



LCIE SUD EST
Laboratoire de Moirans
Z.I. Centr'Alp
170, Rue de Chatagnon
38430 MOIRANS - FRANCE

GENERAL INFORMATION

FCCID: FI5TMSAF01

1.1. Product description

1.2.

2.1 PURPOSE

This specification describes the functional requirements, and the operation of the Michelin Tire Mounted Sensor. The information is important for the design and integration with the vehicle monitoring system.

2.2 SCOPE

This document applies to the Michelin TMS. This document does not intend to restrict or specify any hardware or software. The intent is only to specify the functionality and advanced features of the TMS.

3.1 MAJOR FUNCTIONS

The main functions are:

- Detect if wheel is in motion (rotation) or not.
- Identify Tire type with an ID.
- Monitor and transmit temperature and battery voltage.
- Data will be transmitted using Bluetooth Low Energy 4.2 advertisement.

Data sheet of equipment

1.3. Tested System Details

Bluetooth LE Type:	☒ BLE	☐ v4.1	☐ v4.2	☐ v5.0
Frequency band:	[2400 – 2483.5] MHz			
Spectrum Modulation:	☒ DSSS (Tested like it)			
Number of Channel:	40			
Spacing channel:	2MHz			
Channel bandwidth:	☒ 1MHz		☐ 2MHz	
Antenna Type:	☒ Integral	☐ External	☐ Dedicated	
Antenna connector:	☐ Yes	☐ No	☒ Temporary for test	
Transmit chains:	1			
	Single antenna			
	Gain: -2dBi			
Beam forming gain:	No			
Receiver chains	1			
Type of equipment:	☒ Stand-alone	☐ Plug-in	☐ Combined	
Ad-Hoc mode:	☐ Yes		☒ No	
Adaptivity mode:	☐ Yes (Load Based)	☐ Off mode	☒ No	
	Clear Channel Assessment Time:			Xµs
Duty cycle:	☐ Continuous duty	☐ Intermittent duty	☒ 100% duty	
Equipment type:	☒ Production model		☐ Pre-production model	
Operating temperature range:	Tmin:	☒ -40°C	☐ 0°C	☐ °C
	Tnom:	20°C		
	Tmax:	☐ 35°C	☐ 55°C	☒ 122°C



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CHANNEL PLAN			
Channel	Frequency (MHz)	Channel	Frequency (MHz)
Cmin: 0	2402	20	2442
1	2404	21	2444
2	2406	22	2446
3	2408	23	2448
4	2410	24	2450
5	2412	25	2452
6	2414	26	2454
7	2416	27	2456
8	2418	28	2458
9	2420	29	2460
10	2422	30	2462
11	2424	31	2464
12	2426	32	2466
13	2428	33	2468
14	2430	34	2470
15	2432	35	2472
16	2434	36	2474
17	2436	37	2476
18	2438	38	2478
Cmid: 19	2440	Cmax: 39	2480

DATA RATE		
Data Rate (Mbps)	Modulation Type	Worst Case Modulation
1	GFSK	☒
2	GFSK	☐

1.4. Test Methodology

Both conducted and radiated testing were performed according to the procedures in ANSI C63.4 or/and ANSI C63.10, FCC Part 15 SubPart 15C.

Radiated testing was performed at an antenna to EUT distance of 10 meters. During testing, all equipment's and cables were moved relative to each other in order to identify the worst case set-up.

1.5. Test facility

Tests have been performed: **November 20, 2019 to November 21, 2019**

This test facility has been fully described in a report and accepted by FCC as compliant with the radiated and AC line conducted test site criteria in ANSI C63.4 or/and ANSI C63.10.

This test facility has also been accredited by COFRAC (French accreditation authority for European Union test lab accreditation organization) according to NF EN ISO/IEC 17025, as compliant with test site criteria and competence in 47 CFR Part 15/ANSI C63.4 and EN55032/CISPR32 norms for 89/336/EEC European EMC Directive application. All pertinent data for this test facility remains unchanged.