



Smart speakers are becoming a common fixture in households as consumers continue to adopt smart home solutions. With on-demand virtual assistants and quality audio performance, incorporating display functionality is a logical next step for these “out all of the time” devices.

The first generation of smart displays incorporate relatively small 7-10” screens. Bigger screens, for example 15-40”, would be helpful for viewing from farther distances. However, larger flat panel displays would lead to larger smart displays that may grow too big for areas with limited space, like a kitchen counter top or a side table, or too bulky to be aesthetically pleasing. A solution to this problem is pico projection – it can enable large, on-demand displays from small devices.

TI DLP® Pico technology enables small, high-performance, low-power projection smart display solutions. A DLP Pico digital micromirror device (DMD), with up to millions of micromirrors, creates the image in sync with color-sequential illumination. A DLP controller on a nearby PCB accepts incoming video via a MIPI DSI or parallel RGB interface from a processor.

Features and Benefits

- High image quality
 - High contrast and wide color gamut enable vibrant images
 - Film-like image: high fill factor (>90%)
 - Resolution options from nHD (640 x 360) to 4K
- Flexibility and scalability
 - Short and ultra-short throw optics enable a large image from a short distance
 - Virtually, any surface can become a display
 - Compact optical engines can be integrated without compromising product size and aesthetics
- High optical efficiency
 - Low-power, high-brightness displays
 - Minimal thermal management required, including fan-free designs with high performance

Recommended Chipsets for Smart Displays

For the smallest display systems, DLP Pico chipsets that include a 0.2”-class micromirror array diagonal are recommended. These solutions enable extremely compact optical systems and the lowest possible power consumption, while 0.3” chipsets offer higher brightness.



Class	DMD	Resolution	Controller
0.2”	DLP2000	640x360	DLPC2607
	DLP2010	854x480	DLPC3430/3435
	DLP230GP	960x540	DLPC3432
	DLP230KP	1280x720	DLPC3434
	DLP230NP	1920x1080	DLPC3436
0.3”	DLP3010	1280x720	DLPC3433/3438
	DLP3310	1920x1080	DLPC3437



Create a vivid, high brightness 20-40” diagonal image with a .2”-class, 50-cc optical engine.

Additional Technical Resources

- [DLP® Pico™ technology for smart speaker displays](#) whitepaper
- [TI DLP® Display Brightness Requirements and Trade-offs](#) video
- [Optical reference design for .23” digital micromirror device \(DMD\)](#) video
- [Smart Speaker projection techniques](#) video
- [Creating a smart speaker projector with natural convection cooling](#) video

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3 Regulatory Notices:

3.1 United States

3.1.1 Notice applicable to EVMs not FCC-Approved:

FCC NOTICE: This kit is designed to allow product developers to evaluate electronic components, circuitry, or software associated with the kit to determine whether to incorporate such items in a finished product and software developers to write software applications for use with the end product. This kit is not a finished product and when assembled may not be resold or otherwise marketed unless all required FCC equipment authorizations are first obtained. Operation is subject to the condition that this product not cause harmful interference to licensed radio stations and that this product accept harmful interference. Unless the assembled kit is designed to operate under part 15, part 18 or part 95 of this chapter, the operator of the kit must operate under the authority of an FCC license holder or must secure an experimental authorization under part 5 of this chapter.

3.1.2 For EVMs annotated as FCC – FEDERAL COMMUNICATIONS COMMISSION Part 15 Compliant:

CAUTION

This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

FCC Interference Statement for Class A EVM devices

NOTE: This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

FCC Interference Statement for Class B EVM devices

NOTE: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

3.2 Canada

3.2.1 For EVMs issued with an Industry Canada Certificate of Conformance to RSS-210 or RSS-247

Concerning EVMs Including Radio Transmitters:

This device complies with Industry Canada license-exempt RSSs. Operation is subject to the following two conditions:

(1) this device may not cause interference, and (2) this device must accept any interference, including interference that may cause undesired operation of the device.

Concernant les EVMs avec appareils radio:

Le présent appareil est conforme aux CNR d'Industrie Canada applicables aux appareils radio exempts de licence. L'exploitation est autorisée aux deux conditions suivantes: (1) l'appareil ne doit pas produire de brouillage, et (2) l'utilisateur de l'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.

Concerning EVMs Including Detachable Antennas:

Under Industry Canada regulations, this radio transmitter may only operate using an antenna of a type and maximum (or lesser) gain approved for the transmitter by Industry Canada. To reduce potential radio interference to other users, the antenna type and its gain should be so chosen that the equivalent isotropically radiated power (e.i.r.p.) is not more than that necessary for successful communication. This radio transmitter has been approved by Industry Canada to operate with the antenna types listed in the user guide with the maximum permissible gain and required antenna impedance for each antenna type indicated. Antenna types not included in this list, having a gain greater than the maximum gain indicated for that type, are strictly prohibited for use with this device.

Concernant les EVMs avec antennes détachables

Conformément à la réglementation d'Industrie Canada, le présent émetteur radio peut fonctionner avec une antenne d'un type et d'un gain maximal (ou inférieur) approuvé pour l'émetteur par Industrie Canada. Dans le but de réduire les risques de brouillage radioélectrique à l'intention des autres utilisateurs, il faut choisir le type d'antenne et son gain de sorte que la puissance isotrope rayonnée équivalente (p.i.r.e.) ne dépasse pas l'intensité nécessaire à l'établissement d'une communication satisfaisante. Le présent émetteur radio a été approuvé par Industrie Canada pour fonctionner avec les types d'antenne énumérés dans le manuel d'usage et ayant un gain admissible maximal et l'impédance requise pour chaque type d'antenne. Les types d'antenne non inclus dans cette liste, ou dont le gain est supérieur au gain maximal indiqué, sont strictement interdits pour l'exploitation de l'émetteur.

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http://www.tij.co.jp/lstds/ti_ja/general/eStore/notice_01.page

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2. Use EVMs only after User obtains the license of Test Radio Station as provided in Radio Law of Japan with respect to EVMs, or
3. Use of EVMs only after User obtains the Technical Regulations Conformity Certification as provided in Radio Law of Japan with respect to EVMs. Also, do not transfer EVMs, unless User gives the same notice above to the transferee. Please note that if User does not follow the instructions above, User will be subject to penalties of Radio Law of Japan.

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