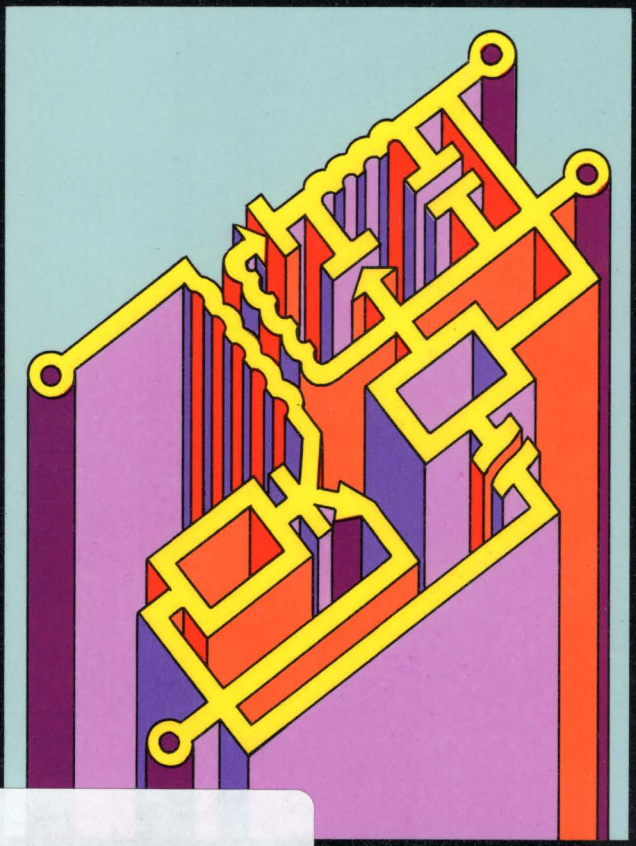
SUBSYSTEMS

PRODUCT PROFILE



THOMSON
ELECTRONICS

SUBSYSTEMS

PRODUCT PROFILE

JANUARY 1991

USE IN LIFE SUPPORT DEVICES OR SYSTEMS MUST BE EXPRESSLY AUTHORIZED

SGS-THOMSON PRODUCTS ARE NOT AUTHORIZED FOR USE AS CRITICAL COMPONENTS IN LIFE SUPPORT DEVICES OR SYSTEMS WITHOUT THE EXPRESS WRITTEN APPROVAL OF SGS-THOMSON Microelectronics. As used herein:

1. Life support devices or systems are those which (a) are intended for surgical implant into the body, or (b) support or sustain life, and whose failure to perform, when properly used in accordance with instructions for use provided with the product, can be reasonably expected to result in significant injury to the user.

2. A critical component is any component of a life support device or system whose failure to perform can reasonably be expected to cause the failure of the life support device or system, or to affect its safety or effectiveness.

TABLE OF CONTENTS

THE SGS-THOMSON GROUP

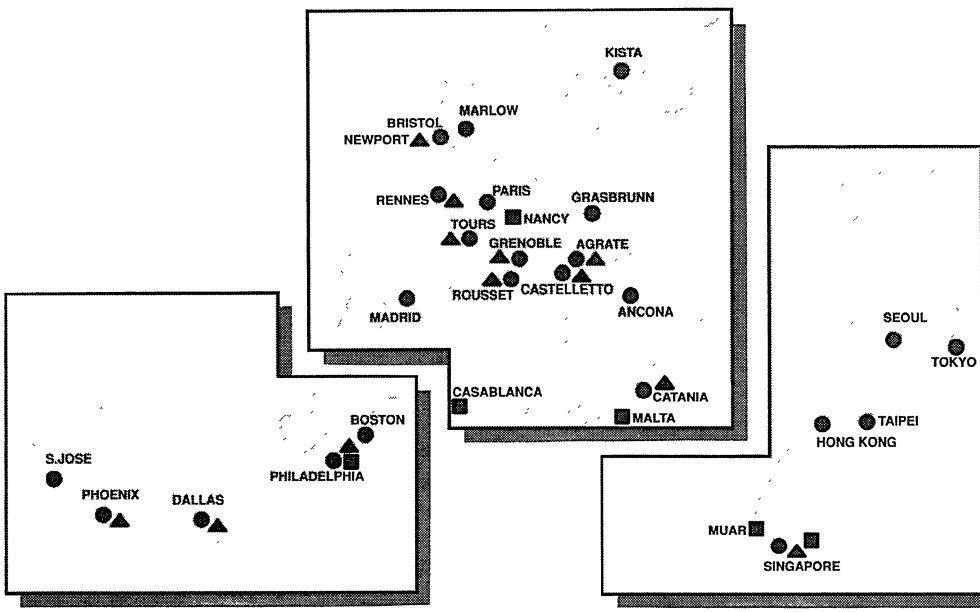
SGS-THOMSON Microelectronics is an international semiconductor company founded in 1987 as a result of the merger of Thomson Semiconducteurs and SGS Microelettronica, two semiconductor companies with 30 years of experience each in the field.

In April 1989 SGS-THOMSON further enhanced its international position with the acquisition of INMOS, a British company with a leading edge MOS product portfolio, which includes very fast static RAMs, color look-up-tables and the 16/32 bit transputer.

Furthermore, in October 1989, with the acquisition of Microwave Semiconductor Corp from Siemens, SGS-THOMSON has created one of the largest portfolios of silicon RF and microwave devices in the world.

SGS-THOMSON has earned a leading position in the world semiconductor market with its rich technological background, considerable production resources and an exceptionally broad product range which covers all sectors of advanced electronics. According to Dataquest (Jan, '91), a leading market analyst company, SGS-THOMSON, with a 1.5 B$ revenue in 1990, has confirmed its position as number twelve on the worldwide market and number two among European manufacturers.

With Corporate headquarters located in both Paris, France and Agrate Brianza, Italy (20 km northeast of Milan), the Group employs over 18000 people and is present worldwide with 8 advanced research and development units, 26 design centers, 17 production locations, 50 direct sales offices in 20 countries and over 500 distributors and representatives throughout the world.



INTRODUCTION

THE SGS-THOMSON SUBSYSTEMS

SGS-THOMSON is one of the most advanced semiconductor suppliers in the world. An independent research company (DATAQUEST) survey indicates that SGS-THOMSON is, by far, the best in the world when intelligent power (or "SMART POWER") is involved.
This thanks to the internal expertise to integrate various silicon technologies into a single chip and to carry more power in smaller packages than anyone in the world.

The SGS-THOMSON broad portfolio of power technologies allows us to design and to manufacture subsystems modules that are not only "SMART POWER" but EASY POWER™ too: complete functions for immediate use.

The most important aspect of bringing a new product to market is timing. This is recognized as the key factor in determining whether a company is able to recover all the costs involved in developing a product and how much market share a company can gain.

In solving our customers' problems/needs, we have developed a family of subsystems by utilizing a state-of-the-art components of its own divisions. This is able to be used immediately in custom applications, allowing the designers to concentrate on other part of the system.

The SGS-THOMSON subsystems are high performance modules for the power supply area: DC-DC converters and step-down regulators, as well as a state-of-the-art motor control circuits. This family allow for rapid design, low cost, and high reliability.

The subsystems activity is vertically integrated inside SGS-THOMSON so that if a particular semiconductor device is needed to solve a specific request from a customer, this can be designed within our company.

So why are hundreds of companies designing with SGS-THOMSON subsystems?

1. Faster turn around on new product development, so faster time to market...
2. Lower cost in R&D as well as in testing and assembly...
3. Higher reliability as only one component-system is added to your board and we do the testing and guarantee that system...
4. Less engineering time and fewer people needed...

Like every product family in SGS-THOMSON, the range of subsystems is continuously growing.

This booklet gives you, Customer, a whole overview of SGS-THOMSON subsystems products, but, in case you don't find what you need, just call us and we may have an answer to your requests.

ALPHANUMERICAL INDEX

ALPHANUMERICAL INDEX

DC/DC CONVERTERS

INDUSTRIAL APPLICATIONS

Single Output Type	Output Power (W)	Input Voltage Range (V_{DC})	Output Volt/mA			Dimensions L · W · H (mm)	Page
GS-1I5-5	1	4.50 to 5.50	5 / 250			35.6 · 21.6 · 14	13
GS-2I5-12	2	4.50 to 5.50	12 / 200			35.6 · 21.6 · 14	15
GS-2I48-28	2	39 to 59	28 / 60			33 · 33 · 16.5	17
GS-3I5-3.3	3	4.75 to 5.25	3.3 / 750			33 · 33 · 16.5	19
Dual Output Type	**Output Power (W)**	**Input Voltage Range (V_{DC})**	**Output 1 Volt/mA**	**Output 2 Volt/mA**		**Dimensions L · W · H (mm)**	**Page**
GS-2I5-D5	2	4.75 to 5.25	+ 5 / 200	− 5 / 200		50.8 · 25.4 · 11	21
GS-2I5-D12	2	4.75 to 5.25	+ 12 / 100	− 12 / 100		50.8 · 25.4 · 11	23
GS-31I10-D1524	31	8.98 to 13.00	15 / 2000	24 / 40		116 · 65 · 21.1	25
Triple Output Type	**Output Power (W)**	**Input Voltage Range (V_{DC})**	**Output 1 Volt/mA**	**Output 2 Volt/mA**	**Output 3 Volt/mA**	**Dimensions L · W · H (mm)**	**Page**
GS-1I5-5D15	1	4.70 to 5.30	+ 5 / 20	+ 15 / 15	− 15 / 15	33.0 · 33.0 · 16.5	27
GS-2I5-5D15	2	4.70 to 5.30	+ 5 / 50	+ 15 / 70	− 15 / 70	33.0 · 33.0 · 16.5	29
GS-5I24-5D15	5	21.60 to 30.00	+ 5 / 250	+ 15 / 125	− 15 / 125	50.8 · 38.1 · 19	31

Common feature: short circuit protection, input-output isolation.

ECL APPLICATIONS (– 5.2 V_{DC} Output)

Single Output Type	Output Power (W)	Input Voltage Range (V_{DC})	Output Volt/mA	Dimensions L · W · H (mm)	Page
GS-3I5-5.2	3	4.75 to 5.25	5.2 / 600	33 · 33 · 16.5	33

Common feature: short circuit protection, input-output isolation.

ISDN APPLICATIONS

Dual Output Type	Output Power (W)	Input Voltage Range (V_{DC})	Output 1 Volt/mA	Output 2 Volt/mA	Dimensions L · W · H (mm)	Page
GS-1I48-D540	1	24 to 70	5 / 80	40 / 12.5	60 · 35 · 20	35

Common feature: short circuit protection, input-output isolation.

DC/DC CONVERTERS (Cont'd)

TELECOM APPLICATIONS (48V_{DC} Input)

Single Output Type	Output Power (W)	Input Voltage Range (V_{DC})	Output Volt/mA	Dimensions L • W • H (mm)	Page
GS-T25-0500*	25	36 to 72	5 / 5000	116 • 65 • 21.1	37
GS-T27-0600*	27	36 to 72	6 / 4500	116 • 65 • 21.1	37
GS-T30-1200*	30	36 to 72	12 / 2500	116 • 65 • 21.1	37
GS-T30-1500*	30	36 to 72	15 / 2000	116 • 65 • 21.1	37
GS-4I48-5**	4	40 to 60	5 / 800	33 • 33 • 16.5	41
GS-4I48-12**	4	40 to 60	12 / 300	33 • 33 • 16.5	43
GS-5I48-15**	5	40 to 60	15 / 330	33 • 33 • 16.5	45
Dual Output Type	**Output Power (W)**	**Output 1 Volt/mA**	**Output 2 Volt/mA**	**Dimensions L • W • H (mm)**	**Page**
GS-2I48-D12**	2	+ 12 / 100	– 12 / 100	50.8 • 38.1 • 19	39

* Common features: short circuit protection, output overvoltage protection, remote sense compensation, input-output isolation six-sided continuous shield.

** Common feature: short circuit protection

LAN APPLICATIONS (– 9 V_{DC} Output)

Single Output Type	Output Power (W)	Input Voltage Range (V_{DC})	Output Volt/mA	Dimensions L • W • H (mm)	Page
GS-2I12-9	2	11.28 to 15.75	– 9 / 250	33.0 • 33.0 • 12.7	47
GS-2I12-9A	2	9.50 to 15.75	– 9 / 250	35.6 • 21.6 • 14	49
GS-2I5-9	2	4.50 to 5.50	– 9 / 250	35.6 • 21.6 • 14	51
GS-2IX-9	2	4.50 to 15.75	– 9 / 250	35.6 • 21.6 • 14	53

Common feature: short circuit protection, input-output isolation.

SWITCHING VOLTAGE REGULATORS

Type	Description	Dimensions L • W • H (mm)	Page
GS-R400V*	Adjustable 4A, 5.1 to 40 V Output; V_{in} up to 46V	85.5 • 67.0 • 21.3	57
GS-R400VB*	Like GS-R400V with Adjustable Current, Syncro Module	85.5 • 67.0 • 21.3	57
GS-R405S*	5V/4A Fixed Output with Reset; V_{in} up to 46V	85.5 • 67.0 • 21.3	57
GS-R405*	5V/4A Fixed Output	85.5 • 67.0 • 21.3	57
GS-R412*	12V/4A Fixed Output	85.5 • 67.0 • 21.2	57
GS-R415*	15V/4A Fixed Output	85.5 • 67.0 • 21.3	57
GS-R424*	24V/4A Fixed Output	85.5 • 67.0 • 21.3	57
GS-R51212*	Triple Output Voltage; 5V/3.5 A; ± 12V/0.1A Isolated Outputs	85.5 • 67.0 • 21.3	63
GS-R400V/2*	Adjustable 2A, 5.1 to 24V Output; V_{in} up to 40V; Small Size	50.8 • 50.8 • 14.7	61
G-R405/2*	5V/4A Fixed Output; Small Size	50.8 • 50.8 • 14.7	61
GS-R412/2*	12V/3A Fixed Output; Small Size	50.8 • 50.8 • 14.7	61
GS-R415/2*	15V/3A Fixed Output; Small Size	50.8 • 50.8 • 14.7	61
GS-R424/2*	24V/2A Fixed Output; Small Size	50.8 • 50.8 • 14.7	61
GS-M51212	Five Output Voltages; 5V/2A; ± 12V/0.125A; Short Circuit Protection	101.6 • 50.8 • 16.5	67
GS-R4840N	40V/1A Negative Output Regulator, Short Circuit Protection	85.5 • 67.0 • 21.3	71
GS-R1005	5V/10A Fixed Output; V_{in} = 18 to 36 V	101.6 • 50.8 • 19	73

* Common features short circuit protection, soft start, thermal protection, crow bar protection for the load, common input-output ground.

POWER CONTROLLER & MOTOR DRIVE MODULES

Type	Description	Dimensions L • W • H (mm)	Page
GS-D050	0.5A Chopped Bipolar Stepper Motor Driver	50.8 • 50.8 • 147	77
GS-D200	2.0A Chopped Bipolar Stepper Motor Driver	85.5 • 67.0 • 21.3	81
GS-D200S	2.5 A Chopped Bipolar Stepper Motor Driver Fully Protected Outputs	85.5 • 67.0 • 21.3	81
GS-D200M	2.5 A Microstep Driver	85.5 • 67.0 • 21.3	85
GS-C200	Programmable Intelligent Stepper Motor Controller with 25 different commands	85.5 • 67.5 • 22.0	89
GS-C200S	Programmable Intelligent Stepper Motor Controller with 29 different commands	85.5 • 67.5 • 22.0	89

POWER CONTROLLER & MOTOR DRIVE BOARDS

Type	Description	Dimensions L • W • H (mm)	Page
GS-D250M	2.5 A Microstep Motor Driver	160 • 100 • 28	95
GS-D350M	5.6 A Microstep Motor Driver	160 • 100 • 48	99
GS-D550	5.6 A Chopped 2 and 5 phases Stepper Motor Driver	160 • 100 • 48	103
GS-DC200	Board with a GS-C200 Controller and a GS-D200 Driver	160 • 100 • 24	109
GS-DC200S	Board with a GS-C200 Controller and a GS-D200S Driver	160 • 100 • 24	109
GS-DC200SS	Board with a GS-C200S Controller and a GS-D200S Driver	160 • 100 • 24	109

DC/DC CONVERTERS

DC-DC CONVERTER

PRELIMINARY DATA

DESCRIPTION

The GS-1I5-5 is a 1.25W DC-DC converter designed to provide an isolated 5V/250mA power source.

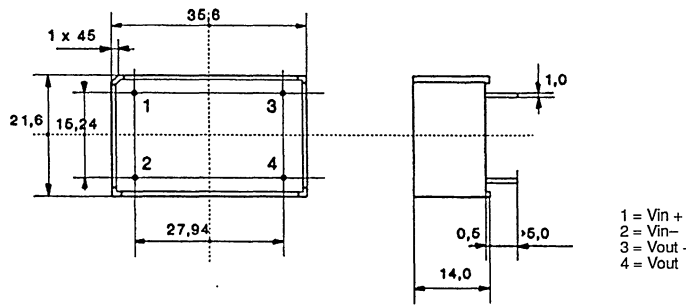
The module operates from a 5V input source and it offers 2500 V_{DC} isolation.

ELECTRICAL CHARACTERISTICS (T_A = 25°C unless otherwise specified)

Symbol	Parameter	Test Conditions	Min	Typ	Max	Unit
V_i	Input Voltage	V_o = 5V I_o = 0 to 250mA	4.50		5.50	V
V_o	Output Voltage	V_i = 4.5 to 5.5V I_o = 0 to 250mA	4.75	5	5.25	V
I_o	Output Current *	V_i = 4.5 to 5.5V	0		250	mA
δV_o	Line regulation	δV_i = 4.5 to 5.5V I_o = 250mA			5	mV
δV_o	Load regulation	V_i = 4.5 to 5.5V δI_o = 0 to 250mA			5	mV
η	Efficiency	V_i = 5.0V I_o = 250mA	70	73		%
V_{or}	Output Ripple Voltage	V_i = 5.0V I_o = 250mA		7	10	mVrms
I_{ir}	Input Reflected Current	V_i = 5.0V I_o = 250mA		25	30	mApp
V_{is}	Isolation voltage		2500			Vdc
Tstg	Storage Temperature		–40		+85	°C
Top	Operating Temperature		0		+70	°C

* **Note:** When output current is less than 20mA, output ripple voltage increase due to discontinuous operation.

CONNECTION DIAGRAM AND MECHANICAL DATA



Dimensions in mm bottom view

SGS-THOMSON MICROELECTRONICS

GS-2I5-12

DC-DC CONVERTER

DESCRIPTION

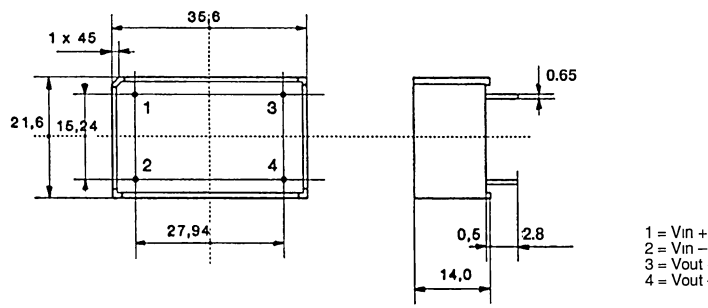
The GS-2I5-12 is a 2.4W DC-DC converter designed to provide an isolated 12V/200mA power source.

The module operates from a 5V input source and it features continuous short circuit protection.
An input filter minimizes the reflected input current.

ELECTRICAL CHARACTERISTICS (T_A = 25°C unless otherwise specified)

Symbol	Parameter	Test Conditions		Min	Typ	Max	Unit
V_i	Input Voltage	V_O = 12V	I_O = 0 to 200mA	4.50		5.50	V
V_O	Output Voltage	V_i = 4.5 to 5.5V	I_O = 0 to 200mA	11.4	12.0	12.6	V
I_O	Output Current	V_i = 4.5 to 5.5V		50		200	mA
δV_O	Line Regulation	δV_i = 4.5 to 5.5V	I_O = 200mA			10	mV
δV_O	Load Regulation	V_i = 4.5 to 5.5V	δI_O = 50 to 200mA			10	mV
η	Efficiency	V_i = 5.0V	I_O = 200mA	65	70		%
V_{or}	Output Ripple Voltage	V_i = 5.0V	I_O = 200mA		5	10	mVrms
I_{ir}	Input Reflected Current	V_i = 5.0V	I_O = 200mA		20	30	mApp
V_{is}	Isolation Voltage			2500			Vdc
T_{stg}	Storage Temperature			–40		+85	°C
T_{op}	Operating Temperature			0		+70	°C

CONNECTION DIAGRAM AND MECHANICAL DATA



Dimensions in mm

bottom view

GS-2I48-28

DC-DC CONVERTER

DESCRIPTION

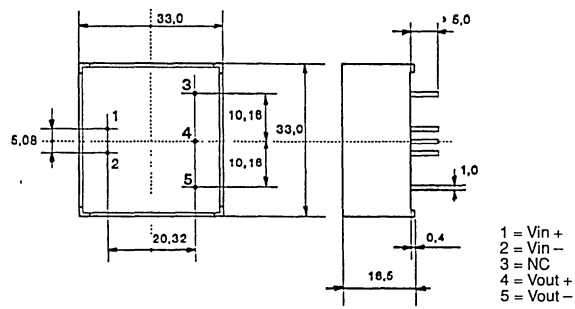
The GS-2I48-28 is a1.6W DC-DC converter designed to provide an isolated 28V/60mA power source.

The module operates from a 48V input source and it offers 500V_{DC} isolation. An input filter minimizes the reflected input current.

ELECTRICAL CHARACTERISTICS (T_A= 25°C unless otherwise specified)

Symbol	Parameter	Test Conditions		Min	Typ	Max	Unit
V_i	Input Voltage	I_o = 15 to 60mA		39.0	48.0	59.0	V
I_i	Input Current	V_i = 48V	I_o = 60mA			60	mA
V_o	Output Voltage	V_i = 39 to 59V	I_o = 15 to 60mA	25.0	28.0	31.0	V
η	Efficiency	V_i = 48V	I_o = 60mA	50			%
V_{or}	Output Ripple Voltage	V_i = 39 to 59V	I_o = 60mA			30	mVpp
I_{ir}	Input Reflected Current	V_i = 48V	I_o = 60mA			25	mApp
f_{op}	Operating Frequency	V_i = 48V	I_o = 15 to 60mA	40		100	kHz
T_{stg}	Storage Temperature			–20		+85	°C
T_{op}	Operating Temperature			0		+70	°C

CONNECTION DIAGRAM AND MECHANICAL DATA



Dimensions in mm

bottom view

GS-3I5-3.3

DC-DC CONVERTER

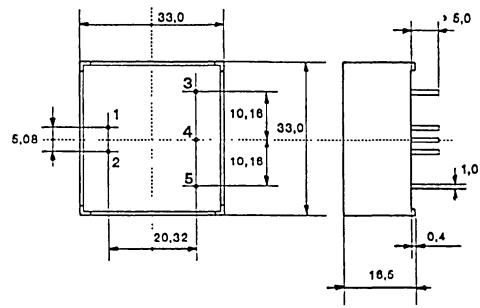
DESCRIPTION

The GS-3I5-3.3 is a 2.5W DC-DC converter used to generate a 3.3V isolated output from a 5.0V input.

ELECTRICAL CHARACTERISTICS (T_A = 25°C unless otherwise specified)

Symbol	Parameter	Test Conditions		Min	Typ	Max	Unit
V_i	Input Voltage	V_o = 3.3V	I_o = 0 to 0.75A	4.75	5.0	5.25	V
V_o	Output Voltage	V_i = 4.75 to 5.25V	I_o = 0 to 0.75A	3.20	3.30	3.40	V
I_o	Output Current	V_i = 4.75 to 5.25V		0		0.75	A
δV_o	Line Regulation	δV_i = 500mV	I_o = 0.75A		2	10	mV
δV_o	Load Regulation	V_i = 5.00V	δI_o = 0.7A		20	50	mV
η	Efficiency	V_i = 5.0V	I_o = 0.75A	70	75		%
V_{or}	Output Ripple Voltage	V_i = 5.0V	I_o = 0.75A		7	15	mVrms
I_{os}	Output Short Circuit Current	V_i = 5.0V			1.2	1.5	A
I_{ir}	Input Reflected Current	V_i = 5.0V	I_o = 0.75A		25	50	mApp
I_{iq}	Input Quiescent Current	V_i = 5.0V	I_o = 0		25	50	mA
V_{is}	Isolation Voltage			750			Vdc
f_{op}	Operating Frequency	V_i = 5.0V	I_o = 0.75A		70		kHz
T_{stg}	Storage Temperature			–40		+105	°C
T_{op}	Operating Temperature			0		+70	°C

CONNECTION DIAGRAM AND MECHANICAL DATA



1 = Vin +
2 = Vin –
3 = NC
4 = Vout +
5 = Vout –

Dimensions in mm

bottom view

GS-2I5-D5

DUAL OUTPUT DC-DC CONVERTER

DESCRIPTION

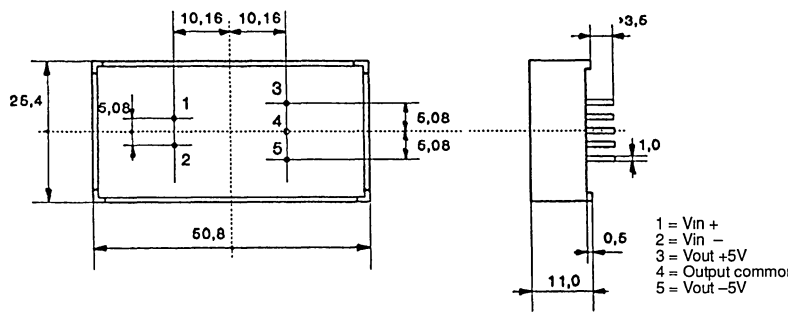
The GS-2I5-D5 is a 2.0W DC-DC converter designed to provide an isolated +5V/200mA and –5V/200mA power source.

The module operates from a 5V input source and it offers 2500V_{DC} isolation.

ELECTRICAL CHARACTERISTICS (T_A = 25°C unless otherwise specified)

Symbol	Parameter	Test Conditions		Min	Typ	Max	Unit
V_i	Input Voltage	$I_{o1} = I_{o2}$ = 0 to 200mA		4.75	5.00	5.25	V
I_i	Input Current	V_i = 4.75 to 5.25V	I_o = Full Load			750	mA
V_{o1}	Output Voltage 1	V_i = 4.75 to 5.25V	I_{o1} = 0 to 200mA	4.75		5.25	V
V_{o2}	Output Voltage 2	V_i = 4.75 to 5.25V	I_{o2} = 0 to 200mA	–4.75		–5.25	V
η	Efficiency	V_i = 5.0V	I_o = Full Load	55	62		%
V_{or}	Output Ripple Voltage	V_i = 4.75 to 5.25V	I_o = Full Load			20	mVrms
I_{ir}	Input Reflected Current	V_i = 4.75 to 5.25V	I_o = Full Load			40	mApp
f_{op}	Operating Frequency	V_I = 5.0V	I_o = Full Load		20		kHz
T_{stg}	Storage Temperature			–20		+85	°C
T_{op}	Operating Temperature			0		+70	°C

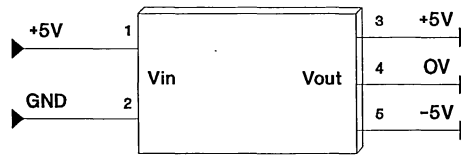
CONNECTION DIAGRAM AND MECHANICAL DATA

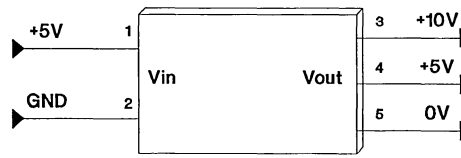


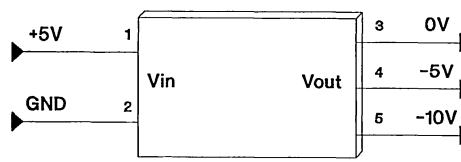
Dimensions in mm bottom view

OUTPUT CONFIGURATION OPTIONS

GS-2I5-D5







GS-2I5-D12

DUAL OUTPUT DC-DC CONVERTER

DESCRIPTION

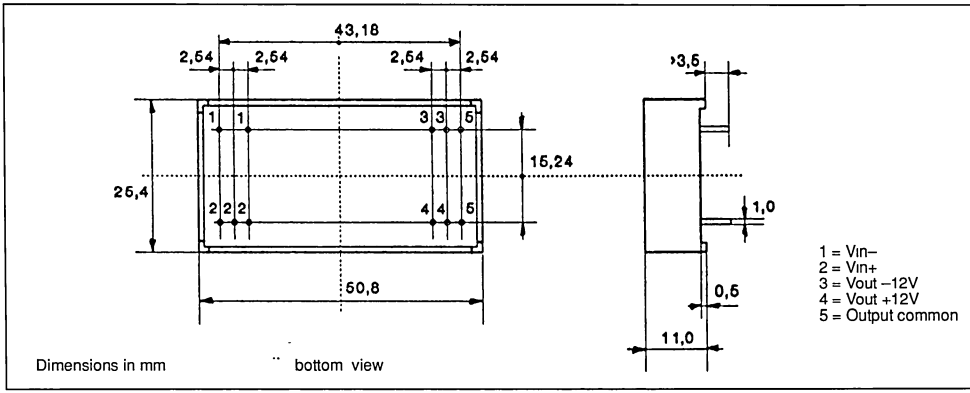
The GS-2I5-D12 is a 2.0W DC-DC converter designed to provide an isolated +12V/100mA and –12V/100mA power source.

The module operates from a 5V input source and it offers 2500Vdc isolation.

ELECTRICAL CHARACTERISTICS (T_A = 25°C unless otherwise specified)

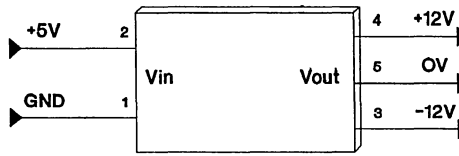
Symbol	Parameter	Test Conditions	Min	Typ	Max	Unit
V_i	Input Voltage	$I_{o1} = I_{o2}$ = 0 to 100mA	4.75	5.00	5.25	V
I_i	Input Current	V_i = 4.75 to 5.25V I_o = Full Load			750	mA
V_{o1}	Output Voltage 1	V_i = 4.75 to 5.25V I_{o1} = 0 to 100mA	10.80		13.20	V
V_{o2}	Output Voltage 2	V_i = 4.75 to 5.25V I_{o2} = 0 to 100mA	–10.80		–13.20	V
η	Efficiency	V_i = 5.0V I_o = Full Load	70	75		%
V_{or}	Output Ripple Voltage	V_i = 4.75 to 5.25V I_o = Full Load			100	mVpp
I_{ir}	Input Reflected Current	V_i = 4.75 to 5.25V I_o = Full Load			75	mApp
f_{op}	Operating Frequency	V_i = 4.75 to 5.25V I_o = Full Load	20		50	kHz
T_{stg}	Storage Temperature		–20		+85	°C
T_{op}	Operating Temperature		0		+70	°C

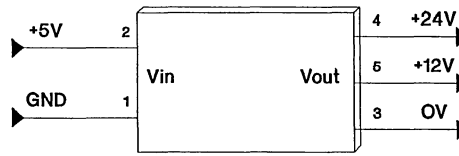
CONNECTION DIAGRAM AND MECHANICAL DATA

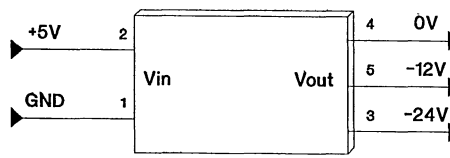


OUTPUT CONFIGURATION OPTIONS

GS-2I5-D12







GS-31I10-D1524

DUAL OUTPUT DC-DC CONVERTER

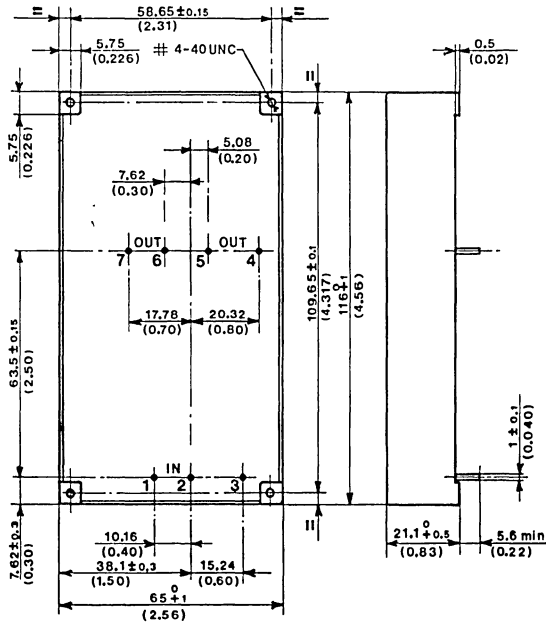
DESCRIPTION

This GS-31I10-D1524 is a 31W DC-DC converter used to generate 15V and 24V isolated outputs from a 10V input.

ELECTRICAL CHARACTERISTICS (T_A = 25°C unless otherwise specified)

Symbol	Parameter	Test Conditions	Min	Typ	Max	Unit
V_i	Input Voltage	P_o = 0 to 31W	8.98	10.20	13	V
V_{o1}	Output Voltage	V_i = 8.98 to 13V I_{o1} = 0 to 2A	14.85	15.00	15.15	V
V_{o2}	Output Voltage	V_i = 8.98 to 13V I_{o2} = 0 to 60mA	23.50	24.00	24.50	V
δV_{o1}	Line Regulation	V_i = 8.98 to 13V δI_{o1} = 2A			10	mV
δV_{o1}	Load Regulation	V_i = 10.2V δI_{o1} = 0.1 to 2A			10	mV
δV_{o2}	Line Regulation	V_i = 8.98 to 13V δI_{o2} = 60mA			10	mV
δV_{o2}	Load Regulation	V_i1 = 10.2V δI_{o2} = 0 to 60mA			10	mV
T_C	Temperature Coefficent	V_i = 10.2V I_{o1} = 2A I_{o2} = 60mA T_A 0 to 70°C		0.01		%C
η	Efficiency	V_i = 10.2V I_{o1} = 2A I_{o2} = 60mA		80		%
V_{or1}	Output Ripple Voltage	V_i = 10.2V I_{o1} = 2A		5.0	8.0	mVrms
V_{or2}	Output Ripple Voltage	V_i = 10.2V I_{o1} = 60mA		5.0	8.0	mVrms
I_{ir}	Input Reflected Current	V_i = 10.2V I_{o1} = 2A I_{o2} = 60mA		200	400	mApp
f_s	Switching frequency	V_i = 10.2V		150		kHZ
V_{is}	Isolation Voltage		500			Vdc
T_{stg}	Storage Temperature		–40		+85	°C
T_{op}	Operating Temperature		0		+70	°C

CONNECTION DIAGRAM AND MECHANICAL DATA



1 = Negative input
2 = Positive input
3 = NC
4 = +24V output
5 = +24V return
6 = +15V output
7 = +15V return

Dimensions in mm (inches)

bottom view

GS-1I5-5D15

TRIPLE OUTPUT DC-DC CONVERTER

DESCRIPTION

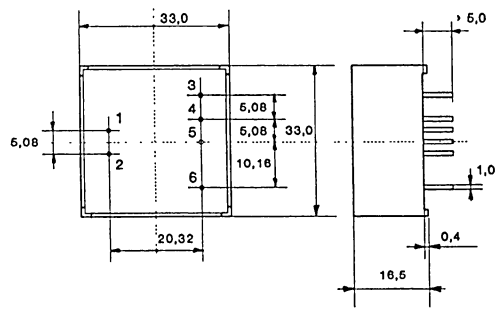
The GS-1I5-5D15 is a 0.6W DC-DC converter designed to provide an isolated 5V/20mA, +15V/15mA and –15V/15mA power source.

The module operates from a 5V input source and it offers 2500 V_{DC} isolation.

ELECTRICAL CHARACTERISTICS (T_A = 25°C unless otherwise specified)

Symbol	Parameter	Test Conditions	Min	Typ	Max	Unit
V_i	Input Voltage	I_{o1} = 3 to 20mA I_{o2} = I_{o3} = 5 to 15mA	4.70	5.00	5.30	V
I_i	Input Current	V_i = 4.7 to 5.3V I_o = Full Load			200	mA
I_i	Input Current	V_i = 4.7 to 5.3V I_o = No Load			40	mA
V_{o1}	Output Voltage 1	V_i = 4.7 to 5.3V I_{o1} = 3 to 20mA	4.75		5.25	V
V_{o2}	Output Voltage 2	V_i = 4.7 to 5.3V I_{o2} = 5 to 15mA	14.25		15.75	V
V_{o3}	Output Voltage 3	V_i = 4.7 to 5.3V I_{o3} = 5 to 15mA	–14.25		–15.75	V
η	Efficiency	V_i = 5.0V I_o = Full Load	68	73		%
V_{or}	Output Ripple Voltage	V_i = 4.7 to 5.3V I_o = Full Load			30	mVpp
I_{ir}	Input Reflected Current	V_i = 4.7 to 5.3 I_o = Full Load			10	mApp
f_{op}	Operating Frequency	V_i = 5.0V I_o = Full Load		150		kHz
T_{stg}	Storage Temperature		–20		+85	°C
T_{op}	Operating Temperature		0		+70	°C

CONNECTION DIAGRAM AND MECHANICAL DATA



1 = Vin –
2 = Vin+
3 = Vout + 15V
4 = Vout – 15V
5 = Output common
6 = Vout + 5V

Dimensions in mm

bottom view

TRIPLE OUTPUT DC-DC CONVERTER

DESCRIPTION

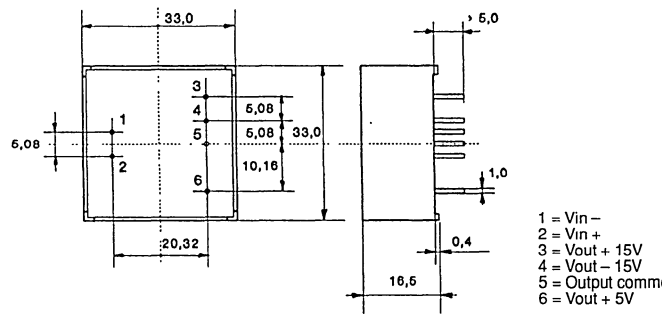
The GS-2I5-5D15 is a 2.3W DC-DC converter designed to provide an isolated 5V/50mA, +15V/70mA and –15V/70mA power source.

The module operates from a 5V input source and it offers 2500V_{DC} isolation.

ELECTRICAL CHARACTERISTICS (T_A = 25°C unless otherwise specified)

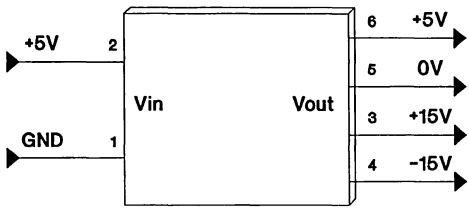
Symbol	Parameter	Test Conditions	Min	Typ	Max	Unit
V_i	Input Voltage	I_{o1} = 3 to 50mA I_{o2} = I_{o3} = 5 to 70mA	4.70	5.00	5.30	V
I_i	Input Current	V_i = 4.7 to 5.3V I_o = Full Load			900	mA
I_i	Input Current	V_i = 4.7 to 5.3V I_o = No Load			60	mA
V_{o1}	Output Voltage 1	V_i = 4.7 to 5.3V I_{o1} = 3 to 50mA	4.75		5.25	V
V_{o2}	Output Voltage 2	V_i = 4.7 to 5.3V I_{o2} = 5 to 70mA	14.25		15.75	V
V_{o3}	Output Voltage 3	V_i = 4.7 to 5.3V I_{o3} = 5 to 70mA	–14.25		–15.75	V
η	Efficiency	V_i = 5.0V I_o = Full Load	70	75		%
V_{or}	Output Ripple Voltage	V_i = 4.7 to 5.3V I_o = Full Load			50	mVpp
I_{ir}	Input Reflected Current	V_i = 4.7 to 5.3V I_o = Full Load			150	mApp
f_{op}	Operating Frequency	V_i = 5.0V I_o = Full Load		50		kHz
T_{stg}	Storage Temperature		–20		+85	°C
T_{op}	Operating Temperature		0		+70	°C

CONNECTION DIAGRAM AND MECHANICAL DATA

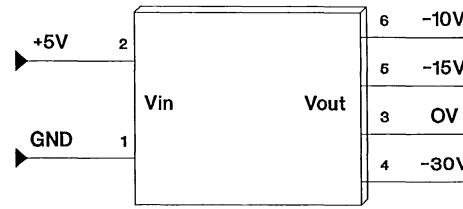


Dimensions in mm bottom view

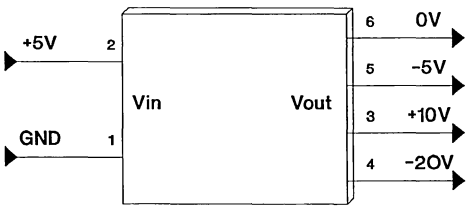
OUTPUT CONFIGURATION OPTIONS



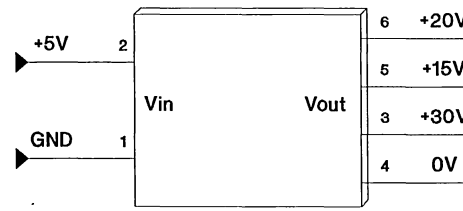
GS-1I5-5D15
GS-2I5-5D15



GS-1I5-5D15
GS-2I5-5D15



GS-1I5-5D15
GS-2I5-5D15



GS-1I5-5D15
GS-2I5-5D15

GS-5I24-5D15

TRIPLE OUTPUT DC-DC CONVERTER

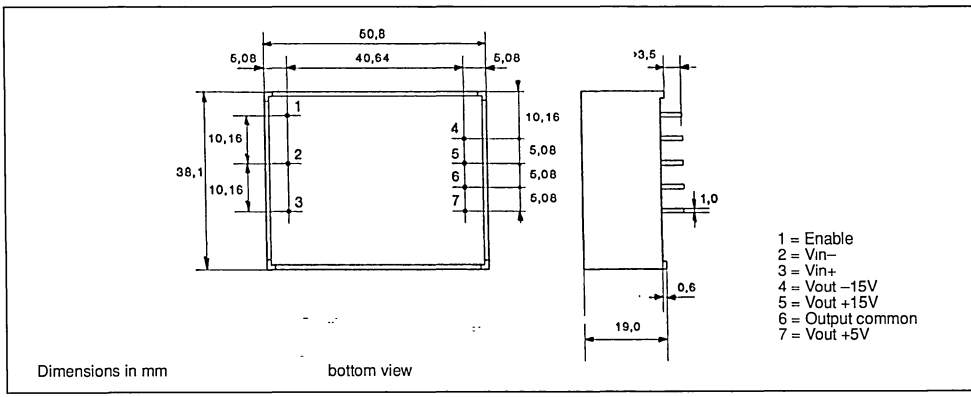
DESCRIPTION

The GS-5I24-5D15 is a 5.0W DC-DC converter designed to provide an isolated 5V/200mA, +15V/125mA and -15V/125mA power source.
The module operates from a 24V input source and it offers 2500V_{DC} isolation.
A high level TTL/CMOS compatible input will enable the unit on while a low input will inhibit it.

ELECTRICAL CHARACTERISTICS (T_A = 25°C unless otherwise specified)

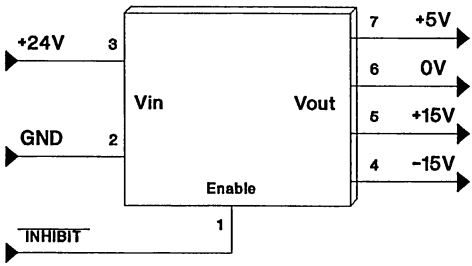
Symbol	Parameter	Test Conditions		Min	Typ	Max	Unit
V_i	Input Voltage	I_{o1} = 0 to 200mA I_{o2} = I_{o3} = 0 to 125mA		21.6		30.0	V
I_i	Input Current	V_i = 24V	I_o = Full Load			350	mA
V_{o1}	Output Voltage 1	V_i = 21.6 to 30.0V	I_{o1} = 0 to 200mA	4.75		5.25	V
V_{o2}	Output Voltage 2	V_i = 21.6 to 30.0V	I_{o2} = 0 to 125mA	14.25		15.75	V
V_{o3}	Output Voltage 3	V_i = 21.6 to 30.0V	I_{o3} = 0 to 125mA	–14.25		–15.75	V
η	Efficiency	V_i = 5.0V	I_o = Full Load	65	70		%
V_{or}	Output Ripple Voltage	V_i = 21.6 to 30.0V	I_o = Full Load			20	mVrms
I_{ir}	Input Reflected Current	V_I = 21.6 to 30.0V	I_o = Full Load			40	mApp
f_{op}	Operating Frequency	V_i= 24V	I_o = Full Load		120		kHz
T_{stg}	Storage Temperature			–20		+85	°C
T_{op}	Operating Temperature			0		+70	°C

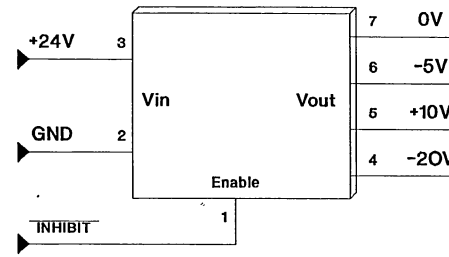
CONNECTION DIAGRAM AND MECHANICAL DATA

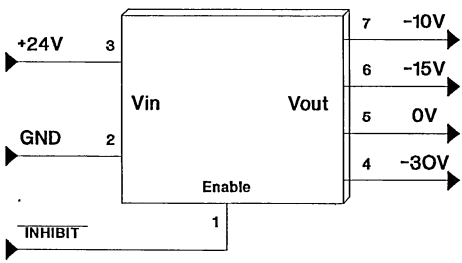


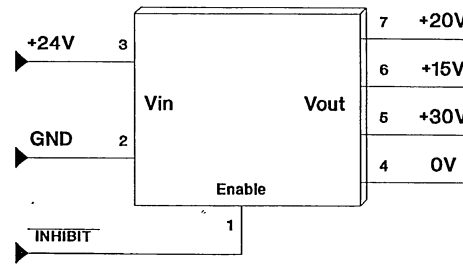
OUTPUT CONFIGURATION OPTIONS

GS-5I24-5D15









DC-DC CONVERTER FOR ECL APPLICATIONS

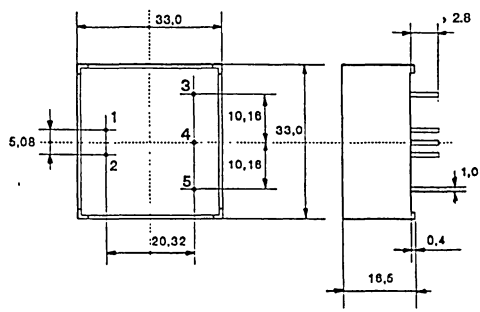
DESCRIPTION

The GS-3I5-5.2 is a 3.0W DC-DC converter used to generate a 5.2V isolated output from a 5.0V input.

ELECTRICAL CHARACTERISTICS (T_A = 25°C unless otherwise specified)

Symbol	Parameter	Test Conditions		Min	Typ	Max	Unit
V_i	Input Voltage	V_o = 5.2V	I_o = 0 to 0.6 A	4.75	5.00	5.25	V
V_o	Output Voltage	V_i = 4.75 to 5.25V	I_o = 0 to 0.6 A	–5.04	–5.20	–5.36	V
I_o	Output Current	V_i = 4.75 to 5.25V		0		0.6	A
δV_o	Line Regulation	δV_i = 500mV	I_o = 0.6A		2	10	mV
δV_o	Load Regulation	V_i = 5.0V	δI_o = 0.55A		10	15	mV
η	Efficiency	V_i = 5.0V	I_o = 0.6A	70	75		%
V_{or}	Output Ripple Voltage	V_i = 5.0V	I_o = 0.6A		5	15	mVrms
I_{os}	Output Short Circuit Current	V_i = 5.0V			0.9	1.5	A
I_{ir}	Input Reflected Current	V_i = 5.0V	I_o = 0,6A		25	50	mApp
I_{iq}	Input Quiescent Current	V_i = 5.0V	I_o = 0		18	30	mA
V_{is}	Isolation Voltage			750			Vdc
f_{op}	Operating Frequency	V_i = 5.0V	I_o = 0.6A		70		kHz
T_{stg}	Storage Temperature			–40		+105	°C
T_{op}	Operating Temperature			0		+70	°C

CONNECTION DIAGRAM AND MECHANICAL DATA



1 = Vin +
2 = Vin –
3 = NC
4 = Vout +
5 = Vout –

Dimensions in mm

bottom view

SGS-THOMSON MICROELECTRONICS

GS-1I48-D540

ISDN DC-DC CONVERTER

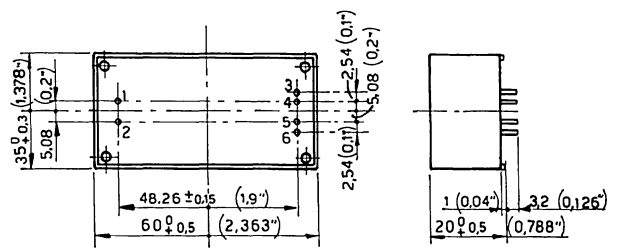
DESCRIPTION

The GS-1I48-D540 converter has been designed for NETWORK TERMINATION ISDN Telecom applications (CCITT I.430).
Two isolated outputs, 5V/80mA and 40V/12.5mA are supplied; the converter offers short circuit protection, input filtering, 80% typical efficency at max load and six sided case.
4000 V_{DC} and 2000 V_{DC} isolation voltages are provided between input to outputs and between outputs respectively.

ELECTRICAL CHARACTERISTICS (T_A = 25°C unless otherwise specified)

Symbol	Parameter	Test Conditions	Min	Typ	Max	Unit
V_i	Input Voltage	V_{o1} = 5V I_{o1} = 2 to 80mA V_{o2} = 40V I_{o2} = 0 to 12.5mA	24	48	70	V
V_{o1}	Output Voltage 1	V_i = 24 to 70V I_{o1} = 2 to 80mA	4.85	5.00	5.15	V
V_{o2}	Output Voltage 2	V_i = 24 to 70V I_{o2} = 0 to 12.5mA	34	40	42	V
η	Efficiency	V_i = 24V I_{o1} = 80mA I_{o2} = 12.5mA	77	80		%
V_{or1}	Output Ripple Voltage	V_i = 24 to 70V I_{o1} = 2 to 80mA		5		mVpp
V_{or2}	Output Ripple Voltage	V_i = 24 to 70V I_{o2} = 0 to 12.5mA		5		mVpp
eN	Input Noise Voltage	V_I = 48V I_{o1} = 80mA BW = 0 to 20 MHz I_{o2} = 12.5mA		9		mVpp
V_{is}	Isolation Voltage	Input to Output 1 Input to Output2	4000			Vdc
V_{is}	Isolation Voltage	Output 1 to Output 2	2000			Vdc
T_{stg}	Storage Temperature		– 40		+85	°C
T_{op}	Operating Temperature		– 25		+70	°C

CONNECTION DIAGRAM AND MECHANICAL DATA



Dimensions in mm (inches) bottom view

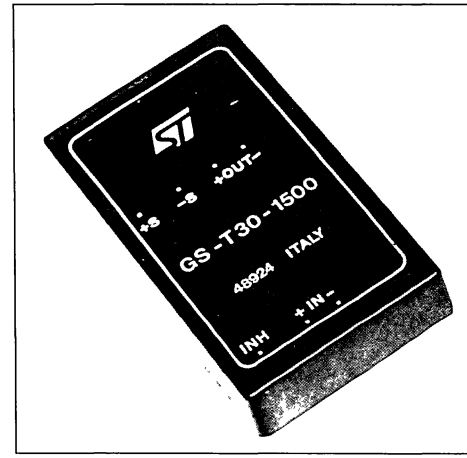
SGS-THOMSON MICROELECTRONICS

GS-T25/30 FAMILY

25-30 WATT DC-DC CONVERTERS

FEATURES

- MTBF in excess of 1M hours at +45°C ambient temperature
- PCB or chassis mountable
- No external component required
- Six sided case
- High efficency (see data)
- 500 V_{DC} minimum isolation
- Wide input voltage range (36 to 72V)
- Reverse input polarity protection
- Peak input overvoltage withstand (90V/1 sec.)
- Minimized input reflected current
- Soft start
- Remote inhibit/enable with low stand by current
- Remote output voltage sense
- Non latching permanent short circuit protection
- Latching output overvoltage protection
- No derating over the temperature range



DESCRIPTION

The GS-T25/30 series is a family of isolated DC-DC converters specially designed for Telecom applications, available in different output voltages: 5V; 6V; 12V and 15V.(Other Output Voltages available on request)

The output power is in the range of 25W to 30W.

To ensure very long life, these converters do not use electrolytic aluminium capacitors or optoelectronic feedback systems.

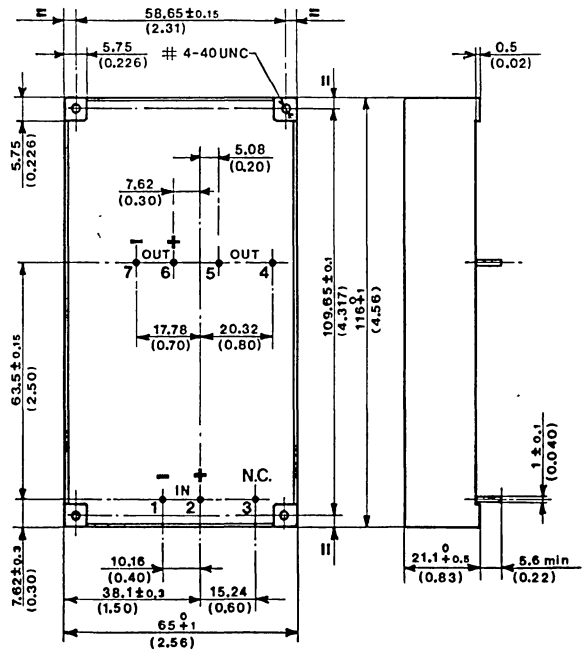
PRODUCTS FAMILY

Ordering Number	Output Voltage	Output Current	Output Power
GS-T25-0500	5V	5A	25W
GS-T27-0600	6V	4.5A	27W
GS-T30-1200	12V	2.5A	30W
GS-T30-1500	15V	2A	30W

ABSOLUTE MAXIMUM RATINGS

Symbol	Parameter	Value	Unit
V_i	DC Input Voltage	34 to 72	V
V_{ipk}	Input Transient Overvoltage (T ≤ 1 sec.)	90	V
V_{ir}	Input Reverse Voltage	100	V
T_{stg}	Storage Temperature Range	– 55 to 105	°C
T_{op}	Operating Temperature Range	– 25 to 71	°C

CONNECTION DIAGRAM AND MECHANICAL DATA



Dimensions in mm (inches)

bottom view

PIN DESCRIPTION

Pin	Function	Description
1	– Input	
2	+ Input	Unregulated input voltage (typically 48V) must be applied between pin 1-2. The input section of the DC-DC converter is protected against reverse polarity by a series diode. No external fuse is required. Input is filtered by a Pi network.
3	Remote Inhibit/Enable	Logically compatible with CMOS or open collector TTL. The converter is ON when the voltage applied to pin 3 is 1.8VDC min or left open referenced to the pin 1. The converter is OFF for a control voltage lower than 1.2VDC.
4	+ Sense	For connection to remote loads this pin allows voltage sensing to the load itself. To be connected to pin 6 when remote sensing is not used.
5	– Sense	See pin 4. To be connected to pin 7 when remote sensing is not used.
6	+ Output	
7	– Output	

GS-2I48-D12

DUAL OUTPUT DC-DC CONVERTER

PRELIMINARY DATA

DESCRIPTION

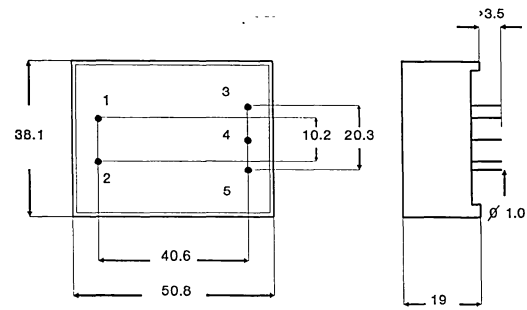
The GS-2I48-D12 is a 2.4W DC-DC converter designed to provide an isolated +12V/100mA and –12V/100mA power source for telecommunications.

The module features a wide input range (40 to 60V), low reflected input current and continuous short-circuit protection.

ELECTRICAL CHARACTERISTICS (T_A = 25°C unless otherwise specified)

Symbol	Parameter	Test Conditions		Min	Typ	Max	Unit
V_i	Input Voltage	I_{o1}, I_{o2} = 0 to 100mA		40	48	60	V
I_i	Input Current	V_I = 48V	I_o = Full Load			80	mA
V_{o1}	Output Voltage	V_i = 40 to 60V	I_{o1} = 0 to 100mA	11.2	12	12.8	V
V_{o2}	Output Voltage	V_i = 40 to 60V	I_{o2} = 0 to 100mA	11.2	12	12.8	V
V_{o1}, V_{o2}	Output Voltages	V_i = 40 to 60V	I_{o1} = I_{o2}= 0 to 100mA	11.6	12	12.4	V
η	Efficiency	V_i = 48V	I_{o1}, I_{o2} = Full Load		73		%
V_{or}	Output Ripple Voltage	V_i = 48V	I_{o1}, I_{o2} = Full Load		30		mVpp
I_{ir}	Input Reflected Current	V_i = 48V	I_{o1}, I_{o2} = Full Load		3		mApp
V_{is}	Isolation Voltage			500			Vdc
f op	Operating Frequency	V_i = 48V		50	100	150	kHz
T_{stg}	Storage Temperature			–40		+85	°C
T_{op}	Operating Temperature			0		+70	°C

CONNECTION DIAGRAM AND MECHANICAL DATA



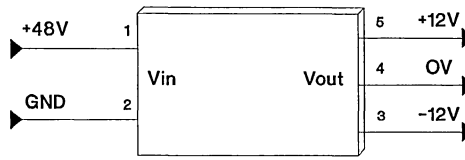
1 = Vin +
2 = Vin –
3 = –12V Output
4 = 0V Output
5 = +12V Output

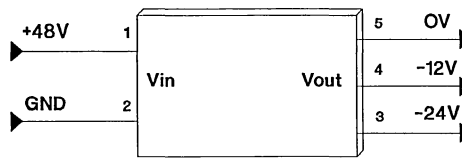
Dimensions in mm

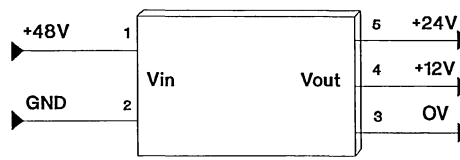
bottom view

OUTPUT CONFIGURATION OPTIONS

GS-2I48-D12







GS-4I48-5

DC-DC CONVERTER

PRELIMINARY DATA

DESCRIPTION

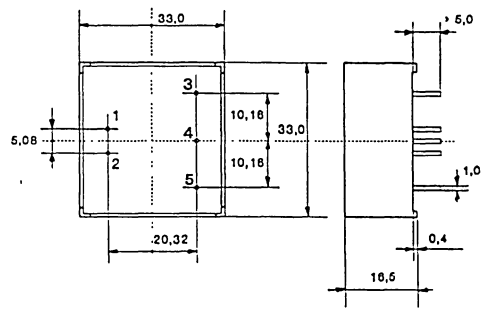
The GS-4I48-5 is a 4W DC-DC converter designed to provide an isolated 5V/800mA power source for telecommunications.

The module features a wide input range (40 to 60V), low reflected input current and continuous short circuit protection.

ELECTRICAL CHARACTERISTICS (T_A = 25°C unless otherwise specified)

Symbol	Parameter	Test Conditions		Min	Typ	Max	Unit
V_i	Input Voltage		I_o = 30 to 800mA	40	48	60	V
I_i	Input Current	V_i = 48V	I_o = 800mA			140	mA
V_o	Output Voltage	V_i = 40 to 60V	I_o = 30 to 800mA	4.85	5.00	5.15	V
I_o	Output Current	V_i = 40 to 60V		30		800	mA
η	Efficiency	V_i = 48V	I_o = 800mA		73		%
V_{or}	Output Ripple Voltage	V_i = 48V	I_o = 800mA			30	mVpp
I_{ir}	Input Reflected Current	V_i = 48V	I_o = 800mA			20	mApp
I_{isc}	Input Short Circuit Current					90	mA
I_{osc}	Output Short Circuit Current	V_i = 48V				1.9	A
V_{is}	Isolation Voltage			500			V
f_{op}	Operating Frequency				150		kHz
T_{stg}	Storage Temperature			–40		+85	°C
T_{op}	Operating Temperature			0		+70	°C

CONNECTION DIAGRAM AND MECHANICAL DATA



1 = Vin +
2 = Vin –
3 = NC
4 = Vout +
5 = Vout –

Dimensions in mm

bottom view

SGS-THOMSON MICROELECTRONICS

GS-4I48-12

DC-DC CONVERTER

DESCRIPTION

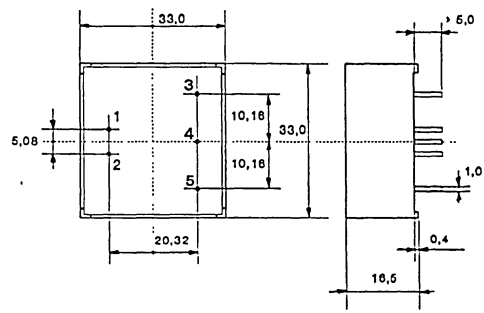
The GS-4I48-12 is a 3.6W DC-DC converter designed to provide an isolated 12V/200mA power source for telecommunications.

The module features a wide input range (40 to 60V), low reflected input current and continuous short circuit protection.

ELECTRICAL CHARACTERISTICS (T_A = 25°C unless otherwise specified)

Symbol	Parameter	Test Conditions		Min	Typ	Max	Unit
V_i	Input Voltage		I_o = 50 to 300mA	40	48	60	V
I_i	Input Current	V_i = 48V	I_o = 300mA			95	mA
V_o	Output Voltage	V_i = 40 to 60V	I_o = 50 to 300mA	11.5	12.0	12.5	V
I_o	Output Current	V_i = 40 to 60V		50		300	mA
η	Efficiency	V_i = 48V	I_o = 300mA	80			%
V_{or}	Output Ripple Voltage	V_i = 40 to 60V	I_o = 300mA			30	mVpp
I_{ir}	Input Reflected Current	V_i = 48V	I_o = 300mA			10	mApp
I_{isc}	Input Short Circuit Current					65	mA
I_{osc}	Output Short Circuit Current	V_i = 48V				1.3	A
V_{is}	Isolation Voltage			500			Vdc
f_{op}	Operating Frequency			50		200	kHz
T_{stg}	Storage Temperature			–40		+85	°C
T_{op}	Operating Temperature			0		+70	°C

CONNECTION DIAGRAM AND MECHANICAL DATA



1 = Vin +
2 = Vin –
3 = NC
4 = Vout +
5 = Vout –

Dimensions in mm

bottom view

SGS-THOMSON MICROELECTRONICS

GS-5I48-15

DC-DC CONVERTER

DESCRIPTION

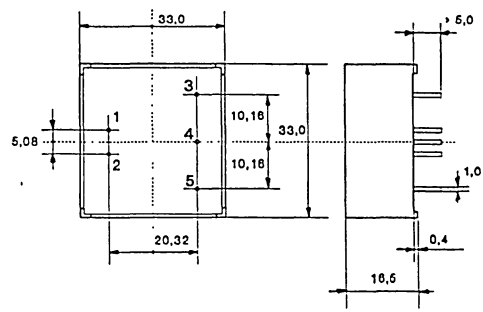
The GS-5I48-15 is a 5W DC-DC converter designed to provide an isolated 15V/330mA power source for telecommunications.

The module features a wide input range (40 to 60V), low reflected input current and continuous short circuit protection.

ELECTRICAL CHARACTERISTICS (T_A = 25°C unless otherwise specified)

Symbol	Parameter	Test Conditions		Min	Typ	Max	Unit
V_i	Input Voltage		I_o = 50 to 330mA	40	48	60	V
I_i	Input Current	V_i = 48V	I_o = 330mA			125	mA
V_o	Output Voltage	V_i = 40 to 60V	I_o = 50 to 330mA	14.25	15.00	15.75	V
I_o	Output Current	V_i = 40 to 60V		50		330	mA
η	Efficiency	V_i = 48V	I_o = 330mA	81			%
V_{or}	Output Ripple Voltage	V_i = 40 to 60V	I_o = 330mA			30	mVpp
I_{ir}	Input Reflected Current	V_i = 48V	I_o = 330mA			10	mApp
I_{isc}	Input Short Circuit Current					65	mA
I_{osc}	Output Short Circuit Current	V_i = 48V				1.3	A
V_{is}	Isolation Voltage			500			Vdc
f_{op}	Operating Frequency			50		250	kHz
T_{stg}	Storage Temperature			–40		+85	°C
T_{op}	Operating Temperature			0		+70	°C

CONNECTION DIAGRAM AND MECHANICAL DATA



1 = Vin +
2 = Vin –
3 = NC
4 = Vout +
5 = Vout –

Dimensions in mm

bottom view

DC-DC CONVERTER FOR LAN NODE SUPPLY

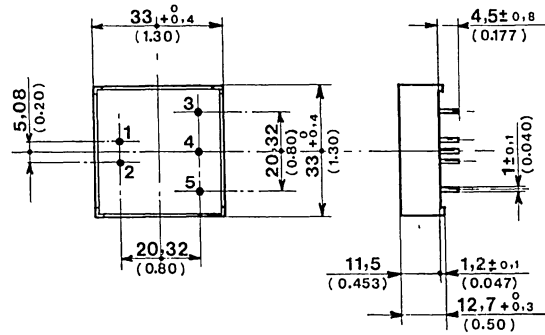
DESCRIPTION

The GS-2I12-9 is a 2.25W DC-DC converter designed to provide power, voltage regulation and isolation for local area network (CHEAPERNET and ETHERNET) transceivers from a wide range of input voltages, according to IEEE 802.3 standards.

ELECTRICAL CHARACTERISTICS (T_A = 25°C unless otherwise specified)

Symbol	Parameter	Test Conditions		Min	Typ	Max	Unit
V_i	Input Voltage	V_O = – 9V	I_O = 70 to 250mA	11.28	12.00	15.75	V
V_O	Output Voltage	V_i = 11.28 to 15.75V	I_O = 70 to 250mA	–8.55	–9.00	–9.45	V
I_O	Output Current	V_i = 11.28 to 15.75V		70		250	mA
δV_O	Transient Load Regulation	V_i = 12V	δI_O = 150mA to 225mA			50	mVpp
V_O	No Load Output Voltage	V_i = 11.28 to 15.75V	I_O = 0			–12	V
η	Efficiency	V_i = 11.28 to 15.75V	I_O = 70mA	55			%
η	Efficiency	V_i = 11.28 to 15.75V	I_O = 250mA	70			%
V_{or}	Output Ripple Voltage	V_i = 11.28 to 15.75V	I_O = 70 to 250mA			50	mVpp
V_{on}	Output Noise Voltage	V_i = 11.28 to 15.75V	I_O = 70 to 250mA			± 75	mVpk
F_{or}	Output Ripple Frequency	V_i = 11.28 to 15.75V	I_O = 70 to 250mA	20		100	kHz
V_{ir}	Input Reflected Voltage	V_i = 11.28 to 15.75V Source resistance= 4Ω	I_O = 70 to 250mA			100	mVpp
R_{IS}	Isolation Resistance	V_{IO} = 3000V		2	50		MΩ
T_{stg}	Storage Temperature			–20		+85	°C
T_{op}	Operating Temperature			0		+70	°C

CONNECTION DIAGRAM AND MECHANICAL DATA



Dimensions in mm

bottom view

DC-DC CONVERTER FOR LAN NODE SUPPLY

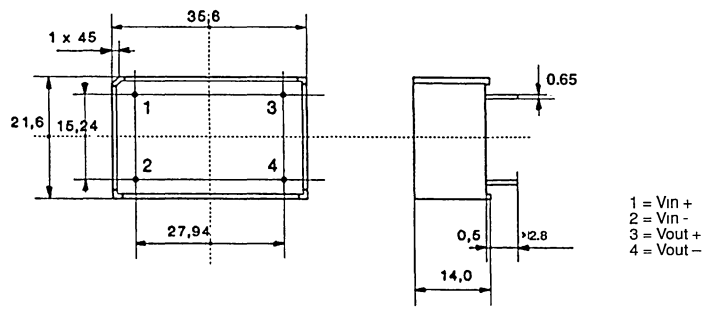
DESCRIPTION

The GS-2I12-9A is a 2.25W DC-DC converter designed to provide power, voltage regulation and isolation for local area network (CHEAPERNET and ETHERNET) transceivers from a wide range of input voltages, according to IEEE 802.3 standards.

ELECTRICAL CHARACTERISTICS (T_A = 25°C unless otherwise specified)

Symbol	Parameter	Test Conditions		Min	Typ	Max	Unit
V_i	Input Voltage	V_O = –9V	I_O = 0 to 250 mA	9.50		15.75	V
V_O	Output Voltage	V_i = 9.5 to 15.75V	I_O = 0 to 250mA	–8.55	–9.00	–9.45	V
I_O	Output Current	V_i = 9.5 to 15.75V		30		250	mA
δV_O	Line Regulation	δV_i = 9.5 to 15.75V	I_O = 250mA			5	mV
δV_O	Load Regulation	V_i = 9.5 to 15.75V	δI_O = 0 to 250mA			5	mV
η	Efficiency	V_i = 12.0V	I_O = 250mA	75	80		%
V_{or}	Output Ripple Voltage	V_I = 12.0V	I_O = 250mA		2	5	mVrms
I_{ir}	Input Reflected Current	V_i = 12.0V	I_O = 250mA		2	5	mApp
V_{is}	Isolation Voltage			2500			Vdc
T_{stg}	Storage Temperature			–40		+85	°C
T_{op}	Operating Temperature			0		+70	°C

CONNECTION DIAGRAM AND MECHANICAL DATA



Dimensions in mm bottom view

DC-DC CONVERTER FOR LAN NODE SUPPLY

DESCRIPTION

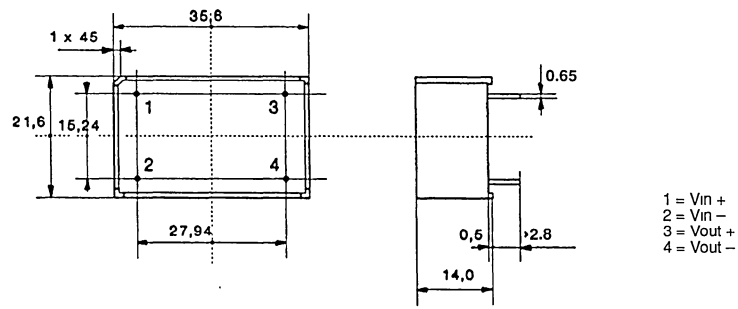
The GS-2I5-9 is a 2.25W DC-DC converter designed to provide power, voltage regulation and isolation for local area network (CHEAPERNET and ETHERNET) transceivers from a standard 5V input voltage, according to IEEE 802.3 standards.

ELECTRICAL CHARACTERISTICS (T_A = 25°C unless otherwise specified)

Symbol	Parameter	Test Conditions		Min	Typ	Max	Unit
V_i	Input Voltage	V_O = –9V	I_O = 0 to 250 mA	4.50		5.50	V
V_O	Output Voltage	V_i = 4.5 to 5.5V	I_O = 0 to 250mA	–8.55	–9.00	–9.45	V
I_O	Output Current *	V_I = 4.5 to 5.5V		0		250	mA
δV_O	Line Regulation	δV_i = 4.5 to 5.5V	I_O = 250mA			5	mV
δV_O	Load Regulation	V_i = 4.5 to 5.5V	δI_O = 0 to 250 mA			5	mV
η	Efficiency	V_i = 5.0V	I_O = 250mA	70	73		%
V_{or}	Output Ripple Voltage	V_i = 5.0V	I_O = 250mA		7	10	mVrms
I_{ir}	Input Reflected Current	V_i = 5,0V	I_O = 250mA		25	30	mApp
V_{is}	Isolation Voltage			2500			Vdc
T_{stg}	Storage Temperature			–40		+85	°C
T_{op}	Operating Temperature			0		+70	°C

* NOTE: When output current is less tham 20mA, the output ripple voltage increases due to discontinuous operation

CONNECTION DIAGRAM AND MECHANICAL DATA



Dimensions in mm bottom view

DC-DC CONVERTER FOR LAN NODE SUPPLY

DESCRIPTION

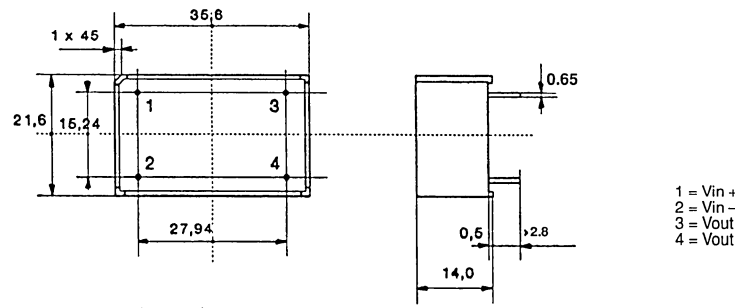
The GS-2IX-9 is a 2.25W DC-DC converter designed to provide power, voltage regulation and isolation for local area network (CHEAPERNET and ETHERNET) transceivers from a wide range of input voltages, according to IEEE 802.3 standards.

ELECTRICAL CHARACTERISTICS (T_A = 25°C unless otherwise specified)

Symbol	Parameter	Test Conditions		Min	Typ	Max	Unit
V_i	Input Voltage	V_o = –9V	I_o = 0 to 250 mA	4.50		15.75	V
V_o	Output Voltage	V_i = 4.5 to 15.75V	I_o = 0 to 250	–8.55	–9.00	–9.45	V
I_o	Output Current *	V_i = 4.5 to 15.75V		0		250	mA
δV_o	Line Regulation	δV_i = 4.5 to 15.75V	I_o = 250mA			5	mV
δV_o	Load Regulation	V_i = 4.5 to 15.75V	δI_o = 0 to 250mA			5	mV
η	Efficiency	V_i = 5.0V	I_o = 250mA	70	73		%
η	Efficiency	V_i = 12.0V	I_o = 250mA	75	80		%
V_{or}	Output Ripple Voltage	V_I = 5.0V	I_o = 250mA		7	10	mVrms
V_{or}	Output Ripple Voltage	V_i = 12.0V	I_o = 250mA		2	5	mVrms
I_{ir}	Input Reflected Current	V_i = 5.0V	I_o = 250mA		25	30	mApp
I_{ir}	Input Reflected Current	V_i = 12.0V	I_o = 250mA		2	5	mApp
V_{is}	Isolation Voltage			2500			Vdc
T_{stg}	Storage Temperature			–40		+85	°C
T_{op}	Operating Temperature			0		+70	°C

* NOTE = When input voltage is low (5V) and the output current is less than 20mA,the output ripple voltage increases due to discontinuous operation

CONNECTION DIAGRAM AND MECHANICAL DATA



Dimensions in mm

bottom view

SWITCHING VOLTAGE REGULATORS

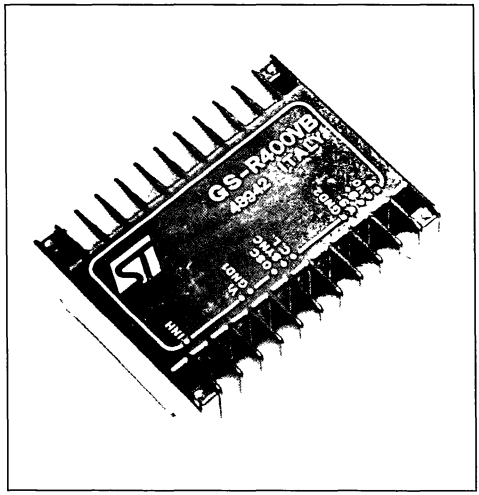
SGS-THOMSON MICROELECTRONICS

GS-R400 FAMILY

20 TO 140W STEP-DOWN SWITCHING REGULATOR FAMILY

FEATURES

- MTBF in excess of 200,000 hours
- 4A max output current
- 46V max input voltage
- 4V max drop-out voltage
- Soft start
- Remote logic inhibit/enable
- Remote output voltage sense
- Non-latching overload and short circuit protection
- Crow-bar output overvoltage protection



DESCRIPTION

The GS-R400 series is a versatile family of high current, high voltage step-down switching voltage regulators.

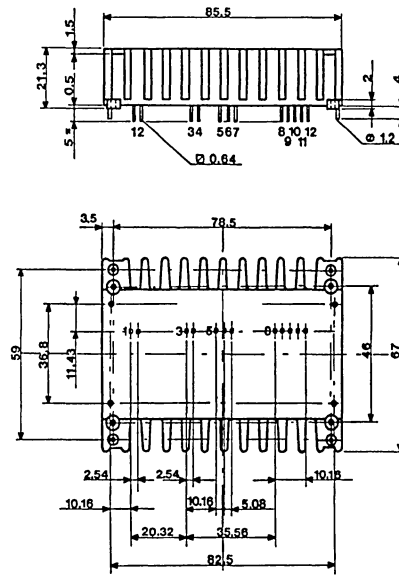
The integral heatsink allows a large power handling capability and it provides also an effective shielding to minimize EMI.

SELECTION CHART

Type Ordering Number	Output Voltage (V)	Input Voltage (V)	Output Ripple (mVpp)	Regulation		Efficiency (%)	Notes
				Line (mV/V)	Load (mV/A)		
GS-R405	5.1 ± 2%	9 to 46	25	2	20	70	Fixed output voltage
GS-R412	12.0 ± 4%	16 to 46	50	5	40	80	"
GS-R415	15.0 ± 4%	19 to 46	65	5	60	85	"
GS-R424	24.0 ± 4%	28 to 46	100	6	90	90	"
GS-R405S	5.1 ± 2%	9 to 46	25	2	20	70	Reset output
GS-R400V	5.1 to 40	Vo+4 to 46	25 to 100	6	20 to 90	70 to 90	Progr. output voltage
GS-R400VB	5.1 to 40	Vo+4 to 46	25 to 100	6	20 to 90	70 to 90	Progr. output voltage and current. Frequency synchr.

Note: The line regulation is measured at I_{out}=1A
The load regulation is measured at V_{in}=V_o+8V and I_{out}=1 to 3A
For $V_O \geq 36V$ and I_o = 4A an external heatsink or forced ventilation are required.

CONNECTION DIAGRAM AND MECHANICAL DATA



Dimensions in mm

PIN DESCRIPTION

Pin	Function	Description
1	Inhibit	The module is disabled by a high logic leve applied to this pin.
2	Reset	Reset output (GS-R405S only).
3	+ Input	DC input voltage. Recommended maximum voltage is 46V.
4	Input GND	Return for Input voltage source.
5	Oscillator	100KHz oscillator output. To be connected to Sync (pin 6) input if the unit is a master and left open if is a slave (GS-R400VB only). See fig. 5.
6	Sync	Synchronization input. To be connected to the Oscillator output (pin 5) of the master. See fig. 5 (GS-R400VB only).
7	Current limiting	A resistor ($\geq$2.2kΩ) connected from this pin to pin 9 sets the current limiting level (GS-R400VB only).
8	Output GND	Return for Output current path. Internally connected to pin 4.
9	– Sense	Senses the remote load return. Must be tied to pin 8 when the remote sensing feature is not used. See fig. 1.
10	+ Sense	Senses the remote load high side. Must be tied to pin 11 when the remote load sensing feature is not used. See fig. 1.
11	+ Output	Regulated DC output voltage.
12	Program	A resistor ($\leq$18kΩ) connected from this pin to pin 10 sets the Output voltage (GS-R400V and GS-R400VB only).

Figure 1. Load Connection

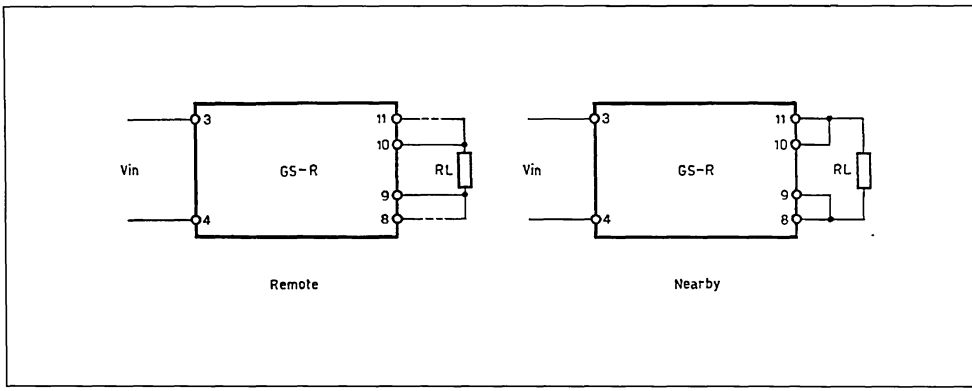


Figure 2. Remote Inhibit Operation

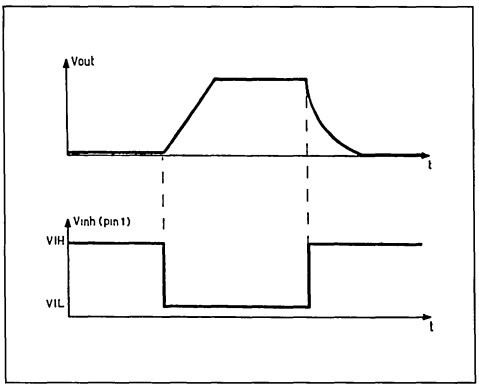


Figure 3. Reset Operation

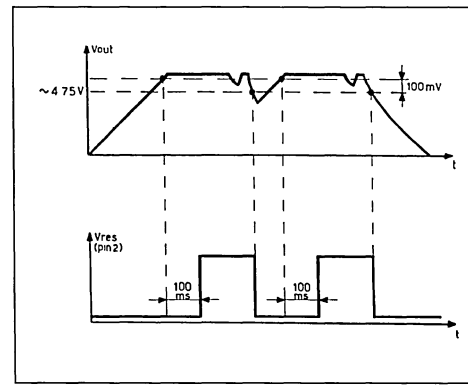


Figure 4. Voltage and Current Programming

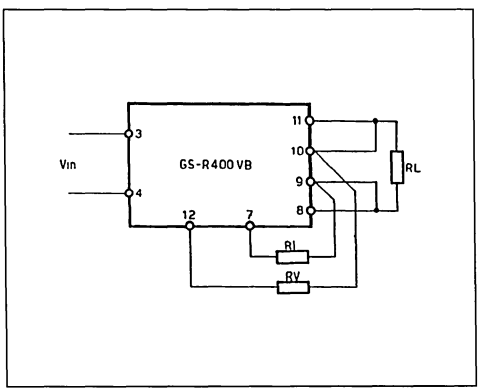
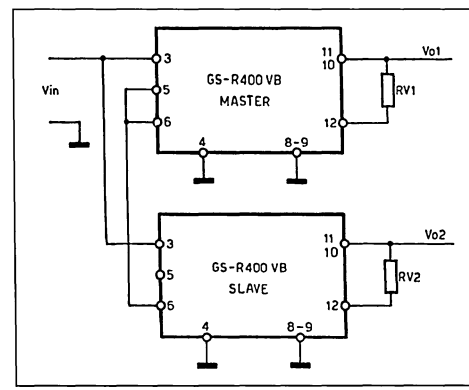
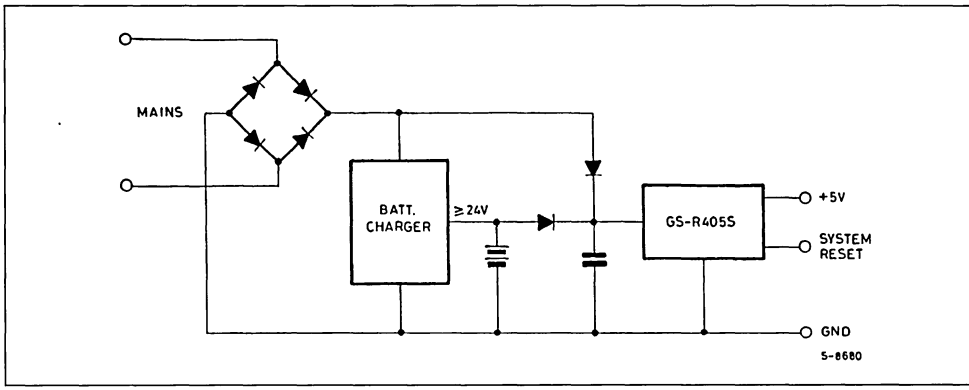


Figure 5. Multiple Units Synchronization

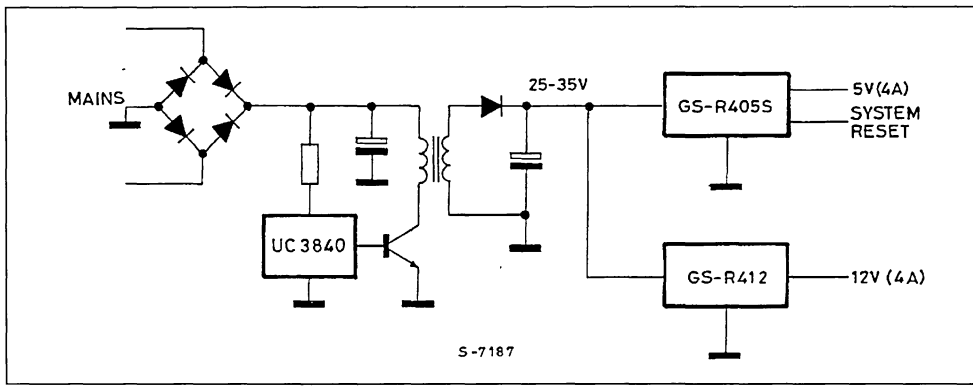


TYPICAL APPLICATIONS

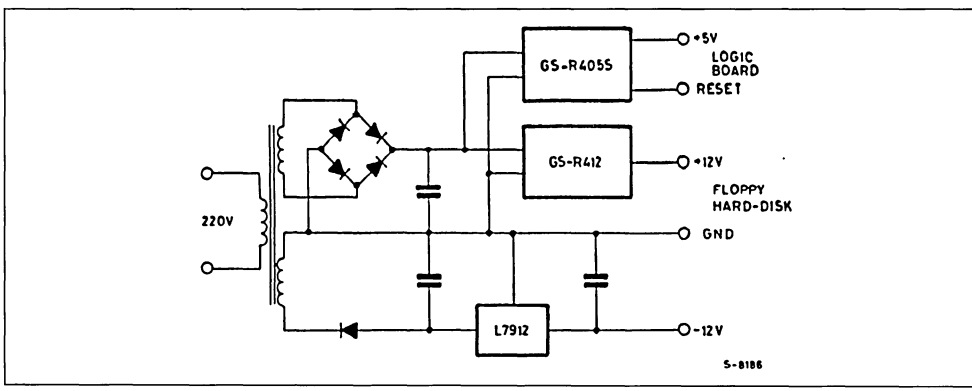
Uninterruptable Power Supply



Multiple Output Supply Using Preregulator



Microcomputer Supply Using GS-R400



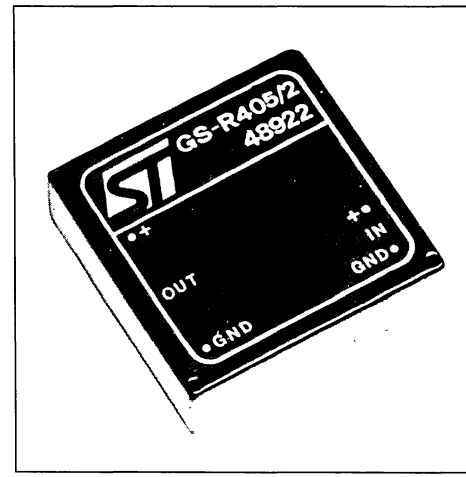
SGS-THOMSON MICROELECTRONICS

GS-R400/2 FAMILY

SMALL SIZE STEP-DOWN SWITCHING REGULATOR FAMILY

FEATURES

- MTBF in excess of 500,000 hours
- 4A max output current
- 40V max input voltage
- 4V max drop-out voltage
- Soft start
- Non-latching short circuit protection
- Crow-bar output overvoltage protection



DESCRIPTION

The GS-R400/2 series is a family of small sized high current, high voltage step-down switching regulators.

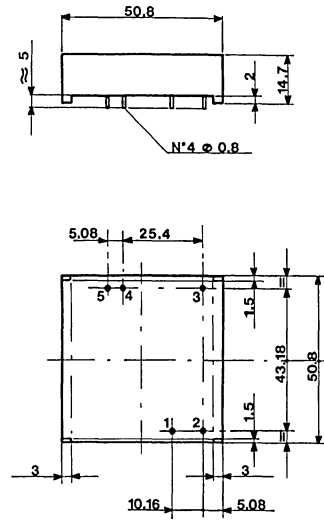
The integral heatsink allows a large power handling capability and it provides also an effective shielding to minimize EMI.

SELECTION CHART

Type Ordering Number	Output Voltage (V)	Input Voltage (V)	Output Ripple (mVpp)	Regulation		Efficiency (%)	Notes
				Line (mV/V)	Load (mV/A)		
GS-R405/2	5.1 ± 2%	9 to 40	25	2	20	80	Fixed output voltage
GS-R412/2	12.0 ± 4%	16 to 40	50	5	40	85	"
GS-R415/2	15.0 ± 4%	19 to 40	65	6	60	87	"
GS-R424/2	24.0 ± 4%	28 to 40	100	6	80	90	"
GS-R400V/2	5.1 to 24	Vo+4 to 40	25 to 100	2 to 6	20 to 80	80 to 90	Progr. output voltage

Notes : Line regulation is measured at I_{out}=1A.
Load regulation is measured at V_{in}=V_o+8V and I_{out}=0,5 to 1,5A.
Case temperature must be kept below 85°C.

CONNECTION DIAGRAM AND MECHANICAL DATA



Dimensions in mm

PIN 5 GS-R400V/2 only

PIN DESCRIPTION

Pin	Function	Description
1	+ Input	DC input voltage. Recommended maximum voltage is 40V.
2	Input GND	Return for Input voltage source.
3	Output GND	Return for Output current path. Internally connected to pin 2.
4	+ Output	Regulated DC output voltage.
5	Program	A resistor (<10kΩ) connected form this pin to pin 4 sets the +Output voltage of the GS-R400V/2.

Figure 1. Power Derating Curve

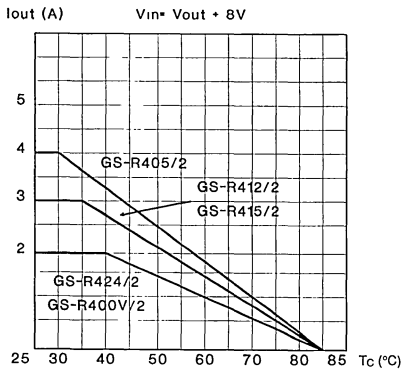
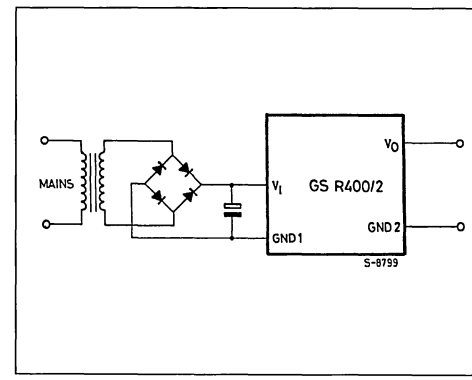


Figure 2. GS-R400/2 - Typical Application



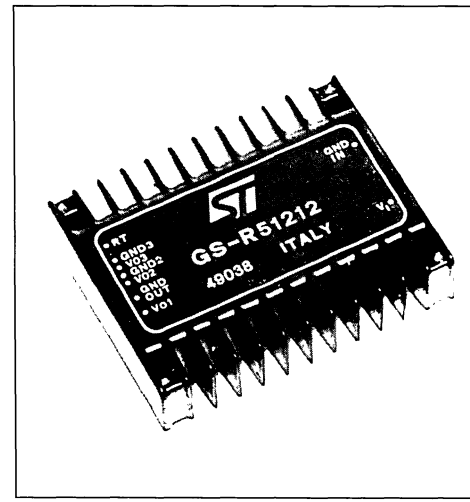
SGS-THOMSON MICROELECTRONICS

GS-R51212

20W TRIPLE OUTPUT STEP-DOWN SWITCHING REGULATOR

FEATURES

- MTBF in excess of 200,000 hours
- 3.5A max output current on 5V output
- 4V max drop-out voltage
- Two 12V/100mA isolated outputs
- Soft start
- Reset output
- Non-latching short circuit protection
- Crow-bar output overvoltage protection



DESCRIPTION

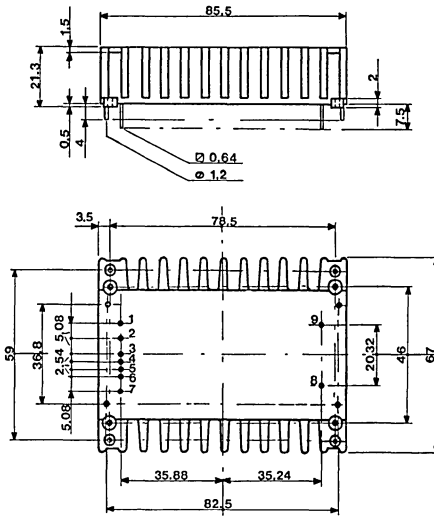
The GS-R51212 is a versatile triple output high current, high voltage step-down switching regulators module that provides a +5V, and two isolated 12V outputs. It is ideal for microprocessor based boards because it powers the logic and the communication port and it has a Reset output for the correct system start-up. The integral heatsink allows a large power handling capability and it provides also an effective shielding to minimize EMI.

MAIN CHARACTERISTICS

Output	Output Voltage (V)	Input Voltage (V)	Output Ripple (mVpp)	Regulation		Efficiency (%)
				Line (mV/V)	Load (mV/A)	
$V_{O}1$	5.1 ±2%	9 to 40	50	2	35	70
$V_{O}2$	12.0 ±4%		10	2	600	
$V_{O}3$	12.0 ±4%		10	2	600	

Note: Line regulation is measured at I_{out}=2.5A V_{in}=15 to 25V
Load regulation is measured at $V_{in}=V_{out}+8V$ and I_{out}=0,5 to 2.5A

CONNECTION DIAGRAM AND MECHANICAL DATA



Dimensions in mm

PIN DESCRIPTION

Pin	Function	Description
1	Output 1	Regulated 5.1V output.
2	Output GND	Return for Output1 current path. Internally connected to pin 8.
3	Output 2	Regulated 12V output.
4	Ground 2	Return of Output 2 current path.
5	Output 3	Regulated 12V output.
6	Ground 3	Return of Output 3 current path.
7	Reset	Open collector Reset output.
8	Input GND	Return of Input voltage source. Internally connected to pin 2.
9	+ Input	DC input voltage. Recommended maximum voltage is 40V.

Figure 1. Output Current Capability vs. Operating Conditions

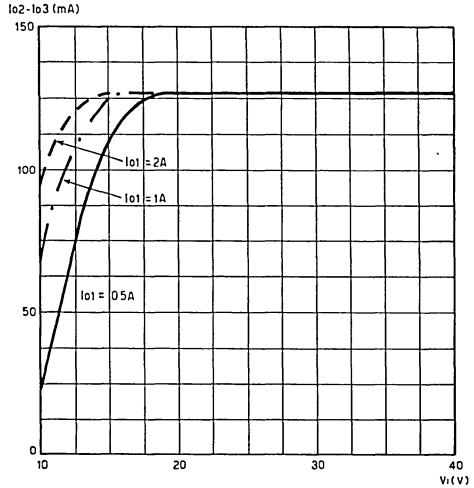


Figure 2. Efficiency Plot

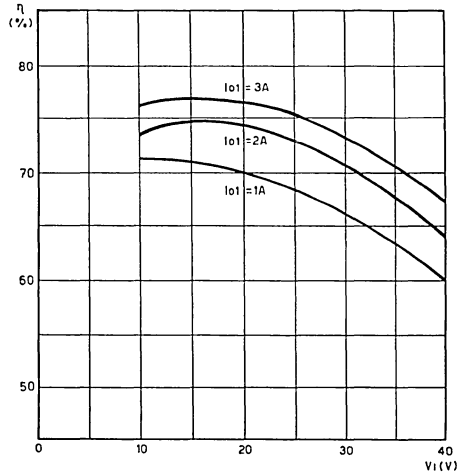


Figure 3. Reset Operation

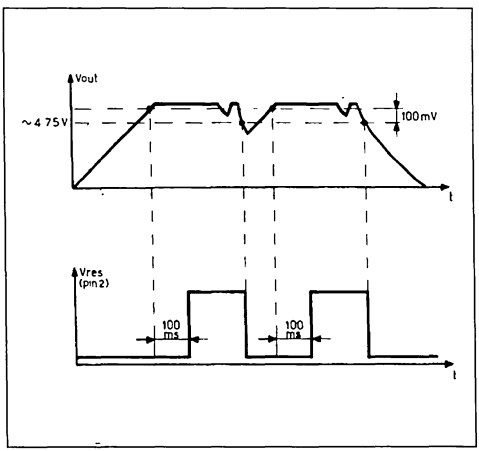
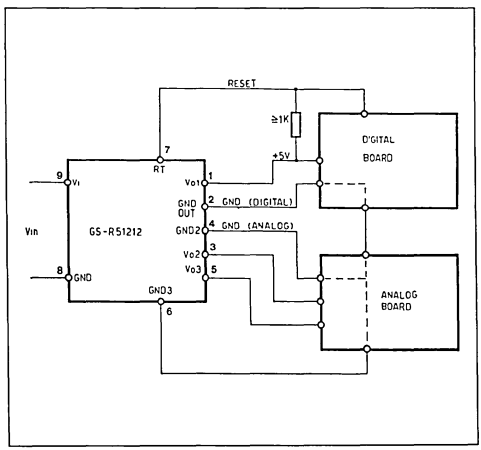


Figure 4. Typical Application

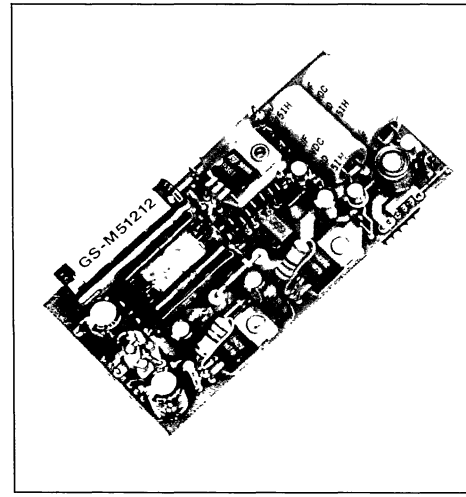


13W FIVE OUTPUT DC-DC CONVERTER FOR MODEM

PRELIMINARY DATA

FEATURES

- MTBF in excess off 200,000 hours
- 2.0A max output current on 5V output
- ± 12/125 mA regulated outputs
- Wide input voltage range
- 75% efficiency
- Protection against short circuit
- Very low ripple and noise



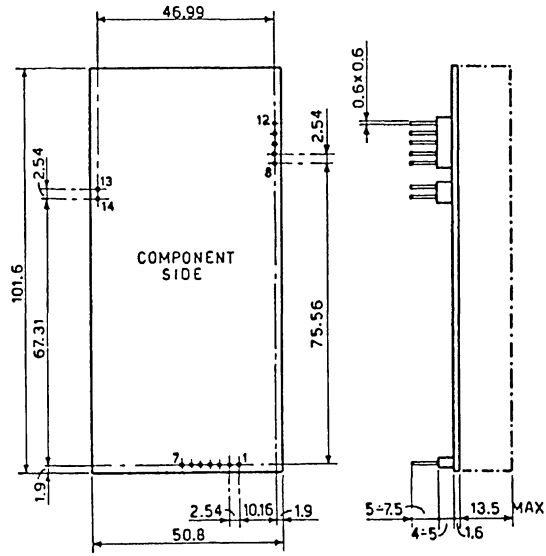
DESCRIPTION

The GS-M51212 is a versatile module specifically designed for modem board power supply. The unit can be supplied either by center tapped transformer secondary winding or by a split DC voltage. Two unregulated outputs (±12V @ 125mA) useful for LED lamps or relay supply are also available. The unit is characterized by 16.5mm maximum height to allow 24.4mm (1 inch) board spacing.

MAIN CHARACTERISTICS

Output	Output Voltage (V)	Output Current (A)	Input Voltage (V)	Output Ripple (mVpp)	Efficiency %
V_O1	5.1 ± 4%	2	−12/0/+12V_{DC} ±25% or 9/0/9V_{AC} ±25%	50	75
V_O2	+12.0 ± 5%	0.125		20	
V_O3	−12.0 ± 5%	0.125		20	
V_O4	+12.0 unr.	0.125		1600	
V_O5	−12.0 unr.	0.125		1600	

CONNECTION DIAGRAM AND MECHANICAL DATA



Dimensions in mm

PIN DESCRIPTION

Pin	Function	Description
1	Vin	Input voltage. Recommended voltage is 9VAC or 12VDC.
2,3,4	Input GND	Return for Input voltage. The transformer center tap must be connecterd to these pins.
5	Vin	Input voltage. Recommended voltage is 9Vac or 12Vdc.
6	– 12Vunr	Unregulated –12V output. The voltage on this pin depends on the supplied input voltage.
7	+ 12Vunr	Unregulated +12V ouput. The voltage on this pin depends on the supplied input voltage.
8,9	+5V	Regulated 5V output.
10	Output GND	Return path for the regulated outputs. Connected to pin 2, 3 and 4.
11	– 12V	Regulated –12V output.
12	+ 12V	Regulated +12V output.
13	Enable	Hardware Enable pin. This pin must be tied to pin 14 to operate the unit.
14	Enable return	Return path for the Enable.

Figure 1. GS-M51212 Block Diagram

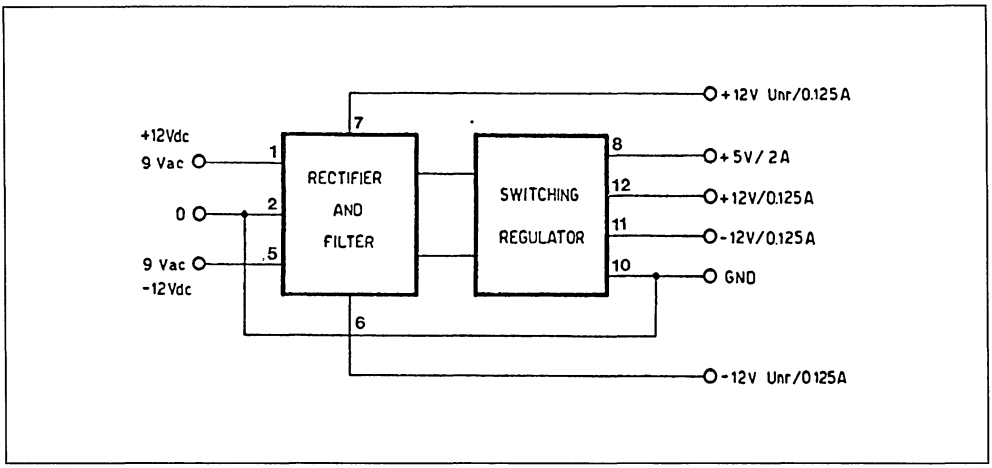
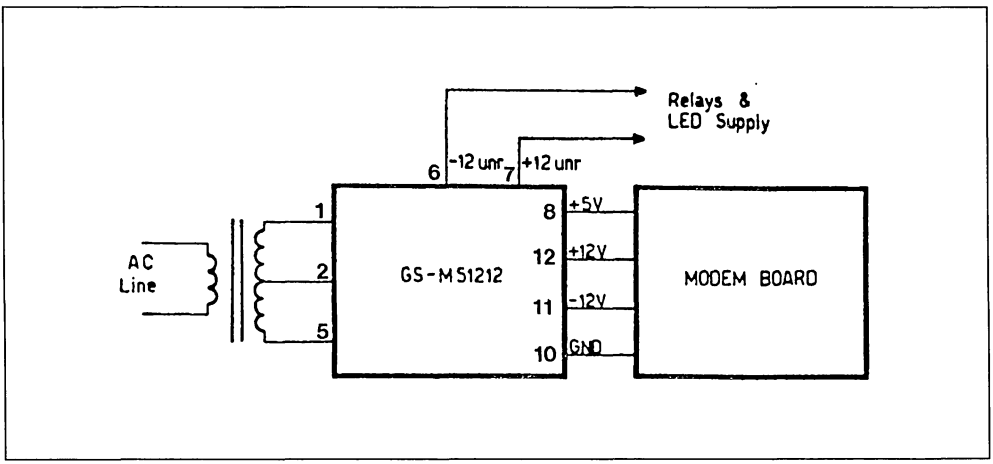


Figure 2. Typical Application

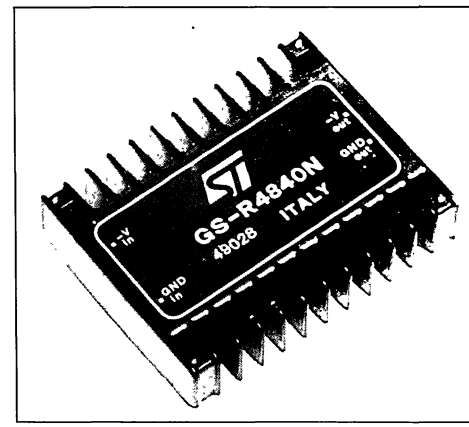


GS-R4840N

44W NEGATIVE SWITCHING REGULATOR

DESCRIPTION

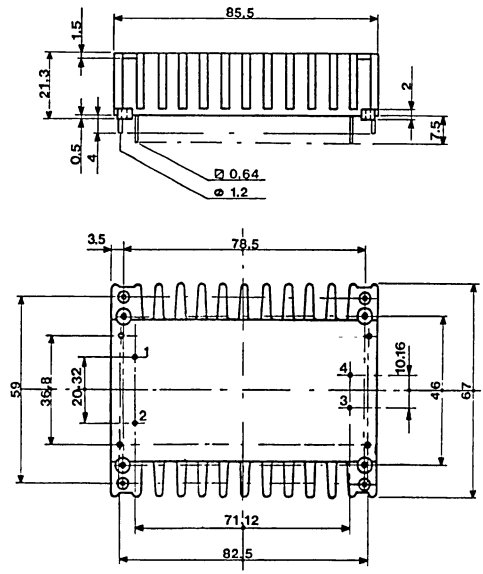
The GS-R4840 is a negative input, negative output switching voltage regulator that can provide up to 44W output power without input to output isolation.



ELECTRICAL CHARACTERISTICS (T_A = 25°c unless otherwise specified)

Symbol	Parameter	Test Conditions		Min	Typ	Max	Unit
V_I	Input Voltage		I_O= 1.08A	–43	–48	–60	V
I_i	Input current	V_i = –48V	I_O= 1.08A			–1	A
V_o	Output voltage	V_i= –43 to –60V	I_O= 0 to 1.08A	–38.5	–40.5	–42.5	V
η	Efficiency	V_i= –48V	I_O= 1.08A		93		%
V_{or}	Output ripple voltage	V_i= –48V	I_O= 1.08A			100	mV_{pp}
I_{osc}	Output current limit	V_i= –48V			–1,6		A
Vni	Input noise (CCITTP53)	V_i= –48V	I_O= 1A			1	mV
Vno	Output noise (CCITTP53)	V_i= –48V	I_O= 1A			1	mV
fop	Operating frequency				50		kHz
Tstg	Storage temperature			–20		+85	°C
Top	Operating temperature			0		+70	°C

CONNECTION DIAGRAM AND MECHANICAL DATA



1 = GND in
2 = Vin –
3 = Vout –
4 = GND out

Dimensions in mm

Note: GND in and GND out are internally connected

GS-R1005

50W STEP DOWN SWITCHING REGULATOR

TENTATIVE DATA

FEATURES

- High efficiency: 80% minimum
- Continuous short circuit protection
- Wide input voltage range (18 to 36V)
- Remote output voltage sense

DESCRIPTION

The GS-R1005 is a step down switching voltage regulator suitable to provide 5V/10A output.

ELECTRICAL CHARACTERISTICS (T_A = 25°C unless otherwise specified)

Symbol	Parameter	Test Conditions		Min	Typ	Max	Unit
V_i	Input Voltage	V_O = 5V	I_O = 0 to 10 A	18	24	36	V
V_O	Output Voltage	V_{in} = 24V	I_O = 0 to 10A	4.80	5.0	5.20	V
I_i	Input Current	V_{in} = 24V	I_O = 10A		2.5		A
η	Efficiency	V_{in} = 24V	I_O = 10A	80	83		%
V_{or}	Output Ripple Voltage	V_{in} = 24V	I_O = 10A		60		mVpp
f_{op}	Operating frequency	V_{in} = 24V	I_O = 10A		50		kHz
T_{stg}	Storage Temperature range			–40		+105	°C
T_{op}	Operating case Temperature range			–20		+80	°C

POWER CONTROLLER & MOTOR DRIVE MODULES

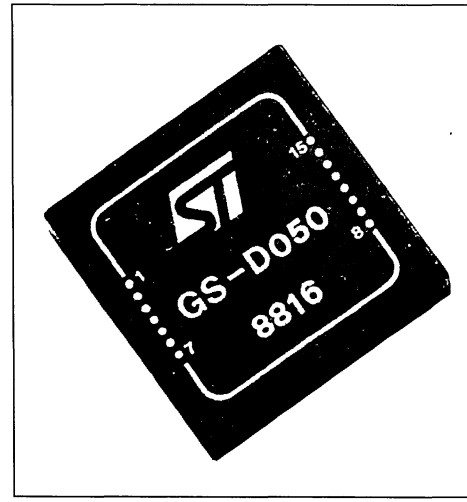
SGS-THOMSON MICROELECTRONICS

GS-D050

0.5A BIPOLAR STEPPER MOTOR DRIVE MODULE

FEATURES

- Input TTL/CMOS compatible
- Logic Inhibit/Enable
- Chopper regulation of motor bipolar current
- Programmable motor current (0.5A max) (by steps or continuously)
- Wide voltage range (10-46V)
- Full-step, Half-step and Quarter-step operations.
- Overtemperature protection



DESCRIPTION

The GS-D050 is a driver for bipolar stepper motors that directly interfaces a microprocessor and two-phase permanent magnet motor.
The motor current is controlled in a chopping mode up to 0.5A. The small outline makes the GS-D050 ideal when space is a premium.

ABSOLUTE MAXIMUM RATINGS

Symbol	Parameter	Value	Unit
V_S	Supply Voltage	46	V
V_{SS}	Logic Supply Voltage	7	V
V_i	Logic Input Voltage	6	V
I_O	Peak Output Current	1.2	A
V_{ref}	Reference Input Voltage	5	V
T_{stg}	Storage Temperature Range	–40 to +105	°C
T_{cop}	Operating Case Temperature Range	–20 to + 85	°C

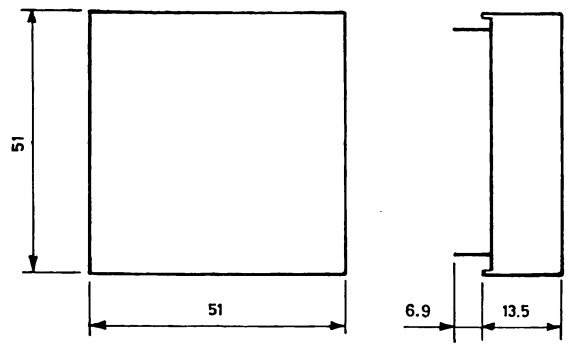
THERMAL DATA

$R_{th(ca)}$	Case-ambient Thermal Resistance	Max	8.0	°C/W

ELECTRICAL CHARACTERISTICS (T_A=25 °C unless otherwise specifed)

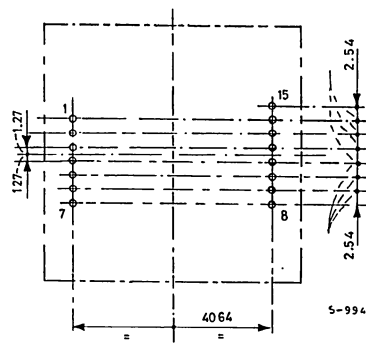
Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
V_S	Supply Voltage	Pin 13	10		46	V
V_{SS}	Supply Voltage	Pin 3	4.75	5	5.25	V
I_S	Quiescent Supply Current	Pin 13 V_S = 35V I_{out} = 0		15	30	mA
I_{SS}	Quiescent Supply Current	Pin 3. All Input High I_{out} = 0 V_{SS} = 5 V		15		mA
V_i	Input Voltage	Pin 5, 6, 7, 8, 9, 10 Low High	 2.0		0.8 V_{SS}	V V
I_i	Input Current	Pin 5, 6, 7, 8, 9, 10 Low High			0.4 10	mA µA
V_{sat}	Source Saturat. Voltage	Pin 1, 2, 14, 15 I_O = 0.5 A Conduction Period			2.1	V
V_{sat}	Source Saturat. Voltage	Pin 1, 2, 14, 15 Io = 0.5 A Recirculation Period			1.4	V
V_{sat}	Sink Saturat. Voltage	Pin 1, 2, 14, 15 Io = 0.5 A			1.4	V

CONNECTION DIAGRAM AND MECHANICAL DATA



Dimensions in mm

MOTHER BOARD LAYOUT (top wiew)



PIN DESCRIPTION

Pin	Function	Description
1	D	Bridge Output D. This output has a phase opposite to the driving signal PH2
2	C	Bridge Output C. This output has the same phase of the driving signal PH2.
3	V_{SS}	Logic Supply Voltage. Maximum applicable voltage is 7 V.
4	GND	See Pin 12
5	I_{12}	Input pin for current level and operating mode selection (see I11 description)
6	I_{02}	Input pin for current level and operating mode selection (see I11 description)
7	PH2	Phase 2 Logic Input
8	PH1	Phase 1 Logic Input
9	I_{01}	Input pin for current level selection (see I11 description)
10	I_{11}	Input pin used, together with I01, to select the current level according to the following table.
11	V_{ref}	Reference Input Voltage for the Chopper Comparators. The voltage applied to this pin settler, the phase current to the desired value. A 5 V ref sets a 0.5 A phase current when full-step drive is selected.
12	GND	Ground Connection. Motor and logic supply voltage as well as the logic signals, must be referenced to this pin.
13	V_2	Motor Unregulated Supply Voltage. Maximum Applicable Voltage is 46 V.
14	A	Bridge Output A. This output has the same phase of the driving signal PH1.
15	B	Bridge Output B. This output has a phase opposite to the driving PH1.

I_{11}/I_{12}	I_{01}/I_{02}	Phase Current
0	0	I_{ph} = 100 % I_{set}
0	1	I_{ph} = 60 % I_{set}
1	0	I_{ph} = 19% I_{set}
1	1	No Current

Figure 1: Equivalent Block Diagram OF GS-D050

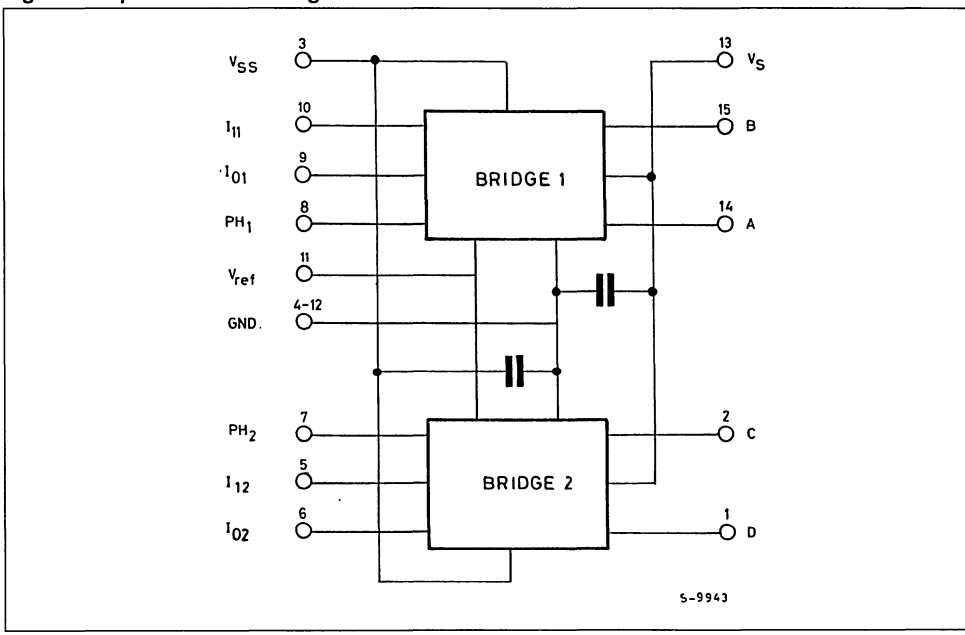
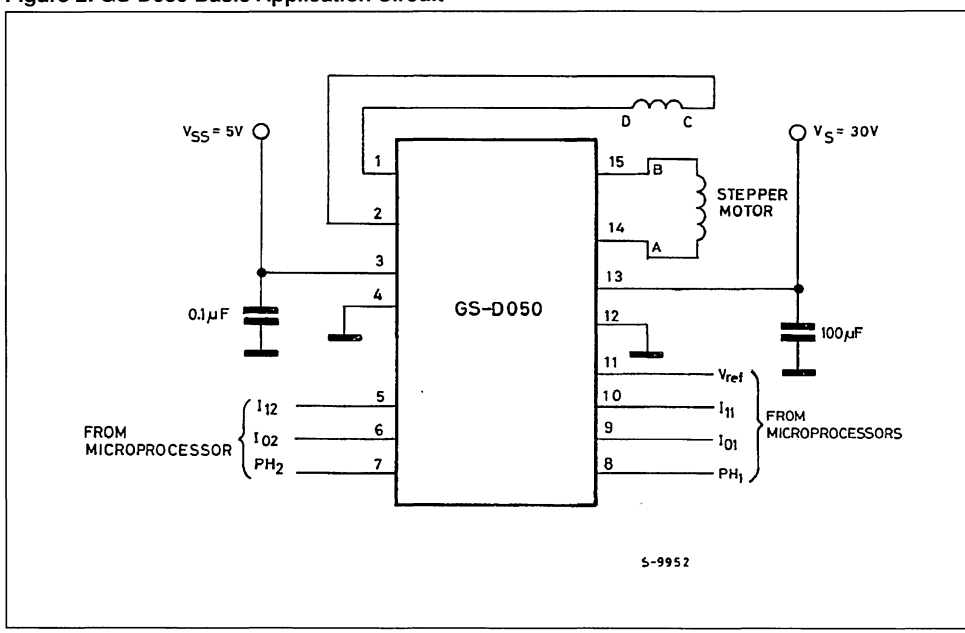


Figure 2: GS-D050 Basic Application Circuit



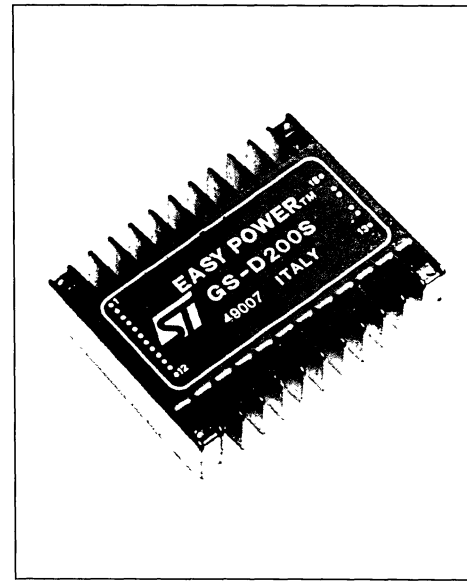
SGS-THOMSON MICROELECTRONICS

GS-D200
GS-D200S

2/2.5A BIPOLAR STEPPER MOTOR DRIVE MODULES

FEATURES

- Wide supply voltage range
- Full/Half step drive capability
- Logic signals TTL/CMOS compatible
- Programmable motor phase current and chopper frequency
- Selectable Slow/Fast current decay
- Synchronization for multimotor applications
- Remote shut-down
- Home position indication



DESCRIPTION

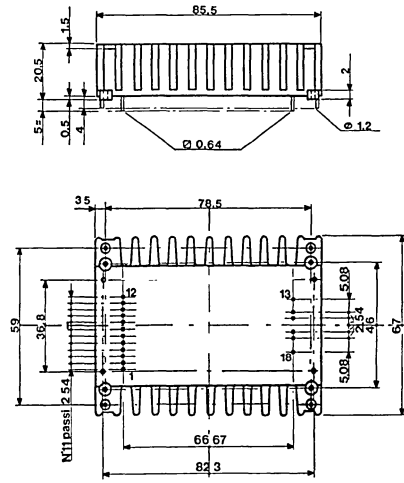
The GS-D200 and GS-D200S are drive modules that directly interface a microprocessor to a two-phase, bipolar, permanent magnet stepper motor. The phase current is chopper controlled, and the internal phase sequence generation reduces the burden of the controller and simplifies software development.

The GS-D200 uses bipolar power outputs while the GS-D200S has powermos outputs to significantly reduce both commutation and conduction losses. A further benefit offered by the GS-D200S is the complete protection of the outputs against any type of shorts.

SELECTION CHART

Ordering Number	Phase Current (A)	Voltage Drop (V)	Supply Voltage (V)	Quiescent Current (mA)	Chopper Frequency (kHz)
GS-D200	1.0 nom. (0.5 to 2.0)	4.1 max	10 to 46 5.0±5%	20 70	17
GS-D200S	2.0 nom. (0.5 to 2.5)	2.5 max	12 to 40 5.0±5%	20 70	17

CONNECTION DIAGRAM AND MECHANICAL DATA



Dimensions in mm

PIN DESCRIPTION

Pin	Function	Description
1	GND1	Return path for the logic signals and 5V supply.
2	Sync	Chopper oscillator output. Several modules can be synchronized by connecting together all Sync pins. This pin can be used as the input for an external clock source.
3	$\overline{\text{Reset}}$	Asynchronous reset input. An active low pulse on this input preset the internal logic to the initial state (ABCD=0101).
4	Half/$\overline{\text{Full}}$	Half/full step selection input. When high or unconnected the half step operation is selected.
5	$\overline{\text{Home}}$	When low this output indicates that the internal counter is in its initial state (ABCD=0101). This signal should be ANDed with the output of a mechanical switch to be used as a system Home indication.
6	$\overline{\text{Stepclk}}$	The motor is moved one step on the rising edge of this signal.
7	CW/$\overline{\text{CCW}}$	Direction control input. When high or unconnected clockwise rotation is selected. Physical direction of motor rotation depends also on windings connection.
8	Oscillator	The chopper oscillator timing, internally fixed at 17kHz, can be modified by connecting a resistor between this pin and V_{SS} or a capacitor between this pin and GND1. The oscillator input must be grounded when the unit is externally synchronized.
9	I_{Oset}	Phase current setting input. A resistor connected between this pin and Gnd1 or V_{SS}, allows the factory setted phase current value (1A for GS-D200 and 2A for GS-D200S) to be changed.
10	Control	Logic input that allows the phase current decay mode selection. When high or unconnected the slow decay is selected.
11	Enable	Module enable input. When low this input floats the outputs enabling the manual positioning of the motor. Must be low during power-up and down sequence, high during normal operation.
12	V_{SS}	5V supply input. Maximum voltage must not exceed 7V.
13	GND2	Return path for the power section.

PIN DESCRIPTION (Continued)

Pin	Function	Description
14	D	D output.
15	C	C output.
16	B	B output.
17	A	A output.
18	V_S	Module and motor supply voltage. Maximum voltage must not exceed the specified values.

Figure 1: GS-D200 and GS-D200S Block Diagram

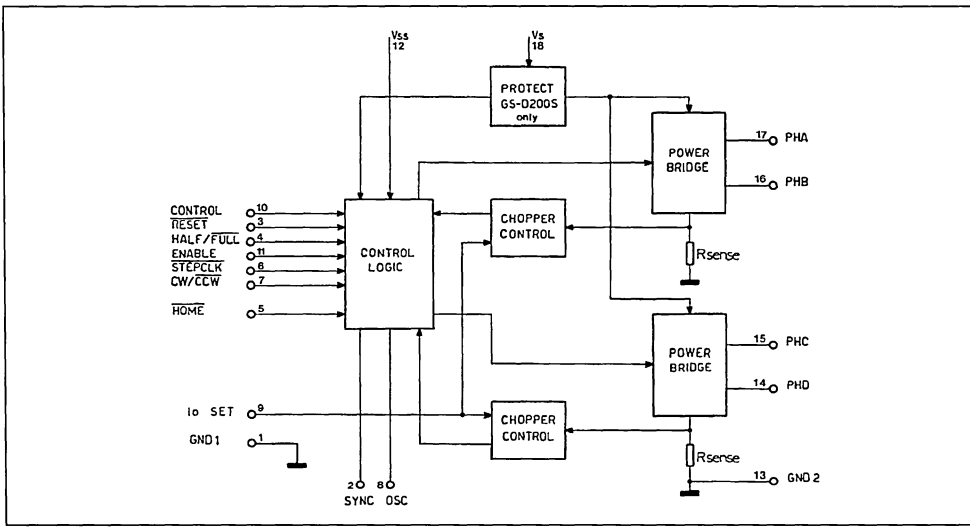


Figure 2: GS-D200 Free Air Derating Curve

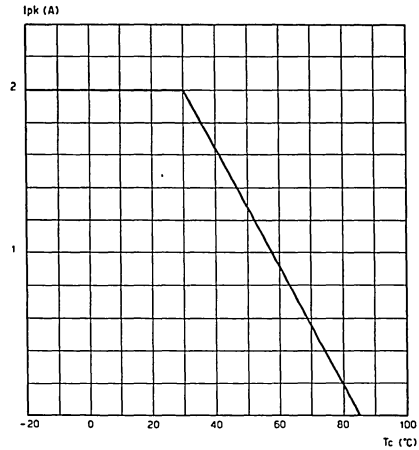


Figure 3: GS-D200S Free Air Derating Curve

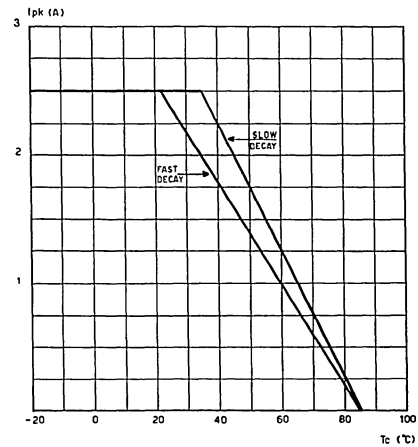
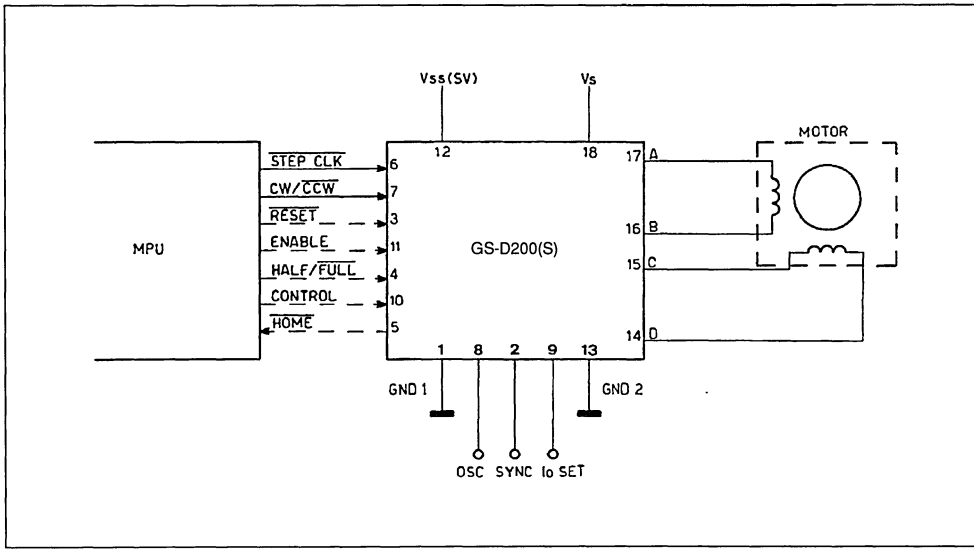


Figure 4: GS-D Modules Typical Application

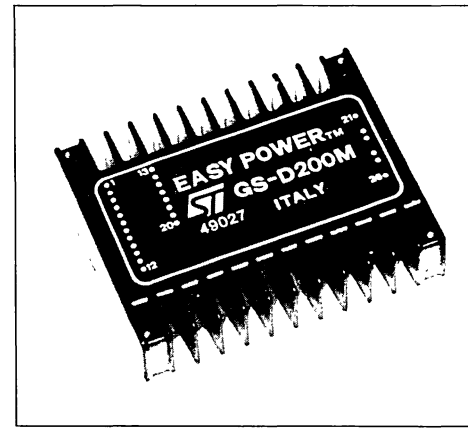


GS-D200M

2.5A MICROSTEP DRIVE MODULE FOR STEPPER MOTORS

FEATURES

- Wide supply voltage range
- High peak phase current (2.5 Apk)
- 1/128 phase current resolution
- Logic signals TTL/CMOS compatible
- Direct microprocessor interface
- Chopper regulation of the phase current
- Programmable peak motor phase current
- Remote shut-down



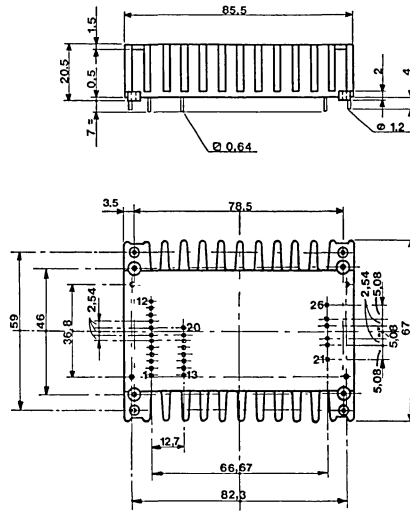
DESCRIPTION

The GS-D200M is a module specifically designed for driving a stepper motor in the microstep mode. The unit interfaces the microprocessor as a parallel port and offers a maximum phase current capability of $2.5A_{pk}$.

ELECTRICAL CHARACTERISTICS (T_A = 25°C V_{ss}=5V and V_s=24V unless otherwise specified)

Symbol	Parameter	Min	Typ	Max	Unit
V_s	DC Supply Voltage	12		40	V
V_{ss}	DC supply voltage	4.75	5	5.25	V
I_s	Quiescent Supply Current		20		mA
I_{ss}	Quiescent Supply Current		60		mA
I_{ph}	Phase peak current			2.5	Apk
V_d	Total voltage drop (I_{ph}=2A)			2.5	V
t_{off}	Recirculation time			32	µs
D_S	Select and Data to Strobe Set-up time	100			ns
D_h	Select and Data to Strobe Hold time	600			ns
Stpw	Strobe pulse width	700			ns
Csrt	Data updating frequency			400	kHz
T_{stg}	Storage temperature range	− 40		+ 105	°C
T_{cop}	Operating case temperature range	− 20		+ 85	°C

CONNECTION DIAGRAM AND MECHANICAL DATA



Dimensions in mm

PIN DESCRIPTION

Pin	Function	Description
1	Vss	5V supply input. Maximum voltage must not exceed 7V.
2	Phase	Phase logic information. This input, normally connected to bit7 of the data bus, determines the director of conduction for the addressed driver.
3 to 9	D6 to D0	Data inputs. The value present on these inputs is stored into the addressed DAC latch during the high-to-low transition of the STROBE input.
10	CS	Chip select input. Data can be stored into DAC latches only when CS is low.
11	STROBE	Latches strobe command. The data present on the bus is transferred to the addressed DAC latch on the high-to-low transition of this input.
12	A/B	DAC latch selection input. When high the A DAC is addressed.
13	Vss	5V supply input. Maximum voltage must not exceed 7V.
14	Refout	Reference output. A 2.5V reference voltage is available on this pin for phase current setting
15	Iset	Current setting input. A resistor connected between pin 14 and this pin sets the phase current peak value.
16	RtA	Phase A ripple current setting resistor.
17	RtB	Phase B ripple current setting resistor.
18	Disable	Power driver disable logic input. When high or unconnected causes the output power stages float.
19	GND	Return path for the logic.
20	GND	Return path for the logic.

PIN DESCRIPTION (Continued)

Pin	Function	Description
21	V_S	Module and motor supply voltage. Maximum voltage must not exceed 40V.
22	D	D output. A motor winding is connected between D and C outputs.
23	C	C output. A motor winding is connected between C and D outputs.
24	B	B output. A motor winding is connected between B and A outputs.
25	A	A output. A motor winding is connected between A and B outputs.
26	GND_1	Ground path for the motor current.

Figure 1. GS-D200M Block Diagram

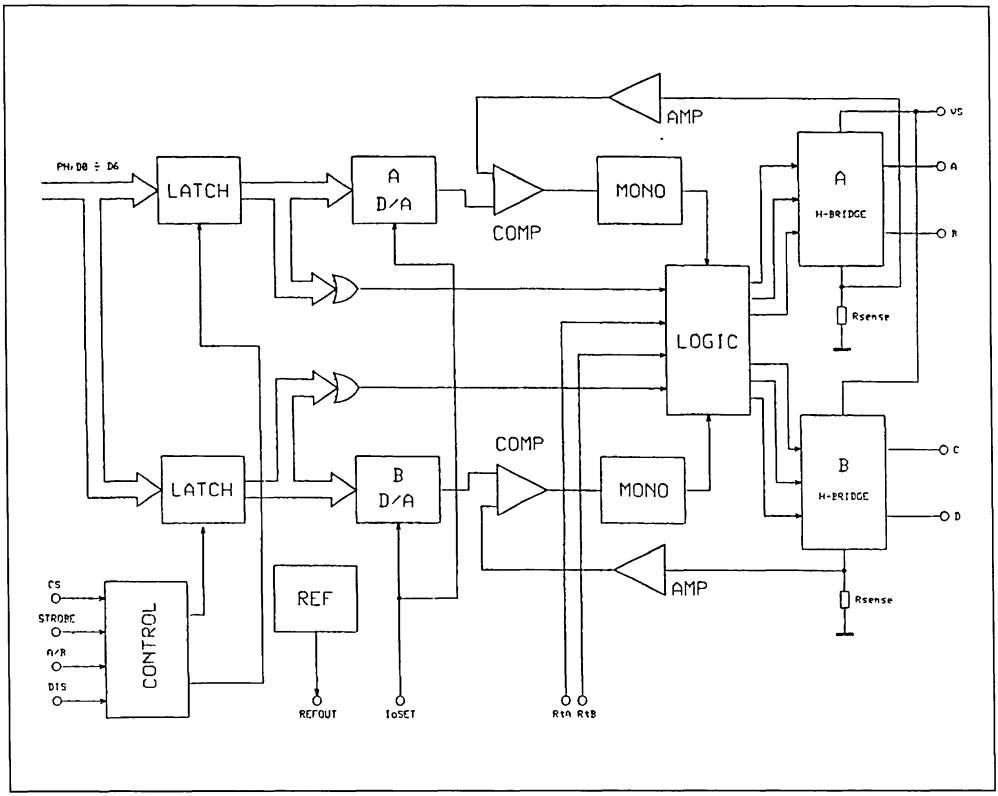
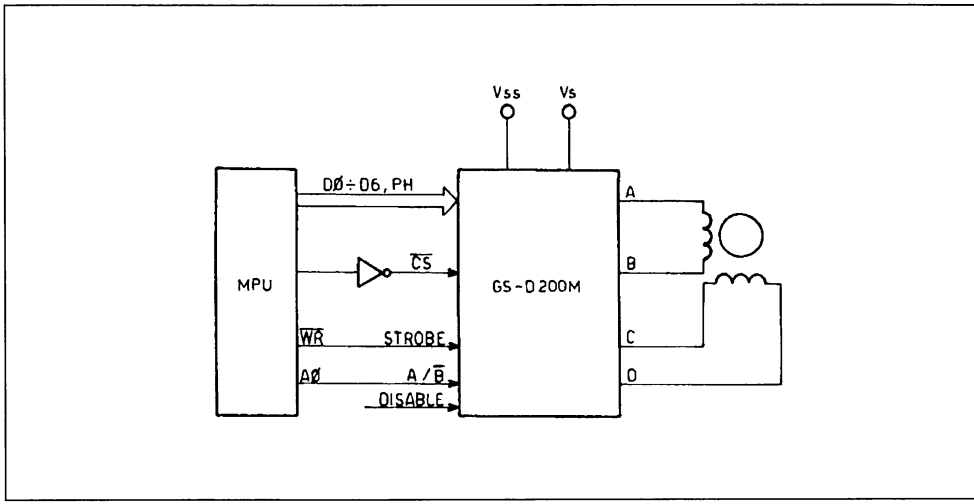


Figure 2: Typical Application



GS-C200
GS-C200S

INTELLIGENT STEPPER MOTORS CONTROLLERS

FEATURES

- Absolute and incremental positioning
- Up to 999,999 step per move
- Speed range to 10,000 step/s
- Ramp length to 999 steps
- Single unregulated supply voltage
- Index and velocity mode
- Automatic Home positioning
- Loops and Delay execution
- Conditional start and stop
- Status feedback to the host
- RS232 communication port
- Point to point and Multipoint protocol
- Closed loop operation
- Counter preset (GS-C200S only)
- Jump to (GS-C200S only)
- Jump to on-condition (GS-C200S only)
- Initialization during execution (GS-C200S only)
- Logic levels TTL compatible

DESCRIPTION

The GS-C200 and GS-C200S are powerful stepper motor controller modules that interface every power sequencer/driver available on the market.

A sophisticated hardware and an easy to learn programming language result in minimal development and debugging time of the motion control systems.

They are supported by dedicated software that includes both an on-screen editor and a debugger that greatly improve the module ease of use.

The instruction sets comprise respectively 25 (GS-C200) and 29 (GS-C200S) different commands which can be executed either under host control or in a stand alone environment. An on board EEPROM is used for program saving and retreiving.

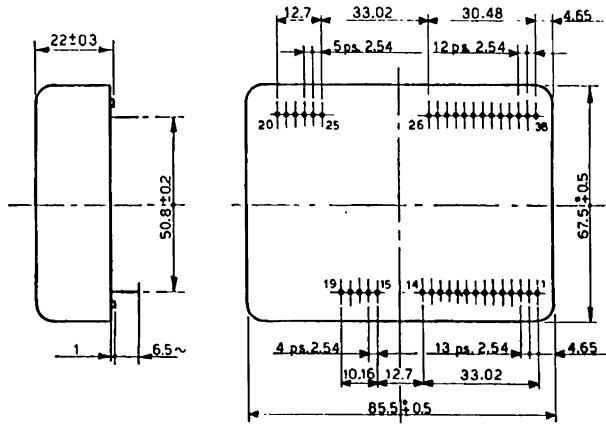
The availability of three User inputs and three programmable User outputs, each of which can be tested or set under program control, assure to the designer a high level of system power and flexibility.

ELECTRICAL CHARACTERISTICS (T_A = 25°C and V_S=24V unless otherwise specified)

Supply Data

Symbol	Parameter	Min	Typ	Max	Unit
V_S	DC Supply Voltage	12		42	V
I_S	Supply Current		80		mA
Tcp	Clock pulse width			5	µs
Trp	Reset pulse width			500	µs
Tstg	Storage temperature range		–20 to +85		°C
Top	Operature temperature range		0 to +50		°C

CONNECTION DIAGRAM AND MECHANICAL DATA



Dimensions in mm

PIN DESCRIPTION

Pin	Function	Description
1	SEL0	Protocol/address LSB select input
2	SEL1	Protocol/address SSB select input
3	SEL2	Protocol/address MSB select input
4	BR0	Baud rate LSB select input
5	BR1	Baud rate SSB select input
6	BR2	Baud rate MSB select input
7	CHS	Checksum enable input
8	GND	Ground
9	REC	Program autorecall input
10		Must be connected to pin 8
11	RXD	RS232 received data input
12	TXD	RS232 transmitted data output
13	TXPD	Transmitted data pull-down resistor
14	RDY	Status logic output
15	–VSL	Unregulated -12V supply output (note 1)
16	+VSL	Unregulated +12V supply output (note 1)
17	Vs	Supply voltage input
18	Vs	Supply voltage input
19	GND	Ground

PIN DESCRIPTION (Continued)

Pin	Function	Description
20	5V	5 Volt auxiliary output (note 2)
21	5V	5 Volt auxiliary output (note 2)
22	MOV	Motor moving logic output
23	RAMP	Ramp in execution logic output
24	ENABLE	Step enable logic input
25		Not connected
26	DIR	Direction selection logic output
27	RESET	Power driver Reset logic output
28	CLOCK	Step clock logic output
29		Not connected
30	HOME	Home position logic input
31	UO1	User 1 logic output
32	EOT	End of travel switch logic input
33	UO2	User 2 logic output
34	UI1	User 1 logic input
35	UO3	User 3 logic output
36	UI2	User 2 logic input
37	UI3	User 3 logic input
38	GND	Ground

Note: 1 - Maximum available current is 10mA.
2 - Maximum available current is 100mA.

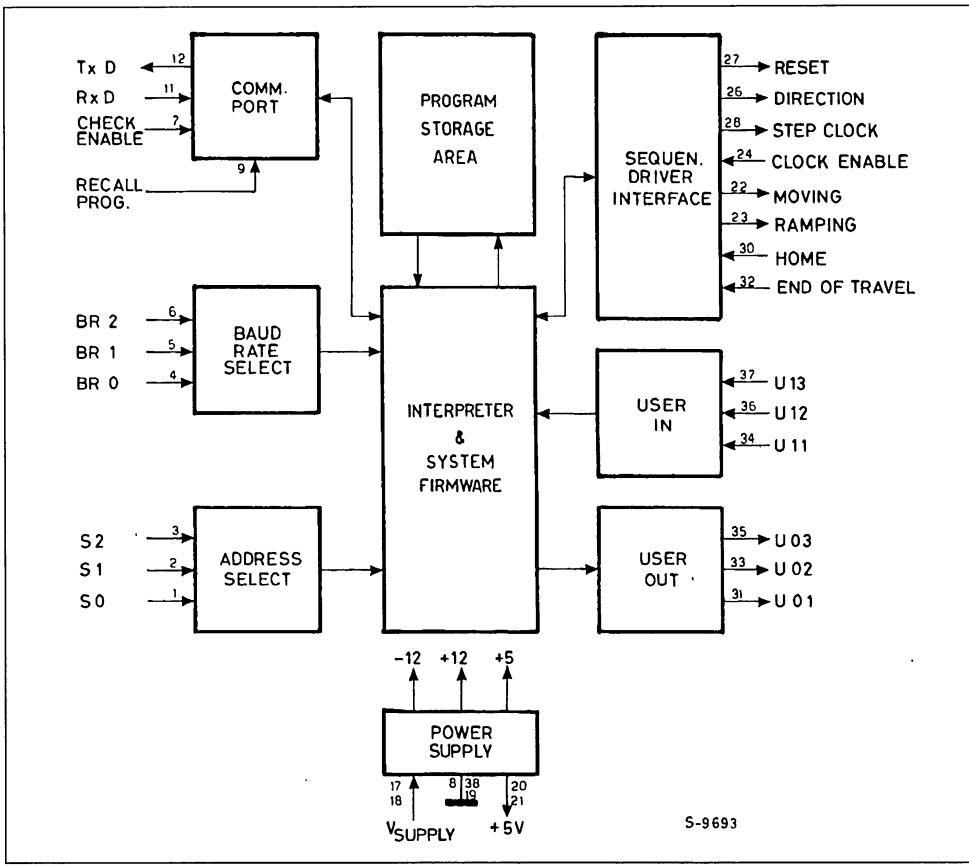
MOTION CHARACTERISTICS

SPEED RANGE	10 to 10000 step/s
SPEED RESOLUTION	10 step
RAMP LENGTH	1 to 999 step
RAMP RESOLUTION	1 step
POSITIONING RANGE (C200) (C200S)	0 to 9999999 step –8388608 to +8388607
SINGLE MOVEMENT RANGE	1 to 999999 step
POSITIONING RESOLUTION	1 step
POSITIONING REPEATIBILITY	± 0 step
PROGRAM STORAGE CAPABILITY	119 bytes

COMMUNICATION PORT CHARACTERISTICS

SIGNAL LINES	3 (TXD, RXD, GND)
BAUD RATE RANGE	110 to 9600
FORMAT	1 Start bit
	7 Data bit
	2 Stop bit
	Odd parity

Figure 1. GS-C Block Diagram

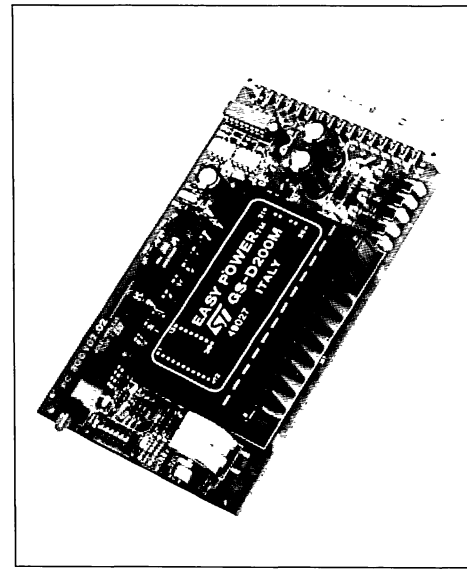


POWER CONTROLLER & MOTOR DRIVE BOARDS

2.5A MICROSTEP DRIVE BOARD FOR STEPPER MOTORS

FEATURES

- 2.5A phase peak current
- 5, 10, 25, 45, 90, 100, 127, microstep/step selection
- Full step selection possibility
- User programmable phase current
- User programmable phase current ripple
- 4/8 wires motor drive
- Galvanic isolation
- Thermal protection
- Step clock in excess of 140 kHz
- Single unregulated supply voltage
- Automatic ripple reduction at rest
- TTL, 12V, 24V programmable input level
- Output level TTL compatible



DESCRIPTION

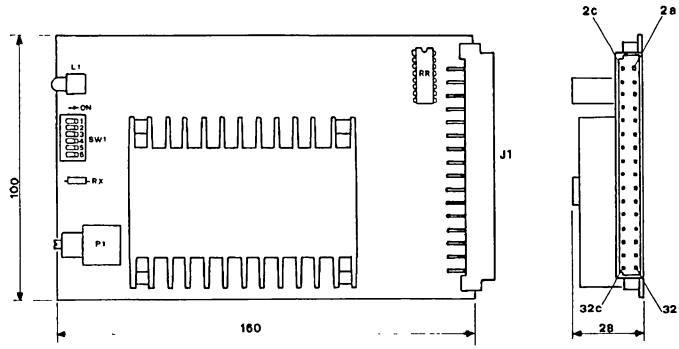
The GS-D250M is a single Europe board for microstepping drive of 4/8 wires stepping motors.It is based around the GS-D200M (microstep drive module) and it implements all the functions needed for a microstepping signal generation and the power stage to drive the stepper motor windings.

ELECTRICAL CHARACTERISTICS (T_A = 25°C and V_S=24V unless otherwise specified)

Supply Data

Symbol	Parameter	Min	Typ	Max	Unit
V_S	DC Supply Voltage	12		40	V
Iph	Phase current	0.5		2.5	Apk
fcp	Clock pulse frequency			140	kHz
Tstg	Storage temperature range	–20		+85	°C
Thop	Operating heatsink temperature			+85	°C

CONNECTION DIAGRAM AND MECHANICAL DATA



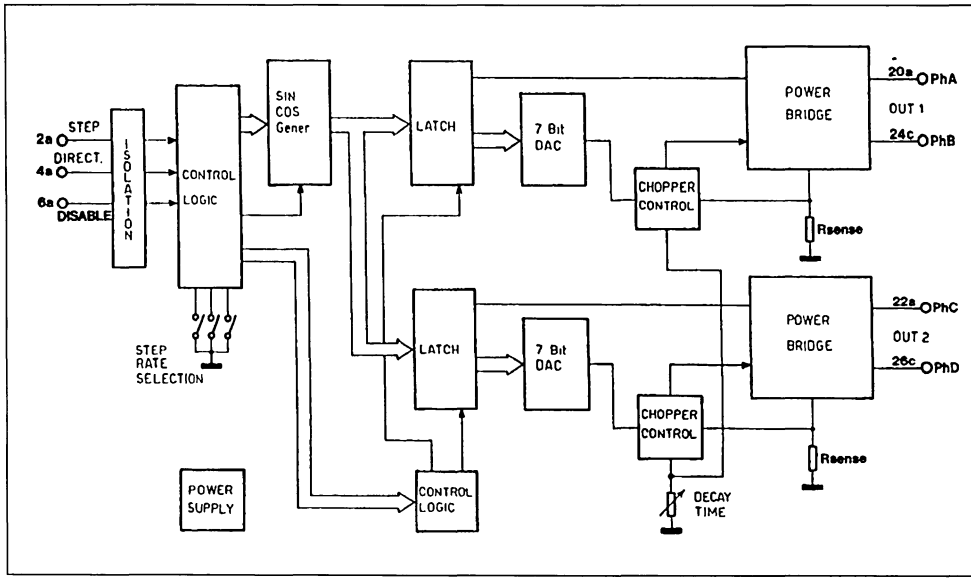
Dimensions in mm

GS-D250M Bus Connector Pins Description

The GS-D250M uses a 32 pins (16+16) DIN 41612 - VG95324 male connector

Pin	Row a Signal	Row c Signal
2	Step pulse input	Step pulse return
4	Direction input	Direction return
6	Disable input	Disable return
8	Microstep/step programming	Microstep/step programming
10	Not used	Not used
12	Sync Output	Microstep/step programming
14	Not used	Not used
16	Supply ground	Supply ground
18	Supply ground	Supply ground
20	Phase A output	Not used
22	Phase C output	Not used
24	Not used	Phase B output
26	Not used	Phase D output
28	Not used	Not used
30	Supply voltage	Supply voltage
32	Not used	Not used

Figure 1. GS-D250M Block Diagram



Phase Current Programming

The GS-D250M can be used to drive 4 wires motors or 8 wires motors.
The phase peak current level can be programmed by a resistor according to the following formulas:

$$Rx = \frac{3.2}{I_{pk}} - 1 \text{ Current setting resistor (k}\Omega\text{)}$$

where Ipk is expressed in Amperes.
The factory setting is for a peak current of 1.6A.
The user can replace Rx (located close to the front edge of the board) by a new resistor according to the desired current level. The minimum value of Rx is 270Ω that corresponds to Ipk= 2.5A.

Phase Current Ripple Programming

The phase current ripple is defined by the setting of the trimmer P_1 in order to optimize the electro-mechanicl characteristics of the system and minimize at the same time the power dissipated into the motor and sinked from the main.

GS-D250M System Interfacing.

The GS-D250M can be field adapted to interface almost any type of controller. It is possible, by changing a resistor array, to choose the logic level, or, sliding the on board dip-switch, select the step clock active edge and the direction command polarity.
A dip-switch allows the phase ripple current automatic reduction to occur at rest in order to minimize the power dissipation.

SW1-2-3 Define the microstep/step rate.

SW1	SW2	SW3	Microstep/step
OFF	OFF	OFF	127
ON	OFF	OFF	100
OFF	ON	OFF	90
ON	ON	OFF	45
OFF	OFF	ON	25
ON	OFF	ON	10
OFF	ON	ON	5
ON	ON	ON	1

SW4 Defines the active step clock transition

ON	Low-to-high active step clock transition
OFF	High-to-low active step clock transition

SW5 Defines the direction polarity

DIR SIGNAL	SWS	ROTATION
HIGH	ON	CCW
HIGH	OFF	CW
LOW	ON	CW
LOW	OFF	CCW

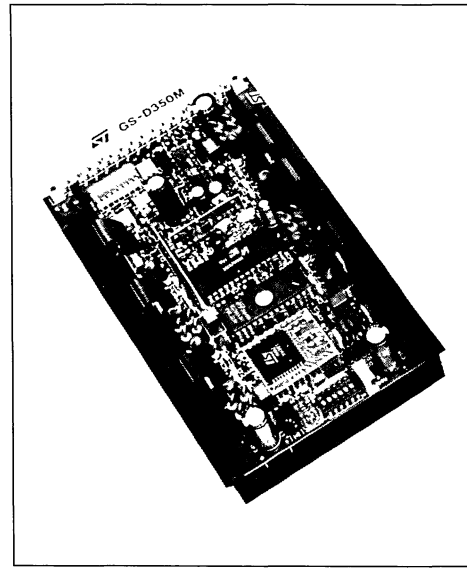
SW6 Enables the current ripple reduction

ON	Current ripple reduction at rest
OFF	Normal operation

5.6A MICROSTEP DRIVE BOARD FOR STEPPER MOTORS

FEATURES

- 5.6A phase peak current
- 5, 10, 25, 45, 90, 100, 127, microstep/step
- Full step operation
- User selectable phase current
- Automatic two quadrant chopping at rest
- Programmable phase current ripple
- 4/8 wires motor drive
- Galvanic isolation
- Full ouput protection against short circuit
- Thermal, under and overvoltage protection
- Step clock in excess of 140 KHz
- Isolated Fault output
- TTL, 12V, 24V programmable input level
- Output level TTL compatible



DESCRIPTION

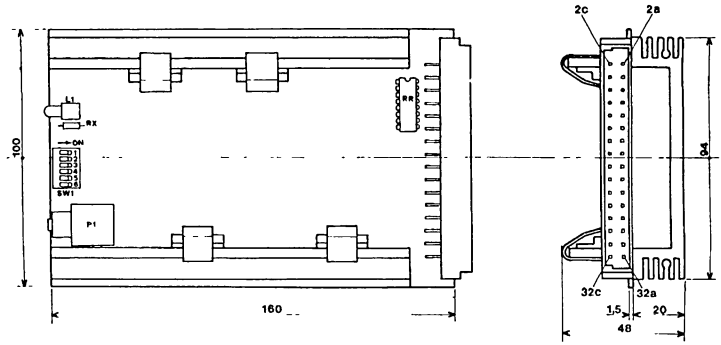
The GS-D350M is a member of the SGS-THOMSON family of stepper motor drive modules. It drives the 4/8 wires motor in a microstep mode thus assuring smooth and resonance free operations.

ELECTRICAL CHARACTERISTICS (T_A = 25°C and Vs=24V unless otherwise specified)

Symbol	Parameter	Min	Typ	Max	Unit
Vs	DC Supply Voltage	18		42	V
Iph	Phase current per output	0.5		2.8	Apk
fcp	Clock pulse frequency			140	kHz
Tstg	Storage temperature range	–20		+85	°C
Thop	Operating heatsink temperature	0		+85	°C

Note: A 4700µF low ESR capacitor must be connected across the supply pins as close to the board as possible.

CONNECTION DIAGRAM AND MECHANICAL DATA



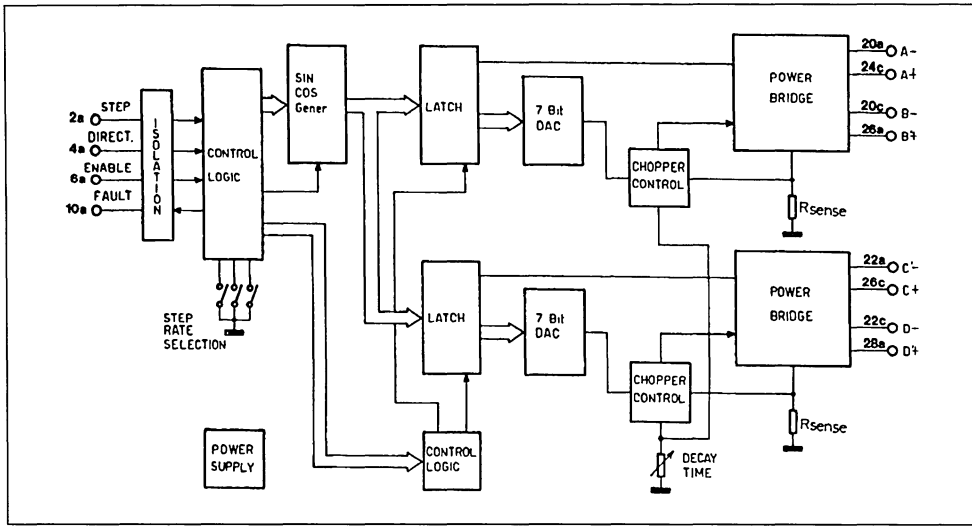
Dimensions in mm

GS-D350 Bus Connector Pins Description

The GS-D350M uses a 32 pins (16+16) standard DIN 41612 - VG95324 male connector

Pin	Row a Signal	Row c Signal
2	Step pulse input	Step pulse return
4	Direction input	Direction return
6	Enable input	Enable return
8	Microstep/step programming	Microstep/step programming
10	Fault logic output	Fault return
12	Sync Output	Microstep/step programming
14	Supply bus discharge output	Supply bus discharge output
16	Supply ground	Supply ground
18	Supply ground	Supply ground
20	Phase A – output	Phase B – output
22	Phase C – output	Phase D – output
24	Not used	Phase A + output
26	Phase B + output	Phase C + output
28	Phase D + output	Not used
30	Supply voltage	Supply voltage
32	Not used	Not used

Figure 1. GS-D350M block diagram



Phase Current Programming

The phase peak current level of each output stage is programmed by a resistor which value is calculated by using the following formula:

$$Rx = \left(\frac{3.2}{Ipk} = -1\right)\ k\Omega$$

where the phase current is the one delivered by a single output stage. The factory setting is for 1.6 Apk current for each output. The user can modify the peak current by a proper substitution of Rx.

Phase Current Ripple Programming

The phase current ripple is defined by the setting of the trimmer P_1 according to the electromechanical characteristics of the system.
The peak-to-peak current ripple level at rest is programmed by a resistor which value is calculated by using the formula:

$$Rt = \frac{t}{0.7}$$ Ripple setting resistor (kΩ)

where t is in microseconds and determined by the motor characteristics according to:

$$t = \frac{L}{R} \cdot \ln\left(\frac{Is}{Is - I}\right)$$

L and R are respectively the winding inductance and resistance and I_S is:

$Is = (Vs+1.5)/R$

Microstep Programming by Hardware

Three switches (SW1, SW2, SW3) are available on the front edge of the board.The switches are in OFF condition when the Knob is pulled versus the board edge. The last condition (ON, ON, ON) defines a full step operation.

Microstep Programming by Host Computer

The microstep/step rate can also be changed on-the-fly by using the three logic inputs available on the bus connector (8a, 8c, 12c) that correspond, respectively, to SW1, SW2, SW3.

This mode of operation may be requested during the motor operation to obtain, as an example, smooth start up and maximum top speed to reduce the time-to-move.

GS-D350M System interfacing

The GS-D350M can be field adapted to interface almost any type of controller. It is possible, by changing a resistor array, to choose the proper logic level, or, by sliding the on board dip-switch, select the step clock active edge and the direction command polarity. A dip-switches allows the phase current ripple automatic reduction to be performed when the motor is at rest.

SW1-2-3 Define the microstep/step rate.

SW1	SW2	SW3	Microstep/step
OFF	OFF	OFF	127
ON	OFF	OFF	100
OFF	ON	OFF	90
ON	ON	OFF	45
OFF	OFF	ON	25
ON	OFF	ON	10
OFF	ON	ON	5
ON	ON	ON	1

SW4 Defines the active step clock transition

ON	Low-to-high active step clock transition
OFF	High-to-low active step clock transition

SW5 Defines the direction polarity

Dir Signal	SW5	Rotation
HIGH	ON	CCW
HIGH	OFF	CW
LOW	ON	CW
LOW	OFF	CCW

SW6 Enables the ripple current reduction

ON	Ripple current reduction at rest
OFF	Normal operation

Figure 2. Four Wires Stepper Motor Connection

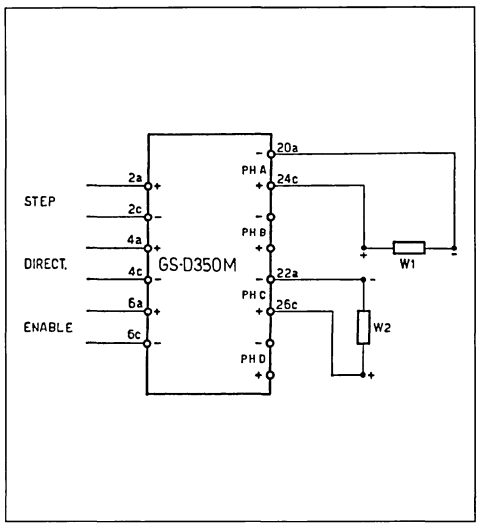
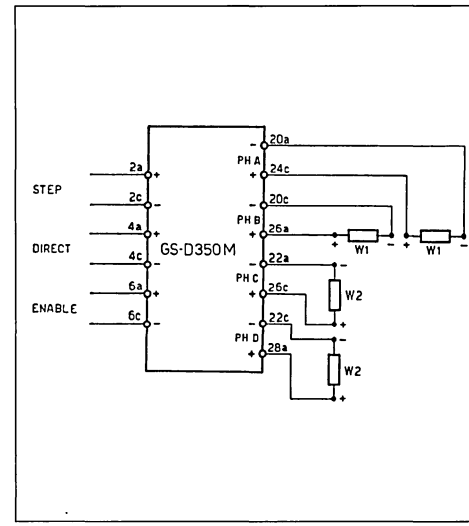


Figure 3. Eight Wires Stepper Motor Connection



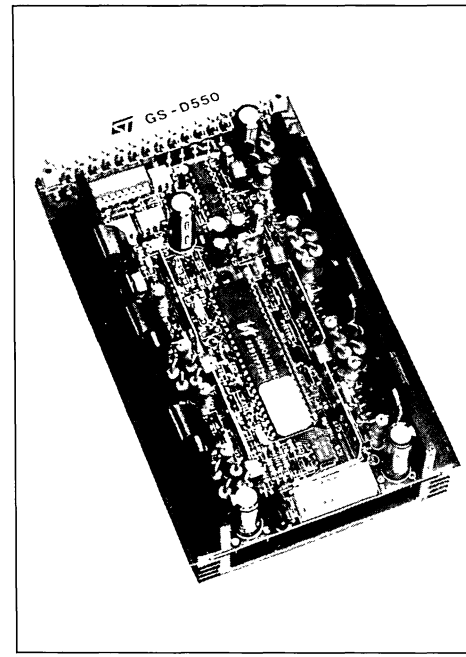
SGS-THOMSON MICROELECTRONICS

GS-D550

2/5 PHASE STEPPING MOTOR DRIVE BOARD

FEATURES

- Two and five phase motor drive
- Half and full step operation
- User programmable phase current during acceleration, slewing, rest
- Two/four quadrant current chopping
- Programmable phase current ripple
- Galvanic isolation of input/output signals
- Full ouput protection
- Thermal, undervoltage and overvoltage protection
- Step clock frequency up to 100 kHz
- TTL, 12V, 24V programmable input level
- Output level TTL compatible
- Single unregulated supply voltage
- On board auxiliary voltages generator



DESCRIPTION

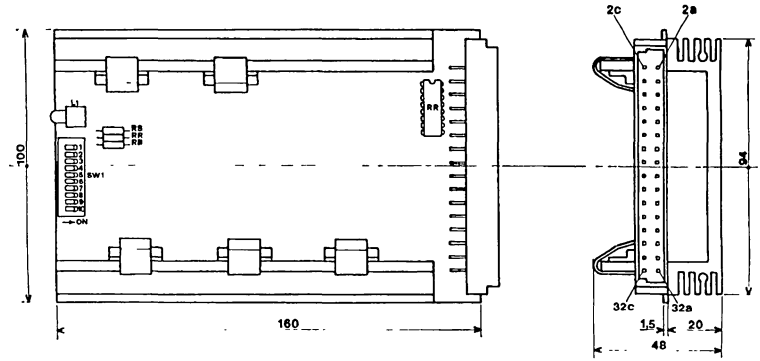
The GS-D550 is a board designed to drive stepper motors with 2 or 5 phases and with a current per phase up to 2.8A.
A very large number of auxiliary functions have been designed in, so that the interface to the microprocessor or host computer is reduced to a minimum. The five output stages use powerfet H bridges to ensure low conduction and switching losses; full protection against short circuits results in an extremely rugged unit suitable for harsh environment operation.

ELECTRICAL CHARACTERISTICS (T_A = 25°C and V_S=24V unless otherwise specified)

Symbol	Parameter	Min	Typ	Max	Unit
V_S	DC Supply Voltage	18		42	V
Iph	Phase current (5 phase)	0.5		2.8	A
Iph	Phase current (2 phase-eight wires)	1.0		5.6	A
fcp	Clock pulse frequency			100	kHz
Tstg	Phase current (5 phase)	–20		+85	°C
Thop	Operating heathsink temperature range	0		+85	°C

Note: A 4700µF low ESR capacitor must be connected across the supply pins as close to the board as possible.

CONNECTION DIAGRAM AND MECHANICAL DATA



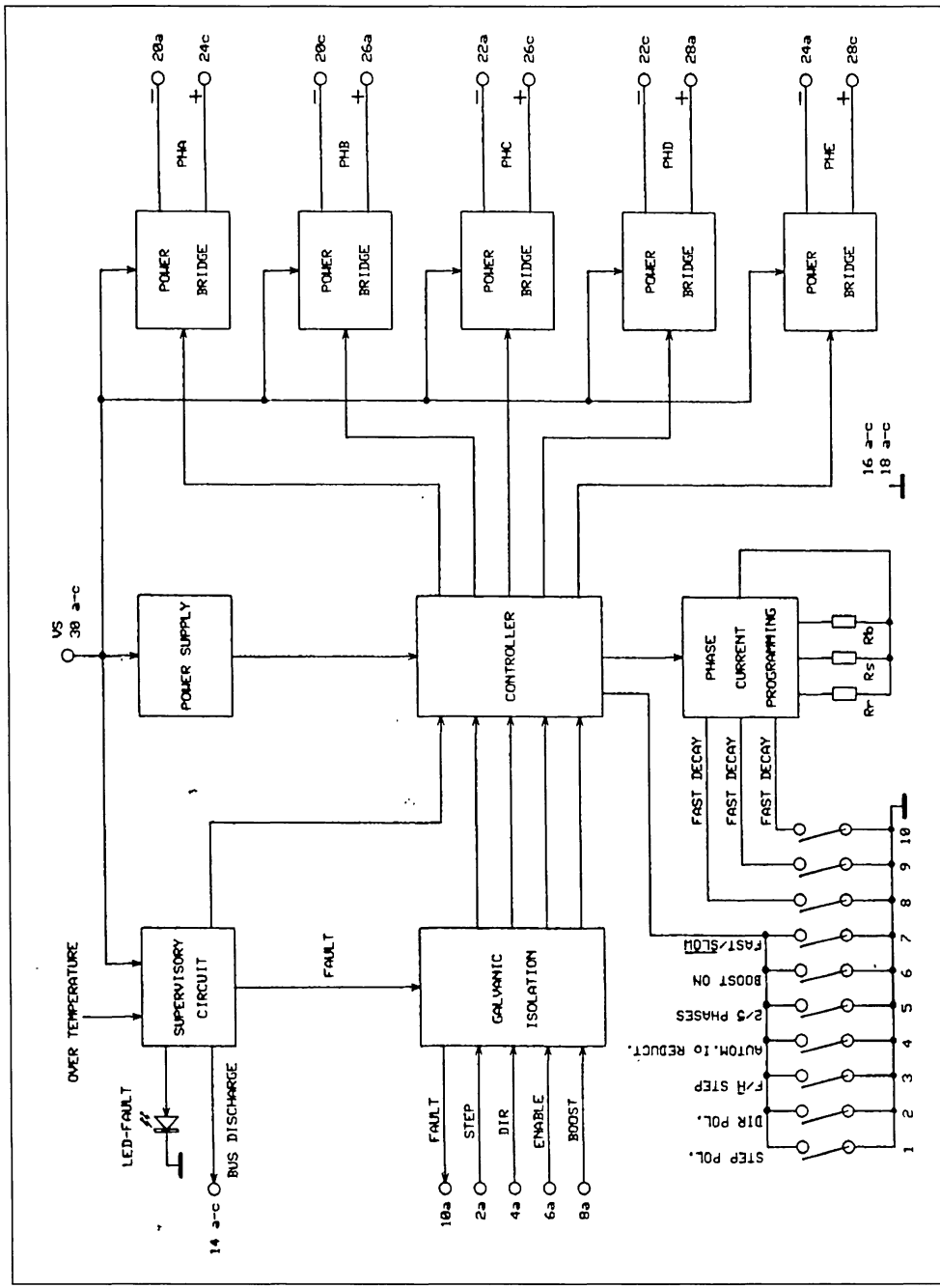
Dimensions in mm

GS-D550 Bus Connector Pins Description

The GS-D550 uses a 32 pins (16+16) DIN 41612-VG95324 male connector.

Pin	Row a Signal	Row c Signal
2	Step pulse input	Step pulse return
4	Direction input	Direction return
6	Enable input	Enable return
8	Current boost input	Not used
10	Fault logic output	Fault return
12	Current boost return	Not used
14	Supply bus discharge output	Supply bus discharge output
16	Supply ground	Supply ground
18	Supply ground	Supply ground
20	Phase A – output	Phase B – output
22	Phase C – output	Phase D – output
24	Phase E – output	Phase A + output
26	Phase B + output	Phase C + output
28	Phase D + output	Phase E + output
30	Supply voltage	Supply voltage
32	Not used	Not used

Figure 1. GS-D550 Block Diagram



Phase current programming

The GS-D550 phase current value is programmed by using a resistor for each of the three conditions, ramping, slewing and at rest.
The calculation starts with the definition of three coefficients:

$$Kr = \frac{5}{0.33 \cdot Ir} - 1$$ Rest current factor

$$Ks = \frac{5}{0.33 \cdot Is} - 1$$ Slew current factor

$$Kb = \frac{5}{0.33 \cdot Ib} - 1$$ Boost current factor

then the three resistor values can be defined

$Rr = Kr$ Rest current setting resistor (KΩ)

$$Rs = \frac{Kr \cdot Ks}{Kr - Ks}$$ Slew current setting resistor (KΩ)

$$Rb = \frac{Ks \cdot Kb}{Ks - Kb}$$ Boost current setting resistor (KΩ)

SW1	Defines the active step clock transition		
	ON	Low-to-high	
	OFF	High-to-low	
SW2	Defines the direction polarity		
	DIR SIGNAL	SW2	ROTATION
	HIGH	ON	CCW
	HIGH	OFF	CW
	LOW	ON	CW
	LOW	OFF	CCW
SW3	Defines the stepping mode		
	ON	Select Half step mode	
	OFF	Select Full step mode	
SW4	Enables the automatic current reduction		
	ON	No current reduction at rest	
	OFF	Automatic current reduction at rest	

SW5	Selects the operational mode	
	ON	Five phases mode
	OFF	Two phases mode
SW6	Selects/enables current boosting	
	ON	Boosted phase current (note 1)
	OFF	Zero phase current (note 1)
SW7	Selects the recirculation mode	
	ON	Four quadrants recirculation
	OFF	Two quadrants recirculation

SW8, SW9, SW10 define the fast recirculation time duration when this operating mode is choosen

SW8	SW9	SW10	Fast recirc. time
OFF	OFF	OFF	12.6 µs
ON	OFF	OFF	11.0 µs
OFF	ON	OFF	9.4 µs
ON	ON	OFF	7.8 µs
OFF	OFF	ON	6.2 µs
ON	OFF	ON	4.6 µs
OFF	ON	ON	3.0 µs
ON	ON	ON	1.4 µs

Note 1: The SW6 action depends also on the Boost input status, i.e.

SW6	Boost	Phase current
ON	ON	Boosted
ON	OFF	Normal
OFF	ON	Zero
OFF	OFF	Normal

Figure 2. Two phase, four wires stepper motor connection

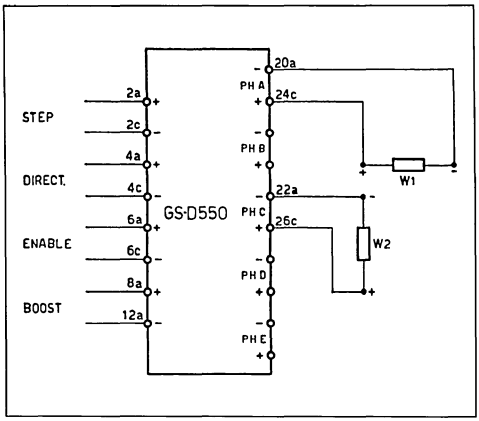


Figure 3. Two phase, eight wires stepper motor connection

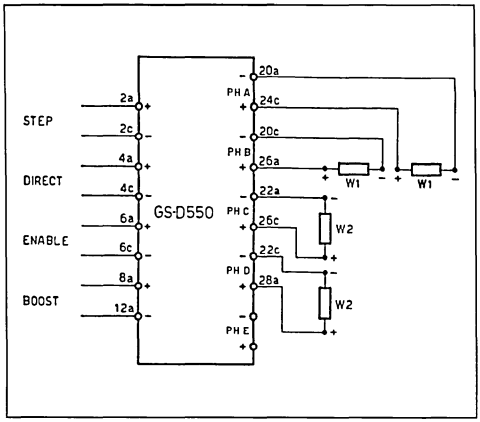
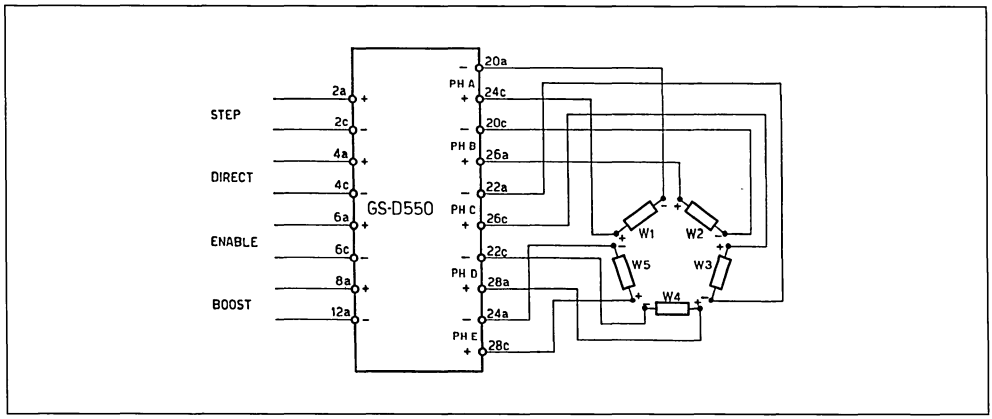


Figure 4. Five phase, four wires stepper motor connection



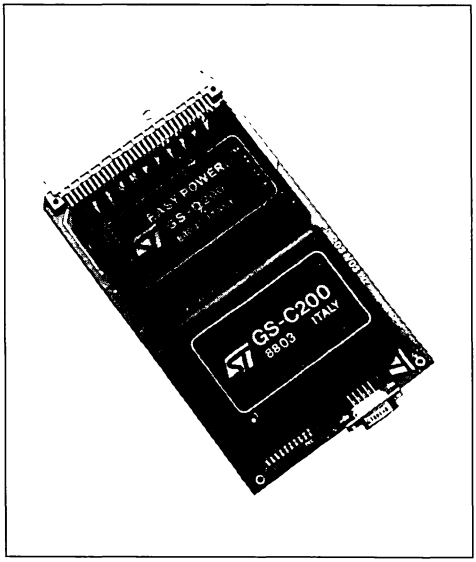
GS-DC200 FAMILY

STEPPER MOTOR CONTROL AND DRIVE BOARDS

DESCRIPTION

The GS-C200 and GS-C200S can be delivered either as stand alone controllers or fully assembled on a single-Europe board together with a power driver module that can be either the GS-D200 or the GS-D200S. These motion control systems, named GS-DC200, GS-DC200S and GS-DC200SS, used together with the GS-C200PROG* software package, allow the user to minimize the end product time-to-market.

* Order code GS-C200PROG



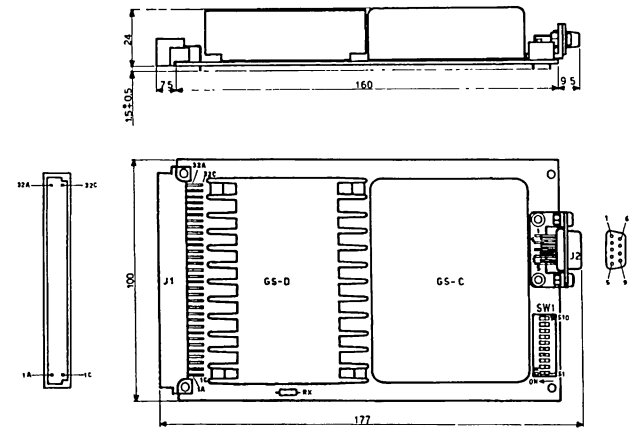
SELECTION CHART

Ordering Number	Controller Sequencer Driver	Instruction Set Commands	Phase Current (A)
GS-DC200	GS-C200 + GS-D200	25	2.0
GS-DC200S	GS-C200 + GS-D200S	25	2.5
GS-DC200SS	GS-C200S + GS-D200S	29	2.5

ELECTRICAL CHARACTERISTICS (T_A = 25°C and V_S=24V unless otherwise specified)

Symbol	Parameter	Min	Typ	Max	Unit
V_S	DC Supply Voltage	12		42	V
I_S	Supply current		150		mA
tcpw	Clock pulse width			5	µs
trpw	Reset pulse width			500	µs
fc	Chopper frequency		17		kHz
Tstg	Storage temperature range	–20		+85	°C
Thop	Operating heathsink temperature range (GS-D200/200S)	0		+85	°C

MECHANICAL DATA



Dimensions in mm

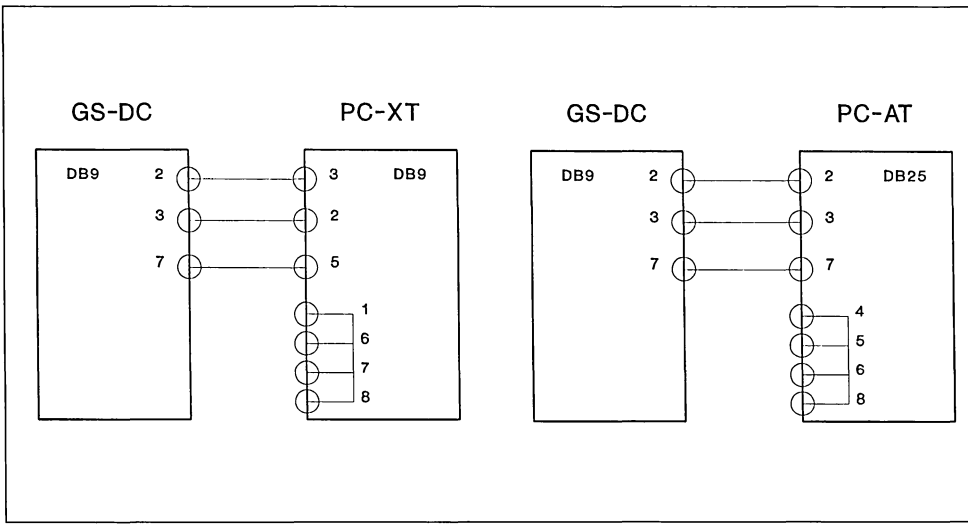
PIN DESCRIPTION

Pin	Row a Signal	Row c Signal
1	Ground	Not used
2	Ground	Not used
3	Ground	Power driver enable input
4	Ground	Power driver control input
5	Ground	Half/full step select
6	Ground	User input 3
7	Ground	User input 2
8	Ground	User output 3
9	Ground	User input 1
10	Ground	User output 2
11	Ground	End-of-travel switch
12	Ground	User output 1
13	Ground	Home switch
14	Ground	Prog. under execution output
15	Not used	Not used
16	Not used	Not used
17	Not used	Not used
18	Not used	Not used
19	Not used	Not used
20	Not used	Not used
21	Phase D output	Phase D output
22	Phase C output	Phase C output

PIN DESCRIPTION (Continued)

Pin	Row a Signal	Row c Signal
23	Phase B output	Phase B output
24	Phase A output	Phase A output
25	Step enable input	Step enable input
26	Ramp in execution logic output	Ramp in execution logic output
27	Motor moving logic output	Motor moving logic output
28	+5V output	+5V output
29	Supply voltage	Supply voltage
30	Supply voltage	Supply voltage
31	Supply Ground	Supply Ground
32	Supply Ground	Supply Ground

Figure 1. GS-C to P.C. Connecting Cable



RS232 Connector Pins Layout (DB9)

Pin	Description
1	Ground
2	Received data input
3	Transmitted data input
7	Ground

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