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Analog Cycle Update

Augmenting Analog Stance by Adding Yield Entering 2H13; Upgrade ADI & MCHP to Buy; Downgrade MXIM to Neutral

- **What's New** — Our recent checks indicate analog demand appears constructive entering June. These checks mollify our prior concern that sluggish ISM would suppress 2Q demand. Based on these checks and recent cycle work we: 1) take a more constructive stock stance adding yield (ADI, MCHP) to our quiver – we upgrade ADI and MCHP to Buy from Neutral, and upgrade LLTC to Neutral from Sell, and separately 2) downgrade MXIM to Neutral from Buy, reflecting our increasing bias toward long-tailed cyclical stocks versus our prior 2-yr stance favoring smartphone suppliers. Mid-cap picks: #1 AVGO, #2 MCHP, #3 ADI; Small-cap: #1 MX, #2 SLAB, #3 SMTTC (Fig 1).
- **Observation 1: Analog Semi Cycle Accelerating into 2H13** — YY sales growth is set to accelerate to +10% in 4Q13 and remain healthy at ~10% in 1H14 (Fig 4). Margins, utilization and inventory should *gradually* improve in 2H13 (Fig 5 and 6). Fundamentals limit the likelihood of a *sharp* 2H bounce snap-back though, which affirms our addition of yield stocks ADI/MCHP (which are also defensive) versus high Beta stocks (Fig 3).
- **Observation 2: Valuation Favors Yield vs. Smartphone Suppliers** — We position toward yield vs. smartphone to reflect our belief that valuation differentials could widen (rather than revert) into 2014 based on: a) increasing global yield appetite, and b) our view that smartphone deceleration / commoditization concerns could get worse before they get better (Fig 8 & 9). Overall analog F12M P/E multiples increased to 1.1x from 0.9x vs. the SP5 the past 2 years. By segment: a) high dividend yield (ADI, LLTC, MCHP) increased 20% to 1.3x from 1.1x between 1Q11-1Q13, b) commodity (FCS, ONNN) +59% to 1.1x from 0.7x, and c) handset (AVGO, MXIM) declined 9% to 1.0x from 1.1x.
- **Action 1: Downgrade MXIM** — We downgrade MXIM to Neutral from Buy and lower our target price to \$33 from \$39 using modestly lower multiples. MXIM outperformed the group 20-pnts in '11 and 15-pnts in '12, but has underperformed 6-pnts in '13 on Samsung concentration concerns. To wit, MXIM's relative P/E compressed to 1x SP5 from 1.3x 1 year ago. Samsung in-sourcing could pressure this multiple another 10-20bps, and offset the likely sales/EPS upside we envision heading into 3Q13's peak build period.
- **Action 2: Upgrade Yield Names** — We upgrade ADI/MCHP to Buy from Neutral and upgrade LLTC to Neutral from Sell (see pages 11-15). We see stock upside driven by fundamental growth + multiple expansion: valuation can improve as cash returns build and investors recalibrate lower risk inherent in their long-tail customer bases.

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Company	Ticker	Rating		Target Price		Current Year Earnings Estimates	
		Old	New	Old	New	Old	New
Analog Devices	ADI	2	1	US\$48.00	US\$54.00	US\$2.09	US\$2.09
Linear Tech	LLTC	3	2	US\$33.00	US\$38.00	US\$1.70	US\$1.70
Microchip Tech	MCHP	2	1	US\$39.00	US\$47.00	US\$2.06	US\$2.06
Maxim Integrated	MXIM	1	2	US\$39.00	US\$33.00	US\$1.79	US\$1.79

See Appendix A-1 for Analyst Certification, Important Disclosures and non-US research analyst disclosures.

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Analog Cycle Update and 2H13 Look Ahead

1. Rankings, Changes, and Analog Buy Menu

Figure 1. Analog Buy Menu

Stocks	ETR %	Investment Style
Mid-Cap Picks		
#1 AVGO	33%	GARP, Hybrid (smartphone + industrial exposure)
#2 MCHP	33%	Yield, Long-Tail
#3 ADI	22%	Yield, Long-Tail
Small-Cap Picks		
#1 MX	39%	Deep Value
#2 SLAB	18%	Small Cap, Quality Growth
#3 SMTC	15%	Small Cap, Quality Growth

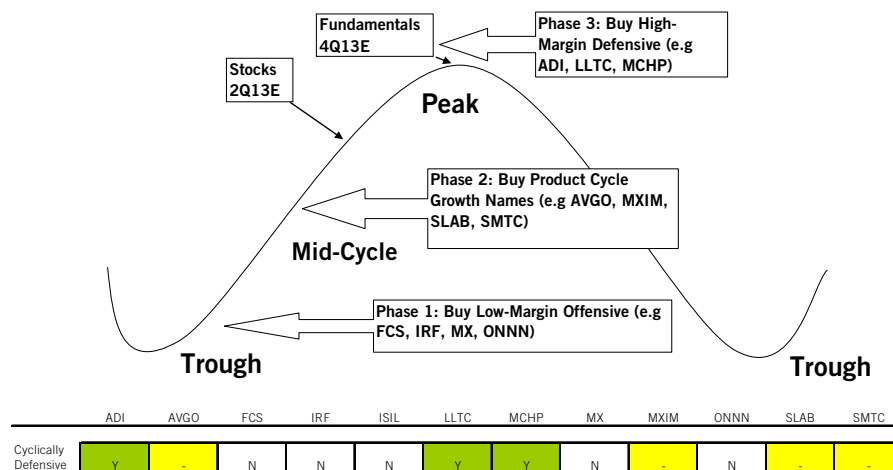
Source: Citi Research

Figure 2. Summary of Changes

MXIM	To Neutral from Buy - Target Price to \$33 from \$39 <i>High Samsung Exposure; Smartphone Multiple Compression</i>
ADI	To Buy from Neutral - Target Price to \$54 from \$48 <i>Broad Analog Appeal; Multiple Expansion on FCF Return</i>
MCHP	To Buy from Neutral - Target Price to \$47 from \$39 <i>Broad Analog Appeal; Multiple Expansion on FCF Return</i>
LLTC	To Neutral from Sell - Target Price to \$38 from \$33 <i>Broad Analog Appeal; Multiple Expansion on FCF Return</i>

Source: Citi Research

Figure 3. Semiconductor Cycle Fundamentals and Stocks



Source: Citi Research

Top Analog Buy-Rated Ideas:

A) Mid-Cap Picks:

#1 Avago Technologies (Buy 1, Target Price: \$45, ETR: 33%)

- **Contrarian View: Smartphone Commoditization Actually Plays to AVGO's Favor** — AVGO's FBAR filters could permeate low-to-mid end smartphones that may require increased precision filtering because of CMOS RF front ends. In order to add bands and reduce cost, suppliers like QCOM (with its 360 platform) are attempting to disruptively add standard silicon (CMOS) front ends. CMOS front ends are 50%+ cheaper than current gallium arsenide technology, but show significantly lower signal integrity and linearity. This should help increase AVGO's FBAR filter attach rate and sustain ~20% wireless growth in coming years. Note, AVGO acquired an RF CMOS startup recently to improve its systems IP so that it can develop better filters for this type of architecture.

- **Wireless Driven Growth Resumes in 2H13** — AVGO discounts soft Jul-Q guidance already telegraphed by Apple supply chain suppliers CRUS, SWKS, QCOM, and BRCM. Beyond July, 2H13 AAPL and Samsung ramps should augment steady albeit gradual industrial and communication demand improvements driving Oct-Q above Street expectations (we model +16% qq / \$675M versus the Street's +8% / \$648M).
- **CyOptics Acquisition Accretive to CY13/14' Street Estimates** — The recent acquisition of CyOptics strengthens AVGO's fiber optics portfolio for 40G and 100G applications. Our pro forma analysis shows the CyOptics acquisition can add \$0.10 and \$0.25 in accretion to our/Street's current AVGO CY13/14 estimates. We assume CyOptics revenues can grow 10% CAGR thru 2013-15' or in-line with AVGO's long-term target revenue growth model with margins slightly dilutive to AVGO's corporate margins in the near-term. Longer term, we expect CyOptics to hit 50% / 30% long-term target model exiting FY14 or in-line with management's expectations.
- **Valuation:** P/E – 11.1x C14E or 9.6x ex-cash, 13.3x \$2.60 cross-cycle EPS or 11.5x ex-cash; 11.3x C14E P/FCF.

#2 Microchip Technologies (Buy 1, Target Price: \$47, ETR: 33%)

- **Solid Shareholder Return Coupled with Improved Margins** – MCHP has consistently offered an above analog average dividend yield (currently at 3.9% vs the analog average 2.1%). Due to cost synergies being realized from the now complete integration of SMSC, we model operating margins to expand by 540bps and gross margins to increase by 170bps by the year-end. We also anticipate MCHP to increase FCF margins by 390bps while still maintaining an almost steady increase in its quarterly dividend.
- **Management Acknowledged M&A a Growth Vehicle... and Does it Well...** – MCHP management has demonstrated keen and sharpening capabilities to integrate acquisitions over the past decade, including in analog (Telcom, SMSC) and memory (SST). We believe investors are beginning to acknowledge M&A growth capabilities as an advantage, so believe future activity here could further bolster sentiment, in addition to fundamental growth potential.
- **Market Share Gains** – According to Gartner, MCHP gained market share in the 16-bit MCU market in 2012 moving to #6 position from #8 position. We believe MCHP remains #2 in the 8-bit MCU market.
- **Valuation:** P/E – 15.0x C14E or 13.4x ex-cash, 18.5x \$1.97 cross-cycle EPS or 16.5x ex-cash; 16.6x C14E P/FCF.

#3 Analog Devices (Buy 1, Target Price: \$54, ETR: 22%)

- **Core Analog Defensive Holding:** We view ADI as a core analog holding because of its attractive 3% dividend yield, franchise data converter market position, solid or 20% of sales auto exposure, and strong management track record. While ADI's analog competitors typically focus on power management markets, ADI offers mixed-signal chips expertise for signal processing. ADI was ranked #1 in data converters with +50% 2012 share.
- **Cash Return Strategy Should Help Expand Multiple** — ADI recently announced it would return ~80% of FCF through a combination of dividend and buyback over the next five years, above the 60% rate the past three years. Increased cash return (dividend the preferred means) should help expand ADI's multiple, in our view. Our analysis shows ADI P/E multiple vs. the SP500 expanded to 1.4x from 0.9x or in-line with FCF return over the last three years.

- **Valuation:** P/E – 17.8x C14E or 13.7x ex-cash, 19x \$2.40 cross-cycle EPS or 14.6x ex-cash; 16.5x C14E P/FCF.

B) Small-Cap Picks:

#1 MagnaChip (Buy 1, Target Price: \$25, ETR: 39%)

- **Foundry Utilization Recovery in 2H13** – We expect MX's foundry utilization rate and gross margin will accelerate in 3Q13 and potentially drive upside to Street estimates. 'Home field advantage' with Samsung and LG coupled with low cost manufacturing capabilities should sustain strong future OEM relationship. MX's unique hybrid model also allows it to quickly adjust to changing demand to optimize revenue/margin mix.
- **Valuation Dislocated from Fundamentals – Should Improve Meaningfully** – MX generates ~15% operating margins and ~20%+ ROIC yet trades near 6x PE and 0.7x EV/S. We see potential for 50%+ multiple expansion in the coming 1-2 years. Several factors should catalyze higher valuation: 1) MX continuing to deliver steady execution (management has delivered 9 steady quarters since IPO in a challenging semi backdrop), 2) private equity ownership lowering from 20%+ recently, and 3) MX demonstrating improved growth in its power and display businesses.
- **Broadening Foundry Exposure Outside of Handsets** – We believe MX is stepping up its efforts to attract a wider variety of US foundry customers. We view this initiative favorably as it could lower utilization risk by diversifying outside of mobile, while also potentially expanding foundry gross margin by tapping a longer-tail of lower-volume US fables mixed signal chip companies.
- **New Strategic Initiatives to Add Growth to** — MX is targeting new strategic initiatives to augment growth which include: 1) a new product line of sensor ICs and an e-compass solution within their display business, 2) expanding premium PMICs and battery protection through super-junction design solutions within their power business, and 3) broadening mixed signal / BCD process technologies and green energy solutions within their foundry business. We model MX's power solutions business to grow 15% Y/Y outperforming foundry (+8% Y/Y) and display solutions (down 5%) in 2014.
- **Valuation:** P/E – 5.9x C14E or 6.1x ex-cash, 7.8x \$2.29 cross-cycle EPS or 8.1x ex-cash, and 8.4x C14E P/FCF.

#2 Silicon Laboratories (Buy 1, Target Price: \$49, ETR: 18%)

- **Bright 2014 Growth Outlook** — We see potential for SLAB to grow 10%-15% Y/Y in 2014 vs. Street's +8% growth driven by: a) MCUs + wireless (29% C12 sales) which should grow 18%/19% in C13/C14 helped by new 32-bit offerings and bundling with Zigbee low power radios, b) timing (13% C12 sales) should grow 11%/15% in C13/C14, c) video tuners (17% C12 sales) where record design wins can drive 33%/15% growth in C13/C14, and d) consumer audio (12% C12 sales) should grow 10%/9% in C14/C15 as SLAB penetrates the \$100M auto market opportunity.

- **Legacy Biz Slow down Priced-In** — After issuing conservative 2Q guidance due to accelerated phase-out of legacy products (touch, handsets, and modems), SLAB is setup for 2H acceleration in the high margin broad based segments like MCU/timing. With only 8% remaining in legacy revenues, we expect lower future quarterly revenue volatility/risk to benefit the stock. Gross margins are set to expand ~100bps in Jun-Q due to the product mix shift towards higher margin MCU and timing products.
- **Valuation:** P/E – 18.5x C14E or 16.5x ex-cash, 25x \$1.64 cross-cycle EPS or 22.6x ex-cash, and 18.6x C14E P/FCF.

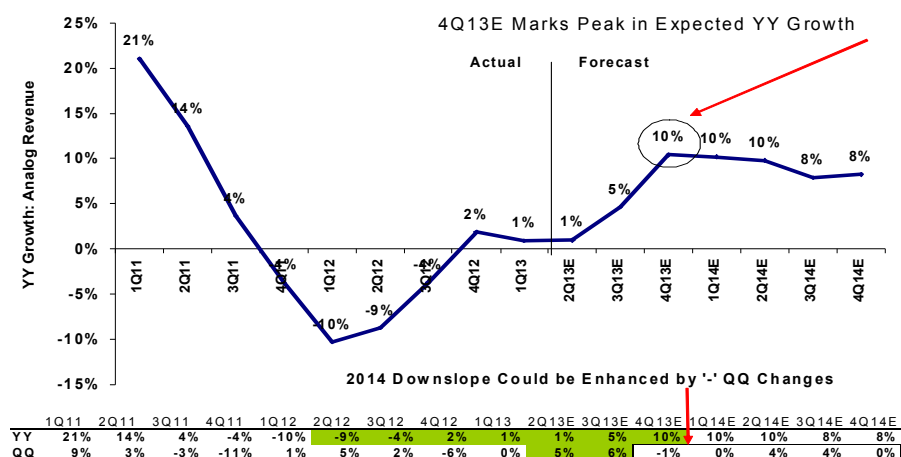
#3 Semtech (Buy 1, Target Price: \$42, ETR: 15%)

- **Above Average Communications Growth in 2013** – We model CY13/14 sales 1.4%/2% above Street based on a) strong 100G Serdes ramps on increased global deployments of wireless base stations, b) rising protection demand from more protection ports per smartphone devices, and c) strong Gennum growth driven by enterprise computing where data center uptake of clock and data recovery chips remain robust.
- **New Handset Ramps in 2H13 Bodes Well for Protection Biz** – We expect SMTc's protection biz (36% of sales) to continue to increase in 2H13 driven by new ramps at Samsung (12% of sales) and Chinese smartphone makers. Long-term, increasing number of ports per smartphone should continue to drive solid growth in protection business. SMTc is the only fabless competitor in this market with performance, engineering talent, and form factor as key differentiators.
- **Valuation:** P/E – 17.7x C14E or 18.4x ex-cash, 22.7x \$1.60 cross-cycle EPS or 23.6x ex-cash, and 12.7x C14E P/FCF.

2. Where Are We in the Analog Semi Cycle?

- **YY Sales Growth:** Analog growth should peak at +10.3% in 4Q13E and decelerate in 1H14, with deceleration pronounced in 2H14. The Street dovishly models 1H14 deceleration because 4Q13E estimates assume an above-seasonal -1% qq decline after healthy expected growth 2Q13E / 3Q13E.

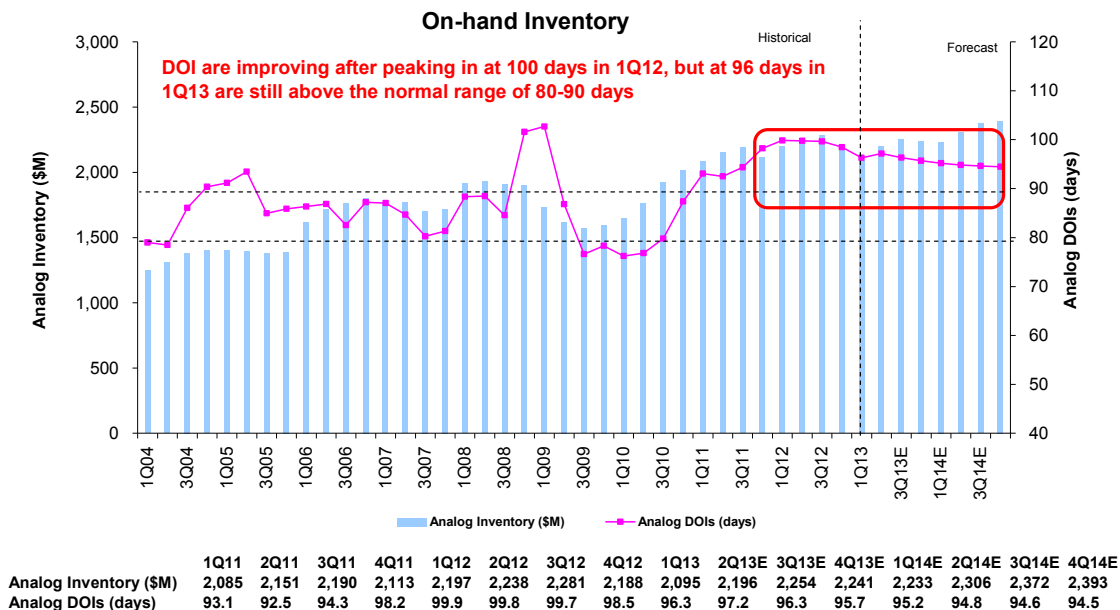
Figure 4. Analog YY Sales Growth (1Q11 – 4Q13E)



Source: Citi Research, Company Reports

- Inventory:** DOIs improved to 96.3 in 1Q13, down from 1Q12's 99.9 peak. Inventory remains chronically elevated versus the prior decade – we believe this limits need for distributors to re-stock thus tempering upcycle velocity.

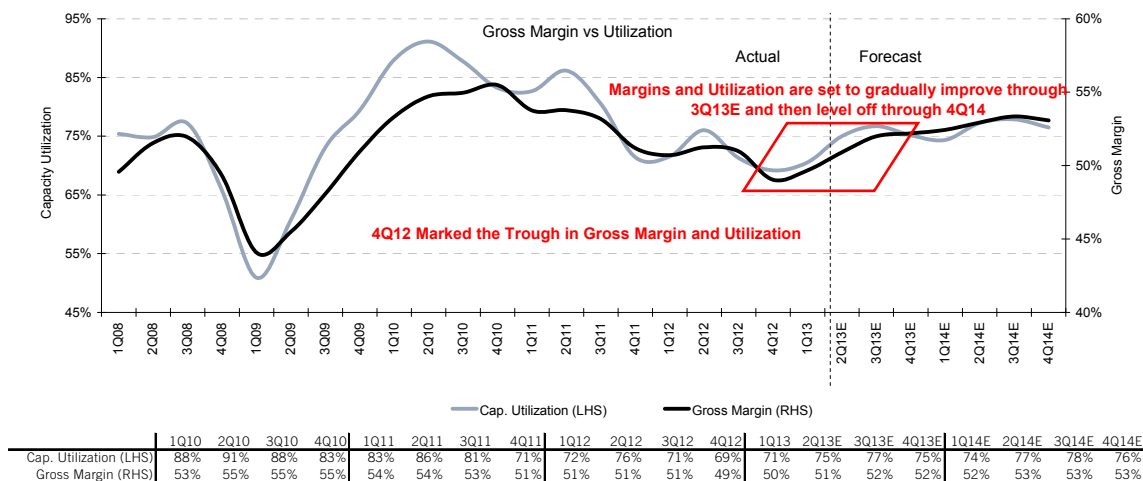
Figure 5. Analog Inventory Dollar and DOI (1Q04 – 4Q11E)



Source: Citi Research, Company Reports

- Gross Margin:** Gross margins deflated to 50% in 1Q13 from 54% in 1Q11 while utilization dipped to 71% from 83% in the same period. We forecast improvement into 2014 albeit gradually with utilization remaining below peak levels based on our modeling.

Figure 6. Gross Margins vs Utilization (1Q08 – 4Q13E)



Source: Citi Research, Company Reports

3. Stock Price Performance and Valuation Analysis

A. Stock Performance and NTM Relative P/E to SP500

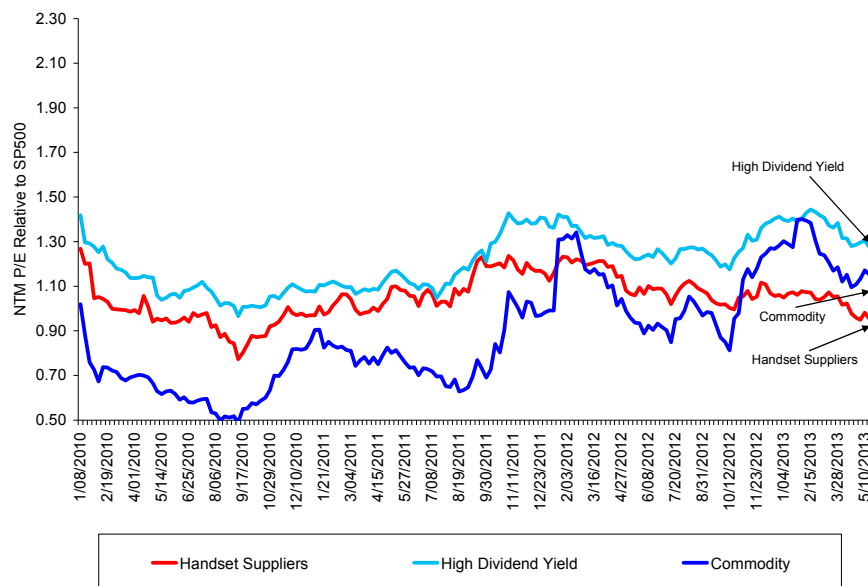
- Analog stocks gained 11.2% in 1Q13 matching the S&P500's 10.8% move. So far in 2Q13, analog underperformed the S&P by 6% reflecting weakness in the communications sector coupled with soft ISM data.
- Top YTD performers IRF (+23%), SMTC (+21%), MCHP (+13%), MX (+12%), and ONNN (+12%).

Figure 7. Analog Stock Performance (1Q10 – 2Q13 QTD)

		1Q10	2Q10	3Q10	4Q10	1Q11	2Q11	3Q11	4Q11	1Q12	2Q12	3Q12	4Q12	1Q13	2Q13 QTD	YTD	Rank
Stock Performance	ADI	-8.1%	-2.6%	13.5%	20.8%	5.1%	0.0%	-19.5%	15.3%	13.8%	-6.0%	4.8%	8.1%	11.4%	-2.8%	8.6%	6
	LLTC	-6.8%	-0.8%	11.3%	13.4%	-2.1%	-1.1%	-15.5%	9.4%	13.1%	-6.3%	2.4%	9.4%	11.9%	-3.5%	8.3%	8
	MCHP	-1.8%	-0.3%	14.7%	10.9%	11.1%	0.6%	-17.0%	18.9%	2.5%	-10.1%	0.0%	0.7%	13.9%	-1.1%	12.8%	3
	AVGO	12.4%	2.4%	6.9%	26.5%	9.7%	22.5%	-13.5%	-11.6%	35.5%	-7.5%	-2.4%	-8.8%	14.1%	-5.5%	8.6%	7
	MXIM	-3.5%	-12.7%	12.0%	28.8%	9.2%	0.6%	-7.8%	12.6%	10.6%	-9.5%	4.7%	11.5%	11.8%	-7.8%	4.0%	9
	SLAB	-1.5%	-14.9%	-9.6%	25.6%	-6.1%	-4.5%	-18.7%	29.5%	-1.0%	-12.0%	-2.9%	13.7%	-1.1%	3.9%	2.8%	10
	SMTC	2.5%	-6.1%	23.3%	12.1%	10.5%	9.3%	-22.8%	17.6%	14.7%	-14.5%	3.4%	15.2%	22.3%	-1.7%	20.6%	2
	FCS	6.6%	-21.0%	11.8%	66.1%	16.6%	-8.2%	-35.4%	11.5%	22.1%	-4.1%	-7.0%	9.8%	-1.8%	-2.4%	-4.2%	11
	IRF	3.5%	-18.7%	13.3%	40.8%	11.4%	-15.4%	-33.4%	4.3%	18.8%	-13.4%	-16.5%	6.2%	19.3%	3.6%	22.9%	1
	ONNN	-9.3%	-20.3%	13.0%	37.0%	-0.2%	6.2%	-31.4%	7.5%	16.7%	-21.2%	-13.0%	14.1%	17.4%	-5.0%	12.4%	4
	MX							-41.7%	11.3%	60.4%	-20.6%	23.8%	34.9%	8.7%	3.1%	11.9%	5
	Analog Group	-1.4%	-9.1%	8.1%	24.5%	4.3%	0.6%	-19.9%	11.7%	12.6%	-9.5%	-1.6%	6.7%	11.2%	-1.6%	9.4%	
	SP500	4.9%	-11.9%	10.7%	10.2%	5.4%	-0.4%	-14.3%	11.2%	12.0%	-3.3%	5.8%	-1.7%	10.8%	5.7%	17.1%	

Source: Citi Research, Factset

Figure 8. NTM Relative P/E to SP500 by Segment (Jan 2012 – Present)



Source: Citi Research, FactSet

Figure 9. Multiple Expansion by Segment 1Q10 – 2Q13 QTD)

	1Q10	2Q10	3Q10	4Q10	1Q11	2Q11	3Q11	4Q11	1Q12	2Q12	3Q12	4Q12	1Q13	2Q13	Multiple Change 2Q11-2Q13
High Dividend Yield	ADI	0.9	1.0	0.9	1.0	1.0	1.0	1.3	1.3	1.3	1.2	1.5	1.5	1.4	20%
	LLTC	1.1	1.1	1.0	1.1	1.1	1.1	1.3	1.3	1.3	1.2	1.5	1.6	1.4	
	MCHP	1.1	1.0	1.0	1.0	1.2	1.2	1.3	1.6	1.4	1.3	1.2	1.4	1.2	
	Average	1.1	1.0	1.0	1.0	1.1	1.1	1.2	1.4	1.3	1.2	1.5	1.5	1.3	
Commodity	FCS	0.7	0.6	0.5	0.8	0.8	0.7	0.9	1.3	1.2	1.1	1.5	1.5	1.4	59%
	ONNN	0.6	0.5	0.6	0.8	0.7	0.7	0.6	1.0	0.9	0.7	0.7	1.2	1.1	
	Average	0.7	0.6	0.6	0.8	0.8	0.7	0.7	1.0	1.1	1.0	0.9	1.3	1.3	
Handset Suppliers	AVGO	0.8	0.9	0.7	0.8	0.9	1.1	1.0	0.9	1.1	1.1	0.9	0.9	1.0	-9%
	MXIM	1.1	1.0	0.9	1.0	1.1	1.1	1.2	1.4	1.3	1.2	1.1	1.3	1.3	
	Average	0.9	0.9	0.8	0.9	1.0	1.1	1.1	1.2	1.1	1.0	1.1	1.1	1.0	
Analog Group Average		1.0	0.9	0.9	1.0	1.0	1.0	1.0	1.2	1.3	1.2	1.0	1.2	1.1	14%

Source: Citi Research, FactSet

- High dividend yield average P/E NTM relative to SP500 expanded 20% in the last two years and is at 1.3x currently. We expect expansion to at least prior 1.4 levels.
- Handset suppliers' average P/E NTM relative to SP500 contracted 9% in the last two years and is at 1.0x currently. We see potential risk that contraction toward ~0.8 levels could occur (INTC contracted to 0.7x at it's low; QCOM has contracted toward ~0.9x).

4. Current C2QE/C3QE and C13E Estimates and EPS Sensitivity

Figure 10. Citi Modeling Estimates Slightly Below the Street for C2Q/C3Q and C13

	Street Revenue Growth %						Citi Revenue Growth %			Citi Gross Margin %			Street Gross Margin %			Citi EPS \$			5% Revenue to EPS Sensitivity		1% Gross Margin to EPS Sensitivity		Citi CY13 P/E	Street Forward 1Y P/E
Ticker	C2Q13E	C3Q13E	2013E	C2Q13E	C3Q13E	2013E	C2Q13E	C3Q13E	2013E	C2Q13E	C3Q13E	2013E	C1Q13E	C2Q13E	2013E	2013E	2013E	2013E	2013E	2013E	2013E	2013E		
ADI	1.9%	3.8%	1.6%	1.9%	3.0%	1.0%	64.5%	65.3%	64.7%	64.7%	64.9%	64.7%	\$0.55	\$0.57	\$ 2.32	\$ 0.23	15%	\$ 0.07	7%	20.71	19.98			
AVGO	7.4%	8.0%	2.8%	5.8%	15.6%	3.7%	52.0%	52.8%	52.0%	50.7%	50.8%	50.7%	\$0.59	\$0.65	\$2.85	\$ 0.25	57%	\$ 0.09	9%	13.57	12.94			
FCS*	6.6%	6.2%	6.2%	6.4%	6.5%	5.9%	30.5%	33.5%	32.1%	30.6%	33.0%	31.3%	\$0.03	\$0.13	\$ 0.73	\$ 0.16	18%	\$ 0.08	8%	25.99	23.10			
IRF	15.9%	0.2%	-2.4%	15.9%	-2.0%	-0.3%	29.0%	30.5%	29.1%	29.0%	30.3%	28.8%	(\$0.19)	(\$0.03)	(\$ 0.03)	\$ 0.17	14%	\$ 0.16	16%	nm	nm			
ISIL	5.1%	2.3%	-9.1%	5.2%	1.6%	-9.0%	54.0%	54.3%	54.2%	54.4%	54.9%	54.5%	\$0.19	\$0.07	\$ 0.43	\$ 0.09	9%	\$ 0.03	3%	nm	nm			
LLTC	2.8%	3.4%	2.3%	2.5%	2.0%	1.2%	75.2%	75.5%	75.3%	75.2%	75.4%	75.4%	\$0.54	\$0.48	\$ 2.03	\$ 0.15	10%	\$ 0.04	4%	21.31	21.34			
MCHP	4.1%	3.7%	19.2%	4.0%	3.0%	18.8%	56.8%	57.3%	56.5%	56.8%	57.5%	57.2%	\$0.52	\$0.52	\$ 2.20	\$ 0.17	10%	\$ 0.06	6%	18.57	18.88			
MX	4.9%	8.7%	7.7%	4.7%	8.3%	7.2%	33.0%	34.0%	33.2%	33.0%	34.0%	33.3%	\$0.47	\$0.63	\$ 2.60	\$ 0.31	-68%	\$ 0.19	19%	7.03	6.28			
MXIM	3.7%	5.6%	6.2%	3.3%	6.0%	6.8%	62.7%	63.7%	63.3%	62.8%	63.0%	62.7%	\$0.49	\$0.50	\$ 2.08	\$ 0.20	18%	\$ 0.06	6%	15.65	17.98			
ONNN	5.3%	5.9%	-2.0%	5.1%	5.0%	-2.7%	33.5%	35.0%	33.7%	33.4%	34.4%	33.5%	\$0.07	\$0.14	\$ 0.94	\$ 0.10	13%	\$ 0.06	6%	16.11	17.30			
SLAB	-1.3%	5.4%	5.7%	-1.6%	5.4%	5.7%	61.3%	61.8%	61.3%	61.2%	61.4%	61.1%	\$0.59	\$0.48	\$ 0.56	\$ 0.35	49%	\$ 0.11	11%	23.12	18.45			
SMTc	4.0%	6.2%	18.2%	3.7%	4.6%	16.8%	61.1%	61.6%	61.3%	60.5%	60.6%	60.4%	\$0.46	\$0.52	\$ 2.32	\$ 0.26	36%	\$ 0.08	8%	21.86	18.35			
Average	5.0%	5.0%	4.7%	4.7%	4.9%	4.6%	51.1%	52.1%	51.4%	51.0%	51.7%	51.1%	\$ 0.36	\$ 0.39	\$ 1.59	\$ 0.20	15%	\$ 0.09	9%	18.39	17.46			

Source: Citi Research, FirstCall

Figure 11. Analog Group Valuation

Terence R. Whalen, 415-951-1738

Specialty Semiconductors, Citi Research

1. Analog Valuation

1. Analog Valuation							Ent Val / Sales				Price (ex-cash) / EPS inc-SBC				Price / EPS inc-SBC				Mkt Cap / FCF				
	Price	Shares C4Q12	Mkt Cap	Net Cash C4Q12	Net Cash / MktCap	Ent Val	C12	C13E	C14E	Cross Cycle	C12	C13E	C14E	Cross Cycle	C12	C13E	C14E	Cross Cycle	C12	C13E	C14E	Cross Cycle	
ADI	45.48	310	14,111	3,260	23%	10,851	4.06	4.02	3.74	3.9	16.5	15.9	13.7	14.6	21.5	20.7	17.8	19.0	22.3	17.3	16.5	17.8	
AVGO	34.44	251	8,644	1,151	13%	7,493	3.15	3.04	2.64	3.1	11.6	11.8	9.6	11.5	13.4	13.6	11.1	13.3	18.1	15.2	11.3	14.8	
FCS	14.10	127	1,789	159	9%	1,631	1.16	1.09	1.01	1.1	23.4	23.7	10.7	12.8	25.6	26.0	11.7	14.0	21.1	9.4	15.9		
IRF	22.20	69	1,535	382	25%	1,153	1.16	1.16	1.10	1.10			31.8	49.1			42.4	nm	nm	nm	nm		
ISIL	5.00	127	633	164	26%	469	0.77	0.85	0.83	0.7				18.3				nm	27.3	nm	8.5	7.9	
LLTC	37.24	237	8,820	483	5%	8,337	6.50	6.42	5.98	6.2	21.0	20.1	17.8	18.1	22.2	21.3	18.8	19.2	16.7	17.9	16.1	16.6	
MCHP	36.44	204	7,449	801	11%	6,648	4.39	3.69	3.40	4.1	20.5	16.6	13.4	16.5	22.9	18.6	15.0	18.5	35.2	21.0	16.6	20.7	
MX	17.95	37	665	-19	-3%	685	0.84	0.78	0.74	0.8	8.9	7.2	6.1	8.1	8.6	7.0	5.9	7.8	11.2	11.6	8.4	10.5	
MXIM	29.90	299	8,933	722	8%	8,211	3.41	3.20	2.84	3.2	16.5	14.4	12.7	15.4	17.9	15.6	13.8	16.8	18.2	14.5	13.3	14.9	
ONNN	7.98	449	3,580	-380	-11%	3,960	1.37	1.41	1.31	1.4	20.4	17.8	12.8	13.0	18.4	16.1	11.6	11.7	nm	20.6	10.2	15.7	
SLAB	41.68	43	1,777	193	11%	1,584	2.81	2.66	2.41	2.8	23.7	20.6	16.5	22.6	26.6	23.1	18.5	25.4	-356.0	21.7	18.6	24.9	
SMTC	36.39	68	2,474	-95	-4%	2,569	4.44	3.80	3.53	4.4	26.8	22.7	18.4	23.6	25.8	21.9	17.7	22.7	31.4	19.8	12.7	22.8	
Avg	28.26	198	5,431	622	11%	4,810	2.84	2.68	2.46	2.73	18.9	17.1	14.9	19.6	20.3	18.4	16.8	16.8	-19.5	18.1	12.9	16.6	
Sum			60,411	6,820		53,591											-62%						

2. Analog Fundamentals

	Rating	Target	F12M Div	Yield	ETR	Sales			Cross Cycle 10-14	Op Marg inc-SBC			Cross Cycle 10-14	EPS inc-SBC			Cross Cycle 10-14	Free Cash Flow			Cross Cycle 10-14
						C12	C13E	C14E		C12	C13E	C14E		C12	C13E	C14E		C12	C13E	C14E	
ADI	Buy	\$54.0	\$ 1.36	3.0%	21.7%	2,675	2,701	2,905	2,816	29.7%	30.9%	34.1%	32.8%	\$2.12	\$2.20	\$2.56	\$2.40	\$633	\$815	\$856	\$791
AVGO	Buy	\$45.0	\$ 0.77	2.2%	32.9%	2,377	2,464	2,835	2,443	27.7%	27.4%	29.3%	28.1%	\$2.56	\$2.54	\$3.11	\$2.60	\$478	\$570	\$767	\$584
FCS	Buy	\$20.0	\$ -	0.0%	41.8%	1,406	1,490	1,607	1,538	4.3%	4.5%	10.2%	8.5%	\$0.55	\$0.54	\$1.20	\$1.00	\$31	\$85	\$190	\$113
IRF	Neutral	\$ -	\$ -	0.0%	-	994	991	1,047	1,050	-7.3%	-2.0%	4.8%	2.9%	-\$1.18	-\$0.40	\$0.52	\$0.34	-\$12	\$33	\$45	\$11
ISIL	Sell	\$5.0	\$ 0.48	9.6%	-	608	553	564	662	0.0%	0.5%	1.7%	5.8%	-\$0.39	\$0.12	\$0.06	\$0.20	\$23	\$55	\$74	\$80
LLTC	Neutral	\$38.0	\$ 1.05	2.8%	4.9%	1,283	1,298	1,394	1,352	45.2%	44.6%	46.7%	47.5%	\$1.68	\$1.75	\$1.98	\$1.94	\$529	\$492	\$548	\$532
MCHP	Buy	\$47.0	\$ 1.41	3.9%	32.9%	1,515	1,799	1,953	1,608	25.9%	25.9%	29.7%	29.2%	\$1.59	\$1.96	\$2.42	\$1.97	\$212	\$355	\$449	\$360
MX	Buy	\$25.0	\$ -	0.0%	39.3%	820	878	920	832	13.9%	14.7%	15.7%	14.4%	\$2.09	\$2.55	\$3.03	\$2.29	\$60	\$57	\$80	\$63
MXIM	Neutral	\$33.0	\$ 1.02	3.4%	13.8%	2,405	2,568	2,896	2,529	24.3%	26.9%	28.2%	26.5%	\$1.67	\$1.91	\$2.17	\$1.78	\$492	\$614	\$674	\$600
ONNN	Neutral	\$9.0	\$ -	0.0%	12.8%	2,895	2,815	3,014	2,896	5.0%	9.1%	11.4%	10.6%	\$0.43	\$0.50	\$0.69	\$0.68	\$20	\$174	\$352	\$228
SLAB	Buy	\$49.0	\$ -	0.0%	17.6%	563	596	657	560	15.5%	16.0%	18.5%	15.9%	\$1.57	\$1.80	\$2.26	\$1.64	-\$5	\$82	\$96	\$71
SMTC	Buy	\$42.0	\$ -	0.0%	15.4%	579	676	728	584	19.8%	20.8%	23.4%	21.9%	\$1.41	\$1.66	\$2.06	\$1.60	\$79	\$125	\$195	\$109
Sum or Avg					23.3%	18,119	18,830	20,521	18,869	17.0%	18.3%	21.1%	20.3%	\$1.17	\$1.43	\$1.84	\$1.54	\$212	\$288	\$360	\$295

* Cross Cycle Calculation is Average 2010 - 2014 average

3. ROIC and Change in Analog Fundamentals

3. ROIC and Change in Analog Fundamentals							Sales YY					Op Marg YY				EPS inc-SBC YY				FCF YY						
	ROIC					Cross Cycle 10- 14									Avg YY Chg 10- 14					CAGR 10					CAGR 10	
	I.C. 4Q12	C11	C12E	C13E	C14E		C12	C13E	C14E	CAGR 10	C12	C13E	C14E		C12	C13E	C14E		C12	C13E	C14E		C12	C13E	C14E	CAGR 10
ADI	1,594	49.6%	39.9%	43.1%	49.1%	47.1%	-8%	1%	8%	0.2%	-451	122	317	294	-16%	4%	17%	0%	-18%	29%	5%	-0.5%				
AVGO	1,828	34.9%	32.1%	31.5%	36.8%	33.8%	1%	4%	15%	6.7%	-24	-30	192	230	2%	-1%	22%	8%	-29%	19%	34%	15.3%				
FCS	1,478	9.2%	3.2%	3.6%	8.8%	7.3%	-12%	6%	8%	0.1%	-648	24	565	206	-56%	-1%	121%	-5%	-62%	171%	124%	2.1%				
IRF	1,032	8.3%	-6.0%	-2.6%	3.7%	3.7%	-13%	0%	6%	-0.5%	-1562	527	687	398	-201%	-66%	-232%	-24%				37%	-15.1%			
ISIL	941	9.7%	-0.1%	0.0%	0.8%	2.6%	-20%	-9%	2%	-9.0%	-1119	52	117	-152	-186%	-130%	-52%	nm	-82%	138%	35%	-11.7%				
LLTC	553	84.0%	75.7%	77.7%	80.5%	82.4%	-4%	1%	7%	-1.0%	-368	-53	213	115	-18%	4%	13%	-3%	-4%	-7%	11%	0.4%				
MCHP	1,785	36.5%	17.1%	24.7%	28.6%	29.2%	6%	19%	9%	9.7%	-494	4	376	153	-14%	24%	24%	4%	-42%	68%	27%	1.7%				
MX	504	19.5%	16.6%	18.3%	19.3%	18.5%	6%	7%	5%	4.5%	128	85	99	93	29%	22%	19%	9%	6%	-3%	38%	6.1%				
MXIM	2,344	20.1%	20.2%	22.3%	24.8%	21.7%	-2%	7%	13%	5.8%	-136	261	132	270	2%	15%	14%	10%	-28%	25%	10%	5.8%				
ONNN	2,285	10.2%	4.7%	8.2%	11.1%	9.8%	-16%	-3%	7%	6.8%	-477	406	236	41	-51%	14%	39%	-6%	-91%	783%	103%	-0.7%				
SLAB	585	19.3%	16.2%	15.9%	18.3%	19.6%	15%	6%	10%	7.4%	372	48	251	65	45%	15%	25%	11%	-106%		17%	-2.1%				
SMTC	910	22.0%	10.1%	11.9%	14.6%	16.3%	20%	17%	8%	12.5%	-303	103	260	180	-3%	18%	24%	10%	2%	59%	55%	30.4%				
Avg	1,320	27.0%	19.1%	21.2%	24.7%	24.2%	-5%	4%	9%	3.1%	-424	129	287	158	-24%	22%	29%	-0.8%	-29%	36%	25%	1.6%				

Valuation as of: 5/28/2013

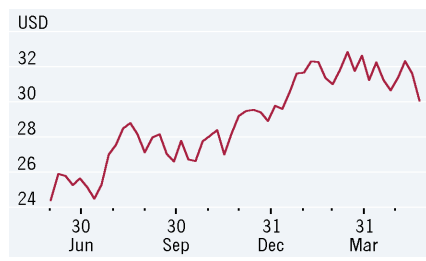
Source: Citi Research, FirstCall

Company Focus

- Company Update
- Rating Change
- Target Price Change

Neutral	2
from Buy	
Price (28 May 13)	US\$29.90
Target price	US\$33.00
from US\$39.00	
Expected share price return	10.4%
Expected dividend yield	3.4%
Expected total return	13.7%
Market Cap	US\$8,703M

Price Performance (RIC: MXIM.O, BB: MXIM US)



Maxim Integrated (MXIM)

Downgrade to Neutral from Buy: >20% Samsung Exposure Increases Risk and Could Suppress Valuation Going Forward

- **We Downgrade MXIM to Neutral from Buy** — We see risk that: 1) margins at Samsung could come under pressure if: a) developed market smartphone functionality plateaus or decelerates meaningfully, b) Samsung increases its insourcing, and or c) Samsung adopts a more aggressive approach to pricing and supplier churn; 2) valuation multiples could contract as Samsung likely exceeds 25%+ in MXIM's upcoming August 10K; 3) non-handset areas like wireline/computing could continue to drag on sales growth; and 4) potential improvements in industrial/auto could go unrecognized by investors because of overriding focus on Samsung/handset.
- **Margin Risk at Samsung?** — MXIM indicated on its April earnings that 3 of its chips would be used across all Samsung Galaxy S4 models: a) integrated power/analog system on chip (Citi estimate \$1.25-\$1.50), b) gesture sensor (Citi estimate \$0.75), and c) building block chip (Citi estimate \$0.25-\$0.50). We believe that Samsung mainstream adoption potentially increases Samsung's customer leverage versus Maxim. If Samsung handset margins begin to come under pressure in 2014 based on low-cost iPhone and China tier-2, then Samsung's rate of insourcing may increase and its pricing pressure on suppliers may also escalate.
- **Valuation Multiple Contraction** — MXIM's F12M P/E Relative to the SP500 contracted to 1.02x (analog average 1.11x) from 1.16x (analog average 1.08x) since May 2011. We see risk for further contraction if investors rotate out of smartphone oriented stocks into more long-tailed cyclical stocks.
- **Weak Communications CapEx Cycle** — MXIM has experienced disappointing wireline growth recently, tied to soft market growth and compounded by declining legacy telecom exposure. Macro base stations are roughly 1/3 of comms (or 4% of total sales) the capex cycle has been weak and we are not convinced that there will be an uptick in capex in 2H. Legacy 10G products (roughly 2-3% of comms sales) have been particularly weak for MXIM and the comms industry as carriers upgrade to 40G and 100G products.
- **Valuation** — We maintain a consistent valuation framework and reduce our target price to \$33 from \$39 based on our forecasts and lowered target multiples. Our \$33 target price reflects a 2.97x EV/S target multiple and a 3.85x EV/IC target multiple applied to 2Q14-1Q15 financial forecasts.

EPS	Q1	Q2	Q3	Q4	FY	FC Cons
2012A	0.46A	0.34A	0.33A	0.46A	1.59A	1.57A
2013E	0.46A	0.42A	0.45A	0.46E	1.79E	1.80E
Previous	0.46A	0.42A	0.45A	0.46E	1.79E	na
2014E	0.50E	0.50E	0.49E	0.53E	2.02E	2.06E
Previous	0.50E	0.50E	0.49E	0.53E	2.02E	na
2015E	na	na	na	na	2.32E	2.34E
Previous	na	na	na	na	2.32E	na

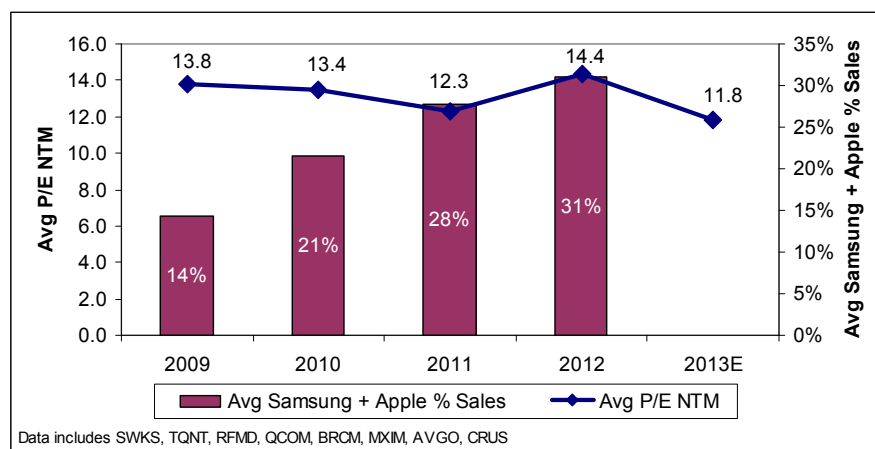
Source: Company Reports and dataCentral, Citi Research. FC Cons: First Call Consensus.

Figure 12. Multiple Compression for Companies with Exposure to Samsung / Apple

		% Apple Sales	% Samsung Sales	Combined % Sales	1Q10	2Q10	3Q10	4Q10	1Q11	2Q11	3Q11	4Q11	1Q12	2Q12	3Q12	4Q12	1Q13	2Q13	Multiple Compression LTM %
P/E (NTM)	SWKS	+10%	+10%	+20%	14.1	12.9	13.3	16.5	17.1	11.3	8.6	8.5	14.0	13.2	10.9	9.2	9.5	9.7	-27%
	TQNT	25%		25%	11.5	8.6	12.0	12.1	12.9	10.5	8.2	14.7	20.4	32.4	27.7	29.2	NM	NM	NM
	RFMD		22%	22%	9.6	6.1	9.2	10.0	11.0	13.1	13.4	10.3	17.8	20.2	25.1	17.1	15.4	13.3	-34%
	QCOM	+10%	+10%	20%	17.4	13.4	17.6	17.3	17.4	16.9	14.0	14.8	17.1	13.8	15.2	14.0	14.2	13.4	-3%
	CRUS	82%		82%	13.1	13.6	12.2	11.4	13.6	12.3	10.9	11.9	15.0	16.4	12.8	7.6	6.2	7.0	-57%
	Wolfson		62%	62%	75.3	36.9	32.4	33.4	21.9	25.5	27.5	74.8	84.8	49.6	37.9	32.7	22.8	27.1	-45%
	MXIM		20%	20%	16.2	11.8	12.3	14.3	14.3	13.8	13.6	16.1	17.6	14.2	14.5	15.7	16.3	14.7	4%
Relative P/E NTM (SP500)	AVGO	21%	<10%	25%	12.1	10.3	9.5	11.3	11.7	13.5	11.6	11.1	13.9	12.5	11.8	11.2	12.8	12.1	-4%
	BRCM	13%	17%	30%	16.1	13.0	13.0	14.8	13.8	11.7	10.9	10.8	13.6	11.1	11.3	11.2	12.2	12.4	12%
	Apple Exposed Avg				12.3	11.1	12.1	11.7	13.3	11.4	9.5	13.3	17.7	24.4	20.3	18.4	6.2	7.0	-71%
	Samsung Exposed Avg				33.7	18.3	18.0	19.2	15.8	17.4	18.2	33.7	40.1	28.0	25.8	21.8	18.2	18.4	-34%
	Both Apple & Samsung				14.9	12.4	13.3	15.0	15.0	13.4	11.3	14.6	12.7	12.3	11.4	12.2	11.9		-6%
	SWKS				0.9	1.1	1.0	1.2	1.3	0.9	0.8	0.7	1.1	1.1	0.9	0.8	0.7	0.7	-37%
	TQNT				0.8	0.7	0.9	0.9	1.0	0.8	0.7	1.2	1.5	2.7	2.2	2.4	NM	NM	NM
Relative P/E NTM (SP500)	RFMD				0.6	0.5	0.7	0.7	0.8	1.0	1.2	0.9	1.4	1.7	2.0	1.4	1.2	1.0	-43%
	QCOM				1.1	1.1	1.4	1.3	1.3	1.3	1.3	1.3	1.2	1.2	1.2	1.2	1.1	1.0	-16%
	CRUS				0.9	1.1	0.9	0.8	1.0	1.0	1.0	1.1	1.4	1.0	0.6	0.5	0.5	0.5	-63%
	Wolfson				5.0	3.1	2.5	2.4	1.6	2.0	2.5	6.3	6.4	4.2	3.0	2.7	1.8	2.0	-53%
	MXIM				1.1	1.0	0.9	1.0	1.1	1.1	1.2	1.4	1.3	1.2	1.1	1.3	1.3	1.1	-10%
	AVGO				0.8	0.9	0.7	0.8	0.9	1.1	1.0	0.9	1.1	1.1	0.9	0.9	1.0	0.9	-17%
	BRCM				1.06	1.07	1.00	1.07	1.04	0.93	0.98	0.91	1.03	0.94	0.89	0.92	0.95	0.90	-3%
Relative P/E NTM (SP500)	Apple Exposed Avg				0.8	0.9	0.9	0.8	1.0	0.9	0.9	1.1	1.3	2.1	1.6	1.5	0.5	0.5	-75%
	Samsung Exposed Avg				2.2	1.5	1.4	1.4	1.2	1.4	1.6	2.9	3.0	2.4	2.0	1.8	1.4	1.3	-43%
	Both Apple & Samsung				1.0	1.0	1.0	1.1	1.1	1.1	1.0	1.0	1.1	1.1	1.0	0.9	0.9	0.9	-19%

Source: Citi Research, FactSet

Figure 13. Apple + Samsung Sales Exposure vs. Component Supply Chain P/E Multiple



Source: Citi Research

Company Focus

- Company Update
- Rating Change
- Target Price Change

Buy	1
<i>from Neutral</i>	
Price (28 May 13)	US\$45.48
Target price	US\$54.00
<i>from US\$48.00</i>	
Expected share price return	18.7%
Expected dividend yield	3.0%
Expected total return	21.7%
Market Cap	US\$14,015M

Price Performance (RIC: ADI.O, BB: ADI US)



Analog Devices (ADI)

Upgrading to Buy from Neutral – Driven by Solid Shareholder Return

- **We Upgrade ADI to Buy from Neutral** — based on: 1) increasing commitment to return 80% of FCF could drive multiple appreciation, 2) 3% dividend yield could increase, 3) long-tailed customer profile could receive more of a multiple premium in the future especially if smartphone commoditization accelerates, and 4) yy ISM comparisons into 3Q13 begin to ease.
- **Cash Return Strategy Should Help Expand Multiple** — ADI recently announced it would return ~80% of FCF through a combination of dividend and buyback over the next five years, above the 60% rate the past three years. Increased cash return (dividend the preferred means) should help expand ADI's multiple, in our view. Our analysis shows ADI P/E multiple vs. the SP500 expanded to 1.4x from 0.9x or in-line with FCF return over the last three years.
- **Dividend Yield** — Our cyclical framework shows that dividend yielding stocks historically outperform the group ahead of peaking fundamentals. ADI's current dividend yield is 3.0% (vs. analog average 2.1%).
- **FCF Generation** — We model strong 8% compounded free cash flow growth the next three years. Taking into account the company's strategy and \$3.8B of cash on the balance sheet, we expect ADI will become more aggressive returning cash to shareholders through dividends and buybacks the next few years.
- **Valuation** — We maintain a consistent valuation framework and increase our target price to \$54 from \$48 based on our forecasts and raised target multiples. Our \$54 target price reflects a 4.14x EV/S target multiple and an 8.65x EV/IC target multiple applied to 2Q14-1Q15 financial forecasts.

EPS	Q1	Q2	Q3	Q4	FY	FC Cons
2012A	0.46A	0.53A	0.56A	0.58A	2.14A	2.13A
2013E	0.44A	0.52A	0.54E	0.58E	2.09E	2.11E
Previous	0.44A	0.52A	0.54E	0.58E	2.09E	na
2014E	0.55E	0.61E	0.65E	0.68E	2.48E	2.56E
Previous	0.55E	0.61E	0.65E	0.68E	2.48E	na
2015E	na	na	na	na	2.80E	3.02E
Previous	na	na	na	na	2.80E	na

Source: Company Reports and dataCentral, Citi Research. FC Cons: First Call Consensus.

Company Focus

- Company Update
- Rating Change
- Target Price Change

Buy	1
<i>from Neutral</i>	
Price (28 May 13)	US\$36.44
Target price	US\$47.00
<i>from US\$39.00</i>	
Expected share price return	29.0%
Expected dividend yield	3.9%
Expected total return	32.8%
Market Cap	US\$7,119M

Price Performance (RIC: MCHP.O, BB: MCHP US)



Microchip Technology (MCHP)

Upgrading to Buy from Neutral – Driven by Solid Shareholder Return

- **We Upgrade MCHP to Buy from Neutral** — based on 1) strong 3.9% dividend yield, 2) margin expansion, and 3) improved FCF generation
- **SMSC Accretion Adds Lever for Continued Outperformance** — Due to cost synergies being realized from the now complete integration of SMSC, we model operating margins to expand by 540bps and gross margins to increase by 170bps by the year-end. We also anticipate MCHP to increase FCF margins by 390bps while still maintaining an almost steady increase in its quarterly dividend.
- **Dividend Yield** — Our cyclical framework shows that dividend yielding stocks historically outperform the group ahead of peaking fundamentals. MCHP's current dividend yield is 3.9% (vs. analog average 2.1%).
- **Margin Expansion** — Due cost synergies being realized from the now complete integration of SMSC we expect that Operating Margin to increase to 26.6% by 4Q13E from 21.8% in 1Q13. We anticipate Gross Margin expansion to 57.3% by 4Q13E from 55.6% in 1Q13.
- **Valuation** — We maintain a consistent valuation framework and increase our target price to \$47 from \$39 based on our forecasts and raised target multiples. Our \$47 target price reflects a 4.58x EV/S target multiple and a 5.06x EV/IC target multiple applied to 2Q14-1Q15 financial forecasts

EPS	Q1	Q2	Q3	Q4	FY	FC Cons
2013A	0.43A	0.39A	0.35A	0.46A	1.63A	1.89A
2014E	0.46E	0.52E	0.53E	0.56E	2.06E	2.22E
Previous	0.46E	0.52E	0.53E	0.56E	2.06E	na
2015E	0.61E	0.63E	0.63E	0.64E	2.51E	2.54E
Previous	0.61E	0.63E	0.63E	0.64E	2.51E	na
2016E	na	na	na	na	2.78E	2.58E
Previous	na	na	na	na	2.78E	na

Source: Company Reports and dataCentral, Citi Research. FC Cons: First Call Consensus.

Company Focus

- Company Update
- Rating Change
- Target Price Change

Neutral	2
from Sell	
Price (28 May 13)	US\$37.24
Target price	US\$38.00
from US\$33.00	
Expected share price return	2.0%
Expected dividend yield	2.8%
Expected total return	4.8%
Market Cap	US\$8,686M

Price Performance (RIC: LLTC.O, BB: LLTC US)



Linear Technology (LLTC) Upgrading to Neutral – Driven by Higher Multiples

- **We Upgrade LLTC to Neutral from Sell** — based on 1) higher multiples, and 2) a rotation out of traditional smartphone stocks into more defensive stocks.
- **Higher Multiples** — LLTC F12M P/E Relative to the SP500 has increased to 1.35x (above the analog sector average of 1.11x) from 1.12 (slightly above the analog sector average of 1.08x) since May of 2011.
- **Valuation** — We maintain a consistent valuation framework and increase our target price to \$38 from \$33 based on our forecasts and higher target multiples. Our \$38 target price reflects a 5.60x EV/S target multiple and a 14.15x EV/IC target multiple applied to 2Q14- 1Q15 financial forecasts

EPS	Q1	Q2	Q3	Q4	FY	FC Cons
2012A	0.47A	0.39A	0.42A	0.44A	1.71A	1.79A
2013E	0.45A	0.38A	0.46A	0.42E	1.70E	1.76E
Previous	0.45A	0.38A	0.46A	0.42E	1.70E	na
2014E	0.43E	0.44E	0.46E	0.48E	1.80E	1.94E
Previous	0.43E	0.44E	0.46E	0.48E	1.80E	na
2015E	na	na	na	na	2.17E	2.32E
Previous	na	na	na	na	2.17E	na

Source: Company Reports and dataCentral, Citi Research. FC Cons: First Call Consensus.

Maxim Integrated

Company description

Maxim Integrated Products (MXIM) manufactures analog mixed-signal circuits for a wide range of markets, including industrial, automotive, computing, wireless, and wireline applications. Sales are spread across consumer (41%), industrial (26%), computing (16%) and communications (19%). Maxim has a broad base of customers and a diversified product portfolio that leverages precision analog and digital capabilities together into proprietary mixed-signal parts. Manufacturing facilities are located in San Jose, California; Beaverton, Oregon; and San Antonio, Texas. Maxim's fiscal year ends 6/30.

Investment strategy

We rate MXIM Neutral. Maxim combines offensive and defensive traits making the stock attractive within our selective High-Growth stock selection framework. However our sector framework currently recommends a transition into more defensive stocks. Offensive traits include: strong new product design capabilities, handset share gains, healthy operating margin leverage and \$450M+ FCF/year. Defensive traits are: 3.2% dividend yield, \$1.53 cash share, and a buyback history.

Valuation

Our 2Q14-1Q15 (forward 12 months one year from now) operating margin forecast is 28.6% and our 2Q14-1Q15 ROIC forecast is 29.6%. Our \$33 target price reflects a 2.97x EV/S target multiple and a 3.85x EV/IC target multiple applied to 2Q14-1Q15 financial forecasts.

Risks

We evaluate MXIM's risks based on the stock's volatility (beta of 0.98x versus SP500), earnings stability, balance sheet strength, free cash flow, capitalization, and other risks set out below.

Risks to our target price include: a) failing to duplicate its handset success in TV, smart metering and financial terminal markets, b) integration difficulty in consolidating Teridian, c) unexpected changes in international distributor inventory stock as MXIM recognizes sales to international distributors sell-in, d) execution challenges related to Maxim's initiative to improve distribution sales and improve penetration in horizontal industrial and medical markets, and e) stagnating revenue as Maxim's gross margin has a moderate strength relationship with its factory utilization. If the impact on the company from any of these factors proves to be greater than we anticipate, the stock will likely have difficulty achieving our target price. However, should they be less than anticipated, the stock could trade above our target price.

Analog Devices

Company description

Analog Devices (NYSE: ADI) sells data converters, signal amplifiers, and digital signal processors. ADI's converter and amplifier focus position it in markets with significant design barriers to entry, high-margin competitors, and sticky design-ins.

Texas Instruments is ADI's primary converter competitor while Texas Instruments and National Semi are amplifier competitors. Other competitors are Broadcom, Cirrus Logic, Infineon, Intersil, Linear, Maxim, Microchip, National, NXP, STMicroelectronics and Silicon Labs. ADI has low customer concentration (no account >4% sales) partly because of its industrial market leverage. Application exposure conveys the horizontal nature of its business: industrial (44%), communications (20% sales), consumer (20%), and automotive (16%). ADI demonstrated strategic foresight by exiting less attractive markets of DSL, handset baseband, and PC power in 2006-2008, sidestepping what would have been punishing declines for these segments in 2008/2009. ADI has consolidated two manufacturing facilities and is in the process of realizing ~350bps of gross margin benefits. ADI operates a fab-lite manufacturing model with 55% output produced internally and 45% sourced externally mainly with TSMC. ADI derives 54% of sales from third party distributors recognizing revenue to the distributor only after the distributor sells through to its end customer. ADI's fiscal year ends in October.

Investment strategy

We rate the shares of Analog Devices Buy. ADI is rated Buy because: 1) ~70% sales are signal path isolating ADI from intensifying analog competition, 2) initiatives in automotive, radio frequency, medical, and instrumentation, support improvement to ~10% long-term growth, and 3) management has made savvy market / margin decisions. ADI's defensive attributes are: a) 36% operating margin and 51%+ ROIC, b) 50%+ outsourced production, c) ~\$560M remaining buyback authorization, d) 3.0% dividend yield, and e) ~\$10.56 net cash per share

Valuation

We maintain a consistent valuation framework and maintain our \$54 target price based on our forecasts and target multiples. Our \$54 target price reflects a 4.14x EV/S target multiple and a 8.65x target multiple applied to 2Q14-1Q15 financial forecasts.

Risks

We evaluate ADI's risks based on the stock's volatility (BETA of 0.85x the S&P 500), volatility in the semiconductor industry, and other factors, such as earnings stability, balance sheet strength, free cash flow, market capitalization, and other risks set out below.

Downside risks to our target price include: a) competitive risk as ADI repositions its product lines and attempts to grow its horizontal power management and radio frequency presence, b) demand risks related to ADI's MEMs business which is predominantly automotive and consumer exposed, and c) supply chain risks as ADI relies upon foundries for ~45% of external front-end manufacturing and also on third-party assembly and test services, some of which are located in geographically unstable areas.

Upside risks we see to our target price include: a) better than expected cost savings from the consolidation of its manufacturing facilities, b) stronger financial performance of power management business, and c) resumption of above market growth in core product areas of data converters and amplifiers based on recent application-focused initiatives.

If the impact of these risk factors is more negative than we currently anticipate, then the share price likely won't reach our target price.

Microchip Technology

Company description

Microchip Technology (MCHP) designs and manufactures semiconductors for a variety of horizontal (industrial, medical, consumer appliance) and vertical (automotive, consumer electronic) markets. Eighty percent of sales are microcontrollers, embedded devices that combine analog circuitry with basic memory and processing capability. The bulk of controllers are 8-bit (59% sales estimated) with a faster growing 16-bit business (8.5% sales estimated) and a nascent 32-bit lineup. Microchip spun out of electronics conglomerate General Instruments and initially offered shares to the public in 1993. Microchip acquired analog TelCom Semiconductor in 2001, microcontroller PowerSmart in 2002, touch screen controller Hampshire Company in 2008, bid unsuccessfully for Atmel Semiconductor in 2008, and recently acquired SST. Outside of controllers, Microchip has ancillary businesses in EEPROM & Flash memory (13%), and analog and mixed signal interface circuits (12.4%). Microchip manufactures 95%+ of its products internally and recognizes 65% of sales through distributors using conservative sell-through recognition. Microchip's fiscal year ends in March.

Investment strategy

We rate MCHP shares Buy. MCHP appears defensive on dividend yield, especially if macro gets worse in 2H12. The stock has strong 3.9% dividend yield, margin expansion, and improved FCF generation.

Valuation

Our analysis of valuation for the group generated two strong correlations: a) EV/S and 2Q14-1Q15 (forward 12 months) operating margin, and b) EV/IC and 2Q14-1Q15 ROIC. Based on the market's attributed importance to these measures, we elect to use a target valuation framework that predicts how changes in operating margin and ROIC between 2Q14-1Q15 will affect a company's valuation over the next 12 months. First we calculate the slope-intercept equation of the group's EV/S and 2Q14-1Q15 operating margin plot. Second, we derive a target EV/S multiple by inputting 2Q14-1Q15 operating margin values into the equation. We repeat these two steps for EV/IC and ROIC.

For MCHP we forecast 30.2% operating margin and 29.6% ROIC for 2Q14-1Q15. Based on these forecasts, we apply a 4.58x EV/S target multiple and a 5.06x EV/IC target multiple to 2Q14-1Q15 forecasts to generate a \$47 blended target price.

Risks

We evaluate MCHP's risks based on the stock's volatility (beta of 0.90x the S&P500), volatility in the semiconductor industry, earnings stability, balance sheet strength, debt load and debt maturity schedule, free cash flow, capitalization, and other risks set out below.

Upside risks we see to our investment thesis include: a) roughly 65% of sales are through distribution. If distributor sales are stronger than expected at this later point in the cycle, then there could be upward pressure on our revenue and target price estimates, b) Microchip is making progress growing its 16-bit microcontroller business. If adoption of Microchip's solutions in this market ramp faster than

expected, then the company could exceed revenue growth expectations, and c) Microchip has a small but growing analog business with healthy gross margins. Should this business expand more rapidly than we expect, then our gross margin estimates could see upward pressure.

Downside risks we see to our investment thesis include: a) Microchip manufactures 95% of its products internally and has a moderate correlation between utilization and gross margin. If revenue and utilization negatively inflect then profitability and earnings could be pressured, b) Microchip unsuccessfully launched a bid for Atmel and more recently acquired SST. If investors interpret any future potential deal negatively, then this could pressure the stock, c) investor sentiment around growth in the 8-bit microcontroller market is mixed. If sentiment further deteriorates regarding this market than MCHP stock could see increasing resistance.

If the impact on the company from any of these factors proves to be greater/less than we anticipate, we believe the stock will likely have difficulty achieving our target price or could outperform it.

Linear Technology

Company description

Linear Technology Corp. (LLTC) manufactures analog products across a range of horizontal and vertical markets including industrial (40%), networking (12% orders), automotive (16%), computing (13%), telecom (8%), handset (1%), consumer (3%), and satellite/military (6%). Linear's product portfolio is anchored in power management 60%+ but is diversified across other device types like operational amplifiers, interface, data converters, and radio frequency. Linear's margins structure is helped by market savvy management, proprietary products, price discipline, long revenue life products, horizontal market penetration, and efficient manufacturing. LLTC produces 90%+ of its products internally and assembles and tests the bulk (80%-85%) of them as well. Manufacturing facilities are located in Sunnyvale, CA and Camas, WA. The company also uses third party fabs such as TSMC. Competitors include Maxim Integrated Products, Analog Devices, and Texas Instruments. LLTC derives 50% of sales from third party distributors recognizing distributor revenue sell-through domestically and sell-in internationally. Linear's fiscal year ends in June.

Investment strategy

We rate LLTC Neutral. LLTC remains a premier analog design firm based on above-industry average gross margins, our current sector view favors defensive stocks with high dividend yields. LLTC currently has a 2.8% dividend yield.

Valuation

We maintain a consistent valuation framework and set our target price of \$38. Forward 12 month financial forecasts reflect upward revision to operating margin and flat ROIC. Our 2Q14-1Q15 (forward 12 months) operating margin forecast is 47.3% and our 2Q14-1Q15 ROIC forecast is 82.2%. Our \$38 target price for LLTC reflects a 5.6x EV/S target multiple and a 14.15x EV/IC target multiple applied to 2Q14-1Q15 financial forecasts.

Risks

We evaluate LLTC's risks based on the stock's volatility (beta of 1.24x the S&P 500), volatility in the semiconductor industry, earnings stability, balance sheet strength, debt load and debt maturity schedule, free cash flow, capitalization, and other risks set out below.

Downside risks we see to the stock not achieving our target price include: a) operational missteps as management must consistently reposition the product line away from margin-deteriorating markets, b) a slowing in the rate of new electronic applications given LLTC is often a choice for first-spin electronics, c) higher than expected employee turnover as analog engineers are difficult to replace, and d) unexpected changes in international distributor inventory stock as LLTC's recognizes sales to international distributors sell-in.

Upside risks we see to the stock exceeding our target price include: a) investors re-shifting sentiment to reward companies with the highest absolute gross margins, b) better than expected growth in LLTC's automotive and high frequency businesses, and c) better growth and profitability from power module and data converter introductions and refreshes that have occurred the past few years.

Appendix A-1

Analyst Certification

The research analyst(s) primarily responsible for the preparation and content of this research report are named in bold text in the author block at the front of the product except for those sections where an analyst's name appears in bold alongside content which is attributable to that analyst. Each of these analyst(s) certify, with respect to the section(s) of the report for which they are responsible, that the views expressed therein accurately reflect their personal views about each issuer and security referenced and were prepared in an independent manner, including with respect to Citigroup Global Markets Inc and its affiliates. No part of the research analyst's compensation was, is, or will be, directly or indirectly, related to the specific recommendation(s) or view(s) expressed by that research analyst in this report.

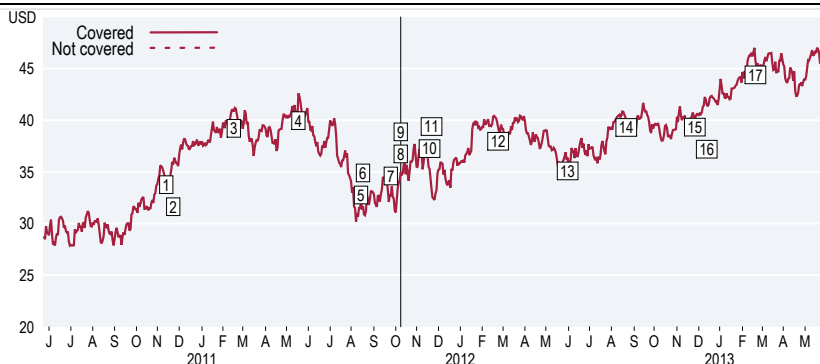
IMPORTANT DISCLOSURES

Analog Devices (ADI)

Ratings and Target Price History

Fundamental Research

Analyst: Terence Whalen



	Date	Rating	Target Price	Closing Price
1	12-Nov-10	1M	*42.00	34.21
2	23-Nov-10	1M	*43.00	35.71
3	16-Feb-11	1M	*49.00	40.84
4	18-May-11	1M	*52.00	42.60
5	15-Aug-11	1M	*43.00	32.08
6	17-Aug-11	1M	*42.00	31.69

* Indicates change

	Date	Rating	Target Price	Closing Price
7	26-Sep-11	1M	*44.00	32.63
8	8-Oct-11	Stock rating system changed		
9	8-Oct-11	*1	44.00	34.25
10	18-Nov-11	1	*49.00	35.30
11	22-Nov-11	1	*45.00	33.32
12	23-Feb-12	1	*46.00	39.33

	Date	Rating	Target Price	Closing Price
13	31-May-12	1	*41.00	36.37
14	22-Aug-12	1	*47.00	39.70
15	27-Nov-12	1	*45.00	40.11
16	13-Dec-12	*2	45.00	41.52
17	20-Feb-13	2	*48.00	45.79

Rating/target price changes above reflect Eastern Standard Time

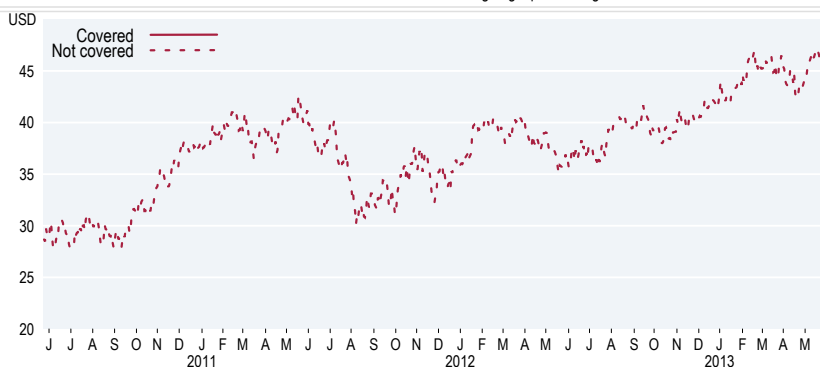
Analog Devices (ADI)

Ratings and Target Price History

Best Ideas Research

Relative Call (3 Month)

Analyst: Terence Whalen



* Indicates change

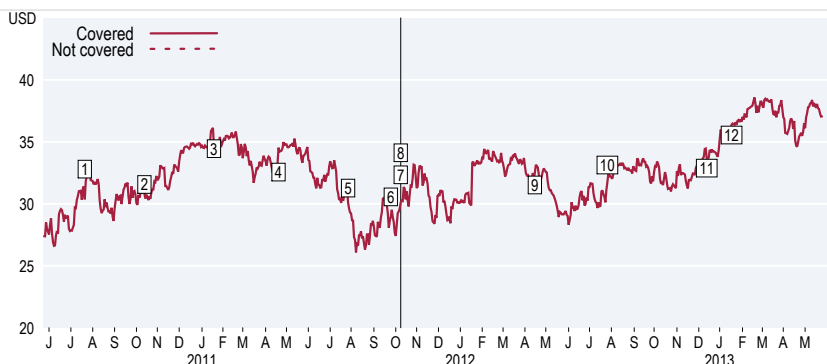
Rating/target price changes above reflect Eastern Standard Time

Linear Technology (LLTC)

Ratings and Target Price History

Fundamental Research

Analyst: Terence Whalen



	Date	Rating	Target Price	Closing Price
1	21-Jul-10	2M	*35.00	30.36
2	13-Oct-10	2M	*33.00	30.80
3	19-Jan-11	2M	*38.00	34.56
4	20-Apr-11	2M	*36.00	34.53

* Indicates change

	Date	Rating	Target Price	Closing Price
5	27-Jul-11	2M	*33.00	30.10
6	26-Sep-11	2M	*31.00	28.97
7	8-Oct-11	Stock rating system changed		
8	8-Oct-11	*2	31.00	29.64

	Date	Rating	Target Price	Closing Price
9	16-Apr-12	2	*36.00	32.51
10	26-Jul-12	2	*32.00	31.76
11	13-Dec-12	*3	32.00	33.61
12	17-Jan-13	3	*33.00	36.38

Rating/target price changes above reflect Eastern Standard Time

Linear Technology (LLTC)

Ratings and Target Price History

Best Ideas Research

Relative Call (3 Month)

Analyst: Terence Whalen



	Date	Rating	Target Price	Closing Price
1	20-Apr-11	*ADD LP	-	34.53

* Indicates change

	Date	Rating	Target Price	Closing Price
2	13-Dec-11	*REM LP	-	29.19

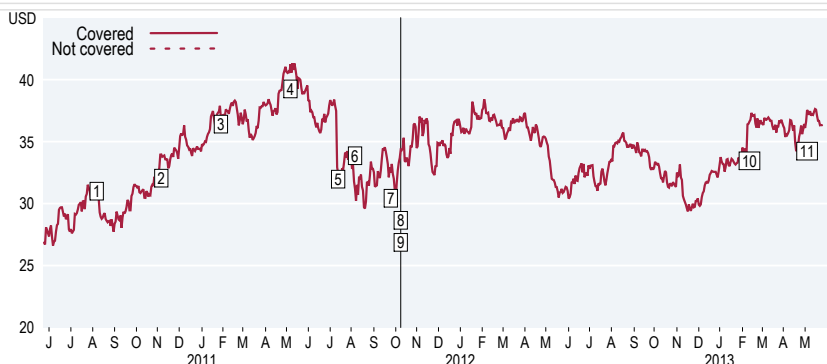
Rating/target price changes above reflect Eastern Standard Time

Microchip Technology (MCHP)

Ratings and Target Price History

Fundamental Research

Analyst: Terence Whalen



	Date	Rating	Target Price	Closing Price
1	6-Aug-10	2M	*33.00	30.51
2	5-Nov-10	2M	*36.00	33.96
3	28-Jan-11	2M	*39.00	36.89
4	6-May-11	2M	*40.00	41.24

* Indicates change

	Date	Rating	Target Price	Closing Price
5	13-Jul-11	2M	*36.00	32.41
6	5-Aug-11	2M	*32.00	31.18
7	26-Sep-11	2M	*34.00	32.51
8	8-Oct-11	Stock rating system changed		

	Date	Rating	Target Price	Closing Price
9	8-Oct-11	*2	-	33.68
10	12-Feb-13	2	*37.00	36.62
11	3-May-13	2	*39.00	37.55

Rating/target price changes above reflect Eastern Standard Time

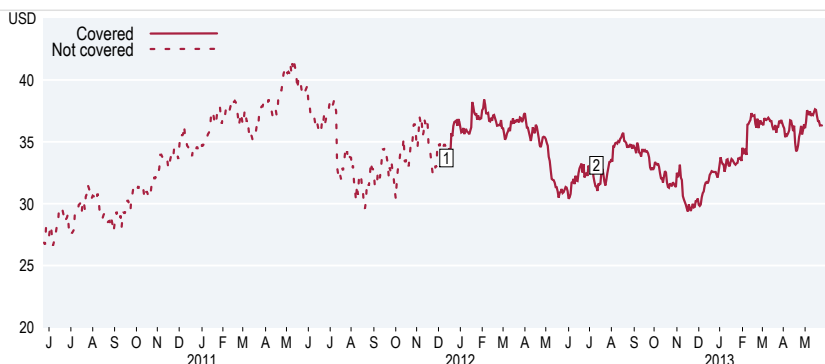
Microchip Technology (MCHP)

Ratings and Target Price History

Best Ideas Research

Relative Call (3 Month)

Analyst: Terence Whalen



	Date	Rating	Target Price	Closing Price
[1]	13-Dec-11	*ADD LP	-	33.98

* Indicates change

	Date	Rating	Target Price	Closing Price
[2]	11-Jul-12	*REM LP	-	31.39

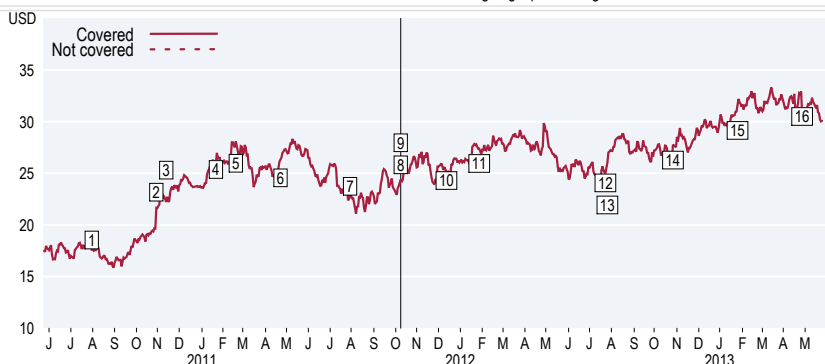
Rating/target price changes above reflect Eastern Standard Time

Maxim Integrated (MXIM)

Ratings and Target Price History

Fundamental Research

Analyst: Terence Whalen



	Date	Rating	Target Price	Closing Price
[1]	30-Jul-10	1M	*22.00	17.53
[2]	29-Oct-10	1M	*25.00	21.66
[3]	12-Nov-10	1M	*27.00	22.22
[4]	21-Jan-11	1M	*30.00	26.13
[5]	18-Feb-11	1M	*34.00	28.10
[6]	22-Apr-11	1M	*35.00	26.15

* Indicates change

	Date	Rating	Target Price	Closing Price
[7]	29-Jul-11	1M	*30.00	22.96
[8]	8-Oct-11	Stock rating system changed		
[9]	8-Oct-11	*1	30.00	24.11
[10]	13-Dec-11	1	*32.00	25.20
[11]	27-Jan-12	1	*33.00	27.39
[12]	24-Jul-12	1	*30.00	25.00

	Date	Rating	Target Price	Closing Price
[13]	26-Jul-12	1	*32.00	26.01
[14]	26-Oct-12	1	*34.00	27.77
[15]	25-Jan-13	1	*36.00	31.63
[16]	26-Apr-13	1	*39.00	30.67

Rating/target price changes above reflect Eastern Standard Time

Maxim Integrated (MXIM)

Ratings and Target Price History

Best Ideas Research

Relative Call (3 Month)

Analyst: Terence Whalen



	Date	Rating	Target Price	Closing Price
[1]	20-Apr-11	*ADD MP	-	25.59

* Indicates change

	Date	Rating	Target Price	Closing Price
[2]	11-Jul-12	*REM MP	-	24.61

Rating/target price changes above reflect Eastern Standard Time

Citigroup Global Markets Inc. owns a position of 1 million USD or more in the debt securities of Linear Technology Corp

Citigroup Global Markets, Inc. is acting as a co-manager in MagnaChip Semiconductor Corporation's announced public offering of common stock.

Within the past 12 months, Citigroup Global Markets Inc. or its affiliates has acted as manager or co-manager of an offering of securities of Avago Technologies, MagnaChip Semiconductor.

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Citigroup Global Markets Inc. currently has, or had within the past 12 months, the following as clients, and the services provided were non-investment-banking, non-securities-related: Intersil Corporation, Fairchild Semiconductor, Analog Devices, Avago Technologies, International Rectifier, Microchip Technology, MagnaChip Semiconductor.

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Citi Research Equity Ratings Distribution

Data current as of 31 Mar 2013

Citi Research Global Fundamental Coverage

% of companies in each rating category that are investment banking clients

12 Month Rating			Relative Rating		
Buy	Hold	Sell	Buy	Hold	Sell
48%	39%	12%	7%	87%	7%
53%	49%	43%	65%	49%	51%

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