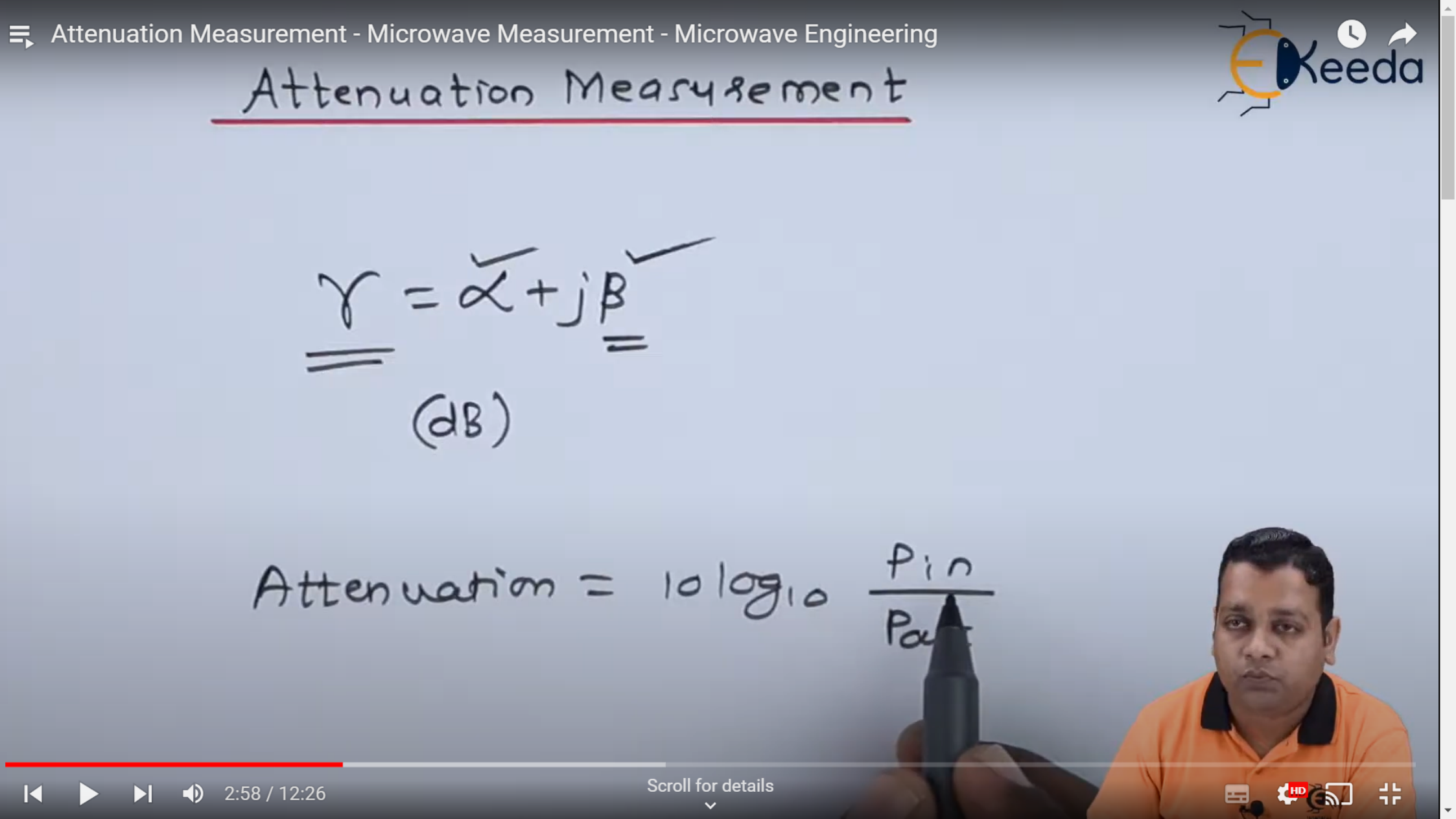
Attenuation Measurement

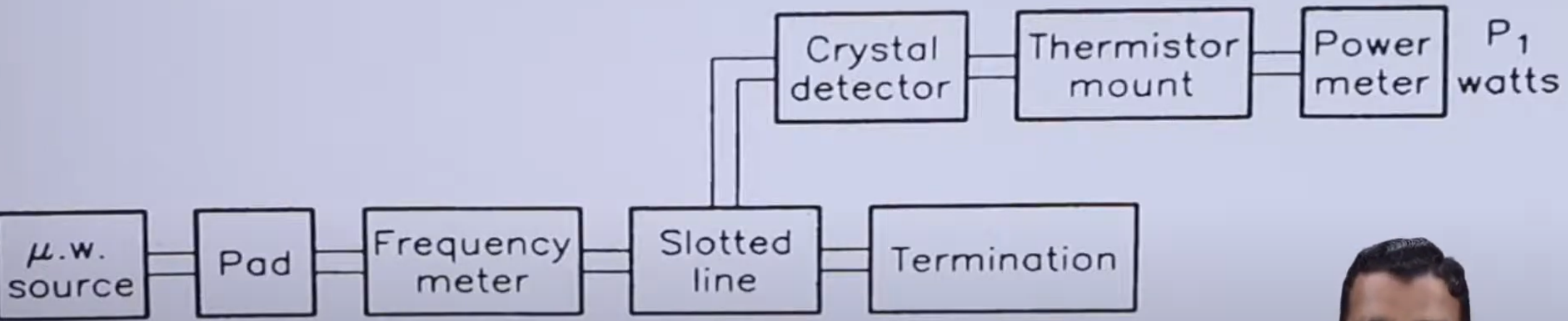
$$\gamma = \alpha + j\beta$$

(dB)

$$\text{Attenuation} = 10 \log_{10} \frac{P_{in}}{P_{out}}$$



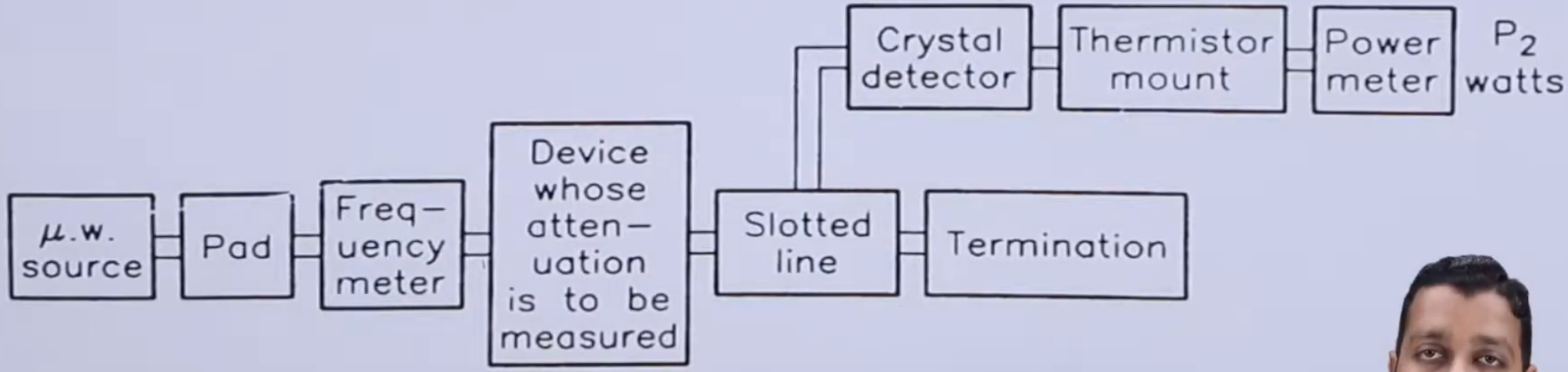
Attenuation Measurement - Microwave Measurement - Microwave Engineering



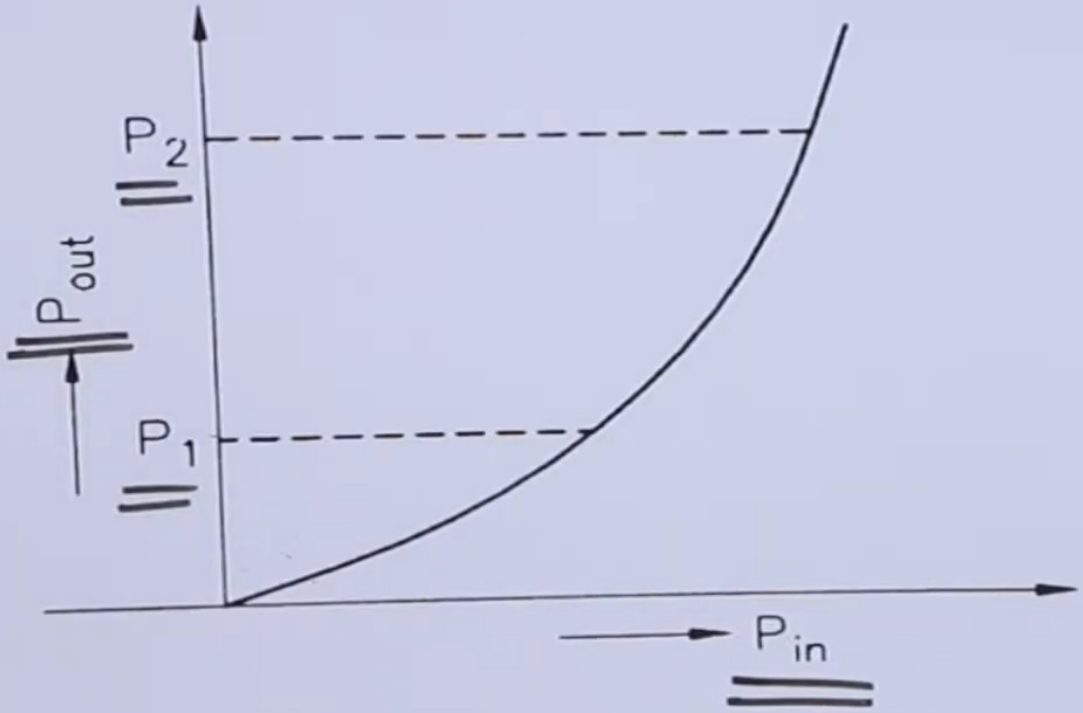
Set up ① Power ratio method

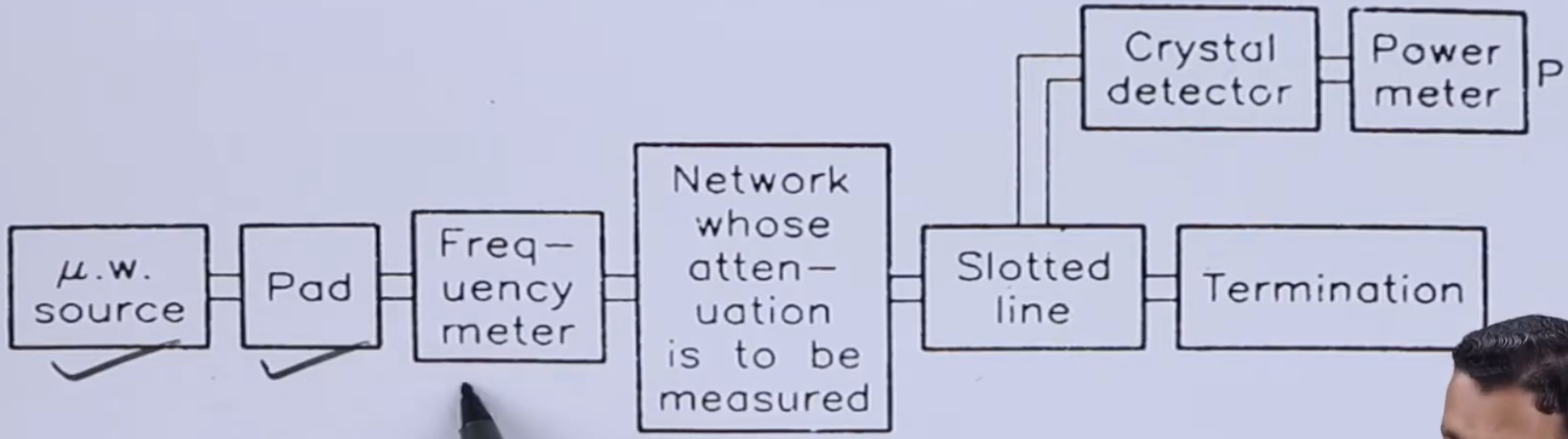
5:55 / 12:26

Scroll for details



set up ② Power ratio method


P2
Pout
P1
Pin


μ.w. source
Pad
Freq– uency meter
Network whose atten– uation is to be measured
Slotted line
Termination
Crystal detector
Power meter
P

UNIT-VI

Attenuation measurement:

(i) microwave components & devices always almost provide some degree of attenuation.

(ii) Attenuation is defined as the ratio of input power to the output power and is normally expressed in decibels.

i.e. $$\text{Attenuation} = 10 \log_{10}\left(\frac{P_{in}}{P_{out}}\right) \text{ in dB}$$

where P_{in} = input power ; P_{out} = o/p power.

the attenuation can be measured by two methods.

(i) power ratio method (ii) RF substitution method.

A) power ratio method:

involves measuring powers P1 & P2 without & with

(ii) the d
the powe
crystal
calculated
network

B) RF

(i) In

this method involves measuring powers P1 & P2 without & with device whose attenuation is to be measured. the ratio of $\frac{P1}{P2}$ pressed in decibels gives attenuation.

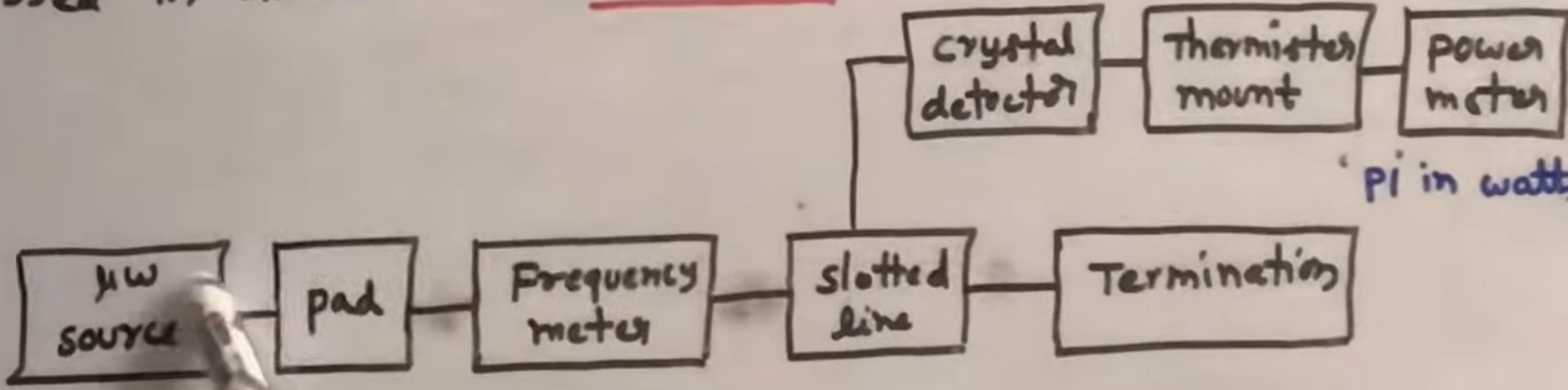


Fig: set up1 - power ratio method

expressed in decibels gives attenuation.

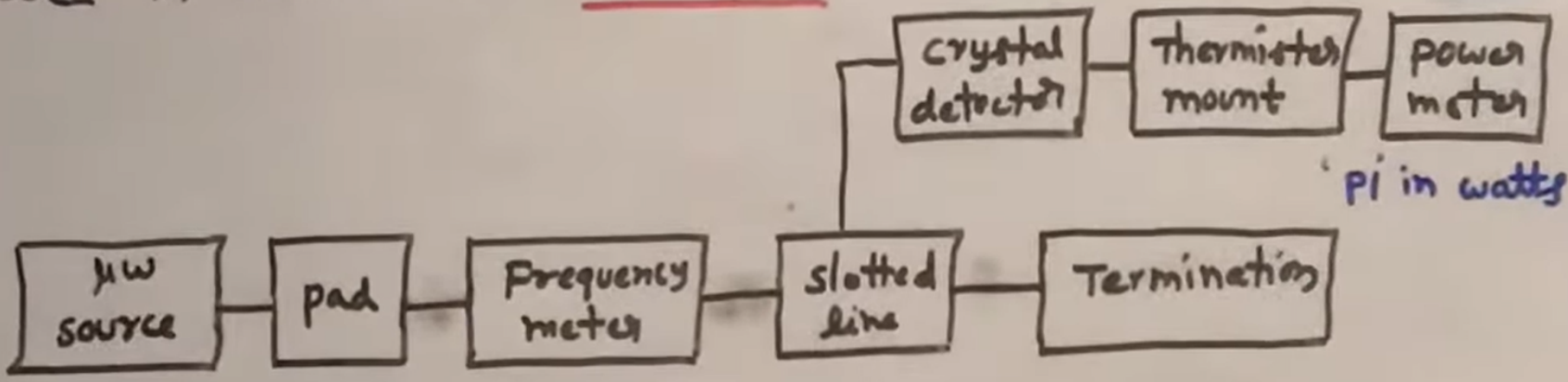
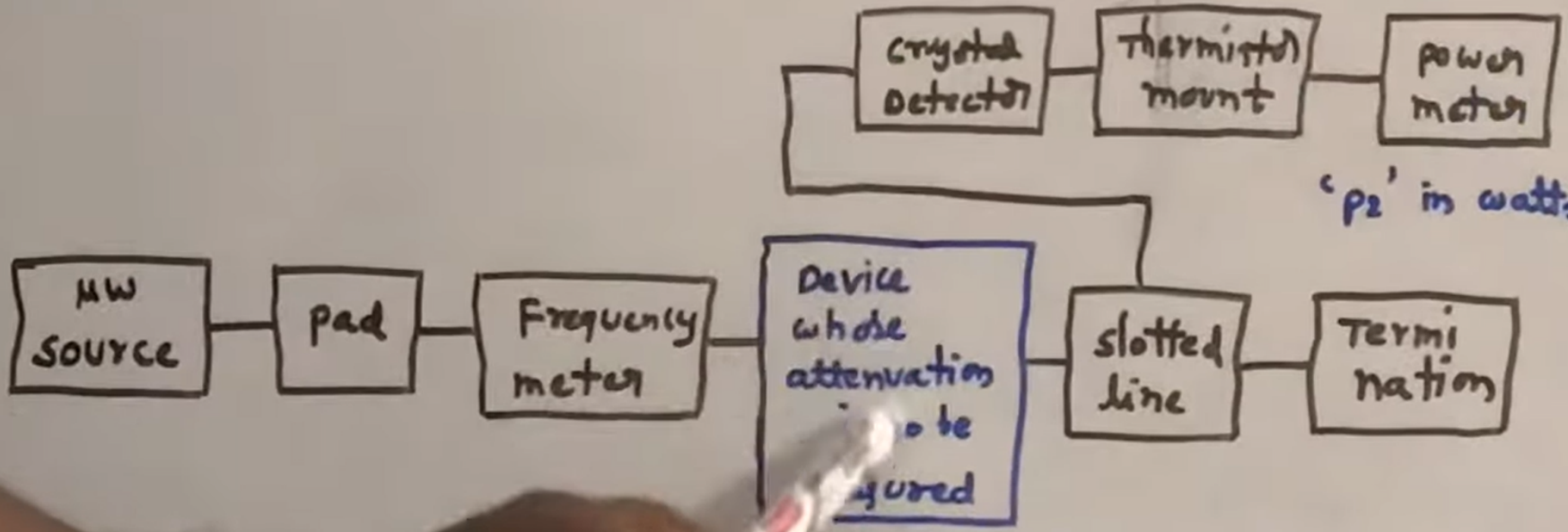


Fig: set up1 - power ratio method



(ii) The drawback of this method is the power positions indicated by the power meter will lie on the non-linear characteristics of crystal diode. Due to this the powers measured & attenuation calculated will not be accurate particularly if the attenuation of network is large & if the input power is low.

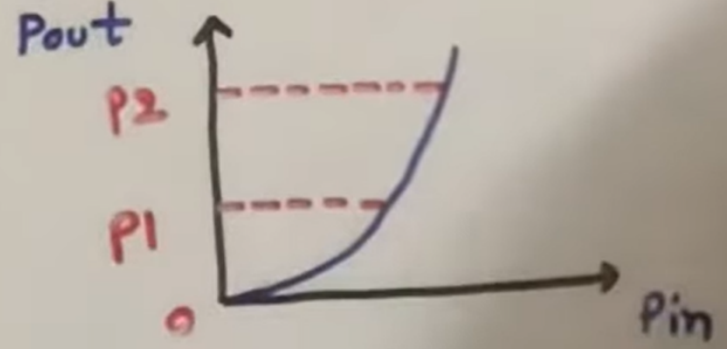


Fig: Square law characteristics of crystal diode.

range of the input power is low.

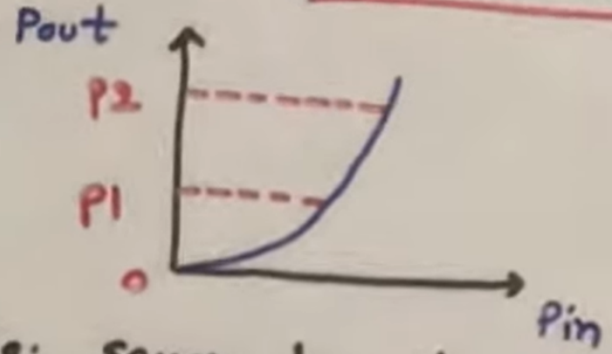
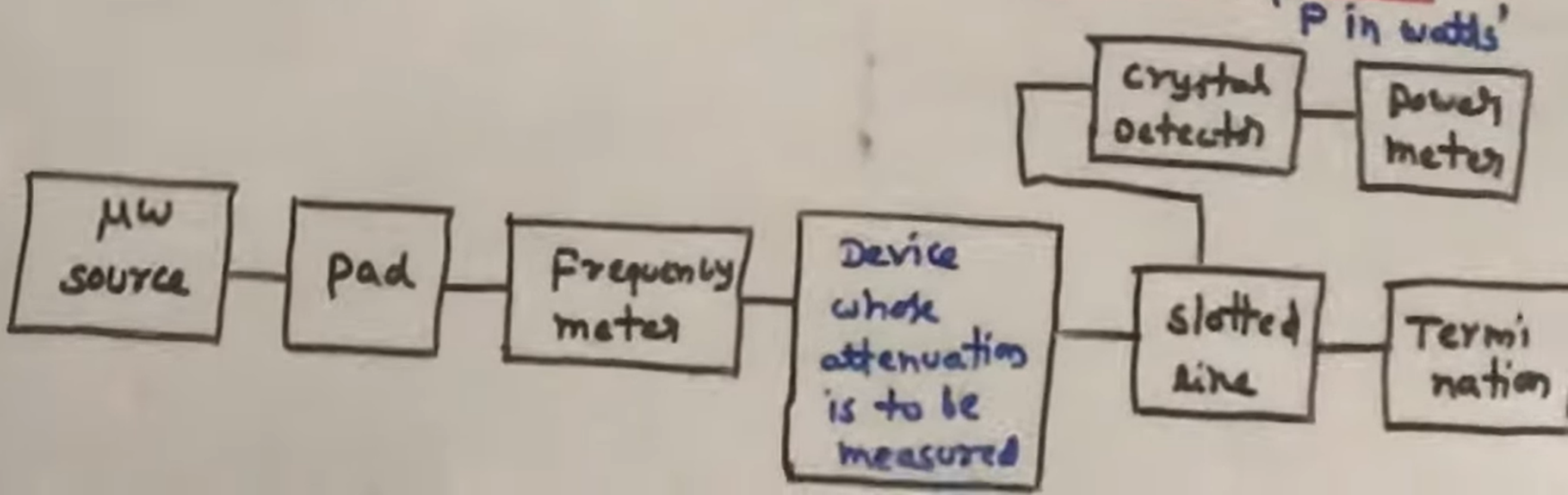


Fig: Square law characteristics of crystal diode.

B) RF substitution method:

(i) In this method, we measure attenuation at a single power position.



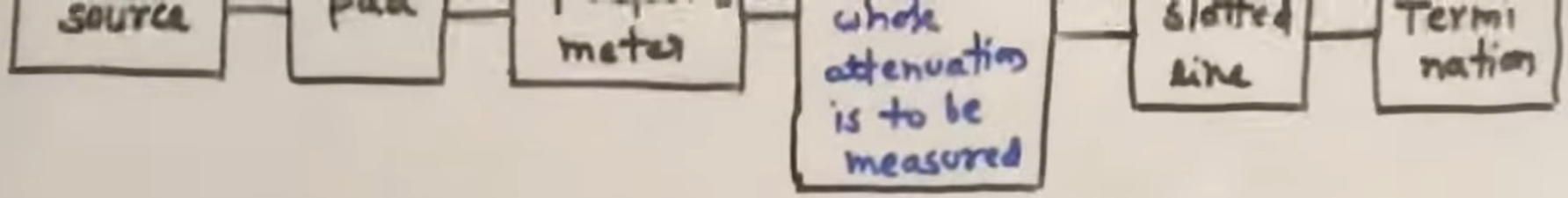


Fig: setup1 – RF substitution method

In this method, the power 'p' is measured by placing the device whose attenuation is to be measured as shown in setup 1. 'p in watts'

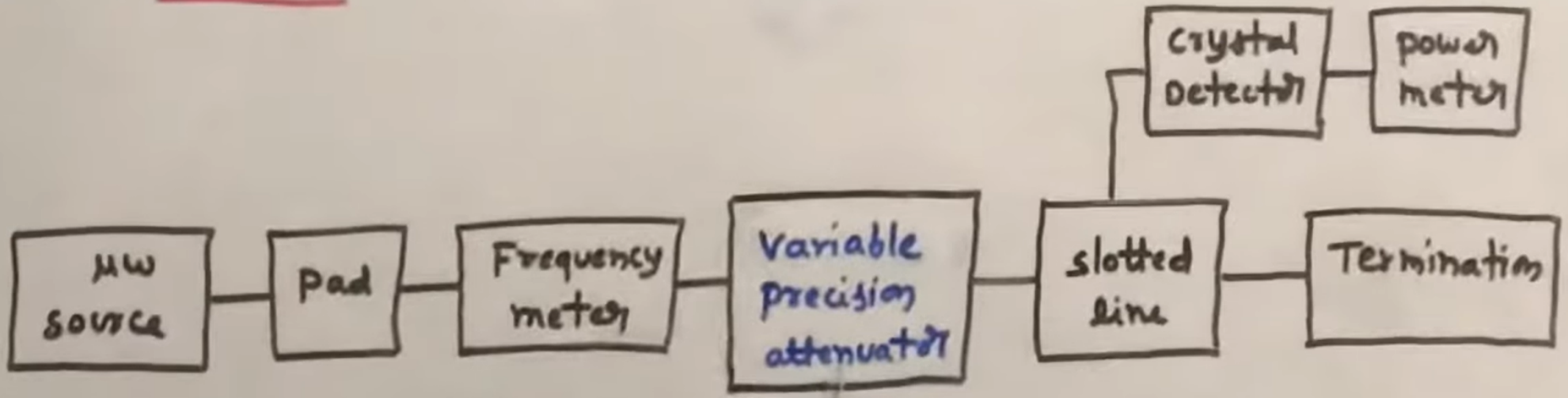


Fig: Setup2 – RF substitution method

setup2, the device is replaced by a precision calibrated attenuator

Fig: Setup1

(ii) In this method, the power 'p' is measured by placing the device whose attenuation is to be measured as shown in setup 1. 'p in watts'

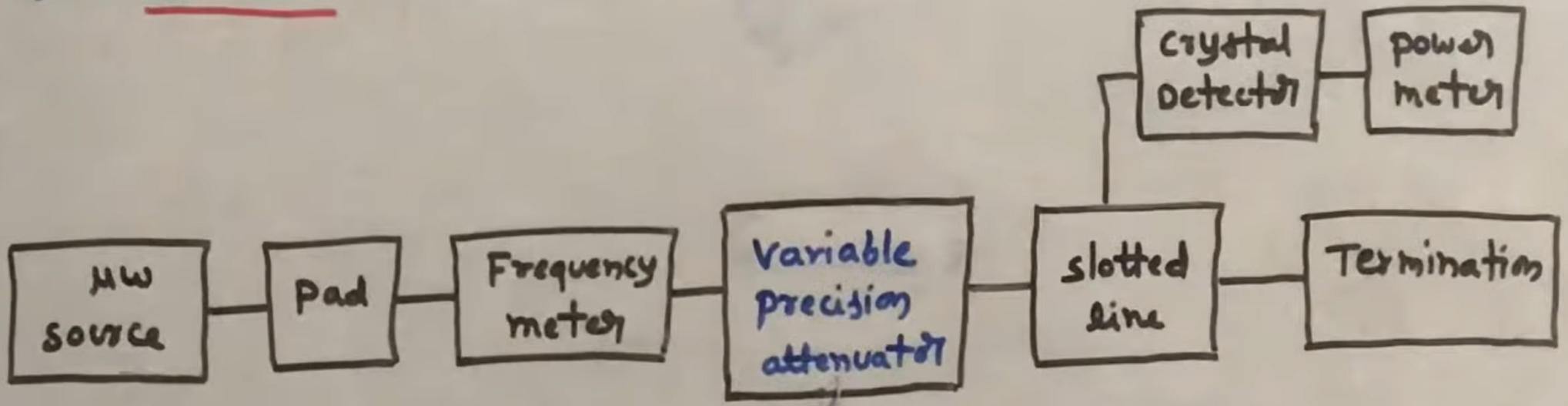


Fig: Setup2 – RF substitution method

(iii) In setup2, the device is replaced by a precision calibrated attenuator which can be adjusted to obtain the same power 'p' as measured in se

(iv) under this condition, the attenuation read on the precision attenuator wou