PMP40270 Test Results

1 General

1.1 Purpose

This test report is to provide the detailed data for evaluating and verifying the PMP40270 which employs one Buck Converter ---- LMS3635 and two USB Charging Port Controllers ---- TPS25821.

1.2 Reference Documentation

Schematic: PMP40270_Sch.pdf

Gerber: PMP40270_GerberNCdrills.zip

Layer Plot: PMP40270_PCBlayers.pdf

Assembly Drawing: PMP40270_Assy.pdf

CAD File: PMP40270_CAD.zip

BOM: PMP40270_BOM.pdf

1.3 Test Equipment

Multi-meter (current): Fluke 287C

Multi-meter (voltage): Fluke 287C

DC Source: Chroma 62012P-600-8

E-Load: Chroma 63105A module

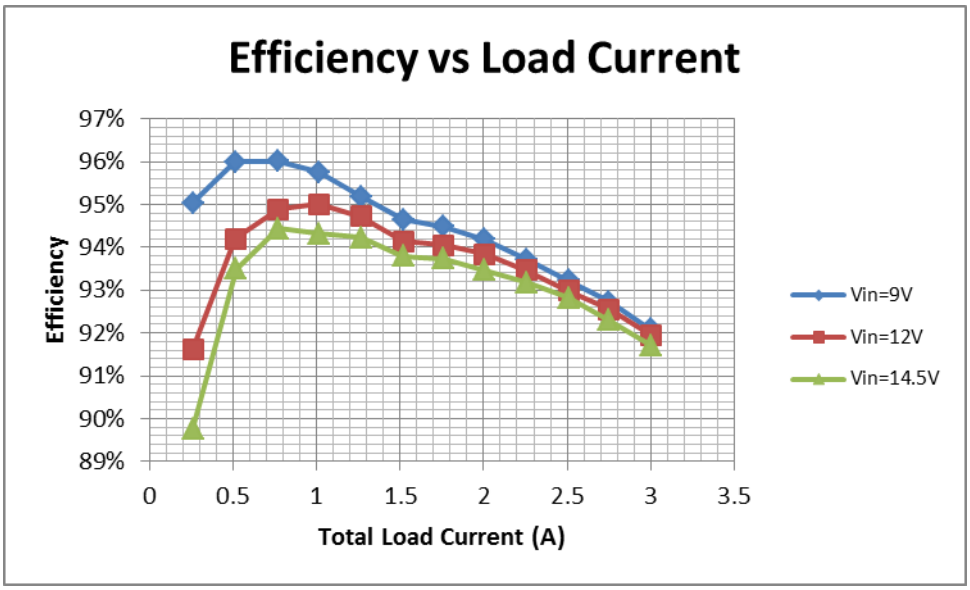
Oscilloscope: Tektronix DPO3054

Electrical Thermography: Fluke Ti9

2 Performance Data and Waveform

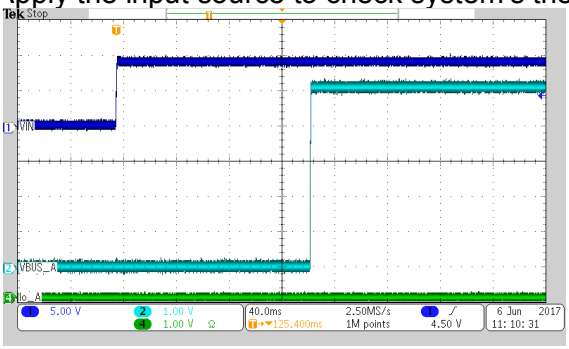
2.1 Efficiency

V_{IN}(V)	I_{IN}(A)	V_{VBUS_A}(V)	I_{VBUS_A}(A)	V_{VBUS_B}(V)	I_{VBUS_B}(A)	Efficiency
8.993	0.157	5.088	0.242	5.075	0.022	95.04%
8.983	0.304	5.070	0.495	5.075	0.022	95.99%
8.974	0.453	5.055	0.750	5.075	0.022	96.01%
8.964	0.594	5.038	0.990	5.075	0.022	95.76%
8.954	0.746	5.018	1.245	5.075	0.022	95.19%
8.944	0.898	5.000	1.498	5.075	0.022	94.65%
8.933	1.044	4.998	1.498	5.058	0.262	94.49%
8.924	1.195	4.998	1.498	5.040	0.507	94.18%
8.913	1.352	4.995	1.498	5.020	0.759	93.72%
8.903	1.510	4.993	1.498	5.000	1.011	93.22%
8.892	1.663	4.993	1.498	4.983	1.251	92.73%
8.881	1.825	4.988	1.498	4.960	1.503	92.09%
11.993	0.122	5.085	0.242	5.073	0.022	91.63%
11.986	0.232	5.068	0.495	5.073	0.022	94.20%
11.979	0.343	5.050	0.750	5.075	0.022	94.89%
11.972	0.448	5.035	0.990	5.075	0.022	95.01%
11.964	0.561	5.018	1.245	5.075	0.022	94.73%
11.957	0.675	4.998	1.498	5.073	0.022	94.14%
11.950	0.784	4.998	1.498	5.055	0.262	94.05%
11.943	0.896	4.998	1.498	5.038	0.507	93.84%
11.935	1.013	4.995	1.498	5.020	0.759	93.46%
11.927	1.130	4.993	1.498	5.000	1.011	92.99%
11.920	1.243	4.993	1.498	4.983	1.251	92.55%
11.911	1.363	4.988	1.498	4.963	1.503	91.96%
14.495	0.103	5.085	0.242	5.073	0.022	89.76%
14.489	0.194	5.068	0.497	5.073	0.022	93.50%
14.483	0.285	5.050	0.750	5.073	0.022	94.44%
14.477	0.373	5.033	0.990	5.073	0.022	94.31%
14.471	0.466	5.015	1.245	5.073	0.022	94.23%
14.465	0.560	4.998	1.498	5.073	0.022	93.79%
14.459	0.650	4.998	1.498	5.055	0.262	93.74%
14.453	0.743	4.995	1.498	5.038	0.507	93.47%
14.446	0.839	4.995	1.498	5.020	0.759	93.18%
14.440	0.935	4.993	1.498	5.000	1.011	92.82%
14.434	1.029	4.990	1.498	4.983	1.251	92.29%
14.428	1.128	4.988	1.498	4.960	1.503	91.71%

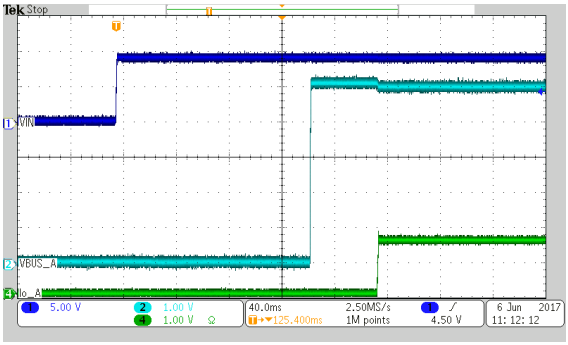


2.2 Start Up

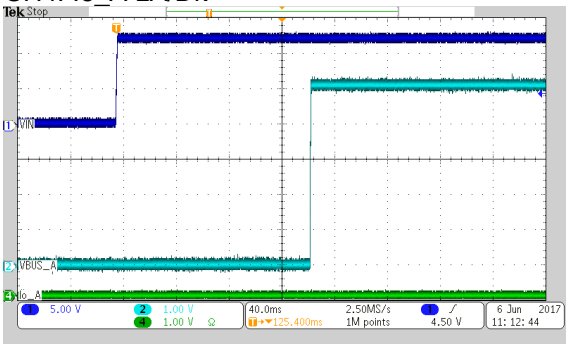
Apply the input source to check system's the soft start.



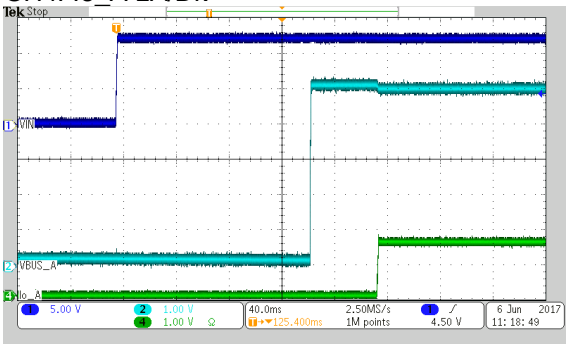
Vin=9V and No Load
CH1: Vin 5V/Div
CH2: VBUS_A 1V/Div
CH4: Io_A 1A/Div



Vin=9V and Full Load
CH1: Vin 5V/Div
CH2: VBUS_A 1V/Div
CH4: Io_A 1A/Div

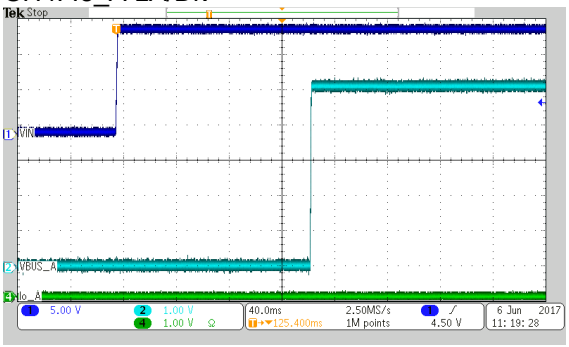


Vin=12V and No Load
CH1: Vin 5V/Div



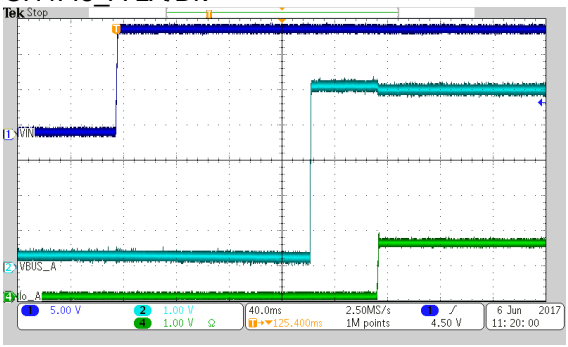
Vin=12V and Full Load
CH1: Vin 5V/Div

CH2: VBUS_A 1V/Div
CH4: Io_A 1A/Div



Vin=14.5V and No Load
CH1: Vin 5V/Div
CH2: VBUS_A 1V/Div
CH4: Io_A 1A/Div

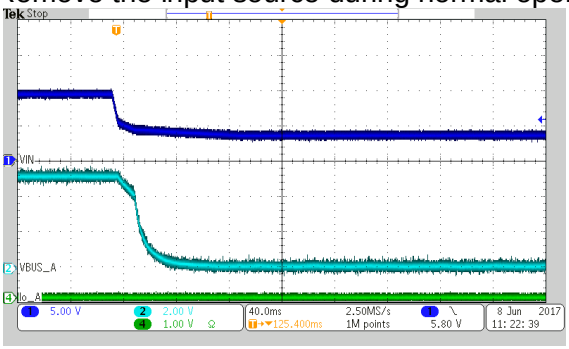
CH2: VBUS_A 1V/Div
CH4: Io_A 1A/Div



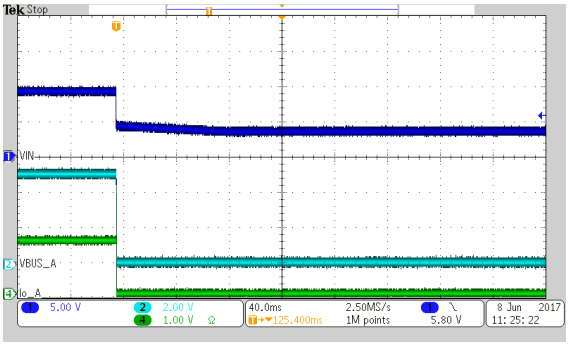
Vin=14.5V and Full Load
CH1: Vin 5V/Div
CH2: VBUS_A 1V/Div
CH4: Io_A 1A/Div

2.3 Shut Down

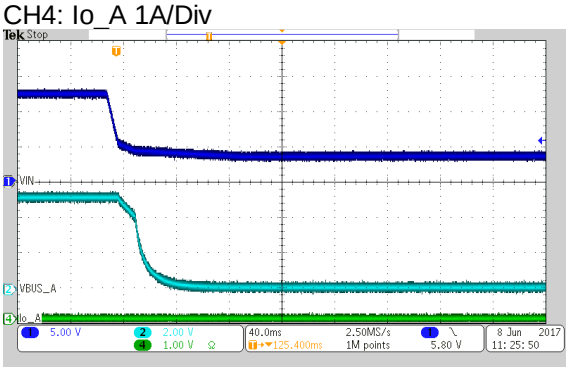
Remove the input source during normal operation.



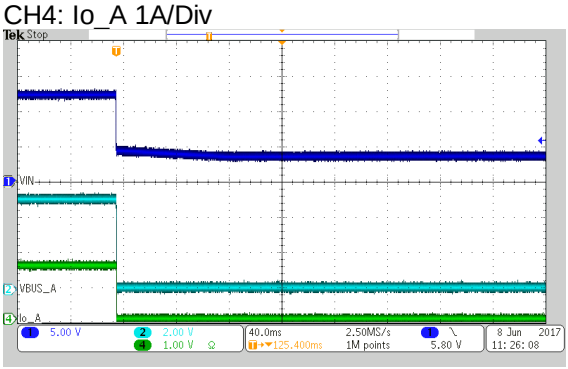
Vin=9V and No Load
CH1: Vin 5V/Div
CH2: VBUS_A 1V/Div
CH4: Io_A 1A/Div



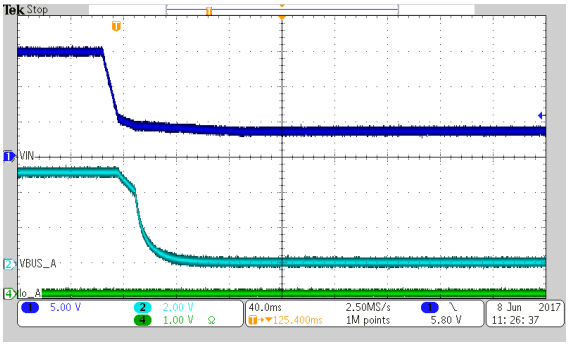
Vin=9V and Full Load
CH1: Vin 5V/Div
CH2: VBUS_A 1V/Div
CH4: Io_A 1A/Div



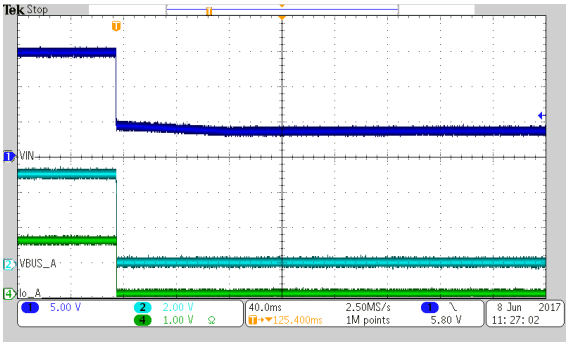
Vin=12V and No Load
CH1: Vin 5V/Div
CH2: VBUS_A 1V/Div
CH4: Io_A 1A/Div



Vin=12V and Full Load
CH1: Vin 5V/Div
CH2: VBUS_A 1V/Div
CH4: Io_A 1A/Div

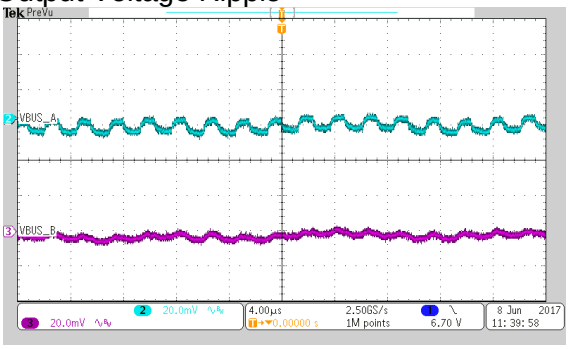


Vin=14.5V and No Load
CH1: Vin 5V/Div
CH2: VBUS_A 1V/Div
CH4: Io_A 1A/Div

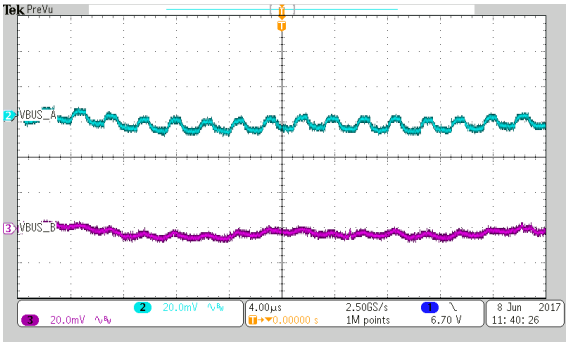


Vin=14.5V and Full Load
CH1: Vin 5V/Div
CH2: VBUS_A 1V/Div
CH4: Io_A 1A/Div

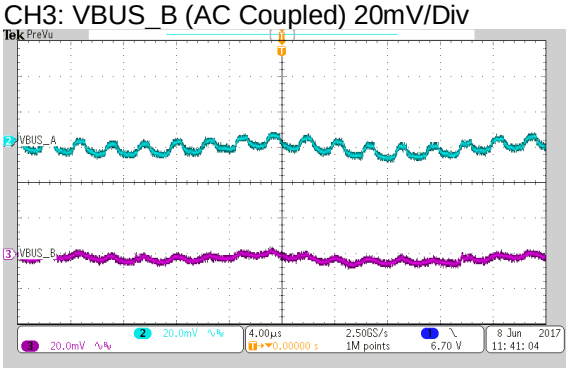
2.4 Output Voltage Ripple



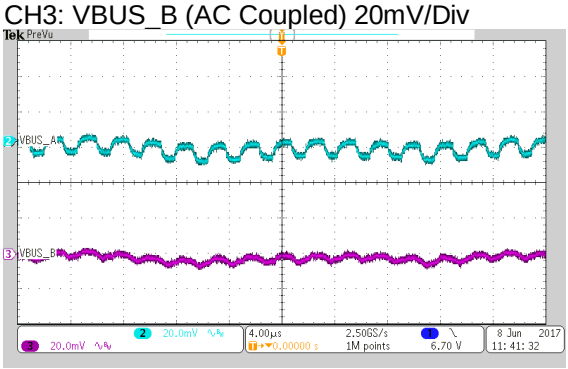
Vin=9V and I_{VBUS_A}=0A, I_{VBUS_B}=0A
CH2: VBUS_A (AC Coupled) 20mV/Div
CH3: VBUS_B (AC Coupled) 20mV/Div



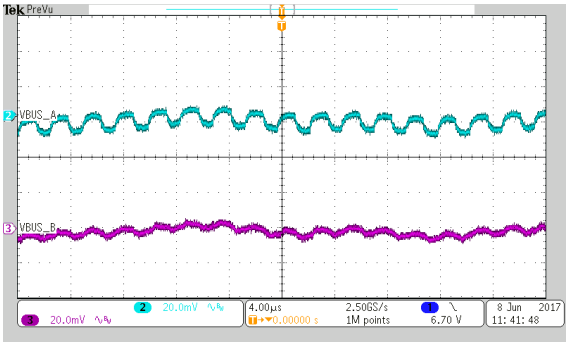
Vin=9V and I_{VBUS_A}=1.5A, I_{VBUS_B}=0A
CH2: VBUS_A (AC Coupled) 20mV/Div
CH3: VBUS_B (AC Coupled) 20mV/Div



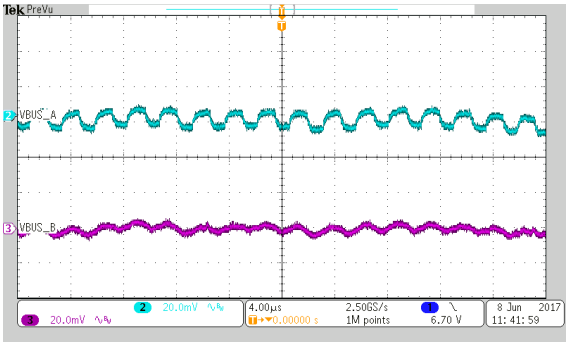
Vin=9V and I_{VBUS_A}=1.5A, I_{VBUS_B}=1.5A
CH2: VBUS_A (AC Coupled) 20mV/Div
CH3: VBUS_B (AC Coupled) 20mV/Div



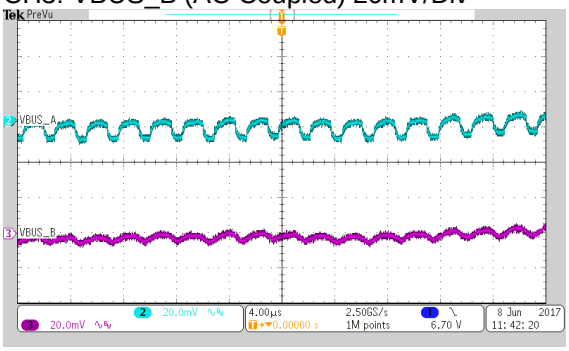
Vin=12V and I_{VBUS_A}=0A, I_{VBUS_B}=0A
CH2: VBUS_A (AC Coupled) 20mV/Div
CH3: VBUS_B (AC Coupled) 20mV/Div



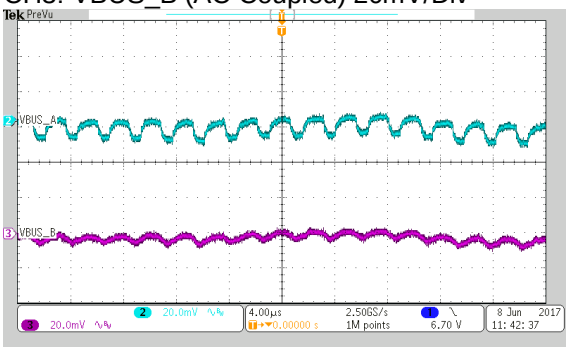
Vin=12V and I_{VBUS_A}=1.5A, I_{VBUS_B}=0A
CH2: VBUS_A (AC Coupled) 20mV/Div
CH3: VBUS_B (AC Coupled) 20mV/Div



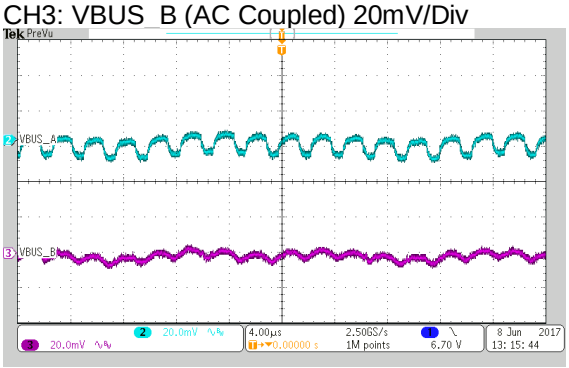
Vin=12V and I_{VBUS_A}=1.5A, I_{VBUS_B}=1.5A
CH2: VBUS_A (AC Coupled) 20mV/Div
CH3: VBUS_B (AC Coupled) 20mV/Div



Vin=14.5V and I_{VBUS_A}=0A, I_{VBUS_B}=0A
CH2: VBUS_A (AC Coupled) 20mV/Div
CH3: VBUS_B (AC Coupled) 20mV/Div



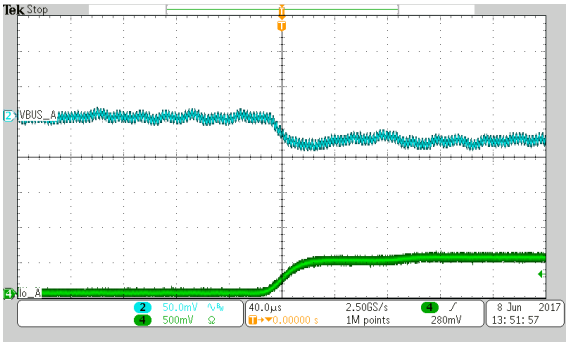
Vin=14.5V and I_{VBUS_A}=1.5A, I_{VBUS_B}=0A
CH2: VBUS_A (AC Coupled) 20mV/Div
CH3: VBUS_B (AC Coupled) 20mV/Div



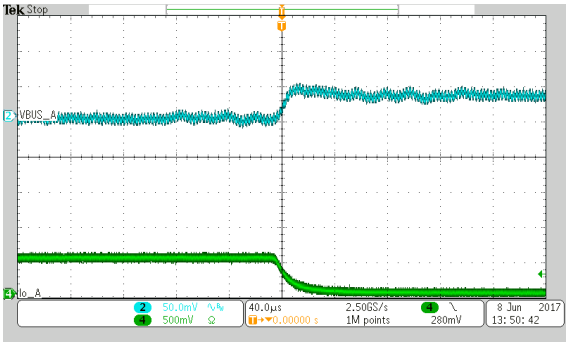
Vin=14.5V and I_{VBUS_A}=1.5A, I_{VBUS_B}=1.5A
CH2: VBUS_A (AC Coupled) 20mV/Div
CH3: VBUS_B (AC Coupled) 20mV/Div

2.5 Dynamic Performance

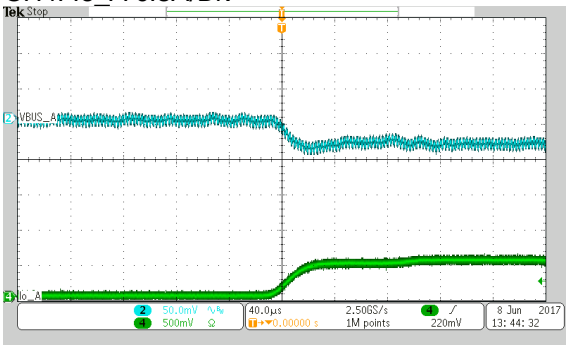
0A↔0.5A Load Step @100mA/us



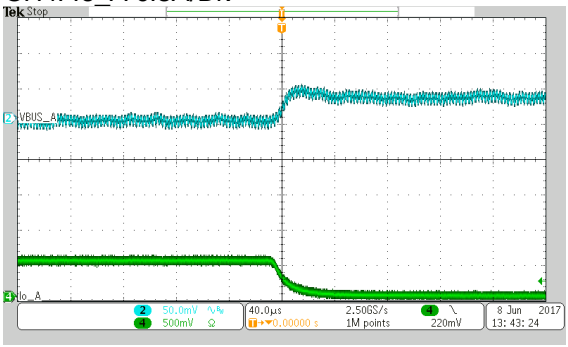
Vin=9V, I_{VBUS_B}=0A and Load switching for I_{VBUS_A} from 0A to 0.5A
CH2: VBUS_A (AC Coupled) 50mV/Div
CH4: Io_A 0.5A/Div



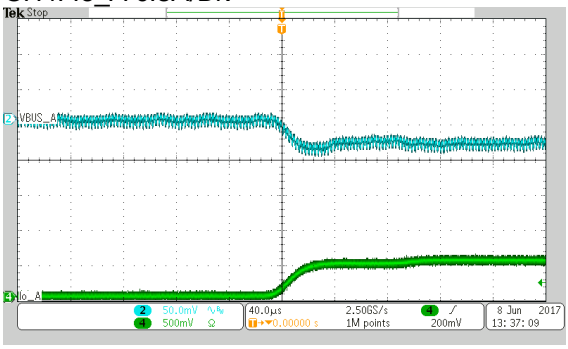
Vin=9V, I_{VBUS_B}=0A and Load switching for I_{VBUS_A} from 0.5A to 0A
CH2: VBUS_A (AC Coupled) 50mV/Div
CH4: Io_A 0.5A/Div



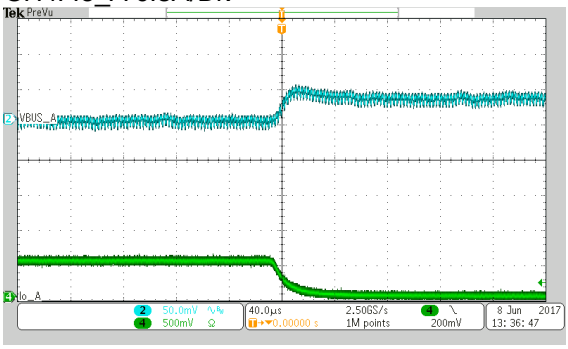
Vin=12V, I_{VBUS_B}=0A and Load switching for I_{VBUS_A} from 0A to 0.5A
CH2: VBUS_A (AC Coupled) 50mV/Div
CH4: Io_A 0.5A/Div



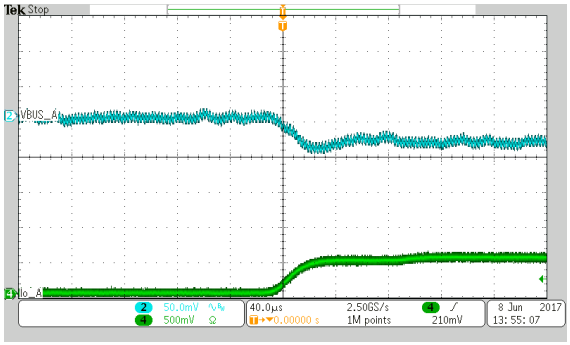
Vin=12V, I_{VBUS_B}=0A and Load switching for I_{VBUS_A} from 0.5A to 0A
CH2: VBUS_A (AC Coupled) 50mV/Div
CH4: Io_A 0.5A/Div



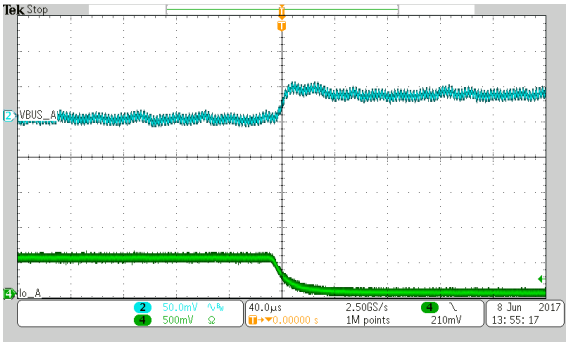
Vin=14.5V, I_{VBUS_B}=0A and Load switching for I_{VBUS_A} from 0A to 0.5A
CH2: VBUS_A (AC Coupled) 50mV/Div
CH4: Io_A 0.5A/Div



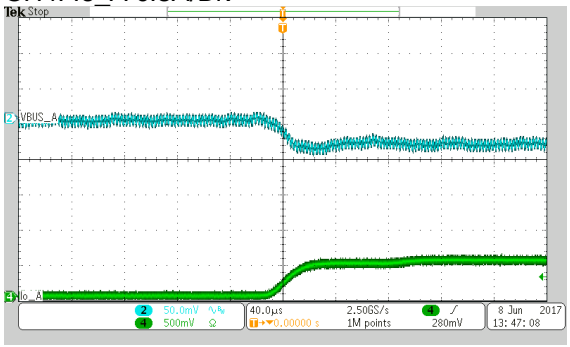
Vin=14.5V, I_{VBUS_B}=0A and Load switching for I_{VBUS_A} from 0.5A to 0A
CH2: VBUS_A (AC Coupled) 50mV/Div
CH4: Io_A 0.5A/Div



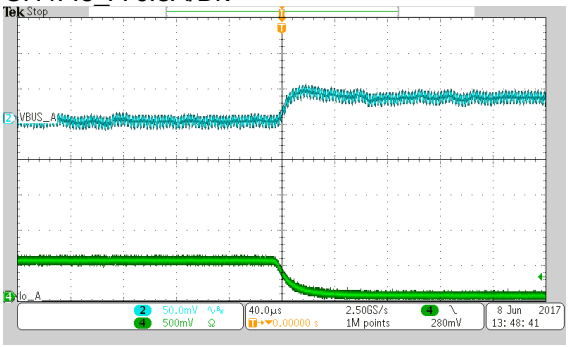
Vin=9V, I_{VBUS_B}=1.5A and Load switching for IVBUS_A from 0A to 0.5A
CH2: VBUS_A (AC Coupled) 50mV/Div
CH4: Io_A 0.5A/Div



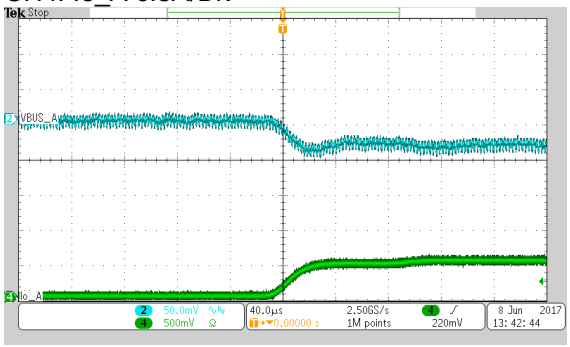
Vin=9V, I_{VBUS_B}=1.5A and Load switching for IVBUS_A from 0.5A to 0A
CH2: VBUS_A (AC Coupled) 50mV/Div
CH4: Io_A 0.5A/Div



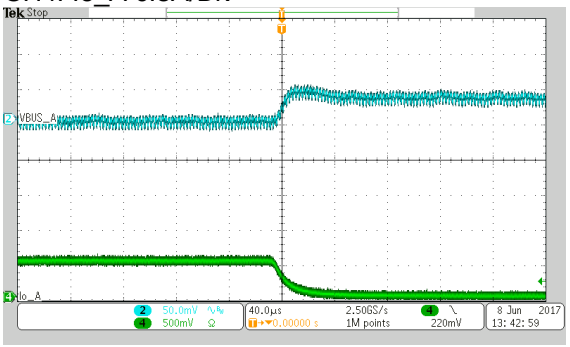
Vin=12V, I_{VBUS_B}=1.5A and Load switching for IVBUS_A from 0A to 0.5A
CH2: VBUS_A (AC Coupled) 50mV/Div
CH4: Io_A 0.5A/Div



Vin=12V, I_{VBUS_B}=1.5A and Load switching for IVBUS_A from 0.5A to 0A
CH2: VBUS_A (AC Coupled) 50mV/Div
CH4: Io_A 0.5A/Div

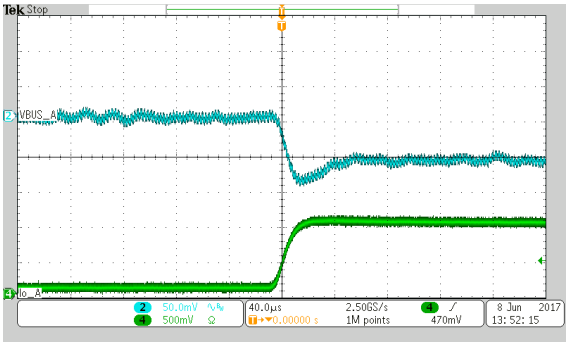


Vin=14.5V, I_{VBUS_B}=1.5A and Load switching for IVBUS_A from 0A to 0.5A
CH2: VBUS_A (AC Coupled) 50mV/Div
CH4: Io_A 0.5A/Div

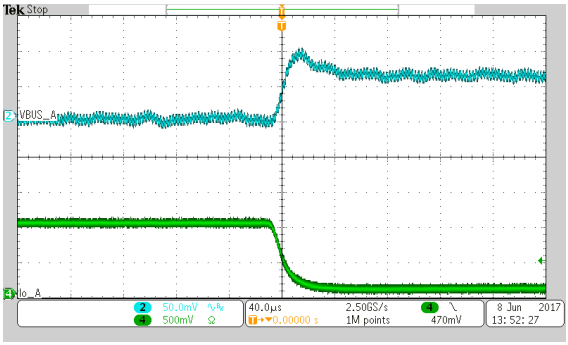


Vin=14.5V, I_{VBUS_B}=1.5A and Load switching for IVBUS_A from 0.5A to 0A
CH2: VBUS_A (AC Coupled) 50mV/Div
CH4: Io_A 0.5A/Div

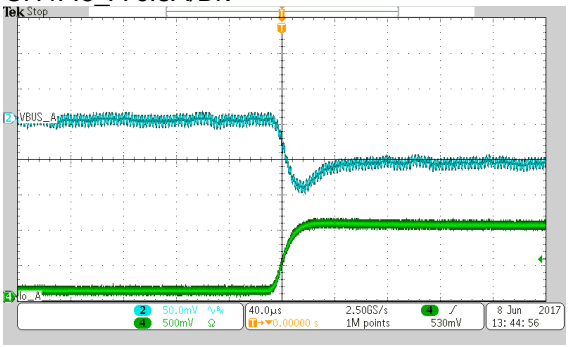
0.08A↔1A Load Step @100mA/us



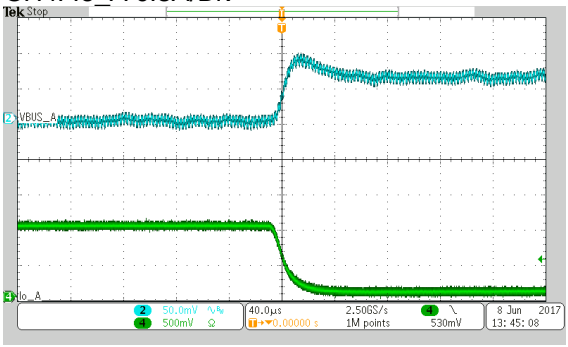
Vin=9V, I_{VBUS_B}=0A and Load switching for I_{VBUS_A} from 0.08A to 1A
CH2: VBUS_A (AC Coupled) 50mV/Div
CH4: Io_A 0.5A/Div



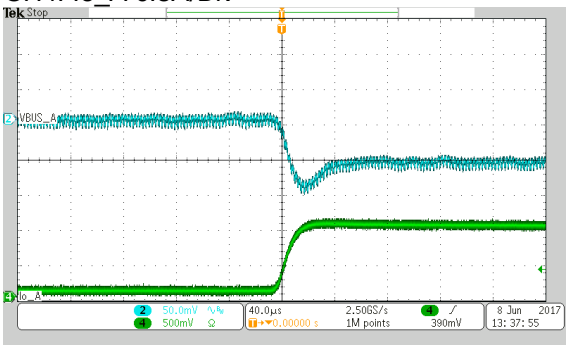
Vin=9V, I_{VBUS_B}=0A and Load switching for I_{VBUS_A} from 1A to 0.08A
CH2: VBUS_A (AC Coupled) 50mV/Div
CH4: Io_A 0.5A/Div



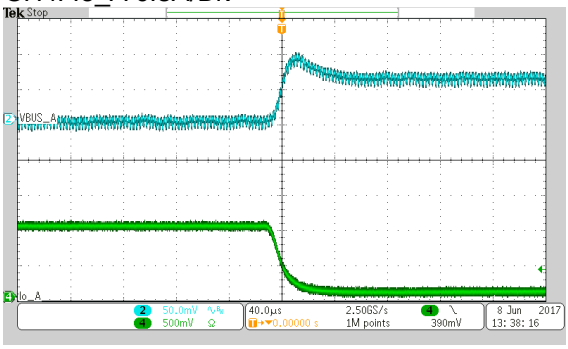
Vin=12V, I_{VBUS_B}=0A and Load switching for I_{VBUS_A} from 0.08A to 1A
CH2: VBUS_A (AC Coupled) 50mV/Div
CH4: Io_A 0.5A/Div



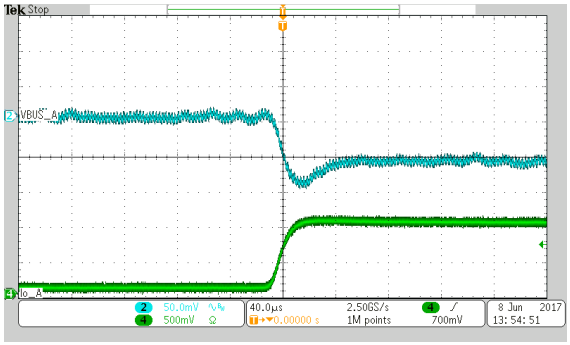
Vin=12V, I_{VBUS_B}=0A and Load switching for I_{VBUS_A} from 1A to 0.08A
CH2: VBUS_A (AC Coupled) 50mV/Div
CH4: Io_A 0.5A/Div



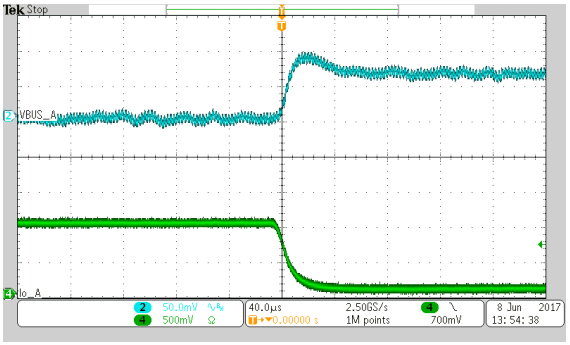
Vin=14.5V, I_{VBUS_B}=0A and Load switching for I_{VBUS_A} from 0.08A to 1A
CH2: VBUS_A (AC Coupled) 50mV/Div
CH4: Io_A 0.5A/Div



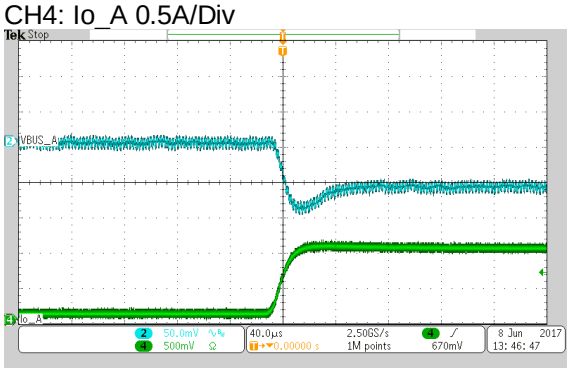
Vin=14.5V, I_{VBUS_B}=0A and Load switching for I_{VBUS_A} from 1A to 0.08A
CH2: VBUS_A (AC Coupled) 50mV/Div
CH4: Io_A 0.5A/Div



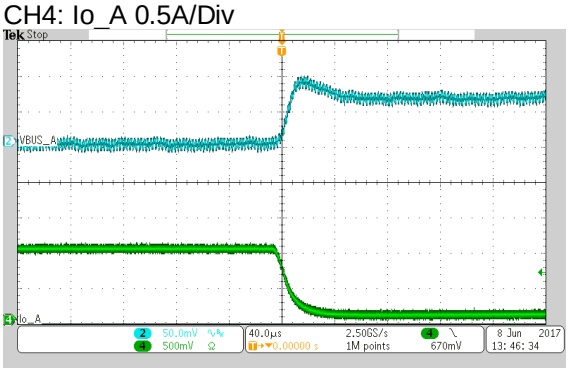
Vin=9V, I_{VBUS_B}=1.5A and Load switching for I_{VBUS_A} from 0.08A to 1A
CH2: VBUS_A (AC Coupled) 50mV/Div
CH4: Io_A 0.5A/Div



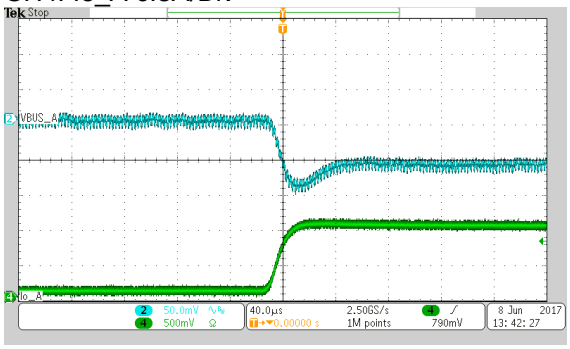
Vin=9V, I_{VBUS_B}=1.5A and Load switching for I_{VBUS_A} from 1A to 0.08A
CH2: VBUS_A (AC Coupled) 50mV/Div
CH4: Io_A 0.5A/Div



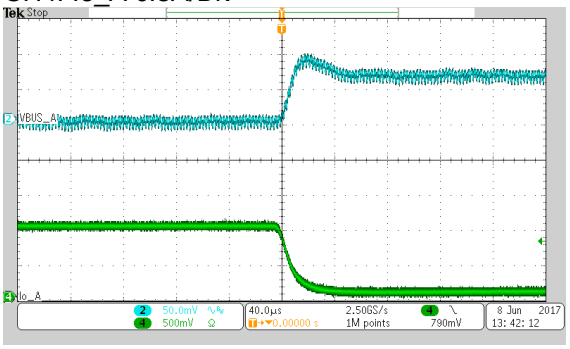
Vin=12V, I_{VBUS_B}=1.5A and Load switching for I_{VBUS_A} from 0.08A to 1A
CH2: VBUS_A (AC Coupled) 50mV/Div
CH4: Io_A 0.5A/Div



Vin=12V, I_{VBUS_B}=1.5A and Load switching for I_{VBUS_A} from 1A to 0.08A
CH2: VBUS_A (AC Coupled) 50mV/Div
CH4: Io_A 0.5A/Div

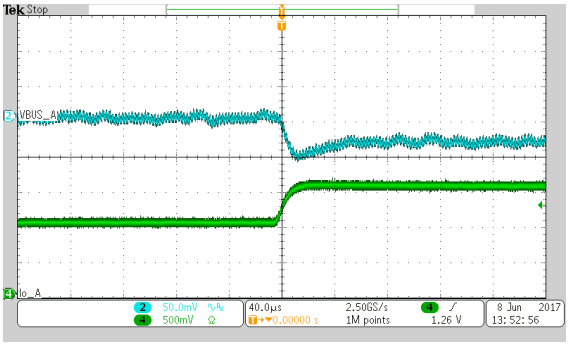


Vin=14.5V, I_{VBUS_B}=1.5A and Load switching for I_{VBUS_A} from 0.08A to 1A
CH2: VBUS_A (AC Coupled) 50mV/Div
CH4: Io_A 0.5A/Div

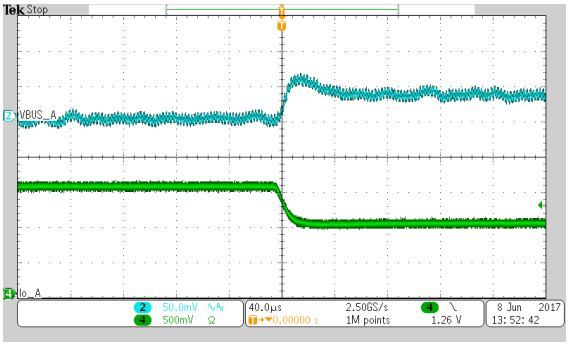


Vin=14.5V, I_{VBUS_B}=1.5A and Load switching for I_{VBUS_A} from 1A to 0.08A
CH2: VBUS_A (AC Coupled) 50mV/Div
CH4: Io_A 0.5A/Div

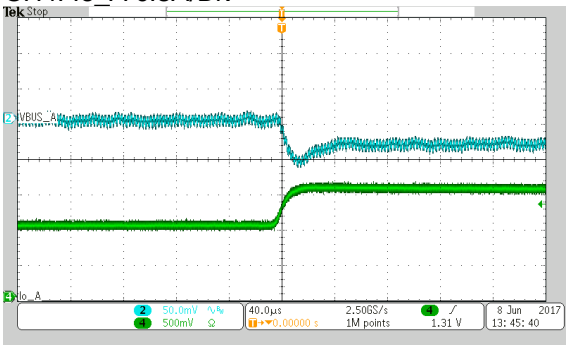
1A↔1.5A Load Step @100mA/us



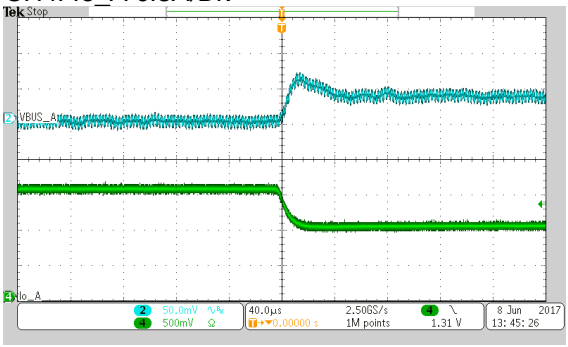
Vin=9V, I_{VBUS_B}=0A and Load switching for I_{VBUS_A} from 1A to 1.5A
CH2: VBUS_A (AC Coupled) 50mV/Div
CH4: Io_A 0.5A/Div



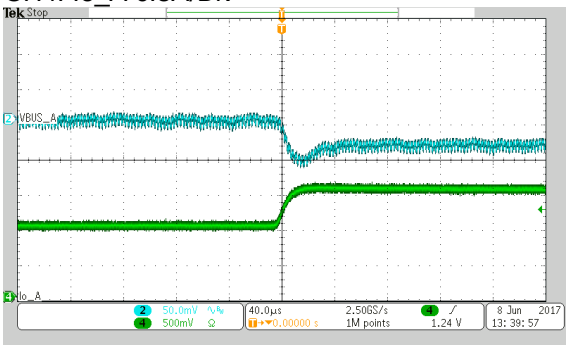
Vin=9V, I_{VBUS_B}=0A and Load switching for I_{VBUS_A} from 1.5A to 1A
CH2: VBUS_A (AC Coupled) 50mV/Div
CH4: Io_A 0.5A/Div



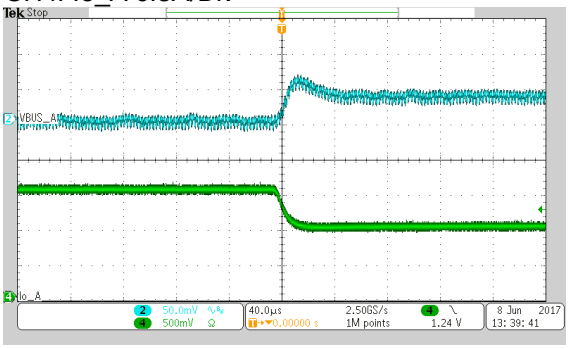
Vin=12V, I_{VBUS_B}=0A and Load switching for I_{VBUS_A} from 1A to 1.5A
CH2: VBUS_A (AC Coupled) 50mV/Div
CH4: Io_A 0.5A/Div



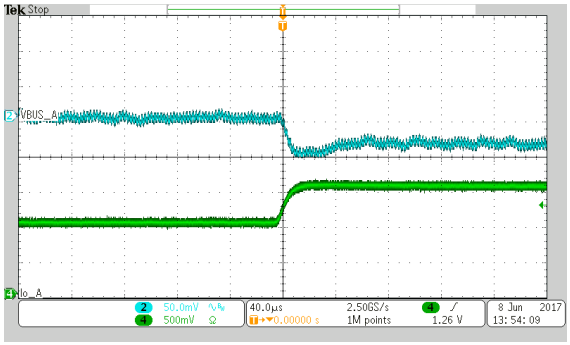
Vin=12V, I_{VBUS_B}=0A and Load switching for I_{VBUS_A} from 1.5A to 1A
CH2: VBUS_A (AC Coupled) 50mV/Div
CH4: Io_A 0.5A/Div



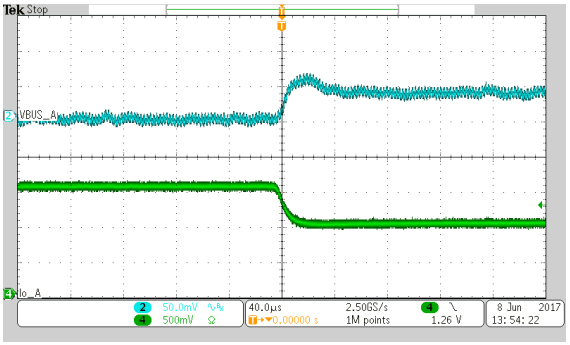
Vin=14.5V, I_{VBUS_B}=0A and Load switching for I_{VBUS_A} from 1A to 1.5A
CH2: VBUS_A (AC Coupled) 50mV/Div
CH4: Io_A 0.5A/Div



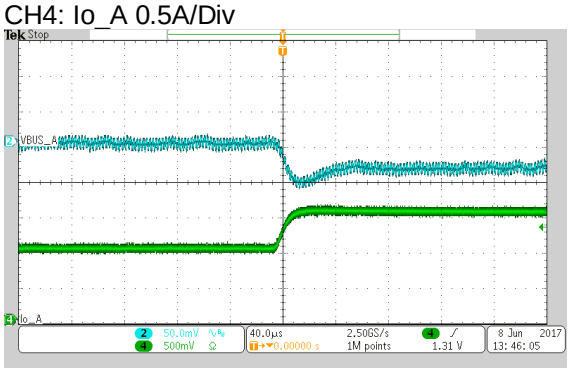
Vin=14.5V, I_{VBUS_B}=0A and Load switching for I_{VBUS_A} from 1.5A to 1A
CH2: VBUS_A (AC Coupled) 50mV/Div
CH4: Io_A 0.5A/Div



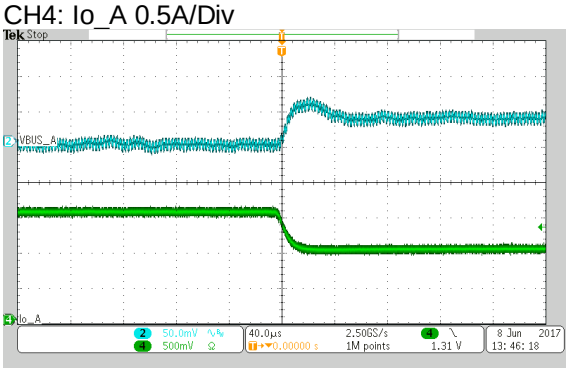
Vin=9V, I_{VBUS_B}=1.5A and Load switching for I_{VBUS_A} from 1A to 1.5A
CH2: VBUS_A (AC Coupled) 50mV/Div
CH4: Io_A 0.5A/Div



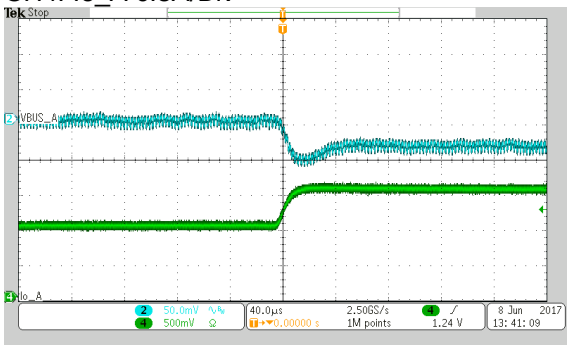
Vin=9V, I_{VBUS_B}=1.5A and Load switching for I_{VBUS_A} from 1.5A to 1A
CH2: VBUS_A (AC Coupled) 50mV/Div
CH4: Io_A 0.5A/Div



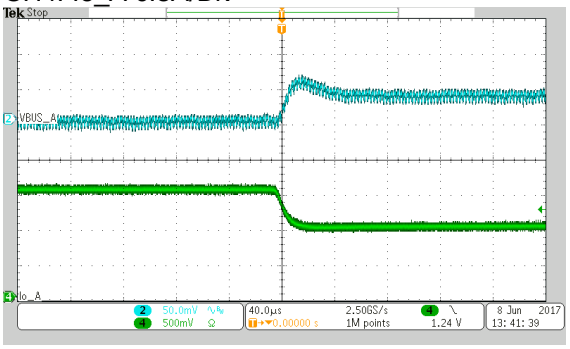
Vin=12V, I_{VBUS_B}=1.5A and Load switching for I_{VBUS_A} from 1A to 1.5A
CH2: VBUS_A (AC Coupled) 50mV/Div
CH4: Io_A 0.5A/Div



Vin=12V, I_{VBUS_B}=1.5A and Load switching for I_{VBUS_A} from 1.5A to 1A
CH2: VBUS_A (AC Coupled) 50mV/Div
CH4: Io_A 0.5A/Div



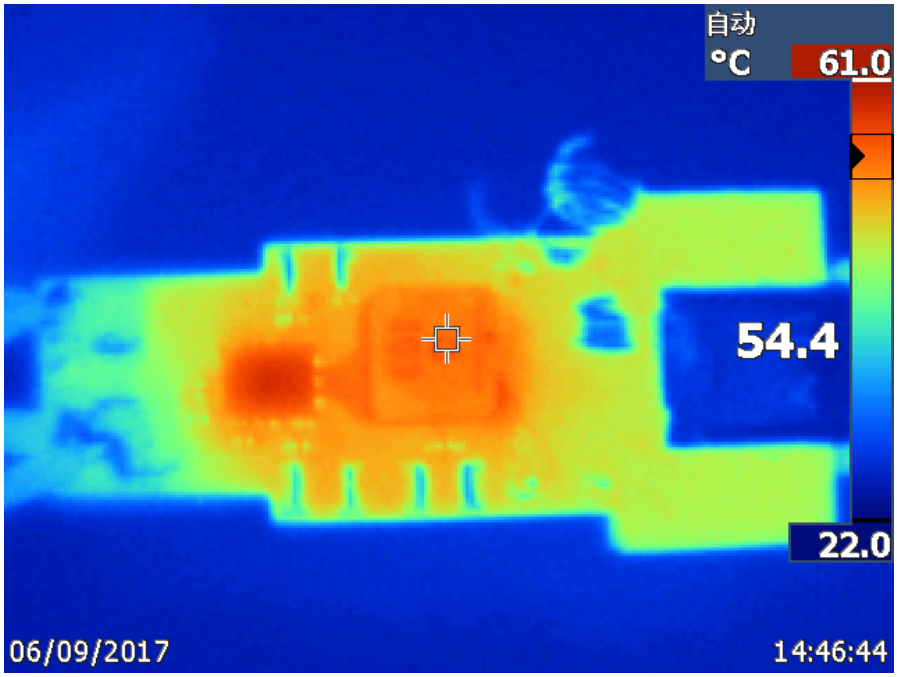
Vin=14.5V, I_{VBUS_B}=1.5A and Load switching for I_{VBUS_A} from 1A to 1.5A
CH2: VBUS_A (AC Coupled) 50mV/Div
CH4: Io_A 0.5A/Div



Vin=14.5V, I_{VBUS_B}=1.5A and Load switching for I_{VBUS_A} from 1.5A to 1A
CH2: VBUS_A (AC Coupled) 50mV/Div
CH4: Io_A 0.5A/Div

2.6 Thermal Performance

The board is applied a 12V DC voltage and 3A load current for both outputs. Run about 10min for warming up.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