The bq500212A is a 5V input single coil wireless power transmitter. The designer has several options regarding the design which we will cover in this presentation.

The bq500212A eliminates the MSP430 used in previous designs to manage low power sleep mode. To reduce power during Standby, no RX on charging pad or charge complete 3.3V is removed from the bq500212A. The function is replaced with two RC timing circuits:

- SNOOZE circuit—OFF time of 400mS, normal Stand-By Time
- SLEEP circuit —OFF time of 4 Sec, used for Charge Complete

New Design used with bq500212A will only use Digital Ping. Digital Ping is a 75mS pulse that will power RX and gives it an opportunity to respond. Ping is sent at regular intervals based RC time constant no MSP430 used.
Power Section:

H-bridge power section can be an integrated solution with drivers and MOSFETs in one package. This is used on the Evaluation Module with CSD97376. A discreet drive and MOSFET are also an option, this design is used on the bq500211A Evaluation Module. To further reduce cost a discreet driver circuit can be used to drive the H-bridge MOSFETs. The design from the bq500211A EVM can be used, details of this circuit can be found in the EVM User’s Guide.

![Power Section with Driver /MOSFET from bq500211A EVM](image)

Non-Qi:

Qi certification involves testing to WPC standard to meet the requirements. If Qi certification is not required the I-sense circuit can be removed, INA199A1. The I-Sense input should be grounded. FOD, PMOD and FOD_CAL should be open, do not install associated resistors.

SNOOZE RC time:

The RC time constant for Snooze can be change to increase detection time, shorter RC time. For lower standby power the RC time can be increased, longer off time. For Qi certification the detection time should be 500mS. Designer should evaluate the trade-off between the two.
Figure 3. Sleep and Snooze Circuit

Comm Sample Circuit:

The voltage divider circuit used to produce Comm + sample signal is used to sample the coil voltage. This voltage will have communication packets from the receiver. Values in the divider network should NOT be changed.

I-Sense:

For Qi certification units very accurate measurement of the current to power section is required. Circuit has a current to voltage translation of 1V to 1A. Care should be taken that this circuit is well laid out with high quality parts.

PMOD / FOD / FOD-Cal:

For Qi certification Foreign Object Detection (FOD) is required. R_FOD sets this threshold. A calibration routine is required to set this threshold. If not required, Non-QI the resistor can be omitted. Part of the FOD setting is FOD –Cal which sets the slope of the loss curve. It not required, Non-QI the resistor can be omitted. For WPC 1.0 devices Parasitic Metal Object Detection (PMOD) can be used, this function is similar to FOD but is optional. If not required omit resistor.

THREE resistors are used to set three values:

- R_FOD between pin17 and pin 43 sets FOD
- R_PMOD between Pin16 and pin 43 sets FOD
- R_CAL between pin15 and pin 43 sets FOD_CAL.

Omitting R_PMOD will disable the PMOD function.
Omitting R_FOD will disable the FOD function.
Omitting R_CAL will result in the default FOD_CAL setting which MAY not result in compliance FOD algorithm for a give system.
Single resistor R-LOSS configuration, Pin 43 to GND for combined THRESHOLD for FOD/PMOD is NOT RECOMMENDED.

![Resistor Configuration for FOD / PMOD / FOD_CAL](image)

**Figure 4.** Resistor Configuration for FOD / PMOD / FOD_CAL
IMPORTANT NOTICE

Texas Instruments Incorporated and its subsidiaries (TI) reserve the right to make corrections, enhancements, improvements and other changes to its semiconductor products and services per JESD46, latest issue, and to discontinue any product or service per JESD48, latest issue. Buyers should obtain the latest relevant information before placing orders and should verify that such information is current and complete. All semiconductor products (also referred to herein as “components”) are sold subject to TI’s terms and conditions of sale supplied at the time of order acknowledgment.

TI warrants performance of its components to the specifications applicable at the time of sale, in accordance with the warranty in TI’s terms and conditions of sale of semiconductor products. Testing and other quality control techniques are used to the extent TI deems necessary to support this warranty. Except where mandated by applicable law, testing of all parameters of each component is not necessarily performed.

TI assumes no liability for applications assistance or the design of Buyers’ products. Buyers are responsible for their products and applications using TI components. To minimize the risks associated with Buyers’ products and applications, Buyers should provide adequate design and operating safeguards.

TI does not warrant or represent that any license, either express or implied, is granted under any patent right, copyright, mask work right, or other intellectual property right relating to any combination, machine, or process in which TI components or services are used. Information published by TI regarding third-party products or services does not constitute a license to use such products or services or a warranty or endorsement thereof. Use of such information may require a license from a third party under the patents or other intellectual property of the third party, or a license from TI under the patents or other intellectual property of TI.

Reproduction of significant portions of TI information in TI data books or data sheets is permissible only if reproduction is without alteration and is accompanied by all associated warranties, conditions, limitations, and notices. TI is not responsible or liable for such altered documentation. Information of third parties may be subject to additional restrictions.

Resale of TI components or services with statements different from or beyond the parameters stated by TI for that component or service voids all express and any implied warranties for the associated TI component or service and is an unfair and deceptive business practice. TI is not responsible or liable for any such statements.

Buyer acknowledges and agrees that it is solely responsible for compliance with all legal, regulatory and safety-related requirements concerning its products, and any use of TI components in its applications, notwithstanding any applications-related information or support that may be provided by TI. Buyer represents and agrees that it has all the necessary expertise to create and implement safeguards which anticipate dangerous consequences of failures, monitor failures and their consequences, lessen the likelihood of failures that might cause harm and take appropriate remedial actions. Buyer will fully indemnify TI and its representatives against any damages arising out of the use of any TI components in safety-critical applications.

In some cases, TI components may be promoted specifically to facilitate safety-related applications. With such components, TI’s goal is to help enable customers to design and create their own end-product solutions that meet applicable functional safety standards and requirements. Nonetheless, such components are subject to these terms.

No TI components are authorized for use in FDA Class III (or similar life-critical medical equipment) unless authorized officers of the parties have executed a special agreement specifically governing such use.

Only those TI components which TI has specifically designated as military grade or “enhanced plastic” are designed and intended for use in military/aerospace applications or environments. Buyer acknowledges and agrees that any military or aerospace use of TI components which have not been so designated is solely at the Buyer’s risk, and that Buyer is solely responsible for compliance with all legal and regulatory requirements in connection with such use.

TI has specifically designated certain components as meeting ISO/TS16949 requirements, mainly for automotive use. In any case of use of non-designated products, TI will not be responsible for any failure to meet ISO/TS16949.

Products

Audio     www.ti.com/audio  Applications
Amplifiers amplifier.ti.com          Automotive and Transportation www.ti.com/automotive
Data Converters dataconverter.ti.com  Communications and Telecom www.ti.com/communications
DSP        dsp.ti.com              Consumer Electronics www.ti.com/consumer-apps
Interface   interface.ti.com        Industrial www.ti.com/industrial
Logic      logic.ti.com            Medical www.ti.com/medical
Power Mgmt  power.ti.com           Security www.ti.com/security
OMAP Applications Processors www.ti.com/omap    TI E2E Community e2e.ti.com
Wireless Connectivity www.ti.com/wirelessconnectivity