

H-Feld Senderahmenantenne 9 kHz - 30 MHz

H-Field Transmit Loop 9 kHz - 30 MHz



Beschreibung:

Die H-Feld Senderahmenantenne HFRA 5149-60B wurde für Störfestigkeitsprüfungen im Frequenzbereich von 9 kHz bis 30 MHz entwickelt, sie entspricht den Anforderungen aus CISPR 16-1-4.

Description:

The HFRA 5149-60B H-field transmitting loop antenna is designed for immunity testing in the frequency range from 9 kHz to 30 MHz and is compliant with CISPR 16-1-4.

Technische Daten:		Specifications:
Frequenzbereich:	9 kHz - 30 MHz	Frequency Range:
Nominelle Impedanz:	50 Ω	Nominal Impedance:
Dauerleistung:	20 W	Continuous Power:
Externer Abschlusswiderstand:	50 Ω / 20 Watt	Ext. termination:
VSWR:	< 2:1 (0.02 - 20 MHz) < 4:1 (0.009 - 30 MHz)	VSWR:
Gehäusematerial:	Aluminium	Housing Material:
Gehäuseabmessungen typ:	590 x 650 x 90 mm	Housing Dimensions typ:
Rahmen-Querschnitt	\varnothing 20 mm	Cross section of loop:
Montage (Stativgewinde)	3/8"	Mounting (camera thread)
Gewicht:	ca. 1250 / 1400 g	Weight:
Anschluss:	2 x N-Buchse	Connector:

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Im Frequenzbereich von 9 kHz bis 30 MHz werden bevorzugt magnetische Feldstärken gemessen, oft aber in Einheiten der elektrischen Feldstärke als „fiktiver E-Feld-Pegel“ in dB μ V/m angegeben.

Im homogenen Fernfeld sind diese beiden Größen durch den „Feldwellenwiderstand des freien Raums“ $120 \pi \Omega = 377 \Omega$ verknüpft. EMV/EMI-Messungen erfolgen hingegen nahezu immer im Nahfeld ($D < 0.1 \lambda$). Insofern besteht Bedarf an definierten H-Feld-Strahlungsquellen. Für Immunitätsprüfungen werden stärkere H-Felder benötigt, aber auch bei messtechnischen Untersuchungen im freien Messgelände, in Schirmräumen und in Absorberhallen besteht Bedarf an leistungsfähigen, kalibrierten magnetischen Sendeantennen, da die H-Feldstärke im Nahfeld mit der dritten Potenz der Entfernung abnimmt (das entspricht etwa 18 dB Abnahme bei Verdoppelung der Distanz). Schon ab 1 m Entfernung beginnt für 30 MHz der Übergang ins Fernfeld, wobei der Exponent der Feldstärkenminderung allmählich von 3 auf 1 absinkt.

Die vorliegende magnetische Sendeantenne kann kurzzeitig bis 100 Watt, im Dauerbetrieb mit 30 Watt belastet werden. Dann ist eine externe 50 Ω Last mit der erforderlichen Leistungsaufnahme anzuschließen. Ein über die Leistung üblicher Labormesssender hinausgehender 20-Watt-Abschluss ist im Lieferumfang der HFRA 5149-60B enthalten.

Zur Befestigung oder Stativmontage befindet sich auf der Unterseite des Gehäuses ein 3/8" Kameragewinde.

In the VLF-HF frequency range from 9 kHz to 30 MHz the magnetic field strength is measured preferably, but often expressed in the unit of the electric field strength as the "fictive E field level" (dB μ V/m).

In the undistorted far-field both units are linked by the characteristic impedance of free space $120 \pi \Omega = 377 \Omega$. Practical EMC/EMI measurements however are carried out in the near-field zone ($D < 0.1 \lambda$).

For that reason defined magnetic field sources are required. For Immunity Tests powerful H fields might be needed, but also general tests and measurements at an open site, in screened rooms and in absorber-lined rooms require well-defined powerful H field sources. Magnetic fields in the near-field zone decay with the inverse 3rd power of distance (ca. 18 dB at twice the distance). Even at 1 m distance at 30 MHz the transition from pure near-field to far-field begins, the exponent of degradation gradually reduces from 3 to 1 in the undistorted far-field.

The magnetic loop antenna described here may be operated with up to 100 W input power for short periods or with 30 W continuously. An external 50 Ω power termination with the proper dissipation is required. A 50 Ω 20 Watt termination is part of the scope of delivery of HFRA 5149-60B. It is more than sufficient for the maximum output of laboratory power signal generators.

The HFRA 5149-60B has a 3/8" camera thread at the box for mounting it e.g. on a tripod.

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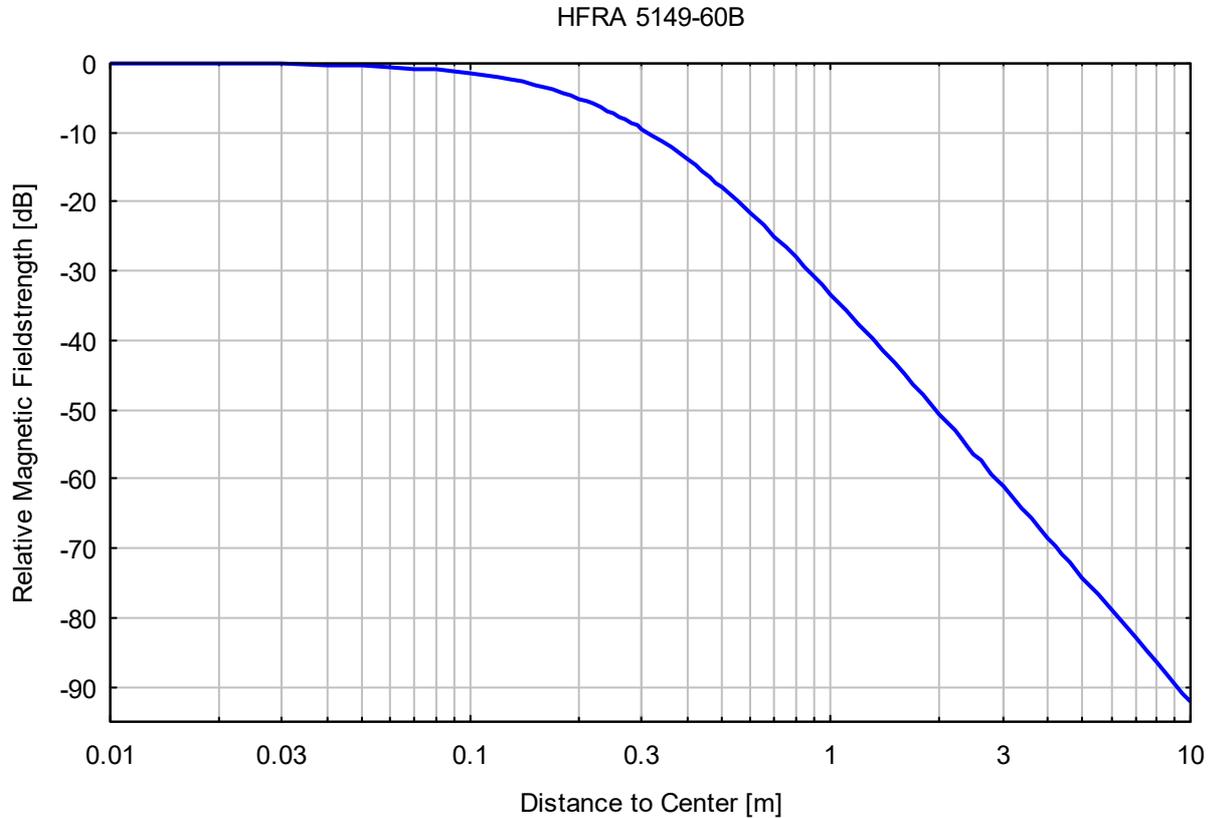


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Relative Magnetfeldstärke als Funktion des Abstands von der Spulenmitte
Relative Magnetic field strength vs. Distance to Coil Center



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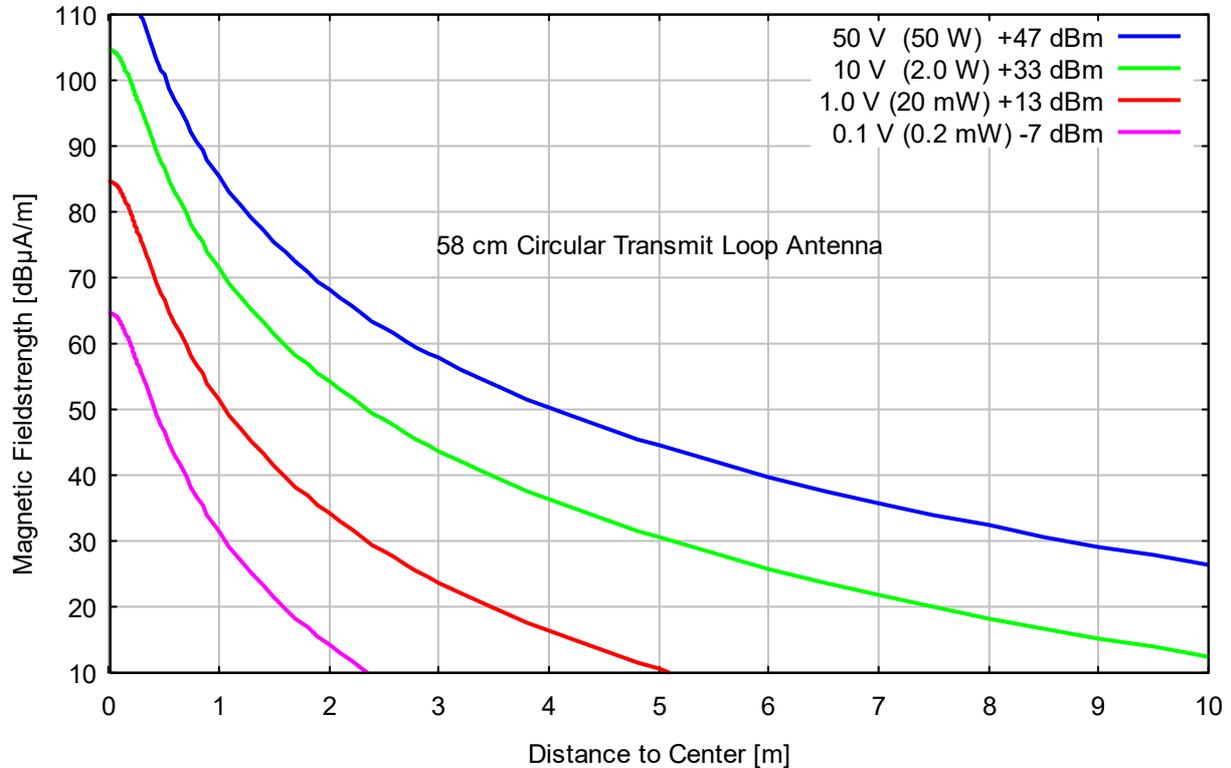
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Feldstärkeerzeugung / Leistungsbedarf
Field strength / Power Requirement

HFRA 5149-60B



Distance to Coil Center [m]	H [dBµA/m] Loop Current 1 mA \triangleq 0.1 V \triangleq 0.2 mW = - 7 dBm	H [dBµA/m] Loop Current 10 mA \triangleq 1 V \triangleq 20 mW = 13 dBm	H [dBµA/m] Loop Current 100 mA \triangleq 10 V \triangleq 2 W = 33 dBm	H [dBµA/m] Loop Current 0.5 A \triangleq 50 V \triangleq 50 W = 47 dBm	H _{Rel.} [dB]
0.00	64.73	84.73	104.73	118.71	0.00
0.01	64.72	84.72	104.72	118.70	-0.02
0.02	64.67	84.67	104.67	118.65	-0.06
0.03	64.59	84.59	104.59	118.57	-0.14
0.04	64.49	84.49	104.49	118.47	-0.25
0.05	64.35	84.35	104.35	118.33	-0.38
0.06	64.19	84.19	104.19	118.16	-0.55
0.07	63.99	83.99	103.99	117.97	-0.74
0.08	63.78	83.78	103.78	117.76	-0.96
0.09	63.53	83.53	103.53	117.51	-1.20
0.10	63.27	83.27	103.27	117.25	-1.46
0.11	62.98	82.98	102.98	116.96	-1.75
0.12	62.67	82.67	102.67	116.65	-2.06

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0.13	62.35	82.35	102.35	116.33	-2.39
0.14	62.00	82.00	102.00	115.98	-2.73
0.15	61.64	81.64	101.64	115.62	-3.09
0.16	61.27	81.27	101.27	115.25	-3.46
0.17	60.88	80.88	100.88	114.86	-3.85
0.18	60.49	80.49	100.49	114.46	-4.25
0.19	60.08	80.08	100.08	114.06	-4.65
0.20	59.66	79.66	99.66	113.64	-5.07
0.21	59.24	79.24	99.24	113.22	-5.49
0.22	58.81	78.81	98.81	112.79	-5.92
0.23	58.37	78.37	98.37	112.35	-6.36
0.24	57.93	77.93	97.93	111.91	-6.80
0.25	57.49	77.49	97.49	111.47	-7.24
0.26	57.05	77.05	97.05	111.03	-7.69
0.27	56.60	76.60	96.60	110.58	-8.13
0.28	56.15	76.15	96.15	110.13	-8.58
0.29	55.70	75.70	95.70	109.68	-9.03
0.30	55.25	75.25	95.25	109.23	-9.48
0.32	54.35	74.35	94.35	108.33	-10.38
0.34	53.46	73.46	93.46	107.44	-11.27
0.36	52.58	72.58	92.58	106.56	-12.15
0.38	51.71	71.71	91.71	105.69	-13.02
0.40	50.85	70.85	90.85	104.83	-13.88
0.42	50.00	70.00	90.00	103.98	-14.73
0.44	49.17	69.17	89.17	103.15	-15.56
0.46	48.35	68.35	88.35	102.33	-16.38
0.48	47.55	67.55	87.55	101.53	-17.18
0.50	46.76	66.76	86.76	100.74	-17.97
0.55	44.86	64.86	84.86	98.84	-19.87
0.60	43.05	63.05	83.05	97.03	-21.68
0.65	41.34	61.34	81.34	95.31	-23.40
0.70	39.71	59.71	79.71	93.69	-25.03
0.75	38.16	58.16	78.16	92.14	-26.58
0.80	36.68	56.68	76.68	90.66	-28.05
0.85	35.28	55.28	75.28	89.25	-29.46
0.90	33.93	53.93	73.93	87.91	-30.80
0.95	32.65	52.65	72.65	86.63	-32.08
1.00	31.42	51.42	71.42	85.40	-33.31
1.10	29.12	49.12	69.12	83.10	-35.62
1.20	26.98	46.98	66.98	80.96	-37.75
1.30	25.01	45.01	65.01	78.99	-39.73
1.40	23.16	43.16	63.16	77.14	-41.57
1.50	21.43	41.43	61.43	75.41	-43.30
1.60	19.81	39.81	59.81	73.79	-44.92
1.70	18.27	38.27	58.27	72.25	-46.46
1.80	16.83	36.83	56.83	70.80	-47.91

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1.90	15.45	35.45	55.45	69.43	-49.28
2.00	14.14	34.14	54.14	68.12	-50.59
2.10	12.90	32.90	52.90	66.88	-51.84
2.20	11.71	31.71	51.71	65.68	-53.03
2.30	10.57	30.57	50.57	64.55	-54.17
2.40	9.47	29.47	49.47	63.45	-55.26
2.50	8.42	28.42	48.42	62.40	-56.31
2.60	7.42	27.42	47.42	61.40	-57.32
2.70	6.44	26.44	46.44	60.42	-58.29
2.80	5.51	25.51	45.51	59.49	-59.22
2.90	4.60	24.60	44.60	58.58	-60.13
3.00	3.73	23.73	43.73	57.71	-61.00
3.20	2.06	22.06	42.06	56.04	-62.67
3.40	0.49	20.49	40.49	54.47	-64.24
3.60	-0.99	19.01	39.01	52.99	-65.72
3.80	-2.39	17.61	37.61	51.59	-67.12
4.00	-3.72	16.28	36.28	50.26	-68.45
4.20	-4.98	15.02	35.02	49.00	-69.71
4.40	-6.19	13.81	33.81	47.79	-70.92
4.60	-7.34	12.66	32.66	46.64	-72.07
4.80	-8.45	11.55	31.55	45.53	-73.18
5.00	-9.51	10.49	30.49	44.47	-74.24
5.50	-11.98	8.02	28.02	42.00	-76.71
6.00	-14.24	5.76	25.76	39.74	-78.98
6.50	-16.33	3.67	23.67	37.65	-81.06
7.00	-18.25	1.75	21.75	35.73	-82.98
7.50	-20.05	-0.05	19.95	33.93	-84.78
8.00	-21.73	-1.73	18.27	32.25	-86.46
8.50	-23.30	-3.30	16.70	30.67	-88.04
9.00	-24.79	-4.79	15.21	29.19	-89.52
9.50	-26.20	-6.20	13.80	27.78	-90.93
10.00	-27.54	-7.54	12.46	26.44	-92.27

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