CMOS LATCHED COMPARATORS

Mr. N. Bala Dastagiri Assistant Professor – ECE Dept. Annamacharya Institute of Technology Rajampet, Andhra Pradesh, INDIA.

Dr. K. Hari Kishore Professor – ECE Dept. KL University, Guntur, Andhra Pradesh, INDIA.

Dr. B. Abdul Rahim Professor – ECE Dept. Annamacharya Institute of Technology Rajampet, Andhra Pradesh, INDIA.

Dr. S. Fahimuddin Associate Professor – ECE Dept. Annamacharya Institute of Technology Rajampet, Andhra Pradesh, INDIA.

CMOS LATCHED COMPARATORS

Copyright ©: Mr. N. Bala DastagiriPublishing Rights P: VSRD Academic Publishing
A Division of Visual Soft India Pvt. Ltd.

ISBN-13: 978-93-86258-59-5 FIRST EDITION, JUNE 2017, INDIA

Typeset, Printed & Published by: VSRD Academic Publishing (A Division of Visual Soft India Pvt. Ltd.)

Disclaimer: The author(s) are solely responsible for the contents of the papers compiled in this book. The publishers or its staff do not take any responsibility for the same in any manner. Errors, if any, are purely unintentional and readers are requested to communicate such errors to the Editors or Publishers to avoid discrepancies in future.

All rights reserved. No part of this publication may be reproduced, stored in a retrieval system or transmitted, in any form or by any means, electronic, mechanical, photocopying, recording or otherwise, without the prior permission of the Publishers & Author.

Printed & Bound in India

VSRD ACADEMIC PUBLISHING

A Division of Visual Soft India Pvt. Ltd.

REGISTERED OFFICE

154, Tezabmill Campus, Anwarganj, KANPUR–208003 (UP) (IN) Mb: 99561 27040, Web: www.vsrdpublishing.com, Email: vsrdpublishing@gmail.com

MARKETING OFFICE (NORTH INDIA)

Basement-2, Villa-10, Block-V, Charmwood Village, FARIDABAD–121009 (HY)(IN) Mb: 98999 36803, Web: www.vsrdpublishing.com, Email: vsrdpublishing@gmail.com

MARKETING OFFICE (SOUTH INDIA)

340, FF, Adarsh Nagar, Oshiwara, Andheri(W), MUMBAI–400053 (MH)(IN) Mb: 99561 27040, Web: www.vsrdpublishing.com, Email: vsrdpublishing@gmail.com

PREFACE

Nowadays due to the advancement of new technologies in the field of electronics, major importance is given towards the application with high speed and low power dissipation. Speed, low noise, and better slew rate, resolution are the important features of high speed applications such as sense amplifier, SOC design, data links etc.

In order to fulfil these specifications the basic building block i.e. comparator has to be tightly constrained. Hence design of comparator is more challenging one in the system.

From several decades many comparators are being used in many integrated circuits, but it is highly possible to modify or develop new topologies or expand known topologies of comparators for improving their performance.

This book presents new topologies of comparators in CMOS nanometer technologies. Numerous detailed circuit diagrams and plots of measured results allow a fast comprehension.

We wish to acknowledge our colleagues who contributed to this book with mind stimulating discussions. Thanks to the managements of Annamacharya Institute of Technology and Sciences(Autonomous), Rajampet and KL University for their financial support as well as the opportunity to use the design environment. Our family members deserve very special thanks for their continued support, encouragement and patience throughout this project.

N. Bala Dastagiri
K. Hari Kishore
B. Abdul Rahim
Shaik Fahimuddin

CONTENTS

CHA	APTE	R1		
INT	RODU	JCTION 1	-	
1.1	MOTIVATION3			
1.2	DEFINITION OF COMPARATOR4			
1.3	ANALOG-TO-DIGITAL CONVERTER (ADC)5			
1.4	COMPLEXITIES IN THE ANALOG IC DESIGN			
CHA	APTE	R 2		
FUN	NDAM	ENTAL CHARACTERISTICS OF LATCHED		
CON	MPAR	ATORS 9)	
2.1	STATI	C LATCH	L	
2.2	CHAR	ACTERISTICS OF COMPARATOR12	2	
	2.2.1	STATIC CHARACTERISTICS 12	,	
	2.2.2	DYNAMIC CHARACTERISTICS 16	;	
2.3	MEAS	UREMENT TECHNIQUE OF LATCHED COMPARATOR 18	;	
CHA	APTE	3		
STA	TE O	F THE ART TOPOLOGIES19)	
3.1	CONV	ENTIONAL COMPARATORS21	L	
	3.1.1	SINGLE-TAIL LATCHED COMPARATOR 21	_	
	3.1.2	DOUBLE-TAIL LATCHED COMPARATOR 22	-	
3.2	COMF	PARATORS WITH SAMPLING SWITCHES	5	
	3.2.1	SINGLE-TAIL LATCHED COMPARATOR 23	5	
	3.2.2	DOUBLE-TAIL LATCHED COMPARATOR 24	ł	
3.3	COMF	PARATORS WITH PREAMPLIFIER25	,	
	3.3.1	SINGLE-TAIL LATCHED COMPARATOR 25	,	
	3.3.2	DOUBLE-TAIL LATCHED COMPARATOR 26	;	
3.4	COMPARATORS FOR THE APPLICATION OF IMPLANTABLE			
	MEDI	CAL DEVICES27	'	
	3.4.1	DYNAMIC LATCH COMPARATOR 27	'	
	3.4.2	SINGLE CLOCK PHASE DUAL RAIL LATCHED		
		COMPARATOR 28	3	

	3.4.3	LATCHED LATCH COMPARATOR AND ITS SUCCEEDING SR LATCH			
CHA PRC IMP	APTER OPOSE ROVE	R 4 ED TOPOLOGIES FOR PERFORMANCE EMENT OF LATCHED COMPARATORS 31			
4.1	PROPO	OSAL-I			
	4.1.1	SINGLE-TAIL LATCHED COMPARATOR WITH			
		PROPOSAL-I			
	4.1.2	DOUBLE-TAIL LATCHED COMPARATOR WITH			
4.2		PROPOSAL-1			
4.2	4 2 1	SINGLE-TAIL LATCHED COMPARATOR WITH			
		PROPOSAL-II			
	4.2.2	DOUBLE-TAIL LATCHED COMPARATOR WITH			
		PROPOSAL-II			
CHA EXP	APTER PERIM	R 5 ENTAL RESULTS 45			
5.1		ATION RESULTS OF PROPOSAL-I LATCHED			
E 2					
5.2	COMP	ARATORS			
CHAPTER 6 CONCLUSION AND FUTURE SCOPE					
6.1	CONC	LUSION			
6.2	FUTUF	RE SCOPE			
CHA REF	APTER EREN	R 7 ICES 61			
APPENDIX A					
SIMULATION RESULTS OF EXISTING					
ARCHITECTURES					