

High Frequency  
Electromagnetic Wave  
Analysis Report

July 3, 2018

Japan Noise Survey



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## 1. Research objectives

In this survey, high frequency electromagnetic wave measurement in the use environment of personal computer is performed and the analysis result is reported. The electromagnetic waves were measured for each part of the personal computer, and the effect was also measured for the reduction method. In addition, this survey was carried out by Japanese noise survey under the request of Rebglo.Ltd.

## 2. Measurement date and time and environmental measurement date and time

From 15:00: 00 until 17: 45: 00 on June 26, 2018

※ Measurement is done intermittently within the date and time.

### Measurement environment

- Measurement location: Office on the First Floor, 2-35-22, Oanaminami, Funabashi-shi, Chiba
  - ※ Photographs of the measurement situation are at the end of this report
- Temperature: 26 – 28 °C
- Humidity: 76 – 78%
- All electrical appliances other than those not subject to measurement are powered off (only lights are lit)
- Area Map



### 3. Measuring instruments and measurement conditions

- Measuring instrument: Electromagnetic wave measuring instrument TM-196
- Measurement frequency range: 10 MHz – 8 GHz
- Measured value:  $\mu\text{W}/\text{cm}^2$  (Power density)
- Instantaneous value data was measured 4 times per minute and recorded
- Measures to reduce: 1 HETTARER is attached to each PC internal memory (2 pieces)

#### Survey target machine overview

A graphic board was incorporated in a general-purpose desktop computer, and a program was run and measured under conditions of actual use.

#### Specification target machine specification

- CPU: Intel Core i 5
  - Memory: 4GB x 2
  - HDD: SSD 240 GB
  - M/B: ATX Z 270
  - GPU: nVidia GTX 1080 Ti
  - Power supply: 80Plus GOLD
  - In addition, although the side cover of the main body is normally closed when being used, it was removed for the measurement.
- ※ Photographs of target machines are on the back of this report

### 4. Outline of measurement result and conclusion

The average value and the maximum value of the instantaneous value of the power density in each period in the measurement period were analysed, calculated and compared. The analysis results are shown in the tables 1 to 5 on the following pages.

After taking measures for the reduction, reduction was detected for all the measured values, and about

78% of reduction effect was obtained.

Table 1. Analysis result list (average value and maximum value)

Measurement Conditions	Period No	Measurement target	Measurement time	Measured value (instantaneous value, $\mu\text{W}/\text{cm}^2$ )				Maximum value ( $\mu\text{W}/\text{cm}^2$ )	Average value ( $\mu\text{W}/\text{cm}^2$ )
				1st Time	2nd Time	3rd Time	4th Time		
No PC	28	CPU (distance 10 cm)	15: 00 – 15: 05	0.017	0.020	0.012	0.009	0.020	0.014
	29	Power supply unit (distance 10 cm)	15: 05 – 15: 10	0.010	0.017	0.013	0.007	0.017	0.012
	30	Memory (distance 10 cm)	15: 10 – 15: 15	0.014	0.011	0.003	0.000	0.014	0.007
	31	Graphic board (distance 10 cm)	15: 15 – 15: 20	0.003	0.003	0.012	0.011	0.012	0.007
	32	Exhaust fan (distance 10 cm)	15: 20 – 15: 25	0.008	0.008	0.005	0.010	0.010	0.008
	33	Whole PC (distance 1 m)	15: 25 – 15: 30	0.007	0.011	0.009	0.008	0.011	0.009
	34	Whole PC (distance 2 m)	15: 30 – 15: 35	0.013	0.006	0.005	0.006	0.013	0.007
	35	Whole PC (distance 3 m)	15: 35 – 15: 40	0.008	0.014	0.007	0.001	0.014	0.007
	36	Whole PC (distance 5 m)	15: 40 – 15: 45	0.005	0.002	0.016	0.009	0.016	0.008

Table 2. Analysis result list (average value and maximum value)

Measurement Conditions	Period No	Measurement target	Measurement time	Measured value (instantaneous value, $\mu\text{W}/\text{cm}^2$ )				Maximum value ( $\mu\text{W}/\text{cm}^2$ )	Average value ( $\mu\text{W}/\text{cm}^2$ )
				1st Time	2nd Time	3rd Time	4th Time		
With PC: Before reduction measures (Before attaching HETTARER)	37	CPU (distance 10 cm)	16: 00 – 16: 05	0.389	0.391	0.387	0.391	0.391	0.389
	38	Power supply unit (distance 10 cm)	16: 05 – 16: 10	0.327	0.323	0.325	0.320	0.327	0.324
	39	Memory (distance 10 cm)	16: 10 – 16: 15	0.290	0.293	0.295	0.294	0.295	0.293
	40	Graphic board (distance 10 cm)	16: 15 – 16: 20	0.325	0.323	0.327	0.314	0.327	0.322
	41	Exhaust fan (distance 10 cm)	16: 20 – 16: 25	0.363	0.359	0.361	0.366	0.366	0.362
	42	Whole PC (distance 1 m)	16: 25 – 16: 30	0.098	0.100	0.094	0.082	0.100	0.094
	43	Whole PC (distance 2 m)	16: 30 – 16: 35	0.077	0.078	0.072	0.075	0.078	0.075
	44	Whole PC (distance 3 m)	16: 35 – 16: 40	0.053	0.051	0.054	0.053	0.054	0.053
	45	Whole PC (distance 5 m)	16: 40 – 16: 45	0.046	0.014	0.024	0.014	0.046	0.025

Table 3. Analysis result list (average value and maximum value)

Measurement Conditions	Period No	Measurement target	Measurement time	Measured value (instantaneous value, $\mu\text{W}/\text{cm}^2$ )				Maximum value ( $\mu\text{W}/\text{cm}^2$ )	Average value ( $\mu\text{W}/\text{cm}^2$ )
				1st Time	2nd Time	3rd Time	4th Time		
With PC: After reduction measures (After attaching HETTARER)	46	CPU (distance 10 cm)	17: 00 – 17: 05	0.371	0.378	0.365	0.367	0.378	0.370
	47	Power supply unit (distance 10 cm)	17: 05 – 17: 10	0.299	0.299	0.281	0.289	0.299	0.292
	48	Memory (distance 10 cm)	17: 10 – 17: 15	0.278	0.273	0.279	0.277	0.279	0.277
	49	Graphic board (distance 10 cm)	17: 15 – 17: 20	0.291	0.275	0.276	0.267	0.291	0.277
	50	Exhaust fan (distance 10 cm)	17: 20 – 17: 25	0.324	0.313	0.308	0.317	0.324	0.315
	51	Whole PC (distance 1 m)	17: 25 – 17: 30	0.050	0.053	0.050	0.055	0.055	0.052
	52	Whole PC (distance 2 m)	17: 30 – 17: 35	0.041	0.044	0.046	0.039	0.046	0.042
	53	Whole PC (distance 3 m)	17: 35 – 17: 40	0.035	0.031	0.021	0.030	0.035	0.029
	54	Whole PC (distance 5 m)	17: 40 – 17: 45	0.010	0.010	0.006	0.007	0.010	0.008

Table 4. Analysis result list (maximum value comparison before and after reduction measures)

Measurement target	① Maximum value before reduction measures ( $\mu\text{W}/\text{cm}^2$ )	② Maximum value after reduction measures ( $\mu\text{W}/\text{cm}^2$ )	②-① Average value ( $\mu\text{W}/\text{cm}^2$ )	②-① (%)
CPU (distance 10 cm)	0.391	0.378	-0.013	-3
Power supply unit (distance 10 cm)	0.327	0.299	-0.028	-8
Memory (distance 10 cm)	0.295	0.279	-0.016	-6
Graphic board (distance 10 cm)	0.327	0.291	-0.036	-11
Exhaust fan (distance 10 cm)	0.366	0.324	-0.042	-11
Whole PC (distance 1 m)	0.100	0.055	-0.045	-45
Whole PC (distance 2 m)	0.078	0.046	-0.032	41
Whole PC (distance 3 m)	0.054	0.035	-0.020	-36
Whole PC (distance 5 m)	0.046	0.010	-0.036	-78

Table 5. Analysis result list (average value comparison before and after reduction measures)

Measurement target	① Average before reduction measures (G)	② Average after reduction measures (G)	②-① (G)	②-① (%)
CPU (distance 10 cm)	0.389	0.370	-0.019	-5
Power supply unit (distance 10 cm)	0.324	0.292	-0.032	-10
Memory (distance 10 cm)	0.293	0.277	-0.016	-6
Graphic board (distance 10 cm)	0.322	0.277	-0.045	-14
Exhaust fan (distance 10 cm)	0.362	0.315	-0.047	-13
Whole PC (distance 1 m)	0.094	0.052	-0.042	-44
Whole PC (distance 2 m)	0.075	0.042	-0.033	-44
Whole PC (distance 3 m)	0.053	0.029	-0.024	-45
Whole PC (distance 5 m)	0.025	0.008	-0.016	-67

**5. Time series measurement data**

Time series data graph per period of measurement ( $\mu\text{W}/\text{cm}^2$ ) are shown on the following pages.

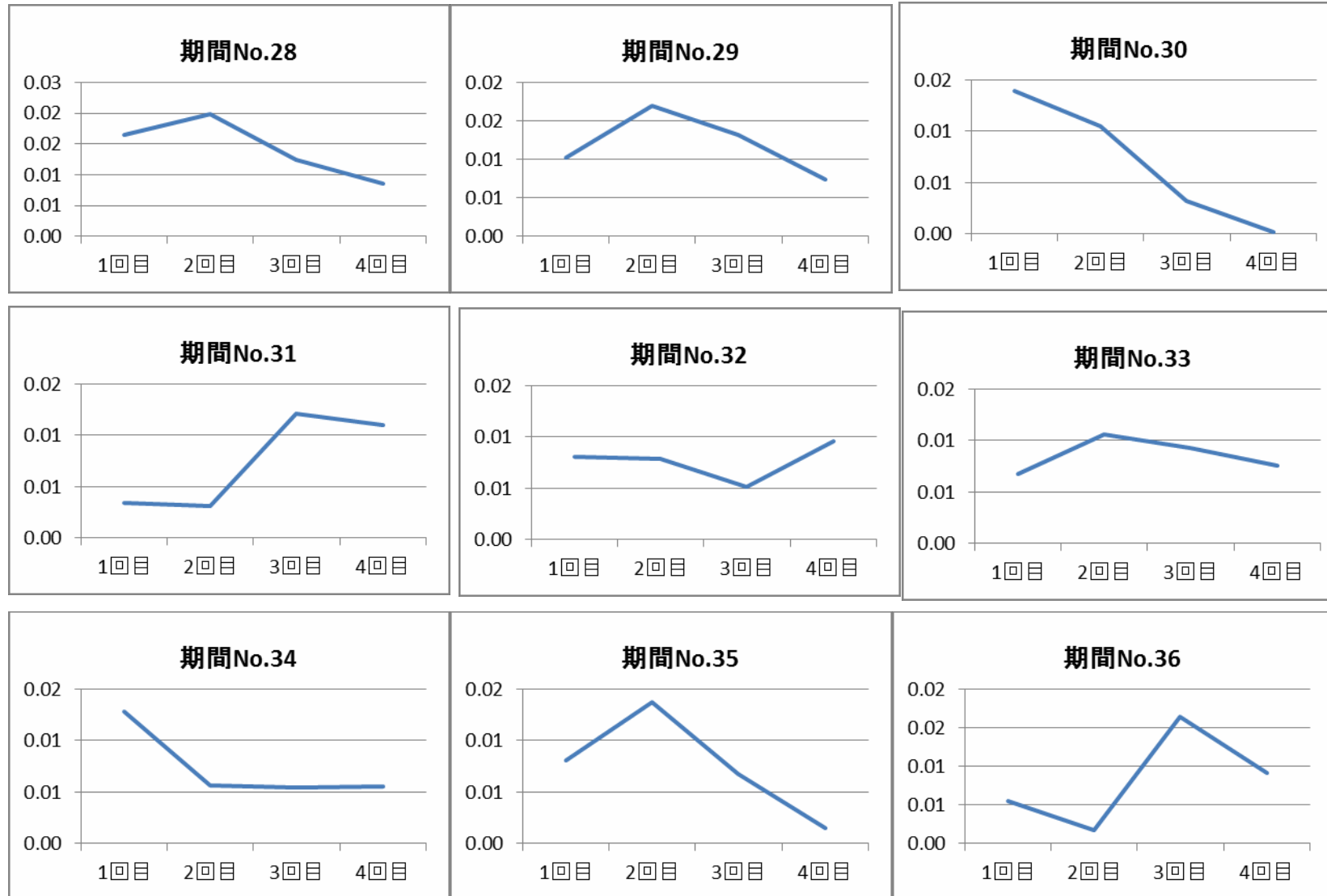
**Contact for Inquiries concerning this report**

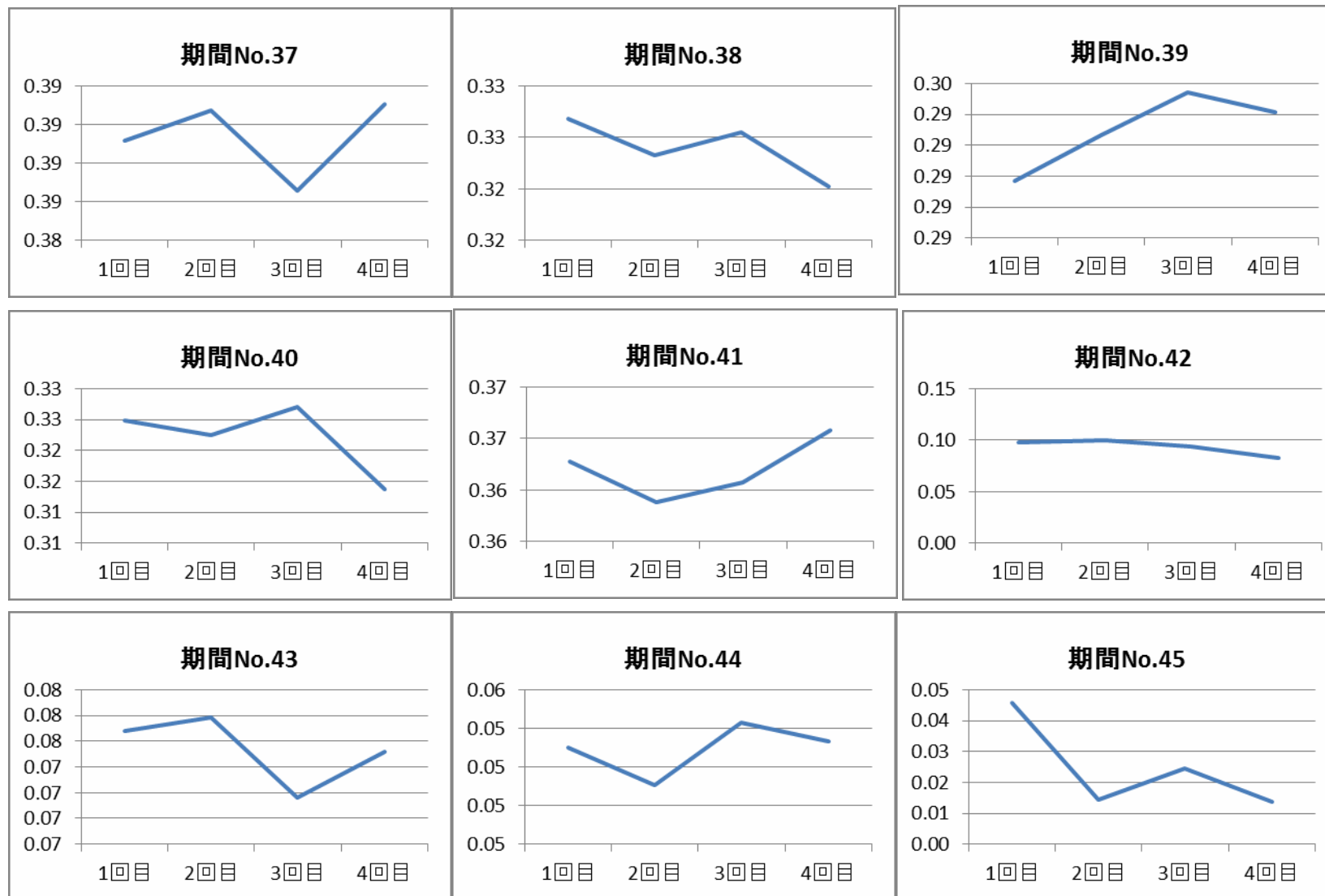
**Japanese noise survey Socho**

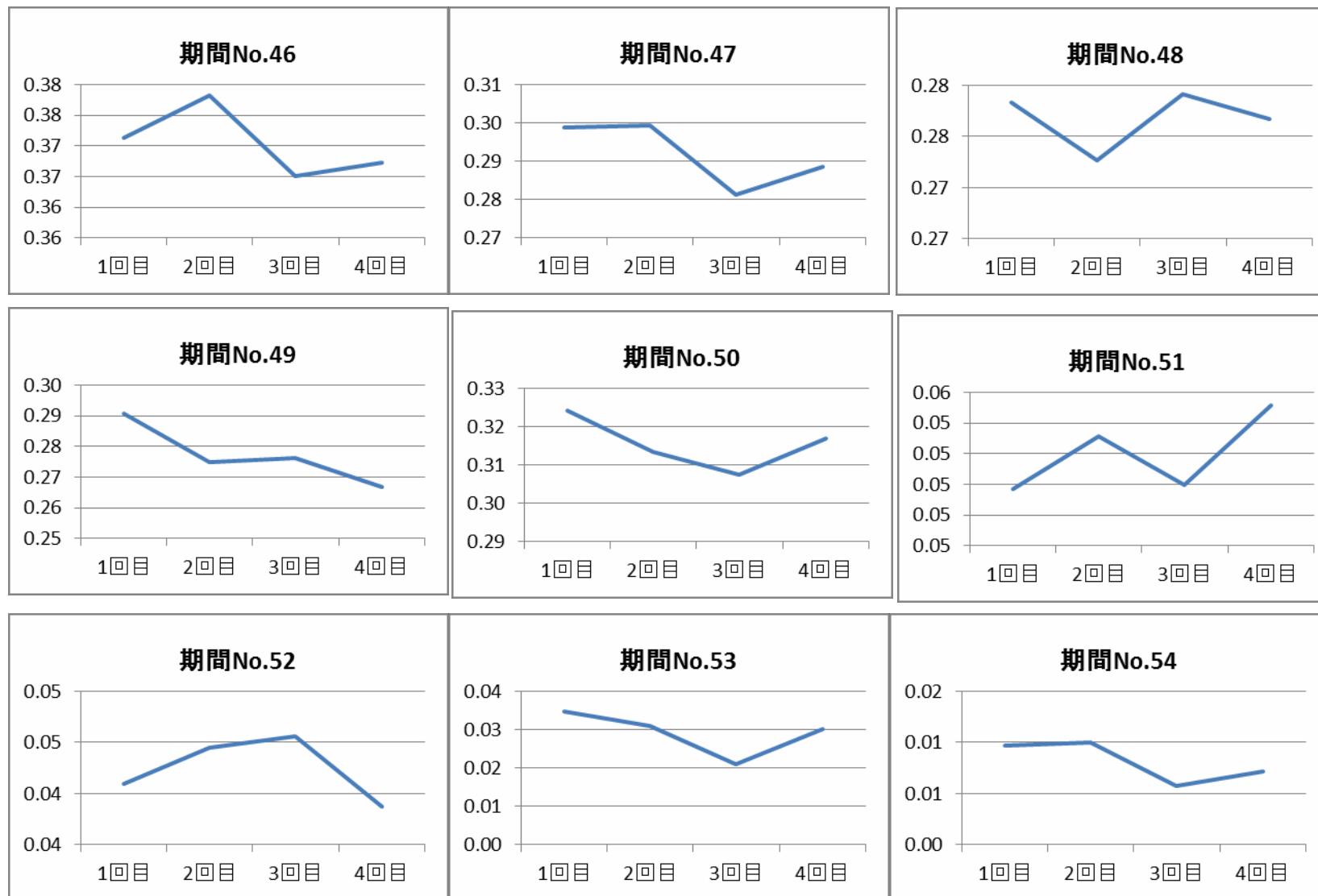
[info@skklab.com](mailto:info@skklab.com)

<http://www.skklab.com>









測定状況一覧



期間No. 2 8



期間No. 2 9



期間No. 3 0



期間No. 3 1



期間No. 3 2



期間No. 3 3



期間No. 3 4



期間No. 3 5



期間No. 3 6



期間No. 3 7



期間No. 3 8



期間No. 3 9



期間No. 4 0



期間No. 4 1



期間No. 4 2

\* Pictures shows before measurement (in consideration of the influence of electromagnetic waves, measurements are taken after turning off camera power).

測定状況一覧



期間No. 4 3



期間No. 4 4



期間No. 4 5



期間No. 4 6



期間No. 4 7



期間No. 4 8



期間No. 4 9



期間No. 5 0



期間No. 5 1



期間No. 5 2



期間No. 5 3



期間No. 5 4

\* Pictures shows before measurement (in consideration of the influence of electromagnetic waves, measurements are taken after turning off camera power).



調査対象機写真

