

# Preliminary iPhone SE Teardown: Full RF Content in a Value Phone

## Summary

We take a look at a preliminary teardown of the newly released iPhone SE. The SE, despite being a value 4" phone, appears to carry the full RF capability with only band 23/43 support missing versus the 6S/6s+. While SE is expected to ship fewer units, it should still be a net content tailwind for the RF suppliers. Overall, content appears to be inline with expectations.

## Key Points

**A look at the iPhone SE, based on a teardown from Chipworks, is shown below.** We take a look at the 4" iPhone SE (retailing at \$399) versus the last 4" 5s (which retailed at \$449) and the 4.7"/5.5" 6s/6s+. The SE appears to carry the full RF support, with only bands 23/43 support missing versus the 6s/6s+. The SE also carries a 12MP camera versus 8MP in the 5s. As we show below, what stands out is that RF content on the 4" SE is significantly higher than the 4" iPhone 5s, pointing to the L-T trend with increasing RF front-end content. This teardown of the iPhone SE carries a QCOM baseband, though there is potential for subsequent iPhone models to be second-sourced with an INTC modem for specific geographies.

Company	Symbol	Price (3/31)	Rating		
			Prior	Curr	PT
Broadcom Limited	AVGO	\$154.50	-	Buy	\$175.00
NXP Semiconductors NV	NXPI	\$81.07	-	Buy	\$120.00
Qorvo, Inc	QRVO	\$50.41	-	Buy	\$50.00
QUALCOMM Incorporated	QCOM	\$51.14	-	Neutral	\$47.00
Skyworks Solutions, Inc.	SWKS	\$77.90	-	Buy	\$105.00

Source: Bloomberg and Mizuho Securities USA

GSM-CDMA TD-LTE Bands	iPhone SE - 2016		iPhone 5s - 2013		iPhone 6s/6s+ - 2015	
	1,2,3,4,5,8,12 13,17,18,19,20,25,26,29 TD-LTE (38,39,40,41)		1, 2, 3, 4, 5, 7, 8, 13, 17, 18, 19, 20, 2, 26, 38, 39, 40 (Tiered)		All Phones LTE-with Band700 Roaming Added bands 12, 23, 43 Has LTE-A and MIMO	
	Part	\$ Content	Part	\$ Content	Part	\$ Content
Skyworks	SKY77611 Power Amplifier Module	\$1.10	low Band LTE Pad 77810-12	\$1.50	SKY77812 Power Amplifier Module	\$2.00
	SKY77826-16 PAD	\$1.50	Mid Band PA 77355-12	\$1.50	SKY77357 Power Amplifier Module	\$1.90
	SKY77357-8 Power Amplifier	\$1.00		\$3.00	SKY13701 WLAN Front-End Module	\$0.50
		\$3.60				\$4.40
Avago/ Broadcom	BCM5976 Touch Screen Controller	\$0.75	A790720 PAD-4G	\$1.60	AFEM-8030 Power Amplifier Module	\$3.00
	ACPM-8020 PAD	\$2.75	A7900 Pentaband MMPA	\$1.30	Other FBAR Filter/ Bands	\$2-\$3
	Other FBAR Filter/ Bands	\$1.00	Other FBAR Filter/ Bands	\$0.50-\$0.80		~\$5.50
		\$4.50		\$3.40		
Qorvo	TQF6410 EDGE PAD	\$1.30			TQF6405 Power Amplifier Module	
	ASM RF5159	\$0.75			RF5150 Antenna Switch	
	WLAN co-exist	\$2.05				
Qualcomm	MDM9625M Modem		MDM9615M LTE Modem		MDM9635M LTE Cat. 6 Modem	
	WTR1625L RF Transceiver		WTR1605L Transceiver	~\$17-\$18	QFE1100 ET	
	QFE1100 envelope tracker	\$15-\$18			RF Transceiver/PMIC	~\$20-\$22
NXP	(Integrated into A9 processor)		M7 Motion Sensor Hub	\$0.60-\$0.80	(Integrated into A9 processor)	
	NXP 1610A3 Display Controller	\$0.30	Logic/Memory/Audio Interfaces		NXP 1610A3 Display Controller	\$0.30
	NXP 66V10 NFC Controller+SE	\$1.20	8-Pin Connector Auth (NX20P)	\$0.80-\$1.00	NXP 66V10 NFC Controller+SE	\$0.90
	Logic/Memory/Audio Interfaces	\$0.40			Logic/Memory/Audio Interfaces	

Source: Apple Company Reports, Chipworks, Mizuho Securities research

**Some disclaimers.** We would note that this is a preliminary teardown, and there are multiple components such as discrete filters that are harder to identify on teardown given their miniature size. **Overall, we believe content is inline with expectations.** No estimate changes here.

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## Glossary

~ - approximately	eMMC - Embedded managed NAND solution	HSA - heterogeneous system architecture combining x86 and ARM	NAND - "not and," a type of memory	QCT - Qualcomm chip technologies
1H - First Half	EBITDA - earnings before interest, taxes, depreciation and amortization	HSD - high single digits	NB - notebook	QTL - Qualcomm technology licensing
2G/3G/4G - 2nd generation, third generation, 4th generation wireless	eCT - Embedded Charge Trap Technology	I/O - input output operations	NDRC - National Development and Reform Commission in China	R&D - research and development
2H - Second Half	eMCP - embedded multi-chip module using DRAM and NAND	IC - integrated circuits	NEO - Named Executive Officers	Rev - revenues
3G/4G - Third generation / Fourth generation	EMV - Europay, MasterCard and Visa, a payment consortium	IoT - internet of things	NFC - near field communications	RF - radio frequency
4G-LTE - Fourth generation, long term evolution	EOY - end of year	IP - intellectual property	nm - nanometer	ROI - return on investment
ADAS - Automotive driver assist systems	EPS - earnings per share	ISM - Institute for Supply Management	NOL - Net Operating Losses	RSP - Renesas Semiconductor products/Drivers
APU - accelerated processing unit	ET - envelope tracking	ITC - International Trade Commission	NOR - a type of non-volatile storage memory	RSU - Restricted Stock Units
ARM - a family of instruction set architectures used for processors for computers, servers, etc.	ETD - Emerging Technologies Division	ITU - International Telecommunication Union	NPV - net present value	SAS - serial attached SCSI (small computer system interface)
ASIC - application specific integrated circuits	EU - European Union	JPY - Japanese yen	NVMe - Non-volatile Memory Express	SAW - surface acoustic wave filters
ASP - average selling price	EV - enterprise value	JV - joint venture	NYSE - New York Stock Exchange	SDH - Synchronous Digital Hierarchy, mostly in Europe
ASPs - average selling prices	EVP - Executive Vice President	K - Thousand	ODM - original design manufacturer	SEC - Securities and Exchange Commission
ATM - Asynchronous Transfer mode	F - Fiscal	Kbps/Mbps - Kilobit per second/Megabit per second bandwidth	OEM - original equipment manufacturer	SG&A - Sales, General and Administrative
B - Billion	F14 - Fiscal year 2014	KGD - Known Good Die	OFN - optical finger navigation	SMIC - Semiconductor Manufacturing International Corporation
BAW - bulk acoustic wave filters	F15 - Fiscal year 2015	Kwpm - thousand wafer per month capacity	OLT - Optical Line Termination or Terminal	SoC - system on chip
BiDi - Bi Directional	F16 - Fiscal year 2016	LIBOR - London Interbank Offered Rate	OM - operating margin	SONET - Synchronous Optical Network, used in North America
BOM - bill of materials	FASB - Financial Accounting Standards Board	LSI - now part of AVGO with the acquisition	ONU - Optical Network Unit	SOX - Philadelphia semiconductor index
bps - basis points	FBAR - film bulk acoustic resonator, a type of filter	LSD - low single digits	Opex - operating expenses	SRAM - static random access memory
CA - carrier aggregation	FBAR/BAW -Film Bulk acoustic resonator/Bulk acoustic wave Filters	LT - long term	P/B - price to book value ratio	SSD - solid state drive
CAGR - compound annual growth rate	FCF - free cash flow	LTE - long term evolution, a 4th generation wireless protocol	P/E - price to earnings	TAM - total available market
CAPEX - capital expenditures	FP - finger print	LY - last year	P/S - price to sales	TD - time division
CEO - Chief Executive Officer	FSL - Fujitsu Semiconductor Limited	m - Meters	PA - power amplifier	TTDI - touch display driver integration
CES - consumer electronics show	FT - force touch	M - Million	PAD - power amplifier duplexer, essentially 2 filters and a Power amplifier	TD-SCDMA - Time Division Synchronous
CF - cash flow	FTC - Federal Trade Commission	M&A - mergers and acquisitions	PC - personal computer	TLC - triple level cell
CFO - Chief Financial Officer	FY - fiscal/full year	MB - megabyte	PCIe - Peripheral Component Interconnect Express	TSR - Total Shareholder Return
COO - Chief Operation Officer	GAAP - generally accepted accounting principles	Mbps - megabit per second	PMI - Purchasing Managers' Index	Tx/Rx - Transmit / Receive
CSP - chip scale packaging	Gb/GB - gigabytes/Gigabit	MCU - micro controller unit	PMIC - Power Management Integrated Circuit	USB - universal serial bus
CY - calendar year	Gb/s - Gigabit per second	MHz - megahertz	PSD - Programmable systems division	wpm - wafer per month
D/E - debt to equity	GF - Global Foundries	MIMO - multiple in, multiple out	PSoC - programmable system on a chip	x86 - Intel based processor architecture
DCF - discounted cash flow	GHz - gigahertz	MLC - multi level cell	PSUs - Performance Stock Units	XMC - Wuhan Xin Xin Semiconductor Manufacturing Corporation
DoD - Department of Defense	GM - gross margin	MoE - merger of equals	PT - price target	y/y - year over year
DRAM - dynamic random access memory	GPU - graphics processing unit	MSD - mid single digits	Q - quarter	YE - year end
DT - desktop	HDD - hard disk drive	MSM - multi station modems, QCOM's QCT chips	q/q - quarter over quarter	YTD - year to date

## Price Target Calculation and Key Risks

### *Broadcom Limited*

**Price Target:** We rate AVGO Buy with a \$175PT. Our PT reflects a multiple of 14.3x our F17E EPS of \$12.24. We believe AVGO will continue to drive margins higher as it closes some very accretive acquisitions this year (such as Emulex).

**Risks:** AVGO competes in a cyclical, technologically intensive industry and sells to a concentrated customer base. Its ability to meet AVGO's financial expectations and achieve future growth is subject to a number of risk factors, including, but are not limited to, the following:

#### **Market Risks include, among other factors:**

- AVGO's continued success of its research and development efforts and timely introduction and execution of its new products.
- AVGO depends on contract manufacturing and third-party manufacturers and also substantial capital investments at its Fort Collins Fab.
- Customer concentration, competition, and pricing pressure from other low-cost OEMs, ODMs and suppliers, possible new market entrants from China, Asia-Pacific, or Taiwan.
- Unexpected changes in legal and regulatory requirements, tariffs and exchange rates, political and economic stability, staffing and management issues, and potentially adverse tax consequences for its international operations.

#### **Technology Risks include, among other factors:**

- Potential loss of intellectual property, Commercialization of competing technologies.
- Litigation Risks.
- Adverse effects of potential existing and possible future patent or other litigation.

### *NXP Semiconductors NV*

**Price Target:** We have NXPI at a Buy rating and a \$120PT. Our PT represents a P/E multiple of approximately 14.7x our post-FSL merger EPS of \$8.19 for F17E and takes into consideration our expectations for approximately \$3B of FCF. We believe that multiple product cycles with EMV, NFC, Automotive, synergies, execution and a focus on cash flow position NXPI well into 2016-17E.

**Risks:** Among the risks to our recommendation and price target are the following factors:

- 1) NXPI has high debt relative to peers;
- 2) NXPI has a big automotive exposure and any slowdown there could impact outlook;
- 3) NXPI has exposure in key cyclical NFC markets;
- 4) Other risks include competition, new technologies, IP, and licensing;

- 5) NXPI also has a significant exposure ~40%+ of revenues from China;
- 6) NXPI is also exposed to key smartphone cycles including Apple; and
- 7) NXPI competes in cyclical markets and is as such exposed to macro-economic, technology, competitive and litigation risks and also pending regulatory approvals on key mergers.

### ***Qorvo, Inc***

**Price Target:** Our \$50PT is based on ~10.0x F17E EPS of \$5.02. We see continued execution, leverage, improving margins, cost synergies and solid product cycles ahead.

**Risks:** QRVO competes in a cyclical, technologically intensive industry and sells to a concentrated customer base. Its ability to meet its own or our financial expectations and achieve future growth is subject to a number of risk factors, including, but are not limited to, the following:

- QRVO's failure to realize all the benefits associated with the RFMD-TriQuint merger
- QRVO's ability to accurately predict customer demand, avoiding obsolete inventory;
- Competition and pricing pressure from other low-cost OEMs, ODMs and suppliers;
- Increasing 4G penetration and/or 4G slowdown,
- Possible new market entrants from China, Asia-Pacific, or Taiwan; and
- Unexpected changes in legal and regulatory requirements, tariffs and exchange rates, political and economic stability, staffing and management issues, and potentially adverse tax consequences for its international operations;
- Potential loss of intellectual property, Commercialization of competing technologies;
- Litigation Risks;
- Adverse effects of potential possible future patent or other litigation.

### ***QUALCOMM Incorporated***

We have QCOM with a Neutral rating and a \$47 PT, based on ~10.0x our F17E EPS of \$4.55, as QCOM faces a slowdown in the overall handset market, pricing pressure in its key processor markets, competition from Mediatek and Spreadtrum in China and lower handset ASPs pressuring royalty revenues. QCOM has traded between 8-17x forward P/E in the last 5 years.

**Risks:** QCOM competes in a technologically intensive and cyclical industry and we believe the risks to QCOM continue to be a slowdown in the handset market, lower royalties, competition from China handset suppliers. Also increasing handset market share between Apple and Samsung has implied less merchant processor opportunity for QCOM.

### ***Skyworks Solutions, Inc.***

**Price Target:** We rate SWKS Buy with a \$105 PT. Our target price reflects our view that a P/E of 18.1x our F16E EPS of \$5.79 as SWKS benefits from higher RF growth but sees current headwinds in the iPhone supply chain. Note that our F16E estimates for

revenue and EPS are \$3.4B and \$5.82 per share, respectively, while our F17E estimates call for revenue of \$3.8B and EPS of \$7.24.

**Risks:** SWKS competes in a cyclical, technologically intensive industry and sells to a concentrated customer base. Its ability to meet its own or our financial expectations and achieve future growth is subject to a number of risk factors, including, but are not limited to, the following:

**Market Risks include but are not limited to:**

- SWKS's continued success of its research and development efforts and timely introduction and execution of its new products;
- SWKS depends on contract manufacturing and third-party manufacturers;
- Customer concentration, competition and pricing pressure from other low-cost OEMs, ODMs and suppliers;
- And possible new market entrants from China, Asia-Pacific, or Taiwan; and
- Unexpected changes in legal and regulatory requirements, tariffs and exchange rates, political and economic stability, staffing and management issues, and potentially adverse tax consequences for its international operations.

**Technology Risks include but are not limited to:**

- Potential loss of intellectual property, Commercialization of competing technologies.
- Litigation Risks
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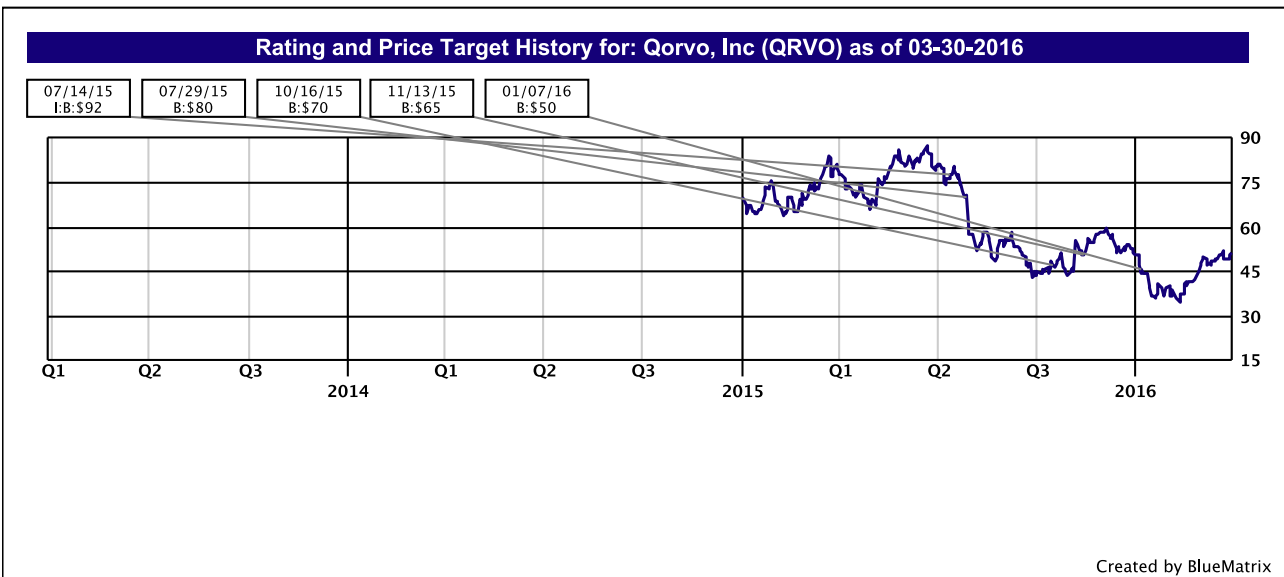
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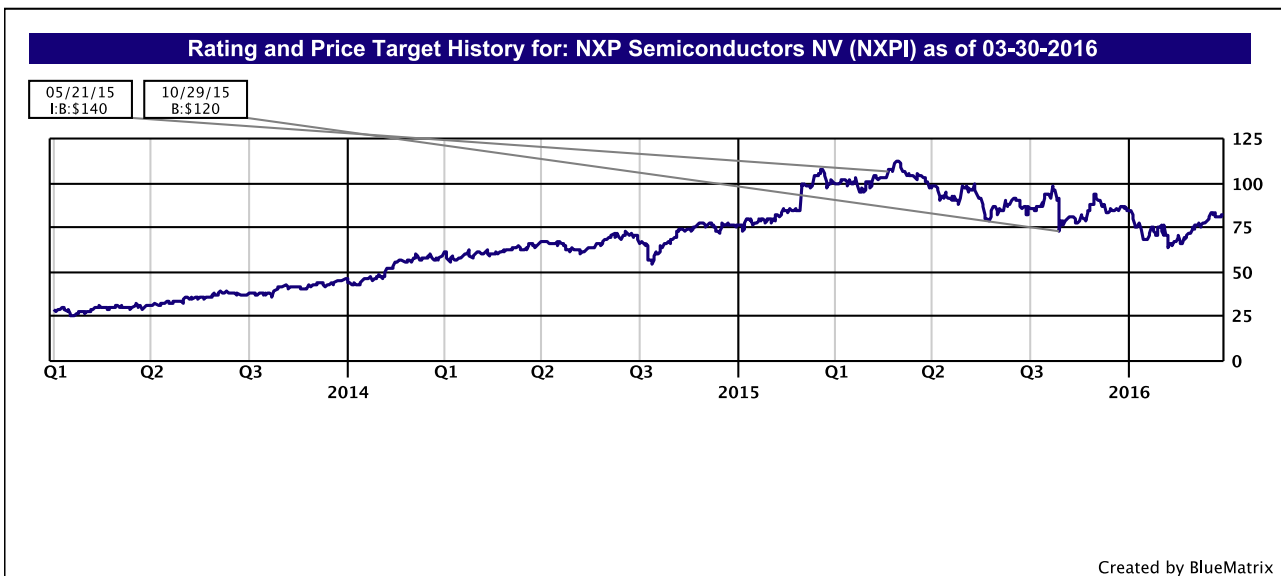
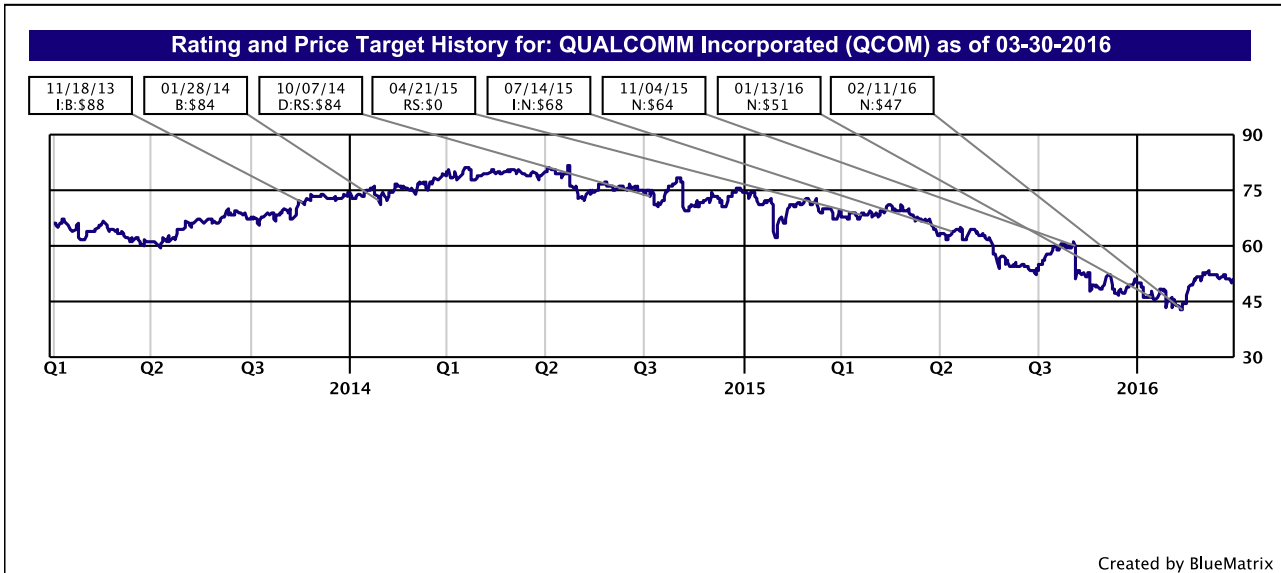
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