# TSQA-1X8PE

## 8 Channel 10 W Precise RF Power Source, 300 MHz…6000 MHz

**Features**

- compact 19”, 3 U design
- high level dynamic range
- very high level accuracy and stability by ALC (Automatic Level Control)
- internal CW signal source
- LAN and USB remote interface
- GUI (Graphical User Interface)
- adapted power consumption


**Available variants and options**

- additional medium power range extension
- pulse modulator

**Applications**

- quality assurance
- research and development (R&D)

### At a Glance

TSQA-1X8PE is a compact, high power multi source with 8 output channels suitable for the frequency range 300 … 6000 MHz. The TSQA-1X8PE offers an output power capability of up to 10 W per channel. Each channel has an ALC for precise output power stability over long periods. The TSQA-1X8PE is equipped with an internal CW RF signal source.
A typical application of this system is to perform RF stress in HTOL (High Operating Lifetime testing) of RF components.

### Medium Power Extension

TSQA-1X8PE is available in a variant with “Medium Power Range Extension”. In this variant the output power range extends from -20 dBm (10 µW) up to +40 dBm (10 W). High and medium power is provide on separate RF connectors.

### Optimized Power Consumption

The power consumption and efficiency are adapted to the required RF output power level in 3 power classes. Dependant on the chosen RF output power the supply voltages of the power amplifier stages is varied. This minimizes heat generation and cooling needs.

### High Output-to Output Isolation

A mismatch of impedance at one or more outputs should not have any influence to the other outputs. The TSQA-1X8PE offers very high isolation of typical 85 dB between ports to avoid this effect.

### High RF Level Precision

Each output channel provides a very precise RF output level with closed-loop level control (ALC), and virtually no visible steps. As a consequence, the symmetry between the 8 outputs as well as the long stability is guaranteed. Also, the control loop’s smooth characteristic guarantees avoidance of overshoot. The output level range is large to cover a big variety of application categories.

### Harmonic Suppression

The RF energy should be concentrated in the fundamental. TSQA-1X8PE has an adaptive harmonic filter for effective suppression of harmonics.

### Option Pulse Modulator

With option pulse modulator installed the TSQA-1X8PE is able to generate CW and pulse modulated signals.

### Input for External Generator

For feeding the multi power source with other signals as CW or pulsed signals, the device offers an RF input for the connection of external RF sources.

### Flexible Control Interfaces

Physical remote interfaces: LAN or USB. TSQA-1X8PE is controllable via GUI (Graphic User Interface) without any additional effort of application software development and regardless of location. Alternatively, the system offers the control via an SCPI inspired ASCII string protocol for ATE (Automatic test Equipment) applications.

### System self-monitoring

The system can run without human intervention during entire test periods of multiple months. It contains automatic self-checking like current consumption, module temperature and logging of errors.

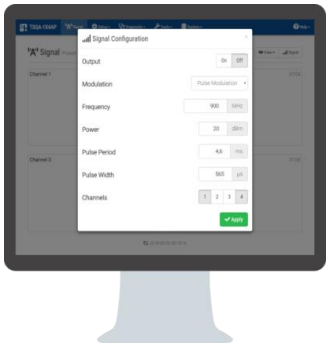
### Higher number of channels

Often batches of 77 DUTs are tested simultaneously in a HTOL test. Higher number of test channels can be provided by stacking TSQA-1X8PME subsystems in a 19” system rack. 10 subsystems are needed to realize an 80 channel HTOL system and can be provided in just 42 U, which is extremely compact. Becker Nachrichtentechnik GmbH offers turnkey solutions with higher number of channels on customer demand.

### Software Functionalities

#### GUI (Graphic User Interface)

Additional to commanding via remote interface parameters like operating frequency, output level and are settable via a GUI. With the pulse option pulse length and period are also settable via the GUI.




For taking into account losses of external RF connecting cables, type and length of the cables can be entered. The software calculates the output power level related to the end of the cable.

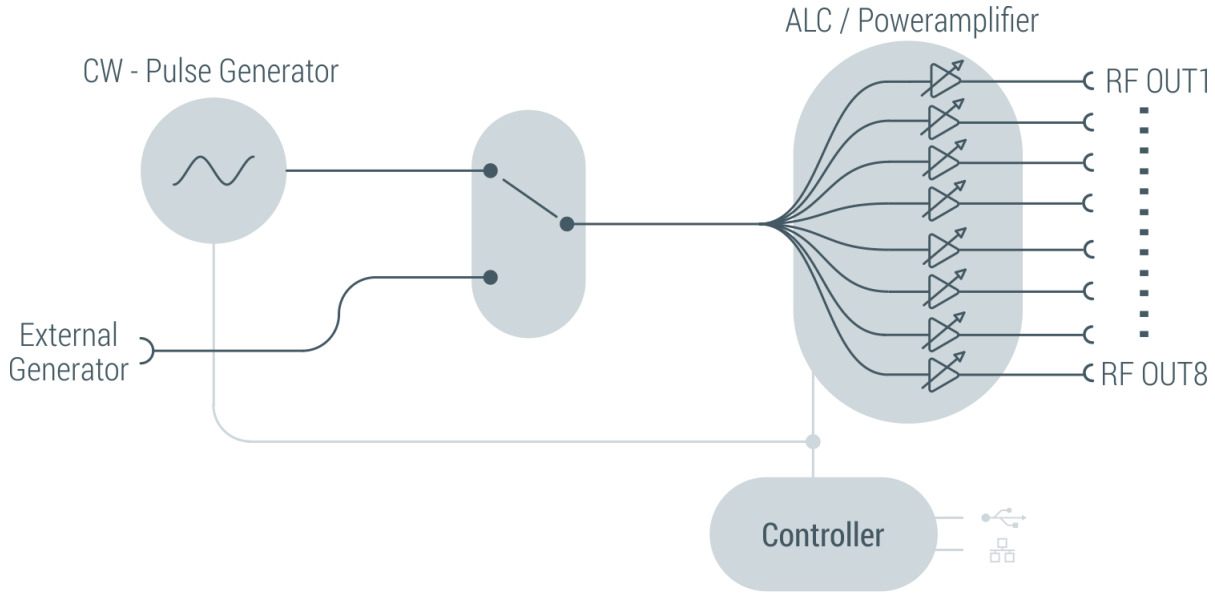
### Entry of frequency and desired output level

The TSQA-1X8PE software allows the entry of up to 5 different frequencies, corresponding output levels and boundaries. The SW automatically cycles through the frequencies during the test.

### Status Read-Out

At any time during the test, the software allows to display the current status, including insertion loss/gain per channel and failure statistics.

### Block Diagram



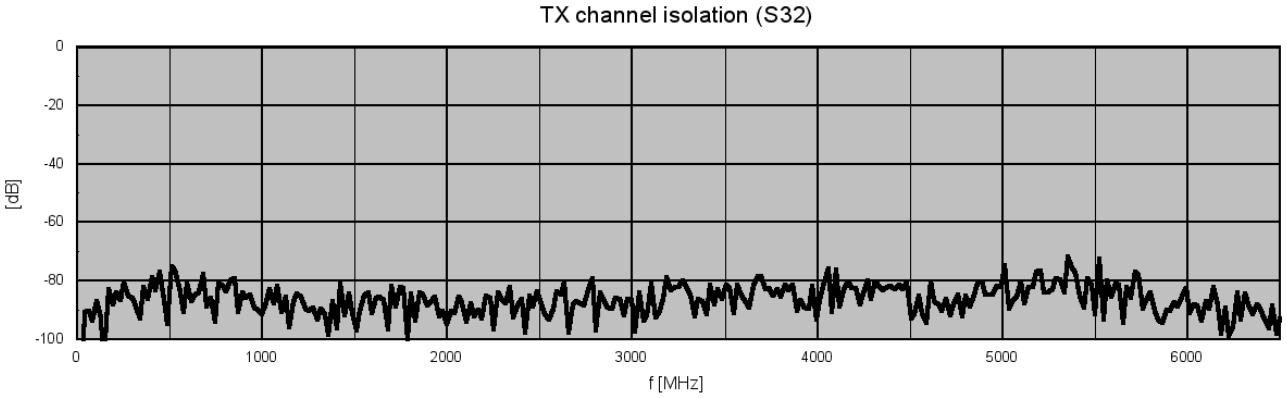
**RF Specification**

| Parameter | Symbol | Min. | Typ. | Max. | Unit | Condition |
|---|---|---|---|---|---|---|
| impedance | $Z_{in}$ / $Z_{out}$ | | 50 | | ohms | |
| number of outputs | $n_{DUT}$ | | 8 | | | |
| low frequency | $f_{min}$ | | 300 | 500 | MHz | |
| high frequency | $f_{max}$ | 6000 | | | MHz | |
| min. output power | $P_{TX\_MIN}$ | | | +20 | dBm | |
| max. output power | $P_{TX\_MAX}$ | +40 | +43 | | dBm | f = 2 GHz |
| | $P_{TX\_MAX}$ | +40 | +42 | | dBm | f = 4 GHz |
| | $P_{TX\_MAX}$ | +38 | +39 | | dBm | f = 6 GHz |
| ALC resolution | $\Delta P_{OUT}$ | | | 0.05 | dB | |
| output power accuracy | $dP_{OUT}$ | | ± 0.3 | | dB | |
| harmonics | d | | -25 | | dBc | f = 3 GHz, $P_{OUT}$ = + 36 dBm |
| output isolation | $S_{23}$ | | -85 | | dB | full gain |
| RF connectors | $X_{RFHI}$ | | SMA female | | | |
| **Variant with Medium Power Extension** | | | | | | |
| impedance | $Z_{in}$ / $Z_{out}$ | | 50 | | Ohm | |
| number of outputs | $n_{OUT}$ | | 8 | | | |
| low frequency | $f_{min}$ | | 300 | 500 | MHz | |
| high frequency | $f_{max}$ | 6000 | | | MHz | |
| output power range | $P_{OUT}$ | -20 | +27 | | dBm | |
| ALC resolution | $\Delta P_{OUT}$ | | | 0.05 | dB | |
| output power accuracy | $dP_{OUT}$ | | ± 0.3 | | dB | |
| harmonics | $d_{HARM}$ | | -30 | | dBc | |
| output isolation | $S_{23}$ | | -70 | | dB | full gain |
| RF connectors | $X_{RFLO}$ | | SMA female | | | |
| **Ext. Generator Input** | | | | | | |
| impedance | $Z_{in}$ / $Z_{out}$ | | 50 | | ohms | |
| low frequency | $f_{min}$ | | | 300 | MHz | |
| high frequency | $f_{max}$ | 6000 | | | MHz | |
| input power | $P_{IN}$ | | 0 | | dBm | nominal |
| maximum input power | $P_{INMAX}$ | | | +10 | dBm | |
| **CW signal source** | | | | | | |
| low frequency | $f_{min}$ | | | 300 | MHz | |
| high frequency | $f_{max}$ | 6000 | | | MHz | |
| frequency resolution | $\Delta f_{GEN}$ | | 10 | | kHz | |
| frequency accuracy | $df_{GEN}$ | | ±2.5 | | ppm | |
| **Option: Pulse Modulator** | | | | | | |
| low frequency | $f_{min}$ | | | 300 | MHz | |
| high frequency | $f_{max}$ | 6000 | | | MHz | |
| pulse lenght | $t_W$ | 577 | | 2300 | ms | |
| period | $t_P$ | 4.6 | | 1000 | ms | |

**Common Specification**

| Parameter | Symbol | Min. | Typ. | Max. | Unit | Condition |
|---|---|---|---|---|---|---|
| power supply | $u_{AC}$ | 90 | 230 | 260 | V | 50 / 60 Hz |
| power consumption | P | | 780 | | W | full RF power |
| power socket | $X_{AC}$ | IEC-60320 C14 | | | | country specific power cable |
| dimensions | W x H x D | approx. 483 x 133 x 431 | | | mm | 19”, 3 U |
| weight | | | 14 | | kg | |
| remote interface | | RJ45 10/100BaseT | | | | ASCII commands |
| operating temp. range | $T_o$ | + 20 | | + 30 | °C | within specification |
| storage temp. range | $T_s$ | - 40 | | + 70 | °C | |
| EMC | | EN61326-1:2013 | | | | according directions: 2014/30/EU |
| safety | | EN61010-1:2010 | | | | according directions: 2014/35/EU |
| ordering information | P/N | 1804.6502.1 | TSQA-1X8PE | | | |
| | P/N | 1804.6502.4 | TSQA-1X8PE | | | Variant with medium power extension |
| | P/N | 1804.6502.O1 | TSQA-1X8PME-O1 | | | Option: pulse generator extension |

**TX Output Isolation High Power** (typical response)




## Appearances

TSQA-1X8PE with RF ports on right side
(Similar appearance)

TSQA-1X8PE with RF ports and power/remote
(Similar appearance)

**Related Products**

| Product | Description | P/N |
|---|---|---|
| TSQA-80PMF | 80 Channel, 5 W Precise Automatic HTOL RF Test System<br>1700 MHz … 9800 MHz | 2003.6302 |
| TSQA-1X8PMF | 8 Channel, 5 W Precise Automatic HTOL RF Sub System<br>1700 MHz … 9800 MHz | 2003.6202 |
| TSQA-80PME | 80 Channel 10 W Precise Automatic HTOL RF Test System<br>300 MHz…6000 MHz | 1804.6302 |
| TSQA-1X8PME | 8 Channel, 10 W Precise Automatic HTOL RF Sub System<br>300 MHz…6000 MHz | 1804.6202 |
| TSQA-80XME | 80 Channel, 500 mW Precise Automatic HTOL RF Test System<br>300 MHz…6000 MHz | 1804.6002 |
| TSQA-1X8XME | 8 Channel, 500 mW Precise Automatic HTOL RF Sub System<br>300 … 6000 MHz | 1804.6002 |
| TSQA-1X80PM | 80 Channel 2.5 W Precise Automatic HTOL RF Test System<br>20 MHz…3000 MHz | 1606.1012 |
| TSQA-1X16PM | 16 Channel 2.5 W Precise Automatic HTOL RF Test System<br>20 MHz…3000 MHz | 1606.1027 |