सीमाशुल्कअग्रिमविनिर्णयप्राधिकरण
Customs Authority for Advance Rulings
नवीनसीमाशुल्कभवन, बेलार्डइस्टेट, मुंबई - ४००००१
New Custom House, Ballard Estate, Mumbai - 400 001
E-MAIL: cus-advrulings.mum@gov.in

F.No. CAAR/CUS/APPL/159/2025-O/o Commr-CAAR-Mumbai **दिनांक**/Date: 12.12.2025

Ruling No. & date	CAAR/Mum/ARC/120/2025-26 dated 12.12.2025
Issued by	Shri Prabhat K. Rameshwaram, Customs Authority for Advance Rulings, Mumbai
Name and address of the applicant	M/s Sanmina SCI India Pvt Ltd. 1, Sipcot Industrial Growth Centre, Mathur Village, Oragadam, Chennai 602105, Tamil Nadu, India. {Email: babudineshkumar.dhanasegaran@sanmina.com }
Concerned Commissionerate	The Commissioner of Customs, Customs Commisionerate – VII (Air Cargo), New Customs House, GST Road, Meenambakkam, Chennai- 600016

ध्यान दीजिए/ N.B.:

1. सीमाशुल्क अधिनियम, 1962 की धारा 28I की उप-धारा (2) के तहत किए गए इस आदेश की एक प्रति संबंधित को निःशुल्क प्रदान की जाती है।
   A copy of this order made under sub-section (2) of Section 28-I of the Customs Act, 1962 is granted to the concerned free of charge.

2. इस अग्रिम विनिर्णय आदेश के खिलाफ कोई भी अपील ऐसे निर्णय या आदेश के संचार की तारीख से 60 दिनों के भीतर संबंधित क्षेत्राधिकार के उच्च न्यायालय के समक्ष की जाएगी।
   Any appeal against this Advance Ruling order shall lie before the **High Court of concerned jurisdiction**, within 60 days from the date of the communication of such ruling or order.

3. धारा 28-I के तहत प्राधिकरण द्वारा सुनाया गया अग्रिम विनिर्णय तीन साल तक या कानून या तथ्यों में बदलाव होने तक, जिसके आधार पर अग्रिम विनिर्णय सुनाया गया है, वैध रहेगा, जो भी पहले हो।
   The advance ruling pronounced by the Authority under Section 28 - I shall remain valid for three years or till there is a change in law or facts on the basis of which the advance ruling has been pronounced, whichever is earlier.

4. जहां प्राधिकरण को पता चलता है कि आवेदक द्वारा अग्रिम विनिर्णय धोखाधड़ी या तथ्यों की गलत बयानी द्वारा प्राप्त किया गया था, उसे शुरू से ही अमान्य घोषित कर दिया जाएगा।
   Where the Authority finds that the advance ruling was obtained by the applicant by fraud or misrepresentation of facts, the same shall be declared void *ab initio*.

अग्रिम विनिर्णय / Advance Ruling

Sanmina SCI India Private (having IEC No. 0403030714) and hereinafter referred to as 'the applicant', in short) filed application (CAAR-1) for advance ruling before the Customs Authority for Advance Rulings, Mumbai (CAAR in short). The said application was received in the secretariat of the CAAR, Mumbai on 11.09.2025 along with enclosures in terms of Section 28H (1) of the Customs Act, 1962 (hereinafter referred to as the 'Act' also). The applicant is seeking advance ruling on the classification of DPS-500AB-40 A - AC-DC Power Module, PKU4913D Series DC-DC Converters, EBDW025A0B Barracuda Series; DC-DC Converter Power Modules, ARTESYN - ADH700-48S28 700 Watt Half-Brick DC-DC Converter, Q48SK12050 600 W Quarter Brick DC/DC Power Modules and 6A Digital PicoDLynxTM: Non-Isolated DC-DC Power Modules for manufacture Wi-Fi receiver, Wi-Fi transmitter and other telecommunication devices and Applicability of serial no. 4 of Notification No.25/2005-Customs dated March 1, 2005 (as amended) for static converters for automatic data processing machines and units thereof, and telecommunication apparatus other than static converters for cellular mobile phones.

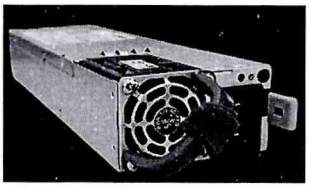
2.1 The Applicant operates from both Special Economic Zone ("SEZ") as well as Domestic Tariff Area ("DTA") units. The Imported products "AC-DC power modules and DC-DC convertors & Power Modules" are used in the manufacture of telecommunication equipment in DTA Unit.

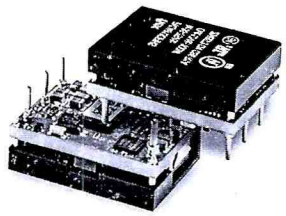
2.2 The Applicant specializes in complex high-technology products in market segments including Communications Networks, Automotive, Industrial & Semiconductor, Medical, Defence & Aerospace, Multimedia, Clean Tech and Computing & Storage. The Applicant offers complex PCBA, system integration, Build-to-Order (BTO), Configure-to-Order (CTO) and test services for a variety of products: from state-of-the-art telecommunications equipment to life saving medical equipment modules to blood glucose meters and Automotive products and also provides customers with engineering expertise for product design, technology and test system development.

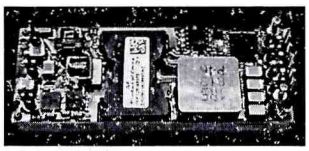
2.3 The Applicant has received an order from its customers for the manufacture of Wi-Fi receiver, Wi-Fi transmitter and other telecommunication equipment. The Applicant is importing DPS-500AB-40 A - AC-DC Power Module, PKU4913D Series DC-DC Converters, EBDW025A0B Barracuda Series; DC-DC Converter Power Modules, ARTESYN - ADH700-48S28 700 Watt Half-Brick DC-DC Converter, Q48SK12050 600 W Quarter Brick DC/DC Power Modules, 6A Digital PicoDLynxTM: Non-Isolated DC-DC Power Module for use in manufacturing of Wi-Fi receiver, Wi-Fi transmitter and other telecommunication equipment.

2.4 The Applicant has provided below the details of imported product and final product hereunder:-

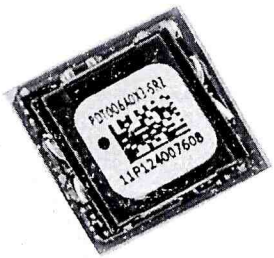
Sample Part Numbers	Imported Item	Description of Imported item

LFIASTPWR-00325-04_A0-1	DPS-500AB-40 A - AC-DC Power Module 	**DPS-500AB-40 A - AC-DC Power Module** AC-DC power modules are devices that convert alternating current (AC) into direct current (DC). AC-DC power modules enable AC power conversion to DC power, allowing telecommunication devices to operate efficiently and effectively. The imported product is an AC-DC power module that convert a source of alternating current (AC) to Direct Current (DC). These modules are integral in a variety of telecommunication applications, where consistent and reliable DC power delivery is critical for the operation of various components and systems on the printed circuit board assembly (PCBA). They typically involve a transformer to step down the voltage, a rectifier to convert AC to pulsating DC, and a filter to smooth out the pulsations, resulting in a stable DC output. The incoming AC voltage, often high and potentially dangerous, is reduced to a safer, more usable level. The module contains an inherent transformer. The transformer's primary coil connects to the AC source, and the secondary coil outputs the transformed AC voltage. A rectifier circuit, often a diode bridge, converts the AC voltage into pulsating DC. This means the voltage is no longer alternating direction, but it still fluctuates. A filter circuit, typically using capacitors and inductors, smooths out the pulsating DC, reducing the fluctuations and creating a more stable DC voltage. A inherent voltage regulator further stabilizes the output voltage, ensuring it remains consistent even

		with variations in the input voltage or the amount of power drawn by the load The imported product is used as such in India, without any further processing.
LFITJS999-CKC000382	PKU4913D Series DC-DC Converters 	**PKU4913D Series DC-DC Converters** The imported product is a DC-DC converter that convert a source of direct current (DC) from one voltage level to another. These modules are integral in a variety of telecommunication applications, where consistent and reliable power delivery is critical for the operation of various components and systems on the printed circuit board assembly (PCBA). Telecommunication systems may require a range of voltage levels for different components. DC-DC power modules provide the flexibility to convert available power supplies (often at inconsistent voltage levels) to the specific voltages needed by the equipment, supporting diverse and complex system architectures. These modules feature voltage regulation, ensuring that output voltage remains stable despite variations in input voltage or load conditions. This stability is essential for the reliable operation of telecommunication devices, which are sensitive to voltage fluctuations. The DC-DC converter is designed to be integrated alongside other components on a printed circuit board assembly (PCBA). DC-to-DC converters are used to lower or raise the input voltage. DC-DC converters are widely used in electronics because different sub-circuits usually require different voltages on the PCBA. In theory, we can provide each of them with an individual power supply, but converting the voltage from a

		single source is a simpler and more affordable solution. Usage of DC-DC converters may increase the electromagnetic interference in the circuit, requiring the integration of capacitors to reduce radio-frequency noise. The converter incorporates elements such as inductance coils, high potential electrical insulators, direct current resistors and wounded capacitors. The functional insulation between the input and output circuits is crucial for proper functioning of the PCBA. In DC-to-DC converters, energy is periodically stored within and released from a magnetic field in an inductor or a transformer, typically within a frequency range. The items imported is used as such in India without any further processing or activity.
LFIAL-C1AF27148-ACAA-1	EBDW025A0B Barracuda Series; DC-DC Converter Power Modules 	**EBDW025A0B Barracuda Series; DC-DC Converter Power Modules** The EBDW025A0B Barracuda series of DC-DC converters are a new generation of DC/ DC power modules designed to support 9.6-12Vdc applications where multiple low voltages are subsequently generated using point of load (POL) converters, as well as other application requiring a tightly regulated output voltage. The converter incorporates digital control, synchronous rectification technology, a fully regulated control topology to achieve efficiency exceeding 95.4% peak at 12Vdc output. This leads to lower power dissipations such that for many applications a heat sink is not required. Standard features include output voltage trim, output overcurrent and over voltage protection, over

		temperature protection, input under and over voltage lockout. The output is fully isolated from the input, allowing versatile polarity configurations and grounding connections. Built-in filtering for both input and output minimizes the need for external filtering.
LFIRIL043-0000039-	ARTESYN - ADH700-48S28 700 Watt Half-Brick DC-DC  Converter	**ARTESYN - ADH700-48S28 700 Watt Half-Brick DC-DC Converter** A half-brick isolated DC-DC converter is a type of power supply module that converts DC voltage to another DC voltage while providing electrical isolation between the input and output circuits. An isolated DC-DC converter is a type of power supply that converts one DC voltage to another while providing galvanic isolation between the input and output circuits. This means there is no direct electrical connection between the input and output sides, typically achieved using a transformer. This isolation is crucial for safety, noise reduction, and sensitive telecommunication applications. Artesyn ADH700 series half-brick isolated DC-DC converter provides a single regulated low noise output. It has a telecom input range of 36 to 65Vdc and is designed primarily for use with standard 48 V telecommunications equipment supplies. The converter's main application area is in low power and remote radio head (RRH) telecommunications applications.

LFIRIL039-0000110-	Q48SK12050 600 W Quarter Brick DC/DC Power Modules 	**Q48SK12050 600 W Quarter Brick DC/DC Power Modules** Quarter-brick DC-DC power modules are a type of modular power supply, characterized by their standardized physical size (a quarter of a full-brick module) and their ability to convert DC voltage from one level to another. Quarter-brick DC-DC converters work in the nature of switching regulators. They utilize a power switch, inductor, diode, and capacitor to convert the input DC voltage to a desired output voltage. The switching action, controlled by the power switch, creates a pulsed voltage that is then smoothed by the capacitor. The ratio of the switching on and off time (duty cycle) determines the output voltage level. These modules are designed for high-frequency operation, enabling them to achieve high power density and efficiency.
LFIRIL039-0000110-1-	6A Digital PicoDLynxTM: Non-Isolated DC-DC Power Modules 	**6A Digital PicoDLynxTM: Non-Isolated DC-DC Power Modules** Non-isolated DC-DC power modules, unlike their isolated counterparts, do not use a transformer to separate the input and output stages electrically. This leads to smaller, more efficient, and cost-effective designs, making them suitable for applications where isolation is not a strict requirement. The absence of a transformer simplifies the design, reduces size and weight, and improves efficiency by eliminating transformer losses. Fewer components and the lack of a transformer contribute to higher overall efficiency. Simpler design and fewer components translate to ease of integration in space constrained applications in PCBAs for telecommunication apparatus. The 6A Digital PicoDLynxTM power modules are non-isolated DC-DC converters that deliver up to 6A of output current. These modules operate over a wide range of input voltage (VIN = 3Vdc-14.4Vdc)

		and provide a precisely regulated output voltage from 0.45Vdc to 5.5Vdc, programmable via an external resistor and further adjustable through PMBus. Features include a digital interface using the PMBus protocol, remote On/Off, adjustable output voltage, over current and over temperature protection. The PMBus interface supports a range of commands to control and monitor the module.

2.5 TECHNICAL SPECIFICATIONS OF THE PRODUCTS WHICH ARE SUBJECT MATTER OF ADVANCE RULING

2.5.1 DPS-500AB-40 A - AC-DC Power Module

Electrical Specifications

- **Input Voltage Range:**
    - Specification: 90 – 264 Vac
    - This wide input voltage range indicates that the power module can accept a variety of AC power supplies. This is critical for deployment in different geographical areas, allowing the module to function with both the US (typically 120V) and European (typically 230V) electrical systems without modification.
- **Input Frequency:**
    - Specification: 47 - 63 Hz (Nominal 50/60 Hz)
    - The module can operate on both 50 Hz and 60 Hz AC power supplies, which is standard in many global markets. This ensures compatibility with equipment used in telecommunications worldwide.
- **Inrush Current:**
    - Specification: 30 Apk maximum
    - Upon start up, the module may draw a peak current of 30 Amps momentarily. This inrush current occurs when the capacitors in the power supply charge up. The specification indicates a design that can withstand this initial surge without damage or malfunction.
- **Efficiency:**
    - Specifications:
        - 92% at 100% load, 94% at 50% load, 92% at 20% load, 88% at 10% load

- Efficiency ratings illustrate how much of the input energy is converted into usable output power versus how much is lost as heat. For example, at 100% load, 92% of the input energy is effectively delivering power, while 8% is dissipated as heat. Higher efficiency reduces operational costs and HVAC requirements for cooling systems in telecommunication equipment and facilities.

- **Electromagnetic Interference (EMI):**
  - Conducted EMI: EN55032 Class A compliant
  - Radiated EMI: EN55032 Class A compliant
  - This regulatory compliance indicates that the power module minimizes electromagnetic noise, preventing it from interfering with nearby electronic equipment. This is essential in telecommunications, where signal integrity is paramount.

- **Power Factor:**
  - Specification: >0.90 at 10% load; >0.95 at 20% load; >0.98 at 50% load; >0.99 at 100% load
  - A power factor above 1 indicates efficient use of electrical power where most of the energy supplied is being effectively converted.

- **Leakage Current:**
  - Specification: <0.875 mA at 264 Vac
  - This indicates the small amount of current that may flow through the insulation of the power module under normal conditions. Lower leakage current signifies better insulation effectiveness, enhancing safety for the end user.

- **Hold-Up Time:**
  - Specification: >20 ms
  - Hold-up time refers to how long the power supply can maintain its output voltage after losing input power. More than 20 milliseconds of hold-up time allow connected devices to have enough time to safely shut down or switch to an alternative power source, critical for maintaining operations in telecommunication equipment during brief outages.

- **Maximum Input Current:**
  - Specification: 7.1 Arms at 100 Vac
  - This value indicates the maximum current that can be safely drawn from the AC supply at a nominal voltage of 100 V. Proper design ensures the module can operate safely within these parameters during peak load scenarios.

Output Specifications

- **Main DC Voltage:**
  - Specification: +12 V / 42 A
  - The primary voltage output is fixed at +12 V, and the module can deliver a maximum current of 42 A. This makes it suitable for powering multiple high-demand components simultaneously in telecommunications systems.
- **Maximum Output Power:**
  - Specification: 504 Watts
  - The unit can supply substantial power to support a range of devices, from network switches to Wi-Fi transmitters, ensuring that critical operations are powered reliably.
- **Stand-By Output:**
  - Specification: +12 V / 1 A
  - The stand-by output allows the module to provide low-level power during idle times or for low-power devices, ensuring that functions like remote management or signaling can remain operational without fully powering all systems.
- **Voltage Regulation:**
  - Specification: +11.4 ~ 12.0 Vdc
  - The regulation range defines the voltage tolerances that ensure connected telecommunications equipment operates within safe and efficient voltage limits. This prevents over-voltage damage and enhances the longevity of equipment.

3. Protection Features

- **Overcurrent Protection (OCP):**
  - Specification: Shutdown with 30 ~200 ms delay time (hiccup mode), trip points of 110% - 130% load
  - The hiccup mode of OCP helps protect against prolonged overcurrent conditions by temporarily shutting down the output, which helps to prevent overheating and potential damage. The delay allows for brief current spikes without triggering shutdown to ensure robust operation.
- **Overvoltage Protection (OVP):**
  - Specification: +12Vdc; 13 – 14.5Vdc
  - OVP ensures that the output does not exceed safe voltage levels, protecting sensitive telecommunications devices from damage caused by voltage spikes.

In summary, the DPS-500AB-40 A AC-DC Power Module showcases a robust set of technical specifications designed for high efficiency, reliability, and compatibility with various telecommunications applications. Its features ensure that it can deliver stable power in diverse operating conditions, protecting sensitive equipment and contributing effectively to telecommunications infrastructure.

2.5.2 PKU4913D Series DC-DC Converters

- **Input Voltage Range: 36 - 75 VDC**
    - This range is suitable for many telecommunications and industrial applications.
- **Turn-off Input Voltage:**
    - Decreasing Input Voltage: 31, 32, 34 V
    - When the input voltage drops below this level, the converter will turn off to protect it from potential damage.
- **Turn-on Input Voltage:**
    - Increasing Input Voltage: 34, 35, 36 V
    - The converter resumes operation once the input voltage is within this range.
- **Internal Input Capacitance: 3 µF (at VI = 53 V)**
    - This capacitance is necessary for operational stability and power integrity.

Output Specifications

- Output Power: 0 to 100 W
    - Maximum output capability of the converter.
- Output Voltage Initial Setting and Accuracy:
    - Initial Setting: 11.76 V to 12.24 V at +25°C, VI = 53 V, IO = 10 A
    - Provides a precise output voltage as per the design.
- Output Adjust Range: 9.6 V to 13.2 V
    - Allows for flexibility in output voltage to suit specific application requirements.
- Output Voltage Tolerance Band: 11.64 V to 12.36 V
    - The output voltage is maintained within this band across varying loads and conditions.
- Idling Voltage: 11.76 V to 12.24 V at IO = 0 A
    - Voltage present when no load is applied.

- Output Current: 0 to 8.3 A
    - Maximum load the converter can drive.
- Current Limit Threshold (Ilim): 9.2 A to 13 A
    - This is the maximum current that the device will allow (hiccup mode protection).
- Short Circuit Current: 8.2 A (at TP1 = 25°C)
    - Represents the maximum current that can be delivered during a short circuit condition.
- Recommended Capacitive Load: 100 µF to 5000 µF
    - External capacitors are recommended to enhance performance under dynamic load conditions beyond the stated load
- Output Ripple & Noise: 80 mVp-p to 120 mVp-p
    - Ensures low noise operation, critical in sensitive applications.
- Over Voltage Protection (OVP): 15 V
    - Protects the converter from output voltage exceeding this level under fault conditions.

Efficiency Specification

- Efficiency:
    - 50% of Maximum IO: 93.7%
    - Max IO (full load): 94.6%
    - This indicates that the converter has a high efficiency, especially at maximum load and certain input voltage conditions, reducing wasted power as heat.

Thermal Specifications

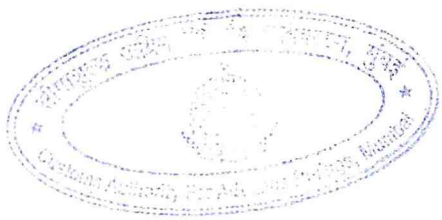
- Operating Temperature Range: -40 to +125 °C
    - Designed to operate in a wide temperature range to suit various environments.

Switching Frequency

- Switching Frequency: 462 kHz to 538 kHz
    - Frequency at which the converter switches and, thus, affects performance and heat dissipation characteristics.

2.5.3 EBDW025A0B Barracuda Series; DC-DC Converter Power Modules

High Efficiency



- The EBDW025A0B power module boasts an efficiency rate that exceeds 94.7% at maximum output power and can reach up to 95.2% during typical operational ranges (40% to 80% of rated output). High efficiency is crucial because it means more of the input power is converted into usable output power, reducing heat generation and the need for additional cooling solutions, consequently leading to lower operating costs and increased reliability.

Wide Input Voltage Range

- The input voltage range for this module is from 36V to 75V. This broad range allows the module to be utilized in various telecommunication applications, including systems with different voltage buses or those that may encounter voltage variations. The flexibility in input voltages makes it ideal for use in distributed power architectures and various PCBA systems.

Output Voltage Adjustability

- The output voltage can be adjusted from 5.0V to 13.2V via the PMBus interface. This feature gives users greater control over the output voltage levels according to specific application needs. Adjustability ensures compatibility with diverse loads and allows for optimization of performance in different scenarios.

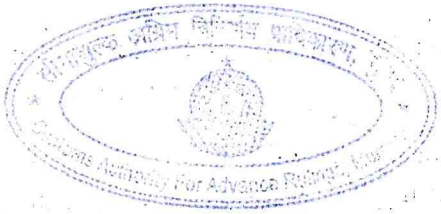
Digital Control via PMBus Interface

- The module includes a PMBus interface that enables digital communication and control. Through this interface, users can monitor parameters, adjust configuration settings such as voltage and current thresholds, and enable or disable specific functions. PMBus is a widely used standard that enhances the module's interoperability with other devices and systems in a power management setup.

Protection Features

- The EBDW025A0B comes equipped with several built-in protection features:
    - Output Overcurrent Protection: This feature safeguards the module from excessive output current that could cause damage. When the output current surpasses a specified limit, the module enters a shutdown mode.
    - Output Overvoltage Protection: If the output voltage exceeds a defined threshold, the module shuts down to prevent damage to downstream components.
    - Overtemperature Protection: An internal thermal protection circuit shuts down the module when it exceeds its safe operating temperature. This protection is critical in maintaining reliability and longevity.
    - Input Undervoltage and Overvoltage Lockout: These features prevent the module from operating outside safe input voltage levels, protecting both the module and connected loads.

Remote On/Off Control



- The module supports remote on/off control through two configurable logic options (positive and negative logic) via its ON/OFF control pin. This feature allows for system designers to control the power module remotely, allowing for flexibility in power management and seamless integration into telecommunication systems. It is especially useful in applications where power needs to be cycled on and off without manual intervention.

EMC Considerations

- The module's design includes considerations for electromagnetic compatibility (EMC), complying with standards such as EN55032 Class B for conducted emissions. This ensures that the module will not interfere with other electronic devices and operates within regulated noise limits, making it suitable for sensitive telecommunication applications.

Load Sharing Capability

- When multiple modules operate in parallel, the load sharing feature ensures that the output currents across the devices are balanced, preventing uneven load distribution. This is critical for redundant systems that require reliability and for applications demanding high power yet leveraging multiple modules for scalability.

2.5.4 ARTESYN - ADH700-48S28 700 Watt Half-Brick DC-DC Converter

Total Power (700 Watts): This indicates the maximum power the converter can deliver. In this case, it can provide 28 volts at a maximum current of 25 amps, resulting in 700 watts of output power. It's crucial for applications requiring reliable power distribution.

Input Voltage (36 to 65 VDC): This is the range of voltage that the converter can accept from the input source. It is suitable for telecom applications that typically use a standard 48 V power supply, providing flexibility across various power sources.

Output Voltage (28 V DC): This is the regulated voltage that the converter delivers to the load. A consistent output voltage is vital for stability in powered devices, particularly in telecommunications where precise voltage levels are crucial.

Output Current (Maximum of 25 A): This indicates the highest current the converter can supply to its output while maintaining stability and performance. Coupled with the output voltage, it defines the total maximum output power.

Efficiency (95% at 100% load): This is the ratio of the output power to the input power, expressed as a percentage. An efficiency of 95% means that 95 watts of power are delivered to the output for every 100 watts consumed from the input, with minimal energy wasted as heat. High efficiency is essential to reduce operational costs and heat generation.

Cooling (Contact cooling or heatsink mounting): This specifies the available methods for heat management. Contact cooling refers to effective heat dissipation techniques that ensure the converter operates within the allowable temperature range. Heatsinks can also be mounted to further enhance thermal performance.

Operating Temperature (-40°C to +85°C): This range defines the environmental temperatures within which the converter can operate reliably. It indicates robustness, making

the unit suitable for harsh and extreme conditions commonly found in industrial and outdoor telecommunications applications.

Storage Temperature (-55°C to +125°C): This indicates the temperature range in which the converter can be safely stored without damage. It tells users the storage capabilities of the converter during shipping or when not in service.

Input UVLO (Under Voltage Lockout):

- **Turn-on (34 VDC typical)**: This is the voltage level at which the converter will start operating.
- **Turn-off (32 VDC typical)**: Below this voltage, the converter will shut down to prevent harm and maintain reliability.

Input Surge (100 V for 100 mSec): This specifies the maximum voltage spike (surge) the converter can withstand for a short period without failing. It ensures protection against transient voltage spikes that may occur in power lines.

I/O Isolation (1500 VDC): This indicates the voltage difference that the converter can withstand between its input and output without any electrical breakdown, providing safety and protection for connected circuits.

Noise & Ripple (130 mV pk-pk typical): This specifies the amount of undesired voltage fluctuation (noise) present on the output DC signal. A low noise and ripple rating is important for ensuring that sensitive electronic devices operate without interference.

Remote Control Function (TTL compatible enable): This feature allows for remote power management by sending control signals (TTL logic levels) to turn the converter on or off. This is useful for system integration and power management in telecommunications systems.

Protection Features:

- **Over temperature Protection**: A feature that automatically shuts down the converter if it overheats, ensuring safety and longevity.
- **Over voltage Protection (35 to 42 VDC window, hiccup mode)**: This protects the output from excessive voltage that could potentially damage connected devices. "Hiccup" mode involves shutting down briefly before attempting to restart.
- **Over current Protection (26.5 to 35 A window, hiccup mode)**: This prevents damage under short-circuit conditions by limiting the current to a safe level, using a similar "hiccup" approach for recovery.

Switching Frequency (Fixed at 280 KHz): This is the frequency at which the converter's internal switch operates. A fixed frequency simplifies the design and allows for predictable operation, which can aid in the overall system design.

2.5.5 Q48SK12050 600 W Quarter Brick DC/DC Power Modules

Voltage and Current Characteristics

- **Input Voltage Range (36V to 75V):** This means the module can take a power supply with a voltage between 36 volts and 75 volts. This flexibility allows it to work in different environments where voltage levels might vary.
- **Output Voltage (12V):** The module outputs a steady voltage of 12 volts, which is a common voltage used by many electronic devices.
- **Output Current up to 50A:** It can deliver up to 50 amperes of current. The amount of current is crucial because it determines how much power the device can supply to the equipment.

Efficiency

- **Efficiency Up to 96.3%:** This high efficiency means that almost all the electricity it uses is converted into usable power, with very little wasted as heat. Better efficiency translates to lower energy costs and less heat generation.

Safety Features

- **Under-Voltage Protection:** This feature prevents the module from operating if the input voltage drops too low, which can damage electronics.
- **Over-Voltage Protection:** If the output voltage exceeds safe levels (more than 14V), the module will shut down or limit power to prevent damage.
- **Over-Current Protection (Short Circuit Protection):** If too much current is drawn (above 50A), the module will limit current to avoid overheating or damage.

Temperature Range

- **Operating Temperature (-40°C to 85°C):** The module can function in very low to very high temperatures, making it suitable for many environments, including harsh conditions.

Size and Form Factor

- **Dimensions (58.4mm x 36.8mm x 12.7mm):** This size is classified as a "Quarter Brick," which is relatively compact, allowing it to fit into various equipment designs without taking too much space.
- **Weight (78 grams):** Lightweight helps in applications where weight is a consideration, especially with printed circuit board assemblies.

Isolation and Noise

- **Input to Output Isolation (2250 Vdc):** This means that the input power and output power are electrically isolated from each other. It prevents any high voltage from affecting the output that powers sensitive electronics.
- **Low Ripple and Noise:** The module ensures that the output voltage is smooth (with minimal fluctuation), which is important in telecommunications where unstable power can affect signal quality.

2.5.6 6A Digital PicoDLynxTM: Non-Isolated DC-DC Power Modules

- With an input voltage range from 3 Vdc to 14.4 Vdc, these modules can accommodate the diverse power supply scenarios typically encountered in telecom environments. This flexibility allows for integration into numerous telecom infrastructures without the need for extensive adaptations.

- Telecommunications systems often operate continuously, making efficiency crucial. The high efficiency (up to 93.8% at certain output settings) can reduce operational costs and heat generation, enhancing the overall reliability of telecom equipment, which is necessary for systems that rely on constant uptime.

- The compact size (12.2 mm x 12.2 mm x 7.25 mm) allows for easy integration into space-constrained environments typical of telecom equipment. This miniaturization can be critical as telecom systems often require a high density of components within limited physical space.

- The inclusion of a digital interface using PMBus provides the capability for control and monitoring, which is beneficial for telecom devices that often require remote management. This can help in monitoring system performance, fault detection, and making real-time adjustments, enhancing overall system integrity.

- The capability for remote On/Off operation allows telecom systems to better manage power consumption, especially in scenarios where equipment needs to cycle through power states based on network demand. This feature is crucial for energy management in telecom network applications.

- The module's built-in overcurrent protection ensures that damage does not occur to the power system or connected telecommunications equipment in the event of an overload, preserving system integrity and reliability, which are critical in telecom infrastructure

2.6 ***Significance of*** AC-DC power modules ***/ DC-DC Converters and power modules in telecommunication equipment***

The applicant further wishes to elaborate upon the reason for utilizing the above products for the manufacture of telecommunication equipment such as Wi-Fi receivers, Wi-Fi transmitters, up-link cards and data-centre switches:-

- **Voltage Regulation**: Telecommunication equipment operate on specific voltage levels. The AC-DC power modules /DC-DC converters and power modules maintain a stable output voltage even under varying load conditions. Without proper voltage regulation, sensitive components on the PCBAs of Wi-Fi receivers and transmitters could experience voltage fluctuations, leading to erratic behaviour, failures in signal transmission, and increased error rates in data communication.

- **High Efficiency**: Many of the AC-DC power modules /DC-DC converters and power modules (which are a subject matter of the advance ruling) have efficiencies exceeding 90% (e.g., up to

95.4% in some models). High efficiency reduces power loss as heat, which is vital in densely packed electronic and telecommunication systems like data centre switches to maintain optimal thermal conditions. The absence of high-efficiency converters would result in significant power losses as heat, necessitating more extensive cooling solutions. This can lead to higher operational costs and complications in thermal management, potentially causing overheating and failure of equipment.

- **Isolation**: The converters and power modules are designed with isolation features (e.g., 2250 Vdc isolation) between input and output. This is important for protecting sensitive circuits and components on the PCBA from over voltages that may arise during faults or surges, a common occurrence in telecom systems. Without isolation, sensitive circuits in telecommunication devices would be vulnerable to input surges and faults, leading to circuit damage, failure of equipment and potential safety hazards due to electrical shock or fire risk.

- **Compact Form Factor**: Devices like the Quarter Brick and half-brick converters are designed for space-saving, which is significant in applications with strict size constraints on PCBAs, such as inside Wi-Fi receivers, transmitters or embedded systems in data-centre switches. The lack of compact, high-performance DC-DC converters on PCBAs would necessitate providing varied power supplies to each component, making it difficult to fit equipment into space-limited applications, potentially leading to design and operational failures.

- **Overvoltage and Overcurrent Protection**: The built-in protection features (e.g., overvoltage protection, overcurrent protection) ensure reliability and longevity of the telecommunication devices. This feature helps prevent damage to the components that could otherwise lead to costly failures or system downtime. Without built-in protection, power surges or load changes could lead to catastrophic failures of components and the equipment itself.

- **Thermal Management**: Advanced thermal performance characteristics (operating temperatures of -40°C to +85°C) allow for operation in harsh environments typical in outdoor installations (where the wi-fi receivers and transmitters are installed) or within data center racks where ambient conditions may vary substantially. Equipment may struggle to operate reliably in various environmental conditions if they cannot handle the specified temperature ranges. This could lead to unexpected shutdowns or failures, especially in outdoor environments where the telecom equipments are installed for use.

- **Low Ripple and Noise**: The low output ripple and noise levels (e.g., 130 mV peak-to-peak) help maintain signal integrity, which is especially crucial in data transmission applications where high fidelity is required for effective communication. High ripple and noise levels could compromise the integrity of the signals processed by telecommunication equipment, leading to data corruption, loss of communication reliability, and frequent disruptions in service.

- **Compatibility With PMBus**: The support for PMBus communication allows for advanced monitoring and controlling capabilities of power delivery, enabling systems to adapt dynamically to current and voltage changes based on operational needs. Without PMBus

capabilities, it becomes challenging to monitor and control power delivery dynamically. This could affect the adaptability of systems to changes in power requirements, risking performance inefficiency. If the converters are not used, the overall reliability of telecommunication systems would decrease, leading to higher failure rates, increased maintenance needs, and potential service outages.

2.7 *Components of the DC-DC Converter Power Modules*

A DC-DC converter power module comprises several key components that work together to convert and regulate voltage efficiently. The main components include:

1. **Input Capacitors**: These capacitors stabilize the input voltage and filter out noise from the power supply. They help manage transient voltage spikes and maintain a steady input for the converter.
2. **Power Switch (Transistor)**: This component regulates the energy flow through the converter. In switching DC-DC converters, power switches turn on and off at a high frequency to control voltage conversion.
3. **Inductor**: The inductor stores energy when the power switch is on and releases it when the switch is off. It plays a critical role in the energy transfer process, helping to smooth out the output voltage.
4. **Diode**: Diodes are used to allow current to pass in one direction. They play an essential role in controlling the direction of energy flow and ensuring that the stored energy can be delivered to the output.
5. **Output Capacitors**: These capacitors smooth the output voltage, reducing ripple and noise. They serve as a reservoir to deliver current to the load when needed, ensuring stable output performance.
6. **Voltage Feedback Circuit**: This includes resistors, amplifiers, and sometimes dedicated chips that monitor the output voltage. This feedback is essential for maintaining the desired output level by adjusting the duty cycle of the power switch.
7. **Control Circuitry**: This circuitry manages the power conversion process, ensuring that the converter operates within safe limits and regulates its output correctly. It includes the control loop and might incorporate PWM (Pulse Width Modulation) techniques.
8. **Heat Sinks**: In many cases, DC-DC converters generate heat during operation due to losses. Heat sinks are used to dissipate this heat, ensuring that the converter operates within its specified temperature range for reliability.
9. **Protection Components**: These include fuses, thermal cut-offs, and voltage or current protection circuits to safeguard the converter and connected loads from overcurrent, overvoltage, or overheating conditions.

3. Applicant's interpretation of Law/Facts

APPROPRIATE HSN CLASSIFICATION OF AC-DC power modules **/ DC-DC CONVERTORS POWER MODULES**

3.1 In order to import the product, the Applicant needs to arrive at the Harmonized System (HS) Nomenclature as per the Customs Tariff Act, 1975 ("Customs Tariff Act") for AC-DC power modules/ DC-DC convertors. Since the Applicant is required to import the product, First Schedule to Customs Tariff Act, 1975 is applied. India being a contracting party to HS convention, adopted the new (seventh) edition of the Harmonized System (HS) nomenclature, HS-2022 w.e.f. 01st January 2022. Therefore, for the purpose of classification of AC-DC power modules /DC-DC convertors the Applicant has analyzed the relevant chapters of HS code 2022 read with General Rules of Interpretation, Section & Chapter Notes and Explanatory Notes issued by World Customs Organization ("WCO").

3.2 The applicant had imported DC-DC convertors in the past adopting Chapter heading 8504 4090 as "Other DC-DC convertors." The applicant wishes to seek certainty of classification of the said products in this regard. From a careful perusal of the legal provisions of the Customs Tariff Act, 1975, it transpires that imported goods are to be classified taking into consideration the scope of headings / sub-headings, related Section Notes, Chapter Notes and the General Rules for Interpretation of the First Schedule to the Customs Tariff Act, 1975. For legal purposes, classification shall be determined according to the terms of the headings and any relative Section or Chapter Notes.

3.3 From a bare perusal of the customs tariff, it can be observed that tariff heading 8504 covers "Electrical Transformers, Static Convertors and Inductors". "Static Converters" are classifiable under single dash ("- ") item 8504 40. Single Dash entry 8504 40 further provides a triple dash entry ("--- ") as "Other Static Convertors" under tariff item 8504 4090. The DC-DC converters and power modules imported by the applicant is in the nature of a static converter. None of the headings from 8504 4010 to 8504 4040 specifically cover DC-DC convertors and power modules. DC-DC convertors and power modules in the nature of a static convertor may appropriately be classified under tariff item 8504 4090 as "Other Static Convertors."

3.4 *Application of WCO explanatory notes with regard to static converters under heading 8504*

The Applicant would like to highlight the WCO HSN Explanatory Notes to chapter heading 8504 under the category "Electrical Static Converters", reproduced hereunder for ease of reference: - (Copy of the same is enclosed herewith as **"Exhibit-4"**)

*(II) **ELECTRICAL STATIC CONVERTERS***

The apparatus of this group are used to convert electrical energy in order to adapt it for further use. They incorporate converting elements (e.g., valves) of different types. They may also incorporate various auxiliary devices (e.g., transformers, induction coils, resistors, command regulators, etc.). Their operation is based on the principle that the converting elements act alternately as conductors and non-conductors.

The fact that these apparatus often incorporate auxiliary circuits to regulate the voltage of the emerging current does not affect their classification in this group, nor does the fact that they are sometimes referred to as voltage or current regulators.

This group includes:

(A) ***Rectifiers*** *by which alternating current (single or polyphase) is converted to direct current, generally accompanied by a voltage change.*

(B) ***Inverters*** *by which direct current is converted to alternating current.*

(C) Alternating current converters and cycle converters *by which alternating current (single or polyphase) is converted to a different frequency or voltage.*

(D) Direct current converters *by which direct current is converted to a different voltage.*

Electrical static converters may be used for different purposes, e.g.:

(I) Converters to supply electricity to drive stationary machines or electric traction vehicles (e.g., locomotives).

(2) Supply converters, such as accumulator chargers (which consist essentially of rectifiers with associated transformer and current control apparatus), converters for galvanising and electrolysis, emergency power packs, converters for installations which supply high-tension direct current, converters for heating purposes and for the current supply to electro-magnets.

Also classified here are converters known as high-tension generators (used particularly with radio apparatus, emission tubes, microwave tubes, ion-beam tubes) which convert the current from any source, usually the mains, into the direct high-tension current necessary for feeding the equipment concerned by means of rectifiers, transformers, etc.

From a bare perusal of the WCO HSN Explanatory Notes to heading 8504 under the category "Electrical Static Converters" it is evident that DC-DC converters and power modules warrant classification under heading 8504. The applicant submitted that the DC-DC converter power module shall constitute "parts" of telecommunication equipment and apparatus. In the instant case, the DC-DC converter power modules are an integral and essential component of the finished products without which the telecommunication equipment cannot function. In terms of note 2(a) to section XVI *"parts which are goods included in any of the headings of Chapter 84 or 85 are in all cases to be classified in their respective headings."* In the instant case, the DC-DC converter power modules have a specific heading under CTH 8504 and shall accordingly merit classification therein.

3.5 ***Applicability of Sl.No.4 of Notification No. 25/2005-Customs dated March 1, 2005 (as amended)***

Notification No. 25/2005-Customs dated March 01, 2005, provides "Nil" rate of Basic Customs Duty in relation to "***Static converters for*** *automatic data processing machines and units thereof, and* ***telecommunication apparatus****, other than static converters for cellular mobile phones"* classifiable under heading 8504 40. Under Sl.No.4 of the Notification, Static Converters classifiable under tariff heading 8504 40 for telecommunication apparatus are eligible for "nil" rate of customs duty. Not all static converters classified under 8504 40 are eligible for nil rate of customs duty under Sl.No.4 of the notification. Only the static converters classified under 8504 40, where the capable end use is specifically for telecommunication apparatus would warrant inclusion therein.

In the instant case, the AC-DC power modules /DC-DC converter power modules are meant for integration with printed circuit board assemblies for the purpose of manufacture of Wi-Fi receivers, Wi-Fi transmitters up-link cards and data-center switches. Since the DC-DC converter power modules are meant for utilization in PCBAs of telecommunication equipment, it can be said that they are used for the purpose of telecommunication apparatus (wherein they are integrated with other components on the PCBAs and used along with other parts of the telecommunication equipment). Since the AC-DC/DC-DC converter power modules are classifiable under heading 8504 40, is being used by the applicant for the manufacture of telecommunication apparatus, the same shall be eligible for nil rate of duty in terms of SI.No.4 of the notification.

Port of Import and reply from concerned jurisdictional Commissionerate

4. The applicant in their CAAR-1 indicated that they intend to import the subject goods i.e. various Inductors to be used in telecommunication apparatus at the jurisdiction of Office of the Commissioner of Customs, ACC, Chennai. The application was forwarded to the Office of the Commissioner of Customs, ACC, Chennai for their comments vide letter dated 26.09.2025, Reminder-I dated 03.11.2025. However, no comments were received from the jurisdictional authorities.

Details of Hearing

5. Hearing was held on 17.11.2025 at 01.00 PM. Shri Debasis Nayak, Shri Aman Goyal, Shri Venkadathri Rajaraman and Shri D. Babu Dinesh Kumar, all representatives of Sanmina have appeared for the hearing and reiterated the contention submitted with the application that the subject import goods are 06 different models of AC-DC and DC-DC converters to be used in Data-Centre Switches, Wi-Fi transmitter, Wi-Fi receiver and other telecommunication devices. They further contended that these converters merit classification under CTH 8504, more specifically under CTI 85044090 (other static converters). They also contended that these devices are to be used in the telecommunication devices, hence eligible for duty exemption under sr. no. 4 (Static converters for automatic data processing machines and units thereof, and telecommunication apparatus other than static converters for cellular mobile phones) of the notification no. 25/2005-Customs dated 01.03.2005.

They in support of their claim rely upon the following case laws:

i. ***M/s. Socomec Innovative Power Solutions Pvt Ltd vs. Commissioner of Customs, Chennai (2024) 18 Centax 342 (Tri. -Mad)***

ii. ***M/s. Cyber Power System India v. Commissioner of Customs (Port) Kolkata, (2024) 19 Centax 219 (Tri. -Cal)***

iii. ***Prostram info system ltd. Vs. Commissioner of Customs, NS-V, JNCH, (CESTAT, Mumbai)***

They filed a compendium of case laws in their support. They also contended that recently CAAR, Delhi has passed ruling observing the different end use of the converter that is not case in the present application.

5.2 Nobody appeared on behalf of the Department for hearing.

Discussion and findings

6.1 I have considered all the materials placed before me in respect of the subject goods. I have gone through the submissions made by the applicant during the personal hearing and comments received from the concerned Commissionerate. I proceed to pronounce a ruling on the basis of information available on record as well as existing legal framework.

6.2At the outset, I find that the issue raised in the question in the Form CAAR-1 is squarely covered under Section 28H(2) of the Customs Act, 1962, being a matter related to classification of goods under the provisions of this Act.

6.3 Before deciding the issue, let me deliberate on the legal framework prescribed in Customs Tariff Act, 1975, Chapter/ Section notes along with HSN explanatory notes. As per Rule 1 of GRI, the titles of Sections, Chapters and sub-Chapters are provided for ease of reference only; for legal purposes, classification shall be determined according to the terms of the headings and any relative Section or Chapter Notes.

6.4 Rule 1 of the General Rules for Interpretation provides that the classification of goods shall be determined according to the terms of the headings of the tariff and any relative Section notes or Chapter notes and thus, gives precedence to this while classifying a product. Rules 2 to 6 provide the general guidelines for classification of goods under the appropriate sub-heading. In the event the goods cannot be classified solely on the basis of Rule 1, and if the headings and section or chapter notes do not otherwise require, the remaining Rules 2 to 6 may then be applied in sequential order. The applicant submitted that converters i.e. AC-DC power module and DC-DC converters & power modules are classifiable under CTI 8504 4090 as "Other Static Convertors.

6.5 AC-DC power modules are devices that convert alternating current (AC) into direct current (DC). AC-DC power modules enable AC power conversion to DC power, allowing telecommunication devices to operate efficiently and effectively.

The imported product *DPS-500AB-40 A - AC-DC Power Module is* an AC-DC power module that convert a source of alternating current (AC) to Direct Current (DC). These modules are integral in a variety of telecommunication applications, where consistent and reliable DC power delivery is critical for the operation of various components and systems on the printed circuit board assembly (PCBA).

They typically involve a transformer to step down the voltage, a rectifier to convert AC to pulsating DC, and a filter to smooth out the pulsations, resulting in a stable DC output.

The incoming AC voltage, often high and potentially dangerous, is reduced to a safer, more usable level. The module contains an inherent transformer. The transformer's primary coil connects to the AC source, and the secondary coil outputs the transformed AC voltage.

A rectifier circuit, often a diode bridge, converts the AC voltage into pulsating DC. This means the voltage is no longer alternating direction, but it still fluctuates.

A filter circuit, typically using capacitors and inductors, smooths out the pulsating DC, reducing the fluctuations and creating a more stable DC voltage.

A inherent voltage regulator further stabilizes the output voltage, ensuring it remains consistent even with variations in the input voltage or the amount of power drawn by the load.

6.6 DC-DC converter power modules enable the conversion of voltage levels to match the needs of specific devices or systems on the PCBA of telecommunication equipment. They can step up (increase) or step down (decrease) the input voltage to provide the desired output voltage. This transformation is essential because devices often operate at different voltage levels than the source voltage, necessitating conversion for compatibility and optimal performance. From the technical specifications provided in the data sheet, it is evident that the imported product has been designed for conversion of DC current. The functioning of a DC-DC converter /power module involves several operations, typically including:

- **Input Regulation**: Managing input voltage fluctuations to maintain output stability.
- **Voltage Conversion**: Adjusting voltage levels (step-up or step-down) based on system needs.
- **Filtering**: Minimizing ripple and noise to ensure clean power delivery.
- **Protection Mechanisms**: Offering features like overvoltage and overcurrent protection to safeguard connected devices

From the above, it evident that the DC-DC converter power modules convert electrical energy (Direct Current) in order to adapt it for further use. The WCO HSN Explanatory notes specifically cover direct current converters by which direct current is converted to a different voltage. Further the WCO HSN Explanatory notes also cover apparatus by which alternating current is converted to direct current. Hence, it is evident that the imported products satisfy the required stipulations provided in the WCO-HSN Explanatory Notes.

6.7 The DC-DC Converter and power modules incorporates converting and auxiliary elements such as induction coils, transformers, capacitors and resistors. The same can be evidenced from the fact that the technical specifications provided in the data sheet highlights parameters such as Open Circuit Inductance, Leakage Inductance and Turn Ratio typical to Inductors and Transformers, Capacitance Winding typical to capacitors and direct current resistance typical to that of the function of resistors.

Inductors are integrated in electrical converters. Inductors store energy in a magnetic field, which is essential for smoothing out current fluctuations, energy storage, and filtering in converters.

Leakage inductance is the portion of inductance that does not contribute to energy transfer between the windings of a transformer. It's critical in converters, especially in transformer-coupled designs such as that of the isolated DC-DC converter, as it can affect efficiency and voltage.

Capacitance winding is integrated in the DC-DC converter power module to enhance the performance limits of the converter in the circuit, particularly in terms of how it might affect signal transmission and energy storage between the windings, especially when used for telecommunication equipment.

Resistors are used in feedback loops in the DC-DC converter power modules to set and regulate the output voltage. They help the converter maintain stable output voltage by adjusting the duty cycle of the switching components based on the feedback received.

The DC resistance of the converter aids in understanding the impact on the flow of current and the efficiency of the circuit. Lower resistance generally means less power loss and better efficiency. Merely because the DC-DC converter power modules incorporate other auxiliary devices such as transformers, inductors or capacitors, it does not preclude classification under this group. The WCO HSN Explanatory Notes have made it categorically clear that merely because the converters include other auxiliary devices, they do not inhibit classification under this group as "other static converters." Consequently, the imported products satisfy all the stipulations provided in the WCO-HSN Explanatory Notes.

6.8 The core of DC-DC converter power modules is the switching mechanism. The switching element alternates between conducting (on) and non-conducting (off) states. This switching action creates a pulsating DC current, which can then be transformed into a different voltage level. Inductors and capacitors are used as energy storage elements. They play a crucial role in smoothing out the pulsating current, storing energy when the switch is on, and releasing it when the switch is off.

When the switch is in the conducting state (on), the input voltage is applied across the inductor. The inductor stores energy by building up a magnetic field, and a portion of the input energy is transferred directly to the output through the inductor. When the switch is in the non-conducting state (off), the inductor's magnetic field collapses, releasing stored energy. *[This is based on the principle of Faraday's Law of Electromagnetic Induction in physics. Faraday's law of electromagnetic induction describes how a changing magnetic field induces a voltage (electromotive force or EMF) in a circuit. This induced voltage, in turn, can cause an electrical current to flow. Essentially, a changing magnetic field acts as a source of electrical energy.]* This energy maintains the current flow to the load through a diode, ensuring a continuous output current.

The principle of alternating between conducting and non-conducting states allows DC-DC converter power modules to efficiently manage energy transfer and voltage conversion through careful control and use of energy storage elements.

The operation of DC-DC converter power modules is built upon the alternating behaviour of the switching components acting as conductors and non-conductors. During the "on" state, energy is accumulated, while in the "off" state, the accumulated energy is transferred to the output. Through effective management of these switching states, combined with inductors and control mechanisms, DC-DC converters can efficiently convert voltage levels while maintaining regulation and responding to varying load conditions.

7. ***Application of Chapter 85***

Electrical machinery and equipment and parts thereof; sound recorders and reproducers, television image and sound recorders and reproducers, and parts and accessories of such articles

8504		**ELECTRICAL TRANSFORMERS, STATIC CONVERTERS (FOR EXAMPLE, RECTIFIERS) AND INDUCTORS**	
8504 10	-	*Ballasts for discharge lamps or tubes :*	
8504 10 10	---	Conventional type	u
8504 10 20	---	For compact fluorescent lamps	u
8504 10 90	---	Other	u
	-	*Liquid dielectric transformers:*	
8504 21 00	--	Having a power handling capacity notexceeding 650 kVA	u
8504 22 00	--	Having a power handling capacity exceeding 650 kVA but not exceeding 10,000 kVA	u
8504 23	--	*Having a power handling capacity exceeding 10,000 kVA:*	
8504 23 10	---	Having a power handling capacity exceeding 10,000 kVA but not exceeding 50,000 kVA	u
8504 23 20	---	Having a power handling capacity exceeding 50,000 kVA but not exceeding 1,00,000 kVA	u
8504 23 30	---	Having a power handling capacity exceeding 1,00,000 kVA but not exceeding 2,50,000 kVA	u
8504 23 40	---	Having a power handling capacity exceeding 2,50,000 kVA	u
	-	*Other transformers:*	
8504 31 00	--	Having a power handling capacity not exceeding 1 kVA	u
8504 32 00	--	Having a power handling capacity exceeding 1 kVA but not exceeding 16 kVA	u
8504 33 00	--	Having a power handling capacity exceeding 16 kVA but not exceeding 500 kVA	u
8504 34 00	--	Having a power handling capacity exceeding 500 kVA	u
8504 40	-	*Static converters:*	
8504 40 10	---	Electric inverter	u
	---	*Rectifier :*	
8504 40 21	----	Dip bridge rectifier	u
8504 40 29	----	Other	u
8504 40 30	---	Battery chargers	u
8504 40 40	---	Voltage regulator and stabilizers (other than automatic)	u
8504 40 90	---	Other	u
8504 50	-	*Other inductors:*	

From a bare perusal of the customs tariff, it can be observed that tariff heading 8504 covers "Electrical Transformers, Static Convertors and Inductors". "Static Converters" are classifiable under single dash ("-") item 8504 40. Single Dash entry 8504 40 further provides a triple dash entry ("---") as "Other Static Convertors" under tariff item 8504 4090. The AC-DC power modules /DC-DC converters and power modules imported by the applicant is in the nature of a static converter. None of the headings from 8504 4010 to 8504 4040 specifically cover DC-DC convertors and power modules. DC-DC convertors and power modules in the nature of a static convertors are classified under tariff item 8504 4090 as "Other Static Convertors."

7.1 Further, note 2 of section XVI provide for classification of **'parts' of machines or articles falling under Chapters 84 & 85**. Note 2 to Section XVI is reproduced hereunder for ease of reference: - (Section note XVI is enclosed as **"Exhibit – 5"**)

> *"2. Subject to Note 1 to this Section, Note 1 to Chapter 84 and Note 1 to Chapter 85,* ***parts of machines*** *(not being parts of the articles of heading 8484, 8544, 8545, 8546 or 8547)* ***are to be classified according to the following rules****:*

(a) parts which are goods included in any of the headings of Chapter 84 or 85 (other than headings 8409, 8431, 8448, 8466, 8473, 8485, 8503, 8522, 8529, 8538 and 8548) are in all cases to be classified in their respective headings;

(b) other parts, if suitable for use solely or principally with a particular kind of machine, or with a number of machines of the same heading (including a machine of heading 8479 or 8543) are to be classified with the machines of that kind or in heading 8409, 8431, 8448, 8466, 8473, 8503, 8522, 8529 or 8538 as appropriate. However, parts which are equally suitable for use principally with the goods of headings 8517 and 8525 to 8528 are to be classified in heading 8517, and parts which are suitable for use solely or principally with the goods of heading 8524 are to be classified in heading 8529;

(c) all other parts are to be classified in heading 8409, 8431, 8448, 8466, 8473, 8503, 8522, 8529 or 8538 as appropriate or, failing that, in heading 8485 or 8548."

In terms of note 2(a) to section XVI, it is evident that 'parts' included in any of the headings of Chapter 84 & 85 are in all cases to be classified under the same heading. Therefore, converters having a specific heading under 8504 40 as "static converters" would fall under this. More specifically, the present AC-DC power modules would fall under 85044029 as "other rectifiers" and DC-DC converters & power modules imported by applicant would fall under 8504 40 90 as "Other" static converter.

7.2 The HSN explanatory notes also provides that:

*(II) **ELECTRICAL STATIC CONVERTERS***

The apparatus of this group are used to convert electrical energy in order to adapt it for further use. They incorporate converting elements (e.g., valves) of different types. They may also incorporate various auxiliary devices (e.g., transformers, induction coils, resistors, command regulators, etc.). Their operation is based on the principle that the converting elements act alternately as conductors and non-conductors.

The fact that these apparatus often incorporate auxiliary circuits to regulate the voltage of the emerging current does not affect their classification in this group, nor does the fact that they are sometimes referred to as voltage or current regulators.

This group includes:

*(A) **Rectifiers** by which alternating current (single or polyphase) is converted to direct current, generally accompanied by a voltage change.*

*(B) **Inverters** by which direct current is converted to alternating current.*

***(C) Alternating current converters and cycle converters** by which alternating current (single or polyphase) is converted to a different frequency or voltage.*

***(D) Direct current converters** by which direct current is converted to a different voltage.*

Electrical static converters may be used for different purposes, e.g.:

(I) Converters to supply electricity to drive stationary machines or electric traction vehicles (e.g., locomotives).

(2) Supply converters, such as accumulator chargers (which consist essentially of rectifiers with associated transformer and current control apparatus), converters for galvanising and electrolysis, emergency power packs, converters for installations which supply high-tension direct current, converters for heating purposes and for the current supply to electro-magnets.

Also classified here are converters known as high-tension generators (used particularly with radio apparatus, emission tubes, microwave tubes, ion-beam tubes) which convert the current from any source, usually the mains, into the direct high-tension current necessary for feeding the equipment concerned by means of rectifiers, transformers, etc.

From the above, it is clear that static converters are used to convert electrical energy in order to adapt it for further use. They incorporate converting elements (e.g., valves) of different types. They may also incorporate various auxiliary devices (e.g., transformers, induction coils, resistors, command regulators, etc.). The fact that these apparatuses often incorporate auxiliary circuits to regulate the voltage of the emerging current does not affect their classification in this group. **AC to DC converter** is also called a **rectifier**. Rectifiers are covered under heading of static converter. As the subject goods are not dip bridge rectifiers therefore, from the GRI 1, HSN explanatory notes and section note 2(a) of section XVI, it can be implied that AC-DC power modules are classifiable under CTI 85044029 as other rectifiers. Direct current converters are also covered under static converters. From the GRI 1, HSN explanatory notes and section note 2(a) of section XVI, it can be implied that DC-DC converters are classifiable under CTI 85044090 as other static converters.

7.3 I also observe that classification of DC or AC converter in number of judgements is settled under CTH 8504 only. Considering the facts and circumstances of case, provision of law and existing case law. I am of the considered view that the subject goods i.e. AC-DC power modules are classifiable under CTI 85044029 as other rectifiers and DC-DC converters are classifiable under CTI 85044090 as other static converters.

8. ***Applicability of Sl.No.4 of Notification No. 25/2005-Customs dated March 1, 2005 (as amended)***

Notification No. 25/2005-Customs dated March 1, 2005 is reproduced below:

Notification
No.25/2005-Customs

New Delhi dated the 1st March, 2005
10 Phalguna, 1926(Saka)

G.S.R. (E).-In exercise of the powers conferred by sub-section (1) of section 25 of the Customs Act, 1962 (52 of 1962), the Central Government, on being satisfied that it is necessary in the public interest so to do, hereby exempts following the goods of the description specified in column (3) of the Table below and falling within the heading, sub-heading or tariff item of the First Schedule to the Customs Tariff Act, 1975 (51 of 1975) as are specified in the corresponding entry in column (2) of the said Table, when imported into India, from the whole of the duty of customs leviable thereon under the said First Schedule, namely -

Table

S. No	Heading, Sub – heading or Tariff item	Description of goods
(1)	(2)	(3)
1.	8472 90	Automatic teller machines
2.	8473 10 00	Printed circuit assemblies of word processing machines
(1)	(2)	(3)
3.	8473 40	Printed circuit assemblies for automatic teller machines
4.	8504 40	Static converters for automatic data processing machines and units thereof, and telecommunication apparatus
5.	8504 50	Other inductors for power supplies for automatic data processing machines and units thereof, and telecommunication apparatus
6.	8504 90	Printed circuit assemblies for static converters for automatic data processing machines and units thereof, and telecommunication apparatus, printed circuit assemblies for other inductors for power supplies for automatic data processing machines and units thereof, and telecommunication apparatus
7.	8518 10 00	Microphones having a frequency range of 300 Hz to 3.4 KHz with a diameter of not exceeding 10mm and height not exceeding 3mm, for telecommunication use
8.	8518 29 00	Loudspeakers, without housing, having a frequency range of 300 Hz to 3.4 KHz with a diameter of not exceeding 50 mm, for telecommunication use
9.	8518 30 00	Line telephone handsets
10.	8518 90 00	Printed circuit assemblies for – (i) microphones having a frequency range of 300 Hz to 3.4 KHz with a diameter not exceeding 10 mm and a height not exceeding 3 mm for telecommunication use. (ii) loud speakers, without housing, having a frequency range of 300 Hz to 3.4 KHz with a diameter not exceeding 50 mm., for telecommunication use; or

It is clear that under Sl.No.4 of the said Notification, static converters classifiable under tariff heading 8504 40 for automatic data processing machines and units thereof, and telecommunication apparatus other than static converters for cellular mobile phones are eligible for "nil" rate of customs duty. I find that the DC-DC converter power modules are meant for integration with printed circuit board assemblies for the purpose of manufacture of wi-fi receivers, wi-fi transmitters up-link cards and data-center switches. Since the DC-DC converter power modules are meant for utilization in PCBAs of telecommunication equipment, it can be said that they are used for the purpose of telecommunication apparatus (wherein they are integrated with other components on the PCBAs and used along with other parts of the telecommunication equipment).

8.2 The applicant has also submitted technical datasheets provided by the manufacturers, which reveals that the AC-DC & DC-DC converter power modules are meant for usage in datacom, networking, wireless networks in telecommunication equipment. Since the AC-DC power modules

& DC-DC converter power modules are classifiable under heading 8504 40, is being used by the applicant for the manufacture of telecommunication apparatus, the same shall be eligible for nil rate of duty in terms of Sl.No.4 of the notification.

8.3 Since, the sub-heading 850440 covers all static converters i.e. rectifiers, inverter, AC converters, DC converters, Gas Discharge converters, electrolytic rectifiers stabilized suppliers and the subject goods are classifiable under CTI 85044090 as "other" static converters, and are to be used for manufacturing of the telecommunication apparatus other than cellular mobile phones, therefore, it can be stipulated that the subject goods are fairly covered under sr. no. 4 of the notification no. 25/2005 Customs dated March 1, 2005. Hence, the subject goods i.e. static converters, used for manufacturing of wi-fi receiver, wi-fi transmitter and other telecommunication devices are eligible for duty exemption.

9. In view of the above discussions and findings, my answers in respect of the questions asked in the present application are as follows:

a) *"DPS-500AB-40 A - AC-DC Power Module* are **classifiable under CTI 85044029 as other rectifiers** *and PKU4913D Series DC-DC Converters, EBDW025A0B Barracuda Series; DC-DC Converter Power Modules, ARTESYN - ADH700-48S28 700 Watt Half-Brick DC-DC Converter, Q48SK12050 600 W Quarter Brick DC/DC Power Modules, 6A Digital PicoDLynxTM: Non-Isolated DC-DC Power Module" for* manufacture of wi-fi receiver, wi-fi transmitter and other telecommunication devices are **classifiable under CTI 85044090 as other static converters** of the First Schedule of the Customs Tariff Act, 1975.

b) As the Nil rate of Basic Custom Duty under sl. No. 4 of notification no. 25/2005-Cus dated 01.03.2025 is applicable on the static converters for ADPM and Telecommunication devices other than static converters for cellular mobile phones, and subject goods are static converters for telecommunication apparatus other than cellular mobile phones, therefore, the same is eligible for BCD exemption.

10. I rule accordingly.

12/12/25

(Prabhat K. Rameshwaram)
Customs Authority for Advance Rulings,
Mumbai.

This copy is certified to be a true copy of the ruling and is sent to:

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8. Guard file.

12-12-25.

(Vivek Dwivedi)
Dy. Commissioner & Secretary
Customs Authority for Advance Rulings,
Mumbai