



# PRODUCT SPECS

CellScanner™ | CellDigitizer™



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# CellScanner™

9 kHz to 18 GHz / 27 GHz / 30 GHz / 40 GHz

**CellScanner™** is a specialized and detailed Technology Analyzer of digitized samples collected from networks using the main wireless technologies in the industry. For use in optimization and capacity monitoring tasks, **CellScanner™** works with scanned spectrum retrieved from a Software-Defined Radio Receiver, **CellDigitizer™**, processing technology-specific information using DSP techniques.

The receiver samples and digitizes up to 100 MHz of spectrum at a time (real time collection and recording capabilities) with a sampling rate of up to 125 MSamples/s and 14-bit digitization - all samples can be geotagged. **CellDigitizer™** has a large dynamic range and automatic input level regulation to avoid saturation when close to transmitters. With a small form factor, it is light weight with low power consumption.



**CellScanner™** processes 3GPP technologies (GSM, UMTS, LTE, and 5G) on frequencies/channel bandwidth compatible with **CellDigitizer™**.

**CellScanner™** main characteristics are:

- Allows simultaneous operation in multi-band, multi-channels and multi-technology
- Operates on Licensed, Non-Licensed or user-defined bands/channels
- Provides a High Dynamic Range
- High sensitivity with a front-end amplifier allowing measurement of signals close to the noise floor
- Automatic front end gain/attenuation control for protection against receiver saturation
- Cost-effective, small form factor and light weight with low power consumption (fanless)

- Allows spectrum recording: ideal for off-line and forensic analysis
- Optionally records I/Q data

**CellScanner™** collection features are:

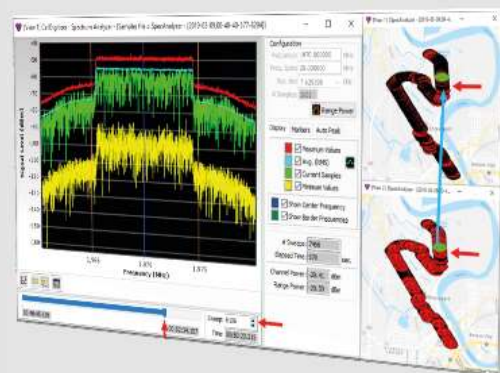
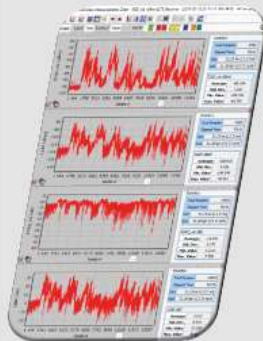
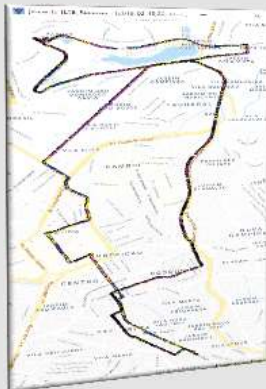
- Geotagged samples (with and without interpolation)
- Allows capture of multiple bands per scan
- Collects samples in sequence from multiple bands (round robin) in a single drive test
- Detects and analyses DMR, Tetra, P-25 P1/P2, 2G, 3G, 4G and 5G signals
- Snap samples to drive route (for GPS positioning error compensation)
- Multi-measurement concatenation and multi-data visualization
- User defined samples filtering can be applied (wide range of criteria)



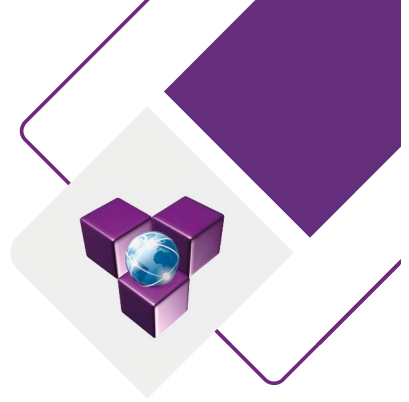
# CellScanner™ Applications

CellScanner™ applications/features include:

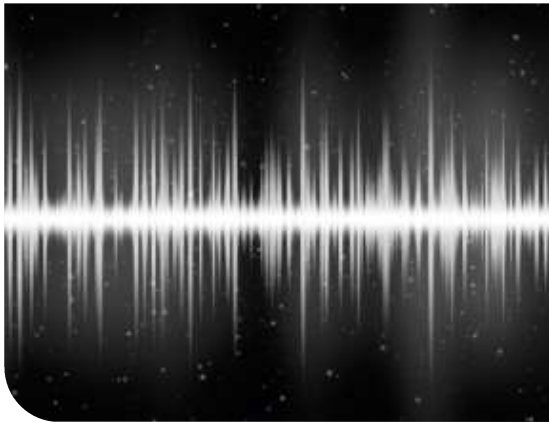
- Base Planning, Optimization, and Capacity Planning of multi-technology networks
- Deployment evaluation: cross feeders, coverage footprint, cluster behavior, frequency plan checking
- Real time acquisition and geotagged spectrum recording for later playback
- Synchronized views (multiple analysis)
- Statistical information (PDF/CDF charts)



Spectrum analyzer capabilities can be added to the system by a simple software upgrade (**CellSpectrum™**), allowing users to also perform propagation model tuning, spectrum field measurements, long term spectrum monitoring, spectrum clearance and interferer location.



# CellScanner™ Performance



## Wide Frequency Range

The frequencies band and channel bandwidths used in commercial wireless systems have been increasing steadily to accommodate the growing demand for larger data rates. Working with a Software-Defined Radio Receiver (**CellDigitizer™**) that supports frequency ranges from 9 kHz up to 40 GHz, **CellScanner™** can process and extract information from all 3GPP technologies and is prepared to incorporate future technologies, enabling testing of modern systems from narrowband to wideband channels.



## Wide Signal Dynamic Range and Saturation avoidance

RF measurement drive/walk tests are submitted to strong (near transmitter) and weak (far from transmitter) signal levels and **CellScanner™** automatic gain control allows it to work with an effective dynamic range - better than 100 dB. The combination of channels, bands, and technologies available in the **CellDigitizer™** frequency range and the non-limitation to 3GPP bands adds flexibility to the tool.



## Real-Time Acquisition and Spectrum Recording

3GPP technologies, in use with most of the wireless LAN standards networks, employ packet-based signaling techniques. **CellScanner™** enables real-time spectrum collecting and recording multiple data-packets processing according to each technology. Recorded spectrum can be post processed by **CellSpectrum™ / CellScanner™**.



# CellScanner™ Performance



## High Measurement Rates

The measurement rate reflects how many channels can be analyzed per second. **CellScanner™** & **CellDigitizer™** collect all the required information related to each selected technology and channel using fast setup times and sophisticated capture control allowing the tool to work with high measurement rates even when collecting multiple technologies.



## Channel Bandwidth flexibility

The wide application of wireless technologies requires scanners to cover from narrow channels in IoT applications up to LTE-Advanced wide channels; the configuration flexibility of **CellDigitizer™** and **CellScanner™** allow the tools to easily tackle the challenge and support scanning of both narrow and wideband channels.



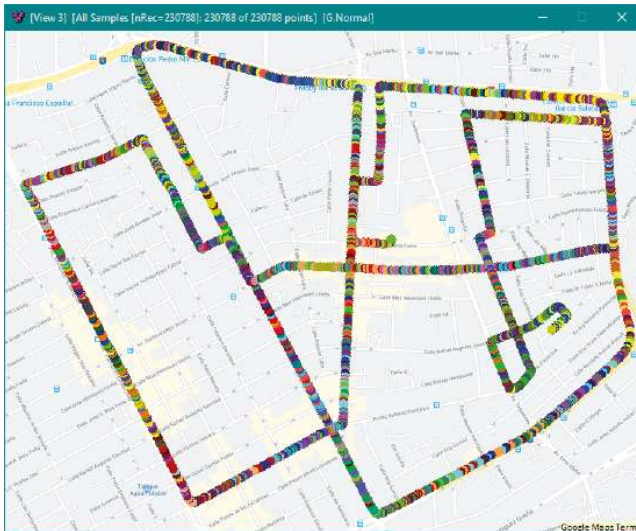
## Portable and flexible

Besides providing the means for capturing and processing digitized samples, **CellScanner™** also offers a wide variety of information manipulation and visualization options; that, along with **CellDigitizer™** small form factor, make the combo very portable and flexible. It can be packaged for transportation and drive test in a hard-shell travel case.



## Easy 'Click and Go'

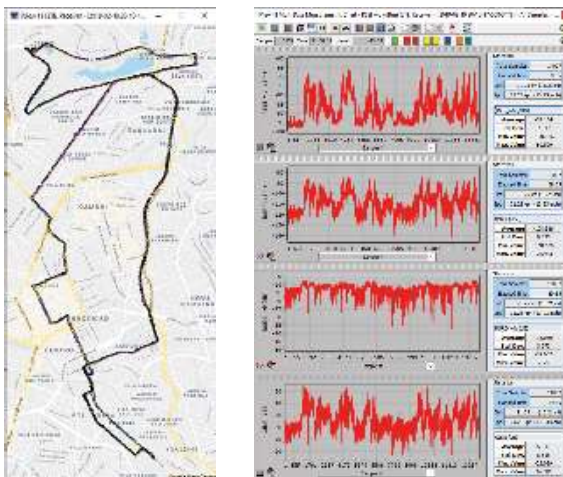
Indoor Measurement Collection



Just click on a point in the visualization window and samples are collected, even when no GPS is available.

## Easy 'See and Conclude'

Analysis capability



Select what you want to see from the information available and charts, maps, and detailed collection data are displayed to help your analysis. Main data includes for example, signal level, BER, RSRP, RSRQ, BSIC, PCI, and CINR.

Rec#	Date	Time	Latitude	Longitude	Tech	Band	Duplex	Channel Mode	Frequency (MHz)	PCI	RSRP (dBm)	RSRQ_0rs (dB)	RSRQ_1sb (dB)	CINR (dBm)	Avg.NoisePw (dBm)	Noise Power (dBm)	RSSI_0rs (dBm)	RSSI_1sb (dBm)	Frame Load (%)		
1	04/22/2019	13:02:35.767	12.512004	-83.743673	JTC	36	TDD	20960	15911	375	-82.22	-30.79	-13.89	-13.34	26.71	-113.52	-119.50	-89.40	-60.57	-60.29	100
2	04/22/2019	13:08:35.830	12.512004	-83.743673	JTC	36	TDD	20960	15911	375	-80.22	-30.79	-13.87	-13.35	26.65	-113.89	-119.85	-89.40	-60.56	-60.27	100
3	04/22/2019	13:08:35.873	12.512004	-83.743673	JTC	36	TDD	20960	15911	375	-82.25	-30.79	-13.87	-13.35	27.7	-113.34	-117.95	-89.46	-60.59	-60.31	100
4	04/22/2019	13:08:36.008	12.512004	-83.743673	JTC	36	TDD	20960	15911	375	-82.27	-30.79	-13.89	-13.38	26.83	-113.95	-120.1	-89.46	-60.51	-60.31	100
5	04/22/2019	13:08:36.038	12.512004	-83.743673	JTC	36	TDD	20960	15911	375	-82.29	-30.79	-13.86	-13.34	26.3	-113.88	-118.53	-89.46	-60.58	-60.3	100
6	04/22/2019	13:08:36.093	12.512004	-83.743673	JTC	36	TDD	20960	15911	375	-80.22	-30.79	-13.86	-13.35	26.45	-113.09	-118.66	-89.40	-60.54	-60.28	100
7	04/22/2019	13:08:36.134	12.512004	-83.743673	JTC	36	TDD	20960	15911	375	-82.25	-30.79	-13.89	-13.38	21.88	-113.41	-122.13	-89.47	-60.59	-60.31	100
8	04/22/2019	13:08:36.193	12.512004	-83.743673	JTC	36	TDD	20960	15911	375	-82.23	-30.79	-13.89	-13.35	31.64	-113.39	-117.98	-89.44	-60.59	-60.3	100
9	04/22/2019	13:08:36.212	12.512004	-83.743673	JTC	36	TDD	20960	15911	375	-82.22	-30.79	-13.88	-13.35	26.65	-113.26	-119.88	-89.40	-60.55	-60.28	100
10	04/22/2019	13:08:36.268	12.512004	-83.743673	JTC	36	TDD	20960	15911	375	-82.22	-30.79	-13.89	-13.35	22.39	-113.79	-125.79	-89.48	-60.58	-60.29	100

# Technology Specifications



## LTE/5G Characteristics

Frequency bands supported	All Licensed and Unlicensed FDD/TDD Bands plus User defined frequencies
Channel Bandwidth	1.4 / 3* / 5* / 10* / 15* / 20* MHz
Maximum number of channels	256
Measurement Elements	Synchronization (PSCH and SSCH) / Resource Elements (RE)
Measurement information	Per channel: PCI, RSSI, RSRP, RSRQ, Cyclic Prefix, Time Offset*, Delay Spread*, Layer 3 (MIB/SIB)*, MIMO rank*, CINR Per Port*: RSRP, RSRQ, Time Offset, Delay Spread, CINR
Information Set Measurement Rate	Up to 40 channels/s
CINR Dynamic Range	- 10 to + 20 dB
Automatic Gain Control	- 30 to + 25 dB gain
RSRP Sensitivity	- 135 to - 20 dBm
CINR / RSRP Accuracy	± 2 dB / ± 2 dBm

## GSM Characteristics

Frequency bands supported	All 3GPP Bands plus User defined frequencies
Maximum number of channels	256
Measurement information	BSIC, RSSI, C/I, BER, SI information (layer 3)*
Measurement speed	Up to 30 channels/s
C/I range	5 to 20
Automatic Gain Control	- 30 to + 25 dB gain
BSIC Detection Level @ 5% BER maximum	- 102 to - 20 dBm
C/I / RSSI Accuracy	± 2 dB / ± 2 dBm

## UMTS Characteristics

Frequency bands supported	All 3GPP Bands plus User defined frequencies
Maximum number of channels	256
Measurement information	RSSI / RSCP / $E_{c/I_0}$ / Delay Spread / SIR* / TimeOffset*
Measurement speed	Up to 30 channels/s
RSCP Sensitivity / $E_{c/I_0}$ range	- 110 dBm / - 20 dB
C/I / RSCP Accuracy	± 2 dB / ± 2 dBm

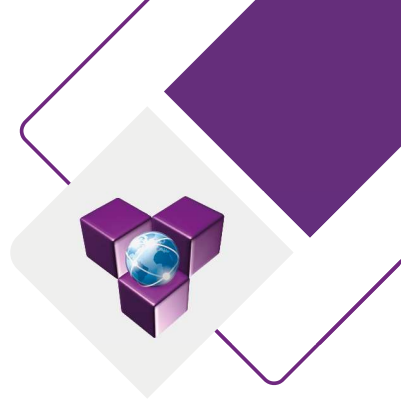
## RF and Digitization Specifications

Frequency Range	9 kHz to 18, 27, 30 or 40 GHz
Max. Instantaneous Bandwidth	100 MHz
Max. Dynamic Range / Noise Figure	100 dB / < 15 dB
Real Time Bandwidth (RTBW)	From 0.1 MHz to 100 MHz
Maximum Safe RF Input Level	+ 10 dBm, 0 V DC
Programmable Attenuation and Gain	- 30, - 20, - 15, - 10, - 5, 0, 5, 15, 25 dB
Spurious Free Dynamic Range (SFDR)	100 dBc (typical)
Amplitude Accuracy (25 °C ± 5 °C)	± 2.0 dB (typical)
A/D Converter Sampling Rate and Resolution	125 MSa/s, 14 bits for I and Q

## Power and Physical

Power Supply / Consumption	12 VDC / 18 W
Operating Temperature Range	0 °C to 50 °C
Enclosure Dimensions / Weight	257.3 (L) x 193.7 (W) x 66.0 (H) mm / 2.7 kg 10.13 (L) x 7.63 (W) x 2.61 (H) inches / 6 lbs

\*Available 1Q 2020



# Technology Specifications

## Regulatory Compliance

FCC / RoHS Compliance / Mark (CE)

EMC Directive 2014/30/EU

EN 61326-1:2013

Low Voltage Directive 2006/95/EC

EN 61010-1-2010 Class 1

# RF and Digitization Specifications

## Frequency

Frequency Ranges 9 kHz to 18, 27, 30 or 40 GHz

Frequency Reference	± 1.0 ppm ± 1.0 ppm 0 °C to 55 °C ± 1.0 ppm per year	Accuracy at room temperature Stability over temperature Aging
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Real-time bandwidth (RTBW) 0.1 / 10 / 40 / 100 MHz

Probability of Intercept (POI)	≥ 25.552 μs signal duration ≤ 17.360 μs signal duration	For 100% POI For 0% POI
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Spurious free dynamic range (SFDR)	60 dBc (typical) 70 dBc (typical) 100 dBc (typical)	100 MHz RTBW 10 / 40 MHz RTBW 0.1 MHz RTBW
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## Amplitude

Amplitude Accuracy 25 °C ± 5 °C ± 2.00 dB typical, for frequencies between 50 MHz to 27 GHz

Measurement Range DANL to levels in table below

Attenuator Range 0 to 30 dB in 10 dB steps

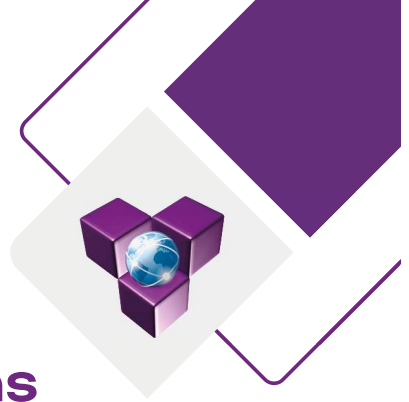
Maximum Safe RF Input Level + 10 dBm, 0 V DC

## Displayed Average Noise Level (DANL)

At 25 °C ± 5 °C, typical

Frequency (GHz)	18 GHz (typical)	27 GHz (typical)
0.1 GHz	- 161 dBm/Hz	- 160 dBm/Hz
0.5 GHz	- 160 dBm/Hz	- 159 dBm/Hz
1.0 GHz	- 160 dBm/Hz	- 159 dBm/Hz
2.0 GHz	- 154 dBm/Hz	- 153 dBm/Hz
3.0 GHz	- 158 dBm/Hz	- 157 dBm/Hz
4.0 GHz	- 162 dBm/Hz	- 162 dBm/Hz
5.0 GHz	- 158 dBm/Hz	- 158 dBm/Hz
6.0 GHz	- 157 dBm/Hz	- 157 dBm/Hz
7.0 GHz	- 153 dBm/Hz	- 155 dBm/Hz
8.0 GHz	- 160 dBm/Hz	- 161 dBm/Hz





# RF and Digitization Specifications

## Displayed Average Noise Level (DANL)

At 25 °C ± 5 °C, typical

Frequency (GHz)	18 GHz (typical)	27 GHz (typical)
9.0 GHz	- 158 dBm/Hz	- 161 dBm/Hz
10.0 GHz	- 160 dBm/Hz	- 161 dBm/Hz
11.0 GHz	- 156 dBm/Hz	- 160 dBm/Hz
12.0 GHz	- 158 dBm/Hz	- 157 dBm/Hz
13.0 GHz	- 151 dBm/Hz	- 157 dBm/Hz
14.0 GHz	- 154 dBm/Hz	- 154 dBm/Hz
15.0 GHz	- 160 dBm/Hz	- 157 dBm/Hz
16.0 GHz	- 157 dBm/Hz	- 157 dBm/Hz
17.0 GHz	- 150 dBm/Hz	- 156 dBm/Hz
18.0 GHz	- 144 dBm/Hz	- 156 dBm/Hz
19.0 GHz		- 149 dBm/Hz
20.0 GHz		- 154 dBm/Hz
21.0 GHz		- 153 dBm/Hz
22.0 GHz		- 152 dBm/Hz
23.0 GHz		- 153 dBm/Hz
24.0 GHz		- 155 dBm/Hz
25.0 GHz		- 153 dBm/Hz
26.0 GHz		- 150 dBm/Hz
27.0 GHz		- 148 dBm/Hz

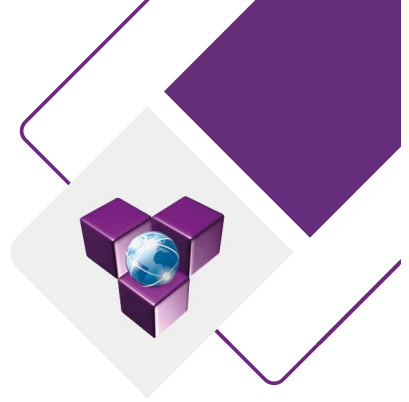
## Spectral Purity

SSB Phase noise 25 °C ± 5 °C	With External 10 MHz oscillator	Without External 10 MHz oscillator	Carrier Offset
At 1 GHz	- 90 dBc/Hz	- 90 dBc/Hz	100 Hz
Measured locked to an external 10 MHz oscillator and measured with external oscillator not present	- 93 dBc/Hz	- 92 dBc/Hz	1 kHz
	- 98 dBc/Hz	- 99 dBc/Hz	10 kHz
	- 106 dBc/Hz	- 109 dBc/Hz	100 kHz
	- 120 dBc/Hz	- 118 dBc/Hz	1 MHz

## Digitization

Data Acquisition  
A/D Converter Sampling Rate  
and Resolution

125 MS/s, 14 bits for RTBW 10 / 40 / 100 MHz



# General Specifications

## Connectors

RF In	SMA female, 50 Ω
10 MHz Reference In and Out	SMA female, 50 Ω
Analog I and Q Out	SMA female, 50 Ω
HIF Out	SMA female, 50 Ω
10/100/1000 Ethernet	RJ45
USB Console	Type B mini
GPIO	25-pin male D-Subminiature
Power	Coaxial Type A: 5.5 mm OD, 2.5 mm ID

## Power

Physical Power Supply	Use AC Wall Power Adaptor provided	Input AC 120 V – 240 V/Output + 12 V
Power Consumption	25 W with Power Adaptor provided (418, 427)	At room temperature
	19 W with Power Adaptor provided (408, 408E)	

## Physical

Operating Temperature Range	0 °C to + 50 °C	
Storage Temperature Range	- 40 °C to + 85 °C	
Size	269 x 173 x 61 mm (10.58 x 6.81 x 2.40 inches)	
	269 x 173 x 55 mm (10.58 x 6.81 x 2.15 inches)	With mounting feet (installed on unit)
	265 x 165 x 30.5 mm (10.43 x 6.5 x 1.2 inches)	
Weight	2.7 kg (6 lbs.)	Without mounting feet Embedded Chassis option

## Regulatory Compliance

RoHS Compliance	RoHS	
Marks	CE	European Union
EMC Directive 2014/30/EU	EN 61326-1:2013	Electromagnetic Compatibility
Low Voltage Directive 2006/95/EC	EN 61010-1:2010 Class 1	Safety

FCC



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