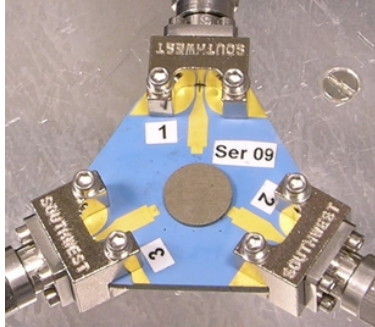
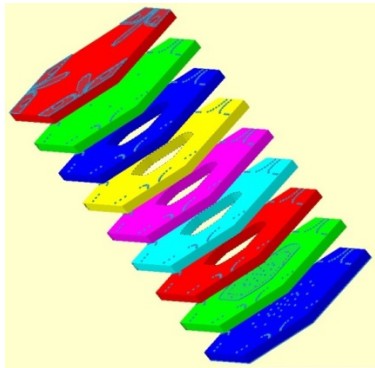


<b>Title:</b>	<i>“Integrated Circulators for TRM”</i>		
<b>Contract type</b>	<i>TRP, ...</i>	<b>Budget (K€)</b>	<b>340</b>
<b>Company (-ies) (including country)</b>	Via Electronic (Germany), MESL Microwave (Scotland, UK), TNO (The Netherlands)		
<b>Team (name of the participant in the project)</b>	Franz Bechtold, Mohamed Ashari Chris Tate (no longer involved , job change) Mark McKay, Gijs van der Bent, Raymond van Dijk		
<b>(* Speaker (s))</b>	Raymond van Dijk	<b>Email</b>	raymond.vandijk@tno.nl
<b>Short Speaker Information (experience and involvement in this project)</b>	Raymond van Dijk has been working as microwave engineer and systems engineer for 15 years in TNO for Defence and Space oriented projects. His working experience is focussed on TR modules in phased-array (radar) systems and microwave semiconductor components therein.		
<b>Summary of the activity (maximum 400 words)</b>	<p><i>Please provide representative pictures of the work performed in the activity.</i> <i>(See example in second page)</i></p>   <p>A multipaction-free integrated circulator in LTCC technology has been developed in a consortium with Via Electronic, MESL microwave and TNO. The device counters multipaction by avoiding gaps in the circulator and using a LTCC stack that can be used to integrate the</p>		

	<p>circulator with the rest of the transmit-receive module. The non-reciprocal action is provided by an embedded ferrite. The ferrite puck is fully enclosed by the LTCC substrate that holds resonator, matching and interconnect.</p> <p>An LTCC technology has been developed to embed pre-sintered ferrites inside the layer stack. The development required ample consideration for mechanical parameters to avoid excessive stress in the sintered product, while still meeting the gap free constraint for multipaction and good grounding metal dimensional control and interconnect for the microwave and magnetic properties.</p> <p>The suitability has been demonstrated at C-band and Ku-band with circulator breadboards. The devices have been tested for small-signal parameters, power handling (&gt;20W) and fast recovery. The C-band sample has also successfully passed multipaction testing up to 200W and corona up to 50 W.</p>
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(\*) The speaker needs to do the registration through the [website](#)