

Whitepaper

EN 300 220-2 v3.3.1

A review of key changes
in the latest edition



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Key changes to EN 300 220-2 V3.3.1

The EN 300 220-2 V3.3.1 standard was published by ETSI at the end of March 2025. It is the basic standard for short range devices in the frequency range from 25 MHz to 1000 MHz with a maximum power of 500 mW e.r.p.

On the 9th July 2025, EN 300 220-2 V3.3.1 - has been listed as a harmonised standard for radio equipment in support of Council Directive 2014/53/EU, also known as the Radio Equipment Directive (RED).

Key dates

EN 300 220-2 V3.3.1 has now been added to the Official Journal of the EU (OJ) as of 11/12/2025 with a stated 18 month transition period.



What are the changes?

At 107 pages, this standard is three times as comprehensive as its predecessor from 2018 with 33 pages.

As such there are some significant changes to the requirements. Significantly, reference to ETSI EN 300 220-1 has been removed, making the standard self-standing. The test methods are now detailed within clause 5 of EN 300 220-2 itself.

For some of the requirements the test methods are identical to the previously referenced version of the standard however, the requirements for tests such as spurious emissions, power spectral density, duty cycle and Tx behaviour under low voltage conditions have all been updated.

In addition new receiver requirements have been added according to the ETSI EG 203 336 on Rx parameters. Although some of these parameters were previously only applicable to Category 1 Receivers, the requirements are now applied generally. The new requirements are for the following tests:

- » Rx Dynamic Range
- » Rx Spurious Response Rejection
- » Rx adjacent Channel Selectivity
- » Rx Intermodulation Rejection

EN 300 220-2 V3.3.1 has also introduced some new requirements for Frequency Hopping Spread Spectrum (FHSS) equipment.

The new standard also sees the addition of temperature range categories for extreme temperature tests under section 5.1.3. Previously these were stated under EN 300 220-1 and were less extensive.

The extreme temperature test range shall be equal to, or exceed, the boundary limits in the categories below:

- » Indoor category: 0 °C to +45 °C
- » Extended indoor category: 0 °C to +85 °C
- » Outdoor category: -20 °C to +70 °C
- » Extended outdoor category: -20 °C to +85 °C
- » Automotive category: -40 °C to +125 °C

More details on each of these changes now follows.



1. Unwanted emissions in the spurious domain

Key change: For conducted & radiated spurious emissions there are limit changes and the number of Sweep points is now defined for 25-1000MHz and 1-6GHz frequency ranges. (Section 4.3.1 of EN 300 220-2).

Spurious emissions are effectively "unwanted" emissions on a frequency or frequencies which are outside the necessary bandwidth and the level of which may be reduced without affecting the corresponding transmission of the information.

These emissions include harmonic emissions, parasitic emissions, intermodulation products and frequency conversion products but exclude out-of-band emission. These are either measured at the antenna port (conducted) or radiated by the cabinet or emissions radiated by integral antenna equipment.

These emissions must be controlled and remain under defined limits over a wide range of frequencies. Figure 1 below compares the transmitter limits for spurious emissions for both the new and previous versions of the standard:

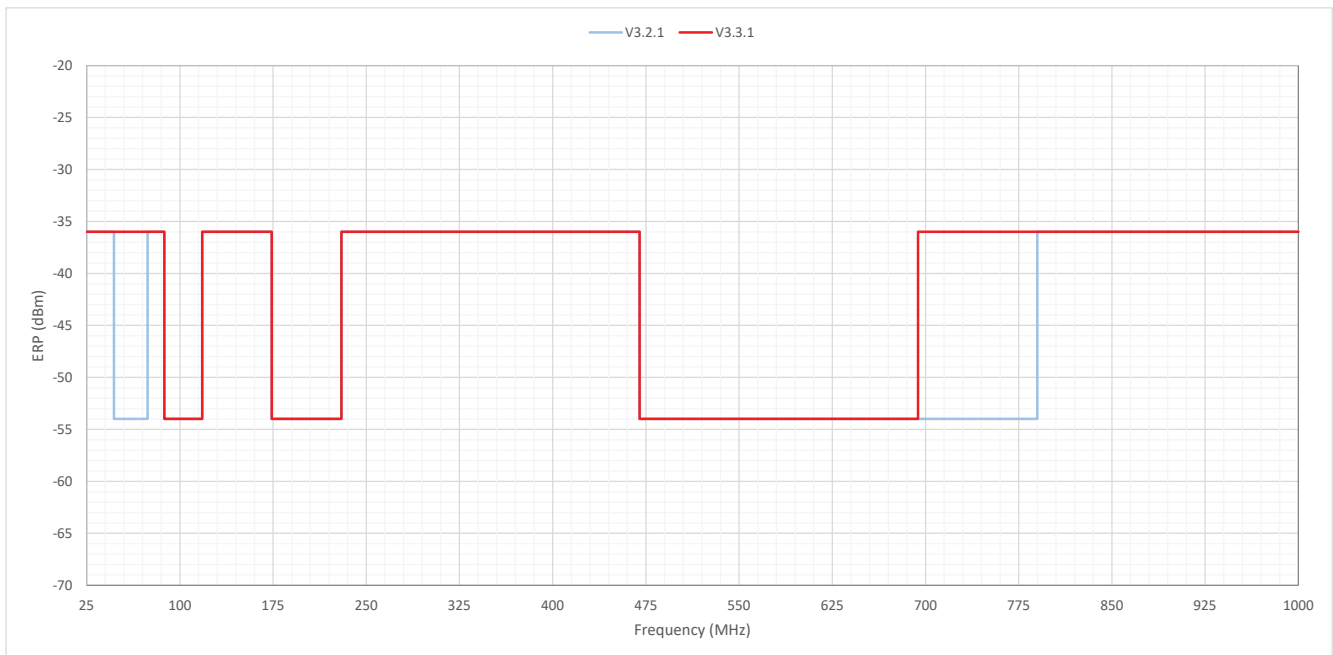


Figure 1: Graphical representation of transmitter limits for spurious emissions (to 1GHz) for EN 300 220-2 V3.2.1 and V3.3.1

The permitted maximum power level has remained the same but the frequency range with regards to the maximum power has changed between 47MHz to 74MHz, as well as between 470MHz to 1GHz.

The direct implication of this is that the requirements are simply less onerous and products that were compliant with EN 300 220-2 V3.2.1 will comply with the latest version, EN 300 220-2 V3.3.1 in terms of transmitter spurious emissions.



2. Tx Maximum e.r.p. Power Spectral Density

Key change: Tx maximum e.r.p. power spectral density -The standard now specifies an averaging time that contains a minimum of 10 transmissions (Section 5.4.2.4 of EN 300 220-2 V3.3.1).

This requirement is a subtle change from the previous version of the standard but may result in a different result depending on the parameters used for previous assessment.

3. Duty Cycle

Key change: The measurement procedure for Duty cycle measurements is clarified and provides more specific measurement settings compared to ETSI EN 300 220-2V3.2.1. The sampling rate and signal level threshold are clearly defined (Section 5.4.3.4 of EN 300 220-2 V3.3.1).

These differences in how the duty cycle is defined will undoubtedly result in changes to the duty cycle measured for a given product. The significance of which will depend on the measurement parameters previously used and the margin to the requirement limit.

4. Maximum Occupied Bandwidth

Key change: Maximum Occupied Bandwidth -The standard now specifies an averaging time that contains a minimum of 10 transmissions (Section 5.4.4.4 of EN 300 220-2 V3.3.1).

This requirement is a subtle change from the previous version of the standard but may result in a different result depending on the parameters used for previous assessment.

5. Tx behaviour under low voltage conditions

Key change: Tx behaviour under low voltage conditions - Spectrum analyser settings have now been added – this was missing from the previous version of the standard (Section 5.4.10 of EN 300 220-2 V3.3.1).

This test is a measure of a transmitters behaviour when subject to a reduced supply voltage. It is only applicable to battery powered devices and as such may require re-assessment for such devices.

6. Adjacent Channel Power

Key change: The Limits for adjacent channel power have been amended. Additionally, for the measurement of DM-2 (continuous modulated) signals a max hold trace mode should now be used, with linear averaging no longer permitted (Section 5.4.11 of EN 300 220-2 V3.3.1).

Adjacent channel power is a test applicable to all transmitters with a channel width of less than or equal to 25KHz. The test is a measurement of power leakage onto adjacent and alternate channels.

Previously the limit for adjacent and alternate channels was different depending on whether the channel width was greater or less than 20kHz. The limits have now been revised to -15dBm and



-20dBm, for adjacent and alternate channels respectively. These limits are less stringent than in the previous version of the standard.

The implication of this is that the requirements would be less onerous and products that were compliant with EN 300 220-2 V3.2.1 would comply with the latest version, EN 300 220-2 V3.3.1 in terms of adjacent channel power.

However, for products that had been tested previously using a DM-2 (continuous modulated) test signal, these measurements will have been performed with linear averaging, whereas the updated requirements stipulate a max hold trace mode. As such, a reassessment of adjacent channel power would be recommended for devices previously tested with a DM-2 test signal.

7. FHSS equipment requirements

Key change: FHSS Equipment - A test method has now been added. This requirement is no longer a declaration made by the manufacturer as previously stated in EN 300 220-2 V3.2.1 (Section 5.4.11 of EN 300 220-2 V3.3.1).

These new requirements apply to all Frequency Hopping Spread Spectrum (FHSS) equipment. The requirements cover the following parameters:

- » Number of hopping channels
- » Dwell time
- » Duty cycle (for dwell times less than 10ms)
- » Hopping channel return time

These tests for FHSS equipment are a new requirement for EN 300 220-2 V3.3.1. As such all FHSS equipment should be assessed against these requirements.

8. Rx Dynamic range

Key change: A new receiver requirement for Rx dynamic range has been added in accordance with ETSI EG 203 336 on Rx parameters. (Section 4.5.2 of EN 300 220-2 V3.3.1).

Rx dynamic range is the range of input signal between the minimum sensitivity level and the maximum input signal power to the receiver which produces the wanted receiver performance.

The equipment Rx dynamic range shall not be less than the limits given in Table 1.

Parameter	Limit
Rx Dynamic Range	≥ 60 dB

Table 1: Receiver dynamic range Parameters

As Rx dynamic range is a new requirement detailed in the new version of the standard ETSI EN 300 220-2 V3.3.1, conformance will need to be demonstrated for both new products and those already on the market.



9. Rx spurious response rejection

Key change: A new receiver requirement for Rx spurious response rejection has been added in accordance with ETSI EG 203 336 on Rx parameters. (Section 4.5.5 of EN 300 220-2 V3.3.1).

The spurious response rejection requirement is a measure of the capability of the receiver to receive a wanted signal without exceeding a given degradation due to the presence of an unwanted unmodulated signal at any frequency at which a response is obtained. The frequencies of the operating and adjacent channels are excluded.

The standard defines that the equipment receiver rejection level for any spurious response within the interval $f_{\text{nom}} \pm 15$ MHz shall not be less than the limits given in Table 2. Where OC denotes the Operating Channel.

Spurious response frequency offset	Limit
± 2 MHz from OC edges FOC_{high} and FOC_{low}	-79 dBm
< -2 MHz from OC edge FOC_{high} or > 2 MHz from OC edge FOC_{low}	-54 dBm

Table 2: Receiver spurious response rejection limits

NOTE: Lower and upper frequency edges values of OC are denoted as FOC_{low} and FOC_{high} .

As Rx spurious response rejection is a new requirement detailed in the new version of the standard ETSI EN 300 220-2 V3.3.1, conformance will need to be demonstrated for both new products and those already on the market.

10. Rx Adjacent Channel Selectivity

Key change: A new receiver requirement for Rx adjacent channel selectivity has been added in accordance with ETSI EG 203 336 on Rx parameters. (Section 4.5.3 of EN 300 220-2 V3.3.1).

Adjacent channel selectivity is a measure of the receiver capability to receive a wanted signal without exceeding a given degradation due to the presence of an unwanted input signal in the adjacent channels. The equipment adjacent channel selectivity shall not be less than the value specified in Table 3.

Parameter	Value
	Wanted signal = $S + 3\text{dB}$
Adjacent channel selectivity	-54 dBm

Table 3: Receiver adjacent channel selectivity limits

The adjacent channel selectivity requirements are only applicable for devices operating in bands D and J as defined in table 4 of EN 300 220-2 V3.3.1 or for any other nationally recognised band with a specified channel spacing.



As Rx adjacent channel selectivity is a new requirement detailed in the new version of the standard ETSI EN 300 220-2 V3.3.1, conformance will need to be demonstrated for all products for which this requirement is applicable.

11. Rx Intermodulation Rejection

Key change: A new receiver requirement for Rx intermodulation rejection has been added in accordance with ETSI EG 203 336 on Rx parameters. (Section 4.5.6 of EN 300 220-2 V3.3.1).

The intermodulation rejection requirement is a measure of the capability of the receiver to receive a wanted modulated signal without exceeding a given degradation due to the presence of two or more unwanted signals with a specific frequency relationship to the wanted signal.

In this test one unwanted signals is unmodulated at a frequency offset from the channel under test by two channel widths. The other unwanted signal is modulated with the same modulation as the wanted signal but at a frequency offset of four channel widths. The equipment receiver intermodulation rejection level, the level at which the unwanted signals block the wanted signal, shall not be less than the value specified in Table 4.

Parameter	Limit
Recevier intermodulation rejection	25 dB

Table 4: Receiver intermodulation rejection limits

As is the case for the adjacent channel selectivity requirement, the Rx intermodulation rejection requirement is only applicable for devices operating in bands D and J or for any other nationally recognised band with a specified channel spacing.

As this is a new requirement detailed in the new version of the standard ETSI EN 300 220-2 V3.3.1, conformance will need to be demonstrated for all products for which this requirement is applicable.



Summary

Considerable changes have been made to the standard with the removal of reference to ETSI EN 300 220-1 for the test method. Several new requirements have also been added for FHSS equipment and receiver parameters.

In terms of transmitter spurious emissions requirements, these are simply less onerous and equipment compliant to EN 300 220-2 V3.2.1 will comply with the latest version, EN 300 220-2 V3.3.1. With regards to the receiver parameters, the changes and additional tests are substantial and need to be addressed as soon as possible for those who wish to become compliant to EN 300 220-2 V3.3.1.

The same can also be said for Frequency hopping spread spectrum equipment. In addition, the test methods for several tests such as Tx maximum power spectral density, duty cycle and adjacent channel power have changed and will most likely require re-assessment.

Due to the complexity of some of the amended and additional tests, only re-testing to the latest version can confirm as to whether your current product will comply with the latest version of EN 300 220-2.

How can we help you?

Eurofins Electrical & Electronics UK has a number of UKAS-Accredited test laboratories that can help you assess to the latest requirements of EN 300 220-2 V3.3.1.

For more information or to discuss how we can help you comply with these new requirements, please call us on +44 330 430 3456 or email EEinfoUK@cpt.eurofinseu.com



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