

Design of a 39.3% Power Efficiency with - 21dBm sensitivity Internal Threshold Voltage Compensated RF Energy Harvester

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Introduction

A low power reconfigurable RF-DC power converter using internal threshold voltage cancellation (IVC) scheme with auxiliary transistors block is presented. A Maximum Power Point Tracking (MPPT) algorithm is implemented in order to maintain the high efficiency by automatically selecting number of stages. The proposed reconfigurable converter efficiently converts the RF signals to DC voltage by dynamically controlling the threshold voltage of the forward and the reversed-biased transistors in the main rectification body.

Schematic and chip Layout

Experimental Results



Circuit diagram of RF-DC converter



Reference	[1]	[2]	[3]	[4]	[5]	This work
Technology	130 nm	130nm	90nm	130 nm	90 nm	180 nm
Frequency(MHz)	902-928	915	868	868	915	900
MPPT	X	Х	X	X	Х	Ο
Input (dBm)	-15	-16.8	-21	-16	-18.83	-15
Output DC(V)	3.2	2.2	1.4	2	1.2	3.3
PCE (%)	32	22.6	24	10	11	39.3
Voltage Sensitivity:						
$1V$ for $1M\Omega$ load	-20.5	-21.6	-23		-17.5	-21
(dBm)						



RF-DC converter Layout pattern

Concept of RF-DC Converter



Conclusion

The range of RF energy harvesting can be increased with the proposed RF–DC converter which offers higher power conversion efficiency and better sensitivity than the previously reported power converter circuits.

Acknowledgement

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(a) positive phase and (b) negative phase

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