1200W AC/DC Switching Power Supply
Model: TG25-1200-XX



FEATURES

- Universal 85-305VAC input voltage.
- Operating ambient temperature range: -20°C to +70°C.
- Built-in active PFC function.
- Output short circuit, Over-current, over-voltage protection, over-temperature protection.
- Standby power 5V@1A.
- High efficiency up to 95%.
- 3+1 redundancy design, current sharing function.
- PG signal and remote sensing function.
- Standby power consumption <0.15 W at 230 VAC, no load.
- Supports Digital Power Management via PMBus.
- High power density, compact size: 7.48”x 5”x 1.61”.
- Operating altitude up to 5000m.
- Safety according to IEC62368-1 .

Models & Ratings

Model No.	Cooling Method	Max Power (W)	Output Voltage (V)	Output Current (A)	Efficiency at 230VAC (%) Typ. (2)	Cap. Load Max. (μF)
TG25-1200-12	Forced air Cooling	1080	12	90	93	-
TG25-1200-24		1200	24	50	94	-
TG25-1200-36			36	33.4	94	-
TG25-1200-48			48	25	95	-
TG25-1200-54			54	22.2	95	-

Input Specifications

Item	Operating Conditions		Min.	Typ.	Max.	Unit
Input Voltage Range	Line AC input		85	100-277	305	VAC
Input Frequency	-		47	50-60	63	Hz
Input Current(1)	115VAC		-	-	13	Arms
	230VAC		-	-	6.5	
	277Vac				5.7	
Inrush Current	115VAC	At 25°C, Cold start	-	-	30	A peak
	230VAC		-	-	60	
Power Factor (3)	115VAC		0.98	-	-	-
	230VAC		0.95	-	-	-
Earth Leakage Current	264VAC/63Hz		-	-	3.5	mA

1.Inrush Current :

For built-in EMI/EMS filters, input surge currents of 0.2ms or less are excluded.

2.Efficiency :

50% load at 230VAC, 25°C, and excluding fan power.

3.Power Factor :

100% load at 25°C.

Output Specifications

Item	Operating Conditions		Min.	Typ.	Max.	Unit
Output Voltage	See Models and Ratings table		12	-	54	VDC
Adjustable Voltage Range	For 12V, 24V, 36V, 48V		-5	-	+10	%
	For 54V (4)		-5	-	+5	%
Minimum Load	-		0	-	-	A
5V Standby (5)	Output Load		0	-	1	A
Load Regulation	Output from 0 - 100% load		-	-	±3	%
Line Regulation	Rated load		-	-	±1	%
Ripple & Noise (6)	Main output		-	-	1	%
	+5V Standby		-	-	50	mV
Transient Response	Load change from 50% to 100%		-	±5	-	%
Turn-on time	115/230VAC from input AC turn on		-	-	2	S
Rise time	10% to 90% of output voltage		1	-	100	mS
Hold-up Time (7)	At 25°C, 115VAC / 230VAC @ 70% load		16	-	-	mS
Short Circuit Protection	Output shut down and auto recovery		-	-	-	-
Over-current Protection	Main output shut down and auto recovery (low line)		105	-	135	%
	Main output shut down and auto recovery (High line)		105	-	145	%
Over-voltage Protection	Main output shut down and latch off, manual reset (Re-power on or Re-remote on) 12V, 24V, 36V.		110	-	145	%
	Main output shut down and latch off, manual reset (Re-power on or Re-remote on) 48V, 54V.		-	-	65	V
	Standby 5V output shut down and auto recovery		-	-	6.5	V
Over-temperature Protection	Main output shutdown and auto recovery		-	-	-	-
PG Signal	Power OK = high	PG signal turn on delay time	100	-	500	mS
	Power not OK = low	PG signal inactive to DC loss delay	1	-	-	
	Logic level high level	sourcing 400 μA max	2	-	5.25	V
	Logic level low level	sinking 1mA max	0	-	0.8	
Remote on/off Control (8)	Main output off	PS-ON = High	2	-	5.25	VDC
	Main output on	PS-ON = Low	0	-	0.8	
Current Sharing Accuracy (9)	Each power supply needs to carry more than 50% of the rated load		-	±10	-	%
Remote Sense (10)	Total compensate voltage		-	200	-	mV

4.Adjustable Voltage Range :

For 54V PoE applications, the output voltage shall be adjustable. The maximum output voltage is limited to 57V to meet IEEE 802.3 PoE regulatory requirements.

5.+5V Standby

In parallel applications, OR-ing isolation must be implemented on the system side. The unit does not incorporate a current sharing function.

6.Ripple & Noise :

Please refer to figure A for measurement of Vo, line & load regulation and ripple voltage, Ripple and noise is the maximum peak-to-peak voltage value measured at the output with 20MHz bandwidth, at rated line voltage and output load, and with a 100μF electrolytic capacitor in parallel with a 0.1μF ceramic capacitor.

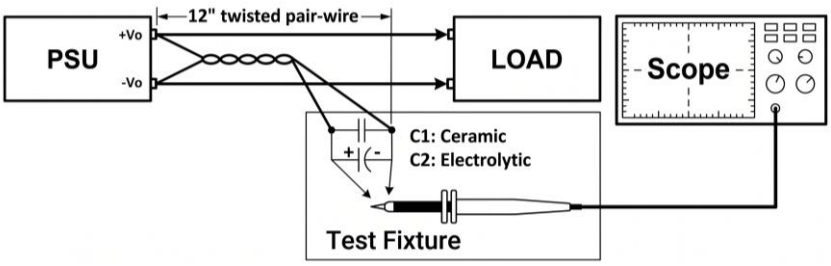


Figure A

7.Hold-up Time

Measure to 90% output voltage.

8.Remote on/off Control

PS ON is an active-low, TTL-compatible signal that allows a motherboard to remotely control the power supply in conjunction with features such as soft on/off. The power supply shall provide an internal pull-up to TTL high.
If Pin 7 and Pin 10 of CN903 are shorted, the AC input can directly turn on the power supply, and the remote control signal should be ignored.

9.Current sharing (Optional)

The main DC output has active current sharing. Current share is achieved by means of active current sharing for maximum 4 units of same model redundant application.
Ensure current sharing accuracy. Adjust the built-in potentiometer on each unit for current sharing before connecting. It is recommended to set the output voltage within ±50 mV of the target voltage.
In current sharing operation, Pin 12 (CS pin) of CN903 for all power supplies must be connected to each other. Refer to figure B.

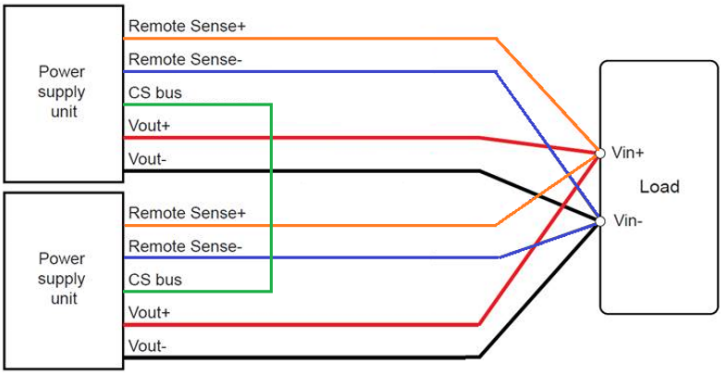


Figure B

Redundant operation (Optional)

The power module supports 3+1 parallel redundant operation, where the 3+1 configuration consists of three active

units and one redundant unit.
Maximum output power = rated power per unit x number of unit. (maximum number is 3)
In redundant operation, the maximum start-up load must not exceed the maximum output current of a single power supply; otherwise, it may not power-up.

10.Remote Sense+，Remote Sense-
Remote sense can compensate voltage drops on the output cable. This signal pin needs to be connected to the load end using a twisted pair cable. Refer to figure B.

General Specifications

Item	Operating Conditions		Min.	Typ.	Max.	Unit
Operating Temperature	Refer to power de-rating curve		-20	-	+70	°C
Storage Temperature	Non-operation		-40	-	+85	
Operating Humidity	Non-condensing		10	-	90	%
Storage Humidity			5	-	95	
Power De-rating (11)	Operating Temperature	+50°C to +70°C	2.5	-	-	%/°C
		+40°C to +70°C (12V)	2	-	-	
Altitude (12)	Operating Altitude (OVC II)		-	-	5000	meters
	Operating Altitude (OVC III)		-	-	2000	meters
Dielectric Strength test (13)	Input - Output		6000	-	-	VDC
	Input - FG		4000	-	-	
	Output - FG		2121	-	-	
Insulation Resistance (14)	Input – Output		100	-	-	MΩ
	Input - FG (Case)		100	-	-	MΩ
	Output – FG (Case)		100	-	-	MΩ
Mean Time Between Failure	At 230Vac/50Hz full load 25°C, Telcordia SR332, issue4.		300,000	-	-	Hrs.
Vibration	Operating：0.5G, 5 - 500Hz, 10 minutes per cycle, 30 minutes for each X, Y and Z axis.					
Shock	Non-operating (package)：20G, half sin-wave, each per axis.					

11.Power De-rating :

Input voltage de-rating curve, refer to figure C and temperature de-rating curve, refer to figure D.

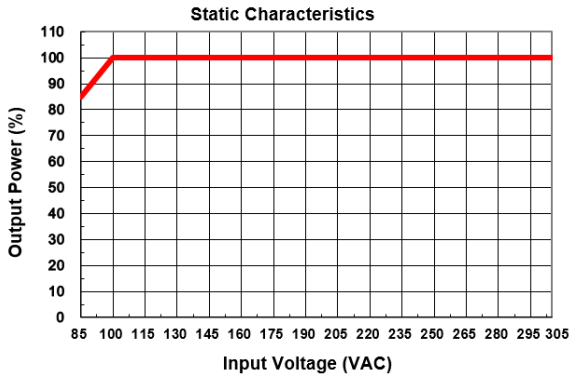


Figure C

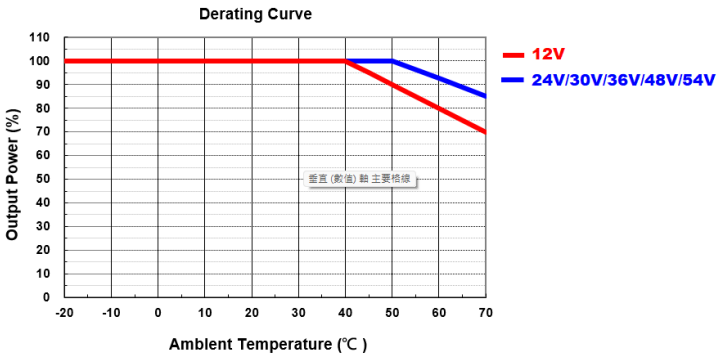


Figure D

12.Altitude :

Above 2000m altitude, the operating ambient temperature shall be derated by 1°C per 305m.

13.Dielectric Strength test :

Safety electric strength test for 3 seconds, leakage current < 10mA.

14.Insulation Resistance Test :

25±5°C, 70% RH, non-condensing testing voltage 500VDC.

Other :

Unless otherwise specified, all specifications is at 230Vac input voltage, full load, and after warm-up at +25°C conditions.

Safety Approvals

Safety Standard	VIN=100Vac-240Vac, 277Vac only	UL62368-1, 3rd Edition, EN62368-1, 3rd Edition, IEC62368-1, 3rd Edition. (5000m altitude)
Safety Class		Class I

Electromagnetic Compatibility (EMC)

Emissions	CE	EN55032(CISPR32), EN55011(CISPR11), EN55014(CISPR32) Class B	
	RE	EN55032(CISPR32), EN55011(CISPR11), EN55014(CISPR32) Class B (15)	
	Harmonic Current	IEC/EN61000-3-2 Class A	
	Flicker	IEC/EN61000-3-3	
Immunity	ESD	IEC61000-4-2, level 4, Contact +/- 8KV; Air discharge +/- 15KV	Criteria A
	RS	IEC61000-4-3, level 3, 10V/m	Criteria A
	EFT	IEC61000-4-4, level 3, +/- 2KV	Criteria A
	Surge	IEC61000-4-5, level 3, Line to Line +/- 1KV; Line to Earth +/- 2KV	Criteria A
		IEC61000-4-5, level 4, Line to Line +/- 2KV; Line to Earth +/- 4KV	Criteria B
	CS	IEC61000-4-6	Criteria A
	PFMF	IEC61000-4-8	Criteria A
	DIP	IEC61000-4-11	Criteria B

15.EMI :

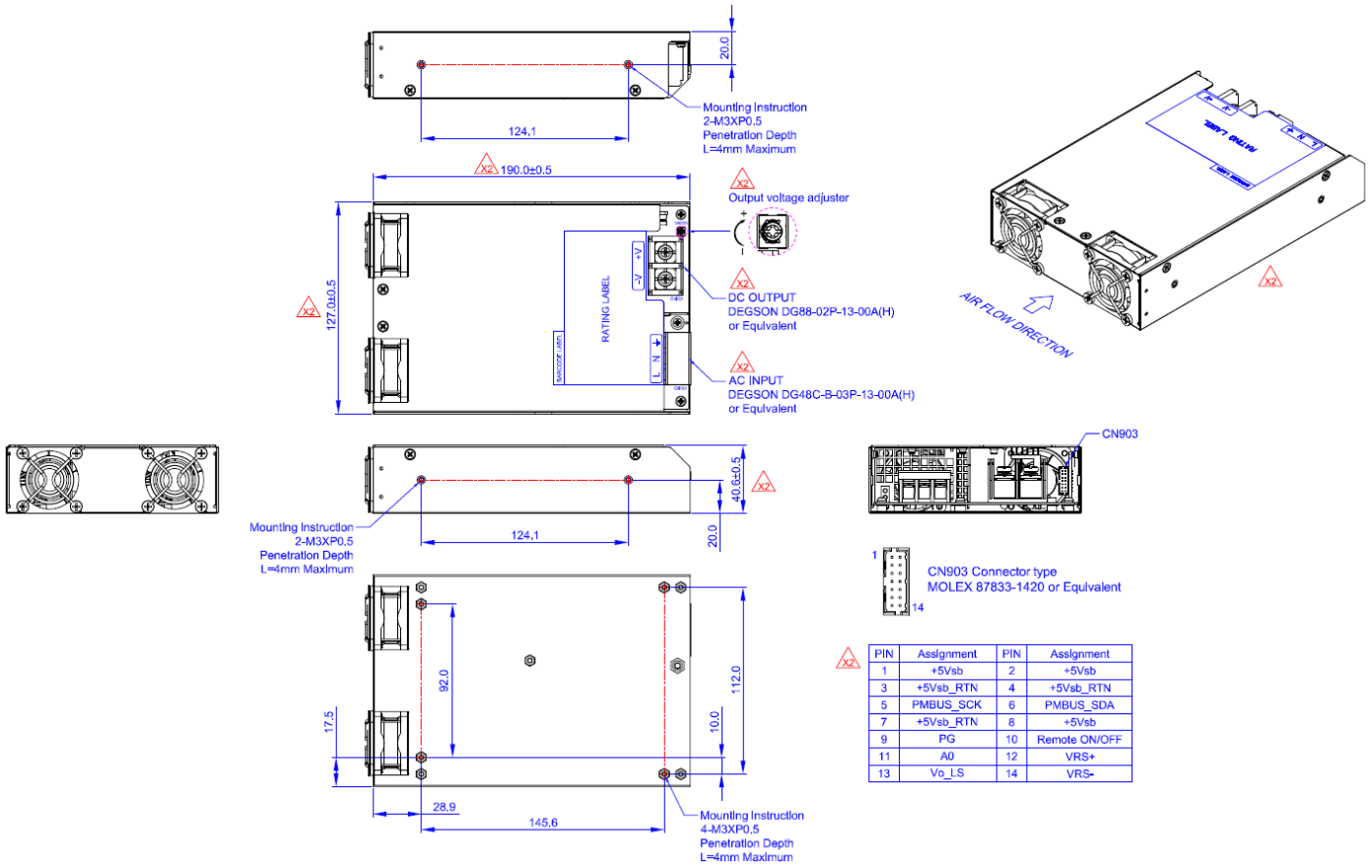
For the RE test, Class B compliance requires an external ferrite clamp core (K5B RC26×30×13-N(B)) on the AC input L and N cables. Without the ferrite core, the product meets Class A limits.

The power supply shall be considered an integral part of the system. All EMC tests were performed with the unit mounted on a 550 mm × 450 mm, 1 mm-thick metal plate. The electromagnetic compatibility of the power supply must be verified in conjunction with the terminal equipment.

Dimensions and Recommended Layout

Item	Value	Unit
Weight (Typ.)	1250	**g**
Size (L x W x H)	190 x 127 x 41	mm

Outline Drawing (Unit: mm, Tolerance: ±0.5 mm)



PIN	Assignment	PIN	Assignment
1	+5Vsb	2	+5Vsb
3	+5Vsb_RTN	4	+5Vsb_RTN
5	PMBUS_SCK	6	PMBUS_SDA
7	+5Vsb_RTN	8	+5Vsb
9	PG	10	Remote ON/OFF
11	A0	12	VRS+
13	Vo_LS	14	VRS-

CAUTION : The **VRS+** terminal is the positive output feedback compensation line. Ensure this line does not short-circuit or come into contact with adjacent pins or peripheral circuitry during wiring. Failure to comply may result in circuit damage.

A0 Address Signal Description :

Defines the PSU PMBus address as follows:

Power supply PMBus device address :	**60h**	**62h**	**64h**	**68h**
Typical external pull-down resistor values on the system side	0Ω	4.7 kΩ	15 kΩ	Open
Recommended external pull-down resistor value range on the system side	<2KΩ	3 kΩ~8.2kΩ	12kΩ~30kΩ	>47kΩ

Hardware :

The PMBus device in the power supply shall be compatible with both SMBus specification 2.0 for I^2C Vdd based power and drive. This bus shall operate at 3.3V level.

Only system needs to have 4.7KΩ internal pull up to 3.3V on the SDA or SCL lines and operate with 3.3V nominal voltage level.

Data Speed :

The PMBus device in the power supply shall operate at the 100Kbps SMBus speed.

PMBUS Command Summary :

PMBus commands are one byte command codes. As below listing is power supply can support of PMBus commands.

Command Code	Bytes	Write/Read	Command Name	Data Format	Default Value / Remark
03h	0	Write	Clear_Faults	N/A	No Data
19h	1	Read	Capability	Byte	90h
1Ah	1	Block Write – Block Read Process Call	Query	Byte	by command status
78h	1	Read	Status_Byte	Byte	00h
79h	2	Read	Status_Word	Word	0000h
7Ah	1	Read	Status_Vout	Byte	00h
7Bh	1	Read	Status_Iout	Byte	00h
7Dh	1	Read	Status_Temperature	Byte	00h
7Eh	1	Read	Status_CML	Byte	00h
81h	1	Read	Status_Fans	Byte	00h
8Bh	2	Read	Read_Vout	Linear	Variable
8Ch	2	Read	Read_Iout	Linear	Variable
8Dh	2	Read	Read_Temperature_1	Linear	Variable
8Eh	2	Read	Read_Temperature_2	Linear	Variable
90h	2	Read	Read_Fan speed Fan1	Linear	Variable
91h	2	Read	Read_Fan speed Fan2	Linear	Variable
96h	2	Read	Read_Pout	Linear	Variable
99h	9	Block Read	MFR_ID	String (ASCII)	“LEAD YEAR”
9Ah	12	Block Read	MFR_MODEL	String (ASCII)	“TG25-1200-XX”
9Dh	4	Block Read	MFR_DATE	String (ASCII)	“YYWW”
9Eh	15	Block Read	MFR_SERIAL	String (ASCII)	Variable

Note 3:Read_Temperature_1 returns the ambient temperature, while Read_Temperature_2 reports the hotspot temperature.

Read_Command :

The READ commands allow the host to read temperature, current, voltage, power and energy parameters of the power supply.

PMBus command	Description	Data format
Read_Vout	Returns the output voltage in voltage.	Linear
Read_Iout	Returns the output current in amperes.	Linear
Read_Pout	Returns the output power in watts of the power supply.	Linear
Read_Temperature_1/2	Returns the temperature in °C of the airflow inside temperature.	Linear

Accuracy

Command Name	Accuracy	Remark
Read_Vout	±3%	
Read_Iout	±5%	Valid when Output Load > 20% of Max Load.
Read_Pout	±5%	Valid when Output Load > 20% of Max Load.
Read_Temperature_1/2	±8°C	Ambient Temperature / hotspot temperature.
Read_Fan speed Fan1/2	±2100rpm	Duty cycle at 100%

Status_Commands :

Status information is binary. A value of 1 indicates a fault or warning event has occurred and a value of 0 indicates that a fault or warning event has not occurred.

The Status _Byte message content is described as shown below.

Bits	Status Bit Name	Meaning
7	Busy	Not support, set to 0
6	Off	Not support, set to 0
5	Vout_OV_Fault	Output over voltage fault has occurred
4	Iout_OC_Fault	Output over current fault has occurred
3	Vin_UV_Fault	Not support, set to 0
2	Temperature	Temperature fault or warning has occurred
1	CML	A communications, memory or logic fault has occurred
0	None of the above	Not support, set to 0

The Status _Word (79h) message content is described as shown below.

Byte	Bits	Bit name	Meaning
Low	7	Busy	Not support, set to 0
	6	OFF	Not support, set to 0
	5	Vout_OV_Fault	Output over voltage fault has occurred
	4	Iout_OC_Fault	Output over current fault has occurred
	3	Vin_UV_Fault	Not support, set to 0
	2	Temperature	Temperature fault or warning has occurred
	1	CML	A communications, memory or logic fault has occurred
	0	None of above	Not support, set to 0
High	7	Vout	Output voltage fault or warning has occurred
	6	Iout	Output current fault or warning has occurred
	5	Input	Not support, set to 0
	4	Not use	Not support, set to 0
	3	Power_Good#	The PWOK signal, if present, is negated
	2	Fans	A fan or airflow fault or warning has occurred
	1	Other	Not support, set to 0
	0	Not use	Not support, set to 0

The Status_Vout command returns one data byte with contents as below:

Bits	Meaning
7	Output over voltage fault has occurred
6	Output over voltage warning has occurred
5	Output under voltage warning has occurred
4	Output under voltage fault has occurred
3	Not support, set to 0
2	Not support, set to 0
1	Not support, set to 0
0	Not support, set to 0

The Status_Iout command returns one data byte with contents as below:

Bits	Meaning
7	Output over current fault has occurred
6	Not support, set to 0
5	Output over current warning has occurred
4	Not support, set to 0
3	Not support, set to 0
2	Not support, set to 0
1	Not support, set to 0
0	Not support, set to 0

Status_Temperature command returns one data byte with contents as below:

Bits	Meaning
7	Over temperature fault
6	Over temperature warning
5	Reserved
4	Reserved
3	Reserved
2	Reserved
1	Reserved
0	Reserved

The Status_Fans command reports on the status of fans installed in position

Bits	Meaning
7	Fan 1 Fault Assertion: The Fault bits shall be asserted if the fan speed remains below 700 RPM for more than 5 seconds, or below 70% of the target speed for more than 15 seconds.
6	Fan 2 Fault Assertion: The Fault bits shall be asserted if the fan speed remains below 700 RPM for more than 5 seconds, or below 70% of the target speed for more than 15 seconds.
5	Not support, set to 0
4	Not support, set to 0
3	Not support, set to 0
2	Not support, set to 0
1	Not support, set to 0
0	Not support, set to 0

PMBus Linear Data Format

The linear data format is typically used for commanding and reporting the parameters such as (but not only) the following:

• Input power and output power,

• Operating temperatures,

• Input current and output current,
• Input voltage,
• Fan speed RPM
The linear data format is a two bytes value with:
• An 11 bit, two's complement mantissa and
• A 5 bit, two's complement exponent (scaling factor).
The format of the two data bytes is illustrated in Figure 4.

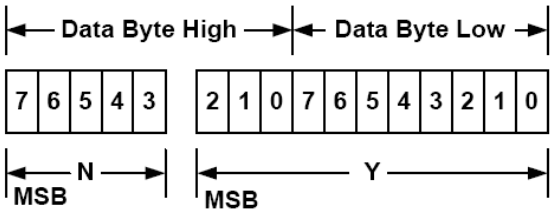


Figure 4. Linear Data Format Data Bytes

The relation between *Y*, *N* and the "real world" value is:
$X = Y \cdot 2^N$
Where, as described above:
X is the "real world" value; *Y* is an 11 bit, two's complement integer; and *N* is a 5 bit, two's complement integer.
Devices that use the linear format must accept and be able to process any value of *N*.

MFR_ID :

This command is used to read the manufacturer's name is "LEAD YEAR".

MFR_MODEL :

MFR_MODEL This command reads the model number string "TG25-1200-XX", where "XX" denotes the output voltage.
The available options for XX are 12, 24, 36, 48, and 54.

MFR_DATE :

Manufacturing date code in YYWW format (XXXX), where YY indicates the year and WW indicates the production week.

MFR_SERIAL :

The serial number format is defined as shown in the figure below.

