

**INTEGRATED WIRELESS POWER SUPPLY TRANSMITTER,
Qi (WIRELESS POWER CONSORTIUM) COMPLIANT
- Evaluation Board User's Guide (A11 type) -**

FEATURES

- Integrated wireless power transmitter controller
- WPC Ver. 1.1 ready
- MCU embedded
- Half-bridge gate driver : 4ch
(full-bridge gate driver : 2ch also configurable)
- Single-coil (Type A11) supported
- Expanded free positioning using multi-coils up to 4 coils (Type A6)
- Highly accurate voltage and current monitor for inverters
- Output controlled by frequency or duty, defined in Qi.
- ASK demodulation for both current and voltage signals (Qi compliant)
- Input voltage range : VADP, VINV : 4.6 to 19.5V
- Supports Under Voltage Lockout , Thermal Shutdown, Over Current Detection
- Short-circuit protection at inverter output
- Temperature Detecting Circuit : 3ch
- LED indicator : 2ch
- package : 64 pins HQFP
(size : 12mm × 12mm)

DESCRIPTION

NN32251A 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.

NN32251A is a controller IC of a power transmitter (Tx) which can supply power to any Qi-compliant wireless chargers.

APPLICATIONS

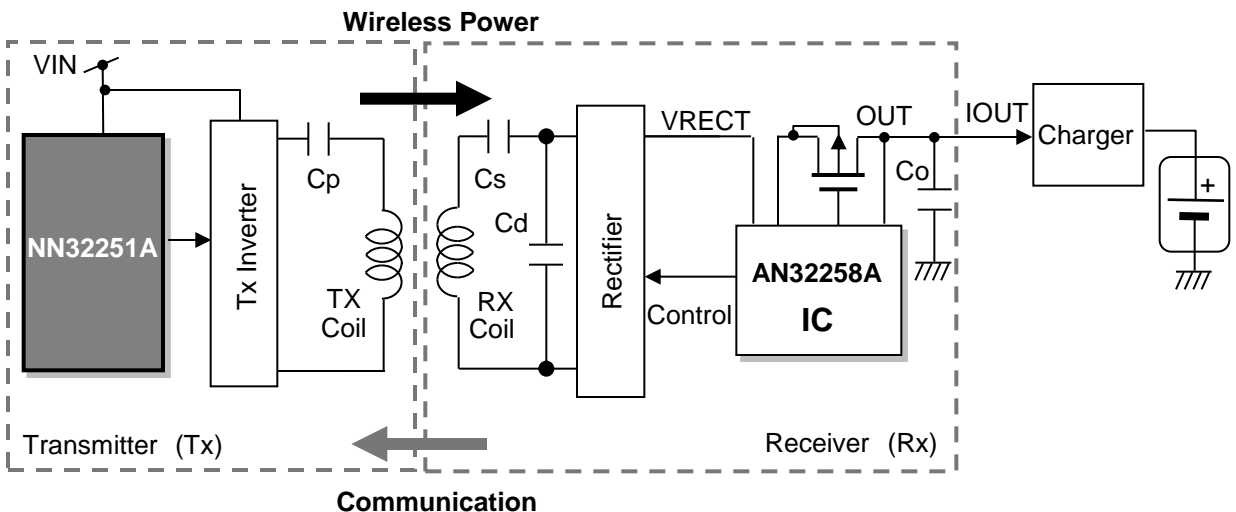
- WPC-compliant wireless charger

IMPORTANT

NN32251A is designed to be used based on the circuits and external components described in this document .

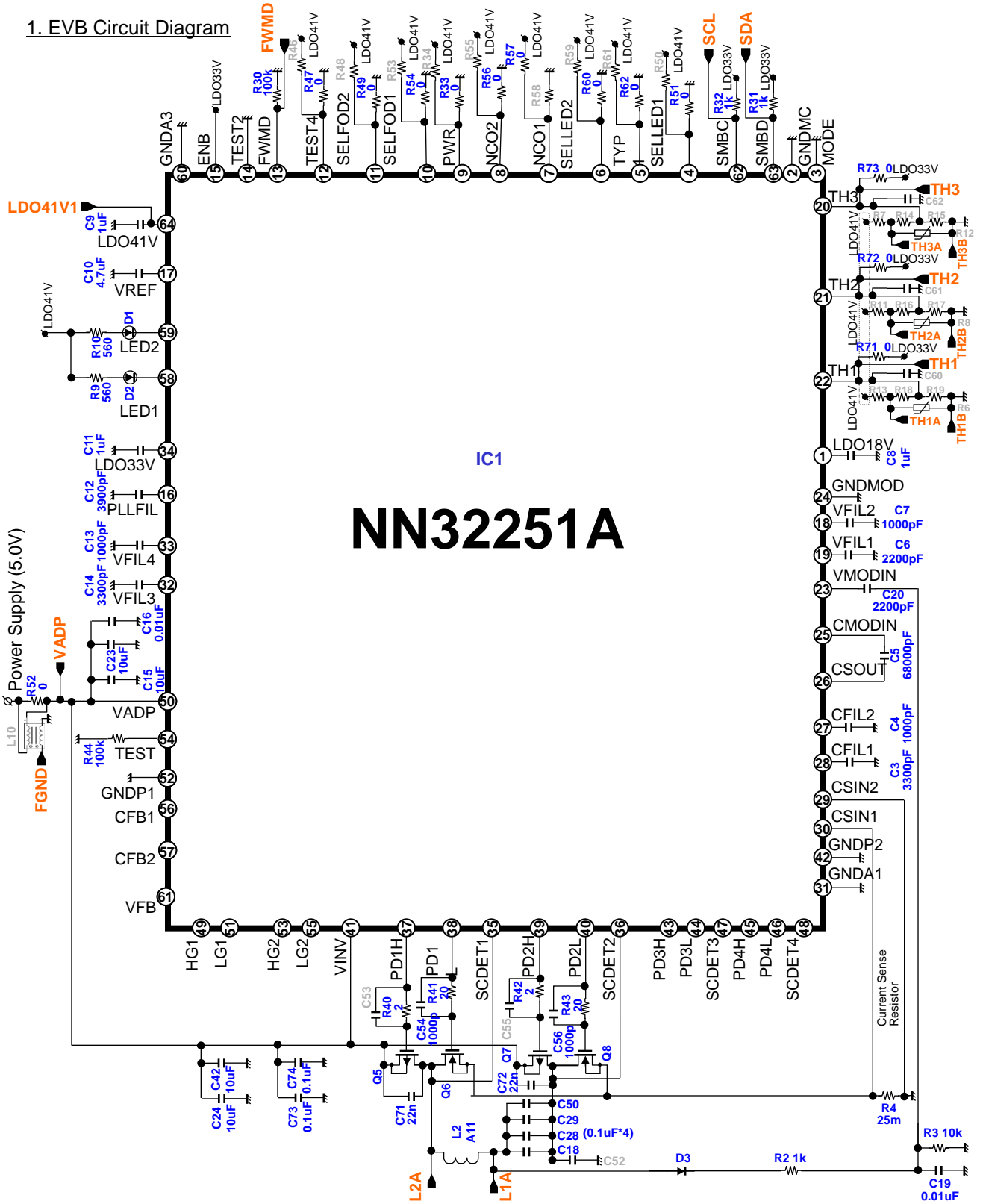
Therefore, Panasonic cannot support any inquiries of modified solution.

Wireless Power System



EVB (for Qi Type A11) Information

1. EVB Circuit Diagram



EVB (for Qi Type A11) Information (Continued)
2. Bill of Materials

| Category | Parts No. | Name | Manufacture | Value | Rating | Size (JIS or PKG) | T(max) mm | Qty |
|------------|---|---------------------|------------------|---------|-----------|----------------------|--------------|-----|
| IC | IC1 | NN32251A | Panasonic | - | - | 12.0 x 12.0 | 1.2 | 1 |
| Coil | L2 | CEBO-RA2D22A | CHEMTRONICS | - | - | - | - | 1 |
| Capacitor | C18,C28, C29,C50 | C4532C0G2E104J320KN | TDK | 0.1uF | 250V | 4.5 x 3.2 | 3.2 | 3 |
| | C3, C14 | GRM188B11E332KA01 | MURATA | 3300pF | 25V | 1.6 x 0.8 | 0.8 | 2 |
| | C4, C7, C13, C54, C56 | GRM188B11E102KA01 | MURATA | 1000pF | 25V | 1.6 x 0.8 | 0.8 | 5 |
| | C6 | GRM188B11E222KA01 | MURATA | 2200pF | 25V | 1.6 x 0.8 | 0.8 | 1 |
| | C12 | GRM188B11E392KA01 | MURATA | 3900pF | 25V | 1.6 x 0.8 | 0.8 | 1 |
| | C5 | GRM188B11E683KA01 | MURATA | 68000pF | 25V | 1.6 x 0.8 | 0.8 | 1 |
| | C16 | GRM188B11H103KA01 | MURATA | 0.01uF | 50V | 1.6 x 0.8 | 0.8 | 1 |
| | C8, C9, C11 | GRM188B31E105KA75 | MURATA | 1uF | 25V | 1.6 x 0.8 | 0.8 | 3 |
| | C19 | GRM188R72A103KA01 | MURATA | 0.01uF | 100V | 1.6 x 0.8 | 0.8 | 1 |
| | C20 | GRM188R72D222KW07D | MURATA | 2200pF | 200V | 1.6 x 0.8 | 0.8 | 1 |
| | C15,C23, C24,C42 | UMK325AB7106MM-T | TAIYO YUDEN | 10uF | 50V | 3.2 x 2.5 | 2.5 | 4 |
| | C10 | GRM21BB31E475KA75 | MURATA | 4.7uF | 25V | 2.1 x1.25 | 1.25 | 1 |
| | C71, C72 | GRM319R71H223JA01 | MURATA | 22nF | 50V | 3.2 x 1.6 | 0.95 | 2 |
| C73, C74 | GRM188R71H104KA93 | MURATA | 0.1uF | 50V | 1.6 x 0.8 | 0.8 | 2 | |
| Resistor | R2, R31, R32 | ERJ3EKF1001V | Panasonic | 1K | 1% | 1.6 x 0.8 | 0.55 | 3 |
| | R3 | ERJ3EKF1002V | Panasonic | 10K | 1% | 1.6 x 0.8 | 0.55 | 1 |
| | R4 | ERJ8BWFR025 | Panasonic | 25m | 1% | 3.2 x 1.6 | 0.75 | 1 |
| | R9,R10 | ERJ3EKF5600U | Panasonic | 560 | 1% | 1.6 x 0.8 | 0.55 | 2 |
| | R30, R44 | ERJ3EKF1003V | Panasonic | 100K | 1% | 1.6 x 0.8 | 0.55 | 2 |
| | R40, R42 | ERJ3GEYJ2R0V | Panasonic | 2 | 5% | 1.6 x 0.8 | 0.55 | 2 |
| | R41, R43 | ERJ3GEYJ200V | Panasonic | 20 | 5% | 1.6 x 0.8 | 0.55 | 2 |
| | R33,R47, R49,R51, R52,R54, R56,R57, R60,R62, R71,R72, R73 | ERJ3GEY0R00V | Panasonic | 0 | - | 1.6 x 0.8 | 0.55 | 13 |
| Pch-MOSFET | Q5,Q7 | SIA445EDJ | Vishay Siliconix | | | 2.05 x 2.05 | 0.8 | 2 |
| Nch-MOSFET | Q6,Q8 | SIA400EDJ | Vishay Siliconix | | | 2.05 x 2.05 | 0.8 | 2 |
| LED | D1 | LNJ337W83RA | Panasonic | green | - | 1.6 x 0.8 | 0.25 | 1 |
| LED | D2 | LNJ237W82RA | Panasonic | red | - | 1.6 x 0.8 | 0.25 | 1 |
| Diode | D3 | DA22F21 | Panasonic | - | - | 3.5 X 1.6 | 0.8 | 1 |

EVB (for Qi Type A11) Information (Continued)
5. LED Display

- Combination of LED display can be adjusted by pins SELLED1(No.4) and SELLED2(No.6) as the next table shows. Both pins are connected to GND on this board.

| Pin Name (Number) | | LED Pin | System Status | | | |
|----------------------|-------------------|------------|---------------|--|-------------|----------------------------|
| | | | Selection | Ping ID & Configuration Power Transfer | Full Charge | Error Temperature Error |
| SELLED2 (No.6) | SELLED1 (No.4) | | Charge | | | |
| | | | Standby | Charge | Full Charge | Error |
| GND | GND | LED1 | OFF | ON | OFF | Blink |
| | | LED2 | OFF | OFF | ON | OFF |
| GND | LDO41V | LED1 | OFF | OFF | OFF | ON |
| | | LED2 | OFF | Blink | ON | OFF |
| LDO41V | GND | LED1 | ON | OFF | OFF | ON |
| | | LED2 | ON | Blink | ON | OFF |
| LDO41V | LDO41V | LED1 | OFF | OFF | OFF | ON |
| | | LED2 | OFF | ON | OFF | OFF |

IMPORTANT NOTICE

1. When using the IC for new models, verify the safety including the long-term reliability for each product.
2. When the application system is designed by using this IC, please confirm the notes in this book.
Please read the notes to descriptions and the usage notes in the book.
3. This IC is intended to be used for general electronic equipment.
Consult our sales staff in advance for information on the following applications: Special applications in which exceptional quality and reliability are required, or if the failure or malfunction of this IC may directly jeopardize life or harm the human body. Any applications other than the standard applications intended.
 - (1) Space appliance (such as artificial satellite, and rocket)
 - (2) Traffic control equipment (such as for automotive, airplane, train, and ship)
 - (3) Medical equipment for life support
 - (4) Submarine transponder
 - (5) Control equipment for power plant
 - (6) Disaster prevention and security device
 - (7) Weapon
 - (8) Others : Applications of which reliability equivalent to (1) to (7) is required

Our company shall not be held responsible for any damage incurred as a result of or in connection with the IC being used for any special application, unless our company agrees to the use of such special application.
However, for the IC which we designate as products for automotive use, it is possible to be used for automotive.
4. This IC is neither designed nor intended for use in automotive applications or environments unless the IC is designated by our company to be used in automotive applications.

Our company shall not be held responsible for any damage incurred by customers or any third party as a result of or in connection with the IC being used in automotive application, unless our company agrees to such application in this book.
5. Please use this IC in compliance with all applicable laws and regulations that regulate the inclusion or use of controlled substances, including without limitation, the EU RoHS Directive. Our company shall not be held responsible for any damage incurred as a result of our IC being used by our customers, not complying with the applicable laws and regulations.
6. Pay attention to the direction of the IC. When mounting it in the wrong direction onto the PCB (printed-circuit-board), it might be damaged.
7. Pay attention in the PCB (printed-circuit-board) pattern layout in order to prevent damage due to short circuit between pins. In addition, refer to the Pin Description for the pin configuration.
8. Perform visual inspection on the PCB before applying power, otherwise damage might happen due to problems such as solder-bridge between the pins of the IC. Also, perform full technical verification on the assembly quality, because the same damage possibly can happen due to conductive substances, such as solder ball, that adhere to the IC during transportation.
9. Take notice in the use of this IC that it might be damaged when an abnormal state occurs such as output pin-VCC short (Power supply fault), output pin-GND short (Ground fault), or output-to-output-pin short (load short). Safety measures such as installation of fuses are recommended because the extent of the above-mentioned damage will depend on the current capability of the power supply.
10. The protection circuit is for maintaining safety against abnormal operation. Therefore, the protection circuit should not work during normal operation.

Especially for the thermal protection circuit, if the area of safe operation or the absolute maximum rating is momentarily exceeded due to output pin to VCC short (Power supply fault), or output pin to GND short (Ground fault), the IC might be damaged before the thermal protection circuit could operate.
11. Unless specified in the product specifications, make sure that negative voltage or excessive voltage are not applied to the pins because the IC might be damaged, which could happen due to negative voltage or excessive voltage generated during the ON and OFF timing when the inductive load of a motor coil or actuator coils of optical pick-up is being driven.
12. Verify the risks which might be caused by the malfunctions of external components.

Request for your special attention and precautions in using the technical information and semiconductors described in this book

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- (6) Comply with the instructions for use in order to prevent breakdown and characteristics change due to external factors (ESD, EOS, thermal stress and mechanical stress) at the time of handling, mounting or at customer's process. When using products for which damp-proof packing is required, satisfy the conditions, such as shelf life and the elapsed time since first opening the packages.
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