



# **TEST REPORT**



Test report no.: 1-0619/20-01-06

### **Testing laboratory**

#### **CTC advanced GmbH**

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#### **Accredited Testing Laboratory:**

The testing laboratory (area of testing) is accredited according to DIN EN ISO/IEC 17025 (2005) by the Deutsche Akkreditierungsstelle GmbH (DAkkS)

The accreditation is valid for the scope of testing procedures as stated in the accreditation certificate with

the registration number: D-PL-12076-01-03

# **Applicant**

### **Dialog Semiconductor BV**

Het Zuiderkruis 53

5215 MV°s Hertogenbosch / NETHERLANDS

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#### Manufacturer

### **Dialog Semiconductor BV**

Het Zuiderkruis 53

5215 MV°s Hertogenbosch / NETHERLANDS

Wideband transmission systems; Data transmission equipment operating in the ETSI EN 300 328

Test standard/s

V2.2.2 2,4 GHz band; Harmonised Standard for access to radio spectrum

For further applied test standards please refer to section 3 of this test report.

### **Test Item**

Kind of test item: **Bluetooth LE chip** 

Model name: DA1469x

Frequency: ISM band 2400 MHz to 2483.5 MHz

Technology tested: Bluetooth® Low Energy Antenna: Integrated antenna

Power supply: 3.0 V DC by battery / external power supply

Temperature range: -40°C to +85°C

**Radio Communications** 

This test report is electronically signed and valid without handwritten signature. For verification of the electronic signatures, the public keys can be requested at the testing laboratory.

Test report authorized:	Test performed:	
Joerg Warken	Mihail Dorongovskij	
Lab Manager	Lab Manager	

**Radio Communications** 



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### 2 General information

### 2.1 Notes and disclaimer

The test results of this test report relate exclusively to the test item specified in this test report. CTC advanced GmbH does not assume responsibility for any conclusions and generalizations drawn from the test results with regard to other specimens or samples of the type of the equipment represented by the test item.

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### 2.2 Application details

Date of receipt of order: 2020-06-12
Date of receipt of test item: 2020-06-19
Start of test: 2020-06-19
End of test: 2020-06-25

Person(s) present during the test: -/-

#### 2.3 Test laboratories sub-contracted

None

#### 3 Test standard/s

Test standard	Date	Description
ETSI EN 300 328 V2.2.2	2019-07	Wideband transmission systems; Data transmission equipment operating in the 2,4 GHz band; Harmonised Standard for access to radio spectrum

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# 4 Test environment

		$T_{nom}$	+22 °C during room temperature tests
Temperature	:	$T_{max}$	No tests under extreme temperature conditions performed.
		$T_{min}$	No tests under extreme temperature conditions performed.
Relative humidity content	:		54 %
Barometric pressure	:		not relevant for this kind of testing
		$V_{nom}$	5.0 V DC by USB
Power supply	:	$V_{max}$	No tests under extreme voltage conditions required.
		$V_{min}$	No tests under extreme voltage conditions required.

# 5 Test item

# 5.1 General description

Kind of test item	:	Bluetooth LE chip
Model name:	:	DA1469x
S/N serial number	:	Cond. 1929_00083
Hardware status	:	331-06-E
Software status	:	SDK_10.0.8.105
Firmware status	:	SDK_10.0.8.105
Frequency band	:	ISM band 2400 MHz to 2483.5 MHz
Type of radio transmission	:	DSSS
Use of frequency spectrum	:	D333
Type of modulation	:	GFSK
Number of channels	:	40
Channel bandwidth (B)	:	2 MHz
Channel spacing	:	2 MHz
Receiver category	:	2
Antenna	:	Integrated antenna
Power supply	:	3.0 V DC by battery / external power supply
Temperature range	:	-40°C to +85°C

# 5.2 Additional information

-/-

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### 6 Description of the test setup

Typically, the calibrations of the test apparatus are commissioned to and performed by an accredited calibration laboratory. The calibration intervals are determined in accordance with the DIN EN ISO/IEC 17025. In addition to the external calibrations, the laboratory executes comparison measurements with other calibrated test systems or effective verifications. Weekly chamber inspections and range calibrations are performed. Where possible, RF generating and signaling equipment as well as measuring receivers and analyzers are connected to an external high-precision 10 MHz reference (GPS-based or rubidium frequency standard).

In order to simplify the identification of the equipment used at some special tests, some items of test equipment and ancillaries can be provided with an identifier or number in the equipment list below (Lab/Item).

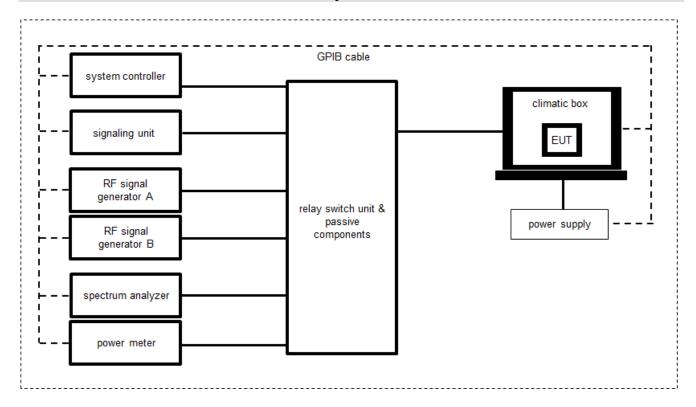
#### **Agenda:** Kind of Calibration

k	calibration / calibrated	EK	limited calibration
ne	not required (k, ev, izw, zw not required)	zw	cyclical maintenance (external cyclical
			maintenance)
ev	periodic self verification	izw	internal cyclical maintenance
Ve	long-term stability recognized	g	blocked for accredited testing
vlkl!	Attention: extended calibration interval		
NK!	Attention: not calibrated	*)	next calibration ordered / currently in progress

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# 6.1 Conducted measurements Bluetooth system



OP = AV + CA

(OP-output power; AV-analyzer value; CA-loss signal path)

### Example calculation:

OP [dBm] = 6.0 [dBm] + 11.7 [dB] = 17.7 [dBm] (58.88 mW)

### **Equipment table:**

No.	Lab / Item	Equipment	Туре	Manufacturer	Serial No.	INV. No.	Kind of Calibration	Last Calibration	Next Calibration
1	А	Switch / Control Unit (including DC- Block, Splitter)	3488A	HP	-/-	300000929	ne	-/-	-/-
2	А	PC Laboratory 19"	Exone i3	Fröhlich + Walter	35230157A037 0	300004646	ne	-/-	-/-
3	А	Signal Generator - 20 GHz	SMB100A	Rohde & Schwarz	176183	300004853	vlKI!	09.10.2017	08.10.2020
4	Α	Spectrum Analyzer	FSV30	Rohde & Schwarz	103170	300004855	vlKI!	11.12.2018	10.12.2020
5	Α	USB-GPIB-Interface	82357B	Agilent Technologies	MY54323070	300004852	ne	-/-	-/-
6	А	Tester Software C.BER	Version 5.0	CTC advanced GmbH	0001	400001379	ne	-/-	-/-
7	Α	Wireless Connectivity Tester	CMW270	Rohde & Schwarz	100683	300005133	k	11.12.2019	10.12.2021

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# 7 Summary of measurement results

	No deviations from the technical specifications were ascertained
	There were deviations from the technical specifications ascertained
IVI	This test report is only a partial test report.  The content and verdict of the performed test cases are listed below.

TC identifier	Description	verdict	date	Remark
RF-Testing	ETSI EN 300 328 V2.2.2 (2019-07)	See table	2020-06-26	Tests according to customer demand

Test specification clause	Test case	temperature conditions	power source voltages	Mode	С	NC	NA	NP	Remark
		Nominal	Nominal	1 Msps 2 Msps				×	
4.3.2.2 5.4.2	RF output power	Low	Nominal	1 Msps 2 Msps				×	-/-
0. 1.2		High	Nominal	1 Msps 2 Msps				X	
4.3.2.3 5.4.2	Power spectral density	Nominal	Nominal	1 Msps 2 Msps				×	-/-
4.3.2.4, 4.3.2.5 5.4.3	Duty cycle, Tx-sequence, Tx-gap, medium utilization	Nominal	Nominal	-/-			×		-/-
5.4.4	Accumulated transmit time, freq. occupation and hopping sequence	Nominal	Nominal	-/-			×		-/-
5.4.5	Hopping frequency separation	Nominal	Nominal	-/-			×		-/-
4.3.2.6 5.4.6	Adaptivity	Nominal	Nominal	-/-			×		-/-
4.3.2.7 5.4.7	Occupied channel bandwidth	Nominal	Nominal	1 Msps 2 Msps				×	-/-
4.3.2.8 5.4.8	Transmitter unwanted emissions in the out-of-band domain	Nominal	Nominal	1 Msps 2 Msps				×	-/-
4.3.2.9 5.4.9	Transmitter unwanted emissions in the spurious domain (cond. + rad.)	Nominal	Nominal	1 Msps 2 Msps				×	-/-
4.3.2.10 5.4.10	Receiver spurious emissions (cond. + rad.)	Nominal	Nominal	1 Msps 2 Msps				×	-/-
4.3.2.11 5.4.11	Receiver blocking	Nominal	Nominal	1 Msps 2 Msps	×				-/-
4.3.2.12	Geo-location	Nominal	Nominal	-/-			×		-/-

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С	Compliant	NC	Not compliant
NA	Not applicable	NP	Not performed

### 8 Additional comments

The Bluetooth® word mark and logos are owned by the Bluetooth SIG Inc. and any use of such marks by CTC advanced GmbH is under license.

Reference documents: Bluetooth® Core Specification 5.1

1-0619\_20-01-06\_log1\_conducted.pdf

Special test descriptions: None

Configuration descriptions:

Bluetooth Low Energy	
Longest Supported payload (37 – 255 Byte)	Tx: 255, RX: 255
LE 1M PHY supported	Yes
LE 2M PHY supported	Yes
Stable Modulation Index supported (SMI)	No
LE Coded PHY supported (S=2)	No
LE Coded PHY supported (S=8)	No

Test mode:		$\boxtimes$	Bluetooth direct test mode enabled (EUT is controlled via CBT/CMW)
			Special software is used. EUT is transmitting pseudo random data by itself
EUT selection:	$\boxtimes$	Only	one device available
		Devic	ces selected by the customer
		Devic	ees selected by the laboratory (Randomly)

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9 EUT classification	
Type of equipment:	stand alone equipment plug in radio equipment combined equipment
Modulation types:	Wide band modulation (none hopping – e.g. DSSS, OFDM) Frequency hopping spread spectrum (FHSS)
Adaptive equipment:	Yes, LBT-based Yes, non-LBT-based Yes (but can be disabled) No
Antennas and transmission operating modes:	Operating mode 1 (single antenna)  - Equipment with 1 antenna,  - Equipment with 2 diversity antennas operating in switched diversity mode by which at any moment in time only 1 antenna is used,  - Smart antenna system with 2 or more transmit/receive chains, but operating in a mode where only 1 transmit/receive chain is used)  Operating mode 2 (multiple antennas, no beamforming)  - Equipment operating in this mode contains a smart antenna system using two or more transmit/receive chains simultaneously but without beamforming.
	Operating mode 3 (multiple antennas, with beamforming)  - Equipment operating in this mode contains a smart antenna system using two or more transmit/receive chains simultaneously with beamforming.  In addition to the antenna assembly gain (G), the beamforming gain (Y) may have to be taken into account when performing the measurements.

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### 10 Measurement results

### 10.1 Receiver blocking

### **Description:**

Receiver blocking is a measure of the ability of the equipment to receive a wanted signal on its operating channel without exceeding a given degradation due to the presence of an unwanted input signal (blocking signal) at frequencies other than those of the operating band and spurious responses.

•		
Measurement parameters		
External result file	1-0619_20-01-06_log1_conducted.pdf	
External result file	Chapter EN300328 RX Receiver Blocking	
Test setup	See sub clause 6.1 – A	
Measurement uncertainty	See sub clause 11	

☐ Radiated

**Table 1:** Receiver blocking parameters for receiver category 1 equipment:

Wanted signal mean power from companion device (dBm) (see notes 1 and 4)	Blocking signal frequency (MHz)	Blocking signal power (dBm) (see note 4)	Type of blocking signal
(-133 dBm + 10 × log10(OCBW)) or -68 dBm whichever is less (see note 2)	2 380 2 504		
(-139 dBm + 10 × log10(OCBW)) or -74 dBm whichever is less (see note 3)	2 300 2 330 2 360 2 524 2 584 2 674	-34	CW
NOTE 1:	OCBW is in Hz.		
NOTE 2:	In case of radiated measurements using a companion device and the level of the wanted signal from the companion device cannot be determined, a relative test may be performed using a wanted signal up to Pmin + 26 dB where Pmin is the minimum level of wanted signal required to meet the minimum performance criteria as defined in clause 4.3.1.12.3 in the absence of any blocking signal.		
NOTE 3:	In case of radiated measurements using a companion device and the level of the wanted signal from the companion device cannot be determined, a relative test may be performed using a wanted signal up to Pmin + 20 dB where Pmin is the minimum level of wanted signal required to meet the minimum performance criteria as defined in clause 4.3.1.12.3 in the absence of any blocking signal.		
NOTE 4:	The level specified is the level at the UUT receiver input assuming a 0 dBi antenna assembly gain. In case of conducted measurements, this level has to be corrected for the (in-band) antenna assembly gain (G). In case of radiated measurements, this level is equivalent to a power flux density (PFD) in front of the UUT antenna with the UUT being configured/positioned as recorded in clause 5.4.3.2.2.		

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**Table 2:** Receiver blocking parameters for receiver category 2 equipment:

Wanted signal mean power from companion device (dBm) (see notes 1 and 3)	Blocking signal frequency (MHz)	Blocking signal power (dBm) (see note 3)	Type of blocking signal
(-139 dBm + 10 × log10(OCBW) + 10 dB) or (-74 dBm + 10 dB) whichever is less (see note 2)	2 380 2 504 2 300 2 584	-34	CW
NOTE 1:	OCBW is in Hz.  In case of radiated measurements using a companion device and the level of the wanted signal from the companion device cannot be determined, a relative test may be performed using a wanted signal up to Pmin + 26 dB where Pmin is the		
minimum level of wante as defined in clause 4.3		ed signal required to meet the minimum performance criteria 1.1.12.3 in the absence of any blocking signal.	
NOTE 3:	The level specified is the level at the UUT receiver input assuming a 0 dBi antenna assembly gain. In case of conducted measurements, this level has to be corrected for the (in-band) antenna assembly gain (G). In case of radiated measurements, this level is equivalent to a power flux density (PFD) in front of the UUT antenna with the UUT being configured/positioned as recorded in clause 5.4.3.2.2.		

**Table 3:** Receiver blocking parameters for receiver category 3 equipment:

Wanted signal mean power from companion device (dBm) (see notes 1 and 3)	Blocking signal frequency (MHz)	Blocking signal power (dBm) (see note 3)	Type of blocking signal
(-139 dBm + 10 × log10(OCBW) + 20 dB) or (-74 dBm + 20 dB) whichever is less (see note 2)	2 380 2 504 2 300 2 584	-34	CW
NOTE 1:	OCBW is in Hz.		
NOTE 2:	In case of radiated measurements using a companion device and the level of the wanted signal from the companion device cannot be determined, a relative test may be performed using a wanted signal up to Pmin + 30 dB where Pmin is the minimum level of wanted signal required to meet the minimum performance criteria as defined in clause 4.3.1.12.3 in the absence of any blocking signal.		
NOTE 3:	The level specified is the level at the UUT receiver input assuming a 0 dBi antenna assembly gain. In case of conducted measurements, this level has to be corrected for the (in-band) antenna assembly gain (G). In case of radiated measurements, this level is equivalent to a power flux density (PFD) in front of the UUT antenna with the UUT being configured/positioned as recorded in clause 5.4.3.2.2.		

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### **Limits:**

	Channel		
	Low channel	High channel	
Performance Criteria	10% PER or FER		

<sup>\*</sup> For equipment that does not support a PER or a FER test to be performed, the minimum performance criterion shall be no loss of the wireless transmission function needed for the intended use of the equipment.

**Result:** Compliant (See log file for details)

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# 11 Measurement uncertainty

Measurement uncertainty		
Occupied channel bandwidth	±5 %	
RF output power, conducted	±1.5 dB	
Power spectral density, conducted	±3 dB	
Unwanted emissions, conducted	±3 dB	
All emissions, radiated	±3 dB	
Temperature	±1 °C	
Humidity	±5 %	
DC and low frequency voltages	±3 %	
Time	±5 %	
Duty cycle	±5 %	

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# 12 Glossary

EUT	Equipment under test
DUT	Device under test
UUT	Unit under test
GUE	GNSS User Equipment
ETSI	European Telecommunications Standards Institute
EN	European Standard
FCC	Federal Communications Commission
FCC ID	Company Identifier at FCC
IC	Industry Canada
PMN	Product marketing name
HMN	Host marketing name
HVIN	Hardware version identification number
FVIN	Firmware version identification number
EMC	Electromagnetic Compatibility
HW	Hardware
SW	Software
Inv. No.	Inventory number
S/N or SN	Serial number
С	Compliant
NC	Not compliant
NA	Not applicable
NP	Not performed
PP	Positive peak
QP	Quasi peak
AVG	Average
ОС	Operating channel
OCW	Operating channel bandwidth
OBW	Occupied bandwidth
ООВ	Out of band
DFS	Dynamic frequency selection
CAC	Channel availability check
OP	Occupancy period
NOP	Non occupancy period
DC	Duty cycle
PER	Packet error rate
CW	Clean wave
MC	Modulated carrier
WLAN	Wireless local area network
RLAN	Radio local area network
DSSS	Dynamic sequence spread spectrum
OFDM	Orthogonal frequency division multiplexing
FHSS	Frequency hopping spread spectrum
GNSS	Global Navigation Satellite System
C/N <sub>0</sub>	Carrier to noise-density ratio, expressed in dB-Hz

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### 13 Document history

Version	Applied changes	Date of release
-/-	Initial release	2020-06-26

# 14 Accreditation Certificate - D-PL-12076-01-03

first page	last page
DAKKS  Deutsche Aktrediterungsstelle	
Deutsche Akkreditierungsstelle GmbH	Deutsche Akkreditierungsstelle GmbH
Beliehene gemäß § 8 Absatz 1 AkkStelleG i.V.m. § 1 Absatz 1 AkkStelleGBV Unterzeichnerin der Multilateralen Abkommen von EA, II.AC und IAF zur gegenseitigen Anerkennung  Akkreditierung	Standort Berlin Standort Frankfurt am Main Standort Braunschweig Spittelmarkt 10 Europa-Allee 52 Bundesallee 100 10117 Berlin 60327 Frankfurt am Main 38116 Braunschweig
Die Deutsche Akkreditierungsstelle GmbH bestätigt hiermit, dass das Prüflaboratorium  CTC advanced GmbH  Untertürkheimer Straße 6-10, 66117 Saarbrücken die Kompetenz nach DIN EN ISO/IEC 17025-2005 besitzt, Prüfungen in folgenden Bereichen	
durchingetern and on the Sofice Distriction of the Sofice Distriction	
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Die Akkreditierungsurkunde gilt nur in Verbindung mit dem Beacheid vom 11.01.2019 mit der Akkreditierungsnummer O-Pt-12076-01 und ist gitlig bis 21.04.2021. Sie besteht aus diesem Deckblatt, der Rückseite des Deckblatts und der folgenden Anlage mit insgesamt 33 Seiten.  Registrierungsnummer der Urkunde: D-Pt-12076-01-03	Der aktuelle Stand der Mitgliedschaft kann folgenden Webseiten entnommen werden: EA: www.european-accreditation.org IJAC: www.lat.org IAF: www.lat.nu
Frankfurt am Main, 11.01.2019 Im Aufmah 150 - doct. Owe Zimmermähr- Abselbangsleiter	
Solid Minimize of All Mild Solid	

Note: The current certificate annex is published on the website (link see below) of the Accreditation Body DAkkS or may be received by CTC advanced GmbH on request

https://www.dakks.de/as/ast/d/D-PL-12076-01-03.pdf

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