

GENERAL DESCRIPTION

The EVQ1531-M-00A Evaluation Board is designed to demonstrate the capabilities of MPS' MP1531 triple output step-up converter with charge-pumps.

The MP1531 includes a 250KHz fixed-frequency step-up converter and a positive and negative linear regulator. The linear regulators are powered via charge-pumps driven by the step-up converter switch node.

A single on/off control enables all 3 outputs. The outputs are internally sequenced at power-on for ease of use. An internal soft-start prevents overloading the input source at startup. Cycle-by-cycle current limit reduces component stress.

ELECTRICAL SPECIFICATION

Parameter	Symbol	Value	Units
Input Voltage	V_{IN}	2.7-5.0	V
Main Output Voltage	V_{MAIN}	5	V
Main Output Current	I_{MAIN}	100	mA
(+) Charge Pump Voltage	V_{GH}	15	V
(+) Charge Pump Current	I_{GH}	5	mA
(-) Charge Pump Voltage	V_{GL}	-10	V
(-) Charge Pump Current	I_{GL}	5	mA

FEATURES

- 2.7V to 5.5V Operating Input Range
- 500mA Switch Current Limit
- 3 Outputs in Single Package
 - Step-Up Converter up to 22V
 - Positive 10mA Linear Regulator
 - Negative 10mA Linear Regulator
- 250mΩ Internal Power MOSFET Switch
- Up to 95% Efficiency
- 1μA Shutdown Mode
- Fixed 250KHz Frequency
- Positive Regulator up to 38V
- Negative Regulator down to -20V
- Internal Power-On Sequencing
- Adjustable Soft-Start/Fault Timer
- Thermal Shutdown
- Cycle-by-Cycle Over Current Protection
- Under Voltage Lockout
- Ready Flag

APPLICATIONS

- TFT LCD Displays
- Portable DVD Players
- Tablet PCs
- Car Navigation Displays

All MPS parts are lead-free, halogen free, and adhere to the RoHS directive. For MPS green status, please visit MPS website under Quality Assurance.

"MPS" and "The Future of Analog IC Technology" are Registered Trademarks of Monolithic Power Systems, Inc.

EVQ1531-M-00A EVALUATION BOARD

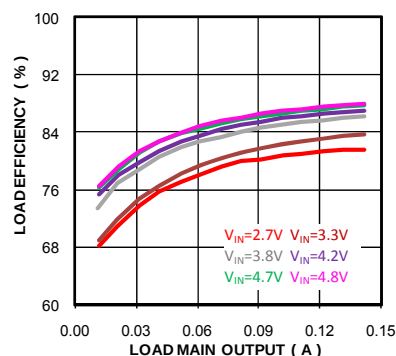


Dimensions (2.34"X x 2.25"Y x 0.50"Z)

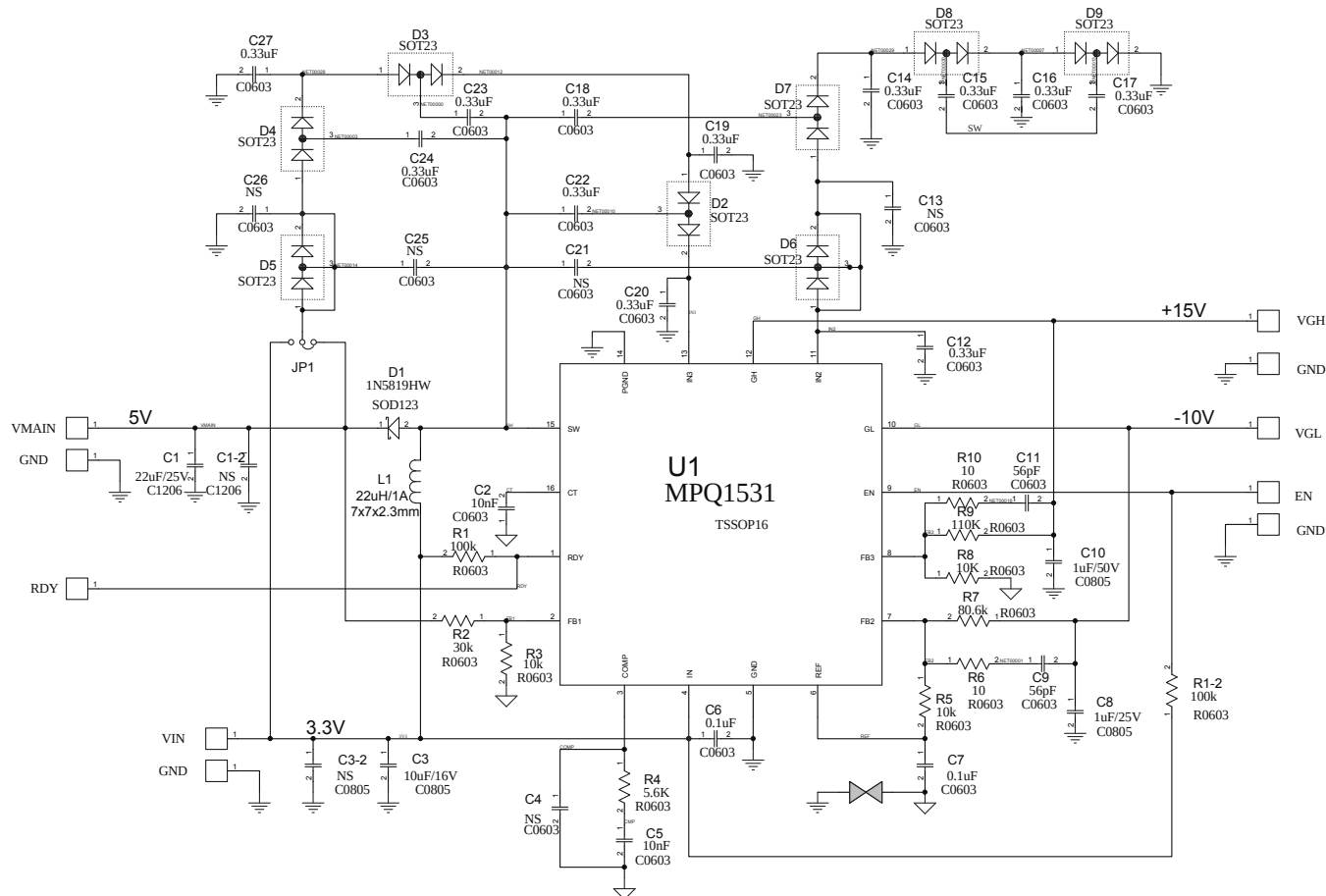
Board Number	MPS IC Number
EVQ1531-M-00A	MPQ1531DM

Load Efficiency

$V_{MAIN}=5V$, $V_{GH}=15V/5mA$, $V_{GL}=-10V/5mA$



EVALUATION BOARD SCHEMATIC



EVQ1531-M-00A BILL OF MATERIALS

Qty	Ref	Value	Description	Package	Manufacturer	Manufacturer P/N
1	C1	22µF	22µF, Ceramic Capacitor, 25V, X5R	1206	Murata	GRM31CR61E226KE15L
7	C1-2, C3-2, C4, C13, C21, C25, C26	NS		0603	Murata	
2	C2, C5	10nF	10nF, Ceramic Capacitor, 50V, X7R	0603	Murata	GRM188R71H103KA01D
1	C3	10µF	10µF, Ceramic Capacitor, 16V, X5R	0805	Murata	GRM21BR61C106KE15L
2	C6, C7	0.1µF	0.1µF, Ceramic Capacitor, 50V, X7R	0603	Murata	GRM188R71H104KA93D
2	C8, C10	1µF	1µF, Ceramic Capacitor, 50V, X7R	0805	Murata	GRM21BR71H105KA12X
2	C9, C11	56pF	56pF, Ceramic Capacitor, 50V, NPO	0603	Murata	GRM1885C1H560JA01D

EVQ1531-M-00A BILL OF MATERIALS *(continued)*

Qty	Ref	Value	Description	Package	Manufacturer	Manufacturer P/N
12	C12, C14, C15, C16, C17, C18, C19, C20, C22, C23, C24, C27	0.33 μ F	0.33 μ F, Ceramic Capacitor, 50V, X7R	0603	TDK	C1608X5R1H334K080AB
1	D1	1A	Schottky Diode, 40V, 1A	SOD-123	Diodes	1N5819HW-7
6	D2, D3, D4, D7, D8, D9	BAS40-04	Schottky Diodes, Dual, 40V, 200mA	SOT23	Diodes	BAS40-04-7
2	D5, D6	NS		SOT23		
1	L1	22 μ H	22 μ H, 1.2A, 0.12 Ω , SMD	WE-6823	Wurth Elektronik	744 062 220
2	R1, R1-2	100K	Resistor, 5%, 1/10W	0603	GENERIC	GENERIC
1	R2	30K	Resistor, 5%, 1/10W	0603	GENERIC	GENERIC
3	R3, R5, R8	10K	Resistor, 5%, 1/10W	0603	GENERIC	GENERIC
1	R4	5.6K	Resistor, 1%, 1/10W	0603	GENERIC	GENERIC
2	R6, R10	10	Resistor, 5%, 1/10W	0603	GENERIC	GENERIC
1	R7	80.6K	Resistor, 1%, 1/10W	0603	GENERIC	GENERIC
1	R9	110K	Resistor, 1%, 1/10W	0603	GENERIC	GENERIC
1	U1		MPQ1531, TSSOP16	TSSOP16	MPS	MPQ1531DM

PRINTED CIRCUIT BOARD LAYOUT

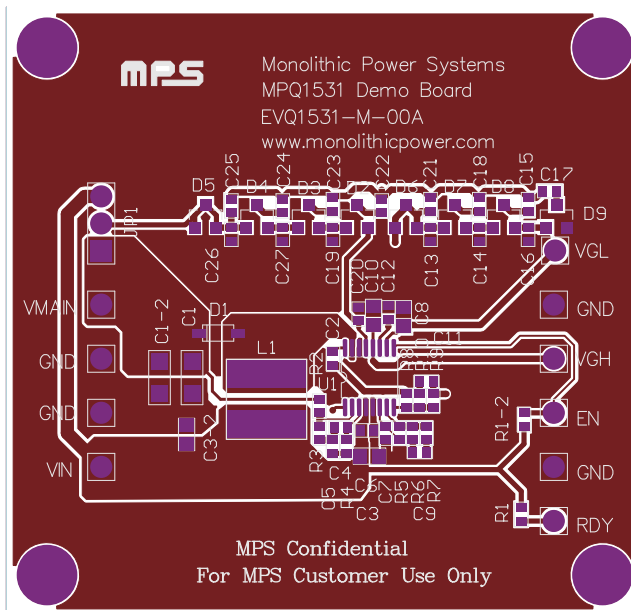


Figure 1—Top Silk Layer

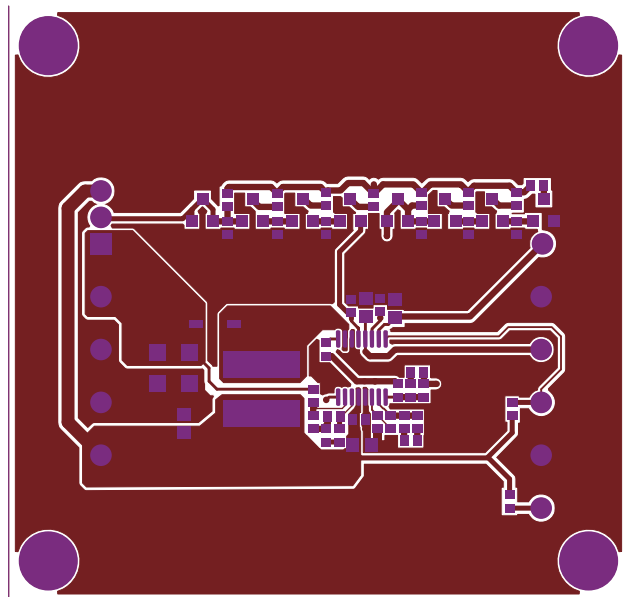


Figure 2—Top Layer

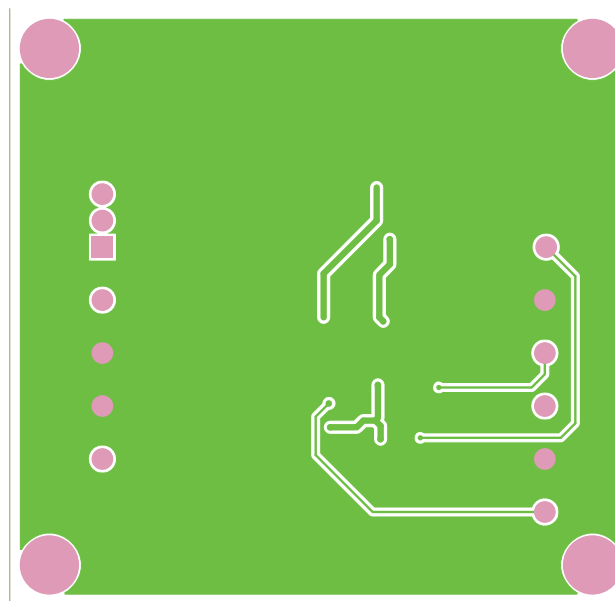
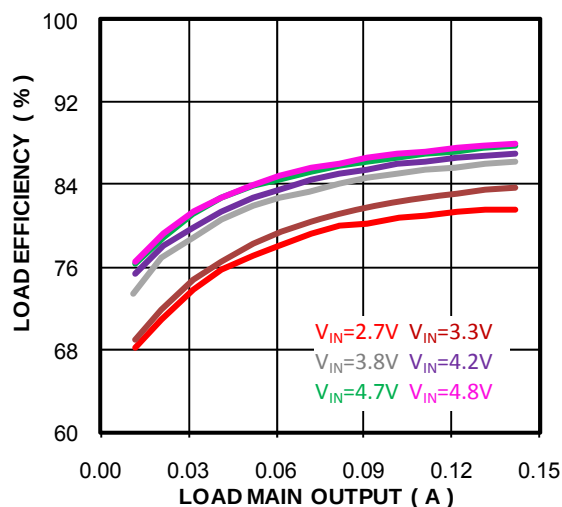


Figure 3—Bottom Layer

TEST RESULTS

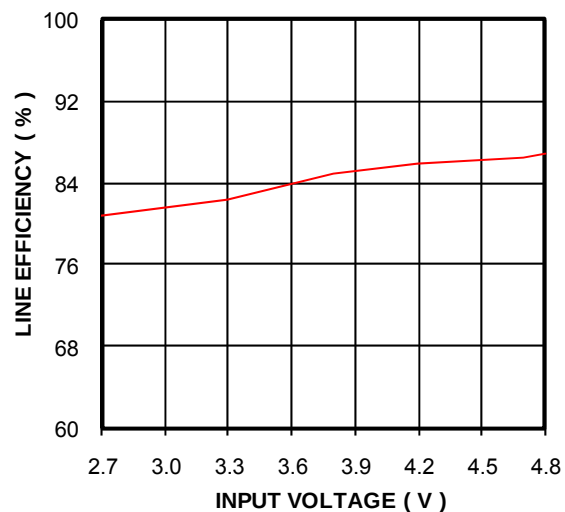
Load Efficiency

$V_{MAIN}=5V$, $V_{GH}=15V/5mA$, $V_{GL}=-10V/5mA$



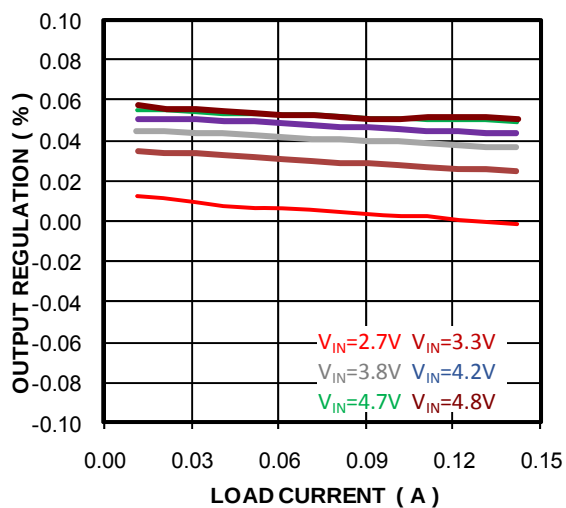
Line Efficiency

$V_{MAIN}=5V$



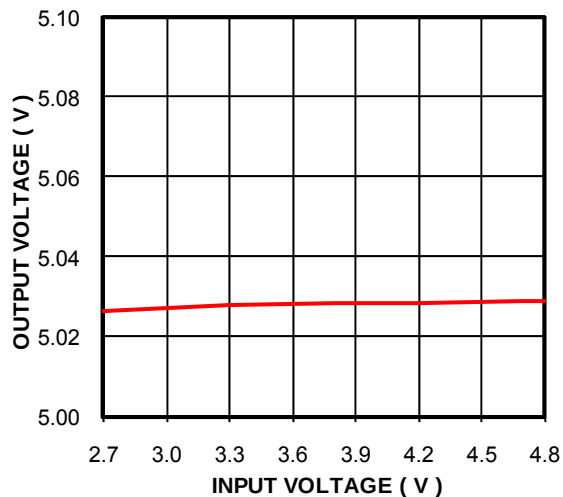
Load Regulation

$V_{MAIN}=5V$, $V_{GH}=15V/5mA$, $V_{GL}=-10V/5mA$



Lined Regulation

$V_{MAIN}=5V$, $I_{MAIN}=0.1A$, $V_{HG}=15V$, $I_{GH}=5mA$, $V_{GL}=-10V$, $I_{GL}=5mA$

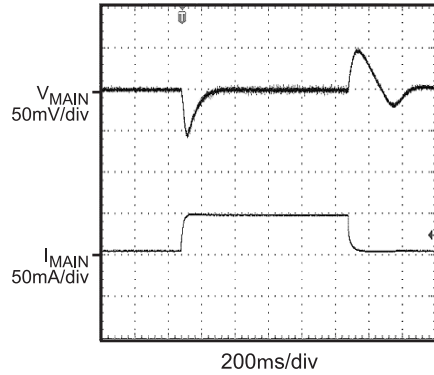


TEST RESULTS *(continued)*

Load Transient

$V_{IN} = 3.3V$, $V_{MAIN} = 5V$, 5mA-50mA STEP

$V_{GH} = 15V$, $I_{GH} = 5mA$, $V_{GL} = -10V$, $I_{GL} = 5mA$

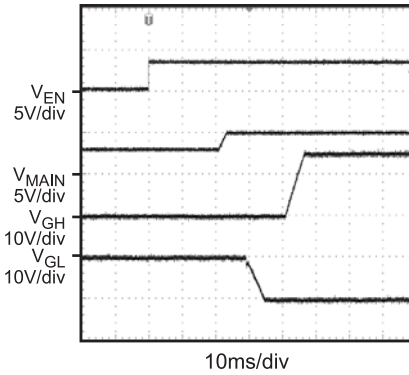


Power-Up Sequencing

$V_{IN} = 3.3V$, $V_{MAIN} = 5V$, $I_{MAIN} = 100mA$,

$V_{GH} = 15V$, $I_{GH} = 5mA$, $V_{GL} = -10V$, $I_{GL} = 5mA$,

$C_{CT} = 10nF$



QUICK START GUIDE

The three output voltages of this board are set to +5V, +15V, and -10V. The board layout accommodates most commonly used inductors and output capacitors.

1. Make sure Jumper JP1 is connected between 2 and 3.
2. Attach positive end of loads to VMAIN, VGH, and VGL pins respectively. Attach negative end of loads to GND pins.
3. Attach input voltage $2.7V \leq V_{IN} \leq 5.5V$ and input ground to VIN and GND pins respectively.
4. During startup $\overline{RDY}$ will be left HIGH. Once the turn-on sequence is complete, this pin will be pulled low if all regulators exceed 80% of their specified voltages. After all regulators are turned on, a fault in any regulator will cause $\overline{RDY}$ to go LOW after approximately 15 μ s. If the fault persists for more than approximately 6ms (for $C_{CT} = 10nF$), the entire chip will shut down.

NOTICE: MPS believes the information in this document to be accurate and reliable. However, it is subject to change without notice. Contact MPS for current specifications. MPS encourages users of its products to ensure that third party Intellectual Property rights are not infringed upon when integrating MPS products into any application. MPS cannot assume any legal responsibility for any said applications.