



narda[®]
Safety Test Solutions

an **L3** Technologies Company



EXCLUSIVE ALL-IN-ONE CONDUCTED EMISSION TEST SET

CDD-4

**Continuous and Discontinuous
Disturbances Analysis and
Verification Set**

APPLICATIONS

The innovative **Analysis and Verification Set PMM CDD** finds its application in the **Continuous and Discontinuous Disturbance Tests** required for:

- household appliances in general;
- electric tools;
- power controllers, toys, entertainment equipment, vending machines, infotainment devices, regulators...

REFERENCE STANDARDS

The CDD set covers all CISPR and IEC/EN standards relevant to the RF conducted emissions: CISPR 16-2-1/11/12/13/14-1/15/22/32 and the corresponding IEC/EN.

Particularly for the Click test, CISPR 14-1—IEC/EN55014-1 defines the measurement methods, the emission limits and the statistical evaluation criteria.

CISPR 16-1-1 defines the disturbances characteristics and dictates the measuring instruments specifications and compliance evaluation procedure.

CLICKS: A COMPLEX TEST MADE EASY

Discontinuous disturbances - also known as “Clicks” - are typically generated by fast transients like the switching of power supply lines. The Click test is not just as simple as measuring amplitudes and frequencies to compare with limits. Instead, the actual emission limits are variable in function of the number of Clicks (Click Rate) recognized in a first run during a set time interval. A second run compares the disturbance levels at the preset frequencies (150 & 500 kHz, 1.4 & 30 MHz) with the new limits. The process includes several variables and exceptions to take into account depending on the equipment under test (EUT).

A true Automatic Click Analyzer like the CA0010 is designed for simplifying the test just as PASS/FAIL evaluation, as well as for providing all the details useful in debugging the EUT.

SINGLE RUN TEST

Thanks to its sophisticated characteristics, CA0010 allows for using the first run data set stored in memory also for the comparison with the new limits, thus halving the test time.

DEBUGGING AT HAND

Through the detailed time history, the designer can easily correlate the clicks with the EUT operating cycles.

OPEN TO THE FUTURE

As standards may vary in time, CA0010 design is so flexible that it can be set for all the Click calculation methods of today and tomorrow.

RELIABLE FOREVER

The Click Analyzer CA0010 and the EMI Receiver 9010F do not have commercial operating systems inside to be free of IT threats, obsolescence, vulnerabilities and hangouts.

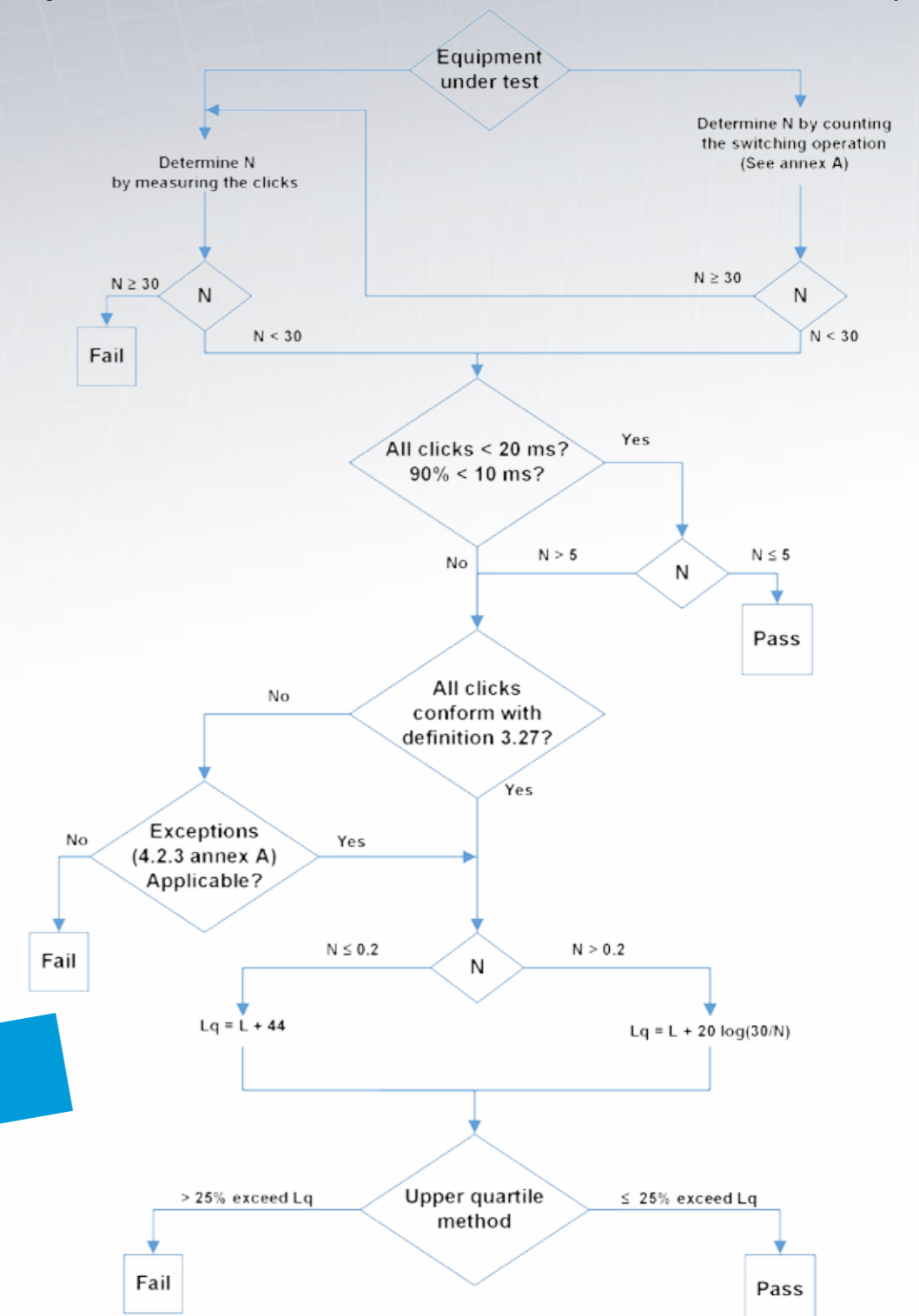
CCD-4: THE ULTIMATE SOLUTION FOR DISCONTINUOUS (CLICKS) AND CONTINUOUS DISTURBANCES TESTS

CCD-4: the ultimate solution for Discontinuous (Clicks) and Continuous Disturbances measurements
The Click Analyzer Unit CA0010 operates in conjunction with the FFT-based, real-time gapless EMI receiver PMM 9010F. This unique combination allows full CISPR compliant measurements of both conducted emissions and clicks in a single, powerful solution for unsurpassed versatility.
The CA0010 internal LISN features full CISPR compliance in the frequency range 150 kHz—30 MHz; if required, external LISNs are available for extending the frequency range down to 9 kHz and/or line currents and voltages (see last page).

CISPR 14-1 - Flow diagram for measurements of discontinuous disturbance that CCD-4 runs automatically:



INTERNAL SWITCHING OPERATION DETECTION



CA0010 Click Analyzer & Verification unit

CA0010 main features:

- Internal 16 A single-phase LISN, fully CISPR 16-1-2 compliant 150 kHz – 30 MHz: just plug the EUT power cord and go!
- RF in front-end with preselection filters and individual auto-attenuators for each of the four frequencies, to guarantee the best dynamic range as required by the challenging discontinuous disturbances
- Auxiliary External LISN RF input, to be used whenever an external, three-phase LISN is required.
- Internal Switching Operations counter with variable current threshold
- CISPR compliant Pulse and Click Sequences Generator for performance verification tests
- Unique feature: three user-selectable Click evaluation methods
- Proprietary software inside
- Time saving Single Run capability

Internal 16 A/230 V LISN and Switching Operations Box

LISN output to EMI Receiver for Continuous Conducted Emission Test

RF output to 9010F EMI Receiver for Discontinuous (Clicks) Disturbances Tests

RF input from external LISN

Click Generator Output

LISN AC mains input

I/O interfaces

Instrument DC power supply

Grounding



INTERNAL ARTIFICIAL MAINS NETWORK (LISN)

The CA0010 unique design includes a CISPR-compliant internal LISN to be used for single-phase EUT with line currents up to 16 A and line voltages to 250 VAC, 50/60 Hz 350 VDC.

- Artificial Hand circuit for testing electric tools
- LISN RF output
- Switching operations counter circuit with variable threshold

NOTE:

As for all LISNs, a suitable isolation transformer at the mains side is required for user's safety.



CA0010 features a complete CISPR compliant Pulse and Click Sequences generation for performance verification tests, controlled by the supplied software PCG—PMM Click Generator.

It includes three generators working in synergy:

- Precise and stable RF CW source
- CISPR Pulse generator
- Click Sequences generator

The system generates all the test signals as required by the standard CISPR 16-1-1, Annex-F included, to be used for verifying any click meter.

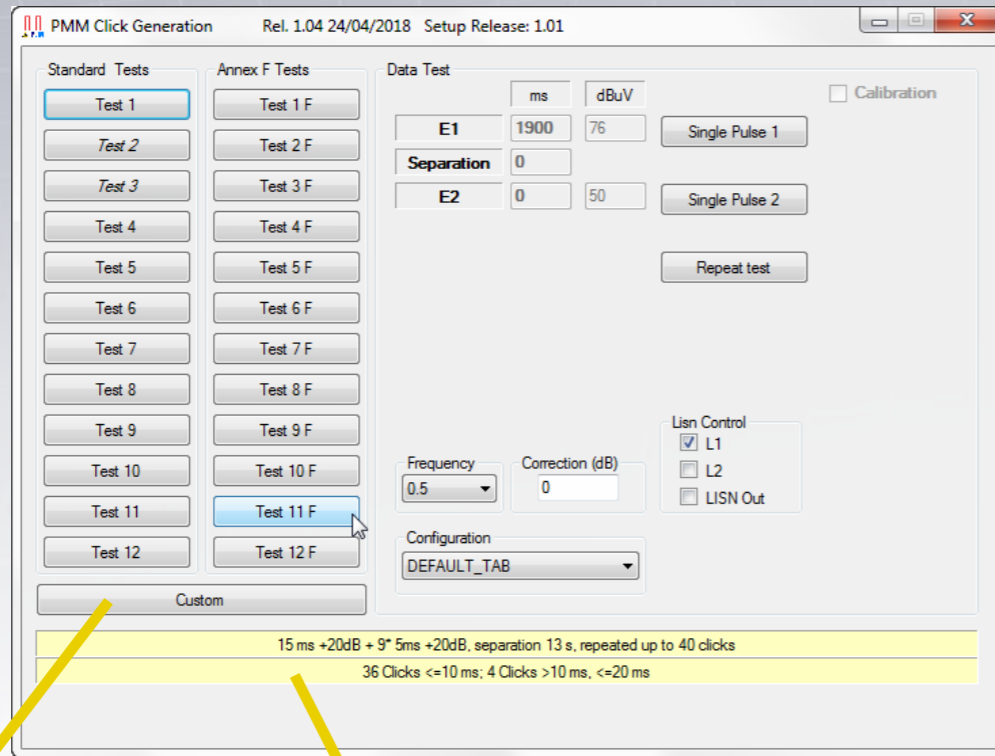
CISPR verification Test Sequences are preset as default; user-defined tests can be easily added.

The Click Generator is used in the auto-calibration routine and for periodic self-check.

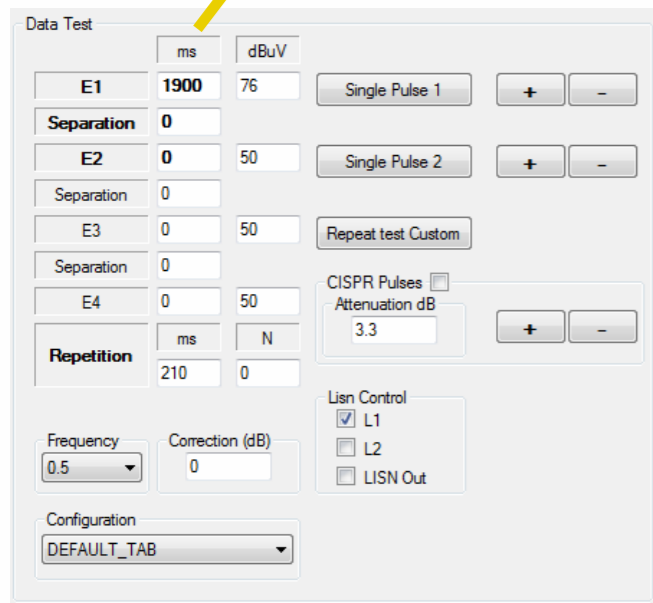
PCG: PMM Click Generation Software

The PCG comes with the CA0010 as standard. All the standard tests listed in CISPR 16-1-1, Tables 17 and F-1, are preset. It is possible to set custom tests too.

Just One Click To Move Across Functions



Preset Test
Upper line: set values
Lower line: expected result from Clickmeter under evaluation



Example of customized test setting

The possibility of making both continuous and discontinuous disturbances tests by a single set is a real added value enhancing the EMC laboratory's productivity.

EMI RECEIVER 9010F

A top-class, ultra-fast full CISPR & MIL-STD EMI Receiver that works in conjunction with the CA0010.

Main features:

- Real-time, Gapless FFT technology
- Frequency range: 10 Hz—30 MHz
- All CISPR detectors simultaneously
- Full scan in only 20 seconds, with 1 s Hold time.
- Extensions to 3/6/18 GHz
- Rechargeable battery
- Compact, lightweight, robust
- USB interface to PC
- Supplied with PMM Emission Software



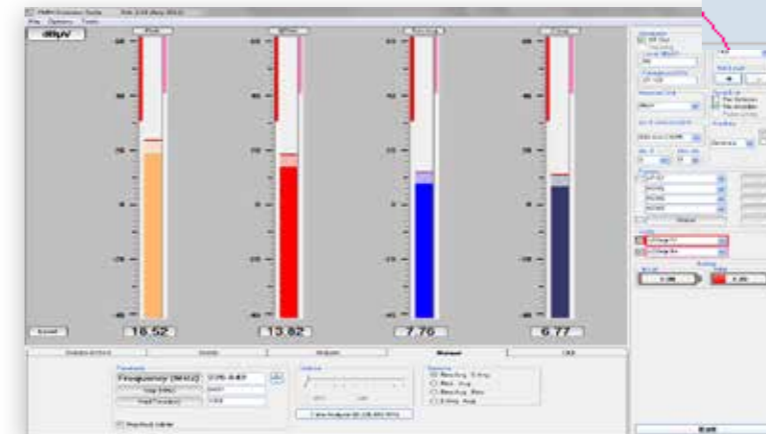
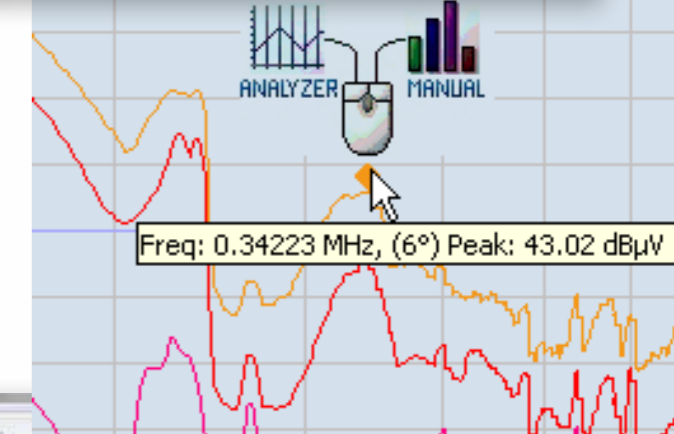
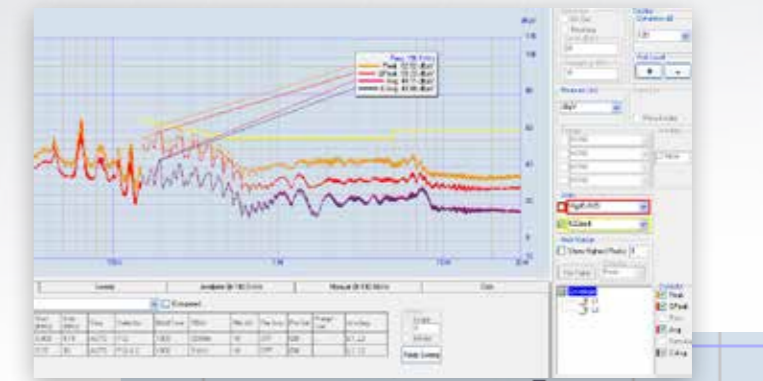
Direct Conversion And FFT

9010F is a true digital receiver: signals are directly sampled after the RF front-end by an A/D converter of very high dynamic range matching the severe criteria of full CISPR compliance. Among the many advantages of this technique in comparison with conventional receivers, the higher protection against overloading and possible damages.

Real time means that the FFT calculation is as fast as the incoming data are sampled, so that no data are missed in the analyzed band.

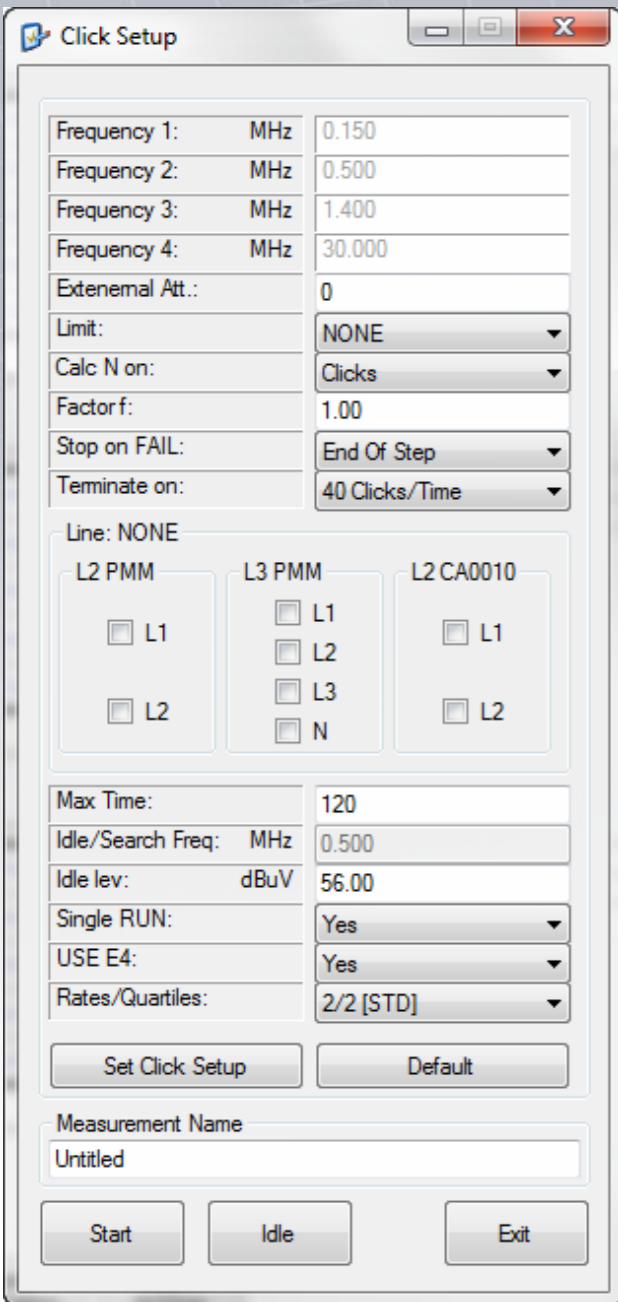
Gapless means that the consecutive time windows are sampled without time gaps between each other.

Optional modules allow for extending the frequency range to Radiated Emission tests to 3, 6 and 18 GHz.



**PCA: PMM Click Analysis Software
OPEN TO THE FUTURE!**

The PCA software comes with the Click Analyzer CA0010 as standard. Based on decades-long experience in this type of tests and having in mind both occasional and continuative users, it is complete though of immediate operability. All parameters to set for the Click test are shown clearly and unmistakably. When selecting the Idle mode, the user can check in real time the amplitude variations of the IF (peak) and QP detector prior to starting the test, as well as in the EUT debugging phase. All measurement data and settings are saved automatically in proprietary format to prevent any possible file mismatch or deletion. The fully detailed test report is displayed with clear indications of Pass/Fail results; it can be saved in various formats.



Click Setup

Frequency 1: MHz 0.150
 Frequency 2: MHz 0.500
 Frequency 3: MHz 1.400
 Frequency 4: MHz 30.000
 Extenemal Att.: 0
 Limit: NONE
 Calc N on: Clicks
 Factor f: 1.00
 Stop on FAIL: End Of Step
 Terminate on: 40 Clicks/Time

Line: NONE

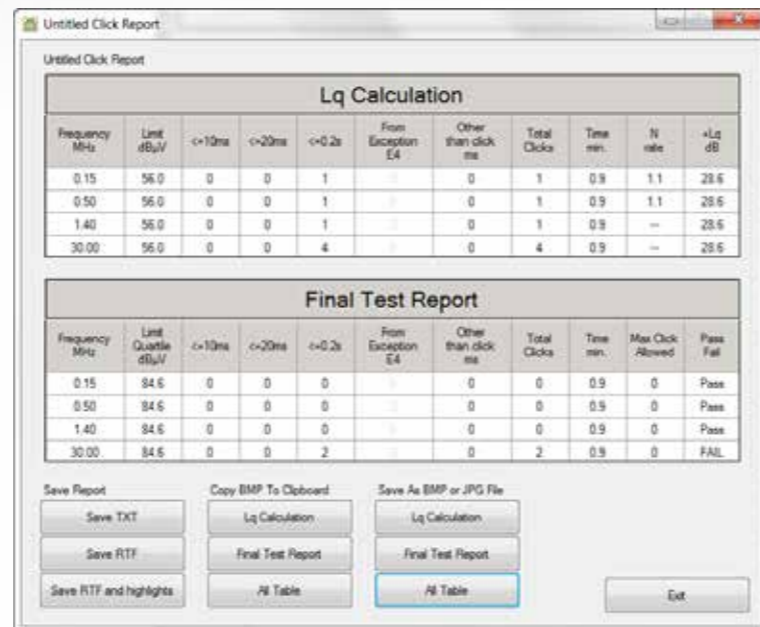
L2 PMM L3 PMM L2 CA0010
 L1 L1 L1
 L2 L2 L2
 L3 L3
 N N

Max Time: 120
 Idle/Search Freq: MHz 0.500
 Idle lev: dBuV 56.00
 Single RUN: Yes
 USE E4: Yes
 Rates/Quartiles: 2/2 [STD]

Set Click Setup Default

Measurement Name
 Untitled

Start Idle Exit



Untitled Click Report

Lq Calculation										
Frequency MHz	Limit dBuV	<=10ms	<=20ms	<=0.2s	From Exception E4	Other than click ms	Total Clicks	Time min.	N rate	+Lq dB
0.15	56.0	0	0	1		0	1	0.9	1.1	28.6
0.50	56.0	0	0	1		0	1	0.9	1.1	28.6
1.40	56.0	0	0	1		0	1	0.9	--	28.6
30.00	56.0	0	0	4		0	4	0.9	--	28.6

Final Test Report										
Frequency MHz	Limit dBuV	<=10ms	<=20ms	<=0.2s	From Exception E4	Other than click ms	Total Clicks	Time min.	Max Click Allowed	Pass Fail
0.15	84.6	0	0	0		0	0	0.9	0	Pass
0.50	84.6	0	0	0		0	0	0.9	0	Pass
1.40	84.6	0	0	0		0	0	0.9	0	Pass
30.00	84.6	0	0	2		0	2	0.9	0	FAIL

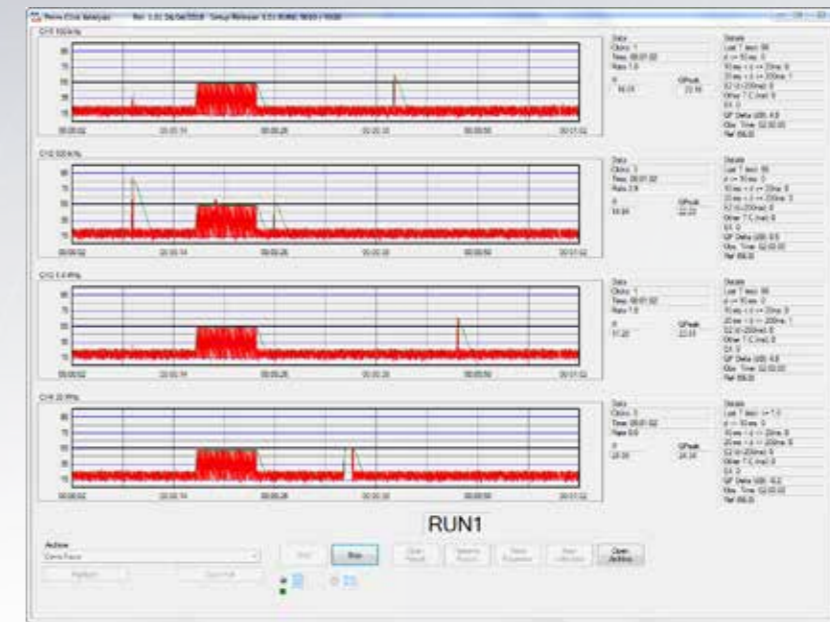
Save Report: Save TXT, Save RTF, Save RTF and highlights
 Copy BMP To Clipboard: Lq Calculation, Final Test Report, All Table
 Save As BMP or JPG File: Lq Calculation, Final Test Report, All Table

PCA: PMM Click Analysis Software

Understanding the reasons behind a Click test fail is the first step to find the required countermeasures to apply to the EUT. PCA is designed for this purpose: the time history of the events that determined the Click counting can be displayed in its totality for all of the four frequencies, or zoomed down to the single details. Because of the time resolution as high as 500 μ S, and the test time as long as 2 hours, the data stored are too many to be displayed conveniently. Therefore a special algorithm is applied in order to show only the data consistent with the clicks.

- The traces displayed show:
- Output of the IF (digital Intermediate Frequency)
 - Output of the Quasi-Peak detector
 - Limit

The precise event time can be read by the marker, for an immediate correlation with the EUT operation cycles. It is therefore possible to recognize immediately the operating condition that generated undesired clicks.



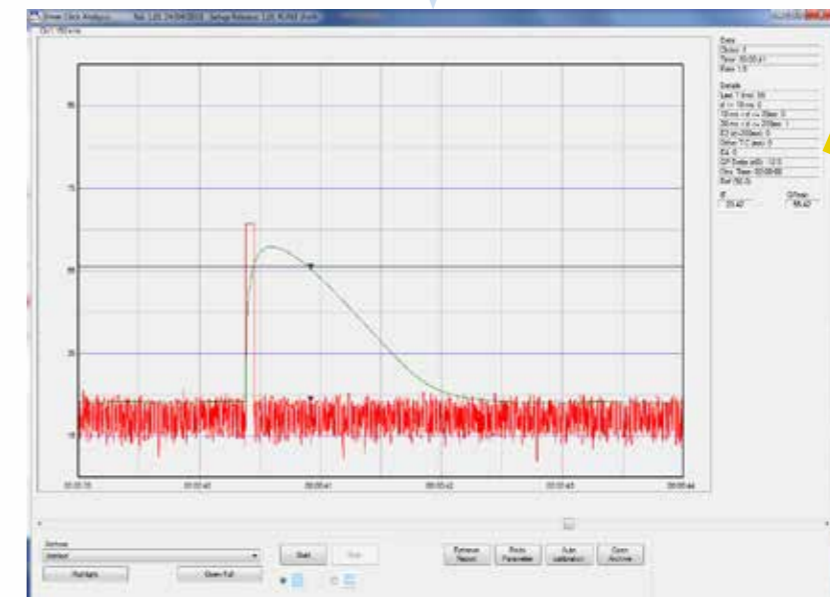
Data

Clicks: 1
 Time: 00:00:41
 Rate: 1.5

Details

Last T (ms): 66
 d <= 10 ms: 0
 10 ms < d <= 20ms: 0
 20 ms < d <= 200ms: 1
 E2 (d>200ms): 0
 Other T.C (ms): 0
 E4: 0
 QP Delta (dB): -12.0
 Obs. Time: 02:00:00
 Ref (56.0)

IF: 23.42 QPeak: 55.42



SPECIFICATIONS CA0001

Frequency range	150 kHz; 500 kHz; 1,4 MHz; 30 MHz
RF input VSWR	Zin 50 Ω, Internal switch from LISN or BNC fem. < 1.2
Attenuator Preamplifier	0 dB to 35 dB (5dB steps) one per channel, independent setting 15 dB, one per channel, independent setting
RF output	Zout 50 Ω, BNC fem.
VSWR	< 1.2
Max input level (without equipment damage)	140 dBuV (2 W)*
Preselector (permanent built-in) Four bandpass filters	150 kHz / 60 kHz BW@6dB 500 kHz / 120 kHz BW@6dB 1,4 MHz / 220 kHz BW@6dB 30 MHz / 180 kHz BW @6dB
Insertion loss (with 0 dB Attenuation)	< 10 dB
RF generator CW	Frequency range 150 kHz to 30 MHz Frequency resolution 100 Hz Accuracy 10 ppm Amplitude range 20 to 95 dBμV Amplitude resolution 0,1 ppm
Click (OOK) Minimum ON time Minimum separation Time resolution	100 μs 100 μs 10 μs
CISPR PULSES	Spectral density range 80 to 101 dBμV/MHz Amplitude resolution 0,1 dB Flatness 1.8 dB from 150 kHz to 30 MHz PRF 1 to 500 Hz PRF resolution 1 Hz
RF output	Internal switch or BNC-f.
Autocalibration	Embedded generator for autocalibration and system test
CISPR compliance	CISPR 14-1, CISPR 16-1-1, CISPR 16-1-2
I/O interface	USB
Application software	PCA - PMM Click Analysis software. Four channels IF and QP time diagram, with click detection and analysis. Measurement log and report. PCG - PMM Click Generation software. CISPR 16-1-1 standard, annex F and user's definable test generation.
Power supply	12 Vdc, 0,7 A
Built-in LISN	Measuring frequency range 150 kHz to 30 MHz Continuous rated output current 16 A Max permissible operating voltage 250 Vac – 350 Vdc AC supply frequency range DC to 60 Hz CISPR equivalent circuit 50 Ω // 50 μH Test socket SCHUKO 2P+E Line plug IEC 60320 C20 Artificial hand 4 mm plug RF output Internal switch or BNC fem.
Operating temperature	-5° to 45°C
Dimensions	235 x 105 x 335 mm
Weight	4.1 kg
Standard accessories	LISN mains cable, 25 cm BNCm - BNCm cable, 25 cm DB9m - DB9m cable, USB cable, AC/DC power adapter, PCA PMM Click Analysis software, PCG PMM Click Generation software, user's manual, standard calibration certificate, accessories pouch.

SPECIFICATIONS 9010F

Frequency range	10 Hz to 30 MHz		
Resolution	0.1 Hz		
Frequency accuracy	< 1 ppm		
RF input	Zin 50 Ω, BNC fem.		
VSWR	10 dB RF att. : < 1.2 0 dB RF att. : < 1.6		
Attenuator	0 dB to 35 dB (5dB steps)		
Preamplifier Gain	20 dB (after preselector)		
Pulse limiter	Built in (selectable)		
Max input level (without equipment damage)	137 dBμV (1 W)*		
Sinewave AC voltage	97 dBμV/MHz		
Pulse spectral density			
Preselector	One Low Pass and six Band Pass filters		
IF bandwidth	6 dB bandwidth: 1, 3, 10, 30, 100, 300 kHz (CISPR 16-1-1; 200 Hz, 9 kHz) 6 dB bandwidth: 10, 100 Hz; 1, 10 kHz (MIL-STD option)		
Noise level @ hold time 1s		Quasi-peak (dBμV)	Average (dBμV)
Preselector OFF, Preamplifier OFF	9 kHz to 150 kHz (200 Hz RBW) 0.15 to 30 MHz (9kHz RBW)	< -13 < 5	< -16 < 0
Preselector OFF, Preamplifier ON	9 kHz to 150 kHz (200 Hz RBW) 0.15 to 30 MHz (9kHz RBW)	< -27 < -9	< -30 < -14
Preselector ON, Preamplifier OFF	9 kHz to 150 kHz (200 Hz RBW) 0.15 to 30 MHz (9kHz RBW)	< -7 < 5	< -10 < 0
Preselector ON, Preamplifier ON	9 kHz to 150 kHz (200 Hz RBW) 0.15 to 30 MHz (9kHz RBW)	< -24 < -7	< -27 < -12
Spurious response	Peak, Hold time 100 ms < -7 dBμV, < 3 dBμV, above 150 kHz		
Detectors	Peak, Quasi-Peak, Average, RMS, RMS-Average, C-Average, APD ⁽¹⁾		
Scan time			
SWEEP MODE	A band (9 - 150 kHz)	< 5 s	Hold time 1 s, 200 Hz RBW
FULL CISPR: preselector ON, QP detector	B band (150 kHz - 30 MHz)	< 20 s	Hold time 1 s, 9 kHz RBW
ANALYZER MODE	A band (9 - 150 kHz)	< 0.5 s	Hold time 0.15 s, 200 Hz RBW
preselector OFF, Peak detector	B band (150 kHz - 30 MHz)	1 s	Hold time 1 s, 300 kHz RBW
		1 s	Hold time 50 ms, 9, 10 kHz RBW
		< 0.1 s	Hold time AUTO, 30 kHz RBW
Level measuring time (Hold time)	CISPR 16-1-1 as default 0.1 ms to 120 s		
Stand alone & measure functions	Marker, marker peak, marker to center, highest peaks, move peak to Analyzer & Manual modes. Store -load: up to 11 traces (sweep mode), two panels, 4 conversion factors. Built-in limits: CISPR 11, 14, 22. Others and custom limits: make and upload by PMM Emission Suite Battery charge and voltage Display style, contrast, backlight CISPR 14-1 compliant Discontinuous disturbance (Click) measurement (optional)		
Display units	dBm, dBμV (80 to 120 dB display dynamic)		
Stand Alone	dBm, dBμV, dBμA, dBpW, dBμV/m, dBμA/m, dBpT (80 to 200 dB display dynamic)		
With PMM Emission Suite software			
Measurement accuracy	10 Hz to 9 kHz: ± 1.0 dB Typ 9 kHz to 30 MHz: ± 0.8 dB		
S/N > 20dB			
RF output	Tracking (manual mode) & CW generator, Z _{out} 50 Ω, BNC-f.		
Frequency range	10 Hz to 50 MHz		
Level range	60 to 90 dBμV (0.1 dB step)		
Level accuracy (10 Hz to 30 MHz)	0.5 dB		
Autocalibration	Internal reference source		
I/O interface	RS-232, High speed Optical (2 channels), USB rear (front for future extension), User port (Drives PMM LISNs and accessories), Bluetooth (optional), IEEE-488 (optional)		
Operating temperature	-5° to 45°C		
Dimensions	235 x 105 x 335 mm		
Weight	4.3 kg		

OTHER LISN AVAILABLE

For larger currents and three-phase EUT, PMM offers different models of the same legendary quality and reliability, compliant to standards including CISPR 16-1-2, VDE 0876, FCC part 15, MIL-STD 461.



L3-32: 32 A, 400 VAC/565 VDC



L3-64: 63 A, 400 VAC/565 VDC
L3-64/690: 63 A, 690 VAC/975 VDC
L3-100: 100 A, 400 VAC/565 VDC



L3-500: 300 (500)A, 690 VAC/975 VDC

Ordering Information

Code		Supplied with:
CDD-4 Click Set	Continuous & Discontinuous Analysis and Verification Set, composed by: <ul style="list-style-type: none"> 9010F EMI receiver CA0010 Click Analyzer & calibration unit 	<ul style="list-style-type: none"> Battery pack BP-02 (9010F only) 2 x AC adapter/charger 2x USB, 1x RS-232, 2x BNC-BNC cables LISN mains cable DB9-DB9 link cable PCA PMM Click Analysis sw PCG PMM Click Generation sw PES Emission Suite
CA0010	CA0010 Click Analyzer & calibration unit only (Requires receiver 9010F)	<ul style="list-style-type: none"> AC adapter/charger USB, BNC-BNC cable LISN mains cable DB9-DB9 link cable PCA PMM Click Analysis sw PCG PMM Click Generation sw
CDD-4/UP	Upgrade of previous Click Analyzers, 1 and 4 channels, based on Receivers 9010. Includes CA0010, 9010F/UP	<ul style="list-style-type: none"> Same as CA0010



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