Texas Instruments

PMP4345 REVA Test Report

China Power Reference Design

REVA

11/22/2013

1 General

1.1 PURPOSE

Provide the detailed data for evaluating and verifying the PMP4345. The PMP4345 is a single outputs DC-DC converter with 2 phase buck converter (TPS40322).
It delivers up to 1.0V/60A output power supply. The converter could provide high efficiency and good performance, which makes it an ideal choice for POL converter.
For testing applications, cooling airflow is required.

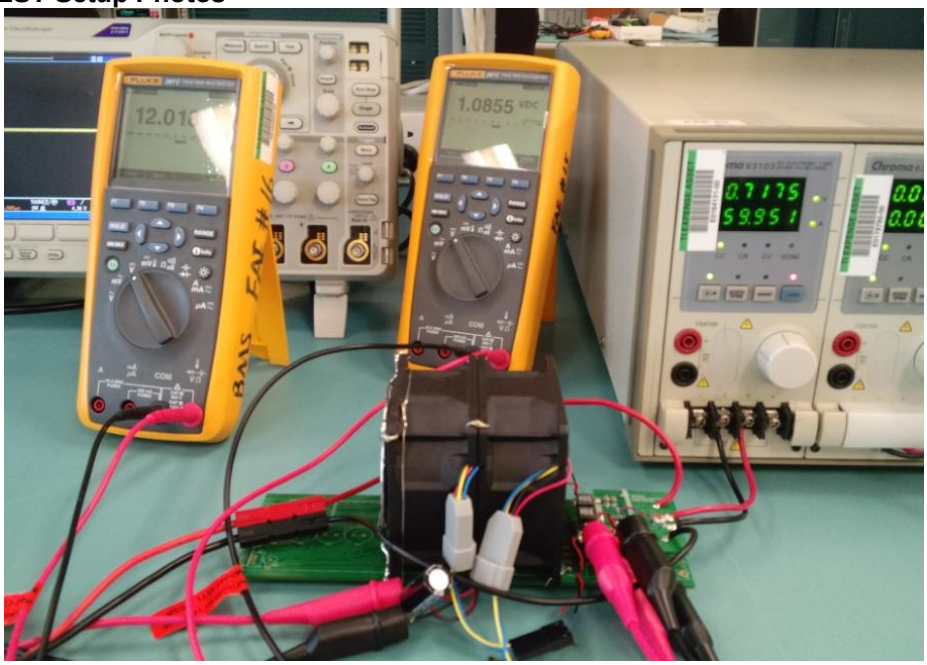
1.2 REFERENCE DOCUMENTATION

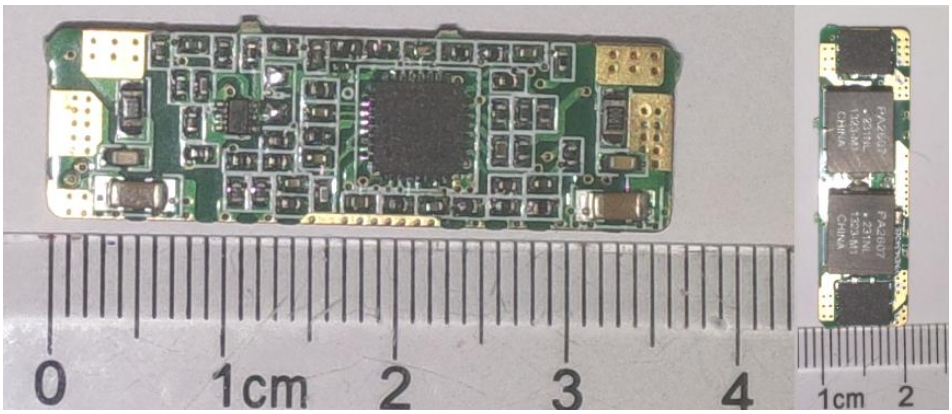
Schematic PMP4345.pdf
Assembly PMP4345.PcbDoc
PMP4345 Mother Board.SchDoc
PMP4345 Mother Board.PcbDoc
BOM

1.3 TEST EQUIPMENTS

Multi-meter: Fluke multimeters
DC Source: TDK-Lambda
Ambient Temperature at 25DegC, Fan cooling
Oscilloscope: DPO3054

1.4 TEST Setup Photos





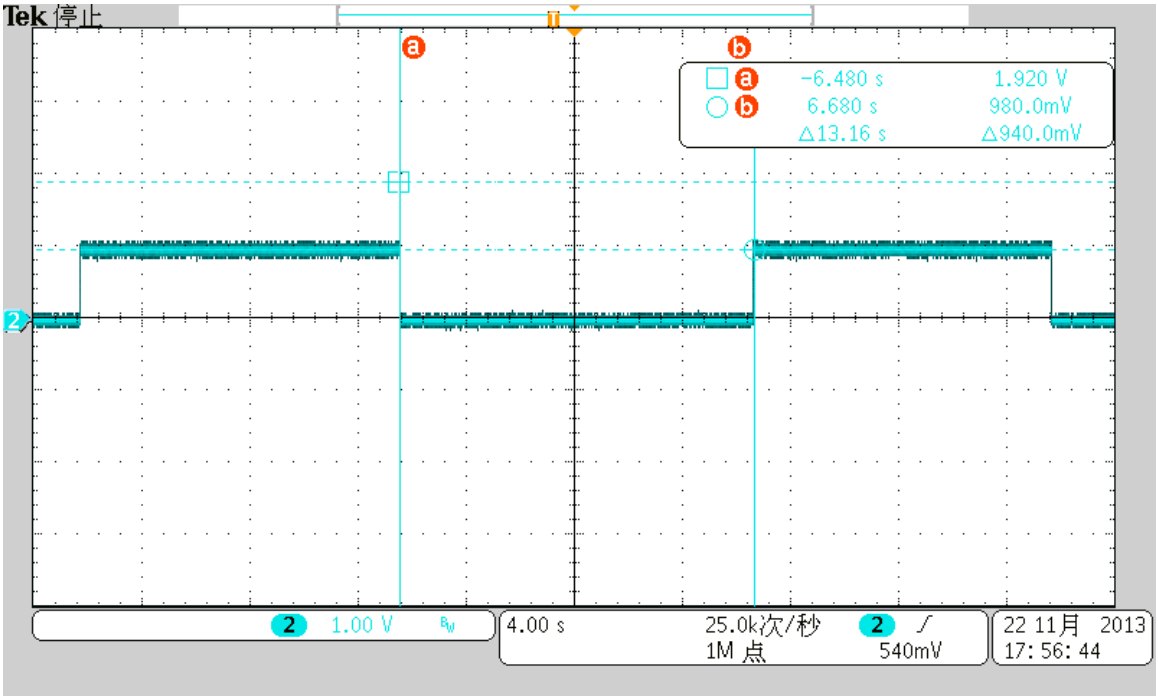
2 INPUT & Output CHARACTERISTICS

2.1: OTP Testing

Set the input at 12.0V, the output is 1.0V/50A without fan cooling.
Trigger the OTP function without trigger the OCP.

Below show the output signal, the unit triggers the OTP continuously.

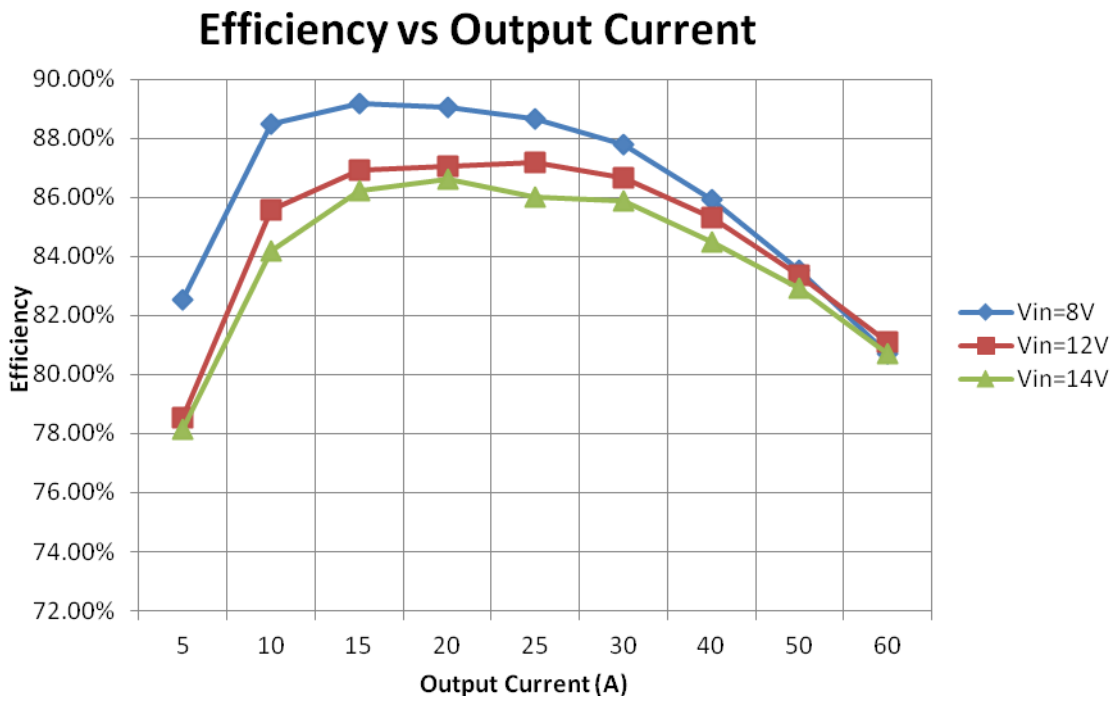
CH2: Output Voltage, 1.0V/Div

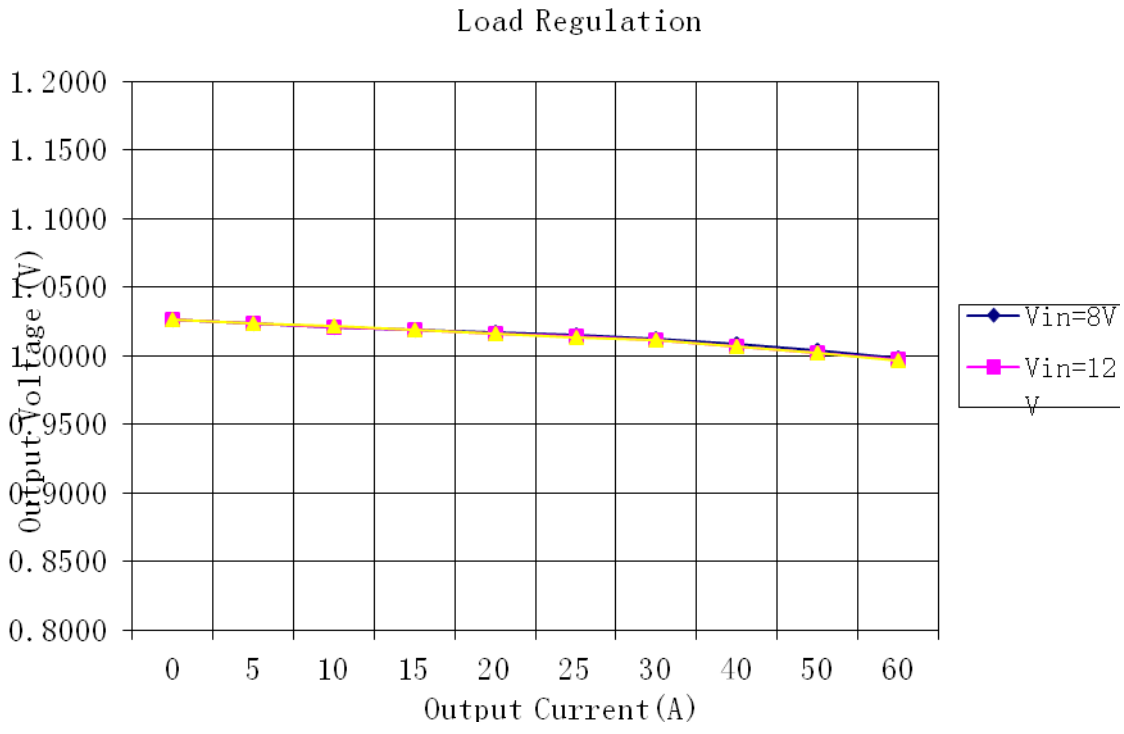


2.2: Eff. vs Output Current

Dual phase 1.0V/60A Output Efficiency

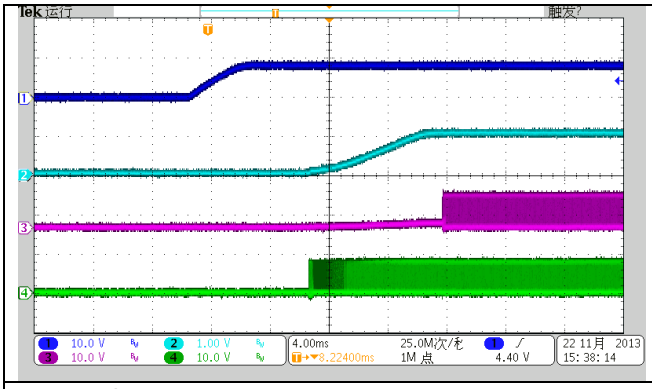
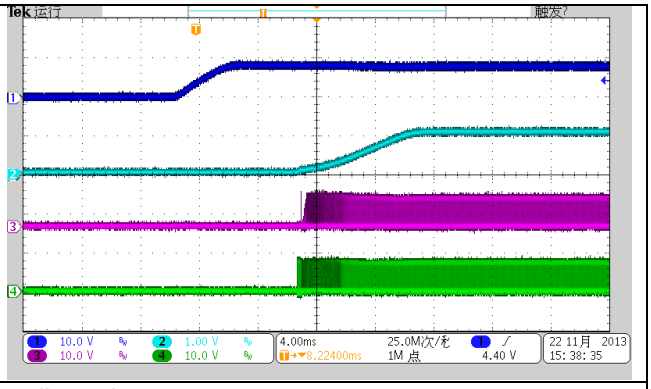
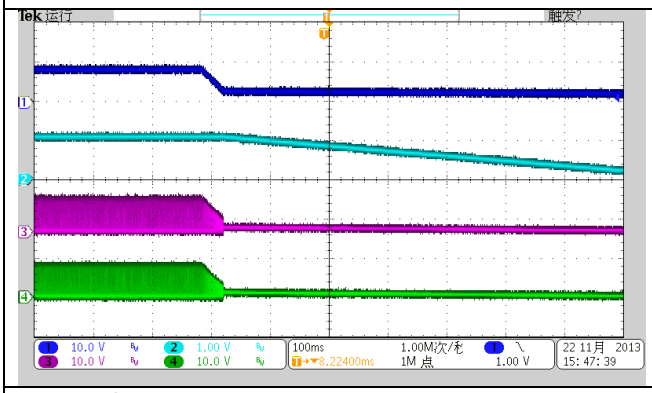
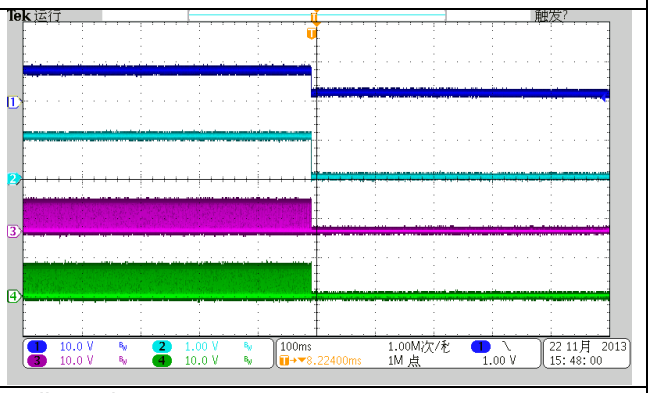
Vin (V)	Iin (A)	Vout (V) On PCB	Vout (V) Sense Point	Iout (A)	Eff. (%)
8V Input					
8.158	0.12	1.0271	1.0260	0	0.00%
8.141	0.77	1.0345	1.0233	5	82.51%
8.122	1.45	1.0423	1.0211	10	88.50%
8.103	2.18	1.0501	1.0187	15	89.17%
8.082	2.94	1.0581	1.0167	20	89.06%
8.060	3.73	1.0664	1.0146	25	88.68%
8.037	4.57	1.0749	1.0125	30	87.80%
7.985	6.37	1.0926	1.0084	40	85.92%
7.926	8.40	1.1124	1.0042	50	83.54%
7.852	10.74	1.1343	0.9981	60	80.70%
12V Input					
12.212	0.10	1.0271	1.0261	0	0.00%
12.201	0.54	1.0350	1.0235	5	78.55%
12.190	1.00	1.0430	1.0210	10	85.56%
12.178	1.49	1.0513	1.0187	15	86.91%
12.166	2.00	1.0592	1.0161	20	87.06%
12.152	2.52	1.0678	1.0137	25	87.17%
12.138	3.07	1.0766	1.0114	30	86.67%
12.108	4.24	1.0947	1.0068	40	85.29%
12.073	5.54	1.1148	1.0022	50	83.34%
12.034	6.99	1.1370	0.9973	60	81.10%
14V Input					
14.099	0.10	1.0269	1.0263	0	0.00%
14.091	0.47	1.0352	1.0239	5	78.15%
14.082	0.88	1.0430	1.0212	10	84.17%
14.072	1.30	1.0514	1.0188	15	86.21%
14.061	1.74	1.0596	1.0161	20	86.62%
14.051	2.21	1.0682	1.0136	25	86.00%
14.040	2.68	1.0771	1.0112	30	85.88%
14.015	3.70	1.0954	1.0065	40	84.50%
13.986	4.81	1.1157	1.0017	50	82.92%
13.953	6.06	1.1373	0.9967	60	80.70%


Efficiency vs Output Current
90.00%
88.00%
86.00%
84.00%
82.00%
80.00%
78.00%
76.00%
74.00%
72.00%
Efficiency
5
10
15
20
25
30
40
50
60
Output Current (A)
Vin=8V
Vin=12V
Vin=14V

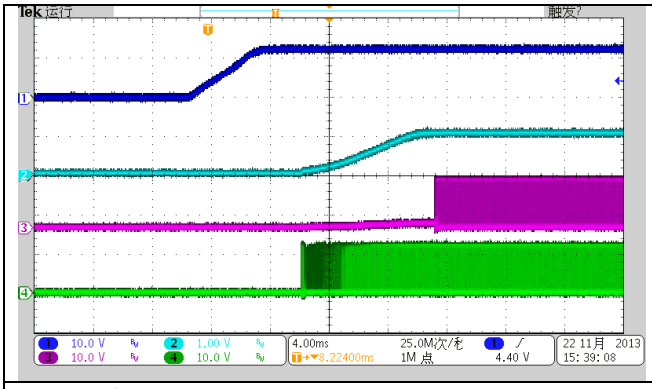
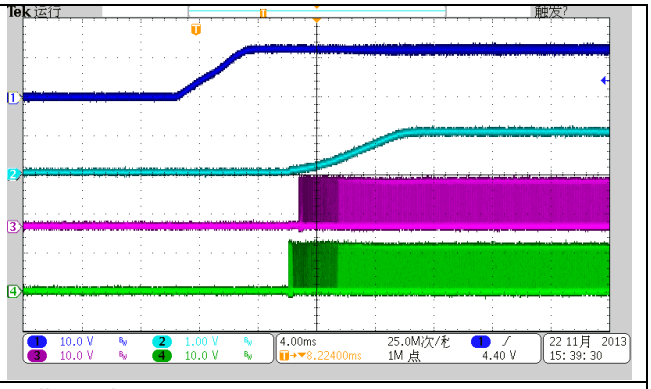
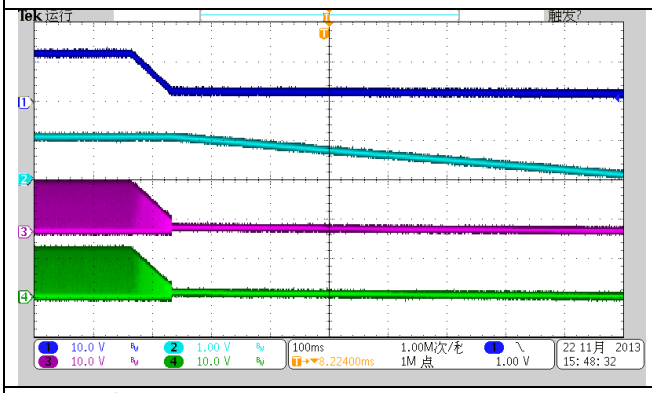
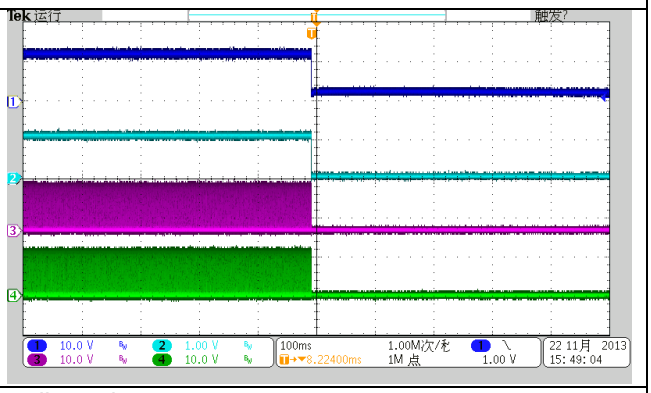

Load Regulation
1.2000
1.1500
1.1000
1.0500
1.0000
0.9500
0.9000
0.8500
0.8000
Output Voltage (V)
0
5
10
15
20
25
30
40
50
60
Output Current (A)
Vin=8V
Vin=12V

2.3: Start Up & Shut Down Waveforms

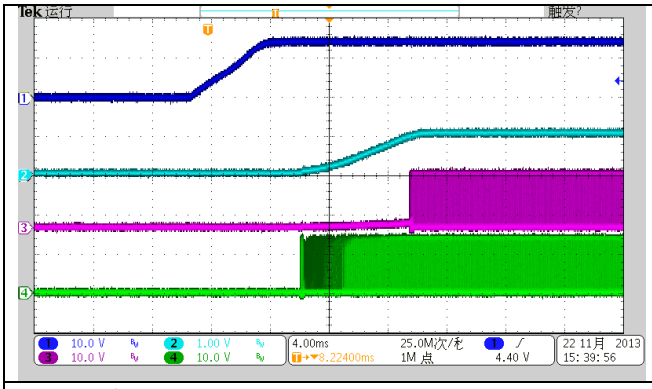
8V Input with Full Load & No Load

	
No Load CH1: Input Voltage 10V/Div CH2: Output Voltage 1.0V/Div CH3: Vsw1 Voltage 10V/Div CH4: Vsw2 Voltage 10V/Div	Full Load CH1: Input Voltage 10V/Div CH2: Output Voltage 1.0V/Div CH3: Vsw1 Voltage 10V/Div CH4: Vsw2 Voltage 10V/Div
	
No Load CH1: Input Voltage 10V/Div CH2: Output Voltage 1.0V/Div CH3: Vsw1 Voltage 10V/Div CH4: Vsw2 Voltage 10V/Div	Full Load CH1: Input Voltage 10V/Div CH2: Output Voltage 1.0V/Div CH3: Vsw1 Voltage 10V/Div CH4: Vsw2 Voltage 10V/Div

12V Input with Full Load & No Load

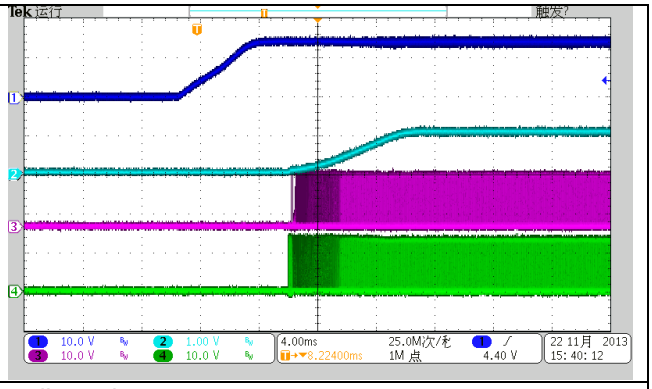
	
No Load CH1: Input Voltage 10V/Div CH2: Output Voltage 1.0V/Div CH3: Vsw1 Voltage 10V/Div CH4: Vsw2 Voltage 10V/Div	Full Load CH1: Input Voltage 10V/Div CH2: Output Voltage 1.0V/Div CH3: Vsw1 Voltage 10V/Div CH4: Vsw2 Voltage 10V/Div
	
No Load CH1: Input Voltage 10V/Div CH2: Output Voltage 1.0V/Div CH3: Vsw1 Voltage 10V/Div CH4: Vsw2 Voltage 10V/Div	Full Load CH1: Input Voltage 10V/Div CH2: Output Voltage 1.0V/Div CH3: Vsw1 Voltage 10V/Div CH4: Vsw2 Voltage 10V/Div

14V Input with Full Load & No Load



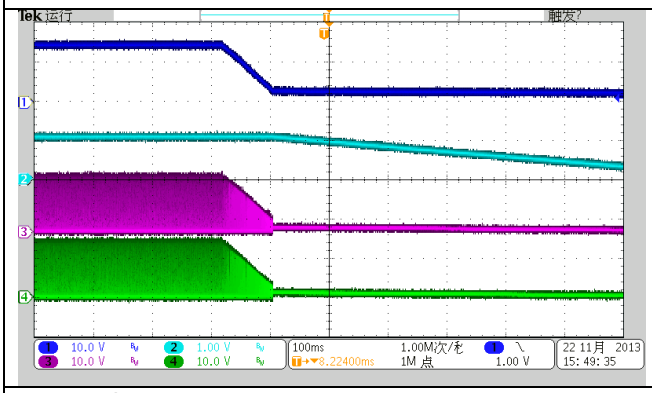
No Load

CH1: Input Voltage 10V/Div
CH2: Output Voltage 1.0V/Div
CH3: Vsw1 Voltage 10V/Div
CH4: Vsw2 Voltage 10V/Div



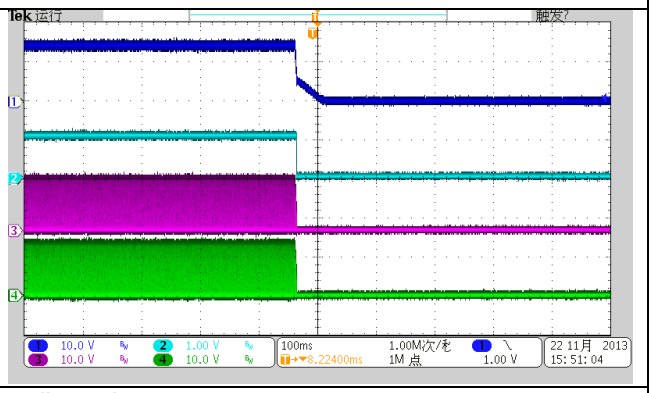
Full Load

CH1: Input Voltage 10V/Div
CH2: Output Voltage 1.0V/Div
CH3: Vsw1 Voltage 10V/Div
CH4: Vsw2 Voltage 10V/Div



No Load

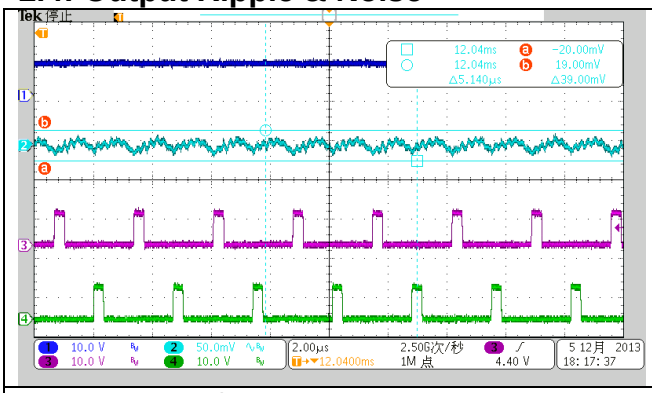
CH1: Input Voltage 10V/Div
CH2: Output Voltage 1.0V/Div
CH3: Vsw1 Voltage 10V/Div
CH4: Vsw2 Voltage 10V/Div



Full Load

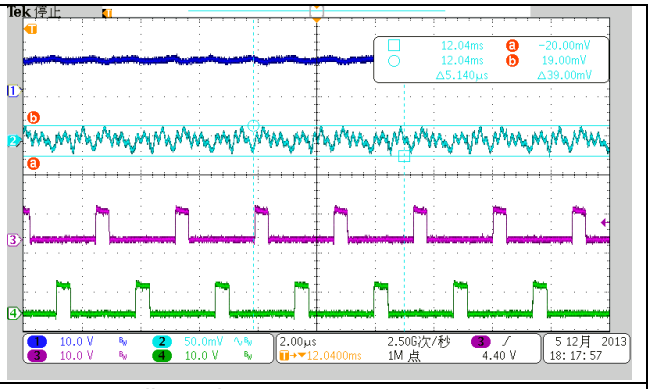
CH1: Input Voltage 10V/Div
CH2: Output Voltage 1.0V/Div
CH3: Vsw1 Voltage 10V/Div
CH4: Vsw2 Voltage 10V/Div

2.4: Output Ripple & Noise



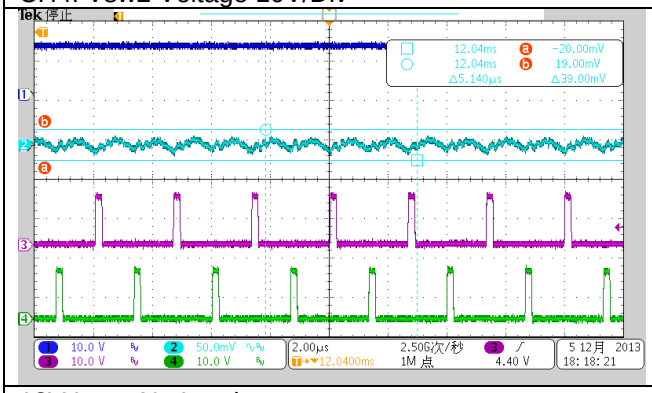
8V Input No Load

CH1: Input Voltage 10V/Div
CH2: Output Ripple & Noise 50mV/Div
CH3: Vsw1 Voltage 10V/Div
CH4: Vsw2 Voltage 10V/Div



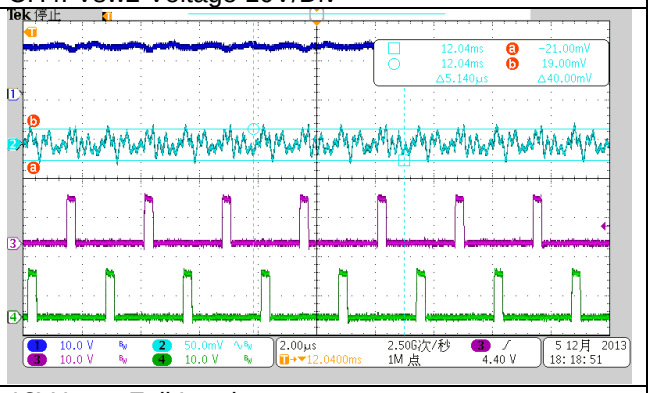
8V Input Full Load

CH1: Input Voltage 10V/Div
CH2: Output Ripple & Noise 50mV/Div
CH3: Vsw1 Voltage 10V/Div
CH4: Vsw2 Voltage 10V/Div



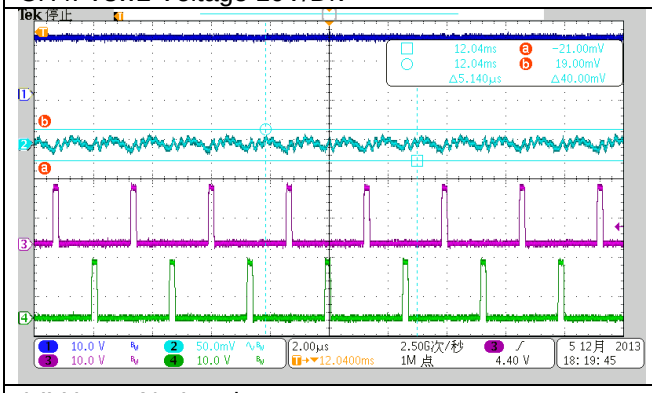
12V Input No Load

CH1: Input Voltage 10V/Div
CH2: Output Ripple & Noise 50mV/Div
CH3: Vsw1 Voltage 10V/Div
CH4: Vsw2 Voltage 10V/Div



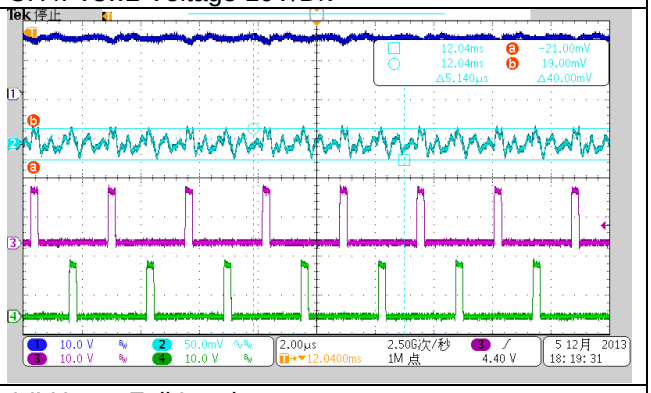
12V Input Full Load

CH1: Input Voltage 10V/Div
CH2: Output Ripple & Noise 50mV/Div
CH3: Vsw1 Voltage 10V/Div
CH4: Vsw2 Voltage 10V/Div



14V Input No Load

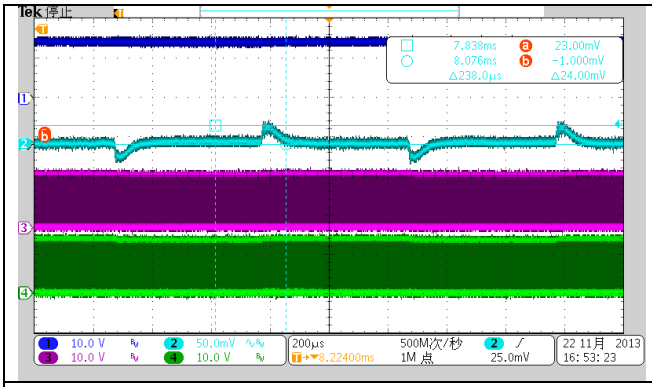
CH1: Input Voltage 10V/Div
CH2: Output Ripple & Noise 50mV/Div
CH3: Vsw1 Voltage 10V/Div
CH4: Vsw2 Voltage 10V/Div



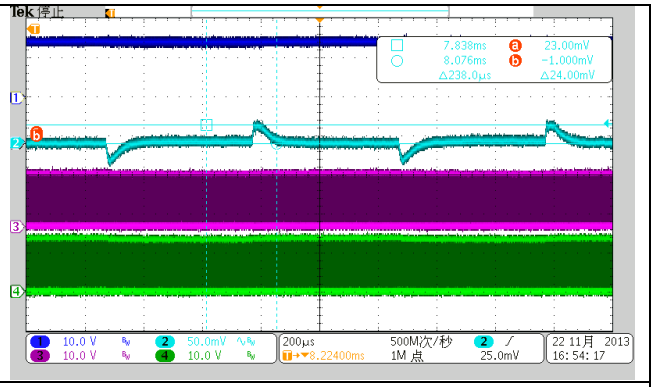
14V Input Full Load

CH1: Input Voltage 10V/Div
CH2: Output Ripple & Noise 50mV/Div
CH3: Vsw1 Voltage 10V/Div
CH4: Vsw2 Voltage 10V/Div

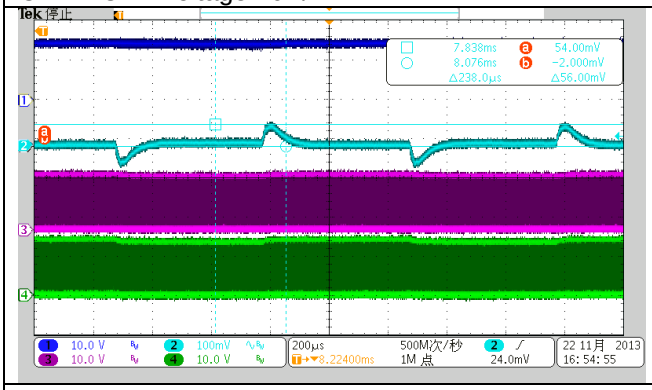
2.5: Dynamic Waveforms



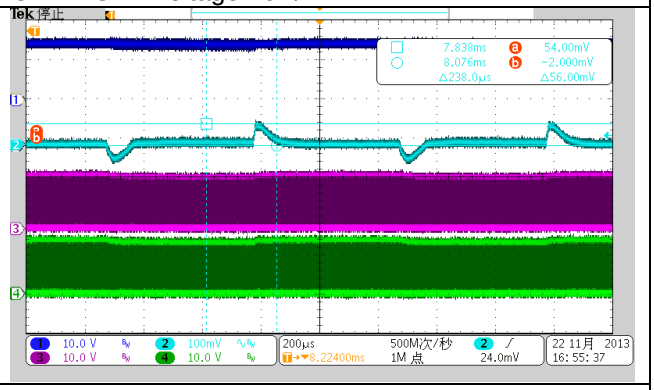
Step Load (25% – 50%)
CH1: Input Voltage 10V/Div
CH2: Output Voltage 50mV/Div
CH3: Vsw1 Voltage 10V/Div
CH4: Vsw2 Voltage 10V/Div



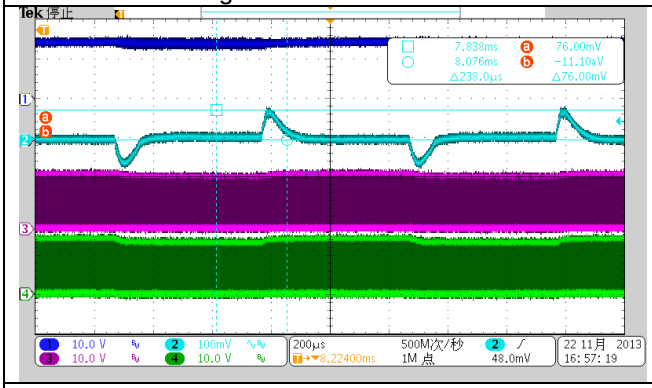
Step Load (50% – 75%)
CH1: Input Voltage 10V/Div
CH2: Output Voltage 50mV/Div
CH3: Vsw1 Voltage 10V/Div
CH4: Vsw2 Voltage 10V/Div



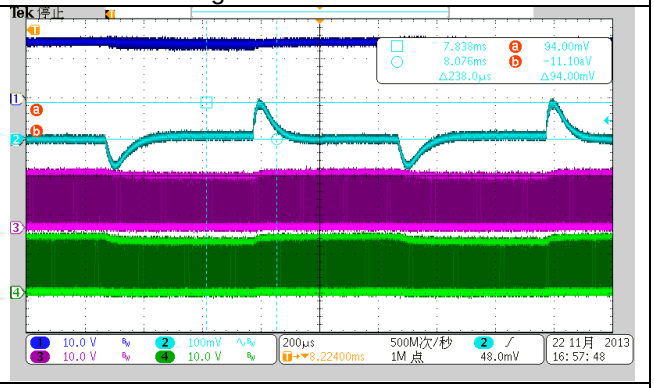
Step Load (0% – 50%)
CH1: Input Voltage 10V/Div
CH2: Output Voltage 100mV/Div
CH3: Vsw1 Voltage 10V/Div
CH4: Vsw2 Voltage 10V/Div



Step Load (50% – 100%)
CH1: Input Voltage 10V/Div
CH2: Output Voltage 100mV/Div
CH3: Vsw1 Voltage 10V/Div
CH4: Vsw2 Voltage 10V/Div

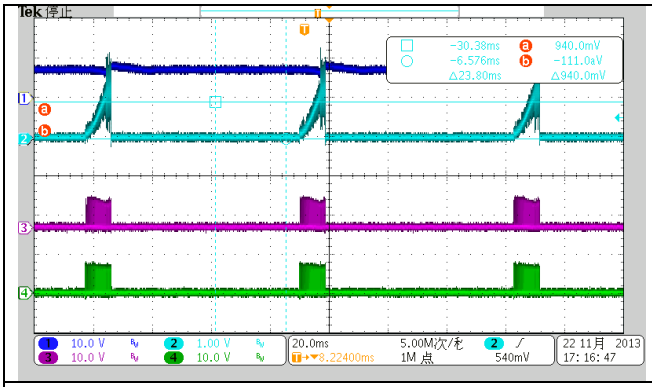
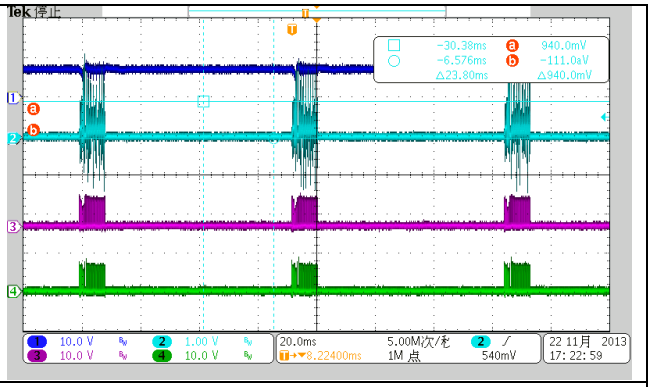
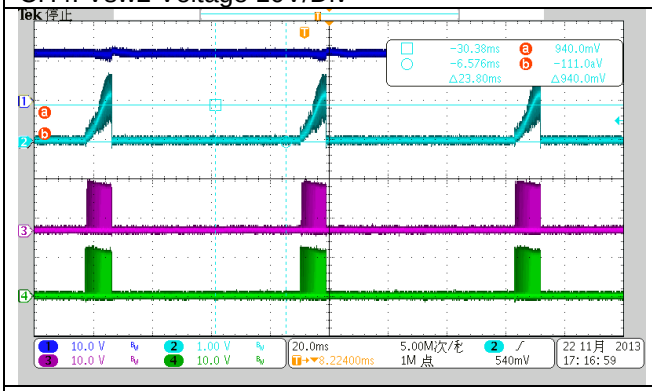
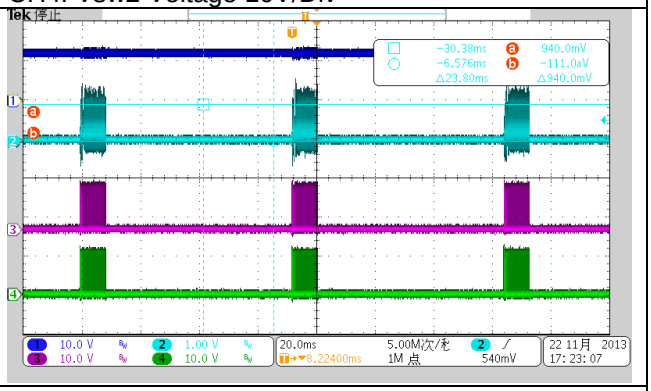
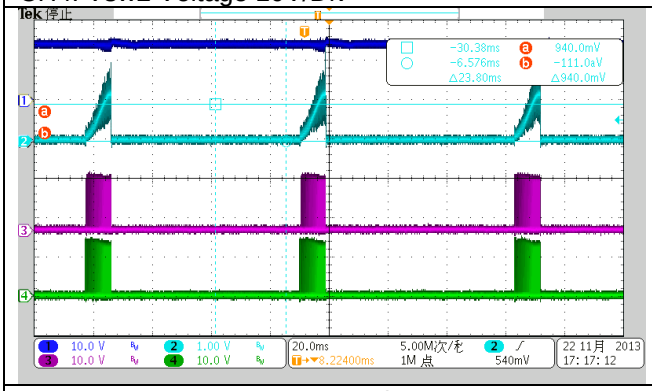
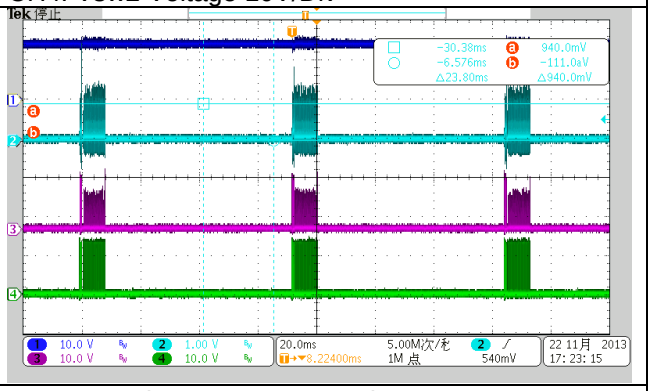


Step Load (10% – 90%)
CH1: Input Voltage 10V/Div
CH2: Output Voltage 100mV/Div
CH3: Vsw1 Voltage 10V/Div
CH4: Vsw2 Voltage 10V/Div



Step Load (0% – 100%)
CH1: Input Voltage 10V/Div
CH2: Output Voltage 100mV/Div
CH3: Vsw1 Voltage 10V/Div
CH4: Vsw2 Voltage 10V/Div

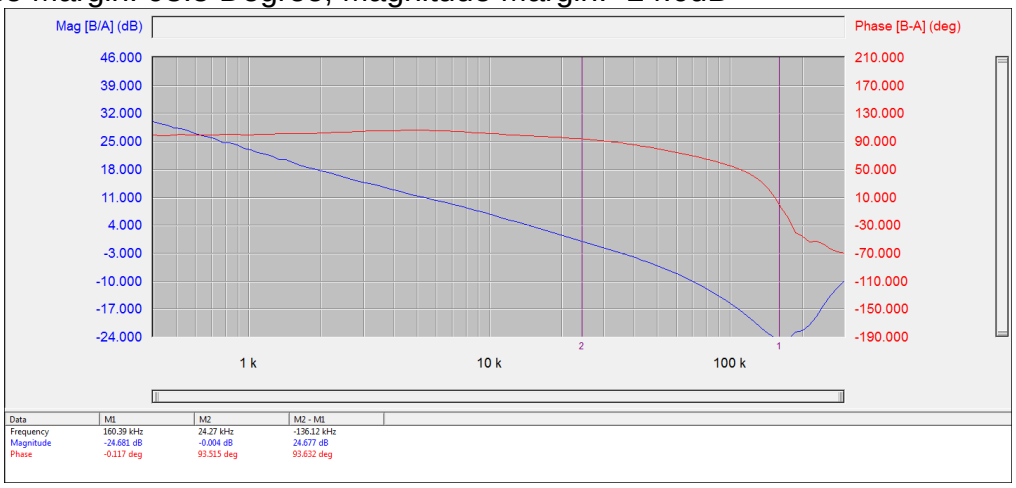
2.6: OCP & SCP Testing Waveforms

	
8V Input Over Current Protection CH1: Input Voltage 10V/Div CH2: Output Voltage 1.0V/Div CH3: Vsw1 Voltage 10V/Div CH4: Vsw2 Voltage 10V/Div	8V Input Shot Current Protection CH1: Input Voltage 10V/Div CH2: Output Voltage 1.0V/Div CH3: Vsw1 Voltage 10V/Div CH4: Vsw2 Voltage 10V/Div
	
12V Input Over Current Protection CH1: Input Voltage 10V/Div CH2: Output Voltage 1.0V/Div CH3: Vsw1 Voltage 10V/Div CH4: Vsw2 Voltage 10V/Div	12V Input Shot Current Protection CH1: Input Voltage 10V/Div CH2: Output Voltage 1.0V/Div CH3: Vsw1 Voltage 10V/Div CH4: Vsw2 Voltage 10V/Div
	
14V Input Over Current Protection CH1: Input Voltage 10V/Div CH2: Output Voltage 1.0V/Div CH3: Vsw1 Voltage 10V/Div CH4: Vsw2 Voltage 10V/Div	14V Input Shot Current Protection CH1: Input Voltage 10V/Div CH2: Output Voltage 1.0V/Div CH3: Vsw1 Voltage 10V/Div CH4: Vsw2 Voltage 10V/Div

3 Bode Plot

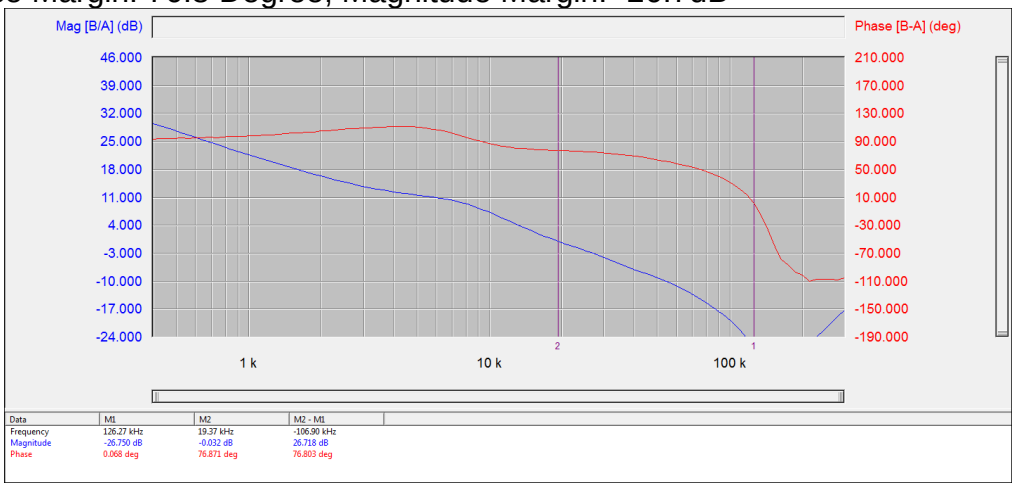
12V Input, Full Load

Phase Margin: 93.5 Degree; Magnitude Margin: -24.6dB



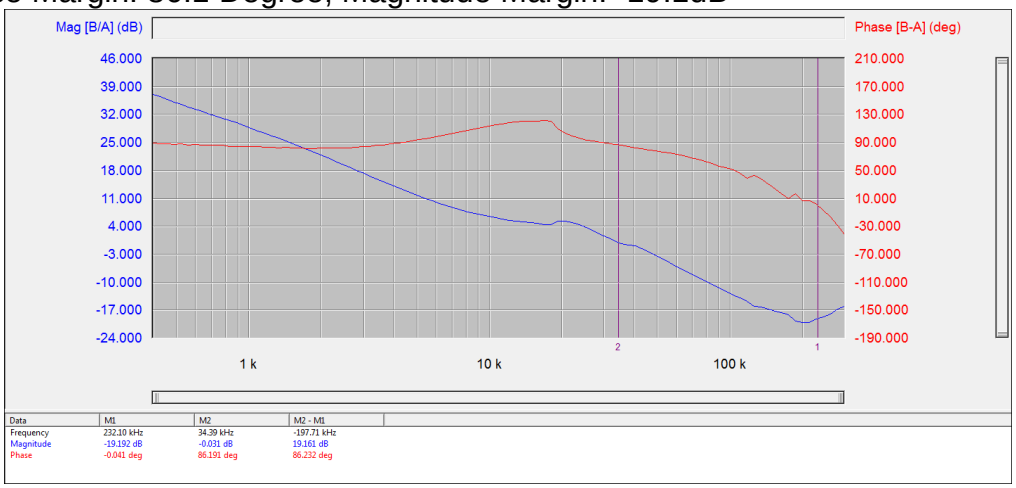
12V Input, Half Load

Phase Margin: 76.8 Degree; Magnitude Margin: -26.7dB



12V Input, No Load

Phase Margin: 86.1 Degree; Magnitude Margin: -19.1dB



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