



EV3120-J-00A

1.2A, 1.1MHz Synchronous Boost Converter Evaluation Board

DESCRIPTION

The EV3120-J-00A is a Boost converter evaluation board for the MP3120DJ, a synchronous, 1.1MHz fixed frequency, current mode step-up converter with output to input disconnect.

It can startup from an input voltage as low as 0.85V and provides inrush current limiting as well as output short circuit protection.

The output voltage also can be regulated when $V_{IN} > V_{OUT}$, and the P-channel MOS is no longer act as a low impedance switch.

The EV3120-J-00A regulates the output voltage up to 3.3V from single cell AA battery without the uses of an external Schottky diode.

The MP3120DJ is offered in a TSOT23-6 package.

ELECTRICAL SPECIFICATION

| Parameter | Symbol | Value | Units |
|----------------|-----------|--------|-------|
| Input Voltage | V_{IN} | 0.85-5 | V |
| Output Voltage | V_{OUT} | 3.3 | V |

FEATURES

- Up to 96% Efficiency
- True Output Load Disconnect
- Inrush Current Limiting and Internal Soft-Start
- Low Voltage Start-Up: 0.85V
- Internal Synchronous Rectifier
- Current Mode Control with Internal Compensation
- Short-Circuit Protection
- 1.1MHz Fixed Frequency Switching
- Input Range: 0.85V to 5V
- Output Range: 2.5V to 5V
- Tiny External Components
- Small 6-lead ThinSOT Package

APPLICATION

- Single-cell, Two-cell and Three-cell Alkaline, NiCd or NiMH or single-cell Li Battery Consumer Products
- MP3 Players
- Wireless Mouse
- Audio Recorders

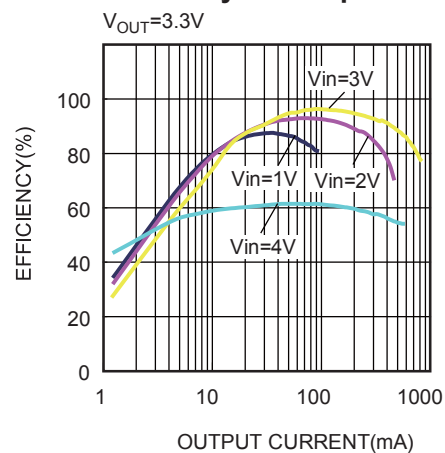
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EV3120-J-00A EVALUATION BOARD

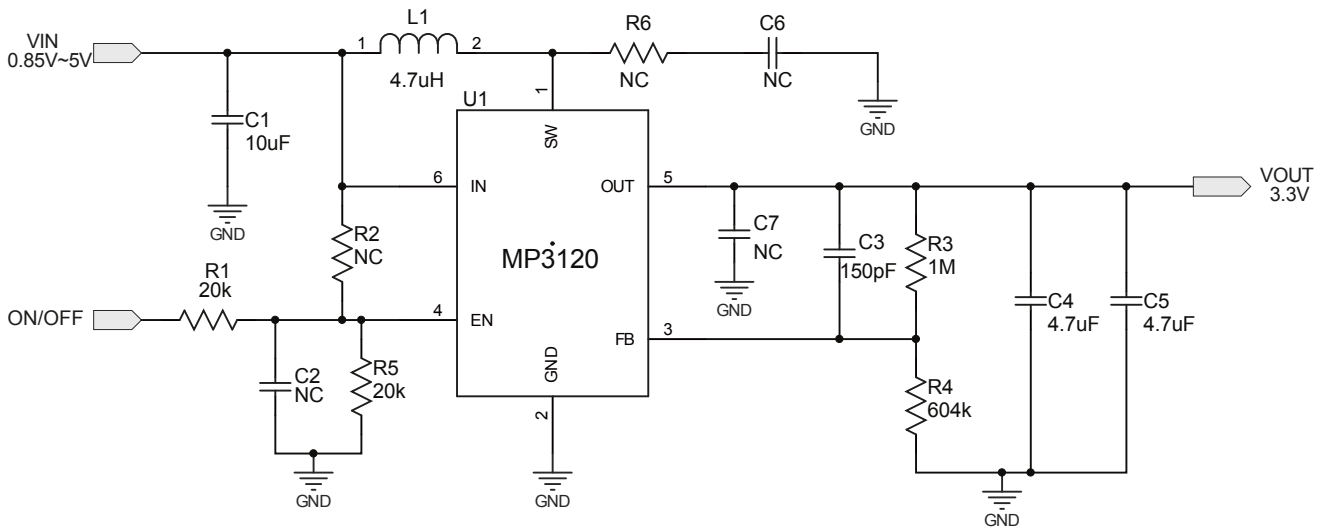


| Board Number | MPS IC Number |
|--------------|---------------|
| EV3120-J-00A | MP3120DJ |

Efficiency vs. Output Current



EVALUATION BOARD SCHEMATIC



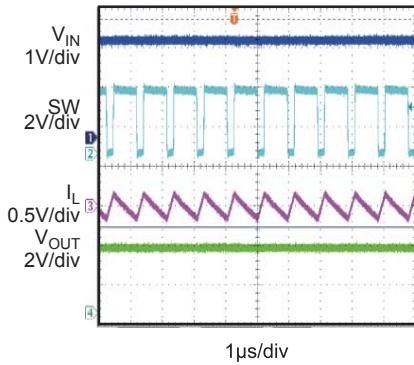
EV3120-J-00A BILL OF MATERIALS

| Qty | Ref | Value | Description | Package | Manufacturer | Manufacturer P/N |
|-----|--------|--------|---------------------------------------|----------|--------------|------------------|
| 1 | U1 | MP3120 | Boost converter | TSOT23-6 | MPS | MP3120DJ |
| 1 | L1 | 4.7μH | R _{DC} =19.5mΩ, 7A inductor, | SMD | Würth | 744311470 |
| 1 | C1 | 10μF | Ceramic Capacitor,25V,X7R | 1206 | TDK | C3216X7R1E106K |
| 1 | C2 | NC | | | | |
| 1 | C3 | 150pF | Ceramic Capacitor,50V,X7R | 0603 | TDK | C1608X7R1C151K |
| 2 | C4,C5 | 4.7μF | Ceramic Capacitor,16V,X7R | 1206 | TDK | C3216X7R1C475K |
| 2 | C6,C7 | NC | | | | |
| 2 | R1, R5 | 20k | Resistor 5% | 0603 | Yageo | RC0603JR-0720KL |
| 2 | R2,R6 | NC | | | | |
| 1 | R3 | 1M | Resistor 1% | 0603 | Yageo | RC0603FR-071ML |
| 1 | R4 | 604k | Resistor 1% | 0603 | Yageo | RC0603FR-07604KL |

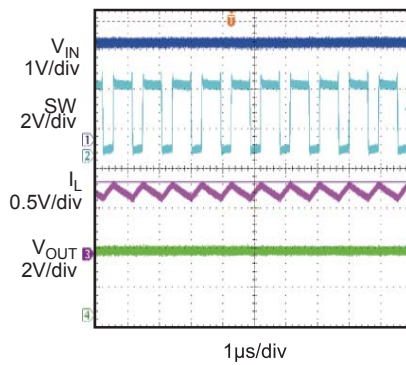
TEST RESULT

C1=10μF, C2=C3=4.7μF, L1=4.7μH, TA=25°C, unless otherwise noted.

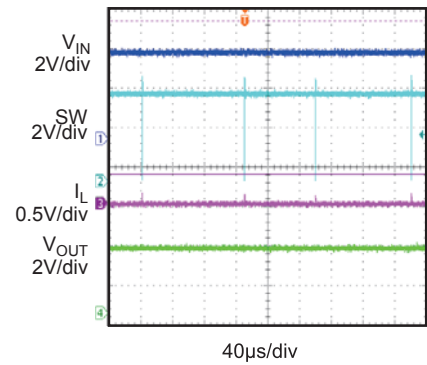
Steady Waveform
VIN=2.5V, VOUT=3.3V, IOUT=0mA



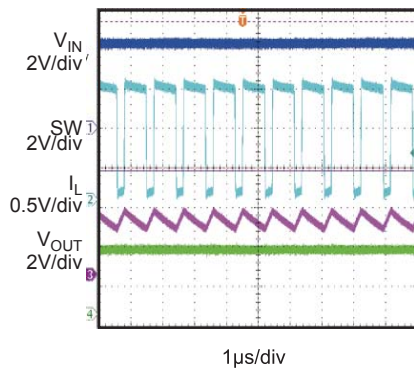
Steady Waveform
VIN=2.5V, VOUT=3.3V, IOUT=500mA



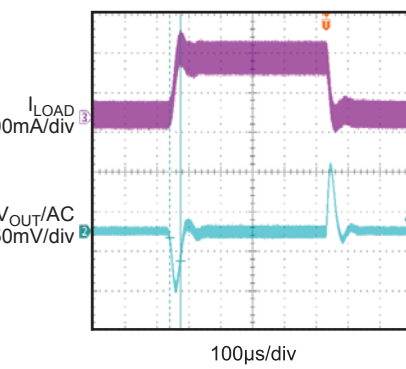
Steady Waveform
VIN=4.4V, VOUT=3.3V, IOUT=0mA



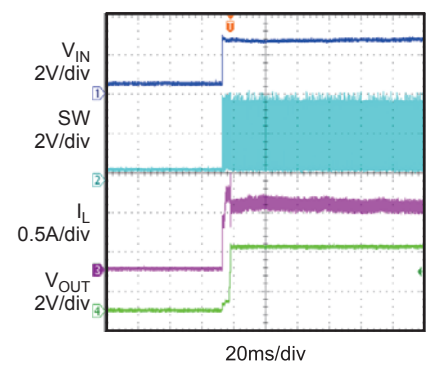
Steady Waveform
VIN=4.4V, VOUT=3.3V, IOUT=500mA



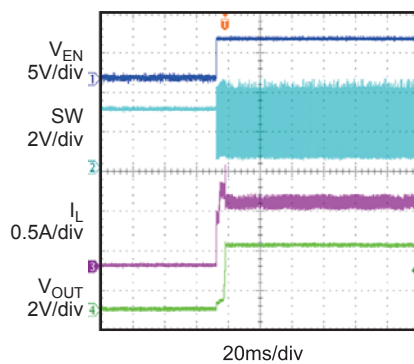
Load Transient Waveform
VIN=2.5V, VOUT=3.3V, IOUT=0mA to 200mA



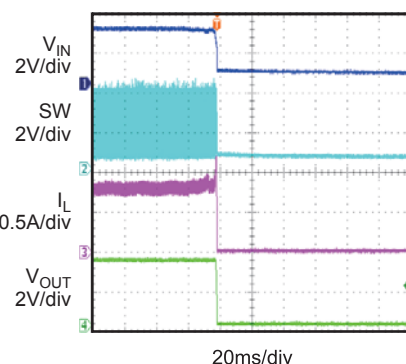
VIN Startup
VIN=2.5V, VOUT=3.3V, IOUT=500mA



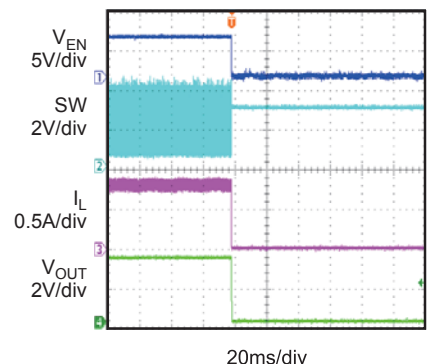
EN Startup
VIN=2.5V, VOUT=3.3V, IOUT=500mA



VIN Shut down
VIN=2.5V, VOUT=3.3V, IOUT=500mA



EN Shut down
VIN=2.5V, VOUT=3.3V, IOUT=500mA

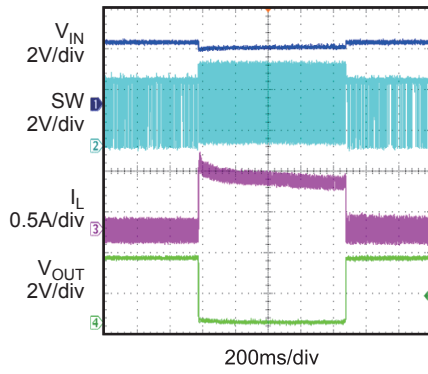


TEST RESULT

C1=10 μ F, C2=C3=4.7 μ F, L1=4.7 μ H, T_A=25°C, unless otherwise noted.

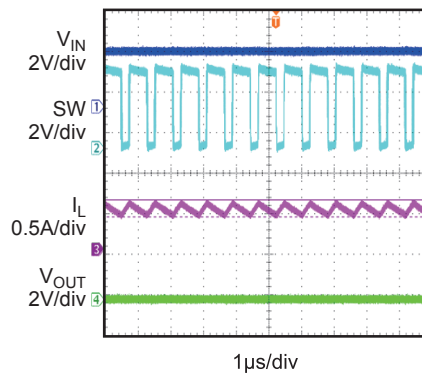
Short Circuit and Recovery

V_{IN}=3V



Short Circuit Steady Waveform

V_{IN}=3V



PRINTED CIRCUIT BOARD LAYOUT

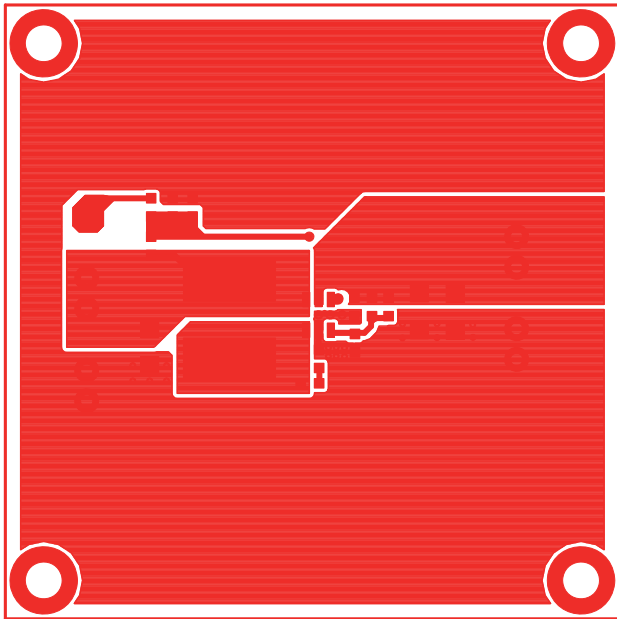


Figure1-Top layer

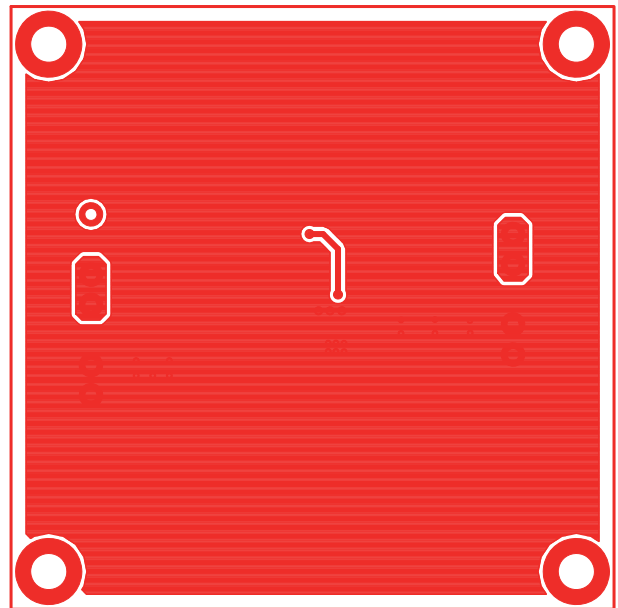


Figure2-Bottom Layer

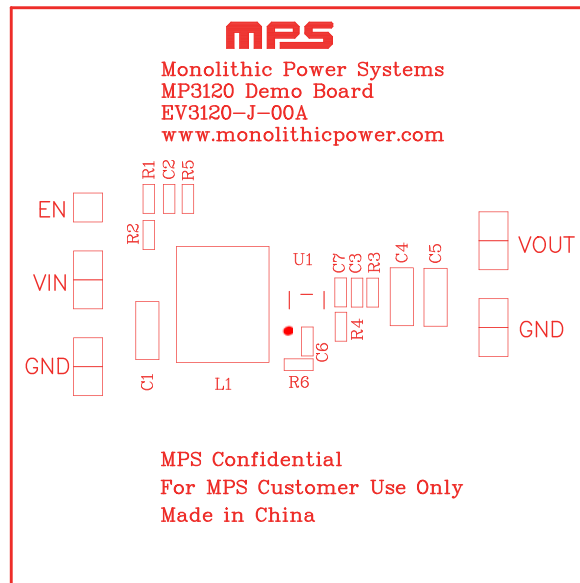


Figure3-Top Silk Layer

QUICK START GUIDE

The output voltage of this board is set to 3.3V. The board layout accommodates most commonly used inductors and output capacitors.

1. Preset power supply to $0.85V \leq V_{IN} \leq 5V$;
2. Turn off the power supply;
3. Connect power supply terminals to
Positive (+): VIN
Negative (-): GND
4. Connect Load to:
Positive (+): OUT
Negative (-): GND
5. Connect the EN to 5V power supply
Positive (+): EN
Negative (-): GND
6. Turn on the power supply.
7. The V_{OUT} of the EVB is set to 3.3V. If other output voltage is needed, adjust V_{OUT} with the formula:

$$V_{OUT} = V_{FB} \times \frac{R3 + R4}{R4}$$

Where $V_{FB}=1.21V$.

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