The “Kaz” directional MW antenna

I have always had a soft spot for Medium Wave and a couple of years ago I decided to take MW DXing a little more seriously. The goal was to hear some North American stations – it couldn't be that hard could it?

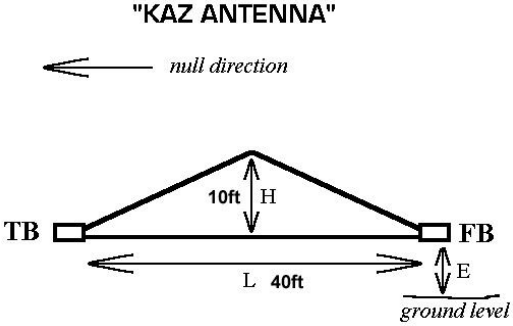
Well, yes it seems it could! The first season saw me using my Icom 756 Pro 3 and my usual 80m dipole antenna, but nothing of any significance was heard. It seems the 756 Pro 3 is deliberately deaf on MW and you can't use the pre-amp. I also listened on a portable MW receiver but that was no better, even with a small 12-inch Tecsun passive loop.

The next season I used an RF Space SDR-IQ, but the pickings were thin. So last year I upgraded to a Perseus SDR and a Wellbrook ALA1530S loop so that I could record the whole of Medium Wave two minutes before the hour to two minutes past to aid with stations IDs.

Now we were getting somewhere, with WBBR 1130 kHz (New York) and NBC 1510 kHz (Boston) being heard regularly, although I wasn't hearing anything like the DX other MW enthusiasts in the UK were reporting.

I actually monitored WBBR every hour, every night for two months to compare reception alongside the daily DsT index, but I can't say I saw a correlation.

Anyway, this coming winter I'm determined to try harder and so I need an antenna that will null or attenuate signals from the continent. I ended up choosing a passive design called a “Kaz”, named after its designer Neil Kazaross.



Very simply, the antenna is part of the Flag/Pennant terminated loop family. It is an isosceles triangle with a base of 40ft and the apex at 10ft. One corner (FB) is fed with an impedance transformer and the other corner (TB) is terminated with a resistor between the two legs.

I used a fibreglass fishing pole to hold the lower 40ft (12.19m) wire about 1 metre off the floor. The other 44.72ft (13.63m) wire is held with the apex 10ft (3.038) above it. It was fed with 20m of Mini 8 50 Ohm coax.

The whole lot was set up across the back garden for testing purposes – if it was successful it would be mounted next to the back fence in the late autumn.

The impedance transformer was wound on an FT240-31 toroid with 10 turns on the input and 44 turns on the output, giving a 4.4 turns ratio or 19.4x impedance ratio. I've read lots of different articles about this and on reflection it might have been better with 48/10 turns, giving a 23x transformation. There is also lots of debate as to the best way to wind the transformer. I did mine with side by side turnings and I may try again with one over the top of the

other.

Modelling with MMANA-GAL showed that the antenna would have a front to back advantage of about 21-24dB depending on the take-off angle (calculated at 5 and 10 degrees). At plus or minus 30 degrees from the axis this falls to about 14.6dB.

So how does it perform. Quite well to be honest. I took measurements of every Medium Wave station I could hear from 0900UTC-11.00UTC on 25th June 2013 using a Perseus SDR.

The full results are at the end, but to summarise:

- Stations directly off the back of the antenna (BBC Radio Norfolk, Netherlands, Belgium) were attenuated by between 11 and 30dB, with the average being about 15dB. This was done by comparing signal strengths with the 1,000 Ohm resistor switched in and then out (open circuit).
- Stations off the front were either not attenuated at all or came up by about 3-4dB when the resistor was switched out
- With the resistor switched out, so creating an open circuit, the antenna effectively becomes omnidirectional.
- Tests were also done whereby the termination point was shorted, instead of being terminated or left open circuit. Noise levels dropped slightly by doing this (1-3dB), but signal levels varied, often dropping compared to the open circuit configuration, sometimes increasing by a small percentage, suggesting that the radiation pattern is not strictly omnidirectional, which MMANA-GAL confirms – use open circuit for omni.

Conclusion

Stations like BBC Radio Wales (882 kHz) and BBC Radio Scotland (810 kHz) were received well here in Norfolk and I think the Kaz makes a good all-round omnidirectional Medium Wave antenna when the resistance is not in circuit.

By flicking a switch (to add the 1,000 Ohm termination resistance) signals to the east/south east were attenuated by between 11-30dB, which should bode well for the winter Transatlantic season.

The antenna also made a good all-round SWL antenna, picking up a host of long wave stations and also Volmet on 5 MHz when configured as an omni antenna.

Further tests could be completed to test varying values of the resistor, up to say 3,000 Ohms to find the sweet spot in terms of the the best front-to-back ratio. And various winding methods for the transformer can be tried too.

Steve G0KYA, June 2013

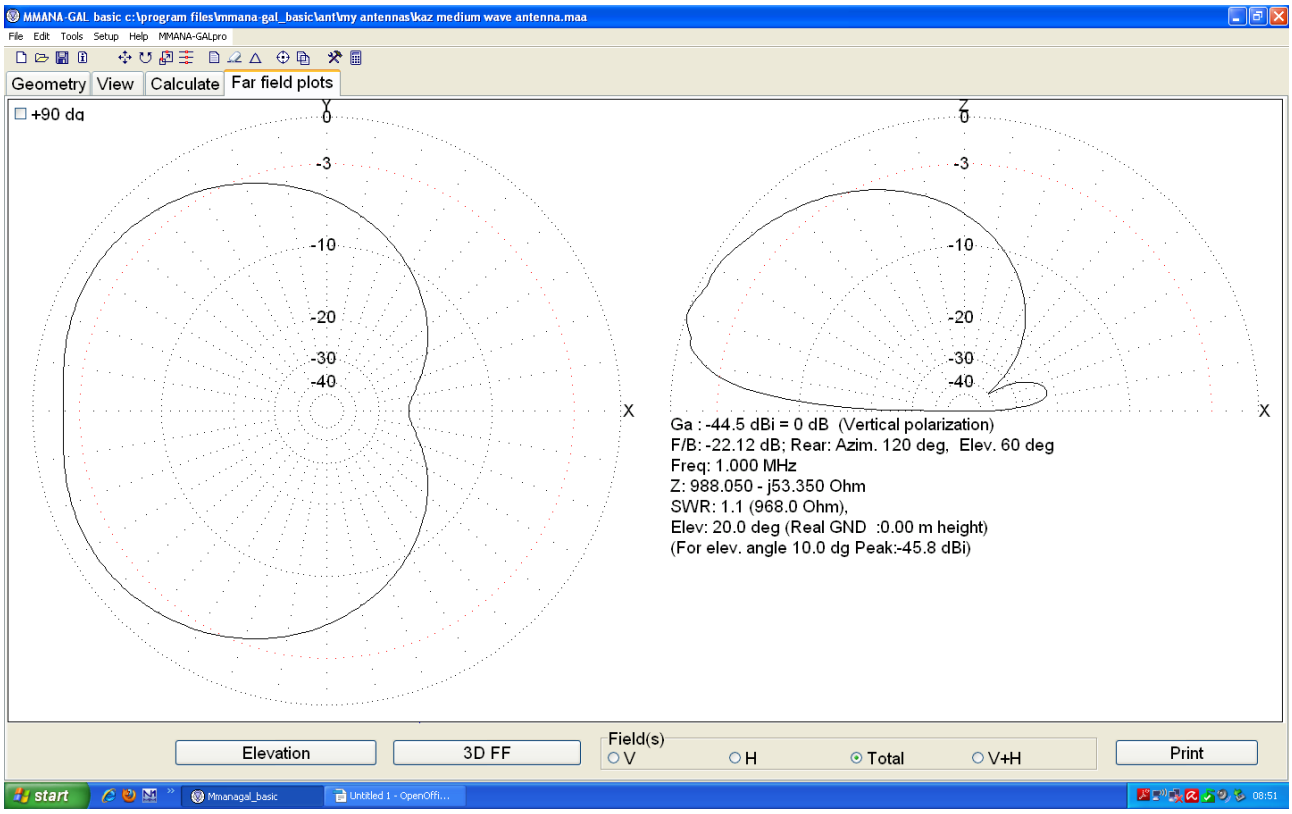
Raw Results

40ft x 10ft Kaz MW Receive Antenna

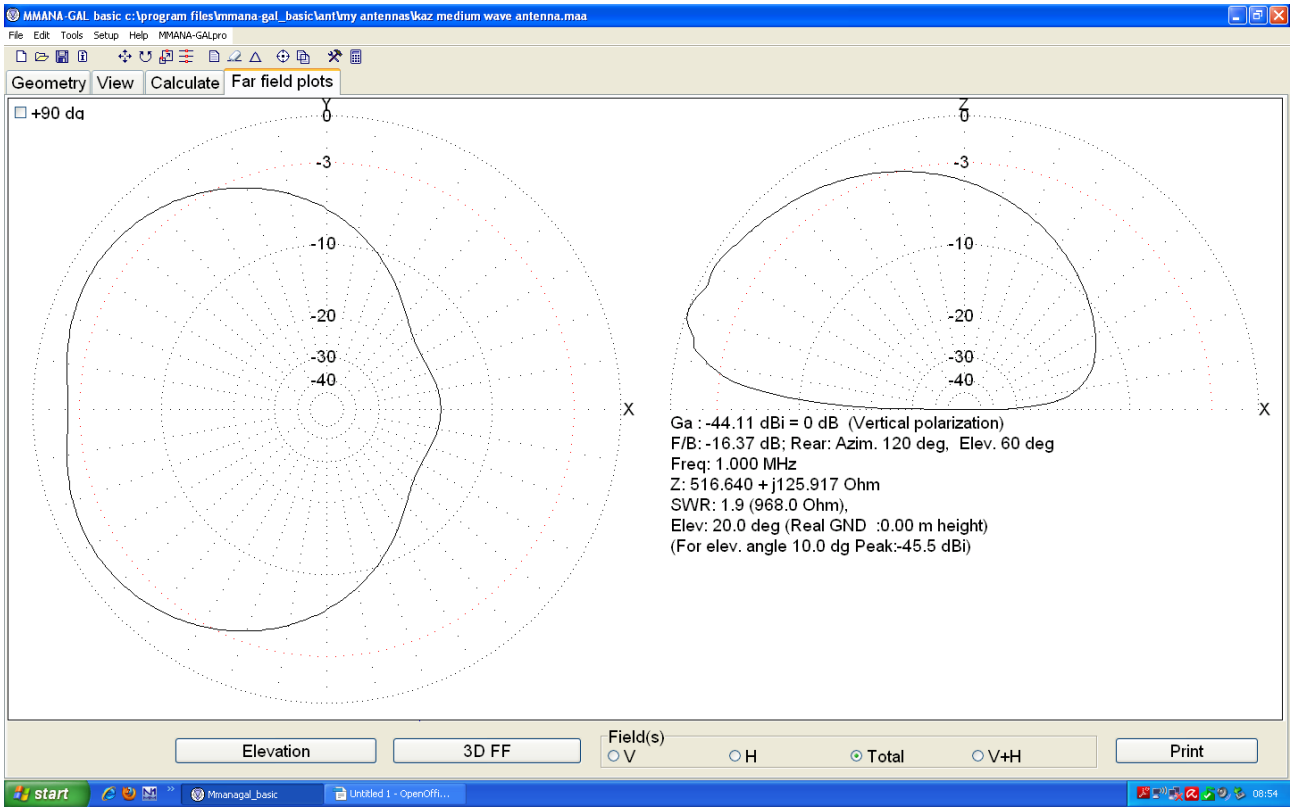
Running 320/140degrees magnetic (max. null at 140 degrees)

	1000 Ω Termination	Open	Shorted
Noise at 995kHz (clear)	S3 (-109dBm)	Same	1dB quieter
Noise at 1535kHz	-105dBm	-97.6dBm	-110.6dBm
Deutshchlandfunk 549kHz	S4.5 (-100dBm)	+8dB	+11dBm
Spectrum 558kHz	S6.5 (-88.7dBm)	+8dB	-6dB
Gold Littlebourne, 603kHz	S6 (-93dBm)	+15dB	+13dB
RTBF Belgium 621kHz	S7.5 (-81.8dBm)	+10dB	+13dB
Three Counties, Luton 630kHz	S6 (-93.3dBm)	+4.4dB	-6dB
BBC Radio Wales 657kHz	S5.5 (-96dBm)	Same	Same
BBC Radio York 666kHz	S4 (-101.6dBm)	Same	Same
Radio Maria 675kHz	S8 (-78.8dBm)	+15.1dB	+15dB
Radio 5 Live 693kHz	S9+5 (-65dBm)	+20.5dB	+17.8dB
France Info 711KHz	S3 (-109dBm)	+11dB	+6dB
?? 720khz	S5 (-99dBm)	+9dB	+4dB
BBC Essex 729kHz	S4.5 (-98.6dBm)	+21.6dB	+18.1dB
BBC Hereford & Worcs. 738kHz	S4 (-104dBm)	+2dB	Same
NPS Radio 747kHz	S7 (-84.5dBm)	+16.5dB	+17.5dB
BBC Essex 765kHz	S6 (-91.5dBm)	+10.5dB	Same
BBC Radio Leeds 774kHz	S5 (-96.9dBm)	+17.9dB	+16dB
Gold 792kHz	S6.5 (-89dBm)	+3dB	-2dB
BBC Scotland 810kHz	S5.5 (-91dBm)	Same	-2dB
Gold Netherlands 828kHz	S6 (-90dBm)	+10dB	+12dB
BBC Asian Network 837kHz	S5.5 (-94dBm)	+2dB	-2dB
BBC Radio Norfolk 855kHz	S9 (-74.3dBm)	+21.3dB	+16.2dB
France – Paris 864KHz	S3 (-110dBm)	+15dB	+14dB
BBC Radio Norfolk 873kHz	S9 (-74.1dBm)	+17dB	Same
BBC Radio Wales 882kHz	S5.5 (-91dBm)	+3.3dB	-3dB
R538 Netherlands 891kHz	S3 (-108dBm)	+11dB	+10.7dB
Radio 5 Live 909kHz	S9 (-75.1dBm)	+10dB	+5dB
Gold 945kHz	S4 (-101dBm)	+6dB	+2dB
Buzz Asia London 963kHz	S4 (-102dBm)	+11dB	-2dB
Buzz Asia London 972kHz	S4 (-103dBm)	+8dB	-6dB
Gold 990kHz	S5 (-96.9dBm)	+3dB	Same
Gold Nottingham 999kHz	S4 (-103dBm)	+3dB	Same
Groot Niews 1008kHz	S5 (-97.8dBm)	+18.8dB	+16.8dB
BBC Radio Cambs 1026kHz	S7.5 (-82.5dBm)	+5dB	+5.3dB
Kizmat Radio London 1035kHz	Inaudible	S4 (-96dBm)	Inaudible
Talksport Norwich 1053kHz	S9+5db (-67dBm)	+20dB	+13.4dB
Talksport Newcastle 1071kHz	S5 (-102dBm)	Same	Same
Talksport Brookmans 1089kHz	S8 (-79.7dBm)	+7.7dB	+8.3dB
Talksport 1107kHz	S8.5 (-76.3dBm)	Same	Same
BBC Derby 1116kHz	S5 (-96.2dBm)	+8dB	+4dB
Gold Norwich 1152kHz	S7 (-83.5dBm)	+30dB	+24dB
Magic Hull 1161kHz	S6 (-90dBm)	+2dB	+0.5dB
Gold Ipswich 1170kHz	S5.5 (-95dBm)	+20dB	+16.1dB
Absolute 1197kHz	S7 (-85dBm)	+8dB	Same
Absolute 1215kHz	S8 (-78.8dBm)	+21dB	+14.8dB
Absolute 1233Hz	S5 (-98dBm)	+14dB	+9dB
Absolute 1242kHz	S8.5 (-76dBm)	+2dB	+1.8dB
Absolute 1251kHz	S8 (-79.1dBm)	+11.6dB	+5.9dB
BBC Radio York 1260kHz	S4 (-101.6dBm)	+11dB	+5dB
Magic AM Barnsley 1305kHz	S4 (-101dBm)	+11dB	-6dB
Gold Peterborough 1332kHz	S7 (-83.5dBm)	+3.5dB	+3dB
Gold, Chelmsford 1359KHz	Inaudible	S6 (-90dBm)	-102dB
BBC Lincoln 1368kHz	S6 (-88.3dBm)	+2dB	-1dB
France Info Lille 1377kHz	S7 (-88dBm)	+15dB	+11dB
BBC Radio Gloucs? 1413kHz	S4 (-102.6dBm)	+11dB	-5dB
Gold 1431kHz	Inaudible	S6 (-92dBm)	-101dB
French 1440kHz	Inaudible	Inaudible	-104dBm
BBC Asian Network 1449kHz	S6 (-92dBm)	Same	Same
BBC Asian Network 1458kHz	S5 (-96dBm)	+10dB	-5dB
BBC Radio Humberside 1485kHz	S6 (-90.6dBm)	+4dB	-0.3dB
Gold London? 1548KHz	S4 (-101.6dBm)	+7dB	-3dB
Asian?? 1557kHz	S4.5 (-100.2dBm)	+10dB	+3dB
Long Wave			
DeutschlandFunk 153kHz	-92dBm	+6dB	+10.9dB
France Allouis 162kHz	-84.2dBm	+16.3dB	+14.2dB
Saarlouis 183kHz	-82.3dBm	+7.6dB	+10.9dB
BBC Radio 4 198kHz	-59.2dBm	No change	-1dB
Deutschlandfunk 207khz	-106dBm	+7dB	+8.3dB
RMC France 216kHz	-104.8dBm	+10.8dB	+10.4dB
Luxembourg 234kHz	S7 (-87.6dBm)	+8dB	+11.4dB
RTE 252kHz	S8 (-78dBm)	No change	No change

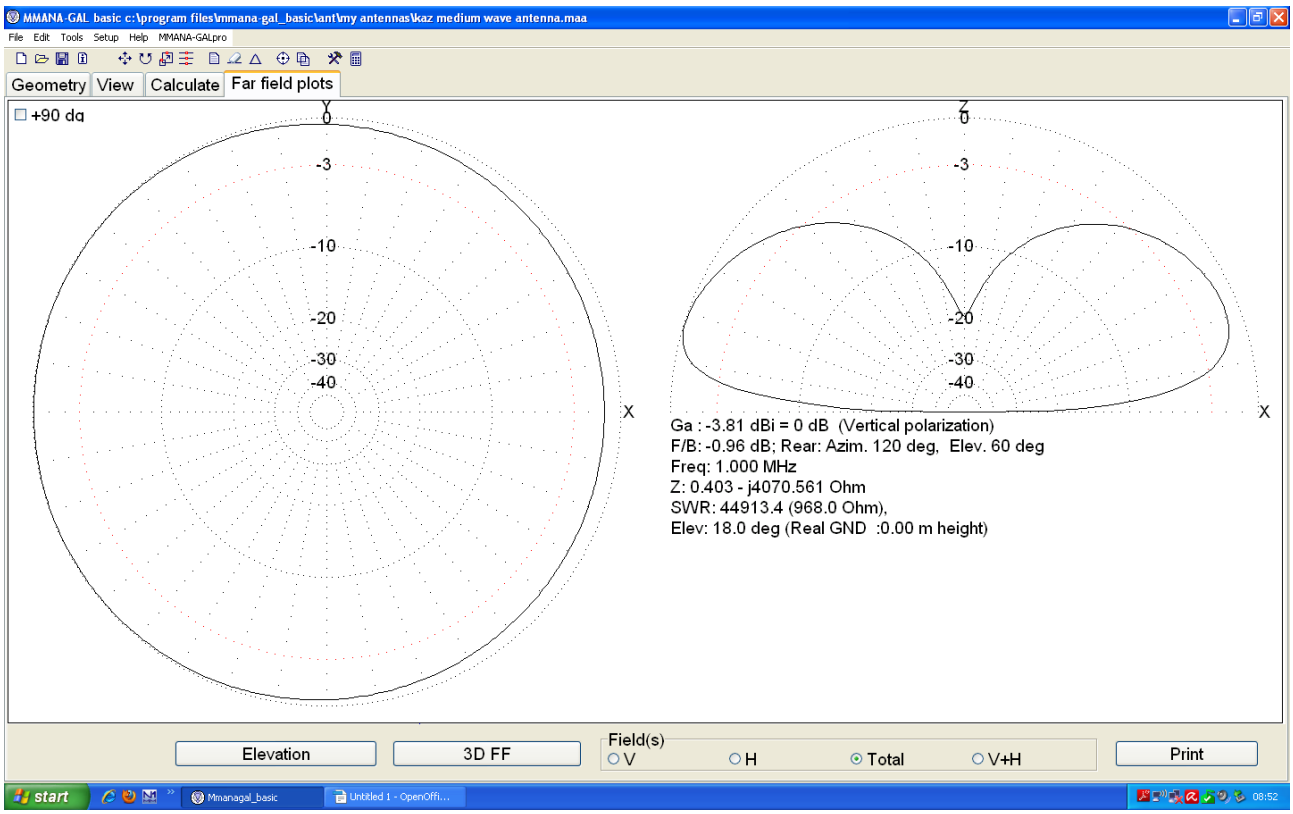
MMANA-GAL models



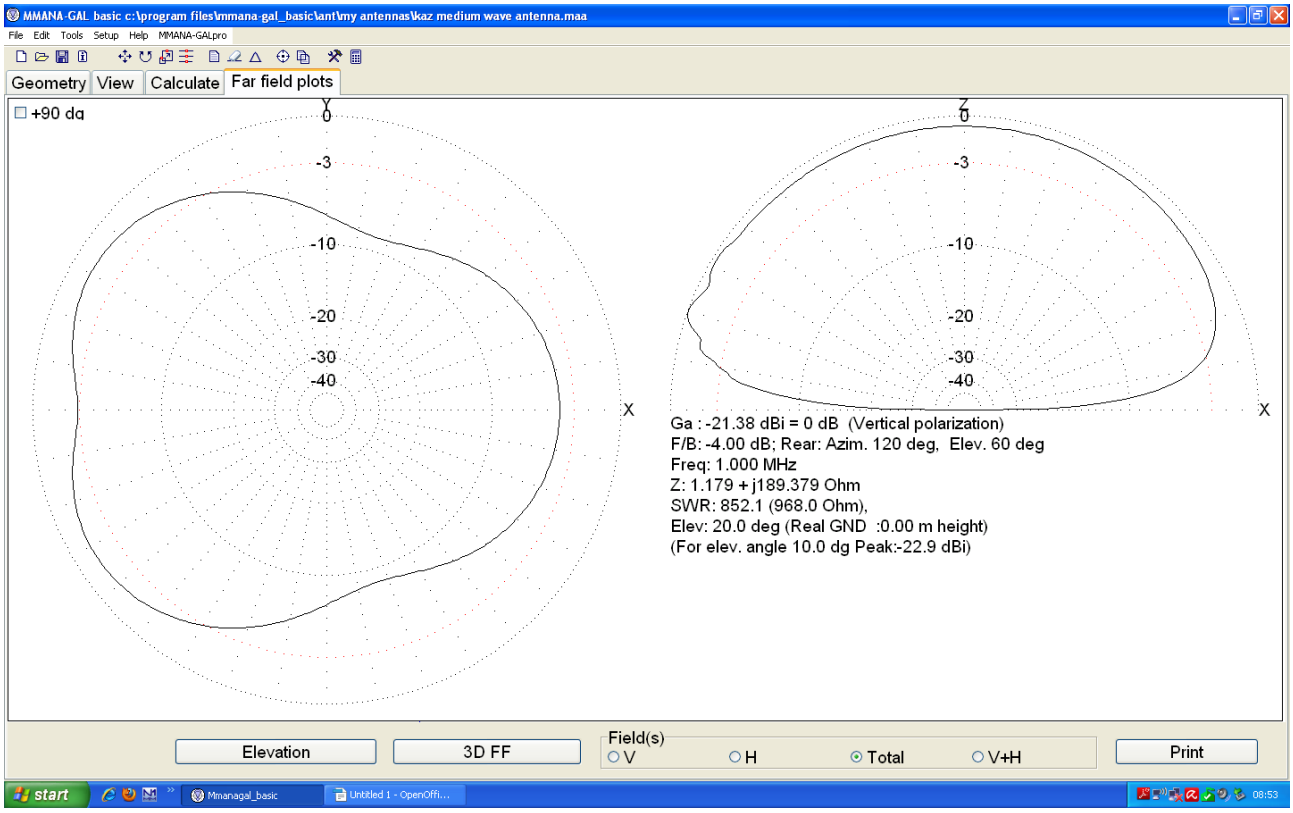
With 1,000 Ohm termination, 10 degree take-off angle



With 500 Ohm termination, 10 degree take-off angle



With open circuit, instead of 1,000 Ohms termination, 10 degree take-off



Termination point shorted