



## PRODUCT OVERVIEW

The PEB4000 series of Power over Ethernet board, offers a **completely ready to use High POE** solution, offering up to 30 watts of output power.

It has full functional compliance with the IEEE 802.3af Power over Ethernet (PoE) standard, with the exception of higher current input, and is designed to extract power from CAT5 and better Ethernet cable when sourced by an IEEE 802.3af compliant Power Sourcing Equipment (PSE) or an IEEE 802.3at Draft 3.0 compliant midspan using 2 finger Layer 1 classification

Its high efficiency DC-DC converter provides a well regulated low noise and low ripple output with in-built overload and output short-circuit protection.

The PEM4000 series provides a quick, easy, and low cost method for Ethernet equipment manufacturers to "PoE enable" their equipment, and removes the need for a local equipment power source, significantly reducing installation costs.

## PRODUCT FEATURES

- Complete package including data connections. **No external components.**
- 30 watt output load<sup>1</sup>
- 1500 Volt DC isolation (Input to Output)
- 12V, 18V & 24V DC output voltage models
- Output overload and short circuit protection and **permanent short circuit protection.**
- Input over-current protection
- Wide input voltage (36V to 57V DC)
- RoHS compliant
- Low output ripple and noise
- Low cost
- EMI/EMC compliance to FCC & CE mark
- Input ESD protection included
- Rugged operating temperature



<sup>1</sup> Dependent on input power supply

## PRODUCT SELECTOR

Part Number	Marking	Nominal Input Voltage	Output Voltage <sup>2</sup>	Efficiency <sup>3</sup>	Power (Maximum) <sup>7</sup>
		(Volts DC)	(Volts DC)	(%)	(Watts)
PEB4012	12	48	12	86	30
PEB4018	18	48	18	87	30
PEB4024	24	48	24	88	30

\* Voltages of 5V, 13.5V, 15V, 21V and 48V available as special make-to-order products

## ABSOLUTE MAXIMUM RATINGS<sup>4, 5</sup>

Supply Voltage (V <sub>CC</sub> )	0V – 57V DC
Storage Temperature (T <sub>s</sub> )	-25 °C – 100 °C
Output Voltage (V <sub>OUT</sub> )	0V to controlled output voltage (operating or non-operating)

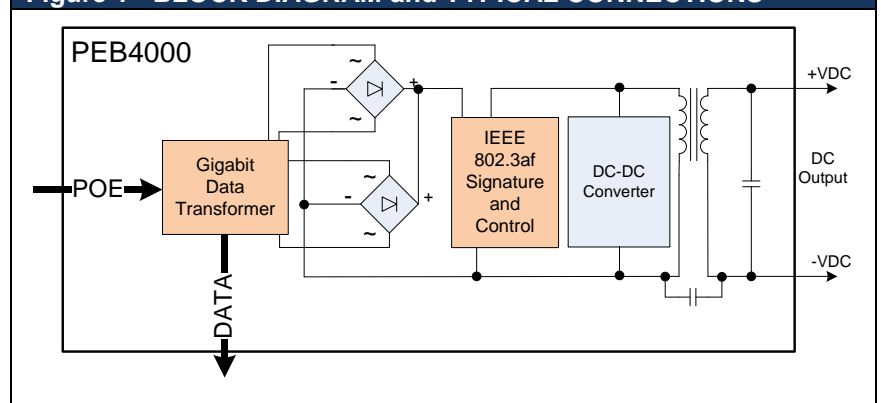
## INPUT CHARACTERISTICS

Parameter	Symbol	Min.	Typ <sup>4</sup> .	Max.	Units
Input Voltage <sup>6</sup>	V <sub>IN</sub>	36	48	57	Volts
Input Current	I <sub>IN</sub>			720	mA
Under Voltage Lockout	V <sub>UVLO</sub>	30		36	Volts
Operating Temperature <sup>7</sup>	T <sub>OP</sub>	-10	25	70	°C
802.3af Power Classification	Class 0. IEEE 802.3at D3.0, Class 4, 2 finger, Layer 1 classification available on special order.				

## DC OUTPUT CHARACTERISTICS

Parameter	Symbol	Min.	Typ <sup>4</sup> .	Max.	Units
Line Regulation	V <sub>LNRG</sub>		0.2%		
Load Regulation	V <sub>LDRG</sub>		0.5%		
Output Ripple and Noise <sup>5</sup>	V <sub>RIP</sub>		80		mV p-p
Isolation Voltage	V <sub>ISOL</sub>			1500	V DC
Temperature Coefficient (Slope)	TC		100	300	ppm °C

## Figure 1 - BLOCK DIAGRAM and TYPICAL CONNECTIONS



<sup>2</sup> Output voltage typical  $\pm 3\%$  at T<sub>A</sub> of 25°C with a nominal input voltage and rated output current.

<sup>3</sup> End to end efficiency including bridge rectifier diodes, at nominal V<sub>in</sub> at 24 watt output load.

<sup>4</sup> All specifications typical are at T<sub>A</sub> of 25°C with a nominal input voltage and rated output current unless otherwise noted. These are meant as a design aid only and are indicative, and not guaranteed.

<sup>5</sup> Exceeding the absolute maximum ratings may cause permanent damage to the product. We do not imply functional operation under these conditions. These ratings assume free air flow.

<sup>6</sup> With minimum output load 3 watts

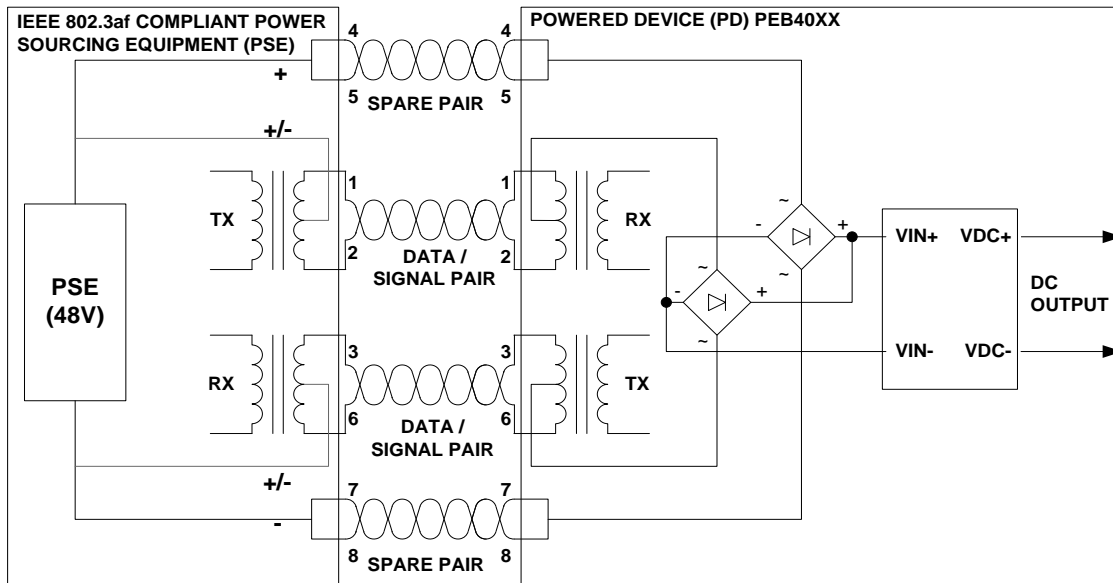
<sup>7</sup> Please see Figure 3 - Thermal performance profile on operating temperature

**FUNCTIONAL DESCRIPTION**
**F.1. Inputs**

The PEB4000 is compatible with all IEEE 802.3af compliant Power Sourcing Equipment (equipment) and supports the different power injection options of Data/Signal pair (Mode A) or Spare Pair (Mode B). See Figure 2 – Typical System Configuration. The PEB4000 series can also be special ordered in Class 4 configuration which will support midspans with IEEE 802.3at draft 3.0 specifications for 2 finger Layer 1 classification.

**Figure 2 – Typical System Configuration**

In Mode A – Signal Pair injection, the signal lines carry both data and power. In Mode B – Spare Pair injection, the Signal pair carries only data, and the spare pair carries power.


**F.2. Powered Device (PD) Signature**

When the PEB4000 is connected to a Cat 5e or greater Ethernet cable from an IEEE 802.3af compliant Power Sourcing Equipment (PSE), Endspan or Midspan, it will automatically present a Powered Device (PD) signature to the PSE, as and when requested. The PSE will then recognise that a PD is connected to that line and supply power. The PEB4000 will always present a Class 0 signature to the PSE.

**F.3. Isolation**

IEEE802.3af section 33.4.1 calls for a Powered Device (PD) to meet safety isolation requirement by meeting the electrical strength test of IEC 60950 sub clause 6.2. Infomart's® PoweredEthernet™ PEB4000 modules meet or exceed 1500V impulse test. This is also referred to as 'Hi Pot Test', 'Flash Tested', 'Withstand Voltage', 'Proof Voltage', 'Dielectric Withstand Voltage' & 'Isolation Test Voltage'.

**F.4. Connections**

INPUT SOCKET		OUTPUT SOCKETS	
1	POE IN. RJ45 Shielded socket. Gigabit.	1	DATA OUT. 8 Pin. 1.25mm pitch wafer. Max current 1A.
		1	DC OUT. 2 Pin. 3.96mm pitch wafer. Max current 3A.

**F.5. Connectors**

The data connector used on the board is standard CCX-W125-08-SMT series wafer or relay-mate-connectors. The matching header or cable housing is the CX-H125-08 fitted with CX-T125-F terminal pins.

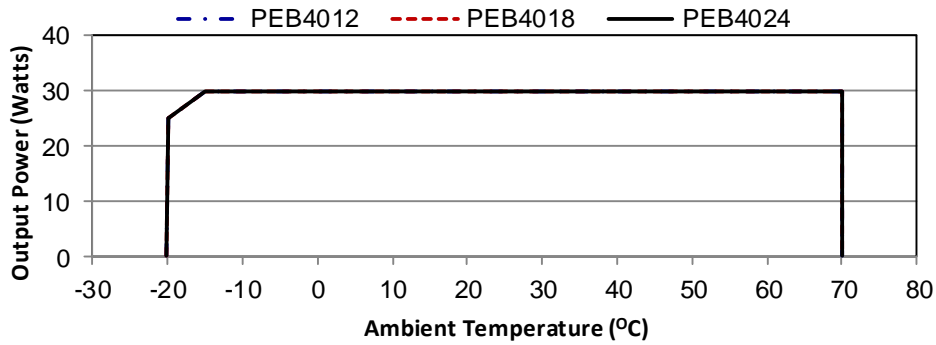
The DC connector used on the board is standard CV-W3961-2 series power-mate-connector. The matching header or cable housing is the CV-H3961 fitted with CV-T3961 terminal pins.

Please visit Chemg Weei Technology Corporation website [www.cwe.com.tw](http://www.cwe.com.tw) for detailed purchase information on these connectors.

**THERMAL PROFILE**

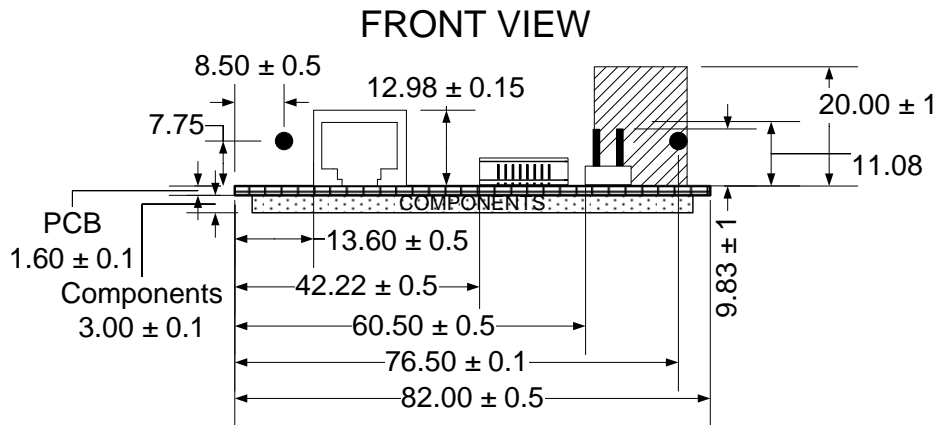
As with any power component, the PEB4000 boards generate heat. It is important that adequate ventilation and airflow be taken into consideration at the design stage. The quantum of heat generated by the PEB4000 will depend on the output load it is required to drive. The PEB4000 generates 21 BTU thermal load per hour at full load. The maximum ambient operating temperature is 70°C. Figure 3 below, shows the thermal performance of the PEB4000 with a nominal 48VDC input. The PEB4000 thermal performance can be improved by forced airflow cooling over the module.

**Figure 3 – Thermal performance profile at nominal  $V_{in}$**

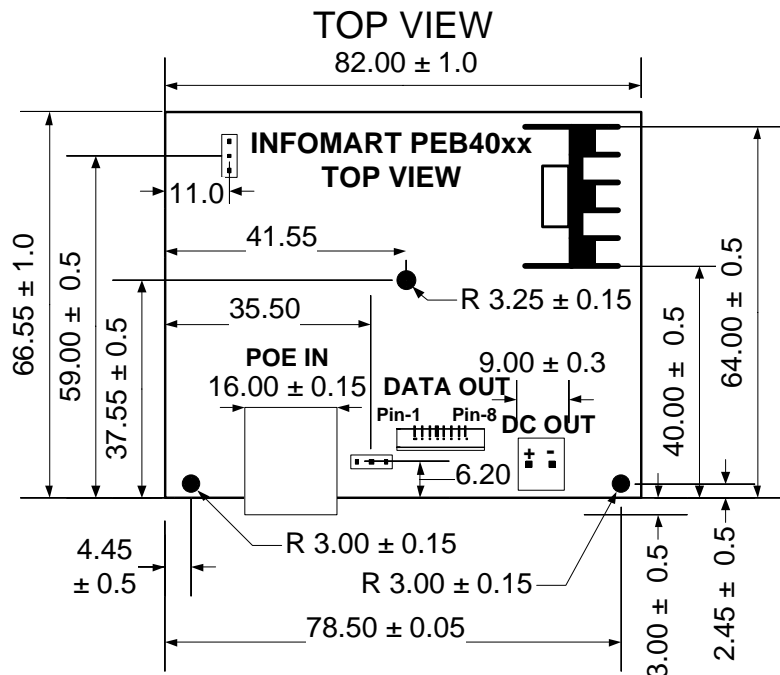


**Figure 4 – PHYSICAL PACKAGE**

All dimensions in mm



5mm CLEARANCE FROM BOTTOM OF PCB IS RECOMMENDED. ADDITIONAL CLEARANCE MAY BE REQUIRED FOR THERMAL PERFORMANCE.



3 MOUNTING HOLES ARE NON-CONDUCTIVE AND FREE FROM BOTTOM SIDE COMPONENT ENCUMBRANCES. M3 SCREW RECOMMENDED.

**SAFETY, COMPLIANCE, EMC, EMI, IMMUNITY**

The PEB4000 series board are tested for EMI (Radiated and Conducted) compliance to EN55022 and FCC Part 15 Class B and EMC compliance to EN55024 for CE mark compliance.



**APPLICATION NOTES**

Power Over Ethernet (PoE) is a technology for wired Ethernet, the most widely installed local area network technology in use today. PoE allows the electrical power necessary for the operation of each end-device to be carried by data cables along with the data, rather than by separate power cords. Thus, it minimizes the number of wires used to install the network, resulting in lower cost, less downtime, easier maintenance and greater installation flexibility. The IEEE standard governing PoE is IEEE802.3af. Compliance with this standard ensures inter-operability between devices.

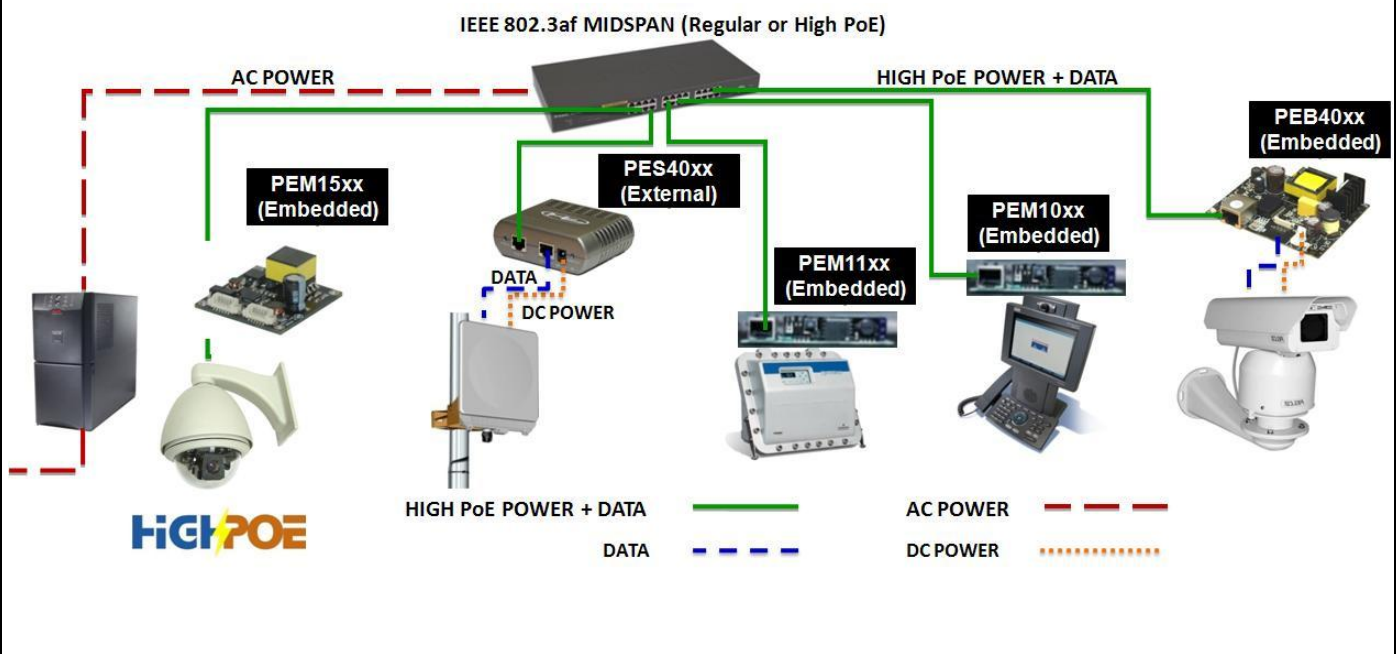
High PoE enables output power up to 30 watts using the existing IEEE802.3af standards, with the exception of higher input power. PEM4000 compatible midspans are Phihong POE30U, Microsemi-PowerDsine PD7000 and PD7001G, or any IEEE802.3af midspan with power output of 30W to 36W.

The PEB4000 series modules offering a modular solution, incorporating full IEEE802.3af compatibility signature to the PSE and isolated on-board DC/DC converter. The PEB4000 series are ideal modular system blocks allowing manufacturers of Ethernet equipment to "PoE enable" their equipment with minimal effort and cost. The PEB4000 modules series offer simple and quicker product development, maximising return on investment.

**APPLICATION AREAS**

- Security and alarm systems,
- Access and physical control systems
- High power Pan-Tilt-Zoom (PTZ) IP video surveillance cameras
- LCD displays, video panels, kiosks
- Public address systems
- 802.11n wireless, mesh networks, Bluetooth access points
- Environmental control, sensors, transducers and telemetry
- Industrial control and automation
- Single board computers

**Figure 5 – Typical PoE System Configuration**



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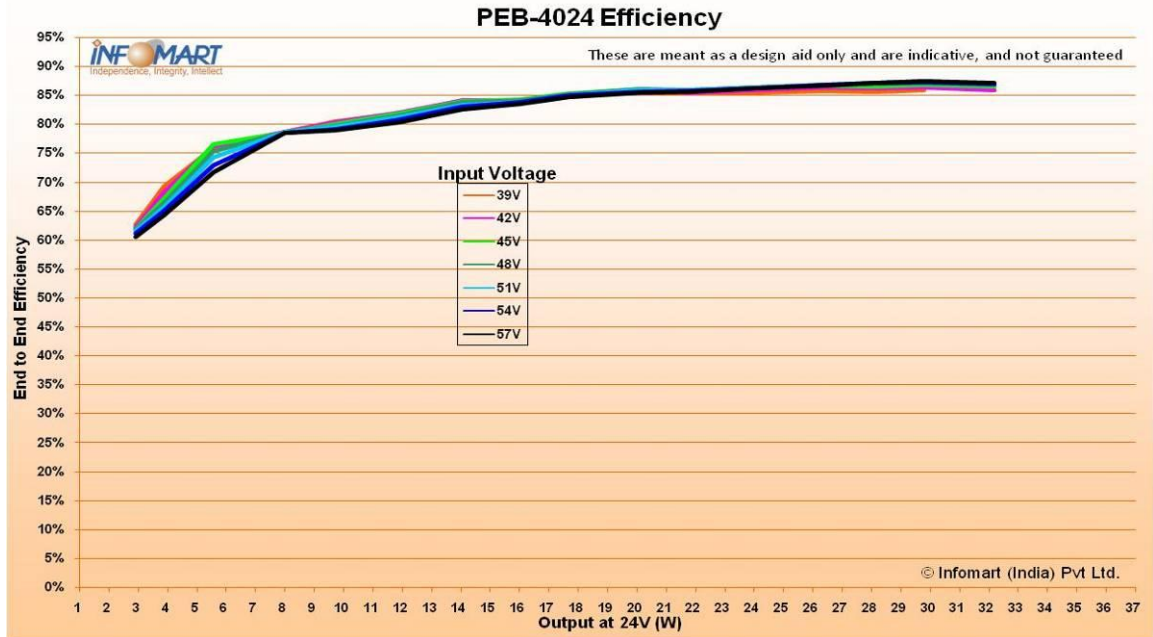
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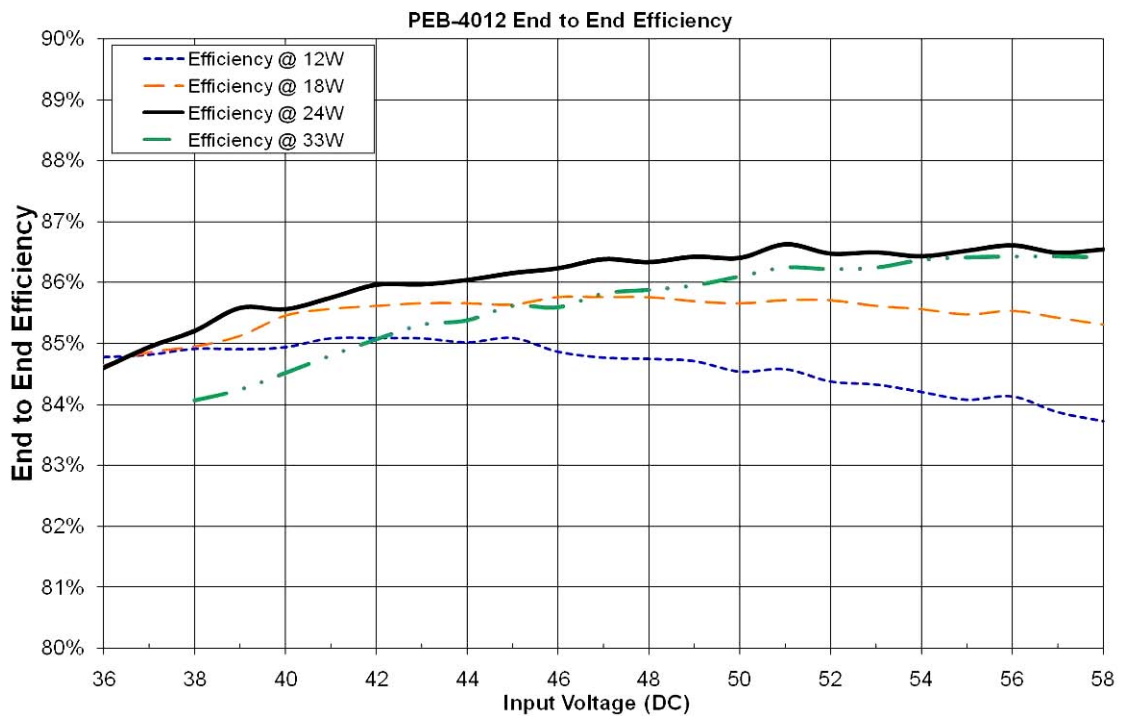
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**TYPICAL EFFICIENCY**

**Figure 6 – Typical end to end system efficiency across input voltages**



**Figure 7 – Typical end to end system efficiency across output loads**



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