CXD2811GG TV Broadcast Demodulator IC Supports the Japanese-Market Analog, Terrestrial Digital, and Digital Satellite Broadcast Standards in a Single Chip

In addition to demodulation of the broadcast satellite and terrestrial digital broadcasts used in the Japanese market, the CXD2811GG also provides both video detection and audio multiplex decoding, as well as ghost reduction, for Japanese analog terrestrial broadcasts. It additionally provides waveform adjustment functions for composite video signals and can easily implement the picture quality adjustments required to match the characteristics of LCD panels or other displays.
An ultraminiature, thin-form tuner can be implemented using a chip set consisting of the CXD2811GG, the CXA3746ER (terrestrial broadcast silicon tuner), and the CXA3775ER (BS/CS silicon tuner).

- Excellent multipath performance
- Fast synchronization acquisition
- Built-in video detection and audio multiplex decoding for analog broadcasts
- Ghost reduction circuit
- Control functions for Sony silicon tuner ICs

Improved Reception Performance for Terrestrial Digital Broadcasts

As terrestrial digital broadcasting expands to cover all of Japan, and broadcast repeater facilities are installed to handle areas with difficult reception, resistance to multipath interference will become an even more serious issue for TV sets.
A year after Sony developed the first terrestrial digital (ISDB-T) demodulation IC, the CXD2807GG, while we had been confident about the multipath characteristics, we refined the transmission path inference algorithm and improved the multipath characteristics both inside and outside the guard interval even further in the CXD2811GG, which we are introducing here. Furthermore, we improved the required C/N for the AWGN (additive white gaussian noise) to improve the weak field reception characteristics.

High-Speed Synchronization Acquisition for Terrestrial Digital

Some amount of time is required for the image to appear when switching channels during terrestrial digital broadcast reception. In the CXD2811GG, we aimed to speed up synchronization acquisition when switching channels and achieved a time of merely 300 ms from the channel switching command until the transport stream is output. This contributes to a smooth response when switching channels.

Digital Signal Processing for Analog Broadcasts

Video signal detection and audio multiplex decoding ICs that use analog signal processing are used in conventional TV sets, and both adjustments to match characteristics and adjustments to handle temperature variations are required. In the CXD2811GG, digital signal processing is used for both video signal detection and audio processing. This means that there are no temperature variations and no sample-to-sample IC variations and as a result no characteristics adjustments are required.

Forms an Optical Chipset with Sony Silicon Tuner ICs

While it goes without saying that the CXD2811GG supports a normal IF (intermediate frequency: 58 MHz), which is the output of a conventional can tuner, it also supports low IF (4 MHz), which is the output from Sony silicon tuner ICs such as the CXA3746ER. Also, the CXD2811GG includes software that optimizes high-frequency reception performance and the AGC required by the CXA3746ER. Since simple commands from the TV set microcomputer suffice, the application software verification period can be reduced.

* The CXA3746ER and CXA3775ER are also introduced in this issue of CX-NEWS in articles that are available on this web site.

V O I C E

During this development effort, at the same time as hoping that these TV silicon tuner and digital signal processing analog TV reception products could change the way TV sets are made, we also found it an extremely challenging project. We are very pleased that, thanks to the cooperation of many people, we were able to complete this development effort.

Photograph 1 Example of Mounting in a Miniature Module

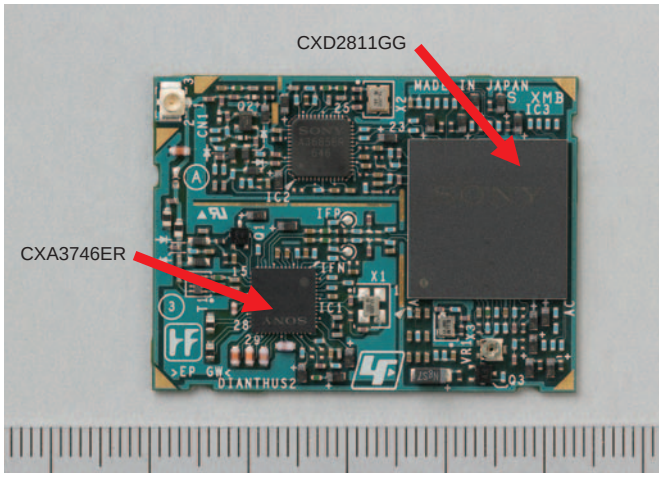

Table 1 Terrestrial Analog Reception Characteristics

Video detection characteristics	Video S/N	60 dB
	Frequency characteristics	0-4.2 MHz ± 0.5 dB
	Group delay	0-4.2 MHz ± 50 ns
Audio detection characteristics	Audio S/N	60 dB
	Frequency characteristics	50-15 kHz ± 3.0 dB
	Distortion	0.1%
Picture quality adjustment equalizer	Frequency characteristics correction	0-4.2 MHz ± 6.0 dB
	Group delay adjustment	0-4.2 MHz ± 200 ns

Figure 1 Terrestrial Digital Reception – Required C/N

Level = –60 dBm, CH = J27

C/N - BER Characteristics (AWGN)

ISDB-T MODE3, 64QAM, GI = 1/8 MHz, Rate = 7/8, Time interleave length = 200 ms

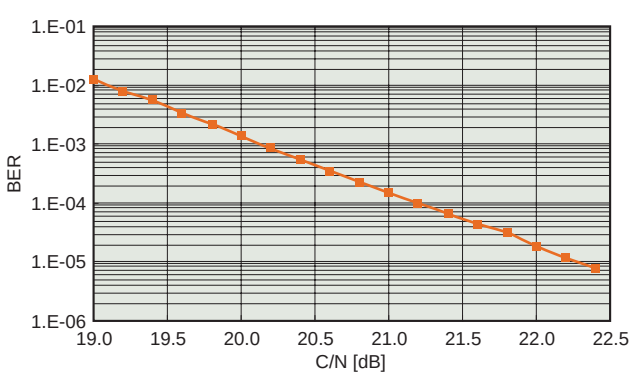

Figure 2 Broadcast Satellite Digital Reception – Required C/N

Level = –45 dBm, CH = BS15

C/N - BER Characteristics (AWGN)

ITSB-S, TC8PSK, QPSK 3/4, QPSK 1/2, 48slot

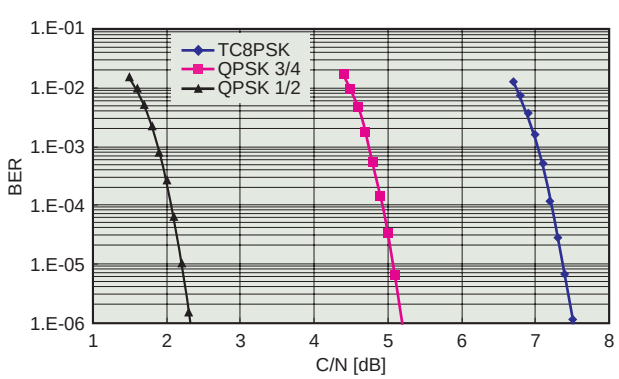

Figure 3 Block Diagram