



How to design With GaN in 1 Hour!

April 1, 2017






The background of the slide is a complex, abstract 3D structure composed of numerous red, translucent, rectangular blocks. These blocks are arranged in a way that creates a sense of depth and perspective, with some blocks appearing to be stacked or layered on top of others. The overall effect is a dynamic, architectural composition that fills the right side of the slide.

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Highest Performance, Highest Reliability GaN








Agenda

-  **The “Do It Yourself” HEM Guide to AC-DC Design**
-  **Choose the right topology**
-  **Deal with all the challenges**
-  **Solutions**
-  **Next Steps**



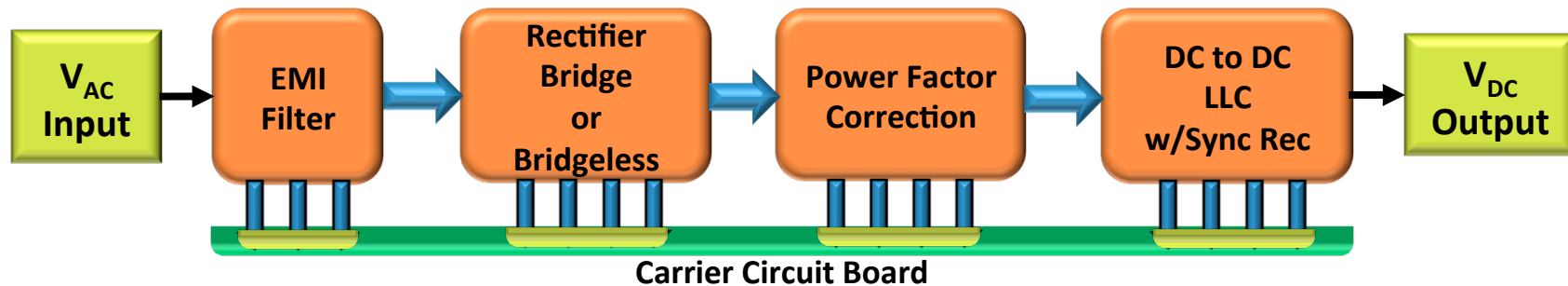
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The “Do it Yourself” Guide to Design In GaN

(complete the design in < 1 hour)



Specification	Value	Additional Options	Value
Plug-In V_{AC}	85 V_{AC} / 265 V_{AC}	EMI Certification	Ready
Output Voltage	12 V_{DC} or 48 V_{DC}	Early Power	Available
Power Rating	500 W	Monitor and Logging Functions	Available
True Efficiency	> 95%	LED	Available
Switching Frequency (PFC/LLC)	200 kHz / 300 kHz	Temperature Sensors	Available
Power Factor	> 0.99	PMBus	Available

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Switching & Transformer Technologies

Type	IGBT	MOSFETs	GaN
Frequency	< 50 kHz	< 250 kHz	> 250 kHz
Transformer	Traditional Regular Wiring	Higher Quality Transformers	Requires the best Quality
Ease of Implementation	Well-Known	Well-Known	Complex
Challenges	Frequency –Size of Transformers	Heat	Every single detail



Bridge Rectifier & PFC Topologies

Type	MOSFET Bridge + CCM PFC	MOSFET Bridge + Interleaved PFC	Ideal Diode Bridge Rectifier + GaN + Interleaved	Bridgeless Totem Pole	Bridgeless Totem Pole + GaN
Power Range	< 100W	100 W to 1000 W	100 W to 1000 W	> 1 kW	> 1 kW
Efficiency	< 85%	< 96%	> 98%	> 97%	> 99%
Power Factor	.90?	>.98	>.99	>.99	>.99
Challenges	Heat Dissipation Decreased Reliability	Heat Dissipation	Speed of GaN	Harmonic Noise	Harmonic Noise Speed of GaN



LLC & SR Topologies

Type	Flyback	Forward	Half-Bridge MOSFET	Full-Bridge MOSFET
Power Range	< 100 W	< 100 W	100 W to 1000 W	> 1 kW
Efficiency	< 90%	< 90%	> 97%	> 98%
Challenges	Power Stability	Control & Losses	More Complex but well-known	Even more complex with controller









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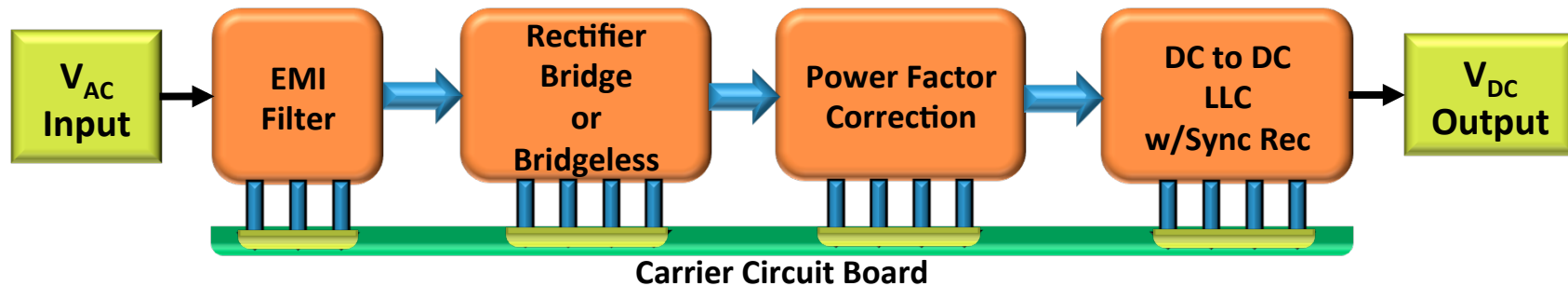
Deal with the challenges:

-  Drivers
-  Inductors
-  Transformer
-  Components
-  Noise
-  PCB layout
-  Traces length & width
-  Copper plating
-  Etc.



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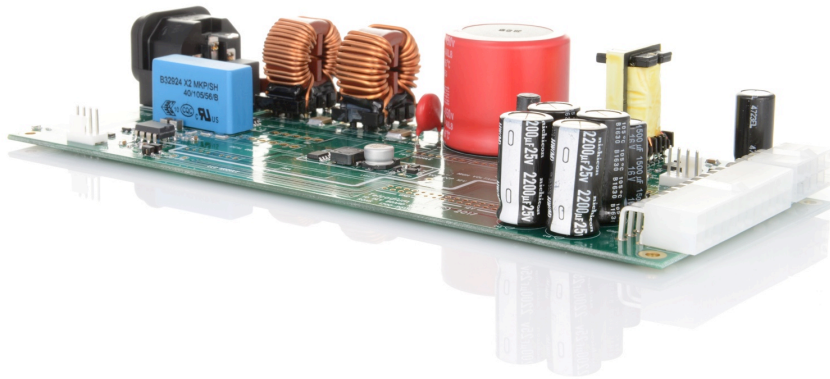


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Let us simplify your life!






TD-DEV-500-12V Carrier Board Carrier Board for all Telcodium Modules



Includes:

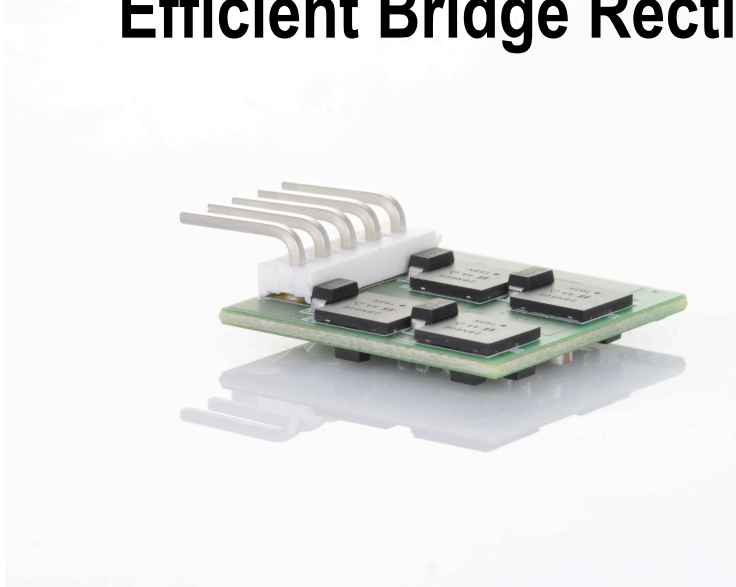
-  **EMI Filtering**
-  **Early Power**
-  **Sensors**
-  **PMBus**

We Provide:

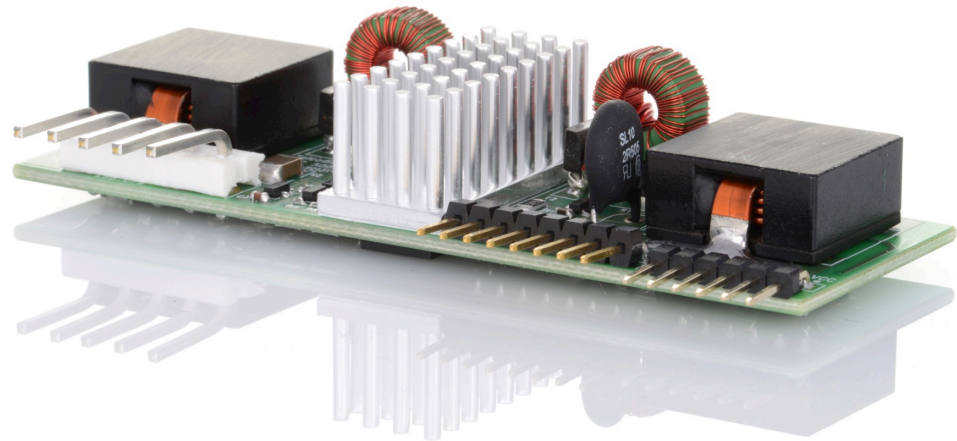
-  **3D File (.igs)**
-  **Schematics (Orcad .dsn)**
-  **Schematics (.pdf)**
-  **Gerber File (.zip)**
-  **BOM (.xls)**

 **Let us simplify your life!**

 **TD-DIODE-1000 Module**
Efficient Bridge Rectifier



 **TD-PFC-500 Module**
Interleaved PFC



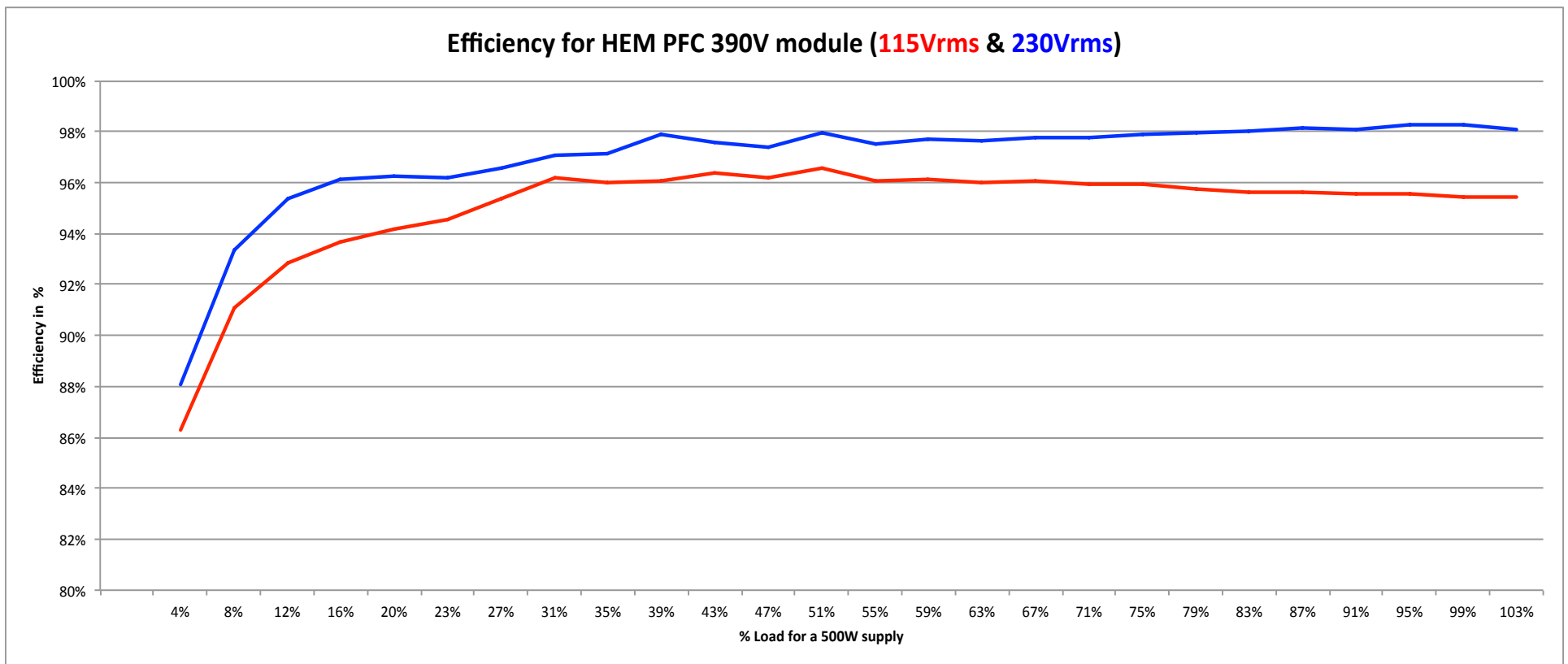
 **GaN Provides Efficiency >98%**

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Let us simplify your life!

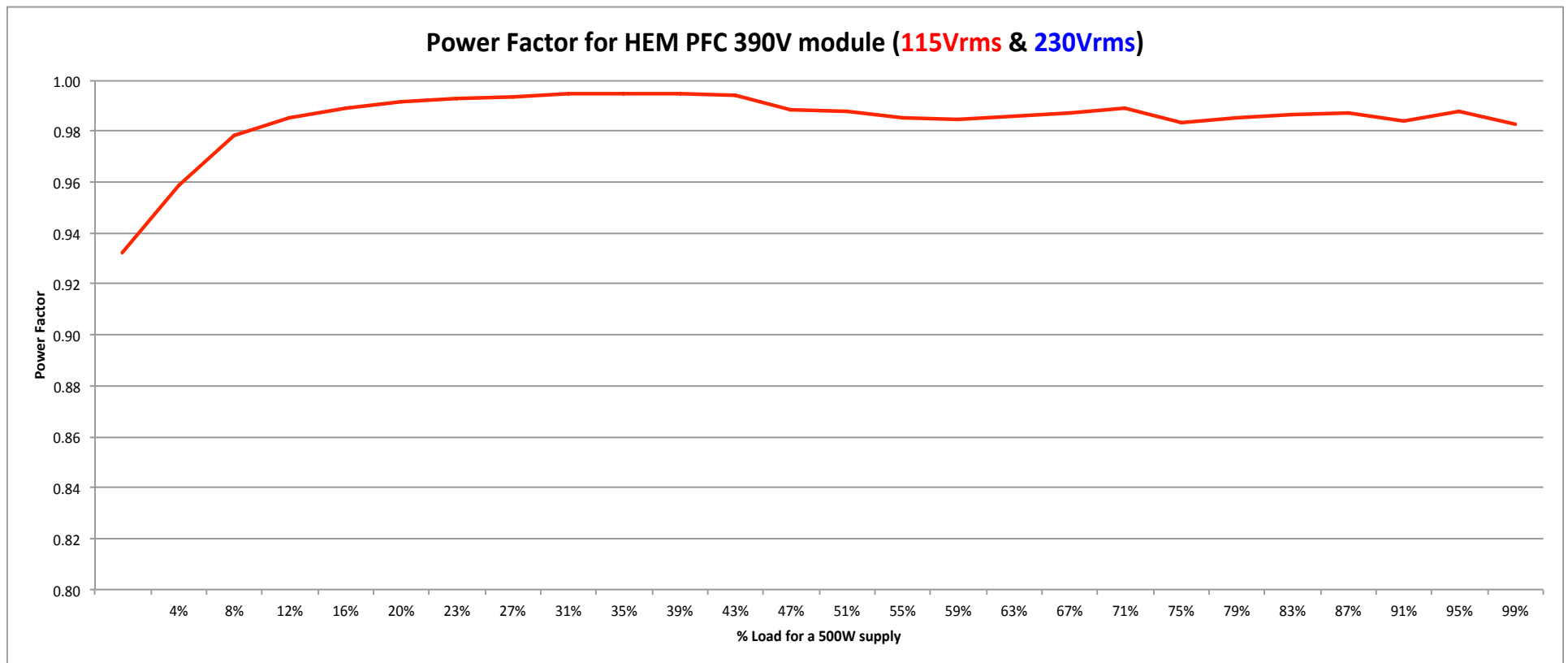
TD-DIODE-1000 Module + TD-PFC-500 Module





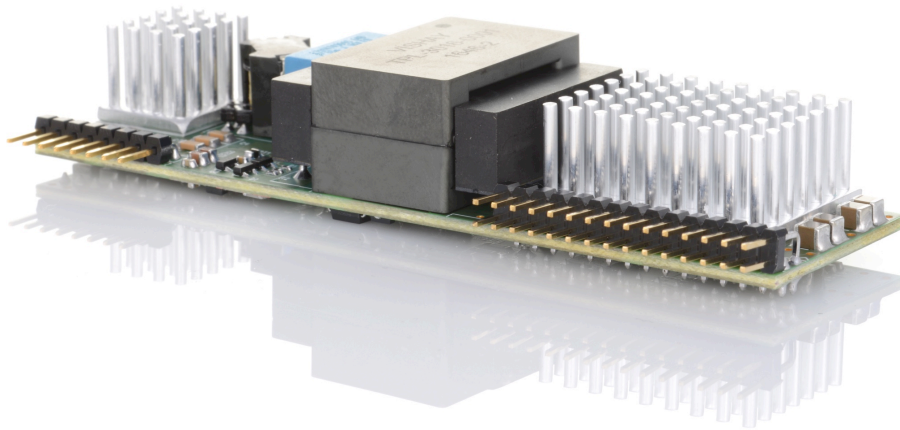
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TD-DIODE-1000 Module + TD-PFC-500 Module




 **Let us simplify your life!**

 **TD-LLC-x00-xxV Module**



-  **Available in different models:**
-  **200W 12V**
-  **300W 12V**
-  **400W 12V**
-  **500W 12V**

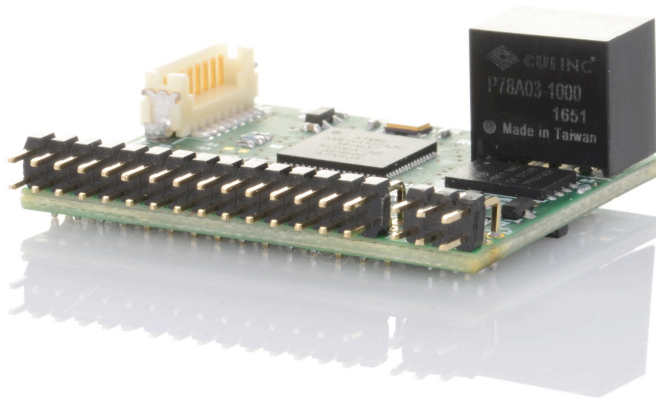
-  **Also available in 48V Output**










 **GaN Provides Efficiency >97%**

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 **TD-CPU-192 Module**



-  **Includes Monitoring of:**
-  **Input Current & Voltage**
-  **Input Frequency**
-  **Output Current and Voltage**
-  **Temperature Sensors**
-  **Fan Speed**
-  **LED Control**
-  **PMBus**
-  **Includes Documentation**



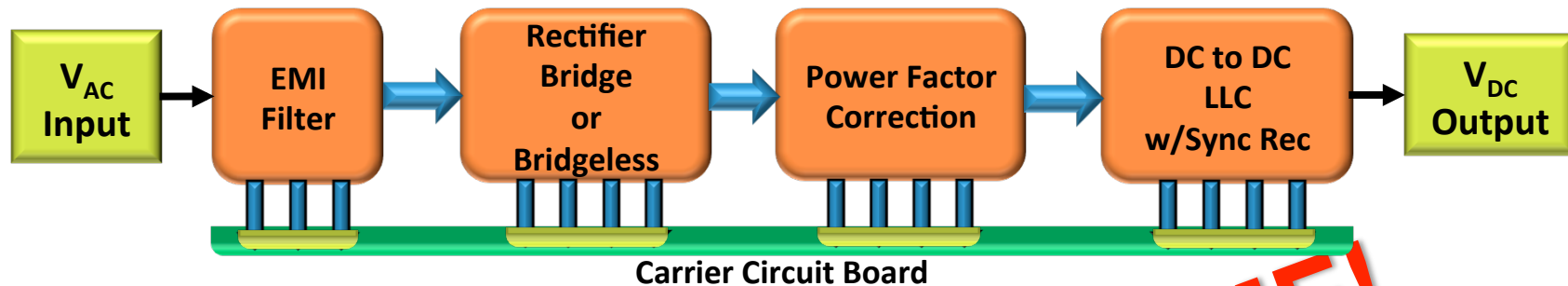
Deal with the challenges: **DONE!**

- ⏻ Drivers
- ⏻ Inductors
- ⏻ Transformer
- ⏻ Components
- ⏻ Noise
- ⏻ PCB layout
- ⏻ Traces lenght & width
- ⏻ Copper plating
- ⏻ Etc.



The “Do it Yourself” Guide to Design In GaN






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Highest Performance, Highest Reliability GaN

Thank You!



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