

# Specifications of the Milliwatt Power Meter

EPM-1

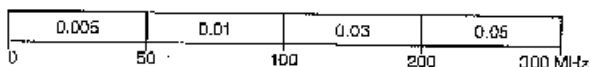
If nothing to the contrary is stated, the specifications are valid for the rated range of use of the a.c. line voltage, of the a.c. line frequency and of the ambient temperature 1 hour after switch on.

Frequency range . . . . . d.c.; 10 Hz to 300 MHz

Input (via TK-10 Test Probe)

Input impedance, coaxial . . . . . 75 Ω or 50 Ω

Reflection coefficient of the input:



Largest permissible input voltage . . . . .  $V_{r.m.s.} = 3 V$

Permitted peak factor<sup>1)</sup> of the test level . . . . .  $\leq 10$

Connector for Test Probe input

at  $Z_0 = 75 \Omega$  . . . . . (IEC 75-7) 1.6/10 (M)

at  $Z_0 = 50 \Omega$  . . . . . "N" connector (M)

### Level display

Measurement range<sup>2)</sup>

unexpanded scale . . . . . 0 dBm  $\pm 1$  dB

expanded scale . . . . . -1; -0.8 to +1 dBm  $\pm 0.2$  dB

Error limits of display

after calibration, taking into account the calibration curve

of each Test Probe,  $Z_{in} = Z_0$  and  $Z_{in} = 0$

Meter Measurement range Temperature range	0 dBm <sup>1)</sup> 0 dBm $\pm 0.2$ dB (23 $\pm 3$ ) °C	Total range <sup>2)</sup> , expanded and unexpanded meter scale +5 to +40 °C
f = 10 Hz to 50 MHz	$\pm 0.015$ dB	$\pm 0.035$ dB
at 100 MHz	$\pm 0.025$ dB	$\pm 0.045$ dB
at 200 MHz	$\pm 0.040$ dB	$\pm 0.060$ dB
at 300 MHz	$\pm 0.050$ dB	$\pm 0.070$ dB

For version BN 564/03: <sup>1)</sup> at -10 dB extra error is  $\pm 0.015$  dB  
<sup>2)</sup> -10 dB +0.2 dB

Frequency response of meter, referred to 10 Hz

(Table values in dB)

f Fed by	0	50	100	200	300 MHz
$Z_{in} = Z_0$	$\pm 0.015$	$\pm 0.035$	$\pm 0.050$	$\pm 0.100$	
$Z_{in} = 0$	$\pm 0.020$	$\pm 0.035$	$\pm 0.120$	$\pm 0.200$	

Effect of instrument temperature on

the meter reading . . . . .  $\leq 0.0015$  dB/K

Effect of Test Probe temperature on

the meter reading . . . . .  $\leq 0.003$  dB/K

### Outputs

Calibrated level (d.c. voltage)

Selectable calibrated levels with  $Z_{out} = Z_0$

and  $Z_{out} = 0$  . . . . . 0 dBm in  $Z_0$  and 0 dB

X-Y plotter voltage output

( $Z_{out} = 5 k\Omega$ ; short-circuit proof)

Open circuit voltage,

unexpanded scale . . . . . approx. 0.25 V/0.1 dB

expanded scale . . . . . approx. 1.25 V/0.1 dB

1) Ratio of peak value to r.m.s. value

2) Also measurement of level at -10 dB with version BN 564/03

Control voltage output,  $Z_{out}$  approx. 500 Ω,

for stabilising a generator (short-circuit proof), setting range

(open circuit voltage) . . . . . approx. 30 mV/0.01 dB

to 300 mV/0.01 dB

Control range . . . . .  $\geq \pm 2 V$

### General specifications

Power supply

Rated ranges of use of a.c. line voltage,

selectable . . . . . 110/117/128/220/227/238 V, -15%/+10%

Rated range of use of a.c. line frequency . . . . . 45 to 66 Hz

Power consumption . . . . . approx. 16 VA

Safety class as per IEC 348 and VDE 0411 . . . . . Class I

Permissible ambient temperature

Rated range of use . . . . . +5 to +40 °C

Storage and transportation . . . . . -40 to +70 °C

Dimensions and weight EPM-1 TK-10

Overall width . . . . . 256 mm 36 mm

Overall height . . . . . 199 mm 36 mm

Overall depth . . . . . 370 mm 93 mm

Weight . . . . . approx. 7 kg approx. 0.2 kg

German Post Office Certificate of Approval No.

for the EPM-1, BN 564/03 . . . . . 272 181 810

### Measurement accessories

TKS-10 Balanced Test Probe, BN 668/00

for use with EPM-1, BN 564/00 and BN 564/03

Frequency range with Test Probe Adaptor

TKSA-124 . . . . . d.c.; 10 Hz to 12 MHz

TKSA-150 . . . . . d.c.; 10 Hz to 2 MHz

TKSA-600 . . . . . d.c.; 10 Hz to 620 kHz

Input impedance

balanced, depending on which

TKSA is used . . . . . 124, 150, 600 Ω

Reflection coefficient for the input . . . . . 0.01

Connector plugs for the TKSA's . . . . . see "Ordering Info."

Error limits of reading

at 0 dBm, in the range 0 dBm  $\pm 0.2$  dB, after calibration,

for an ambient temperature of (23  $\pm 3$ ) °C

and at f = 1 kHz . . . . .  $\pm 0.015$  dB

Over the whole level range, expanded or unexpanded, after

calibration, in the rated range of use of ambient temperature

for  $Z_{in} = Z_0$  and at f = 1 kHz . . . . .  $\pm 0.035$  dB

Frequency response of display

Error limits, referred to 1 kHz,  $Z_{in} = Z_0$  . . . . . +0.02/-0.03 dB

### General specifications

Dimensions (w x h x d) in mm Weight

TKS-10 Test Probe . . . . . 36 x 36 x 93 approx. 0.2 kg

TKSA-... Test Probe Adaptor . . . . . 36 x 36 x 80 approx. 0.1 kg

TKSE-... Calibration Adaptor . . . . . 36 x 32 x 63 approx. 0.1 kg

**Attenuator networks (for TK-10 and TKS-10)**

Type	Z value	Insertion loss for d.c. voltages	Frequency range
BN 594/01 BN 594/02	75 Ω coaxial	9.03 dB ±0.15 dB 19.03 dB ±0.20 dB	0 to 300 MHz
BN 594/03 BN 594/04	50 Ω coaxial	10.79 dB ±0.15 dB 20.79 dB ±0.20 dB	0 to 300 MHz
BN 594/05	150 Ω balanced	6.02 dB ±0.01 dB	0 to 5 MHz

Variation in insertion loss with frequency referred to d.c.  
(Values in dB)

Coaxial	±0.01					±0.03
Balanced	±0.01	+0.01/-0.02	-0.01/-0.05	---	---	---
	0	0.62	2	5	100	300 MHz

**Reflection coefficient**

Coaxial	0.01					0.03
Balanced	0.015	0.025	0.05	---	---	---
	0	0.62	2	5	100	300 MHz

**Ordering Information**

**EPM-1 Milliwatt Power Meter with TK-10 Test Probe**

The following versions are available:

Impedance	Version		Order No.	
	Level	Connector	EPM-1	TK-10
75 Ω, coaxial	0 dBm	1.6/10 (M)	BN 564/00	BN 572/00
75 Ω, coaxial	0 dBm/ -10 dB	1.6/10 (M)	BN 564/03	BN 572/00
50 Ω, coaxial	0 dBm	Conn. N (M)	BN 564/01	BN 572/01

**Accessories (at extra cost):**

Protective Transport Cover DE-13 BN 476/00.10

**Accessories for balanced measurements**

(possible with EPM-1, BN 564/00 and BN 564/03):

Balanced Test Probe TKS-10 BN 668/00  
 with Test Probe Adaptors TKSA-/  
 Calibration Adaptors TKSE-  
 for 600 Ω: TKSA-600, 3 pole CF plug BN 668/00.12  
 TKSE-600, 3 pole CF socket BN 668/00.22  
 for 150 Ω: TKSA-150, 3 pole CF plug BN 668/00.11  
 TKSE-150, 3 pole CF socket BN 668/00.21  
 for 124 Ω: TKSA-124, 3 pole CF plug BN 668/00.14  
 TKSE-124, 3 pole CF socket BN 668/00.24  
 TKSA-124, WE No. 379 A (M) BN 668/00.10  
 TKSE-124, WE No. 470 C (F) BN 668/00.20

**Accessories for TKS-10 (balanced measurements):**

Description	Z value	Connector	Order No.
Attenuator network 6.02 dB	150 Ω	3po/2 CF (F-M)	BN 594/05
"T" pads	600 Ω	3pole CF (F-F-F)	BN 595/05
	150 Ω	3pole CF (F-F-F)	BN 595/04

Meaning of abbreviations: (M) pin connector  
(F) socket connector

Connectors . . . . . see "Ordering Information"

**"T" pads**

(See Ordering Information for different versions and connectors)

Coaxial . . . . . d.c. to 300 MHz  
 Balanced,  $Z_1 = 150 \Omega$  . . . . . d.c. to 2 MHz  
 $Z_0 = 600 \Omega$  . . . . . d.c. to 620 kHz

Voltage difference between the two outputs when terminated with  $Z_0$

Version	coaxial	balanced
d.c. voltages	≤0.03 dB	≤0.025 dB
whole frequency range	≤0.04 dB	≤0.03 dB

**Matching pads, couplings (see "Ordering Information")**

**Accessories for the TK-10 (coaxial measurements):**

Description	Z value	Connector type	Order No.
Attenuator network 9.03 dB	75 Ω	1.6/10 (F-M)	BN 594/01
19.03 dB	75 Ω	1.6/10 (F-M)	BN 594/02
10.79 dB	50 Ω	N-Conn. (F-M)	BN 594/03
20.79 dB	50 Ω	N-Conn. (F-M)	BN 594/04
"T" pad	75 Ω	1.6/10 (F-F-F)	BN 595/01
	75 Ω	1.6/10 (F-M-F)	BN 595/03
	50 Ω	N-Conn. (F-F-F)	BN 595/02

**Matching pads<sup>1)</sup>, Z = 75 Ω, from 1.6/10 (F)**

On	Reflection coefficient at 100/300 MHz	Order No.
BNC (M)	0.02/0.04	S 391
BNC (F)	0.02/0.04	S 392
2.5/6 (M)	0.03/0.05	S 393
2.5/6 (F)	0.03/0.05	S 394
1.6/5.6 (M)	0.015/0.03	S 395
1.6/5.6 (F)	0.015/0.03	S 396

1) Further matching pads can be purchased

**Matching pads, Z = 50 Ω, from N-conn. (F)**

On	Reflection coefficient at 100/300 MHz	Order No.
BNC (M)	0.01/0.025	S 407
BNC (F)	0.01/0.025	S 408
4.1/9.5 (M)	0.01/0.01	S 409
4.1/9.5 (F)	0.01/0.01	S 410
C-Conn. (M)	0.01/0.015	S 411
C-Conn. (F)	0.01/0.015	S 412

**Coupling, Z = 75 Ω**

Connector type	Reflection coefficient at 100/300 MHz	Order No.
1.6/10 (M-M)	0.01/0.015	S 390

**Coupling, Z = 50 Ω**

Connector type	Reflection factor at 100/300 MHz	Order No.
N-Conn. (M-M)	0.01/0.015	S 406

A Specification Sheet with more details is available on request