



General Specification for Vehicles, Electromagnetic Compatibility

1 Introduction

Note: Nothing in this standard supercedes applicable laws and regulations.

Note: In the event of conflict between the English and domestic language, the English language shall take precedence.

1.1 Purpose. This document is one out of a series of three global Electromagnetic Compatibility (EMC) documents that specify EMC test and validation requirements. The complete series consists of the following documents:

- GMW3091
- GMW3097
- GMW3103

1.2 Applicability. This standard applies to vehicle validation for all General Motors passenger vehicles and light-duty trucks.

1.3 Remarks. This document specifies requirements and test procedures for verification for EMC. It refers to international EMC Standards whenever possible, but also describes internal test procedures if necessary.

2 References

Note: Only the latest approved standards are applicable unless otherwise specified.

2.1 External Standards/Specifications.

ECE Regulation 10	IEC 489-3	ISO 10605	ISO 11451-3
GB/T 18387	IEC CISPR 12	ISO 11451-1	TEX-1160-U
ICES-002	IEC CISPR 25	ISO 11451-2	

2.2 GM Standards/Specifications.

GMW3059	GMW3097	GMW3103
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2.3 Additional References.

International Commission on Non-Ionizing Radiation Protection (ICNIRP) Guidelines for Limiting Exposure to Time-Varying Electric, Magnetic and Electromagnetic Fields (Up to 300 GHz) published in 1998.

3 Requirements

3.1 Test Equipment and Test Samples.

3.1.1 Test Equipment. The test facilities and equipment shall be in good working order and shall have a valid calibration label.

3.2 Performance Requirements. The Device under Test (DUT) shall pass both the component level tests according to GMW3097 and the vehicle level tests according to GMW3091, following the process according to GMW3103.

For all tests the more stringent requirement applies at frequency breakpoints and overlaps.

All deviations that occur during immunity testing shall be recorded.

3.3 Regulatory (Applicable to all Global Programs and Programs for Export). The requirements in 3.3 shall be used as a default for all global programs and for those programs intended for export. Consult the GM Regulatory group(s) for specific vehicle validation and/or export requirements to confirm.

3.3.1 Regulatory – Radiated Emissions. Vehicle radiated emissions regulations contain methods and limits for control of emissions (as measured at 10 m).

The traditional vehicle radiated emissions (as measured at 10 m) basis document varies, but it generally is tied to the United Nations base document (ECE Regulation 10) and International Electrotechnical Commission (IEC) IEC CISPR 12.

3.3.1.1 Broadband Radiated Emissions Requirements (10 m). This requirement applies to all vehicle types (non-hybrid, hybrid, and electric (non-charging mode)). Compliance with the requirements of 3.4.1 ensures compliance with regulatory standards for broadband radiated emissions (as measured at 10 m).

3.3.1.2 Narrowband Radiated Emissions Requirements (10 m). This requirement applies to all vehicle types (non-hybrid, hybrid, and electric (non-charging mode)). Compliance with the requirements of 3.4.2 ensures compliance with regulatory standards for radiated emissions (as measured at 10 m).

Note: With the exception of compliance testing for Brazil, an acceptable alternative to the 10 m narrowband emissions is compliance to on-board radiated emissions antenna terminal voltage (76 MHz to 108 MHz) at a level of 20 dBμV (Average (AV)) as detailed in ECE Regulation 10.

3.3.1.3 Magnetic and Electric Field Emissions Requirements (3 m) – China Market Only. This requirement applies to hybrid and electric (non-charging mode) vehicles intended for the Chinese market. Refer to the methods and limits found in GB/T 18387.

3.3.2 Regulatory – Radiated Immunity. Vehicle radiated immunity regulatory requirements include both exposure from off-board sources, as well as an Original Equipment Manufacturer (OEM) listing of permissible frequencies and power levels.

3.3.2.1 Off-Board Radiated Immunity. This requirement applies to all vehicle types (non-hybrid, hybrid, and electric (non-charging mode)). Compliance with the requirements of 3.5.1 ensures compliance with regulatory standards for radiated immunity from off-board sources.

Note: For regulatory compliance testing, it is acceptable to limit the frequency range from 20 MHz to 2000 MHz and the radio frequency (RF) exposure to 30 V/m. The radar band between 1200 MHz to 1400 MHz is not included in the certification testing.

3.3.2.2 On-Board Radiated Immunity (Mobile Transmitter). This requirement applies to all vehicle types (non-hybrid, hybrid, and electric (non-charging mode)). Compliance with the requirements of 3.5.2 ensures compliance with regulatory standards for radiated immunity from on-board sources.

Note: For certification, it is permissible to submit a subset of the frequencies and power levels found in 3.5.2.

3.3.3 Regulatory – Electric Vehicles (While Charging). The use of alternating current (AC) or direct current (DC) power mains for charging electric vehicles requires additional certification requirements relative to radiated and conducted interference, radiated immunity, as well as AC/DC mains powerline transients.

3.3.3.1 Broadband Radiated Emissions (While Charging). Refer to the latest release of ECE Regulation 10 for setup and methodology. Compliance with the requirements of 3.4.1 ensures compliance with that regulation.

Note: No additional requirements exist for narrowband compliance (while charging).

3.3.3.2 Conducted Emissions – Harmonics on AC Power Lines (While Charging). Refer to the latest release of ECE Regulation 10 for setup, methodology, and limits.

3.3.3.3 Conducted RF Emissions (While Charging). Refer to the latest release of ECE Regulation 10 for setup, methodology, and limits.

3.3.3.4 Conducted RF Emissions (While Charging) – China Market Only. Refer to the methods and limits found in GB/T 18387.

3.3.3.5 Conducted Emissions (While Charging) – Voltage Fluctuations and Flicker. Refer to the latest release of ECE Regulation 10 for setup, methodology, and limits.

3.3.3.6 Radiated Immunity (While Charging). Refer to the latest release of ECE Regulation 10 for test setup. Compliance with the methods and limits of 3.5.1 ensures compliance to the regulations.

Note: For regulatory compliance testing, it is acceptable to limit the frequency range from 20 MHz to 2000 MHz and the RF exposure to 30 V/m. The radar band between 1200 MHz to 1400 MHz is not included in the certification testing.

3.3.3.7 Conducted Immunity (While Charging) – Fast Transients. Refer to the latest release of ECE Regulation 10 for setup, methodology, and limits. There is no equivalent requirement in the GMW3091 document.

3.3.3.8 Conducted Immunity (While Charging) – Surge. Refer to the latest release of ECE Regulation 10 for setup, methodology, and limits. There is no equivalent requirement in the GMW3091 document.

3.4 Vehicle Radiated Emissions. Unintentional vehicle radiated emissions are comprised of both narrowband and broadband emissions. These emissions are measured at 10 m protection distance from the vehicle, as well as on-board (via the receiver terminal voltage). The radiated emissions (as measured at 10 m) basis document varies, but it generally is tied to the United Nations base document (ECE R10.04) and CISPR 12. The terminal voltage measurements reference CISPR 25 as the base document.

Additionally, for the protection of consumer portable navigation devices, a new near-field radiated/coupled emissions requirement is added in this release for the Global Positioning System (GPS) and Russian/Eastern European Global Positioning System (GLONASS) receiver bands.

3.4.1 Broadband Radiated Emissions Requirements (10 m). All General Motors vehicle programs shall use the latest publication of ECE Regulation 10 using the 10 m distance and comply with the requirements of that regulation.

Note: This imposes a 2 dB more-restrictive limit as compared to CISPR 12 and also requires all equipment capable of generating broadband emissions which can be switched on permanently by the driver or passenger should be in operation in maximum load, e.g., wiper motors or fans. The horn and electric window motors are excluded because they are not used continuously.

Note: GMNA regional programs may use the CISPR 12 standard and limits for broadband radiated emissions, consistent with Canadian export requirements per ICES-002.

3.4.2 Narrowband Radiated Emissions Requirements (10 m). All General Motors vehicle programs shall use both of the following standards and comply with each of their respective limits:

- Latest publication of ECE Regulation 10, using the 10 m distance
- CISPR 12, using the 10 m distance

Note: Both standards are required due to the different detectors ((AV) for ECE R10.04 and peak (PK) or Quasi-Peak (QP) for CISPR 12) and different performance metrics. However, if data is obtained using simultaneous PK and AV detectors, the test time is not impacted, and data is available for both standards.

Note: GMNA regional programs may omit the narrowband radiated emissions as it is not a requirement for Canadian export requirements per ICES-002.

3.4.3 Interference to On-Board-Receivers.

3.4.3.1 Requirements.

Note: For AM (G1), FM I (JA1), and FM II (G3) radio broadcast bands, an alternative compliance method is provided in 3.4.4 and 3.4.5. (AM = Amplitude Modulation, FM = Frequency Modulation).

Note: For Texas Department of Transportation (DoT) requirements found in bands NA1 and G4 NA2 of Table 1 and Table 2, as well as those DoT requirements for the state of Indiana in bands NA3 and NA4 of these same tables, an alternative compliance method is provided in 3.4.6. This alternative compliance test is also applicable to the G2 NZ1, G4 NZ2, and AU1 bands of these same tables.

The requirements apply to the complete vehicle with all systems connected.

For systems comprised of both electronic controllers and inductive loads (e.g., motors, solenoids, pulse width modulated (PWM) motors, etc.), both the “Non-Spark” and “Spark” limits apply to the combined system. In this case, the average (AV) detector may be used in place of the peak (PK) detector for the “Non-Spark” limit portion of the test for those cases where the combined emissions exceed the “Non-Spark” limit. If the AV detector is used, the requirement is more restrictive by 6 dB. This is an exception based on the inability to detect the module noise over the arcing noise of a motor when using the PK detector.

Emissions shall not exceed the levels for the antenna terminal voltage specified in Table 1, Table 2, and Table 3.

Table 1: Requirement for Non-Spark Radiated Emissions

ID Number	Region	RF Service	Frequency (MHz)	Conditions	Non-Spark Limit (dBµV)
G1	Global	Medium Wave/AM	0.53 to 1.71	RBW = 9 kHz or 10 kHz Step Size ≤ 5 kHz Time/Step ≥ 50 ms	Both 20 PK and 0 AV
NA1	GMNA	LO-VHF Land Mobile (Texas DoT)	45.54 to 45.98 46.88 to 47.48	RBW = 9 kHz or 10 kHz Step Size ≤ 5 kHz Time/Step ≥ 5 ms	-4 PK ^{Note 1}
G2_EU1a	GME	4 Meter (German Police – Lower Band)	74.21 to 77.48		10 AV
G2_NZ1	GMH	4 Meter (New Zealand Police)	75.0 to 77.4 78.5 to 79.988		-10 AV ^{Note 1}
G2_EU1b	GME	4 Meter (German Police – Upper Band)	84.01 to 87.28		-10 AV
JA1	Japan, GMB	FM I	76 to 90	RBW = 120 kHz Step Size ≤ 60 kHz Time/Step ≥ 5 ms	Both 20 PK and 6 AV
G3	Global	FM II	87.5 to 108		
G4_NA2	GMNA	HI-VHF Land Mobile (Texas DoT)	150.320 to 159.950 161.913 to 163.038	RBW = 9 kHz or 10 kHz Step Size ≤ 5 kHz Time/Step ≥ 5 ms	-4 PK ^{Note 1}
G4_NZ2	GMH	2 Meter (New Zealand Police)	141 to 144		-10 AV ^{Note 1}
G4_EU2a	GME	2 Meter (UK Police)	142 to 167.555 169.385 to 172.155 173.985 to 175		-4 AV
G4_EU2b		2 Meter (German Police)	167.555 to 169.385 172.155 to 173.985		-10 AV
G5	GME, GMH	DAB I	174.1 to 240		Both 20 PK and 10 AV
EU3a	GME	Tetra (Emergency)	380 to 385 390 to 395 406 to 410		-10 AV
EU3b			410 to 412 420 to 422		-4 AV
EU3c		Tetra (Civil)	380 to 430		6 AV ^{Note 2}
AU1	GMH, GMNA	UHF (Police – U.S. and New Zealand)	450 to 520		-4 AV ^{Note 1}
NA3	GMNA	UHF (Indiana DoT)	453.5 to 458.5		-4 AV ^{Note 1}
NA4	GMNA	Trunked Radio (Indiana DoT)	806 to 870		6 AV ^{Note 1}
G8	Global	GPS	1567 to 1574 1576 to 1583		See Note 3
EU4	Europe	GLONASS	1598.0625 to 1605.375		0 AV

Legend: ID = Identification; **RBW** = Resolution Bandwidth; **VHF** = Very High Frequency; **UK** = United Kingdom; **DAB** = Digital Audio Broadcast; **UHF** = Ultra High Frequency; **U.S.** = United States; **GPS** = Global Positioning System; **GLONASS** = Russian/Eastern European Global Positioning System

Note 1: Any non-compliant emissions shall be further evaluated via the method and limits of 3.4.6 – Land Mobile Radio Audio Test (LMRAT).

Note 2: Band G7 includes general protection for the civil usage of the Tetra services in Europe (380 MHz to 430 MHz), as well as a precautionary limit for the expected Tetra usage in Australia (403 MHz to 430 MHz).

Note 3: Band G8: Requirement, using an AV detector, is 40 dBµV at 1567 MHz, decreasing linearly in frequency to 0 dBµV at 1574 MHz, 0 dBµV between 1574 MHz and 1576 MHz, 0 dBµV at 1576 MHz increasing linearly in frequency to 40 dBµV at 1583 MHz.

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Table 2: Requirement for Spark Radiated Emissions ^{Note 1}

ID Number	Region	RF Service	Frequency Range (MHz)	Conditions	Spark Limit (dBμV)
G1	Global	Medium Wave (AM)	0.53 to 1.71	RBW = 9 kHz Step Size ≤ 20 kHz Time/Step = 1 s	6 QP
NA1	GMNA	LO-VHF Land Mobile (Texas DoT)	45.54 to 45.98 46.88 to 47.48	RBW = 9 kHz Step Size ≤ 4 kHz Time/Step = 5 ms	35 PK ^{Note 2}
G2_EU1	GME	4 Meter (German Police)	74.21 to 87.28	RBW = 120 kHz Step Size ≤ 1 MHz Time/Step = 1 s	10 QP
G2_NZ1	GMH	4 Meter (New Zealand Police)	75.0 to 77.4 78.5 to 79.988		10 QP ^{Note 2}
JA1	Japan, GMB	FM I	76 to 90		6 (15 ^{Note 3}) QP
G3	Global	FM II	87.5 to 108		
G4_NA2	GMNA	HI-VHF Land Mobile (Texas DoT)	150.320 to 159.950 161.913 to 163.038	RBW = 9 kHz Step Size ≤ 4 kHz Time/Step = 5 ms	35 PK ^{Note 2}
G4_NZ2	GMH	2 Meter (New Zealand Police)	141 to 144	RBW = 120 kHz Step Size 1 MHz Time/Step = 1 s	10 QP ^{Note 2}
G4_EU2	GME	2 Meter (UK/German Police)	142 to 175		10 QP
G5	GME, GMH	DAB I	174.1 to 240		10 QP
EU3	GME, GMH	Tetra	380 to 430		10 QP
AU1	GMNA, GMH	UHF (Police – U.S. and New Zealand)	450 to 520		10 QP ^{Note 2}
NA3	GMNA	UHF (Indiana DoT)	453.5 to 458.5		10 QP ^{Note 2}
NA4	GMNA	Trunked Radio (Indiana DoT)	806 to 870		10 QP ^{Note 2}

Legend: ID = Identification; **RBW** = Resolution Bandwidth; **VHF** = Very High Frequency; **UK** = United Kingdom; **DAB** = Digital Audio Broadcast; **UHF** = Ultra High Frequency; **U.S.** = United States

Note 1: Any emissions from a PWM-controlled DC brush motor (as measured via a Quasi-Peak (QP) detector) must be evaluated with the PWM set to 100%.

Note 2: Any non-compliant emissions shall be further assessed via the method and limits of 3.4.6 – Land Mobile Radio Audio Test (LMRAT).

Note 3: Ignition noise only.

Table 3: Requirement for Switch Pop Noise ^{Note}

ID Number	Mandatory/Optional	Region	RF Service	Frequency Range (MHz)	Conditions	Switch Pop Limit (dBμV)
G1	Optional	Global	Medium Wave (AM)	0.53 to 1.71	RBW = 9 kHz Step Size ≤ 50 kHz Time/Step = 5 s	19 PK

Legend: ID = Identification; **RBW** = Resolution Bandwidth

Note: Requirement only applicable to noise sources of frequent actuation (e.g., brake light switch, turn signal relay, intermittent wiper). Cycle the switch or contact continuously during scan.

3.4.3.2 Test Equipment. The test equipment shall comply with the requirements of IEC CISPR 25.

3.4.3.3 Test Procedure. Use test method IEC CISPR 25.

In order to save test time, it is allowed to measure with bandwidth greater than those specified. If noise measured under this condition exceeds the requirements, the measurement has to be retaken in those frequency bands with the specified bandwidth to determine pass/fail.

3.4.4 Subjective Radio Listen Test (Terminal-Voltage Method). This test provides a means of assessing potential interference risk to radio broadcast services. The method establishes a known RF broadcast antenna terminal level to assess the interference risk from unintentional on-board RF sources. The intent is that this metric will be replaced by methodology detailed in 3.4.5. However, until this occurs, this method shall be considered equivalent to the requirements of 3.4.5.

3.4.4.1 Requirements. The vehicle shall comply with subjective rating score of 8 or better, as defined in Table 5, for spark generated emissions, non-spark generated emissions and switch pop noise sources (e.g., brake light switch, intermittent wiper relays, turn signal relays).

Use a signal of 30 dB above the antenna noise floor for the Medium Wave band (G1) and 20 dB above the antenna noise floor for the FM bands (JA1 and G3) as measured with a Quasi Peak detector.

This test is optional, based on the discretion of the EMC engineer and can supercede the requirements in Table 1, Table 2, and Table 3.

3.4.4.2 Test Equipment. This test requires:

3.4.4.2.1 Radiated emissions test equipment according to the requirements of IEC CISPR 25.

3.4.4.2.2 Compact Disc (CD) player, MP3 player, or similar used as audio signal source.

3.4.4.2.3 CD, MP3 files, or similar with tracks of voice signals. There shall also be a "silent" track included on the media. All signals shall be recorded in stereo.

3.4.4.2.4 RF signal generator with a frequency range of 0.15 MHz to 108 MHz capable of external amplitude modulation (AM) and frequency modulation (FM) modulation and with pre-emphasis (50 μ s and 75 μ s) for the FM modulation. For 76 MHz to 108 MHz, stereo modulation is required. The generator shall have an adjustable output power level capable of generating a minimum of 0 dBm.

3.4.4.2.5 Modulation analyzer for measurement of modulation index and deviation of the RF signal (may be internal to the RF signal generator).

3.4.4.3 Test Procedure. Use the audio signal source as a modulation source for the RF signal generator. The RF signal generator output shall be connected to a suitable transmitting antenna (e.g., 85 cm rod antenna) located approximately 1 m from the vehicle radio antenna. The transmitting antenna shall be positioned next to the vehicle and shall have no contact with the vehicle.

Note: Diversity antenna systems require special consideration relative to antenna polarization and vehicle orientation. Defer to the direction provided by the EMC test engineer.

Note: If audio signal source and RF signal generator are located inside the anechoic chamber, care must be taken to ensure that noise emitted by the test equipment does not cause any interference to the vehicle radio.

Using the QP detector and the test method per IEC CISPR 25 (with the vehicle inside an anechoic chamber), determine the unmodulated signal generator levels necessary to generate a receiving antenna terminal voltage of:

- 30 dB signal to antenna noise floor for AM band.
- 20 dB signal to antenna noise floor for FM band.

Note: During determination of the necessary RF transmission power, care must be taken to avoid the influence of persons inside the chamber. It is recommended that those persons who will carry out the subjective assessment are already sitting inside the vehicle during this time.

Note: This test may also be performed in an open field site. If suitable radio stations are available, they may be used instead of the signal generator.

For evaluation of medium wave (MW) frequency (G1) range, use AM modulation. The measured AM modulation shall be 80% for the loudest passage of the CD track or audio file.

For evaluation of the VHF (JA1 and G3) frequency range, use FM stereo modulation. For radios which have a de-emphasis of 75 μ s (e.g., North America) the pre-emphasis of the signal generator shall be set to 75 μ s. For radios which have a de-emphasis of 50 μ s (e.g., Europe and Japan) the pre-emphasis of the signal generator shall be set to 50 μ s. The measured deviation shall be 75 kHz for the loudest passage of the CD track or audio file.

The RF signal generator shall be tuned to each of the frequencies listed in Table 4 (as determined by the marketing region), unless otherwise specified in the vehicle test plan.

Listen to the audio when modulating the RF signal with voice signals. Assess its quality subjectively using the subjective rating scale in Table 5.

Table 4: RF Assessment Frequencies (by Region)

Country	Radio Service	Frequencies ^{Note 1}								
Australia	MW (AM) Broadcast (G1)	693 kHz Note 2	774 kHz Note 2	1278 kHz Note 2						
	VHF (FM II) Broadcast (G3)	89.9 MHz Note 2	100.3 MHz	101.1 MHz	101.9 MHz Note 2	103.5 MHz	103.9 MHz	104.3 MHz Note 2	103.9 MHz	103.9 MHz
China	MW (AM) Broadcast (G1)	540 kHz Note 2	603 kHz	729 kHz	954 kHz Note 2	1053 kHz	1134 kHz	1269 kHz Note 2		
	VHF (FM II) Broadcast (G3)	87.9 MHz Note 2	92.3 MHz	96.1 MHz	99.7 MHz Note 2	101.1 MHz	104.0 MHz	106.7 MHz Note 2		
Europe	MW (AM) Broadcast (G1)	531 kHz Note 2	576 kHz	594 kHz	837 kHz Note 2	1323 kHz	1539 kHz Note 2			
	VHF (FM II) Broadcast (G3)	88.1 MHz Note 2	89.9 MHz	90.4 MHz Note 2	96.0 MHz	99.7 MHz	100.8 MHz Note 2	103.9 MHz	107.4 MHz	
Japan	MW (AM) Broadcast (G1)	540 kHz Note 2	730 kHz	990 kHz Note 2	1270 kHz	1570 kHz Note 2				
	VHF (FM I) Broadcast (JA1)	76 MHz Note 2	79.4 MHz	83 MHz Note 2	86.5 MHz	88 MHz Note 2				
Korea	MW (AM) Broadcast (G1)	639 kHz Note 2	792 kHz Note 2	837 kHz	900 kHz Note 2					
	VHF (FM II) Broadcast (G3)	89.1 MHz Note 2	90.7 MHz	91.9 MHz	93.1 MHz Note 2	95.9 MHz	99.1 MHz	107.7 MHz Note 2		
South America	MW (AM) Broadcast (G1)	700 kHz Note 2	740 kHz	750 kHz	780 kHz	810 kHz	1040 kHz Note 2	1100 kHz	1600 kHz Note 2	
	VHF (FM I) Broadcast (JA1)	76 MHz Note 2	79.4 MHz	83 MHz Note 2	86.5 MHz	88 MHz Note 2				
	VHF (FM II) Broadcast (G3)	88.3 MHz Note 2	89.3 MHz	98.1 MHz	100.7 MHz Note 2	100.9 MHz	102.5 MHz	105.7 MHz Note 2		
U.S.	MW (AM) Broadcast (G1)	540 kHz Note 2	580 kHz	730 kHz Note 2	760 kHz	990 kHz Note 2	1230 kHz	1270 kHz Note 2	1570 kHz Note 2	
	VHF (FM II) Broadcast (G3)	89.9 MHz	90.5 MHz Note 2	96.1 MHz Note 2	100.3 MHz	103.9 MHz Note 2	104.3 MHz Note 2	107.5 MHz Note 2		

Note 1: Additional frequencies may be added, based on the highest spark and/or non-spark signals identified during testing per 3.4.3. Typically, a total of 15 frequencies are assessed for each service band.

Note 2: At these frequencies, all manually-operated devices are actuated, in addition to those sources that are on for the standard test.

MW = Medium Wave

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Table 5: Subjective Rating Scale for Each Test Point

Subjective Rating (SR)	Reception	Reception Description	EMC
10	Excellent	No detectable hiss/static/audio distortion.	Acceptable - EMC noise is either not present or not objectionable.
9	Very Good	Extremely clean signal with occasional hiss/static/audio distortion.	
8	Good	Very clean signal with intermittent hiss/static/audio distortion.	
7	Listenable	Clean signal with frequent hiss/static/audio distortion.	Border Line - EMC noise is present and slightly objectionable, but customer will still listen to station.
6	Fair	Solid signal with constant background static/hiss/audio distortion.	
5	Will listen if important	Equal amounts of static/hiss and signal. Understandable, will listen if important	Unacceptable - EMC noise is objectionable and customer will not listen to station.
4	Objectionable	Station is present, but there is annoying amount of static/hiss/distortion. Will not listen.	
3	Bad	Mostly static/hiss/audio distortion present with some intelligible signal, but not usable.	
2	Useless	Small breaks in static/hiss/audio distortion; can tell that a station is present.	
1	Nonexistent	No station and/or desired station is not present; constant static/hiss/audio distortion is present.	

3.4.5 Subjective Radio Listen Test (Substitution Method). This test provides a means of assessing potential interference risk to radio broadcast services. This method establishes a known RF broadcast environment(s) into which the vehicle is placed and any corresponding interference from unintentional on-board RF sources is evaluated. The intent is that this method shall be the final method for radio broadcast interference risk assessment. However, until facilities are harmonized, this method shall be considered equivalent to the requirements of 3.4.4.

3.4.5.1 Requirements. When exposed to the fringe RF broadcast signal environment (also known as the “Frederic-level”) as shown in Table 6, the vehicle should comply with a subjective rating score of 8 or better, as defined in Table 5, for both spark generated emissions and non-spark generated emissions.

In the event that this subjective rating is 7 or less, the vehicle interference risk shall be subsequently assessed for both a medium (also referred to as the “Milford-level”) and a high (also referred to as the “Warren-level”) RF broadcast environment. (Refer to Table 6.) For both environments, a minimum subjective rating score of 8 is required for both of these additional environments to be deemed compliant.

For the case of switch pop noise sources (e.g., brake light switch, intermittent wiper relays, turn signal relays), a minimum subjective rating of 6 shall be required when exposed to the medium, or “Milford-level”, signal environment.

This test is optional, based on the discretion of the EMC engineer and can supersede the requirements in Table 1, Table 2, and Table 3.