

# CXD2816R

## DVB-S2/S Standard Digital Satellite Broadcast Demodulator IC Achieves the Industry's Top level of Performance and Low Power Consumption



The newly-developed Sony CXD2816R is a demodulator IC that supports broadcast services conforming to the DVB-S (Digital Video Broadcasting – Satellite ETSI EN 300 421) European digital satellite broadcast standard and the follow-on DVB-S2 (ETSI EN 302 307).

The CXD2816R can control peripheral devices that conform to the DiSEqC (pronounced “die-sec”) standard (Digital Satellite Equipment Control) and supports a wide range of applications.

- Superb multipath performance
- Built-in IQ imbalance correction circuit
- Phase noise canceller
- Capable of controlling DiSEqC 2.x compliant devices
- Achieves high-speed sync acquisition
- Low power consumption  
DVB-S2 reception: 380 mW (Typ.)  
DVB-S reception: 220 mW (Typ.)

### Superb Multipath Performance

In satellite broadcast reception, in environments, such as apartment complexes, where signal lines are long and the wiring complicated, reflected waves occur almost everywhere and thus many diverse multipath environment exist.

The CXD2816R achieves the industry's top level of equalization performance and can hold problems to a minimum in communal reception environments. Figure 2 shows examples of multipath and figure 3 shows the CXD2816R's resistance to multipath.

### Built-in IQ Imbalance Correction Circuit

An IQ imbalance can result in incompleteness in the 90° phase shifter used by the RF IC quadrature demodulator and differences in the path lengths between the I and Q channels. This IC includes an IQ imbalance correction

circuit and can automatically correct phase and amplitude errors in RF IC I and Q channels. This can also support substrate pattern optimization to minimize the board area required for RF IC connection.

### Phase Noise Canceller

Phase noise increases during rain and due to performance degradation over time of the parabolic antenna used and can have severe adverse influences on reception performance. In particular, antenna degradation over time is the most common cause of problems in satellite broadcast reception.

This IC adopts a newly-developed architecture and improves the robustness of performance in environments with phase noise. Figure 4 shows an example of phase noise and this IC's resistance to that noise.

### Capable of Controlling DiSEqC 2.x Compliant Devices

DiSEqC is a widely adopted protocol for controlling parabolic antennas, switches, and other devices connected to the digital satellite broadcast set top box by coaxial cable.

The CXD2816R can control devices that conform to this standard.

### Achieves High-Speed Sync Acquisition for the DVB-S Standard

In this development effort, we aimed at increasing the speed of sync acquisition for DVB-S, which is a lower symbol rate broadcast standard.

Although 80 ms was required for sync acquisition in previous devices, we were able to achieve a high-speed sync acquisition time

of just 16 ms by adopting new algorithms. Also, by handling broadcast waveforms that have a large frequency offset, this device achieves stable, high-speed sync acquisition even in degraded signal environments. This contributes to rapid channel switching in TV sets.

### Low Power Consumption

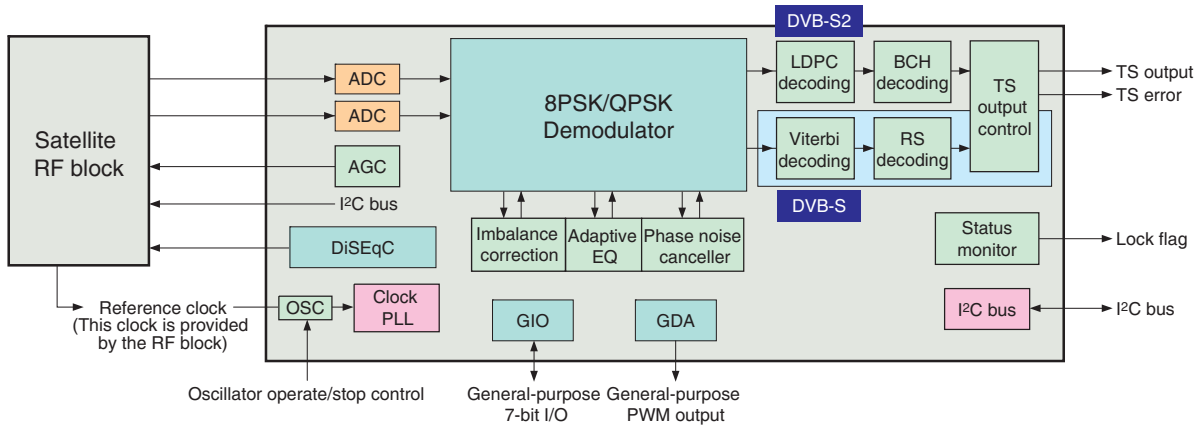
For the DVB-S2 standard, we reduced the amount of RAM and control the operating timing according to the noise conditions in the circuits in the LDPC decoding block, efforts that required extremely high-level design technologies. As a result, we achieved smaller circuits and lower power consumption.

This IC achieves the low power consumption of 380 mW (typ.) during DVB-S2 reception and 220 mW (typ.) during DVB-S reception. This means that end product thermal design is easier, a heat sync is no longer required, and the device is appropriate for on-board designs. It is provided in an 80-pin LQFP package with a size of 12 × 12 mm.

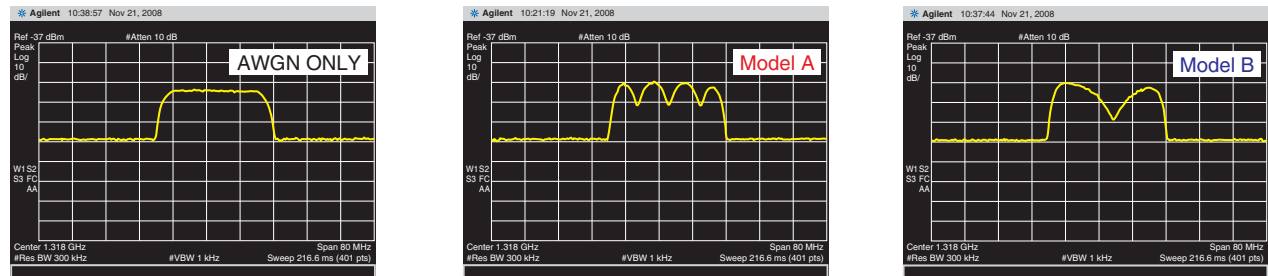
### V O I C E

We revised the design of the phase noise canceller so that it would always achieve optimal reception performance with fewer register settings, assuming the wide range of signal reception environments and antennas that exist in today's world. Also, even during reception, this device is always searching for a variety of control parameters and continually updating them so that the control parameter settings are always optimal. Thus this is an IC that strives for ease of use in this aspect as well. We strongly recommend that you consider this device.

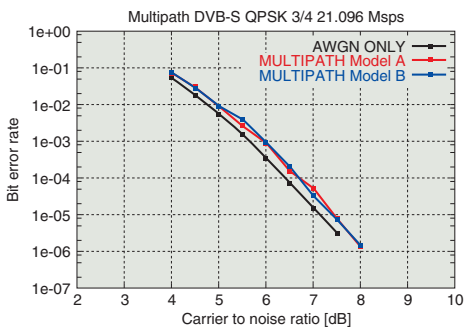
**Figure 1** Block Diagram



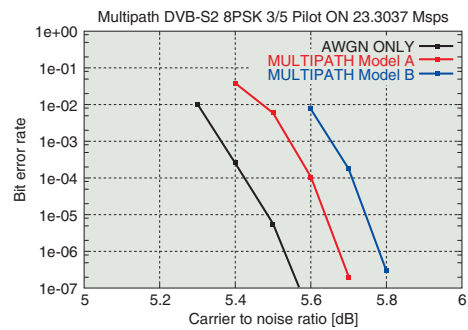
**Figure 2** Multipath Examples



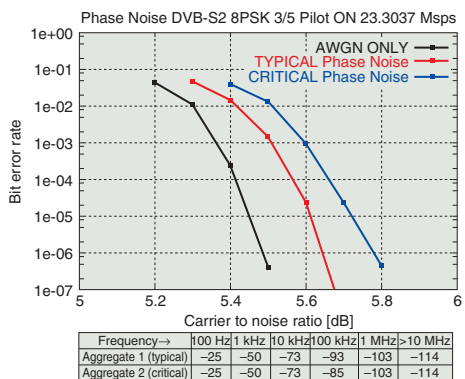
**Figure 3 (a)** Multipath Resistance (DVB-S)



**Figure 3 (b)** Multipath Resistance (DVB-S2)



**Figure 4** Phase Noise Resistance (DVB-S2)



**Table 1** Sync Acquisition Time (Compared to other Sony products)

DVB-S

No frequency offset

Symbol rate	Mod / code rate	CXD2816R	CXD2810GG
20 Mps	QPSK 1/2	16 [ms]	80 [ms]
	QPSK 7/8	13.5 [ms]	70 [ms]

Frequency offset: ±5 MHz

Symbol rate	Mod / code rate	CXD2816R	CXD2810GG
20 Mps	QPSK 1/2	16 [ms]	210 [ms]
	QPSK 7/8	13.5 [ms]	175 [ms]