



HIGH SPEED PROGRAMMING OPTIONS FOR SM800, SM1500, SM3000 and SM6000

- Programming speed about 10 - 20 times faster (compared with standard versions)
- Low output capacitance

| SM800-series (800 watt) | | | |
|-------------------------|-------------|-----------|----------|
| SM 7.5-80 | Option P250 | 0 - 7.5 V | 0 - 80 A |
| SM 18-50 | Option P251 | 0 - 18 V | 0 - 50 A |
| SM 70-AR-24 | Option P252 | 0 - 70 V | 0 - 24 A |
| SM 400-AR-4 | Option P253 | 0 - 400 V | 0 - 4 A |

| SM1500-series (1500 watt) | | | |
|---------------------------|-------------|-----------|-----------|
| SM 15-100 | Option P210 | 0 - 15 V | 0 - 100 A |
| SM 35-45 | Option P211 | 0 - 35 V | 0 - 45 A |
| SM 52-30 | Option P212 | 0 - 52 V | 0 - 30 A |
| SM 52-AR-60 | Option P213 | 0 - 52 V | 0 - 60 A |
| SM 70-22 | Option P214 | 0 - 70 V | 0 - 22 A |
| SM 120-13 | Option P215 | 0 - 120 V | 0 - 13 A |
| SM 300-5 | Option P216 | 0 - 300 V | 0 - 5 A |

| SM3000-series (3000 watt) | | | |
|---------------------------|-------------|-----------|-----------|
| SM 15-200 D | Option P104 | 0 - 15 V | 0 - 200 A |
| SM 30-100 D | Option P031 | 0 - 30 V | 0 - 100 A |
| SM 45-70 D | Option P105 | 0 - 45 V | 0 - 70 A |
| SM 70-45 D | Option P032 | 0 - 70 V | 0 - 45 A |
| SM 120-25 D | Option P106 | 0 - 120 V | 0 - 25 A |
| SM 300-10 D | Option P061 | 0 - 300 V | 0 - 10 A |

| SM6000-series (6000 watt) | | | |
|---------------------------|-------------|-----------|-----------|
| SM 15-400 | Option P166 | 0 - 15 V | 0 - 400 A |
| SM 30-200 | Option P167 | 0 - 30 V | 0 - 200 A |
| SM 45-140 | Option P168 | 0 - 45 V | 0 - 140 A |
| SM 60-100 | Option P169 | 0 - 60 V | 0 - 100 A |
| SM 70-90 | Option P170 | 0 - 70 V | 0 - 90 A |
| SM 120-50 | Option P171 | 0 - 120 V | 0 - 50 A |
| SM 300-20 | Option P172 | 0 - 300 V | 0 - 20 A |

Description:

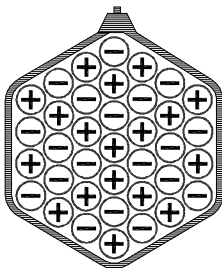
- The SM-series with the High Speed Programming Options are optimized for maximum programming speed. The speed is about **10 - 20 times higher** compared to the standard version.
- To achieve the high speed, the output capacitance has been made much smaller. Because of the smaller capacitors, the output ripple voltage is higher, but this is generally no problem for applications requiring high speed.
- The low output capacitance and the fast control result in relatively low current overshoots (if any) in case of sudden voltage variations caused by the load, this is of great advantage for laserdiode applications.

Applications:

- Laser diode power supply, continuous or pulsed.
- Test systems requiring a fast settling time to improve throughput of factory.
- A constant current source with a low parallel capacitance: plasma, load sensitive to current overshoots, etc.
- A constant current source on a load with fast voltage variations.

Recommendations:

- Use **low inductive cabling**, specially for higher currents.
The inductance of the connecting cables (between the power supply and the load) can cause overshoots and slow-down of the rise- and fall-times.
A low inductive cable can be constructed by using multiple isolated strands for the plus- and minus-wires and by bundling the combination of the mixed plus- and minus-wires. Each plus-wire should be close to a minus-wire, see figure below. For lower currents it can be sufficient to tie the plus- and minus-wire very close to each other.



Low Inductance Cable cross section

- Depending on the load impedance, the series inductance of the cables and the parallel capacitance of the power supply can make a resonant circuit, causing ringing and overshoots. Note that the voltage- and current-control of the power supply has little influence on this effect, because it is outside the control loop. To overcome this problem, connect an RC-filter to the load, to damp the circuit.
- When using analog programming, take care that the **programming source is fully floating**. In case of a non-floating source, the power supply should be equipped with an ISO AMP CARD. When the source is not sufficiently floating, it could result in distorted waveforms.
- Remote sensing is not recommended.



An ISO AMP CARD should be used in case of a non-floating programming source.

| SM800 | | | | |
|---|---|---------------------------------------|--|--|
| Programming speed <i>High Speed Version</i> | SM 7.5-80 <i>option P250</i> | SM 18-50 <i>option P251</i> | SM 70-AR-24 <i>option P252</i> | SM 400-AR-4 <i>option P253</i> |
| CV-mode, resistive load | | | | |
| Rise time (10 - 90%) | | | | |
| output voltage step | 0 → 7.5V | 0 → 16V | 0 → 35V | 0 → 200V |
| time, (100 % load) | 0.2 ms | 0.22 ms | 0.24 ms | 0.4ms |
| time, (10 % load) | 0.2 ms | 0.26 ms | 0.24 ms | 0.3ms |
| output voltage step | - | - | 0 → 70V | 0 → 400V |
| time, (100 % load) | - | - | 0.24 ms | 0.82ms |
| time, (10 % load) | - | - | 0.24 ms | 0.55 ms |
| Fall time (90 - 10%) | | | | |
| output voltage step | 7.5 → 0 V | 16 → 0 V | 35 → 0 V | 200 → 0 V |
| time, (100 % load) | 0.2 ms | 0.24 ms | 0.27 ms | 0.42ms |
| time, (10 % load) | 1 ms | 1.95 ms | 3 ms | 4.6ms |
| output voltage step | - | - | 70 → 0 V | 400 → 0 V |
| time, (100 % load) | - | - | 0.85ms | 1.7ms |
| time, (10 % load) | - | - | 9.5ms | 20 ms |
| Ripple @ full load | | | | |
| typical (rms / pp) | 20 / 80mV | 40 / 120mV | 35V/24A 25/90mV 70V/12A | 200V/4A 35/200mV 400V/2A |
| @ full load typical (rms / pp) | - | - | 30/110mV | 30/160mV |
| Recovery time | | | | |
| @ 50 - 100% load step, typical | 100µs | 100µs | 100µs | 100µs |
| Output Capacitance (typical) | 310µF | 200µF | 80 µF | 4 µF |
| CC-mode, resistive load | Similar result as with CV-mode and resistive load | | | |
| CC-mode, diode load (constant voltage load) | Even higher speed possible. Generally 2 - 8 times, depending on unit and load. Needs special attention on layout of cabling and damping networks because of the very high speed. Special "low inductive cables" recommended, see section Recommendations. | | | |

| SM1500 | | | | | | | | |
|---|---|---------------------------------------|---------------------------------------|--|---------------------------------------|--|---------------------------------------|---|
| Programming speed <i>High Speed Version</i> | SM 15-100 <i>option P210</i> | SM 35-45 <i>option P211</i> | SM 52-30 <i>option P212</i> | SM 52-AR-60 <i>option P213</i> | SM 70-22 <i>option P214</i> | SM 120-13 <i>option P215</i> | SM 300-5 <i>option P216</i> | SM400-AR-8 <i>option P217</i> |
| CV-mode, resistive load | | | | | | | | |
| Rise time (10 - 90%) | | | | | | | | |
| output voltage step | 0 → 15V | 0 → 35V | 0 → 52V | 0 → 26V | 0 → 70V | 0 → 120V | 0 → 300V | 0 → 200V |
| time, (100 % load) | 0.20 ms | 0.27 ms | 0.31 ms | 0.44ms | 0.47 ms | 0.46 ms | 1.0 ms | 0.35 ms |
| time, (10 % load) | 0.11 ms | 0.14 ms | 0.23 ms | 0.43 ms | 0.30 ms | 0.27 ms | 0.51 ms | 0.33 ms |
| output voltage step | - | - | - | 0 → 52V | - | - | - | 0 → 400V |
| time, (100 % load) | - | - | - | 0.53ms | - | - | - | 0.98 ms |
| time, (10 % load) | - | - | - | 0.34 ms | - | - | - | 0.59 ms |
| Fall time (90 - 10%) | | | | | | | | |
| output voltage step | 15 → 0 V | 35 → 0 V | 52 → 0 V | 26 → 0 V | 70 → 0V | 120 → 0V | 300 → 0V | 200 → 0V |
| time, (100 % load) | 0.21 ms | 0.33 ms | 0.38 ms | 0.27 ms | 0.78ms | 0.51 ms | 1.40ms | 0.35 ms |
| time, (10 % load) | 1.6 ms | 3.5 ms | 3.9 ms | 3.2ms | 8.3ms | 4.5 ms | 13ms | 3.8 ms |
| output voltage step | - | - | - | 52 → 0 V | - | - | - | 400 → 0V |
| time, (100 % load) | - | - | - | 1.0ms | - | - | - | 1.7ms |
| time, (10 % load) | - | - | - | 9.7ms | - | - | - | 18ms |
| Ripple @ full load | | | | | | | | |
| typical (rms / pp) | 15/50mV | 50/115mV | 55/135mV | 26V/60A 30/105mV 52V/30A | 45/150mV | 20/80mV | 25/115mV | 200V/8A 85/355mV 400V/4A |
| @ full load typical (rms / pp) | - | - | - | 25/90mV | - | - | - | 60/245mV |
| Recovery time | | | | | | | | |
| @ 50 - 100% load step, typical | 100µs | 100µs | 100µs | 100µs | 100µs | 100µs | 100µs | 100µs |
| Output Capacitance (typical) | 390µF | 190µF | 91µF | 195µF | 113µF | 21 µF | 10µF | 7 µF |
| CC-mode, resistive load | Similar result as with CV-mode and resistive load | | | | | | | |
| CC-mode, diode load (constant voltage load) | Even higher speed possible. Generally 2 - 8 times, depending on unit and load. Needs special attention on layout of cabling and damping networks because of the very high speed. Special "low inductive cables" recommended, see section Recommendations. | | | | | | | |

| SM3000 | | | | | | |
|---|---|--|---|---|--|--|
| Programming speed <i>High Speed Version</i> | SM 15-200 D <i>option P104</i> | SM 30-100 D <i>option P031</i> | SM 45-70 D <i>option P105</i> | SM 70-45 D <i>option P032</i> | SM 120-25 D <i>option P106</i> | SM 300-10 D <i>option P061</i> |
| CV-mode, resistive load | | | | | | |
| Rise time (10 - 90%) output voltage step time, (100 % load) time, (10 % load) | 0 → 15V 0.36 ms 0.26 ms | 0 → 30V 0.33 ms 0.32 ms | 0 → 45V 0.50 ms 0.35 ms | 0 → 70V 0.45 ms 0.30 ms | 0 → 120V 0.34 ms 0.32 ms | 0 → 300V 1.00 ms 0.40 ms |
| Fall time (90 - 10%) output voltage step time, (100 % load) time, (10 % load) | 15 → 0 V 0.37 ms 1.60 ms | 30 → 0 V 0.55 ms 3.50 ms | 45 → 0 V 0.60 ms 5.00 ms | 70 → 0 V 0.67 ms 6.00 ms | 120 → 0 V 0.38 ms 3.50 ms | 300 → 0 V 1.20 ms 11.0 ms |
| Ripple @ full load typical (rms / pp) | 5/35 mV | 15/70 mV | 20/100 mV | 30/120 mV | 30/120 mV | 60/320 mV |
| Recovery time @ 50 - 100% load step typical time | 100 μs | 100 μs | 100 μs | 100 μs | 100 μs | 100 μs |
| Output Capacitance (typical) | 800 μF | 500 μF | 360 μF | 170 μF | 33 μF | 16 μF |
| CC-mode, resistive load | Similar result as with CV-mode and resistive load | | | | | |
| CC-mode, diode load (constant voltage load) | Even higher speed possible. Generally 2-8 times, depending on unit and load. Needs special attention on layout of cabling and damping networks because of the very high speed. Special "low inductive cables" recommended, see section Recommendations. | | | | | |

| SM6000 | | | | | | | |
|---|---|--|--|--|---------------------------------------|--|--|
| Programming speed <i>High Speed Version</i> | SM 15-400 <i>option P166</i> | SM 30-200 <i>option P167</i> | SM 45-140 <i>option P168</i> | SM 60-100 <i>option P169</i> | SM 70-90 <i>option P170</i> | SM 120-50 <i>option P171</i> | SM 300-20 <i>option P172</i> |
| CV-mode, resistive load | | | | | | | |
| Rise time (10 - 90%) output voltage step time, (100 % load) time, (10 % load) | 0 → 15V 0.40 ms 0.38 ms | 0 → 30V 0.41 ms 0.38 ms | 0 → 45V 0.53 ms 0.16 ms | 0 → 60V 0.44 ms 0.41 ms | 0 → 70V 0.62 ms 0.40 ms | 0 → 120V 0.57 ms 0.19 ms | 0 → 300V 1.1 ms 0.44 ms |
| Fall time (90 - 10%) output voltage step time, (100 % load) time, (10 % load) | 15 → 0 V 0.39 ms 1.5 ms | 30 → 0 V 0.41 ms 3.6 ms | 45 → 0 V 0.26 ms 10 ms | 60 → 0 V 0.57 ms 5.6 ms | 70 → 0 V 0.50 ms 6.2 ms | 120 → 0 V 0.38 ms 4.2 ms | 300 → 0 V 1.0 ms 10 ms |
| Ripple @ full load typical (rms / pp) | 6/20 mV | 28/80 mV | 34/80 mV | 34/90 mV | 38/100 mV | 30/120 mV | 48/150 mV |
| Recovery time @ 50 - 100% load step typical time | 100 μs | 100 μs | 100 μs | 100 μs | 100 μs | 100 μs | 100 μs |
| Output Capacitance (typical) | 1200 μF | 800 μF | 520 μF | 330 μF | 290 μF | 73 μF | 32 μF |
| CC-mode, resistive load | Similar result as with CV-mode and resistive load | | | | | | |
| CC-mode, diode load (constant voltage load) | Even higher speed possible. Generally 2-8 times, depending on unit and load. Needs special attention on layout of cabling and damping networks because of the very high speed. Special "low inductive cables" recommended, see section Recommendations. | | | | | | |

