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(19) **United States**(12) **Patent Application Publication**
Jogalekar et al.(10) **Pub. No.: US 2024/0213185 A1**(43) **Pub. Date: Jun. 27, 2024**(54) **SYSTEM, ELECTRONIC DEVICE AND PACKAGE WITH VERTICAL TO HORIZONTAL SUBSTRATE INTEGRATED WAVEGUIDE TRANSITION AND HORIZONTAL GROUNDED COPLANAR WAVEGUIDE TRANSITION****H01L 23/498** (2006.01)**H01P 3/00** (2006.01)**H01P 3/12** (2006.01)**H01P 5/107** (2006.01)**H01P 11/00** (2006.01)(52) **U.S. Cl.****CPC** **H01L 23/66** (2013.01); **H01L 21/4853**(2013.01); **H01L 21/4857** (2013.01); **H01L****21/565** (2013.01); **H01L 23/3121** (2013.01);**H01L 23/49822** (2013.01); **H01L 23/49838**(2013.01); **H01P 3/003** (2013.01); **H01P 3/121**(2013.01); **H01P 5/107** (2013.01); **H01P****11/002** (2013.01); **H01P 11/003** (2013.01);**H01L 2223/6633** (2013.01)(71) Applicant: **Texas Instruments Incorporated**,
Dallas, TX (US)(72) Inventors: **Aditya Nitin Jogalekar**, Dallas, TX
(US); **Harshpreet Singh Phull Bakshi**,
Dallas, TX (US); **Rajen Manicon**
Murugan, Dallas, TX (US); **Sylvester**
Ankamah-Kusi, Dallas, TX (US)(21) Appl. No.: **18/146,886**(22) Filed: **Dec. 27, 2022****Publication Classification**(51) **Int. Cl.****H01L 23/66** (2006.01)**H01L 21/48** (2006.01)**H01L 21/56** (2006.01)**H01L 23/31** (2006.01)

(57)

ABSTRACT

An electronic device includes a multilevel package substrate with a horizontal substrate integrated waveguide (SIW) with a channel, a vertical SIW with an opening, a grounded coplanar waveguide (GCPW), a first transition between the horizontal SIW and the GCPW, and a second transition between the horizontal and vertical SIWs, as well as a semiconductor die having conductive structures coupled to a signal trace and a ground trace of the GCPW, and a package structure that encloses the semiconductor die and a portion of the multilevel package substrate.

