

1. OVERVIEW

NT1068.2_EVK is an evaluation platform for performance and capabilities demonstration of NT1068.2: 4-channel GPS/GLONASS/Galileo/BeiDou/NavIC/QZSS S, L1, L2, L3, L5, E1, E5a, E5b, E6, B1, B2, B3 band RF Front-End IC. It is suitable the most for in-lab examining with measurement equipment like spectrum analyzer, oscilloscope, network analyzer and etc, but also it has connectors for wiring to external development platforms.

2. KEY FEATURES

- IO ports:
 - RF splitter input with active antenna supply option
 - Every channel individual RF input
 - Every channel IF output ready to connect either as digital 2-bit CMOS/LVDS or analog differential signal (single-ended signal is also available as assembly option)
 - External reference frequency input (TCXO)
 - CLK output ready to connect either as CMOS, differential or LVDS (single-ended sinewave is also available as assembly option)
 - Embedded USB to SPI adapter for NT1068.2 registers configuration
- On-board reference frequency sources:
 - 10 MHz TCXO
 - 16.368 MHz TCXO
- Additional modules:
 - 1-to-4 RF splitter
 - 2-to-4 RF splitter
 - 4-channel RF preselector
 - 1-to-5 RF splitter (SPL15-45514 or SPL15-465X5 recommended)
- Comprehensive software and manual:
 - NT1068.2 datasheet
 - NT1068.2_EVK user manual
 - GUI for NT1068.2 registers access (Windows 7/8/8.1/10 and later compatible; Linux Ubuntu 18.04 and later compatible)
 - NT1068.2 configuration examples
 - Database of reference design

3. PACKAGE CONTENT

- PCB NT1068.2_EVK_V1 (demo board NT1068.2)
- Power supply cable
- Link to online documentation and GUI

4. STRUCTURE

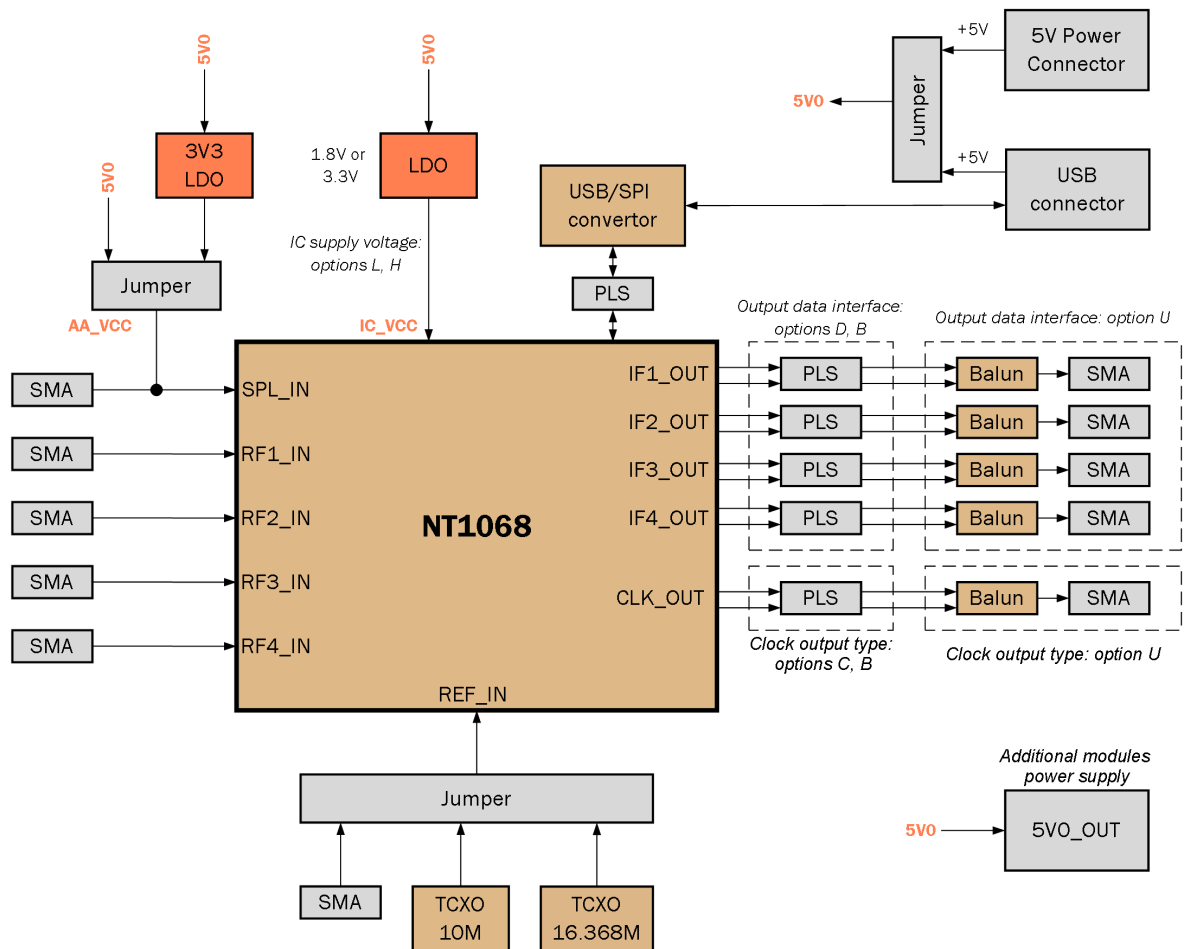
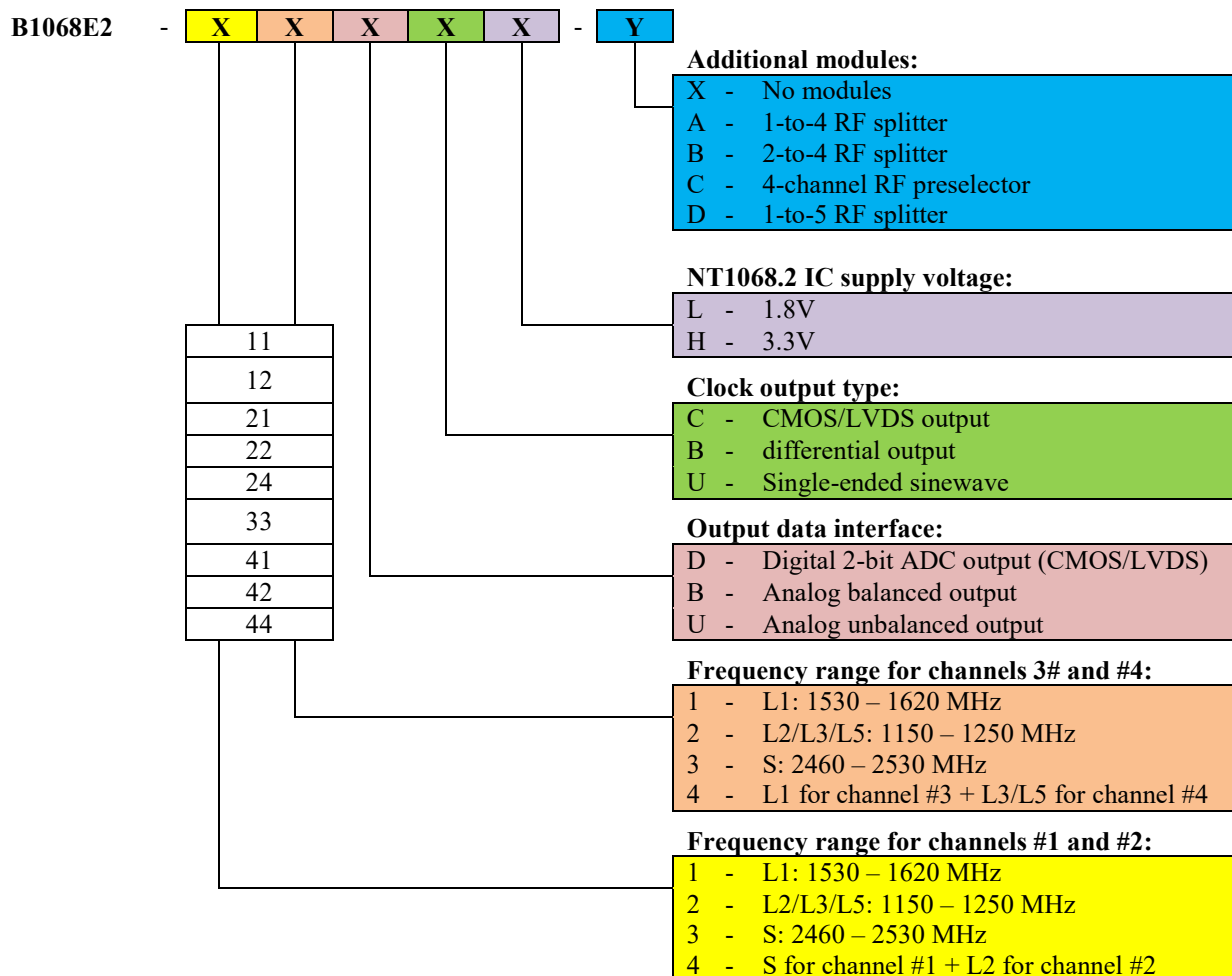


Figure 4.1 NT1068.2_EVK Block diagram

5. ORDERING INFORMATION



If several additional modules are required, please, add corresponding symbols consequently, e.g. B1068E2-44UUH-AB. Refer to documents [NT1065_Additional_modules_vx.xx.pdf](#) and document [RF_Splitter_1_to_5_vx.x.pdf](#) for description and assembly options.

6. TECHNICAL DESCRIPTION

Table 6.1 NT1068.2_EVK_V1 ports description

Port number	Description	Notes
X1	USB connector for chip control and power supply (optionally)	—
X2	External power supply connector (5.0V) for NT1068.2_EVK_V1	300mA current limit should be set
X3	External reference frequency input (SMA)	—
X4	RF splitter input (SMA)	—
X5-X8	Channels #1-4 RF inputs (SMA)	—
X9	Single-ended clock output (SMA)	Assembly option
X10-X13	Channels #1-4 IF single-ended outputs	Assembly option
XP2	Power sources switch: 1-2 position – Power supply from USB port X1 2-3 position – External power supply from port X2	2-3 position by default
XP3	Reference frequency sources switch: 1-2 position – Onboard 10 MHz TCXO 2-3 position – Onboard 16.368MHz TCXO Not set – external, from connector X3	1-2 position by default
XP4	Active antenna power supply switch: 1-2 position – 3.3V supply voltage 2-3 position – 5V supply voltage Not set – disabled	Not set by default
XP5	NT1068.2 IC control from external controller: Pin #1 – MOSI Pin #2 – MISO Pin #3 – SCK Pin #4 – CS Pin #5 – GND	From USB by default
XP7, XP8	GND	—
XP10-XP13	Channels #1-4 analog differential outputs / 2-bit ADC digital outputs (LVDS or CMOS)	Assembly option
XP14	Clock frequency analog differential output / CMOS output	Assembly option
XP15	5V supply voltage for additional external components	—
VD3	3.3V supply voltage status (green LED)	—
VD4	5V supply voltage status (green LED)	—
VD7	NT1068.2 AOK status (red LED)	—

7. EVALUATION KIT RECONFIGURATION

Power supply source reconfiguration:

- Default configuration: external power supply (5.0V, 300mA limit) from port X2, jumper on XP2 connector is set to 2-3 position.
- In order to use power supply from USB port X1, set jumper on XP2 connector to 1-2 position.

Reference frequency source reconfiguration:

- Default configuration: Onboard 10 MHz TCXO, jumper on XP3 connector is set to 1-2 position.
- In order to use onboard 16.368 MHz TCXO, set jumper on XP3 connector to 2-3 position.
- In order to use X3 SMA input for external reference frequency connection, remove jumper from XP3 connector.

Active antenna power supply source reconfiguration:

- Set jumper on XP4 connector to 1-2 position to provide 3.3V supply voltage to antenna connected to X4 port.
- Set jumper on XP4 connector to 2-3 position to provide 5.0V supply voltage to antenna connected to X4 port.
- Not set by default, no supply voltage is connected for antenna supply.

Control modes:

- NT1068.2_EVK is expected to be controlled from USB port X1.
- In order to control NT1068.2_EVK from external controller, use pins of XP5 connector.

Channel output and clock output types are available as assembly options.

Note: After board is reconfigured as desired, please reconfigure NT1068.2 IC registers accordingly. Pay attention to reference frequency value, channel frequency band, channel output data interface type and clock output type. For NT1068.2 IC registers configuration description refer to [section 10](#) of this document and to [section 7](#) of the datasheet.

8. QUICK START

In order to start working with evaluation kit follow instructions:

- Make sure that all connectors and jumpers on the board are set in the correct positions according to selected options (see [Table 6.1](#) and [section 7](#)).
- Set 5V supply voltage on external power source. In order to prevent chip damage in case of incorrect connection or onboard elements short circuit it is also recommended to set current limitation 300mA. Connect power supply cable and/or USB cable to PCB NT1068.2_EVK_v1 board.
- Install drivers according to [section 9](#) if needed for OS.
- Run NT1068v2 CE application and follow instructions:
 - Click **IC→GUI** button to read registers state and to ensure that demo board and the adapter are connected correctly. IC ID should be 1068.2.1. If the program is not responding, or IC ID shows incorrect value, check whether devices are connected properly. You can also disconnect and reconnect USB cable and then repeat the connection procedure.
 - NT1068.2 IC wakes up in the active mode: all channels and clock output are enabled. PLLs are supposed to be locked after 1 ms. Write configuration file “[NT1068_2_Recommended_values.hex](#)” by clicking **File→IC** button to apply values recommended for default configuration of NT1068.2.
 - One of configuration examples can be written to NT1068.2 IC by clicking **File→IC** button.
 - If another configuration is used, do not forget to add values recommended in the document “[NT1068.2_Recommendations_v1.0.pdf](#)” (also listed in “[NT1068_2_Recommended_values.hex](#)” file).
 - If jumper XP2 is set to 1-2 position (power supply from USB), LED “AOK” (VD7 on the board) may indicate “fail” state with red light. This occurs because PLLs don’t locked due to weak front of voltage, applied to the chip via USB interface. To lock PLLs run tuning execute.

9. USB ADAPTER DRIVER INSTALLATION

OS MS Windows 7 and 8 require drivers installation. Open “en.stsw-stm32102” folder, select version suitable for your OS and follow instructions from “readme” file to install STM drivers. OS MS Windows 10 doesn’t require drivers installation.

10.RUNNING AND USING NT1068 CONTROL TOOL

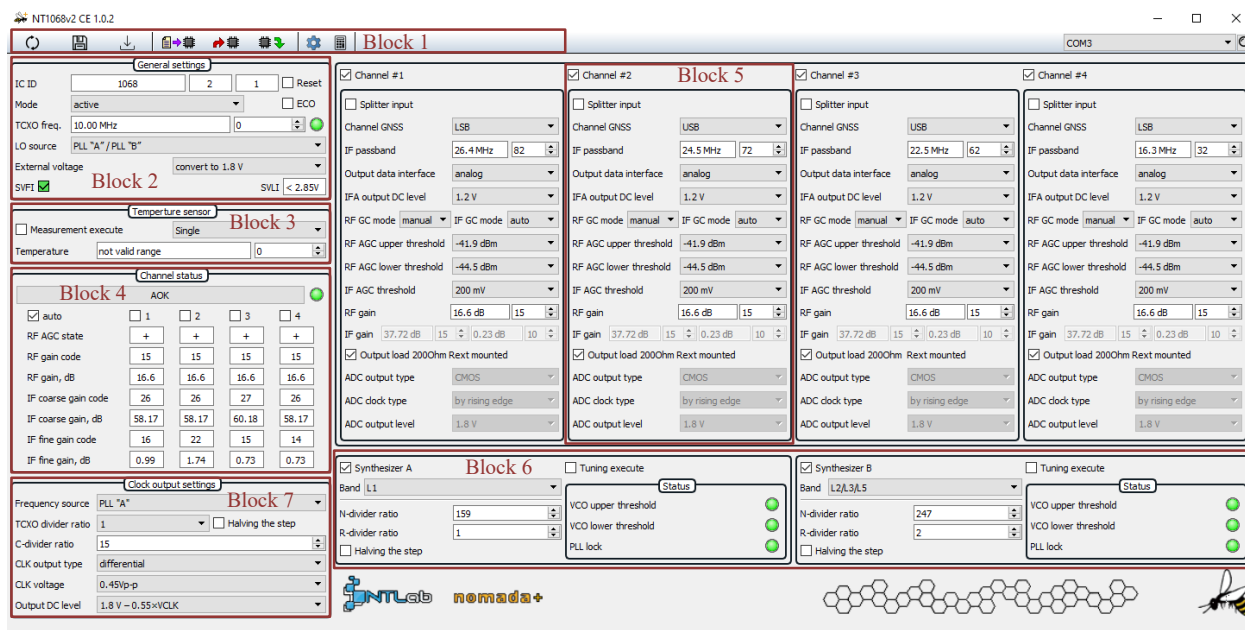








Figure 10.1 Receiver settings view

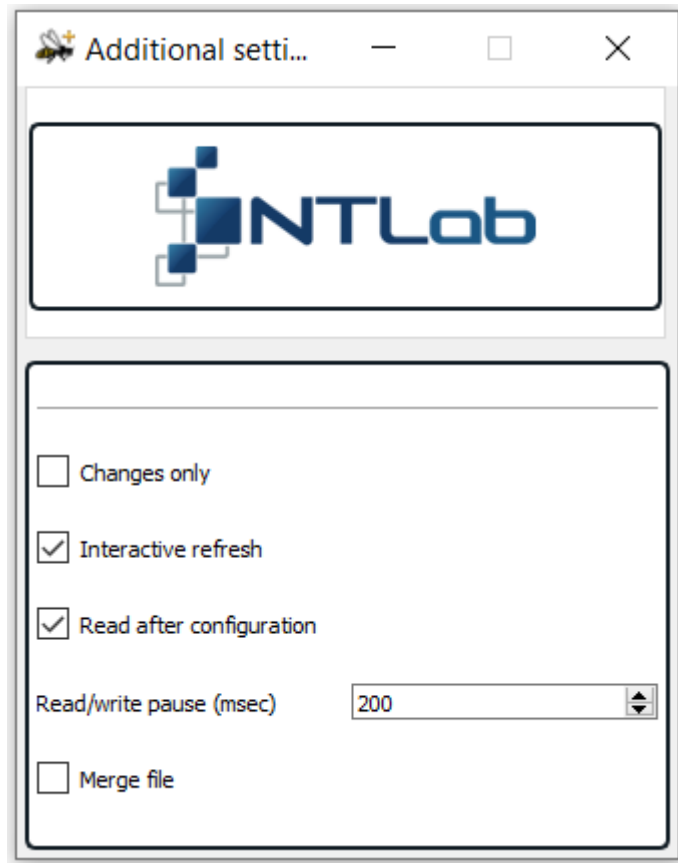
The program allows you to perform the following operations:

Figure 10.1, Block 1:

-  **IC** → **GUI** Reads current state of all IC registers and displays them in the GUI.
-  **GUI** → **IC** Writes displayed register states from GUI to IC. Only changes from the latest IC reading are written. If IC was never read after program start, all registers are written.
-  **File** → **IC** Writes registers states containing in the file directly to IC. Writing is sequential; if file contains several values of the same register, register will be overwritten several times with those values.
-  **File** → **GUI** Reads registers states containing in the file and displays them in the GUI. If file contains several values of the same register, only the last value is displayed.
-  **GUI** → **File** Writes displayed register states from GUI to a file:
 - To save full configuration file open **Service settings** and disable **Changes only** option (enabled by default). Full register map will be written to a file. After that **Changes only** option must be **enabled**.
 - If **Merge with previous** option is **enabled** (Service settings):
 - New file: copies last opened file (file path is shown in the program header), adds changes that user made in GUI to the end of a new file.
 - Existing file: adds changes from the latest opened file (file path is shown in the program header) that user made in GUI to the end of existing file.
 - If **Merge with previous** option is **disabled** (Service settings, disabled by default):
 - Writes full register map. Overwrites an existing file.
-  **Load default.hex** Restores default register states to GUI.

 **Service settings** also include the following options:

- **Interactive refresh** of registers states at the display after writing.
- When **Read after configuration** is enabled, GUI returns states of the registers after each write operation.
- Setting of **pause** between **read/write** operations (value in ms).



While using GUI under Linux Ubuntu, make sure that User has permission to access the device:

```
$ cat /dev/ttyACM0
cat: /dev/ttyACM0: Permission denied
```

If NT1068.2_EVK board is connected to PC and GUI can't read registers map, use command given below to permit access:

```
$ sudo chmod a+rw /dev/ttyACM0
```


Figure 10.1, Block 2, “General settings”:

- **IC ID** displays chip serial number and chip version.
- Software **Reset** leads to registers reset to default values. Write “1” and registers will be reset to default states; finish software reset by write “0”.
- Supply voltage level indicator (**SVLI**) informs about input voltage level: $VCC \geq 2.85V$ or $VCC < 2.85V$. Both of them are valid. Result depends on selected assembly option.
- Supply voltage failure indicator (**SVFI**) is intended to inform about occurred supply voltage reset that led to registers reset to default values. It is in “0” state by default. In order to work with SVFI, set it to “1”. It is also recommended to permit SVFI as AOK’s component. See more details about failure indication in [section 7.6](#) of NT1068.2 IC datasheet.
- External supply voltage applied for NT068.2 IC is internally regulated by default. Do not change **External voltage** control when working with EVK.
- Chip **Mode** can be active, standby or PLL “A” only.
- When high performance is not needed (e.g. for tracking mode) NT1068.2 IC can be ‘on-fly’ switched to power economy mode (**ECO**) to reduce power consumption. Please be noted that some parameters will degrade.
- **TCXO freq** field is intended for external reference frequency value setting. By default, onboard 10MHz TCXO is connected and appropriate value is written to NT1068.2 IC register. As an option onboard 16.368MHz TCXO can be selected. In this case or if another reference frequency from external generator is used (valid range is 5–65MHz), use GUI to select reference frequency range to which TCXO frequency belongs. It is allowed to change control code, corresponding reference frequency value will be displayed on the left.
- **Light** on the right from **TCXO freq.** control field indicates whether reference signal is applied or not.
- **LO source** options: PLL “A” for all channels; PLL “A” for channels #1-2 & PLL “B” for channels #3-4.

Figure 10.1, Block 3, “Temperature sensor”:

- **Sensor mode** setting allows to choose single or continuous measurement.
- **Measurement execute** checkbox starts temperature measurement procedure. It is automatically reset to “0” when finished.
- **Temperature** field displays measurement result and obtained code.

Figure 10.1, Block 4, “Channel status”:

- **AOK light** indicates chip status: valid or fail (VD7 on PCB NT1068.2_EVK_V1). It can be configured by clicking on **AOK button**.
- Channel status can be monitored for one selected channel. Select one channel using appropriate checkbox to get RF AGC state, RF gain code and value in dB, IF gain code and value in dB. Auto mode is also available, but in GUI only. It scans four channels and returns their statuses.

Figure 10.1, Block 5, individual settings for each channel:

- **Channel #** checkbox enables corresponding channel.
- In order to work with **Splitter input**, enable desired channels and select splitter mode for each channel dedicated to splitter input. Enabled channels that are not set to splitter mode can be supplied with RF signals via individual RF inputs.

- To select required frequency band related to carrier, set mixer preset **Channel GNSS** to USB (upper sideband) or LSB (lower sideband) mode.
- **IF passband** should be set according to desired frequency plan. It is allowed to change control code, corresponding LPF cut-off frequency value will be displayed on the left.
- **Output data interface** can be analog differential or 2-bit ADC (pay attention to selected assembly option of the board).
 - **IFA output DC level** can be changed for analog differential output data interface only. Its value depends on input supply option: 1.2V or $0.5 \times VCC$ when NT1068.2 IC supply voltage is 1.8V (L assembly option); 1.8V, 2.0V, 2.1V or 2.2V when NT1068.2 IC supply voltage is 3.3V (H assembly option).
 - For analog differential output, set checkbox if **output load 200Ohm is mounted** on the board.
 - **ADC output type** can be CMOS or LVDS.
 - **ADC clock type** can be asynchronous, clocked by rising or falling edge.
 - If CMOS type is selected, **ADC output level** (logic-level high) can be set to 1.8V or VCC ext. when NT1068.2 IC supply voltage is 1.8V (L assembly option); to 1.8V, 2.4V, 2.7V or ext.VCC when NT1068.2 IC supply voltage is 3.3V (H assembly option).
 - If LVDS type is selected, ADC output current can be set to 1.8mA, 2.6mA, 3.5mA or 4.4mA.
- **RF gain control mode** can be automatic or manual.
 - In manual gain control mode **RF gain** can be set. It is allowed to change control code, corresponding gain value will be displayed on the left.
 - In automatic gain control mode **RF gain status** will be available.
 - For both manual and automatic modes **RF AGC upper thresholds** and **RF AGC lower thresholds** settings are available. The upper threshold should always be higher than lower. Also it is strongly recommended to set dBm-value of upper threshold at least 3dB higher than lower threshold to guarantee stability of RF AGC loop. Information about RF AGC configuration is given in [section 7.8](#) of the datasheet.
- **IF gain control mode** can be automatic or manual.
 - In manual gain control mode **IF gain** can be set. It is allowed to change control code, corresponding gain value will be displayed on the left.
 - In automatic gain control mode **IF gain status** will be available.
- If **analog differential output data interface** and **IFA auto GC mode** are set, it is allowed to set:
 - **IF AGC threshold** w.r.t. sinewave signal: 200mVp-p or 400mVp-p.
- If **analog differential output data interface** and **IFA manual GC mode** are set, it is allowed to set:
 - **IFA coarse gain** (value in dB, 5bits)
 - **IFA fine gain** (value in dB, 5bits)
- If **2-bit ADC output data interface** and **IFA auto GC mode** are set, it is allowed to set:
 - **IF AGC digital detector threshold** w.r.t. sinewave signal (value in %, 5bits)
- If **2-bit ADC output data interface** and **IFA manual GC mode** are set, it is allowed to set:
 - **IFA coarse gain** (value in dB, 5bits)
 - **IFA fine gain** (value in dB, 5bits)

Figure 10.1, Block 6, “Synthesizer A” and “Synthesizer B” settings:

- **Synthesizer** checkbox enables corresponding block.
- **Band** should be selected according to the desired frequency plan. See guidelines in [section 7.2](#) of the datasheet.
- **N-divider ratio** is VCO to PFD frequency integer-valued division ratio. Its value can be set from 8 to 511 and should be chosen according to the formulas given in [section 7.3](#) of datasheet.
- **R-divider ratio** is TCXO to PFD frequency integer-valued division ratio. Its value can be set from 1 to 15 and should be chosen according to the formulas given in [section 7.3](#) of datasheet.
- **Halving the step** allows to halve F_{LO} step without changing F_{PFD} . Refer to the formulas given in [section 7.3](#) of the datasheet.
- **Tuning execute** should be executed if F_{TCXO} , frequency band, N or R-divider ratio were changed or **Halving the step** selected. It is automatically reset to “0” when finished.
- **VCO voltage comparator status** indicates if upper/lower threshold is exceeded.
- **PLL** indicator displays its **status**: locked or not.

Figure 10.1, Block 7, “Clock output settings”:

- **Frequency source** of clock frequency and ADCs sampling frequency can be PLL “A”, PLL “B” or external TCXO. Clock output can be disabled if not used.
- If TCXO pass-through mode is selected, its frequency can be directly used as clock frequency or additionally divided by 2, 4 or 8. There is also an option of **Halving the step** – please refer to [section 7.11](#) of the datasheet for clock frequency calculation.
- **C-divider ratio** is VCO to CLK frequency integer-valued division ratio. Its value can be set from 8 to 31 and should be calculated from the formulas given in [section 7.11](#) of datasheet. This setting is available if PLL “A” or PLL “B” clock source is selected.

Clock settings that are given below are available only if CLK output is enabled.

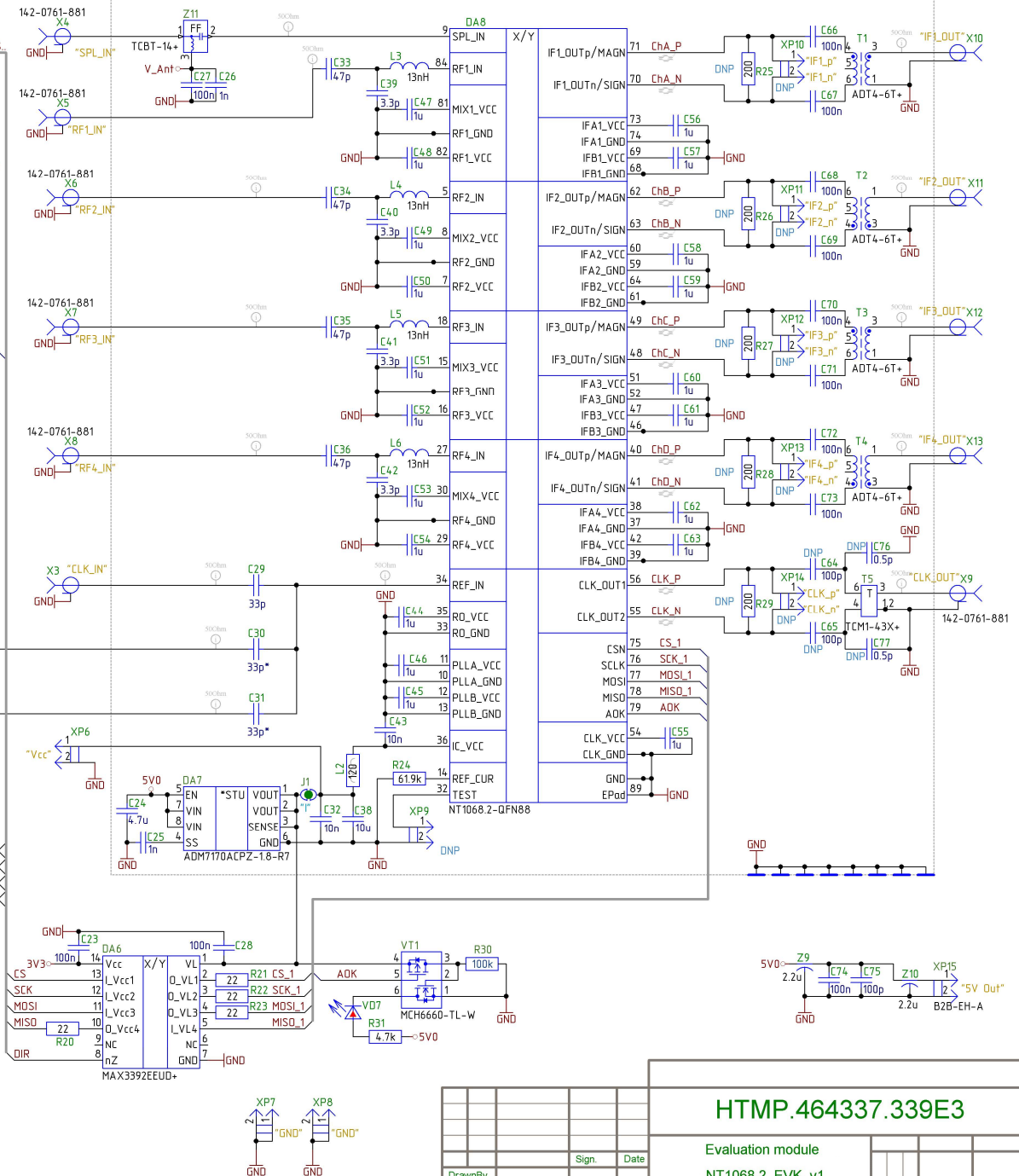
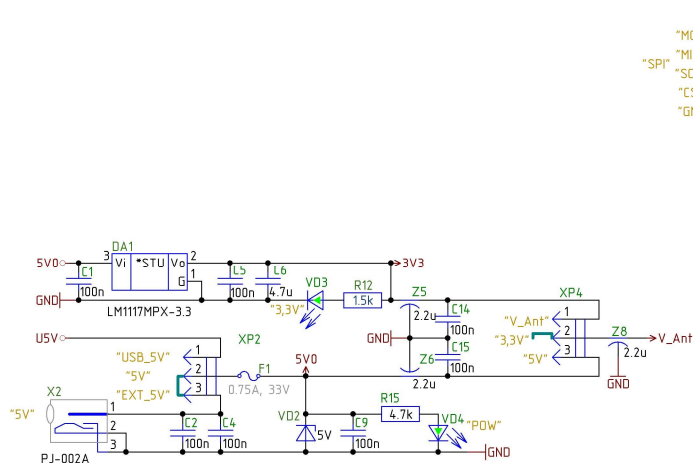
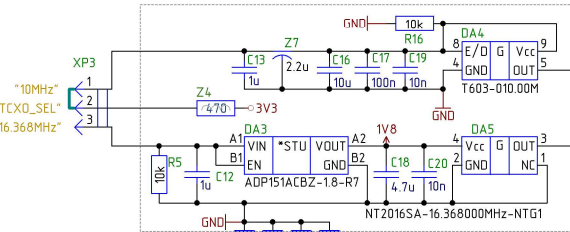
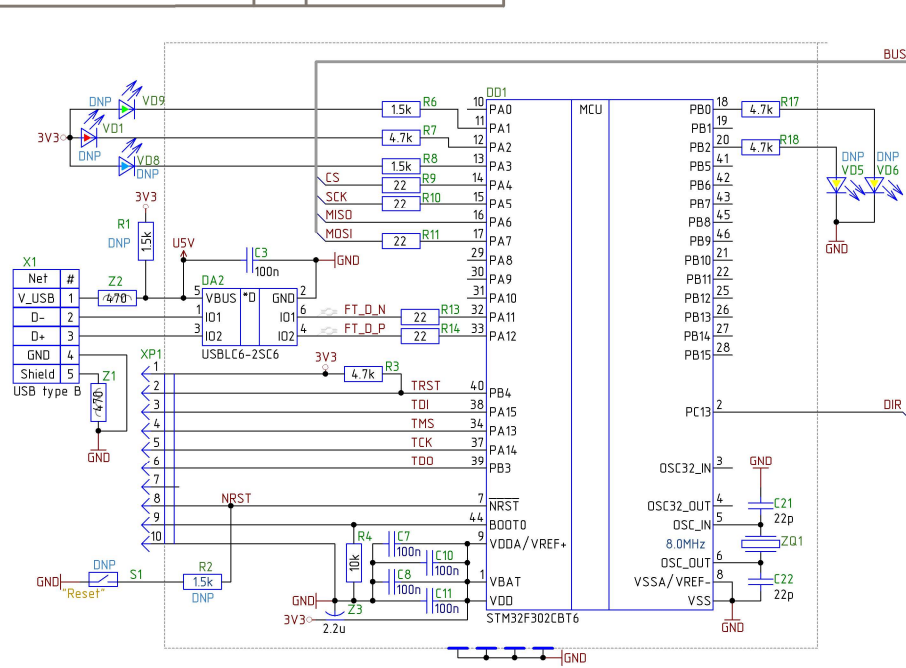
- **Output type** can be differential, CMOS or LVDS.
 - Default clock output type is differential: **CLK voltage** and **Output DC level** can be selected. Please note that output DC level depends on input supply voltage level.
 - For LVDS clock output type CLK voltage setting is available.
 - For CMOS clock output type use the lowest control window to select CLK output logic-level high. Depends on input supply voltage level.

Pay attention to hints: they show register address of the setting.

For more information about purpose of control bits please refer to NT1068.2_LE_DS ([subsection 4.4.2](#) and [section 7](#)).

11. REVISION HISTORY

To be tracked.



HTMP.464337.339E3

Evaluation module

NT1068.2_EVK_v1

Schematic diagram



Sheet 1

NTLab

Format A2

B1068E2-11UUL

#	PART NUMBER	Description	PART NAME	Designator	Quantity	Comm.
1	GRM155R71C104KA88D	0.1uF, 10%, 16V, 0402, X7R	Murata	C1, C5, C7, C8, C10, C11, C14, C15, C23, C27, C28, C74	12	
2	GRM188R72A104KA35D	0.1uF, 10%, 100V, 0603, X7R	Murata	C2, C4, C9, C17	4	
3	GRM155R71C104KA88D	0.1uF, 10%, 16V, 0402, X7R	Murata	C3	1	
4	GRM155R60J475ME47D	4.7uF, 20%, 6.3V, 0402, X5R	Murata	C6, C24	2	
5	GRM155R61A105K	1uF 10%, 10V, 0402, X5R	Murata	C12, C13	2	
6	0805X106K100N3	10uF, 10%, 10V, 0805, X5R	Murata	C16	1	
7	GRM035R60J475ME15D	4.7uF, 20%, 6.3V, 0201, X5R	Murata	C18	1	
8	GRM155R71E103KA01D	0.01uF, 10%, 25V, 0402, X7R	Murata	C19	1	
9	GRM033R71A103KA01J	10nF, 10%, 10V, 0201, X7R	Murata	C20, C32	2	
10	GRM1555C1H220J	22pF, 5%, 50V, 0402, COG	Murata	C21, C22	2	
11	GRM1555C1H102JA01D	1nF, 5%, 25V, 0402, COG	KEMET	C25, C26	2	
12	GRM1555C1H330GA01J	33pF, 5%, 50V, 0402, COG	Murata	C29, C30, C31	3	
13	GRM1555C1H470JA01D	47pF, 5%, 50V, 0402, COG	Murata	C33, C34, C35, C36	4	
14	0805X106K100N3	10uF, 10%, 10V, 0805, X5R	Murata	C38	1	
15	0402N3R3C500N	Cap. 3.3pF, +/-0.25pF, 50V, 0402, COG	Murata	C39, C40, C41, C42	4	
16	GRM155R71E103KA01D	0.01uF, 10%, 25V, 0402, X7R	Murata	C43	1	
17	GRM033C80J105ME05D	1uF 20%, 6.3V, 0201, X6S	Murata	C44, C45, C46, C47, C48, C49, C50, C51, C52, C53, C54	11	
18	GRM033C80J105ME05D	1uF 20%, 6.3V, 0201, X6S	Murata	C55, C56, C57, C58, C59, C60, C61, C62, C63	9	
19	GRM033R61E101KA01D	100pF, 10%, 25V, 0201, X5R	Murata	C64, C65	2	DNP
20	GRM155R71C104KA88D	0.1uF, 10%, 16V, 0402, X7R	Murata	C66, C67, C68, C69, C70, C71, C72, C73	8	
21	GRM033R61E101KA01D	100pF, 10%, 25V, 0201, X5R	Murata	C75	1	
22	GRM1555C1HR50BA01D	0.5pF, +/-0.1pF, 50V, 0402, COG	Murata	C76, C77	2	DNP
23	LM1117MPX-3.3	LDO, 3.3V, SOT-223	NSC	DA1	1	
24	USBLC6-2SC6	ESD protection	STMicroelectronics	DA2	1	
25	ADP151ACBZ-1.8-R7	LDO, Fixed 1.8V, 200mA, 4-WFBGA	AD	DA3	1	
26	T603-010.00M		ConnorWinfield	DA4	1	
27	NT2016SA-16.368000MHz-NTG1	TCXO, 16.368 MHz, SMD 2.0 x 1.6 mm	NDK	DA5	1	
28	MAX3392EUD+	Level converter, L13O-H1O3I, 1.2V ... 5.5V	Maxim	DA6	1	
29	ADM1770ACPZ-1.8-R7	LDO, 1.8V, 2.3V...6.5V, 500 mA, Ultralow Noise	AD	DA7	1	
30	NT1068.2-QFN88	RF Front-End, ADC, QFN88	NTL	DA8	1	
31	STM32F302CBT6	MCU, 32 kbytes RAM, 128 Kbytes Flash, 2.0 - 3.6 V, LQFP48	STMicroelectronics	DD1	1	
32	0ZCG0075BF2B	FUSE Resettable 0.75A 33V, 1812	bel	F1	1	
33	BLM15B8121SN1	Ferrite Bead, 120 Ohm, 25%, 0.3A, 0402, -55/+125	Murata	L2	1	
34	LQW15AN7N5G00	7.5n, 2%, 570mA, 0402	Murata	L3, L4, L5, L6	4	
35	RC0402JR-071K5L	10 Ohm, 5%, 0402	FaithfulLink	R1, R6, R8	3	
36	RC0402JR-071K5L	1.5 kOhm, 5%, 0402	FaithfulLink	R2	1	DNP
37	RC0402FR-074K7L	4.7 kOhm, 1%, 0402	FaithfulLink	R3, R7, R17, R18	4	
38	CR0402-JW-103GLF	10 kOhm, 5%, 0402	Bourns	R4, R5, R16	3	
39	RC0402JR-22R	22 Ohm, 5%, 0402	FaithfulLink	R9, R10, R11, R13, R14, R20, R21, R22, R23	9	
40	RC0402JR-071K5L	1.5 kOhm, 5%, 0402	FaithfulLink	R12	1	
41	RC0402JR-074K7L	4.7 kOhm, 1%, 0402	Yageo	R15, R31	2	
42	CR0402-JW-103GLF	10 kOhm, 5%, 0402	Bourns	R19	1	DNP
43	RC0402FR-0761K9L	61.9 kOhm, 1%, 0402	FaithfulLink	R24	1	
44	RC0402J200R	200 Ohm, 5%, 0402	FaithfulLink	R25, R26, R27, R28, R29	5	DNP
45	RC0402FR-07100KL	100 kOhm, 1%, 0402	FaithfulLink	R30	1	
46	IT-1184-160G-G	Switch	Switronic	S1	1	DNP
47	S0971-46R	Shield Clip	HARWIN	SH1, SH2, SH3, SH4, SH5, SH6, SH7, SH8, SH9, SH10, SH11, SH12, SH13, SH14, SH15, SH16	16	
48	ADT4-6T+	Transformer, RF, 50 Ohm, 0.06 to 300 MHz, CD637	Mini-Circuits	T1, T2, T3, T4	4	
49	TCM1-43X+	Transformer RF, 10-4000MHz 2:1, config K	Mini-Circuits	T5	1	
50	T1608VC-A1	Diode, Opt, Red, 0603	Paralight	VD1	1	DNP
51	SMAJ5.0A	Suppressor, 5V, Uni, DO-214AC	Littlefuse	VD2	1	
52	T1608GC-A1N	Diode, Opt, Green, 0603	Paralight	VD3, VD4	2	
53	LED-0603YVC	Diode, Opt, Yellow, 0603	Paralight	VD5, VD6	2	DNP
54	T1608VC-A1	Diode, Opt, Red, 0603	Paralight	VD7	1	
55	LED-0603BVC	Diode, Opt, Blue, 0608	Paralight	VD8	1	DNP
56	T1608GC-A1N	Diode, Opt, Green, 0603	Paralight	VD9	1	DNP
57	MCH6860-TL-W	MOSFET N/P-CH 20V 2A/1.5A 6MCPH	ON	VT1	1	
58	670680010	USB type B	Molex	X1	1	
59	PJ-002A	DC 2.0 mm inner, male		X2	1	
60	901-143-6RFX	SMA, Right Angle	Amphenol	X3, X10, X11, X12, X13	5	
61	142-0761-881	SMA, Edge	Cinch	X4, X5, X6, X7, X8, X9	6	
62	2206PA-10G-739	10x1, 1.27mm	Neltron	XP1	1	
63	PLS-3	3x1, 2.54mm		XP2, XP3, XP4	3	
64	102976-5	Connector	AMP	XP5	1	
65	PLS-2	2x1, 2.54 mm		XP6, XP7, XP8	3	
66	PLS-2	2x1, 2.54 mm		XP9, XP10, XP11, XP12, XP13, XP14	6	DNP
67	B2B-EH-A	2x1, 2.54 mm	Molex	XP15	1	
68	MJ-6-1	Jumper 2.54mm		XS1, XS2, XS3	3	
69	BLM18PG471SN1D	FerriteBead, 470 Ohm, 1A, 0603	Murata	Z1, Z2	2	
70	NFM18PC225B1A3	CAPACITOR PASS	Murata	Z3, Z5, Z6, Z7, Z8, Z9, Z10	7	
71	BLM18GG471SN1	FerriteBead, 470 Ohm(100M), 1.8 kOhm (1G), 0.2A, 0603	Murata	Z4	1	
72	TCBT-14+	Filter 50Q Wideband 10 MHz to 10 GHz, 200mA, <1dB	Mini-Circuits	Z11	1	
73	ECS-80-18-33-JGN-TR	Crystal, quartz, 8.0MHz, 20 ppm, 3.2x2.5smd	ECS	ZQ1	1	

B1068E2-22UUL

#	PART NUMBER	Description	PART_NAME	Designator	Quantity	Comm.
1	GRM155R71C104KA88D	0.1uF, 10%, 16V, 0402, X7R	Murata	C1, C5, C7, C8, C10, C11, C14, C15, C23, C27, C28, C74	12	
2	GRM188R72A104KA35D	0.1uF, 10%, 100V, 0603, X7R	Murata	C2, C4, C9, C17	4	
3	GRM155R71C104KA88D	0.1uF, 10%, 16V, 0402, X7R	Murata	C3	1	
4	GRM155R60J475ME47D	4.7uF, 20%, 6.3V, 0402, X5R	Murata	C6, C24	2	
5	GRM155R61A105K	1uF 10%, 10V, 0402, X5R	Murata	C12, C13	2	
6	0805X106K100N3	10uF, 10%, 10V, 0805, X5R	Murata	C16	1	
7	GRM035R60J475ME15D	4.7uF, 20%, 6.3V, 0201, X5R	Murata	C18	1	
8	GRM155R71E103KA01D	0.01uF, 10%, 25V, 0402, X7R	Murata	C19	1	
9	GRM033R71A103KA01J	10nF, 10%, 10V, 0201, X7R	Murata	C20, C32	2	
10	GRM1555C1H220J	22pF, 5%, 50V, 0402, COG	Murata	C21, C22	2	
11	GRM1555C1H102JA01D	1nF, 5%, 25V, 0402, COG	KEMET	C25, C26	2	
12	GRM1555C1H330GA01J	33pF, 5%, 50V, 0402, COG	Murata	C29, C30, C31	3	
13	GRM1555C1H470JA01D	47pF, 5%, 50V, 0402, COG	Murata	C33, C34, C35, C36	4	
14	0805X106K100N3	10uF, 10%, 10V, 0805, X5R	Murata	C38	1	
15	0402N3R3C500N	Cap. 3.3pF, +/-0.25pF, 50V, 0402, COG	Murata	C39, C40, C41, C42	4	
16	GRM155R71E103KA01D	0.01uF, 10%, 25V, 0402, X7R	Murata	C43	1	
17	GRM033C80J105ME05D	1uF 20%, 6.3V, 0201, X6S	Murata	C44, C45, C46, C47, C48, C49, C50, C51, C52, C53, C54	11	
18	GRM033C80J105ME05D	1uF 20%, 6.3V, 0201, X6S	Murata	C55, C56, C57, C58, C59, C60, C61, C62, C63	9	
19	GRM033R61E101KA01D	100pF, 10%, 25V, 0201, X5R	Murata	C64, C65	2	DNP
20	GRM155R71C104KA88D	0.1uF, 10%, 16V, 0402, X7R	Murata	C66, C67, C68, C69, C70, C71, C72, C73	8	
21	GRM033R61E101KA01D	100pF, 10%, 25V, 0201, X5R	Murata	C75	1	
22	GRM1555C1HR50BA01D	0.5pF, +/-0.1pF, 50V, 0402, COG	Murata	C76, C77	2	DNP
23	LM1117MPX-3.3	LDO, 3.3V, SOT-223	NSC	DA1	1	
24	USBLC6-2SC6	ESD protection	STMicroelectronics	DA2	1	
25	ADP151ACBZ-1.8-R7	LDO, Fixed 1.8V, 200mA, 4-WFBGA	AD	DA3	1	
26	T603-010.00M		ConnorWinfield	DA4	1	
27	NT2016SA-16.368000MHz-NTG1	TCXO, 16.368 MHz, SMD 2.0 x 1.6 mm	NDK	DA5	1	
28	MAX3392EUD+	Level converter, L13O-H1O3I, 1.2V ... 5.5V	Maxim	DA6	1	
29	ADM1770ACPZ-1.8-R7	LDO, 1.8V, 2.3V...6.5V, 500 mA, Ultralow Noise	AD	DA7	1	
30	NT1068.2-QFN88	RF Front-End, ADC, QFN88	NTL	DA8	1	
31	STM32F302CBT6	MCU, 32 Kbytes RAM, 128 Kbytes Flash, 2.0 - 3.6 V, LQFP48	STMicroelectronics	DD1	1	
32	0ZCG0075BF2B	FUSE, Resettable 0.75A 33V, 1812	bel	F1	1	
33	BLM15B8121SN1	Ferrite Bead, 120 Ohm, 25%, 0.3A, 0402, -55/+125	Murata	L2	1	
34	LQW15AN13NG00D	13nH, 2%, 0.43A, 0402, LQW	Murata	L3, L4, L5, L6	4	
35	RC0402JR-071K5L	10 Ohm, 5%, 0402	FaithfulLink	R1, R6, R8	3	
36	RC0402JR-071K5L	1.5 kOhm, 5%, 0402	FaithfulLink	R2	1	DNP
37	RC0402FR-074K7L	4.7 kOhm, 1%, 0402	FaithfulLink	R3, R7, R17, R18	4	
38	CR0402-JW-103GLF	10 kOhm, 5%, 0402	Bourns	R4, R5, R16	3	
39	RC0402JR-22R	22 Ohm, 5%, 0402	FaithfulLink	R9, R10, R11, R13, R14, R20, R21, R22, R23	9	
40	RC0402JR-071K5L	1.5 kOhm, 5%, 0402	FaithfulLink	R12	1	
41	RC0402JR-074K7L	4.7 kOhm, 1%, 0402	Yageo	R15, R31	2	
42	CR0402-JW-103GLF	10 kOhm, 5%, 0402	Bourns	R19	1	DNP
43	RC0402FR-0761K9L	61.9 kOhm, 1%, 0402	FaithfulLink	R24	1	
44	RC0402J200R	200 Ohm, 5%, 0402	FaithfulLink	R25, R26, R27, R28, R29	5	DNP
45	RC0402FR-07100KL	100 kOhm, 1%, 0402	FaithfulLink	R30	1	
46	IT-1184-160G-G	Switch	Switronic	S1	1	DNP
47	S0971-46R	Shield Clip	HARWIN	SH1, SH2, SH3, SH4, SH5, SH6, SH7, SH8, SH9, SH10, SH11, SH12, SH13, SH14, SH15, SH16	16	
48	ADT4-6T+	Transformer, RF, 50 Ohm, 0.06 to 300 MHz, CD637	Mini-Circuits	T1, T2, T3, T4	4	
49	TCM1-43X+	Transformer RF, 10-4000MHz 2:1, config K	Mini-Circuits	T5	1	
50	T1608VC-A1	Diode, Opt, Red, 0603	Paralight	VD1	1	DNP
51	SMAJ5.0A	Suppressor, 5V, Uni, DO-214AC	Littlefuse	VD2	1	
52	T1608GC-A1N	Diode, Opt, Green, 0603	Paralight	VD3, VD4	2	
53	LED-0603YVC	Diode, Opt, Yellow, 0603	Paralight	VD5, VD6	2	DNP
54	T1608VC-A1	Diode, Opt, Red, 0603	Paralight	VD7	1	
55	LED-0603BVC	Diode, Opt, Blue, 0608	Paralight	VD8	1	DNP
56	T1608GC-A1N	Diode, Opt, Green, 0603	Paralight	VD9	1	DNP
57	MCH6860-TL-W	MOSFET N/P-CH 20V 2A/1.5A 6MCPH	ON	VT1	1	
58	670680010	USB type B	Molex	X1	1	
59	PJ-002A	DC 2.0 mm inner, male		X2	1	
60	901-143-6RFX	SMA, Right Angle	Amphenol	X3, X10, X11, X12, X13	5	
61	142-0761-881	SMA, Edge	Cinch	X4, X5, X6, X7, X8, X9	6	
62	2206PA-10G-739	10x1, 1.27mm	Neltron	XP1	1	
63	PLS-3	3x1, 2.54mm		XP2, XP3, XP4	3	
64	102976-5	Connector	AMP	XP5	1	
65	PLS-2	2x1, 2.54 mm		XP6, XP7, XP8	3	
66	PLS-2	2x1, 2.54 mm		XP9, XP10, XP11, XP12, XP13, XP14	6	DNP
67	B2B-EH-A	2x1, 2.54 mm	Molex	XP15	1	
68	MJ-6-1	Jumper 2.54mm		XS1, XS2, XS3	3	
69	BLM18PG471SN1D	FerriteBead, 470 Ohm, 1A, 0603	Murata	Z1, Z2	2	
70	NFM18PC225B1A3	CAPACITOR PASS	Murata	Z3, Z5, Z6, Z7, Z8, Z9, Z10	7	
71	BLM18GG471SN1	FerriteBead, 470 Ohm(100M), 1.8 kOhm (1G), 0.2A, 0603	Murata	Z4	1	
72	TCBT-14+	Filter 50Q Wideband 10 MHz to 10 GHz, 200mA, <1dB	Mini-Circuits	Z11	1	
73	ECS-80-18-33-JGN-TR	Crystal, quartz, 8.0MHz, 20 ppm, 3.2x2.5smd	ECS	ZQ1	1	

B1068E2-33UUL

#	PART NUMBER	Description	PART NAME	Designator	Quantity	Comm.
1	GRM155R71C104KA88D	0.1uF, 10%, 16V, 0402, X7R	Murata	C1, C5, C7, C8, C10, C11, C14, C15, C23, C27, C28, C74	12	
2	GRM188R72A104KA35D	0.1uF, 10%, 100V, 0603, X7R	Murata	C2, C4, C9, C17	4	
3	GRM155R71C104KA88D	0.1uF, 10%, 16V, 0402, X7R	Murata	C3	1	
4	GRM155R60J475ME47D	4.7uF, 20%, 6.3V, 0402, X5R	Murata	C6, C24	2	
5	GRM155R61A105K	1uF 10%, 10V, 0402, X5R	Murata	C12, C13	2	
6	0805X106K100N3	10uF, 10%, 10V, 0805, X5R	Murata	C16	1	
7	GRM035R60J475ME15D	4.7uF, 20%, 6.3V, 0201, X5R	Murata	C18	1	
8	GRM155R71E103KA01D	0.01uF, 10%, 25V, 0402, X7R	Murata	C19	1	
9	GRM033R71A103KA01J	10nF, 10%, 10V, 0201, X7R	Murata	C20, C32	2	
10	GRM1555C1H220J	22pF, 5%, 50V, 0402, COG	Murata	C21, C22	2	
11	GRM1555C1H102JA01D	1nF, 5%, 25V, 0402, COG	KEMET	C25, C26	2	
12	GRM1555C1H330GA01J	33pF, 5%, 50V, 0402, COG	Murata	C29, C30, C31	3	
13	GRM1555C1H470JA01D	47pF, 5%, 50V, 0402, COG	Murata	C33, C34, C35, C36	4	
14	0805X106K100N3	10uF, 10%, 10V, 0805, X5R	Murata	C38	1	
15	GRM0335C1H2R2BA01D	2.2pF, ±0.1pF, 50V, 0201, COG	Murata	C39, C40, C41, C42	4	
16	GRM155R71E103KA01D	0.01uF, 10%, 25V, 0402, X7R	Murata	C43	1	
17	GRM033C80J105ME05D	1uF 20%, 6.3V, 0201, X6S	Murata	C44, C45, C46, C47, C48, C49, C50, C51, C52, C53, C54	11	
18	GRM033C80J105ME05D	1uF 20%, 6.3V, 0201, X6S	Murata	C55, C56, C57, C58, C59, C60, C61, C62, C63	9	
19	GRM033R61E101KA01D	100pF, 10%, 25V, 0201, X5R	Murata	C64, C65	2	DNP
20	GRM155R71C104KA88D	0.1uF, 10%, 16V, 0402, X7R	Murata	C66, C67, C68, C69, C70, C71, C72, C73	8	
21	GRM033R61E101KA01D	100pF, 10%, 25V, 0201, X5R	Murata	C75	1	
22	GRM1555C1HR50BA01D	0.5pF, ±0.1pF, 50V, 0402, COG	Murata	C76, C77	2	DNP
23	LM1117MPX-3.3	LDO, 3.3V, SOT-223	NSC	DA1	1	
24	USBLC6-2SC6	ESD protection	STMicroelectronics	DA2	1	
25	ADP151ACBZ-1.8-R7	LDO, Fixed 1.8V, 200mA, 4-WFBGA	AD	DA3	1	
26	T603-010.00M		ConnorWinfield	DA4	1	
27	NT2016SA-16.368000MHz-NTG1	TCXO, 16.368 MHz, SMD 2.0 x 1.6 mm	NDK	DA5	1	
28	MAX3392EED+	Level converter, L13O-H1O3I, 1.2V ... 5.5V	Maxim	DA6	1	
29	ADM7170ACPZ-1.8-R7	LDO, 1.8V, 2.3V...6.5V, 500 mA, Ultralow Noise	AD	DA7	1	
30	NT1068.2-QFN88	RF Front-End, ADC, QFN88	NTL	DA8	1	
31	STM32F302CBT6	MCU, 32 kbytes RAM, 128 Kbytes Flash, 2.0 - 3.6 V, LQFP48	STMicroelectronics	DD1	1	
32	0ZCG0075BF2B	FUSE Resettable 0.75A 33V, 1812	bel	F1	1	
33	BLM15B8121SN1	Ferrite Bead, 120 Ohm, 25%, 0.3A, 0402, -55/+125	Murata	L1	1	
34	LQW15AN2N9B00	2.9nH, ±0.1nH, 850mA, 0402	Murata	L3, L4, L5, L6	4	
35	RC0402JR-071K5L	10 Ohm, 5%, 0402	FaithfulLink	R1, R6, R8	3	
36	RC0402JR-071K5L	1.5 kOhm, 5%, 0402	FaithfulLink	R2	1	DNP
37	RC0402FR-074K7L	4.7 kOhm, 1%, 0402	FaithfulLink	R3, R7, R17, R18	4	
38	CR0402-JW-103GLF	10 kOhm, 5%, 0402	Bourns	R4, R5, R16	3	
39	RC0402JR-22R	22 Ohm, 5%, 0402	FaithfulLink	R9, R10, R11, R13, R14, R20, R21, R22, R23	9	
40	RC0402JR-071K5L	1.5 kOhm, 5%, 0402	FaithfulLink	R12	1	
41	RC0402JR-074K7L	4.7 kOhm, 5%, 0402	Yageo	R15, R31	2	
42	CR0402-JW-103GLF	10 kOhm, 5%, 0402	Bourns	R19	1	DNP
43	RC0402FR-0761K9L	61.9 kOhm, 1%, 0402	FaithfulLink	R24	1	
44	RC0402J200R	200 Ohm, 5%, 0402	FaithfulLink	R25, R26, R27, R28, R29	5	DNP
45	RC0402FR-07100KL	100 kOhm, 1%, 0402	FaithfulLink	R30	1	
46	IT-1184-160G-G	Switch	Switronic	S1	1	DNP
47	S0971-46R	Shield Clip	HARWIN	SH1, SH2, SH3, SH4, SH5, SH6, SH7, SH8, SH9, SH10, SH11, SH12, SH13, SH14, SH15, SH16	16	
48	ADT4-6T+	Transformer, RF, 50 Ohm, 0.06 to 300 MHz, CD637	Mini-Circuits	T1, T2, T3, T4	4	
49	TCM1-43X+	Transformer RF, 10-4000MHz 2:1, config K	Mini-Circuits	T5	1	
50	T1608VC-A1	Diode, Opt, Red, 0603	Paralight	VD1	1	DNP
51	SMAJ5.0A	Suppressor, 5V, Uni, DO-214AC	Littlefuse	VD2	1	
52	T1608GC-A1N	Diode, Opt, Green, 0603	Paralight	VD3, VD4	2	
53	LED-0603YVC	Diode, Opt, Yellow, 0603	Paralight	VD5, VD6	2	DNP
54	T1608VC-A1	Diode, Opt, Red, 0603	Paralight	VD7	1	
55	LED-0603BVC	Diode, Opt, Blue, 0608	Paralight	VD8	1	DNP
56	T1608GC-A1N	Diode, Opt, Green, 0603	Paralight	VD9	1	DNP
57	MCH6660-TL-W	MOSFET N/P-CH 20V 2A/1.5A 6MCPH	ON	VT1	1	
58	670680010	USB type B	Molex	X1	1	
59	PJ-002A	DC 2.0 mm inner, male		X2	1	
60	901-143-6RFX	SMA, Right Angle	Amphenol	X3, X10, X11, X12, X13	5	
61	142-0761-881	SMA, Edge	Cinch	X4, X5, X6, X7, X8, X9	6	
62	2206PA-10G-739	10x1, 1.27mm	Neltron	XP1	1	
63	PLS-3	3x1, 2.54mm		XP2, XP3, XP4	3	
64	102976-5	Connector	AMP	XP5	1	
65	PLS-2	2x1, 2.54 mm		XP6, XP7, XP8	3	
66	PLS-2	2x1, 2.54 mm		XP9, XP10, XP11, XP12, XP13, XP14	6	DNP
67	B2B-EH-A	2x1, 2.54 mm	Molex	XP15	1	
68	MJ-6-1	Jumper 2.54mm		XS1, XS2, XS3	3	
69	BLM18PG471SN1D	FerriteBead, 470 Ohm, 1A, 0603	Murata	Z1, Z2	2	
70	NFM18PC225B1A3	CAPACITOR PASS	Murata	Z3, Z5, Z6, Z7, Z8, Z9, Z10	7	
71	BLM18GG471SN1	FerriteBead, 470 Ohm(100M), 1.8 kOhm (1G), 0.2A, 0603	Murata	Z4	1	
72	TCBT-14+	Filter 50Q Wideband 10 MHz to 10 GHz, 200mA, <1dB	Mini-Circuits	Z11	1	
73	ECS-80-18-33-JGN-TR	Crystal, quartz, 8.0MHz, 20 ppm, 3.2x2.5smd	ECS	ZQ1	1	

B1068E2-11UUH

#	PART NUMBER	Description	PART NAME	Designator	Quantity	Comm.
1	GRM155R71C104KA88D	0.1uF, 10%, 16V, 0402, X7R	Murata	C1, C5, C7, C8, C10, C11, C14, C15, C23, C27, C28, C74	12	
2	GRM188R72A104KA35D	0.1uF, 10%, 100V, 0603, X7R	Murata	C2, C4, C9, C17	4	
3	GRM155R71C104KA88D	0.1uF, 10%, 16V, 0402, X7R	Murata	C3	1	
4	GRM155R60J475ME47D	4.7uF, 20%, 6.3V, 0402, X5R	Murata	C6, C24	2	
5	GRM155R61A105K	1uF 10%, 10V, 0402, X5R	Murata	C12, C13	2	
6	0805X106K100N3	10uF, 10%, 10V, 0805, X5R	Murata	C16	1	
7	GRM035R60J475ME15D	4.7uF, 20%, 6.3V, 0201, X5R	Murata	C18	1	
8	GRM155R71E103KA01D	0.01uF, 10%, 25V, 0402, X7R	Murata	C19	1	
9	GRM033R71A103KA01J	10nF, 10%, 10V, 0201, X7R	Murata	C20, C32	2	
10	GRM1555C1H220J	22pF, 5%, 50V, 0402, COG	Murata	C21, C22	2	
11	GRM1555C1H102JA01D	1nF, 5%, 25V, 0402, COG	KEMET	C25, C26	2	
12	GRM1555C1H330GA01J	33pF, 5%, 50V, 0402, COG	Murata	C29, C30, C31	3	
13	GRM1555C1H470JA01D	47pF, 5%, 50V, 0402, COG	Murata	C33, C34, C35, C36	4	
14	0805X106K100N3	10uF, 10%, 10V, 0805, X5R	Murata	C38	1	
15	0402N3R3C500N	Cap. 3.3pF, +/-0.25pF, 50V, 0402, COG	Murata	C39, C40, C41, C42	4	
16	GRM155R71E103KA01D	0.01uF, 10%, 25V, 0402, X7R	Murata	C43	1	
17	GRM033C80J105ME05D	1uF 20%, 6.3V, 0201, X6S	Murata	C44, C45, C46, C47, C48, C49, C50, C51, C52, C53, C54	11	
18	GRM033C80J105ME05D	1uF 20%, 6.3V, 0201, X6S	Murata	C55, C56, C57, C58, C59, C60, C61, C62, C63	9	
19	GRM033R61E101KA01D	100pF, 10%, 25V, 0201, X5R	Murata	C64, C65	2	DNP
20	GRM155R71C104KA88D	0.1uF, 10%, 16V, 0402, X7R	Murata	C66, C67, C68, C69, C70, C71, C72, C73	8	
21	GRM033R61E101KA01D	100pF, 10%, 25V, 0201, X5R	Murata	C75	1	
22	GRM1555C1HR50BA01D	0.5pF, +/-0.1pF, 50V, 0402, COG	Murata	C76, C77	2	DNP
23	LM1117MPX-3.3	LDO, 3.3V, SOT-223	NSC	DA1	1	
24	USBLC6-2SC6	ESD protection	STMicroelectronics	DA2	1	
25	ADP151ACBZ-1.8-R7	LDO, Fixed 1.8V, 200mA, 4-WFBGA	AD	DA3	1	
26	T603-010.00M		ConnorWinfield	DA4	1	
27	NT2016SA-16.368000MHz-NTG1	TCXO, 16.368 MHz, SMD 2.0 x 1.6 mm	NDK	DA5	1	
28	MAX3392EEUD+	Level converter, L13O-H1O3I, 1.2V ... 5.5V	Maxim	DA6	1	
29	ADM7170ACPZ-3.3-R7	LDO, 3.3V, 2.3V...6.5V, 500 mA, Ultralow Noise	AD	DA7	1	
30	NT1068.2-QFN88	RF Front-End, ADC, QFN88	NTL	DA8	1	
31	STM32F302CBT6	MCU, 32 kbytes RAM, 128 Kbytes Flash, 2.0 - 3.6 V, LQFP48	STMicroelectronics	DD1	1	
32	0ZCG0075BF2B	FUSE Resettable 0.75A 33V, 1812	bel	F1	1	
33	BLM15B8121SN1	Ferrite Bead, 120 Ohm, 25%, 0.3A, 0402, -55/+125	Murata	L2	1	
34	LQW15AN7N5G00	7.5n, 2%, 570mA, 0402	Murata	L3, L4, L5, L6	4	
35	RC0402JR-071K5L	10 Ohm, 5%, 0402	FaithfulLink	R1, R6, R8	3	
36	RC0402JR-071K5L	1.5 kOhm, 5%, 0402	FaithfulLink	R2	1	DNP
37	RC0402FR-074K7L	4.7 kOhm, 1%, 0402	FaithfulLink	R3, R7, R17, R18	4	
38	CR0402-JW-103GLF	10 kOhm, 5%, 0402	Bourns	R4, R5, R16	3	
39	RC0402JR-22R	22 Ohm, 5%, 0402	FaithfulLink	R9, R10, R11, R13, R14, R20, R21, R22, R23	9	
40	RC0402JR-071K5L	1.5 kOhm, 5%, 0402	FaithfulLink	R12	1	
41	RC0402JR-074K7L	4.7 kOhm, 5%, 0402	Yageo	R15, R31	2	
42	CR0402-JW-103GLF	10 kOhm, 5%, 0402	Bourns	R19	1	DNP
43	RC0402FR-0761K9L	61.9 kOhm, 1%, 0402	FaithfulLink	R24	1	
44	RC0402J200R	200 Ohm, 5%, 0402	FaithfulLink	R25, R26, R27, R28, R29	5	DNP
45	RC0402FR-07100KL	100 kOhm, 1%, 0402	FaithfulLink	R30	1	
46	IT-1184-160G-G	Switch	Switronic	S1	1	DNP
47	S0971-46R	Shield Clip	HARWIN	SH1, SH2, SH3, SH4, SH5, SH6, SH7, SH8, SH9, SH10, SH11, SH12, SH13, SH14, SH15, SH16	16	
48	ADT4-6T+	Transformer, RF, 50 Ohm, 0.06 to 300 MHz, CD637	Mini-Circuits	T1, T2, T3, T4	4	
49	TCM1-43X+	Transformer RF, 10-4000MHz 2:1, config K	Mini-Circuits	T5	1	
50	T1608VC-A1	Diode, Opt, Red, 0603	Paralight	VD1	1	DNP
51	SMAJ5.0A	Suppressor, 5V, Uni, DO-214AC	Littlefuse	VD2	1	
52	T1608GC-A1N	Diode, Opt, Green, 0603	Paralight	VD3, VD4	2	
53	LED-0603YVC	Diode, Opt, Yellow, 0603	Paralight	VD5, VD6	2	DNP
54	T1608VC-A1	Diode, Opt, Red, 0603	Paralight	VD7	1	
55	LED-0603BVC	Diode, Opt, Blue, 0608	Paralight	VD8	1	DNP
56	T1608GC-A1N	Diode, Opt, Green, 0603	Paralight	VD9	1	DNP
57	MCH6860-TL-W	MOSFET N/P-CH 20V 2A/1.5A 6MCPH	ON	VT1	1	
58	670680010	USB type B	Molex	X1	1	
59	PJ-002A	DC 2.0 mm inner, male		X2	1	
60	901-143-6RFX	SMA, Right Angle	Amphenol	X3, X10, X11, X12, X13	5	
61	142-0761-881	SMA, Edge	Cinch	X4, X5, X6, X7, X8, X9	6	
62	2206PA-10G-739	10x1, 1.27mm	Neltron	XP1	1	
63	PLS-3	3x1, 2.54mm		XP2, XP3, XP4	3	
64	102976-5	Connector	AMP	XP5	1	
65	PLS-2	2x1, 2.54 mm		XP6, XP7, XP8	3	
66	PLS-2	2x1, 2.54 mm		XP9, XP10, XP11, XP12, XP13, XP14	6	DNP
67	B2B-EH-A	2x1, 2.54 mm	Molex	XP15	1	
68	MJ-6-1	Jumper 2.54mm		XS1, XS2, XS3	3	
69	BLM18PG471SN1D	FerriteBead, 470 Ohm, 1A, 0603	Murata	Z1, Z2	2	
70	NFM18PC225B1A3	CAPACITOR PASS	Murata	Z3, Z5, Z6, Z7, Z8, Z9, Z10	7	
71	BLM18GG471SN1	FerriteBead, 470 Ohm(100M), 1.8 kOhm (1G), 0.2A, 0603	Murata	Z4	1	
72	TCBT-14+	Filter 50Q Wideband 10 MHz to 10 GHz, 200mA, <1dB	Mini-Circuits	Z11	1	
73	ECS-80-18-33-JGN-TR	Crystal, quartz, 8.0MHz, 20 ppm, 3.2x2.5smd	ECS	ZQ1	1	

B1068E2-22UUH

#	PART NUMBER	Description	PART NAME	Designator	Quantity	Comm.
1	GRM155R71C104KA88D	0.1uF, 10%, 16V, 0402, X7R	Murata	C1, C5, C7, C8, C10, C11, C14, C15, C23, C27, C28, C74	12	
2	GRM188R72A104KA35D	0.1uF, 10%, 100V, 0603, X7R	Murata	C2, C4, C9, C17	4	
3	GRM155R71C104KA88D	0.1uF, 10%, 16V, 0402, X7R	Murata	C3	1	
4	GRM155R60J475ME47D	4.7uF, 20%, 6.3V, 0402, X5R	Murata	C6, C24	2	
5	GRM155R61A105K	1uF 10%, 10V, 0402, X5R	Murata	C12, C13	2	
6	0805X106K100N3	10uF, 10%, 10V, 0805, X5R	Murata	C16	1	
7	GRM035R60J475ME15D	4.7uF, 20%, 6.3V, 0201, X5R	Murata	C18	1	
8	GRM155R71E103KA01D	0.01uF, 10%, 25V, 0402, X7R	Murata	C19	1	
9	GRM033R71A103KA01J	10nF, 10%, 10V, 0201, X7R	Murata	C20, C32	2	
10	GRM1555C1H220J	22pF, 5%, 50V, 0402, COG	Murata	C21, C22	2	
11	GRM1555C1H102JA01D	1nF, 5%, 25V, 0402, COG	KEMET	C25, C26	2	
12	GRM1555C1H330GA01J	33pF, 5%, 50V, 0402, COG	Murata	C29, C30, C31	3	
13	GRM1555C1H470JA01D	47pF, 5%, 50V, 0402, COG	Murata	C33, C34, C35, C36	4	
14	0805X106K100N3	10uF, 10%, 10V, 0805, X5R	Murata	C38	1	
15	0402N3R3C500N	Cap. 3.3pF, +/-0.25pF, 50V, 0402, COG	Murata	C39, C40, C41, C42	4	
16	GRM155R71E103KA01D	0.01uF, 10%, 25V, 0402, X7R	Murata	C43	1	
17	GRM033C80J105ME05D	1uF 20%, 6.3V, 0201, X6S	Murata	C44, C45, C46, C47, C48, C49, C50, C51, C52, C53, C54	11	
18	GRM033C80J105ME05D	1uF 20%, 6.3V, 0201, X6S	Murata	C55, C56, C57, C58, C59, C60, C61, C62, C63	9	
19	GRM033R61E101KA01D	100pF, 10%, 25V, 0201, X5R	Murata	C64, C65	2	DNP
20	GRM155R71C104KA88D	0.1uF, 10%, 16V, 0402, X7R	Murata	C66, C67, C68, C69, C70, C71, C72, C73	8	
21	GRM033R61E101KA01D	100pF, 10%, 25V, 0201, X5R	Murata	C75	1	
22	GRM1555C1HR50BA01D	0.5pF, +/-0.1pF, 50V, 0402, COG	Murata	C76, C77	2	DNP
23	LM1117MPX-3.3	LDO, 3.3V, SOT-223	NSC	DA1	1	
24	USBLC6-2SC6	ESD protection	STMicroelectronics	DA2	1	
25	ADP151ACBZ-1.8-R7	LDO, Fixed 1.8V, 200mA, 4-WFBGA	AD	DA3	1	
26	T603-010.00M		ConnorWinfield	DA4	1	
27	NT2016SA-16.368000MHz-NTG1	TCXO, 16.368 MHz, SMD 2.0 x 1.6 mm	NDK	DA5	1	
28	MAX3392EEDU+	Level converter, L13O-H1O3I, 1.2V ... 5.5V	Maxim	DA6	1	
29	ADM1770ACPZ-3.3-R7	LDO, 3.3V, 2.3V...6.5V, 500 mA, Ultralow Noise	AD	DA7	1	
30	NT1068.2-QFN88	RF Front-End, ADC, QFN88	NTL	DA8	1	
31	STM32F302CBT6	MCU, 32 Kbytes RAM, 128 Kbytes Flash, 2.0 - 3.6 V, LQFP48	STMicroelectronics	DD1	1	
32	0ZCG0075BF2B	FUSE Resettable 0.75A 33V, 1812	bel	F1	1	
33	BLM15B8121SN1	Ferrite Bead, 120 Ohm, 25%, 0.3A, 0402, -55/+125	Murata	L2	1	
34	LQW15AN13NG00D	13nH, 2%, 0.43A, 0402, LQW	Murata	L3, L4, L5, L6	4	
35	RC0402JR-071K5L	10 Ohm, 5%, 0402	FaithfulLink	R1, R6, R8	3	
36	RC0402JR-071K5L	1.5 kOhm, 5%, 0402	FaithfulLink	R2	1	DNP
37	RC0402FR-074K7L	4.7 kOhm, 1%, 0402	FaithfulLink	R3, R7, R17, R18	4	
38	CR0402-JW-103GLF	10 kOhm, 5%, 0402	Bourns	R4, R5, R16	3	
39	RC0402JR-22R	22 Ohm, 5%, 0402	FaithfulLink	R9, R10, R11, R13, R14, R20, R21, R22, R23	9	
40	RC0402JR-071K5L	1.5 kOhm, 5%, 0402	FaithfulLink	R12	1	
41	RC0402JR-074K7L	4.7 kOhm, 1%, 0402	Yageo	R15, R31	2	
42	CR0402-JW-103GLF	10 kOhm, 5%, 0402	Bourns	R19	1	DNP
43	RC0402FR-0761K9L	61.9 kOhm, 1%, 0402	FaithfulLink	R24	1	
44	RC0402J200R	200 Ohm, 5%, 0402	FaithfulLink	R25, R26, R27, R28, R29	5	DNP
45	RC0402FR-07100KL	100 kOhm, 1%, 0402	FaithfulLink	R30	1	
46	IT-1184-160G-G	Switch	Switronic	S1	1	DNP
47	S0971-46R	Shield Clip	HARWIN	SH1, SH2, SH3, SH4, SH5, SH6, SH7, SH8, SH9, SH10, SH11, SH12, SH13, SH14, SH15, SH16	16	
48	ADT4-6T+	Transformer, RF, 50 Ohm, 0.06 to 300 MHz, CD637	Mini-Circuits	T1, T2, T3, T4	4	
49	TCM1-43X+	Transformer RF, 10-4000MHz 2:1, config K	Mini-Circuits	T5	1	
50	T1608VC-A1	Diode, Opt, Red, 0603	Paralight	VD1	1	DNP
51	SMAJ5.0A	Suppressor, 5V, Uni, DO-214AC	Littlefuse	VD2	1	
52	T1608GC-A1N	Diode, Opt, Green, 0603	Paralight	VD3, VD4	2	
53	LED-0603YVC	Diode, Opt, Yellow, 0603	Paralight	VD5, VD6	2	DNP
54	T1608VC-A1	Diode, Opt, Red, 0603	Paralight	VD7	1	
55	LED-0603BVC	Diode, Opt, Blue, 0608	Paralight	VD8	1	DNP
56	T1608GC-A1N	Diode, Opt, Green, 0603	Paralight	VD9	1	DNP
57	MCH6660-TL-W	MOSFET N/P-CH 20V 2A/1.5A 6MCPH	ON	VT1	1	
58	670680010	USB type B	Molex	X1	1	
59	PJ-002A	DC 2.0 mm inner, male		X2	1	
60	901-143-6RFX	SMA, Right Angle	Amphenol	X3, X10, X11, X12, X13	5	
61	142-0761-881	SMA, Edge	Cinch	X4, X5, X6, X7, X8, X9	6	
62	2206PA-10G-739	10x1, 1.27mm	Neltron	XP1	1	
63	PLS-3	3x1, 2.54mm		XP2, XP3, XP4	3	
64	102976-5	Connector	AMP	XP5	1	
65	PLS-2	2x1, 2.54 mm		XP6, XP7, XP8	3	
66	PLS-2	2x1, 2.54 mm		XP9, XP10, XP11, XP12, XP13, XP14	6	DNP
67	B2B-EH-A	2x1, 2.54 mm	Molex	XP15	1	
68	MJ-6-1	Jumper 2.54mm		XS1, XS2, XS3	3	
69	BLM18PG471SN1D	FerriteBead, 470 Ohm, 1A, 0603	Murata	Z1, Z2	2	
70	NFM18PC225B1A3	CAPACITOR PASS	Murata	Z3, Z5, Z6, Z7, Z8, Z9, Z10	7	
71	BLM18GG471SN1	FerriteBead, 470 Ohm(100M), 1.8 kOhm (1G), 0.2A, 0603	Murata	Z4	1	
72	TCBT-14+	Filter 50Q Wideband 10 MHz to 10 GHz, 200mA, <1dB	Mini-Circuits	Z11	1	
73	ECS-80-18-33-JGN-TR	Crystal, quartz, 8.0MHz, 20 ppm, 3.2x2.5smd	ECS	ZQ1	1	

B1068E2-33UUH

#	PART NUMBER	Description	PART NAME	Designator	Quantity	Comm.
1	GRM155R71C104KA88D	0.1uF, 10%, 16V, 0402, X7R	Murata	C1, C5, C7, C8, C10, C11, C14, C15, C23, C27, C28, C74	12	
2	GRM188R72A104KA35D	0.1uF, 10%, 100V, 0603, X7R	Murata	C2, C4, C9, C17	4	
3	GRM155R71C104KA88D	0.1uF, 10%, 16V, 0402, X7R	Murata	C3	1	
4	GRM155R60J475ME47D	4.7uF, 20%, 6.3V, 0402, X5R	Murata	C6, C24	2	
5	GRM155R61A105K	1uF 10%, 10V, 0402, X5R	Murata	C12, C13	2	
6	0805X106K100N3	10uF, 10%, 10V, 0805, X5R	Murata	C16	1	
7	GRM035R60J475ME15D	4.7uF, 20%, 6.3V, 0201, X5R	Murata	C18	1	
8	GRM155R71E103KA01D	0.01uF, 10%, 25V, 0402, X7R	Murata	C19	1	
9	GRM033R71A103KA01J	10nF, 10%, 10V, 0201, X7R	Murata	C20, C32	2	
10	GRM1555C1H220J	22pF, 5%, 50V, 0402, COG	Murata	C21, C22	2	
11	GRM1555C1H102JA01D	1nF, 5%, 25V, 0402, COG	KEMET	C25, C26	2	
12	GRM1555C1H330GA01J	33pF, 5%, 50V, 0402, COG	Murata	C29, C30, C31	3	
13	GRM1555C1H470JA01D	47pF, 5%, 50V, 0402, COG	Murata	C33, C34, C35, C36	4	
14	0805X106K100N3	10uF, 10%, 10V, 0805, X5R	Murata	C38	1	
15	GRM0335C1H2R2BA01D	2.2pF, ±0.1pF, 50V, 0201, COG	Murata	C39, C40, C41, C42	4	
16	GRM155R71E103KA01D	0.01uF, 10%, 25V, 0402, X7R	Murata	C43	1	
17	GRM033C80J105ME05D	1uF 20%, 6.3V, 0201, X6S	Murata	C44, C45, C46, C47, C48, C49, C50, C51, C52, C53, C54	11	
18	GRM033C80J105ME05D	1uF 20%, 6.3V, 0201, X6S	Murata	C55, C56, C57, C58, C59, C60, C61, C62, C63	9	
19	GRM033R61E101KA01D	100pF, 10%, 25V, 0201, X5R	Murata	C64, C65	2	DNP
20	GRM155R71C104KA88D	0.1uF, 10%, 16V, 0402, X7R	Murata	C66, C67, C68, C69, C70, C71, C72, C73	8	
21	GRM033R61E101KA01D	100pF, 10%, 25V, 0201, X5R	Murata	C75	1	
22	GRM1555C1HR50BA01D	0.5pF, ±0.1pF, 50V, 0402, COG	Murata	C76, C77	2	DNP
23	LM1117MPX-3.3	LDO, 3.3V, SOT-223	NSC	DA1	1	
24	USBLC6-2SC6	ESD protection	STMicroelectronics	DA2	1	
25	ADP151ACBZ-1.8-R7	LDO, Fixed 1.8V, 200mA, 4-WFBGA	AD	DA3	1	
26	T603-010.00M		ConnorWinfield	DA4	1	
27	NT2016SA-16.368000MHz-NTG1	TCXO, 16.368 MHz, SMD 2.0 x 1.6 mm	NDK	DA5	1	
28	MAX3392EEDU+	Level converter, L13O-H1O3I, 1.2V ... 5.5V	Maxim	DA6	1	
29	ADM7170ACPZ-3.3-R7	LDO, 3.3V, 2.3V...6.5V, 500 mA, Ultralow Noise	AD	DA7	1	
30	NT1068.2-QFN88	RF Front-End, ADC, QFN88	NTL	DA8	1	
31	STM32F302CBT6	MCU, 32 kbytes RAM, 128 Kbytes Flash, 2.0 - 3.6 V, LQFP48	STMicroelectronics	DD1	1	
32	0ZCG0075BF2B	FUSE Resettable 0.75A 33V, 1812	bel	F1	1	
33	BLM15B8121SN1	Ferrite Bead, 120 Ohm, 25%, 0.3A, 0402, -55/+125	Murata	L1	1	
34	LQW15AN2N9B00	2.9nH, ±0.1nH, 850mA, 0402	Murata	L3, L4, L5, L6	4	
35	RC0402JR-071K5L	10 Ohm, 5%, 0402	FaithfulLink	R1, R6, R8	3	
36	RC0402JR-071K5L	1.5 kOhm, 5%, 0402	FaithfulLink	R2	1	DNP
37	RC0402FR-074K7L	4.7 kOhm, 1%, 0402	FaithfulLink	R3, R7, R17, R18	4	
38	CR0402-JW-103GLF	10 kOhm, 5%, 0402	Bourns	R4, R5, R16	3	
39	RC0402JR-22R	22 Ohm, 5%, 0402	FaithfulLink	R9, R10, R11, R13, R14, R20, R21, R22, R23	9	
40	RC0402JR-071K5L	1.5 kOhm, 5%, 0402	FaithfulLink	R12	1	
41	RC0402JR-074K7L	4.7 kOhm, 5%, 0402	Yageo	R15, R31	2	
42	CR0402-JW-103GLF	10 kOhm, 5%, 0402	Bourns	R19	1	DNP
43	RC0402FR-0761K9L	61.9 kOhm, 1%, 0402	FaithfulLink	R24	1	
44	RC0402J200R	200 Ohm, 5%, 0402	FaithfulLink	R25, R26, R27, R28, R29	5	DNP
45	RC0402FR-07100KL	100 kOhm, 1%, 0402	FaithfulLink	R30	1	
46	IT-1184-160G-G	Switch	Switronic	S1	1	DNP
47	S0971-46R	Shield Clip	HARWIN	SH1, SH2, SH3, SH4, SH5, SH6, SH7, SH8, SH9, SH10, SH11, SH12, SH13, SH14, SH15, SH16	16	
48	ADT4-6T+	Transformer, RF, 50 Ohm, 0.06 to 300 MHz, CD637	Mini-Circuits	T1, T2, T3, T4	4	
49	TCM1-43X+	Transformer RF, 10-4000MHz 2:1, config K	Mini-Circuits	T5	1	
50	T1608VC-A1	Diode, Opt, Red, 0603	Paralight	VD1	1	DNP
51	SMAJ5.0A	Suppressor, 5V, Uni, DO-214AC	Littlefuse	VD2	1	
52	T1608GC-A1N	Diode, Opt, Green, 0603	Paralight	VD3, VD4	2	
53	LED-0603YVC	Diode, Opt, Yellow, 0603	Paralight	VD5, VD6	2	DNP
54	T1608VC-A1	Diode, Opt, Red, 0603	Paralight	VD7	1	
55	LED-0603BVC	Diode, Opt, Blue, 0608	Paralight	VD8	1	DNP
56	T1608GC-A1N	Diode, Opt, Green, 0603	Paralight	VD9	1	DNP
57	MCH6660-TL-W	MOSFET N/P-CH 20V 2A/1.5A 6MCPH	ON	VT1	1	
58	670680010	USB type B	Molex	X1	1	
59	PJ-002A	DC 2.0 mm inner, male		X2	1	
60	901-143-6RFX	SMA, Right Angle	Amphenol	X3, X10, X11, X12, X13	5	
61	142-0761-881	SMA, Edge	Cinch	X4, X5, X6, X7, X8, X9	6	
62	2206PA-10G-739	10x1, 1.27mm	Neltron	XP1	1	
63	PLS-3	3x1, 2.54mm		XP2, XP3, XP4	3	
64	102976-5	Connector	AMP	XP5	1	
65	PLS-2	2x1, 2.54 mm		XP6, XP7, XP8	3	
66	PLS-2	2x1, 2.54 mm		XP9, XP10, XP11, XP12, XP13, XP14	6	DNP
67	B2B-EH-A	2x1, 2.54 mm	Molex	XP15	1	
68	MJ-6-1	Jumper 2.54mm		XS1, XS2, XS3	3	
69	BLM18PG471SN1D	FerriteBead, 470 Ohm, 1A, 0603	Murata	Z1, Z2	2	
70	NFM18PC225B1A3	CAPACITOR PASS	Murata	Z3, Z5, Z6, Z7, Z8, Z9, Z10	7	
71	BLM18GG471SN1	FerriteBead, 470 Ohm(100M), 1.8 kOhm (1G), 0.2A, 0603	Murata	Z4	1	
72	TCBT-14+	Filter 50Q Wideband 10 MHz to 10 GHz, 200mA, <1dB	Mini-Circuits	Z11	1	
73	ECS-80-18-33-JGN-TR	Crystal, quartz, 8.0MHz, 20 ppm, 3.2x2.5smd	ECS	ZQ1	1	

