

CWS 500N2.3

CONTINUOUS WAVE SIMULATOR FOR BCI (BULK CURRENT INJECTION) FROM 4 KHZ UP TO 1 GHZ



FOR TESTS ACCORDING TO ...

- > DO 160 Section 20
- > EN 61000-4-6
- > EN 61000-6-1
- > EN 61000-6-2
- > Fiat 9.90110
- > Ford EMC-CS-2009.1
- > Ford ES-XW7T-1A278-AC
- > Ford FMC1278
- > IEC 60601-1-2
- > IEC 61000-4-6
- > ISO 11452-4
- > ISO 11452-5
- > MIL STD 461 D CS 114
- > MIL STD 461 E CS 114
- > MIL STD 461 F CS 114
- > MIL STD 461 G CS 114
- > SAE J1113-4

BULK CURRENT INJECTION (BCI) TESTING







Bulk Current Injection (BCI) is a test procedure to proof the immunity to electrical disturbances with narrowband electromagnetic energy. The test signal is injected by means of a current injection probe physically being a current transformer laid around the wiring harness. Immunity tests are performed varying the level and the frequency of the injected test signal. The BCI test method is widely known in the military/aircraft and the automotive industry to test single components of a complex system.

The CWS 500N2.3 is designed to be used for tests as per MIL STD 461 D/E/F/G CS 114, ISO 11452-4 and IEC/EN 61000-4-6 with CDNs and EM clamps and related standards.

HIGHLIGHTS

- > **Most compact equipment - all-in-one box**
- > **Supports BCI testing as per various standard requirements**
- > **Basic frequency range 9 kHz up to 400 MHz**
- > **Extended frequency range 4 kHz up to 1 GHz**
- > **Built-in 110 W class A amplifier up to 400 MHz**

APPLICATION AREAS

- | | |
|--|---|
|  AUTOMOTIVE |  INDUSTRY |
|  TELECOM |  MEDICAL |
|  AVIONICS |  BROADCAST |
|  MILITARY |  RESIDENTIAL |

TECHNICAL DETAILS

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OUTPUT	
RF output	N connector at the front panel
Output power	Built-in Class A amplifier 110 W (nominal)
Gain amplifier	> 50 dB
Output impedance	50 ohm
Harmonic distortion	< -20 dBc at max. power
Insertion loss	Approx. 1 dB (directional coupler + RF relay)

SIGNAL GENERATOR	
Output level	-63.5 dBm to 0 dBm
Frequency range	4 kHz* to 1 GHz
Output impedance	50 ohm
Direct RF output	To control an external amplifier

DUAL DIRECTIONAL COUPLER	
Dual directional coupler	Included to measure forward power and reverse power
Frequency range	4 kHz* to 1 GHz
Power	200 W max.
Insertion loss	0.6 dB max.
Mainline VSWR	1.1:1 max.

TEST FREQUENCIES	
Frequency range	4 kHz* to 400 MHz (built-in ampl.), 4 kHz* to 1,000 MHz (ext. amplifier)
Unmodulated signal	CW (continuous wave)
Amplitude modulation	Frequency: 1 Hz to 3,000 Hz, Index: 1 % to 95 %
Pulse modulation	Frequency: 1 Hz to 3,000 Hz, Index: 10 % to 80 %
*	4 kHz with optional IMN1-CWS Impedance matching network, otherwise 9 kHz to 1 GHz

TECHNICAL DETAILS

MEASUREMENT	
PM 1000.1	3-channel power meter, 4 kHz to 1 GHz
Forward power	Internal power meter #1, -10 dBm to +52 dBm
Reverse power	Internal power meter #2, -10 dBm to +52 dBm
Injected current (Monitor)	Internal power meter #3, -45 dBm to +13 dBm

TIME PARAMETERS	
Dwell time	td = 0.3 s - 9,999 s
Pause time	tr = 0/0.3 s - 9,999 s

BULK CURRENT INJECTION AS PER MIL 461 CS 114	
Output level	As required in MIL 461 CS 114, using the closed loop method up to curve #5, 109 dBuA

BULK CURRENT INJECTION AS PER RTCA-DO-160G, SECTION 20	
Output level	As required in RTCA-DO-160G, Section 20, using closed loop or substitution method, up to 250 mA

BULK CURRENT INJECTION AS PER ISO 11452-4	
Output level	As required in ISO 11452-4, using closed loop or substitution method, up to level 4, 200 mA

TEST ROUTINES FOR BULK CURRENT INJECTION	
MIL 461 CS114	Operation via icd.control
RTCA-DO-160G, Section 20	Operation via icd.control
ISO 11452-4	Operation via icd.control

TECHNICAL DETAILS

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TEST ROUTINES FOR IEC 61000-4-6

Quick Start	Immediate start; easy-to-use and fast test routine
Service	Service, Set-up

IEC 61000-4-6

Output level	1 V to 30 Vrms (emf), all standard test levels are guaranteed with all coupling methods
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MEASUREMENTS, IEC 61000-4-6

Cal in (BNC)	Integrated power meter to record the calibration data of a coupling device
Injected current	Measured by internal power meter
RF indicator	LED indicating the RF output status
LCD	Display of the test level and the preselected frequency value

GENERAL DATA

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Dimensions, weight	19"/6 HU, 31.6 kg
Supply voltage	115 V or 230 V +10/-15 %, 50/60 Hz
Input power	Max. 1430 W Inrush
Power factor	cos(phi) = 0.96 at max. output power as per IEC 555
Fuses	2x6.3 AT (115 V) or 2x6.3 AT (230 V)
Cooling	Active cooling, air ventilation
Temperature	10 °C to 40 °C
Rel. humidity	Max. 85 %, non-condensing
Atmospheric pressure	86 kPa (860 mbar) to 106 kPa (1,060 mbar)

GENERAL DATA

INTERFACE

Serial interface	USB
Parallel interface	IEEE 488, addresses 1 - 30
Fail 1	BNC input; test will be stopped (active low)
Fail 2	BNC input; test status will be saved (max. 10 events) when active low. Test continues

ACCESSORIES

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Cables	N-type coaxial cables to connect the 3dB attenuator and/or the injection probe, BNC-coaxial cable to connect the current monitoring probe, with N-to-BNC adapter
icd.control	Extensive and most versatile remote control and reporting software. The standard library helps to configure the test setup. Multiple interruption functions automated by IEEE instruments or manually. Easy-to-use as well as expandable to complex test routines based on vector definitions.

TECHNICAL DETAILS

OPTIONS

ATTENUATOR AND GENERAL OPTIONS

ATT3/100	3 dB attenuator, 100 W
ATT20/100	20 dB attenuator, 100 W, for small level RF signals as per MIL STD 461 an DO-160
ATT20/15	20 dB attenuator for current monitor path, the set includes 2 units
AD-N-BNC	N(m) to BNC(f) adapter for ATT20/15
Set C-BNC	BNC cable for current monitor probe connection
T-50A	50 ohm, 6 W termination resistor
C-IEEE	GPIO cable for PC interconnection

OPTIONS FOR MIL-STD 461 CS 114

BCI INJECTION CLAMPS

F-120-6A	Clamp-on injection probe, 10 kHz to 400 MHz, 40 mm diameter
IMN1-CWS	Impedance matching network for the low frequency range from 4 kHz to 1 MHz

CURRENT MONITOR CLAMPS

MD 4070	Monitoring Device active/passive current sensing probe, 4 kHz to 400 (600) MHz 23 mm inner diameter
MD 4070TC	Traceable calibration (ISO 17025), order only with device MD 4070

ACCESSORIES FOR CLAMP CALIBRATION

FCC-BCICF-1	Injection probe calibration fixture (jig) for F-120-6A / F-130-1A probe types
Fix MD 4070	Positioning fixture for MD 4070 in PCJ 9201

OPTIONS FOR ISO 11452-4

BCI INJECTION CLAMPS

F-130A-1	Clamp-on injection probe, 1 MHz to 400 MHz, 40 mm diameter
F-140	Clamp-on injection probe, 1 MHz to 1000 MHz, 40 mm diameter

CURRENT MONITORING CLAMPS

F-52	Clamp-on monitor probe, 10 kHz - 500 MHz, 40 mm diameter
F-55	Clamp-on monitor probe, 10 kHz - 500 MHz, 32 mm diameter
F-65	Clamp-on monitor probe, 100 kHz - 1000 MHz, 32 mm diameter

ACCESSORIES FOR CLAMP CALIBRATION

FCC-BCICF-1	Injection probe calibration fixture (jig) for F-120-6A / F-130-1A probe types
FCC-BCICF-2	Injection probe calibration fixture (jig) for F-140 probe type

TECHNICAL DETAILS

OPTIONS FOR IEC 61000-4-6

BCI INJECTION CLAMP

F-120-9A	Clamp-on injection probe, 10 kHz to 230 MHz, 40 mm diameter
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CURRENT MONITORING CLAMPS

F-33-2	Clamp-on monitor probe, 1 kHz - 250 MHz, 32 mm diameter
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ACCESSORIES FOR BCI CALIBRATION

FCC-BCICF-6-150	Injection probe calibration fixture (Jig) for F-120-9A probe type
R-100A	150 ohm-to-50 ohm matching impedance with N-type connector for BCI-clamp calibration
T-50	50 Ohm Termination

COUPLING/DECOUPLING NETWORKS

CDNs	Coupling/decoupling networks available for all kind of line types, models M, AF, T and S (see separate information)
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EM CLAMP

EM 101	RF Injection clamp, (10 kHz) 150 kHz - 1,000 MHz, 100 W, max. Cable Diameter 23 mm
FTC 101	Decoupling clamp for EM 101 RF injection clamp, 150 kHz - 1,000 MHz, max. Cable Diameter 23 mm

OPTIONS FOR IEC 61000-4-6

CALIBRATION OPTIONS IEC 61000-4-6

Connector plate size	Size as per IEC 61000-4-6 Ed.4, The CDN output connector height h defines the connector plate size for the calibration procedure, h = 30 mm => 100 mm x 100 mm h > 30 mm => 150 mm x 150 mm
R-100N	150 ohm-to-50 ohm matching impedance for CDN calibration acc. IEC 61000-4-6 Ed. 4 Connector plate: 100 mm x 100 mm
R-100N1	150 ohm-to-50 ohm matching impedance for CDN calibration acc. IEC 61000-4-6 Ed. 4 Connector plate: 150 mm x 150 mm
Cal adapters	For all types of CDNs and clamps
CWS-CAL	Basic calibration kit including 1 x R-100N, 1 x 50 cm BNC cable, 1 x plastic case
CA EM Ed. 4	Calibration kit for EM 101 as per IEC 61000-4-6 Ed. 4: 2 x R-100N1, 4 x connection rods, 1 x interconnection for rod, 1 x T50, 1 x 90 deg angle for RF input, 1 x 50 cm BNC cable 1 x plastic case
KIT-IEC-6	Cable and adapter kit consisting of: 3 x BNC cables 50 cm, 2 x adapters N(m)-BNC(f), 1 x adapter BNC(f)-N(f), For the calibration of CDNs, EM clamp and BCI probe acc. to IEC 61000-4-6 the ATT20/15 set is mandatory!!

Information about scope of delivery, visual design and technical data correspond with the state of development at time of release. Subject to change without further notice.



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