MODIS Bands Summary Tables

MCST

3/25/97

Reflectance Bands 1-19, 26 (VIS, NIR and SWIR)

By Ascending Band Number

Band No.	Center Wavelength (specified)	Pixel Size (m)	FWHM Bandwidth (nm) (specified)	<<<<<<<<<<<<<<< Radiances >>>>>>>>>>>>>>> See Note 1 Ltyp_spec W/(m2-sr-um) (specified)	See Note 1 Lmax_spec W/(m2-sr-um) (DN=3506.4)	Lsat(DN=4096) W/(m2-sr-um)	See Note 2 DN@Ltyp per Target Gain*	NEdL W/(m2-sr-um) (specified)	NEdL (%of Ltyp)	SNR@Ltyp = Ltyp/NEdL	<<<<<<<<<<<<<Gains>>>>>>>>>>>>> See Note 2 Target Gain* DN*(m2-sr-um)/W	PFM Measured Gain (PL3095-N06314)
1	645	250	50.0	21.8	685	792	112.7	0.1690	0.78%	129.0	5.17	TBD
2	858	250	35.0	24.7	285	330	307.0	0.1230	0.50%	200.8	12.43	TBD
3	469	500	20.0	35.3	593	686	210.8	0.1450	0.41%	243.4	5.97	TBD
4	555	500	20.0	29.0	518	599	198.3	0.1270	0.44%	228.3	6.84	TBD
5	1240	500	20.0	5.4	110	127	173.9	0.0730	1.35%	74.0	32.20	TBD
6	1640	500	24.6	7.3	70	81	369.4	0.0270	0.37%	270.4	50.60	TBD
7	2130	500	50.0	1.0	22	25	161.0	0.0090	0.90%	111.1	160.99	TBD
8	412	1000	15.0	44.9	175	202	908.7	0.0510	0.11%	880.4	20.24	TBD
9	443	1000	10.0	41.9	133	154	1115.8	0.0500	0.12%	838.0	26.63	TBD
10	488	1000	10.0	32.1	101	117	1125.7	0.0400	0.12%	802.5	35.07	TBD
11	531	1000	10.0	27.9	82	95	1205.1	0.0370	0.13%	754.1	43.19	TBD
12	551	1000	10.0	21.0	64	74	1162.2	0.0280	0.13%	750.0	55.34	TBD
13	667	1000 w/TDI	10.0	9.5	32	37	1051.5	0.0104	0.11%	913.5	110.68	TBD
14	678	1000 w/TDI	10.0	8.7	31	36	994.0	0.0080	0.09%	1087.5	114.25	TBD
15	748	1000	10.0	10.2	26	30	1389.5	0.0170	0.17%	600.0	136.22	TBD
16	869	1000	15.0	6.2	16	19	1372.5	0.0120	0.19%	516.7	221.36	TBD
17	905	1000	30.0	10.0	185	214	191.4	0.0600	0.60%	166.7	19.14	TBD
18	936	1000	50.0	3.6	256	296	49.8	0.0630	1.75%	57.1	13.84	TBD
19	940	1000	15.0	15.0	189	219	281.1	0.0600	0.40%	250.0	18.74	TBD
26	1375	1000	30.0	6.0	90	104	236.1	0.0400	0.67%	150.0	39.35	TBD

Band No.	Center Wavelength (specified)	See Note 3 Band Ave. Solar Irradiance W/(m2-um)	<<<<<<<<<<<<<<< Reflectances >>>>>>>>>>>>>>> See Note 4 Reflectance @Ltyp *=[pi*Ltyp/Esun]*	See Note 4 Reflectance@Lmax *=[pi*Ltyp/Esun]*	See Note 4 Reflectance@Lsat *=*[pi*Ltyp/Esun]	NEdBRF*cos(theta_ev)/BRF*cos(theta_ev) *=BRF*COS(theta_ev)*(NEdL/Ltyp)*	See Note 5	<<<<<<<<<<<<<<< Cloud Radiances >>>>>>>>>>>>>>> Lcloud_spec W/(m2-sr-um)	Lcloud/Ltyp (specified)	Lcloud/Lsat (specified)
1	645	1599.947	0.0428	1.3450	1.5555		3.32E-04	457	21	0.58
2	858	987.068	0.0786	0.9071	1.0490		3.91E-04	293	12	0.89
3	469	2014.191	0.0551	0.9249	1.0696		2.26E-04	570	16	0.83
4	555	1857.836	0.0490	0.8759	1.0130		2.15E-04	559	19	0.93
5	1240	474.631	0.0357	0.7281	0.8420		4.83E-04	138	26	1.08
6	1640	246.000	0.0932	0.8939	1.0338		3.45E-04	68	9	0.84
7	2130	246.000	0.0128	0.2810	0.3249		1.15E-04	27	27	1.06
8	412	1705.351	0.0827	0.3224	0.3728		9.40E-05	573	13	2.83
9	443	1863.523	0.0706	0.2242	0.2593		8.43E-05	585	14	3.80
10	488	1918.392	0.0526	0.1654	0.1913		6.55E-05	539	17	4.61
11	531	1885.393	0.0465	0.1366	0.1580		6.17E-05	538	19	5.67
12	551	1870.995	0.0353	0.1075	0.1243		4.70E-05	528	25	7.13
13	667	1549.518	0.0193	0.0649	0.0750		2.11E-05	471	50	12.73
14	678	1505.705	0.0182	0.0647	0.0748		1.67E-05	440	51	12.27
15	748	1274.955	0.0251	0.0641	0.0741		4.19E-05	373	37	12.41
16	869	969.652	0.0201	0.0518	0.0599		3.89E-05	286	46	15.46
17	905	897.366	0.0350	0.6477	0.7490		2.10E-04	252	25	1.18
18	936	814.279	0.0139	0.9877	1.1422		2.43E-04	267	74	0.90
19	940	812.947	0.0580	0.7304	0.8447		2.32E-04	244	16	1.12
26	1375	365.581	0.0516	0.7734	0.8944		3.44E-04	113	19	1.09

Reflectance Bands 1-19, 26 (VIS, NIR and SWIR)

By Ascending Wavelength

Band No.	Center Wavelength (specified)	Pixel Size (m)	FWHM Bandwidth (nm) (specified)	<<<<<<<<<<<<<<< See Note 1 Ltyp_spec W/(m2-sr-um) (specified)	Radiances See Note 1 Lmax_spec W/(m2-sr-um) (DN=3506.4)	>>>>>>>>>>>>>>> Lsat(DN=4096) W/(m2-sr-um)	See Note 2 DN@Ltyp per Target Gain*	NEdL W/(m2-sr-um) (specified)	NEdL (%of Ltyp)	SNR@Ltyp = Ltyp/NEdL	<<<<<<<<<<<<<Gains>>>>>>>>>>>> See Note 2 Target Gain* DN*(m2-sr-um)/W	FPM Measured Gain (PL3095-N06314)
8	412	1000	15.0	44.9	175	202	908.7	0.0510	0.11%	880.4	20.24	TBD
9	443	1000	10.0	41.9	133	154	1115.8	0.0500	0.12%	838.0	26.63	TBD
3	469	500	20.0	35.3	593	686	210.8	0.1450	0.41%	243.4	5.97	TBD
10	488	1000	10.0	32.1	101	117	1125.7	0.0400	0.12%	802.5	35.07	TBD
11	531	1000	10.0	27.9	82	95	1205.1	0.0370	0.13%	754.1	43.19	TBD
12	551	1000	10.0	21.0	64	74	1162.2	0.0280	0.13%	750.0	55.34	TBD
4	555	500	20.0	29.0	518	599	198.3	0.1270	0.44%	228.3	6.84	TBD
1	645	250	50.0	21.8	685	792	112.7	0.1690	0.78%	129.0	5.17	TBD
13	667	1000 w/TDI	10.0	9.5	32	37	1051.5	0.0104	0.11%	913.5	110.68	TBD
14	678	1000 w/TDI	10.0	8.7	31	36	994.0	0.0080	0.09%	1087.5	114.25	TBD
15	748	1000	10.0	10.2	26	30	1389.5	0.0170	0.17%	600.0	136.22	TBD
2	858	250	35.0	24.7	285	330	307.0	0.1230	0.50%	200.8	12.43	TBD
16	869	1000	15.0	6.2	16	19	1372.5	0.0120	0.19%	516.7	221.36	TBD
17	905	1000	30.0	10.0	185	214	191.4	0.0600	0.60%	166.7	19.14	TBD
18	936	1000	50.0	3.6	256	296	49.8	0.0630	1.75%	57.1	13.84	TBD
19	940	1000	15.0	15.0	189	219	281.1	0.0600	0.40%	250.0	18.74	TBD
5	1240	500	20.0	5.4	110	127	173.9	0.0730	1.35%	74.0	32.20	TBD
26	1375	1000	30.0	6.0	90	104	236.1	0.0400	0.67%	150.0	39.35	TBD
6	1640	500	24.6	7.3	70	81	369.4	0.0270	0.37%	270.4	50.60	TBD
7	2130	500	50.0	1.0	22	25	161.0	0.0090	0.90%	111.1	160.99	TBD

Band No.	Center Wavelength (specified)	See Note 3 Band Ave. Solar Irrandiance W/(m2-um)	<<<<<<<<<<<<<<< See Note 4 Reflectance @Ltyp *=[pi*Ltyp/Esun]*	Reflectances See Note 4 Reflectance@Lmax =[pi*Lmax/Esun]*	>>>>>>>>>>>>>>> See Note 4 Reflectance@Lsat *=[pi*Lsat/Esun]*	NEdBRF*cos(theta_ev)/BRF*cos(theta_ev) * =BRF*COS(theta_ev)*(NEdL/Ltyp)*	See Note 5	<<<<<<<<<<<<<<< Lcloud_spec W/(m2-sr-um)	Cloud Radiances>>>>>>>>>>>>>> Lcloud/Ltyp (specified)	Lcloud/Lsat (specified)
8	412	1705.351	0.0827	0.3224	0.3728		9.40E-05	573	13	2.83
9	443	1863.523	0.0706	0.2242	0.2593		8.43E-05	585	14	3.80
3	469	2014.191	0.0551	0.9249	1.0696		2.26E-04	570	16	0.83
10	488	1918.392	0.0526	0.1654	0.1913		6.55E-05	539	17	4.61
11	531	1885.393	0.0465	0.1366	0.1580		6.17E-05	538	19	5.67
12	551	1870.995	0.0353	0.1075	0.1243		4.70E-05	528	25	7.13
4	555	1857.836	0.0490	0.8759	1.0130		2.15E-04	559	19	0.93
1	645	1599.947	0.0428	1.3450	1.5555		3.32E-04	457	21	0.58
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14	678	1505.705	0.0182	0.0647	0.0748		1.67E-05	440	51	12.27
15	748	1274.955	0.0251	0.0641	0.0741		4.19E-05	373	37	12.41
2	858	987.068	0.0786	0.9071	1.0490		3.91E-04	293	12	0.89
16	869	969.652	0.0201	0.0518	0.0599		3.89E-05	286	46	15.46
17	905	897.366	0.0350	0.6477	0.7490		2.10E-04	252	25	1.18
18	936	814.279	0.0139	0.9877	1.1422		2.43E-04	267	74	0.90
19	940	812.947	0.0580	0.7304	0.8447		2.32E-04	244	16	1.12
5	1240	474.631	0.0357	0.7281	0.8420		4.83E-04	138	26	1.08
26	1375	365.581	0.0516	0.7734	0.8944		3.44E-04	113	19	1.09
6	1640	246.000	0.0932	0.8939	1.0338		3.45E-04	68	9	0.84
7	2130	246.000	0.0128	0.2810	0.3249		1.15E-04	27	27	1.06

VIS_NIR_SWIR Notes

Note 1: Ltyp and Lmax_spec are values taken directly from the GSFC Specification for the MODIS, page 3-11.

Note 2: Target Gain is set via:

Target Gain = (4096-200)/(1.1*Lmax_spec)

Note 3: Band averaged, Top of the Atmosphere (TOA), solar irradiance (Esun) values (W/(m2-um)) taken from Wehrli, 1984 @ 1AU

Note 4: Wavelength Radiances (W/m2-sr-um) converted to Reflectance values (BRF) @1 AU via:

Reflectance (BRF)= pi*L[W/(m2*sr*um)]/Esun[W/(m2*um)] @1 AU = rho*cos(theta_ev)

Note 5: NEdBRF @ ltyp computed from:

NEdL_spec/Ltyp_spec = NEdBRF/BRF@Ltyp

Thermal Bands 20-25, 27-36 (MWIR, and LWIR)

Wavelength Units (um)

Band No.	Center Wavelength (nm) (specified)	Bandwidth (nm) (specified)	<<<<<<<<<<<<<<<<<<<<<<<<<<Radiances>>>>>>>>>>>>>>>>>>>>>>>>>> Note 1 Ltyp W/(m2-sr-um) (specified)	Note 1 Lmax_spec W/(m2-sr-um) (specified)	Note 2 Lmax_set W/(m2-sr-um) (>315K)	Note 3 Lsat_per_target_gain W/(m2-sr-um) (target)	<<<<<<<<<<<<<<<<<<<<<<Temperatures>>>>>>>>>>>>>>>>>>>>> Ttyp (K) (specified)	Tmax_spec per Lmax_spec (specified)	Tmax_set (K) (>315K)	Note 3 Tsat_per_target_gain DN=4096 (target)
20 PV	3750	180	0.45	1.71	1.71	1.88	300	335	335	337.81
21 PV	3959	59.4	2.38	86.00	85.45	93.99	335	500	500	506.64
22 PV	3959	59.4	0.67	1.89	1.89	2.08	300	328	328	330.85
23 PV	4050	60.8	0.79	2.16	2.16	2.38	300	328	328	330.91
24 PV	4465	65	0.17	0.34	2.42	2.66	250	264	315	317.96
25 PV	4515	67	0.59	0.88	2.57	2.82	275	285	315	318.00
27 PV	6715	360	1.16	3.21	9.71	10.68	240	271	315	319.47
28 PV	7325	300	2.18	4.46	11.08	12.19	250	275	315	319.90
29 PV	8550	300	9.58	14.54	14.55	16.01	300	324	324	330.13
30 PV	9730	300	3.69	6.34	12.61	13.87	250	275	315	321.48
31 PC	11030	500	9.55	13.25	13.26	14.58	300	324	324	331.70
32 PC	12020	500	8.94	12.10	12.10	13.31	300	324	324	332.37
33 PC	13335	300	4.52	6.56	9.50	10.45	260	285	315	323.72
34 PC	13635	300	3.76	5.02	9.19	10.11	250	268	315	323.90
35 PC	13935	300	3.11	4.42	8.88	9.77	240	261	315	324.04
36 PC	14235	300	2.08	2.96	8.58	9.44	220	238	315	324.20
31 Hi PC	11030	500	29.08	29.08	29.09	32.00	400	400	400	411.53
32 Hi PC	12030	500	25.07	25.07	25.03	27.53	400	400	400	412.47

Wavenumber Units (cm-1)

Band No.	Note 4 Band Center (cm-1) (specified)	Note 5 Bandwidth (cm-1) (specified)	<<<<<<<<<<<<<<<<<<<<<<<<<<Radiances>>>>>>>>>>>>>>>>>>>>>>>>>> Note 6 Ltyp W/(m2*sr*cm-1) (specified)	Note 6 Lmax_spec W/(m2*sr*cm-1) (specified)	Note 6 Lmax_set W/(m2*sr*cm-1) (>315K)	Note 6 Lsat_per_target_gain W/(m2*sr*cm-1) (target)	<<<<<<<<<<<<<<<<<<<<<<Temperatures>>>>>>>>>>>>>>>>>>>>> Ttyp (K) (specified)	Tmax_spec per Lmax_spec (specified)	Tmax_set (K) (>315K)	Tsat_per_target_gain DN=4096 (target)
20 PV	2666.67	128.07	0.000633	0.002405	0.002398	0.002638	300	335	335	337.81
21 PV	2525.89	37.90	0.003730	0.134794	0.133928	0.147321	335	500	500	506.64
22 PV	2525.89	37.90	0.001050	0.002962	0.002960	0.003256	300	328	328	330.85
23 PV	2469.14	37.07	0.001296	0.003543	0.003546	0.003901	300	328	328	330.91
24 PV	2239.64	32.61	0.000339	0.000678	0.004829	0.005311	250	264	315	317.96
25 PV	2214.84	32.87	0.001203	0.001794	0.005230	0.005753	275	285	315	318.00
27 PV	1489.20	79.90	0.005231	0.014474	0.043774	0.048151	240	271	315	319.47
28 PV	1365.19	55.94	0.011697	0.023930	0.059471	0.065418	250	275	315	319.90
29 PV	1169.59	41.05	0.070032	0.106291	0.106374	0.117011	300	324	324	330.13
30 PV	1027.75	31.70	0.034934	0.060023	0.119368	0.131304	250	275	315	321.48
31 PC	906.62	41.12	0.116186	0.161201	0.161274	0.177402	300	324	324	331.70
32 PC	831.95	34.62	0.129165	0.174821	0.174864	0.192350	300	324	324	332.37
33 PC	749.91	16.87	0.080376	0.116651	0.168953	0.185848	260	285	315	323.72
34 PC	733.41	16.14	0.069903	0.093328	0.170865	0.187952	250	268	315	323.90
35 PC	717.62	15.45	0.060391	0.085829	0.172505	0.189755	240	261	315	324.04
36 PC	702.49	14.81	0.042148	0.059980	0.173888	0.191276	220	238	315	324.20
31 Hi PC	906.62	41.12	0.353790	0.353790	0.353943	0.389338	400	400	400	411.53
32 Hi PC	831.26	34.56	0.362815	0.362815	0.362257	0.398482	400	400	400	412.47

Note: Percentage differences between the target gains and the actual gains are expected. Gains for most PC bands are expected to be lower than target values.

Thermal Bands 20-25, 27-36 (MWIR, and LWIR) - continued

Wavelength Units (um)

Band No.	NEdL W/(m2-sr-um) (specified)	NEdL (%of Ltyp) (specified)	NEdT (K)	SNR@Ltyp = Ltyp/NEdL (specified)	NEdL W/(m2-sr-um) (measured)	SNR@Ltyp = Ltyp/NEdL (measured)	<<<<<<<<<<<<<Gains>>>>>>>>>>>>>> Note 3 Target Gain* DN*(m2-sr-um)/W	PFM Measured Gain (PL3095-N06314)
20	0.000957	0.21%	0.05	470.2	TBD	TBD	2076.71	TBD
21	0.015000	0.63%	2.00	158.7	TBD	TBD	41.45	TBD
22	0.001900	0.28%	0.07	352.6	TBD	TBD	1875.48	TBD
23	0.002170	0.27%	0.07	364.1	TBD	TBD	1638.10	TBD
24	0.002180	1.28%	0.25	78.0	TBD	TBD	1462.36	TBD
25	0.006200	1.05%	0.25	95.2	TBD	TBD	1380.49	TBD
27	0.010800	0.93%	0.25	107.4	TBD	TBD	364.84	TBD
28	0.017200	0.79%	0.28	126.7	TBD	TBD	319.55	TBD
29	0.008990	0.09%	0.05	1065.6	TBD	TBD	243.40	TBD
30	0.021900	0.59%	0.25	168.5	TBD	TBD	280.91	TBD
31	0.007010	0.07%	0.05	1362.3	TBD	TBD	267.19	TBD
32	0.006060	0.07%	0.05	1475.2	TBD	TBD	292.64	TBD
33	0.018300	0.40%	0.25	247.0	TBD	TBD	372.77	TBD
34	0.016100	0.43%	0.25	233.5	TBD	TBD	385.37	TBD
35	0.014100	0.45%	0.25	220.6	TBD	TBD	398.69	TBD
36	0.015400	0.74%	0.35	135.1	TBD	TBD	412.74	TBD
31 Hi	0.247000	0.85%	1.00	117.7	TBD	TBD	121.74	TBD
32 Hi	0.198000	0.79%	1.00	126.6	TBD	TBD	141.50	TBD

Wavenumber Units (cm-1)

Band No.	Note 6 NEdL W/(m2*sr*cm-1) (specified)	NEdL (%of Ltyp) (specified)	NEdT (K)	SNR@Ltyp = Ltyp/NEdL (specified)	NEdL W/(m2-sr-um) (measured)	SNR@Ltyp = Ltyp/NEdL (measured)	<<<<<<<<<<<<<Gains>>>>>>>>>>>>>> Note 3 Target Gain* DN^(m2*sr*cm-1)/W	PFM Measured Gain (PL3095-N06314)
20	1.35E-06	0.21%	0.05	470.2	TBD	TBD	1476772.31	TBD
21	2.35E-05	0.63%	2.00	158.7	TBD	TBD	26445.66	TBD
22	2.98E-06	0.28%	0.07	352.6	TBD	TBD	1196581.08	TBD
23	3.56E-06	0.27%	0.07	364.1	TBD	TBD	998687.71	TBD
24	4.35E-06	1.28%	0.25	78.0	TBD	TBD	733516.94	TBD
25	1.26E-05	1.05%	0.25	95.2	TBD	TBD	677201.98	TBD
27	4.87E-05	0.93%	0.25	107.4	TBD	TBD	80911.47	TBD
28	9.23E-05	0.79%	0.28	126.7	TBD	TBD	59555.68	TBD
29	6.57E-05	0.09%	0.05	1065.6	TBD	TBD	33295.88	TBD
30	2.07E-04	0.59%	0.25	168.5	TBD	TBD	29671.51	TBD
31	8.53E-05	0.07%	0.05	1362.3	TBD	TBD	21961.46	TBD
32	8.76E-05	0.07%	0.05	1475.2	TBD	TBD	20254.73	TBD
33	3.25E-04	0.40%	0.25	247.0	TBD	TBD	20963.33	TBD
34	2.99E-04	0.43%	0.25	233.5	TBD	TBD	20728.71	TBD
35	2.74E-04	0.45%	0.25	220.6	TBD	TBD	20531.70	TBD
36	3.12E-04	0.74%	0.35	135.1	TBD	TBD	20368.42	TBD
31 Hi	3.01E-03	0.85%	1.00	117.7	TBD	TBD	10006.74	TBD
32 Hi	2.87E-03	0.79%	1.00	126.6	TBD	TBD	9777.10	TBD

Note: Percentage differences between the target gains and the actual gains are expected. Gains for most PC bands are expected to be lower than target values.

MWIR_ LWIR Notes

Note 1: Ltyp and Lmax_spec are values taken directly from the GSFC Specification for the MODIS, page 3-12.

Note 2: LmaX_set are radiances values used to set the thermal band gains. It is equal to the larger of Lmax_spec or 315K.

Note 3: Target gain is set via:

Target Gain = (4096-200)/(1.1*Lmax_set)

Note 4: Spectral Band Center (cm-1) determined from specified Center Wavelength (nm) via:

Spectral Band Center (cm-1) = 10,000,000/CW(nm)

Note 5: Bandwidths (cm-1) are determined from specified Bandwidths (nm) via:

BW(cm-1) =10,000,000/[1/(CW-BW/2)-1/(CW+BW/2]

Where:

CW = specified center wavelength (nm)

BW = specified bandwidth (nm)

Note 6: Wave Number Radiances (W/(m2*sr*cm-1) are converted to Wavelength Radiances via:

L_nu [W/(m2*sr*cm-1)] = L_lambda[W/(m2*sr*um)]*CW(nm)/(1000*cbw(cm-1))

Where:

CW = specified center wavelength (nm)

cw = specified center wavelength (cm-1)