

CAUI4 Channel Loss Variation Due to Temperature

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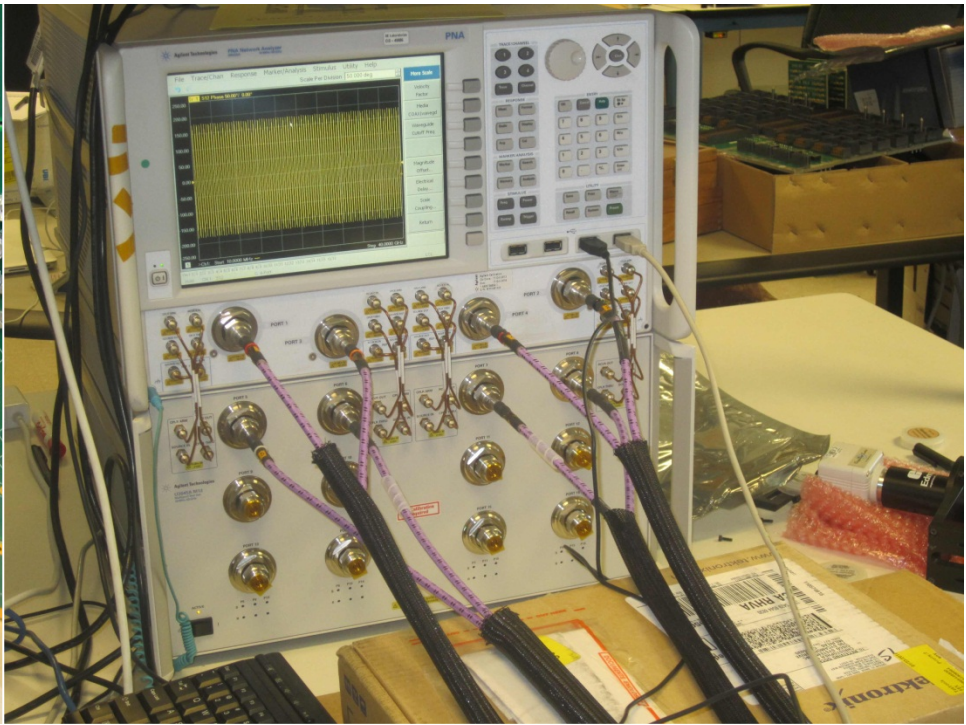
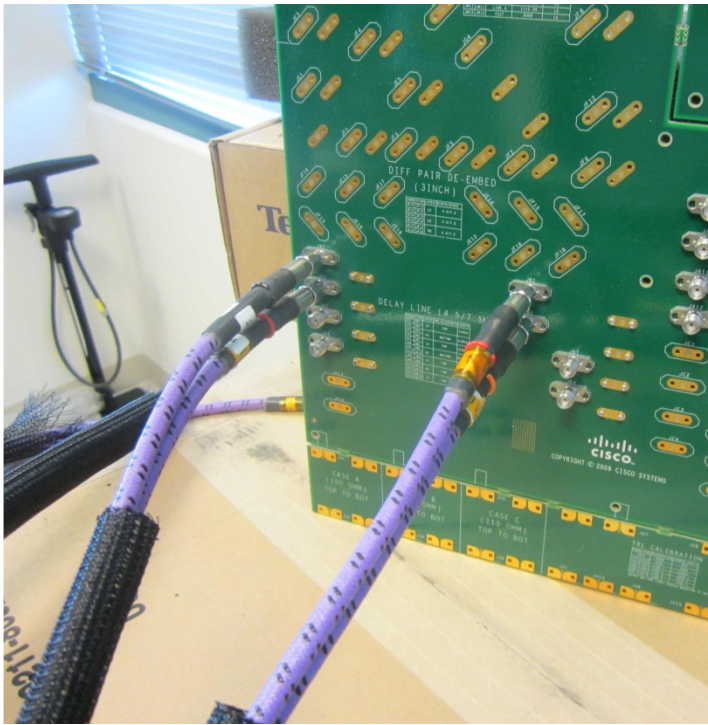
Acknowledgments

- Wei Yao
- Christopher Ea
- Darja Padilla

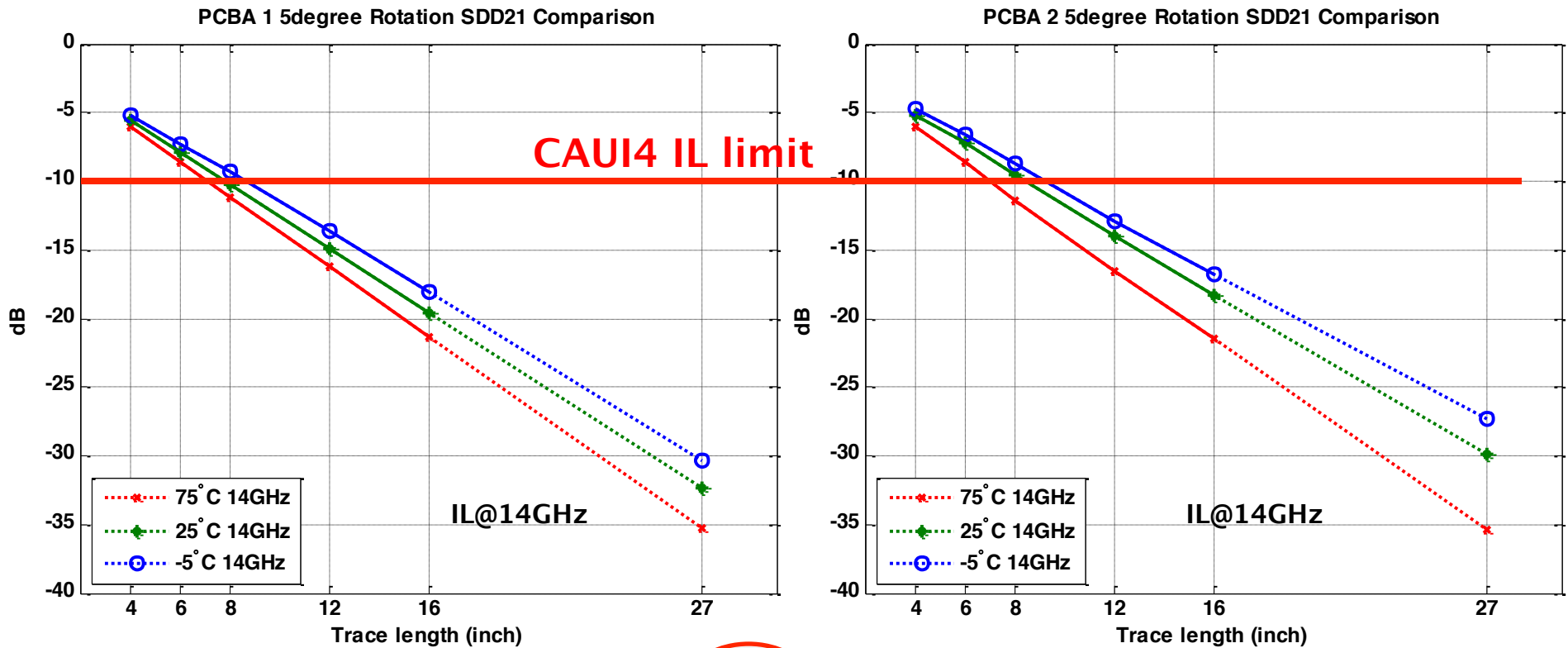
Scope

- Investigate performance variations induced by temperature over CAUI-4 compliant channels
- Verify if the currently requested robustness of $\pm 1\text{dB}$ for CTLE gain peak setting is suitable
- Either confirm the current spec or propose a new value
- Different trace lengths with two different materials were tested across temperature
- Main parameter analyzed was IL at 14 GHz
- Two different brands of the same “nominal” material
 - PCBA material 1: DK=3.81, DF0.0112
 - PCBA material 2: DK=3.71, DF0.0107
 - Trace geometry: 4.5 mils tracks, 7.5 mils spacing, 1 oz. copper

The Measurement Setup



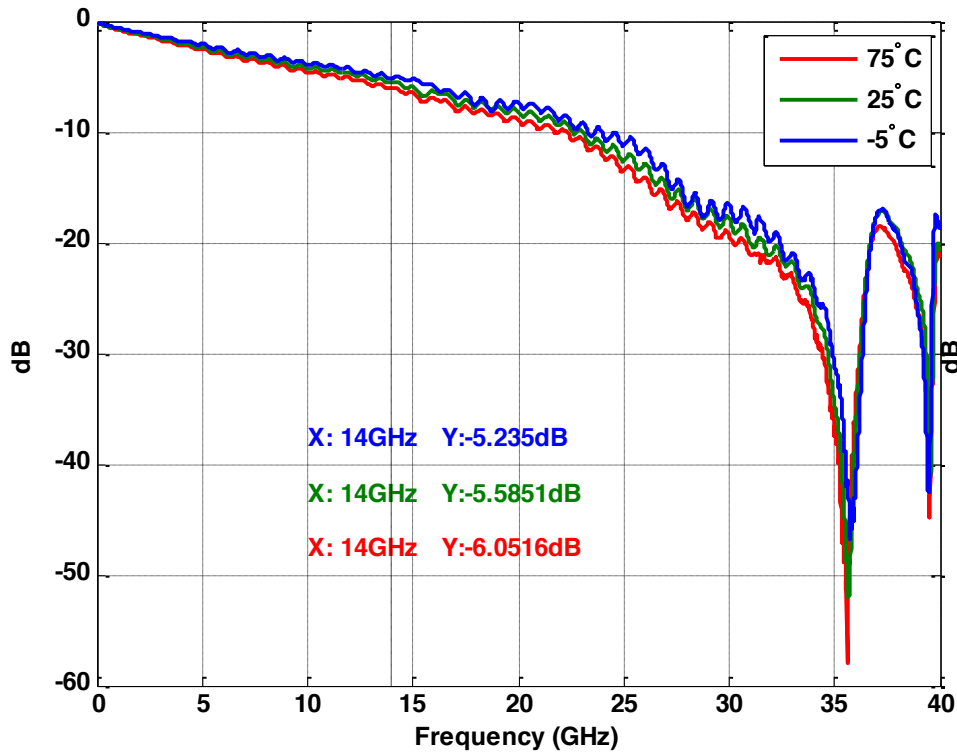
Over Different Length and Temperature



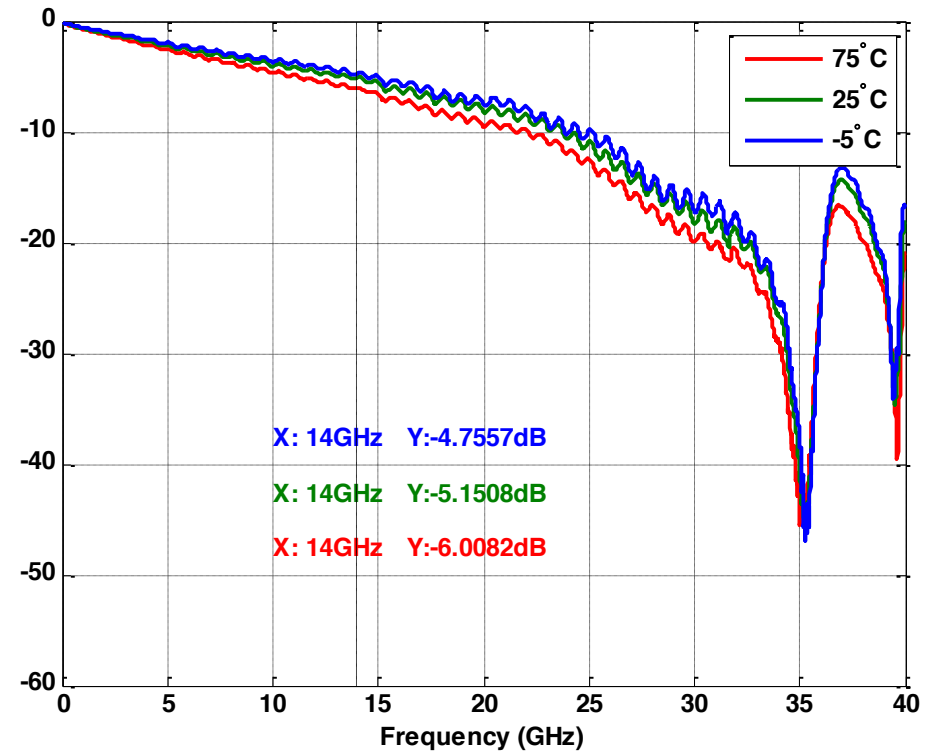
14GHz IL(75C)-IL(-5C)	4"	6"	8"	12"	16"	27"
PCBA 1	-0.82	-1.28	-1.93	-2.62	-3.23	-4.90
PCBA 2	-1.25	-1.93	-2.65	-3.60	-4.77	-7.99

4" Trace IL Variation over Temperature

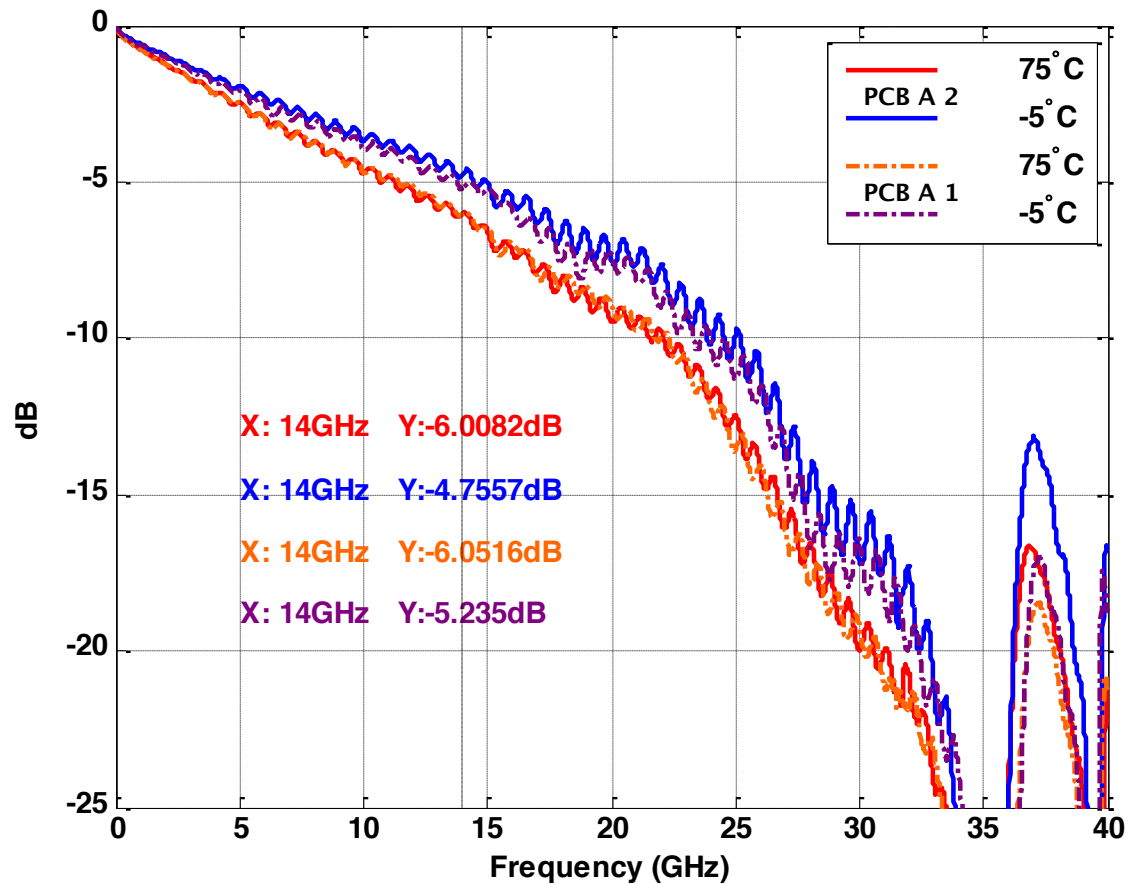
PCBA 1



PCBA 2

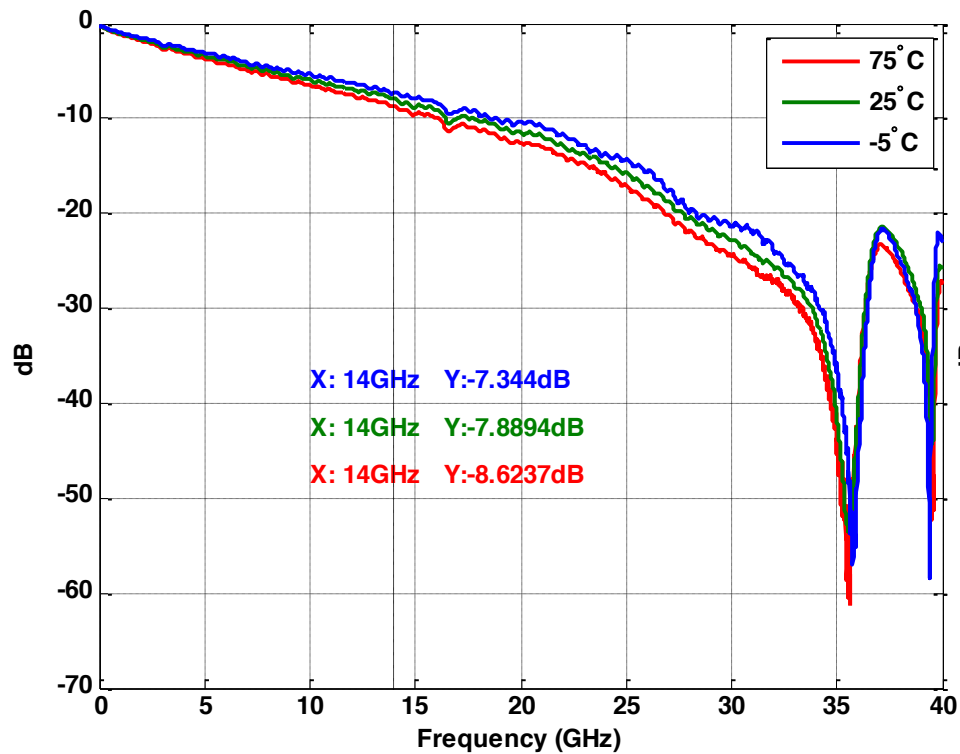


4" Trace IL Variation over Temperature (cont'd)

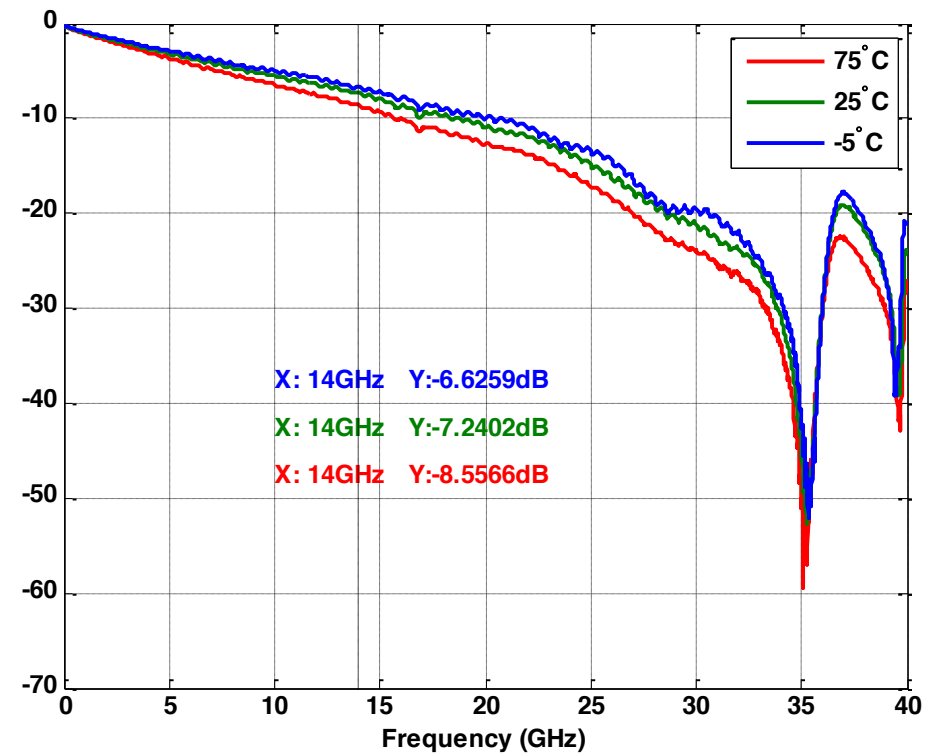


6" Trace IL Variation over Temperature

PCBA 1

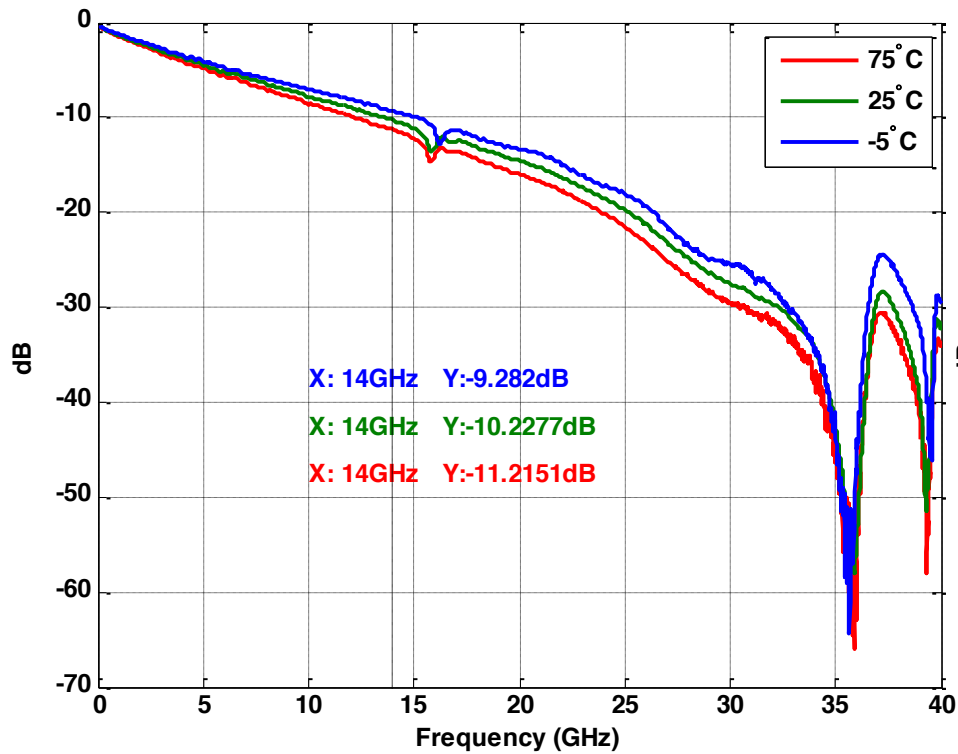


PCBA 2

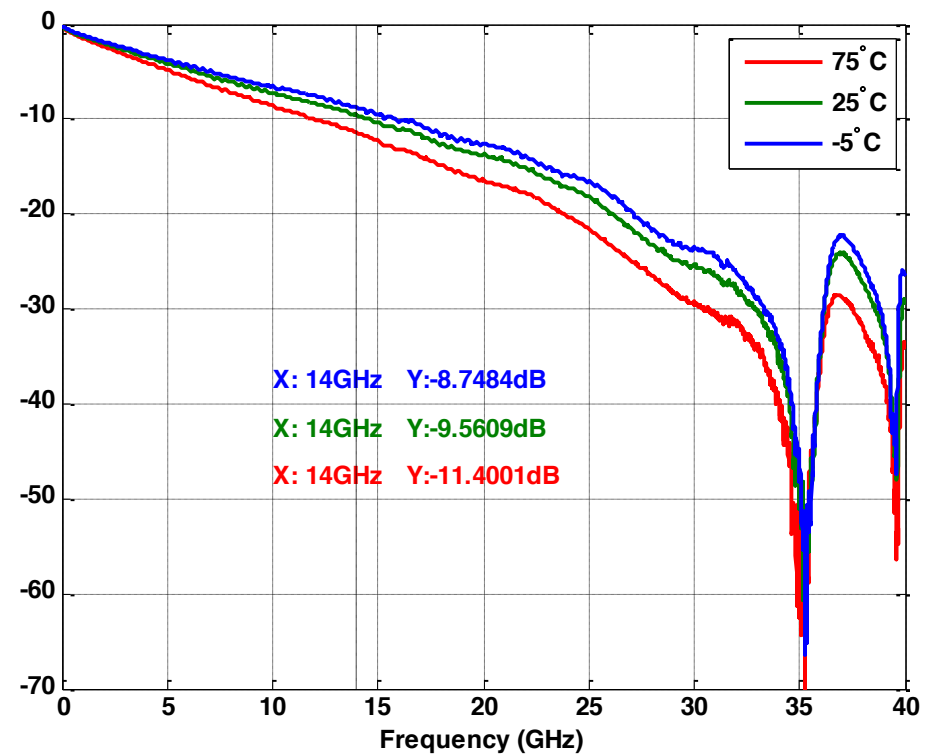


8" Trace IL Variation over Temperature

PCBA 1



PCBA 2



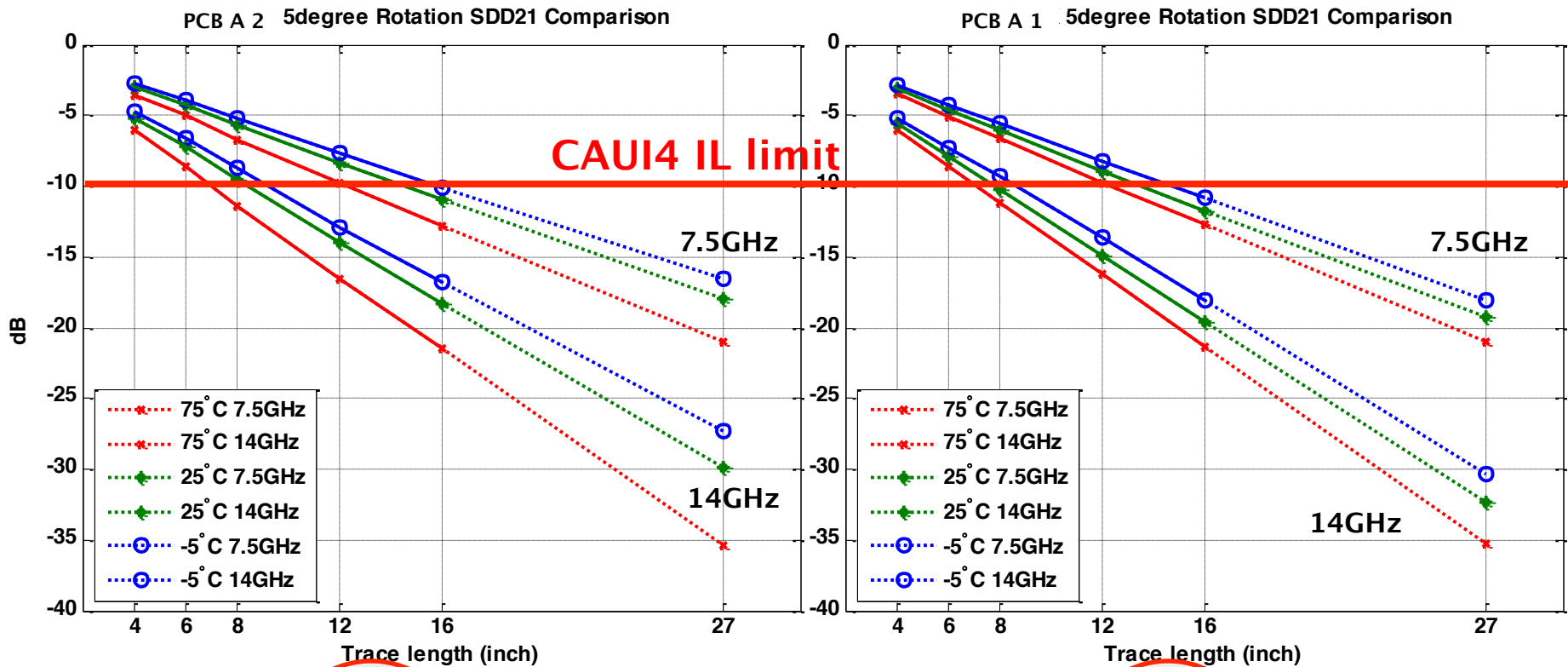
Conclusions

- Insertion Loss variation over temperature of CAUI-4 compliant channels has been measured to exceed 1.9 dB over an 80 °C excursion
- Only contribution analyzed is coming from PCB IL
- This analysis does not include other variations possibly coming from
 - Module connector stability over temperature and from part-to-part
 - ICs (on Host and Module) stability over temperature and from part-to-part
- Current robustness of ± 1 dB seem inadequate
- It is proposed to increase the robustness to at least ± 2 dB depending on assessment of other contributions
- It is encouraged that other parties to provide more experimental data to validate these findings

Backup



Over Different Length and Temperature



	7.5GHz IL(75C)-IL(-5C)						14GHz IL(75C)-IL(-5C)					
	4"	6"	8"	12"	16"	27"	4"	6"	8"	12"	16"	27"
PCBA 1	-0.61	-0.82	-1.06	-1.53	-1.90	-2.91	-0.82	-1.28	-1.93	-2.62	-3.23	-4.90
PCBA 2	-0.83	-1.15	-1.59	-2.08	-2.72	-4.48	-1.25	-1.93	-2.65	-3.60	-4.77	-7.99

Thank You!

