

GS120/175T48 Family

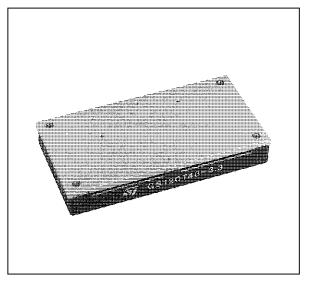
120W/175W DC-DC CONVERTERS FAMILY

Туре	Vi	Vo	ا _ہ
GS120T48-3.3 GS120T48-3.3E	38 to 60 V	3,35 V	35 A
GS175T48-5 GS175T48-5E	38 to 60 V	5,075 V	35 A
GS175T48-12 GS175T48-12E	38 to 60 V	12,0 V	15 A
GS175T48-15 GS175T48-15E	38 to 60 V	15,0 V	12 A

FEATURES

- UL, CSA, TUV approved
- High output power (up to 175W)
- High efficiency (82% typ. on GS175T48-5 module)
- Parallel operation with equal current sharing
- Synchronization pinRemote ON/OFF
- Remote load voltage sense compensation
- Output short-circuit protection
- Undervoltage lock-out
- Minimal overshoot during load transients
- Output overvoltage protection
- 500V_{DC} input to output isolation voltage
- Internal input and output filtering
- Softstart
- PCB or chassis mountable
- Optional additional finned heatsink
- Mechanical dimensions 125 66,5 19 (4,92 •

 $2,62 \bullet 0,75)$



DESCRIPTION

The GS120/175T48family includes 120/175W DC-DC converters used to generate fixed isolated output voltages with an output current up to 35A from a wide range input voltage (38 to 60V). The suffix E Identifies the metric threading on the planar heatsink (see fig. 1).

Type Ordering Number	Description	Thermal Resistance	Dimensions L ∙ W ∙ H mm (inches)
HS01	Additional finned heatsink (See fig. 7)	2.8°C/W	125 • 66.5 • 15 (4.92 • 2.62 • 0.59)

OPTION

Symbol	Parameter	Test Conditions	Min	Тур	Max	Unit
Vi	Input Voltage	$V_0 = 3.35V$ $I_0 = 0$ to 35A (Operating Conditions)	38	48	60	VDC
Viuv	Input Undervoltage Lockout	Vo = 3.35V I ₀ = 0 to 35A	32	34	36	VDC
lį	$ I_{i} \qquad Average Input Current \qquad V_{i} = 0 \text{ to } 60V \\ I_{0} = 35A $				4.2	А
lipk	lipkInrush Transient Peak Current $V_i = 60V$ $I_0 = 35A$				0.2	A ² s
lir	lir Reflected Input Current Vi = 38 to 60V BW = 5Hz to 20MHz Io = 35A (See fig. 2)				20	mApp
Vien	Enable Input Voltage	Vi = 38 to 60V Io = 0 to 35A	0		1.2	V
lien					-1	mA
Viinh	Inhibit Voltage	$V_i = 38 \text{ to } 60V \text{ I}_0 = 0 \text{ to } 35A$ Vien = open	8		18	V
Pi	Input Power	$V_i = 38 \text{ to } 60V \text{ I}_0 = 0A \text{ (No Load)}$		1.5	2	W
Vo	V_0 Total Output Voltage Regulation $V_i = 38 \text{ to } 60V \text{ I}_0 = 0 \text{ to } 35A$ 3		3.25	3.35	3.45	V
Vost	Short-term Output Voltage Regulation	$V_i = 38 \text{ to } 60V \ I_0 = 0 \text{ to } 35A$	3.30	3.35	3.40	V
Vots	Total Static Tolerance	$V_i = 38 \text{ to } 60V I_0 = 0 \text{ to } 35A$	3.28	3.35	3.42	V
Vol	OIOutput Overvoltage Limit InitiationVi = 38 to 60V Io = 0 to 35A		4	4.5	5.2	VDC
Vor	Output Ripple Voltage	$V_i = 38 \text{ to } 60V I_0 = 35A$		20	30	mVpp
Von	Output Noise Voltage	$V_i = 38 \text{ to } 60V \text{ I}_0 = 35A$		50	80	mVpp
ΔV_0	Total Remote Sense Compensation	Vi = 38 to 60V			0.6	V
δVο	Peak Load Transient Response	$V_i = 48V \delta I_0 = 5A$ slope = 0.1A/µs			60	mVp
lo	Output Current	$V_i = 38 \text{ to } 60 \text{V} \text{ V}_0 = 3.35 \text{V}$	0		35	А
lol	Overcurrent Limit Initiation	Vi = 48V	36		39	А
losc	Shortcircuit Output Current	$V_i = 48V$ $V_0 = 0.2 \text{ to } 0.5V$			51	А
ts	Load Transient Settling Time	$Vi = 48V \delta Io = 5A$ slope = 0.1A/µs			200	μs
ton	Turn-on Time				5	ms
			3		10	
Vis	Isolation Voltage		500			V
fs	Switching Frequency	$V_i = 38 \text{ to } 60V \ I_0 = 0 \text{ to } 35A$	160	175	200	kHz
η	Efficiency	Vi = 38 to 60V Io = 35A	76	77		%
Rth	Thermal Resistance	Case to Ambient		5.2		°C/W
Тсор	Operating Case Temperature Range		- 10		+85	°C
Tstg	Storage Temperature Range		- 40		+105	°C

GS120T48-3.3ELECTRICAL CHARACTERISTICS ($T_{amb} = 25^{\circ}C$ unless otherwise specified)



Symbol	Parameter	Test Conditions	Min	Тур	Max	Unit
Vi	Input Voltage	$V_0 = 5.075V$ $I_0 = 0$ to 35A (Operating Conditions)	38	48	60	VDC
Viuv	Input Undervoltage Lockout	$V_0 = 5.075V$ $I_0 = 0 \text{ to } 35A$	32	34	36	VDC
lj	Average Input Current	Vi = 0 to 60V Io = 35A			6.1	Α
lipk	Inrush Transient Peak Current	Vi = 60V Io = 35A			0.2	A ² s
lir					30	mApp
Vien	Enable Input Voltage	$V_i = 38 \text{ to } 60V \ I_0 = 0 \text{ to } 35A$	0		1.2	V
lien	Enable Input Current	Vi = 38 to 60V Io = 0 to 35A Vien = 0V			-1	mA
Viinh	Inhibit Voltage	Vi = 38 to 60V Io = 0 to 35A 8 Vien = open			18	V
Pi	Input Power	$V_i = 38 \text{ to } 60V I_0 = 0A (No Load)$		1.5	2	W
Vo	Total Output Voltage Regulation $V_i = 38 \text{ to } 60 \text{ V}$ $I_0 = 0 \text{ to } 35 \text{ A}$ 4.9		4.94	5.075	5.21	V
Vost	Short-term Output Voltage Regulation Vi = 38 to 60V Io = 0 to 35A 5.0		5.002	5.075	5.148	V
Vots	Total Static Tolerance	$V_i = 38 \text{ to } 60V \ I_0 = 0 \text{ to } 35A $ 4.97		5.075	5.18	V
Vol	Dutput Overvoltage $V_i = 38 \text{ to } 60 \text{V}$ $I_0 = 0 \text{ to } 35 \text{A}$ imit Initiation		6	6.3	7	VDC
Vor	Output Ripple Voltage	$V_i = 38 \text{ to } 60V I_0 = 35A$		20	30	mVpp
Von	Output Noise Voltage	$V_i = 38 \text{ to } 60V I_0 = 35A$		50	80	mVpp
ΔV_0	Total Remote Sense Compensation	Vi = 38 to 60V			0.6	V
δVo	Peak Load Transient Response	$V_i = 48V \delta I_0 = 5A$ slope = 0.1A/ μ s			100	mVp
lo	Output Current	Vi = 38 to 60V Vo = 5.075V	0		35	А
lol	Overcurrent Limit Initiation	Vi = 48V	36		39	А
l _{osc}	Shortcircuit Output Current	$V_i = 48V$ $V_0 = 0.2$ to 0.5V			51	A
ts	Load Transient Settling Time	$V_i = 48V \delta I_0 = 5A$ slope = 0.1A/ μ s			250	μs
ton	Turn-on Time	$V_i = 48V$ $I_0 = 35A$ $V_{ien} = from high to low$			5	ms
			3		10	
Vis	Isolation Voltage		500			V
fs	Switching Frequency	$V_i = 38 \text{ to } 60V \ I_0 = 0 \text{ to } 35A$	160	175	200	kHz
η	Efficiency	$V_i = 38 \text{ to } 60V I_0 = 35A$	81	82		%
Rth	Thermal Resistance	Case to Ambient		5.2		°C/W
Т _{сор}	Operating Case Temperature Range		- 10		+85	°C
Tstg	Storage Temperature Range		- 40		+105	°C

GS175T48-5 ELECTRICAL CHARACTERISTICS ($T_{amb} = 25^{\circ}C$ unless otherwise specified)



G3173148-12 ELECTRICAL CHARACTERISTICS (Tamb = 25°C Unless Otherwise Specified	GS175T48-12 ELECTRICAL CHARACTERISTICS (Tamb =	25°C unless otherwise specified
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Symbol	Parameter	Test Conditions	Min	Тур	Max	Unit
Vi	Input Voltage	$V_0 = 12V$ $I_0 = 0$ to 15A (Operating Conditions)	38	48	60	VDC
Viuv	Input Undervoltage Lockout	voltage Lockout $V_0 = 12V$ $I_0 = 0 \text{ to } 15A$		34	36	VDC
lj	Average Input Current	$V_i = 0 \text{ to } 60V I_0 = 15A$			5.5	А
lipk	Inrush Transient Peak Current Vi = 60V Io = 15A				0.2	A ² s
lir	$ \begin{array}{ll} \mbox{Reflected Input Current} & \mbox{Vi} = 38 \mbox{ to } 60 \mbox{V} \\ \mbox{BW} = 5 \mbox{Hz} \mbox{ to } 20 \mbox{MHz} \\ \mbox{I}_0 = 15 \mbox{A} \mbox{(See fig. 2)} \end{array} $				20	mApp
Vien	Enable Input Voltage	$V_i = 38 \text{ to } 60V \ I_0 = 0 \text{ to } 15A$	0		1.2	V
lien	Enable Input Current				-1	mA
Viinh	Inhibit Voltage	$V_i = 38 \text{ to } 60 \text{V}$ $I_0 = 0 \text{ to } 15 \text{A}$ Vien = open			18	V
Pi	Input Power	$V_i = 38 \text{ to } 60V I_0 = 0A (No Load)$		1.5	2	W
Vo	Total Output Voltage Regulation	$V_i = 38 \text{ to } 60V \ I_0 = 0 \text{ to } 15A$	11.4	12.0	12.6	V
Vost	Short-term Output Voltage Regulation	Vi = 38 to 60V Io = 0 to 15A	11.76	12.0	12.24	V
Vots	Total Static Tolerance	$V_i = 38 \text{ to } 60V \ I_0 = 0 \text{ to } 15A$	11.64	12.0	12.36	V
Vol	Output Overvoltage Limit Initiation	$V_i = 38 \text{ to } 60V \ I_0 = 0 \text{ to } 15A$	13.2	14	15	VDC
Vor	Output Ripple Voltage	$V_i = 38 \text{ to } 60V I_0 = 15A$		35	70	mVpp
Von	Output Noise Voltage	$V_i = 38 \text{ to } 60V I_0 = 15A$		60	120	mVpp
ΔV_{0}	Total Remote Sense Compensation	Vi = 38 to 60V			0.6	V
δVο	Peak Load Transient Response	$V_i = 48V \delta I_0 = 3A$ slope = 0.2A/µs			200	mVp
lo	Output Current	$V_i = 38 \text{ to } 60V V_0 = 12V$	0		15	А
lol	Overcurrent Limit Initiation	$V_i = 48V$	16		19	А
losc	Shortcircuit Output Current	$V_i = 48V$			25	А
ts	Load Transient Setting Time	$V_i = 48V \delta I_0 = 3A$ slope = 0.2A/µs			300	μs
ton	Turn-on Time				5	ms
			3		10	
Vis	Isolation Voltage		500			V
fs	Switching Frequency	$V_i = 38 \text{ to } 60V \ I_0 = 0 \text{ to } 15A$	160	175	200	kHz
η	Efficiency	Vi = 38 to 60V I _O = 15A	84	86		%
Rth	Thermal Resistance	Case to Ambient		5.2		°C/W
т _{сор}	Operating Case Temperature Range		- 10		+85	°C
Tstg	Storage Temperature Range		- 40		+105	°C

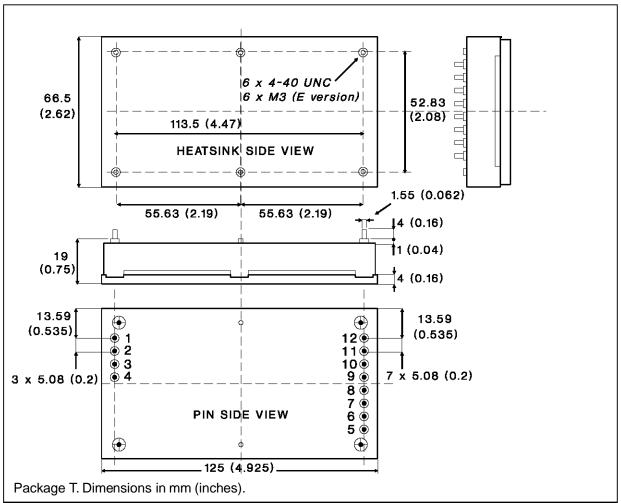


Symbol	Parameter	Test Conditions	Min	Тур	Max	Unit
Vi	Input Voltage	$V_0 = 15V$ $I_0 = 0$ to 12A (Operating Conditions)	38	48	60	VDC
Viuv	Input Undervoltage Lockout	$V_0 = 15V$ $I_0 = 0 \text{ to } 12A$	32	34	36	VDC
lj	Average Input Current	$V_i = 0 \text{ to } 60V I_0 = 12A$			5.5	А
lipk	Inrush Transient Peak Current	Vi = 60V Io = 12A			0.2	A ² s
lir	Reflected Input Current	Vi = 38 to 60V Io = 12A			20	mApp
Vien	Enable Input Voltage	$V_i = 38 \text{ to } 60V \text{ I}_0 = 0 \text{ to } 12A$	0		1.2	V
lien	Enable Input Current	Vi = 38 to 60V lo = 0 to 12A Vien = 0V			-1	mA
Viinh	Inhibit Voltage	$V_i = 38 \text{ to } 60V I_0 = 0 \text{ to } 12A$ Vien = open	8		18	V
Pi	Input Power	$V_i = 38 \text{ to } 60V I_0 = 0A (No Load)$		1.5	2	W
Vo	Total Output Voltage Regulation	$V_i = 38 \text{ to } 60V \text{ I}_0 = 0 \text{ to } 12A$	14.25	15.0	15.75	V
Vost	Short-term Output Voltage Regulation	$V_i = 38 \text{ to } 60V \text{ I}_0 = 0 \text{ to } 12A$	14.7	15.0	15.3	V
Vots	Total Static Tolerance	$V_i = 38 \text{ to } 60V \text{ I}_0 = 0 \text{ to } 12A$	14.55	15.0	15.45	V
Vol	Output Overvoltage Limit Initiation	Vi = 38 to 60V Io = 0 to 12A	16.5	17	18	VDC
Vor	Output Ripple Voltage	$V_i = 38 \text{ to } 60V I_0 = 12A$		45	90	mVpp
Von	Output Noise Voltage	$V_i = 38 \text{ to } 60V \text{ I}_0 = 12A$		75	150	mVpp
ΔV_0	Total Remote Sense Compensation	Vi = 38 to 60V			0.6	V
δVo	Peak Load Transient Response	$V_i = 48V \delta I_0 = 3A$ slope = 0.2A/µs			200	mVp
lo	Output Current	Vi = 38 to 60V Vo = 15V	0		12	А
lol	Overcurrent Limit Initiation	Vi = 48V	13		16	А
losc	Shortcircuit Output Current	$V_i = 48V$ $V_0 = 0.2 \text{ to } 0.5V$			21	А
ts	Load Transient Settling Time	$V_i = 48V \delta I_0 = 3A$ slope = 0.2A/µs			300	μs
ton	Turn-on Time				5	ms
			3		10	
Vis	Isolation Voltage		500			V
fs	Switching Frequency	$V_i = 38 \text{ to } 60V \ I_0 = 0 \text{ to } 12A$	160	175	200	kHz
η	Efficiency	Vi = 38 to 60V Io = 12A	86	88		%
Rth	Thermal Resistance	Case to Ambient		5.2		°C/W
Т _{сор}	Operating Case Temperature Range		- 10		+85	°C
Tstg	Storage Temperature Range		- 40		+105	°C

$\textbf{GS175T48-15 ELECTRICAL CHARACTERISTICS} (T_{amb} = 25^{\circ}C \text{ unless otherwise specified})$



CONNECTION DIAGRAM AND MECHANICAL DATA Figure 1.



PIN DESCRIPTION

Pin	Function	Description
1	- IN	Negative input voltage.
2	+ IN	Positive input voltage. Unregulated input voltage (typically 48V) must be applied between pin 1-2.
3	ON/OFF	The converter is ON (Enable) when the voltage applied to this pin with reference to pin 1 is lower than 1.2V (see Vien). The converter is OFF (Inhibit) for a control voltage in the range of 8 to 18V. When the pin is unconnected the converter is OFF (Inhibit).
4	CASE	Case connection pin.
5	SYNC	Synchronization pin. See figures 3, 4, 5, 6. Open when not used.
6	PARALLEL	Parallel output. See figures 3, 4, 5, 6. Open when not used.
7	+ SENSE	Senses the remote load high side. To be connected to pin 11,12 when remote sense is not used.
8	- SENSE	Senses the remote load return. To be connected to pin 9,10 when remote sense is not used. In parallel configuration, take care to connect all -S pins together (see figures 3,4,5,6).
9,10	- OUT	Fixed output voltage return.
11,12	+ OUT	Fixed output voltage.

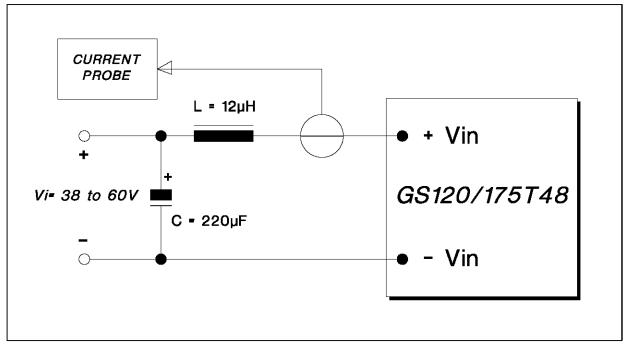


USER NOTES

Reflected Input Current

The reflected input current measurement (lir, see Electrical Characteristics) is performed according to the test set-up of fig. 2.

Figure 2.



Softstart

To avoid heavy inrush current the output voltage rise time is 10ms maximum in any condition of load.

Remote Sensing

The remote voltage sense compensation range is for a total drop of 0.6V equally shared between the load connecting wires.

It is a good practice to shield the sensing wires to avoid oscillations.

See the connection diagram on figures 3, 4, 5, 6. **Remote ON/OFF**

The module is controlled by the voltage applied between the ON/OFF pin and -IN pin.

The converter is ON (Enable) when the voltage applied is lower than 1.2 V (see Vien on Electrical Characteristics).

The converter is OFF (Inhibit) for a control voltage in the range of 8 to 18V (see Viinh).

When the pin is unconnected the converter is OFF. Maximum sinking current is 1mA.

Module Protection

The module is protected against occasional and permanent shortcircuits of the output pins to ground, as well as against output current overload. It uses a current limiting protection circuitry, avoiding latch-up problems with certain type of loads.

A crowbar output overvoltage protection is activated when the output voltage exceeds the specified values (see Electrical Characteristics).

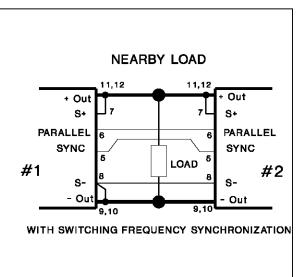
Parallel Operation

To increase available output regulated power, the module features the parallel connection possibility with equal current sharing and maximum deviation of 10% (two modules in parallel).

See the connection diagram on figures 3, 4, 5, 6.



Figure 3.



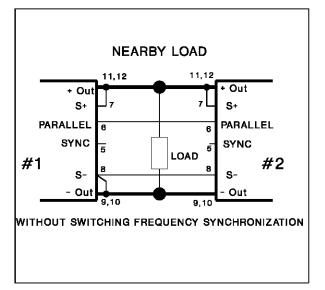


Figure 5.

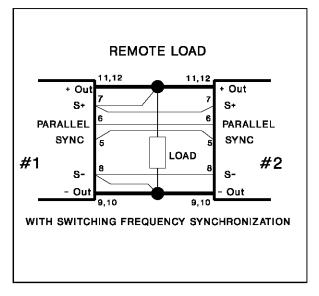
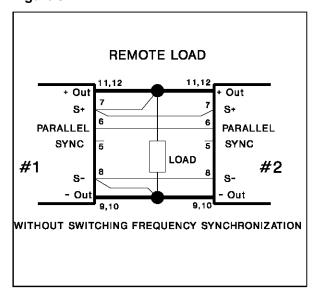


Figure 6.

Figure 4.

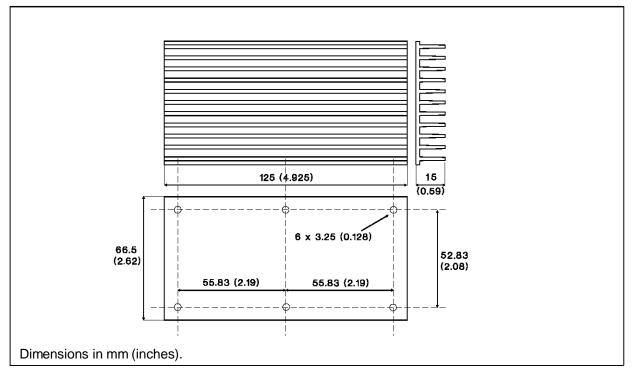


Finned heatsink option

An additional finned heatsink is available (type ordering number HS01) to allow the user to decrease the total thermal resistance of the module to a typical value of 2.8 °C/W. The heatsink is suitable both for standard (4-40 UNC threading) and E version (M3 threading); screw length in the range of 6 to 8 mm (0.24 to 0.32"). See fig. 7.



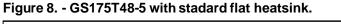


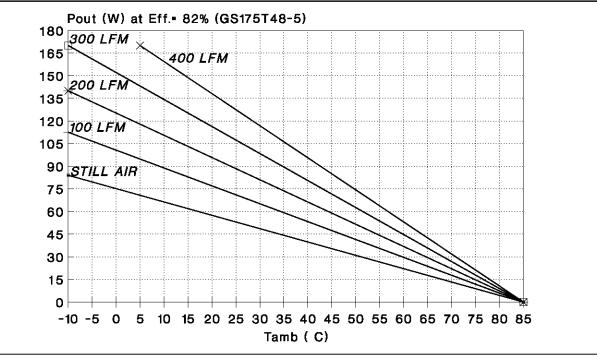


Thermal Characteristics

Following figures show the behaviour at still air and forced ventilation operation of the GS175T48-5 module (typical efficiency 82%) without

(fig. 8) and with the additional finned HS01 heatsink (fig. 9) $\,$





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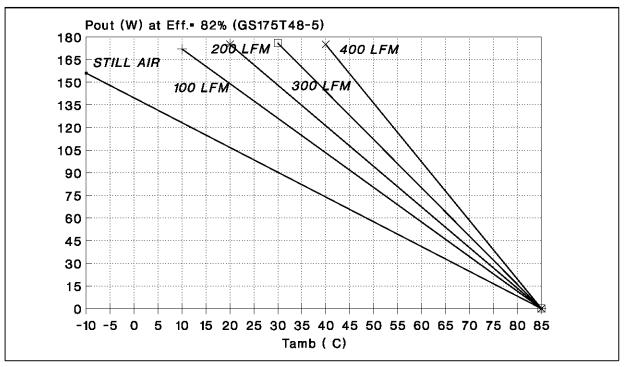


Figure 9. - GS175T48-5 with additional HS01 finned heatsink

Safety approvals

The converter is agency certified to the following safety requirements.

Agency	Requirements	License Number		
UL	UL-STD-1950	E141284		
CSA	CSA-STD-C22.2 No.234 (level 3)	LR 99794-2		
TUV EN 60950 DIN VDE 0805		R 9272137		

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