SGS-THOMSON MICROELECTRONICS

APPLICATION NOTE

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 x 200Ω (RFS = 200Ω).

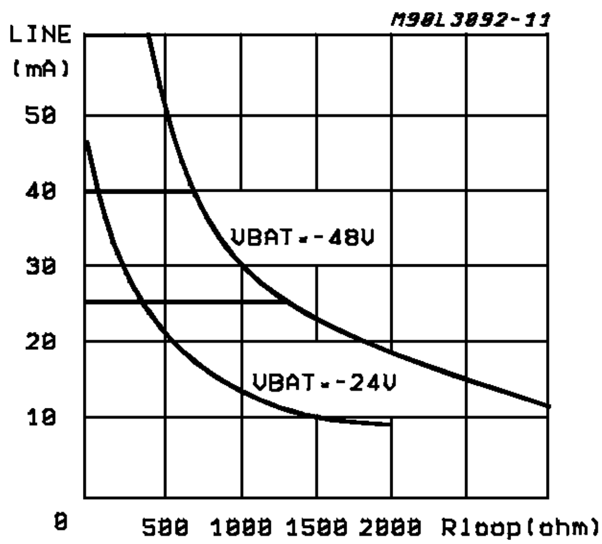
The typical current value versus loop resistance is given by:

$$I_L = Ilim \qquad \text{for } R_L < \frac{|V_{B-}| - 5V}{Ilim} - 2RFS$$

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

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 x 200Ω Feeding Resistance.



MAXIMUM LOOP LENGHT

Two are the parameters influenced by line lenght 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 corrispondance of which distortion is still less than 1% for +4dBm (1.23 VRMS) AC signals. The SLIC feeding resistance is set 2 x 200Ω.

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.

V_{B-} = –48V

ON/OFF Hook commutation

IL = 8.10mA VL = 40.58V RL = 5KΩ

OFF/ON Hook commutation.

IL = 5.91mA VL = 41.30V RL = 7KΩ

V_{B-} = –24V

ON/OFF Hook commutation

IL = 8.10mA VL = 16.52V RL = 2KΩ

OFF/ON Hook commutation.

IL = 5.82mA VL = 17.44V RL = 3KΩ

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:

VBT = |VB+| + |VB-|
VRING = 0.58VBT - 8.6 (Vrms) (1)
VDCRING = 0.1736VBT + 0.75 (V)

EX:

VB+ = 72V; VB- = -48V
VRING = 0.58 x 120 - 8.6 = 61Vrms
VDCRING = 21.6V
VB+ = 50V; VB- = -24V
VRING = 0.58 x 74 - 8.6 = 34.3Vrms
VDCRING = 13.6V

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 lenght. 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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