

Antenna Gain Over Frequency

11/19/2024

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Test Description:

Connect the DUT's antenna to a coax cable, and connect the coax cable to a spectrum analyzer.

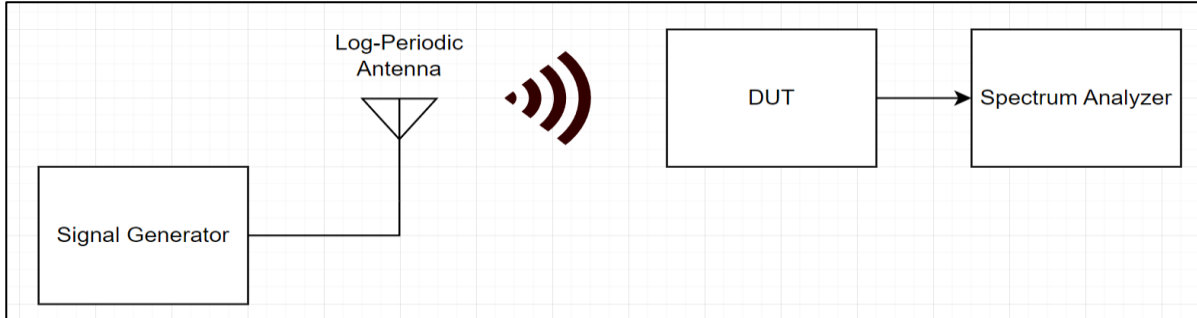
Connect a log-periodic antenna with flat gain around 433.92 MHz to a signal generator and point towards the DUT.

Measure transmitted signal vs. frequency with the spectrum analyzer, and use gain pattern measurements to calculate gain vs frequency.

Coax cable connected to antenna leads, disconnected from RF transmitter



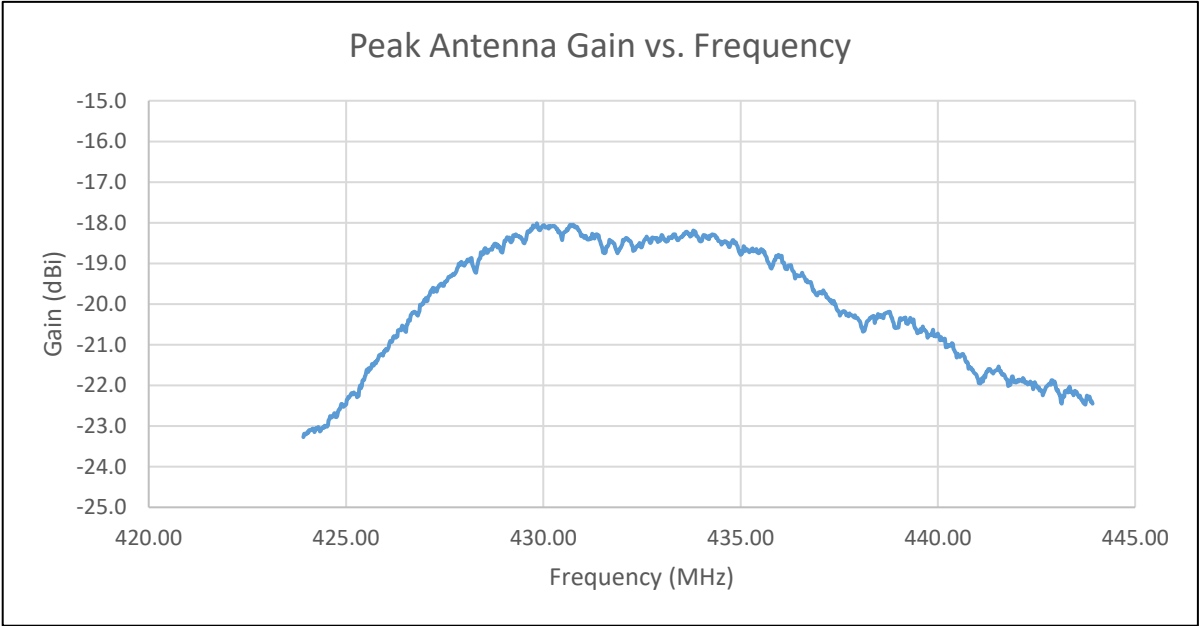
System setup



433.92 MHz Peak Gain:
Measured Signal at 433.92 MHz:

-18.3 dBi

-33.60 dBm



Raw Data Collected:

Frequency (Hz)	Frequency (MHz)	Measured Signal (dBm)	Gain (dBi)
423920000	423.92	-38.6	-23.3
423940000	423.94	-38.5	-23.2
423960000	423.96	-38.5	-23.2
423980000	423.98	-38.5	-23.2
424000000	424.00	-38.5	-23.2
424020000	424.02	-38.5	-23.2
424040000	424.04	-38.5	-23.2
424060000	424.06	-38.4	-23.1
424080000	424.08	-38.4	-23.1
424100000	424.10	-38.4	-23.1
424120000	424.12	-38.4	-23.1
424140000	424.14	-38.4	-23.1
424160000	424.16	-38.4	-23.1
424180000	424.18	-38.4	-23.1
424200000	424.20	-38.4	-23.1
424220000	424.22	-38.4	-23.1
424240000	424.24	-38.3	-23.0
424260000	424.26	-38.4	-23.1
424280000	424.28	-38.3	-23.0
424300000	424.30	-38.3	-23.0
424320000	424.32	-38.4	-23.1
424340000	424.34	-38.4	-23.1
424360000	424.36	-38.4	-23.1
424380000	424.38	-38.4	-23.1
424400000	424.40	-38.3	-23.0
424420000	424.42	-38.3	-23.0
424440000	424.44	-38.3	-23.0
424460000	424.46	-38.3	-23.0
424480000	424.48	-38.3	-23.0
424500000	424.50	-38.3	-23.0
424520000	424.52	-38.3	-23.0
424540000	424.54	-38.3	-23.0
424560000	424.56	-38.2	-22.9
424580000	424.58	-38.1	-22.8
424600000	424.60	-38.1	-22.8
424620000	424.62	-38.1	-22.8
424640000	424.64	-38.1	-22.8
424660000	424.66	-38.1	-22.8
424680000	424.68	-38.1	-22.8
424700000	424.70	-38.0	-22.7
424720000	424.72	-38.0	-22.7
424740000	424.74	-38.1	-22.8
424760000	424.76	-38.1	-22.8
424780000	424.78	-38.0	-22.7
424800000	424.80	-37.9	-22.6
424820000	424.82	-37.9	-22.6
424840000	424.84	-37.9	-22.6
424860000	424.86	-37.8	-22.5
424880000	424.88	-37.8	-22.5
424900000	424.90	-37.8	-22.5
424920000	424.92	-37.8	-22.5
424940000	424.94	-37.8	-22.5
424960000	424.96	-37.8	-22.5

424980000	424.98	-37.8	-22.5
425000000	425.00	-37.8	-22.5
425020000	425.02	-37.7	-22.4
425040000	425.04	-37.6	-22.3
425060000	425.06	-37.6	-22.3
425080000	425.08	-37.6	-22.3
425100000	425.10	-37.6	-22.3
425120000	425.12	-37.5	-22.2
425140000	425.14	-37.5	-22.2
425160000	425.16	-37.5	-22.2
425180000	425.18	-37.5	-22.2
425200000	425.20	-37.5	-22.2
425220000	425.22	-37.5	-22.2
425240000	425.24	-37.5	-22.2
425260000	425.26	-37.5	-22.2
425280000	425.28	-37.6	-22.3
425300000	425.30	-37.6	-22.3
425320000	425.32	-37.6	-22.3
425340000	425.34	-37.4	-22.1
425360000	425.36	-37.3	-22.0
425380000	425.38	-37.4	-22.1
425400000	425.40	-37.3	-22.0
425420000	425.42	-37.2	-21.9
425440000	425.44	-37.2	-21.9
425460000	425.46	-37.2	-21.9
425480000	425.48	-37.1	-21.8
425500000	425.50	-37.0	-21.7
425520000	425.52	-36.9	-21.6
425540000	425.54	-36.9	-21.6
425560000	425.56	-37.0	-21.7
425580000	425.58	-36.9	-21.6
425600000	425.60	-36.9	-21.6
425620000	425.62	-36.9	-21.6
425640000	425.64	-36.9	-21.6
425660000	425.66	-36.8	-21.5
425680000	425.68	-36.8	-21.5
425700000	425.70	-36.8	-21.5
425720000	425.72	-36.7	-21.4
425740000	425.74	-36.7	-21.4
425760000	425.76	-36.8	-21.5
425780000	425.78	-36.7	-21.4
425800000	425.80	-36.7	-21.4
425820000	425.82	-36.6	-21.3
425840000	425.84	-36.6	-21.3
425860000	425.86	-36.6	-21.3
425880000	425.88	-36.5	-21.2
425900000	425.90	-36.5	-21.2
425920000	425.92	-36.5	-21.2
425940000	425.94	-36.6	-21.3
425960000	425.96	-36.5	-21.2
425980000	425.98	-36.5	-21.2
426000000	426.00	-36.4	-21.1
426020000	426.02	-36.4	-21.1
426040000	426.04	-36.4	-21.1
426060000	426.06	-36.4	-21.1

426080000	426.08	-36.4	-21.1
426100000	426.10	-36.3	-21.0
426120000	426.12	-36.2	-20.9
426140000	426.14	-36.2	-20.9
426160000	426.16	-36.2	-20.9
426180000	426.18	-36.2	-20.9
426200000	426.20	-36.1	-20.8
426220000	426.22	-36.1	-20.8
426240000	426.24	-36.1	-20.8
426260000	426.26	-36.1	-20.8
426280000	426.28	-36.1	-20.8
426300000	426.30	-36.1	-20.8
426320000	426.32	-35.9	-20.6
426340000	426.34	-35.9	-20.6
426360000	426.36	-35.9	-20.6
426380000	426.38	-35.9	-20.6
426400000	426.40	-36.0	-20.7
426420000	426.42	-35.8	-20.5
426440000	426.44	-35.8	-20.5
426460000	426.46	-35.9	-20.6
426480000	426.48	-35.9	-20.6
426500000	426.50	-36.0	-20.7
426520000	426.52	-36.0	-20.7
426540000	426.54	-35.8	-20.5
426560000	426.56	-35.8	-20.5
426580000	426.58	-35.7	-20.4
426600000	426.60	-35.7	-20.4
426620000	426.62	-35.7	-20.4
426640000	426.64	-35.6	-20.3
426660000	426.66	-35.6	-20.3
426680000	426.68	-35.5	-20.2
426700000	426.70	-35.5	-20.2
426720000	426.72	-35.5	-20.2
426740000	426.74	-35.5	-20.2
426760000	426.76	-35.5	-20.2
426780000	426.78	-35.5	-20.2
426800000	426.80	-35.6	-20.3
426820000	426.82	-35.6	-20.3
426840000	426.84	-35.5	-20.2
426860000	426.86	-35.5	-20.2
426880000	426.88	-35.3	-20.0
426900000	426.90	-35.3	-20.0
426920000	426.92	-35.3	-20.0
426940000	426.94	-35.3	-20.0
426960000	426.96	-35.3	-20.0
426980000	426.98	-35.2	-19.9
427000000	427.00	-35.2	-19.9
427020000	427.02	-35.1	-19.8
427040000	427.04	-35.2	-19.9
427060000	427.06	-35.2	-19.9
427080000	427.08	-35.1	-19.8
427100000	427.10	-35.1	-19.8
427120000	427.12	-35.1	-19.8
427140000	427.14	-35.0	-19.7
427160000	427.16	-35.0	-19.7

427180000	427.18	-35.0	-19.7
427200000	427.20	-34.9	-19.6
427220000	427.22	-35.0	-19.7
427240000	427.24	-34.9	-19.6
427260000	427.26	-34.9	-19.6
427280000	427.28	-35.0	-19.7
427300000	427.30	-35.0	-19.7
427320000	427.32	-34.9	-19.6
427340000	427.34	-34.9	-19.6
427360000	427.36	-34.8	-19.5
427380000	427.38	-34.8	-19.5
427400000	427.40	-34.8	-19.5
427420000	427.42	-34.8	-19.5
427440000	427.44	-34.8	-19.5
427460000	427.46	-34.8	-19.5
427480000	427.48	-34.8	-19.5
427500000	427.50	-34.8	-19.5
427520000	427.52	-34.8	-19.5
427540000	427.54	-34.7	-19.4
427560000	427.56	-34.7	-19.4
427580000	427.58	-34.7	-19.4
427600000	427.60	-34.6	-19.3
427620000	427.62	-34.6	-19.3
427640000	427.64	-34.6	-19.3
427660000	427.66	-34.6	-19.3
427680000	427.68	-34.6	-19.3
427700000	427.70	-34.6	-19.3
427720000	427.72	-34.6	-19.3
427740000	427.74	-34.6	-19.3
427760000	427.76	-34.6	-19.3
427780000	427.78	-34.5	-19.2
427800000	427.80	-34.5	-19.2
427820000	427.82	-34.4	-19.1
427840000	427.84	-34.4	-19.1
427860000	427.86	-34.3	-19.0
427880000	427.88	-34.3	-19.0
427900000	427.90	-34.3	-19.0
427920000	427.92	-34.3	-19.0
427940000	427.94	-34.3	-19.0
427960000	427.96	-34.3	-19.0
427980000	427.98	-34.3	-19.0
428000000	428.00	-34.4	-19.1
428020000	428.02	-34.3	-19.0
428040000	428.04	-34.3	-19.0
428060000	428.06	-34.3	-19.0
428080000	428.08	-34.2	-18.9
428100000	428.10	-34.2	-18.9
428120000	428.12	-34.2	-18.9
428140000	428.14	-34.3	-19.0
428160000	428.16	-34.2	-18.9
428180000	428.18	-34.2	-18.9
428200000	428.20	-34.3	-19.0
428220000	428.22	-34.4	-19.1
428240000	428.24	-34.4	-19.1
428260000	428.26	-34.5	-19.2

428280000	428.28	-34.5	-19.2
428300000	428.30	-34.5	-19.2
428320000	428.32	-34.4	-19.1
428340000	428.34	-34.3	-19.0
428360000	428.36	-34.2	-18.9
428380000	428.38	-34.2	-18.9
428400000	428.40	-34.2	-18.9
428420000	428.42	-34.0	-18.7
428440000	428.44	-34.0	-18.7
428460000	428.46	-34.1	-18.8
428480000	428.48	-34.1	-18.8
428500000	428.50	-34.0	-18.7
428520000	428.52	-33.9	-18.6
428540000	428.54	-33.9	-18.6
428560000	428.56	-34.0	-18.7
428580000	428.58	-34.0	-18.7
428600000	428.60	-34.0	-18.7
428620000	428.62	-34.0	-18.7
428640000	428.64	-34.0	-18.7
428660000	428.66	-34.0	-18.7
428680000	428.68	-34.0	-18.7
428700000	428.70	-34.0	-18.7
428720000	428.72	-33.9	-18.6
428740000	428.74	-33.9	-18.6
428760000	428.76	-33.8	-18.5
428780000	428.78	-33.8	-18.5
428800000	428.80	-33.8	-18.5
428820000	428.82	-33.8	-18.5
428840000	428.84	-33.9	-18.6
428860000	428.86	-33.9	-18.6
428880000	428.88	-33.9	-18.6
428900000	428.90	-33.9	-18.6
428920000	428.92	-34.0	-18.7
428940000	428.94	-34.0	-18.7
428960000	428.96	-34.0	-18.7
428980000	428.98	-34.0	-18.7
429000000	429.00	-33.8	-18.5
429020000	429.02	-33.7	-18.4
429040000	429.04	-33.7	-18.4
429060000	429.06	-33.7	-18.4
429080000	429.08	-33.7	-18.4
429100000	429.10	-33.7	-18.4
429120000	429.12	-33.7	-18.4
429140000	429.14	-33.7	-18.4
429160000	429.16	-33.7	-18.4
429180000	429.18	-33.8	-18.5
429200000	429.20	-33.8	-18.5
429220000	429.22	-33.7	-18.4
429240000	429.24	-33.6	-18.3
429260000	429.26	-33.6	-18.3
429280000	429.28	-33.6	-18.3
429300000	429.30	-33.6	-18.3
429320000	429.32	-33.6	-18.3
429340000	429.34	-33.6	-18.3
429360000	429.36	-33.6	-18.3

429380000	429.38	-33.6	-18.3
429400000	429.40	-33.7	-18.4
429420000	429.42	-33.6	-18.3
429440000	429.44	-33.7	-18.4
429460000	429.46	-33.7	-18.4
429480000	429.48	-33.7	-18.4
429500000	429.50	-33.8	-18.5
429520000	429.52	-33.8	-18.5
429540000	429.54	-33.8	-18.5
429560000	429.56	-33.7	-18.4
429580000	429.58	-33.6	-18.3
429600000	429.60	-33.5	-18.2
429620000	429.62	-33.5	-18.2
429640000	429.64	-33.5	-18.2
429660000	429.66	-33.5	-18.2
429680000	429.68	-33.5	-18.2
429700000	429.70	-33.5	-18.2
429720000	429.72	-33.5	-18.2
429740000	429.74	-33.4	-18.1
429760000	429.76	-33.4	-18.1
429780000	429.78	-33.4	-18.1
429800000	429.80	-33.4	-18.1
429820000	429.82	-33.4	-18.1
429840000	429.84	-33.3	-18.0
429860000	429.86	-33.4	-18.1
429880000	429.88	-33.5	-18.2
429900000	429.90	-33.5	-18.2
429920000	429.92	-33.5	-18.2
429940000	429.94	-33.4	-18.1
429960000	429.96	-33.4	-18.1
429980000	429.98	-33.4	-18.1
430000000	430.00	-33.4	-18.1
430020000	430.02	-33.4	-18.1
430040000	430.04	-33.4	-18.1
430060000	430.06	-33.4	-18.1
430080000	430.08	-33.4	-18.1
430100000	430.10	-33.4	-18.1
430120000	430.12	-33.4	-18.1
430140000	430.14	-33.4	-18.1
430160000	430.16	-33.4	-18.1
430180000	430.18	-33.4	-18.1
430200000	430.20	-33.4	-18.1
430220000	430.22	-33.4	-18.1
430240000	430.24	-33.4	-18.1
430260000	430.26	-33.4	-18.1
430280000	430.28	-33.4	-18.1
430300000	430.30	-33.4	-18.1
430320000	430.32	-33.4	-18.1
430340000	430.34	-33.5	-18.2
430360000	430.36	-33.4	-18.1
430380000	430.38	-33.5	-18.2
430400000	430.40	-33.5	-18.2
430420000	430.42	-33.5	-18.2
430440000	430.44	-33.6	-18.3
430460000	430.46	-33.7	-18.4

430480000	430.48	-33.7	-18.4
430500000	430.50	-33.6	-18.3
430520000	430.52	-33.5	-18.2
430540000	430.54	-33.5	-18.2
430560000	430.56	-33.5	-18.2
430580000	430.58	-33.5	-18.2
430600000	430.60	-33.5	-18.2
430620000	430.62	-33.5	-18.2
430640000	430.64	-33.4	-18.1
430660000	430.66	-33.4	-18.1
430680000	430.68	-33.3	-18.0
430700000	430.70	-33.4	-18.1
430720000	430.72	-33.4	-18.1
430740000	430.74	-33.4	-18.1
430760000	430.76	-33.3	-18.0
430780000	430.78	-33.4	-18.1
430800000	430.80	-33.4	-18.1
430820000	430.82	-33.4	-18.1
430840000	430.84	-33.4	-18.1
430860000	430.86	-33.4	-18.1
430880000	430.88	-33.5	-18.2
430900000	430.90	-33.5	-18.2
430920000	430.92	-33.5	-18.2
430940000	430.94	-33.6	-18.3
430960000	430.96	-33.6	-18.3
430980000	430.98	-33.6	-18.3
431000000	431.00	-33.6	-18.3
431020000	431.02	-33.6	-18.3
431040000	431.04	-33.7	-18.4
431060000	431.06	-33.6	-18.3
431080000	431.08	-33.6	-18.3
431100000	431.10	-33.7	-18.4
431120000	431.12	-33.7	-18.4
431140000	431.14	-33.7	-18.4
431160000	431.16	-33.7	-18.4
431180000	431.18	-33.7	-18.4
431200000	431.20	-33.7	-18.4
431220000	431.22	-33.7	-18.4
431240000	431.24	-33.6	-18.3
431260000	431.26	-33.6	-18.3
431280000	431.28	-33.6	-18.3
431300000	431.30	-33.7	-18.4
431320000	431.32	-33.6	-18.3
431340000	431.34	-33.6	-18.3
431360000	431.36	-33.6	-18.3
431380000	431.38	-33.6	-18.3
431400000	431.40	-33.6	-18.3
431420000	431.42	-33.7	-18.4
431440000	431.44	-33.8	-18.5
431460000	431.46	-33.8	-18.5
431480000	431.48	-33.9	-18.6
431500000	431.50	-33.9	-18.6
431520000	431.52	-34.0	-18.7
431540000	431.54	-34.0	-18.7
431560000	431.56	-34.1	-18.8

431580000	431.58	-34.0	-18.7
431600000	431.60	-33.9	-18.6
431620000	431.62	-33.9	-18.6
431640000	431.64	-33.9	-18.6
431660000	431.66	-33.8	-18.5
431680000	431.68	-33.7	-18.4
431700000	431.70	-33.8	-18.5
431720000	431.72	-33.8	-18.5
431740000	431.74	-33.8	-18.5
431760000	431.76	-33.8	-18.5
431780000	431.78	-33.8	-18.5
431800000	431.80	-33.8	-18.5
431820000	431.82	-33.9	-18.6
431840000	431.84	-34.0	-18.7
431860000	431.86	-34.0	-18.7
431880000	431.88	-34.0	-18.7
431900000	431.90	-34.0	-18.7
431920000	431.92	-34.0	-18.7
431940000	431.94	-33.9	-18.6
431960000	431.96	-33.9	-18.6
431980000	431.98	-33.9	-18.6
432000000	432.00	-33.8	-18.5
432020000	432.02	-33.7	-18.4
432040000	432.04	-33.7	-18.4
432060000	432.06	-33.7	-18.4
432080000	432.08	-33.7	-18.4
432100000	432.10	-33.7	-18.4
432120000	432.12	-33.7	-18.4
432140000	432.14	-33.7	-18.4
432160000	432.16	-33.7	-18.4
432180000	432.18	-33.7	-18.4
432200000	432.20	-33.7	-18.4
432220000	432.22	-33.8	-18.5
432240000	432.24	-33.8	-18.5
432260000	432.26	-33.9	-18.6
432280000	432.28	-34.0	-18.7
432300000	432.30	-34.0	-18.7
432320000	432.32	-34.0	-18.7
432340000	432.34	-33.9	-18.6
432360000	432.36	-33.9	-18.6
432380000	432.38	-33.9	-18.6
432400000	432.40	-33.9	-18.6
432420000	432.42	-33.9	-18.6
432440000	432.44	-33.8	-18.5
432460000	432.46	-33.9	-18.6
432480000	432.48	-33.9	-18.6
432500000	432.50	-33.9	-18.6
432520000	432.52	-33.8	-18.5
432540000	432.54	-33.8	-18.5
432560000	432.56	-33.7	-18.4
432580000	432.58	-33.7	-18.4
432600000	432.60	-33.7	-18.4
432620000	432.62	-33.6	-18.3
432640000	432.64	-33.7	-18.4
432660000	432.66	-33.7	-18.4

432680000	432.68	-33.7	-18.4
432700000	432.70	-33.8	-18.5
432720000	432.72	-33.8	-18.5
432740000	432.74	-33.8	-18.5
432760000	432.76	-33.7	-18.4
432780000	432.78	-33.7	-18.4
432800000	432.80	-33.7	-18.4
432820000	432.82	-33.7	-18.4
432840000	432.84	-33.7	-18.4
432860000	432.86	-33.7	-18.4
432880000	432.88	-33.7	-18.4
432900000	432.90	-33.8	-18.5
432920000	432.92	-33.8	-18.5
432940000	432.94	-33.7	-18.4
432960000	432.96	-33.7	-18.4
432980000	432.98	-33.7	-18.4
433000000	433.00	-33.6	-18.3
433020000	433.02	-33.6	-18.3
433040000	433.04	-33.7	-18.4
433060000	433.06	-33.7	-18.4
433080000	433.08	-33.7	-18.4
433100000	433.10	-33.8	-18.5
433120000	433.12	-33.8	-18.5
433140000	433.14	-33.7	-18.4
433160000	433.16	-33.7	-18.4
433180000	433.18	-33.7	-18.4
433200000	433.20	-33.7	-18.4
433220000	433.22	-33.7	-18.4
433240000	433.24	-33.7	-18.4
433260000	433.26	-33.7	-18.4
433280000	433.28	-33.6	-18.3
433300000	433.30	-33.6	-18.3
433320000	433.32	-33.6	-18.3
433340000	433.34	-33.6	-18.3
433360000	433.36	-33.7	-18.4
433380000	433.38	-33.7	-18.4
433400000	433.40	-33.7	-18.4
433420000	433.42	-33.7	-18.4
433440000	433.44	-33.7	-18.4
433460000	433.46	-33.7	-18.4
433480000	433.48	-33.7	-18.4
433500000	433.50	-33.6	-18.3
433520000	433.52	-33.6	-18.3
433540000	433.54	-33.6	-18.3
433560000	433.56	-33.6	-18.3
433580000	433.58	-33.6	-18.3
433600000	433.60	-33.5	-18.2
433620000	433.62	-33.5	-18.2
433640000	433.64	-33.5	-18.2
433660000	433.66	-33.5	-18.2
433680000	433.68	-33.6	-18.3
433700000	433.70	-33.6	-18.3
433720000	433.72	-33.6	-18.3
433740000	433.74	-33.6	-18.3
433760000	433.76	-33.6	-18.3

433780000	433.78	-33.6	-18.3
433800000	433.80	-33.5	-18.2
433820000	433.82	-33.6	-18.3
433840000	433.84	-33.5	-18.2
433860000	433.86	-33.5	-18.2
433880000	433.88	-33.6	-18.3
433900000	433.90	-33.6	-18.3
433920000	433.92	-33.6	-18.3
433940000	433.94	-33.7	-18.4
433960000	433.96	-33.7	-18.4
433980000	433.98	-33.8	-18.5
434000000	434.00	-33.8	-18.5
434020000	434.02	-33.7	-18.4
434040000	434.04	-33.6	-18.3
434060000	434.06	-33.6	-18.3
434080000	434.08	-33.6	-18.3
434100000	434.10	-33.6	-18.3
434120000	434.12	-33.6	-18.3
434140000	434.14	-33.7	-18.4
434160000	434.16	-33.6	-18.3
434180000	434.18	-33.7	-18.4
434200000	434.20	-33.7	-18.4
434220000	434.22	-33.6	-18.3
434240000	434.24	-33.6	-18.3
434260000	434.26	-33.6	-18.3
434280000	434.28	-33.6	-18.3
434300000	434.30	-33.6	-18.3
434320000	434.32	-33.6	-18.3
434340000	434.34	-33.6	-18.3
434360000	434.36	-33.6	-18.3
434380000	434.38	-33.7	-18.4
434400000	434.40	-33.7	-18.4
434420000	434.42	-33.7	-18.4
434440000	434.44	-33.8	-18.5
434460000	434.46	-33.8	-18.5
434480000	434.48	-33.8	-18.5
434500000	434.50	-33.8	-18.5
434520000	434.52	-33.8	-18.5
434540000	434.54	-33.8	-18.5
434560000	434.56	-33.8	-18.5
434580000	434.58	-33.8	-18.5
434600000	434.60	-33.8	-18.5
434620000	434.62	-33.8	-18.5
434640000	434.64	-33.8	-18.5
434660000	434.66	-33.8	-18.5
434680000	434.68	-33.8	-18.5
434700000	434.70	-33.9	-18.6
434720000	434.72	-33.9	-18.6
434740000	434.74	-33.9	-18.6
434760000	434.76	-33.8	-18.5
434780000	434.78	-33.8	-18.5
434800000	434.80	-33.7	-18.4
434820000	434.82	-33.7	-18.4
434840000	434.84	-33.8	-18.5
434860000	434.86	-33.8	-18.5

434880000	434.88	-33.8	-18.5
434900000	434.90	-33.8	-18.5
434920000	434.92	-33.9	-18.6
434940000	434.94	-33.9	-18.6
434960000	434.96	-34.0	-18.7
434980000	434.98	-34.0	-18.7
435000000	435.00	-34.1	-18.8
435020000	435.02	-34.0	-18.7
435040000	435.04	-34.1	-18.8
435060000	435.06	-34.0	-18.7
435080000	435.08	-33.9	-18.6
435100000	435.10	-33.9	-18.6
435120000	435.12	-34.0	-18.7
435140000	435.14	-34.0	-18.7
435160000	435.16	-34.0	-18.7
435180000	435.18	-34.0	-18.7
435200000	435.20	-34.0	-18.7
435220000	435.22	-34.0	-18.7
435240000	435.24	-34.0	-18.7
435260000	435.26	-34.0	-18.7
435280000	435.28	-33.9	-18.6
435300000	435.30	-33.9	-18.6
435320000	435.32	-34.0	-18.7
435340000	435.34	-34.0	-18.7
435360000	435.36	-34.0	-18.7
435380000	435.38	-34.0	-18.7
435400000	435.40	-34.0	-18.7
435420000	435.42	-34.0	-18.7
435440000	435.44	-34.0	-18.7
435460000	435.46	-34.1	-18.8
435480000	435.48	-34.0	-18.7
435500000	435.50	-34.0	-18.7
435520000	435.52	-33.9	-18.6
435540000	435.54	-34.0	-18.7
435560000	435.56	-34.0	-18.7
435580000	435.58	-34.0	-18.7
435600000	435.60	-34.0	-18.7
435620000	435.62	-34.1	-18.8
435640000	435.64	-34.1	-18.8
435660000	435.66	-34.2	-18.9
435680000	435.68	-34.2	-18.9
435700000	435.70	-34.3	-19.0
435720000	435.72	-34.3	-19.0
435740000	435.74	-34.3	-19.0
435760000	435.76	-34.4	-19.1
435780000	435.78	-34.4	-19.1
435800000	435.80	-34.4	-19.1
435820000	435.82	-34.3	-19.0
435840000	435.84	-34.3	-19.0
435860000	435.86	-34.2	-18.9
435880000	435.88	-34.2	-18.9
435900000	435.90	-34.1	-18.8
435920000	435.92	-34.1	-18.8
435940000	435.94	-34.1	-18.8
435960000	435.96	-34.1	-18.8

435980000	435.98	-34.1	-18.8
436000000	436.00	-34.1	-18.8
436020000	436.02	-34.1	-18.8
436040000	436.04	-34.1	-18.8
436060000	436.06	-34.3	-19.0
436080000	436.08	-34.3	-19.0
436100000	436.10	-34.3	-19.0
436120000	436.12	-34.4	-19.1
436140000	436.14	-34.4	-19.1
436160000	436.16	-34.4	-19.1
436180000	436.18	-34.4	-19.1
436200000	436.20	-34.4	-19.1
436220000	436.22	-34.4	-19.1
436240000	436.24	-34.4	-19.1
436260000	436.26	-34.4	-19.1
436280000	436.28	-34.3	-19.0
436300000	436.30	-34.4	-19.1
436320000	436.32	-34.5	-19.2
436340000	436.34	-34.5	-19.2
436360000	436.36	-34.5	-19.2
436380000	436.38	-34.7	-19.4
436400000	436.40	-34.6	-19.3
436420000	436.42	-34.6	-19.3
436440000	436.44	-34.6	-19.3
436460000	436.46	-34.6	-19.3
436480000	436.48	-34.6	-19.3
436500000	436.50	-34.6	-19.3
436520000	436.52	-34.6	-19.3
436540000	436.54	-34.6	-19.3
436560000	436.56	-34.5	-19.2
436580000	436.58	-34.6	-19.3
436600000	436.60	-34.6	-19.3
436620000	436.62	-34.6	-19.3
436640000	436.64	-34.7	-19.4
436660000	436.66	-34.7	-19.4
436680000	436.68	-34.7	-19.4
436700000	436.70	-34.8	-19.5
436720000	436.72	-34.8	-19.5
436740000	436.74	-34.8	-19.5
436760000	436.76	-34.8	-19.5
436780000	436.78	-34.8	-19.5
436800000	436.80	-34.8	-19.5
436820000	436.82	-34.9	-19.6
436840000	436.84	-35.0	-19.7
436860000	436.86	-35.0	-19.7
436880000	436.88	-35.0	-19.7
436900000	436.90	-35.0	-19.7
436920000	436.92	-35.1	-19.8
436940000	436.94	-35.1	-19.8
436960000	436.96	-35.0	-19.7
436980000	436.98	-35.0	-19.7
437000000	437.00	-35.0	-19.7
437020000	437.02	-35.0	-19.7
437040000	437.04	-35.0	-19.7
437060000	437.06	-35.0	-19.7

437080000	437.08	-35.0	-19.7
437100000	437.10	-35.0	-19.7
437120000	437.12	-35.0	-19.7
437140000	437.14	-35.0	-19.7
437160000	437.16	-35.0	-19.7
437180000	437.18	-35.1	-19.8
437200000	437.20	-35.1	-19.8
437220000	437.22	-35.2	-19.9
437240000	437.24	-35.2	-19.9
437260000	437.26	-35.2	-19.9
437280000	437.28	-35.2	-19.9
437300000	437.30	-35.2	-19.9
437320000	437.32	-35.3	-20.0
437340000	437.34	-35.2	-19.9
437360000	437.36	-35.2	-19.9
437380000	437.38	-35.3	-20.0
437400000	437.40	-35.3	-20.0
437420000	437.42	-35.4	-20.1
437440000	437.44	-35.4	-20.1
437460000	437.46	-35.5	-20.2
437480000	437.48	-35.5	-20.2
437500000	437.50	-35.5	-20.2
437520000	437.52	-35.6	-20.3
437540000	437.54	-35.5	-20.2
437560000	437.56	-35.5	-20.2
437580000	437.58	-35.5	-20.2
437600000	437.60	-35.5	-20.2
437620000	437.62	-35.5	-20.2
437640000	437.64	-35.5	-20.2
437660000	437.66	-35.5	-20.2
437680000	437.68	-35.6	-20.3
437700000	437.70	-35.6	-20.3
437720000	437.72	-35.6	-20.3
437740000	437.74	-35.6	-20.3
437760000	437.76	-35.5	-20.2
437780000	437.78	-35.6	-20.3
437800000	437.80	-35.6	-20.3
437820000	437.82	-35.6	-20.3
437840000	437.84	-35.6	-20.3
437860000	437.86	-35.6	-20.3
437880000	437.88	-35.6	-20.3
437900000	437.90	-35.6	-20.3
437920000	437.92	-35.6	-20.3
437940000	437.94	-35.6	-20.3
437960000	437.96	-35.6	-20.3
437980000	437.98	-35.7	-20.4
438000000	438.00	-35.7	-20.4
438020000	438.02	-35.7	-20.4
438040000	438.04	-35.8	-20.5
438060000	438.06	-35.9	-20.6
438080000	438.08	-35.9	-20.6
438100000	438.10	-36.0	-20.7
438120000	438.12	-36.0	-20.7
438140000	438.14	-36.0	-20.7
438160000	438.16	-35.9	-20.6

438180000	438.18	-35.8	-20.5
438200000	438.20	-35.7	-20.4
438220000	438.22	-35.7	-20.4
438240000	438.24	-35.7	-20.4
438260000	438.26	-35.7	-20.4
438280000	438.28	-35.6	-20.3
438300000	438.30	-35.6	-20.3
438320000	438.32	-35.6	-20.3
438340000	438.34	-35.6	-20.3
438360000	438.36	-35.6	-20.3
438380000	438.38	-35.6	-20.3
438400000	438.40	-35.8	-20.5
438420000	438.42	-35.7	-20.4
438440000	438.44	-35.7	-20.4
438460000	438.46	-35.6	-20.3
438480000	438.48	-35.5	-20.2
438500000	438.50	-35.6	-20.3
438520000	438.52	-35.6	-20.3
438540000	438.54	-35.6	-20.3
438560000	438.56	-35.6	-20.3
438580000	438.58	-35.6	-20.3
438600000	438.60	-35.6	-20.3
438620000	438.62	-35.7	-20.4
438640000	438.64	-35.5	-20.2
438660000	438.66	-35.5	-20.2
438680000	438.68	-35.5	-20.2
438700000	438.70	-35.5	-20.2
438720000	438.72	-35.5	-20.2
438740000	438.74	-35.5	-20.2
438760000	438.76	-35.5	-20.2
438780000	438.78	-35.5	-20.2
438800000	438.80	-35.6	-20.3
438820000	438.82	-35.6	-20.3
438840000	438.84	-35.6	-20.3
438860000	438.86	-35.7	-20.4
438880000	438.88	-35.8	-20.5
438900000	438.90	-35.9	-20.6
438920000	438.92	-35.9	-20.6
438940000	438.94	-35.9	-20.6
438960000	438.96	-35.9	-20.6
438980000	438.98	-35.9	-20.6
439000000	439.00	-35.9	-20.6
439020000	439.02	-35.8	-20.5
439040000	439.04	-35.6	-20.3
439060000	439.06	-35.6	-20.3
439080000	439.08	-35.7	-20.4
439100000	439.10	-35.7	-20.4
439120000	439.12	-35.7	-20.4
439140000	439.14	-35.7	-20.4
439160000	439.16	-35.6	-20.3
439180000	439.18	-35.6	-20.3
439200000	439.20	-35.8	-20.5
439220000	439.22	-35.8	-20.5
439240000	439.24	-35.8	-20.5
439260000	439.26	-35.7	-20.4

439280000	439.28	-35.7	-20.4
439300000	439.30	-35.6	-20.3
439320000	439.32	-35.7	-20.4
439340000	439.34	-35.7	-20.4
439360000	439.36	-35.7	-20.4
439380000	439.38	-35.7	-20.4
439400000	439.40	-35.8	-20.5
439420000	439.42	-35.9	-20.6
439440000	439.44	-35.9	-20.6
439460000	439.46	-35.9	-20.6
439480000	439.48	-36.0	-20.7
439500000	439.50	-36.0	-20.7
439520000	439.52	-36.0	-20.7
439540000	439.54	-36.0	-20.7
439560000	439.56	-35.9	-20.6
439580000	439.58	-36.0	-20.7
439600000	439.60	-35.9	-20.6
439620000	439.62	-35.9	-20.6
439640000	439.64	-35.9	-20.6
439660000	439.66	-35.9	-20.6
439680000	439.68	-36.0	-20.7
439700000	439.70	-36.0	-20.7
439720000	439.72	-36.0	-20.7
439740000	439.74	-36.1	-20.8
439760000	439.76	-36.1	-20.8
439780000	439.78	-36.1	-20.8
439800000	439.80	-36.1	-20.8
439820000	439.82	-36.1	-20.8
439840000	439.84	-36.1	-20.8
439860000	439.86	-36.0	-20.7
439880000	439.88	-35.9	-20.6
439900000	439.90	-36.1	-20.8
439920000	439.92	-36.1	-20.8
439940000	439.94	-36.1	-20.8
439960000	439.96	-36.1	-20.8
439980000	439.98	-36.1	-20.8
440000000	440.00	-36.0	-20.7
440020000	440.02	-36.1	-20.8
440040000	440.04	-36.1	-20.8
440060000	440.06	-36.2	-20.9
440080000	440.08	-36.1	-20.8
440100000	440.10	-36.2	-20.9
440120000	440.12	-36.2	-20.9
440140000	440.14	-36.2	-20.9
440160000	440.16	-36.1	-20.8
440180000	440.18	-36.2	-20.9
440200000	440.20	-36.4	-21.1
440220000	440.22	-36.4	-21.1
440240000	440.24	-36.4	-21.1
440260000	440.26	-36.3	-21.0
440280000	440.28	-36.3	-21.0
440300000	440.30	-36.3	-21.0
440320000	440.32	-36.3	-21.0
440340000	440.34	-36.3	-21.0
440360000	440.36	-36.3	-21.0

440380000	440.38	-36.3	-21.0
440400000	440.40	-36.4	-21.1
440420000	440.42	-36.4	-21.1
440440000	440.44	-36.5	-21.2
440460000	440.46	-36.5	-21.2
440480000	440.48	-36.6	-21.3
440500000	440.50	-36.5	-21.2
440520000	440.52	-36.6	-21.3
440540000	440.54	-36.6	-21.3
440560000	440.56	-36.6	-21.3
440580000	440.58	-36.6	-21.3
440600000	440.60	-36.6	-21.3
440620000	440.62	-36.5	-21.2
440640000	440.64	-36.5	-21.2
440660000	440.66	-36.6	-21.3
440680000	440.68	-36.6	-21.3
440700000	440.70	-36.7	-21.4
440720000	440.72	-36.7	-21.4
440740000	440.74	-36.7	-21.4
440760000	440.76	-36.8	-21.5
440780000	440.78	-36.9	-21.6
440800000	440.80	-36.8	-21.5
440820000	440.82	-36.9	-21.6
440840000	440.84	-36.9	-21.6
440860000	440.86	-36.9	-21.6
440880000	440.88	-36.9	-21.6
440900000	440.90	-37.0	-21.7
440920000	440.92	-37.0	-21.7
440940000	440.94	-37.0	-21.7
440960000	440.96	-37.0	-21.7
440980000	440.98	-37.0	-21.7
441000000	441.00	-37.1	-21.8
441020000	441.02	-37.2	-21.9
441040000	441.04	-37.2	-21.9
441060000	441.06	-37.2	-21.9
441080000	441.08	-37.3	-22.0
441100000	441.10	-37.2	-21.9
441120000	441.12	-37.1	-21.8
441140000	441.14	-37.2	-21.9
441160000	441.16	-37.1	-21.8
441180000	441.18	-37.1	-21.8
441200000	441.20	-37.1	-21.8
441220000	441.22	-37.0	-21.7
441240000	441.24	-37.0	-21.7
441260000	441.26	-37.0	-21.7
441280000	441.28	-36.9	-21.6
441300000	441.30	-36.9	-21.6
441320000	441.32	-36.9	-21.6
441340000	441.34	-36.9	-21.6
441360000	441.36	-37.0	-21.7
441380000	441.38	-37.0	-21.7
441400000	441.40	-37.0	-21.7
441420000	441.42	-37.0	-21.7
441440000	441.44	-36.9	-21.6
441460000	441.46	-36.9	-21.6

441480000	441.48	-36.9	-21.6
441500000	441.50	-36.9	-21.6
441520000	441.52	-36.9	-21.6
441540000	441.54	-36.8	-21.5
441560000	441.56	-36.9	-21.6
441580000	441.58	-37.0	-21.7
441600000	441.60	-37.0	-21.7
441620000	441.62	-37.0	-21.7
441640000	441.64	-37.0	-21.7
441660000	441.66	-37.0	-21.7
441680000	441.68	-37.0	-21.7
441700000	441.70	-37.1	-21.8
441720000	441.72	-37.1	-21.8
441740000	441.74	-37.1	-21.8
441760000	441.76	-37.2	-21.9
441780000	441.78	-37.3	-22.0
441800000	441.80	-37.3	-22.0
441820000	441.82	-37.3	-22.0
441840000	441.84	-37.3	-22.0
441860000	441.86	-37.2	-21.9
441880000	441.88	-37.1	-21.8
441900000	441.90	-37.1	-21.8
441920000	441.92	-37.2	-21.9
441940000	441.94	-37.2	-21.9
441960000	441.96	-37.2	-21.9
441980000	441.98	-37.2	-21.9
442000000	442.00	-37.2	-21.9
442020000	442.02	-37.2	-21.9
442040000	442.04	-37.2	-21.9
442060000	442.06	-37.2	-21.9
442080000	442.08	-37.2	-21.9
442100000	442.10	-37.2	-21.9
442120000	442.12	-37.2	-21.9
442140000	442.14	-37.2	-21.9
442160000	442.16	-37.1	-21.8
442180000	442.18	-37.2	-21.9
442200000	442.20	-37.2	-21.9
442220000	442.22	-37.2	-21.9
442240000	442.24	-37.2	-21.9
442260000	442.26	-37.2	-21.9
442280000	442.28	-37.3	-22.0
442300000	442.30	-37.2	-21.9
442320000	442.32	-37.3	-22.0
442340000	442.34	-37.2	-21.9
442360000	442.36	-37.2	-21.9
442380000	442.38	-37.3	-22.0
442400000	442.40	-37.3	-22.0
442420000	442.42	-37.4	-22.1
442440000	442.44	-37.3	-22.0
442460000	442.46	-37.2	-21.9
442480000	442.48	-37.3	-22.0
442500000	442.50	-37.3	-22.0
442520000	442.52	-37.3	-22.0
442540000	442.54	-37.4	-22.1
442560000	442.56	-37.3	-22.0

442580000	442.58	-37.4	-22.1
442600000	442.60	-37.4	-22.1
442620000	442.62	-37.4	-22.1
442640000	442.64	-37.4	-22.1
442660000	442.66	-37.5	-22.2
442680000	442.68	-37.5	-22.2
442700000	442.70	-37.4	-22.1
442720000	442.72	-37.4	-22.1
442740000	442.74	-37.3	-22.0
442760000	442.76	-37.3	-22.0
442780000	442.78	-37.3	-22.0
442800000	442.80	-37.3	-22.0
442820000	442.82	-37.3	-22.0
442840000	442.84	-37.3	-22.0
442860000	442.86	-37.3	-22.0
442880000	442.88	-37.2	-21.9
442900000	442.90	-37.2	-21.9
442920000	442.92	-37.3	-22.0
442940000	442.94	-37.3	-22.0
442960000	442.96	-37.2	-21.9
442980000	442.98	-37.3	-22.0
443000000	443.00	-37.4	-22.1
443020000	443.02	-37.4	-22.1
443040000	443.04	-37.4	-22.1
443060000	443.06	-37.5	-22.2
443080000	443.08	-37.5	-22.2
443100000	443.10	-37.5	-22.2
443120000	443.12	-37.7	-22.4
443140000	443.14	-37.7	-22.4
443160000	443.16	-37.6	-22.3
443180000	443.18	-37.6	-22.3
443200000	443.20	-37.6	-22.3
443220000	443.22	-37.4	-22.1
443240000	443.24	-37.4	-22.1
443260000	443.26	-37.4	-22.1
443280000	443.28	-37.4	-22.1
443300000	443.30	-37.5	-22.2
443320000	443.32	-37.4	-22.1
443340000	443.34	-37.3	-22.0
443360000	443.36	-37.4	-22.1
443380000	443.38	-37.5	-22.2
443400000	443.40	-37.5	-22.2
443420000	443.42	-37.5	-22.2
443440000	443.44	-37.5	-22.2
443460000	443.46	-37.4	-22.1
443480000	443.48	-37.4	-22.1
443500000	443.50	-37.5	-22.2
443520000	443.52	-37.5	-22.2
443540000	443.54	-37.5	-22.2
443560000	443.56	-37.6	-22.3
443580000	443.58	-37.6	-22.3
443600000	443.60	-37.6	-22.3
443620000	443.62	-37.6	-22.3
443640000	443.64	-37.7	-22.4
443660000	443.66	-37.7	-22.4

443680000	443.68	-37.7	-22.4
443700000	443.70	-37.7	-22.4
443720000	443.72	-37.7	-22.4
443740000	443.74	-37.8	-22.5
443760000	443.76	-37.6	-22.3
443780000	443.78	-37.6	-22.3
443800000	443.80	-37.6	-22.3
443820000	443.82	-37.6	-22.3
443840000	443.84	-37.6	-22.3
443860000	443.86	-37.6	-22.3
443880000	443.88	-37.7	-22.4
443900000	443.90	-37.7	-22.4
443920000	443.92	-37.8	-22.5