



Partner of the Mobility Industry for Reliability, Quality, Safety & Validation

# **MOST150**

## **Automotive Application Recommendations for Physical Layer Components**

Jörg Angstenberger, 30.09.2008



- Existing MOST25 Physical Layer Components
- MOST150 Physical Layer Components SIDELOOKER & HEAVEN
- MOST150 Qualification Concept
- HEAVEN - Interface FOT and Pigtail-Fiber
- Overview Qualification Procedures
- SIDELOOKER Qualification Procedure
- HEAVEN Qualification Procedure
- Conclusion



# Existing MOST25 Physical Layer Components

## Functional Specification / Qualification Standard

### MOST Physical Layer devices



Pigtail



ECU



***MOST Physical Layer Specification describes functional behavior of devices***



***Automotive Application Recommendation 2V1 describes how to prove quality and reliability of MOST25 devices (Sidelooker)***

# MOST150 Physical Layer Components

## SIDELOOKER and HEAVEN Concept coexisting

### SIDELOOKER

FOT



*FOT is  
integrated  
in Pigtail*

Pigtail



*Pigtail is  
integrated  
in ECU*

ECU

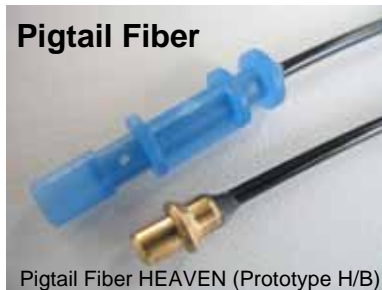


### HEAVEN

FOT



Pigtail Fiber



Connector



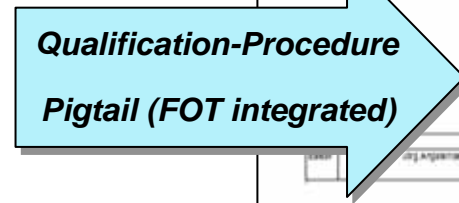
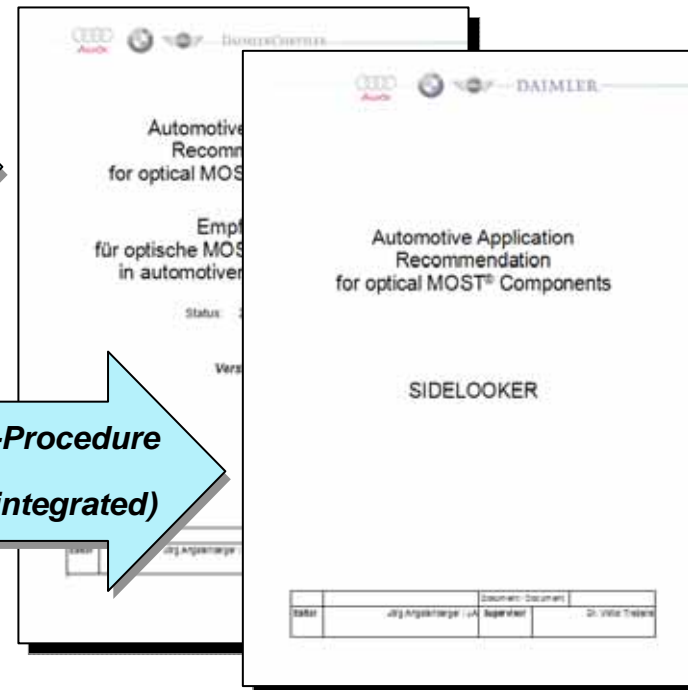
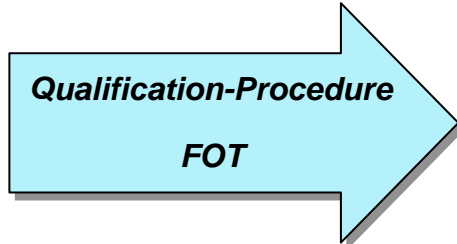
ECU



*FOT, Pigtail Fiber and Connector  
are assembled at ECU Level*

# MOST150 Qualification Concept

## SIDELOOKER Concept



**FOT is integrated in Pigtail**



**Pigtail is integrated in ECU**

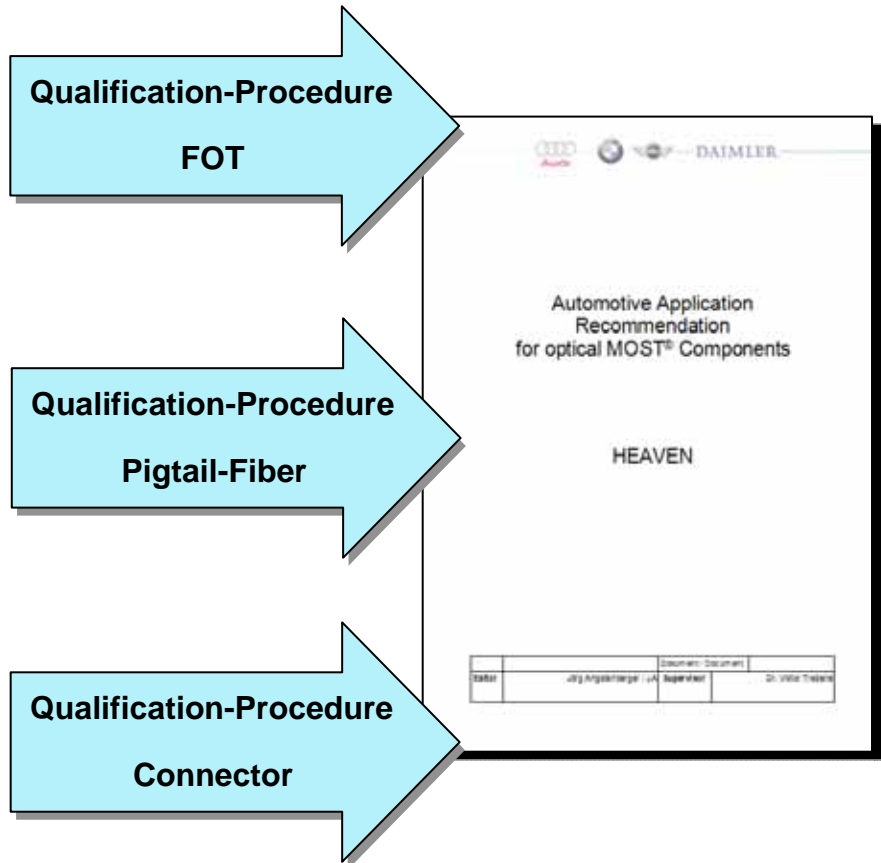
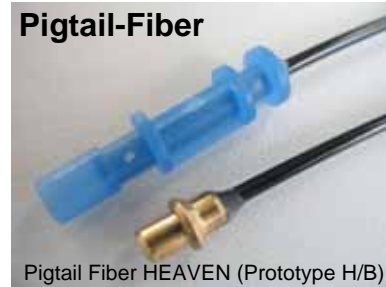


**The qualification process of MOST150 for SIDELOOKER is similar to the known process of MOST25.**

**The existing document has to be harmonized to get an speedgrade independent AAR that covers all SIDELOOKER components.**

# MOST150 Qualification Concept

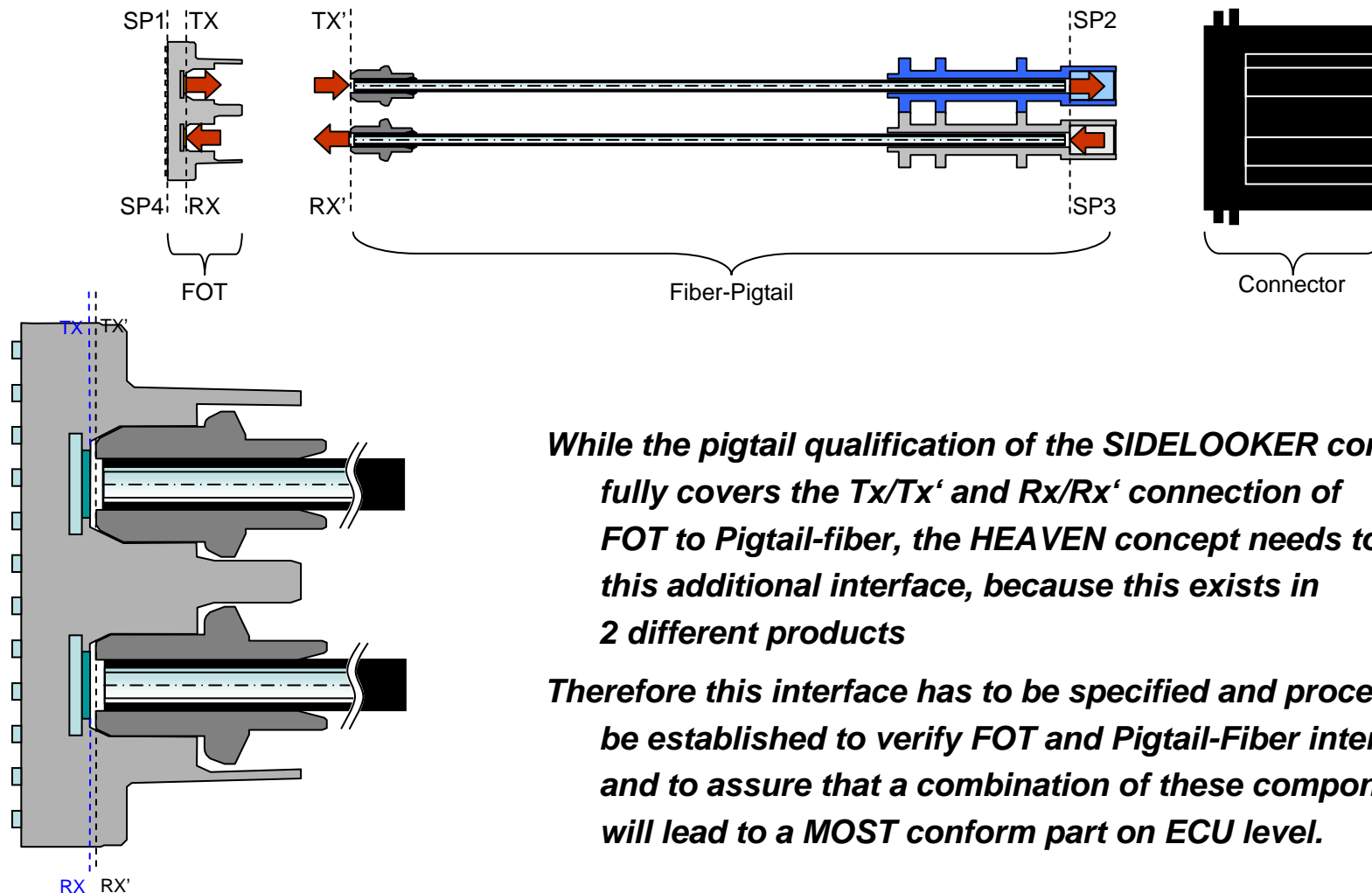
## HEAVEN Concept



**Independent qualification procedures for FOT, Pigtail-Fiber and Connector.**

# HEAVEN – Interface FOT and Pigtail-Fiber

## Optical Interface between FOT and Pigtail Fiber



***While the pigtail qualification of the SIDELOOKER concept fully covers the Tx/Tx' and Rx/Rx' connection of FOT to Pigtail-fiber, the HEAVEN concept needs to handle this additional interface, because this exists in 2 different products***

***Therefore this interface has to be specified and processes has to be established to verify FOT and Pigtail-Fiber interface and to assure that a combination of these components will lead to a MOST conform part on ECU level.***

# Qualification Groups Overview

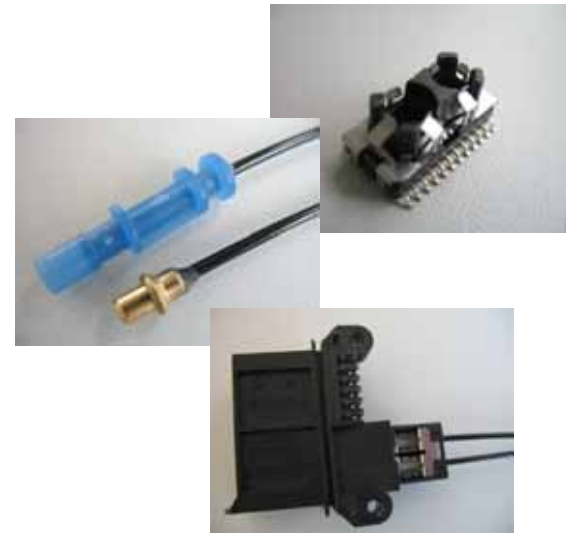
## SIDELOOKER

- *FOT Qualification*
- *Pigtail Qualification (integrated FOT)*



## HEAVEN

- *FOT Qualification*
- *Pigtail-Fiber Qualification*
- *Connector Qualification*



## SIDELOOKER - FOT



Hamamatsu FOT Tx (MOST25/150)

### Qualification Scope

- semiconductor related parameters
- package related parameters
- optical Interface
- characterization of electrical and optical parameters

### **Dimension & Samples**

Physical Dimensions (PD), Reference Parts (REF)

### **Functional**

ESD (ESD) and EMC (EMC) tests as well as semiconductor related test like Gate Leakage (GL) and Latch Up (LU)

### **Climatic**

Chemical Resistance (CR)

### **Manufacturing**

Moister Level Definition (MLD), Solderability (SD), Resistance to Soldering Heat (RSH), Bond Pull Strength (BP) and Bond Shear Strength (BS).

### **Mechanical**

Lead Pull (LP), Lead Bend (LB) and Lead Torsion (LT) tests

### **Operating Life**

High and Low Temperature Operating Life tests (HTOL, LTOL), Temperature Cycling (TC) or Temperature Shock (TS) with Preconditioning (PRE), Temperature and Humidity Biased (THB) with Preconditioning (PRE) and resistance for Corrosive Atmosphere (CA)

### **Characterization**

Functional Characterization (CHA) of all relevant parameters of the FOT according to corresponding MOST Physical Layer specification

## SIDELOOKER - PIGTAIL (integrated FOT)



Tyco Micropigtail (here for MOST25)

### Qualification Scope

- mechanical construction
- optical interface
- mechanical interface
- characterization of optical and mechanical parameters

### ***Dimension & Samples***

Physical Dimensions (PD), Reference Parts (REF)

### ***Functional***

ESD (ESD) and EMC (EMC) Tests

### ***Climatic***

Chemical Resistance (CR), Thermal Pistoning (TP) of fiber

### ***Climatic and Mechanical***

Stepped Temperature Test (STT), Mechanical Shock (MS), Vibration Random (VR) and Vibration Sinus (VS)

### ***Manufacturing***

Plugging Frequency (PFR), Angular Plugging (AP), Solderability (SD), Resistance to Soldering Heat (RSH)

### ***Mechanical***

Contact Torsion (CT), Wire Pulling (WP), Draw-Out Strength (DOS), Dust (D), Permanent Pulling (PP), Drop Test (DT), Draw-Out Strength Connector (DSC)

### ***Operating Life***

High Temperature Operating Life Test (HTOL), Temperature Cycling or Shock (TC/TS), Temperature and Humidity Biased (THB), Temperature Humidity Cycling (HTC) and Corrosive Atmosphere (CA)

### ***Characterization***

Functional Characterization (CHA) of all relevant parameters of the PIGTAIL construction according to the corresponding MOST Physical Layer specification

## HEAVEN - FOT



Hamamatsu FOT HEAVEN (MOST150)

### Qualification Scope

- semiconductor related parameters
- mechanical construction
- mechanical and optical interface
- characterization of electrical and optical and mechanical parameters

#### ***Dimension & Samples\****

Physical Dimensions (PD), Reference Parts (REF)

#### ***Functional\****

ESD (ESD) and EMC (EMC) tests as well as semiconductor related test like Gate Leakage (GL) and Latch Up (LU)

#### ***Climatic\****

Chemical Resistance (CR)

#### ***Manufacturing\****

Moister Level Definition (MLD), Solderability (SD), Resistance to Soldering Heat (RSH), Bond Pull Strength (BP) and Bond Shear Strength (BS).

#### ***Mechanical\****

Mechanical Shock (MS), Vibration Random (VR), Vibration Sinus (VS), Wire Pulling (WP) and Draw-Out Strength (DOS) to verify the lock/spring mechanism. Drop Test (DT)

#### ***Operating Life\****

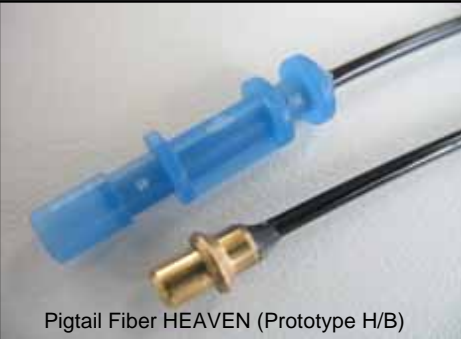
High and Low Temperature Operating Life Test (HTOL, LTOL), Temperature Cycling (TC) or Temperature Shock (TS) with Preconditioning (PRE), Temperature and Humidity Biased (THB) with Preconditioning (PRE), Temperature Humidity Cycling (HTC), Stepped Temperature Test (STT) and Corrosive Atmosphere (CA)

#### ***Characterization\****

Functional characterization (CHA) of all relevant parameters of the FOT according to the corresponding MOST Physical Layer specification

\*NOTE: The qualification loads are preliminary and still under discussion

## HEAVEN – Pigtail-Fiber



Pigtail Fiber HEAVEN (Prototype H/B)

### Qualification Scope

- mechanical interface, physical dimensions
- optical interface / surface
- attachment of ferrule to fiber

Fiber has to be qualified according to LV131 “Fiber optics in motor vehicles; test guideline for LWL bulk stock”

### **Dimension & Samples\***

Physical Dimensions (PD), Reference Parts (REF)

### **Climatic\***

Chemical Resistance (CR), Thermal Pistoning of fiber (TP)

### **Mechanical\***

Wire Pulling (WP), Draw-Out Strength Ferrule (DOSF) to prove the mechanical attachment of the ferrule to the fiber.

### **Operating Life\***

Temperature Shock (TS), Temperature and Humidity Biased (THB) to prove the mechanical contact of the ferrule to the fiber. Corrosive Atmosphere (CA) to test the influence on the fiber surface.

### **Characterization\***

Functional characterization (CHA) of all relevant parameters of the Fiber according to the corresponding MOST Physical Layer specification.

\*NOTE: The qualification loads are preliminary and still under discussion

## HEAVEN - Connector



Tyco Connector (similar to MOST25)

### Qualification Scope:

- mechanical interface, physical dimensions
- optical interface / surface
- attachment of female connector housing to connector

Connector has to be qualified according to LV214 "Plug connectors in motor vehicles; test guideline"

### **Dimension & Samples\***

Physical Dimensions (PD), Reference Parts (REF)

### **Mechanical\***

Dust (D), Drop test (DT), Wire Pulling Housing (WPH), Draw-Out Strength Ferrule Housing (DSFH), Mechanical Shock (MS), Vibration Random (VR) and Vibration Sinus (VS) to prove the mechanical attachment of the ferrule housing to the connector.

### **Operating Life\***

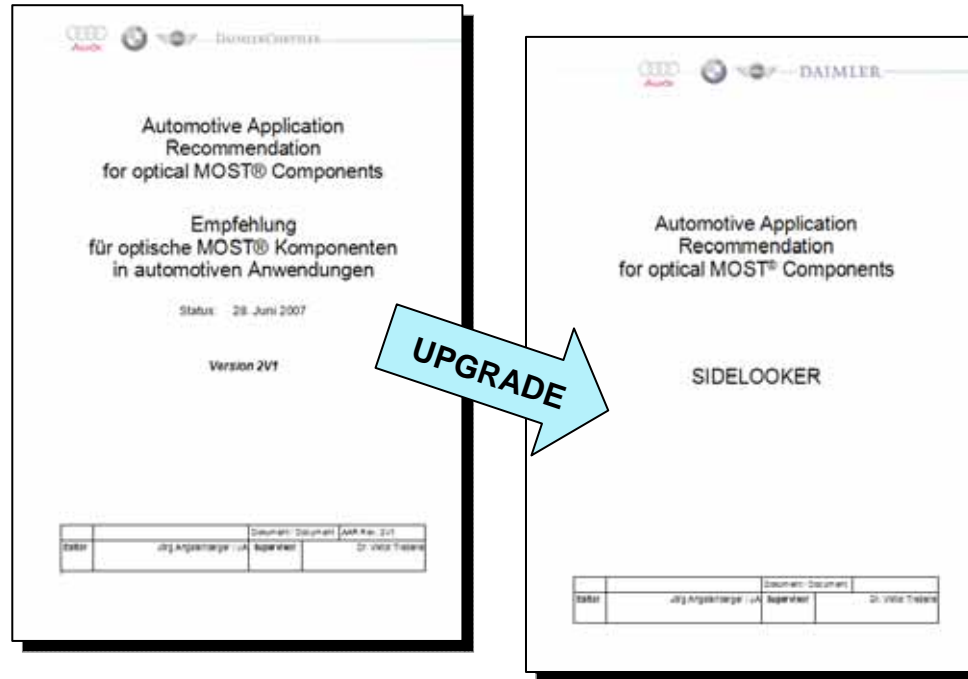
Temperature Cycling (TC) or Temperature Shock (TS) to prove the mechanical attachment of the ferrule housing to the connector.

### **Characterization\***

Functional Characterization (CHA) of all relevant parameters of the connector according to the corresponding MOST Physical Layer specification.

\*NOTE: The qualification loads are preliminary and still under discussion

## SIDELOOKER Qualification Standard

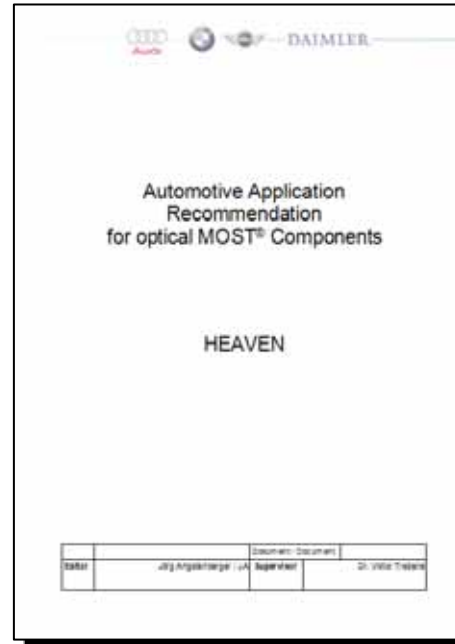


**Release planned by  
end of October**

**Existing Automotive Application Recommendation 2V1 for MOST25**

**Physical Layer Components gets upgraded to a speedgrade independent Automotive Application Recommendation for SIDELOOKER devices in general**

## HEAVEN Qualification Standard



***Release planned by  
end of this year***

***Automotive Application Recommendation for MOST Physical Layer Components in HEAVEN packages is being developed***

- ***separate qualification procedures for FOT, Pigtail-Fiber and Connector***
- ***additional focus on mechanical and optical interface between FOT and Pigtail-Fiber because of interchangeability aspects***

# ***Thank you for your attention!***

***RELNETyX is looking forward to support your MOST Physical Layer projects  
for MOST25 and MOST150***

**Jörg Angstenberger**

Manager MOST Consulting & Test

Tel: +49(0)178/78 59 323

[joerg.angstenberger@relnetyx.com](mailto:joerg.angstenberger@relnetyx.com)

**Dr. Viktor Tiederle**

Director Reliability Technology

Validation & Compliance Test

Tel: +49(0)178/78 59 326

[viktor.tiederle@relnetyx.com](mailto:viktor.tiederle@relnetyx.com)

**RELNETyX AG ♦ Meisenweg 33 ♦ 70771 Leinfelden-Echterdingen**

**Tel +49(0)711/69397-80 ♦ Fax +49(0)711/69397-71**