



life.augmented

# Towards advanced BMS development for NEV ST's BMS solution

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# BMS Offer

In production

## L9963



14-cell Analog Front End  
BCD9sL  
TQFP64EP

Q3 2020 qualified

## L9963E



14-cell Analog Front End  
BCD9sL  
TQFP64EP

In production

## L9963T



BMS Transceiver  
BCD9sL  
SO16N

# L9963

Up to 14 cells monitoring and balancing

16-bit  $\Sigma$ - $\Delta$  ADC for cell voltage monitoring



















18-bit  $\Sigma$ - $\Delta$  ADC for battery current monitoring

Internal balancing FET up to 200mA

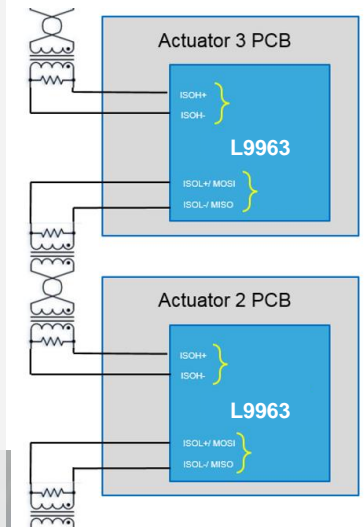
Configurable for external FET balancing

Vertical interface up to 3 Mbps

- ISO 26262 Ready for ASIL D systems
- Cell total conversion error 2 mV
- Current sense error 0.5%
- Real simultaneous conversion of 14 cells: total conversion is done in 300  $\mu$ s.



Outperforming Competition			
			
V measure accuracy			
I measure accuracy			
Conversion Time *			
VIF speed			
Others			

 **ISO 26262**





# L9963 vs Competition

	  life.augmented	Competitor 1	Competitor 2
# of cells	14	18	14
Vertical interface	2.66 Mbps	1 Mbps	2 Mbps
Cell voltage accuracy	$1.7\text{ V} \leq V_{\text{CELL}} \leq 4.7\text{ V}$ $-40\text{ }^\circ\text{C} < T_J < 125\text{ }^\circ\text{C}$ 2mV	$2\text{ V} \leq V_{\text{CELL}} \leq 4.2\text{ V}$ $-40\text{ }^\circ\text{C} < T_J < 125\text{ }^\circ\text{C}$ 4.2mV	$1.5\text{ V} \leq V_{\text{CELL}} \leq 4.5\text{ V}$ $-40\text{ }^\circ\text{C} < T_J < 125\text{ }^\circ\text{C}$ 4.5mV
ADC resolution	16 bit	16 bit	16 bit
Conversion time	300 $\mu\text{s}$	1.2 ms	360 $\mu\text{s}$
Current sense	Coloumb counter	No	Coloumb counter
Temperature sensor	7	9	7
Balancing	Internal & external	Internal	Internal & external
Package	64 pin	64 pin	64 pin



# L9963 Advanced Features

1

Measures 4 to 14 cells in series, supporting also busbar connection without altering cell results.

2

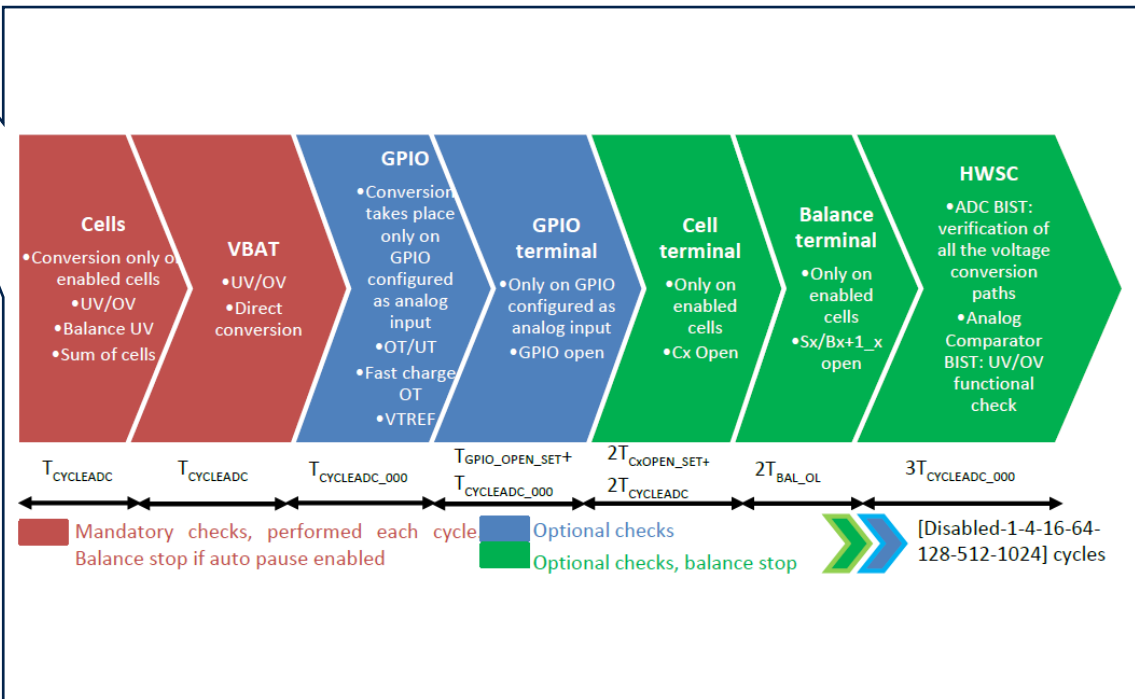
Intelligent diagnostic routine providing automatic failure validation. Redundant fault notification through both SPI Global Status Word (GSW) and dedicated FAULT line.

3

2.66 Mbps isolated serial communication with regenerative buffer, supporting long cables and dual access ring.

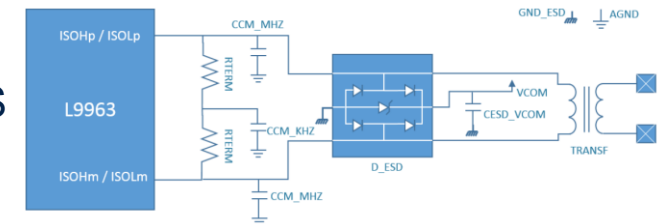
4

Robust hot-plug performance. No Zeners needed in parallel to the cells.

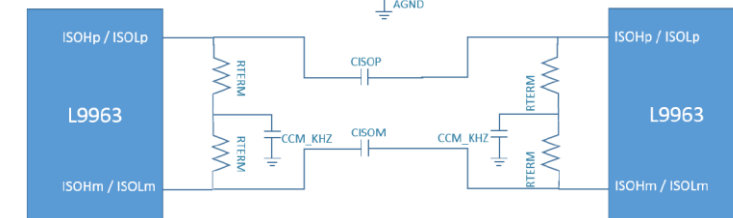


Fast cells conversion & acquisition  
 $15 \times \text{L9963} = \underline{210 \text{ cells}} \rightarrow < 10\text{ms}$

Distributed BMS



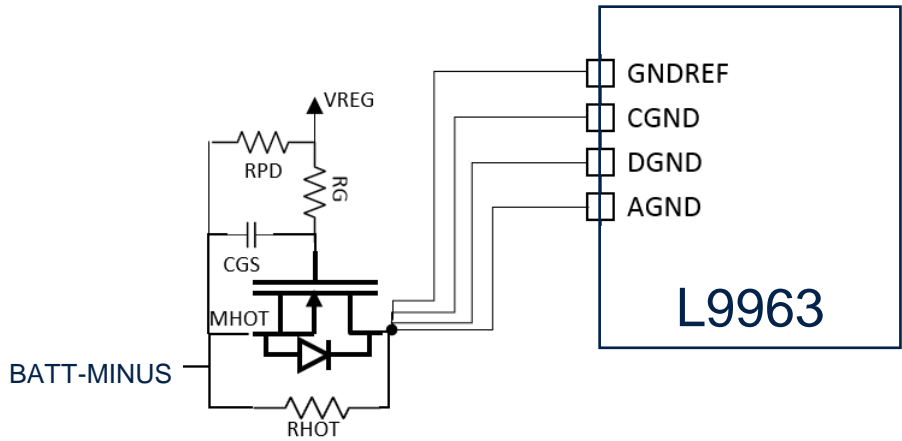
Centralized BMS



# Hot Plug Protection

## 4

- Hot plug is a critical condition for AFE
- The majority of the AFE devices requires a large number of external components to withstand hot plug.
- L9963 has an intrinsic robustness to hot plug and only in some very critical cases few limited external components are needed



L9963 can safely handle hot plug if:

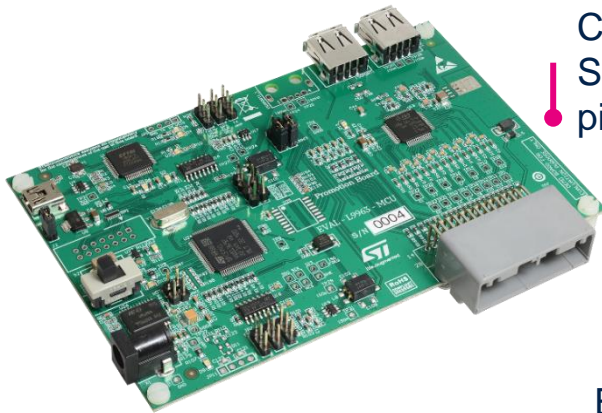
- The recommended components and configurations for cell voltage sensing and balancing are used
- AMR is not violated

In case the above conditions are not met, a few additional external components must be mounted.

# L9963 - Tools

## Battery Management IC for EV/HEV

### Evaluation board



EVAL-L9963-MCU

Complete BMS board with embedded SPC574S MCU (1st stage of BMS pipeline)



EVAL-L9963-NDS

CMU board, it's a node in a distributed system (from the 2nd stage up to 15th)

### Support material



Datasheet



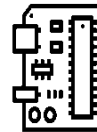
Application notes



FMEDA



Safety manual



Evaluation board

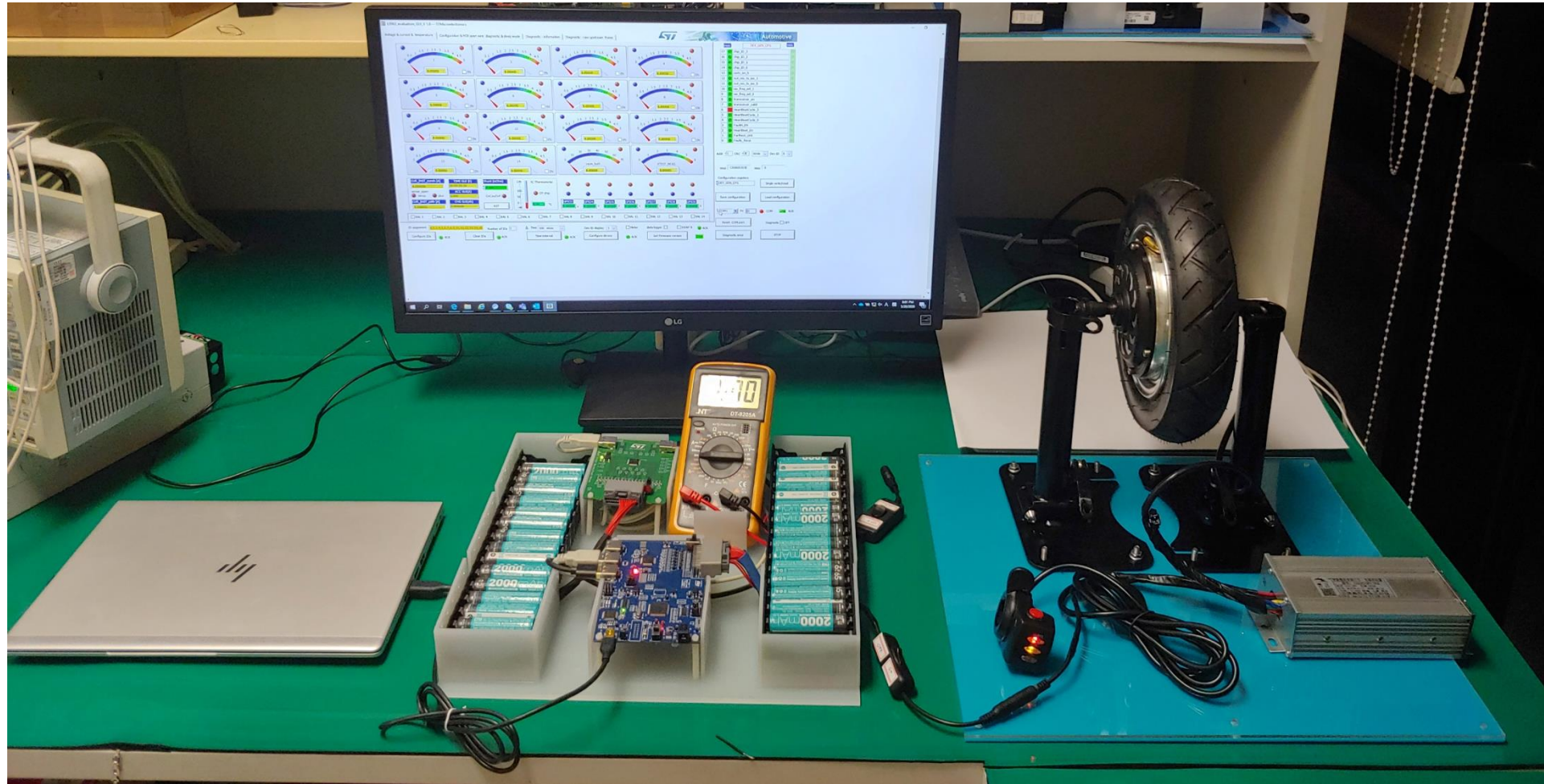


User GUI



EMC report

# Appendix : L9963 EVB



# Appendix : L9963 EVB

L9963\_evaluation\_GUI\_V 1.8--- STMicroelectronics

Voltage & current & temperature Configuration & PCB open wire diagnostic & sleep mode Diagnostic - information Diagnostic - raw upstream frame

The GUI displays a 4x4 grid of gauges for parameters 1 through 14. Parameters 1-13 have a scale from 0 to 5, while parameter 14 has a scale from 0 to 70. All gauges show a value of 0.00000. Below the gauges are several control panels:

- Parameters 1-14:** Each gauge has an 'EN' checkbox and a numerical display.
- IC Thermometer:** Shows a temperature of 0.00 °C.
- GPIOs:** Displays voltage levels for GPIO3 through GPIO9, all at 0.00000 V.
- Configuration Registers:** A table for DEV\_GEN\_CFG registers.
- Control Buttons:** Includes 'Save configuration', 'Load configuration', 'Reset COM port', 'Diagnostic once', 'STOP', 'Configure IDs', 'Clear IDs', 'Time interval', 'Configure device', and 'Get Firmware version'.

mosi	DEV_GEN_CFG	miso	
17	0	chip_ID_3	0
16	0	chip_ID_2	0
15	0	chip_ID_1	0
14	0	chip_ID_0	0
13	0	isobx_en_h	0
12	0	out_res_tx_iso_1	0
11	0	out_res_tx_iso_0	0
10	0	iso_freq_sel_1	0
9	0	iso_freq_sel_0	0
8	0	transceiver_on	0
7	0	transceiver_valid	0
6	1	HeartBeatCycle_2	0
5	0	HeartBeatCycle_1	0
4	0	HeartBeatCycle_0	0
3	0	FaultH_EN	0
2	0	HeartBeat_En	0
1	0	Farthest_Unit	0
0	0	Fault_force	0

Addr x1 CRC x3E Write Dev ID 0

mosi x C00800203E miso x 0

Configuration registers  
DEV\_GEN\_CFG Single write/read

Save configuration Load configuration

COM1 Fn x0 COM ACK

Reset COM port Diagnostic OFF

Diagnostic once STOP

ID assignment 1,2,3,4,5,6,7,8,9,10,11,12,13,14,15 Number of IDs 1 Time 100 mSec Dev ID display 1 Meter data logger SWAP A ACK

Configure IDs Clear IDs Time interval Configure device Get Firmware version

# Appendix : L9963 EVB

L9963\_evaluation\_GUI\_V 1.8--- STMicroelectronics

Voltage & current & temperature
Configuration & PCB open wire diagnostic & sleep mode
Diagnostic - information
Diagnostic - raw upstream frame

Automotive

GPIO3_OT_TH 0.000	GPIO4_OT_TH 0.000	GPIO5_OT_TH 0.000	GPIO6_OT_TH 0.000	GPIO7_OT_TH 0.000	GPIO8_OT_TH 0.000	GPIO9_OT_TH 0.000
GPIO3_UT_TH 0.000	GPIO4_UT_TH 0.000	GPIO5_UT_TH 0.000	GPIO6_UT_TH 0.000	GPIO7_UT_TH 0.000	GPIO8_UT_TH 0.000	GPIO9_UT_TH 0.000

threshVcellOV 0.000	VBATT_SUM_OV_TH 0.000	CSA_THRESH_NORM [mV] 0.000000	ADC_FILTER_SOC 290 us
threshVcellUV 0.000	VBATT_SUM_UV_TH 0.000	adc_ovc_curr_threshold_sleep [mV] 0.000000	

<input type="checkbox"/> Ratio abs 3 sel	<input type="checkbox"/> Ratio abs 7 sel
<input type="checkbox"/> Ratio abs 4 sel	<input type="checkbox"/> Ratio abs 8 sel
<input type="checkbox"/> Ratio abs 5 sel	<input type="checkbox"/> Ratio abs 9 sel
<input type="checkbox"/> Ratio abs 6 sel	

GPIO_CONV <input type="checkbox"/> OFF	CELL_TERM_CONV <input type="checkbox"/> OFF	SOC <input type="checkbox"/> OFF
GPIO_TERM_CONV <input type="checkbox"/> OFF	BAL_TERM_CONV <input type="checkbox"/> OFF	HWSC <input type="checkbox"/> OFF

CoulombCounter_en <input type="checkbox"/> OFF	
comm_timeout_dis <input type="checkbox"/> OFF	

PCB open wire diagnostic

C0C1C2C3C4C5C6C7C8C9C10C11C12C13C14

PCB open wire ACK

CONF_CYCLIC_EN <input type="checkbox"/> OFF	NCYCLE_GPIO_TERM 0	NCYCLE_HWSC 0
CYCLIC_UPDATE <input type="checkbox"/> OFF	NCYCLE_CELL_TERM 0	ADC_FILTER_CYCLE 0
	NCYCLE_BAL_TERM 0	TCYCLE_SLEEP 0
	NCYCLE_GPIO 0	ADC_FILTER_SLEEP 0

Enter sleep mode ACK

ID assignment
1,2,3,4,5,6,7,8,9,10,11,12,13,14,15
Number of IDs

Time

Dev ID display

Meter

data logger

SWAP A

ACK

Configure IDs ACK

Clear IDs ACK

Time interval ACK

Configure device ACK

Get Firmware version ACK

Reset COM port

Diagnostic  OFF

Addr

CRC

Write

Dev ID

mosi x00800203E miso 0

Configuration registers

Single write/read

Save configuration

Load configuration

COM1

Fn

COM
ACK

STOP

Diagnostic once

ID assignment
1,2,3,4,5,6,7,8,9,10,11,12,13,14,15
Number of IDs

Time

Dev ID display

Meter

data logger

SWAP A

ACK

Configure IDs ACK

Clear IDs ACK

Time interval ACK

Configure device ACK

Get Firmware version ACK

Reset COM port

Diagnostic  OFF

Addr

CRC

Write

Dev ID

mosi x00800203E miso 0

Configuration registers

Single write/read

Save configuration

Load configuration

COM1

Fn

COM
ACK

STOP

Diagnostic once

ID assignment
1,2,3,4,5,6,7,8,9,10,11,12,13,14,15
Number of IDs

Time

Dev ID display

Meter

data logger

SWAP A

ACK

Configure IDs ACK

Clear IDs ACK

Time interval ACK

Configure device ACK



Get Firmware version ACK

Reset COM port

Diagnostic  OFF

# Appendix : L9963 EVB

L9963\_evaluation\_GUI\_V 1.8--- STMicroelectronics

Voltage & current & temperature
Configuration & PCB open wire diagnostic & sleep mode
Diagnostic - information
Diagnostic - raw upstream frame

General
Cell
BIST
GPIO

loss\_agnd TrimmCalOk sense\_minus\_open Fault\_L\_line\_status eof\_bal HeartBeat\_En OVR\_LATCH EEPROM\_DWNLD\_DONE

loss\_dgnd clk\_mon\_init\_done sense\_plus\_open FaultH\_EN bal\_on HeartBeat\_fault DUTY\_ON EEPROM\_CRC\_ERR\_CAL\_RAM

loss\_cgnd clk\_mon\_en curr\_sense\_ovc\_norm FaultH\_line\_fault TimedBalacc CoulombCounter\_en CONF\_CYCLIC\_EN EEPROM\_CRC\_ERR\_SECT\_0

loss\_gndref OSCFail curr\_sense\_ovc\_sleep Comm\_timeout\_fit EoBTimeerror CoCouOvF TCYCLE\_OVF RAM\_CRC\_ERR

wu\_gpio7 wu\_spi wu\_isoline wu\_faultH wu\_cyc\_wup

max value
max cell index
min value
min cell index

0.00000 [V]
1
0.00000 [V]
1

Max. history value of V cell [V]

V cell 1	V cell 2	V cell 3	V cell 4	V cell 5	V cell 6	V cell 7	V cell 8	V cell 9	V cell 10	V cell 11	V cell 12	V cell 13	V cell 14
0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000

Min. history value of V cell [V]

V cell 1	V cell 2	V cell 3	V cell 4	V cell 5	V cell 6	V cell 7	V cell 8	V cell 9	V cell 10	V cell 11	V cell 12	V cell 13	V cell 14
0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000

ID assignment 1,2,3,4,5,6,7,8,9,10,11,12,13,14,15
Number of IDs 
Time  mSec
Dev ID display 
 Meter
 data logger
 SWAP A
● ACK

● ACK
 ● ACK
 ● ACK
 ● ACK
 ●

mosi
DEV\_GEN\_CFG
miso

17	0	chip_ID_3	0
16	0	chip_ID_2	0
15	0	chip_ID_1	0
14	0	chip_ID_0	0
13	0	isotx_en_h	0
12	0	out_res_tx_iso_1	0
11	0	out_res_tx_iso_0	0
10	0	iso_freq_sel_1	0
9	0	iso_freq_sel_0	0
8	0	transceiver_on	0
7	0	transceiver_valid	0
6	1	HeartBeatCycle_2	0
5	0	HeartBeatCycle_1	0
4	0	HeartBeatCycle_0	0
3	0	FaultH_EN	0
2	0	HeartBeat_En	0
1	0	Farthest_Unit	0
0	0	FaultL_force	0

Addr  CRC  Write  Dev ID

mosi  miso

Configuration registers

DEV\_GEN\_CFG

I<sup>2</sup>C  Fn  ● COM ● ACK

Diagnostic  OFF

● ACK
 ● ACK
 ● ACK
 ● ACK
 ●

# Appendix : L9963 EVB

L9963\_evaluation\_GUI\_V 1.8--- STMicroelectronics

Voltage & current & temperature | Configuration & PCB open wire | diagnostic & sleep mode | Diagnostic - information | Diagnostic - raw upstream frame

General | Cell | BIST | GPIO

**OPEN**

CELL0 CELL8  
CELL1 CELL9  
CELL2 CELL10  
CELL3 CELL11  
CELL4 CELL12  
CELL5 CELL13  
CELL6 CELL14  
CELL7 VBAT

**UNDER VOLTAGE**

VCELL1\_BAL\_UV VCELL8\_BAL\_UV  
VCELL2\_BAL\_UV VCELL9\_BAL\_UV  
VCELL3\_BAL\_UV VCELL10\_BAL\_UV  
VCELL4\_BAL\_UV VCELL11\_BAL\_UV  
VCELL5\_BAL\_UV VCELL12\_BAL\_UV  
VCELL6\_BAL\_UV VCELL13\_BAL\_UV  
VCELL7\_BAL\_UV VCELL14\_BAL\_UV

**OPEN**

BAL1\_OPEN BAL8\_OPEN  
BAL2\_OPEN BAL9\_OPEN  
BAL3\_OPEN BAL10\_OPEN  
BAL4\_OPEN BAL11\_OPEN  
BAL5\_OPEN BAL12\_OPEN  
BAL6\_OPEN BAL13\_OPEN  
BAL7\_OPEN BAL14\_OPEN

**SHORT**

BAL1\_SHORT BAL8\_SHORT  
BAL2\_SHORT BAL9\_SHORT  
BAL3\_SHORT BAL10\_SHORT  
BAL4\_SHORT BAL11\_SHORT  
BAL5\_SHORT BAL12\_SHORT  
BAL6\_SHORT BAL13\_SHORT  
BAL7\_SHORT BAL14\_SHORT

SOC data\_ready\_vsum data\_ready\_vbattdiv VCOM\_UV VCOM\_OV VREG\_OV VREG\_UV VDIG\_OV VANA\_OV

max value: 0.00000 [V]

max cell index: 1

min value: 0.00000 [V]

min cell index: 1

Max. history value of V cell [V]

V cell 1	V cell 2	V cell 3	V cell 4	V cell 5	V cell 6	V cell 7	V cell 8	V cell 9	V cell 10	V cell 11	V cell 12	V cell 13	V cell 14
0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000

Min. history value of V cell [V]

V cell 1	V cell 2	V cell 3	V cell 4	V cell 5	V cell 6	V cell 7	V cell 8	V cell 9	V cell 10	V cell 11	V cell 12	V cell 13	V cell 14
0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000

17	0	chip_ID_3	0
16	0	chip_ID_2	0
15	0	chip_ID_1	0
14	0	chip_ID_0	0
13	0	isotx_en_h	0
12	0	out_res_tx_iso_1	0
11	0	out_res_tx_iso_0	0
10	0	iso_freq_sel_1	0
9	0	iso_freq_sel_0	0
8	0	transceiver_on	0
7	0	transceiver_valid	0
6	1	HeartBeatCycle_2	0
5	0	HeartBeatCycle_1	0
4	0	HeartBeatCycle_0	0
3	0	FaultH_EN	0
2	0	HeartBeat_En	0
1	0	Farthest_Unit	0
0	0	FaultL_force	0

Addr x1 CRC x3E Write Dev ID 0

mosi C00800203E miso 0

Configuration registers

DEV\_GEN\_CFG Single write/read

Save configuration Load configuration

COM1 Fn x0 COM ACK

Reset COM port Diagnostic OFF

Diagnostic once STOP

ID assignment 1,2,3,4,5,6,7,8,9,10,11,12,13,14,15 Number of IDs 1

Time 100 mSec



Dev ID display 1

Meter data logger SWAP A ACK

Configure IDs Clear IDs Time interval Configure device Get Firmware version

# Appendix : L9963 EVB

L9963\_evaluation\_GUI\_V 1.8--- STMicroelectronics

Voltage & current & temperature
Configuration & PCB open wire diagnostic & sleep mode
Diagnostic - information
Diagnostic - raw upstream frame

General
Cell
BIST
GPIO

**OPEN\_BIST**

OPEN_BIST_FAIL 0	OPEN_BIST_FAIL 7
OPEN_BIST_FAIL 1	OPEN_BIST_FAIL 8
OPEN_BIST_FAIL 2	OPEN_BIST_FAIL 9
OPEN_BIST_FAIL 3	OPEN_BIST_FAIL 10
OPEN_BIST_FAIL 4	OPEN_BIST_FAIL 11
OPEN_BIST_FAIL 5	OPEN_BIST_FAIL 12
OPEN_BIST_FAIL 6	OPEN_BIST_FAIL 13

**MUX\_BIST**

MUX_BIST_FAIL 0	MUX_BIST_FAIL 7
MUX_BIST_FAIL 1	MUX_BIST_FAIL 8
MUX_BIST_FAIL 2	MUX_BIST_FAIL 9
MUX_BIST_FAIL 3	MUX_BIST_FAIL 10
MUX_BIST_FAIL 4	MUX_BIST_FAIL 11
MUX_BIST_FAIL 5	MUX_BIST_FAIL 12
MUX_BIST_FAIL 6	MUX_BIST_FAIL 13

**BIST\_BAL\_COMP\_LS/HS**

BIST_BAL_COMP_LS_FAIL 0	BIST_BAL_COMP_HS_FAIL 7
BIST_BAL_COMP_LS_FAIL 1	BIST_BAL_COMP_HS_FAIL 8
BIST_BAL_COMP_LS_FAIL 2	BIST_BAL_COMP_HS_FAIL 9
BIST_BAL_COMP_LS_FAIL 3	BIST_BAL_COMP_HS_FAIL 11
BIST_BAL_COMP_LS_FAIL 4	BIST_BAL_COMP_HS_FAIL 10
BIST_BAL_COMP_LS_FAIL 5	BIST_BAL_COMP_HS_FAIL 12
BIST_BAL_COMP_LS_FAIL 6	BIST_BAL_COMP_HS_FAIL 13

**GPIO\_BIST**

GPIO3_BIST_FAIL
GPIO4_BIST_FAIL
GPIO5_BIST_FAIL
GPIO6_BIST_FAIL
GPIO7_BIST_FAIL
GPIO8_BIST_FAIL
GPIO9_BIST_FAIL

VTREF\_COMP\_BIST\_FAIL

VREG\_COMP\_BIST\_FAIL

VBAT\_COMP\_BIST\_FAIL

VCOM\_COMP\_BIST\_FAIL

max value		max cell index		min value		min cell index	
0.00000 [V]		1		0.00000 [V]		1	

Max. history value of V cell [V]

V cell 1	V cell 2	V cell 3	V cell 4	V cell 5	V cell 6	V cell 7	V cell 8	V cell 9	V cell 10	V cell 11	V cell 12	V cell 13	V cell 14
0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000

Min. history value of V cell [V]

V cell 1	V cell 2	V cell 3	V cell 4	V cell 5	V cell 6	V cell 7	V cell 8	V cell 9	V cell 10	V cell 11	V cell 12	V cell 13	V cell 14
0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000

mosi
miso

DEV_GEN_CFG		
17	0	chip_ID_3
16	0	chip_ID_2
15	0	chip_ID_1
14	0	chip_ID_0
13	0	isobx_en_h
12	0	out_res_tx_iso_1
11	0	out_res_tx_iso_0
10	0	iso_freq_sel_1
9	0	iso_freq_sel_0
8	0	transceiver_on
7	0	transceiver_valid
6	1	HeartBeatCycle_2
5	0	HeartBeatCycle_1
4	0	HeartBeatCycle_0
3	0	FaultH_EN
2	0	HeartBeat_En
1	0	Farthest_Unit
0	0	FaultI_force

Addr  CRC  Write  Dev ID

mosi  miso

Configuration registers

COM  ACK

Diagnostic  OFF

ID assignment  Number of IDs

ACK


ACK

Time  mSec   ACK

Dev ID display   Meter  data logger  SWAP A  ACK

ACK

ACK




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14

# Appendix : L9963 EVB

L9963\_evaluation\_GUI\_V 1.8--- STMicroelectronics

Voltage & current & temperature
Configuration & PCB open wire diagnostic & sleep mode
Diagnostic - information
Diagnostic - raw upstream frame



General | Cell | BIST | **GPIO**

GPIO DIAG.

GPIO3on	GPIO3short	GPIO3_OPEN	GPIO3_fastchg_OT
GPIO4on	GPIO4short	GPIO4_OPEN	GPIO4_fastchg_OT
GPIO5on	GPIO5short	GPIO5_OPEN	GPIO5_fastchg_OT
GPIO6on	GPIO6short	GPIO6_OPEN	GPIO6_fastchg_OT
GPIO7on	GPIO7short	GPIO7_OPEN	GPIO7_fastchg_OT
GPIO8on	GPIO8short	GPIO8_OPEN	GPIO8_fastchg_OT
GPIO9on	GPIO9short	GPIO9_OPEN	GPIO9_fastchg_OT

17	0	chip_ID_3	0
16	0	chip_ID_2	0
15	0	chip_ID_1	0
14	0	chip_ID_0	0
13	0	isotx_en_h	0
12	0	out_res_tx_iso_1	0
11	0	out_res_tx_iso_0	0
10	0	iso_freq_sel_1	0
9	0	iso_freq_sel_0	0
8	0	transceiver_on	0
7	0	transceiver_valid	0
6	1	HeartBeatCycle_2	0
5	0	HeartBeatCycle_1	0
4	0	HeartBeatCycle_0	0
3	0	FaultH_EN	0
2	0	HeartBeat_En	0
1	0	Farthest_Unit	0
0	0	FaultL_force	0

	<b>max value</b>	<b>max cell index</b>	<b>min value</b>	<b>min cell index</b>
	0.00000 [V]	1	0.00000 [V]	1

Max. history value of V cell [V]

V cell 1	V cell 2	V cell 3	V cell 4	V cell 5	V cell 6	V cell 7	V cell 8	V cell 9	V cell 10	V cell 11	V cell 12	V cell 13	V cell 14
0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000

Min. history value of V cell [V]

V cell 1	V cell 2	V cell 3	V cell 4	V cell 5	V cell 6	V cell 7	V cell 8	V cell 9	V cell 10	V cell 11	V cell 12	V cell 13	V cell 14
0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000

ID assignment 1,2,3,4,5,6,7,8,9,10,11,12,13,14,15 Number of IDs 1

Time 100 mSec

Dev ID display 1  Meter  data logger  SWAP A  ACK

ACK
   ACK
   ACK
   ACK
   ACK

Addr  CRC  Write  Dev ID

mosi  miso

Configuration registers

Fn   COM  ACK

Diagnostic  OFF

SO16



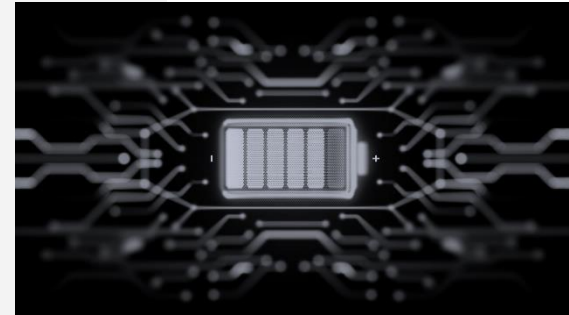
# L9963T Isolated Transceiver for BMS

Transformer isolated communication interface

Up to 2.66 Mbps

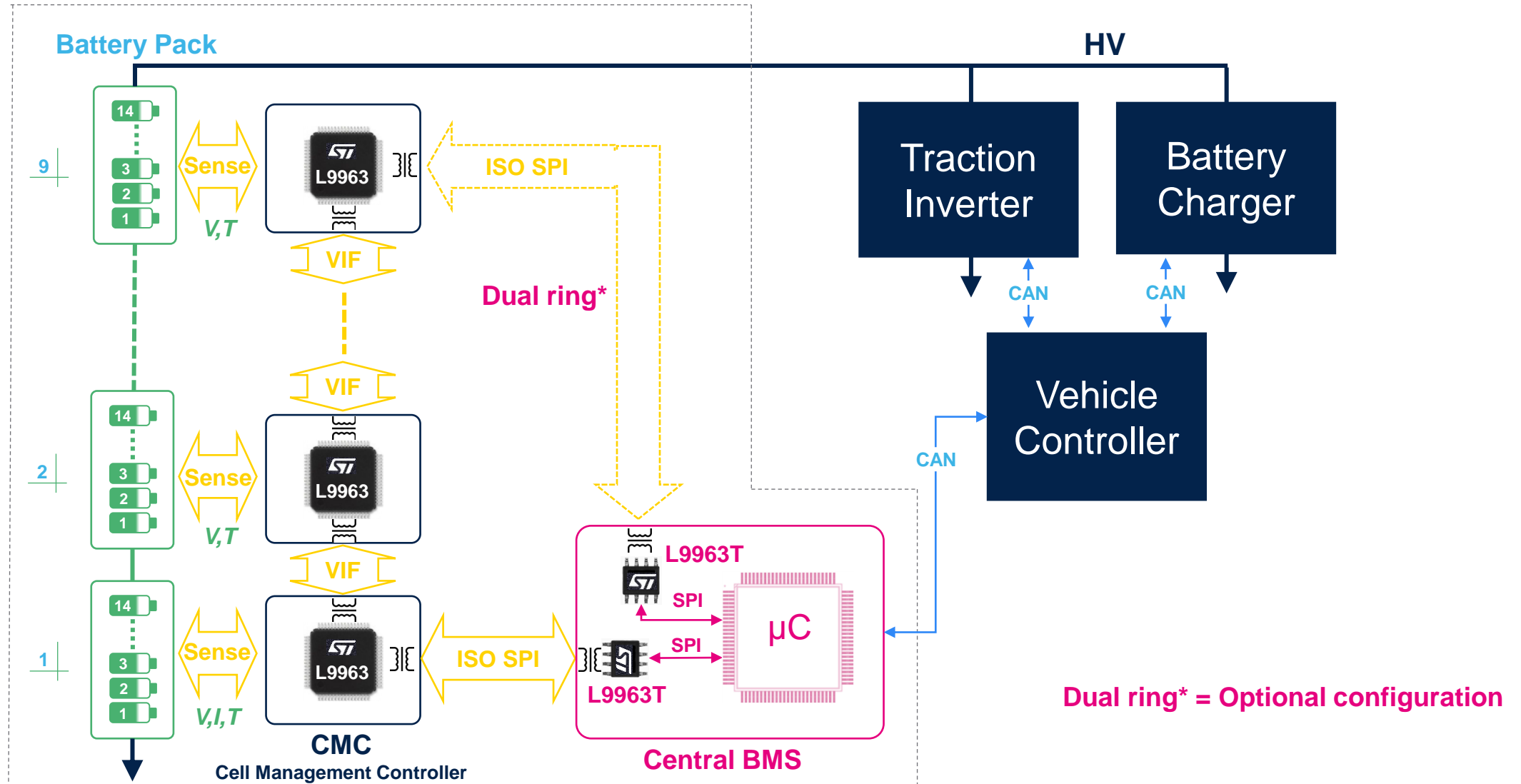
3.3V and 5V compatible logic threshold

- Isolated SPI interface
- L9963 companion transceiver for BMS application
- Automotive EV application
- Robust conducted and radiated immunity performance
- ISO26262, ready for ASIL D system

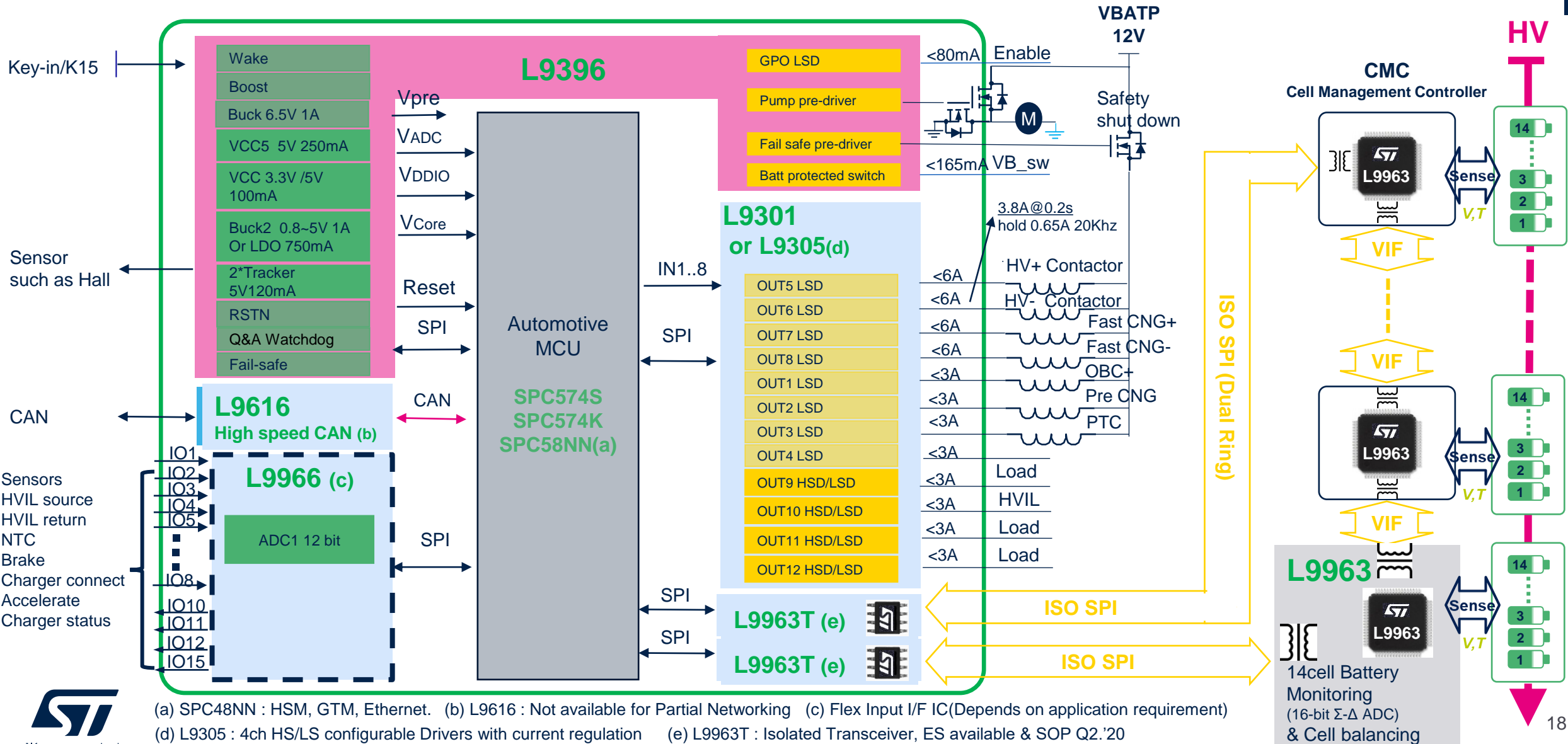


**Sample : Available**  
**SOP : Q3. 2020**

# L9963 & L9963T System Overview



# ST BMS Solution for BEV/HEV



(a) SPC48NN : HSM, GTM, Ethernet. (b) L9616 : Not available for Partial Networking (c) Flex Input I/F IC(Depends on application requirement)

(d) L9305 : 4ch HS/LS configurable Drivers with current regulation (e) L9963T : Isolated Transceiver, ES available & SOP Q2.'20



# Thank you

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