Texas Instruments

FB PS LLC Test Report

HVPS SYSTEM AND APPLICATION TEAM

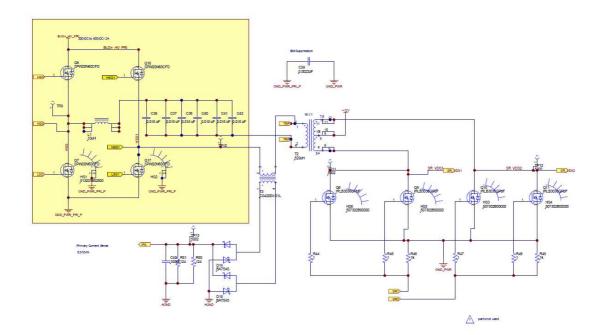**REVA**

12/05/2014

1 General

1.1 PURPOSE

Provide the detailed data for evaluating and verifying the FB-PS-LLC.

The FB-PS-LLC is a Full bridge Phase Shift LLC reference design realized by UCD3138. The topology is same as full bridge LLC. Full bridge LLC is always selected in high power level AC/DC application, and for output voltage in control under light load, PWM mode is always selected. But there is some disadvantages in PWM mode for LLC, like hard switch, high switch frequency and high power loss. The purpose of this reference design is to find a high efficiency method for LLC under light load. Select Phase shift mode replace of PWM mode under light load is a good method.

For testing applications, cooling airflow is required.
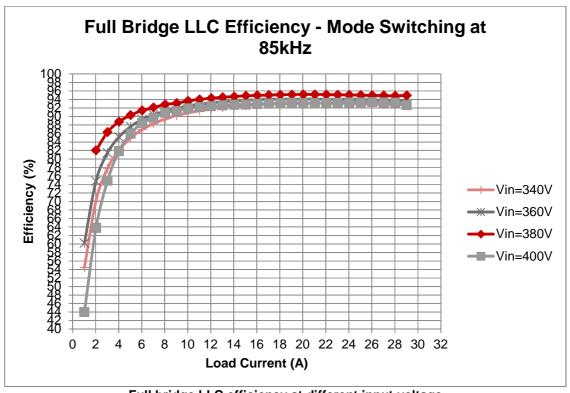
Block Diagram

Board Photo

1.3 TEST EQUIPMENTS
Multi-meter:
AC Source: Chroma 61503
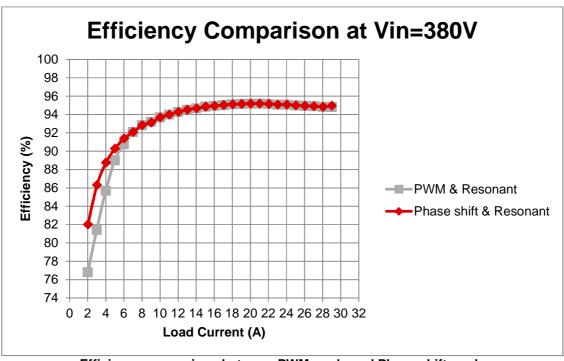Load: Chroma 63202
Power Meter: WT210
Ambient Temperature at 25DegC, with Fan cooling

2 INPUT & OUTPUT CHARACTERISTICS
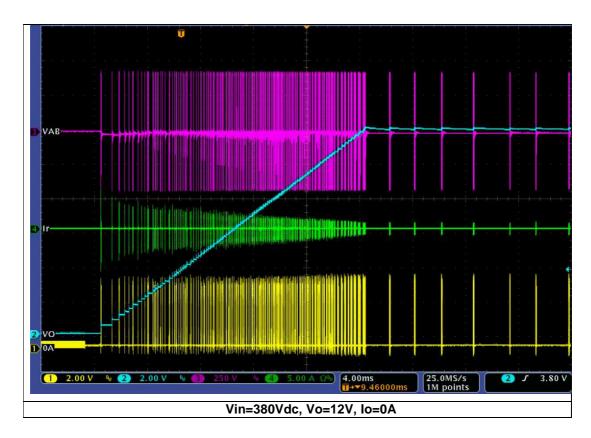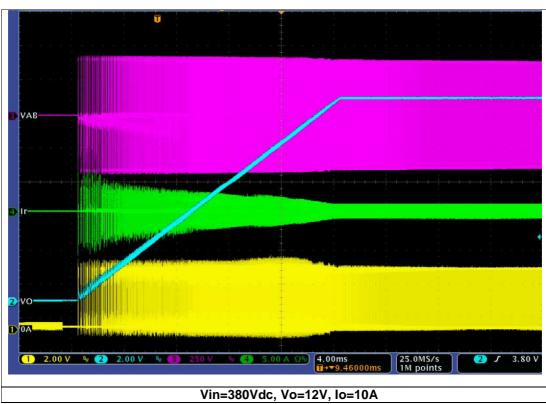
2.1 Efficiency comparison

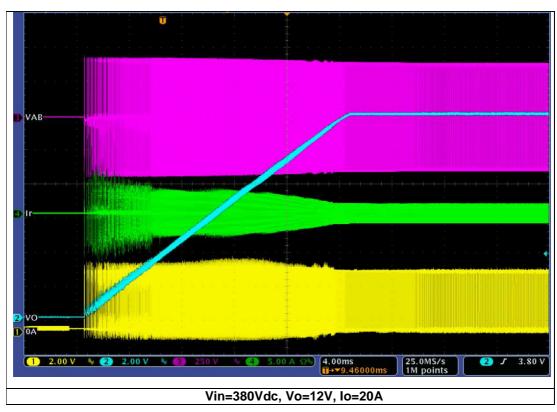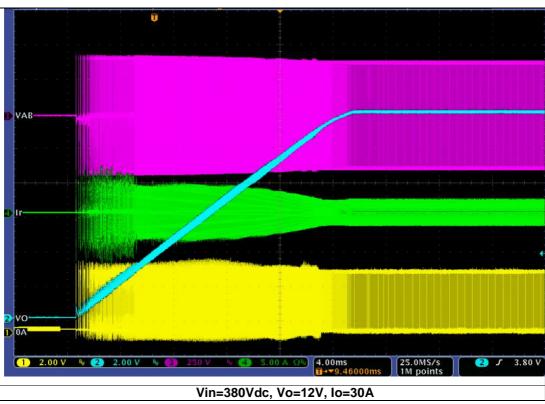**Full bridge LLC efficiency at different input voltage**

Efficiency comparison between PWM mode and Phase shift mode

2.2   The ramp up waveform

Vin=380Vdc, Vo=12V, Io=0A

Vin=380Vdc, Vo=12V, Io=10A

Vin=380Vdc, Vo=12V, Io=20A

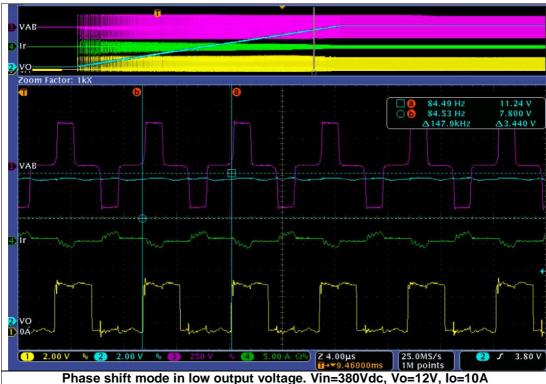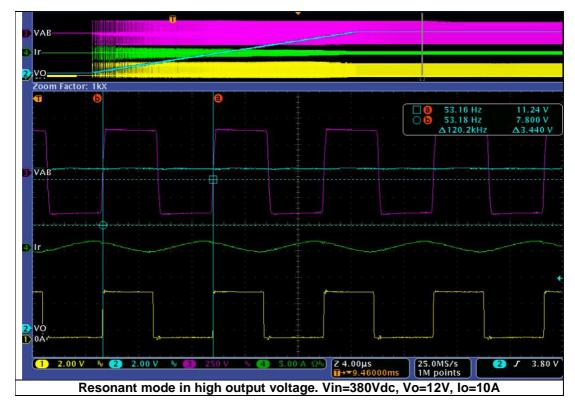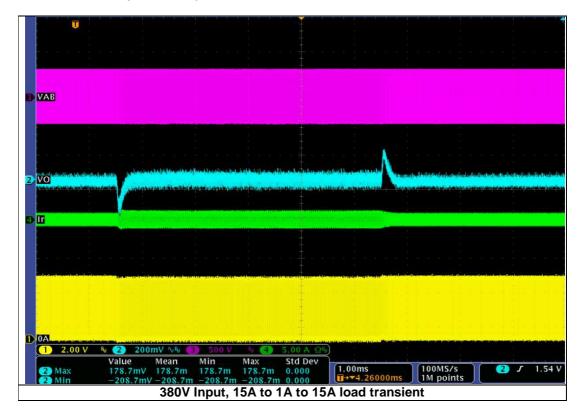**Vin=380Vdc, Vo=12V, Io=30A**

2.3   The mode switch waveforms

Phase shift mode in low output voltage. Vin=380Vdc, Vo=12V, Io=10A
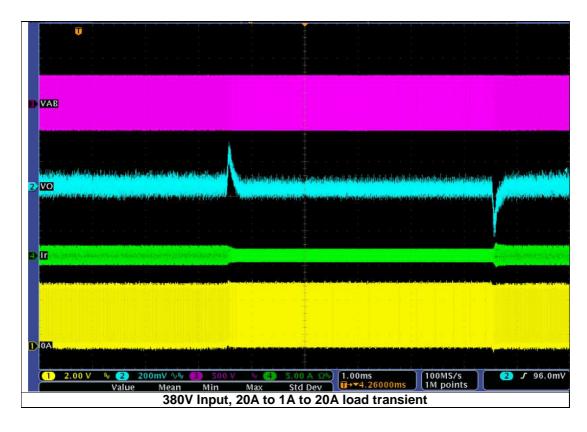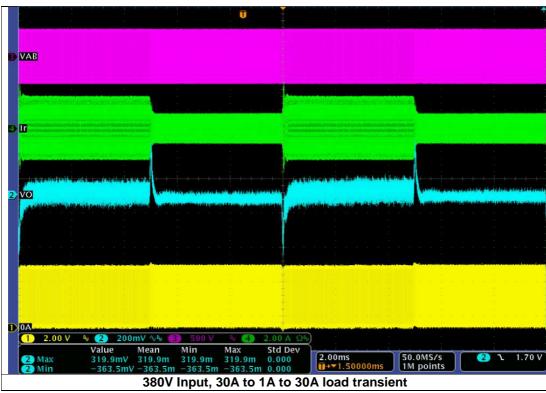**Phase angle is very small, switch frequency is 150kHz (maximum switch frequency)**

Phase shift mode in low output voltage. Vin=380Vdc, Vo=12V, Io=10A
Phase angle is increased, switch frequency is 150kHz (maximum switch frequency)
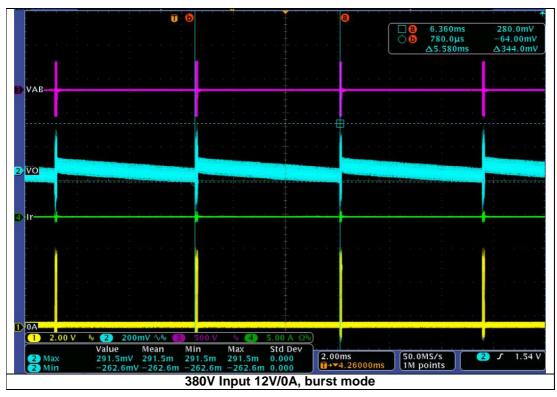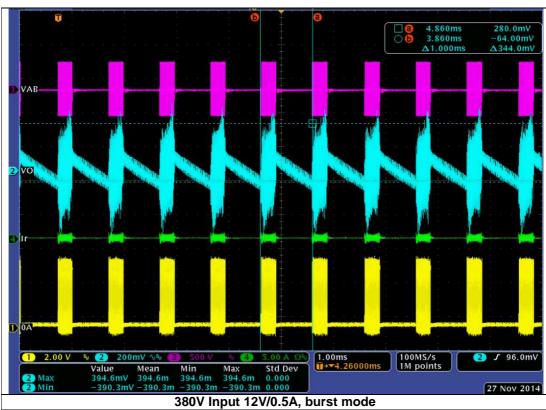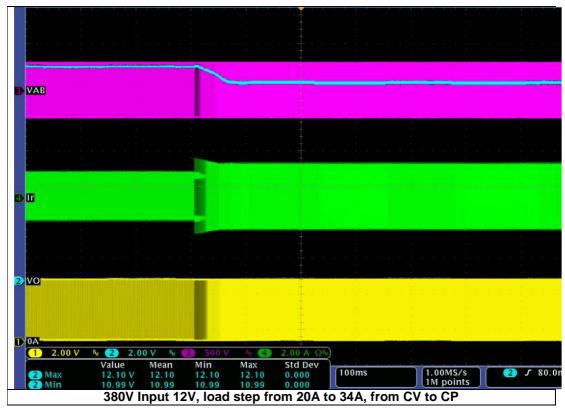
Resonant mode in high output voltage. Vin=380Vdc, Vo=12V, Io=10A

2.4   The load dynamic response Waveforms

380V Input, 15A to 1A to 15A load transient

380V Input, 20A to 1A to 20A load transient

380V Input, 30A to 1A to 30A load transient

2.5 Burst mode in light load

380V Input 12V/0A, burst mode

380V Input 12V/0.5A, burst mode

2.6 CPCC and short load

380V Input 12V, load step from 20A to 34A, from CV to CP

380V Input 12V, from 10A to short load

380V Input short load performance

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