EMCC™ DR. RAŠEK

TEST REPORT # EMCC-040197BCA, 2015-02-18

EQUIPMENT UNDER TEST:

Trade Name:	T10
Type Designation(s):	T10F S2, T10F S3, T10F S4, T10F S5, T10F S6
Serial Number:	Type S2: Rotor: 150230092, Stator: Test sample, no serial number Type S3: Rotor: 121330133, Stator: Test sample, no serial number Type S4: Rotor: 154630085, Stator: Test sample, no serial number Type S5: Rotor: 180630016, Stator: Test sample, no serial number Type S6: Rotor: 173330052, Stator: Test sample, no serial number
Equipment Class:	Low Power Transceiver
Manufacturer:	Hottinger Baldwin Messtechnik GmbH
Address:	Im Tiefen See 45 64293 Darmstadt Germany
Phone:	+49 6151 803-681
Fax:	+49 6151 803-98790

RELEVANT STANDARD(S): 47 CFR Part 15C, RSS-210 Issue 8

MEASUREMENT PROCEDURE:

☒ RSS-Gen Issue 4 ☒ ANSI C63.10-2009 ☐ Other

TEST REPORT PREPARED BY:

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HEAD OF COMMERCIAL EMC AND RADIO DEPT.:

Wolfgang Döring

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1 GENERAL INFORMATION

1.1 Purpose

The purpose of this report is to show compliance with the 47 CFR Part 15C and Industry Canada RSS-210 Issue 8 requirements for the certification of licence-exempt Intentional Radiators.

1.2 Limits and Reservations

1.3 Test Location

Test Laboratory:	EMCCons DR. RAŠEK GmbH & Co. KG
Accreditation No.:	D-PL-12067-01-00
Address of Labs I, II, III and Head Office:	EMCCons DR. RAŠEK GmbH & Co. KG Moggast, Boelwiese 8 91320 Ebermannstadt GERMANY
Address of Labs IV and V:	EMCCons DR. RAŠEK GmbH & Co. KG Stoernhofer Berg 15 91364 Unterleinleiter GERMANY
Laboratory:	Test Laboratory IV The 3 m & 10 m semi-anechoic chamber site has been fully described in a report submitted to the FCC and accepted in the letter dated December 24, 2013, Registration Number 878769. This 3 m & 10 m alternative test site is approved by Industry Canada under file number 3464C-1.
Phone:	+49 9194 9016
Fax:	+49 9194 8125
E-Mail:	info@emcc.de
Web:	www.emcc.de

1.4 Manufacturer

Company Name:	Hottinger Baldwin Messtechnik GmbH
Street:	Im Tiefen See 45
City:	64293 Darmstadt
Country:	Germany
Name for contact purposes:	Mr Michael Koslowski
Phone:	+49 6151 803-681
Fax:	+49 6151 803-98790
E-Mail:	michael.koslowski@hbm.com

1.5 Dates and Test Location

Date of receipt of EUT:	2014-10-15 (T10F S2); 2014-10-22 (T10F S3, T10F S4), 2014-11-03 (T10F S5), 2014-11-03 (T10F S6)
Test Date:	CW 43/2014 till CW 6/2015
Test Location:	Lab IV

1.6 Ordering Information

Purchase Order and Date:	E60-4500494797/2000, 2014-10-21
Vendor Number:	806266

1.7 Climatic Conditions

Date	Temperature [°C]	Relative Humidity [%]	Air Pressure [hPa]	Lab	Customer attended tests
2014-10-27	21	45	983	IV	no
2014-10-28	22	43	979	IV	no
2014-11-03	22	43	967	IV	no
2014-11-04	22	43	956	IV	no
2014-11-05	23	42	961	IV	no
2014-11-17	22	37	965	IV	no
2014-11-19	22	40	977	IV	no
2014-12-03	21	32	976	IV	no
2014-12-04	21	33	973	IV	no
2014-12-11	21	36	971	IV	no
2015-02-06	21	23	980	IV	no

2 PRODUCT DESCRIPTION

2.1 Equipment Under Test (EUT)

Trade Name:	T10	
Type Designation(s):	T10F S2, T10F S3, T10F S4, T10F S5, T10F S6	
Serial Number(s):	Type T10F S2: 150230092 (Rotor), Test sample, no serial number (Stator)	
	Type T10F S3: 121330133 (Rotor), Test sample, no serial number (Stator)	
	Type T10F S4: 154630085 (Rotor), Test sample, no serial number (Stator)	
	Type T10F S5: 180630016 (Rotor), Test sample, no serial number (Stator)	
	Type T10F S6: 173330052 (Rotor), Test sample, no serial number (Stator)	
FCC ID:	2ADAT-T10S2TOS6	
Industry Canada Certification Number:	IC: 12438A-T10S2TOS6	
Application:	Low Power Transceiver	
Transmit Frequencies:	F1: 25 kHz	F2: 5 MHz
Modulation:	F1: unmodulated	F2: PPM
Emission Designator:	F1: 30H4N0N	F2: 478KM1D
Power Supply:	24 VDC	
Ports:	Signal and supply - 7 pole binder industrial connector	
Antennas:	Integrated loop antenna	
Variants:	T10F S2 ,T10F S3, T10F S4, T10F S5 and T10F S6	
Remarks:	The T10FS S2 to T10FS S6 has not been physically presented to the test laboratory.	

The variants S2, S3, S4, S5 and S6 share the same electronic in the stator with different antenna diameters. The rotor these variants do as well share the same electronic, but have different diameters which are used for different torque levels.

Due to the mechanically variants of the rotor the shared electronic varies also its outer shape and layout of the board, but the electrical circuitry is kept the same.

2.2 Intended Use

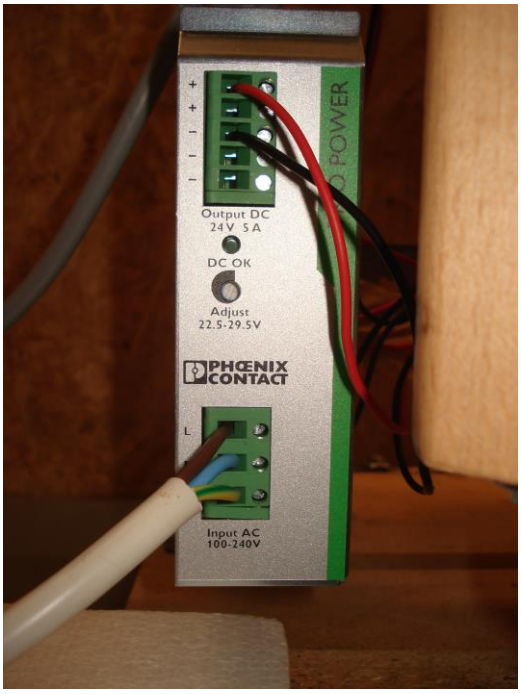
The EUTs are complete measuring systems to measure torque on a rotating shaft. The standard use is inside a test stand.

2.3 EUT Peripherals/Simulators

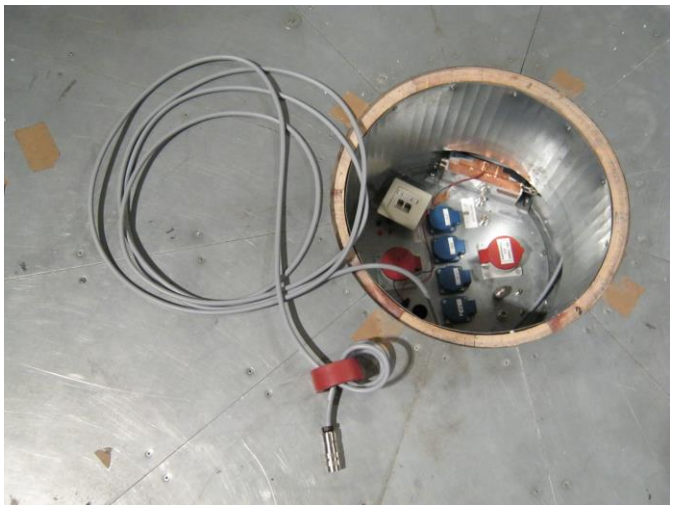
The EUT was tested connected with

- Power supply TRIO-PS/1AC/24DC/5 (Phoenix Contact)
- Junction box with termination resistor and connectors for the power supply
- Ferrite (VITROPERM 500 F, Type: T60006-L2063-W517) with 3 turns at the signal and supply connector to port 1

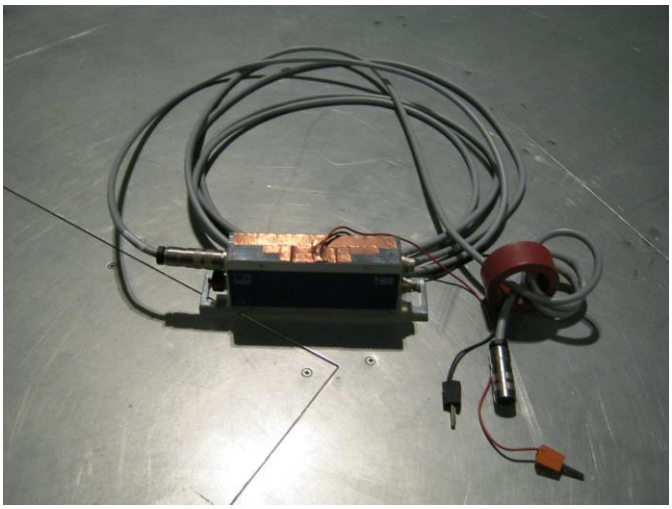
Photograph 2.3-1: Power supply TRIO-PS/1AC/24DC/5



Photograph 2.3-2: Power supply TRIO-PS/1AC/24DC/5, front view



Photograph 2.3-3: Junction box with signal and supply cable and ferrite connected



Photograph 2.3-4: Junction box with signal and supply cable and ferrite

2.4 Mode of operation during testing and test set-up

The equipment under test (EUT) was operated during the tests under the following conditions:
Normal operating mode.
The rotor of the EUT was fixed and there was no torque applied to the EUT.

Under normal test conditions the EUT was powered with 24 VDC by the AC / DC supply TRIO-PS/1AC/24DC/5 delivered by the customer. A ferrite (VITROPERM 500 F, Type: T60006-L2063-W517) was attached with 3 turns to the signal and supply cable connected to port 1.
All peripherals/simulators were operated outside of the test environment.

2.5 Modifications required for compliance

The Type T10F S6 (173330052 (Rotor), Test sample, no serial number (Stator)) was modified by HBM personal. The RF power was tuned to minimum power level.

3 TEST RESULTS SUMMARY

Summary of test results for the following EUT:

Manufacturer: Hottinger Baldwin Messtechnik GmbH
Trade Name: T10
Type Designation(s): T10F S2, T10F S3, T10F S4, T10F S5, T10F S6
Serial Number(s): Type T10F S2: 150230092 (Rotor), Test sample, no serial number (Stator)
Type T10F S3: 121330133 (Rotor), Test sample, no serial number (Stator)
Type T10F S4: 154630085 (Rotor), Test sample, no serial number (Stator)
Type T10F S5: 180630016 (Rotor), Test sample, no serial number (Stator)
Type T10F S6: 173330052 (Rotor), Test sample, no serial number (Stator)

Requirement	RSS, Section	47 CFR Section	Report Section	Result
Antenna Requirement	RSS-Gen, 8.3	15.203	4	Passed
Conducted AC Power Line Emissions 150 kHz – 30 MHz	RSS-Gen, 8.8	15.207	5	Passed
Occupied Bandwidth (99%)	RSS-Gen, 6.6		6	Passed
Radiated Emissions 9 kHz – 30 MHz	RSS-210, A2.6 RSS-Gen, 6.13, 8.9, 8.10	15.205, 15.209	7	Passed
Radiated Emissions 30 MHz – 1000 MHz	RSS-210, A2.6 RSS-Gen, 6.13, 8.9, 8.10	15.205, 15.209	8	Passed

N.A. – not applicable; N.T. – Not tested acc. to applicant's order.

The client has made the determination that EUT Condition, Characterization, and Mode of Operation are representative of production units and meet the requirements of the specifications referenced herein. Consistent with Industry practice, measurement and test equipment not directly involved in obtaining measurement results but having an impact on measurements (such as cable loss, antenna factors, etc.) are factored into the "Correction Factor" documented in certain test results. Instrumentation employed for testing meets tolerances consistent with known Industry Standards and Regulations.
The measurements contained in this report were made in accordance with the procedures described in ANSI C63.10-2009 and RSS-Gen Issue 4.
All requirements were found to be within the limits outlined in this report.
The test results in this report apply only to the particular equipment under test (EUT) as declared in this report.

Test Personal: Karlheinz Kraft, Ludwig Kraft
Issuance Date: 2015-02-18

4 ANTENNA REQUIREMENT

Test Requirement: 47 CFR 15.203, IC RSS-Gen Issue 4, 8.3

4.1 Regulation

FCC 15.203 An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of Part 15C. The manufacturer may design the unit so that the user can replace a broken antenna, but the use of a standard antenna jack or electrical connector is prohibited. This requirement does not apply to carrier current devices or to devices operated under the provisions of Sections 15.211, 15.213, 15.217, 15.219, or 15.221.
Further, this requirement does not apply to intentional radiators that must be professionally installed, such as perimeter protection systems and some field disturbance sensors, or to other intentional radiators which, in accordance with Section 15.31(d), must be measured at the installation site. However, the installer shall be responsible for ensuring that the proper antenna is employed so that the limits in this Part are not exceeded.

IC RSS-Gen: 8.3 Transmitter Antenna for Licence-Exempt Radio Apparatus
The applicant for equipment certification, as per RSP-100, must provide a list of all antenna types that may be used with the licence-exempt transmitter, indicating the maximum permissible antenna gain (in dBi) and the required impedance for each antenna.
Licence-exempt transmitters that have received equipment certification may operate with different types of antennas. However, it is not permissible to exceed the maximum equivalent isotropically radiated power (e.i.r.p.) limits specified in the applicable standard (RSS) for the licence-exempt apparatus.
Testing shall be performed using the highest gain antenna of each combination of licence-exempt transmitter and antenna type, with the transmitter output power set at the maximum level[NOTE]. When a measurement at the antenna connector is used to determine RF output power, the effective gain of the device's antenna shall be stated, based on a measurement or on data from the antenna manufacturer.
NOTE: Compliance is required under all operational combinations of transmitter output power and antenna gain.
User manuals for transmitters equipped with detachable antennas shall also contain the following notice in a conspicuous location:

> *This radio transmitter (identify the device by certification number or model number if Category II) has been approved by Industry Canada to operate with the antenna types listed below with the maximum permissible gain indicated. Antenna types not included in this list, having a gain greater than the maximum gain indicated for that type, are strictly prohibited for use with this device.*

Immediately following the above notice, the manufacturer shall provide a list of all antenna types
No applicable antenna requirement specified in **RSS-210**.

4.2 Result

Manufacturer:	Hottinger Baldwin Messtechnik GmbH
Device:	T10
Type(s):	T10F S2, T10F S3, T10F S4, T10F S5, T10F S6
Serial No(s):	See section 2
Test date:	2015-02-18

The EUT meets the requirements of this section.

5 POWER LINE CONDUCTED EMISSIONS TEST

Test Requirement: FCC 47 CFR 15.207, IC RSS-Gen Issue 4, 8.8
Test Procedure: ANSI C63.10-2009, IC RSS-Gen

5.1 Regulation

FCC 15.207 (a) Except as shown in paragraphs (b) and (c) of this section, for an intentional radiator that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies, within the band 150 kHz to 30 MHz, shall not exceed the limits in the following table, as measured using a 50 µH/50 ohms line impedance stabilization network (LISN). Compliance with the provisions of this paragraph shall be based on the measurement of the radio frequency voltage between each power line and ground at the power terminal. The lower limit applies at the boundary between the frequency ranges.

Frequency of emission (MHz)	**Conducted limit (dBµV)**	
	Quasi-peak	**Average**
0.15-0.5	66 to 56*	56 to 46*
0.5–5	56	46
0.5-30	60	50

*Decreases with the logarithm of the frequency.

(b) The limit shown in paragraph (a) of this section shall not apply to carrier current systems operating as intentional radiators on frequencies below 30 MHz.

In lieu thereof, these carrier current systems shall be subject to the following standards:

(1) For carrier current system containing their fundamental emission within the frequency band 535–1705 kHz and intended to be received using a standard AM broadcast receiver: no limit on conducted emissions.

(2) For all other carrier current systems: 1000 µV within the frequency band 535–1705 kHz, as measured using a 50 µH/50 ohms LISN.

(3) Carrier current systems operating below 30 MHz are also subject to the radiated emission limits in § 15.205, § 15.209, § 15.221, § 15.223, or § 15.227, as appropriate.

(c) Measurements to demonstrate compliance with the conducted limits are not required for devices which only employ battery power for operation and which do not operate from the AC power lines or contain provisions for operation while connected to the AC power lines. Devices that include, or make provisions for, the use of battery chargers which permit operating while charging, AC adapters or battery eliminators or that connect to the AC power lines indirectly, obtaining their power through another device which is connected to the AC power lines, shall be tested to demonstrate compliance with the conducted limits.

IC RSS-Gen: 8.8 AC Power Line Conducted Emissions Limits for Licence-Exempt Radio Apparatus
A radio apparatus that is designed to be connected to the public utility (AC) power line shall ensure that the radio frequency voltage, which is conducted back onto the AC power line on any frequency or frequencies within the band 150 kHz-30 MHz, shall not exceed the limits in Table 3.
Unless the requirements applicable to a given device state otherwise, for any radio apparatus equipped to operate from the public utility AC power supply either directly or indirectly (such as with a battery charger), the radio frequency voltage of emissions conducted back onto the AC power lines in the

frequency range of 0.15 MHz to 30 MHz shall not exceed the limits shown in Table 3 below. The more stringent limit applies at the frequency range boundaries.

Table 3 – AC Power Line Conducted Emission Limits

Frequency of emission (MHz)	**Conducted limit (dBµV)**	
	Quasi-peak	**Average****
0.15-0.5	66 to 56*	56 to 46*
0.5–5	56	46
0.5-30	60	50

*Decreases with the logarithm of the frequency.
** A linear average detector is required.

→ The IC limits are equal to the FCC limits.

5.2 Test Equipment

Type	**Manufacturer/ Model No.**	**EMCC Ident No.**	**Last Calibration**	**Next Calibration**
EMI Test Receiver	Rohde & Schwarz / ESU8	3846	2014-07	2015-07
V-LISN 50 Ω//(50 uH + 5 Ω)	Rohde & Schwarz / ESH2-Z5	1901	2013-10	2015-10
Protector Limiter	Rohde & Schwarz / ESH3-Z2	1519	2014-09	2015-09
AC Power Source	AEG	0001	n.a	n.a

5.3 Test Procedures

The EUT was placed on a wooden table of nominal size 1 m by 1.5 m, raised 80 cm above the reference groundplane. The vertical conducting wall of the screened room was located 40 cm to the rear of the EUT.
The excess length of the power cord of the ac adapter to the EUT was folded back and forth at the center of the lead to form a bundle not exceeding 40 cm in length.
LISN housing, measuring instrument case, reference ground plane and the vertical conducting wall of the screened room was bonded together.

5.4 Test Result Type T10F S2

Freq [MHz]	Line	Detector	Result [dBµV]	Limit [dBµV]	Margin
0.685	L	AV	41.6	46.0	4.4
0.745	L	AV	37.7	46.0	8.3
0.685	L	QP	45.0	56.0	11.0
0.620	L	AV	34.9	46.0	11.1
0.685	N	AV	39.5	46.0	6.5
0.745	N	AV	35.9	46.0	10.1
0.685	N	QP	43.0	56.0	13.0
0.620	N	AV	32.5	46.0	13.5

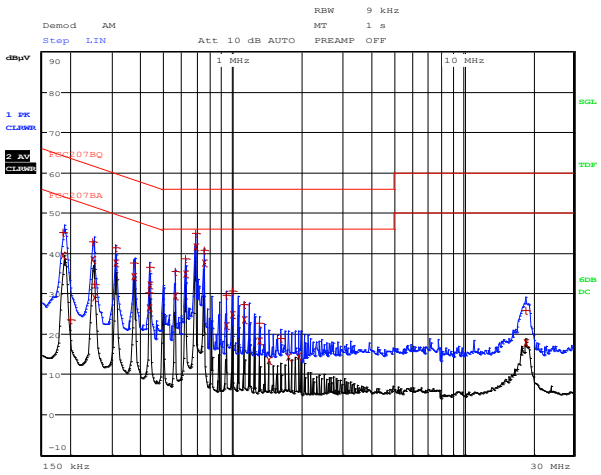
The table above contains worst-case emissions, only. For further details refer to the test plots.

Manufacturer: Hottinger Baldwin Messtechnik GmbH
Device: T10
Type(s): T10F S2
Serial No(s): 150230092 (Rotor); Test sample, no serial number (Stator)
Test date: 2014-11-03

The EUT meets the requirements of this section.

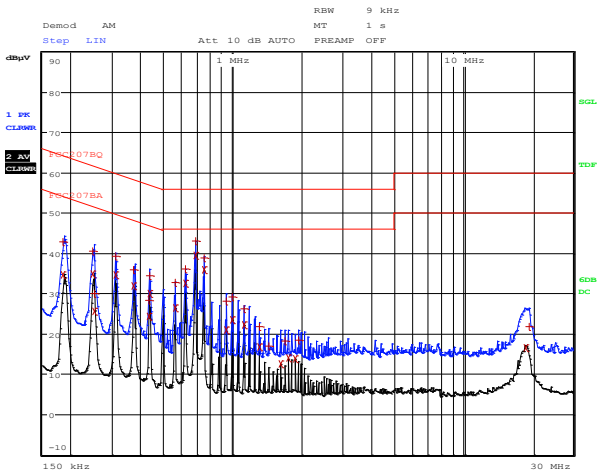
5.5 Measurement Plots Type T10F S2

Test on line L:



Manufacturer: HBM, EUT #30, Power 115Vac / 60 Hz, configurat
ion: with one ferrit, Line: L
Date: 3.NOV.2014 15:44:33

Test on line N:



Manufacturer: HBM, EUT #30, Power 115Vac / 60 Hz, configurat
ion: with one ferrit, Line: N
Date: 3.NOV.2014 15:49:37

5.6 Test Result Type T10F S3

Freq [MHz]	Line	Detector	Result [dBµV]	Limit [dBµV]	Margin
0.685	L	AV	41.6	46.0	4.4
0.745	L	AV	37.3	46.0	8.7
0.685	L	QP	45.2	56.0	10.8
0.620	L	AV	34.7	46.0	11.3
0.685	N	AV	39.2	46.0	6.8
0.745	N	AV	34.9	46.0	11.1
0.685	N	QP	43.1	56.0	12.9
0.620	N	AV	31.9	46.0	14.1

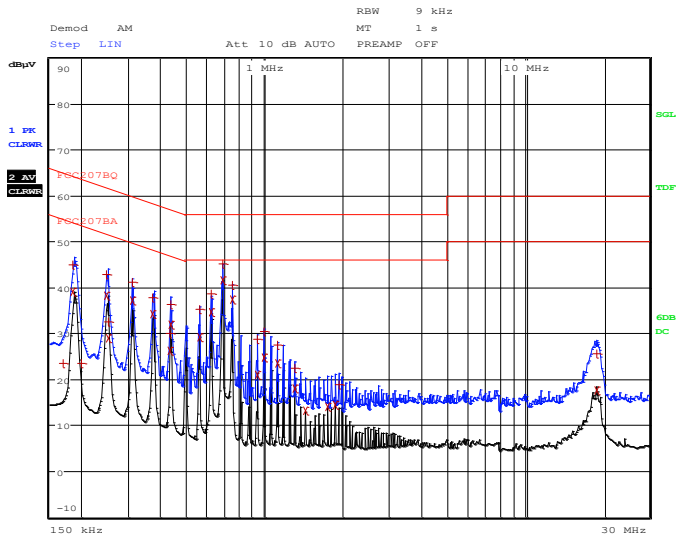
The table above contains worst-case emissions, only. For further details refer to the test plots.

Manufacturer:	Hottinger Baldwin Messtechnik GmbH
Device:	T10
Type(s):	T10F S3
Serial No(s):	121330133 (Rotor); Test sample, no serial number (Stator)
Test date:	2014-11-03

The EUT meets the requirements of this section.

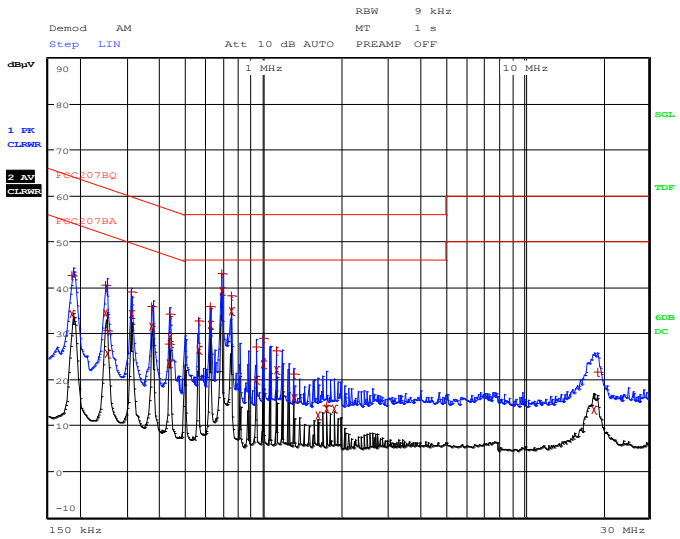
5.7 Measurement Plots Type T10F S3

Test on line L:



Manufacturer: HBM, EUT #31, Power 115Vac / 60 Hz, configurat
ion: with one ferrit, Line: L
Date: 3.NOV.2014 16:06:37

Test on line N:



Manufacturer: HBM, EUT #31, Power 115Vac / 60 Hz, configurat
ion: with one ferrit, Line: N
Date: 3.NOV.2014 16:01:43

5.8 Test Result Type T10F S4

Freq [MHz]	Line	Detector	Result [dBµV]	Limit [dBµV]	Margin
0.685	L	AV	41.1	46.0	4.9
0.745	L	AV	36.6	46.0	9.4
0.685	L	QP	45.4	56.0	10.6
0.620	L	AV	34.1	46.0	11.9
0.685	N	AV	38.8	46.0	7.2
0.745	N	AV	34.6	46.0	11.4
0.685	N	QP	43.2	56.0	12.8
0.620	N	AV	31.5	46.0	14.5

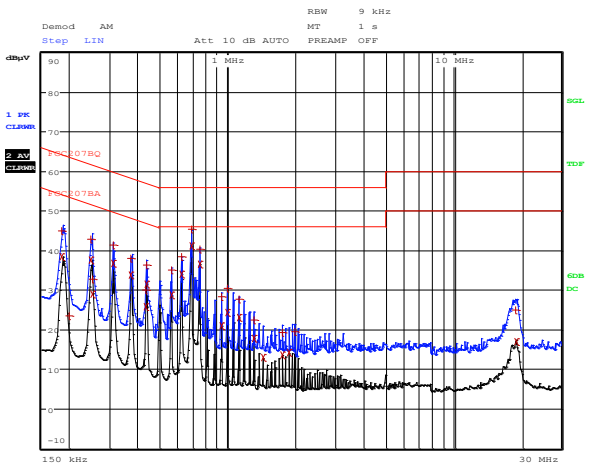
The table above contains worst-case emissions, only. For further details refer to the test plots.

Manufacturer:	Hottinger Baldwin Messtechnik GmbH
Device:	T10
Type(s):	T10F S4
Serial No(s):	154630085 (Rotor); Test sample, no serial number (Stator)
Test date:	2014-11-03

The EUT meets the requirements of this section.

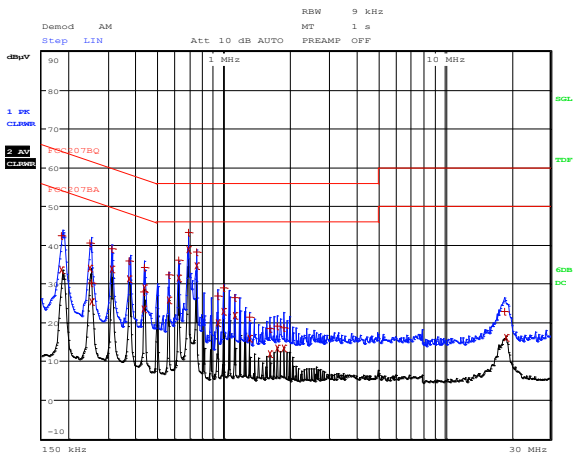
5.9 Measurement Plots Type T10F S4

Test on line L:



Manufacturer: HBM, EUT #32, Power 115Vac / 60 Hz, configurat
ion: with one ferrit, Line: L
Date: 3.NOV.2014 16:26:06

Test on line N:



Manufacturer: HBM, EUT #32, Power 115Vac / 60 Hz, configurat
ion: with one ferrit, Line: N
Date: 3.NOV.2014 16:14:22

5.10 Test Result Type T10F S5

Freq [MHz]	Line	Detector	Result [dBµV]	Limit [dBµV]	Margin
0.680	L	AV	42.3	46.0	3.7
0.745	L	AV	39.7	46.0	6.3
0.620	L	AV	36.7	46.0	9.3
0.310	L	AV	38.8	50.0	11.2
0.680	N	AV	40.3	46.0	5.7
0.745	N	AV	37.7	46.0	8.3
0.620	N	AV	34.3	46.0	11.7
0.310	N	AV	36.0	50.0	14.0

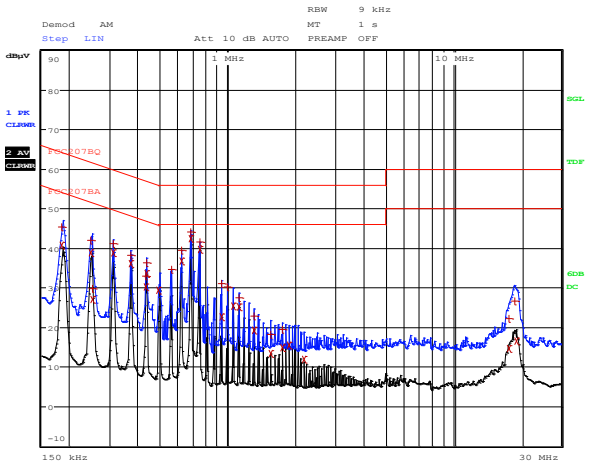
The table above contains worst-case emissions, only. For further details refer to the test plots.

Manufacturer:	Hottinger Baldwin Messtechnik GmbH
Device:	T10
Type(s):	T10F S5
Serial No(s):	180630016 (Rotor); Test sample, no serial number (Stator)
Test date:	2014-11-19

The EUT meets the requirements of this section.

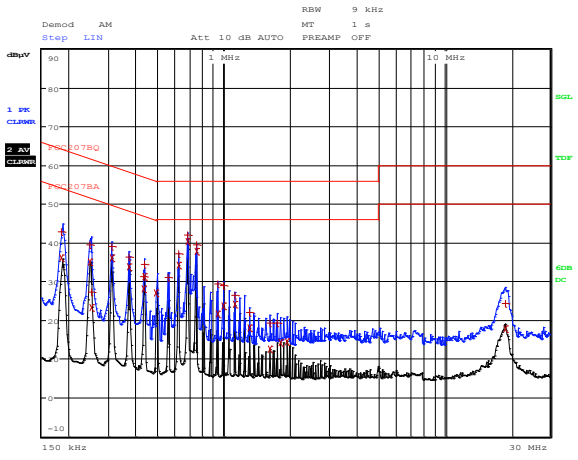
5.11 Measurement Plots Type T10F S5

Test on line L:



Manufacturer: HBM, EUT #35, Power 115Vac / 60 Hz, configurat
ion: with one ferrit, Line: L
Date: 19.NOV.2014 15:39:50

Test on line N:



Manufacturer: HBM, EUT #35, Power 115Vac / 60 Hz, configurat
ion: with one ferrit, Line: N
Date: 19.NOV.2014 15:34:00

5.12 Test Result Type T10F S6

Freq [MHz]	Line	Detector	Result [dBµV]	Limit [dBµV]	Margin
0.680	L	AV	40.4	46.0	5.6
0.745	L	AV	37.6	46.0	8.4
0.620	L	AV	35.2	46.0	10.8
0.310	L	AV	36.9	50.0	13.1
0.680	N	AV	38.0	46.0	8.0
0.745	N	AV	35.4	46.0	10.6
0.620	N	AV	32.5	46.0	13.5
0.310	N	AV	33.6	50.0	16.4

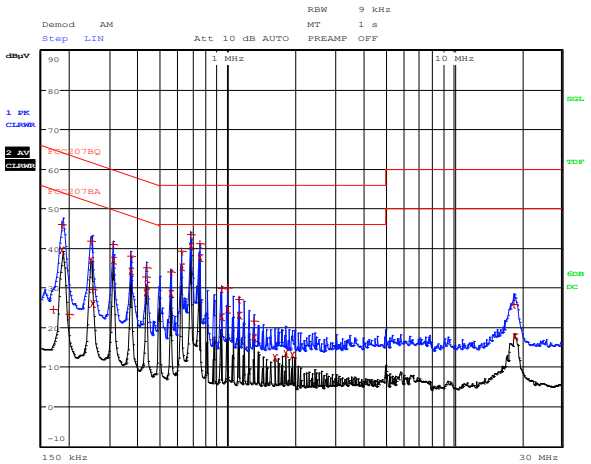
The table above contains worst-case emissions, only. For further details refer to the test plots.

Manufacturer:	Hottinger Baldwin Messtechnik GmbH
Device:	T10
Type(s):	T10F S6
Serial No(s):	173330052 (Rotor); Test sample, no serial number (Stator)
Test date:	2014-12-11

The EUT meets the requirements of this section.

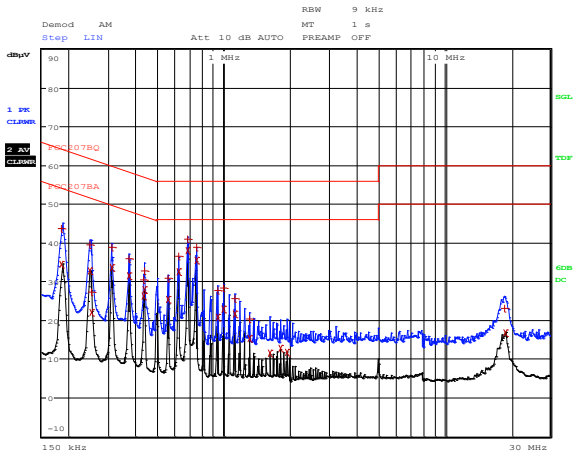
5.13 Measurement Plots Type T10F S6

Test on line L:



Manufacturer: HBM, EUT #34 Rotor, #36 Stator, modified, Powe
r 115Vac / 60 Hz, configuration: with one ferrit, Line: L
Date: 11.DEC.2014 14:50:35

Test on line N:



Manufacturer: HBM, EUT #34 Rotor, #36 Stator, modified, Powe
r 115Vac / 60 Hz, configuration: with one ferrit, Line: N
Date: 11.DEC.2014 14:45:14

6 OCCUPIED BANDWIDTH (99%)

Test Requirement: IC RSS-Gen Issue 4, 6.6
Test Procedure: IC RSS-Gen Issue 4, 6.6

6.1 Regulation

Test Requirement: IC RSS-Gen Issue 4, 6.6
Test Procedure: IC RSS-Gen Issue 4, 6.6

6.2 Regulation

IC RSS-Gen 6.6 Occupied Bandwidth
The emission bandwidth (x dB) is defined as the frequency range between two points, one above and one below the carrier frequency, at which the spectral density of the emission is attenuated x dB below the maximum in-band spectral density of the modulated signal. Spectral density (power per unit bandwidth) is to be measured with a detector of resolution bandwidth in the range of 1% to 5% of the anticipated emission bandwidth, and a video bandwidth at least 3x the resolution bandwidth.
When the occupied bandwidth limit is not stated in the applicable RSS or reference measurement method, the transmitted signal bandwidth shall be reported as the 99% emission bandwidth, as calculated or measured.

- The transmitter shall be operated at its maximum carrier power measured under normal test conditions.
- The span of the analyzer shall be set to capture all products of the modulation process, including the emission skirts.
- The resolution bandwidth (RBW) shall be in the range of 1% to 5% of the occupied bandwidth (OBW) and video bandwidth (VBW) shall be approximately 3x RBW.

Note: Video averaging is not permitted.
A peak, or peak hold, may be used in place of the sampling detector as this may produce a wider bandwidth than the actual bandwidth (worst-case measurement). Use of a peak hold may be necessary to determine the occupied bandwidth if the device is not transmitting continuously.
The trace data points are recovered and are directly summed in linear power level terms. The recovered amplitude data points, beginning at the lowest frequency, are placed in a running sum until 0.5% of the total is reached and that frequency recorded. The process is repeated for the highest frequency data points (starting at the highest frequency, at the right side of the span, and going down in frequency). This frequency is then recorded.
The difference between the two recorded frequencies is the 99% occupied bandwidth

6.3 Test Equipment

Type	Manufacturer/ Model No.	EMCC Ident No.	Last Calibration	Next Calibration
Spectrum Analyzer	Rohde & Schwarz / FSU	3831	2014-06	2015-06
Antenna Mag 1-0.1R	EMCC	-	-	-

6.4 Test Procedures

Measurement was performed in a semi-anechoic room. The EUT was tested on a 0.8 meter high tabletop and was connected to its associated peripherals. The antenna was positioned with its plane vertical on top of the EUT. The analyzer was setup at the nominal centre frequency of the EUT. For the 25 kHz carrier the span was 1 kHz, the resolution bandwidth 10 Hz and the video bandwidth 30 Hz. For the 5 MHz carrier the span was 1MHz, the resolution bandwidth 10 kHz and the video bandwidth 30 kHz. A max peak hold was used to measure the occupied bandwidth.
There was no torque applied to the EUT during the test.

Note: According to the customer the 25 kHz carrier is unmodulated and used for energy transfer from the stator to the rotor. The 5 MHz carrier is for data transmission from rotor to the stator and is puls position modulated.

6.5 Test Result Type T10F S2

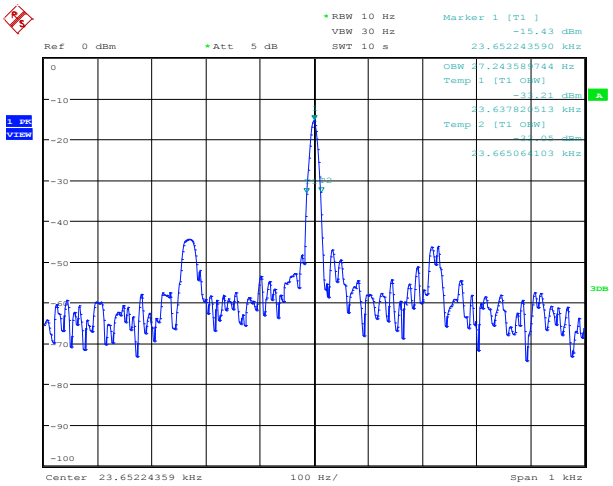
Occupied Bandwidth (99%), 25 kHz carrier	[Hz]	27.2
Occupied Bandwidth (99%), 5 MHz carrier	[kHz]	439.1

Manufacturer: Hottinger Baldwin Messtechnik GmbH
Device: T10
Type(s): T10F S2
Serial No(s): 150230092 (Rotor); Test sample, no serial number (Stator)
Test date: 2015-02-06

The EUT meets the requirements of this section.

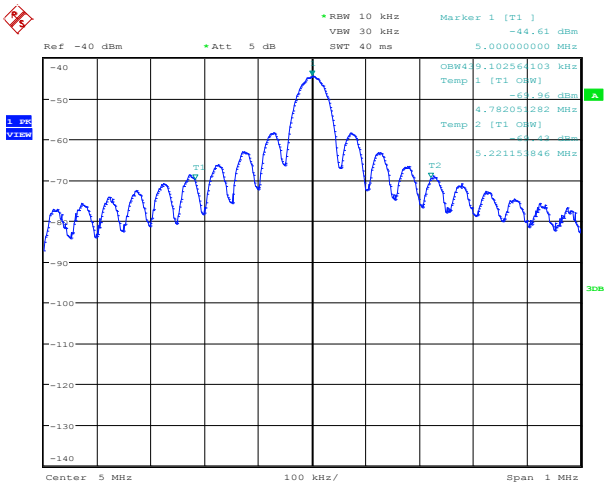
6.5.1 Measurement Plot

Plot T10F S2 carrier 25 kHz:



Manufacturer: HBM EUT: T10F #30, Mode: normal operation
Date: 6.FEB.2015 09:28:18

Plot T10F S2 carrier 5 MHz



Manufacturer: HBM EUT: T10F #30, Mode: normal operation
Date: 6.FEB.2015 10:40:36

6.6 Test Result Type T10F S3

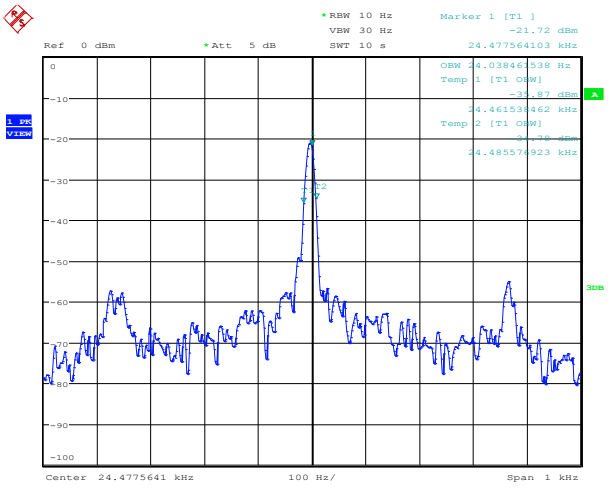
Occupied Bandwidth (99%), 25 kHz carrier	[Hz]	24.0
Occupied Bandwidth (99%), 5 MHz carrier	[kHz]	456.7

Manufacturer: Hottinger Baldwin Messtechnik GmbH
Device: T10
Type(s): T10F S3
Serial No(s): 121330133 (Rotor); Test sample, no serial number (Stator)
Test date: 2015-02-06

The EUT meets the requirements of this section.

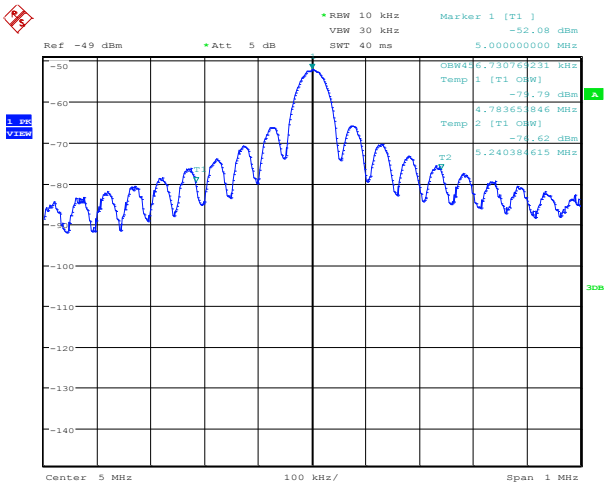
6.6.1 Measurement Plot

Plot T10F S3 carrier 25 kHz:



Manufacturer: HBM EUT: T10F #31, Mode: normal operation
Date: 6.FEB.2015 09:33:38

Plot T10F S3 carrier 5 MHz



Manufacturer: HBM EUT: T10F #31, Mode: normal operation
Date: 6.FEB.2015 10:38:52

6.7 Test Result Type T10F S4

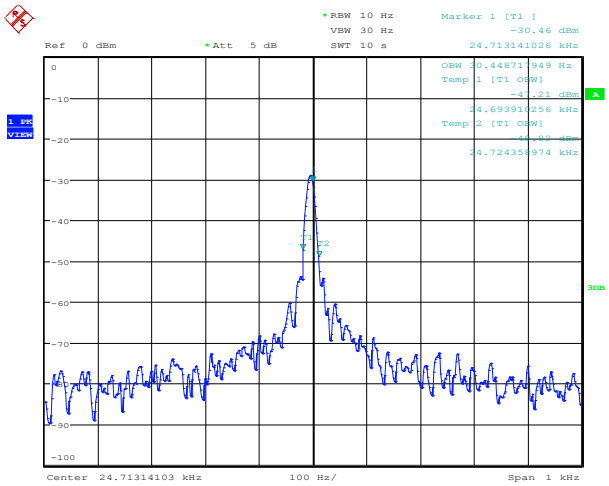
Occupied Bandwidth (99%), 25 kHz carrier	[Hz]	30.4
Occupied Bandwidth (99%), 5 MHz carrier	[kHz]	450.3

Manufacturer: Hottinger Baldwin Messtechnik GmbH
Device: T10
Type(s): T10F S4
Serial No(s): 154630085 (Rotor); Test sample, no serial number (Stator)
Test date: 2015-02-06

The EUT meets the requirements of this section.

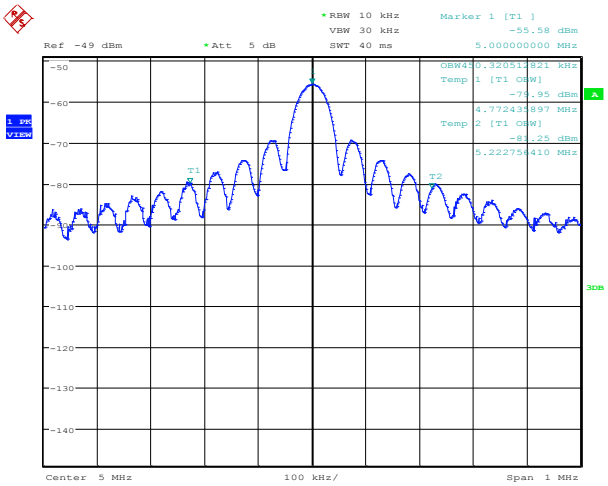
6.7.1 Measurement Plot

Plot T10F S4 carrier 25 kHz:



Manufacturer: HBM EUT: T10F #32, Mode: normal operation
Date: 6.FEB.2015 09:37:29

Plot T10F S4 carrier 5 MHz



Manufacturer: HBM EUT: T10F #32, Mode: normal operation
Date: 6.FEB.2015 10:36:42

6.8 Test Result Type T10F S5

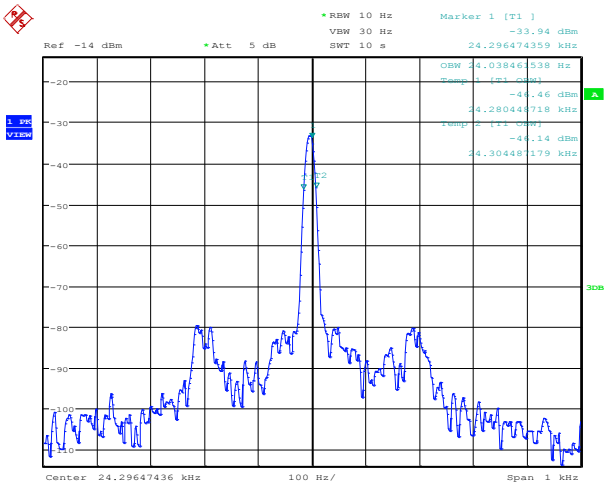
Occupied Bandwidth (99%), 25 kHz carrier	[Hz]	24.0
Occupied Bandwidth (99%), 5 MHz carrier	[kHz]	477.6

Manufacturer: Hottinger Baldwin Messtechnik GmbH
Device: T10
Type(s): T10F S5
Serial No(s): 180630016 (Rotor); Test sample, no serial number (Stator)
Test date: 2015-02-06

The EUT meets the requirements of this section.

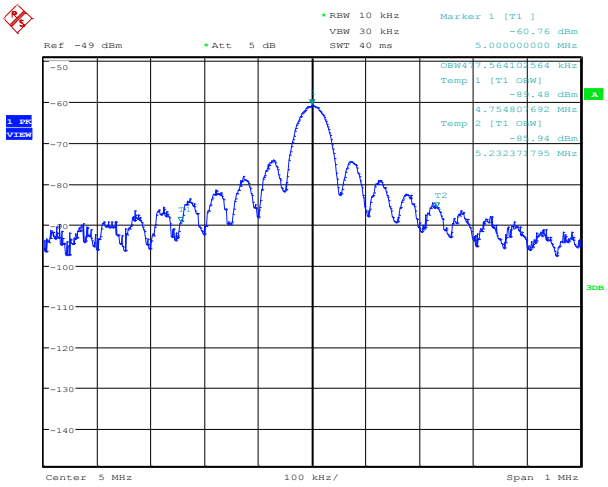
6.8.1 Measurement Plot

Plot T10F S5 carrier 25 kHz:



Manufacturer: HBM EUT: T10F #35, Mode: normal operation
Date: 6.FEB.2015 09:40:58

Plot T10F S5 carrier 5 MHz



Manufacturer: HBM EUT: T10F #35, Mode: normal operation
Date: 6.FEB.2015 10:34:42

6.9 Test Result Type T10F S6

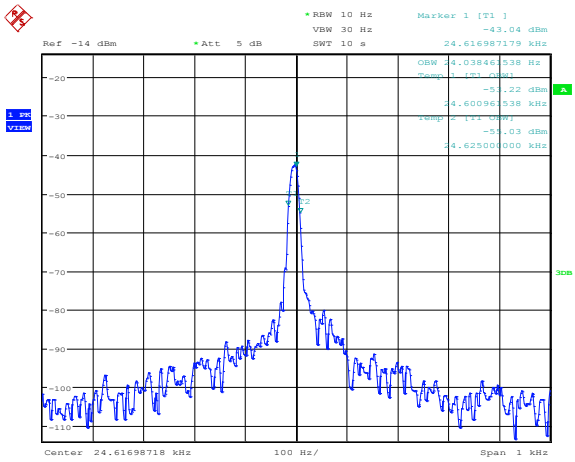
Occupied Bandwidth (99%), 25 kHz carrier	[Hz]	24.0
Occupied Bandwidth (99%), 5 MHz carrier	[kHz]	464.7

Manufacturer: Hottinger Baldwin Messtechnik GmbH
Device: T10
Type(s): T10F S6
Serial No(s): 173330052 (Rotor); Test sample, no serial number (Stator)
Test date: 2015-02-06

The EUT meets the requirements of this section.

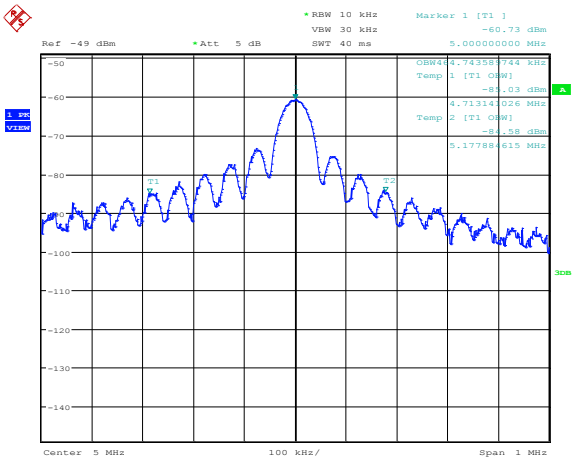
6.9.1 Measurement Plot

Plot T10F S6 carrier 25 kHz:



Manufacturer: HBM EUT: T10F #34 Rotor, #36 Stator, Mode: nor
mal operation
Date: 6.FEB.2015 09:44:33

Plot T10F S6 carrier 5 MHz



Manufacturer: HBM EUT: T10F #34 Rotor, #36 Stator, Mode: nor
mal operation
Date: 6.FEB.2015 10:31:39

7 RADIATED EMISSIONS 9 kHz – 30 MHz

Test requirement: FCC 47 CFR 15.205, 15.209
IC RSS-Gen Issue 4, 6.13, 8.9, 8.10. RSS-210 A2.6
Test procedure: ANSI C63.10-2009, RSS-Gen

7.1 Regulation

FCC 15.33 Frequency range of radiated measurements:
(a) Unless otherwise noted in the specific rule section under which the equipment operates for an intentional radiator the spectrum shall be investigated from the lowest radio frequency signal generated in the device, without going below 9 kHz […]

FCC 15.35 Measurement detector functions and bandwidths.

The conducted and radiated emission limits shown in this Part are based on the following, unless otherwise specified elsewhere in this Part:
(a) On any frequency or frequencies below or equal to 1000 MHz, the limits shown are based on measuring equipment employing a CISPR quasi-peak detector function and related measurement bandwidths, unless otherwise specified.
(c) Unless otherwise specified, e.g. Section 15.255(b), when the radiated emission limits are expressed in terms of the average value of the emission, and pulsed operation is employed, the measurement field strength shall be determined by averaging over one complete pulse train, including blanking intervals, as long as the pulse train does not exceed 0.1 seconds. As an alternative (provided the transmitter operates for longer than 0.1 seconds) or in cases where the pulse train exceeds 0.1 seconds, the measured field strength shall be determined from the average absolute voltage during a 0.1 second interval during which the field strength is at its maximum value. The exact method of calculating the average field strength shall be submitted with any application for certification or shall be retained in the measurement data file for equipment subject to notification or verification.

FCC 15.209(a) Except as provided elsewhere in this subpart, the emissions from an intentional radiator shall not exceed the field strength levels specified in the following table:

Frequency	Field Strength		Measurement distance
[MHz]	[µV/m]	[dB(µV/m)]	[m]
0.009–0.490	2400/F[kHz]	67.6 – 20 logF[kHz]	300
0.490–1.705	24000/F[kHz]	87.6 – 20 logF[kHz]	30
1.705–30.0	30	29.5	30

(b) In the emission table above, the tighter limit applies at the band edges.
(c) The level of any unwanted emissions from an intentional radiator operating under these general provisions shall not exceed the level of the fundamental emission. For intentional radiators which operate under the provisions of other sections within this part and which are required to reduce their unwanted emissions to the limits specified in this table, the limits in this table are based on the frequency of the unwanted emission and not the fundamental frequency. However, the level of any unwanted emissions shall not exceed the level of the fundamental frequency.

(d) The emission limits shown in the above table are based on measurements employing a CISPR quasi peak detector except for the frequency bands 9–90 kHz, 110–490 kHz and above 1000 MHz. Radiated emission limits in these three bands are based on measurements employing an average detector.
(e) The provisions in §§ 15.31, 15.33, and 15.35 for measuring emissions at distances other than the distances specified in the above table, determining the frequency range over which radiated emissions are to be measured, and limiting peak emissions apply to all devices operated under this part.

IC RSS-Gen 6.13 Transmitter Unwanted Emissions
The measurement method shall be described in the test report. When the applicable unwanted emissions limits are defined in relative terms, the same parameter, peak power or average power, used for the transmitter's output power measurement shall also be used for the unwanted emission measurements.
In measuring unwanted emissions, the spectrum shall be investigated from 30 MHz or the lowest radio frequency signal generated in the equipment, whichever is lower, without going below 9 kHz, up to at least the frequency given below:

(a) If the equipment operates below 10 GHz: to the tenth harmonic of the highest fundamental frequency or to 40 GHz, whichever is lower.
(b) If the equipment operates at or above 10 GHz: to the fifth harmonic of the highest fundamental frequency or to 100 GHz, whichever is lower.

IC RSS-Gen 8.9 Transmitter Emission Limits for Licence-Exempt Radio Apparatus
Except when the requirements applicable to a given device state otherwise, emissions from licence-exempt transmitters shall comply with the field strength limits shown in Table 4 or Table 5 below. Additionally, the level of any transmitter emission shall not exceed the level of the transmitter's fundamental emission.

IC RSS-Gen 8.10 Restricted Frequency Bands
[…]
(b) Unwanted emissions that fall into restricted bands of Table 6 shall comply with the limits specified in RSS-Gen; and
(c) Unwanted emissions that do not fall within the restricted frequency bands of Table 6 shall comply either with the limits specified in the applicable RSS or with those specified in this RSS-Gen.

Table 5 - General Field Strength Limits for Licence-Exempt Transmitters at Frequencies Below 30 MHz

Frequency	Electric Field Strength (µV/m)	Magnetic Field Strength (H-Field) (µA/m)	Measurement Distance (metres)
9-490 kHz	2,400/F (F in kHz)	2,400/377F (F in kHz)	300
490-1,705 kHz	24,000/F (F in kHz)	24,000/377F (F in kHz)	30
1,705-30 MHz	30	N/A	30

Note: The emission limits for the bands 9-90 kHz and 110-490 kHz are based on measurements employing a linear average detector. Transmitting devices are not permitted in restricted frequency bands unless stated otherwise in the relevant RSS.

7.2 Test Equipment

Type	Manufacturer/ Model No.	EMCC Ident No.	Last Calibration	Next Calibration
Antenna (9 kHz – 30 MHz)	Rohde & Schwarz HFH-Z2	374	2014-06	2016-06
Receiver (20 Hz - 8 GHz)	Rohde & Schwarz ESU8	3846	2014-08	2015-08

7.3 Test Procedures

Measurement was performed in a semi-anechoic room at a test distance of 3 m. A calibrated loop antenna as specified in ANSI C63.10 clause 4.5.1 was positioned with its plane vertical at the test distance from the EUT and rotated about its vertical axis for maximum response at each azimuth about the EUT. For certain applications, the loop antenna may also need to be positioned horizontally at the specified distance from the EUT. Instead of changing the loop antenna polarization to horizontal the EUT antenna was rotated by 90 degrees. I.e. tests performed for 2 EUT antenna polarizations. The center of the loop antenna was 1 m above the ground.
The EUT was tested on a 0.8 meter high tabletop.
The EUT is connected to its associated peripherals, with any excess I/O cabling bundled to approximately 1 meter.
In certain applications, a remotely located device may be connected to the EUT. In these cases, it is permissible for cabling from the remotely located device to the EUT or accessories to be placed directly on the reference groundplane or, if normally installed beneath the reference groundplane, beneath it. The remotely located device shall be located at a distance sufficient to ensure that it does not contribute to the measured level. This procedure evaluates the interference potential of the EUT, its accessories, and interconnecting cables or wires standing apart from the remotely located device, which in turn shall be evaluated separately, if required.
Measurement initially performed as a pre-scan in the full frequency range in order to find worst case emissions. Final measurement performed at worst-case emission frequencies in a FCC and IC listed semi-anechoic room at the specified 3 m test distance. Pre-scan and final measurement performed in modulated mode.
Worst case emissions are listed under chapter: Final test results.

Radiated Emissions Test Characteristics	
Frequency range	9 kHz - 30 MHz
Test distance	3 m*
Test instrumentation resolution bandwidth	200 Hz (9 kHz - 150 kHz)
	10 kHz (150 kHz - 30 MHz)
Receive antenna height	1 m
Receive antenna polarization	Vertical

* According to Section 15.31 (f)(2): At frequencies below 30 MHz, measurements may be performed at a distance closer than that specified in the regulations; however, an attempt should be made to avoid making measurements in the near field. Pending the development of an appropriate measurement procedure for measurements performed below 30 MHz, when performing measurements at a closer distance than specified, the results shall be extrapolated to the specified distance by either making measurements at a minimum of two distances on at least one radial to determine the proper extrapolation factor or by using the square of an inverse linear distance extrapolation factor (40 dB/decade). The 40 dB/decade factor was used.

7.4 Calculation of Field Strength Limits

E.g. radiated spurious emissions field strength limits for the band 1.705–30.0 MHz:

µV/m at 30 meters = 30

30 µV/m corresponds with 29.5 dBµV/m.

7.5 Field Strength Calculation

All emission measurements performed using the test receiver's transducer factor setting capability, i.e. the field strength value measured directly without the necessity of additional correction factors.
For test distance other than what is specified, but fulfilling the requirements of Section 15.31 (f)(2) the field strength is calculated by adding additionally an extrapolation factor of 40 dB/decade (inverse linear-distance for field strength measurements). The basic equation with a sample calculation is as follows:

FS = FST + DF

where

FS = Field Strength in dBµV/m

FST = Field Strength at test distance in dBµV/m

DF = Distance Extrapolation Factor in dB,

where DF = 40 log (Dtest/Dspec) where Dtest = Test Distance and Dspec = Specified Distance

Assume the tests performed at a reduced Test Distance of 3 m instead of the Specified Distance of 30 m giving a Distance Extrapolation Factor of DF = 40 log (3 m/30 m) = -40 dB.
Assuming a measured field strength level of 58.8 dBµV/m is obtained. The Distance Factor of -40 dB is added, giving a field strength of 18.8 dBµV/m. The 18.8 dBµV/m value can be mathematically converted to its corresponding level in µV/m.

FS = 58.8 - 40 = 18.8 [dBµV/m]

Level in µV/m = Common Antilogarithm (18.8/20) = 8.7

7.6 Final Test Results Type T10F S2

Frequency	Detector	3m_Result	Distance Correction	30m_Result	30m_Limit	300m_Result	300m_Limit	Margin
[MHz]		[dB(µV/m)]	[dB]	[dB(µV/m)]	[dB(µV/m)]	[dB(µV/m)]	[dB(µV/m)]	[dB]
0.782	QP	66.9	-40	26.9	29.7			2.8
0.734	QP	65.0	-40	25.0	30.3			5.3
0.592	QP	62.0	-40	22.0	32.2			10.2
0.024	AV	109.0	-80			29.0	40.1	11.1
0.686	QP	63.5	-40	23.5	30.9			7.4
5.000	QP	37.9	-40	-2.1	29.5			31.6

The table above contains worst-case emissions, only. For further details refer to the measurement plot.

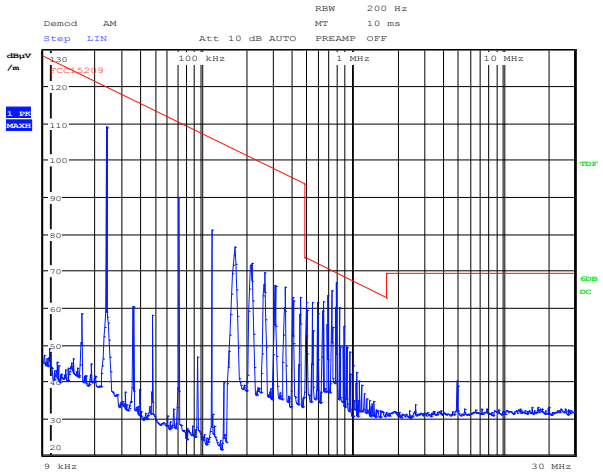
Manufacturer:	Hottinger Baldwin Messtechnik GmbH
Device:	T10
Type(s):	T10F S2
Serial No(s):	150230092 (Rotor); Test sample, no serial number (Stator)
Test date:	2014-11-04

All emissions in the range 9 kHz to 30 MHz are below the specified limits.

The EUT meets the requirements of this section.

7.7 Measurement Plot Type T10F S2

Test distance d = 3 m



Manufacturer: HBM, EUT: 30, EUT axis horizontal, H-antenna 2 directions, EUT 4 directions
Date: 4.NOV.2014 13:45:10

7.8 Final Test Results Type T10F S3

Frequency	Detector	3m_Result	Distance Correction	30m_Result	30m_Limit	300m_Result	300m_Limit	Margin
[MHz]		[dB(µV/m)]	[dB]	[dB(µV/m)]	[dB(µV/m)]	[dB(µV/m)]	[dB(µV/m)]	[dB]
0.759	QP	67.6	-40	27.6	30.0			2.4
0.660	QP	65.3	-40	25.3	31.2			5.9
0.025	AV	109.2	-80			29.2	39.8	10.6
0.513	QP	63.6	-40	23.6	33.4			9.8
0.710	QP	67.5	-40	27.5	30.6			3.1
5.000	QP	39.0	-40	-1.0	29.5			30.5

The table above contains worst-case emissions, only. For further details refer to the measurement plot.

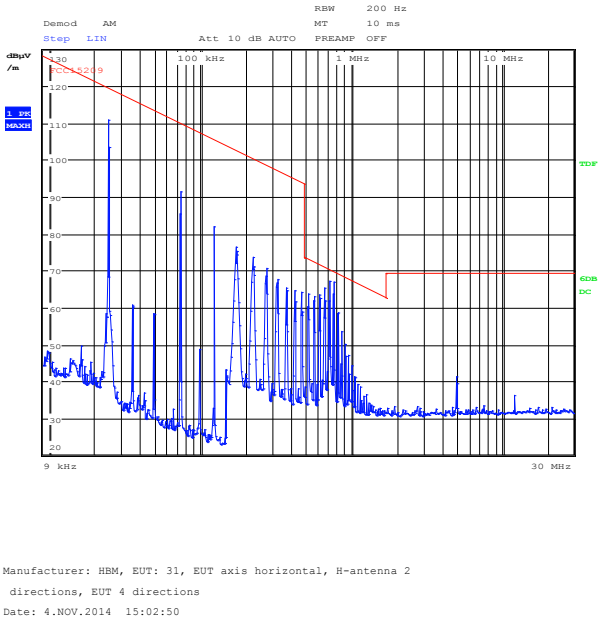
Manufacturer:	Hottinger Baldwin Messtechnik GmbH
Device:	T10
Type(s):	T10F S3
Serial No(s):	121330133 (Rotor); Test sample, no serial number (Stator)
Test date:	2014-11-04

All emissions in the range 9 kHz to 30 MHz are below the specified limits.

The EUT meets the requirements of this section.

7.9 Measurement Plot Type T10F S3

Test distance d = 3 m



7.10 Final Test Results Type T10F S4

Frequency	Detector	3m_Result	Distance Correction	30m_Result	30m_Limit	300m_Result	300m_Limit	Margin
[MHz]		[dB(µV/m)]	[dB]	[dB(µV/m)]	[dB(µV/m)]	[dB(µV/m)]	[dB(µV/m)]	[dB]
0.714	QP	68.9	-40	28.9	30.5			1.6
0.665	QP	67.8	-40	27.8	31.2			3.4
0.025	AV	111.0	-80			31.0	39.8	8.8
0.516	QP	64.9	-40	24.9	33.3			8.4
0.074	AV	88.6	-80			8.6	30.2	21.6
5.000	QP	42.5	-40	2.5	29.5			27.0

The table above contains worst-case emissions, only. For further details refer to the measurement plot.

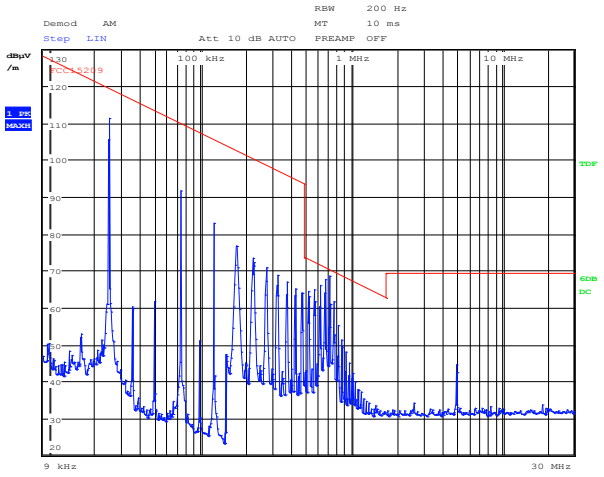
Manufacturer:	Hottinger Baldwin Messtechnik GmbH
Device:	T10
Type(s):	T10F S4
Serial No(s):	154630085 (Rotor); Test sample, no serial number (Stator)
Test date:	2014-11-04

All emissions in the range 9 kHz to 30 MHz are below the specified limits.

The EUT meets the requirements of this section.

7.11 Measurement Plot Type T10F S4

Test distance d = 3 m



7.12 Final Test Results Type T10F S5

Frequency	Detector	3m_Result	Distance Correction	30m_Result	30m_Limit	300m_Result	300m_Limit	Margin
[MHz]		[dB(µV/m)]	[dB]	[dB(µV/m)]	[dB(µV/m)]	[dB(µV/m)]	[dB(µV/m)]	[dB]
0.724	QP	68.7	-40	28.7	30.4			1.7
0.654	QP	65.7	-40	25.7	31.3			5.6
0.024	AV	110.7	-80			30.7	39.9	9.2
0.509	QP	64.3	-40	24.3	33.5			9.2
0.896	QP	52.0	-40	12.0	28.6			16.6
5.000	QP	44.3	-40	4.3	29.5			25.2

The table above contains worst-case emissions, only. For further details refer to the measurement plot.

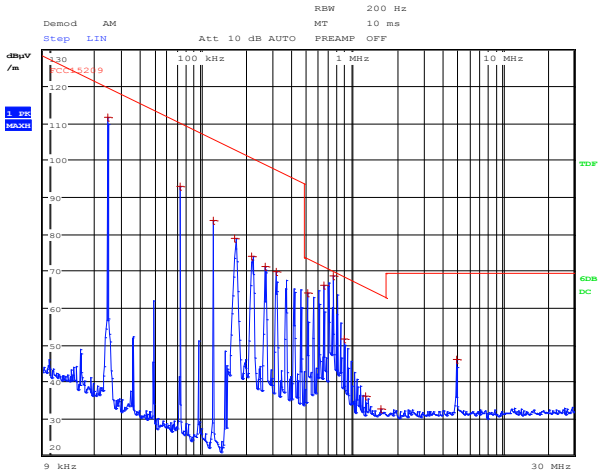
Manufacturer:	Hottinger Baldwin Messtechnik GmbH
Device:	T10
Type(s):	T10F S5
Serial No(s):	180630016 (Rotor); Test sample, no serial number (Stator)
Test date:	2014-11-05

All emissions in the range 9 kHz to 30 MHz are below the specified limits.

The EUT meets the requirements of this section.

7.13 Measurement Plot Type T10F S5

Test distance d = 3 m



Manufacturer: HBM, EUT: 35, EUT axis vertikal, H-antenna 2 directions, EUT 4 directions
Date: 5.NOV.2014 10:59:33

7.14 Final Test Results Type T10F S6

Frequency	Detector	3m_Result	Distance Correction	30m_Result	30m_Limit	300m_Result	300m_Limit	Margin
[MHz]		[dB(µV/m)]	[dB]	[dB(µV/m)]	[dB(µV/m)]	[dB(µV/m)]	[dB(µV/m)]	[dB]
0.761	QP	69.1	-40	29.1	30.0			0.9
0.663	QP	68.2	-40	28.2	31.2			3.0
0.025	AV	113.3	-80			33.3	39.8	6.5
0.515	QP	65.9	-40	25.9	33.4			7.5
0.712	QP	69.8	-40	29.8	30.6			0.8
0.614	QP	66.8	-40	26.8	31.8			5.0
5.000	QP	48.3	-40	8.3	13.6			5.3

The table above contains worst-case emissions, only. For further details refer to the measurement plot.

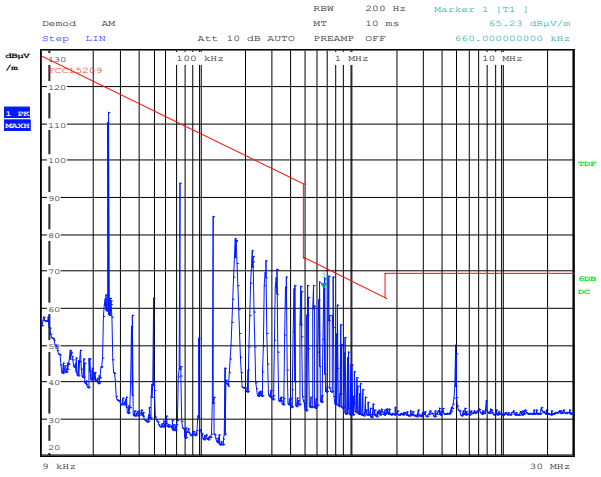
Manufacturer:	Hottinger Baldwin Messtechnik GmbH
Device:	T10
Type(s):	T10F S6
Serial No(s):	173330052 (Rotor); Test sample, no serial number (Stator)
Test date:	2014-12-04

All emissions in the range 9 kHz to 30 MHz are below the specified limits.

The EUT meets the requirements of this section.

7.15 Measurement Plot Type T10F S6

Test distance d = 3 m



Manufacturer: HBM, EUT: #34 Rotor, #36 Stator, modified, EUT
axis horizontal, H-antenna 2 directions, EUT 4 directions
Date: 4.DEC.2014 11:51:25

8 RADIATED EMISSIONS 30 MHz – 1000 MHz

Test Requirement: FCC 47 CFR 15.205, 15.209
IC RSS-Gen Issue 4, 6.13, 8.9, 8.10
Test Procedure: ANSI C63.10-2009, IC RSS-Gen

8.1 Regulation

FCC 15.33 Frequency range of radiated measurements:
(a) Unless otherwise noted in the specific rule section under which the equipment operates for an intentional radiator the spectrum shall be investigated from the lowest radio frequency signal generated in the device, without going below 9 kHz, up to at least the frequency shown in this paragraph:
(1) If the intentional radiator operates below 10 GHz: to the tenth harmonic of the highest fundamental frequency or to 40 GHz, whichever is lower.
(4) If the intentional radiator contains a digital device, regardless of whether this digital device controls the functions of the intentional radiator or the digital device is used for additional control or function purposes other than to enable the operation of the intentional radiator, the frequency range shall be investigated up to the range specified in paragraphs (a)(1)-(a)(3) of this section or the range applicable to the digital device, as shown in paragraph (b)(1) of this Section, whichever is the higher frequency range of investigation.

FCC 15.35 Measurement detector functions and bandwidths.
The conducted and radiated emission limits shown in this Part are based on the following, unless otherwise specified elsewhere in this Part:
(a) On any frequency or frequencies below or equal to 1000 MHz, the limits shown are based on measuring equipment employing a CISPR quasi-peak detector function and related measurement bandwidths, unless otherwise specified. The specifications for the measuring instrument using the CISPR quasi-peak detector can be found in Publication 16 of the International Special Committee on Radio Interference (CISPR) of the International Electrotechnical Commission. As an alternative to CISPR quasi-peak measurements, the responsible party, at its option, may demonstrate compliance with the emission limits using measuring equipment employing a peak detector function, properly adjusted for such factors as pulse desensitization, as long as the same bandwidths as indicated for CISPR quasi-peak measurements are employed.
Note: For pulse modulated devices with a pulse-repetition frequency of 20 Hz or less and for which CISPR quasi-peak measurements are specified, compliance with the regulations shall be demonstrated using measuring equipment employing a peak detector function, properly adjusted for such factors as pulse desensitization, using the same measurement bandwidths that are indicated for CISPR quasi-peak measurements.

FCC 15.209(a) Except as provided elsewhere in this subpart, the emissions from an intentional radiator shall not exceed the field strength levels specified in the following table:

Frequency	Field Strength		Measurement Distance
[MHz]	[µV/m]	[dB(µV/m)]	[m]
30–88	100	40.0	3
88–216	150	43.5	3
216-960	200	46	3
Above 960	500	54	3

(b) In the emission table above, the tighter limit applies at the band edges.
(c) The level of any unwanted emissions from an intentional radiator operating under these general provisions shall not exceed the level of the fundamental emission. For intentional radiators which operate under the provisions of other sections within this part and which are required to reduce their unwanted emissions to the limits specified in this table, the limits in this table are based on the frequency of the unwanted emission and not the fundamental frequency. However, the level of any unwanted emissions shall not exceed the level of the fundamental frequency.
(e) The provisions in §§ 15.31, 15.33, and 15.35 for measuring emissions at distances other than the distances specified in the above table, determining the frequency range over which radiated emissions are to be measured, and limiting peak emissions apply to all devices operated under this part.

IC RSS-Gen 6.13
In measuring unwanted emissions, the spectrum shall be investigated from 30 MHz or the lowest radio frequency signal generated in the equipment, whichever is lower, without going below 9 kHz, up to at least the frequency given below:

(a) If the equipment operates below 10 GHz: to the tenth harmonic of the highest fundamental frequency or to 40 GHz, whichever is lower.
(b) If the equipment operates at or above 10 GHz: to the fifth harmonic of the highest fundamental frequency or to 100 GHz, whichever is lower.

IC RSS-Gen 8.9 Transmitter Emission Limits for Licence-Exempt Radio Apparatus
Except when the requirements applicable to a given device state otherwise, emissions from licence-exempt transmitters shall comply with the field strength limits shown in Table 4 or Table 5 below. Additionally, the level of any transmitter emission shall not exceed the level of the transmitter's fundamental emission.

IC RSS-Gen 8.10 Restricted Frequency Bands
[…]
(b) Unwanted emissions that fall into restricted bands of Table 6 shall comply with the limits specified in RSS-Gen; and
(c) Unwanted emissions that do not fall within the restricted frequency bands of Table 6 shall comply either with the limits specified in the applicable RSS or with those specified in this RSS-Gen.

Table 4 – General Field Strength Limits for Licence-Exempt Transmitters at Frequencies Above 30 MHz

Frequency (MHz)	Field Strength (µv/m at 3 metres)
30-88	100
88-216	150
216-960	200
Above 960*	500

***** Unless otherwise specified, for all frequencies greater than 1 GHz, the radiated emission limits for licence-exempt radio apparatus stated in applicable RSSs (including RSS-Gen) are based on measurements using a linear average detector function having a minimum resolution bandwidth of

1 MHz. If an average limit is specified for the EUT, then the peak emission shall also be measured with instrumentation properly adjusted for such factors as pulse desensitization to ensure the peak emission is less than 20 dB above the average limit.
Note: Transmitting devices are not permitted in restricted frequency bands unless stated otherwise in the specific RSS.

8.2 Test Equipment

Type	Manufacturer/ Model No.	EMCC Ident No.	Last Calibration	Next Calibration
Antenna (30 MHz - 1 GHz)	EMCO Model 3143	898	2013-05	2015-05
Receiver (9 kHz - 1 GHz)	Rohde & Schwarz ESS	303	2014-02	2015-02

8.3 Test Procedures

The EUT was tested on a 0.8 meter high tabletop.
In certain applications, a remotely located device may be connected to the EUT. In these cases, it is permissible for cabling from the remotely located device to the EUT or accessories to be placed directly on the reference groundplane or, if normally installed beneath the reference groundplane, beneath it. The remotely located device shall be located at a distance sufficient to ensure that it does not contribute to the measured level. This procedure evaluates the interference potential of the EUT, its accessories, and interconnecting cables or wires standing apart from the remotely located device, which in turn shall be evaluated separately, if required.
With the EUT operating in "worst case" mode, emissions from the unit are maximized by adjusting the polarization and height of the receive antenna and rotating the EUT on the turntable. Manipulating the system cables also maximizes EUT emissions *[Remark: Not applicable]*. All tests performed with the EUT placed in both vertical and horizontal polarizations on the nonconductive table.

Measurement initially performed as a pre-scan in the full frequency range in order to find worst case emissions. Final measurement performed at worst-case emission frequencies in a FCC and IC listed semi-anechoic room at the specified 3 m test distance. Pre-scan and final measurement performed in modulated mode.
Final measurement performed up to the tenth harmonic of the carrier according to FCC Section 15.33.and IC RSS-Gen 6.13 a.

Worst case emissions are listed under chapter: test results.

Radiated Emissions Test Characteristics	
Frequency range	30 MHz - 1000 MHz
Test distance	3 m
Test instrumentation resolution bandwidth	120 kHz (30 MHz - 1,000 MHz)
Receive antenna scan height	1 m - 4 m
Receive antenna polarization	Vertical/Horizontal

* According to Section 15.31 (f)(1): At frequencies at or above 30 MHz, measurements may be performed at a distance other than what is specified provided: measurements are not made in the near

field except where it can be shown that near field measurements are appropriate due to the characteristics of the device; and it can be demonstrated that the signal levels needed to be measured at the distance employed can be detected by the measurement equipment. (...) When performing measurements at a distance other than that specified, the results shall be extrapolated to the specified distance using an extrapolation factor of 20 dB/decade (inverse linear-distance for field strength measurements; inverse-linear-distance-squared for power density measurements).

8.4 Calculation of Field Strength Limits

E.g. radiated spurious emissions field strength limits for the restricted band 108-121.94 MHz:

µV/m at 3 meters = 150

150 µV/m corresponds with 43.5 dBµV/m.

8.5 Field Strength Calculation

The field strength is calculated by adding the Antenna Factor and Cable Factor. The basic equation with a sample calculation is as follows:

FS = RA + AF + CF
where
FS = Field Strength in dBµV/m
RA = Receiver Amplitude in dBµV
AF = Antenna Factor in dB(1/m)
CF = Cable Attenuation Factor in dB
Assume a receiver reading of 23.5 dBµV is obtained. The Antenna Factor of 7.4 dB(1/m) and a Cable Factor of 1.1 dB are added, giving a field strength of 32 dBµV/m. The 32 dBµV/m value can be mathematically converted to its corresponding level in µV/m.

FS = 23.5 + 7.4 + 1.1 = 32 [dBµV/m]

Level in µV/m = Common Antilogarithm (32/20) = 39.8

8.6 Final Test Results Type T10F S2

Frequency [MHz]	Reading [dB(µV)]	Antenna factor [dB(1/m)]	Result [dB(µV/m)]	Limit [dB(µV/m)]	Margin [dB]	Polarisation h / v
35.00	15.6	11.5	27.1	40	12.9	v
45.00	16.4	8.8	25.2	40	14.8	v
50.00	20.9	7.4	28.3	40	11.7	v
155.00	13.0	11.4	24.4	43.5	19.1	v
729.98	3.4	26.5	29.9	46	16.1	v
893.51	-1.5	30.2	28.8	46	17.2	v

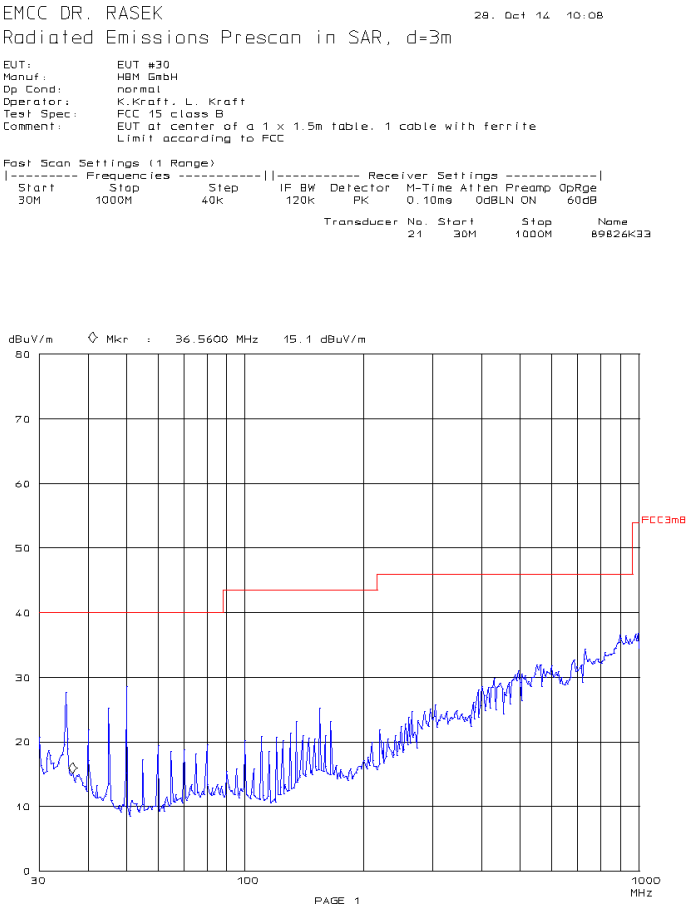
All tests performed at 3 m distance. The table above contains worst-case emissions for the normal mode, only. For further details refer to the pre-scan test plots.

Manufacturer:	Hottinger Baldwin Messtechnik GmbH
Device:	T10
Type(s):	T10F S2
Serial No(s):	150230092 (Rotor); Test sample, no serial number (Stator)
Test date:	2014-10-28

All emissions in the range 30 MHz to 1000 MHz are below the specified limits.

The EUT meets the requirements of this section.

8.7 Pre-scan Plot Type T10F S2



8.8 Final Test Results Type T10F S3

Frequency [MHz]	Reading [dB(µV)]	Antenna factor [dB(1/m)]	Result [dB(µV/m)]	Limit [dB(µV/m)]	Margin [dB]	Polarisation h / v
35.00	21.2	11.5	32.7	40	7.3	v
45.00	17.2	8.8	26.0	40	14.0	v
50.00	25.5	7.4	32.9	40	7.1	v
265.00	16.0	14.6	30.6	46	15.4	v
275.00	15.2	15.2	30.4	46	15.6	v
340.00	15.4	18.4	33.8	46	12.2	v

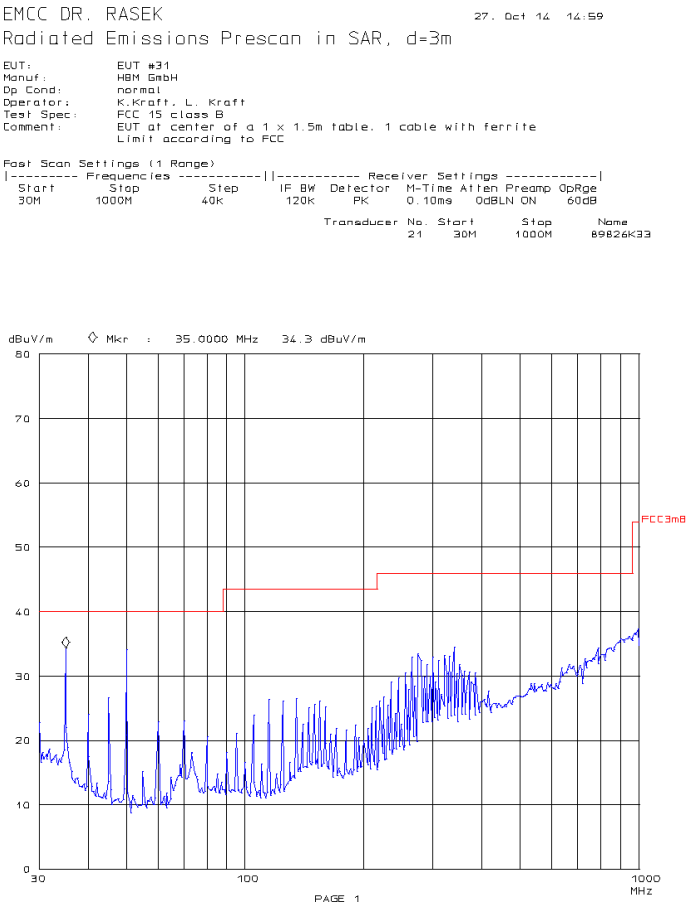
All tests performed at 3 m distance. The table above contains worst-case emissions for the normal mode, only. For further details refer to the pre-scan test plots.

Manufacturer:	Hottinger Baldwin Messtechnik GmbH
Device:	T10
Type(s):	T10F S3
Serial No(s):	121330133 (Rotor); Test sample, no serial number (Stator)
Test date:	2014-10-27

All emissions in the range 30 MHz to 1000 MHz are below the specified limits.

The EUT meets the requirements of this section

8.9 Pre-scan Plot Type T10F S3



8.10 Final Test Results Type T10F S4

Frequency [MHz]	Reading [dB(µV)]	Antenna factor [dB(1/m)]	Result [dB(µV/m)]	Limit [dB(µV/m)]	Margin [dB]	Polarisation h / v
34.99	18.4	11.5	29.9	40	10.1	v
50.00	22.1	7.4	29.5	40	10.5	v
295.01	19.4	16.0	35.4	46	10.6	v
305.00	17.9	16.7	34.6	46	11.5	v
320.00	17.0	18.1	35.1	46	10.9	v
330.01	18.3	18.5	36.8	46	9.2	v

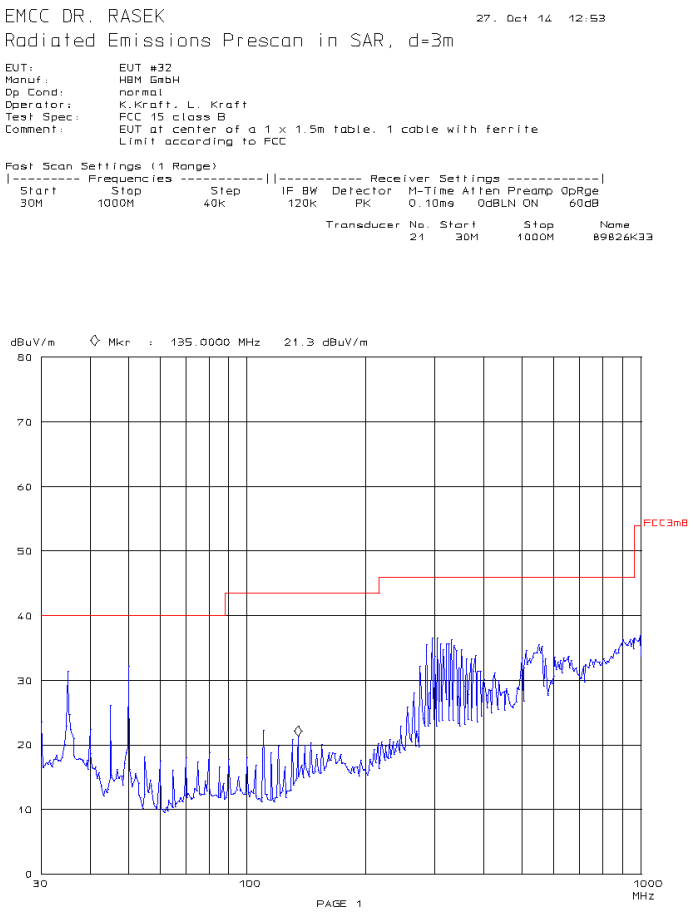
All tests performed at 3 m distance. The table above contains worst-case emissions for the normal mode, only. For further details refer to the pre-scan test plots.

Manufacturer:	Hottinger Baldwin Messtechnik GmbH
Device:	T10
Type(s):	T10F S4
Serial No(s):	154630085 (Rotor); Test sample, no serial number (Stator)
Test date:	2014-10-27

All emissions in the range 30 MHz to 1000 MHz are below the specified limits.

The EUT meets the requirements of this section

8.11 Pre-scan Plot Type T10F S4



8.12 Final Test Results Type T10F S5

Frequency [MHz]	Reading [dB(µV)]	Antenna factor [dB(1/m)]	Result [dB(µV/m)]	Limit [dB(µV/m)]	Margin [dB]	Polarisation h / v
30.00	11.0	12.9	23.9	40	16.1	v
35.00	18.0	11.5	29.5	40	10.5	v
50.00	17.1	7.4	24.5	40	15.5	v
54.99	18.4	7.0	25.4	40	14.6	v
155.00	20.4	11.4	31.8	43.5	11.7	h
165.99	20.7	10.8	31.5	43.5	11.9	v

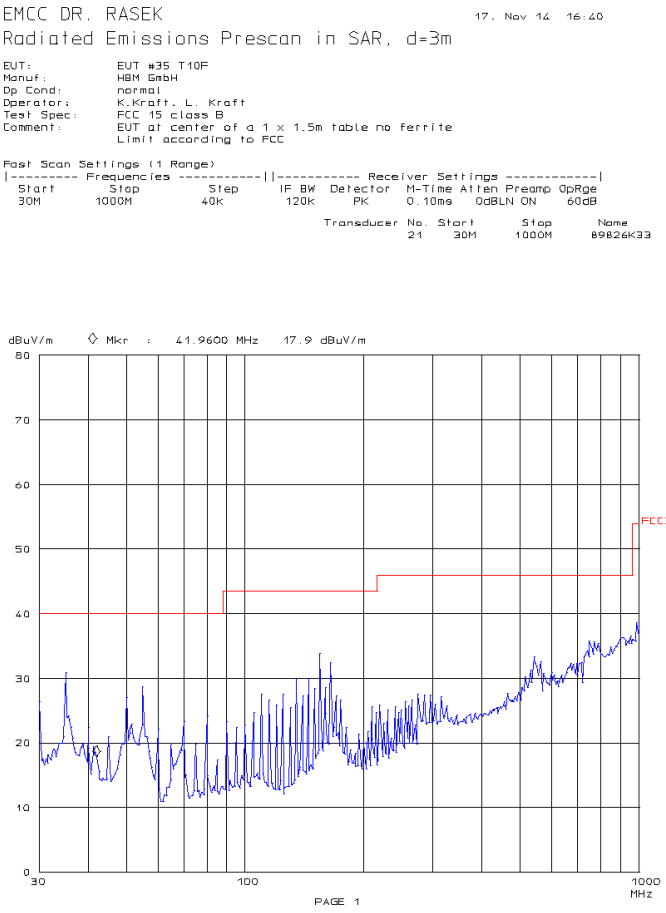
All tests performed at 3 m distance. The table above contains worst-case emissions for the normal mode, only. For further details refer to the pre-scan test plots.

Manufacturer:	Hottinger Baldwin Messtechnik GmbH
Device:	T10
Type(s):	T10F S5
Serial No(s):	180630016 (Rotor); Test sample, no serial number (Stator)
Test date:	2014-11-17

All emissions in the range 30 MHz to 1000 MHz are below the specified limits.

The EUT meets the requirements of this section

8.13 Pre-scan Plot Type T10F S5



8.14 Final Test Results Type T10F S6

Frequency [MHz]	Reading [dB(µV)]	Antenna factor [dB(1/m)]	Result [dB(µV/m)]	Limit [dB(µV/m)]	Margin [dB]	Polarisation h / v
50.00	21.3	7.4	28.7	40	11.4	v
70.01	21.3	7.3	28.6	40	11.4	v
40.00	12.9	10.2	23.1	40	17.0	v
30.02	11.2	12.9	24.1	40	16.0	v
135.00	20.5	10.2	30.7	43.5	12.7	h
225.00	19.4	13.1	32.5	46	13.5	h
265.00	15.3	14.6	29.9	46	16.0	h

All tests performed at 3 m distance. The table above contains worst-case emissions for the normal mode, only. For further details refer to the pre-scan test plots.

Manufacturer:	Hottinger Baldwin Messtechnik GmbH
Device:	T10
Type(s):	T10F S6
Serial No(s):	173330052 (Rotor); Test sample, no serial number (Stator)
Test date:	2014-12-03

All emissions in the range 30 MHz to 1000 MHz are below the specified limits.

The EUT meets the requirements of this section

8.15 Pre-scan Plot Type T10F S6

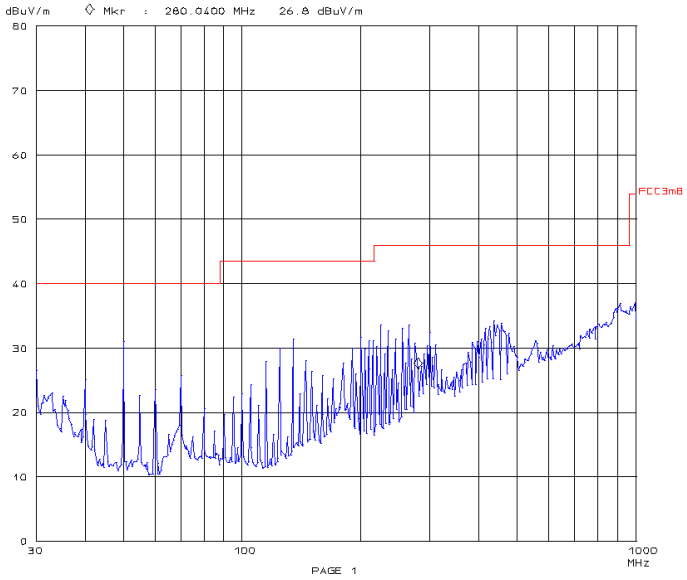
EMCC DR. RASEK 03. Dec 14 15:51
Radiated Emissions Prescan in SAR, d=3m

EUT: EUT #34 Rotor, #36 Stator, min. Leistung
Manuf: HBM GmbH
Op Cond: normal
Operator: K.Kraft, L. Kraft
Test Spec: FCC 15 class B
Comment: EUT at center of a 1 x 1.5m table no ferrite
Limit according to FCC

Fast Scan Settings (1 Range)

Frequencies								
Start	Stop	Step	IF BW	Detector	M-Time	Atten	Preamp	OpRge
30M	1000M	40k	120k	PK	0.10ms	0dB	LN ON	60dB

Transducer	No.	Start	Stop	Name
	21	30M	1000M	89826K33



9 LIST OF ANNEXES

Following annexes are separated parts from this test report.

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Annex 2: Photographs of EUT; external view	2
Annex 3: Photographs of EUT; internal view	7
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