Test Report issued under the responsibility of:

TÜVRheinland®

TEST REPORT
IEC 62368-1
Audio/video, information and communication technology equipment
Part 1: Safety requirements

Report Number..... :	CN21HIKE 001
Date of issue..... :	2021-10-26
Total number of pages..... :	27
Name of Testing Laboratory preparing the Report..... :	**TÜV Rheinland (Shenzhen) Co., Ltd.**
Applicant's name..... :	**Texas Instruments Inc.**
Address..... :	12500 TI Boulevard Dallas TX 75243, USA
Test specification:	
Standard..... :	IEC 62368-1: 2018
Test procedure..... :	CB Scheme
Non-standard test method..... :	N/A
TRF template used..... :	IECEE OD-2020-F1:2020, Ed.1.3
Test Report Form No..... :	IEC62368_1E
Test Report Form(s) Originator ... :	UL(US)
Master TRF..... :	Dated 2021-02-04

If this Test Report Form is used by non-IECEE members, the IECEE/IEC logo and the reference to the CB Scheme procedure shall be removed.

This report is not valid as a CB Test Report unless signed by an approved CB Testing Laboratory and appended to a CB Test Certificate issued by an NCB in accordance with IECEE 02.

General disclaimer:

The test results presented in this report relate only to the object tested.
This report shall not be reproduced, except in full, without the written approval of the Issuing CB Testing Laboratory. The authenticity of this Test Report and its contents can be verified by contacting the NCB, responsible for this Test Report.

Test item description .....:	Charger IC		
Trade Mark.....:	TEXAS INSTRUMENTS		
Manufacturer.....:	Same as applicant		
Model/Type reference.....:	BQ25790, BQ25792, BQ25798, BQ25672		
Ratings .....:	Rated input: 24Vdc Max.		
Responsible Testing Laboratory (as applicable), testing procedure and testing location(s):			
☒	**CB Testing Laboratory:**	**TÜV Rheinland (Shenzhen) Co., Ltd.**	
Testing location/ address..... :		1601-1604, 17-18F, Tower A Building 2, Shenzhen International Innovation Valley, Dashi 1st Road, Xili Street, Xili Community, Shenzhen 518052 Nanshan District, China	
Tested by (name, function, signature)..... :		Joanna Chen (Project handler)	Joanna chen
Approved by (name, function, signature) . :		Crystal Ye (Reviewer)	Crystal Ye
☐	**Testing procedure: CTF Stage 1:**		
Testing location/ address..... :			
Tested by (name, function, signature)..... :			
Approved by (name, function, signature) . :			
☐	**Testing procedure: CTF Stage 2:**		
Testing location/ address..... :			
Tested by (name + signature)..... :			
Witnessed by (name, function, signature) :			
Approved by (name, function, signature) . :			
☐	**Testing procedure: CTF Stage 3:**		
☐	**Testing procedure: CTF Stage 4:**		
Testing location/ address..... :			
Tested by (name, function, signature)..... :			
Witnessed by (name, function, signature) :			
Approved by (name, function, signature) . :			
Supervised by (name, function, signature):			

List of Attachments (including a total number of pages in each attachment):

Attachment 1: Test result for annex G.9 (1 page)

Attachment 2: National Differences (28 pages)

Attachment 3: Photo documentation (2 pages)

Summary of testing:

Tests performed (name of test and test clause):	**Testing location:**
G.9 Integrated circuit (IC) current limiters Remark: The tests were performed on model BQ25790.	**TUV Rheinland (Shenzhen) Co., Ltd.** 1601-1604, 17-18F, Tower A Building 2, Shenzhen International Innovation Valley, Dashi 1st Road, Xili Street, Xili Community, Shenzhen 518052 Nanshan District, China

Summary of compliance with National Differences (List of countries addressed):

EU Group Differences, EU Special National Conditions, CA, US.

Explanation of used codes: CA=Canada, US=United states of America.

For National Differences see attachment 2 of this test report.

Statement concerning the uncertainty of the measurement systems used for the tests

(may be required by the product standard or client)

☐ **Internal procedure used for type testing through which traceability of the measuring uncertainty has been established:**

Procedure number, issue date and title:

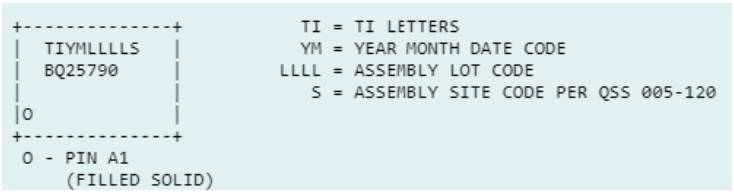
Calculations leading to the reported values are on file with the NCB and testing laboratory that conducted the testing.

☒ **Statement not required by the standard used for type testing**

Copy of marking plate:

The artwork below may be only a draft. The use of certification marks on a product must be authorized by the respective NCBs that own these marks.

Marking on ICs body:



```
Topside Symbol         : QFN4X4

  +------------+     TI = TI LETTERS
  ! O          !     YM = YEAR MONTH DATE CODE
  !   BQ25792  !   LLLL = ASSY LOT CODE
  !            !      S = ASSEMBLY SITE CODE PER QSS 005-120
  !   TI YMS   !
  !   LLLL     !      7 CHARACTERS MAX PER LINES 1 & 2
  +------------+
    O - PIN 1 (MARKED)
```

```
Topside Symbol         : QFN4X4

  +------------+     TI = TI LETTERS
  ! O          !     YM = YEAR MONTH DATE CODE
  !   BQ25798  !   LLLL = ASSY LOT CODE
  !            !      S = ASSEMBLY SITE CODE PER QSS 005-120
  !   TI YMS   !
  !   LLLL     !      7 CHARACTERS MAX PER LINES 1 & 2
  +------------+
    O - PIN 1 (MARKED)
```

```
Topside Symbol         : QFN4X4

  +------------+     TI = TI LETTERS
  ! O          !     YM = YEAR MONTH DATE CODE
  !   BQ25672  !   LLLL = ASSY LOT CODE
  !            !      S = ASSEMBLY SITE CODE PER QSS 005-120
  !   TI YMS   !
  !   LLLL     !      7 CHARACTERS MAX PER LINES 1 & 2
  +------------+
    O - PIN 1 (MARKED)
```

Note:

1. “TI” means the manufacturer.

Marking on package:

Note:

1. Trademark “ TEXAS INSTRUMENTS ” marked on package label.

Test item particulars:	
Product group .....:	☐ end product ☒ built-in component
Classification of use by .....:	☐ Ordinary person ☐ Children likely present ☐ Instructed person ☒ Skilled person
Supply connection.....:	☐ AC mains ☐ DC mains ☒ not mains connected: ☒ ES1 ☐ ES2 ☐ ES3
Supply tolerance .....:	☐ +10%/-10% ☐ +20%/-15% ☐ +30%/ -10% ☒ None
Supply connection – type .....:	☐ pluggable equipment type A - ☐ non-detachable supply cord ☐ appliance coupler ☐ direct plug-in ☐ pluggable equipment type B - ☐ non-detachable supply cord ☐ appliance coupler ☐ permanent connection ☐ mating connector ☒ other: built-in component, to be soldered onto PCB
Considered current rating of protective device.....:	☐ A; Location: ☐ building ☐ equipment ☒ N/A
Equipment mobility .....:	☐ movable ☐ hand-held ☐ transportable ☐ direct plug-in ☐ stationary ☒ for building-in ☐ wall/ceiling-mounted ☐ SRME/rack-mounted ☐ other:
Overvoltage category (OVC) .....:	☐ OVC I ☐ OVC II ☐ OVC III ☐ OVC IV ☒ other: not directly connected to the mains
Class of equipment .....:	☐ Class I ☐ Class II ☒ Class III ☐ Not classified ☐
Special installation location .....:	☒ N/A ☐ restricted access area ☐ outdoor location☐
Pollution degree (PD) .....:	☐ PD 1 ☒ PD 2 ☐ PD 3
Manufacturer's specified T_{ma}.....:	85 °C ☐ Outdoor: minimum °C
IP protection class .....:	☒ IPX0 ☐ IP___
Power systems .....:	☐ TN ☐ TT ☐ IT - V_{L-L} ☒ not AC mains
Altitude during operation (m) .....:	☐ 2000 m or less ☒ 5000 m
Altitude of test laboratory (m) .....:	☒ 2000 m or less ☐ m
Mass of equipment (kg) .....:	<0.1 kg

Possible test case verdicts:

- test case does not apply to the test object…: N/A

- test object does meet the requirement ……: P (Pass)

- test object does not meet the requirement…: F (Fail)

Testing:

Date of receipt of test item ……: 2021-10-11

Date (s) of performance of tests……: 2021-10-11 to 2021-10-18

General remarks:

"(See Enclosure #)" refers to additional information appended to the report.
"(See appended table)" refers to a table appended to the report.

Throughout this report a ☐ comma / ☒ point is used as the decimal separator.

Manufacturer's Declaration per sub-clause 4.2.5 of IECEE 02:

The application for obtaining a CB Test Certificate includes more than one factory location and a declaration from the Manufacturer stating that the sample(s) submitted for evaluation is (are) representative of the products from each factory has been provided……:	☐ **Yes** ☒ **Not applicable**

When differences exist; they shall be identified in the General product information section.

Name and address of factory (ies)……: Same as applicant

General product information and other remarks:

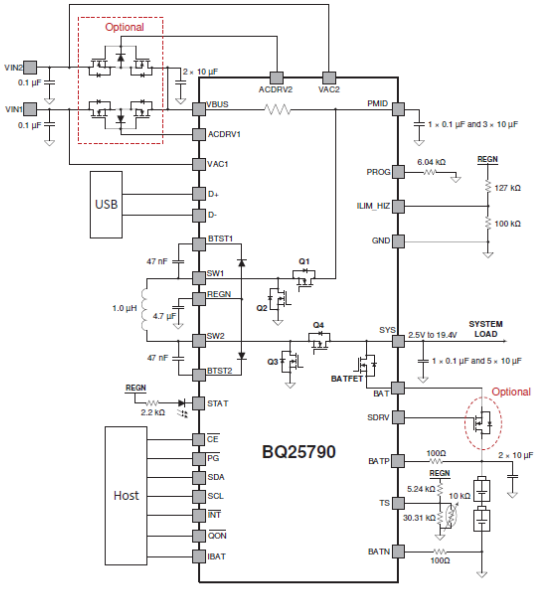
1. The EUT covered in this report is a built-in charge management IC which used in IT/AV product. It can monitor the charging status and regulate the output current accordingly.
2. The EUT support for charging from single-cell to four-cell battery, and the Max. charging voltage is 18.8V. The max. input voltage is 24V and the max. rated charging current is 5.0A. Refer to below table for parameters of all models:

	BQ25790	BQ25792	BQ25798	BQ25672
Rated input voltage	24V	24V	24V	24V
Maximum charge voltage	18.8V	18.8V	18.8V	18.8V
Maximum charge current	5.0A	5.0A	5.0A	3.0A
Package Type	DSBGA (56pins)	QFN(29pins)	QFN(29pins)	QFN(29pins)

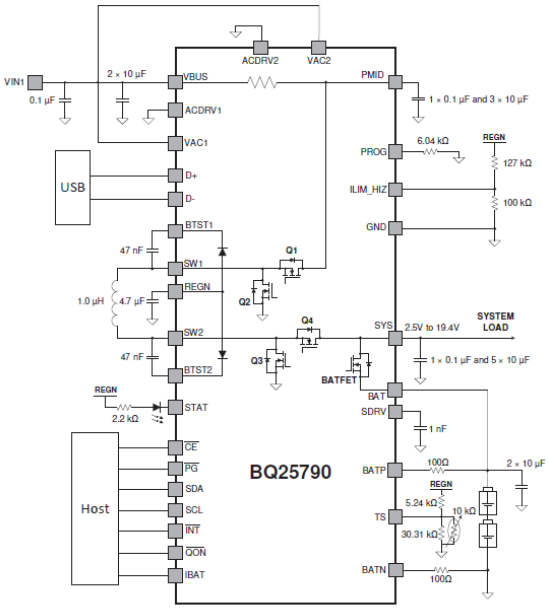
3. The tests are performed on model BQ25790 to cover other models.

See below for the typical application diagram:

For model BQ25790:

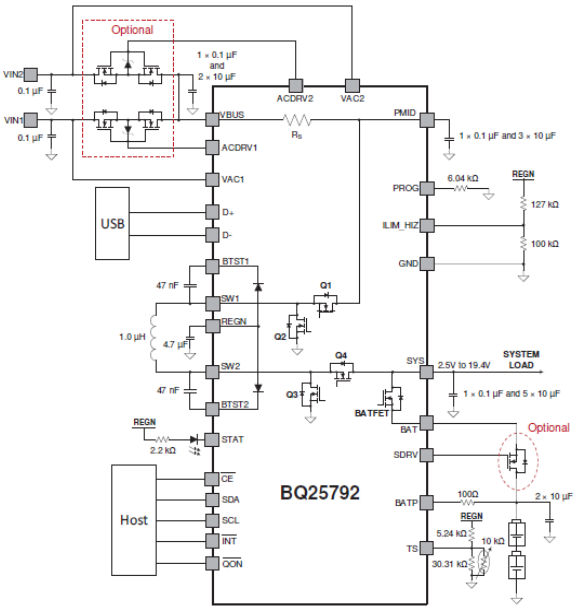


BQ25790 Application Diagram with Two Input Sources and Ship FET

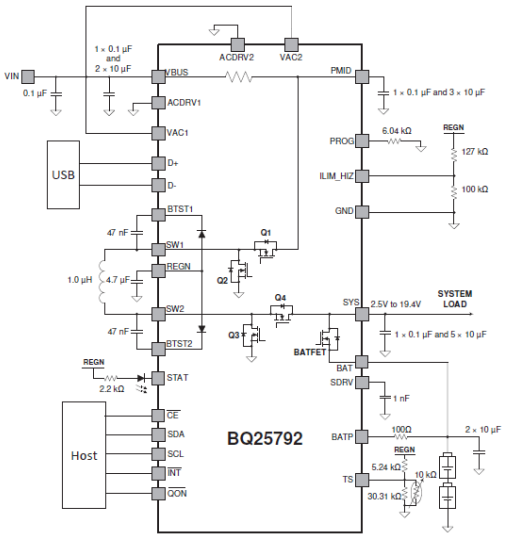


BQ25790 Application Diagram with Single Input Source and No Ship FET

For models BQ25792:

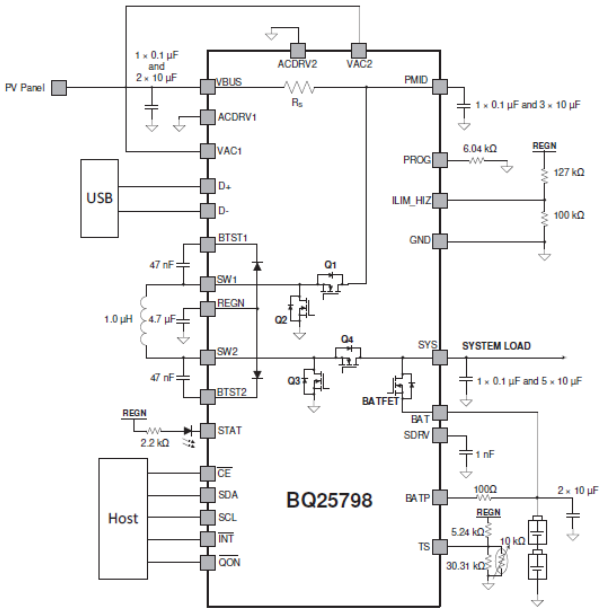


BQ25792 Application Diagram with Two Input Sources and Ship FET

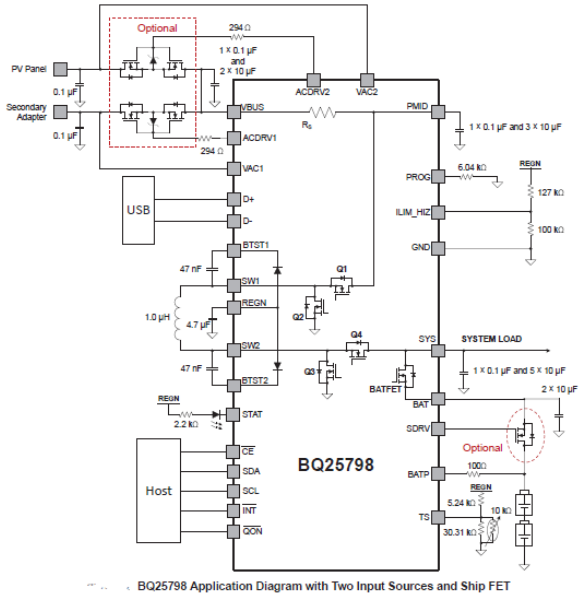


BQ25792 Application Diagram with Single Input Source and No Ship FET

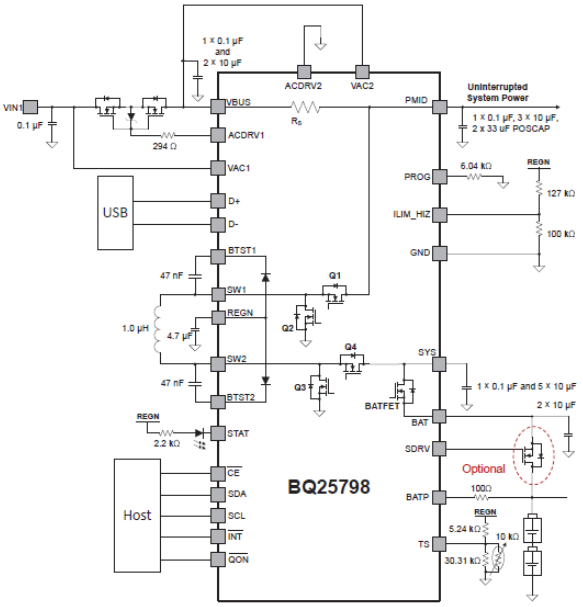
For model BQ25798:



BQ25798 Application Diagram with Single Input Source and No Ship FET

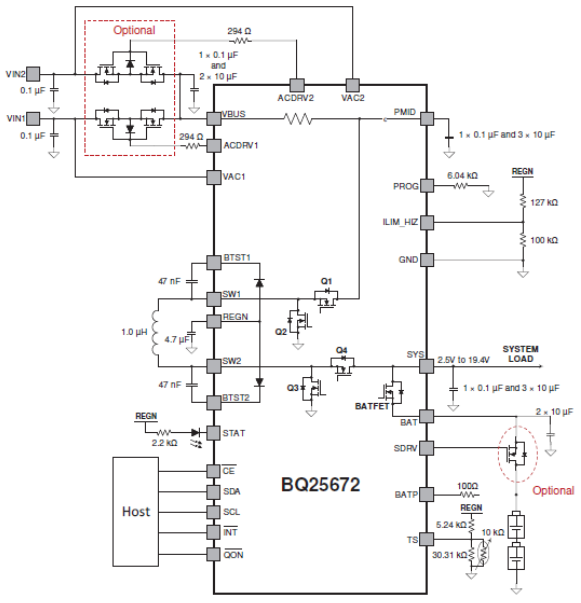


BQ25798 Application Diagram with Two Input Sources and Ship FET

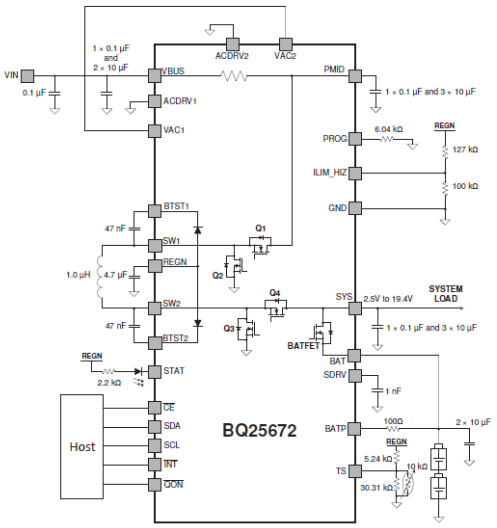


BQ25798 Application Diagram with Single Input Source, Back Up Mode and Ship FET

For model BQ25672:



BQ25672 Application Diagram with Two Input Sources and Ship FET

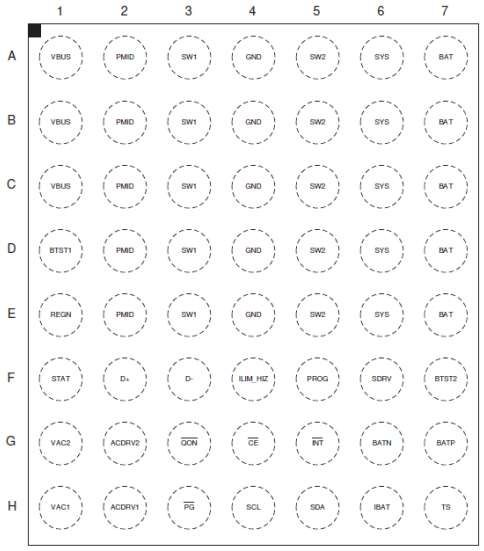


BQ25672 Application Diagram with Single Input Source and No Ship FET

See below for pin description:

For model BQ25790:

YBG Package
56-Pin DSBGA
Top View

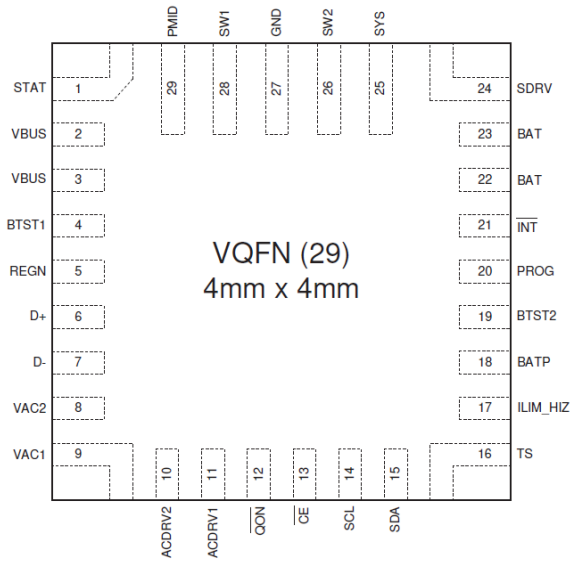


Pin Functions

PIN NAME	PIN NO.	I/O	DESCRIPTION
VBUS	A1 B1 C1	P	**Charger Input Voltage –** The power input terminal of the charger. An input current sensing circuit is connected between VBUS and PMID. The recommended capacitor at VBUS is one piece of 10μF ceramic capacitor.
PMID	A2 B2 C2 D2 E2	P	**Q1 MOSFET Drain Connection –** An internal N-channel high side MOSFET (Q1) is connected between PMID and SW1 with drain on PMID and source on SW1. Place a 0.1μF ceramic capacitor from PMID to power GND as close as possible to the charger IC. The recommended capacitors at PMID are 3 piece of 10μF and one piece of 0.1μF ceramic capacitors.
SW1	A3 B3 C3 D3 E3	P	**Buck Side Half Bridge Switching Node**
GND	A4 B4 C4 D4 E4	P	**Ground Return**
SW2	A5 B5 C5 D5 E5	P	**Boost Side Half Bridge Switching Node**
SYS	A6 B6 C6 D6 E6	P	**The Charger Output Voltage to System –** The internal N-channel high side MOSFET (Q4) is connected between SYS and SW2 with drain on SYS and source on SW2. Place a 0.1μF ceramic capacitor from SYS to power GND as close as possible to the charger IC. The recommended capacitors at SYS are 5 piece of 10μF and one piece of 0.1μF ceramic capacitors.
BAT	A7 B7 C7 D7 E7	P	**The Battery Charging Power Connection –** Connect to the positive terminal of the battery pack. The internal charging current sensing circuit is connected between SYS and BAT. The recommended capacitors at BAT are 2 piece of 10μF ceramic capacitors.
BTST1	D1	P	**Input High Side Power MOSFET Gate Driver Power Supply –** Connect a 10V or higher rating, 47nF ceramic capacitor between SW1 and BTST1 as the bootstrap capacitor for driving high side switching MOSFET (Q1).
REGN	E1	P	**The Charger Internal Linear Regulator Output –** It is supplied from either VBUS or BAT dependent on which voltage is higher. Connect a 10V, 4.7μF ceramic capacitor from REGN to power ground. The REGN LDO output is used for the internal MOSFETs gate driving voltage and the voltage bias for TS pin resistor divider.
BTST2	F7	P	**Output High Side Power MOSFET Gate Driver Power Supply –** Connect a 10V or higher rating, 47nF ceramic capacitor between SW2 and BTST2 as the bootstrap capacitor for driving high side switching MOSFET (Q4).

ACDRV1	H2	P	**Input FETs Driver Pin 1 –** The charge pump output to drive the port #1 input N-channel MOSFET (ACFET1) and the reverse blocking N-channel MOSFET (RBFET1). The charger turns on the back-to-back MOSFETs by increasing the ACDRV1 voltage 5V above the common drain connection of the ACFET1 and RBFET1 when the turn-on condition is met. Tie ACDRV1 to GND if no ACFET1 and RBFET1 installed.
VAC1	H1	P	**VAC1 Input Detection –** When a voltage between 3.6V and 24V apply on VAC1, it represents a valid input is plugged in port 1. Connect to VBUS if the ACFET1 and RBFET1 are not installed.
ACDRV2	G2	P	**Input FETs Driver Pin 2 –** The charge pump output to drive the port #2 input N-channel MOSFET (ACFET2) and the reverse blocking N-channel MOSFET (RBFET2). The charger turns on the back-to-back MOSFETs by increasing the ACDRV2 voltage 5V above the common drain connection of the ACFET2 and RBFET2 when the turn-on condition is met. Tie ACDRV2 to GND if no ACFET2 and RBFET2 installed.
VAC2	G1	P	**VAC2 Input Detection –** When a voltage between 3.6V and 24V is applied on VAC2, it represents a valid input being plugged in port #2. Connect to VBUS if the ACFET2 and RBFET2 are not present.
STAT	F1	DO	**Open Drain Charge Status Output –** It indicates various charger operations. Connect to the pull up rail via 10kΩ resistor. LOW indicates charging in progress. HIGH indicates charging completed or charging disabled. When any fault condition occurs, STAT pin blinks at 1Hz. The STAT pin function can be disabled when DIS_STAT bit is set to 1.
$\overline{PG}$	H3	DO	**Open Drain Active Low Power Good Indicator –** Connected to the pull up rail via 10kΩ resistor. LOW indicates a good input source if the VBUS voltage is above 3.6V and below 24V.
D+	F2	AIO	**Positive Line of the USB Data Line Pair –** D+/D- based USB host/charging port detection. The detection includes data contact detection (DCD), primary and secondary detection in BC1.2, and the adjustable high voltage adapter.
D-	F3	AIO	**Negative Line of the USB Data Line Pair –** D+/D- based USB host/charging port detection. The detection includes data contact detection (DCD), primary and secondary detection in BC1.2, and the adjustable high voltage adapter.
SDRV	F6	P	**External N-channel Ship FET (SFET) Gate Driver Output –** The driver pin of the external ship FET. The ship FET is always turned on when the ship mode is disabled, and it keeps off when the charger is in ship mode or shutdown mode. Connect a 0402 / 50V / 1nF ceramic capacitor from SDRV to GND when the ship FET is not used.
$\overline{QON}$	G3	DI	**Ship FET Enable or System Power Reset Control Input –** When the device is in ship mode or in the shutdown mode, the SDRV turns off the external ship FET to minimize the battery leakage current. A logic low on this pin with t_{SM_EXIT} duration turns on ship FET to force the device exit the ship mode. A logic low on this pin with t_{RST} duration resets system power by turning off the ship FET for t_{RST_SFET} (also set the charger in HIZ mode when VBUS is high) and then turning on ship FET (also disable the charger HIZ mode) to provide full system power reset. During t_{RST_SFET} when the ship FET is off, the charger applies a 30mA discharging current on SYS to discharge system voltage. The pin contains an internal pull-up to maintain default high logic.
PROG	F5	DI	**Charger POR Default Settings Program –** At power up, the charger detects the resistance tied to PROG pin to determine the default switching frequency and the default battery charging profile. The surface mount resistor with ±1% or ±2% tolerance is recommended. Please refer to more details in the section of PROG Pin Configuration.
SCL	H4	DI	**I^2C Interface Clock –** Connect SCL to the logic rail through a 10kΩ resistor.
SDA	H5	DIO	**I^2C Interface Data –** Connect SDA to the logic rail through a 10kΩ resistor.
$\overline{INT}$	G5	DO	**Open Drain Interrupt Output. –** Connect the $\overline{INT}$ pin to a logic rail via a 10kΩ resistor. The $\overline{INT}$ pin sends an active low, 256μs pulse to the host to report the charger device status and faults.
ILIM_HIZ	F4	AI	**Input Current Limit Setting and HIZ Mode Control Pin –** Program ILIM_HIZ voltage by connecting a resistor divider from pull up rail to ILIM_HIZ pin to ground. The pin voltage is calculated as: $V_{(ILIM\_HIZ)}$ = 1V + 800mΩ × IINDPM, in which IINDPM is the target input current. The input current limit used by the charger is the lower setting of ILIM_HIZ pin and the IINDPM register. When the pin voltage is below 0.75V, the buck-boost converter enters non-switching mode with REGN on. When the pin voltage is above 1V, the converter resumes switching.
IBAT	H6	AO	**Charging Current Sensing Output –** A current source output pin with the output current value as a ratio of charging current. The typical ratio is 25μA output current when the charging current is 1A. The recommended application case is connecting this pin to GND through a 10kΩ resistor, in order to achieve a 250 mV/A voltage to charging current gain. The maximum voltage at this pin is clamped at 3.3V.
$\overline{CE}$	G4	DI	**Active Low Charge Enable Pin –** Battery charging is enabled when EN_CHG bit is 1 and $\overline{CE}$ pin is LOW. $\overline{CE}$ pin must be pulled HIGH or LOW, do not leave floating.
BATP	G7	P	**Positive Input for Battery Voltage Sensing –** Connect to the positive terminal of battery pack. Place 100Ω series resistance between this pin and the battery positive terminal.
BATN	G6	AI	**Negative Input for Battery Voltage Sensing –** Connect to the negative terminal of battery pack. Place 100Ω series resistance between this pin and the battery negative terminal.
TS	H7	AI	**Temperature Qualification Voltage Input –** Connect a negative temperature coefficient thermistor. Program temperature window with a resistor divider from REGN to TS to GND. Charge suspends when TS pin voltage is out of range. Recommend a 103AT-2 10kΩ thermistor.

For models BQ25792:



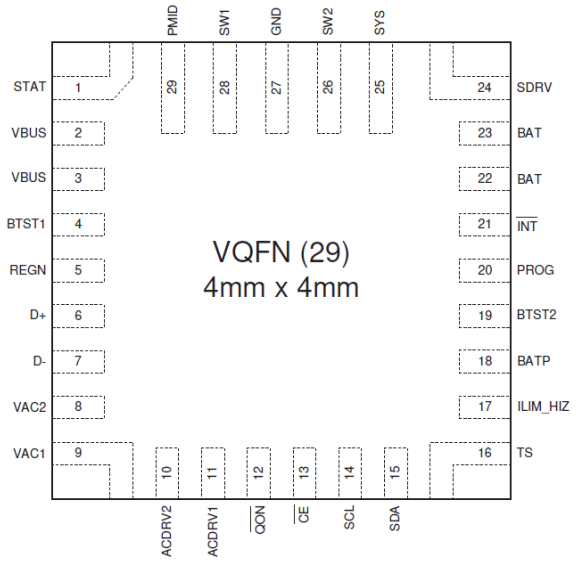
RQM Package 29-Pin VQFN Top View

Pin Functions

PIN		I/O	DESCRIPTION
NAME	NO.		
STAT	1	DO	**Open Drain Charge Status Output –** It indicates various charger operations. Connect to the pull up rail via a 10kΩ resistor. LOW indicates charging in progress. HIGH indicates charging completed or charging disabled. When any fault condition occurs, STAT pin blinks at 1Hz. The STAT pin function can be disabled when DIS_STAT bit is set to 1.
VBUS	2-3	P	**Charger Input Voltage –** The power input terminal of the charger. An input current sensing circuit is connected between VBUS and PMID. The recommended capacitors at VBUS are 2 pieces of 10µF and one piece of 0.1µF ceramic capacitors. Place the 0.1µF ceramic capacitor as close as possible to the charger IC.
BTST1	4	P	**Input High Side Power MOSFET Gate Driver Power Supply –** Connect a 10V or higher rating, 47nF ceramic capacitor between SW1 and BTST1 as the bootstrap capacitor for driving high side switching MOSFET (Q1).
REGN	5	P	**The Charger Internal Linear Regulator Output –** It is supplied from either VBUS or BAT dependent on which voltage is higher. Connect a 10V, 4.7µF ceramic capacitor from REGN to power ground. The REGN LDO output is used for the internal MOSFETs gate driving voltage and the voltage bias for TS pin resistor divider.
D+	6	AIO	**Positive Line of the USB Data Line Pair –** D+/D- based USB host/charging port detection for VIN1 input. The detection includes data contact detection (DCD), primary and secondary detection in BC1.2, and the adjustable high voltage adapter.
D-	7	AIO	**Negative Line of the USB Data Line Pair –** D+/D- based USB host/charging port detection for VIN1 input. The detection includes data contact detection (DCD), primary and secondary detection in BC1.2, and the adjustable high voltage adapter.
VAC2	8	P	**VAC2 Input Detection –** When a voltage between 3.6V and 24V is applied on VAC2, it represents a valid input being plugged into port #2. Connect to VBUS if the ACFET2 and RBFET2 are not installed.
VAC1	9	P	**VAC1 Input Detection –** When a voltage between 3.6V and 24V is applied on VAC1, it represents a valid input being plugged into port #1. Connect to VBUS if the ACFET1 and RBFET1 are not installed.

ACDRV2	10	P	**Input FETs Driver Pin 2 –** The charge pump output to drive the port #2 input N-channel MOSFET (ACFET2) and the reverse blocking N-channel MOSFET (RBFET2). The charger turns on the back-to-back MOSFETs by increasing the ACDRV2 voltage 5V above the common drain connection of the ACFET2 and RBFET2 when the turn-on condition is met. Tie ACDRV2 to GND if no ACFET2 and RBFET2 installed.
ACDRV1	11	P	**Input FETs Driver Pin 1 –** The charge pump output to drive the port #1 input N-channel MOSFET (ACFET1) and the reverse blocking N-channel MOSFET (RBFET1). The charger turns on the back-to-back MOSFETs by increasing the ACDRV1 voltage 5V above the common drain connection of the ACFET1 and RBFET1 when the turn-on condition is met. Tie ACDRV1 to GND if no ACFET1 and RBFET1 installed.
$\overline{QON}$	12	DI	**Ship FET Enable or System Power Reset Control Input –** When the device is in ship mode or in the shutdown mode, the SDRV turns off the external ship FET to minimize the battery leakage current. A logic low on this pin with t_{SM_EXIT} duration turns on ship FET to force the device to exit the ship mode. A logic low on this pin with t_{RST} duration resets system power by turning off the ship FET for t_{RST_SFET} (also setting the charger in HIZ mode when VBUS is high) and then turning on ship FET (also disabling the charger HIZ mode) to provide full system power reset. During t_{RST_SFET} when the ship FET is off, the charger applies a 30mA discharging current on SYS to discharge system voltage. The pin contains an internal pull-up to maintain default high logic.
$\overline{CE}$	13	DI	**Active Low Charge Enable Pin –** Battery charging is enabled when EN_CHG bit is 1 and $\overline{CE}$ pin is LOW. $\overline{CE}$ pin must be pulled HIGH or LOW, do not leave floating.
SCL	14	DI	**I^2C Interface Clock –** Connect SCL to the logic rail through a 10 kΩ resistor.
SDA	15	DIO	**I^2C Interface Data –** Connect SDA to the logic rail through a 10 kΩ resistor.
TS	16	AI	**Temperature Qualification Voltage Input –** Connect a negative temperature coefficient thermistor. Program temperature window with a resistor divider from REGN to TS to GND. Charge suspends when TS pin voltage is out of range. Recommend a 103AT-2 10kΩ thermistor.
ILIM_HIZ	17	AI	**Input Current Limit Setting and HIZ Mode Control Pin –** Program ILIM_HIZ voltage by connecting a resistor divider from pull up rail to ILIM_HIZ pin to ground. The pin voltage is calculated as: V_{ILIM_HIZ} = 1V + 800mΩ × IINDPM, in which IINDPM is the target input current. The input current limit used by the charger is the lower setting of ILIM_HIZ pin and the IINDPM register. When the pin voltage is below 0.75V, the buck-boost converter enters non-switching mode with REGN on. When the pin voltage is above 1V, the converter resumes switching.
BATP	18	P	**Positive Input for Battery Voltage Sensing –** Connect to the positive terminal of battery pack. Place 100Ω series resistance between this pin and the battery positive terminal.
BTST2	19	P	**Output High Side Power MOSFET Gate Driver Power Supply –** Connect a 10V or higher rating, 47nF ceramic capacitor between SW2 and BTST2 as the bootstrap capacitor for driving high side switching MOSFET (Q4).
PROG	20	AI	**Charger POR Default Settings Program –** At power up, the charger detects the resistance tied to PROG pin to determine the default switching frequency and the default battery charging profile. The surface mount resistor with ±1% or ±2% tolerance is recommended. Please refer to more details in the section of PROG Pin Configuration.
$\overline{INT}$	21	DO	**Open Drain Interrupt Output. –** Connect the $\overline{INT}$ pin to a logic rail via a 10kΩ resistor. The $\overline{INT}$ pin sends an active low, 256μs pulse to the host to report the charger device status and faults.
BAT	22-23	P	**The Battery Charging Power Connection –** Connect to the positive terminal of the battery pack. The internal charging current sensing circuit is connected between SYS and BAT. The recommended capacitors at BAT are 2 pieces of 10μF ceramic capacitors.
SDRV	24	P	**External N-channel Ship FET (SFET) Gate Driver Output –** The driver pin of the external ship FET. The ship FET is always turned on when the ship mode is disabled, and it keeps off when the charger is in ship mode or shutdown mode. Connect a 1nF, 50V rated, 0402 package, ceramic capacitor from SDRV to GND when the ship FET is not used.
SYS	25	P	**The Charger Output Voltage to System –** The internal N-channel high side MOSFET (Q4) is connected between SYS and SW2 with drain on SYS and source on SW2. The recommended capacitors at SYS are 5 pieces of 10μF and one piece of 0.1μF ceramic capacitors. Place the 0.1μF ceramic capacitor as close as possible to the charger IC.
SW2	26	P	**Boost Side Half Bridge Switching Node**
GND	27	P	**Ground Return**
SW1	28	P	**Buck Side Half Bridge Switching Node**
PMID	29	P	**Q1 MOSFET Drain Connection –** An internal N-channel high side MOSFET (Q1) is connected between PMID and SW1 with drain on PMID and source on SW1. The recommended capacitors at PMID are 3 pieces of 10μF and one piece of 0.1μF ceramic capacitors. Place the 0.1μF ceramic capacitor as close as possible to the charger IC.

For model BQ25798:



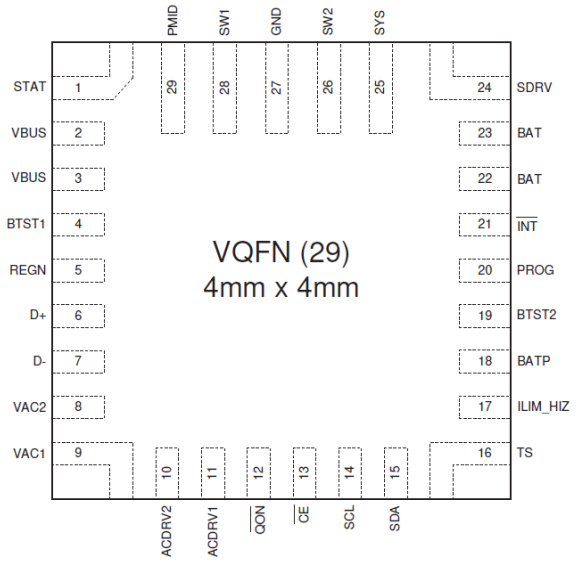
RQM Package 29-Pin VQFN Top View

Pin Functions

PIN		I/O	DESCRIPTION
NAME	NO.		
STAT	1	DO	**Open Drain Charge Status Output –** It indicates various charger operations. Connect to the pull up rail via a 10kΩ resistor. LOW indicates charging in progress. HIGH indicates charging completed or charging disabled. When any fault condition occurs, STAT pin blinks at 1Hz. The STAT pin function can be disabled when DIS_STAT bit is set to 1.
VBUS	2-3	P	**Charger Input Voltage –** The power input terminal of the charger. An input current sensing circuit is connected between VBUS and PMID. The recommended capacitors at VBUS are 2 pieces of 10µF and one piece of 0.1µF ceramic capacitors. Place the 0.1µF ceramic capacitor as close as possible to the charger IC.
BTST1	4	P	**Input High Side Power MOSFET Gate Driver Power Supply –** Connect a 10V or higher rating, 47nF ceramic capacitor between SW1 and BTST1 as the bootstrap capacitor for driving high side switching MOSFET (Q1).
REGN	5	P	**The Charger Internal Linear Regulator Output –** It is supplied from either VBUS or BAT dependent on which voltage is higher. Connect a 10V, 4.7µF ceramic capacitor from REGN to power ground. The REGN LDO output is used for the internal MOSFETs gate driving voltage and the voltage bias for TS pin resistor divider.
D+	6	AIO	**Positive Line of the USB Data Line Pair –** D+/D- based USB host/charging port detection for VIN1 input. The detection includes data contact detection (DCD), primary and secondary detection in BC1.2, and the adjustable high voltage adapter.
D-	7	AIO	**Negative Line of the USB Data Line Pair –** D+/D- based USB host/charging port detection for VIN1 input. The detection includes data contact detection (DCD), primary and secondary detection in BC1.2, and the adjustable high voltage adapter.
VAC2	8	P	**VAC2 Input Detection –** When a voltage between 3.6V and 24V is applied on VAC2, it represents a valid input being plugged into port #2. Connect to VBUS if the ACFET2 and RBFET2 are not installed.
VAC1	9	P	**VAC1 Input Detection –** When a voltage between 3.6V and 24V is applied on VAC1, it represents a valid input being plugged into port #1. Connect to VBUS if the ACFET1 and RBFET1 are not installed.

ACDRV2	10	P	**Input FETs Driver Pin 2 –** The charge pump output to drive the port #2 input N-channel MOSFET (ACFET2) and the reverse blocking N-channel MOSFET (RBFET2). The charger turns on the back-to-back MOSFETs by increasing the ACDRV2 voltage 5V above the common drain connection of the ACFET2 and RBFET2 when the turn-on condition is met. Tie ACDRV2 to GND if no ACFET2 and RBFET2 installed.
ACDRV1	11	P	**Input FETs Driver Pin 1 –** The charge pump output to drive the port #1 input N-channel MOSFET (ACFET1) and the reverse blocking N-channel MOSFET (RBFET1). The charger turns on the back-to-back MOSFETs by increasing the ACDRV1 voltage 5V above the common drain connection of the ACFET1 and RBFET1 when the turn-on condition is met. Tie ACDRV1 to GND if no ACFET1 and RBFET1 installed.
$\overline{QON}$	12	DI	**Ship FET Enable or System Power Reset Control Input –** When the device is in ship mode or in the shutdown mode, the SDRV turns off the external ship FET to minimize the battery leakage current. A logic low on this pin with t_{SM_EXIT} duration turns on ship FET to force the device to exit the ship mode. A logic low on this pin with t_{RST} duration resets system power by turning off the ship FET for t_{RST_SFET} (also setting the charger in HIZ mode when VBUS is high) and then turning on ship FET (also disabling the charger HIZ mode) to provide full system power reset. During t_{RST_SFET} when the ship FET is off, the charger applies a 30mA discharging current on SYS to discharge system voltage. The pin contains an internal pull-up to maintain default high logic.
$\overline{CE}$	13	DI	**Active Low Charge Enable Pin –** Battery charging is enabled when EN_CHG bit is 1 and $\overline{CE}$ pin is LOW. $\overline{CE}$ pin must be pulled HIGH or LOW, do not leave floating.
SCL	14	DI	**I^2C Interface Clock –** Connect SCL to the logic rail through a 10 kΩ resistor.
SDA	15	DIO	**I^2C Interface Data –** Connect SDA to the logic rail through a 10 kΩ resistor.
TS	16	AI	**Temperature Qualification Voltage Input –** Connect a negative temperature coefficient thermistor. Program temperature window with a resistor divider from REGN to TS to GND. Charge suspends when TS pin voltage is out of range. Recommend a 103AT-2 10kΩ thermistor.
ILIM_HIZ	17	AI	**Input Current Limit Setting and HIZ Mode Control Pin –** Program ILIM_HIZ voltage by connecting a resistor divider from pull up rail to ILIM_HIZ pin to ground. The pin voltage is calculated as: V_{ILIM_HIZ} = 1V + 800mΩ × IINDPM, in which IINDPM is the target input current. The input current limit used by the charger is the lower setting of ILIM_HIZ pin and the IINDPM register. When the pin voltage is below 0.75V, the buck-boost converter enters non-switching mode with REGN on. When the pin voltage is above 1V, the converter resumes switching. Connect ILIM_HIZ to REGN to set the maximum input current limit.
BATP	18	P	**Positive Input for Battery Voltage Sensing –** Connect to the positive terminal of battery pack. Place 100Ω series resistance between this pin and the battery positive terminal.
BTST2	19	P	**Output High Side Power MOSFET Gate Driver Power Supply –** Connect a 10V or higher rating, 47nF ceramic capacitor between SW2 and BTST2 as the bootstrap capacitor for driving high side switching MOSFET (Q4).
PROG	20	AI	**Charger POR Default Settings Program –** At power up, the charger detects the resistance tied to PROG pin to determine the default switching frequency and the default battery charging profile. The surface mount resistor with ±1% or ±2% tolerance is recommended. Please refer to more details in the section of PROG Pin Configuration.
$\overline{INT}$	21	DO	**Open Drain Interrupt Output. –** Connect the $\overline{INT}$ pin to a logic rail via a 10kΩ resistor. The $\overline{INT}$ pin sends an active low, 256μs pulse to the host to report the charger device status and faults.
BAT	22-23	P	**The Battery Charging Power Connection –** Connect to the positive terminal of the battery pack. The internal charging current sensing circuit is connected between SYS and BAT. The recommended capacitors at BAT are 2 pieces of 10μF ceramic capacitors.
SDRV	24	P	**External N-channel Ship FET (SFET) Gate Driver Output –** The driver pin of the external ship FET. The ship FET is always turned on when the ship mode is disabled, and it keeps off when the charger is in ship mode or shutdown mode. Connect a 1nF, 50V rated, 0402 package, ceramic capacitor from SDRV to GND or SDRV to BAT when the ship FET is not used.
SYS	25	P	**The Charger Output Voltage to System –** The internal N-channel high side MOSFET (Q4) is connected between SYS and SW2 with drain on SYS and source on SW2. The recommended capacitors at SYS are 5 pieces of 10μF and one piece of 0.1μF ceramic capacitors. Place the 0.1μF ceramic capacitor as close as possible to the charger IC.
SW2	26	P	**Boost Side Half Bridge Switching Node** Inductor connection to mid point of Q1 and Q2 switches.
GND	27	P	**Ground Return**
SW1	28	P	**Buck Side Half Bridge Switching Node** Inductor connection to mid point of Q3 and Q4 switches.
PMID	29	P	**Q1 MOSFET Drain Connection –** An internal N-channel high side MOSFET (Q1) is connected between PMID and SW1 with drain on PMID and source on SW1. The recommended capacitors at PMID are 3 pieces of 10μF and one piece of 0.1μF ceramic capacitors. Place the 0.1μF ceramic capacitor as close as possible to the charger IC. If backup mode will be used, an additional 2 pieces of 33 uF POSCAP are recommended to hold up PMID during the switchover from adapter to battery backup.

For model BQ25672:



RQM Package 29-Pin VQFN Top View

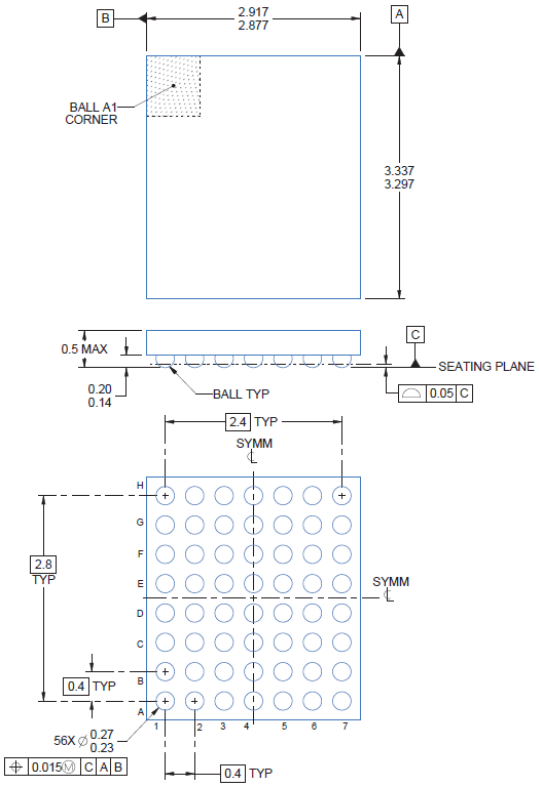
Pin Functions

PIN		I/O	DESCRIPTION
NAME	NO.		
STAT	1	DO	**Open Drain Charge Status Output –** It indicates various charger operations. Connect to the pull up rail via a 10kΩ resistor. LOW indicates charging in progress. HIGH indicates charging completed or charging disabled. When any fault condition occurs, STAT pin blinks at 1Hz. The STAT pin function can be disabled when DIS_STAT bit is set to 1.
VBUS	2-3	P	**Charger Input Voltage –** The power input terminal of the charger. An input current sensing circuit is connected between VBUS and PMID. The recommended capacitors at VBUS are 2 pieces of 10μF and one piece of 0.1μF ceramic capacitors. Place the 0.1μF ceramic capacitor as close as possible to the charger IC.
BTST1	4	P	**Input High Side Power MOSFET Gate Driver Power Supply –** Connect a 10V or higher rating, 47nF ceramic capacitor between SW1 and BTST1 as the bootstrap capacitor for driving high side switching MOSFET (Q1).
REGN	5	P	**The Charger Internal Linear Regulator Output –** It is supplied from either VBUS or BAT dependent on which voltage is higher. Connect a 10V, 4.7μF ceramic capacitor from REGN to power ground. The REGN LDO output is used for the internal MOSFETs gate driving voltage and the voltage bias for TS pin resistor divider.
D+	6	AIO	**Positive Line of the USB Data Line Pair –** D+/D- based USB host/charging port detection for VIN1 input. The detection includes data contact detection (DCD), primary and secondary detection in BC1.2, and the adjustable high voltage adapter.
D-	7	AIO	**Negative Line of the USB Data Line Pair –** D+/D- based USB host/charging port detection for VIN1 input. The detection includes data contact detection (DCD), primary and secondary detection in BC1.2, and the adjustable high voltage adapter.
VAC2	8	P	**VAC2 Input Detection –** When a voltage between 3.6V and 24V is applied on VAC2, it represents a valid input being plugged into port #2. Connect to VBUS if the ACFET2 and RBFET2 are not installed.
VAC1	9	P	**VAC1 Input Detection –** When a voltage between 3.6V and 24V is applied on VAC1, it represents a valid input being plugged into port #1. Connect to VBUS if the ACFET1 and RBFET1 are not installed.

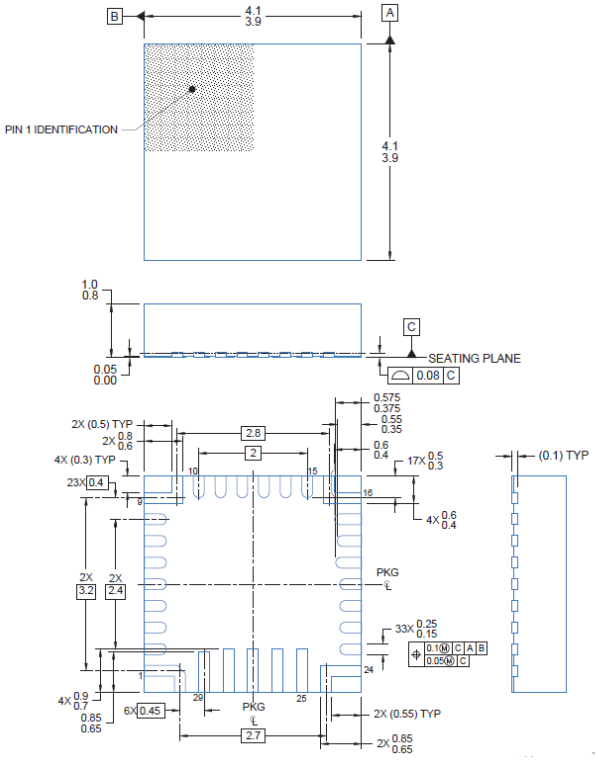
ACDRV2	10	P	**Input FETs Driver Pin 2 –** The charge pump output to drive the port #2 input N-channel MOSFET (ACFET2) and the reverse blocking N-channel MOSFET (RBFET2). The charger turns on the back-to-back MOSFETs by increasing the ACDRV2 voltage 5V above the common drain connection of the ACFET2 and RBFET2 when the turn-on condition is met. Tie ACDRV2 to GND if no ACFET2 and RBFET2 installed.
ACDRV1	11	P	**Input FETs Driver Pin 1 –** The charge pump output to drive the port #1 input N-channel MOSFET (ACFET1) and the reverse blocking N-channel MOSFET (RBFET1). The charger turns on the back-to-back MOSFETs by increasing the ACDRV1 voltage 5V above the common drain connection of the ACFET1 and RBFET1 when the turn-on condition is met. Tie ACDRV1 to GND if no ACFET1 and RBFET1 installed.
$\overline{QON}$	12	DI	**Ship FET Enable or System Power Reset Control Input –** When the device is in ship mode or in the shutdown mode, the SDRV turns off the external ship FET to minimize the battery leakage current. A logic low on this pin with t_{SM_EXIT} duration turns on ship FET to force the device to exit the ship mode. A logic low on this pin with t_{RST} duration resets system power by turning off the ship FET for t_{RST_SFET} (also setting the charger in HIZ mode when VBUS is high) and then turning on ship FET (also disabling the charger HIZ mode) to provide full system power reset. During t_{RST_SFET} when the ship FET is off, the charger applies a 30mA discharging current on SYS to discharge system voltage. The pin contains an internal pull-up to maintain default high logic.
$\overline{CE}$	13	DI	**Active Low Charge Enable Pin –** Battery charging is enabled when EN_CHG bit is 1 and $\overline{CE}$ pin is LOW. $\overline{CE}$ pin must be pulled HIGH or LOW, do not leave floating.
SCL	14	DI	**I^2C Interface Clock –** Connect SCL to the logic rail through a 10 kΩ resistor.
SDA	15	DIO	**I^2C Interface Data –** Connect SDA to the logic rail through a 10 kΩ resistor.
TS	16	AI	**Temperature Qualification Voltage Input –** Connect a negative temperature coefficient thermistor. Program temperature window with a resistor divider from REGN to TS to GND. Charge suspends when TS pin voltage is out of range. Recommend a 103AT-2 10kΩ thermistor.
ILIM_HIZ	17	AI	**Input Current Limit Setting and HIZ Mode Control Pin –** Program ILIM_HIZ voltage by connecting a resistor divider from pull up rail to ILIM_HIZ pin to ground. The pin voltage is calculated as: V_{ILIM_HIZ} = 1V + 800mΩ × IINDPM, in which IINDPM is the target input current. The input current limit used by the charger is the lower setting of ILIM_HIZ pin and the IINDPM register. When the pin voltage is below 0.75V, the buck converter enters non-switching mode with REGN on. When the pin voltage is above 1V, the converter resumes switching. Connect ILIM_HIZ to REGN to set the maximum input current limit.
BATP	18	P	**Positive Input for Battery Voltage Sensing –** Connect to the positive terminal of battery pack. Place 100Ω series resistance between this pin and the battery positive terminal.
BTST2	19	P	**Output High Side Power MOSFET Gate Driver Power Supply –** Connect a 10V or higher rating, 47nF ceramic capacitor between SW2 and BTST2 as the bootstrap capacitor for driving high side switching MOSFET (Q4).
PROG	20	AI	**Charger POR Default Settings Program –** At power up, the charger detects the resistance tied to PROG pin to determine the default switching frequency and the default battery charging profile. The surface mount resistor with ±1% or ±2% tolerance is recommended. Please refer to more details in the section of PROG Pin Configuration.
$\overline{INT}$	21	DO	**Open Drain Interrupt Output. –** Connect the $\overline{INT}$ pin to a logic rail via a 10kΩ resistor. The $\overline{INT}$ pin sends an active low, 256μs pulse to the host to report the charger device status and faults.
BAT	22-23	P	**The Battery Charging Power Connection –** Connect to the positive terminal of the battery pack. The internal charging current sensing circuit is connected between SYS and BAT. The recommended capacitors at BAT are 2 pieces of 10μF ceramic capacitors.
SDRV	24	P	**External N-channel Ship FET (SFET) Gate Driver Output –** The driver pin of the external ship FET. The ship FET is always turned on when the ship mode is disabled, and it keeps off when the charger is in ship mode or shutdown mode. Connect a 1nF, 50V rated, 0402 package, ceramic capacitor from SDRV to GND or SDRV to BAT when the ship FET is not used.
SYS	25	P	**The Charger Output Voltage to System –** The internal N-channel high side MOSFET (Q4) is connected between SYS and SW2 with drain on SYS and source on SW2. The recommended capacitors at SYS are 5 pieces of 10μF and one piece of 0.1μF ceramic capacitors. Place the 0.1μF ceramic capacitor as close as possible to the charger IC.
SW2	26	P	**Boost Side Half Bridge Switching Node** Inductor connection to mid point of Q1 and Q2 switches.
GND	27	P	**Ground Return**
SW1	28	P	**Buck Side Half Bridge Switching Node** Inductor connection to mid point of Q3 and Q4 switches.
PMID	29	P	**Q1 MOSFET Drain Connection –** An internal N-channel high side MOSFET (Q1) is connected between PMID and SW1 with drain on PMID and source on SW1. The recommended capacitors at PMID are 3 pieces of 10μF and one piece of 0.1μF ceramic capacitors. Place the 0.1μF ceramic capacitor as close as possible to the charger IC.

See below for the dimension (Unit: mm):

For model BQ25790:



For models BQ25792, BQ25798, BQ25672:



OVERVIEW OF ENERGY SOURCES AND SAFEGUARDS				
Clause	**Possible Hazard**			
5	Electrically-caused injury			
Class and Energy Source (e.g. ES3: Primary circuit)	Body Part (e.g. Ordinary)	Safeguards		
		B	S	R
ES1: All circuits including supplying circuits	Skilled	N/A	N/A	N/A
6	Electrically-caused fire			
Class and Energy Source (e.g. PS2: 100 Watt circuit)	Material part (e.g. Printed board)	Safeguards		
		B	1st S	2nd S
PS3: Supply circuits	Combustible materials inside the equipment	N/A*	N/A	N/A
PS3: All internal circuits except circuits for BAT output	Combustible materials inside the equipment	N/A*	N/A	N/A
PS2: BAT Output	Combustible materials inside the equipment	N/A*	N/A	N/A
7	Injury caused by hazardous substances			
Class and Energy Source (e.g. Ozone)	Body Part (e.g., Skilled)	Safeguards		
		B	S	R
N/A (no such sources)	N/A	N/A	N/A	N/A
8	Mechanically-caused injury			
Class and Energy Source (e.g. MS3: Plastic fan blades)	Body Part (e.g. Ordinary)	Safeguards		
		B	S	R
MS1: Edges and corners	Skilled	N/A	N/A	N/A
MS1: Mass of the unit	Skilled	N/A	N/A	N/A
9	Thermal burn			
Class and Energy Source (e.g. TS1: Keyboard caps)	Body Part (e.g., Ordinary)	Safeguards		
		B	S	R
*	*	*	*	*
10	Radiation			
Class and Energy Source (e.g. RS1: PMP sound output)	Body Part (e.g., Ordinary)	Safeguards		
		B	S	R
N/A	Skilled	N/A	N/A	N/A
Supplementary Information:*built-in component, to be evaluated in end-product. "B" – Basic Safeguard; "S" – Supplementary Safeguard; "R" – Reinforced Safeguard				

ENERGY SOURCE DIAGRAM
Optional. Manufacturers are to provide the energy sources diagram identify declared energy sources and identifying the demarcations are between power sources. Recommend diagram be provided included in power supply and multipart systems. Insert diagram below. Example diagram designs are; Block diagrams; image(s) with layered data; mechanical drawings
All circuit were considered as ES1. Supply circuits and all internal circuits except circuits for BAT output were considered as PS3. BAT output were considered as PS2. ☒ ES ☒ PS ☐ MS ☐ TS ☐ RS

IEC 62368-1			
Clause	Requirement + Test	Result - Remark	Verdict
4	**GENERAL REQUIREMENTS**		P
4.1.1	Acceptance of materials, components and subassemblies		P
4.1.2	Use of components	Component not covered by IEC standards are tested under the conditions present in the equipment. See also Annex G	P
4.1.3	Equipment design and construction	Built-in component, to be evaluated in end-product	N/A
4.1.4	Specified ambient temperature for outdoor use (°C) ..... :		N/A
4.1.5	Constructions and components not specifically covered		N/A
4.1.8	Liquids and liquid filled components (LFC)		N/A
4.1.15	Markings and instructions	(See Annex F)	P
4.4.3	Safeguard robustness	Built-in component, to be evaluated in end-product	N/A
4.4.4	Displacement of a safeguard by an insulating liquid		N/A
4.4.5	Safety interlocks		N/A
4.5	**Explosion**		N/A
4.6	**Fixing of conductors**		N/A
4.7	**Equipment for direct insertion into mains socket–outlets**		N/A
4.8	**Equipment containing coin/button cell batteries**		N/A
4.9	**Likelihood of fire or shock due to entry of conductive object** *Built-in component only*		N/A
4.10	**Component requirements**		N/A

5	**ELECTRICALLY-CAUSED INJURY**		P
5.2	**Classification and limits of electrical energy sources**		P
5.2.2	ES1, ES2 and ES3 limits	ES1	P
5.2.2.2	Steady-state voltage and current limits ..... :	(See appended table 5.2)	P
5.2.2.3	Capacitance limits ..... :		N/A
5.2.2.4	Single pulse limits..... :		N/A
5.2.2.5	Limits for repetitive pulses..... :		N/A
5.2.2.6	Ringing signals		N/A
5.2.2.7	Audio signals		N/A

IEC 62368-1			
Clause	Requirement + Test	Result - Remark	Verdict
5.3	**Protection against electrical energy sources** *Only ES1 exist*		N/A
5.4	**Insulation materials and requirements**		N/A
5.5	**Components as safeguards**		N/A
5.6	**Protective conductor**		N/A
5.6	**Protective conductor**		N/A
5.7	**Prospective touch voltage, touch current and protective conductor current**		N/A
5.8	**Backfeed safeguard in battery backed up supplies**		N/A
6	**ELECTRICALLY- CAUSED FIRE**		P
6.2	**Classification of PS and PIS**		P
6.2.2	Power source circuit classifications ..... :	Supply circuits and all internal circuits except circuits for BAT output were considered as PS3. BAT output were considered as PS2. (See appended table 6.2.2)	P
6.2.3	Classification of potential ignition sources	Built-in component, to be evaluated in end-product	N/A
6.2.3.1	Arcing PIS ..... :	No arcing PIS	N/A
6.2.3.2	Resistive PIS ..... :	No resistive PIS	N/A
6.3	**Safeguards against fire under normal operating and abnormal operating conditions**		N/A
6.3.1	No ignition and attainable temperature value less than 90 % defined by ISO 871 or less than 300 °C for unknown materials..... :	Built-in component, to be evaluated in end-product	N/A
	Combustible materials outside fire enclosure..... :		N/A
6.4	**Safeguards against fire under single fault conditions**		N/A
6.5	**Internal and external wiring**		
6.6	**Safeguards against fire due to the connection to additional equipment**		N/A
7	**INJURY CAUSED BY HAZARDOUS SUBSTANCES**		N/A
7.2	**Reduction of exposure to hazardous substances**		N/A
7.3	**Ozone exposure**		N/A
7.4	**Use of personal safeguards or personal protective equipment (PPE)**		N/A
	Personal safeguards and instructions..... :		—
7.5	**Use of instructional safeguards and instructions**		N/A

IEC 62368-1			
Clause	Requirement + Test	Result - Remark	Verdict
	Instructional safeguard (ISO 7010)..... :		—
7.6	**Batteries and their protection circuits**		N/A
8	**MECHANICALLY-CAUSED INJURY**		P
8.2	**Mechanical energy source classifications** *MS1*		P
8.3	**Safeguards against mechanical energy sources**		N/A
8.4	**Safeguards against parts with sharp edges and corners**		N/A
8.5	**Safeguards against moving parts**		N/A
8.6	**Stability of equipment**		N/A
8.7	**Equipment mounted to wall, ceiling or other structure**		N/A
8.8	**Handles strength**		N/A
8.9	**Wheels or casters attachment requirements**		N/A
8.10	**Carts, stands and similar carriers**		N/A
8.11	**Mounting means for slide-rail mounted equipment (SRME)**		N/A
8.12	**Telescoping or rod antennas**		N/A
9	**THERMAL BURN INJURY** *Built-in component only, to be evaluated in end-product*		N/A
10	**RADIATION** *Built-in component only, no laser or radiation hazards*		N/A
10.2	**Radiation energy source classification**		N/A
10.3	**Safeguards against laser radiation**		N/A
10.4	**Safeguards against optical radiation from lamps and lamp systems (including LED types)**		N/A
10.5	**Safeguards against X-radiation**		N/A
10.6	**Safeguards against acoustic energy sources**		N/A

IEC 62368-1			
Clause	Requirement + Test	Result - Remark	Verdict
B	**NORMAL OPERATING CONDITION TESTS, ABNORMAL OPERATING CONDITION TESTS AND SINGLE FAULT CONDITION TESTS** ***Built-in component, see annex G.9 only.***		N/A
C	**UV RADIATION**		N/A
D	**TEST GENERATORS**		N/A
E	**TEST CONDITIONS FOR EQUIPMENT CONTAINING AUDIO AMPLIFIERS**		N/A
F	**EQUIPMENT MARKINGS, INSTRUCTIONS, AND INSTRUCTIONAL SAFEGUARDS**		P
F.1	**General**		N/A
	Language ..... :		—
F.2	**Letter symbols and graphical symbols**		N/A
F.2.1	Letter symbols according to IEC60027-1		N/A
F.2.2	Graphic symbols according to IEC, ISO or manufacturer specific		N/A
F.3	**Equipment markings**		P
F.3.1	Equipment marking locations	See below	P
F.3.2	Equipment identification markings		P
F.3.2.1	Manufacturer identification ..... :	Trademark marked on package label	P
F.3.2.2	Model identification ..... :	Model no. marked	P
F.3.3	Equipment rating markings		N/A
F.4	**Instructions**		N/A
F.5	**Instructional safeguards**		N/A
G	**COMPONENTS**		P
G.1	**Switches**		N/A
G.2	**Relays**		N/A
G.3	**Protective devices**		N/A
G.4	**Connectors**		N/A
G.5	**Wound components**		N/A
G.6	**Wire Insulation**		N/A
G.7	**Mains supply cords**		N/A
G.8	**Varistors**		N/A
G.9	**Integrated circuit (IC) current limiters**		P
G.9.1	Requirements	See appended table G.9	P
	IC limiter output current (max. 5A) ..... :	5.0A for models BQ25790, BQ25792 and BQ25798; 3.0A for models BQ25672.	—

IEC 62368-1			
Clause	Requirement + Test	Result - Remark	Verdict
	Manufacturers' defined drift ..... :		—
G.9.2	Test Program		P
G.9.3	Compliance	After the test program, the device still can limit the current in accordance with its specification as applicable	P
G.10	**Resistors**		N/A
G.11	**Capacitors and RC units**		N/A
G.12	**Optocouplers**		N/A
G.13	**Printed boards**		N/A
G.14	**Coating on components terminals**		N/A
G.15	**Pressurized liquid filled components**		N/A
G.16	**IC including capacitor discharge function (ICX)**		N/A
H	**CRITERIA FOR TELEPHONE RINGING SIGNALS**		N/A
J	**INSULATED WINDING WIRES FOR USE WITHOUT INTERLEAVED INSULATION**		N/A
K	**SAFETY INTERLOCKS**		N/A
L	**DISCONNECT DEVICES**		N/A
M	**EQUIPMENT CONTAINING BATTERIES AND THEIR PROTECTION CIRCUITS**		N/A
N	**ELECTROCHEMICAL POTENTIALS**		N/A
O	**MEASUREMENT OF CREEPAGE DISTANCES AND CLEARANCES**		N/A
P	**SAFEGUARDS AGAINST CONDUCTIVE OBJECTS**		N/A
Q	**CIRCUITS INTENDED FOR INTERCONNECTION WITH BUILDING WIRING**		N/A
R	**LIMITED SHORT CIRCUIT TEST**		N/A
S	**TESTS FOR RESISTANCE TO HEAT AND FIRE**		N/A
T	**MECHANICAL STRENGTH TESTS**		N/A
U	**MECHANICAL STRENGTH OF CATHODE RAY TUBES (CRT) AND PROTECTION AGAINST THE EFFECTS OF IMPLOSION**		N/A
V	**DETERMINATION OF ACCESSIBLE PARTS**		N/A
X	**ALTERNATIVE METHOD FOR DETERMINING CLEARANCES FOR INSULATION IN CIRCUITS CONNECTED TO AN AC MAINS NOT EXCEEDING 420 V PEAK (300 V RMS)**		N/A
Y	**CONSTRUCTION REQUIREMENTS FOR OUTDOOR ENCLOSURES**		N/A

IEC 62368-1			
Clause	Requirement + Test	Result - Remark	Verdict

5.2	TABLE: Classification of electrical energy sources						P
Supply Voltage	Location (e.g. circuit designation)	Test conditions	Parameters				ES Class
			U (V)	I (mA)	Type[1)]	Additional Info [2)]	
24Vdc max.	Supply circuits	Normal	24	--	SS	--	ES1
Supplementary information: 1) Type: Steady state (SS), Capacitance (CP), Single pulse (SP), Repetitive pulses (RP), etc. 2) Additional Info: Frequency, Pulse duration, Pulse off time, Capacitance value, etc.							

5.4.1.8	TABLE: Working voltage measurement	N/A

5.4.1.10.2	TABLE: Vicat softening temperature of thermoplastics	N/A

5.4.1.10.3	TABLE: Ball pressure test of thermoplastics	N/A

5.4.2, 5.4.3	TABLE: Minimum Clearances/Creepage distance	N/A

5.4.4.2	TABLE: Minimum distance through insulation	N/A

5.4.4.9	TABLE: Solid insulation at frequencies >30 kHz	N/A

5.4.9	TABLE: Electric strength tests	N/A

5.5.2.2	TABLE: Stored discharge on capacitors	N/A

5.6.6	TABLE: Resistance of protective conductors and terminations	N/A

5.7.4	TABLE: Unearthed accessible parts	N/A

5.7.5	TABLE: Earthed accessible conductive part	N/A

5.8	TABLE: Backfeed safeguard in battery backed up supplies	N/A

6.2.2	TABLE: Power source circuit classifications					P
Location	Operating and fault condition	Voltage (V)	Current (A)	Max. Power[1)] (W)	Time (S)	PS class
Power source circuit	--	--	--	--	--	PS3 (declaration)

IEC 62368-1			
Clause	Requirement + Test	Result - Remark	Verdict

BAT circuits	--	--	--	--	--	PS2 (declaration)
Remark:						

6.2.3.1	**TABLE: Determination of Arcing PIS**	**N/A**
6.2.3.2	**TABLE: Determination of resistive PIS**	**N/A**
8.5.5	**TABLE: High pressure lamp**	**N/A**
9.6	**TABLE: Temperature measurements for wireless power transmitters**	**N/A**
5.4.1.4, 9.3, B.1.5, B.2.6	**TABLE: Temperature measurements**	**N/A**
B.2.5	**TABLE: Input test**	**N/A**
B.3, B.4	**TABLE: Abnormal operating and fault condition tests**	**N/A**
M.3	**TABLE: Protection circuits for batteries provided within the equipment**	**N/A**
M.4.2	**TABLE: Charging safeguards for equipment containing a secondary lithium battery**	**N/A**
Q.1	**TABLE: Circuits intended for interconnection with building wiring (LPS)**	**N/A**
T.2, T.3, T.4, T.5	**TABLE: Steady force test**	**N/A**
T.6, T.9	**TABLE: Impact test**	**N/A**
T.7	**TABLE: Drop test**	**N/A**
T.8	**TABLE: Stress relief test**	**N/A**
X	**TABLE: Alternative method for determining minimum clearances distances**	**N/A**
4.1.2	**TABLE: Critical components information**	**N/A**

G.9	Integrated circuit (IC) current limiters		P
Sample 1	10 000 cycles of turning enable pin on and off at 25°C with max. rated input voltage and max. rated output load	After 10000 cycles, the IC current limiter can limit current accordance with its specification as applicable	P
Sample 2	1. 50 cycles of turning enable pin on and off at 70°C with max. rated input voltage and 0Ω||470μF* output load; 2. 50 cycles of turning enable pin on and off at -30°C with max. rated input voltage and 0Ω||470μF* output load.	No fail after test	P
Sample 3	1. 50 cycles of turning input power pin on and off at 70°C with max. rated input voltage, enable pin held active and 0Ω||470μF* output load; 2. 50 cycles of turning input power pin on and off at -30°C with max. rated input voltage, enable pin held active and 0Ω||470μF* output load.	No fail after test	P
Sample 4	50 cycles at 70°C with max. rated input voltage, enable pin held active and output load change between open circuit and short circuit (0Ω).	No fail after test	P
Sample 5	50 cycles of turning enable pin on and off at 25°C with max. rated input voltage and 150% of max. output load	Due to the features of the IC, overload for the output is impossible, so max. rated output load applied which had considered in test for sample 1, no additional test necessary.	N/A
Sample 6	50 cycles of turning input power pin on and off at 25°C with max. rated input voltage, enable pin held active and 150% of max. output load	Due to the features of the IC, overload for the output is impossible, so max. rated output load applied, no fail after test	P

Remark:

1. * || = in parallel
2. Temperature tolerance is ±2°C
3. Sample conditioned 3 h before test
4. Above tests are performed together with the ancillary circuits provided by IC manufacturer to simulated the related operation mode.

IEC62368_1E - ATTACHMENT			
Clause	Requirement + Test	Result - Remark	Verdict

ATTACHMENT TO TEST REPORT

IEC 62368-1

EUROPEAN GROUP DIFFERENCES AND NATIONAL DIFFERENCES

(Audio/video, information and communication technology equipment - Part 1: Safety requirements)

Differences according to..... : EN IEC 62368-1:2020+A11:2020

Attachment Form No. ..... : EU_GD_IEC62368_1E

Attachment Originator..... : UL(Demko)

Master Attachment..... : 2021-02-04

	CENELEC COMMON MODIFICATIONS (EN)		
	Clause numbers in the cells that are shaded light grey are clause references in EN IEC 62368-1:2020+A11:2020. All other clause numbers in that column, except for those in the paragraph below, refers to IEC 62368-1:2018. Clauses, subclauses, notes, tables, figures and annexes which are additional to those in IEC 62368-1:2018 are prefixed "Z".		
	Add the following annexes: Annex ZA (normative) — Normative references to international publications with their corresponding European publications Annex ZB (normative) — Special national conditions Annex ZC (informative) — A-deviations Annex ZD (informative) — IEC and CENELEC code designations for flexible cords		
1	**Modification to Clause 3 .**		N/A
3.3.19	**Sound exposure** *Replace 3.3.19 of IEC 62368-1 with the following definitions:*		N/A
3.3.19.1	**momentary exposure level, MEL** metric for estimating 1 s sound exposure level from the HD 483-1 S2 test signal applied to both channels, based on EN 50332-1:2013, 4.2. Note 1 to entry: MEL is measured as A-weighted levels in dB. Note 2 to entry: See B.3 of EN 50332-3:2017 for additional information.		N/A

IEC62368_1E - ATTACHMENT			
Clause	Requirement + Test	Result - Remark	Verdict
3.3.19.3	**sound exposure, E** A-weighted sound pressure (p) squared and integrated over a stated period of time, T Note 1 to entry: The SI unit is $Pa^2 s$. $$E = \int_0^T p(t)^2 \, dt$$		N/A
3.3.19.4	**sound exposure level, SEL** logarithmic measure of sound exposure relative to a reference value, E_0, typically the 1 kHz threshold of hearing in humans. Note 1 to entry: SEL is measured as A-weighted levels in dB. $$SEL = 10 \lg \left(\frac{E}{E_0}\right) \text{dB}$$ Note 2 to entry: See B.4 of EN 50332-3:2017 for additional information.		N/A
3.3.19.5	**digital signal level relative to full scale, dBFS** levels reported in dBFS are always r.m.s. Full scale level, 0 dBFS, is the level of a dc-free 997-Hz sine wave whose undithered positive peak value is positive digital full scale, leaving the code corresponding to negative digital full scale unused Note 1 to entry: It is invalid to use dBFS for non-r.m.s. levels. Because the definition of full scale is based on a sine wave, the level of signals with a crest factor lower than that of a sine wave may exceed 0 dBFS. In particular, square wave signals may reach +3,01 dBFS.		N/A
2	**Modification to Clause 10**		N/A
10.6	**Safeguards against acoustic energy sources** Replace 10.6 of IEC 62368-1 with the following:		N/A
10.6.1.1	**Introduction** **Safeguard** requirements for protection against long-term exposure to excessive sound pressure levels from personal music players closely coupled to the ear are specified below. Requirements for earphones and headphones intended for use with personal music players are also covered. A personal music player is a portable equipment intended for use by an **ordinary person**, that: – is designed to allow the user to listen to audio or audiovisual content / material; and – uses a listening device, such as headphones or		N/A

IEC62368_1E - ATTACHMENT			
Clause	Requirement + Test	Result - Remark	Verdict
	earphones that can be worn in or on or around the ears; and – has a player that can be body worn (of a size suitable to be carried in a clothing pocket) and is intended for the user to walk around with while in continuous use (for example, on a street, in a subway, at an airport, etc.). EXAMPLES Portable CD players, MP3 audio players, mobile phones with MP3 type features, PDAs or similar equipment. Personal music players shall comply with the requirements of either 10.6.2 or 10.6.3. NOTE 1 Protection against acoustic energy sources from telecom applications is referenced to ITU-T P.360. NOTE 2 It is the intention of the Committee to allow the alternative methods for now, but to only use the dose measurement method as given in 10.6.5 in future. Therefore, manufacturers are encouraged to implement 10.6.5 as soon as possible. Listening devices sold separately shall comply with the requirements of 10.6.6. These requirements are valid for music or video mode only. The requirements do not apply to: – professional equipment; NOTE 3 Professional equipment is equipment sold through special sales channels. All products sold through normal electronics stores are considered not to be professional equipment. – hearing aid equipment and other devices for assistive listening; – the following type of analogue personal music players: • long distance radio receiver (for example, a multiband radio receiver or world band radio receiver, an AM radio receiver), and • cassette player/recorder; NOTE 4 This exemption has been allowed because this technology is falling out of use and it is expected that within a few years it will no longer exist. This exemption will not be extended to other technologies. – a player while connected to an external amplifier that does not allow the user to walk around while in use. For equipment that is clearly designed or intended primarily for use by children, the limits of the relevant toy standards may apply. The relevant requirements are given in EN 71-1:2011, 4.20 and the related tests methods and measurement distances apply.		

IEC62368_1E - ATTACHMENT			
Clause	Requirement + Test	Result - Remark	Verdict
10.6.1.2	**Non-ionizing radiation from radio frequencies in the range 0 to 300 GHz** The amount of non-ionizing radiation is regulated by European Council Recommendation 1999/519/EC of 12 July 1999 on the limitation of exposure of the general public to electromagnetic fields (0 Hz to 300 GHz). For intentional radiators, ICNIRP guidelines should be taken into account for Limiting Exposure to Time-Varying Electric, Magnetic, and Electromagnetic Fields (up to 300 GHz). For hand-held and body mounted devices, attention is drawn to EN 50360 and EN 50566.		N/A
10.6.2	**Classification of devices without the capacity to estimate sound dose**		N/A
10.6.2.1	**General** This standard is transitioning from short-term based (30 s) requirements to long-term based (40 hour) requirements. These clauses remain in effect only for devices that do not comply with sound dose estimation as stipulated in EN 50332-3. For classifying the acoustic output $L_{Aeq,T}$, measurements are based on the A-weighted equivalent sound pressure level over a 30 s period. For music where the average sound pressure (long term $L_{Aeq,T}$) measured over the duration of the song is lower than the average produced by the programme simulation noise, measurements may be done over the duration of the complete song. In this case, T becomes the duration of the song. NOTE Classical music, acoustic music and broadcast typically has an average sound pressure (long term $L_{Aeq,T}$) which is much lower than the average programme simulation noise. Therefore, if the player is capable to analyse the content and compare it with the programme simulation noise, the warning does not need to be given as long as the average sound pressure of the song does not exceed the required limit. For example, if the player is set with the programme simulation noise to 85 dB, but the average music level of the song is only 65 dB, there is no need to give a warning or ask an acknowledgement as long as the average sound level of the song is not above the basic limit of 85 dB.		N/A
10.6.2.2	**RS1 limits (to be superseded, see 10.6.3.2)** RS1 is a class 1 acoustic energy source that does not exceed the following: – for equipment provided as a package (player with its listening device), and with a proprietary connector between the player and its listening device, or where the combination of player and listening device is known by other means such as setting or automatic detection, the $L_{Aeq,T}$ acoustic		N/A

IEC62368_1E - ATTACHMENT			
Clause	Requirement + Test	Result - Remark	Verdict
	output shall be ≤ 85 dB when playing the fixed "programme simulation noise" described in EN 50332-1. – for equipment provided with a standardized connector (for example, a 3,5 phone jack) that allows connection to a listening device for general use, the unweighted r.m.s. output voltage shall be ≤ 27 mV (analogue interface) or -25 dBFS (digital interface) when playing the fixed "programme simulation noise" described in EN 50332-1. – The RS1 limits will be updated for all devices as per 10.6.3.2.		
10.6.2.3	**RS2 limits (to be superseded, see 10.6.3.3)** RS2 is a class 2 acoustic energy source that does not exceed the following: – for equipment provided as a package (player with its listening device), and with a proprietary connector between the player and its listening device, or when the combination of player and listening device is known by other means such as setting or automatic 130 detection, the $L_{Aeq,T}$ acoustic output shall be ≤ 100 dB(A) when playing the fixed "programme simulation noise" as described in EN 50332-1. – for equipment provided with a standardized connector (for example, a 3,5 phone jack) that allows connection to a listening device for general use, the unweighted r.m.s. output voltage shall be ≤ 150 mV (analogue interface) or -10 dBFS (digital interface) when playing the fixed "programme simulation noise" as described in EN 50332-1.		N/A
10.6.2.4	**RS3 limits** RS3 is a class 3 acoustic energy source that exceeds RS2 limits.		N/A
10.6.3	**Classification of devices (new)**		N/A
10.6.3.1	**General** Previous limits (10.6.2) created abundant false negative and false positive PMP sound level warnings. New limits, compliant with The Commission Decision of 23 June 2009, are given below.		N/A
10.6.3.2	**RS1 limits (new)** RS1 is a class 1 acoustic energy source that does not exceed the following: – for equipment provided as a package (player with its listening device), and with a proprietary connector between the player and its listening device, or where the combination of player and listening device is known by other means such as setting or automatic detection, the $L_{Aeq,T}$ acoustic		N/A

IEC62368_1E - ATTACHMENT			
Clause	Requirement + Test	Result - Remark	Verdict
	output shall be ≤ 80 dB when playing the fixed "programme simulation noise" described in EN 50332-1. – for equipment provided with a standardized connector (for example, a 3,5 phone jack) that allows connection to a listening device for general use, the unweighted r.m.s. output voltage shall be ≤ 15 mV (analogue interface) or -30 dBFS (digital interface) when playing the fixed "programme simulation noise" described in EN 50332-1.		
10.6.3.3	**RS2 limits (new)** RS2 is a class 2 acoustic energy source that does not exceed the following: – for equipment provided as a package (player with its listening device), and with a proprietary connector between the player and its listening device, or where the combination of player and listening device is known by other means such as setting or automatic detection, the weekly sound exposure level, as described in EN 50332-3, shall be ≤ 80 dB when playing the fixed "programme simulation noise" described in EN 50332-1. – for equipment provided with a standardized connector (for example, a 3,5 phone jack) that allows connection to a listening device for general use, the unweighted r.m.s. output level, integrated over one week, as described in EN50332-3, shall be ≤ 15 mV (analogue interface) or -30 dBFS (digital interface) when playing the fixed "programme simulation noise" described in EN 50332-1.		N/A
10.6.4	**Requirements for maximum sound exposure**		N/A
10.6.4.1	**Measurement methods** All volume controls shall be turned to maximum during tests. Measurements shall be made in accordance with EN 50332-1 or EN 50332-2 as applicable.		N/A
10.6.4.2	**Protection of persons** Except as given below, protection requirements for parts **accessible** to **ordinary persons**, **instructed persons** and **skilled persons** are given in 4.3. NOTE 1 Volume control is not considered a **safeguard.** Between RS2 and an **ordinary person**, the **basic safeguard** may be replaced by an **instructional safeguard** in accordance with Clause F.5, except that the **instructional safeguard** shall be placed on the equipment, or on the packaging, or in the instruction manual. Alternatively, the **instructional safeguard** may be		N/A

IEC62368_1E - ATTACHMENT			
Clause	Requirement + Test	Result - Remark	Verdict
	given through the equipment display during use. The elements of the **instructional safeguard** shall be as follows: – element 1a: the symbol  , IEC 60417-6044 (2011-01) – element 2: “High sound pressure” or equivalent wording – element 3: “Hearing damage risk” or equivalent wording – element 4: “Do not listen at high volume levels for long periods.” or equivalent wording An **equipment safeguard** shall prevent exposure of an **ordinary person** to an RS2 source without intentional physical action from the **ordinary person** and shall automatically return to an output level not exceeding what is specified for an RS1 source when the power is switched off. The equipment shall provide a means to actively inform the user of the increased sound level when the equipment is operated with an output exceeding RS1. Any means used shall be acknowledged by the user before activating a mode of operation which allows for an output exceeding RS1. The acknowledgement does not need to be repeated more than once every 20 h of cumulative listening time. NOTE 2 Examples of means include visual or audible signals. Action from the user is always needed. NOTE 3 The 20 h listening time is the accumulative listening time, independent of how often and how long the personal music player has been switched off. A **skilled person** shall not be unintentionally exposed to RS3.		
10.6.5	**Requirements for dose-based systems**		N/A
10.6.5.1	**General requirements** Personal music players shall give the warnings as provided below when tested according to EN 50332-3, using the limits from this clause. The manufacturer may offer optional settings to allow the users to modify when and how they wish to receive the notifications and warnings to promote a better user experience without defeating the safeguards. This allows the users to be informed in a method that best meets their physical capabilities and device usage needs. If such optional settings are offered, an administrator (for example, parental restrictions, business/educational administrators,		N/A

IEC62368_1E - ATTACHMENT			
Clause	Requirement + Test	Result - Remark	Verdict
	etc.) shall be able to lock any optional settings into a specific configuration. The personal music player shall be supplied with easy to understand explanation to the user of the dose management system, the risks involved, and how to use the system safely. The user shall be made aware that other sources may significantly contribute to their sound exposure, for example work, transportation, concerts, clubs, cinema, car races, etc.		
10.6.5.2	**Dose-based warning and requirements** When a dose of 100 % *CSD* is reached, and at least at every 100 % further increase of *CSD*, the device shall warn the user and require an acknowledgement. In case the user does not acknowledge, the output level shall automatically decrease to compliance with class RS1. The warning shall at least clearly indicate that listening above 100 % *CSD* leads to the risk of hearing damage or loss.		N/A
10.6.5.3	**Exposure-based requirements** With only dose-based requirements, cause and effect could be far separated in time, defying the purpose of educating users about safe listening practice. In addition to dose-based requirements, a PMP shall therefore also put a limit to the short-term sound level a user can listen at. The exposure-based limiter (EL) shall automatically reduce the sound level not to exceed 100 dB(A) or 150 mV integrated over the past 180 s, based on methodology defined in EN 50332-3. The EL settling time (time from starting level reduction to reaching target output) shall be 10 s or faster. Test of EL functionality is conducted according to EN 50332-3, using the limits from this clause. For equipment provided as a package (player with its listening device), the level integrated over 180 s shall be 100 dB or lower. For equipment provided with a standardized connector, the unweighted level integrated over 180 s shall be no more than 150 mV for an analogue interface and no more than -10 dBFS for a digital interface. NOTE In case the source is known not to be music (or test signal), the EL may be disabled.		N/A
10.6.6	**Requirements for listening devices (headphones, earphones, etc.)**		N/A
10.6.6.1	**Corded listening devices with analogue input**		N/A

IEC62368_1E - ATTACHMENT			
Clause	Requirement + Test	Result - Remark	Verdict
	With 94 dB L_{Aeq} acoustic pressure output of the listening device, and with the volume and sound settings in the listening device (for example, built-in volume level control, additional sound features like equalization, etc.) set to the combination of positions that maximize the measured acoustic output, the input voltage of the listening device when playing the fixed "programme simulation noise" as described in EN 50332-1 shall be ≥ 75 mV. NOTE The values of 94 dB and 75 mV correspond with 85 dB and 27 mV or 100 dB and 150 mV.		
10.6.6.2	**Corded listening devices with digital input** With any playing device playing the fixed "programme simulation noise" described in EN 50332-1, and with the volume and sound settings in the listening device (for example, built-in volume level control, additional sound features like equalization, etc.) set to the combination of positions that maximize the measured acoustic output, the $L_{Aeq,T}$ acoustic output of the listening device shall be ≤ 100 dB with an input signal of -10 dBFS.		N/A
10.6.6.3	**Cordless listening devices** In cordless mode, – with any playing and transmitting device playing the fixed programme simulation noise described in EN 50332-1; and – respecting the cordless transmission standards, where an air interface standard exists that specifies the equivalent acoustic level; and – with volume and sound settings in the receiving device (for example, built-in volume level control, additional sound features like equalization, etc.) set to the combination of positions that maximize the measured acoustic output for the above mentioned programme simulation noise, the $L_{Aeq,T}$ acoustic output of the listening device shall be ≤ 100 dB with an input signal of -10 dBFS.		N/A
10.6.6.4	**Measurement method** *Measurements shall be made in accordance with EN 50332-2 as applicable.*		
3	**Modification to the whole document**		

IEC62368_1E - ATTACHMENT			
Clause	Requirement + Test	Result - Remark	Verdict

	Delete all the "country" notes in the reference document according to the following list: 0.2.1 Note 1 and 2; 1 Note 4 and 5; 3.3.8.1 Note 2 3.3.8.3 Note 1; 4.1.15 Note; 4.7.3 Note 1 and 2 5.2.2.2 Note; 5.4.2.3.2.2 Table 12 Note c; 5.4.2.3.2.4 Note 1 and 3 5.4.2.3.2.4 Table 13 Note 2; 5.4.2.5 Note 2; 5.4.5.1 Note 5.4.10.2.1 Note; 5.4.10.2.2 Note; 5.4.10.2.3 Note 5.5.2.1 Note; 5.5.6 Note; 5.6.4.2.1 Note 2 and 3 and 4 5.6.8 Note 2; 5.7.6 Note; 5.7.7.1 Note 1 and Note 2 8.5.4.2.3 Note; 10.2.1 Table 39 Note 3 and 4 and 5; 10.5.3 Note 2 ~~10.6.1~~ Note 3; F.3.3.6 Note 3; Y.4.1 Note Y.4.5 Note		N/A
4	**Modification to Clause 1**		N/A
1	***Add*** *the following note:* *NOTE Z1 The use of certain substances in electrical and electronic equipment is restricted within the EU: see Directive 2011/65/EU.*		N/A
5	**Modification to 4.Z1**		N/A
4.Z1	***Add*** *the following new subclause after 4.9:* To protect against excessive current, short-circuits and earth faults in circuits connected to an a.c. **mains**, protective devices shall be included either as integral parts of the equipment or as parts of the building installation, subject to the following, a), b) and c): a) except as detailed in b) and c), protective devices necessary to comply with the requirements of B.3.1 and B.4 shall be included as parts of the equipment; b) for components in series with the mains input to the equipment such as the supply cord, appliance coupler, r.f.i. filter and switch, short-circuit and earth fault protection may be provided by protective devices in the building installation; c) it is permitted for **pluggable equipment type B**		N/A

IEC62368_1E - ATTACHMENT			
Clause	Requirement + Test	Result - Remark	Verdict
	or **permanently connected equipment**, to rely on dedicated overcurrent and short-circuit protection in the building installation, provided that the means of protection, e.g. fuses or circuit breakers, is fully specified in the installation instructions. If reliance is placed on protection in the building installation, the installation instructions shall so state, except that for **pluggable equipment type A** the building installation shall be regarded as providing protection in accordance with the rating of the wall socket outlet.		
6	**Modification to 5.4.2.3.2.4**		N/A
5.4.2.3.2.4	***Add*** *the following to the end of this subclause:* The requirement for interconnection with **external circuit** is in addition given in EN 50491-3:2009.		N/A
7	**Modification to 10.2.1**		N/A
10.2.1	Add the following to [c] and [d] in table 39: For additional requirements, see 10.5.1.		N/A
8	**Modification to 10.5.1**		N/A
10.5.1	***Add*** *the following after the first paragraph:* For RS 1 compliance is checked by measurement under the following conditions: In addition to the normal operating conditions, all controls adjustable from the outside by hand, by any object such as a tool or a coin, and those internal adjustments or pre-sets which are not locked in a reliable manner, are adjusted so as to give maximum radiation whilst maintaining an intelligible picture for 1 h, at the end of which the measurement is made. NOTE Z1 Soldered joints and paint lockings are examples of adequate locking. The dose-rate is determined by means of a radiation monitor with an effective area of 10 cm^2, at any point 10 cm from the outer surface of the apparatus. Moreover, the measurement shall be made under fault conditions causing an increase of the high voltage, provided an intelligible picture is maintained for 1 h, at the end of which the measurement is made. For RS1, the dose-rate shall not exceed 1 µSv/h taking account of the background level. NOTE Z2 These values appear in Directive 96/29/Euratom of 13 May 1996.		N/A

IEC62368_1E - ATTACHMENT			
Clause	Requirement + Test	Result - Remark	Verdict

9	**Modification to G.7.1**		N/A
G.7.1	***Add*** *the following note:* NOTE Z1 The harmonized code designations corresponding to the IEC cord types are given in Annex ZD.		N/A
10	**Modification to Bibliography**		N/A
	Add the following notes for the standards indicated: IEC 60130-9 NOTE Harmonized as EN 60130-9. IEC 60269-2 NOTE Harmonized as HD 60269-2. IEC 60309-1 NOTE Harmonized as EN 60309-1. IEC 60364 NOTE some parts harmonized in HD 384/HD 60364 series. IEC 60601-2-4 NOTE Harmonized as EN 60601-2-4. IEC 60664-5 NOTE Harmonized as EN 60664-5. IEC 61032:1997 NOTE Harmonized as EN 61032:1998 (not modified). IEC 61508-1 NOTE Harmonized as EN 61508-1. IEC 61558-2-1 NOTE Harmonized as EN 61558-2-1. IEC 61558-2-4 NOTE Harmonized as EN 61558-2-4. IEC 61558-2-6 NOTE Harmonized as EN 61558-2-6. IEC 61643-1 NOTE Harmonized as EN 61643-1. IEC 61643-21 NOTE Harmonized as EN 61643-21. IEC 61643-311 NOTE Harmonized as EN 61643-311. IEC 61643-321 NOTE Harmonized as EN 61643-321. IEC 61643-331 NOTE Harmonized as EN 61643-331.		N/A

11	**ADDITION OF ANNEXES**		N/A
ZB	**ANNEX ZB, SPECIAL NATIONAL CONDITIONS (EN)**		N/A
4.1.15	**Denmark, Finland, Norway** and **Sweden** To the end of the subclause the following is added: **Class I pluggable equipment type A** intended for connection to other equipment or a network shall, if safety relies on connection to reliable earthing or if surge suppressors are connected between the network terminals and **accessible** parts, have a marking stating that the equipment shall be connected to an earthed **mains** socket-outlet. The marking text in the applicable countries shall be as follows: In **Denmark**: “Apparatets stikprop skal tilsluttes en stikkontakt med jord som giver forbindelse til stikproppens jord.” In **Finland**: "Laite on liitettävä suojakoskettimilla varustettuun pistorasiaan" In **Norway**: “Apparatet må tilkoples jordet stikkontakt” In **Sweden**: “Apparaten skall anslutas till jordat uttag”		N/A

IEC62368_1E - ATTACHMENT			
Clause	Requirement + Test	Result - Remark	Verdict
4.7.3	**United Kingdom** To the end of the subclause the following is added: The torque test is performed using a socket-outlet complying with BS 1363, and the plug part shall be assessed to the relevant clauses of BS 1363. Also see Annex G.4.2 of this annex		N/A
5.2.2.2	**Denmark** After the 2nd paragraph add the following: A warning (marking safeguard) for high touch current is required if the touch current exceeds the limits of 3,5 mA a.c. or 10 mA d.c.		N/A
5.4.11.1 and Annex G	**Finland and Sweden** To the end of the subclause the following is added: For separation of the telecommunication network from earth the following is applicable: If this insulation is solid, including insulation forming part of a component, it shall at least consist of either • two layers of thin sheet material, each of which shall pass the electric strength test below, or • one layer having a distance through insulation of at least 0,4 mm, which shall pass the electric strength test below. If this insulation forms part of a semiconductor component (e.g. an optocoupler), there is no distance through insulation requirement for the insulation consisting of an insulating compound completely filling the casing, so that clearances and creepage distances do not exist, if the component passes the electric strength test in accordance with the compliance clause below and in addition • passes the tests and inspection criteria of 5.4.8 with an electric strength test of 1,5 kV multiplied by 1,6 (the electric strength test of 5.4.9 shall be performed using 1,5 kV), and • is subject to routine testing for electric strength during manufacturing, using a test voltage of 1,5 kV. It is permitted to bridge this insulation with a		N/A

IEC62368_1E - ATTACHMENT			
Clause	Requirement + Test	Result - Remark	Verdict
	capacitor complying with EN 60384-14:2005, subclass Y2. A capacitor classified Y3 according to EN 60384-14:2005, may bridge this insulation under the following conditions: • the insulation requirements are satisfied by having a capacitor classified Y3 as defined by EN 60384-14, which in addition to the Y3 testing, is tested with an impulse test of 2,5 kV defined in 5.4.11; • the additional testing shall be performed on all the test specimens as described in EN 60384-14; the impulse test of 2,5 kV is to be performed before the endurance test in EN 60384-14, in the sequence of tests as described in EN 60384-14.		
5.5.2.1	**Norway** After the 3rd paragraph the following is added: Due to the IT power system used, capacitors are required to be rated for the applicable line-to-line voltage (230 V).		N/A
5.5.6	**Finland, Norway** and **Sweden** To the end of the subclause the following is added: Resistors used as **basic safeguard** or bridging **basic insulation** in **class I pluggable equipment type A** shall comply with G.10.1 and the test of G.10.2.		N/A
5.6.1	**Denmark** **Add** to the end of the subclause Due to many existing installations where the socket-outlets can be protected with fuses with higher rating than the rating of the socket-outlets the protection for pluggable equipment type A shall be an integral part of the equipment. *Justification:* In Denmark an existing 13 A socket outlet can be protected by a 20 A fuse.		N/A
5.6.4.2.1	**Ireland and United Kingdom** After the indent for **pluggable equipment type A**, the following is added: – the **protective current rating** is taken to be 13 A, this being the largest rating of fuse used in the **mains** plug.		N/A

IEC62368_1E - ATTACHMENT			
Clause	Requirement + Test	Result - Remark	Verdict
5.6.4.2.1	**France** After the indent for **pluggable equipment type A**, the following is added: – in certain cases, the **protective current rating** of the circuit supplied from the mains is taken as 20 A instead of 16 A.		N/A
5.6.5.1	To the second paragraph the following is added: The range of conductor sizes of flexible cords to be accepted by terminals for equipment with a rated current over 10 A and up to and including 13 A is: 1,25 mm^2 to 1,5 mm^2 in cross-sectional area.		N/A
5.6.8	**Norway** To the end of the subclause the following is added: Equipment connected with an earthed mains plug is classified as **class I equipment**. See the Norway marking requirement in 4.1.15. The symbol IEC 60417-6092, as specified in F.3.6.2, is accepted.		N/A
5.7.6	**Denmark** To the end of the subclause the following is added: The installation instruction shall be affixed to the equipment if the **protective conductor current** exceeds the limits of 3,5 mA a.c. or 10 mA d.c.		N/A
5.7.6.2	**Denmark** To the end of the subclause the following is added: The warning (marking safeguard) for high touch current is required if the touch current or the protective current exceed the limits of 3,5 mA .		N/A
5.7.7.1	**Norway and Sweden** To the end of the subclause the following is added: The screen of the television distribution system is normally not earthed at the entrance of the building and there is normally no equipotential bonding system within the building. Therefore the protective earthing of the building installation needs to be isolated from the screen of a cable distribution system. It is however accepted to provide the insulation external to the equipment by an adapter or an interconnection cable with galvanic isolator, which may be provided by a retailer, for example. The user manual shall then have the following or similar information in Norwegian and Swedish language respectively, depending on in what country the equipment is intended to be used in: “Apparatus connected to the protective earthing of		N/A

IEC62368_1E - ATTACHMENT			
Clause	Requirement + Test	Result - Remark	Verdict
	the building installation through the mains connection or through other apparatus with a connection to protective earthing – and to a television distribution system using coaxial cable, may in some circumstances create a fire hazard. Connection to a television distribution system therefore has to be provided through a device providing electrical isolation below a certain frequency range (galvanic isolator, see EN 60728-11)" NOTE In Norway, due to regulation for CATV-installations, and in Sweden, a galvanic isolator shall provide electrical insulation below 5 MHz. The insulation shall withstand a dielectric strength of 1,5 kV r.m.s., 50 Hz or 60 Hz, for 1 min. Translation to Norwegian (the Swedish text will also be accepted in Norway): "Apparater som er koplet til beskyttelsesjord via nettplugg og/eller via annet jordtilkoplet utstyr – og er tilkoplet et koaksialbasert kabel-TV nett, kan forårsake brannfare. For å unngå dette skal det ved tilkopling av apparater til kabel-TV nett installeres en galvanisk isolator mellom apparatet og kabel-TV nettet." Translation to Swedish: "Apparater som är kopplad till skyddsjord via jordat vägguttag och/eller via annan utrustning och samtidigt är kopplad till kabel-TV nät kan i vissa fall medföra risk för brand. För att undvika detta skall vid anslutning av apparaten till kabel-TV nät galvanisk isolator finnas mellan apparaten och kabel-TV nätet.".		
8.5.4.2.3	**United Kingdom** Add the following after the 2nd dash bullet in 3rd paragraph: An emergency stop system complying with the requirements of IEC 60204-1 and ISO 13850 is required where there is a risk of personal injury.		N/A

IEC62368_1E - ATTACHMENT			
Clause	Requirement + Test	Result - Remark	Verdict
B.3.1 and B.4	**Ireland and United Kingdom** The following is applicable: To protect against excessive currents and short-circuits in the primary circuit of **direct plug-in equipment**, tests according to Annexes B.3.1 and B.4 shall be conducted using an external miniature circuit breaker complying with EN 60898-1, Type B, rated 32A. If the equipment does not pass these tests, suitable protective devices shall be included as an integral part of the **direct plug-in equipment**, until the requirements of Annexes B.3.1 and B.4 are met		N/A
G.4.2	**Denmark** To the end of the subclause the following is added: Supply cords of single phase appliances having a rated current not exceeding 13 A shall be provided with a plug according to DS 60884-2-D1:2011. CLASS I EQUIPMENT provided with socket-outlets with earth contacts or which are intended to be used in locations where protection against indirect contact is required according to the wiring rules shall be provided with a plug in accordance with standard sheet DK 2-1a or DK 2-5a. If a single-phase equipment having a RATED CURRENT exceeding 13 A or if a polyphase equipment is provided with a supply cord with a plug, this plug shall be in accordance with the standard sheets DK 6-1a in DS 60884-2-D1 or EN 60309-2. Mains socket outlets intended for providing power to Class II apparatus with a rated current of 2,5 A shall be in accordance DS 60884-2-D1:2011 standard sheet DKA 1-4a. Other current rating socket outlets shall be in compliance with Standard Sheet DKA 1-3a or DKA 1-1c. Mains socket-outlets with earth shall be in compliance with DS 60884-2-D1:2011 Standard Sheet DK 1-3a, DK 1-1c, DK1-1d, DK 1-5a or DK 1-7a *Justification:* Heavy Current Regulations, Section 6c		N/A

IEC62368_1E - ATTACHMENT			
Clause	Requirement + Test	Result - Remark	Verdict
G.4.2	**United Kingdom** To the end of the subclause the following is added: The plug part of direct plug-in equipment shall be assessed to BS 1363: Part 1, 12.1, 12.2, 12.3, 12.9, 12.11, 12.12, 12.13, 12.16, and 12.17, except that the test of 12.17 is performed at not less than 125 °C. Where the metal earth pin is replaced by an Insulated Shutter Opening Device (ISOD), the requirements of clauses 22.2 and 23 also apply.		N/A
G.7.1	**United Kingdom** To the first paragraph the following is added: Equipment which is fitted with a flexible cable or cord and is designed to be connected to a mains socket conforming to BS 1363 by means of that flexible cable or cord shall be fitted with a 'standard plug' in accordance with the Plugs and Sockets etc. (Safety) Regulations 1994, Statutory Instrument 1994 No. 1768, unless exempted by those regulations. NOTE "Standard plug" is defined in SI 1768:1994 and essentially means an approved plug conforming to BS 1363 or an approved conversion plug.		N/A
G.7.1	**Ireland** To the first paragraph the following is added: Apparatus which is fitted with a flexible cable or cord shall be provided with a plug in accordance with Statutory Instrument 525: 1997, "13 A Plugs and Conversion Adapters for Domestic Use Regulations: 1997. S.I. 525 provides for the recognition of a standard of another Member State which is equivalent to the relevant Irish Standard		N/A
G.7.2	**Ireland and United Kingdom** To the first paragraph the following is added: A power supply cord with a conductor of 1,25 mm^2 is allowed for equipment which is rated over 10 A and up to and including 13 A.		N/A

ZC	**ANNEX ZC, NATIONAL DEVIATIONS (EN)**		N/A
10.5.2	**Germany** The following requirement applies: For the operation of any cathode ray tube intended for the display of visual images operating at an acceleration voltage exceeding 40 kV,		N/A

IEC62368_1E - ATTACHMENT			
Clause	Requirement + Test	Result - Remark	Verdict
	authorization is required, or application of type approval (Bauartzulassung) and marking. *Justification*: German ministerial decree against ionizing radiation (Röntgenverordnung), in force since 2002-07-01, implementing the European Directive 96/29/EURATOM. **NOTE** Contact address: Physikalisch-Technische Bundesanstalt, Bundesallee 100, D-38116 Braunschweig, Tel.: Int+49-531-592-6320, Internet: http://www.ptb.de		
ZD	**IEC and CENELEC CODE DESIGNATIONS FOR FLEXIBLE CORDS (EN)**		N/A
			N/A

Type of flexible cord	Code designations	
	IEC	CENELEC
PVC insulated cords		
Flat twin tinsel cord	60227 IEC 41	H03VH-Y
Light polyvinyl chloride sheathed flexible cord	60227 IEC 52	H03VV-F H03VVH2-F
Ordinary polyvinyl chloride sheathed flexible cord	60227 IEC 53	H05VV-F H05VVH2-F
Rubber insulated cords		
Braided cord	60245 IEC 51	H03RT-F
Ordinary tough rubber sheathed flexible cord	60245 IEC 53	H05RR-F
Ordinary polychloroprene sheathed flexible cord	60245 IEC 57	H05RN-F
Heavy polychloroprene sheathed flexible cord	60245 IEC 66	H07RN-F
Cords having high flexibility		
Rubber insulated and sheathed cord	60245 IEC 86	H03RR-H
Rubber insulated, crosslinked PVC sheathed cord	60245 IEC 87	H03RV4-H
Crosslinked PVC insulated and sheathed cord	60245 IEC 88	H03V4V4-H
Cords insulated and sheathed with halogen-free thermoplastic compounds		
Light halogen-free thermoplastic insulated and sheathed flexible cords		H03Z1Z1-F H03Z1Z1H2-F
Ordinary halogen-free thermoplastic insulated and sheathed flexible cords		H05Z1Z1-F H05Z1Z1H2-F

IEC62368_1E - ATTACHMENT			
Clause	Requirement + Test	Result - Remark	Verdict

ATTACHMENT TO TEST REPORT IEC 62368-1
U.S.A. AND CANADA NATIONAL DIFFERENCES
(Audio/video, information and communication technology equipment – Part 1: Safety requirements)

Differences according to..... :	CSA/UL 62368-1:2019
TRF template used:..... :	IECEE OD-2020-F3, Ed. 1.1
Attachment Form No. ..... :	US_CA_ND_IEC62368_1E
Attachment Originator..... :	UL(US)
Master Attachment..... :	Date 2021-02-04

IEC 62368-1 - US and Canadian National Differences
Special National Conditions based on Regulations and Other National Differences

1 (1DV.1) (1.3)	All equipment is to be designed to allow installation in accordance with the National Electrical Code (NEC), ANSI/NFPA 70, the Canadian Electrical Code (CEC), Part 1, CAN/CSA C22.1, and when applicable, the National Electrical Safety Code, IEEE C2. Also, for such equipment marked or otherwise identified, installation is allowed per the Standard for the Protection of Information Technology Equipment, ANSI/NFPA 75.	In accordance with the National Electrical Code (NEC) and the Canadian Electrical Code (CEC) part 1 CAN/CSA C22.1, ANSI/NFPA 70, and unless marked or otherwise identified, the Standard for Electronic Computer/Data-Processing Equipment, ANSI/NFPA 75.	P
1 (1DV.2.1)	This standard includes additional requirements for equipment used for entertainment purposes intended for installation in general patient care areas of health care facilities. See Annex DVB.	Not such equipment.	N/A
1 (1DV.2.2)	This standard includes additional requirements for equipment intended for mounting under cabinets. See Annex DVC.		N/A
1 (1DV.2.3)	IEC 62368-3 clause 5 for DC power transfer at ES1 or ES2 voltage levels is considered informative. IEC 62368-3 clause 6 for remote power feeding telecommunication (RFT) circuits is considered normative (see ITU K.50). Alternatively, equipment with RFT circuits are given in either UL 2391 or CSA/UL 60950-21. RFT-C circuits are not permitted unless the RFT-C circuit complies with RFT-V limits (≤ 200V per conductor to earth).		N/A

IEC62368_1E - ATTACHMENT			
Clause	Requirement + Test	Result - Remark	Verdict
1 (1DV.3)	For protection against direct lightning strikes, reference is made to NFPA 780 and CAN/CSA-B72 for additional requirements.		N/A
1 (DV.5)	Additional requirements apply to some forms of power distribution equipment, including sub-assemblies.		N/A
4.1 (4.1.17)	For lengths exceeding 3.05 m, external interconnecting cable assemblies are required to be a suitable cable type (e.g., DP, CL2) specified in the NEC.		N/A
	For lengths 3.05 m or less, external interconnecting cable assemblies that are not types specified in the NEC generally are required to have special construction features and identification markings.		N/A
4.6 (4.6.2)	Wire-wrap terminals have special construction and performance requirements.		N/A
4.8 (4.8.3, 4.8.4.5, 4.8.5)	Coin / button cell batteries have modified special construction and performance requirements.		N/A
5.4.2.3.2 (5.4.2.3.2.1)	Surge Arrestors and Transient Voltage Surge Suppressors installed external to the equipment are required to comply with the appropriate NEC and CEC requirements.		N/A
5.5.9	Receptacles, rated 125-V, single phase, 15- or 20-A accessible to either ordinary, instructed, or skilled persons are required to be provided with GFCI Protection for Personnel if the equipment containing the receptacles is installed outdoors. The protection devices are required to comply with UL 943, and CAN/CSA C22.2 No.144.		N/A
5.6.3	Protective earthing conductors comply with the minimum conductor sizes in Table G.7, except as required by Table G.7ADV.1 for cord connected equipment, or Annex DVH for permanently connected equipment.		N/A
5.7.8 (5.7.8.1)	Equipment intended to receive telecommunication ringing signals is required to comply with a special touch current measurement tests.		N/A

IEC62368_1E - ATTACHMENT			
Clause	Requirement + Test	Result - Remark	Verdict
6.5.1	PS3 wiring outside a fire enclosure is required to comply with single fault testing in B.4, or be current limited per one of the permitted methods.		N/A
Annex F (F.3.3.9)	Output terminals provided for supply of other equipment, except mains supply, are required to be marked with a maximum rating or reference to equipment permitted to be connected.		N/A
Annex F (F.3.7)	Outdoor Enclosures are required to be classified and marked in accordance with UL 50 or 50E, or CAN/CSA C22.2 No. 94.1 or 94.2.		N/A
Annex G (G.7)	Permanent connection of equipment to the mains supply by a power supply cord is not permitted, except for certain equipment, such as ATMs.		N/A
	Power supply cords are required to have attachment plugs rated not less than 125 percent of the rated current of the equipment.		N/A
	Flexible power supply cords are required to be compatible with Article 400 of the NEC, and Tables 11 and 12 of the CEC.		N/A
	Minimum cord length is required to be 1.5 m, with certain constructions such as external power supplies allowed to consider both input and output cord lengths into the requirement. Power supply cords are required to be no longer than 4.5 m in length if used in ITE Rooms.		N/A
	Power supply cords for outdoor equipment are required to be suitable outdoor use type as required by Section 400.4 of the NEC and Rule 4-012 of the CEC, i.e., marked “W.”		N/A
Annex H.2	Continuous ringing signals under normal operating conditions up to 16 mA only are permitted if the equipment is subjected to special installation and performance restrictions.		N/A

IEC62368_1E - ATTACHMENT			
Clause	Requirement + Test	Result - Remark	Verdict
Annex H.4	For circuits with other than ringing signals and with voltages exceeding 42.4 Vpeak or 60 Vd.c., the maximum acceptable current through a 2000 ohm resistor (or greater) connected across the voltage source with other loads disconnected is 7.1 mA peak or 30 mA d.c. under normal operating conditions.		N/A
Annex Q (Q.3)	Equipment with paired conductor and/or coax communications cables/wiring connected to building wiring are required to have special voltage, current, power and marking requirements.		N/A
Annex DVA (1)	Equipment that is designed such that it may be powered from a separate electrical service, is required to meet applicable requirements for service equipment for control and protection of services and their installation and complies with Article 230 of the National Electrical Code (NEC), NFPA 70 and Section 6 of the Canadian Electrical Code, Part I, CSA C22.1.		N/A
	Equipment intended for use in spaces used for environmental air (plenums) are subjected to special flammability requirements for heat and visible smoke release.		N/A
	For ITE room applications, automated information storage systems with combustible media greater than 0.76 m^3 (27 cu ft) are required to have a provision for connection of either automatic sprinklers or a gaseous agent extinguishing system with an extended discharge.		N/A
	Consumer products designed or intended primarily for children 12 years of age or younger are subject to additional requirements in accordance with U.S. and Canadian Regulations.		N/A
	Baby monitors are required to additionally comply with ASTM F2951, Consumer Safety Specification for Baby Monitors.		N/A

IEC62368_1E - ATTACHMENT			
Clause	Requirement + Test	Result - Remark	Verdict
	Storage batteries and battery management equipment, other than associated with lead-acid batteries, and including battery backup systems that are not an integral part of stationary AV and ICT equipment, such as provided in separate cabinets, are required to be certified (listed) to the appropriate standard(s) for such storage batteries and equipment.		N/A
Annex DVA (5.6)	For Pluggable Equipment Type A, the protection in the installation is assumed to be 20A.		N/A
Annex DVA (6.3)	The maximum quantity of flammable liquid stored in equipment is required to comply with NFPA 30.		N/A
Annex DVA (6.4.8)	For ITE room applications, enclosures with combustible material measuring greater than 0.9 m^2 (10 sq ft) or a single dimension greater than 1.8 m (6 ft) are required to have a flame spread rating of 50 or less. For equipment with the same dimensions for other applications, an external surface that is not a fire enclosure requires a minimum flammability classification of V-1.		N/A
Annex DVA (10.3)	Equipment with lasers is required to meet the U.S. Code of Federal Regulations 21 CFR 1040 (and the Canadian Radiation Emitting Devices Act, REDR C1370).		N/A
Annex DVA (10.5)	Equipment that produces ionizing radiation is required to comply with the U.S. Code of Federal Regulations, 21 CFR 1020 (and the Canadian Radiation Emitting Devices Act, REDR C1370).		N/A
Annex DVA (F.3.3.4)	e on a.c. mains supply systems with a neutral and more than one phase conductor (e.g. 120/240 V, 3-wire) require a special marking format for electrical ratings. Additional considerations apply for voltage ratings that exceed the attachment cap rating or that are lower than the "Normal Operating Condition" in Table 2 of CAN/CSA C22.2 No. 235."		N/A
Annex DVA (F.3.3.6)	Equipment identified for ITE (computer) room installation is required to be marked with the rated current.		N/A

IEC62368_1E - ATTACHMENT			
Clause	Requirement + Test	Result - Remark	Verdict
Annex DVA (G.1)	Vertically-mounted disconnect switches and circuit breakers are required to have the "on" position indicated by the handle in the up position.		N/A
Annex DVA (G.3.4)	Suitable NEC/CEC branch circuit protection rated at the maximum circuit rating is required for all standard supply outlets and receptacles (such as supplied in power distribution units) if the supply branch circuit protection is not suitable.		N/A
	Where a fuse is used to provide Class 2 or Class 3 current limiting, it is not operator-accessible unless it is non- interchangeable.		N/A
Annex DVA (G.4.2)	Equipment with isolated ground (earthing) receptacles is required to comply with NEC 250.146(D) and CEC 10-400 and 10-612.		N/A
Annex DVA (G.4.3)	Interconnection of units by conductors supplied by a limited power source, or a Class 2 circuit defined in the NEC/CEC may have field wiring connections other than specified in DVH.3, such as wire-wrap and crimp-on types, if the limited power source and Class 2 circuits are separated from all other circuits by barriers, routing or fixing.		N/A
Annex DVA (G.5.3)	Power distribution transformers distributing power at 100 volts or more, and rated 10 kVA or more, require special transformer overcurrent protection.		N/A
Annex DVA (G.5.4)	Motor control devices are required for cord-connected equipment with a mains-connected motor if the equipment is rated more than 12 A, or if the equipment has a nominal voltage rating greater than 120 V, or if the motor is rated more than 1/3 hp (locked rotor current over 43 A).		N/A
Annex DVA (G.7)	Flexible cords used outdoors are required to have the suffix “W” marked on the flexible cord.		N/A
Annex DVA (M)	For ITE room applications, equipment with battery systems capable of supplying 750 VA for five minutes are required to have a battery disconnect means that may be connected to the ITE room remote power-off circuit.		N/A

IEC62368_1E - ATTACHMENT			
Clause	Requirement + Test	Result - Remark	Verdict
Annex DVA (Q)	If applicable per NEC 725.121(C), some limited power sources supplied from AV/ICT equipment are required to have a label indicating the maximum voltage and maximum current, or maximum voltage and nominal current output for each connection point. Where multiple connection points have the same rating, a single label is permitted to be used.		N/A
	Wiring terminals intended to supply Class 2 outputs in accordance with the NEC or CEC Part 1are required to be marked with the voltage rating and “Class 2” or equivalent. The marking is located adjacent to the terminals and visible during wiring.		N/A
	Applicable parts of Chapter 8 of the NEC, and Rules 54 and 60 of the CEC, may be applicable to ITE installed outdoors with connections to communication systems.		N/A
Annex DVB (1)	Additional requirements apply for equipment used for entertainment purposes intended for installation in general patient care areas of health care facilities.		N/A
Annex DVC (1)	Additional requirements apply for equipment intended for mounting under kitchen cabinets.		N/A

IEC62368_1E - ATTACHMENT			
Clause	Requirement + Test	Result - Remark	Verdict
Annex DVE (4.1.1)	Some equipment, components, sub-assemblies and materials associated with the risk of fire, electric shock, or personal injury are required to have component or material ratings in accordance with the applicable national (U.S. and Canadian) component or material requirements. These equipment and components include: appliance couplers, attachment plugs, battery backup systems, circuit breakers, communication circuit accessories, connectors (used for current interruption of non-LPS circuits), direct plug-in equipment, electrochemical capacitor modules (energy storage modules with ultracapacitors), enclosures (outdoor), flexible cords and cables, fuses (branch circuit), ground-fault current interrupters, interconnecting cables, modular data centers, power supply cords, some power distribution equipment, printed wiring, protectors for communications circuits, receptacles, surge protective devices, vehicle battery adapters, wire connectors, and wire and cables.		N/A
Annex DVH	Equipment for permanent connection to the mains supply is subjected to additional requirements.		N/A
Annex DVH (DVH.1)	Wiring methods (terminals, leads, etc.) used for the connection of the equipment to the mains are required to be in accordance with the NEC/CEC.		N/A
Annex DVH (DVH.3.2)	Terminals for permanent wiring, including protective earthing terminals, are required to be suitable for U.S./Canadian wire gauge sizes, rated 125 percent of the equipment rating, and be specially marked when specified.		N/A
	Wire binding screws are not permitted to attach conductors larger than 10 AWG (5.3 mm^2).		N/A
Annex DVH (DVH.4)	Permanently connected equipment is required to have a suitable wiring compartment and wire bending space.		N/A

IEC62368_1E - ATTACHMENT			
Clause	Requirement + Test	Result - Remark	Verdict
Annex DVH (DVH 5.5)	Equipment connected to a centralized d.c. power system, and having one pole of the DC mains input terminal connected to the main protective earthing terminal in the equipment, is required to comply with special earthing, wiring, marking and installation instruction requirements.		N/A
Annex DVI (6.7)	Equipment intended for connection to telecommunication network outside plant cable is required to be protected against overvoltage from power line crosses.		N/A
Annex DVJ (10.6.1)	Equipment connected to a telecommunication and cable distribution networks and supplied with an earphone intended to be held against, or in the ear is required to comply with special acoustic pressure requirements.		N/A

Product: Charger IC

Type Designation: BQ25790, BQ25792, BQ25798, BQ25672

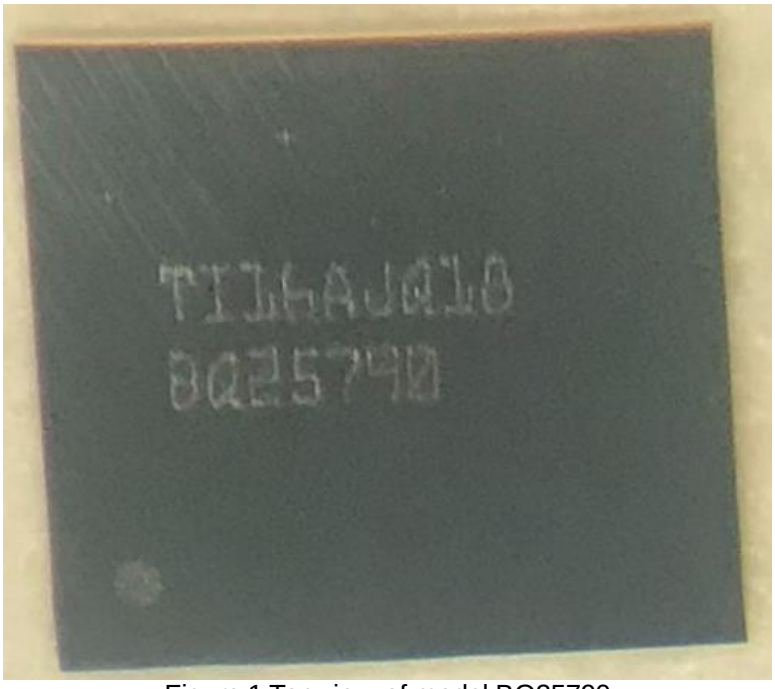


Figure 1 Top view of model BQ25790

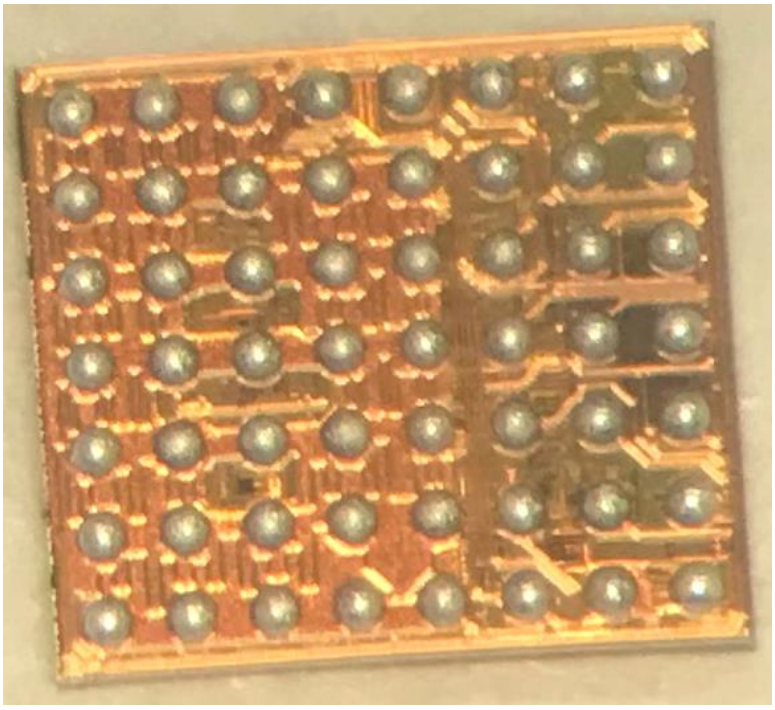


Figure 2 Bottom view of model BQ25790

Product: Charger IC

Type Designation: BQ25790, BQ25792, BQ25798, BQ25672

Figure 3 Top view of models BQ25792, BQ25798, BQ25672

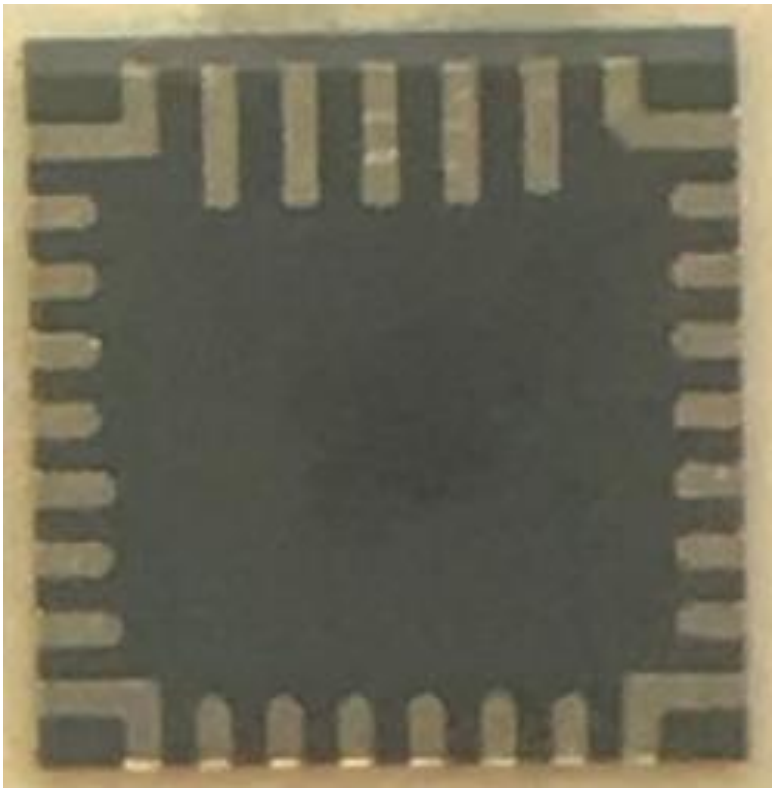


Figure 4 Bottom view of models BQ25792, BQ25798, BQ25672