OM3 reach based on the 100 m OM4 reach PMD baseline modeling

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Summary

71 m

Approach

- Use model parameters from petrilla_01_0313
  - VCSEL rise-time, RIN, TP1 DJ & RJ and DCD, fibre dispersion values (modal and CD), Rx bandwidth and sensitivity, target Q, baseline wander…..
- and an independently modified spreadsheet model derived from 10GEPBud3_1_16a.xls,
  - adjusted for bit rate etc
  - with jitter calculation similar to those described in king_01_0110
    - plus a first order approximation to include MPN induced jitter and a 0.17 UI allowance for other jitter introduced by optical Tx & Rx chains.

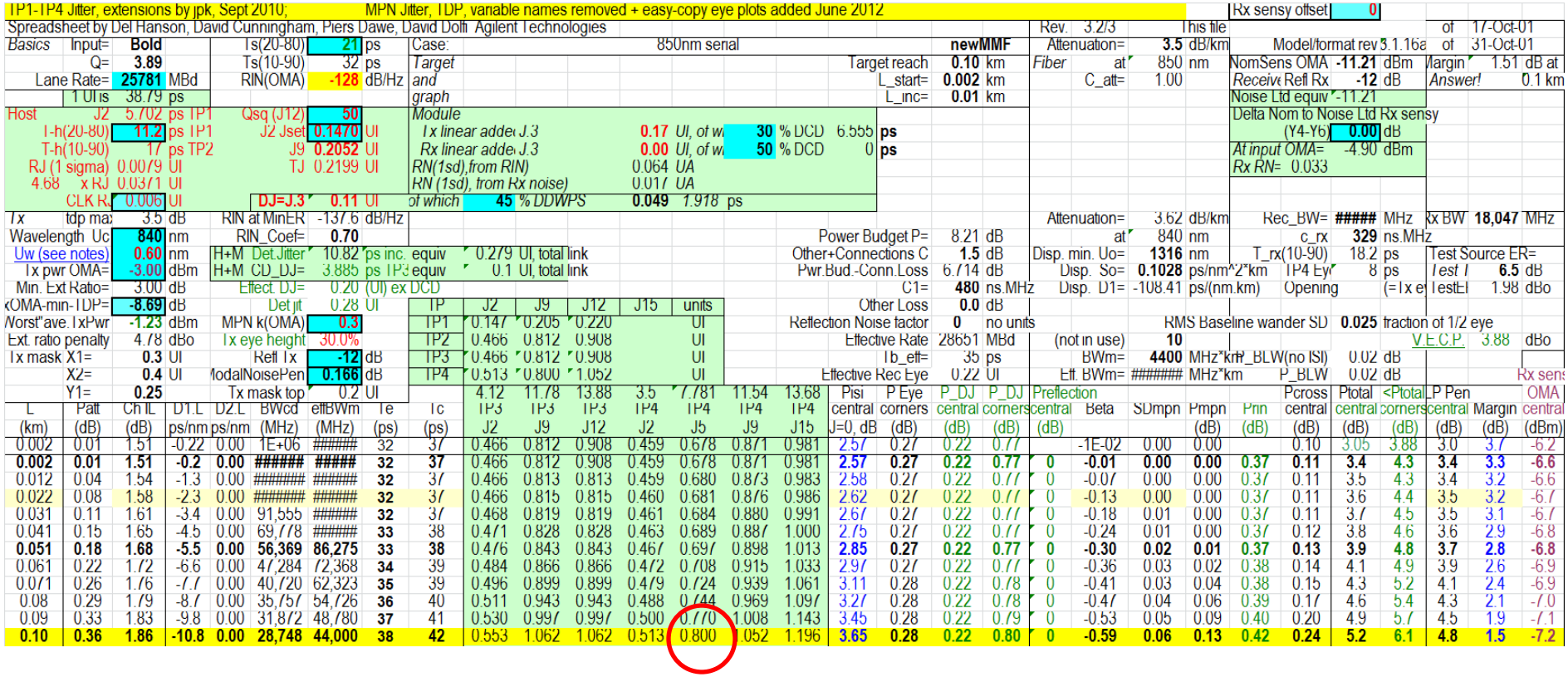
Values from petrilla_01_0113

Parameter	Unit	100G 100m
Signal rate	GBd	25.78125
Q (BER)		3.8905 (5.0E-5)
Center Wavelength, min	nm	840
Spectral Width, max	nm	0.60
OMA at max TDP, min	dBm	-3.0
Extinction ratio, min	dB	3.0
Tx output transition times, 20% -80%, max	ps	21
$RIN_{12}OMA$, max	dB/Hz	-128
RIN coefficient		0.7
MPN coefficient		0.3
Modal Noise Penalty	dB	0.129
Tx reflectance, max	dB	-12
Tx optical return loss tolerance, max	dB	12

Parameter	Unit	100G 100m
Signal rate	GBd	25.78125
Q (BER)		3.8905 (5.0E-5)
Wavelength, min	nm	840
Rx sensitivity (OMA), max	dBm	-11.2
Rx Bandwidth, min	MHz	18,047
RMS base line wander coefficient		0.025
Rx reflectance, max	dB	-12

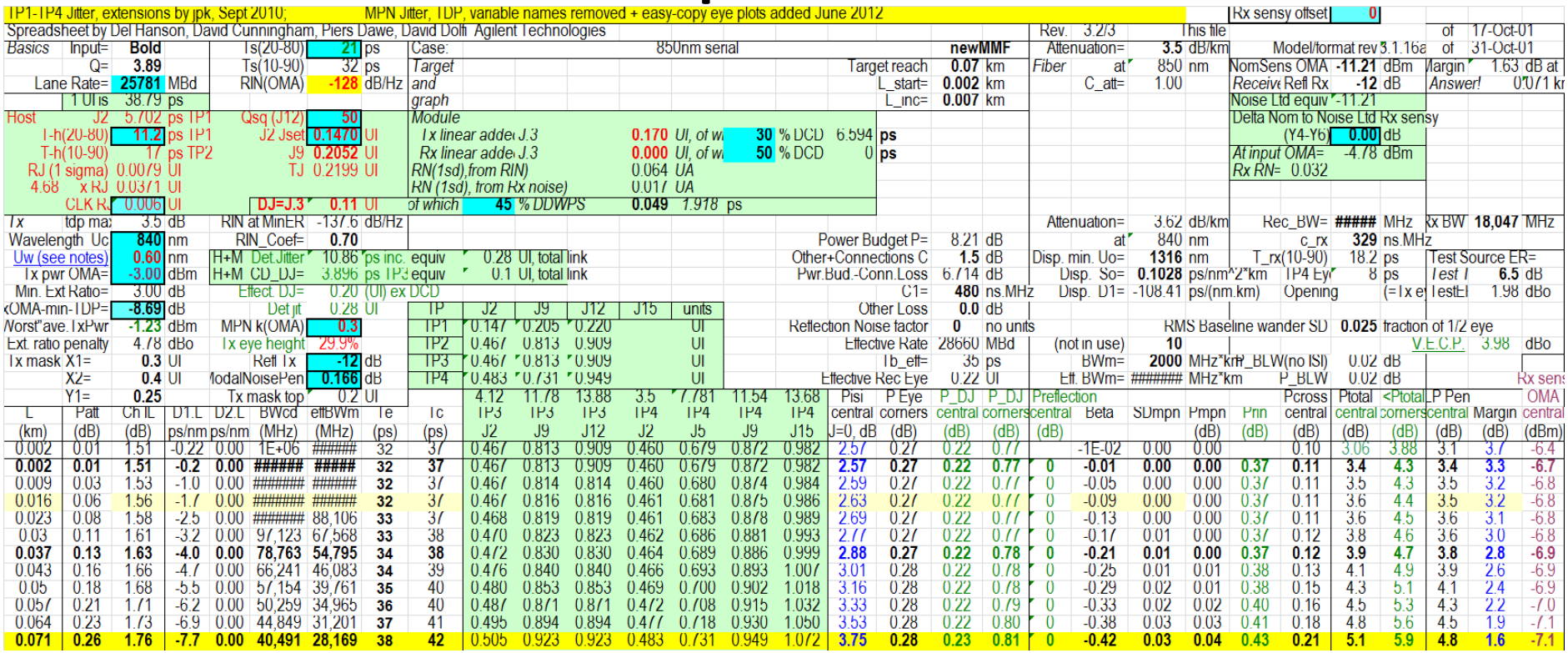
Parameter	Unit	100G 100m
Signal rate	GBd	25.78125
Q (BER)		3.8905 (5.0E-5)
Reach	m	100
Fiber Attenuation	dB/km	3.5
Dispersion min Uo	nm	1316
Dispersion So	ps/nm^2km	0.10275
Fiber modal bandwidth	MHz·km	4400
Reflection Noise Factor		0
Signal power budget at max TDP	dB	8.20
Connector & splice loss allocation	dB	1.50
Fiber Insertion loss	dB	0.36

Model snapshot for OM4



- 100 m on OM4 for VECP ≤ 4.0 dB and TJ ≤ 0.8 UI jitter at ‘TP4’ at target BER

Model snapshot for OM3



TP1-TP4 Jitter, extensions by jpk, Sept 2010; MPN Jitter, TDP, variable names removed + easy-copy eye plots added June 2012

Spreadsheet by Del Hanson, David Cunningham, Piers Dawe, David Dolfi Agilent Technologies

L (km)	Patt (dB)	Ch IL (dB)	DT.L ps/nm	DZ.L ps/nm	BWcd (MHz)	effBWm (MHz)	Te (ps)	Ic (ps)	TP3 J2	TP3 J9	TP3 J12	TP4 J2	TP4 J5	TP4 J9	TP4 J15	Pisi central J=0, dB	P Eye corners (dB)	P_DJ central (dB)	P_DJ corners (dB)	Preflection central (dB)	Beta	SDmpn (dB)	Pmpn (dB)	Pnn (dB)	Pcross central (dB)	Ptotal central (dB)	<Ptotal corners (dB)	P Pen central (dB)	Margin (dB)	OMA central (dBm)
0.002	0.01	1.51	-0.22	0.00	1E+06	#####	32	37	0.467	0.813	0.909	0.460	0.679	0.872	0.982	2.57	0.27	0.22	0.77		-1E-02	0.00	0.00		0.10	3.06	3.88	3.1	3.7	-6.4
0.002	**0.01**	**1.51**	**-0.2**	**0.00**	#####	#####	**32**	**37**	0.467	0.813	0.909	0.460	0.679	0.872	0.982	**2.57**	**0.27**	**0.22**	**0.77**	**0**	**-0.01**	**0.00**	**0.00**	**0.37**	**0.11**	**3.4**	**4.3**	**3.4**	**3.3**	**-6.7**
0.009	0.03	1.53	-1.0	0.00	#####	#####	**32**	37	0.467	0.814	0.814	0.460	0.680	0.874	0.984	2.59	0.27	0.22	0.77	0	-0.05	0.00	0.00	0.37	0.11	3.5	4.3	3.5	3.2	-6.8
0.016	0.06	1.56	-1.7	0.00	#####	#####	**32**	37	0.467	0.816	0.816	0.461	0.681	0.875	0.986	2.63	0.27	0.22	0.77	0	-0.09	0.00	0.00	0.37	0.11	3.6	4.4	3.5	3.2	-6.8
0.023	0.08	1.58	-2.5	0.00	#####	88,106	**33**	37	0.468	0.819	0.819	0.461	0.683	0.878	0.989	2.69	0.27	0.22	0.77	0	-0.13	0.00	0.00	0.37	0.11	3.6	4.5	3.6	3.1	-6.8
0.03	0.11	1.61	-3.2	0.00	97,123	67,568	**33**	38	0.470	0.823	0.823	0.462	0.686	0.881	0.993	2.77	0.27	0.22	0.77	0	-0.17	0.01	0.00	0.37	0.12	3.8	4.6	3.6	3.0	-6.8
0.037	**0.13**	**1.63**	**-4.0**	**0.00**	**78,763**	**54,795**	**34**	**38**	0.472	0.830	0.830	0.464	0.689	0.886	0.999	**2.88**	**0.27**	**0.22**	**0.78**	**0**	**-0.21**	**0.01**	**0.00**	**0.37**	**0.12**	**3.9**	**4.7**	**3.8**	**2.8**	**-6.9**
0.043	0.16	1.66	-4.7	0.00	66,241	46,083	**34**	39	0.476	0.840	0.840	0.466	0.693	0.893	1.007	3.01	0.28	0.22	0.78	0	-0.25	0.01	0.01	0.38	0.13	4.1	4.9	3.9	2.6	-6.9
0.05	0.18	1.68	-5.5	0.00	57,154	39,761	**35**	40	0.480	0.853	0.853	0.469	0.700	0.902	1.018	3.16	0.28	0.22	0.78	0	-0.29	0.02	0.01	0.38	0.15	4.3	5.1	4.1	2.4	-6.9
0.057	0.21	1.71	-6.2	0.00	50,259	34,965	**36**	40	0.487	0.871	0.871	0.472	0.708	0.915	1.032	3.33	0.28	0.22	0.79	0	-0.33	0.02	0.02	0.40	0.16	4.5	5.3	4.3	2.2	-7.0
0.064	0.23	1.73	-6.9	0.00	44,849	31,201	**37**	41	0.495	0.894	0.894	0.477	0.718	0.930	1.050	3.53	0.28	0.22	0.80	0	-0.38	0.03	0.03	0.41	0.18	4.8	5.6	4.5	1.9	-7.1
0.071	**0.26**	**1.76**	**-7.7**	**0.00**	**40,491**	**28,169**	**38**	**42**	0.505	0.923	0.923	0.483	0.731	0.949	1.072	**3.75**	**0.28**	**0.23**	**0.81**	**0**	**-0.42**	**0.03**	**0.04**	**0.43**	**0.21**	**5.1**	**5.9**	**4.8**	**1.6**	**-7.1**

- 71 m with same input and optical parameter values for VECP ≤ 4.0 dB and TJ ≤ 0.8 UI jitter at ‘TP4’ at target BER

Conclusion

- Independent calculation based on 100 m PMD parameters values in petrilla_01_0113 indicates
    - 100 m on OM4
    - 71 m on OM3