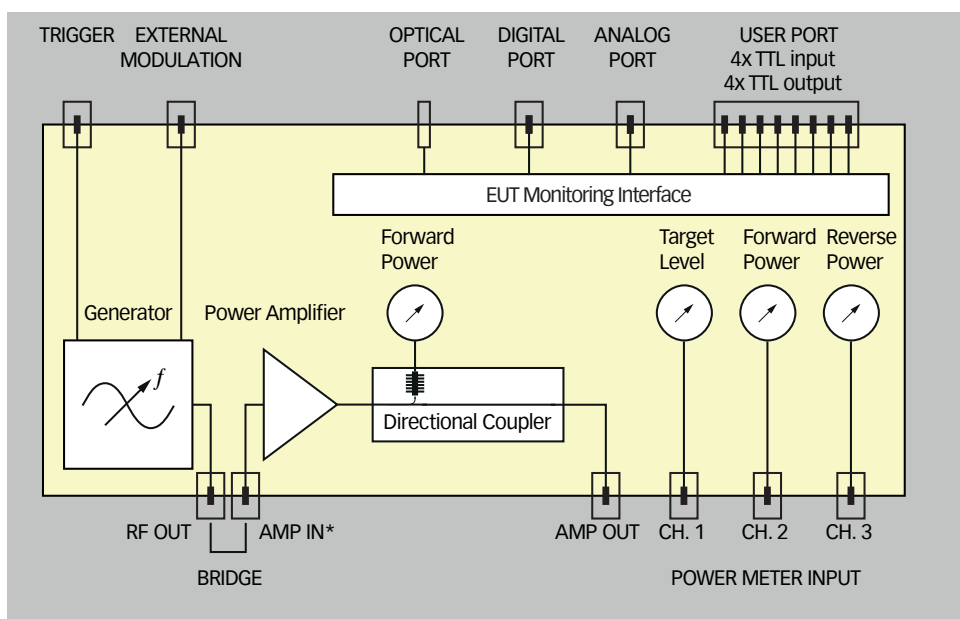


The wide frequency range of the signal generator and the power meter offer the possibility to connect external amplifiers and directional couplers. In combination with a remote control software, external power amplifiers and directional couplers, further applications can be covered, such as testing of conducted disturbances induced by high frequency fields according to IEC/EN 61000-4-6, automotive BCI tests e.g. according to ISO 11452-4 as well as high frequency electromagnetic fields according to IEC/EN 61000-4-3 or IEC/EN 61000-4-20.

In order to start with predefined parameter settings the optional test software `icd.control` is recommended. The software offers a large standard database and predefined drives for using external measuring devices. More complex systems including radiated tests can be controlled by using the software solution CIS (Compliance Immunity Software).

**Standards:**

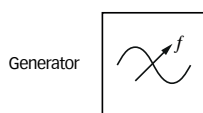
- IEC/EN 61000-4-39
- IEC/EN 60601-1-2



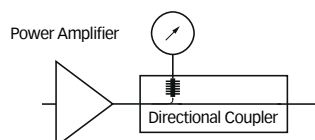
# NSG 4070C1-LFCP

## SYSTEM FOR MAGNETIC FIELD TESTING IN THE CLOSE PROXIMITY

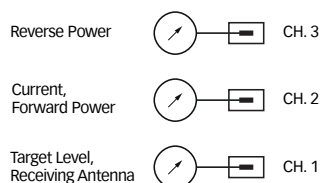
### Modules of NSG 4070C1-LFCP



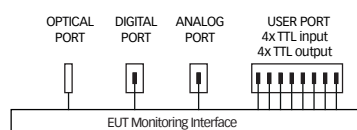
The heart of the device is the signal generator, which generates the sinusoidal signal over the wide frequency range from 4 kHz to 1 GHz and in the level range -60 dBm to +10 dBm. The built-in modulator allows amplitude and pulse modulation. The NSG 4070C1-LFCP contains extended parameters for pulse modulation and allows up to three envelopes to be interleaved. One input allows modulation from an external source.



The output of the signal generator is connected to the internal power amplifier via a bridge. Next to the amplifier a directional coupler is connected to measure the forward power.



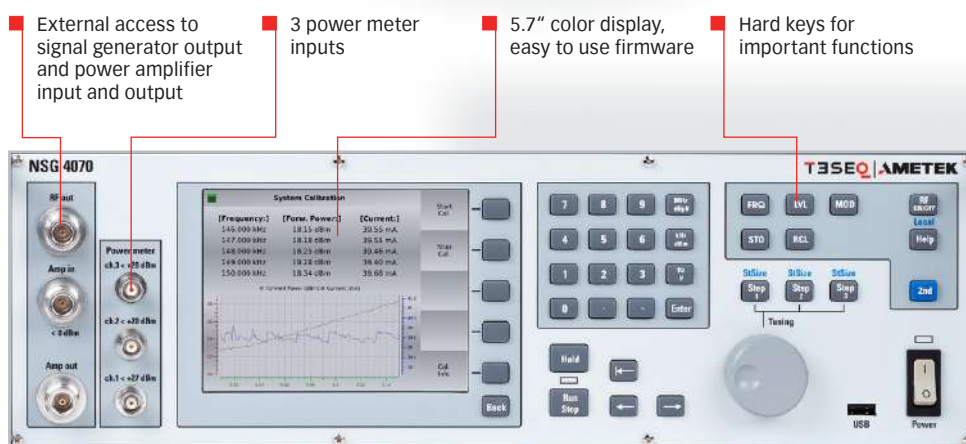
The NSG 4070C1-LFCP can measure forward and reverse power via an external directional coupler. For this application, power meter inputs 2 and 3 are located on the front panel. The power meter input 1 is intended for adjusting the target value. The power meter input 2 of NSG 4070C1-LFCP is intended for connecting the current probe in the range 9 kHz to 150 kHz.



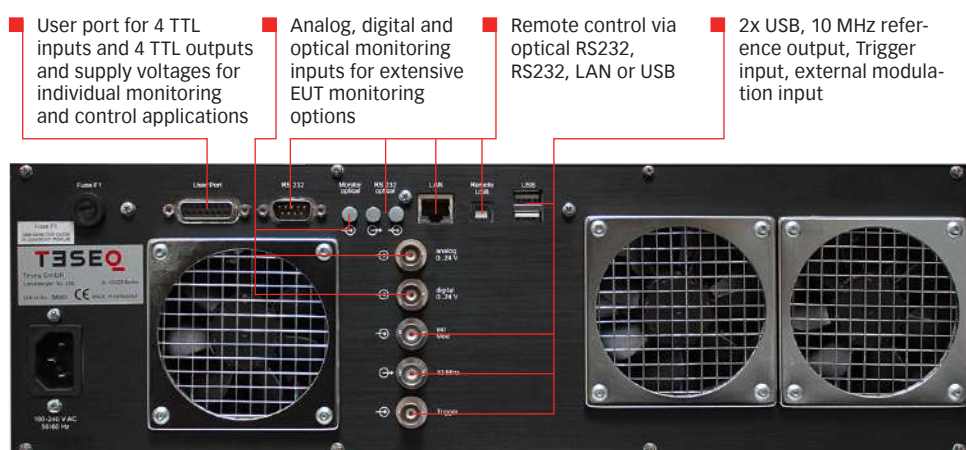
The EUT monitoring interface allows the simple and fast integration of the interfaces of the EUT to be monitored. The TTL inputs and outputs of the NSG 4070C1-LFCP can be used to integrate additional equipment for monitoring test specimens. The optical EUT monitoring input can detect the status of an indicator lamp. When using the extensive EUT monitoring functions, the user receives a meaningful test result with assignment of the events to the respective test frequency. Subsequent design changes to the EUT can thus be qualified more quickly.

# NSG 4070C1-LFCP SYSTEM FOR MAGNETIC FIELD TESTING IN THE CLOSE PROXIMITY

## Front panel

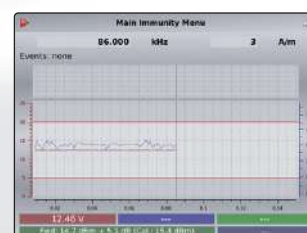
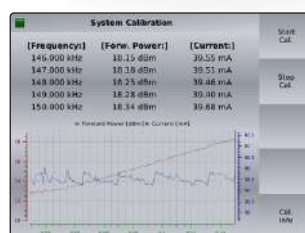
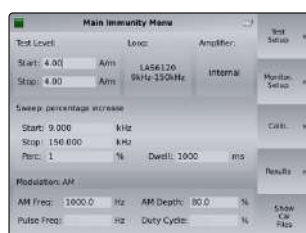


## Back panel



# NSG 4070C1-LFCP SYSTEM FOR MAGNETIC FIELD TESTING IN THE CLOSE PROXIMITY

## Firmware: Immunity mode



## Configuration

## Calibration

## Testing



During the EMC tests, the test object undergoes different tests at different test stations. Among other things, short set-up times are an advantage so that the operating personnel can efficiently test the EUT. Switching on and testing expresses the wish of many users. With its unique menu-driven operation, the NSG 4070C1-LFCP fulfils this wish to operate magnetic field testing according to IEC/EN 61000-4-39 and IEC/EN 60601-1-2 from the front panel of the device. On-site testing of machines and systems is possible with the NSG 4070C1-LFCP. The NSG 4070C1-LFCP contains configurations that the operator can load or modify according to the test being performed. This allows the parameter setting to be carried out with a user activity and in the shortest possible time. To execute a test, an existing system calibration file would have to be loaded or generated. Thanks to the very fast power meters and firmware optimized for fast measurement, the NSG 4070C1-LFCP takes less than a minute to calibrate for IEC/EN 61000-4-39 the range 9 kHz to 150 kHz or 150 kHz to 26 MHz. During the test, the display changes to show the current frequency, level, EUT monitoring channels and their states. The response to EUT monitoring events can be adjusted. Irrespective of the EUT monitoring, the sweep can be interrupted with the "HOLD" key to manually change the frequency and level, for example, to further investigate the reaction of the DUT. Test results can be saved and reloaded as required. Based on a loaded test, tests can be repeated easily as the test configuration and system calibration data are included. When the test result is saved on a USB stick, a simple test report in PDF format and CSV format is also saved.

## Firmware: Generator and Power Meter mode



In addition to the Immunity menu for performing the EMC test, the NSG 4070C1-LFCP, with two further menus, offers the option of operating the device as a stand-alone signal generator. The measured values of the power meters are displayed in the power meter menu. The operator can easily check his system and measure cables and attenuators.

# **NSG 4070C1-LFCP** **SYSTEM FOR MAGNETIC FIELD TESTING** **IN THE CLOSE PROXIMITY**

## **Technical specifications**

### **Generator**

RF	
Frequency range:	4 kHz to 1 GHz
Resolution:	1 Hz
Reference frequency:	10 MHz
Aging:	25 ppm
RF Level	
Level range:	-60 dBm to +10 dBm
Resolution:	0.1 dB
Settling time:	10 ms
Amplitude modulation	
Modulation depth:	0 to 100%
Modulation frequency range:	1 Hz to 50 kHz
Frequency resolution:	1 Hz
Pulse modulation (possible to interlace up to three pulse modulations)	
Rise/fall time (10%/90%):	< 1 µs
Modulation frequency range:	0.01 Hz to 1 MHz
Frequency resolution:	0.01 Hz
Duty cycle:	0.1% to 100%
External modulation	
Delay time:	< 1 µs / 180°
Period:	min. 20 µs
Pulse width:	min. 10 µs

### **Power meter**

Frequency range:	4 kHz to 1 GHz
Linear measurement range	
channel 1:	-35 dBm to +27 dBm
channel 2,3:	-45 dBm to +20 dBm
Max. input / no damage	
channel 1-3:	+28 dBm
Noise level:	>5 dB below the measurement range
Input return loss:	>20 dB (below 500 MHz), >17 dB (500 MHz to 1 GHz)
Connector:	BNC socket, 50 Ω
Accuracy 10 to 30°C:	<0.5 dB, typ. <0.3 dB

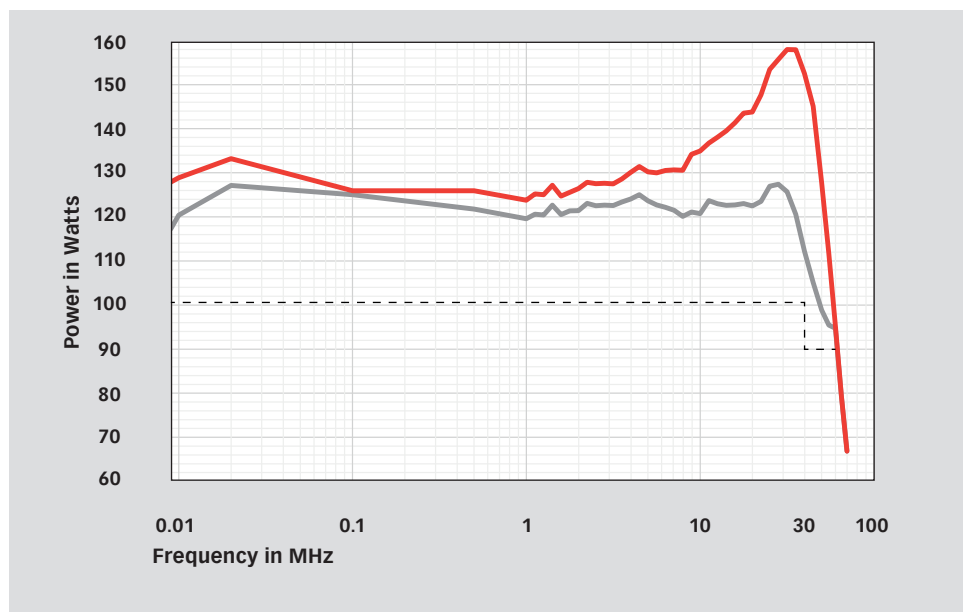
# **NSG 4070C1-LFCP** **SYSTEM FOR MAGNETIC FIELD TESTING** **IN THE CLOSE PROXIMITY**

## **Power amplifier**

Nominal output power:	100 W
Frequency range:	9 kHz - 50 MHz
Type:	single band, class A
Input/output impedance (nominal):	50 $\Omega$
Input return loss (minimum):	10 dB
Output return loss (nominal):	min. 9.5 dB
Output return loss without damage:	0 dB
Gain (minimum):	50 dB
Gain flatness (maximum):	+ / - 3 dB
Linear output power (minimum)	
9 kHz to 30 MHz:	50 dBm (100 W)
30 MHz to 50 MHz:	49.5 dBm (90 W)
Input power without damage (maximum):	0 dBm
Harmonic distortion at linear output power (typical):	< -20 dBc

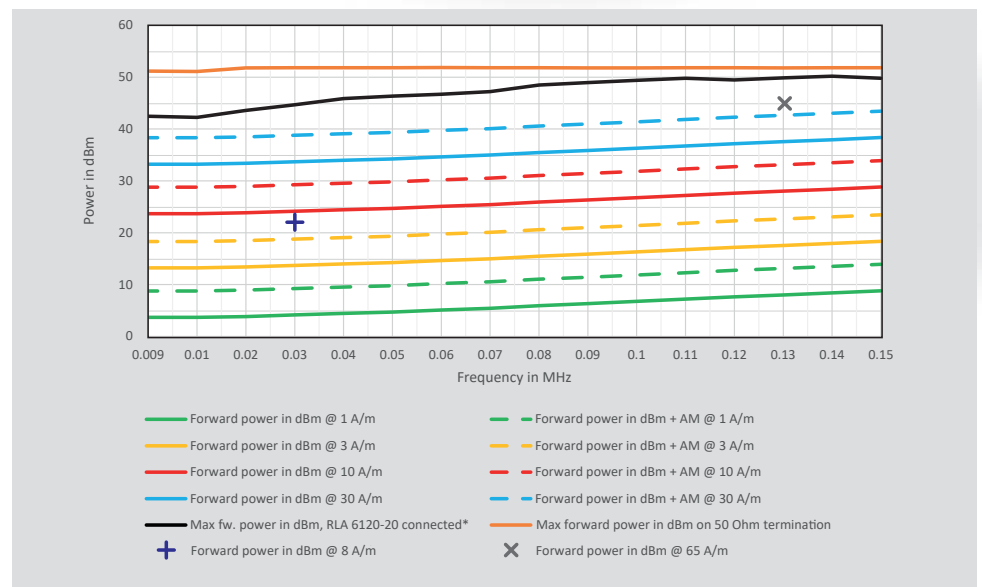
## **Power amplifier of NSG 4070C1-LFCP connected to 50 Ohms**

**Legend:**  
 — typical saturated power,  
 — typical linear power,  
 .... specification linear power

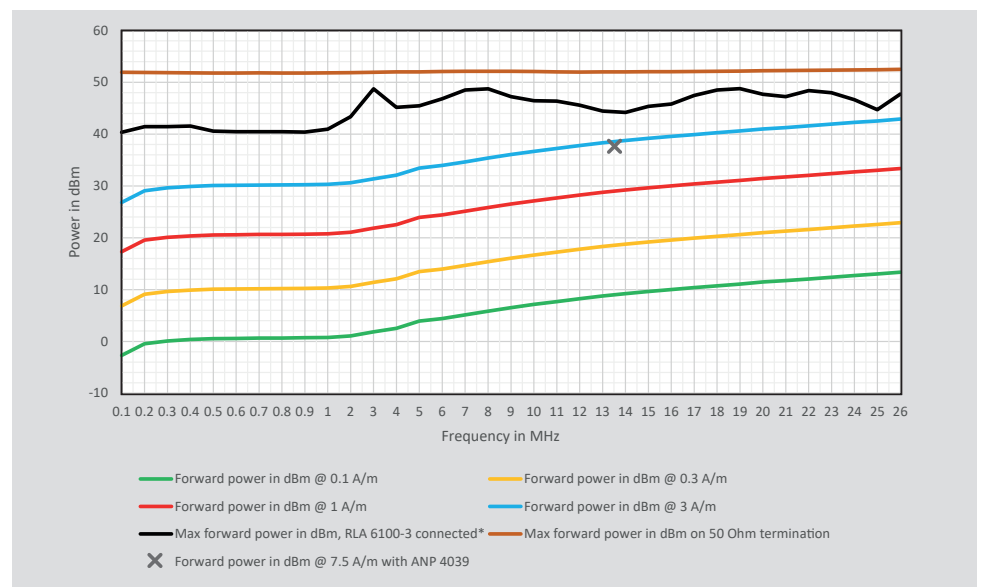


# NSG 4070C1-LFCP SYSTEM FOR MAGNETIC FIELD TESTING IN THE CLOSE PROXIMITY

Example for typical power requirements using LAS 6120



Example for typical power requirements using LAS 6100



# **NSG 4070C1-LFCP**

## **SYSTEM FOR MAGNETIC FIELD TESTING IN THE CLOSE PROXIMITY**

### **Test and measurement routines**

#### **Generator mode**

Sweep:	frequency sweep, level sweep
Modulation:	AM, AM PC (peak conservation), pulse modulation and external
Others:	free parameter setting from 4 kHz to 1 GHz, high power mode using power amplifier

#### **Power meter mode**

Level setting:	free generator level setting via numeric input or rotary knob, generator ON/OFF, power amplifier (internal) ON/OFF
Frequency setting:	free frequency setting via numeric input or rotary knob
Power display:	channel 1 to 3, amplifier output (internal)

#### **Immunity mode**

Level:	Start and stop level or sections, levels in A/m
Loops:	LAS 6120 range 9 kHz to 150 kHz and LAS 6100 range 150 kHz to 26 MHz
Test methods:	according IEC 61000-4-39 range 9 kHz to 150 kHz and 150 kHz to 26 MHz
Sweep:	Frequency or section sweep with linear, steps per decade or percentual increase
Modulation:	AM, AM PC (peak conservation), pulse modulation, external or mixed (e.g. 1 kHz AM internal modulated with 1 Hz PM external)
EUT monitoring:	Individual port configuration, EUT monitoring setup and check function, EUT monitoring results displayed during test in both results file and test report
Calibration:	System calibration and current probe calibration, display, calibration file store and recall function, recall of sensor loop correction files
EUT threshold search:	manual search by changing frequency or stress level
Store and recall:	function for test configurations, calibration results and test results, supports USB sticks
Component check:	quick system component check, e.g. cable, attenuator max. 58 dB insertion loss
Additional features:	free parameter setting from 4 kHz to 1 GHz, supports external power amplifier, directional coupler and attenuator (on power meter channel 1)

# NSG 4070C1-LFCP SYSTEM FOR MAGNETIC FIELD TESTING IN THE CLOSE PROXIMITY



NSG 4070C1-LFCP front panel with RF ports

## Analog ports

Front panel	
Generator output:	N socket 50 $\Omega$ , 4 kHz to 1 GHz
Power amplifier input:	N socket 50 $\Omega$ , max. 0 dBm
Power amplifier output:	N socket 50 $\Omega$
Power meter channel 1 to 3:	as defined in chapter "Power meter"
Back panel	
Monitoring input analog:	BNC socket, 0 to 24 V $R_i=15$ k $\Omega$ , 6 mV resolution
External modulation input:	BNC socket, impedance >10 k $\Omega$ , level: 1 Vpp to get 100% AM, 1 Hz to 50 kHz
10 MHz reference output:	BNC socket, approx. 1 Vpp / 50 $\Omega$

## Digital ports

Front panel	
USB:	USB host connector for USB stick, keyboard, mouse
Back panel	
User port:	D-Sub 15 pole 4 TTL inputs 4 TTL outputs +12 V / 800 mA, -12 V / 200 mA, +5 V / 800 mA power supply
Monitoring digital input:	BNC socket 0 to 24 V via optical coupler $R_i=1.5$ k $\Omega$ , switching threshold approx. 2 to 3 V
Monitoring optical input:	LWL (Light wave connector), HP versatile link HFBR0501 series 40 kBd, (avoid scattered light on the back panel)
Trigger input:	BNC socket, TTL for external triggering, max. frequency 100 Hz, trigger delay <10 ms
RS232:	D-Sub 9 pole, up to 115200 Bd
RS232 optical:	Connector 2 x HFBRx523 socket for 1 mm fiber optic cable with length between 5 m and 30 m with 115200 Bd, for other distances 38400 Bd, max. 50 m
2x USB:	USB host connector for USB stick, keyboard, mouse
USB device connector:	For remote control
Network:	RJ45, Ethernet 10 / 100 BASE-T

# **NSG 4070C1-LFCP**

## **SYSTEM FOR MAGNETIC FIELD TESTING IN THE CLOSE PROXIMITY**

### **Power supply**

Power consumption	100 to 240 VAC 50/60 Hz autoranging	Recommended fuse F1 for nominal 110 V	Recommended fuse F1 for nominal 230 V
NSG 4070C1-LFCP	approx. 512 W	6.3 A (slow)	2.5 A (slow)

### **General data**

Operating temperature range:	0 °C to 40 °C
Storage temperature range:	-20 °C to 60 °C
Relative humidity:	95 %/30 °C (no moisture condensation)
EMC:	DIN/EN 61326-1:2006
Shock:	DIN/EN 60068-2-27
Vibration:	DIN/EN 60068-2-6
Protection class:	DIN/EN 61010-1/IEC 61010-1

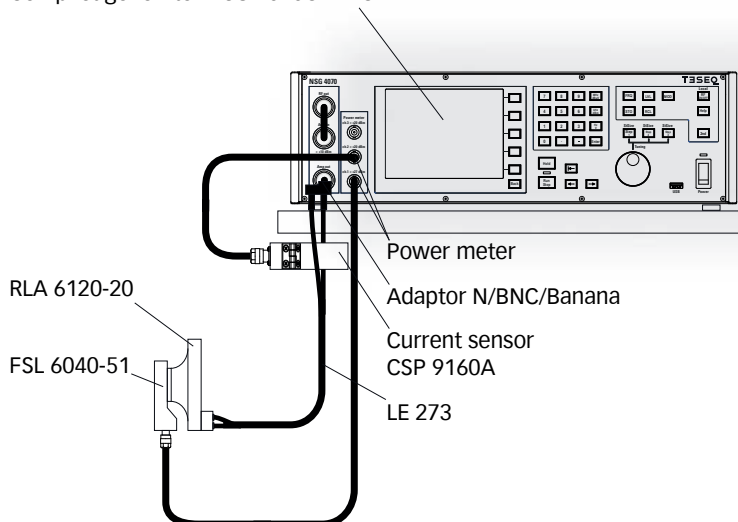
### **Mechanical specifications**

Size (W x H x D) :	45 cm (19") x 15 cm (3HU) x 42.3 cm (with handle bar and foot)
Weight:	approx. 15 kg (with internal power amplifier)
Cardboard box:	80 cm x 61 cm x 34 cm, approx. 8 kg (empty)

# **NSG 4070C1-LFCP** **SYSTEM FOR MAGNETIC FIELD TESTING** **IN THE CLOSE PROXIMITY**

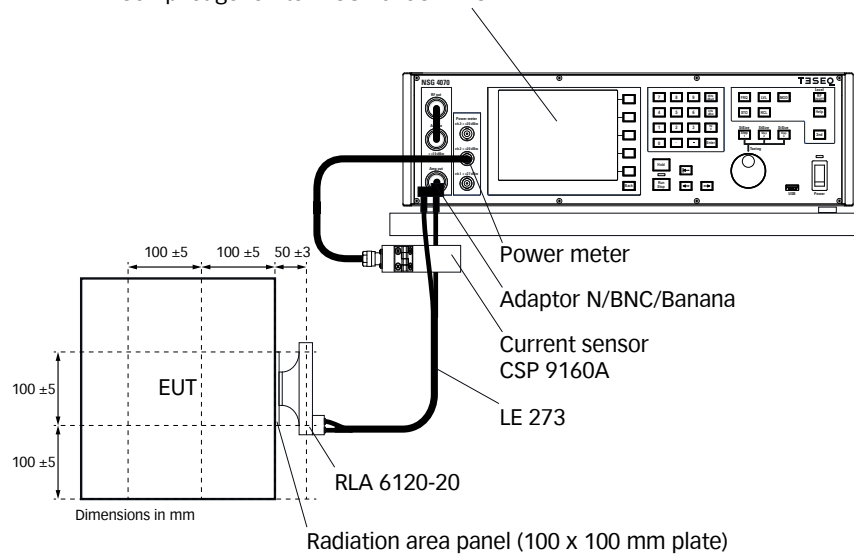
Setup example for test level setting in the frequency range 9 kHz to 150 kHz

Compact generator NSG 4070C1-LFCP



Setup example for testing in the frequency range 9 kHz to 150 kHz

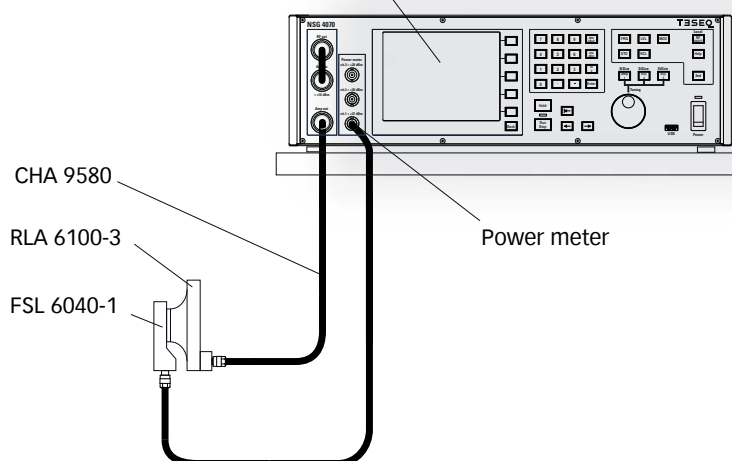
Compact generator NSG 4070C1-LFCP



# **NSG 4070C1-LFCP** **SYSTEM FOR MAGNETIC FIELD TESTING** **IN THE CLOSE PROXIMITY**

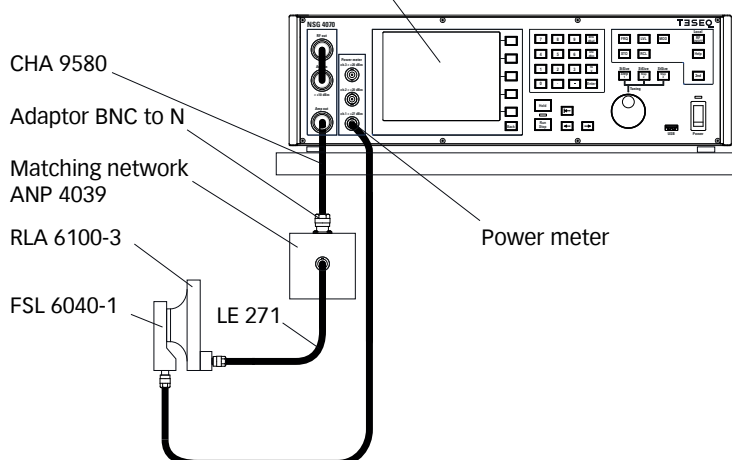
Setup example for test level setting for the frequency range 150 kHz to 26 MHz

Compact generator NSG 4070C1-LFCP



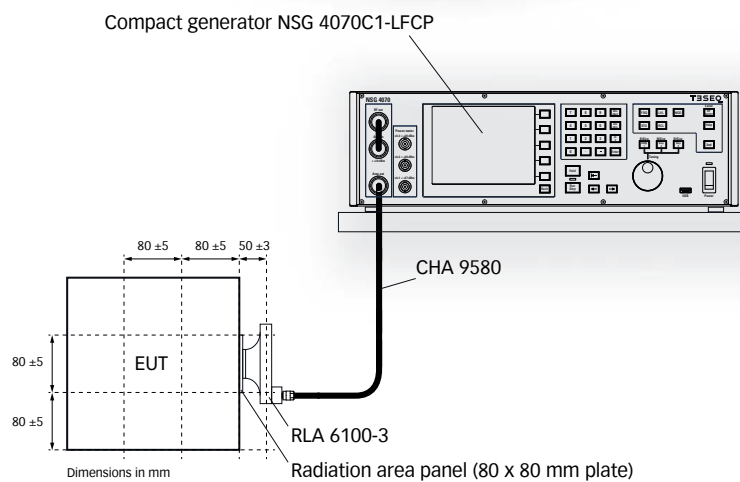
Setup example for test level setting at 13.56 MHz for e.g. 7.5 A/m (IEC 60601-1-2)

Compact generator NSG 4070C1-LFCP

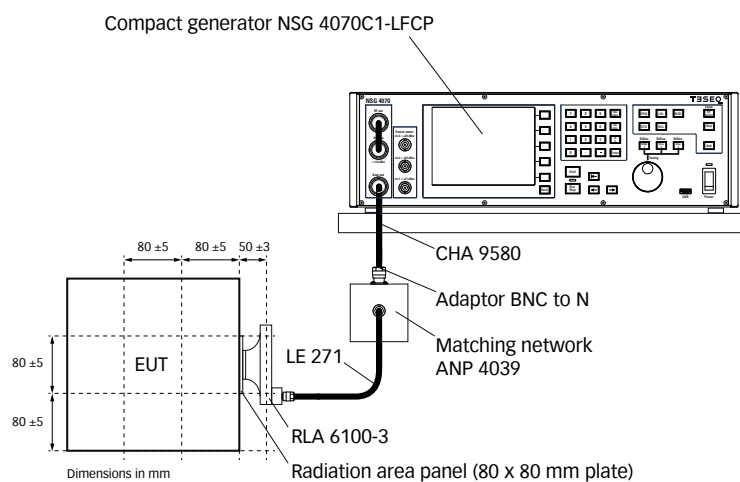


# **NSG 4070C1-LFCP** **SYSTEM FOR MAGNETIC FIELD TESTING** **IN THE CLOSE PROXIMITY**

Setup example for testing in the frequency range 150 kHz to 26 MHz



Setup example for testing at 13.56 MHz for e.g. 7.5 A/m (IEC 60601-1-2)



# NSG 4070C1-LFCP SYSTEM FOR MAGNETIC FIELD TESTING IN THE CLOSE PROXIMITY



**NSG 4070C1-LFCP**

## Delivery items

System for magnetic field testing in the closed proximity NSG 4070C1-LFCP, 4 kHz to 1 GHz RF generator and power meter; 9 kHz to 50 MHz power amplifier 100 W; spare fuses (2); RS232 cable (Nullmodem); USO 4013 (USB to serial / optical converter with 20 m optical cable); LAN cable, crossover, 3 m; keyboard (English); mains cable GB, CH, USA / JP, EU; operating manual

## Model No. and options



**NSG 4070C1-LFCP with rack mounting  
kit (option: NSG 4070 Rack)**

Part number	Description
259703	NSG 4070C1-LFCP System for magnetic field testing in the close proximity, frequency range 9 kHz - 50 MHz, 4 kHz - 1 GHz RF generator and power meter, power amplifier with 100 W, 9 kHz - 50 MHz, USO 4013 (USB to serial / optical converter with 20 m optical cable), RS232 cable, LAN cable, keyboard (English), mains cable GB, CH, USA / JP, EU
253840	NSG 4070 Rack Rack mounting kit for NSG 4070 (red handles)
97-259700	NSG 4070C-LFCP-TC Traceable calibration (ISO17025), order only with the device
98-259700	NSG 4070C-LFCP-DAkKS DAkKS calibration (ISO17025), order only with the device
258280	LAS 6120 Loop antenna set (25 Hz) 9 kHz to 150 kHz, includes RLA 6120-20 (radiating loop antenna), spacer, radiation area panel (100 mm x 100 mm plate), TPF 6120 (tripod fixture), FSL 6040-51 (field sensing loop antenna), CSP 9160A (current sensor), LE 273 (two wire cable, with 4 mm banana plugs, 3 m), 2x RF cable (BNC(m)-BNC(m) 1 m, RG58), 2x N-BNC adaptor, banana to BNC adaptor, user manual and ISO 17025 traceable calibration certificate (scope of calibration FSL 6040-51 and CSP 9160A)
258281	LAS 6100 Loop antenna set 150 kHz to 30 MHz, includes RLA 6100-3 (radiating loop antenna), spacer, radiation area panel (80 mm x 80 mm plate), TPF 6100 (tripod fixture), FSL 6040-1 (field sensing loop antenna), ANP 4039 (matching network for 13.56 MHz), CHA 9580 (N(m)-BNC(m), 2 m, RG223), RF cable (BNC(m)-BNC(m), 1 m, RG58) LE 271 (SHV(f)-BNC(m), 1 m, RG58), N-BNC adaptor, user manual and ISO 17025 traceable calibration certificate (scope of calibration FSL 6040-1)

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82-259703 E01 June 2022