to 4.7 Ω (Table II). The experimental efficiency of the *G*-type power gyrator, for different input currents, is shown in Figure 8.

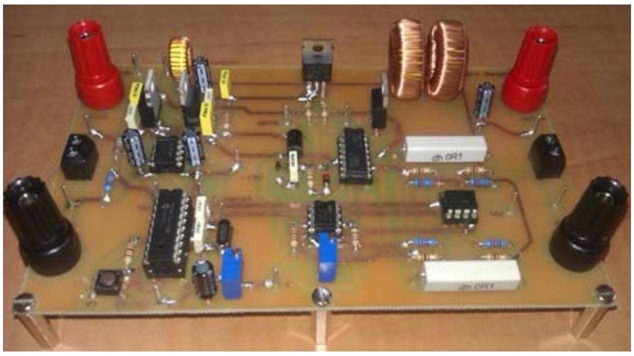

Fig. 7. Photograph of the final implemented prototype.

TABLE II. - Experimental results to obtain the efficiency of the G-type power gyrator implemented.

I_{in} (A)	V_{out} (V)	I_{out} (A)	P_{in} (W)	P_{out} (W)	η (%)
0,40	5,03	1,03	7,20	5,18	71,96
0,50	5,70	1,17	9,00	6,67	74,10
0,60	6,33	1,30	10,80	8,23	76,19
0,70	6,92	1,42	12,60	9,83	77,99
0,80	7,44	1,52	14,40	11,31	78,53
0,90	7,97	1,63	16,20	12,99	80,19
1,00	8,43	1,72	18,00	14,50	80,55
1,10	8,85	1,81	19,80	16,02	80,90
1,20	9,27	1,89	21,60	17,52	81,11
1,30	9,67	1,97	23,40	19,05	81,41
1,40	10,06	2,06	25,20	20,72	82,24
1,50	10,43	2,13	27,00	22,22	82,28
1,60	10,82	2,21	28,80	23,91	83,03
1,70	11,12	2,27	30,60	25,24	82,49
1,80	11,45	2,34	32,40	26,79	82,69
1,90	11,78	2,40	34,20	28,27	82,67
2,00	12,09	2,47	36,00	29,86	82,95

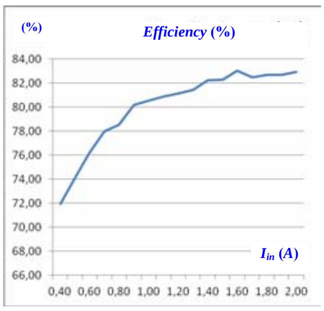

Fig. 8. Experimental efficiency of the *G*-type power gyrator for different values of the input current.

This graph shows how, as the *G*-type power gyrator works closer to the optimum point (I_{in}=2 *A*), the performance and efficiency are enhanced. Note that the efficiency of the gyrator is determined by the value of the load, and that, for a given output current value, different output voltages can be obtained.

5. Conclusions

This paper has provided, on the one hand, a classification of high efficiency switching power-gyrator structures and, on the other, the validity of their use as cells for energy processing in photovoltaic solar installations. In particular, having into account the properties of these topologies presented in the article, their inclusion in solar facilities allows increasing the performance of the whole installation.

The design, simulation and implementation of a *G*-type power gyrator are carried out throughout the article, including a sliding control implemented by means an analog controller. In addition to the use of the aforementioned switching power gyrator, a maximum power point tracking (MPPT) is mandatory in the energy processing path in order to obtain the maximum power from the photovoltaic solar panel.

Therefore, the practical implementation carried out includes a control loop of the power gyrator in order to track the aforementioned maximum power point of the photovoltaic solar panel. In the presented design, this MPPT circuit has been implemented by means of a PIC microcontroller, a Microchip's PIC18F1220, that achieves the tracking of the PV-panel MPP. In the case carried out in this article, the MPPT algorithm implemented has been the aforementioned perturb and observation (P&O).

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