

Apex 3k5PIN Conversion

Conversion to Apex 3k5PIN provides 32 different operating pin positions



The Advanced Energy (AE) Apex® 3k2PIN is a 3 kW 13.56 MHz RF generator with a pin diode matching network capable of operating in a few different impedance zones. This versatile generator is known for its power delivery consistency, high power density, and exceptional reliability. However, with only two pin diodes, the impedance matching network is limited to four pin positions.

In order to expand the available tuning range of the Apex and provide improved process control for a wide variety of applications, a conversion kit was developed to add additional pin diodes to the existing Apex 3k2PIN. By converting to a 3k5PIN, the same Apex unit is now capable of operating in 32 different pin positions, covering a much larger impedance range than before.

BENEFITS

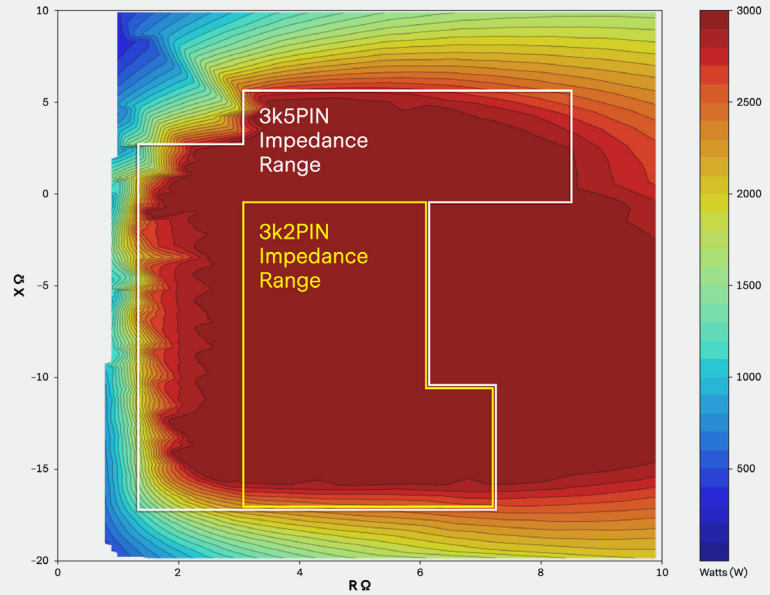
- Cost effective approach to enhancing performance compared to new generator/match combination
- Increased impedance matching range for improved tuning of custom processes
- Converted unit is transparent from an operational standpoint
- Flexible conversion kits, each with four pre-programmed pin positions, allow custom impedance range selection while maintaining compatibility with existing tool software
- Optional graphical user interface provides on-site selection of pin positions to optimize the impedance range to each customer process position

Comparison Apex 3k5PIN to Apex 3k2PIN

Feature	Apex 3k5PIN	Apex 3k2PIN
Output Power	3000 W	3000 W
Frequency	13.56 MHz $\pm 0.005\%$	13.56 MHz $\pm 0.005\%$
Analog Interface	25-pin D-sub, female	25-pin D-sub, female
RF Output Connector	Direct Chamber Mount	Direct Chamber Mount
Input Power	187 to 229 VAC, 3 ph, 47 to 63 Hz	187 to 229 VAC, 3 ph, 47 to 63 Hz
Height	5.25" (133.4 mm)	5.25" (133.4 mm)
Width	8.5" (215.9 mm)	8.5" (215.9 mm)
Depth	15" (381 mm)	15" (381 mm)
Weight	45 lbs (20.4 kg)	45 lbs (20.4 kg)
Efficiency	60% at full power, 5-j0 impedance	60% at full power, 5-j0 impedance
Impedance Range (AE Spec)	Apex 3k5PIN Impedance Matching Point	Apex 3k2PIN Impedance Matching Point
0	5.9+j1.0 Ω	5.0-j2.0 Ω
1	6.5-j4.9 Ω	6.5-j12.5 Ω
2	6.1-j2.5 Ω	5.8-j7.0 Ω
3	6.9-j6.0 Ω	6.5-j14.5 Ω
4	3.5-j0.5 Ω	Only 4 impedance matching points available with the APEX 3k2PIN
5	4.0-j7.5 Ω	
6	3.9-j5.0 Ω	
7	4.1-j9.0 Ω	
8	3.9-j0.0 Ω	
9	4.5-j6.0 Ω	
10	4.5-j4.9 Ω	
11	5.0-j8.0 Ω	
12	2.5-j1.5 Ω	
13	2.8-j8.0 Ω	
14	2.5-j6.0 Ω	
15	3.0-j10.0 Ω	
16	6.5-j6.0 Ω	
17	7.0-j9.0 Ω	
18	6.5-j7.5 Ω	
19	7.0-j9.9 Ω	
20	4.5-j9.0 Ω	
21	4.5-j11.0 Ω	
22	4.5-j10.0 Ω	
23	4.5-j12.5 Ω	
24	5.0-j8.0 Ω	
25	5.5-j10.5 Ω	
26	5.5-j9.9 Ω	
27	5.5-j11.0 Ω	
28	3.0-j10.0 Ω	
29	3.5-j12.5 Ω	
30	3.5-j11.0 Ω	
31	3.9-j13.0 Ω	

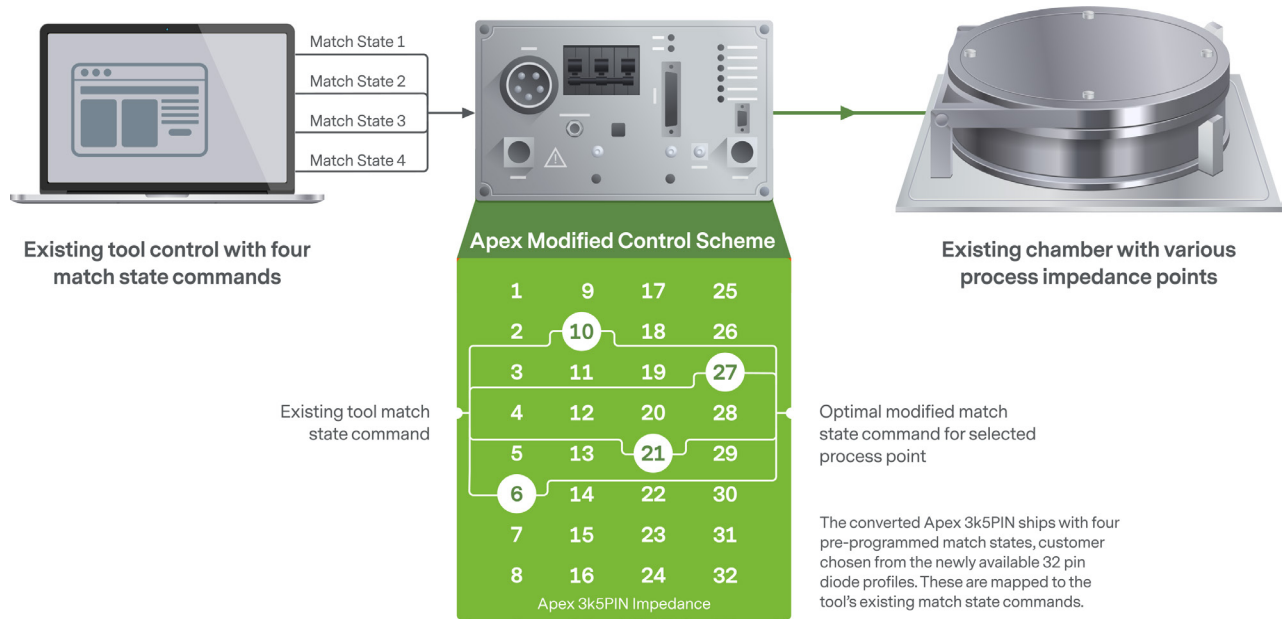
Apex 3k2PIN vs. 3k5PIN approximate impedance range over all pin positions

The power profile shown here illustrates the expanded impedance range available with the 3k5PIN. The converted unit can deliver full power (3000 W) at more impedance points across the spectrum.



Seamless Transition

The converted unit is designed to drop back into the existing configuration and work seamlessly within the tool's control scheme.



Conversion Summary

All modifications to the unit are located within the impedance matching network, with no changes to the RF drive circuitry. Besides the ability to custom tune to more loads, the converted unit operates exactly as it did previously. This conversion covers all legacy Apex 3k2PIN part numbers to the right.

Conversion Part Numbers		
3156114-001	→	3156114-621
3156114-003	→	3156114-623
3156114-005	→	3156114-625
3156114-006	→	3156114-626



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Advanced Energy (AE) has devoted more than three decades to perfecting power for its global customers. AE designs and manufactures highly engineered, precision power conversion, measurement and control solutions for mission-critical applications and processes.

AE's power solutions enable customer innovation in complex semiconductor and industrial thin film plasma manufacturing processes, demanding high and low voltage applications, and temperature-critical thermal processes.

With deep applications know-how and responsive service and support across the globe, AE builds collaborative partnerships to meet rapid technological developments, propel growth for its customers and power the future of technology.

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