

Temperature sensitivity of the QE for CHEOPS CCDs

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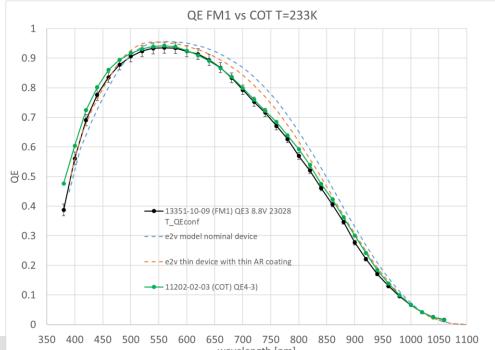


ESA measurements of the temperature sensitivity exist for the commercial off-the-shelf (COTS) device CCD47-20-11202-02-03, but not for any of the EM or FM devices from the CHEOPS batch 13351

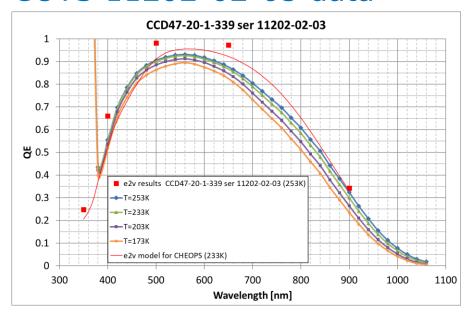
The QE curves for the COTS device and the CHEOPS flight spare (FM1) device 13351-10-09 are quite

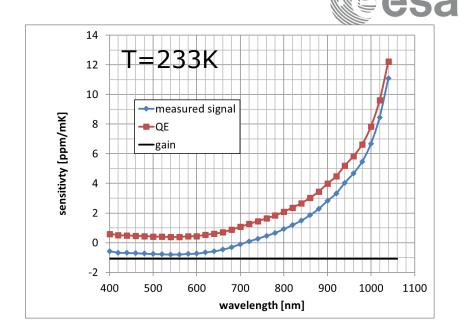
similar:

 So it seems justified to use the sensitivity data from the COTS device for CHEOPS purposes



COTS 11202-02-03 data





- QE data at 4 temperatures
- Data at 203-233-253K are used to derive the sensitivity at T=233K
- Note that the measured signal is temperature dependent through gain and QE
- Gain is NOT wavelength dependent





























Comparison with Corot data

Mon. Not. R. Astron. Soc. 365, 1171-1179 (2006)

doi:10.1111/j.1365-2966.2005.09793.x

Calibration of flight model CCDs for CoRoT mission

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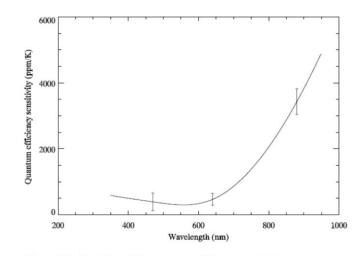
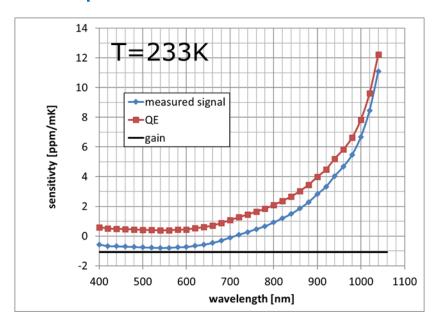


Figure 12. Evolution of the quantum efficiency sensitivity to temperature with wavelength [$\alpha_{Q_e}(\lambda, T_0 = -45^{\circ}\text{C})$]. Error bars represent dispersion on all CCDs.



Very similar!

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QE temperature sensitivity for 11202-02-03 (233K)

1040

1060



380 0.488481 400 0.591256 420 0.506598 440 0.487927 460 0.468872 480 0.446262 500 0.416542 520 0.402866 540 0.382989 560 0.39014 580 0.42646 600 0.443201 620 0.527631 640 0.602754 660 0.710587 680 0.879138 700 1.071791 720 1.263546 740 1.446774	Lambda [nm]	Sensitivity [ppm/mK]
420 0.506598 440 0.487927 460 0.468872 480 0.446262 500 0.416542 520 0.402866 540 0.382989 560 0.39014 580 0.42646 600 0.443201 620 0.527631 640 0.602754 660 0.710587 680 0.879138 700 1.071791 720 1.263546	380	0.488481
440 0.487927 460 0.468872 480 0.446262 500 0.416542 520 0.402866 540 0.382989 560 0.39014 580 0.42646 600 0.527631 640 0.602754 660 0.710587 680 0.879138 700 1.071791 720 1.263546	400	0.591256
460 0.468872 480 0.446262 500 0.416542 520 0.402866 540 0.382989 560 0.39014 580 0.42646 600 0.443201 620 0.527631 640 0.602754 660 0.710587 680 0.879138 700 1.071791 720 1.263546	420	0.506598
480 0.446262 500 0.416542 520 0.402866 540 0.382989 560 0.39014 580 0.42646 600 0.443201 620 0.527631 640 0.602754 660 0.710587 680 0.879138 700 1.071791 720 1.263546	440	0.487927
500 0.416542 520 0.402866 540 0.382989 560 0.39014 580 0.42646 600 0.443201 620 0.527631 640 0.602754 660 0.710587 680 0.879138 700 1.071791 720 1.263546	460	0.468872
520 0.402866 540 0.382989 560 0.39014 580 0.42646 600 0.443201 620 0.527631 640 0.602754 660 0.710587 680 0.879138 700 1.071791 720 1.263546	480	0.446262
540 0.382989 560 0.39014 580 0.42646 600 0.443201 620 0.527631 640 0.602754 660 0.710587 680 0.879138 700 1.071791 720 1.263546	500	0.416542
560 0.39014 580 0.42646 600 0.443201 620 0.527631 640 0.602754 660 0.710587 680 0.879138 700 1.071791 720 1.263546	520	0.402866
580 0.42646 600 0.443201 620 0.527631 640 0.602754 660 0.710587 680 0.879138 700 1.071791 720 1.263546	540	0.382989
600 0.443201 620 0.527631 640 0.602754 660 0.710587 680 0.879138 700 1.071791 720 1.263546	560	0.39014
6200.5276316400.6027546600.7105876800.8791387001.0717917201.263546	580	0.42646
640 0.602754 660 0.710587 680 0.879138 700 1.071791 720 1.263546	600	0.443201
660 0.710587 680 0.879138 700 1.071791 720 1.263546	620	0.527631
680 0.879138 700 1.071791 720 1.263546	640	0.602754
700 1.071791 720 1.263546	660	0.710587
720 1.263546	680	0.879138
	700	1.071791
740 1.446774	720	1.263546
	740	1.446774
760 1.640746	760	1.640746
780 1.834426	780	1.834426
800 2.086421		
820 2.362858	820	2.362858
840 2.65579	840	2.65579
860 3.024505	860	3.024505
880 3.448744	880	3.448744
900 3.983411	900	3.983411
920 4.478907		4.478907
940 5.202698		0.0000
960 5.841491		0.0.12.52
980 6.63389		
1000 7.839517		
1020 9.622851	1020	9.622851

12.23661

12.7683

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