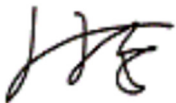


APPROVAL SHEET

ITEM	SK Broadband Bluetooth Remote
DESCRIPTION	Smart3 STB
PART NUMBER	BRM-BA03
RS MODEL	RD12F00
BUYER	SKB
DATE	2021.08.27
RCU VERSION	1.1
DOC VERSION	0.5

MAKER : REMOTE SOLUTION CO.,LTD.

Writer	EE	ME	Design	Software	Approval
					
2021.08.27	2021.08.27	2021.08.27	2021.08.27	2021.08.27	2021.08.27

DATE : 2021.08.27

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RCU Ver	Doc Ver	Date	Change Part	Description	Page
1.0	0.1	21.05.24		Initial	
	0.2	21.06.23	Instrument	- Drawing update	46~47
	0.3	21.07.22	design	- Manual confirmation	33~37
1.1	0.4	21.08.23	soft	- Manufacture date applied (applied to S/N field of DIS)	9~23
	0.5	21.08.27	soft	B/list update	61~68

Product Design



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INSTITUTION : 2021.05.24	SPECIFICATION (TRANSMITTER REMOCON)	MODEL NO :	1
REFORM :			
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1. Coverage : This product is manufactured as a remote solution and this specification applies to SK Broadband AI2/UHD4 STB remote control.

2. Product Specifications

2-1 Mechanical

2-1-1 Appearance

- 2-1-1-1 There should be no issue for Button Locking
- 2-1-1-2 There should be no stiff and looseness when opening or closing the battery cover
- 2-1-1-3 There should be no issue for attachment of label
- 2-1-1-4 There should be no spread of printing in RCU
- 2-1-1-5 There should be no warpage in RCU
- 2-1-1-6 There should be no stick effect from rubber
- 2-1-1-7 Spring turn count should be matching to Spec
- 2-1-1-8 There should be no electricity issue because of deformation of spring
- 2-1-1-9 Spring should be horizontal when inserting the Battery
- 2-1-1-10 Edge of Spring should be rounded
- 2-1-1-11 There should be no sharpness in case
- 2-1-1-12 The Printing of product should be same as product specification
- 2-1-1-13 When 5Kg of force is applied to each part of the body for 3 seconds, there should be no structural defects such as destruction
- 2-1-1-14 No other specific matters

2-1-2 Decomposition Structure

- 2-1-2-1 Confirmation of internal parts after disassembly should match specification (drawing)
- 2-1-2-2 There should be no abnormality when confirming the incorporation of components and soldering condition after disassembly
- 2-1-2-3 There should be no touching of Mechanical parts and Electrical parts
- 2-1-2-4 It should match the drawing (specification) when comparing with the parts list
- 2-1-2-5 PCB Print contents should match the drawings
- 2-1-2-6 Circuit components should use specified standard products
- 2-1-2-7 The Carbon Contact should not have Flux

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2-1-3 Button Specification

2-1-3-1 Touch Feeling : There is no defect when key button is pressed vertically

2-1-3-2 Operating Force : Metal Dome 110g±20g

Rubber Key : Less then 200g±30g (Small Key)

Rubber Key : Less then 210g±30g (Large Key)

2-1-3-3 Operating distance : 0.5±0.1 mm

2-1-3-4 Return force : more then 40% of the operating force Spec[Key center measurement]

2-1-3-5 Load: There should no defect PCB and other general , when applied for 3 seconds
with a force of 3Kg vertically

2-1-4 Battery Specifications

2-1-4-1 There should no defect when battery injecting and ejecting

2-1-4-2 There should no defect of electronical contact when battery insert

2-1-4-3 Gap distance : Gap distance between (+) side and (-) side should be less than 0.4mm

2-1-4-4 Battery should not be energized in reverse

2-1-4-5 There should no battery heating or deformation of the mechanic when reversed
battery inserting

2-1-4-6 There should be no problem when checking battery compatibility by manufacturer
[Compatibility by Size: AAA(L=44.2~43.4, Φ10.5 ~9.5)] , AA (L=50.5~49.0 , Φ14.5 ~ 13.5)]

2-1-5 Dimension

Outside dimension of the product : must meet individual approval specs (overall Length Tolerance:±0.8)

GAP (standard 0.3 mm) - GAP: Front knob and side gap should be less than 0.6 mm.

However, only the total length is measured during import inspection

Product Size : 48mm*175mm*23mm

Weight : 131.7(±2)g (With AA Battery x 2EA)

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2-2 Electrical properties

2-2-1 General Operating Test

2-2-1-1 There should be no problem in Button operation

2-2-1-2 In case of remote controller with Multi Brand, there should be no problem in operation by each other maker

2-2-1-3 Other buttons does not work when Button is operated

2-2-1-4 There should be no abnormality in continuous key operation

2-2-1-5 In case of various LEDs, there should be no problem when checking the brightness and blurring. [Set limit sample if necessary]

2-2-2 Current consumption

function	enter	Condition	SPEC		
			2.2V	2.5V	3.0V
Before leakage current pairing	Leave for 1 minute after power is applied	Average	20uA Below	20uA Below	20uA Below
After leakage current pairing	Leave for 1 minute after power is applied	Average	50uA Below	50uA Below	50uA Below
IR transmission	TV Volum (+) button 1 minute movement	Average	30mA Below	30mA Below	30mA Below
RF transmission	Volum (+) button 1 minute movement	Average	5mA Below	5mA Below	5mA Below
Buzzer	Text erase + 4	Peak	60mA Below	60mA Below	60mA Below
Backlight	Remote control angle 40° or more	Peak	OFF	20mA Below	20mA Below
Voice search	Voice search button	Peak	10mA Below	10mA Below	10mA Below

2-2-3 High Voltage : When inputting 3.4V voltage, there should be no abnormality in remote control key operation

2-2-4 IR LED Current(2ohm) : Over 300mA (2 Battery)

2-2-5 Power Consumption : Less then 300mW (Battery 3.0V)

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2-2-6 Oscillation frequency : Input Voltage : D.C 3.0V (Power supply 3.0V)
: 40.00 Mhz $\pm$ 10ppm

2-2-7 Oscillation stop voltage: Less than 1.9V

2-2-8 All Key Operation Test

2-2-8-1 All Key operation is abnormal or not checked

2-2-8-2 There should be no abnormality when operating each key ON / OFF more than 10 times
[ON / OFF every 1 second]

2-2-9 Decompression / Boost Operating Voltage

2-2-9-1 There should be no problem in operation when repeating 5 times at 2.2V ~ 3.4V

2-2-9-2 Check the voltage at 0V starting operation

2-2-9-3 Check the operation stop voltage at the voltage drop from 2.2V
[However, when there is no regulation, it should be less than 2.2V]

2-2-10 Contact resistance

2-2-10-1 Conduction / Carbon is inspected according to specification
[Conduction: 200Ω or less / Carbon: 300Ω or less]

2-2-11 Transmission Format (Output Wave Form)

2-2-11-1 Format : uPD6122

2-2-11-2 Carrier : 37.9kHz $\pm$ 3%

2-2-11-3 Frame : Interval(TF) : 108ms $\pm$ 3%

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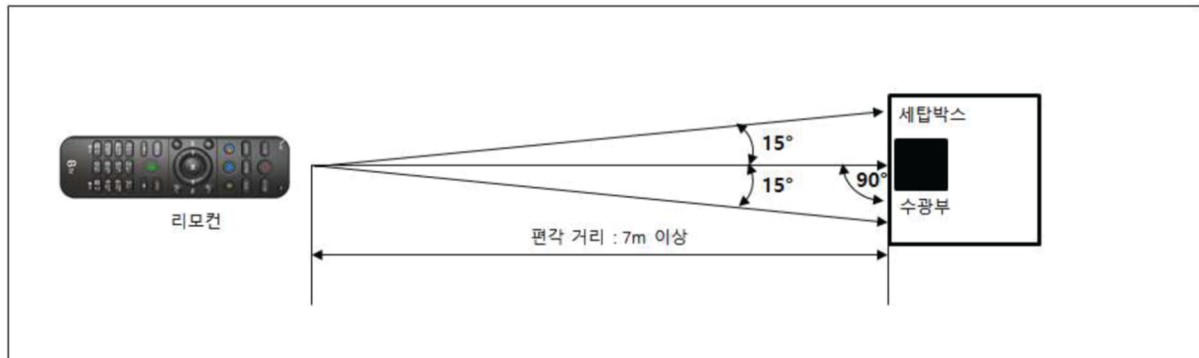
2-2-12 Operating distance and declination Operating distance:

2-2-12-1 Horizontal deflection (on optical axis) Straight line distance

When the receiver of the SET and the Remote Control Unit are horizontally or vertically on the optical axis



2-2-12-2 Remote control unit reference Horizontal deviation 15 ° (left, right, top, bottom) reaching distance (SET fixed)



2-2-12-3 RF straight line reach

RF Button : 7m

RF Voice transmission : 7m

- Measure using the buyer's set-top box. (Illumination : 200Lux, Temp. +25°C)

2-2-13 Buzzer Spec

Decibel : Measured at 10Cm distance using decibel meter: 85dB ±10dB [Applied voltage 3.0V]

(Measured using 1KHz test sound: 75±6dB) [Applied voltage 3.0V]

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INSTITUTION : 2021.05.24	SPECIFICATION (TRANSMITTER REMOCON)	MODEL NO :	7
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DECISION : 2021.08.27		RD12F00	68

3. Environmental characteristics

3-1 Printing test

3-1-1 Eraser test

3-1-1-1 No abnormality by carrying out the round trip 50 times with the load of 1.0Kg with the eraser

3-1-1-2 There should be no abnormality by scratching the printed surface with the fingernail 5 times.

3-1-2 Tape Test

3-1-2-1 After printing, coating area is attached with Tape with 1Kg load, it is peeled at 45 ° and tested after 3 times test

3-1-3 Alcohol test

3-1-3-1 Gently apply alcohol to the gauze and perform 20 ~ 50 reciprocations with a load of 1 kg.
(CASE: 20 times, RUBBER: 50 times)

3-1-4 Coating property

3-1-4-1 After leaving 2HR at room temperature, 3M SCOTCH Brand No. 600 or more TAPE equivalent or better After close contact, do not pull instantly at 15° from flat surface.

3-2 Reliability Test

3-2-1 Load Life Test

3-2-1-1 After inserting the batteries and operating at a rate of 30 ~ 60 times per minute and operating 100,000 times : There should be no abnormality in function when inspecting.

3-2-2 High temperature operation test

3-2-2-1 50 ° C ± 3 ° C, humidity 65%, and left for 24 hours

The operation inspection shall be carried out at intervals of 12 hours, so that there should be no abnormality in function and appearance

3-2-3 Low-temperature operation test

3-2-3-1 Put a rated load in a thermostat of -5 ± 3 ° C and leave it for 24 hours

The operation inspection shall be carried out at intervals of 12 hours, so that there should be no abnormality in function and appearance.

3-2-4 High temperature and high humidity operation test

3-2-4-1 Leave at rated temperature of 50 ± 3 ° C and humidity 80% for 24 hours

The operation inspection shall be carried out at intervals of 12 hours, so that there should be no abnormality in function and appearance.

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3-2-5 temperature preservation test

- 3-2-5-1 Leave in a thermostatic chamber at 70 ± 3 ° C for 48 hours in a no-load state, and leave it at room temperature and humidity for 1 hour
There should be no abnormality in function and appearance at the time of inspection

3-2-6 Cold storage test

- 3-2-6-1 Allow to stand for 48 hours in a no-load state in a thermostat at -20 ± 3 ° C for 1 hour
There should be no abnormality in function and appearance at the time of inspection

3-2-7 High temperature and high humidity preservation test

- 3-2-6-1 Temperature 50 ± 3 °C Leave in a constant temperature chamber of 95% humidity for 48 hours in a no-load state, and leave for one hour at normal temperature and humidity
There should be no abnormality in function and appearance at the time of inspection

3-2-8 Thermal shock test

- 3-2-8-1 Temperature: 70 ± 3 °C ~ -20 ± 3 °C, 50 cycles at intervals of 30 minutes, left at room temperature and humidity for 1 hour
There should be no abnormality in function and appearance at the time of inspection.

3-2-9 Vibration test

- 3-2-9-1 Vibration frequency: 10Hz~55Hz(7.5min) → 55Hz(2Hrs) → 55Hz~10Hz(7.5min), amplitude: 1.5mm, As a condition, there should be no abnormalities during inspection after conducting X, Y, Z directions.

3-2-10 Drop Test

- 3-2-10-1 Tested on Hardwood 6 times, once every 4 times [Dropping at 100cm after battery insertion]
3-2-10-1-1 No Top / Bottom Widening and Crack
3-2-10-1-2 No defective energization due to spring deformation
3-2-10-1-3 There should be no stick phenomenon due to the rubber deviation.
3-2-10-1-4 There should be no other unusual phenomenon.

3-2-11 Static test

- 3-2-11-1 Place the R / C with the battery inserted on the copper plate and perform the static test
3-2-11-1-1 ± 10 kV : No problem in operation
3-2-11-1-2 ± 12 kV : No destruction

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INSTITUTION : 2021.05.24	<u>SPECIFICATION</u> (TRANSMITTER REMOCON)	MODEL NO :	9
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4. Software Specification (1/15)

RCU Key code table

SKB 스마트 TV 제어 STB RCUI

Device Name : BRM_BA03_XXX 리모컨용수신기

Device Name : BMM_BA03_XXX 리모

		Key		Code		RF (BLE)		USB HID Usage Name			
Position	No	Key name	[IR/REC Simple repeat]		Page	Usage ID	Keyboard Page (0x07)	Consumer Page (0x0C)	Description		
			MODE1 CUSTOM 0x007F	MODE2 CUSTOM 0x0FA0							
Front	1	통합전원	Btv 전원 + TV 전원	Btv 전원 + TV 전원					order: Btv power + BRK + TV power+ VER + BRK		
	2	TV 전원	삼성 + LG	삼성 + LG					dedicated TV only key Default Samsung, LG		
	3	스마트TV	삼성 + LG	삼성 + LG					dedicated TV only key Default Samsung, LG		
	4	바road기	0x58A7	0x587A	0x07	0x005800					
	5	선호채널	0x56A9	0x569A	0x07	0x005600					
	6	반전표	0x6D92	0x6D29	0x07	0x006D00					
Side	7	외부입력	[0x01FE] + [0x0BF4]	[0x01FE] + [0x0BF4]					dedicated TV only key Default Samsung, LG [Source] Navi keys is working TV		
	8	조음력	0x45BA	0x45AB	0x07	0x004500					
Front	9	Btv 음량+	0x43BC	0x43CB	0x07	0x004300					
	10	Btv 음량-	0x42BD	0x42DB	0x07	0x004200					
	11	Google Assistant	0x012E	0x01E2	0x07	0x000100					
	12	홈	0x02FD	0x02DF	0x07	0x000200			order: HOME -> BRK -> BATT INFO		
	13	Zem KIDS	0x59AA	0x59EA	0x07	0x005900					
	14	TV 음량+	삼성 + LG	삼성 + LG					dedicated TV only key Default Samsung, LG		
	15	TV 음량-	삼성 + LG	삼성 + LG							
	16	▲(상)	0x49B6	0x49B8	0x07	0x004900					
	17	▼(하)	0x4AB5	0x4AB8	0x07	0x004A00					
	18	◀(좌) / ▶(우) 뒤전환기	0x4BB4	0x4BAB	0x07	0x004B00					
	19	▶(우) / ▶▶(우) 뒤전환기	0x4CB3	0x4CB8	0x07	0x004C00					
	20	OK/▶▶(우) 뒤전환기(자동)	0x4AB9	0x4AB8	0x0C	0x0041			Menu Pick		
	21	채널 △	0x40BF	0x40FB	0x07	0x004000					
	22	채널 ∇	0x41BE	0x41EB	0x07	0x004100					
	23	이력	0x4EB1	0x4EB8	0x07	0x004E00			TV code output in Smart TV mode		
	24	나가기	0x43CB	0x43BC	0x07	0x004300			TV code output in Smart TV mode		
	25	마이크	0x012E	0x01E2	0x07	0x002300					
	26	◀◀(이전) / R	0x609F	0x609F	0x07	0x006000					
	27	▶▶(다음) / B	0x639C	0x63C9	0x07	0x006300					
	28	1	0x21DE	0x21ED	0x07	0x002100					
	29	2	0x22DD	0x22DD	0x07	0x002200					
	30	3	0x23CD	0x23CD	0x07	0x002300					
	31	4	0x24BD	0x24BD	0x07	0x002400					
	32	5	0x25DA	0x25AD	0x07	0x002500					
	33	6	0x26DD	0x26DD	0x07	0x002600					
	34	7	0x27DB	0x27BD	0x07	0x002700					
	35	8	0x28D7	0x287D	0x07	0x002800					
	36	9	0x29BD	0x29BD	0x07	0x002900					
	37	+ / 문자제출	0x2A5D	0x2A5D	0x07	0x002A00					
38	0	0x20DF	0x20FD	0x07	0x002000						
39	# / 문자전환	0x2BD4	0x2BD4	0x07	0x002B00						
	40	Btv 전원	0x01FE	0x01EF	0x07	0x000100			통합전원 버튼 눌러서 실제 송출 IRBT 모드 변경에 따라 바뀌는 BT 로 송출		
	41	Normal Battery	0x3AC5	0x3ASC	0x07	0x003A00 + 0x00FFFF					
	42	Low Battery	0x3BC4	0x3BAC	0x07	0x003B00 + 0x00FFFF					
	43	Empty Battery	0x3CC3	0x3CCB	0x07	0x003C00 + 0x00FFFF					
	44	End-Lock-Invert	0x3DC2	0x3DC2	0x07	0x003D00 + 0x00FFFF			이러면 적당입시(BT Connected)		
	45	Break Data Code	0xF700	0xF700	0x07	0x00FFFF			IR을 커먼 적용, BT, 전 기 적용		
	46	RCU Ver#3	0xF310 - 0xF314	0xF310 - 0xF314					리모컨 제조사별 코드(RS) 0xF300-0xF30A : BT02 (UHD 이어폰1) 0xF310-0xF314 : BT06 (UHD 이어폰2 - BLE) 0xF320-0xF324 : BT03 (Smart STB 신규) 0xF330-0xF334 : BT05 (세러문드 STB) 0xF340-0xF344 : BT07 (UHD 이어폰3 - BLE) 0xF350-0xF354 : BT08 (AN STB - BLE) 0xF360-0xF364 : BT09 (키즈용 리모컨 - BLE) 0xF370-0xF374 : BA01(Android모던 - BLE) 0xF380-0xF384 : BT10(AI STB - BLE) 0xF3A0-0xF3A4 : BT11(AI 2 STB - BLE) 0xF3C0-0xF3C4 : BT12(Smart TV 제어) 0xF3D0-0xF3D4 : BA03(Smart TV 제어) * 상위 4bit 버전 코드 (0-A)		
		47	RCU Ver#4	0xF4A0 - 0xF4A4	0xF4A0 - 0xF4A4					리모컨 제조사별 코드(UE) 0xF400-0xF404 : BT02 (UHD 이어폰1) 0xF410-0xF414 : BT06 (UHD 이어폰2 - BLE) 0xF420-0xF424 : BT03 (Smart STB 신규) 0xF430-0xF434 : BT05 (세러문드 STB) 0xF440-0xF444 : BT07 (UHD 이어폰3 - BLE) 0xF450-0xF454 : BT08 (AN STB - BLE) 0xF460-0xF464 : BT09 (키즈용 리모컨 - BLE) 0xF470-0xF474 : BA01(Android모던 - BLE) 0xF480-0xF484 : BT10(AI 2 STB - BLE) 0xF4A0-0xF4A4 : BT11(AI 2 STB - BLE) 0xF4B0-0xF4B4 : BA02(ATV STB - BLE) 0xF4C0-0xF4C4 : BT12(Smart TV 제어) 0xF4D0-0xF4D4 : BA03(Smart TV 제어) * 상위 4bit 버전 코드 (0-A)	
			48	RCU Ver#5	0xF510 - 0xF514	0xF510 - 0xF514					리모컨 제조사별 코드(UE) 0xF5A0-0xF5A4 : BT07 (UHD 이어폰3 - BLE) 0xF550-0xF554 : BT08 (AN STB - BLE) 0xF560-0xF564 : BT09 (키즈용 리모컨 - BLE) 0xF5B0-0xF5B4 : SR01 (안시스 - BLE) * 후속 - 12bit 코드 : BT07 시작부터 시작
				49	Setup-Share	0x5AAB	0x5ABA	0x07	0x005A00 + 0x00FFFF		
50				Setup-Share	0x5AA5	0x5AA5	0x07	0x005B00 + 0x00FFFF			
51				Drag Up	0x8778	0x8787	0x07	0x008700 + 0x00FFFF			
52				Drag Down	0x827D	0x82D7	0x07	0x008200 + 0x00FFFF			
53				Drag Left	0x837C	0x83C7	0x07	0x008300 + 0x00FFFF			
54				Drag Right	0x847B	0x84B7	0x07	0x008400 + 0x00FFFF			
55				touch	0x857A - 0xFF00	0x85A7 - 0xFF00	0x07	0x008500 + 0x00FFFF			0x3-3bit 누름/버튼 누름 상태
56	Unblock			0x8659 - 0xFF00	0x8687 - 0xFF00	0x07	0x008600 + 0x00FFFF			0x3-3bit 누름/버튼 누름 상태	
57	음성 제어	0x02D0		0x02D2	0x07	0x000200			0x3-3bit 누름/버튼 누름 상태		
58	Btv control mode	0x6959	0x6959	0x07	0x006900			0x3-3bit 누름/버튼 누름 상태			
59	TV control mode	0x6758	0x6759	0x07	0x006700			TV 제어모드 전환 코드			
60	TV control mode noi	0x6897	0x6879	0x07	0x006800			TV 제어모드 사용중일때 열리는 코드			



	Function	Key combination	Press time	Description
Setting mode	1	Unpairing	[*] + [H]	3sec remove pairing information
	2	Re-Pairing	[*] + [H]	3sec try pairing after removing pairing information
	3	TV Set (Manual)	[스마트TV] + [리부팅]키	3sec setup your TV with the numbering keys
	4	TV Set (Auto Search)	[스마트TV] + [리부팅]키	3sec setup your TV using CH+/- key
	5	TV Set(Grouping)	그룹링 번호키([스마트] + [스마트TV])	3sec setup your TV with CH+/- key in TV group
	6	IR Code Learn	[TV 전원] + [OK]	3sec BT06-07 is not supported
	7	Code Read Out	[스마트TV] + [리부팅]키	3sec press [설정표] after entry setting mode
	8	Change BT-IR mode (BT)	[*] + [1]	3sec
	9	Change BT-IR mode (IR)	[*] + [2]	3sec
	10	Factory Default	[*] + [3]	3sec Not-allowed-pairing(loop-pairing)
	11	Buzzer Test	[*] + [4]	3sec stop buzzer when press any key
	12	Backlight On/Off	[*] + [5]	3sec On/Off toggle(Default: On), On: LED twice/Off: LED 4-arms blink
	13	Change IR Code mode	[*] + [9]	3sec Mode 1 <-> Mode 2
	14	Drag Up	[*] + [UP]	Immediately
	15	Drag Down	[*] + [DOWN]	Immediately
	16	Drag Left	[*] + [LEFT]	Immediately
	17	Drag Right	[*] + [RIGHT]	Immediately see operation scenario
	18	RC44-testmode	이동	3sec
	19	Android Bluetooth	[BACK] + [OK]	5sec BACK is IR code. OK is BLE code. after 3sec LED blink 1-time

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4. Software Specification (2/15)

SKB Smart TV Control STB RCU RF Protocol

1. BLE Device

RTL8762CKF (Bluetooth v4.2: Single-Mode BLE)

2. BLE Profile & Service

GAP, GATT

HID over GATT Profile

~~Find Me Profile (call RCU) --> included IAS~~

HIDS(HID Service)

Realtelk OTA Update Service

~~Voice transmission service --> Realtelk mSBC uses HIDS because it is a HOGP type~~

BAS(Battery Service)

DIS(Device Information Service)

~~ATV V5(Android TV Voice Service) - Google Assistant~~

iSet Service - TV auto setup & power/input sync

~~ScPS(Scan Parameters Service) - undecided~~

~~Bond Management Service - undecided~~

IAS(Immediate Alert Service) - call RCU

~~LLS(Link Loss Service) - undecided~~

~~TPS(Tx Power Service) - undecided~~

3. Vendor ID / Product ID

Vendor ID : 0x005D (Realtek)

Product ID : 0x0003(BT12)

4. GAP Appearance Value(Device Class)

0x0180 : Generic Remote Control

5. BD Address

14 4E 34 xx xx xx (14 4E 34 assigned by RemoteSolution)

00 13 7B xx xx xx (00 13 7B assigned by Movon)

40 19 20 xx xx xx (40 19 20 assigned by Movon added)

6. Device Name

BRM_BT12_XXX (BLE)

B : B tv,

RM : RemoteSolution, MM : Movon, UE : UEI

XXX : MAC Address last 3 characters

BRM-Audio11 (A2DP)

B : B tv,

RM : RemoteSolution, MM : Movon, UE : UEI

7. Method of pairing

Just Works

8. Voice feature

NUGU: 120byte mSBC (60bytes transmitted twice, 57+3 byte, 4.2 Extended LE not used.)

9. HID protocol table

* HID Key press & hold code on ATT - Report ID(0x80)

NUM	Field	Description	Values	Size	Direction
1	Opcode	Notification	0x18	1byte	RCU -> STB
2	Att Handle	Handle	0x0000 ~ 0xFFFF	2byte	
3	Payload	Keycode	Usage ID	3byte	

Ex) When [B tv power] key is pressed: 0x00, 0x01, 0x00

When any key is released: 0x00, 0xFF, 0xFF

* HID Consumer Key code on ATT - Report ID(0x03)

NUM	Field	Description	Values	Size	Direction
1	Opcode	Notification	0x18	1byte	RCU -> STB
2	Att Handle	Handle	0x0000 ~ 0xFFFF	2byte	
3	Payload	Keycode	Usage ID	2byte	
4			0x0000	2byte	

Release key code: 0x00 00 00 00

* HID Voice Search code on ATT - Report ID(0x85)

NUM	Field	Description	Values	Size	Direction
1	Opcode	Notification	0x18	1byte	RCU -> STB
2	Att Handle	Handle	0x0000 ~ 0xFFFF	2byte	
3		Reserved	0x00	1byte	
4	Payload	Start voice	0x23	1byte	
5		Keycode 2	0x00	1byte	

Release key code: 0x00 23 FF

* HID Mic Start on ATT - Report ID(0x85)

NUM	Field	Description	Values	Size	Direction
1	Opcode	Write Request	0x12	1byte	STB -> RCU
2	Att Handle	Handle	0x0000 ~ 0xFFFF	2byte	
3		Reserved	0x00	1byte	
4	Payload	MIC Start	0x26	1byte	
5		Keycode 2	0x00	1byte	

* HID Mic Stop on ATT - Report ID(0x85)

NUM	Field	Description	Values	Size	Direction
1	Opcode	Write Request	0x12	1byte	STB -> RCU
2	Att Handle	Handle	0x0000 ~ 0xFFFF	2byte	
3		Reserved	0x00	1byte	
4	Payload	MIC Stop	0x27	1byte	
5		Keycode 2	0x00	1byte	

* HID RCU Unpairing on ATT - Report ID(0x81)

NUM	Field	Description	Values	Size	Direction
1	Opcode	Write Request	0x12	1byte	STB -> RCU
2	Att Handle	Handle	0x0000 ~ 0xFFFF	2byte	
3		Reserved	0x00	1byte	
4	Payload	Unpaired	0x2A	1byte	
5		Keycode 2	0x00	1byte	

* The RCU removes the pairing information of the RCU when it receives the command from the STB.

* Voice data on ATT - Report ID(0xF8)

NUM	Field	Description	Values	Size	Direction
1	Opcode	Notification	0x18	1byte	RCU -> STB
2	Att Handle	Handle	0x0000 ~ 0xFFFF	2byte	
3	Payload	Voice data	0xXX....	120byte	

10. Advertisement data format

GAP ADTYPE FLAG

Discovery Mode: LE General Discoverable Mode | BR/EDR Not Supported

GAP ADTYPE LOCAL NAME

see 6 section

GAP ADTYPE 16BIT COMPLETE

Service: 0x1812(HID)

GAP ADTYPE APPEARANCE

see 4 section

11. Scan response data format

GAP ADTYPE LOCAL NAME

see 6 section

GAP ADTYPE APPEARANCE

see 4 section

12. Connection Parameters

Connection interval(IDLE)	Connection interval(Voice)	Connection interval(OTA)
Minimum: 7.5ms 11.25ms	Minimum: 7.5ms 11.25ms	Minimum: 7.5ms 11.25ms
Maximum: 7.5ms 11.25ms	Maximum: 7.5ms 11.25ms	Maximum: 7.5ms 11.25ms
Slave Latency: 499 133	Slave Latency: 499 133	Slave Latency: 0
Supervision timeout: 10sec	Supervision timeout: 10sec	Supervision timeout: 10sec

13. Advertising interval

Pairing 시 ADV			
		interval(min/max)	duration
Step1.	undirect	50ms	20s
Step2.	Standby state		
Reconnect 시 ADV_DIRECT			
		interval(min/max)	duration
Step1.	direct (high duty)	1.87ms	1.28s
Step2.	direct (low duty)	30ms	5s
Step3.	direct (idle low duty)	1.5s	계속 (1.5s 간격으로 1 cycle)

*When inserting/removing a battery:

Depending on the paired / un-paired state, the above scheme works.

If paired after RCU cold boot, High duty DIRECT_ADV starts after 12 seconds regardless of whether or not there is a key input.

* When connecting, when entering Any Key during ADV_DIRECT:

Regardless of the current step, if there is a key input, it is immediately executed again from Step1 (high duty ADV_DIRECT).

14. BT key code Interval

BT key press interval: 300ms (continuous key), 80ms (normal key)

BT release key code: 30ms

15. DIS(Device Information Service)

Property	Value	Value(ex: RS)	Value(ex: Movon)
Serial Number String	Manufacturing date	20210819	20210819
Manufacturer Name String	Manufacturer	RemoteSolution Co.,LTD.	Movon corporation
Model Number String	Model No	BRM_BT12	BMM_BT12
Firmware Revision String	F/W Revision	1.0	1.0
Software Revision String	Rom Patch Revision	1.0.552.8	1.0.552.8
Hardware Revision String	H/W Revision	1.0	1.0
System ID	IEEE 64bit ID(with OUI)	xxxxxxxxxxxxFF344E14	xxxxxxxxxxxxFF201940

* Serial Number String: The BT chipset MAC is applied to the remote control without the manufacturing date

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4. Software Specification (3/15)

*QuickSet data on ATT - Report ID(0x86)

NUM	Field	Description	Values	Size	Direction
1	Opcode	Notification	0x1B	1byte	RCU -> STB
2	Att Handle	Handle	0x0000 ~ 0xFFFF	2byte	
3	Payload	Sequence	0x00 ~ 0xFF	1byte	
4		Data	0xFF....	max	

*QuickSet data on ATT - Report ID(0x86)

NUM	Field	Description	Values	Size	Direction
1	Opcode	Write Request	0x12	1byte	STB -> RCU
2	Att Handle	Handle	0x0000 ~ 0xFFFF	2byte	
3	Payload	Sequence	0x00 ~ 0xFF	1byte	
4		Data	0xFF....	max	

[i-SET Protocol]

* i-Set Service Class UUID : 0000FE0-0000-1000-8000-00805F9B34FB

* i-Set Command - UUID : 0000FE1-0000-1000-8000-00805F9B34FB

NUM	Field	Description	Values	Size	Direction
1	Opcode	Write Request	0x12	1byte	STB -> RCU
2	Att Handle	Handle	0x0000 ~ 0xFFFF	2byte	
3	Payload	Command	0x00: i-Set Stop 0x01: i-Set Start 0x02: STB screen off 0x03: STB screen on 0x04: i-Set Get TV code	1byte	

* i-Set Command Response - UUID : 0000FE1-0000-1000-8000-00805F9B34FB

NUM	Field	Description	Values	Size	Direction
1	Opcode	Notification	0x1b	1byte	RCU -> STB
2	Att Handle	Handle	0x0000 ~ 0xFFFF	2byte	
3	Payload	Result	0x00: NG 0x01: OK	1byte	
4		Error code	0x00: ISET_ERROR_NONE 0x01: ISET_ERROR_CODE_TIMEOUT 0x02: ISET_ERROR_CODE_CHKSUM_ERROR 0x03: ISET_ERROR_CODE_INVALID_COMMAND 0x04: ISET_ERROR_CODE_INVALID_EDID_FORMAT 0x05: ISET_ERROR_CODE_UNKNOWN_VENDOR 0x06: ISET_ERROR_CODE_IDENTICAL_VENDOR 0x07: ISET_ERROR_CODE_INVALID_EDID_LENGTH 0x08: ISET_ERROR_CODE_UNKNOWN_DEVICE 0x09: ISET_ERROR_CODE_NONE_SEQ_ORDER	1byte	
5		TV Set Type	0x00: ISET - only assigned when i-Set TV setup is OK 0x01: Manual(digit or autosearch) 0x02: IR Learning	1byte	
6		Code	0x0000 ~ 0xFFFF(TV set No) eg: Set No is 320 0x01 0x40	2byte	

* i-Set EDID Data - UUID : 0000FE3-0000-1000-8000-00805F9B34FB

NUM	Field	Description	Values	Size	Direction
1	Opcode	Write Command	0x52	1byte	STB -> RCU
2	Att Handle	Handle	0x0000 ~ 0xFFFF	2byte	
3	Payload	EDID Parameters	0x00 ~ 0xFF	256byte	

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4. Software Specification (4/15)

SKB Android STB RCU Operation Scenarios

BT mode: BLE connected, IR mode: BLE disconnected

Bluetooth pairing scenario (BLE +-A2DP)

1. In the unpairing state, pressing any key(excluded key: TV전원/통합전원/TV음량+/-,외부입력) on the remote control will transmit the pairing st
~~Or, when the ear jack is inserted (battery voltage>= 2.4V), it transmits the pairing IR code.~~
2. After transmitting the IR code, the remote control enters Advertising Mode and switches to the pairing mode.
3. In Advertising Mode, LED blinks at 1s (ON: 250ms, OFF: 750ms) cycle.
-Ignore entering the setting mode by voice search and key combination during pairing (however, unpairing and repairing are supported)
4. When the IR Trigger Code is received from the STB, it searches for Bluetooth devices and tries to pair with the remote control BLE.
5. After BT pairing is completed, CSR8630 (after Audio BT) of the remote controller enters Discovery Mode and switches to pairing mode.
6. After pairing BT in STB, search for additional Bluetooth devices and try to pair with Audio BT.
7. When the audio BT is successfully paired with the remote control, LED Blink 5 times at 200ms (ON: 100ms, OFF: 100ms) cycle.
8. The remote controller ends Advertising after 20 seconds in BLE Advertising mode. And, Audio BT Discovery does not.
9. After 30 seconds in the Audio BT Discovery mode, the Discovery mode is terminated, and BT Unpair is completed and the pairing scenario en
10. LED OFF when pairing fails

Bluetooth pairing reset (Unpairing) scenario

1. Press the [*] + [Home] keys for 3 seconds
2. When BT Unpair is completed normally, LED blinks 5 times quickly (ON: 100ms, OFF: 100ms)
→ When BT Unpair is completed normally, Power Off Audio BT
→ Audio stream if connected, disconnect and proceed with Unpair

Bluetooth re-pairing scenario

1. Press the [*] + [#] keys for 3 seconds
2. If BT is connected, RCU performs disconnection
3. Store the BT pairing information in the temporary area, and delete the pairing information related to the BT stack.
4. Start BT pairing(always new pairing)
5. When pairing fails, the pairing information in the temporary area is resorted to the pairing area of the BT stack.

Operation scenario when not paired

1. Regardless of whether pairing is successful, all keys except voice search key operate as IR.
2. Attempt pairing when performing the following operation.
2-1. Any Key(excluded key: TV전원/통합전원/TV음량+/-,외부입력) is pressed
2-2. Enter [*] + [#] for 3sec
2-3. Insert ear jack (battery voltage>= 2.4V)

Operation scenario when paired

1. TV key (TV전원 / TV음량+/- / 외부입력) operates irrespective of whether pairing is successful or not.
2. The integrated power key is operated by IR. (B tv + TV)
3. [Btv-전원] key operates by IR.
4. All other keys operate as BT. (But TV전원/통합전원/TV음량+/-,외부입력 key works only with IR)
5. In the case of BT disconnection in pairing state, all keys operate as IR.
- 5-1. However, re-pairing is performed when the voice (NUGU) or [G/A] key is pressed. (Same operation as pressing the [*] +[#] keys for 3 seconds)

All power operation scenario

1. When the [통합전원] key is pressed, it is output in the following order.
Btv power code -> TV power code (toggle, discrete, learning) -> RCU version code --> iSet Macro (optional)
2. TV power code classification
2.1 Toggle: When the TV power code is toggled during manual setting or iSet setting
2.2 Discrete: When the TV power code is discrete by the iSet setting
2.3 IR learning: In case of learning IR on the [TV전원] button
3. iSet Macro
3.1 Output when iSet is set and TV's input code is discrete code

* If iSet is wroked, see Section 4 of the "iSet Operation Scenario" sheet.
4. When iSet is not set
4-1. Btv Power Code -> Break Code -> TV Code -> RCU Ver Code
RCU ver information can be transmitted by DIS (Device Information Service). RCU Ver code is reviewed for deletion (TBD).
4-2. Default TV Code: Samsung, LG batch code transmission
4-3. When setting iSet
4-3-1. Btv Power Code -> RCU Ver Code -> iSet linkage operation -> iSet TV power supply code (ON or OFF)
RCU ver information can be transmitted by DIS (Device Information Service). RCU Ver code is reviewed for deletion (TBD).
4-3-2. Determine if a trigger code is required for iS operation (TBD)
4-3-3. Send TV Code when BT connection is disconnected
Code output sequence: Btv power -> RCU ver -> iS TV power (toggle)
4-4. Even when changing from BT mode to IR mode, iSet linkage operation
* DIS is not used in the integrated power supply scenario, and will be used for other purposes (compared to eta version) in the future.
5. When the TV is powered by IR learning
5-1. Use the last set setting.
5-2. Ex) If IR learning is done at the end, the value is also used for integrated power supply; iSet MACRO is not used.

Battery information transmission scenario

1. Battery level transmission when the [home] key is pressed (in BT mode, BT / IR mode, IR code)
2. Detect voltage range: 1.8V ~ 3.2V divided into 3 levels (Empty / Low / Normal)
2-1. Normal: 2.4V or more-green LED
2-2. Low: More than 2.2V ~ less than 2.4V-red LED
2-3. Empty: less than 2.2V-red LED
3. Battery level transmission when BT Connect (Pairing or Reconnecting)
3-1. Battery level means key code (Normal, Low, Empty)
4. After RCU booting, after about 40ms after any key release, transmit the battery status (3 step code).
4-1. However, the [통합전원], [TV 전원], [TV 음량+/-], [외부입력], [Home], [MIC], [GA](BA03) keys are excluded from this operation.
4-2. Battery information is not transmitted for key release that occurs after entering pairing mode.
4-3. After the key is released, it is applied up to 10 times based on the battery information transmission.

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4. Software Specification (5/15)

- (If key input occurs before sending the battery information code, the input key code output is given priority.)
- 4-4. If BT is connected 10 times (battery code) before and battery information is transmitted, battery information is not transmitted for the key release that occurs thereafter.
5. Battery voltage should be transmitted in level [%] and follow BAS specification.
- 5-1. 1.8 V or less: 0%
- 5-2. 3.2V or higher: 100%
- 5-3. The voltage between the above voltages is converted as a percentage.

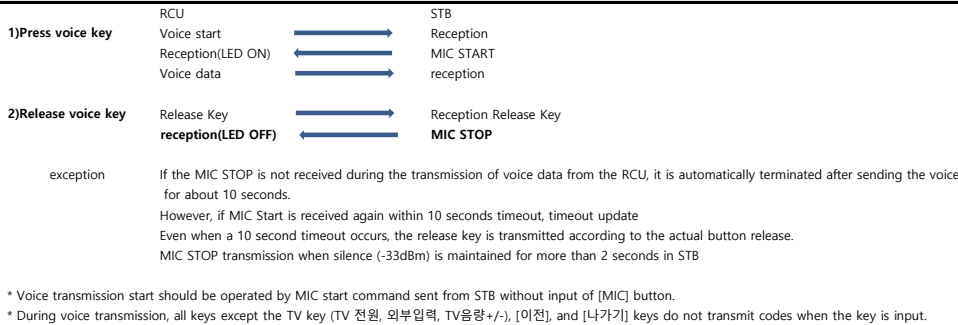
RCU Low Battery operation scenario

- Low Voltage: 2.2V or more ~ less than 2.4V
- RED LED ON when key code is transmitted at low voltage
- No change in BT / IR mode
- Restrict audio-BT (Streaming) operation at low voltage (maintain while streaming is in progress)
- After inserting the ear-jack, the low voltage battery level code is output (usage limit pop-up display), (in BT mode in BT / IR mode in IR code)
- OTA upgrade restrictions

RCU Empty Battery operation scenario

- Empty Battery: Less than 2.2V
- RED LED ON when key code is transmitted during empty voltage
- BT / IR mode maintenance
- AD2P operation restriction (STOP during use), Empty Battery Code output when earphone is inserted
- When the voice search key is input, the empty battery code is output. Do not transmit Mic Start
- Empty Battery Code output when pairing is attempted. No pairing code sent
- No cut-off voltage. Operates in empty until the battery runs out

Voice Transmission operation scenario



Drag Mode

- When the [문자지움] key + four-way key is combined, drag works as the four-way key (response to drag operation to use the web browser)
 - In the process of entering the first drag mode, no break code is transmitted when one key is input while another key is input.
 - For BT mode / IR mode key code definition, refer to the special key code in the CodeTable sheet.
- < Android key value of drag mode >
- | Key Name | Scancode | Android Keycode |
|------------|----------|-------------------|
| Drag Up | 0x136 | KEYCODE_BUTTON_L1 |
| Drag Down | 0x137 | KEYCODE_BUTTON_R1 |
| Drag Left | 0x138 | KEYCODE_BUTTON_L2 |
| Drag Right | 0x139 | KEYCODE_BUTTON_R2 |
- When any one key is released after key combination, code transmission stops without sending break code.
 - When drag key combination again, send the corresponding key code (drag mode up / down / left / right)

BLE/IR Mode change operation scenario

- This concept is different from IR transmission when unpaired or disconnected.
- Factory Default: BLE mode.
- How to switch modes
- BLE mode: [*] + [1] BLE mode when input for 3 seconds. LED 2 times Blink (ON: 250ms, OFF: 250ms)
- IR mode: [*] + [2] IR mode switching when input for 3 seconds. LED 4 times Blink (ON: 250ms, OFF: 250ms)
- IR mode operation
- IR transmission when a button is pressed. However, when the [Microphone] button is pressed, the voice is transmitted.
- BT connection must be maintained and attempted to reconnect (Find Me)
- When BT connection is made by attempting pairing by unpairing or repairing, it automatically switches to BT mode (maintains the previous mode in case of failure)
- BLE mode operation
- Includes all operation scenarios except IR mode operation.
- Maintains mode information during POR / repair.

Find me(Call RCU) operation scenario

- Using IAS (Immediate alert level service)
- Buzzer Well: See Buzzer Spec
- Backlight: Backlight is on while the buzzer is ringing in normal battery condition
- Buzzer sound output time: 1 minute
- Abort when inputting any button. (Output when the button is input)
- Stopped buzzer sound when combining / disengaging earjack
- Periodic connection attempt is required in disconnected state. (TBD)
- After BT disconnection due to STB shutdown or link loss, the remote controller attempts to connect every 1.5 seconds.
- At this time, the average standby current consumed should be similar to the BT connection state.
- [*] + [4] Buzzer sound confirmation function when input for 3 seconds (test mode)

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(TRANSMITTER REMOCON)

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4. Software Specification (6/15)

Factory Default operation scenario

Factory default function by 2 key combination

[*] + [3] Input for 3 seconds

Initializes pairing information, TV setting information, BLE / IR mode information, iSet, IR learning contents, and manual setting of backlight On / Off.

-LED blink is processed in the same way as unpairing.

OTA mode

1. When requesting the battery level (BAS) of the OTA app, the remote control sends the battery level [%] value to the STB.

-STB executes OTA only when the battery level of the remote control is 2.4V or higher.

-STB shows a pop-up window indicating that OTA is impossible for other battery levels.

~~Before upgrading, stop the audio stream.~~

-Before upgrade, turn off the back light.

2. When the OTA is upgraded, the GREEN LED turns on.

~~Blink time may change later~~

3. LED operation for OTA result (Judging whether OTA was successful before rebooting after OTA is completed)

-Success: GREEN LED blinks 3 times at 250ms intervals (ON: 250ms, OFF: 250ms)

* When the new f / w version and the old f / w version are different after the upgrade is completed

-Failure: RED LED blinks 3 times at 250ms intervals (ON: 250ms, OFF: 250ms)

* If the new f / w version and the old f / w version are the same after completing the upgrade

* BT connection fails after entering OTA mode

* BT connection is lost when upgrading (Battery removal, STB shutdown)

4. The OTA upgrade image is divided into app code and patch code.

-App code image file name definition by manufacturer

* RS: BRM_BA03_Vx.x.YYYYMMDD.bin

* MOVON: BMM_BA03_Vx.x.YYYYMMDD.bin

-Define patch code image file name (common to manufacturer)

* RTL_Bee2_Patch_Vx.x.x.x.bin

5. OTA image creation uses Realtek MP_PackTool.

* OTA AES256 key define by remote control manufacturer

RS

0x52,0x53,0x5F,0x52,0x44,0x31,0x32,0x46,

0x28,0x53,0x4B,0x42,0x5F,0x42,0x52,0x4D,

0x5F,0x42,0x41,0x30,0x33,0x29,0x5F,0x53,

0x6D,0x61,0x72,0x74,0x54,0x56,0x5F,0x58

MOVON

0x4D,0x4F,0x56,0x4F,0x4E,0x20,0x53,0x4B,

0x42,0x20,0x52,0x43,0x55,0x20,0x42,0x41,

0x30,0x33,0x97,0x0D,0xBE,0xEF,0xC0,0xD3,

0xD1,0x11,0xF6,0x8E,0x10,0x60,0xFB,0x1A

* Remote control manufacturer information

Address: 0x000002A00

Data Length: 8-bytes

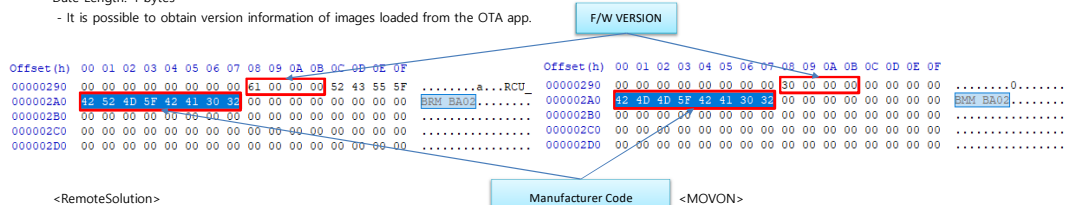
Manufacturer	OTA Manufacturer Code (ASCII)
RemoteSolution	BRM_BA03
Movon	BMM_BA03

* Remote control version information location in RCU f/w

Address: 0x000002908

Date Length: 4-bytes

- It is possible to obtain version information of images loaded from the OTA app.



TV Setup scenario

1. Manual setting

1-1. [스마트TV] + [외부입력] Press simultaneously for 3 seconds-> LED ON

→ TV start code transmission

1-2. 3-digit numeric button input (LED OFF when key input, LED ON when key release)

→ When the 3 digits entered are in the IR DB, the power off code of 3-Frame is transmitted, otherwise, the RED (regardless of battery level) LED is ON for 1 second and then the GREEN LED is ON.

→ However, when 0,0,0 is input, it is set as default (Samsung, LG) and at the same time, 3 times of LED Blink (ON: 250ms, OFF: 250ms), then the setting mode ends.

→ 1-2 ~ 1-3 can be repeated

1-3. Enter the [Play/Pause] key to complete the setting. At this time, LED 3 times Blink (ON: 250ms, OFF: 250ms)

→ TV termination code transmission

* Keys that can be entered except for numeric keys during manual setting

→ [TV전원] key: Sends a TV power off code 3 frame corresponding to a 3-digit number when input.

→ [채널+/-] key: Switch to Auto search mode (search starts from next / previous of the current setting number)

→ When other keys are input, exit the setting mode with output of the TV synchronization end code.

2. Auto Search (full DB search)

2-1. [스마트TV] + [외부입력] Press simultaneously for 3 seconds-> LED ON

→ TV start code transmission

2-2. Enter the [채널+] or [채널-] button.

→ Power off code transmission of 3-Frame (LED is OFF during code transmission, and remains ON when transmission is completed)

→ [채널+]: Power off code transmission of the next setting number

→ [채널-]: Power off code transmission of previous setting number

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4. Software Specification (7/15)

- > If the key is continuously input, the next or previous setting number is searched at about 500ms intervals and the power off code is automatically transmitted.
- > Even if the entire IR DB is looped, the search is still possible.
- 2-3. Enter the [Play/Pause] key to complete the setting. At this time, LED 3 times Blink (ON: 250ms, OFF: 250ms)
- ~~TV termination code transmission~~

- * Searchable keys except [채널+] and [채널-]
- > [TV전원] key: Sends the TV Power off code 3 frame of the set number searched when input.
- > Numeric keys: Switch to manual setting mode
- > When other keys are input, exit the setting mode with output of the TV synchronization end code.

3. Group Search (Brand DB search)

- 3-1. [스마트TV] + Press one of [1] ~ [9] keys simultaneously for 3 seconds-> LED ON
- ~~TV start code transmission~~
- 3-2. Enter the [채널+] or [채널-] button.
 - > Power-off code transmission of 3-Frame (LED is turned off during code transmission and keeps ON when transmission is completed)
 - > [채널+]: Power off code transmission of the next setting number
 - > [채널-]: Power off code transmission of previous setting number
 - > If the key is continuously input, the next or previous setting number is searched at about 500ms intervals and the power off code is automatically transmitted.
 - > Even if the IR DB of the group is looped, the search is still possible.
- 3-3. Enter the [Play/Pause] key to complete the setting. At this time, LED 3 times Blink (ON: 250ms, OFF: 250ms)
- ~~TV termination code transmission~~
- * Searchable keys except [CH +] and [CH-]
- > [TV전원] key: Sends the TV Power off code 3 frame of the set number searched when input.
- > When other keys are input, exit the setting mode with output of the TV synchronization end code.

- * The power-off code of the 3-Frame that is output when setting may differ depending on the TV. If necessary, the power-off code must be output in more than 3-Frame.
- * The waiting time for the setting mode is 15 seconds, and after this time, the setting mode ends with the TV sync code output. At this time, LED is blinked 10 times (ON: 100ms, OFF: 100ms).
- > Keep the previous setting.
- * After completing the setting, iSet integration is not possible.

IR code mode changing

- 1.Mode 1-> Mode 2 switching
 - 1-1. Press [*] + [9] keys simultaneously for 3 seconds
 - 1-2. Completed after 4 LED Blinks (ON: 250ms, OFF: 250ms)
- 2. Mode 2-> Mode 1 switching
 - 2-1. Press [*] + [9] keys simultaneously for 3 seconds
 - 2-2. Completed after 2 LED Blinks (ON: 250ms, OFF: 250ms)
- * IR code assignment after switching IR mode: see CodeTable

Code Read Out

- This function reads the 3 digit TV number set on the RCU.
- 1. Press [스마트TV] + [외부입력] key simultaneously for 3 seconds-> LED ON
- ~~TV start code transmission~~
- 2. Enter [원래메뉴] [편성표]-> LED OFF for about 1 second
- 3. The set 3 digit number indicates LED Blink.
 - > LED Blink time for each digit (ON: 250ms, OFF: 250ms)
 - > LED OFF time between digits: 1 second
 - > Digit "0" blinks 10 times
- 4. After the 3-digit setting number blinks, the TV sync exit code is transmitted.
- * The waiting time for the setting mode is 15 seconds, and after this time, the setting mode is terminated with the TV sync code output. At this time, LED is blinked 10 times (ON: 100ms, OFF: 100ms).
- * Any key input is ignored while this function is being executed.

Back Light operating scenario

- 1. ON condition
 - ON when remote pick-up or buzzer operation
 - ON when any key is input during audio playback (B / light is not ON when picked up)
 - If key input continues, enters OFF mode after 2 seconds
 - OFF when Find me (buzzer) is running (must be OFF even when ON)
- 2. ON time: It remains ON for 2 seconds, and OFF when there is no operation
 - 2 seconds extension when picking up before OFF
- 3. Voltage range: 2.4V or more
 - At a voltage less than 2.4V, it does not turn on even if the pick up or buzzer operates.
- * Detailed specifications: see "Backlight" tab

Stuck Key

- If any key is pressed for a certain period of time, code transmission is restricted to reduce battery consumption.
- 1. When any key is pressed for 2 minutes, the code (IR / BT) transmission is stopped.
- ~~When QS interlock key is input, code transmission stops after 30 seconds~~
- > In case of key combination in drag mode, code is stopped when pressed for 2 minutes.

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4. Software Specification (8/15)

2. Link operation after entering Stuck Key mode
- > ~~LED OFF~~ RED RED ON(OFF when all keys are released)
 - > Back light auto OFF, no reaction when pick up
 - > ~~Automatic shutdown when A2DP working~~
 - > ~~No operation when inserting ear-jack~~

* Find me should work.

BackLight manual ON/OFF setup

You can manually control the On / Off setting of the backlight.
Press [*] + [S] keys simultaneously for 3 seconds

1. Backlight ON setting (default)
- > When the backlight setting is Off, it is changed to the On state.
 - > Completed after 2 LED Blinks (ON: 250ms, OFF: 250ms)
2. Set backlight OFF
- > When the backlight setting is On, it is changed to the Off state.
 - > After 4 LED Blinks (ON: 250ms, OFF: 250ms)

Android Bug Report

- Set the Android Bug Report function.
Press the [이전] + [Play/Pause] keys simultaneously for 5 seconds
- > After 3 seconds of pressing the combination key, the LED will blink once (ON: 250ms, OFF: 250ms).
 - > Bug Report starts after 2 seconds after 1 LED blink.

RCU Version Read Out

This is a function to indicate the RCU F/W Version 2 digits as the number of LED blinks.

- Press the [스마트TV] + [외부입력] keys simultaneously for 3 seconds -> LED ON
- [통합전원] input -> LED OFF for about 1 second
- LED Blink indicates the 2-digit (major.minor) version.
 - > LED Blink time by version (ON: 250ms, OFF: 250ms)
 - > LED OFF time between versions: 1 second
 - > Version "0" blinks 10 times

* Setting mode standby time is 15 seconds, and after this time, setting mode is terminated. At this time, blink the LED 10 times (ON: 100ms, OFF: 100ms).

* Any key input while this function is being executed is ignored.

* Example: When F/W version is 1.2

- > LED blinks once
- > LED OFF for 1 second
- > LED blinks twice

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4. Software Specification (9/15)

iSet operation scenario

This function is to set the TV manufacturer code of the remote control automatically by using the EDID information of the TV.

1. Scenario after pairing

1.1 After pairing is completed, STB sends power status information to the remote control.

* STB power OFF state: STB screen off command (0x02)

* STB power ON state: STB screen on command (0x03)

The remote control stores the above information in memory and uses it for power and external input sync between STB and TV when the [Integrated Power] and [Btv Power] buttons are pressed.

1.2 STB sends the iSet Start command (0x01) to the remote control and waits for a response from the remote control (0x0100).

1.2.1 The remote control enables zero slave latency to speed up data reception (zero latency disable after success and failure (timeout))

1.2.2 The remote control has a timeout of 20 seconds after receiving the 0x01 command, in case there is no iSet operation of the STB.

When the timeout ends, the RCU responds with 0x0001.

1.3 After receiving the response (0x0100) of the remote control, STB sends EDID raw data (256 bytes) of the TV to the remote control.

1.3.1 STB is divided into 256 bytes of EDID data to be sent.

1.3.2 After receiving EDID data, the remote controller responds with 0x0100 and restarts the 20-second timer.

1.3.3 Check the received EDID length and if it exceeds 256 bytes, respond with 0x0007, end the 20-second timer, disable zero latency, and terminate the iSet.

1.4 After sending all EDIDs, STB sends the iSet Stop command (0x00) command and ends the iSet task.

1.4.1 The remote control disables the 20-second timer and disables zero slave latency.

1.4.2 Validate some attributes as shown below.

* When the data length is less than 128 or the number of extension blocks is greater than 0 and the length exceeds 256

NG response code: 0x0107-> ISET_ERROR_CODE_INVALID_EDID_LENGTH

* Header information is wrong (first 8 digits of EDID data)

NG response code: 0x0104-> ISET_ERROR_CODE_INVALID_EDID_FORMAT

* When CheckSum is wrong

NG response code: 0x0102-> ISET_ERROR_CODE_CHKSUM_ERROR

* If HDMI OUI is wrong

NG response code: 0x0104-> ISET_ERROR_CODE_INVALID_EDID_FORMAT

1.5 If the validity check is completed without abnormality, proceed as follows.

1.5.1 When VID is "0"

* Send OK response code (0x0005-> ISET_ERROR_CODE_UNKNOWN_VENDOR).

* Save VID, PID, HDMI port number in NVM and exit iSet.

1.5.2 When VID and PID are searched in EDID TABLE (When the PID of the table is 0xFFFF, only VID is searched.)

EDID TABLE example

```
/* Table structure
 * vid[2], pid[2], set_no[2] // ; VID & PID 는 EDID 1au data 순서로 기재한다.
 * end mark
 */
const byte IR_TV_EDID_TABLE[] = {
    TV_VID(0x4C2D), TV_PID(0x960B), SET_NUM(341), // SAMSUNG(SAM) - LFD TV(특히 전광판/광고용)
    TV_VID(0x4C2D), TV_PID(0xFFFF), SET_NUM(226), // SAMSUNG(SAM)
    TV_VID(0x1E16), TV_PID(0xFFFF), SET_NUM(227), // LG(LGSH)
    TV_VID(0x2134), TV_PID(0xFFFF), SET_NUM(9), // HITACHI(HIT)
    TV_VID(0x24C3), TV_PID(0xFFFF), SET_NUM(66), // JVC(JVC)
    TV_VID(0x40D9), TV_PID(0xFFFF), SET_NUM(194), // SONY(SHW)
    TV_VID(0x3409), TV_PID(0xFFFF), SET_NUM(95), // PANASONIC(WE1)
    TV_VID(0x5262), TV_PID(0xFFFF), SET_NUM(2), // TOSHIBA(TSB)
```

In the table above, if SET_NUM is not in F / W

* Send OK response code (0x0008-> ISET_ERROR_CODE_UNKNOWN_DEVICE).

* Save the VID, PID, and HDMI port numbers in NVM (optional) and exit iSet.

In the table above, if SET_NUM is within F / W

* Send OK response code (0x0000-> ISET_ERROR_NONE).

* VID, PID, and HDMI port numbers are stored in NVM.

* LED 3 times Blink (ON: 100ms, OFF: 100ms) and iSet is finished.

Note: The code of this setting number is used for power and external input synchronization between STB & TV.

1.5.3 When VID and PID are not searched in EDID TABLE

* Send OK response code (0x0005-> ISET_ERROR_CODE_UNKNOWN_VENDOR).

* Save VID, PID, HDMI port number in NVM and exit iSet.

1.6 The TV field (3-byte) of the response code is described in detail in Section 6 below.

2. Scenario when TV EDID is changed (TV change or HDMI port change)

Even if the previous EDID data (256 bytes) and the currently read EDID data 1 byte are different

Proceed from Section 1.2 of "Post-Pairing Scenario".

However, if the VID and PID are the same and the HDMI port is changed, there is no LED blink.

3. Scenario after BT reconnection

After the BT reconnects, the STB sends STB power status information to the remote control as in section 1.1 above.

* STB power OFF state: STB screen off command (0x02)

* STB power ON state: STB screen on command (0x03)

~~If the change of EDID is confirmed, follow item 2 above.~~

After that, the STB sends EDID data to the remote control (always with or without change).

4. Scenario according to STB [Integrated Power] button operation (BT connected state)

When the [Integrated Power] button is input while BT is connected, the TV power (toggle, ON, OFF) code is sent according to the current STB power state.

Also, when it turns ON from STB OFF, it sends TV INPUT code 3 times repeatedly to switch HDMI port to STB.

BT disconnected state is output in the order of STB power cord (IR)-> TV power toggle code-> STB version code (IR).

4.1 Enter the [All Power] button

The remote control checks the existence of the "TV power ON and OFF" code (discrete) in the TV manufacturer's setting number set in the EDID table.

4.1.1 When the TV power Discrete code (ON, OFF) is present, send the TV power cord as follows according to the STB power state.

STB power ON status: STB power cord (BT/IR) transmission -> TV power OFF code transmission -> STB version code (IR)

STB power OFF status: STB power cord (BT/IR) transmission -> TV power ON code transmission -> STB version code (IR) -> MACRO (TV INPUT)

* MACRO output order

1. Send TV INPUT code 2 seconds after inputting [Integrated power]

2. Send TV INPUT code 3 seconds after above 1

3. Transmit and terminate the TV INPUT code 5 seconds after the above 2

* Macro output is available only when the TV INPUT code is discrete (no output when there is no discrete code)

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4. Software Specification (10/15)

* During the TV INPUT code macro output, the LED turns ON.

* If EDID is received during TV INPUT code macro output, macro output is stopped.

4.1.2 Discrete code does not exist

STB power cord (IR)-> TV power toggle code-> STB version code (IR).

4.2 STB screen ON / OFF command reception

Save screen status information from STB

* During TV INPUT code transmission, when TV power OFF code is transmitted, TV INPUT code transmission is stopped.

5. Scenario according to STB [Btv power] button operation

If there is HDMI discrete code regardless of BT connection or not, send the TV INPUT code at the [Btv power] button to synchronize the external input.

5.1 [Btv Power] button input

STB power cord (BT) transmission-> TV INPUT code transmission and termination after 1 second

5.2 The remote control transmits the corresponding code when there is an HDMI discrete code of the set TV.

-No TV INPUT code transmission

6. i-Set Command Response Code "TV" Field Operation Scenario

This is a function to transmit the currently set TV tuning code to the STB, and the type and setting number set in the TV field (3-byte) are loaded.

6.1 When receiving EDID of TV starting with i-Set Start cmd (0x01)

6.1.1 i-Set TV setup OK: "0x00" in TV Type field and synchronized code allocation by EDID in TV code field

TV Type: 0x00

TV Code: 0x0140 (320)-When the TV setting number set to EDID is 320

6.1.2 i-Set TV setup NG: Allocate the last set type (0x01 or 0x02) and tuned code in the TV Type field

Example 1: User manually tuned 350 times

TV Type: 0x01

TV Code: 0x015E (320)

Example 2: When the user has learned (Manual tuning code is 350)

TV Type: 0x02

TV Code: 0x015E (320)

6.2 For STB request: i-Set Get TV code cmd (0x04)

6.2.1 When the remote control receives the above command (0x04) from the STB, it should send a response code within 5 seconds.

6.2.2 "Result" and "Error Code" fields are assigned as 0x01 and 0x00.

6.2.3 The "TV Type" field is assigned one of 0x00 (iSET), 0x01 (Manual), and 0x02 (IR Learning) according to the method in which the TV is tuned.

6.2.4 The "TV Code" field assigns the currently tuned code.

7. 기타

7. Other

7.1 If TV manufacturer code is set manually after iSet setup

* iSet function disable: Operates regardless of STB power status.

7.2 When VID & PID are connected to another TV, iSet setting and STB interlocking operation should be performed.

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4. Software Specification (11/15)

Smart TV control operation scenario

1. How to switch smart TV control mode

1.1 When the [스마트TV] button is input, the following key code is transmitted and switched at the same time

- Smart home (IR) of the synchronized (manual, automatic, learning) TV
- Smart TV control mode (IR/BT)
- Btv Break code (BT) - BT unconnected status (IR) is not transmitted

* Pairing proceeds in unpaired state (no smart TV mode conversion).

* If the 'smart home' IR code of the TV does not exist, the 'smart TV control' mode will not be switched.

1.2 Controllable Buttons

- Includes TV-only button(s) as well as [이전] and [나가기] buttons.
- * 12 buttons: [TV전원], [외부입력], [TV음량+/-], 4-way, [Play/Pause], [스마트TV], [이전], [나가기]
- * The upper button always maintains TV mode in TV control mode.

Note: When the external input button is input, the 5-second timer does not run (because it is already in TV mode).

* It should be IR learning.

2. How to switch Btv control mode

2.1 [Home] button input

- Exit (IR) of the tuned TV
 - Btv control mode (IR/BT)
 - Btv Break/Release code (IR/BT)
 - Btv Home (IR/BT)
 - Btv Break/Release code (IR/BT) - BT unconnected status (IR) is not transmitted
 - HDMI discrete code (IR) of the tuned TV after 300ms - Transmitted only when discrete code exists in the state of BT connection and iSet synchronization
- * If the [Home] button is input after changing to the Btv control mode, the 'Btv Home' key code is transmitted. (No macro transmission)

2.2 Special purpose button input

- Apply button: NUGU, GA (BA03), schedule, ZEM kids, shortcut
- Transition method: same logic as Btv home button (instead of sending home button, sending the corresponding Btv keycode)

2.3 Btv dedicated button repeat input

- Applied buttons: Btv dedicated buttons (numbers 0~9), *, #, favorite channels, channels +/-, REW (Red), FF (Blue), Btv volume +/-, mute
- How to switch
 - . When the target button is repeatedly inputted 3 times within 60 seconds, it switches to Btv mode (same macro as the Btv home button. However, the corresponding key code is transmitted instead of the home key)
 - . Only the corresponding key code is transmitted normally until you enter it twice within 60 seconds.
 - . Input the smart TV control mode target button (see Section 1.2) within 60 seconds, or reset the count 3 times when the last input exceeds 60 seconds

2.4 Enter number + [Play/Pause] button

- Apply button: number button (0~9)
- How to switch
 - . When the [Play/Pause] button is input after inputting the number buttons (0~9), it switches to Btv mode (same macro as the Btv home button with the [Play/Pause] button key code)
 - . It operates when the [Play/Pause] button is input after entering the number button once, or when the [Play/Pause] button is input after entering the number button twice. (In case of input 3 times, it is changed to Btv mode by operation of section 2.3)

2.5 In case of switching to other Btv control mode

- When H/W reset occurs, Btv mode is default.
- When [통합전원] is input
- In case of TV synchronization (manual, automatic)
- Factory reset (including unpairing)

3. Notification while using TV mode

3.1 Transmission of key code (IR/BT) indicating 'TV control mode'

- Apply button: 4-way button, [Play/Pause], [이전], [나가기]
- Transmission method: When the button is pressed and released, it is transmitted (repeated when the corresponding key is pressed 5 times)
- Count is cleared because it is converted to Btv control mode during factory reset.

3.2 Buzzer sound indicating 'TV control mode'

Apply button: numbers (0~9), *, #, favorite channel, channel +/-, REW, FF

Buzzer Specification: Refer to 'RCU 'Smart TV' Warning Buzzer Operation Specification' of Buzzer Spec

4. LED Color Operation Scenario

4.1 Btv Control Mode: Green

Green is lit even when the TV dedicated button is input

4.2 Smart TV control mode: Blue -> Only the button that transmits the TV code turns blue

Green turns on when Btv dedicated button is input

4.3 When the battery voltage is below the low voltage (including empty), Red is always on regardless of the control mode.

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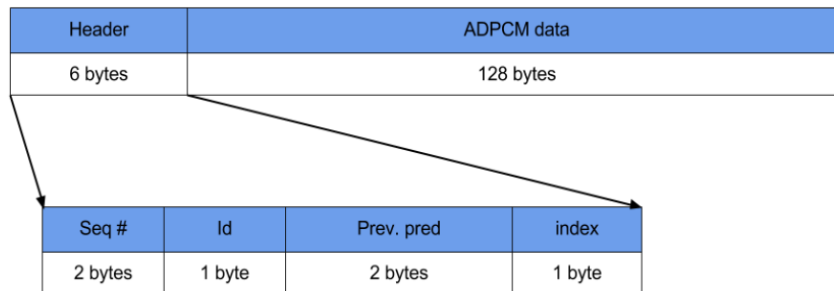
4. Software Specification (12/15)

Android TV Voice (Google Voice)

Type	Short-form	UUID	Properties
Service	ATVV_SERVICE_UUID	AB5E0001-5A21-4F05-BC7D-AF01F617B664	
Write Characteristic	ATVV_CHAR_TX	AB5E0002-5A21-4F05-BC7D-AF01F617B664	Write
Read Characteristic	ATVV_CHAR_RX	AB5E0003-5A21-4F05-BC7D-AF01F617B664	Notify
Control Characteristic	ATVV_CHAR_CTL	AB5E0004-5A21-4F05-BC7D-AF01F617B664	Notify

* VOICE DATA - ATVV_CHAR_RX

NUM	Field	Description	Values	Size	Direction
1	Opcode	Notification	0x1B	1byte	RCU -> STB
2	Att Handle	Handle	0x0000 ~ 0xFFFF	2byte	
3	Att Value	Seq #	0x0000 ~ 0xFFFF	2byte	
4		Id	0x00 ~ 0xFF	1byte	
5		Prev pred	0x0000 ~ 0xFFFF	2byte	
6		Index	0x00 ~ 0xFF	1byte	
7		ADPCM Data	0x00 ~ 0xFF	128byte	



Header type	
Seq #	Sequence number of audio frame. Monotonically increasing until rollover.
Id	Remote control id. Will expand on this. [TODO]
Prev pred	Previous predicted ADPCM value
Index	Index into step size table

* AUDIO STOP - ATVV_CHAR_CTL

NUM	Field	Description	Values	Size	Direction
1	Opcode	Notification	0x1B	1byte	RCU -> STB
2	Att Handle	Handle	0x0000 ~ 0xFFFF	2byte	
3	Att Value	Command	0x00	1byte	

* AUDIO START - ATVV_CHAR_CTL

NUM	Field	Description	Values	Size	Direction
1	Opcode	Notification	0x1B	1byte	RCU -> STB
2	Att Handle	Handle	0x0000 ~ 0xFFFF	2byte	
3	Att Value	Command	0x04	1byte	

* DPAD SELECT - ATVV_CHAR_CTL

NUM	Field	Description	Values	Size	Direction
1	Opcode	Notification	0x1B	1byte	RCU -> STB
2	Att Handle	Handle	0x0000 ~ 0xFFFF	2byte	
3	Att Value	Command	0x07	1byte	

* START SEARCH - ATVV_CHAR_CTL

NUM	Field	Description	Values	Size	Direction
1	Opcode	Notification	0x1B	1byte	RCU -> STB
2	Att Handle	Handle	0x0000 ~ 0xFFFF	2byte	
3	Att Value	Command	0x08	1byte	

* AUDIO SYNC - ATVV_CHAR_CTL : Not Implemented

NUM	Field	Description	Values	Size	Direction
1	Opcode	Notification	0x1B	1byte	RCU -> STB
2	Att Handle	Handle	0x0000 ~ 0xFFFF	2byte	
3	Att Value	Command	0x0A	1byte	
4		frame_num	0x0001 : exact frame number.	2byte	

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4. Software Specification (13/15)

* GET_CAPS_RESP - ATVV_CHAR_CTL

NUM	Field	Description	Values	Size	Direction
1	Opcode	Notification	0x1B	1byte	RCU -> STB
2	Att Handle	Handle	0x0000 ~ 0xFFFF	2byte	
3	Att Value	Command	0x0B	1byte	
4		version	0x0004 : (ver0.4)	2byte	
5		codecs_supported	0x0001 [0000_0001B]: ADPCM, 8khz/16bit (default) 0x0003 [0000_0011B]: ADPCM (8khz/16bit & 16khz/16bit) (future) 0x0005 [0000_0101B]: Opus and ADPCM 8khz/16bit 0x0007 [0000_0111B]: Opus and ADPCM (8khz/16bit & 16khz/16bit)	2byte	
6		bytes/frame	0x0086 (134 bytes, default) (future) DLE-dependent	2byte	
7		bytes/characteristic	0x0014 (20 bytes, default) (future) DLE-dependent	2byte	

* MIC_OPEN_ERROR - ATVV_CHAR_CTL

NUM	Field	Description	Values	Size	Direction
1	Opcode	Notification	0x1B	1byte	RCU -> STB
2	Att Handle	Handle	0x0000 ~ 0xFFFF	2byte	
3	Att Value	Command	0x0C	1byte	
4		error_code	0x0F01 : invalid codec 0x0F02 : Remote timed out waiting for Mic_open() 0x0F03 : Invalid State; already streaming audio	2byte	

* ATV_GET_CAPS - ATVV_CHAR_TX

NUM	Field	Description	Values	Size	Direction
1	Opcode	Write Request	0x12	1byte	STB -> RCU
2	Att Handle	Handle	0x0000 ~ 0xFFFF	2byte	
3	Att Value	Command	0x0A	1byte	
4		version	0x0005 : (ver0.5)	2byte	
5		codecs_supported	0x0001 [0000_0001B]: ADPCM, 8khz/16bit (default) 0x0003 [0000_0011B]: ADPCM (8khz/16bit & 16khz/16bit) (future) 0x0005 [0000_0101B]: Opus and ADPCM 8khz/16bit 0x0007 [0000_0111B]: Opus and ADPCM (8khz/16bit & 16khz/16bit)	2byte	

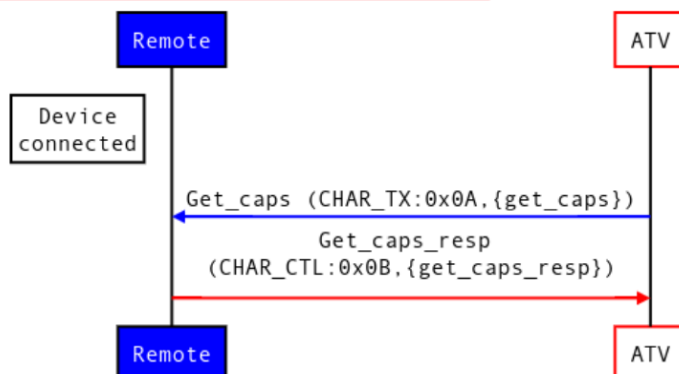
* ATV_MIC_OPEN - ATVV_CHAR_TX

NUM	Field	Description	Values	Size	Direction
1	Opcode	Write Request	0x12	1byte	STB -> RCU
2	Att Handle	Handle	0x0000 ~ 0xFFFF	2byte	
3	Att Value	Command	0x0C	1byte	
4		codec_used	0x0001 [0000_0001B]: ADPCM, 8khz/16bit (default) 0x0002 [0000_0010B]: ADPCM 16khz/16bit (future) 0x0004 [0000_0100B]: Opus	2byte	

* ATV_MIC_CLOSE - ATVV_CHAR_TX

NUM	Field	Description	Values	Size	Direction
1	Opcode	Write Request	0x12	1byte	STB -> RCU
2	Att Handle	Handle	0x0000 ~ 0xFFFF	2byte	
3	Att Value	Command	0x0D	1byte	

BLE Voice (ATV-Remote) Initialization

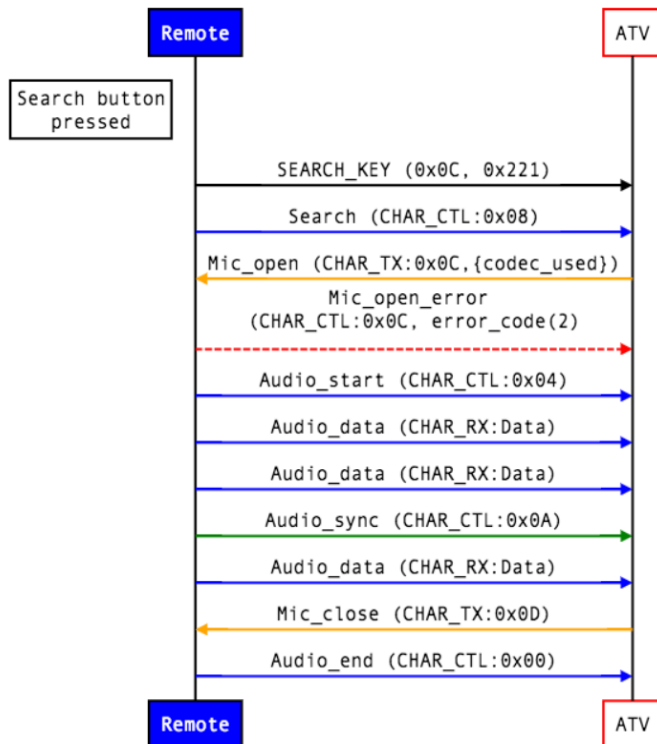


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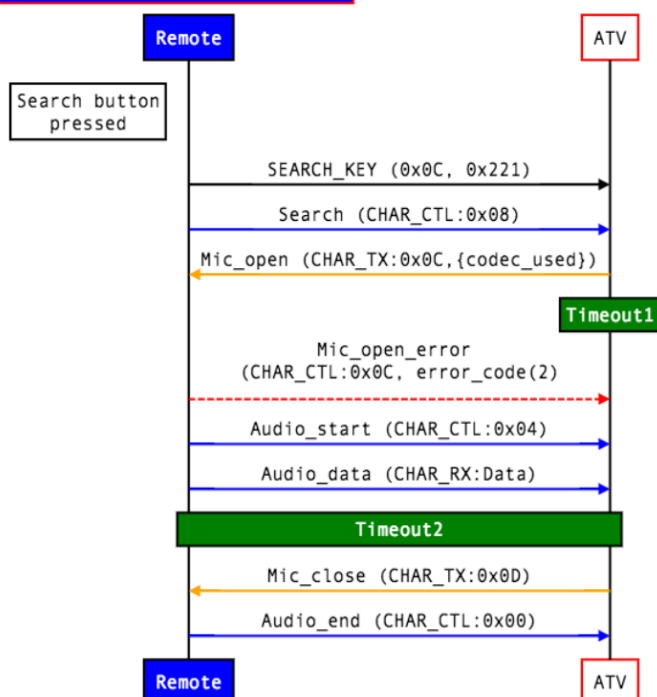
INSTITUTION : 2021.05.24	SPECIFICATION (TRANSMITTER REMOCON)	MODEL NO :	22
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4. Software Specification (14/15)

BLE Voice (ATV-Remote) Voice search



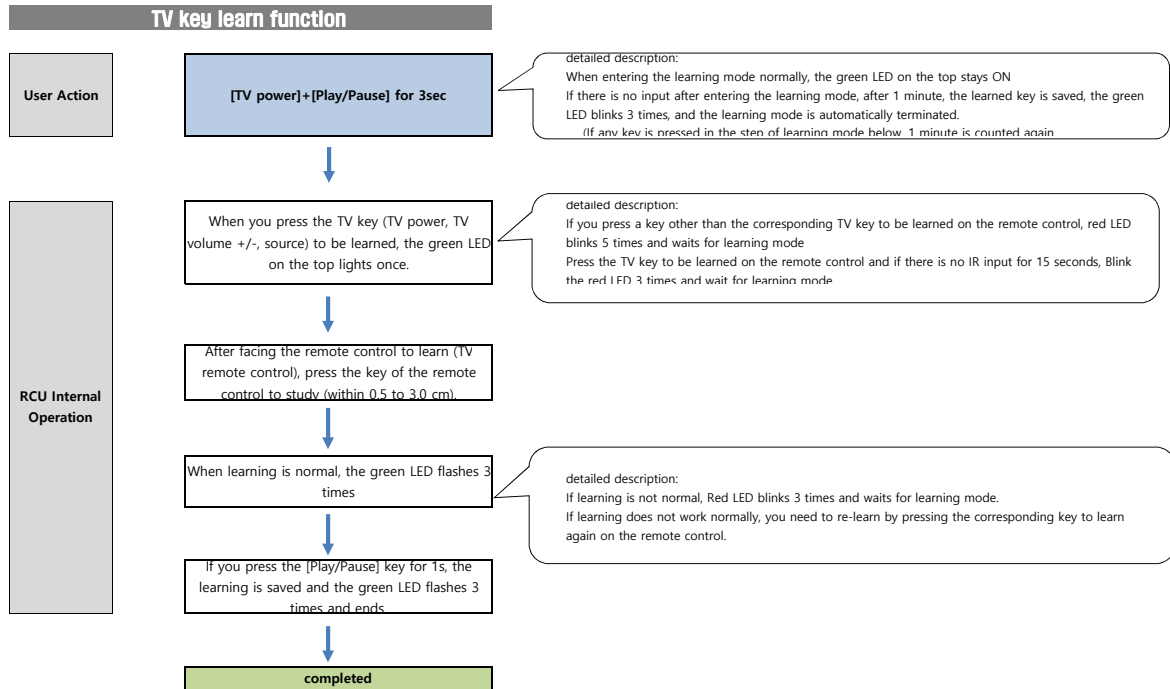
BLE Voice (ATV-Remote) Timeouts



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4. Software Specification (15/15)



* However, when low battery, flashing of green LED is replaced with red

Learnable keys: [TV전원], [TV음량 +/-], [외부입력], [UP], [DOWN], [LEFT], [RIGHT], [Play/Pause], [스마트TV], [이전], [나가기]

* In the case of [Play/Pause] key, there is a button for learning and a function to end learning. If it is input for more than 1.5 seconds, the learning mode is terminated :

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5. Part List

5.1 Mechanical List

No.	Part Name	Spec	Q'ty	Maker	비고
1	TOP CASE	ABS HF-0680, K21383(BLACK), SILK1	1	일상전자	
2	BOTTOM COVER	ABS HF-0680, K21383(BLACK)	1	일상전자	
3	BATTERY COVER	ABS HF-0680, K21383(BLACK)	1	일상전자	
4	IR WINDOW	PC SC-1220R, 40697 B(D/RED)	1	일상전자	
5	CH VOL KNOB	ABS HF-0680, K21383(BLACK), SILK1	1	일상전자	
6	INDICATOR LED	PC LD7800, W1020J(MIKY) / TP-1020, LDW542(MILKY)	1	일상전자	
7	SIDE KEY MUTE	ABS HF-0680, K21383(BLACK), SILK1	1	일상전자	
8	SIDE KEY VOLUME	ABS HF-0680, K21383(BLACK), SILK1	1	일상전자	
9	RUBBER KEYPAD	SILICONE, COLOR2(CLEAR, YELLOW), SILK5, SPRAY2, LASER, SF COATING	1	RS HK TAESUNG	
10	METAL DOME SHEET	Φ5DR, 110G, 35KEY	1	제이앤티	
11	(+)SPRING	SUS 304 NI-CO Φ0.6	1	대성하이텍	
12	(-)SPRING	SUS 304 NI-CO Φ0.6	1	대성하이텍	
13	COMMON SPRING	SUS 304 NI-CO Φ0.6	1	신광스프링	
14	MESH	MESH, RC56,0.05T	1	엠에스 전자부품	
15	PE BAG	80X265X0.08T, RECYCLE MARK	1	건아테크	
16	CARTON BOX	553*415*282 (80EA/1Box)	0.0125	대흥포장	
17	BACK LABEL	BOPP,30X42,SILK2	1	탐인쇄	
18	MANUAL	SMILAR PAPER,250X170	1	아침인쇄	
19	LABEL	ART PAPER, 16X4	1	탐인쇄	
20	PASS LABEL	ART PAPER,15X30,SILK2	1	탐인쇄	
21	TAPE	TAPE, RB50	1	제이앤티	
22	Alkaline Battery	ALKALINE BATTERY, 1.5V LR6, AA	2	HUATAI BEXEL ROCKET DURACELL	

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5.2 Electronical Part List

No	Components Name	Components Spec	Manufacturer	Quantity	Reference
1	Antenna Chip	ACA3216A1CCS	Inpaq	1	ANT1
2	Buzzer SMD	BM9027S HR-9027BT3S2 KDM-09D-3V BMY-2703	FHD Bosan HS Tech	1	BZ1
3	Electrolytic Capacitor SMD	47UF,16V,±20%,5053	Samhwa Samyoung	1	CE1
4	Ceramic Capacitor Chip	1.2PF,NP0,±0.25PF,1005	MURATA	2	C5,C6
5	Ceramic Capacitor Chip	22PF,C0G,±5%,1005	TDK	1	C2
6	Ceramic Capacitor Chip	100PF,C0G,±5%,1005	Samsung	1	C28
7	Ceramic Capacitor Chip	150PF,X7R,±10%,1005	YAGEO	1	C27
8	Ceramic Capacitor Chip	10NF,X5R,±10%,1005	Taiyo-uden	1	C34
9	Ceramic Capacitor Chip	100NF,10V,X7R,±10%,1005	WALSIN	9	C7,C8,C9,C10,C21,C23,C25,C30,C31
10	Ceramic Capacitor Chip	1UF,X5R,±10%,1005	Darfon	6	C1,C17,C19,C20,C22,C24
11	Ceramic Capacitor Chip	2.2UF,X5R,±10%,1005	samhwa	1	C18
12	Ceramic Capacitor Chip	10UF,6.3V,X5R,±20%,1005	ABCO	10	C11,C12,C13,C14,C26,C29,C32,C33,C35,C36
13	Resistor Chip	0 OHM,1/16W,±5%,1005	YAGEO	3	R1,L1,R4
14	Resistor Chip	2 OHM,1/16W,±5%,1005	TYCO	1	FB1
15	Resistor Chip	2 OHM,1/10W,±5%,1608	Cosmetech	1	R52
16	Resistor Chip	2.7 OHM,1/10W,±5%,1608	Samsung	1	R17
17	Resistor Chip	180 OHM,1/16W,±5%,1005	ROHM	1	R30
18	Resistor Chip	270 OHM,1/16W,±5%,1005	TA-I	5	R41,R46,R47,R48,R49
19	Resistor Chip	300 OHM,1/16W,±5%,1005	WALSIN	1	R9
20	Resistor Chip	330 OHM,1/16W,±5%,1005	PILKCOR	5	R31,R33,R34,R42,R43
21	Resistor Chip	470 OHM,1/16W,±5%,1005	Fenghua	6	R20,R21,R22,R23,R50,R53
22	Resistor Chip	560 OHM,1/16W,±1%,1005	AVX	7	R27,R28,R29,R36,R37,R38,R39
23	Resistor Chip	1K OHM,1/16W,±5%,1005	Murata	1	R16
24	Resistor Chip	2.7K OHM,1/16W,±5%,1005	TDK	1	R56
25	Resistor Chip	4.7K OHM,1/16W,±5%,1005	Taiyouden	3	R2,R3,R5
26	Resistor Chip	10K OHM,1/16W,±5%,1005	Darfon	3	R8,R10,R12
27	Resistor Chip	18K OHM,1/16W,±1%,1005	Eyang	1	R7
28	Resistor Chip	33K OHM,1/16W,±5%,1005	KEMET	1	R19
29	Resistor Chip	47K OHM,1/16W,±5%,1005	Kyocera	2	R11,R15
30	Resistor Chip	82K OHM,1/16W,±5%,1005	Murata	1	R13
31	Resistor Chip	100K OHM,1/16W,±5%,1005	TDK	6	R18,R24,R25,R26,R51,R54
32	Resistor Chip	820K OHM,1/16W,±5%,1005	Sunlord	1	R14
33	Inductor Chip	3.3NH,±0.3NH,1005	INPAQ	1	L2
34	Inductor Chip	3.9NH,±0.3NH,1005	KEXIN	1	C3
35	Power Inductor Chip	PCLS2012-2R2M(2.2UH,1A)	LRC	1	L3
36	Power Inductor Chip	10UH,±10%,2012	PANJIT	1	L4
37	FET N-CH	2KK5009(SOT23) L2N7002SLT1G(SOT23) 2N7002K(SOT23) PIA3430(SOT-23) MMBT7002K(SOT23)	KEC	4	Q7,Q8,Q9,Q10
38	NPN Transistor Chip	FTC8050H(SOT23) MMBT5D123(SOT23) STD123S(SOT23) KST8050(SOT23) SS8050(SOT23)	IMS	6	Q1,Q2,Q3,Q4,Q5,Q6
39	Switching Diode Chip	1N4148WS(SOD323)	Semtech	1	D1
40	Schottky Diode Chip	1KK2104(SOD123) MBR0540W-HAF(SOD123FL) MBR0540T1-D(SOD123) MBR0540(SOD123)	UTC	1	D2
41	IR LED SMD	I BIR-HMC33M-TRC-SIDE(30DEG) IR26-61C-L510-R-2G (30DEG)	Vishay	1	IR1
42	RGB LED Chip	YLS191RGB2206A-C (1616)	First silicon	1	LED1
43	White LED	BL-HZ336G-L8-TRB(WHITE,T4-4J,1608) 27-21/T1D-KPQHY/3C (1608,WHITE)	Bright LED	18	LED2,LED3,LED4,LED5,LED6,LED8,LED9,LED11,LED12,LED13,LED14,LED16,LED17,LED18,LED21,LED22,LED23,LED24
44	Analog Microphone SMD	ZTS6151 AOS3729A-R38-NTM	Everight	1	MIC1
45	Tact Switch SMD	PTS099160(1.6N,R/A) SKRTLAE010(1.6N,R/A)	Hong-Li	4	KB15,KB22,KB28,KB34
46	Photo Transistor Chip	PT12-21B-TR8(SMD,R/A) BPT-HPG33A-TRB	ALPS	1	PT1
47	Bluetooth IC	RTL8762CKF(QFN48)	Bright LED	1	U1
48	Accelerometer IC	LIS2DH12TR(LGA-12) LIS2DE12TR(LGA-12)	Realtek	1	U2
49	Boost Converter IC	SYV7070 TPS61097A-33DBVR IM8132S	STM	1	U3
50	Crystal SMD	40MHZ,±10PPM,9PF,2016 40MHZ,7R40000002_S1,2016	SILERGY	1	X1
51	PCB	RD12E,F(FR-4, 4L,1.2T,OSP,CARBON)	TI	1	

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(TRANSMITTER REMOCON)

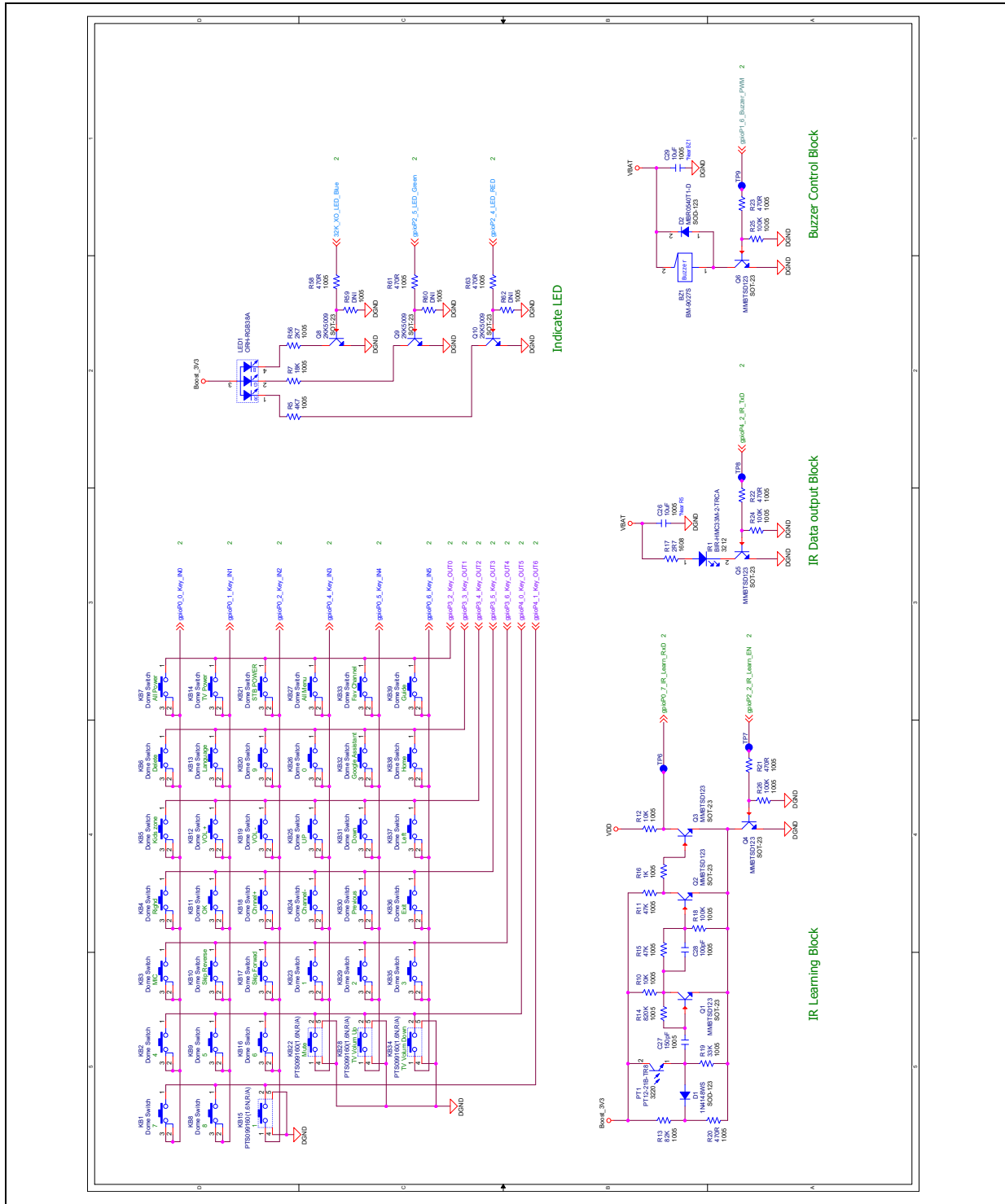
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6.2 Keys / IR Learning / IR TxD / Buzzer PART



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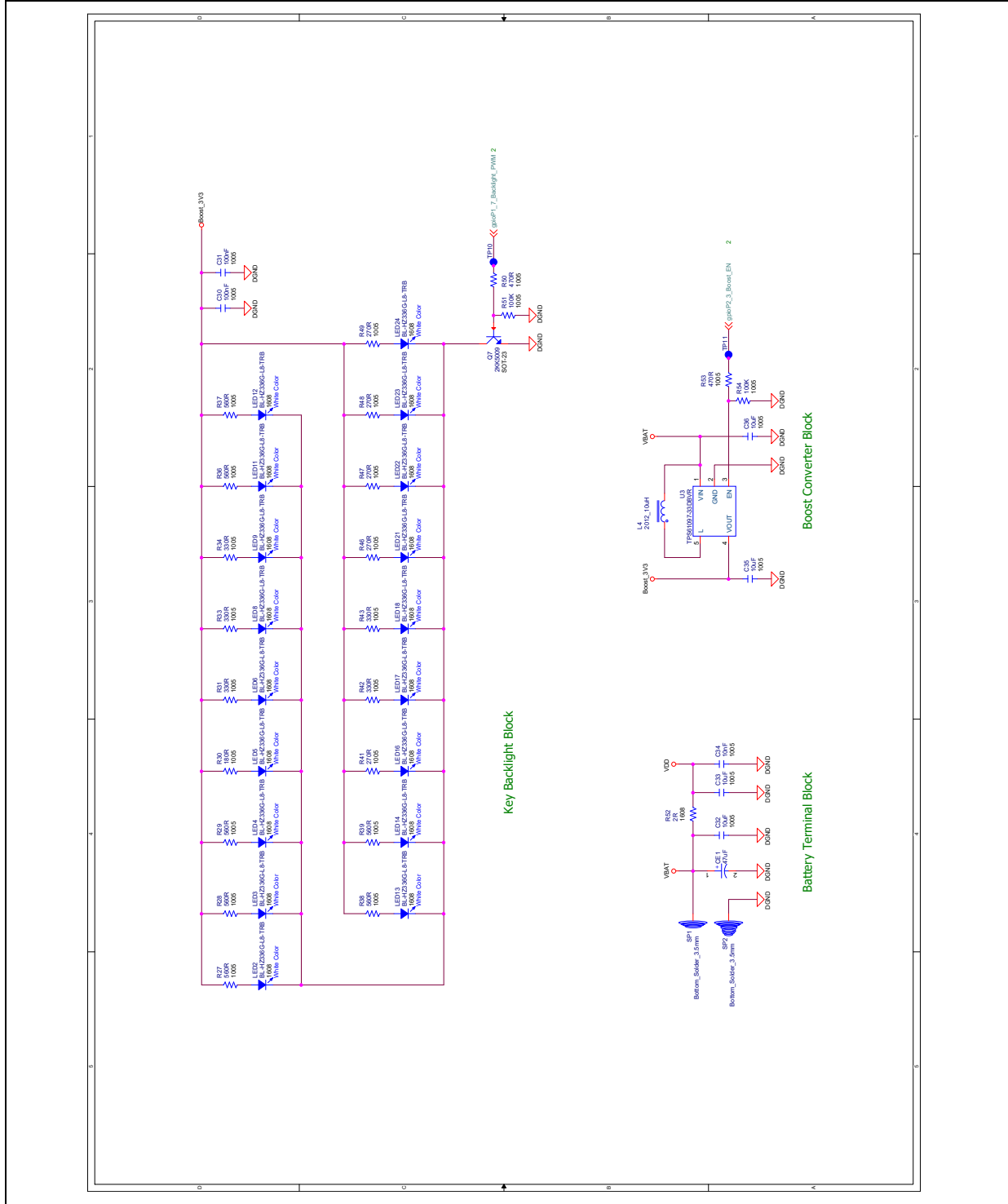
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6.3 Backlight / Battery Terminal Part



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(TRANSMITTER REMOCON)

MODEL NO :

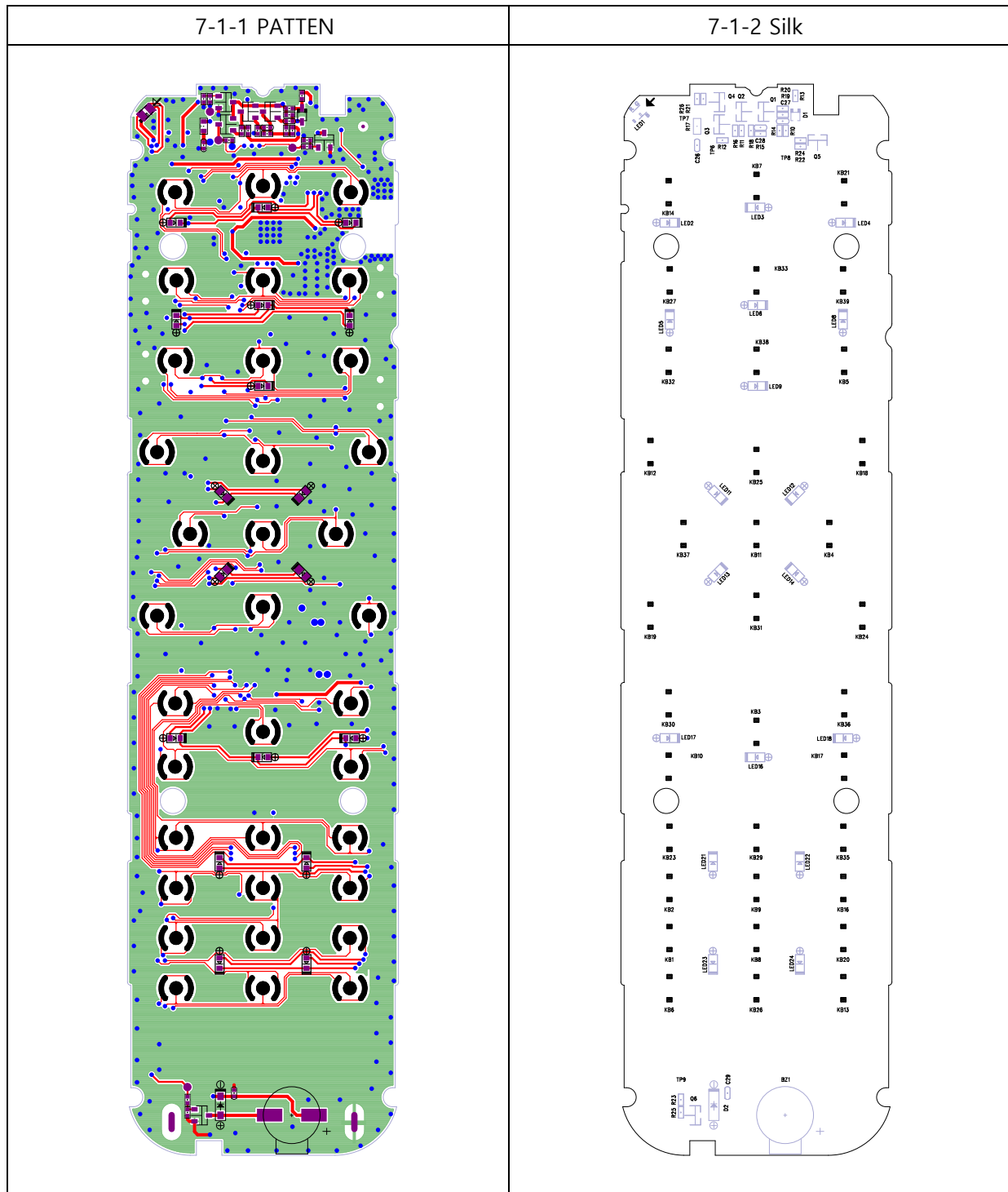
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7. PCB Diagram

7.1 TOP PCB (1/3)



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7.2 BOTTOM PCB (2/3)

7-1-3 PATTEN	7-1-4 Silk
1BL-3096D RD12E/F SKB REMOTE SOLUTION 2021.04.28 MP100.0 UM-3 "AA" / LR06 UM-3 "AA" / LR06 R001	1BL-3096D RD12E/F SKB REMOTE SOLUTION 2021.04.28 MP100.0 UM-3 "AA" / LR06 UM-3 "AA" / LR06 R001

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7.3 MAIN PCB (3/3)

7-1-5 Drill Chart

SIZE	QTY	SYM	PLATED	TOL
0.3	513	+	YES	+/-0.0
0.8 x 3	2	×	YES	+/-0.0
0.5	8	□	YES	+/-0.0
0.8	8	◇	NO	+/-0.0

7-1-6 Main PCB 사양

1) PCB Material : FR4, 4-Layer

2) PCB Thickness : 1.2T

3) Copper Foil Thickness :

- Out Layer 0.5 OZ

- Inner Layer 1 OZ

4) PCB Size

Single - 42.7_mm x 168.8mm

Array – 132.6_mm x 188.85_mm (5 In 1)

5) SilkScreen Color : White

6) PSR Ink Color : Green

7) Surface : OSP

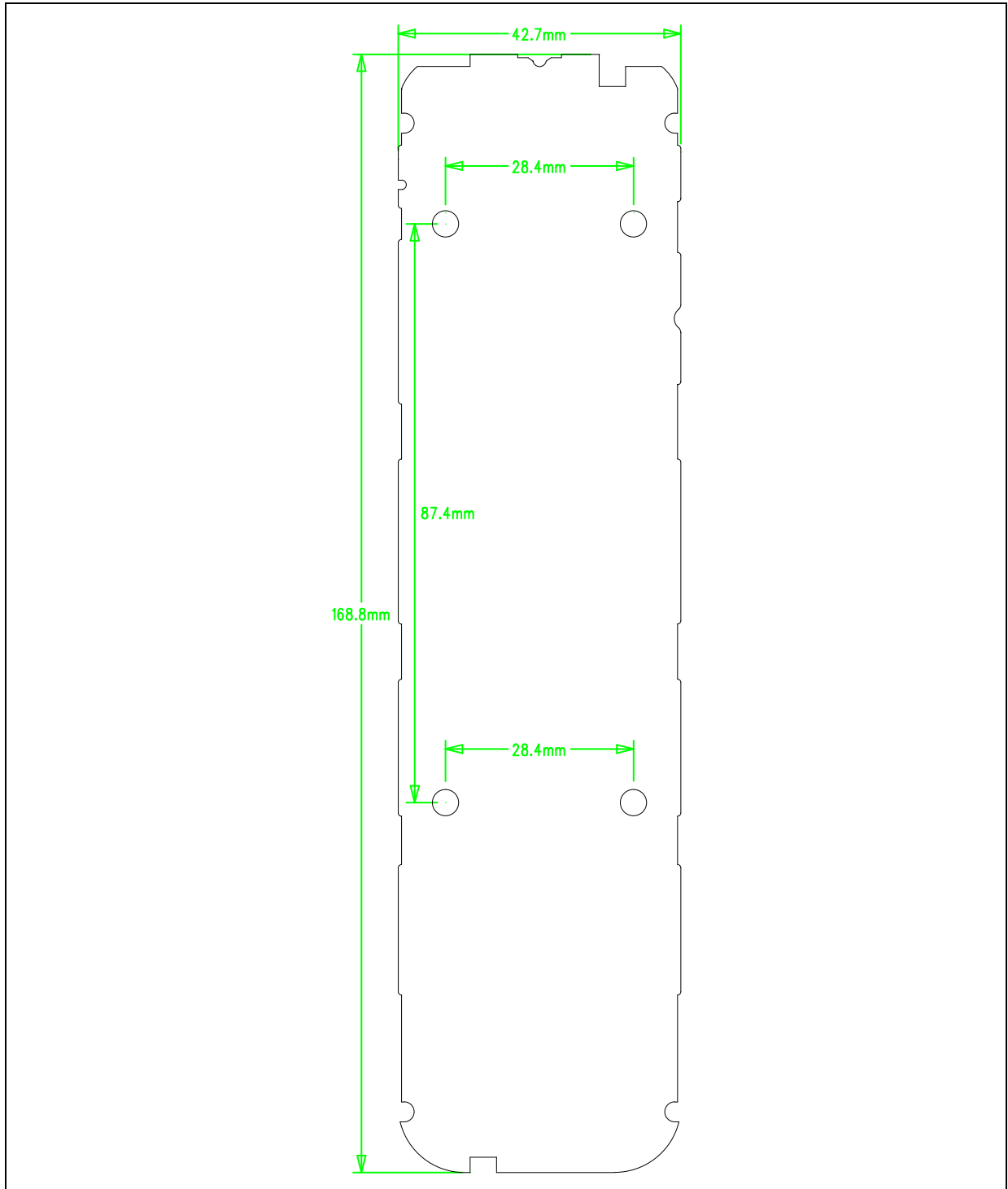
8) Dome Key : Carbon

9) PCB Version : 1BL-3096D

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8. PCB Outline Specification – Main PCB

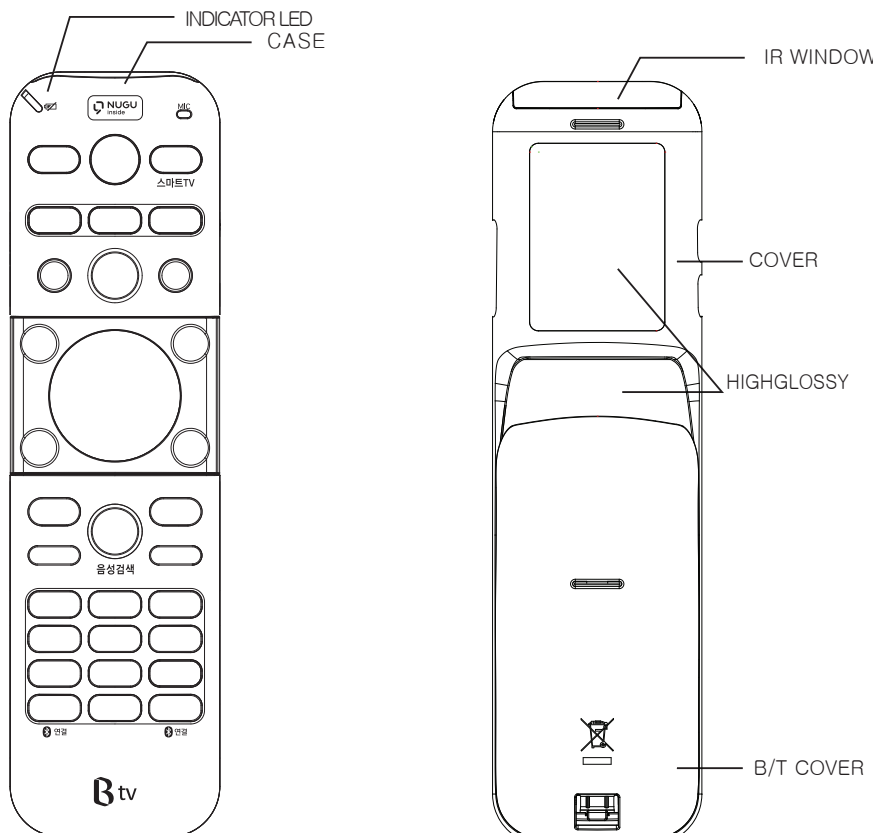


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9. Design & Mechanical Specification

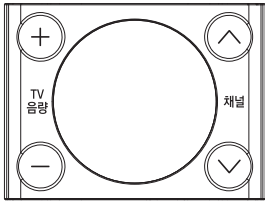
9. Design (1/5) – Mold

DESIGN SPECIFICATION	Model : RD12F00
	
1. MOLD	
1.1 MOLD COLOR * CASE, B/T COVER : ABS, HF-0680, K21383(Black), TEXTURE * COVER : ABS, HF-0680, K21383(Black), TEXTURE & HIGH GROSSY * IR WINDOW : PC, SC-1220R, 40697B(D/Red), HIGH GROSSY	
1.2 SILK COLOR * COOLGREY 3C	

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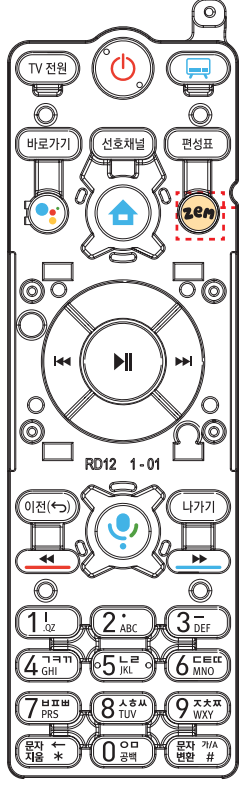
9. Design (2/5) – KNOB

DESIGN SPECIFICATION		Model : RD12F00
 CH/VOL KNOB  SIDE KNOB		
2.KNOB		
2.1 MOLD COLOR * ABS, HF-0680, K21383(Black), TEXTURE		2.2 SILK COLOR * COOLGREY 3C

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9. Design (3/5) – RUBBER

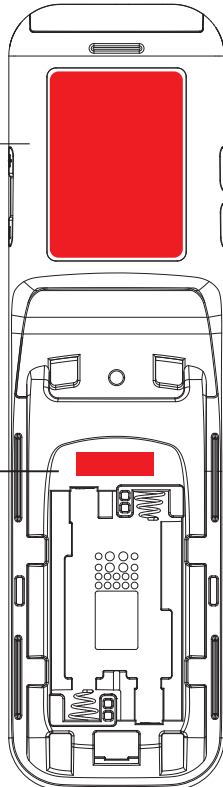
DESIGN SPECIFICATION		Model : RD12F00
 3.1.1 RD12 1-01 ALL BACK LIGHTING	P/T 7619C(RED)    P/T 7724C(GREEN)   P/T 123C(YELLOW)  P/T 660C(BLUE)      BLACK  TV 전원 바로가기 선택채널 편성표 이전(←) 나가기 COOLGREY 3C 1 2 3 4 5 6 7 8 9 문자 ← 0 → 문자 가/A 자음 * 공백 변환 #	
	3.2 SPRAY & SILK COLOR COOLGREY 3C SPRAY SILK-7619C,7724C,123C,660C,BLACK BLACK SPRAY LASER ETCHING SOFT COATING	
3.RUBBER		
3.1 RUBBER COLOR 3.1.1 P/T 1205C 3.1.2 OTHER TRANSLUCENCE WHITE		

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9. Design (4/5) – LABEL

DESIGN SPECIFICATION
Model : RD12F00



리모컨 동작이 안될 때
1. 빨간LED가 켜지면 배터리를 교체해 주세요.
2. 셋톱박스 뒤 전원을 껐다 다시 켜 주세요.
3. 리모컨을 재연결해 주세요.
리모컨 [ON] 버튼을 동시에 3초간 누르면 녹색LED가 깜빡이면서 리모컨이 재연결 됩니다.

TV불름/전원이 안될 때
TV전원 ON → [스마트TV/4[외부입력] 동시에 3초간 누름 → 녹색LED가 켜지면 [채널시]를 TV가 꺼질 때 까지 누름 → TV가 꺼지면 [M]를 눌러 완료

B tv 이용가이드 보기 ▶ 

호환셋톱박스
Smart 2, 3, mini/AI Sound Max
모델명 BRM-BA03

공급원: SK브로드밴드 / 제조원: 리모트솔루션(주)
No. R-RMB-RD12 Made In Korea
해당 무선셋톱은 운용 중 전파혼신 가능성이 있습니다.

SCALE 150%

VX.X YYYY.MM.DD

Version No.
(Changeable)
Date of Manufacture
(Changeable)

※ 소프트웨어 반드시 Ver. 확인 할 것!

4. BACK LABEL

4.1 Material : White Bopp
4.2 Size : 30 X 42mm
4.3 Silk Color : Black, P/T 360C, P/T 422C
4.4 Coating : Matte Laminating

5. VERSION LABEL

5.1 Material : Art Paper
5.2 Size : 16 X 4mm
5.3 Silk Color : Black

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9. Design (5/5) – MANUAL

DESIGN SPECIFICATION

Model : RD12F00

Passed Label

6.PASSED LABEL

7.MANUAL

6.1 Material : Art Paper
6.2 Size : 30 X 15mm
6.3 Silk Color : Text-Black, P/T 2728C
Background – White

7.1 Material : 80 Vellum Paper
7.2 Size : 145 X 290mm
7.3 Silk Color : Offset 4 Color

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REMOTE SOLUTION CO., LTD.

INSTITUTION : 2021.05.24

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SPECIFICATION

(TRANSMITTER REMOCON)

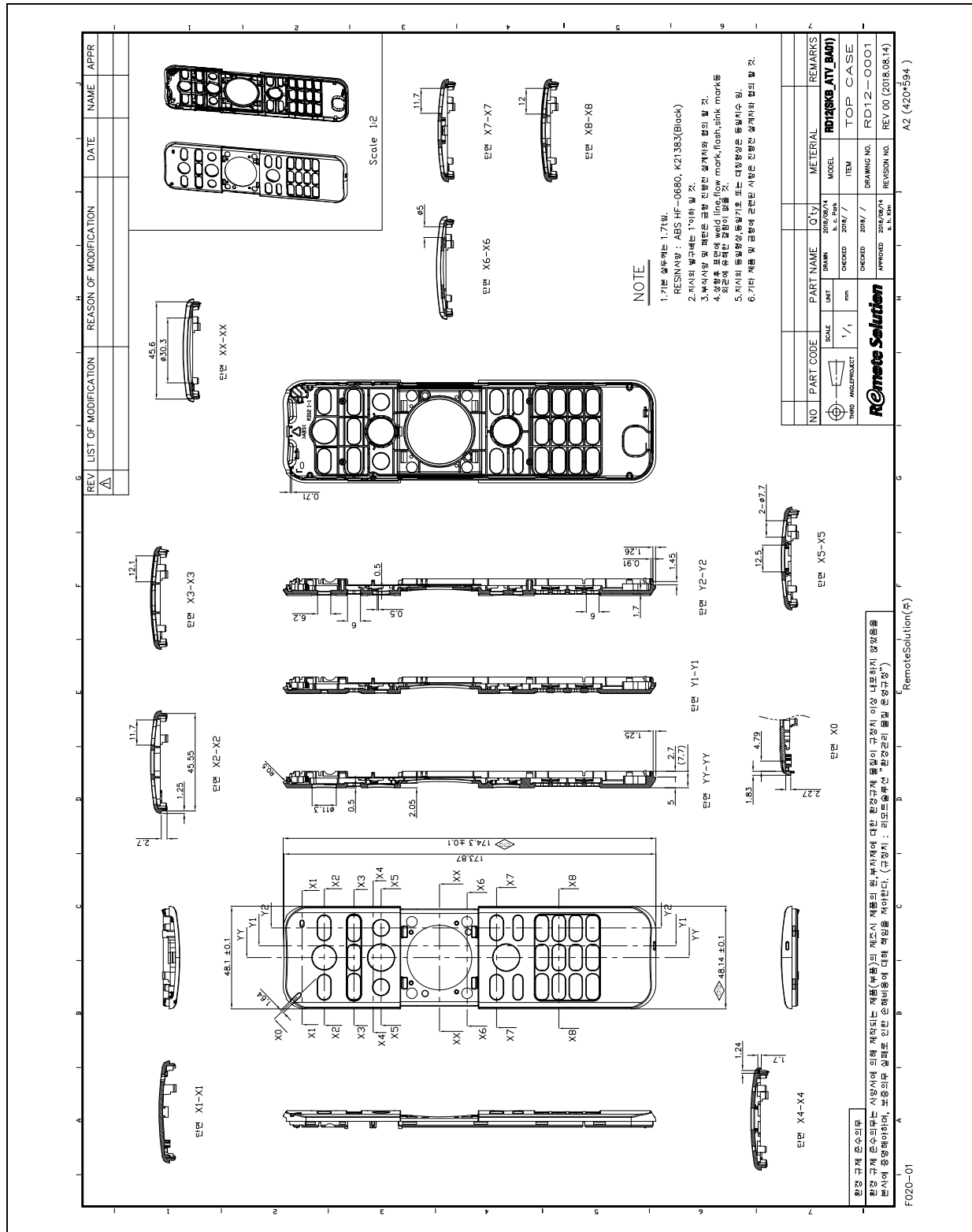
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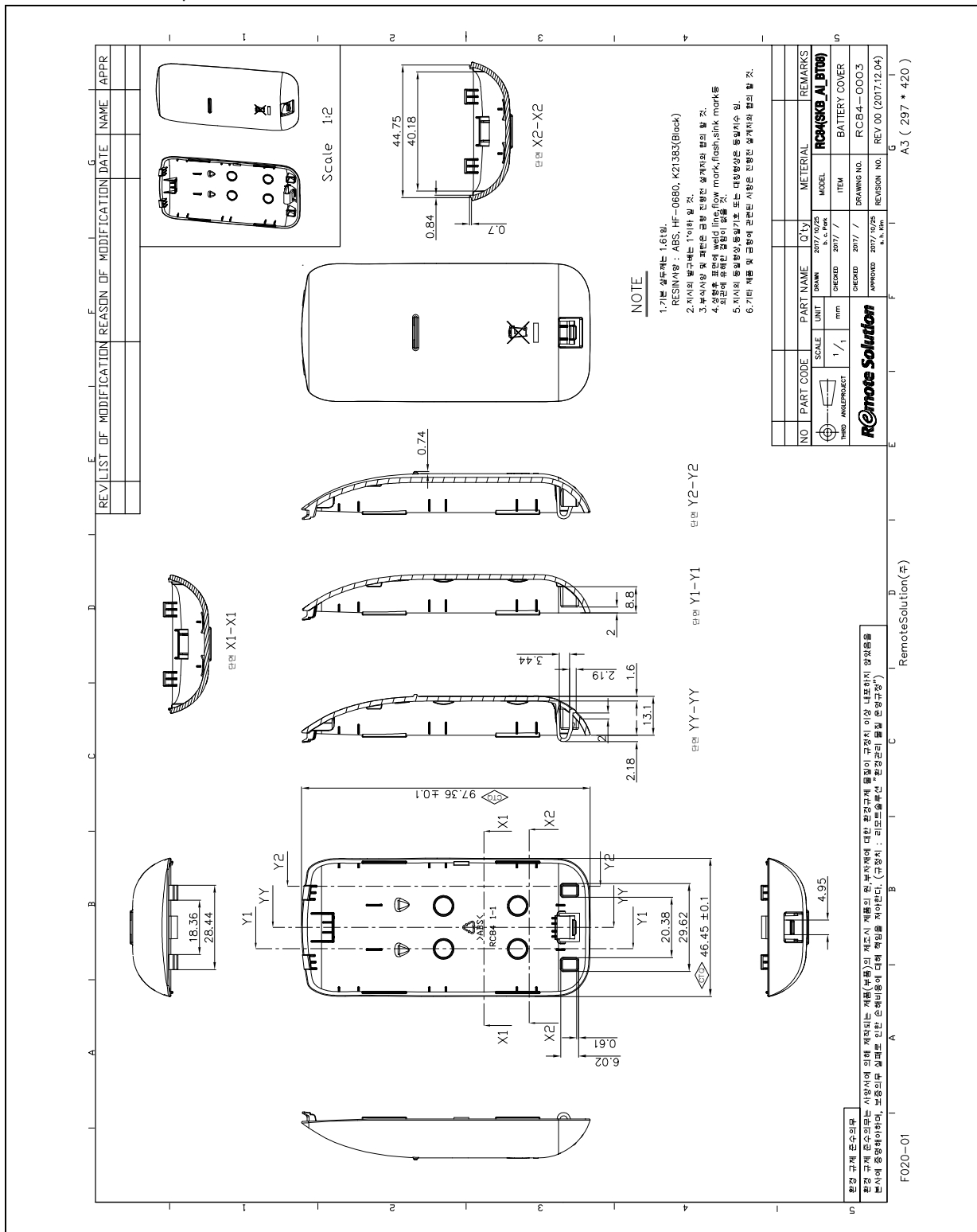
10. Mechanical Spec (1/15) – TOP CASE



REMOTE SOLUTION CO., LTD.

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10. Mechanical Spec (3/15) – BATTERY COVER



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SPECIFICATION

(TRANSMITTER REMOCON)

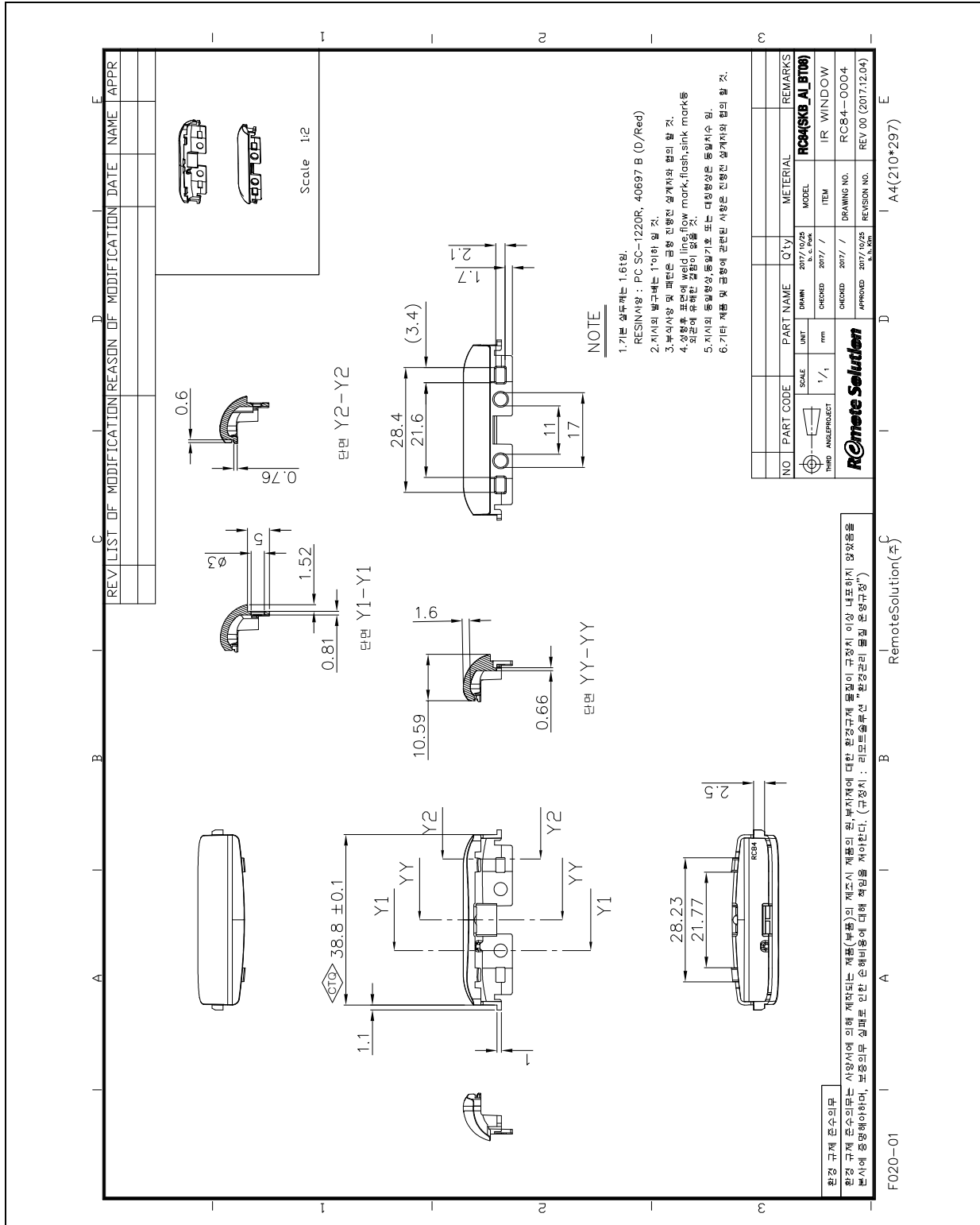
MODEL NO :

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10. Mechanical Spec (4/15) – IR WINDOW



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SPECIFICATION

(TRANSMITTER REMOCON)

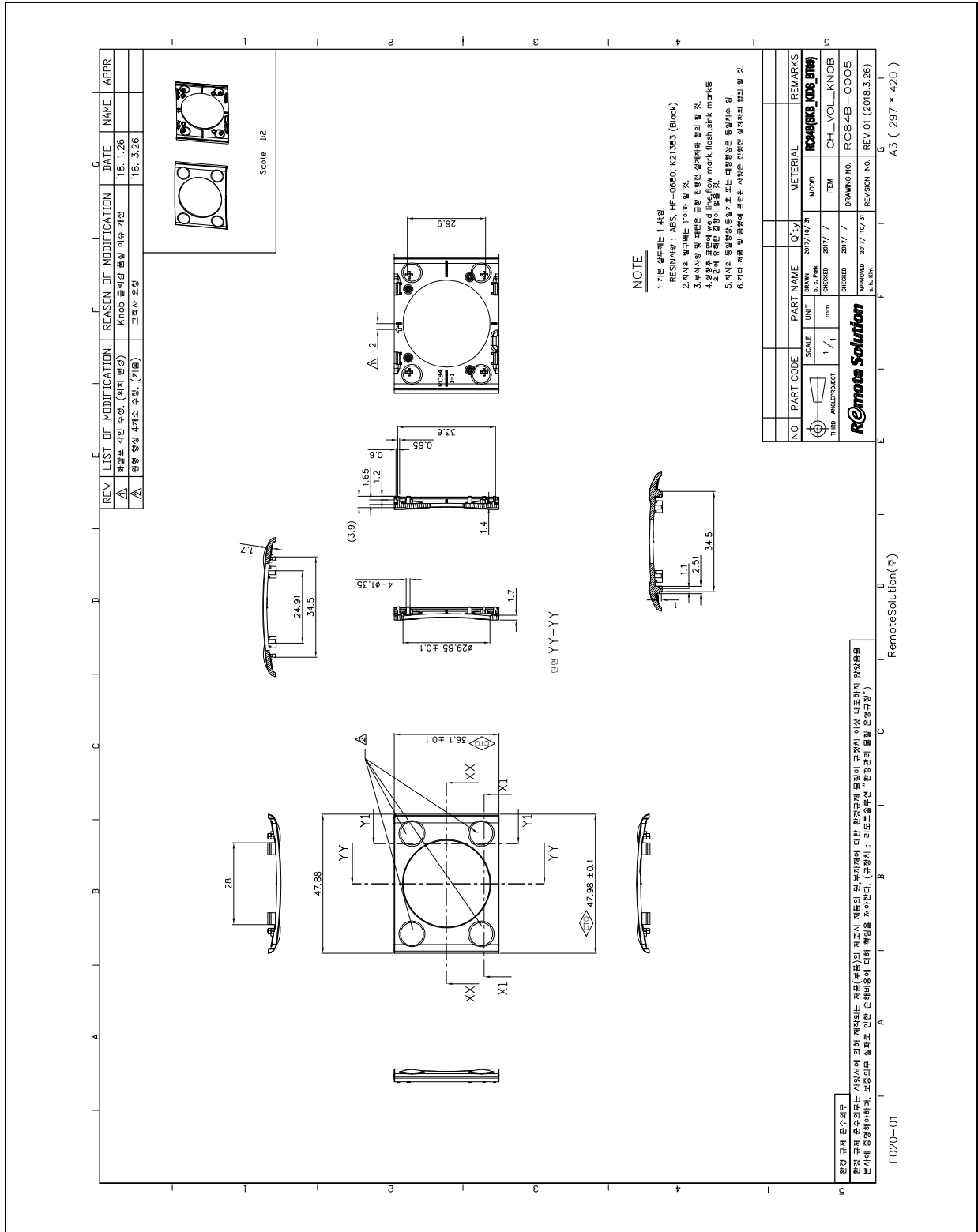
MODEL NO :

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10. Mechanical Spec (5/15) – CH , VOL KNOB



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10. Mechanical Spec (6/15) – INDICATOR LED

[illegible]

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SPECIFICATION

(TRANSMITTER REMOCON)

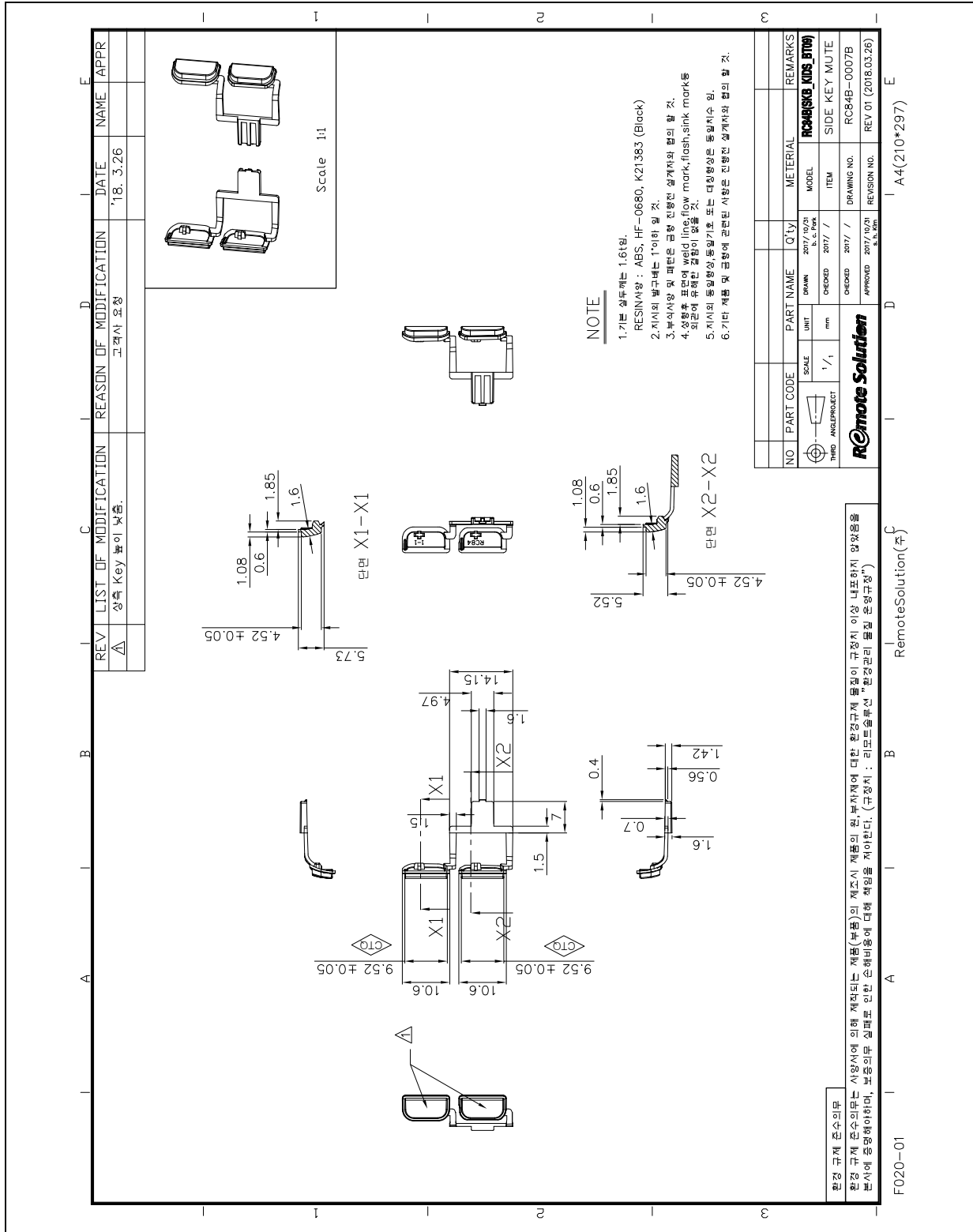
MODEL NO :

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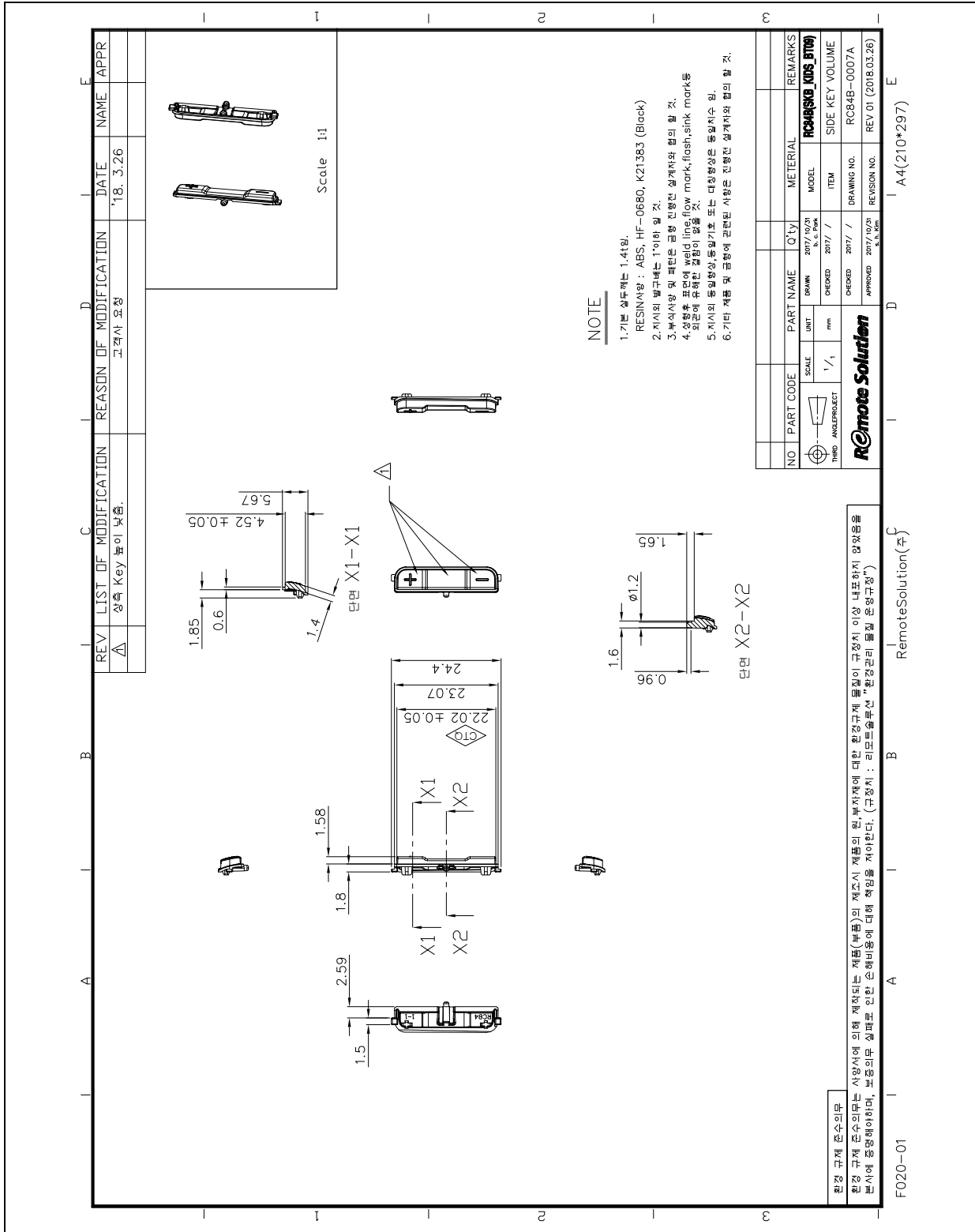
10. Mechanical Spec (7/15) – SIDE KEY MUTE



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10. Mechanical Spec (8/15) – SIDE KEY VOLUME



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SPECIFICATION

(TRANSMITTER REMOCON)

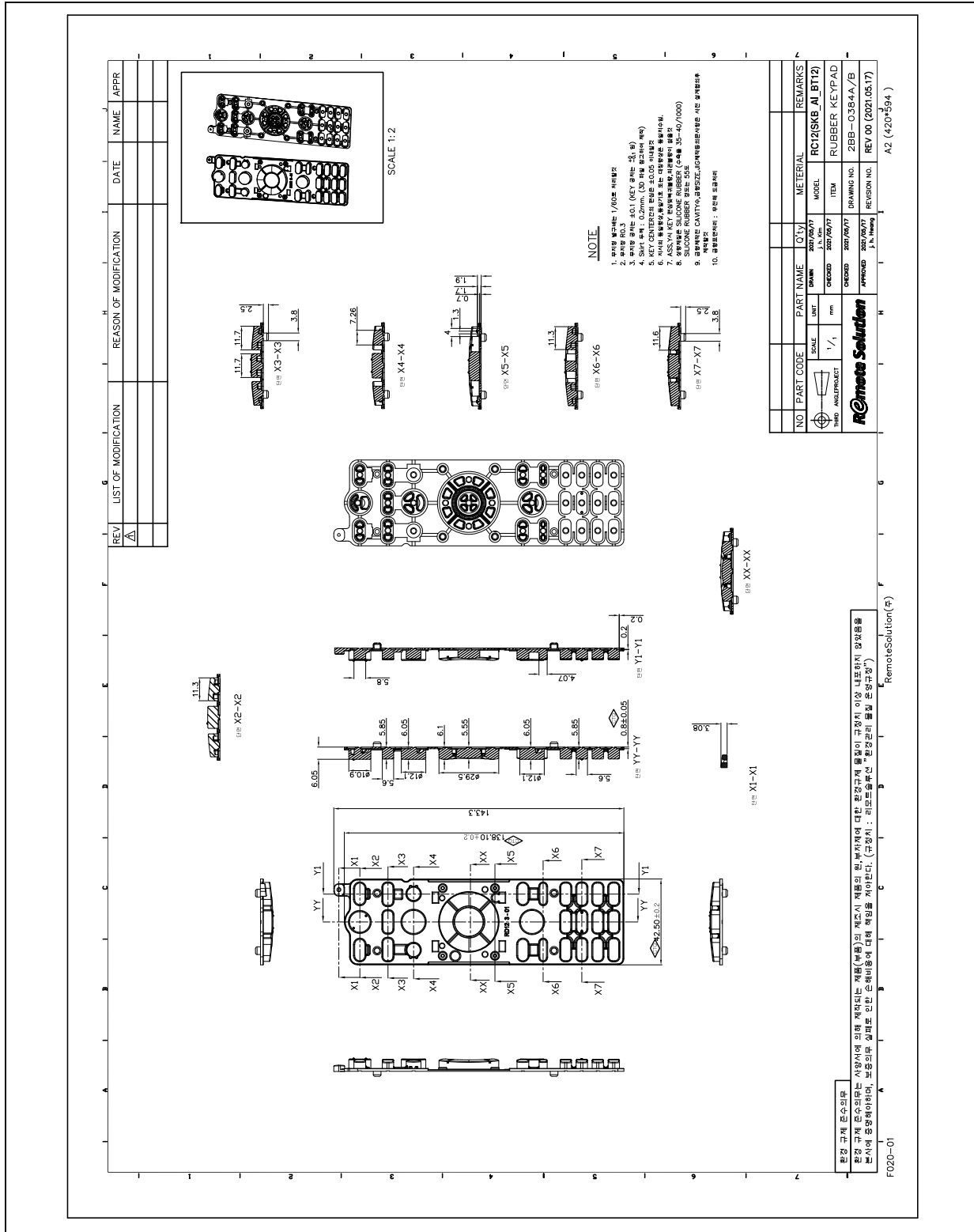
MODEL NO :

RD12F00

46

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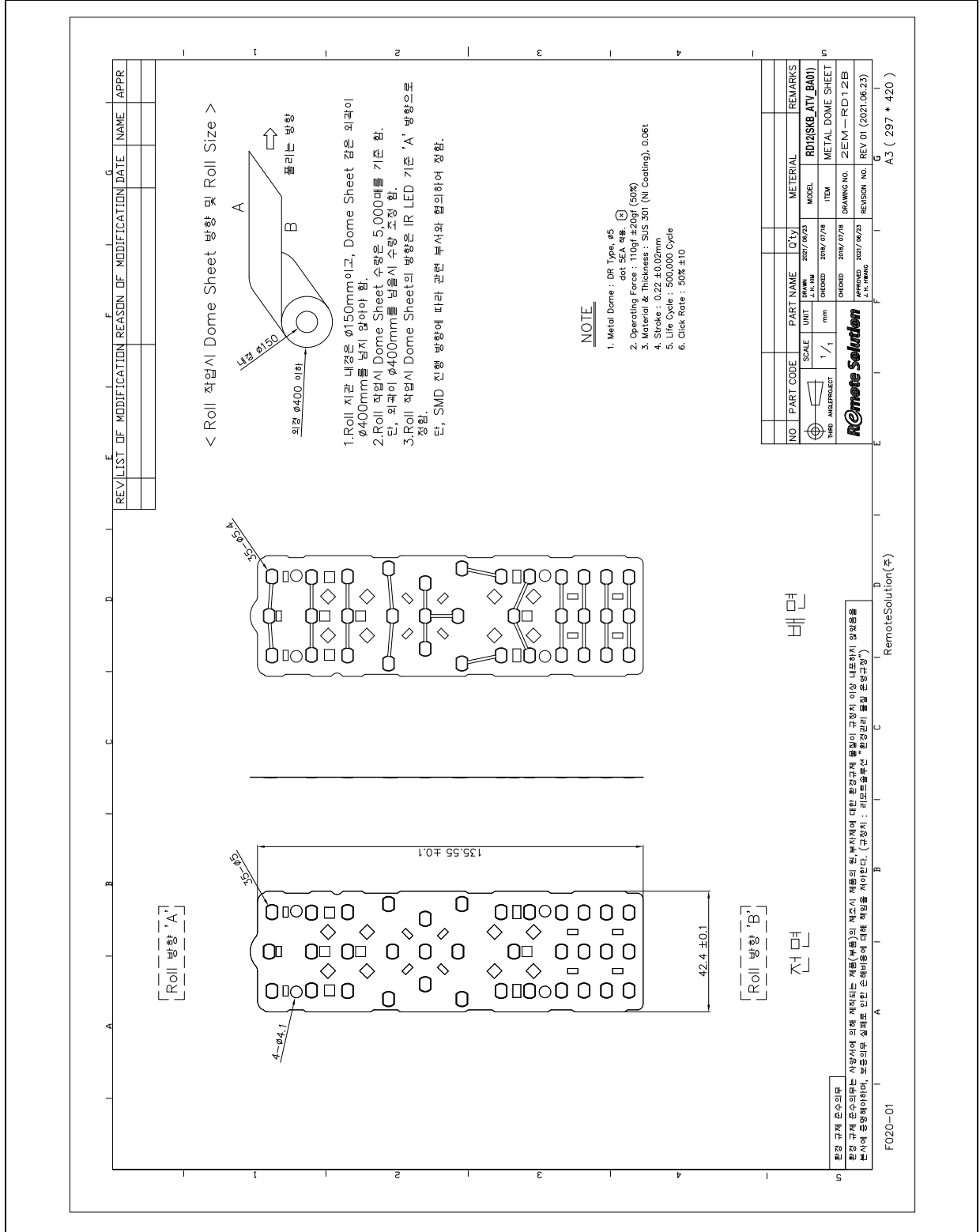
10. Mechanical Spec (9/15) – RUBBER KEYPAD



REMOTE SOLUTION CO., LTD.

INSTITUTION : 2021.05.24	SPECIFICATION (TRANSMITTER REMOCON)	MODEL NO :	47
REFORM :			
DECISION : 2021.08.27		RD12F00	68

10. Mechanical Spec (10/15) – METAL DOME

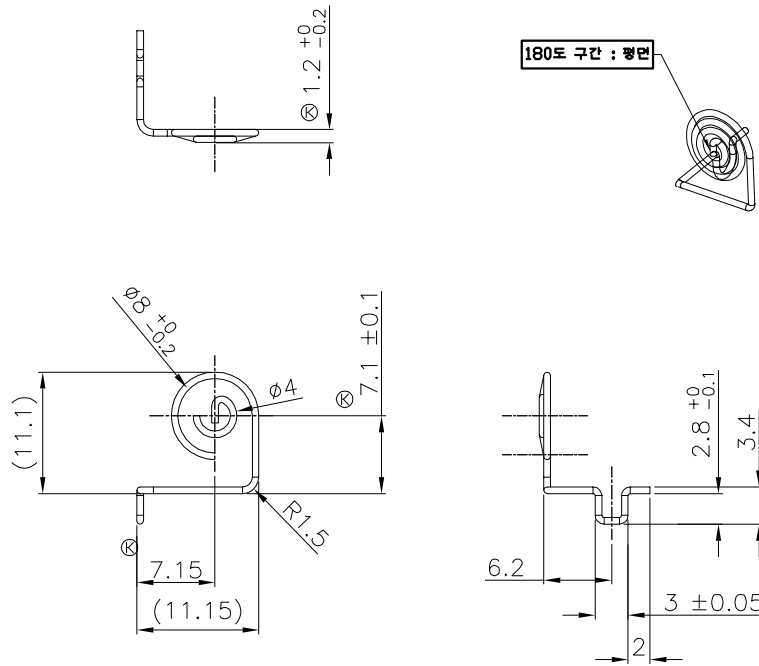


REMOTE SOLUTION CO., LTD.

INSTITUTION : 2021.05.24	SPECIFICATION (TRANSMITTER REMOCON)	MODEL NO :	48
REFORM :			
DECISION : 2021.08.27		RD12F00	68

10. Mechanical Spec (11/15) – (+) SPRING

NO	M O D E L	TITLE	MATERIAL	FINISH	REMARK
1					
2					



종 류	압 축 SPRING	총 권 수	2.25 권
재 질	SUS304-WPB NI-CO	권 방 향	우
선 경	Ø0.6	자유장 길이	1.2 $\pm$ 0.2

NOTE

1. ㉞ 지시치수 중점관리할것
2. 재료 절단부 처리 주의할것
3. BENDING 부 직각 유지 할 것
직각부는 필히 자연 "R" 가공 할 것

환경 규제 준수 의무

한정 규제 준수 의무는 상항서에 의해 제작되는 제품(부품)의 제조시 제품의 원, 부자재에 대한 한정규제 물질이 규정치 이상 내포하지 않았음을
확인서에 증명해야하며, 그 결과로 실패를 인한 손해비용에 대해 책임을 지어한다. (규정치 : 리모콘출력선 “한정관리물질 함유규정”)

NO	PART CODE	PART NAME	Q'ty	METERIAL	REMARKS	
	SCALE 2/1	UNIT mm	DRAWN	2017/10/19 b. c. Park	(+)SPRING RC84(SK_BI_BT08)	
			CHECKED	2017/10/19 s. b. Lim		
			CHECKED	2017/10/19		
			APPROVED	2017/10/19 s. h. Kim		
R@remote Solution			 Z ISSUE	2SP-RC84		

REMOTE SOLUTION CO., LTD.

INSTITUTION : 2021.05.24	SPECIFICATION (TRANSMITTER REMOCON)	MODEL NO :	49
REFORM :			
DECISION : 2021.08.27		RD12F00	68

10. Mechanical Spec (12/15) – (-) SPRING

NO	M O D E L	TITLE	MATERIAL	FINISH	REMARK
1					
2					

⑧ 8 ±0.2

R1.5

180도 구간 : 평면

⑧ 7.1 ±0.1

⑧ 7.15

(11.1)

(11.15)

⑧ 6.2

2.8 ±0.1

3.4

3 ±0.05

2

종 류	압 축 SPRING	총 권 수	4.25 권
재 질	SUS304-WPB NI-C	권 방 향	좌
선 경	Ø0.6	자유장 길이	8 ±0.2

NOTE

- ⑧ 지시치수 중점관리 할 것
- 재료 절단부 처리 주의 할 것
- BENDING 부 직각 유지 할 것
직각부는 필히 자연 "R" 가공 할 것

환경 규제 준수 의무

환경 규제 준수의무는 사양서에 의해 제작되는 제품(부품)의 제조시 제품의 원,부자재에 대한 환경규제 물질이 규정치 이상 내포하지 않았음을 본사에 증명해야하며, 보증의무 실패로 인한 손해비용에 대해 책임을 져야한다. (규정치 : 리모트솔루션 "환경관리 물질 운영규정")

NO	PART CODE	PART NAME	Q'ty	MATERIAL	REMARKS
----	-----------	-----------	------	----------	---------

	SCALE	UNIT	DRAWN	(-)SPRING RC84(SKB_AI_BT08) 2SM-RC84
	2/1	mm	2017/10/19 b. c. Park	
			2017/10/19 s. b. Lim	
			2017/10/19 s. h. Kim	

ISSUE

REMOTE SOLUTION CO., LTD.

INSTITUTION : 2021.05.24	SPECIFICATION (TRANSMITTER REMOCON)	MODEL NO :	50
REFORM :			
DECISION : 2021.08.27		RD12F00	68

10. Mechanical Spec (13/15) – (±) SPRING

NO	M O D E L	TITLE	MATERIAL	FINISH	REMARK
1					
2					

종 류	압 축 SPRING	총 권 수	A	2.25권	B	4.25 권
재 질	SUS304-WPB NI-C□	권 방 향	A	좌	B	우
선 경	Ø0.6	자유장 길이	A	1.2 ⁺⁰ _{-0.2}	B	8 ±0.2

NOTE

- ① 지시치수 중점관리할것
- 재료 절단부 처리 주의할것
- BENDING부 직각유지할것
직각부는 필히 자연"R"가공할것

환경 규제 준수 의무

환경 규제 준수의무는 사양서에 의해 제작되는 제품(부품)의 제조시 제품의 원,부자재에 대한 환경규제 물질이 규정치 이상 내포하지 않았음을 본사에 증명해야하며, 보증의무 실패로 인한 손해비용에 대해 책임을 지어한다. (규정치 : 리모트솔루션 "환경관리 물질 운영규정")

NO	PART CODE	PART NAME	Q'ty	METERIAL	REMARKS
----	-----------	-----------	------	----------	---------

COMMON SPRING RC65(SKB_Smart)

2SC-RC65

SCALE 2/1 UNIT mm

DRAWN 2015/06/01 b. c. Park

CHECKED 2015/06/01 s. b. Lim

CHECKED 2015/06/01

APPROVED 2015/06/01 b. c. Kim

ISSUE

Remote Solution

F020-01

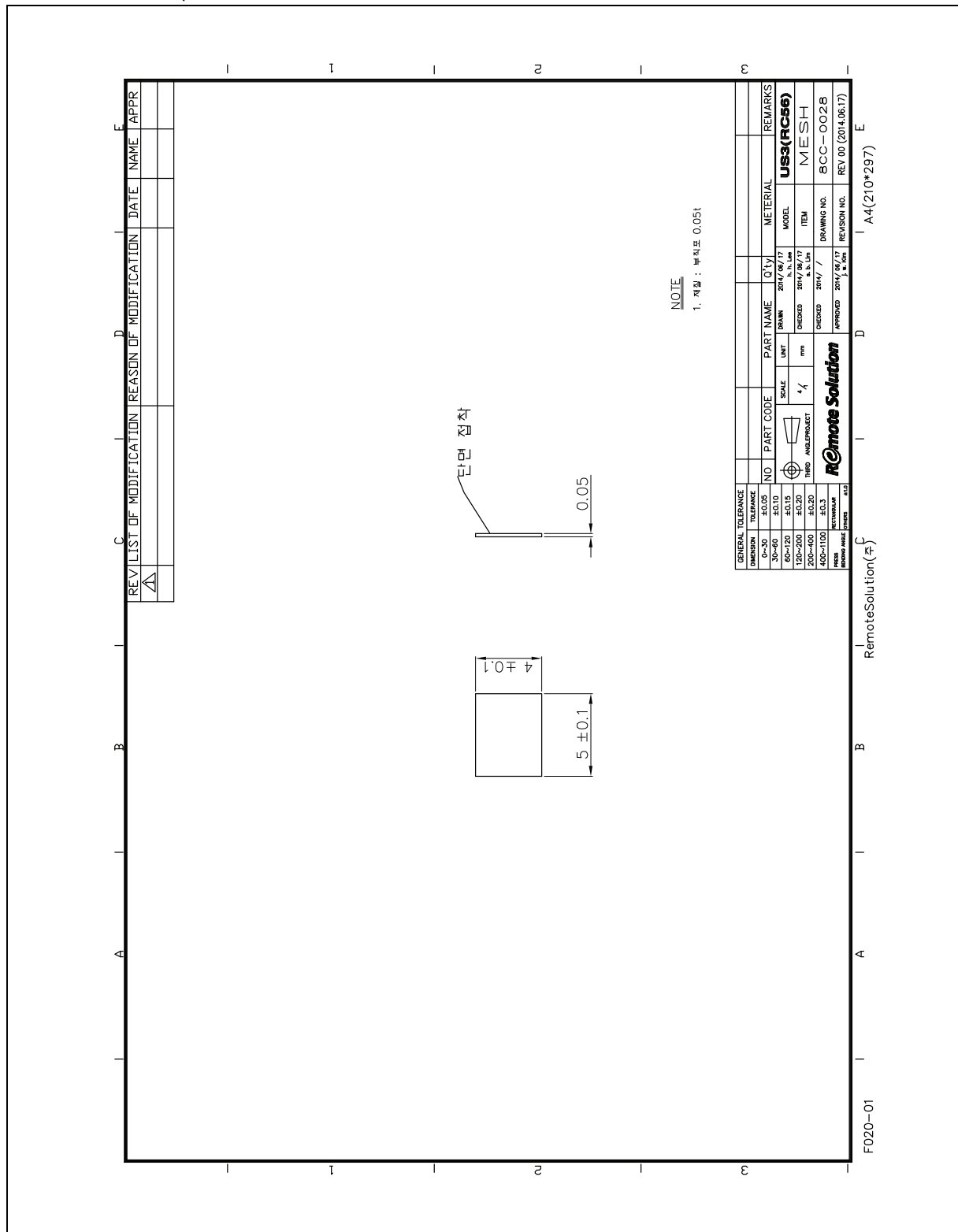
리모트솔루션(주)

A4 (210 * 297)

REMOTE SOLUTION CO., LTD.

INSTITUTION : 2021.05.24	SPECIFICATION (TRANSMITTER REMOCON)	MODEL NO :	51
REFORM :			
DECISION : 2021.08.27		RD12F00	68

10. Mechanical Spec (14/15) – MESH



REMOTE SOLUTION CO., LTD.

INSTITUTION : 2021.05.24	SPECIFICATION (TRANSMITTER REMOCON)	MODEL NO :	52
REFORM :			
DECISION : 2021.08.27		RD12F00	68

10. Mechanical Spec (15/15) PE BAG

NO	MODEL	TITLE	MATERIAL	FINISH
1				

COLOR : BLACK

NOTE

1. 도면 치수로 관리 할 것.
2. 재료 : PE 0.05t 투명

△	ISSUE NO	MM/DD/YY	SIGNATURE	CHANGE NO	CHANGE CONTENTS
	N / S	mm	DRAWN	2014/12/10	PE BAG CJ(RC60) 7PP-0052T
			CHECKED	2014/12/10	
			DRAWN	2014/12/10	
				j. w. Kim	

REMOTE SOLUTION CO., LTD.

INSTITUTION : 2021.05.24	SPECIFICATION (TRANSMITTER REMOCON)	MODEL NO :	53
REFORM :		RD12D00	
DECISION : 2021.08.27			68

11. Packaging Specification

10-1 MATERIAL : CARTON

10-2 SIZE : 553 (L)* 415 (W)* 282 (H) (Out Side)

10-3 QUANTITY : 80EA

1. 설치배합 구성표 : 田 田

원자구성	A	B	C	D	E
양형 (g/㎡)	KLB175	K180	CK180	K180	KLB175

2. 원자배합 구성표 : 田 田

원자구성	A	B	C
양형 (g/㎡)	A180	S125	A180

NOTE

1. 적용 MODEL : RB90, RC65

NO	PART CODE	PART NAME	Q'ty	MATERIAL	SPEC	치목 SIZE	REMARKS
4		1	SW(B田)	538*400			
3		5	SW(A田)	400*260			
2		6	SW(A田)	538*260			
1		1	DW(AB田)	553*415*282			

THIRD ANGLE PROJECT

SCALE 1/1 mm

CHECKED 2012/ /

CHECKED 2012/ /

APPROVED 2012/ /

BOX PARTITION

RB90

Z 7BC-0082A

REV	LIST OF MODIFICATION	REASON OF MODIFICATION	DATE	NAME	APPR

(D)553 (W)415 (D)553 (W)415

Remote Solution

Made In Korea

PART NAME	INTERDOOR AMITY
LOT NO.	
PART CODE	
DESCRIPTION	
QUANTITY	

Remote Solution

Made In Korea

PART NAME	INTERDOOR AMITY
LOT NO.	
PART CODE	
DESCRIPTION	
QUANTITY	

(D)553 (W)415 (D)553 (W)415

Remote Solution

Made In Korea

PART NAME	INTERDOOR AMITY
LOT NO.	
PART CODE	
DESCRIPTION	
QUANTITY	

Remote Solution

Made In Korea

PART NAME	INTERDOOR AMITY
LOT NO.	
PART CODE	
DESCRIPTION	
QUANTITY	

(D)553 (W)415 (D)553 (W)415

Remote Solution

Made In Korea

PART NAME	INTERDOOR AMITY
LOT NO.	
PART CODE	
DESCRIPTION	
QUANTITY	

Remote Solution

Made In Korea

PART NAME	INTERDOOR AMITY
LOT NO.	
PART CODE	
DESCRIPTION	
QUANTITY	

(D)553 (W)415 (D)553 (W)415

Remote Solution

Made In Korea

PART NAME	INTERDOOR AMITY
LOT NO.	
PART CODE	
DESCRIPTION	
QUANTITY	

Remote Solution

Made In Korea

PART NAME	INTERDOOR AMITY
LOT NO.	
PART CODE	
DESCRIPTION	
QUANTITY	

(D)553 (W)415 (D)553 (W)415

Remote Solution

Made In Korea

PART NAME	INTERDOOR AMITY
LOT NO.	
PART CODE	
DESCRIPTION	
QUANTITY	

Remote Solution

Made In Korea

PART NAME	INTERDOOR AMITY
LOT NO.	
PART CODE	
DESCRIPTION	
QUANTITY	

(D)553 (W)415 (D)553 (W)415

Remote Solution

Made In Korea

PART NAME	INTERDOOR AMITY
LOT NO.	
PART CODE	
DESCRIPTION	
QUANTITY	

Remote Solution

Made In Korea

PART NAME	INTERDOOR AMITY
LOT NO.	
PART CODE	
DESCRIPTION	
QUANTITY	

(D)553 (W)415 (D)553 (W)415

Remote Solution

Made In Korea

PART NAME	INTERDOOR AMITY
LOT NO.	
PART CODE	
DESCRIPTION	
QUANTITY	

Remote Solution

Made In Korea

PART NAME	INTERDOOR AMITY
LOT NO.	
PART CODE	
DESCRIPTION	
QUANTITY	

(D)553 (W)415 (D)553 (W)415

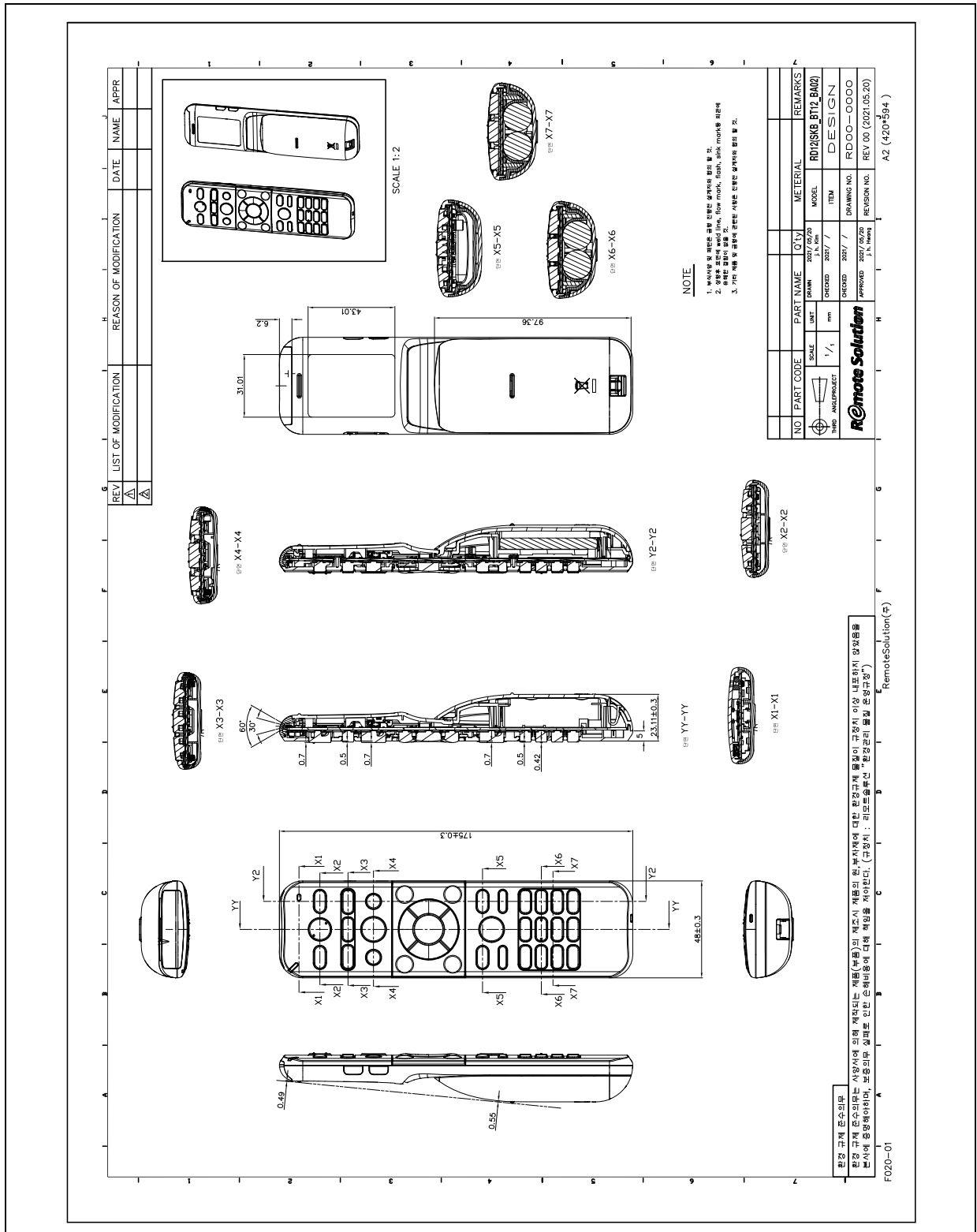
Remote Solution

Made In Korea

REMOTE SOLUTION CO., LTD.

INSTITUTION : 2021.05.24	SPECIFICATION (TRANSMITTER REMOCON)	MODEL NO :	54
REFORM :		RD12F00	
DECISION : 2021.08.27			68

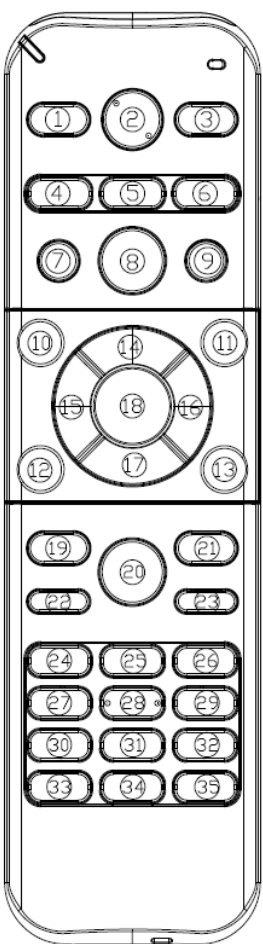
12. Assembling Specification



REMOTE SOLUTION CO., LTD.

INSTITUTION : 2021.05.24	SPECIFICATION (TRANSMITTER REMOCON)	MODEL NO :	55
REFORM :			
DECISION : 2021.08.27		RD12F00	68

13. Rubber Tension Test

	NO.	Tension	Return	NO.	Tension	Return
	1	190	113	25	206	125
	2	192	109	26	197	123
	3	195	108	27	22	130
	4	205	120	28	212	125
	5	197	122	29	211	116
	6	203	120	30	215	130
	7	187	112	31	206	112
	8	184	116	32	197	118
	9	172	110	33	224	129
	10	211	126	34	202	110
	11	204	129	35	214	115
	12	201	125			
	13	209	121			
	14	201	121			
	15	199	105			
	16	203	115			
	17	197	111			
	18	257	152			
	19	197	122			
	20	201	121			
	21	200	116			
	22	200	120			
	23	192	104			
	24	232	148			
	Tension Spec :		Small Key : 200 ± 30gr			
			Large Key(10,11,12,13,14,15,16,17,18번 Key) : 210 ±30gr			

REMOTE SOLUTION CO., LTD.

INSTITUTION : 2021.05.24	SPECIFICATION (TRANSMITTER REMOCON)	MODEL NO :	56
REFORM :			
DECISION : 2021.08.27		RD12F00	68

14. Manufacturing Process Flow Chart(1/3) - SMD

Customer	SKB		Process Flow Diagram		Document No	RS-20210518	Sign	권태걸	
Product	BA03				Date	2021.05.18	Review		
Model	RD12F				Part	SMD	Approval		
No.	Revision date	Content		Check	No.	Revision date	Content	Check	
Process No		01	02	03	04	05	06	07	08
P r o c e s s	Outsourcing								
	MAIN								
	SUB								
	Personnel	-	-			-	-	-	
Process	LOADER	SCREEN PRINTER	Worktable	CHIP MOUNTER	CHIP MOUNTER	REFLOW	UNLOADER	VISION TEST	
Content	.PCB Loading	.Solder Paste Printing	.Spring Insert	.Chip Mounting	.Chip Mounting	.Soldering	.PCB Unloading	.PCB Inspection (Solder, part's)	
Machine	LOADER	SCREEN PRINTER	.	CHIP MOUNTER	CHIP MOUNTER	REFLOW	UNLOADER	VISION Machine	
Tools	.	.	.Spring Insert Part's	.	.	.	.	.	
Inspection Machine	.	.3D Inspection machine	.	.	.	.	.	.	
Focused Management Item	.PCB Loading position	.Solder cream height	.Spring Reverse shovel	.Coordinate value	.Coordinate value	.temperature control	.PCB Loading position	.Inspection criteria	

RSC-200-001(Rev.0)

REMOTE SOLUTION CO., LTD.

INSTITUTION : 2021.05.24	SPECIFICATION (TRANSMITTER REMOCON)	MODEL NO :	57
REFORM :			
DECISION : 2021.08.27		RD12F00	68

14.Manufacturing Process Flow Chart(2/3) - PBA

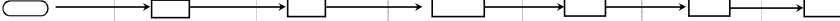
Customer	SKB		Process Flow Diagram				Document_No	RS-20210518	Sign	권태걸
Product	BA03						Date	2021.05.18	Review	
Model	RD12F						Part	PBA	Approval	
No.	Revision date	Content			Check	No.	Revision date	Content		Check
Process No		01	02	03	04	05	06	07	08	
P r o c e s s	Outsourcing									
	MAIN									
	SUB									
	Personnel	 								
Process	Dome Sheet	Realtek Writing	leakage current test	IR operation test	date printing marking	Appearance inspection				
Content	.Dome Sheet Attach	.RTL8762CA Writing	.leakage current test	.IR operation test	.date printing marking	.Appearance inspection				
Machine	.Dome Sheet jig	.Writing jig,PC	.PC	.PC	.marking machine					
Tools	.Dome Sheet jig tool	.	.ammeter .POWER Supply	.ammeter .POWER Supply						
Inspection Machine										
Focused Management Item	.Dome Sheet Attachment Check	.Writing Firmware check	.Nonconforming product management	.Nonconforming product management	.Check print status	.Nonconforming product management				

RSC-200-D01(Rev.0)

REMOTE SOLUTION CO., LTD.

INSTITUTION : 2021.05.24	SPECIFICATION (TRANSMITTER REMOCON)	MODEL NO :	58
REFORM :			
DECISION : 2021.08.27		RD12F00	68

14. Manufacturing Process Flow Chart (3/3) – Assembly

Customer	SKB		Process Flow Diagram				Document_No	RS-20210518	Sign	권대걸
Product	BA03						Date	2021.05.18	Review	
Model	RD12F						Part	Assembly	Approval	
No.	Revision date	Content		Check	No.	Revision date	Content		Check	
Process No		01	02	03	04	05	06	07	08	
P r o c e s s	Outsourcing									
	MAIN									
	SUB									
	Personnel									
Process		Preparation work	TOP CASE Assembly	Bottom case Assembly	TOP CASE Assembly	Assembly	backlight TEST	IR CODE TEST	POB FMC TEST	
Content		.battery insert .PE-Bag package	.KNOB insert .Mike mesh attach	.indicator LED insert .SIDE KEY insert	.PCB cutting & insert .SIDE KEY insert .Rubber insert	.IR Window insert .Assembly	.Attaching protective film .battery insert .backlight TEST	.IR CODE TEST .Back Label attach .SIDE KEY TEST .Back Light TEST	.Pairing TEST .Rssi TEST .Voice TEST .BACK LIGHT CHECK	
Machine		-	-	-	-	-	-	4IN1 Machine	.PC	
Tools		-	-	-	.Assembly machine	.Assembly machine	.Darkroom	.IR receiver	.Pairing Dongle	
Inspection Machine		-	-	-	-	-	-	-	.Monitor .darkroom box	
Focused Management Item		.Scratch	.Scratch	.Scratch	.Scratch	.Assembly Status check	.Attaching protective film	.IR CODE check .LED check	.Rssi Test .PAIRING Test .Voice Test .Unpairing Test	
Process No		09	10							
P r o c e s s	Outsourcing									
	MAIN									
	SUB									
	Personnel									
Process		Appearance inspection	Package							
Content		.BATTERYCOVER Inset .Appearance inspection	.PE BAG Package .Passed Label attach .Insert Battery							
Machine		-	-							
Tools		-	-							
Inspection Machine		-	-							
Focused Management Item		.BATTERYCOVER Inset .Appearance inspection	.packing quantity							

RSC-200-001(Rev.0)

REMOTE SOLUTION CO., LTD.

INSTITUTION : 2021.05.24

REFORM :

DECISION : 2021.08.27

SPECIFICATION

(TRANSMITTER REMOCON)

MODEL NO :

59

RD12F00

68

15. Manufacturing Controlplan (1/2)

REMOTESOLUTION (KR)				*Manufacture process :																			
STEPS		ITEMS		Remote Control		NO	Revision date		The Reason of revision		Man	Review	Appr	Set the date : 2021.05.19									
☐		Model		SK Broadband Smart2/3 STB RCU										A	made	review	admit						
☐		Proto												P									
☒		Part Number		RD12F00										R									
양산선행														O									
☐		CFT		PM(MB Kim), R&D(JH Kim, YT Ahn, H Hong, CH Kim), Prod.(YR Na,KH Noh), Prod Tech(RK Kim, TG Kwon), QC(SG Son, SM Kim), Purchase(SJ Woo), Sale(GH Lee)			2021.05.19		Initial preparation					V	5/19	-	5/19						
MP														A									
VENDOR CODE				Customer technical acknowledge/date (when required):										Other admit/date (when required)									
PROCESS No.		PROCESS SUBMAN		Process		Equipment	NO		Products		Process	Management Criteria		How to check		Cycle	Management Plan		PD	QC	Corrective Action		Remark
				Raw material inventory			1		Raw materials		Supplier (warehouse)	Vendor Input											
				Incoming inspection		Visual, Text film	1		Raw materials		A visual inspection (Design)	Don't allow harmful defects		Visual inspection		Sampling	Inspection specification				Isolation, return money, Issuance of		
						Vernier caliper	2		Raw materials		The dimensional check	In line with the structure drawings - length size management		measurement Data		Sampling	Inspection specification				Isolation, return money, Issuance of		
						Tension Gauge	3		Raw materials		Characteristics of check	In accordance with specifications of the structures		measurement Data		Sampling	Inspection specification				Isolation, return money, Issuance of		
						Visual	4		Raw materials		Combined inspection	After the merger is not allowed to produce abnormal		The assembly		Sampling	Inspection specification				Isolation, return money, Issuance of		
						Chamber	5		Raw materials		Reliability Test	Reliability test no abnormalities		measurement Data		once a month	Test specification				Isolation, return money, Issuance of		
						EA 1000A III	6		Raw materials		Harmful material inspection	Hazardous substances management benchmark		measurement Data		Once a week	Hazardous substances management				Isolation, return money, Issuance of		
20				Materials Warehousing/ releasing		A material cart	1		Raw materials		FIFO	Confirm materials specifications FIFO management		Now product labeling		Every Lot	ERP PIG(SAP)				Isolation, return money		
51				Prevention of static electricity		Static Electricity Checker	1		Static Electricity		Management of static Electricity	Should be within Good Zone		Electrostatic tester		once a day	Check Sheet				Anti-static shoes and Electrostatic ring to		
				Stirring solder cream		Solder paste mixer (DMS200)	1		Solder cream		Storage of Solder cream	In cold storage with 5±3 ℃		Thermometer		once a day	Measurement sheet of temperature				Reset, Adjustment		
							2		Solder cream		Stirring of Solder cream	45 sec		Timer		Before using	Management register of Stock and Delivery				Reset, Adjustment		
							3		Solder cream		Leaving room temperature	25±5 ℃, 2Hr (Foot_proof)		Timer		Before using	Management register of Stock and Delivery				Reset, Adjustment		
30				Supplying PCB		Vacuum Loader (SBSF-200)	1		PCB		Sorting status	For direction to sort out		Visual inspection		1/Lot	-				rearrange		
							2		PCB		PCB The installation	PCB Pick up/After drop phenomenon		Visual inspection		1/Lot	-				The new installation		
40				Cleaning PCB		PCB Cleaner (PCC-4000)	1		PCB		Cleaning PCB's dirt	Location of brush and Air should be fine		Visual		1/Lot					The new setting		
				Spreading Solder cream		Screen Printer (HP-520S)	1		Solder Cream		Squeeze pressure	14-16kgf		Check Equipment		1/Lot	Equipment checklist				From the rear device		
							2		Solder Cream		Squeeze speed/angle	35 ~ 100mm/sec, 60E (Normal : 70~80mm/sec)		Check Equipment		1/Lot	Equipment checklist				From the rear device		
						Maintain a constant temperature device (HTC-1380)	3		Solder Cream		Condition of printing solder cream	Tin less, Tin over No blockage		Visual Inspection (Magnifier)		1/Lot	At the beginning, middle, end				From the rear device		
							4		Solder Cream		Keeping internal fixed temperature	23 ~ 27 degrees		Set Display		once a day	-				From the set temperature		
							5		Solder Cream		Automatic cleaning -> Metal mask	There should be no scraps around the opening area (Manual Cleaning : 1Time/2hrs.)		Check Equipment		once in 5 times	Equipment				Manual cleaning		
				SMD components patch		Chip Mount	1		Chip components		Nozzle pressure	Air : 0.45 ~ 0.55 lb/ Nozzle : -80 ± 10 mmHg		Pressure gauge		1time/daily	Equipment work sheet				Reset, Adjustment		
							2		Chip components		PMC specification is consistent	Feeder List (MONITOR) To prevent the mixing system		Visual inspection		When the mode changes	Record the account				Reset, Adjustment		
							3		Chip components		Part a Pick up location	5~25% of component area		Equipment to confirm		When the mode changes	Equipment work sheet				Reset, Adjustment		
						이형 Mount (SM421)	4		Chip components		Air/Nozzle pressure	Air : 4.5 ~ 5.5 lb/ Nozzle : -100 ± 10 mmHg		Pressure gauge		1 time/ monthly	equipment work sheet				Reset, Adjustment		
							5		Chip components		Part a Pick up location	5~25% of component area		Equipment to confirm		When the mode changes	equipment work sheet				Reset, Adjustment		
70				Spring assembly		Manual work	1		SMD products		Insert the spring (+/-)	Meet standard of BOM		Visual		When receiving material	System (SAP)				From the set parameters		
				Reflow Soldering		Reflow Soldering	1		SMD products		Preheat interval	Temperature : 150 ~ 200 ℃		Preheating temperature Check		1time/ daily	Reflow Profile				From the set parameters		
							2		SMD products		Soldering	Temperature : 200 ℃ 이상 (peak:235~250 ℃) - PCB 1.2t/ FR-4		Profile Check		1time/ daily	Reflow Profile				From the set parameters		
							3		SMD products			Soldering time : 40 ~ 70sec		Profile Check		1time/ daily	Reflow Profile				From the set parameters		
90				PCB Out		SMB-220	1		SMD products		cool down	PCB finishing Impeded (not allowed)		Visual inspection		All	equipment				From the set parameters		
100				visual inspection		lupe, Visual	1		SMD products		Confirm the part soldering condition	- no tin, tin, less skewed, plug, inverse interpolation, not advanced - part control within 1/3 of the scope of		Visual inspection		All	work sheet				Identification, Isolation, Repair		
53				Analysis nonconfirming products and disassembling		Lupe, Iron Solder	1		SMD products		Management of Soldering Iron temperature	Temperature management of soldering iron(380~420 ℃)		Measuring temperature		once a day	Checklist for temperature of Soldering Iron				Reset temperature, Change soldering iron		
110				Attaching Metal Dome sheet		MetalDome sheet M/C	1		Raw Materials		Attaching Metal Dome sheet	Adhesion shall be good.		Equipment		All	work sheet				Identification, Isolation, Repair		

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15. Manufacturing Controlplan (2/2)

No.	Process Flow chart SUB-MAN Sheet	Process	Equipment	Manage the project		Special trial test	Management Criteria			Division		Corrective Action	Remarks
				NO	Products		Process	Standard	How to check	Cycle	Management Plan		
120		Realtek IC Writing	Writing M/C	1	Main PCBA	Realtek IC Writing (RTL8762CA)	Writing(Programming) should be fine - RS / Test Program	Equipment	All	work sheet	○	Identification, Isolation, Repair	
130		Leakage current Inspection	Function Test M/C	1	Main PCBA	Leakage current inspection	Current should be fine (satisfied with the spec)	Equipment	All	work sheet	○	Identification, Isolation, Repair	
140		IR/RF Power & Operating current Inspection	Function Test M/C	1	Main PCBA	IR/RF Operating (Low voltage 2.3V input)	No defect on IR/RF Operating	Equipment	All	work sheet	○	Identification, Isolation, Repair	
				2	Main PCBA	Operating current	Current should be fine (satisfied with the spec)	Equipment	All	work sheet	○	Identification, Isolation, Repair	
150		Marking	Marking M/C	1	PCB Assy	Criteria management	Nondefect - Marking manufacture date Defect - Attach Nonconforming label	Equipment	All	work sheet	○	Identification, Isolation, Repair	
160		Packing	Magazine	1	PCB Assy	Product Packaging	No model mixing Identification confirmation	Visually	All	equipment	○	Re packing	
54		Analysis nonconforming products and repair	Magnifier, Soldering Iron, Inspection JIG	1	PCB Assy	Management of Soldering Iron temperature	Temperature management of soldering iron (380~420℃)	Measuring temperature	once a day	Checklist for temperature of Soldering Iron	○	Reset temperature, Change soldering iron	
				2	PCB Assy	Analysis and repair	Should pass retest after repair Should be no issue on soldered point	Function / Current test	nonconforming	Nonconforming Process checklist	○	Re-test after repair, scrap	
170		Top Case Assy	Guide cutter	1	PCB Assy	Removing the PCB Guide	PCB without bending. No pattern damage when removing the guide	visually	All	work sheet	○	Isolation, Repair	
		Top Case Assy	Handwork	2	Top Case, Keypad, Main PCBA	Top Case + Keypad + Main PCBA	Keypad and Main PCBA should not be lifted when seated	visually	All	work sheet	○	Isolation, Repair	
180		Assembling	Handwork	1	Top Assy, Bottom Cover, Filter	Assembling, Top Case Assy + Bottom Cover	There should be no deviations, gaps or gaps in spring Check the filter combination After the provisional match, the full match Be careful not to damage the phone jack during temporary molding	visually	All	work sheet	○	Isolation, Repair	
190		IR Operating Inspection	4IN1 Inspection JIG	1	Finished	IR operation Attach Back Label Side key inspection	No abnormality of Full Key IR output Check LED lighting No side key abnormalities	Equipment	All	work sheet	○	Identification, Isolation, Repair	
200		RF Operating Inspection	RF Inspection JIG	1	Finished Barcode	Pairing RF operation	Check pairing status and buzzer sound Check RSSI value, SW, FW version Voice and leakage current check Version label (manufacture date)	Visually	All	work sheet	○	Containment, repair	
210		PE-BAG fusion	fusion JIG	1	finished	PFusion of PE-BAG batteries	No abnormality of PE-BAG fusion	Visually	All	work sheet	○	Containment, repair	
220		visual Inspection	Visually	1	finished	Appearance	There should be no abnormality in the state of matching (Gap, step) There should be no abnormality on the IR Filter part's protective skin. No abnormality in specifications, no foreign matter and no marks	Visually	All	work sheet	○	Containment, repair	
				2	finished	Insert PE-BAG batteries	Inserting batteries into PE-BAG	Visually	All	work sheet	○	Containment, repair	
230		Product packing	Handwork	1	finished	Manual, PE-Bag	No manual missing or tearing	Visually	All	work sheet	○	Containment, repair	
				2	finished	Carton Box packaging	There should be no abnormality in mixing and quantitation (Box: 80EA)	Visually	Box	work sheet Barcode label	○	Containment, repair	
55		Analysis nonconforming products and repair	Handwork	1	finished	Analyzing and dismantling	Management of equipment and poor performance, Caution and confirmation of parts damage when dismantling	Visually/ Identification label	Nonconforming	Nonconformity Management ledger	○	Re-inspection after repair, Disposal	
				2	finished	Identification Management	Good and non-conforming products should not be mixed	Nonconforming	Nonconforming	Nonconformity Management ledger	○	Re-inspection after repair, Disposal	
				1	finished	Visual inspection (Design)	There should be no deleterious defect	Standard Sample /Visual	Sampling G-II, 0.65	Standard document of test, Inspection Manual	○	Sorting, Rework, Releasing nonconforming	
				2	finished	Function test	Pairing, voice, LED lighting, buzzer, Full Key, i-Set No abnormal operation	Inspection P/G	Sampling G-II, 0.65	Standard document of test, Inspection Manual	○	Sorting, Rework, Releasing nonconforming	
240		QOC	Pairing Dongle, Inspection P/G, JIG, Power Supply, Current meter, Lupe	3	finished	Electrical characteristics	1. RF (volume) operation current: TBD 2. IR (TV volume) operating current: TBD 3. Leakage current -Before pairing: (AVR) TBD -After pairing: (AVR) TBD 4. Operating voltage: TBD	Power Supply, current meter	Sampling n=5, c=0	Standard document of test, Inspection Manual	○	Sorting, Rework, Releasing nonconforming	
				4	finished	Overhaul	Pattern open/short, copper dirt, Cold sold, Solderless, Foreign substances inside, There should be no Mission cause	Visually, Lupe	n=1, c=0	Standard document of test, Inspection Manual	○	Sorting, Rework, Releasing nonconforming	
				5	finished	Condition of packing	There should be no issues with packaging condition, dirt, identification and quantification	Visual	Sampling Check	Standard document of test, Inspection Manual	○	Sorting, Rework, Releasing nonconforming	
56		Out Going	Forklift, Truck	1	finished	Product inventory management	There should be no issues with quantity of stock, mixing product and condition of storage	Products list	Standby stock	System(SAP)			

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16. TV Brand List (1/4)

Rev 1.7	2021.08.31
	SAMSUNG TM1940/TM1240 외 IR DB 43종 업데이트
Maker(Brand)Name	Code number (3 digit) List
삼성(SAMSUNG)	226 163 218 215 212 206 167 191 162 181 037 183 178 185 232 225 154 092 052 035 034 231 135 157 187 341 465
엘지(LG,금성,GOLDSTAR)	227 236 206 192 186 193 175 178 185 224 201 092 183 003 002 030 164 168 032 072 031 094 096 417
대우(DAEWOO)	014 231 043 190 177 217 176 159 166 233 029 158 150 206 178 185 216 165 169 156 152 155 151 228 195 153 170 188 198 038 160 189 039 199 182 235 092 050 053 202 047 051 179 344 375 420
대우루컴즈(DAEWOO LUCOMS)	327 335 350 351 352 353 321
아남(ANAM)	204 174 234 018 019 223 193 180 171 053 220 222 161 095 221 210 211 122 158 049 054 055 069 099 302 357 374
에이텍(ATEC)	031
이레전자(ERAE)	004 006 007 008 011 012 013
덱트론(DECTRON)	033
디보스(DIBOSS)	015 109
디지털 디바이스(DIGITAL DEVICE)	301 312
디지털스트림테크놀로지(DIGITAL STREAM)	351 360
디지털 싸이노스(DIGIAL CYNOS)	016
삼보컴퓨터(TRIGEM COMPUTER)	332
새찬전자(SAECHAN)	028 041 044
코리아데이터시스템스(KDS)	033 073
티디에스(TDS)	103
트라이뷰(TRIVIEW)	302
프리즘 테크놀로지(PRISM TECHNOLOGY)	303 355 072
하이얼(HAIER)	033 077 078 302 333 345
한국전자(KEC)	053 206
한성(HANSUNG)	378 414 420
현대아이티(HYUNDAI IT) -현대이미지퀘스트	022 017 107 108 309
현우 맥 플러스(MCPLUS)	206
휴리프(HULIF)	104
쿠메스전자(QUMES)	106
뉴콤월드(NEWCOMMWORLD)	219
다오코리아(DaoKorea)	304
모뉴엘(Moneual) - 롯데마트	305 306 307 326
드림뷰(DreamView) - 이마트	308 332
노브랜드(No Brand) - 이마트	308 332 330 463 373 351
일렉트로맨(ELECTROMAN) - 이마트	308
제이엘통상(XPEER) - 홈플러스	321
우성엔터프라이즈(WeCube) - 홈플러스	322
티바(TIVA, 스피드테크놀로지)	324
스카이미디아(Vishorn)	325 330 336
동양전자(DONGYANG)	068
비티씨정보통신(BTC)	316
씨마디지털(CIMADIGITEC)	318 319 072
LS전자(LS ELECTRONICS)	313
모티브씨엔씨(MOTV)	311
시그마TV(SIGMACOM)	310
유니크로(UNIKRO)	100 317
보임틀(VOIMTLE)	304
보림전자(BOLIM)	028 315 323
3S DIGITAL	028
삼인디스플레이(XSTIM)	104 320 329
유투스(케이엘전자 UTUS)	314
인디텍(VIEWPIA)	107
재원전자(JAEWON)	333
지파엔씨(GPNC)	327 306
제노스미디어(ZENOS)	303 328
제이아이케이솔루션(LEGRAND)	342
파인포스(FINEFORCE)	306
더블유시디(WCD)	331
토마토디스플레이(TOMATO DISPLAY)	337 306 356
넥스디지털(NEX)	338
매직나라(MAGIC NARA)	332 339
유니크컴퍼니(UNIQUE COMPANY)	340
알파스캔(ALPHASCAN)	306 203 345

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16. TV Brand List (2/4)

Maker(Brand)Name	Code number (3 digit) List
야마카시(YAMAKASI, 바이텍코리아)	343 346 347 348 349
자비오씨앤씨(XAVVIO)	354
티베라(TVERA)	355
스카이워스(SKYWORTH)	353
오리온정보통신(TOPSYNC)	351 330 357 306
한스정보(HANSJUNGBO, HANS TOUCH)	356
샤오미(XIAOMI)	361
디스플레이파크(DISPLAY PARK)	072
스마트홈 일렉트로닉스 - 스마트라(SMART HOME ELECTRONICS)	362 363 072 420
주연테크(JOOYON)	302 346 373
대유위니아(WINIADAERWOO, WINIADIMCHAE)	338
아낙(ANAC)	345
매직뷰(MAGICVU)	355
모넥스(MONEX)	302
엘디케이(LDK)	321 206
와사비망고(WASABIMANGO)	072 419
하이메이드(HIMADE)	072 072
인트로스(INTROS)	072 355
삼화디스플레이(SAMHWA)	072
아도나스(ADONIS)	355
큐닉스(QNIX)	370 371 372
와이드뷰(WIDE VU)	373 360
벅셀(BEXEL)	350
폴라로이드(POLAROID)	072
클라인즈(KLEINZ)	373
아인츠(IEINZ)	373
티비스타(TVSTAR)	355
더함 TV (THEHAM)	072
이엔티비(ENTV)	374
MOZEE	373
시네아이(DLT) -시네EYE	373
ZEPA	373
젠티뷰(ZENTVIEW)	356 373
FIDES	321 072
프리토스(FREETOSS)	321
CACC	072
제네시스(GENESIS)	321 355
이노스(INNOS)	072
스마트뷰(SMART VIEW)	418 072 467
이스트라(ESTRA)	419 351
COOCAA	353
티지엔컴퍼니(TG&Co.)	332 308
트루비(TRUVI)	419 420
IRIVER(드림어스)	072 420
유맥스(UMAX)	072 420
의영시스템(WOW TV)	357
앤티웍스(ANTWORKS)	330
현아이디어(HYNAEDA)	373
지스타(ZSTA)	373
타라엘씨디(TARALCD)	302
인켈(INKEL-SHERWOOD)	209 353 163 072 151 327 350 354 464
호리온(HORION)	419 072 467
NEXTBOOK	419
브라운슈거(BROWN SUGAR)	419
더하이텍(THEHITECH)	344
루브제(LUVZE)	373
브릴리언츠(BRILLIANT)	353
디포인트(DPOINT)	072
저스트인테크(JIT)	373
OIC코리아(OIC KOREA, PRISM KOREA)	302
델로라(DELORA)	467
브리드(VRID)	072
TNM	420 355 360 466
JAMOS	358
A MARK	092 154 193 206
AOC	193 404
AUDIOVOX	038

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16. TV Brand List (3/4)

Maker(Brand)Name	Code number (3 digit) List
CANDEL	150 081
CAMEL	366
CETRONIC	053
CHANGHONG	351
CITIZEN	050 052 092 150 163 081
CLASSIC	053
CONCERTO	150
CONTEC	053 135 157
CORONADO	092 154 206
CRAIG	053
CROWN	053 092
CURTIS MATHES	052 092 163
CXC	053
DAYTRON	092
DELL	410
DYNASTY	053
ELECTROHOME	038 092
EMERSON	359 026 038 053 092 111 135 154 206
FUNAI	053 359
FUJITSU	205 412
FUTURETECH	053
GE	042 167 037 049 067 071
GRUNDIG	401
HISENSE	368
HITACHI	377 009 023 024 025 083 097 098 150 139 206 376
HP	403
INFINITY	068
INSIGNIA	411
JBL	068
JCPENNY	052 092 089
JVC	058 066 092 070 071 321
KENWOOD	058 070 415
KIVI	420
KLOSS	082
KMC	092 154 206
KTV	053 092 154 250
LUXMAN	051 150
LXI	151 167 037 068 090
MAGNAVOX	001 150 154 167 037 068 206 185 081 082 085
MARANTZ	068 108
MATSUI	068
METZ	408 462
MGA	150
MITSUBISHI	074 075 076 105 150
MTC	052 150 163
NAD	090
NEC	005 014 042 105 150 151 152 413
NIKEI	053
ONKING	053
ONTEC	053
ONWA	053
ORION	111 101 072
PANASONIC	095 161 049 054 055 223 067 068 238 061 069 071 250
PENNEY	150 163 167
PHILCO	150 154 167 037 068 206 185 081 082 085
PHILIPS	026 066 120 150 154 167 203 037 068 206 236 178 185 081 082 085 086 087 312
PIONEER	002 003 027 097 367
PORTLAND	092 150 154 206
PROTON	032 092 122
QUASAR	049 067 071 250
RADIO SHACK	053 185 092
RCA	010 097 150 167 037 370
RUNCO	416
REALISTIC	053
SANYO	020 102 151
SCOTT	053 092

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16. TV Brand List (4/4)

Maker(Brand)Name	Code number (3 digit) List
SEARS	092 150 151 163 167 037 206 089 090
SHARP	001 062 063 064 065 092 208 206
SONY	048 060 059 058 057 056 207 115 194 147 070 139 045 046 080
SOUNDESIGN	053 081
SPECTRICON	193
SSS	053
SYLVANIA	051 150 167 185 037 068 081 082 085
TATUNG	049
TCL	334 009 369 376 460 461
TEAC	407
TECHNICS	095 071
TECHWOOD	150
TEKNIKA	053 092 150 154 163 165 052 206 081
THOMSON	409
TMK	150
TOSHIBA	021 052 105 163 088 151 089 090 091 093
TOTEVISION	092
UNIDEN	406
VICTOR	066
VIDTECH	150
VIEWSONIC	405
VIZIO	364
WARDS	092 150 154 167 185 037 068 071 206 085
WESTING HOUSE	038 014 402
YAMAHA	150
YUPITERUZENITH	053
ZENITH	050 084 072
ZONDA	193

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17. Grouping brand list(1/4)

	Maker(Brand)Name	Code number (3 digit) List
GROUP 01	삼성(SAMSUNG)	226 163 218 215 212 206 167 191 162 181 037 183 178 185 232
		225 154 092 052 035 034 231 135 157 187 341 465
GROUP 02	엘지(LG,금성,GOLDSTAR)	227 236 206 192 186 193 175 178 185 224 201 092 183 003 002
		030 164 168 032 072 031 094 096 417
GROUP 03	대우(DAEWOO)	014 231 043 190 177 217 176 159 166 233 029 158 150 206 178
		185 216 165 169 156 152 155 151 228 195 153 170 188 198 038
		160 189 039 199 182 235 092 050 053 202 047 051 179 344 375
	대우루컴즈(DAEWOO LUCOMS)	420
		327 335 350 351 352 353 321
	아남(ANAM)	204 174 234 018 019 223 193 180 171 053 220 222 161 095 221
	이레전자(ERA)	210 211 122 158 049 054 055 069 099 302 357 374
	디지털 디바이스(DIGITAL DEVICE)	004 006 007 008 011 012 013
	디지털스트림테크놀로지(DIGITAL STREAM)	301 312
	삼보컴퓨터(TRIGEM COMPUTER)	351 360
	삼보컴퓨터(삼보컴퓨터)	332
	코리아데이터시스템(KDS)	033 073
	티디에스(TDS)	103
	트라이뷰(TRIVIEW)	302
	프리즘 테크놀로지(PRISM TECHNOLOGY)	303 355 072
	한국전자(KEC)	053 206
	현대아이티(현대이미지케스트)	022 017 107 108 309
	현우 맥 플러스(MCPLUS)	206
	유리프(HULIF)	104
	쿠메스전자(QUMES)	106
	다오코리아(DaoKorea)	304
	모뉴얼(Moneual) - 롯데마트	305 306 307 326
	드림뷰(DreamView) - 이마트	308 332
	노브랜드(No Brand) - 이마트	308 332 330 463 373 351
	일렉트로맨(ELECTROMAN) - 이마트	308
	제이엘통상(XPEER) - 홈플러스	321
	우성엔터프라이즈(WeCube) - 홈플러스	322
	티바(TIVA, 스피드테크놀로지)	324
	스카이미디아(Vishom)	325 330 336
	동양전자(DONGYANG)	068
	비티씨정보통신(BTC)	316
	씨마디지털(CIMADIGITEC)	318 319 072
	LS전자(LS ELECTRONICS)	313
	모티브씨엔씨(MOTV)	311
	시그마TV(SIGMACOM)	310
	유니크로(UNIKRO)	100 317
	보임틀(VOIMTLE)	304
	보림전자(BOLIM)	028 315 323
	삼인디스플레이(XSTIM)	104 320 329
	유투스(케이엘전자 UTUS)	314
	인디텍(VIEWPIA)	107
	재원전자(JAEWON)	333
	지피엔씨(GPNC)	327 306
	제노스미디어(ZENOS)	303 328
	제이아이케이솔루션(LEGRAND)	342
	파인포스(FINEFORCE)	306
	다불유시디(WCD)	331
	토마토디스플레이(TOMATO DISPLAY)	337 306 356
	넥스디지털(NEX)	338
	매직나라(MAGIC NARA)	332 339
	유니크컴퍼니(UNIQUE COMPANY)	340
	알파스캔(ALPHASCAN)	306 203 345
	야마카시(YAMAKASI, 바이텍코리아)	343 346 347 348 349
	자바씨엔씨(XAVVIO)	354
	티베라(TVERA)	355
	스카이워스(SKYWORTH)	353
	오리온정보통신(TOPSYNC)	351 330 357 306
	한스정보(HANSJUNGBO, HANS TOUCH)	356
	샤오미(XIAOMI)	361
	디스플레이파크(DISPLAY PARK)	072

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17. Grouping brand list(2/4)

	Maker(Brand)Name	Code number (3 digit) List
GROUP 04	스마트홈 일렉트로닉스 - 스마트라 (SMART HOME ELECTRONICS)	362 363 072 420
	주연테크(JOYON)	302 346 373
	대유위니아(WINIADAEWOO, WINIADIMCHAE)	338
	아낙(ANAC)	345
	매직뷰(MAGICVU)	355
	모넥스(MONEX)	302
	엘디케이(LDK)	321 206
	와사비망고(WASABIMANGO)	072
	하이메이드(HIMADE)	072 072
	인트로스(INTROS)	072 355
	삼화디스플레이(SAMHWA)	072
	JAMOS	358
	CAMEL	366
	아도니스(ADONIS)	355
	큐닉스(QNIX)	370 371 372
	와이드뷰 (WIDE VU)	373 360
	벡셀 (BEXEL)	350
	폴라로이드 (POLAROID)	072
	클라인즈 (KLEINZ)	373
	아인츠 (IEINZ)	373
	티바스타 (TVSTAR)	355
	더함 TV (THEHAM)	072
	이엔티비 (ENTV)	374
	MOZEE	373
	시네아이(DLT) -시네EYE	373
	ZEPA	373
	젠티뷰(ZENTVIEW)	356 373
	FIDES	321 072
	프리토스 (FREETOSS)	321
	CACC	072
	제네시스 (GENESIS)	321 355
	이노스 (INNOS)	072
	한성(HANSUNG)	378 414 420
	스마트뷰 (SMART VIEW)	418 072 467
	이스트라(ESTRA)	419 351
	COOCAA	353
	타지엔컴퍼니(TG&Co.)	332 308
	트루비(TRUVI)	419 420
	IRIVER(드림어스)	072 420
	유맥스(UMAX)	072 420
	의영시스템	357
	엔트웍스(ANTWORKS)	330
	현아이디어(HYUNIDEA)	373
	지스타(ZSTA)	373
	타라엘씨디(TARALCD)	302
	호리온(HORION)	419 072 467
	NEXTBOOK	419
	브라운슈거(BROWN SUGAR)	419
	더하이텍(THEHITECH)	344
	루브제(LUVZE)	373
	브릴리언츠(BRILLIANT)	353
	디포인트(DPOINT)	072
	저스트인테크(JIT)	373
	OIC코리아(OIC KOREA, PRISM KOREA)	302
	델로라(DELORA)	467
	브리드(VRID)	072
	TNM	420 355 360 466
GROUP 05	SONY	048 060 059 058 057 056 207 115 194 147 070 139 045 046 080
	PANASONIC	095 161 049 054 055 223 067 068 238 061 069 071 250
	NEC	005 014 042 105 150 151 152 413
	JVC	058 066 092 070 071 321
	SANYO	020 102 151
	PIONEER	002 003 027 097 367
	FUJITSU	205 412
	SHARP	001 062 063 064 065 092 208 206

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17. Grouping brand list(3/4)

	Maker(Brand)Name	Code number (3 digit) List
GROUP 06	HITACHI	377 009 023 024 025 083 097 098 150 139 206 376
	HP	403
	TOSHIBA	021 052 105 163 088 151 089 090 091 093
	mitsubishi	074 075 076 105 150
GROUP 07	PHILIPS	026 066 120 150 154 167 203 037 068 206 236 178 185 081 082
	하이얼(HAIER)	085 086 087 312
	HISENSE	033 077 078 302 333 345
	ZENITH	368
	CANDEL	050 084 072
	EMERSON	150 081
	GE	359 026 038 053 092 111 135 154 206
	GRUNDIG	042 167 037 049 067 071
	MAGNAVOX	401
	A MARK	001 150 154 167 037 068 206 185 081 082 085
GROUP 08	PENNEY	092 154 193 206
	에이텍(ATEC)	150 163 167
	3S DIGITAL	031
	뉴컴월드(NEWCOMMWORLD)	028
	디지털 싸이노스(DIGIAL CYNOS)	219
	새천전자(SAECHAN)	016
	AOC	028 041 044
	AUDIOVOX	193 404
	CETRONIC	038
	CHANGHONG	053
	CITIZEN	351
	CLASSIC	050 052 092 150 163 081
	CONCERTO	053
	CONTEC	150
	CORONADO	053 135 157
	CRAIG	092 154 206
	CROWN	053
	CURTIS MATHES	053 092
	CXC	052 092 163
	DAYTRON	053
	DELL	092
	DYNASTY	410
	덱트론(DECTRON)	053
	디보스(DIBOSS)	033
	ELECTROHOME	015 109
	FUNAI	038 092
	FUTURETECH	053 359
		053
	INFINITY	068
	INKEL	209 353 163 072 151 327 350 354 464
	INSIGNIA	411
	JBL	068
	JCPENNY	052 092 089
	KENWOOD	058 070 415
	KIVI	420
	KLOSS	082
	KMC	092 154 206
	KTV	053 092 154 250
	LUXMAN	051 150
	LXI	151 167 037 068 090
	MARANTZ	068 108
	MATSUI	068
	METZ	408 462
	MGA	150
	MITC	052 150 163
	NAD	090
	NIKEI	053
	ONKING	053
	ONTEC	053
	ONWA	053

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17. Grouping brand list(4/4)

	Maker(Brand)Name	Code number (3 digit) List
GROUP 09	ORION	111 101 072
	PHILCO	150 154 167 037 068 206 185 081 082 085
	PORTLAND	092 150 154 206
	PROTON	032 092 122
	QUASAR	049 067 071 250
	RADIO SHACK	053 185 092
	RCA	010 097 150 167 037 370
	RUNCO	416
	REALISTIC	053
	SCOTT	053 092
	SEARS	092 150 151 163 167 037 206 089 090
	SOUNDESIGN	053 081
	SPECTRICON	193
	SSS	053
	SYLVANIA	051 150 167 185 037 068 081 082 085
	TATUNG	049
	TCL	334 009 369 376 460 461
	TEAC	407
	TECHNICS	095 071
	TECHWOOD	150
	TEKNIKA	053 092 150 154 163 165 052 206 081
	THOMSON	409
	TMK	150
	TOTEVISION	092
	UNIDEN	406
	VICTOR	066
	VIDTECH	150
	VIEWSONIC	405
	VIZIO	364
	WARDS	092 150 154 167 185 037 068 071 206 085
	WESTING HOUSE	038 014 402
	YAMAHA	150
	YUPITERUZENITH	053
	ZONDA	193