

TSQA-80PMF

80 Channel 5 W Precise High Power Automatic HTOL RF System, 1700 MHz ... 9800 MHz

Features

- compact 19", 42 U design
- LAN remote interface
- Graphic User Interface (GUI)
- high level accuracy and stability
- high dynamic level measurement
- integrated CW signal source
- AC power consumption adapted to output power

Options:

- pulse modulator
- automatic test sequencing
- integrated PC control console

Applications

- qualification of e.g. active and passive cellular and wireless front-end components
- quality assurance (new designs, batch verification)
- research and development (R&D)



At a Glance

High-temperature Operating Life Time (HTOL) testing is an intense stress test performed to simulate aging and accelerate thermally activated failure mechanisms. During HTOL testing a large set of devices under test (DUT) is put under extreme temperature and absolute maximum rating conditions. Typically, it is performed at 125°C. Details are described in JEDEC standard JESD22-A108.

Power stress tests and HTOL tests require RF systems with many output channels each delivering output power with high level precision and stability over time. TSQA-80PMF is a compact, automatic HTOL RF testing system, suitable for the frequency range 1700 MHz ... 9800 MHz in 50 ohms technology. It is built up with 10 identical sub devices, each offers 8 RF channels. Each RF output has an output power capability of up to 8 W per channel.

The system offers 10 x 8 input channels in order to monitor the DUT RF output power levels. The control occurs via web interface e.g. on the built-in control console.

TSQA-1X8PMF implements software to automate the complete testing process of e.g. electronic components like semiconductors, SAW/BAW filters and LTCC (Low Temperature Cofired Ceramics) components. Due to its large frequency range the device is suitable for tests of components for the 5G (FR1) and Wi-Fi 6E standard.

Minimizing RF Cable Losses to DUT

Losses of RF cables to and from the DUTs have important consequences with respect to performance. High cable losses must be compensated by the power stages to avoid reduction of power level at the DUT input. This causes high impact on the power consumption and heat generation of HTOL systems. Additionally, RF cables have temperature and frequency dependent effects which reduce the precision of the power level at the DUTs.

The TSQA-80PMF features RF output- and input ports on the right or left side of the system cabinet, to minimize cable length to the climate chamber.

High TX to TX Port Isolation

HTOL systems must offer a high isolation between the RF output ports. A failing DUT should not have any influence to the other DUTs during the tests. The TSQA-80PMF offers very high isolation of 80 dB type between ports to avoid this effect.

Optimized Power Consumption

The power consumption and efficiency are adapted to the required RF output power level in 2 power classes. Dependant on the desired RF output power the supply voltage of the power amplifier stages is varied. This optimizes cost for electrical power and heat generation.

High Level Precision

TSQA-80PMF has 80 RF power outputs. Each output channel provides a very precise RF output level with closed-loop level control (ALC), and virtually no visible steps. Therefore, the symmetry between the 80 outputs as well as the long-term stability is guaranteed. Also, the control loop's smooth characteristic guarantees avoid any overshoot.

The output level range is large to cover a big variety of DUT categories. HTOL tests can be run both with active components and gain (e.g. amplifiers) as well as passive components with low insertion loss (e.g. filters).

Harmonic Suppression

The RF energy in HTOL tests should be concentrated on the fundamental of the signal to avoid additional stress to the DUTs coming from harmonics. The TSQA-80PMF has an adaptive harmonic filter for effective suppression of harmonics.

High Precision RF Level Detection

Corresponding to each output channels the TSQA-80PMF HTOL system provides an input channel to precisely measure the power at the DUT output matched to the specific range.

Versatile RF Test Signal Types

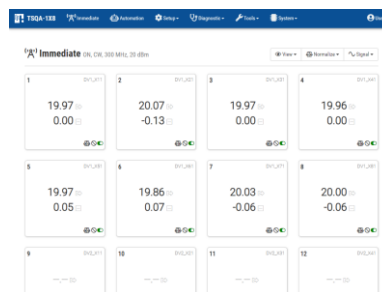
The TSQA-80PMF features an internal CW source and an optional pulse modulator. The signal source and the pulse parameters can be also controlled via LAN remote interface.

Compact and Versatile

The entire TSQA-80PMF with 80 output RF power and 80 measurement channels is realized in a 19" rack with a total height of 42 U.

Software Functionalities

Physical remote interfaces: LAN or USB. Control protocol: ASCII strings or browser-based using the integrated web server. It allows configuration of parameters and operating the system. Using the web-interface (GUI) allows the remote operation of the system without any additional effort of application software development and regardless of a remote location.



GUI appearance (example)

Impact of Cable Losses

The unavoidable loss of the RF cables to and from the DUTs is taken into account by the software. Therefore, cable type and length are configurable. The data of many customary cable types are already implemented in the software. The software calculates the input- and output power levels at the DUT.

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.

Option Automatic Test Sequencing

The Automatic Test Sequencing option reduces significantly the number of operator interventions. The operator defines all test parameters before starting the test: E.g. test duration, warm up time, insertion loss limits. After that the system runs autonomously over the entire test time, displaying test status and statistics and writing protocol data for later analysis.

In order to allow optimal failure analysis, the system offers the possibility to take off the RF stress from failed DUTs individually and immediately after the failure occurs.

After the predefined test time has elapsed, the test procedure stops automatically and the RF levels will be turned down to remove the RF stress from the DUTs.

Option Integrated PC Control Console

On customer request the TSQA-80PMF can be delivered with an integrated control PC. It is installed in a 1 U drawer.



Appearance:
Option drawer with
control PC mounted in
19" system rack.

RF Specification

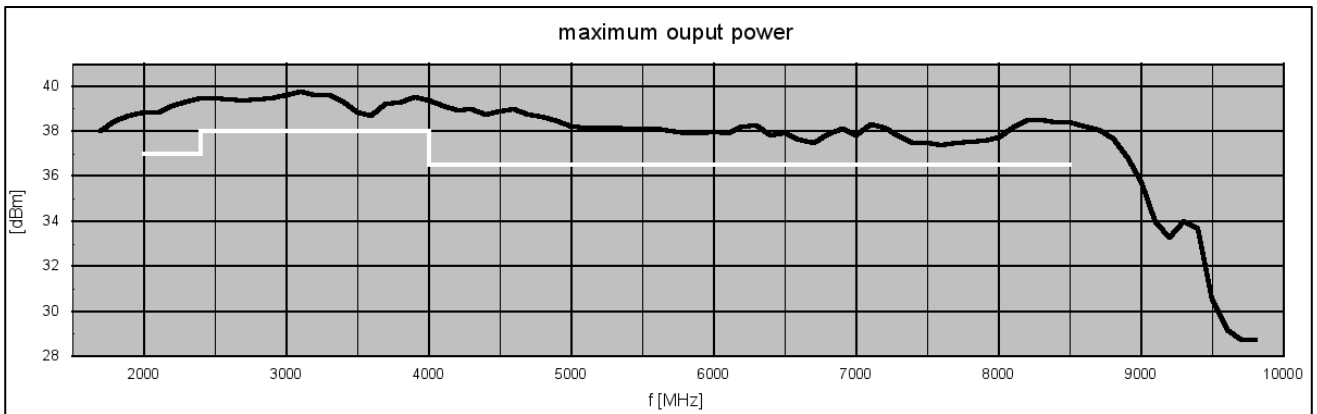
| Parameter | Symbol | Min. | Typ. | Max. | Unit | Condition |
|--------------------------------|------------------|-------|--------------------|-------|----------|-----------------------------------|
| impedance | Z_{IN}/Z_{OUT} | | 50 | | Ω | |
| number of outputs | n_{DUT} | | 80 | | | |
| low frequency | f_{MIN} | | 1700 | 2000 | MHz | |
| high frequency | f_{MAX} | 8500 | 9800 | | MHz | |
| min. output power | P_{TX_MIN} | | | +20.0 | dBm | |
| max. output power | P_{TX_MAX} | | +37.0 | | dBm | $f < 2$ GHz |
| | P_{TX_MAX} | +37.0 | +38.0 | | dBm | 2 GHz $\leq f < 2.4$ GHz |
| | P_{TX_MAX} | +38.0 | +39.0 | | dBm | 2.4 GHz $\leq f \leq 4$ GHz |
| | P_{TX_MAX} | +36.5 | +38.0 | | dBm | 4 GHz $< f \leq 8.5$ GHz |
| | P_{TX_MAX} | | +36.0 | | dBm | $f > 8.5$ GHz |
| ALC resolution | ΔP_{TX} | | | 0.05 | dB | |
| output power accuracy | dP_{TX} | | ± 0.3 | | dB | CW, RMS detection |
| harmonics | HD | | -25 | | dBc | $f = 2.7$ GHz, $P_{TX} = +37$ dBm |
| output isolation | S_{23} | | -80 | | dB | full gain |
| number of inputs | n_{RX} | | 80 | | | power measurement |
| detection | | | RMS | | | CW (continuous wave) |
| | | | Peak | | | envelope (option Pulse Mod.) |
| measuring level range | P_{RX_MIN} | | +10 | +20 | dBm | RF level measurement inputs |
| measuring level range | P_{RX_MAX} | +40 | | | dBm | |
| abs. meas. accuracy | ΔP_{RX} | | ± 0.5 | | dB | RMS detection |
| rel. meas. accuracy | dP_{RX} | | ± 0.2 | | dB | DUT I.L. < 2 dB |
| RF connectors | X_{RF} | | SMA female | | | RF outputs and inputs |
| CW signal source | | | | | | |
| low frequency | f_{MIN} | | | 1700 | MHz | |
| high frequency | f_{MAX} | 9800 | | | MHz | |
| frequency resolution | Δf_{GEN} | | 10 | | kHz | |
| frequency accuracy | df_{GEN} | | ± 2.5 | | ppm | |
| Option: Pulse Modulator | | | | | | |
| pulse length range | t_w | 577 | | 2300 | μs | |
| period range | t_p | 4.6 | | 1000 | ms | |
| detection | | | RMS and peak power | | | |

Common Specifications

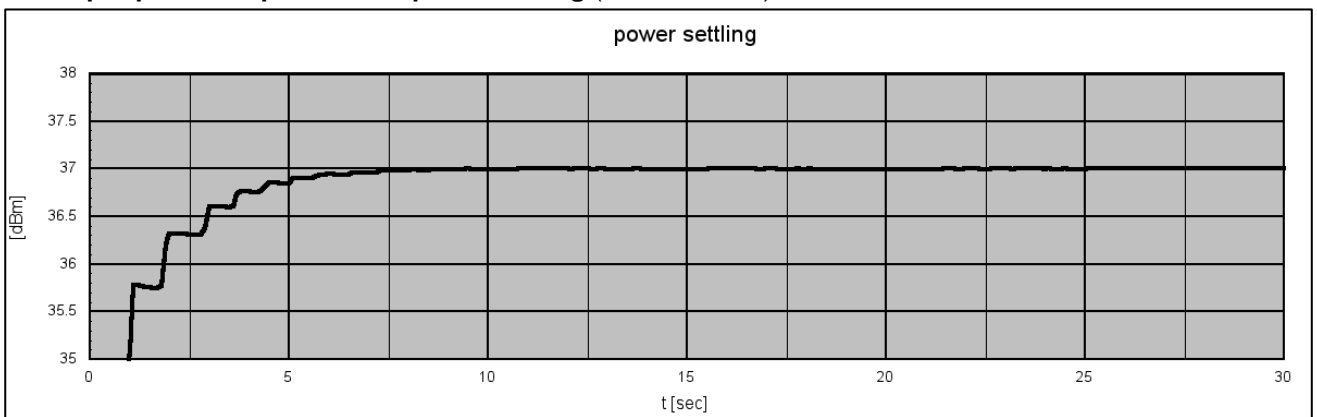
| Parameter | Symbol | Min. | Typ. | Max. | Unit | Condition |
|-------------------------------|---|---|------|------|------|---|
| power consumption | P | | 5 | | kW | full output power |
| power supply*3 | U _{AC3P} | | 400 | | V | TN-S 3 phase network, 50 / 60 Hz |
| power plug | X _{AC3P} | CEE-plug 5-pole 6h 400V 14A IP44 red | | | | other plug types on request |
| power cable length | L | | 5 | | m | system to power plug |
| dimensions | W x H x D | approx. 600 x 2100 x 800 | | | mm | 19", 42 U |
| weight | | | 240 | | 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 | |
| Product conformity | | | | | | |
| Electromagnetic compatibility | EU: in line with EMC directive (2014/30/EC) | | | | | applied harmonized standards: EN 61326-1 (for use in industrial environment), EN 61326-2-1, EN 55011 (class B), EN 61000-3-2, EN 61000-3-3 |
| Electrical safety | EU: in line with low voltage directive (2014/35/EC) | | | | | applied harmonized standard: EN 61010-1 |

| Ordering Information | Designation | P/N: | Remarks |
|--|---------------|--------------|-----------------------------|
| | TSQA-80PMF | 1804.6302.1 | RF connectors on right side |
| | TSQA-80PMF | 1804.6302.2 | RF connectors on left side |
| Option pulse modulator | TSQA-80PMF-P | 1804.6302.O1 | |
| Option Automatic Test Sequencing | TSQA-80PMF-TS | 1804.6302.O2 | |
| Option Integrated drawer with control PC | | 1804.6302.O3 | |

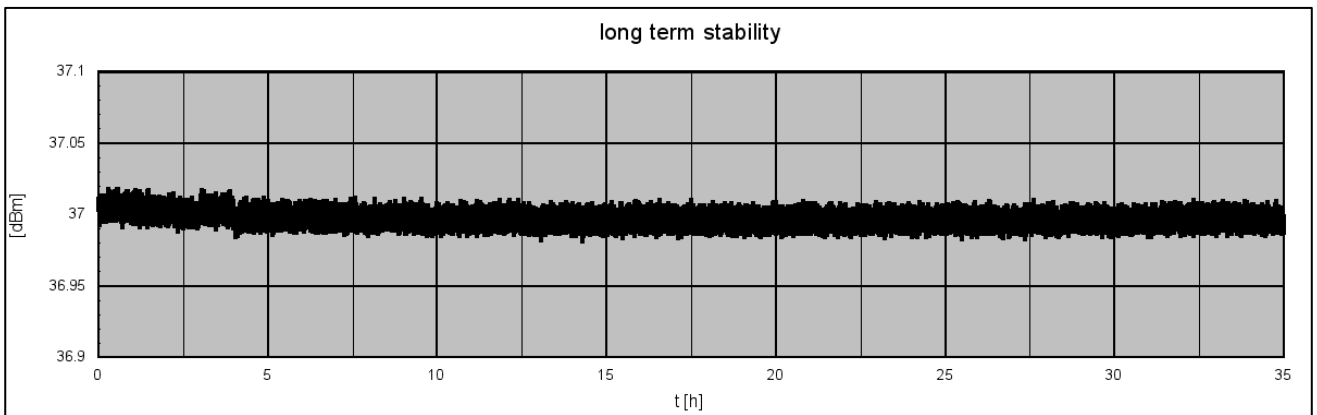
Typical maximum RF output power



RF output power response after power setting (no over shoot)



RF power long term stability (over 35 hours)



Appearance



Related Products

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