XP Power

Green Mode Operation

October 2014

Green Mode

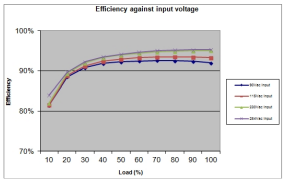
GREEN XP POWER

Average active mode efficiency
25 – 50 – 75 – 100% Load

No load power consumption

CEC-EISA-ErP-NRCan etc.

Energy star – EU CoC



Green Mode Topologies

Off Line Fly - Back

ECE/ECL series
ECS25, 45, 60, 65, 100, 130 series
AFM30, 45, 60 series

PFC & Fly - Back

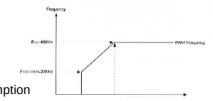
ECP150 series
AEB100 series

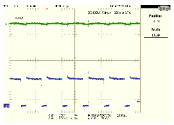
PFC & LLC

GCS150, 180 series
ECP180, 225 series
AHM85, 100, 150, 180, 250 series

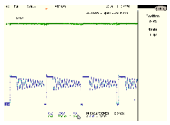
Off Line Fly - Back

- Switching frequency reduces with load to 22kHz
- Reduced switching losses at lower load
- Maximise efficiency across load range
- Burst mode at zero load for no load power consumption

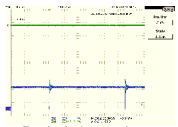




100% load – 62kHz



10% load – 35kHz



Zero load – burst mode

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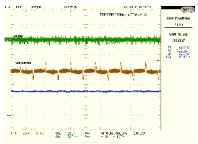
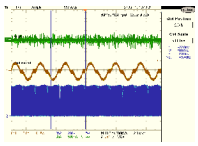
PFC & Fly - Back

- PFC is not operational at low load (<60W)
- Reduced losses as PFC is not required
- Reduced power factor at lower load
- Non-sinusoidal input current at lower load
- Main converter freq reduces with load to 22kHz
- Reduced switching losses at lower load
- Maximise efficiency across load range
- Burst mode at zero load <0.5W power consumption



25% load – PFC off



100% load – PFC on

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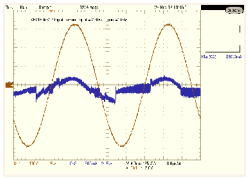
PFC & LLC

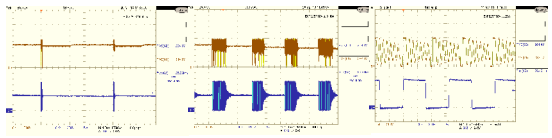
- PFC enters burst mode at lower loads
- Reduced losses at lower load
- Reduced power factor at lower load (non-sinusoidal input current)



XP Power 6

PFC & LLC

- Main converter enters burst mode at lower loads
- Maximise efficiency across load range
- PFC & Main converter burst mode at lower load
- <0.5W power consumption



Zero load – 50Hz | 1% load – 1kHz | 10% load – 76kHz

XP Power 7

Audible Noise

- Side effect of burst mode operation
- Noise sources
  - Transformers
  - PFC inductors
  - X Capacitors
  - Line capacitors
  - Snubber capacitors

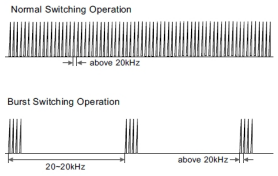


Figure 1. Burst Switching Operation

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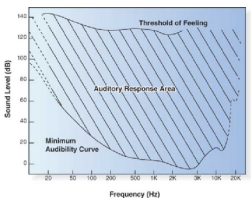
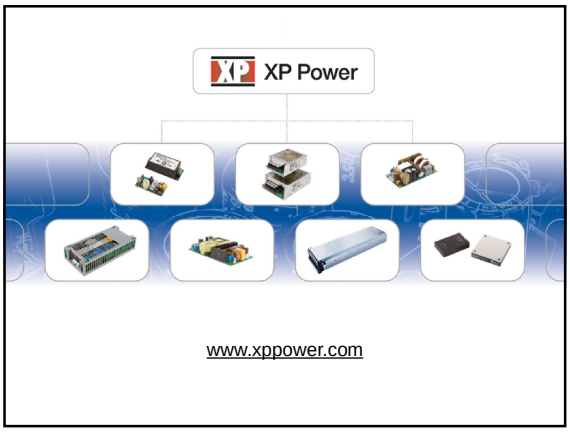
Audible Noise Mitigation

- Varnish impregnate PFC inductors & transformers
- Change ceramic capacitors to film in key areas
  - Piezo electric effect
- Change burst mode frequency
  - Avoid 2kHz – 4kHz



XP Power 9



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