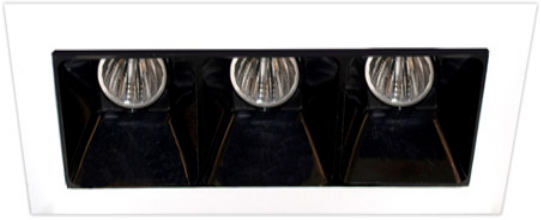
Amerlux Cubebits - https://www.amerlux.com/Products/Interior/Downlights/Cubebits



Specifiers and designers looking to make a bold, look-at-me statement with design and performance now have the recessed linear downlights form they have been looking for.

The solution: Cubebits.

The fixture's 1.5" wide profile is available in 3-cell, 6-cell, 9-cell and 12-cell units and is compatible with grid and flange ceilings for up to 1 1/2" ceiling thickness. The downlight comes standard with dimming capability with spot, flood and wide flood beam distribution options. The black and white specular finished bezel allows for quiet, comfortable yet required light output. Easy installation and comfortable light output come together without compromising superior control or performance.

Product Overview - Type: Recessed Downlight, Accent & Display; Wattage: L (low), M (medium), H (high); Lumen Output: up to 2208 lm; Color Temp: 2700K, 3000K, 3500K, 4000K; CRI: 90 CRI; Dimming: 0-10V (120-277VAC) - 1% Dim ELV (120VAC) - 5% Dim Lutron Hi-lume® H Series/EcoSystem - 1% dim with soft on, fade to black, 120-277VAC

National Energy Market Observer:

1. **Crystal IS and NEIDL Release Germicidal UV Research on Deactivating SARS-Cov-2** - Crystal IS and the Boston University (BU) National Emerging Infectious Diseases Laboratories (NEIDL) have published research relative to ultraviolet (UV) LEDs operating in the UV-C band (100–280 nm) deactivating the SARS-CoV-2 virus. The work revealed almost instantaneous deactivation at wavelengths of 270 nm or shorter and much lower efficacy for LEDs operating at 280 nm. In general, the research confirms that proper UV-C doses can deactivate the virus that causes COVID-9 in a matter of a few seconds at worst. https://www.ledsmagazine.com/

2. **Quantum Computing Meets Li-Fi by Mark Halper** - It's not entirely clear how "quantum" it really is, but one thing's for sure: This is not your father's lighting industry! The transformation continues. Lighting vendors are going all out to transform themselves into high-tech Internet and data communication players, so it seemed only a matter of time until one of the most intriguing concepts in information technology — quantum computing — worked its way onto the scene, as it did today with a Li-Fi startup. Columbia, MD-based Light Rider Inc. announced that it plans to offer a Li-Fi system next year, delivering Internet in homes and offices via lightwaves rather than via the radio frequencies of Wi-Fi. https://www.ledsmagazine.com/smart-lighting-iot/article/14184773/quantum-computing-meets-lifi

3. **DALI Lighting Awards Open for Entries** - The best use of DALI control solutions in lighting projects across the world while also recognizing the importance of producing great quality illumination. All types of commercial, architectural and industrial lighting projects linked with DALI technology can be nominated, and there are different categories for indoor and outdoor lighting. There is no entry fee, and entrants can nominate multiple projects on an individual basis or as part of a team. Entries can be submitted from any section of the supply chain (including lighting designers, electrical consultants, architects, installers and commissioning engineers among others) and there is no requirement for DALI Alliance membership to participate. https://www.digitalilluminationinterface.org/awards

4. **The Health Case Against Daylight Saving** - Daylight saving in 2020 ends November 1 and will resume March 14, 2021. The American Academy of Sleep Medicine recently issued a position statement calling for an end to daylight saving, citing health risks posed by the longstanding practice designed to reduce energy costs. It is, therefore, the position of the American Academy of Sleep Medicine that these seasonal time changes should be abolished in favor of a fixed, national, year-round standard time. Check out the complete report published in the Journal of Clinical Sleep Medicine. https://jcsm.aasm.org/doi/pdf/10.5664/jcsm.8780

5. **Submissions for the 38th Annual IALD International Lighting Design Awards are Now Open** - The IALD International Lighting Design Awards, the longest running international lighting design awards program, is the highest honor in the profession recognizing work that reaches new heights and represents excellence in aesthetic and technical achievement. Since 1983, the awards program has supported the mission and vision of IALD—raising the profile of the profession and demonstrating the visible success of lighting design. http://iald.org/IALD/media/Docs/2021-Call-for-Entries.pdf

6. **Dallas Market Center to Launch ArchLIGHT Summit in Fall 2021** - Bold new lighting show for the architectural, specification and design communities to be driven by three progressive principles and held inside the largest marketplace for lighting: the Dallas Market Center announces a new lighting trade event and educational platform for architectural, specification and design communities debuting in fall 2021. The first ArchLIGHT Summit will take place September 21-22, 2021, in the Dallas Trade Mart, already home to the permanent marketplace for the semi-annual Lightovation, the largest residential lighting show in North America. ArchLIGHT Summit will feature hundreds of commercial lighting brands plus the opportunity to explore the inspirational permanent showrooms of residential/commercial crossover brands that are part of Lightovation--thus creating the most comprehensive and convenient array of lighting resources for any type of project in the built environment. For more information, visit www.ArchLIGHTSummit.com

7. **LCA Announces New Course on Integration of Lighting Control with Building Automation** - The Lighting Controls Association (LCA) now offers EE115: Integration and Building Automation as a new course in its popular Education Express program. Today's lighting control systems work alongside and may need to communicate with many other systems such as audio/visual (A/V), mechanical air handling (HVAC), life/safety, or computer networking (ITS). When the majority of systems in a building communicate with and trigger each other, this is referred to as a building automation system (BAS), which can present intricate designs and require careful integration and coordination of design disciplines. http://lightingcontrolsassociation.org/

8. **PNNL: A Review of Existing Test Methods for Occupancy Sensors** - Toward the goal of a more accurate test method that would capture new and emerging sensor capabilities, researchers at Pacific Northwest National Laboratory (PNNL) conducted a literature review of test methods for characterizing occupancy sensor performance. The review, conducted on behalf of the U.S. Department of Energy Lighting R&D Program, summarized test conditions for indoor sensors and identified apparent test-method improvements needed to evaluate emerging technologies and products. This information will inform the development of a technology-agnostic occupancy-sensor test method that more accurately represents performance in buildings. https://www.energy.gov/sites/prod/files/2020/08/f77/ssl-cls-review-test-method-occupancy-sensor-aug2020.pdf

9. **LEDs Magazine Virtual Event September 29-30, 2020** - LEDs Magazine recently launched its first all-online event, a two-day conference on Sept. 29—30 titled "Renaissance of light quality: SSL industry swaps focus from efficiency to architecture." On Sept. 29, Day 1 of the program, a theme unfolded of bringing together the individual characteristics of light quality to build the optimum experience of light. LED and solid-state lighting (SSL) professionals and commercial end users arrived on the platform on Day 2, Sept. 30, to learn how a new generation of lighting components and controls can instill SSL systems with the ability to produce a healthier quality of light, using evidence-backed research to develop application-appropriate technology. https://www.ledsmagazine.com/

10. **LEDs Magazine's Renaissance of Light Quality Virtual Conference Sessions Now Available for On-Demand Viewing** - On September 29-30, 2020, LEDs Magazine held a virtual lighting conference. The sessions are now available for on-demand viewing https://virtual.ledsmagazine.com/

- The Inspiration that Drives the SSL Design Community
- An Understanding of the Latest Advancements in LED and OLED Sources
- How to Drive SSL Light Engines with Minimal Flicker and Maximum Uniformity
- Strategies Behind Advanced Luminaire Design and Deployment
- How Light Quality is Intertwined with Lighting for Health and Wellbeing
- How the LED and SSL Sectors can More Efficiently Move Forward with More Creativity

11. **DOE Adoption of Light-Emitting Diodes in Common Lighting Applications Report** - The latest edition of the DOE report, Adoption of Light-Emitting Diodes in Common Lighting Applications, models the current state of the U.S. general-lighting market and provides analysis on realized and potential energy- and money-saving benefits associated with LED lamps and luminaires. The new report estimates annual U.S. energy savings of 1.3 quadrillion Btu (quads) in 2018 due to LED adoption, equivalent to cost savings of $14.7 billion for consumers and about 5% of total electricity use from buildings in 2018. The theoretical potential for widespread use of the most efficient, connected LED products would amount to over 5 quads of energy savings, nearly four times greater than present energy savings and equivalent to about 20% of total building electricity use in 2018. Key findings at: https://www.energy.gov/eere/ssl/led-adoption-report

12. **DOE Announces $80 Million for Innovative Building Technologies and Practices** - Today, the U.S. Department of Energy (DOE) announced the Buildings Energy Efficiency Frontiers & Innovation Technologies (BENEFIT) 2020 Funding Opportunity Announcement (FOA). This funding opportunity will provide up to $80 million for projects that enhance energy demand flexibility across buildings and the electric power grid. Included: next generation lighting. https://www.energy.gov/eere/buildings/building-technologies-office

13. **DOE Provides $65 Million for 'Connected Communities'** - America's 125 million homes and commercial buildings currently use almost 40% of U.S. energy, 74% of its electricity, and account for the great majority of peak electricity demand. Connected communities can leverage the latest advancements in building science, like state-of-the-art sensors, controls, and analytics, to more flexibly manage and deploy grid-scale energy efficiency and distributed energy resources. With funding up to $65 million, DOE aims to expand its existing set of connected communities nationwide to demonstrate how groups of buildings, and the distributed energy resources (DERs) to which they connect, can reliably and affordably cooperate to collectively manage and optimize their energy performance—all while maintaining or even improving occupant comfort. https://www.energy.gov/eere/articles/can-connected-communities-solve-grid-challenges-scale-let-s-find-out

14. **LEDucation 2021 Call for Speakers** - LEDucation is a powerful platform to reach a wide variety of professionals in lighting and affiliated fields. Topic areas include, but not limited to, deconstructed lighting case studies; codes and compliance issues; lighting for health and well-being; design and construction tools, markets, and methodologies; the business of lighting; and emerging LED, OLED, and controls technologies. Submit your forward-thinking topic to the LEDucation Speaker Submission Portal by November 30, 2020, 11:59 pm EST.

15. **Why Wireless Lighting Controls Work for Distributors by Tom Perich, Director of Channel Marketing, Lutron Electronics** - Here are five strategies to consider when building a business in wireless lighting controls. The design-build approach to projects now accounts for nearly half of all U.S. nonresidential spending. It can help streamline schedules and reduce costs, but it can also put additional stress on contractors who are already dealing with ongoing labor shortages, an aging workforce and now a pandemic-altered construction environment. With wireless lighting control, distributors can simplify lighting installations for customers, secure repeat business and create customers for life. Check out the five ways to ensure your company will be your customers' go-to source for wireless lighting control. https://www.ewweb.com/green-market/lighting/article/21143477/why-wireless-lighting-controls-work-for-distributors

16. **Characterization and Analysis of the Energy-Reporting Accuracy of Connected Devices** - Advanced building systems such as connected lighting increasingly have greater functionality and energy-dependent operating modes. This increased functionality makes energy consumption estimates more complex because energy performance is dependent on what operating modes are used and how much time is spent in each mode. Devices and systems that can report their own energy consumption mitigate this uncertainty. The study, conducted by Pacific Northwest National Laboratory at its Connected Lighting Test Bed, was intended to generate awareness of building systems capable of reporting their own energy consumption and further interest in the value of energy data for a variety of uses. The results draw attention to how the accuracy of reported metrics can be characterized and quantify the performance variation found in market-available products. https://www.energy.gov/sites/prod/files/2020/08/f77/ssl-cls-energy-reporting-accuracy-connected-devices-jun2020.pdf

17. **Acuity Brands Teams up with Violet Defense and PURO Lighting to Expand UV Disinfection Product Portfolio** - These strategic agreements will give Acuity Brands access to Violet Defense's patented UV technology to expand its portfolio of UV disinfection products. PURO and Acuity Brands will also work together on the development of a next generation of UV lighting products. The products deliver high intensity full spectrum ultraviolet light, using a pulsed xenon lamp and UV transmissive lens, in unoccupied spaces, to quickly kill bacteria and inactivate viruses. Independent clinical testing has confirmed that pulsed xenon products can substantially reduce the pathogenic bioburden. The compact size of the UV disinfection products from both companies make them unobtrusive when installed in a ceiling and easier to implement than many traditional UV solutions. https://www.ledinside.com/news/2020/10/acuity_brand_uv

18. **The DALI Alliance (Diia) Is Now Offering D4i Certification of DALI-Based Control Devices** - Eligible devices include light-level or occupancy sensors, as well as control nodes that can communicate wirelessly with external networks. D4i is the DALI standard for intelligent, IoT-ready luminaires. By taking care of control and power requirements, D4i makes it much easier to mount sensors and communication devices on luminaires. In addition, intelligent D4i LED drivers inside the luminaire have the capability to store and report a wide range of luminaire, energy and diagnostics data in a standardized format. Smart D4i luminaires are ideal platforms for the IoT, capable of gathering information from on-board D4i sensors, and providing data for performance monitoring, asset management, predictive maintenance and many other tasks. Communication and data exchange with an external network can take place via a D4i control device with wireless communication capabilities. https://www.dali-alliance.org/specifications/download.html

19. **New Study Shows Need for LED Lighting in Senior Centers** - The facility in California installed LED lighting that would change color and intensity throughout the day. The tuned lighting was used in corridors during the day, and dimmed at night. The four month study monitored 63 residents with an average age of 88.3 years old. 71% of the people in the study were women. While nursing homes are turning to LED lighting as a cost savings measure, the study suggests LED lighting will also improve the health of residents. Residents exposed to fluorescent lighting woke up on an average of 3.6 times overnight, while those exposed to the LED lighting had 1.8 sleep disturbances a night. http://lightedmag.com/new-study-shows-need-for-led-lighting-in-senior-centers/

20. **Cree, Inc. to Sell LED Business to SMART Global Holdings, Inc. for up to $300 Million** - Under the terms of the agreement, which has been approved by the Company's board of directors, Cree expects to receive an initial cash payment of $50 million upon closing and $125 million to be paid upon maturity of a seller note issued by SMART to Cree due August 2023. Cree also has the potential to receive an earn-out payment of up to $125 million based on the revenue and gross profit performance of Cree LED in the first full four quarters post-transaction close, also payable in the form of a three-year seller note. https://www.cree.com/news-events/news/article/smart-global-holdings-to-acquire-cree-led-business

21. **Employ the TM-30 Method to Find the Right Light by Craig DiLouie** - From ensuring that merchandise looks vibrant in a retail store to including proper flesh tones in an office space, color quality is a key specification characteristic for light sources. TM-30 has three main outputs. The first is fidelity index (Rf), which is similar to CRI but averages 99 color samples and is limited to a 0–100 scale; it's considered more accurate than CRI. Gamut index (Rg) expresses average color saturation. This addresses situations where you might have two light sources with the same CRI/Rf, but one accentuates reds while the other mutes them. An Rg greater than 100 shows an average increase in color saturation, while less than 100 shows a decrease. The third output is particularly useful: color vector and distortion graphics that get past averages to visually reveal exactly which colors are saturated and muted. https://www.ecmag.com/section/lighting/show-your-true-colors-employ-tm-30-method-find-right-light

22. **NEEA and DLC Release New Study Results on Network Lighting Controls** - The Northwest Energy Efficiency Alliance (NEEA) and the DesignLights Consortium (DLC) recently released the results of a study that strengthens the case for expanding use of networked lighting controls (NLCs) to significantly drive energy savings in the commercial and industrial sector. The report found that energy savings enjoyed by adding NLCs to LED lighting projects approach 70% for some building types, with savings across various categories of buildings averaging 49%. Prepared for the DLC and NEEA by Energy Solutions, "Energy Savings from Networked Lighting Control Systems with and without LLLC" details the results of a one-year study. For more information, visit the DLC website to download the full study.

23. **NAED Cancels Both Western & Eastern Conferences in 2021** - The Western Region Conference scheduled for January 18 - 20 and the Eastern/South Central Region Conference scheduled for February 22 - 24. NAED is refocusing its efforts to bring members a virtual conference the week of February 22, 2021. This will be an opportunity for industry leaders and professionals from all regions to gain access to world class speakers, education, appointments, and strategic solutions in the industry. More details on the week-long event will be released in mid-November. https://www.naed.org/events

24. **ArchLIGHT Summit Exhibitor Registration Opens** - Dallas Market Center announces that exhibitor registration is now open for ArchLIGHT Summit, a new lighting trade event and educational platform for architectural, specification and design communities. The first ArchLIGHT Summit will take place September 21-22, 2021 on the first floor of the Dallas Trade Mart building. For exhibitors, the show will present the unique opportunity to reach the architectural, specification and design communities seeking commercial lighting brands that represent the leading edge of innovation and technology. For attendees, ArchLIGHT Summit will feature hundreds of commercial lighting brands plus the opportunity to explore permanent showrooms of residential/commercial crossover brands already located inside the marketplace. Early-bird booth rates are available at: https://www.archlightsummit.com/exhibit/

25. **Energy Efficiency as a Service is Catching On by Rick Laezman** - One of those innovative financing mechanisms, energy efficiency as a service (EEaaS), is helping building owners invest in new technology to reduce energy use. Typically, a building owner enters into an agreement with a provider that pays for energy efficiency retrofits to the building. The building owner does not pay any upfront costs for the improvements. Instead, payments are made in installments over a defined period of time. Payments are covered by the savings in energy costs realized from the improvements. While the concept is not new, it is increasing in popularity and use as the energy efficiency field continues to grow. https://www.ecmag.com/section/green-building/energy-efficiency-service-catching

Global Energy Market Observer:

26. **Theatre Installs UV-C Lights to Tackle Coronavirus** - The Royal Theatre, a Madrid icon which recently reopened its doors to the public, says the lights provide an extra layer of protection for its artists, employees and spectators. It says UV-C is a 'tried and tested' solution and a complement to traditional cleaning. It 'will ensures 99.9 per cent' virus inactivation. Protection measures for the UV-C light include delayed start to allow the evacuation of the area to be disinfected; remote control; motion sensor that switches off the device when it detects movement of a person or animal; drop sensor (in mobile units); red or green indicator lights, as well as an audio warning signal. The Teatro Real Project collaborated with lighting controls integrator Stonex which advised on the best ways to disinfect the different areas within the theatre. The installation incorporates four GoldenSea UV UVL150 units within the stage and auditorium areas, and two of the mobile GSUV UVM216 unit for backstage and rehearsal rooms. https://www.luxreview.com/2020/10/16/theatre-installs-uv-c-lights-to-tackle-coronavirus/

27. **UV-C Accidents Highlight Need for Caution** - A series of accidents involving UV-C lighting has raised concerns in the industry and highlighted the need to proceed with caution, say observers. The incidents in Asia saw schoolchildren and journalists exposed to potentially harmful UV-C irradiation. In a primary school in Yhang, China, 130 students were exposed to UV-C disinfection lamp for five hours and many suffered burns to their eyes and skin. The cause of the mishap was human error: the onsite electrician mistakenly turned on the lamps in three classrooms following a power failure. In the Philippines last week, a UV-C robot named Keno mingled with members of the media while energised, resulting in a number of journalists requiring medical treatment. https://www.luxreview.com/2020/10/01/uv-c-accidents-highlight-need-for-caution/

28. **St Pancras Deploys UV-C Robots to Reassure Rail Passengers** - ST PANCRAS International in London has become the first train station in the world to deploy UV-C lighting robots in the fight against coronavirus. It says the cleaning robots will help eradicate viruses throughout the station's concourse and facilities and reassure rail passengers that the facility is safe to use. The ultraviolet robot, from Danish manufacturer UVD Robots, was originally initially designed to significantly reduce the risk of hospital acquired infections. Now it will be doing the rounds throughout one of the UK's busiest railway station, in conjunction with an ultrasonic disinfection atomiser cleaning robot, known as an Eco Bot 50. The robot's lamps can kill 99 per cent of viruses and bacteria including Covid-19 on all surfaces and in the air surrounding it in a matter of minutes. VIDEO: https://www.youtube.com/watch?time_continue=9&v=_F25APDo4ww&feature=emb_logo

29. **Siemens and Macquarie Announce Joint Venture** - The joint venture that offers comprehensive onsite Energy-as-a-Service (EaaS) solutions at no up-front cost for its customers, which include corporate and industrial clients, as well as municipalities, universities, schools and hospitals. Calibrant Energy offers a unique combination of technical, operating, and risk management expertise that enables customers to access the benefits of on-site energy systems with a new level of simplicity. Using an EaaS model, Calibrant will build onsite energy solutions that seek to deliver immediate cost savings, cost certainty, resilience and low-cost energy grid augmentation. Calibrant's technologies will include solar, integrated solar-battery solutions, hybrid systems, standalone batteries, microgrids, combined heat and power, and centralized heating and cooling infrastructure upgrades. https://tedmag.com/siemens-and-macquarie-announce-joint-venture/

30. **Frost & Sullivan 2020 Annual Update of Global LED Lighting Market** - Lighting is moving beyond its traditional purpose of illumination and adding value on tangible aspects of sustainability irrespective of the market. The global LED lighting market is a highly competitive market, driven by the demand for energy efficient lighting, reduced prices and increasing awareness on the potential health benefits to human beings. The global LED lighting market is estimated to be $67,714.7 million in 2019, an increase of 3.2% from 2018. The revenue forecast includes the impact of COVID-19 on the LED lighting market and its effect on growth rate. The market is heading towards consolidation - over the last two years, major players have either sold part of their lighting business or have been wholly acquired by another company. https://go.frost.com/NA_PR_EE_JBrinkley_MEFA_LEDLighting_Sep20

31. **Lighting Design Awards Postponed Until May 2021** - The Lighting Design Awards – which celebrates the cream of international projects and innovations and was scheduled for 19 November – will now take place on Thursday 13 May at the Troxy in east London. The shortlist for this year's Lighting Design Awards, now in its 45th year, includes projects from over 40 countries. The organizers will announce a number of special categories to recognize 'exceptional work undertaken during this difficult year. https://www.luxreview.com

32. **Zhaga's Book 18 Plans to Add ANSI's C136.41 Dimming Receptacle** - Zhaga is planning a 3rd edition of the popular Book 18 specification for outdoor luminaires that will allow for architectures combining an ANSI C136.41 dimming receptacle with a Zhaga receptacle. Book 18 Ed. 3.0 will enable Zhaga-D4i certification of hybrid luminaires as well as control devices with an ANSI interface in addition to the certifications already offered by Book 18 Ed. 2.0. http://lightingcontrolsassociation.org/

Monthly Feature:

TrendForce Announces Top 10 Tech Industry Trends for 2021 - In this release, TrendForce provides its forecast of 10 key trends in the tech industry for 2021. https://www.ledinside.com/node/view/31677

1. **As the DRAM industry officially enters the EUV era, NAND Flash stacking technology advances past 150L** - The three major DRAM suppliers Samsung, SK Hynix, and Micron will not only continue their transition towards the 1Znm and 1alpha nm process technologies, but also formally introduce the EUV era, with Samsung leading the charge, in 2021. DRAM suppliers will gradually replace their existing double patterning technologies in order to optimize their cost structure and manufacturing efficiency.

2. **Mobile network operators will step up their 5G base station build-out while Japan/Korea look ahead to 6G** - The 5G Implementation Guidelines: SA Option 2, released by the GSMA in June 2020, delves into great technical details regarding 5G deployment, both for mobile network operators and from a global perspective. Operators are expected to implement 5G standalone architectures (SA) on a large scale in 2021.

3. **Internet of Things evolves into Intelligence of Things as AI-enabled devices move closer to autonomy** - In 2021, deep AI integration will be the primary value added to IoT, whose definition will evolve from Internet of Things to Intelligence of Things. Innovations in tools such as deep learning and computer vision will bring about a total upgrade for IoT software and hardware applications. Taking into account industry dynamics, economic stimulus, and remote access demand, IoT is expected to see large-scale adoption across certain major verticals, namely, smart manufacturing and smart healthcare.

4. **Integration between AR glasses and smartphones will kick-start a wave of cross-platform applications** - AR glasses will move towards a smartphone-connected design in 2021 in which the smartphone serves as the computing platform for the glasses. This design allows for significant reduction in cost and weight for AR glasses.

5. **A crucial part of autonomous driving, driver monitoring systems (DMS) will skyrocket in popularity** - Automotive safety technology has evolved from an application for car exteriors to one for car interiors, while sensing technology is moving towards a future where it integrates driver status monitoring with external environmental readings. Similarly, automotive AI integration is evolving past its existing entertainment and user assistance functions, into an indispensable enabler of automotive safety.

6. **Foldable displays will see adoption in more devices as a means of upping screen real estate** - As foldable phones progressed from concept to product in 2019, certain smartphone brands successively released their own foldable phones to test the waters. Although these phones' sell-through performances have so far been mediocre owing to their relatively high costs – and, by extension, retail prices – they are still able to generate much buzz in the mature and saturated smartphone market.

7. **Mini LED and QD-OLED will become viable alternatives to white OLED** - Competition between display technologies is expected to heat up in the high-end TV market in 2021. In particular, Mini LED backlighting enables LCD TVs to have finer control over their backlight zones and therefore deeper display contrast compared with current mainstream TVs. Spearheaded by market leader Samsung, LCD TVs with Mini LED backlighting are competitive with their white OLED counterparts while offering similar specs and performances. Furthermore, given their superior cost-effectiveness, Mini LED is expected to emerge as a strong alternative to white OLED as a display technology.

8. **Advanced packaging will go full steam ahead in HPC and AiP** - The development of advanced packaging technology has not slowed down this year despite the impact of the COVID-19 pandemic. As various manufacturers release HPC chips and AiP (antenna in package) modules, semiconductor companies such as TSMC, Intel, ASE, and Amkor are eager to participate in the burgeoning advanced packaging industry as well. With regards to HPC chip packaging, due to these chips' increased demand on I/O lead density, the demand on interposers, which are used in chip packaging, has increased correspondingly as well.