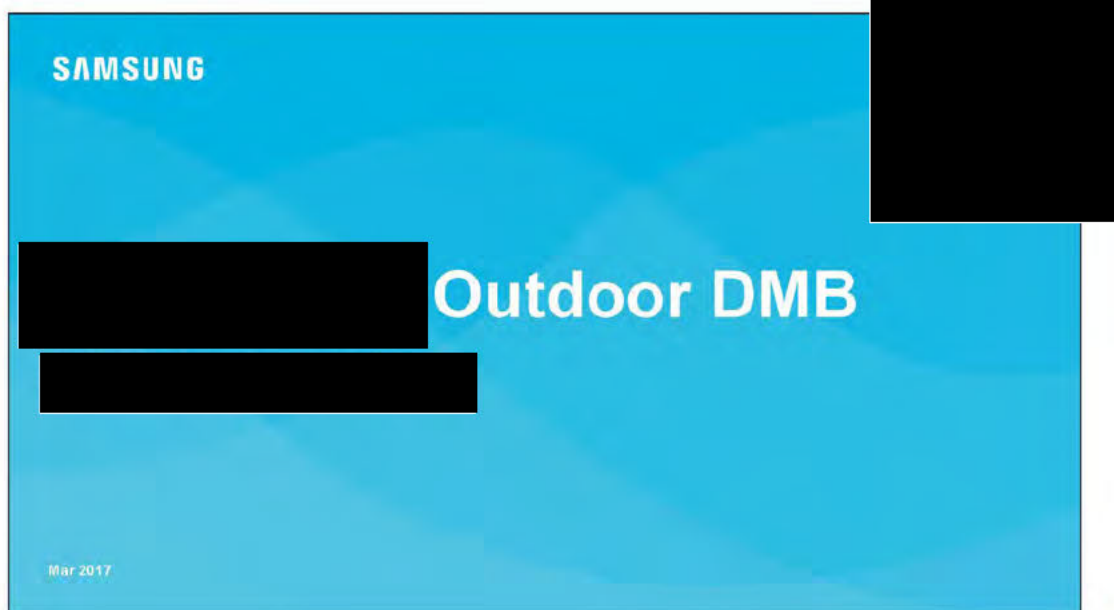
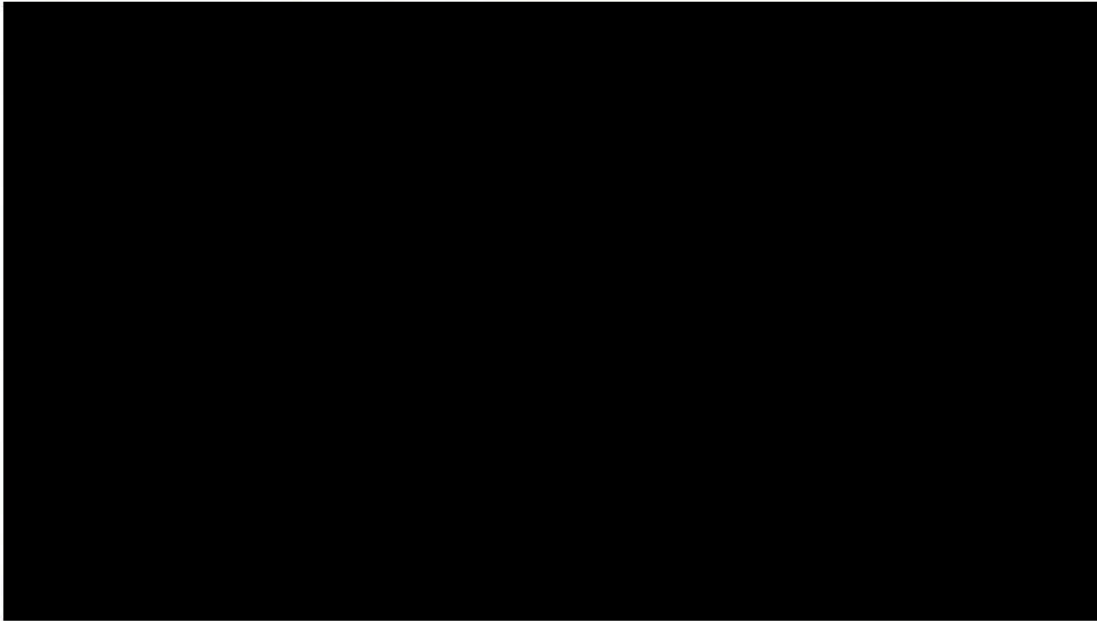


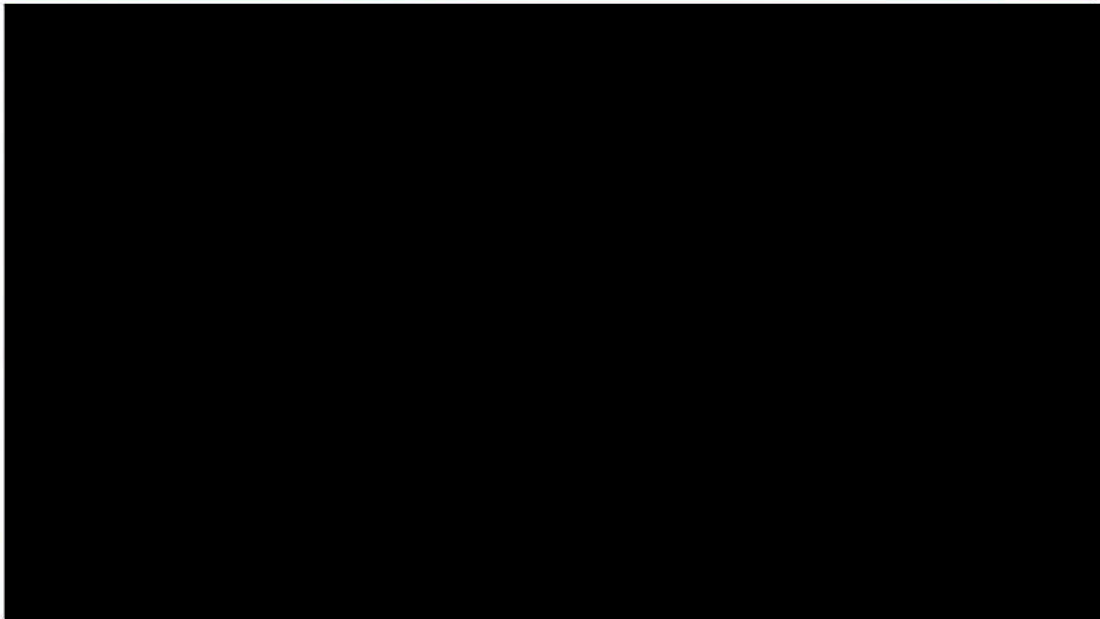


Agenda

- **Lesson Learned About Outdoor DMB**
- Samsung Outdoor DMB - OH Series

SAMSUNG





Agenda

- Lesson Learned About Outdoor DMB
- **Samsung Outdoor DMB - OH Series**

SAMSUNG



Samsung OH Series Features : Summary

CONFIDENTIAL

Each Samsung ODMB's elements, such as display, media player & CMS, enclosure and maintenance & service offer outdoor-optimized features & benefits

Traditional 4 Elements

SAMSUNG OH Series

1. Enclosure

All-in-one System

Self-cooling System
Low Fan Noise
Embedded Power
Slim Design
IP 56
Wide Operational Temp.



Magic glass

MagicGlass - Thermal
Anti-Vandalism / IK10



2. Display

Panel

TUV Certified High Visibility
High Contrast Ratio
Polarized Sunglass Support
Low Reflection
TN1 110 °C PANEL



Specialty

Integrated Network Hub / WIFI
Ambient Light Sensor
HD Based T



3. Media Player & CMS

SoC

Replace Media Player
Lower TCO & Failure rate



M. Player Platform & CMS

Remote Management
Device Control
Redundancy
Excellent Performance
High Security
Various Interactivity



4. Maintenance & Service

Maintenance & Service

Filter-Less Design
Easy Replacement
Appropriate SVC Options



1. Enclosure > Major Thermo-Mechanical Requirements

CONFIDENTIAL
MSUNG

Thermal design of OH series **MUST** ensure the picture quality, mechanical robustness and lifetime in the installation environment

ODMB Installation Environment



- Ambient temperature range: -22~122 F
- Solar irradiation in frontal surface: ~ 700W/m2

OH Series Design Requirement



No Air Vent



IP56



Thermal Reliability

@ -30 ~ 55°C ambient condition

8

Electronics vs balloon



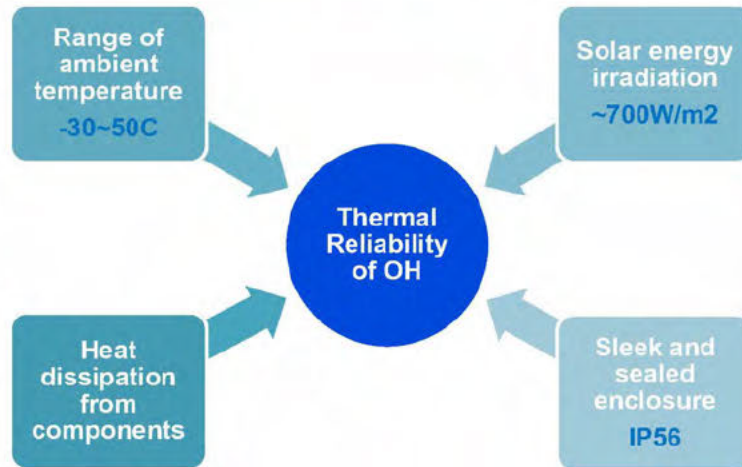
Temperature of a system ~ Size of a balloon
= $f(\text{heat in, heat out, System characteristics})$

10

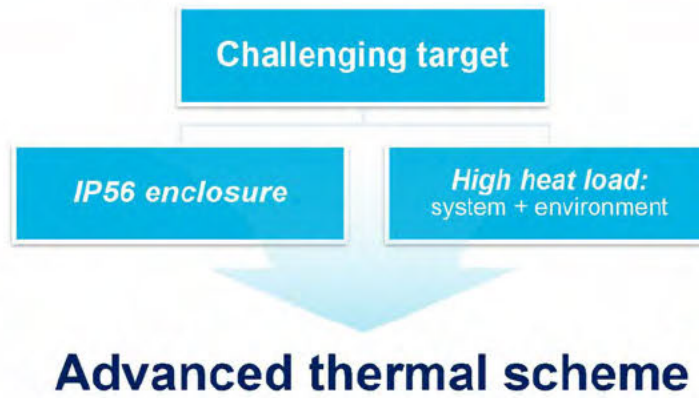
1. Enclosure > Consideration of Heat Transfer

Confidential

SAMSUNG



10



1. Enclosure > Base Model Analysis: Schematic

Confidential

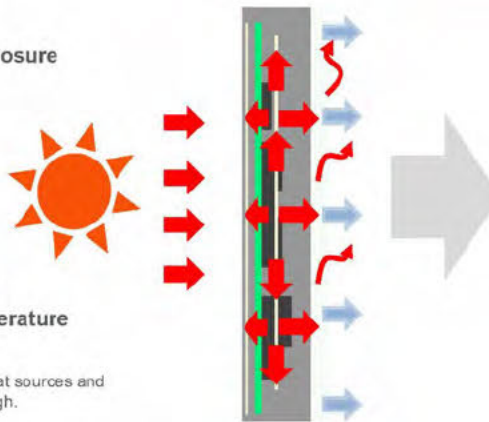
SAMSUNG

Objective

High brightness
Direct sunlight exposure
IP56 certificate

Considerations

Extra thermal load
High ambient temperature
Sealed enclosure
 R_{th} between internal heat sources and
ambient is inherently high.



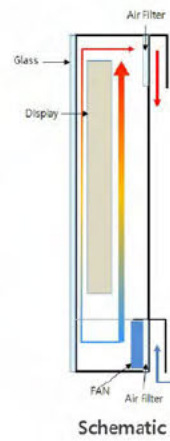
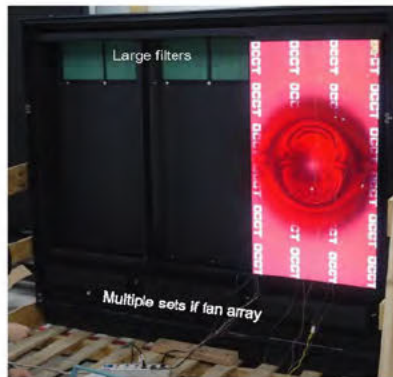
Deep
understanding
on a display
based on
experiences
is MUST

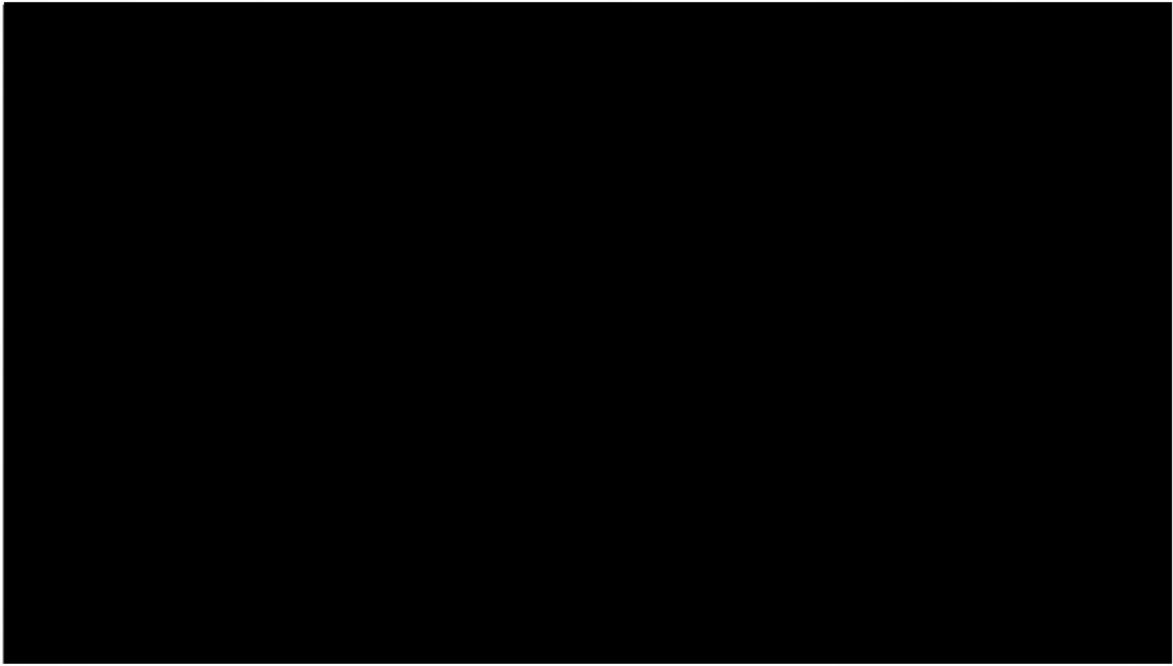
1. Enclosure > Thermal Flow Analysis : Conventional

Confidential

SAMSUNG

3rd Party Outdoor Enclosure





1. Enclosure > OH Series Thermal Mag. System

Confidential

SAMSUNG



Advanced optical technology on the protection glass

- Radiation energy block
- Visibility enhancement

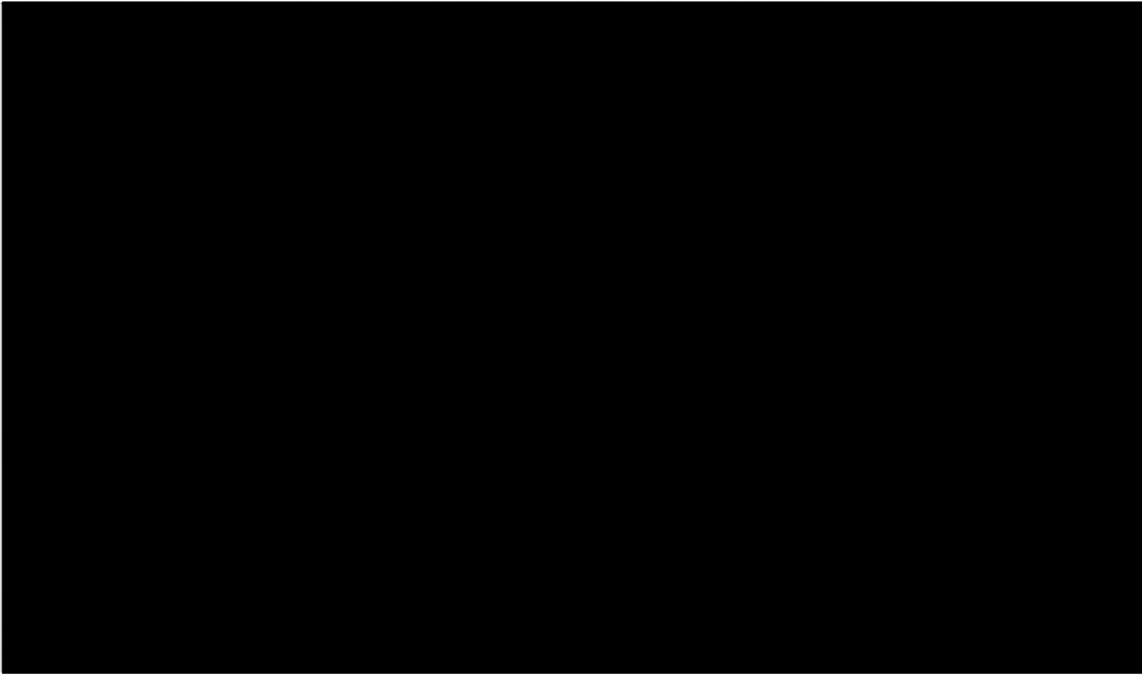


Heat transfer enhancement technology in the chassis structure

- Two-phase heat spreader to mitigate hot spot
- Enhanced convection for heat dissipation

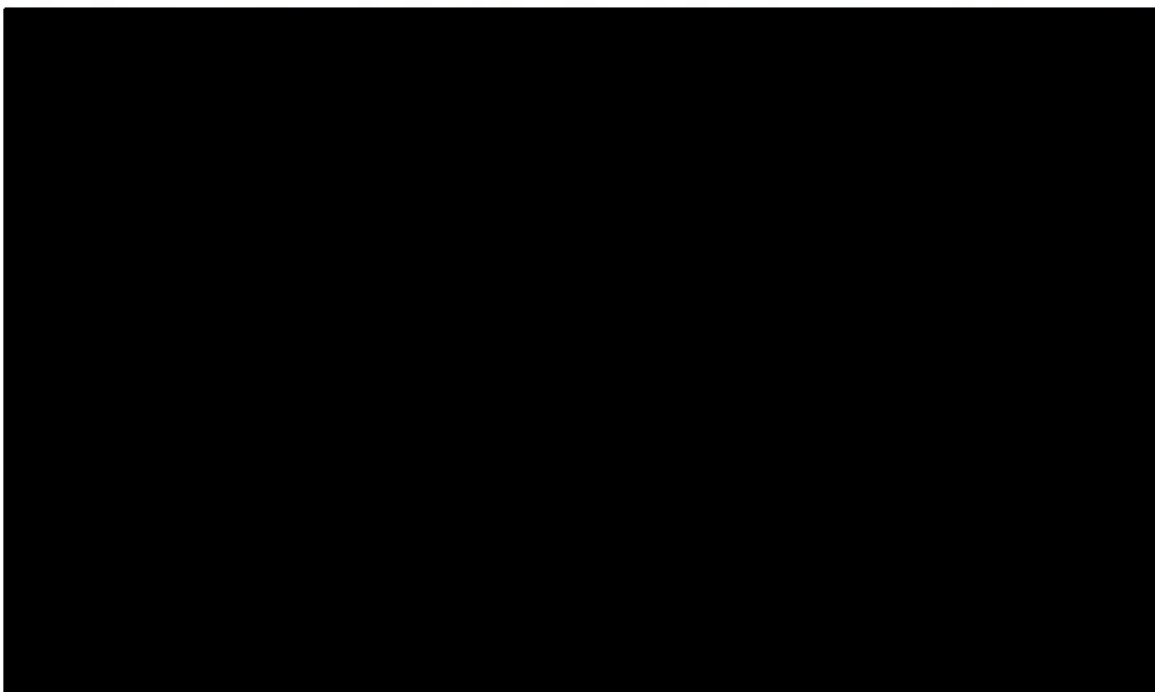
15



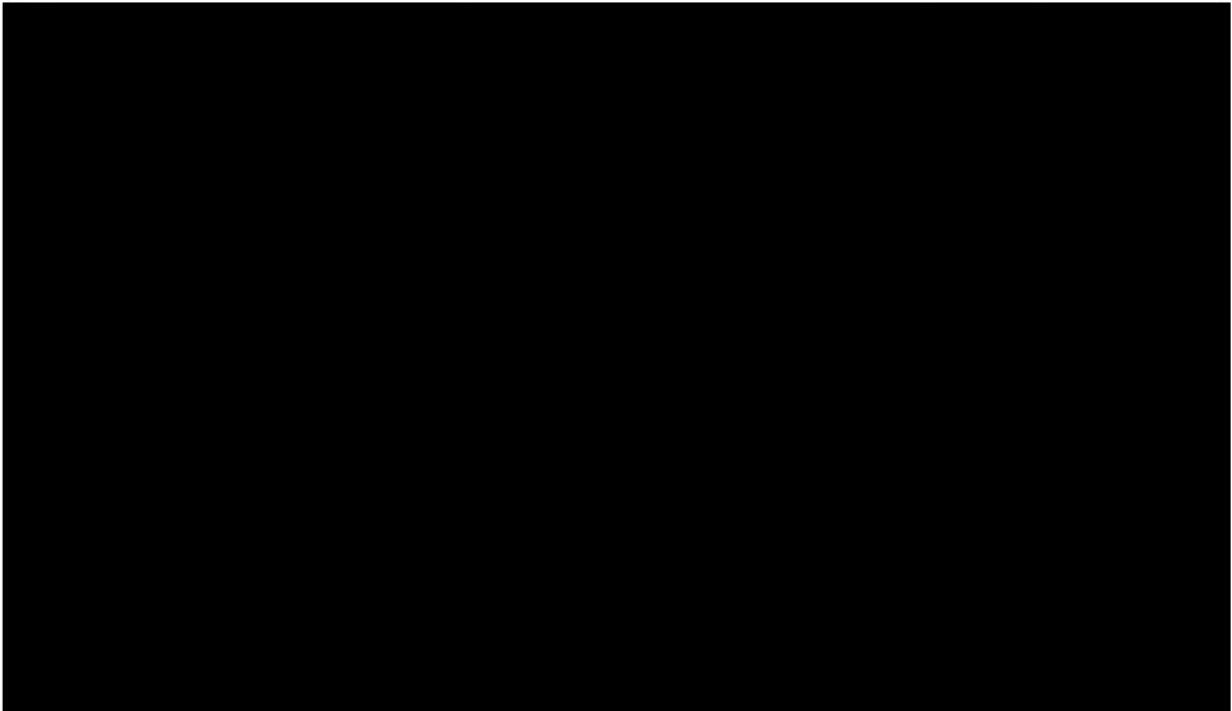


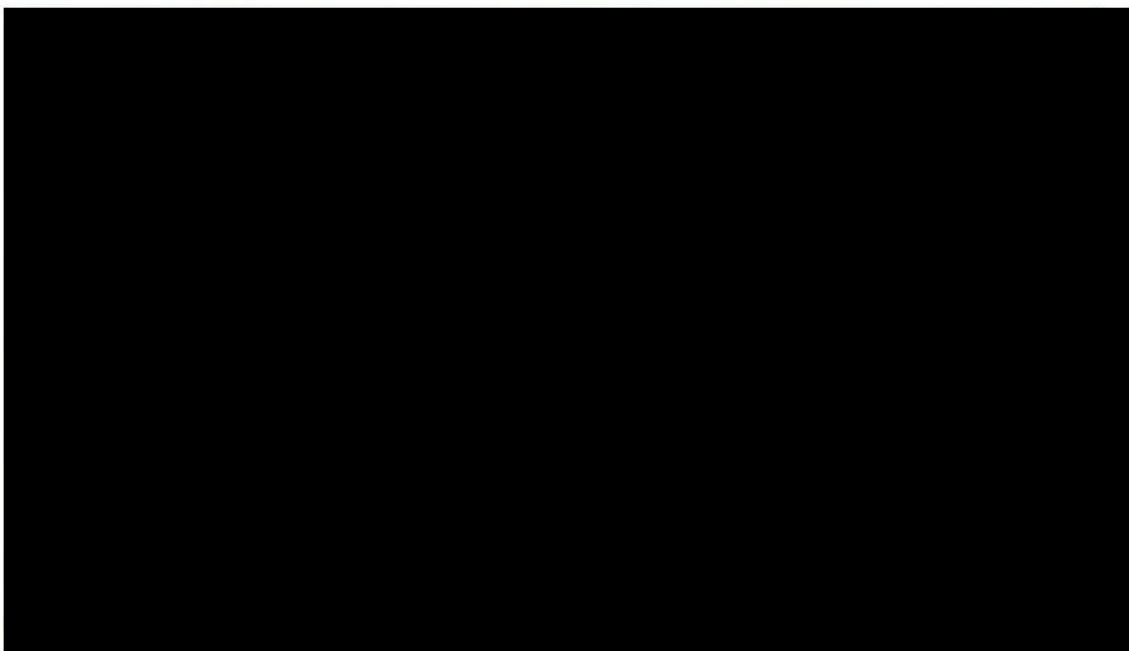


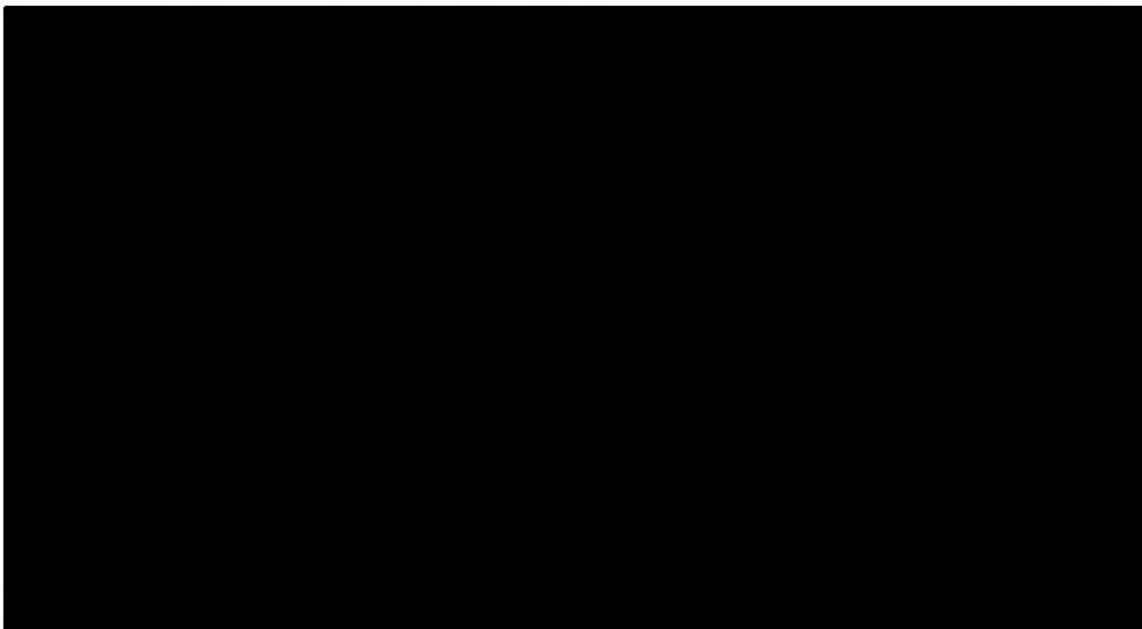






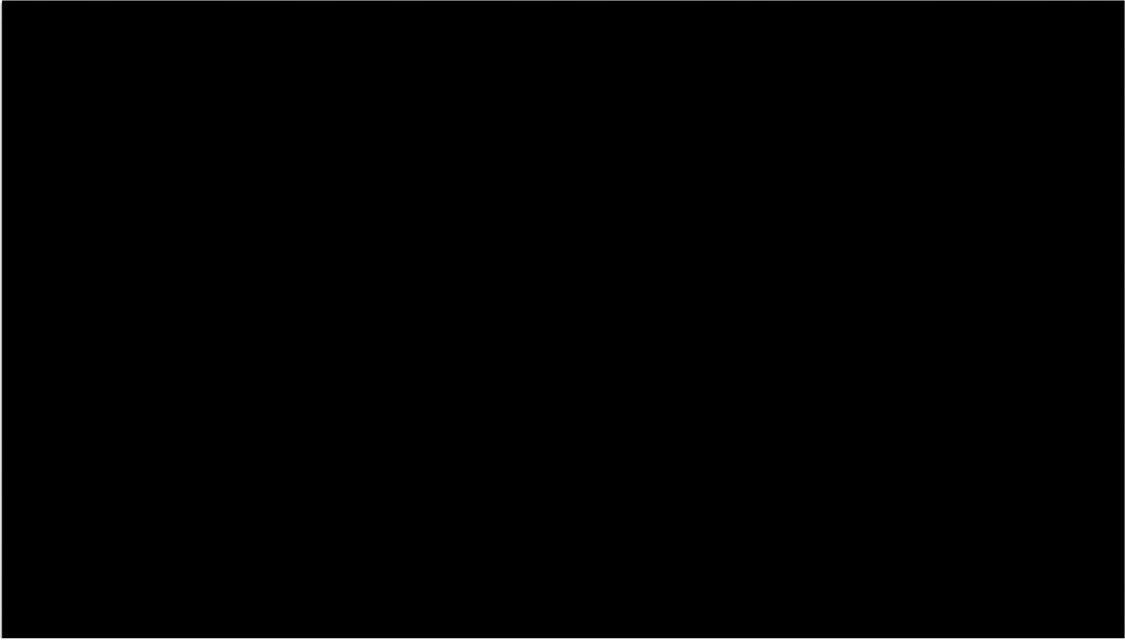






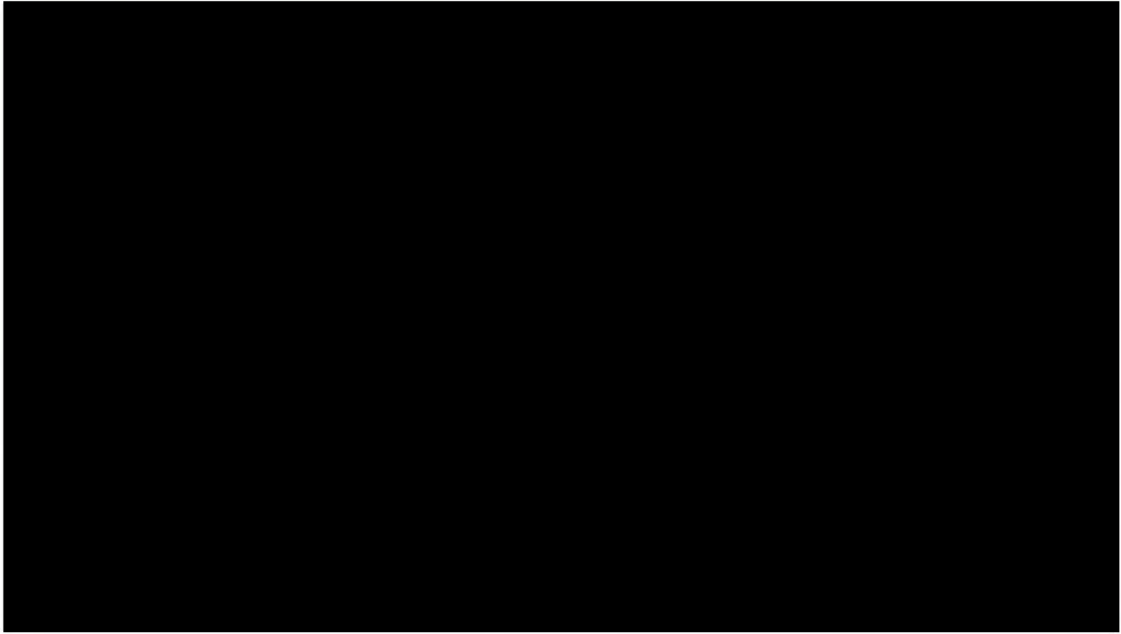




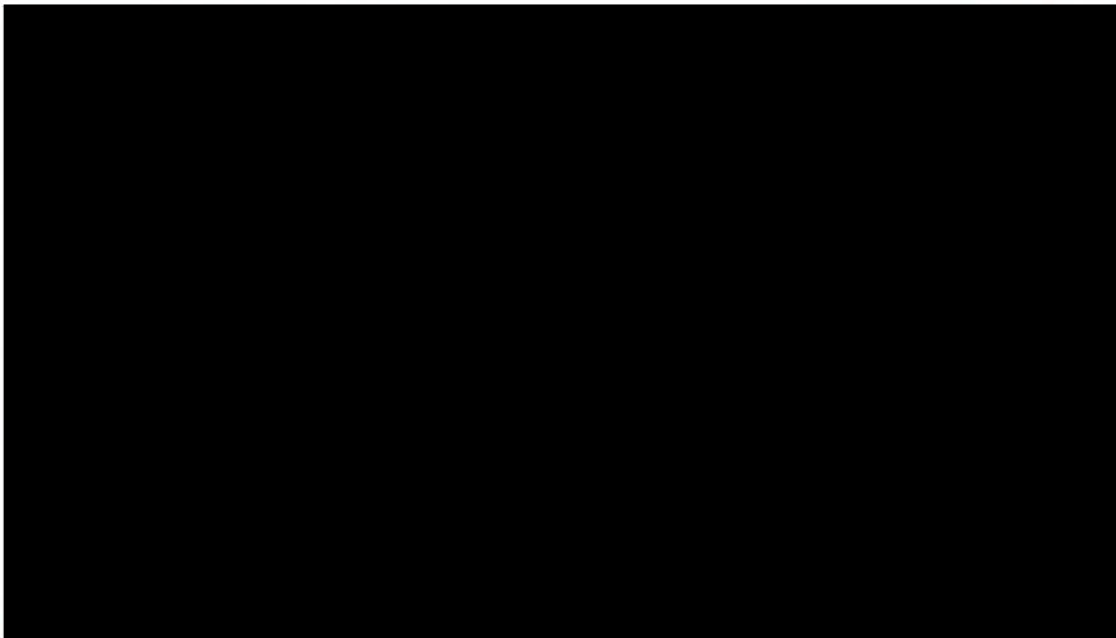




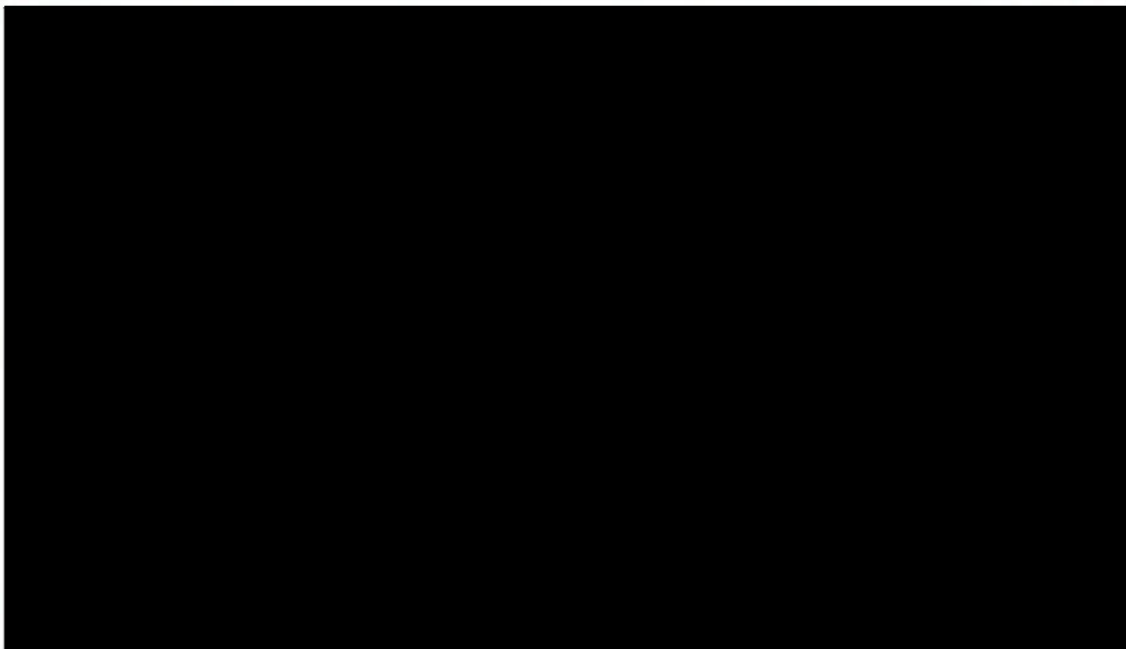




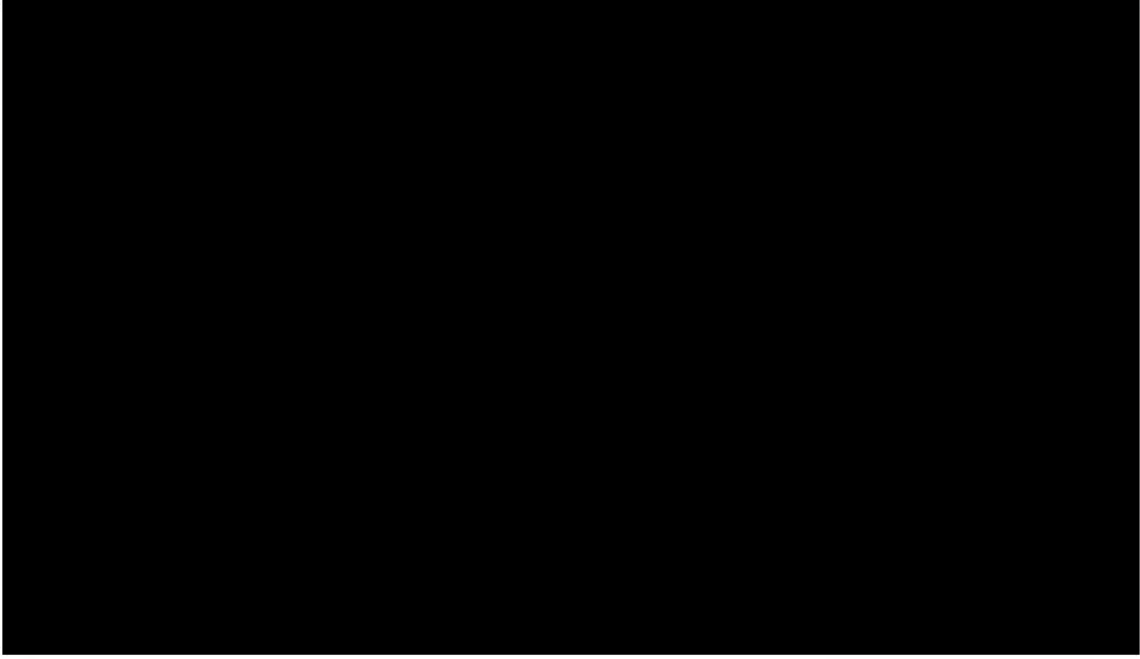


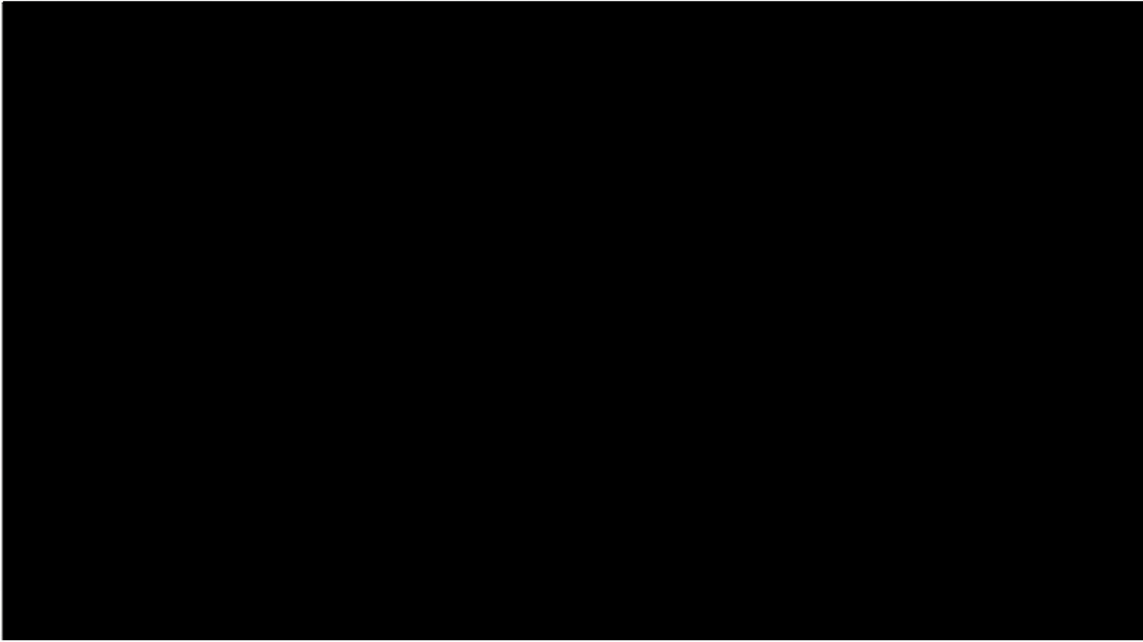






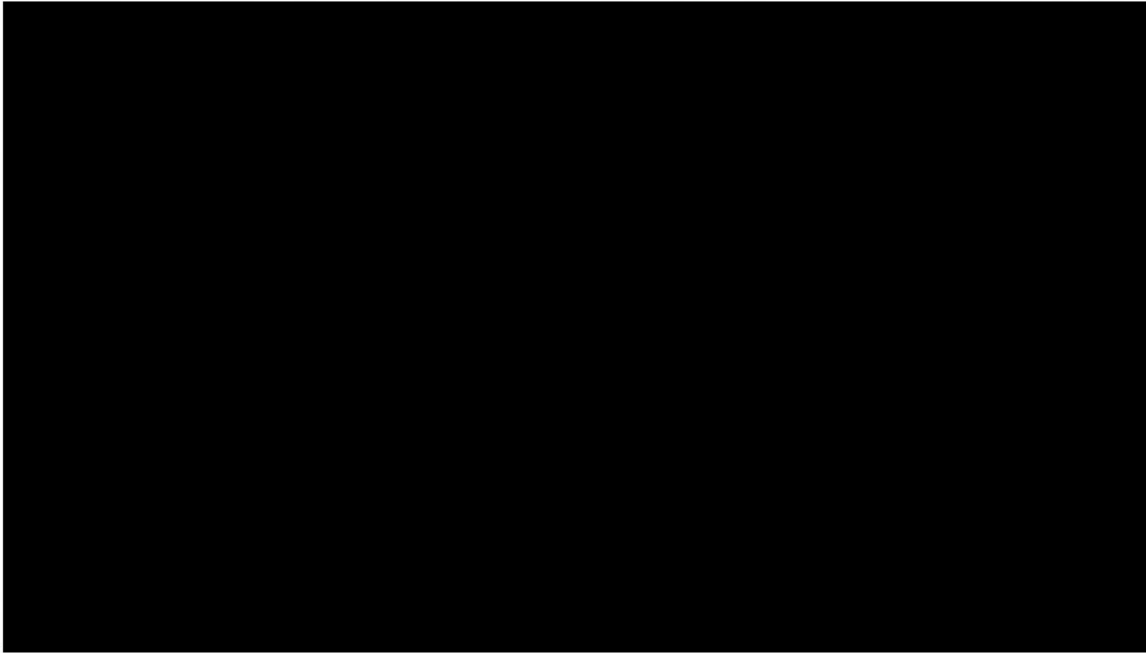










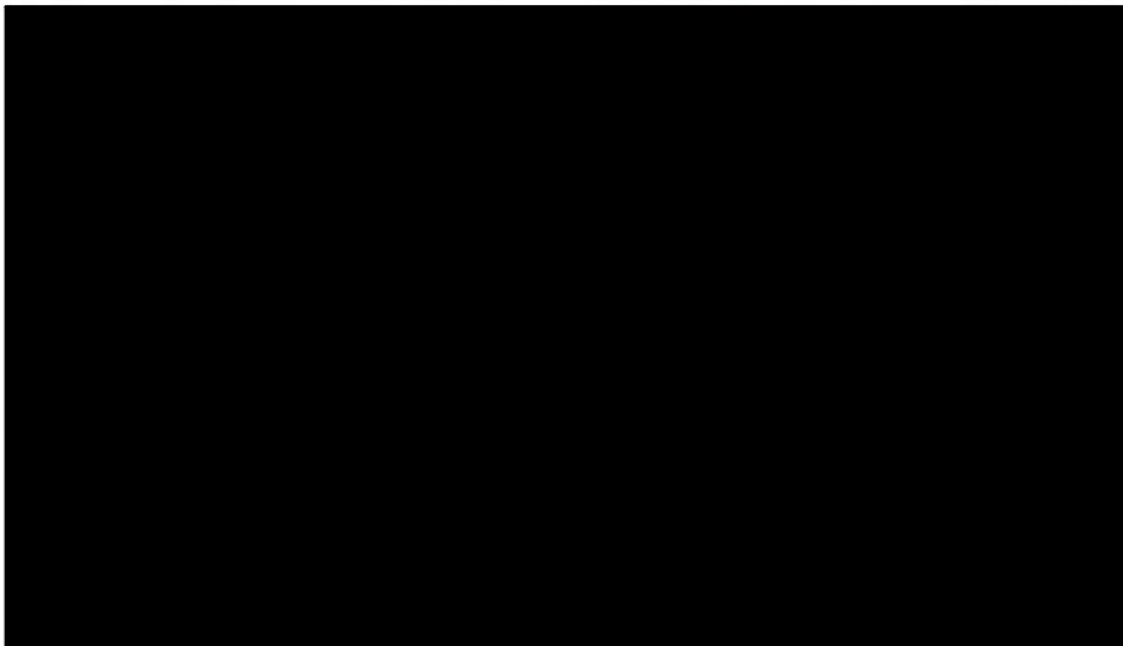




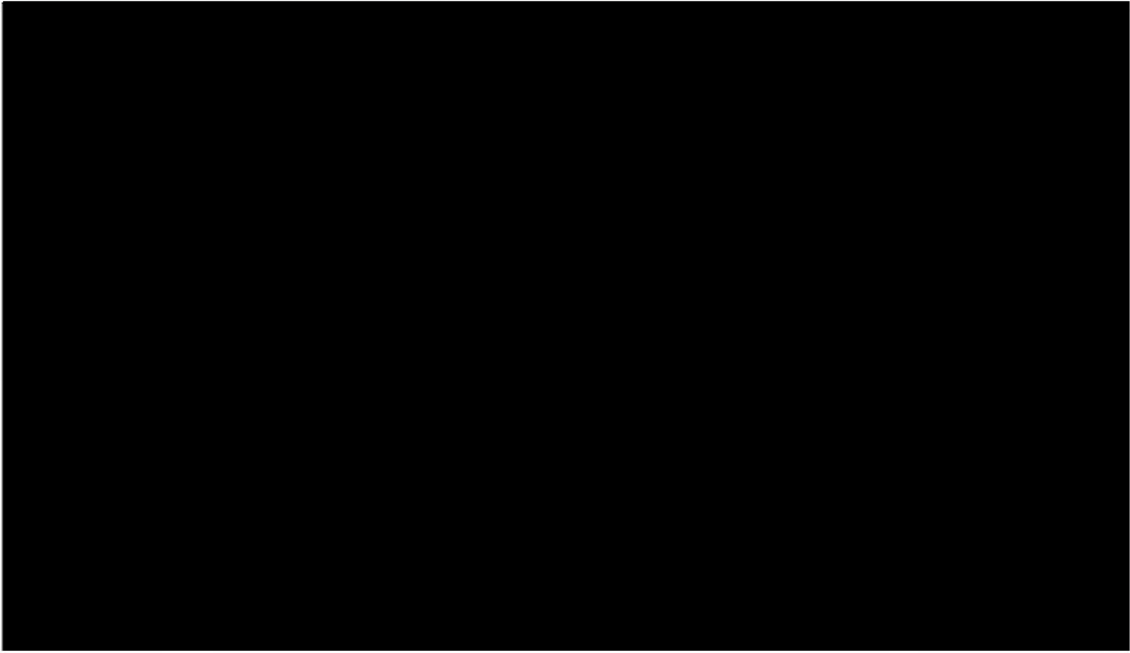


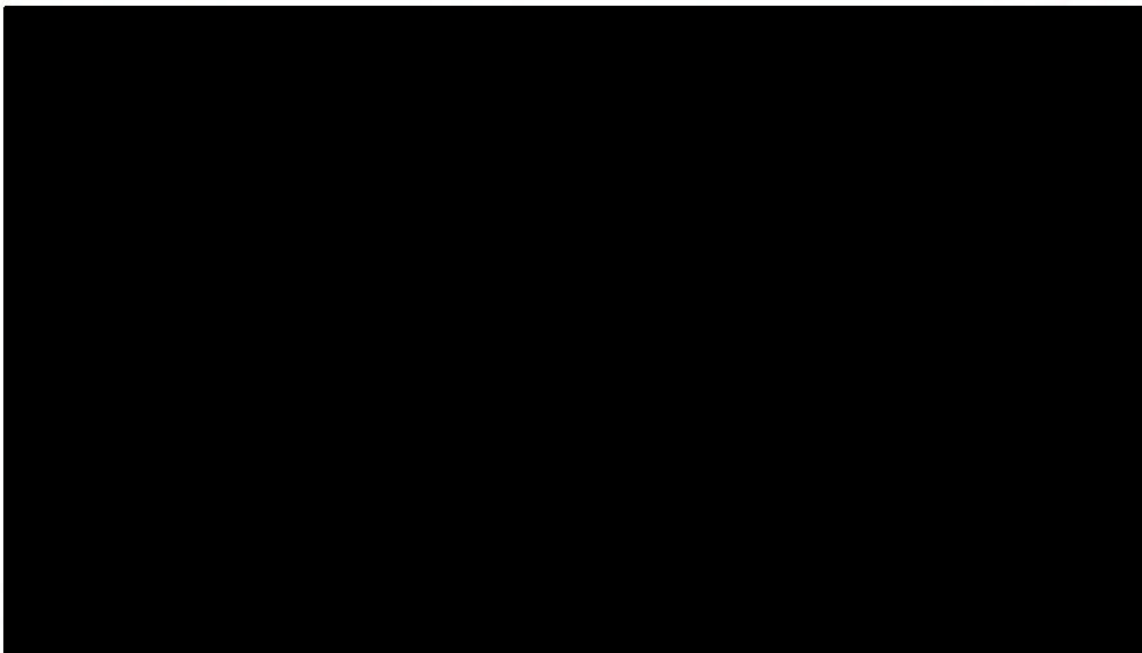


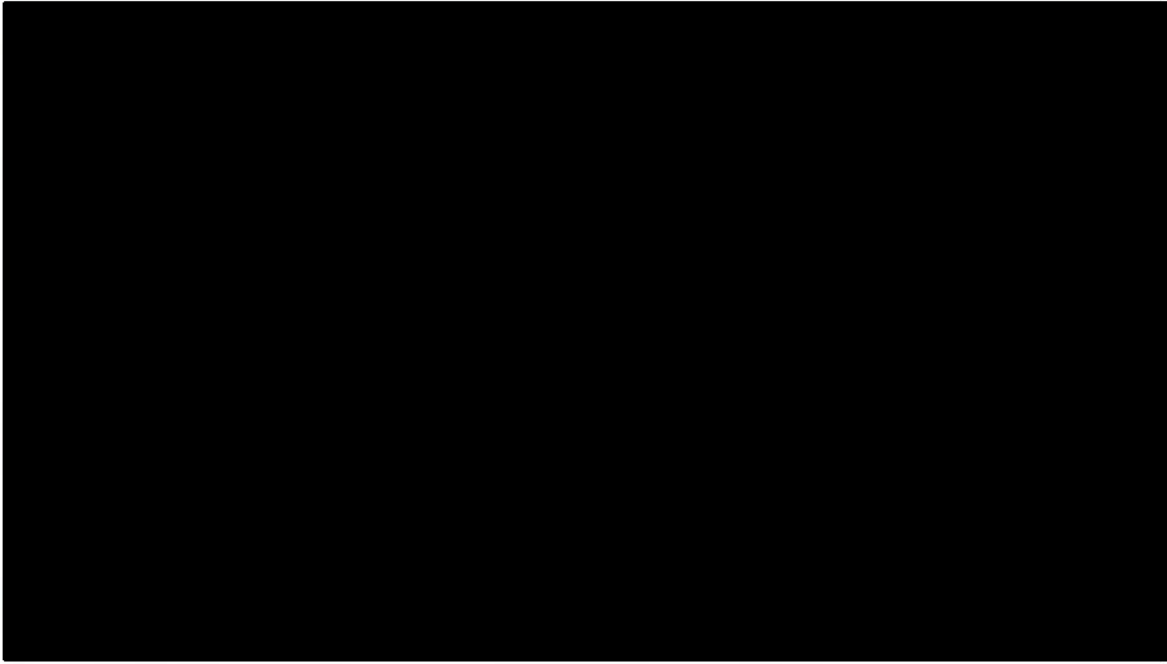






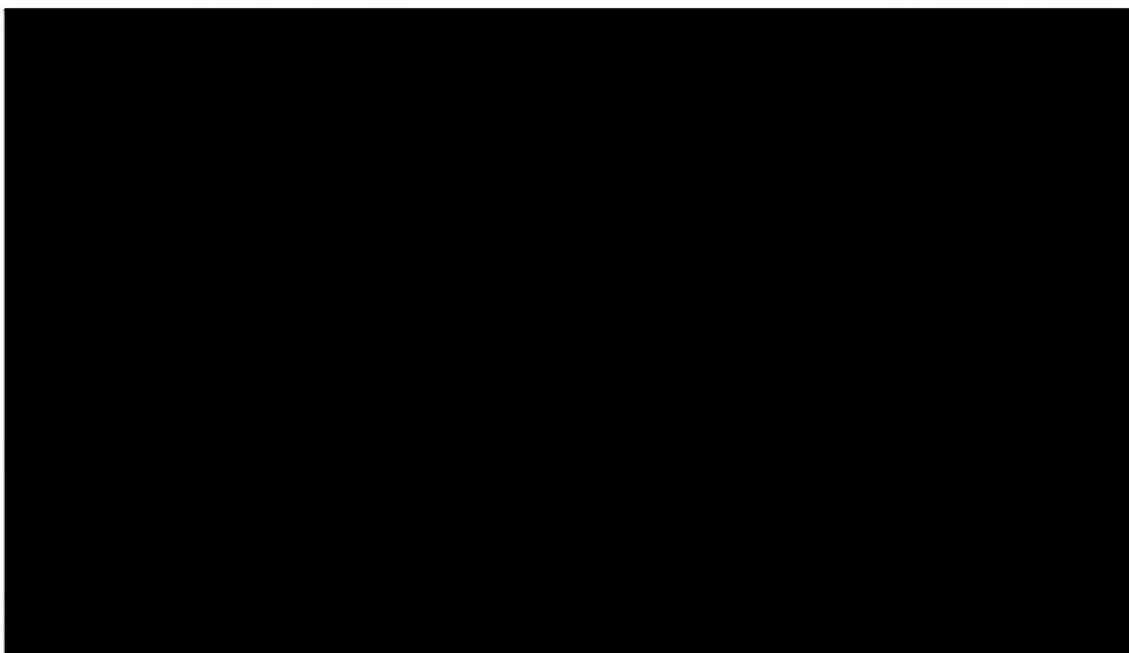


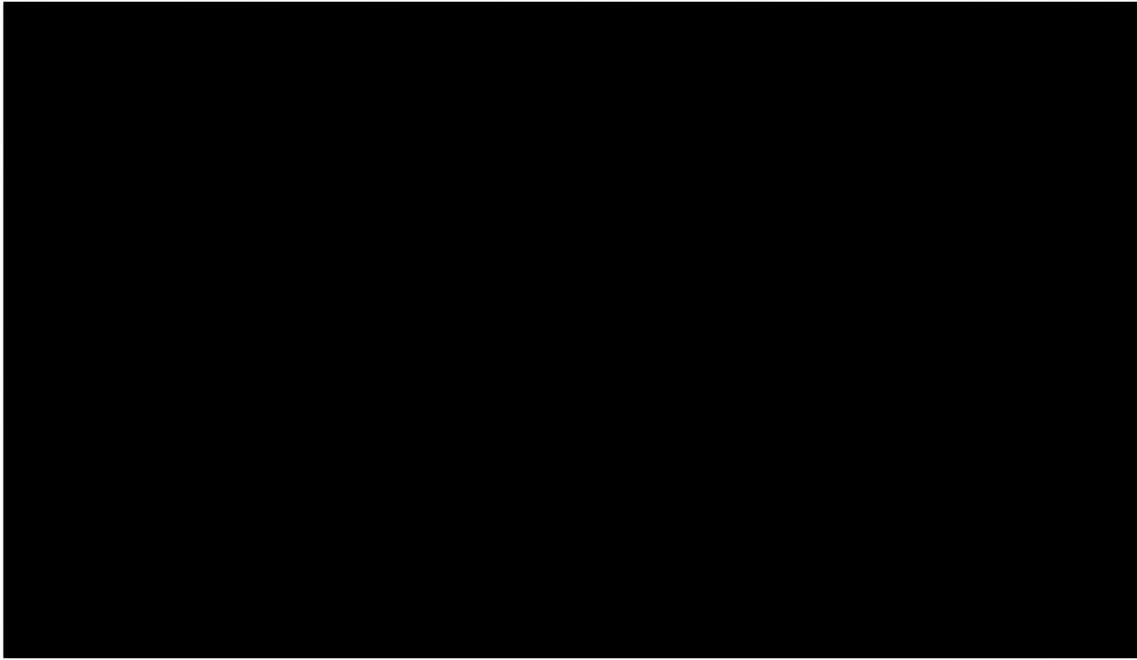












Merge







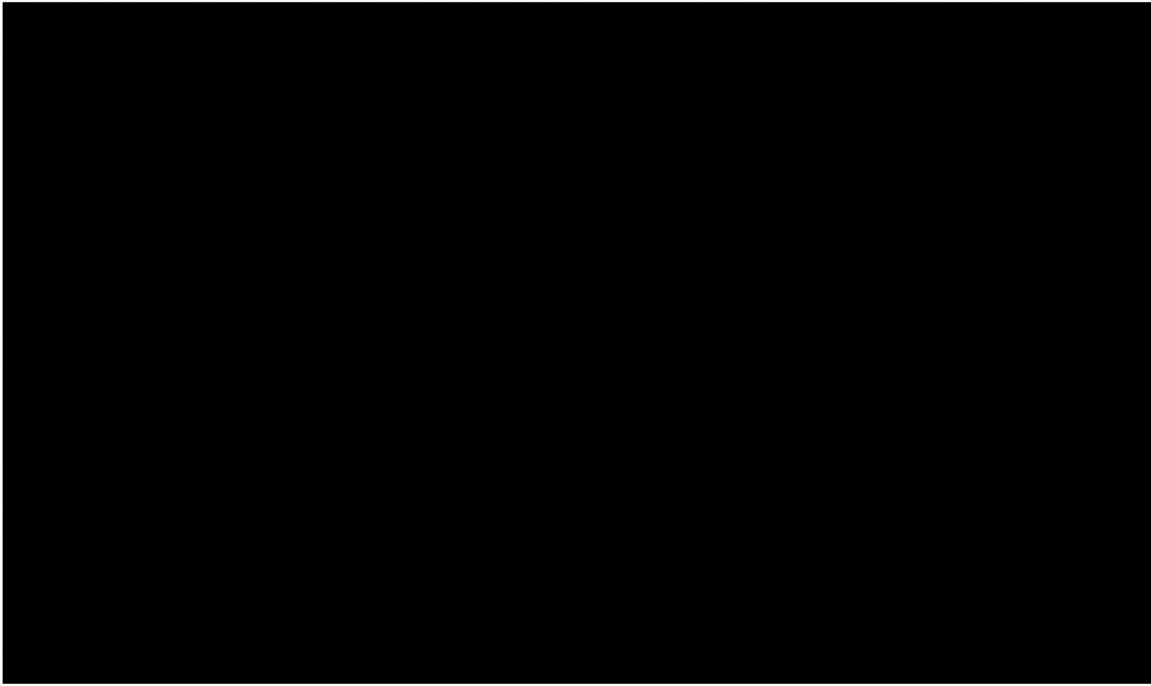
Merge



Merge



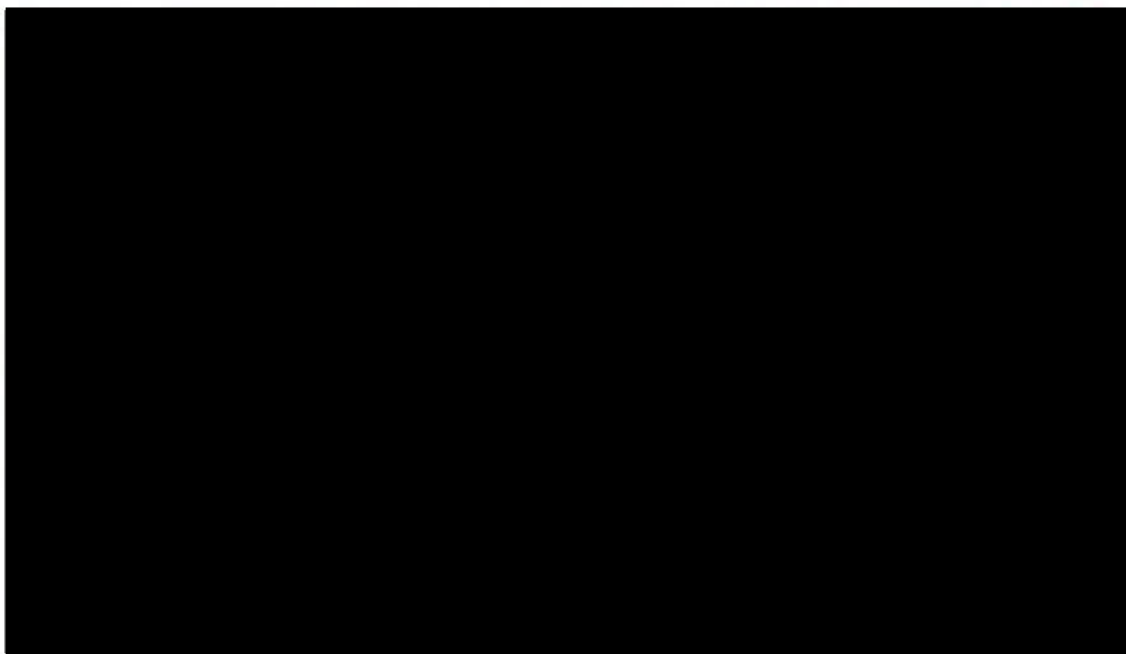
Merge



Merge



Merge



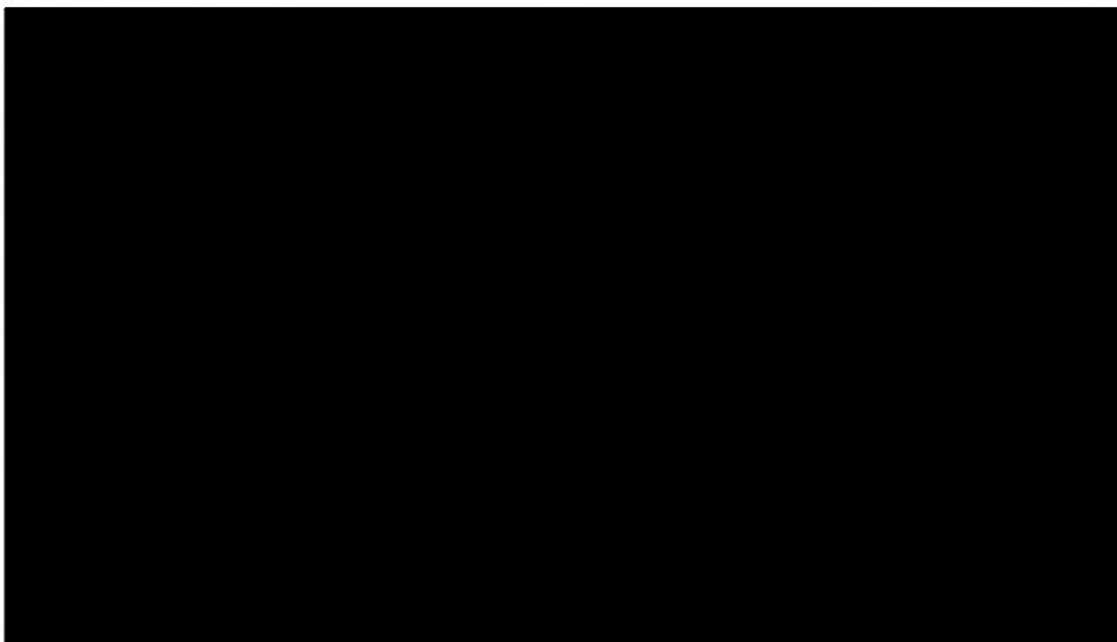
Merge















Successful experiences by Samsung thermal technology



SEK-2500U/XS



SEK-2000/XS

Premium technology leader in electronics cooling

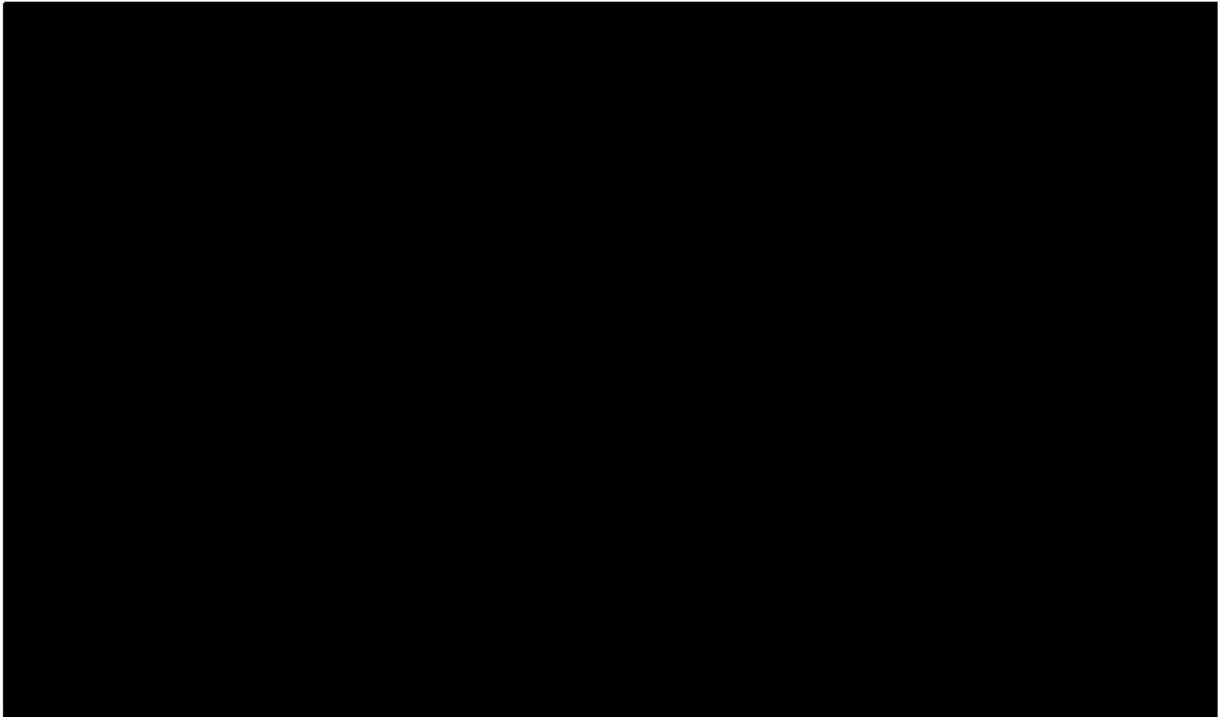
Superb implementation of thermal management scheme in 50Million+ TV sets per year

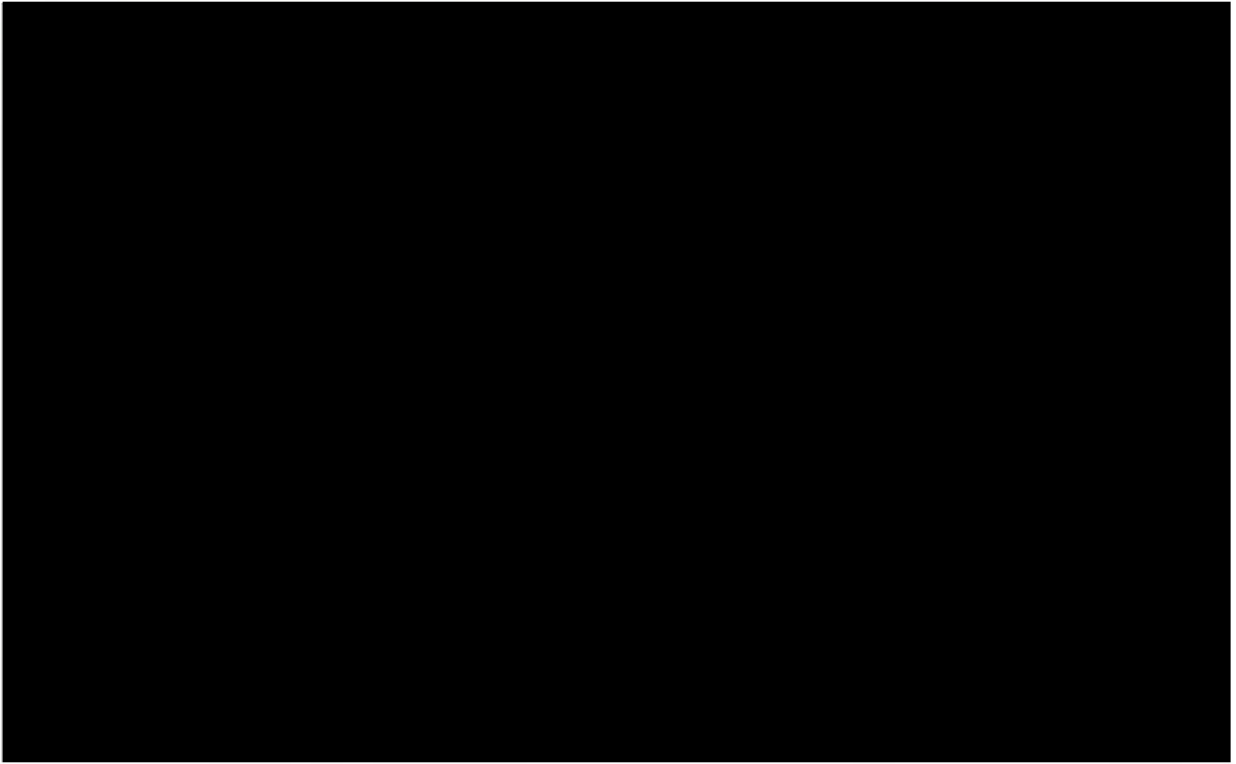
Close cooperation with Chipset suppliers as well as thermal part suppliers

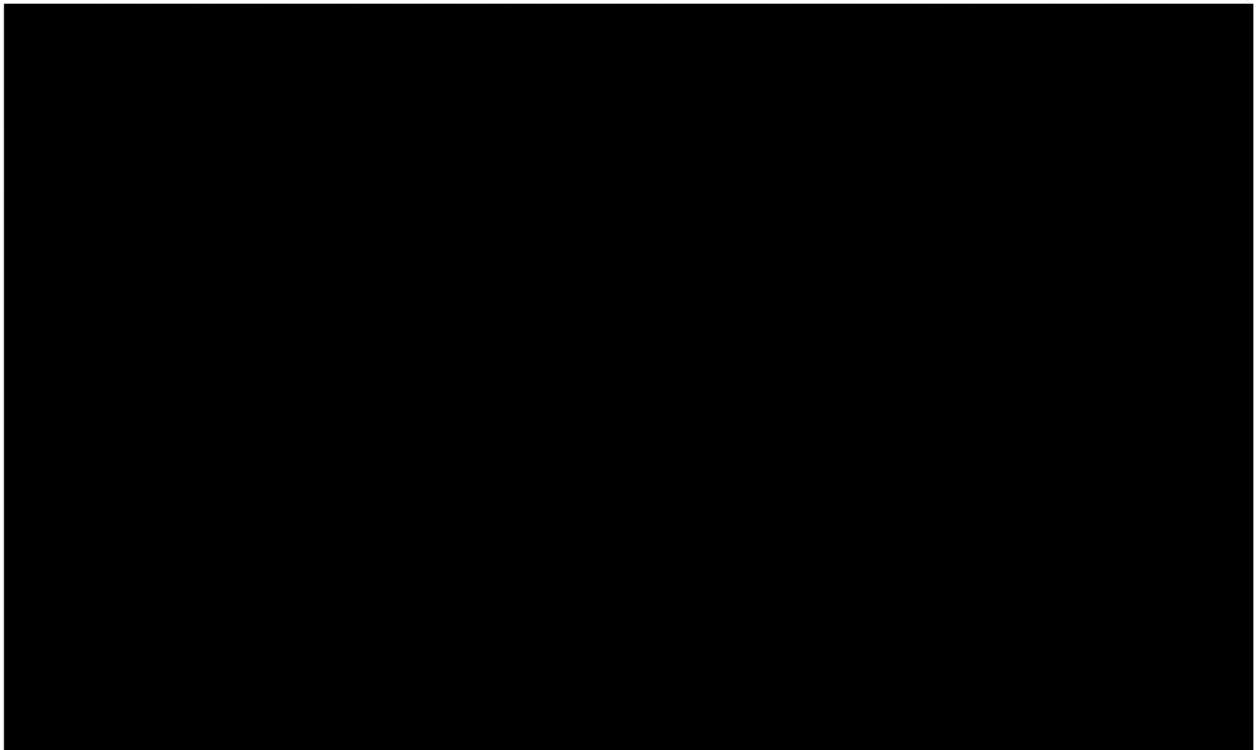
2016

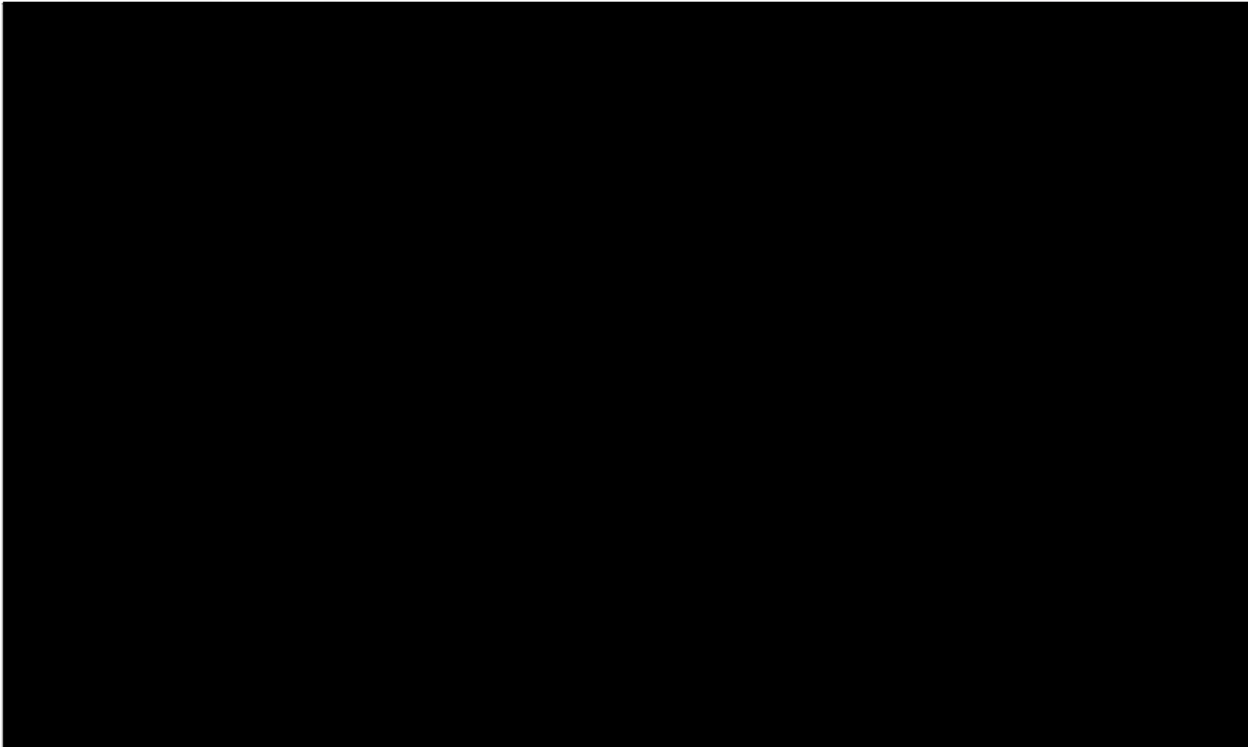


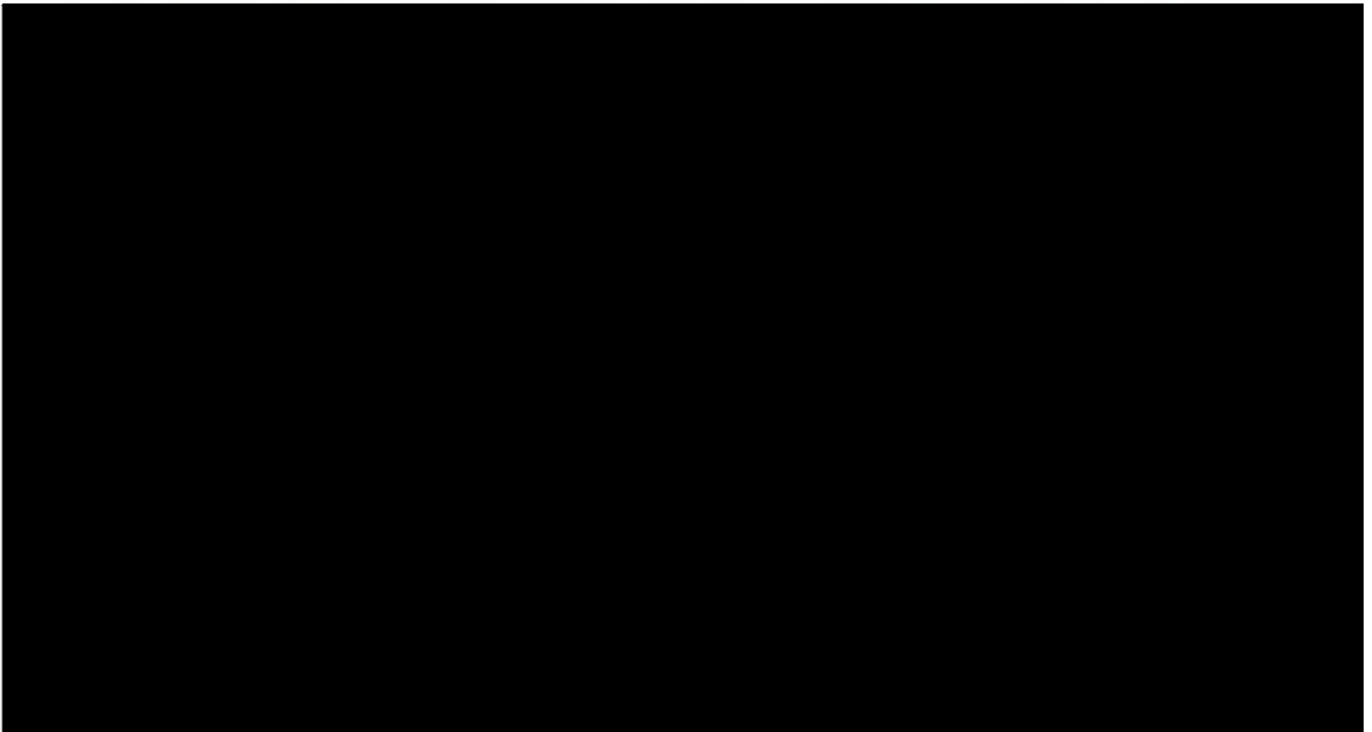




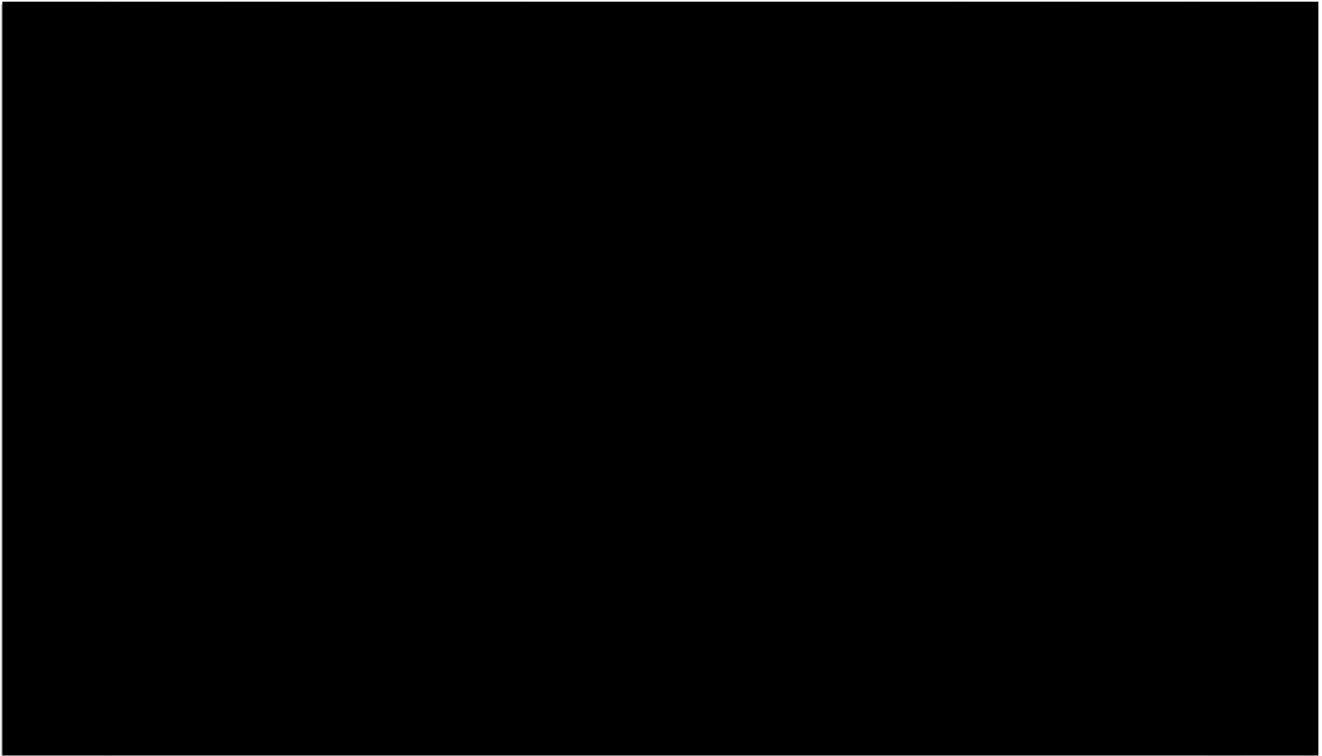


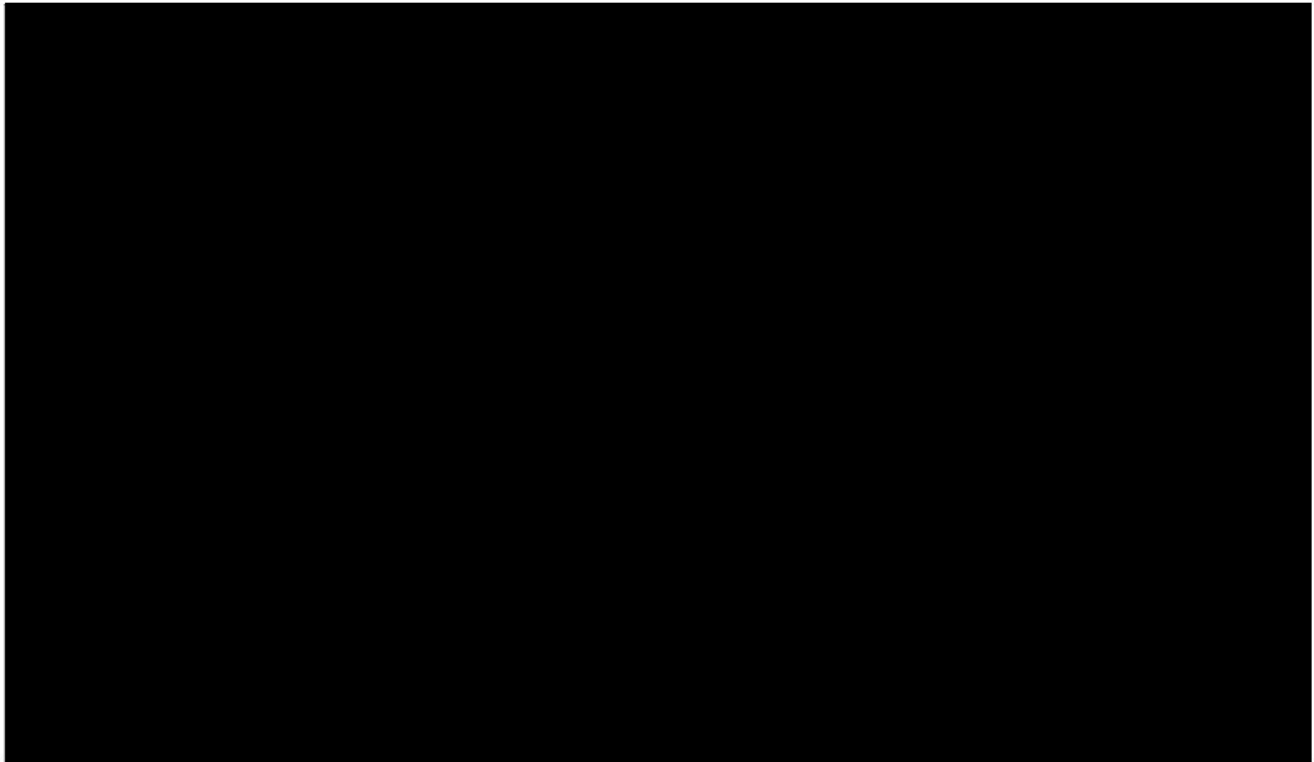


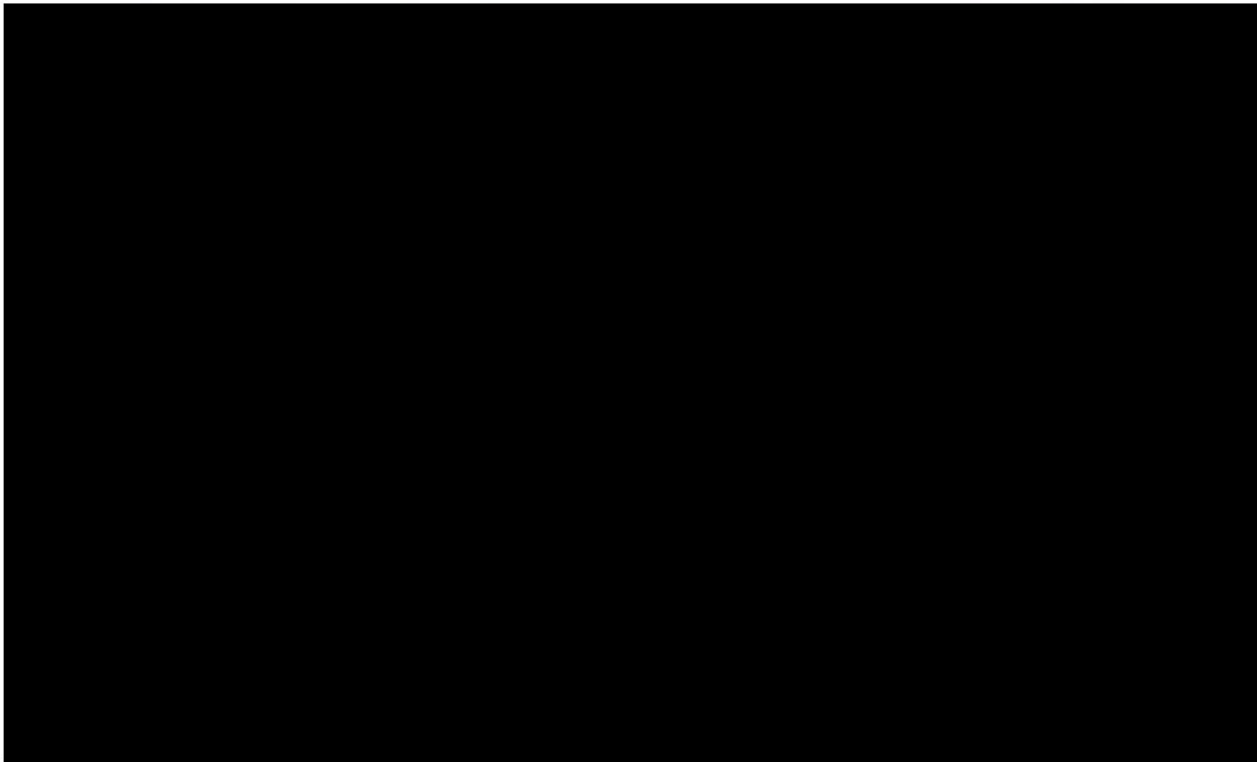


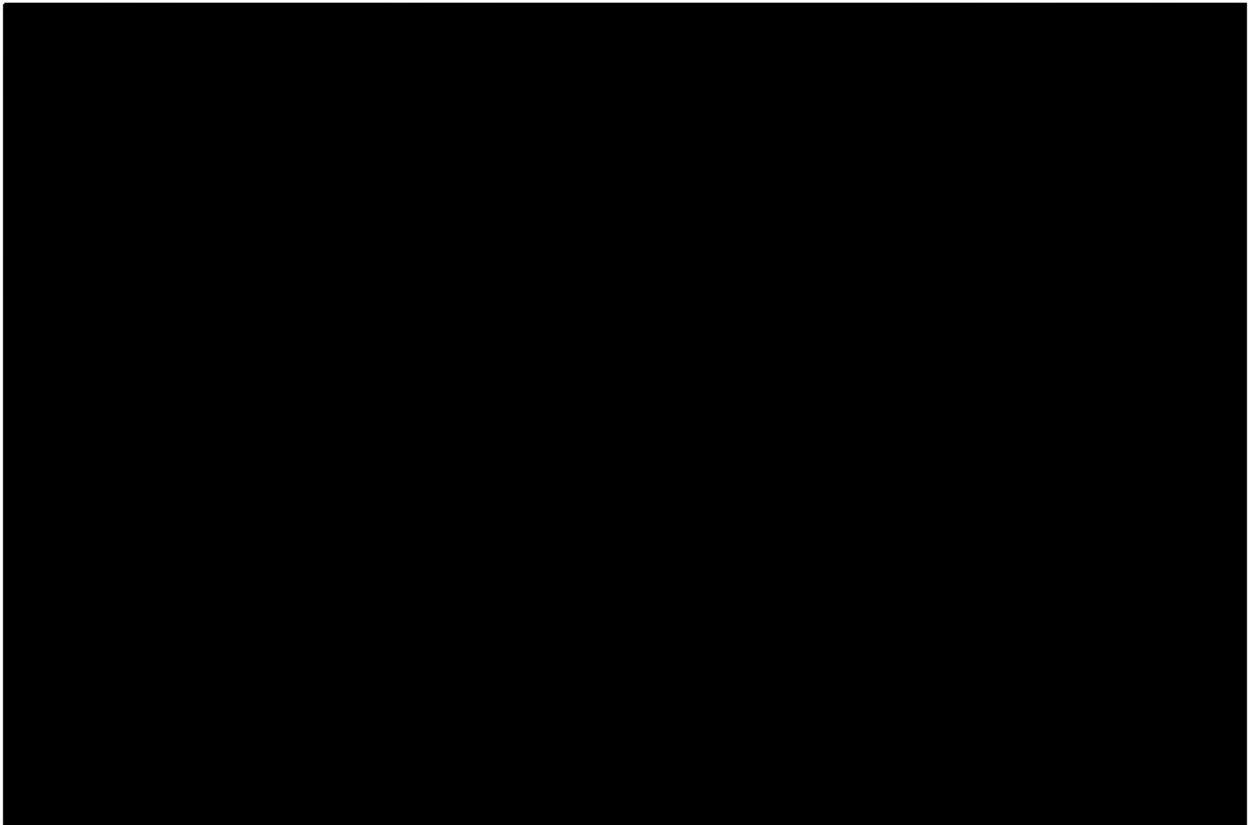


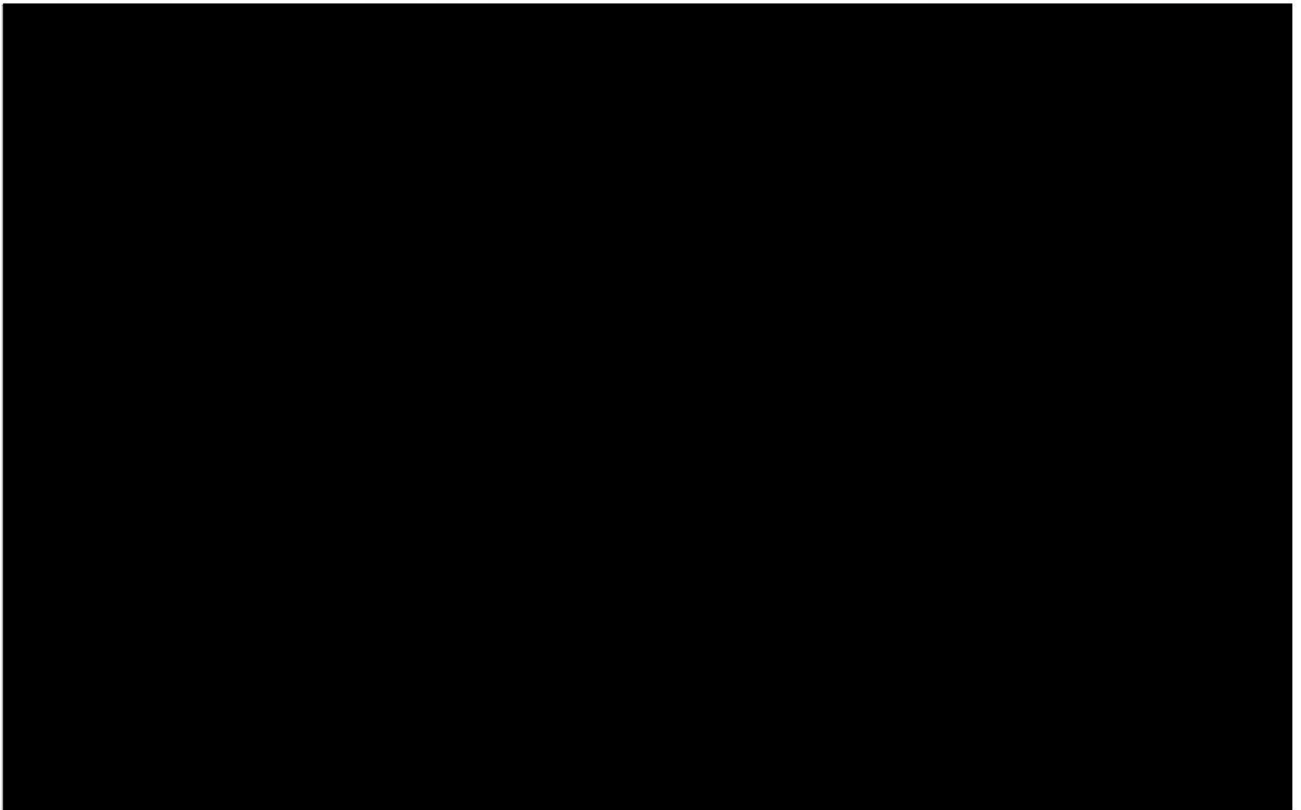








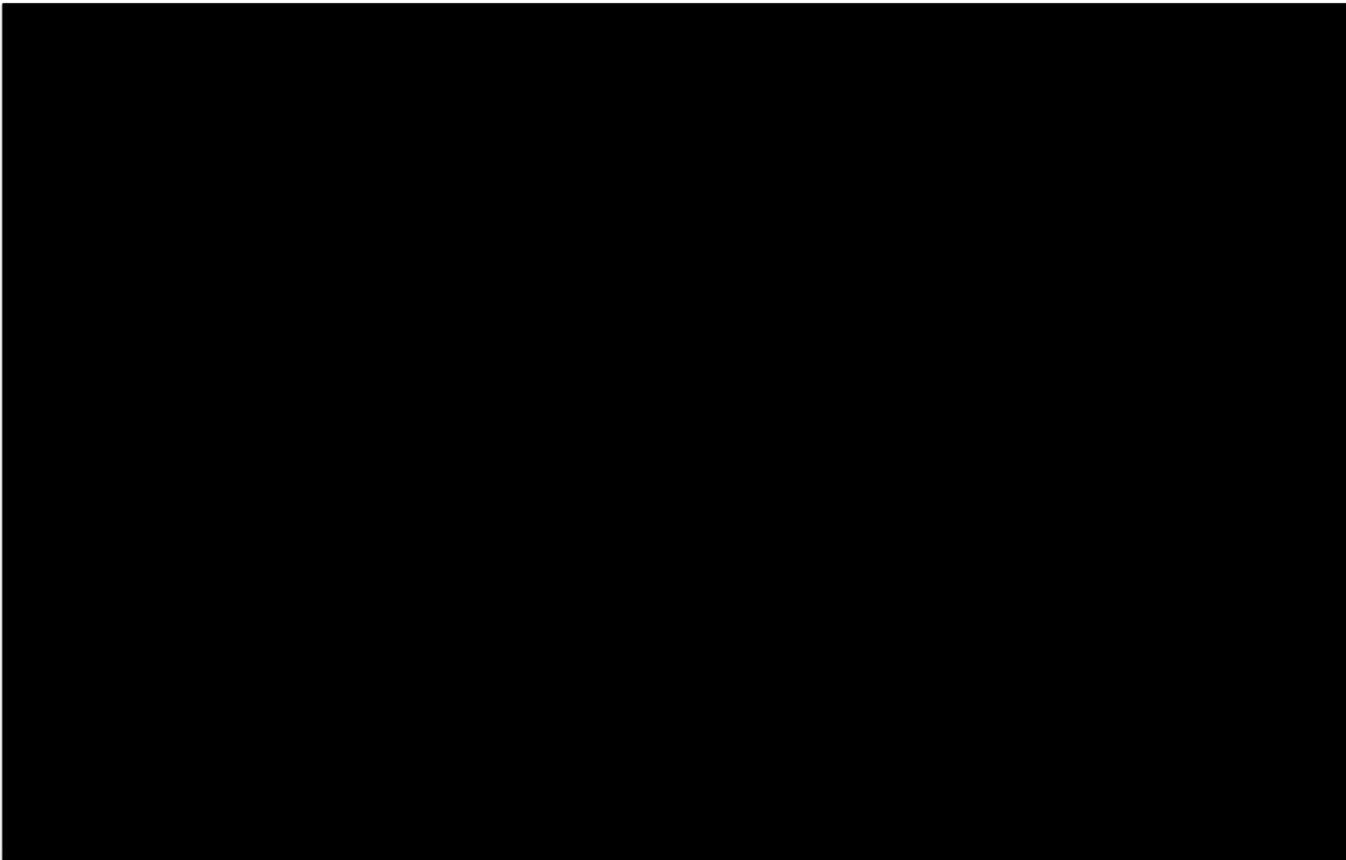




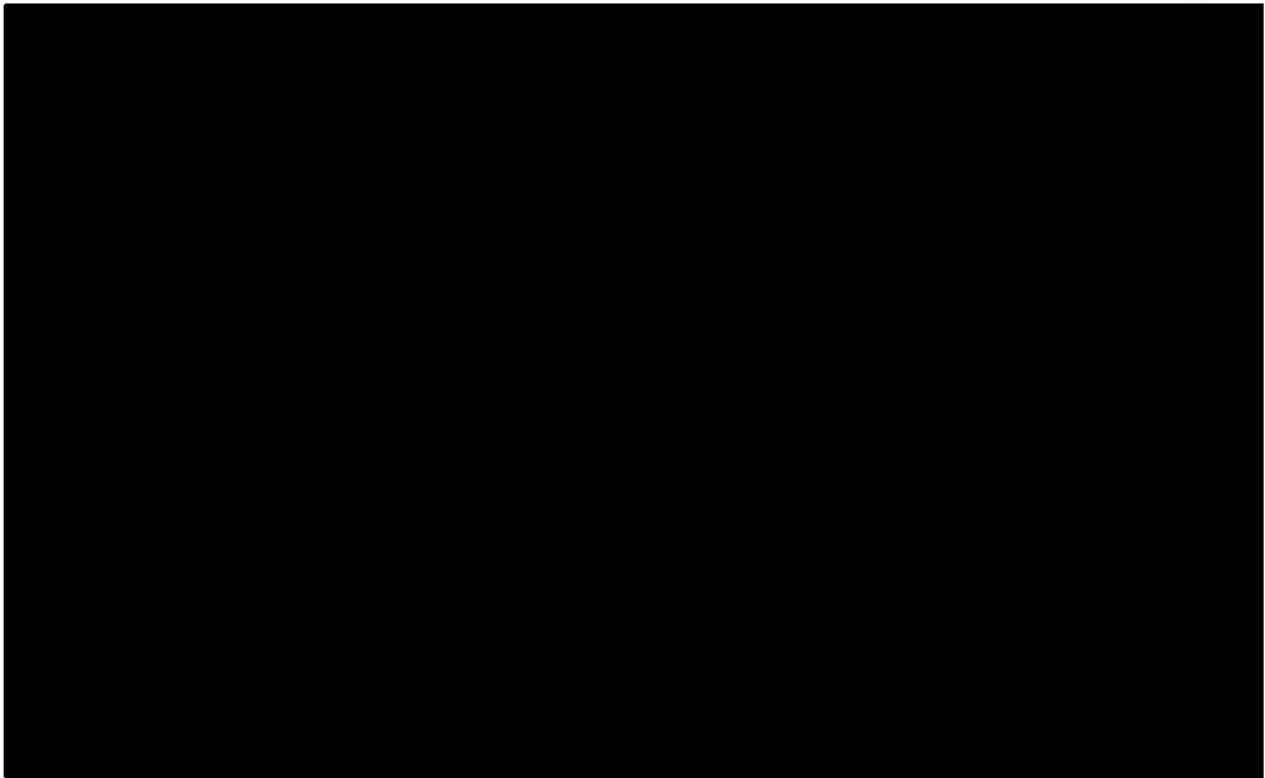


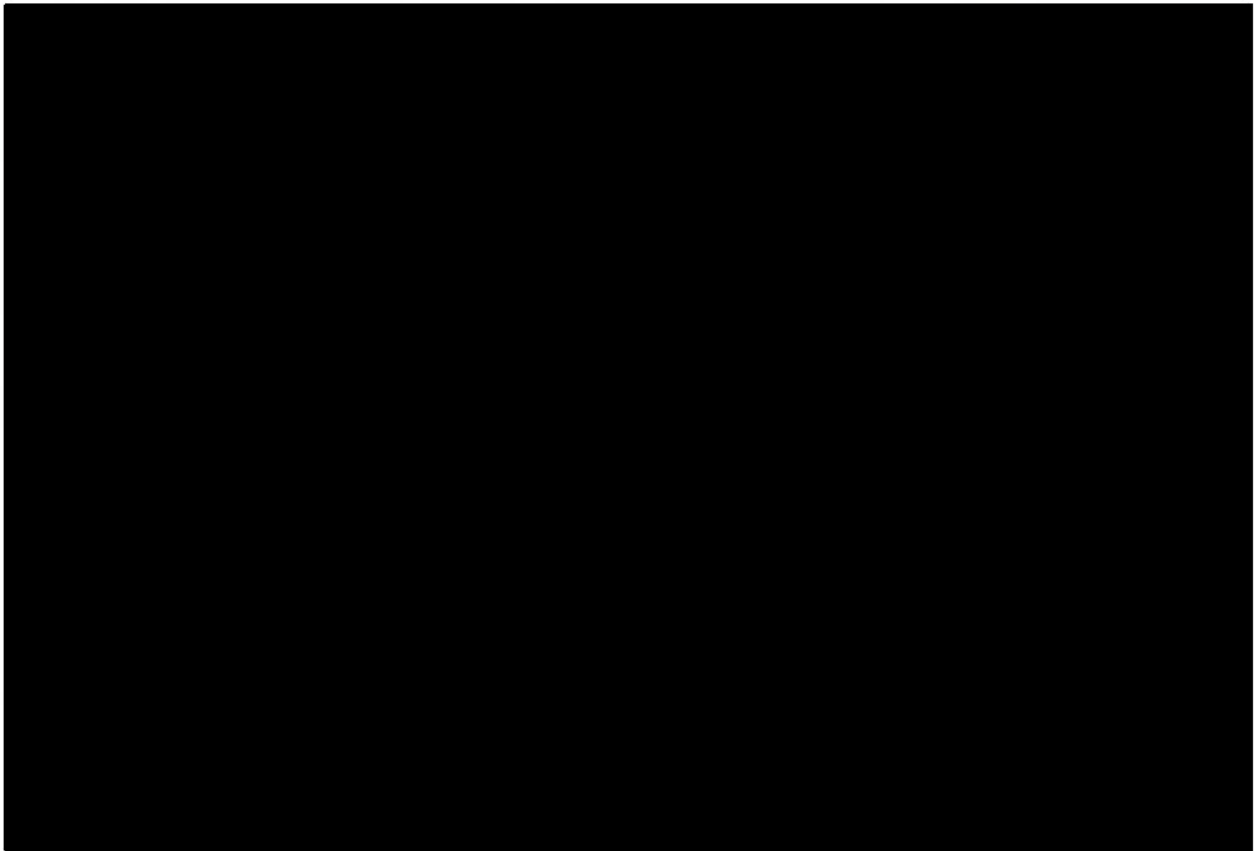












SAMSUNG

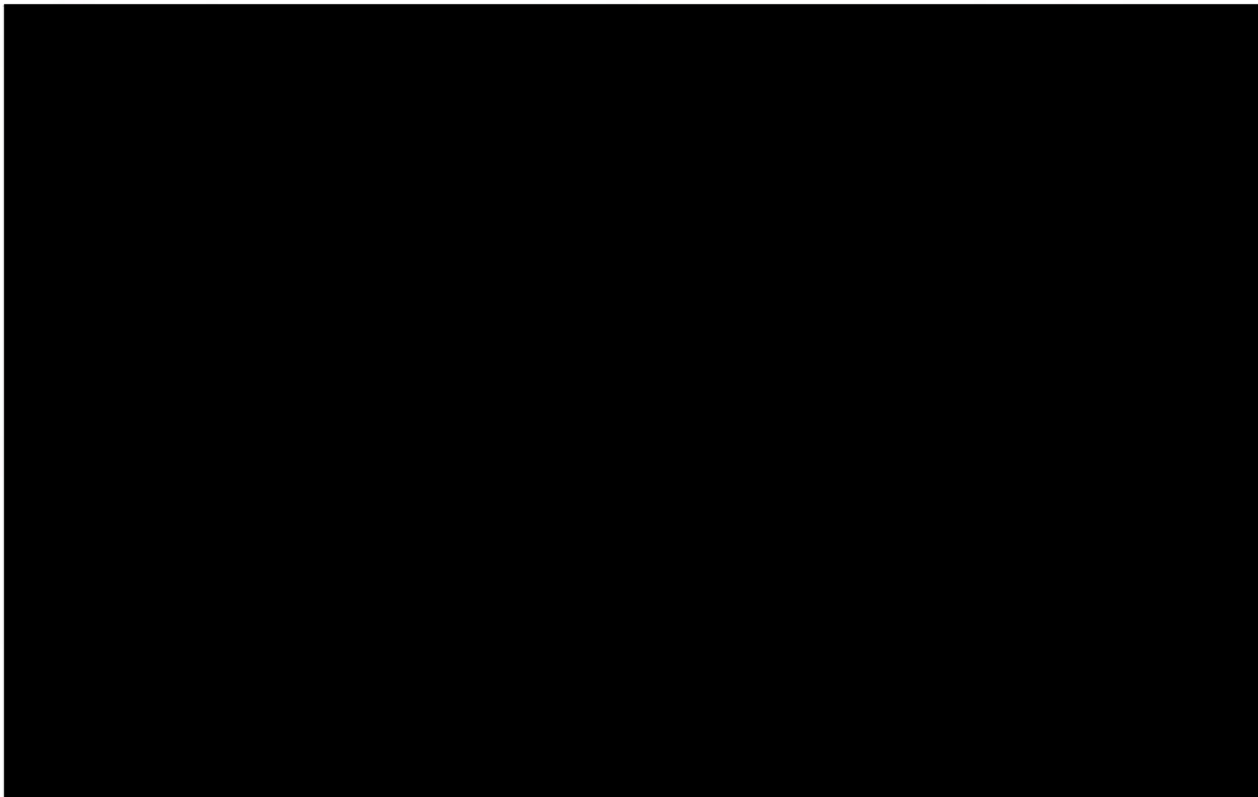
Outdoor DMB

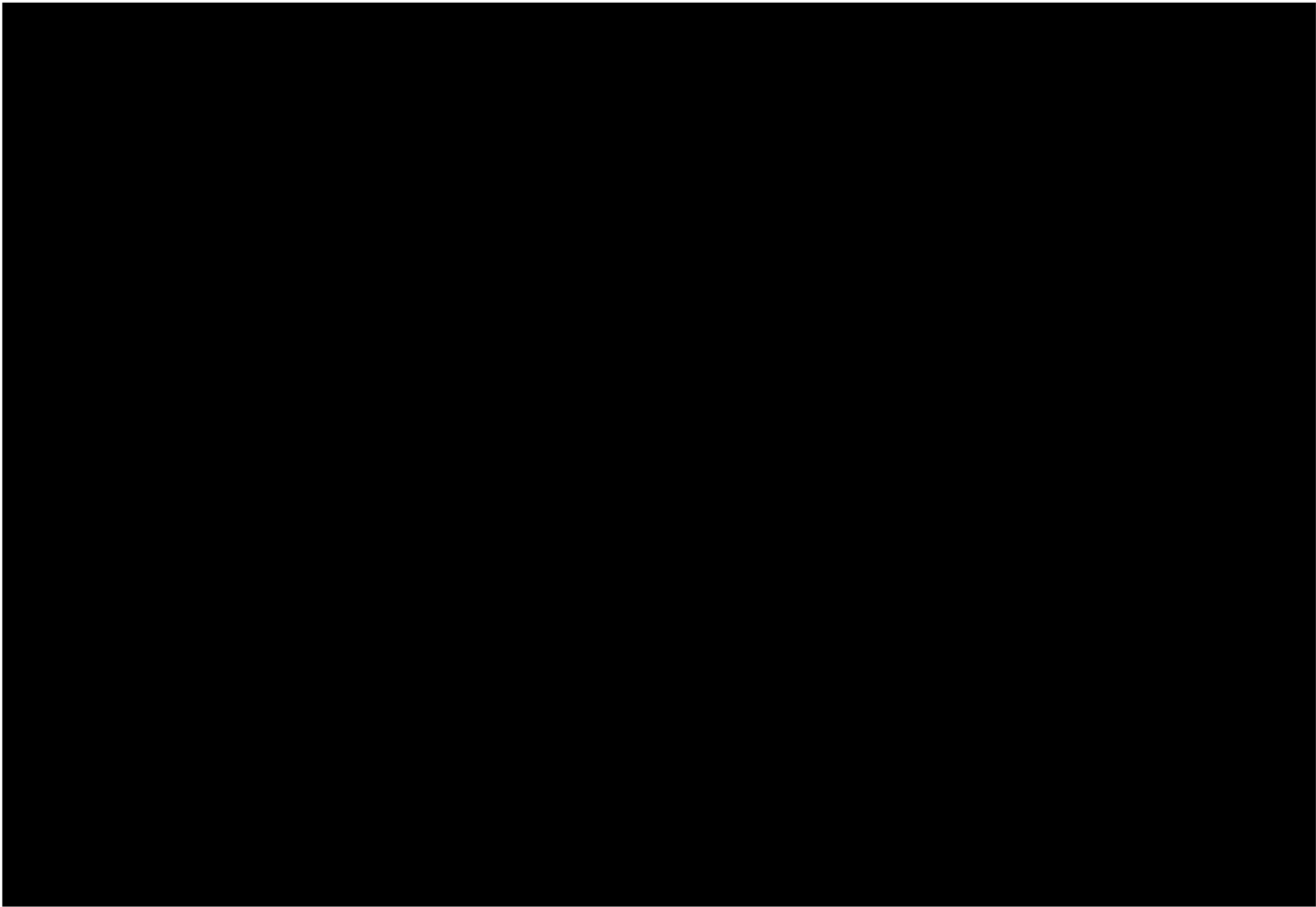
Mar 2017

Agenda

- **Lesson Learned About Outdoor DMB**
- Samsung Outdoor DMB - OH Series

SAMSUNG

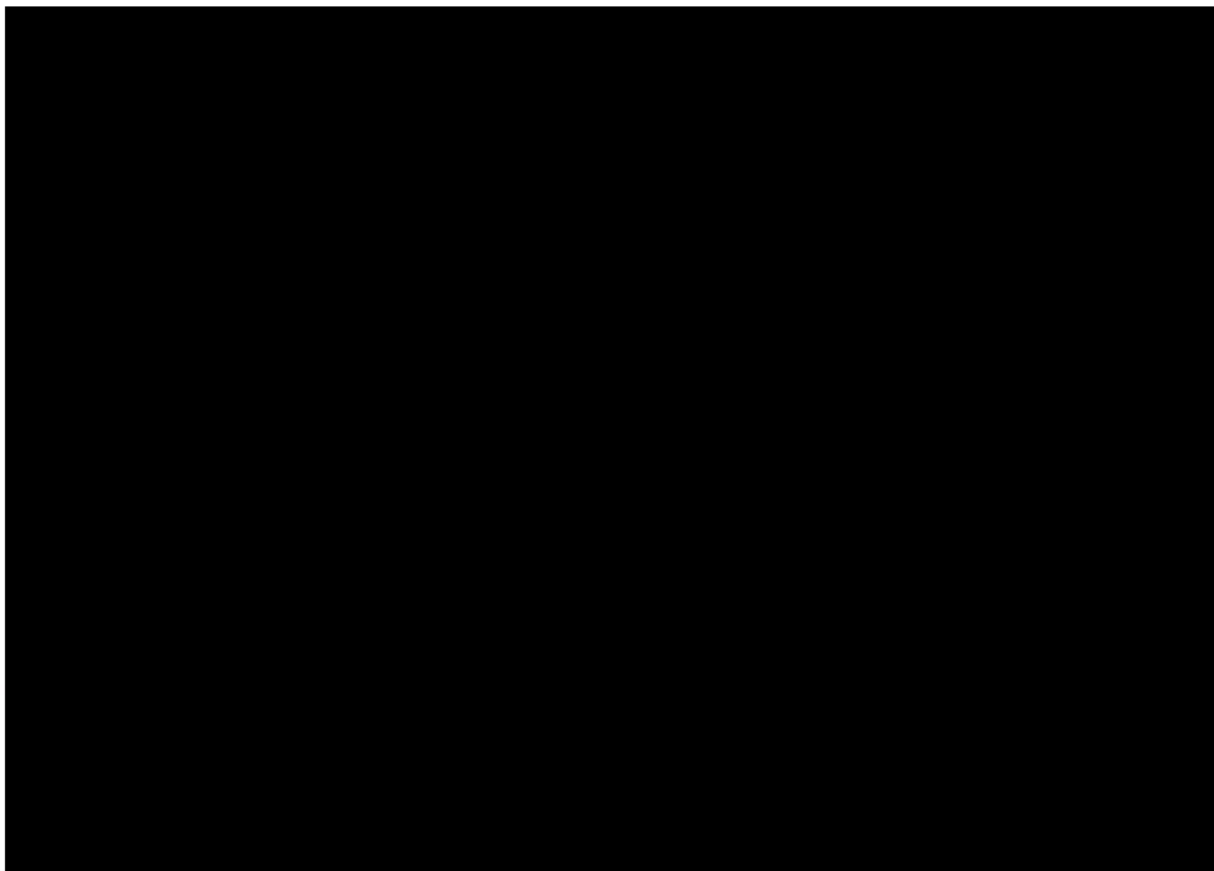


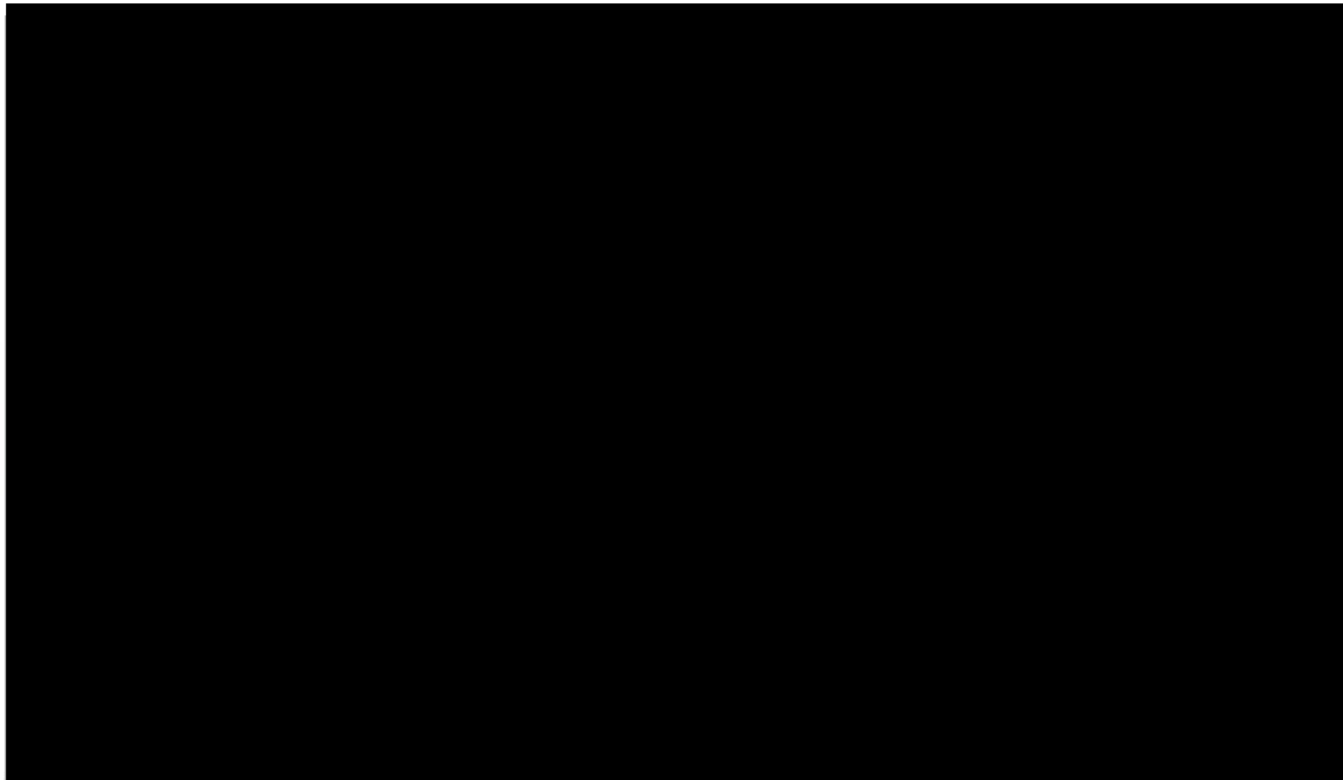


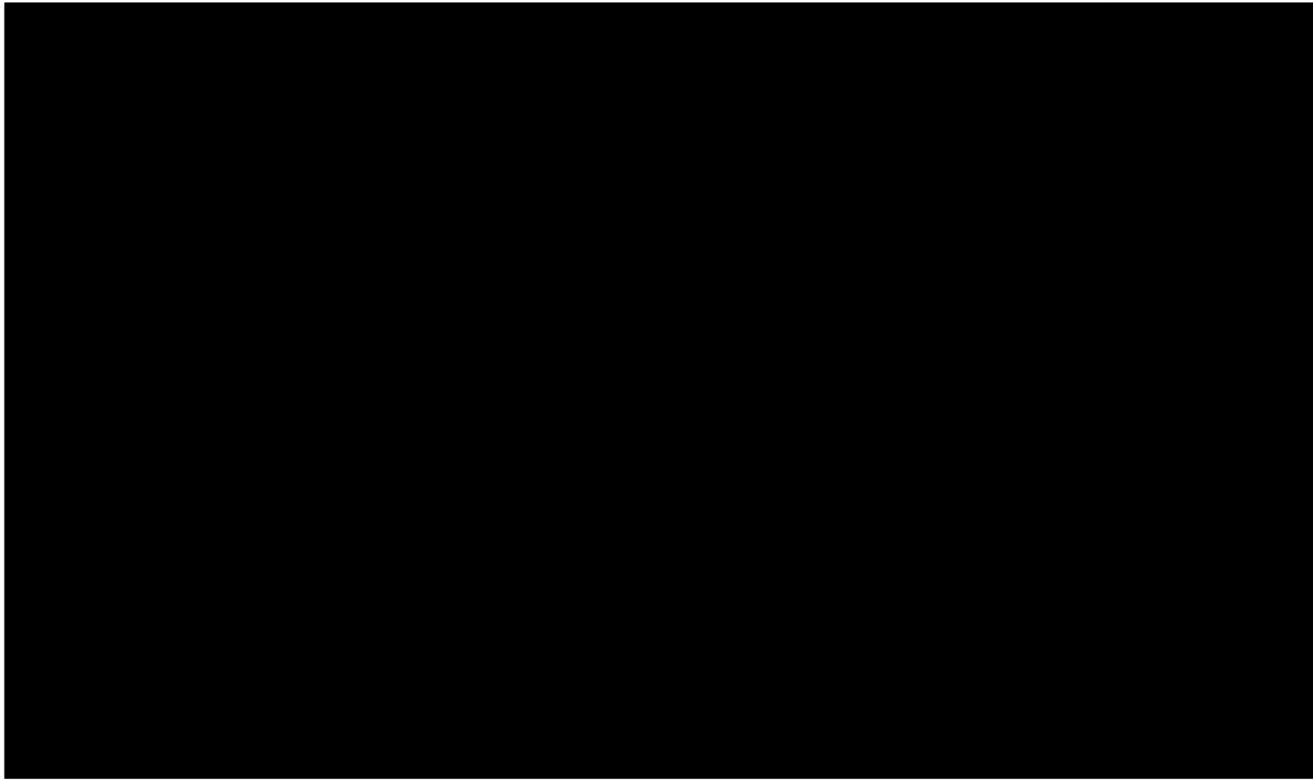
Agenda

- Lesson Learned About Outdoor DMB
- **Samsung Outdoor DMB - OH Series**

SAMSUNG







Electronics vs balloon

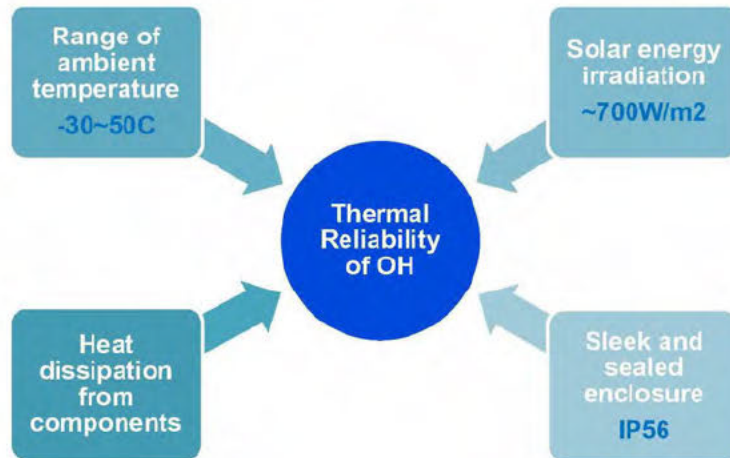


Temperature of a system ~ Size of a balloon
= $f(\text{heat in, heat out, System characteristics})$

9

1. Enclosure > Consideration of Heat Transfer

CONFIDENTIAL
SAMSUNG



10

1. Enclosure > Thermal Design Objective: OH Series

CONFIDENTIAL
SAMSUNG



11

1. Enclosure > Base Model Analysis: Schematic

CONFIDENTIAL

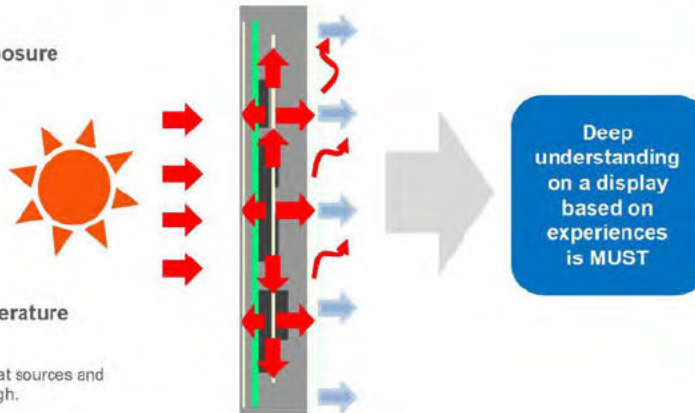
SAMSUNG

Objective

High brightness
Direct sunlight exposure
IP56 certificate

Considerations

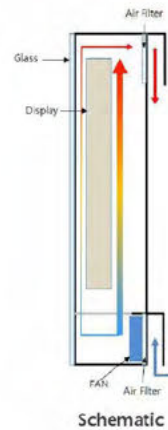
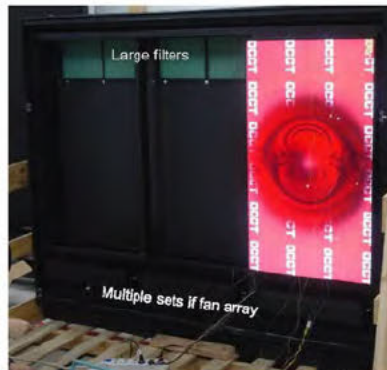
Extra thermal load
High ambient temperature
Sealed enclosure
 R_{th} between internal heat sources and
ambient is inherently high.

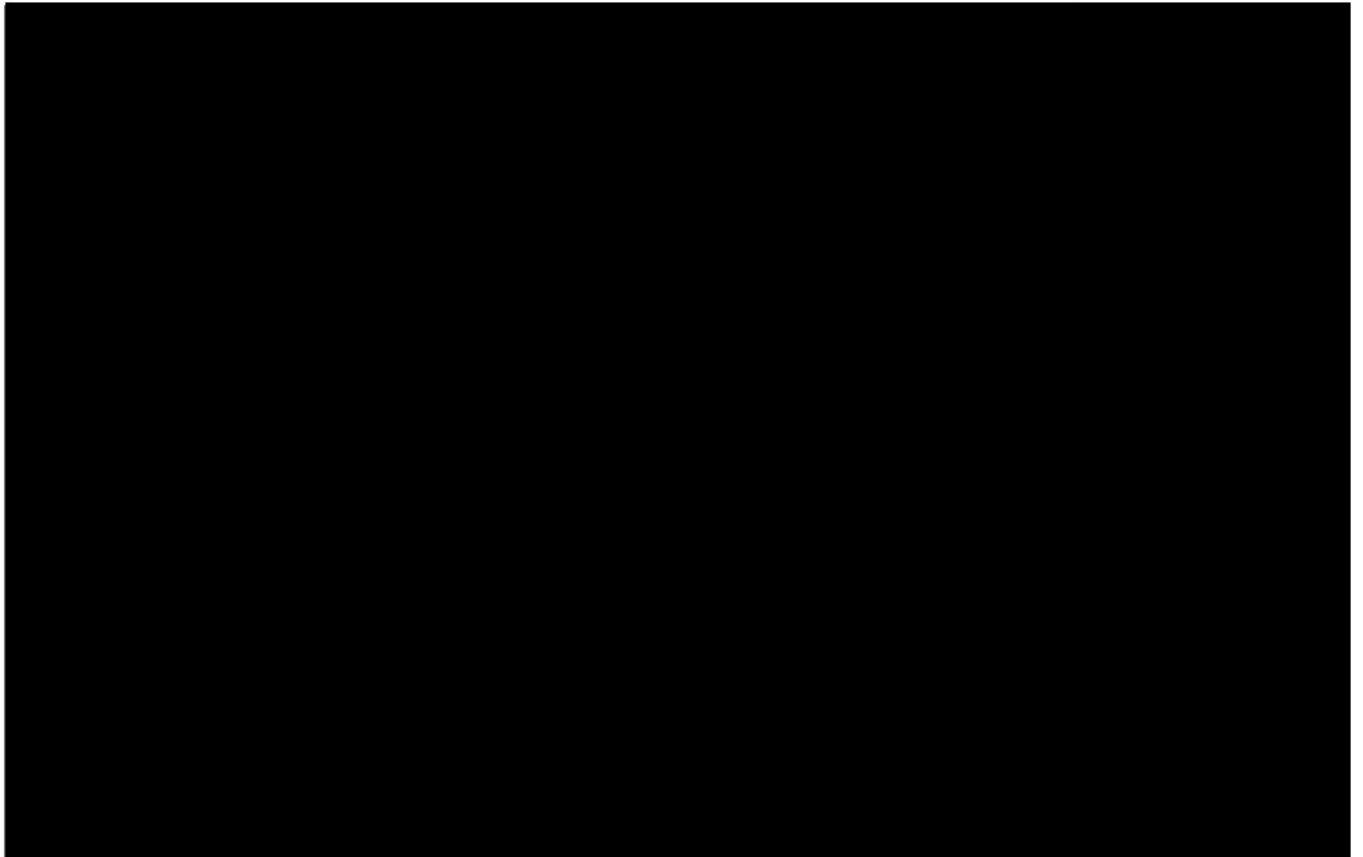


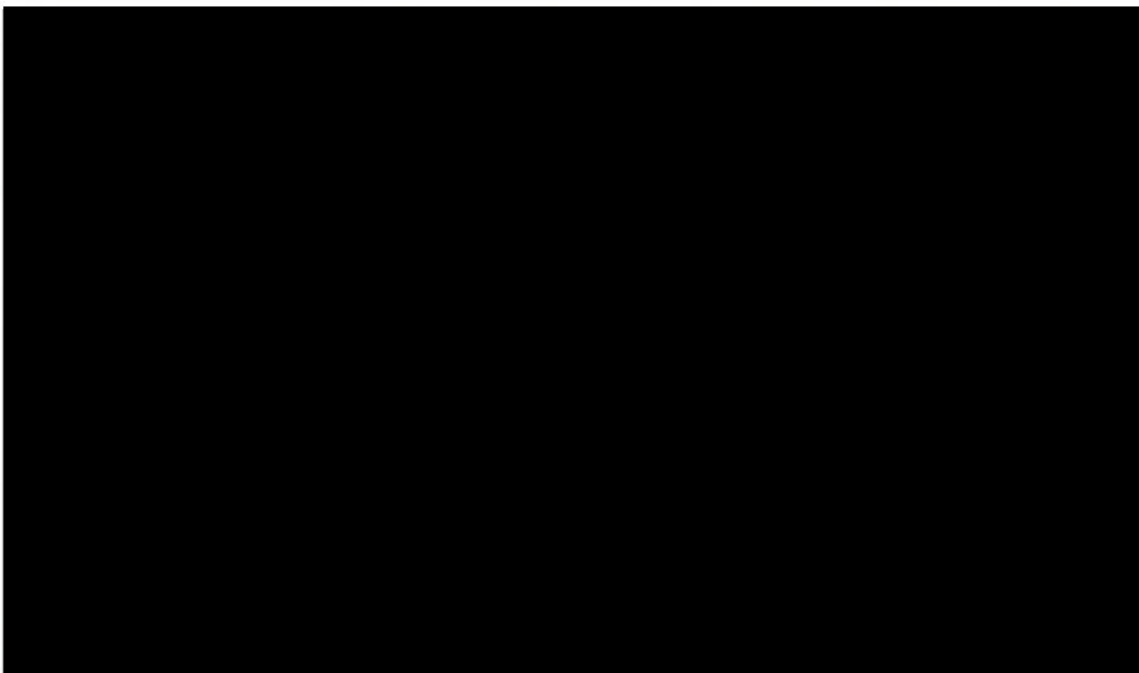
1. Enclosure > Thermal Flow Analysis : Conventional

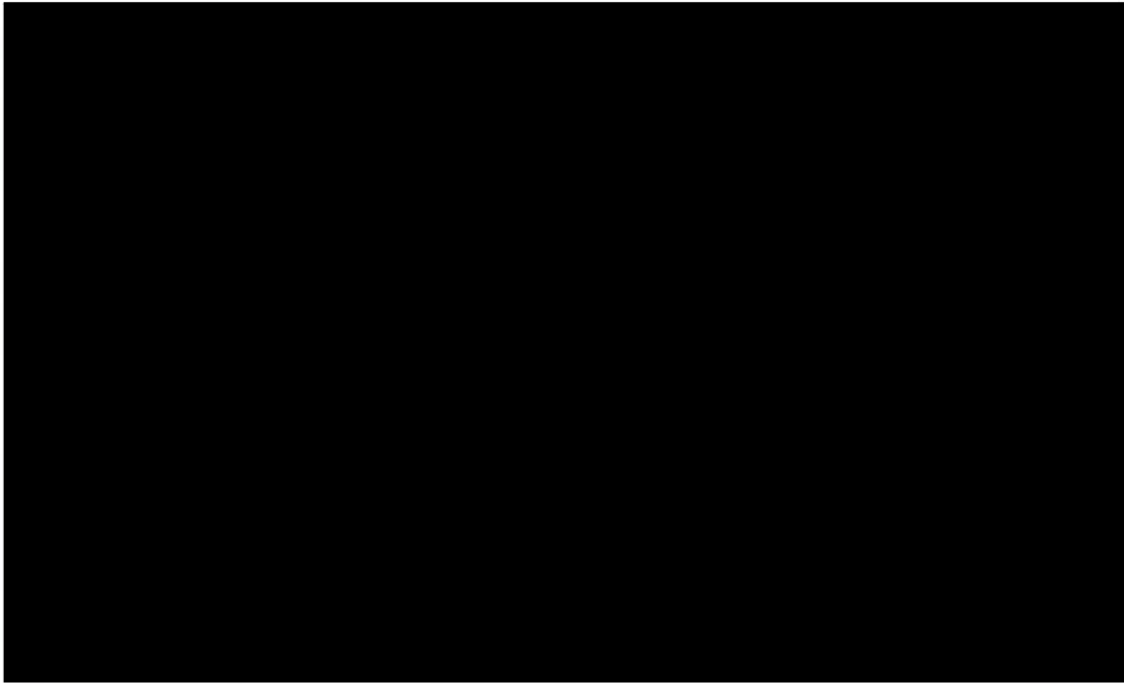
Confidential
MSUNG

3rd Party Outdoor Enclosure

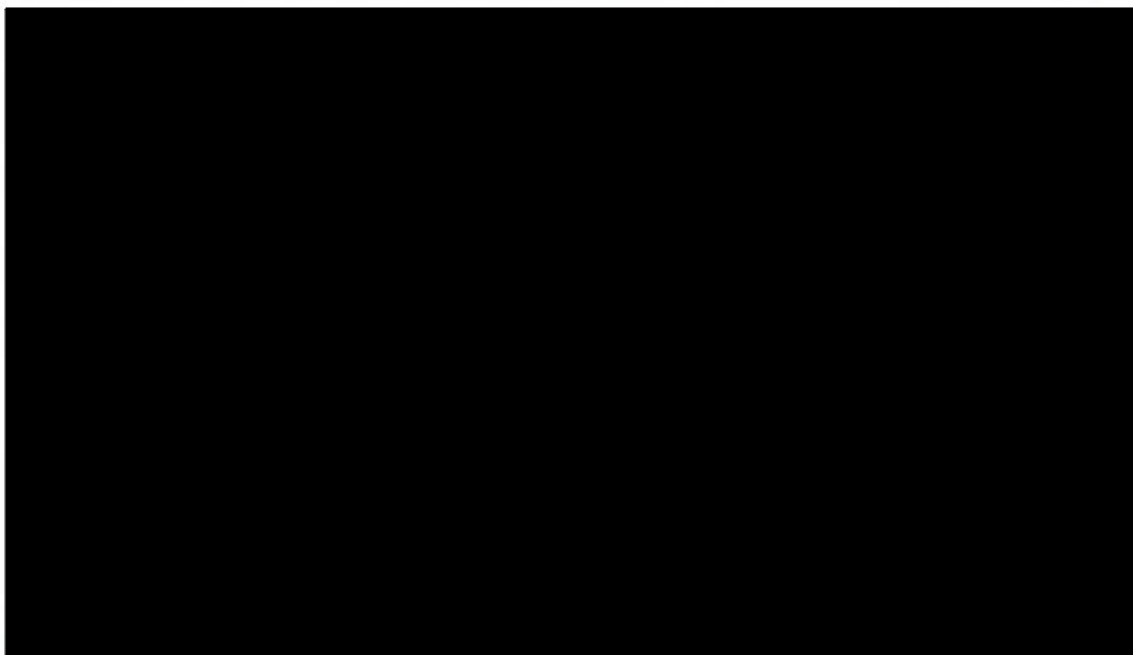


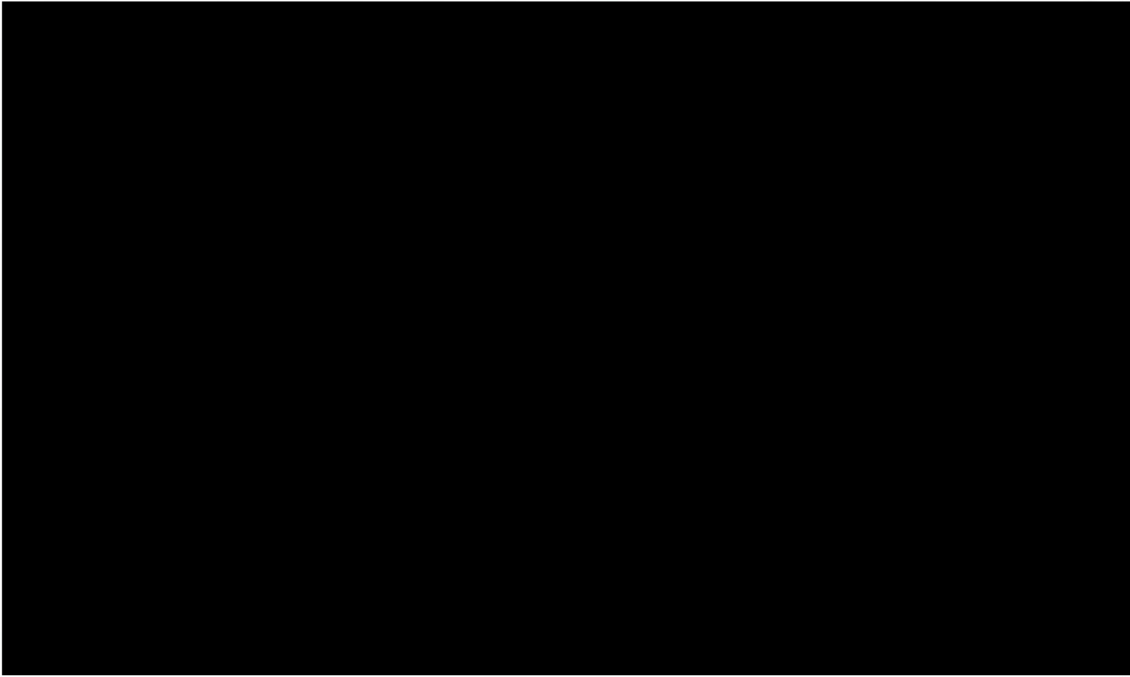


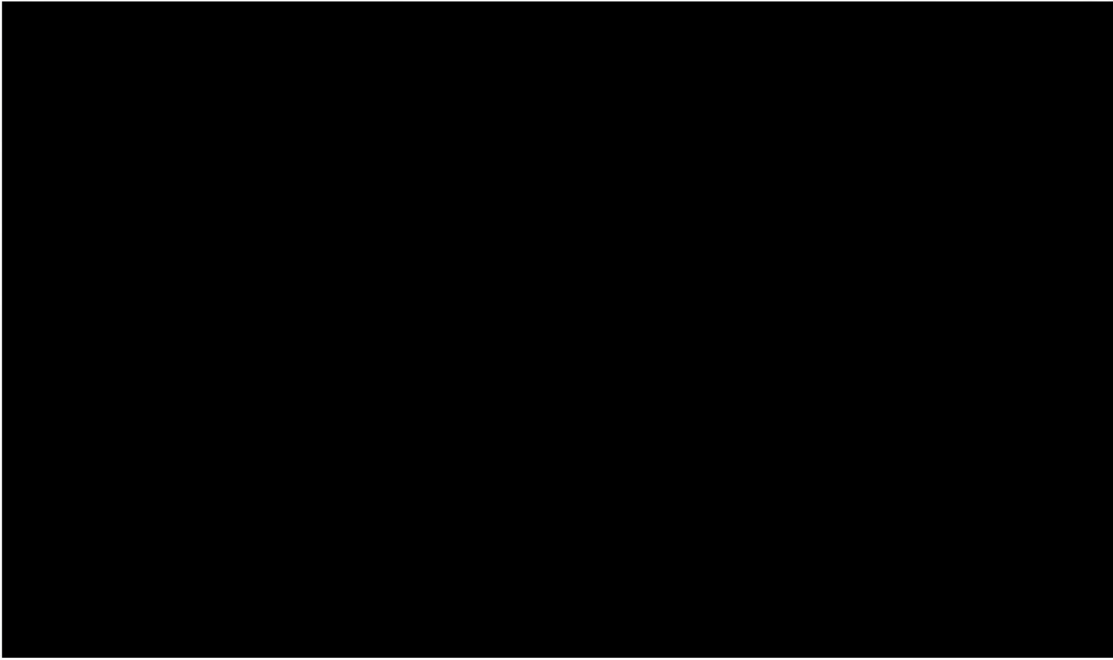


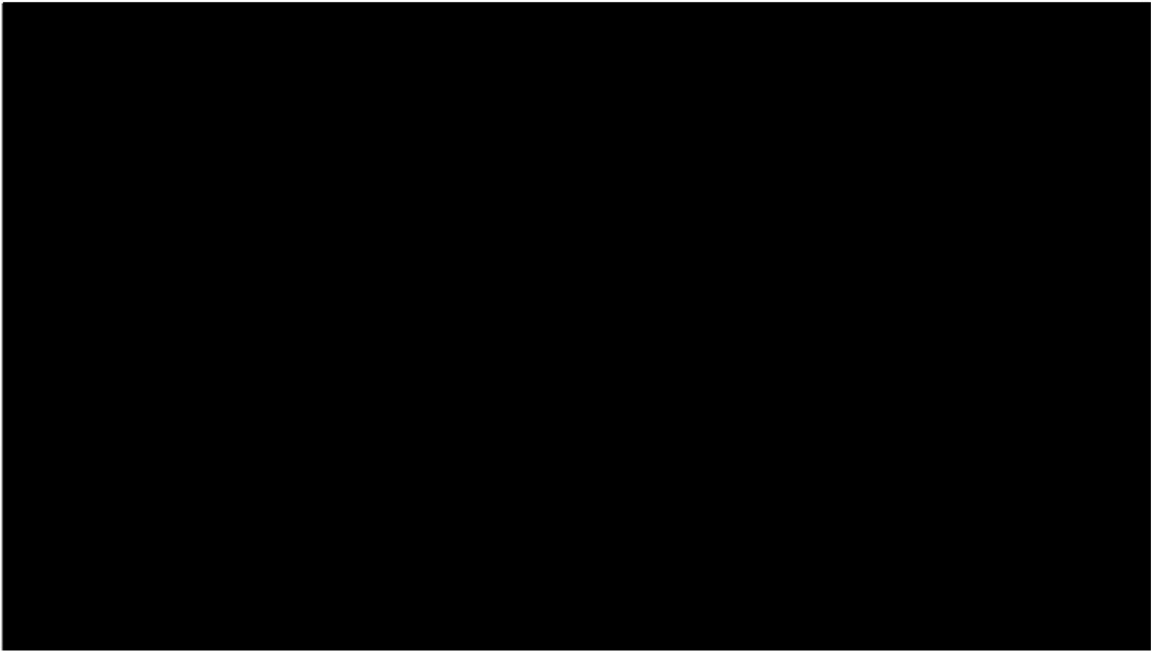






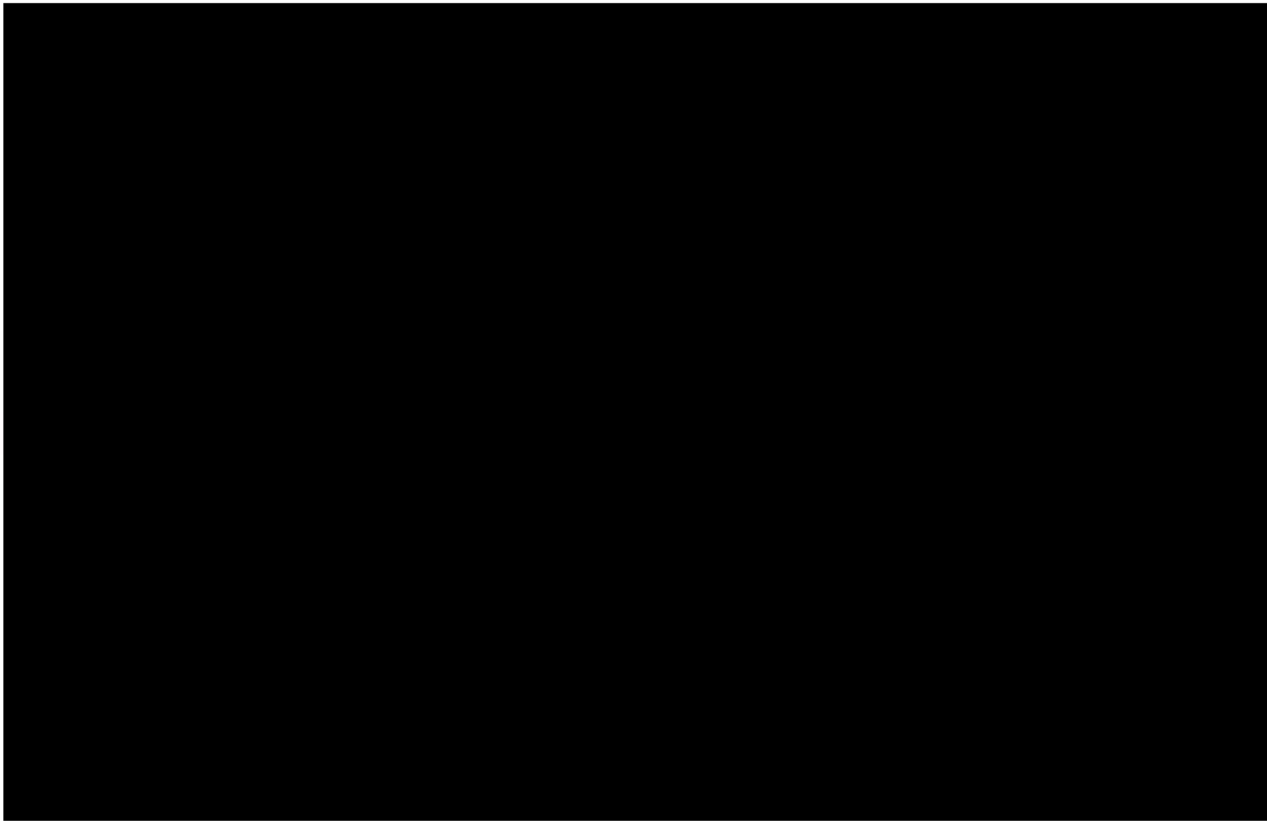


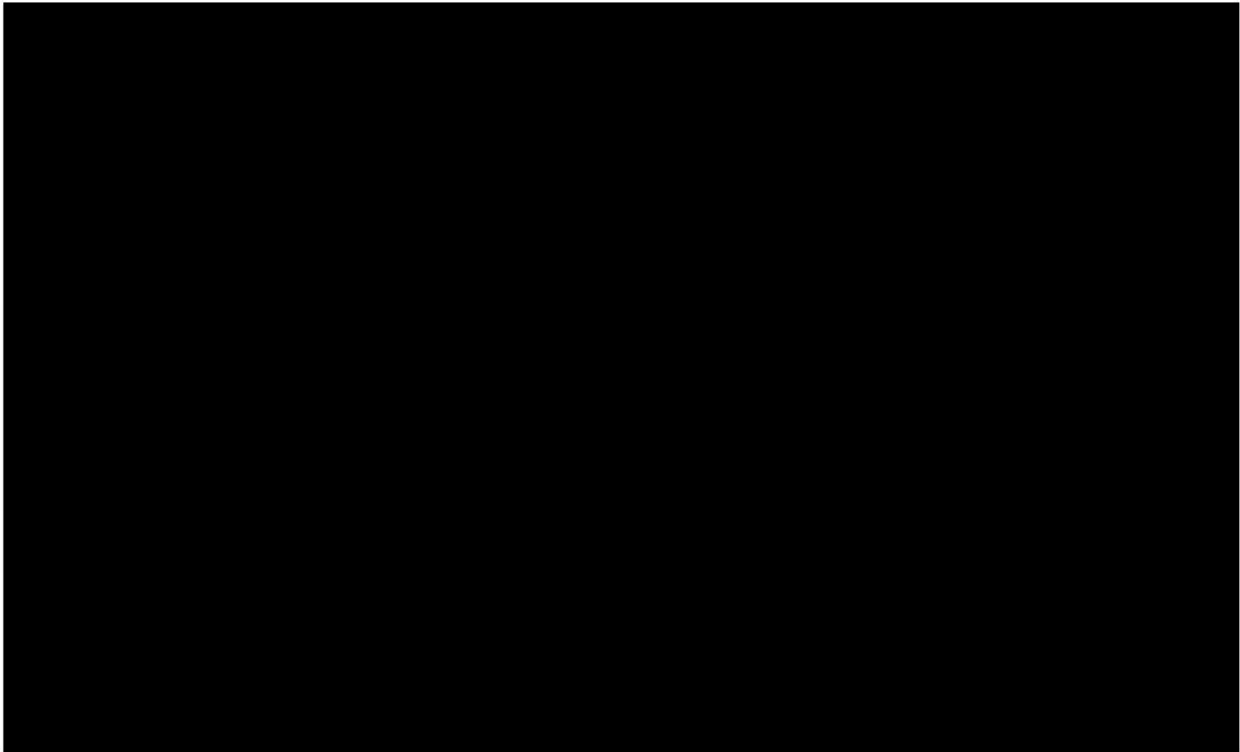


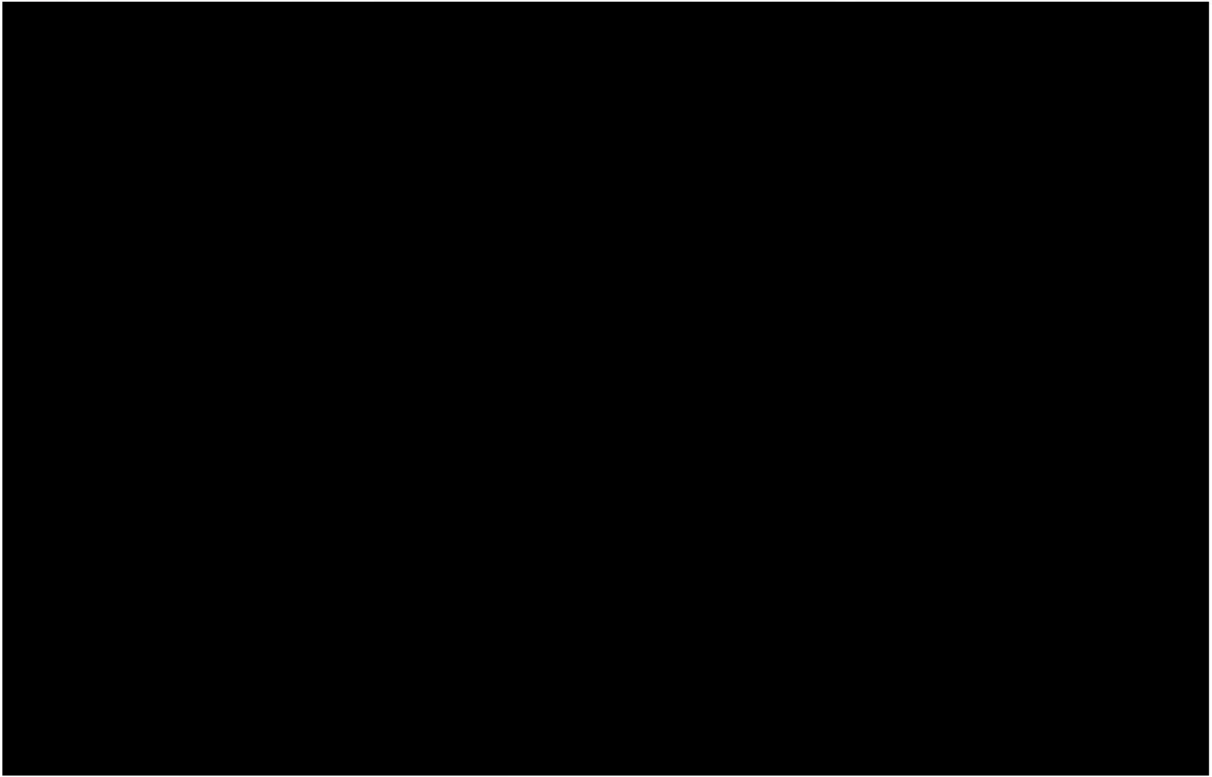


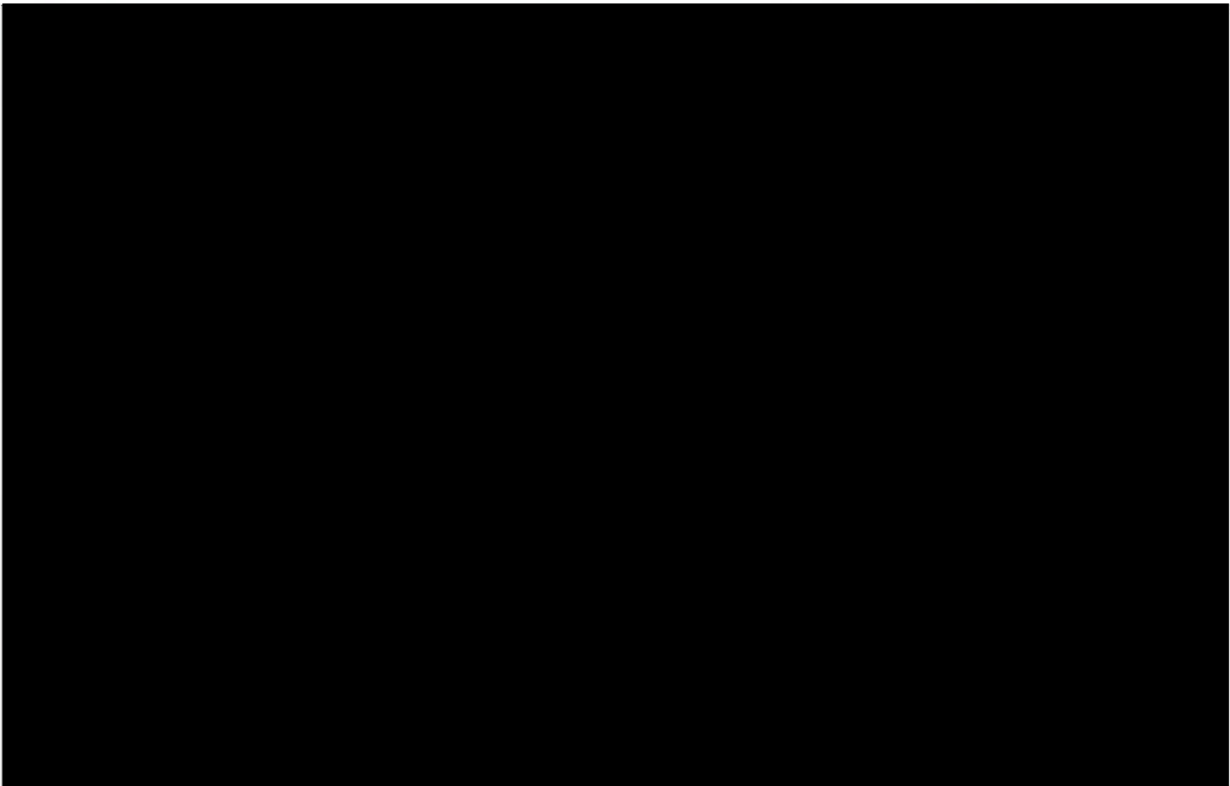




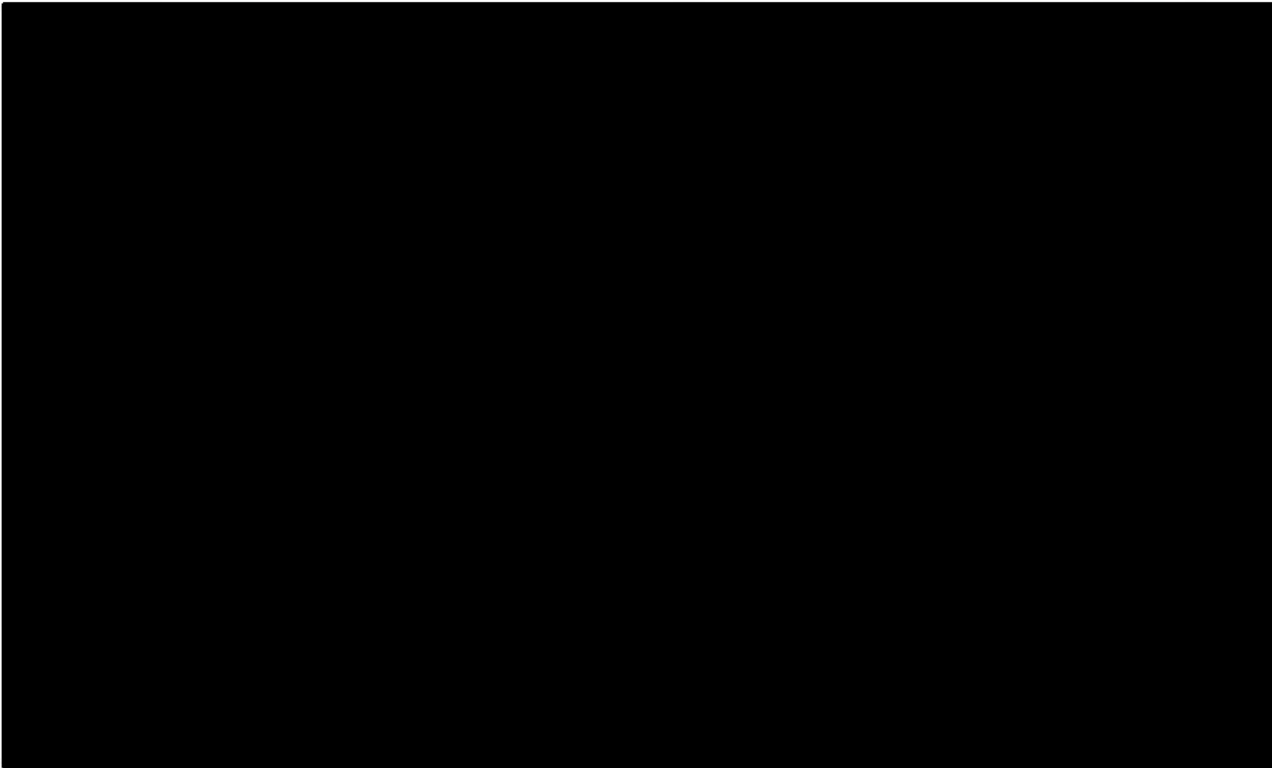


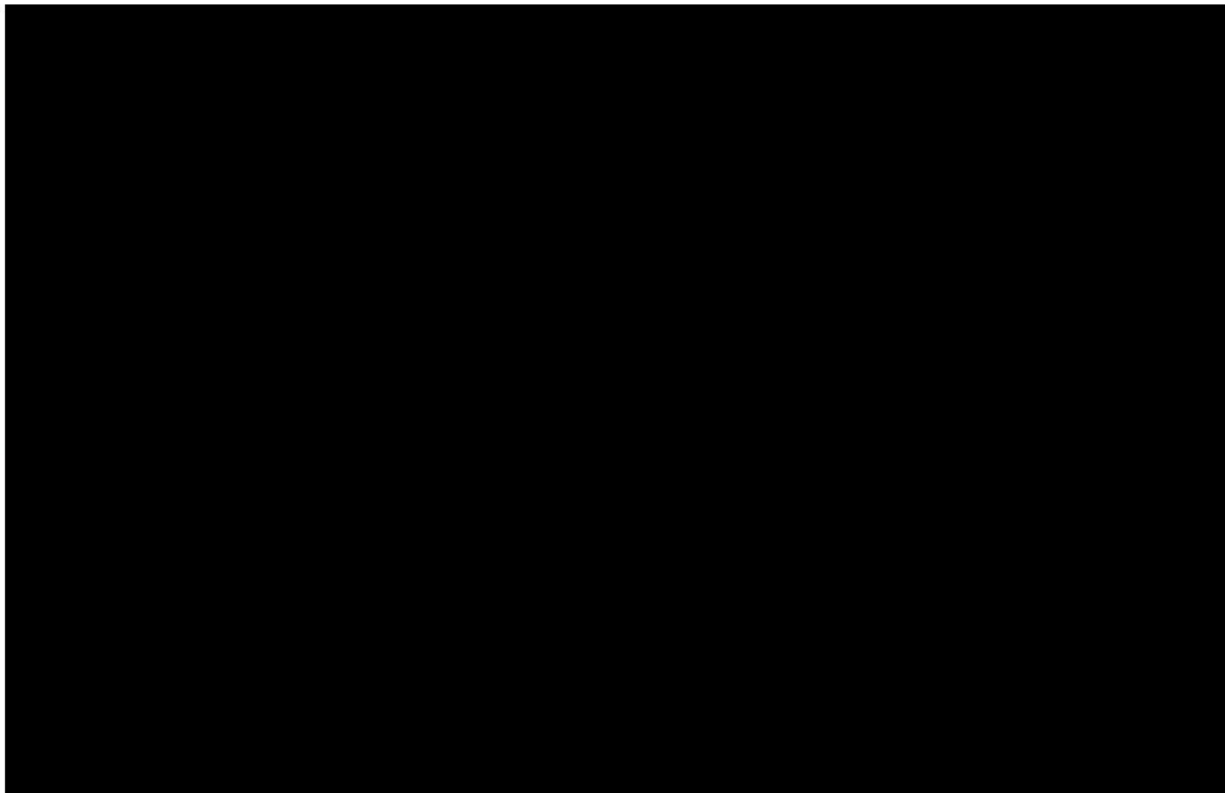


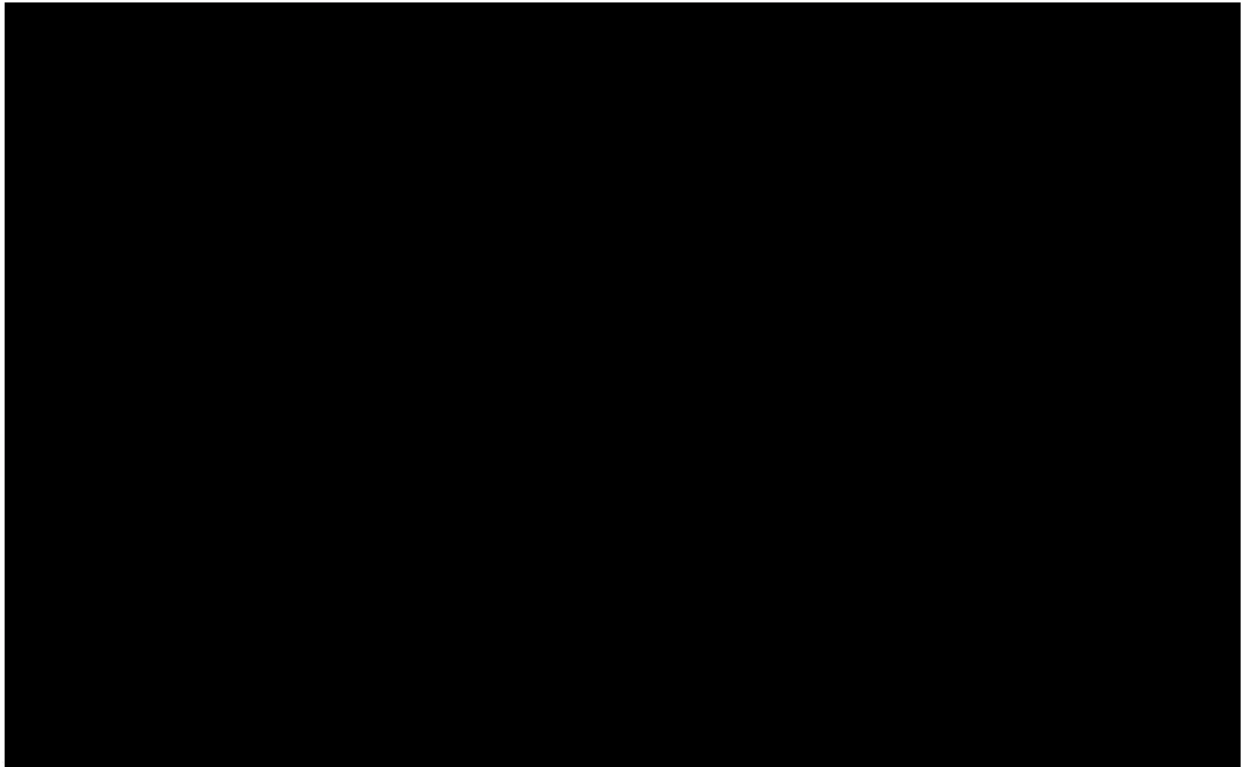


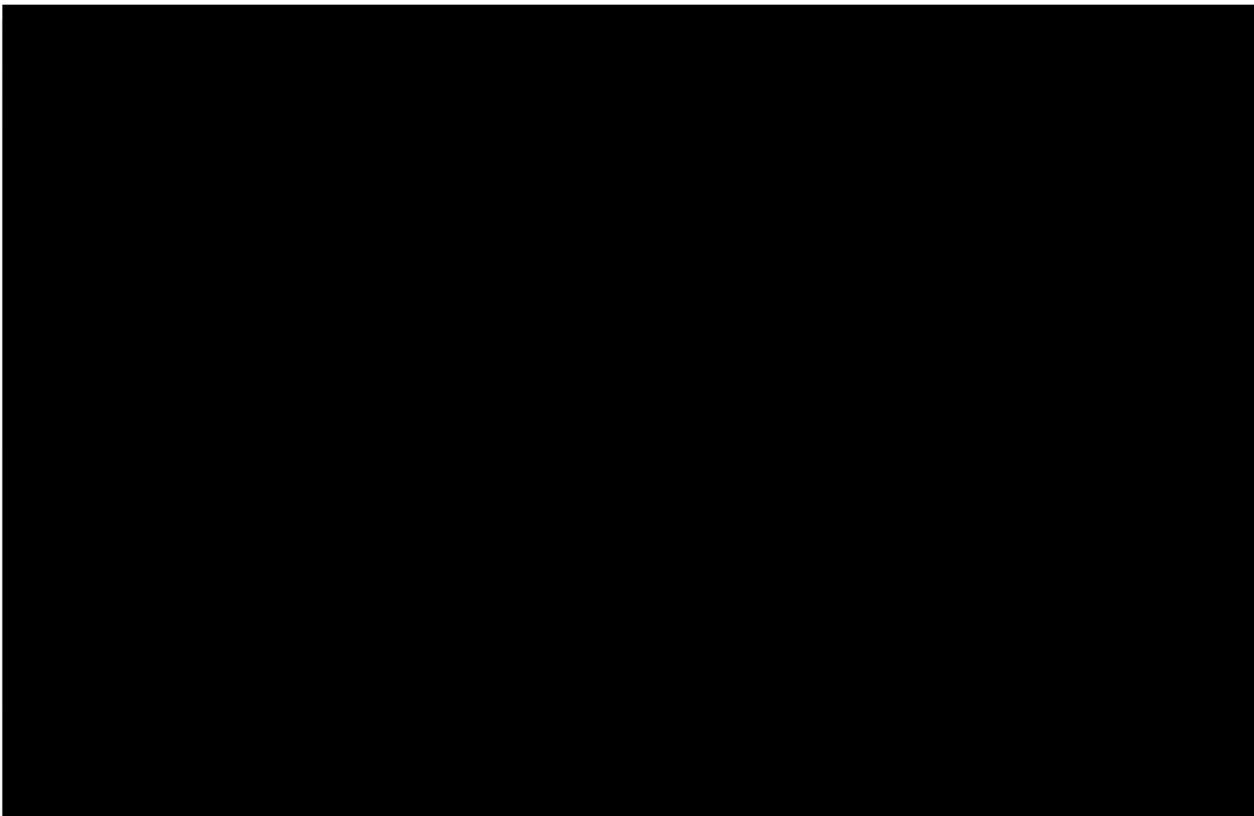


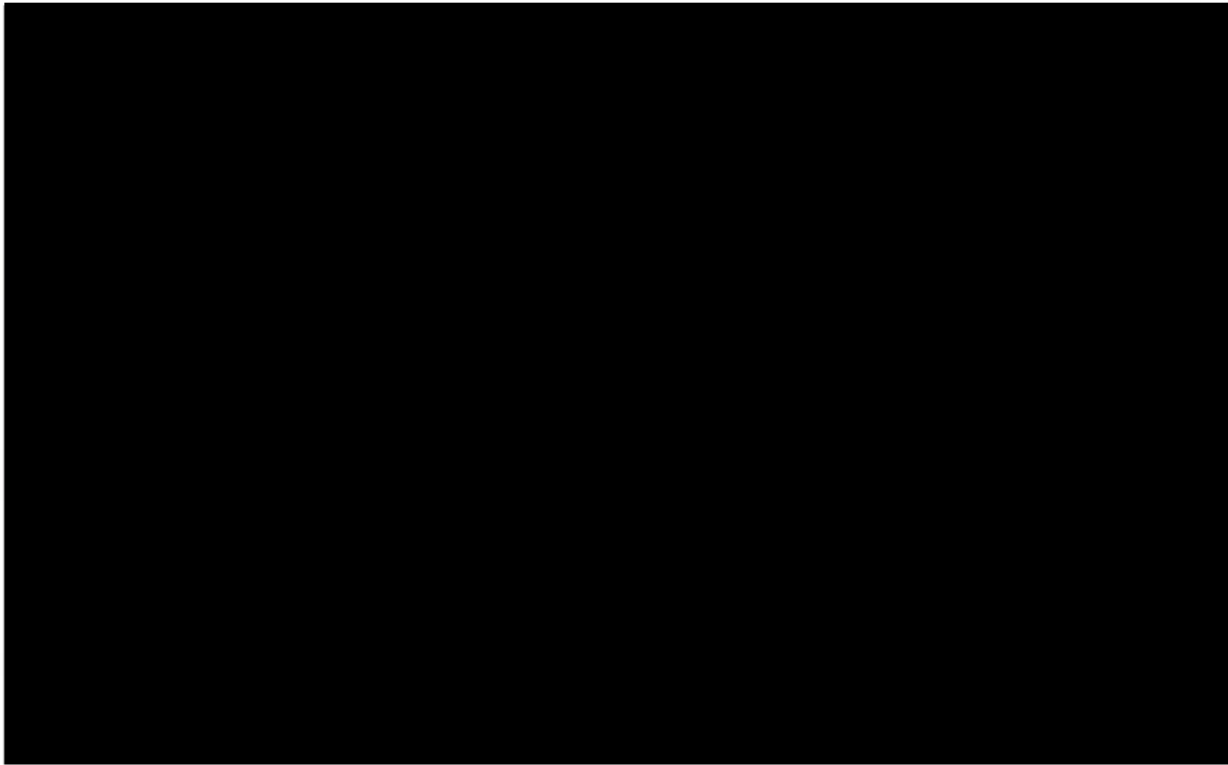


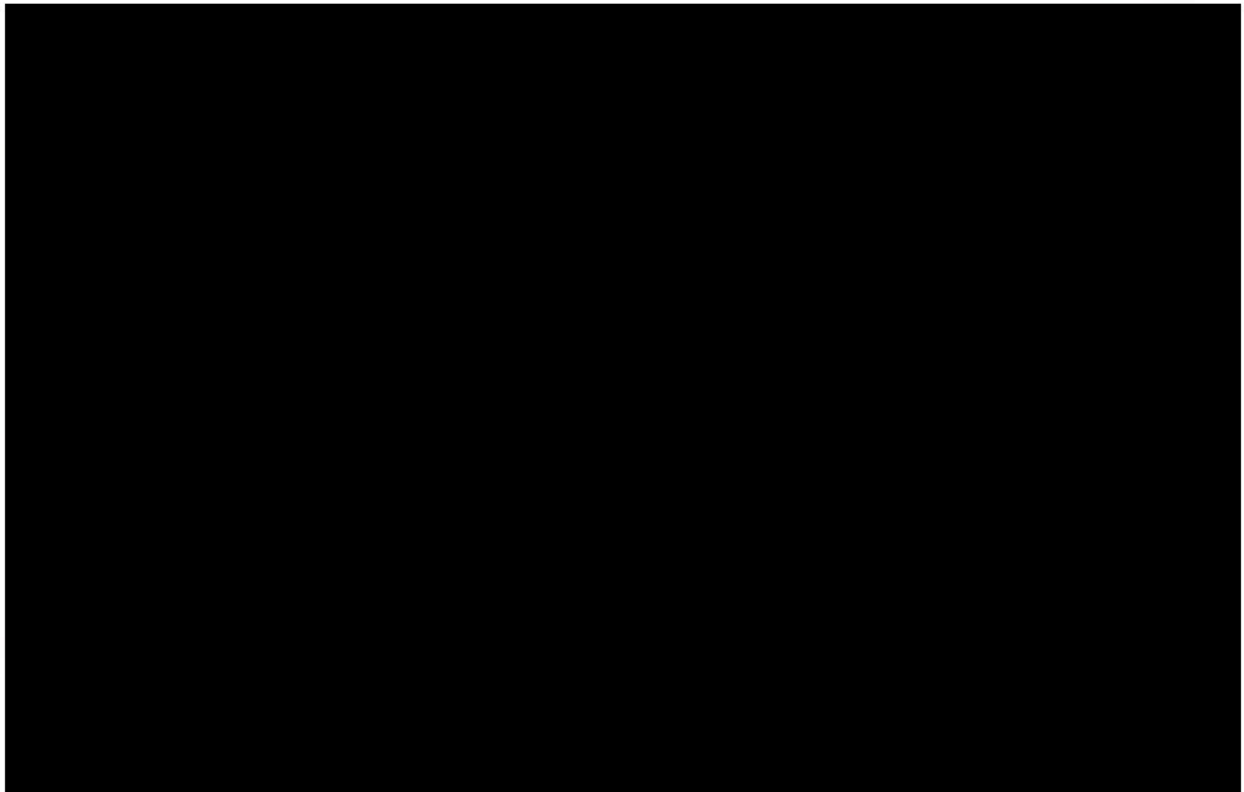


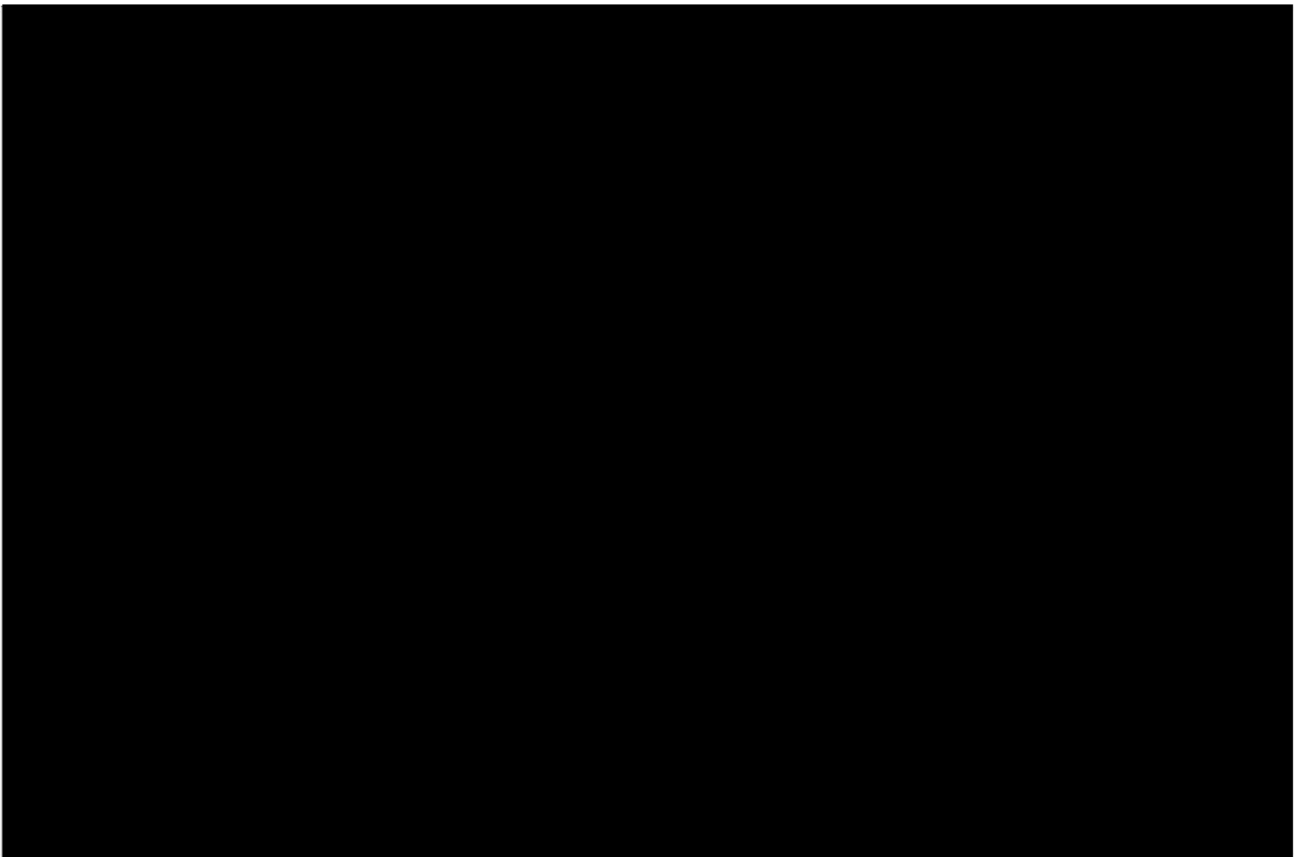


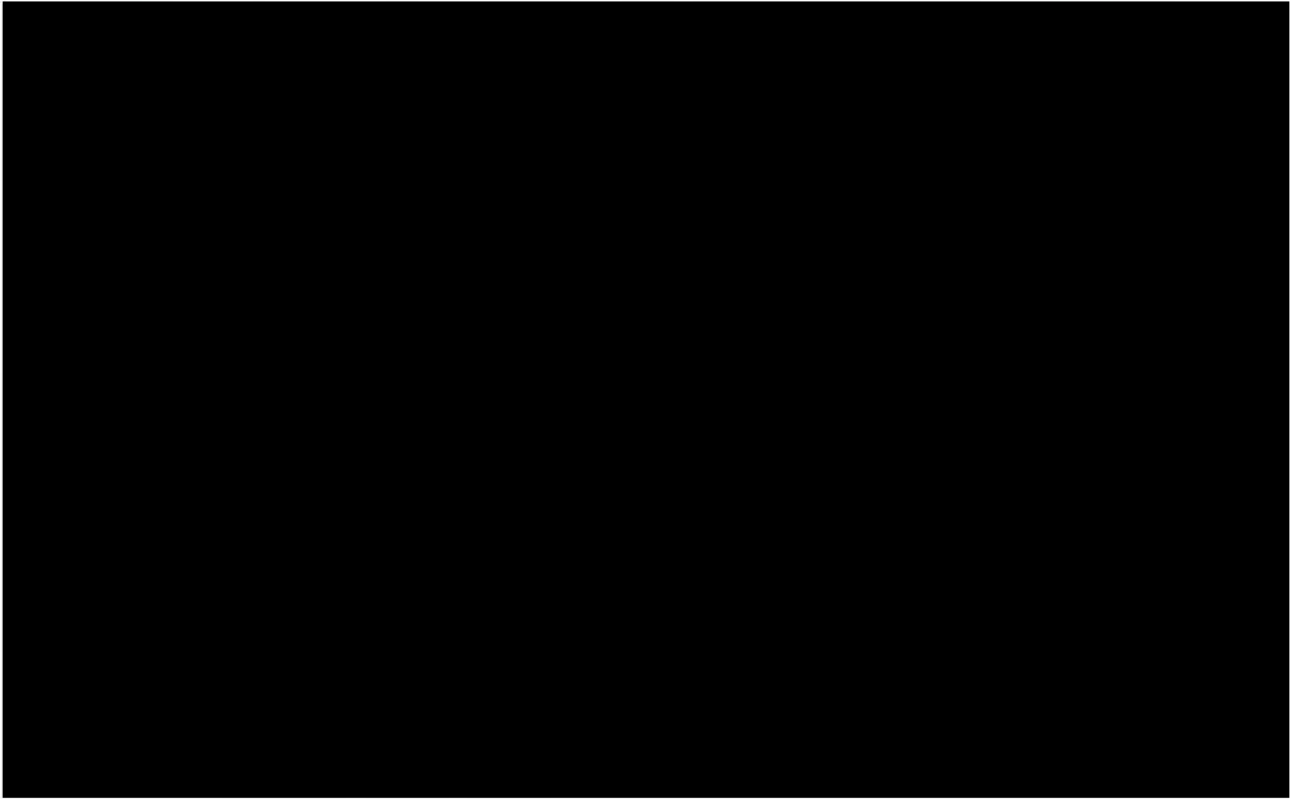


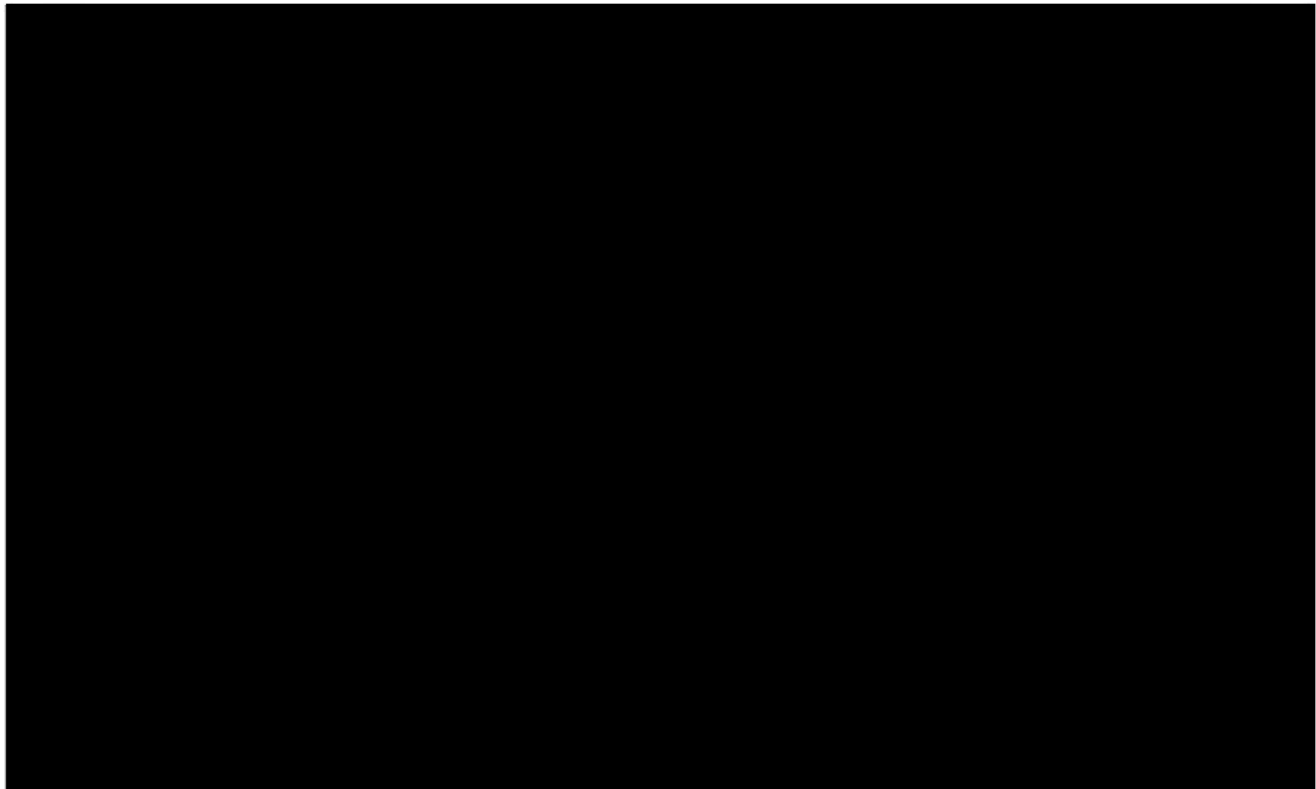


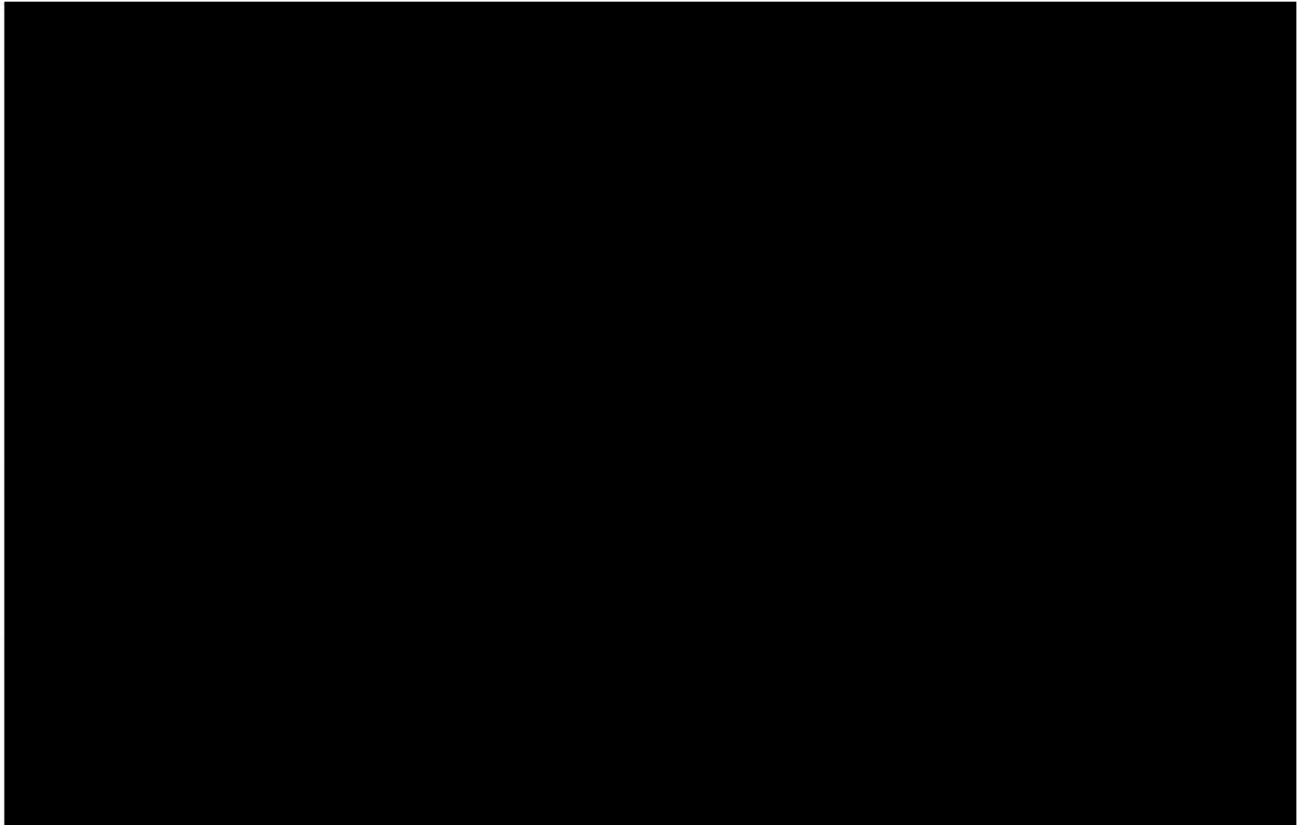


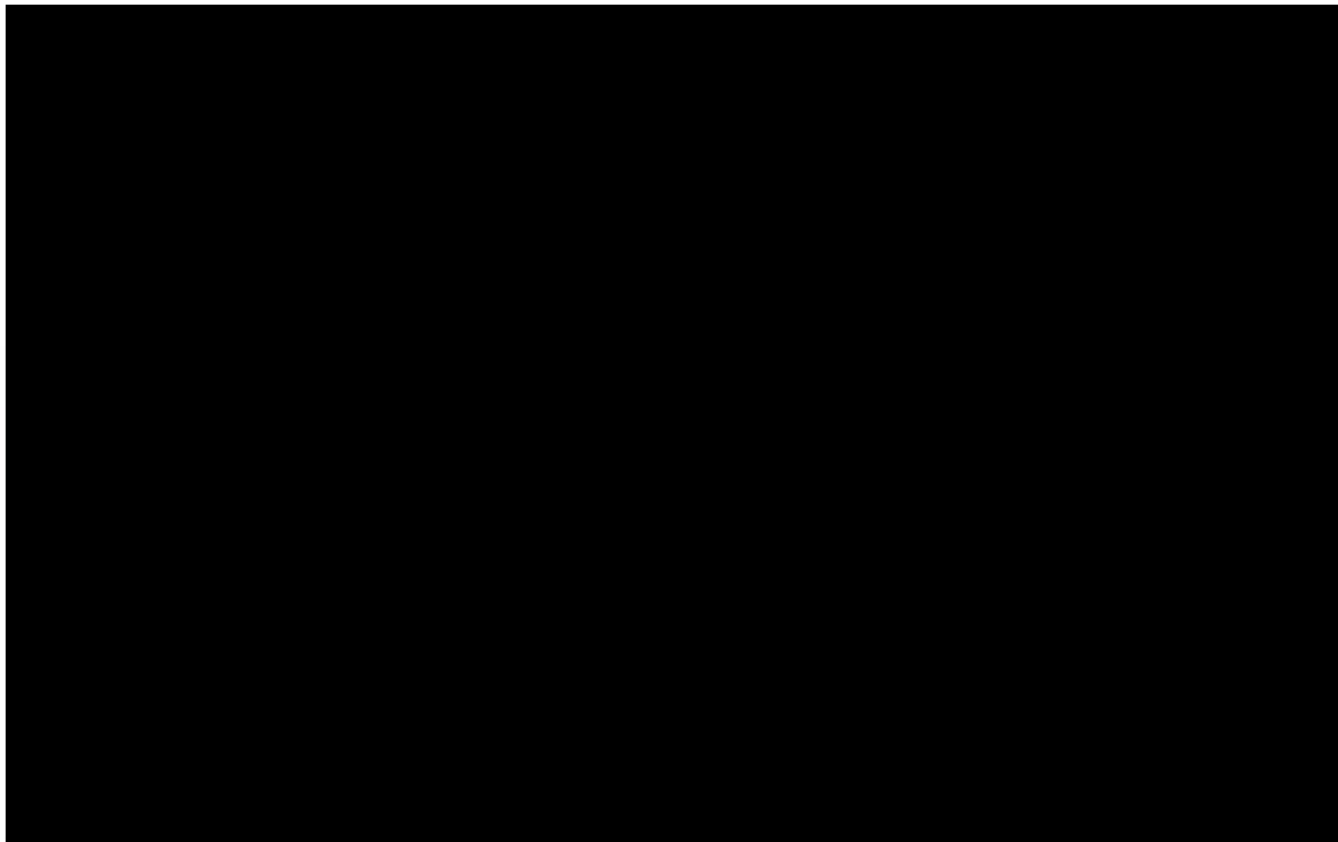


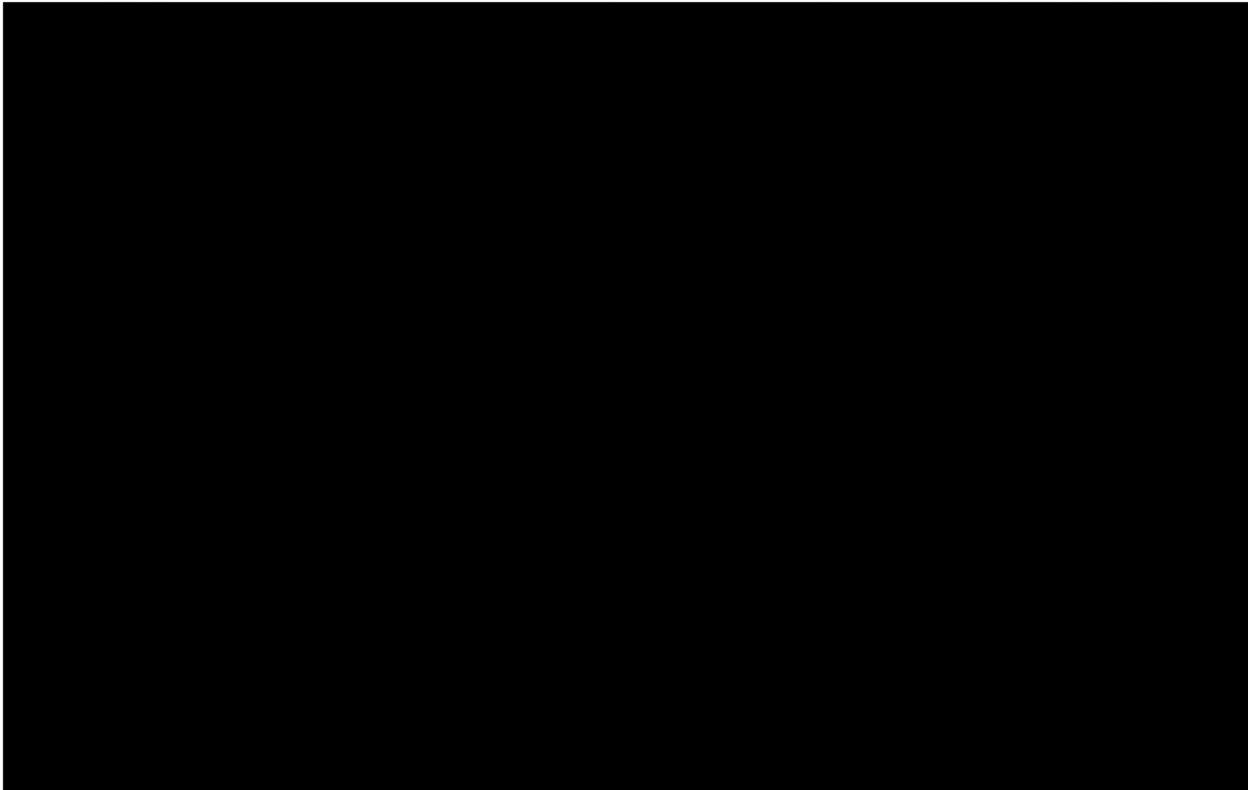


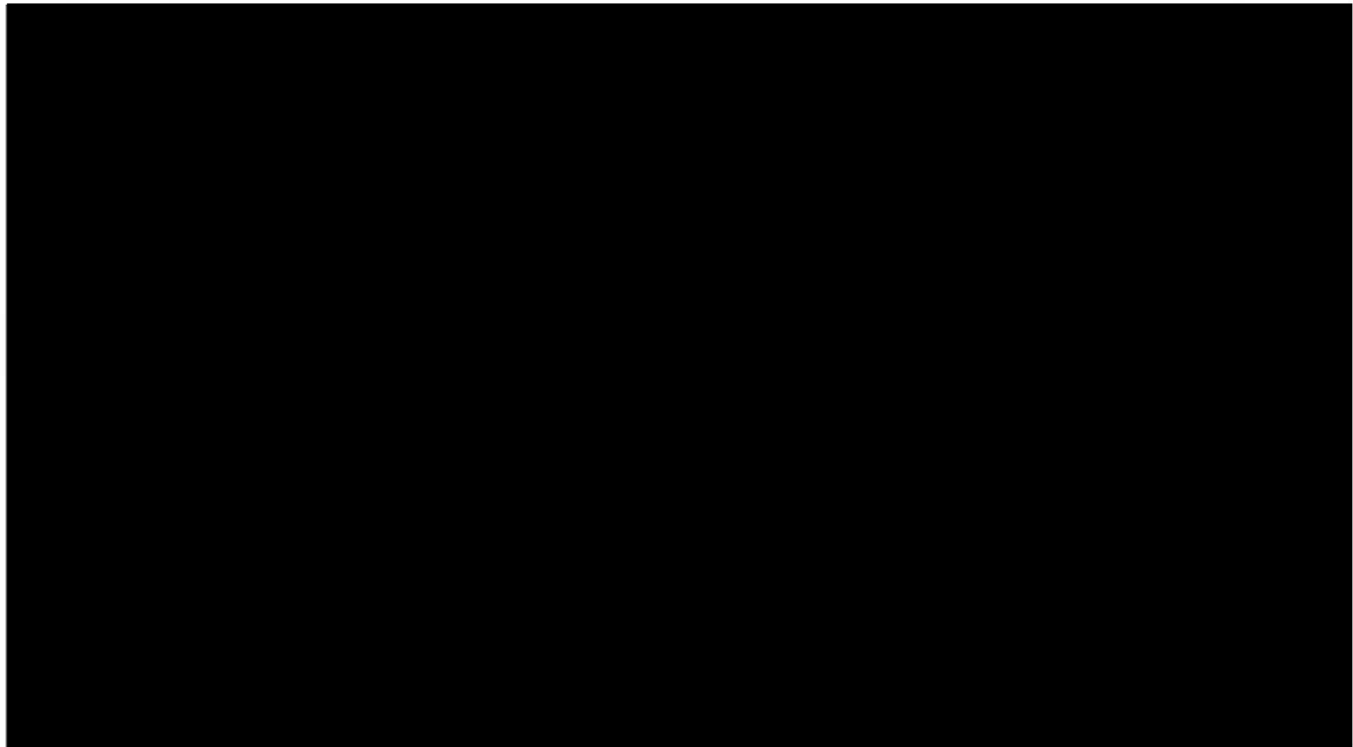




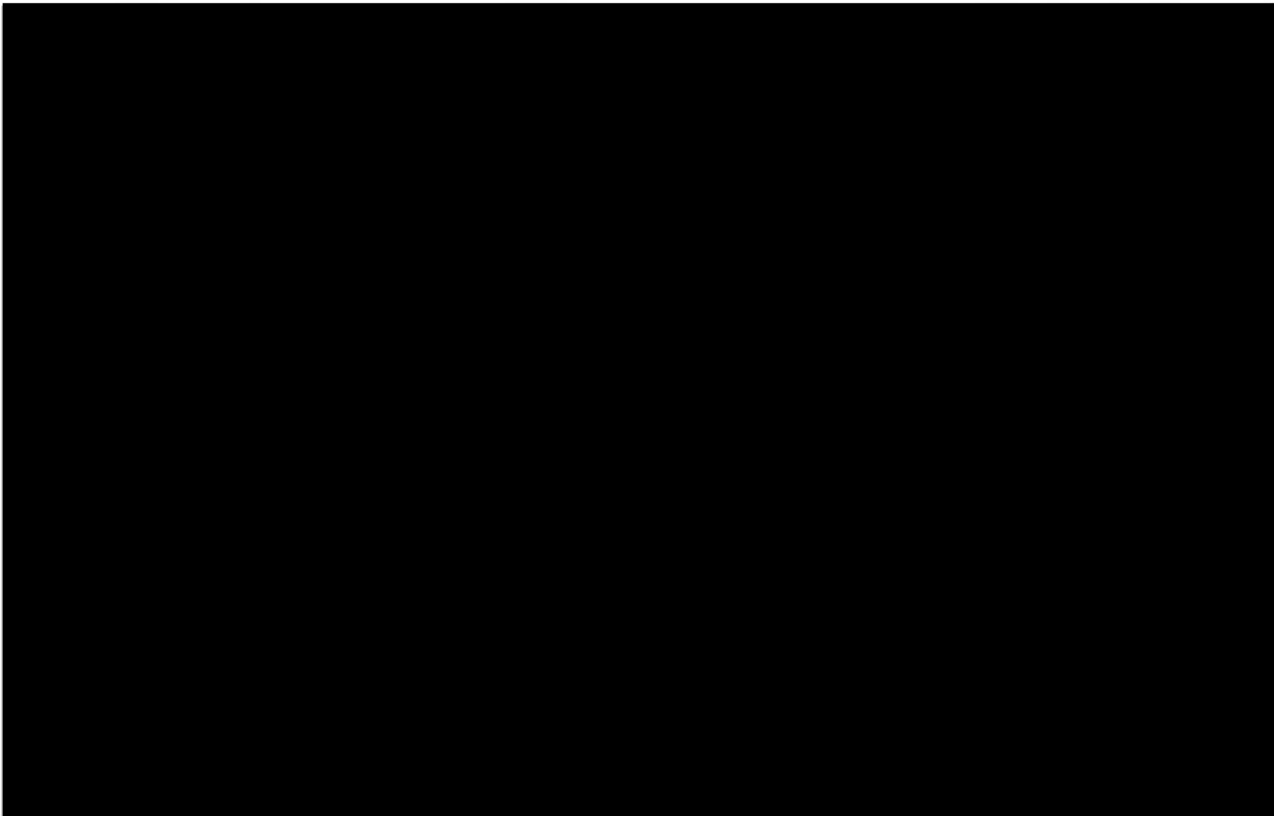


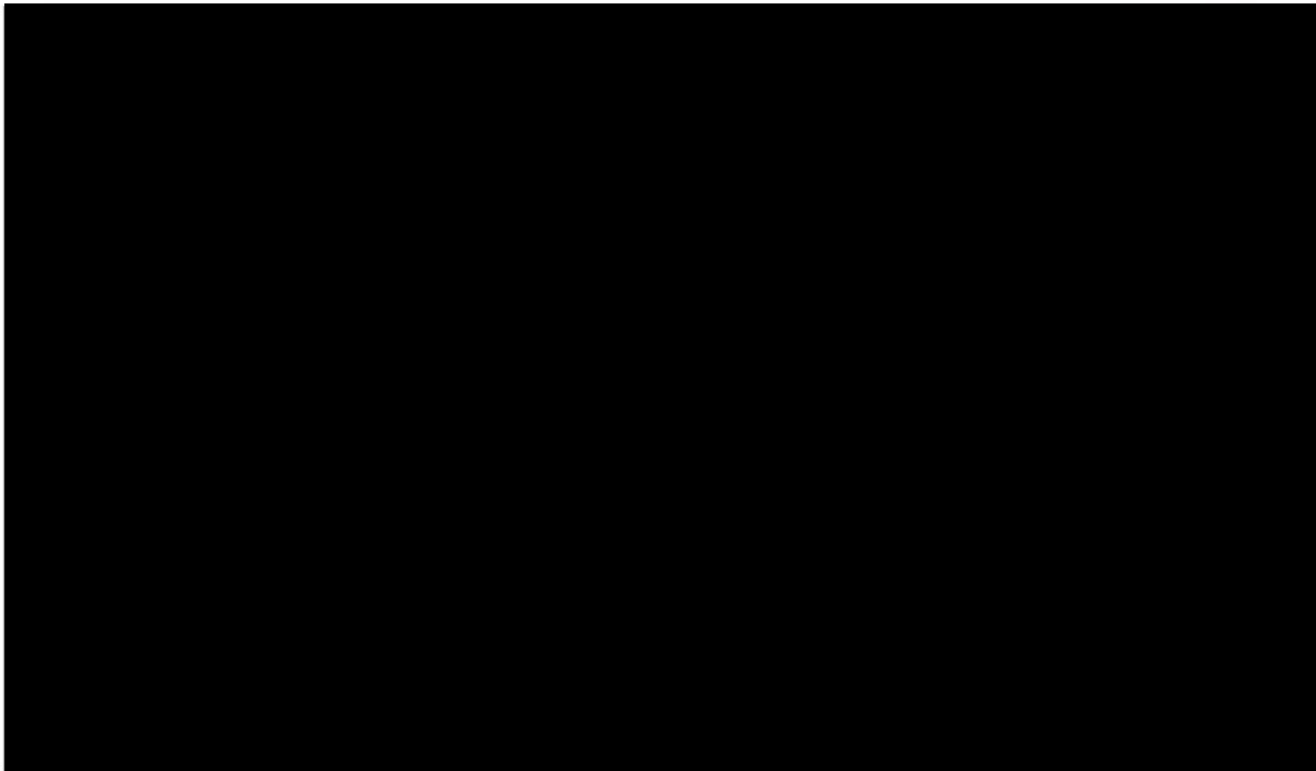


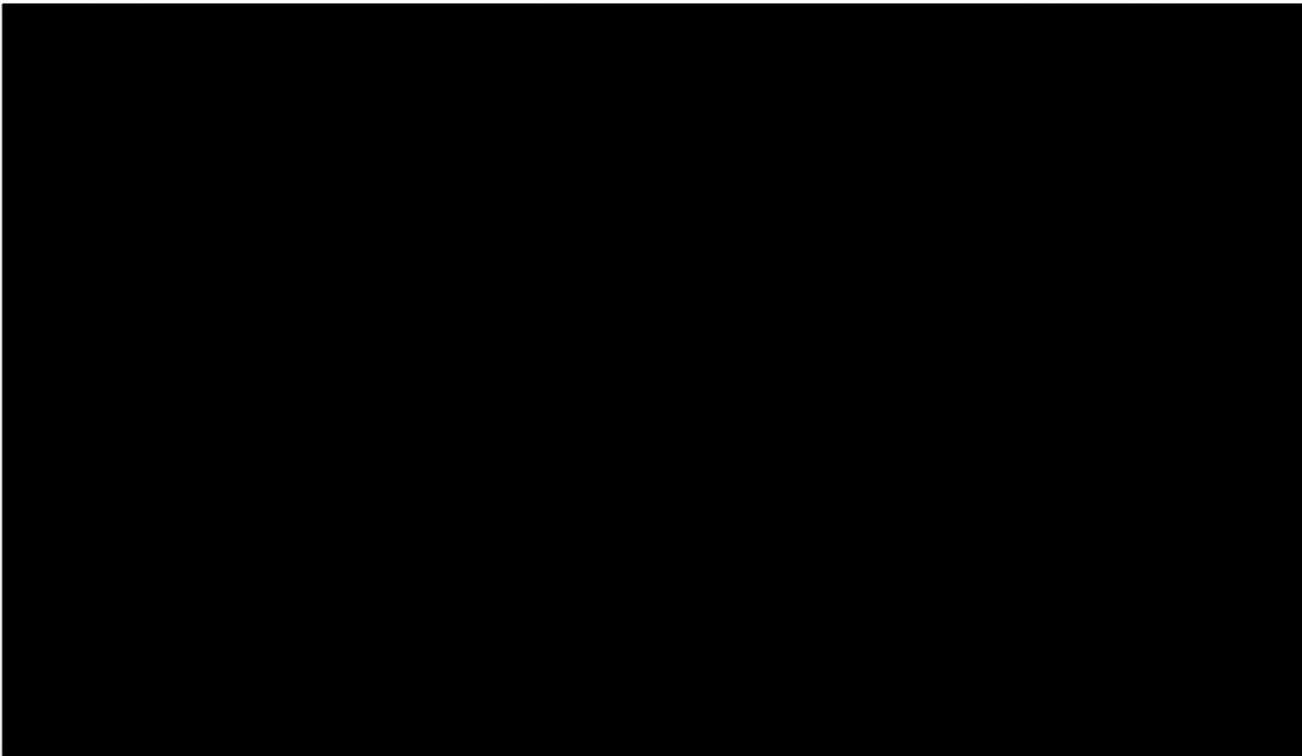






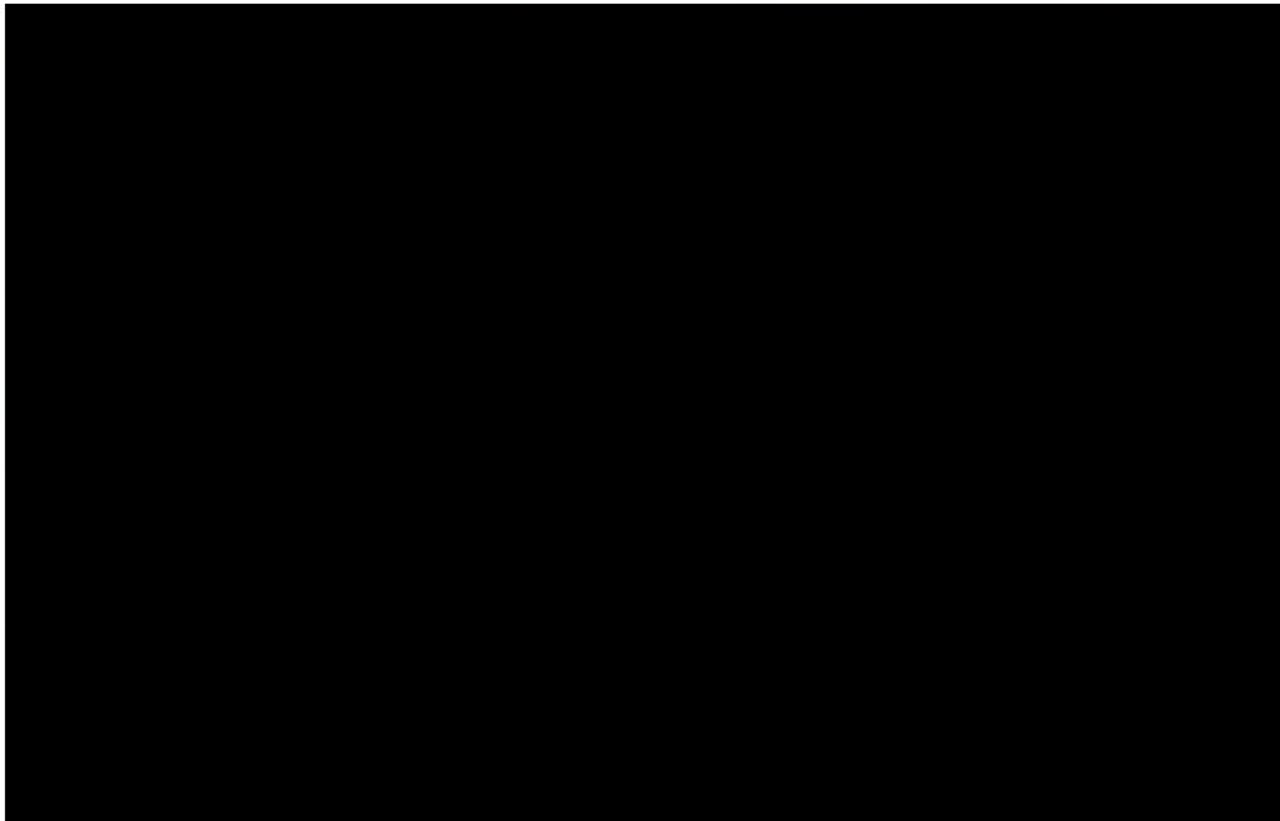


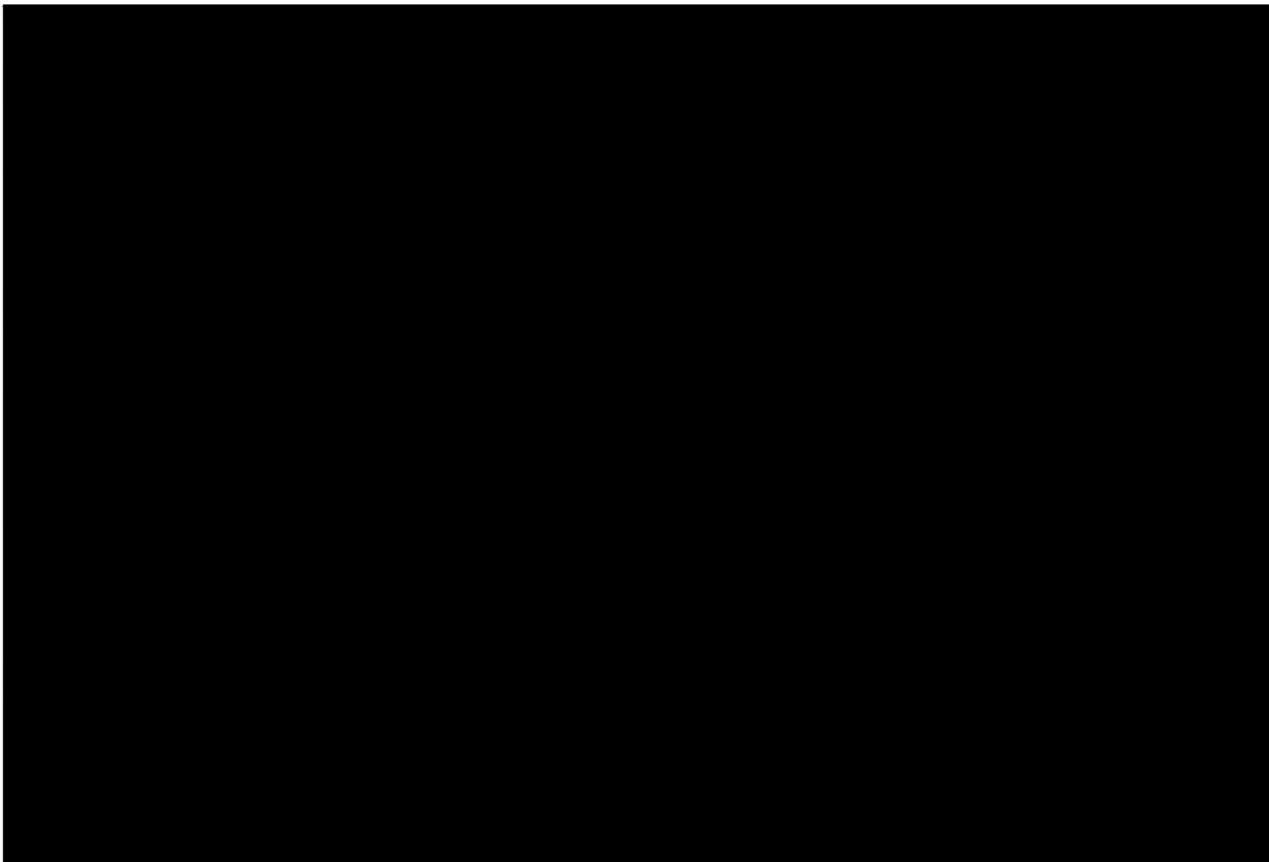




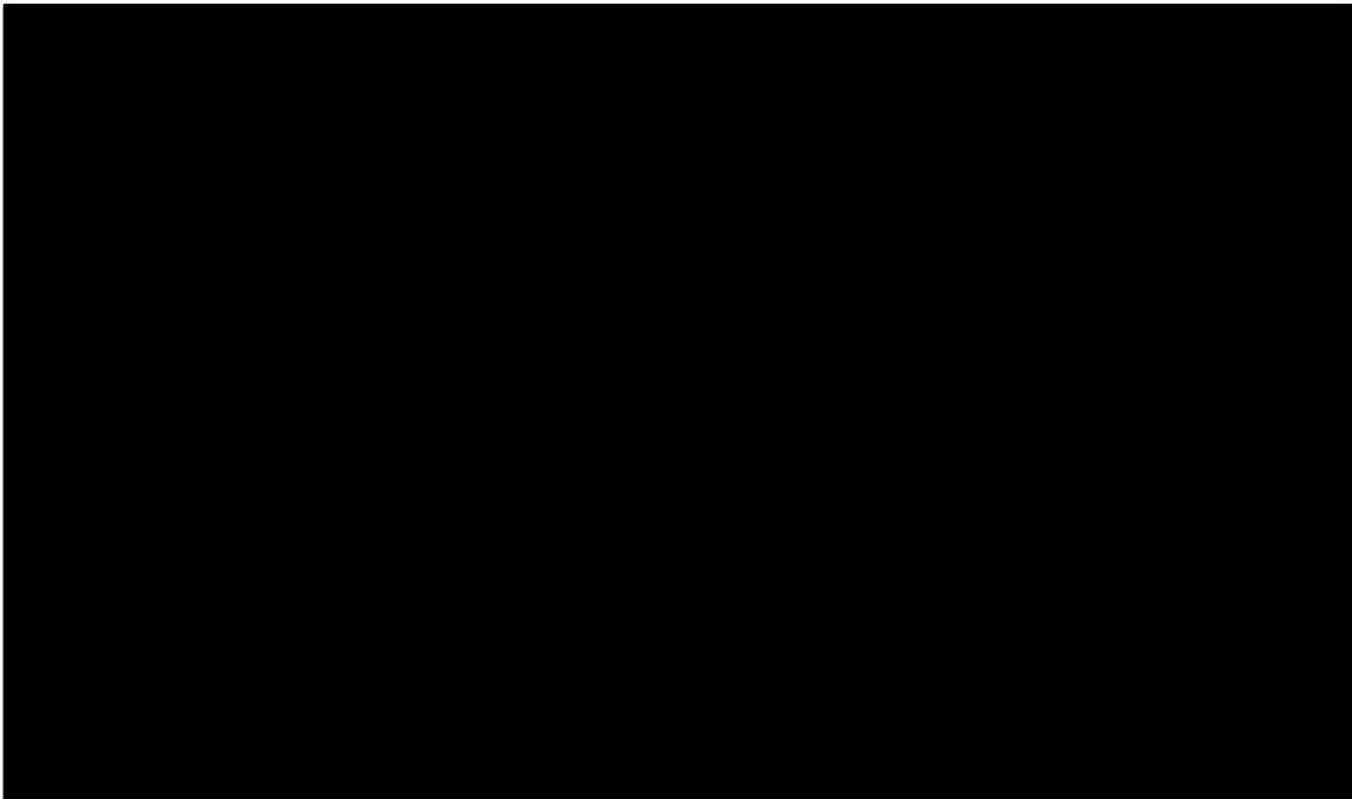


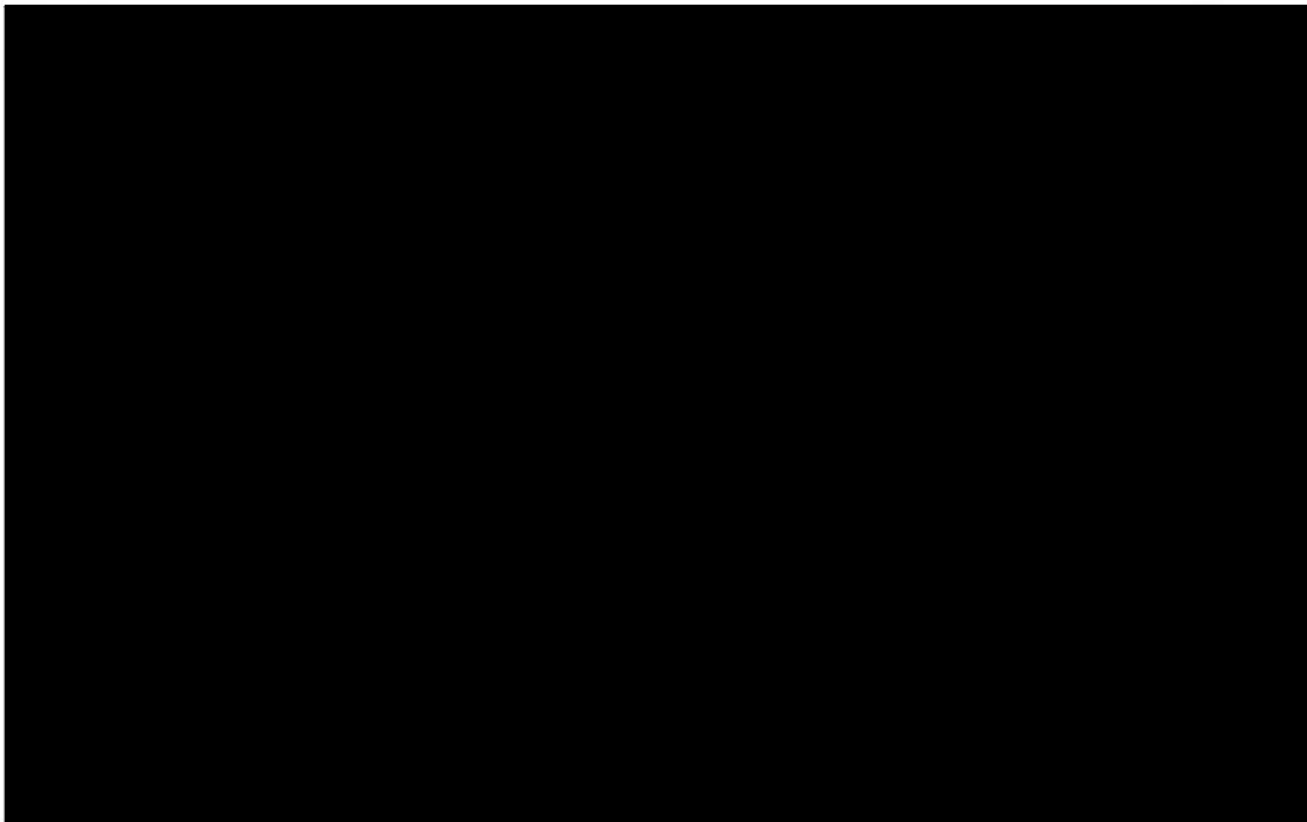


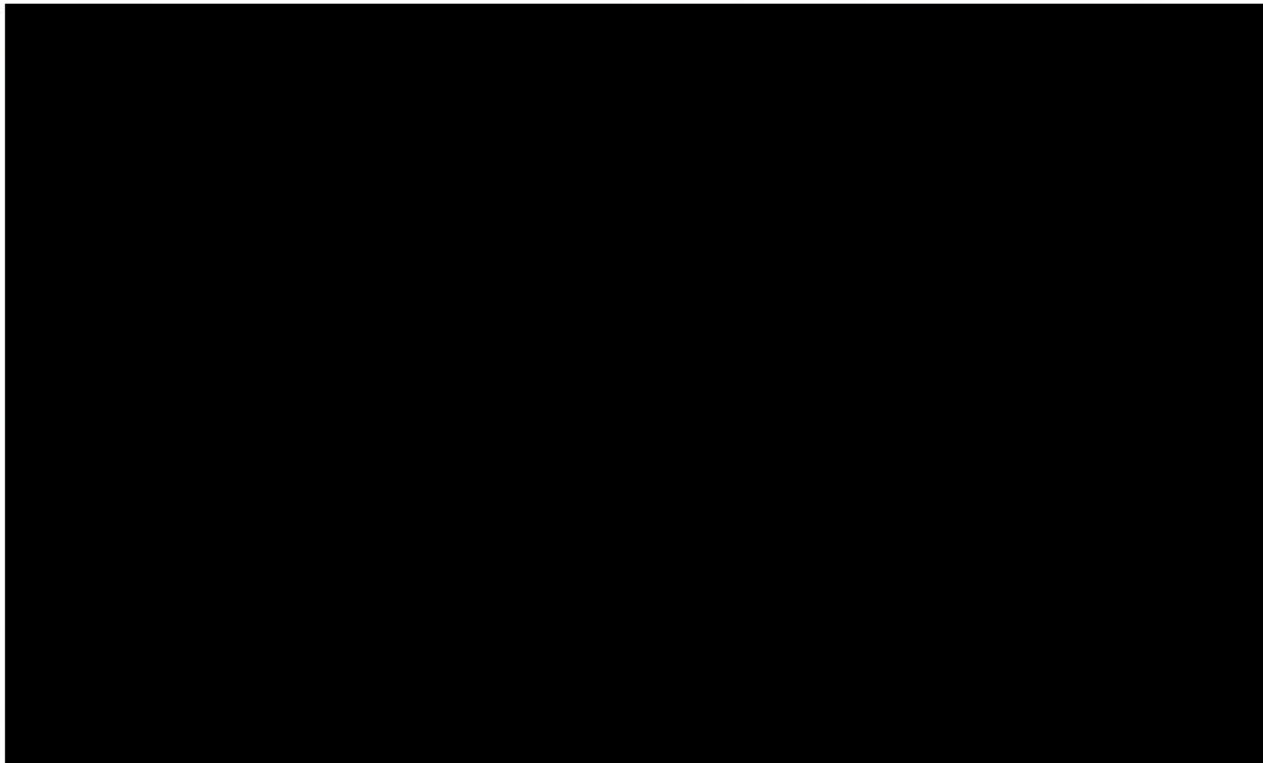




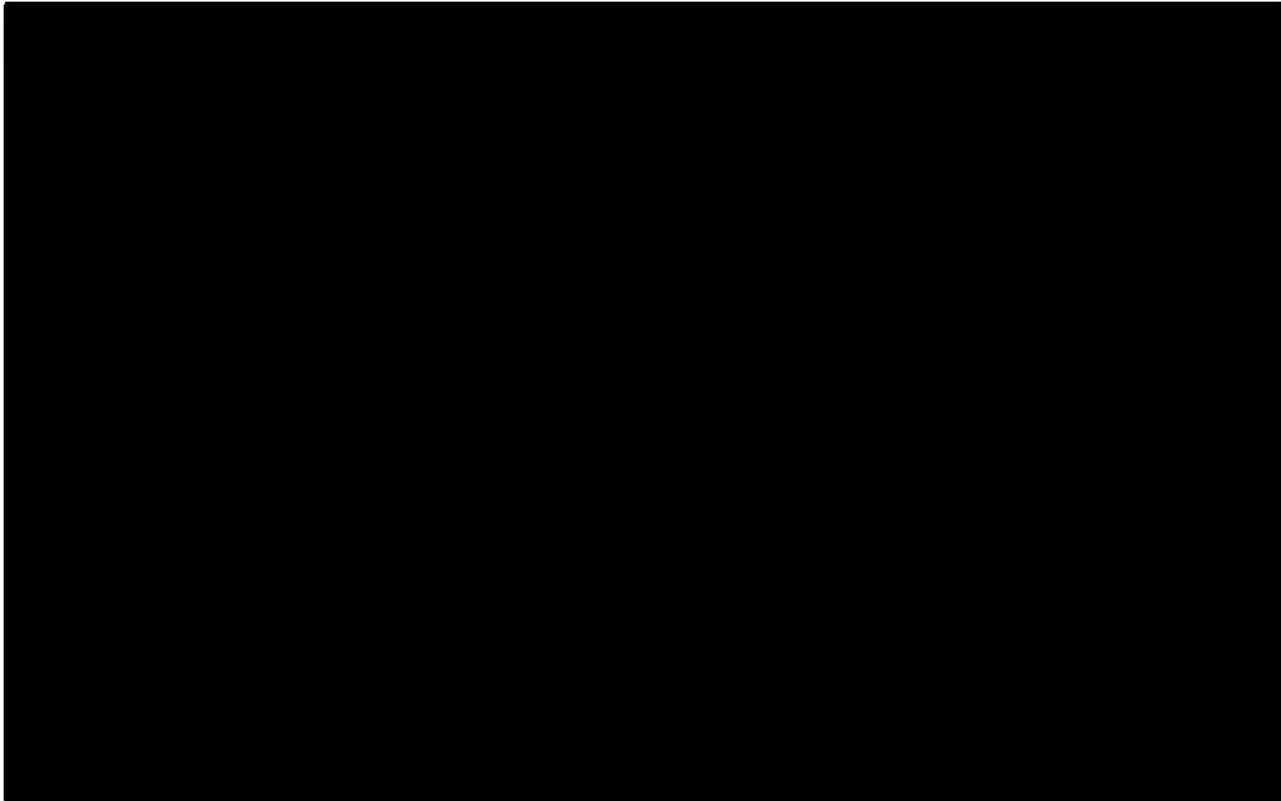


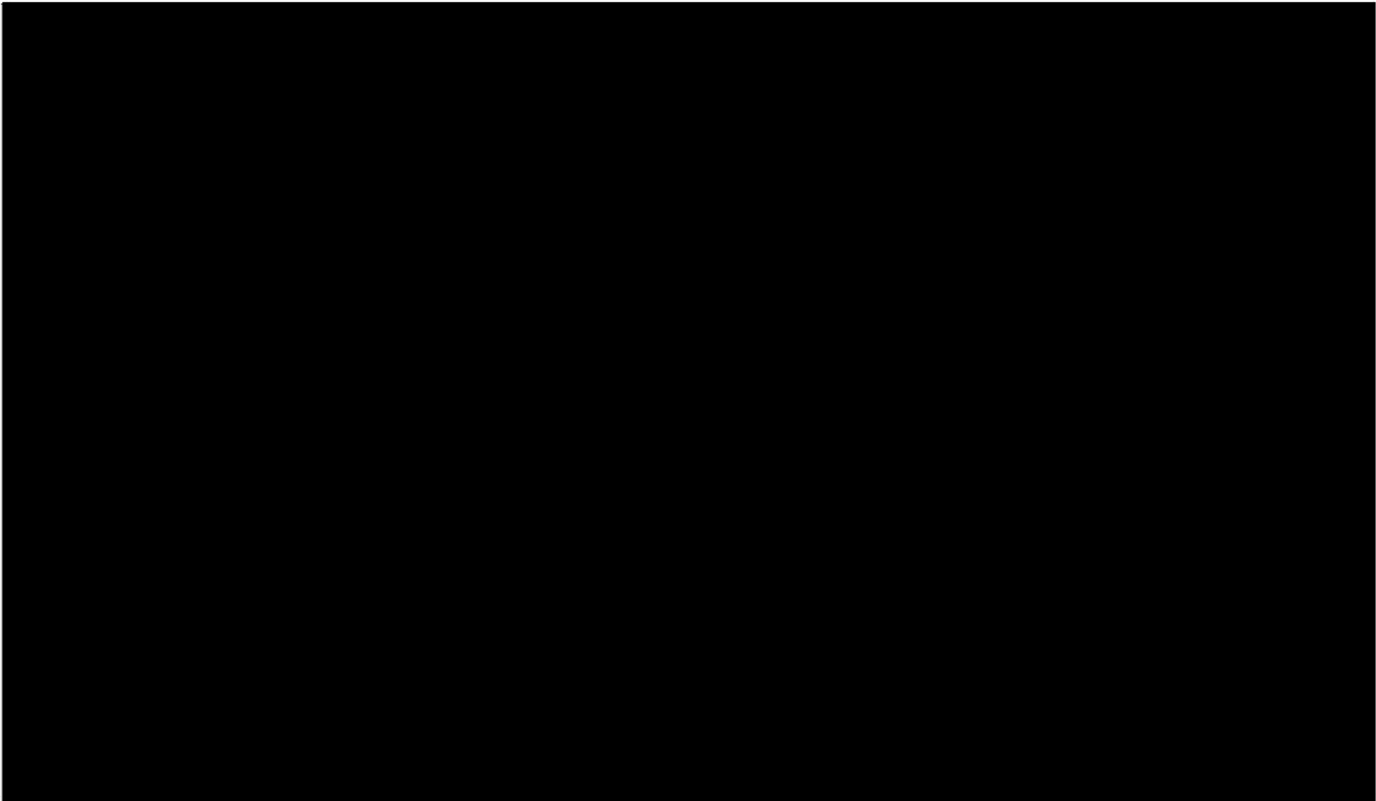


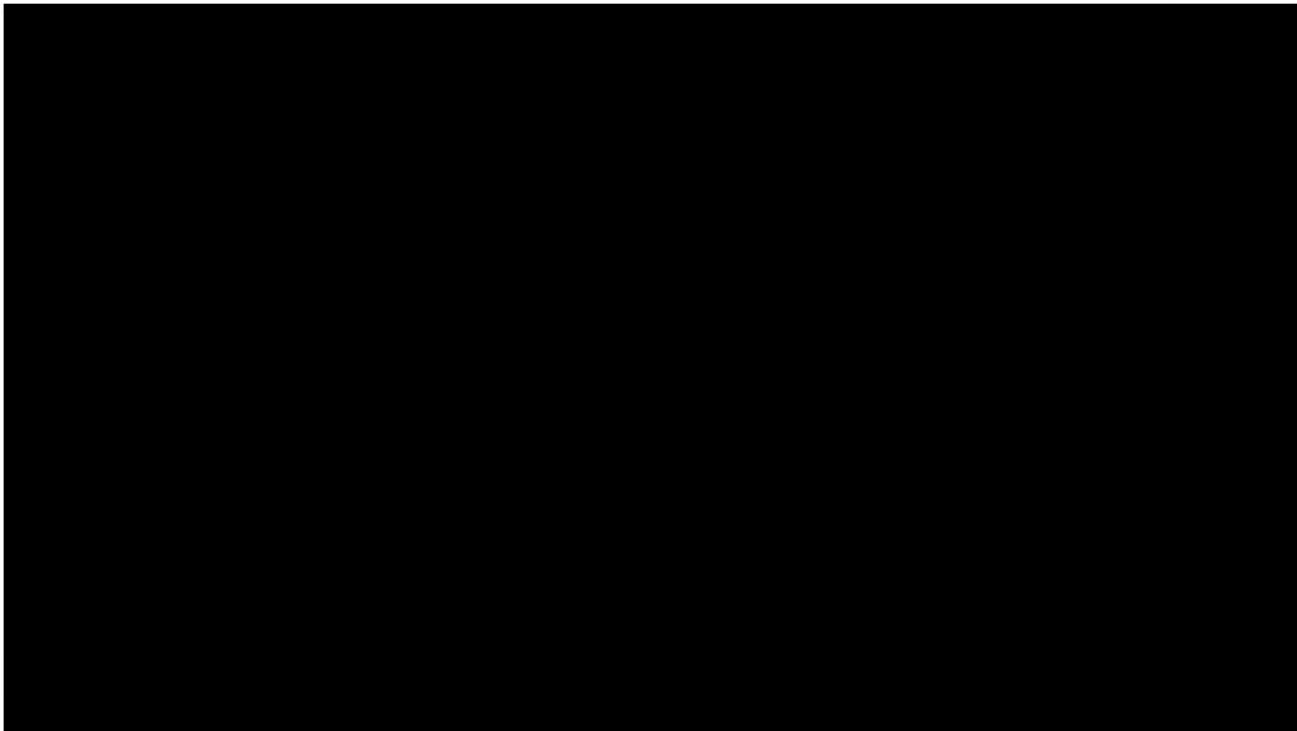




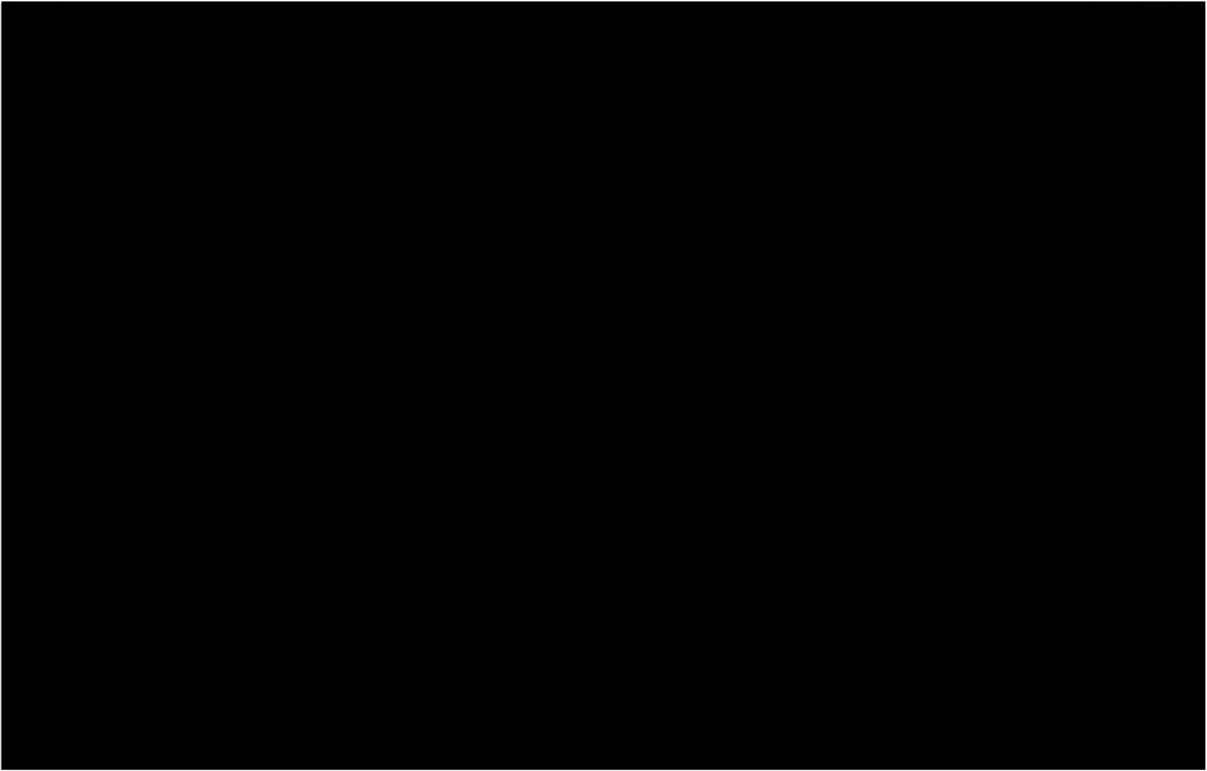
Merge



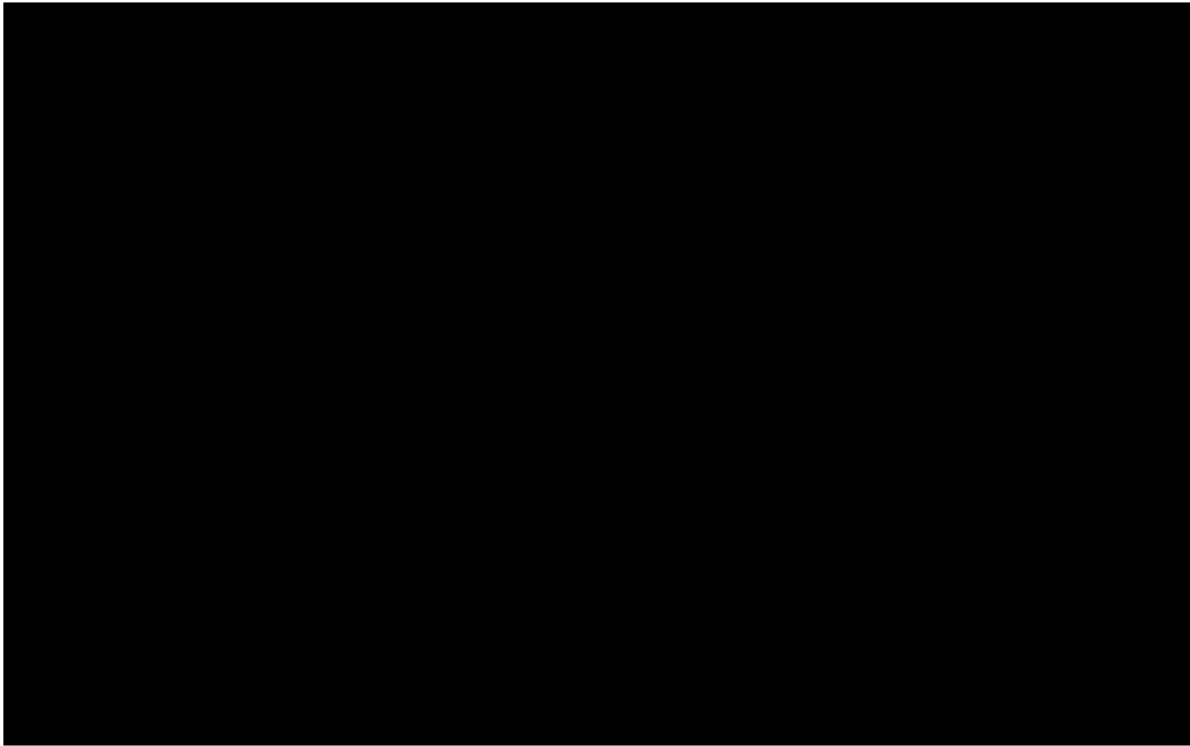




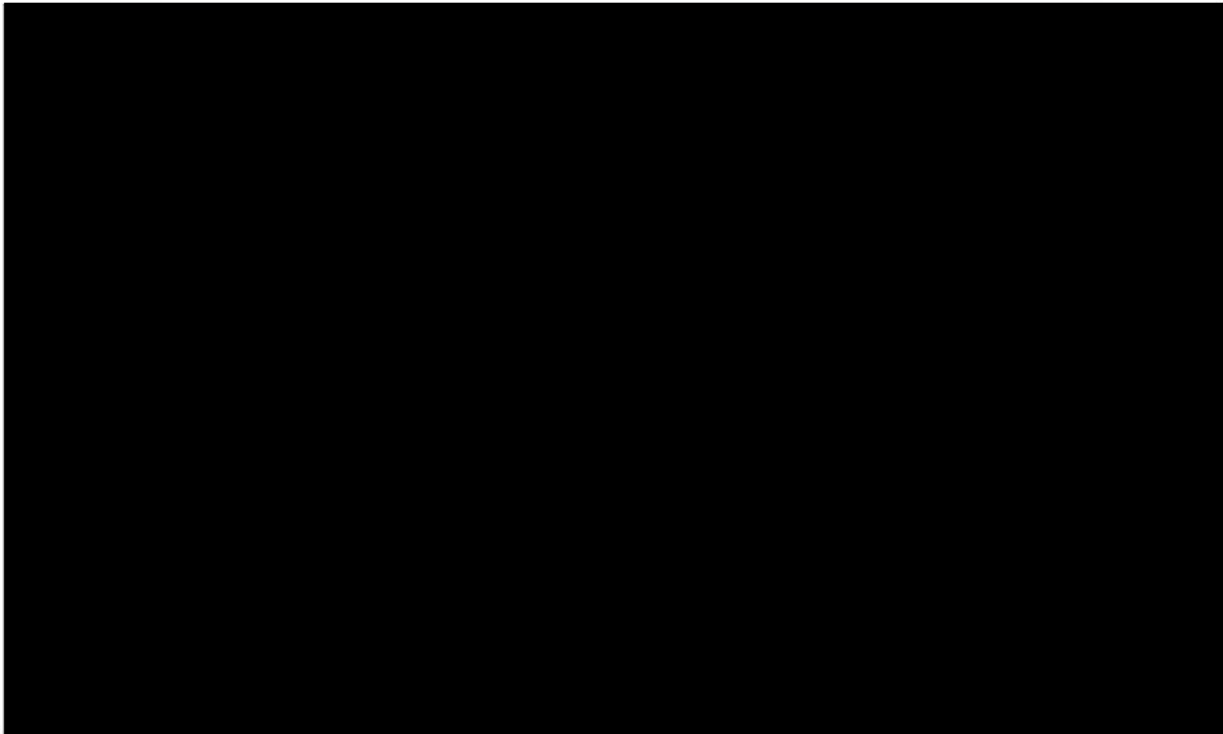
Merge



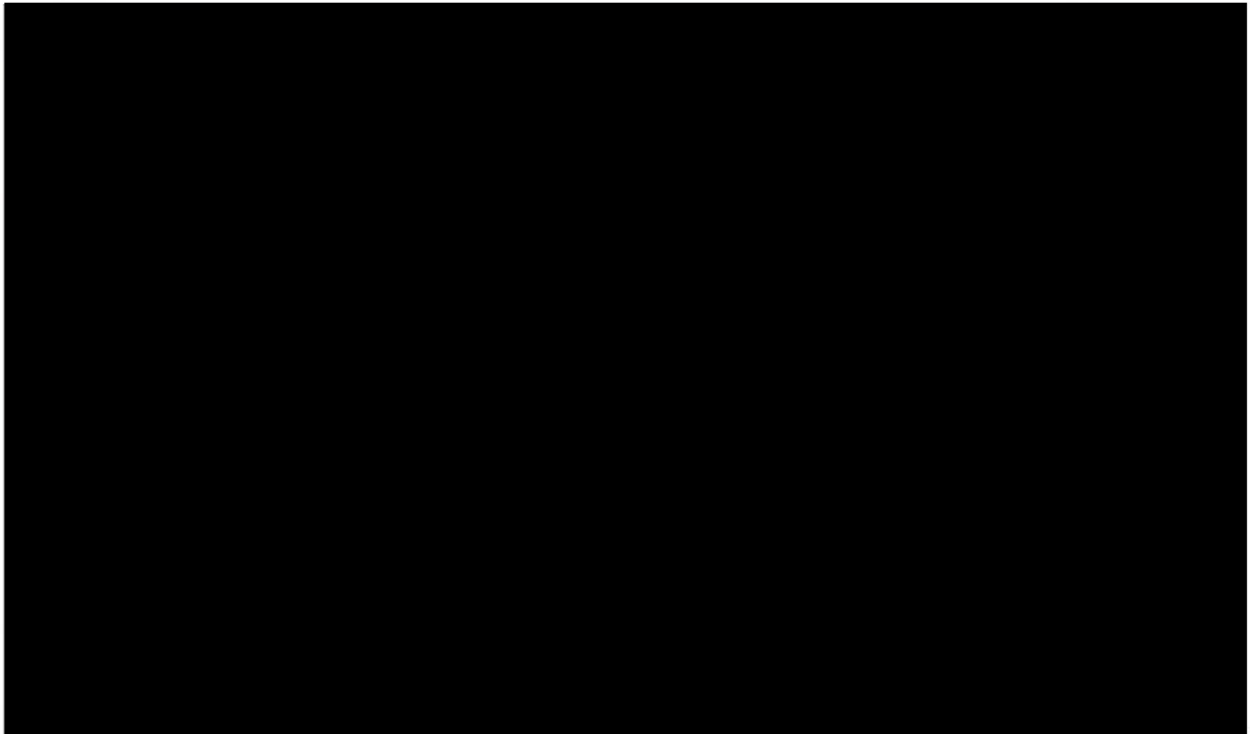
Merge



Merge



Merge



Merge



Merge

