



Next Generation Ultra Low Loss PCB Materials

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Acknowledgements

- [Tarun Amla](#), ITEQ
- [Mahyar Vahabzadeh](#), Rogers
- Chris Connors, Greg Barsky, Broadcom

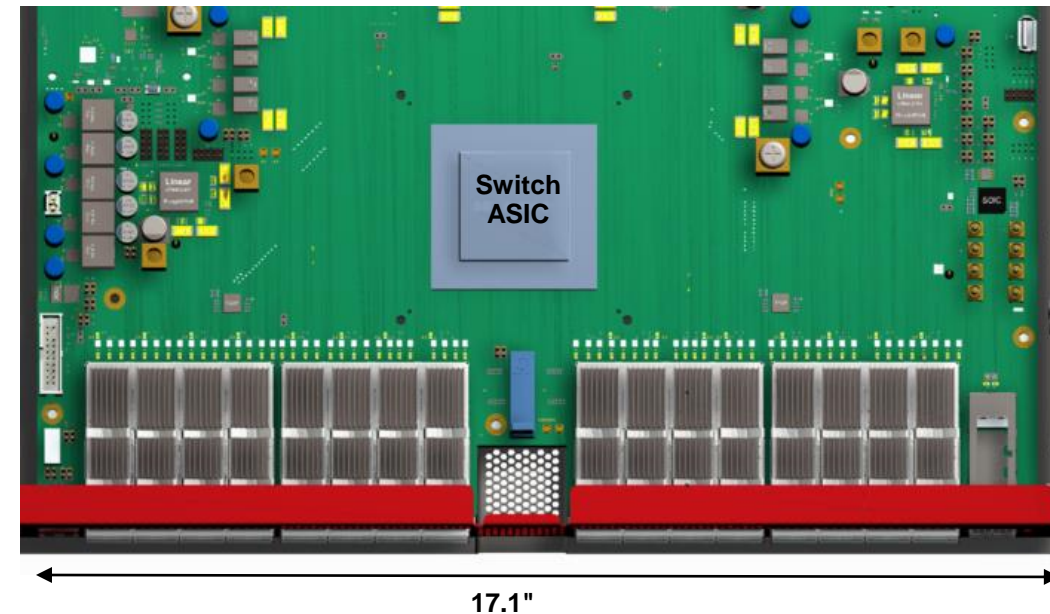
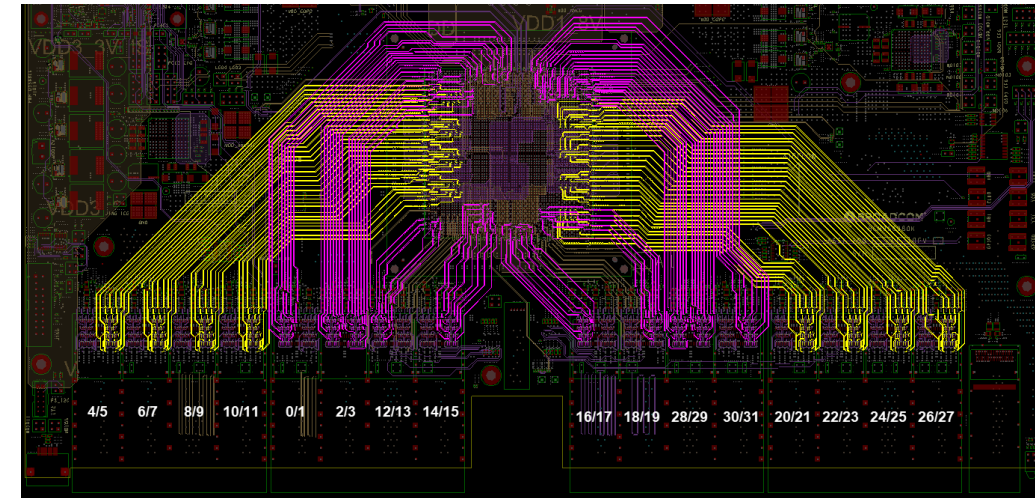
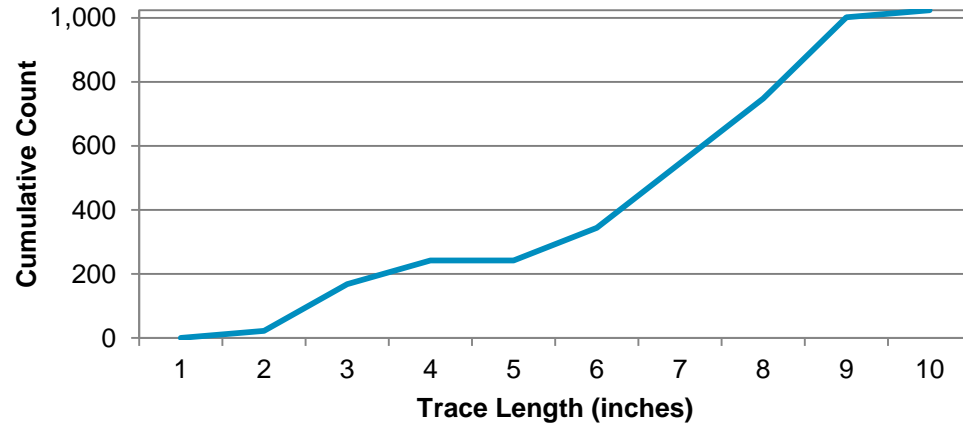
Background

- There has been much discussion on C2M channel budgets, and what is required for a practical fixed “pizza” box switch system
- This presentation details background information to assist with these discussions:
 - Trace lengths from a 1RU 256 lane system
 - Measured Losses from new ultra-low loss PCB materials
- The dB loss numbers are of course not a full channel simulation, or COM model, but are provided as guidance

Trace Lengths in a 256-lane 1 RU Switch System

- 32 front-panel module cages
- Min Trace Length: 1.7"
- Max Trace Length: 9.5"

256 Tx + Rx Pair 1RU System Trace Lengths



Next Generation Ultra Low Loss PCB materials

- In addition to the existing PCB materials, new materials are becoming available which enable insertion losses of $< 1\text{dB}/''$ at 27 GHz
 - Suitable for high layer count PCB fabrication as used in switch systems
- Examples of such materials are presented here, data shared with permission.

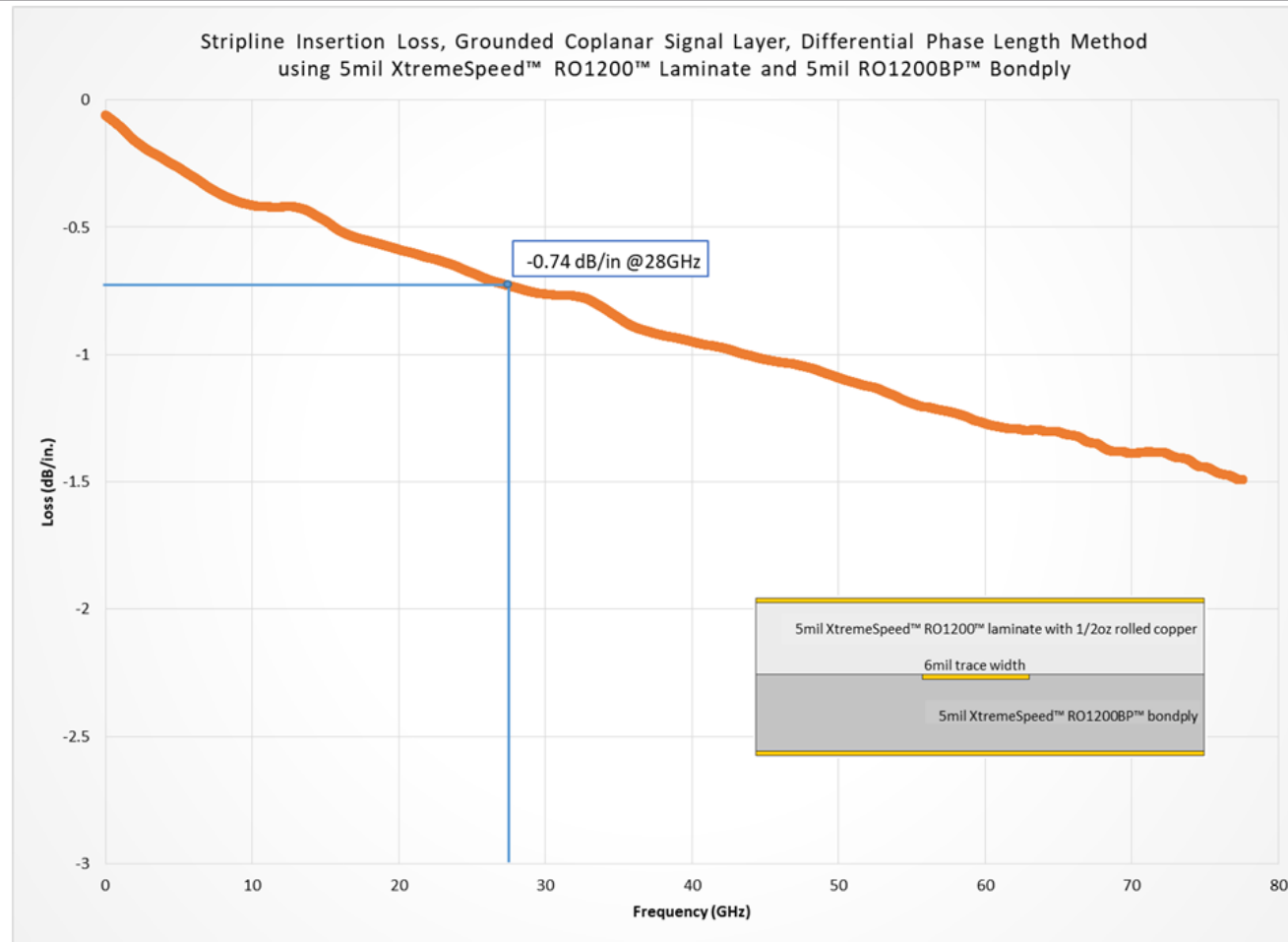
Manufacturer	Material Name	Dk	Df	IL (dB / inch) @ 28 GHz
Rogers	RO1200	3.05 (10 GHz)	0.0017 (10 GHz)	0.74 ¹
ITEQ	IT-988G SE	3.24 (28 GHz)	0.0014 (28 GHz)	0.95 ²
ITEQ	IT-998G	3.0 (28 GHz)	0.001 (28 GHz)	0.7 ³

¹ 6 mil trace, rolled copper foil, grounded coplanar stripline

² differential stripline measurement, test vehicle

³ simulated performance

XtremeSpeed™ RO1200™ Material Stripline Insertion Loss



Data shared with kind permission

Summary

- Next Generation volume PCB materials suitable for 802.3ck applications will become available within 12 – 24 mo with losses < 1 dB
- This will enable PCB loss budgets < 10dB, for 1RU switch platforms which fits within the proposed 16dB ball – ball VSR target (from [lim_3ck_01b_0718](#))
- We should adopt the 16dB proposed budget



Thank You