

Model Name: SLAP2X9  
Type of product: Sense Line Assembly  
Brand Name: Visteon  
Manufacturer: Visteon Corporation  
Manufacturer Address: One Village center drive, Van Buren Township  
48111-5711 Michigan  
United States of America

## SLA Features

The SLAP2X9 (Sense Line Assembly Plus) is an electronic module intended to monitor battery module cell groups voltages and module temperatures from the High Voltage battery bus in addition to activate cell balancing to improve battery cells life.

All cell voltages and module temperatures are reported directly to the VICM3 on a regular periodic basis via Wireless communication through the BRFM.

The SLAP2X9 implements a Cell Monitoring Unit board that uses a Pinnacle IC (ADRF8800), this is an IC that provides wireless communication between the Battery Cell Monitoring chip and the Battery Management System Controller.

SLAP2X9 operates in the frequency range 2.405 GHz - 2.480 GHz (ISM band) by using Wireless battery management technology.

## Duty Cycle

SLAP2X9 can send 3 packets per 100ms + 3 packets (health reports) every minute.

With a path stability of 80%, this means  $(30 \cdot 60 + 3) / 0.8 = 2253.75$  transmissions per minute or 37.5625 transmissions per second.

The max TX length is 1.016 ms

$37.5625 \text{ TX per second with each TX being } 1.016 \text{ ms} = \text{on for } 38.1 \text{ms every second} = 3.81\% \text{ of Duty Cycle.}$

The 27% Duty Cycle belongs to the Dual BRFM (FCC ID: NT8-BRFM/IC: 3043A-BRFM).

## System interaction:

<i>Module-to-Vehicle Electrical Interface</i>																															
<i>Analog Input</i>	<p>Battery module provides voltage to SLA. Power nominal value will depend on the number of cells that each variant will have as follow:</p> <table border="1"> <thead> <tr> <th><i>Variant</i></th> <th><i>Minimum</i></th> <th><i>Nominal</i></th> <th><i>Max</i></th> <th><i>NTC</i></th> </tr> </thead> <tbody> <tr> <td><i>SLAP2X9</i></td> <td><i>12 V</i></td> <td><i>21.92 V</i></td> <td><i>26.4 V</i></td> <td><i>3</i></td> </tr> <tr> <td><i>SLAP1X12</i></td> <td><i>8 V</i></td> <td><i>14.6 V</i></td> <td><i>17.6 V</i></td> <td><i>2</i></td> </tr> <tr> <td><i>SLAP3X12</i></td> <td><i>24 V</i></td> <td><i>43.8</i></td> <td><i>52.8 V</i></td> <td><i>3</i></td> </tr> <tr> <td><i>SLAP3X6</i></td> <td><i>12 V</i></td> <td><i>21.9v</i></td> <td><i>26.4 V</i></td> <td><i>2</i></td> </tr> <tr> <td><i>SLAP2X6</i></td> <td><i>8 V</i></td> <td><i>14.6v</i></td> <td><i>17.6 V</i></td> <td><i>2</i></td> </tr> </tbody> </table>	<i>Variant</i>	<i>Minimum</i>	<i>Nominal</i>	<i>Max</i>	<i>NTC</i>	<i>SLAP2X9</i>	<i>12 V</i>	<i>21.92 V</i>	<i>26.4 V</i>	<i>3</i>	<i>SLAP1X12</i>	<i>8 V</i>	<i>14.6 V</i>	<i>17.6 V</i>	<i>2</i>	<i>SLAP3X12</i>	<i>24 V</i>	<i>43.8</i>	<i>52.8 V</i>	<i>3</i>	<i>SLAP3X6</i>	<i>12 V</i>	<i>21.9v</i>	<i>26.4 V</i>	<i>2</i>	<i>SLAP2X6</i>	<i>8 V</i>	<i>14.6v</i>	<i>17.6 V</i>	<i>2</i>
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<i>Communication Bus</i>	NA																														
<i>RF Link(s)</i>	ISM Band (2.405 GHz to 2.480 GHz) used to communicate with BRFM modules. Rx sensitivity shall be around 50% of PER, where each measurement shall vary by no more than +/- 2.0dB from the golden sample. Tx output power shall vary by no more than +/-2.5dB from the golden sample. Radio frequency reference shall be within ±20PPM from desired frequency (2.44GHz, channel 7).																														
<i>Module-to-Vehicle Non-Electrical Interface</i>																															
N/A																															
<i>User Interface</i>																															
NA																															
<i>Internal Interface</i>																															
<p><i>Note: For these internal I/O, monitoring shall only occur via communication bus data or via indirect methods. Direct monitoring using attachments leads to external monitoring devices shall not be included.</i></p>																															
<i>Analog Input</i>	NA																														
<i>Digital (discrete state) Input – steady-state I/O</i>	NA																														
<i>Switching &amp; Clock Frequency Content</i>	SPI communication shall be 1Mbps nominal. Used to communicate between RF manager to Sensors ASIC. RF Manager IC XTAL frequency shall be 40MHz nominal.																														
<i>Digital (discrete state) Input – dynamic I/O</i>	NA																														
<i>Analog Output</i>	Main power supply SMPS U402 shall have an output voltage of 3.3V with ±5mV peak-to-peak ripple voltage																														
<i>Digital (discrete state) Output</i>																															
<i>Communication Bus</i>																															
<p><b>Note:</b> This section assumes that production software is not mandatory; the use of specialized software is acceptable.  <b>Note:</b> Software diagnostic timers should be reset to minimum detection values, to facilitate assertion of potential diagnostic flags during the RF exposure time (maximum 2 seconds).  <b>Note:</b> States/faults/issues shall be reported directly over the communication bus (i.e., Class 2, Controller Area Network (CAN), etc.) or indirectly if the communication bus is not available via the cycling of output(s) (e.g., PWM duty cycle change, telltale flash rate change, etc.)</p>																															

**Note:** Unless otherwise specified in the EMC Test Plan, in order to ensure a refreshed value, all information related to data monitoring (such as analog input voltages, operating states, etc.) shall be via parameter requests (e.g., Parameter ID (PID)) and not via scheduled, or periodic, broadcast messages. This ensures bi-directional communications during immunity testing.

The following information shall also be included in the case of radio equipment intentionally emitting radio waves:

- a. Frequency band : 2.405 – 2.480 GHz
- b. Maximum radio-frequency power transmitted in the frequency band(s) in which the radio equipment operates. Max output power = 10 dBm

### **(U.S.A. and Canada)**

#### **FCC**

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions:

- (1) This device may not cause harmful interference, and
- (2) The device must accept any interference received, including interference that may cause undesired operation.

*Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.*

#### ***RF exposure safety***

*This device complies with the FCC RF exposure limits and has been evaluated in compliance with portable exposure conditions.*

*The equipment must be installed and operated and was evaluated with minimum distance of **5.67 cm** of the human body. This distance or greater is maintained by vehicle design and ensures compliance by normal use of the vehicle.*

*For a Class B digital device or peripheral, the instructions furnished the user shall include the following or similar statement, placed in a prominent location in the text of the manual:*

*Note: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:*

- Reorient or relocate the receiving antenna.*
- Increase the separation between the equipment and receiver.*
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.*
- Consult the dealer or an experienced radio/TV technician for help.*

### **ISED CANADA**

This device complies with Industry Canada License-exempt RSS standard(s). Operation is subject to the following two conditions:

- (1) This device may not cause harmful interference, and
- (2) The device must accept any interference received, including interference that may cause undesired operation.

Le présent appareil est conforme aux CNR d'Industrie Canada applicables aux appareils radio exempts de licence. L'exploitation est autorisée aux deux conditions suivantes:

- (1) l'appareil ne doit pas produire de brouillage, et,
- (2) l'utilisateur de l'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.

*Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.*

### ***RF exposure safety***

*This device complies with the RF exposure limits and has been evaluated in compliance with portable exposure conditions.*

*The equipment must be installed and operated and was evaluated with minimum distance of **5.67 cm** of the human body. This distance or greater is maintained by vehicle design and ensures compliance by normal use of the vehicle.*

### ***CAN ICES-003***

*Les changements ou modifications non expressément approuvés par la partie responsable de la conformité peuvent annuler le droit de l'utilisateur à utiliser l'équipement.*

### ***Sécurité d'exposition aux RF***

*Cet appareil est conforme aux limites d'exposition RF d'ISED et a été évalué conformément aux conditions d'exposition portable.*

*L'équipement doit être installé et utilisé à une distance minimale de **5.67 cm** du corps humain. Cette distance ou plus est maintenue par la conception du véhicule et assure la conformité par l'utilisation normale du véhicule.*

### ***CAN NMB-003***

*Cet appareil numérique de classe B est conforme à la norme canadienne NMB-003.*

**Declaration of Conformity**

CE MARK:



Simplified EU DoC:

Hereby, Visteon Corporation declares that the radio equipment type SLAP2X9 is in compliance with Directive 2014/53/EU. The full text of the EU declaration of conformity is available at the following internet address: <http://www.visteondocs.com/>

български [Bulgarian]	С това фирмата <b>Visteon Corporation</b> декларира, че частта <b>SLAP2X9</b> е в съответствие със съществените изисквания и други приложими разпоредби на директивата 2014/53/ЕС.
Česky [Czech]	<b>Visteon Corporation</b> tímto prohlašuje, že tento <b>SLAP2X9</b> je ve shodě se základními požadavky a dalšími příslušnými ustanoveními směrnice 2014/53/EU.
Dansk [Danish]	Undertegnede <b>Visteon Corporation</b> erklærer herved, at følgende udstyr <b>SLAP2X9</b> overholder de væsentlige krav og øvrige relevante krav i direktiv 2014/53/EU.
Deutsch [German]	Hiermit erklärt <b>Visteon Corporation</b> , dass sich das Gerät <b>SLAP2X9</b> in Übereinstimmung mit den grundlegenden Anforderungen und den übrigen einschlägigen Bestimmungen der Richtlinie 2014/53/EU befindet.
Eesti [Estonian]	Käesolevaga kinnitab <b>Visteon Corporation</b> seadme <b>SLAP2X9</b> vastavust direktiivi 2014/53/EL põhinõuetele ja nimetatud direktiivist tulenevatele teistele asjakohastele sätetele.
English	Hereby, <b>Visteon Corporation</b> , declares that this <b>SLAP2X9</b> is in compliance with the essential requirements and other relevant provisions of Directive 2014/53/EU.
Español [Spanish]	Por medio de la presente <b>Visteon Corporation</b> declara que el <b>SLAP2X9</b> cumple con los requisitos esenciales y cualesquiera otras disposiciones aplicables o exigibles de la Directiva 2014/53/UE.
Ελληνική [Greek]	ΜΕ ΤΗΝ ΠΑΡΟΥΣΑ <b>Visteon Corporation</b> ΔΗΛΩΝΕΙ ΟΤΙ <b>SLAP2X9</b> ΣΥΜΜΟΡΦΩΝΕΤΑΙ ΠΡΟΣ ΤΙΣ ΟΥΣΙΩΔΕΙΣ ΑΠΑΙΤΗΣΕΙΣ ΚΑΙ ΤΙΣ ΛΟΙΠΕΣ ΣΧΕΤΙΚΕΣ ΔΙΑΤΑΞΕΙΣ ΤΗΣ ΟΔΗΓΙΑΣ 2014/53/ΕΚ.
Français [French]	Par la présente <b>Visteon Corporation</b> déclare que l'appareil <b>SLAP2X9</b> est conforme aux exigences essentielles et aux autres dispositions pertinentes de la directive 2014/53/UE.
Italiano [Italian]	Con la presente <b>Visteon Corporation</b> dichiara che questo <b>SLAP2X9</b> è conforme ai requisiti essenziali ed alle altre disposizioni pertinenti stabilite dalla direttiva 2014/53/UE.

Latviski [Latvian]	Ar šo <b>Visteon Corporation</b> deklarē, ka <b>SLAP2X9</b> atbilst Direktīvas 2014/53/EK būtiskajām prasībām un citiem ar to saistītajiem noteikumiem.
Lietuvių [Lithuanian]	Šiuo <b>Visteon Corporation</b> deklaruoja, kad šis <b>SLAP2X9</b> atitinka esminius reikalavimus ir kitas 2014/53/EB Direktyvos nuostatas.
Nederlands [Dutch]	Hierbij verklaart <b>Visteon Corporation</b> dat het toestel <b>SLAP2X9</b> in overeenstemming is met de essentiële eisen en de andere relevante bepalingen van richtlijn 2014/53/EG.
Malti [Maltese]	Hawnhekk, <b>Visteon Corporation</b> , jiddikjara li dan <b>SLAP2X9</b> jikkonforma mal-htigijiet essenzjali u ma provvedimenti oħrajn relevanti li hemm fid-Dirrettiva 2014/53/UE.
Magyar [Hungarian]	Alulírott, <b>Visteon Corporation</b> nyilatkozom, hogy a <b>SLAP2X9</b> megfelel a vonatkozó alapvető követelményeknek és az 2014/53/EU irányelv egyéb előírásainak.
Polski [Polish]	Niniejszym <b>Visteon Corporation</b> oświadcza, że <b>SLAP2X9</b> jest zgodny z zasadniczymi wymogami oraz pozostałymi stosownymi postanowieniami Dyrektywy 2014/53/UE.
Português [Portuguese]	<b>Visteon Corporation</b> declara que este <b>SLAP2X9</b> está conforme com os requisitos essenciais e outras disposições da Directiva 2014/53/UE.
Slovensko [Slovenian]	<b>Visteon Corporation</b> izjavlja, da je ta <b>SLAP2X9</b> v skladu z bistvenimi zahtevami in ostalimi relevantnimi določili direktive 2014/53/ES.
Slovensky [Slovak]	<b>Visteon Corporation</b> týmto vyhlasuje, že <b>SLAP2X9</b> spĺňa základné požiadavky a všetky príslušné ustanovenia Smernice 2014/53/EÚ.
Suomi [Finnish]	<b>Visteon Corporation</b> vakuuttaa täten että <b>SLAP2X9</b> tyypinen laite on direktiivin 2014/53/EU oleellisten vaatimusten ja sitä koskevien direktiivin muiden ehtojen mukainen.
Svenska [Swedish]	Härmed intygar <b>Visteon Corporation</b> att denna <b>SLAP2X9</b> står i överensstämmelse med de väsentliga egenskapskrav och övriga relevanta bestämmelser som framgår av direktiv 2014/53/EU.
Íslenska [Icelandic]	Hér með lýsir <b>Visteon Corporation</b> yfir því að <b>SLAP2X9</b> er í samræmi við grunnkröfur og aðrar kröfur, sem gerðar eru í tilskipun 2014/53/EU.
Norsk [Norwegian]	<b>Visteon Corporation</b> erklærer herved at utstyret <b>SLAP2X9</b> er i samsvar med de grunnleggende krav og øvrige relevante krav i direktiv 2014/53/EF.
Crnogorski jezik, Црногорски језик [Montenegrin]	Ovim, <b>Visteon Corporation</b> , izjavljuje da ovaj <b>SLAP2X9</b> je usklađen sa bitnim zahtjevima i drugim relevantnim odredbama Direktive 2014/53/UE.
Română [Romanian]	Prin prezenta, <b>Visteon Corporation</b> , declară că acest <b>SLAP2X9</b> respectă cerințele esențiale și alte dispoziții relevante din Directiva 2014/53 / UE.

Türkiye [Turkey]	<b>Visteon Corporation</b> , işbu <b>SLAP2X9</b> 'ın 2014/53 / EU Direktifinin esas şartları ve diğer ilgili hükümlerine uygun olduğunu beyan eder.
Hrvatska [Croatian]	Ovime <b>Visteon Corporation</b> izjavljuje da je ovaj <b>SLAP2X9</b> u skladu s osnovnim zahtjevima i ostalim relevantnim odredbama Direktive 2014/53 / EU.

DRAFT VERSION