



US005729185A

**United States Patent** [19]**Johnson et al.**[11] **Patent Number:** **5,729,185**[45] **Date of Patent:** **Mar. 17, 1998**

[54] **ACOUSTIC WAVE FILTER PACKAGE LID ATTACHMENT APPARATUS AND METHOD UTILIZING A NOVOLAC EPOXY BASED SEAL**

[75] **Inventors:** Gary Carl Johnson, Tempe; David Patrick Stumbo, Scottsdale; Steven Richard Young, Gilbert; Michael Anderson, Phoenix, all of Ariz.

[73] **Assignee:** Motorola Inc., Schaumburg, Ill.

[21] **Appl. No.:** 639,673

[22] **Filed:** Apr. 29, 1996

[51] **Int. Cl.** <sup>6</sup> H03H 9/64; H01L 41/00

[52] **U.S. Cl.** 333/193; 310/313 R; 29/25.35

[58] **Field of Search** 333/193-196; 310/313 R, 313 B, 313 C, 313 D, 340, 341, 344, 348; 29/25.35

[56] **References Cited****U.S. PATENT DOCUMENTS**

4,047,129	9/1977	Ishiyama	333/193
4,213,104	7/1980	Cullen et al.	333/150
4,282,498	8/1981	Iizawa	333/186
4,291,285	9/1981	Kadota	333/150
4,295,102	10/1981	Schmidt et al.	331/65
4,296,347	10/1981	Weirauch	310/313 B
4,306,456	12/1981	Maerfeld	73/517 R
4,365,219	12/1982	Nathan	333/193
4,450,374	5/1984	Cho et al.	310/313 B
4,480,148	10/1984	Archer	174/51
4,571,794	2/1986	Nakamura	29/25.35
4,628,146	12/1986	Schmotz et al.	174/52 PE
4,699,682	10/1987	Takishima	156/292
4,737,742	4/1988	Takoshima et al.	333/150
5,043,221	8/1991	Koleske	428/413
5,059,848	10/1991	Mariani	310/313 R

5,162,822	11/1992	Wakamori	333/193
5,237,235	8/1993	Cho et al.	29/25.35 X
5,337,026	8/1994	Borchelt et al.	333/150
5,345,201	9/1994	Greer et al.	333/193
5,361,967	11/1994	Anderson et al.	228/124.6
5,410,789	5/1995	Noto et al.	29/25.35
5,414,917	5/1995	Tanaka	29/25.35

**FOREIGN PATENT DOCUMENTS**

1389610	8/1973	European Pat. Off.	
0077715	5/1984	Japan	310/344
0049310	3/1991	Japan	333/195
6132759	10/1992	Japan	
405090882 A	4/1993	Japan	333/193
9639632	12/1996	WIPO	

*Primary Examiner*—Robert Pascal

*Assistant Examiner*—Barbara Summons

*Attorney, Agent, or Firm*—Brian M. Mancini

[57] **ABSTRACT**

A method for packaging an acoustic wave filter (102). The method includes a step of providing a first wafer (100). The first wafer (100) supports acoustic wave transduction and propagation. The method also includes steps of processing the wafer (100) to provide transducer patterns (18, 18') thereon and disposing a seal ring (25) on the wafer (100). The seal ring (25) completely encloses active areas allowing portions of each bond pad to extend outside of the seal ring. The method further includes steps of disposing a second wafer (40) atop the seal ring (25) and the first wafer (100), sealing the second wafer (40) to the first wafer (100), dicing the second wafer (40) with a saw that provides a first kerf width, whereby portions of the second wafer (40) overlying bonding pads (20) of the transducer patterns (18, 18') are removed and dicing the first wafer (100) with a saw that provides a second kerf width narrower than the first kerf width to provide a packaged SAW die.

**19 Claims, 2 Drawing Sheets**

