



SKB BUE-BT09

Product Specification

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1 Introduction

1.1 Purpose & Description

This document describes the product requirement of SKB BT09. Basic scenario follows the previous

Features

- New ME Design
- BLE 4.2 – RTL8762AK / BT Classic CSR8630
- IR TX (2 LEDs: SMD type!, facing front and bottom)
- IR RX (refer to the IR Learning circuit by Realtek)
- Universal TV control – Korea, TV only
- QuickSet 3.4
- Voice (Tx) –
- Audio Streaming (Rx) – CSR8630
- OTA
- Back light (White, Laser Etching rubber)
- Remote Finder (Buzzer, BLE “Find Me” profile or other) - (Must be louder than BT07, +>= 90dB)
- Accelerometer
- AA Battery included (Change from Duracell to GP UEI Jacket)
- 43 keys (Metal dome only), Added one key “Kids Zone”
- Side Tack Switch (TV control keys)

Host Information

UEI RCU shall support 2 new AI Speaker STB models and 4 more old models

- Existing STB (4 Models)
- New STB (AI STB)

Model Name	BKO-UH400 BHX-UH400	BKO-UH600 BHX-UH600	BKO-AI700 BHX- AI700
STB Type	UHD2 STB	UHD3 HDR	AI STB
Platform	Android (AOSP) 4.4.4	Android N	Android O (TBD)
Chipset	BCM7252S (12K DMIPS)	BCM7268JD	BCM7268JD (TBD)
Bluetooth	BT 4.0 Dual Mode (BT3.0 / BLE)	BT 4.2 Dual Mode (BT3.0 / BLE 4.2)	BT 4.2 Dual Mode (BT3.0 / BLE 4.2)
UEI RCU	BT07 support BT09 support (backward compatibility)	BT07 support BT09 support (backward compatibility)	BT09 support

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1.2 General Product Information

General Information	
Information Description	Standard (Yes) , Custom, No
1) Industrial Rendering Included (Rendering must include Version; Date; dimensions; materials; and colors)	1) Yes BT09 CMF 20180208 Release.rar in KeyedIn (Date is 2/8/2018) 2) BT09 Design 0417 - Keypad Updated.zip (Date is 4/20/2018 in KeyedIn)
2) IC Type(s) , Memory Size and Package Type(s)	3) RTL8762AK (Main SOC) CSR 8630 (for Audio)
3) UEI internal SW number	4) 1750
4) Product Development Type	5) OEM

1.3 Key Press Definitions

Key sequence legend use in this document:

Item	Symbol	Description
1	< >	Press and release key
2	<< >>	Press and hold key down for a minimum of 3 seconds
3	<<< >>>	Press and keep holding down until desired results are obtained
4	→	Continue on to next step

2 Reference Documentation

2.1 Customer Documentation

- SKB_RCU_BT08_Protocol_Rev0.5- This is Korean



SKB_RCU_BT08_Protocol_Rev0.5.xlsx

- Customer Korean Spec is being updated in the below link – SW team will follow this
<http://pms.skdevice.net/redmine/boards/779/topics/10435>

2.2 UEI Standard Documentation (as applicable)

Spec 0003, Rev 19, Mechanical Standard for Design and Testing of Hand-held Remote Control (HRC)

Spec 0005, Rev 3, Environmental Specification – Drop Test

Spec 0004, Rev 4, Silicon Rubber Keypad, Poly-dome, and Metal Dome Specification

Spec 0007, Rev 3, Carbon Key

Spec 0020, Rev C, ESD

Spec 0010, Rev 3, Marking

3 Rendering and Key Description

3.1 Rendering – BT09 – Updated from V1.2 – Kids key changed



3.2 Key Table

No	Key	Key (English)	Pictures
1	TV 전원	TV Power	
2	TV 음량+	TV Vol +	
3	TV 음량-	TV Vol -	
4	TV 외부입력	TV Input	
5	통합전원	All Power	
6	B tv 전원	B tv(STB) Power	
7	조용히	Mute	
8	전체메뉴	All Menu	
9	영화	Movie	
10	TV 다시보기	TV Replay	
11	쇼핑	Shopping	
12	◀◀(되감기)/R	Rewind / Red	
13	■(멈춤)/G	Stop / Green	
14	▶▶(재생/일시정지)/Y	Play/Pause / Yellow	
15	▶▶(빨리감기)/B	Fast Forward / Blue	
16	I ◀◀뒤건너뛰기	Skip Reverse	
17	마이크	Mic	
18	▶▶I (앞건너뛰기)	Skip Forward	
19	음량+	Vol+	
20	음량-	Vol-	
21	홈	Home	
22	멀티뷰	Multi View	
23	채널▲	Channel▲	
24	채널▼	Channel▼	
25	▲(상)	Up	
26	▼(하)	Down	
27	◀(좌)	Left	
28	▶(우)	Right	
29	OK	OK	
30	나가기	Exit	
31	이전	Previous	
32	옵션	Option	
33	검색	Search	
34	★(찜)	★(Favorite)	
35	편성표	Guide	
36	1	1	
37	2	2	
38	3	3	
39	4	4	
40	5	5	
41	6	6	
42	7	7	
43	8	8	
44	9	9	
45	*/문자지움	*/Delete	
46	0	0	
47	#/문자변환	#/Language	
48	키즈	Kids Zone	* This key is newly added from BT09
49	선호채널	Favorite Channel	* This key is newly added from BT08 and will be used on BT09 as well

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4 Mechanical Requirements

4.1 Mechanical Information

Mechanical Information	
Information Description	Standard (Yes), Custom, No
1) Pro/E Shell Design Responsibility	1) SKB
2) IR Lens	2) Yes
3) IR Lens Color e.g. dark blue; purple; dark red; dark grey; black	3) Dark RESIN/COLOR : PC/DARK VILET, Finish : HIGH GLOSSY(SPI-A2)
4) Overlay e.g. common for older platform projects, the overlay label is typically used to hide extra keys.	4) NA
5) Keypad Definition (Force versus Travel)	5) Standard
6) Keypad Printing/Coating (check with ME whether this is for painting or coating)	6) Keypad Printing
7) Hard Cap Keys a. Type (Hard Epoxy, Soft Epoxy, ABS Cap) b. Hard cap key Coating	7) No
8) Backlight Diffuser Type and material i.e. Diffuser Plate – PC, LGF	8) LGF
9) Metal Domes / Poly domes a. Number and Location b. If yes, then specify dome diameter size	9) All Metal Domes a. 41 metal domes + 4 tact switch
10) Programming/Debugging Opening On Plastics (Required on all designs unless customer requests not to have them)	10) Yes
11) Battery Door Type (Specify – latch, sliding, push button, etc.)	11) Latch
12) Painted Plastics a. Top Case, Bottom Case, Door, Whole unit	12) No a.
13) Rubberized Coating a. Top Case, Bottom Case, Door, Whole Unit	13) No a) NA
14) TPE a) Top Case, Bottom Case, Door, Whole Unit	14) NA a. NA
15) Special Finishes: NCVM, IML/IMD, metal parts	15) NA
16) Patent Numbers (Printed / Embossed)	16) NA
17) Country of Origin Marking (Required for all products being shipped into USA) a. (Printed, Embossed)	17) NA
18) Tooling Inserts	18) NA
19) Compliance Marking Requirements (WEEE, CE, FCC, UL, etc.) a. Location (e.g. Battery area, bottom case)	19) WEEE Required Detailed will be provided by SKB
20) Plastic Inlay / Bezel (is this covered in tooling inserts section?)	20) NA

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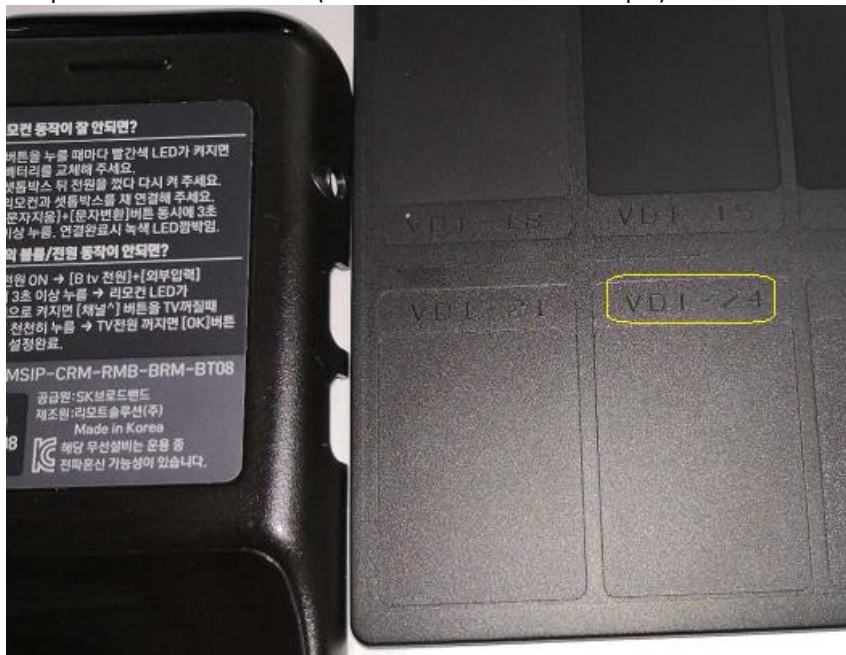
21) Counter Weight (Certain customers may require this for balancing the remote design) a. Amount	21) No
22) Other (Add any other items not captured by above bullet points)	22) Use side fire Buzzer

4.2 Housing Material and Finish Details

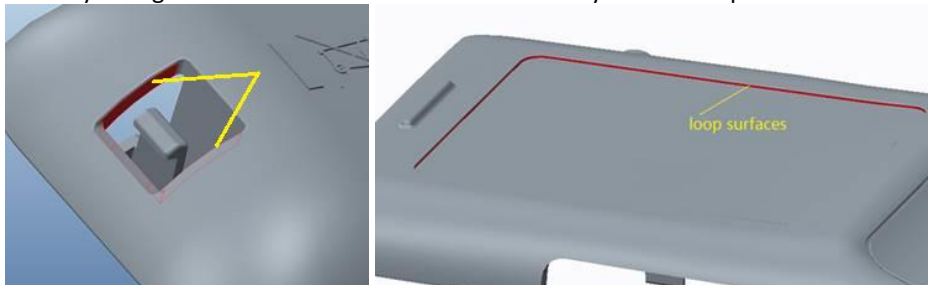
4.3 Drawings or other ME requirements

Please refer to the documents available in KeyedIn

- "BT09 Design 20180206 Release.rar"
- "BT09 CMF 20180208 Release.rar"
- This design is based on Movon sample, and we are allowed to use the same CMF as Remote Solution sample that we have in UEG (Left is Remote Solution sample)



- We may change the radius for better manufacturability. – SKB accepted the below changes.



5 Electrical Requirements

5.1 Hardware Information

Hardware Information	
Information Description	Standard (Yes) , Custom, No
1) 3, 4.5, or 6 Volt Operation (AAAA, AAA, AA, Coin cell) a. Battery Type (Alkaline or Heavy Duty) b. Included in BOM c. Batteries installed or in Polybag d. Battery Tab	1) (Alkaline AA) a. Alkaline (GP UEL Jacket) b. Yes c. In Polybag d. No
2) Number of physical keys	2) 44
3) SIO access on PCB e.g. pins, pads, etc.	3) No
4) JTAG/Programming Interface on PCB. a. Type (e.g. pins or pads. If pads are chosen, then a fixture maybe required for programming the boards.)	4) JTAG only for Realtek Chipset a. Pads under Battery for both Realtek and CSR Interface
5) IR LED a. Quantity (1 or 2) b. Type (W, N, WW) "W=Wide N= Narrow" (3mm, 5mm)	5) Specify a. 3 b. 1 side fire TX on top 1 side fire RX on top 1 top fire TX on bottom
6) Low Battery Detection a. Type (External or Internal)	6) Yes a. Internal
7) PCB Details a. Type (Single Sided, Double Sided Silver thru hole, Double Sided Plated thru hole, Double Sided Carbon thru hole) b. Material (XPC, FR1, FR4) c. Fabrication process (Wet film or Dry film) d. Flammability Requirement (If mandated by customer)	7) a. 4 Sided Plated thru hole b. FR4 c. Dry film d. NA
8) Dual Footprint (Applicable to IXYS MCUs)	8) NA
9) RAM Retention (Non Flash Product)	9) NA
10) RF Operation a. RF Type (433MHz; 868MHz; RF4CE; Z-Wave; Bluetooth; etc.) b. RF PCB (Integrated on Main board or Module) c. RF PCB Material (if separate PCB) d. Antenna Type (as recommended by EE team)	10) a. BT 4.2 (BLE/BT Classic) b. Integrated c. NA d. 2 Chip Antennas
11) Visible LED for user feedback a. Type(SMT/Thru-hole) b. Color (Red, Green, etc)	11) a. SMT – 2 LED b. Green and Red
12) Backlight a. LED Type & Color (i.e. top firing, side firing) b. Number of LEDs	12) a. LED & White b. 8 - TBD

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13) Learning Capability	13) Yes (Use Realtek Chipset)
14) Mode LEDs a. Color and location	14) NA a. NA
15) Voice a. Microphone type (Analog, Digital) b. Mounting method (Top, bottom)	15) Yes a. Analog b. TOP
16) Audio Streaming a. Chipset b. Profile c. Codec (SBC, MP3, or AAC)	16) Yes CSR8630 AD2P mSBC
17) Remote Finder a. Feedback Type (Visual or Audio) b. If Visual, specify the type i.e. LED color, etc. c. If Audio, specify Piezo or Speaker, etc.	17) Yes a. Audio b. NA c. Use side fire buzzer
18) Accelerometer	18) YES BMA222E(F) or newer part

5.2 Performance Requirements

5.2.1 REALTEK

Conducted Transmit Power:

Conducted transmit power, at 7dBm power setting, measured at antenna feed-point:

Parameter	Condition, notes	Min	Typ	Max	Unit
TX Power	According to the data sheet		0	-	dBm

Conducted Receive Sensitivity:

Conducted receive sensitivity, at antenna matching input

Parameter	Condition, Notes	Min	Typ	Max	Unit
RX Sensitivity to meet 1% PER	According to the data sheet		-88	-	dBm

RF Range

30 meter minimum, open field, measured against Target

5.2.2 CSR8630

Conducted Transmit Power:

Conducted transmit power, at 7dBm power setting, measured at antenna feed-point:

Parameter	Condition, notes	Min	Typ	Max	Unit
TX Power	According to the data sheet		4	-	dBm

Conducted Receive Sensitivity:

Conducted receive sensitivity, at antenna matching input

Parameter	Condition, Notes	Min	Typ	Max	Unit
RX Sensitivity to meet 1% PER	According to the data sheet		-86	-	dBm

RF Range

30 meter minimum, open field, measured against Target

5.2.3 IR Range and Angle Requirements

Transmission range depends upon the receive angle and the sensitivity of the receiver.

*Angle and range tests are based on a NEC carrier based code.

Single Wide*:

Head on Range: 50 Feet (in the horizontal plane).

Remote Angle coverage: 25° Up/Down and 25° Left/Right from the Center/Head on target position) @ 20 Feet.

5.2.4 IR Frequency Support & Tolerance

The RCU will support IR protocols with frequencies up to 455 KHz with a tolerance of +/-3%.

5.2.5 Microphone Spec

5.2.5.1 Audio Format Requirement

- Sampling rate: 16000Hz
- Channel: mono
- Encoding: 16bit PCM (ENCODING_PCM_16BIT)

5.2.5.2 Sound Quality Requirement

- Need to satisfy Google Voice Spec

5.2.6 Battery life

Battery life shall be optimized for the maximum life time using Alkaline AA batteries (GP UEI Jacket) and based on the following usage profile:

IR	75 key presses per day (0.5 s duration)
RF	100 key presses per day (0.5 s duration)
Voice	1.5 min a day (30 sessions of 3 s)
Finder	10 activations per month at 10 s each
Standby	18 hours of standby sync per day
Battery Life Status	3 events per day

5.3 RF Factory Test Mode

- Press and hold <<HOME>> + <<#>> to enter Factory RF Test Mode.
 - Then, RCU shall be blinking 3 times - short_blink (100ms on and 100ms off)
- The pairing is cleared when the RCU enters the factory test mode in order to minimize the production line test duration.
- *** FACTORY TEST POINTS NEED TO BE EXPOSED***
- Please refer to the EATP

6 QA Requirements

6.1 Quality Information - UEI STANDARD

Quality/Testing Information	
Information Description	Standard (Yes) , Custom, No
1) ESD Protection	1) Yes
2) Environmental Testing	2) Yes
3) FCC or CE Certification Requirements	3) Korea Standard and BT Certification for Korea
4) Bluetooth Certification	4) Yes
5) Reliability Testing	5) Yes
6) SIO Verification	6) No
7) Environmental Requirements a. RoHS Certification type (RoHS, Green, Sony Green, WEEE, REACH, Eup, Erp, Prop 65, etc.)	7) Yes a. RoHS
8) CPSIA (Consumer Product Safety Improvement Act – required by certain customers)	8) (Specify)
9) Special Agency Requirements (i.e. ASTM G1515, G154, 155, UL634, etc.)	9) (Specify)
10) Other (Describe)	10) (Specify)

Product Specification
7 Packaging and Marking Requirements

Miscellaneous Information	
Information Description	Standard (Yes) , Custom, No
1) URC Part number and Date Code a. Type (Label or Laser etch) b. Location (battery area or bottom case)	1) Yes a. Laser etch b. Bottom case
2) Customer Part number Label	2) NA
3) Device Code label	3) NA
4) Packaging a. Type (Bulk, Blister, Clamshell, Giftbox)	4) Yes a. Bulk
5) Master Carton a. Units per carton	5) Yes a. 50 units
6) Inner Carton a. Units per	6) NA a. NA
7) Packaging bag a. Type (Poly bag, Bubble bag, etc.)	3) Yes a. Poly bag
8) Battery pull-out Tab	4) NA
9) User Manual a. User Manual type (Stapled, Folded Map) b. Dimensions c. Paper Weight and Type (If customer requires certain type, otherwise use standard) d. User Manual Responsibility (Customer or UEI)	5) Yes a. Folded Map b. 25cm*18cm c. 100g/m2, White d. UEI
10) Configurable Product (This is used for platform projects. If the product is configurable, then the URC needs to be defined accordingly)	6) No
11) Spare Part (e.g. battery door, etc) a. Type	7) No a.
12) Other (Describe)	8) (Specify)

8 Software Requirements

The software shall be based on the Realtek RTL8762AK platform. It shall be able to communicate to the following three STB configurations:

- STB with Android KitKat 4.4.x with BT Classic and BLE 4.0.
- STB with Android Lollipop with BT Classic and BLE 4.2.
- STB with Android Marshmallow with BT Classic and BLE 4.2.

The RCU software shall support the following features:

- BLE 4.0 and BLE 4.2 via Realtek RTL8762AK
- BT Classic via CSR8630.
- Voice upstream via BLE 4.2 or BLE 4.0.
- Audio downstream via BT Classic.
- Universal IR for TV for selected keys (TV Power On/Off/Toggle, Volume +/-, Input)
- OTA for upgrading the firmware via BLE. CSR8630 configuration upgrade will not be supported.
- Remote Finder
- Battery Monitor
- UEI Quickset 3.4 features (OTV, Auto Setup, and control)
- IR assisted pairing

8.1 Embedded Library

8.1.1 Default Devices & Settings

Device	Default Code
STB	BLE Data + IR for Power Key C5443 + C5444(for alternative mode, Mode2) This should be sent by SendIRPatter CMD of Mini-Script IRB – * <u>Please refer to “LearnIRPattern” format documentation</u>
TV	LG & Samsung combo signal (T2051 & T1860)

8.1.2 Library Requirements

8.1.2.1 STB Codeset

- Default STB codeset is C5443 (SKB IR Mode), and C5444 can be set as Mode 2 manually
- Please find the <SKB BT09 RCU 2018 IR SPEC> on 8.1.2.2
- Follow UEI Exec. 090
- However, Some keys, like <<All Power>>, <<Home>> use the combo signal to send the SKB-specific IR code (this is handled by RCU FW separately)
- <<HOME>> Key requires BREAK key.

8.1.2.2 TV Codesets

- RCU shall support Universal TV: T (WW TV brands and Korean Local TV brands)
- SKB Embedded Codeset List
 - (1) Codeset No and, (2) Codeset Sequence, and (3) Group(Brand) Code.
 - “Sequential Setup Method” and “Brand Setup Method”
- UEI RCU shall use the following matching table (in Column F and G) to use UEI IR Binary file matching to each SKB Codeset – Attached file is the matching table.

Product Specification

 SKB BT09 RCU 2018
 IR SPEC.xlsx

- In summary, UEI RCU shall implement Local Manual Setup (Sequential, Brand(Group), and Direct) based on the SKB Load List and also use UEI-SKB codeset matching table to use UEI binary files resides on Realtek BLE chipset.
- Please refer to 8.12.2 for Local Manual Setup method.

8.1.3 Database Format and Release/Delivery

8.1.3.1 DB Format

- **Encrypted Binary for Samsung P5**
- Same format used for QuickSet - No new tool chain is required for this type of DB format
- Encrypted binaries can only be processed by UEI Mini-script QS IR Blaster (Samsung MCU based UEI Blaster)

8.1.3.2 Delivery Bin files

- UEI Library team generates the individual Bin files for the two STB codesets and 253 TV codesets, as specified in 9.1.2.2 TV Codesets (*No brand/model information will be shared)
- Bin files will be stored in BLE chipset and downloaded to P5 (as per local User programming – limited by FDRA size). *No UEI SW support required for this task.
- Realtek SW team is contracted to fully develop UEI RCU FW for SKB BLE RCU project, including all RCU features. They will make the index and store all the encrypted bin files in the flash, and load the correct bin file based on the matching table (*Please see the attached Doc)
- Realtek allocates 25KB for FDRA for this local DB
- IR Codeset Index Format by Realtek


 IRB codeset DB
 flash format.pdf

8.1.4 Device Mode Mapping

Device	Default Code	Device Type
STB	C	0
Universal TV	T	1

8.2 Bluetooth

8.2.1 BLE and BT Classic Local Device Configuration

Each Bluetooth device contains a unique MAC address called BD address (Bluetooth Device address) which is taken from ranges assigned by IEEE. The below MAC Address is assigned by UEI PM.

We need to keep using the following MAC address range (Once BT09 is approved, then BT07 will be EOL immediately – Running Change)

MAC Address Range:

Chip	Mac Address Start	Mac Address End
REALTEK	9CAC6D 000000	9CAC6D 07A151
CSR	9CAC6D 07A152	9CAC6D 0F4240

RCU shall have a VID and PID defined from the following:

Product Specification

VID (Vendor ID)	0x06E7
PID (Product ID)	0x8058

8.2.2 Connectivity

8.2.2.1 Advertising / Pairing

- RCU shall support BLE “Just Works” pairing mechanism by setting IO capabilities as No Input/No Output.
- RCU shall start sending BLE advertisement packets if it has no pairing information and the user hold the pairing button(s) defined by PAIR_BUTTONS for PAIR_BUTTON_DURATION.
- RCU shall send BLE advertisement packets with interval defined by PAIR_ADV_INTERVAL for PAIR_ADV_DURATION. RCU will stop sending advertisement packet if it is successfully paired with the host before the PAIR_ADV_DURATION expires.
- RCU shall ignore all key pressed when sending the BLE advertisement packets until PAIR_ADV_DURATION expires.

Parameter	Value	Unit
PAIR_BUTTONS	<<Mic>> or <<*>> + <<#>> or Connecting ear-jack	RCU Key(s)
PAIR_BUTTON_DURATION	Once for <<MIC>> 3 for <<*>> + <<#>>	Seconds
PAIR_ADV_INTERVAL	50	Milliseconds
PAIR_ADV_DURATION	25	Seconds

- RCU shall send BLE advertisement packet no longer than 31 bytes.
- RCU shall send BLE advertisement packet based on the Advertisement Packet Format.
- RCU is paired and has pairing information but NOT connected to the STB, if user press <<MIC>> button or connecting ear-jack to trigger pairing start, then RCU shall send IR_RCU_NOT_CONN (Refer to 8.3.3 Key Table) to STB, then STB will show pop-up message to the user

Advertisement Packet Format (Realtek):

Data Field	Length	Value	Description
Flag	0x02	0x01, 0x05	Limited Discoverable, No BR/EDR
Appearance	0x03	0x19, 0x0180	Generic Remote Control
Service Length	0x07	0x02, 0x1812, 0x180F, 0x1802	HID, Battery, and Immediate Alert Service
Local Name	0x13	0x09, 0x42, 0x55, 0x45, 0x5f, 0x42, 0x54, 0x30, 0x39	‘BUE_BT09_XXX’ Device Name in ASCII. B: Btv UE: Universal Electronic BT09: UHD_HDR Bluetooth LE RCU XXX : Any three digit of number from MAC_ADDRESS

- RCU shall respond to BLE scan response request from the host based on Scan Response Packet Format.

Scan Response Packet Format.

Data Field	Length	Value	Description
Local Name	0x13	0x09, 0x42, 0x55, 0x45, 0x5f,	‘BUE_BT09_XXX’ Device Name in ASCII. B: Btv UE: Universal Electronic

Product Specification

		0x42, 0x54, 0x30, 0x39	BT09: UHD_HDR Bluetooth LE RCU XXX : Any three digit of number from MAC_ADDRESS
--	--	------------------------	---

- RCU shall support the remote finder via BLE FindMe profile using the BLE immediate alert service
- RCU shall advertise device name **BUE_Audio09** for the Bluetooth Classic (CSR8630) used for the Audio Downstream.
- RCU shall advertise Bluetooth Classic only when the headset is detected. This is to save power of the RCU.

8.2.2.2 Connections

- RCU shall store the BLE pairing information when it is successfully paired with the host.
- RCU shall maintain the active connection with connection parameter defined by CONNECTION_INTERVAL, SLAVE_LATENCY, and SUPERVISION_TIMEOUT.

Parameter	Idle / Voice	During OTA	Unit
CONNECTION_INTERVAL	7.5	16.25	Milliseconds
SLAVE_LATENCY	199	0	Number of times
SUPERVISION_TIMEOUT	10	6.5	Seconds

8.2.2.3 Reconnection

- RCU shall start sending BLE directed advertisement packets when it is not connected to the host or detects a key press with prior pairing information.
- RCU shall send high duty direct advertisement packets in RECONNECT_HD_ADV_DURATION time with RECONNECT_HD_ADV_INTERVAL for RECONNECT_HD_ADV_MAX_TIMES
 - When RCU is not connected and detects a key press with prior pairing information.
 - RCU will stop sending high duty direct advertisement packets if it successfully reconnects with the host before the RECONNECT_HD_ADV_DURATION and RECONNECT_HD_ADV_MAX_TIMES expires.
- RCU shall transmit the key report associated with the key pressed once the connection is re-established.
- RCU shall continuously send low duty direct advertisement packets in RECONNECT_LD_ADV_DURATION time with RECONNECT_LD_ADV_INTERVAL
 - When it is not connected.
 - RCU will stop sending low duty direct advertisement packets if it successfully reconnects with the host.

Parameter	Value	Unit
RECONNECT_HD_ADV_INTERVAL	1.87	Milliseconds
RECONNECT_HD_ADV_DURATION	1.28	Seconds
RECONNECT_HD_ADV_MAX_TIMES	1	times
RECONNECT_LD_ADV_INTERVAL	1.87(1 cycle)	Milliseconds
RECONNECT_LD_ADV_DURATION	1.5	Seconds

8.2.2.4 Pairing / Connection timing information

- BLE and BT chipsets shall be operating with the below timing sequence.
THIS IS TBD and being updated by both Realtek and UEI

8.2.2.5 Un-Pairing

- RCU shall terminate an active link when the user hold the un-pairing button(s) defined by UNPAIR_BUTTONS for UNPAIR_BUTTON_DURATION.
- RCU shall clear the pairing information when the link is terminated. Key press will no longer trigger a reconnection.

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Parameter	Value	Unit
UNPAIR_BUTTONS	<<*>> + <<Home>>	RCU Key(s)
UNPAIR_BUTTON_DURATION	3	Seconds

8.2.2.6 Voice

- RCU shall maintain the active connection with connection parameter defined by VOICE_CONNECTION_INTERVAL, VOICE_SLAVE_LATENCY, and VOICE_SUPERVISION_TIMEOUT in voice transmission.

Parameter	Value	Unit
VOICE_CONNECTION_INTERVAL	7.5	Milliseconds
VOICE_SLAVE_LATENCY	199	Number of times
VOICE_SUPERVISION_TIMEOUT	10	Seconds

8.2.3 Service/Profile
8.2.3.1 GAP – Generic Access Profile

- RCU shall support the following characteristics in the GAP Service.

Characteristic	UUID	Value	Description
Device Name	0x2A00	BUE_BT09	RCU BLE Device Name
Appearance	0x2A01	0x0180	Generic Remote Control

8.2.3.2 GATT – Generic Attribute Profile

- RCU shall support the following characteristics in the GATT service.

Characteristic	UUID	Value	Description
System ID	0x2A23	<CAI> 0xFFFF <OUI>	<CAI> is the last 3 bytes of the BLE MAC address. <OUI> is the first 3 bytes of the BLE MAC address.
Model Number	0x2A24	UEISKB0000002	RCU Model Number in ASCII
Firmware Revision	0x2A26	<Major>.<Minor>.<Release>	RCU Bootloader revision in ASCII
Hardware Revision	0x2A27	UEIS-15281	RCU Hardware revision in ASCII
Software Revision	0x2A28	1750.XX.YY	4 digit software label XX = X-release revision (e.g. 01 for X1) YY = release minor revision (Alpha release)
Manufacturer Name	0x2A29	“Universal Electronics, Inc.”	RCU Manufacturer Name
PnP ID	0x2A50	0x02 <VID, PID, Product Version>	USB VID, PID, and UEI product version.

8.2.3.3 HOGP – HID Over GATT Profile

- RCU shall support the following characteristics in the HOGP service.

Characteristic	UUID	Value	Description
HID Information	0x2A4A	0x0111, 0x00, 0x01	USB HID version, Country Code, Flags
Report Map	0x2A4B	0x05 0x01 0x09 0x06 0xA1 etc.	HID format information
Protocol Mode	0x2A4E	0x01	Report Protocol Mode

8.2.3.4 Battery

- RCU shall support the following characteristics in the Battery service.

Characteristic	UUID	Value	Description
Battery Level	0x2A19	0-100	RCU Battery Level in percentage

8.2.3.5 Find Me Profile

- RCU shall support the following characteristics in the Immediate Alert Service.

Characteristic	UUID	Value	Description
Alert Level	0x2A06	0-2	RCU Alert Level

8.3 Key

8.3.1 Transmission

- RCU shall send the specific data based on the key function table defined in section 8.3.2
- RCU shall always transmit keys with IR data independent of the BLE connection status for keys that do not have HID data defined in section 8.3.2
- RCU shall send the BLE key report when the BLE is paired. Otherwise, it will send the IR data based on the RCU MODE.
- RCU shall send the BLE key report when the key is pressed and BLE is paired.
- RCU shall send the BLE key release report when the key is released or the STUCK_KEY_TIMEOUT has expired and BLE is paired.
- RCU shall transmit the IR data continuously when the key is pressed. It will stop transmitting either when the key is released or the STUCK_KEY_TIMEOUT has expired.
- RCU shall only send either the RF data or the IR data associated with the first button when two buttons are pressed. This includes situation when two buttons are pressed then the first button is released, RCU will not send the RF data or IR data of the second button.

Parameter	Value	Unit	Description
STUCK_KEY_TIMEOUT	120	Seconds	Timeout for transmitting the IR or RF key data

8.3.2 Key Function Table

No	Keys		Device		Code			
					IR		RF(BLE) – HID Standard Key	
	Key name	Key Name (in English)	STB	TV	MODE1 CUSTOM 0x807F C5443	MODE2 CUSTOM 0xF5A0 C5444	Page	Usage ID
1	TV 전원	TV Power		V	[0x02FD]+[0x08F7]	[0x02FD]+[0x08F7]	These TV keys support LG and Samsung TV combo as a default. When QS (auto-setup) is in use	
2	TV 음량+	TV Vol +		V	[0x07F8]+[0x02FD]	[0x07F8]+[0x02FD]		
3	TV 음량-	TV Vol -		V	[0x0BF4]+[0x03FC]	[0x0BF4]+[0x03FC]		
4	TV 외부입력	TV Input		V	[0x01FE]+[0x0BF4]	[0x01FE]+[0x0BF4]		
5	통합전원	All Power	V	V	BTV <<38ms>> + BREAK + LG TV + Samsung TV + RCU VerBTV Power + TV Power	BTV <<38ms>> + BREAK + LG TV + Samsung TV + RCU VerBTV Power + TV Power	When QS is in use, send BTV Power Only, QS is not available, send BTV Power and TV Power combo signal based on the local TV IR setup states	
6	B TV 전원	STB Power	V		0x01FE	0x01EF	0x07	0x0100
7	조용히	Mute	V		0x45BA	0x45AB	0x07	0x4500
8	전체메뉴	All Menu	V		0x47B8	0x478B	0x07	0x4700

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12	◀◀(되감기)/ R	Rewind / R	V		0x609F	0x60F9	0x07	0x6000
13	■(멈춤) / G	Stop / G	V		0x619E	0x61E9	0x07	0x6100
14	▶/II(재생/일시정지) / Y	Play/Pause / Y	V		0x629D	0x62D9	0x07	0x6200
15	▶▶(빨리감기) / B	Fast Forward / B	V		0x639C	0x63C9	0x07	0x6300
16	I ◀◀뒤건너뛰기	Skip Reverse	V		0x649B	0x64B9	0x07	0x6400
17	마이크	Mic	V		0xD12E - No repeat code	0xD1E2 - No repeat code	0x07	0x2300
18	▶▶ I (앞건너뛰기)	Skip Forward	V		0x659A	0x65A9	0x07	0x6500
19	음량+	Vol+	V		0x43BC	0x43CB	0x07	0x4300
20	음량-	Vol-	V		0x42BD	0x42DB	0x07	0x4200
21	홈	Home	V		0x02FD - No Repeat code (Send out battery info as well)	0x02DF - No Repeat code (Send out battery info as well)	0x07	0x0200
22	멀티뷰	Multi View	V		0x33CC	0x33CC	0x07	0x3300
23	채널^	Channel^	V		0x40BF	0x40FB	0x07	0x4000
24	채널v	ChannelV	V		0x41BE	0x41EB	0x07	0x4100
25	▲(상)	Up	V		0x49B6	0x496B	0x07	0x4900
26	▼(하)	Down	V		0x4AB5	0x4A5B	0x07	0x4A00
27	◀(좌)	Left	V		0x4BB4	0x4B4B	0x07	0x4B00
28	▶(우)	Right	V		0x4CB3	0x4C3B	0x07	0x4C00
29	OK	OK	V		0x46B9	0x469B	0x07	0x4600
30	나가기	Exit	V		0x34CB	0x34BC	0x07	0x3400
31	이전	Previous	V		0x4EB1	0x4E1B	0x07	0x4E00
33	검색	Search	V		0x4FB0	0x4F0B	0x07	0x4F00
34	★(찜)	★(Favorite)	V		0x53AC	0x51EA	0x07	0x5300
35	편성표	Guide	V		0x6D92	0x6D29	0x07	0x6D00
36	1	1	V		0x21DE	0x21ED	0x07	0x2100
37	2	2	V		0x22DD	0x22DD	0x07	0x2200
38	3	3	V		0x23DC	0x23CD	0x07	0x2300
39	4	4	V		0x24DB	0x24BD	0x07	0x2400
40	5	5	V		0x25DA	0x25AD	0x07	0x2500
41	6	6	V		0x26D9	0x269D	0x07	0x2600
42	7	7	V		0x27D8	0x278D	0x07	0x2700
43	8	8	V		0x28D7	0x287D	0x07	0x2800
44	9	9	V		0x29D6	0x296D	0x07	0x2900
45	*/문자지움	*/Delete	V		0x2AD5	0x2A5D	0x07	0x2A00
46	0	0	V		0x20DF	0x20FD	0x07	0x2000
47	#/문자변환	#/Language	V		0x2BD4	0x2B4D	0x07	0x2B00
48	키즈존	Kids Zone	V		0x58A7	0x587A	0x07	0x5800
49	선호채널	Favorite Channel	V		0x56A9	0x569A	0x07	0x5600

- All key should be sent following standard NEC protocol (UEI EXEC 090), but for <<HOME>> and <<Mic>> key sends the extra BREAK code (0xFF00) defined in the below Special Key Code table
- Mic Key is used for Paring Start
- Home key is also used for Batter Info update by IR (sending extra IR signal for Battery)
- Send HID Key in RF(BLE) Mode, and IR key in IR mode – for all keys including B tv Power key

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8.3.3 Special Key Code

- These keys are supported by UEI STB codeset, except RCU version from #71~#81)
- RCU Version code is NOT following standard IR protocol, but just need to be sent to STB as it is defined - This shall be handled by RCU FW Code using SendIrPattern CMD on P5 Mini-Script FW

51	Normal Battery	Normal Battery	V		0x3AC5	0x3A5C	0x07	0x3A00
52	Low Battery	Low Battery	V		0x3BC4	0x3B4C	0x07	0x3B00
53	Empty Battery	Empty Battery	V		0x3CC3	0x3C3C	0x07	0x3C00
54	EarJack Insert	EarJack Insert	V		0x3DC2	0x3D2C	0x07	0x3D00+0xFFFF
55	This Break code is used only for <<HOME>> and <<Mic> Key	Break Data Code	V		0xFF00	0xFF00	0x07	0xFFFF
57	동조 시작	TV Sync Start	V		0x54AB	0x54BA	0x07	0x5400+0xFFFF
58	동조 종료	Sync Stop	V		0x55AA	0x55AA	0x07	0x5500+0xFFFF
59	드래그 모드(상)	Drag Mode – Up	V		0x8778	0x8787	0x07	0x8700+0xFFFF
60	드래그 모드(하)	Drag Mode – Down	V		0x827D	0x82D7	0x07	0x8200+0xFFFF
61	드래그 모드(좌)	Drag Mode – Left	V		0x837C	0x83C7	0x07	0x8300+0xFFFF
62	드래그 모드(우)	Drag Mode - Right	V		0x847B	0x84B7	0x07	0x8400+0xFFFF
63	IR_RCU_NOT_CONN	IR_RCU_NOT_CONN	V		0xD22D	0xD2D2	N/A	N/A
71~81	RCU Version for UEI	RCU Version for UEI	V		0xF550 ~ 0xF55A	0xF550 ~ 0xF55A	0x07	0xF550 ~ 0xF55A + 0xFFFF

8.3.4 Additional Keys for Setup

	Key name	Key Name (in English)	Keys	Duration	Remark
1	Un-pairing	Un-pairing	<<*>> + <<Home>>	Press for 3 sec	
2	Re-Pairing	Re-Pairing	<<*>> + <<#>>	Press for 3 sec	
3	TV 동조 (Auto Search)	TV Sync (Auto Search)	<<STB Power>> + <<Input>>	Press for 3 sec	Used for Auto Search and Manual Setup Auto Search: User can search all codesets, which are stored in RCU and ordered by priority. By pressing Ch+ and CH-, user can search the desired codeset (RCU sends Power Toggle signal whenever new codeset is selected)
4	TV 동조 (그룹핑)	TV Sync (Grouping)	Grouping No Key <<1~9>> + <<STB Power>>	Press for 3 sec	Search Brands by CH+/CH- Button Group Search : User may select Brand first by pressing the combo key <<1~9>> + <<STB Power>>, each number represents the specific brands like: 1- Samsung, 2-LG After brand is selected by this number key combination, user can search the desired codeset within that specific brands
5	IR Code 학습	IR Code Learning	<<TV Power>> + <<OK>>	Press for 3 sec	New feature for BT08
6	Code Read Out	Code Read Out	<<STB Power>> + <<Input>>	Press for 3 sec	This is used to show the current codeset No Please See the detailed information on 8.12.3
7	IR Code 모드 전환	IR Code - Mode change	<<*>> + <<9>>	Press for 3 sec	Toggle either from IR Mode 1 -> IR Mode 2 or IR Mode 2 -> IR Mode 1
8	BT-IR 모드변환 (BT)	BT-IR Mode Change (BT)	<<*>> + <<1>>	Press for 3 sec	Set the RCU mode as BT
9	BT-IR 모드변환 (IR)	BT-IR Change (IR)	<<*>> + <<2>>	Press for 3 sec	Set the RCU mode as IR
10	Factory Default	Factory Default	<<*>> + <<3>>	Press for 3 sec	Manufacturing reset. See section 8.12.1
11	Buzzer Test	Buzzer Test	<<*>> + <<4>>	Press for 3 sec	Buzzer stop by any key press (Key doesn't work)
12	드래그 모드(상)	Drag Mode(Up)	<<*>> + <<UP>>	On click	Refer to Drag Mode Scenario
13	드래그 모드(하)	Drag Mode(Down)	<<*>> + <<DOWN>>	On click	
14	드래그 모드(좌)	Drag Mode(Left)	<<*>> + <<LEFT>>	On click	
15	드래그 모드(우)	Drag Mode(Right)	<<*>> + <<RIGHT>>	On click	
16	백라이트 온/오프	Backlight On/Off	<<*>> + <<5>>	Press for 3 sec	New feature for BT08 Toggle Backlight On/Off – When it's ON LED shall

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					blink twice(short), when off, LED shall blink 4 times (short)
17	Software Version Verification	Software Version Verification	<<*>>+<<6>>	Press for 3 sec	Read the software version label. See section 8.12.5

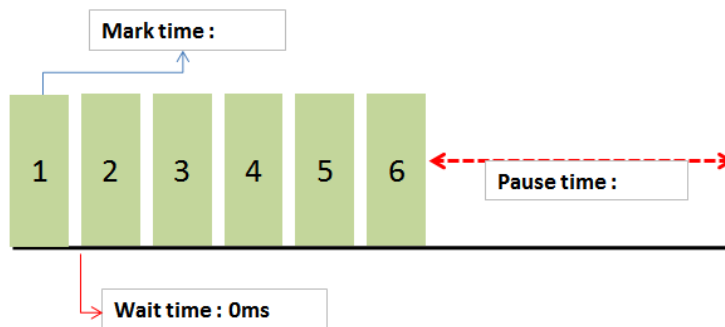
8.3.5 Drag Mode

- The RCU shall provide the special IR key code to support Android Web Browser
- When any key of the two combo keys is released, then RCU shall send BREAK signal

Key Name	Scan code	Android Key code
Drag Mode (Up)	0x136	KEYCODE_BUTTON_L1
Drag Mode (Down)	0x137	KEYCODE_BUTTON_R1
Drag Mode (Left)	0x138	KEYCODE_BUTTON_L2
Drag Mode (Right)	0x139	KEYCODE_BUTTON_R2

8.4 Remote Finder

- RCU shall support the remote finder via BLE FindMe profile using the BLE immediate alert service.
- RCU shall activate the buzzer no more than 3 seconds when the alert level is set to one and BLE is paired.
- RCU shall de-activate the buzzer when the alert level is set to zero and BLE is paired.
- RCU shall de-activate the buzzer when any key press is detected and the buzzer is activated. IR or RF key will not be transmitted when key press is used to deactivate the buzzer.
- RCU shall de-activate the buzzer when ear-jack is inserted and the buzzer is activated. Ear-jack insert will trigger the Audio Streaming based on the defined scenario
- RCU shall activate the buzzer based on the following sequence where each number represents a specific frequency. All frequencies will have DUTY_CYCLE defined by the following table.
- RCU shall repeat the following sequence for 60seconds if key press was not detected.
- RCU shall be able to test the remote finder feature and activate the buzzer sequence by pressing the Buzzer Test buttons defined in the Key Function Table.

Buzzer 1-Frame 출력 파형


Parameter	Value	Unit
Mark Time	100	Milliseconds
Wait Time	0	Milliseconds
Pause Time	1000	Milliseconds
1	1319	Hz
2	1479	Hz
3	1661	Hz
4	1754	Hz
5	1980	Hz
6	2220	Hz

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DUTY_CYCLE	50	Percent
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- Test Mode
 - Pressing <<*>> + <<4>> for 3 seconds shall activate the buzzer sound test until any key is pressed
- Buzzer SPL Requirement
 - Measure the SPL 10cm from the left side of RCU as shown below picture



- SPL Min Level shall be around 84dB
- Test Criteria
 - TBD by EE team and updated EATP in detail

8.5 Voice Upstream

- RCU shall send the HID Key report associated with the VOICE_BUTTON and HID key release report when the VOICE_BUTTON is pressed and released. When the host receives the VOICE_BUTTON key report, the host shall send a REQUEST_VOICE packet to the RCU.
- RCU shall start streaming the voice data to the host when it receives the REQUEST_VOICE packet.
- RCU shall stop streaming the voice data when it receives a REQUEST_VOICE_STOP packet from the host even if the VOICE_BUTTON is still pressed. This gives the host the ability to stop the voice upstream when no voice data is detected. The VOICE_BUTTON would need to be depressed and pressed again to initiate the voice stream again.
- RCU shall stop streaming the voice data to the host if it does not receive a REQUEST_VOICE_STOP packet from the host after the VOICE_DURATION.

Parameter	Value	Unit
VOICE_BUTTON	<<Mic>>	RCU Key
VOICE_DURATION	10	Seconds

8.6 Audio Downstream

- RCU shall attempt to establish the BT Classic connect with the last connected host when the headset is detected.
- RCU shall send BT Classic advertisement when headset is detected and it has not previously connected with a host.
- RCU shall send BT Classic advertisement when headset is detected and it cannot connect with the previously connected host.
- RCU shall notify the host either via IR or BLE indicating headset is detected and BT Classic is activated.
- RCU shall disconnect the audio stream when the un-paired button defined in Key Function Table is pressed. User would need to disconnect the headset and connect the headset again to initiate the audio downstream again.

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- When STB is turned off and A2DP was disconnected from STB, RCU shall wait for 35 seconds to reconnect to A2DP, but after 35 seconds, RCU shall not be trying to reconnect to A2DP when STB is turned on again.
 - STB Disconnect A2DP – Audio streaming is stopped
 - If STB is turned on
 - Within 35 seconds – RCU reconnect to A2DP
 - After 35 seconds – RCU shall not reconnect to A2DP

8.6.1 Ear-jack Scenario

- When ear-jack is connected, RCU shall following the below scenario.

When Ear-jack is plugged	RCU is NOT connected		BLE is Paired and Connected	
	RCU has no paired Info	RCU has paired info	BLE Mode by <<* >> + <<1>>	BLE Mode by <<*>> + <<2>>
Battery is Normal	Send [Pairing] IR Key	Send IR Code - #63 (IR_RCU_NOT_CONN)	Earjack insert (BT)	Earjack insert (IR)
Low	No Action	Low Batt. Code (IR)	Low Batt. Code (BT)	Low Batt. Code (IR)
Empty	No Action	Empty Batt. Code (IR)	Empty Batt. Code (BT)	Empty Batt. Code (IR)

8.6.2 Audio Tones

- When “A2DP connected” – A2DP source is connected, CSR shall play the following Tones
 - “Connected 3 beep Rising Tone” – 48ms C6 D6 A6

8.7 Battery Monitor

- RCU shall report battery status via HID standard Battery Service when BLE is connected
- RCU shall notify the host the battery level automatically when a voltage change triggers a battery state change based on the following table.
- RCU shall shutdown the audio streaming, if connected, and notify the host when the battery state changes to Low State.
- RCU shall not enable the audio streaming when the headset is detected during Low Battery State.

Battery State	Battery Voltage (V)
Normal	$2.40 \leq V$
Low	$2.20 \leq V < 2.40$
Empty	$V < 2.20$

- RCU shall report battery level when requested from the host or notification based on the following conversion table:

Battery Level (%)	Battery Voltage (V)
100	$3.0 \leq V$
90	$2.9 \leq V < 3.0$
80	$2.8 \leq V < 2.9$
70	$2.7 \leq V < 2.8$
60	$2.6 \leq V < 2.7$
50	$2.5 \leq V < 2.6$
40	$2.4 \leq V < 2.5$

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30	$2.3 \leq V < 2.4$
20	$2.2 \leq V < 2.3$
10	$2.1 \leq V < 2.2$
0	$V < 2.1$

- RCU should send battery information via IR whenever <<Home>> key is released.
- In IR Mode, send IR signal defined in 8.3.2, and in BLE mode use battery service

8.7.1 Low Battery Mode

- RCU shall turn on RED LED instead GREEN LED, while any key is pressed
- BT / IR mode is unchanged
- RCU shall stop Audio BT Streaming – But, if Audio streaming is already on going, then RCU keep streaming
- When ear jack is inserted, RCU shall send Low Voltage Battery Level Code via IR when in IR code or BT when in BT mode (* Then, STB will show popup on screen)
- OTA is not available in this mode (*This is STB Spec)
- In IR learning mode, Green and Red will replace each other for all LED feedback

8.7.2 Empty Battery Mode

- RCU shall turn on RED LED instead GREEN LED, while any key is pressed
- BT / IR mode is unchanged
- RCU shall stop Audio BT Streaming even when user is playing audio
- When ear jack is inserted, RCU shall send Empty Voltage Battery Level Code via IR when in IR code or BT when in BT mode (* Then, STB will show popup on screen)
- OTA is not available in this mode (*This is STB Spec)
- In IR learning mode, Green and Red will replace each other for all LED feedback

8.7.3 Shutdown voltage

- RCU shall shutdown when battery voltage less than 1.83V.

8.8 Quickset

- The RCU shall support UEI Quickset 3.4 features and QS Transfer Protocol described in this document below.
- UEI Mini-Script Specification

 UEI Mini-Script
 QS IR Blaster Proc
- QuickSet specification and scenario is described in this attached QTP Spec

 SKB Mini-script
 Blaster Remote Cx
- Unpairing the RCU will not deactivate the QuickSet features
- TV code set assigned from QuickSet will not be override unless Factory Reset or QS update or User Manual setup again

8.9 OTA

- The RCU shall support OTA from the host. CSR8630 configuration and IR library will not be upgradable.
- The RCU shall reboot itself when the OTA transfer is completed.
- The RCU shall validate the new firmware image for any bit flip or transfer error via CRC. It will only boot the new firmware image if it is validated, otherwise, it shall boot the current running image.

8.9.1 OTA Scenario

- When OTA App request to report battery level (BAS), RCU shall send battery level information to STB
 - (STB will activate OTA only when the battery level is above 2.4V)
- When starting OTA, RCU shall turn on Green LED
- After OTA, RCU shall show the OTA result by LED blinks
 - Success: GREEN LED 250ms interval 3 Times
 - Fail: RED LED 250ms interval 3 Times

8.9.2 OTA Vendor code

- To distinguish FW image files by RCU vendor, UEI is requested to add the following 3 byte codes in our Binary code.
 - Add Binary Stamp on 0x28 and 0x29.

	0x28	0x29	0x2A
Remote Solution	'R'	'M'	'8'
Movon	'M'	'M'	'8'
UEI	'U'	'E'	'8'

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VERSION															
0	1	2	3	4	5	6	7	8	9	a	b	c	d	e	f
00000000h:	03	00	52	55	0B	00	07	42	31	61	7F	FF	E7	82	F9 69 ; ..RU...B1a[] ??
00000010h:	CB	05	E5	11	BE	F3	E1	26	33	08	F9	25	00	00	00 ; ??알?3.?....
00000020h:	00	00	00	00	00	00	00	00	52	4D	37	00	02	48	80 47 ;RM7..HG
00000030h:	02	48	00	47	FE	E7	70	47	6D	88	51	00	91	A1	50 00 ; .H.G pGm을 .P.

F/W 구분

8.10 Visual Feedback

8.10.1.1 LED

- RCU shall SHORT_BLINK the LED 2 times when power is first applied.
- RCU shall LONG_BLINK the LED continuously when BLE is transmitting advertisement packets.
- RCU shall SHORT_BLINK the LED 5 times when BLE is paired successfully with the host.
- RCU shall SHORT_BLINK the LED 5 times when BLE is un-pairs successfully with the host.
- RCU shall turn the LED ON when transmitting IR signal triggered by a key press or ear-jack connect. LED will be OFF when the key is released.
- RCU shall SHORT_BLINK the LED 1 time when transmitting BLE signal. (including special key codes specified in 8.3.3)
- RCU shall NORMAL_BLINK the LED 2 times when it is changed to BLE mode by <<*>> + <<1>>
- RCU shall NORMAL_BLINK the LED 4 times when it is changed to IR mode by <<*>> + <<2>>

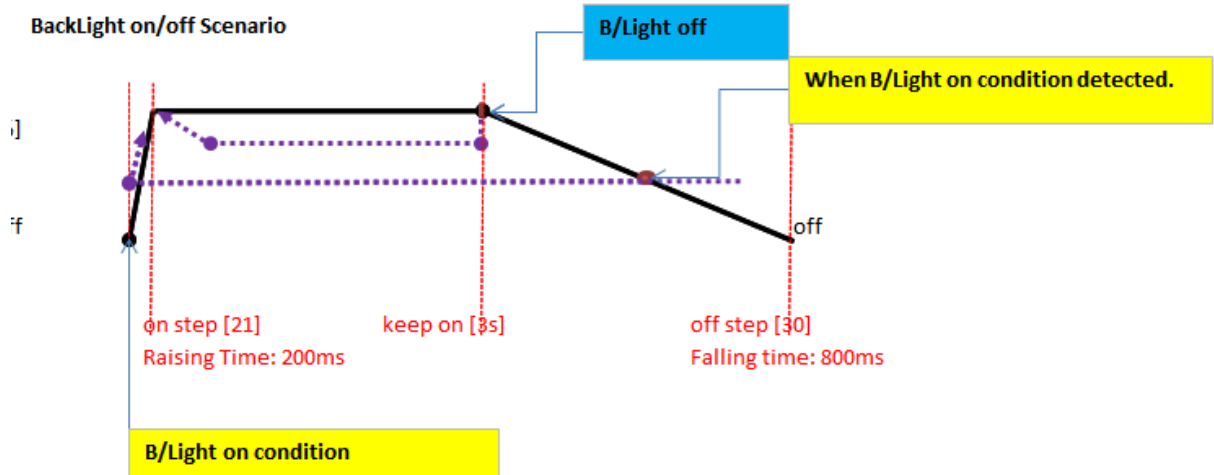
Parameter	On Duration	Off Duration (when blinking more than 1 time)	Units
SHORT_BLINK	100	100	milliseconds
LONG_BLINK	250	750	milliseconds
NORMAL_BLINK	250	250	milliseconds

8.11 Backlight

- Operation Condition : Backlight shall work only the battery level is above 2.4V
- Backlight feature shall be enabled or disabled by the toggle key press "<<*>> + <<5>>"
 - When Backlight feature is enabled, LED shall blink 2 times (SHORT_BLINK)
 - When Backlight feature is disabled, LED shall blink 4 times (SHORT_BLINK)
- RCU shall NOT turn on the back light when Find Me feature is activated

Parameter	Duration	Units
RAISING_TIME	200	milliseconds
ON_TIME	3000	milliseconds
FALLING_TIME	800	milliseconds

- If RCU detects movement at any time, then raise the duty to the max and start ON_TIME duration again.
- However, when A2DP is connected (Audio Streaming is activated), RCU shall NOT turn on the back light by movement, but by Key Press (On and Off timing is the same)
- Please refer to the below diagram



8.12 Additional Features

8.12.1 Manufacturing Reset

- The RCU shall clear the pairing information when the Factory Default Keys are pressed defined in the Key Function Table.
- The RCU shall clear the device codes when the Factory Default Keys are pressed defined in the Key Function Table.
- The RCU shall unlock the volume feature when the Factory Default Keys are pressed defined in the Key Function Table.
- The RCU shall SHORT_BLINK four times when the manufacture reset is successful, otherwise, LONG_BLINK one time.

8.12.2 Local Manual Setup

- RCU shall set up TV codeset manually using the below method
- Once setup the codeset manually, QS macro shouldn't be working and the TV keys (TV Power toggle, Input, TV Volume Up, TV Volume Down) shall be assigned to use the local TV codeset.

8.12.2.1 Sequential Setup

- Turn on TV using physical key on TV or TV RCU
- Press <<Input>> + <<STB Power>> for 3 sec, then Green LED shall be turned on
- Press <Channel up> for the next key code or <Channel Down> for the previous key code until TV is off
 - RCU sends Power Toggle signal sequentially (Refer to the SKB Codeset List in 8.1.2.2)
- If TV is turned off, then Press <OK> Key, then LED will blink 3 times and Setup process is done.

8.12.2.2 Group Setup

- Turn on TV using physical key on TV or TV RCU
- Press <<1 ~ 9>> + <<STB Power>> for 3 sec, then Green LED shall be blinking
- Press <Channel up> for the next key code or <Channel Down> for the previous key code until TV is off
 - RCU sends Power Toggle signal sequentially (Refer to the SKB Codeset List in 8.1.2.2)
- If TV is turned off, then Press << OK>> Key, then LED will blink 3 times and Setup process is done.

8.12.2.3 Direct Setup (3 digit Codeset No)

- Turn on TV using physical key on TV or TV RCU

Product Specification

- Press <<Input>> + <<STB Power>> for 3 sec, then Green LED shall be blinking
- When LED is on, Press Codeset No as below
 - ex) Codeset No "026" -> Press < 0 > → < 2 > → < 6 > → < OK >
- LED will blink 3 times and Setup is done.

8.12.2.4 Codeset Reset

- Press <<Input>> + <<B tv Power>> for 3 sec, then Green LED shall be is turned on
- Press < 0 > → < 0 > → < 0 >
- Then LED will blink 3 times and Setup is done.

8.12.3 Code Readout

This is feature is to read the three digit of SKB Local TV codeset number, set by Manual setup in 8.12.2

8.12.3.1 Code Readout

- Press <<Input>> + <<B tv Power>> for 3 sec, then Green LED is turned on
- Press <<#8 All Menu>>, then RCU shall send the <<#57 TV Sync Start>> IR Key
- If no key is pressed for READOUT_TIMEOUT, then RCU shall send the <<#58 TV Sync Stop>> IR Key and stop Readout.
- RCU Green LED shall be turned off for one second, and begin to SHORT_BLINK
- RCU shall indicate each digit of codeset by SHORT_BLINK
- RCU shall turn off LED for BLINK_GAP after SHORT_BLINKs of each digit
- E.g. If the setup codeset is 520, then RCU shall
SHORT_BLINK 5 times + BLINK_GAP + SHORT_BLINK 3 times, + BLINK GAP + SHORT_BLINK 10 times
- After blinking for Readout, RCU shall send the <<#58 TV Sync Stop>> IR Key and stop Readout.

Parameter	On Duration	Off Duration (when blinking more than 1 time)	Units
SHORT_BLINK	250ms	250ms	milliseconds

Parameter	Value	Units
BLINK_GAP	1000ms	milliseconds
READOUT_TIMEOUT	15	seconds

8.12.4 IR learning

- This feature is newly added from BT08, and the detailed spec will be shared in a separate spec.
- For SW development: Please refer to the SKB BT08 Spec "IR Reader" tab.
- This RCU have Four keys capable for learning the IR from a teacher RCU, they are: <TV Power>, <TV input>, <TV Vol +> and <TV Vol ->
- The following setup will use <Key_for_learning> represent the desired key for learning.

8.12.4.1 IR learning setup

- Press <<TV Power>> + <<OK>> for 3 sec to enter IR learning mode. Green LED will turn on until exit
- Press <Key_for_learning> to wait IR signal from teaching RCU. Green LED blinks off 1 second.
 - Hold teaching remote close to IR lens, press the key to be taught on teaching remote
 - Green LED short blinks 3 times indicates a successful learning

Product Specification

- Red LED short blinks 3 times indicates learning failure, it may due to invalid capture or timeout (15 sec)
- When waiting IR, pressing any keys on RCU will not do interruption
- After learning (regardless successful or not), press <Key_for_learning> for next learning
- Pressing keys not capable for learning (except <OK>) will blinks the Red LED 5 times
- After finish learning, press <OK> to exit. Green LED will short blinks 3 times then turn off
- If no key pressed for 1 min, the IR learning mode will timeout and exit. Green LED will short blinks 3 times then turn off

9 Appendix

9.1 QuickSet DB

QuickSet Codeset Load List - ** This is only for QuickSet SDK, resides in STB, and different from what we have in RCU as embedded Local DB for SKB Local Manual Setup support



SKB_Korea TV
BSC_08182016.txt

We deleted Videocon TV from the load list