

Continuous Glucose Monitoring Service (CGMS)

Bluetooth® Test Suite

- **Revision:** CGMS.TS.p6
- **Revision Date:** 2020-12-22
- **Group Prepared By:** BTI



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1 Scope

This Bluetooth document contains the Test Suite Structure (TSS) and Test Cases (TC) to test the Bluetooth CGM Service Specification.

The objective of this test suite is to provide a basis for interoperability for Bluetooth devices giving a high probability of air interface interoperability between different manufacturers Bluetooth devices.

2 References, Definitions, and Abbreviations

2.1 References

This Bluetooth document incorporates, by dated or undated reference, provisions from other publications. These normative references are cited at the appropriate places in the text and the publications are listed hereafter.

- [1] Test Strategy and Terminology Overview
- [2] CGM Service Specification v1.0 or later
- [3] CGM Service Characteristics v1.0 or later
- [4] ICS Proforma for CGM Service
- [5] GATT Test Suite GATT.TS
- [6] Characteristic and Descriptor descriptions are accessible via the [Bluetooth SIG Assigned Numbers](#)
- [7] CGM Service Implementation extra Information for Test, IXIT
- [8] Core Specification Supplement (CSS) v6 or later



3 Test Suite Structure (TSS)

3.1 Overview

The CGM Service requires the presence of GAP, SM (for LE), SDP (for BR/EDR) and GATT. This is illustrated in [Figure 3.1](#).

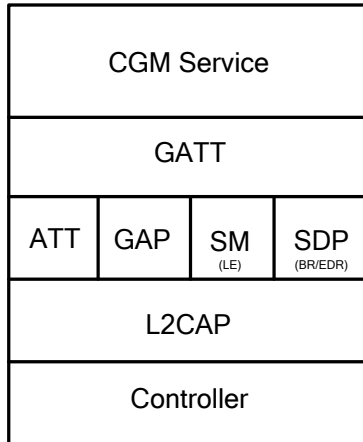


Figure 3.1: CGM Service Test Model

3.2 Test Strategy

The test objectives are to verify functionality of the CGM Service within a Bluetooth Host and enable interoperability between Bluetooth Hosts on different devices. The testing approach is to cover mandatory and optional requirements in the service specification and to match these to the support of the IUT as described in the ICS Proforma [\[4\]](#).

The test equipment shall provide an implementation of the Radio Controller and the parts of the Host needed to perform the test cases defined in the CGM Service Test Suite. For some test cases, it is necessary to stimulate the IUT from an Upper Tester. In practice, this could be implemented as a special test interface, an MMI (Man Machine Interface), or another interface supported by the IUT.

The CGM test suite contains Valid Behavior (BV) tests complemented with Invalid Behavior (BI) tests where required. The test coverage mirrored in the test suite structure is the result of a process that started with cataloged specification requirements that were logically grouped and assessed for testability enabling coverage in defined test purposes.

The test suite structure is a tree with the first level representing the protocol groups and described on [Section 3.3](#).

3.3 Test Groups

The following test groups have been defined:

- Service Definition
 - Verify the service definition.
- Characteristic Declaration
 - Verify the presence and contents of characteristic declarations.

- Characteristic Descriptors
 - Verify the presence and contents of characteristic descriptors.
- Characteristic Read
 - Verify that characteristics that support reading can be read. Verify the format and value of characteristic values.
- Configure Indication and Notification
 - Verify characteristics can be configured for indication or notification.
- Characteristic Notification
 - Verify that characteristics that support notification can be notified.
- Service Procedures
 - Verify the operation of additional procedures defined in the service specification including aborting procedures, deleting records, reporting records and counting the number of records.
- CGM Specific Ops Control Point Procedures
 - This group tests the operation of CGM Specific Operation Control Point procedures defined in the service specification including read and write of the CGM measurement communication interval and write of the Glucose calibration time.

4 Test Cases (TC)

4.1 Introduction

4.1.1 TC Naming Conventions

Test cases shall be assigned unique identifiers per the conventions in [1]. The convention used here is **<spec abbreviation>/<IUT role>/<class>/<feat>/<func>/<subfunc>/<cap>/<xx>-<nn>-<y>**.

Bolded ID parts shall appear in the order prescribed. Non-bolded ID parts (if applicable) shall appear between the bolded parts. The order of the non-bolded parts may vary from test suite to test suite but shall be consistent within each individual test suite.

Identifier Abbreviation	Spec Identifier <spec abbreviation>
CGMS	Continuous Glucose Monitoring Service
Identifier Abbreviation	Role Identifier <IUT role>
SEN	Sensor role
Identifier Abbreviation	Feature Identifier <feat>
CBE	Common Behavior of Control Point – Error Handling
CGMCP	CGM Specific ops Control Point Procedures
CN	Characteristic Notification
CON	Configure Indication and Notification
CR	Characteristic Read
CW	Characteristic Write
DEC	Characteristic Declaration
DES	Characteristic Descriptors
RAA	Record Access Control Point – Abort Procedure
RAD	Record Access Control Point – Delete Procedure
RAE	Record Access Control Point – Specific Errors
RAN	Record Access Control Point – Number Procedure
RAR	Record Access Control Point – Report Procedure
SD	Service Definition

Table 4.1: CGMS TC Class Naming Convention



4.1.2 Conformance

When conformance is claimed for a particular specification, all capabilities are to be supported in the specified manner (process-mandatory). The mandated tests from this Test Suite depend on the capabilities to which conformance is claimed.

The Bluetooth Qualification Program may employ tests to verify implementation robustness. The level of implementation robustness that is verified varies from one specification to another and may be revised for cause based on interoperability issues found in the market.

Such tests may verify:

- That claimed capabilities may be used in any order and any number of repetitions that is not excluded by the specification
- That capabilities enabled by the implementations are sustained over durations expected by the use case
- That the implementation gracefully handles any quantity of data expected by the use case
- That in cases where more than one valid interpretation of the specification exist, the implementation complies with at least one interpretation and gracefully handles other interpretations
- That the implementation is immune to attempted security exploits

A single execution of each of the required tests is required in order to constitute a pass verdict. However, it is noted that in order to provide a foundation for interoperability, it is necessary that a qualified implementation consistently and repeatedly pass any of the applicable tests.

In any case, where a member finds an issue with the test plan generated by Launch Studio, the Test Case as described in the Test Suite, or with the test system utilized, the member is required to notify the responsible party via an errata request such that the issue may be addressed.

4.1.3 Pass/Fail Verdict Conventions

Each Test Case has an Expected Outcome section. The IUT is granted the Pass Verdict when all the detailed pass criteria conditions within the Expected Outcome section are met.

The convention in this Test Suite is that, unless there is a specific set of fail conditions outlined in the Test Case, the IUT fails the Test Case as soon as one of the pass criteria conditions cannot be met. If this occurs, the outcome of the test is a Fail Verdict.

4.2 Setup Preambles

The procedures defined in this section are provided for information, as they are used by test equipment in achieving the initial conditions in certain tests.

4.2.1 ATT Bearer on LE Transport

Follow the preamble procedure described in [5] Section 4.2.1.2 with the IUT operating in the Peripheral role.

4.2.2 ATT Bearer on BR/EDR Transport

Follow the preamble procedure described in [5] section 4.2.1.1 with the IUT operating in the Peripheral role.



4.2.3 Record Access Control Point

Follow this preamble procedure to enable IUT for use with Record Access Control Point.

1. If a connection exists, it shall be disconnected.
2. Establish an ATT Bearer connection between the Lower Tester and IUT as described in Section 4.2.1 if using LE Transport or Section 4.2.2 if using a BR/EDR Transport.
3. The handle of the CGM Measurement characteristic and Record Access Control Point characteristic has been previously discovered by the Lower Tester during the test procedure in Section 4.4 or is known to the Lower Tester by other means.
4. The handle of the Client Characteristic Configuration descriptor of the CGM Measurement characteristic and Record Access Control Point characteristic has been previously discovered by the Lower Tester during the test procedure in Section 4.5 or is known to the Lower Tester by other means.
5. If the Lower Tester and IUT were not previously bonded, perform a bonding procedure. If previously bonded, re-enable encryption.
6. The CGM Measurement characteristic is configured for notifications.
7. The Record Access Control Point characteristic is configured for indications.

4.2.4 CGM Specific Ops Control Point

Follow this preamble procedure to enable IUT for use with CGM Specific Ops Control Point.

1. If a connection exists, it shall be disconnected.
2. Establish an ATT Bearer connection between the Lower Tester and IUT as described in Section 4.2.1 if using LE Transport or Section 4.2.2 if using a BR/EDR Transport.
3. The handle of the CGM Measurement characteristic and CGM Specific Ops Control Point characteristic has been previously discovered by the Lower Tester during the test procedure in Section 4.4 or is known to the Lower Tester by other means.
4. The handle of the Client Characteristic Configuration descriptor of the CGM Measurement characteristic and CGM Specific Ops Control Point characteristic has been previously discovered by the Lower Tester during the test procedure in Section 4.5 or is known to the Lower Tester by other means.
5. If the Lower Tester and IUT were not previously bonded, perform a bonding procedure. If previously bonded, re-enable encryption.
6. The CGM Measurement characteristic is configured for notifications.
7. The CGM Specific Ops Control Point characteristic is configured for indications.

4.3 Service Definition

Verify the service definition.

CGMS/SEN/SD/BV-01-C [Service Definition – ‘CGM Service’]

- Test Purpose

Verify the IUT has one instantiation of the CGM Service either as primary or secondary service.
- Reference

[2] 2



- Initial Condition

Establish an ATT Bearer connection between the Lower Tester and IUT as described in Section 4.2.1 if using LE Transport or Section 4.2.2 if using a BR/EDR Transport.

- Test Procedure

1. The Lower Tester sends an ATT_Find_By_Type_Value_Request (0x0001, 0xFFFF) to the IUT, with type set to «Primary Service» and Value set to «CGM Service». Verify one attribute handle range is returned, containing the starting handle and the ending handle of the «CGM Service» definition.

Note: Ending handle could be 0xFFFF if «CGM Service» is the last service.

2. If no instances of CGM Service as a primary service are found, the Lower Tester sends an ATT_Find_By_Type_Value_Request (0x0001, 0xFFFF) to the IUT, with type set to «Secondary Service» and Value set to the UUID for «CGM Service». Verify one attribute handle range is returned, containing the starting handle and the ending handle of the «CGM Service» definition.

Note: Ending handle could be 0xFFFF if «CGM Service» is the last service.

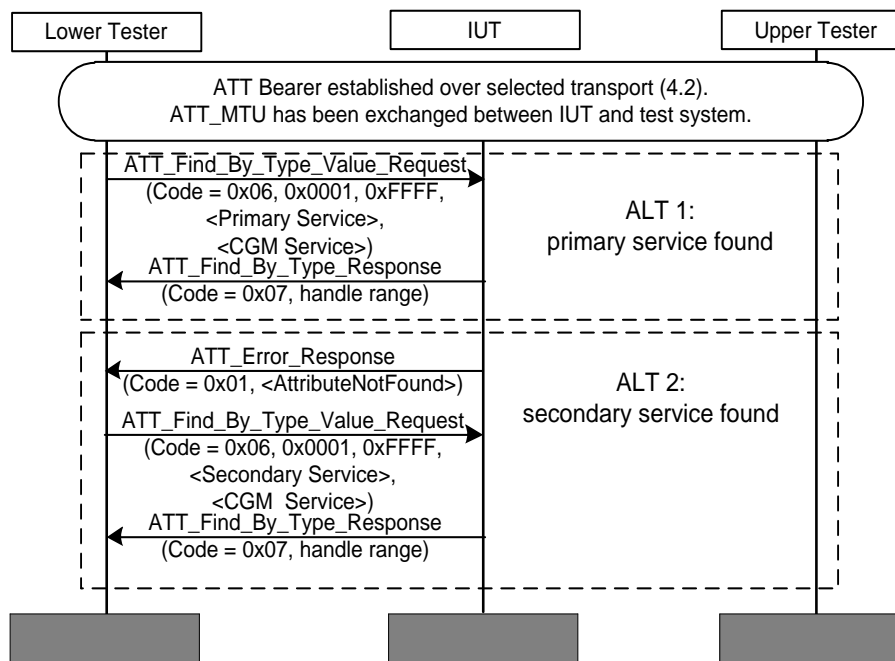


Figure 4.1: Continuous Glucose Monitor Service Discovery

- Expected Outcome

Pass verdict

One attribute handle range is returned either as a primary service or a secondary service containing the starting handle and the ending handle of the «CGM Service» definition.

4.4 Characteristic Declaration

- Test Purpose

This test group is for generic use and contains one or more test cases to verify that the characteristic property field of the characteristic declaration meets the requirements of the service. The verification

is performed one property at a time, as enumerated in the test cases in [Table 4.2](#) below, using this generic test procedure.

- Reference

Section 3 [\[2\]](#).

- Initial Condition

The handle range of the service has been previously discovered by the Lower Tester in test case [CGMS/SEN/SD/BV-01-C \[Service Definition – ‘CGM Service’\]](#).

Establish an ATT Bearer connection between the Lower Tester and IUT as described in Section [4.2.1](#) if using LE Transport or Section [4.2.2](#) if using a BR/EDR Transport.

- Test Case Configuration

Test Case	Characteristic Properties Value (Requirements)
CGMS/SEN/DEC/BV-01-C [Characteristic Declaration – ‘CGM Measurement’]	0x10 (see [6])
CGMS/SEN/DEC/BV-02-C [Characteristic Declaration – ‘CGM Feature’]	0x02 (see [6])
CGMS/SEN/DEC/BV-03-C [Characteristic Declaration – ‘CGM Status’]	0x02 (see [6])
CGMS/SEN/DEC/BV-04-C [Characteristic Declaration – ‘CGM Session Start Time’]	0x0A (see [6])
CGMS/SEN/DEC/BV-05-C [Characteristic Declaration – ‘CGM Session Run Time’]	0x02 (see [6])
CGMS/SEN/DEC/BV-06-C [Characteristic Declaration – ‘Record Access Control Point’]	0x28 (see [6])
CGMS/SEN/DEC/BV-07-C [Characteristic Declaration – ‘CGM Specific Ops Control Point’]	0x28 (see [6])

Table 4.2: Characteristic Declaration Test Cases

- Test Procedure

The following test procedure applies to the test cases listed in the table below:

1. Discover all characteristics of the service by executing the test procedure of GATT test case [GATT/SR/GAD/BV-04-C](#) in [\[5\]](#).
2. For a discovered characteristic that is listed in the table below, verify the characteristic properties field of the characteristic declaration meets the requirements of the service.

- Expected Outcome

The following pass and fail verdicts apply to the test cases listed in [Table 4.2](#):

Pass verdict

Each characteristic is discovered and the corresponding characteristic properties field of the characteristic declaration meets the requirements of the service.

4.5 Characteristic Descriptors

- Test Purpose

This test group is for generic use and contains one or more test cases to verify that the characteristic descriptors meet the requirements of the service. The verification is done one descriptor at a time, as enumerated in the test cases in [Table 4.3](#), using this generic test procedure.

- Reference

[\[2\]](#) 3.1.2.1, 3.6, and 3.7

- Initial Condition

The handle range of each characteristic referenced in the test cases below has been previously discovered by the Lower Tester during the test procedure in [Section 4.4](#) or is known to the Lower Tester by other means.

Establish an ATT Bearer connection between the Lower Tester and IUT as described in [Section 4.2.1](#) if using LE Transport or [Section 4.2.2](#) if using a BR/EDR Transport.

- Test Case Configuration

Test Case	Value (Requirements)
CGMS/SEN/DES/BV-01-C [CGM Measurement – ‘Client Characteristic Configuration Descriptor’]	0x0000 or 0x0001 (3.1.2.1 in [2])
CGMS/SEN/DES/BV-02-C [Record Access Control Point – ‘Client Characteristic Configuration Descriptor’]	0x0000 or 0x0002 (3.8.4.1 in [2])
CGMS/SEN/DES/BV-03-C [CGM Specific Ops Control Point – ‘Client Characteristic Configuration Descriptor’]	0x0000 or 0x0002 (3.8.4.1 in [2])

Table 4.3: Characteristic Descriptor Test Cases

- Test Procedure

The following test procedure applies to the test cases listed in [Table 4.3](#):

For each characteristic referenced in a test case below:

- Discover all characteristic descriptors of the characteristic by executing the test procedure of GATT test case [GATT/SR/GAD/BV-06-C](#) in [\[5\]](#) using the handle range of the characteristic. The IUT returns one or more handle-UUID pairs.

2. If the UUID in a handle-UUID pair is for a characteristic descriptor referenced in a test case below, read the characteristic descriptor by executing the test procedure of GATT test case GATT/SR/GAR/BV-06-C in [5].

3. Verify the value of the characteristic descriptor meets the requirements of the service.

- Expected Outcome

The following pass and fail verdicts apply to the test cases listed in Table 4.3:

Pass verdict

The characteristic descriptor is discovered, the characteristic descriptor is read, and the value of the characteristic descriptor meets the requirements of the service.

4.6 Characteristic Read

- Test Purpose

This test group is for generic use and contains one or more test cases to read and verify that the characteristic values required by the service are compliant. The verification is done one value at the time, as enumerated in the test cases in Table 4.4 below, using this generic test procedure.

- Reference

[2] 3.2.1

- Initial Condition

The handle of each characteristic value referenced in the test cases below has been previously discovered by the Lower Tester during the test procedure in Section 4.4 or is known to the Lower Tester by other means.

Establish an ATT Bearer connection between the Lower Tester and IUT as described in Section 4.2.1 if using LE Transport or Section 4.2.2 if using a BR/EDR Transport.

- Test Case Configuration

Test Case	Value (Requirements)
CGMS/SEN/CR/BV-01-C [Characteristic Read – 'CGM Feature']	3 octets received with RFU bits set to 0. (Section 3.2.1.1 in [2])

Test Case	Value (Requirements)
CGMS/SEN/CR/BV-02-C [Characteristic Read – ‘CGM Feature Type Sample Location’] Note: Set the bit 0 of the Type Nibble to 1 for a precise distinction between LSN and MSN.	2 Nibbles received containing following values: <ul style="list-style-type: none"> LSN = Type Nibble MSN = Sample-Location Nibble The RFU bits in both nibble are set to 0 (Section 3.2.1.2 in [2])

Table 4.4: Characteristic Read Value Test Cases

- Test Procedure

The following test procedure applies to the test cases listed in the table below for each characteristic referenced in a test case below:

- Read the characteristic value by executing the test procedure of GATT test case GATT/SR/GAR/BV-01-C in [5].
- Verify the characteristic value meets the requirements of the service.

- Expected Outcome

The following pass and fail verdicts apply to the test cases listed in Table 4.4:

Pass verdict

The characteristic is successfully read and the characteristic value meets the requirements of the service.

A 2 octet E2E-CRC-Field is present in the read characteristic value. The field value depends on if the IUT supports E2E-safety or not. If not, the value should be set to 0xFFFF.

CGMS/SEN/CR/BV-03-C [Characteristic Read – ‘CGM Feature’ – Multiple Bonds]

- Test Purpose

Verify that the IUT claims proper support for multiple bonds in the CGM Feature characteristic (CGM Feature Bit 13 ‘Multiple Bond supported’ is set to 1).

- Reference

Section 3.2.1.1 in [2]

- Initial Condition

The handle of the characteristic value the test case below has been previously discovered by the Lower Tester during the test procedure in Section 4.4 or is known to the Lower Tester by other means.

Establish an ATT Bearer connection between the Lower Tester and IUT as described in Section 4.2.1 if using LE Transport or Section 4.2.2 if using a BR/EDR Transport.



- Test Procedure
 1. Read the value of the CGM Feature characteristic by executing the test procedure of GATT test case GATT/SR/GAR/BV-01-C in [5].
 2. Verify the characteristic value meets the requirements of the service.

- Expected Outcome

Pass verdict

The characteristic is successfully read and Bit 13 of the CGM Feature characteristic 'Multiple Bond supported' is set to 1.

CGMS/SEN/CR/BV-04-C [Characteristic Read – 'CGM Session Start Time with E2E-CRC']

- Test Purpose

Verify that the IUT can read the CGM Session Start Time characteristic.

- Reference

[2] 3.4

- Initial Condition

The handle of the characteristic in the test case below has been previously discovered by the Lower Tester during the test procedure in Section 4.4 or is known to the Lower Tester by other means.

Establish an ATT Bearer connection between the Lower Tester and IUT as described in Section 4.2.1 if using LE Transport or Section 4.2.2 if using a BR/EDR Transport.

Both the IUT and the Lower Tester support E2E-CRC safety (Bit 12 'E2E-CRC supported' in CGM Feature flags is set to 1).

- Test Procedure

1. Read the value of the CGM Session Start Time characteristic by executing the test procedure of GATT test case GATT/SR/GAR/BV-01-C in [5].
2. Verify the characteristic value meets the requirements of the service.

- Expected Outcome

Pass verdict

The CGM Session Start Time characteristic is successfully read and meets the requirements of the service.

The E2E-CRC field is present in CGM Session Start Time characteristic value.

CGMS/SEN/CR/BV-05-C [Characteristic Read – 'CGM Session Start Time without E2E-CRC']

- Test Purpose

Verify that the IUT can read the CGM Session Start Time characteristic.



- Reference

[2] 3.4

- Initial Condition

The handle of the characteristic in the test case below has been previously discovered by the Lower Tester during the test procedure in Section 4.4 or is known to the Lower Tester by other means.

Establish an ATT Bearer connection between the Lower Tester and IUT as described in Section 4.2.1 if using LE Transport or Section 4.2.2 if using a BR/EDR Transport.

Neither the IUT nor the Lower Tester support E2E-CRC safety (Bit 12 'E2E-CRC supported' in CGM Feature flags is set to 0).

- Test Procedure

1. Read the value of the CGM Session Start Time characteristic by executing the test procedure of GATT test case GATT/SR/GAR/BV-01-C in [5].
2. Verify the characteristic value meets the requirements of the service.

- Expected Outcome

Pass verdict

The CGM Session Start Time characteristic is successfully read and meets the requirements of the service.

The E2E-CRC field is excluded and not present in CGM Session Start Time characteristic value.

CGMS/SEN/CR/BV-06-C [Characteristic Read – 'CGM Session Run Time with E2E-CRC']

- Test Purpose

Verify that the IUT can read the CGM Session Run Time characteristic.

- Reference

[2] 3.5

- Initial Condition

The handle of the characteristic in the test case below has been previously discovered by the Lower Tester during the test procedure in Section 4.4 or is known to the Lower Tester by other means.

Establish an ATT Bearer connection between the Lower Tester and IUT as described in Section 4.2.1 if using LE Transport or Section 4.2.2 if using a BR/EDR Transport.

Both the IUT and the Lower Tester support E2E-CRC safety (Bit 12 'E2E-CRC supported' in CGM Feature flags is set to 1).

- Test Procedure

1. Read the value of the CGM Session Run Time characteristic by executing the test procedure of GATT test case GATT/SR/GAR/BV-01-C in [5].



2. Verify the characteristic value meets the requirements of the service.

- Expected Outcome

Pass verdict

The CGM Session Run Time characteristic is successfully read and meets the requirements of the service.

The E2E-CRC field is present in CGM Session Run Time characteristic value.

CGMS/SEN/CR/BV-07-C [Characteristic Read – ‘CGM Session Run Time without E2E-CRC’]

- Test Purpose

Verify that the IUT can read the CGM Session Run Time characteristic.

- Reference

[2] 3.5

- Initial Condition

The handle of the characteristic in the test case below has been previously discovered by the Lower Tester during the test procedure in Section 4.4 or is known to the Lower Tester by other means.

Establish an ATT Bearer connection between the Lower Tester and IUT as described in Section 4.2.1 if using LE Transport or Section 4.2.2 if using a BR/EDR Transport.

Neither the IUT nor and the Lower Tester support E2E-CRC safety (Bit 12 ‘E2E-CRC supported’ in CGM Feature flags is set to 0).

- Test Procedure

1. Read the value of the CGM Session Run Time characteristic by executing the test procedure of GATT test case GATT/SR/GAR/BV-01-C in [5].
2. Verify the characteristic value meets the requirements of the service.

- Expected Outcome

Pass verdict

The CGM Session Run Time characteristic is successfully read and meets the requirements of the service.

The E2E-CRC field is excluded and not present in CGM Session Run Time characteristic value.

CGMS/SEN/CR/BV-08-C [Characteristic Read – ‘CGM Status’]

- Test Purpose

Verify that the IUT can read the CGM Status characteristic.

- Reference

[2] 3.3



- Initial Condition

The handle of the characteristic in the test case below has been previously discovered by the Lower Tester during the test procedure in Section 4.4 or is known to the Lower Tester by other means.

Establish an ATT Bearer connection between the Lower Tester and IUT as described in Section 4.2.1 if using LE Transport or Section 4.2.2 if using a BR/EDR Transport.

Both the IUT and the Lower Tester have the same CGM Feature Bit settings concerning E2E-CRC safety (Bit 12 “E2E-CRC supported” is set to 1 or to 0).

- Test Procedure

1. Read the value of the CGM Status characteristic by executing the test procedure of GATT test case GATT/SR/GAR/BV-01-C in [5].
2. Verify the characteristic value meets the requirements of the service.

- Expected Outcome

Pass verdict

The CGM Status characteristic is successfully read and meets the requirements of the service.

CGMS/SEN/CR/BV-09-C [Characteristic Read – ‘Verify E2E-CRC calculation’]

- Test Purpose

Verify the calculated E2E-CRC value.

- Reference

[2] 3.1.1.8, 3.2.1.1, 3.2.1.3, 3.3.2, 3.4.4, 3.5.2, 3.7.2

- Initial Condition

The handle of the characteristic in the test case below has been previously discovered by the Lower Tester during the test procedure in Section 4.4 or is known to the Lower Tester by other means.

Establish an ATT Bearer connection between the Lower Tester and IUT as described in Section 4.2.1 if using LE Transport or Section 4.2.2 if using a BR/EDR Transport.

Both the IUT and the Lower Tester support E2E-CRC safety (Bit 12 ‘E2E-CRC supported’ in CGM Feature flags is set to 1).

- Test Procedure

1. Read out any characteristic value which supports E2E-CRC safety (e.g., CGM Status) by executing the test procedure of GATT test case GATT/SR/GAR/BV-01-C in [5].
2. Verify that the read out characteristic contains an E2E-CRC field and the calculated CRC meets the requirement of the service.

- Expected Outcome

Pass verdict

The calculated CRC meets the requirement of the service.



4.7 Characteristic Write

CGMS/SEN/CW/BV-01-C [Characteristic Write - 'CGM Session Start Time', Type 1]

- Test Purpose

Verify that the Session Start Time characteristic can be written.

- Reference

[2] 3.4.1

- Initial Condition

The handle of the characteristic value referenced in the test case below has been previously discovered by the Lower Tester during the test procedure in Section 4.4 or is known to the Lower Tester by other means.

Both the IUT and the Lower Tester have the same CGM Feature Bit settings concerning E2E-CRC safety (Bit 12 "E2E-CRC supported" is set to 1 or to 0).

Establish an ATT Bearer connection between the Lower Tester and IUT as described in Section 4.2.1 if using LE Transport or Section 4.2.2 if using a BR/EDR Transport.

- Test Procedure

1. Select a value that is valid for the characteristic. The Lower Tester writes the characteristic value on the IUT by executing the test procedure of GATT test case GATT/SR/GAW/BV-03-C in [5].
2. The Lower Tester reads the CGM Session Start Time by executing either CGMS/SEN/CR/BV-04-C [Characteristic Read – 'CGM Session Start Time with E2E-CRC'] or CGMS/SEN/CR/BV-05-C [Characteristic Read – 'CGM Session Start Time without E2E-CRC'] based on E2E-CRC support indicated by the IUT.
3. The Lower Tester reads the CGM Session Run Time by executing either CGMS/SEN/CR/BV-06-C [Characteristic Read – 'CGM Session Run Time with E2E-CRC'] or CGMS/SEN/CR/BV-07-C [Characteristic Read – 'CGM Session Run Time without E2E-CRC'] based on E2E-CRC support indicated by the IUT.
4. Verify that the characteristic value is successfully written in step 1 based on the CGM Session Start and Run Times read in steps 2 and 3.

- Expected Outcome

Pass verdict

The characteristic value is successfully written in step 1 and is verified by the Lower Tester to be within 10% of the CGM Session Start time minus the CGM Session Run Time.

CGMS/SEN/CW/BI-01-C [Characteristic Write - 'CGM Session Start Time', Type 2]

- Test Purpose

Verify that the Session Start Time characteristic can't be written when value is invalid.

- Reference

[2] 3.4.1



- Initial Condition

The handle of the characteristic value referenced in the test case below has been previously discovered by the Lower Tester during the test procedure in Section 4.4 or is known to the Lower Tester by other means.

Both the IUT and the Lower Tester have the same CGM Feature Bit settings concerning E2E-CRC safety (Bit 12 “E2E-CRC supported” is set to 1 or to 0).

Establish an ATT Bearer connection between the Lower Tester and IUT as described in Section 4.2.1 if using LE Transport or Section 4.2.2 if using a BR/EDR Transport.

- Test Procedure

1. Select a value that is invalid for the characteristic, (e.g., set the Time Zone field to a value of 126). The Lower Tester writes the characteristic value on the IUT by executing the test procedure of GATT test case GATT/SR/GAW/BV-03-C in [5].
2. The Lower Tester receives an ATT Error Response.

- Expected Outcome

Pass verdict

The IUT sends an ATT Error Response with the error code ‘0xff’ set to ‘Out-Of-Range’ as defined in [8] Section 2.1.

The IUT responds within the applicable timeout.

4.8 Configure Indication and Notification

- Test Purpose

This test group is for generic use and contains one or more test cases to verify compliant operation in response to enable and disable characteristic indication or notification. The verification is done one value at a time, as enumerated in the test cases in Table 4.5 below, using this generic test procedure.

- Reference

[2] 3.1.1

- Initial Condition

The handle of each characteristic value referenced in the test cases below has been previously discovered by the Lower Tester during the test procedure in Section 4.4 or is known to the Lower Tester by other means.

The handle of the client characteristic configuration descriptor of each characteristic referenced in the test cases below has been previously discovered by the Lower Tester during the test procedure in Section 4.5 or is known to the Lower Tester by other means.

Establish an ATT Bearer connection between the Lower Tester and IUT as described in Section 4.2.1 if using LE Transport or Section 4.2.2 if using a BR/EDR Transport.

- Test Case Configuration

Test Case	Value (Requirements)
CGMS/SEN/CON/BV-01-C [Configure Notification – ‘CGM Measurement’]	0x0001 (Section 3.1.1 in [2])
CGMS/SEN/CON/BV-02-C [Configure Indication – ‘Record Access Control Point’]	0x0002 (Section 3.5 in [2])
CGMS/SEN/CON/BV-03-C [Configure Indication – ‘CGM Specific Ops Control Point’]	0x0002 (Section 3.7 in [2])

Table 4.5: Configure Indication and Notification Test Cases

- Test Procedure

The following test procedure applies to the test cases listed in the table below:

1. Disable indication or notification by writing value 0x0000 to the client characteristic configuration descriptor of the characteristic using the test procedure of GATT test case GATT/SR/GAW/BV-08-C in [5].
2. The Lower Tester reads the value of the client characteristic configuration descriptor.
3. If the test case is for notification, enable notification by writing value 0x0001 to the client characteristic configuration descriptor of the characteristic. If the test case is for indication, enable indication by writing value 0x0002 to the client characteristic configuration descriptor of the characteristic.
4. The Lower Tester reads the value of the client characteristic configuration descriptor.

- Expected Outcome

Pass verdict

The characteristic descriptor is successfully written and the value returned when read is consistent with the value written.

4.9 CGM Measurement Characteristic Notification

This test group is for generic use and contains one or more test cases to verify that the value of the CGM Measurement characteristic meets the requirements of the service particular the presence of the optional Sensor Status Annunciation field, CGM Trend Information field, CGM Quality field and E2E-CRC field.

CGMS/SEN/CN/BV-01-C [CGM Measurement Notifications - Type 1]

- Reference

[2] 3.1.1

- Initial Condition

Perform the preamble described in in Section 4.2.3.



- Test Procedure

Perform an action on the IUT to create at least one CGM Measurement characteristic with at least the mandatory field values as defined in [3].

1. The Lower Tester uses the RACP (e.g., using the procedure in Section 0) to cause the record to be notified.
2. Verify the characteristic value meets the requirements of the service.

- Expected Outcome

Pass verdict

The IUT sends a number of notifications of the CGM Measurement characteristic depending on the used MTU size.

At least a Size field, a Flags field, a CGM Glucose Concentration field and a Time Offset field are present in the record.

The value of the characteristic meets the requirements of the service as defined in the CGM Feature requirement of the different Test Cases.

CGMS/SEN/CN/BV-02-C [CGM Measurement Notifications – Type 2]

- Test Purpose

Verify that the IUT can send notifications of the CGM Measurement characteristic that include Sensor Status Annunciation values.

- Reference

[2] 3.1.1

- Initial Condition

Perform the preamble described in in Section 4.2.3.

- Test Procedure

1. Perform an action on the IUT to create at least one CGM Measurement characteristic that include Sensor Status Annunciation values.
2. The Lower Tester uses the RACP (e.g., using the procedure in Section 0) to cause the record to be notified.
3. Verify the characteristic value meets the requirements of the service.

- Expected Outcome

Pass verdict

The IUT sends a number of notifications of the CGM Measurement characteristic depending on the used MTU size.

A Size field, a Flags field, a CGM Glucose Concentration field and a Time Offset field are present in the record.



At least in one record the Sensor Status Annunciation Field is present.

The value of the characteristic meets the requirements of the service as defined in the CGM Feature requirement.

CGMS/SEN/CN/BV-03-C [CGM Measurement Notifications – Type 3]

- Test Purpose

Verify that the IUT can send notifications of the CGM Measurement characteristic that includes CGM Trend Information values.

- Reference

[2] 3.1.1

- Initial Condition

Perform the preamble described in in Section 4.2.3.

- Test Procedure

1. Perform an action on the IUT to create at least one CGM Measurement characteristic that includes CGM Trend Information value.
2. The Lower Tester uses the RACP (e.g., using the procedure in Section 0) to cause the record to be notified.
3. Verify the characteristic value meets the requirements of the service.

- Expected Outcome

Pass verdict

The IUT sends a number of notifications of the CGM Measurement characteristic depending on the used MTU size.

A Size field, a Flags field, a CGM Glucose Concentration field and a Time Offset field are present in the record.

At least in one record the CGM Trend Information Field is present.

The value of the characteristic meets the requirements of the service as defined in the CGM Feature requirement.

CGMS/SEN/CN/BV-04-C [CGM Measurement Notifications – Type 4]

- Test Purpose

Verify that the IUT can send notifications of the CGM Measurement characteristic that includes CGM Quality values.

- Reference

[2] 3.1.1

- Initial Condition

Perform the preamble described in in Section 4.2.3.

- Test Procedure

1. Perform an action on the IUT to create at least one CGM Measurement characteristic that includes CGM Quality value.
2. The Lower Tester uses the RACP (e.g., using the procedure in Section 0) to cause the record to be notified.
3. Verify the characteristic value meets the requirements of the service.

- Expected Outcome

Pass verdict

The IUT sends a number of notifications of the CGM Measurement characteristic depending on the used MTU size.

A Size field, a Flags field, a CGM Glucose Concentration field and a Time Offset field are present in the record.

At least in one record the CGM Quality Field is present.

The value of the characteristic meets the requirements of the service as defined in the CGM Feature requirement.

CGMS/SEN/CN/BV-05-C [CGM Measurement Notifications - Type 5]

- Test Purpose

Verify that the IUT can send notifications of the CGM Measurement characteristic that includes E2E-CRC values.

- Reference

[2] 3.1.1

- Initial Condition

Perform the preamble described in in Section 4.2.3.

- Test Procedure

1. Perform an action on the IUT to create at least one CGM Measurement characteristic including an E2E-CRC value as defined in [3].
2. The Lower Tester uses the RACP (e.g., using the procedure in Section 0) to cause the record to be notified.
3. Verify the characteristic value meets the requirements of the service.

- Expected Outcome

Pass verdict

The IUT sends a number of notifications of the CGM Measurement characteristic depending on the used MTU size.

A Size field, a Flags field, a CGM Glucose Concentration field, a Time Offset field and an E2E-CRC field are present in the record.

The value of the characteristic meets the requirements of the service as defined in the CGM Feature requirement of the different Test Cases.

4.10 Record Access – Report Number of Stored Records

This test group contains test cases to verify compliant operation when the Lower Tester uses Record Access Control Point (RACP) 'Report Number of Stored Records' procedures.

CGMS/SEN/RAN/BV-01-C [Report Number of Stored Records – 'All records']

- Test Purpose

Verify that the IUT can perform the 'Report Number of Stored Records' procedure with an Operator of 'All records'.

- Reference

[2] 3.6.2, 3.6.3.2

- Initial Condition

Perform the preamble described in in Section 4.2.3.

Perform an action on the IUT that will induce it to generate a defined number of patient records.

- Test Procedure

1. The Lower Tester writes the 'Report number of stored records' Op Code (0x04) to the RACP using an Operator of 'All records' (0x01) and no Operand.
2. The IUT sends an indication of the Record Access Control Point characteristic with the 'Report Number of Stored Records Response' Op Code (0x05), an Operator of Null (0x00), and an Operand representing the number of records a generated in step 1.
3. The Lower Tester receives an ATT_Handle_Value_Indication from the IUT containing the Record Access Control Point characteristic handle and value.
4. The Lower Tester sends an ATT_Handle_Value_Confirmation to the IUT.
5. Verify the characteristic value meets the requirements of the service.

- Expected Outcome

Pass verdict

The IUT sends one indication of the Record Access Control Point characteristic with the 'Number of Stored Records Response' Op Code (0x05), an Operator of Null (0x00), and an Operand representing the number of records a generated in step 1.

The value of the Operand represents the correct number of all records in the IUT.

CGMS/SEN/RAN/BV-02-C [Report Number of Stored Records –'Greater than or equal to Time Offset']

- Test Purpose

Verify that the IUT can perform the 'Report Number of Stored Records' procedure with an Operator of 'greater than or equal to' and using the Time Offset Filter Type in the Operand.

- Reference

[2] 3.6.2, 3.6.3.2

- Initial Condition

Perform the preamble described in in Section 4.2.3.

Perform an action on the IUT that will induce it to generate a defined number of records (at least three).

- Test Procedure

1. The Lower Tester writes the 'Report number of stored records' Op Code (0x04) to the RACP using an Operator of 'greater than or equal to' (0x03) and an Operand containing the Time Offset Filter Type (0x01) followed by the value of the Time Offset of the second record.
2. The IUT sends an indication of the Record Access Control Point characteristic with the 'Number of Stored Records Response' Op Code (0x05), an Operator of Null (0x00), and an Operand representing the number of records generated in step 1 minus 1.
3. The Lower Tester receives an ATT_Handle_Value_Indication from the IUT containing the Record Access Control Point characteristic handle and value.
4. The Lower Tester sends an ATT_Handle_Value_Confirmation to the IUT.
5. Verify the characteristic value meets the requirements of the service.

- Expected Outcome

Pass verdict

The IUT sends one indication of the Record Access Control Point characteristic with the 'Number of Stored Records Response' Op Code (0x05), an Operator of Null (0x00), and an Operand representing the number of records a generated in step 1 minus 1.

CGMS/SEN/RAN/BV-03-C [Report Number of Stored Records – ‘No records found’]

- Test Purpose

Verify that the IUT responds properly if the ‘Report Number of Stored Records’ procedure is performed with an Operator of ‘all records’ and the IUT does not contain any records.

- Reference

[2] 3.6.2, 3.6.3.2

- Initial Condition

Perform the preamble described in in Section 4.2.3.

Perform an action on the IUT that clears all records from the IUT database

- Test Procedure

1. The Lower Tester writes the ‘Report number of stored records’ Op Code (0x04) to the RACP using an Operator of ‘all records’ (0x01) and no Operand.
2. The IUT sends an indication of the Record Access Control Point characteristic with the ‘Number of Stored Records Response’ Op Code (0x05), an Operator of Null (0x00), and an Operand representing that no records were found (0x0000).
3. The Lower Tester receives an ATT_Handle_Value_Indication from the IUT containing the Record Access Control Point characteristic handle and value.
4. The Lower Tester sends an ATT_Handle_Value_Confirmation to the IUT.
5. Verify the characteristic value meets the requirements of the service.

- Expected Outcome

Pass verdict

The IUT sends one indication of the Record Access Control Point characteristic with the ‘Number of Stored Records Response’ Op Code (0x05), an Operator of Null (0x00), and an Operand representing that no records were found (0x0000).

4.11 Record Access - Delete Stored Records

This test group contains test cases to verify compliant operation when the Lower Tester uses Record Access Control Point (RACP) ‘Delete Stored Records’ procedures.

CGMS/SEN/RAD/BV-01-C [Delete Stored Records – ‘All records’]

- Test Purpose

Verify that the IUT can perform the ‘Delete Stored Records’ procedure with an Operator of ‘All records’.

- Reference

[2] 3.6.2, 3.6.3.3



- Initial Condition

Perform the preamble described in in Section 4.2.3.

- Test Procedure

1. Perform a 'Report Number of Stored Records' (CGMS/SEN/RAN/BV-01-C [Report Number of Stored Records – 'All records']) procedure.
2. The Lower Tester writes the 'Delete stored records' Op Code (0x02) to the RACP using an Operator of 'All records' (0x01) and no Operand.
3. The IUT sends an indication of the Record Access Control Point characteristic with the 'Response Code' Op Code (0x06), an Operator of Null (0x00), and an Operand representing Request Op Code (0x02) followed by the Response Code for 'Success' (0x01).
4. The Lower Tester receives an ATT_Handle_Value_Indication from the IUT containing the Record Access Control Point characteristic handle and value.
5. The Lower Tester sends an ATT_Handle_Value_Confirmation to the IUT.
6. The Lower Tester writes the 'Report Number of Stored Records' Op Code (0x05) to the RACP using an Operator of 'All records' (0x01) and no Operand.
7. The IUT sends an indication of the Record Access Control Point characteristic with the 'Number of Stored Records Response' Op Code (0x05), an Operator of Null (0x00), and an Operand representing that no records were found (0x0000).
8. The Lower Tester receives an ATT_Handle_Value_Indication from the IUT containing the Record Access Control Point characteristic handle and value.
9. The Lower Tester sends an ATT_Handle_Value_Confirmation to the IUT.
10. Verify the characteristic value meets the requirements of the service.

- Expected Outcome

Pass verdict

The IUT sends one indication of the Record Access Control Point characteristic with the 'Response Code' Op Code (0x06), an Operator of Null (0x00), and an Operand representing Request Op Code (0x02) followed by the Response Code for 'Success' (0x01).

All records have been deleted from the IUT.

CGMS/SEN/RAD/BV-02-C [Delete Stored Records – 'Within range of (inclusive) Time Offset value pair']

- Test Purpose

Verify that the IUT can perform the 'Delete Stored Records' procedure with an Operator of 'Within range of (inclusive)'.

- Reference

[2] 3.6.2, 3.6.3.3

- Initial Condition

Perform the preamble described in in Section 4.2.3.



Perform an action on the IUT that will induce it to generate a defined number of patient records (at least four).

- Test Procedure
 1. The Lower Tester writes the 'Delete stored records' Op Code (0x02) to the RACP using an Operator of 'Within range of' (0x04) and a Operand containing the Time Offset Filter Type (0x01) followed by a pair of Time Offset values representing the value of the second record and the value of the third record.
 2. The IUT sends an indication of the Record Access Control Point characteristic with the Response Code Op Code (0x06), an Operator of Null (0x00), and an Operand representing Request Op Code (0x02) followed by the Response Code for 'Success' (0x01).
 3. The Lower Tester receives an ATT_Handle_Value_Indication from the IUT containing the Record Access Control Point characteristic handle and value.
 4. The Lower Tester sends an ATT_Handle_Value_Confirmation to the IUT.
 5. Verify that the second and third records have been deleted from the IUT.
 6. Verify the characteristic value meets the requirements of the service.

- Expected Outcome

Pass verdict

The IUT sends one indication of the Record Access Control Point characteristic with the 'Response Code' Op Code (0x06), an Operator of Null (0x00), and an Operand representing Request Op Code (0x01) followed by the Response Code for 'Success' (0x01).

The second and third records have been deleted from the IUT.

4.12 Record Access – Report Stored Records

This test group contains test cases to verify compliant operation when the Lower Tester uses Record Access Control Point (RACP), 'Report Stored Records' procedures.

CGMS/SEN/RAR/BV-01-C [Report Stored Records – 'All records']

- Test Purpose

Verify that the IUT can perform the 'Report Stored Records' procedure with an Operator of 'All records'.
- Reference

[2] 3.6.2, 3.6.3.4
- Initial Condition

Perform the preamble described in in Section 4.2.3.

Perform an action on the IUT that will induce it to generate a defined number of records.

- Test Procedure
 1. The Lower Tester writes the 'Report Stored Records' Op Code (0x01) to the RACP using an Operator of 'All Records' (0x01) and no Operand.
 2. The IUT sends a number of notifications of the CGM Measurement characteristic depending on the used MTU size.
 3. The Lower Tester receives ATT_Handle_Value_Notification(s) from the IUT containing the CGM Measurement characteristic handle and value.
 4. The IUT sends an indication of the Record Access Control Point characteristic with the 'Response Code' Op Code (0x06), an Operator of Null (0x00), and an Operand representing Request Op Code (0x01) followed by the Response Code for 'Success' (0x01).
 5. The Lower Tester receives an ATT_Handle_Value_Indication from the IUT containing the Record Access Control Point characteristic handle and value.
 6. The Lower Tester sends an ATT_Handle_Value_Confirmation to the IUT.
 7. Verify the characteristic value meets the requirements of the service.

- Expected Outcome

Pass verdict

The IUT sends a number of notifications of the CGM Measurement characteristic depending on the used MTU size.

The received CGM Measurements contain the values of the records generated in step 1.

The IUT sends one indication of the Record Access Control Point characteristic with the 'Response Code' Op Code (0x06), an Operator of Null (0x00), and an Operand representing Request Op Code (0x01) followed by the Response Code for 'Success' (0x01).

The oldest record is transmitted before newer records.

CGMS/SEN/RAR/BV-02-C [Report Stored Records – 'Less than or equal to Time Offset']

- Test Purpose

Verify that the IUT can perform the 'Report Stored Records' procedure with an Operator of 'Less than or equal to' and using the Time Offset Filter Type in the Operand.
- Reference

[2] 3.6.2, 3.6.3.4
- Initial Condition

Perform the preamble described in in Section 4.2.3.

Perform an action on the IUT that will induce it to generate a defined number of records (at least three).

- Test Procedure
 1. The Lower Tester writes the 'Report Stored Records' Op Code (0x01) to the RACP using an Operator of 'Less than or equal to' (0x02), an Operand representing the Filter Type 'Time Offset' (0x01), and the maximum value for the filter representing Time Offset of the second record.
 2. The IUT sends notification(s) of the CGM Measurement characteristic representing the oldest two records.
 3. The Lower Tester receives ATT_Handle_Value_Notification(s) from the IUT containing the CGM Measurement characteristic handle and value.
 4. The IUT sends an indication of the Record Access Control Point characteristic with the 'Response Code' Op Code (0x06), an Operator of Null (0x00), and an Operand representing Request Op Code (0x01) followed by the Response Code for 'Success' (0x01).
 5. The Lower Tester receives an ATT_Handle_Value_Indication from the IUT containing the Record Access Control Point characteristic handle and value.
 6. The Lower Tester sends an ATT_Handle_Value_Confirmation to the IUT.
 7. Verify the characteristic value meets the requirements of the service.

- Expected Outcome

Pass verdict

The IUT sends notification(s) of the CGM Measurement characteristic.

The CGM Measurement characteristic contains the values of the oldest two records.

The IUT sends one indication of the Record Access Control Point characteristic with the 'Response Code' Op Code (0x06), an Operator of Null (0x00), and an Operand representing Request Op Code (0x01) followed by the Response Code for 'Success' (0x01).

The characteristic value meets the requirements of the service.

CGMS/SEN/RAR/BV-03-C [Report Stored Records – 'Greater than or equal to Time Offset']

- Test Purpose

Verify that the IUT can perform the 'Report Stored Records' procedure with an Operator of 'greater than or equal to' and using the Time Offset Filter Type in the Operand.
- Reference

[2] 3.6.2, 3.6.3.4
- Initial Condition

Perform the preamble described in in Section 4.2.3.

Perform an action on the IUT that will induce it to generate a defined number of records (at least three).

- Test Procedure
 1. The Lower Tester writes the 'Report Stored Records' Op Code (0x01) to the RACP using an Operator of 'Greater than or equal to' (0x03) and a Operand containing the Filter Type 'Time Offset' (0x01) followed by the value of the Time Offset for the second record.
 2. The IUT sends notification(s) of the CGM Measurement characteristic representing the most recent records beginning with record two.
 3. The Lower Tester receives an ATT_Handle_Value_Notification from the IUT containing the CGM Measurement characteristic handle and value.
 4. The IUT sends an indication of the Record Access Control Point characteristic with the 'Response Code' Op Code (0x06), an Operator of Null (0x00), and an Operand representing Request Op Code (0x01) followed by the Response Code for 'Success' (0x01).
 5. The Lower Tester receives an ATT_Handle_Value_Indication from the IUT containing the Record Access Control Point characteristic handle and value.
 6. The Lower Tester sends an ATT_Handle_Value_Confirmation to the IUT.
 7. Perform step 3 again using the Filter Type 'Time Offset' (0x01) followed by a value for the Time Offset which is greater than the most recent record.
 8. The IUT sends an indication of the Record Access Control Point characteristic with the 'Response Code' Op Code (0x06), an Operator of Null (0x00), and an Operand representing Request Op Code (0x01) followed by the Response Code for 'No Records found' (0x06).
 9. Verify the characteristic value meets the requirements of the service.

- Expected Outcome

Pass verdict

The IUT sends notification(s) of the CGM Measurement characteristic.

The CGM Measurement characteristic contains the values of the most recent records beginning with record two.

For the 'Success' case, the IUT sends one indication of the Record Access Control Point characteristic with the 'Response Code' Op Code (0x06), an Operator of Null (0x00), and an Operand representing Request Op Code (0x01) followed by the Response Code for 'Success' (0x01).

For the 'No Records found' case, the IUT sends one indication of the Record Access Control Point characteristic with the 'Response Code' Op Code (0x06), an Operator of Null (0x00), and an Operand representing Request Op Code (0x01) followed by the Response Code for 'No Records found' (0x06).

CGMS/SEN/RAR/BV-04-C [Report Stored Records – 'Within range of (inclusive) Time Offset value pair']

- Test Purpose

Verify that the IUT can perform the 'Report Stored Records' procedure with an Operator of 'within range of (inclusive)' and using the Time Offset Filter Type in the Operand.

- Reference

[2] 3.6.2, 3.6.3.4



- Initial Condition

Perform the preamble described in in Section 4.2.3.

Perform an action on the IUT that will induce it to generate a defined number of records (at least 4).

- Test Procedure

1. The Lower Tester writes the 'Report Stored Records' Op Code (0x01) to the RACP using an Operator of 'Within range of' (0x04) and a Operand containing the Filter Type 'Time Offset' (0x01) followed by a pair of Time Offset values representing the value of the second record and the value of the third record.
2. The IUT sends notification(s) of the CGM Measurement characteristic representing the second and the third record.
3. The Lower Tester receives an ATT_Handle_Value_Notification from the IUT containing the CGM Measurement characteristic handle and value.
4. The IUT sends an indication of the Record Access Control Point characteristic with the 'Response Code' Op Code (0x06), an Operator of Null (0x00), and an Operand representing Request Op Code (0x01) followed by the Response Code for 'Success' (0x01).
5. The Lower Tester receives an ATT_Handle_Value_Indication from the IUT containing the Record Access Control Point characteristic handle and value.
6. The Lower Tester sends an ATT_Handle_Value_Confirmation to the IUT.
7. Verify the characteristic value meets the requirements of the service.

- Expected Outcome

Pass verdict

The IUT sends notification(s) of the CGM Measurement characteristic.

The CGM Measurement characteristic contains the values of the second and third record. The IUT sends one indication of the Record Access Control Point characteristic with the 'Response Code' Op Code (0x06), an Operator of Null (0x00), and an Operand representing Request Op Code (0x01) followed by the Response Code for 'Success' (0x01).

CGMS/SEN/RAR/BV-05-C [Report Stored Records – 'First record']

- Test Purpose

Verify that the IUT can perform the 'Report Stored Records' procedure with an Operator of 'First record'.

- Reference

[2] 3.6.2, 3.6.3.4

- Initial Condition

Perform the preamble described in in Section 4.2.3.

Perform an action on the IUT that will induce it to generate a defined number of records (at least two).



- Test Procedure
 1. The Lower Tester writes the 'Report Stored Records' Op Code (0x01) to the RACP using an Operator of 'First record' (0x05) and no Operand.
 2. The IUT sends one notification of the CGM Measurement characteristic.
 3. The Lower Tester receives an ATT_Handle_Value_Notification from the IUT containing the CGM Measurement characteristic handle and value.
 4. The IUT sends an indication of the Record Access Control Point characteristic with the 'Response Code' Op Code (0x06), an Operator of Null (0x00), and an Operand representing Request Op Code (0x01) followed by the Response Code for 'Success' (0x01).
 5. The Lower Tester receives an ATT_Handle_Value_Indication from the IUT containing the Record Access Control Point characteristic handle and value.
 6. The Lower Tester sends an ATT_Handle_Value_Confirmation to the IUT.
 7. Verify the characteristic value meets the requirements of the service.

- Expected Outcome

Pass verdict

The IUT sends a notification of the CGM Measurement characteristic.

The CGM Measurement characteristic contains the value of the oldest record.

The IUT sends one indication of the Record Access Control Point characteristic with the 'Response Code' Op Code (0x06), an Operator of Null (0x00), and an Operand representing Request Op Code (0x01) followed by the Response Code for 'Success' (0x01).

CGMS/SEN/RAR/BV-06-C [Report Stored Records – 'Last record']

- Test Purpose

Verify that the IUT can perform the 'Report Stored Records' procedure with an Operator of 'last record'.
- Reference

[2] 3.6.2, 3.6.3.4
- Initial Condition

If a connection exists, it shall be disconnected.

Perform the preamble described in in Section 4.2.3.

Perform an action on the IUT that will induce it to generate a defined number of records (at least two).
- Test Procedure
 1. The Lower Tester writes the 'Report Stored records' Op Code (0x01) to the RACP using an Operator of 'Last record' (0x06) and no Operand.
 2. The IUT sends one notification of the CGM Measurement characteristic representing the most recent record.



3. The Lower Tester receives an ATT_Handle_Value_Notification from the IUT containing the CGM Measurement characteristic handle and value.
4. The IUT sends an indication of the Record Access Control Point characteristic with the 'Response Code' Op Code (0x06), an Operator of Null (0x00), and an Operand representing Request Op Code (0x01) followed by the Response Code for 'Success' (0x01).
5. The Lower Tester receives an ATT_Handle_Value_Indication from the IUT containing the Record Access Control Point characteristic handle and value.
6. The Lower Tester sends an ATT_Handle_Value_Confirmation to the IUT.
7. Verify the characteristic value meets the requirements of the service.

- Expected Outcome

Pass verdict

The IUT sends a notification of the CGM Measurement characteristic.

The CGM Measurement characteristic contains the value of the most recent record.

The IUT sends one indication of the Record Access Control Point characteristic with the 'Response Code' Op Code (0x06), an Operator of Null (0x00), and an Operand representing Request Op Code (0x01) followed by the Response Code for 'Success' (0x01).

4.13 Record Access – Abort operation procedure

This test group contains test cases to verify compliant operation when the Lower Tester uses Record Access Control Point (RACP) 'Abort Operation' procedure.

CGMS/SEN/RAA/BV-01-C [Abort Operation – 'Report Stored Records']

- Test Purpose

Verify that the IUT can perform an 'Abort' of the Report Stored Records procedure.

- Reference

[2] 3.6.2, 3.6.3.5

- Initial Condition

Perform the preamble described in in Section 4.2.3.

Perform an action on the IUT that will induce it to generate enough records such that the transmission is not able to complete before the abort is attempted. In most cases, ~200 records are sufficient since this will take over 5 seconds to transfer.

- Test Procedure

1. The Lower Tester writes the 'Report Stored Records' Op Code (0x01) to the RACP using an Operator of 'All records' (0x01) and no Operand.
2. The IUT starts to send notifications of the CGM Measurement characteristic.
3. The Lower Tester receives a number of ATT_Handle_Value_Notifications from the IUT containing the CGM Measurement characteristics handle and value.

4. The Lower Tester writes the 'Abort Operation' Op Code (0x03) to the RACP with an Operator of Null (0x00) and no Operand.
5. The IUT sends an indication of the Record Access Control Point characteristic with the 'Response Code' Op Code (0x06), an Operator of Null (0x00), and an Operand representing Request Op Code (0x03) followed by the Response Code for 'Success' (0x01).
6. The Lower Tester receives an ATT_Handle_Value_Indication from the IUT containing the Record Access Control Point characteristic handle and value.
7. The Lower Tester sends an ATT_Handle_Value_Confirmation to the IUT.
8. Verify that the notifications stop.
9. Verify the characteristic value meets the requirements of the service.

- Expected Outcome

Pass verdict

The IUT sends notification(s) of the CGM Measurement characteristic.

The CGM Measurement characteristics contain some but not all record values.

The IUT sends one indication of the Record Access Control Point characteristic with the 'Response Code' Op Code (0x06), an Operator of Null (0x00), and an Operand representing Request Op Code (0x03) followed by the Response Code for 'Success' (0x01).

The notifications stopped after write the 'Abort Operation' Op Code.

4.14 Record Access – RACP specific Errors

This test group contains test cases to verify compliant operation when the Lower Tester uses Record Access Control Point (RACP) procedure and specific error results.

CGMS/SEN/RAE/BI-01-C [RACP specific Errors – 'Unsupported Filter Type']

- Test Purpose

Verify that the IUT responds appropriately when a Client writes an Op Code to the RACP with an unsupported Filter Type.

- Reference

[2] 3.6.2, 3.6.3.6

- Initial Condition

Perform the preamble described in in Section 4.2.3.

Perform an action on the IUT that will induce it to generate a defined number of records (at least 3).

- Test Procedure

1. The Lower Tester writes the 'Report Stored Records' Op Code (0x01) to the RACP using an Operator of 'Greater than or equal to' (0x03) and a Operand containing a Filter Type from the 'Reserved for future use' range followed by a value of 0x000F.

2. The IUT sends an indication of the Record Access Control Point characteristic with the 'Response Code' Op Code (0x06), an Operator of Null (0x00), and an Operand representing Request Op Code (0x01) followed by the Response Code Value for 'Operand not supported' (0x09).
3. Verify the characteristic value meets the requirements of the service.

- Expected Outcome

Pass verdict

The IUT sends an indication of the Record Access Control Point characteristic with the 'Response Code' Op Code (0x06), an Operator of Null (0x00), and an Operand representing Request Op Code (0x01) followed by the Response Code Value for 'Operand not supported' (0x09).

CGMS/SEN/RAE/BI-02-C [RACP specific Errors – 'Procedure Already In Progress']

- Test Purpose

Verify that the IUT responds appropriately when a Client attempts to perform a procedure before another procedure is completed.

- Reference

[2] 3.6.2, 3.6.3.6

- Initial Condition

Perform the preamble described in in Section 4.2.3.

Perform an action on the IUT that will induce it to generate several (~100) records.

- Test Procedure

1. The Lower Tester writes the 'Report Stored Records' Op Code (0x01) to the RACP using an Operator of 'all records' (0x01) and no Operand.
2. Before the procedure is completed, the Lower Tester performs the same procedure again.
3. Verify the characteristic value meets the requirements of the service.

- Expected Outcome

Pass verdict

The IUT rejects the Write Request to start the second procedure and responds with an Attribute Protocol Application Error Code set to 'Procedure Already in Progress' (0xFE).

CGMS/SEN/RAE/BI-03-C [RACP specific Errors – 'Client Characteristic Configuration Descriptor Improperly Configured']

- Test Purpose

Verify that the IUT responds appropriately when a Client attempts to perform an RACP procedure with a Client Characteristic Configuration descriptor that is improperly configured.

- Reference

[2] 3.6.2, 3.6.3.6



- Initial Condition

Perform the preamble described in in Section 4.2.3.

Perform an action on the IUT that will induce it to generate 3 records.

- Test Procedure

1. The Lower Tester resets to 0 one or both of the Client Characteristic Configuration descriptors from the CGM Measurement characteristic or Record Access Control Point characteristic.
2. The Lower Tester writes the 'Report Stored Records' Op Code (0x01) to the RACP using an Operator of 'all records' (0x01) and no Operand.
3. Verify the characteristic value meets the requirements of the service.

- Expected Outcome

Pass verdict

The IUT rejects the Write Request to start the second procedure and responds with an Attribute Protocol Application Error Code set to 'Client Characteristic Configuration Descriptor Improperly Configured' (0xFD).

4.15 CGM Specific Ops Control Point

This test group contains test cases to verify compliant operation when the Lower Tester uses CGM Specific Ops Control Point procedures.

CGMS/SEN/CGMCP/BV-01-C [CGM Specific Ops – 'Get CGM Communication Interval with E2E-CRC']

- Test Purpose

Verify that the IUT can perform the 'Get CGM Communication Interval' procedure.

- Reference

[2] 3.7.1, 3.7.2.1

- Initial Condition

Perform the preamble described in in Section 4.2.4.

Both the IUT and the Lower Tester support E2E-CRC safety (Bit 12 'E2E-CRC supported' in CGM Feature flags is set to 1).

- Test Procedure

1. The Lower Tester writes the 'Get CGM Communication Interval' Op Code (0x02) to the CGM Specific Ops Control Point with no operands.
2. The IUT sends an indication of the CGM Specific Ops Control Point characteristic with the 'Get Communication Interval response' Op Code (0x03) and an Operand representing the communication interval in minutes.
3. The Lower Tester receives an ATT_Handle_Value_Indication from the IUT containing the CGM Specific Ops Control Point characteristic handle and value.



4. The Lower Tester sends an ATT_Handle_Value_Confirmation to the IUT.
5. Verify the characteristic value meets the requirements of the service.

- Expected Outcome

Pass verdict

The IUT sends an indication of the CGM Specific Ops Control Point characteristic with the 'Get Communication Interval response' Op Code (0x03) and an Operand representing the communication interval in minutes.

The E2E-CRC field is present in CGM Specific Ops Control Point characteristic value.

CGMS/SEN/CGMCP/BV-02-C [CGM Specific Ops – 'Get CGM Communication Interval without E2E-CRC']

- Test Purpose

Verify that the IUT can perform the 'Get CGM Communication Interval' procedure.

- Reference

[2] 3.7.1, 3.7.2.1

- Initial Condition

Perform the preamble described in in Section 4.2.4.

Neither the IUT nor the Lower Tester support E2E-CRC safety (Bit 12 'E2E-CRC supported' in CGM Feature flags is set to 0).

- Test Procedure

1. The Lower Tester writes the 'Get CGM Communication Interval' Op Code (0x02) to the CGM Specific Ops Control Point with no operands.
2. The IUT sends an indication of the CGM Specific Ops Control Point characteristic with the 'Get Communication Interval response' Op Code (0x03) and an Operand representing the communication interval in minutes.
3. The Lower Tester receives an ATT_Handle_Value_Indication from the IUT containing the CGM Specific Ops Control Point characteristic handle and value.
4. The Lower Tester sends an ATT_Handle_Value_Confirmation to the IUT.
5. Verify the characteristic value meets the requirements of the service.

- Expected Outcome

Pass verdict

The IUT sends an indication of the CGM Specific Ops Control Point characteristic with the 'Get Communication Interval response' Op Code (0x03) and an Operand representing the communication interval in minutes.

The E2E-CRC field is excluded and not present in CGM Specific Ops Control Point characteristic value.



4.15.1 CGM Specific Ops – ‘Set CGM Communication Interval’

- Test Purpose

Verify that the IUT can perform the ‘Set CGM Communication Interval’ procedure.

- Reference

[2] 3.7.1, 3.7.2.1

- Initial Condition

Perform the preamble described in in Section 4.2.4.

Both the IUT and the Lower Tester have the same CGM Feature Bit settings concerning E2E-CRC safety (Bit 12 “E2E-CRC supported” is set to 1 or to 0). Setting is found in Table 4.6.

- Test Case Configuration

Test Case	E2E-CRC Value (Requirements)
CGMS/SEN/CGMCP/BV-03-C [CGM Specific Ops – ‘Set CGM Communication Interval’ – with E2E-CRC]	Bit 12 “E2E-CRC supported” is set to 1
CGMS/SEN/CGMCP/BV-26-C [CGM Specific Ops – ‘Set CGM Communication Interval’ – without E2E-CRC]	Bit 12 “E2E-CRC supported” is set to 0

Table 4.6: CGM Specific OPS - Set CGM Communication Interval test cases

- Test Procedure

The following test procedure applies to the test cases listed in the table below:

1. The Lower Tester writes the ‘Set CGM Communication interval’ Op Code (0x01) to the CGM Specific Ops Control Point with an Operand containing a value which is supported by the device for a communication interval time in minutes (e.g., 0x05 representing 5 minutes). The supported range is defined in the IXIT [7].
2. The IUT sends an indication of the CGM Specific Ops Control Point characteristic with the ‘Response Code’ Op Code (0x1C) and an Operand representing the Request Op Code (0x01) followed by the Response Code for ‘Success’ (0x01).
3. The Lower Tester receives an ATT_Handle_Value_Indication from the IUT containing the CGM Specific Ops Control Point characteristic handle and value.
4. The Lower Tester sends an ATT_Handle_Value_Confirmation to the IUT.
5. If E2E-CRC is supported, perform CGMS/SEN/CGMCP/BV-01-C [CGM Specific Ops – ‘Get CGM Communication Interval with E2E-CRC’] to verify that the previous set ‘Communication Time Interval’ is stored in IUT. If E2E-CRC is not supported, perform CGMS/SEN/CGMCP/BV-02-C [CGM Specific Ops – ‘Get CGM Communication Interval without E2E-CRC’] to verify that the previous set ‘Communication Time Interval’ is stored in IUT.
6. Verify the characteristic value meets the requirements of the service.

- Expected Outcome

Pass verdict

The IUT sends an indication of the CGM Specific Ops Control Point characteristic with the 'Response Code' Op Code (0x1C) and an Operand representing the Request Op Code (0x01) followed by the Response Code for 'Success' (0x01).

The new Communication interval is stored in IUT as used in step 2.

4.15.2 CGM Specific Ops – 'Set smallest CGM Communication Interval supported by Device'

- Test Purpose

Verify that when the IUT performs the 'Set CGM Communication Interval' procedure with a communication interval value of 0xFF the communication interval is set to the smallest interval supported by the device.

- Reference

[2] 3.7.1, 3.7.2.1

- Initial Condition

Perform the preamble described in Section 4.2.4.

The smallest Communication Interval supported by the device is known.

Both the IUT and the Lower Tester have the same CGM Feature Bit settings concerning E2E-CRC safety (Bit 12 "E2E-CRC supported" is set to 1 or to 0). Setting is found in Table 4.7.

- Test Case Configuration

Test Case	E2E-CRC Value (Requirements)
CGMS/SEN/CGMCP/BV-04-C [CGM Specific Ops – 'Set smallest CGM Communication Interval supported by Device' – with E2E-CRC]	Bit 12 "E2E-CRC supported" is set to 1
CGMS/SEN/CGMCP/BV-27-C [CGM Specific Ops – 'Set smallest CGM Communication Interval supported by Device' – without E2E-CRC]	Bit 12 "E2E-CRC supported" is set to 0

Table 4.7: CGM Specific OPS - Set smallest CGM Communication Interval supported test cases

- Test Procedure

The following test procedure applies to the test cases listed in the table below:

- The Lower Tester writes the 'Set CGM Communication Interval' Op Code (0x01) to the CGM Specific Ops Control Point with an Operand containing the value 0xFF.
- The IUT sends an indication of the CGM Specific Ops Control Point characteristic with the 'Response Code' Op Code (0x1C) and an Operand representing the Request Op Code (0x01) followed by the Response Code for 'Success' (0x01).



3. The Lower Tester receives an ATT_Handle_Value_Indication from the IUT containing the CGM Specific Ops Control Point characteristic handle and value.
 4. The Lower Tester sends an ATT_Handle_Value_Confirmation to the IUT.
 5. If E2E-CRC is supported, perform [CGMS/SEN/CGMCP/BV-01-C \[CGM Specific Ops – ‘Get CGM Communication Interval with E2E-CRC’\]](#) to verify that the new communication interval is stored in the IUT and set to smallest value supported by the device. If E2E-CRC is not supported, perform [CGMS/SEN/CGMCP/BV-02-C \[CGM Specific Ops – ‘Get CGM Communication Interval without E2E-CRC’\]](#) to verify that the new communication interval is stored in the IUT and set to smallest value supported by the device.
 6. Verify the characteristic value meets the requirements of the service.
- Expected Outcome

Pass verdict

The IUT sends an indication of the CGM Specific Ops Control Point characteristic with the ‘Response Code’ Op Code (0x1C) and an Operand representing the Request Op Code (0x01) followed by the Response Code for ‘Success’ (0x01).

The new Communication interval is stored in IUT and set to the value used by the device, which means the smallest Communication interval supported by the device.

4.15.3 CGM Specific Ops – ‘Disable communication interval’

- Test Purpose

Verify that the IUT can disable periodic communication when a communication interval value of 0x00 is used in the ‘Set CGM Communication Interval’ procedure.
- Reference

[\[2\]](#) 3.7.1, 3.7.2.1
- Initial Condition

Perform the preamble described in in Section [4.2.4](#).

Both the IUT and the Lower Tester have the same CGM Feature Bit settings concerning E2E-CRC safety (Bit 12 “E2E-CRC supported” is set to 1 or to 0). Setting is found in [Table 4.8](#).
- Test Case Configuration

Test Case	E2E-CRC Value (Requirements)
CGMS/SEN/CGMCP/BV-05-C [CGM Specific Ops – ‘Disable communication interval’ – with E2E-CRC]	Bit 12 “E2E-CRC supported” is set to 1
CGMS/SEN/CGMCP/BV-28-C [CGM Specific Ops – ‘Disable communication interval’ – without E2E-CRC]	Bit 12 “E2E-CRC supported” is set to 0

Table 4.8: CGM Specific OPS - Disable Communication Interval supported test cases

- Test Procedure
 1. The Lower Tester writes the 'Set CGM Communication Interval' Op Code (0x01) to the CGM Specific Ops Control Point with an Operand containing the value 0x00.
 2. The IUT sends an indication of the CGM Specific Ops Control Point characteristic with the 'Response Code' Op Code (0x1C) and an Operand representing the Request Op Code (0x01) followed by the Response Code for 'Success' (0x01).
 3. The Lower Tester receives an ATT_Handle_Value_Indication from the IUT containing the CGM Specific Ops Control Point characteristic handle and value.
 4. The Lower Tester sends an ATT_Handle_Value_Confirmation to the IUT.
 5. If E2E-CRC is supported, perform [CGMS/SEN/CGMCP/BV-01-C \[CGM Specific Ops – 'Get CGM Communication Interval with E2E-CRC'\]](#) to verify that the new communication interval is stored in the IUT and is set to 0x00. If E2E-CRC is not supported, perform [CGMS/SEN/CGMCP/BV-02-C \[CGM Specific Ops – 'Get CGM Communication Interval without E2E-CRC'\]](#) to verify that the new communication interval is stored in the IUT and is set to 0x00.
 6. Verify the characteristic value meets the requirements of the service.

- Expected Outcome

Pass verdict

The IUT sends an indication of the CGM Specific Ops Control Point characteristic with the 'Response Code' Op Code (0x1C) and an Operand representing the Request Op Code (0x01) followed by the Response Code for 'Success' (0x01).

The new Communication interval is stored in IUT and set to 0x00.

[CGMS/SEN/CGMCP/BV-06-C \[CGM Specific Ops – 'Get Glucose Calibration Value' Type 1\]](#)

- Test Purpose

Verify that the IUT can perform the 'Get Glucose Calibration value' procedure.

- Reference

[\[2\]](#) 3.7.1, 3.7.2.2

- Initial Condition

Perform the preamble described in in Section [4.2.4](#).

The CGM Feature Characteristic bit for supporting Calibration is set to 1.

More than one Calibration Data record is present in the IUT, e.g., by performing [CGMS/SEN/CGMCP/BV-08-C \[CGM Specific Ops – 'Set Glucose Calibration value'\]](#). The number of records stored shall be known.

Both the IUT and the Lower Tester have the same CGM Feature Bit settings concerning E2E-CRC safety (Bit 12 "E2E-CRC supported" is set to 1 or to 0).



- Test Procedure
 1. The Lower Tester writes the 'Get Glucose Calibration value' Op Code (0x05) to the CGM Specific Ops Control Point with an Operand containing a valid value of the Calibration Data Record Number as defined in in [2].
 2. The IUT sends an indication of the CGM Specific Ops Control Point characteristic with the 'Read Glucose Calibration Value response' Op Code (0x06) and an Operand representing the actual Calibration Data of the requested record.
 3. The Lower Tester receives an ATT_Handle_Value_Indication from the IUT containing the CGM Specific Ops Control Point characteristic handle and value.
 4. The Lower Tester sends an ATT_Handle_Value_Confirmation to the IUT.
 5. Verify the characteristic value meets the requirements of the service.

- Expected Outcome

Pass verdict

The IUT sends an indication of the CGM Specific Ops Control Point characteristic with the 'Read Glucose Calibration Value response' Op Code (0x06) and an Operand representing the actual Calibration Data of the requested record.

CGMS/SEN/CGMCP/BV-07-C [CGM Specific Ops – 'Get Glucose Calibration Value' Type 2]

- Test Purpose

Verify that the IUT can perform the 'Get Glucose Calibration value' procedure with a record number of 0xFFFF to read out the last stored Calibration Data.

- Reference

[2] 3.7.1, 3.7.2.2

- Initial Condition

Perform the preamble described in in Section 4.2.4.

The CGM Feature Characteristic bit for supporting Calibration in set to 1.

One or more Calibration Data records are present in the IUT.

Both the IUT and the Lower Tester have the same CGM Feature Bit settings concerning E2E-CRC safety (Bit 12 "E2E-CRC supported" is set to 1 or to 0).

- Test Procedure

1. The Lower Tester writes the 'Get Glucose Calibration value' Op Code (0x05) to the CGM Specific Ops Control Point with an Operand containing 0xFFFF as value for the Calibration Data Record Number.
2. The IUT sends an indication of the CGM Specific Ops Control Point characteristic with the 'Read Glucose Calibration Value response' Op Code (0x06) and an Operand representing the Calibration Data of the last stored record.



3. The Lower Tester receives an ATT_Handle_Value_Indication from the IUT containing the CGM Specific Ops Control Point characteristic handle and value.
4. The Lower Tester sends an ATT_Handle_Value_Confirmation to the IUT.
5. Verify that the read Calibration Data has the record number of the last stored Calibration Data record.
6. Verify the characteristic value meets the requirements of the service.

- Expected Outcome

Pass verdict

The IUT sends an indication of the CGM Specific Ops Control Point characteristic with the 'Read Glucose Calibration Value response' Op Code (0x06) and an Operand representing the Calibration Data of the last stored record.

The read Calibration Data contains the record number of the last stored Calibration Data record.

CGMS/SEN/CGMCP/BI-01-C [CGM Specific Ops – 'Get Glucose Calibration Value' Type 3]

- Test Purpose

Verify that the IUT can perform the 'Get Glucose Calibration value' procedure with a record number of 0xFFFE representing an invalid record number.

- Reference

[2] 3.7.1, 3.7.2.2

- Initial Condition

Perform the preamble described in in Section 4.2.4.

The CGM Feature Characteristic bit for supporting Calibration in set to 1.

One or more Calibration Data records are present in the IUT, but not more than 65533 records.

Both the IUT and the Lower Tester have the same CGM Feature Bit settings concerning E2E-CRC safety (Bit 12 "E2E-CRC supported" is set to 1 or to 0).

- Test Procedure

1. The Lower Tester writes the 'Get Glucose Calibration value' Op Code (0x05) to the CGM Specific Ops Control Point with an Operand containing 0xFFFE as value for the Calibration Data Record Number.
2. The IUT sends an indication of the CGM Specific Ops Control Point characteristic with the 'Response Code' Op Code (0x1C) and an Operand representing the Request Op Code (0x05) followed by the Response Code for 'Parameter out of Range' (0x05).
3. The Lower Tester receives an ATT_Handle_Value_Indication from the IUT containing the CGM Specific Ops Control Point characteristic handle and value.
4. The Lower Tester sends an ATT_Handle_Value_Confirmation to the IUT.
5. Verify the characteristic value meets the requirements of the service.



- Expected Outcome

Pass verdict

The IUT sends an indication of the CGM Specific Ops Control Point characteristic with the 'Response Code' Op Code (0x1C) and an Operand representing the Request Op Code (0x05) followed by the Response Code for 'Parameter out of Range' (0x05).

CGMS/SEN/CGMCP/BV-08-C [CGM Specific Ops – 'Set Glucose Calibration value']

- Test Purpose

Verify that the IUT can perform the 'Set Glucose Calibration value' procedure.

- Reference

[2] 3.7.1, 3.7.2.2

- Initial Condition

Perform the preamble described in in Section 4.2.4.

The CGM Feature Characteristic bit for supporting Calibration is set to 1.

Both the IUT and the Lower Tester have the same CGM Feature Bit settings concerning E2E-CRC safety (Bit 12 "E2E-CRC supported" is set to 1 or to 0).

- Test Procedure

- The Lower Tester executes the procedure included in [CGMS/SEN/CGMCP/BV-07-C \[CGM Specific Ops – 'Get Glucose Calibration Value' Type 2\]](#) to read out the last stored Calibration Data.
- The Lower Tester writes the 'Set Glucose Calibration Value' Op Code (0x04) to the CGM Specific Ops Control Point with an Operand containing a Glucose Calibration.

The example of a possible valid Glucose Calibration value is shown in the table below:

	Glucose Concentration mg/dL	Calibration Time (Minutes)	Sample Location	Next Calibration (Min)	Calibration Data Record Number	Calibration Status
Value	78	5	Arterial Plasma	5	0	0
Hex	0x004E	0x0005	0x06	0x0005	0x0000	0x00

Note: If the Calibration Data Record gets written, the Calibration Data Record Number and the data in the Calibration Status field will be ignored.

- The IUT sends an indication of the CP CGM Specific Ops Control Point characteristic with the 'Response Code Value' Op Code (0x1C) and an Operand representing the Request Op Code (0x04) followed by the Response Code for 'Success' (0x01).
- The Lower Tester receives an ATT_Handle_Value_Indication from the IUT containing the CGM Specific Ops Control Point characteristic handle and value.

5. The Lower Tester sends an ATT_Handle_Value_Confirmation to the IUT.
6. Perform a [CGMS/SEN/CGMCP/BV-07-C \[CGM Specific Ops – ‘Get Glucose Calibration Value’ Type 2\]](#) procedure to verify that the previous written Glucose Calibration value is stored in IUT.
7. Verify the characteristic value meets the requirements of the service.

- Expected Outcome

Pass verdict

The IUT sends an indication of the CGM Specific Ops Control Point characteristic with the ‘Response Code’ Op Code (0x1C) and an Operand representing the Request Op Code (0x04) followed by the Response Code for ‘Success’ (0x01).

The record number is increased.

The new Calibration Data is stored in the IUT.

CGMS/SEN/CGMCP/BV-09-C [CGM Specific Ops – ‘Get Patient High Alert Level’]

- Test Purpose

Verify that the IUT can perform the ‘Get Patient High Alert Level’ procedure.

- Reference

[\[2\]](#) 3.7.1, 3.7.2.3

- Initial Condition

Perform the preamble described in in Section [4.2.4](#).

The CGM Feature Characteristic bit for supporting Patient High/Low Alerts in set to 1.

Both the IUT and the Lower Tester have the same CGM Feature Bit settings concerning E2E-CRC safety (Bit 12 “E2E-CRC supported” is set to 1 or to 0).

- Test Procedure

1. The Lower Tester writes the ‘Get Patient High Alert Level’ Op Code (0x08) to the CGM Specific Ops Control Point with no Operand.
2. The IUT sends an indication of the CGM Specific Ops Control Point characteristic with the ‘Get Patient High Alert Level Response’ Op Code (0x09) and an Operand representing the actual Patient High Alert Level value in milligrams per deciliter.
3. The Lower Tester receives an ATT_Handle_Value_Indication from the IUT containing the CGM Specific Ops Control Point characteristic handle and value.
4. The Lower Tester sends an ATT_Handle_Value_Confirmation to the IUT.
5. Verify the characteristic value meets the requirements of the service.

- Expected Outcome

Pass verdict

The IUT sends an indication of the CGM Specific Ops Control Point characteristic with the 'Get Patient High Alert Level Response' Op Code (0x09) and an Operand representing the actual Patient High Alert Level value in milligrams per deciliter.

CGMS/SEN/CGMCP/BV-10-C [CGM Specific Ops – 'Set Patient High Alert Level']

- Test Purpose

Verify that the IUT can perform the 'Set Patient High Alert Level' procedure.

- Reference

[2] 3.7.1, 3.7.2.3

- Initial Condition

Perform the preamble described in in Section 4.2.4.

The CGM Feature Characteristic bit for supporting Patient High/Low Alerts is set to 1.

Both the IUT and the Lower Tester have the same CGM Feature Bit settings concerning E2E-CRC safety (Bit 12 "E2E-CRC supported" is set to 1 or to 0).

- Test Procedure

1. The Lower Tester executes the procedure included in [CGMS/SEN/CGMCP/BV-09-C \[CGM Specific Ops – 'Get Patient High Alert Level'\]](#) to get the actual stored High Alert Level value.
2. The Lower Tester writes the 'Set Patient High Alert Level' Op Code (0x07) to the CGM Specific Ops Control Point with an Operand containing a Patient High Alert Level value in milligrams per deciliter, within a range supported by the device (e.g., 200 mg/dl, value should be different from actual value of step 1). The supported range is defined in the IXIT [7].
3. The IUT sends an indication of the CGM Specific Ops Control Point characteristic with the 'Response Code' Op Code (0x1C) and an Operand representing the Request Op Code (0x07) followed by the Response Code for 'Success' (0x01).
4. The Lower Tester receives an ATT_Handle_Value_Indication from the IUT containing the CGM Specific Ops Control Point characteristic handle and value.
5. The Lower Tester sends an ATT_Handle_Value_Confirmation to the IUT.
6. The Lower Tester executes the procedure included in [CGMS/SEN/CGMCP/BV-09-C \[CGM Specific Ops – 'Get Patient High Alert Level'\]](#) to verify the new high alert level value.
7. Verify the characteristic value meets the requirements of the service.

- Expected Outcome

Pass verdict

The IUT sends an indication of the CGM Specific Ops Control Point characteristic with the 'Response Code' Op Code (0x1C) and an Operand representing the Request Op Code (0x07) followed by the Response Code for 'Success' (0x01).

The 'Patient High Alert Level' is set to the new value as used in step 3.

CGMS/SEN/CGMCP/BI-02-C [CGM Specific Ops – 'Set invalid Patient High Alert Level']

- Test Purpose

Verify that the IUT can't write an invalid (too high) 'Patient High Alert Value' when performing the 'Write Patient High Alert Level' procedure.

- Reference

[2] 3.7.1, 3.7.2.3

- Initial Condition

Perform the preamble described in in Section 4.2.4.

The CGM Feature Characteristic bit for supporting Patient High/Low Alerts is set to 1.

Both the IUT and the Lower Tester have the same CGM Feature Bit settings concerning E2E-CRC safety (Bit 12 "E2E-CRC supported" is set to 1 or to 0).

- Test Procedure

1. The Lower Tester writes the 'Set Patient High Alert Level' Op Code (0x07) to the CGM Specific Ops Control Point with an Operand containing a Patient High Alert Level value outside the supported range of the IUT as provided in the IXIT [7].
2. The IUT sends an indication of the CGM Specific Ops Control Point characteristic with the 'Response Code' Op Code (0x1C) and an Operand representing the Request Op Code (0x07) followed by the Response Code for 'Parameter out of Range' (0x05).
3. The Lower Tester receives an ATT_Handle_Value_Indication from the IUT containing the CGM Specific Ops Control Point characteristic handle and value.
4. The Lower Tester sends an ATT_Handle_Value_Confirmation to the IUT.
5. Verify the characteristic value meets the requirements of the service.

- Expected Outcome

Pass verdict

The IUT sends an indication of the CGM Specific Ops Control Point characteristic with the 'Response Code' Op Code (0x1C) and an Operand representing the Request Op Code (0x07) followed by the Response Code for 'Parameter out of Range' (0x05).

Former value of the high alert level value already exists.

CGMS/SEN/CGMCP/BV-11-C [CGM Specific Ops – ‘Get Patient Low Alert Level’]

- Test Purpose

Verify that the IUT can perform the ‘Get Patient Low Alert Level’ procedure.

- Reference

[2] 3.7.1, 3.7.2.3

- Initial Condition

Perform the preamble described in in Section 4.2.4.

The CGM Feature Characteristic bit for supporting Patient High/Low Alerts is set to 1.

Both the IUT and the Lower Tester have the same CGM Feature Bit settings concerning E2E-CRC safety (Bit 12 “E2E-CRC supported” is set to 1 or to 0).

- Test Procedure

1. The Lower Tester writes the ‘Get Patient Low Alert Level’ Op Code (0x0B) to the CGM Specific Ops Control Point with no Operand.
2. The IUT sends an indication of the CGM Specific Ops Control Point characteristic with the ‘Get Patient Low Alert Level Response’ Op Code (0x0C) and an Operand representing the Patient Low Alert Level value in milligrams per deciliter.
3. The Lower Tester receives an ATT_Handle_Value_Indication from the IUT containing the CGM Specific Ops Control Point characteristic handle and value.
4. The Lower Tester sends an ATT_Handle_Value_Confirmation to the IUT.
5. Verify the characteristic value meets the requirements of the service.

- Expected Outcome

Pass verdict

The IUT sends an indication of the CGM Specific Ops Control Point characteristic with the ‘Get Patient Low Alert Level Response’ Op Code (0x0C) and an Operand representing the Patient Low Alert Level value in milligrams per deciliter.

CGMS/SEN/CGMCP/BV-12-C [CGM Specific Ops – ‘Set Patient Low Alert Level’]

- Test Purpose

Verify that the IUT can perform the ‘Set Patient Low Alert Level’ procedure.

- Reference

[2] 3.7.1, 3.7.2.3

- Initial Condition

Perform the preamble described in in Section 4.2.4.

The CGM Feature Characteristic bit for supporting Patient High/Low Alerts is set to 1.



Both the IUT and the Lower Tester have the same CGM Feature Bit settings concerning E2E-CRC safety (Bit 12 “E2E-CRC supported” is set to 1 or to 0).

- Test Procedure

1. The Lower Tester executes the procedure included in [CGMS/SEN/CGMCP/BV-11-C \[CGM Specific Ops – ‘Get Patient Low Alert Level’\]](#) to get the actual stored Low Alert Level value.
2. The Lower Tester writes the ‘Set Patient Low Alert Level’ Op Code (0x0A) to the CGM Specific Ops Control Point with an Operand containing a Patient Low Alert Level value in milligrams per deciliter, within a range supported by the device (e.g., 55 mg/dl, value should be different from actual value of step 2). The supported range is defined in the IXIT [\[7\]](#).
3. The IUT sends an indication of the CGM Specific Ops Control Point characteristic with the ‘Response Code’ Op Code (0x1C) and an Operand representing the Request Op Code (0x0A) followed by the Response Code for ‘Success’ (0x01).
4. The Lower Tester receives an ATT_Handle_Value_Indication from the IUT containing the CGM Specific Ops Control Point characteristic handle and value.
5. The Lower Tester sends an ATT_Handle_Value_Confirmation to the IUT.
6. The Lower Tester executes the procedure included in [CGMS/SEN/CGMCP/BV-11-C \[CGM Specific Ops – ‘Get Patient Low Alert Level’\]](#) to verify the new low alert level value.
7. Verify the characteristic value meets the requirements of the service.

- Expected Outcome

Pass verdict

The IUT sends an indication of the CGM Specific Ops Control Point characteristic with the ‘Response Code’ Op Code (0x1C) and an Operand representing the Request Op Code (0x0A) followed by the Response Code for ‘Success’ (0x01).

The ‘Patient Low Alert Level’ is set to the new value as used in step 3.

CGMS/SEN/CGMCP/BI-03-C [CGM Specific Ops – ‘Set invalid Patient Low Alert Level’]

- Test Purpose

Verify that the IUT can’t write an invalid (to high) ‘Patient Low Alert Value’ when performing the ‘Set Patient Low Alert Level’ procedure.

- Reference

[\[2\]](#) 3.7.1, 3.7.2.3

- Initial Condition

Perform the preamble described in in Section [4.2.4](#).

The CGM Feature Characteristic bit for supporting Patient High/Low Alerts is set to 1.

Both the IUT and the Lower Tester have the same CGM Feature Bit settings concerning E2E-CRC safety (Bit 12 “E2E-CRC supported” is set to 1 or to 0).



- Test Procedure
 1. The Lower Tester writes the 'Set Patient Low Alert Level' Op Code (0x0A) to the CGM Specific Ops Control Point with an Operand containing a Patient Low Alert Level value outside the supported range of the IUT as provided in the IXIT [7].
 2. The IUT sends an indication of the CGM Specific Ops Control Point characteristic with the 'Response Code' Op Code (0x1C) and an Operand representing the Request Op Code (0x0A) followed by the Response Code for 'Parameter out of Range' (0x05).
 3. The Lower Tester receives an ATT_Handle_Value_Indication from the IUT containing the CGM Specific Ops Control Point characteristic handle and value.
 4. The Lower Tester sends an ATT_Handle_Value_Confirmation to the IUT.
 5. Verify the characteristic value meets the requirements of the service.

- Expected Outcome

Pass verdict

The IUT sends an indication of the CGM Specific Ops Control Point characteristic with the 'Response Code' Op Code (0x1C) and an Operand representing the Request Op Code (0x0A) followed by the Response Code for 'Parameter out of Range' (0x05).

There is no change of the 'Patient Low Alert Level' values stored in the IUT.

CGMS/SEN/CGMCP/BV-13-C [CGM Specific Ops – 'Get Hypo Alert Level']

- Test Purpose

Verify that the IUT can perform the 'Get Hypo Alert Level' procedure.

- Reference

[2] 3.7.1, 3.7.2.4

- Initial Condition

Perform the preamble described in in Section 4.2.4.

The CGM Feature Characteristic bit for supporting Hypo Alerts is set to 1.

Both the IUT and the Lower Tester have the same CGM Feature Bit settings concerning E2E-CRC safety (Bit 12 "E2E-CRC supported" is set to 1 or to 0).

- Test Procedure

1. The Lower Tester writes the 'Get Hypo Alert Level' Op Code (0x0E) to the CGM Specific Ops Control Point with no Operand.
2. The IUT sends an indication of the CGM Specific Ops Control Point characteristic with the 'Get Hypo Alert Level Response' Op Code (0x0F) and an Operand representing the Hypo Alert Level value in milligrams per deciliter.
3. The Lower Tester receives an ATT_Handle_Value_Indication from the IUT containing the CGM Specific Ops Control Point characteristic handle and value.



4. The Lower Tester sends an ATT_Handle_Value_Confirmation to the IUT.
5. Verify the characteristic value meets the requirements of the service.

- Expected Outcome

Pass verdict

The IUT sends an indication of the CGM Specific Ops Control Point characteristic with the 'Get Hypo Alert Level Response' Op Code (0x0F) and an Operand representing the Hypo Alert Level value in milligrams per deciliter.

CGMS/SEN/CGMCP/BV-14-C [CGM Specific Ops – 'Set Hypo Alert Level']

- Test Purpose

Verify that the IUT can perform the 'Set Hypo Alert Level' procedure.

- Reference

[2] 3.7.1, 3.7.2.4

- Initial Condition

Perform the preamble described in in Section 4.2.4.

The CGM Feature Characteristic bit for supporting Hypo Alerts is set to 1.

Both the IUT and the Lower Tester have the same CGM Feature Bit settings concerning E2E-CRC safety (Bit 12 "E2E-CRC supported" is set to 1 or to 0).

- Test Procedure

1. The Lower Tester executes the procedure included in [CGMS/SEN/CGMCP/BV-13-C \[CGM Specific Ops – 'Get Hypo Alert Level'\]](#) to get the actual stored Hypo Alert Level value.
2. The Lower Tester writes the 'Set Hypo Alert Level' Op Code (0x0D) to the CGM Specific Ops Control Point with an Operand containing a Hypo Alert Level value in milligrams per deciliter, within a range supported by the device (e.g., 60 mg/dl, value should be different from actual value of step 2) The supported range is defined in the IXIT [7].
3. The IUT sends an indication of the CGM Specific Ops Control Point characteristic with the 'Response Code' Op Code (0x1C) and an Operand representing the Request Op Code (0x0D) followed by the Response Code for 'Success' (0x01).
4. The Lower Tester receives an ATT_Handle_Value_Indication from the IUT containing the CGM Specific Ops Control Point characteristic handle and value.
5. The Lower Tester sends an ATT_Handle_Value_Confirmation to the IUT.
6. The Lower Tester executes the procedure included in [CGMS/SEN/CGMCP/BV-13-C \[CGM Specific Ops – 'Get Hypo Alert Level'\]](#) to verify the new Hypo Alert Level value.
7. Verify the characteristic value meets the requirements of the service.

- Expected Outcome

Pass verdict

The IUT sends an indication of the CGM Specific Ops Control Point characteristic with the 'Response Code' Op Code (0x1C) and an Operand representing the Request Op Code (0x0D) followed by the Response Code for 'Success' (0x01).

The 'Hypo Alert Level' is set to the new value as used in step 3.

CGMS/SEN/CGMCP/BI-04-C [CGM Specific Ops – 'Set invalid Hypo Alert Level']

- Test Purpose

Verify that the IUT can't write an invalid (too high) 'Hypo Alert Value' when performing the 'Set Hypo Alert Level' procedure.

- Reference

[2] 3.7.1, 3.7.2.4

- Initial Condition

Perform the preamble described in in Section 4.2.4.

The CGM Feature Characteristic bit for supporting Hypo Alerts is set to 1.

Both the IUT and the Lower Tester have the same CGM Feature Bit settings concerning E2E-CRC safety (Bit 12 "E2E-CRC supported" is set to 1 or to 0).

- Test Procedure

1. The Lower Tester writes the 'Set Hypo Alert Level' Op Code (0x0D) to the CGM Specific Ops Control Point with an Operand containing a Hypo Alert Level value outside the supported range of the IUT as provided in the IXIT [7].
2. The IUT sends an indication of the CGM Specific Ops Control Point characteristic with the 'Response Code' Op Code (0x1C) and an Operand representing the Request Op Code (0x0D) followed by the Response Code for 'Parameter out of Range' (0x05).
3. The Lower Tester receives an ATT_Handle_Value_Indication from the IUT containing the CGM Specific Ops Control Point characteristic handle and value.
4. The Lower Tester sends an ATT_Handle_Value_Confirmation to the IUT.
5. Verify the characteristic value meets the requirements of the service.

- Expected Outcome

Pass verdict

The IUT sends an indication of the CGM Specific Ops Control Point characteristic with the 'Response Code' Op Code (0x1C) and an Operand representing the Request Op Code (0x0D) followed by the Response Code for 'Parameter out of Range' (0x05).

The original Hypo Alert Level value isn't changed.

CGMS/SEN/CGMCP/BV-15-C [CGM Specific Ops – ‘Get Hyper Alert Level’]

- Test Purpose

Verify that the IUT can perform the ‘Get Hyper Alert Level’ procedure.

- Reference

[2] 3.7.1, 3.7.2.5

- Initial Condition

Perform the preamble described in in Section 4.2.4.

The CGM Feature Characteristic bit for supporting Hyper Alerts is set to 1.

Both the IUT and the Lower Tester have the same CGM Feature Bit settings concerning E2E-CRC safety (Bit 12 “E2E-CRC supported” is set to 1 or to 0).

- Test Procedure

1. The Lower Tester writes the ‘Get Hyper Alert Level’ Op Code (0x11) to the CGM Specific Ops Control Point with no Operand.
2. The IUT sends an indication of the CGM Specific Ops Control Point characteristic with the ‘Get Hyper Alert Level Response’ Op Code (0x12) and an Operand representing the Hyper Alert Level value in milligrams per deciliter.
3. The Lower Tester receives an ATT_Handle_Value_Indication from the IUT containing the CGM Specific Ops Control Point characteristic handle and value.
4. The Lower Tester sends an ATT_Handle_Value_Confirmation to the IUT.
5. Verify the characteristic value meets the requirements of the service.

- Expected Outcome

Pass verdict

The IUT sends an indication of the CGM Specific Ops Control Point characteristic with the ‘Get Hyper Alert Level Response’ Op Code (0x12) and an Operand representing the Hyper Alert Level value in milligrams per deciliter.

CGMS/SEN/CGMCP/BV-16-C [CGM Specific Ops – ‘Set Hyper Alert Level’]

- Test Purpose

Verify that the IUT can perform the ‘Set Hyper Alert Level’ procedure.

- Reference

[2] 3.7.1, 3.7.2.5

- Initial Condition

Perform the preamble described in in Section 4.2.4.

The CGM Feature Characteristic bit for supporting Hyper Alerts is set to 1.



Both the IUT and the Lower Tester have the same CGM Feature Bit settings concerning E2E-CRC safety (Bit 12 “E2E-CRC supported” is set to 1 or to 0).

- Test Procedure

1. The Lower Tester executes the procedure included in [CGMS/SEN/CGMCP/BV-15-C \[CGM Specific Ops – ‘Get Hyper Alert Level’\]](#) to get the actual stored Hyper Alert Level value.
2. The Lower Tester writes the ‘Set Hyper Alert Level’ Op Code (0x10) to the CGM Specific Ops Control Point with an Operand containing a Hyper Alert Level value in milligrams per deciliter, within a range supported by the device (e.g., 200 mg/dl, value should be different from actual value of step 2). The supported range is defined in the IXIT [\[7\]](#).
3. The IUT sends an indication of the CGM Specific Ops Control Point characteristic with the ‘Response Code’ Op Code (0x1C) and an Operand representing the Request Op Code (0x10) followed by the Response Code for ‘Success’ (0x01).
4. The Lower Tester receives an ATT_Handle_Value_Indication from the IUT containing the CGM Specific Ops Control Point characteristic handle and value.
5. The Lower Tester sends an ATT_Handle_Value_Confirmation to the IUT.
6. The Lower Tester executes the procedure included in [CGMS/SEN/CGMCP/BV-15-C \[CGM Specific Ops – ‘Get Hyper Alert Level’\]](#) to verify the new Hyper Alert Level value.
7. Verify the characteristic value meets the requirements of the service.

- Expected Outcome

Pass verdict

The IUT sends an indication of the CGM Specific Ops Control Point characteristic with the ‘Response Code’ Op Code (0x1C) and an Operand representing the Request Op Code (0x10) followed by the Response Code for ‘Success’ (0x01).

The ‘Hyper Alert Level’ is set to the new value as used in step 3.

CGMS/SEN/CGMCP/BI-05-C [CGM Specific Ops – ‘Set invalid Hyper Alert Level’]

- Test Purpose

Verify that the IUT can’t write an invalid (to high) ‘Hyper Alert Value’ when performing the ‘Set Hyper Alert Level’ procedure.

- Reference

[\[2\]](#) 3.7.1, 3.7.2.5

- Initial Condition

Perform the preamble described in in Section [4.2.4](#).

The CGM Feature Characteristic bit for supporting Hyper Alerts is set to 1.

Both the IUT and the Lower Tester have the same CGM Feature Bit settings concerning E2E-CRC safety (Bit 12 “E2E-CRC supported” is set to 1 or to 0).



- Test Procedure
 1. Verify that a connection between the Lower Tester and IUT is established.
 2. The Lower Tester writes the 'Set Hyper Alert Level' Op Code (0x10) to the CGM Specific Ops Control Point with an Operand containing a Hyper Alert Level value outside the supported range of the IUT as provided in the IXIT [7].
 3. The IUT sends an indication of the CGM Specific Ops Control Point characteristic with the 'Response Code' Op Code (0x1C) and an Operand representing the Request Op Code (0x10) followed by the Response Code for 'Parameter out of Range' (0x05).
 4. The Lower Tester receives an ATT_Handle_Value_Indication from the IUT containing the CGM Specific Ops Control Point characteristic handle and value.
 5. The Lower Tester sends an ATT_Handle_Value_Confirmation to the IUT.
 6. Verify the characteristic value meets the requirements of the service.

- Expected Outcome

Pass verdict

The IUT sends an indication of the CGM Specific Ops Control Point characteristic with the 'Response Code' Op Code (0x1C) and an Operand representing the Request Op Code (0x10) followed by the Response Code for 'Parameter out of Range' (0x05).

The original Hyper Alert Level value isn't changed.

CGMS/SEN/CGMCP/BV-17-C [CGM Specific Ops – 'Get Rate of Decrease Alert Level']

- Test Purpose

Verify that the IUT can perform the 'Get Rate of Decrease Alert Level' procedure.

- Reference

[2] 3.7.1, 3.7.2.6

- Initial Condition

Perform the preamble described in in Section 4.2.4.

The CGM Feature Characteristic bit for supporting Rate of Increase/Decrease Alerts is set to 1.

Both the IUT and the Lower Tester have the same CGM Feature Bit settings concerning E2E-CRC safety (Bit 12 "E2E-CRC supported" is set to 1 or to 0).

- Test Procedure

1. The Lower Tester writes the 'Get Rate of Decrease Alert Level' Op Code (0x14) to the CGM Specific Ops Control Point with no Operand.
2. The IUT sends an indication of the CGM Specific Ops Control Point characteristic with the 'Get Rate of Decrease Alert Level Response' Op Code (0x15) and an Operand representing the Rate of Decrease Alert Level value in milligrams per deciliter.
3. The Lower Tester receives an ATT_Handle_Value_Indication from the IUT containing the CGM Specific Ops Control Point characteristic handle and value.



4. The Lower Tester sends an ATT_Handle_Value_Confirmation to the IUT.
5. Verify the characteristic value meets the requirements of the service.

- Expected Outcome

Pass verdict

The IUT sends an indication of the CGM Specific Ops Control Point characteristic with the 'Get Rate of Decrease Alert Level Response' Op Code (0x15) and an Operand representing the Rate of Decrease Alert Level value in milligrams per deciliter.

CGMS/SEN/CGMCP/BV-18-C [CGM Specific Ops – 'Set Rate of Decrease Alert Level']

- Test Purpose

Verify that the IUT can perform the 'Set Rate of Decrease Alert Level' procedure.

- Reference

[2] 3.7.1, 3.7.2.6

- Initial Condition

Perform the preamble described in in Section 4.2.4.

The CGM Feature Characteristic bit for supporting Increase/Decrease Alerts is set to 1.

Both the IUT and the Lower Tester have the same CGM Feature Bit settings concerning E2E-CRC safety (Bit 12 "E2E-CRC supported" is set to 1 or to 0).

- Test Procedure

1. The Lower Tester executes the procedure included in [CGMS/SEN/CGMCP/BV-17-C \[CGM Specific Ops – 'Get Rate of Decrease Alert Level'\]](#) to get the actual stored Rate of Decrease Alert Level value.
2. The Lower Tester writes the 'Set Rate of Decrease Alert Level' Op Code (0x13) to the CGM Specific Ops Control Point with an Operand containing a Rate of Decrease Alert Level value in milligrams per deciliter per minute, within a range supported by the IUT (e.g., -5 mg/dl/min, value should be different from actual value of step 2). The supported range is defined in the IXIT [7].
3. The IUT sends an indication of the CGM Specific Ops Control Point characteristic with the 'Response Code' Op Code (0x1C) and an Operand representing the Request Op Code (0x13) followed by the Response Code for 'Success' (0x01).
4. The Lower Tester receives an ATT_Handle_Value_Indication from the IUT containing the CGM Specific Ops Control Point characteristic handle and value.
5. The Lower Tester sends an ATT_Handle_Value_Confirmation to the IUT.
6. The Lower Tester executes the procedure included in [CGMS/SEN/CGMCP/BV-17-C \[CGM Specific Ops – 'Get Rate of Decrease Alert Level'\]](#) to verify the new Rate of Decrease Alert Level value.
7. Verify the characteristic value meets the requirements of the service.

- Expected Outcome

Pass verdict

The IUT sends an indication of the CGM Specific Ops Control Point characteristic with the 'Response Code' Op Code (0x1C) and an Operand representing the Request Op Code (0x13) followed by the Response Code for 'Success' (0x01).

The 'Rate of Decrease Alert Level' is set to the new value as used in step 3.

CGMS/SEN/CGMCP/BI-06-C [CGM Specific Ops – 'Set invalid Rate of Decrease Alert Level']

- Test Purpose

Verify that the IUT can't write an invalid (to high) 'Rate of Decrease Alert Value' when performing the 'Set Rate of Decrease Alert Level' procedure.

- Reference

[2] 3.7.1, 3.7.2.6

- Initial Condition

Perform the preamble described in in Section 4.2.4.

The CGM Feature Characteristic bit for supporting Increase/Decrease Alerts is set to 1.

Both the IUT and the Lower Tester have the same CGM Feature Bit settings concerning E2E-CRC safety (Bit 12 "E2E-CRC supported" is set to 1 or to 0).

- Test Procedure

1. The Lower Tester writes the 'Set Rate of Decrease Alert Level' Op Code (0x13) to the CGM Specific Ops Control Point with an Operand containing a Rate of Decrease Alert Level value of 0X0802 (- Infinity).
2. The IUT sends an indication of the CGM Specific Ops Control Point characteristic with the 'Response Code' Op Code (0x1C) and an Operand representing the Request Op Code (0x13) followed by the Response Code for 'Parameter out of Range' (0x05).
3. The Lower Tester receives an ATT_Handle_Value_Indication from the IUT containing the CGM Specific Ops Control Point characteristic handle and value.
4. The Lower Tester sends an ATT_Handle_Value_Confirmation to the IUT.
5. Verify the characteristic value meets the requirements of the service.

- Expected Outcome

Pass verdict

The IUT sends an indication of the CGM Specific Ops Control Point characteristic with the 'Response Code' Op Code (0x1C) and an Operand representing the Request Op Code (0x13) followed by the Response Code for 'Parameter out of Range' (0x05).

The original Rate of Decrease Alert Level value isn't changed.



CGMS/SEN/CGMCP/BV-19-C [CGM Specific Ops – ‘Get Rate of Increase Alert Level’]

- Test Purpose

Verify that the IUT can perform the ‘Get Rate of Increase Alert Level’ procedure.

- Reference

[2] 3.7.1, 3.7.2.6

- Initial Condition

Perform the preamble described in in Section 4.2.4.

The CGM Feature Characteristic bit for supporting Rate of Increase/Decrease Alerts is set to 1.

Both the IUT and the Lower Tester have the same CGM Feature Bit settings concerning E2E-CRC safety (Bit 12 “E2E-CRC supported” is set to 1 or to 0).

- Test Procedure

1. The Lower Tester writes the ‘Get Rate of Increase Alert Level’ Op Code (0x17) to the CGM Specific Ops Control Point with no Operand.
2. The IUT sends an indication of the CGM Specific Ops Control Point characteristic with the ‘Get Rate of Increase Alert Level Response’ Op Code (0x18) and an Operand representing the Rate of Increase Alert Level value in milligrams per deciliter.
3. The Lower Tester receives an ATT_Handle_Value_Indication from the IUT containing the CGM Specific Ops Control Point characteristic handle and value.
4. The Lower Tester sends an ATT_Handle_Value_Confirmation to the IUT.
5. Verify the characteristic value meets the requirements of the service.

- Expected Outcome

Pass verdict

The IUT sends an indication of the CGM Specific Ops Control Point characteristic with the ‘Get Rate of Increase Alert Level Response’ Op Code (0x18) and an Operand representing the Rate of Increase Alert Level value in milligrams per deciliter.

CGMS/SEN/CGMCP/BV-20-C [CGM Specific Ops – ‘Set Rate of Increase Alert Level’]

- Test Purpose

Verify that the IUT can perform the ‘Set Rate of Increase Alert Level’ procedure.

- Reference

[2] 3.7.1, 3.7.2.6

- Initial Condition

Perform the preamble described in in Section 4.2.4.

The CGM Feature Characteristic bit for supporting Increase/Decrease Alerts is set to 1.



Both the IUT and the Lower Tester have the same CGM Feature Bit settings concerning E2E-CRC safety (Bit 12 “E2E-CRC supported” is set to 1 or to 0).

- Test Procedure

1. The Lower Tester executes the procedure included in [CGMS/SEN/CGMCP/BV-19-C \[CGM Specific Ops – ‘Get Rate of Increase Alert Level’\]](#) to get the actual stored Rate of Increase Alert Level value.
2. The Lower Tester writes the ‘Set Rate of Increase Alert Level’ Op Code (0x16) to the CGM Specific Ops Control Point with an Operand containing a Rate of Increase Alert Level value in milligrams per deciliter per minute, within a range supported by the device (e.g., +5 mg/dl/min, value should be different from actual value of step 2). The supported range is defined in the IXIT [\[7\]](#).
3. The IUT sends an indication of the CGM Specific Ops Control Point characteristic with the ‘Response Code’ Op Code (0x1C) and an Operand representing the Request Op Code (0x16) followed by the Response Code for ‘Success’ (0x01).
4. The Lower Tester receives an ATT_Handle_Value_Indication from the IUT containing the CGM Specific Ops Control Point characteristic handle and value.
5. The Lower Tester sends an ATT_Handle_Value_Confirmation to the IUT.
6. The Lower Tester executes the procedure included in [CGMS/SEN/CGMCP/BV-19-C \[CGM Specific Ops – ‘Get Rate of Increase Alert Level’\]](#) to verify the new Rate of Increase Alert Level value.
7. Verify the characteristic value meets the requirements of the service.

- Expected Outcome

Pass verdict

The IUT sends an indication of the CGM Specific Ops Control Point characteristic with the ‘Response Code’ Op Code (0x1C) and an Operand representing the Request Op Code (0x16) followed by the Response Code for ‘Success’ (0x01).

The ‘Rate of Increase Alert Level’ is set to the new value as used in step 3.

[CGMS/SEN/CGMCP/BI-07-C \[CGM Specific Ops – ‘Set invalid Rate of Increase Alert Level’\]](#)

- Test Purpose

Verify that the IUT can’t write an invalid (to high) ‘Rate of Increase Alert Value’ when perform the ‘Set Rate of Increase Alert Level’ procedure.

- Reference

[\[2\]](#) 3.7.1, 3.7.2.6

- Initial Condition

Perform the preamble described in in Section [4.2.4](#).

The CGM Feature Characteristic bit for supporting Increase/Decrease Alerts is set to 1.



Both the IUT and the Lower Tester have the same CGM Feature Bit settings concerning E2E-CRC safety (Bit 12 “E2E-CRC supported” is set to 1 or to 0).

- Test Procedure
 1. The Lower Tester writes the ‘Set Rate of Increase Alert Level’ Op Code (0x16) to the CGM Specific Ops Control Point with an Operand containing a Rate of Increase Alert Level value of 0X0802 (- Infinity).
 2. The IUT sends an indication of the CGM Specific Ops Control Point characteristic with the ‘Response Code’ Op Code (0x1C) and an Operand representing the Request Op Code (0x16) followed by the Response Code for ‘Parameter out of Range’ (0x05).
 3. The Lower Tester receives an ATT_Handle_Value_Indication from the IUT containing the CGM Specific Ops Control Point characteristic handle and value.
 4. The Lower Tester sends an ATT_Handle_Value_Confirmation to the IUT.
 5. Verify the characteristic value meets the requirements of the service.

- Expected Outcome

Pass verdict

The IUT sends an indication of the CGM Specific Ops Control Point characteristic with the ‘Response Code’ Op Code (0x1C) and an Operand representing the Request Op Code (0x16) followed by the Response Code for ‘Parameter out of Range’ (0x05).

The original Rate of Increase Alert Level value isn’t changed.

CGMS/SEN/CGMCP/BV-21-C [CGM Specific Ops – ‘Reset Device Specific Alert’]

- Test Purpose

Verify that the IUT can perform the ‘Reset Device Specific Alert’ procedure.

- Reference

[2] 3.7.1, 3.7.2.7

- Initial Condition

Perform the preamble described in in Section 4.2.4.

The CGM Feature Characteristic bit for supporting Device Specific Alerts is set to 1.

Both the IUT and the Lower Tester have the same CGM Feature Bit settings concerning E2E-CRC safety (Bit 12 “E2E-CRC supported” is set to 1 or to 0).

Perform an action on the IUT that will set the Device Specific Alert flag.

- Test Procedure

1. Perform [CGMS/SEN/CR/BV-08-C \[Characteristic Read – ‘CGM Status’\]](#) to verify that the Device Specific Alert bit is set.
2. The Lower Tester writes the ‘Reset Device Specific Alert’ Op Code (0x19) to the CGM Specific Ops Control Point with no Operand.



3. The IUT sends an indication of the CGM Specific Ops Control Point characteristic with the 'Response Code' Op Code (0x1C) and an Operand representing the Request Op Code (0x19) followed by the Response Code for 'Success' (0x01).
4. The Lower Tester receives an ATT_Handle_Value_Indication from the IUT containing the CGM Specific Ops Control Point characteristic handle and value.
5. The Lower Tester sends an ATT_Handle_Value_Confirmation to the IUT.
6. Perform [CGMS/SEN/CR/BV-08-C \[Characteristic Read – 'CGM Status'\]](#) to verify that the Device Specific Alert bit is cleared.
7. Verify the characteristic value meets the requirements of the service.

- Expected Outcome

Pass verdict

The IUT sends an indication of the CP CGM Specific Ops characteristic with the 'Response Code' Op Code (0x1C) and an Operand representing Request Op Code (0x19) followed by the Response Code for 'Success' (0x01).

The Device Specific Alert Bit in the CGM Status and Status Annunciation Field are reset.

CGMS/SEN/CGMCP/BV-22-C [CGM Specific Ops – 'Start Session' Type 1]

- Test Purpose

Verify that the IUT can perform the 'Start session' procedure if no Session is currently running.

- Reference

[\[2\]](#) 3.7.1, 3.7.2.8

- Initial Condition

Perform the preamble described in in Section [4.2.4](#).

No CGM Session is currently running.

Both the IUT and the Lower Tester have the same CGM Feature Bit settings concerning E2E-CRC safety (Bit 12 "E2E-CRC supported" is set to 1 or to 0).

- Test Procedure

1. The Lower Tester writes 'Start Session' Op Code (0x1A) to the CGM Specific Ops Control Point with no Operand.
2. The IUT sends an indication of the CGM Specific Ops Control Point characteristic with the 'Response Code' Op Code (0x1C) and an Operand representing the Request Op Code (0x1A) followed by the Response Code for 'Success' (0x01).
3. The Lower Tester receives an ATT_Handle_Value_Indication from the IUT containing the CGM Specific Ops Control Point characteristic handle and value.
4. The Lower Tester sends an ATT_Handle_Value_Confirmation to the IUT.
5. The Lower Tester executes the procedure included in [CGMS/SEN/CR/BV-08-C \[Characteristic Read – 'CGM Status'\]](#)



6. Verify that the CGM Status Bit 'Session stopped' bit set to 0.
7. Verify the characteristic value meets the requirements of the service.

- Expected Outcome

Pass verdict

The IUT sends an indication of the CP CGM Specific Ops characteristic with the 'Response Code' Op Code (0x1C) and an Operand representing Request Op Code (0x1A) followed by the Response Code for 'Success' (0x01).

The CGM Status Bit 'Session stopped' is set to 0.

CGMS/SEN/CGMCP/BI-08-C [CGM Specific Ops – 'Start Session' Type 2]

- Test Purpose

Verify that the IUT can't perform the 'Start session' procedure if a Session is currently running.

- Reference

[2] 3.7.1, 3.7.2.8

- Initial Condition

Perform the preamble described in in Section 4.2.4.

A CGM Session is currently running.

Both the IUT and the Lower Tester have the same CGM Feature Bit settings concerning E2E-CRC safety (Bit 12 "E2E-CRC supported" is set to 1 or to 0).

- Test Procedure

1. The Lower Tester executes the procedure included in [CGMS/SEN/CR/BV-08-C \[Characteristic Read – 'CGM Status'\]](#).
2. Verify that the CGM Status Bit 'Session stopped' is set to 0.
3. The Lower Tester writes 'Start Session' Op Code (0x1A) to the CGM Specific Ops Control Point with no Operand.
4. The IUT sends an indication of the CGM Specific Ops Control Point characteristic with the 'Response Code' Op Code (0x1C) and an Operand representing the Request Op Code (0x1A) followed by the Response Code for 'Procedure not completed' (0x04).
5. The Lower Tester receives an ATT_Handle_Value_Indication from the IUT containing the CGM Specific Ops Control Point characteristic handle and value.
6. The Lower Tester sends an ATT_Handle_Value_Confirmation to the IUT.
7. The Lower Tester executes the procedure included in [CGMS/SEN/CR/BV-08-C \[Characteristic Read – 'CGM Status'\]](#).
8. Verify the characteristic value meets the requirements of the service.

- Expected Outcome

Pass verdict

The IUT sends an indication of the CGM Specific Ops Control Point characteristic with the 'Response Code' Op Code (0x1C) and an Operand representing the Request Op Code (0x1A) followed by the Response Code for 'Procedure not completed' (0x04).

The CGM Status Bit 'Session stopped' is set to 0.

CGMS/SEN/CGMCP/BV-23-C [CGM Specific Ops – 'Stop session']

- Test Purpose

Verify that the IUT can perform the 'Stop session' procedure to stop a currently running Session.

- Reference

[2] 3.7.1, 3.7.2.9

- Initial Condition

Perform the preamble described in in Section 4.2.4.

A CGM Session is currently running.

Both the IUT and the Lower Tester have the same CGM Feature Bit settings concerning E2E-CRC safety (Bit 12 "E2E-CRC supported" is set to 1 or to 0).

- Test Procedure

1. The Lower Tester executes the procedure included in [CGMS/SEN/CR/BV-08-C \[Characteristic Read – 'CGM Status'\]](#).
2. Verify that the CGM Status Bit 'Session stopped' is set to 0.
3. The Lower Tester writes 'Stop Session' Op Code (0x1B) to the CGM Specific Ops Control Point with no Operand.
4. The IUT sends an indication of the CGM Specific Ops Control Point characteristic with the 'Response Code' Op Code (0x1C) and an Operand representing the Request Op Code (0x1B) followed by the Response Code for 'Success' (0x01).
5. The Lower Tester receives an ATT_Handle_Value_Indication from the IUT containing the CGM Specific Ops Control Point characteristic handle and value.
6. The Lower Tester sends an ATT_Handle_Value_Confirmation to the IUT.
7. The Lower Tester executes the procedure included in [CGMS/SEN/CR/BV-08-C \[Characteristic Read – 'CGM Status'\]](#).
8. Verify that the CGM Status Bit 'Session stopped' bit set to 1.
9. Verify the characteristic value meets the requirements of the service.

- Expected Outcome

Pass verdict

The IUT sends an indication of the CGM Specific Ops Control Point characteristic with the 'Response Code' Op Code (0x1C) and an Operand representing the Request Op Code (0x1B) followed by the Response Code for 'Success' (0x01).

The CGM Status Bit 'Session stopped' bit set to 1.

CGMS/SEN/CGMCP/BV-24-C [CGM Specific Ops – 'Start Session' Type 3]

- Test Purpose

Verify that the IUT can't perform the 'Start session' procedure if a currently running Session is stopped and the IUT does not support Multiple Sessions.

- Reference

[2] 3.7.1, 3.7.2.8

- Initial Condition

Perform the preamble described in in Section 4.2.4.

A CGM Session is currently running.

Both the IUT and the Lower Tester have the same CGM Feature Bit settings concerning E2E-CRC safety (Bit 12 "E2E-CRC supported" is set to 1 or to 0).

- Test Procedure

1. The Lower Tester executes the procedure included in [CGMS/SEN/CR/BV-08-C \[Characteristic Read – 'CGM Status'\]](#).
2. Verify that the CGM Status Bit 'Session stopped' is set to 0.
3. The Lower Tester executes the procedure included in [CGMS/SEN/CGMCP/BV-23-C \[CGM Specific Ops – 'Stop session'\]](#) to stop the currently running session.
4. The Lower Tester executes the procedure included in [CGMS/SEN/CR/BV-08-C \[Characteristic Read – 'CGM Status'\]](#).
5. Verify that the CGM Status Bit 'Session stopped' is set to 1.
6. The Lower Tester writes 'Start Session' Op Code (0x1A) to the CGM Specific Ops Control Point with no Operand.
7. The IUT sends an indication of the CGM Specific Ops Control Point characteristic with the 'Response Code' Op Code (0x1C) and an Operand representing the Request Op Code (0x1A) followed by the Response Code for 'Procedure not completed' (0x04).
8. The Lower Tester receives an ATT_Handle_Value_Indication from the IUT containing the CGM Specific Ops Control Point characteristic handle and value.
9. The Lower Tester sends an ATT_Handle_Value_Confirmation to the IUT.

- Expected Outcome

Pass verdict

The IUT sends an indication of the CGM Specific Ops Control Point characteristic with the 'Response Code' Op Code (0x1C) and an Operand representing the Request Op Code (0x1A) followed by the Response Code for 'Procedure not completed' (0x04).

CGMS/SEN/CGMCP/BV-25-C [CGM Specific Ops – 'Start Session' Type 4]

- Test Purpose

Verify that the IUT can perform the 'Start session' procedure after a currently running Session is stopped.

- Reference

[2] 3.7.1, 3.7.2.8

- Initial Condition

Perform the preamble described in in Section 4.2.4.

A CGM Session is currently running.

Both the IUT and the Lower Tester have the same CGM Feature Bit settings concerning E2E-CRC safety (Bit 12 "E2E-CRC supported" is set to 1 or to 0).

- Test Procedure

1. The Lower Tester executes the procedure included in [CGMS/SEN/CR/BV-08-C \[Characteristic Read – 'CGM Status'\]](#).
2. Verify that the CGM Status Bit 'Session stopped' is set to 0.
3. The Lower Tester executes the procedure included in [CGMS/SEN/CGMCP/BV-23-C \[CGM Specific Ops – 'Stop session'\]](#) to stop the currently running session.
4. The Lower Tester executes the procedure included in [CGMS/SEN/CR/BV-08-C \[Characteristic Read – 'CGM Status'\]](#).
5. Verify that the CGM Status Bit 'Session stopped' is set to 1.
6. The Lower Tester writes 'Start Session' Op Code (0x1A) to the CGM Specific Ops Control Point with no Operand.
7. The IUT sends an indication of the CGM Specific Ops Control Point characteristic with the 'Response Code' Op Code (0x1C) and an Operand representing the Request Op Code (0x1A) followed by the Response Code for 'Success' (0x01).
8. The Lower Tester receives an ATT_Handle_Value_Indication from the IUT containing the CGM Specific Ops Control Point characteristic handle and value.
9. The Lower Tester sends an ATT_Handle_Value_Confirmation to the IUT.
10. The Lower Tester executes the procedure included in [CGMS/SEN/CR/BV-08-C \[Characteristic Read – 'CGM Status'\]](#).

11. Verify that the CGM Status Bit 'Session stopped' is set to 0.
12. Verify the characteristic value meets the requirements of the service.

- Expected Outcome

Pass verdict

The IUT sends an indication of the CGM Specific Ops Control Point characteristic with the 'Response Code' Op Code (0x1C) and an Operand representing the Request Op Code (0x1A) followed by the Response Code for 'Success' (0x01).

Session Stopped bit is set to 0.

4.16 Common Behavior of Control Points – General Error Handling

This test group contains test cases to verify compliant operation when the Lower Tester uses Control Point (RACP, and CGM specific Ops CP) procedures and an error results.

CGMS/SEN/CBE/BI-01-C [General Error Handling –'Op Code Not Supported']

- Test Purpose

Verify that the IUT responds appropriately when a Client writes an unsupported Op Code to the Control Points.

- Reference

[2] 3.8, 3.8.2

- Initial Condition

Perform the preamble described in in Section 4.2.3.

Perform an action on the IUT that will induce it to generate 3 or more records.

- Test Procedure

1. The Lower Tester writes an Op Code (0x00) to the Record Access Control Point using an Operator of 'All Records' (0x01) and no Operand.
2. The Lower Tester writes an Op Code value from the Reserved for Future Use range other than 0x00 to the Record Access Control Point using an Operator of 'All Records' (0x01) and no Operand.
3. Verify the characteristic value meets the requirements of the service.

- Expected Outcome

Pass verdict

For both cases, the IUT sends an indication of the Record Access Control Point characteristic with the 'Response Code' Op Code (0x06), an Operator of Null (0x00), and an Operand representing the Request Op Code (i.e., the RFU value written) followed by the Response Code Value for 'Op Code not supported' (0x02).

CGMS/SEN/CBE/BI-02-C [General Error Handling – ‘Invalid Operator’]

- Test Purpose

Verify that the IUT responds appropriately when a Client writes a ‘Report Stored Records’ Op Code to the Record Access Control Point with an invalid Operator.

- Reference

[2] 3.6.3.6, 3.8.2

- Initial Condition

Perform the preamble described in in Section 4.2.3.

Perform an action on the IUT that will induce it to generate 3 or more records.

- Test Procedure

1. The Lower Tester writes the ‘Report Stored Records’ Op Code (0x01) to the RACP using an Operator of Null (0x00) and no Operand.
2. The IUT sends an indication of the Record Access Control Point characteristic with the ‘Response Code’ Op Code (0x06), an Operator of Null (0x00), and an Operand representing Request Op Code (0x01) followed by the Response Code Value for ‘Invalid Operator’ (0x03).
3. The Lower Tester receives an ATT_Handle_Value_Indication from the IUT containing the CGM Specific Ops Control Point characteristic handle and value.
4. The Lower Tester sends an ATT_Handle_Value_Confirmation to the IUT.
5. Verify the characteristic value meets the requirements of the service.

- Expected Outcome

Pass verdict

The IUT sends an indication of the Record Access Control Point characteristic with the ‘Response Code’ Op Code (0x06), an Operator of Null (0x00), and an Operand representing Request Op Code (0x01) followed by the Response Code Value for ‘Invalid Operator’ (0x03).

CGMS/SEN/CBE/BI-03-C [General Error Handling – ‘Unsupported Operator’]

- Test Purpose

Verify that the IUT responds appropriately when a Client writes an Op Code to the RACP with an unsupported Operator.

- Reference

[2] 3.8, 3.8.2

- Initial Condition

Perform the preamble described in in Section 4.2.3.

Perform an action on the IUT that will induce it to generate 3 or more records.



- Test Procedure
 1. The Lower Tester writes the 'Report Stored Records' Op Code (0x01) to the Record Access Control Point using an Operator from the 'Reserved for Future Use' range and no Operand.
 2. The IUT sends an indication of the Record Access Control Point characteristic with the 'Response Code' Op Code (0x06), an Operator of Null (0x00), and an Operand representing the Request Op Code (0x01) followed by the Response Code Value for 'Operator not supported' (0x04).
 3. The Lower Tester receives an ATT_Handle_Value_Indication from the IUT containing the Record Access Control Point characteristic handle and value.
 4. The Lower Tester sends an ATT_Handle_Value_Confirmation to the IUT.
 5. Verify the characteristic value meets the requirements of the service.

- Expected Outcome

Pass verdict

The IUT sends an indication of the Record Access Control Point characteristic with the 'Response Code' Op Code (0x06), an Operator of Null (0x00), and an Operand representing the Request Op Code (0x01) followed by the Response Code Value for 'Operator not supported' (0x04).

CGMS/SEN/CBE/BI-04-C [General Error Handling – 'Invalid Operand' – Type 1]

- Test Purpose

Verify that the IUT responds appropriately when a Client writes an Op Code to the Record Access Control Point with an Operand where none was expected.

- Reference

[2] 3.8, 3.8.2

- Initial Condition

Perform the preamble described in in Section 4.2.3.

Perform an action on the IUT that will induce it to generate 3 or more records.

- Test Procedure

1. The Lower Tester writes the 'Report stored records' Op Code (0x01) to the Record Access Control Point using an Operator of 'all records' (0x01) and an Operand containing the Time Offset Filter Type and a Time Offset value of 0x0001.
2. The IUT sends an indication of the Record Access Control Point characteristic with the 'Response Code' Op Code (0x06) and an Operand representing the Request Op Code (0x01) followed by the Response Code Value for 'Invalid Operand' (0x05).
3. The Lower Tester receives an ATT_Handle_Value_Indication from the IUT containing the Record Access Control Point characteristic handle and value.
4. The Lower Tester sends an ATT_Handle_Value_Confirmation to the IUT.
5. Verify the characteristic value meets the requirements of the service.

- Expected Outcome

Pass verdict

The IUT sends an indication of the Record Access Control Point characteristic with the 'Response Code' Op Code (0x06) and an Operand representing the Request Op Code (0x01) followed by the Response Code Value for 'Invalid Operand' (0x05).

CGMS/SEN/CBE/BI-05-C [General Error Handling – 'Invalid Operand' – Type 2]

- Test Purpose

Verify that the IUT responds appropriately when a Client writes an Op Code to the Record Access Control Point with an Operand that is invalid.

- Reference

[2] 3.8, 3.8.2

- Initial Condition

If a connection exists, it shall be disconnected.

Perform the preamble described in in Section 4.2.3.

Perform an action on the IUT that will induce it to generate 3 or more records.

- Test Procedure

1. The Lower Tester writes the 'Report Stored Records' Op Code (0x01) to the Record Access Control Point using an Operator of 'Within range of' (0x04) and a Operand containing the Time Offset Filter Type (0x01) followed by a pair of Time Offset values 0xFFFF representing the 'minimum' value and 0x0000 representing the 'maximum' value.
2. The IUT sends an indication of the Record Access Control Point characteristic with the 'Response Code' Op Code (0x06), an Operator of Null (0x00), and an Operand representing the Request Op Code (0x01) followed by the Response Code Value for 'Invalid Operand' (0x05).
3. The Lower Tester receives an ATT_Handle_Value_Indication from the IUT containing the Record Access Control Point characteristic handle and value.
4. The Lower Tester sends an ATT_Handle_Value_Confirmation to the IUT.
5. Verify the characteristic value meets the requirements of the service.

- Expected Outcome

Pass verdict

The IUT sends an indication of the Record Access Control Point characteristic with the 'Response Code' Op Code (0x06), an Operator of Null (0x00), and an Operand representing the Request Op Code (0x01) followed by the Response Code Value for 'Invalid Operand' (0x05).

CGMS/SEN/CBE/BI-06-C [General Error Handling – ‘Missing CRC’]

- Test Purpose

Verify that the IUT does not allow a write of the CGM Session Start Time characteristic if a required E2E-CRC is missing.

- Reference

[2] 1.8, 3.4.4

- Initial Condition

IUT supports E2E-CRC safety; The Lower Tester does not support E2E-CRC safety.

The handle of the characteristic value referenced in the test case below has been previously discovered by the Lower Tester during the test procedure in Section 4.4 or is known to the Lower Tester by other means.

- Test Procedure

1. The Lower Tester writes the ‘Write CGM Session Start Time’ Op Code with an Operand containing a value for a Session Start time as defined in [6] without an E2E-CRC.
2. The Lower Tester receives an ATT_Error Response from the IUT.
3. Verify the characteristic value meets the requirements of the service.

- Expected Outcome

Pass verdict

The IUT sends an ATT Error Response with the error code ‘0x80’ set to ‘Missing CRC’ as defined in [2].

CGMS/SEN/CBE/BI-07-C [General Error Handling – ‘Invalid CRC’]

- Test Purpose

Verify that the IUT does not allow a write of the CGM Specific Ops Control Point characteristic if a required E2E-CRC is invalid.

- Reference

[2] 1.8, 3.7.2

- Initial Condition

Both the IUT and the Lower Tester support E2E-CRC safety (Bit 12 ‘E2E-CRC supported’ in CGM Feature flags is set to 0).

The handle of each characteristic value referenced in the test cases below has been previously discovered by the Lower Tester during the test procedure in Section 4.4 or is known to the Lower Tester by other means.

- Test Procedure
 1. The Lower Tester writes the 'Set CGM Communication interval' Op Code (0x01) to the CGM Specific Ops Control Point with an Operand containing a valid communication interval (e.g., 5 min) and an invalid CRC.
 2. The Lower Tester receives an ATT_Error Response.
 3. Verify the characteristic value meets the requirements of the service.

- Expected Outcome

Pass verdict

The IUT sends an ATT Error Response with the error code '0x81' set to 'Invalid CRC' as defined in [\[2\]](#).

5 Test Case Mapping

The Test Case Mapping Table (TCMT) maps test cases to specific capabilities in the ICS. Profiles, protocols and services may define multiple roles, and it is possible that a product may implement more than one role. The product shall be tested in all roles for which support is declared in the ICS document.

The columns for the TCMT are defined as follows:

Item: contains an y/x reference, where y corresponds to the table number and x corresponds to the feature number as defined in the ICS Proforma for the Continuous Glucose Monitoring Service document [4]. If the item is defined with Protocol, Profile or Service abbreviation before y/x, the table and feature number referenced are defined in the abbreviated ICS proforma document.

Feature: recommended to be the primary feature defined in the ICS being tested or may be the test case name.

Test Case(s): the applicable test case identifiers required for Bluetooth Qualification if the corresponding y/x references defined in the Item column are supported.

For purpose and structure of the ICS/IXIT proforma and instructions for completing the ICS/IXIT proforma refer to the Bluetooth ICS and IXIT proforma document.

Item	Feature	Test case(s)
(CGMS 1/1 OR CGMS 1/2) AND CGMS 3/1	CGM Service Definition	CGMS/SEN/SD/BV-01-C
CGMS 3/2	CGM Measurement Characteristic	CGMS/SEN/DEC/BV-01-C CGMS/SEN/DES/BV-01-C CGMS/SEN/CON/BV-01-C
CGMS 3/3 AND CGMS 3/4 AND CGMS 3/5 AND CGMS 3/6	Size Field, Flags Field, CGM Glucose Concentration Field and Time Offset Field of CGM Measurement Characteristic	CGMS/SEN/CN/BV-01-C
CGMS 3/7	Sensor Status Annunciation Field of CGM Measurement Characteristic	CGMS/SEN/CN/BV-02-C
CGMS 3/8	CGM Trend Information Field of CGM Measurement Characteristic	CGMS/SEN/CN/BV-03-C
CGMS 3/9	CGM Quality Field of CGM Measurement Characteristic	CGMS/SEN/CN/BV-04-C
CGMS 3/10	E2E-CRC Field of CGM Measurement Characteristic	CGMS/SEN/CN/BV-05-C

Item	Feature	Test case(s)
CGMS 3/11	CGM Feature Characteristic	CGMS/SEN/DEC/BV-02-C CGMS/SEN/CR/BV-01-C CGMS/SEN/CR/BV-02-C
CGMS 2/8 AND CGMS 3/11	CGM Feature Characteristic	CGMS/SEN/CR/BV-03-C
CGMS 3/13 AND CGMS 2/7	CGM Session Start Time with E2E-CRC	CGMS/SEN/CR/BV-04-C CGMS/SEN/CBE/BI-06-C
CGMS 3/13 AND NOT CGMS 2/7	CGM Session Start Time without E2E-CRC	CGMS/SEN/CR/BV-05-C
CGMS 3/14 AND CGMS 2/7	CGM Session Run Time without E2E-CRC	CGMS/SEN/CR/BV-06-C
CGMS 3/14 AND NOT CGMS 2/7	CGM Session Run Time without E2E-CRC	CGMS/SEN/CR/BV-07-C
CGMS 2/7	Verify E2E-CRC	CGMS/SEN/CR/BV-09-C
CGMS 3/12	CGM Status Characteristic	CGMS/SEN/DEC/BV-03-C CGMS/SEN/CR/BV-08-C
CGMS 3/13	CGM Session Start Time Characteristic	CGMS/SEN/CW/BV-01-C CGMS/SEN/CW/BI-01-C
CGMS 3/13	CGM Session Start Time Characteristic	CGMS/SEN/DEC/BV-04-C
CGMS 3/14	CGM Session Run Time Characteristic	CGMS/SEN/DEC/BV-05-C
CGMS 3/15	Record Access Control Point	CGMS/SEN/DEC/BV-06-C
CGMS 3/15	Record Access Control Point Characteristic	CGMS/SEN/DES/BV-02-C CGMS/SEN/CON/BV-02-C CGMS/SEN/CBE/BI-01-C
CGMS 3/17 AND CGMS 5/1	Record Access - Delete Stored Records	CGMS/SEN/RAD/BV-01-C
CGMS 3/17 AND CGMS 4/6	Record Access - Delete Stored Records, Within range Operator	CGMS/SEN/RAD/BV-02-C
CGMS 3/16	Record Access - Report Stored Records	CGMS/SEN/RAE/BI-01-C CGMS/SEN/RAE/BI-02-C
CGMS 3/18	Record Access – Abort Operation	CGMS/SEN/RAA/BV-01-C

Item	Feature	Test case(s)
CGMS 4/1	Record Access - Report Stored Records	CGMS/SEN/RAR/BV-01-C CGMS/SEN/CBE/BI-02-C CGMS/SEN/CBE/BI-03-C CGMS/SEN/CBE/BI-04-C CGMS/SEN/RAE/BI-03-C
CGMS 4/1 AND CGMS 4/6	General Error Handling – ‘Invalid Operand’ – Type 2	CGMS/SEN/CBE/BI-05-C
CGMS 4/2 AND CGMS 4/3	Record Access – Report Stored Records, Less than or equal to Operator	CGMS/SEN/RAR/BV-02-C
CGMS 4/4 AND CGMS 4/5	Record Access – Report Stored Records, Greater than or equal to Operator	CGMS/SEN/RAR/BV-03-C
CGMS 4/6 AND CGMS 4/7	Record Access – Report Stored Records, Within range Operator	CGMS/SEN/RAR/BV-04-C
CGMS 4/8	Record Access – Report Stored Records, First record Operator	CGMS/SEN/RAR/BV-05-C
CGMS 4/9	Record Access – Report Stored Records, Last record Operator	CGMS/SEN/RAR/BV-06-C
CGMS 7/1	Record Access – Report Stored Records, All Records Operator	CGMS/SEN/RAN/BV-01-C
CGMS 5/1 AND CGMS 7/1	Record Access – Report Number of stored Records, All Records – No records found	CGMS/SEN/RAN/BV-03-C
CGMS 7/4 AND CGMS 7/5	Record Access – Report Number of stored Records, Within range Operator	CGMS/SEN/RAN/BV-02-C
CGMS 3/22	CGM Specific Ops Control Point	CGMS/SEN/DEC/BV-07-C CGMS/SEN/DES/BV-03-C CGMS/SEN/CON/BV-03-C
CGMS 3/22 AND CGMS 2/7	CGM Specific Ops Control Point, Invalid CRC	CGMS/SEN/CBE/BI-07-C
CGMS 3/23 AND CGMS 2/7	CGM Specific Ops Control Point – Set Communication Interval – with E2E-CRC	CGMS/SEN/CGMCP/BV-03-C CGMS/SEN/CGMCP/BV-04-C
CGMS 3/23 AND NOT CGMS 2/7	CGM Specific Ops Control Point – Set Communication Interval – without E2E-CRC	CGMS/SEN/CGMCP/BV-26-C CGMS/SEN/CGMCP/BV-27-C
CGMS 3/24b AND CGMS 2/7	Disable Periodic Communication – with E2E- CRC	CGMS/SEN/CGMCP/BV-05-C

Item	Feature	Test case(s)
CGMS 3/24b AND NOT CGMS 2/7	Disable Periodic Communication – without E2E-CRC	CGMS/SEN/CGMCP/BV-28-C
CGMS 2/7 AND CGMS 3/24	CGM Specific Ops Control Point – Get Communication Interval, with E2E-CRC	CGMS/SEN/CGMCP/BV-01-C
CGMS 3/24 AND NOT CGMS 2/7	CGM Specific Ops Control Point – Get Communication Interval, without E2E-CRC	CGMS/SEN/CGMCP/BV-02-C
CGMS 2/1 AND CGMS 3/25	CGM Specific Ops Control Point – Set Glucose Calibration	CGMS/SEN/CGMCP/BV-08-C
CGMS 2/1 AND CGMS 3/26	CGM Specific Ops Control Point – Get Glucose Calibration	CGMS/SEN/CGMCP/BV-06-C CGMS/SEN/CGMCP/BV-07-C CGMS/SEN/CGMCP/BI-01-C
CGMS 2/2 AND CGMS 3/27	CGM Specific Ops Control Point – Set Patient High Alert Level	CGMS/SEN/CGMCP/BV-10-C CGMS/SEN/CGMCP/BI-02-C
CGMS 2/2 AND CGMS 3/28	CGM Specific Ops Control Point – Get Patient High Alert Level	CGMS/SEN/CGMCP/BV-09-C
CGMS 2/2 AND CGMS 3/29	CGM Specific Ops Control Point – Set Patient Low Alert Level	CGMS/SEN/CGMCP/BV-12-C CGMS/SEN/CGMCP/BI-03-C
CGMS 2/2 AND CGMS 3/30	CGM Specific Ops Control Point – Get Patient Low Alert Level	CGMS/SEN/CGMCP/BV-11-C
CGMS 2/3 AND CGMS 3/31	CGM Specific Ops Control Point – Set Hypo Alert Level	CGMS/SEN/CGMCP/BV-14-C CGMS/SEN/CGMCP/BI-04-C
CGMS 2/3 AND CGMS 3/32	CGM Specific Ops Control Point – Get Hypo Alert Level	CGMS/SEN/CGMCP/BV-13-C
CGMS 2/4 AND CGMS 3/33	CGM Specific Ops Control Point – Set Hyper Alert Level	CGMS/SEN/CGMCP/BV-16-C CGMS/SEN/CGMCP/BI-05-C
CGMS 2/4 AND CGMS 3/34	CGM Specific Ops Control Point – Get Hyper Alert Level	CGMS/SEN/CGMCP/BV-15-C
CGMS 2/5 AND CGMS 3/35	CGM Specific Ops Control Point – Set Rate of Decrease Alert Level	CGMS/SEN/CGMCP/BV-18-C CGMS/SEN/CGMCP/BI-06-C
CGMS 2/5 AND CGMS 3/36	CGM Specific Ops Control Point – Get Rate of Decrease Alert Level	CGMS/SEN/CGMCP/BV-17-C
CGMS 2/5 AND CGMS 3/37	CGM Specific Ops Control Point – Set Rate of Increase Alert Level	CGMS/SEN/CGMCP/BV-20-C CGMS/SEN/CGMCP/BI-07-C

Item	Feature	Test case(s)
CGMS 2/5 AND CGMS 3/38	CGM Specific Ops Control Point – Get Rate of Increase Alert Level	CGMS/SEN/CGMCP/BV-19-C
CGMS 2/6 AND CGMS 3/39	CGM Specific Ops Control Point – Reset Device Specific Alert	CGMS/SEN/CGMCP/BV-21-C
CGMS 3/40	CGM Specific Ops Control Point – Start Session	CGMS/SEN/CGMCP/BV-22-C CGMS/SEN/CGMCP/BI-08-C
CGMS 2/9 AND CGMS 3/40	CGM Specific Ops Control Point – Start Session, multiple sessions	CGMS/SEN/CGMCP/BV-25-C
CGMS 3/41	CGM Specific Ops Control Point – Stop Session	CGMS/SEN/CGMCP/BV-23-C
CGMS 3/40 AND CGMS 3/41 AND NOT CGMS 2/9	CGM Specific Ops Control Point – Start Session, no multiple sessions	CGMS/SEN/CGMCP/BV-24-C

Table 5.1: Test Case Mapping

6 RACP Test Matrix

The following tables summarize the features of RACP and the combinations with other features that are tested and not tested. For the tables, below, the following key applies:

- YES = A test for this combination exists.
- NO = A test for this combination does not exist.
- N/A = Not a valid combination.

	RACP Request Op Codes			
RACP Operands	Report stored records	Delete stored records	Abort operation	Report number of stored records
All records	YES	YES	YES	YES
Less than or equal to	YES	NO	N/A	NO
Greater than or equal to	YES	NO	N/A	YES
Within range of (inclusive)	YES	YES	N/A	NO
First record	YES	NO	N/A	NO
Last record	YES	NO	N/A	NO

	RACP Request Op Codes			
RACP Response Codes	Report stored records	Delete stored records	Abort operation	Report number of stored records
Success	YES	YES	YES	YES
Op Code not supported	NO (tested by Profile)	N/A	N/A	N/A
Invalid Operator	YES	NO	N/A	NO
Operator not supported	YES	NO	N/A	NO
Invalid Operand	YES	NO	N/A	NO
No records found	YES	NO	N/A	N/A
Abort unsuccessful	N/A	N/A	NO	N/A
Procedure not completed	N/A	N/A	N/A	N/A
Operand not supported	YES	N/A	N/A	NO
Unsupported Filter Type	YES	N/A	N/A	NO
Procedure already in progress	YES	NO	N/A	NO

7 Revision History and Contributors

Revision History

Publication Number	Revision Number	Date	Comments
0	1.0.0	2014-11-25	Prepare for Publication
	1.0.1r00	2015-05-10	<p>TSE 6171: Changed characteristic from CGM Specific Ops Control Point to Record Access Control Point in TP/CBE/BI-04-C (CGMS/SEN/CBE/BI-04-C after ID conversion)</p> <p>TSE 6170: Deleted steps 7 and 8 in TP/RAR/BV-02-C (CGMS/SEN/RAR/BV-02-C after ID conversion) and updated Pass verdict accordingly.</p>
1	1.0.1	2015-07-14	Prepared for TCRL 2015-1 publication
	1.0.2r00	2015-10-01	<p>TSE 6430: Added clarifying text to the TP/CGMCP/BV-24-C (CGMS/SEN/CGMCP/BV-24-C after ID conversion) test case purpose in Section 4.15.32.</p> <p>TSE 6571: Removed mapping of TP/CGMP/BV-12-C (CGMS/SEN/CGMCP/BV-12-C after ID conversion) to item 3/27 in the test case mapping table in Section 5.</p> <p>TSE 6431: Corrected the Calibration Value Response Op Code in step 2 of the Test Procedure in Section 4.15.8.</p> <p>TSE 6429: Corrected the Request Op Code in Section 4.15.14 and the 'Get Hypo Alert Level Response' Op Code in Section 4.15.16.</p>
	1.0.1.0r00	2015-10-28	Updated version numbering to align with Specification version change from 1.0 to 1.0.1 for ESR09. With the specification taking a third identifying number, the TS version identifier moves to the fourth number and starts again at 0.
2	1.0.1.0	2015-12-22	Prepared for TCRL 2015-2 publication.
	1.0.1.1r00	2016-02-05	TSE 6770: TCMT Item and Feature updated for Test Cases CGMS/SEN/DEC/BV-04-C and CGMS/SEN/DEC/BV-06-C.
	1.0.1.1r01	2016-04-13	Converted to new Test Case ID conventions as defined in TSTO v4.1.
3	1.0.1.1	2016-07-13	Prepared for TCRL 2016-1 publication.

Publication Number	Revision Number	Date	Comments
	1.0.1.2r00	2016-10-05	<p>TSE 7199: Added reference to CSS v6. Corrected reference in CGMS/SEN/CW/BV-01-C. Corrected Pass verdict error code in CGMS/SEN/CW/BI-01-C with reference to CSS v6.</p> <p>TSE 7200: Corrected mapping for CGMS/SEN/CGMCP/BV-05-C</p> <p>TSE 7201: Updated restrictions on fields in CGMS/SEN/CN/BV-01-C from “only to “at least”.</p> <p>TSE 7298: updated out of range parameter values in CGMS/SEN/CGMCP/BI-02-C, CGMS/SEN/CGMCP/BI-03-C, CGMS/SEN/CGMCP/BI-04-C, CGMS/SEN/CGMCP/BI-05-C.</p>
4	1.0.1.2	2016-12-13	Approved by BTI. Prepared for TCRL 2016-2 publication.
	1.0.1.3r00–r02	2019-02-26 – 2019-06-17	<p>TSE 11260 (rating 4): Updated template. Split tests CGMS/SEN/CGMCP/BV-03-C – -05-C to variants with and without E2E-CRC support. New tests CGMS/SEN/CGMCP/BV-26-C – -28-C added for the E2E-CRC not supported variants. Updated TCMT accordingly.</p> <p>TSE 11261 (rating 3): Updated test case CGMS/SEN/CW/BV-01-C Test Procedure steps and Pass Verdict to better align with ICS.</p>
5	1.0.1.3	2019-07-29	Approved by BTI. Prepared for TCRL 2019-1 publication.
	1.0.1.3 edition 2r00	2020-05-07	TSE 14786 (rating 1): Updated TCIDs CGMS/SEN/CON/BV-26-C – -28-C to align with TCMT and TCRL as CGMS/SEN/CGMCP/BV-26-C – -28-C.
	1.0.1.3 edition 2	2020-08-13	Performed minor formatting and template updates and accepted all tracked changes. Approved by BTI on 2020-08-13. Prepared for edition 2 publication.
	p6r00–r01	2020-10-21 – 2020-11-17	<p>TSE 15726 (rating 2): Updated TCMT entry for TC CGMS/SEN/CBE/BI-06-C.</p> <p>Consistency Checker fixes and template-related editorials, including updating Conformance and Pass/Fail Verdict Conventions text and updating the document number, setting previous v1.0.1.3 to p5.</p>

Publication Number	Revision Number	Date	Comments
6	p6	2020-12-22	Approved by BTI on 2020-12-02. Prepared for TCRL 2020-1 publication.

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