

Human-centric Lighting Solutions

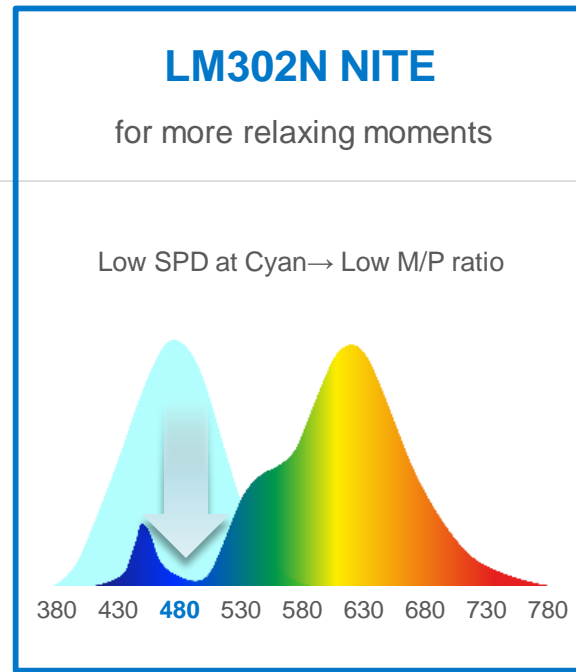
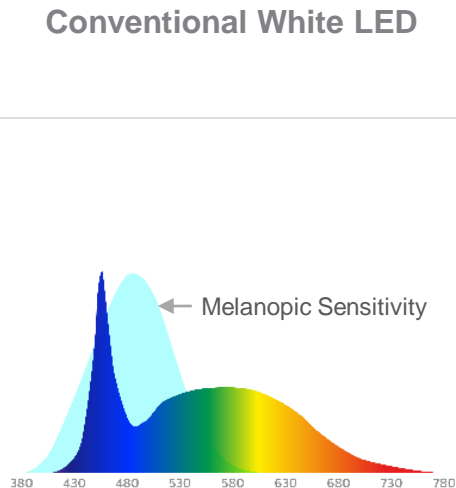
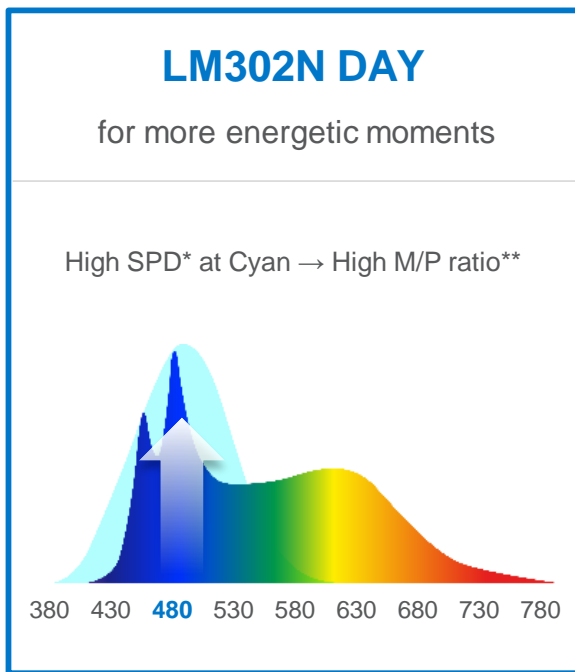
SAMSUNG

Light for Circadian Rhythm



Samsung LM302N DAY & LM302N NITE

Melanopic spectra is designed for better effectiveness and light quality

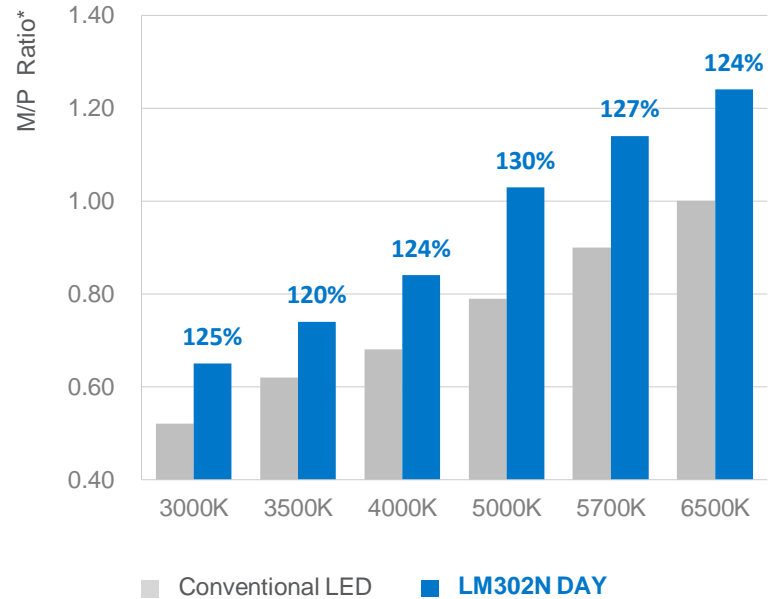
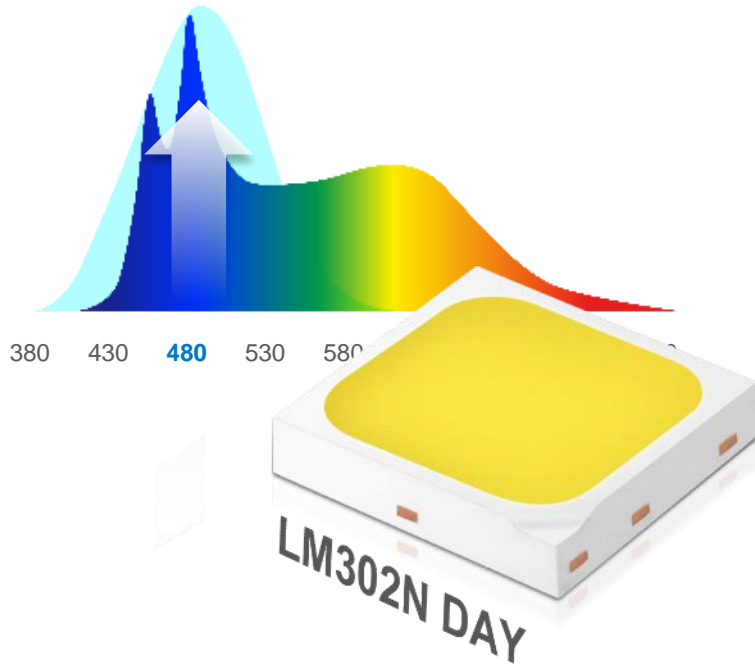


* SPD: Spectral Power Distribution

** M/P Ratio: Melanopic/Photopic Ratio

LM302N DAY

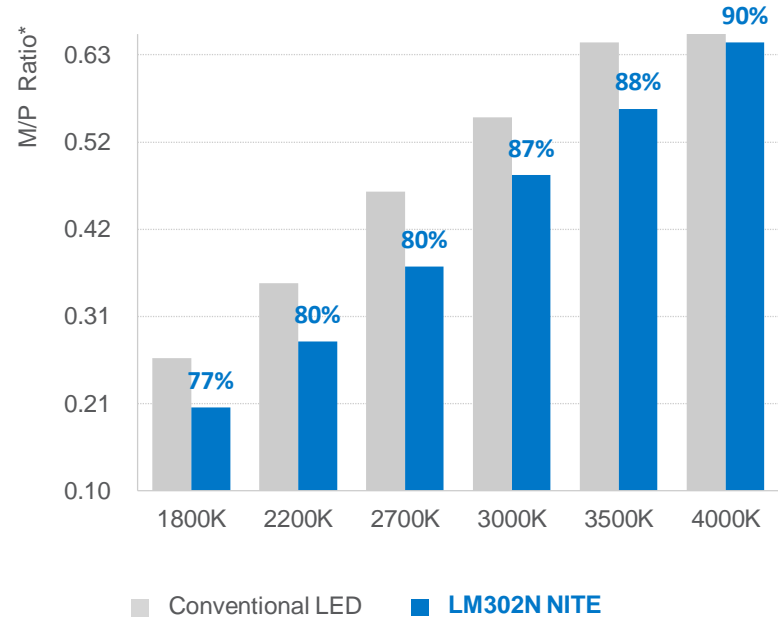
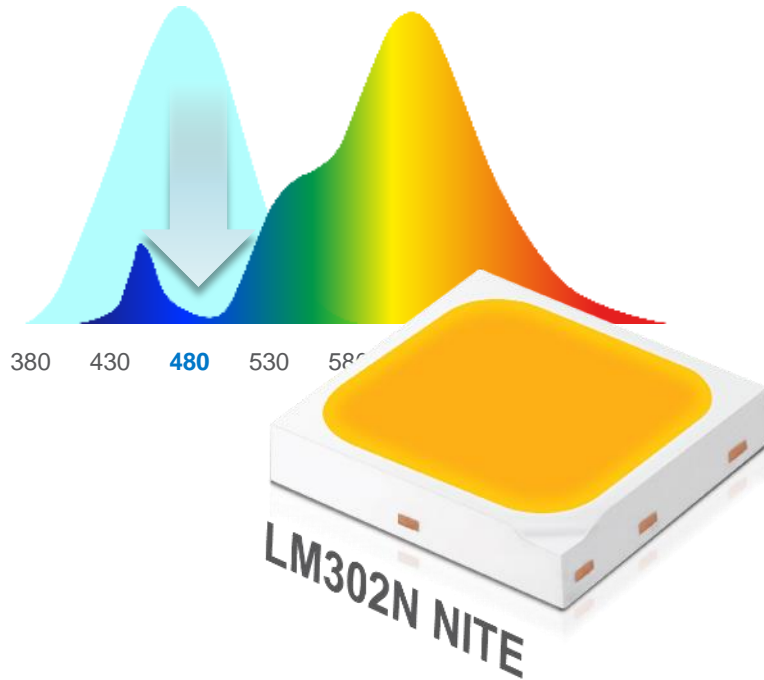
Higher M/P ratio by directly boosting cyan enhances melatonin suppression levels



* M/P Ratio: Melanopic/Photopic Ratio

LM302N NITE

Lower M/P ratio by directly controlling cyan enhances melatonin secretion levels



* M/P Ratio: Melanopic/Photopic Ratio

Key Considerations

There are key considerations in human-centric lighting to being a practical lighting



* M/P Ratio: Melanopic/Photopic Ratio

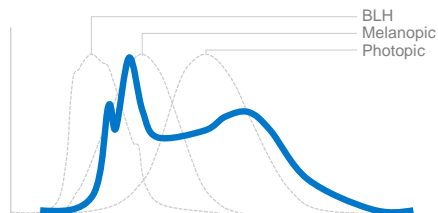
** MDEI: Melanopic Daylight Equivalent Illuminance

LM302N DAY

Controlling direct-cyan realizes well balanced energizing lighting solution

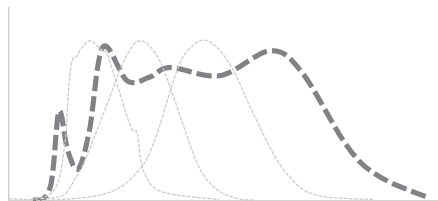
LM302N DAY

Blue Chip + Cyan Chip



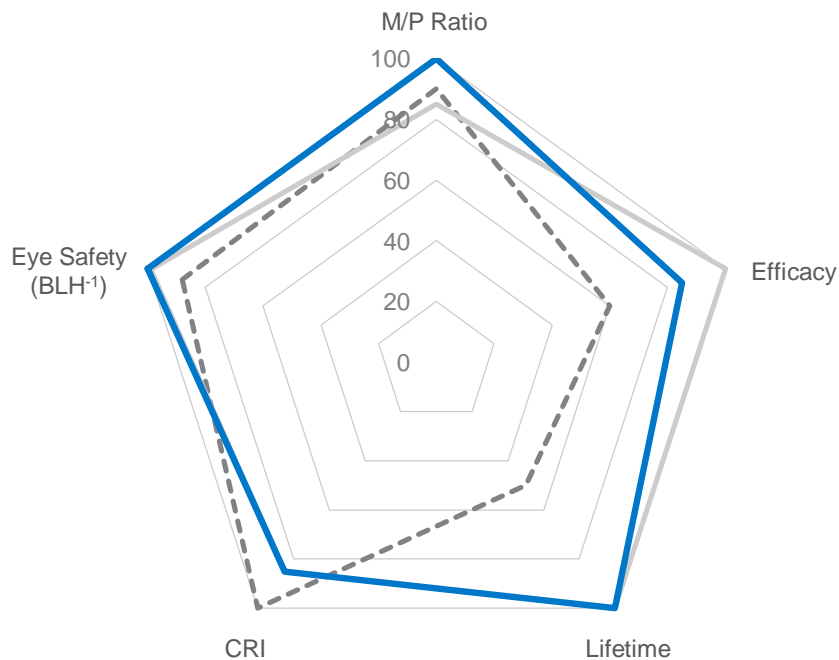
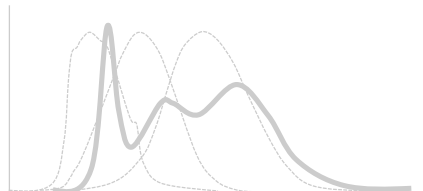
Company A

nUV Chip + Blue Phosphor



Company B

Blue Chip + Short Green Phosphor

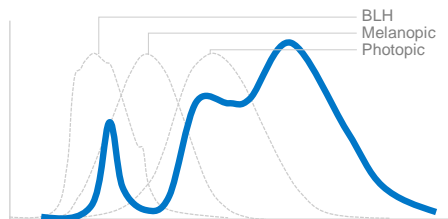


LM302N NITE

Controlling direct-cyan realizes well balanced relaxing lighting solution

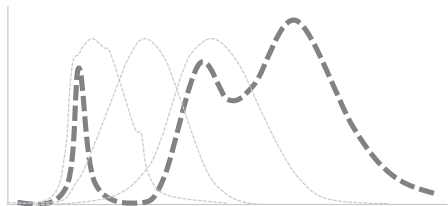
LM302N NITE

Blue Chip + Narrow Green Phosphor
(Cyan gap)



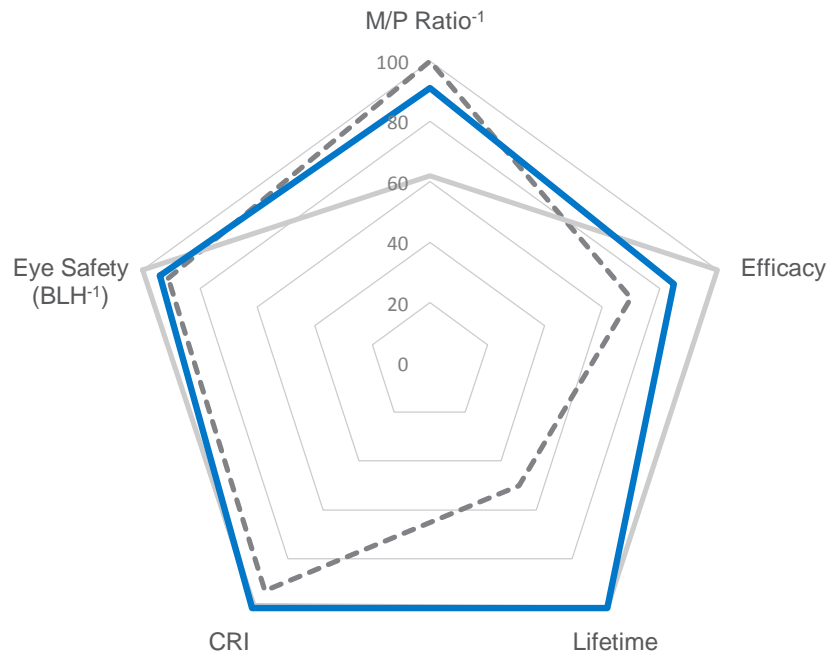
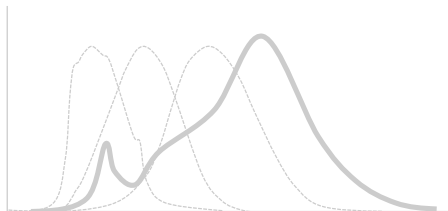
Company C

nUV Chip + Narrow Green Phosphor
(Cyan gap)



Conventional LED

Conventional Warm White



Clinical Test

Approved by IRB*

Melatonin levels measured under LM302N DAY & LM302N NITE

- Subjects: 30 individuals from 20s to 50s
- Test Period: April 2019 – February 2020
- Conditions: 3 days and 2 nights under each lighting type*
Daytime (5000K, 500 lux), Nighttime (2200K, 190 lux)

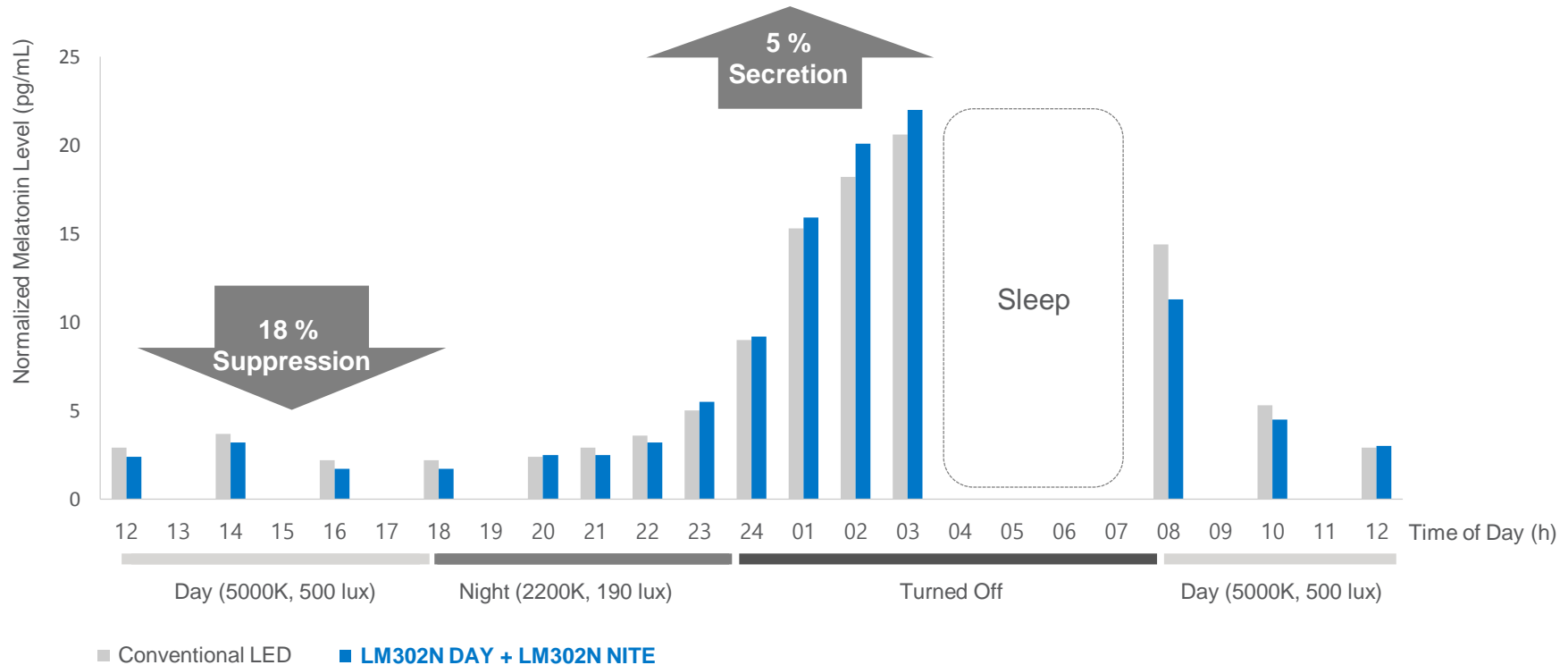
※ Performed under human-centric lighting and conventional lighting in random order



* IRB: Institutional Review Board

Clinical Test: Melatonin Level

Melatonin level was 18% lower during the day and 5% higher at night

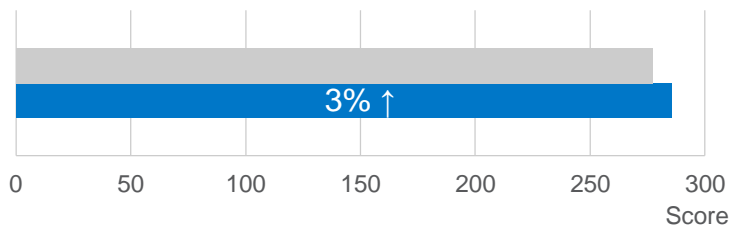


Clinical Test: Concentration & Sleep Level

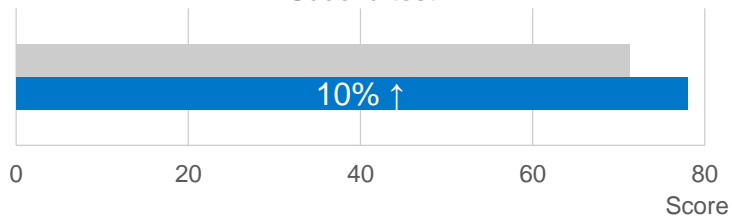
LM302N DAY

3-10% higher concentration level

d2 test



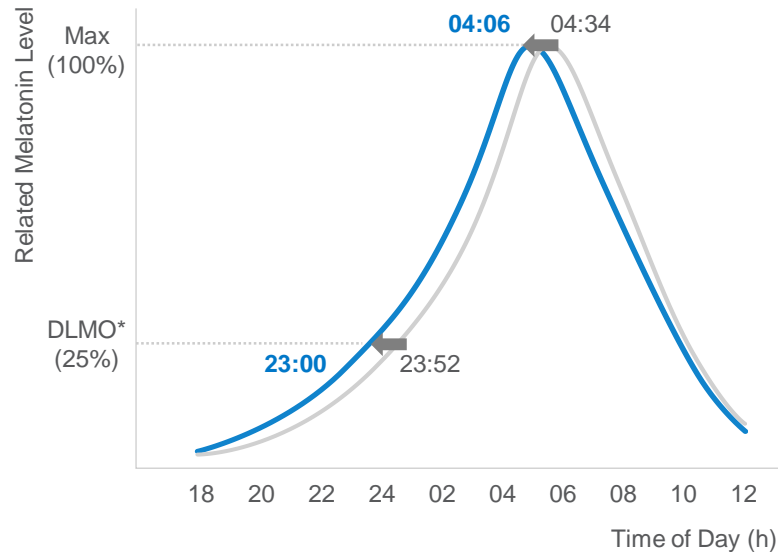
Sudoku test



■ Conventional LED ■ LM302N DAY

LM302N NITE

52-min. faster time to deep sleep



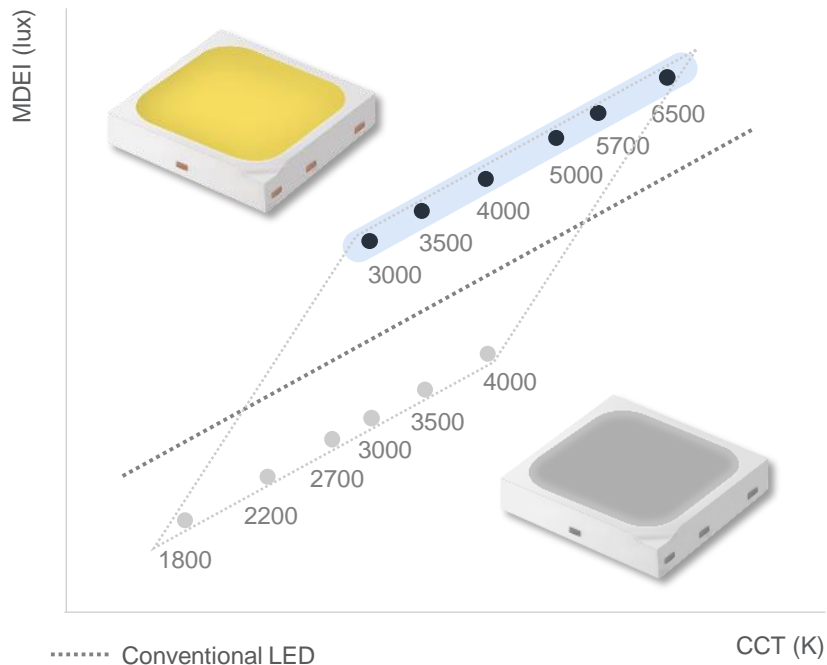
■ Conventional LED ■ LM302N NITE

* DLMO: Dim Light Melatonin Onset (25% of melatonin max.)

※ Melatonin Real Data Fitting

Applications: LM302N DAY

Maximizing energizing effects under various CCTs



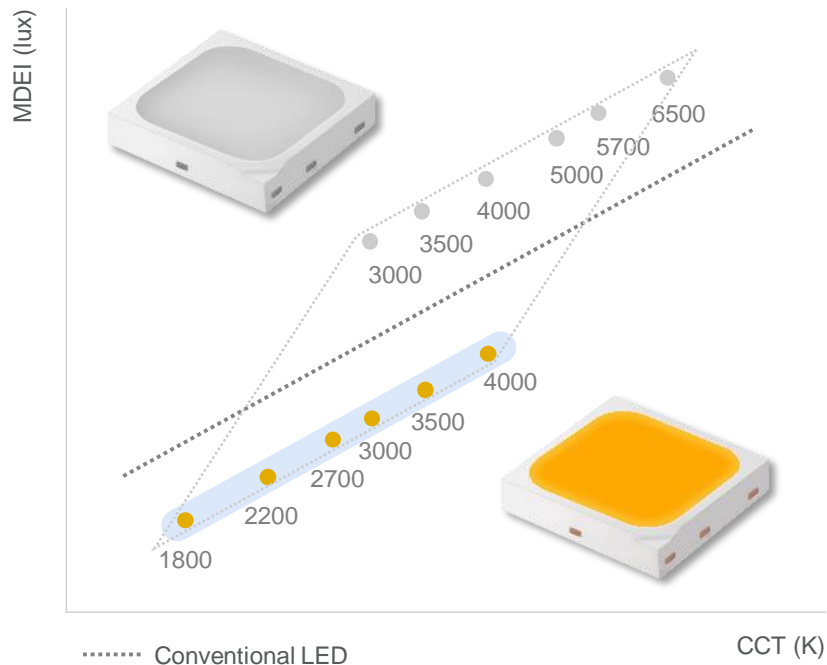
LM302N DAY 3000K – 6500K



Application: Office, School, Factory, Gym, etc.

Applications: LM302N NITE

Maximizing relaxing effects under various CCTs



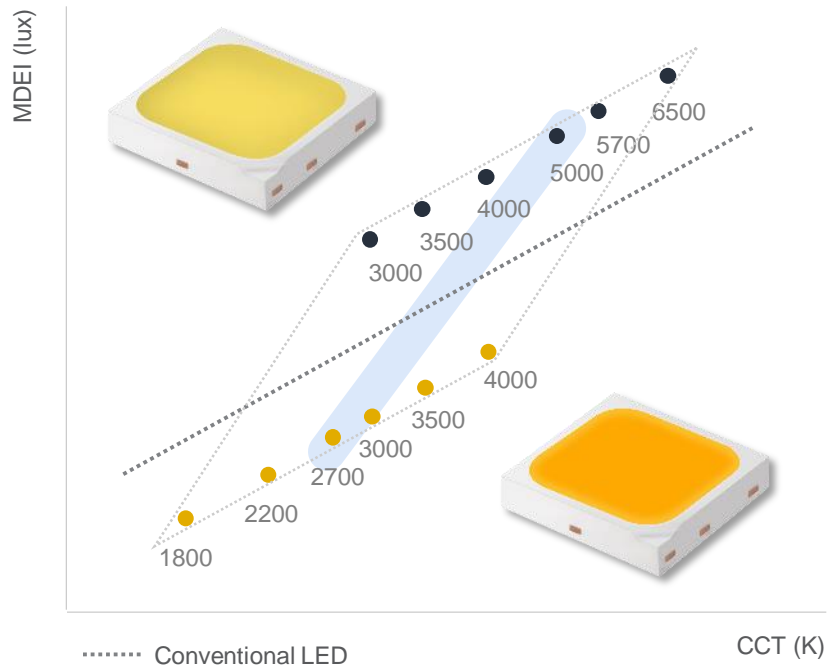
LM302N NITE 1800K – 4000K



Application: Meditation Class, Home, Accommodation, Yoga Studio, etc.

Applications: LM302N DAY & LM302N NITE

Maximizing circadian entrainment



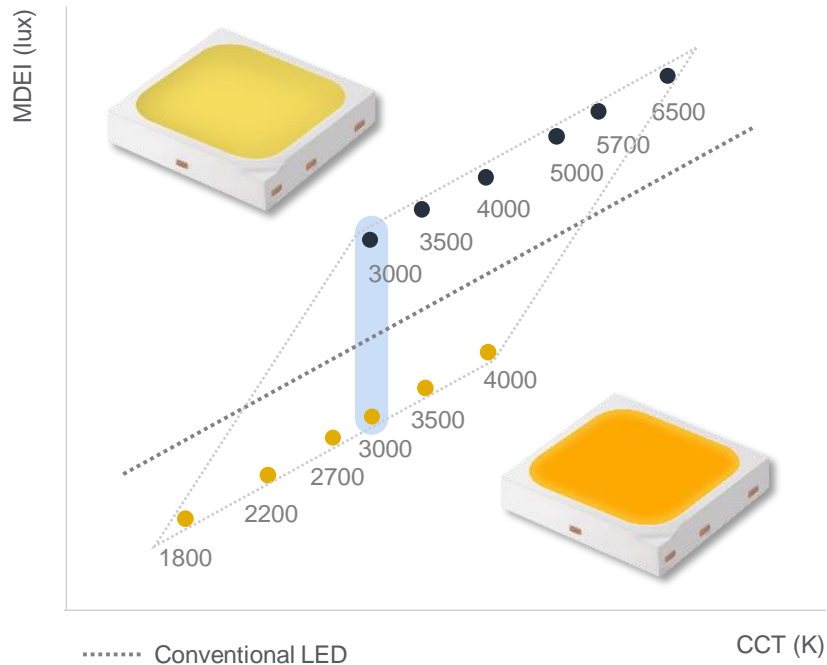
LM302N DAY (5000K) + LM302N NITE (2700K)



Application: Healthcare Institutions, Residences, etc.

Applications: LM302N DAY & LM302N NITE

Naturally optimizing circadian entrainment without any notice



LM302N DAY (3000K) + LM302N NITE (3000K)



Application: Residences, Healthcare Institutions, etc.

Thank you