Ultra high speed bi-polar power supply

- Waveform generation, sequence operation, various measurements can be performed on a single power supply
- All settings and operations are realized only by operation on the front panel
- Perfect synchronous operation is possible even during high speed operation during parallel operation

Output voltage: ±20 V to ±60 V
Output power: 150 W to 2000 W

www.matsusada.com
DOSF series is equipped with a built-in function generator enabling its compact size and ultra fast response. Any waveform can be programmed easily from the front panel and new features including memory setting and protection functions are now available. External control is also available (communication options).
And, DOSF series can be used as ultra high-speed bi-polar amplifier by inputting an external signal.

Features

- Ultra fast response of DC to 200 kHz
- Function generator integrated
- Waveform with less distortion by DDS method (DC to 200 kHz sine wave, square wave and triangular wave)
- DC and AC output, and CV and CC mode can be programmed individually, making the unit user-friendly with its simple operation.
- External control is available with communication options. (USB, LAN, RS-232C and RS-485)
- LCD display uses high contrast white LED backlight for high legibility

![Diagram of four-quadrant operation]

Typical applications

Driving capacitive load (capacitors and so on), biasing inductive loads (coils, transformers, etc.), various motor testing, power conditioners, solar panels, surface treatment
### Lineup

*Models with voltage, current or frequencies not listed here are also available. Please contact the nearest sales office.*

<table>
<thead>
<tr>
<th>Model</th>
<th>Output voltage V(rms)</th>
<th>Output current A(rms)</th>
<th>Output power W</th>
<th>Frequency response kHz(-3dB) CV mode</th>
<th>CC mode</th>
<th>Weight kg(approx.)</th>
<th>Dimension (P, 6, 7)</th>
</tr>
</thead>
<tbody>
<tr>
<td>DOSF20-7.5</td>
<td>±7.5(5.3)</td>
<td>±15(10.5)</td>
<td>150</td>
<td></td>
<td></td>
<td>11</td>
<td>A</td>
</tr>
<tr>
<td>DOSF20-15</td>
<td>±15(10.5)</td>
<td>±30(21)</td>
<td>300</td>
<td></td>
<td></td>
<td>17</td>
<td>A</td>
</tr>
<tr>
<td>DOSF20-30</td>
<td>±30(21)</td>
<td>±60(42)</td>
<td>600</td>
<td>DC to 200</td>
<td></td>
<td>23</td>
<td>B</td>
</tr>
<tr>
<td>DOSF20-60</td>
<td>±60(42)</td>
<td>±100(70)</td>
<td>1200</td>
<td>DC to 100</td>
<td></td>
<td>40</td>
<td>C</td>
</tr>
<tr>
<td>DOSF20-100</td>
<td>±100(70)</td>
<td></td>
<td>2000</td>
<td></td>
<td></td>
<td>47</td>
<td>D</td>
</tr>
<tr>
<td>DOSF25-6</td>
<td>±6(4.2)</td>
<td>±12(8.6)</td>
<td>150</td>
<td></td>
<td></td>
<td>11</td>
<td>A</td>
</tr>
<tr>
<td>DOSF25-12</td>
<td>±12(8.6)</td>
<td>±24(17.1)</td>
<td>300</td>
<td></td>
<td></td>
<td>17</td>
<td>A</td>
</tr>
<tr>
<td>DOSF25-24</td>
<td>±24(17.1)</td>
<td>±48(34)</td>
<td>600</td>
<td></td>
<td></td>
<td>23</td>
<td>B</td>
</tr>
<tr>
<td>DOSF25-48</td>
<td>±48(34)</td>
<td>±80(56)</td>
<td>1200</td>
<td></td>
<td></td>
<td>40</td>
<td>C</td>
</tr>
<tr>
<td>DOSF25-80</td>
<td>±80(56)</td>
<td>±150(70)</td>
<td>2000</td>
<td></td>
<td></td>
<td>47</td>
<td>D</td>
</tr>
<tr>
<td>DOSF45-3.3</td>
<td>±150(70)</td>
<td>±3.3(2.4)</td>
<td>150</td>
<td>DC to 200</td>
<td>DC to 100</td>
<td>12</td>
<td>A</td>
</tr>
<tr>
<td>DOSF45-6.6</td>
<td>±3.3(2.4)</td>
<td>±6.6(4.7)</td>
<td>300</td>
<td></td>
<td></td>
<td>17</td>
<td>A</td>
</tr>
<tr>
<td>DOSF45-13.3</td>
<td>±6.6(4.7)</td>
<td>±13.3(9.5)</td>
<td>600</td>
<td></td>
<td></td>
<td>23</td>
<td>B</td>
</tr>
<tr>
<td>DOSF45-16</td>
<td>±13.3(9.5)</td>
<td>±16(11.3)</td>
<td>720</td>
<td></td>
<td></td>
<td>23</td>
<td>B</td>
</tr>
<tr>
<td>DOSF45-26.7</td>
<td>±16(11.3)</td>
<td>±26.7(18.9)</td>
<td>1200</td>
<td></td>
<td></td>
<td>40</td>
<td>C</td>
</tr>
<tr>
<td>DOSF45-44.4</td>
<td>±26.7(18.9)</td>
<td>±44.4(31.1)</td>
<td>2000</td>
<td></td>
<td></td>
<td>47</td>
<td>D</td>
</tr>
<tr>
<td>DOSF60-2.5</td>
<td>±44.4(31.1)</td>
<td>±2.5(1.75)</td>
<td>150</td>
<td></td>
<td></td>
<td>12</td>
<td>A</td>
</tr>
<tr>
<td>DOSF60-5</td>
<td>±2.5(1.75)</td>
<td>±5(3.5)</td>
<td>300</td>
<td></td>
<td></td>
<td>17</td>
<td>A</td>
</tr>
<tr>
<td>DOSF60-10</td>
<td>±5(3.5)</td>
<td>±10(7)</td>
<td>600</td>
<td></td>
<td></td>
<td>23</td>
<td>B</td>
</tr>
<tr>
<td>DOSF60-20</td>
<td>±10(7)</td>
<td>±20(14)</td>
<td>1200</td>
<td></td>
<td></td>
<td>40</td>
<td>C</td>
</tr>
<tr>
<td>DOSF60-33.3</td>
<td>±20(14)</td>
<td>±33.3(23.3)</td>
<td>2000</td>
<td></td>
<td></td>
<td>47</td>
<td>D</td>
</tr>
</tbody>
</table>

### Specifications

<table>
<thead>
<tr>
<th>Input voltage / current</th>
<th>Model</th>
<th>Input voltage</th>
<th>Input current</th>
<th>Recommended breaker</th>
</tr>
</thead>
<tbody>
<tr>
<td>150 W</td>
<td>115 V</td>
<td>4 A</td>
<td>115 VAC / 15 A</td>
<td></td>
</tr>
<tr>
<td>300 W</td>
<td>230 V</td>
<td>7 A</td>
<td>230 VAC / 15 A</td>
<td></td>
</tr>
<tr>
<td>600 W</td>
<td>230 V</td>
<td>7 A</td>
<td>230 VAC / 15 A</td>
<td></td>
</tr>
<tr>
<td>720 W</td>
<td>230 V</td>
<td>8 A</td>
<td>230 VAC / 15 A</td>
<td></td>
</tr>
<tr>
<td>1.2 kW</td>
<td>115 V</td>
<td>13 A</td>
<td>230 VAC / 20 A</td>
<td></td>
</tr>
<tr>
<td>2 kW</td>
<td>230 V</td>
<td>20 A</td>
<td>230 VAC / 30 A</td>
<td></td>
</tr>
</tbody>
</table>

- **Waveform generation function**: Sine wave, Rectangular wave, Triangular wave, Phase setting (Sine wave), Duty setting (Rectangular wave and Triangular wave)
- **Frequency setting accuracy**: ≤0.03 %
- **Frequency for waveform**: DC, 1 kHz to 200 kHz (at CV mode), 100 kHz (at CC mode)
- **External control voltage**: -10 V to +10 V (input impedance > 10 kΩ, change by a switch)
- **Output setting range**: DC : -100 % to +100 % / AC : 0 % to +100 %
- **Ripple**: 0.02 %rms
- **Stability**: 0.016 % / Hr typ.
- **Setting accuracy**: DC±0.5 %F.S., AC±0.5 %F.S. (at frequency = DC to 20 kHz)
- **Distortion factor**: CV : 0.05 %, CC : 0.5 %
- **Voltage regulation**: Line : 0.05 % (for ±10 % input change) / Load : 0.05 % (for 0 % to 100 % load change)
- **Protections**: Against over voltage, over current (variable OVP / OCP limit) and output short-circuit
- **Temperature coefficient**: 0.02 % / °C (at CV mode), 0.04 % / °C (at CC mode)
- **Output voltage control**: -10 V to +10 V (output impedance 50 Ω)
- **Output display**: LCD on front panel, Output voltage monitor (3-digit), output current monitor (3-digit) (AC, DC, MAX, MIN)
- **Output display accuracy**: DC : ±1.5 %F.S.±1-digit / AC : ±1.5 %F.S.±1-digit (at frequency ≥ DC to 20 kHz)
- **Output monitor**: Output voltage, Output current : -10 V to +10 V ±1 %F.S.(output impedance 1 kΩ)
- **Preset function**: 10-memory
- **Operating temperature**: 0 °C to +40 °C
- **Storage temperature**: -40 °C to +85 °C
- **Humidity**: 20 % to 80 %RH (no condensation)
- **Accessories**: Input cable 2.5 m length (1) (3-pin connector for 115V input models, Flying lead for 230V input models) Instruction manual (1)
Functions

Fundamental wave generated function

The DOSF is equipped with a built in function generator that produces sine, rectangular, and triangle waves. Frequency range can be set between 0.01 Hz and 200 kHz, and easy adjustments of amplitude, initial phase(sine wave), switching/cutoff phase setting(sine wave), and duty cycle(rectangular wave, triangular wave) are possible, making it very convenient for a variety of evaluation tests and applications.

- Initial phase
- Switching phase
- Cutoff phase

Applications

Rush current source for rush current measurement, wave fluctuation test etc.

Sequence functions *

DOSF is equipped with a sequence function that can program step length, step amplitude, ramp, CV / CC mode, sequence-ending setting, AC superposition, step jump, number of jump, etc. Any desired wave form can be generated making it useful for various experiment, evaluation, and validation applications.

- Setting length : 10 ms to 1999 s999 ms(resolution : 1 ms), Ramp and AC wave form is 50 ms
- Up to 16 steps can be set and saved plus three programs per program.
- Can be set CV / CC mode per program
- Frequency : Infinite, 1 to 999

Program image

Complicated wave forms such as below can be easily generated just by using the sequence function.

- Pulse current variation
- Ripple current superposition
- AC voltage / frequency variation
- DC voltage interruption

Applications

Motor testing, pulse power supplies, or various evaluation equipment, etc

* If amplifier’s output cuts off while it is running a sequence program half-way-through, the leftover sequence will not run but it is re-activated from the beginning of the original sequence.
**Measurement functions**

DOSF is equipped with measurement functions that measure DC value, AC RMS value, Max value, and Min. value. thus Wide frequency ranges, DC to 200 kHz, can be measured automatically, and it is easy to change the setting depending on application.

**Memory function**

DOSF is equipped with both preset and set-up memory.

During fundamental wave operation, output voltage (at CV mode), Output current(at CC mode), CV / CC setting, and waveform setting can be saved to 10 set-up memories. Also, sequence programs can be saved in up to 3 programs. Data changes can be saved and data called out very easily.

**DOSF is equipped with a [ protection function ], [ key-lock function ], and [ CV / CC crossover ], as standard options.**

**Operability**

DOSF series has numerous functions, it is user-friendly, and will contribute to minimizing tact time as well as improving efficiency of operation.

- **Power switch**: This has priority over all operations for safety reason.
- **Amplitude setting switch**: DC and AC amplitude changeover (voltage or current)
- **Amplitude adjustment rotary encoder**: It is used as amplitude setting, each setting change, sequence editing
- **Output switch**: Turn Output ON / OFF
- **Display**: Display each setting, monitor value
- **Memory switch**: Call up and save set-up memory
- **Wave switch**: Fundamental wave changeover
- **OVP setting switch**: Set OVP, OCP protection function setting and measurement setting
- **CV / CC changeover switch**: CV / CC changeover
- **Key-lock switch**: Set key-lock
- **Display switch**: Change display
- **Frequency setting switch**: Change waveform setting (frequency, phase, duty cycle, etc)
- **Frequency adjustment rotary encoder**: Set wave setting value
- **External control voltage effective switch**: Integrated function generator and external voltage operation changeover
Function / Dimensions inch (mm)

A

[Front]

1. Power ON / OFF switch
2. Amp. / Bias setting encoder
3. Amp. / Bias change switch
4. OUTPUT indication LED
5. OUTPUT ON / OFF switch
6. Display
7. Memory setting switch
8. OVP setting switch

B

[Front]

9. Key lock indicate LED
10. Key lock switch
11. Waveform change switch
12. CV / CC change switch
13. Display change switch
14. Frequency / Duty change switch
15. Frequency / Duty setting encoder
16. External control voltage indicate LED
17. External control voltage switch
18. External control voltage input terminal
19. Interlock (option)
20. Remote switch ON / OFF (option)
21. Connector for Master-slave (option)
22. Output terminal
23. Output terminal
24. Output current monitor terminal
25. AC Input terminal

[Side]

D : 150W models...482
300W models...550

[Side]
1. Power ON / OFF switch
2. Amp. / Bias setting encoder
3. Amp. / Bias change switch
4. OUTPUT indication LED
5. OUTPUT ON / OFF switch
6. Display
7. Memory setting switch
8. OVP setting switch
9. Key lock indicate LED
10. Key lock switch
11. Waveform change switch
12. CV / CC change switch
13. Display change switch
14. Frequency / Duty change switch
15. Frequency / Duty setting encoder
16. External control voltage indicate LED
17. External control voltage switch
18. External control voltage input terminal
19. Output terminal
20. Output voltage monitor terminal
21. Output current monitor terminal
22. Remote switch ON / OFF (option)
23. Interlock (option)
24. Connector for Master-slave (option)
25. AC Input terminal
Options

- **Rise time**
  (Stepping time): The response time is sometimes described by the rise time (as shown in the drawing on the right).
  The rise time of an amplifier at a response speed of (= frequency bandwidth) 
  $f_c$ (Hz) is generally acquired by $\frac{\text{tr}}{\text{tf}} \approx 0.35 / f_c$.
  Fall time $\text{tf}$ is the same as $\text{tr}$.
  Frequency bandwidth:
  - at 200 kHz or lower, $\text{tr} = \text{tf} = \approx 1.8 \mu s$
  - at 100 kHz or lower, $\text{tr} = \text{tf} = \approx 3.5 \mu s$

- **Response speed**
  When accurate output waveforms are required, select an amplifier with a frequency bandwidth, which is higher than the required operating frequency. In the case of sine waves, 3 to 5 times more frequency bandwidth is required, whereas with square waves, around 10 times more frequency bandwidth is needed. Inadequate bandwidth can cause a decrease in output amplitude and a difference between input and output phases. Operating the product (load) while monitoring the actual output waveforms is recommended.

- **Capacitive load**
  Capacitive load may cause oscillation. In such cases, place a resistor in series with the output. Be careful to not limit the frequency bandwidth by using a resistor in series that is too large.

- **Inductive load**
  Some inductance of inductive load may cause resonance in CC mode. In such cases, connect a C-R series circuit between output terminals to prevent resonance.
PSS2en

The sequence software for power supplies and electronic loads

PSS2 is the dedicated software which can actuate various power supplies, electronic loads and digital controller for power supplies manufactured by Matsusada Precision Inc. with simple set up. It is the perfect for the aging test, the burn-in test and the withstand voltage test for electronic parts, and for the endurance test, intermittent / continuous operation test or various simulation test for electric component of automobile.

FEATURE

• Set-up of various sequences with simple action only inputting voltage, current and time is possible.
• Logging data can be saved in real time with the monitoring function.
• Collective control or individual sequence operation of up to 512 power supplies and electric loads is possible.
• Test continuously changing environment load of temperature or humidity in coupled operation with thermostatic chamber manufactured by ESPEC Corp. is possible.
• Packaged control in one application soft is possible if power supplies or electronic loads applied in combination with PSS2 are of many different types.
• Communication is possible using LAN port, USB (TMC) port, RS-485port in addition to RS-232C port (Only for models mounted Multi digital interface option (-LMi))
• Direct control of output voltage and current value of the power supplies is possible. (Only for models included in PSS2-DCPS and PSS2-GP)

EXAMPLES FOR OPERATION OF PSS2en

1 Set-up test condition
Make-up test conditions like as setting the power supplies or action sequence and so on. Number of settable sequence pattern is max.16, it is possible to set various test conditions fitted the target like as selection of the action mode and setting of any protection function, etc.

2 Execution of Test
It is possible to test each group setup. On the operation display, it is possible to monitor on the one screen required information like as sequence, the status of the thermostatic chamber and the power supply, and voltage / current at testing. Also when execute in parallel plural group, it is possible to monitor these status together.

3 Confirmation of Measured Data
It is possible the test data completed. It is possible to confirm values of each sequence, the individual graph or the packaged graph. Also it is possible to output measured data with CSV style and then to sum up or analyze them with the spreadsheet software.
### Low voltage type High-speed bi-polar power supplies

#### Ultra-fast response type

**DOS series**

<table>
<thead>
<tr>
<th>Output voltage</th>
<th>±20V to ±60V</th>
</tr>
</thead>
<tbody>
<tr>
<td>Output power</td>
<td>150W to 1.2kW</td>
</tr>
<tr>
<td>Frequency bandwidth</td>
<td>DC to maximum 200kHz</td>
</tr>
</tbody>
</table>

- Ultra-fast response is achieved in compact size.

#### High voltage type

**DOC series**

<table>
<thead>
<tr>
<th>Output voltage</th>
<th>±500V, ±1000V</th>
</tr>
</thead>
<tbody>
<tr>
<td>Output power</td>
<td>50W, 100W</td>
</tr>
<tr>
<td>Frequency bandwidth</td>
<td>DC to maximum 10kHz</td>
</tr>
</tbody>
</table>

- High voltage output (maximum ±1kV) and fast response.

#### Function generator built-in type

**DOPF series**

<table>
<thead>
<tr>
<th>Output voltage</th>
<th>±20V to ±300V</th>
</tr>
</thead>
<tbody>
<tr>
<td>Output power</td>
<td>150W to 2kW</td>
</tr>
<tr>
<td>Frequency bandwidth</td>
<td>DC to maximum 30kHz</td>
</tr>
</tbody>
</table>

- DOPF series can be used for various applications by fast response and built-in function generator.

#### Wide lineup type

**DOP series**

<table>
<thead>
<tr>
<th>Output voltage</th>
<th>±5V to ±300V</th>
</tr>
</thead>
<tbody>
<tr>
<td>Output power</td>
<td>150W to 2kW</td>
</tr>
<tr>
<td>Frequency bandwidth</td>
<td>DC to maximum 30kHz</td>
</tr>
</tbody>
</table>

- The model which is most suitable for your application can be selected from wide lineup.

#### Compact and high power type

**DHOP series**

<table>
<thead>
<tr>
<th>Output voltage</th>
<th>±20V, ±45V</th>
</tr>
</thead>
<tbody>
<tr>
<td>Output power</td>
<td>240W</td>
</tr>
<tr>
<td>Frequency bandwidth</td>
<td>DC to maximum 100kHz</td>
</tr>
</tbody>
</table>

- High power and fast response are achieved in compact half-rack size.

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Introduction of other bi-polar amplifier
Please contact our sales office for detailed catalog of each models.

### High voltage type High-speed Amplifier

**Ultra-high speed type**

**AMP series**

- **Output voltage**: ±40V to ±30kV
- **Output power**: 100W to 1.2kW
- **Slew rate**: more than 700V/µs, or more than 300V/µs

- Slew rate with actual load is as high as 700V/µs.
- Peak current output of 3 times of rated output current is available.
- Various protections such as over current/voltage protection and output short circuit are available.
- Suitable for Solar battery panel evaluations, Beam deflection, Corona discharge, and so on.

**AMS / AMT series**

- **Output voltage**: ±600V to ±20kV
- **Output power**: 20W to 100W
- **Frequency bandwidth**: DC to maximum 100kHz

- Wide lineup of output voltage.
- Quick response as fast as 100kHz enables to output according to input wave forms.
- Various protections such as over current protection, arc and output short circuit are available.
- Suitable for Beam deflection, Corona discharge, Electrophotography process, and so on.

### Large current / high speed type**

**AMPS series**

- **Output voltage**: ±400V to ±20kV
- **Output power**: 400W to 1.2kW
- **Slew rate**: 400V/µs to 1200V/µs

- Maximum peak current is 4A.
- Frequency bandwidth with actual load is as high as 100kHz.
- Various protections such as over current protection and output short circuit are available.
- It is also possible to measure short circuit current when the output voltage of solar battery is 0V.

**Ultra compact type**

**AMJ series**

- **Output voltage**: ±500V to ±4kV
- **Output power**: 20W, 40W
- **Frequency bandwidth**: DC to maximum 75kHz

- Ultra compact size and fast response.
- Output of any wave forms according to input wave forms is available.
- Various protections such as over current protection, arc and output short circuit are available.
- Suitable for Beam deflection, Corona discharge, Electrophotography process, and so on.
Customer Inquiry Sheet (DOSF series)

Please copy this page and above fax number after filling out form below.

- I would like
  - A quotation
  - An explanation of product
  - A demonstration
  - To purchase
  - Other ( )

- Give us your requirement / comment

- Please fill in below.
  
  Address:
  Company:
  Dept.: Title:
  Name:
  Tel: Fax:
  E-mail:

Manufacturer warranty

We warrant the specification, unless otherwise specified, at max. rated output after warm up, and scope of application is between 10 % and 100 % of max. rated output. We warrant that products contained in this catalog (hereinafter, the "Products") are free from defects in material and workmanship under normal use for a period of one (1) year from the date of shipment thereof. However, the warranty period for X-ray detectors and X-ray source shall be either one (1) year from the date of shipment or 1,000 hours, whichever shorter. The above warranty shall not apply to any Product which, at our sole judgment, has been: i) Repaired or altered by persons unauthorized by us; or ii) Connected, installed, adjusted or used otherwise than in accordance with the instructions furnished by us (including being used in an inappropriate installation environment, such as in corrosive gas, high temperature and humidity). We are not liable for any loss, damage or failure of the Products after the shipment thereof caused by external factors such as disasters. We will not inspect, adjust or repair any of our power supply products in the field or at any customer site. If you suspect that there has been a power supply failure in the field, please inspect your whole unit by yourself in an effort to determine that the problem is, in fact, arising out of our power supply products. If it is found that the problem is arising out of such power supply product after inspection, please contact your local sales office for additional troubleshooting. A "Return Merchandise Authorization" is required in case the power supply must be sent back to the factory in Japan for inspection and repair. We, at our sole discretion repair or replace such defective products at no cost to the purchaser. We assume no liability to the purchaser or any third party for special, incidental, consequential, or other damages resulting from a breach of the foregoing warranty. This warranty excludes any and all other warranties not set forth herein, express or implied, including without limitation the implied warranties of merchantability or fitness for a particular purpose. The Products are not designed and produced for such applications as requiring extremely high reliability and safety, or involving human lives (such as nuclear power, aerospace, social infrastructure facility, medical equipment, etc.). The use under such environment is not covered by this warranty and may require additional design and manufacturing processes. No modification or supplement of this warranty shall be binding unless in writing and signed by a duly authorized officer of Matsusada. Matsusada reserves the right to make any changes in the contents of catalogs or specifications at any time without advance notice. Due to compelling reason such as unavailability of components used, products might be un available or unable to repair. The products specified in catalogs or specifications are designed for use by the person who has enough expertise or under the control of such person, and not for general consumers. Schematics of products shall not be submitted to users. Test result or test data for the products shall be available upon request with charge.

Make sure you read the specification in the latest catalog before you order. Contact nearby sales office for the latest catalog.

PLEASE SEE THE LINK BELOW FOR THE COMPLETE WARRANTY TERMS
http://www.matsusada.com/site/warranty.html

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