

SLIC L3000N/L3092 PERFORMANCE ANALYSIS WITH -24V BATTERY

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INTRODUCTION

This technical note describes the L3000N/L3092 SLIC performances when used with a battery voltage of -24V. All the main characteristics are analyzed and compared with the results obtained with a standard battery voltage of -48V.

The following data were obtained from a typical device in order to have an idea on how DC characteristic, power consumption, ringing voltage and AC performances are influenced by a reduced battery voltage.

POWER CONSUMPTION

Table 1 shows the L3000N-L3092 current consumption with two batteries combination $V_{B-} = -48V$; $V_{B+} = 72V$ and $V_{B-} = -24V$; $V_{B+} = +50V$. The measurements are made in the different operating modes (Power Down; Stand-by; Conversion with $I_L = 0$; $I_L = 40mA$ and Ringing without AC Line Load (Ringing Equivalent Number REN = 0).

Table 1: SLIC Typical Current Consumption with Different Battery Voltages.

	Current Consumption (mA)			
	-48V	+72V	-24V	+60V
PW - DOWN	0	0	0	0
SBY ($I_L = 0$)	1.93	0	1.9	0
CVS ($I_L = 0$)	4.91	-	4.4	0
CVS ($I_L = 40mA$)	52.2	-	50	0
RING (0 REN)	13.4	10.8	10.0	7.9

DC CHARACTERISTICS

In fig 1 you can see the typical DC characteristics for the two battery voltages: feeding resistance was set to $2 \times 200\Omega$ (RFS = 200Ω).

The typical current value versus loop resistance is given by:

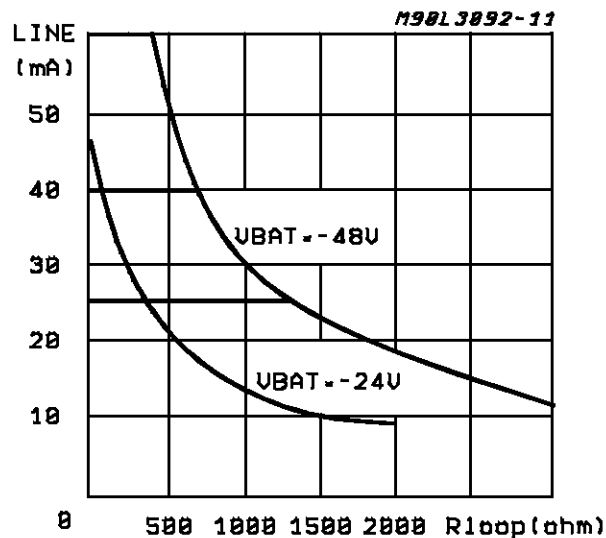
$$I_L = I_{lim} \quad \text{for } R_L < \frac{|V_{B-}| - 5V}{I_{lim}} - 2RFS$$

$$I_L = \frac{|V_{B-}| - 5V}{R_L + 2RFS} \quad \text{for } R_L > \frac{|V_{B-}| - 5V}{I_{lim}} - 2RFS$$

Where RFS represents the resistance of each

side of the traditional feeding system (most common values for RFS are 200, 400 and 500Ω).

Figure 1: L3000N/L3092 DC Characteristic with a $2 \times 200\Omega$ Feeding Resistance.



MAXIMUM LOOP LENGTH

Two are the parameters influenced by line length increment: the first is the DC line current and the second is the maximum AC signal that can be sent without distortion (THD = 1%). Here below are shown the typical maximum loop resistance values and the relative line current in correspondence of which distortion is still less than 1% for +4dBm (1.23 VRMS) AC signals. The SLIC feeding resistance is set $2 \times 200\Omega$.

$V_{B-} = -48V$	$V_{B-} = -24V$
Rmax. = 2200Ω	Rmax. = 940Ω
$I_L = 16.61mA$	$I_L = 14.47mA$

ON/OFF HOOK CURRENT THRESHOLDS

Here below are reported the typical values of the DC current thresholds used by the SLIC to detect the ON hook and OFF hook line conditions.

APPLICATION NOTE

$V_{B-} = -48V$

ON/OFF Hook commutation

$IL = 8.10mA$ $VL = 40.58V$ $RL = 5K\Omega$

OFF/ON Hook commutation.

$IL = 5.91mA$ $VL = 41.30V$ $RL = 7K\Omega$

$V_{B-} = -24V$

ON/OFF Hook commutation

$IL = 8.10mA$ $VL = 16.52V$ $RL = 2K\Omega$

OFF/ON Hook commutation.

$IL = 5.82mA$ $VL = 17.44V$ $RL = 3K\Omega$

$V_{B-} = -24V$

AC PERFORMANCES

All the AC performances: TXgain, RX gain, Return Loss, Transhybrid Loss and Longitudinal Balance were measured and no significative variations were found changing from $-48V$ to $-24V$ of battery voltage.

GRX, GTX and THL variation were inside 0.03dB; RL inside .07dB and longitudinal balance inside .9dB.

RINGING PERFORMANCES

L3000N/L3092 SLIC injects directly the ringing signal into the line. The ringing signal has a DC

component superimposed with the AC one.

The maximum ringing amplitude that can be obtained by L3000N without distortion depends on the total battery voltage available:

Let:

$$\begin{aligned} VBT &= |VB+| + |VB-| \\ VRING &= 0.58VBT - 8.6 \text{ (Vrms)} \\ VDCRING &= 0.1736VBT + 0.75 \text{ (V)} \end{aligned} \quad (1)$$

EX:

$$\begin{aligned} VB+ &= 72V; \quad VB- = -48V \\ VRING &= 0.58 \times 120 - 8.6 = 61 \text{Vrms} \\ VDCRING &= 21.6V \\ VB+ &= 50V; \quad VB- = -24V \\ VRING &= 0.58 \times 74 - 8.6 = 34.3 \text{Vrms} \\ VDCRING &= 13.6V \end{aligned}$$

From eq. (1):

$$VBT = (VRING + 8.6)/0.58$$

CONCLUSIONS

The measurements carried on show that it is possible to make the SLIC working also with reduced battery voltage (down to $-24V$) without any degradation in terms of AC performances.

It should be noted that with -24 battery voltage you can get good performances up to 950Ω of loop length. In case you need higher line currents you can increase the battery voltage of the amount you need, optimizing in this way power dissipation.

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