

(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property
Organization
International Bureau

(43) International Publication Date
17 October 2024 (17.10.2024)



(10) International Publication Number
WO 2024/215565 A4

- (51) International Patent Classification:
H02M 1/00 (2007.01) *H02M 7/04* (2006.01)
H02M 7/219 (2006.01) *H02M 7/483* (2007.01)
H02M 5/458 (2006.01)
- (21) International Application Number: PCT/US2024/023188
- (22) International Filing Date: 05 April 2024 (05.04.2024)
- (25) Filing Language: English
- (26) Publication Language: English
- (30) Priority Data:
63/458,805 12 April 2023 (12.04.2023) US
18/627,004 04 April 2024 (04.04.2024) US
- (63) Related by continuation (CON) or continuation-in-part (CIP) to earlier applications:
- (71) Applicant: **DG MATRIX, INC.** [US/US]; 8105 Last Oak Court, Raleigh, North Carolina 27613-1692 (US).
- (72) Inventor: **INAM, Haroon**; 1157 Stone Kirk Drive, Raleigh, North Carolina 27614 (US).
- (74) Agent: **GEORGE, JiNan Glasgow**; PO Box 52546, Durham, North Carolina 27717 (US).
- (81) Designated States (*unless otherwise indicated, for every kind of national protection available*): AE, AG, AL, AM, AO, AT, AU, AZ, BA, BB, BG, BH, BN, BR, BW, BY, BZ, CA, CH, CL, CN, CO, CR, CU, CV, CZ, DE, DJ, DK, DM, DO, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN, HR, HU, ID, IL, IN, IQ, IR, IS, IT, JM, JO, JP, KE, KG, KH, KN, KP, KR, KW, KZ, LA, LC, LK, LR, LS, LU, LY, MA, MD, MG, MK, MN, MU, MW, MX, MY, MZ, NA,

(54) Title: MULTI-PORT TRANSFORMER ENABLED MODULAR MULTI-PORT POWER CONVERSION SYSTEM

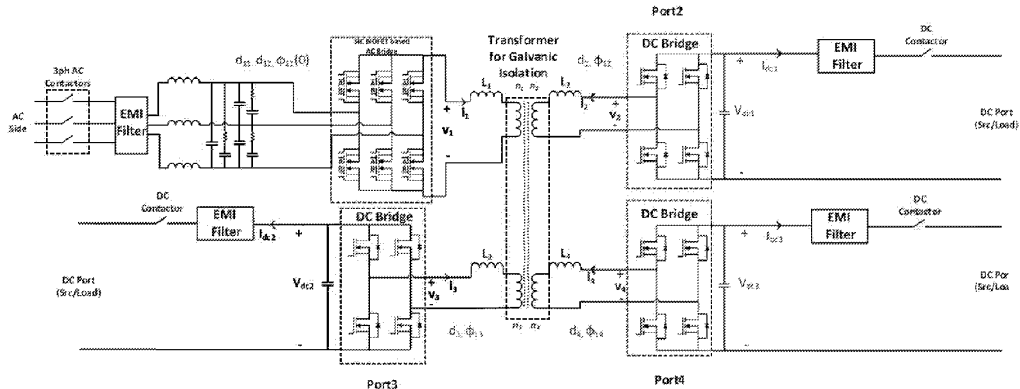


FIG. 2

(57) Abstract: A modular, multiport power conversion system includes a central transformer with a plurality of windings inductively connected to the central transformer. The plurality of windings are connected to ports able to connect to both AC and DC-devices, including both power sources and power consuming nodes. Each port is able to be selectively galvanically isolated, such that a controller is able to determine from which ports power is drawn and/or to which ports power is transferred. The system is operable to use zero voltage switching (ZVS) and/or zero current switching (ZCS) for each port to reduce power loss and increase efficiency, especially for high frequency embodiments.

[Continued on next page]

WO 2024/215565 A4

NG, NI, NO, NZ, OM, PA, PE, PG, PH, PL, PT, QA, RO,
RS, RU, RW, SA, SC, SD, SE, SG, SK, SL, ST, SV, SY, TH,
TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, WS,
ZA, ZM, ZW.

(84) Designated States (*unless otherwise indicated, for every kind of regional protection available*): ARIPO (BW, CV, GH, GM, KE, LR, LS, MW, MZ, NA, RW, SC, SD, SL, ST, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, RU, TJ, TM), European (AL, AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HR, HU, IE, IS, IT, LT, LU, LV, MC, ME, MK, MT, NL, NO, PL, PT, RO, RS, SE, SI, SK, SM, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, KM, ML, MR, NE, SN, TD, TG).

Declarations under Rule 4.17:

- *as to applicant's entitlement to apply for and be granted a patent (Rule 4.17(ii))*
- *as to the applicant's entitlement to claim the priority of the earlier application (Rule 4.17(iii))*

Published:

- *with international search report (Art. 21(3))*
- *with amended claims (Art. 19(1))*

Date of publication of the amended claims:

05 December 2024 (05.12.2024)