

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

(19) World Intellectual Property
Organization
International Bureau

(43) International Publication Date
03 October 2024 (03.10.2024)



(10) International Publication Number
WO 2024/206725 A1

(51) International Patent Classification:

H01L 23/367 (2006.01) H01L 23/498 (2006.01)
H01L 23/373 (2006.01) H01L 25/07 (2006.01)
H01L 23/473 (2006.01)

(21) International Application Number:

PCT/US2024/022102

(22) International Filing Date:

28 March 2024 (28.03.2024)

(25) Filing Language:

English

(26) Publication Language:

English

(30) Priority Data:

63/455,822 30 March 2023 (30.03.2023) US
18/617,325 26 March 2024 (26.03.2024) US

(71) Applicant: **SEMICONDUCTOR COMPONENTS INDUSTRIES, LLC** [US/US]; 5701 N. Pima Road, Scottsdale, Arizona 85250 (US).

(72) Inventors: **PRAJUCKAMOL, Atapol**; 92/59, Chiyapruk Rangsit K.4, Rangsit-Nakorn Nayok Rd, Thanyaburi, 12130 (TH). **CHEW, Chee Hiong**; 302, S2 A7/4, Green Street Home, Seremban Two, Seremban, 70300 (MY).

(74) Agent: **LEIJA, Javier M.**; Onsemi, 5701 N. Pima Road, Scottsdale, Arizona 85250 (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,

(54) Title: POWER MODULE WITH OVERLAPPING TERMINALS

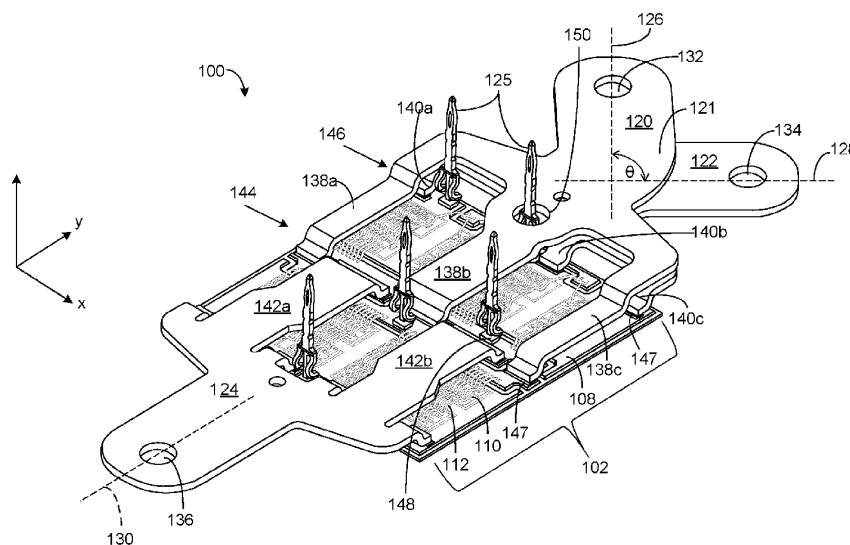


FIG. 1

(57) Abstract: A power module (100) is disclosed for use in electric vehicles and industrial applications. The power modules (100) route large currents through a set of metal power tabs (120, 122, 124) instead of passing high currents through conductive layers of a direct bonded metal structure (102). By orienting the metal power tabs (120, 122) in a mini-heart design, stray inductance and resistance can both be reduced, thereby improving performance while simultaneously reducing the footprint of the high power module (100). In addition, wire bonds (112) between chip assemblies (110) in a high-power semiconductor device module (100) can be replaced by solid metal clips (212) that can better withstand high currents and voltages. The SSDC package incorporates the metal power tabs and provides heat dissipation via a metal base plate (510) that includes a heat sink. The heat sink can be immersed in a cooling fluid to provide faster heat dissipation.

[Continued on next page]

MA, MD, MG, MK, MN, MU, MW, MX, MY, MZ, NA,
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).

Published:

— *with international search report (Art. 21(3))*