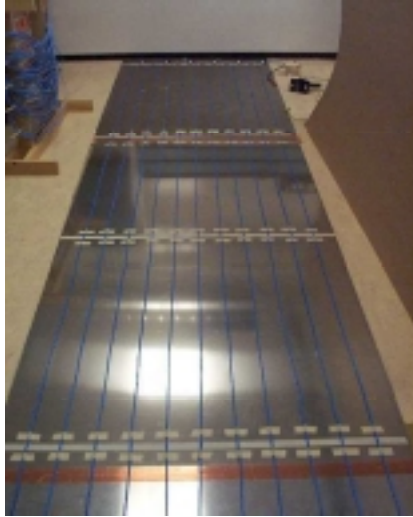


Cabling ESD Study

Lucent Technologies

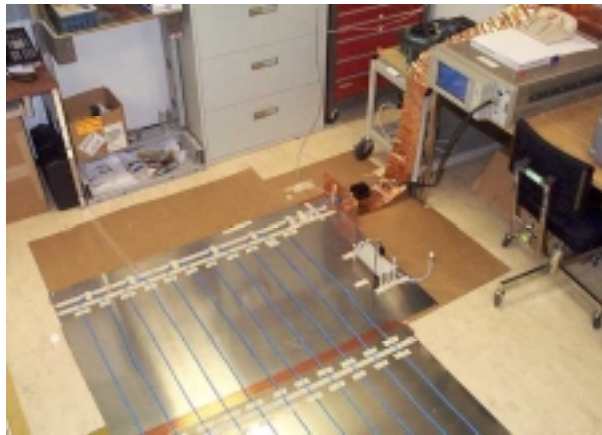
- 1. Subject different cables to a Human Body Model contact discharge of 8 KV.**
- 2. Release charge after 4 hours and capture response (Record temperature and humidity).**
- 3. Normalize responses to a single humidity using linear correlation.**
- 4. Compare responses for different cable types.**

Cable Layout



- On ground plane looking toward the ESD charging-end fixture
- 56 meter length of 4-pr UTP cable arranged in serpentine pattern
- 10 cm spacing between adjacent loops and edges of 1.2m x 5.2m ground plane

Discharging Point



- Cable layout on ground plane looking toward current sensing transducer
- Transducer connected to scope through 20 dB attenuator and 1m length of coax

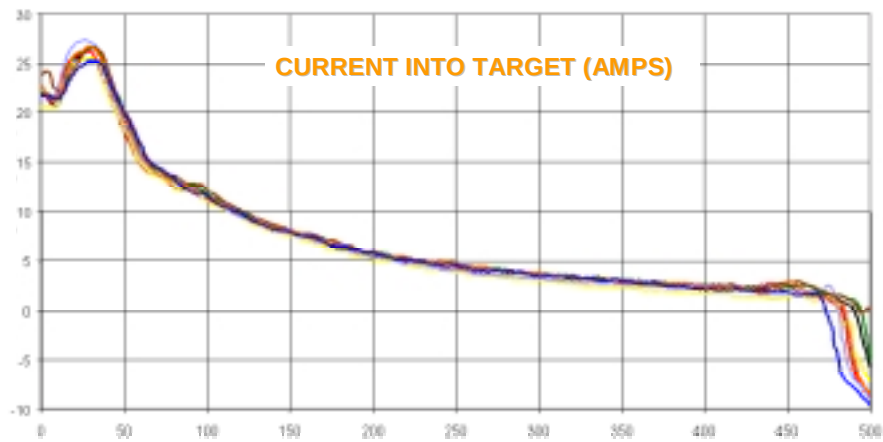
ESD charging-end fixture



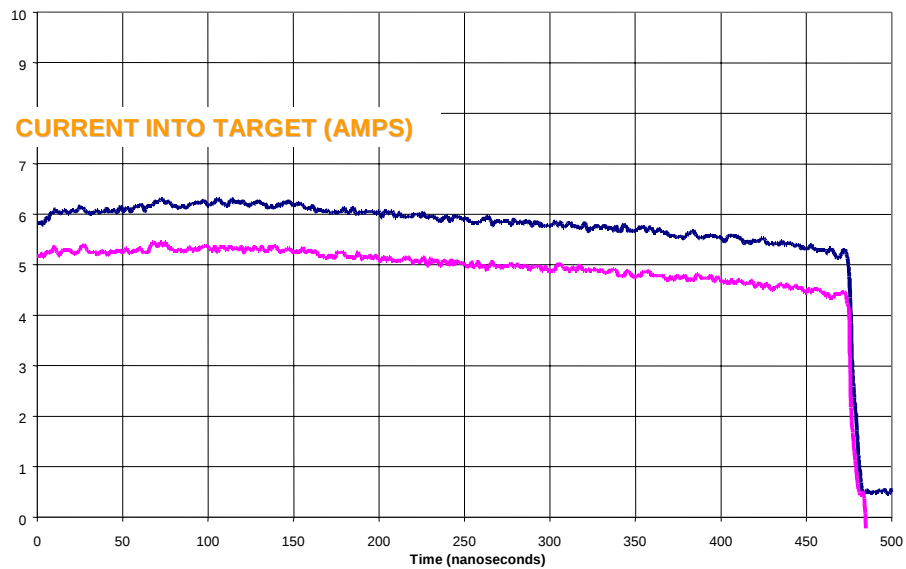
- Discharge tip positioned on BNC adapter shield
- Orange conductor pair connected to binding post shield connection
- Unused pairs connected to ground plane through binding post BNC adapter



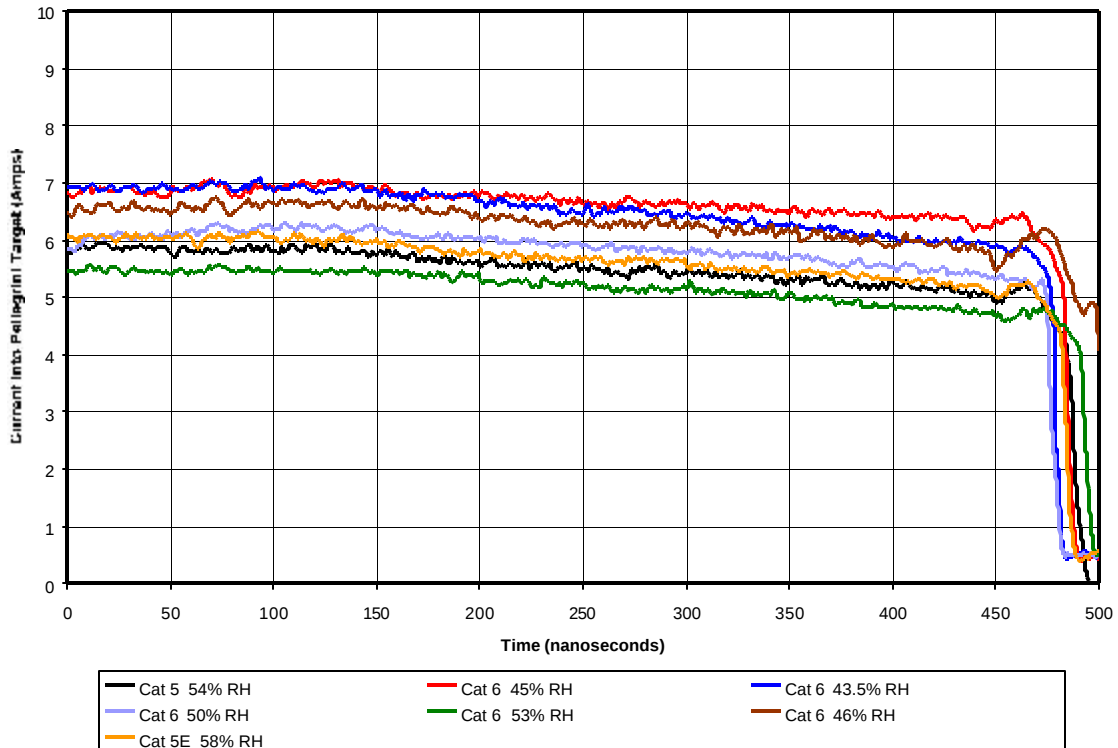
- Discharge end of cable showing the connection to the current-sensing transducer via a relay contact.
- Unused pairs are shown connected to the ground plane through a copper foil.



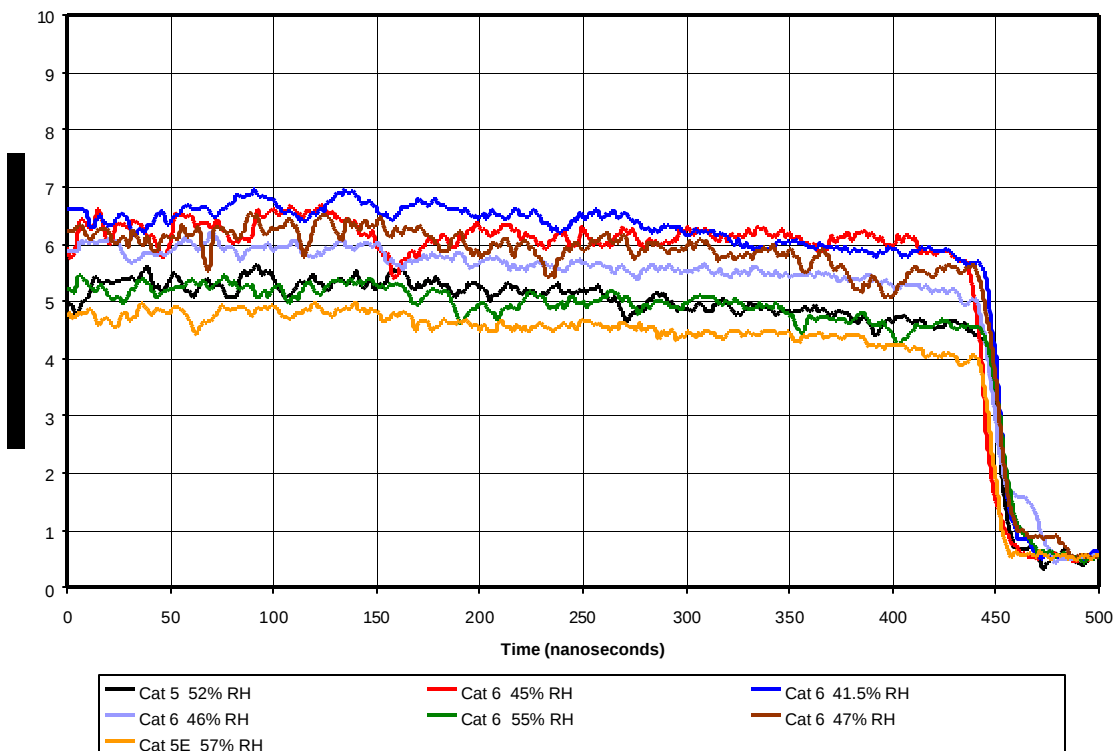
Discharge waveforms for cables under test with unused pairs connected together and grounded (First Cycle)



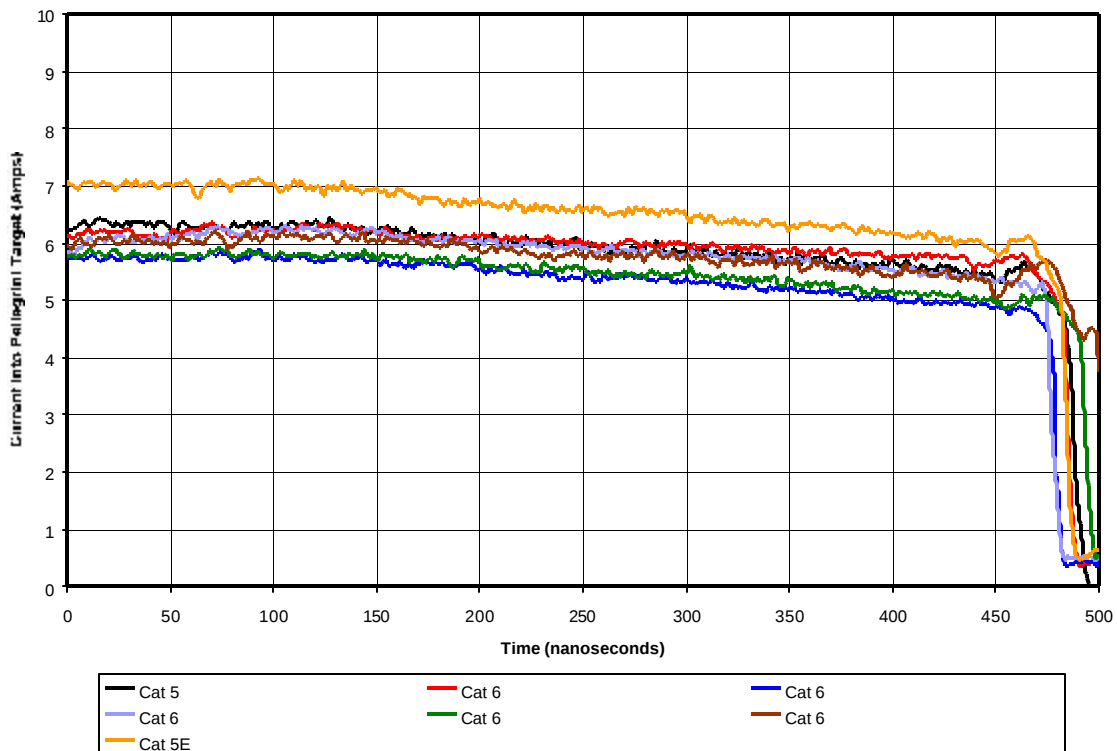
Discharge waveforms for t=4 hours time interval at relative humidities of 50% and 63% for case of unused pairs connected together and grounded.



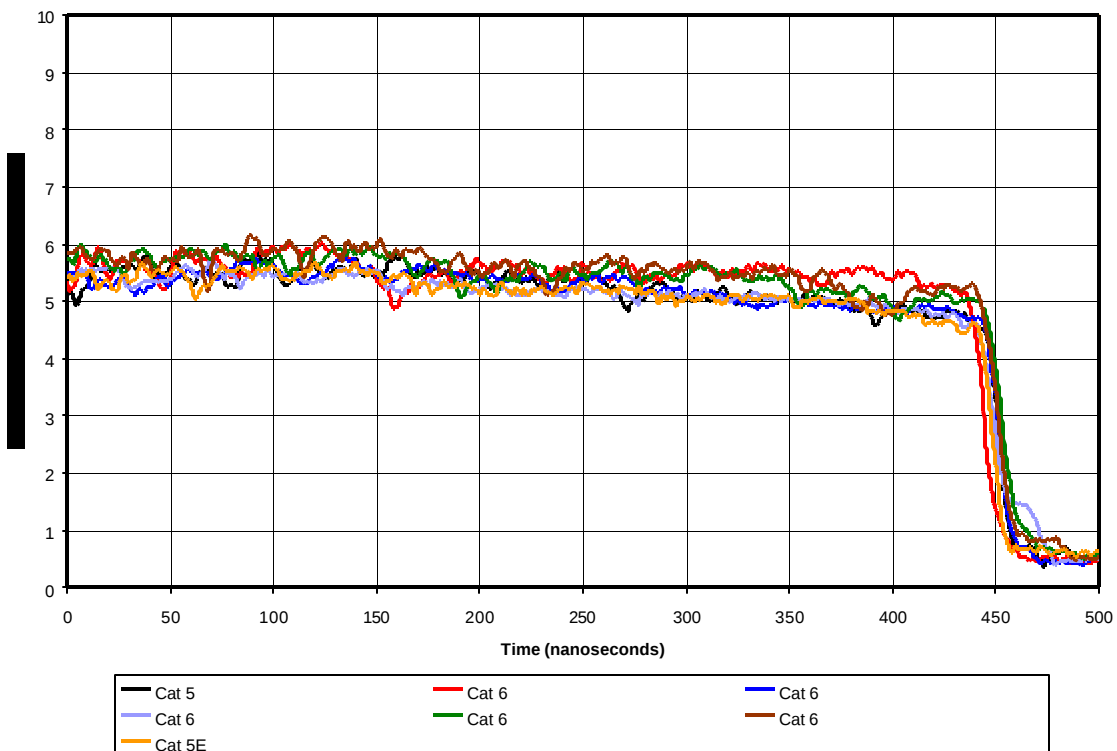
Discharge waveforms for t=4 hours time interval for case of unused pairs connected together and grounded



Discharge waveforms for t=4 hours for case of unused pairs floating



Discharge waveforms for t=4 hours time interval (with unused pairs grounded) after correction for humidity.



Discharge waveforms for t=4 hours time interval (with unused pairs floating) after correction for humidity.

CONCLUSION:

No significant difference in discharge between different cable categories.

Equipment should at least meet (human body) Standard IEC 61000-4-2 Guideline:

According to Section A.4 Table A.1:

• *Class 1 equipment (2 kv test level) should:*

- *not* be in a low humidity environment
- be protected by Anti-static Material

• *Class 2 equipment (4 kv test level) should :*

- be protected by Anti-static Material

• *Class 3 equipment (8 kv test level) should :*

- *not* be in a low humidity environment

• *Class 4 equipment (15 kv test level) should :*

- *Not to worry (too much)*