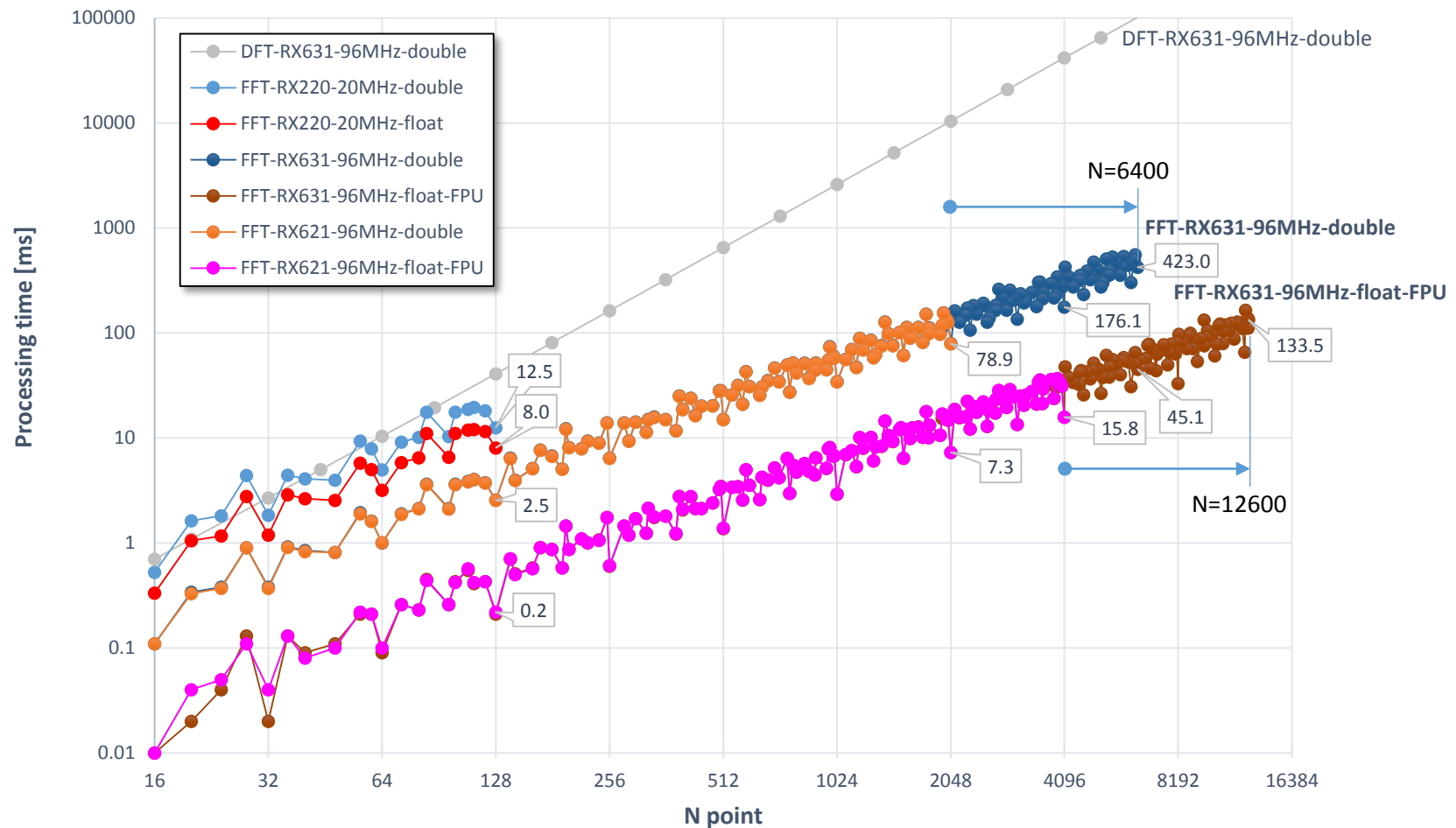# FFT performance of RX631, RX621, RX220

- RX631: 256kB, 96MHz, float-FPU
- RX621:   96kB, 96MHz, float-FPU
- RX220:   16kB, 12MHz, no FPU

FFT processing time vs N point

Kazuyuki Hirooka, 2016/11/17

N=4x(2^p)x(3^q)x(5^r)x(7^s)

※ FFT: real input only

Specification

- Boards
  - AKIZUKI AE-RX220
    - RAM: 16kByte
    - Clock: 20MHz (Xtal 20MHz)
    - No FPU

  - AKIZUKI RX621
    - RAM: 96kByte
    - Clock: 96MHz (Xtal 12MHz x 8)
    - FPU("float" precision)

  - GR-CITRUS (AKIZUKI RX631)
    - RAM: 256kByte
    - Clock: 96MHz (Xtal 12MHz x 8)
    - FPU("float" precision)

- DFT, FFT
  - Input: real only
  - Output: 0 to Nyquist frequency
  - Precision
    - double   8byte
    - float   4byte

Radix combination used in FFT (1/2)

N	Radix	N	Radix	N	Radix
12600	8x7x5x3x3x5	8192	8x8x8x16	5000	8x5x5x5x5
12544	8x7x7x2x16	8100	4x5x3x3x3x3x5	4900	4x7x7x5x5
12500	4x5x5x5x5x5	8064	8x7x3x3x16	4860	4x3x3x3x3x3x5
12348	4x7x7x7x3x3	8000	4x5x5x5x16	4800	4x5x5x3x16
12288	8x8x4x3x16	7840	7x7x5x2x16	4704	7x7x2x3x16
12096	4x7x3x3x3x16	7776	2x3x3x3x3x3x16	4608	8x4x3x3x16
12000	5x5x5x2x3x16	7680	8x4x5x3x16	4536	7x3x3x3x3x8
11760	7x7x5x3x16	7560	8x7x3x3x3x5	4500	4x5x5x3x3x5
11664	4x4x3x3x3x3x3x3	7500	4x5x5x5x3x5	4480	8x7x5x16
11520	8x5x2x3x3x16	7200	5x5x2x3x3x16	4320	5x2x3x3x3x16
11340	4x7x3x3x3x3x5	7168	8x8x7x16	4200	8x7x5x3x5
11200	4x7x5x5x16	7056	7x7x3x3x16	4116	4x7x7x7x3
10976	7x7x7x2x16	7000	8x7x5x5x5	4096	8x8x4x16
10800	5x5x3x3x3x16	6912	8x2x3x3x3x16		
10752	8x4x7x3x16	6860	4x7x7x7x5		
10584	7x7x3x3x3x8	6804	4x7x3x3x3x3x3		
10500	4x7x5x5x3x5	6720	4x7x5x3x16		
10368	8x3x3x3x3x16	6480	5x3x3x3x3x16		
10240	8x8x5x2x16	6400	8x5x5x2x16		
10080	7x5x2x3x3x16	6300	4x7x5x3x3x5		
10000	5x5x5x5x16	6272	8x7x7x16		
9800	8x7x7x5x5	6144	8x8x2x3x16		
9720	8x3x3x3x3x3x5	6048	7x2x3x3x3x16		
9604	7x7x7x7x4	6000	5x5x5x3x16		
9600	8x5x5x3x16	5880	8x7x7x3x5		
9408	4x7x7x3x16	5832	4x2x3x3x3x3x3x3		
9216	8x8x3x3x16	5760	8x5x3x3x16		
9072	7x3x3x3x3x16	5600	7x5x5x2x16		
9000	8x5x5x3x3x5	5488	7x7x7x16		
8960	8x7x5x2x16	5400	8x5x3x3x3x5		
8820	4x7x7x3x3x5	5376	8x7x2x3x16		
8748	4x3x3x3x3x3x3x3	5292	4x7x7x3x3x3		
8640	4x5x3x3x3x16	5184	4x3x3x3x3x16		
8400	7x5x5x3x16	5120	8x8x5x16		
8232	7x7x7x3x8	5040	7x5x3x3x16		

Radix combination used in FFT (2/2)

N	Radix	N	Radix	N	Radix	N	Radix
4096	8x8x4x16	2160	5x3x3x3x16	972	4x3x3x3x3x3	288	2x3x3x16
4032	4x7x3x3x16	2100	4x7x5x3x5	960	4x5x3x16	280	8x7x5
4000	5x5x5x2x16	2048	8x8x2x16	900	4x5x3x3x5	256	8x2x16
3920	7x7x5x16	2016	7x2x3x3x16	896	8x7x16	252	4x7x3x3
3888	4x4x3x3x3x3x3	2000	5x5x5x16	864	2x3x3x3x16	240	5x3x16
3840	8x5x2x3x16	1960	8x7x7x5	840	8x7x3x5	224	7x2x16
3780	4x7x3x3x3x5	1944	4x2x3x3x3x3x3	800	5x5x2x16	216	3x3x3x8
3600	5x5x3x3x16	1920	8x5x3x16	784	7x7x16	200	8x5x5
3584	8x4x7x16	1800	8x5x3x3x5	768	8x2x3x16	196	7x7x4
3528	7x7x3x3x8	1792	8x7x2x16	756	4x7x3x3x3	192	4x3x16
3500	4x7x5x5x5	1764	4x7x7x3x3	720	5x3x3x16	180	4x3x3x5
3456	8x3x3x3x16	1728	4x3x3x3x16	700	4x7x5x5	168	7x3x8
3360	7x5x2x3x16	1680	7x5x3x16	672	7x2x3x16	160	5x2x16
3240	8x3x3x3x3x5	1620	4x3x3x3x3x5	648	3x3x3x3x8	144	3x3x16
3200	8x5x5x16	1600	4x5x5x16	640	8x5x16	140	4x7x5
3136	4x7x7x16	1568	7x7x2x16	600	8x5x3x5	128	8x16
3072	8x8x3x16	1536	8x4x3x16	588	4x7x7x3	120	8x3x5
3024	7x3x3x3x16	1512	7x3x3x3x8	576	4x3x3x16	112	7x16
3000	8x5x5x3x5	1500	4x5x5x3x5	560	7x5x16	108	4x3x3x3
2940	4x7x7x3x5	1440	5x2x3x3x16	540	4x3x3x3x5	100	4x5x5
2916	4x3x3x3x3x3x3	1400	8x7x5x5	512	8x4x16	96	2x3x16
2880	4x5x3x3x16	1372	7x7x7x4	504	7x3x3x8	84	4x7x3
2800	7x5x5x16	1344	4x7x3x16	500	4x5x5x5	80	5x16
2744	7x7x7x8	1296	3x3x3x3x16	480	5x2x3x16	72	3x3x8
2700	4x5x3x3x3x5	1280	8x5x2x16	448	4x7x16	64	4x16
2688	8x7x3x16	1260	4x7x3x3x5	432	3x3x3x16	60	4x3x5
2592	2x3x3x3x3x16	1200	5x5x3x16	420	4x7x3x5	56	7x8
2560	8x4x5x16	1176	7x7x3x8	400	5x5x16	48	3x16
2520	8x7x3x3x5	1152	8x3x3x16	392	7x7x8	40	8x5
2500	4x5x5x5x5	1120	7x5x2x16	384	8x3x16	36	4x3x3
2400	5x5x2x3x16	1080	8x3x3x3x5	360	8x3x3x5	32	2x16
2352	7x7x3x16	1024	8x8x16	336	7x3x16	28	7x4
2304	8x2x3x3x16	1008	7x3x3x16	324	4x3x3x3x3	24	3x8
2268	4x7x3x3x3x3	1000	8x5x5x5	320	4x5x16	20	4x5
2240	4x7x5x16	980	4x7x7x5	300	4x5x3x5	16	16

END