Digital Power Management and Analysis Software - Enabling Power Rail Measurements
5/6 Series MSO Option 5-DPM and 6-DPM Application Datasheet

Automated multiple power rail measurements
The Digital Power Management and Analysis (DPM) software option provides automated power rail measurements for the 5/6 Series MSO oscilloscopes. With multiple FlexChannel® inputs, the next generation user interface of the 5/6 Series MSO enables design engineers to measure and analyze ripple, overshoot/undershoot, power supply sequencing, amplitude, and timing measurements. You can simultaneously analyze multiple power rails using power rail probes or passive probes.

The DPM software automatically generates reports that include measurements, test results, and plot images. This solution helps design engineers meet their time-to-market needs.

Key features

- Ripple analysis computes the ripple on power rails and ensures that designs meet requirements.
- Transient analysis measures overshoot/undershoot to determine the extent to which power rails vary from nominal values.
- Power sequence analysis enables power designers to ensure that power rails reach the on or off states in the expected times.
- Multi-rail testing speeds design, validation, and testing.
- Power rail autoset and power rail preset ensure optimal oscilloscope settings.
- Compatible TPR1000/TPR4000 power rail probes enable low-noise, low-loading measurements with up to 60 V DC offset, with 1 GHz and 4 GHz versions.
- Programming interface commands are included for all measurements, configurations, and results.
- Save reports of active power measurements, plots, and tables into MHT, PDF or CSV format.

Application

Digital Power Management and Analysis software transforms the Tektronix 5/6 Series MSO oscilloscopes into debug and analysis tools to quickly measure and analyze power rails. Power rail measurements helps the designers meet design requirements and achieve high power integrity in their designs. The DPM software automates measurements such as ripple analysis, overshoot and undershoot, and power supply sequencing to help accurately and quickly characterize power rails.

DPM software used with a 5/6 Series MSO Oscilloscope together with power rail probes forms a complete measurement system for power rail testing.

Ripple analysis

Especially for today's complex IC's power rails can have strict limitations on ripple. Automated ripple analysis speeds these critical measurements. You begin by entering the expected ripple frequency for each power rail. At a press of the Power Rail Preset button the software uses this information to optimize the oscilloscope settings for the best possible measurements.

Analyze multiple power rails at once to reduce test times during design and validation. For example, an 8-channel 5 Series MSO can measure up to 7 power rails at once. You can also take advantage of the 5/6 series MSO Spectrum View capability to perform spectrum analysis on the ripple.

You can analyze cycle-by-cycle by selecting a PWM clock (if available) and view peak-peak and RMS values for each ripple cycle. This gives statistics for all of the cycles within an acquisition. Bandwidth limit capability enables designers to analyze the ripple numbers at different bandwidths.
The 5/6-DPM enables ripple measurements on multiple power rails simultaneously. The results badge, results table, and the waveform view give designers complete insight.

The 5/6-DPM enables simultaneous multi-rail testing. This ensures faster design, validation and test times.

Spectrum view capability enables designers to identify the source of ripple a very powerful capability for designers of power rails.

The 5/6-DPM enables simultaneous multi-rail testing. This ensures faster design, validation and test times.
Power sequence analysis

Power sequence analysis on 7 power rails simultaneously automates turn-on-time and turn-off-time measurements. It enables designers to measure the power sequencing of their power rails and ensure that they reach their turn-on and turn-off states within the required times. Automating these tests helps achieve consistent, accurate results under different load conditions.

Power sequence analysis enables Turn-on and Turn-off tests to be performed on multiple power rails simultaneously.
The 5/6-DPM enables multi rail power-on testing simultaneously.

To set up the test, you specify the nominal input and output voltages, a trigger level, and a Wait Time (duration). Pressing the Power Rail Preset button initiates an optimization process in which the software optimizes scale settings, record length, and sample rate for the best results. Arming the oscilloscope and power cycling your DUT initiates the measurement.

Turn-on and turn-off times are given in the results badge and indicated on the waveform with colored indicators. Results are also available in a table. You can compare and validate your design for wait times by observing the results table and look for any anomalies.
5/6-DPM enables multi rail power-off testing simultaneously.

**Transient analysis**

Transient analysis includes overshoot and undershoot measurements. Measurements may be performed on multiple power rails simultaneously and automatically with a few simple steps.
5/6 DPM Configuration enables designers to select the source, Reference voltage and Bandwidth required for analysis.

A reference voltage is entered for each power rail before initiating the test. The overshoot measurement gives the difference between the maximum voltage and the reference voltage. The undershoot measurement gives the difference between the minimum voltage and the reference voltage.

This measurement may be performed for a single cycle within an acquisition, or over every cycle within an acquisition (Cycle Mode). You can synchronize cycles based on a power rail signal, or another signal in the system. Cycle-by-cycle measurements can be analyzed using statistics, histograms, or plots. Bandwidth limit capability enables designers to analyze the ripple numbers at different bandwidths.
5/6-DPM makes comprehensive overshoot and undershoot measurements on multiple power rails simultaneously.
Report generation

Data collection, archiving, and documentation necessary for the design and development process is very simple with the DPM software. You can easily generate the reports in MHT, PDF, or CSV formats and document the measurement results.

DPM software provides the ability to compile all the results of a test run into different report formats with pass/fail results for easy analysis.
### Measurements and features

<table>
<thead>
<tr>
<th>Feature</th>
<th>Description</th>
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<tbody>
<tr>
<td><strong>Ripple analysis</strong></td>
<td>Measures Ripple on multiple power rails simultaneously. Based on the Oscilloscope and the power rail probes used, the Ripple values can be &lt;10 mV (MSO64) and &gt;10 mV (MSO5 series). Spectrum view enables to identify the source of Ripple. Allows Ripple frequency to be configured for each power rail. Allows bandwidth limit capability using the vertical menu of the Oscilloscope channels.</td>
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<tr>
<td><strong>Transient analysis</strong></td>
<td>Overshoot and Undershoot measurements enable the designers to measure the Power Rail specific Overshoot and Undershoot values. Multi Rail support speeds up the testing. Allows designers to enter the voltage levels and reference voltage levels for calculating the Overshoot and Undershoot. Allows bandwidth limit capability using the vertical menu of the Oscilloscope channels.</td>
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<tr>
<td><strong>Power sequence analysis</strong></td>
<td>Turn-on and Turn-off times testing enables designers to find out the Turn-on or Turn-off times of all rails in one go. Allows designers to enter the capture time.</td>
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<tr>
<td><strong>Plots</strong></td>
<td>Histogram</td>
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<tr>
<td><strong>Report</strong></td>
<td>MHT and PDF format, Data export to CSV format</td>
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<tr>
<td><strong>Degauss/Deskew (static)</strong></td>
<td>Automatic detection of probes, Auto Zero. User can deskew probes from the menus for each channel</td>
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<tr>
<td><strong>Source support</strong></td>
<td>Live analog signals, reference waveforms, and math waveforms</td>
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Ordering information

Models

<table>
<thead>
<tr>
<th>New instrument order option</th>
<th>Product upgrade option</th>
<th>Supported instruments</th>
</tr>
</thead>
<tbody>
<tr>
<td>5/6-DPM</td>
<td>SUP5/6-DPM</td>
<td>5/6 Series MSO Oscilloscopes (MSO54, MSO56, MSO58, MSP58LP, MSO64)</td>
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<tr>
<td>SUP5/6-DPM-FL</td>
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Recommended probes and accessories

<table>
<thead>
<tr>
<th>Accessory type</th>
<th>Recommended</th>
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<tr>
<td>Power Rail Probes</td>
<td>TPR1000, TPR4000</td>
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Complete power probing portfolio

Use the following list of Power Rail probes with option 5/6-DPM to ensure complete solution to Digital power measurement capabilities on the 5/6 Series MSO oscilloscopes.

<table>
<thead>
<tr>
<th>Power Rail Probes</th>
<th>Description</th>
<th>Image</th>
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<tbody>
<tr>
<td>TPR1000, TPR4000</td>
<td>TPR1000 and TPR4000 are the recommended probes for the DPM measurement. The TPR1000 and TPR4000 probes provide a low-noise measurement solution (oscilloscope and probe), which is critical to not confuse the noise of the oscilloscope and probe with the noise and ripple of the measured DC supply. The higher input impedance in the probes minimizes the oscilloscope loading effect on the DC rails (50 kΩ at DC). P6150 and Direct SMA cable with DC Block can also be used for power rail measurement.</td>
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Details for power rail probes are available at [https://www.tek.com/datasheet/active-power-rail-probes](https://www.tek.com/datasheet/active-power-rail-probes)