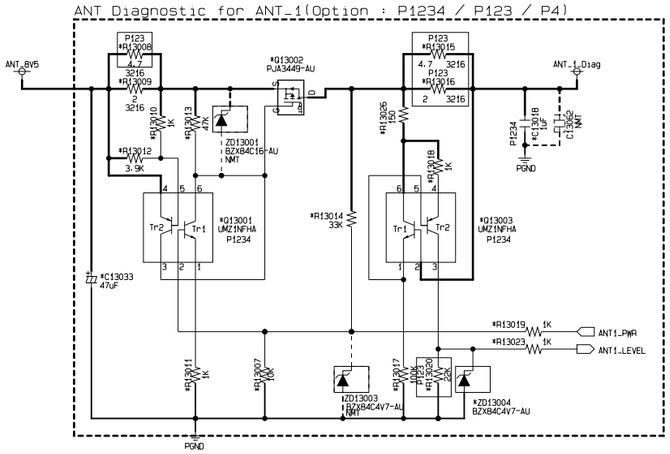
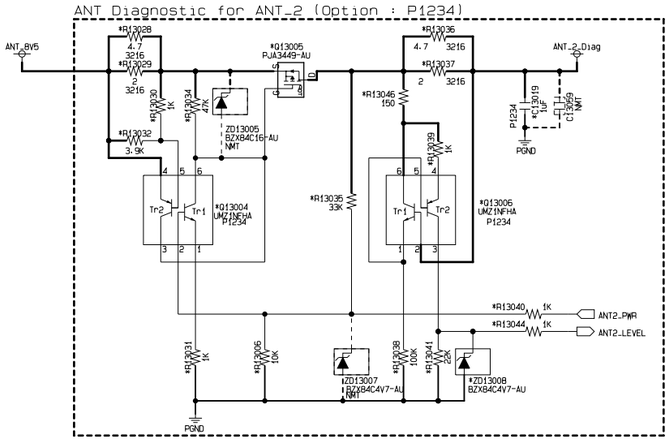
		MATERIAL	COLOR/FINISH
A			

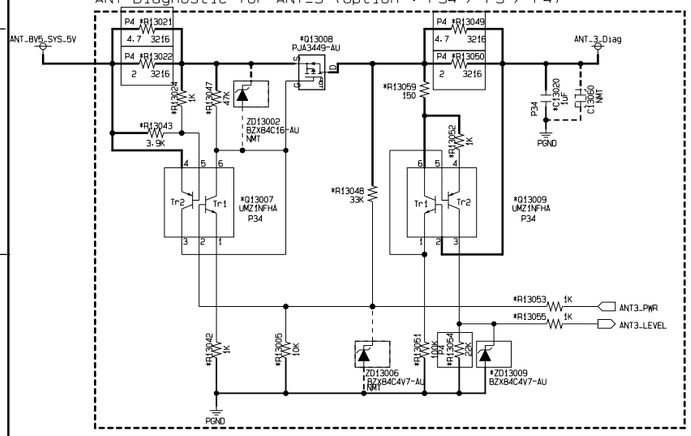
ANT Diagnostic for ANT_1(Option : P1234 / P123 / P4)



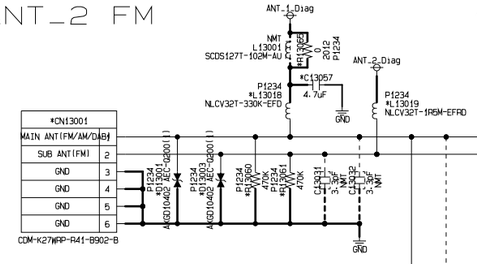
ANT Diagnostic for ANT_2 (Option : P1234)



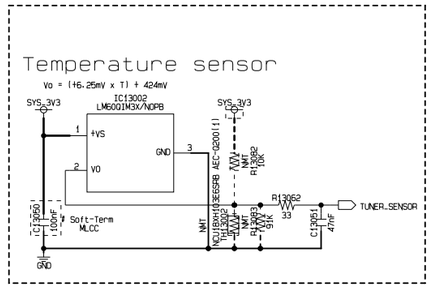
ANT Diagnostic for ANT_3 (Option : P34 / P3 / P4)



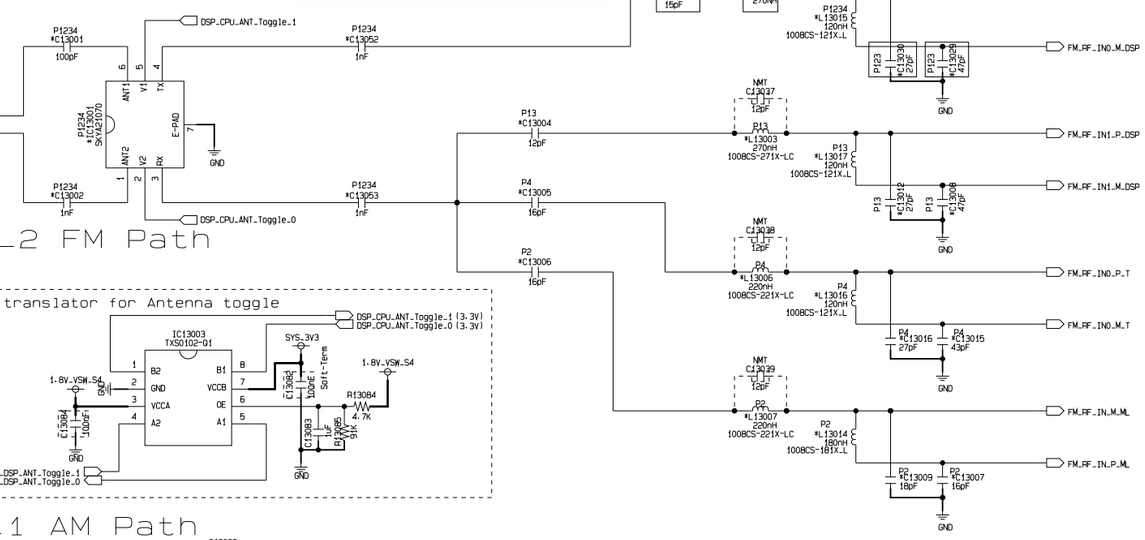
ANT_1 AM / FM / DAB
ANT_2 FM



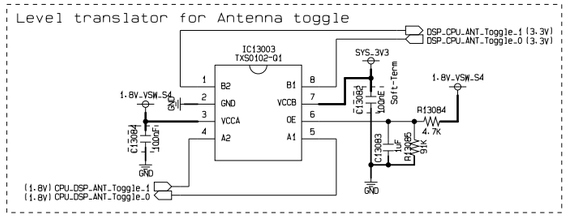
Temperature sensor



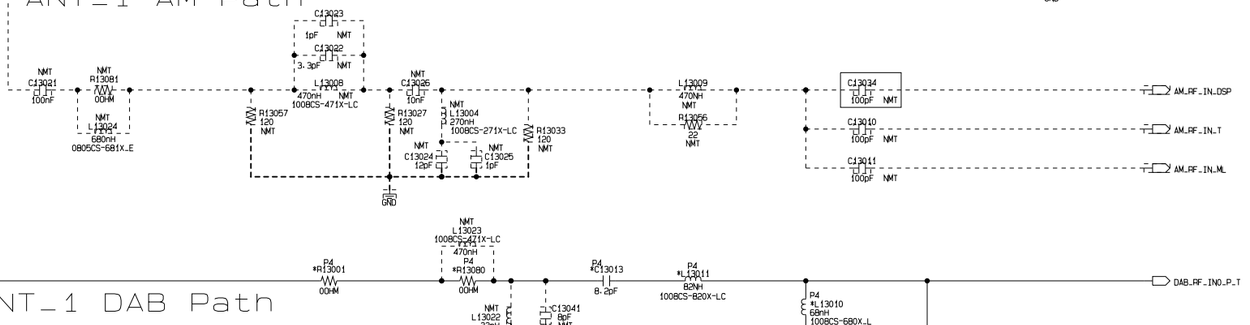
ANT_1 FM Path



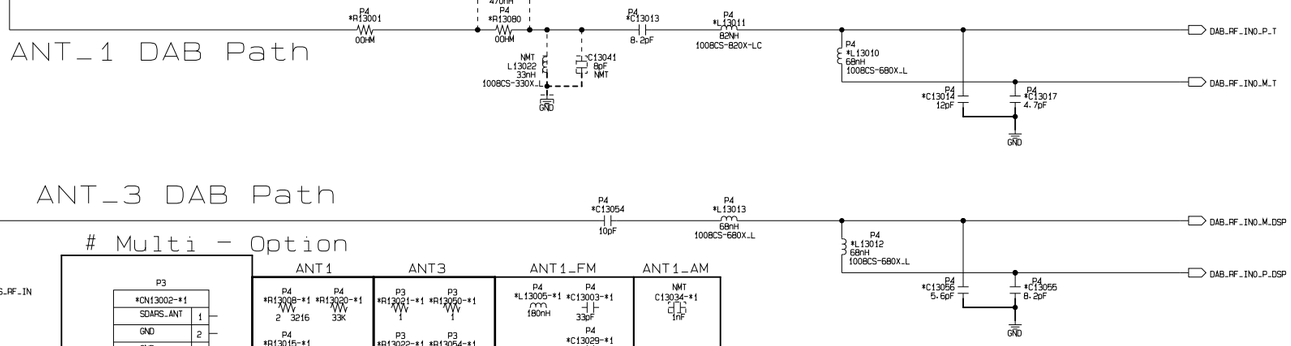
ANT_2 FM Path



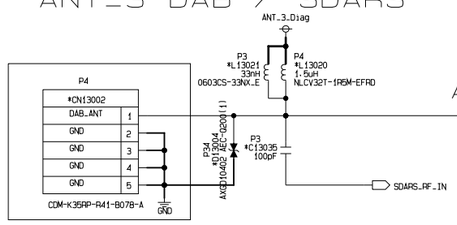
ANT_1 AM Path



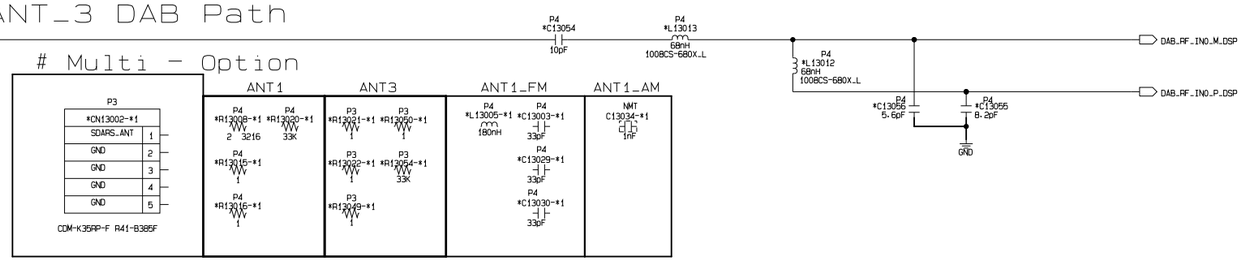
ANT_1 DAB Path



ANT_3 DAB / SDARS



ANT_3 DAB Path

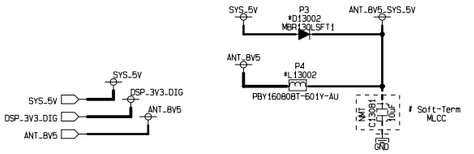


Multi - Option

*Tuner Config.

Market	EU		RdW	NAR	CH/TW/KOR	JPN
Function	FM	FM+DAB	FM	FM+SDARS+HD	FM	FM+VICS
ICAS-3	Titan (IC14001) + Merlin (IC16001) P2	Mercury (IC14001) + Titan (IC15001) P4	Titan (IC14001) + Merlin (IC16001) P2	Mercury (IC14001) + SDARS (IC17002) P3	Titan (IC14001) P1	Titan (IC14001) P1

For JPN, VICS option will be applied additionally



DIMENSIONAL	TOLERANCE
ANGULAR	0
UNLESS OTHERWISE SPECIFIED	

CHANGUO

NMT = Not mounted
DBG = For HW debugging
NIF = Not in final design

C	B	A	NO	PART NO	DESCRIPTION	MATERIAL	COLOR FINISH	NOTE
QUANTITY								

THIRD ANGLE PRO	SCALE	UNIT mm	DRAWN JS.Jeong
			CHECKED Siyun.Yoo
LG Electronics Inc.			APPROVED

2019.10.10

EAX67685006 (ICAS-3)

ISSUE

ANT/DIAG (13/18)

		MATERIAL	COLOR/FINISH
A			

Pin changes between ES1 and ES2

Version	H19	H21	H22
ES1	GPIO_P10	N.C	N.C
ES2	VSSC	VDDC	GPIO_P10

Solid Fill

*SF14001 ACC SFOX07658403O RAC3427B101

*SF14002 ACC SFOX07658403O RAC3427B101

*SF14003 ACC SFOX07658403O RAC3427B101

*SF14004 ACC SFOX07658403O RAC3427B101

BOM Multi Option : Mercury / Titan

1. Mercury
   - SAF4000EL/102Z
2. Titan
   - SAF7770EL/101Z1205 : FM/AM (support sound out)
   - SAF7770EL/101Z1200 : FM/AM (no sound out- BGS only)

P12 *IC14007-41 SAF7770EL/102Z1205

*IC14001 SAF4000EL/102Q IC_SAF400_GND

*IC14001 SAF4000EL/102Q IC_SAF400_Power_Block

*C14006 100nF

ES2 : Open

DSP_3V3_ANA

DSP_3V3_REG

DSP_3V3_DIG

DSP_1V8_ANA

DSP_1V2

PBY160808T-471Y-AU

*L14001 1uF

*L14002 1uF

*L14003 UPB201209T-331Y-AU

*L14004 UPB3216J1T-121Y-AU

*L14005 PBY160808T-471Y-AU

*L14006 10uH

*L14007 YLS6045EX-100M-CA

Soft-Term MLCC

*R14188 0

*R14189 0

*R14190 0

*R14191 0

*R14192 0

*R14193 0

*C14001 100nF

*C14002 10uF

*C14003 10uF

*C14004 10uF

*C14005 100nF

*C14006 100nF

*C14007 100nF

*C14008 100nF

*C14009 100nF

*C14010 100nF

*C14011 100nF

*C14012 10uF

*C14013 100nF

*C14014 100nF

*C14015 100nF

*C14016 100nF

*C14017 100nF

*C14018 100nF

*C14019 100nF

*C14020 100nF

*C14021 100nF

*C14022 10uF

*C14023 100nF

*C14024 10uF 2012

*C14025 10uF 2012

*C14026 10uF

*C14027 10pF

*C14028 10uF

*C14029 10uF

*C14030 10uF

*C14031 10uF

*C14032 10uF

*C14033 10uF

*C14034 100nF

*C14035 100nF

*C14036 100nF

*C14037 100nF

*C14038 100nF

*C14039 100nF

*C14040 100nF

*C14041 4.7uF

*C14042 100nF

*C14043 100nF

*C14044 100nF

*C14045 100nF

*C14046 100nF

*C14047 100nF

*C14048 100nF

*C14049 100nF

*C14050 100nF

*C14051 100nF

*C14052 100nF

*C14053 100nF

*C14054 100nF

*C14055 100nF

*C14056 100nF

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*C14099 22uF

*C14100 22uF

*C14101 22uF

*C14102 22uF

*C14103 22uF

*C14104 22uF

*C14105 22uF

*C14106 22uF

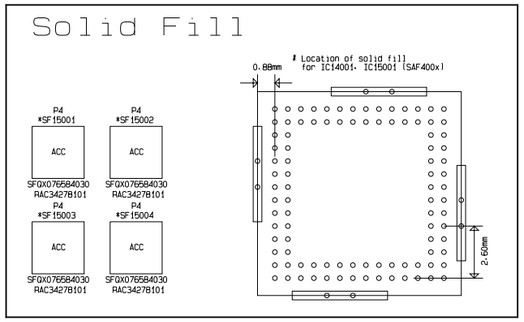
*C14107 22uF

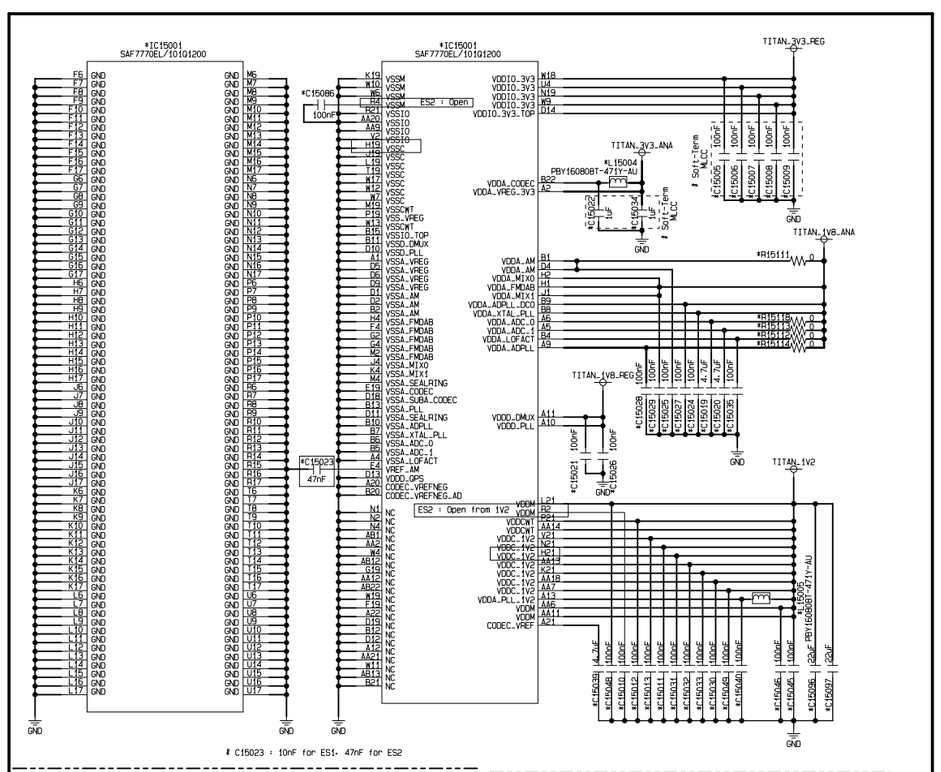
		MATERIAL	COLOR/FINISH
A			

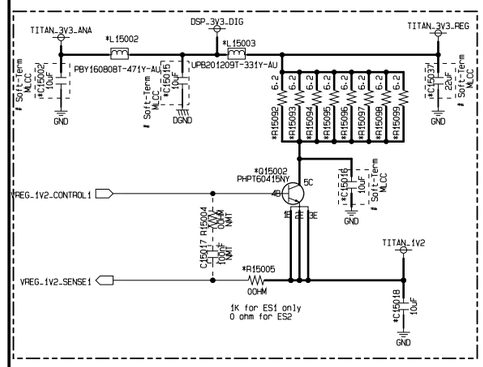
Pin changes between ES1 and ES2

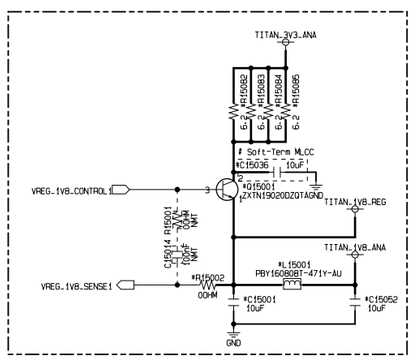
Version	H19	H21	H22
ES1	GPIO_P10	N.C	N.C
ES2	VSSC	VDDC	GPIO_P10

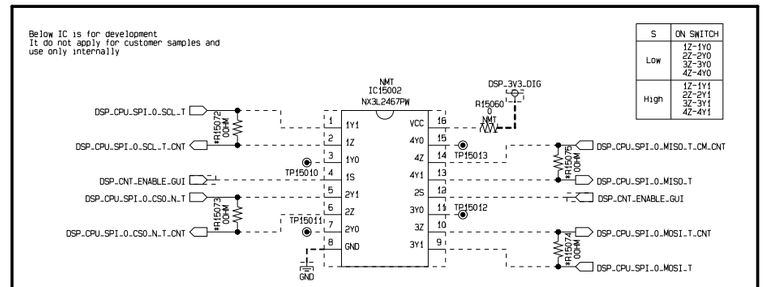
Solid Fill



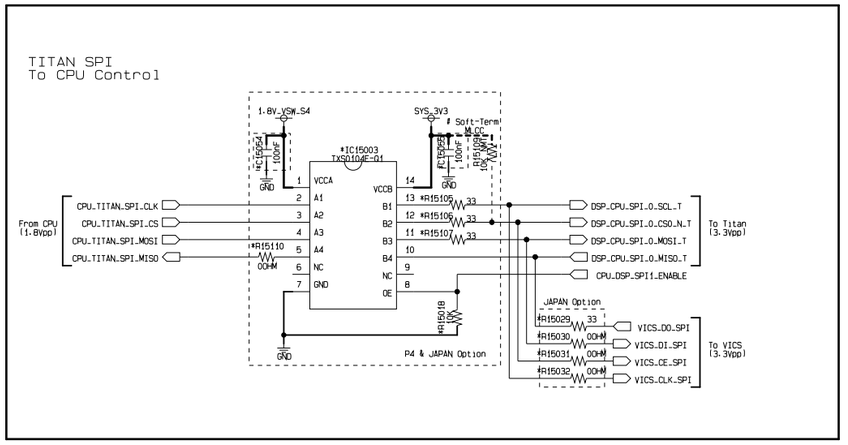


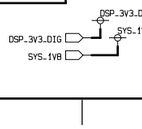


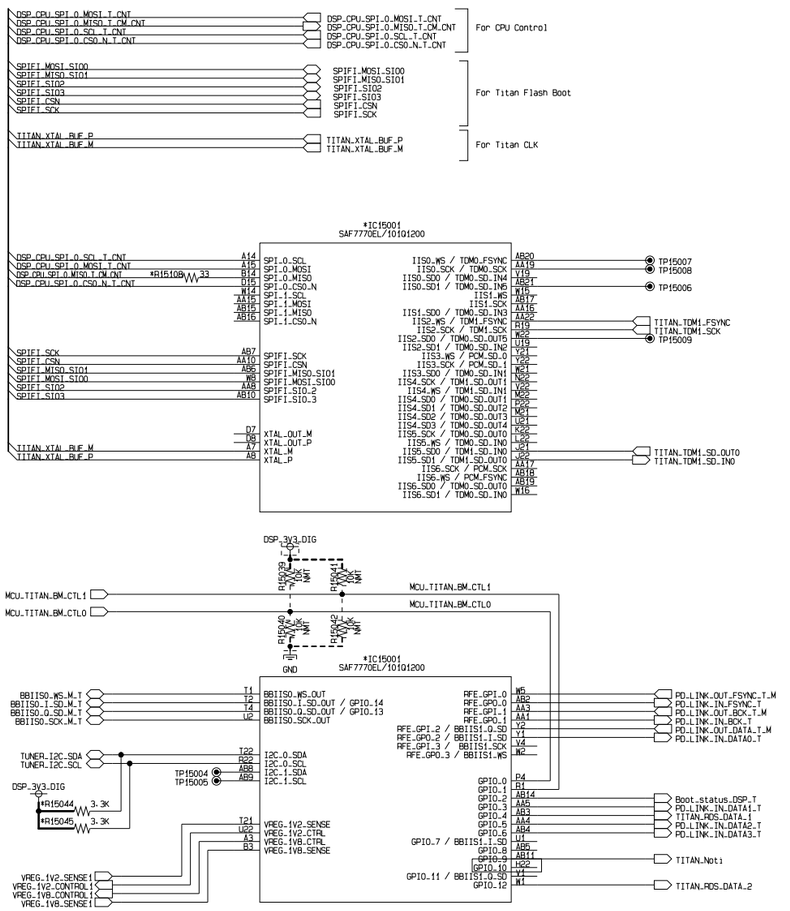


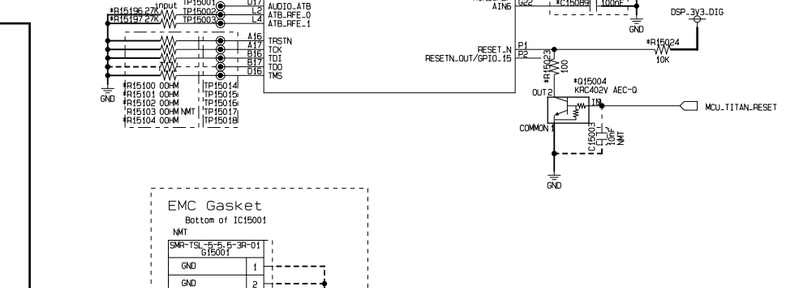


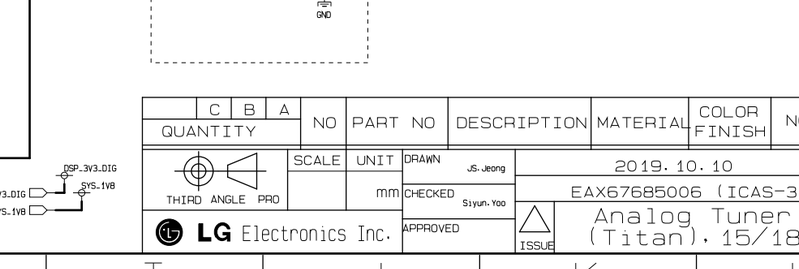
S	ON SWITCH
Low	1Z-1Y0 2Z-2Y0 3Z-3Y0 4Z-4Y0
High	1Z-1Y1 2Z-2Y1 3Z-3Y1 4Z-4Y1

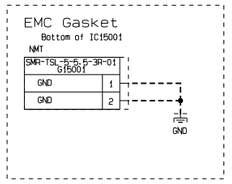












NMT = Not mounted
DBG = For HW debugging
NIF = Not in final design

DIMENSIONAL	TOLERANCE
ANGULAR	0
UNLESS OTHERWISE SPECIFIED	

C	B	A	NO	PART NO	DESCRIPTION	MATERIAL	COLOR FINISH	NOTE
QUANTITY								

THIRD ANGLE PRO	SCALE	UNIT mm	DRAWN JS.Jeong
			CHECKED Siyun.Yoo
LG Electronics Inc.			APPROVED

2019.10.10

EAX67685006 (ICAS-3)

ISSUE

Analog Tuner (Titan), 15/18

		MATERIAL	COLOR/FINISH
A			

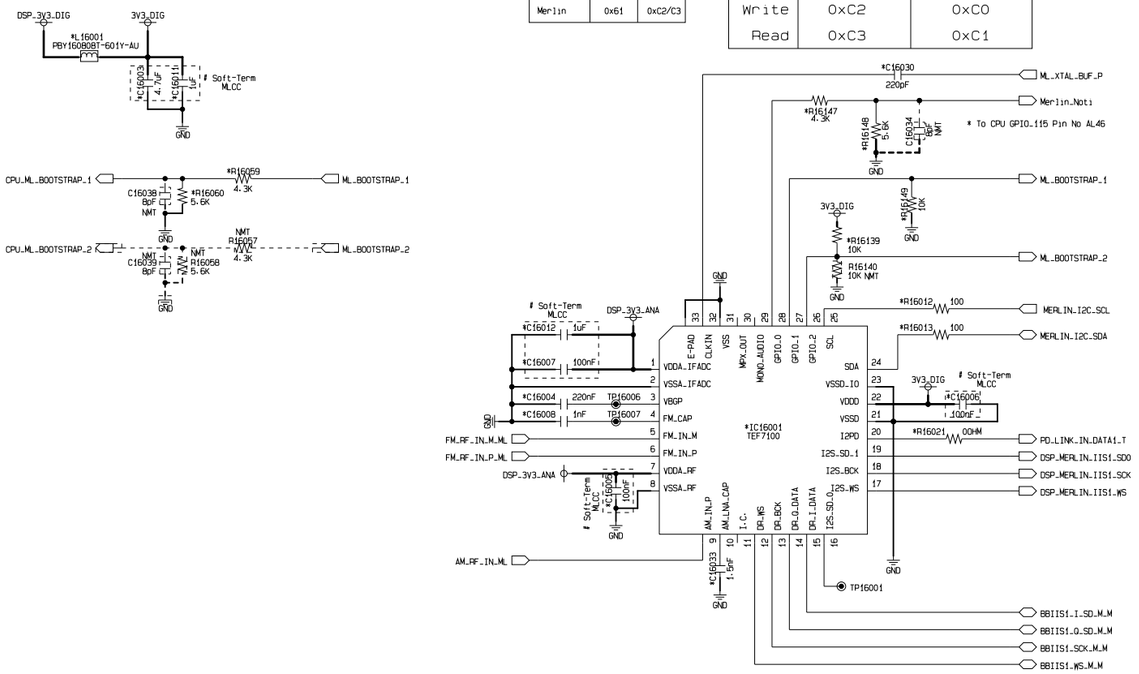
AM/FM/HD 3TUNER : MERLIN (Option : P2)

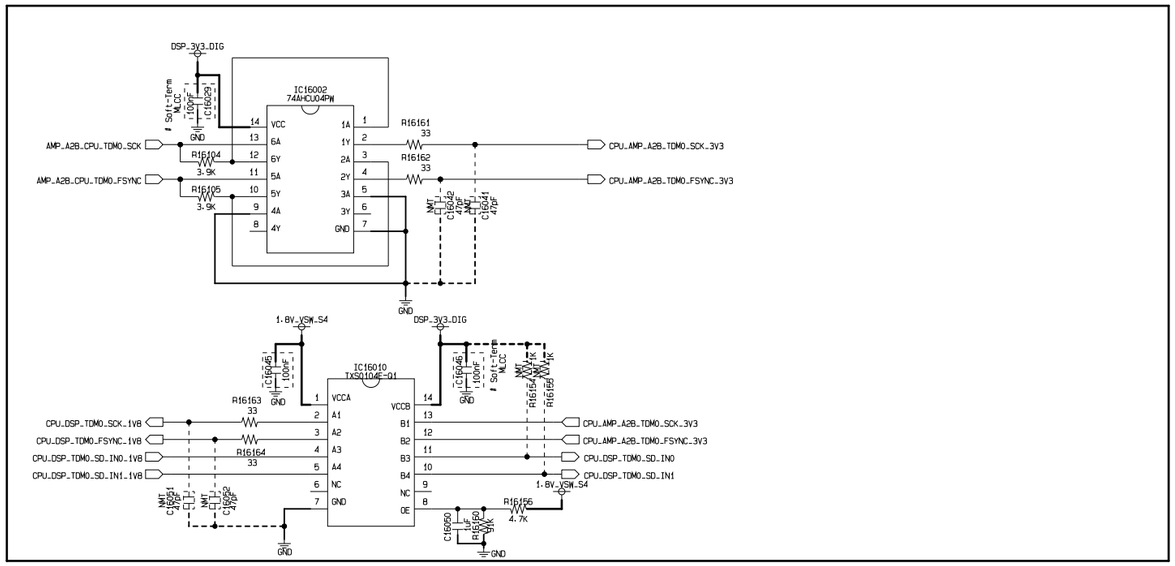
MERLIN I2C device address

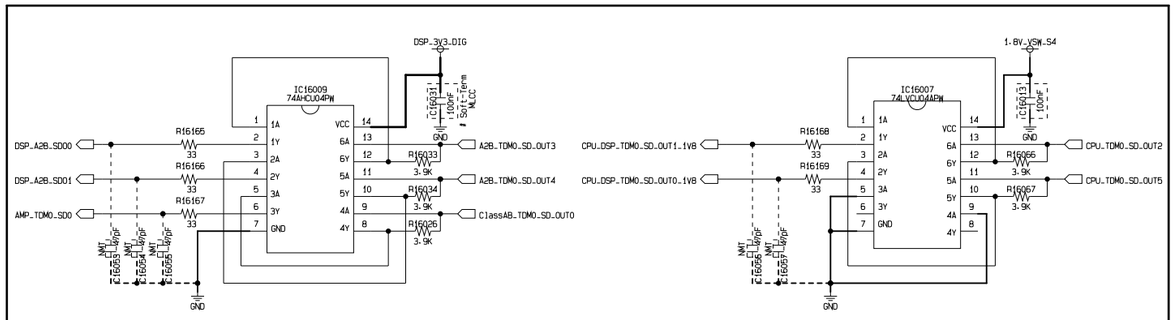
Device	7bit	8bit
Merlin	0x61	0xC2/C3

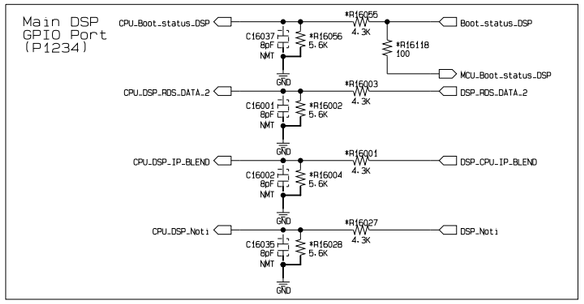
MERLIN I2C setting (8bit)

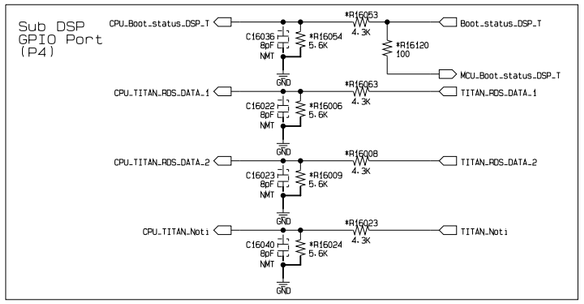
GPIO_2	pulled up	pulled down
Write	0xC2	0xC0
Read	0xC3	0xC1

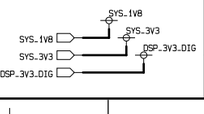












DIMENSIONAL TOLERANCE	
ANGULAR	0
UNLESS OTHERWISE SPECIFIED	

CHANGES

NMT = Not mounted
DBG = For HW debugging
NIF = Not in final design

C	B	A	NO	PART NO	DESCRIPTION	MATERIAL	COLOR FINISH	NOTE
QUANTITY								

THIRD ANGLE PRO | SCALE | UNIT mm | DRAWN JS.Jeong | CHECKED Siyun.Yoo | APPROVED | ISSUE

LG Electronics Inc.

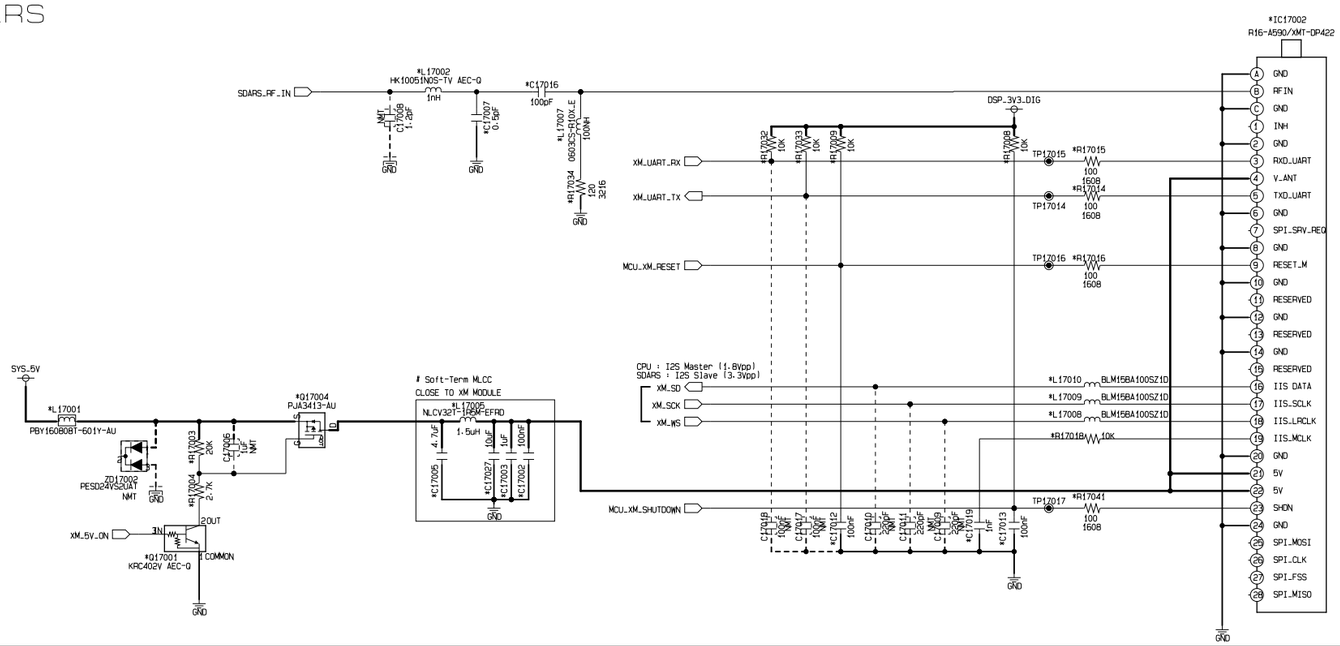
2019.10.10

EAX67685006 (ICAS-3)

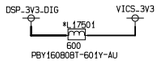
AM/FM Receiver (Merlin), 16/18

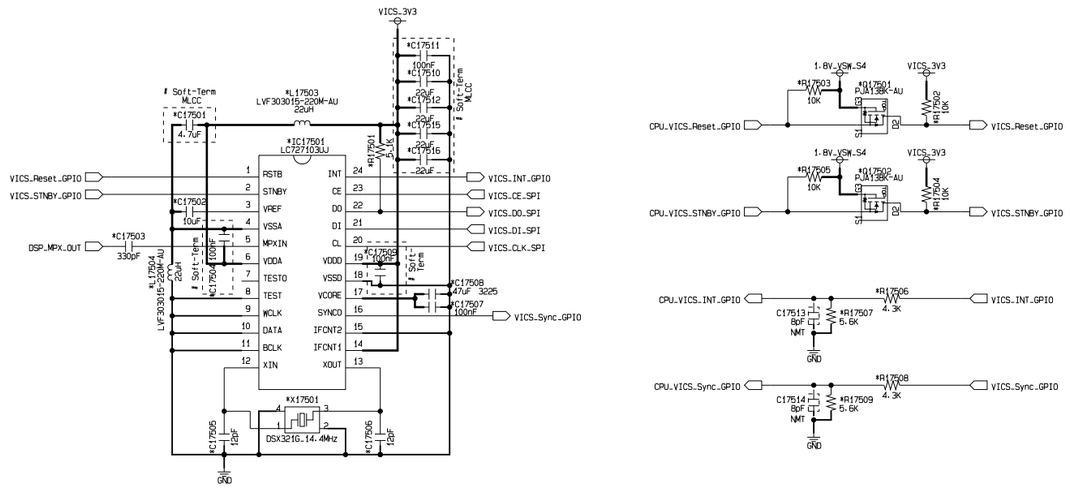
		MATERIAL	COLOR/FINISH
A			

SDARS

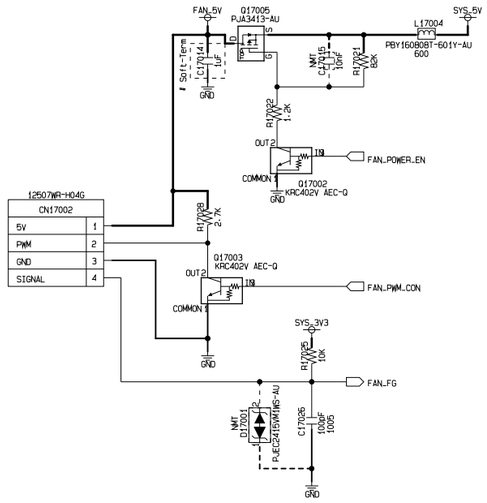


OPTION : VICS





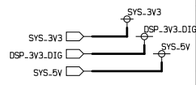
FAN Connector



DIMENSIONAL TOLERANCE	
ANGULAR	0
UNLESS OTHERWISE SPECIFIED	

DIAGRAM

NMT = Not mounted
DBG = For HW debugging
NIF = Not in final design



C	B	A	NO	PART NO	DESCRIPTION	MATERIAL	COLOR FINISH	NOTE
QUANTITY								

THIRD ANGLE PRO	SCALE	UNIT mm	DRAWN JS. Jeong
LG Electronics Inc.			CHECKED Siyun. Yoo
			APPROVED

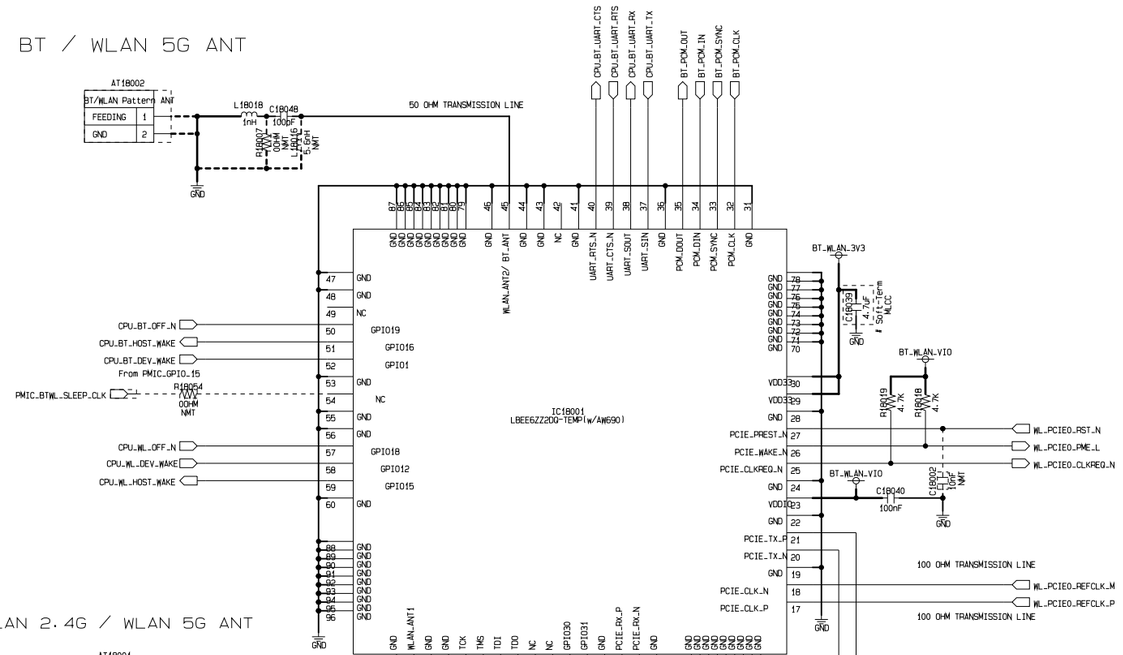
ISSUE	2019. 10. 10
	EAX67685006
	SDARS/VICS/FAN (17/18)

A B C D E F G H I J K L

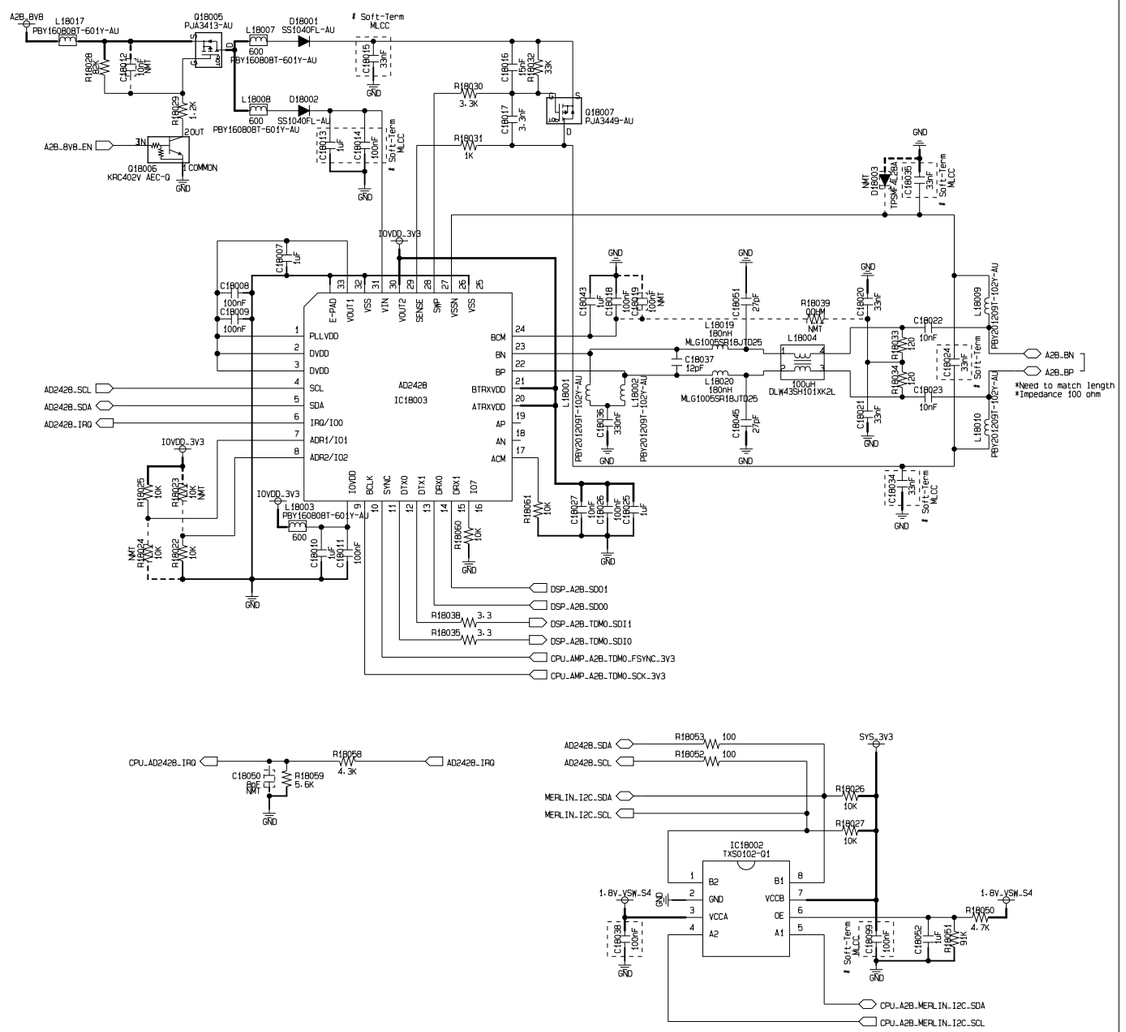
		MATERIAL	COLOR/FINISH
A			

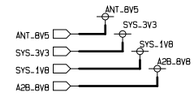
BT/WIFI Module

BT / WLAN 5G ANT



A2B





DIMENSIONAL TOLERANCE	
ANGULAR	0
UNLESS OTHERWISE SPECIFIED	

CHANGUS

NMT = Not mounted
DBG = For HW debugging
NIF = Not in final design

C	B	A	NO	PART NO	DESCRIPTION	MATERIAL	COLOR FINISH	NOTE
QUANTITY								

THIRD ANGLE PRO

SCALE	UNIT	DRAWN	CHECKED	APPROVED
	mm	JS.Jeong	Siyun.Yoo	

LG Electronics Inc.

2019.10.10

EAX67685006 (ICAS-3)

ISSUE

WiFi/BT & A2B (18/18)

No		MATERIAL	COLOR/FINISH
A			

Date	Revision Contents
2017.05.08	Initial creation of circuit diagram. for ICAS-3 (EAX67685001 REV1.0)
2017.09.08	1.Major changes of schematic (EAX67685001 REV1.0 -> EAX67685002 REV1.0) 1)sht 001 : Updated quadlock pinmap acc. to ICAS_Entwurf_Quadlock_V0_4_SS_170412 PWR blocks were changed 2)sht 006 : Capacity of LPDDR4 was changed from 3GB x 2EA to 4GB x 2EA 2)sht 007 : Added FPD-LINKIII serializer DS90UH941A and HSD connector for AR-HUD 3)sht 007 : Moved IMU sensor block from sht 007 to sht 012 4)sht 009 : Added 1000BASE-T1 ethernet connector(PE335410-CDE01.DELPHI AMEC GEN2) 5)sht 010 : Changed USB protection ICs for USB1 and USB2 - USB1 : MAX16982 -> NIV1161 - USB2 : MAX16970GEEB/V -> MAX20042 - USB3 block (for JAPAN) was moved to sub PCB 6)sht 011 : Changed SB-i power amplifier from TDA7803-8ZX to TDA7803-ZST (different package shape) 7)sht 012 : Add 30P B to B connector for sub PCB connection 8)sht 018 : Changed the BT/WiFi Chip Antenna of ANT_0 - AMAN1003015LG02(AMOTECH) -> Pattern ANT 9)Applied AEC-Q components 10)Add Solid fills for BGA ICs 2.Deleted items from schematic 1)sht 002 : Deleted LIN (TJA1021T) block 2)sht 010 : USB3 (MAX3420EECJ/V+) block + HSD were moved to sub PCB 3)sht 012 : GNSS block (UBX-M8030-KA -> CSR0531) was moved to sub PCB (Changed to CSR solution)
2017.10.24	1.Major changes of schematic (EAX67685002 REV1.0 -> REV1.1) 1)sht 001 : Delete MCU_UART2_TX & RX from Q.lock connector 2)sht 003 : MCU_CPU_UART -> MCU_CPU_IVI_UART. MCU_UART2 -> MCU_CPU_CLU_UART Add EEPROM_3V3 switching block 3)sht 004 : Add Level translator(IC4005) for MCU_CPU_CLU_UART level transition Add BLSP9_I2C and changed all I2C connections Changed CPU UART channel connection 4)sht 009 : Changed FL9001 (DLW43SH101XK2L. Murata -> AE5002. Pulse) 5)sht 014 : Changed X14001 (FA-238A -> DSX321G. 55.46667MHz) Changed applications of Mercury for ES1 -> ES2 version up 6)sht 015 : Change applications of Titan for ES1 -> ES2 version up 7)sht 016 : IC16010 & IC16008 were changed from NLVSX4014 to TXS0104E-Q1
2018.02.06	1.Major changes of schematic (EAX67685002 REV1.1 -> REV1.2) 1)sht 001 : ESD capacitors on Q.lock were changed to 10nF.250V.2012 TVSs (PESD1LIN) were added on ULA_STATUS and ZR_RESET Connect MED_DEB_UART lines to quadlock (Q.lock <-> MCU pin46&47) Compnents of 5V_DET were optimized (R1044.R1045.R1046.C1066) 2)sht 003 : IC3001 P/N was changed from SPC5748C to SC667604CKU2 (Same IC but changed the P/N only) C3057.C3059.C3060.C3061 were changed. NMT -> 100nF R3051 (10k) was added on PB[6] for unused input (WO_GNSS) 3)sht 004. 005 : Pin termination for unused inputs were added 4)sht 008 : C8001.C8026.C8019 were changed. 2.2uF/6.3V -> 4.7uF/16V 5)sht 009 : L9003(600ohm Bead) and C9038 (10uF) were added to separate AVDD_3V3 The generation of AMEC connector was changed. GEN2 -> GEN4 6)sht 014. 015 : Pin termination for unused inputs were added. especially for RF & Analog audio inputs 7)sht 018 : R18061(10k) was added on pin17(ACM) of IC18003 R18001(0ohm.NMT). C18004(100nF.NMT) were added for X18001 8)sht 003.004.005 : Swap the pin propertry. MCU_CPU_RESERVED_2(CPU_MCU_RESERVED_2)<->MCU_CPU_ERR_MONITOR(CPU_MCU_ERR_MONITOR) 9)sht 017 : R17025 was changed from 1kohm.1005 to 10kohm.1005 10)sht 004. 007 : CPU_IMU_INT. CPU_IMU_READY. CPU_IMU_RESERVED GPIOs were added between IC4001(CPU) and IC7301 (FPD-LINKIII serializer for AR-HUD) 11)sht 003 : R13082 was changed from 100ohm.1005 to 0ohm.1005 sht 017 : L17002 was changed from HK10051N2S-TV (1.2nH) to HK10052N2S-TV (2.2nH) 12)sht 014 : The option PD_LINK Resistors were changed - R14192.R14193 : P2 -> NMT - R14006.R14007 : P24 -> P4 13)sht 014 : C14026.C14027 were changed from 7pF.1608 to 10pF.1608 (Crystal matching) 14)sht 013 : Optimized ANT DTC circuit of ANT1 ~ ANT3 15)sht 001 : Optimized FB filters of IC1004. IC1200. IC1201 R1031.R1032 (47k) were added on "EN" pin of IC1200. IC1201 16)sht 010 : Optimized USB LC(RC) filters for Eye-pattern 17)sht 001 : IC1009 was changed. MPQ8847AGD-AEC1-Z -> MPQ8847AGQB-AEC1-Z 18)sht 009 : GND (Ethernet Shield GND) of CN9001 was separated from ICAS-3 GND. by using MLCCs C9051.C9052 (10pF. NMT) were added on RGMII TXCLK & RXCLK 19)sht 006 : IC6001 was changed from MTFC64GAJAEDN-AIT (169P. eMMC5.0) to MTFC64GAPALBH-AIT (153P. eMMC5.1)
2018.06.12	1. Major changes of schematic (EAX67685002 REV1.2 -> REV1.3) 1)sht 001 : LM25119-Q1 -> LMR14030 + LMR14050 for EMC improvement Optimize resistance values for ECALL mute and kopplebox L1021. C1174. C1043 are added for EMC improvement 2)sht 001. 014 : PMV27UPEA -> PMPB20XPEA to gurantee high power dissipation (Q1201.Q1203.Q1205.Q14003) 3)sht 002 : Pin11 (SPLIT) of TJA1043T/1 are disconnected from 4.7kohm resistor 4)sht 008 : VDDIOEI. VDDIOEO power supply is changed (VDD_Eth_3V3 -> VDD_Eth_1V8) to reduce RGMII radiated noise 5)sht 009 : VDDO supply input of 88Q2110 is changed (DVDD_3V3 -> PHY_AVDD_1.8V) for EMC improvement 6)sht 011 : Ferrite beads (L11001.L11002) are added to separate DGND of power AMP 10nF capacitors are added on analog audio outputs for EMC improvement 7)sht 014.015 : "R2"."R4" pin treatments of IC14001&IC15001 are changed acc.to updated application note. 8)sht 016 : TDM lines are simplified comparing with REV1.2. and RC filters are added. TDM option blocks (IC16005. IC16006. IC16008) are deleted 9)All shts : Location of gaskets are prepared (NMT) for EMC test 10)sht 003.008.009.014 : Load capacitors for crystals are optimized. based on crystal matching test result 11)sht 003.015 : SPI interface between MCU and Titan are deleted (Unused)
2018.10.18	1. Major changes of schematic (EAX67685002 REV1.3 -> REV1.4) 1)sht 001 : 5V_DET -> 4V5_DET. adding SYS_5V_FAIL detect 2)sht 001 : SYS_1V1 is moved from LMR14030(IC1201) to PMIC(IC5001) Add LDO(IC1010) for SYS_1V1_ETH. remove power switching FETs for 1.1V supply Fsw of IC1004.IC1007.IC1200 are changed from 1.057MHz to 2.18MHz (ECo applied for REV1.3) 3)sht 002 : I-CAN termination resistors are changed from 4.7k to 61.9ohm (ECO applied for REV1.3) 4)sht 003 : Swap MCU_CPU_CLU_UART & MCU_CPU_IVI_UART to use DMA for safety partition 5)sht 004 : MCU_CPU_SPI level translating block is moved from PMIC GPIO to TXS0104E(IC4005) Apple CP chip is changed from 34S2313(2.0B) to MFI337S3961(2.0C) R4105 : 33hm -> 22ohm / R4033 : 0ohm -> 22ohm for eMMC SI optimization 6)sht 009 : CM termination filter for 88Q2110 is changed acc. to Marvell's recommend. 7)sht 007 : HSD color & code are changed according to customer's request
2018.11.29	1. Major changes of schematic (EAX67685002 REV1.4 -> REV1.5) 1)sht 001 : 2.2uF 100V 3225 soft-term MLCC -> 4.7uF 50V 3216 MLCC x 2EA (Orthogonal) on VCC line 2)sht 016 : 3V3_ANA -> DSP_3V3_ANA for MERLIN VDDA supply input. to improve S/N curve 3)sht 013 : ANT toggle switching block is moved from PMIC GPIO to level transltor IC (IC13003) 4)sht 005 : MLCCs are added to improve CPU PDN characteristics 5)sht 011 : L11001 (BLM18KG221SZ1D) -> R11001 (0ohm. 1608) L11002 (BLM15AG221SH1D) -> L11002 (BLM15AG221SH1D. NMT) to solve no sound output issue 6)sht 009 : 88Q2110 REV "A0" -> "A1" 7)ETC : Modified PCB based on 1st VW HW OPL list
2019.01.11	1. Major changes of schematic (EAX67685002 REV1.5 -> EAX67685003 REV1.0) 1)sht 009 : R9051.R9052 are changed (1kohm. 1/8W.2012 -> 1kohm. 1/2W.3216) acc.to 1000BASE-T1 review. 2)sht 001 : Add R1010 (0ohm) on 12V_VW_CAN_VCC based on 2nd VW HW OPL list 3)sht 002 : Delete R2005.R2006.R2007.R2018.R2019.R2020 (100ohm.1005) from CAN & CAN-FD. acc. to CAN review. 4)sht 001 : R1044 is changed from 22k.1percent to 47.1percent because BATT_UNDER_DET level is changed from 4.5V to 5.8V (Power state machine is changed) 5)sht 001 : Depopulate SYS_5V_FAIL detect block. because of power state machine change (MMI_DCI_Undervoltage @ 4.5V<Vbat<6V concept is cancelled) 6)sht 009 : 88Q2110 REV "A1" -> "A2" LPF are changed to improve 1000BASE-T1 network characteristics
2019.10.10	1. Major changes of schematic for HW D20 (Agreed by VW) 1)sht 009 : Depopulate C9011.C9012.C9013.C9014.R9025.R9026.R9027.R9028.R9031.R9032 Change L9011.L9012.L9013.L9014.R9021.R9022.R9023.R9024 to 0ohm Depopulate D9001.D9002

DIMENSIONAL TOLERANCE	
ANGULAR	0
UNLESS OTHERWISE SPECIFIED	

CHANGES

	C	B	A	NO	PART NO	DESCRIPTION	MATERIAL	COLOR FINISH	NOTE
QUANTITY									

THIRD ANGLE PRO	SCALE	UNIT	DRAWN JS. Jeong	2019.10.10
		mm	CHECKED Siyun. Yoo	EAX67685006
LG Electronics Inc.			APPROVED	ISSUE: Revision List

MEB ICAS-3 Block Diagram

No		MATERIAL	COLOR/FINISH
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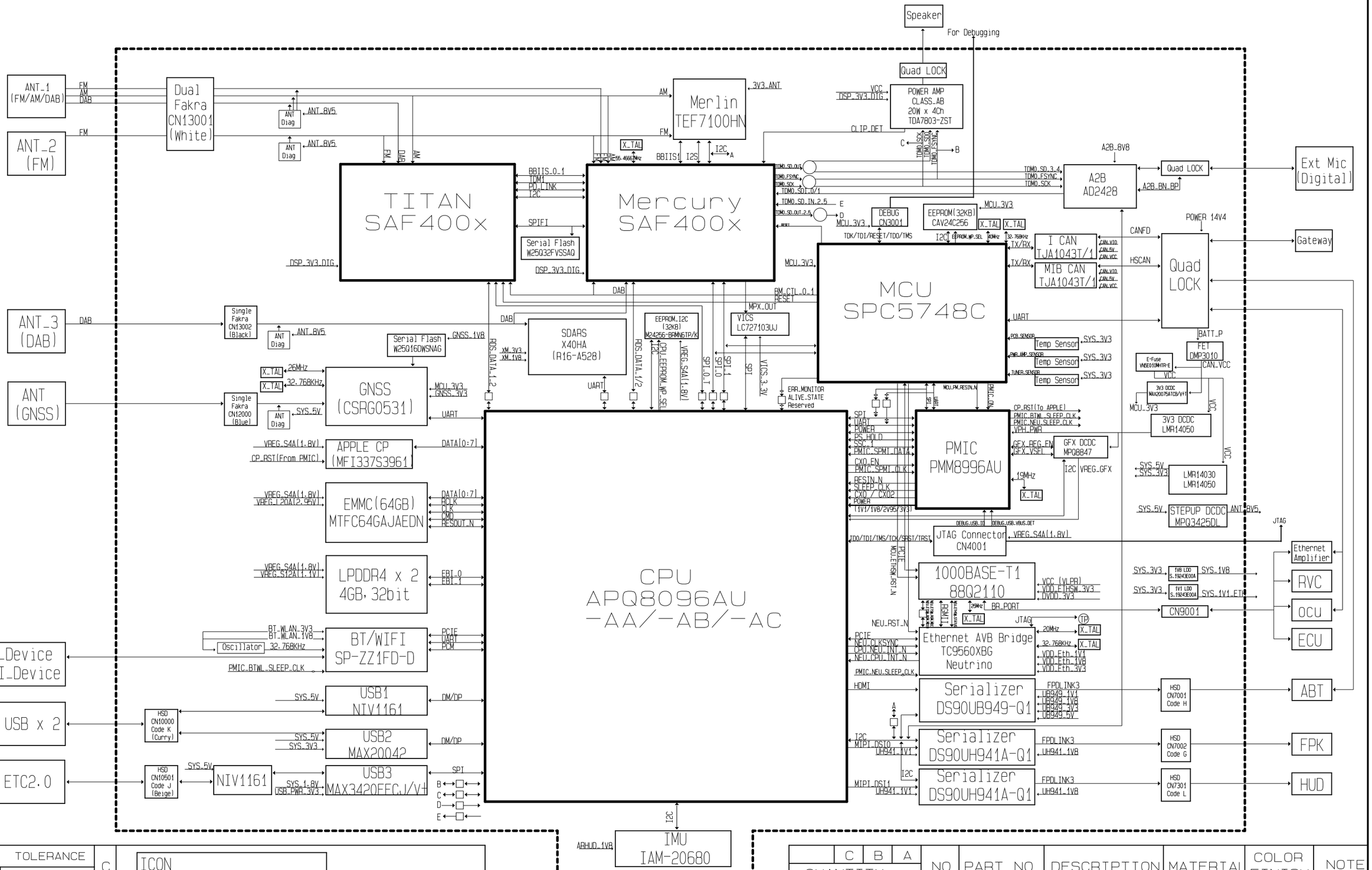

DIMENSIONAL TOLERANCE	
ANGULAR	0
UNLESS OTHERWISE SPECIFIED	

CHANGES

ICON

- TP Test Point
- ◇ 0 ohm NMT
- □ Level Shifter
- ○ Inverter

	C	B	A	NO	PART NO	DESCRIPTION	MATERIAL	COLOR FINISH	NOTE
QUANTITY									

THIRD ANGLE PRO	SCALE	UNIT	DRAWN JS. Jeong	2019. 10. 10
		mm	CHECKED Siyun. Yoo	EAX67685006
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