

Model Name: BRFM
 Type of product: Battery Radiofrequency Module
 Brand Name: Visteon
 Manufacturer: Visteon Corporation
 Manufacturer Address: One Village center drive, Van Buren Township
 48111-5711 Michigan
 United States of America

BRFM features:

The BRFM is an electronic module intended to aggregate data from up to 24 CMU units and module temperatures from the High Voltage battery bus in addition to pack voltage and current data collected from the Battery Disconnect Signal Board (BDSB) and from multiple Cell Monitoring Units (CMUs) to communicate them to the Vehicle Integration Control Module (VICM3).

All cell voltages, module temperatures, pack voltage and current are reported directly to the VICM3 on a regular periodic basis.

There are two variants of the BRFM:

- Application 1 has a single wireless RFIC (Pinnacle) and one antenna.
- Application 2 has two wireless RFICs (Pinnacle) and two antennas.

The BRFM implements a Pinnacle IC (ADRF8850), this is an IC that provides wireless communication between the Battery Cell Monitoring chip and the Battery Management System Controller.

The BRFM includes a voltage supervisor/windowed watchdog (TPS3850) counter which generates a wake up signal to the VICM3 when any of the battery cells reports a critical condition when the VICM3 is sleeping.

The BRFM has two redundant sets of sensors that monitor the battery pack for excessive temperature, pressure, that indicate a battery cell thermal runaway or thermal propagation.

System interaction:

Module-to-Vehicle Electrical Interface	
Analog Input	VICM3 provides power to BRFM module. Power nominal value is 5.4V Minimum voltage expected is 5.2V and maximum is 5.6V.
Analog Output	BDSB Power Output is provided or enabled by BRFM module depending on variant. BDSB Power is provided by Single BRFM variant. BDSB Power nominal value is 5V. Minimum voltage expected is 4.2V and maximum is 5.5V
Digital (discrete state) Output	BDSB Power Output is provided or enabled by BRFM module depending on variant. BDSB Power is enabled by sending commands through the Dual BRFM variant. BDSB Power nominal value is 5V. Minimum voltage expected is 4.2V and maximum is 5.5V
Communication Bus	isoSPI communication serves as interface between BRFM and VICM3, as well as BRFM and BDSB. isoSPI lines shall be monitored to ensure proper performance. Amplitude and timing measurements should be captured. 1Mbps nominal is expected.
RF Link(s)	ISM Band (2.405 GHz to 2.480 GHz) used to communicate with CMU 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).
Module-to-Vehicle Non-Electrical Interface	
Pressure Sensors -> Values shall be between 50kPa and 150kPa ±1% (0 – 150C) and ±2% (-40C – 0C)	
Temperature Sensors -> Detection range shall be between -40C and 150C ±1% of measured value	
Internal Interface	
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.	

Switching & Clock Frequency Content	<i>SPI communication shall be 1Mbps nominal. Used to communicate between RF manager to Sensors ASIC and RF Manager to isoSPI Transceiver. RF Manager IC XTAL frequency shall be 40MHz nominal. Pressure sensor frequency shall be 20kHz. UART communication between RF Manager 1 and RF Manager 2 for Dual BRFM variant. These shall be 1Mbps nominal.</i>
Analog Output	
Digital (discrete state) Output	<i>3.3V voltage output from U7/U9 shall be within the following range: +3.25V < VOUT < +3.35V Main power supply (U30001) shall have an output voltage of 3.3V with ±5mV peak-to-peak ripple voltage</i>
Communication Bus	
<p>Note: This section assumes that production software is not mandatory; the use of specialized software is acceptable.</p> <p>Note: 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).</p> <p>Note: 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> <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.</p> <p>Note: The BRFM is powered by a power supply that meets the requirements of ES1 and PS1 (P<15W) in accordance with the IEC 62368-1 standard.</p> <p>Note: VICM3 provides power to BRFMS module. Power nominal value for Japanese version is 5.4V. Minimum voltage expected is 4.86V and maximum is 5.94V.</p>	

Harness Pinout, Capacities, and Use

Connector ID / Cavity #	Name	Description	Termination (R-L-C) etc.	Wire Gauge (AWG) Used in Vehicle	Twist w/ Cavity #	Shielded w/ Cavity #	Applicable Bands		
							Required for Module Operation	External Antenna Band WiFi	External Antenna Band YYYY
X1-1	BUF5V I	5V Input Power from VICM		16	n/a	n/a	Yes	n/a	n/a
X1-2	NC	NC		n/a	n/a	n/a	n/a	n/a	n/a
X1-3	NC	NC		n/a	n/a	n/a	n/a	n/a	n/a
X1-4	VICM_WU_SIG	Vehicle Integration Control Module Wake Up Signal	Connect to 5V	16	n/a	n/a	Yes	n/a	n/a
X1-5	BUF5V O	5V Output Power to BDSB	BDSB or simulator	16	n/a	n/a	Yes	n/a	n/a
X1-6	NC	NC		n/a	n/a	n/a	n/a	n/a	n/a
X1-7	RTN_5 VO	Ground to BDSB		16	n/a	n/a	Yes	n/a	n/a
X1-8	RTN_5 VI	Ground to VICM		16	n/a	n/a	Yes	n/a	n/a
X1-9	BRFM_SPLY_V_2	Battery Radio Frequency Module Supply Voltage 2		16	n/a	n/a	Yes	n/a	n/a
X1-10	NC	NC		n/a	n/a	n/a	n/a	n/a	n/a
X1-11	ISOSPI_PV2	isoSPI Positive 2 to VICM	100 ohm cross positive and negative	20	n/a	n/a	Yes	n/a	n/a
X1-12	ISOSPI_NV2	isoSPI Negative 2 to VICM							

X1-13	ISOSPI_PV1	isoSPI Positive 1 to VICM	100 ohm cross positive and negative	20	n/a	n/a	Yes	n/a	n/a
X1-14	ISOSPI_NV1	isoSPI Negative 1 to VICM							
X1-15	ISOSPI_PB1	isoSPI Positive 1 to BDSB 1	100 ohm cross positive and negative	20	n/a	n/a	Yes	n/a	n/a
X1-16	ISOSPI_NB1	isoSPI Negative 1 to BDSB 1							
X1-17	ISOSPI_PB2	isoSPI Positive 2 to BDSB 2	100 ohm cross positive and negative	20	n/a	n/a	Yes	n/a	n/a
X1-18	ISOSPI_NB2	IsoSPI Negative 2 to BDSB 2							
X1-19	NC	NC		n/a	n/a	n/a	n/a	n/a	n/a
X1-20	BRFM_RTN_2	Battery Radio Frequency Module Return 2	BDSB or simulation	16	n/a	n/a	Yes	n/a	n/a

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 = 10dBm

(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 **11 cm** of the human body. This distance or greater is maintained by vehicle design and ensures compliance by normal use of the vehicle.*

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 ISED 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 **11 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'ISDE et a été évalué conformément aux conditions d'exposition **portable**.*

*L'équipement doit être installé et utilisé à une distance minimale de **11 cm** du corps humain.*

CAN NMB-003

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

Part 15 – Interference Statement (On Part and in Owners Manual, or in Owners Manual)

NOTE: When the device is so small or for such use that it is not practicable to place the Interference Statement on it (e.g. TPMS), the below statement shall be placed in the Owners Manual:

"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) this device must accept any interference received, including interference that may cause undesired operation."

Interference Statement (On Part and in Owners Manual, or in Owners Manual)

Licence-exempt radio apparatus shall contain the following or equivalent notice in a conspicuous location in the user manual or alternatively on the device or both.

This device complies with Innovation, Science, and Economic Development Canada (ISED) licence-exempt RSS standard(s).

Operation is subject to the following two conditions: (1) this device may not cause interference, and (2) this device must accept any interference, including interference that may cause undesired operation of the device

Customer Information

Declaration of Conformity

CE MARK:



Simplified EU DoC:



Hereby, Visteon Corporation declares that the radio equipment type **BRFM** 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 Visteon Corporation декларира, че частта BRFM е в съответствие със съществените изисквания и други приложими разпоредби на директивата 2014/53/ЕС.
Česky [Czech]	Visteon Corporation tímto prohlašuje, že tento BRFM je ve shodě se základními požadavky a dalšími příslušnými ustanoveními směrnice 2014/53/EU.
Dansk [Danish]	Undertegnede Visteon Corporation erklærer herved, at følgende udstyr BRFM overholder de væsentlige krav og øvrige relevante krav i direktiv 2014/53/EU.
Deutsch [German]	Hiermit erklärt Visteon Corporation , dass sich das Gerät BRFM in Übereinstimmung mit den grundlegenden Anforderungen und den übrigen einschlägigen Bestimmungen der Richtlinie 2014/53/EU befindet.
Eesti [Estonian]	Käesolevaga kinnitab Visteon Corporation seadme BRFM vastavust direktiivi 2014/53/EL põhinõuetele ja nimetatud direktiivist tulenevatele teistele asjakohastele sätetele.

English	Hereby, Visteon Corporation , declares that this BRFM is in compliance with the essential requirements and other relevant provisions of Directive 2014/53/EU.
Español [Spanish]	Por medio de la presente Visteon Corporation declara que el BRFM cumple con los requisitos esenciales y cualesquiera otras disposiciones aplicables o exigibles de la Directiva 2014/53/UE.
Ελληνική [Greek]	ΜΕ ΤΗΝ ΠΑΡΟΥΣΑ Visteon Corporation ΔΗΛΩΝΕΙ ΟΤΙ BRFM ΣΥΜΜΟΡΦΩΝΕΤΑΙ ΠΡΟΣ ΤΙΣ ΟΥΣΙΩΔΕΙΣ ΑΠΑΙΤΗΣΕΙΣ ΚΑΙ ΤΙΣ ΛΟΙΠΕΣ ΣΧΕΤΙΚΕΣ ΔΙΑΤΑΞΕΙΣ ΤΗΣ ΟΔΗΓΙΑΣ 2014/53/ΕΚ.
Français [French]	Par la présente Visteon Corporation déclare que l'appareil BRFM est conforme aux exigences essentielles et aux autres dispositions pertinentes de la directive 2014/53/UE.
Italiano [Italian]	Con la presente Visteon Corporation dichiara che questo BRFM è conforme ai requisiti essenziali ed alle altre disposizioni pertinenti stabilite dalla direttiva 2014/53/UE.
Latviski [Latvian]	Ar šo Visteon Corporation deklarē, ka BRFM atbilst Direktīvas 2014/53/EK būtiskajām prasībām un citiem ar to saistītajiem noteikumiem.
Lietuvių [Lithuanian]	Šiuo Visteon Corporation deklaruoja, kad šis BRFM atitinka esminius reikalavimus ir kitas 2014/53/EB Direktyvos nuostatas.
Nederlands [Dutch]	Hierbij verklaart Visteon Corporation dat het toestel BRFM in overeenstemming is met de essentiële eisen en de andere relevante bepalingen van richtlijn 2014/53/EG.
Malti [Maltese]	Hawnhekk, Visteon Corporation , jiddikjara li dan BRFM jikkonforma mal-ħtiġijiet essenzjali u ma provvedimenti oħrajn relevanti li hemm fid-Dirrettiva 2014/53/UE.
Magyar [Hungarian]	Alulírott, Visteon Corporation nyilatkozom, hogy a BRFM megfelel a vonatkozó alapvető követelményeknek és az 2014/53/EU irányelv egyéb előírásainak.
Polski [Polish]	Niniejszym Visteon Corporation oświadcza, że BRFM jest zgodny z zasadniczymi wymogami oraz pozostałymi stosownymi postanowieniami Dyrektywy 2014/53/UE.
Português [Portuguese]	Visteon Corporation declara que este BRFM está conforme com os requisitos essenciais e outras disposições da Directiva 2014/53/UE.
Slovensko [Slovenian]	Visteon Corporation izjavlja, da je ta BRFM v skladu z bistvenimi zahtevami in ostalimi relevantnimi določili direktive 2014/53/ES.
Slovensky [Slovak]	Visteon Corporation týmto vyhlasuje, že BRFM spĺňa základné požiadavky a všetky príslušné ustanovenia Smernice 2014/53/EÚ.
Suomi [Finnish]	Visteon Corporation vakuuttaa täten että BRFM tyypinen laite on direktiivin 2014/53/EU oleellisten vaatimusten ja sitä koskevien direktiivin muiden ehtojen mukainen.
Svenska	Härmed intygar Visteon Corporation att denna BRFM står i överensstämmelse med de väsentliga egenskapskrav och övriga relevanta bestämmelser som framgår av direktiv 2014/53/EU.

[Swedish]	
Íslenska [Icelandic]	Hér með lýsir Visteon Corporation yfir því að BRFM er í samræmi við grunnkröfur og aðrar kröfur, sem gerðar eru í tilskipun 2014/53/EU.
Norsk [Norwegian]	Visteon Corporation erklærer herved at utstyret BRFM er i samsvar med de grunnleggende krav og øvrige relevante krav i direktiv 2014/53/EF.
Crnogorski jezik, Црногорски језик [Montenegrin]	Ovim, Visteon Corporation , izjavljuje da ovaj BRFM je usklađen sa bitnim zahtjevima i drugim relevantnim odredbama Direktive 2014/53/UE.
Română [Romanian]	Prin prezenta, Visteon Corporation , declară că acest BRFM respectă cerințele esențiale și alte dispoziții relevante din Directiva 2014/53 / UE.
Türkiye [Turkey]	Visteon Corporation , işbu BRFM 'in 2014/53 / EU Direktifinin esas şartları ve diğer ilgili hükümlerine uygun olduğunu beyan eder.
Hrvatska [Croatian]	Ovime Visteon Corporation izjavljuje da je ovaj BRFM u skladu s osnovnim zahtjevima i ostalim relevantnim odredbama Direktive 2014/53 / EU.

United Arab Emirates

 <p>هيئة تنظيم الاتصالات والحكومة الرقمية TELECOMMUNICATIONS AND DIGITAL GOVERNMENT REGULATORY AUTHORITY</p>	<p>TDR - UNITED ARAB Emirates</p> <p>Mode Dealer ID Name: DA0089862/12</p> <p>TARTE: ER15601/22</p> <p>Model Name: BRFM</p> <p>Product Type: Short range devices / Low power Devices</p>	
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Oman

Oman - TRA
D172338
TRA/TA-R/14680/22

United Kingdom



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

Mexico

Homologation by IFT: GEVIBR23-18353

Certification By: NYCE



'La operación de este equipo está sujeta a las siguientes dos condiciones:

(1) es posible que este equipo o dispositivo no cause interferencia perjudicial y (2) este equipo o dispositivo debe aceptar cualquier interferencia, incluyendo la que pueda causar su operación no deseada'.

a) Lea el Manual antes de operar o usar el Equipo.

b) Información de importador:

Nombre: General Motors de México, S. de R. L. de C. V.

Dirección/Address: Av. Ejército Nacional 843-B. Colonia Granada, Miguel Hidalgo. CP 11520
Ciudad de México, México.

Contacto: Fernando Camacho Jiménez

Correo: fernando.camacho@gm.com

Teléfono: (52-722) 235 8487

c) Marca: Visteon Corporation / Nombre del Modelo: BRFM

d) El BRFM es instalado dentro del Battery Pack, por lo tanto, el usuario final no tiene interacción directa con el módulo BRFM.

e) Especificaciones Eléctricas:

Tensión de alimentación: 5,4V (Vcc)

Corriente de alimentación: 450 mA

Frecuencia: 2.4 GHz

Potencia: 2.5 W

China

「使用微功率短距離無線電發射設備應當符合國家無線電管理的有關規定」

South Korea



인증번호: R-R-VC1-BRFM

인증 받은 자의 상호: Visteon Corporation

기자재의 명칭/ 모델명: BRFM

제조연월일: 별도표기

제조사/제조국가: Visteon Corporation /USA

Japan



Kazakhstan

- Safety using requirements. (GM will need to provide or place this information on final User Manual in Russian and Kazakhstan language).
- Installing, storing, shipping, sailing and utilization requirements. (GM will need to provide or place this information on final User Manual in Kazakhstan language).

EAC

Ukraine



Israel

מספר אישור אלחוטי של משרד התקשורת הוא 51-93499

“Wireless approval signed by the Ministry of Communication no. 51-93499”