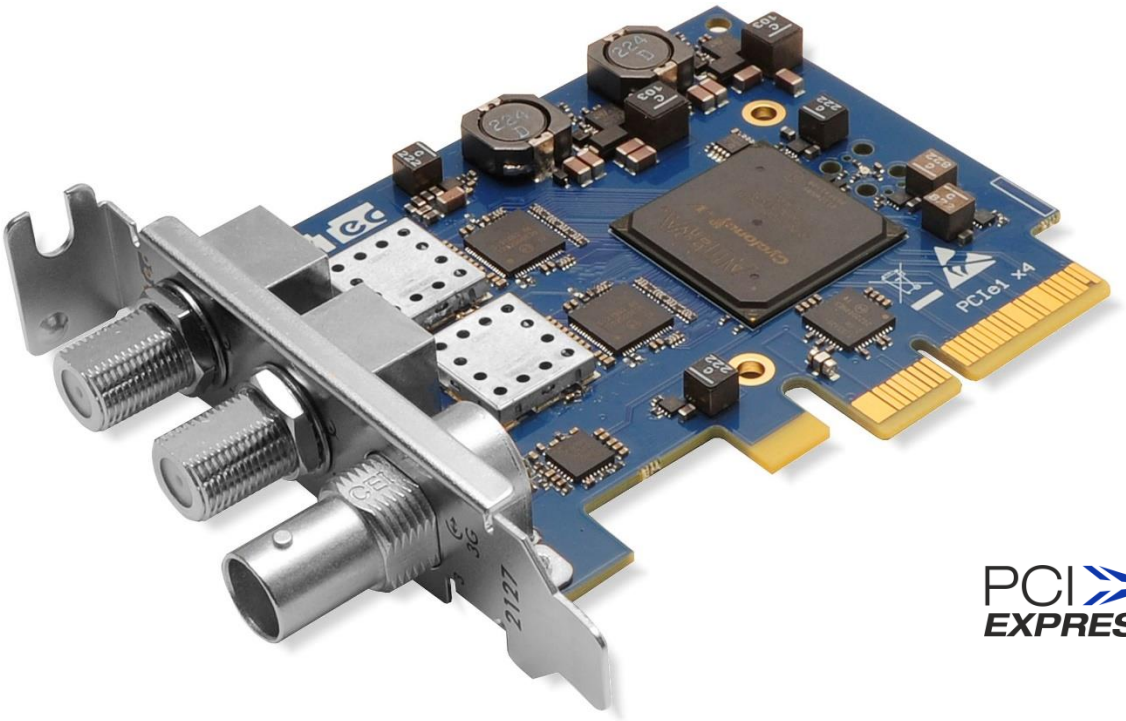
DTA-2127

Quad S2X receiver with 3G-SDI/ASI output



PCI EXPRESS

DATASHEET

January 2023

Table of Contents

1. Introduction

1.1. General Description

The DTA-2127 is a high-density low-profile satellite receiver on a PCIe gen1 x4 card. It offers 2 independent L band inputs, each of which can be used to receive and demodulate 2 independent satellite signals. This means that a total of 4 independent satellite channels can be received and demodulated. Each receiver is agile and can receive modulated signals in the range of 950 to 2150MHz.

The card can receive DVB-S, DVB-S2 and DVB-S2X modulated signals carrying an MPEG-2 Transport Stream. Note that the DTA-2127 does not care about the content of the MPEG-2 TS and can receive MPEG-2, H.264, HEVC and non-video data such as IP data as long as all content is encapsulated in a Transport Stream.

An additional ASI/SDI output[1] port is provided that allows, for example, a received Transport Stream to be output over ASI. Alternatively, a compressed video signal from a received Transport Stream may be decoded in software and output uncompressed over the output port configured as SDI.

The DTA-2127 is capable of powering and controlling 2 satellite dishes by supplying the required LNB voltage and DiSEqC control signals through each RF input cable.

[1] The ASI/SDI port can also be used as an input, but this requires special firmware. Contact DekTec if this feature is of interest to you.

2. Functional Description

2.1. Block Diagram

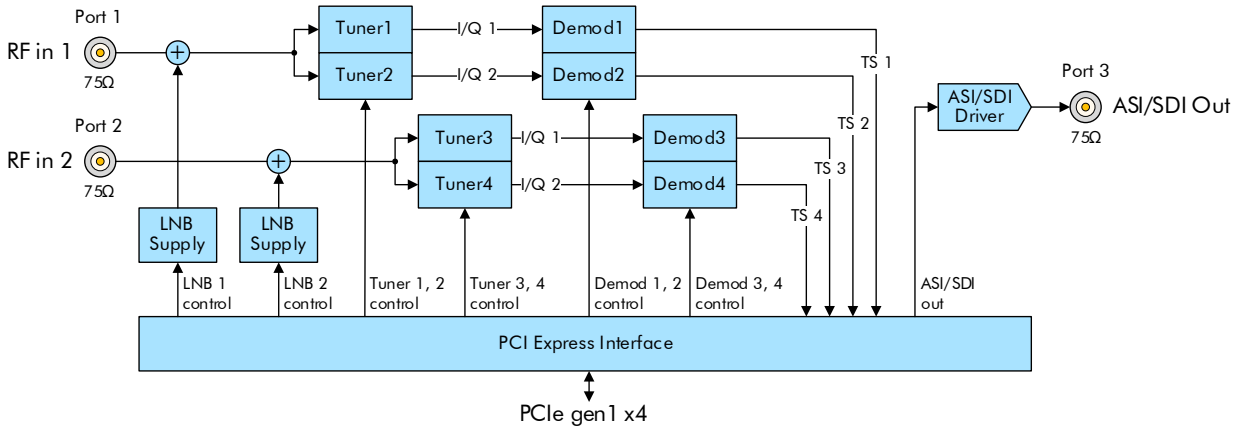


Figure 1. Functional block diagram of the DTA-2127

2.2. Receiving Satellite Signals

The L band signal from the LNB must be connected to RF input port 1 or 2. The user can software select the center frequency of the signal they wish to receive. The DTA-2127 has 4 tuners, tuners 1 and 2 are connected to input port 1, tuners 3 and 4 to port 2. Each tuner is independent and can tune to a different or the same frequency as another tuner. The tuner will report level measurement information to the software.

When the signal is locked, the tuner will provide the I/Q signal to the demodulator. The demodulator will then lock to the signal either automatically or try to lock to the signal using the parameters defined by the software. The demodulator will report the lock status and RF quality elements to the software.

2.3. Controlling the LNB

The DTA-2127 can be connected directly to a satellite dish, or it can be connected to an RF distribution system. If connected to a dish, the LNB can be powered right from the card itself. The user can set the LNB supply voltage from software; the user can also send DiSEqC commands back to the LNB or RF distribution system (e.g. control RF switches, motorized dishes). Refer to Sections 3.4.1 and 3.4.2 for detailed information.

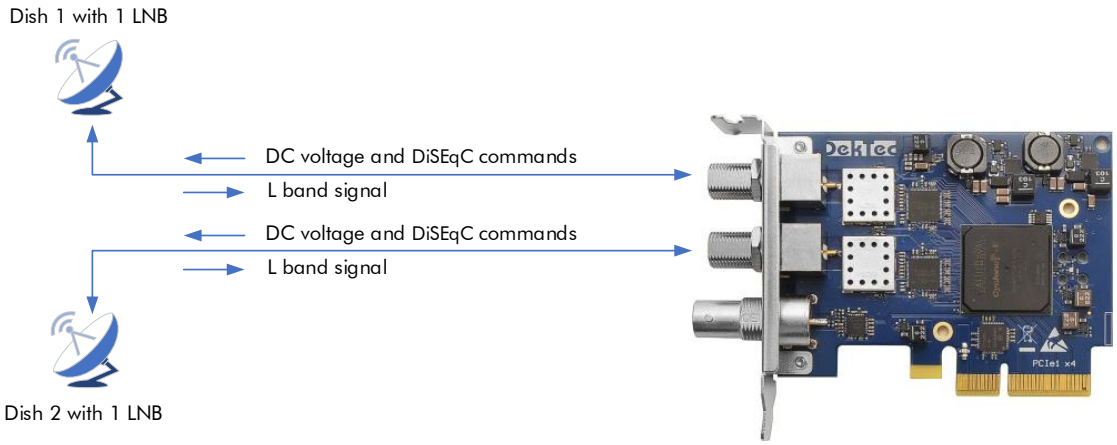


Figure 2. The DTA-2127 can receive an L band signal while powering/controlling the LNB over the same cable.

Notes

- Each RF input port is independent in terms of powering the LNB and sending DiSEqC commands.
- If the DTA-2127 is connected to an RF distribution system, the LNB power system is not used.

2.4. Software Support

The DTA-2127 comes with a free SDK that is available for both Windows and Linux. The SDK contains a device driver and the DTAPI library that provides uniform access to any DekTec hardware. The SDK enables you to write custom applications that receive one or multiple satellite signals and/or produce an ASI or SDI signal.

The device driver implements low-level operations that require direct access to the DTA-2127 hardware, such as initialization and coordination of DMA transfers, the handling of interrupts and reading and writing of Vital Product Data (VPD).

DekTec provides the following standard (chargeable) applications that support the DTA-2127:

- ***StreamXpert***: Real-time stream analyzer.
- ***StreamXpert Lite***: Real-time stream analyzer.
- ***MuxXpert***: Real-time (re-)multiplexing.

3. Specifications

3.1. RF Inputs

The characteristics of the two RF inputs are specified in the table below.

Parameter	Qualification	Min	Typ	Max	Unit
RF INPUT PORT 1, 2					
Connector type			BNC, female		
Impedance			75		Ω
Return loss	950 .. 2150MHz		-10		dB
TUNING					
Frequency range		950		2150	MHz
Sensitivity		-70		-20	dBm
STANDARDS					
DVB-S			EN 300		
DVB-S2			EN 302 307		
DVB-S2X			EN 302 307-2		
Symbol rate*	QPSK, 8-PSK	1		54	MBd
	16-APSK	1		50.7	MBd
	32-APSK	1		40.5	MBd
RF LEVEL MEASUREMENT					
Range		-70		-20	dBm
Accuracy			±3		dBm
MER MEASUREMENT					
Range		0		22	dB
Accuracy			±2		dB

* Section 3.3 lists all supported modulation parameters and the corresponding symbol-rate range.

3.2. ASI/SDI output

The characteristics of the ASI/SDI output[1] port are specified in the table below.

Parameter	Qualification	Min	Typ	Max	Unit
ASI/SDI OUTPUT PORT					
Connector type			BNC, female		
Impedance			75		Ω
Return loss	0 .. 3GHz		-11		dB
DVB-ASI					
Standard			EN 50083-9		
TS rate		1		213	Mbits/s
3G-SDI					
Line rate			3.0		Gbits/s
Defining standard			SMPTE 424M		
Formats			1080p50/59.94/60		
HD-SDI					
Line rate			1.5		Gbits/s
Defining standard			SMPTE 292M		
Formats			720p23.98/24/25/29.97/30 720p50/59.94/60 1080i50/59.94/60 1080p(sf)23.98/24/25/29.97/30		
SD-SDI					
Line rate			270		Mbits/s
Defining standard			SMPTE 259M		
Formats			525i, 625i		

3.3. Supported Modulation Parameters

The table below specifies the modulation standards, modes, code rates and symbol rates that the DTA-2127 can properly receive.

			Symbol Rate	
Standard	Modulation	Code rate	Min (MBd)	Max (MBd)
DVB-S	QPSK	1/2, 2/3, 3/4, 5/6, 7/8	1.0	54.0
DVB-S2	QPSK	1/2, 2/3, 3/4, 3/5, 4/5, 5/6, 8/9, 9/10	1.0	54.0
	8-PSK	2/3, 3/4, 3/5, 5/6, 8/9, 9/10	1.0	54.0
	16-APSK	2/3, 3/4, 4/5, 5/6, 8/9, 9/10	1.0	50.7
	32-APSK	3/4, 4/5, 5/6, 8/9	1.0	40.6
		9/10	1.0	40.5
DVB-S2X	QPSK	13/45, 9/20, 11/20	1.0	54.0
	8-APSK-L	5/9, 26/45	1.0	54.0
	8-PSK	23/36, 25/36, 13/18	1.0	54.0
	16-APSK-L	1/2, 8/15, 5/9, 3/5, 2/3	1.0	50.7
	16-APSK	26/45, 3/5, 28/45, 23/36, 13/18, 7/9, 77/90	1.0	50.7
	32-APSK-L	2/3	1.0	40.6
	32-APSK	32/45, 11/15, 7/9	1.0	40.6

3.4. Controlling the DISH, LNB and Upstream Equipment

The DTA-2127 can power and control the dish/LNB and upstream equipment via the RF input ports.

3.4.1. LNB Power

A DC voltage of 13V (vertical) or 18V (horizontal) is used to select polarization on an LNB. Note that the DTA-2127 also allows 14V/19V in case there is a long cable between the receiver and the LNB.

Parameter	Qualification	Min	Typ	Max	Unit
LNB POWER					
Voltage	Vertical 13V	12.5	13.0	13.5	V
	Vertical 14V	13.5	14.0	14.5	V
	Horizontal 18V	17.5	18.0	18.5	V
	Horizontal 19V	17.5	18.0	18.5	V
Current	Vertical 13V	0	0.40	0.50	A
	Vertical 14V	0	0.40	0.50	A
	Horizontal 18V	0	0.40	0.50	A
	Horizontal 19V	0	0.40	0.50	A
Power	Vertical 13V	0	5.2	6.8	W
	Vertical 14V	0	5.6	7.2	W
	Horizontal 18V	0	7.2	9.3	W
	Horizontal 19V	0	7.6	9.8	W

3.4.2. DiSEqC – Digital Satellite Equipment Control

DiSEqC (https://en.wikipedia.org/wiki/DiSEqC) is a communication protocol that allows the DTA-2127 to control satellite equipment such as a multi-dish switch. It works by superimposing 22kHz tones on the same cable that carries the L band signal to the DTA-2127.

The DTA-2127 supports DiSEqC versions 1.x and 2.x.

- DiSEqC version 1.x is a one-way protocol (from receiver to dish) that allows switching between multiple satellite sources, and, depending on the minor version, control certain other satellite receive equipment.
- DiSEqC version 2.x adds bi-directional communications.

Parameter	Qualification	Min	Typ	Max	Unit
DiSEqC					
Connector type			RF, female		
Amplitude	22kHz tone	.50	.65	.80	V

3.5. Miscellaneous Specifications

Parameter	Qualification	Min	Typ	Max	Unit
POWER					
Supply rails used			+3.3, +12		V
Power consumption	Idle		5.6		W
	Running without LNB		6.1		W
	Running, both LNBs @400mA		25W		W
PCI EXPRESS BUS					
Label			PCIe1 x4		
Profile			Low profile		
MECHANICAL					
Dimensions	L x H x D card		85.2 x 68.4 x 16.2		mm
	L x H x D full (-LP)		100.8 x 80.1 x 18.4		mm
Weight			225		g
ENVIRONMENTAL					
Operating temperature		0		+45	°C
COMPLIANCY	In compliant PC				
CE – Emission			EN 55022:2011		
			EN 61000-3-2:2006/A1:2009		
			EN 61000-3-3:2006/A2:2010		
CE – Immunity			EN 55024:2010		
FCC – Class			B		
Safety			UL 1419, IEC60065		

4. Performance Measurements

4.1. RF Input Port 1 and 2

RF input port 1 and 2 perform similarly, so only measurements for a single port are shown in this section.

4.1.1. SNR and MER Measurements

The table below shows SNR and MER measurements for different modulation parameters, when a modulator with a high-quality output signal is directly connected to the RF input of the DTA-2127. Thus, the measurements in this table show the highest SNR and MER values that can be measured given the modulation parameters.

#	Standard	Modulation	Code rate	Roll off	FEC	Pilots	SNR (dB)	MER (dB)
A	DVB-S	QPSK	5/6	35%	long	on or off	25.7	25.7
B	DVB-S2	QPSK	1/2	35%	long	on or off	26.5	26.5
C		8-APSK	3/4	25%	long	on or off	28.2	28.2
D		16-APSK	5/6	35%	long	on or off	30.5	30.5
E		32-APSK	8/9	25%	long	on or off	29.0	29.0
F	DVB-S2X	8-APSK-L	5/9	5%	long	on or off	26.7	26.7
G		16-APSK-L	3/5	10%	long	on or off	28.2	28.2
H		32-APSK	32/45	15%	long	on or off	28.5	28.5
I		32-APSK-L	2/3	20%	long	on or off	29.0	29.0

Figure 3. SNR and MER measurements @ 1250MHz.

4.1.2. RF Input Port - Return Loss

The figure below shows the return loss measured at RF input port 1 of the DTA-2127.

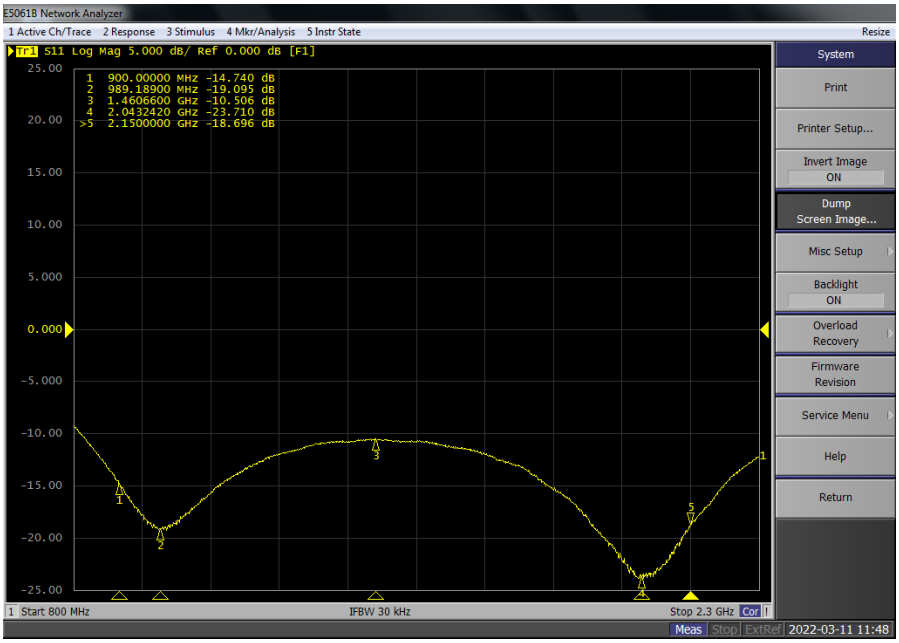


Figure 4. Return loss measurement for RF input 1.

4.2. SDI Output Port

4.2.1. Return Loss

The figure below shows the return loss measured at the SDI output port of the DTA-2127.

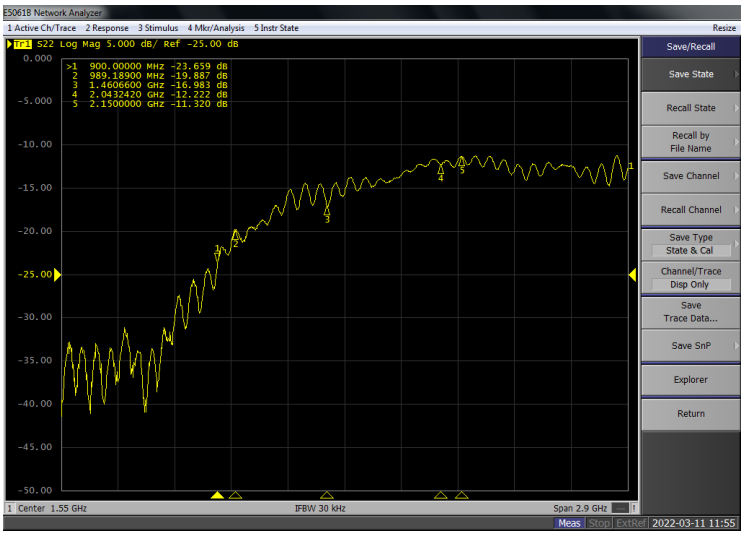


Figure 5. Return loss measurement of the SDI output port

4.2.2. Jitter

The figure below shows the timing- and alignment jitter measured at the SDI output port of the DTA-2127.

			Timing Jitter (UI)			Alignment Jitter (UI)		
#	SDI rate	Format	f(Hz)	Required	Measured	f(kHz)	Required	Measured
A	SD-SDI	525i59.94	10	<0.2	0.05	1	<0.2	0.03
B	HD-SDI	1080i50	10	<1.0	0.25	100	<0.2	0.09
C		1080i59.94	10	<1.0	0.25	100	<0.2	0.09
D	3G-SDI	1080p60	10	<2.0	0.45	100	<0.3	0.17
E		1080p59.94	10	<2.0	0.45	100	<0.3	0.17