

NXP BJB SOLUTION INTRODUCTION

贾晓峰
BMS Application Engineer

JULY 2021



SECURE CONNECTIONS
FOR A SMARTER WORLD

PUBLIC

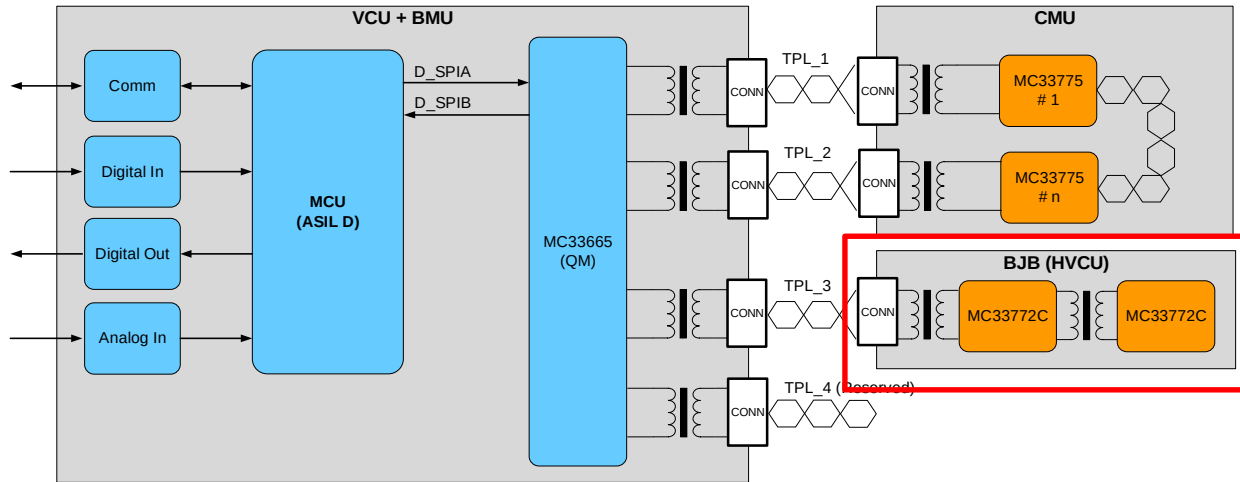
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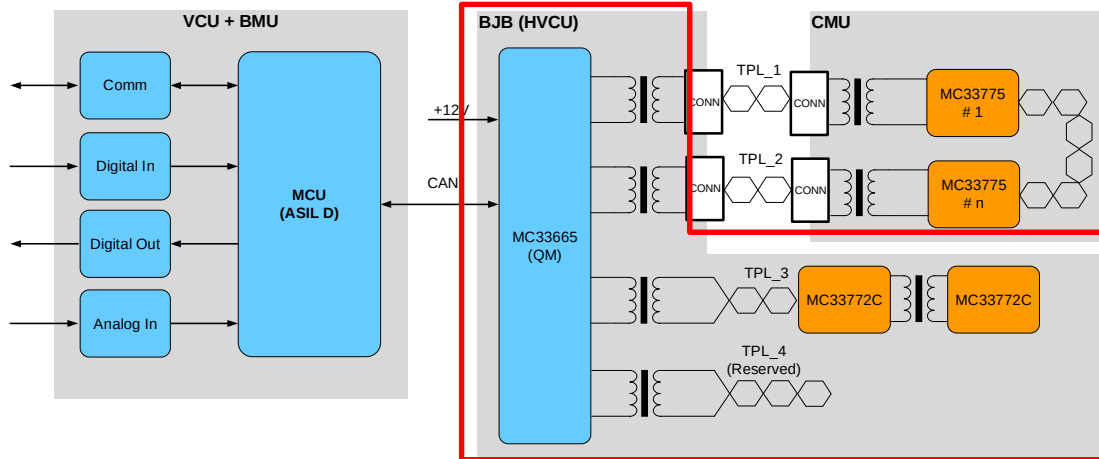
CONTENTS QUICK START GUIDE

- ❖ BJB architecture
- ❖ NXP BJB technology roadmap
- ❖ NXP BJB solution

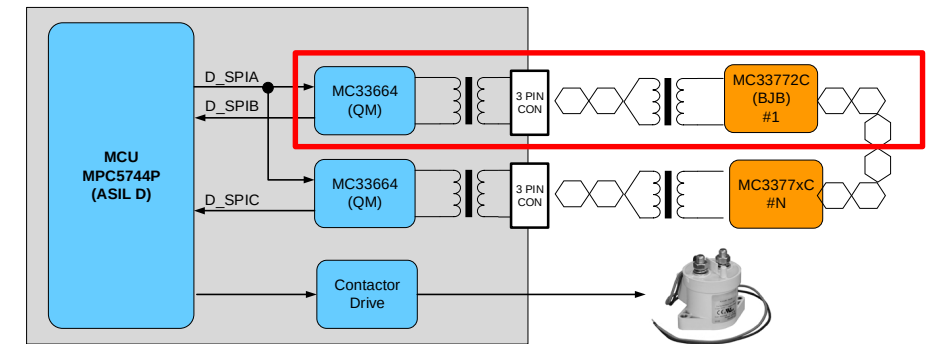
FLEXIBLE ARCHITECTURES



Different TPL chain with CMU and BMU



Combined with BMU, different TPL chain with CMU



One TPL chain with CMU and BMU

BJB SOLUTION ROADMAP (BMS CHINA)

2018

2019

2020

2021

BJBRev1.0

- HV/ I /T measurement
- ISO-CAN Comm with BMU/VCU
- FuSa:QM

MM9Z1_638, TJA1052i

BJB Rev2.0 (published)

- ~**1000V** High Voltage measurement
- Temperature measurement
- I measurement, **optimized Shunt** selection
- **Insulation detection** integrated
- ISO-CAN Comm with BMU/VCU
- FuSa: QM

MM9Z1_638, TJA1052i

BJB Rev2.1 (published)

- High voltage, current and temperature measurement
- Insulation detection integrated
- ISO-CAN interface
- FuSa: **ASIL-B**

MC33772B

S32K118 + FS4503

BMUBJB V1.0

- BJB function embedded in BMU
- ISO-SPI communicate with BMU
- FuSa: ASIL-C

MC33772B x 2

BJB(772) V3.0

- **No uC on board**, daisy-chain based
- Fully **redundant HV / I** measurement
- Insulation detection integrated
- **TPL** communication
- FuSa: **ASIL-C**

MC33772C x 2

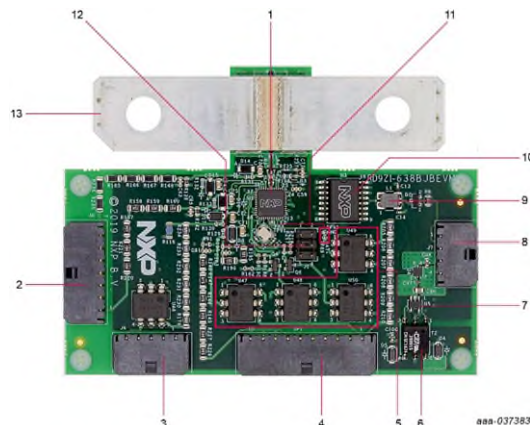
BMUBJB V1.1

- BJB function embedded to BMU
- **TPL** communicate with BMU, as the 1st node in daisy-chain
- FuSa: ASIL-C

MC33772C x2

CUSTOMER ENGAGEMENT WITH BJB SOLUTION

2018



BJB Rev2.0 (published)

- ~1000V High Voltage measurement
- Temperature measurement
- I measurement, **optimized Shunt** selection
- **Insulation detection** integrated
- ISO-CAN Comm with BMU/VCU
- FuSa: QM

MM9Z1_638, TJA1052i

2019



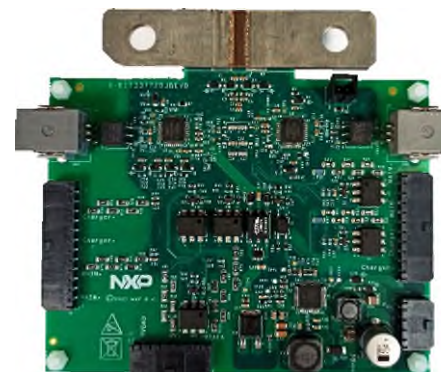
BJB Rev2.1 (published)

- High voltage, current and temperature measurement
- Insulation detection integrated
- ISO-CAN interface
- FuSa: **ASIL-B**

MC33772B

S32K118 + FS4503

2020



BJB Rev3.0

- No uC on board, **daisy-chain based**
- Fully **redundant HV / I** measurement
- Insulation detection integrated
- **TPL** communication
- **ASIL-C**

MC33772C x 2



PDU (BMU+BJB) Rev1.0/1.1

- **PDU arch: BMU+BJB**
- loopback daisy-chain
- HV monitoring, contactor control
- Insulation resistance detection
- CAN-FD
- FuSa: Safety Manager implementation

Rev1.0: MPC5775B + FS65xx

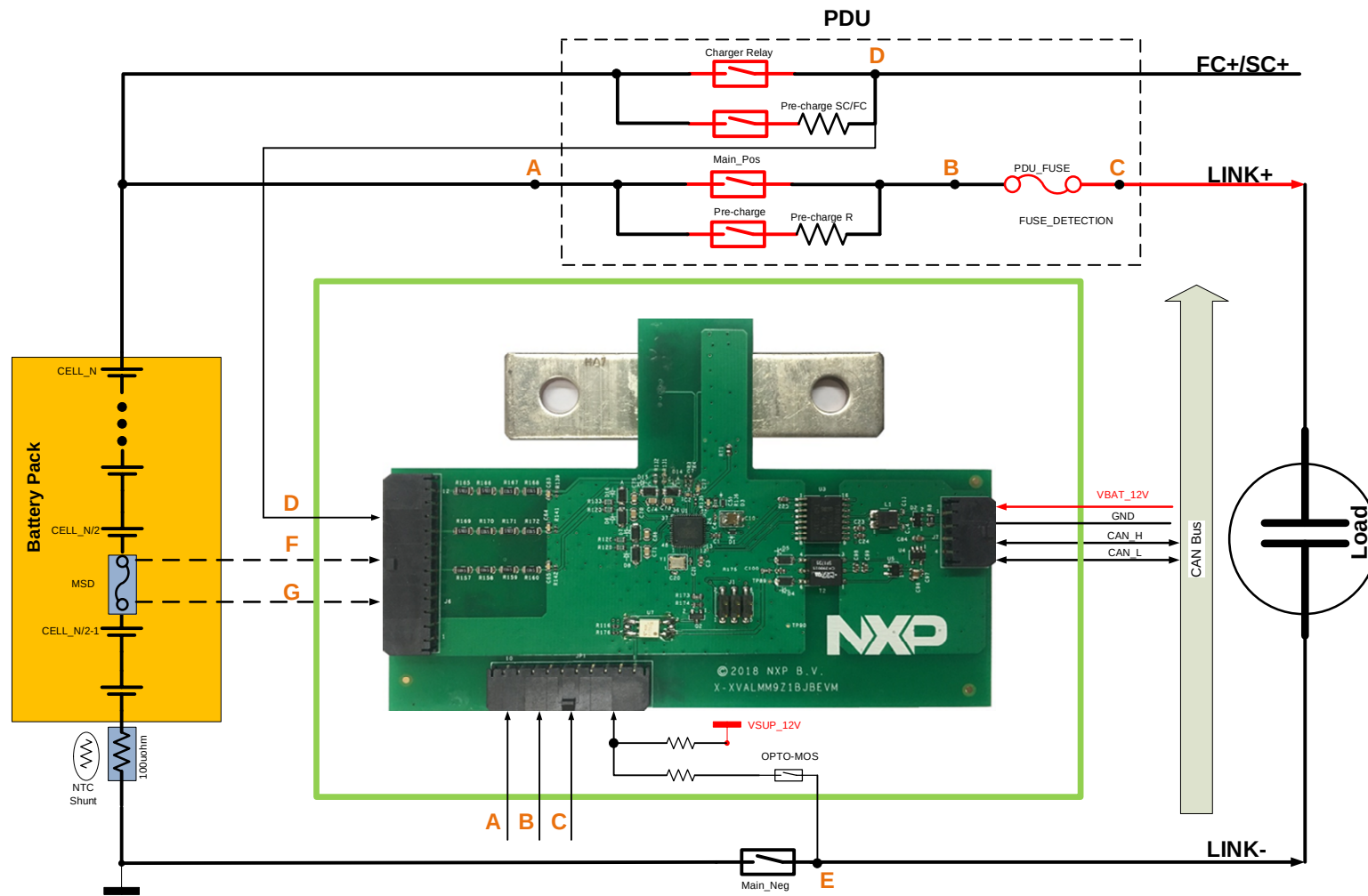
Rev1.1: **S32K34x + FS2600 + MC33772C**

MC22XS4200 (24V, 2-chan)

TJA1046 (42V, dual CAN-FD),

UJA1169 (SBC)

BJB SOLUTION REV1.0 (RD9Z1-638BJBEVM)



Feature:

- VSUP input range is 5V ~12V
- Up to 7 channels voltage measurement
- 1 channel current measurement
- 1 channel temperature measurement for SHUNT calibration
- Isolated placement, low voltage domain and high voltage domain.
- Isolated CAN communication with BMU/VCU
- Insulation detection integrated in next version

Key components:

- Intelligent battery sensor - MM9Z1_638
- ISO CAN PHY - TJA1052i
- DC/DC driver

BJB SOLUTION REV2.0 (RD9Z1-638BJBEVM)

Feature:

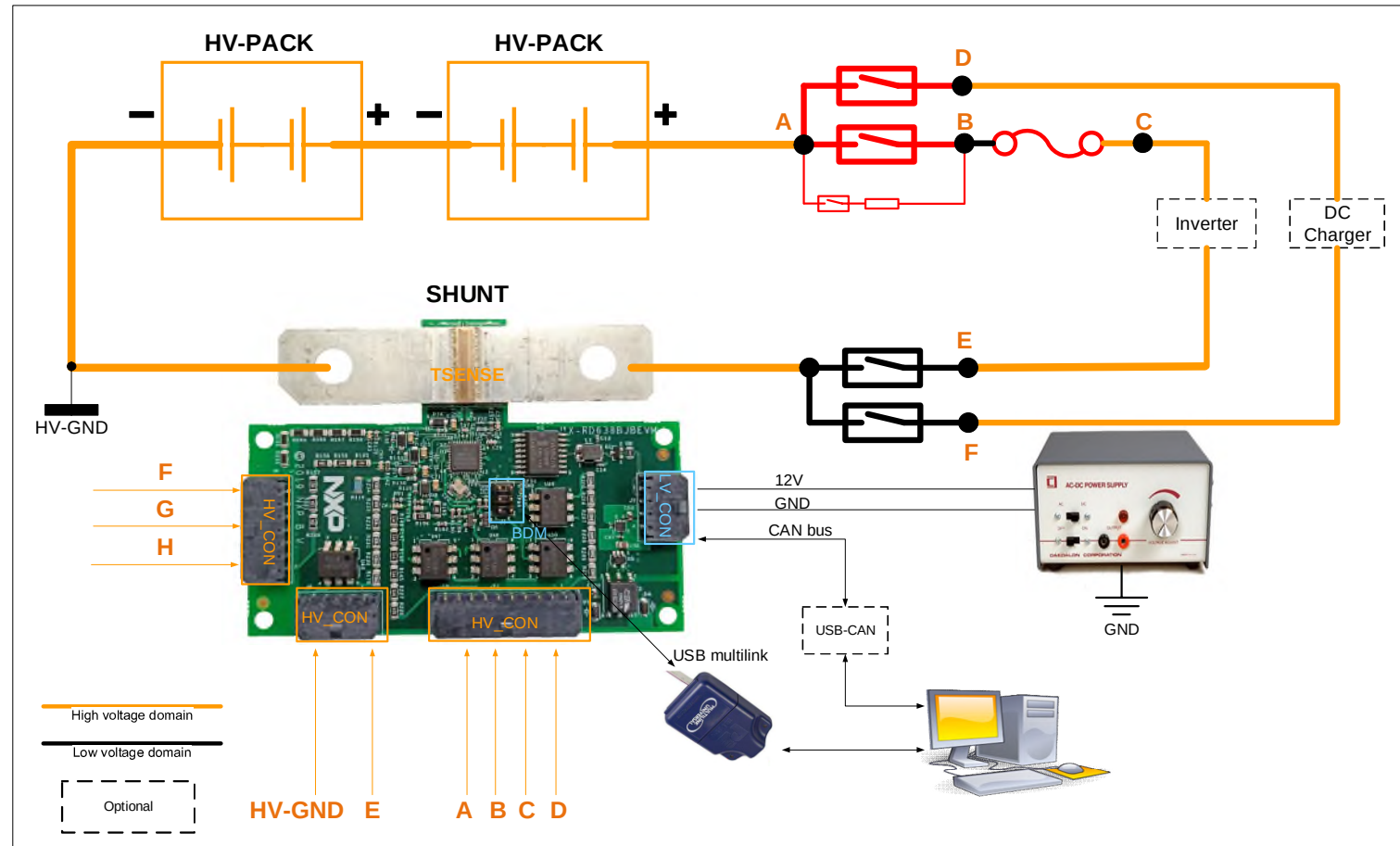
- VSUP input range is 5V ~12V
- Up to 7 channels voltage measurement and compatible with 1000V input
- 1 channel current measurement, 50uohm shunt used to reduce joule heating
- 1 channel temperature measurement for SHUNT calibration
- Insulation detection integrated
- Isolated placement, low voltage domain and high voltage domain.
- Isolated CAN communication with BMU/VCU

Key components:

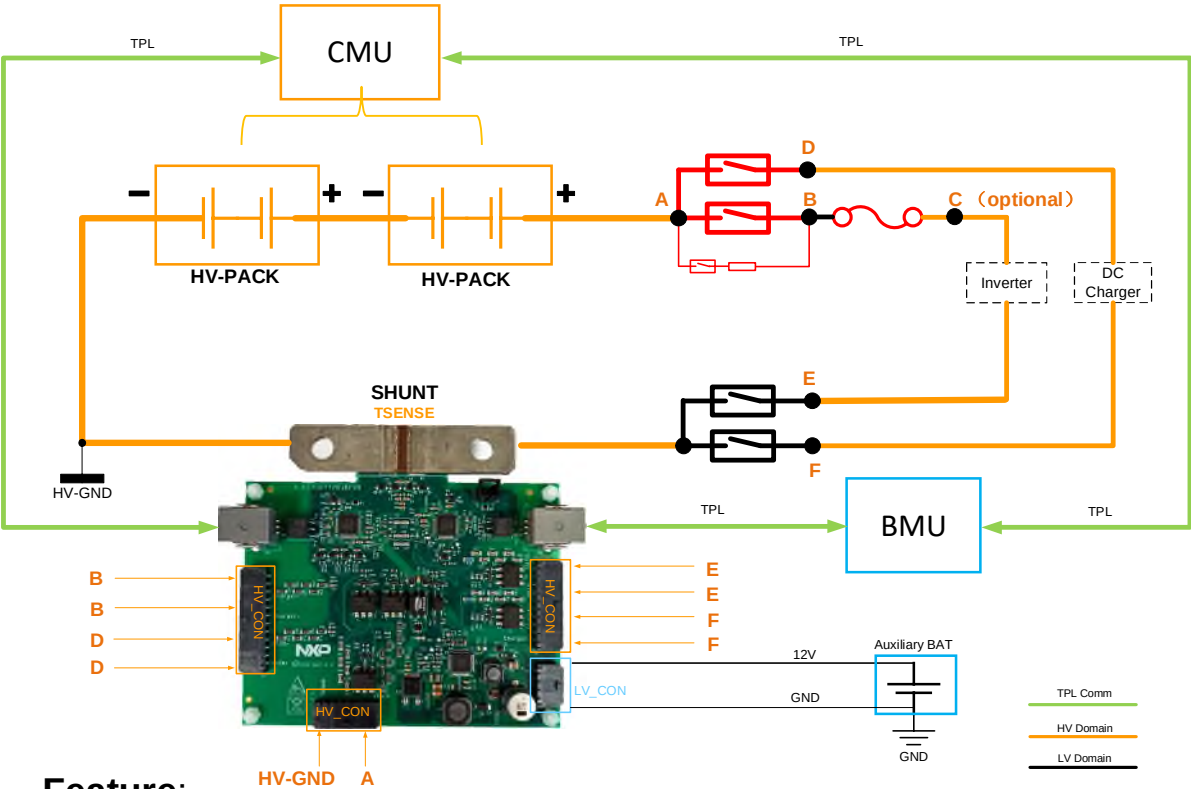
- Intelligent battery sensor - MM9Z1_638
- ISO CAN PHY - TJA1052i
- DC/DC driver

NXP.com release:

- <https://www.nxp.com/design/designs/rd9z1-638bjbevm-battery-junction-box-reference-design:RD9Z1-638BJBEVM>
- Board, Schematic, BOM, Gerber file and wire-harness
- Software demo code (uC code)
- GUI (CAN protocol in user manual,UM11396)



BJB V3.0 REFERENCE DESIGN (MC33772C* 2)

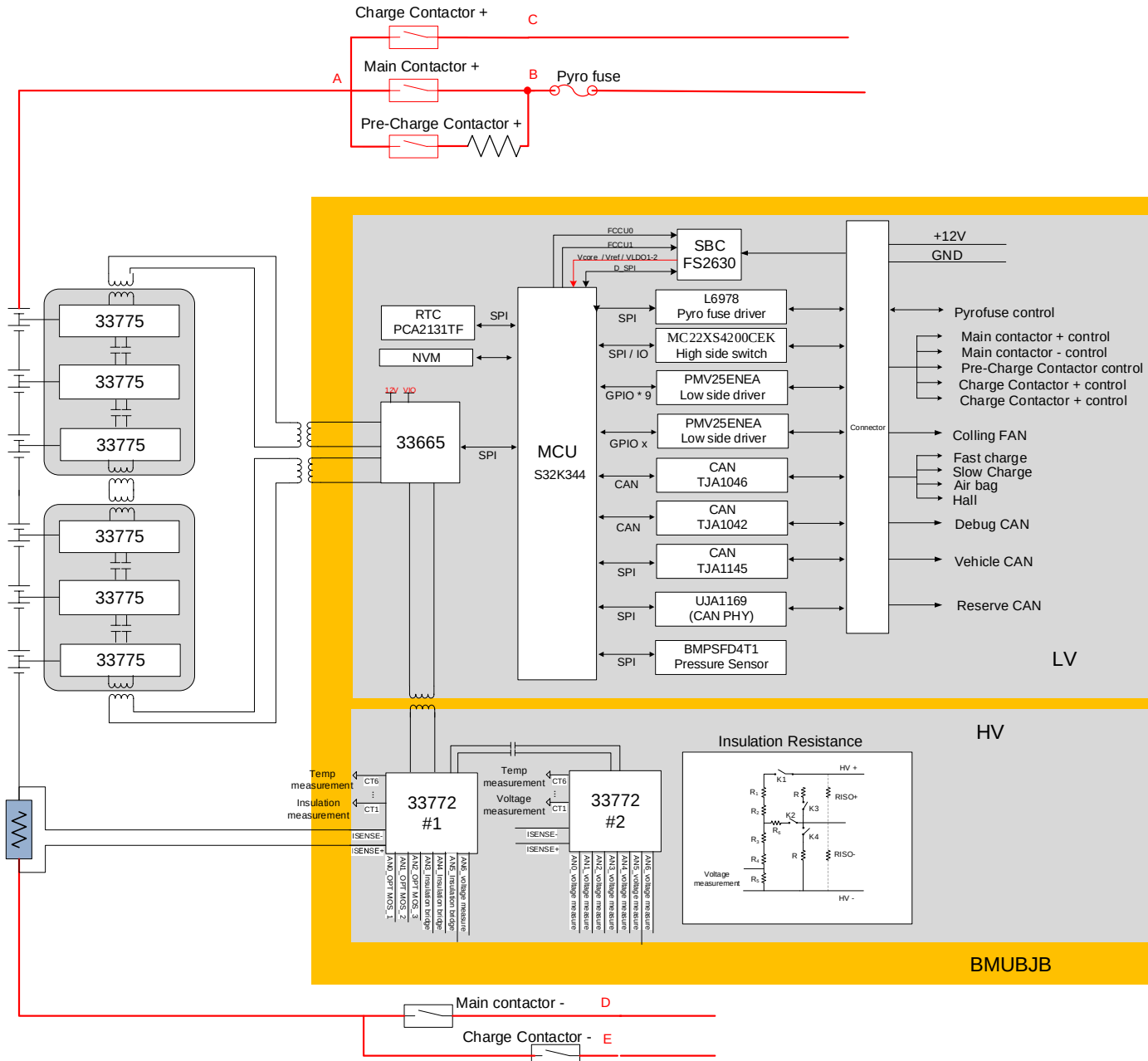


Feature:

- Isolated placement, low voltage domain and high voltage domain
- Wide input range at VSUP, 5V ~12V or 5V ~ 28v
- TPL communication with **Functional safety feature**
- Functional safety integration, up to **ASIL C** level
- **No MCU** required in system

Functions	Description	Result(Spec)	Fusa Arch
HV measurement	5 channels (option #1)	< 0.5% @RT(1%) < 0.3% @RT(1%)	ASIL C
	9 channels (option #2)	< 0.5% @RT(1%) < 0.3% @RT(1%)	• 1 * ASIL C (Pack) • 8 * ASIL B
Current measurement	2 channels	< 0.3% @RT (1%) < 0.8% @CT (1%) < 0.6% @HT (1%)	• ASIL D • OBD
Temperature measurement	1 channel for SHUNT	< +/-2K (+/-2K)	ASIL C
	1 channel for contactor	< +/-2K (+/-2K)	ASIL C
Insulation detection (GB/T38661)	1 channel	< 20% @50K (20%) < 20% @510K (20%) < 20% @2M (20%)	ASIL C
Communication	TPL		8-bit CRC
	TPL (Loop back)		1 position break (fail functional or fail operational)
	TPL (Loop back)		2 position break (fail safe)
VSUP	Wide input	• 5V - 28V • 5V - 12V	• ASIL D SBC onboard • No SBC onboard (BMU supply this board)

PDU(BMU+BJB)_1.1



Key Features

- New powerful MCU-S32K3 and Power manage unit -FS26 select
- Message router between MCU and BMS using MC33665, can support multiple communication interfaces, CAN(FD) , UART, SPI and provide 4 isolation TPL daisy chain ports
- High voltage measurement, Insulation resistance measurement, OPT_MOS control and temperature measurement by using MC33772C
- On board pressure sensor for thermal run-away detection
- New Real-time-clock for accuracy demand and ultra-low power consumption
- External NVM for saving data from system
- Function safety design: ASIL-C



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