

TELCODIUM
POWER SUPPLY TECHNOLOGY

**How to design
With GaN
in 1 Hour!**

April 1, 2017

transphorm

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**



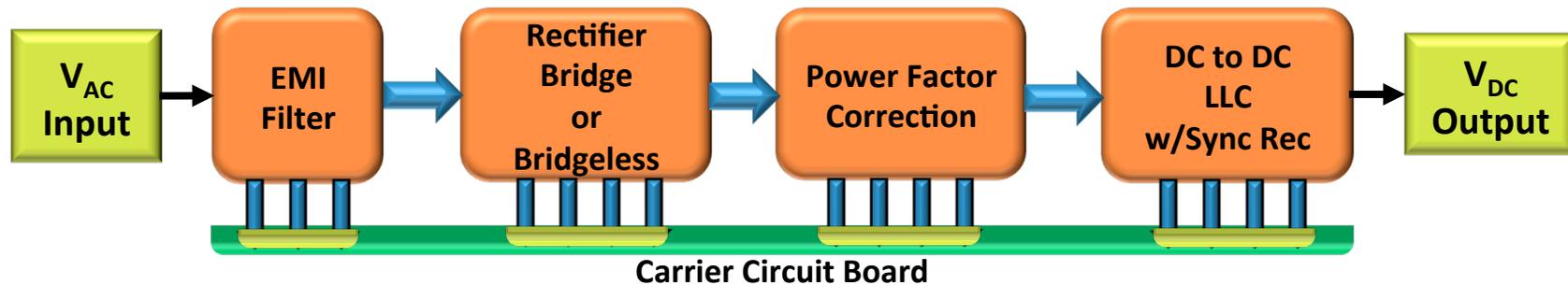
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The “Do it Yourself” Guide to Design In GaN

(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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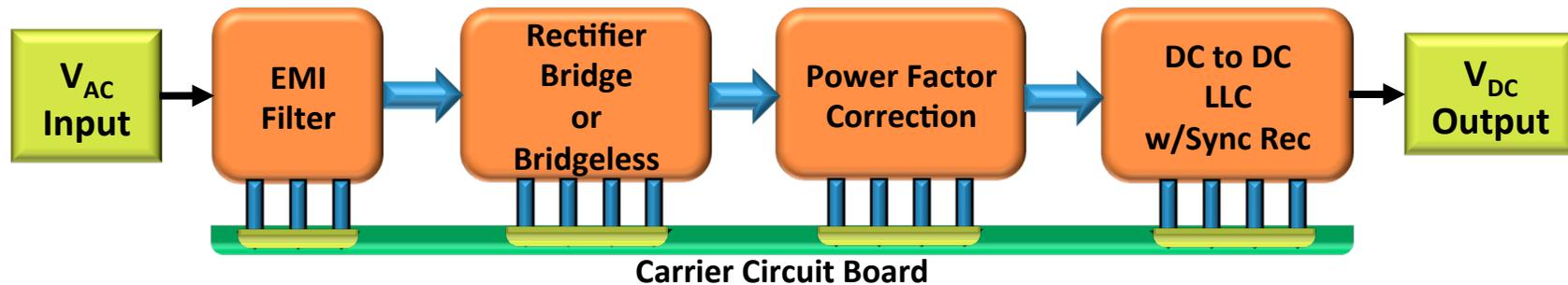
Deal with the challenges:

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



The “Do it Yourself” Guide to Design In GaN

(complete the design in < 1 hour)



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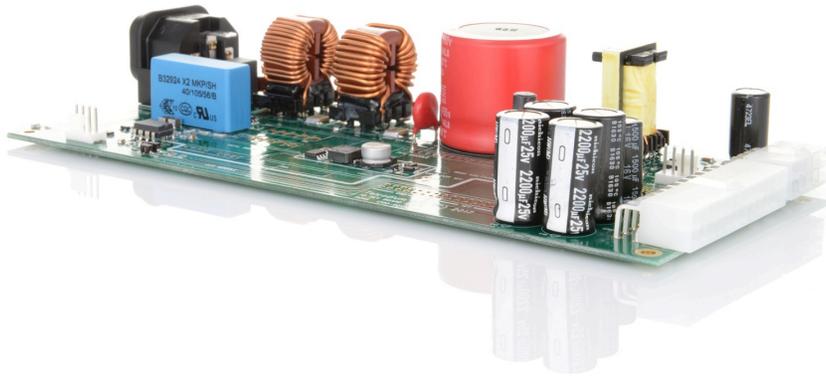


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Let us simplify your life!

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



Includes:

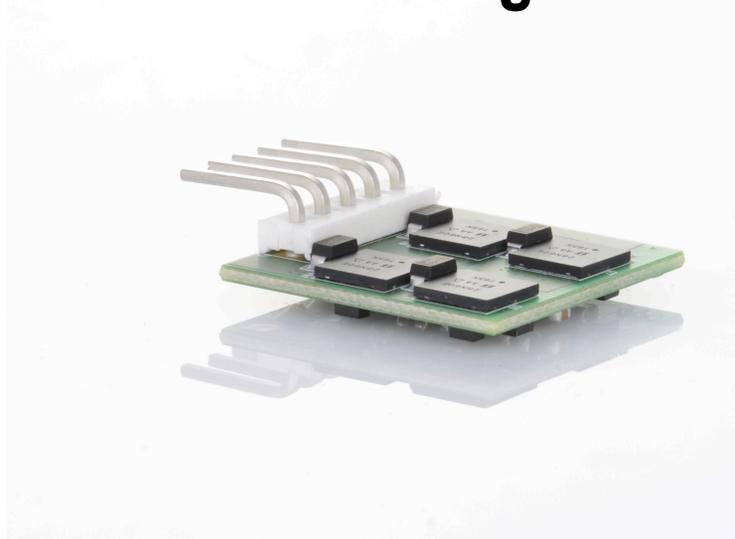
-  **EMI Filtering**
-  **Early Power**
-  **Sensors**
-  **PMBus**

We Provide:

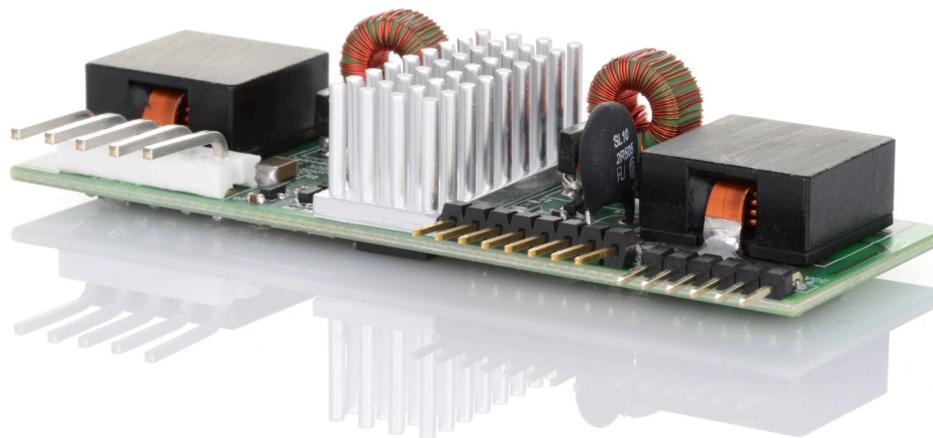
-  **3D File (.igs)**
-  **Schematics (Orcad .dsn)**
-  **Schematics (.pdf)**
-  **Gerber File (.zip)**
-  **BOM (.xls)**

 **Let us simplify your life!**

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



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



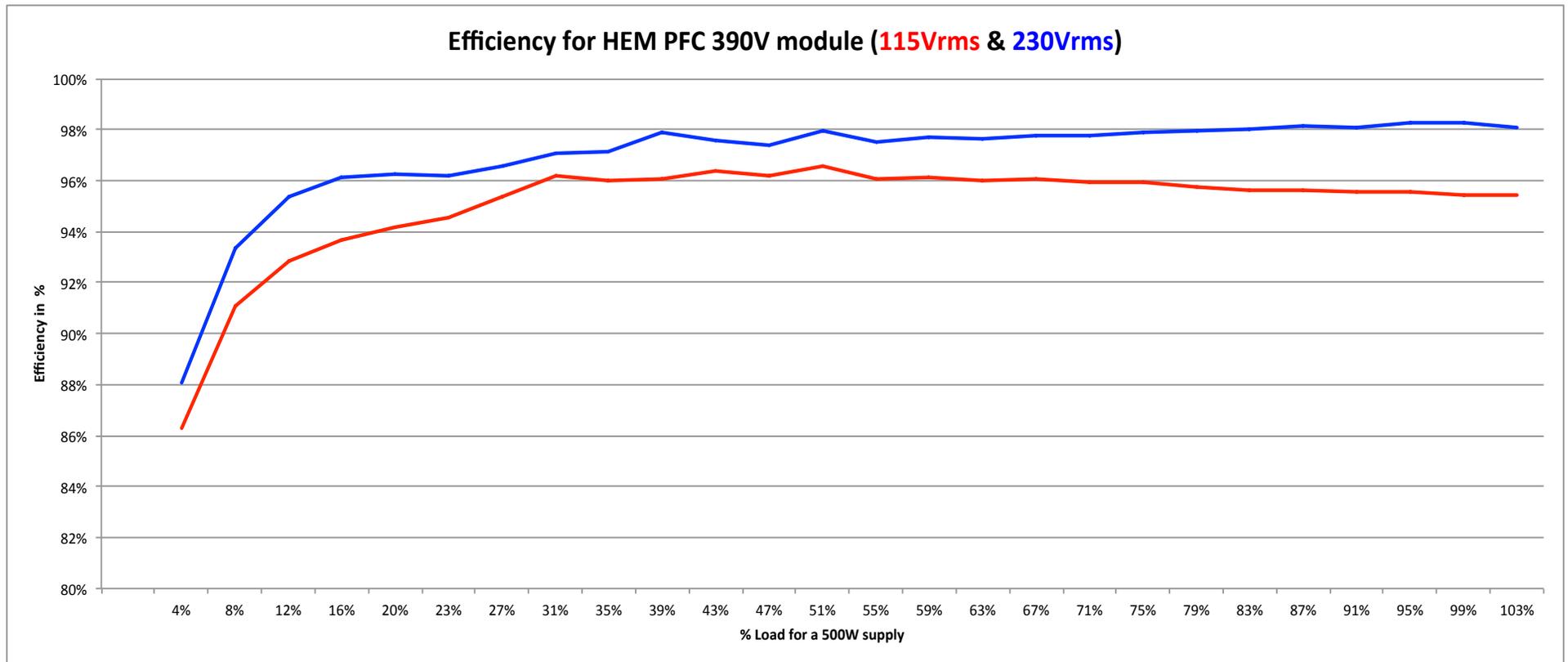
 **GaN Provides Efficiency >98%**

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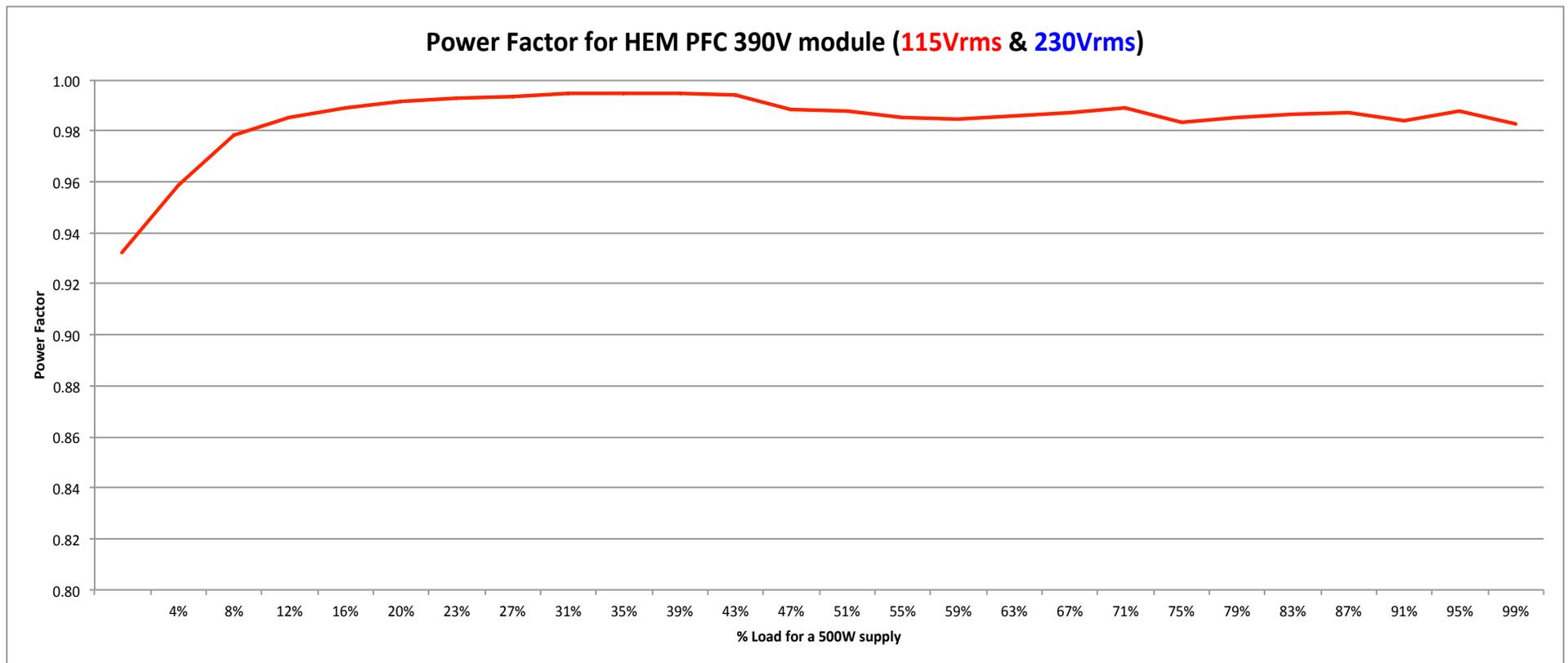
TD-DIODE-1000 Module + TD-PFC-500 Module





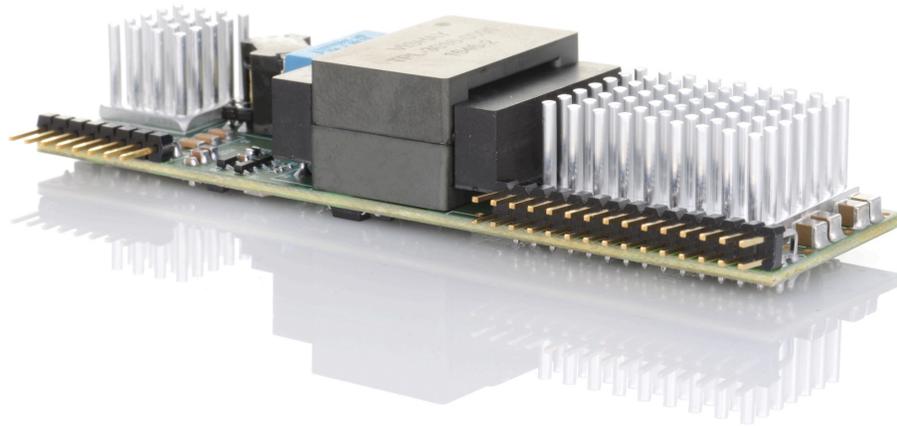
Let us simplify your life!

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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 **Let us simplify your life!**

 **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**



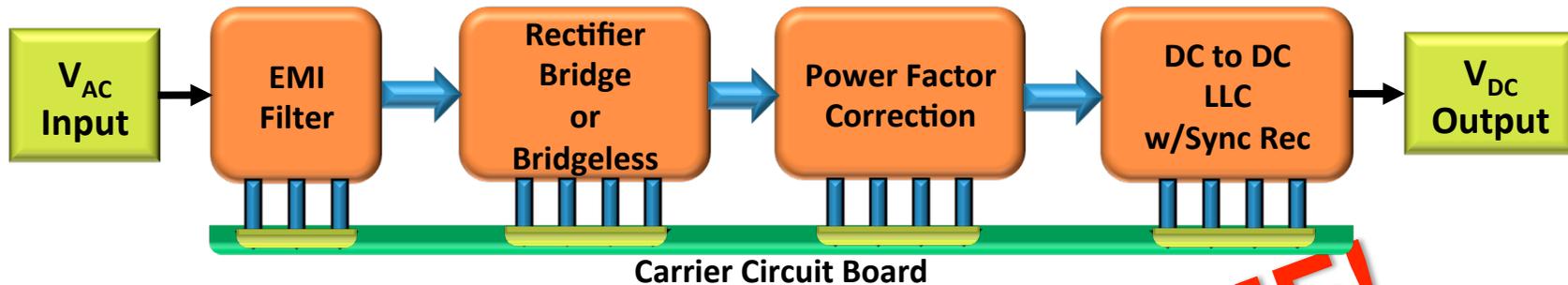
Deal with the challenges: **DONE!**

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- 🔌 Inductors
- 🔌 Transformer
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COMPLETED ON TIME!



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TELCODIUM

POWER SUPPLY TECHNOLOGY

AVAILABLE EXCLUSIVELY AT





Let us simplify your life! Part 2

For \$5000 and 2 weeks we can adjust to your custom form factor

Contact us for your specific requirements

TELCODIUM
POWER SUPPLY TECHNOLOGY

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Highest Performance, Highest Reliability GaN

Thank You!



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