

Tritium Flux Computations for 3D Diodes-August 2010

		T ₂ Gas	TBC	TBR	Ti _{1.5}	⁶³ Ni (24%)	¹⁴⁷ Pm
β Emission	(sec ⁻¹ /cm ³)	8.92E+10	3.44E+13	8.80E+13	1.26E+14	4.48E+12	2.48E+14

β Flux (½)	(sec ⁻¹ /μm ²)	4.46E-02	1.72E+01	4.40E+01	6.30E+01	2.24E+00	1.24E+02
-------------------	---------------------------------------	----------	----------	----------	----------	----------	----------

Note that 95% of the 'composite' tritium β-particles are absorbed in 2.5 μm of silicon.

Current	(A/μm ²)	3.42E-17	1.32E-14	3.37E-14	4.83E-14		
----------------	----------------------	----------	----------	----------	----------	--	--

Titanium tritide is being used by our competition.

Tritiated butyl rubber (TBR) is the compound we will be using from now on.

Tritiated β-Carotene (TBC) was used last January for 3D porous silicon diode chips fabricated by Cypress in October.

Tritium gas (T₂ molecule) was used in NSF SBIR Phase I project.

β Power	(μW/μl)	0.081	31.4	80.2	153.1	12.3	680.1
----------------	---------	-------	------	------	-------	------	-------

β Activity	(mCi/μl)	2.41	931	2379	3407	121	6697
-------------------	----------	------	-----	------	------	-----	------

Chip β Power		Efficiency	TBR	Volts/Chip	Stacked	Volts/Stack	TBR	Activity	Specific Energy (T _½)	Specific Power					
											(μW/cm ³)	(μW/chip)	(V)	Chips (#)	(V)
Trench-2/6	Si @	1.4%	49	5.6	0.25	18	4.5	101	8.4	151	31.4				
	Si @	5%	174	20.0	0.3	15	4.5	301	8.4	126	31.4	8.09E+03	7.48E-02	18831	0.174
	Si @	10%	348	40.1	0.35	12	4.2	481	8.4	101	31.4	1.62E+04	1.50E-01	52021	0.481
Trench-2/6	SiC @	15%	1336	80.1	0.88	5	4.4	401	12.3	61	63.5	4.49E+04	4.15E-01	146299	1.354
Trench-1/4	SiC @	15%	2004	120.3	0.88	5	4.4	601	12.3	61	63.5	6.73E+04	6.23E-01	414156	3.832
Film-Jelly Roll	AlN @	20%	1603	3.2	1.85			48			14.6	5.32E+04	4.92E-01		

Trench-1/4	SiC @	Efficiency	⁶³ Ni (24%)	Volts/Chip	Chips in	Volts/Stack	⁶³ Ni (24%)	Activity	Specific Energy (T _½)	Specific Power					
											15%	307	18.4	0.88	5
Trench-1/4	SiC @	15%	17002	¹⁴⁷ Pm	1020.1	0.88	5	4.4	5100	¹⁴⁷ Pm	34.5	172	178.7	1.22E+05	5.28E+00