



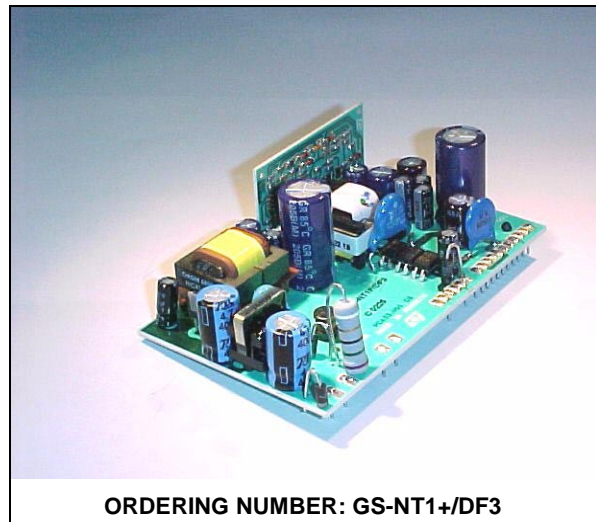
## POWER MANAGEMENT MODULE FOR ISDN NT1+

REV. 01

Type	V <sub>i</sub>	V <sub>o</sub>	I <sub>o</sub>
NT1+/DF3	$180 < V_{i1} < 264$ V $40 < V_{i2} < 120$ V <sub>dc</sub>	± 40V	4.5W
		± 5V	720mW
		- 21V	900mW
		- 50V	100mW
		- 135V	700mW

### FEATURE

- COMBINED AC+DC CONVERTER FOR ISDN NT1+ APPLICATION
- U<sub>o</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
- INTERNAL RELAY FUNCTION FOR V<sub>o1</sub> POLARITY REVERSE
- ANALOG OUTPUTS EMERGENCY CONDITION PROGRAMMABLE VIA EXTERNAL COMMAND, TTL-COMPATIBLE, 1mA SINK CURRENT
- U-INTERFACE ACCORDING TO ETR 080 WITH EXTERNAL CAPACITOR  $\leq 2.2$  uF
- S-INTERFACE ACCORDING TO ETS 300 012
- SAFETY COMPLIANCE ACCORDING TO EN60950



ORDERING NUMBER: GS-NT1+/DF3

- MECHANICAL DIMENSIONS (LxWxH):96x58x26.6

### DESCRIPTION

The NT1+/DF3 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+/DF3 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 Restricted Power Mode (RPM).

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 V<sub>ac</sub> 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. Output 2 delivers 5V (up to 720 mW) for the logics and output 3 delivers -21V (up to 900 mW). Out voltage 4 is -50V with 100 mW output power. Last, output 5 delivers -135V and the output power can reach peaks of 700 mW.

## GS-NT1+/DF3

---

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 ( $V_{i2}$ ). Therefore in RPM the following conditions apply to outputs 1 and 2: output 1 reverses the voltage (it becomes -40V) and the maximum power  $P_{out}$  is reduced to 420 mW.  $P_{2max}$  is reduced to 450 mW typically, however the output power available at outputs 2, 3, 4, 5 mainly depend on input power available from the "U-Interface"  $V_{i2}$ , therefore subject of variation as per local application and regulation. In RPM it is also possible to set a different "emergency condition" setting HIGH the auxiliary input 3 (analog emergency input,  $V_{in3}$ ). In this case  $P_{out1}$  is reduced to 25 mW, voltage level being -40V.

The following tables give you details of the various parameters in the 3 different operating modes, namely NPM with  $V_{i3}$  LOW, RPM with  $V_{i3}$  HIGH.

Availability of the input AC main is also acknowledged by 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 detected by another auxiliary output (out 7) that is HIGH only when  $V_{in2} > 34 V_{dc}$ .

The NT1+ PMM provides double insulation ( $3000 V_{rms}$ ) between the inputs (1 and 2), and among the input 1 and all the outputs. Basic insulation  $2000 V_{dc}$  exist among Out 1 and all the other outputs. The other outputs (including the 2 auxiliary outputs) and the input 3, share the same common ground.

Double insulation ( $2000 V_{rms}$ ) 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 Condotion:**  $V_{in1}=180$  to  $264 V_{rms}$   $V_{in2}=40$  to  $120 V_{dc}$ 

Symbol	Parameter	Test Condition	Min.	Typ.	Max.	Unit
$V_{i1}$	AC Input Voltage 1		180		264	$V_{RMS}$
$V_{i2}$	DC Input Voltage 2	any polarity	40		120	$V_{dc}$
$f_i$	$V_{i1}$ Input Frequency	$V_{i1} = 230 V_{RMS}$	43		56	Hz
$V_{i1st}$	Start up Input 1 voltage	Output parameters as per NPM Standard Condition			175	$V_{RMS}$
$P_{i1}$	Input 1 Apparent Power	NPM Standard Condition			15	VA
$V_{i2nd}$	Start up Input 2 voltage	Output parameters as per Standard Condition			40	$V_{dc}$
$V_{o1}$	Output Voltage 1	Standard condition	34	40	42	V
$V_{o2}$	Output Voltage 2	Standard condition	4.75	5	5.25	V
$V_{o3}$	Output Voltage 3	Standard condition	-20	-21	-24	V
$V_{o4}$	Output Voltage 4	Standard condition	-48	-50	-65	V
$V_{o5}$	Output Voltage 5	Standard condition	-130	-135	-170	V
$V_{o6}$	Auxiliary Output 6(EM)	Standard condition	3.75	5	5.25	V
$V_{o7}$	Auxiliary Output 7(red LED)	Standard condition	3.75	5	5.25	V
$V_{or1,3,4,5}$	Output Ripple voltage 1,3,4,5	Standard condition BW: 0-20 MHz			100	$mV_{rms}$
$V_{or2}$	Output Ripple voltage 2	Standard condition BW: 0-20 MHz			30	$mV_{rms}$
$P_{o1}$	Output Power 1	Std. condition according to ETS300 012, E5.1.5, E5.1.6, E5.1.7 (n=4)		4.5		W
$P_{o2}$	Output Power 2	Standard condition		720		mW
$P_{o3}$	Output Power 3	Standard condition		900		mW
$P_{o4}$	Output Power 4	Standard condition		100		mW
$P_{o5}$	Output Power 5	During 1 s, 40% of the time during the ring period at the analog interface. The output is current limited at $2.5 \text{ mA} \pm 0.2 \text{ mA}$ , with 100 $\mu\text{F}$ capacitor		700		mW
$V_{i1th}$	NPM => RPM mode $V_{i1}$ threshold	Output parameters as per Standard Condition			160	$V_{rms}$
$T_{tr}$	Transition time	transition NPM => RPM and vice versa according to ETS300 012, E5.1.3 (n=4)			5	ms
$V_{i1pk}$	Input 1 Transient overvoltage	$t = 10/700 \text{ us}$ as per 1TR9 Dec. 96	2000			V
$V_{i1pk}$	Input 1 Transient overvoltage	common mode test according to ETS300 047-5p5.6	2500			V

**GS-NT1+/DF3**

Symbol	Parameter	Test Condition	Min.	Typ.	Max.	Unit
$V_{i1pk}$	Input 1 Transient overvoltage	impuls transfer from main according to ETS300 047-5p5.7.1	2500			V
$V_{o1pk}$	Output 1 Transient overvoltage	$t=1.2/50$ us	500			V
$V_{is}$	Insulation Voltage	Input 1 to outputs and input 1 to input 2, $t=60s$ reinforced insulation as per EN60950	3000			V
$V_{ist}$	Insulation Voltage	Input 1 to outputs $t=10/700$ us (pulse)	4000			V
th	Hold-up time	$V_{in} = 180 V_{RMS}$ Standard Condition	20			ms
MTBF	Mean Time Before Failure	Ground Fixed, MIL-HDBK-217E	1			Mh
Top	Oper. Ambient Temperature		-10		+70	°C

**ELECTRICAL CHARACTERISTICS** when in RPM ( $T_{amb}=25^{\circ}\text{C}$ , unless otherwise specified.)**RPM Standard Condition:**  $V_{in1} < 100 V_{rms}$  $V_{in2} = 28 \text{ to } 115 V_{dc}$  $V_{in3} = \text{LOW}$ 

Symbol	Parameter	Test Condition	Min.	Typ.	Max.	Unit
$V_{i1}$	AC Input Voltage 1				100	$V_{rms}$
$V_{i2}$	DC Input Voltage 2	any polarity	40		120	$V_{dc}$
$V_{i2nd}$	Start up Input 2 voltage	Output parameters as per Std. Condition			48	$V_{dc}$
$V_{o1}$	Output Voltage 1	Standard Condition	-34	-40	-42	V
$V_{o2}$	Output Voltage 2	Standard Condition	4.75	5	5.25	V
$V_{o3}$	Output Voltage 3	Standard condition	-20	-21	-24	V
$V_{o4}$	Output Voltage 4	Standard condition	-48	-50	-65	V
$V_{o5}$	Output Voltage 5	Standard condition	-130	-135	-170	V
$V_{o6}$	Auxiliary Output 6 (EM)	Standard condition	3.75	5	5.25	V
$V_{o7}$	Auxiliary Output 7 (red LED)	Standard condition	3.75	5	5.25	V
$V_{or1,3,4,5}$	Output Ripple Voltage 1,3,4,5	Standard condition BW :0-20 MHz			100	$mV_{rms}$
$V_{or2}$	Output Ripple Voltage 2	Standard condition BW:0-20 Mhz			30	$mV_{rms}$
$P_{o1}$	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
$P_{o2}$	Output Power 2	Standard Condition		450		mW
$P_{o3}$	Output Power 3	Standard Condition		tbd		mW
$P_{o4}$	Output Power 4	Standard Condition		tbd		mW
$P_{o5}$	Output Power 5	Standard Condition		tbd		mW
$V_{i1st}$	RPM => NPM mode $V_{i1}$ threshold	Output parameters as per Standard Condition			175	$V_{rms}$
$T_{tr}$	Transition Tlme	transition NPM => RPM and vice versa according to ETS300 012, E5.1.3 (n=4)			5	ms
$V_{i1pk}$	Input 1 Transient overvoltage	$t = 10/700 \text{ us}$ as per 1TR9 Dec. 96	2000			V
$V_{i1pk}$	Input 1 Transient overvoltage	common mode test according to ETS300 047-5p5.6	2500			V
$V_{i1pk}$	Input 1 Transient overvoltage	impuls transfer from main according to ETS300 047-5p5.7.1	2500			V
$V_{o1pk}$	Output 1 Transient overvoltage	$t=1.2/50 \text{ us}$	500			V
$V_{is}$	Insulation Voltage	Input 1 to outputs and input 1 to input 2, $t=60\text{s}$ reinforced insulation as per EN60950	3000			V
$V_{ist}$	Insulation Voltage	Input 1 to outputs $t=10/700 \text{ us}$ (pulse)	4000			V
th	Hold-up time	$V_{in} = 180 V_{rms}$ Standard Condition	20			ms

## GS-NT1+/DF3

---

Symbol	Parameter	Test Condition	Min.	Typ.	Max.	Unit
MTBF	Mean Time Before Failure	Ground Fixed, MIL-HDBK-217E	1			Mhours
Top	Oper. Ambient Temperature		-10		+70	°C
T <sub>stg</sub>	Storage Temperature Range		-40		+85	°C

**ELECTRICAL CHARACTERISTICS** when in **RPM** (T<sub>amb</sub>=25°C, unless otherwise specified.)

RPM Standard Condition:  $V_{in1} < 100 V_{rms}$  $V_{in2} = 40 \text{ to } 120 V_{dc}$  $V_{in3} = \text{HIGH}$ 

Symbol	Parameter	Test Condition	Min.	Typ.	Max.	Unit
$V_{i1}$	AC Input Voltage 1				100	$V_{rms}$
$V_{i2}$	DC Input Voltage 2	any polarity	40		120	$V_{dc}$
$V_{i2nd}$	Start up Input 2 voltage	Output parameters as per Std. Condition			40	$V_{dc}$
$V_{o1}$	Output Voltage 1	Standard Condition	-34	-40	-42	V
$V_{o2}$	Output Voltage 2	Standard Condition	4.75	5	5.25	V
$V_{o3}$	Output Voltage 3	Standard condition	-20	-21	-24	V
$V_{o4}$	Output Voltage 4	Standard condition	-48	-50	-65	V
$V_{o5}$	Output Voltage 5	Standard condition	-130	-135	-170	V
$V_{o6}$	Auxiliary Output 6 (EM)	Standard condition			1.25	V
$V_{o7}$	Auxiliary Output 7 (red LED)	Standard condition	3.75	5	5.25	V
$V_{or1,3,4,5}$	Output Ripple Voltage 1,3,4,5	Standard condition BW :0-20 MHz			100	$mV_{rms}$
$V_{or2}$	Output Ripple Voltage 2	Standard condition BW:0-20 Mhz			30	$mV_{rms}$
$P_{o1}$	Output Power 1	Std. condition	25			mW
$P_{o2}$	Output Power 2	Standard Condition		450		mW
$P_{o3}$	Output Power 3	Standard Condition		tbd		mW
$P_{o4}$	Output Power 4	Standard Condition		tbd		mW
$P_{o5}$	Output Power 5	Standard Condition		tbd		mW
$V_{i1st}$	RPM => NPM mode $V_{i1}$ threshold	Output parameters as per Standard Condition			175	$V_{rms}$
$T_{tr}$	Transition time	transition NPM => RPM and vice versa according to ETS300 012, E5.1.3 (n=4)			5	ms
$V_{i1pk}$	Input 1 Transient overvoltage	$t = 10/700 \text{ us}$ as per 1TR9 Dec. 96	2000			V
$V_{i1pk}$	Input 1 Transient overvoltage	common mode test according to ETS300 047-5p5.6	2500			V
$V_{i1pk}$	Input 1 Transient overvoltage	impuls transfer from main according to ETS300 047-5p5.7.1	2500			V
$V_{o1pk}$	Output 1 Transient overvoltage	$t=1.2/50 \text{ us}$	500			V
$V_{is}$	Insulation Voltage	Input 1 to outputs and input 1 to input 2, $t=60s$ reinforced insulation as per EN60950	3000			V

**GS-NT1+/DF3**

Symbol	Parameter	Test Condition	Min.	Typ.	Max.	Unit
V <sub>ist</sub>	Insulation Voltage	Input 1 to outputs t=10/700 us (pulse)	4000			V
t <sub>h</sub>	Hold-up time	V <sub>in</sub> = 180 V <sub>rms</sub> Standard Condition	20			ms
MTBF	Mean Time Before Failure	Ground Fixed, MIL-HDBK-217E	1			Mhours
T <sub>op</sub>	Oper. Ambient Temperature		-10		+70	°C
T <sub>stg</sub>	Storage Temperature Range		-40		+85	°C

**Figure 1. NT1 Plus Power Management Module TOP VIEW (dimensions in mm)**

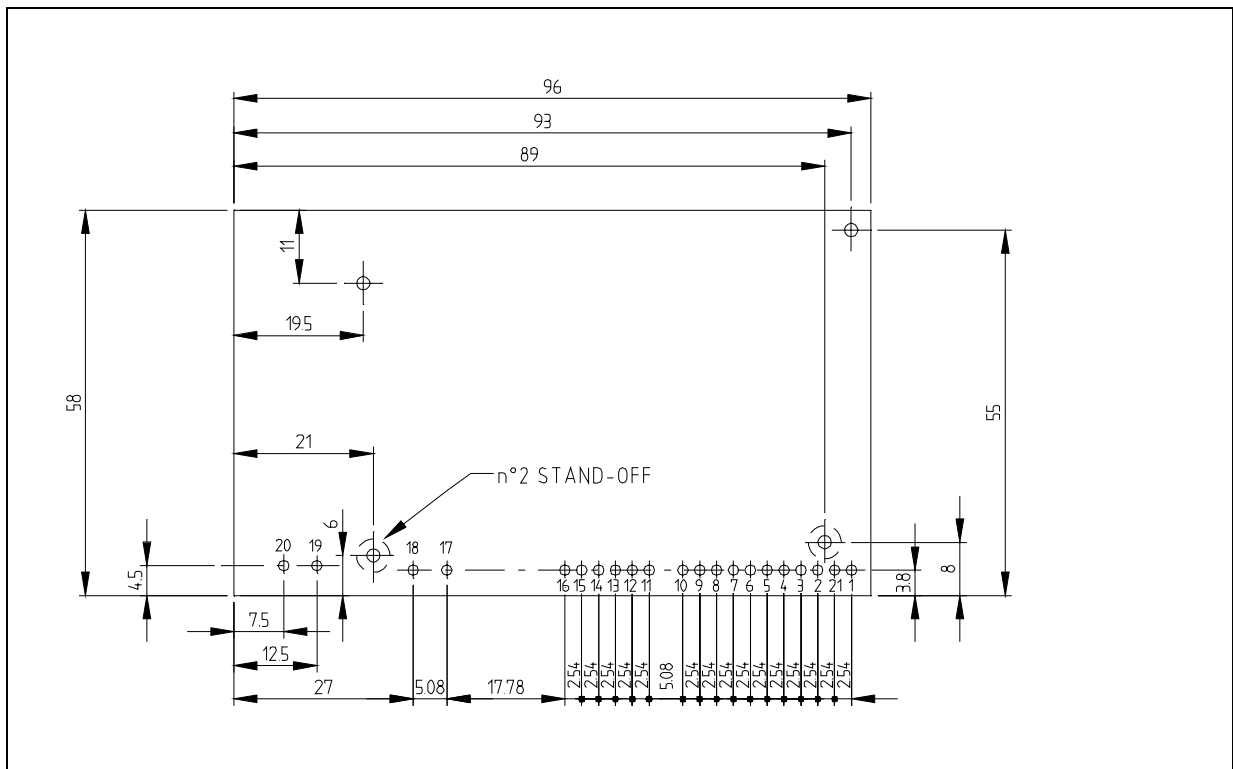
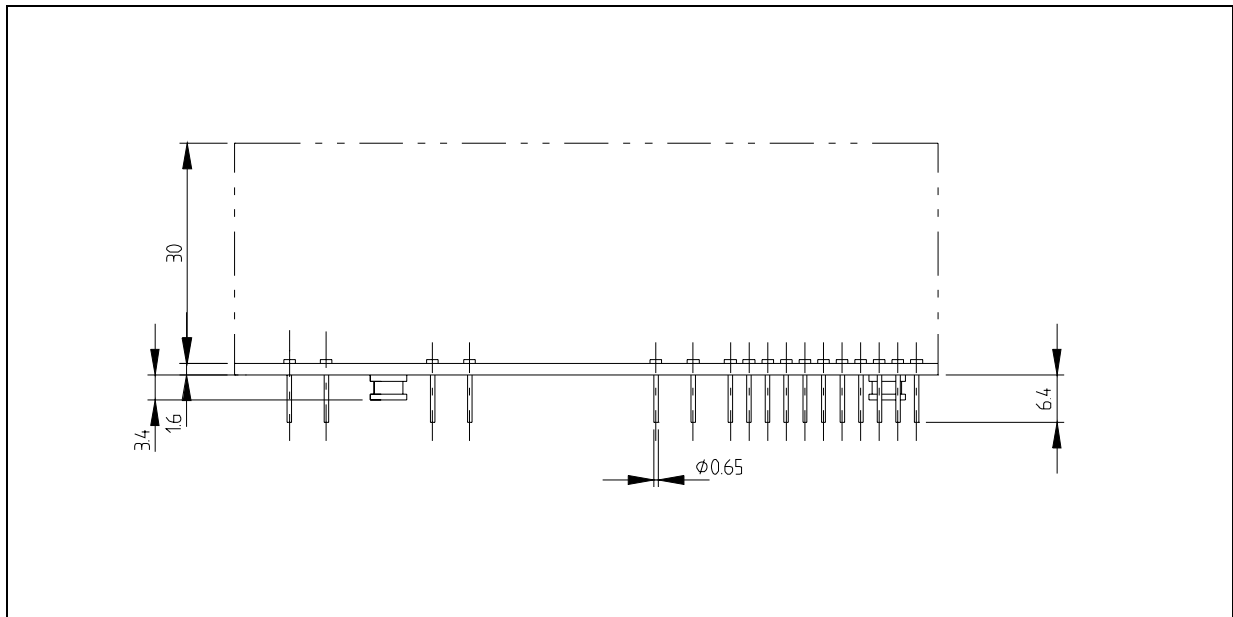




Figure 2. NT1 Plus Power Management Module SIDE VIEW (dimensions in mm)



## PIN CONFIGURATION

Pin No	Signal	Pin No	Signal
1	Output 5 (-135 V)	12	N.C.
2	Output 6 (EM, Green LED)	13	N.C.
3	V <sub>in3</sub> , Analog Emergency Input 3	14	Output 1 return (0 V) S-interface
4	Output 3 (-21 V)	15	N.C.
5	Output 4 (-50 V)	16	N.C.
6, 9	GND, Common return for pins 1, 2, 3, 4, 5, 7, 8, 10, 21	17	V <sub>i2</sub> Input Voltage 2, V <sub>dc</sub> (any polarity)
7	Output 2 (+5 V)	18	V <sub>i2</sub> Input Voltage 2, V <sub>dc</sub> (any polarity)
8	Relé'	19	V <sub>i1</sub> Input Voltage 1, VAC
10	Output 7 (RED LED)	20	V <sub>i1</sub> Input Voltage 1, VAC
11	Output 1 (± 40 V) S-interface	21	Vring ON/OFF

Information furnished is believed to be accurate and reliable. However, STMicroelectronics assumes no responsibility for the consequences of use of such information nor for any infringement of patents or other rights of third parties which may result from its use. No license is granted by implication or otherwise under any patent or patent rights of STMicroelectronics. Specifications mentioned in this publication are subject to change without notice. This publication supersedes and replaces all information previously supplied. STMicroelectronics products are not authorized for use as critical components in life support devices or systems without express written approval of STMicroelectronics.

The ST logo is a registered trademark of STMicroelectronics  
© 2003 STMicroelectronics - All Rights Reserved

STMicroelectronics GROUP OF COMPANIES  
Australia - Brazil - Canada - China - Finland - France - Germany - Hong Kong - India - Israel - Italy - Japan - Malaysia - Malta - Morocco -  
Singapore - Spain - Sweden - Switzerland - United Kingdom - U.S.A.  
<http://www.st.com>