BMS Datasheet

EF-BMS-16S SMART – 60A
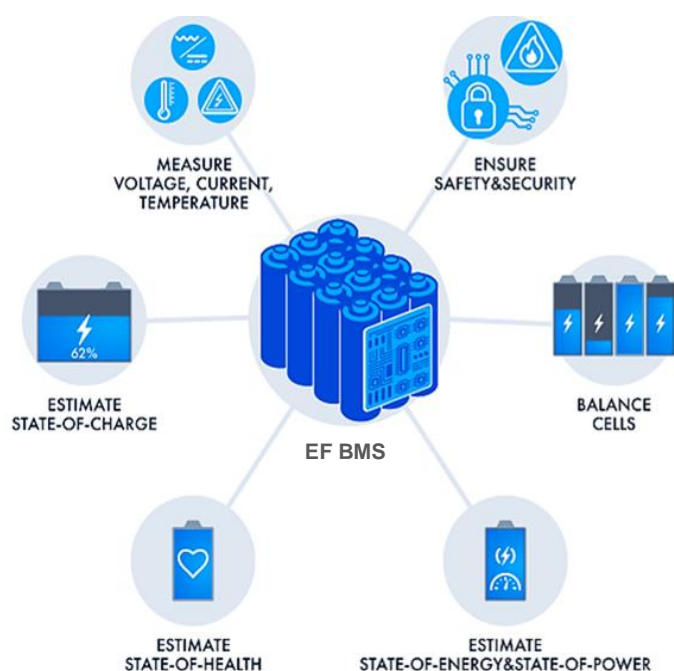
INTRODUCTION-

BMS, or *Battery Management System*, is an essential component of every *Lithium* battery. *Electrifuel EF-BMS-16S* supports lithium batteries of any chemistry and up to 60 *V* nominal. Battery capacity from sub-*1 Ah* to *1000 Ah* can be managed easily.

EF-BMS-16S measures individual voltages of parallel cell groups and manages the switching of load and charger. During charging, cells are balancedby bleeding-off current from cells with higher voltage to accomplish full balance and maintain good health of the battery pack.

State-of-Charge is also calculated and available via communication bus to be displayedfor the user.

State-of-Health is estimated using advanced Algorithms used to cumulatively

Increase accuracy, and it is broadcasted via communication bus to be displayed for users.

EF BMS

MEASURE VOLTAGE, CURRENT, TEMPERATURE

ENSURE SAFETY&SECURITY

ESTIMATE STATE-OF-CHARGE

BALANCE CELLS

ESTIMATE STATE-OF-HEALTH

ESTIMATE STATE-OF-ENERGY&STATE-OF-POWER

SAFETY

Various safety-critical mechanisms are built-in: disconnection of load or charger if any of the Cells or Pack go out of allowed range of voltage or current, also up to two temperatures from 3 zones is measured and can be used for emergency disconnect or for disabling of charging if cell temperature is too low or too high.

FEATURES

❖ Integrated Up to *60 A* power switches.

❖ Supports *12-V, to 60-V* systems (3*s-16s*), all lithium chemistries.

❖ MCU-based, Part no- (STM32G0B1CBT6)

❖ All Parameters, Constraints, and Triggers are adjustable.

❖ Supports up to 8 temperature sensors : 5 dedicated (4 external, 1 on-board) + 4additional.

❖ Dissipative passive balancing up to *300 mA*.

❖ Connectivity options: *UART, CAN* , Bluetooth – BLE, or Cellular.

❖ On Board micro-SD Card for Event Logs, Usage Statistics and can store up to 5 years of detailed data.

❖ Over The Air (OTA) firmware upgrades.

❖ Programmable Inputs & Outputs.

❖ Accurate voltage measurements (+/- 5mV tolerance).

❖ Accurate current measurements (+/- 1A tolerance).

❖ Auto sleep mode in IDLE and auto wakeup onload/charger.

❖ Deep Sleep option for long-time battery warehousestorage.

❖ Ultra-low self-power consumption.

❖ Alarm Buzzer for any fault.
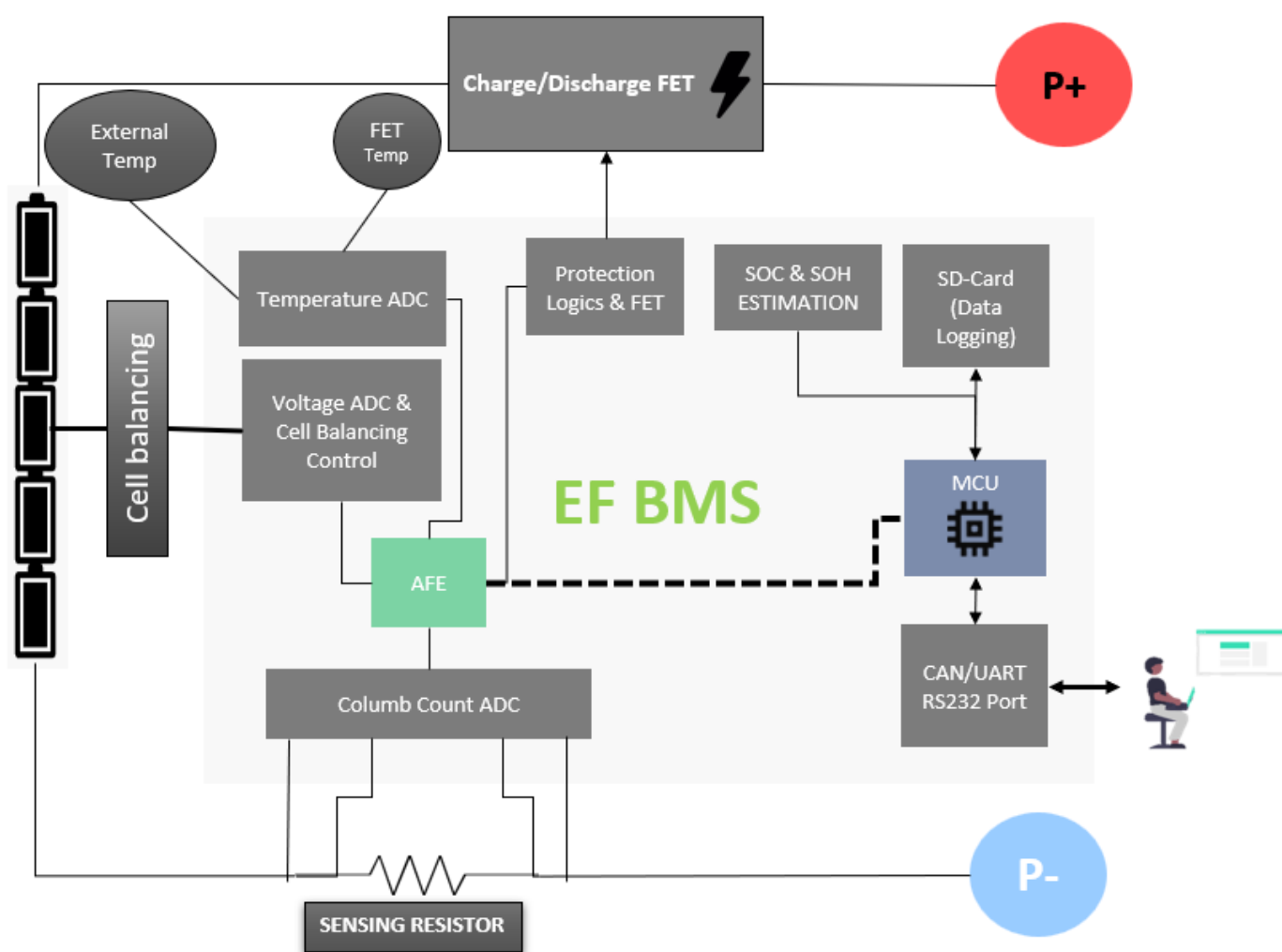
APPLICATIONS

- 2 &3 Wheeler

- Energy Storage System

- Battery Swapping

BMS FUNCTIONALITY
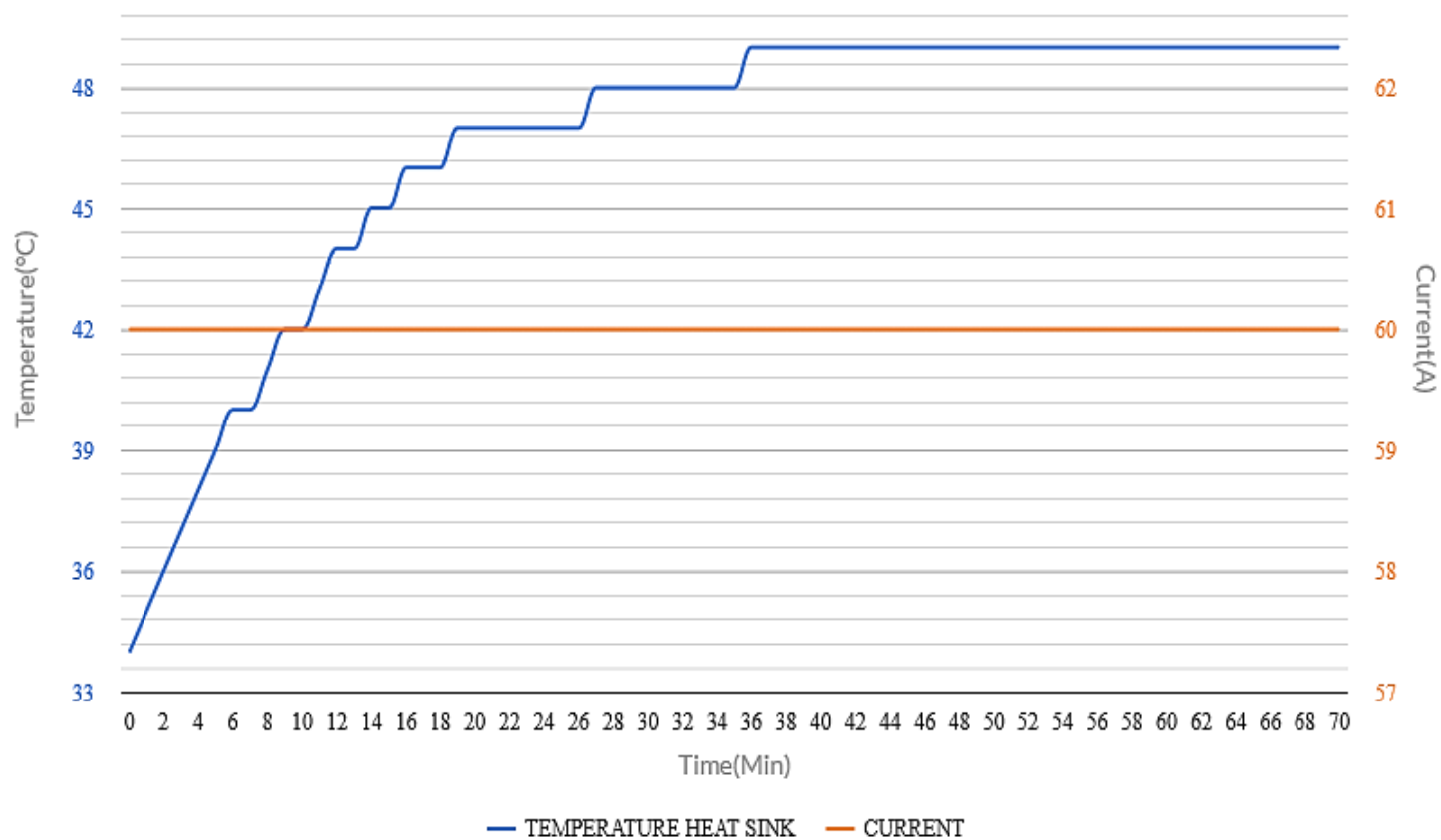
- **BLOCK DIAGRAM**

ELECTRICAL CHARACTERISTICS

Table 1: Product characteristics (all parameters rated at 28 °C if not specified otherwise)

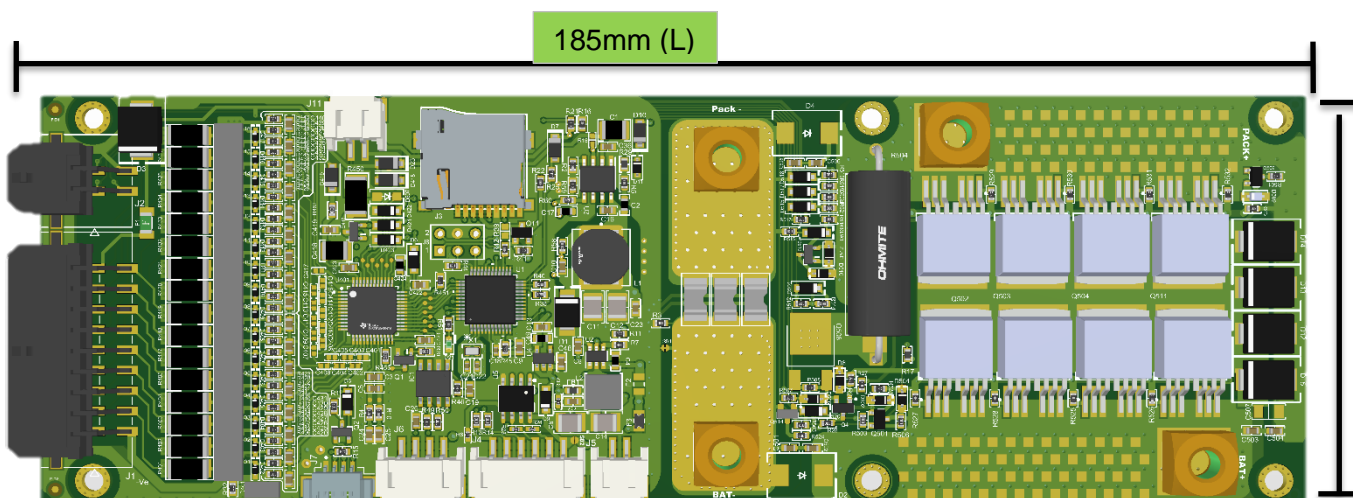| Parameter	Comment	Min.	Typ.	Max.	Unit
Battery voltage	Operation range	6.0	-	85	V
Cell voltage	Measurement range	0.8	-	4.5	V
Discharge current	Continuous without Heat Sink	±1	-	40	A
	Mounted on a cool surface (Heat Sink)	±1	-	60	A
	Peak (<10 sec.)	±1	-	85	A
	With external Power Switch Module				
Charge Current	Contactor	NA	-	NA	-
	Continuous Mounted on a cool surface (Heat Sink)	±1		60	A
	With an external Power Switch Module /Contactor	NA	-	NA	-
Balancing current	Per cell, VCell=4.2V	-	230	250	mA
Communication I/O current	Long term	-	-	10	mA
	ADC range	0	-	75.0	V
Communication I/O voltage	Logic High (1)	3.0	3.3	3.4	V
	Logic Low (0)	0	0	1.1	V
Dimension Without cooling plate		-	60x185x10	-	mm
Dimension With cooling plate		-	60x185x20	-	mm

CHARGING VOLTAGE SHOULD NOT EXCEED Max 85V IN ANY CASE.

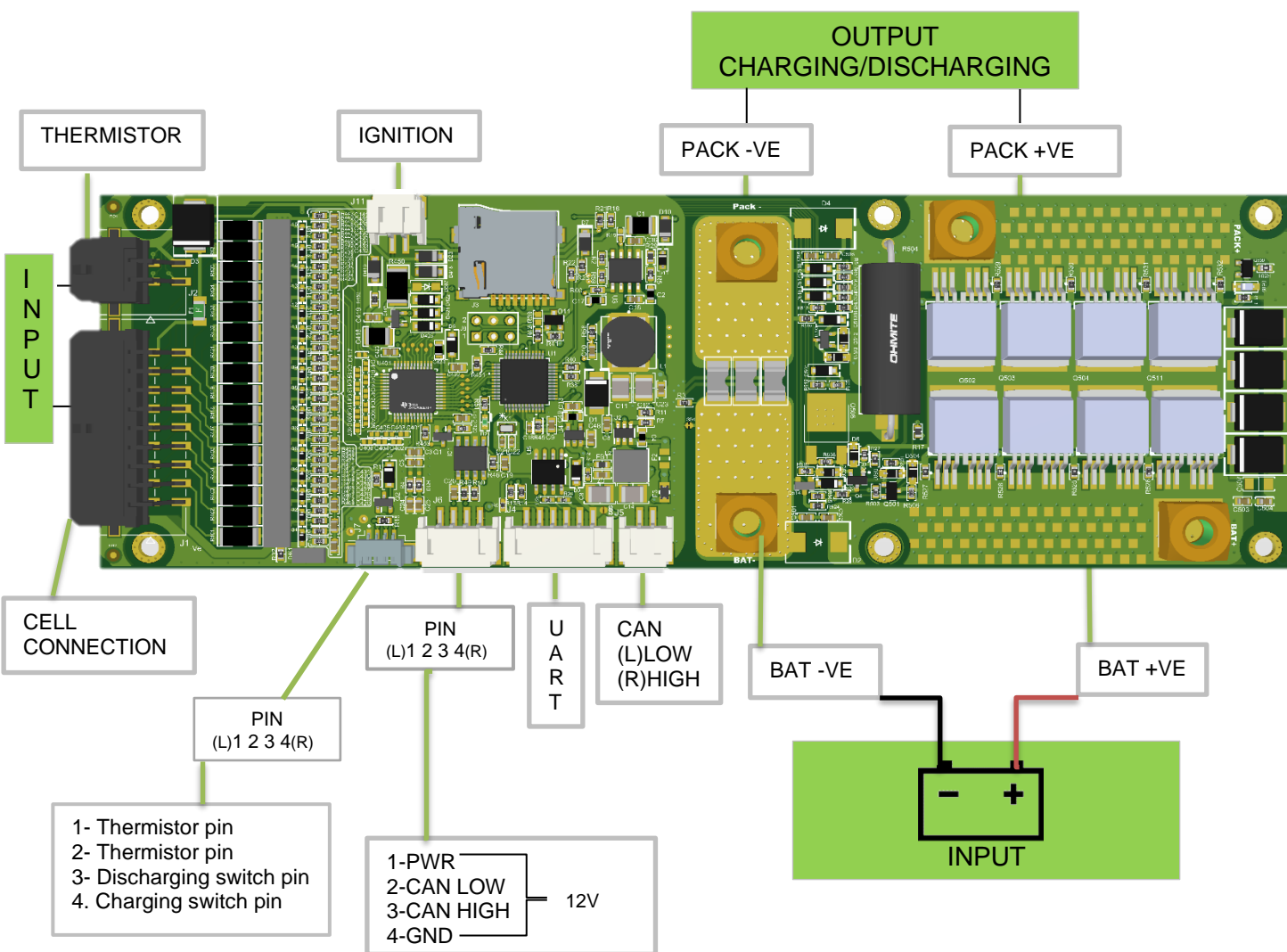*This EF-BMS-16s SM is a configurable BMS, so parameters are presented in Min to Max values.
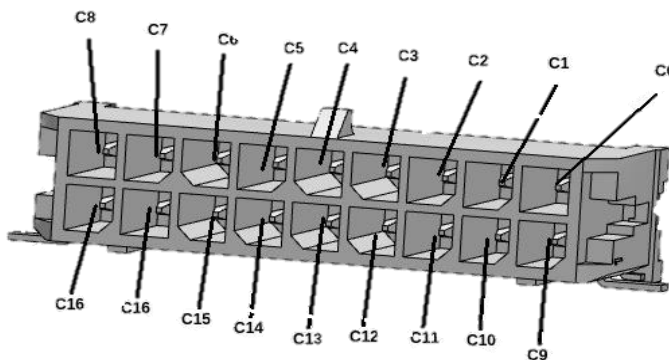
CONSTANT CURRENT 60A VS TEMPERATURE

Chart: TEMPERATURE HEAT SINK — CURRENT. X-axis: Time(Min). Left Y-axis: Temperature(°C). Right Y-axis: Current(A).

MECHANICAL DATA

185mm (L)

60mm(W)

CONNECTIONS

THERMISTOR

IGNITION

OUTPUT
CHARGING/DISCHARGING

PACK -VE

PACK +VE

INPUT

PACK

CELL
CONNECTION

PIN
(L)1 2 3 4(R)

U
A
R
T

CAN
(L)LOW
(R)HIGH

BAT -VE

BAT +VE

PIN
(L)1 2 3 4(R)

1- Thermistor pin
2- Thermistor pin
3- Discharging switch pin
4. Charging switch pin

1-PWR
2-CAN LOW
3-CAN HIGH
4-GND

12V

INPUT

CELL CONNECTION-

1. MALE CONNECTOR -

2. FEMALE CONNECTOR-

Table for cell connections, where C0 represents **B -VE** & here C Represents cells

String	3 Series Pack	4 Series Pack	5 Series Pack	6 Series Pack	7 Series Pack	8 Series Pack	9 Series Pack	10 Series Pack	11 Series Pack	12 Series Pack	13 Series Pack	14 Series Pack	15 Series Pack	16 Series Pack
C16-C15	Short	Short	Short	Short	Short	Short	Short	Short	Short	Short	Short	Short	Short	C16
C15-C14	Short	Short	Short	Short	Short	Short	Short	Short	Short	Short	Short	Short	C15	C15
C14-C13	Short	Short	Short	Short	Short	Short	Short	Short	Short	Short	Short	C14	C14	C14
C13-C12	Short	Short	Short	Short	Short	Short	Short	Short	Short	Short	C13	C13	C13	C13
C12-C11	Short	Short	Short	Short	Short	Short	Short	Short	Short	C12	C12	C12	C12	C12
C11-C10	Short	Short	Short	Short	Short	Short	Short	Short	C11	C11	C11	C11	C11	C11
C10-C9	Short	Short	Short	Short	Short	Short	Short	C10	C10	C10	C10	C10	C10	C10
C9-C8	Short	Short	Short	Short	Short	Short	C9	C9	C9	C9	C9	C9	C9	C9
C8-C7	Short	Short	Short	Short	Short	C8	C8	C8	C8	C8	C8	C8	C8	C8
C7-C6	Short	Short	Short	Short	C7	C7	C7	C7	C7	C7	C7	C7	C7	C7
C6-C5	Short	Short	Short	C6	C6	C6	C6	C6	C6	C6	C6	C6	C6	C6
C5-C4	Short	Short	C5	C5	C5	C5	C5	C5	C5	C5	C5	C5	C5	C5
C4-C3	Short	C4	C4	C4	C4	C4	C4	C4	C4	C4	C4	C4	C4	C4
C3-C2	C3	C3	C3	C3	C3	C3	C3	C3	C3	C3	C3	C3	C3	C3
C2-C1	C2	C2	C2	C2	C2	C2	C2	C2	C2	C2	C2	C2	C2	C2
C1-C0	C1	C1	C1	C1	C1	C1	C1	C1	C1	C1	C1	C1	C1	C1

Revision	Date	Description
A	2022-03-01	Initial release
B	2022-04-20	Mechanical data updated
C	2022-05-09	A connector Pin Label added
D	2022-07-06	BMS mask color updated
E	2022-08-10	BMS mask color updated
F	2023-04-18	MOSFET control signal description edit