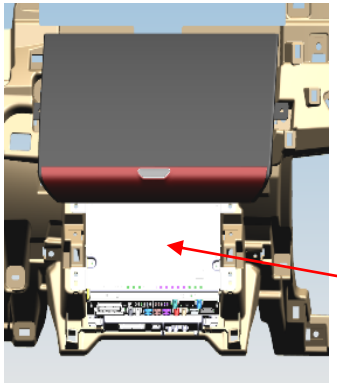
Geely(CEVT) IHU Manual

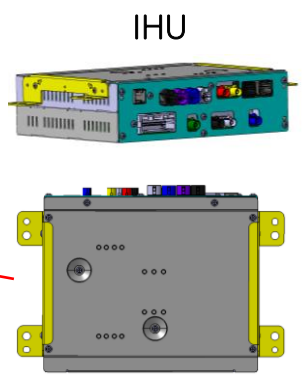
China Euro Vehicle Technology : 吉利 / Volvo

LG
Life's Good

2-1. Product Inforamtion

Platform Overview





System	CPU	S820A-SCL Quad, 1.51GHz x2, 1.28GHz x2
	RAM	LPDDR4 4GB
	Storage	UFS 64GB Universal Flash Storage
	OS	Google Android 9.0 (P)
	MICOM	32bit Microcontroller (NXP) Autosar
Audio /Radio	DSP	NXP DiRaNa3
Display	LCD	12.7 inch IPS (1920x1080)
	Touch	Capacitive
	Type	LVDS

Main Features

Broadcast
- EU : Dual Tuner with TMC (RDS), DAB+

Media
- 2xUSB, BT Stream, IPOD (EU only)

Connectivity
- Bluetooth 5.0, WiFi (802.11 a/b/g/n/ac)
- CarPlay, Android Auto (EU only)

In-Vehicle Network
- FlexRay, LIN, Ethernet, CAN

Navigation
- 2D/3D Map

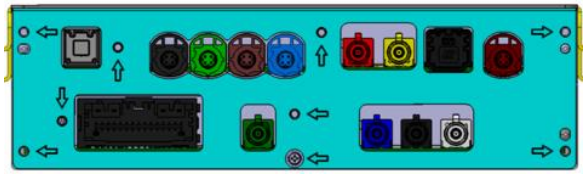
Rear View Camera
- Around View Camera (LVDS I/F)

Audio
- External AMP (A2B Interface)

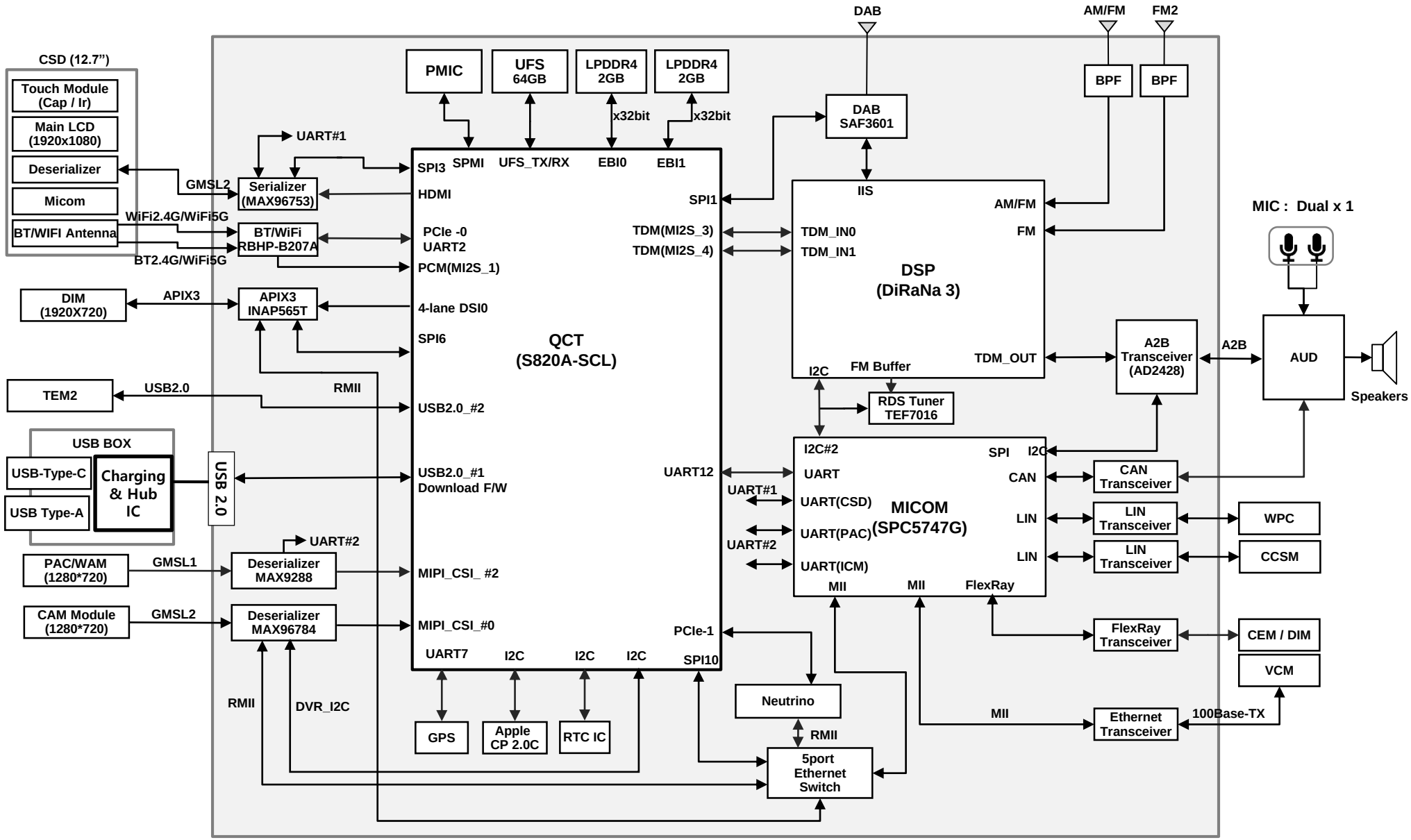
Product Schedule

2020. Q4 (EU)

2. System Overview

Function		China
		DCY11
System	Image	
	CPU	S820A-SCL
	SDRAM	LPDDR4 4GB
	UFS	64GB
Position	GPS/SBAS/Glonass	O
	DR (Gyro Sensor)	O
Broad Casting	FM/AM	Dual Tuner, AM X
	RDS	O
	XM	X
	DAB+	O
Media	USB	1x USB 2.0 HS
	iPod	O
	AUX	X
Bluetooth	Supported Specification	BT 5.0
WIFI	Protocol	802.11 a/b/g/n/ac (2.4 / 5GHz)
Ethernet	10/100 IEEE802.3	O
External Interface	TEM	O
	AMP	External
	PAC/WAM	O / X
	CSD	O
	DIM	O
	DVR	O

3. Block Diagram



4. Part List

ITEM	Part Number	Vendor	Remark
CPU	S820A-SCL	Qualcomm	
LPDDR4 Memory (2x 2G)	K4F6E3S4HM-THCL02V	Samsung	
UFS Memory (64GB)	KLUCG4J1ZD-B0CQ053	Samsung	
MICOM	SPC5747GK1CKU2	NXP	CMA IHU
Audio DSP	SAF7751	NXP	CMA IHU
GMSL2 Transmitter	MAX96753F	Maxim	
GPS Module	NEO-M8L(03A)	U-Blox	
BT/WiFi Module	RBHP-B207A	LGIT	
Audio A2B	AD2428	Analog	
APIX3 Transmitter	INAP565T	Inova	
Ethernet Switch	SJA1105P	NXP	
Ethernet Bridge	TC9560XBG	Toshiba	
GMSL1 Receiver (PAC, WAM)	MAX9288GTM	Maxim	
GMSL2 Receiver (DVR)	MAX96784	Maxim	
Ethernet Transceiver	LAN88730AMR	Microchip	CMA IHU
DAB Receiver	SAF3601	NXP	
RDS Tuner	TEF7016	NXP	

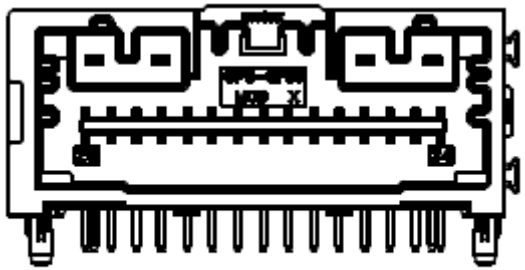
6. Electrical specification

<table>
<tr><th></th><th>Specification</th></tr>
<tr><td>Operating Current</td><td>Max. 1.5A (estimate value) / Input voltage : 12V</td></tr>
<tr><td>Quiescent Current</td><td>Under 100uA @ 12.0 ± 0.2V, 25C.</td></tr>
<tr><td>Inrush Current</td><td>Max. 14A @ 14V</td></tr>
<tr><td>Operating Voltage</td><td>
< Specification >
<table>
<tr><th>Up Stream</th><th>Description</th></tr>
<tr><td>+Bat < 7V</td><td>May not operate, no destruction.</td></tr>
<tr><td>7V < +Bat < 8V</td><td>Communication OK</td></tr>
<tr><td>8V < +Bat < 16V</td><td>100% Normal mode.</td></tr>
<tr><td>16 V < +Bat</td><td>May not operate, no destruction.</td></tr>
</table>
< Specification >
<table>
<tr><th>Voltage Range</th><th>Description</th></tr>
<tr><td>6.5 V > +Bat</td><td>May not operate, no destruction.</td></tr>
<tr><td>6.5 V < +Bat < 7 V</td><td>Hysteresis region.</td></tr>
<tr><td>7 V < +Bat < 16 V</td><td>Communication OK</td></tr>
<tr><td>8 V < +Bat < 16 V</td><td>Normal Operation.</td></tr>
<tr><td>16 V < +Bat < 17 V</td><td>Hysteresis region</td></tr>
<tr><td>17 V < +Bat</td><td>May not operate, destruction possible</td></tr>
</table>
</td></tr>
</table>

7. In-Out pin map (34pin_power cable)

34PIN MAIN CONNECTOR

01	02									03	04		
B+	NC									GND	GND		
05	06	07	08	09	10	11	12	13	14	15	16	17	18	19
NC	NC	NC	NC	GND	NC (FACTORY UART)	GND	GND	GND	A2B_BN (-)	A2B_BP (+)	HS_CAN_L	HS_CAN_H	FLAXRAY_A1+	FLAXRAY_A1-
20	21	22	23	24	25	26	27	28	29	30	31	32	33	34
NC	MONITOR_EN	USB_EN	USB_WAKEUP	CSD_LOCK_DET	NC (FACTORY UART)	GND	LIN1 (WPC)	GND	LIN2 (CCSM)	GND	GND	GND	FLAXRAY_A2+	FLAXRAY_A2-



34WAY POLARIZATION OPTION 'A'
P/N: 34961-0340

8. System specification(FM Radio)

MEASUREMENT		Test condition	Specification
FM part			UNLESS OHTERWISE SPECIFIED : Dev. 22.5Khz, 1kHz AF, Mono, SG: 60dBuV, Audio 2.83V
Frequency range		87.5Mhz ~ 108Mhz	▶ Min: 87.5Mhz
			▶ Max: 108Mhz
Signal to noise ratio	88.1Mhz	RF input: 60dBuV Stereo mode Pilot: 10%(7.5Khz)	▶ ≥70dB ▶ ≥56dB at noise peak
	98.1Mhz		
	107.9Mhz		
Sensitivity at 30dB S/N	88.1Mhz	RF input: 74dBuV MOD: 22.5Khz	▶ 12dBuV ± 6dBuV
	98.1Mhz		
	107.9Mhz		
Immunity against high input level	88.1Mhz	RF input: 74dBuV to 120dBuV Start from 74dBuV	▶ output level difference ±0.5dB ▶ Distortion ≤0.5dB
	98.1Mhz		
	107.9Mhz		
-3dB limiting sensitivity	88.1Mhz	60dBuV starting point	▶ Default: 10dBuV (Range 0dBuV ~ 12dBuV)
	98.1Mhz		
	107.9Mhz		
AM rejection	88.1Mhz	RF input: 20dBuV AM MOD: 30%, 1Khz AF	▶ ≥60dB
	98.1Mhz		
	107.9Mhz		
Stereo separation	88.1Mhz	RF input: 54dBuV Dev.: 30% Pilot tone: 10%	▶ ≥30dB
	98.1Mhz		
	107.9Mhz		
Channel level difference'	88.1Mhz	Pilot tone: 10% Stereo same signal both left and right	▶ =0dB
	98.1Mhz		
	107.9Mhz		
Stop sensitivity for seek	88.1Mhz	20dBuV	▶ Default: 20dBuV (Range: 15dBuV ~ 40dBuV)
	98.1Mhz		
	107.9Mhz		
Frequency response	999Khz	74dBuV, 30% MOD	▶ 50hz to 15Khz : 0dB ±3dB
Distortion	88.1Mhz	1Khz AF, Dev. 75Khz RF input: 12dBuV	▶ ≤10%
	98.1Mhz		
	107.9Mhz		
T.H.D	88.1Mhz	1Khz AF, Dev. 22.5Khz RF input: 54dBuV	▶ 200Hz: < 3%
	98.1Mhz		▶ 1KHz: < 1%
	107.9Mhz		▶ 5KHz: < 1%

8. System specification (BT/WiFi)

MODEL NAME : RBHP-B207A (LG INNOTEK)
- **BT(v5.0) + 2.4GHz/5GHz WLAN(IEEE 802.11a/b/g/n/ac) 2.4G SISO/5G MIMO**

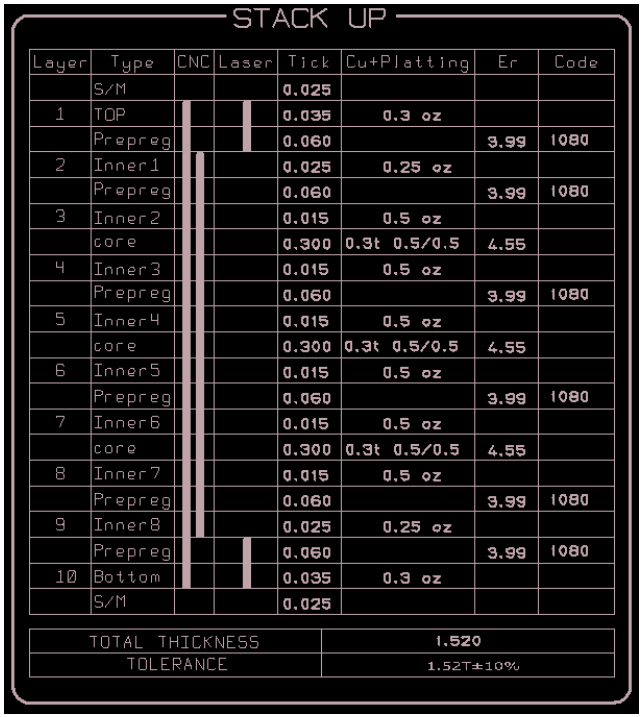
Features
- **Operation Voltage is 3.3V/1.8V Dual Power Rail**
- **WiFi Single-stream up to 866 Mbps data rate**
- **Automotive Module**
  : All components are AEC-Q 100/200 qualified
- **Support 2 Antenna port**
  : ANT0 : Bluetooth/5G WLAN, ANT1 : 2.4G/5G WLAN
- **Integrated WLAN PA, RF Switch and LNA**
- **RoHS Compliant**
- **Size : 19.2 x 17.0 x 3.1 mm3**
- **Support bandwidth : HT20 / HT40 / VHT80**
- **HOST Interface : PCIE/SDIO(WLAN), UART(BT), PCM(I2S)**
- **Package type : SMD type**
- **BT LE is supported only 1M.**

Feature		Model			비고
		Requirement	Bluetooth	WiFi	
BT/ WiFi	Version	BT/WiFi	BT 5.0	802.11 a/b/g/n/ac	2.4G WiFi : 802.11 b/g/n 5G WiFi : 802.11 a/n/ac
	Band of operation	Bluetooth 2.4GHz WIFI 2.4GHz + 5GHz	2402MHz – 2480MHz	2412 MHz – 2472 MHz 5745 MHz – 5825 MHz	
	Impedance	50ohm	50ohm	50ohm	

8. System specification (Intercommunication)

Communication Interface	CEVT Specification	LGE Specification
LVDS : 2 Interfaces		
CSD : output	GMSL2	Ok (Maxim MAX96753)
PAC : input	GMSL	Ok (Maxim MAX9288)
DIM : output	APIX2	Ok (Inova INAP565T)
DVR : input	GMSL2	Ok (Maxim MAX96784)
FlexRay : interfacing Vehicle Backbone		
CEM	FlexRay	Ok (NXP TJA1081)
LIN : 2 Ports		
CCSM	Share DMSM LIN Port	Ok (NXP TJA1021)
WPC	Share CCSM LIN Port	Ok (NXP TJA1021)
CAN		
Connect to External AMP (High Model Only)		
High Speed CAN		Ok (NXP TJA1043)
Ethernet		
Connect to VCM	Static 100Mbps	Ok
Ethernet PHY		Ok (LAN88730)
Audio		
External AMP	A2B	OK (AD2428)

9. PCB (Main PCB)

Feature	Model MAIN (EAX69079501)	Remark
층수	10층	
두께	1.52T ±10%	
SIZE	146.5 X 190 mm	
소재	FR4 DS-7408	
STACK UP		
표면처리	OSP	

STACK UP

Layer	Type	CNC	Laser	Tick	Cu+Platting	Er	Code
	S/M			0.025			
1	TOP			0.035	0.3 oz		
	Prepreg			0.060		3.99	1080
2	Inner1			0.025	0.25 oz		
	Prepreg			0.060		3.99	1080
3	Inner2			0.015	0.5 oz		
	core			0.300	0.3t 0.5/0.5	4.55	
4	Inner3			0.015	0.5 oz		
	Prepreg			0.060		3.99	1080
5	Inner4			0.015	0.5 oz		
	core			0.300	0.3t 0.5/0.5	4.55	
6	Inner5			0.015	0.5 oz		
	Prepreg			0.060		3.99	1080
7	Inner6			0.015	0.5 oz		
	core			0.300	0.3t 0.5/0.5	4.55	
8	Inner7			0.015	0.5 oz		
	Prepreg			0.060		3.99	1080
9	Inner8			0.025	0.25 oz		
	Prepreg			0.060		3.99	1080
10	Bottom			0.035	0.3 oz		
	S/M			0.025			
TOTAL THICKNESS				1.520			
TOLERANCE				1.52T±10%			

SINGLE ENDED

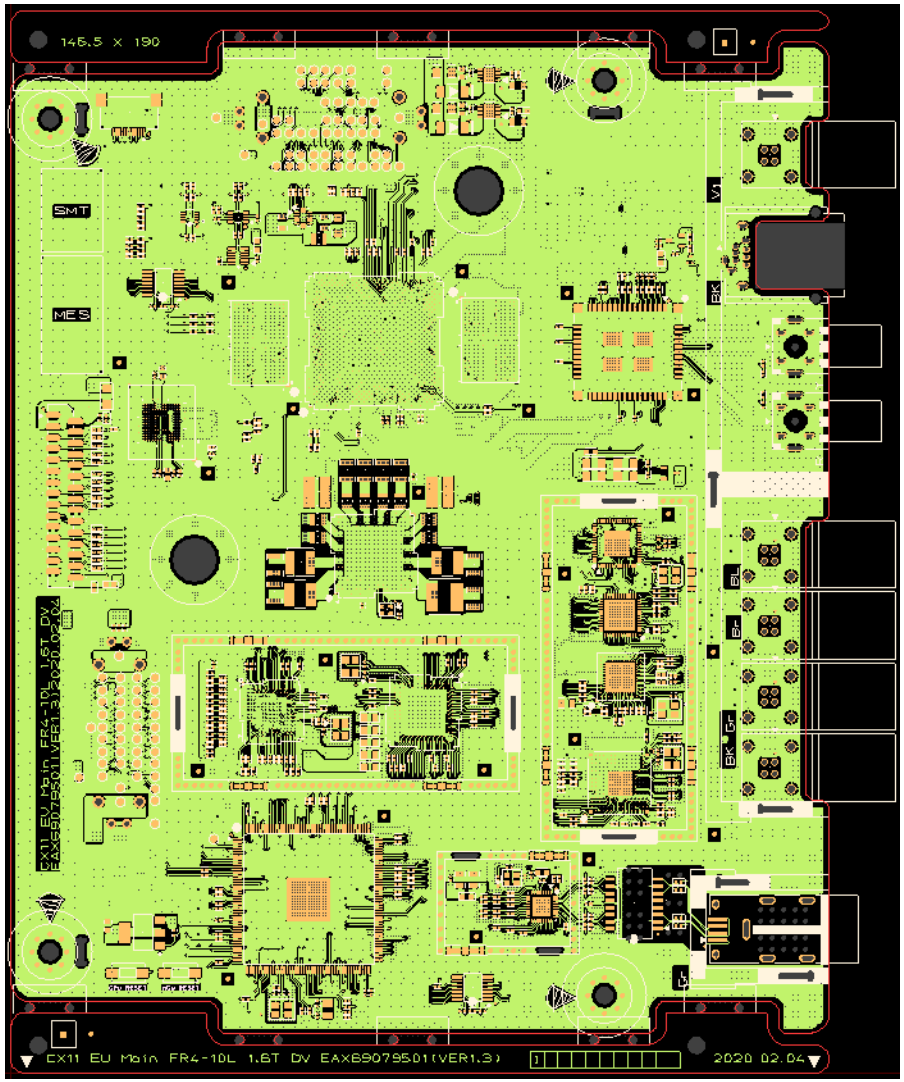
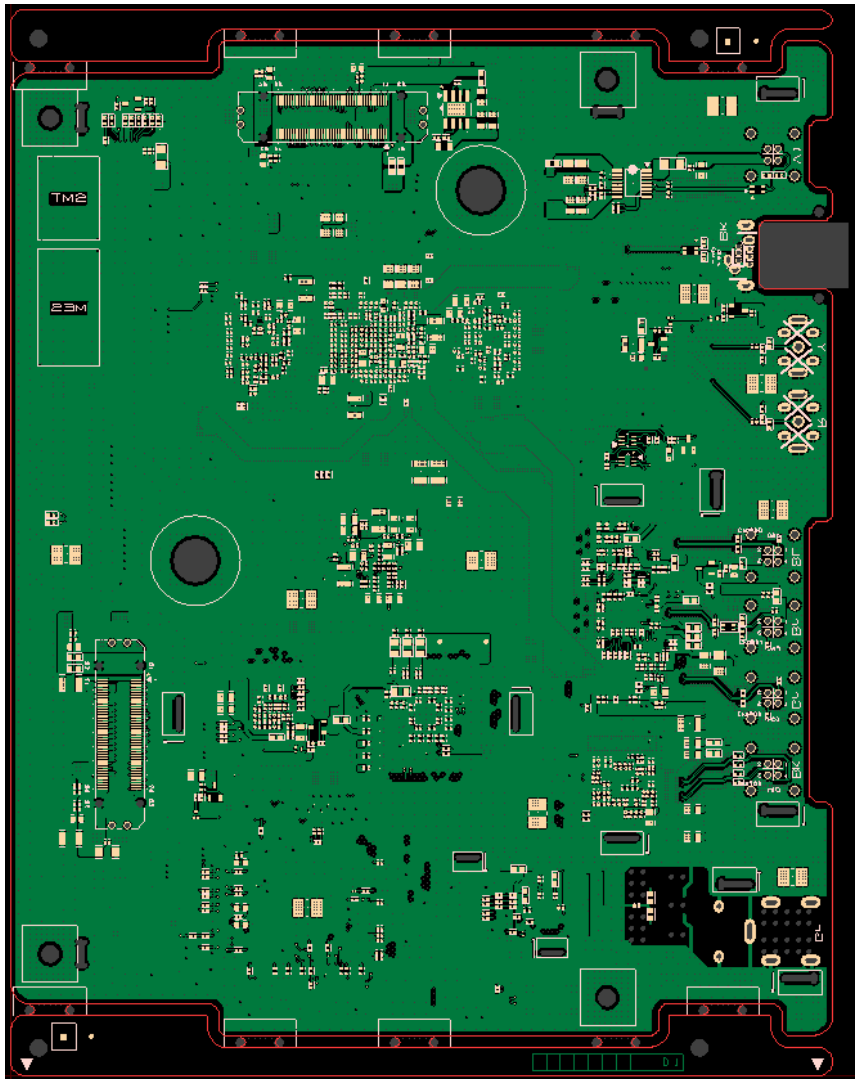
ZØ	WIDTH	TARGET LAYER	REFERENCE LAYER
44	0.060	9L	8L 10L
45	0.050	9L	8L 10L
50	0.095	1L, 10L	2L, 9L
50	0.260	1L, 10L	3L, 8L
~~50~~	~~0.880~~	~~1L~~	~~4L~~

DIFFERENTIAL PAIR

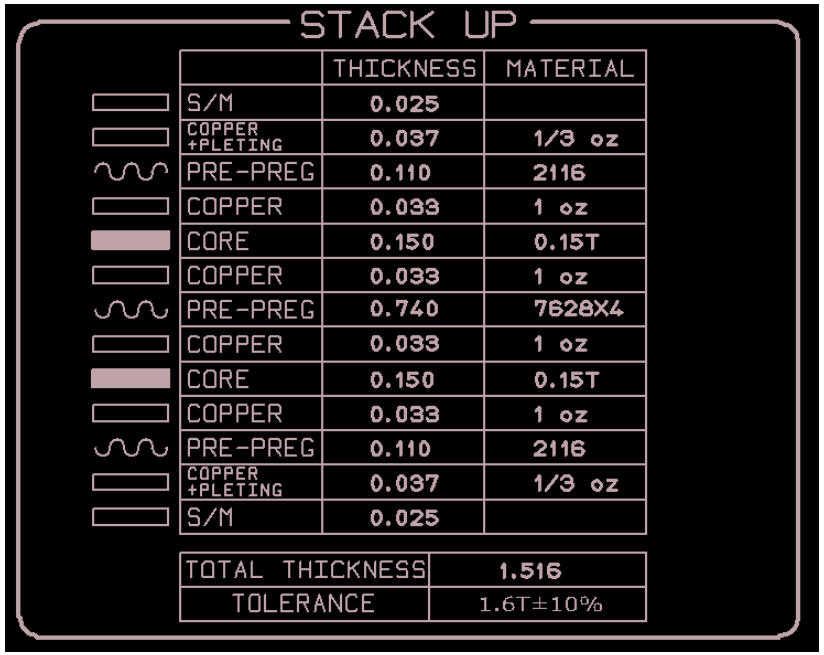
ZØ	WIDTH	SPACEING	TARGET LAYER	REFERENCE LAYER
90	0.090	0.100	1L, 10L	2L, 9L
90	0.080	0.110	4L	3L/5L
~~90~~	~~0.052~~	~~0.183~~	~~9L~~	~~8L/10L~~
100	0.085	0.150	1L, 10L	2L, 9L
100	0.190	0.170	1L	3L
100	0.055	0.170	2L, 9L	1L/3L, 8L/10L
100	0.067	0.138	4L	3L/5L

9. PCB (Main PCB)

main PCB Placement

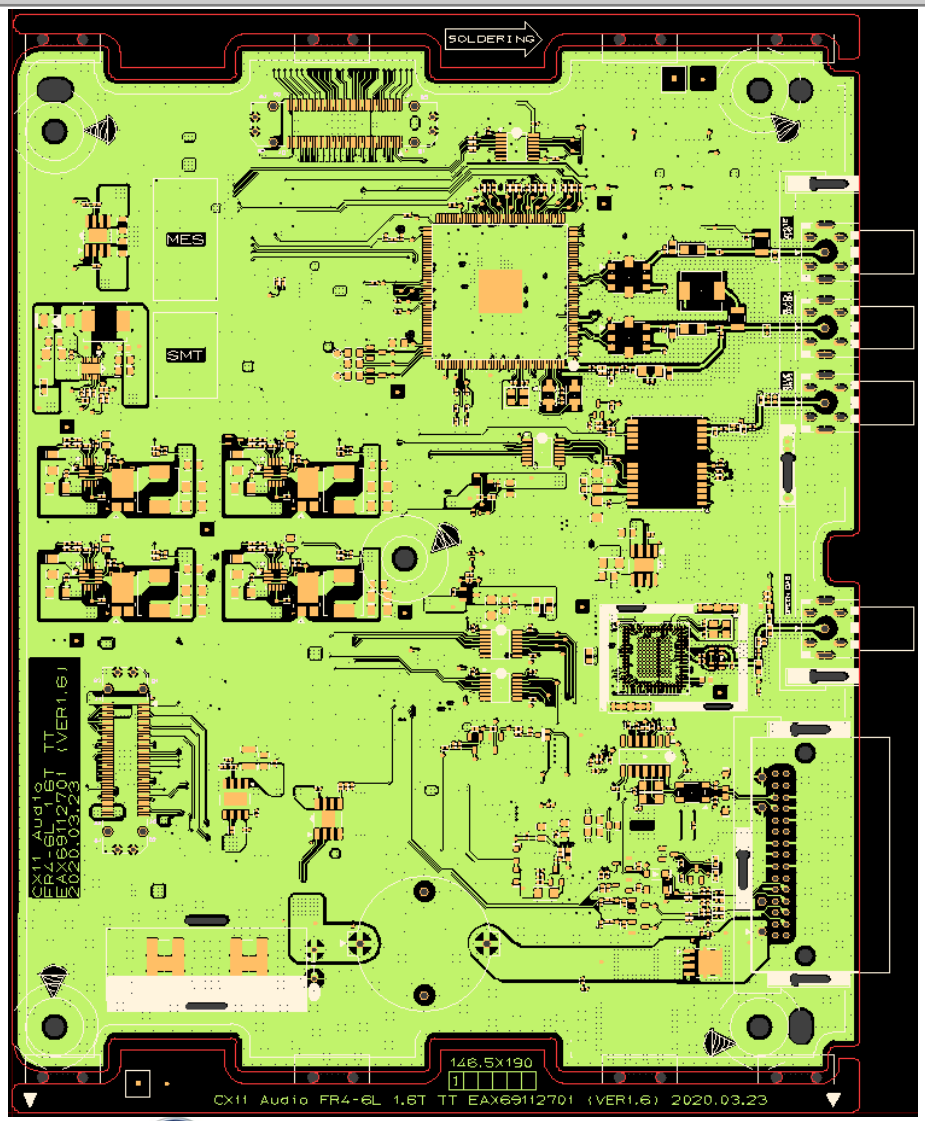
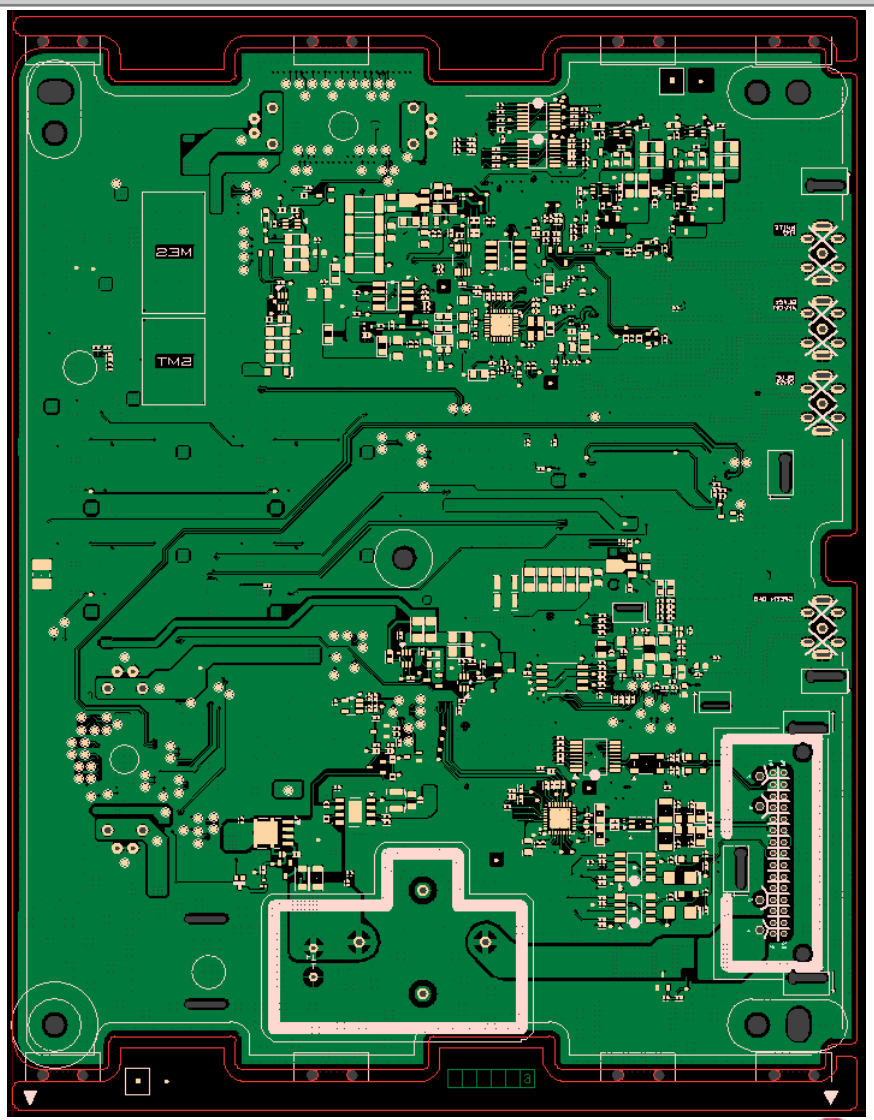
Main PCB TOP	Main PCB BOTTOM
	

9. PCB (Audio PCB)

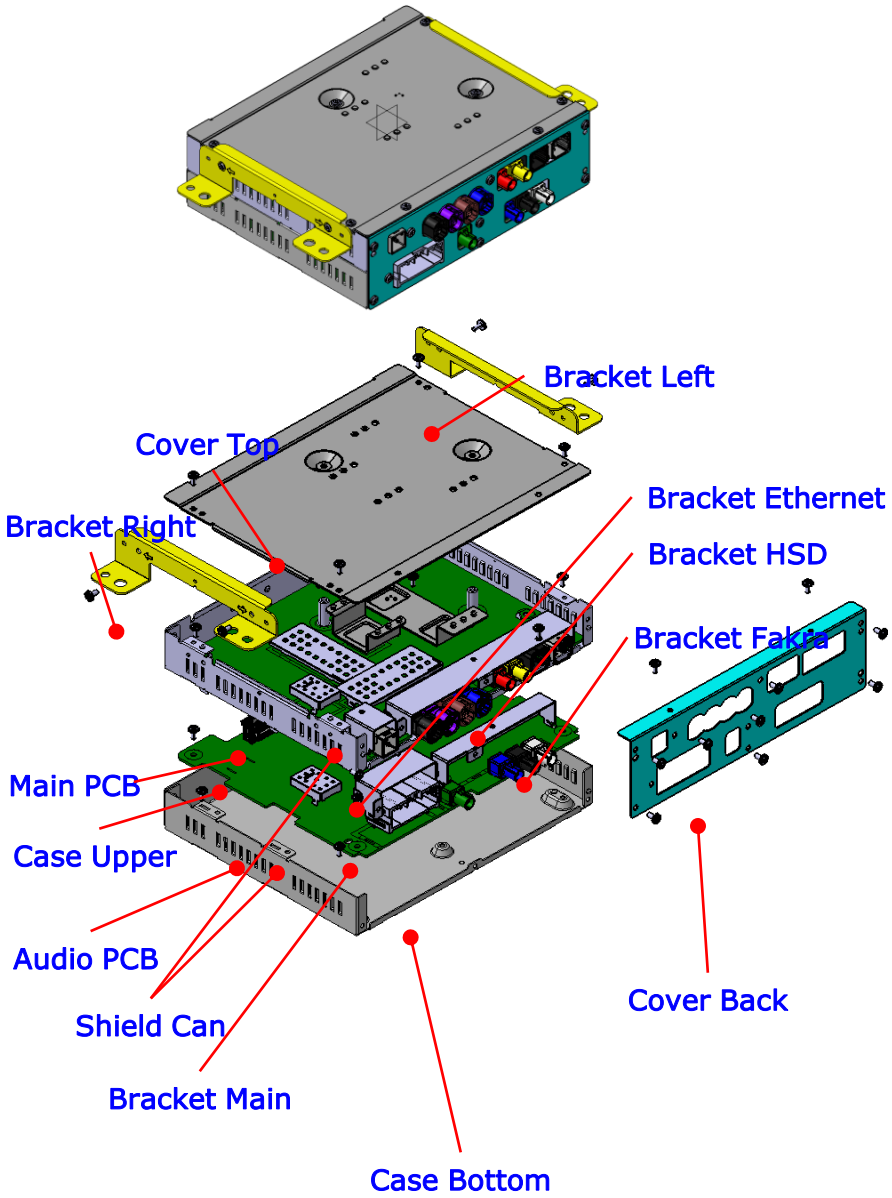
Feature	Model AUDIO (EAX69112701)	Remark
layout	6층	
SIZE	1.6T ±10%	
	146.5 X 190 mm	
material	FR4 DS-7408	
STACK UP	  	
표면처리	OSP	

9. PCB (Audio PCB)

Audio PCB Placement

Audio PCB TOP	Audio PCB BOTTOM
	

10. 기구 구조 구성도



HARD TOOLING APPROVAL REPORT

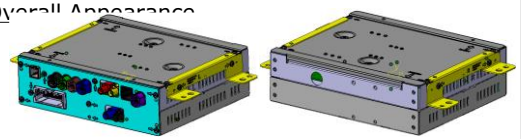
No.	COMPONENT NAME	Image	Cavity	Material	Thickness	Manufacturing Process	Capacity	Tool Supplier
1	CHASSIS BOTTOM		PRO	SECC	0.8t	PRESS	1,000,000	Dongkwang
2	CHASSIS UPPER		PRO	SECC	0.8t	PRESS	1,000,000	Dongkwang
3	COVER BACK		PRO	SECC	0.8t	PRESS	1,000,000	Dongkwang
4	HEAT SINK COVER TOP		PRO	AL 5052	1t	PRESS	1,000,000	Dongkwang
5	HEAT SINK CPU		PRO	AL 5052	1t	PRESS	1,000,000	Dongkwang
6	HEAT SINK PMIC		PRO	AL 5052	1t	PRESS	1,000,000	Dongkwang
7	BRACKET_FIX_L		PRO	SECC	1.2t	PRESS	1,000,000	Dongkwang
8	BRACKET_FIX_R		PRO	SECC	1.2t	PRESS	1,000,000	Dongkwang
9	BRACKET FAKRA		PRO	SECC	0.8t	PRESS	1,000,000	Dongkwang
10	BRACKET MAIN CNT		PRO	SECC	0.8t	PRESS	1,000,000	Dongkwang
11	BRACKET HSD		PRO	SECC	0.8t	PRESS	1,000,000	Dongkwang
12	BRACKET EHTERNET		PRO	SECC	0.8t	PRESS	1,000,000	Dongkwang
13	SHIELD CAN SERDES		PRO	SECC	0.8t	PRESS	1,000,000	Dongkwang

Post Texture Comments

- LGE : IHU has a 9 variants according to the Fakra CNT.
But tooling are used in common of all variants.

AUTHORIZED APPROVAL DATE :
Markus Olsson

Overall Appearance



CEVT

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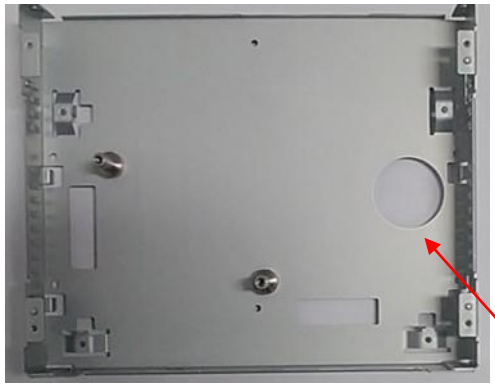
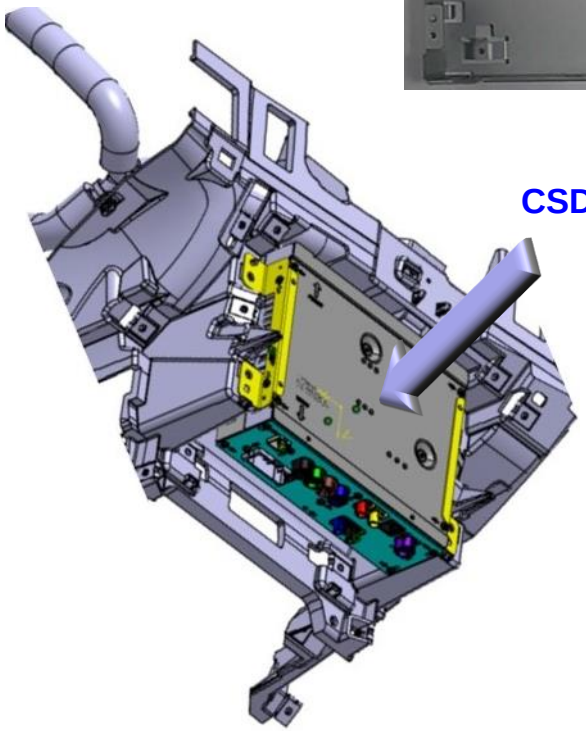
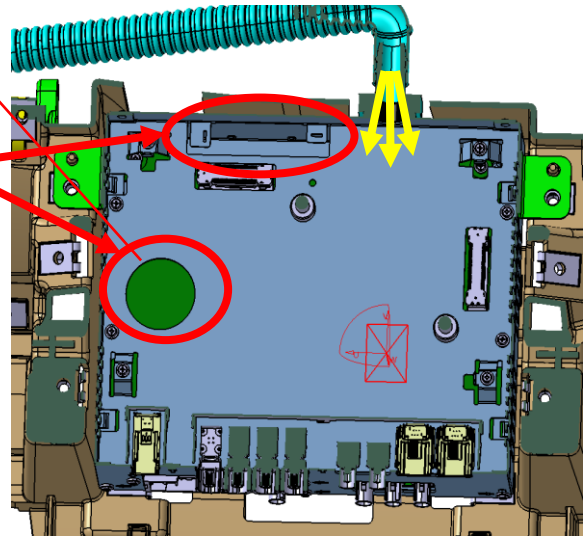
10. 기구 구조 구성도 (DCY11 Cooling System)

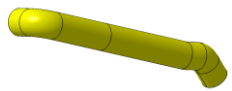




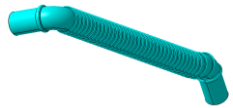
CSD

Air flow holes From the bottom PCB





IHU COOLING HOSE FOAM



IHU COOLING HOSE

11. EMC Specification

-EMC Specification (Volvo EMC 8888621495-2)

Test Items		DUT Direction	Antenna Position from DUT	Antenna Polarisation	Frequency	Level	Others Condition
RE01	Magnetic near field requirement		7cm		1Hz~400MHz		Loop Sensor (No single turn)
RE02	Magnetic and Electric far field requirement		3m		9kHz~30MHz		Monopole & loop Antenna
RE03	Electric field requirement, ALSE	3 direction (X,Y,Z)		Vertical/Horizontal	100kHz~6GHz		4 kinds of Antenna
CE02	Conducted Current requirement		10cm		500kHz~320MHz		Current probe
RI01	Magnetic Field Immunity		5cm		DC~1MHz	DC:300uF RF:3~500uF	Loop Antenna
RI02	Harness Excitation (BCI) Requirements		15cm/45cm		0.1MHz~400MHz	70~106dBuA	Injection Probe
RI03	RI03 ALSE Requirements	3 direction (X,Y,Z)		Vertical/Horizontal	200MHz~3.1GHz	70V/m~600V/m	Log-periodic Antenna, Biconical Antenna, Horn Antenna
RI04	Portable transmitters Requirements	3 direction (X,Y,Z)	5mm		140MHz~5GHz	0.2W~25W	Antenna SBA-9113, SBA-9119
CE01	Conducted Transient Emission						Slow/Fast Signal Oscilloscope
CI01	Transient immunity on Power Lines						Pulse Generator
CI02	Transient immunity on Signal Lines						Pulse Generator Coupling Clamp
ESD01	Handling Tests					Contact : +/-4,6kHz Air : +/-8kHz	Contact/Air
ESD02	Powered Tests					Contact : +/4,6,8kHz Air : +/-15kHz	Contact/Air

12. Feature List (SW Specification)

	Feature	CX11 EU
Tuners	FM	Double tuner, double antenna
	DAB+/RDS , Sirius (Reserved)	O(Export EU)
Interface & Connectivity	USBx2(2.0 edition)	O
	AUX (3.5Plug)	X
	BT(5.0) , WiFi (2.4GHz & 5GHz)	O
	Wireless Charger (Qi)	O
	NFC	X
USB-Media	Audio / Video / Picture	O
	Copy data from USB to HDD	O
USB-iPod	Audio	O
HDD-Media	Audio / Video / Picture	O
	Data Management	O
Navigation	Connected navigation	O
	Global traffic information (RTTI)	O
	Connected navigation service	O
Connectivity	APPS / Entertainment (Smart Phone)	O
	Web Browser (Smart Phone)	O
Telematics	Car Diagnostic (Smart Phone)	O
	Remote control (T-Box)	O
	E-CALL (T-Box)	O (Regal Requirement : O)
	B-CALL (Smart Phone)	O
Speech	TTS	O
	Voice Recognition (Local VR & Cloud VR)	O
Smart phone Integration	Carlife	X
	Apple CarPlay / Android Auto	O / O
Bluetooth	Handsfree	O
	Phone Book	O
	Media streaming including control	O
HMI	CSD Display / Cluster Display (NAVI , Video)	12.7" / O(1920x1080)
	UI	English/...
	Personalization	KEY/KEY
	Vehicle Settings	O
	Hybrid functions	O
	Handwriting	O
Camera	360 degree camera	X
	Parking Camera	O
Audio	Sound settings	O
	External Amplifier	O

FCC Statement

FCC Part 15.19 Statements:

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

FCC Part 15.105 statement

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules.These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

-Reorient or relocate the receiving antenna.

-Increase the separation between the equipment and receiver.

-Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.

-Consult the dealer or an experienced radio/TV technician for help.

Additional Information

FCC Part 15.21 statement

Any changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate this equipment.

RF Exposure Statement (MPE)

The antenna(s) must be installed such that a minimum separation distance of at least 20 cm is maintained between the radiator (antenna) and all persons at all times. This device must not be co-located or operating in conjunction with any other antenna or transmitter.

ISED Statement

This device complies with Industry Canada licence-exempt RSS standard(s). Operation is subject to the following two conditions:

(1) this device may not cause interference, and

(2) this device must accept any interference, including interference that may cause undesired operation of the device.

Le présent appareil est conforme aux CNR d'Industrie Canada applicables aux appareils radio exempts de licence. L'exploitation est autorisée aux deux conditions suivantes :

(1) l'appareil ne doit pas produire de brouillage, et

(2) l'utilisateur de l'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.

This radio transmitter [2703H-IAGL-NHT1] has been approved by Innovation, Science and Economic Development Canada to operate with the antenna types listed below, with the maximum permissible gain indicated. Antenna types not included in this list that have a gain greater than the maximum gain indicated for any type listed are strictly prohibited for use with this device.]

Le présentémetteurradio [2703H-IAGL-NHT1] a étéapprouvépar Innovation, Sciences et DéveloppementéconomiqueCanada pour fonctionneravec les types d'antenneénumérésci-dessouset ayantun gain admissible maximal. Les types d'antennenon inclusdanscetteliste, et dontle gain estsupérieurau gain maximal indiquépour tout type figurant sur la liste, sontstrictementinterditspour l'exploitationde l'émetteur.

ISED Statement

RF Exposure

The antenna (or antennas) must be installed so as to maintain at all times a distance minimum of at least 20 cm between the radiation source (antenna) and any individual. This device may not be installed or used in conjunction with any other antenna or transmitter.

l'expositionaux RF

L’antenne(oules antennes) doitêtreinstalléede façonà maintenirà tout instant unedistance minimum de au moins20 cm entre la source de radiation (l’antenne) et toutepersonnephysique.