Press Briefing

12/3/2009

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Overview

- Unique CMOS broadband RF/Mixed-Signal SoC technology
  - Best performance, cost, & size
  - World’s 1st Global Standards CMOS TV tuner (’04)
  - Tuner-Demodulator SoC’s for Digital TV, Cable, & Mobile (’09)

- First target markets – World’s biggest & rapidly transforming
  - Consumer TV – 625Mu
  - Mobile – 1.2Bu
  - Cable – 345Mu

- Market leadership - Tier 1 customers in all Digital TV segments
  - #1 in mobile TV, Set-Top-Box, PCTV
Key Milestones

- Founded Sept’03 by RFCMOS experts
- Nov’04, $15M raise Series A (USVP, Mission, UMC)
- World’s 1st Global Stds. CMOS TV tuner
- Smallest, & Lowest power tuner in the world – 10Mu
- Cash flow positive Oct’07
- Mass production start: Gen-1 Global CMOS tuner
- Nov’06-$20M in Series B (Battery, USVP, Mission, UMC)
- World’s 1st Global Stds. CMOS TV tuner
- #1 in Mobile TV tuner market share
- Shanghai Design Center established
- 60Mu shipments August ’09
- Tuner-Demodulator SoC ICs for DVBT & Cable
- #1 in DVBT STB
- #1 in DVBT STB
- #1 in Mobile TV tuner market share
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- Tuner-Demodulator SoC ICs for DVBT & Cable
- #1 in DVBT STB
Rapid Innovation & Design Cycles – 3 Generations of Evolution

- Tuner-QAM Demod Cable SoC
- DVBT SoC for terrestrial TV
- ISDBT-1 segment SoC for mobile TV
- Hybrid TV Tuner

- Global digital terrestrial & cable TV tuner
- Ultra small & lowest power mobile TV tuner
- Global standards TV tuner
MaxLinear in Asia

Shanghai Design Center

- High volume customers in Japan, China, Korea, Taiwan & Turkey
- Sales & Support Offices
- MaxLinear Representatives & Distributors
- Manufacturing Locations
Tier-1 Customers

- AVerMedia
- Dell
- Sony
- HP
- Acer
- Thomson
- Hauppauge
- Panasonic
- Murata
- Casio
- Kyocera
- Vestel
- Samsung
- LG
- Fujitsu
- MTC
- Sharp
- Toyota
- Sanyo
- Toshiba
- Hitachi
- Pace
- Alps
- NEC
- MaxLinear
Same Core Technology Addresses Multiple Markets

- Consumer 625Mu
- Cable 350Mu
- Mobile 1.15B units
- Connectivity 2B units

- TV TAM alone is 280M units
- Our core RF/MS tech enables TAM expansion
  - Connectivity TAM is at least 2Bu
Positioning – No Compromise

HIGH PERFORMANCE
LOW COST

LOW POWER
SMALL SIZE
Highest Integration

MxL CMOS Tuner

- Fully integrated switchable digital filters
- 400mW power consumption
- Extensive integration for low BOM

Typical SiGe Tuner

- Expensive & standard specific SAW filters
- >1W power consumption
- >90% more components
Highly Differentiated End Products

- 4x multi-tuner application
- Ultra Low Power
  - (4 x 350mW)
- No external SAW filters
- Crystal re-use for all 4 tuners
- Not possible with any other Si or Can tuner

Power Density is a Real Problem!
Thermal image of MaxLinear vs. Competition

MaxLinear Operating @ 400mW
~250mW/cm^2

Competitor Operating @ 1000mW
~450mW/cm^2
Worldwide Standards Covered

- DMB-T (GB20600-2006)
- DOCSIS
- DVB-H
- DVB-T
- ATSC
- ISDB-T
- DiBEG
- SCTE-40
- CableLabs

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Extensive Product Roadmap

MOBILE
- MxL7001 & 2 ISDB-T-1 Seg
- MxL703RM ISDB-T-1 Seg
- MxL751SM ISDB-T-1 Seg

CONSUMER
- MxL135RF ISDB-T
- MxL5007T DVB-T ATSC DTMB
- MxL131RF Automotive X-temp
- MxL301RF Hybrid
- MxL201RF & 203RF Digital Cable (J.83 A/B/C) DOCSIS 2.0/3.0
- MxL241SF Digital Cable (J.83 A/B/C)

CABLE

2009 2010
Example Product Shipping Today
Our Growth Strategy & Vision

- Existing target market has “lots of runway”
- Can expand TAM via adjacent and new comms markets
- Will increase SAM by ASP expansion via integration
- Focus will continue to be on highly differentiated products
Mobile Products
MxL751SM

ISDB-T Tuner & Demodulator
with Diversity
Mobile TV Markets

- Today Japan represents the only significant market
  - MaxLinear is the leading supplier of frontend solutions
  - Brazil (variant of ISDB-T) could be a large market

- Mobile TV in China (CMMB) looks to be the next market for growth

- DVB-H is still lagging

- ATSC-M/H showing potential
MARKET ASSESSMENT

Operators:
– Customers complain about performance with integrated antenna
– Higher performance desired

Handset Makers:
– SoC considered on board for significant savings
– Replacing whip antenna with integrated antenna
  • waterproofing, mechanical improvement, cost reduction

IC Vendors
– No IC supplier with RF expertise
– SoC or SiP solutions with worse performance vs. discrete solution
MxL751SM - Next Generation ISDB-T 1-Seg

- RF Tuner + ISDB-T 1-Seg Demodulator SoC
- Low Complexity diversity solution (Pat. Pend.)
- Only solution with millions of tuners and demodulators shipped
- Lowest power consumption with automatic switching between single and diversity modes
- Superior performance
  - Best sensitivity → no external LNA, dual receive paths
  - Best SNR margin for fading conditions
  - Superior Doppler performance
- Highly simplified SW implementation
The Significant Value of 3dB Improvement

- Digital Signals degrade rapidly past a certain SNR
- Small improvements in “Cliff Zone” = service vs. no service
- MxL provides significant improvement at near same cost
Small Difference = Big Impact

- Indoor reception is highly dependent on location
- Most situations have significant multipath
- MxL diversity provides significant improvement under multipath conditions
Why Diversity Has Not Succeeded (Yet)

Existing diversity solution proved performance benefit but…….

<table>
<thead>
<tr>
<th>Cost</th>
<th>2X vs. single channel solution</th>
</tr>
</thead>
<tbody>
<tr>
<td>Power</td>
<td>Significantly higher power</td>
</tr>
<tr>
<td>Size</td>
<td>Module size too large</td>
</tr>
</tbody>
</table>

MxL751 solves these issues
Why Diversity Now

- Users don’t want whip antennas
  - Easy to break
  - Expensive
  - Not waterproof
- Trend toward internal antenna has started
  - Reception expectation has been set by whip
  - Internal antenna can significantly degrade performance!
  - Users may notice performance difference

Why SoC Now

- Only 1-Seg to support now—no 3-Seg or other format
- Mature products
- Simplicity (1 SW integration)
- Production risk (only 1 chip)
- Flexibility (easy to implement)
- And, of course, COST
MxL751SM Summary

- Unique solution: Patent pending low-cost diversity SoC

- Each component is highest performance
  - No compromises on LNA, SNR, and cost

- Tens of millions of units shipped with same architecture
  - 4th Generation ISDB-T 1-Seg product

- MxL ➔ Proven product, meeting the right market needs with the right performance
Consumer Products
MxL30xRF

Multi-Standard Silicon TV Tuner
for
Hybrid TV Applications
Market Trends

Televisions go greener, thinner
Digital Transition

- Stand-alone tuner = greatest flexibility for TV!
- Several new DTV standards are in the work
  - DVB-T2, DVB-C2, ATSC M/H, etc.
- Analog still required worldwide for TV……but…..
  - ……..Analog mainly viewed over cable TV
  - Tuner requirements for cable much higher!
- MxL verified by major US cable MSOs & cable STB makers!
- Tuner power and size becoming critical
  - Not only total power but Power Density
TV Tuner Challenge

- Existing MOPLL solutions:
  - Do not scale for future multi-tuner applications
  - Limited by Size, Cost, & Standards, high power
  - Continue to struggle with Reliability & Temperature

- Existing silicon tuners have…:
  - Very high power consumption
  - Complicated layout (4 layer, heat sink, etc.)
  - Performance degradation over temperature
  - Struggle to meet required cost points
Introducing The MxL301/2RF

- First silicon hybrid tuner to meet 4P requirements:
  - Price, Performance, Power, Partitioning
  - Aligned with next generation TV & SoC architectures

- MxL301/2RF provides:
  - Market proven digital performance
  - Higher level of integration
  - Configurable designs for future standards
  - Lowest cost solutions; ideal for PVR functions
TV Platforms

Tuner (Analog, DTTV, & Cable TV)
- VIF SAW
- SIF SAW
- SAW (High IF)
- DTTV Demod

Analog Demod

Baseband SoC (AV & MPEG Decoder, Scaler, etc.)

Balun

Xtal

Xtal

Xtal
TV SoC Platform Evolution – Type 1

MxL302RF

Balun

Tuner (Analog, DTTV, & Cable TV)

VIF SAW

SIF SAW

SAW (H/L IF)

½ NIM Hybrid

Analog Demod

DTTV Demod

Baseband SoC (AV & MPEG Decoder, Scaler, etc.)

TV baseband – Type 1

TDA988x, Sanyo, etc.
TV SoC Platform Evolution – Type 2

MxL301RF

Xtal

Tuner (Analog, DTTV, & Cable TV)

SAW (H/L IF)

½ NIM Hybrid

Balun

Xtal

DSP Analog/DTTV Demod

Analog Demod

DTTV Demod

Baseband SoC (AV & MPEG Decoder, Scaler, etc.)

TV baseband – Type 2
MxL301/2RF Hybrid Tuner Benefits

- Based on market leading DTV performance of MxL
  - 65 Million units shipped as of September 2009
- Universal tuner for all digital and analog standards
  - Programmable IF frequency & filter shape
  - Interface to any demodulator
- Simple and flexible design
  - 2 Layer PCB, NO SAW filters; NO input transformer, Xtal sharing,
- High quality Analog performance (comparable to cans)
- Lowest power ~400mW
Cable Products
MxL20xRF & MxL241SF

Silicon TV Tuners & SoC
for
Cable TV Applications
Cable Markets Summary

Asian Cable Markets
- Government mandate to switch all of China cable to digital by 2015 will make China the largest digital cable market in the world
- Korea & Japan have established cable markets
- India holds great potential

Export Markets
- Korean, Japanese, Taiwanese & Chinese OEMs/ODMs already supplying end products to US & Europe
- Likely to see more participation in the US from Chinese suppliers
- US companies are acquiring Asian box manufacturers and are relying increasingly more on Asian manufacturers

MaxLinear is active in all of these markets
MxL201RF Digital Cable TV Tuner

Applications
- Cable Set-Top Boxes
- DOCSIS cable modems and EMTAs
- Residential Gateways
- Tuner Modules

Benefits
- Superior performance
  - Passes all stringent MSO & OEM testing with best performance
- Ultra low power – 400 mW → low heat dissipation
- Lowest BOM cost – $0.18
- Smallest footprint – 5mm X 5mm, 32pin QFN
- Single point calibration for input power level reporting

MxL203RF variant for DVB-C only applications
Ultra Low Power, Small Form Factor Cable DTA

MxL201RF+Zoran Cable DTA

PCB Size: 82mm x 56.5mm (2 Layer)
DC Power: 2.45W
ST Cable PVR STB Ref. Design

3 x MxL201RF
MxL241SF – Unsurpassed FE Integration

- **Proven tuner-MxL201RF + Proven demod-TI Puma 5**
  - MaxLinear product and co-development with TI
- **J83 Annexes A, B & C & DOCSIS 2.0 & 3.0**
- **6mm X 6mm 40 pin QFN package**
- **Power consumption < 450mW**
- **Significant chip & BOM savings**
- **No other front end cable chip as highly integrated as the MxL241SF**
Lowest Cost 8x4 Gateway (with ch flexibility)

TI Reference Design

4 x MxL241SF
- MPEG Tuner
- MPEG Tuner
- MPEG Tuner
- MPEG Tuner

Wideband Tuner

PGA

TI Puma-5

Ge PHY

Internet

RF

Max Data Rate
- 160 Mb/s
- 40 Mb/s

Spectrum example:
- 4 DS DOCSIS channels
- 4 Video channels

4 video ch anywhere in the spectrum

4 DS ch bonded group in 96MHz

IP-STB

HDD

NAS/Embedded HDD

IP-STB

MPEG Tuner

MPEG Tuner

MPEG Tuner

MPEG Tuner

HDD

IP-STB

MPEG Tuner

MPEG Tuner

MPEG Tuner

MPEG Tuner

Max Data Rate

120
80
40

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Summary

- MaxLinear has a large & growing presence in Asia
  - High volume shipments to export DVB-T market
  - #1 in Japan mobile TV market
  - Shipments for export and domestic cable markets starting now
  - Television market will provide further growth

- Planning on growth in these markets & horizontal markets

- Will continue to provide highly differentiated products
  - Lowest power, highest integration, best performance
Thank You!

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Back-up
Block Diagram – Configurable IF Filter Shape

For traditional QSS demodulators (TDA988x, Sanyo, etc.)

SOFTWARE CONFIGURABLE FILTER SHAPE

For ADC based (low or high) IF Demodulators (Trident, BCM, Zoran, etc.)
Block Diagram – Configurable IF Frequency

For ADC based (low or high) IF Demodulators (Trident, BCM, Zoran, etc.)