=1-10	
Battery Pack Name	[]	Half-width alphanumeric characters and symbols, 0-8 characters	
Parameter Version	0001	Hex charactors, 4 characters	
Current Resolution	1 5	Input range=1.0.1	
		Sase File	
MM8118_GOx_Sample1_BatteryC	apacity7000mAl	1 V	Search

### Figure 9. ParameterEditor screen

4.7 Write Battery Parameter

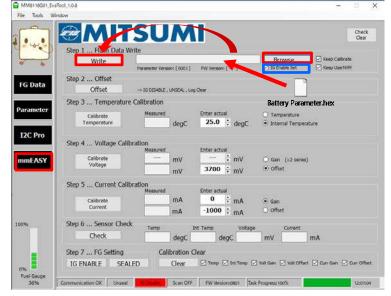
To write battery parameter, follow the steps below. (Figure 10)

- 1. Click [mmEASY]
- 2. Drag and drop the battery parameter file made by [ParameterEditor] in [Step 1] area, or click [Browse] and select it.
- 3. If you want to start the evaluation right after the battery parameter write finished, check [IG\_Enable set].
- 4. Click [Write].
- 4.8 Each Sensors Calibration

MM8118G01 has voltage sensor, current sensor, IC temperature sensor and thermistor, and needs Calibration (adjustment) for these sensors.

Please refer the document below for the calibration procedure.

[MM8118\_AN030\_StandardEvaluationKit\_Quick StartGuide\_rev1.●.pdf]



### Figure 10. Battery Parameter Write

-07		heck
·		Dear.
- Star	Step 1 Flash Data Write Write Browse Draw Calibrate	
	Write Browse Mees Calerate Parameter Version: [0001] PW Version: [] Is Broke Set Rep UserNM	
	Step 2 Offset	
G Data	Offset -> 35 DISABLE , UNDERL , Log Dear	
Step 1 F FG Data FG Data FG Data FG Data FG Data Step 2 O Step 3 T Step 3 T Step 4 V Calle Step 5 O Calle Step 5 O Calle Step 5 O Calle Calle Step 5 O Calle Calle Step 7 FG	Step 3 Temperature Calibration	
rameter		
	Calibrate tessured enter actual O Temperature Temperature degC 25.0 : degC • Internal Temperature	
C Dro		
AC PIO	Step 4 Voltage Calibration	
	Calibrate mV	
mEASY	Voltage	
	mV 3700 t mV • Offset	
	Step 5 Current Calibration	
	Calibrate mA Gan	
	Current mA 1000 t mA O Offset	
ú	Step 6 Sensor Check	
	Temp Dit Temp. Votage Current	
	Check degC degC mV mA	
	Step 7 FG Setting Calibration Clear	
	IG ENABLE SEALED Clear Common Continue Station Station Court Can Court Can Court	Offer

### Figure 11. Calibration

# 5. NOTES

#### [Safety Precautions]

• Though Mitsumi Electric Co., Ltd. (hereinafter referred to as "Mitsumi") works continually to improve our product's quality and reliability, semiconductor products may generally malfunction or fail. Customers are responsible for complying with safety standards and for providing adequate designs and safeguards for their hardware, software and systems which minimize risk and avoid situations in which a malfunction or failure of this product could cause loss of human life, bodily injury, or damage to property, including data loss or corruption. Before customers use this product, create designs including this product, or incorporate this product into their own applications, customers must also refer to and comply with (a) the latest versions or all of our relevant information, including without limitation, product specifications, data sheets and application notes for this product and (b) the user's manual, handling instructions or all relevant information for any products which is to be used, or combined with this products. Customers are solely responsible for all aspects of their own product design or applications, including but not limited to (a) determining the appropriateness of the use of this product in such design or applications; (b) evaluating and determining the applicability of any information contained in this document, or in charts, diagrams, programs, algorithms, sample application circuits, or any other referenced documents; and (c) validating all operating parameters for such designs and applications.

• This product is intended for applying to computers, OA units, communication units, instrumentation units, machine tools, industrial robots, AV units, household electrical appliances, and other general electronic units.

#### [Precautions for Product Liability Act]

•No responsibility is assumed by us for any consequence resulting from any wrong or improper use or operation, etc. of this product.

#### [ATTENTION]

• This product is designed and manufactured with the intention of normal use in general electronics. No special circumstance as described below is considered for the use of it when it is designed. With this reason, any use and storage under the circumstances below may affect the performance of this product. Prior confirmation of performance and reliability is requested to customers.

Environment with strong static electricity or electromagnetic wave

Environment with high temperature or high humidity where dew condensation may occur

• This product is not designed to withstand radioactivity, and must avoid using in a radioactive environment.

• This specification is written in Japanese and English. The English text is faithfully translated into the Japanese. However, if any question arises, Japanese text shall prevail.

