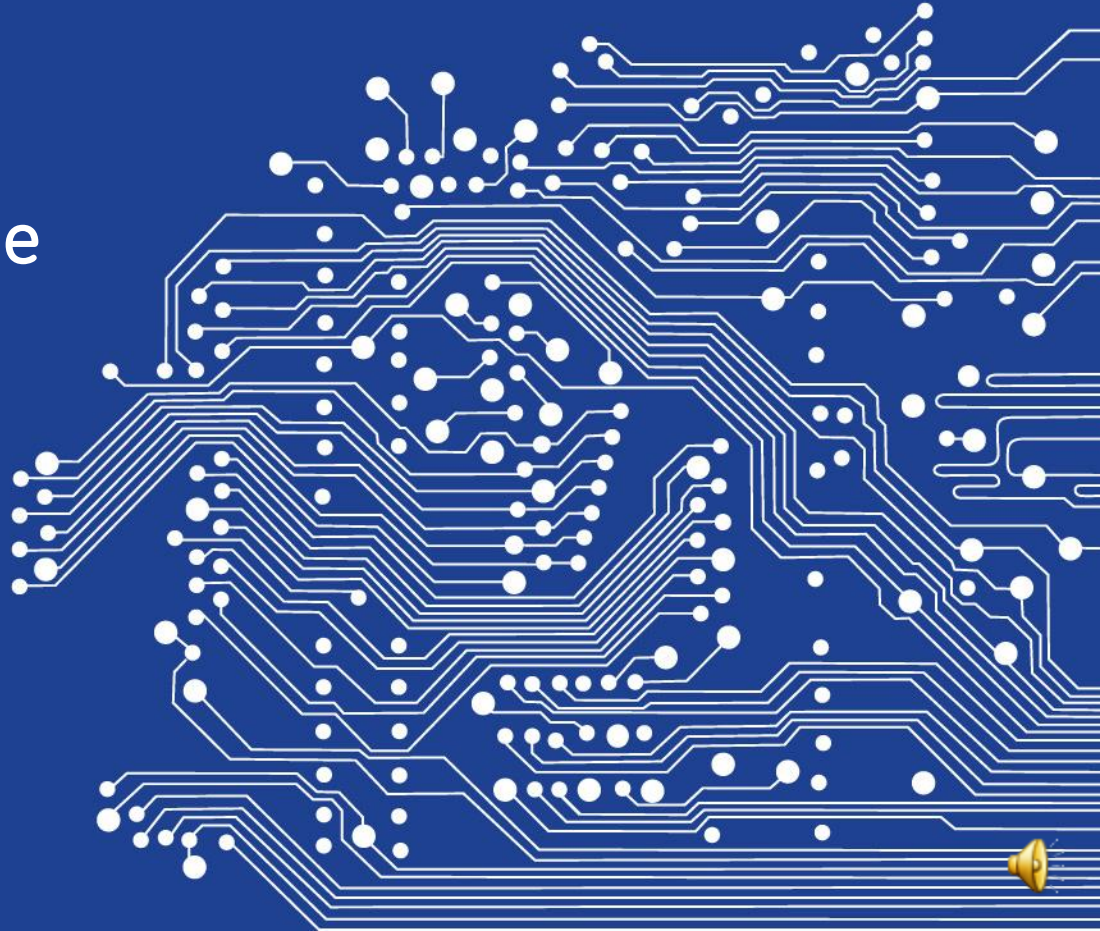


GE Energy

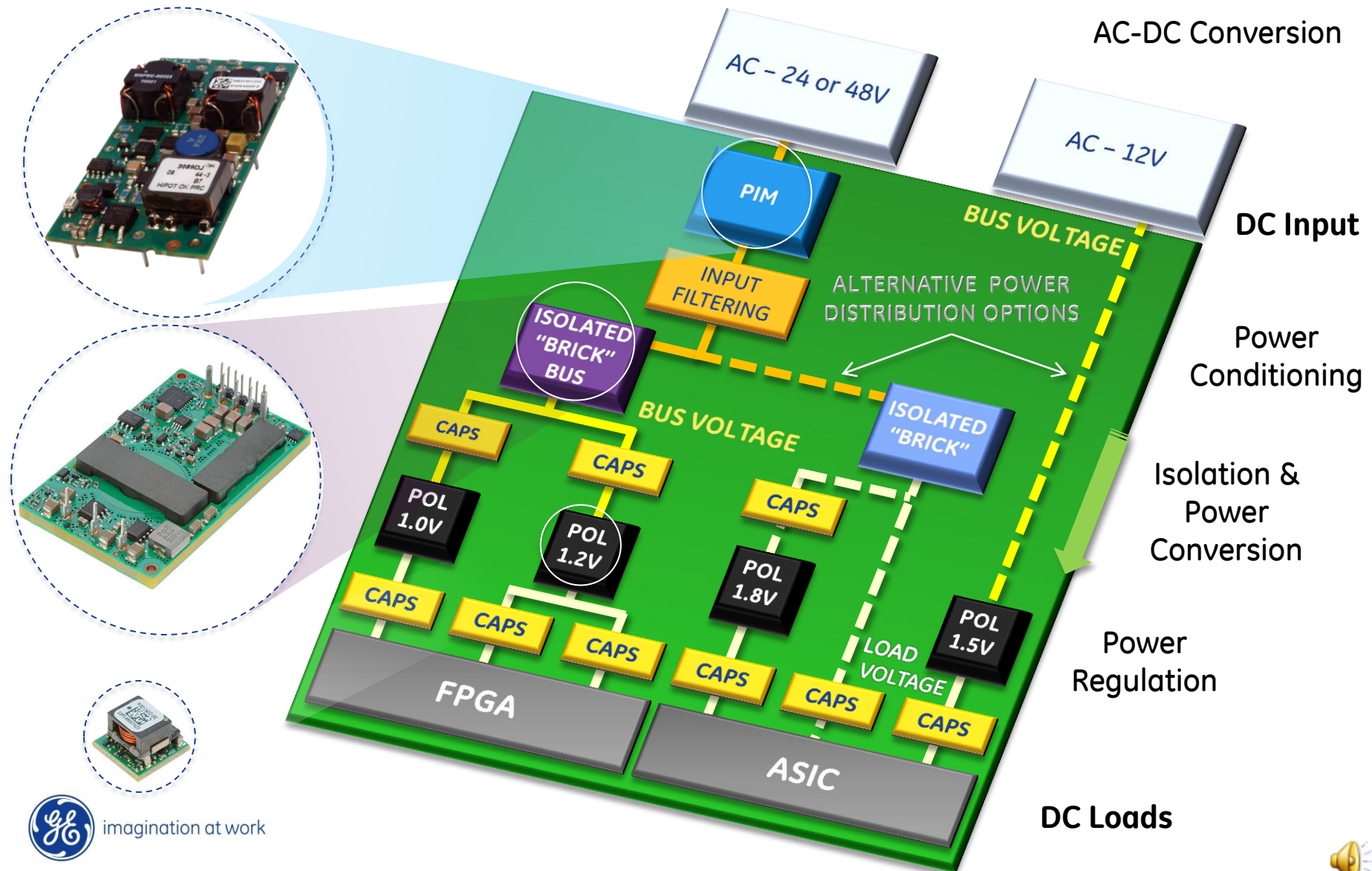
February 2012 Product Training Module DC-DC Barracuda



imagination at work



GE Complete Family of DC-DC Solutions



GE's Barracuda Family



STANDARD

240W

EBVW020

300W

EBVW025

300W

QBVW025

400W

QBVW033

DIGITAL

240W

EBDW020

300W

EBDW025

300W

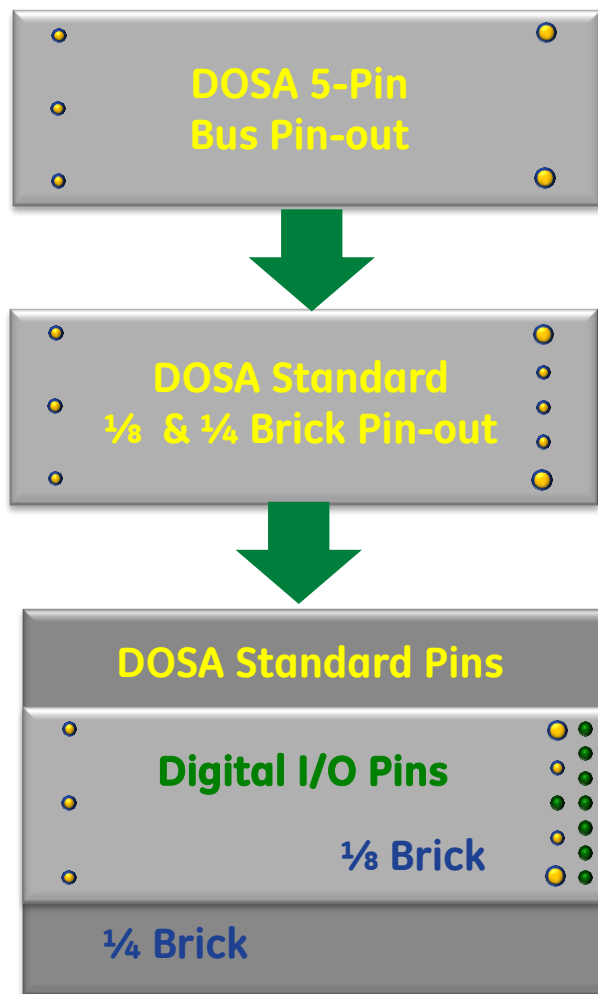
QBDW025

400W

QBDW033

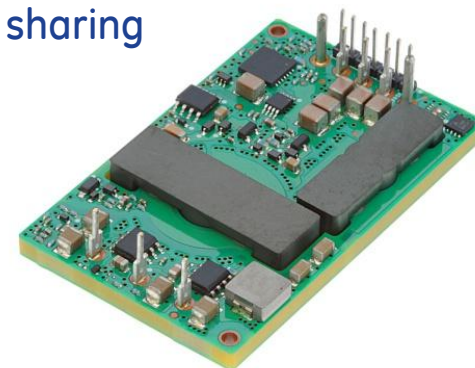
- Available in both **Digital** pin-out or Standard bus converter 5-pin format.
- **DOSA™** Standard footprints
- **PMBUS™** digital system interface.
- **Fully Regulated**, wide input range
- Exceptional efficiency, **96%**
- Exceptional **Thermal** performance.
- Flexible **digital** design

Barracuda Customer Benefits

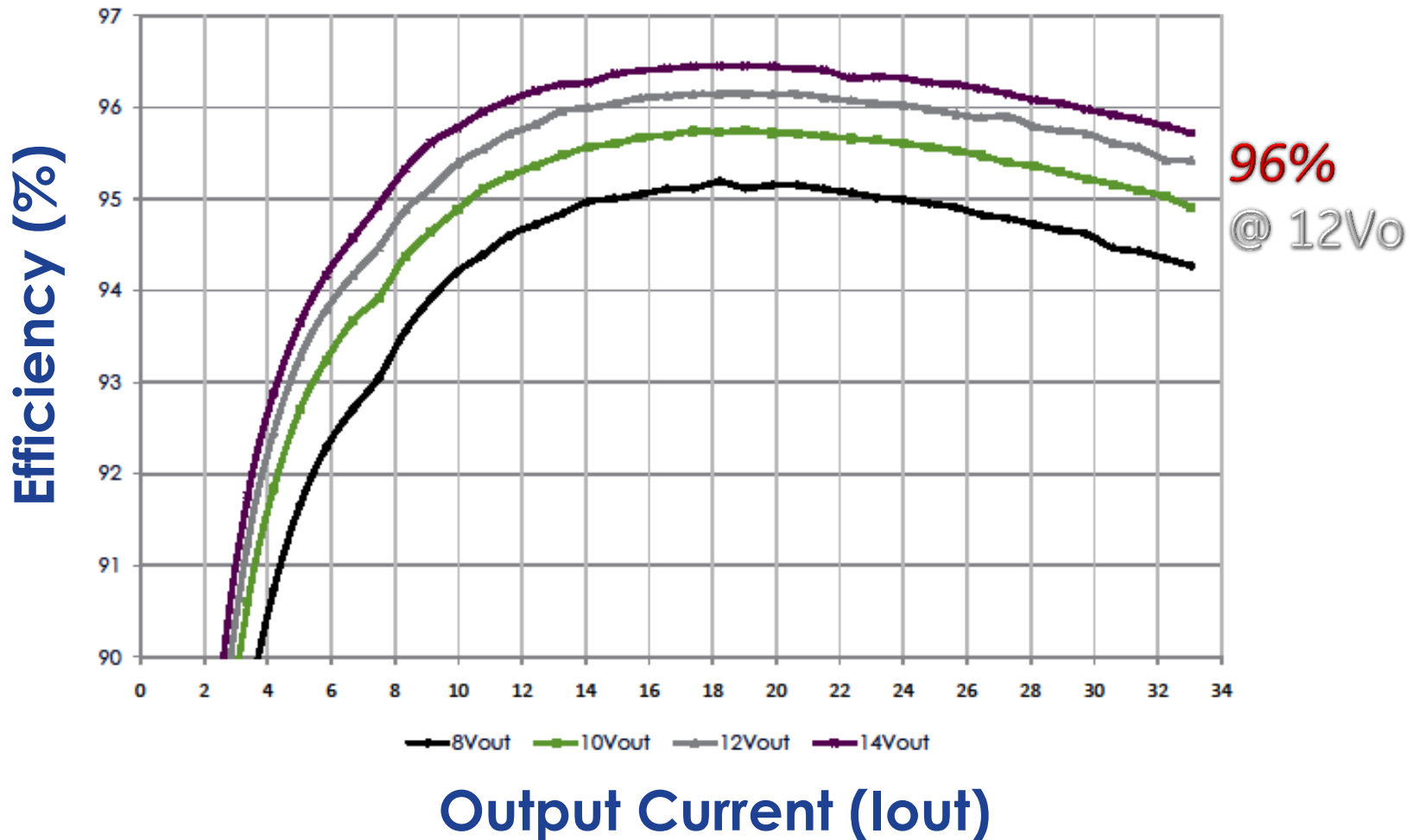


- **Flexible and Backwards Compatible**

- Fully Regulated with Wide Input Range
- Forward and backward compatibility between DOSA standard, 5-Pin bus, and Fully Digital modules for both E-bricks and Q-bricks
- A single layout accommodates new digital modules as well as all existing legacy modules
- Configurable output voltage (9.6V, 12V) allows backward replacement into existing 4:1 and 5:1 un-regulated sockets
- User configurable digital pins
- -P option for Droop Load sharing
- -H option for Base Plate

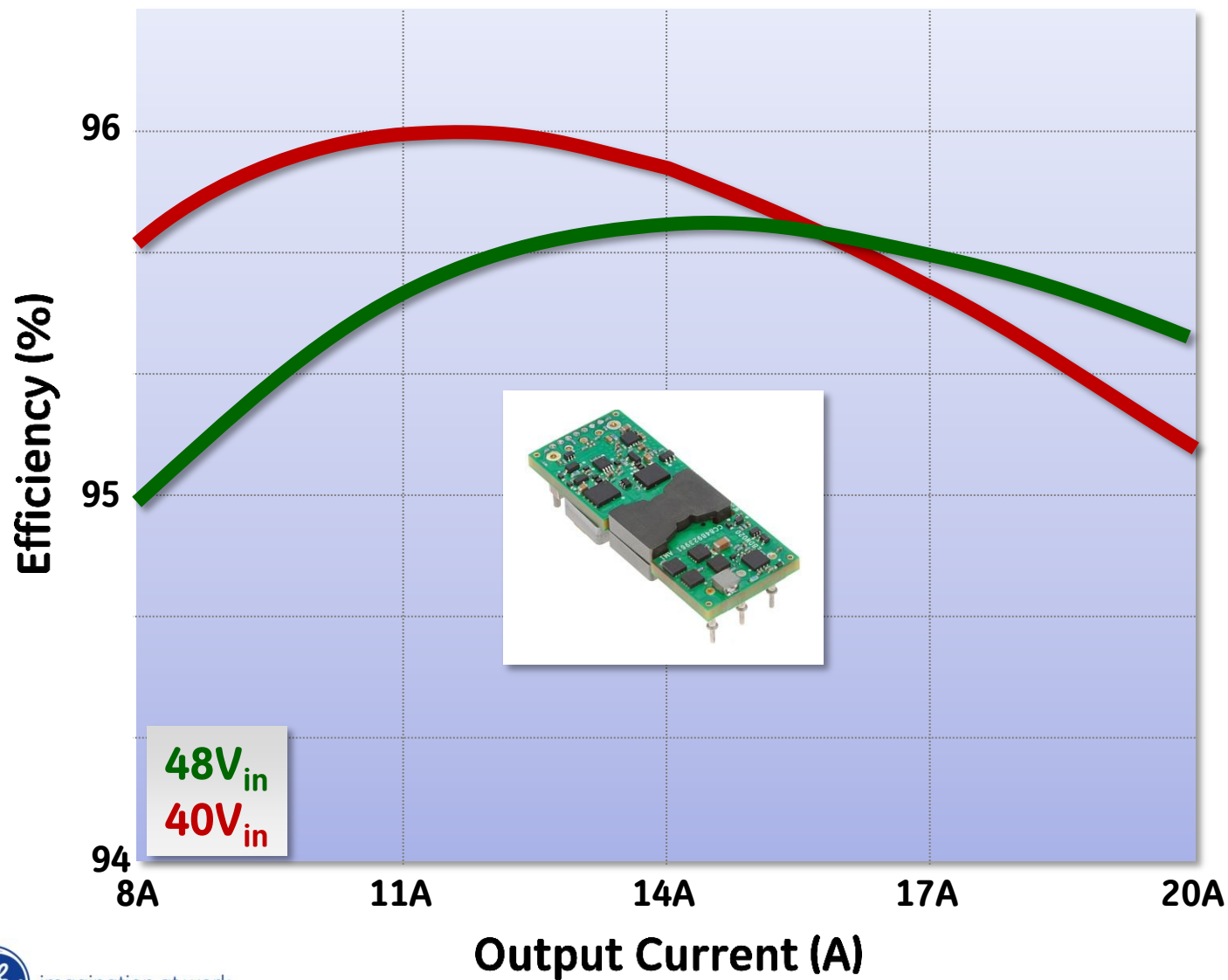


Barracuda Efficiency (QBVW033)

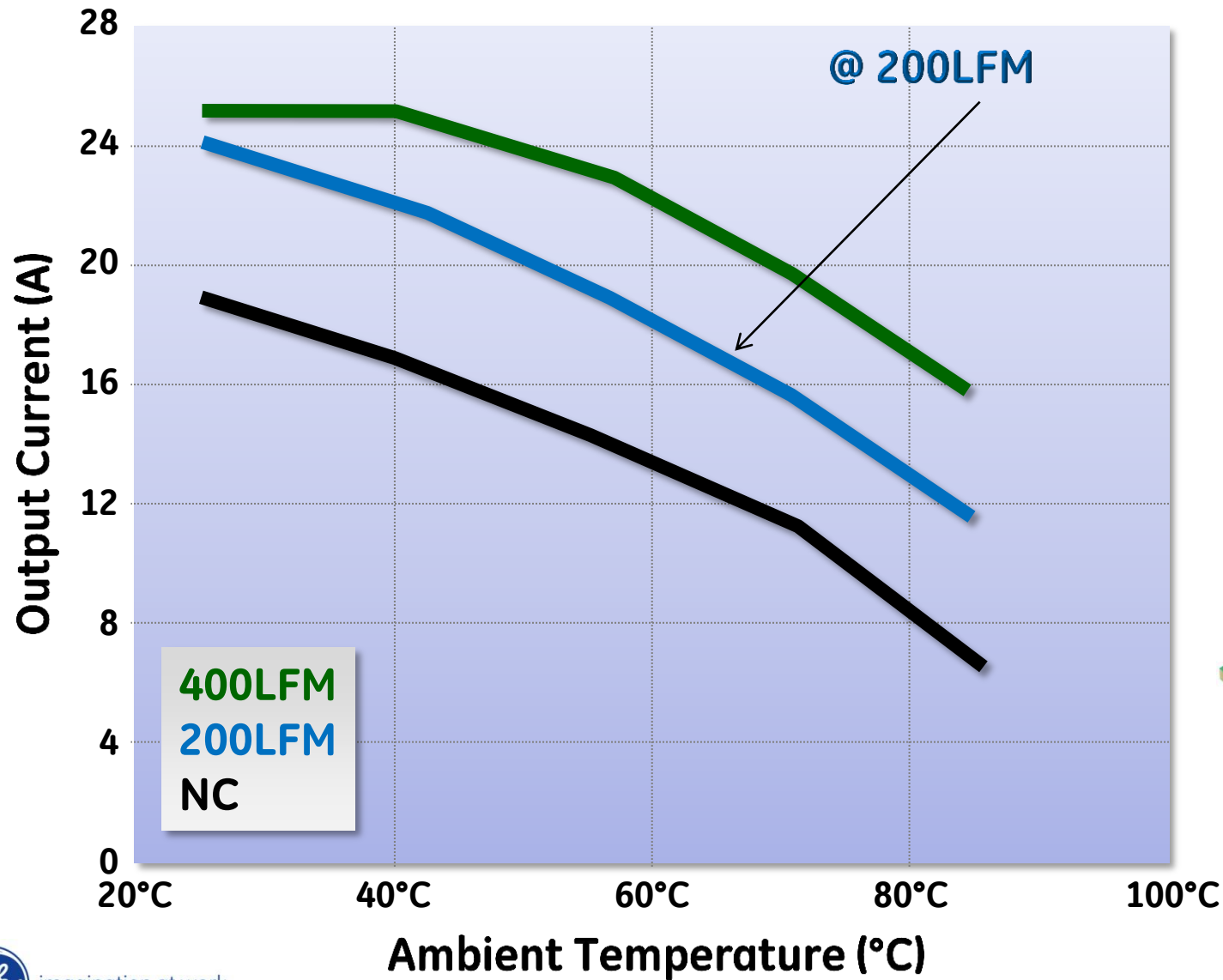


HIGHER EFFICIENCY & EXCEPTIONAL THERMAL PERFORMANCE

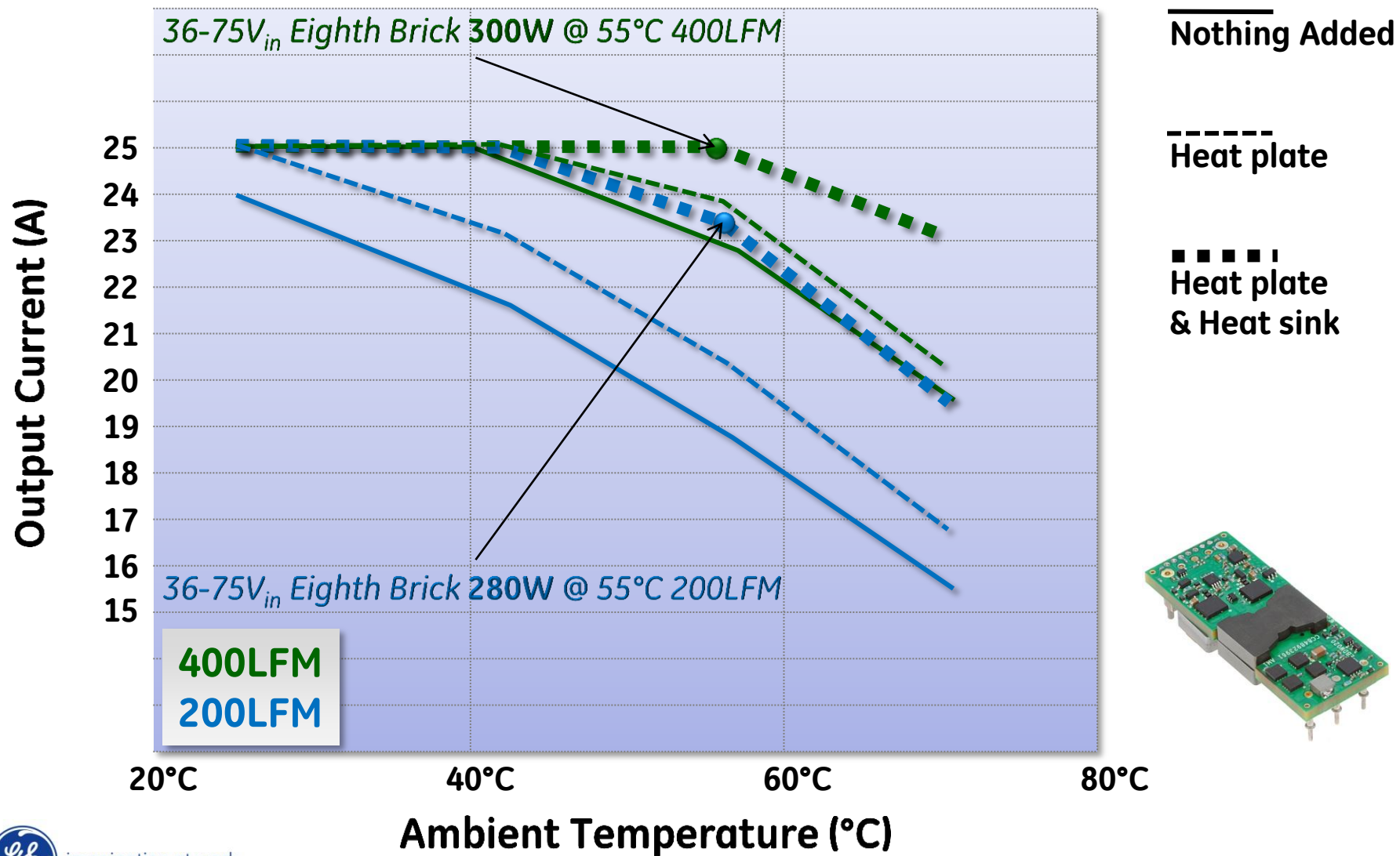
Barracuda Efficiency (EBDW020)



Barracuda De-rating (EBDW025 with Heat Plate)



Barracuda (EBDW025 with Heat Plate & Heat Sink)

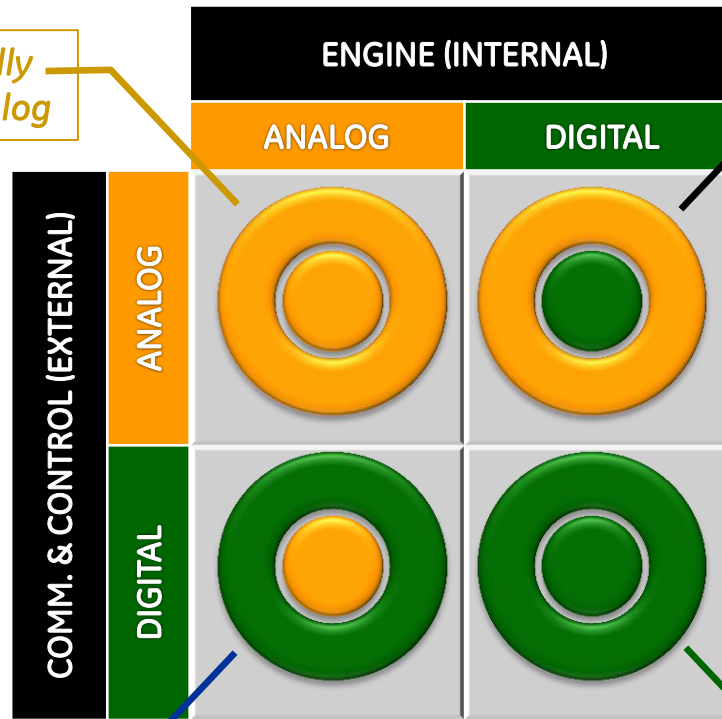


GE DLynx™ & Barracuda™ Digital

PVX012



Fully Analog



Hybrid Analog

**EBVW
QBVW**



PDT012

Lower cost
Lower loss
Smaller size
Reliability

Hybrid Digital

Digital Communication
(External Interface)

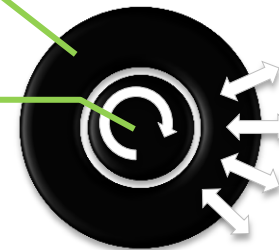
Uses a digital interface to communicate & control

Digital Core
(Internal Engine)

Need to digitize the world to make PWM decisions & control module output

Fully Digital

**EBDW
QBDW**



Barracuda Digital Feature Summary

Pin Function	Description	Notes
SMALERT	SM BUS ALERT	REFERENCED TO SIGGND
SCLK	SERIAL CLOCK	REFERENCED TO SIGGND
SIGGND	SIGNAL GROUND	SEPARATE FROM Vout(-)
SDAT	SERIAL DATA	REFERENCED TO SIGGND
ADDR1	RESISTOR TO SIGGND FOR MODULE ADDRESS 1	REFERENCED TO SIGGND
ADDR0	RESISTOR TO SIGGND FOR MODULE ADDRESS 0	REFERENCED TO SIGGND
TRIM/C1	ANALOG TRIM OR CONFIGURABLE PIN 1	Analog Trim, Secondary On/Off
C2	CONFIGURABLE PIN 2	Power good, Frequency Sync, Secondary On/Off

Programmable DSC based controller allows multiple features to be mapped to a given pin, provisioned by the user.

Barracuda QBDW033A0B

Functions & Specifications

Functions/Specs.	Specification	Functions/Specs.	Via PMBus™
Input Voltage Range	36-75V	Set V_{OUT} 8.1 – 13.2V	√
Output Voltage Range	8.1-13.2V	Set V_{OUT} droop	√
Efficiency	95% Minimum	Margin V_{OUT} High/Low	√
Line and Load Regulation	0.2%	Digital On/Off	√
Input-Output Isolation	2250Vdc	Adjust V_{IN} On/Off Limits	√
Operating Temp. Range	-40 – 85°C	Adjust V_{OUT} OV Fault Limit and Action	√
Remote Sense Range	5% of V_{OUT}	Adjust V_{OUT} OC Warning/Fault Limit and Action	√
Output Current Rating	33Adc	Adjust OT Warning/Fault Limit and Action	√
Analog On/Off (V_{IN} ref)	√	Adjust V_{IN} OV Fault Limit	√
V_{OUT} Adj via R_{TRIM}	√	Adjust PGOOD Limits	√
Remote Sense	√	Adjust Startup Delay and Rise Time	√
Overtemperature Protection	√	Measure I_{OUT} , V_{OUT} , V_{IN} , Temp	√
Overcurrent Protection	√	Monitor faults/alarms/PGOOD	√
Overvoltage Protection	√	Configure SMBAlert/ARA	√
Analog On/Off (V_{OUT} ref)	√ (option)	Configure On/Off pin(s) logic	√
Power Good	√ (option)	Calibrate V_{OUT} , V_{IN} Readings	√
Load Share	√ (option)	Read module ID, mfg location, etc.	√

AVS (Adaptive Voltage Scaling)

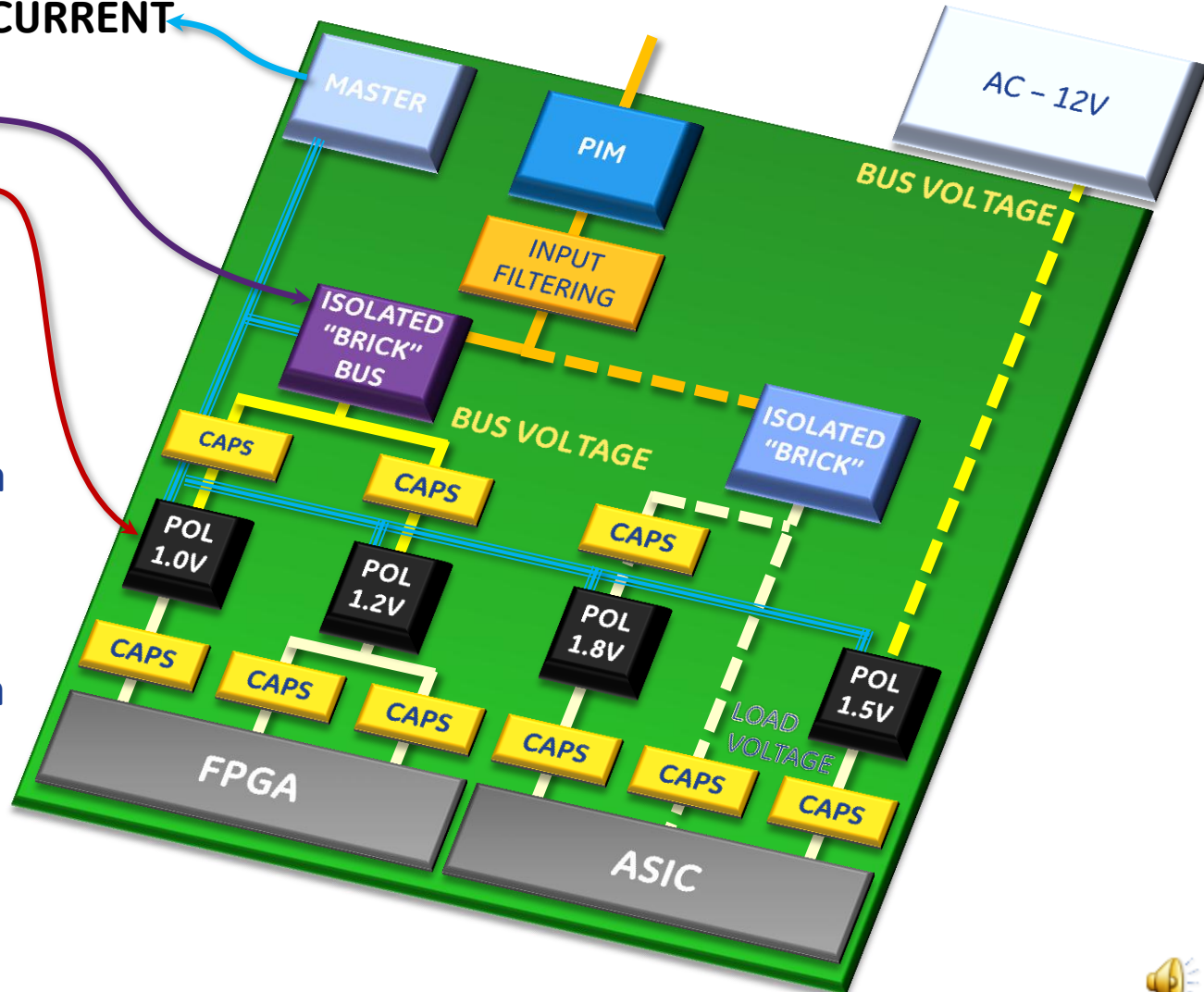
Adaptively change load and bus voltages to optimize energy consumption

READ BACK BUS & LOAD CURRENT

→ **SET BUS VOLTAGE**
→ **SET LOAD VOLTAGE**

Some of the adaptive variables:

1. Processor needs
2. Temperature variation
3. Board Impedances
4. Component variances
5. Module efficiency
6. IC power consumption



GE Digital Power Insight™ - DPI Kit



DIGITAL POWER
INSIGHT™ GUI

USB - I²C Interface



EVALUATION
Board
(representative)



PMBus™
Daisy
Chain



Application Board



GE Digital Power Insight™ - Simple GUI

Digital Power Insight™ POL/BUS GUI v1.18

POL Address	1 28	2 35	3	4
Rtrim (Kohms)	20	20		
Nominal Vout (V)	1.200	1.200		

Vout (V)	1.172	1.188		
Iout (A)	2.188	0.375		
Vin (V)	12.438	6.219		
Switch Freq (kHz)	608	608		
ON/PGOOD	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
UVin/OVout/UVout	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
OC Fault/Warn	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
OT Fault/Warn	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
CMD/DAT/PEC/OTH	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

On	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Vout Trim (V)	0.000	0.000		
Margin	MGOFF	MGOFF		
On/Off Options	ANON	ANON		
Vin, Turn On (V)	2.750	2.750		
Vin, Turn Off (V)	2.500	2.500		
Rise Time (ms)	2.625	2.625		
PGOOD On %	92/108%	92/108%		
PGOOD Off %	90/110%	90/110%		
Margin High (V)	1.318	1.319		
Margin Low (V)	1.078	1.079		
OC Warn (A)	14.000	4.000		
OV Limit %	108%	108%		
OV Response	SHUT	SHUT		
UV Limit %	92%	92%		
UV Response	CONT	CONT		
Selected Module	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>

Bus Conv Address	5	6
Vout (V)		
Iout (A)		
Vin (V)		
Temp (degC)		
ON/PGOOD	<input type="checkbox"/>	<input type="checkbox"/>
UVi/UVi/OVo/UVo	<input type="checkbox"/>	<input type="checkbox"/>
OC Fault/Warn	<input type="checkbox"/>	<input type="checkbox"/>
OT Fault/Warn	<input type="checkbox"/>	<input type="checkbox"/>
CMD/DAT/PEC/OTH	<input type="checkbox"/>	<input type="checkbox"/>

On	<input type="checkbox"/>	<input type="checkbox"/>
Vout Set (V)		
Margin		
On/Off Options		
Vin, Turn On (V)		
Vin, Turn Off (V)		
Rise Time (ms)		
PGOOD On (V)		
PGOOD Off (V)		
Margin High (V)		
Margin Low (V)		
OC Warn (A)		
OC Fault (A)		
OC Fault Resp		
OVin Fault(V)		
OVin Response		
OVout Fault (V)		
OVout Response		
OT Warn (degC)		
Selected Module	<input type="radio"/>	<input type="radio"/>

Poll Module	<input checked="" type="checkbox"/> 1 <input checked="" type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> 5 <input type="checkbox"/> 6 All None
SMBAlert	Rate 1500ms

Communications Log
☐ Stop Poll
 ☐ I2C
 ☐ PEC Error

```

[Start] 46 [Write] 8B [Start] 47 [Read] C0 04 59 [Stop]
[Start] 46 [Write] 8C [Start] 47 [Read] 06 E0 1A [Stop]
[Start] 46 [Write] 88 [Start] 47 [Read] C7 D8 12 [Stop]
[Start] 46 [Write] 33 [Start] 47 [Read] 13 28 30 [Stop]
[Start] 46 [Write] 79 [Start] 47 [Read] 00 00 87 [Stop]
[Start] 46 [Write] 7A [Start] 47 [Read] 00 3F [Stop]
[Start] 46 [Write] 7B [Start] 47 [Read] 00 54 [Stop]
[Start] 46 [Write] 7D [Start] 47 [Read] 00 29 [Stop]
[Start] 46 [Write] 7E [Start] 47 [Read] 00 94 [Stop]
      
```

Command/Data Log
☒ Stat
 ☒ I2C
 Log Data
Clear

```

01/12 11:35:10 [2:35] CLEAR FAULTS
01/12 11:35:16 [2:35] CLEAR FAULTS
01/12 11:35:21 [1:28] CLEAR FAULTS
01/12 11:35:22 [1:28] status: (all clear)
01/12 11:35:22 [1:28] measures: Vout=1.188 Iout=2.18
8 Vin=12.438
01/12 11:35:22 [*] SMBAlert changed to normal
01/12 11:35:25 [2:35] CLEAR FAULTS
01/12 11:35:52 [2:35] READ SETTINGS
01/12 11:35:55 [2:35] CLEAR FAULTS
01/12 11:36:03 [2:35] GET STATUS
01/12 11:36:03 [2:35] status: (all clear)
01/12 11:36:03 [2:35] measures: Vout=1.172 Iout=0.37
5 Vin=6.156
      
```

Get Status	Clear Faults	Load Config
Read Settings	Store Defaults	Save Config
Write Settings	Restore Defaults	Alert Address
Log Settings	Lineage Power	Find Modules

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Web Tools

Power Module Selector Guide

Power Systems Designer

Stability Analysis Tool

Application Notes Library

Documentation | Corporate

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Lineage Power DC-DC Converters

Efficiencies up to 96.5%

- Industry Standard Footprints

DOSA

TOTAL EFFICIENCY™ ARCHITECTURE

Front Ends and Rectifiers

- 12V Front Ends
- 24 / 48V Front Ends
- 24/48V Rectifiers
- Power Shelves

Lineage Power offers a broad range of both AC & DC Input Front Ends & Rectifiers featuring efficiencies approaching 97% with power densities >30W/in³. Our broad selection of redundant power solutions includes models qualified to 80 Plus Gold and Platinum Standards in recognition of our industry leading efficiencies and energy

Isolated DC-DC Converters

- Regulated Bricks
- Intermediate Bus Converters
- DC Filters

With >30 years of technology leadership, Lineage Power DC-DC converters are designed for high reliability in DOSA Standard footprints. Powering >10,000 applications around the globe, our Board Mounted Power modules address the ever-evolving demand for higher densities and improved efficiencies and energy

Non-Isolated DC-DC Converters

- TLynx (SMT) Modules
- Naos Raptor (SIP) Modules
- Tunable Loop Technology

Lineage Power's Tunable Loop™ technology drastically reduces our footprint of our products and supporting components while maintaining reliability, performance, and price advantages over other existing technologies.

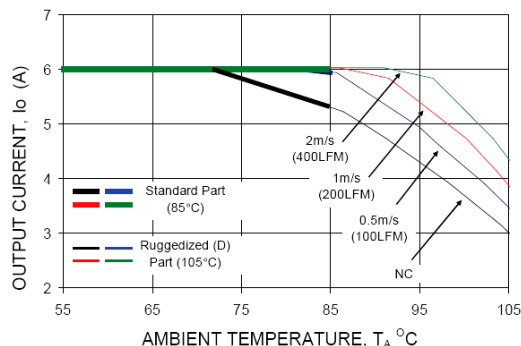
NEW! 2A POL Module

80 PLUS GOLD

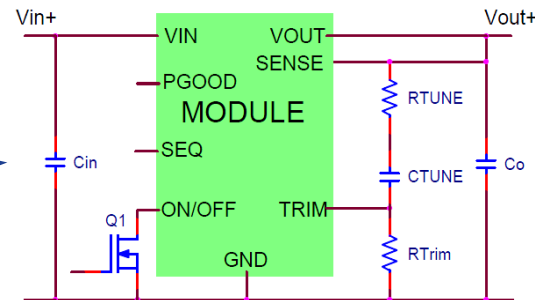
80 PLUS GOLD

80 PLUS GOLD

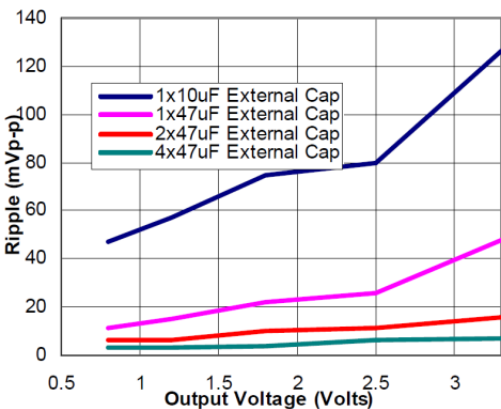
Rich Datasheet Content/Tools



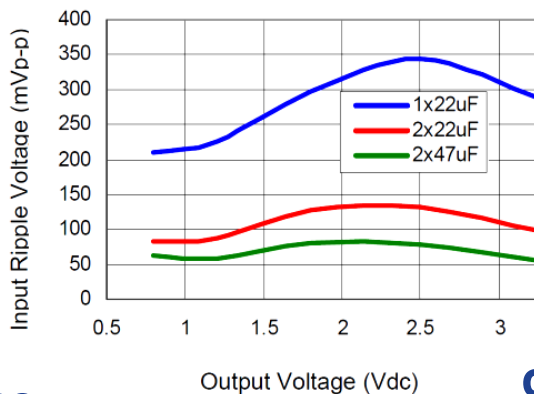
General schematic



Thermal de-rating guidelines & other characteristic curves

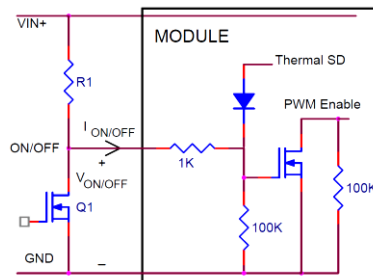


Input capacitance sizing



Noise test configurations

Output filtering



Remote On/Off scheme

GE ENERGY USEFUL LINKS

GE Barracuda™ Isolated Bus Converter basic information and datasheets:

<http://www.lineagepower.com/oem/barracuda.html>

GE DPI Digital Power Insight™ GUI:

<http://www.lineagepower.com/oem/digitalpowerinsight.html>

GE DLynx™ POL basic information:

www.dlynx.info

GE DLynx™ POL datasheets:

www.lineagepower.com/oem/dlynx-series-smt.html

FPGA Selection Guides:

http://www.lineagepower.com/oem/pdf/FPGA_Selection_Guide.pdf

Application Notes & Tools:

<http://www.lineagepower.com/oem/downloads.html>

www.ge.com/powerelectronics

