

SAN JOSE, CA – November 12, 2012 – Venture-Q announces its new **Competitive Landscape** report, the first of a six-report set dedicated to **commercialization of GaN-on-Si technology for power conversion** applications.

The high potential of GaN-on-Si technology for next generation discrete and IC products in power conversion applications is by now evident. It attracts an increasing number of vendors and funding sources, which leads to increasing competitive pressure in 2013 and beyond.

IC level integration potential is also widely recognized as evidenced by recent patent applications and R&D activities of IC vendors. It is an enabling technology for high voltage and power applications. In these applications it offers distinct competitive advantages over the alternative silicon technologies featuring limited monolithic integration capabilities.

This report delivers a comprehensive, up-to-date view of the competitive landscape for GaN-on-Si technology in power conversion applications. The competitive landscape is presented from four different aspects:

- 1 Segmentation of the competitive landscape
- 2 Device technology competition
- 3 Foundry business competition
- 4 Competitive vendor attributes and ranking

Segmentation of the competitive landscape features five areas defined by (1) competition type (direct, substitute and new entrant), and (2) competition domain (device and foundry). This report provides detailed analyses of each of the competition segments (shown below).

Big Picture View of Power GaN/Si Competition		
Competition Type	Power GaN/Si Competition Domain	
	Device	Foundry
Direct	<ul style="list-style-type: none"> • Power GaN device/module vendors <ul style="list-style-type: none"> - HEMT - MOSFET - Hybrid MOSFET-HEMT 	<ul style="list-style-type: none"> • Power GaN device vendors <ul style="list-style-type: none"> - Internal foundry service • RF power foundries <ul style="list-style-type: none"> - Pure-play - Internal foundry service
Substitute	<ul style="list-style-type: none"> • Silicon device/module vendors <ul style="list-style-type: none"> - Superjunction MOSFET - IGBT • Silicon carbide device/module vendors <ul style="list-style-type: none"> - SiC MOSFET - SiC JFET 	
New entrant	<ul style="list-style-type: none"> • RF power device vendors <ul style="list-style-type: none"> - R&D efforts in GaN/Si power conversion technology • Silicon IC vendors <ul style="list-style-type: none"> - GaN only and/or GaN + Si single-chip integration 	<ul style="list-style-type: none"> • Silicon wafer foundries <ul style="list-style-type: none"> - Pure-play - Internal foundry service • LED vendors <ul style="list-style-type: none"> - Internal foundry service • Epi-wafer vendors <ul style="list-style-type: none"> - Pure-play - Internal foundry service

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This report also provides an analysis of barriers to entry into GaN-on-Si device design and manufacturing by competing vendor types. A set of timetables (from Jan. 2012 to Dec. 2015) provide the time required to commercialize the technology for the three competition types (direct, substitute and new entrant).

Device technology competition aspect of the competitive landscape features silicon superjunction MOSFETs as the main technology competition for GaN-on-Si technology in power conversion applications. This report provides an analysis of this competition as well as for two main substitute competition technologies (GaN MOSFET and SiC MOSFET).

Monolithic integration of GaN and silicon devices is of increasing interest among competing vendors joined by traditional silicon IC vendors such as Intersil, International Rectifier and Power Integrations, and Texas Instruments. This report briefly addresses the monolithic integration of GaN and silicon devices while detailed analyses are provided in the follow-up report titled *Patent Analyses & Strategies*.

Foundry business aspect of the competitive landscape covers the power GaN foundry business currently dominated by RF power device vendors. These vendors are the closest to commercializing GaN-on-Si technology for power conversion applications as evidenced by RF Micro Devices' recent market entry.

Competitive vendor attributes and ranking aspect of the competitive landscape covers significant vendors currently pursuing GaN and SiC devices in power conversion applications (shown below). Two report tables contain ranking data for 14 of these vendors, one for monolithic integration (IC) and the other for discrete power devices. The ranking is derived using VQ's seven ranking criteria including: R&D/technology and manufacturing capabilities, financial strength, strategic importance of GaN technology, cost structure, and patent portfolio.

Vishay Intertechnology	Powdec	MicroGaN	Furukawa Electric
Intersil	Panasonic	STMicroelectronics	Freescall Semiconductor
ON Semiconductor	Toshiba	Infineon Technologies	Cree
Fairchild Semiconductor	Rohm Semiconductor	NXP	Fuji Electric
RF Micro Devices	Texas Instruments	GaN Systems	Mitsubishi Electric
Alpha & Omega Semiconductor	Power Integrations	International Rectifier	Fujitsu Semiconductor
Sanken Electric	MicroSemi	Efficient Power Conversion	
Powdec	Renesas Technology	Transphorm	

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Vendor	Ranking criteria							Total rating	Rank
	1	2	3	4	5	6	7		
IRF	7	8	8	10	8	7	9	57	1
Infineon	7	9	8	7	7	9	4	51	2
Transphorm	8	6	6	10	4	8	8	50	3
STM	7	8	8	8	7	8	3	49	4
Sanken	8	8	8	3	7	6	7	47	5
Toshiba	8	8	8	3	7	6	6	46	6
Panasonic	8	8	8	7	7	4	3	45	7
Renesas	7	7	8	7	7	4	5	45	8
Rohm	8	8	8	2	7	4	4	41	9
EPC	2	5	2	10	8	8	5	40	10
MicroGaN	4	5	3	10	6	4	2	34	11
Alpha & Omega	2	3	5	6	8	4	2	30	12
Power Integrations	4	4	6	7	7	0	2	30	13
Nitronex	7	7	3	0	6	0	0	23	14

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Vendor	Ranking criteria							Total rating	Rank
	1	2	3	4	5	6	7		
IRF	7	8	8	10	7	8	9	57	1
Sanken	8	8	8	8	7	7	7	53	2
Panasonic	8	8	8	7	7	6	7	51	3
STM	7	8	8	8	7	6	3	47	4
Transphorm	8	8	6	10	4	3	8	47	5
Renesas	7	7	8	7	7	4	2	42	6
Rohm	8	8	8	2	7	2	6	41	7
Infineon	7	9	8	7	7	2	1	41	8
Power Integrations	4	4	6	8	8	9	2	41	9
Toshiba	8	8	8	3	7	2	4	40	10
MicroGaN	4	5	3	10	6	2	2	32	11
EPC	2	5	2	10	8	2	1	30	12
Alpha & Omega	2	3	5	6	8	2	1	27	13
Nitronex	7	7	3	0	6	0	0	23	14

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About the Competitive Landscape report

Publication date: November 2012. The report price is \$4,950.00. For multiple report discounts, please contact VQ@venture-Q.com or +1 408 300 1494 (phone) or +1 408 440 1716 (Fax). Reports are delivered via e-mail as PDF files.

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