Totem Pole PFC

NCP1681 500W EVB

Public Information

onsemi

500 W CCM/MM Evaluation Board Specs & Key Components

Description	Value	Units
Input Voltage Range	90 - 265	VAC
Line Frequency Range	47 - 63	Hz
Output Voltage	395	V
Output Power*	500	W
Boost Inductor	175(MM)/500(CCM)	µH
Bulk Capacitors	2x 220	µF
Fast Leg Switch**	GS66508B/NCP58921	
Fast Leg Driver	NCP51561	
Slow Leg Switch	FCPF067N65	
ZCD Resistor	100	mΩ
Switching Frequency	65 (MM) /95 (CCM)	kHz

* For 95 kHz operation power delivery is thermally limited below 110 V_{AC}
** NCP58921 – onsemi integrated driver GaN under selective sampling

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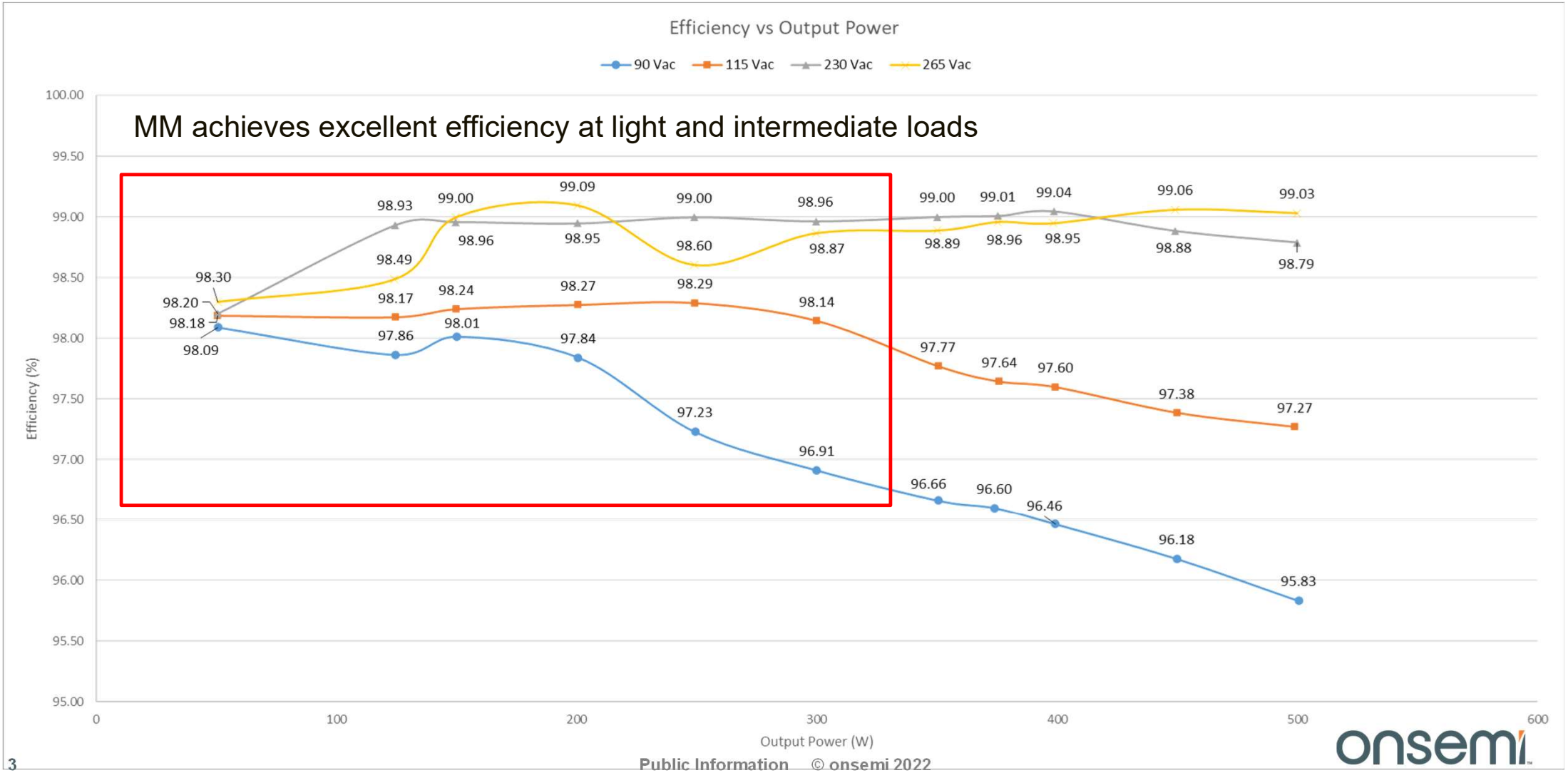
Multi-Mode Efficiency @ 65 kHz



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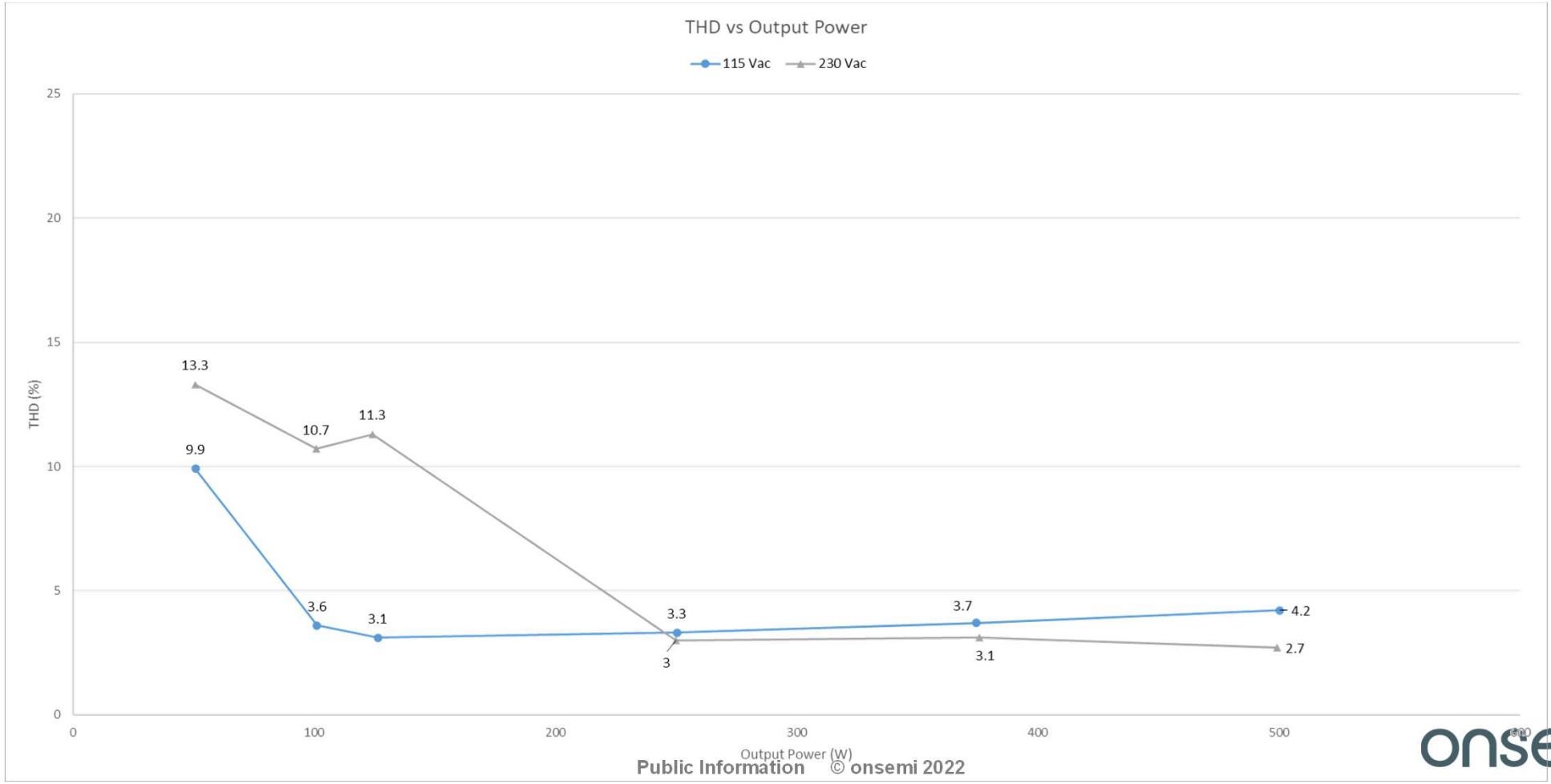
CCM THD Across Line/Load

- THD performance at 115 & 230 Vac < 5% @ full load and < 15% down to 10% load
- Data capture with 500 µH fixed inductor → Exploring swinging choke to improve THD performance at lighter loads



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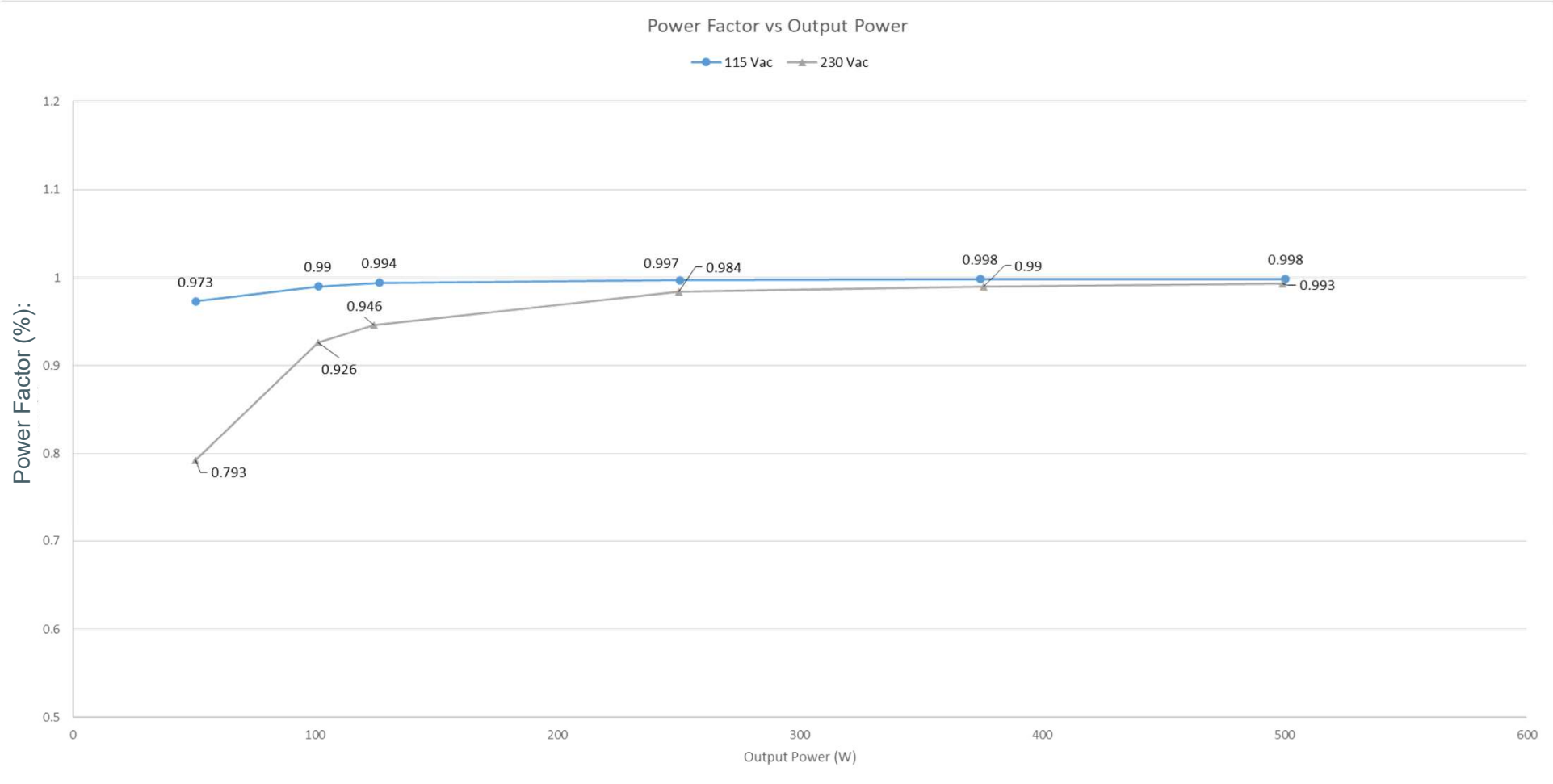
Power Factor Across Line/Load

- PF is > 0.92 for loads greater than 25%



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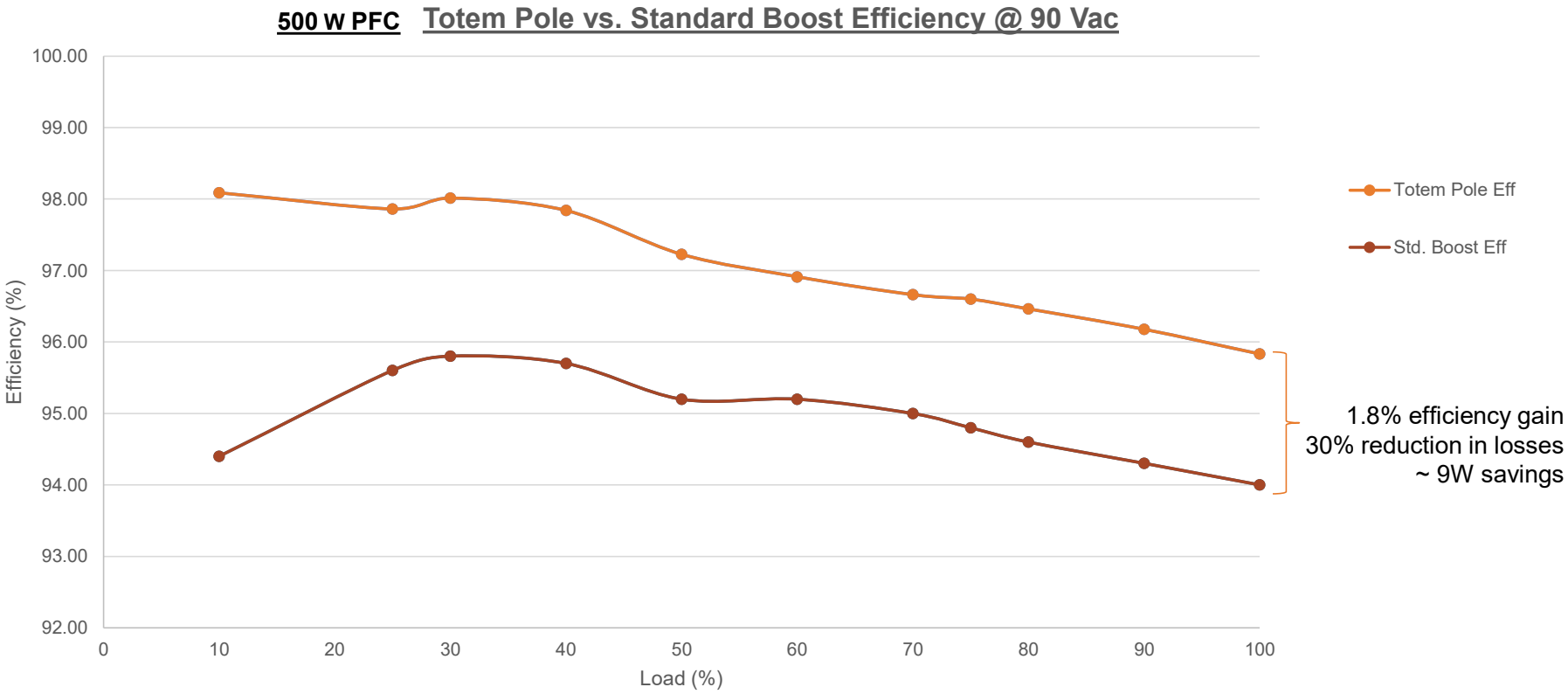
Totem Pole vs. Standard Boost Efficiency Comparison on a 500 W PFC



- Totem Pole (NCP1681) utilizes 2eGaNs & 2 SJ FETs
- Standard boost uses bridge Diodes + 2 SJ FETs & 1 SiC diode

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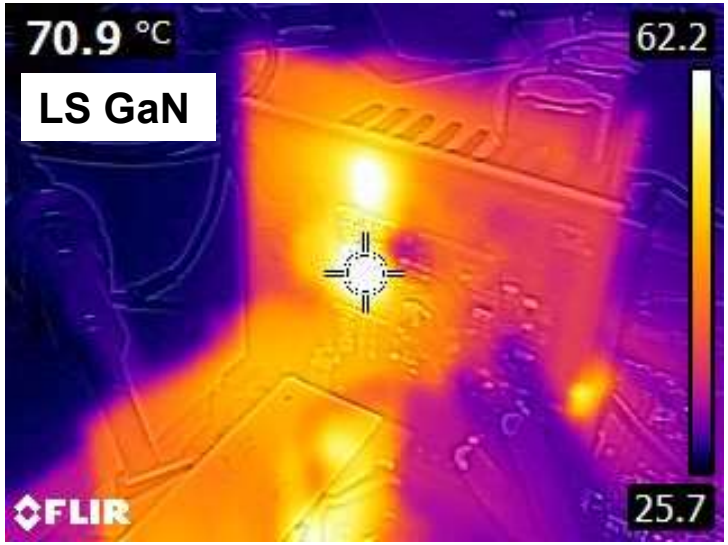
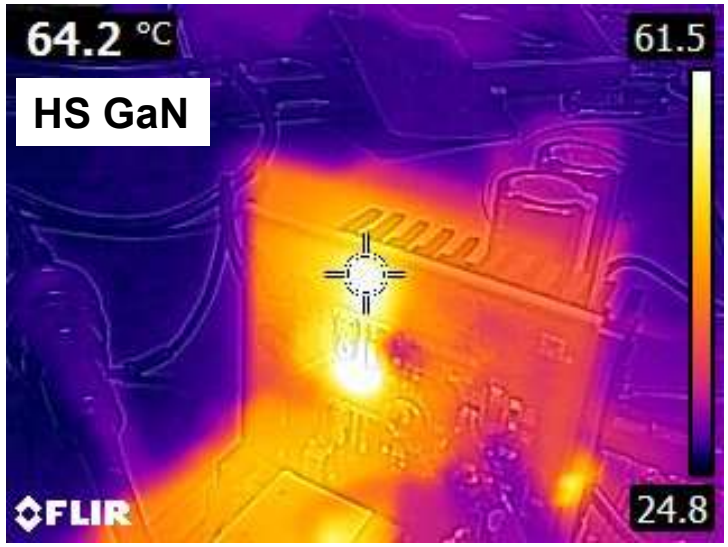
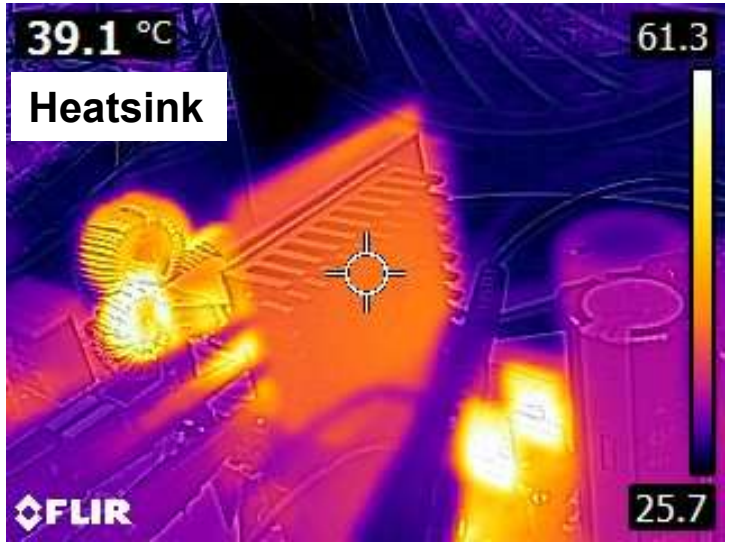
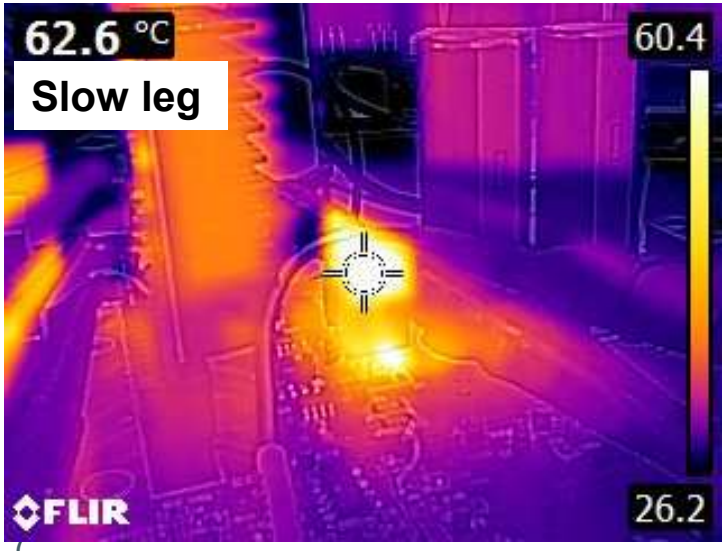
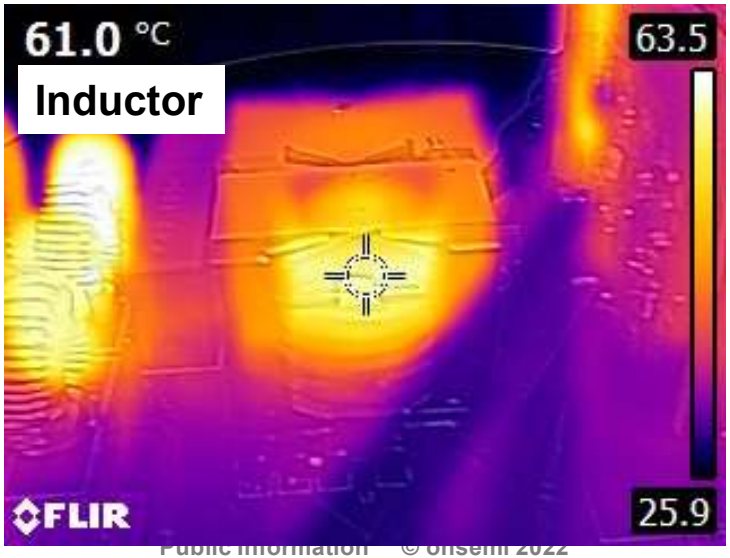
Thermal scan @ 90 V_{AC}, 500 W











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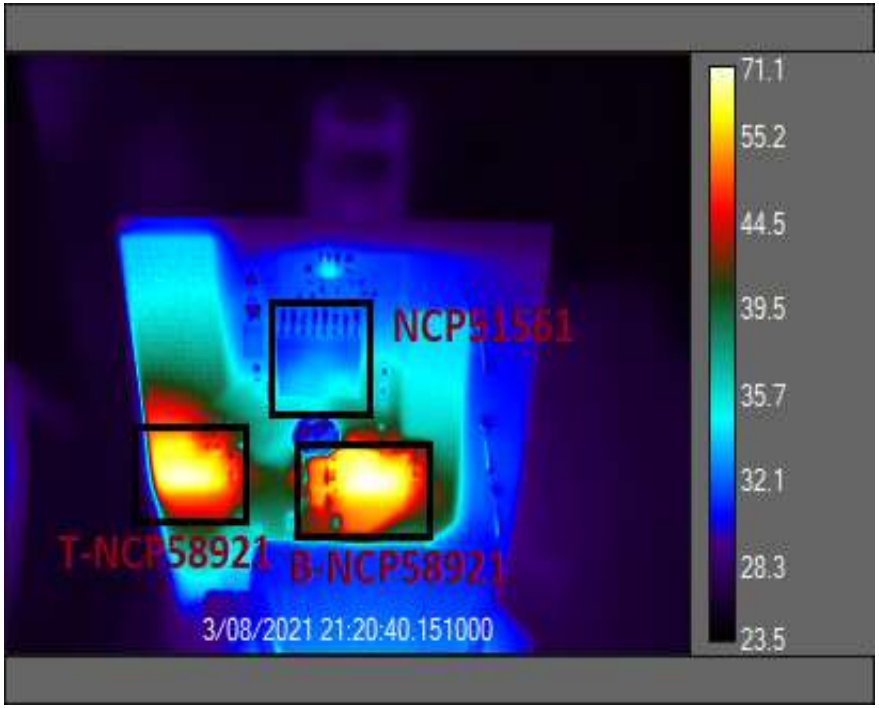
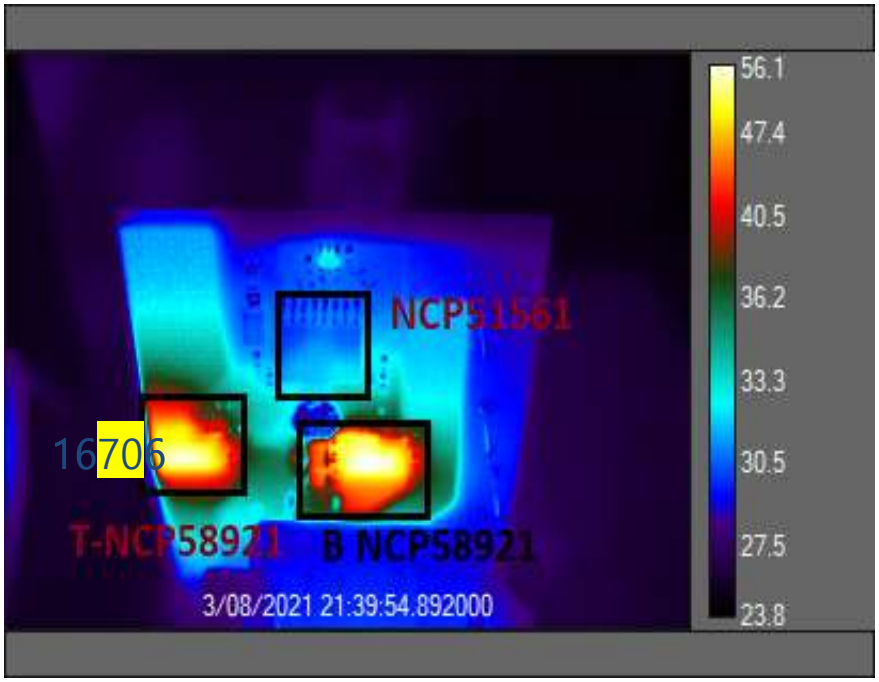
Totem Pole PFC – Thermal (500 W, 115 and 230 Vac)



115 Vac – Max Temp – 71.1° C



230 Vac – Max Temp – 56.1 ° C

- Vout = 395 V
- Iload = 1.25 A

* To operate at loads > 300 W an external fan is necessary
* Recommended minimum 500 LFM at full load

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