



GS70/100T300 Family

70W/100W DC-DC CONVERTERS FAMILY

Type	V_i	V_o	I_o
GS70T300-3.5	200 to 400 V	3,5 V	20 A
GS100T300-5	200 to 400 V	5,2 V	20 A
GS100T300-12	200 to 400 V	12,0 V	8,3 A
GS100T300-15	200 to 400 V	15,0 V	6,6 A
GS100T300-24	200 to 400 V	24,0 V	4,2 A
GS100T300-48	200 to 400 V	48,0 V	2,0 A

FEATURES

- High input voltage range bus: 200 to 400Vdc
- UL, TUV approved
- High output power (up to 100W)
- High efficiency (80% min. on GS100T300-5 module)
- Output voltages range: 3.5-5.2-12-15-24 and 48V
- Output voltage adjustable by external pin
- Remote load voltage sense compensation
- Output short-circuit protection
- Output overvoltage protection
- Undervoltage lock-out
- Minimal overshoot during load transients
- 3750V_{RMS} input to output isolation voltage
- Internal input and output filtering
- Softstart
- PCB or chassis mountable
- Mechanical Dimensions 101,6 • 50,8 • 20 mm (4,00 • 2,00 • 0,79 inches)



DESCRIPTION

The GS70/100T300 family includes 70/100W DC-DC converters used to generate isolated output voltages with an output current up to 20A from a wide range input voltage (200 to 400Vdc). All the GS70/100T300 family modules require an external fuse (1 Amps.) on the input side.

GS70/100T300 Family

GS70T300-3.5 ELECTRICAL CHARACTERISTICS ($T_{amb} = 25^{\circ}\text{C}$ unless otherwise specified)

Symbol	Parameter	Test Conditions	Min	Typ	Max	Unit
V_i	Input Voltage	$V_o = 3.5\text{V}$ $I_o = 0$ to 20A (Operating Conditions)	200	300	400	V_{DC}
Q_i	Inrush Charge	$V_i = 400\text{V}$ $I_o = 20\text{A}$		$40 \cdot 10^{-6}$		C
P_i	Input Power	$V_i = 300\text{V}$ $I_o = 0\text{A}$ (No Load)		2.5		W
V_o	Output Voltage	$V_i = 200$ to 400V $I_o = 0$ to 20A	3.43	3.5	3.57	V
V_o	Output Voltage Range	$V_i = 200$ to 400V $I_o = 0$ to 20A (see fig. 2)	1.75		3.5	V
V_{orn}	Output Ripple and Noise Voltage	$V_i = 300\text{V}$ $I_o = 20\text{A}$ BW = 0 to 20Mhz		35	40	mVpp
V_{ol}	Output Overvoltage Limit Initiation	$V_i = 200$ to 400V $I_o = 0$ to 20A		$1.2 \cdot V_o$		V
δV_{OL}	Line Regulation	$V_i = 200$ to 400V $I_o = 20\text{A}$			± 0.1	%
δV_{OO}	Load Regulation	$V_i = 300\text{V}$ $I_o = 0$ to 20A			± 0.1	%
ΔV_o	Total Remote Sense Compensation	$V_i = 200$ to 400V			0.6	V
δV_o	Peak Load Transient Response	$V_i = 300\text{V}$ $\delta I_o = 10\text{A}$		500		mVp
SVR	Supply Voltage Rejection	$f = 100\text{Hz}$		55		dB
I_o	Output Current	$V_i = 200$ to 400V $V_o = 3.3\text{V}$	0		20	A
I_{ol}	Overcurrent Limit Initiation	$V_i = 300\text{V}$	21	23	25	A
I_{osc}	Shortcircuit Output Current	$V_i = 300\text{V}$	18	23	28	A
t_s	Load Transient Settling Time	$V_i = 300\text{V}$ $\delta I_o = 10\text{A}$		300		μs
t_{on}	Turn-on Time	$V_i = 200\text{V}$ $I_o = 20\text{A}$		6	10	ms
V_{is}	Isolation Voltage	Input to Output	3750			V_{RMS}
		Input to Baseplate	2500			
		Output to Baseplate	500			
f_s	Switching Frequency	$V_i = 200$ to 400V $I_o = 0$ to 20A		150		kHz
η	Efficiency	$V_i = 300\text{V}$ $I_o = 20\text{A}$	78	79		%
R_{th}	Thermal Resistance	Baseplate to Ambient		7.5		$^{\circ}\text{C/W}$
T_{cop}	Operating Case Temperature Range		0		+70	$^{\circ}\text{C}$
T_{stg}	Storage Temperature Range		- 40		+100	$^{\circ}\text{C}$

GS100T300-5 ELECTRICAL CHARACTERISTICS ($T_{amb} = 25^{\circ}\text{C}$ unless otherwise specified)

Symbol	Parameter	Test Conditions	Min	Typ	Max	Unit
V_i	Input Voltage	$V_o = 5\text{V}$ $I_o = 0$ to 20A (Operating Conditions)	200	300	400	V_{DC}
Q_i	Inrush Charge	$V_i = 400\text{V}$ $I_o = 20\text{A}$		$40 \cdot 10^{-6}$		C
P_i	Input Power	$V_i = 300\text{V}$ $I_o = 0\text{A}$ (No Load)		2.5		W
V_o	Output Voltage	$V_i = 200$ to 400V $I_o = 0$ to 20A	5.09	5.20	5.30	V
V_o	Output Voltage Range	$V_i = 200$ to 400V $I_o = 0$ to 20A (see fig. 2)	2.6		5.20	V
V_{orn}	Output Ripple and Noise Voltage	$V_i = 300\text{V}$ $I_o = 20\text{A}$ BW = 0 to 20Mhz		40	50	mVpp
V_{ol}	Output Overvoltage Limit Initiation	$V_i = 200$ to 400V $I_o = 0$ to 20A		$1.2 \cdot V_o$		V
δV_{OL}	Line Regulation	$V_i = 200$ to 400V $I_o = 20\text{A}$			± 0.1	%
δV_{OO}	Load Regulation	$V_i = 300\text{V}$ $I_o = 0$ to 20A			± 0.1	%
ΔV_o	Total Remote Sense Compensation	$V_i = 200$ to 400V			0.6	V
δV_o	Peak Load Transient Response	$V_i = 300\text{V}$ $\delta I_o = 1\text{A}$		500		mVp
SVR	Supply Voltage Rejection	$f = 100\text{Hz}$		55		dB
I_o	Output Current	$V_i = 200$ to 400V $V_o = 5\text{V}$	0		20	A
I_{ol}	Overcurrent Limit Initiation	$V_i = 300\text{V}$	21	23	25	A
I_{osc}	Shortcircuit Output Current	$V_i = 300\text{V}$	18	23	28	A
t_s	Load Transient Settling Time	$V_i = 300\text{V}$ $\delta I_o = 1\text{A}$		300		μs
t_{on}	Turn-on Time	$V_i = 200\text{V}$ $I_o = 20\text{A}$		6	10	ms
V_{is}	Isolation Voltage	Input to Output	3750			V_{RMS}
		Output to Baseplate	500			
		Input to Baseplate	2500			
f_s	Switching Frequency	$V_i = 200$ to 400V $I_o = 0$ to 20A		150		kHz
η	Efficiency	$V_i = 300\text{V}$ $I_o = 20\text{A}$	80	81		%
R_{th}	Thermal Resistance	Baseplate to Ambient		7.5		$^{\circ}\text{C/W}$
T_{cop}	Operating Case Temperature Range		0		+70	$^{\circ}\text{C}$
T_{stg}	Storage Temperature Range		- 40		+100	$^{\circ}\text{C}$

GS70/100T300 Family

GS100T300-12 ELECTRICAL CHARACTERISTICS ($T_{amb} = 25^{\circ}\text{C}$ unless otherwise specified)

Symbol	Parameter	Test Conditions	Min	Typ	Max	Unit
V_i	Input Voltage	$V_o = 12\text{V}$ $I_o = 0$ to 8.3A (Operating Conditions)	200	300	400	V_{DC}
Q_i	Inrush Charge	$V_i = 400\text{V}$ $I_o = 8.3\text{A}$		$40 \bullet 10^{-6}$		C
P_i	Input Power	$V_i = 300\text{V}$ $I_o = 0\text{A}$ (No Load)		2.5		W
V_o	Output Voltage	$V_i = 200$ to 400V $I_o = 0$ to 8.3A	11.76	12.00	12.24	V
V_o	Output Voltage Range	$V_i = 200$ to 400V $I_o = 0$ to 8.3A (see fig. 2)	6.0		13.2	V
V_{orn}	Output Ripple and Noise Voltage	$V_i = 300\text{V}$ $I_o = 8.3\text{A}$ BW = 0 to 20Mhz		100	120	mVpp
V_{ol}	Output Overvoltage Limit Initiation	$V_i = 200$ to 400V $I_o = 0$ to 8.3A		$1.2 \bullet V_o$		V
δV_{OL}	Line Regulation	$V_i = 200$ to 400V $I_o = 8.3\text{A}$			± 0.1	%
δV_{OO}	Load Regulation	$V_i = 300\text{V}$ $I_o = 0$ to 8.3A			± 0.1	%
ΔV_o	Total Remote Sense Compensation	$V_i = 200$ to 400V			0.6	V
δV_o	Peak Load Transient Response	$V_i = 300\text{V}$ $\delta I_o = 4\text{A}$		500		mVp
SVR	Supply Voltage Rejection	$f = 100\text{Hz}$		45		dB
I_o	Output Current	$V_i = 200$ to 400V $V_o = 12\text{V}$	0		8.3	A
I_{ol}	Overcurrent Limit Initiation	$V_i = 300\text{V}$	8.8	9.1	11.0	A
I_{osc}	Shortcircuit Output Current	$V_i = 300\text{V}$	7.5	9.0	11.0	A
t_s	Load Transient Settling Time	$V_i = 300\text{V}$ $\delta I_o = 4\text{A}$		300		μs
t_{on}	Turn-on Time	$V_i = 200\text{V}$ $I_o = 8.3\text{A}$		6	10	ms
V_{is}	Isolation Voltage	Input to Output	3750			V_{RMS}
		Input to Baseplate	2500			
		Output to Baseplate	500			
f_s	Switching Frequency	$V_i = 200$ to 400V $I_o = 0$ to 8.3A		150		kHz
η	Efficiency	$V_i = 300\text{V}$ $I_o = 8.3\text{A}$	83	84		%
R_{th}	Thermal Resistance	Baseplate to Ambient		7.5		$^{\circ}\text{C/W}$
T_{cop}	Operating Case Temperature Range		0		+70	$^{\circ}\text{C}$
T_{stg}	Storage Temperature Range		- 40		+100	$^{\circ}\text{C}$

GS100T300-15 ELECTRICAL CHARACTERISTICS ($T_{amb} = 25^{\circ}\text{C}$ unless otherwise specified)

Symbol	Parameter	Test Conditions	Min	Typ	Max	Unit
V_i	Input Voltage	$V_o = 15\text{V}$ $I_o = 0$ to 6.6A (Operating Conditions)	200	300	400	V_{DC}
Q_i	Inrush Charge	$V_i = 400\text{V}$ $I_o = 6.6\text{A}$		$40 \cdot 10^{-6}$		C
P_i	Input Power	$V_i = 300\text{V}$ $I_o = 0\text{A}$ (No Load)		2.5		W
V_o	Output Voltage	$V_i = 200$ to 400V $I_o = 0$ to 6.6A	14.7	15.0	15.3	V
V_o	Output Voltage Range	$V_i = 200$ to 400V $I_o = 0$ to 6.6A (see fig. 2)	7.5		16.5	V
V_{orn}	Output Ripple and Noise Voltage	$V_i = 300\text{V}$ $I_o = 6.6\text{A}$ BW = 0 to 20Mhz		110	150	mVpp
V_{ol}	Output Overvoltage Limit Initiation	$V_i = 200$ to 400V $I_o = 0$ to 6.6A		$1.2 \cdot V_o$		V
δV_{OL}	Line Regulation	$V_i = 200$ to 400V $I_o = 6.6\text{A}$			± 0.1	%
δV_{OO}	Load Regulation	$V_i = 300\text{V}$ $I_o = 0$ to 6.6A			± 0.1	%
ΔV_o	Total Remote Sense Compensation	$V_i = 200$ to 400V			0.6	V
δV_o	Peak Load Transient Response	$V_i = 300\text{V}$ $\delta I_o = 3.3\text{A}$		500		mVp
SVR	Supply Voltage Rejection	$f = 100\text{Hz}$		45		dB
I_o	Output Current	$V_i = 200$ to 400V $V_o = 15\text{V}$	0		6.6	A
I_{ol}	Overcurrent Limit Initiation	$V_i = 300\text{V}$	7.1	7.5	8.0	A
I_{osc}	Shortcircuit Output Current	$V_i = 300\text{V}$	6.5	8.0	10.0	A
t_s	Load Transient Settling Time	$V_i = 300\text{V}$ $\delta I_o = 3.3\text{A}$		300		μs
t_{on}	Turn-on Time	$V_i = 200\text{V}$ $I_o = 6.6\text{A}$		6	10	ms
V_{is}	Isolation Voltage	Input to Output	3750			V_{RMS}
		Input to Baseplate	2500			
		Output to Baseplate	500			
f_s	Switching Frequency	$V_i = 200$ to 400V $I_o = 0$ to 6.6A		150		kHz
η	Efficiency	$V_i = 300\text{V}$ $I_o = 6.6\text{A}$	84	85		%
R_{th}	Thermal Resistance	Baseplate to Ambient		7.5		$^{\circ}\text{C/W}$
T_{cop}	Operating Case Temperature Range		0		+70	$^{\circ}\text{C}$
T_{stg}	Storage Temperature Range		- 40		+100	$^{\circ}\text{C}$

GS70/100T300 Family

GS100T300-24 ELECTRICAL CHARACTERISTICS ($T_{amb} = 25^{\circ}\text{C}$ unless otherwise specified)

Symbol	Parameter	Test Conditions	Min	Typ	Max	Unit
V_i	Input Voltage	$V_o = 24\text{V}$ $I_o = 0$ to 4.2A (Operating Conditions)	200	300	400	V_{DC}
Q_i	Inrush Charge	$V_i = 400\text{V}$ $I_o = 4.2\text{A}$		$40 \bullet 10^{-6}$		C
P_i	Input Power	$V_i = 300\text{V}$ $I_o = 0\text{A}$ (No Load)		2.5		W
V_o	Output Voltage	$V_i = 200$ to 400V $I_o = 0$ to 4.2A	23.5	24.0	24.5	V
V_o	Output Voltage Range	$V_i = 200$ to 400V $I_o = 0$ to 4.2A (see fig. 2)	12.0		26.4	V
V_{orn}	Output Ripple and Noise Voltage	$V_i = 300\text{V}$ $I_o = 4.2\text{A}$ BW = 0 to 20Mhz		200	240	mVpp
V_{ol}	Output Overvoltage Limit Initiation	$V_i = 200$ to 400V $I_o = 0$ to 4.2A		$1.2 \bullet V_o$		V
δV_{OL}	Line Regulation	$V_i = 200$ to 400V $I_o = 4.2\text{A}$			± 0.1	%
δV_{OO}	Load Regulation	$V_i = 300\text{V}$ $I_o = 0$ to 4.2A			± 0.1	%
ΔV_o	Total Remote Sense Compensation	$V_i = 200$ to 400V			0.6	V
δV_o	Peak Load Transient Response	$V_i = 300\text{V}$ $\delta I_o = 2.1\text{A}$		500		mVp
SVR	Supply Voltage Rejection	$f = 100\text{Hz}$		40		dB
I_o	Output Current	$V_i = 200$ to 400V $V_o = 24\text{V}$	0		4.2	A
I_{ol}	Overcurrent Limit Initiation	$V_i = 300\text{V}$	4.5	5.0	5.5	A
I_{osc}	Shortcircuit Output Current	$V_i = 300\text{V}$	3.8	4.5	6.0	A
t_s	Load Transient Settling Time	$V_i = 300\text{V}$ $\delta I_o = 2.1\text{A}$		300		μs
t_{on}	Turn-on Time	$V_i = 200\text{V}$ $I_o = 4.2\text{A}$		6	10	ms
V_{is}	Isolation Voltage	Input to Output	3750			V_{RMS}
		Input to Baseplate	2500			
		Output to Baseplate	500			
f_s	Switching Frequency	$V_i = 200$ to 400V $I_o = 0$ to 4.2A		150		kHz
η	Efficiency	$V_i = 300\text{V}$ $I_o = 4.2\text{A}$	84	85		%
R_{th}	Thermal Resistance	Baseplate to Ambient		7.5		$^{\circ}\text{C/W}$
T_{cop}	Operating Case Temperature Range		0		+70	$^{\circ}\text{C}$
T_{stg}	Storage Temperature Range		- 40		+100	$^{\circ}\text{C}$

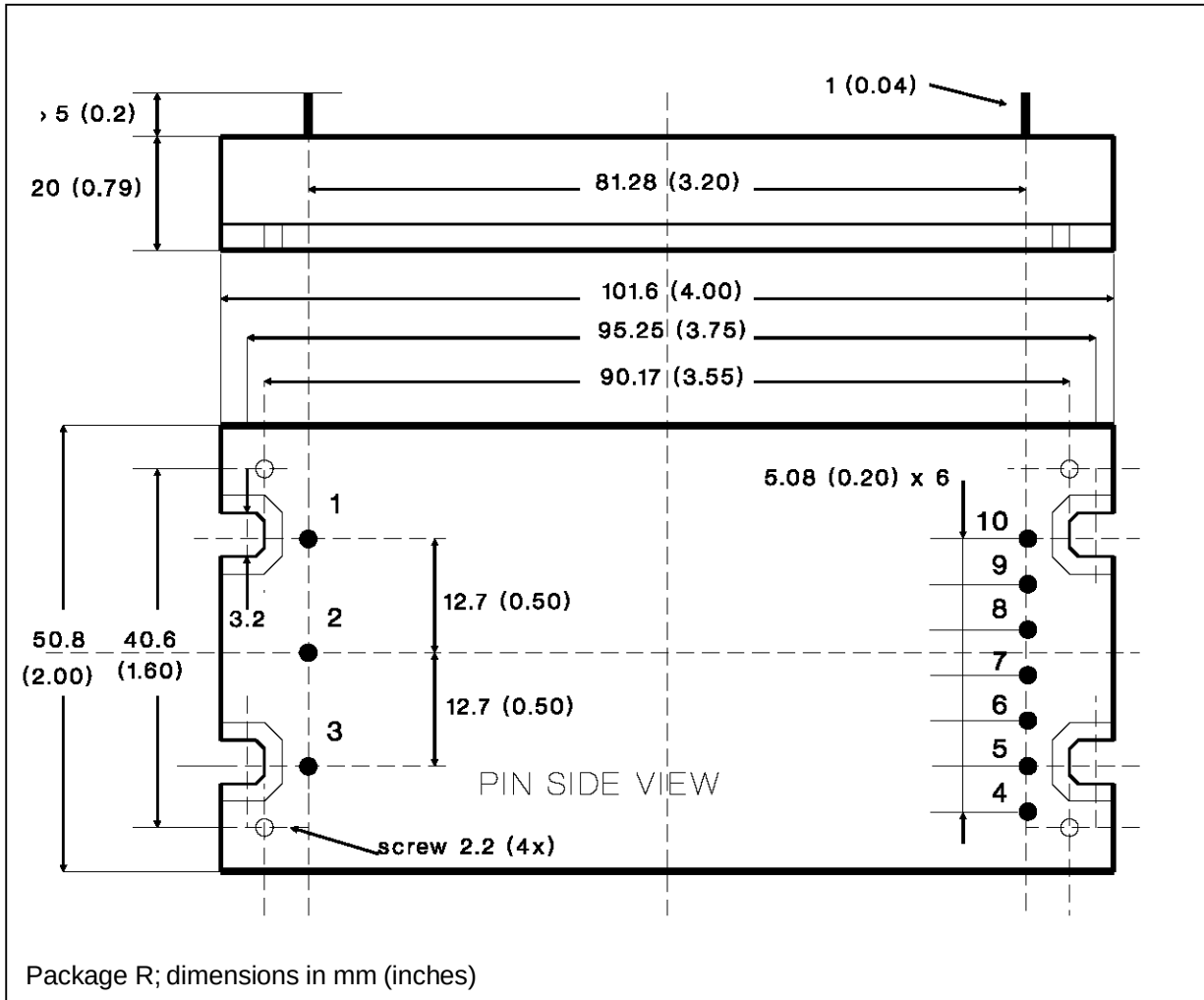
GS100T300-48 ELECTRICAL CHARACTERISTICS ($T_{amb} = 25^{\circ}\text{C}$ unless otherwise specified)

Symbol	Parameter	Test Conditions	Min	Typ	Max	Unit
V_i	Input Voltage	$V_o = 48\text{V}$ $I_o = 0$ to 2.1A (Operating Conditions)	200	300	400	V_{DC}
Q_i	Inrush Charge	$V_i = 400\text{V}$ $I_o = 2.1\text{A}$		$40 \cdot 10^{-6}$		C
P_i	Input Power	$V_i = 300\text{V}$ $I_o = 0\text{A}$ (No Load)		2.5		W
V_o	Output Voltage	$V_i = 200$ to 400V $I_o = 0$ to 2.1A	47.04	48.00	48.96	V
V_o	Output Voltage Range	$V_i = 200$ to 400V $I_o = 0$ to 2.1A (see fig. 2)	24.0		52.8	V
V_{orn}	Output Ripple and Noise Voltage	$V_i = 300\text{V}$ $I_o = 2.1\text{A}$ BW = 0 to 20Mhz		400	500	mVpp
V_{ol}	Output Overvoltage Limit Initiation	$V_i = 200$ to 400V $I_o = 0$ to 2.1A		$1.2 \cdot V_o$		V
δV_{OL}	Line Regulation	$V_i = 200$ to 400V $I_o = 2.1\text{A}$			± 0.1	%
δV_{OO}	Load Regulation	$V_i = 300\text{V}$ $I_o = 0$ to 2.1A			± 0.1	%
ΔV_o	Total Remote Sense Compensation	$V_i = 200$ to 400V			0.6	V
δV_o	Peak Load Transient Response	$V_i = 300\text{V}$ $\delta I_o = 1\text{A}$		500		mVp
SVR	Supply Voltage Rejection	$f = 100\text{Hz}$		35		dB
I_o	Output Current	$V_i = 200$ to 400V $V_o = 48\text{V}$	0		2	A
I_{ol}	Overcurrent Limit Initiation	$V_i = 300\text{V}$	2.1	2.3	2.5	A
I_{osc}	Shortcircuit Output Current	$V_i = 300\text{V}$	1.8	2.3	2.8	A
t_s	Load Transient Settling Time	$V_i = 300\text{V}$ $\delta I_o = 1\text{A}$		300		μs
t_{on}	Turn-on Time	$V_i = 200\text{V}$ $I_o = 2.1\text{A}$		6	10	ms
V_{is}	Isolation Voltage	Input to Output	3750			V_{RMS}
		Input to Baseplate	2500			
		Output to Baseplate	500			
f_s	Switching Frequency	$V_i = 200$ to 400V $I_o = 0$ to 2.1A		150		kHz
η	Efficiency	$V_i = 300\text{V}$ $I_o = 2.1\text{A}$	84	85		%
R_{th}	Thermal Resistance	Baseplate to Ambient		7.5		$^{\circ}\text{C/W}$
T_{cop}	Operating Case Temperature Range		0		+70	$^{\circ}\text{C}$
T_{stg}	Storage Temperature Range		- 40		+100	$^{\circ}\text{C}$

GS70/100T300 Family

CONNECTION DIAGRAM AND MECHANICAL DATA

Figure 1.



PIN DESCRIPTION

Pin	Function	Description
1	ENABLE	The converter is ON (Enable) when the voltage applied to this pin with reference to pin 2 is lower than 1.2V. The converter is OFF (Inhibit) for a control voltage in the range of 2.1 to 5V. When the pin is unconnected the converter is OFF (Inhibit).
2	- Vin	Negative input voltage.
3	+ Vin	Positive input voltage. Unregulated input voltage in the range of 200 to 400Vdc must be applied between pin 2-3.
4,5	+ Vo	+Vo output voltage.
6,7	- Vo	+Vo output voltage return.
8	+ SENSE	Senses the remote load high side. To be connected to pins 4,5 when remote sense is not used.
9	- SENSE	Senses the remote load return. To be connected to pins 6,7 when remote sense is not used.
10	ADJ	Adjust output voltage pin. A voltage generator between the ADJ. pin and -SENSE pin sets the Vo. When unconnected Vo is at nominal value (see fig. 2).

ADJUSTMENT OF THE OUTPUT VOLTAGE

The output voltage can be fixed following the indications given in fig. 2. The external reference voltage V_{adj} can be calculated using the following formula:

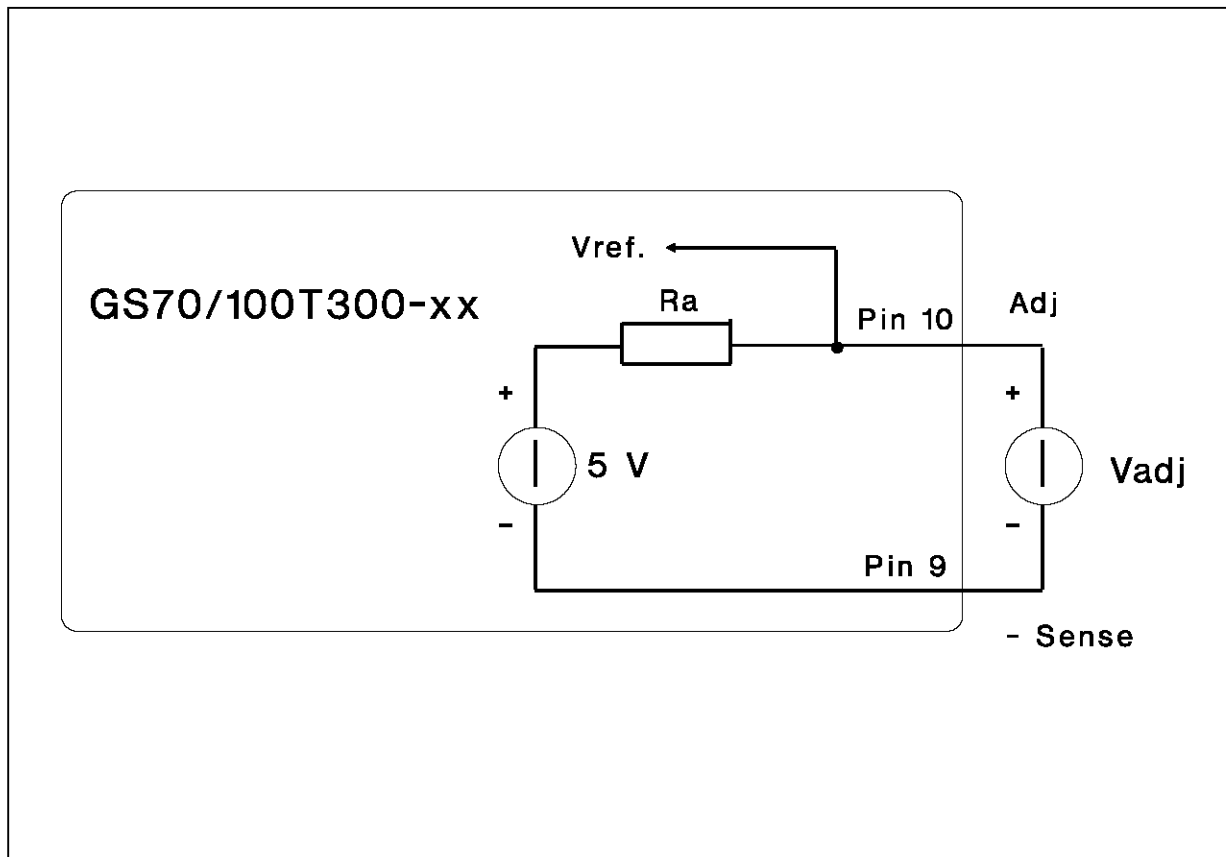
$$V_{adj} = 5 \cdot \frac{V_o}{V_{nom}}$$

The V_{out} and V_{adj} ranges are given in the following table:

Table 1: Output voltage generation with external voltage generator

Type	Nominal Output Voltage (V)	Output Voltage Range (V_{out})	External Voltage Generator allowed Range (V_{adj})
GS70T300-3.5	3.5	1.75 to 3.50	2.5 to 5.0
GS100T300-5	5.2	2.60 to 5.20	2.5 to 5.0
GS100T300-12	12.0	6.00 to 13.20	2.5 to 5.5
GS100T300-15	15.0	7.50 to 16.50	2.5 to 5.5
GS100T300-24	24.0	12.00 to 26.40	2.5 to 5.5
GS100T300-48	48.0	24.00 to 52.80	2.5 to 5.5

Figure 2. Output voltage adjustment



GS70/100T300 Family

Safety approvals

The converter is agency certified to the following safety requirements.

Agency	Requirements	License Number
UL	UL-STD-1950	E141284
TUV	EN 60950	R 9371740.1

® UL is a registered trademark of UNDERWRITERS LABORATORIES inc.

® TUV is a registered trademark of TUV Rheinland.

Information furnished is believed to be accurate and reliable. However, SGS-THOMSON Microelectronics assumes no responsibility for the consequences of use of such information nor for any infringement of patents or other rights of third parties which may result from its use. No license is granted by implication or otherwise under any patent or patent rights of SGS-THOMSON Microelectronics. Specification mentioned in this publication are subject to change without notice. This publication supersedes and replaces all information previously supplied. SGS-THOMSON Microelectronics products are not authorized for use as critical components in life support devices or systems without express written approval of SGS-THOMSON Microelectronics.

© 1994 SGS-THOMSON Microelectronics – All Rights Reserved

® UL is a registered trademark of UNDERWRITERS LABORATORIES inc.

® TUV is a registered trademark of TUV Rheinland.

SGS-THOMSON Microelectronics GROUP OF COMPANIES

Australia - Brazil - China - France - Germany - Hong Kong - Italy - Japan - Korea - Malaysia - Malta - Morocco - The Netherlands - Singapore - Spain - Sweden - Switzerland - Taiwan - Thailand - United Kingdom - U.S.A.