

# Work Instruction AA\_ETS\_5.4\_01\_56

Measurement Dwell Time according to FCC Part 15.247

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## Object

This Work Instruction describes the measurement of Time of Occupancy for Frequency Hopping Systems in accordance to the section 15.247.

## Validity Range

This Work Instruction is valid in the test laboratories of ETS.  
Safety tests are not subject of this work instruction.

## Abbreviations and Acronyms

ETS	Electronic Technology Systems
AA	Arbeitsanweisung (Work Instruction)
VA	Verfahrensanweisung (Standard Operation Procedure)
EUT	Equipment Under Test

## Changing Service

This Work Instruction is object of the intern documents changing service according to VA\_ETS\_4.3\_01 "Lenkung der Dokumente und Daten"

## Related Documents

ISO/IEC 17025	"General requirements for the competence of testing and calibration laboratories"
	"Quality Management Manual of Electronic Technology Systems"
VA_ETS_4.3_01	„Lenkung der Dokumente und Daten“ (controlling documents and data)
VA_ETS_4.5_01	„Vergabe von Unteraufträgen“ (placing sub-orders)
VA_ETS_5.4_01	„Prüfverfahren“ (test-procedures)
VA_ETS_5.4_05	“Schätzung von Meßunsicherheiten” (estimation of measurement uncertainties)
VA_ETS_5.5_01	„Prüfmittelüberwachung, -wartung und Kalibrierung“ (controlling and calibrating test equipment)

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## Responsibilities

The laboratory manager is responsible for the Implementation of the technical tests in his laboratory domain. He assures that the laboratory has the necessary technical provisions for the particular test runs.

The test operator performs the tests. The technical tests are performed according to the present Work Instruction.

## Industrial Safety

The rules of industrial safety have to be observed strictly. Especially in case of powered devices the requirements of the electrical safety have to be respected. In case of transmitters with significant transmitting power (e.g. relay station) the exposition has to be limited by distance or other suitable steps.

## Quality Assurance

The quality of test results in general have to be assured according to chapter 5.9 of the Quality Management Manual of ETS.

Traceability of measurement results is assured according to chapter 5.6 of the Quality Management Manual.

All used test equipment has to be calibrated according to VA\_ETS\_5.5\_01 "Prüfmittelüberwachung, -wartung und Kalibrierung" (controlling and calibrating test equipment).

VA\_ETS\_5.4\_01 „Prüfverfahren“ (test-procedures) assures the usage of the last version of standards and public notices.

Estimation of measurement uncertainty has to be done according to VA\_ETS\_5.4\_05 "Schätzung von Meßunsicherheiten" (estimation of measurement uncertainties).

## Review of documentation and labelling

In preparation of the tests and for review purposes are to check the requirements for documentation and labelling. For that is to use the attached document „Formal requirements according FCC procedure Declaration of Conformity (DOC). This work can be done by test operator or by certification operator, following laboratory manager`s decision.

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## Methods of Measurement

The measuring test takes place with the measuring construction as per draft.

The gate time of the generator HP 33120A must comply with the demanded measuring period depending on EUT.

example: 0,4 s x number of the hopping channels for hopping systems in the  
2400-2483.5 MHz band

the necessary gate time amounts to 0.4 s x 79 channels = 31.6 s

Settings for Timer HP33120A  $f=1/2t$  (Gate time for Counter) ( $f = 0,015823$  Hz)

The described measuring construction delivers the number of events where a fix frequency is activated.

The measured number of events is multiplied with the measured burst time. The result is the Dwell time (time of occupancy).

Repeat this instructions for Time of Occupancy in **Master Inquiry Mode**

For Inquiry measurement use HCI Command 0x0001 0x30 0x05

E.g. -for CSR chip use controll software BtCLI

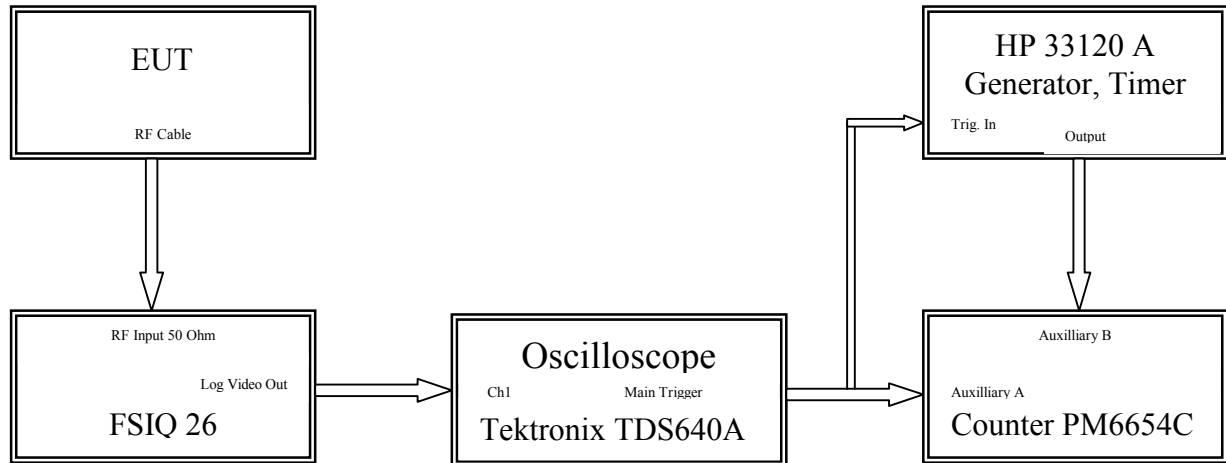
type in *inquiry giac 0x30 0x05* for longer inquiry time (61,4s).

-for other chipset use special software from customer to realize  
Master Inquiry for longer then 13s.

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## Time of Occupancy, Measurement configuration



### Settings EUT

The configuration shall be adjusted to the longest packet type with the highest data rate.

Output power: maximum power

Connection by cable to the Spectrum Analyzer FSIQ26 or ESI 40

### Settings Counter PM6654C

Local/Reset

-Program: Tot A /  $\mu$ B  
Event Counter

-Trigger A: DC, level 2,0 V  
-Trigger B: DC, level 0,5 V  
-All Trigger LED switch off

### Settings FSIQ26

-Preset

-Center Frequency on middle Channel eg. 2441 MHz

-Zero Span  
-Ref Level=Ch Power+5dB  
-Att: e.g. 30dB

-Video Trigger  
-Trigger level on the maximum Burst

-Sweep Time dependent on Burst Time  
e.g. BT DH5 = 4 ms  
DH1 = 1 ms  
Inquiry = 300  $\mu$ s

### Settings TDS640A

-Setup, Recall/Save 10

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-Settings if not recall active:

-Autoset  
-Vertical: 200 mV/div  
-Time Base: 1ms/div

**-Impedance: 1M Ohm**

-Coupling: D C  
-Trigger Level, dependent on maximum Burst Level  
eg. 840mV

### Settings Timer HP33120A

-Function: Rechteck, Burst,  
Single (ext, Trigger)  
-AMPL: 1.0 Vpp  
-Frequency: dependent on the System!

**Hopping system 2.4 GHz Band**

0.4s\*number of channels  
eg. BT: hopping  $t=0.4s*79$   $t=31,6s$   
eg. BT: inquiry  $t=0.4s*32$   $t=12,8s$

**5.724-5.850 GHz Band**

$t=30s$  fix

**$f=1/2t$**  (Gate time for Counter)

eg. BT<sub>hopping</sub>  $t=31,6s$   **$f=0,0158$  Hz**

BT<sub>inquiry</sub>  $t=12,8s$   **$f=0,0391$  Hz**

5,7 GHz Band  $t=30,0s$   **$f=0,0166$**

**Hz**

▲  
┌ Gate time (half frequency)  
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## **Documentation**

Environmental conditions e.g. temperature, humidity, air pressure, supply voltage etc. have to be documented.

The EUT and test setup are to be documented by photographs for the test report.

## **Enclosures**