COMPARATIVE TECHNICAL REPORT

Six-Year Trends in Environmental RF Exposure Across Brickell and Downtown Miami: Comparative Measurements from 2020 to 2026

Exploratory longitudinal assessment of the sub 6 GHz radiofrequency background and verification of millimeter wave signals from 24 to 40 GHz

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Campaigns	Nov 15 2020 · Jul 14 2024 · Sep 3 2026 · Sep 20 2026
Assessment area	Brickell and Downtown Miami corridor and documented subroutes
Investigator	Joaquín Machado
Design	Exploratory longitudinal comparison of exposure levels
Primary coverage	Broadband RF from 10 MHz to 8 GHz with sub 6 GHz spectral context
Additional verification	Millimeter waves from 24 to 40 GHz in 2024 and 2026

Updated report covering four documented surveys over 2,135 days since the 2020 baseline.

Abstract

Objective. This exploratory longitudinal assessment compared environmental radiofrequency exposure levels along the Brickell and Downtown Miami corridor during documented surveys on November 15, 2020, July 14, 2024, and September 20, 2026. The partial follow-up on September 3, 2026, was retained as supporting evidence because it recorded one cumulative maximum rather than a distribution of independent observations.

Method. The primary series includes 30 spot readings from 2020, 10 independent MAX-mode windows from 2024, and 13 reset MAX windows from the comprehensive 2026 replication. The sensor was kept away from nearby electronic devices, the camera operated in airplane mode with WiFi disabled, and measurements near transmitters were avoided to characterize the area background. The main surveys took place on Sundays; 2020 and 2024 also retained the same reported time period. Differences between spot readings and MAX windows require the comparisons to be interpreted as descriptive trends rather than perfect metrological equivalence.

Results. From 2020 to 2026, the observed maximum rose from 9.639 to 35.390 μW/cm² (+267.2%; 3.67 times), while P95 increased from 6.522 to 32.834 μW/cm² (+403.5%; 5.03 times). At the lower end, the observed minimum rose from 0.201 to 0.922 μW/cm² (+358.9%; 4.59 times), and Q1 rose from 0.943 to 4.009 μW/cm² (+325.1%; 4.25 times). These lower-end statistics indicate a higher observed emission floor across the sampled readings or windows, not a continuous 24-hour floor. The 2024 campaign remains central: its minimum was 1.616 μW/cm² (+704.0% versus 2020) and then decreased in 2026, while its median, mean, P95, and maximum formed an intermediate stage between 2020 and 2026.

Headline change from 2020 to 2026

Indicator	2020	2026	Increase	Multiple
Observed minimum	0.201	0.922	+358.9%	4.59 times
First quartile	0.943	4.009	+325.1%	4.25 times
95th percentile	6.522	32.834	+403.5%	5.03 times
Maximum	9.639	35.390	+267.2%	3.67 times

Millimeter waves. No detectable reading was obtained with the 24 to 40 GHz meter in 2024. In 2026, 10 PEAK readings from 31.6 to 178 μW/m² were documented, with a retained MAX of 4,990 μW/m² and displayed averages below 5 μW/m². The change is described as a transition from no detection to documented detection; a percentage cannot be calculated because the 2024 baseline is not a numerical value equal to zero.

Conclusion. The data document a progressive increase in recorded levels from 2020 through 2024 and 2026, with 2024 as the transition stage and 2026 as the campaign with the highest upper tail. The observed minimum in 2026 was lower than in 2024, so the change was not uniform across every point or window. This study characterizes the observed radiofrequency environment; by itself, it neither identifies a specific transmitting technology nor constitutes compliance certification or a health-effects assessment.

Main Results in Numbers

Indicator	2020	2024	20 sep 2026
Independent observations	30	10	13
Observed minimum	0.201	1.616	0.922
First quartile	0.943	2.637	4.009
Median	2.854	6.979	7.841
Mean	2.696	8.557	12.463
95th percentile	6.522	19.298	32.834
Maximum	9.639	22.430	35.390

Table 1 Summary values in μW/cm². Observations are spot readings in 2020 and independent MAX-mode windows in 2024 and 2026.

Indicator	2020 to 2024	2024 to 2026	2020 to 2026
Observed minimum	+704.0 %	-42.9 %	+358.9 %
First quartile	+179.6 %	+52.0 %	+325.1 %
Median	+144.6 %	+12.4 %	+174.8 %
Mean	+217.4 %	+45.7 %	+362.4 %
95th percentile	+195.9 %	+70.1 %	+403.5 %
Maximum	+132.7 %	+57.8 %	+267.2 %

Table 2 Percentage change between campaigns. A positive sign indicates a higher value and a negative sign indicates a lower value.

Plain Language Interpretation

- The typical value, represented by the median, was 2.75 times the 2020 level at the end of the series.
- The mean was 4.62 times the 2020 mean, reflecting the growing influence of windows with high values.
- The 95th percentile was 5.03 times the 2020 value. This indicator summarizes the upper end without depending on a single maximum.
- The 2026 maximum was 3.67 times the 2020 maximum and 1.58 times the 2024 maximum.
- The observed minimum rose sharply in 2024 but fell in 2026 relative to 2024. The main conclusion therefore rests on the full set of indicators rather than one value.

Note on September 3, 2026. The eight photographs from this follow-up show successive updates of the same cumulative MAX, from 20.73 to 51.10 mW/m², equivalent to a final maximum of 5.110 μW/cm². They were not used to calculate a mean, median, or percentages for an independent distribution.

Objective and Scope

The objective is to determine background environmental exposure levels along the corridor and establish how they changed from 2020 through 2024 and 2026 as the 4G and 5G environment evolved. The comparison retains 2024 as the transition campaign: it is the first point at which the center, lower end, and upper tail of the distribution all increased, before 2026 expanded the observed range again.

- Quantifies changes in central tendency, dispersion, extremes, and descriptive intervals
- Distinguishes photographs from independent windows to avoid pseudoreplication
- Compares recorded background exposure while avoiding dominant contributions from nearby devices or transmitters

- Places the measurements in the context of active 4G, low- and mid-band 5G, and public WiFi networks
- Independently verifies the millimeter wave range from 24 to 40 GHz
- Compares the maximum from the partial 2026 subroute with historical maxima without treating its cumulative steps as independent samples
- Retains the limitations created by the difference between spot readings and maximum windows

Assessment Area

The reference area covers the corridor around the Miami River and Brickell Avenue, including sectors near Miami Tower, Kimpton EPIC Hotel, JW Marriott Marquis, the waterfront, SE 6th Street, and 701 Brickell. The 2020 maps define the general area used as the reference for later campaigns.

Reference	Latitude	Longitude
Northeastern boundary	25.771111	-80.187466
Southwestern boundary	25.768664	-80.190346
Interior point	25.770759	-80.188845

Table 3 Coordinates documented in 2020

The approximate bounding rectangle measures 272 m from north to south and 288 m from east to west, with a diagonal of about 396 m and a reference area of 0.078 km² or 19.4 acres. The 2024 campaign is described as the same general location, but individual coordinates are unavailable to match each window to a 2020 point. The 2026 campaign covered only the southern subroute around Brickell Avenue between the Miami River and SE 6th Street, with a reference point near 25.768664, -80.190346.

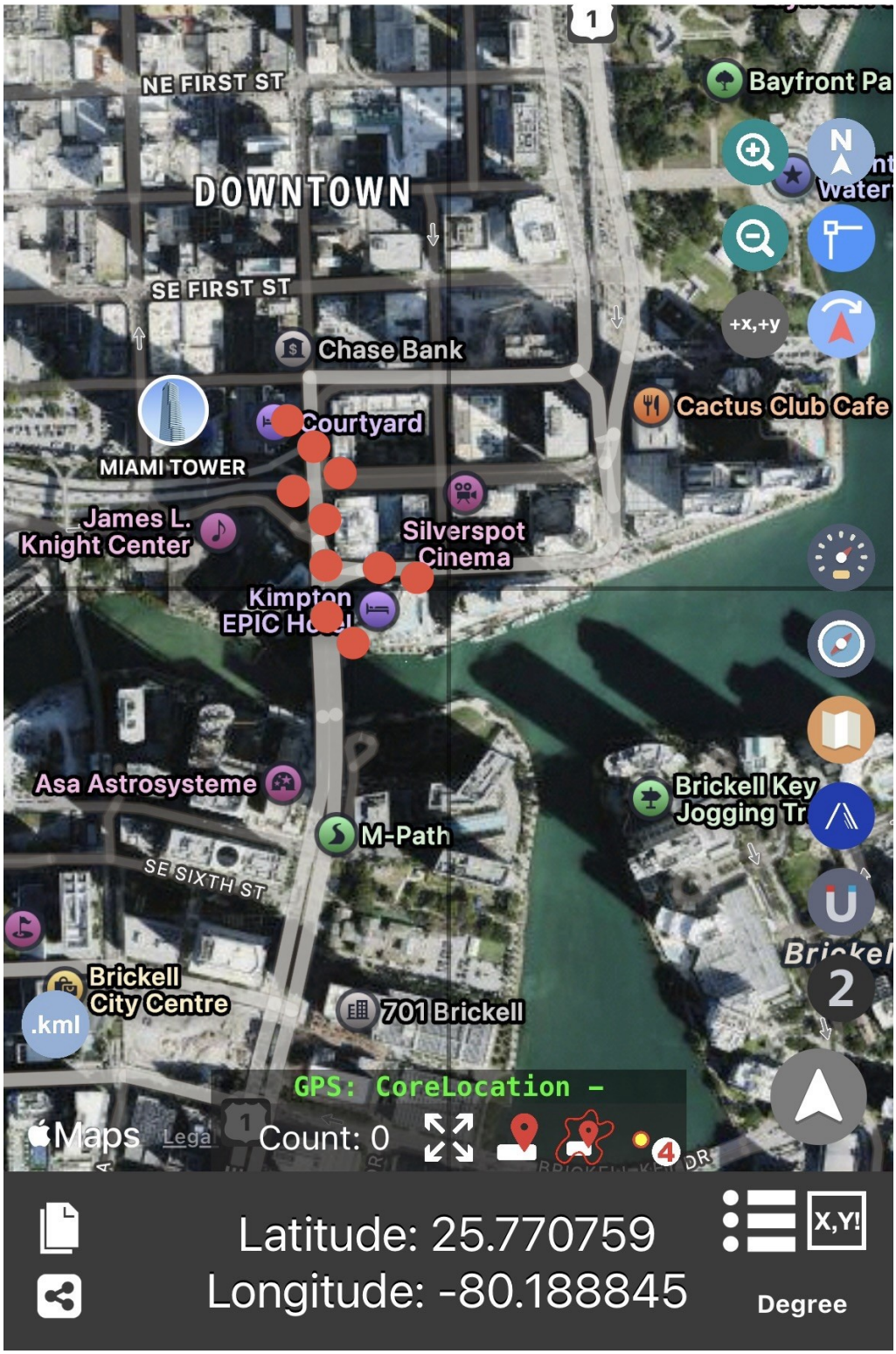


Figure 1 General corridor and collection points

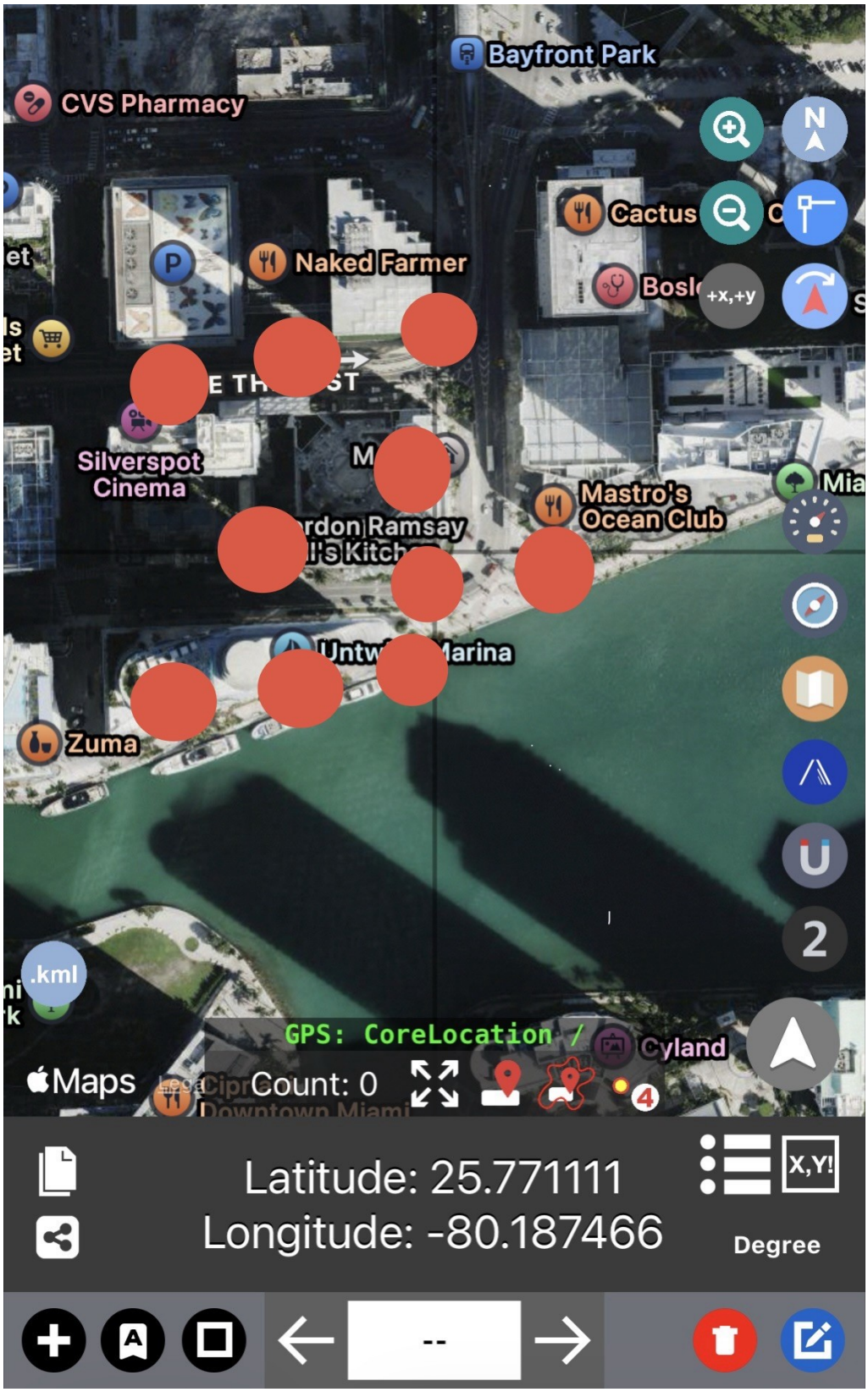


Figure 2 Northern sector and waterfront

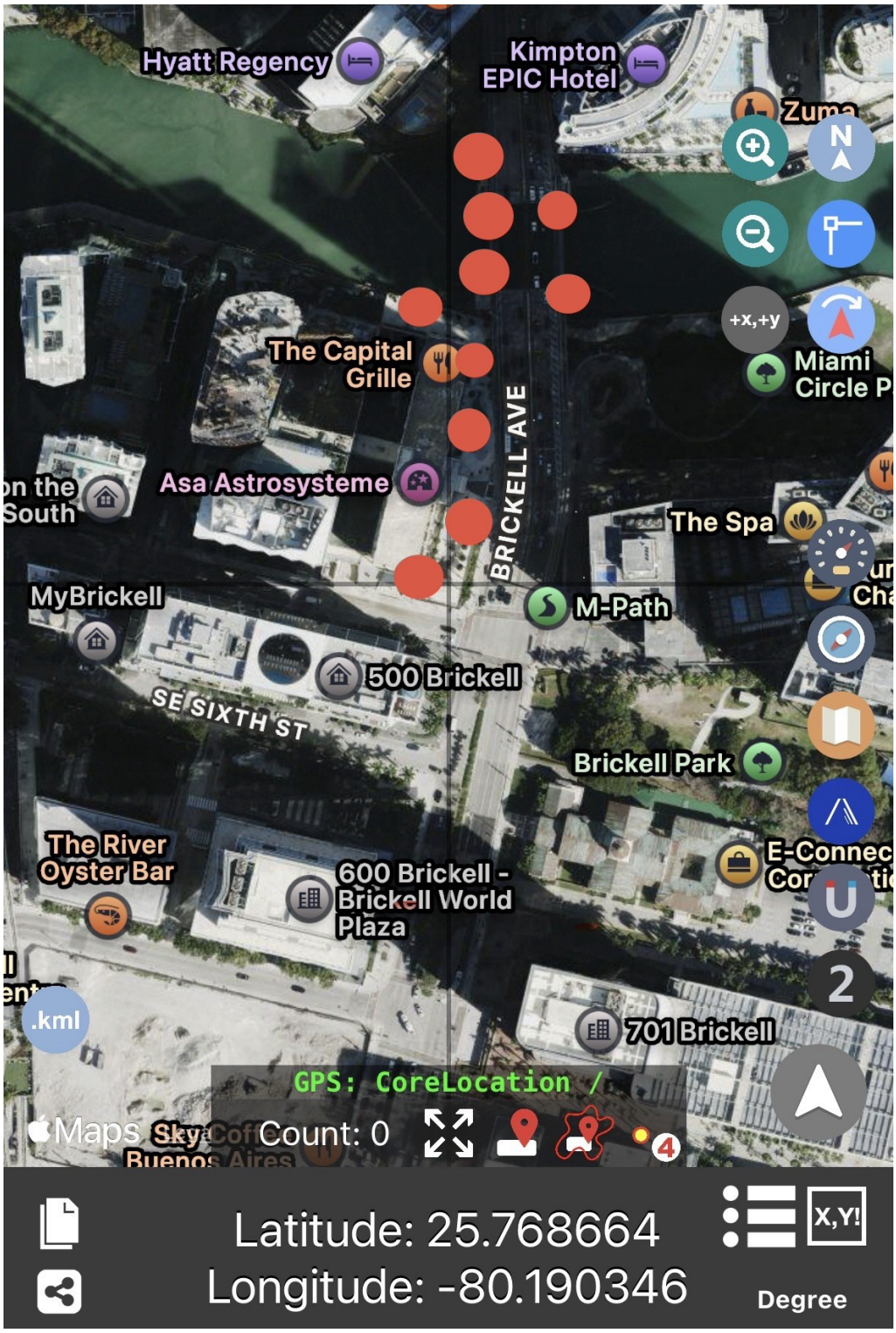


Figure 3 Route along Brickell Avenue

Comparative Design and Methodology

Design of Each Campaign

Campaign	Date	Analytical unit	Count	Visible mode
Baseline	November 15 2020	Photographed spot reading	30	Mixed units
Transition	July 14 2024	Consolidated independent window	10	MAX
Partial follow-up	September 3 2026	Continuous route with cumulative maximum	1 route	MAX without reset
Comprehensive replication	September 20 2026	MAX window + instantaneous reading	13 + 47	Reset MAX and live display

Table 4 Design differences that condition the comparison

Field Controls and Comparability

Factor	Applied control	Value for comparison
Instrumentation	Two identical meters of the same model	Reduces differences from instrument design or response
Calibration	Reviewed previously on both instruments	Increases consistency of the readings
Day and time	Sunday and the same time period	Reduces variation from weekly pattern and time of day
Camera	Airplane mode and WiFi disabled	Avoids nearby emissions generated by photographic recording
Near field	Sensor kept away from nearby electronic devices	Reduces local contamination of the reading
Transmitters	Proximity to high-frequency telecommunications sources was avoided	Directs the measurement toward the area background rather than a point source

Table 5 Controls reported by the investigator for the comparable 2020 and 2024 campaigns

The September 3, 2026, photographs show the same 10 MHz to 8 GHz Electrosmog Meter model, but that follow-up had partial coverage and continuous MAX operation; it is used only as supporting evidence. On Sunday, September 20, the historical corridor was repeated with MAX reset approximately every five minutes and a simultaneous HF-B8G used to observe instantaneous readings. A third yellow-ball instrument of the same model quickly returned to maxima in the 200 to 300 mW/m² range after reset, providing evidence of recurrence on an independent unit.

Instrumentation and Acquisition Chain

A photographed value is not the radiofrequency waveform itself. In broadband meters, the conceptual chain includes electric-field capture by the sensor, signal detection, conditioning and temporal integration, conversion, and calculation of an indicated reading or retained maximum. Frequency coverage, sensitivity, attack time, integration constant, display update rate, and MAX logic are different parameters. The available documentation is insufficient to reconstruct each stage of the yellow Electrosmog Meter used in 2020, 2024, and 2026 numerically.

LATNEX HF B8G Triaxial Meter from 10 MHz to 8 GHz

The black-ball HF-B8G measures broadband RF electric field with selectable X, Y, Z, or triaxial readings. An isotropic estimate of field magnitude is expressed as $E = \sqrt{(Ex^2 + Ey^2 + Ez^2)}$. Under approximate plane-wave, far-field conditions, equivalent power density is $S = E^2/377$ in W/m² when E is in V/m. In this report, 1 mW/m² equals

0.1 μW/cm². Near emitters, the far-field relationship may not accurately represent local power flow; orientation, frequency response, and calibration also affect the reading.

The manufacturer specification contains an internal inconsistency: one section lists a sampling time of 2.5 times/s, or about one value every 0.4 s, while another lists a sample rate of 1.5 times/s, or about one value every 0.67 s. Neither figure alone specifies detector attack time, minimum detectable duration, integration-window width, or the exact MAX update interval. The photographed black-meter reading represents the display visible at that instant; it is not a continuous record of every maximum between photographs. The meter includes instantaneous, maximum, average, and manual storage functions, but the analyzed record contains photographs rather than a digital memory download.

Yellow Electrosmog Meter and MAX Comparison

The yellow instrument, labeled 10 MHz to 8 GHz, served as the primary meter for the 2020, 2024, and 2026 MAX values. During the complete 2026 route, MAX was reset approximately every five minutes; the final value in each window is the highest value retained since its own reset. Intermediate displays from the same window are not replicates. During the partial September 3 route, without a reset, the eight displays are states of one cumulative MAX. No unambiguous manual for the exact revision of the yellow instrument was identified in the record, so a sampling rate, attack time, integration period, or peak-hold algorithm cannot be assigned to it.

The 47 legible HF-B8G displays averaged 23.21 mW/m², with a maximum of 46.83, while the 13 yellow-meter MAX windows averaged 124.63 mW/m², with a maximum of 353.90. These populations are not synchronous pairs from the same estimator: they differ in number of observations, mode, and represented duration. Their mean ratio therefore does not demonstrate a calibration difference or permit calculation of the true amplitude or duration of pulses. The third yellow meter quickly reproduced maxima in the 200 to 300 mW/m² range after successive resets. This supports recurrence during the observation but does not establish periodicity, modulation frequency, or a duration below 0.5 s.

Temporal Response and Event Interpretation

A reported rate of n readings per second determines the spacing between reported values, not necessarily the speed of the detector ahead of the processor. An event shorter than that interval may alter the integrated value, activate a peak detector, or go unnoticed, depending on the circuit and acquisition phase. Conceptually, indicated reading = F{E(t), spectral response, detector, time window, filtering}; MAX = the highest value that the implementation elects to retain after reset. Without knowing F, it is not valid to claim that the yellow meter detects every pulse shorter than 0.5 s and the black meter detects none. The supported conclusion is that windowed MAX retained recurrent high events that are not represented in the same way by photographs of the live display.

RF Explorer and the Frequency Domain

RF Explorer is a swept-spectrum analyzer. Its commercial architecture includes a frequency synthesizer and mixer; it selects successive frequency segments and displays received power versus frequency in dBm referenced to the RF input. MAX HOLD retains the highest level observed in each spectral bin across sweeps; it is not equivalent to the single MAX of a broadband environmental meter. Resolution bandwidth, or RBW, dwell time, sweep settings, antenna, and configured segments constrain what can be observed. No exported capture documenting the model, range, settings, and traces from this campaign is available to attribute the increase quantitatively to a channel, carrier, or operator. Continuous sub 6 GHz coverage or a specific RBW should not be extrapolated from a specification for an unidentified RF Explorer model.

The dBm value at a 50 Ω port is not directly an environmental power density. Conversion to field strength or μW/m² requires the antenna factor or gain by frequency, losses, polarization, configuration, and calibration. The RF Explorer observations provide spectral context; they do not divide the integrated meter readings among 4G, 5G, or WiFi technologies.

Safe and Sound Pro mmWave and the Upper Band

The Safe and Sound Pro mmWave detects RF in the 24 to 40 GHz band labeled on the photographed unit. The current specification states 20 to 40 GHz with a stub antenna, 200 kHz internal sampling, a nominal interval of 5 µs, and response time below 50 µs. These figures describe the specified electronics; they do not mean that the display changes 200,000 times per second or identify a modulation or emitter. PEAK is the peak shown at the observation instant, MAX retains the highest PEAK since reset, and AVG is a time average as implemented by the manufacturer. The 4,990 µW/m² MAX was not reset between the ten 2026 photographs, so it is one retained maximum rather than ten independent events.

The stub antenna does not receive all directions equally. The specification describes it as nearly omnidirectional with approximate 50° reception sectors forward and backward and ±5 dB response from 20 to 40 GHz. Orientation, reflections, and small changes in position affect the reading. The documented non-detection in 2024 and intermittent detection in 2026 demonstrate a change in what was observed during the two surveys. Without frequency-selective scanning or controlled orientation, location, threshold, and duration, however, the signal cannot be assigned to 5G and a percentage change for the millimeter wave band cannot be calculated.

Relationship Between the Instruments and the Longitudinal Result

Broadband meters quantify the combined magnitude within their spectral response; the swept analyzer shows the frequency distribution within its settings; and the mmWave detector extends observation to a higher band. The strongest longitudinal comparison concerns the statistics from the normalized campaigns and the repeated maxima in the 2026 windows. Comparing the emission floor requires separating the observed minimum from the first quartile and remembering that a five-minute maximum does not estimate continuous background in the same way as a spot reading. Demonstrating changes in mean power, pulses of known duration, and attribution by service would require synchronized time series, calibrated spectral traces, and repeated spatial points.

Technological and Spectral Characterization

The 2024 campaign expanded the original objective to identify which parts of the radiofrequency environment were present during the deployment of 5G networks. The investigator reviewed FCC implementation information and used RF Explorer to observe active spectrum associated with 4G, low- and mid-band 5G, public WiFi, and other emissions within the sub 6 GHz band and its upper margin.

The availability of a new specialized millimeter wave meter was one reason to repeat and expand the assessment in 2024. The additional objective was to determine whether detectable emissions had reached the 24 to 40 GHz range and at what magnitude they appeared during the route.

Component	Coverage	Function in the study	Main result
Electrosmog Meter	10 MHz to 8 GHz	Primary quantification of exposure levels	2020 and 2024 campaigns and partial 2026 maximum
Safe and Sound Pro	650 MHz to 10 GHz	Complementary check of the broadband RF environment	Coverage of sub 6 GHz services and the adjacent upper spectrum
RF Explorer	Sub 6 GHz configuration and upper margin	Observation of active spectrum and support for contextual identification	Presence of the 4G, low- and mid-band 5G, and WiFi environment
Safe and Sound Pro mmWave	24 to 40 GHz	Specific search for millimeter waves during the route	No detectable reading reported in 2024
FCC information	Public deployment data	Context for active networks in the area	Documentary reference for interpreting the technological environment

Table 6 Instrumental and documentary coverage of the radiofrequency analysis



Figure 4 Complementary meters used for the 650 MHz to 10 GHz and 24 to 40 GHz bands

The photograph documents the two Safe and Sound meters used in 2024. No millimeter wave reading was reported during the route with the 24 to 40 GHz instrument. The observed increase therefore cannot be attributed to detected mmWave emissions and must be interpreted within an RF environment dominated by lower and sub 6 GHz bands.

Consolidation of the 2024 Data

The 35 images received from 2024 were reviewed by time sequence, display, context, and timer reset. IMG 0046 and IMG 0046 2 are binary-identical files, so the copy was excluded. The 34 unique images were grouped into 10 independent windows. The final maximum or equivalent value in μW/cm² was retained from each window.

In window 3, the displays of 2.609 V/m, 6.920 mA/m, and 1.805 μW/cm² are equivalent under the 377 Ω impedance assumption. This internal agreement supports the transcription and confirms that the three photographs are not three separate observations.

Normalization

All values were expressed as power density in μW/cm². Readings in mW/m² were divided by 10. Readings in V/m were converted using S equal to E squared divided by 3.77 under the plane-wave, far-field assumption. For H in mA/m, E approximately equal to 377 H in A/m was used before conversion.

The intervals and chart colors are internal descriptive tools. They do not represent regulatory, health, or compliance categories.

Comparative Results

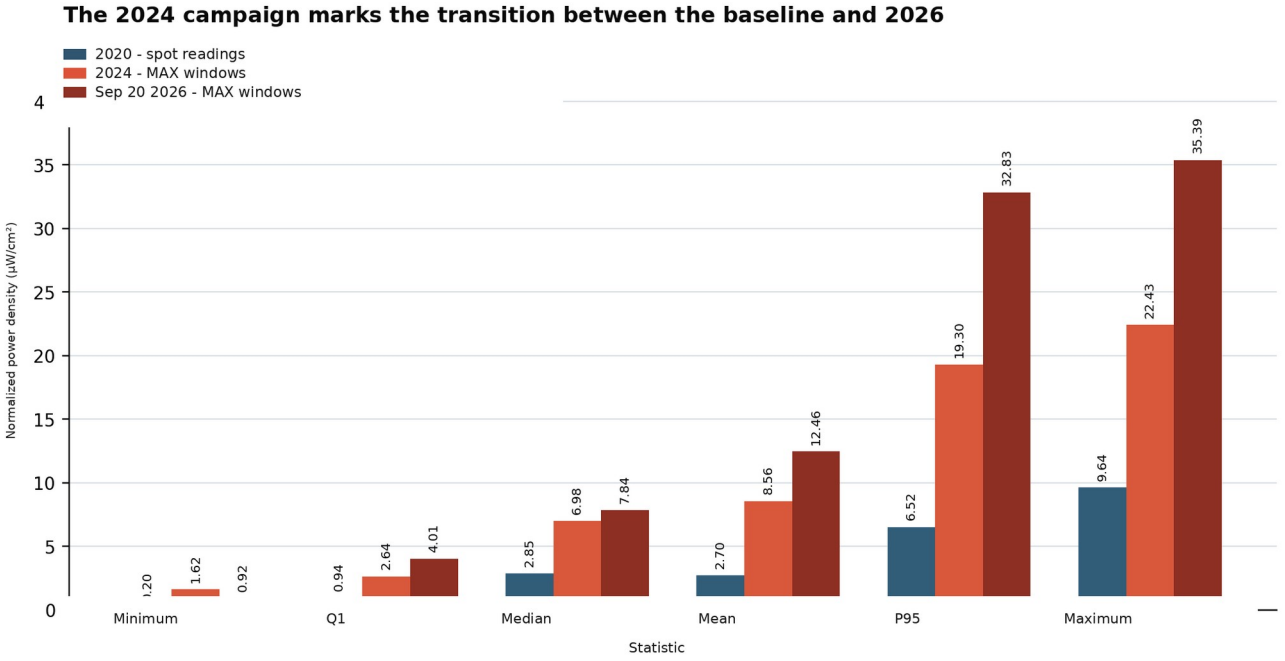


Figure 5 Temporal comparison of descriptive statistics

Indicator	2020	2024	Relative change
Minimum	0.201	1.616	+704.0%
First quartile	0.943	2.637	+179.6%
Median	2.854	6.979	+144.6%
Mean	2.696	8.557	+217.4%
95th percentile	6.522	19.298	+195.9%
Maximum	9.639	22.430	+132.7%

Table 7 Change in the main indicators in µW/cm²

Distribution by Interval

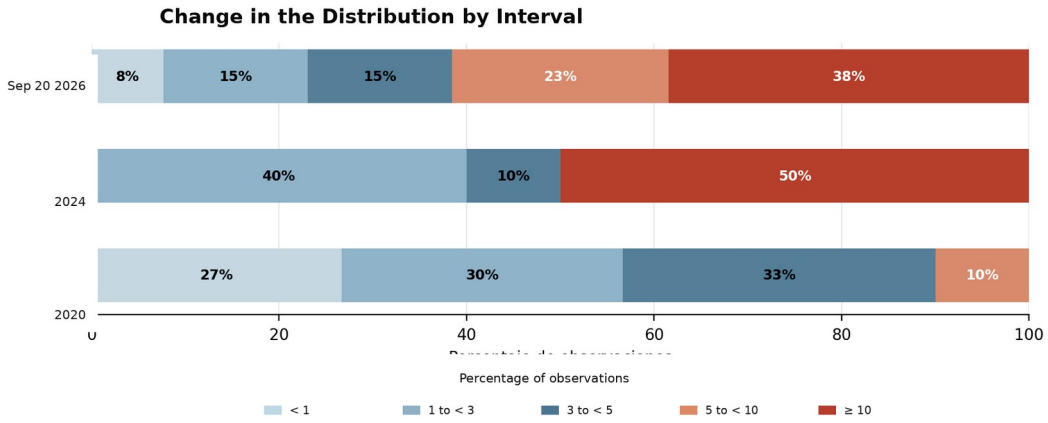


Figure 6 Percentage distribution across descriptive intervals

Interval	2020 n	2020 %	2024 n	2024 %	2026 n	2026 %
Below 1	8	26.7%	0	0.0%	1	7.7%
1 to below 3	9	30.0%	4	40.0%	2	15.4%
3 to below 5	10	33.3%	1	10.0%	2	15.4%
5 to below 10	3	10.0%	0	0.0%	3	23.1%
10 or more	0	0.0%	5	50.0%	5	38.5%

Table 8 Frequencies across non-regulatory descriptive intervals

Longitudinal Interpretation

The entire distribution shifted toward higher values. In 2020, 26.7% of observations were below 1 μW/cm² and none reached 10 μW/cm². In 2024, no window was below 1 μW/cm² and 50.0% reached at least 10 μW/cm². In 2026, five of 13 windows reached at least 10 μW/cm², three reached 20 μW/cm², and two reached 30 μW/cm². The 95th percentile rose from 6.522 in 2020 to 19.298 in 2024 and 32.834 μW/cm² in 2026.

The separation is not limited to one extreme value. Simultaneous increases in the first quartile, median, mean, and 95th percentile indicate a shift across several parts of the distribution. However, the 2024 sample is smaller and its observations represent window maxima.

Increase in the Recorded Background Exposure

From 2020 to 2024, the observed minimum increased 704.0%, the first quartile 179.6%, and the median 144.6%. From 2020 to 2026, the observed minimum increased 358.9% and the first quartile 325.1%. These changes extend across the lower end and center of the distribution and do not depend only on the campaign maximum.

The protocol was designed to measure the corridor background level. Deliberately excluding nearby devices and point transmitters, while using equivalent instruments on the same day of the week and during the same time period, strengthens the interpretation of a higher background recorded by the instruments between campaigns. Differences in capture mode and the absence of continuous series prevent this result from being converted into a universal rate of background increase throughout the day. The complementary spectrum review places the change in an environment with active 4G, low- and mid-band 5G, and public WiFi services. The 24 to 40 GHz verification produced no detectable reading in 2024, so the recorded increase in that campaign is not associated in this study with millimeter waves.

Results of the 2024 Campaign

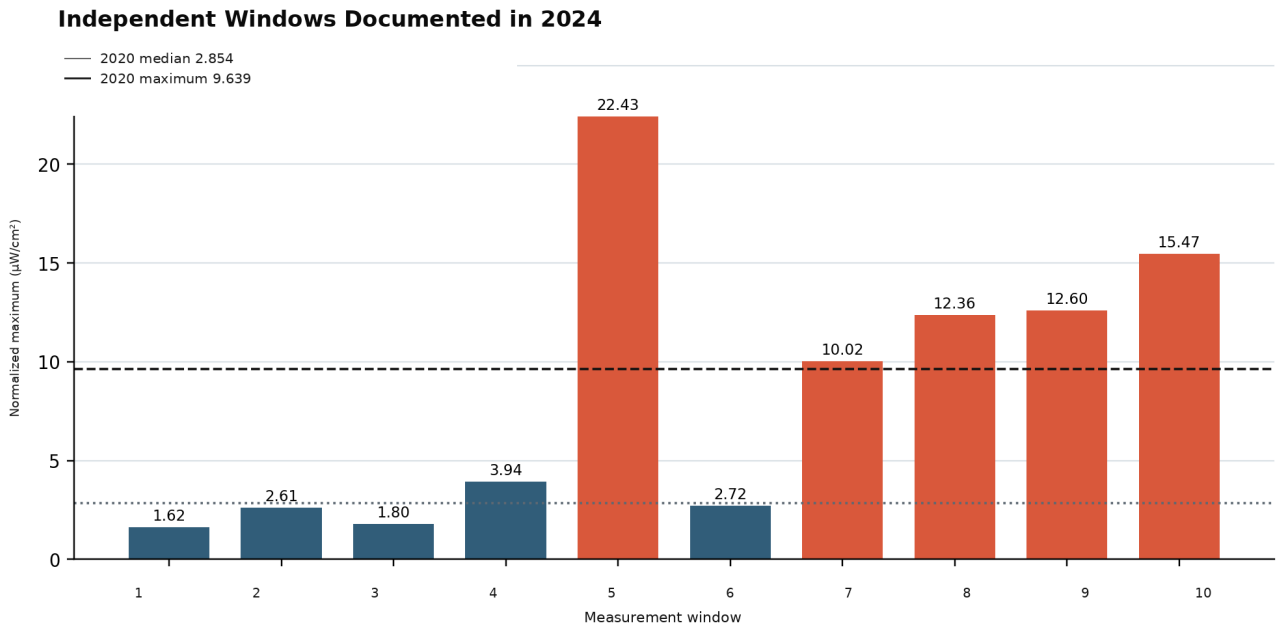


Figure 7 Consolidated maxima from the 2024 windows

The 10 windows ranged from 1.616 to 22.430 µW/cm². The median was 6.979 µW/cm² and the standard deviation was 7.132 µW/cm². Five windows exceeded the maximum observed in the entire 2020 campaign.

Window	Evidence	Context	Retained reading	Normalized	Criterion
1	0015 to 0022	Urban frontage and waterfront	1.616 µW/cm²	1.616	Direct
2	0035 to 0040	Marina and vessel	3.136 V/m	2.609	Conversion
3	0046 to 0048	JW Marriott Marquis	1.805 µW/cm²	1.805	Confirmed equivalence
4	0054 to 0055	Bridge and waterfront	3.938 µW/cm²	3.938	Direct
5	0058 to 0061	Elevated level and Citibank corridor	22.43 µW/cm²	22.430	Direct
6	0064	Elevated level with new timer	3.203 V/m	2.721	Approximate conversion
7	0075 to 0087	Bridge over the river	10.02 µW/cm²	10.020	Approximate direct reading
8	0089 to 0090	Urban corridor	12.36 µW/cm²	12.360	Direct
9	0096 to 0098	Tree-lined avenue	6.892 V/m	12.599	Conversion
10	0100 to 0110	Corridor posted at 20 mph	15.47 µW/cm²	15.470	Direct

Table 9 Consolidation of the ten independent 2024 windows

Partial Follow Up on September 3 2026

Only the southern subroute around Brickell Avenue between the Miami River and SE 6th Street was covered. The instrument remained in MAX without a reset; the eight photographs are therefore successive updates of one cumulative maximum, not eight samples.

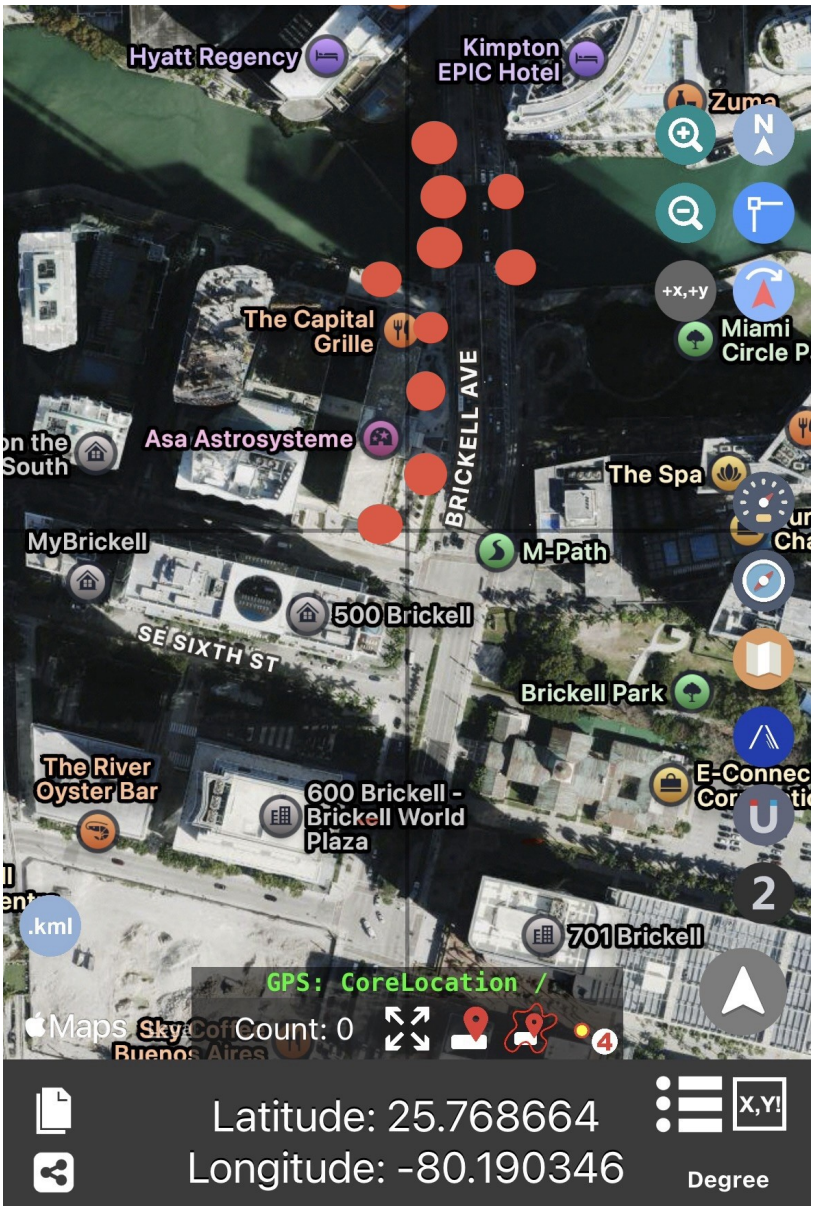


Figure 8 Partial subroute on September 3 2026

The display is configured in mW/m². The sequence rose from 20.73 to 51.10 mW/m², equivalent to 2.073 and 5.110 µW/cm². The final maximum remained below the overall maxima from 2020 and 2024. Its analytical value is to document accumulation within this subroute and the reason for conducting the later comprehensive survey.

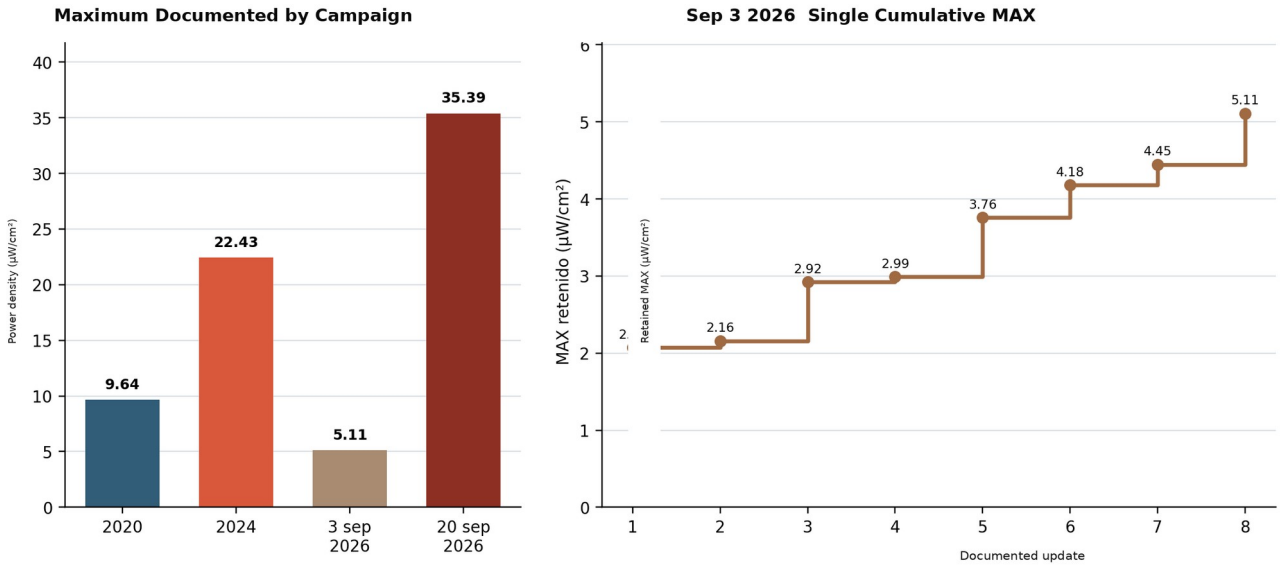


Figure 9 Campaign maxima and traceability of the partial cumulative MAX

Step	File	Display mW/m²	Equivalent µW/cm²	Interpretation
1	IMG_0980	20.73	2.073	Update of the same MAX
2	IMG_0984	21.59	2.159	Update of the same MAX
3	IMG_0981	29.20	2.920	Update of the same MAX
4	IMG_0982	29.88	2.988	Update of the same MAX
5	IMG_0985	37.56	3.756	Update of the same MAX
6	IMG_0986	41.77	4.177	Update of the same MAX
7	IMG_0987	44.46	4.446	Update of the same MAX
8	IMG_0983	51.10	5.110	Update of the same MAX

Table 10 Non-independent updates on September 3 2026

Comprehensive Campaign on Sunday September 20 2026

The complete historical corridor was repeated. The yellow-ball meter remained in MAX and was reset approximately every five minutes to segment the route. In parallel, the black-ball LATNEX HF-B8G displayed the instantaneous or currently visible reading. The design examines two different variables: the maximum retained within each window and the level coinciding with the exact instant of the photograph.

Abrupt decreases in MAX, supported by the visible timer and change of context, define 13 independent windows. Photographs within one window are intermediate states, not replicates. The final maximum in each window was normalized from mW/m² to µW/cm² by dividing by 10.

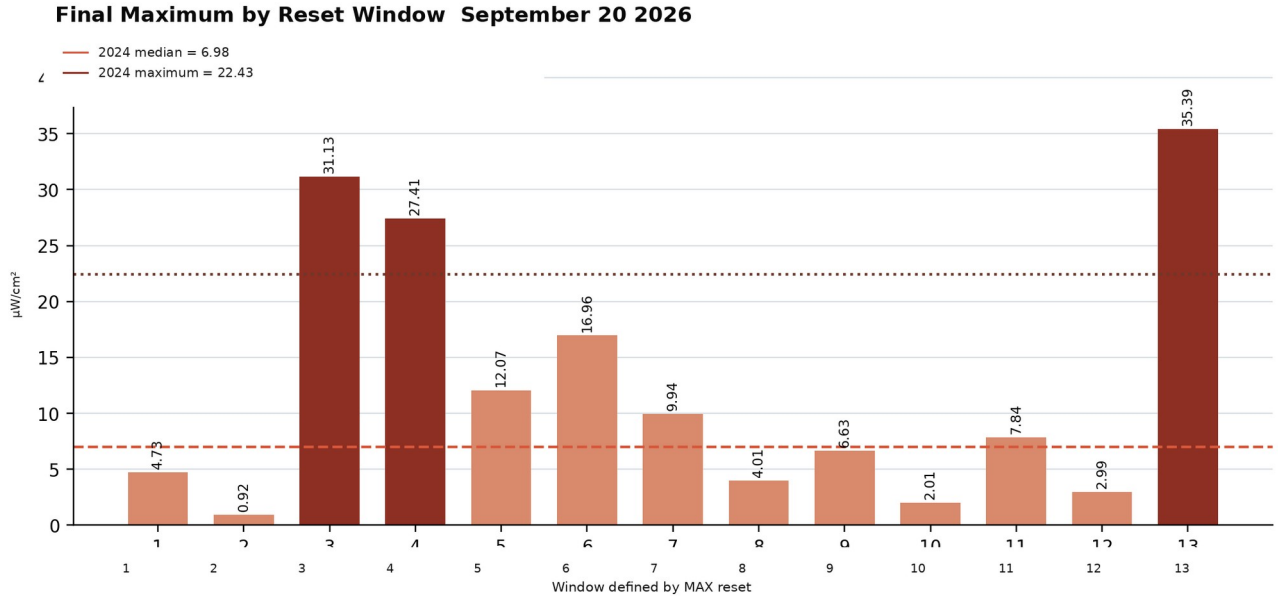


Figure 10 Maxima by reset window in 2026

Window	Evidence	MAX mW/m²	MAX µW/cm²
Y1	IMG_0988	47.30	4.730
Y2	IMG_0992 to IMG_0993	9.224	0.922
Y3	IMG_0998 to IMG_1019	311.30	31.130
Y4	IMG_1025 to IMG_1026	274.10	27.410
Y5	IMG_1027 to IMG_1034	120.70	12.070
Y6	IMG_1040 to IMG_1048	169.60	16.960
Y7	IMG_1054 to IMG_1057	99.36	9.936
Y8	IMG_1062 to IMG_1065	40.09	4.009
Y9	IMG_1071 to IMG_1080	66.30	6.630
Y10	IMG_1082 to IMG_1093	20.06	2.006
Y11	IMG_1099 to IMG_1102	78.41	7.841
Y12	IMG_1109 to IMG_1119	29.88	2.988
Y13	IMG_1122 to IMG_1138	353.90	35.390

Table 11 Consolidation of the 13 MAX windows on September 20 2026

Statistics of the 2020 to 2024 to 2026 Progression

Indicator	2020	2024	Sep 20 2026	2020 to 2024	2024 to 2026
Minimum	0.201	1.616	0.922	+704.0%	-42.9%
Q1	0.943	2.637	4.009	+179.6%	+52.0%
Median	2.853	6.979	7.841	+144.6%	+12.4%
Mean	2.696	8.557	12.463	+217.4%	+45.7%
P95	6.522	19.298	32.834	+195.9%	+70.1%
Maximum	9.639	22.430	35.390	+132.7%	+57.8%
CV	78.9%	83.3%	93.9%	—	—

Table 12 Temporal trend in μW/cm²; CV is the coefficient of variation

From 2020 to 2024, the median increased 144.6% and the mean 217.4%. From 2024 to 2026, the median increased another 12.4%, while the mean rose 45.7% and P95 rose 70.1%. The pattern is consistent with progressive growth driven by an increasingly broad upper tail rather than a uniform jump at every point.

Temporal Response of the Two Meters

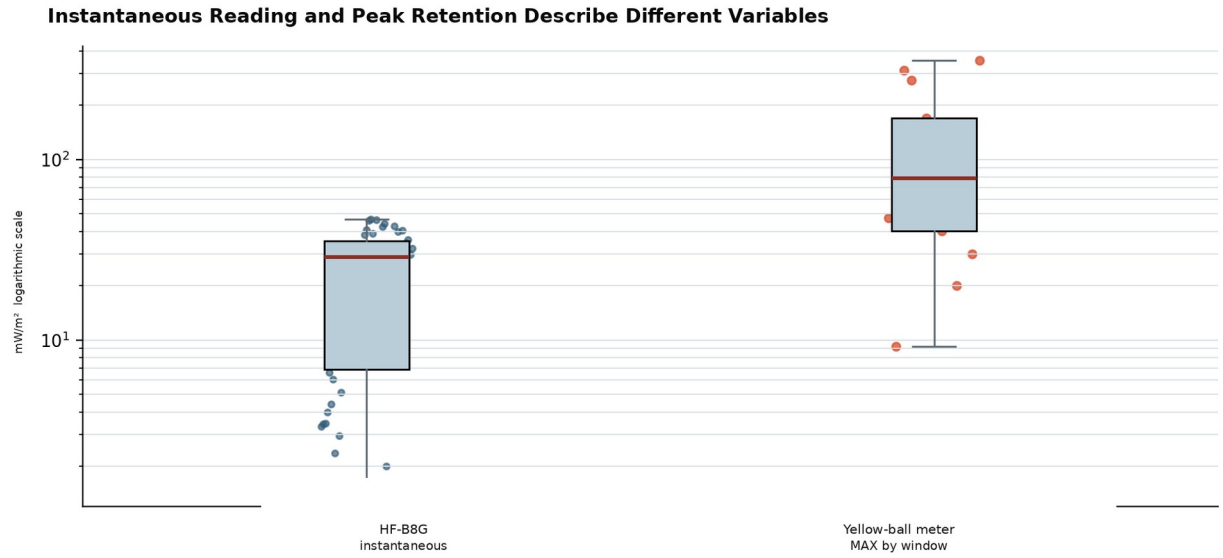


Figure 11 Different instrumental variables during the simultaneous survey

The 47 legible instantaneous HF-B8G readings had a mean of 23.21 mW/m², a median of 28.77, P95 of 45.38, and a maximum of 46.83 mW/m². The 13 final window maxima from the yellow meter had a mean of 124.63, median of 78.41, P95 of 328.34, and maximum of 353.90 mW/m². They should not be compared as though they were two simultaneous calibrations: one displays an instant while the other retains the highest event since reset.

The divergence between the instantaneous display and retained MAX, together with the rapid reproduction of maxima in the 200 to 300 mW/m² range on a third identical yellow meter after reset, supports the conclusion that high events were recurrent and did not depend on one unit. This is consistent with brief peaks that may occur between visible updates of the black display. Without high-speed synchronized recording, a duration below 0.66 s cannot be asserted and the events cannot be attributed to a specific modulation or technology.

Millimeter Waves from 24 to 40 GHz

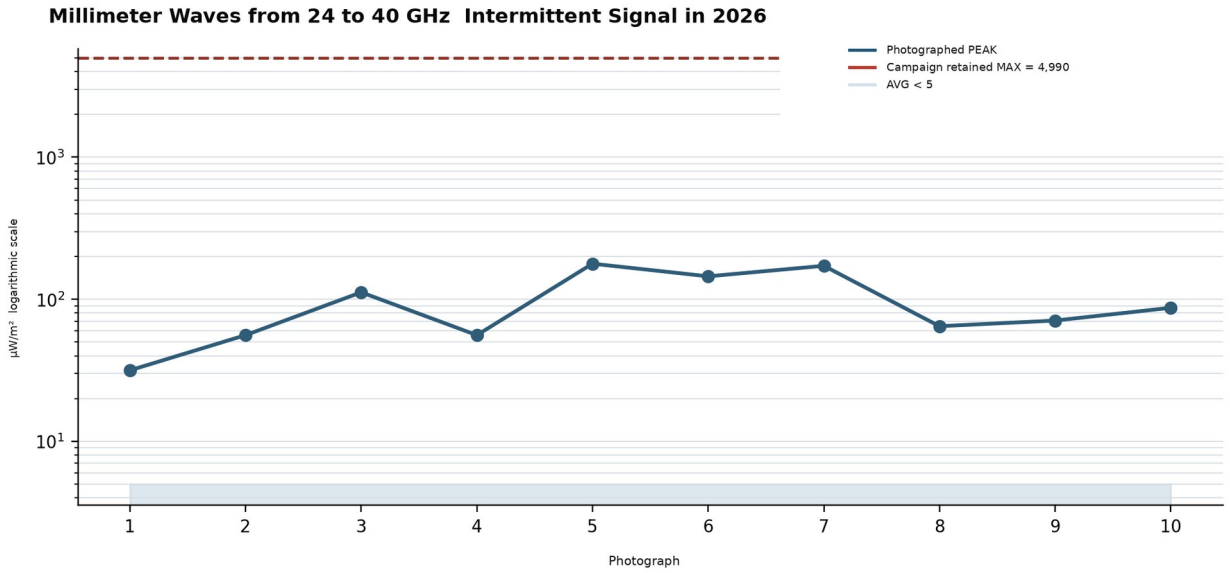


Figure 12 Intermittent millimeter wave signal documented in 2026

Across ten photographs, PEAK ranged from 31.6 to 178.0 µW/m², with a mean of 97.29, median of 78.95, and P95 of 175.30 µW/m². MAX remained at 4,990 µW/m² and AVG at <5.00 µW/m². The combination of a high retained maximum, moderate photographed PEAK values, and an average below the visible threshold describes a highly intermittent or low-duty-cycle signal. Because MAX was not reset between the ten photographs, 4,990 µW/m² belongs to the overall campaign window rather than to every point.

The temporal contrast is direct: reported non-detection in 2024 and documented detection in 2026 within the same instrumental band. The meter confirms energy from 24 to 40 GHz but does not identify whether it came from 5G, a point-to-point link, radar, WiGig, or another source.

Value of Follow Up Years Later

The campaigns form an exploratory timeline spanning 2,135 days. There were 1,337 days between 2020 and 2024 and 798 days between 2024 and the comprehensive 2026 campaign. The dates do not define a continuous annual rate, but they show an ordered sequence: baseline, 2024 transition, and additional expansion of the upper tail in 2026.

- Helps distinguish spatial variability from possible temporal changes as comparable campaigns are added
- Identifies sectors and windows that should receive priority for prolonged measurement and frequency-specific analysis
- Provides a historical reference before and after later changes in infrastructure and urban use
- Demonstrates the importance of recording timer, reading mode, units, and sequences to avoid counting unit conversions as samples
- Provides testable hypotheses without attributing the change to a specific source or technology

Limitations and Uncertainty

- The campaigns are not exact metrological replicates because 2020 contains spot readings and 2024 contains window maxima
- The 2024 points lack individual coordinates and cannot be matched one-to-one with the 2020 markers
- The broadband instrument does not separate frequency, operator, technology, modulation, or dominant source
- The RF Explorer review and FCC information contextualize the technologies present but do not convert broadband readings into quantitative attribution by service
- No exported RF Explorer spectral curves or synchronized high-speed digital records were included
- The investigator confirmed the calibration review and identical model, although the file does not include certificates or serial numbers
- Using the same time period on Sunday reduces temporal variation but does not necessarily equalize network load across years
- The record does not permit uniform reconstruction of the height, orientation, and duration of every individual reading
- Weather conditions, network traffic, and pedestrian density were not documented quantitatively
- The 2024 sample is smaller, and consolidation depends on the photographic sequence and visible timer
- The September 3, 2026, campaign covers only a subroute and represents one continuous survey in MAX mode without reset
- The eight September 3 values are updates of the same cumulative maximum and must not be analyzed as eight independent samples
- The 2024 to 2026 comparison uses window maxima, but the windows do not have identical durations or spatial limits
- The HF-B8G and yellow meter did not record synchronized digital time series, so the exact peak width cannot be calculated
- The 4,990 μW/m² millimeter wave MAX was retained throughout the campaign and cannot be assigned to a specific photograph or point
- A robotic device visible near IMG 1137 is a possible local confounder for that photograph, although the later maximum in IMG 1138 was documented in a different context

- Some digits are classified as approximate because of focus, reflection, or display angle
- Conversions from V/m and mA/m assume plane-wave, far-field conditions
- The comparison is descriptive and does not support causal, clinical, epidemiological, or regulatory inference

Conclusions

The 2024 replication documented a clearly higher distribution than the 2020 baseline within the same general urban corridor. The median was 2.45 times the 2020 median, the mean 3.17 times, and the maximum 2.33 times. Five windows at 10 μW/cm² or more contrast with the absence of readings in that interval during 2020.

The controls applied in the comparable 2020 and 2024 campaigns strengthen the conclusion that the instruments recorded an increase in the environmental background exposure of the area. The sensor was kept away from nearby electronic devices, the camera emitted no wireless signals, point transmitters were avoided, and Sunday, the time period, the instrument model, and the prior calibration review were retained.

The difference between spot readings and window maxima limits the exact estimate of the increase but does not eliminate the observed shift across the distribution. The study demonstrates an increase recorded by the instruments within the radiofrequency environment of 4G, sub 6 GHz 5G, and WiFi networks without identifying the quantitative contribution of each technology, band, operator, or source.

The specific 24 to 40 GHz millimeter wave assessment produced no detectable reading during the 2024 campaign. The results therefore do not support the conclusion that the increase observed in 2024 was caused by mmWave emissions present along the route.

The comprehensive September 20, 2026, campaign raised the window maximum to 35.39 μW/cm², 57.8% above 2024 and 267.2% above 2020. The median rose more moderately, by 12.4% relative to 2024; the recent change therefore lies mainly in high events rather than a uniform elevation along the entire route.

The 2024 campaign is essential to this conclusion. It shows that the shift was already visible two years before 2026 and quantifies an intermediate stage with a median of 6.979 μW/cm², mean of 8.557, and maximum of 22.430 μW/cm². Without it, a 2020 to 2026 comparison would confuse a progressive evolution with a single temporal jump.

Millimeter wave verification changed from non-detection in 2024 to intermittent detection in 2026. The evidence establishes presence within the band covered by the instrument but does not identify the service or source. The coexistence of AVG <5 μW/m² and MAX of 4,990 μW/m² calls for future measurements with synchronized temporal and spectral recording.

The primary value of the updated study is the combination of temporal coverage, segmented maxima, simultaneous instantaneous readings, and a millimeter wave comparison. The next campaign should fix the points, duration, height, orientation, resets, averages, and digital export protocol to separate temporal trend, spatial variation, duty cycle, and frequency composition.

Recommendations for the Next Campaign

- Repeat the 2026 subroute as a priority using fixed points and resetting MAX at each location
- Repeat at least the same ten sectors from 2024 and add fixed points covering the 2020 boundary
- Record coordinates, height, orientation, date, time, weather, and context for each measurement
- Use equal intervals at each point and retain the mean, maximum, 95th percentile, and complete time series
- Measure simultaneously in instantaneous and maximum modes to connect both historical protocols
- Attach the manufacturer, model, serial number, certificate or calibration record, configuration, and verification date for each instrument

- Add frequency-selective analysis in sectors with the highest persistent values
- Save and append RF Explorer screenshots or exported files for each point and observed band
- Repeat the 24 to 40 GHz verification at fixed points and retain the time record even when the result is non-detectable
- Retain the historical Sunday time period and add weekday periods to separate temporal variation
- Keep the camera in airplane mode with WiFi disabled and preserve separation from nearby sources
- Predefine quality criteria, duplicates, field blanks, and treatment of approximate readings

Consolidated 2020 Record

The 30 readings are retained in photographic file order. Normalized values allow internal comparison with 2024 and are rounded to three decimal places.

Number	File	Original reading	Unit	Normalized μW/cm²
1	IMG_1491	1.281	V/m	0.435
2	IMG_1492	1.190	V/m	0.376
3	IMG_1493	1.041	V/m	0.287
4	IMG_1495	3.524	mW/m²	0.352
5	IMG_1499	5.158	V/m	7.057
6	IMG_1502	58.67	mW/m²	5.867
7	IMG_1504	96.39	mW/m²	9.639
8	IMG_1505	28.80	mW/m²	2.880
9	IMG_1506	35.08	mW/m²	3.508
10	IMG_1507	31.03	mW/m²	3.103
11	IMG_1541	2.073	μW/cm²	2.073
12	IMG_1542	2.246	μW/cm²	2.246
13	IMG_1543	3.475	μW/cm²	3.475
14	IMG_1544	3.891	μW/cm²	3.891
15	IMG_1545	3.698	μW/cm²	3.698
16	IMG_1546	3.053	μW/cm²	3.053
17	IMG_1547	1.572	μW/cm²	1.572
18	IMG_1549	1.827	μW/cm²	1.827
19	IMG_1550	3.174	μW/cm²	3.174
20	IMG_1551	2.827	μW/cm²	2.827
21	IMG_1563	3.870	V/m	3.973
22	IMG_1564	3.750	V/m	3.730
23	IMG_1570	3.012	μW/cm²	3.012
24	IMG_1571	2.804	μW/cm²	2.804
25	IMG_1572	2.925	μW/cm²	2.925
26	IMG_1577	0.891	μW/cm²	0.891

Number	File	Original reading	Unit	Normalized µW/cm²
27	IMG_1578	1.099	µW/cm²	1.099
28	IMG_1580	1.585	V/m	0.666
29	IMG_1588	0.201	µW/cm²	0.201
30	IMG_1589	0.224	µW/cm²	0.224

Table 13 Historical 2020 record

Technical Notes and Traceability

Instrument References

Safe Living Technologies. Safe and Sound Pro mmWave Operation Manual. Defines PEAK as the instantaneous maximum, MAX as the highest retained PEAK, and AVG as time-averaged power density. https://safelivingtechnologies.com/content/Products/SafeandSoundmmWaveManualForWebv1.pdf

Safe Living Technologies. Safe and Sound Pro mmWave product information. The manufacturer indicates effective coverage around 20 to 40 GHz; the front of the unit used is labeled 24 to 40 GHz. https://safelivingtechnologies.com/products/safe-and-sound-pro-mmwave-meter.html

LATNEX. HF-B8G FAQ and manufacturer documentation. Triaxial broadband meter for high-frequency RF. https://www.latnex.com/pages/faq-on-hf-b8g

Primary sources: photographs and maps supplied by investigator Joaquín Machado. Reported dates: November 15, 2020; July 14, 2024; September 3, 2026; and September 20, 2026. Location: Brickell and Downtown Miami, Florida.

Protocol reported for 2020 and 2024: Sunday during the same time period; two identical meters of the same model with calibration reviewed; sensor free of nearby electronic devices; camera in airplane mode with WiFi disabled; and deliberate exclusion of positions near high-frequency telecommunications transmitters. The objective was to characterize the environmental background exposure of the area.

Technological characterization in 2024: spectrum review with RF Explorer; comparison with public FCC deployment information; consideration of 4G, low- and mid-band 5G, and public WiFi networks; and complementary verification with the Safe and Sound Pro mmWave from 24 to 40 GHz. The investigator reported no detectable millimeter wave reading during the route.

2024 consolidation criterion: consecutive photographs with the same progressive timer and context were treated as one window. The final visible maximum or converted equivalent was retained. IMG 0046 2 is byte-for-byte identical to IMG 0046 and was excluded as a duplicate.

September 3, 2026, criterion: eight changes in the same cumulative MAX, with the visible unit mW/m²; final maximum 51.10 mW/m² = 5.110 µW/cm². September 20, 2026, criterion: 13 windows defined by MAX resets, 47 legible instantaneous HF-B8G readings, and ten PEAK readings from the 24 to 40 GHz meter. Warning: this is an exploratory assessment, not compliance certification, a clinical assessment, or a causal determination.

LATNEX. HF-B8G Professional High Frequency and RF Meter. https://www.latnex.com/products/hf-b8g (accessed September 23, 2026). The specification itself lists 2.5 and 1.5 readings/s in different sections; neither figure is adopted as a measured temporal response.

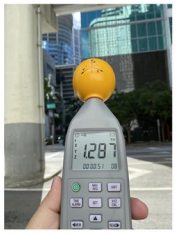
RF Explorer. 6G Combo Specification. https://j3.rf-explorer.com/rf-explorer-6g-combo-specification (accessed September 23, 2026). Reference for the sweep principle and MAX HOLD; the field unit model and options are not documented well enough to assign specific ranges.

Safe Living Technologies. Safe and Sound Pro mmWave Meter. https://safelivingtechnologies.com/products/safe-and-sound-pro-mmwave-meter.html (accessed September 23, 2026). Specification for coverage, internal rate, temporal response, and antenna pattern.

2020 Photographic Appendix

Visual record of 30 photographs embedded in the original report. The thumbnails establish the existence and sequence of the files; use the reference photographs and transcription tables in the body to examine values.

Legible Reference Photographs



IMG_1491 | 0.435 µW/cm²



IMG_1504 | 9.639 µW/cm²



IMG_1588 | 0.201 µW/cm²

Complete Thumbnail Record

2020 1 to 30


IMG_1491 | 0.435 µW/cm


IMG_1492 | 0.376 µW/cm


IMG_1493 | 0.287 µW/cm


IMG_1495 | 0.352 µW/cm


IMG_1499 | 7.057 µW/cm


IMG_1502 | 5.867 µW/cm


IMG_1504 | 9.639 µW/cm


IMG_1505 | 2.880 µW/cm


IMG_1506 | 3.508 µW/cm


IMG_1507 | 3.103 µW/cm


IMG_1541 | 2.073 µW/cm


IMG_1542 | 2.246 µW/cm


IMG_1543 | 3.475 µW/cm


IMG_1544 | 3.891 µW/cm


IMG_1545 | 3.698 µW/cm


IMG_1546 | 3.053 µW/cm


IMG_1547 | 1.572 µW/cm


IMG_1549 | 1.827 µW/cm


IMG_1550 | 3.174 µW/cm


IMG_1551 | 2.827 µW/cm


IMG_1563 | 3.973 µW/cm


IMG_1564 | 3.730 µW/cm



IMG_1570 | 3.012 µW/cm


IMG_1571 | 2.804 µW/cm



IMG_1572 | 2.925 µW/cm


IMG_1577 | 0.891 µW/cm


IMG_1578 | 1.099 µW/cm


IMG_1580 | 0.666 µW/cm


IMG_1588 | 0.201 µW/cm


IMG_1589 | 0.224 µW/cm

2024 Photographic Appendix

Visual record of 34 photographs embedded in the original report. The thumbnails establish the existence and sequence of the files; use the reference photographs and transcription tables in the body to examine values.

Legible Reference Photographs

IMG_0015 | Window 1 | 1.616 µW/cm²	IMG_0058 | Window 5 | 22.430 µW/cm²	IMG_0098 | Window 9 | 12.599 µW/cm²

Complete Thumbnail Record

2024 1 to 30


IMG_0015 | Window 1


IMG_0017 | Window 1


IMG_0022 | Window 1


IMG_0035 | Window


IMG_0038 | Window


IMG_0040 | Window


IMG_0046 | Window


IMG_0047(1) | Window


IMG_0048(1) | Window


IMG_0054 | Window


IMG_0055 | Window


IMG_0058 | Window


IMG_0061 | Window


IMG_0064 | Window


IMG_0075 | Window 7


IMG_0077 | Window 7


IMG_0078 | Window 7


IMG_0081 | Window 7


IMG_0087 | Window 7


IMG_0089 | Window


IMG_0090 | Window


IMG_0096 | Window


IMG_0098 | Window


IMG_0100 | Window 10


IMG_0101 | Window 10


IMG_0102 | Window 10


IMG_0103 | Window 10


IMG_0104 | Window 10


IMG_0105 | Window 10


IMG_0106 | Window 10

2024 31 to 34



IMG_0107 | Window 10



IMG_0108 | Window 10



IMG_0109 | Window 10



IMG_0110 | Window 10

September 3 2026 Photographic Appendix

Visual record of 8 photographs embedded in the original report. The thumbnails establish the existence and sequence of the files; use the reference photographs and transcription tables in the body to examine values.

Legible Reference Photographs



IMG_0980 | 20.73 mW/m² = 2.073 µW/cm²



IMG_0983 | 51.10 mW/m² = 5.110 µW/cm²

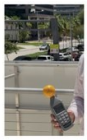
Complete Thumbnail Record

Sep 3 2026 1 to 8


IMG_0980 | 20.73 mW/m²


IMG_0984 | 21.59 mW/m²


IMG_0981 | 29.20 mW/m²


IMG_0982 | 29.88 mW/m²


IMG_0985 | 37.56 mW/m²


IMG_0986 | 41.77 mW/m²


IMG_0987 | 44.46 mW/m²


IMG_0983 | 51.10 mW/m²

September 20 2026 Photographic Appendix

Visual record of 60 photographs embedded in the original report. The thumbnails establish the existence and sequence of the files; use the reference photographs and transcription tables in the body to examine values.

Legible Reference Photographs



IMG_0998



IMG_1119



IMG_1138

Complete Thumbnail Record

Sep 20 2026 1 to 30


IMG_0988


IMG_0992


IMG_0993


IMG_0998


IMG_1001


IMG_1003


IMG_1005


IMG_1006


IMG_1008


IMG_1011


IMG_1013


IMG_1019


IMG_1025


IMG_1026


IMG_1027


IMG_1028


IMG_1030


IMG_1034


IMG_1040


IMG_1048


IMG_1054


IMG_1057


IMG_1062


IMG_1063


IMG_1064


IMG_1065


IMG_1071


IMG_1076


IMG_1080


IMG_1082

Sep 20 2026 31 to 60


IMG_1083


IMG_1087


IMG_1093


IMG_1095


IMG_1096


IMG_1097


IMG_1099


IMG_1100


IMG_1101


IMG_1102


IMG_1109

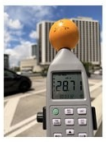

IMG_1111


IMG_1113


IMG_1114


IMG_1115


IMG_1116


IMG_1117


IMG_1119


IMG_1122


IMG_1123


IMG_1125


IMG_1126


IMG_1128


IMG_1129


IMG_1131


IMG_1132


IMG_1133


IMG_1134


IMG_1137


IMG_1138

2026 mmWave Photographic Appendix

Visual record of 10 photographs embedded in the original report. The thumbnails establish the existence and sequence of the files; use the reference photographs and transcription tables in the body to examine values.

Legible Reference Photographs



IMG_1146 | PEAK 31.6 µW/m²



IMG_1150 | PEAK 178.0 µW/m²



IMG_1155 | PEAK 87.1 µW/m²

Complete Thumbnail Record

mmWave 2026 1 to 10


IMG_1146 | PEAK 31.6 µ


IMG_1147 | PEAK 55.9 µ


IMG_1148 | PEAK 112.0


IMG_1149 | PEAK 55.9 µ


IMG_1150 | PEAK 178.0


IMG_1151 | PEAK 145.0


IMG_1152 | PEAK 172.0


IMG_1153 | PEAK 64.6 µ


IMG_1154 | PEAK 70.8 µ


IMG_1155 | PEAK 87.1 µ