

## Injection Clamp Kits (ICK)

Absolute EMC offers an assortment of injection test kits for the use of conducted immunity. The kits can be used with many available conducted immunity systems, including the Schlöder CDG 7000, to make selection and setup easy. All calibration fixtures, injection clamps, attenuators, and termination resistors necessary for meeting the requirements of conducted immunity systems. All all-in-one systems are covered.

ICK Cover testing to the following:

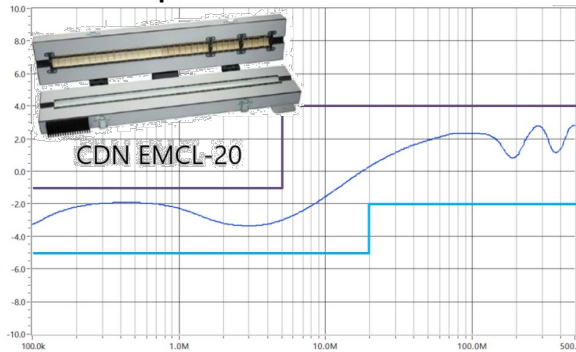
- Commercial product: IEC 61000-4-6 Conducted immunity to RF fields
- Military Products: MIL-STD-461 CS114 BCI rf immunity
- Commercial Avionics: DO-160 Section 21 Immunity to rf BCI method
- Automotive Products: ISO 11452-4 BCI, closed-loop, and substitution methods

Model	Application	Included in package
<b>ICK EM20-IEC</b> EM Clamp method for cable bundles up to 20 mm	IEC 61000-4-6	<ul style="list-style-type: none"> <li>• EM Clamp, 10 kHz – 1 GHz, 100 watts, 20mm Cable diameter, N(f)</li> <li>• EM Clamp Calibration fixture: brackets, 4mm rod, x2</li> <li>• 150 <math>\Omega</math> to 50 <math>\Omega</math> adaptor, BNC, x2</li> <li>• 50 <math>\Omega</math> Termination, 4GHz, BNC, 1 watt</li> <li>• Clamp on Current Monitor Clamp SM, 10 kHz - 400 MHz, BNC(f)</li> <li>• 6dB Attenuator, 100 watts, DC-6 GHz, N(f)-N(m) (in-out)</li> <li>• 10dB Attenuator, 25 Watts, DC-18GHz, N(f)-N(m), bi-directional</li> <li>• 20dB Attenuator, 25 Watts, DC-18GHz, N(f)-N(m) , bi-directional</li> <li>• Coax Cable: BNC(m)-BNC(m), 2m, shielded, x2</li> <li>• Coax Cable: N(m)-N(m), 2m, shielded</li> <li>• Adaptors: N(m)-BNC(f), N(f)-BNC(m)</li> </ul>
	IEC 61000-6-2	
	IEC 61000-6-1	
	CISPR 14 IEC 61326-1	
<b>ICK EM20-IEC-A</b>		Same as <b>ICK EM20-IEC</b> with the addition of: Absorbing clamp 20mm Cable diameter
<b>ICK EM35-IEC</b> EM Clamp method for cable bundles up to 35 mm	IEC 61000-4-6	<ul style="list-style-type: none"> <li>• EM Clamp, 10 kHz – 1 GHz, 100 watts, 35mm Cable diameter, N (f)</li> <li>• EM Clamp Calibration fixture: brackets, 4mm rod, x2</li> <li>• 150 <math>\Omega</math> to 50 <math>\Omega</math> adaptor, BNC, x2</li> <li>• 50 <math>\Omega</math> Termination, 4GHz, BNC, 1 watt</li> <li>• Clamp on Current Monitor Clamp, 10 kHz - 400 MHz, N(f)</li> <li>• 6dB Attenuator, 100 watts, DC-6 GHz, N(f)-N(m) (in-out)</li> <li>• 10dB Attenuator, 25 Watts, DC-18GHz, N(f)-N(m), bi-directional</li> <li>• 20dB Attenuator, 25 Watts, DC-18GHz, N(f)-N(m) , bi-directional</li> <li>• Coax Cable: BNC(m)-BNC(m), 2m, shielded, x2</li> <li>• Coax Cable: N(m)-N(m), 2m, shielded</li> <li>• Adaptors: N(m)-BNC(f), N(f)-BNC(m)</li> </ul>
	IEC 61000-6-2	
	IEC 61000-6-1	
<b>ICK EM35-IEC-A</b>		Same as <b>ICK EM35-IEC</b> with the addition of: Absorbing clamp 35mm Cable diameter
<b>ICK BCI-IEC</b> BCI method for cable bundles up to 50 mm	IEC 61000-4-6	<ul style="list-style-type: none"> <li>• BCI Probe, 10 kHz – 400 MHz, 100 Watts, 50mm(2") cable diameter, N(f)</li> <li>• Calibration fixture for BCI Clamp &amp; Current Monitor Clamp</li> <li>• 150 <math>\Omega</math> to 50 <math>\Omega</math> adaptor, BNC, x2</li> <li>• 50 <math>\Omega</math> Termination, 4GHz, BNC, 2watt</li> <li>• Clamp on Current Monitor Clamp, 10 kHz - 400 MHz, N(f)</li> <li>• 6dB Attenuator, 100 watts, DC-6 GHz, N(f)-N(m) (in-out)</li> <li>• 10dB Attenuator, 25 Watts, DC-18GHz, N(f)-N(m), bi-directional</li> <li>• 20dB Attenuator, 25 Watts, DC-18GHz, N(f)-N(m) , bi-directional</li> <li>• Coax Cable: BNC(m)-BNC(m), 2m, shielded, x2</li> <li>• Coax Cable: N(m)-N(m), 2m, shielded</li> <li>• Adaptors: N(m)-BNC(f) x3</li> </ul>
	IEC 61000-6-2	
	IEC 61000-6-1	
<b>*EM Clamp is the preferred method, BCI is inefficient in comparison taking much more power to reach levels</b>		

Model	Application	Included in package
<b>ICK BCI-MIL-DO</b> BCI method for cable bundles up to 50 mm <b>(note this setup can be used for ISO BCI)</b>	MIL-STD-461 DO-160	<ul style="list-style-type: none"> <li>• BCI Probe, 10 kHz – 400 MHz, 100 Watts, 50mm(2”) cable diameter, N(f)</li> <li>• Clamp on Current Monitor Clamp, 10 kHz - 400 MHz, N(f)</li> <li>• Calibration fixture for BCI Clamp &amp; Current Monitor Clamp</li> <li>• 50 Ω Termination, N(m), 3GHz, 25 watts</li> <li>• 3dB Attenuator, 100 watts, DC-6 GHz, N(f)-N(m) (in-out)</li> <li>• 6dB Attenuator, 100 watts, DC-6 GHz, N(f)-N(m) (in-out)</li> <li>• 10dB Attenuator, 25 Watts, DC-18GHz, N(f)-N(m), bi-directional</li> <li>• 20dB Attenuator, 25 Watts, DC-18GHz, N(f)-N(m) , bi-directional</li> <li>• Coax Cable: BNC(m)-BNC(m), 2m, shielded, x2</li> <li>• Coax Cable: N(m)-N(m), 2m, shielded, x2</li> <li>• Adaptors: N(m)-BNC(f) x3</li> </ul>
<b>ICK BCI-ISO</b> BCI: Closed-loop or substitution Methods for cable bundles up to 50mm	ISO 11452-4 Ford, GM, FCA, VW, Daimler, Toyota, Honda, Tesla, ...	<ul style="list-style-type: none"> <li>• BCI Probe, 10 kHz – 400 MHz, 100 Watts, 50mm(2”) cable diameter, N(f)</li> <li>• Clamp on Current Monitor Clamp, 10 kHz - 400 MHz, N(f)</li> <li>• Calibration fixture for BCI Clamp &amp; Current Monitor Clamp</li> <li>• 50 Ω Termination, N(m), 3GHz, 25 watts</li> <li>• 3dB Attenuator, 100 watts, DC-6 GHz, N(f)-N(m) (in-out)</li> <li>• 6dB Attenuator, 100 watts, DC-6 GHz, N(f)-N(m) (in-out)</li> <li>• 10dB Attenuator, 25 Watts, DC-18GHz, N(f)-N(m), bi-directional</li> <li>• 20dB Attenuator, 25 Watts, DC-18GHz, N(f)-N(m) , bi-directional</li> <li>• Coax Cable: BNC(m)-BNC(m), 2m, shielded, x2</li> <li>• Coax Cable: N(m)-N(m), 2m, shielded, x2</li> <li>• Adaptors: N(m)-BNC(f) x3</li> </ul>

### Equipment Specifications:

#### 20mm EM Clamp



Frequency range: 10 kHz - 1000 MHz

Nominal impedance: 50 Ω

Connector: N-type, female

Max. input level:

0,15 – 100 MHz: 100 W, 15 min

100 – 230 MHz: 100 W, 5 min

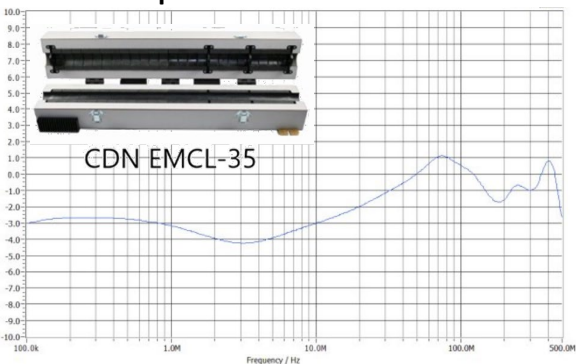
230 – 1000 MHz: 50 W, 3 min

Cable diameter: < 20 mm

Dimensions (L x W x H) in mm: 632 x 120 x 80

Weight: 7 kg

#### 35mm EM Clamp



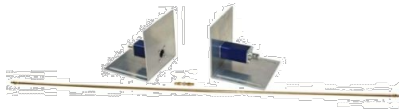
Same General specs as 20mm Clamp

Cable diameter: < 35 mm

Dimensions (L x W x H) in mm: 666 x 135 x 120

Weight: 14 kg

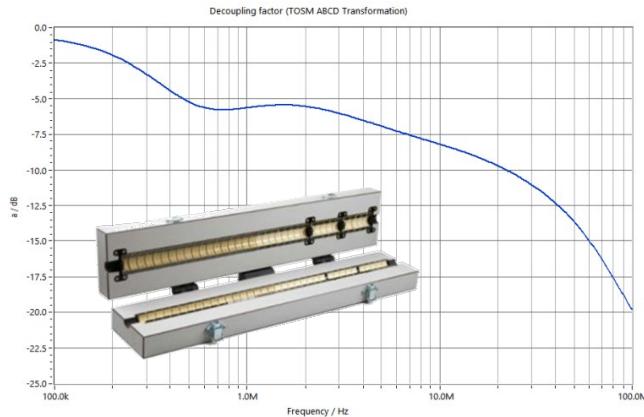
### EM Clamp Calibration Fixture



Mounting bracket incl. 50/150  $\Omega$  adapter (2 pieces)  
 BNC termination, 50  $\Omega$ , 1 W  
 Adapter with 2 banana-plugs, length 34 mm  
 Brass rod 4 mm with banana-plugs, length 672 mm

### CDN EMCL-CAL (incl.)

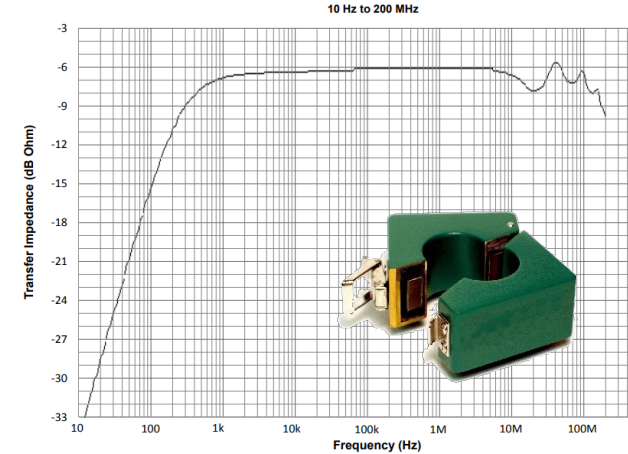
#### Decoupling Clamp / Absorption Clamp



Frequency range: 100 kHz – 1 GHz  
 Cable diameter: < 20 mm or < 35 mm

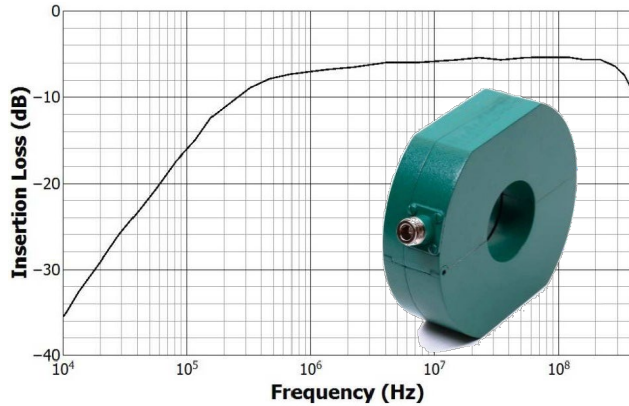
20 mm version:  
 Dimension (L x W x H): 632 x 120 x 80 mm  
 Weight: App. 6,8 kg

#### Clamp-on Current Monitoring Clamp SM



Sensitivity: 1.0 V/A  $\pm$ 1%  
 Output resistance: 50  $\Omega$   
 Maximum peak current: 500 A  
 Maximum rms Current: 5 A  
 Cable Diameter: 26.9mm, 1.06in.  
 Droop rate: 0.7 % / microsecond  
 Useable rise time: 2.5 nanosecond  
 Current time product: 0.002 AAs maximum  
 Low frequency 3dB point: 1.0 kHz  
 High frequency 3dB point: 150 MHz  
 I/f figure: 0.01 Arms /Hz  
 Output connector: BNC(f)  
 Operating temperature: 0 to 65°C  
 Weight: 16 oz (454 gm)  
 Hinged clamp-on design for one-handed mounting

### BCI Probe IEC & MIL-DO



Maximum input power: 100W for 60 minutes

Case temperature: < 50°C

Frequency Range: 10 kHz to 400 MHz

Ratio: 1:1

Weight: 6 lb (2.7 kg)

Hole Diameter: 2.0 inches [50.8 mm]

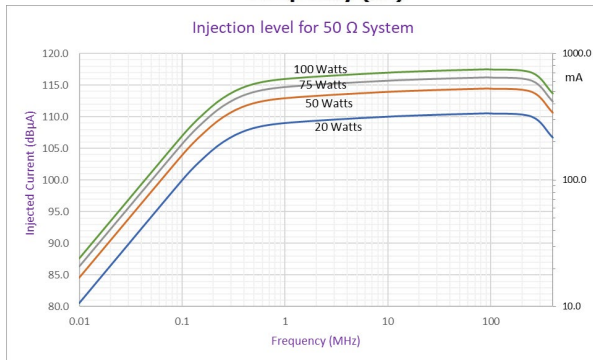
Width: 5.75 inches [147 mm]

Height: 5.0 inches [127 mm]

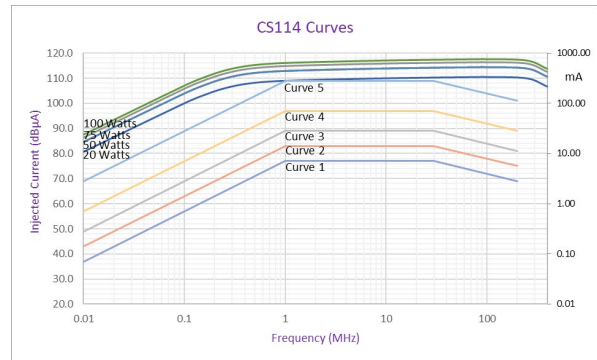
Thickness: 1.63 inches [41 mm]

Use with calibration fixture F-3

(for IEC testing the more efficient EM Clamps are recommended)

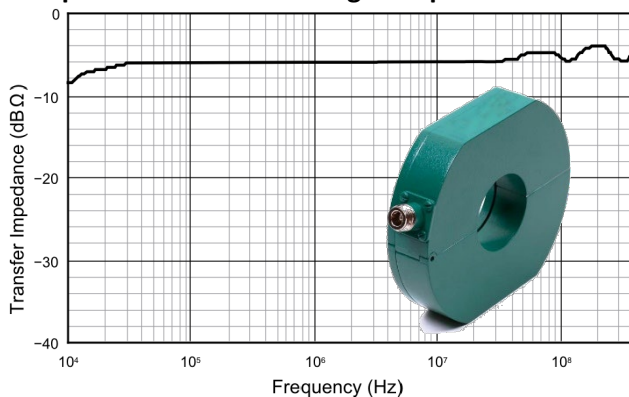


Injected current into 50 Ω jig (100Ω loop)



Injected current into 50 Ω jig (100Ω loop)

### Clamp-on Current Monitoring Clamp IEC & MIL-DO



Frequency Range 10 kHz to 400 MHz

Maximum RMS Current 4 A

MIL-STD-461 CS114, CS115, CS116

Hole Diameter 2.0 inches [50.8 mm]

Width 5.75 inches [147 mm]

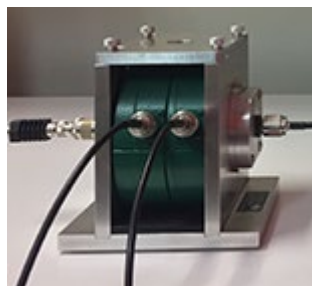
Height 5.0 inches [127 mm]

Thickness 1.25 inches [32 mm]

Weight 2.2 lbs [1.0 kg]

Nominal Transfer Impedance -6 dBΩ

### BCI & Monitor Probe Calibration Fixture IEC & MIL/DO



10 kHz to 400 MHz

VSWR: < 3

Interior width: 3.0 inches [76 mm]

Interior height: 5.4 inches [137 mm]

Depth: 6.0 inches [152 mm]

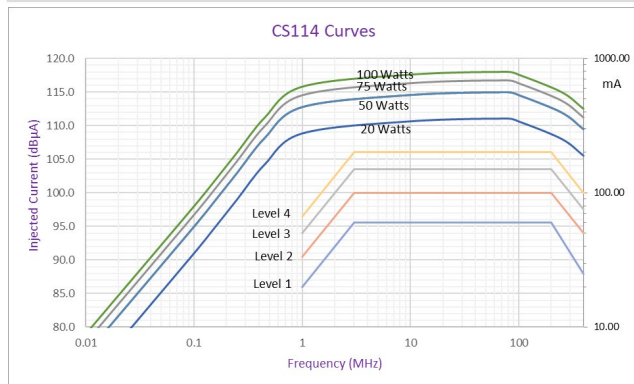
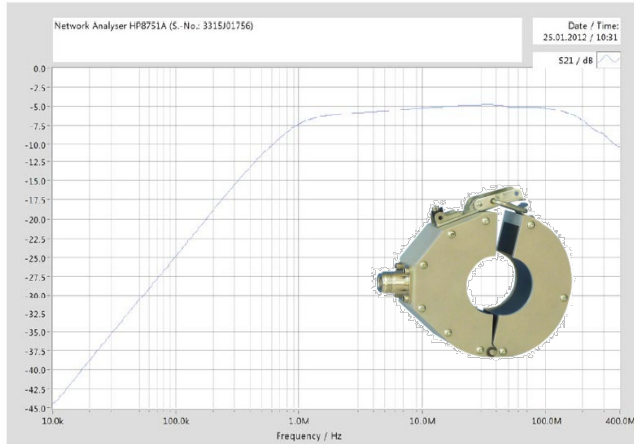
Inner conductor diameter: 0.94 inches [24 mm]

Weight: 6.5 lbs [3.0 kg]

Removable center conductor for use with non-clamp-on probes

MIL-STD-461 CS114, CS115, CS116

### BCI Probe ISO



Meets specifications of ISO 11452-4:2005

Frequency range: 1 MHz up to 400 MHz

Designed for automotive BCI testing

Low insertion loss

Input Connector: Type N Female

Inner diameter: 40 mm

Outer Diameter: 120 mm

Width: 40 mm

Max. core temperature: 90 °C

Turns Ratio: 1:1

Primary inductance: 5.1 µH @ 100 kHz

Ambient temperature: 0 to 40 °C

Fastening: 1 Clip

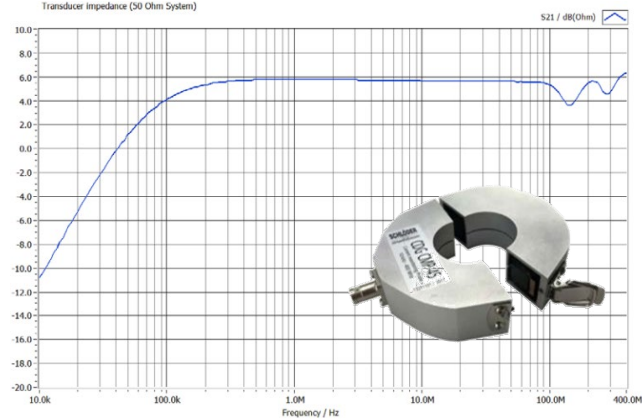
Input Power rating until core temperature is 90 °C

90 min @ 70 W (48.45 dBm)

45 min @ 100 W (50 dBm)

Calibration Jig included

### Current Monitor Probe ISO



Frequency Range: 10 kHz – 400 MHz

Insertion Impedance: < 2,5 Ω

Max. signal current: 1A

Signal output: BNC socket

External diameter: 116mm

Internal diameter: 45mm

Thickness: 30 mm

Weight: approx. 0,6 kg

**3dB Attenuator**



**6dB Attenuator**



Fixed Attenuator, Uni-directional  
 Maximum Frequency: 6 GHz  
 Impedance: 50 Ω  
 Power Maximum: 100 Watt  
 VSWR Maximum: 1.45:1  
 Attenuation: 3db or 6 dB  
 Connector Series 1: N(f) Input  
 Connector Series 2: N(m) output  
 Body: 4.9 x 2.7 x 3.8in (124.5x68.6x96.6mm)

**10dB Attenuator**



**20dB Attenuator**



Fixed Attenuator, Bi-directional  
 Maximum Frequency: 18 GHz  
 Impedance: 50 Ω  
 Power Maximum: 25 Watt  
 VSWR Maximum: 1.45:1  
 Attenuation: 10 dB or 20 dB  
 Connector Series 1: N(m)  
 Connector Series 2: N(f)  
 Body: 2.67 x 2.3in (2.67x58.42mm)

**Coax Cables**



Absolute Coax A (AB-A)  
 • Ultra-Flexible • Double Shielded Outer Conductor  
 Maximum Frequency: 18 GHz  
 Impedance: 50 Ω nominal  
 Max Power: @ 1GHz 410 Watts  
 Shielding Effectiveness: -90 dB minimum (cable only)  
 Dielectric Withstanding Voltage: 3.0 kV at 60 Hz  
 Capacitance: 29 pF/ft (95.1 pF/m)  
 Finished Outer Diameter: 0.163 in (0.414 cm)  
 Static Bend Radius: 0.8 in (2.032 cm)

**Terminations and adaptors**



BNC(m) 2w

N(m) 25 watt

BNC(f) to N(m)

BNC(m) to N(f)

Ω