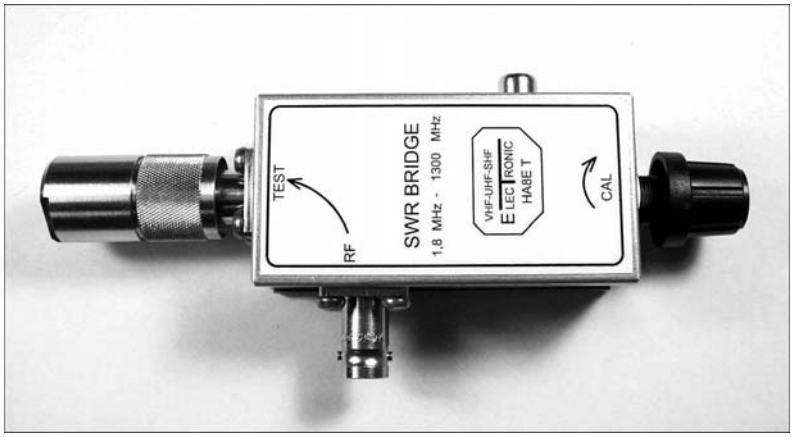
Return Loss Bridge 1,8 MHz ...1300 MHz

HA8ET-033B

It was published: CQ DL 6/96



Specifications of Retun Loss Bridge:

Nominal impedance:.....…Z_0 = 50 Ω ±1%
Optimal power:.....… P = 1…2 W
Maximal power:.....…P_{max} = 2 W (max: 30 sec!)
Minimal power:.....…P_{min} = 100 mW
Measurable minimal return loss:…..... a_r = 40 dB on 432 MHz
Accuracy specifications.....… <±1 dB on 432 MHz
<±2 dB on 1296 MHz
Frequency range:.....…..1.8 MHz…1300 MHz

HOW to Use the Return Loss Bridge

1. Put 1...2 watts power to the **RF** input the SWR-Bridge (Example: from a handy-radio output.)

2. Short-circuit the **TEST** output with the short-circuit tag available with bridge. (up to 144 MHz a wide screwdriver is suitable for this purpose)

3. Connect an analogue or digital instrument (R>100 kΩ/V) onto the **DC** output. Voltage Range: 2,5 V or 3 V.

4. If your analogue instrument has dB-scale, set up a whole dB-value near the full-scale with the help of the **CAL** potentiometer. If you haven't dB-scale, adjust end-amplitude on the instrument.

5. Connect the antenna or the device to be measured in place of the short-circuit tag. On the dB-scale you can directly get the **return loss** (a_r). The a_r can be easily converted into **SWR** with the help of the enclosed table or the Diagram #1. For example: 20 dB (a_r) = 1,222 (SWR)

6. If there isn't dB-scale on your instrument, you can directly get the **SWR** for the $\mathbf{U_{DC}}$ from Diagram #2 (full scale = 2,5 V), or from Diagram #3 (full scale = 3 V).

7. If you use a digital instrument, adjust with **CAL** potentiometer 2,5 V (or 3 V) and you can get the SWR from the Diagram #2 or #3, as previously.

8. You can even measure the attenuation of coaxial cable at any frequency. Short-circuit it at its end by the available short-circuit tag. Then use the above mentioned method to measure the **SWR** value of the short-circuited cable. Using Diagram #4 you will directly receive the cable attenuation. The longer the cable, the more correct the measurement process. (The length of the cable > 10 m)

9. I used N-male socket on the **TEST** port for the correct measurement. If the socket of your antenna is an other type, use a good quality adapter.

10. Between the **RF** port of the bridge and the transmitter (generator) the cable you use can be as long as you wish.

11. The shorter cable you use between the **TEST** port of the bridge and the antenna the more accurate your measurement will be.

VY 73!

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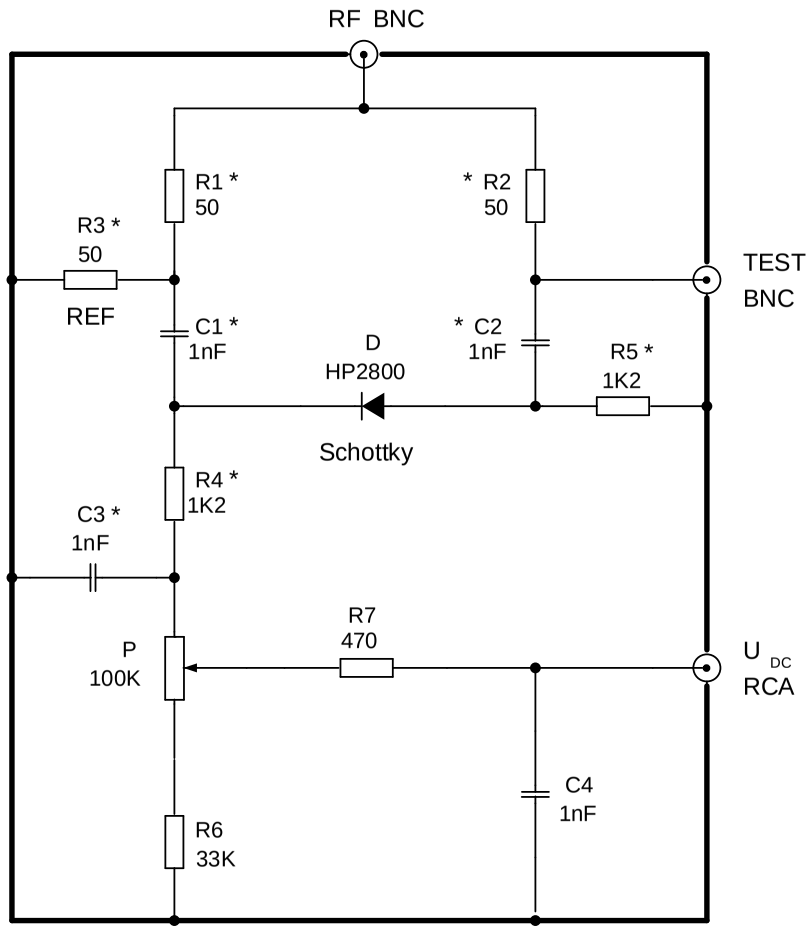
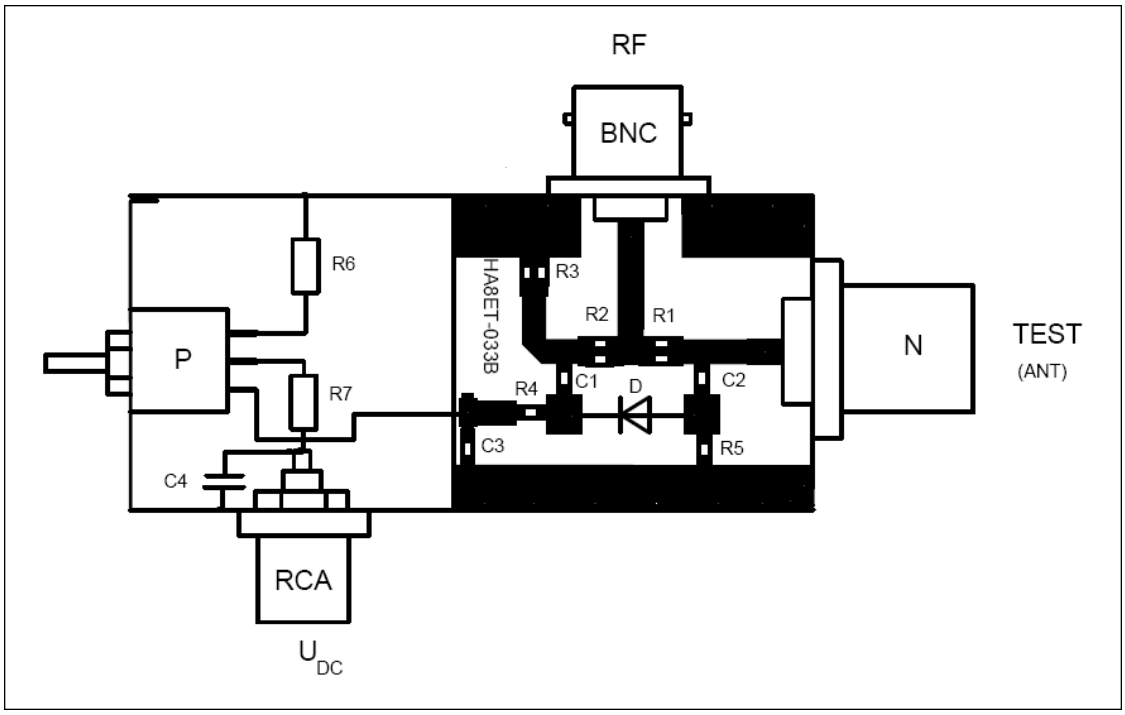


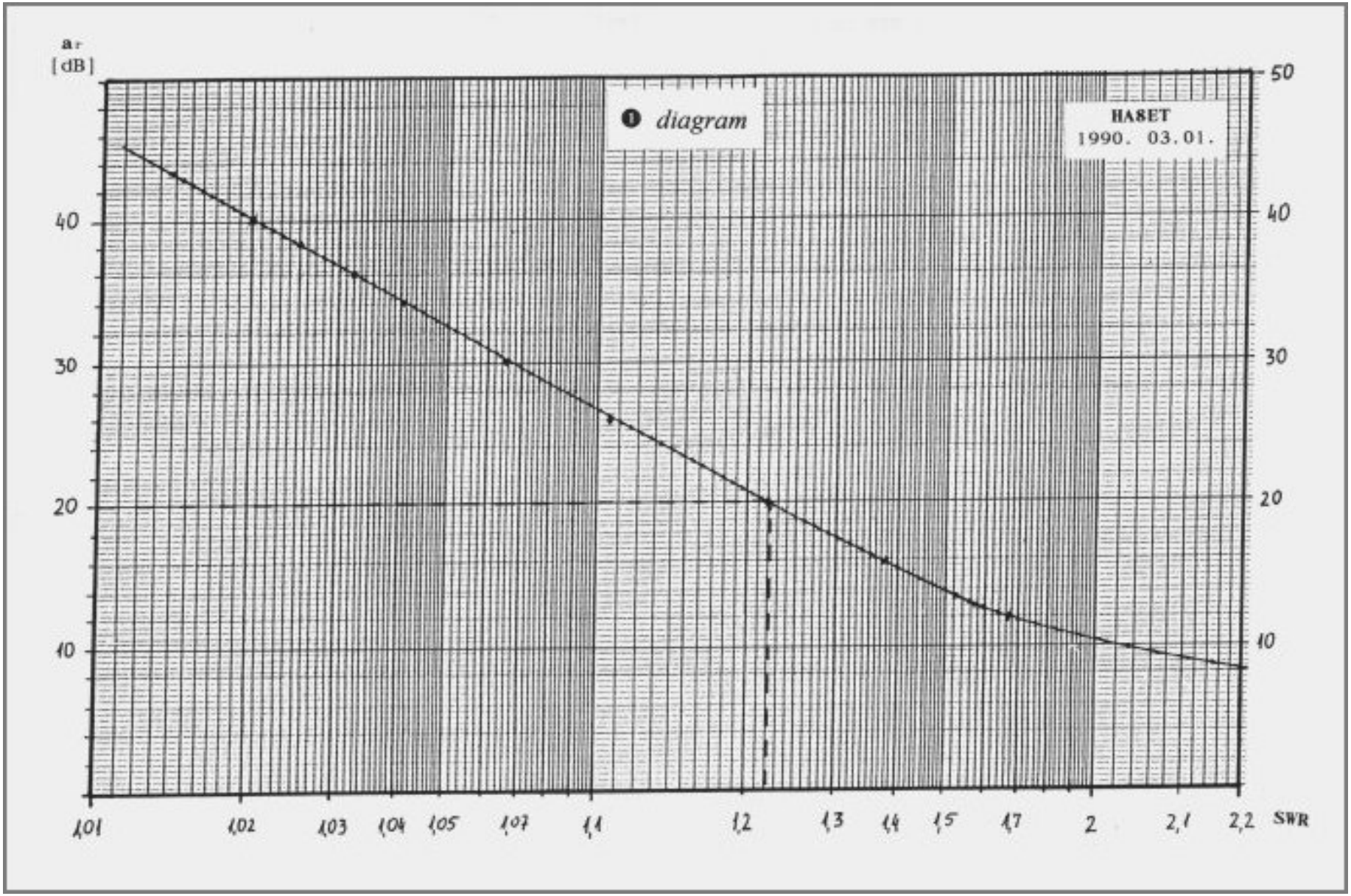
Title	SWR-BRIDGE HF...PMR	
Size A4	Number HA8ET-033B	Rev
Date 17. 07. 2006.	Drawn by HA8ET	
Filename 8ET_33B	Sheet 1 of 1	

Layout of the Return Loss Bridge



Bill of material

Designator	Value	Package
R1, R2, R3	2 x 100 Ω 1% parallel	1206 SMD
R4, R5	1k2 5%	1206 SMD
R6	33k 5%	0,25W metal film
R7	470 Ω 5%	0,25W metal film
C1, C2, C3	1nF 50V	1206
C4	1nF 50V	Monolit
D	HP2800	Schottky
P	100K Linear	Piher PC16HLE6
TEST connector	N female	N6551E1-004-NT3G-50
RF connector	BNC female	
DC connector	RCA female	
BOX	74 x 37 x 30 mm	


a r
[dB]
❶ diagram
HA8ET
1990. 03.01.
40
30
20
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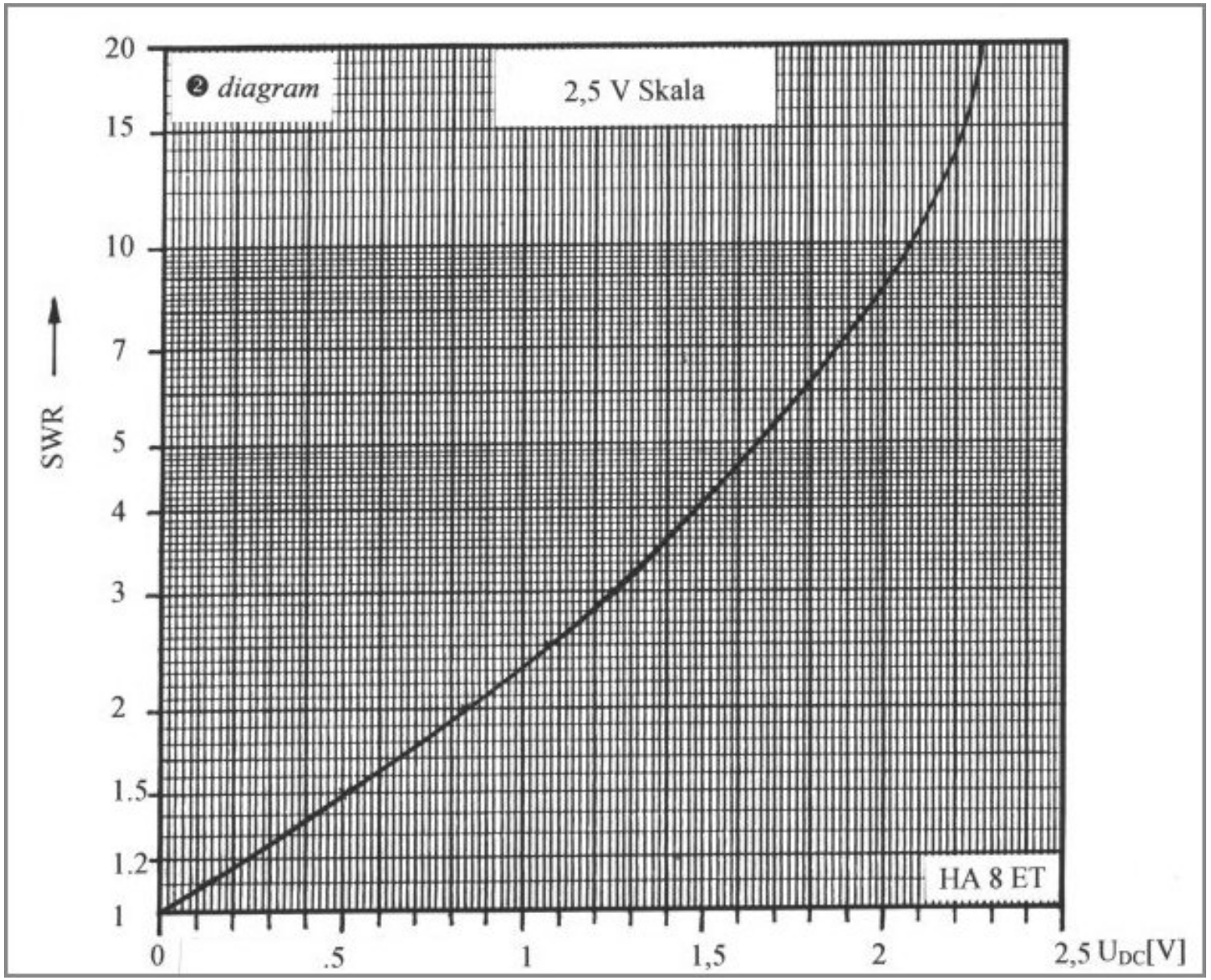
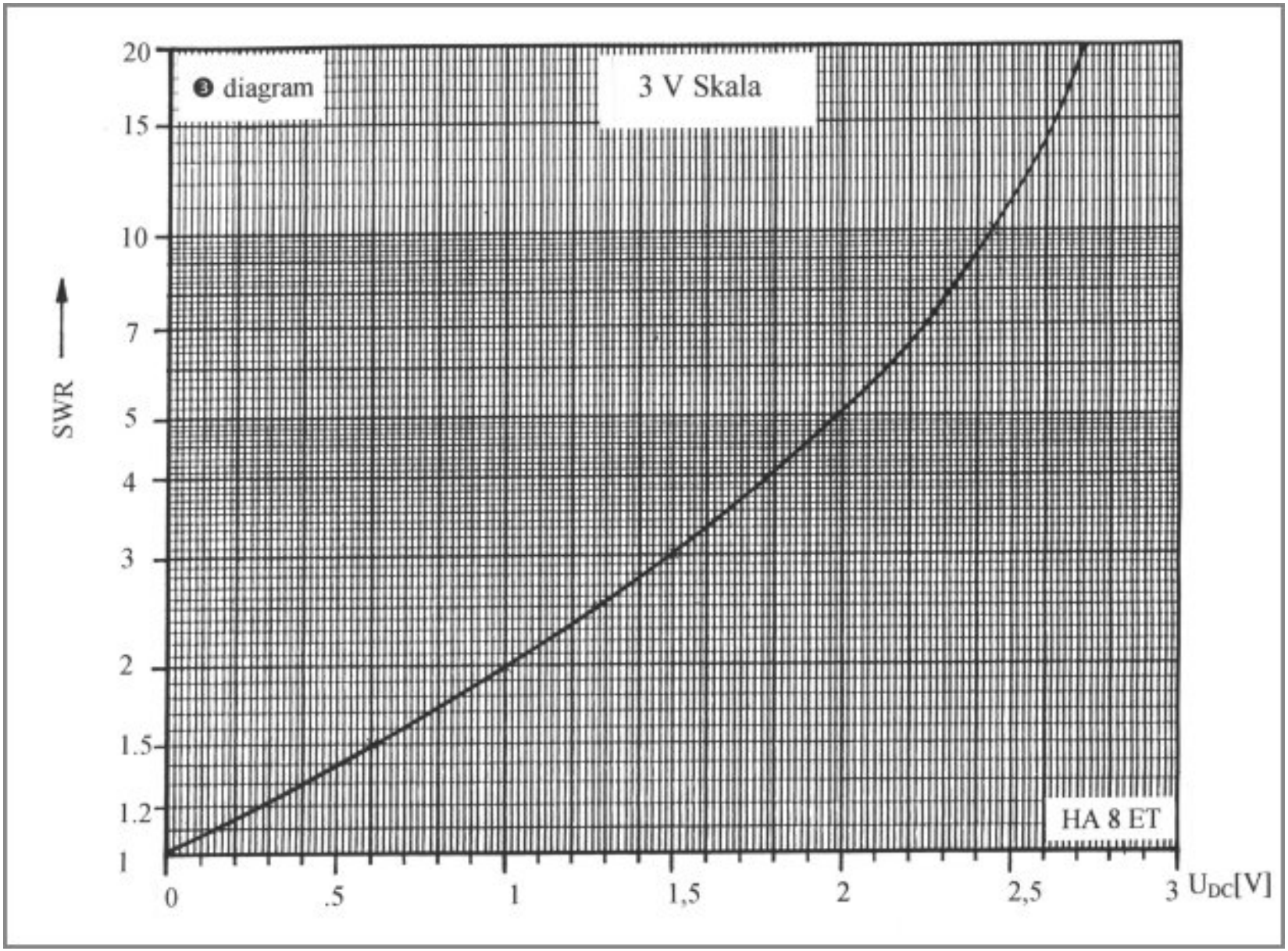
50
40
30
20
10
1,01
1,02
1,03
1,04
1,05
1,07
1,1
1,2
1,3
1,4
1,5
1,7
2
2,1
2,2
SWR


❷ diagram
2,5 V Skala
SWR
20
15
10
7
5
4
3
2
1.5
1.2
1
0
.5
1
1,5
2
2,5 UDC[V]
HA 8 ET


❸ diagram
3 V Skala
SWR
20
15
10
7
5
4
3
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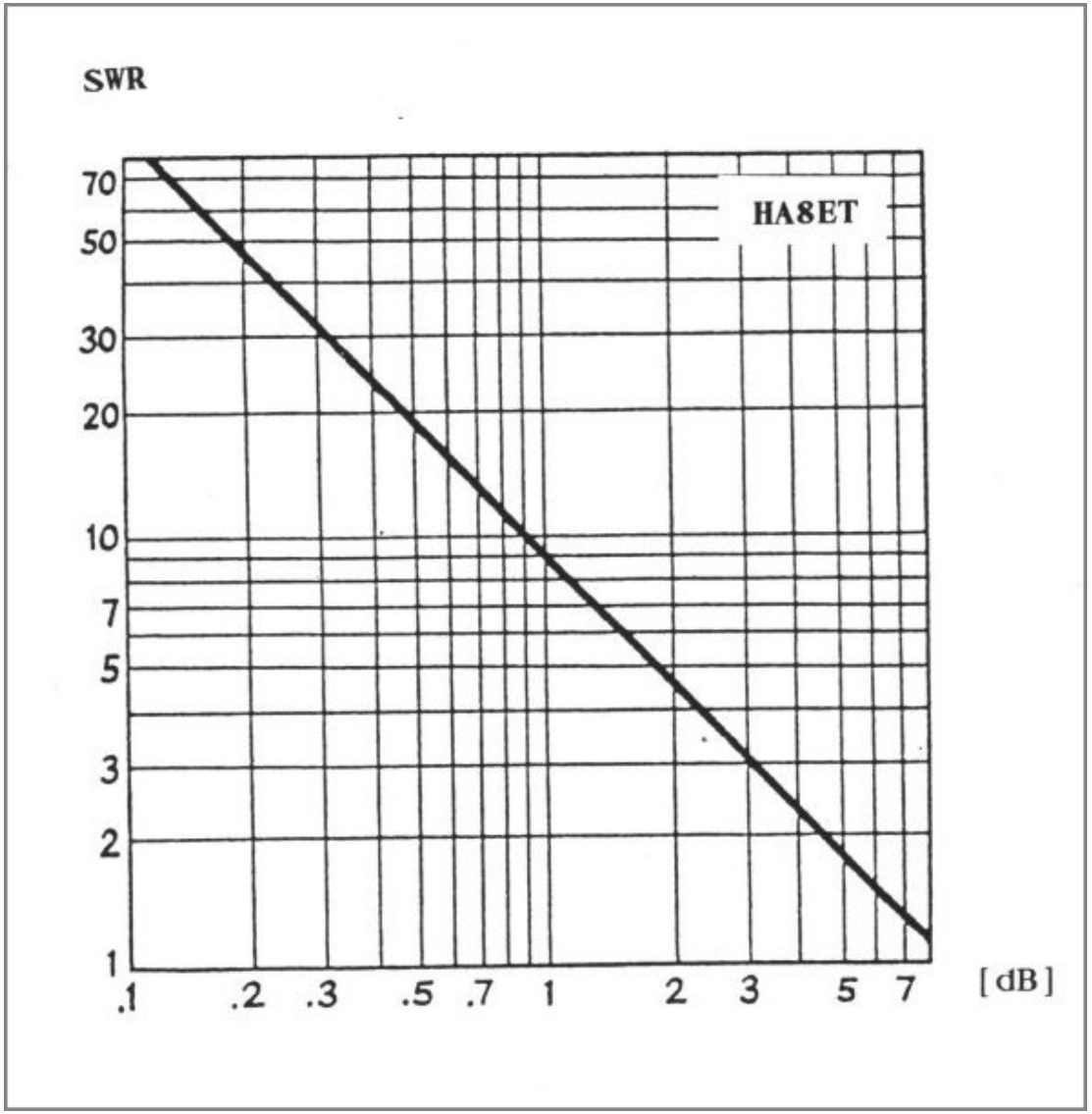
1.5
1.2
1
0
.5
1
1,5
2
2,5
3
UDC[V]
HA 8 ET



VSWR	Return Loss (dB)	Attenuation (dB)	Reflection Coefficient (%)
1.020	40.00	0.000434	1.00
1.041	33.98	0.001738	2.00
1.062	30.46	0.003910	3.00
1.083	27.96	0.006954	4.00
1.105	26.02	0.01087	5.00
1.128	24.44	0.01566	6.00
1.151	23.10	0.02133	7.00
1.174	21.94	0.02788	8.00
1.198	20.92	0.03532	9.00
1.222	20.00	0.04365	10.00
1.247	19.17	0.05287	11.00
1.273	18.42	0.06299	12.00
1.326	17.08	0.08597	14.00
1.353	15.00	0.09883	15.00
1.381	15.92	0.1126	16.00
1.439	14.89	0.1430	18.00
1.469	14.42	0.1597	19.00
1.500	13.98	0.1773	20.00
1.564	13.15	0.2155	22.00
1.632	12.40	0.2577	24.00
1.667	12.04	0.2803	25.00
1.703	11.70	0.3040	26.00
1.740	11.37	0.3287	27.00
1.778	11.06	0.3546	28.00
1.857	10.46	0.4096	30.00
1.984	9.64	0.5000	32.98
2.000	9.54	0.5115	33.33
2.333	7.96	0.7572	40.00
2.500	7.36	0.8814	42.86
2.660	6.87	1.0000	45.35
3.000	6.02	1.2494	50.00
3.570	5.00	1.6509	56.23
4.095	4.33	2.0000	60.75
5.809	3.02	3.0000	70.71