



Certificate of Calibration

Customer Address: Rental unit

Certificate: 2312201CC

Product: Quadridge Horn Antenna

Manufacturer: The EMC Shop
 Model: 3164-10
 Serial: 00223549

Notes: 400 MHz - 10 GHz
 3 Meter Measurements

Date of Calibration: 12/20/2023
 Next Calibration: *

**The next calibration date is defined by the equipment user/owner.*

The above equipment was tested and found to be within the Manufacturer's specification at the parameters listed. The results of the tests performed are held on file at TheEMCShop.com; see the comments below. The Calibration was carried out in accordance with the general requirements of FCC Part 15 and ANSI C63.5 using laboratory standards which are traceable to the National Institute of Standards and Technology (NIST) except where none exist. Tests are carried out in environmental conditions controlled to the extent appropriate to the instrument's specification.

Calibration Equipment			
Model	Description	Serial Number	Due Date
3164-10	Quad-Ridge Reference Antenna	0021376	1/23/2024
v5.9-6e	DE Antenna Measurement Studio	Software	N/A
ETS-Lindgren	3-Meter Chamber	3492	N/A
DAMS 6100	DE Turntable	1249-3725	N/A
MS4644A	Network Analyzer	91958	5/5/2024

Ambient Conditions of Laboratory

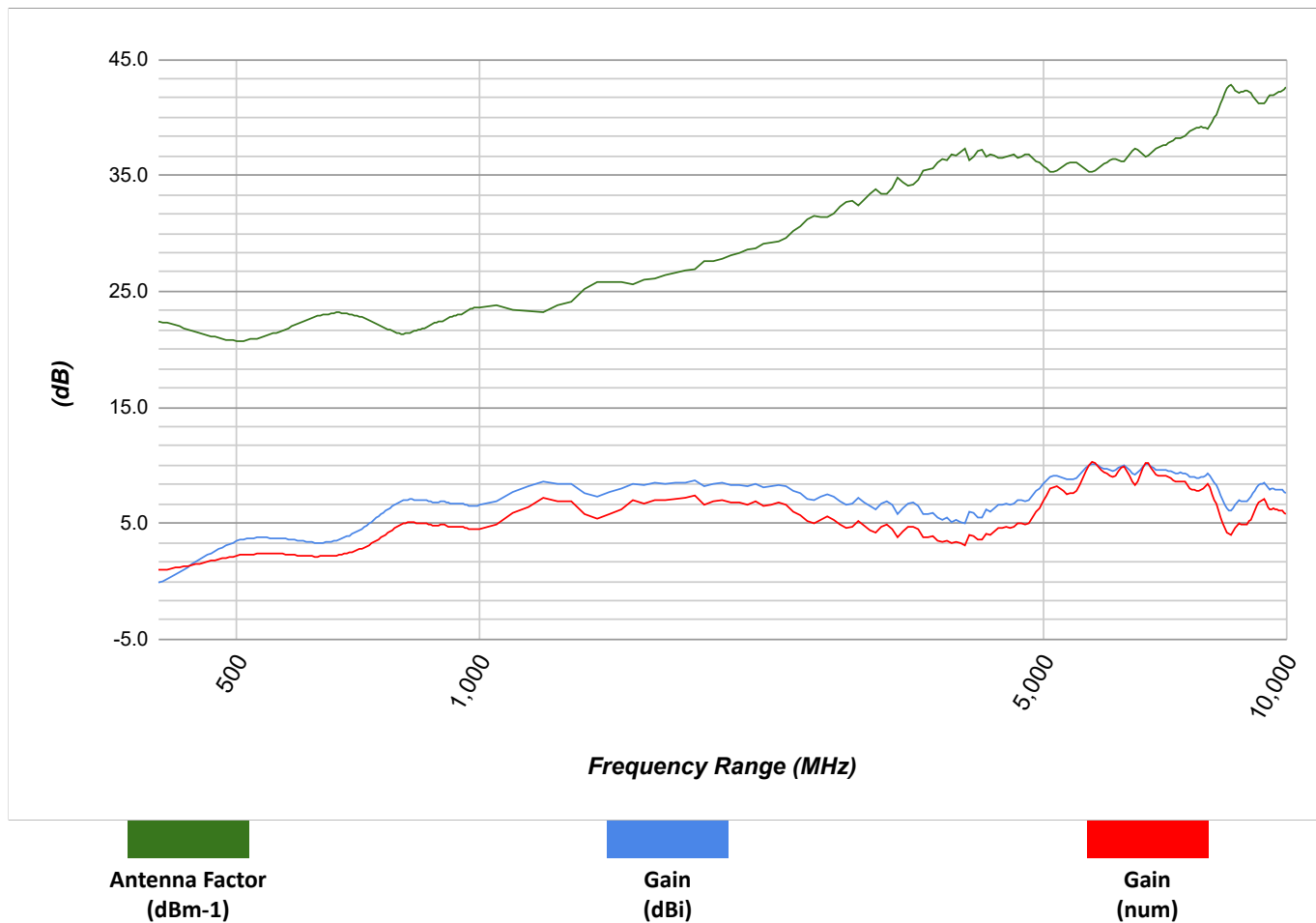
Temperature (°C): **25.4**
 Relative Humidity (%): **32**

Technician: **Caleb Crites**

Signature: *Caleb B Crites*



Horizontal Polarization at 3 Meters Chart





Horizontal Polarization at 3 Meters Data

Frequency (MHz)	AF (dBm-3)	Gain (dBi)	Gain (num)
400	22.4	-0.1	1.0
405	22.3	0.0	1.0
410	22.3	0.2	1.0
415	22.2	0.4	1.1
420	22.1	0.6	1.2
425	22.0	0.8	1.2
430	21.8	1.0	1.3
435	21.7	1.2	1.3
440	21.6	1.5	1.4
445	21.5	1.7	1.5
450	21.4	1.9	1.5
455	21.3	2.1	1.6
460	21.2	2.3	1.7
465	21.1	2.4	1.8
470	21.1	2.6	1.8
475	21.0	2.8	1.9
480	20.9	2.9	2.0
485	20.8	3.1	2.0
490	20.8	3.2	2.1
495	20.8	3.3	2.1
500	20.7	3.5	2.2
505	20.7	3.6	2.3
510	20.7	3.6	2.3
515	20.8	3.7	2.3
520	20.9	3.7	2.3
525	20.9	3.7	2.3
530	20.9	3.8	2.4
535	21.0	3.8	2.4
540	21.1	3.8	2.4
545	21.2	3.8	2.4
550	21.3	3.7	2.4
555	21.4	3.7	2.4
560	21.4	3.7	2.4
565	21.5	3.7	2.4
570	21.6	3.7	2.4
575	21.7	3.7	2.3
580	21.8	3.6	2.3
585	22.0	3.6	2.3
590	22.1	3.6	2.3

595	22.2	3.5	2.2
600	22.3	3.5	2.2
605	22.4	3.5	2.2
610	22.5	3.4	2.2
615	22.6	3.4	2.2
620	22.7	3.4	2.2
625	22.8	3.3	2.1
630	22.9	3.3	2.1
635	22.9	3.3	2.2
640	23.0	3.3	2.2
645	23.0	3.4	2.2
650	23.0	3.4	2.2
655	23.1	3.4	2.2
660	23.1	3.5	2.2
665	23.2	3.5	2.2
670	23.2	3.6	2.3
675	23.1	3.7	2.3
680	23.1	3.8	2.4
685	23.1	3.9	2.4
690	23.0	3.9	2.5
695	23.0	4.1	2.5
700	22.9	4.2	2.6
705	22.9	4.3	2.7
710	22.8	4.4	2.8
715	22.8	4.5	2.8
720	22.7	4.7	2.9
725	22.6	4.8	3.0
730	22.5	5.0	3.1
735	22.4	5.1	3.3
740	22.3	5.3	3.4
745	22.2	5.5	3.5
750	22.1	5.6	3.6
755	22.0	5.8	3.8
760	21.9	5.9	3.9
765	21.8	6.1	4.0
770	21.7	6.2	4.2
775	21.7	6.3	4.3
780	21.6	6.5	4.4
785	21.5	6.6	4.6
790	21.4	6.7	4.7
795	21.4	6.8	4.8
800	21.3	6.9	4.9
805	21.3	7.0	5.0
810	21.4	7.0	5.0

815	21.4	7.0	5.1
820	21.4	7.1	5.1
825	21.5	7.1	5.1
830	21.6	7.0	5.1
835	21.6	7.0	5.0
840	21.7	7.0	5.0
845	21.7	7.0	5.0
850	21.8	7.0	5.0
855	21.8	7.0	5.0
860	21.9	7.0	5.0
865	22.0	6.9	4.9
870	22.1	6.9	4.9
875	22.2	6.8	4.8
880	22.3	6.8	4.8
885	22.3	6.8	4.8
890	22.4	6.8	4.8
895	22.4	6.9	4.9
900	22.4	6.9	4.9
905	22.5	6.9	4.9
910	22.6	6.8	4.8
915	22.7	6.8	4.7
920	22.8	6.7	4.7
925	22.8	6.7	4.7
930	22.9	6.7	4.7
935	22.9	6.7	4.7
940	23.0	6.7	4.7
945	23.0	6.7	4.7
950	23.0	6.7	4.7
955	23.1	6.7	4.7
960	23.2	6.6	4.6
965	23.3	6.6	4.6
970	23.4	6.5	4.5
975	23.5	6.5	4.5
980	23.5	6.5	4.5
985	23.6	6.5	4.5
990	23.6	6.5	4.5
995	23.6	6.5	4.5
1,000	23.6	6.6	4.5
1,050	23.8	6.9	4.9
1,100	23.4	7.7	5.9
1,150	23.3	8.2	6.4
1,200	23.2	8.6	7.2
1,250	23.8	8.4	6.9
1,300	24.1	8.4	6.9

1,350	25.2	7.6	5.8
1,400	25.8	7.3	5.4
1,450	25.8	7.7	5.8
1,500	25.8	8.0	6.2
1,550	25.6	8.4	7.0
1,600	26.0	8.3	6.7
1,650	26.1	8.5	7.0
1,700	26.4	8.4	7.0
1,750	26.6	8.5	7.1
1,800	26.8	8.5	7.2
1,850	26.9	8.7	7.4
1,900	27.6	8.2	6.6
1,950	27.6	8.4	6.9
2,000	27.8	8.5	7.0
2,050	28.1	8.3	6.8
2,100	28.3	8.3	6.8
2,150	28.6	8.2	6.6
2,200	28.7	8.4	6.9
2,250	29.1	8.1	6.5
2,300	29.2	8.2	6.6
2,350	29.3	8.3	6.8
2,400	29.6	8.2	6.6
2,450	30.2	7.8	6.0
2,500	30.6	7.6	5.7
2,550	31.2	7.1	5.2
2,600	31.5	7.0	5.0
2,650	31.4	7.3	5.3
2,700	31.4	7.5	5.6
2,750	31.7	7.3	5.3
2,800	32.3	6.9	4.9
2,850	32.7	6.6	4.6
2,900	32.8	6.7	4.7
2,950	32.4	7.2	5.2
3,000	32.9	6.8	4.8
3,050	33.4	6.5	4.4
3,100	33.8	6.2	4.2
3,150	33.4	6.7	4.7
3,200	33.4	6.9	4.9
3,250	33.9	6.6	4.5
3,300	34.8	5.8	3.8
3,350	34.4	6.3	4.3
3,400	34.1	6.7	4.7
3,450	34.2	6.8	4.7
3,500	34.6	6.5	4.5

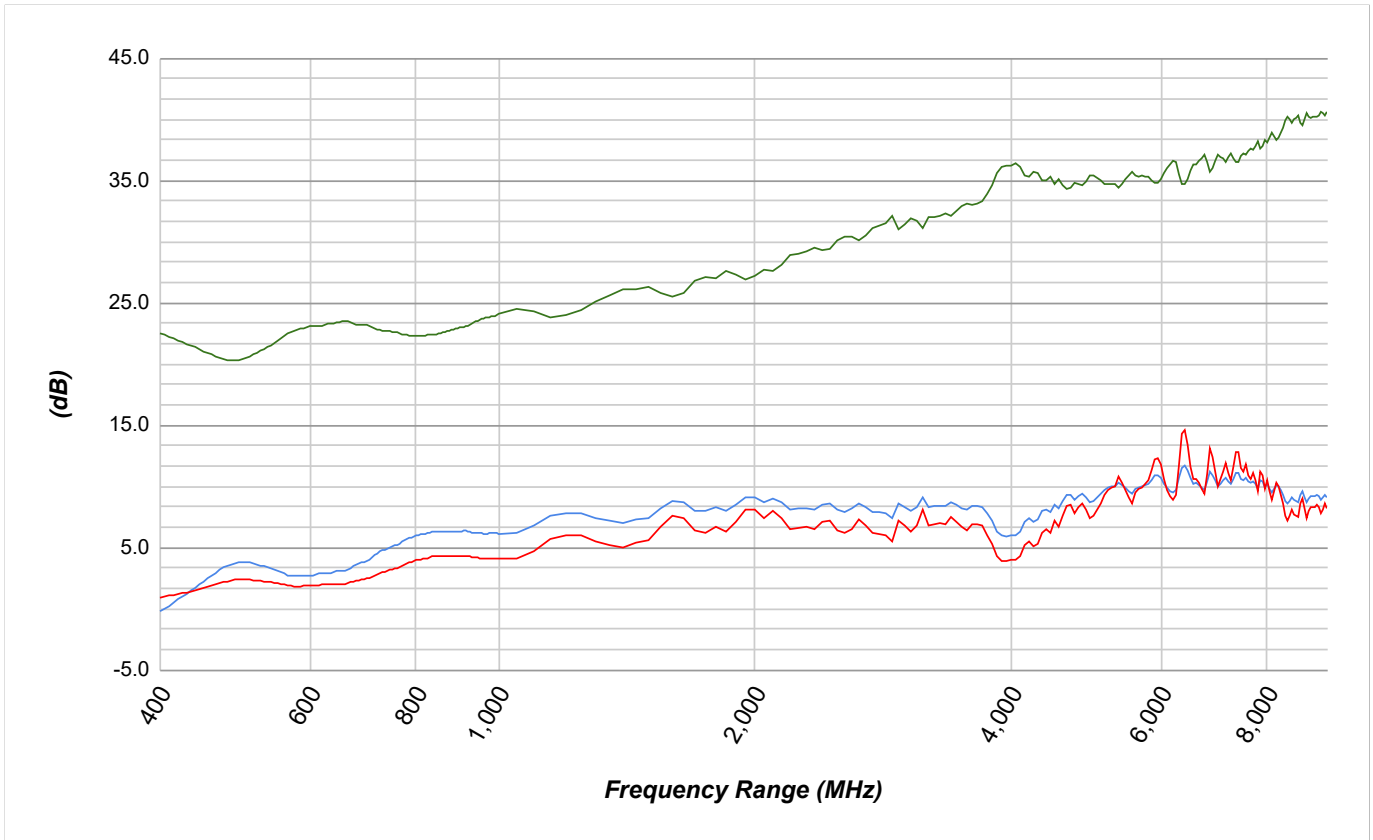
3,550	35.4	5.8	3.8
3,600	35.5	5.8	3.8
3,650	35.6	5.9	3.9
3,700	36.1	5.5	3.5
3,750	36.4	5.3	3.4
3,800	36.3	5.5	3.5
3,850	36.8	5.1	3.3
3,900	36.7	5.3	3.4
3,950	37.0	5.1	3.3
4,000	37.3	5.0	3.1
4,050	36.3	6.0	4.0
4,100	36.6	5.9	3.9
4,150	37.1	5.5	3.6
4,200	37.2	5.5	3.6
4,250	36.6	6.2	4.1
4,300	36.8	6.0	4.0
4,350	36.7	6.3	4.3
4,400	36.5	6.6	4.6
4,450	36.5	6.6	4.6
4,500	36.6	6.7	4.7
4,550	36.7	6.6	4.6
4,600	36.8	6.7	4.7
4,650	36.5	7.0	5.0
4,700	36.6	7.0	5.0
4,750	36.8	6.9	4.9
4,800	36.8	7.0	5.0
4,850	36.5	7.4	5.5
4,900	36.2	7.8	6.0
4,950	36.1	8.0	6.3
5,000	35.8	8.4	6.9
5,050	35.6	8.7	7.4
5,100	35.3	9.0	8.0
5,150	35.3	9.1	8.1
5,200	35.4	9.1	8.2
5,250	35.6	9.0	8.0
5,300	35.8	8.9	7.8
5,350	36.0	8.8	7.5
5,400	36.1	8.8	7.6
5,450	36.1	8.8	7.6
5,500	36.1	8.9	7.8
5,550	35.9	9.2	8.3
5,600	35.7	9.5	8.9
5,650	35.5	9.8	9.5
5,700	35.3	10.0	10.0

5,750	35.3	10.1	10.3
5,800	35.4	10.1	10.2
5,850	35.6	10.0	9.9
5,900	35.8	9.8	9.6
5,950	36.0	9.7	9.4
6,000	36.1	9.7	9.3
6,050	36.3	9.6	9.1
6,100	36.4	9.5	9.0
6,150	36.4	9.6	9.1
6,200	36.3	9.8	9.5
6,250	36.2	9.9	9.8
6,300	36.2	10.0	9.9
6,350	36.5	9.8	9.5
6,400	36.8	9.6	9.1
6,450	37.1	9.3	8.6
6,500	37.3	9.2	8.3
6,550	37.2	9.4	8.6
6,600	37.0	9.6	9.2
6,650	36.8	9.9	9.8
6,700	36.6	10.1	10.2
6,750	36.7	10.1	10.2
6,800	36.9	9.9	9.8
6,850	37.1	9.8	9.5
6,900	37.3	9.6	9.2
6,950	37.4	9.6	9.1
7,000	37.5	9.6	9.1
7,050	37.6	9.6	9.1
7,100	37.6	9.6	9.1
7,150	37.8	9.5	9.0
7,200	37.9	9.5	8.9
7,250	38.0	9.4	8.7
7,300	38.2	9.3	8.6
7,350	38.2	9.3	8.6
7,400	38.2	9.4	8.6
7,450	38.3	9.3	8.6
7,500	38.4	9.3	8.6
7,550	38.6	9.2	8.3
7,600	38.8	9.0	8.0
7,650	38.9	9.0	7.9
7,700	39.0	9.0	7.9
7,750	39.1	8.9	7.8
7,800	39.1	8.9	7.8
7,850	39.2	9.0	7.9
7,900	39.1	9.0	8.0

7,950	39.1	9.1	8.2
8,000	39.0	9.3	8.4
8,050	39.3	9.1	8.1
8,100	39.6	8.8	7.5
8,150	40.0	8.5	7.0
8,200	40.2	8.3	6.7
8,250	40.7	7.9	6.1
8,300	41.2	7.4	5.5
8,350	41.6	7.0	5.0
8,400	42.1	6.6	4.6
8,450	42.5	6.3	4.2
8,500	42.7	6.1	4.1
8,550	42.8	6.1	4.0
8,600	42.6	6.3	4.3
8,650	42.3	6.6	4.6
8,700	42.2	6.8	4.8
8,750	42.1	7.0	5.0
8,800	42.2	6.9	4.9
8,850	42.2	6.9	4.9
8,900	42.3	6.9	4.9
8,950	42.3	6.9	4.9
9,000	42.2	7.1	5.2
9,050	42.1	7.3	5.3
9,100	41.8	7.6	5.7
9,150	41.6	7.8	6.1
9,200	41.4	8.1	6.5
9,250	41.2	8.3	6.8
9,300	41.2	8.4	6.9
9,350	41.2	8.4	7.0
9,400	41.2	8.5	7.1
9,450	41.4	8.3	6.8
9,500	41.7	8.1	6.4
9,550	41.9	7.9	6.2
9,600	41.9	8.0	6.2
9,650	41.9	8.0	6.3
9,700	42.0	7.9	6.2
9,750	42.1	7.9	6.2
9,800	42.2	7.9	6.1
9,850	42.2	7.9	6.1
9,900	42.3	7.9	6.1
9,950	42.4	7.7	5.9
10,000	42.6	7.6	5.8



Vertical Polarization at 3 Meters Chart





Vertical Polarization at 3 Meters Data

Frequency (MHz)	AF (dBm-3)	Gain (dBi)	Gain (num)
400	22.5	-0.2	0.9
405	22.4	0.0	1.0
410	22.2	0.2	1.1
415	22.1	0.5	1.1
420	21.9	0.8	1.2
425	21.8	1.0	1.3
430	21.6	1.2	1.3
435	21.5	1.5	1.4
440	21.4	1.7	1.5
445	21.2	2.0	1.6
450	21.0	2.2	1.7
455	20.9	2.5	1.8
460	20.8	2.7	1.9
465	20.6	2.9	2.0
470	20.5	3.2	2.1
475	20.4	3.4	2.2
480	20.3	3.5	2.2
485	20.3	3.6	2.3
490	20.3	3.7	2.4
495	20.3	3.8	2.4
500	20.4	3.8	2.4
505	20.5	3.8	2.4
510	20.6	3.8	2.4
515	20.8	3.7	2.3
520	20.9	3.6	2.3
525	21.1	3.5	2.3
530	21.2	3.5	2.2
535	21.4	3.4	2.2
540	21.5	3.3	2.2
545	21.7	3.2	2.1
550	21.9	3.1	2.1
555	22.1	3.0	2.0
560	22.3	2.9	2.0
565	22.5	2.7	1.9
570	22.6	2.7	1.9
575	22.7	2.7	1.8
580	22.8	2.7	1.8
585	22.9	2.7	1.8
590	22.9	2.7	1.9

595	23.0	2.7	1.9
600	23.1	2.7	1.9
605	23.1	2.7	1.9
610	23.1	2.8	1.9
615	23.1	2.9	1.9
620	23.1	2.9	2.0
625	23.2	2.9	2.0
630	23.3	2.9	2.0
635	23.3	2.9	2.0
640	23.3	3.0	2.0
645	23.4	3.1	2.0
650	23.4	3.1	2.0
655	23.5	3.1	2.0
660	23.5	3.1	2.0
665	23.5	3.2	2.1
670	23.4	3.3	2.2
675	23.3	3.5	2.2
680	23.2	3.6	2.3
685	23.2	3.7	2.3
690	23.2	3.8	2.4
695	23.2	3.8	2.4
700	23.2	3.9	2.5
705	23.1	4.0	2.5
710	23.0	4.2	2.6
715	22.9	4.4	2.7
720	22.8	4.5	2.8
725	22.8	4.7	2.9
730	22.7	4.8	3.0
735	22.7	4.8	3.0
740	22.7	4.9	3.1
745	22.7	5.0	3.2
750	22.6	5.1	3.2
755	22.6	5.2	3.3
760	22.6	5.2	3.3
765	22.5	5.3	3.4
770	22.4	5.5	3.5
775	22.4	5.6	3.6
780	22.4	5.7	3.7
785	22.3	5.8	3.8
790	22.3	5.8	3.8
795	22.3	5.9	3.9
800	22.3	6.0	4.0
805	22.3	6.0	4.0
810	22.3	6.1	4.0

815	22.3	6.1	4.1
820	22.3	6.1	4.1
825	22.4	6.2	4.1
830	22.4	6.2	4.2
835	22.4	6.3	4.3
840	22.4	6.3	4.3
845	22.4	6.3	4.3
850	22.5	6.3	4.3
855	22.5	6.3	4.3
860	22.6	6.3	4.3
865	22.6	6.3	4.3
870	22.7	6.3	4.3
875	22.7	6.3	4.3
880	22.8	6.3	4.3
885	22.8	6.3	4.3
890	22.9	6.3	4.3
895	22.9	6.3	4.3
900	23.0	6.3	4.3
905	23.0	6.3	4.3
910	23.0	6.4	4.3
915	23.1	6.4	4.3
920	23.1	6.3	4.3
925	23.2	6.3	4.3
930	23.3	6.2	4.2
935	23.4	6.2	4.2
940	23.5	6.2	4.2
945	23.5	6.2	4.2
950	23.6	6.2	4.1
955	23.7	6.2	4.1
960	23.7	6.1	4.1
965	23.8	6.1	4.1
970	23.8	6.1	4.1
975	23.8	6.2	4.1
980	23.9	6.2	4.1
985	23.9	6.2	4.1
990	23.9	6.2	4.1
995	24.0	6.2	4.1
1,000	24.1	6.1	4.1
1,050	24.5	6.2	4.1
1,100	24.3	6.8	4.7
1,150	23.8	7.6	5.7
1,200	24.0	7.8	6.0
1,250	24.4	7.8	6.0
1,300	25.1	7.4	5.5

1,350	25.6	7.2	5.2
1,400	26.1	7.0	5.0
1,450	26.1	7.3	5.4
1,500	26.3	7.4	5.6
1,550	25.8	8.2	6.7
1,600	25.5	8.8	7.6
1,650	25.8	8.7	7.4
1,700	26.8	8.0	6.4
1,750	27.1	8.0	6.2
1,800	27.0	8.3	6.7
1,850	27.6	8.0	6.3
1,900	27.3	8.5	7.1
1,950	26.9	9.1	8.1
2,000	27.2	9.1	8.1
2,050	27.7	8.7	7.4
2,100	27.6	9.0	8.0
2,150	28.1	8.7	7.4
2,200	28.9	8.1	6.5
2,250	29.0	8.2	6.6
2,300	29.2	8.2	6.7
2,350	29.5	8.1	6.5
2,400	29.3	8.5	7.1
2,450	29.4	8.6	7.2
2,500	30.1	8.1	6.4
2,550	30.4	7.9	6.2
2,600	30.4	8.2	6.5
2,650	30.1	8.6	7.3
2,700	30.5	8.3	6.8
2,750	31.1	7.9	6.2
2,800	31.3	7.9	6.1
2,850	31.5	7.8	6.0
2,900	32.1	7.4	5.5
2,950	31.0	8.6	7.2
3,000	31.4	8.3	6.8
3,050	31.9	8.0	6.3
3,100	31.7	8.3	6.8
3,150	31.1	9.1	8.1
3,200	32.0	8.3	6.8
3,250	32.0	8.4	6.9
3,300	32.1	8.4	7.0
3,350	32.3	8.4	6.9
3,400	32.1	8.7	7.5
3,450	32.5	8.5	7.1
3,500	32.9	8.2	6.7

3,550	33.1	8.1	6.4
3,600	33.0	8.4	6.9
3,650	33.1	8.4	6.9
3,700	33.3	8.3	6.8
3,750	33.9	7.8	6.0
3,800	34.6	7.2	5.3
3,850	35.6	6.3	4.3
3,900	36.1	6.0	3.9
3,950	36.2	5.9	3.9
4,000	36.2	6.0	4.0
4,050	36.4	6.0	4.0
4,100	36.1	6.3	4.3
4,150	35.4	7.1	5.2
4,200	35.3	7.4	5.5
4,250	35.7	7.1	5.1
4,300	35.6	7.3	5.3
4,350	35.0	8.0	6.2
4,400	35.0	8.1	6.5
4,450	35.3	7.9	6.2
4,500	34.7	8.5	7.2
4,550	35.1	8.2	6.7
4,600	34.6	8.8	7.6
4,650	34.3	9.3	8.4
4,700	34.4	9.3	8.5
4,750	34.8	8.9	7.8
4,800	34.7	9.2	8.3
4,850	34.6	9.4	8.6
4,900	34.9	9.1	8.1
4,950	35.4	8.7	7.4
5,000	35.4	8.8	7.6
5,050	35.2	9.1	8.1
5,100	35.0	9.4	8.6
5,150	34.7	9.7	9.3
5,200	34.7	9.9	9.7
5,250	34.7	10.0	9.9
5,300	34.7	10.0	10.0
5,350	34.4	10.3	10.8
5,400	34.7	10.1	10.3
5,450	35.1	9.9	9.7
5,500	35.4	9.6	9.1
5,550	35.7	9.4	8.6
5,600	35.4	9.8	9.5
5,650	35.3	9.9	9.8
5,700	35.4	10.0	9.9

5,750	35.3	10.1	10.2
5,800	35.3	10.2	10.5
5,850	35.0	10.5	11.3
5,900	34.8	10.9	12.2
5,950	34.8	10.9	12.3
6,000	35.1	10.7	11.8
6,050	35.6	10.2	10.6
6,100	36.0	9.9	9.7
6,150	36.3	9.6	9.2
6,200	36.6	9.5	8.9
6,250	36.5	9.7	9.3
6,300	35.5	10.7	11.7
6,350	34.7	11.5	14.3
6,400	34.7	11.7	14.6
6,450	35.1	11.3	13.4
6,500	35.8	10.7	11.6
6,550	36.3	10.2	10.6
6,600	36.3	10.3	10.6
6,650	36.6	10.1	10.3
6,700	36.8	9.9	9.8
6,750	37.1	9.7	9.4
6,800	36.5	10.4	11.0
6,850	35.7	11.2	13.1
6,900	36.0	10.9	12.4
6,950	36.6	10.5	11.2
7,000	37.1	10.0	10.0
7,050	36.9	10.2	10.6
7,100	36.8	10.5	11.2
7,150	36.5	10.7	11.9
7,200	36.9	10.4	11.1
7,250	37.2	10.2	10.5
7,300	36.8	10.6	11.6
7,350	36.5	11.1	12.8
7,400	36.5	11.1	12.8
7,450	37.0	10.6	11.5
7,500	37.2	10.5	11.2
7,550	37.1	10.7	11.8
7,600	37.4	10.4	10.9
7,650	37.6	10.3	10.6
7,700	37.5	10.4	11.1
7,750	37.8	10.2	10.5
7,800	38.2	9.8	9.6
7,850	37.6	10.5	11.2
7,900	37.8	10.4	10.9

7,950	38.3	9.9	9.8
8,000	38.1	10.2	10.5
8,050	38.5	9.8	9.6
8,100	38.9	9.5	8.9
8,150	38.6	9.8	9.6
8,200	38.3	10.1	10.3
8,250	38.5	10.0	10.0
8,300	38.9	9.7	9.3
8,350	39.3	9.3	8.6
8,400	39.9	8.8	7.6
8,450	40.2	8.6	7.2
8,500	40.0	8.8	7.6
8,550	39.7	9.1	8.1
8,600	40.0	8.9	7.7
8,650	40.1	8.8	7.6
8,700	40.3	8.7	7.5
8,750	39.7	9.3	8.6
8,800	39.5	9.6	9.0
8,850	40.0	9.1	8.2
8,900	40.5	8.7	7.4
8,950	40.2	9.0	8.0
9,000	40.1	9.2	8.3
9,050	40.2	9.2	8.3
9,100	40.2	9.2	8.3
9,150	40.2	9.3	8.5
9,200	40.3	9.2	8.3
9,250	40.6	8.9	7.8
9,300	40.5	9.1	8.1
9,350	40.3	9.3	8.6
9,400	40.6	9.1	8.2
9,450	41.4	8.3	6.8
9,500	41.5	8.2	6.7
9,550	41.4	8.4	6.9
9,600	41.3	8.6	7.2
9,650	42.0	7.9	6.2
9,700	41.7	8.2	6.6
9,750	41.8	8.1	6.5
9,800	42.2	7.8	6.0
9,850	42.6	7.5	5.6
9,900	42.5	7.6	5.8
9,950	42.8	7.4	5.5
10,000	42.9	7.3	5.4