

# NCV8871BSTGEVB

## NCV8871 Automotive Grade Boost Controller Audio Amplifier Evaluation Board User's Manual



ON Semiconductor®

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### EVAL BOARD USER'S MANUAL

#### Description

The NCV8871BST evaluation board provides an opportunity to evaluate the NCV887100 in an audio amplifier power supply type application. The board supplies an 18 V output with 9 A of output current from as low as a 6 V input. The enable pin can also be used to synchronize the supply to an external clock.

#### Key Features

- 18 V Output Voltage
- 9 A Output Current
- Fixed Frequency Operation at 170 kHz
- Regulates Fully Loaded From as Low as 6 V Input
- Survives 40 V Load Dump
- External Clock Synchronization up to 340 kHz
- Automotive Grade



Figure 1. NCV8871BSTGEVB Evaluation Board

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**Table 1. EVALUATION BOARD TERMINAL DESCRIPTIONS**

| Terminal | Function  |
|----------|---|
| VIN      | Positive dc input voltage.  |
| GND      | Common dc return.   |
| VOUT     | Dc output voltage.  |
| EN/SYNC  | Dc enable voltage and external clock synchronization. A dc logic low disables the device. |

**Table 2. ABSOLUTE MAXIMUM RATINGS** (Voltages are with respect to GND)

| Rating                      | Value      | Unit |
|-----------------------------|------------|------|
| Dc Supply Voltage (VIN)     | -0.3 to 40 | V    |
| Dc Supply Voltage (EN/SYNC) | -0.3 to 6  | V    |
| Ambient Temperature         | -40 to 85  | °C   |

Stresses exceeding Maximum Ratings may damage the device. Maximum Ratings are stress ratings only. Functional operation above the Recommended Operating Conditions is not implied. Extended exposure to stresses above the Recommended Operating Conditions may affect device reliability.

**Table 3. ELECTRICAL CHARACTERISTICS**

(TA = 25°C, 4.5 ≤ VIN ≤ 18 V, IOOUT ≤ 2 A, unless otherwise specified)

| Characteristic                    | Conditions                | Typical Value | Unit |
|-----------------------------------|---------------------------|---------------|------|
| <b>OUTPUT VOLTAGE</b>             |                           |               |      |
| Output Voltage                    |                           | 18.00         | V    |
| Voltage Accuracy                  | -40 ≤ TA ≤ 85             | 4             | %    |
| Soft-start Time                   |                           | 7.4           | ms   |
| <b>SWITCHING REGULATOR</b>        |                           |               |      |
| Switching Frequency               |                           | 170           | kHz  |
| SYNC Frequency                    |                           | 170 to 340    | kHz  |
| Duty Cycle Range                  |                           | 2 to 88       | %    |
| <b>Current Limit</b>              |                           |               |      |
| Cycle-by-cycle current limit      |                           | 50            | A    |
| <b>General</b>                    |                           |               |      |
| Input Undervoltage Lockout (UVLO) | VIN increasing            | 3.8           | V    |
| Efficiency                        | VIN = 13.2 V, IOOUT = 5 A | 5             | %    |
| Thermal Shutdown                  |                           | 170           | °C   |

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## TYPICAL WAVEFORMS

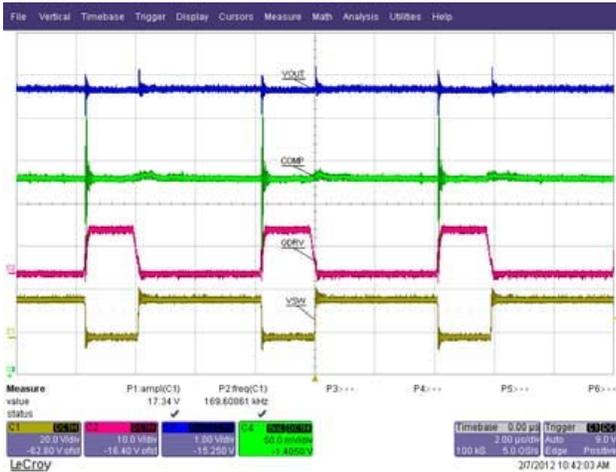


Figure 2. Normal Operation

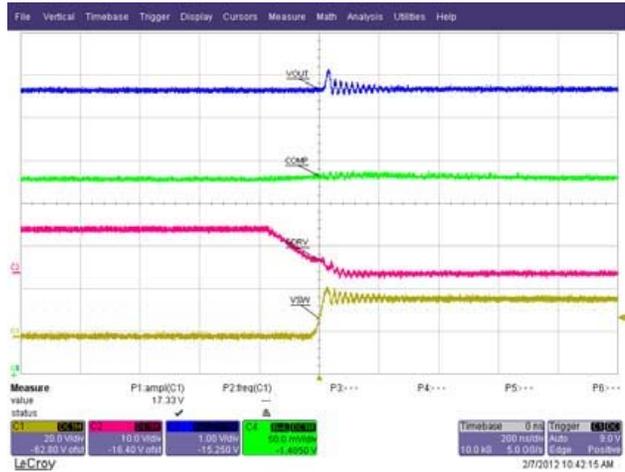


Figure 3. Gate Drive Falling Edge

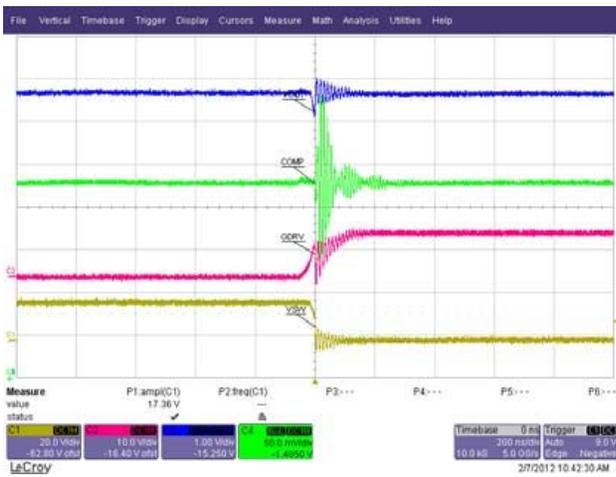


Figure 4. Gate Drive Rising Edge

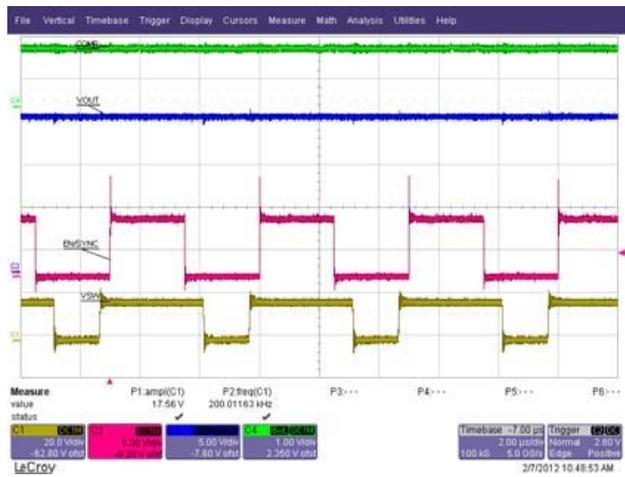


Figure 5. Synchronization

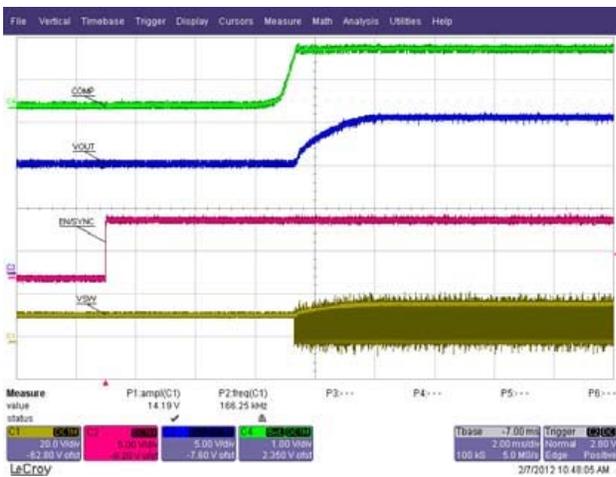


Figure 6. Soft Start with Load

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## SCHEMATIC

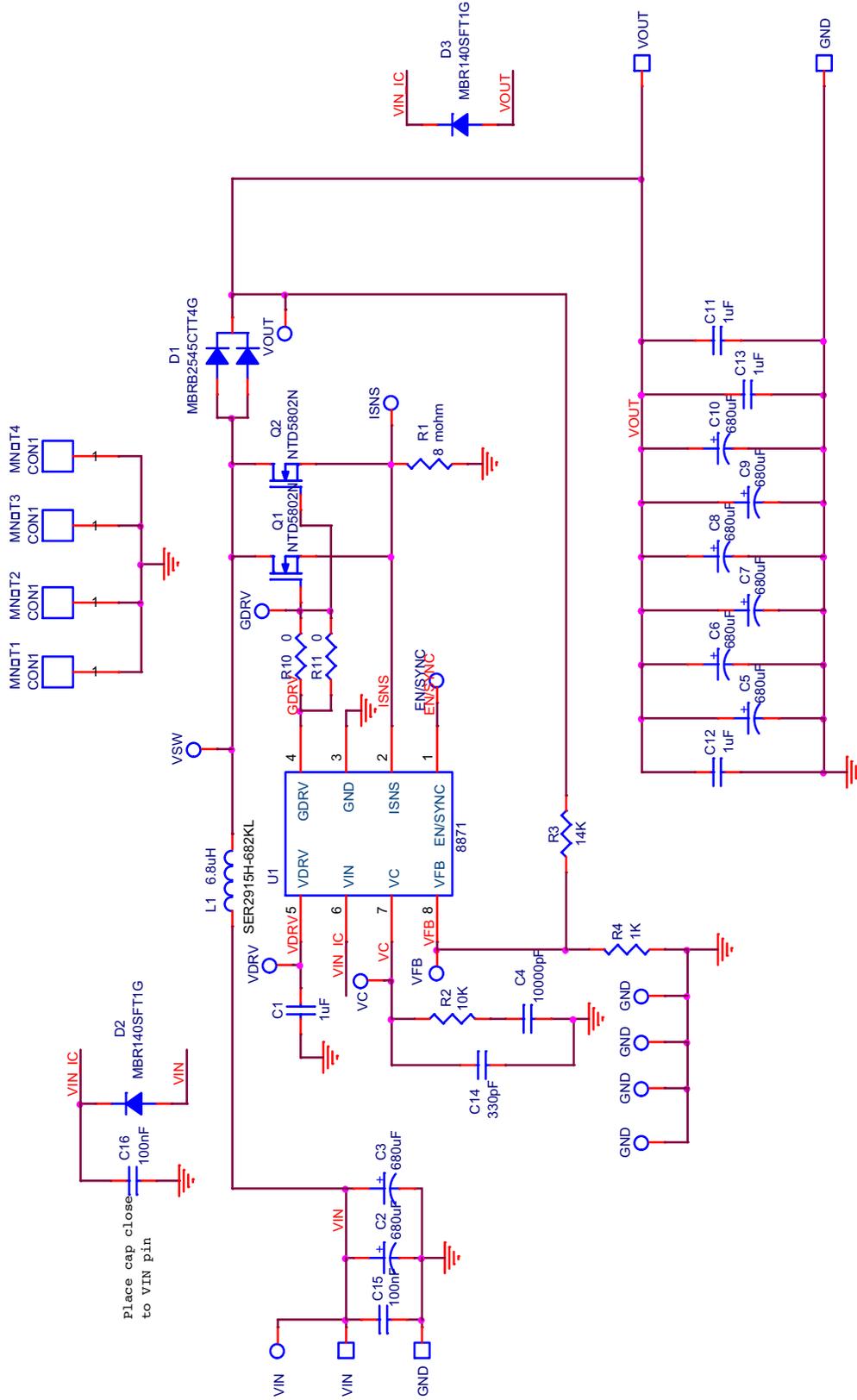


Figure 7. NCV8871BSTGEVB Evaluation Board Schematic

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## PCB Layout

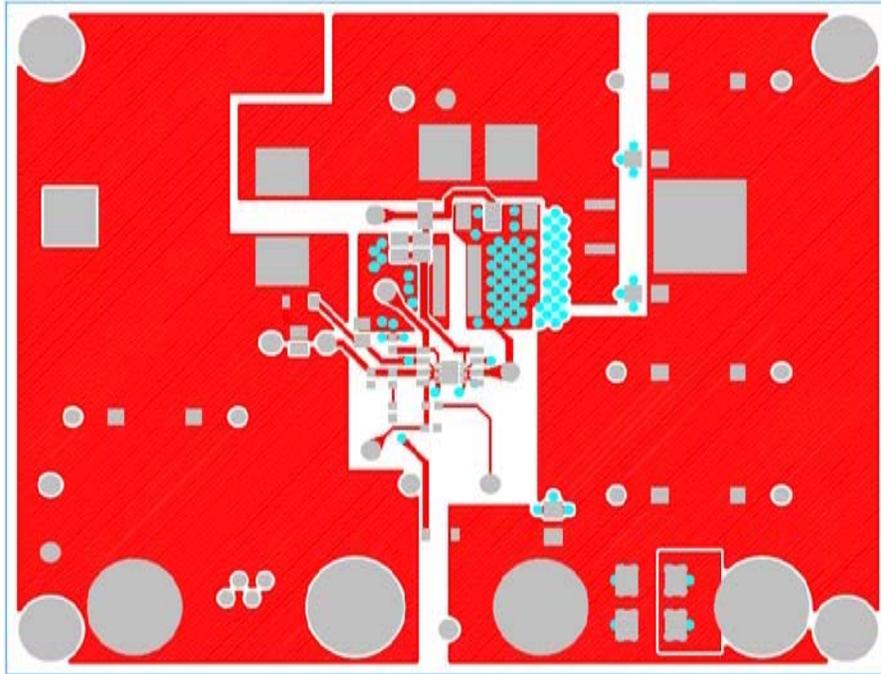


Figure 8. Top Layout

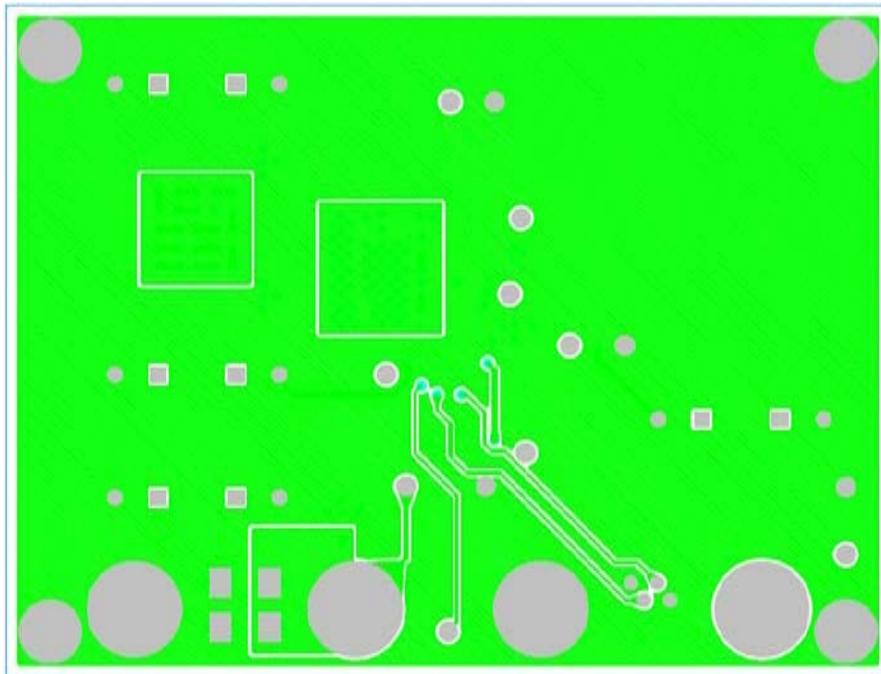


Figure 9. Bottom Layout

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**Table 4. BILL OF MATERIALS**

| QTY | Description                            | Value        | Tolerance | Footprint     | Manufacturer                         | Manufacturer's Part Number | Substitution Allowed | RoHS Compliant |
|-----|--|--------------|-----------|---------------|--------------------------------------|----------------------------|----------------------|----------------|
| 1   | CAP CER 1UF 16V X7R 0603               | 1 uF         | 10%       | 603           | Murata Electronics North America     | GRM188R71C105KA12D         | Yes                  | Yes            |
| 2   | CAP ELECT 1000UF 50V FK SMD            | 1000 uF      | 20%       | FKV_CAP       | Panasonic - ECG                      | EEE-FK1H102AM              | No                   | Yes            |
| 1   | CAP CER 33000PF 50V X7R 0603           | 33000 pF     | 10%       | 603           | Murata Electronics North America     | GRM188R71H333KA61D         | No                   | Yes            |
| 9   | CAP 180UF 50V ELECT FM RADIAL          | 180 uF       | 20%       | CAP_8P0       | Murata Electronics North America     | EEU-FM1H181L               | No                   | Yes            |
| 3   | CAP CER 1UF 50V X7R 1206               | 1 uF         | 10%       | 1206          | Murata Electronics North America     | GCM31MR71H105KA55L         | Yes                  | Yes            |
| 1   | CAP CER 2700PF 100V 10% X7R 0603       | 2700 pF      | 10%       | 603           | Murata Electronics North America     | GRM188R72A272KA01D         | No                   | Yes            |
| 2   | CAP CER .1UF 50V 10% X7R 0805          | 100 nF       | 10%       | 805           | Murata Electronics North America     | GRM21BR71H104KA01L         | Yes                  | Yes            |
| 1   | Do Not Populate                        |              |           | 603           |                                      |                            | Yes                  | Yes            |
| 1   | 45V, 30A D2PAK Schottky Rectifier      | 45 V / 30 A  | N/A       | D2PAK_3       | ON Semiconductor                     | MBRB2545CTT4G              | No                   | Yes            |
| 2   | DIODE SCHOTTKY 40V 1A SOD123FL         | 40 V / 1 A   | N/A       | SOD_123       | ON Semiconductor                     | MBR140SFT1G                | No                   | Yes            |
| 1   | CONN HEADER 4POS R/A 1.5MM TIN         | N/A          | N/A       | 4PINCONN      | Coilcraft Inc                        | 292206-4                   | No                   | Yes            |
| 1   | High Temp SMT Power Inductor 6.8uH     | 6.8 uH       | 30A       | SER2900       | Coilcraft Inc                        | SER2915H-682KL             | No                   | Yes            |
| 2   | MOSFET N-CH 40V 101A DPAK              | 40 V / 101 A | N/A       | DKPAK3_DMD    | ON Semiconductor                     | NTD5802NT4G                | No                   | Yes            |
| 1   | RES 0.008 OHM 3W 1% 3015 SMD           | 0.008        | 1%        | 3015          | Susumu                               | KRL7638-C-R008-F-T1        | No                   | Yes            |
| 1   | RES 6.34K OHM 1/10W 1% 0603 SMD        | 6.34 K       | 1%        | 603           | Vishay/Dale                          | CRCW06036K34FKEA           | Yes                  | Yes            |
| 1   | RES 14.0K OHM 1/10W 1% 0603 SMD        | 14.0 K       | 1%        | 603           | Vishay/Dale                          | CRCW060314K0FKEA           | Yes                  | Yes            |
| 1   | RES 1.00K OHM 1/10W 1% 0603 SMD        | 1.00 K       | 1%        | 603           | Vishay/Dale                          | CRCW06031K00FKEA           | Yes                  | Yes            |
| 2   | RES 0.0 OHM 1/8W 0805 SMD              | 0            | 5%        | 805           | Vishay/Dale                          | CRCW08050000Z0EA           | Yes                  | Yes            |
| 13  | PIN INBOARD .042" HOLE 1000/PKG        | N/A          | N/A       | TP            | Vector Electronics                   | K24C/M                     | Yes                  | Yes            |
| 4   | CONN JACK BANANA UNINS PANEL MOU       | N/A          | N/A       | BANANA        | Emerson Network Power Conn Solutions | 108-0740-001               | No                   | Yes            |
| 1   | Automotive Non-Sync Boost Controller   | N/A          | N/A       | SO-IC8_N_ADJ  | ON Semiconductor                     | NCV8871_00                 | No                   | Yes            |
| 1   | Automotive Non-Sync Boost Controller   | N/A          | N/A       | 10PINDFNP5    | ON Semiconductor                     | NCV8872_00                 | No                   | Yes            |
| 4   | Hex Spacer 4-40 1/2" Zinc Plated Steel | N/A          | N/A       | MOUN-THOLE125 | McMaster-Carr                        | 93620A432                  | Yes                  | Yes            |
| 4   | Hex Nut 4-40 1/4" Zinc Plated Steel    | N/A          | N/A       | MOUN-THOLE125 | McMaster-Carr                        | 90480A005                  | Yes                  | Yes            |

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