



# COMBI/E1-3.3

## Power Management Module for *ISDN NT1*

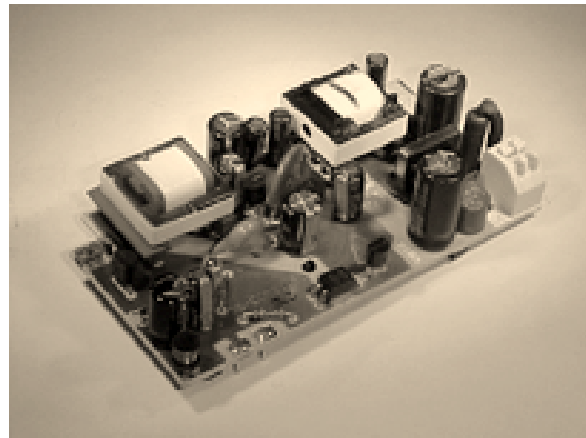
SPECIFICATION Rev. 01

| Type         | Vi                                     | Vo          | Io     |
|--------------|--|-------------|--------|
| COMBI/E1-3.3 | 195 to 253 Vac<br>and<br>28 to 115 Vdc | out1: 3.3 V | 100 mA |
|              |  | out 2: 40V  | 120 mA |

### FEATURES

- Uko INTERFACE (DC) and MAINS (AC) inputs to enable NPM (Normal Power Mode) and RPM (Restricted Power Mode) CONDITIONS
- INPUT FILTER TO MEET EMI requirements
- PEAK INPUT OVERVOLTAGE WITHSTANDING
- AC INPUT PROTECTION FUSE
- INPUTS TO OUTPUTS INSULATION
- 2 INSULATED OUTPUTS:  
Vo1=3.3 V for NT1 logics  
Vo2=40 V for "S" interface
- AUXILIARY LOGIC OUTPUT TTL-COMPATIBLE for LED & NPM/RPM MODE indication.
- INTERNAL RELAY FUNCTION FOR Vo2 POLARITY REVERSE
- "S" INTERFACE OUTPUT CHARACTERISTICS:
  - Peak output of 220 mA for 150 ms
  - Typical output power 4,5 W
  - Output filtering to meet ETSI requirements
  - Hold up time: 20 ms with 4,5 W output power
  - Continuous short circuit protection
  - Peak overvoltage withstand:1KV for 10/700 us transversal

### PRODUCT VIEW



**ORDERING NUMBER: GS-COMBI/E1-3.3**

- U-INTERFACE ACCORDING TO ETR080
- S-INTERFACE ACCORDING TO ETS 300 012
- MTBF: 300 Kh, according to MIL HDBK 217-F
- Operating Temperature: -10 to +70°C

### DESCRIPTION

The NT1 Power Management Module COMBI/E1 is a comprehensive solution for ISDN-NT1 (Network Termination Basic Access NTBA) equipment, combining both AC-DC and DC-DC functions.

The GS-COMBI/E1 provide the NTBA with all necessary supply voltages as well as control signals to operate in the different operating modes, typically the Normal Power Mode (NPM) and Restricted Power Mode (RPM).

Connected to the main, Input 1 (2 poles AC connector) is the AC input power to the COMBI/E1, source of the whole necessary power in normal operating mode, namely in NPM. Input 2 is the DC power source when in RPM, therefore to connect to the U-INTERFACE.

The device supply 3.3V (out 1) for logics and 40 V (out 2) for the S interface both in Normal Power Mode (NPM) and in Restricted Power Mode (RPM).

RPM mode is the emergency condition that occurs if the mains (AC) input is not available. An internal "relay function" is available to reverse the 40 V output polarity. A third auxiliary output can be used for LEDs driving and RPM/NPM mode acknowledge (Logic output).

The Logic output becomes high (+3.3V) when in NPM condition.

The converter offers short-circuit protection on both outputs: particularly, short-circuit on 40V output doesn't affect the +3.3V output.

Out 1, out 2 and out 3 (Logic output) share the same common return.

3000 VRMS insulation voltage for 60 seconds (reinforced insulation) is provided among input 1 and all outputs. Same reinforced insulation is also provided between Input 1 and Input 2.

2000 VRMS / 1 min. reinforced insulation is provided between input 2 and all outputs.

When in NPM mode (AC main supply), the module max. power consumption is <15 VA (apparent power).

Input 2 undervoltage lockout offers high impedance in order to have 10 uA max input current when  $V_{i2}$  is <18 Volts.

The design of the module has been conducted using the following reference standards:

EN 60950, VDE0878 part 1 class B (EMC), EN55022 class B (emission), EN50 082-1 (immunity) ITU-T I.430, ETS 300 012 and ETR 080 and ETS300 047 (ISDN BASIC ACCESS, Safety and Protection); anyway, please note that no certification processes have been carried out on the module itself.

**ELECTRICAL CHARACTERISTICS** when in **NPM** ( $T_{amb}=25^{\circ}C$ , unless otherwise specified.)**NPM Standard Condition:  $V_{in1} = 195$  to  $253$  Vrms  $V_{in2} = 28$  to  $115$  Vdc**

| Symbol | Parameter                      | Test Condition  | Min. | Typ. | Max. | Unit  |
|--------|--------------------------------|---|------|------|------|-------|
| Vi1    | Input Voltage 1                |   | 195  |      | 253  | VRMS  |
| Vi2    | Input Voltage 2                | any polarity  | 28   |      | 115  | Vdc   |
| fi     | Vi1 Input Frequency            | Vi1 = 230 VRMS  | 43   |      | 56   | Hz    |
| Vi1st  | Start up Input 1 voltage       | Output parameters as per NPM Standard Conditions                  |      |      | 185  | VRMS  |
| Vi2st  | Start up Input 2 voltage       | Output parameters as per Standards Conditions                     |      |      | 44   | Vdc   |
| Vo1    | Output Voltage 1               | Standard conditions   | 3.1  | 3.3  | 3.5  | V     |
| Vo2    | Output Voltage 2               | Standard conditions   | 36   | 40   | 42   | V     |
| Vo3    | Output Voltage 3               | Standard conditions, $I_{o3}=0.9$ to $3mA$                        | 3.1  | 3.3  | 3.5  | V     |
| Vor1   | Output Ripple voltage 1        | Standard conditions BW: 0-20 MHz                                  |      |      | 20   | mVrms |
| Vor2   | Output Ripple voltage 2        | Standard conditions BW: 0-20 MHz                                  |      |      | 100  | mVrms |
| Io1    | Output Current 1               | Standard conditions   | 3    |      | 100  | mA    |
| Io2    | Output Current 2               | Standard conditions   | 0    |      | 120  | mA    |
| Ioc2   | Output Overcurrent 2           | $t=150ms$ , $V_{o1}=34$ to $42$ V                                 | 220  | 240  | 260  | mA    |
| Io2sc  | Output 2 short circuit current | Continuous short circuit  | 20   | 40   | 60   | mA    |
| Vi1th  | NPM => RPM mode Vi1 threshold  | Output parameters as per Standard Conditions                      |      |      | 160  | Vrms  |
| Ttr    | Transition time                | transition NPM => RPM and vice versa                              |      |      | 5    | ms    |
| Vi1pk  | Input 1 Transient overvoltage  | $t = 8/20$ us transversal   | 2    |      |      | kV    |
| Vi2pk  | Input 2 Transient overvoltage  | $t = 10/700$ us transversal                                       | 500  |      |      | V     |
| Vo2pk  | Output 1 Transient overvoltage | $t = 10/700$ us transversal                                       | 1000 |      |      | V     |
| Pi1r   | Input 1 Real Power             | NPM standard conditions   |      |      | 9    | W     |
| Pi1    | Input 1 Apparent Power         | NPM standard conditions   |      |      | 15   | VA    |
| Vist   | Insulation Voltage, pulse      | INputs to outputs $t=10/700$ us (pulse)                           | 4    |      |      | kV    |
| th     | Hold-up time                   | $V_{in}=195$ VRMS $P_{out} 1:0$ to $340$ mW<br>$P_{out} 2: 4.5$ W | 20   |      |      | ms    |

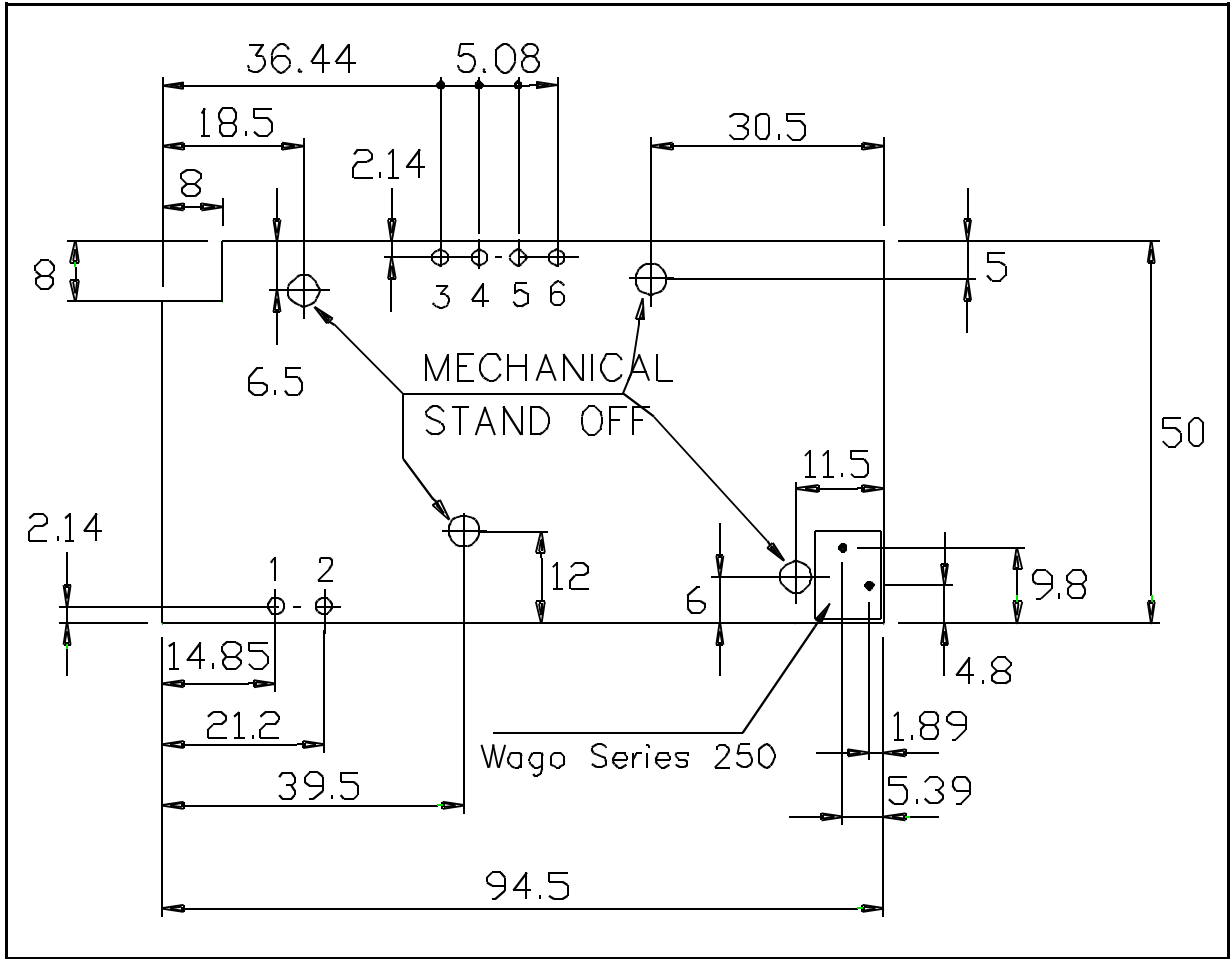
## COMBI/E1-3.3

**ELECTRICAL CHARACTERISTICS** when in RPM ( $T_{amb}=25^{\circ}C$ , unless otherwise specified.)

**RPM Standard Condition:  $V_{in1} < 100 V_{rms}$   $V_{in2} = 28$  to  $115 V_{dc}$**

| Symbol | Parameter                      | Test Condition                              | Min. | Typ. | Max. | Unit  |
|--------|--------------------------------|---|------|------|------|-------|
| Vi1    | Input Voltage 1                |   | 0    |      | 100  | Vrms  |
| Vi2    | Input Voltage 2                | any polarity                                | 28   |      | 115  | Vdc   |
| Vi2st  | Start Up Input 2 Voltage       |   |      |      | 44   | Vdc   |
| Vo1    | Output Voltage 1               | RPM Standard Conditions                     | 3.1  | 3.3  | 3.5  | V     |
| Vo2    | Output Voltage 2               | RPM Standard Conditions                     | 34   | 40   | 42   | V     |
| Vo3    | Output Voltage 3               | RPM Standard conditions, out 3 load=50 kOhm |      |      | 0.8  | V     |
| Vor1   | Output Ripple Voltage 1        | RPM Standard Conditions BW:0-20 Mhz         |      |      | 20   | mVrms |
| Vor2   | Output Ripple Voltage 2        | RPM Standard Conditions BW:0-20 Mhz         |      |      | 100  | mVrms |
| Io1    | Output Current 1               | RPM Standard Conditions                     | 3    |      | 100  | mA    |
| Io2    | Output Current 2               | RPM Standard Conditions                     | 0    |      | 12.5 | mA    |
| Io2sc  | Output 2 short circuit current | Continuous short circuit                    | 9    |      | 13.5 | mA    |
| Vi1th  | RPM=>NPM mode Vi1 threshold    |   |      |      | 185  | VRMS  |
| Ttr    | Transition time                | transition NPM => RPM and vice versa        |      |      | 5    | ms    |
| Vi1pk  | Input 1 Transient overvoltage  | t = 8/20 us transversal                     | 2.0  |      |      | Kv    |
| Vi2pk  | Input 2 Transient overvoltage  | t= 10/700 us transversal                    | 500  |      |      | V     |
| Vo2pk  | Out 2 Transient overvoltage    | t= 10/700 us transversal                    | 1000 |      |      | V     |
| Vist   | Insulation Voltage, pulse      | Inputs to outputs t=10/700 us (pulse)       | 4    |      |      | kV    |

**NT1 Power Management Module TOP VIEW** (dimensions in mm)

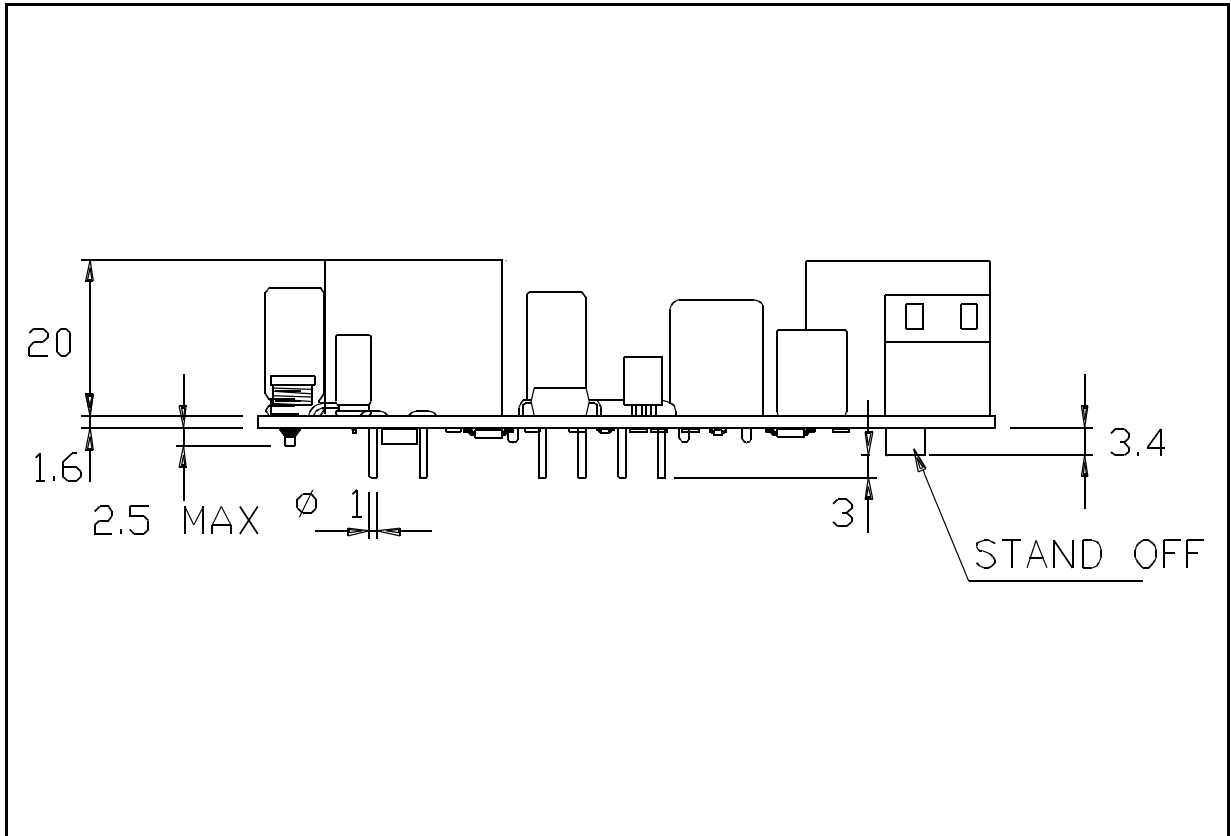


**PIN CONFIGURATION**

Input 1 (Vin 1: 230Vac) apply to the WAGO Series connector bottom right in the TOP VIEW

| Pin No | Function                     | Pin No | Function                  |
|--------|------------------------------|--------|---------------------------|
| 1      | DC "U inteface" input (in 2) | 4      | Out common ground GND     |
| 2      | DC "U inteface" input (in 2) | 5      | Out 2: +/-40 V output     |
| 3      | Out 1: +3.3V output          | 6      | Out 3: Logic output (NPM) |

NT1 Power Management Module SIDE VIEW (dimensions in mm)



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