Texas Instruments

PMP4379 Test Report

China Power Reference Design

1 General

1.1 PURPOSE

Provide the detailed data for evaluating and verifying the PMP4379.
PMP4379 is DC input (4.5V – 15V) and dual output (1.2V/5A) POL module.
The output voltage could be trimmed by the resistors; the range is from 0.6V to 5.7V.
Typical application is the 1.2V/5A

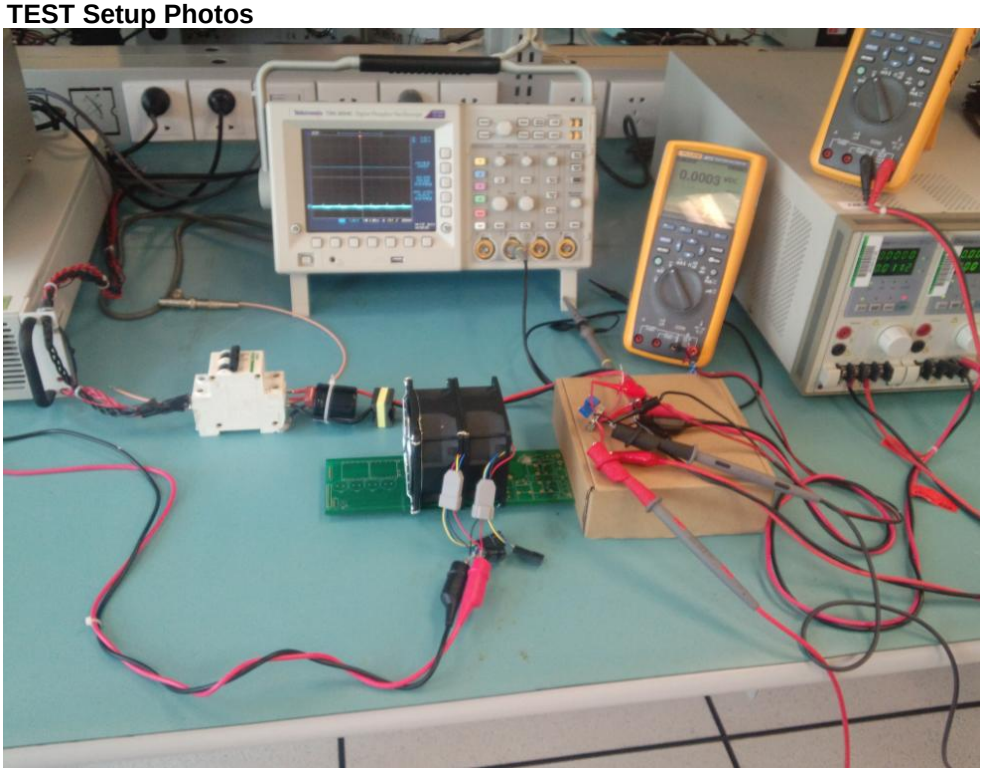
1.2 REFERENCE DOCUMENTATION

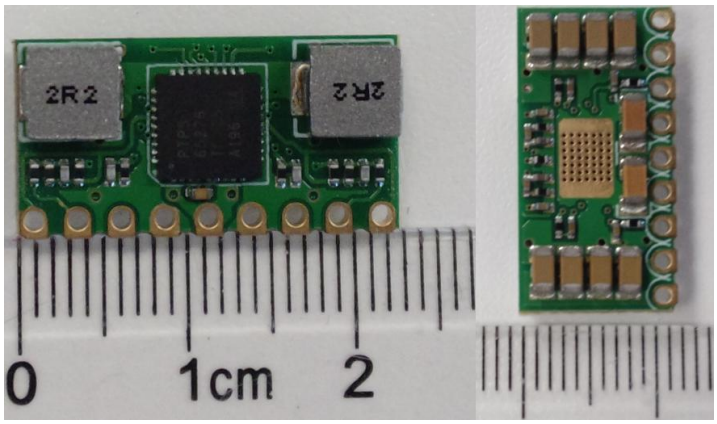
PMP4379 Schematic.pdf
PMP4379 PCB Layout.pdf
PMP4379 BOM.pdf

1.3 TEST EQUIPMENTS

Multi-meter: Fluke multimeters
DC Source: TDK-Lambda
Ambient Temperature at 25DegC, Fan cooling
Oscilloscope: TDS3034C

1.4 TEST Setup Photos





2 INPUT & Output CHARACTERISTICS

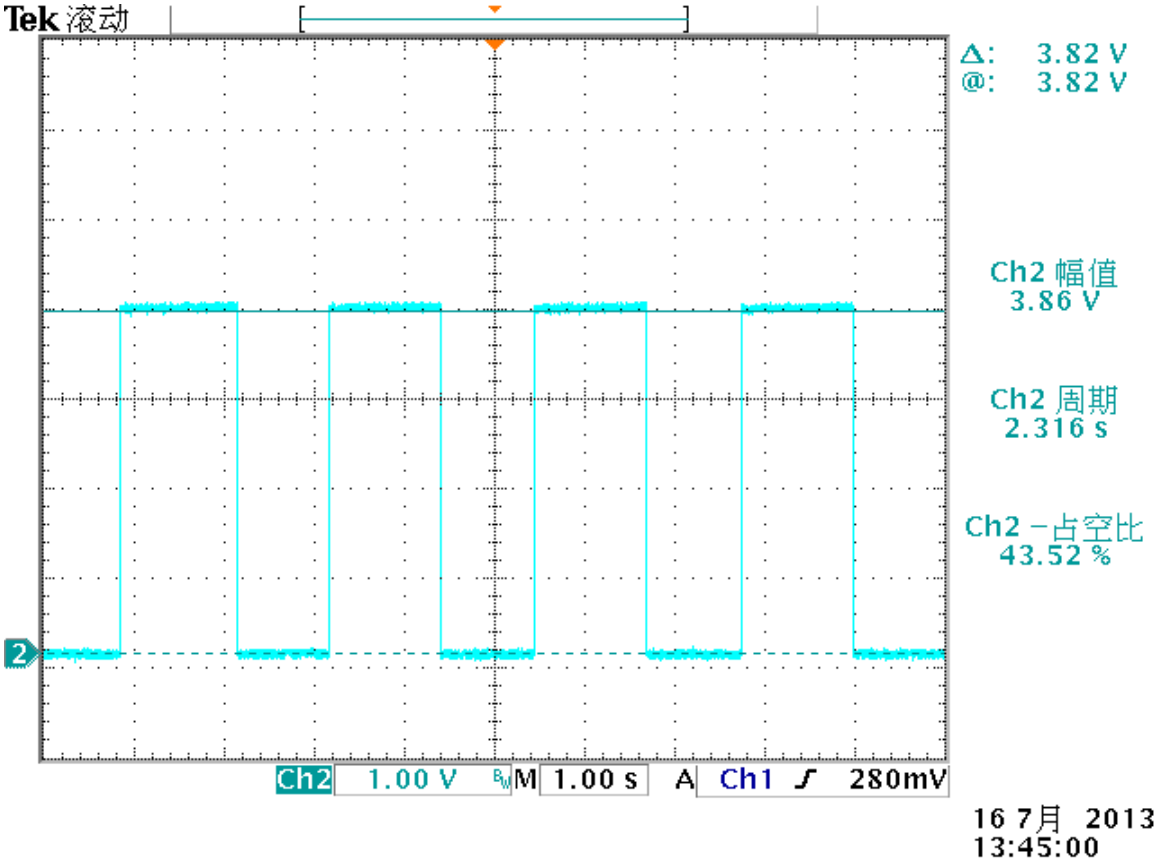
2.1: Long Time OTP Testing

According to the customer requirement, we set the input at 8.3V, the output is dual 3.7V/5.65A without fan cooling. Trigger the OTP function without trigger the OCP.

The power unit running under the OTP status from the 9:00 AM to 13:30 PM, it OK without damaged.

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

CH2: Output Voltage, 1.0V/Div



2.2: Eff. vs Output Current

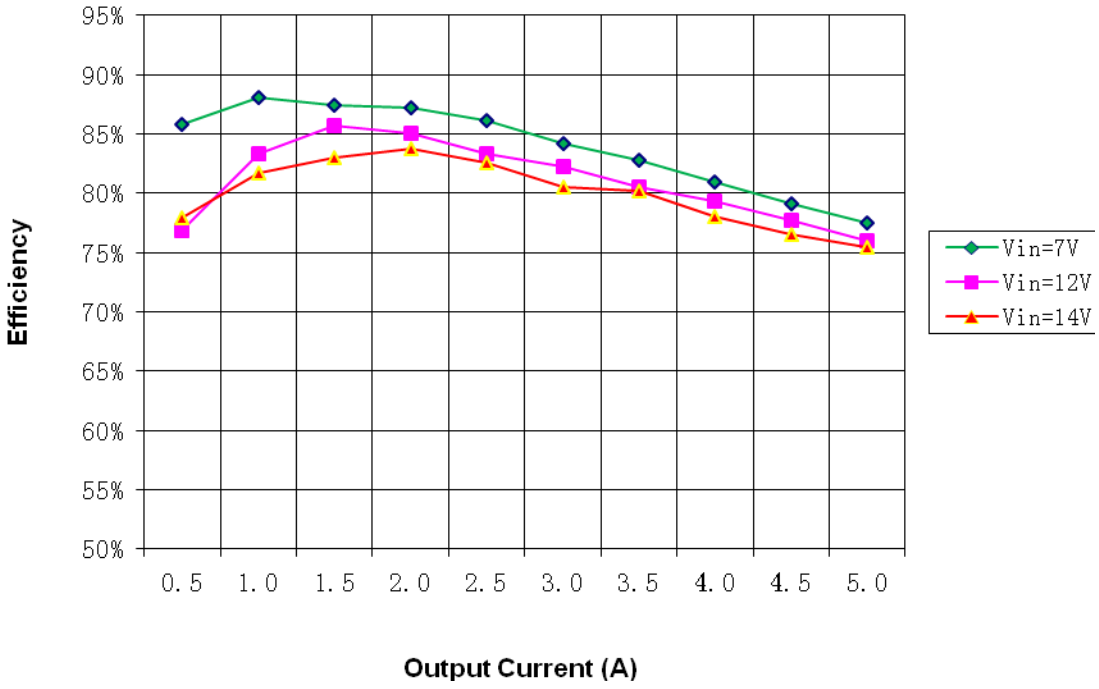
Dual 1.2V/5A Output Efficiency

Vin (V)	Iin (A)	Vout (V)	Iout (A)	Eff. (%)
7V Input				
7.027	0.01	1.2055	0.0	0.0%
7.021	0.20	1.2053	0.5	85.8%
7.015	0.39	1.2053	1.0	88.1%
7.008	0.59	1.2052	1.5	87.4%
7.001	0.79	1.2051	2.0	87.2%
6.994	1.00	1.2051	2.5	86.2%
6.986	1.23	1.2051	3.0	84.1%
6.978	1.46	1.2052	3.5	82.8%
6.969	1.71	1.2053	4.0	80.9%
6.959	1.97	1.2055	4.5	79.1%
6.950	2.24	1.2056	5.0	77.4%

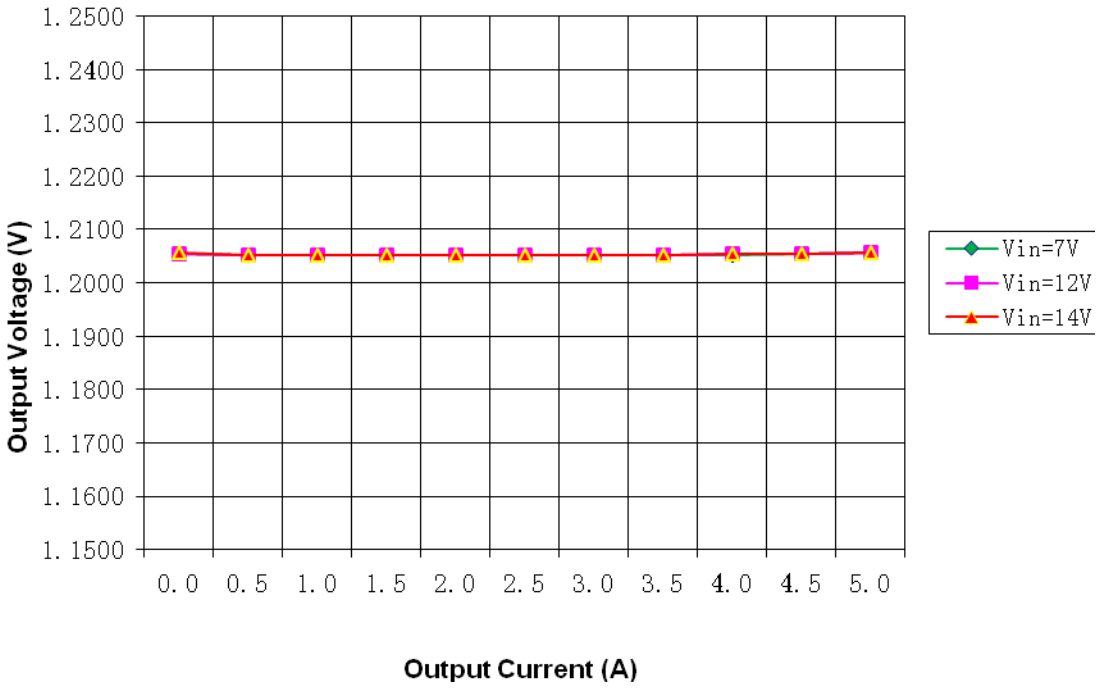
Vin (V)	Iin (A)	Vout (V)	Iout (A)	Eff. (%)
12V Input				
12.069	0.01	1.2055	0.0	0.0%
12.066	0.13	1.2053	0.5	76.8%
12.063	0.24	1.2053	1.0	83.3%
12.060	0.35	1.2051	1.5	85.7%
12.056	0.47	1.2052	2.0	85.1%
12.052	0.60	1.2052	2.5	83.3%
12.048	0.73	1.2051	3.0	82.2%
12.044	0.87	1.2052	3.5	80.5%
12.040	1.01	1.2054	4.0	79.3%
12.036	1.16	1.2055	4.5	77.7%
12.030	1.32	1.2057	5.0	75.9%

Vin (V)	Iin (A)	Vout (V)	Iout (A)	Eff. (%)
14V Input				
14.057	0.01	1.2056	0.0	0.0%
14.055	0.11	1.2053	0.5	78.0%
14.052	0.21	1.2053	1.0	81.7%
14.050	0.31	1.2052	1.5	83.0%
14.047	0.41	1.2052	2.0	83.7%
14.044	0.52	1.2052	2.5	82.5%
14.041	0.64	1.2052	3.0	80.5%
14.037	0.75	1.2053	3.5	80.1%
14.034	0.88	1.2054	4.0	78.1%
14.030	1.01	1.2055	4.5	76.6%
14.026	1.14	1.2057	5.0	75.4%

Efficiency vs Output Current Dual 1.2V Output



Regulation vs Output Current Dual 1.2V Output



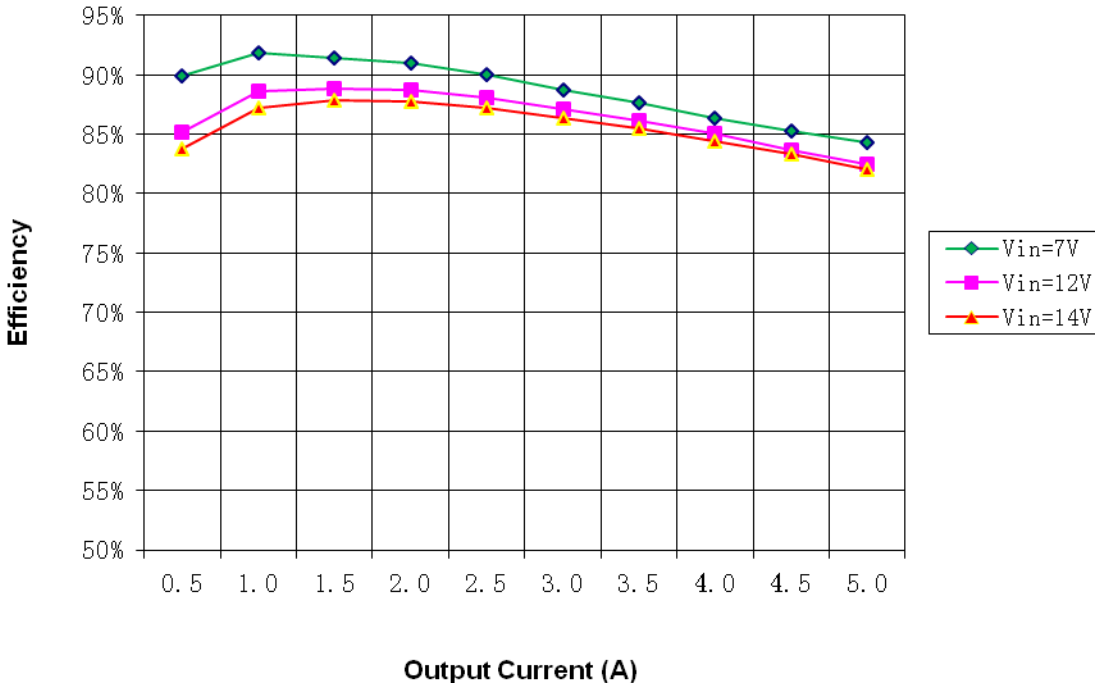
Dual 1.8V/5A Output Efficiency

Vin (V)	Iin (A)	Vout (V)	Iout (A)	Eff. (%)
7V Input				
7.133	0.02	1.8022	0.0	0.0%
7.106	0.28	1.8020	0.5	90.0%
7.083	0.55	1.8020	1.0	91.9%
7.053	0.84	1.8019	1.5	91.4%
7.020	1.13	1.8018	2.0	91.0%
6.994	1.43	1.8020	2.5	90.0%
6.962	1.75	1.8021	3.0	88.7%
6.930	2.08	1.8023	3.5	87.7%
6.893	2.42	1.8026	4.0	86.4%
6.854	2.78	1.8030	4.5	85.2%
6.822	3.14	1.8033	5.0	84.3%

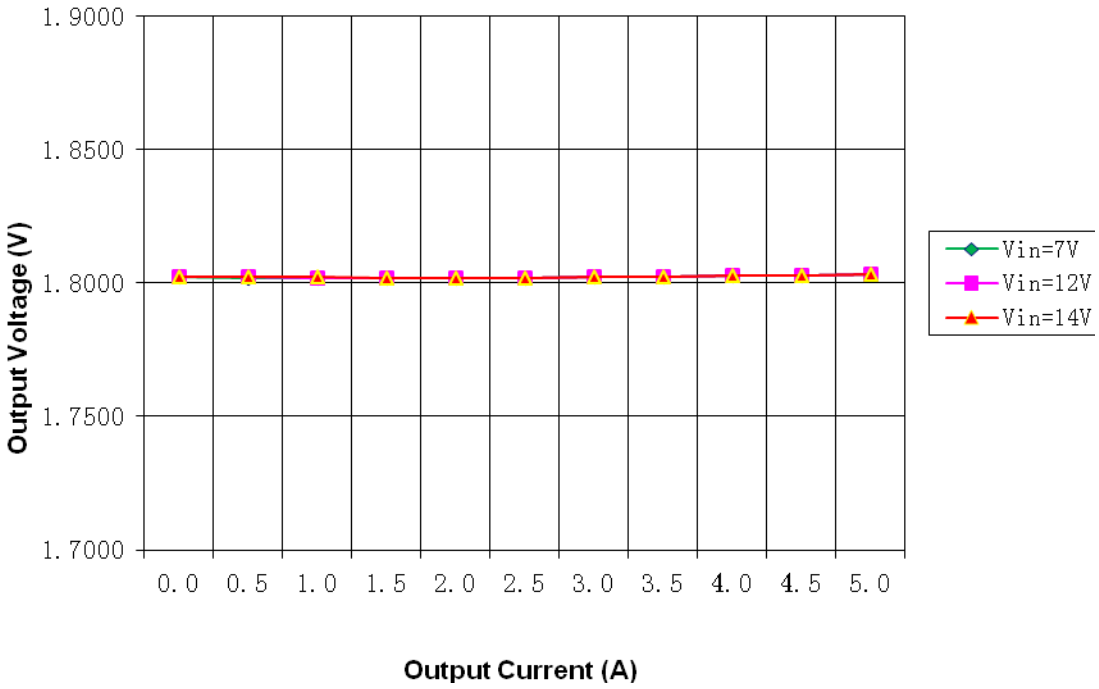
Vin (V)	Iin (A)	Vout (V)	Iout (A)	Eff. (%)
12V Input				
12.153	0.02	1.8024	0.0	0.0%
12.141	0.17	1.8021	0.5	85.2%
12.120	0.34	1.8020	1.0	88.6%
12.108	0.50	1.8019	1.5	88.8%
12.089	0.67	1.8019	2.0	88.7%
12.070	0.85	1.8020	2.5	88.1%
12.051	1.03	1.8021	3.0	87.1%
12.032	1.22	1.8023	3.5	86.2%
12.019	1.41	1.8026	4.0	85.1%
12.001	1.62	1.8030	4.5	83.7%
11.997	1.82	1.8034	5.0	82.5%

Vin (V)	Iin (A)	Vout (V)	Iout (A)	Eff. (%)
14V Input				
14.130	0.02	1.8024	0.0	0.0%
14.117	0.15	1.8021	0.5	83.7%
14.105	0.29	1.8021	1.0	87.2%
14.091	0.44	1.8020	1.5	87.9%
14.077	0.58	1.8018	2.0	87.8%
14.060	0.73	1.8019	2.5	87.2%
14.044	0.89	1.8022	3.0	86.3%
14.030	1.05	1.8024	3.5	85.5%
14.011	1.22	1.8027	4.0	84.4%
14.000	1.39	1.8030	4.5	83.3%
13.984	1.57	1.8035	5.0	82.0%

Efficiency vs Output Current Dual 1.8V Output



Regulation vs Output Current Dual 1.8V Output



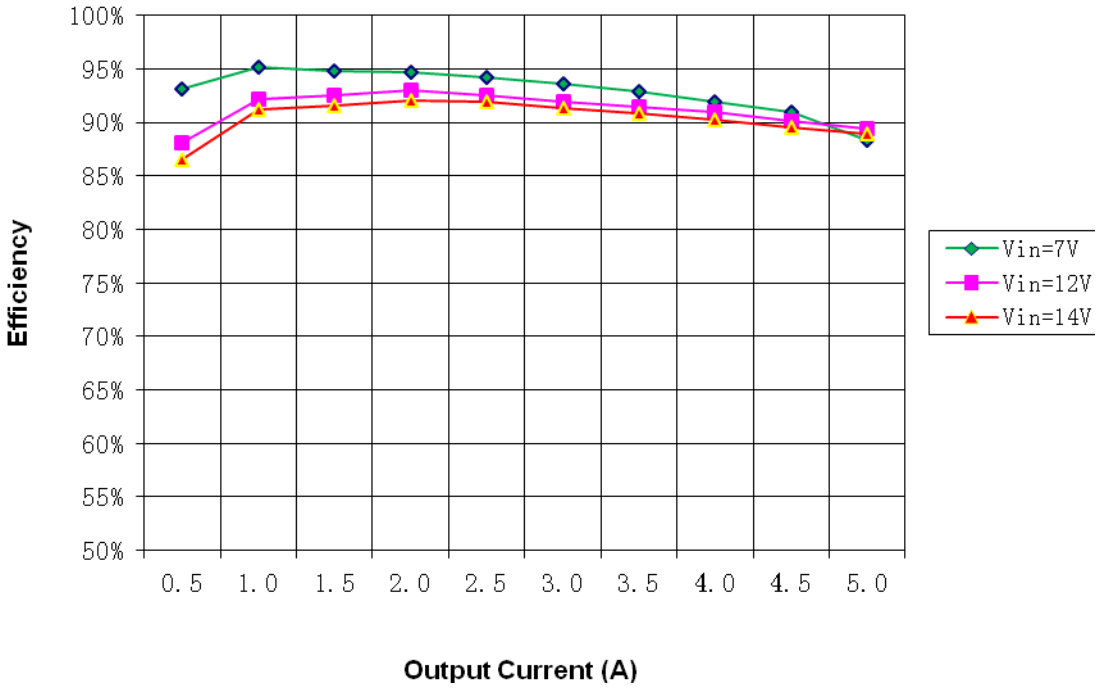
Dual 3.3V/5A Output Efficiency

Vin (V)	Iin (A)	Vout (V)	Iout (A)	Eff. (%)
7V Input				
7.161	0.34	3.3059	0.0	0.0%
7.119	0.50	3.3056	0.5	93.1%
7.065	0.98	3.3056	1.0	95.2%
7.017	1.49	3.3056	1.5	94.8%
6.961	2.01	3.3058	2.0	94.6%
6.905	2.54	3.3060	2.5	94.2%
6.844	3.10	3.3062	3.0	93.6%
6.787	3.67	3.3069	3.5	92.8%
6.730	4.28	3.3074	4.0	92.0%
6.663	4.92	3.3082	4.5	90.9%
6.482	5.78	3.3091	5.0	88.3%

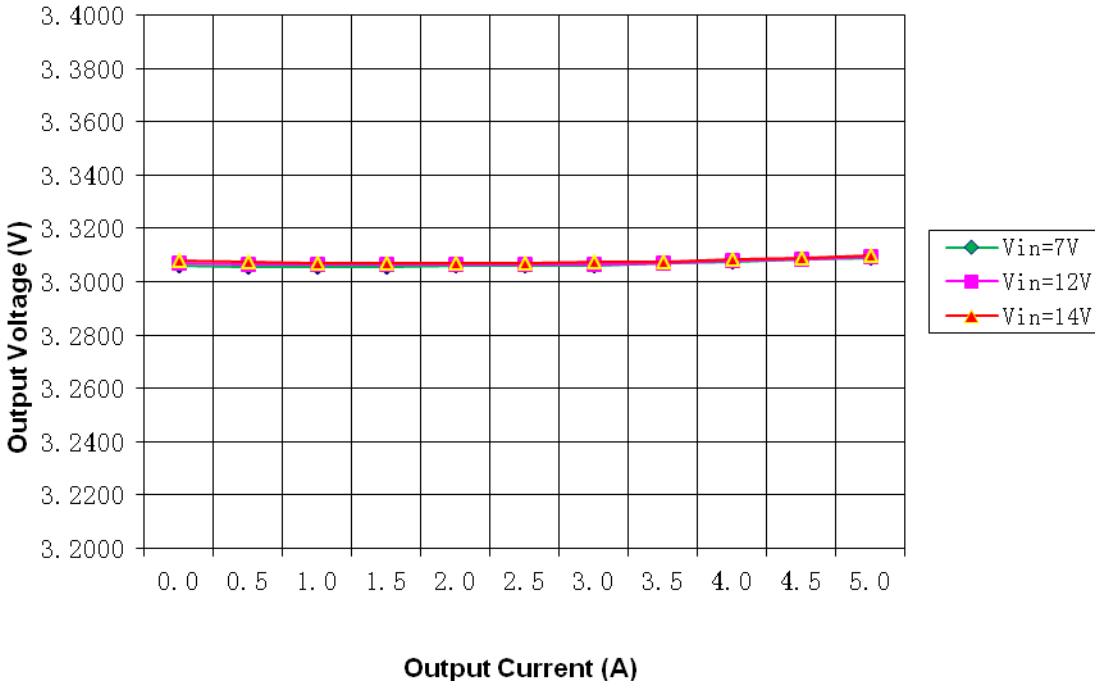
Vin (V)	Iin (A)	Vout (V)	Iout (A)	Eff. (%)
12V Input				
12.178	0.04	3.3068	0.0	0.0%
12.152	0.31	3.3066	0.5	88.1%
12.125	0.59	3.3064	1.0	92.1%
12.090	0.89	3.3065	1.5	92.5%
12.060	1.18	3.3063	2.0	93.0%
12.034	1.48	3.3065	2.5	92.6%
12.005	1.80	3.3067	3.0	91.9%
11.967	2.12	3.3072	3.5	91.4%
11.931	2.44	3.3077	4.0	90.9%
11.896	2.78	3.3084	4.5	90.1%
11.860	3.12	3.3092	5.0	89.4%

Vin (V)	Iin (A)	Vout (V)	Iout (A)	Eff. (%)
14V Input				
14.138	0.03	3.3077	0.0	0.0%
14.117	0.27	3.3073	0.5	86.5%
14.096	0.51	3.3071	1.0	91.2%
14.064	0.77	3.3070	1.5	91.6%
14.038	1.02	3.3068	2.0	92.1%
14.011	1.28	3.3070	2.5	92.0%
13.989	1.55	3.3073	3.0	91.3%
13.961	1.83	3.3074	3.5	90.8%
13.931	2.10	3.3082	4.0	90.3%
13.901	2.39	3.3089	4.5	89.5%
13.869	2.68	3.3098	5.0	89.0%

Efficiency vs Output Current Dual 3.3V Output



Regulation vs Output Current Dual 3.3V Output



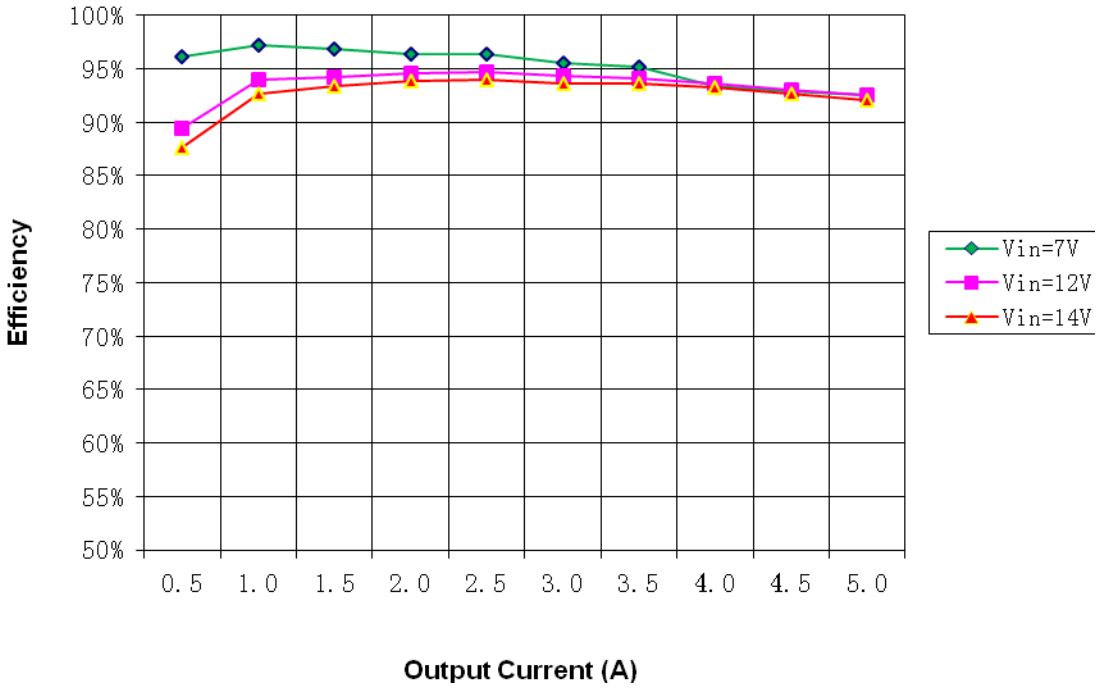
Dual 5.0V/5A Output Efficiency

Vin (V)	Iin (A)	Vout (V)	Iout (A)	Eff. (%)
7V Input				
7.222	0.03	5.0395	0.0	0.0%
7.149	0.73	5.0397	0.5	96.1%
7.075	1.47	5.0394	1.0	97.2%
6.991	2.23	5.0396	1.5	96.8%
6.906	3.03	5.0398	2.0	96.4%
6.824	3.83	5.0401	2.5	96.4%
6.742	4.70	5.0409	3.0	95.5%
6.640	5.58	5.0411	3.5	95.2%
6.525	6.62	5.0420	4.0	93.4%
6.420	7.61	5.0425	4.5	93.0%
6.309	8.64	5.0431	5.0	92.6%

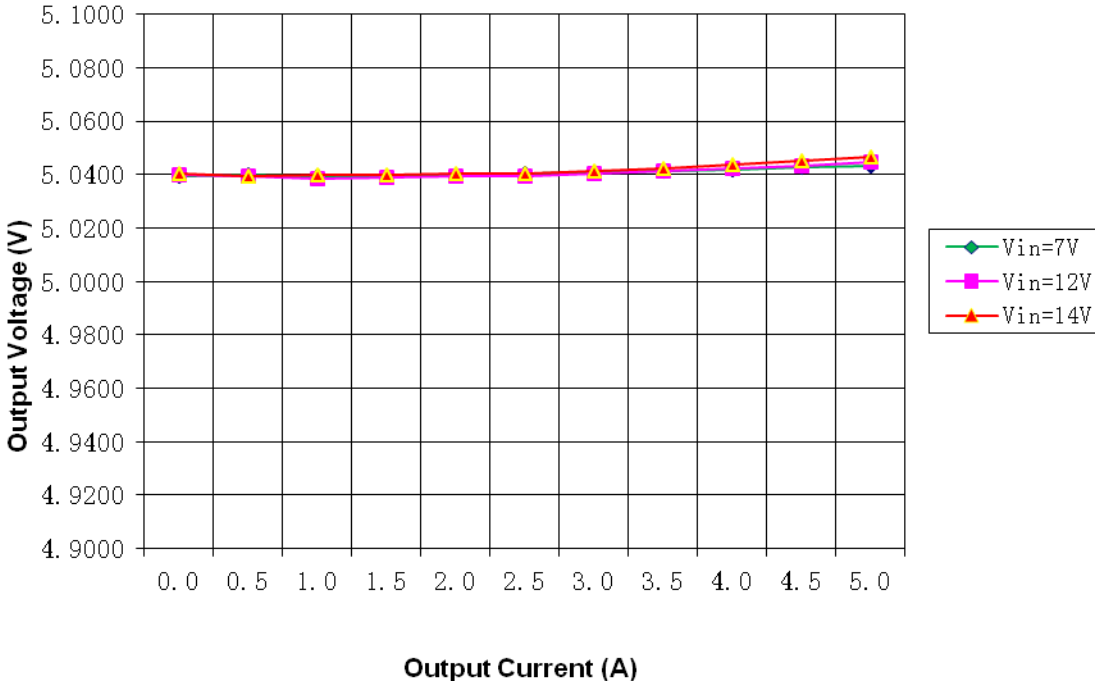
Vin (V)	Iin (A)	Vout (V)	Iout (A)	Eff. (%)
12V Input				
12.198	0.05	5.0398	0.0	0.0%
12.160	0.46	5.0392	0.5	89.5%
12.112	0.89	5.0386	1.0	93.9%
12.064	1.33	5.0389	1.5	94.2%
12.024	1.77	5.0392	2.0	94.6%
11.974	2.22	5.0393	2.5	94.7%
11.925	2.69	5.0404	3.0	94.4%
11.877	3.16	5.0412	3.5	94.1%
11.826	3.64	5.0422	4.0	93.7%
11.778	4.14	5.0432	4.5	93.0%
11.726	4.65	5.0445	5.0	92.5%

Vin (V)	Iin (A)	Vout (V)	Iout (A)	Eff. (%)
14V Input				
14.147	0.51	5.0401	0.0	0.0%
14.112	0.41	5.0394	0.5	87.7%
14.073	0.77	5.0397	1.0	92.7%
14.032	1.15	5.0398	1.5	93.4%
13.999	1.53	5.0401	2.0	93.9%
13.958	1.92	5.0405	2.5	94.0%
13.914	2.32	5.0414	3.0	93.6%
13.871	2.72	5.0423	3.5	93.6%
13.829	3.13	5.0437	4.0	93.2%
13.785	3.56	5.0449	4.5	92.7%
13.744	3.99	5.0464	5.0	92.1%

Efficiency vs Output Current Dual 5.0V Output

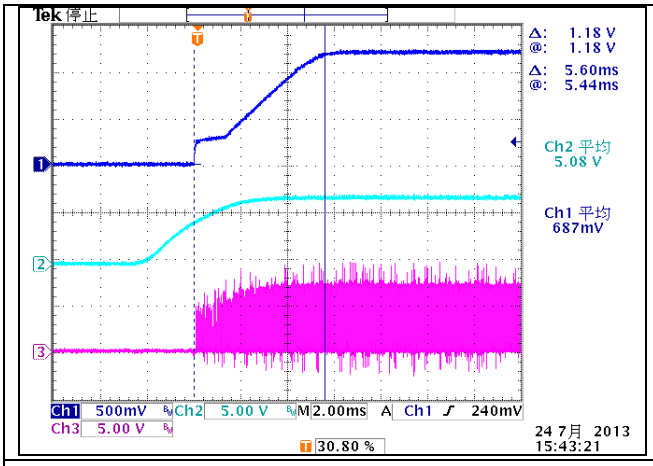
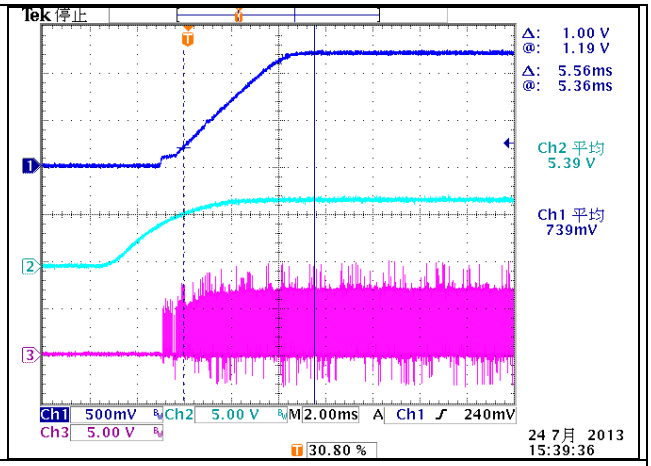
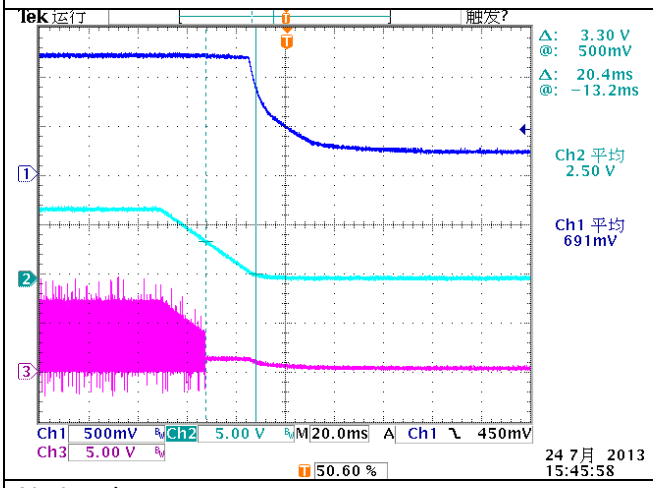
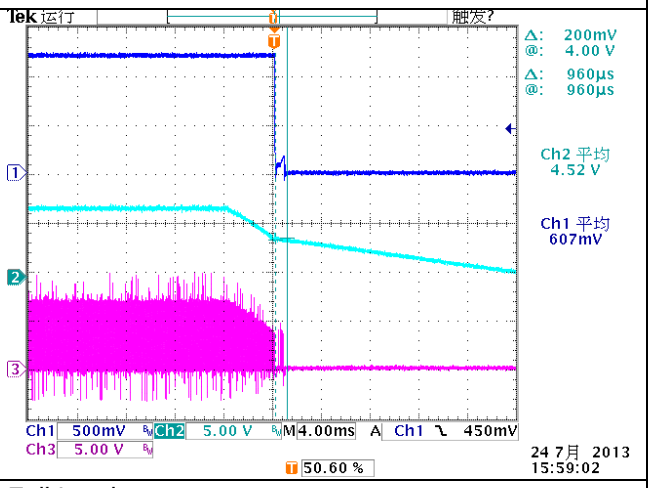


Regulation vs Output Current Dual 5.0V Output

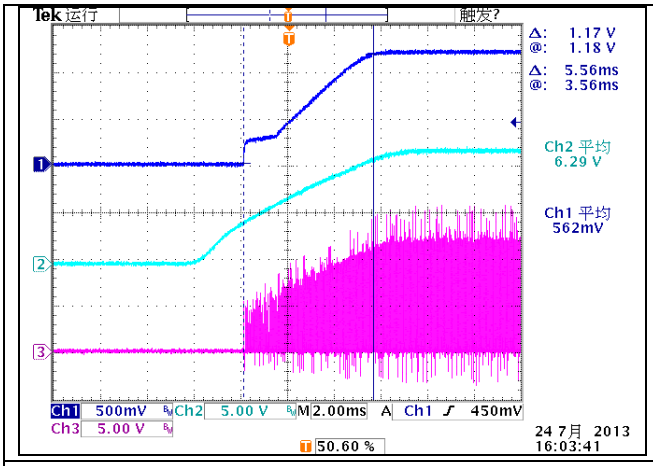


2.3: Start Up & Shut Down Waveforms

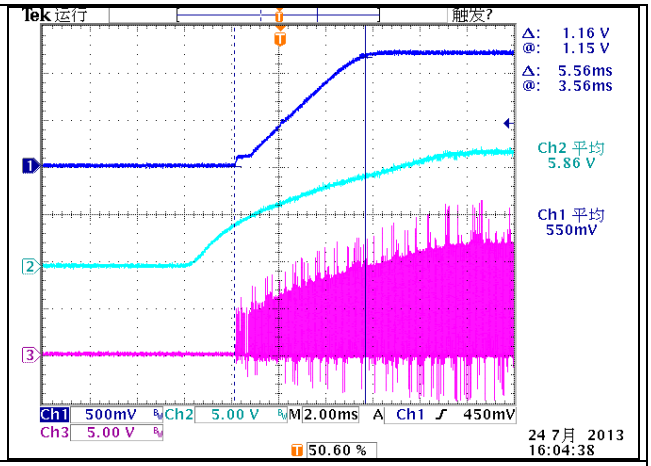
7V Input with Full Load & No Load

	
No Load CH1: Output Voltage 0.5V/Div CH2: Input Voltage 5.0V/Div CH3: Vsw Voltage 5.0V/Div	Full Load CH1: Output Voltage 0.5V/Div CH2: Input Voltage 5.0V/Div CH3: Vsw Voltage 5.0V/Div
	
No Load CH1: Output Voltage 0.5V/Div CH2: Input Voltage 5.0V/Div CH3: Vsw Voltage 5.0V/Div	Full Load CH1: Output Voltage 0.5V/Div CH2: Input Voltage 5.0V/Div CH3: Vsw Voltage 5.0V/Div

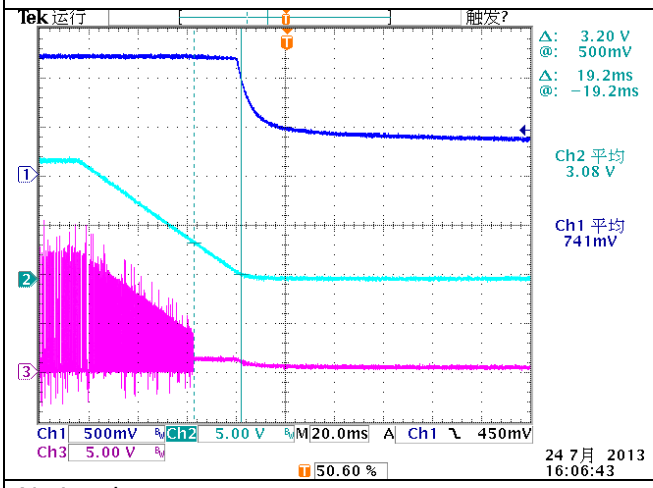
12V Input with Full Load & No Load



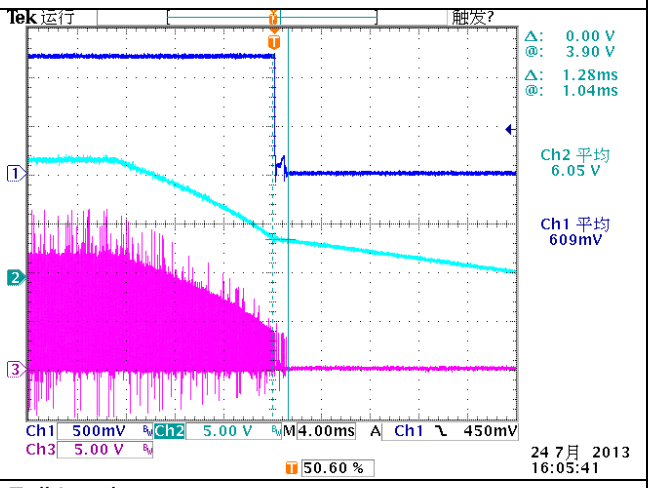
No Load
CH1: Output Voltage 0.5V/Div
CH2: Input Voltage 5.0V/Div
CH3: Vsw Voltage 5.0V/Div



Full Load
CH1: Output Voltage 0.5V/Div
CH2: Input Voltage 5.0V/Div
CH3: Vsw Voltage 5.0V/Div

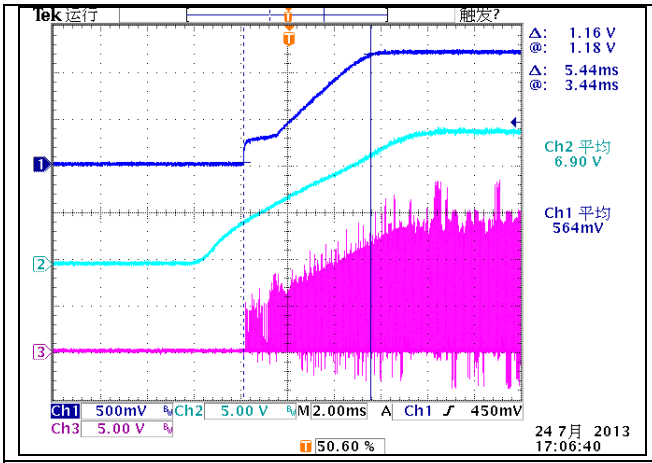


No Load
CH1: Output Voltage 0.5V/Div
CH2: Input Voltage 5.0V/Div
CH3: Vsw Voltage 5.0V/Div

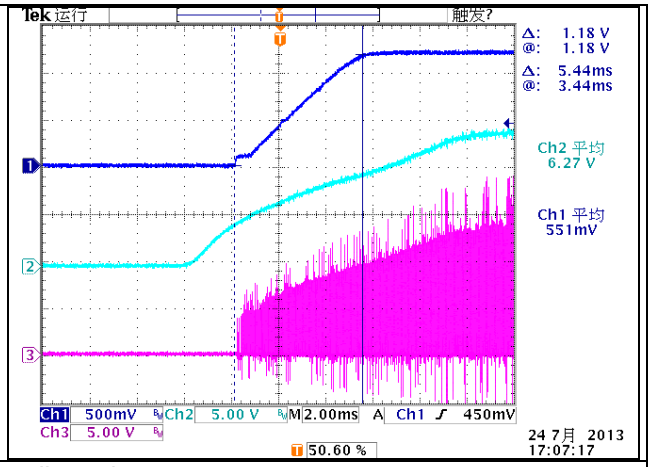


Full Load
CH1: Output Voltage 0.5V/Div
CH2: Input Voltage 5.0V/Div
CH3: Vsw Voltage 5.0V/Div

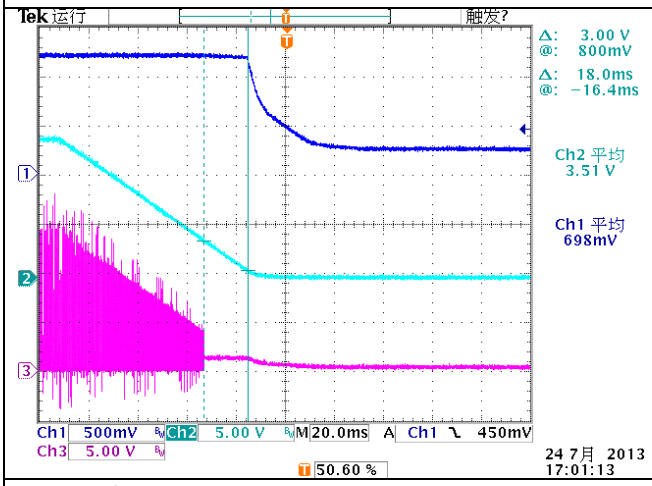
14V Input with Full Load & No Load



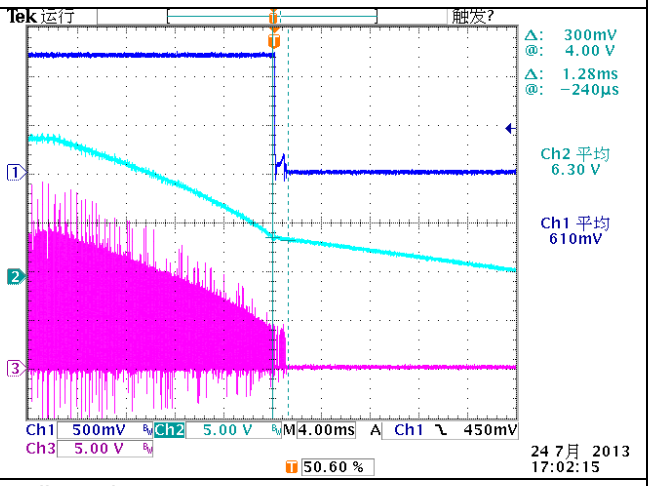
No Load
CH1: Output Voltage 0.5V/Div
CH2: Input Voltage 5.0V/Div
CH3: Vsw Voltage 5.0V/Div



Full Load
CH1: Output Voltage 0.5V/Div
CH2: Input Voltage 5.0V/Div
CH3: Vsw Voltage 5.0V/Div

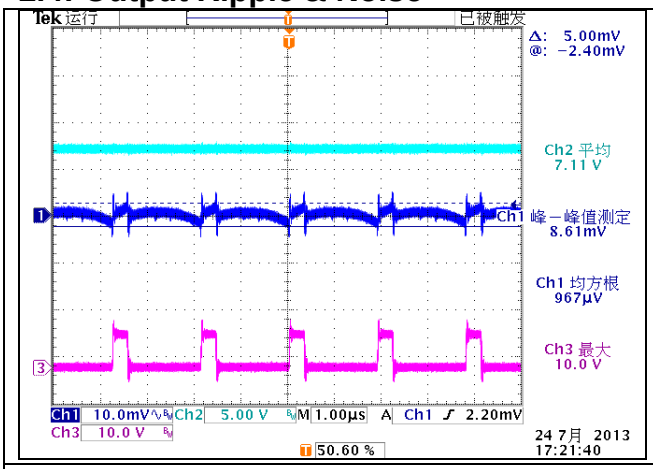


No Load
CH1: Output Voltage 0.5V/Div
CH2: Input Voltage 5.0V/Div
CH3: Vsw Voltage 5.0V/Div

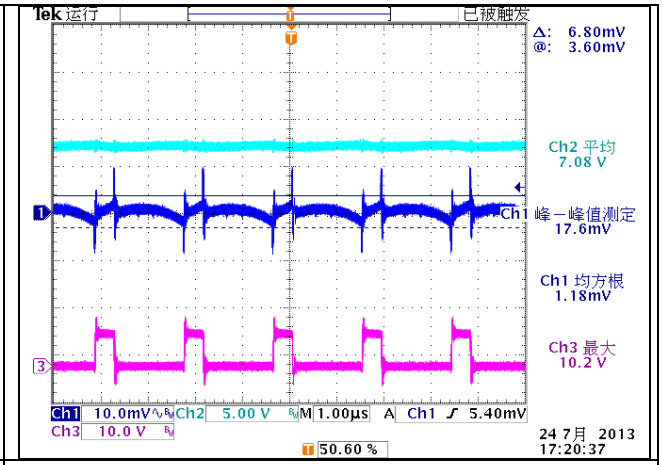


Full Load
CH1: Output Voltage 0.5V/Div
CH2: Input Voltage 5.0V/Div
CH3: Vsw Voltage 5.0V/Div

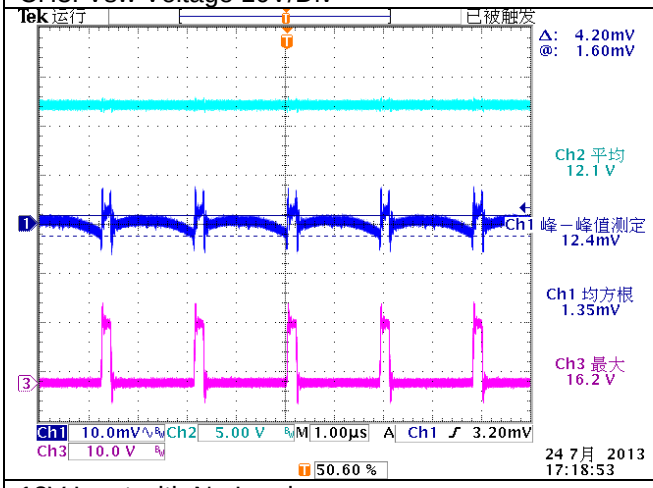
2.4: Output Ripple & Noise



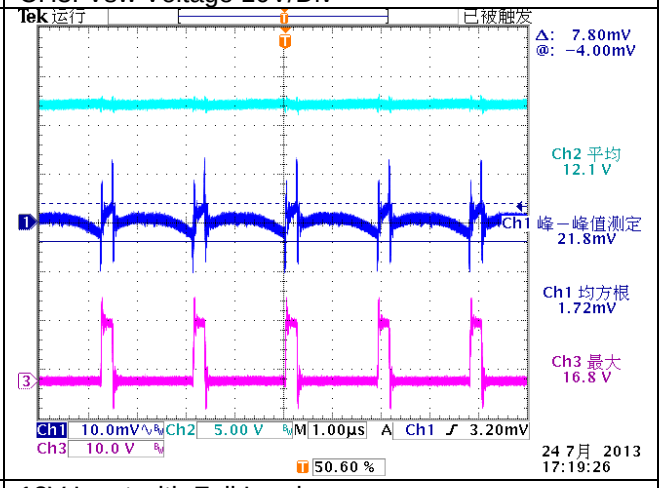
7V Input with No Load
CH1: Output Voltage 10mV/Div
CH2: Input Voltage 5.0V/Div
CH3: Vsw Voltage 10V/Div



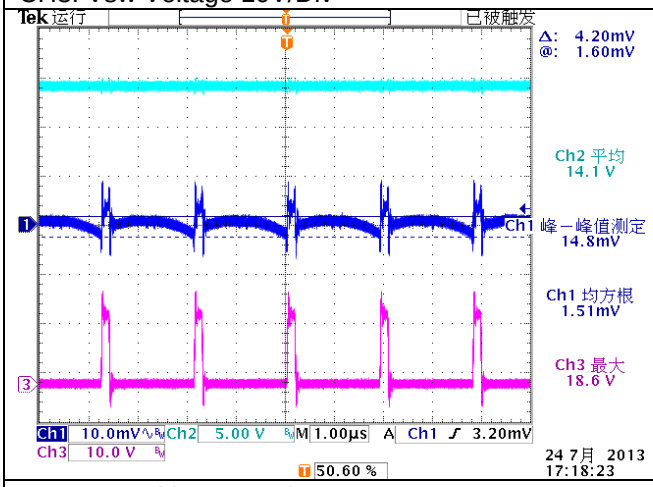
7V Input with Full Load
CH1: Output Voltage 10mV/Div
CH2: Input Voltage 5.0V/Div
CH3: Vsw Voltage 10V/Div



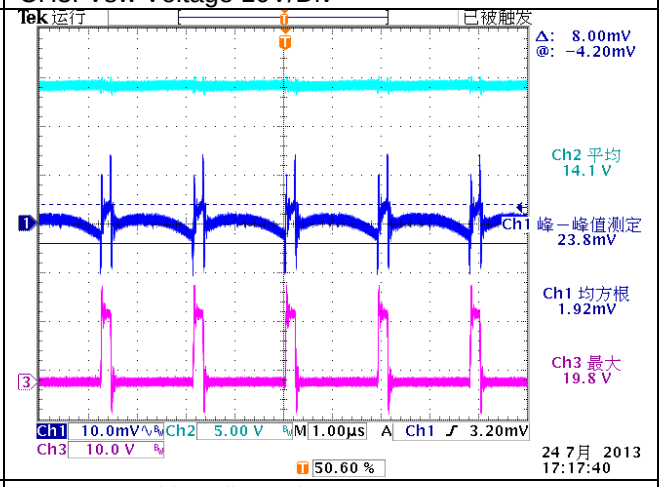
12V Input with No Load
CH1: Output Voltage 10mV/Div
CH2: Input Voltage 5.0V/Div
CH3: Vsw Voltage 10V/Div



12V Input with Full Load
CH1: Output Voltage 10mV/Div
CH2: Input Voltage 5.0V/Div
CH3: Vsw Voltage 10V/Div

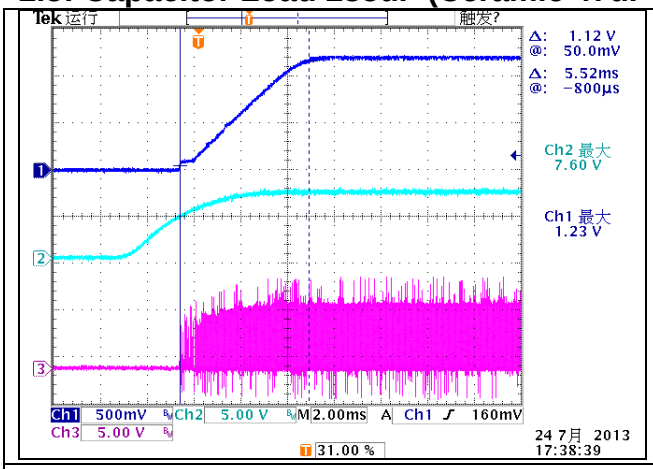


14V Input with No Load
CH1: Output Voltage 10mV/Div
CH2: Input Voltage 5.0V/Div
CH3: Vsw Voltage 10V/Div

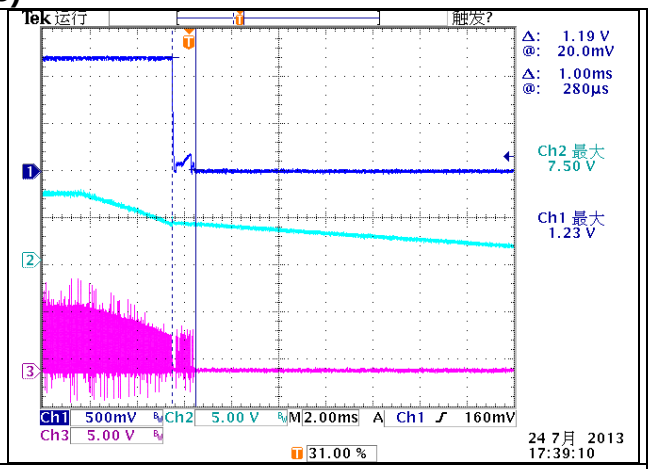


14V Input with Full Load
CH1: Output Voltage 10mV/Div
CH2: Input Voltage 5.0V/Div
CH3: Vsw Voltage 10V/Div

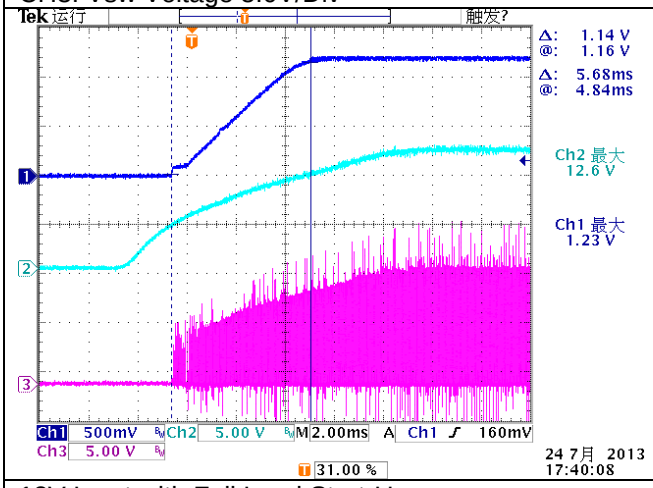
2.5: Capacitor Load 235uF (Ceramic 47uF*5)



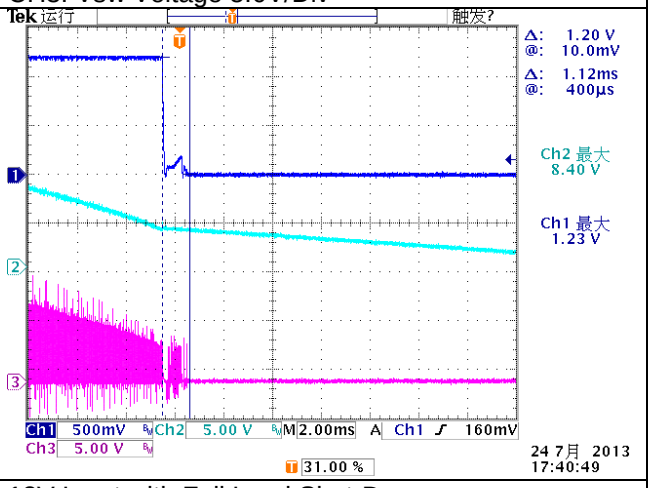
7V Input with Full Load Start-Up
CH1: Output Voltage 0.5V/Div
CH2: Input Voltage 5.0V/Div
CH3: Vsw Voltage 5.0V/Div



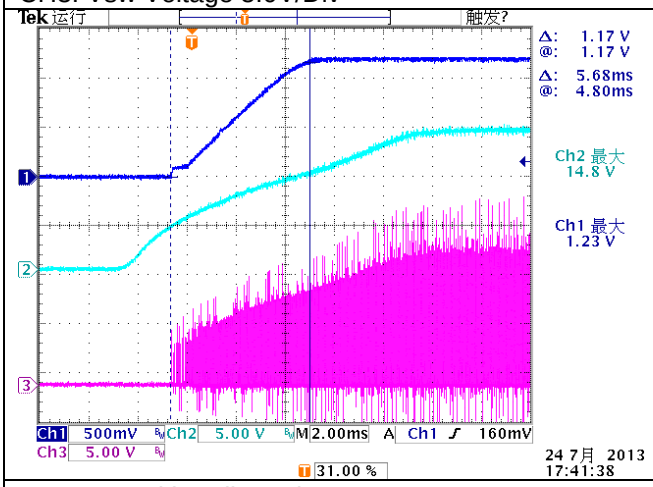
7V Input with Full Load Shut-Down
CH1: Output Voltage 0.5V/Div
CH2: Input Voltage 5.0V/Div
CH3: Vsw Voltage 5.0V/Div



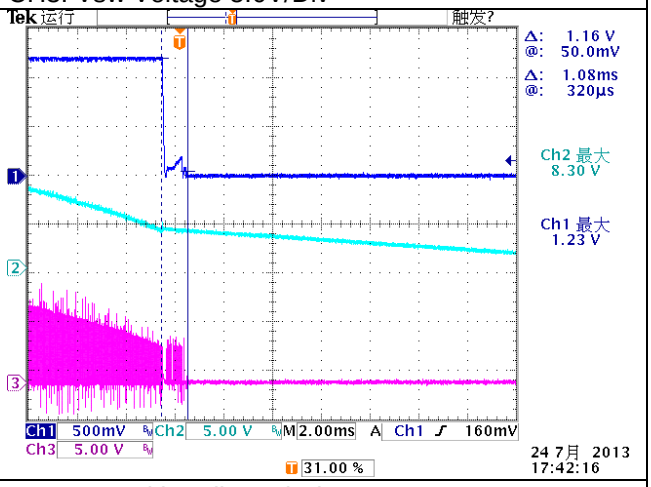
12V Input with Full Load Start-Up
CH1: Output Voltage 0.5V/Div
CH2: Input Voltage 5.0V/Div
CH3: Vsw Voltage 5.0V/Div



12V Input with Full Load Shut-Down
CH1: Output Voltage 0.5V/Div
CH2: Input Voltage 5.0V/Div
CH3: Vsw Voltage 5.0V/Div

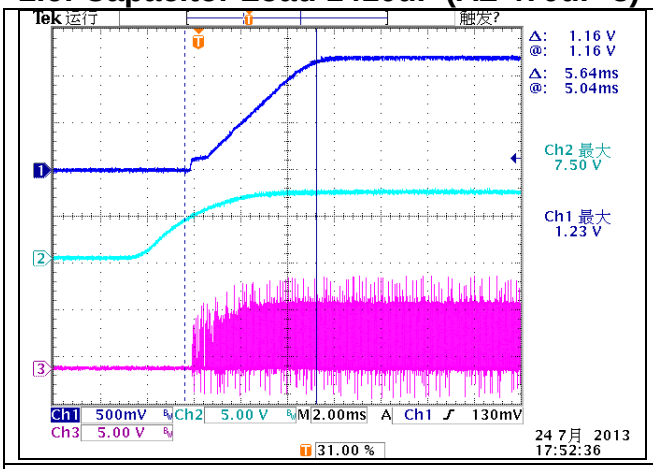


14V Input with Full Load Start-Up
CH1: Output Voltage 0.5V/Div
CH2: Input Voltage 5.0V/Div
CH3: Vsw Voltage 5.0V/Div

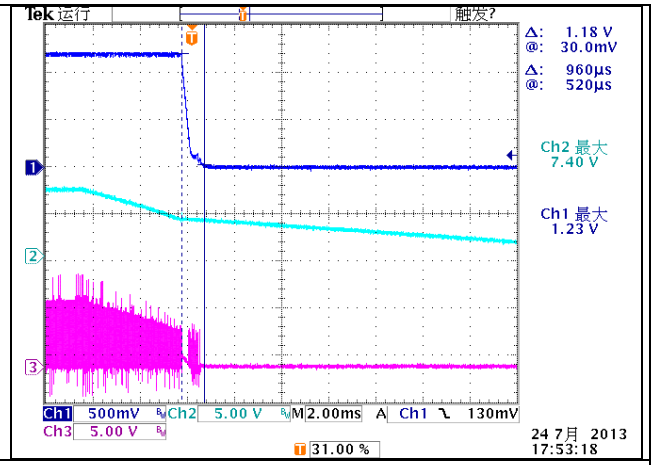


14V Input with Full Load Shut-Down
CH1: Output Voltage 0.5V/Div
CH2: Input Voltage 5.0V/Div
CH3: Vsw Voltage 5.0V/Div

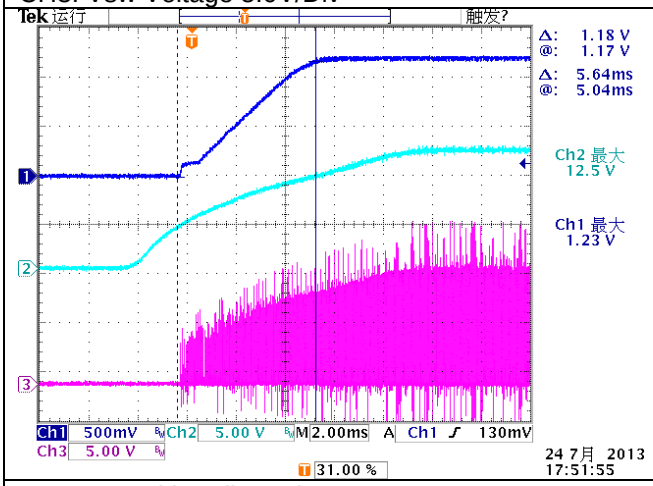
2.6: Capacitor Load 1410uF (AL 470uF*3)



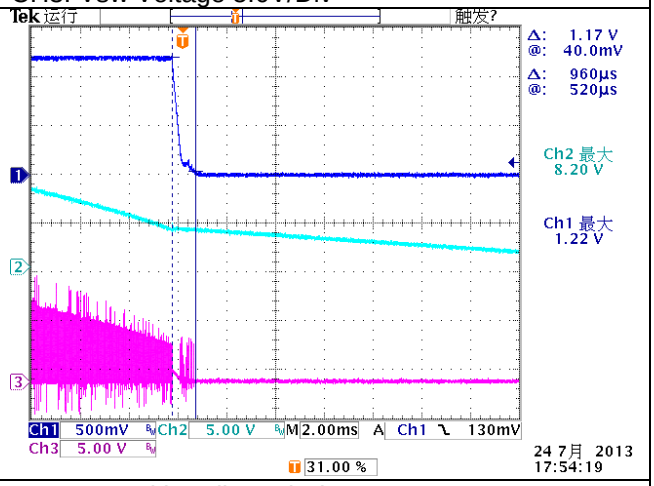
7V Input with Full Load Start-Up
CH1: Output Voltage 0.5V/Div
CH2: Input Voltage 5.0V/Div
CH3: Vsw Voltage 5.0V/Div



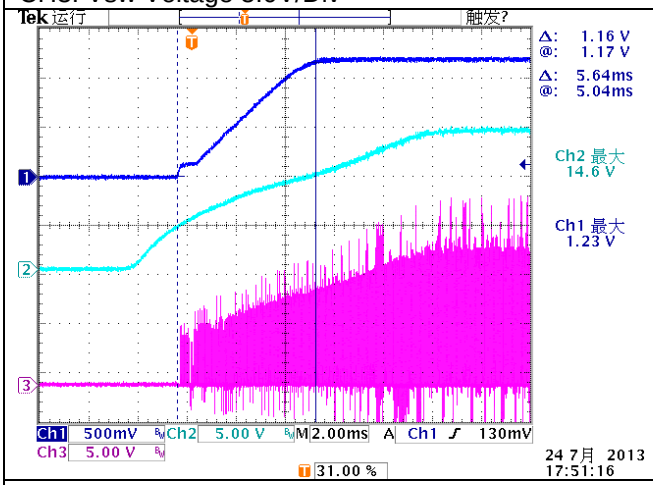
7V Input with Full Load Shut-Down
CH1: Output Voltage 0.5V/Div
CH2: Input Voltage 5.0V/Div
CH3: Vsw Voltage 5.0V/Div



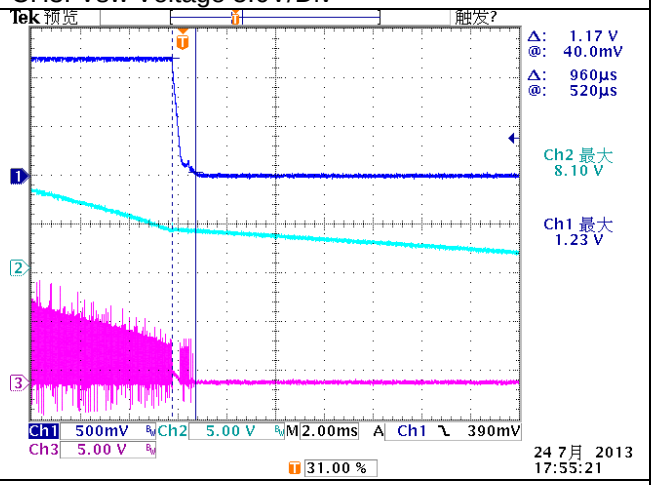
12V Input with Full Load Start-Up
CH1: Output Voltage 0.5V/Div
CH2: Input Voltage 5.0V/Div
CH3: Vsw Voltage 5.0V/Div



12V Input with Full Load Shut-Down
CH1: Output Voltage 0.5V/Div
CH2: Input Voltage 5.0V/Div
CH3: Vsw Voltage 5.0V/Div

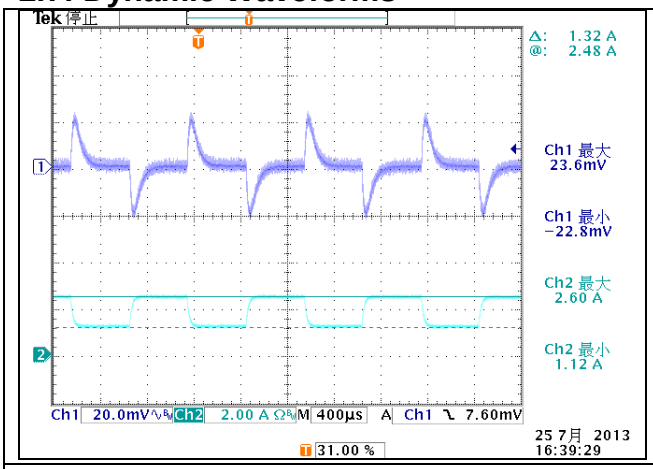


14V Input with Full Load Start-Up
CH1: Output Voltage 0.5V/Div
CH2: Input Voltage 5.0V/Div
CH3: Vsw Voltage 5.0V/Div

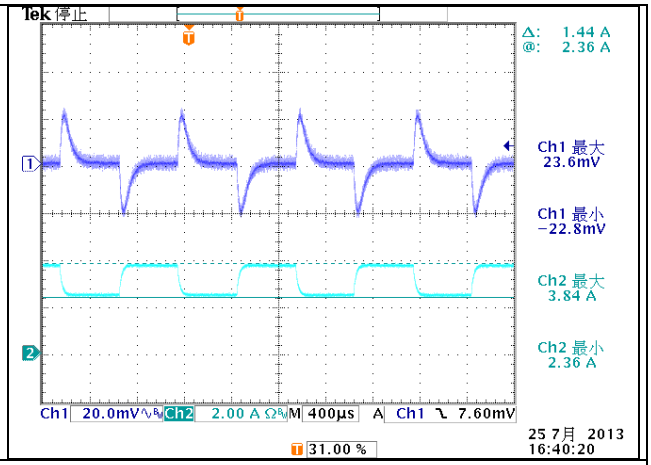


14V Input with Full Load Shut-Down
CH1: Output Voltage 0.5V/Div
CH2: Input Voltage 5.0V/Div
CH3: Vsw Voltage 5.0V/Div

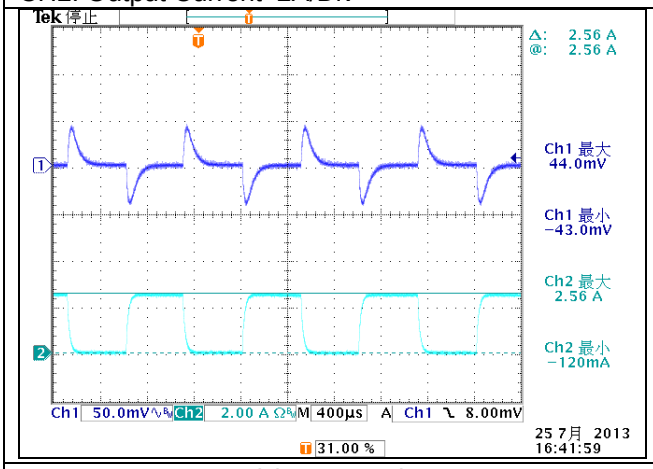
2.7: Dynamic Waveforms



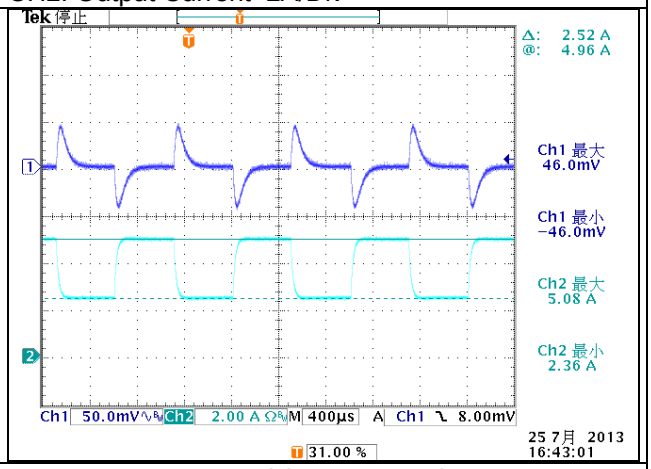
1.25A – 2.5A Step Load (25% – 50%)
CH1: Output Voltage 20mV/Div
CH2: Output Current 2A/Div



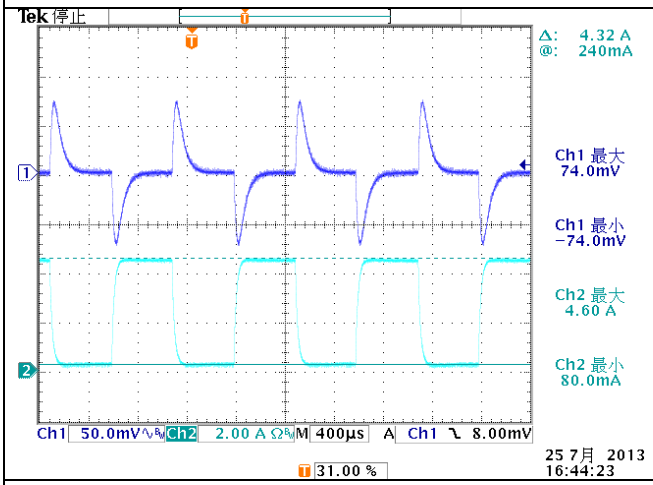
2.5A – 3.75A Step Load (50% – 75%)
CH1: Output Voltage 20mV/Div
CH2: Output Current 2A/Div



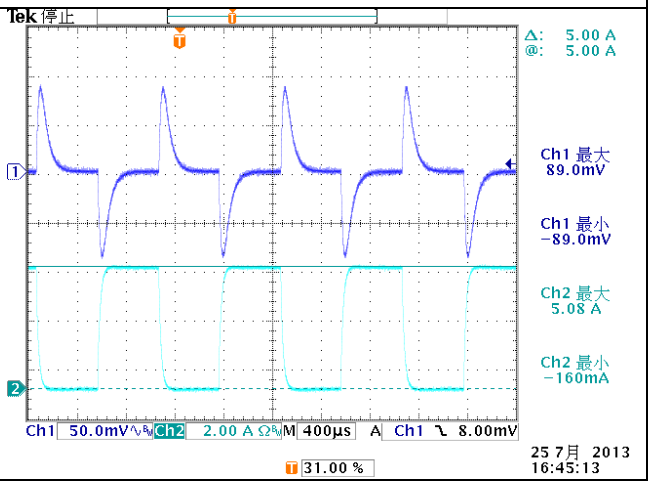
0A – 2.5A Step Load (0% – 50%)
CH1: Output Voltage 20mV/Div
CH2: Output Current 2A/Div



2.5A – 5.0A Step Load (50% – 100%)
CH1: Output Voltage 20mV/Div
CH2: Output Current 2A/Div

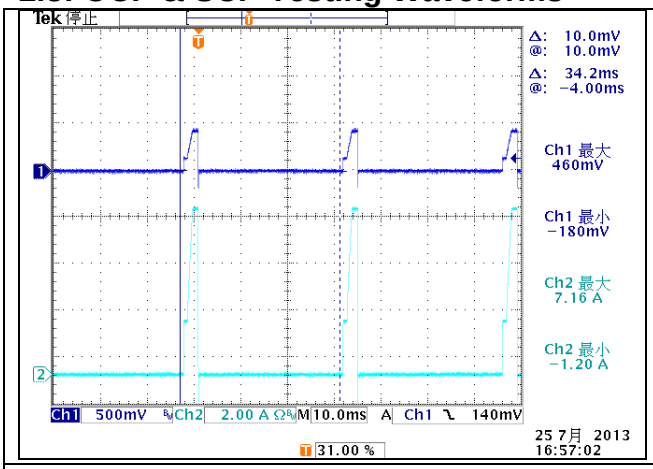


0.25A – 4.5A Step Load (10% – 90%)
CH1: Output Voltage 20mV/Div
CH2: Output Current 2A/Div

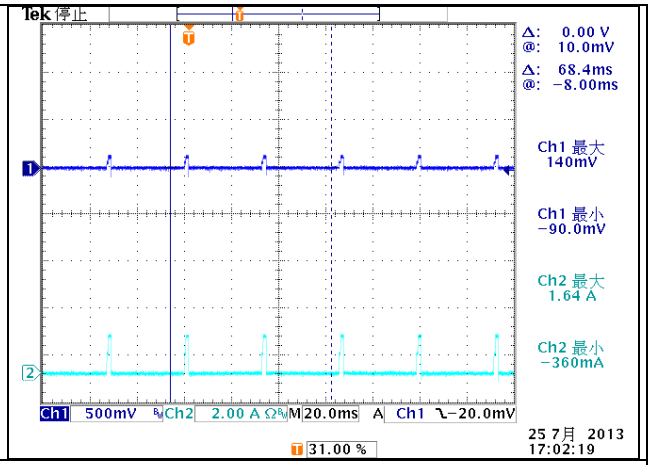


0A – 5.0A Step Load (0% – 100%)
CH1: Output Voltage 20mV/Div
CH2: Output Current 2A/Div

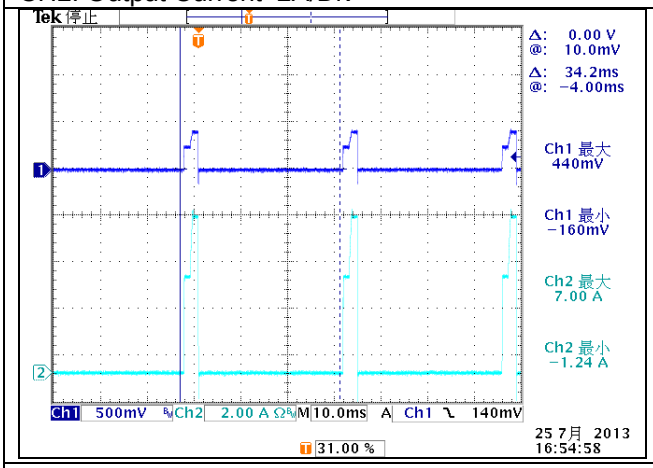
2.8: OCP & SCP Testing Waveforms



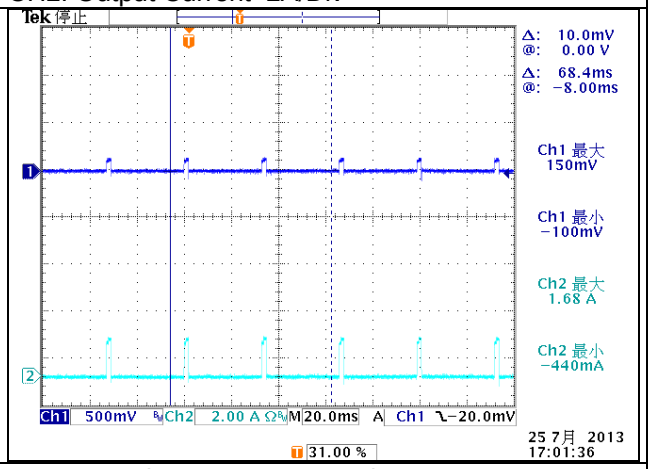
7V Input Over Current Protection
CH1: Output Voltage 500mV/Div
CH2: Output Current 2A/Div



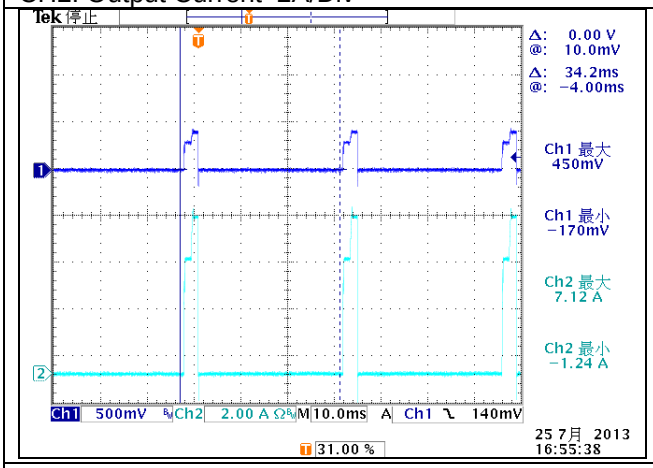
7V Input Shot Current Protection
CH1: Output Voltage 500mV/Div
CH2: Output Current 2A/Div



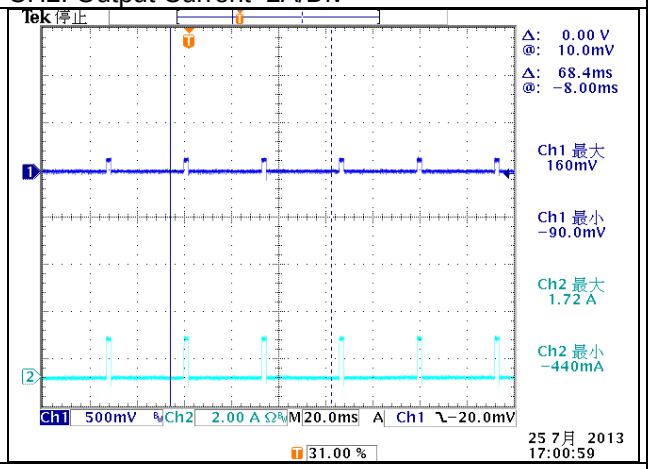
12V Input Over Current Protection
CH1: Output Voltage 500mV/Div
CH2: Output Current 2A/Div



12V Input Shot Current Protection
CH1: Output Voltage 500mV/Div
CH2: Output Current 2A/Div



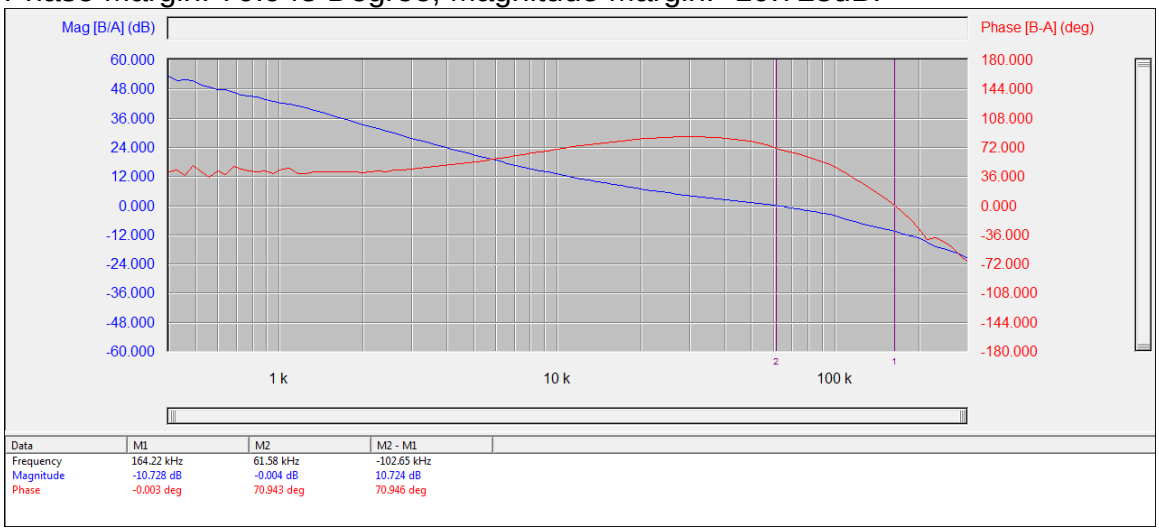
14V Input Over Current Protection
CH1: Output Voltage 500mV/Div
CH2: Output Current 2A/Div



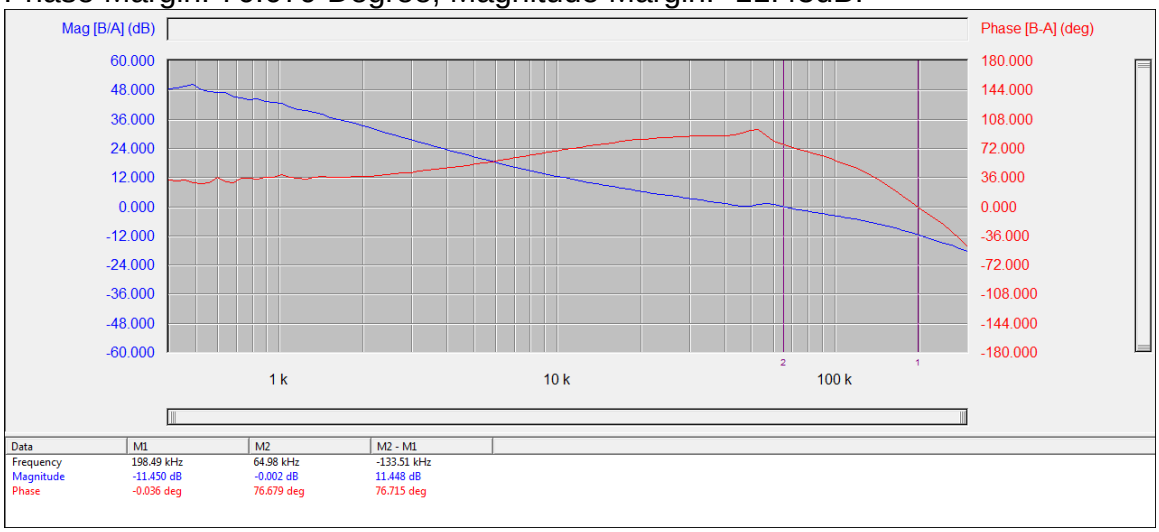
14V Input Shot Current Protection
CH1: Output Voltage 500mV/Div
CH2: Output Current 2A/Div

3 Bode Plot

12V Input, No Load (1.2V/0A).
Phase Margin: 70.943 Degree; Magnitude Margin: -10.728dB.



12V Input, Full Load (1.2V/5.0A).
Phase Margin: 76.679 Degree; Magnitude Margin: -11.45dB.



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