# Report on the FCC and IC Testing of the Robert Bosch Power Tools GmbH

## Model: GCY 300-42

## In accordance with FCC 47 CFR Part 1.1310 and Part 2.1093 & ISED RSS-GEN Issue 5, section 3.4 and ISED RSS-102, Issue 5, section 2.5

Prepared for: Robert Bosch Power Tools GmbH
70538 Stuttgart
Germany

FCC ID: TXTGCY300-42
IC: 909H-GCY30042

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## COMMERCIAL-IN-CONFIDENCE

Date: 2021-07-19
Document Number: TR-57696-17551-06 | Issue: 02

| RESPONSIBLE FOR | NAME | DATE | SIGNATURE |
|---|---|---|---|
| **Project Management** | Michael Ingerl | 2021-07-19 | SIGN-ID 538035 |
| **Authorised Signatory** | Alex Fink | 2021-08-06 | SIGN-ID 540220 |

Signatures in this approval box have checked this document in line with the requirements of TÜV SÜD Product Service document control rules.

**ENGINEERING STATEMENT**
The measurements shown in this report were made in accordance with the procedures described on test pages. All reported testing was carried out on a sample equipment to demonstrate limited compliance with FCC 47 CFR Part 1.1310 and Part 2.1093 &
ISED RSS-GEN Issue 5, section 3.4 and ISED RSS-102, Issue 5, section 2.5. The sample tested was found to comply with the requirements defined in the applied rules.

| RESPONSIBLE FOR | NAME | DATE | |
|---|---|---|---|
| **Testing** | Michael Ingerl | 2021-07-19 | SIGN-ID 538037 |

| Laboratory Accreditation | Laboratory recognition | ISED Canada test site registration |
|---|---|---|
| DAkkS Reg. No. D-PL-11321-11-02<br>DAkkS Reg. No. D-PL-11321-11-03 | Registration No. BNetzA-CAB-16/21-15 | 3050A-2 |

**EXECUTIVE SUMMARY**
A sample of this product was tested and found to be compliant with FCC 47 CFR Part 1.1310 and Part 2.1093 & ISED RSS-GEN Issue 5, section 3.4 and ISED RSS-102, Issue 5, section 2.5



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# Contents

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# 1 Report Summary

## 1.1 Report Modification Record

Alterations and additions to this report will be issued to the holders of each copy in the form of a complete document.

| Issue | Description of Change | Date of Issue |
|---|---|---|
| 1 | First Issue | 2021-07-09 |
| 2 | Added Serial Numbers, HW and SW Version at chapter 1.2.<br>Corrected Type of equipment and Type of Antennas at chapter 1.4. | 2021-07-19 |

**Table 1**

## 1.2 Introduction

| | |
|---|---|
| Applicant | Robert Bosch Power Tools GmbH |
| Manufacturer | Robert Bosch Power Tools GmbH |
| Model Number(s) | GCY 300-42 |

Serial Number(s)

| Description | Conducted | Radiated | Modulation | Remarks | Serial Number |
|---|---|---|---|---|---|
| prepared with control wires, antenna port fitted on PCB | X | | | no potting needed | 124V00222 |

| | |
|---|---|
| Hardware Version(s) | 1.1.6 |
| Software Version(s) | 2.6.0 |
| Number of Samples Tested | 1 |
| Test Specification/Issue/Date | FCC 47 CFR Part 1.1310 and Part 2.1093 &<br>ISED RSS-GEN Issue 5, section 3.4 and ISED RSS-102, Issue 5, section 2.5 |
| Test Plan/Issue/Date | --- |
| Order Number | 5487175 |
| Date of Receipt of EUT | 2021-06-04 |
| Start of Test | 2021-06-24 |
| Finish of Test | 2021-06-24 |
| Name of Engineer(s) | Michael Ingerl |
| Related Document(s) | KDB 447498 D01 General RF Exposure Guidance v06<br>ANSI C63.10 (2013) |

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## 1.3 Brief Summary of Results

A brief summary of the tests carried out in accordance with FCC 47 CFR Part 1.1310 and Part 2.1093 & ISED RSS-GEN Issue 5, section 3.4 and ISED RSS-102, Issue 5, section 2.5 is shown below.

| Section | Specification Clause | Test Description | Result | Comments/Base Standard |
|---|---|---|---|---|
| Configuration and Mode: Continuously transmitting | | | | |
| 2.1 | 1.1310 | Exposure of Humans to RF Fields | Pass | KDB 447498 D01 v06 |

**Table 2**

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### 1.4 Basic information of EUT

| ***Equipment characteristics:*** | | | |
|---|---|---|---|
| Type designation | GCY 300-42 | | |
| Type of equipment: | Connectivity Module | | |
| Power supply: | ☐ AC<br>Nominal:<br>Minimum:<br>Maximum:<br>Nominal frequency: Hz | ☒ DC<br>Nominal: 5V<br>Minimum: 4.75V<br>Maximum: 5.25V | ☐ Batterie<br>Nominal: |
| Note for power supply: | Coin cell was at any test in the EUT but power supplied over 5V DC | | |
| Kind of equipment: | Transceiver | | |
| Frequency range: | 2400-2483.5 MHz | | |
| Number of RF-channels: | 40 | | |
| Channel spacing | 2 MHz | | |
| Adaptive | No | | |
| FHHS | No | | |
| Type(s) of Modulation (e.g. BPSK, FSK, ASK, …) | As per Bluetooth 4.2 Low Energy Standard | | |
| Type of radio transmission / Use of frequency spectrum (e.g. DSSS, OFDM,.) | As per Bluetooth 4.2 Low Energy Standard | | |
| Number / Type of Antenna(s) | Integral Antenna | | |
| Antenna Gain: | 2402 MHz: -0.22 dBi<br>2440 MHz: -1.08 dBi<br>2480 MHz: -1.82 dBi | | |
| Temperature Range: | -20°C – 50°C | | |

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## 1.5 EUT Modification Record

The table below details modifications made to the EUT during the test programme.
The modifications incorporated during each test are recorded on the appropriate test pages.

| Modification State | Description of Modification still fitted to EUT | Modification Fitted By | Date Modification Fitted |
|---|---|---|---|
| 0 | As supplied by the customer (Conducted Sample) SN: 124V00222 | Not Applicable | Not Applicable |

**Table 3**

## 1.6 Test Location

TÜV SÜD Product Service conducted the following tests at our Straubing Test Laboratory.

| Test Name | Name of Engineer(s) |
|---|---|
| Configuration and Mode: Continuously transmitting | |
| Exposure of Humans to RF Fields | Michael Ingerl |

**Table 4**

Office Address:

Äußere Frühlingstraße 45
94315 Straubing
Germany

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# 2 Test Details

## 2.1 Exposure of Humans to RF Fields

### 2.1.1 Specification Reference

FCC 47 CFR Part 1.1310 and Part 2.1093 &
ISED RSS-GEN Issue 5, section 3.4 and ISED RSS-102, Issue 5, section 2.5
KDB 447498 D01 General RF Exposure Guidance v06, chapter 4.3.1

### 2.1.2 Equipment Under Test and Modification State

GCY 300-42 (Conducted Sample), S/N: 124V00222 - Modification State 0

### 2.1.3 Date of Test

2021-06-24

### 2.1.4 Evaluation Results

acc. to KDB 447498 D01:

| | |
|---|---|
| Maximum Radiated Power (EIRP) Pmax: | 0.00 dBm = 1.00 mW<br>(See at TR-57696-17551-03, section 3.6) |
| Compliance Boundary d: | 1 mm |
| Frequency f: | 2440 MHz = 2.440 GHz |
| Numeric Threshold (Pmax / d) $(f)^{0.5}$ | 1.562 |
| Numeric Threshold Limit (1 g SAR): | 3.0 |

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ISED RSS-GEN Issue 5, section 3.2 and ISED RSS-102, Issue 5, section 2.5 :

| Exposure of Humans to RF Fields | Applicable | Declared by applicant | Measured | Exemption |
|---|---|---|---|---|
| The antenna is | | | | |
| ☐ detachable | | | | |
| The conducted output power (CP in watts) is measured at the antenna connector: $CP$ = | | | ☐ | |
| The effective isotropic radiated power (EIRP in watts) is calculated using | | | | |
| ☐ the numerical antenna gain: $G$ = | | ☐ | | |
| $EIRP = G \cdot CP \Rightarrow EIRP$ = | | | | |
| ☐ the field strength[1] in V/m: $FS$ = ..... V/m | | | ☐ | |
| $EIRP = \frac{(FS \cdot D)^2}{30} \Rightarrow EIRP$ = mW | | | | |
| with: | | | | |
| Distance between the antennas in m: $D$ = mm | | ☐ | | |
| ☒ not detachable | | | | |
| A field strength measurement is used to determine the effective isotropic radiated power (EIRP in watts) given by: | | | | |
| $EIRP = \frac{(FS \cdot D)^2}{30} \Rightarrow EIRP$ = 0.00 dBm = 1.00 mW (See at TR-57696-17551-03, section 3.6) | | | | |
| with: | | | | |
| Field strength in V/m: $FS$ = = | | | ☐ | |
| Distance between the two antennas in m: $D$ = | | | ☐ | |
| Selection of output power | | | | |
| The output power TP is the higher of the conducted or effective isotropic radiated power (e.i.r.p.): | | | | |
| $TP$ = 1.00 mW | | | | |

[1] The conversion formula is valid only for properly matched antennas. In other cases the transmitter output power may have to be measured by a terminated measurement when applying the exemption clauses.
If an open area test site is used for field strength measurement, the effect due to the metal ground reflecting plane should be subtracted from the maximum field strength value in order to reference it to free space, before calculating TP.

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| Exposure of Humans to RF Fields (continued) | | Applicable | Declared by applicant | Measured | Exemption |
|---|---|---|---|---|---|
| Separation distance between the user and the transmitting device is | | | | | |
| ☒ less than or equal to 20 cm | ☐ greater than 20 cm | | ☒ | | |
| Transmitting device is | | | | | |
| ☐ in the vicinity of the human head | ☒ body-worn | | ☒ | | |

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| SAR evaluation | | | | |
|---|---|---|---|---|
| SAR evaluation is required if the separation distance between the user and/or bystander and the antenna and/or radiating element of the device is less than or equal to 20 cm, except when the device operates at or below the applicable output power level (adjusted for tune-up tolerance) for the specified separation distance defined in the table.<br>For controlled use devices where the 8 W/kg for 1 gram of tissue applies, the exemption limits for routine evaluation in the table are multiplied by a factor of 5. For limb-worn devices where the 10 gram value applies, the exemption limits for routine evaluation in the table are multiplied by a factor of 2.5. If the operating frequency of the device is between two frequencies located in the table, linear interpolation shall be applied for the applicable separation distance. For test separation distance less than 5 mm, the exemption limits for a separation distance of 5 mm can be applied to determine if a routine evaluation is required.<br>For medical implants devices, the exemption limit for routine evaluation is set at 1 mW. The output power of a medical implants device is defined as the higher of the conducted or e.i.r.p to determine whether the device is exempt from the SAR evaluation. | | | | |

| Frequency (MHz) | Exemption limits (mW)[2] at separation distance of | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | ≤5 mm | 10 mm | 15 mm | 20 mm | 25 mm | 30 mm | 35 mm | 40 mm | 45 mm | ≥50 mm |
| 450 | 52 | 70 | 88 | 106 | 123 | 141 | 159 | 177 | 195 | 213 |
| 835 | 17 | 30 | 42 | 55 | 67 | 80 | 92 | 105 | 117 | 130 |
| 1900 | 7 | 10 | 18 | 34 | 60 | 99 | 153 | 225 | 316 | 431 |
| 2450 | 4 | 7 | 15 | 30 | 52 | 83 | 123 | 173 | 235 | 309 |
| 3500 | 2 | 6 | 16 | 32 | 55 | 86 | 124 | 170 | 225 | 290 |
| 5800 | 1 | 6 | 15 | 27 | 41 | 56 | 71 | 85 | 97 | 106 |

| | | | | |
|---|---|---|---|---|
| Carrier frequency: | $f$ | = | 2440 MHz | |
| Distance: | $d$ | = | 1 mm | ☒ |
| Transmitter output power: | $TP$ | = | 1.00 mW | |
| Limit: | $TP_{limit}$ | = | 4 mW | ☒ |

[2] The excemption limit in the table are based on measurements and simulations on half-wave dipole antennas at separaton distances of 5 mm to 25 mm from a flat phantom, providing a SAR value of approximately 0.4 W/kg for 1 g of tissue. For low frequencies (300 MHz to 835 MHz), the exemption limits are derived from a linear fit. For high frequencies (1900 MHz and above), the exemption limits are derived from a third order polynomial fit.

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# 3 Measurement Uncertainty

For a 95% confidence level. the measurement uncertainties for defined systems are:

| Radio Testing | | | |
|---|---|---|---|
| Test Name | kp | Expanded Uncertainty | Note |
| Occupied Bandwidth | 2.0 | ±1.14 % | 2 |
| RF-Frequency error | 1.96 | ±1 · 10-7 | 7 |
| RF-Power. conducted carrier | 2 | ±0.079 dB | 2 |
| RF-Power uncertainty for given BER | 1.96 | +0.94 dB / -1.05 | 7 |
| RF power. conducted. spurious emissions | 1.96 | +1.4 dB / -1.6 dB | 7 |
| RF power. radiated | | | |
| 25 MHz – 4 GHz | 1.96 | +3.6 dB / -5.2 dB | 8 |
| 1 GHz – 18 GHz | 1.96 | +3.8 dB / -5.6 dB | 8 |
| 18 GHz – 26.5 GHz | 1.96 | +3.4 dB / -4.5 dB | 8 |
| 40 GHz – 170 GHz | 1.96 | +4.2 dB / -7.1 dB | 8 |
| Spectral Power Density. conducted | 2.0 | ±0.53 dB | 2 |
| Maximum frequency deviation | | | |
| 300 Hz – 6 kHz | 2 | ±2.89 % | 2 |
| 6 kHz – 25 kHz | 2 | ±0.2 dB | 2 |
| Maximum frequency deviation for FM | 2 | ±2.89 % | 2 |
| Adjacent channel power 25 MHz – 1 GHz | 2 | ±2.31 % | 2 |
| Temperature | 2 | ±0.39 K | 4 |
| (Relative) Humidity | 2 | ±2.28 % | 2 |
| DC- and low frequency AC voltage | | | |
| DC voltage | 2 | ±0.01 % | 2 |
| AC voltage up to 1 kHz | 2 | ±1.2 % | 2 |
| Time | 2 | ±0.6 % | 2 |

**Table 5**

| Radio Interference Emission Testing | | | |
|---|---|---|---|
| Test Name | kp | Expanded Uncertainty | Note |
| Conducted Voltage Emission | | | |
| 9 kHz to 150 kHz (50Ω/50µH AMN) | 2 | ± 3.8 dB | 1 |
| 150 kHz to 30 MHz (50Ω/50µH AMN) | 2 | ± 3.4 dB | 1 |
| 100 kHz to 200 MHz (50Ω/5µH AMN) | 2 | ± 3.6 dB | 1 |
| Discontinuous Conducted Emission | | | |
| 9 kHz to 150 kHz (50Ω/50µH AMN) | 2 | ± 3.8 dB | 1 |
| 150 kHz to 30 MHz (50Ω/50µH AMN) | 2 | ± 3.4 dB | 1 |
| Conducted Current Emission | | | |
| 9 kHz to 200 MHz | 2 | ± 3.5 dB | 1 |
| Magnetic Fieldstrength | | | |
| 9 kHz to 30 MHz (with loop antenna) | 2 | ± 3.9 dB | 1 |
| 9 kHz to 30 MHz (large-loop antenna 2 m) | 2 | ± 3.5 dB | 1 |
| Radiated Emission | | | |
| Test distance 1 m (ALSE) | | | |
| 9 kHz to 150 kHz | 2 | ± 4.6 dB | 1 |
| 150 kHz to 30 MHz | 2 | ± 4.1 dB | 1 |
| 30 MHz to 200 MHz | 2 | ± 5.2 dB | 1 |
| 200 MHz to 2 GHz | 2 | ± 4.4 dB | 1 |
| 2 GHz to 3 GHz | 2 | ± 4.6 dB | 1 |
| Test distance 3 m | | | |
| 30 MHz to 300 MHz | 2 | ± 4.9 dB | 1 |
| 300 MHz to 1 GHz | 2 | ± 5.0 dB | 1 |
| 1 GHz to 6 GHz | 2 | ± 4.6 dB | 1 |
| Test distance 10 m | | | |
| 30 MHz to 300 MHz | 2 | ± 4.9 dB | 1 |
| 300 MHz to 1 GHz | 2 | ± 4.9 dB | 1 |
| Radio Interference Power | | | |
| 30 MHz to 300 MHz | 2 | ± 3.5 dB | 1 |
| Harmonic Current Emissions | | | 4 |
| Voltage Changes. Voltage Fluctuations and Flicker | | | 4 |

**Table 6**

| Immunity Testing | | | |
|---|---|---|---|
| Test Name | kp | Expanded Uncertainty | Note |
| Electrostatic Discharges | | | 4 |
| Radiated RF-Field | | | |
| Pre-calibrated field level | 2 | +32.2 / -24.3 % | 5 |
| Dynamic feedback field level | 2.05 | +21.2 / -17.5 % | 3 |
| Electrical Fast Transients (EFT) / Bursts | | | 4 |
| Surges | | | 4 |
| Conducted Disturbances. induced by RF-Fields | | | |
| via CDN | 2 | +15.1 / -13.1 % | 6 |
| via EM clamp | 2 | +42.6 / -29.9 % | 6 |
| via current clamp | 2 | +43.9 / -30.5 % | 6 |
| Power Frequency Magnetic Field | 2 | +20.7 / -17.1 % | 2 |
| Pulse Magnetic Field | | | 4 |
| Voltage Dips. Short Interruptions and Voltage Variations | | | 4 |
| Oscillatory Waves | | | 4 |
| Conducted Low Frequency Disturbances | | | |
| Voltage setting | 2 | ± 0.9 % | 2 |
| Frequency setting | 2 | ± 0.1 % | 2 |
| Electrical Transient Transmission in Road Vehicles | | | 4 |

**Table 7**

Note 1:
The expanded uncertainty reported according to CISPR 16-4-2:2003-11 is based on a standard uncertainty multiplied by a coverage factor of kp = 2. providing a level of confidence of p = 95.45%
Note 2:
The expanded uncertainty reported according to UKAS Lab 34 (Edition 1. 2002-08) is based on a standard uncertainty multiplied by a coverage factor of kp = 2. providing a level of confidence of p = 95.45%
Note 3:
The expanded uncertainty reported according to UKAS Lab 34 (Edition 1. 2002-08) is based on a standard uncertainty multiplied by a coverage factor of kp = 2.05. providing a level of confidence of p = 95.45%
Note 4:
It has been demonstrated that the used test equipment meets the specified requirements in the standard with at least a 95%confidence.
Note 5:
The expanded uncertainty reported according to IEC 61000-4-3 is based on a standard uncertainty multiplied by a coverage factor of kp = 2. providing a level of confidence of p = 95.45%
Note 6:
The expanded uncertainty reported according to IEC 61000-4-6 is based on a standard uncertainty multiplied by a coverage factor of kp = 2. providing a level of confidence of p = 95.45%
Note 7:
The expanded uncertainty reported according ETSI TR 100 028 V1.4.1 (all parts) to is based on a standard uncertainty multiplied by a coverage factor of kp = 1.96. providing a level of confidence of p = 95.45%
Note 8:
The expanded uncertainty reported according to ETSI TR 102 273 V1.2.1 (all parts) is based on a standard uncertainty multiplied by a coverage factor of kp = 1.96. providing a level of confidence of p = 95.45%