GP100L3B54TE Global Platform Line High Efficiency Rectifier

3Φ-200/208/240V_{AC} input; Default Output: ±54V_{DC} @ 6000W

RoHS Compliant

The GP100L3B54TE series of rectifiers provide significant efficiency improvements in the Global Platform of Power supplies. High-density front-to-back airflow is designed for minimal space utilization and is highly expandable for future growth. The 3Φ - 200/208/240V_{RMS} input product is designed to be deployed internationally. It is configured with an isolated ModBus/RS485 compliant communications bus that allows it to be used in a broad range of applications. Feature set flexibility makes these rectifiers an excellent choice for applications requiring modular, very-high-efficiency AC to 48V_{DC} to 54V_{DC} intermediate voltages, such as in distributed power.

Applications

- 54V_{DC} distributed power architectures
- General Purpose Power Applications
- UV Curing, Laser, Industrial RF
- Test and Measurement, Industrial Applications
- PLC controlled applications
- Applications Requiring Fast Restart or Fast Transient Response
- UL/CSA62368-1 for panel board applications not requiring UL1012

Features

- Efficiency 96.5% typical, exceeds 80plus Titanium levels
- Compact 1RU form factor with 30 W/in^3 density
- Constant power from 48 – 58V_{DC}
- 6000W from nominal 3Φ-200/208/240V_{AC}
- ModBus over Isolated RS485 based serial bus
- Power factor correction (meets EN/IEC 61000-3-2 and EN 60555-2 requirements)
- Output overvoltage and overload protection
- AC Input overvoltage and undervoltage protection
- Over-temperature warning and protection
- Redundant, parallel operation with active load sharing
- Internally controlled Variable-speed fan
- Hot insertion/removal (hot plug)
- Three front panel LED indicators
- EN/IEC/UL/CSA C22.2 62368-1 2nd edition +A1
- UL/CSA62368-1 3rd Ed
- Conformal Coating
- CE mark[§]
- Meets FCC part 15, EN55032 Class A standards
- Meets EN61000 immunity and transient standards
- Shock & vibration: Meets IPC 9592 Class II standards

[*] UL is a registered trademark of Underwriters Laboratories, Inc.

[†] CSA is a registered trademark of Canadian Standards Association.

[§] This product is intended for integration into end-user equipment. All CE marking procedures of end-user equipment should be followed. (The CE mark is placed on selected products.)

[**] ISO is a registered trademark of the International Organization of Standards

Technical Specifications

Absolute Maximum Ratings

Stresses in excess of the absolute maximum ratings can cause permanent damage to the device. These are absolute stress ratings only, functional operation of the device is not implied at these or any other conditions in excess of those given in the operations sections of the data sheet. Exposure to absolute maximum ratings for extended periods can adversely affect the device reliability.

Parameter	Device	Min	Max	Unit
Input Voltage: Continuous	V_{IN}	0	310	V_{AC}
Operating Ambient Temperature[1]	T_A	-10	75	°C
Storage Temperature	T_{stg}	-40	85	°C
I/O Isolation voltage to Frame (100% factory Hi-Pot tested)			2121	V_{DC}
[1] See the derating guidelines under the Environmental Specifications section				

Electrical Specifications

Unless otherwise indicated, specifications apply over all operating input voltage, Vo = 54V_{DC}, resistive load, and temperature conditions. To meet measurement accuracy a warm up time of 1hr may be required.

INPUT						
Parameter		**Symbol**	**Min**	**Typ**	**Max**	**Unit**
Operating Voltage Range (3Φ delta with safety frame ground)		V_{IN}	176	200/208/220/240	275	V_{AC}
Low voltage	Turn - OFF	V_{IN}			171	
	Turn - ON				176	
	Hysteresis		5			
High voltage	Turn - OFF	V_{IN}	280			
	Turn-On		275			
	Hysteresis		5			
Input voltage phase unbalance		V_{IN}	-15		+10	%
Frequency		F_{IN}	47		63	Hz
Operating Current (3Φ - all phases operational)		I_{IN}			30	A_{AC}
Input current phase unbalance [load > 50% of FL]					1.5	%
Inrush Transient (per Φ at 208V_{RMS}, 25°C, excluding X-Capacitor charging)		I_{IN}			60	A_{PK}
Source Impedance (NEC allows 2.5% of source voltage drop inside a building)					0.30	Ω
Idle Power (at 208V_{AC}, 25°C)	Main output OFF Main output ON @ I_o=0	P_{IN}			30 45	W
Leakage Current (per Φ, 530V_{AC}, 60Hz)		I_{IN}			5	mA
Power Factor (50 – 100% load)		PF	0.98	0.995		
Efficiency (200/208/240V_{AC} @ 25°C)	30-80% load 50% load	η		93/95 95		%
Holdup time (V_{in} = 180V_{rms}, V_{out} ≥ 42V_{DC}, constant power load)		T	8			ms
Ride through (at 208V_{AC}, 25°C, constant power load)		T	1/2	1		cycle
Power Good[2] (V_{OUT} > 44V_{DC}, P_{OUT} = constant power)		PG	5	8	20	ms
Isolation (per EN62368)	Input - Output Input - Chassis/Signals	V	3000 2087			V_{AC}

Technical Specifications (continued)

Electrical Specifications (continued)

48/52/54V_{DC} MAIN OUTPUT						
Parameter		**Symbol**	**Min**	**Typ**	**Max**	**Unit**
Output Power (176 - 275V_{AC} – 3Φ, T_{AMB}= 0 – 55°C)		W	6050			W_{DC}
Factory set default set point V_{IN} = 208V, I = 10% FL, 25°C		V_{OUT}		54		V_{DC}
Nominal set point (droop regulation; max-no load, min-full load)			-450		50	mV_{DC}
Overall regulation (load, temperature, aging) 0 – 45°C LOAD > 2.5A			-0.5		+0.5	%
T_{AMB} > 45°C			-2		+2	%
Output Voltage Set Range			44		58	V_{DC}
Programmable voltage resolution				0.012		V_{DC}
Output Current (T_{AMB} = 50°C) V_{OUT} = 48V_{DC}		I_{OUT}	1		125	A_{DC}
Output Current (T_{AMB} = 55°C) V_{OUT} = 52V_{DC}			1		115	
V_{OUT} = 54V_{DC}			1		111	
Active Current share (> 50% FL)			-5		5	%FL
Output Ripple RMS (5Hz to 20MHz)		V_{OUT}			100	mV_{rms}
(20MHz bandwidth, Load > 10%FL) Peak-to-Peak (5Hz to 20MHz)					250	mV_{p-p}
(20MHz bandwidth, Load < 10%FL) Peak-to-Peak (5Hz to 20MHz)					400	mV_{p-p}
External Bulk Load Capacitance		C_{OUT}	0		1,700	µF/A
Turn-On (monotonic turn-ON from 30 – 100% of Vnom, above -5°C[3])		T				
Delay				5		s
Rise Time				80		ms
Output Overshoot		V_{OUT}			2	%
Load Step Response						
ΔI (V_{IN} = 200/208/240V_{AC}, 25°C, load step 20% ↔ 80%, di/dt = 1A/µs)		I_{OUT}			60	%FL
ΔV (200/208/240 V_{AC}, 25°C)		V_{OUT}	-5		5	%
Settling Time to normal regulation		T			2	ms
Overload[4] - Power limit when V_{OUT} ≥ 48V_{DC}		P_{OUT}	6050			W_{DC}
Recoverable current limit when 40V_{DC} < V_{OUT} < 48V_{DC}		I_{OUT}	110		120	%FL
Output shutdown (one retry after a 2 – 10 second delay)		V_{OUT}			36	V_{DC}
Short circuit protection		No damage				
System power up		Upon startup, delay overload shutdown for 20 seconds to allow the insertion and startup of multiple modules within a system.				
Overvoltage	200ms delayed shutdown (default) Immediate shutdown	V_{OUT}	59	59.5	60	V_{DC}
			> 65			
	Programmable range		44		59.5	
	Latched shutdown	If 3 restart attempted within a 30 sec window unit latches OFF				
	Restart delay		3.5	4	5	sec
Over-temperature warning (prior to commencement of shutdown)		T		5		°C
Shutdown (below the max device rating being protected)				20		
Restart attempt Hysteresis (below shutdown level)				10		
Isolation Output-Chassis		V	500			V_{DC}
Restart/Reset conditions		Loss of input > 100ms or Output OFF followed by ON command				

[2] Complies with ANSI TI.523-2001 section 4.9.2 emissions max limit of 20mV flat unweighted wideband noise limits

[3] Below -5°C, the rise time is approximately 5 minutes to protect the bulk capacitors.

[4] Overload retries must incorporate normal soft-start turn-ON.

5V_{DC} Auxiliary Output					
Parameter	**Symbol**	**Min**	**Typ**	**Max**	**Units**
Output Voltage Setpoint	V_{OUT}		5		V_{DC}
Overall Regulation		-5		+5	%
Output Current		0		2	A
Ripple and Noise (20mHz bandwith)			50	100	mV_{P-P}
Over-voltage Clamp				7	V_{DC}
Over-current Limit		110		225	%FL

Technical Specifications (continued)

General Specifications

Parameter		Min	Typ	Max	Units	Notes
Reliability	Calculated		1,183,000		Hours	Full load, 25°C ;
			403,437			Full load, 55°C ; - MTBF per Telecordia SR232 Reliability protection for electronic equipment,
Service Life			10		Years	80% load, 35°C ambient, excluding fans
Unpacked Weight			4.3/9.5		kg/lb	
Packed Weight			4.9/10.8		kg/lb	
Heat Dissipation		260 Watts or 890 BTU/h @ 80% load,				350 Watts or 1200 BTU/h @ 100% load

Signal Specifications

Unless otherwise indicated, specifications apply over all operating input voltage, resistive load, and temperature conditions. Signals are referenced to Logic_GND (L_GND) unless noted otherwise. See the Signal Definitions table for additional information

Parameter	Symbol	Min	Typ	Max	Unit
Interlock2/Remote ON/OFF					
54V output OFF	V_{OUT}	2.5		12	V_{DC}
54V output ON	V_{OUT}	0		0.4	V_{DC}
Vprog Margining					
Output voltage range	V_{OUT}	44		58	V_{DC}
Voltage control range	$V_{control}$	0		3.3	V_{DC}
Programmed output voltage range	V_{OUT}	44		58	V_{DC}
Voltage adjustment resolution (12-bit A/D)	$V_{control}$		3.3		mV_{DC}
Output configured to $54V_{DC}$	$V_{control}$	3.0		3.3	V_{DC}
Output configured to $44V_{DC}$	$V_{control}$	0		0.1	V_{DC}
Fault					
Logic HI (No fault is present)	V	2.4	—	3.3	V_{DC}
Logic LO (Fault is present)	V	0	—	0.4	V_{DC}
Sink current	I	—	—	50	mA
Signal has 10K internal pull-up to 3.3V.					
Power Good					
Logic HI (No fault is present)	V	2.4	—	3.3	V_{DC}
Logic LO (Fault is present)	V	0	—	0.4	V_{DC}
Sink current	I	—	—	50	mA
Signal has 10K internal pull-up to 3.3V.					
IShare Single wire connection between rectifiers Signal referenced to Vout(-), no external components to be used on this signal.	V	0	—	3.3	V_{DC}
Interlock1 Normal operation [Connected externally to Vout (-)]	V	0		0.4	V_{DC}
Module Present Normal operation [Internally connected to Vout(-)]	V	—		0.4	V_{DC}

Technical Specifications (continued)

Digital Interface Specifications

Parameter	Conditions	Symbol	Min	Typ	Max	Unit
RS485 Isolation from the main output					60	V_{DC}
Standard measurement parameters	Update frequency Report delay after 25% step Report delay to accuracy				1 2 10	Hz sec sec
I_{OUT} measurement range		I_{MR}	0		130	A_{DC}
I_{OUT} measurement accuracy 25°C	> 25A < 25A	$I_{OUT(ACC)}$	-1 2.5		+1 2.5	% of FL A_{DC}
V_{OUT} measurement range		$V_{OUT(rMR)}$	0		70	V_{DC}
V_{OUT} measurement accuracy[5]		$V_{OUT(ACC)}$	-1		+1	%
P_{OUT} measurement range		$P_{OUT(rMR)}$	0		6100	W_{DC}
P_{OUT} measurement accuracy	25°C	$P_{OUT(ACC)}$	-60		75	W_{DC}
	-10°C – 55°C		-60		100	
Temp measurement range		$Temp_{(rMG)}$	0		150	°C
Temp measurement accuracy[6]		$Temp_{(ACC)}$	-5		+5	%
V_{IN} measurement range, each phase		$V_{IN(rMG)}$	0		600	V_{AC}
V_{IN} measurement accuracy		$V_{IN(ACC)}$	-1.5		+1.5	%
I_{IN} measurement range, each phase		$I_{IN(MR)}$	0		20	A_{DC}
I_{IN} measurement accuracy		$I_{IN(ACC)}$	-0.5		0.5	% of FL
P_{IN} measurement range, computed 3Φ result		$P_{in(rng)}$	0		6750	W_{in}
P_{IN} measurement accuracy	> 500W 100 – 500W < 100W	$P_{in(acc)}$	-1.5 2.5 30		+1.5 2.5 30	% % W

[5] Above 2.5A of load current
[6] Temperature accuracy reduces non-linearly with decreasing temperature

Environmental Specifications

Parameter		Min	Typ	Max	Units	Notes
Ambient Temperature		-10[7]		75	°C	Air inlet from sea level to 5,000 feet.
Storage Temperature		-40		85	°C	
Operating Altitude				3048/10000	m / ft	
Non-operating Altitude				8200/30k	m / ft	
Power Derating with Temperature				2.0	%/°C	55°C to 75°C[8]
Power Derating with Altitude				2.0	°C/305 m °C/1000 ft	Above 1524/5000 m/ft; 3962/13000 m/ft max
Humidity	Operating Storage	5 5		95 95	% %	Relative humidity, non-condensing
Shock and Vibration	Operational	Meets IPC 9592 Class II, Section 5 and GR-63_CORE requirements				
	Packaged	0.02 0.01 0.00 5			g^2/Hz	ModifiedlASTM-D-4728-91 8-hour duration on each axis
Acoustic Noise			55	58	dBA	80% load current 25C ambient 1.5m distance
Airborne Contamination Protection		PCBs conformally coated with UL 94V-0, UL Recognized component (QMJU2) material				

[7] Designed to start and work at an ambient as low as -40°C, but may not meet operational limits until above -5°C
[8] The maximum operational ambient is reduced in Europe in order to meet certain power cord maximum ratings of 70°C. The maximum operational ambient where 70°C rated power cords are utilized is reduced to 60°C until testing demonstrates that a higher level is acceptable.

Technical Specifications (continued)

EMC

[Surges and sags applied one Φ at a time and all 3Φ's simultaneously; phase angles 0, 90, 270°]

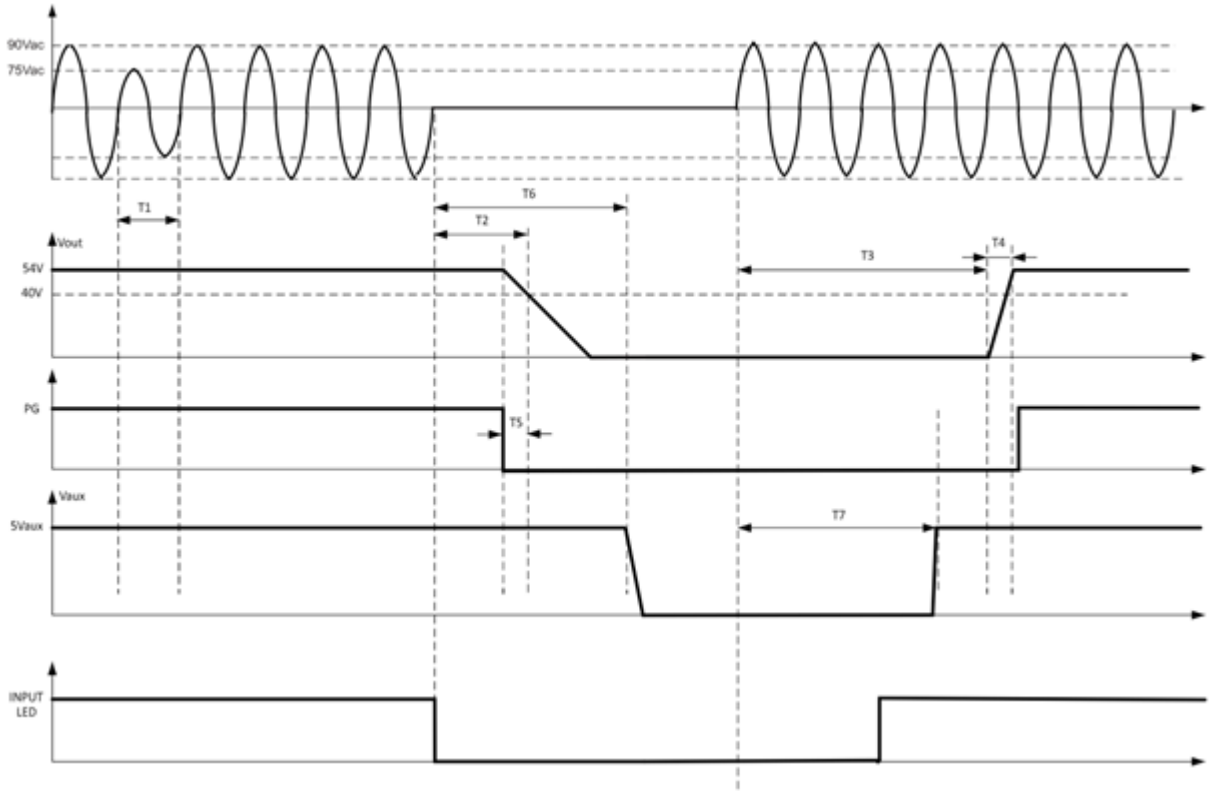
Parameter	Function	Standard		Level	Criteria	Test
AC input	Conducted emissions	EN55032, FCC part 15 EN61000-3-2 Telcordia GR1089-CORE		A – 6dB margin		0.15 – 30MHz 0 – 2 KHz
	Radiated emissions	EN55032		A – 2dB margin		30 – 10000MHz
AC Input Immunity	Line surge			3 x V_{NOM} 240V	B	1Φ only or all 3Φ
	Line sags and interruptions	EN61000-4-11			A	-30%, 10ms
					B	-60%, 100ms
					B	-100%, 5sec
		SEMI-F47 Compliant at 208V_{AC} Output will Stay at Full Power			A	25 % Sag for 2 Sec
					A	1/2 cycle interruption
					B	1 cycle interruption
				50% Sag	Any Phase	10 cycles @ 50Hz
						12 cycles @ 60Hz
				70% Sag		25 cycles @ 50Hz
						30 cycles @ 60Hz
				80% Sag		50 cycles @ 50Hz
						60 cycles @ 60Hz
	Lightning surge	EN61000-4-5, Level 4, 1.2/50µs – error free			A	4kV, comm
					A	2kV, diff
		ANSI C62.41 -2002	100kHz ring wave 1.2/50µs-8/20µs 550ns EFT burst	3, Category B 3, Category B	B, Table 2 B, Table 3 B, Table 7	6kV/0.5kA 6kV, 3kA 2kV, severity II
	Fast transients	EN61000-4-4		3	A	5/50ns, 2kV (common mode)
Enclosure immunity	Conducted RF fields	EN61000-4-6		3	A	130dBµV, 0.15-80MHz, 80% AM
	Radiated RF fields	EN61000-4-3		3	A	10V/m, 80-1000MHz, 80% AM
		ENV 50140			A	
	ESD	EN61000-4-2		4	A	8kV contact, 15kV air

Criteria	Performance
A	No performance degradation
B	Temporary loss of function or degradation not requiring manual intervention
C	Temporary loss of function or degradation that may require manual intervention
D	Loss of function with possible permanent damage

Technical Specifications (continued)

Timing diagrams

Response to input fluctuations



T1 – ride through time – 0.5 to 1 cycles [10 – 20ms] V_{OUT} remains within regulation – load dependent

T2 – hold up time - 8ms – V_{OUT} stays above $40V_{DC}$

T3 – delay time – less than 10s – from when the AC returns within regulation to when the output starts rising

T4 – rise time - 80ms – the time it takes for V_{OUT} to rise from 10% to 90% of regulation

T5 – power good warning – 5ms – the time between assertion of the PG signal and the output decaying below $40V_{DC}$.

T6 – hold up time of the 5VAUX output @ full load – 1s – from the time AC input failed

T7 – rise time of the 5VAUX output - 3.65ms – 5VAUX is available at least 450ms before the main output is within regulation

Blinking of the input/AC LED – V_{IN} < $180V_{AC}$ (the low transitioned signal represents blinking of the input “LED”).

Technical Specifications (continued)

Signal Specification

Control Signals

Interlock1:

Interlock1 pin open will turn off main output immediately within 50 ms, faster than normal remote on/off control.

LED/analog signals/communication should report status when interlock is open.

Interlock is top priority no matter Enable/Modbus command status

Interlock2 / Remote On/Off:

Remote on/off main output with system control. Logic low to turn on main output and Logic High to turn off in 100-200ms.

Vprog

Voltage programming (V_{prog}): Hardware voltage programming controls the output voltage until a software command to change the output voltage is executed. Software voltage programming permanently overrides the hardware margin setting and the rectifier no longer listens to any hardware margin settings until power to the controller is interrupted, for example if input power or bias power is recycled.

When bias power is recycled to the controller the controller restarts into its default configuration, programmed to set the output as instructed by the V_{prog} pin. Again, subsequent software commanded settings permanently override the margin setting. As an example, applying a voltage between V_{prog} and L_GND is an effective way of changing the factory set point of the rectifier to whatever voltage level is desired by the user during initial start-up.

Programming can be accomplished either by an external resistor or by a voltage source injecting a precision voltage level into the Vprog pin. Above $3V_{DC}$ the rectifier sets the output to its default state.

If V_{prog} feature is not used, keep this pin open. this signal is pulled up to 3.3V with a resistor inside, therefore output voltage is default factory setting.

$$V_{out}(V) = 46 + \left(\frac{R(k\Omega)}{R(k\Omega) + 10} * 3.3\text{-}0.1 \right) * 4.14$$

Where,

R= 312.5ohm.100kohm

R= Open, Vout=54V

R= 0ohm/short, Vout=44V

I_share

Load share (Ishare): This is a single wire analog signal that is generated and acted upon automatically by rectifiers connected in parallel. Ishare pins should be connected to each other for rectifiers, if active current share among the rectifiers is desired. No resistors or capacitors should get connected to this pin. This pin is referenced to Vout(-).

Status Signals

Power Good: This signal is HI when the main output is delivered and goes LO if the main output is out of regulation.

Fault: This signal representing whether a Fault occurred. This signal goes LO for any failure.

Communication

GP100L3B54TEZ supports Modus communication, to control and monitoring. Also supports firmware remote upgrade and black box.

Refer Modbus Communication Protocol Feature Document Issue 0.1 for details.

Technical Specifications (continued)

Modbus Physical layer:

MODBUS over serial line should implement an electrical interface in accordance with EIA/TIA-485 standard (also known as RS485 standard). This standard allows point to point and multipoint systems, in a “two-wire configuration”.

Signal pin Modbus+ is presented as B/D1, and Modbus- as A/D0

Modbus mode

Supports RTU mode

MODBUS Addressing

The MODBUS addressing space comprises 1-99 different addresses.

Addr_0,Addr_1

Treat Addr_0 to Addr_1 address pin as a ones place and tens place for the address. Each address pin is pulled up to internal 3.3V though 10K ohm resistor. external resistor Rs connected L_GND changes voltage level to configure address according to the table below

Addr_1 is to set tens place for the address, and Addr_0 is to set one place.

Tens or one place	Voltage level	R_S (± 0.1%)
1	3.30	open
2	2.67	45.3k
3	2.34	24.9k
4	2.01	15.4k
5	1.68	10.5k
6	1.35	7.15k
7	1.02	4.99k
8	0.69	2.49k
9	0.36	1.27k
0	0	0

For example, if want address 0x53d, set Addr_0 to 3 with a 24.9K resistor to L_GND and Addr_1 to 5 with a 10.5K pin to L_GND.

Unit will keep default address 0x11d when all address pins are open.

Remote upgrade

GP100L3B54TEZ supports to upgrade firmware on live through Modbus

Technical Specifications (continued)

Modbus Registers

All registers in this document are 0-based. Holding register 40002 is addressed as 0001 in a Modbus message.

Reg Addr	Reg length (word)	Register Name	R/W	Reg type	Note
1	18	SERIAL_NUMBER	R/W	STR18	
19	1	GROUP_ADDRESS	R/W	INT	
20	11	COMCODE	R/W	STR11	
31	14	STATION_TYPE_R	R	STR20	
51	7	SERIES	R/W	STR7	XX: YYZ, XX YY is 0-9, Z is A-Z
58	7	SEC_APPLICATION_VERSION	R	STR7	VERmaj, VERmin, Month, Day, Year, Hour, Minutes
65	7	PRI_APPLICATION_VERSION	R	STR7	VERmaj, VERmin, Month, Day, Year, Hour, Minutes
72	10	CLEI_NUMBER	R	STR10	
82	1	CAPACITY	R	INT	Current capacity of rectifier (A x 10)
84	2	ON_TIME	R	INT	In hours
301	1	RECT_STATUS	R		Device Status 0001h: 1 = oring FET failed 0002h: 1 = AC input failure 0004h: Not Used 0008h: 1 = Rectifier shutdown due to thermal alarm 0010h: 1 = Rectifier failure 0020h: Not Used 0040h: 1 = Load share imbalance 0080h: 1 = Participating in load share (Enabled) 0100h: Manual Off, 1 = Manually OFF 0200h:1 = Standby from controller requested 0400h: 1 = Rectifier shutdown due to high voltage 0800h: Rectifier Power Status, 1 = On and producing power 1000h: 1 = Ready to participate in load share 2000h: 1 = ID # has changed (cleared when read) 4000h: 1 = Fan failed 8000h: 1 = Rectifier is in current limit/Power Limit
500	1	VIN_RMS_A	R	INT	Input voltage phase A in VIN_RSU
501	1	VIN_RMS_B	R	INT	Input voltage phase B in VIN_RSU
502	1	VIN_RMS_C	R	INT	Input voltage phase C in VIN_RSU
503	1	IIN_RMS_A	R	INT	Input current phase A in IIN_RSU
504	1	IIN_RMS_B	R	INT	Input current phase B in IIN_RSU
505	1	IIN_RMS_C	R	INT	Input current phase C in IIN_RSU
506	1	AC_POWER_ALL	R	INT	Input power all phases in PIN_RSU
523	1	VCATHODE (volts)	R	INT	Output voltage in VOUT_RSU
524	1	VANODE (volts)	R	INT	Output voltage in VOUT_RSU
527	1	OUTPUT CURRENT	R	INT	Output current in IOUT_RSU
531	1	TEMP_INTERNAL (hottest)	R	INT	Hottest Temperature in TEMP_RSU (Celsius)
532	1	TEMP_DCDC	R	INT	Temperature in TEMP_RSU (Celsius)
533	1	TEMP_PFC	R	INT	Temperature in TEMP_RSU (Celsius)
534	1	TEMP_SYNC	R	INT	Temperature in TEMP_RSU (Celsius)
535	1	TEMP_ORFET	R	INT	Temperature in TEMP_RSU (Celsius)
536	1	TEMP_AMBIENT	R	INT	Temperature in TEMP_RSU (Celsius)

Technical Specifications (continued)

Modbus Registers (continued)

Reg Addr	Reg length (word)	Register Name	R/W	Reg type	Note
803	1	CMD_ALL	R/W		00 01h Standby 00 02h Unit On 00 04h HV Shutdown 00 08h Loadshare On 00 10h Loadshare Off 00 20h Restart 00 40h Lamp Test 00 80h 01 00h Fault LED On 02 00h Fault LED Off 04 00h Oring FET Test 08 00h 10 00h 20 00h 40 00h 80 00h
850	1	VIN_RSU_R	R	INT	Readback scaling factor for input voltage
851	1	IIN_RSU_R	R	INT	Readback scaling factor for input current
852	1	PIN_RSU_R	R	INT	Readback scaling factor for input power
853	1	FIN_RSU_R	R	INT	Readback scaling factor for input frequency
854	1	VBUS_RSU_R	R	INT	Readback scaling factor for bus voltage
860	1	VOUT_RSU_R	R	INT	Readback scaling factor for output voltage
861	1	IOUT_RSU_R	R	INT	Readback scaling factor for output current
862	1	POUT_RSU_R	R	INT	Readback scaling factor for output power
870	1	TEMP_RSU_R	R	INT	Readback scaling factor for temperature
904	1	VSET	R/W	INT	Vout set-point (non-volatile memory) in VOUT_RSU
905	1	VCMD	R/W	INT	Vout set-point (volatile memory) in VOUT_RSU
920	1	CL_PERCENT	R/W	INT	Current limit set point in % of rectifier capacity. Configurable from 30 to 100.
922	1	ISHVSD	R/W	INT	Individual selective high voltage shutdown in VOUT_RSU

Byte format

The format (11 bits) for each byte in RTU mode is:

Coding System: 8 – bit binary
Bits per Byte: 1 start bit, 8 data bits, 1 parity bit, 1 stop bit
Parity: default is even parity
Baud: default is 19200

Supported functions

0x03: Read Holding Registers
0x06: Write Single Holding Register
0x10: Write Multi Holding Register

Technical Specifications (continued)

Modbus References

A. "Galaxy Communication Protocol Feature Document" (99ESSS001) Ver 2.19 Team
B. Modbus application protocol V1.1b3
C. Modbus Serial Line Protocol and Implementation Guide V1.02
D. OmniOn ACS510 low voltage AC drivers User manual
E. OmniOn AC500 PLC user manual

Standard Modbus Exception Codes

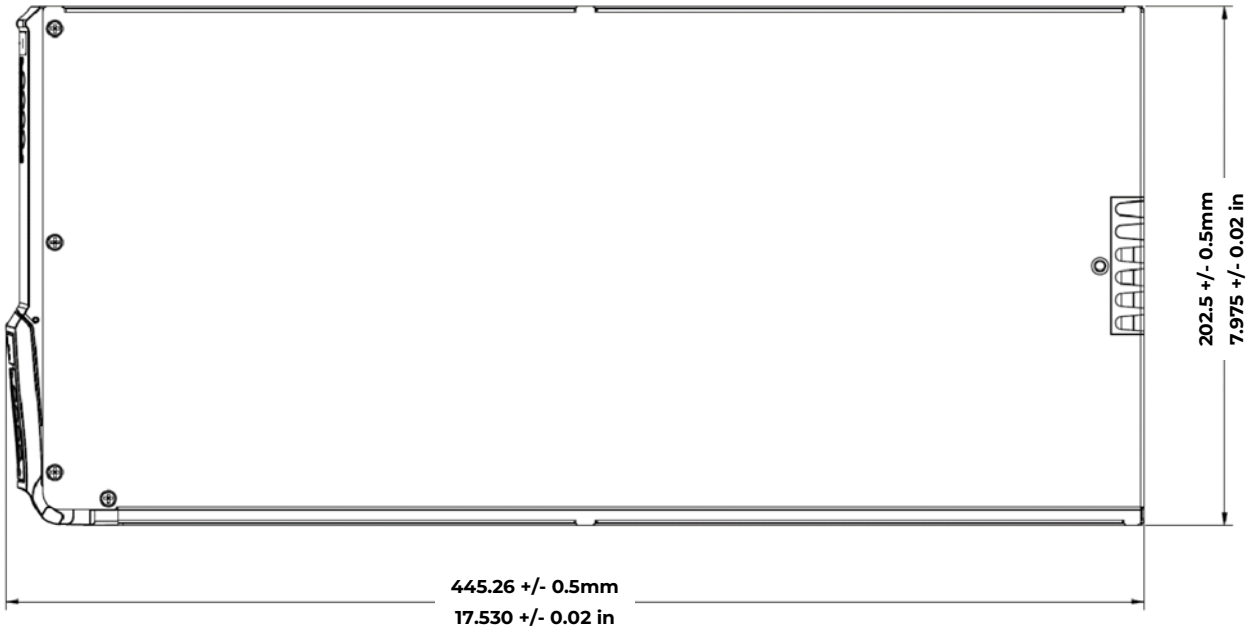
Code	Name	Description
1	Illegal Function	The function code received in the query is not an allowable action for the slave. If a Poll Program Complete command was issued, this code indicates that no program function preceded it.
2	Illegal Data Address	The data address received in the query is not an allowable address for the slave.
3	Illegal Data Value	A value contained in the query data field is not an allowable value for the slave.

Alarm and LED state summary

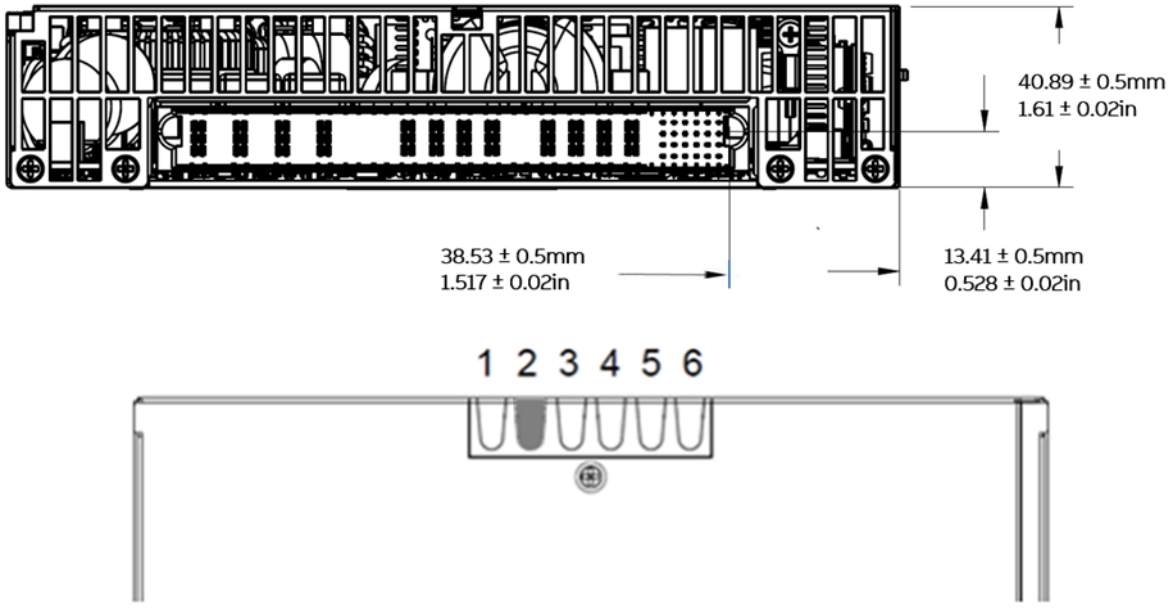
	Rectifier LED State				Monitoring Signals		
Condition	AC OK Green	DC OK Green	Fault Red		Fault	Power Good	Module Present
OK	1	1	0		HI	HI	LO
Thermal Alarm (5°C before shutdown)	1	1	Blinks		HI	HI	LO
Thermal Shutdown	1	0	1		LO	LO	LO
Defective Fan	1	0	1		LO	LO	LO
Blown AC Fuse in Unit[10]	1	0	1		LO	LO	LO
AC Present but not within limits	Blinks	0	0		HI	HI	LO
AC not present[10]	0	0	0		HI	LO	LO
Boost Stage Failure	1	0	1		LO	LO	LO
Over Voltage Latched Shutdown	1	0	1		LO	LO	LO
Over Current	1	Blinks	0		HI	Pulsing[11]	LO
Non-catastrophic Internal Failure[9]	1	1	1		LO	HI	LO
Missing Module							HI
Standby (remote)	1	0	0		HI	LO	LO

[9] Any detectable fault condition that does not cause a shutting down. For example, ORing FET failure, boost section out of regulation, etc.
[10] This signal is correct only if the rectifiers back biased from other power supply in parallel.
[11] Pulsing at a duty cycle of 1ms as long as the unit is overload.

Mechanical Outline



Top View [Note: add safety label to side of unit per UL,EC directives, TUV, Power System Practices]



Keying

Product	Keying Location Knotched
Modbus communications	2

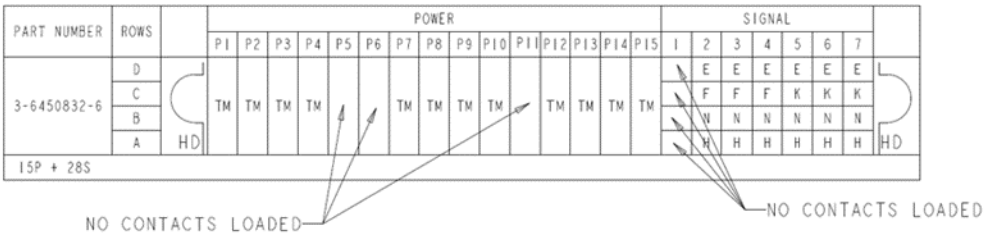
Technical Specifications (continued)

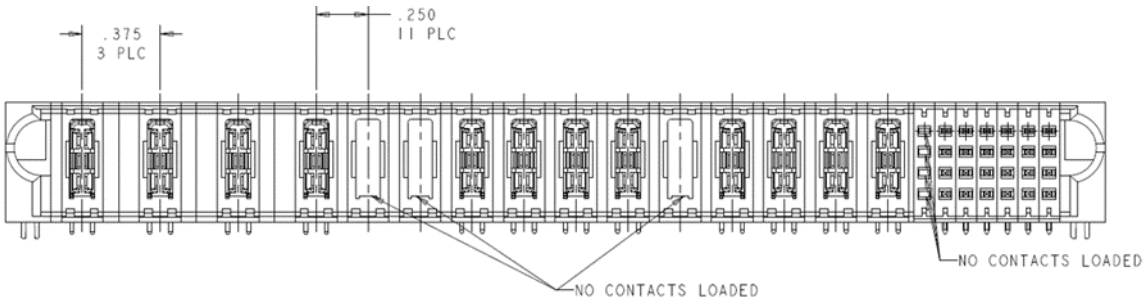
Front Panel LEDs

Symbol	Color	Function
~		**ON:** Input ok **Blinking:** Input out of limits
!		**ON:** Fault **Blinking:** Thermal Alarm
⎓		**ON:** Output ok **Blinking:** Overload

Mating Connector

Rectifier side: Tyco 3-6450832-6





Technical Specifications (continued)

GP100L3B54 Rectifier Pinout

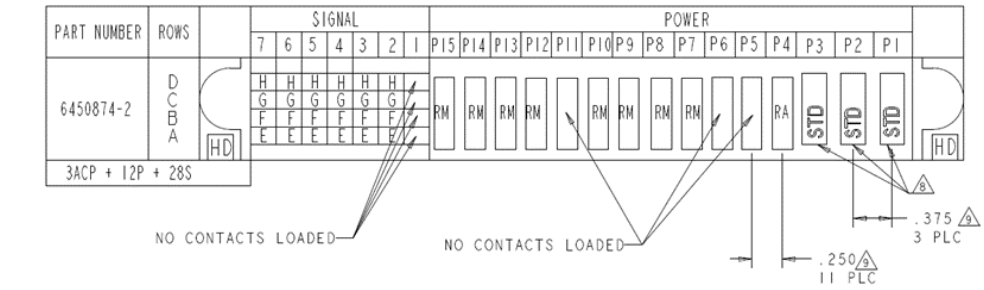
Facing rear of module																					
AC INPUT						DC OUTPUT									SIGNALS						
P1	P2	P3	P4	P5	P6	P7	P8	P9	P10	P11	P12	P13	P14	P15	1	2	3	4	5	6	7
L1	L2	L3	Frame Gnd	Empty	Empty	Vout+	Vout+	Vout+	Vout+	Empty	Vout-	Vout-	Vout-	Vout-	Empty	INTERLOCK	NO CONNECT	ADDR_1	NO CONNECT	A/D0	B/D1
															Empty	NO CONNECT	NO CONNECT	ADDR_0	MOD_PRES	FAULT#	LOGIC_ GND
															Empty	NO CONNECT	NO CONNECT	NO CONNECT	VPROG	POWER GOOD	5VA
															Empty	ISHARE	NO CONNECT	REMOTE ON/OFF	NO CONNECT	NO CONNECT	NO CONNECT
PWB																					

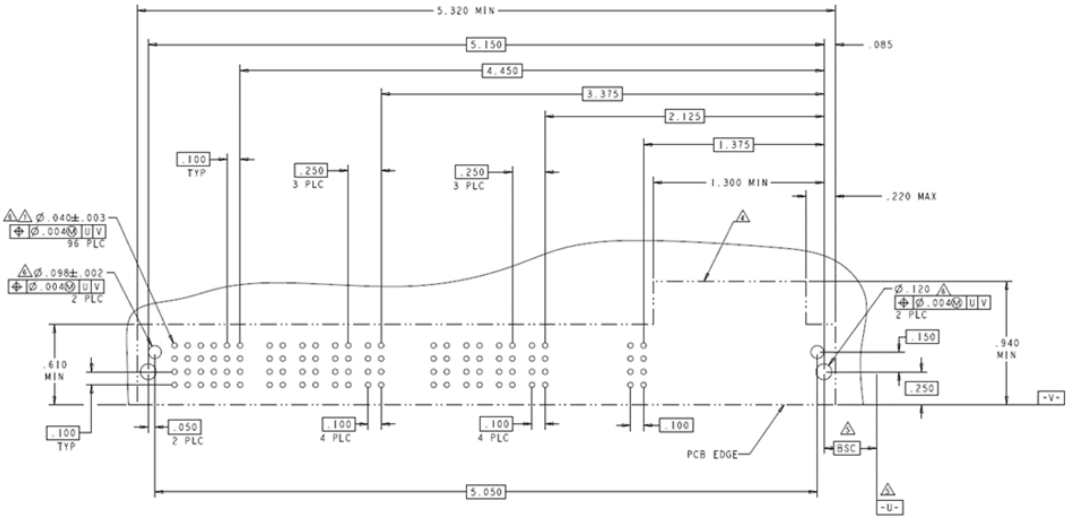
= Short Pin

= System side mating connector must have its Frame GRD pin the longest to ensure that it is mating first

Technical Specifications (continued)

System side receptacle: Tyco soldered version: 6450874-2
press-fit version: 6450884-2
AC power contact: 1-1600961-8 (3X)
AC power contact secondary lock: 1600903-1 (3X)





RECOMMENDED PCB LAYOUT

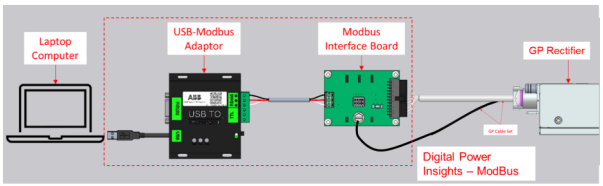
Technical Specifications (continued)

Ordering Information

Please contact your OmniOn Sales Representative for pricing, availability and optional features.

Item	Description	Ordering code
GP100L3B54TEZ	110A rectifier with ModBus/RS485 communication,54V_{DC} default	1600408967A

Accessories

	Item	Description	Ordering code
	Cable Harness	GP100 Lowline, 1m, Cable Assy with integrated EMI Filters	1600422545A
	Digital Power Insights – ModBus Developers Toolkit	ModBus Adaptor, Interface Board, Downloadable GUI and Instructions (Requires Signal Cable 1600422545A Purchased separately)	1600464989A

Change History (excludes grammar & clarifications)

Revision	Date	Description of the change
1.0	05/31/2023	Initial release
2.0	10/20/2023	Added “Output Current (T_{AMB} = 50°C)” in Main Output specifications, Updated content of Modbus register
2.1	10/30/2023	Updated as per OmniOn template
2.2	11/21/2023	Update wording on page 6
2.3	01/12/2024	Updated Keying position

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