

# Transceiver Strategies for 3.5G Handsets

## Next Generation Handsets Series

### TABLE OF CONTENTS

1.	INTRODUCTION .....	1-1
1.1	3.5G Handset Transceivers.....	1-1
1.2	Transceivers Present Formidable Challenges .....	1-2
2.	EXECUTIVE SUMMARY.....	2-1
3.	HANDSET MARKET EVOLUTION.....	3-1
3.1.	Mobile Phones—Historic Perspective .....	3-1
3.2.	WEDGE—WCDMA and EDGE Convergence.....	3-4
3.2.1	Why WEDGE?.....	3-5
4.	HANDSET TRANSCEIVERS .....	4-1
4.1.	A Critical Part of Handset System Solution .....	4-1
4.2	RF Transceiver and Multi-Mode Operation .....	4-3
4.3	EDGE and WCDMA Modulations .....	4-5
4.4	Transceiver Architectures.....	4-7
4.4.1	Receiver Architectures .....	4-7
4.4.2	Transmitter Architectures .....	4-8
4.4.3	Polar Modulation Architectures .....	4-10
4.4.4	Direct (Linear) Modulation Architecture.....	4-12
5.	TRANSCEIVER COMPETITIVE LANDSCAPE.....	5-1
5.1	Analog Devices.....	5-1
5.1.1	Analog Devices—EDGE.....	5-1
5.1.2	Analog Devices—WCDMA.....	5-2
5.2	Freescale .....	5-3
5.2.1	Freescale—EDGE .....	5-3
5.2.2	Freescale—WCDMA .....	5-4
5.2.2	Freescale—WEDGE.....	5-5
5.3	Infineon .....	5-6
5.3.1	Infineon—EDGE .....	5-6
5.3.2	Infineon—WCDMA .....	5-7
5.3.3	Infineon—WEDGE.....	5-8
5.4.	Philips .....	5-10
5.4.1	Philips—EDGE .....	5-10
5.4.2	Philips—WCDMA .....	5-11
5.5	Qualcomm .....	5-12
5.5.1	Qualcomm—WCDMA and WEDGE .....	5-12
5.6	Renesas.....	5-14
5.7	RF Micro Devices—EDGE .....	5-15
5.8	Silicon Laboratories—EDGE .....	5-17
5.9	Skyworks Solutions—EDGE.....	5-18
5.10	Quorum System.....	5-20
5.10.1	Quorum—EDGE .....	5-20
5.10.2	Quorum—WEDGE .....	5-20
5.11	Sequoia Communications—WEDGE .....	5-22
5.12	Sirific Wireless .....	5-23

5.12.1	Sirific Wireless—EDGE .....	5-23
5.12.2	Sirific Wireless—WCDMA .....	5-24
5.12.3	Sirific Wireless—WEDGE.....	5-24
5.13	Tropian.....	5-26
5.13.1	Tropian—EDGE.....	5-26
5.13.2	Tropian—WCDMA.....	5-27
6.	TRANSCEIVER PRODUCT TRENDS .....	6-1
6.1.	From BiCMOS to CMOS .....	6-2
6.2.	Direct Conversion Receiver Architecture .....	6-3
6.3.	Coexistence of Direct and Polar Modulation for Transmitter Architecture .....	6-3
6.4	MCM Integration versus Single Chip.....	6-4
6.5	Single Chip Multimode Transceiver.....	6-5
6.6	Standard DIGITAL Interface to Baseband.....	6-5
6.7	Reference Design versus Stand-Alone .....	6-6
6.8	Diversity at the Gate .....	6-7
7.	RECEIVER DIVERSITY—HSDPA PERFORMANCE ENHANCEMENT .....	7-1
7.1	SW3210—Sirific Wireless Receiver Diversity Implementation.....	7-3
7.2	TRT6285 — Qualcomm Receiver Diversity Implementation.....	7-5
8.	STRATEGIES FOR SUCCESS.....	8-1
8.1	Electronics Value Chain .....	8-1
8.1.1	Two Value Chains .....	8-1
8.1.2	Increasing Levels of Software .....	8-3
8.2	Signal Processing Value Chain .....	8-4
8.3	Transceiver Value Chain .....	8-6
8.3.1	Product Definition .....	8-9
8.3.2	Product Engineering .....	8-10
8.3.3	Product Manufacturing .....	8-12
8.3.4	Product Testing .....	8-12
8.3.5	Marketing and Sales.....	8-13
8.4	ASP Trends .....	8-15
8.5	Conclusion.....	8-17
9.	ABOUT THE PETROV GROUP .....	9-1
9.1	PETROV GROUP.....	9-1
9.1.1.	Our Distinctions: .....	9-2
9.1.2.	Benefits of Our Methodology.....	9-2
9.1.3	Benefits to Our Clients.....	9-3

# Transceiver Strategies for 3.5G Handsets

## Next Generation Handsets Series

### LIST OF FIGURES

3.1	G2 to G3 Evolution .....	3-1
3.2	Worldwide Unit Market Shares (Billion Units) of GSM and CDMA Product Families .....	3-2
3.3	Summary of GSM-Platform Technologies .....	3-3
4.1	High Level Block Diagram of a Handset.....	4-1
4.2	Handset Shipments (Billion Units) by Handset Tiers.....	4-3
4-3	GSM-Platform Digital Modulation Techniques .....	4-6
4-4	Small Signal Polar Modulation.....	4-11
4-5	Large Signal Polar Modulation Used by RFMD.....	4-11
4-6	Closed Loop Polar Modulation .....	4-12
4-7	Block Diagram of SW2210 Transceiver from Sirific .....	4-13
4-8	Comparison of Transmit Architectures .....	4-14
5-1	ADI AD6546—Othello E Block Diagram.....	5-2
5-2	Freescale MMM6000—EDGE MCM in a 9x11mm <sup>2</sup> Package .....	5-4
5-3	Freescale MMM6007 WCDMA MCM in an 11x15mm <sup>2</sup> Package .....	5-5
5-5	Infineon PMB6277 CMOS EDGE Transceiver with DigRF Interface .....	5-7
5-6	Infineon PMB570-1 WCDMA Tri-band Transceiver .....	5-8
5-7	Infineon PMB6950 WEDGE MCM.....	5-9
5-8	Philips UAS3588 SiP EDGE Radio .....	5-10
5-9	Qualcomm Two-chip WEDGE Solution.....	5-13
5-10	RFMD RFR 2723 Receiver Chip Manufactured in SiGe BiCMOS .....	5-15
5-11	RFMD RF 6007 Transmitter and Signal Processing Chip in CMOS.....	5-16
5-12	Silicon Labs Si4212 Aero Ile Transceiver .....	5-19
5-13	Skyworks SKY74200 EDGE Transceiver Module .....	5-15
5-14	Quorum QS3000 Single Chip WEDGE Transceiver .....	5-21
5-15	Sequoia SEQ 5400 Single Chip WEDGE Transceiver.....	5-23
5-16	Sirific SW3210 Single Chip WEDGE Transceiver .....	5-25
5-17	Tropian WCDMA Codestar .....	5-27
6-1	EDGE Transceiver Competitors .....	6-8
6-2	WCDMA Transceiver Competitors .....	6-9
6-3	WEDGE Transceiver Solutions by Vendor—Current .....	6-10
6-4	WEDGE Transceiver Solutions by Vendor—Future .....	6-11
7-1	Sirific SW3210 Transceiver and Front-end Solution with tri-band Receiver Diversity.....	7-4
7-2	Qualcomm TRT 6285 Transceiver and Front-end Solution with tri-band Receiver Diversity.....	7-6
8-1	Structural Differences of SP and DP Value Chain .....	8-6
8-2	Different Nature and Uses of DP and SP Products Systems.....	8-6
8-3	Transceiver Value Chain .....	8-8
8-4	Pricing Trends for Transceivers.....	8-16

## ORDER FORM

Print, Fill out, and Fax to 650-858-1211

Report Description	Pages/Figures	Report Price	Totals
Transceiver Strategies for 3.5G Handsets—Next Generation Handsets Series	105 / 38	\$2,250	\$ _____
How to Grow Profitably—Value Chain Insights for IC Vendors	70 / 18	\$2,450	\$ _____
Linear Technology Corporation—Why Linear is the Most Profitable IC Vendor	180 / 40	\$2,450	\$ _____
Automotive, Medical, and Automation Mixed-Signal Market and Technology	260 / 65	\$2,450	\$ _____
Melexis NV—Automotive Mixed-Signal Case Study	92 / 19	\$1,950	\$ _____
Analog/Mixed Signal Integration Trends	384 / 45	\$1,950	\$ _____
Trends in HW/SW Co-Design	100 / 10	\$1,950	\$ _____
Chip Design Strategy—Managing Design Tool Issues	220 / 21	\$2,450	\$ _____
Chip Design Strategy—IC Design Technology of IBM	350 / 60	\$2,450	\$ _____
	Total		\$ _____

### Payment Method

AmEx [ ] Visa [ ] MC [ ] Card No. \_\_\_\_\_ Exp. Date \_\_\_\_\_

Card Holder Name \_\_\_\_\_ Address \_\_\_\_\_

Signature Authorizing Order: \_\_\_\_\_ Date \_\_\_\_\_

### Payment Terms

Our payment terms are 30 days, with a 2% discount if paid within 10 working days; a 10% discount for multiple report purchase. Contact us for information for wire transfer payment.

### Shipping Information

Name \_\_\_\_\_ Title \_\_\_\_\_

Company \_\_\_\_\_ Division \_\_\_\_\_

FedEx Address \_\_\_\_\_

Phone: \_\_\_\_\_ Fax: \_\_\_\_\_ E-mail: \_\_\_\_\_

PETROV GROUP	4173 El Camino Real, Suite #40 Palo Alto, CA 94306	Fax: 650-858-1211 E-mail: <a href="mailto:inquiry@petrovgroup.com">inquiry@petrovgroup.com</a> Phone: 650-858-1311
--------------	---	--

## **Petrov Group Announces Study of Transceiver Strategies for 3G Handsets**

PALO ALTO, Calif.—(BUSINESS WIRE)—March 6, 2006—The Petrov Group today announced its in-depth study of strategies for transceiver business success in next generation handsets. The report demonstrates why RF transceiver solutions are a critical part of 3G handset systems and evaluates technology and market trends, as well as the approaches of successful vendors.

“The number of handset transceivers has already exceeded one billion per year, and cellular phones continue to be the largest segment of mobile wireless devices,” said Boris Petrov, managing partner of the Petrov Group.

“This transceiver study is part of our “Next Generation Handsets” series, in which we focus on 3.5G+ handsets with triple play features—voice, data, and video. These data-centric handsets represent the next growth opportunity and a major inflection point for handset vendors, carriers, ISVs, and semiconductor component vendors.”

The report is indispensable for understanding the dynamics of the handset business. It focuses on transceivers for 3.5G+ handsets in a unique and comprehensive way, and it includes important topics such as products and their key trends, major competitors, transceiver architectures, integration trends, examples of diversity implementation, and pricing trends.

The study analyzes in detail the signal processing value chain and critical value activities for transceiver vendors. It identifies specific requirements for a successful RF transceiver business and implications for customers and partners. The report price is \$2,250 and includes a follow-up teleconference.

The Petrov Group, LLC is a strategy and investment advisory firm focused on the high-tech industry since 1982. It is recognized for pragmatic due diligence on companies and technologies. Petrov Group’s methodology includes development of proprietary models; select examples are shown on its Web site at [www.petrovgroup.com](http://www.petrovgroup.com)

CONTACT: Boris Petrov  
650-858-1311

[inquiry@petrovgroup.com](mailto:inquiry@petrovgroup.com)