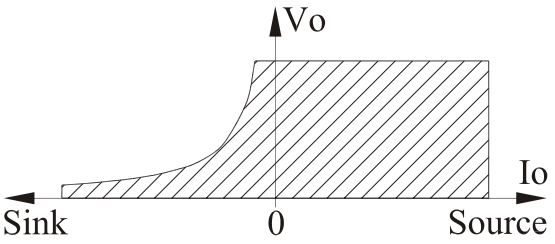
SM 6000 with Power Sink Option

2 Quadrant operation: Source and Sink

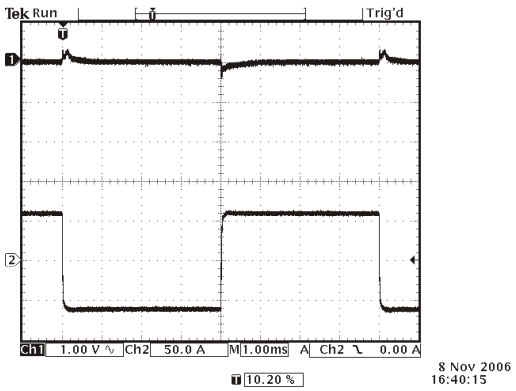
SM15-400

Models	Order Code
SM 15-400	P230
SM 30-200	P231
SM 45-140	P232
SM 60-100	P233
SM 70-90	P234

The Power Sink Option permits the power supply to absorb bursts of power fed back to the unit. An internal module senses the status of power supply and sinks current across the output terminals, thus maintaining a constant output voltage.
The Power Sink Option allows a faster response when the power supply is step programmed to a lower voltage at low load conditions.

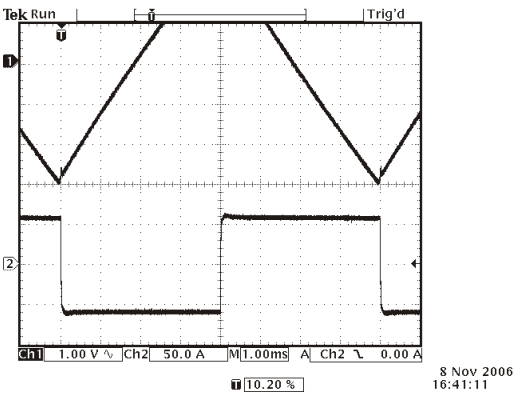


- Can absorb 700 W peak power
- Maintains output voltage setting regardless output power is positive or negative (source and sink)
- Ideal solution for supplying electric motors with PWM-speed control. These systems often return power to the power supply during a braking action
- Ideal solution for ATE systems requiring fast down programming at no load conditions
- Generation Automotive waveforms (fast)



SM15-400 **with** Power Sink Option
Current – 60 A means the load delivers 60 A to the power supply (sink operation)

Upper trace: output voltage
Lower trace: output current
(current switching from +60 A to –60 A at Vo=6 V)

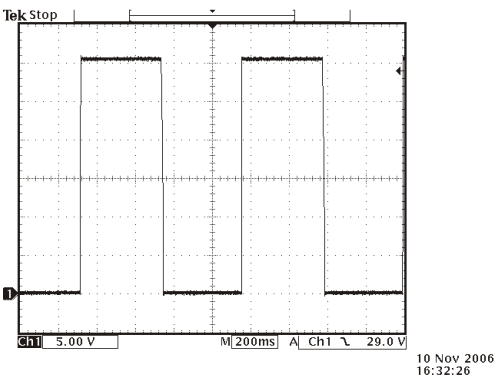


SM15-400 **without** Power Sink Option
*The output voltage is out of control when the output current is **negative***

Upper trace: output voltage
Lower trace: output current
(current switching from +60 A to –60 A at Vo=6 V)

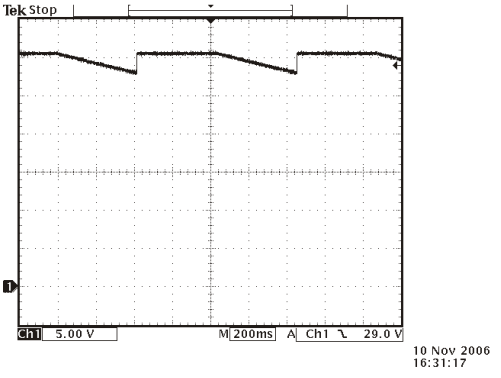
Power Sink Specifications	SM15-400 ***Option P230***	SM30-200 ***Option P231***	SM45-140 ***Option P232***	SM60-100 ***Option P233***	SM70-90 ***Option P234***
Sink Power Rating max. peak power (electronically limited) max. continuous power ($T_{amb.}$ = 25 °C) max. continuous power ($T_{amb.}$ = 50 °C)	700 W 550 W 275 W				
Max. duration Sink Peak Power P_{sink} = 700 W, $T_{amb.}$ = 25 °C **Duty Cycle for use at Peak Power** P_{sink} = 700 W, $T_{amb.}$ = 25 °C P_{sink} <= 700 W, t_{on} <= 40 s t_{on} = time, power dissipation is > 0 W t_{off} = time, power dissipation is 0 W $P_{av} = P_{peak} * t_{on} / (t_{off} + t_{on})$	max. t_{on} = 80 s, following t_{off} = 600 s (for cooling down) t_{on} <= 40 s / t_{off} >= 12 s average power <= 550 W				
Max. Sink Current (V_o >= 2 V and P <= 700 W)	Limited at 140 A	Limited at 140 A	Limited at 140 A	Limited at 100 A	Limited at 100 A
Protection	Electronic Power Limit (700 W) limits the current. The temperature of the power sink is fan controlled and the circuit shuts down in case of thermal overload.				
Recovery time / Deviation Vo = 6 V, I_o: +200 A → –80 A recovery within 100 mV / deviation:	di/dt = –5 A/µs 250 µs / 0.40 V	di/dt = –5 A/µs 350 µs / 0.75 V	-	-	-
Vo = 15 V, I_o: +90 A → –30 A recovery within 100 mV / deviation:	di/dt = –3.5 A/µs 550 µs / 0.25 V	di/dt = –3.5 A/µs 550 µs / 0.45 V	di/dt = –3.5 A/µs 650 µs / 0.90 V	di/dt = –3.5 A/µs 650 µs / 1.10 V	di/dt = –3.5 A/µs 650 µs / 1.10 V
Vo = 24 V, I_o: +50 A → –12 A recovery within 100 mV / deviation:	-	di/dt = –1.8 A/µs 650 µs / 0.36 V	di/dt = –1.8 A/µs 750 µs / 0.60 V	di/dt = –1.8 A/µs 750 µs / 0.70 V	di/dt = –1.8 A/µs 800 µs / 0.75 V
Vo = 42 V, I_o: +20 A → –10 A recovery within 100 mV / deviation:	-	-	di/dt = –1.2 A/µs 880 µs / 0.75 V	di/dt = –1.2 A/µs 880 µs / 0.80 V	di/dt = –1.2 A/µs 900 µs / 0.80 V
Vo = 60 V, I_o: +20 A → – 5 A recovery within 100 mV / deviation:	-	-	-	di/dt = –0.9 A/µs 1.2 ms / 0.70 V	di/dt = –0.9 A/µs 1.2 ms / 0.70 V
(load current switches from positive to negative)	*note: values are typical*	*note: values are typical*	*note: values are typical*	*note: values are typical*	*note: values are typical*
Programming Down Speed Fall time at **no load** (90 - 10%) Fall time at no load *without Power Sink*	(15 → 0 V) 6 ms 3.5 s	(30 → 0 V) 10 ms 5.5 s	(45 → 0 V) 4.5 ms 3 s	(60 → 0 V) 9.5 ms 5.5 s	(70 → 0 V) 10.5 ms 6 s
Unit with Fast Programming Option *Fall time at* **no load** (90 - 10%) Fall time at no load *without Power Sink*	***P230+P166*** 420 µs 180 ms	***P231+P167*** 670 µs 410 ms	***P232+P168*** 670 µs 490 ms	***P233+P169*** 770 µs 700 ms	***P234+P170*** 980 µs 1.2 s
Parallel and Series operation Refer to power sink manual for details and restrictions.	Using multiple units in parallel operation, only one unit can have a power sink. Using multiple units in series operation, all units must have a power sink.				

Notes:
- *The maximum sink current at higher voltages will not be the maximum specified current due to the power limit. For example at 30 V the maximum sink current will only be 24 A (30 V x 24 A = 700 W = maximum power).*
- *A higher sink current than the maximum current will cause the output voltage to rise.*



SM30-200 **with** Power Sink Option
fast discharge of output capacitors by Power Sink circuit

Trace: output voltage
Voltage Programming Speed at NO LOAD



SM30-200 **without** Power Sink Option
slow response time during voltage step down, time needed to discharge the output capacitors

Trace: output voltage
Voltage Programming Speed at NO LOAD