



## NT1+/AME2

### Power Management Module for *ISDN NT1+*

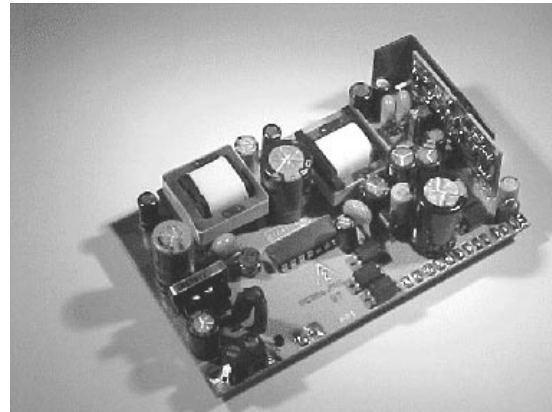
Rev. 02

| Type      | Vi              | Vo     | Po    |
|-----------|-----------------|--------|-------|
| NT1+/AME2 | 180<Vi1<264Vrms | +/-40V | 4.5W  |
|           |                 | +5V    | 350mW |
|           |                 | -24V   | 1.4W  |
|           |                 | -50V   | 1.6 W |
|           | 40<Vi2<120 Vdc  | 3.3V   | 950mW |
|           |                 |        |       |

#### FEATURES

- COMBINED AC+DC CONVERTER FOR ISDN NT1+ APPLICATION
- U<sub>0</sub> INTERFACE (DC) AND MAIN (AC) INPUTS TO ENABLE NPM (Normal Power Mode) AND RPM (Restricted Power Mode) CONDITIONS
- INPUT FILTER TO MEET EMC REQUIREMENTS
- 5 INSULATED MAIN OUTPUTS
- PEAK INPUT OVERVOLTAGE WITHSTANDING
- INPUT FUSE ON AC MAIN INPUT
- INPUTS TO OUTPUTS INSULATION
- AUXILIARY LOGIC OUTPUT TTL-COMPATIBLE FOR NPM/RPM MODE INDICATION (EM SIGNAL & GREEN LED). 3mA OUTPUT SOURCE CURRENT
- AUXILIARY LOGIC OUTPUT TTL-COMPATIBLE FOR U-INTERFACE DETECTION (RED LED). 3mA OUTPUT SOURCE CURRENT

#### PRODUCT VIEW



#### ORDERING NUMBER: GS-NT1+/AME2

- INTERNAL RELAY FUNCTION FOR Vo1 POLARITY REVERSE
- ANALOG OUTPUTS EMERGENCY CONDITION PROGRAMMABLE VIA EXTERNAL COMMAND, TTL COMPATIBLE, 1mA SINK CURRENT
- U-INTERFACE ACCORDING TO ETR 080 WITH EXTERNAL CAPACITOR  $\leq 2.2 \mu\text{F}$
- S-INTERFACE ACCORDING TO ETS 300 012
- SAFETY COMPLIANCE ACCORDING TO EN60950
- MECHANICAL DIMENSIONS (LxWxH): 96x58x26.6

**DESCRIPTION**

The NT1+ Power Management Module is a comprehensive solution for ISDN-NT1 "Plus" (Network Termination Basic Access type Plus) equipment, combining both AC-DC and DC-DC functions.

The NT1+ Power Management Module (NT1+ PMM) provide the NT1+ equipment with all necessary supply voltages as well as control signals to operate in the different operating modes, typically the Normal Power Mode (NPM) and the Restricted Power Mode (RPM). This specific version has been designed to meet the Alcatel Microelectronics chip set requirements, in agreement with Alcatel Microelectronics.

Connected to the main, Input 1 is the AC input power to the NT1+ PMM, 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.

When the main is available (230 Vac in this version) NT1+ PMM operate in Normal Power Mode, therefore it supply +40V (output 1) to the S-Interface being the output power 4.5 W. This output is current limiter protected via foldback characteristic. Output 2 delivers 5V (up to 350mW), output 3 delivers -24V (up to 1400 mW), output 4 is -50V at 1600 mW. Output 5 is the 3.3V for the chip set, the output power is typically 950 mW.

When the main is missing, the module remains active but only in Restricted Power Mode (RPM). The only power source in RPM is the Input 2, the U-Interface (Vi2). Therefore in RPM the following condition apply to output 1: output 1 reverses the voltage (it becomes -40V) and the maximum power  $P_{out}$  is reduced to 420 mW. Mainly depending on input power available from Vi2 "U-interface", the maximum power available at the other outputs (2,3,4,5) is necessarily reduced than in NPM. It's subject of variation as per local application and regulation.

In RPM it is also possible to set a different "emergency condition" setting HIGH (3.3 V) the auxiliary input 3 (analog emergency input, Vin3). In this case,  $P_{out1}$  is further limited to 25mW, voltage level being -40V.

The following tables give you details of the various parameters in the 3 different operating

modes, namely NPM, RPM with Vi3 LOW, RPM with Vi3 HIGH.

Availability of the input AC main is also acknowledged by a specific auxiliary output (out 6, "EM signal"), a TTL-compatible signal set HIGH (to logic level "1") when the main is available and LOW when the AC main is missing.

The presence of the "U" is acknowledged by an other auxiliary output (out 7) that is HIGH only when  $V_{in2} > 40V$ .

The NT1+ PMM provides double insulation (3000 Vrms) between the inputs (1 and 2), and among the input 1 and all the outputs. Basic insulation exists among Out1 and all other outputs. The other outputs (including the 2 auxiliary outputs) and the input 3, share the same common ground.

Double insulation (2000 Vrms) is provided among Input 2 (DC "U") and all outputs.

The NT1+ Power Management Module operate in the range  $-10$  to  $+70^{\circ}C$ , storage temperatures in the range  $-40$  to  $+85^{\circ}C$  are allowed.

**ELECTRICAL CHARACTERISTICS** when in **NPM** ( $T_{amb}=25^{\circ}\text{C}$ , unless otherwise specified.)**NPM Standard Condition:**  $V_{in1} = 180 \text{ to } 264 \text{ Vrms}$      $V_{in2} = 40 \text{ to } 120 \text{ Vdc}$ 

| Symbol   | Parameter                      | Test Condition                                                                                                                                       | Min. | Typ. | Max. | Unit               |
|----------|--------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------|------|------|------|--------------------|
| Vi1      | AC Input Voltage 1             |                                                                                                                                                      | 180  |      | 264  | Vrms               |
| Vi2      | DC Input Voltage 2             | any polarity                                                                                                                                         | 40   |      | 120  | Vdc                |
| fi       | Vi1 Input Frequency            | $V_{i1} = 230 \text{ Vrms}$                                                                                                                          | 43   |      | 56   | Hz                 |
| Vi1st    | Start up Input 1 voltage       | Output parameters as per NPM Standard Condition                                                                                                      |      |      | 175  | Vrms               |
| Pi1      | Input 1 Apparent Power         | NPM Standard Condition                                                                                                                               |      |      | 15   | VA                 |
| Vi2st    | Start up Input 2 voltage       | Output parameters as per Std. Condition                                                                                                              |      |      | 48   | Vdc                |
| Vo1      | Output Voltage 1               | Standard condition                                                                                                                                   | 34   | 40   | 42   | V                  |
| Vo2      | Output Voltage 2               | Standard condition                                                                                                                                   | 4.75 | 5    | 5.25 | V                  |
| Vo3      | Output Voltage 3               | Standard condition                                                                                                                                   | -22  | -24  | -26  | V                  |
| Vo4      | Output Voltage 4               | Standard condition                                                                                                                                   | -47  | -50  | -55  | V                  |
| Vo5      | Output Voltage 5               | Standard condition                                                                                                                                   | 3.15 | 3.3  | 3.45 | V                  |
| Vo6      | Auxiliary Output 6 (EM)        | Standard condition                                                                                                                                   | 2.7  |      | 3.5  | V                  |
| Vo7      | Auxiliary Output 7 (red LED)   | Standard condition                                                                                                                                   | 2.7  |      | 3.5  | V                  |
| Vor1,3,4 | Output Ripple voltage 1,3,4    | Standard condition BW: 0-20 MHz                                                                                                                      |      |      | 100  | mVrms              |
| Vor2     | Output Ripple voltage 2        | Standard condition BW: 0-20 MHz                                                                                                                      |      |      | 30   | mVrms              |
| Vor5     | Output Ripple voltage 5        | Standard condition BW: 0-20 MHz                                                                                                                      |      |      | 30   | mVrms              |
| Po1      | Output Power 1                 | Std. condition according to ETS300 012, E5.1.5, E5.1.6, E5.1.7 (n=4)                                                                                 |      |      | 4.5  | W                  |
| Po2      | Output Power 2                 | Standard condition                                                                                                                                   |      |      | 350  | mW                 |
| Po3      | Output Power 3                 | Standard condition                                                                                                                                   |      |      | 1.4  | W                  |
| Po4      | Output Power 4                 | During 1 s, 40% of the time during the ring period at the analog interface. The output is current limited at 2.5 mA +/- 0.2 mA, with 220uF capacitor |      |      | 1.6  | W                  |
| Po5      | Output Power 5                 | Standard condition                                                                                                                                   |      |      | 950  | mW                 |
| Vi1th    | NPM => RPM mode Vi1 threshold  | Output parameters as per Standard Condition                                                                                                          |      |      | 160  | Vrms               |
| Ttr      | Transition time                | transition NPM => RPM and vice versa according to ETS300 012, E5.1.3 (n=4)                                                                           |      |      | 5    | ms                 |
| Vi1pk    | Input 1 Transient overvoltage  | $t = 10/700 \text{ us}$ as per 1TR9 Dec. 96                                                                                                          | 2000 |      |      | V                  |
| Vi2pk    | Input 2 Transient overvoltage  | $t = 10/700 \text{ us}$ as per 1TR9 Dec. 96                                                                                                          | 1000 |      |      | V                  |
| Vo1pk    | Output 1 Transient overvoltage | $t = 10/700 \text{ us}$ as per 1TR9 Dec. 96                                                                                                          | 250  |      |      | V                  |
| Vis      | Insulation Voltage             | Input 1 to outputs and input 1 to input 2, $t=60\text{s}$ reinforced insulation as per EN60950                                                       | 3000 |      |      | Vrms               |
| Vist     | Insulation Voltage             | Input 1 to outputs $t=10/700 \text{ us}$ (pulse)                                                                                                     | 4000 |      |      | V                  |
| th       | Hold-up time                   | $V_{in} = 180 \text{ Vrms}$ Standard Condition                                                                                                       | 20   |      |      | ms                 |
| MTBF     | Mean Time Before Failure       | Ground Fixed, MIL-HDBK-217E                                                                                                                          | 1    |      |      | Mh                 |
| Top      | Oper. Ambient Temperature      |                                                                                                                                                      | -10  |      | +70  | $^{\circ}\text{C}$ |
| Tstg     | Storage Temperature Range      |                                                                                                                                                      | -40  |      | +85  | $^{\circ}\text{C}$ |

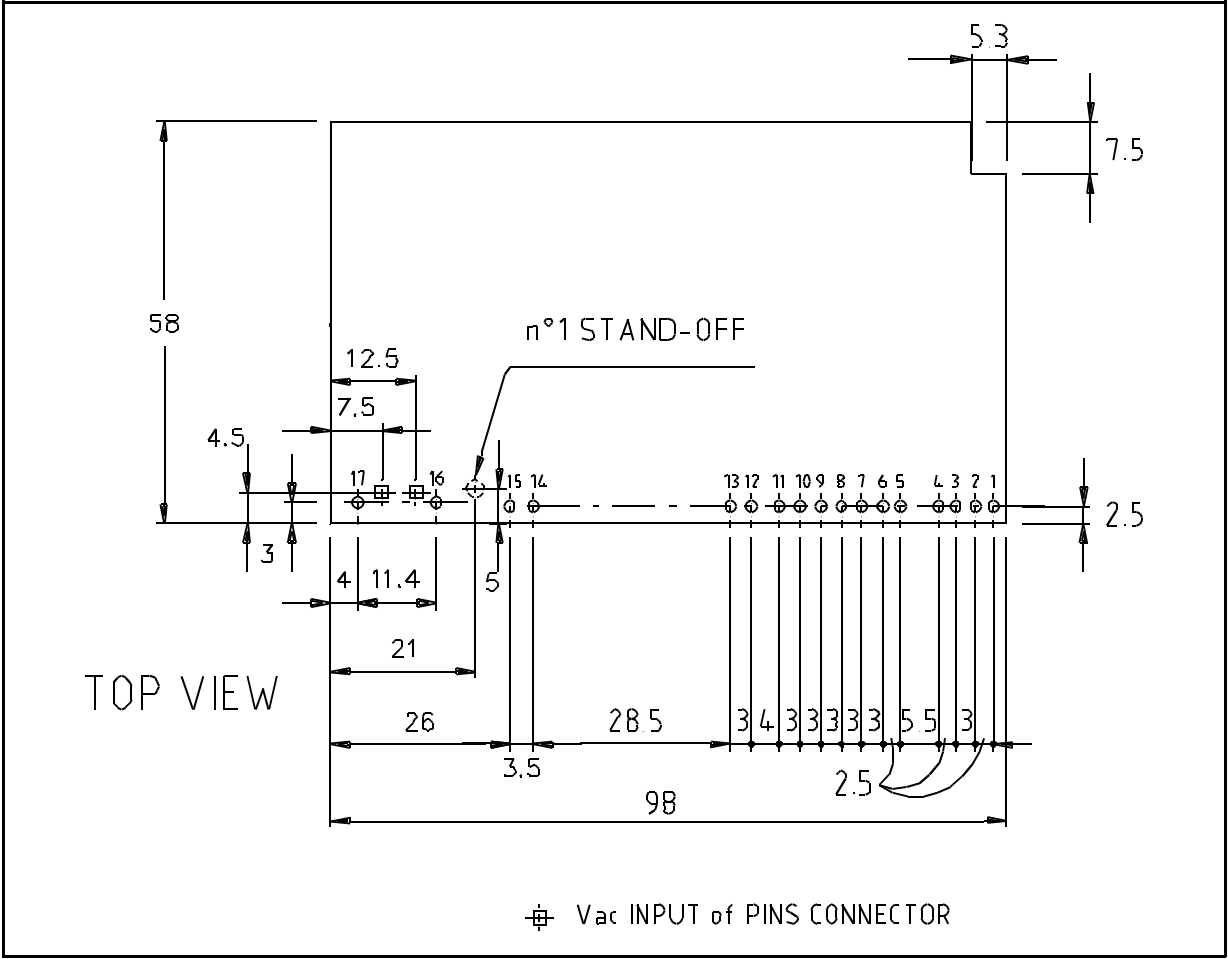
**ELECTRICAL CHARACTERISTICS** when in **RPM** ( $T_{amb}=25^{\circ}\text{C}$ , unless otherwise specified.)**RPM Standard Condition:**  $V_{in1} < 100 \text{ Vrms}$   $V_{in2} = 40 \text{ to } 120 \text{ Vdc}$   $V_{in3} = \text{LOW (0V)}$ 

| Symbol   | Parameter                     | Test Condition                                                                                                                                       | Min. | Typ. | Max. | Unit  |
|----------|-------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------|------|------|------|-------|
| Vi1      | AC Input Voltage 1            |                                                                                                                                                      | 0    |      | 100  | Vrms  |
| Vi2      | DC Input Voltage 2            | any polarity                                                                                                                                         | 40   |      | 120  | Vdc   |
| Vi2st    | Start up Input 2 voltage      | Output parameters as per Std. Condition                                                                                                              |      |      | 48   | Vdc   |
| Vo1      | Output Voltage 1              | Standard condition                                                                                                                                   | -34  | -40  | -42  | V     |
| Vo2      | Output Voltage 2              | Standard condition                                                                                                                                   | 4.75 | 5    | 5.25 | V     |
| Vo3      | Output Voltage 3              | Standard condition                                                                                                                                   | -22  | -24  | -26  | V     |
| Vo4      | Output Voltage 4              | Standard condition                                                                                                                                   | -47  | -50  | -55  | V     |
| Vo5      | Output Voltage 5              | Standard condition                                                                                                                                   | 3.15 | 3.3  | 3.45 | V     |
| Vo6      | Auxiliary Output 6 (EM)       | Standard condition                                                                                                                                   | 0    |      | 1.25 | V     |
| Vo7      | Auxiliary Output 7 (red LED)  | Standard condition                                                                                                                                   | 2.7  |      | 3.5  | V     |
| Vor1,3,4 | Output Ripple voltage 1,3,4   | Standard condition BW: 0-20 MHz                                                                                                                      |      |      | 100  | mVrms |
| Vor2     | Output Ripple voltage 2       | Standard condition BW: 0-20 MHz                                                                                                                      |      |      | 30   | mVrms |
| Vor5     | Output Ripple voltage 5       | Standard condition BW: 0-20 MHz                                                                                                                      |      |      | 30   | mVrms |
| Po1      | Output Power 1                | Std condition according to ETS300 012, E5.1.1, E5.1.4.1, E5.1.4.2, E5.1.5.3 (n=4)                                                                    |      |      | 420  | mW    |
| Po2      | Output Power 2                | Standard condition                                                                                                                                   |      | 60   |      | mW    |
| Po3      | Output Power 3                | Standard condition                                                                                                                                   | 100  |      |      | mW    |
| Po4      | Output Power 4                | During 1 s, 40% of the time during the ring period at the analog interface. The output is current limited at 2.5 mA +/- 0.2 mA, with 220uF capacitor |      | 1    |      | W     |
| Po5      | Output Power 5                | Standard condition                                                                                                                                   |      | 620  |      | mW    |
| Vi1th    | RPM => NPM mode Vi1 threshold | Output parameters as per Standard Condition                                                                                                          |      |      | 175  | Vrms  |
| Ttr      | Transition time               | transition NPM => RPM and vice versa according to ETS300 012, E5.1.3 (n=4)                                                                           |      |      | 5    | ms    |
| Vi1pk    | Input 1 Transient overvoltage | t = 10/700 us as per 1TR9 Dec. 96                                                                                                                    | 2000 |      |      | V     |
| Vi2pk    | Input 2 Transient overvoltage | t = 10/700 us as per 1TR9 Dec. 96                                                                                                                    | 1000 |      |      | V     |
| Vo1pk    | Output1 Transient overvoltage | t = 10/700 us                                                                                                                                        | 250  |      |      | V     |
| Vis      | Insulation Voltage            | Input 1 to outputs and input 1 to input 2, t=60s reinforced insulation as per EN60950                                                                | 3000 |      |      | Vrms  |
| Vist     | Insulation Voltage (pulse)    | Input 1 to outputs t=10/700 us (pulse)                                                                                                               | 4000 |      |      | V     |
| th       | Hold-up time                  | Vin = 180 Vrms Standard Condition                                                                                                                    | 20   |      |      | ms    |
| MTBF     | Mean Time Before Failure      | Ground Fixed, MIL-HDBK-217E                                                                                                                          | 1    |      |      | Mh    |
| Top      | Oper. Ambient Temperature     |                                                                                                                                                      | -10  |      | +70  | °C    |
| Tstg     | Storage Temperature Range     |                                                                                                                                                      | -40  |      | +85  | °C    |

**ELECTRICAL CHARACTERISTICS** when in **RPM** ( $T_{amb}=25^{\circ}\text{C}$ , unless otherwise specified.)**RPM Condition:**  $V_{in1} < 100 \text{ Vrms}$   $V_{in2} = 40 \text{ to } 120 \text{ Vdc}$   $V_{in3} = \text{HIGH (3.3V)}$ 

| Symbol   | Parameter                     | Test Condition                                                                                                                                       | Min. | Typ. | Max. | Unit  |
|----------|-------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------|------|------|------|-------|
| Vi1      | AC Input Voltage 1            |                                                                                                                                                      | 0    |      | 100  | Vrms  |
| Vi2      | DC Input Voltage 2            | any polarity                                                                                                                                         | 40   |      | 120  | Vdc   |
| Vi2st    | Start up Input 2 voltage      | Output parameters as per Std. Condition                                                                                                              |      |      | 48   | Vdc   |
| Vo1      | Output Voltage 1              | Standard condition                                                                                                                                   | -34  | -40  | -42  | V     |
| Vo2      | Output Voltage 2              | Standard condition                                                                                                                                   | 4.75 | 5    | 5.25 | V     |
| Vo3      | Output Voltage 3              | Standard condition                                                                                                                                   | -22  | -24  | -26  | V     |
| Vo4      | Output Voltage 4              | Standard condition                                                                                                                                   | -47  | -50  | -55  | V     |
| Vo5      | Output Voltage 5              | Standard condition                                                                                                                                   | 3.15 | 3.3  | 3.45 | V     |
| Vo6      | Auxiliary Output 6 (EM)       | Standard condition                                                                                                                                   | 0    |      | 1.25 | V     |
| Vo7      | Auxiliary Output 7 (red LED)  | Standard condition                                                                                                                                   | 2.7  |      | 3.5  | V     |
| Vor1,3,4 | Output Ripple voltage 1,3,4   | Standard condition BW: 0-20 MHz                                                                                                                      |      |      | 100  | mVrms |
| Vor2     | Output Ripple voltage 2       | Standard condition BW: 0-20 MHz                                                                                                                      |      |      | 30   | mVrms |
| Vor5     | Output Ripple voltage 5       | Standard condition BW: 0-20 MHz                                                                                                                      |      |      | 30   | mVrms |
| Po1      | Output Power 1                | Std condition according to ETS300 012, E5.1.1, E5.1.4.1, E5.1.4.2, E5.1.5.3 (n=4)                                                                    |      |      | 25   | mW    |
| Po2      | Output Power 2                | Standard condition                                                                                                                                   |      | 60   |      | mW    |
| Po3      | Output Power 3                | not used                                                                                                                                             |      | 600  |      | mW    |
| Po4      | Output Power 4                | During 1 s, 40% of the time during the ring period at the analog interface. The output is current limited at 2.5 mA +/- 0.2 mA, with 220uF capacitor |      | 1    |      | W     |
| Po5      | Output Power 5                | Standard condition                                                                                                                                   |      | 620  |      | mW    |
| Vi1th    | RPM => NPM mode Vi1 threshold | Output parameters as per Standard Condition                                                                                                          |      |      | 175  | Vrms  |
| Ttr      | Transition time               | transition NPM => RPM and vice versa according to ETS300 012, E5.1.3 (n=4)                                                                           |      |      | 5    | ms    |
| Vi1pk    | Input 1 Transient overvoltage | t = 10/700 us as per 1TR9 Dec. 96                                                                                                                    | 2000 |      |      | V     |
| Vi2pk    | Input 2 Transient overvoltage | t = 10/700 us as per 1TR9 Dec. 96                                                                                                                    | 1000 |      |      | V     |
| Vo1pk    | Output1 Transient overvoltage | t = 10/700 us                                                                                                                                        | 250  |      |      | V     |
| Vis      | Insulation Voltage            | Input 1 to outputs and input 1 to input 2, t=60s reinforced insulation as per EN60950                                                                | 3000 |      |      | Vrms  |
| Vist     | Insulation Voltage (pulse)    | Input 1 to outputs t=10/700 us (pulse)                                                                                                               | 4000 |      |      | V     |
| th       | Hold-up time                  | Vin = 180 Vrms Standard Condition                                                                                                                    | 20   |      |      | ms    |
| MTBF     | Mean Time Before Failure      | Ground Fixed, MIL-HDBK-217E                                                                                                                          | 1    |      |      | Mh    |
| Top      | Oper. Ambient Temperature     |                                                                                                                                                      | -10  |      | +70  | °C    |
| Tstg     | Storage Temperature Range     |                                                                                                                                                      | -40  |      | +85  | °C    |

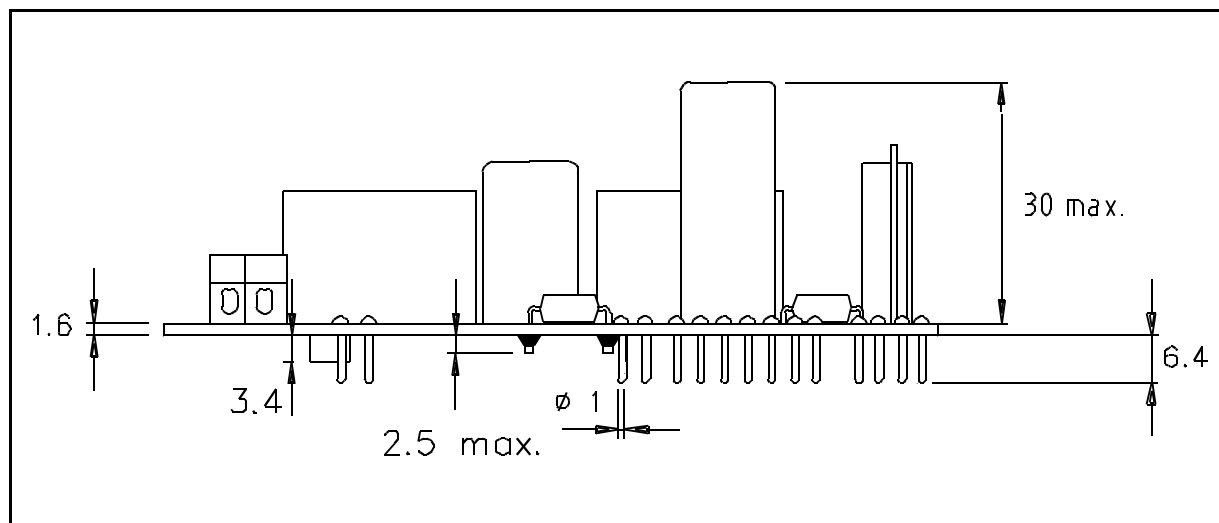
NT1+/AME2 Power Management Module TOP VIEW (dimensions in mm)



**PIN CONFIGURATION**

**Input 1 (230 Vac) applies to the Vac INPUT CONNECTOR**

| Pin No | Signal                          | Pin No | Signal                                             |
|--------|---------------------------------|--------|----------------------------------------------------|
| 1      | Output 1 return                 | 10     | Output 3 (-24V)                                    |
| 2      | Output 1 (+/- 40 V)             | 11     | Output 7 (RED LED)                                 |
| 3      | N.C.                            | 12     | N.C.                                               |
| 4      | N.C.                            | 13     | GND, Common return for output 2,3,4,5,6,7, Input 3 |
| 5      | Output 2 (+5 V)                 | 14     | Vi2 Input Voltage 2, Vdc (any polarity)            |
| 6      | Output 6 (EM, Green LED)        | 15     | Vi2 Input Voltage 2, Vdc (any polarity)            |
| 7      | Output 5 (+3.3V)                | 16     | Vi1 Input Voltage 1, VAC                           |
| 8      | Vin 3, Analog Emergency Input 3 | 17     | Vi1 Input Voltage 1, VAC                           |
| 9      | Output 4 (-50 V)                |        | N.C.                                               |

**NT1+/AME2 Power Management Module SIDE VIEW** (dimensions in mm)

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