Panasonic

**AN32258A**

http://www.semicon.panasonic.co.jp/en/

# INTEGRATED WIRELESS POWER SUPPLY RECEIVER, Qi (WIRELESS POWER CONSORTIUM) COMPLIANT — Evaluation Board User's Guide —

## FEATURES

- Integrated Wireless Power Receiver Solution
- WPC Ver. 1.1 Compliant
- Synchronous Full Bridge Rectifier Control
- Input Voltage Range : VRECT = 4.4 V to 19 V
- Selectable Output Voltage: 5 V
- Temperature Detecting Circuit
- Full Charge Detection with Adjustable Current Level
- Switching Control of External Power Supply
- Supports Under Voltage Lockout , Thermal Shutdown, Over Voltage Detection, and Over Current Detection.
- LED Indicator
- 3.16 mm X 3.16 mm WLCSP
  48 Pins with 0.4mm pitch

## DESCRIPTION

AN32258A is a wireless power system controller IC which is compliant with Qi version 1.1 of the System Description Wireless Power Transfer, Volume 1 for Low Power defined by Wireless Power Consortium. AN32258A is a controller IC of a power receiver (Rx) which can be used with any Qi-compliant wireless chargers.

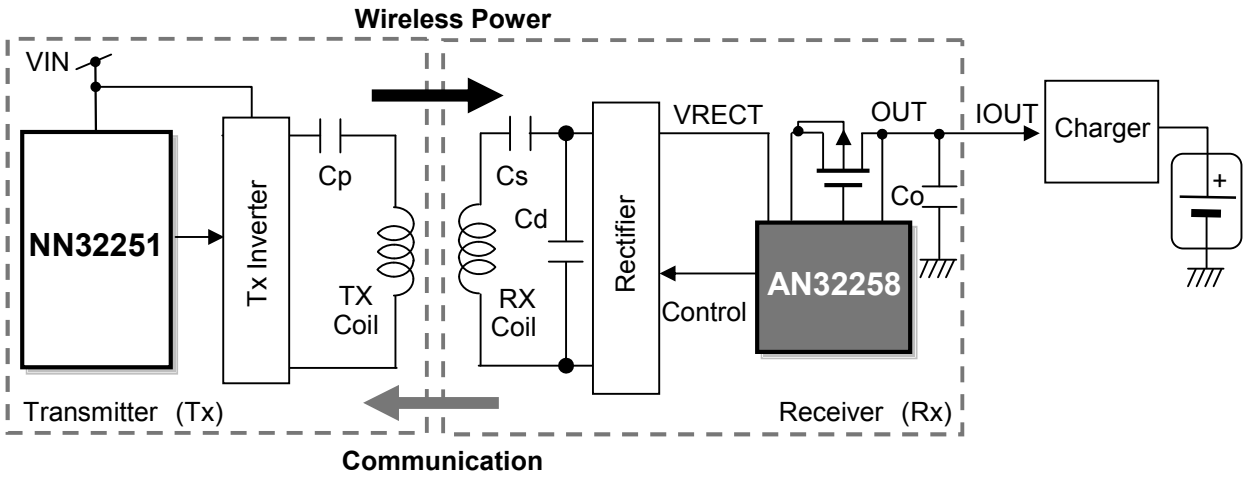
## APPLICATIONS

- WPC Compliant Receivers
- Cell Phones, Smartphones
- Headsets
- Digital Cameras
- Tablet Devices
- Portable Media Players etc.

## IMPORTANT

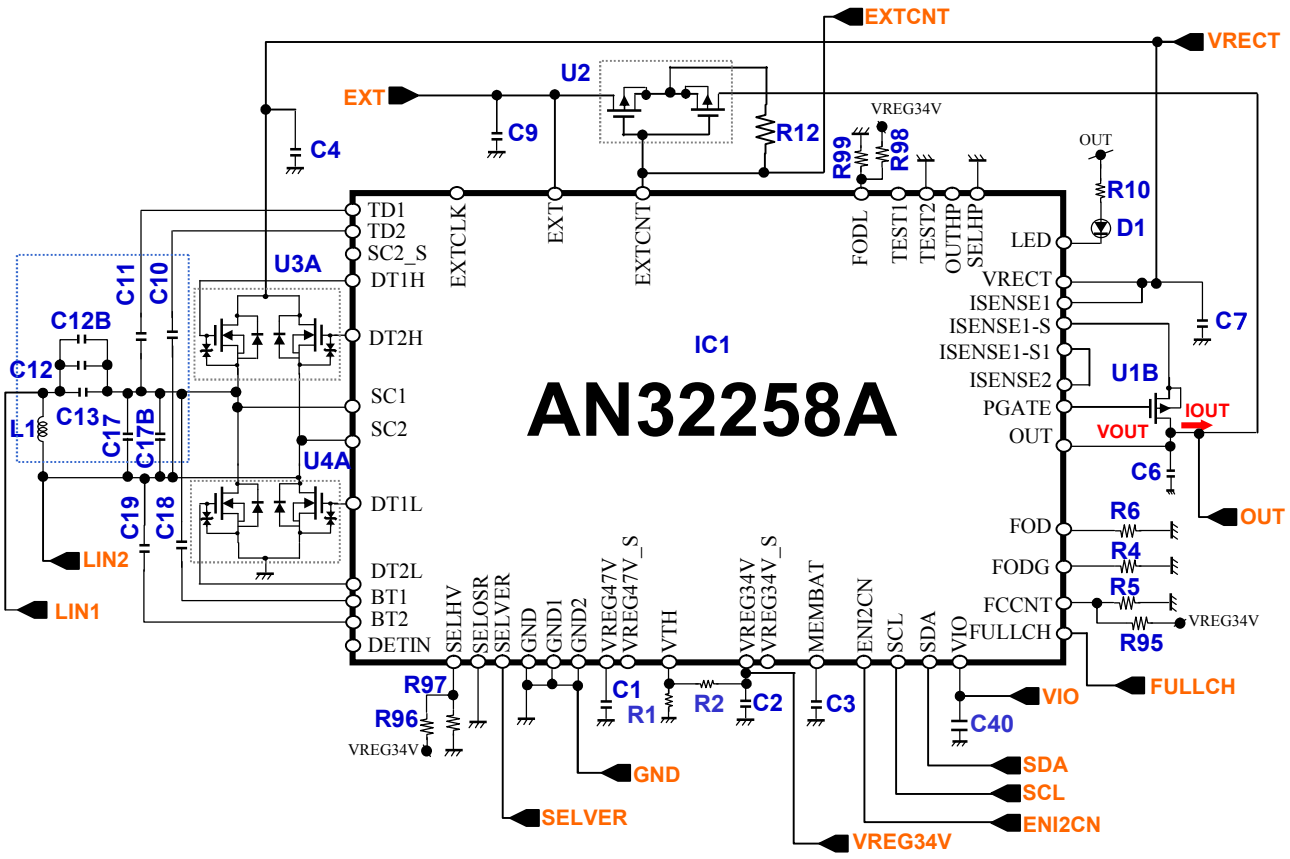
AN32258A is designed to be used based on the circuits and external components described in this document and Application Note. Therefore, Panasonic cannot support any inquiries of modified solution.

## Wireless Power System



## EVB (for Qi 5W) Information

1. EVB Circuit Diagram



## EVB (for Qi 5W) Information (Continued)

2. Bill of Materials

2-1. Mounting parts

| Category | Parts No. | Name | Manufacture | Value | Rating | Size (JIS or PKG) | T(max) mm | Qty |
|---|---|---|---|---|---|---|---|---|
| IC | IC1 | AN32258A | Panasonic | - | - | 3.16*3.16 | 0.50 | 1 |
| Coil | L1 | KNCWA15C545Z | Panasonic | 15 uH | - | 54*40 | 0.53 (Typ) | 1 |
| Capacitor | C1-3 | GRM155B31A105KE15 | Murata | 1.0uF | 10V | 1005 | 0.55 | 3 |
| | C4 | GRM219B31E106KA12 | Murata | 10uF | 25V | 2125 | 0.95 | 1 |
| | C6 | GRM188B31C475KAAJ | Murata | 4.7uF | 16V | 1608 | 0.95 | 1 |
| | C10,C11 | GRM155R71H223KA12 | Murata | 22000pF | 50V | 1005 | 0.55 | 2 |
| | C12,C12B | GRM188R71H683KA93# | Murata | 68000pF | 50V | 1608 | 0.90 | 2 |
| | C13 | GRM188R71H473KA61# | Murata | 47000pF | 50V | 1608 | 0.90 | 1 |
| | C17 | GRM155R11H102KA01# | Murata | 1000pF | 50V | 1005 | 0.55 | 1 |
| | C17B | GRM155R11H681KA01# | Murata | 680pF | 50V | 1005 | 0.55 | 1 |
| | C18, C19 | GRM155B31E104KA87 | Murata | 0.1uF | 25V | 1005 | 0.55 | 2 |
| Resistor | R2 | ERJ2RKF4702X | Panasonic | 47k ohm | 1% | 1005 | 0.4 | 1 |
| | R4 | ERJ2RKF3302X | Panasonic | 33k ohm | 1% | 1005 | 0.4 | 1 |
| | R6 | ERJ2RKF1003X | Panasonic | 100k ohm | 1% | 1005 | 0.4 | 1 |
| | R10 | ERJ2RKF5600X | Panasonic | 560 ohm | 1% | 1005 | 0.4 | 1 |
| | R95, R99 | ERJ2GE0R00X | Panasonic | 0 ohm | - | 1005 | 0.4 | 2 |
| P-MOS FET | U1B | MTM231232LBF | Panasonic | - | - | 2.0*2.1 | 1.1 | 1 |
| Dual N-MOS FET | U3A,U4A | FC8V33030L | Panasonic | - | - | WMini8-F1 (2.8*2.9) | 0.85 | 2 |
| LED | D1 | LNJ237W82RA | Panasonic | - | - | 1608 | 0.20 | 1 |

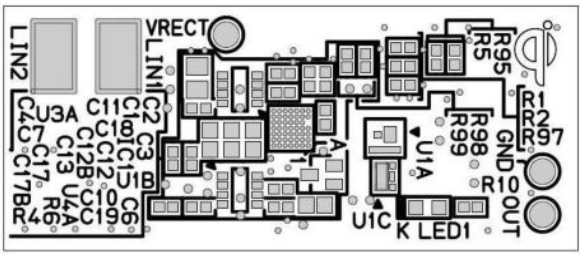
## EVB (for Qi 5W) Information (Continued)

3. EVB Layout

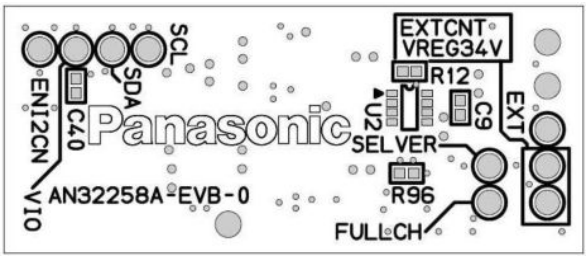
3-1. Evaluation Board


EVB Photo (Top)


EVB Photo (Bottom)




EVB Top Assembly




EVB Bottom Assembly

3-2. Specification of EVB

| Category | Specification |
|---|---|
| EVB size | 40.0 mm × 17.0 mm |
| Thickness | 0.80 mm |
| Layer | 4 layers |

Note : The circuit and layout are designed for this evaluation board only. Thorough verification and evaluation must be done for the final product at your own risk.

## EVB (for Qi 5W) Information (Continued)

4. Monitor Pin Functions

| Name | I/O | Function | Description |
|---|---|---|---|
| LIN1 | I | Rx coil 1 | Connect a receiver coil |
| LIN2 | I | Rx coil 2 | Connect a receiver coil |
| EXT | Power Supply | External power detection | Supplies power externally in direct.<br>When EXT becomes larger than 4.2V, EXTCNT will become low and the wireless power transmission will stop. The external power supply will then directly output, and the Tx will be stopped. |
| EXCNT | O | External PMOS control | Controls the switch to an external power supply.<br>When EXT is larger than 4.2V, EXTCNT will become low and the external MOSFET will turn on. |
| VRECT | Power Supply | Voltage of rectifier | Voltage of the rectifier output becomes the power supply of AN32258A. |
| OUT | I | LDO feedback | Connects to the PMOS drain of the LDO |
| GND | GND | Ground | |
| FULLCH | I | Full charge detection | This input controls the full charge detection externally such as from an MCU. When a high voltage level (over 1.6V) is inputted for over 50us, AN32258A will recognize it as full-charge and send packets to Tx to stop the power transmission. Right after the input becomes low, the power transmission can restart. |
| SELVER | I | Test pin | Leave this pin open. Panasonic uses this pin for test purposes only. |
| ENI2CN | O | Test pin | Leave this pin open. Panasonic uses this pin for test purposes only. |
| VIO | Power Supply | Test pin | Leave this pin open. Panasonic uses this pin for test purposes only. |
| SCL | I | Test pin | Leave this pin open. Panasonic uses this pin for test purposes only. |
| SDA | I/O | Test pin | Leave this pin open. Panasonic uses this pin for test purposes only. |
| VREG34V | O | Internal regulator output | Outputs a voltage level of 3.4V.<br>This output cannot be used for external devices. |

## EVB (for Qi 5W) Information (Continued)

5. Procedure

5-1. Preparation

- Charger pad of Qi compliant
- Voltage / Current meters
- Output load, such as resistors or a battery with charge control

EVB with a coil

An example of charge pads

5-2. Procedure

(1) Connect wires to the pins named OUT and GND. Then, put the coil on the charge pad in such a way that the wire side of the coil faces to the pad.

(2) After the authentication sequence, the pad starts to transmit power. The LED turns on when AN32258A receives power. An output of 5 volts can also be measured at the pin OUT. Either the red LED or the 5 volts output affirms that the board is properly operating.

(3) Load current up to 1 A at the output is possible.

5-3. Notice

・When the Rx coil is replaced to another one, the resonance capacitors (C12-13, C17) may need to be changed. However, Panasonic cannot support any inquiries of modified solution.