LTC3260EMSE
High Voltage, Low Noise, Dual Supply Inverting Charge Pump

DESCRIPTION

Demonstration circuit 1793A is a high voltage inverting charge pump with low noise dual-polarity LDO regulators featuring the LTC®3260EMSE. The LTC3260 operates with an input voltage from 4.5V to 32V. The demo board provides selectable LDO± output set magnitudes of 3.3V, 5V, 12V and 24V for each polarity. Additional LDO± set point jumper selections and optional topside ADJ± resistors allow the user to set other desired LDO± output voltages. The demo board also provides the means to select between Burst Mode® operation or constant-frequency mode operation, plus select an operating frequency of 500kHz, 200kHz, and 50kHz.

The LTC3260 data sheet gives a complete description of the device, operation and application information. The data sheet must be read in conjunction with this quick start guide for demo circuit 1793A.

Design files for this circuit board are available at http://www.linear.com/demo

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PERFORMANCE SUMMARY

Specifications are at T_A = 25°C

SYMBOL	PARAMETER	CONDITIONS	MIN	TYP	MAX	UNITS
V_{IN}	Input Voltage		4.5		32	V
VLDO+	LDO+ Output Voltage	V_{IN} ≥ LDO+ Set Point + 0.8V	1.2		32	V
VLDO–	LDO– Output Voltage	V_{OUT} ≤ LDO– Set Point – 0.5V	–32		–1.2	V
V_{OUT}	Output Voltage	MODE = 0V MODE ≥ 2V		$–V_{IN}$ $–0.94 • V_{IN}$		V V

QUICK START PROCEDURE

Refer to Figure 1 for the proper measurement equipment setup and jumper settings, and follow the procedure below.

NOTE: When measuring the input or output voltage ripple, care must be taken to avoid a long ground lead on the oscilloscope probe. Measure the input or output voltage ripple by touching the probe tip directly across the V_{IN} or V_{OUT} and GND terminals. See Figure 2 for proper scope probe technique.

1. Make sure the jumper settings are as follows:

   JP1: EN+ is in the ON position.

   JP2: EN– is in the ON position.

   JP3: MODE is in the BURST position.

   JP4: FREQ is in the 500kHz position.

   JP5: LDO+ is set to the 5V setting.

   JP6: LDO– is set to the –5V setting.

2. Set PS1 to 12V.

QUICK START PROCEDURE

3. Slowly increase the load on LDO– to –50mA and observe how the output ripple on V_{OUT} changes and how the burst frequency increases. When the load is large enough, the charge pump will run constant frequency to keep V_{OUT} in regulation.
4. Slowly increase the load on LDO+ to 50mA and observe the output ripple and the output voltage on LDO+.
5. Set the LDO+ load and the LDO– load to 0mA and turn off PS1.

   NOTE: To avoid applying an overvoltage to the ADJ± pins, power must be turned off before changing the LDO+ or LDO– jumpers.
6. Set the JP5 LDO+ jumper to the 3.3V position and JP6 LDO– to the –3.3V position.
7. Repeat steps 2 through 5.
8. Set the JP5 LDO+ jumper to the 12V position and JP6 LDO– to the –12V position.
9. Turn on and set PS1 to 15V.
10. Repeat steps 3 through 5.
11. Set the JP5 LDO+ jumper to the 24V position and JP6 LDO– to the –24V position.
12. Turn on and set PS1 to 32V.
13. Repeat steps 3 through 6.
14. Turn on and set PS1 to 12V.
15. Slowly increase the load on V_{OUT} to –100mA and observe the output ripple and output voltage on V_{OUT}.
16. Set the load on V_{OUT} to 0mA.
17. Change the JP3 MODE jumper from Burst Mode operation to constant-frequency mode and repeat steps 14 and 15.
18. Change the JP4 FREQ jumper from 500kHz to 200kHz, then slowly increase the load on V_{OUT} from 0mA to –50mA and observe the output ripple and output voltage on V_{OUT}.
19. Set the load on V_{OUT} to 0mA.
20. Change the JP4 FREQ jumper from 200kHz to 50kHz. Slowly increase the load on V_{OUT} from 0mA to –10mA and observe the output ripple and output voltage on V_{OUT}.

Figures 4 and 5 illustrate how the efficiency varies with load current in Burst Mode operation and in constant-frequency mode operation.

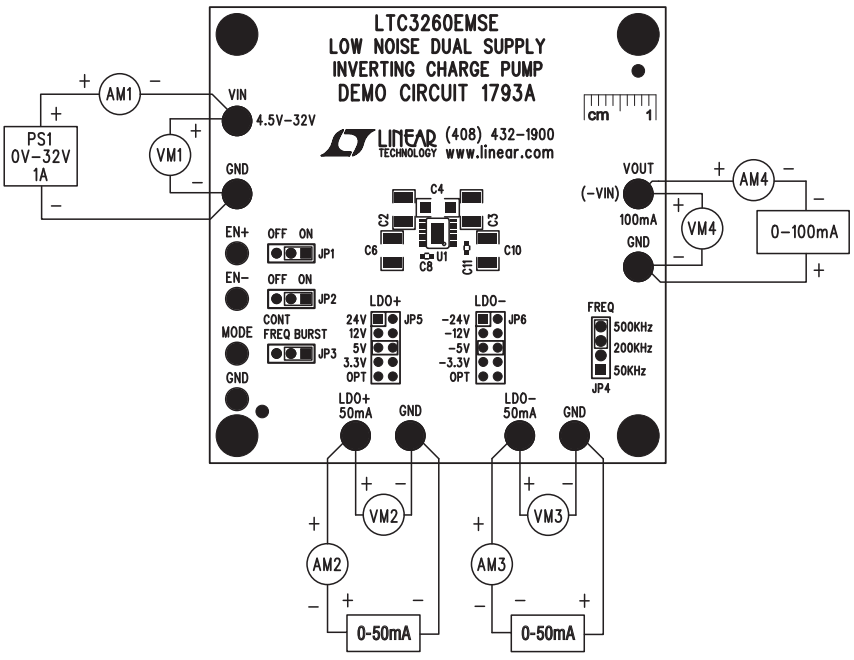

Figure 1. Proper Measurement Equipment Setup for DC1793A

QUICK START PROCEDURE

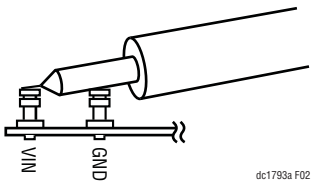

Figure 2. Measuring Input or Output Ripple

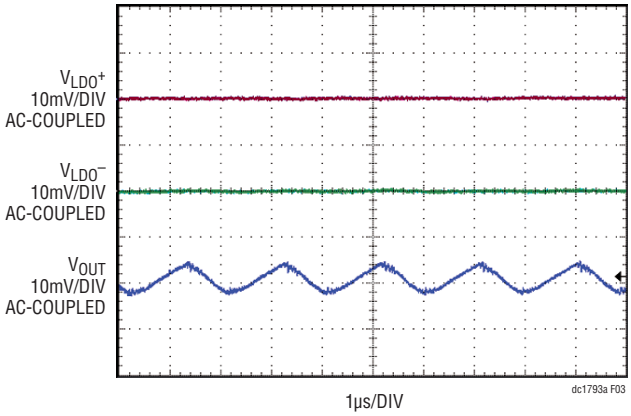

Figure 3. LDO Rejection of V_{OUT} Ripple

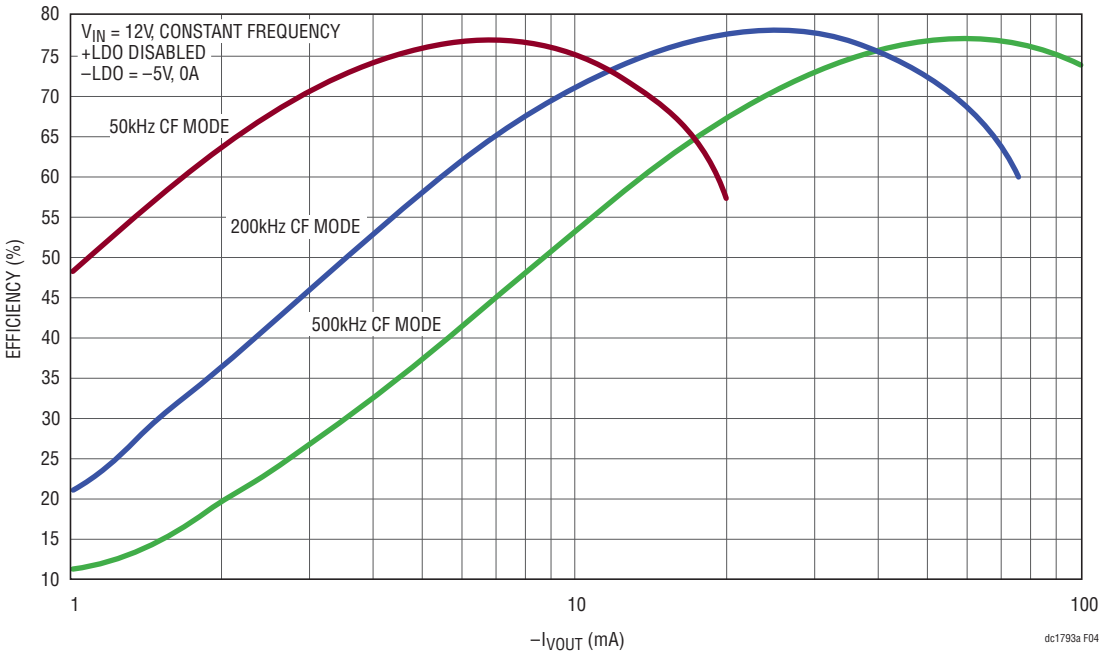

Figure 4. V_{IN} to V_{OUT} Constant-Frequency Mode Operation Efficiency

QUICK START PROCEDURE

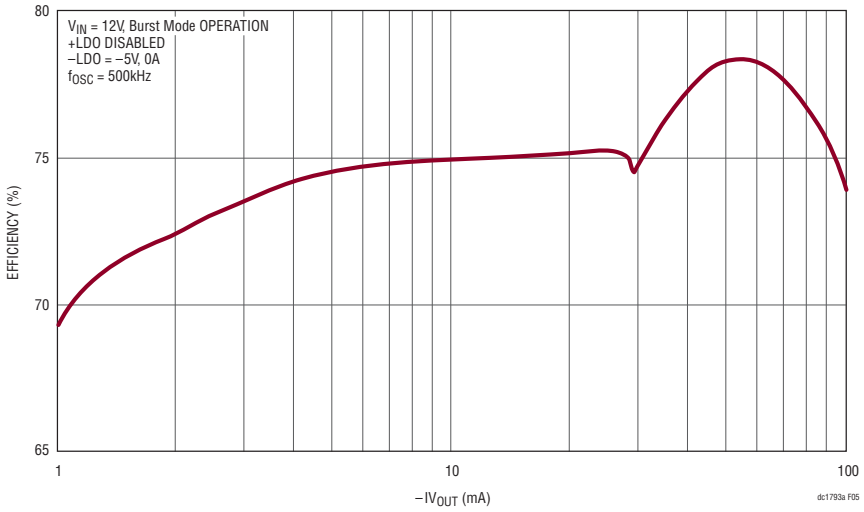

Figure 5. V_{IN} to V_{OUT} Burst Mode Operation Efficiency

PARTS LIST

ITEM	QTY	REFERENCE	PART DESCRIPTION	MANUFACTURER/PART NUMBER
Required Circuit Components				
1	4	C2, C3, C6, C10	CAP, CER, 10µF, 50V, X7S, 10%, 1210	TDK, C3225X7S1H106K
2	1	C4	CAP, CER, 1µF, 50V, X7R, 10%, 1206	MURATA, GRM31MR71H105KA88
3	2	R11, R18	RES, 100k, 1/16W, 1%, 0402, SMD	VISHAY, CRCW0402100KFKED
4	1	U1	LOW NOISE DUAL-SUPPLY INVERTING CHARGE PUMP	LINEAR TECHNOLOGY, LTC3260EMSE#PBF
Additional Demo Board Circuit Components				
5	1	C1	CAP, CER, 4.7µF, 50V, X7R, 10%, 1210	MURATA, GRM32ER71H475KA88L
6	0	C5, C7, C9 (OPT)	CAP, CER, 0603, 50V	OPT
7	2	C8, C11	CAP, CER, 0.01µF, 25V, X7R, 10%, 0402	MURATA, GRM155R71E103KA01D
8	3	R1, R8, R10	RES, 1MΩ, 1/16W, 5%, 0402, SMD	VISHAY, CRCW04021M00JNED
9	2	R2, R13	RES, 1.91MΩ, 1/16W, 1%, 0402, SMD	VISHAY, CRCW04021M91FKED
10	2	R3, R14	RES, 909k, 1/16W, 1%, 0402, SMD	VISHAY, CRCW0402909KFKED
11	2	R5, R16	RES, 174k, 1/16W, 1%, 0402, SMD	VISHAY, CRCW0402174KFKED
12	0	R6, R17 (OPT)	RES, 0402, SMD	OPT
13	3	R7, R9, R12	RES, 1k, 1/16W, 5%, 0402, SMD	VISHAY, CRCW04021K00FKED
14	1	R19	RES, 1MΩ, 1/16W, 1%, 0402, SMD	VISHAY, CRCW04021M00FKED
15	1	R20	RES, 200k, 1/16W, 1%, 0402, SMD	VISHAY, CRCW0402200KFKED
Hardware: For Demo Board Only				
17	3	JP1-JP3	HEADER, 3 PIN, 1 ROW, 0.079"	SAMTEC, TMM-103-02-L-S
18	1	JP4	HEADER, 4 PIN, 1 ROW, 0.079"	SAMTEC, TMM-104-02-L-S
19	2	JP5, JP6	HEADER, 2×5 PINS, 2mm	SAMTEC, TMM-105-02-L-D
20	6	JP1-JP6	SHUNT, 2mm	SAMTEC, 2SN-KB-G
21	8	E1, E2, E7-E12	TP, TURRET, 0.094", PBF	MILL-MAX, 2501-2-00-80-00-00-07-0
22	4	E3-E6	TURRET, 0.061", DIA	MILL-MAX, 2308-2-00-80-00-00-07-0

SCHEMATIC DIAGRAM

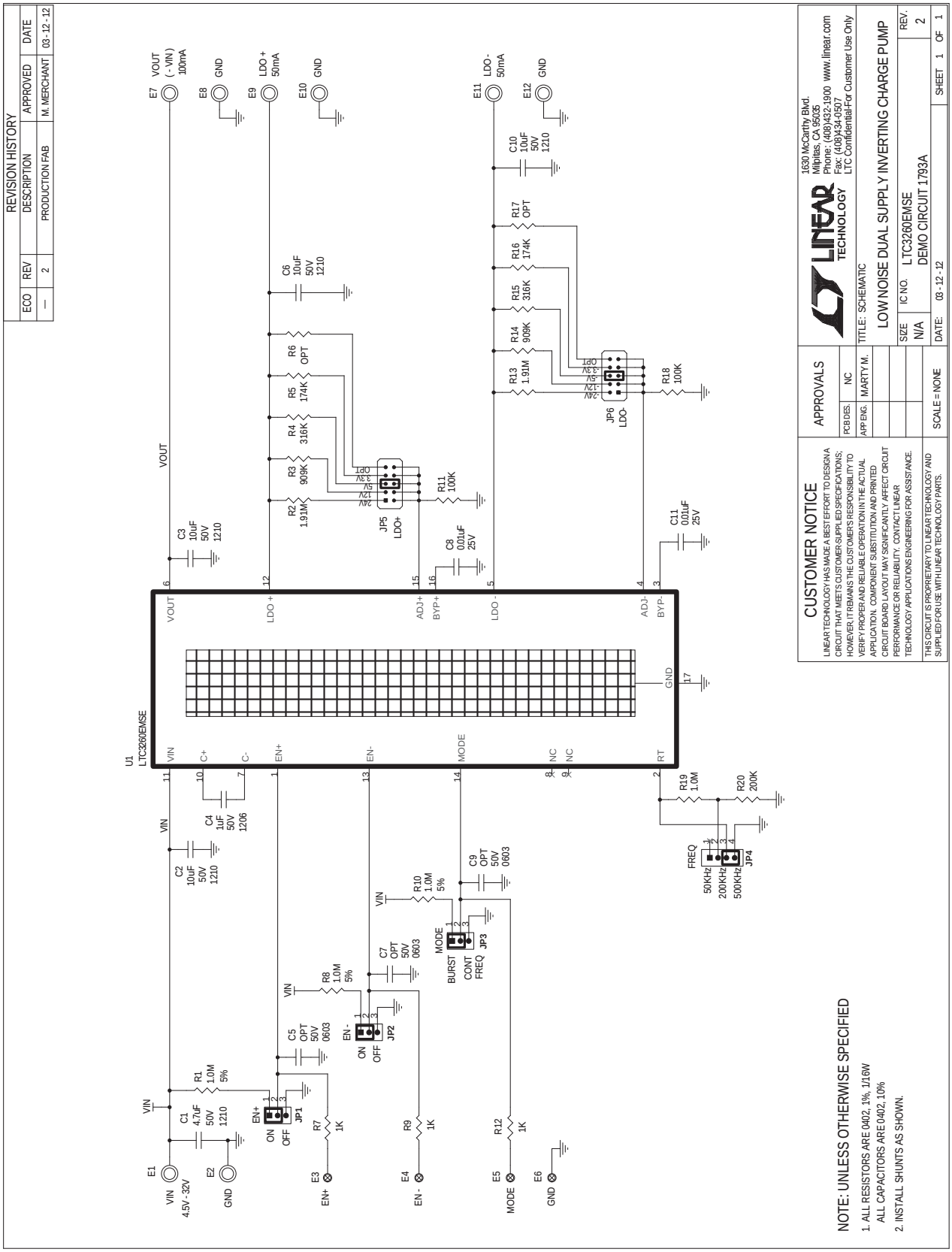

Figure 6. LTC3260EMSE Low Noise Dual Supply Inverting Charge Pump

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This notice contains important safety information about temperatures and voltages. For further safety concerns, please contact a LTC application engineer.

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