

NCV8871BSTGEVB

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



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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 those listed in the Maximum Ratings table may damage the device. If any of these limits are exceeded, device functionality should not be assumed, damage may occur and reliability may be affected.

Table 3. ELECTRICAL CHARACTERISTICS

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

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

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TYPICAL WAVEFORMS

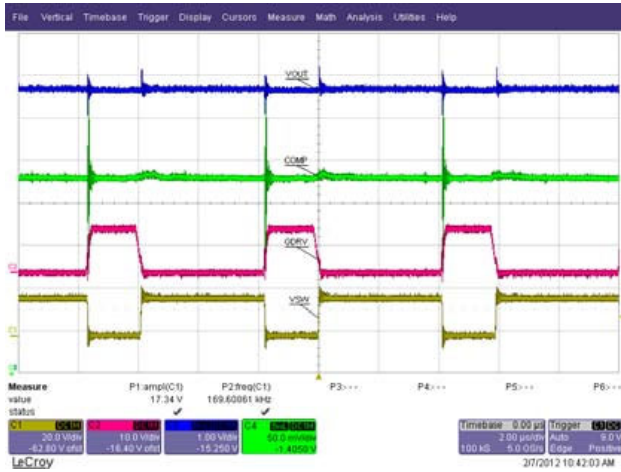


Figure 2. Normal Operation

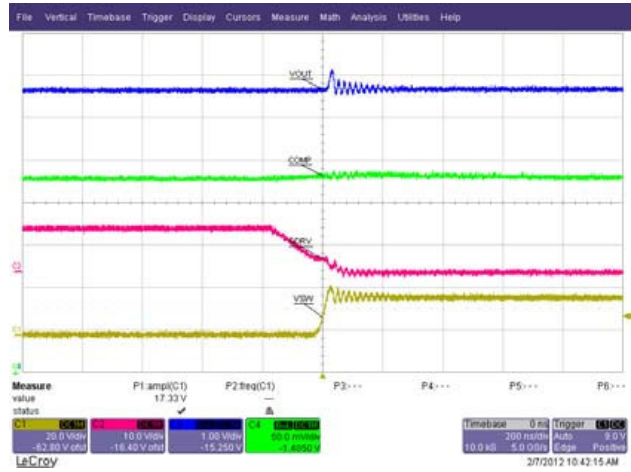


Figure 3. Gate Drive Falling Edge

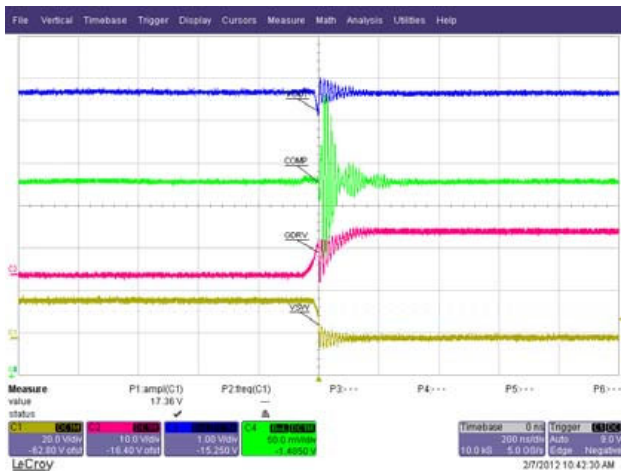


Figure 4. Gate Drive Rising Edge

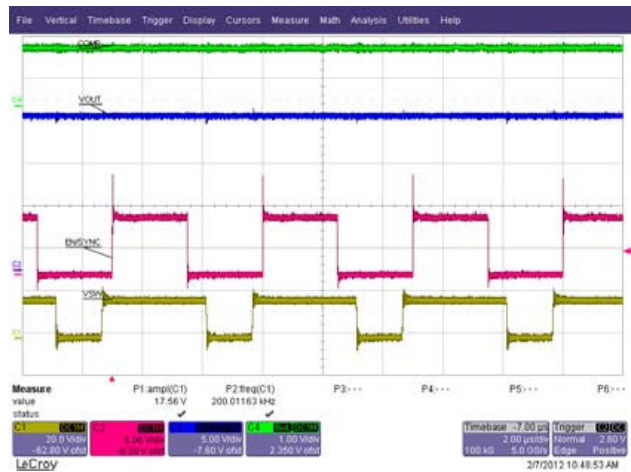


Figure 5. Synchronization

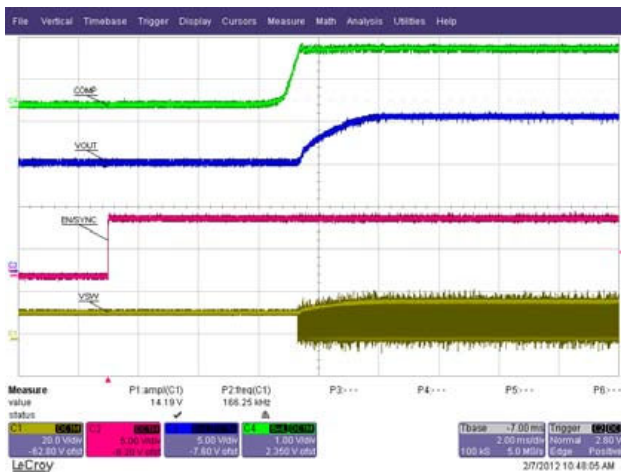


Figure 6. Soft Start with Load

SCHEMATIC



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PCB Layout

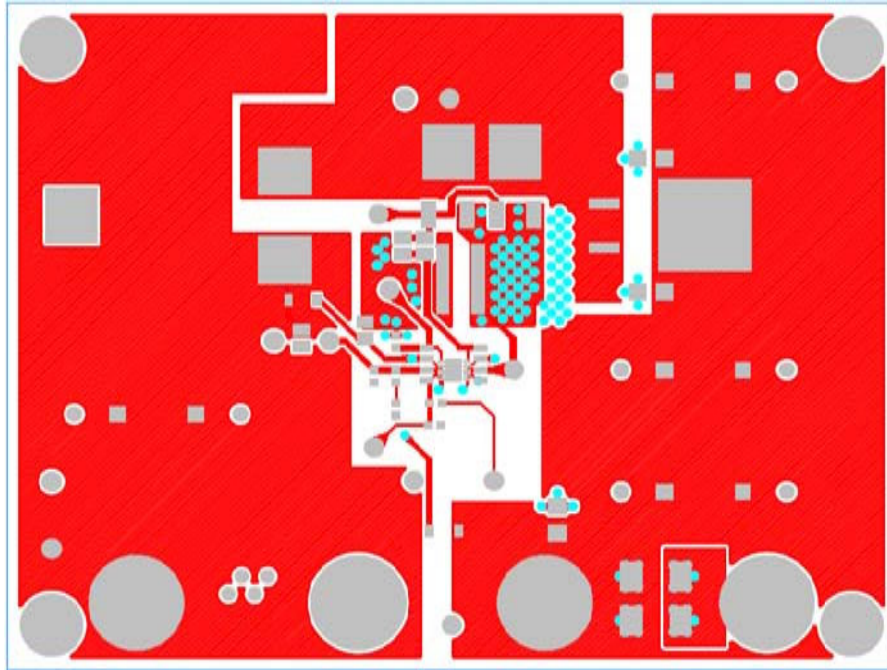


Figure 8. Top Layout

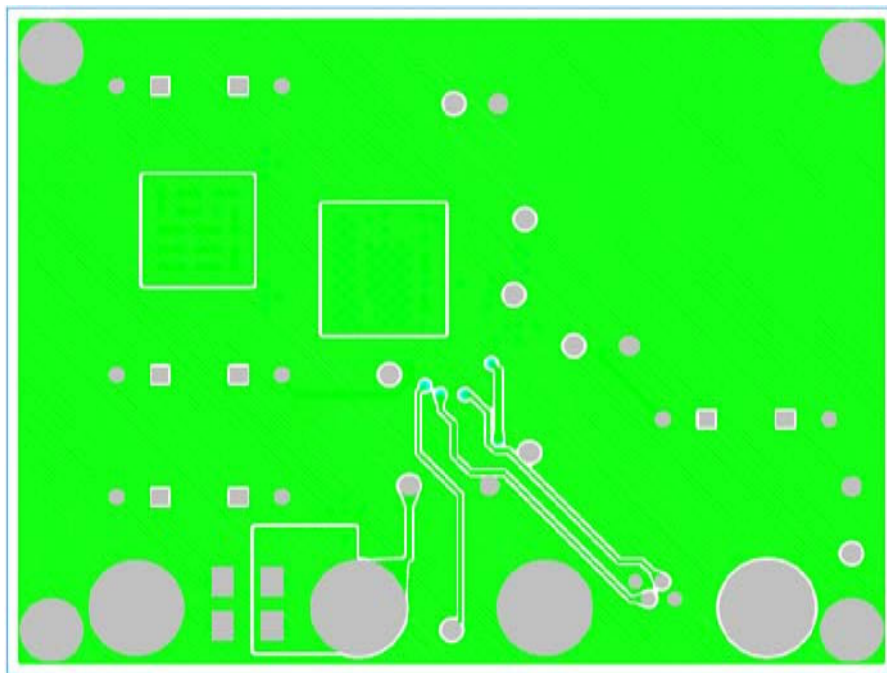


Figure 9. Bottom Layout

NCV8871BSTGEVB

Table 4. BILL OF MATERIALS

Reference Designator(s)	QTY	Description	Value	Tolerance	Footprint	Manufacturer	Manufacturer's Part Number	Substitution Allowed	RoHS Compliant
C1	1	CAP CER 1UF 16V X7R 0603	1 uF	10%	603	Murata Electronics North America	GRM188R71C105KA12D	Yes	Yes
C2, C3	2	CAP ELECT 1000UF 50V FK SMD	1000 uF	20%	FKV_CAP	Panasonic - ECG	EEE-FK1H102AM	No	Yes
C4	1	CAP CER 33000PF 50V X7R 0603	33000 pF	10%	603	Murata Electronics North America	GRM188R71H333KA61D	No	Yes
C5 thru C10, C18 thru C20	9	CAP 180UF 50V ELECT FM RADIAL	180 uF	20%	CAP_8P0	Murata Electronics North America	EEU-FM1H181L	No	Yes
C11, C12, C13	3	CAP CER 1UF 50V X7R 1206	1 uF	10%	1206	Murata Electronics North America	GCM31MR71H105KA55L	Yes	Yes
C14	1	CAP CER 2700PF 100V 10% X7R 0603	2700 pF	10%	603	Murata Electronics North America	GRM188R72A272KA01D	No	Yes
C15, C16	2	CAP CER .1UF 50V 10% X7R 0805	100 nF	10%	805	Murata Electronics North America	GRM21BR71H104KA01L	Yes	Yes
C17	1	Do Not Populate			603			Yes	Yes
D1	1	45V, 30A D2PAK Schottky Rectifier	45 V / 30 A	N/A	D2PAK_3	ON Semiconductor	MBRB2545CTT4G	No	Yes
D2, D3	2	DIODE SCHOTTKY 40V 1A SOD123FL	40 V / 1 A	N/A	SOD_123	ON Semiconductor	MBR140SFT1G	No	Yes
J1	1	CONN HEADER 4POS R/A 1.5MM TIN	N/A	N/A	4PINCONN	Coilcraft Inc	292206-4	No	Yes
L1	1	High Temp SMT Power Inductor 6.8uH	6.8 uH	30A	SER2900	Coilcraft Inc	SER2915H-682KL	No	Yes
Q1, Q2	2	MOSFET N-CH 40V 101A DPAK	40 V / 101 A	N/A	DPAK3_DMD	ON Semiconductor	NTD5802NT4G	No	Yes
R1	1	RES 0.008 OHM 3W 1% 3015 SMD	0.008	1%	3015	Susumu	KRL7638-C-R008-F-T1	No	Yes
R2	1	RES 6.34K OHM 1/10W 1% 0603 SMD	6.34 K	1%	603	Vishay/Dale	CRCW06036K34FKEA	Yes	Yes
R3	1	RES 14.0K OHM 1/10W 1% 0603 SMD	14.0 K	1%	603	Vishay/Dale	CRCW060314K0FKEA	Yes	Yes
R4	1	RES 1.00K OHM 1/10W 1% 0603 SMD	1.00 K	1%	603	Vishay/Dale	CRCW06031K00FKEA	Yes	Yes
R10, R11	2	RES 0.0 OHM 1/8W 0805 SMD	0	5%	805	Vishay/Dale	CRCW08050000Z0EA	Yes	Yes
TP1 thru 6, 7, 9, 14 thru 17, 20	13	PIN INBOARD .042" HOLE 1000/PKG	N/A	N/A	TP	Vector Electronics	K24C/M	Yes	Yes
TP10, 11, 12, 13	4	CONN JACK BANANA UNINS PANEL MOU	N/A	N/A	BANANA	Emerson Network Power Conn Solutions	108-0740-001	No	Yes
U1	1	Automotive Non-Sync Boost Controller	N/A	N/A	SOIC8_N_ADJ	ON Semiconductor	NCV8871_00	No	Yes
U2	1	Automotive Non-Sync Boost Controller	N/A	N/A	10PINDFNP5	ON Semiconductor	NCV8872_00	No	Yes
MNT1, 2, 3, 4	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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