



## **4-Pair over Ethernet POE ICM temperature rise and magnetic parameters**

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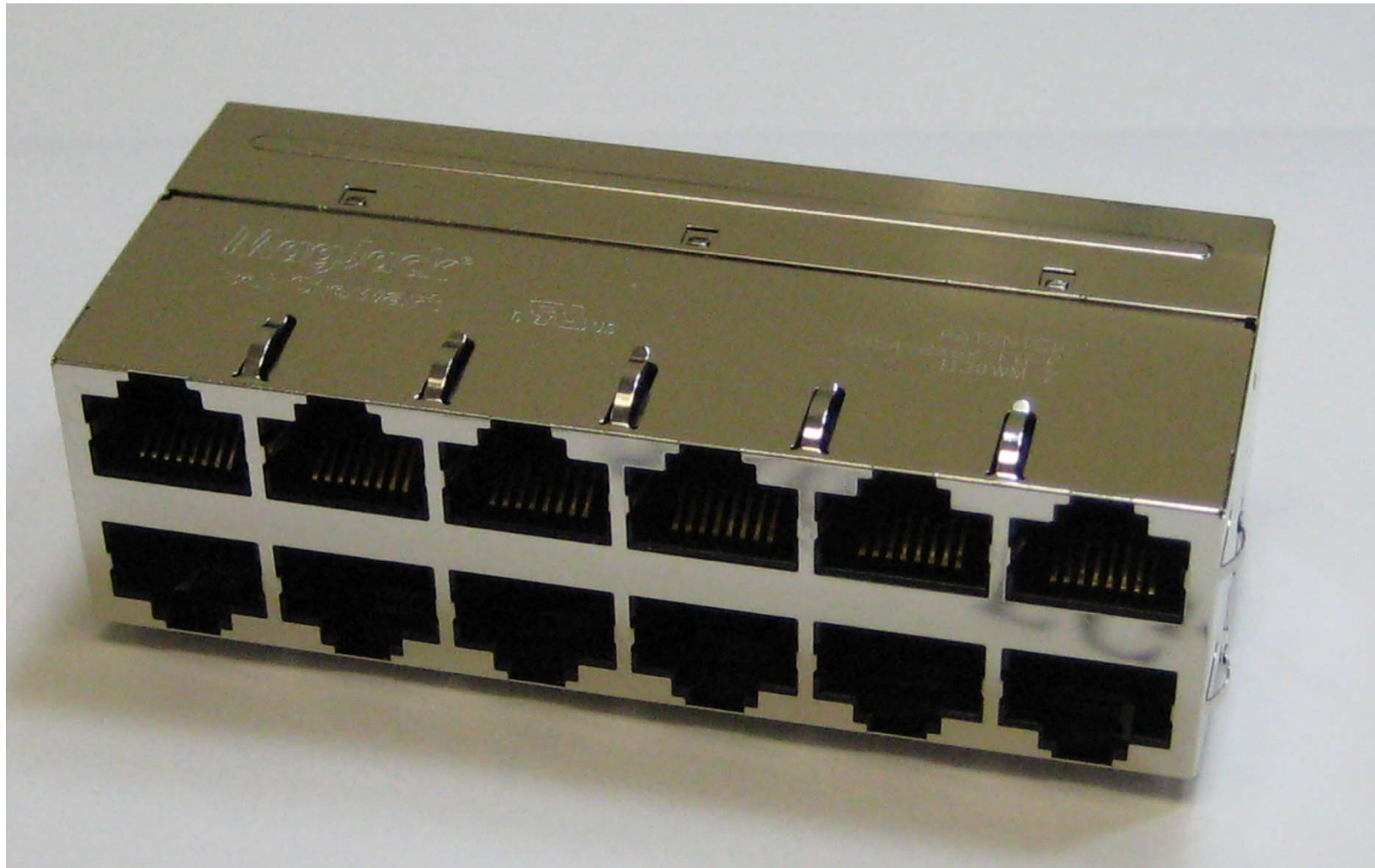
IEEE 802.3 4PPOE Task Force, Indian Wells, CA January 2014

# Topics

- 10/100/1000Base-T compatible, with 600mA of current on all four pairs
- Targeted 12mA DC imbalance
- Electrical parameters measured:
  - OCL with DC bias, Return Loss
- Component temperature rise
- ICM resistance unbalance
- Pair to pair channel resistance unbalance

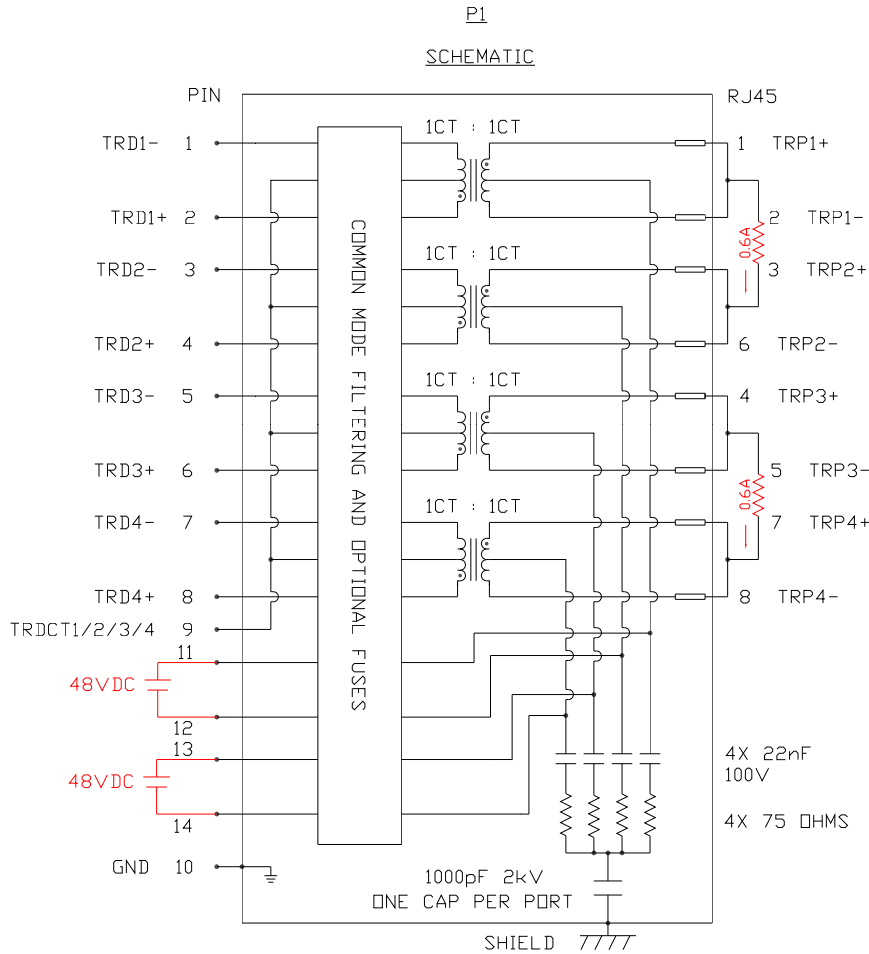
## 4-Pair POE ICM

# ICM (INTEGRATED CONNECTOR MODULE)

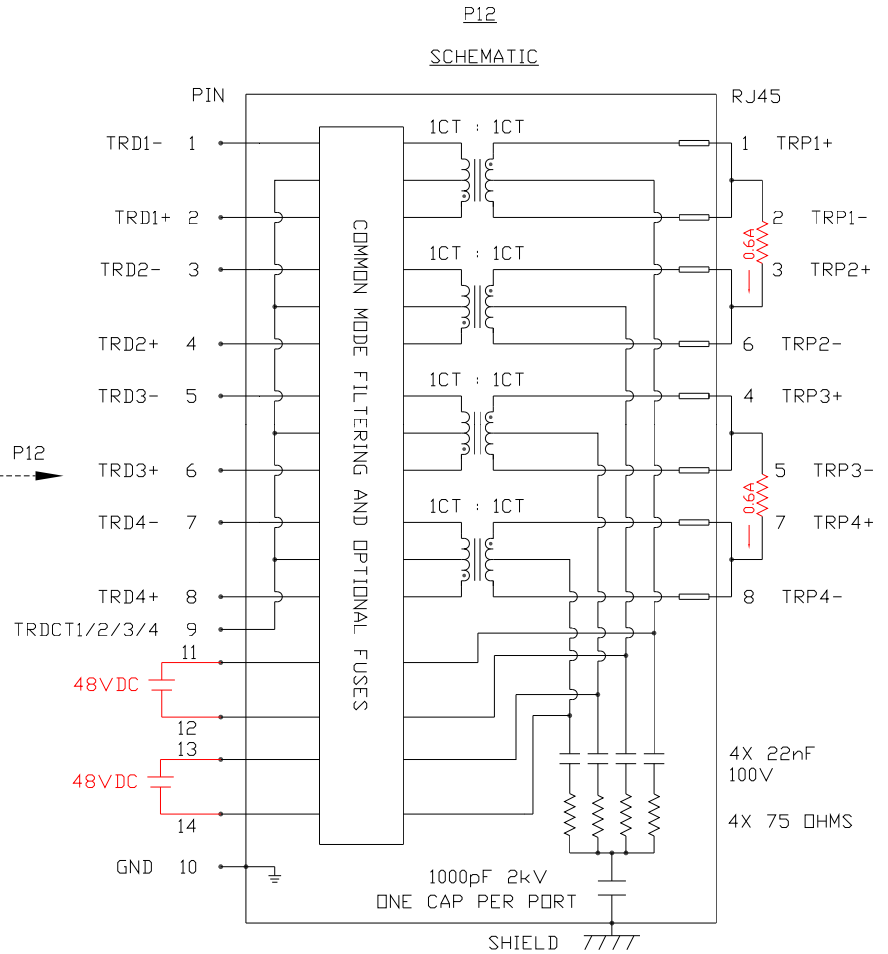


4-Pair POE ICM

# 2X6 4-pair POE ICM schematic

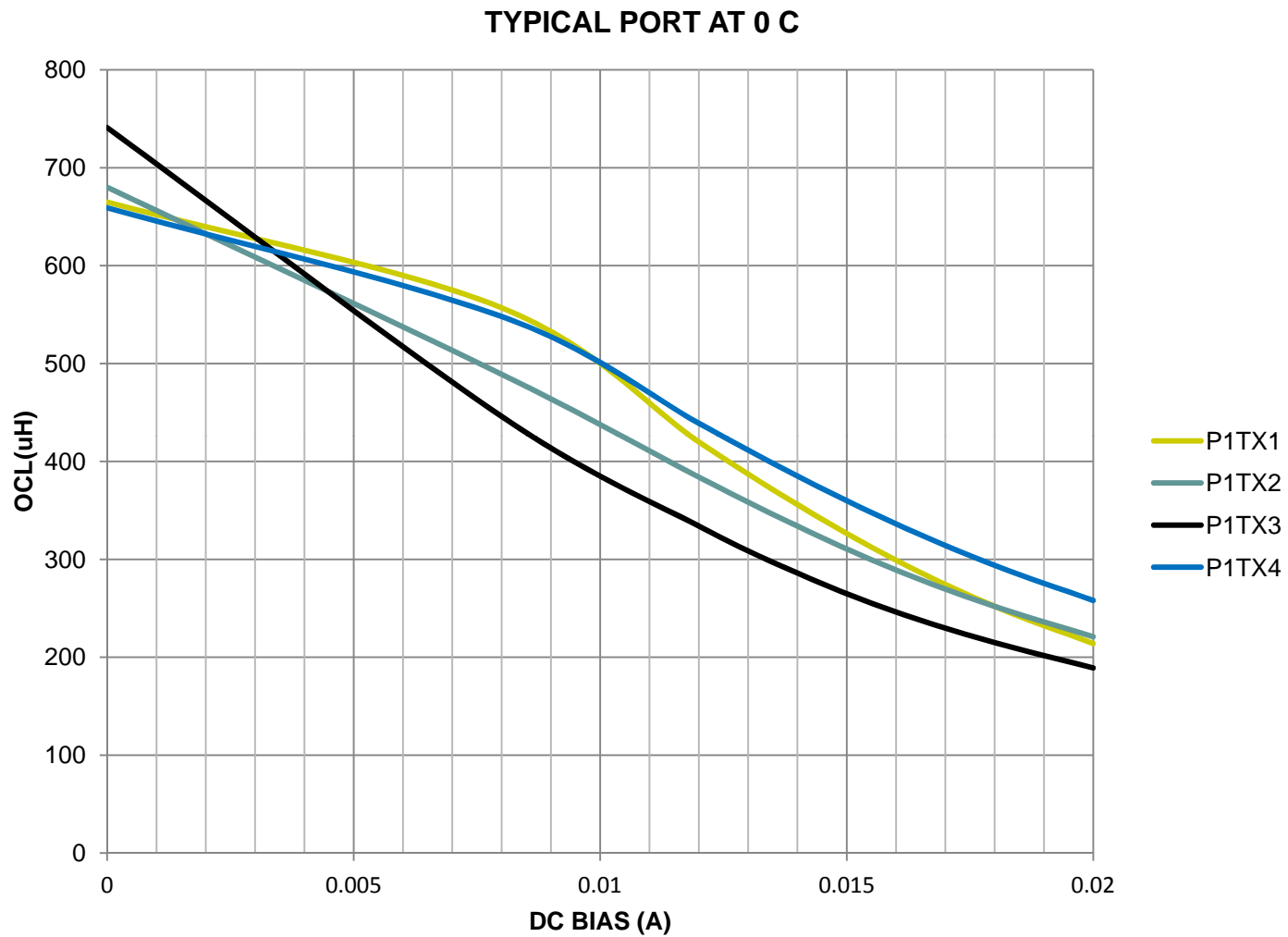


P1 THRU P12



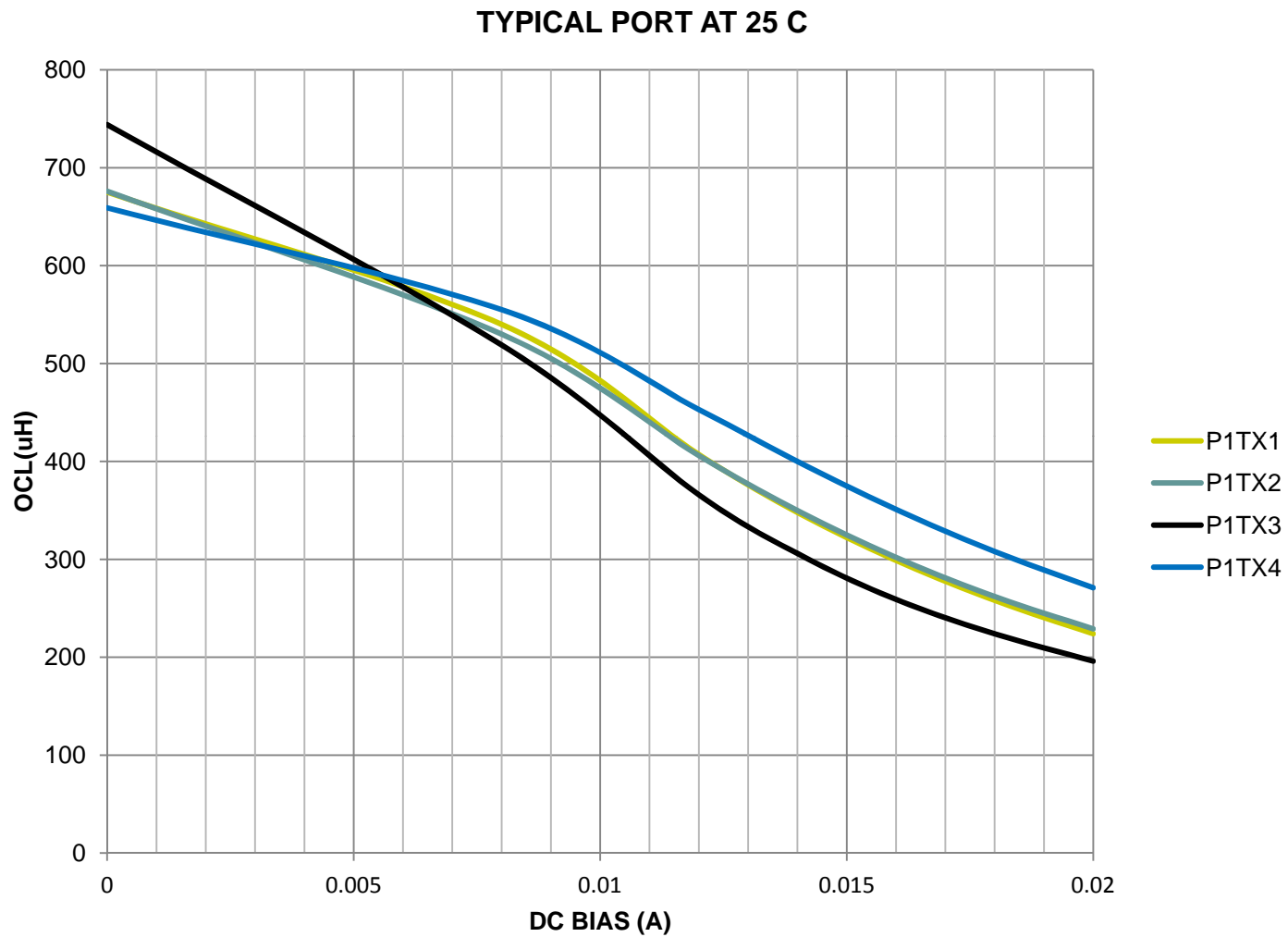
## 4-Pair POE ICM

# Typical OCL over temperature and DC bias, 0 degrees C.



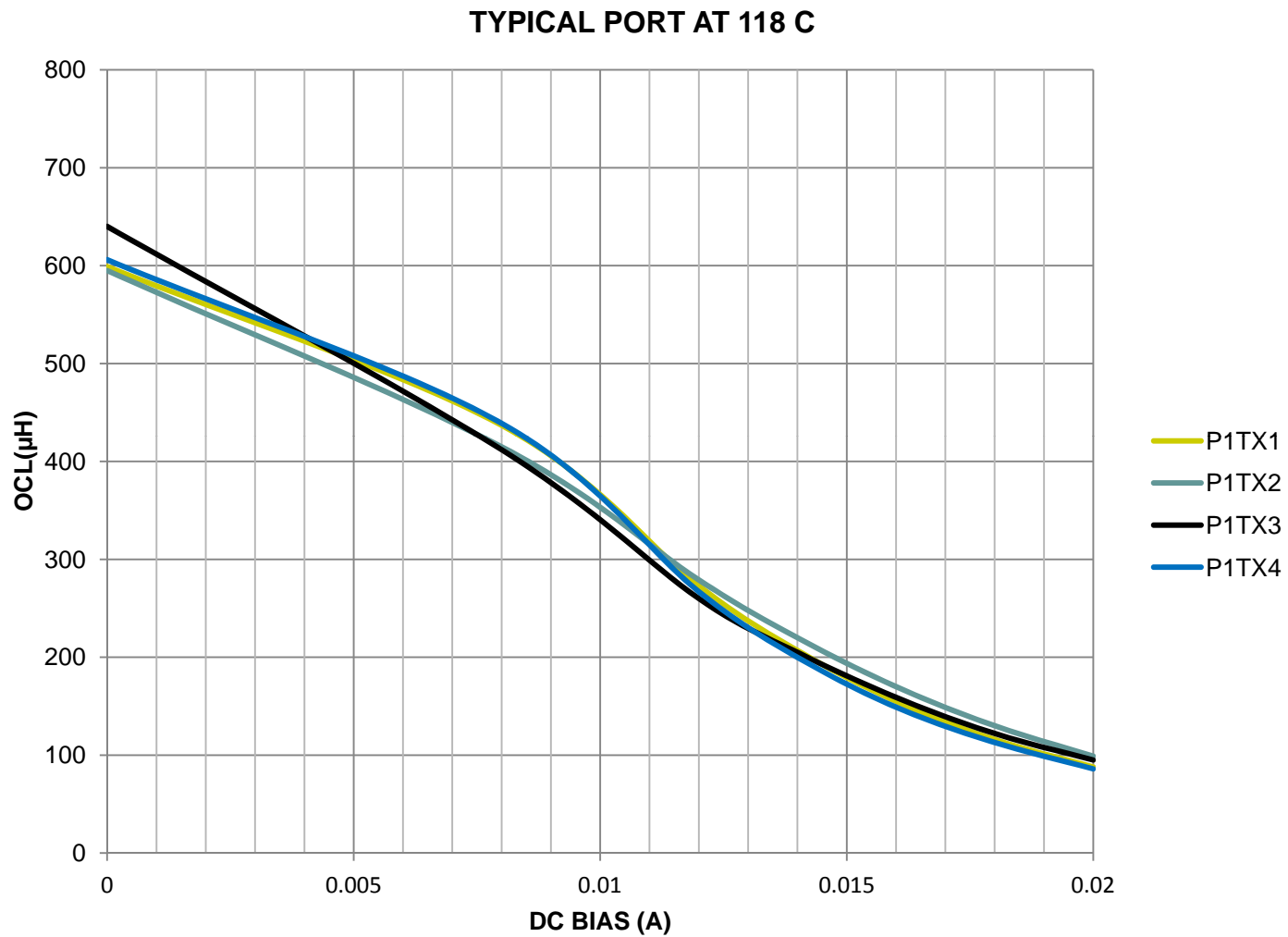
## 4-Pair POE ICM

# Typical OCL over temperature and DC bias, 25 degrees C.



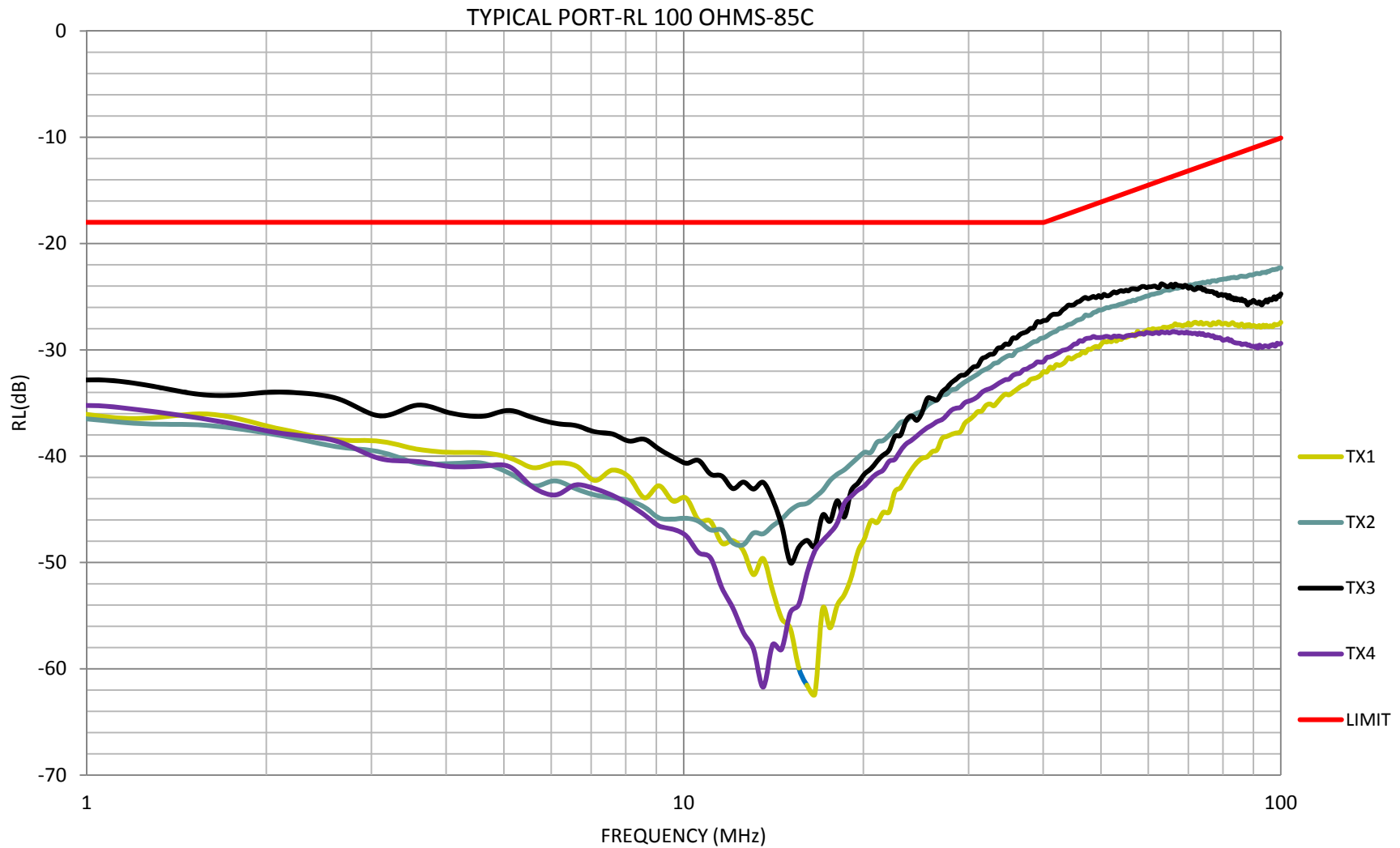
## 4-Pair POE ICM

# Typical OCL over temperature and DC bias, 118 degrees C.



## 4-Pair POE ICM

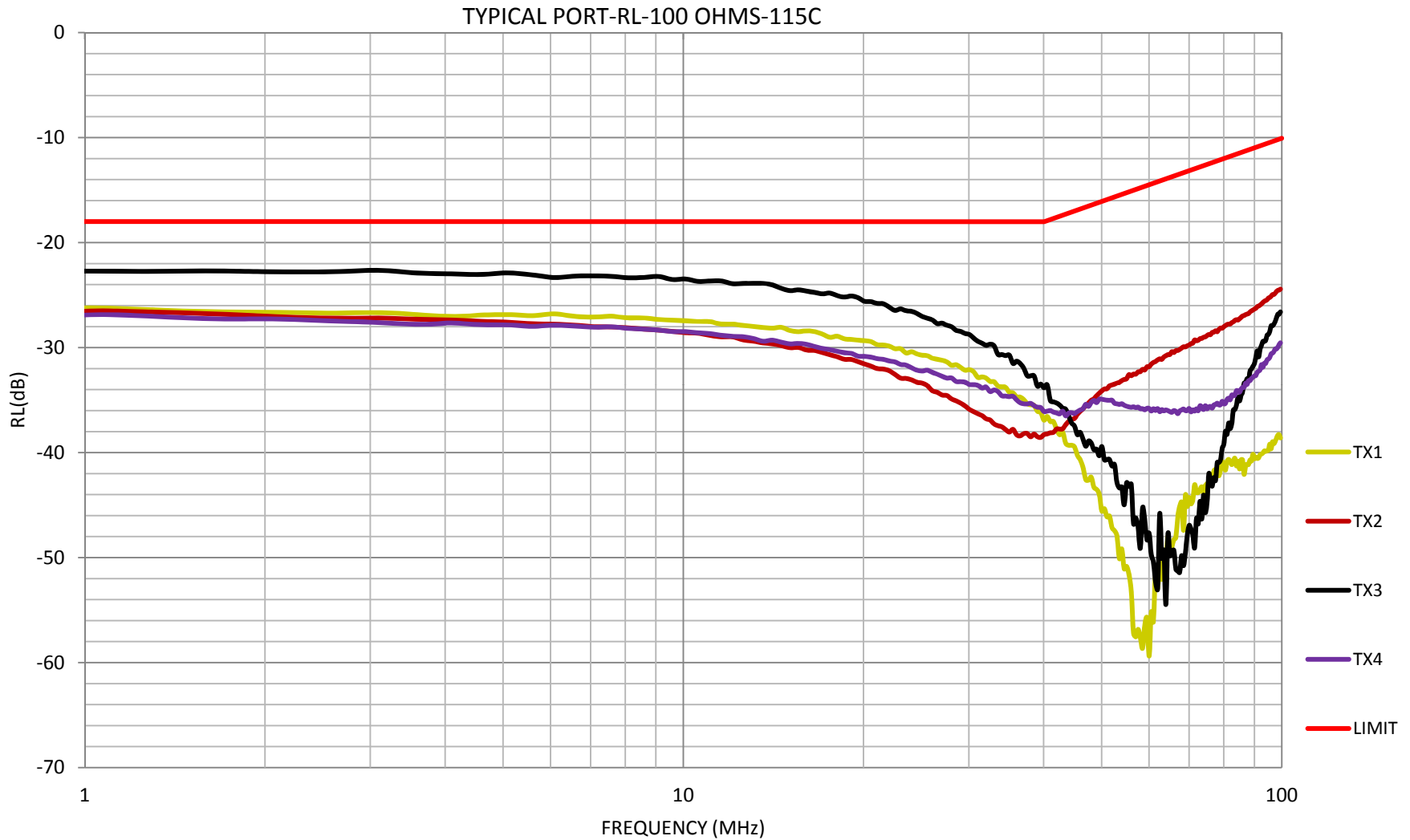
# Typical return loss 100 Ohms, 85 degrees C



## 4-Pair POE ICM

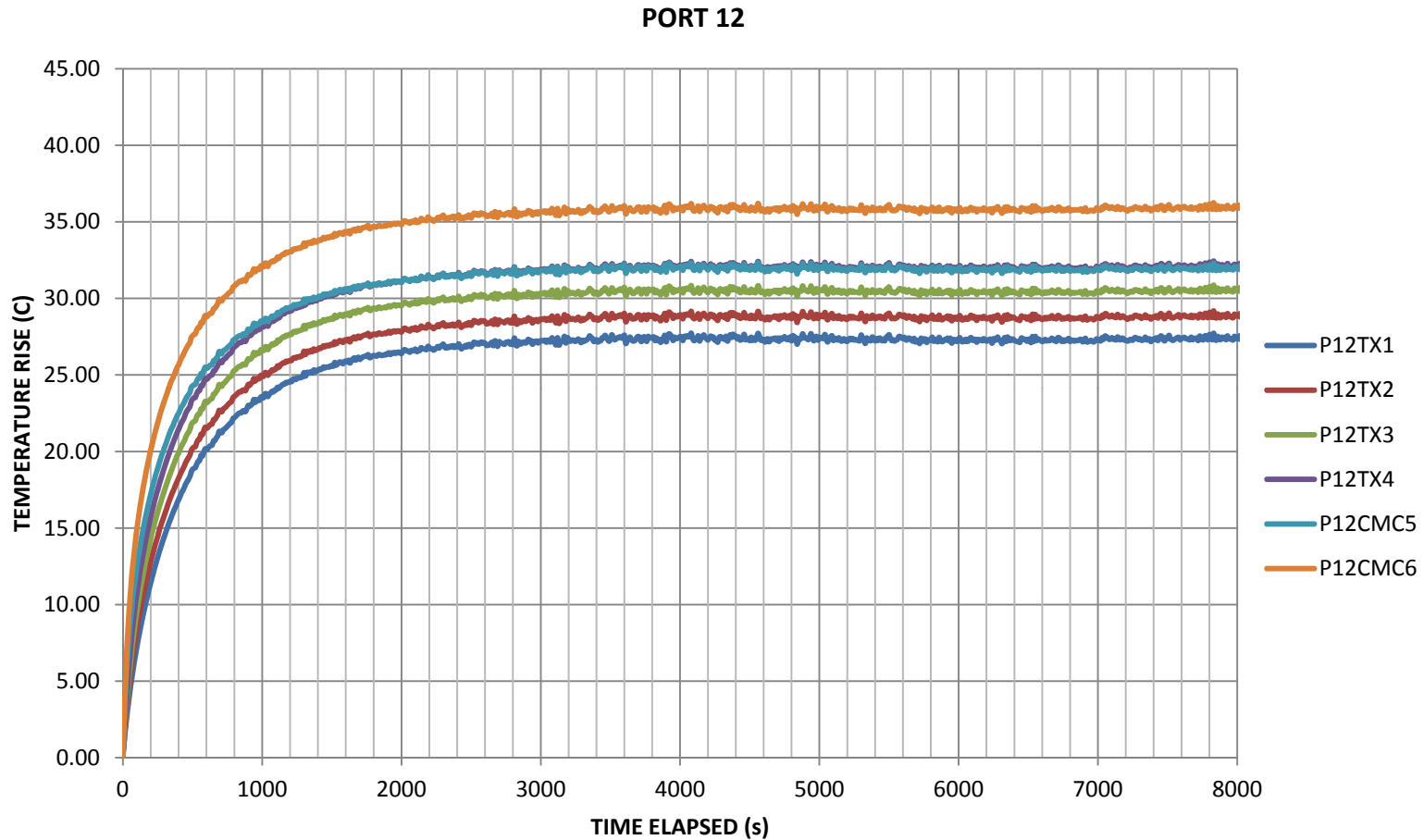


# Typical return loss 100 Ohms, 115 degrees C



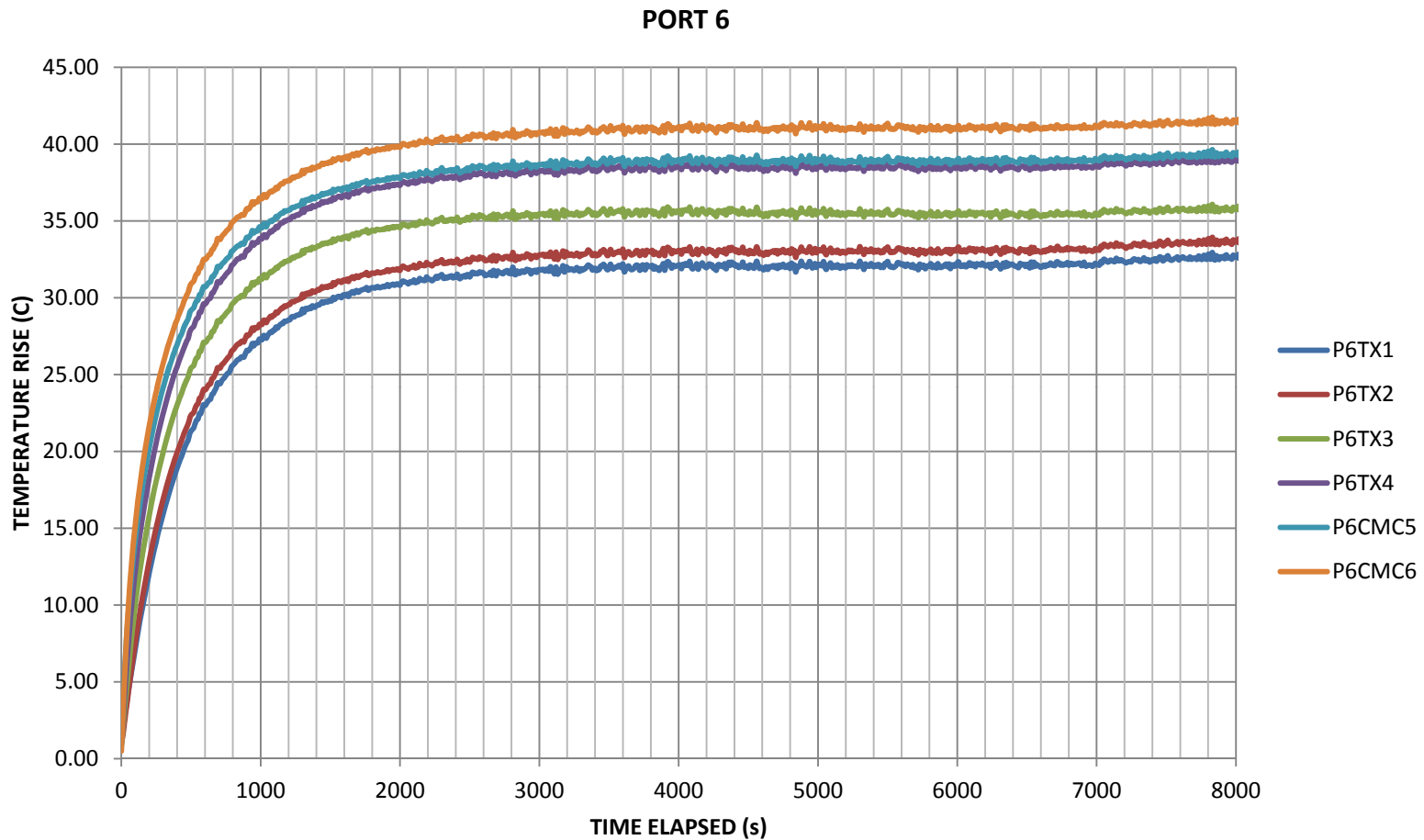
## 4-Pair POE ICM

# Typical temperature rise outer port, all ports running 1.2A.



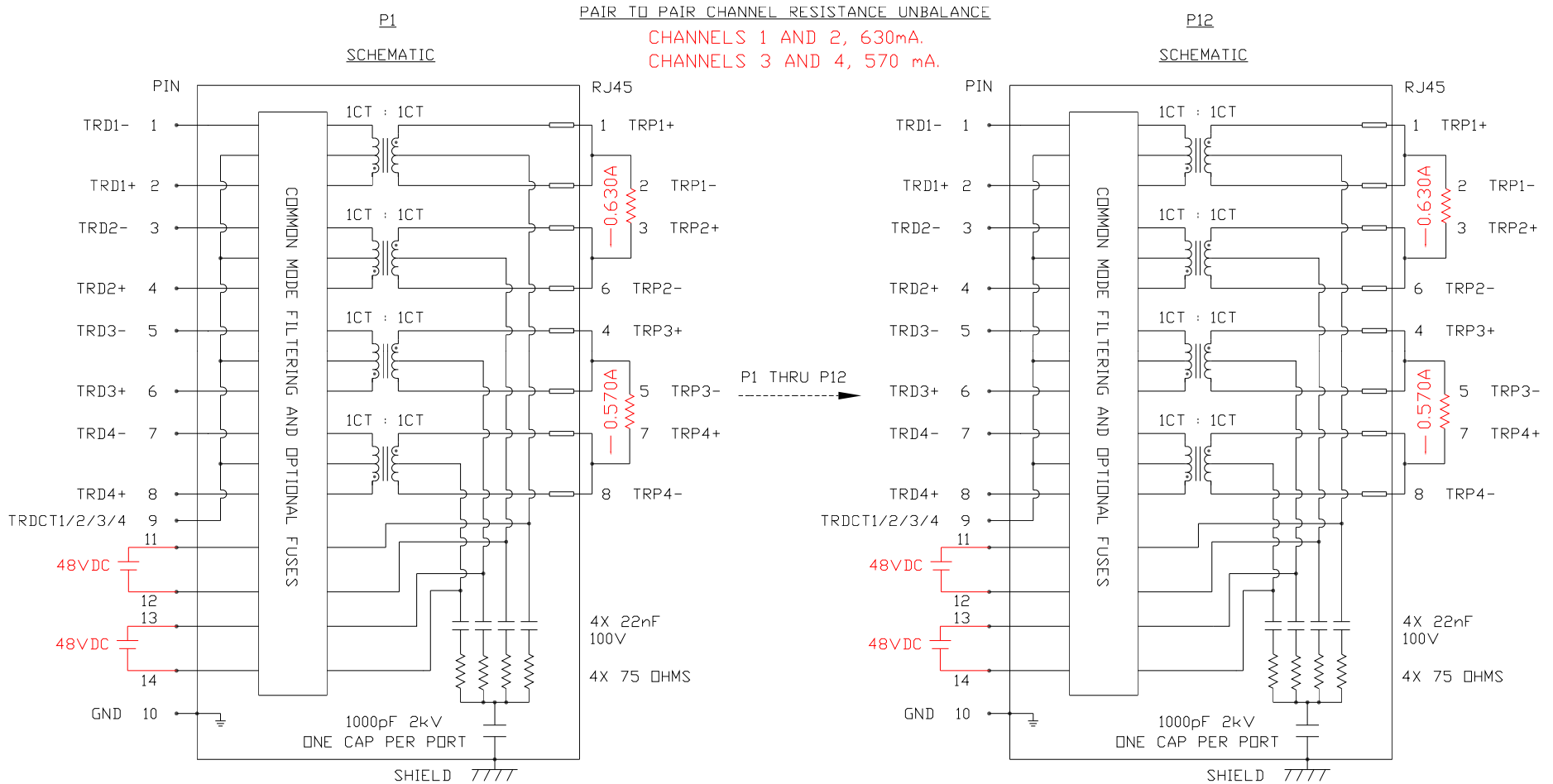
## 4-Pair POE ICM

## Typical temperature rise inner port, all ports running 1.2A.



## 4-Pair POE ICM

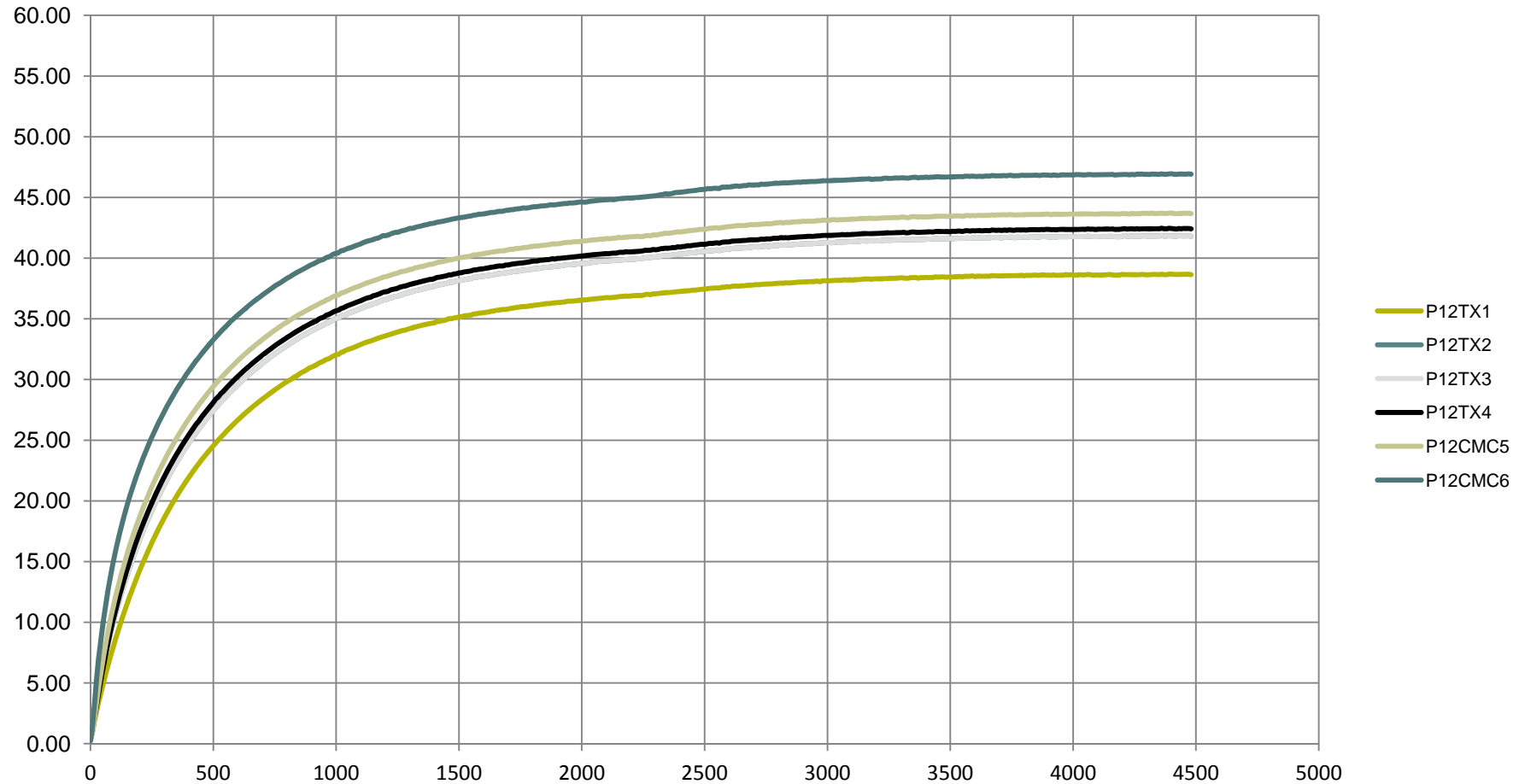
# Pair to pair channel resistance unbalance, temperature rise.



## 4-Pair POE ICM

# Typical temperature rise outer port, channels 1 and 2 running 630mA, channels 3 and 4 running 570mA.

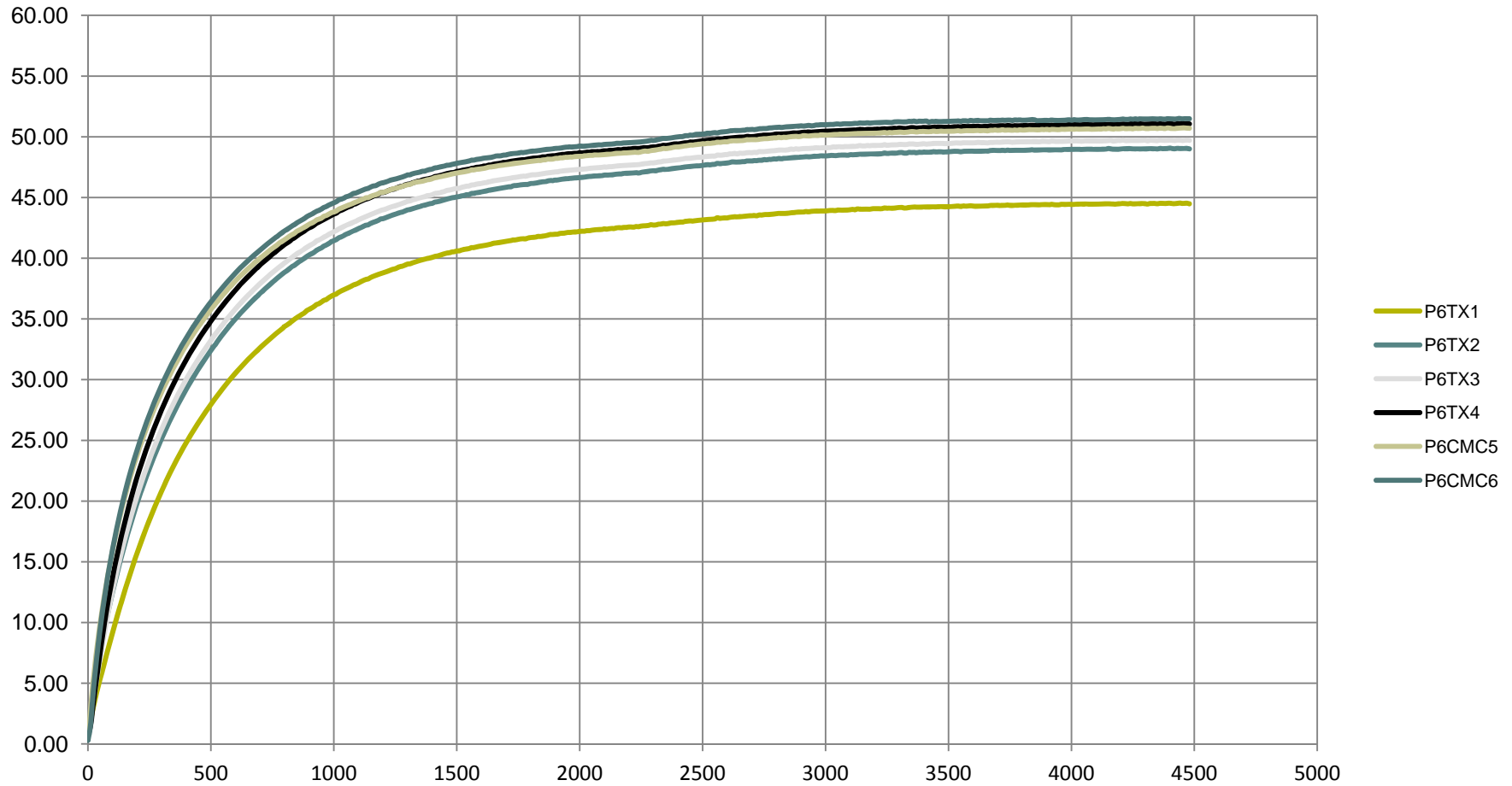
## P12 TEMP RISE



## 4-Pair POE ICM

# Typical temperature rise inner port, channels 1 and 2 running 630mA, channels 3 and 4 running 570mA.

## P6 TEMP RISE



## 4-Pair POE ICM

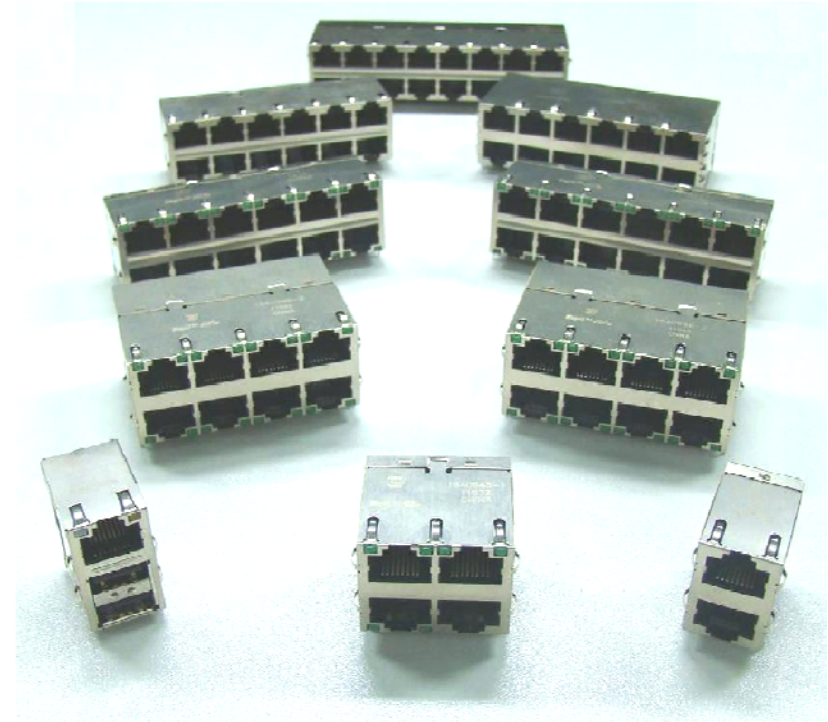
## DCR unbalance in the ICM.

- Typical DCR RJ contact to ICM power output pin is 0.251 to 0.280 Ohms
- Resistance will differ with circuit topology
- Worst case delta seen in measured pairs indicate ~ 3% maximum unbalance between pairs
- More accurate measurements need to verify precision

## 4-Pair POE ICM

## Conclusions

- Backward compatibility can be met with 12mA of bias at maximum temperature.
- Meets current IEEE return loss HIPOT specifications.
- Compatible with 2XN high density connectors in the market today.



## 4-Pair POE ICM



THANK YOU!

4-Pair POE ICM

