Application Note:

Baseband PCB

EEC 134

Team MegaHurtz

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This note will be used for the baseband PCB of the radar system. This note will explain how to create the schematic and PCB layout of the baseband component. Though the course provides a PCB tutorial, this app note will serve as a step by step guide to help create an efficient baseband PCB.

## **Baseband Schematic**

The baseband PCB consists of the gain stage, the low pass filter, the teensy, the voltage regulator and the DAC. The gain stage includes two amplifiers to ensure the signal has enough power at the output. When determining which components to be on the baseband PCB, an important thing to consider which components can process high frequency signals. This components will be included in the RF PCB, which will eventually be connected to the baseband PCB. Since both the baseband and RF components are a lot to test, I decided to split up both parts into two separate PCBs. This allows the group to test each board individually and debug the PCB a lot easier.

To begin the baseband schematic, organize the schematic in a way that separates all the components. Though this isn't required, this allows the user to easily look back and find out the different connections. An example below is an easy way to keep the entire schematic organized for future use when soldering the PCB.

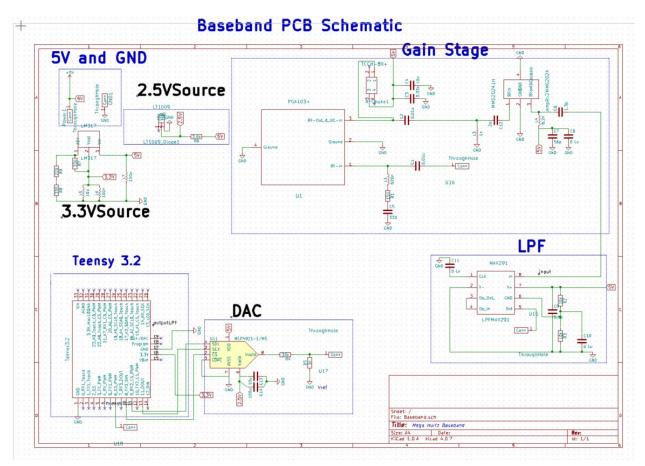


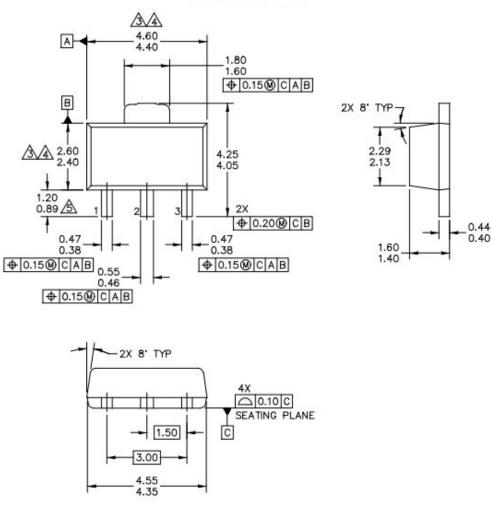
Figure 1. Baseband Schematic

When creating the schematic, be sure to look at the datasheet of each component you will be using. Included in the datasheet is a recommended circuit that the user should follow. This recommended circuit will include different resistors, capacitors, and inductors. For every component you will be using, be sure the actual component already exists in the KiCad Library. The resistors, capacitors and inductors all should be included in the library. However, the op-amps will be a different dimension.

## Footprint Editor:

When designing the footprint for a new component, look at the datasheet for the desired component. Included will be a pinout that shows the dimension of each pin. This page will be used to determine the spacing and the size of the actual component. I will use the MMG20241 amplifier as an example. Looking at the datasheet below, you can see the size of each pin and the distance between each. These values will be used in "Footprint Editor" to create the MMG20241 component. When creating the component, be sure to label each pin correctly, as this will be used to connect to other components in the schematic.

FACINGE DIMENSIONS



© FREESCALE SEMICONDUCTOR, INC. MECHANIC		AL OUTLINE PRINT VERSION		NOT TO SCALE	
TITLE: SOT-89A, 3 LEAD,		DOCUMENT NO: 98ASA00241D		REV: 0	
		CASE NUMBER: 2142-01		15 JUL 2010	
4.5 X 2.5 PKG, 1.5 MM	PITCH	STANDARD: NON-JEDEC			

Figure 2. MMG20241H Dimensions

TIP: I recommend drawing it out on a piece of paper and mathematically determining the spacing between each. This ensures that you correctly created the right component.

Be sure to start with simpler ones provided in the PCB tutorial before moving onto more complicated footprints.

## Assigning footprints to components

When creating the footprint, save the component in the current directory by exporting the file and creating a folder. Once a folder is created, click preferences on the top of the footprint editor. A screen will show up labeled as, "Add Footprint Libraries Wizard".

Add Foo	tprint Libraries Wizard		-		$\times$			
	Welcome to the Add Footprint Libraries Wizard!							
40	Please select the source	e for the libraries to add:						
	Files on my computer							
	O Github repository	y https://github.com/KiCad						
		Save a local copy to:						
		C:\Users\csaec\OneDrive\Docume	Browse					
	Visit our official Kicad repository on Github and get more libraries							
		< Back	Next >	Can	cel			

Figure 3. Footprint Library Wizard

Click next, then select the folder you created. **Be sure to have different folders for different components.** Now set the active library. This ensures that you will be able to connect this footprint to the component. After opening up "CvPCB", click the component you wish to associate. Then, on the right column, find the correct footprint. Once found, double click that footprint so that the component is included in the middle column. Repeat this for all the components in the list as shown below.

MX201         2         Cl -         0.01u t Apacitors, MOC. 0005         2 hett           M66         3         C2 -         0.01u t Apacitors, MOC. 0005         3 hett           Masuresent, Points         4         C3 -         0.01u t Apacitors, MOC. 0005         3 hett           Masuresent, Points         5         C4 -         10u t Apacitors, MOC. 2006         5 hett           Microwav         6         C5 -         330 t Apacitors, MOC. 2003         6 hett           Modules         7         C6 -         1.3 pt Capacitors, MOC. 2003         7 bett           Mouting, Bolss         8         C7 -         Spin t Apacitors, MOC. 2002         9 hett           Opto-Devices         9         0         0.1 u Capacitors, MOC. 2003         10 hett           Opto-Devices         9         0.1 u Capacitors, MOC. 2003         10 hett           Opto-Devices         10         C1 -         0.1 u Capacitors, MOC. 2003         10 hett           Pri Pri Prang, Ladforms         11         C10 -         0.1 u Capacitors, MOC. 2003         12 hett           Post, Independers         13         C12 -         2 pt Capacitors, MOC. 2003         12 hett           Post, Independers         13         C12 -         2 pt Capacitors, MOC. 2003         12			
MAX211         2         Cl -         0.01 is 0.spacitors_MONC_0005         2 networks_MONG           MG6         3         C2 -         0.01 is 0.spacitors_MONC_0005         3 networks_MONG           Meanuresset_Points         4         C3 -         0.01 is 0.spacitors_MONC_0005         3 networks_MONG           Meanuresset_Points         5         C4 -         10 is 0.spacitors_MONC_1206         5 networks_MONG         6 networks_MONG           Microwave         6         C5 -         330 is 0.spacitors_MONC_0402         6 networks_MONG         6 networks_MONG           Monting Molas         8         C7 -         56 pis 0.spacitors_MONC_0402         9 networks_MONG         10 networks_MONG           Opto-Devices         9         0         0.1 is 0.spacitors_MONC_0402         9 networks_MONG         11 networks_MONG         10 networks_MONG<			
Not         3         cd -         0.011 f 3pacitor 9007-9005         3 Batt           Nearurent, Scales         5         0.4         0.011 f 3pacitor 9007-9005         6 Batt           Nearurent, Scales         5         0.4         1.01 f 3pacitor 9007-9005         6 Batt           Nicrossve         6         0.5         3.01 c 3pacitors, 9007-9002         7 Batt           Nucling, Mola         8         0.7         0.5         1.3 p f 3pacitors, 9007-9002         7 Batt           Nucling, Mola         8         0.7         0.5         0.1 a f 3pacitors, 9007-9002         9 Batt           Opto-Porices         9         0.0         0.1 a f 3pacitors, 9007-9002         10 Batt           Opto-Porices         9         0.0         0.1 a f 3pacitors, 9007-9003         11 Batt           PT_PT_PT_PT_PT_PT_D_Leadforms         12         0.1 a f 3pacitors, 9007-9003         11 Batt           PT_DAT_PT_DT_D_Leadforms         12         0.1 a f 3pacitors, 9007-9003         12 Batt           PT_DAT_PT_DT_D_Leadforms         12         0.1 a f 3pacitors, 9007-9003         13 Batt           PT_DAT_PT_D_Leadforms         12         0.1 a f 3pacitors, 9007-9003         13 Batt           PT_DAT_D_Leadforms         12         0.1 a f 3pacitors, 9007-9003         13	etty:PGA103		
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Microsove         6         6         6         6         7         30         1 apacitors g000; 0403         6         6         6         7         06         1.3         01 </td <td colspan="3">4 Battery Molders: Keystone 104 1x23mm-CoinCell</td>	4 Battery Molders: Keystone 104 1x23mm-CoinCell		
Mexilized         7 $0^2 - 1.3^2$ $0^3$ periods and $0^2$ (Model (Mo	5 Battery Holders: Keystone 105 1x2430-CoinCell		
Municipulois         8         C7         Spin barcelors         9         00         0.10         10 space(lors_BODC_0402         00	6 Battery Holders: Keystone 106 1x20mm-CoinCell		
Mounting Joles         8         C7 -         56 p         6 pacetiors M00C (402)         8 Batt           Opto-Dvices         9         0         0.1 u         1.0 apacitors M00C (402)         9 Batt           Opto-Dvices         10         0.9 -         0.1 u         1.0 apacitors M00C (403)         10 Batt           Opto-Dvices         12         0.1 u         1.0 apacitors M00C (403)         12 Batt           Pin Jandaders         12         0.1 u         0.0 apacitors M00C (403)         12 Batt           Pote Jandaders         13         0.1 2         0.2 pacitors M00C (403)         13 Batt           Pote Jandaders         15         0.1 u         1.0 apacitors M00C (403)         13 Batt           Pote Jandaders         15         0.1 u         1.0 apacitors M00C (403)         13 Batt           Pote Jandaders         15         0.1 u         1.0 apacitors M00C (403)         13 Batt           RF Achanas         16         M01 - ThroughN01e ThroughN01e ThroughN01e M01         10 Batt           Relays MD         19         1.4 u         0.1 adators M01, 403         20 Batt           Relays MT         20         1.5 - 10u i Inductors M01, 403         20 Batt           Relays MT         21         1.0 adators M01, 403         <	7 Battery Holders: Keystone 107 1x23mm-CoinCell		
Opto-Devices         9         CO         0.1s ic opacitors MOC_0402         9 Batts           Opto-Devices         0         0         0.1s ic opacitors MOC_0403         10 Batts           PTP_PET_PEG_Leadforms         11 C10         0.1s ic opacitors MOC_0403         11 Batts           PTP_DET_PEG_Leadforms         12 C11         0.1s ic opacitors MOC_0403         13 Batts           Pin_Inseders         13 C12         2.p ic opacitors MOC_0403         13 Batts           Power_Integrations         15 C14         10 c0 + ic opacitors MOC_0403         15 Batts           Power_Integrations         15 C14         10 c0 + ic opacitors MOC_0403         15 Batts           Processing MOC         15 C14         10 c0 + ic opacitors MOC_0403         15 Batts           Processing MOC         15 L3         16 c001         17 Batts         16 Batts           Re_Modular         15 L4         0.0 ic inductors MOL_0403         15 Batts           Re_Modular         15 L4         0.0 ic inductors MOL_0403         12 Batts           Relations _ TMT         21 L5 - 10 wit inductors _ MOL_0403         21 Batts           Relations _ TMVERSI         21 L7 - 10 wit inductors _ MOL_0403         20 Batts           Relations _ TWVERSI         22 L7 - 10 wit inductors _ MOL_0403         20 Batts	8 Battery Holders: Keystone 1042 1x18650		
$3$ 10 $0^{2}$ $0.1$ $10$ $0.1$ $10$ <th< td=""><td colspan="2">9 Battery_Holders:Keystone_1058_1x2032-CoinCell</td></th<>	9 Battery_Holders:Keystone_1058_1x2032-CoinCell		
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$Pin_1 Beakers13Cl22p : 2p : 2p_{cl2} c_{2} (M22)^{-} ($	tery Holders: Keystone 2479 3xAAA		
Participation         14         Cl3         10 a : Gapacitors_BMC_Q603         14 Batts           Dever_Integrations         15 Cl4 - 1000 a : Gapacitors_BMC_Q603         15 Batt           News_Integrations         15 Cl4 - 1000 a : Gapacitors_BMC_Q603         15 Batt           NE Chobe         16 GMD1 - ThroughDole : Thr	13 Battery Holders:Keystone 2993		
power_Integrations15Cl4 -100 if $C_{3}$ excl4rs_M0C_9(063)15 MettyPreschuber16 GWD1 -Throughhole it Throughholes	14 Battery Holders: Keystone 3000 1x12mm-CoinCell		
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RP_Attennas         17         L1 $620n$ 1 Inductors 2001, 6001         17 Batt           RP_Modula         16         L3         1n         Inductors 2001, 6001         16 Batt           Relay_BD         19         L4         0.2n         In Inductors 2001, 6002         19 Batt           Relay_BD         20         L5         10 in Inductors 2001, 6003         20 Butt           Resistors_BD         21         L6         100n I Inductors 2001, 6003         22 Butt           Resistors_BD         23         L017         L017/11017         23 Dutt         23 Butt           Resistors_BD         23         L017         L017/11017         23 Dutt         24 Butt           Resistors_BD         24         LPMOXDE         ThroughIDs I ThroughIDs IThroughIDs         25 Butt           Socket         27         R1         105 IP Resistors_BDR1, 603         26 Butt           Socket         27         R1         100 I Resistors_BDR1, 603         20 Butt           Socket         27         R1         100 I Resistors_BDR1, 603         20 Butt           Socket         27         R1         100 I Resistors_BDR1, 603         20 Butt           Socket         28         R2         100 I Resis	16 Battery Holders: Keystone 3008 1x2450-CoinCell		
NP_Modulos         10         1.0         1	17 Battery Holders: Keystone 3009 1x2450-CoinCell		
Incluyent         19         L4         0.2 is 1 inductor_NOD1_P002         19 Back           Balayent         0         1.5         1.0 is 1 inductor_NOD1_P002         20 Back           Basintors_NOD         21         L6         1.00 is 1 inductor_NOD1_P001_P002         21 Back           Basintors_NOT         22         L7         1.00 is 1 inductor_NOD1_P001_P003         22 Batk           Basintors_NOT         23         L6         1.00 is 1 inductor_NOD1_P001_P003         23 Batk           Basintors_NOT         23         L7         L0.01 inductor_NOD1_P001_P003         23 Batk           Basintors_NOT         23         L7         L0.03 inductor_NOD1_P001_P003         23 Batk           Basintors_NOT         23         Datk         Environment         25 Batk         26 Batk           Basintor_NOT         25         Datk         Environment         26 Batk         26 Batk           Stating_Chines         27         R1         Dissistor_NOT_NOT_RON_RO03         26 Batk           Symbol         28         R2         1.00 it Resistor_NOD1_RO03         20 Batk           Symbol         28         R4         3.00 it Resistor_NOD1_RO13         20 Batk           Symbol         28         R4         3.00 it Resistor_NOD	18 Battery Holders:Reystone 3034 1x20mm-CoinCell		
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Resistors_NDM         21         L6 -         100 m i Inductor_MDMI_001         21 Dutt           Resistors_Universal         21         L7 -         100 m i Inductor_MDMI_001         22 Butt           Resistors_Universal         23         LM317 -         LM317 / IM317 / IM317         23 Dutt           Building_Cabinets         23         LM317 -         LM317 / IM317 / IM317         23 Dutt           Building_Cabinets         25         LF0005_Dicdel -         LF0005_Dir/MD321 / IM32211         25 Dutt           Building_Cabinets         25         DirodyBile -         LF0005_Dir/MD321 / IM32211         25 Dutt           Bocket_Strips         25         Power1 -         LF0005_Dir/DD31 / Imoughlole : Throughlole : Dower1 -         25 Dutt           0_00T_ackages_MD         29         R3 -         10 i: Resistors_MD1, 0603         20 Butt           0_00T_ackages_THT         30         R4 -         30 i: Resistors_MD1, 0603         30 Butt           0_00T_ackages_MD         23         R6 -         3.6 K: Resistors_MD1, 0603         30 Butt           0_00T_ackages_MD         31         R7 -         30 i: Resistors_MD1, 0603         31 Butt           TeamfaniBlootk_Phoenix         32         R	20 Buttons Switches SMD:Nidec Copal SH-7010A		
Bealistor_TMT         22         107 -         1000 i Inductor_MOD1,603         22 Butt           Bealistor_TMT         23 MAI7         MAX31 i MAX31/MAI7         23 Butt           BRD_Backages         24 EMPAX231 -         MAX31 i MAX31/MAX31         24 Butt           Butchading_Cabinets         25 EMIX (D00) iT/1000 iT/1000 iT/000 iT/000         25 Butt           Bockst         26 Foreg1 -         Throughilole iThroughilole iThro	21 Buttons Switches SMD:Nidec Copal SH-7010A 21 Buttons Switches SMD:Nidec Copal SH-7010B		
neistors_Universal         23 IAU17 - IAU17 / IAU17/IAU17         23 Dutk           Multip_dackgers         24 LFMAX251 - MAX251 / MAX251         24 Dutk           Subjeckspr         25 LF005_Didd1 - INTroughlois f.HoughloisFhroughlois         25 Dutk           Subckts         25 Dutk         15 Unophick         25 Dutk           Subckts         26 Dutk         15 Unophick         25 Dutk           Subckts         27 R1 - Info         Resistors_MDR.p.603         25 Dutk           Symbol         29 R3 - Info         Resistors_MDR.p.603         25 Dutk           Socksts         27 R1 - Info         Resistors_MDR.p.603         25 Dutk           Socksts         29 R3 - Info         Resistors_MDR.p.603         25 Dutk           Socksts         28 R4 - Info         Resistors_MDR.p.603         25 Dutk           Socksts         23 Uf - Info         Resistors_MDR.p.603         25 Dutk           Stransformers_MD         25 R8 - Info         25 Dutk         26 Dutk           Transformers_MD	22 Buttons Switches SMD:Nidec Copal SH-7040B		
MDD packages         24 # BF9AX251 -         MXX231 MXX231 MXX231         24 Be7X         24 Be7X           Binding Cabinsia         24 Be7XX251 -         MXX231 MXX231 MXX231         24 BerX         25 BetX           Binding Cabinsia         25 DT005 Dicdel -         TXD09 : TXD09 : TXD09 : TXD09 IT         25 BetX         25 BetX           Bockst Binding Cabinsia         26 FWer1 -         ThroughDiele Through	22 Buttons_Switches_SMD:Nidec_Copal_SH-7040B 23 Buttons_Switches_SMD:Panasonic_EVOPUJ_EVOPUA		
bh.ad.ing_Cabinets         25 tr1002_Dicdel - tr1009 : t71009 : t71009 : t71009         25 tr1002_Dicdel - tr10001000 : t71009         25 tr1002_Dicdel - t71009         25 tr1002_Di			
Schtzips         26 Pewerl - Throughlole : Throughlole	24 Buttons_Switches_SMD: Panasonic_EVQPUK_EVQPUB		
Sockets         27         R1         150         Heatingtong MDR, 6031         27         Dutt           Symbols         28         R2         101         Heatingtong MDR, 6031         28         D2           D0, D7, Packages_MMD         28         R2         101         Heatingtong MDR, 6031         29         D2           D0, D7, Packages_MMD         25         R3         101         Heatingtong MDR, 6031         29         D1           D0, D7, Packages_MMD         30         R4         30         R4         D0         D	25 Buttons_Switches_SMD: Panasonic_EVOPUL_EVOPUC		
gmbola         28         R2 -         10 t         10 e latting MOD1 (001)         29         Det De Carbon (001)         20         Det De Carbon (001)         21         Det De Carbon (001)         21         Det De Carbon (001)         22         Det De Carbon (001)         23         De Carbon (001)         24         De Carbon (001)         25         De Carbon (001)         25         De Carbon (001)         25         De Carbon (001)         25         De Carbon (001)         26         De Carbon (001)         26         De Carbon (001)         26         De Carbon (001)         26         De Carbon (01)         26         De Carbon (01)         26         De Carbon (01)         26         De Carb	26 Buttons_Switches_SMD: Panasonic_EVQPUM_EVQPUD		
20         29         R3         -         10 t Pesistor_MON1         29         29           20         20         Packages_MON         29         81         -         00 t Pesistor_MON1         29         01         00         Dot         Dot <td colspan="2">27 Buttons_Switches_SMD:SW_DIP_x1_W5.08mm_Slide_Copal_CHS-A</td>	27 Buttons_Switches_SMD:SW_DIP_x1_W5.08mm_Slide_Copal_CHS-A		
70_007_Package_THT         30         R4 - 00t : Resistor_M05.D_001         30         Dutt           Remay         31         R5 - 11 : Resistor_M05.D_003         31         Butt           Remay         31         R5 - 11 : Resistor_M05.D_003         31         Butt           TerminalBlocks_MAGO         32         R6 - 3.64 : Resistor_M05.D_003         32         Butt           TerminalBlocks_MAGO         33         R7 - 330 : Resistor_M05.D_003         34         Butt           Transformer_SMD         34         R8 - 330 : Resistor_M05.D_003         34         Butt           Transformer_SMD         35         R9 - 220 : Resistor_M05.D_003         35         Butt           Transformer_SMD         36         RPCH+18F Chack-102H-80+         36         Butt           Transformer_SMD         37         Teensy3.2 : Teensy3.2 : Teensy3.1         37         Butt           Yaires         39         U1 - VG103 : F04.U3 : F04.03	28 Buttons_Switches_SMD:SW_DIP_x1_W5.9mm_Slide_Copal_CVS		
Seemay         31         B5         11: Desistors_MOD1_0001         31 But           Perminal Diods_Flowink         32         R6         3.6 it         Desistors_MOD1_0001         32 But           Perminal Diods_Flowink         32         R6         3.6 it         Desistors_MOD1_0001         32 But           Perminal Diods_FLowink         33         R7         -         320 it         Desistors_MOD1_0001         33 But           Perminal Diods_FLowink         34         R8         -         330 it         Pessitors_MOD1_0001         35 But           StandStormsrg_MD1         35         R7         -         320 it         Desistors_MOD1_0001         35 But           Transformsrg_MD1         35         R7         -         220 it         Resistors_MOD1_0001         35 But           Transformsrg_MD1         36         Rhots         36         Rhots         36 But           Transformsrg_MD2         7         Toom90 it         RC choks itCOH=06+         86         70 But           Valves         30         U1 -         ValV32:FCM2+03         10         36 But         36 But           Valves         30         U1 -         ValV32:FCM2+00         S.94,94,9m_Pitch1,27m         36 But	29 Buttons_Switches_SMD:SW_DIP_x1_W7.62mm_Slide_Copal_CHS-B		
PerminalBlock_Fhoenix         32         R6 -         3.6k:         Resistor_MONE_0603         32         Data           PerminalBlock_MADO         33         N7 -         33::         Resistor_MONE_0603         33         Butt           PerminalBlock_MADO         33         N7 -         33::         Resistor_MONE_0603         34         Butt           PrompinalBlock_MADO         34         R8 -         33::         Resistor_MONE_0603         34         Butt           Transformers_NMD         35         R9 -         22::         Resistor_MONE_0603         35         Butt           Transformers_NMT         36         RVTChode +:         RYChode +: RYChokerCOL+80*         60:         At the compose -         37         Data           Transformers_NMT         37         Teensy3.2 -         Teensy3.2 : Teensy:Teensy3.1         37         Data           Taiveo         39         U1 -         NUT492:L-KAM: Housing=00C1:80C1:8_3.9x4.9mm_Pitch1.27mm         38         Butt           Variators         39         U1 -         NUT492:L-KAM: Housing=0C1:80C1:8_3.9x4.9mm_Pitch1.27mm         39         Data	30 Buttons_Switches_SMD:SW_DIP_x1_W8.61mm_Slide_LowProfile		
Derminalizada (MAG)         33         R7 -         33 0 1 Besistors (MO) (PO)         33 Unit           Horoughtole         34         R8 -         33 0 1 Resistors (MO) (PO)         34 Bit           Disconstruction         35         R9 -         220 1 Resistors (MO) (PO)         35 Date           Disconstruction         36         RPC.hoki -         TCCM-90 + 18 (PC) hoki (TCCM+60)         35 Date           Iransistors (DABOrgishara         36         RPC.hoki -         TCCM-90 + 18 (PC) hoki (TCCM+60)         36 Date           Valves         36         U1 -         TCCM-90 + 18 (PC) hoki (TCCM+60)         37 Date           Valves         39         U1 -         VAL03 FGA-103         39 Bate           Variators         39         U1 -         NMM 322-HCM = Hoking-SOCH 30(C-0_3, 5#4, 9mPitch1, 27m)         39 Bate	31 Buttons_Switches_SMD:SW_DIP_x2_W5.08mm_Slide_Copal_CHS-A		
ThroughNole         34         R8         330         Resistors_MOLR_0603         34         Butt           Transformers_MDM         35         R9         220:         Resistors_MOLR_0603         35         Butt           Transformers_MDM         35         R9         220:         Resistors_MOLR_0603         35         Butt           Transformers_MDM         35         R9         20:         Resistors_MOLR_0603         35         Butt           Transformers_TMT         36         RPCh009:         RPCh009:         RPCh009:         RPCh02         6603         60:         Butt           Transformers_TMT         37         Teensyl.2:         Teensyl?eensyl.3:         37         Datt           Valvas         30         U1 -         PGA103:* F0A103:PGA-103         38         Butt           Valvas         30         U1 -         NCM492:PCAM:         Butt         S9         D9         D4	32 Buttons_Switches_SMD:SW_DIP_x2_W5.9mm_Slide_Copal_CVS		
Itemsformers_HMD         35         Pi -         220:         Possistors_HMD:0603         35         Data           Iransformers_HMT         36         RPChokel -         TCCH=80+ : RF.chokeTCCH=80+ : RF.chokeTCCH=80+         36         Butt           Iransistors_OldSorjetAra         37         Teensy3.2 : Teensy3.2 : Veensy3.1         37         Dutt           Yaives         38         U1 -         FCAL03+ : FAL03:FCA-103         S0         Butt           Yaives         39         U1 -         NCH321+CAM : Houdings_GOCH30CC+3_3.5x4.9ms_Pitch1.27mm         39         Butt	33 Buttons_Switches_SMD:SW_DIP_x2_W6.15mm_Slide_Omron_A6H		
Transformers_TMT         36 RPChokel - TCCM-80+ : RF Choke1TCCM-80+         36 Butt           Transistors_OldSowjetAera         37 Teensy3.2 : Teensy3.2 : Teensy12eensy3.1         37 Dutt           Valvas         36 Ul - FOA103 : PGA103 : PGA103 : PGA103 : Anny Fitch1.27mm         38 Butt           Aristors         39 Ul - MCP492L-EFMS : Bouing_SOC:SOC-8_3.9x4.9mm_Fitch1.27mm         39 Butt	34 Buttons_Switches_SMD:SW_DIP_x2_W7.62mm_Slide_Copal_CHS-B		
Transistors_OldSowjetAera         37 Teensy3.2 - Teensy3.2 : Foensy1?eensy3.1         37 Dutty           Naives         38 U1 - FOENI03+ : FOENI03:FOEN-03         38 Butty           Arsistors         39 U1 - MCM942: Mol : Bouling_SOC:800:00:8_3.9x4.9mm_Pitch1.27mm         39 Butty	35 Buttons_Switches_SMD:SW_DIP_x2_W8.61mm_Slide_LowProfile		
%alves         38         U1 -         FGA103+ : FGA103:FGA-103         38         Butt           %alves         39         U11 -         MCP4521-E/MS : Housings_SOIC:SOIC-8_3.9x4.9mm_Pitch1.27mm         39         Butt	36 Buttons_Switches_SMD:SW_DIP_x3_W5.9mm_Slide_Copal_CVS		
Taristors 39 Ull - MCP4921-E/MS : Rousings_SOIC-8_3.9x4.9mm_Pitch1.27mm 39 Butto	37 Buttons_Switches_SMD:SW_DIP_x3_W8.61mm_Slide_LowProfile		
	38 Buttons_Switches_SMD:SW_DIP_x4_W5.08mm_Slide_Copal_CHS-A		
	tons_Switches_SMD:SW_DIP_x4_W5.9mm_Slide_Copal_CVS		
	40 Buttons_Switches_SMD:SW_DIP_x4_W6.15mm_Slide_Omron_A6H		
	tons_Switches_SMD:SW_DIP_x4_W7.62mm_Slide_Copal_CHS-B		
via 42 UJ7 - Throughhole: Throughhole: Throughhole Throughhole 42 Utt via 15mil V 43 U18 - Throughhole : Throughhole : Throughhole (	42 Buttons_Switches_SMD:SW_DIP_x4_W8.61mm_Slide_LowProfile		

Figure 4. Associating footprints

We can now move onto the PCB design.

## PCB Design

On the schematic window, generate a netlist. Once the netlist is complete, click "Run PCB new" to begin the design. Click the "read netlist" button located on the top bar. When read in, be sure no errors are present. Once the netlist is read in, the design should show all the components in one location as shown below:

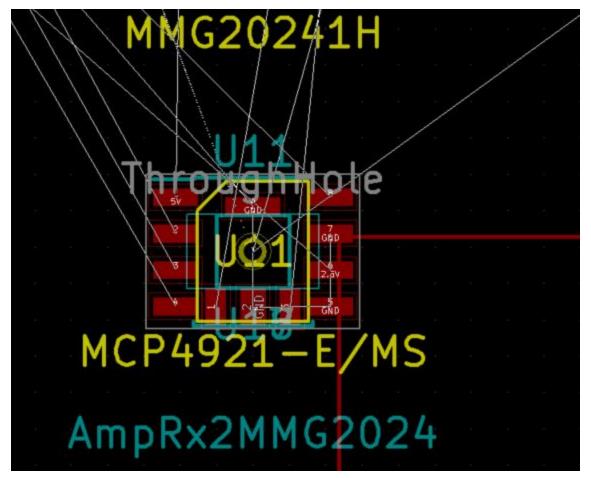


Figure 5. Rats netlist

Move the components so they're all organized. A simple way of organizing the components is to follow the schematic created previously. Move all the resistors, capacitors, and inductors so that they're in the same layout shown in the datasheet. When placing the teensy, place the teensy in the corner of the board so that the USB port will be sticking out. A complete design of the schematic is shown below.

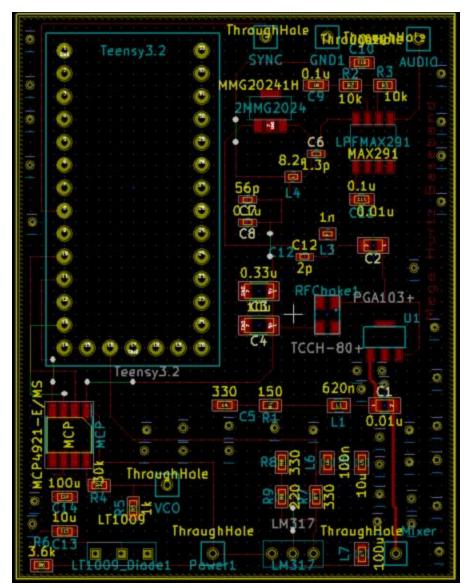


Figure 6. Complete Design of Baseband Board.

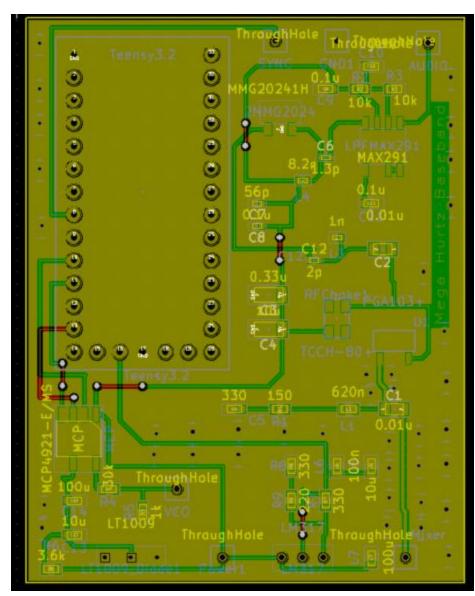


Figure 7. Complete Design of Baseband Board.