

### 3.5.2. Pulse Biased S-Parameter Measurements

When measuring a transistor, the DC measurements are usually performed in fast sweep mode, i.e. pretty fast in time. On the other hand, performing the biased RF measurements (network analyzer), the underlying DC bias has to be kept constant during the whole frequency sweep, incremented and again constant for the next frequency sweep. This means that the RF measurements may have been performed at completely different chip temperatures than the DC measurements. And while the possibly cooler DC measurements served to extract the DC model parameters, we may run into problems when extracting the remaining RF parameters, which refer to hotter measurement conditions.

To avoid this, a complete measurement setup has been configured for IC-CAP as the Agilent 85124A Pulsed Modeling System. This system allows 1us pulsed measurements from DC up to 40GHz. Fig.1 gives an overview of the system, and fig.2 depicts the applied pulse scheme.

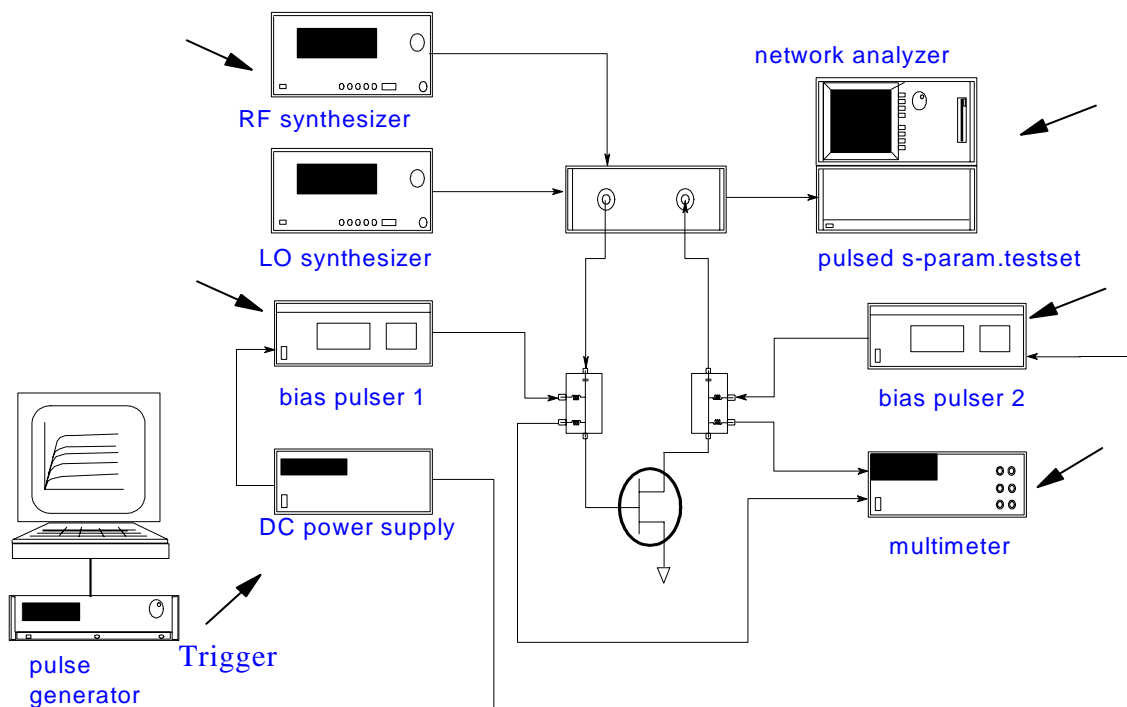


Fig. 1: block diagram of the Agilent 85124A pulsed measurement system from DC to RF

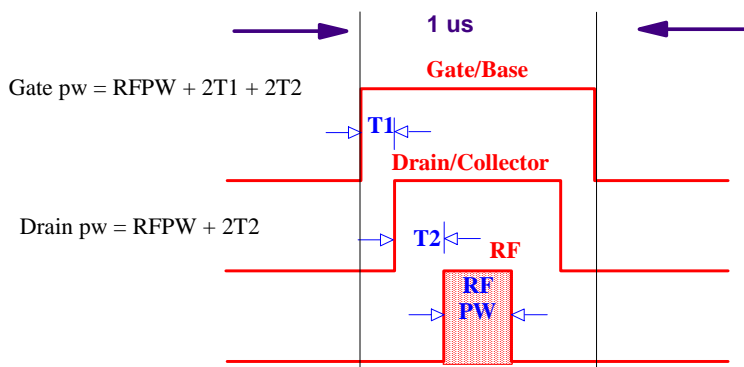


Fig.2: pulse timing of the measurement system in fig.1.

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The components of this pulsed measurement system are treated by IC-CAP like a *single* instrument with pulse risetime, pulse period etc. All the triggering is, therefore, included in the drivers and the user can focus on modeling measurements rather than measurement details.

The following table gives the key specifications of this system.

Specification	Min	Max	Notes
Frequency Range	45MHz	20GHz	
Pulse Width	1us	1ms	
Pulse Period	20us	999s	
DC Current	1pA	30A	
pulsed DC Voltage	-100V	100V	100V @ 10 Ohm   ( 10V @ 1 Ohm )
max. AC at Port 2		47dBm	

#### Publications:

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M.Dunn, B.Schaefer: Link Measurements to Nonlinear Bipolar Device Modeling, Microwaves & RF, Feb.1996, Penton Publishing, Cleveland, Ohio 44114