



# SM 1500 with Power Sink Option

## 2 Quadrant operation: Source and Sink



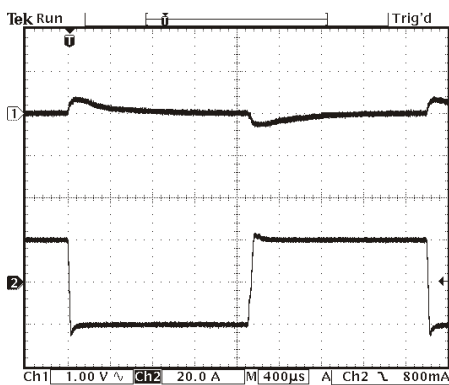
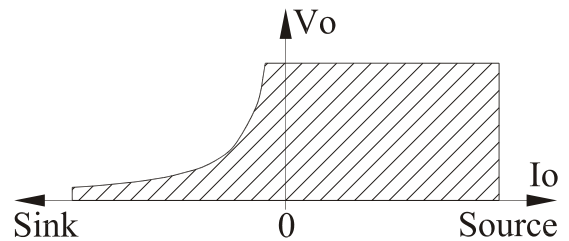
SM52-AR-60

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 small load conditions.

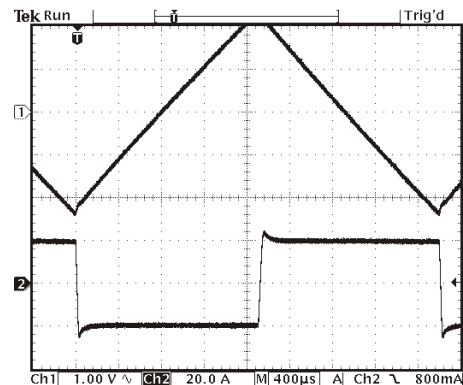
- Can absorb 200 W peak power
- Maintains output voltage setting regardless output power is positive or negative (source and sink)
- Ideal solution for supplying electric motors with PWM-speed control. These systems often return power to the power supply during a braking action
- Ideal solution for ATE systems requiring fast down programming at no load conditions
- Generation Automotive waveforms (fast)

Models	Order Code
SM 15-100	P202
SM 35-45	P203
SM 52-30	P204
SM 52-AR-60	P205
SM 70-22	P206



SM35-45 with Power Sink Option  
Current - 20 A means the load delivers 20 A to the power supply (sink operation)

Upper trace: output voltage  
Lower trace: output current  
(current switching from +20 A to -20 A at  $V_o=6 V$ )

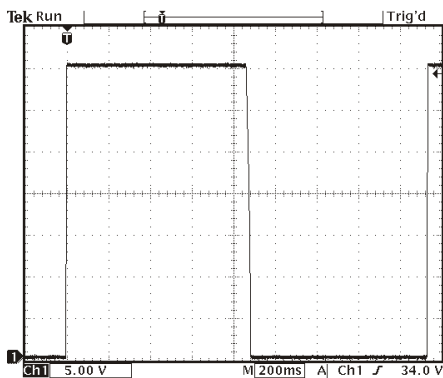


SM35-45 without Power Sink Option  
The output voltage is out of control when the output current is negative

Upper trace: output voltage  
Lower trace: output current  
(current switching from +20 A to -20 A at  $V_o=6 V$ )

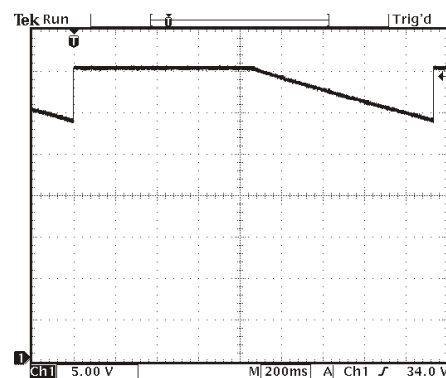
Power Sink Specifications	SM15-100 <i>option P202</i>	SM35-45 <i>option P203</i>	SM52-30 <i>option P204</i>	SM52-AR-60 <i>option P205</i>	SM70-22 <i>option P206</i>
<b>Sink Power Rating</b> max. peak power (electronically limited) max. continuous power ( $T_{amb.} = 25\text{ }^{\circ}\text{C}$ ) max. continuous power ( $T_{amb.} = 50\text{ }^{\circ}\text{C}$ )	200W 175W 90W				
<b>Max. duration Sink Peak Power</b> $P_{sink} = 200\text{ W}, T_{amb.} = 25\text{ }^{\circ}\text{C}$	max. $t_{on} = 60\text{ s}$ , following $t_{off} = 400\text{ s}$ (for cooling down)				
<b>Duty Cycle for use at Peak Power</b> $P_{sink} = 200\text{ W}, T_{amb.} = 25\text{ }^{\circ}\text{C}$ $P_{sink} \leq 200\text{ W}, t_{on} \leq 20\text{ s}$  $t_{on}$ = time, power dissipation is $> 0\text{ W}$ $t_{off}$ = time, power dissipation is $0\text{ W}$ $P_{av} = P_{peak} * t_{on} / (t_{off} + t_{on})$	$t_{on} \leq 20\text{ s} / t_{off} \geq 10\text{ s}$ average power $\leq 175\text{ W}$				
<b>Max. Sink Current</b> ( $V_o \geq 2\text{ V}$ and $P \leq 200\text{ W}$ )	Limited at 40A	Limited at 40A	Limited at 30A	Limited at 40A	Limited at 30A
<b>Protection</b>	Electronic Power Limit (200W) limits the current. The temperature of the power sink is fan controlled and the circuit shuts down in case of thermal overload.				
<b>Recovery time / Deviation</b> $V_o = 6\text{ V}, I_o: +40\text{ A} \rightarrow -15\text{ A}$ recovery within 100 mV / deviation:  $V_o = 15\text{ V}, I_o: +25\text{ A} \rightarrow -8\text{ A}$ recovery within 100 mV / deviation:  $V_o = 35\text{ V}, I_o: +20\text{ A} \rightarrow -3\text{ A}$ recovery within 100 mV / deviation:  $V_o = 52\text{ V}, I_o: +10\text{ A} \rightarrow -2\text{ A}$ recovery within 100 mV / deviation:  $V_o = 70\text{ V}, I_o: +10\text{ A} \rightarrow -1\text{ A}$ recovery within 100 mV / deviation:  (load current switches from positive to negative)	di/dt = -1.7 A/ $\mu\text{s}$ 300 $\mu\text{s}$ / 0.20V	di/dt = -1.7 A/ $\mu\text{s}$ 500 $\mu\text{s}$ / 0.45V	-	di/dt = -1.7 A/ $\mu\text{s}$ 700 $\mu\text{s}$ / 0.50V	-
	di/dt = -1.6 A/ $\mu\text{s}$ 500 $\mu\text{s}$ / 0.15V	di/dt = -1.6 A/ $\mu\text{s}$ 600 $\mu\text{s}$ / 0.40V	di/dt = -1.6 A/ $\mu\text{s}$ 640 $\mu\text{s}$ / 0.70V	di/dt = -1.3 A/ $\mu\text{s}$ 900 $\mu\text{s}$ / 0.45V	-
	-	di/dt = -1.3 A/ $\mu\text{s}$ 1.10 ms / 0.35V	di/dt = -1.3 A/ $\mu\text{s}$ 800 $\mu\text{s}$ / 0.60V	di/dt = -0.83 A/ $\mu\text{s}$ 1.30 ms / 0.35V	di/dt = -1.3 A/ $\mu\text{s}$ 800 $\mu\text{s}$ / 0.70V
	-	-	di/dt = -0.7 A/ $\mu\text{s}$ 800 $\mu\text{s}$ / 0.60V	di/dt = -0.6 A/ $\mu\text{s}$ 1.90 ms / 0.35V	di/dt = -0.6 A/ $\mu\text{s}$ 1.00 ms / 0.70V
	-	-	-	-	di/dt = -0.6 A/ $\mu\text{s}$ 1.20 ms / 0.50V
	<i>note: values are typical</i>	<i>note: values are typical</i>	<i>note: values are typical</i>	<i>note: values are typical</i>	<i>note: values are typical</i>
<b>Programming Down Speed</b> Fall time at <b>no load</b> (90 - 10%) Fall time at no load <i>without Power Sink</i>	(15 $\rightarrow$ 0V) 8ms 2 s	(35 $\rightarrow$ 0V) 18 ms 5.5 s	(52 $\rightarrow$ 0V) 10ms 4 s	(26/52 $\rightarrow$ 0V) 10ms/45ms 4s/7.5 s	(70 $\rightarrow$ 0V) 18ms 5.5s
Unit with Fast Programming Option Fall time at <b>no load</b> (90 - 10%) Fall time at no load <i>without Power Sink</i>	<b>P202+P211</b> 320 $\mu\text{s}$ 60ms	<b>P203+P212</b> 570 $\mu\text{s}$ 200ms	<b>P204+P212</b> 650 $\mu\text{s}$ 270 ms	<b>P205+P213</b> 550 $\mu\text{s}$ / 1.2ms 170ms/550ms	<b>P206+P214</b> 1.0ms 550ms
<b>Parallel and Series operation</b> 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.				

- 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 6.7 A ( $30\text{ V} \times 6.7\text{ A} = 200\text{ W} = \text{maximum power}$ ).
- A higher sink current than the maximum current will cause the output voltage to rise.



SM35-45 with Power Sink Option  
fast discharge of output capacitors  
by the power sink circuit

trace: output voltage  
Voltage Programming Speed at NO LOAD



SM35-45 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