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DATA SHEET

SV5C-eDP Generator

Embedded DisplayPort Generator

C SERIES



Ordering Information:

Email orders

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Introduction

OVERVIEW

The **SV5C-eDP Embedded DisplayPort Generator** is an ultra-portable, high-performance instrument capable of generating traffic for Embedded DisplayPort and DisplayPort applications at data rates of up to 8.1 Gbps. The SV5C-eDP Generator provides analog parameter controls that enable DisplayPort receiver stress-testing and allow for deep insights into voltage and timing sensitivities of DisplayPort sink devices. The instrument operates with the award-winning Introspect ESP Software environment which includes full pattern synthesis tools for generating test patterns and video frames for system-level test. Figure 1 below illustrates a typical application of the SV5C-eDP Generator in an Embedded DisplayPort system.

KEY FEATURES

- Protocol: supports Embedded DisplayPort (eDP) up to v1.4 and Display Port (DP) up to v1.4
- Supported Data Rates: up to 8.1 Gbps with a fully continuous range of data rates
- Lane Count: configurable from 1 to 4 lanes per port plus Auxiliary Channel
- Analog Controls: voltage amplitude and common mode voltage, each per lane
- Signal Impairments: jitter injection, sinusoidal voltage noise injection, per-wire timing skew
- Pattern Generation: full video frame generation with 2 GBytes of pattern memory





PHYSICAL CONNECTIONS

The physical connections of the SV5C-eDP Generator are shown in Figure 2. The lanes (main link 1 to 4) are contained on a single MXP connector, as shown in the figure. The pin mapping for the Main Link signals is provided in Table 1 below.



TABLE 1: MAIN LINK MXP CONNECTOR PINOUT

CONNECTOR	PIN	LANE
_	12	Main Link 1P
	11	Main Link 1N
2 15	10	Main Link 2P
3 14	9	Main Link 2N
5 12	7	Main Link 3P
6 11 7 10	8	Main Link 3N
8 9	5	Main Link 4P
	6	Main Link 4N



The Auxiliary Channel signals are placed on a separate MXP connector as shown in Figure 2 on the previous page. The Auxiliary Channel pin mapping is provided in Table 2 below. Note that the Auxiliary Channel in DisplayPort is bi-directional, and as such there are separate MXP connections for the TX signal (the generator / source controls the Auxiliary Channel) and the RX signal (the generator / source receives from the Auxiliary Channel).

The connection between the TX and RX can be made externally though a combiner circuit. The recommended part for this function is Mini-Circuits ZFRSC-42-S+. The required connections between the SV5C-eDP Generator, the combiner, and a Sink device are shown in the diagram of Figure 3.

TABLE 2: AUXILIARY CHANNEL MXP CONNECTOR PINOUT

CONNECTOR	PIN	LANE
	12	Auxiliary Channel P, TX
1 16 2 15 3 14	11	Auxiliary Channel N, TX
4 13 5 12 6 11	16	Auxiliary Channel P, RX
7 10 8 9	15	Auxiliary Channel N, RX





ORDERING INFORMATION

TABLE 3: ITEM NUMBERS FOR THE SV5C-EDP GENERATOR WITH RELATED

PRODUCTS

PART NUMBER	NAME	KEY DIFFERENTIATORS
5740	SV5C-eDP Analyzer (includes	High performance eDP protocol
	Introspect ESP SW license)	analyzer and eDP source tester
5741	SV5C-eDP Generator (includes	High performance eDP protocol
	Introspect ESP SW license)	generator and eDP sink tester



Specifications

TABLE 4: GENERAL SPECIFICATIONS

PARAMETER	VALUE	UNITS	DESCRIPTION AND CONDITIONS
Application / Protocol			
Physical Layer Interface	eDP DP		Support for eDP to version 1.4 Support for DP to version 1.4
Ports			
Number of Transmitter Lanes	5		Main Link 1, 2, 3, 4 Auxiliary Channel (bidirectional)
Number of GPIO pins	6		Programmable as external trigger input or flag output pins
Number of dedicated reference clock inputs	1		
Number of dedicated reference clock outputs	1		
PC connections for Introspect ESP Software Control	2		USB2 and USB3
Data Rates and Reference Clocks			
Minimum Data Rate	1562.6	Mbps	Per Lane
Maximum Data Rate	12.5	Gbps	Per Lane
Minimum External Input Clock	10	MHz	
Maximum External Input Clock	250	MHz	
Minimum External Output Clock	10	MHz	
Maximum External Output Clock	500	MHz	
Power Consumption			
DC Input Voltage	12	V	
Power Dissipation	100	W	



TABLE 5: EDP TRANSMITTER LANE CHARACTERISTICS

PARAMETER	VALUE	UNITS	DESCRIPTION AND CONDITIONS
HS Voltage Performance			
Minimum Output Voltage Swing	20	mV	Differential
Maximum Output Voltage Swing	1000	mV	Differential
Voltage Swing Resolution	10	mV	Differential
Voltage Swing Accuracy	10% or 10	mV	The larger value of 10% or 10 mV
Minimum Common Mode Voltage	-20	mV	
Maximum Common Mode Voltage	750	mV	
Common Mode Voltage Resolution	1	mV	
Common Mode Voltage Accuracy	20% or 20	mV	The larger value of 20% or 20 mV
Swing and Common Mode Setting	Per Lane		
HS Timing Performance			
Rise and Fall Time	30	ps	Typical, fastest slew rate setting 20% to 80%
Slew Rate Range	13	V/ns	Difference between the fastest slew rate and the slowest slew rate
De-Emphasis Performance			
Pre-Tap 1 Range	+/- 150	mV	FIR taps defined as additive increments
Pre-Tap 1 Resolution	10	mV	
Post-Tap 1 Range	+/- 300	mV	
Post-Tap 1 Resolution	10	mV	
Post-Tap 2 Range	+/- 150	mV	
Post-Tap 2 Resolution	10	mV	
De-Emphasis Setting	Per Lane		
Transmitter Lane Output Coupling			
Output Differential Impedance	100	Ohm	
Differential Impedance Tolerance	+/- 10	Ohm	

SPECIFICATIONS



TABLE 6: EDP TRANSMITTER SIGNAL IMPAIRMENT CHARACTERISTICS

PARAMETER	VALUE	UNITS	DESCRIPTION AND CONDITIONS
Noise Floor			
Random Jitter (RMS)	< 1.2	ps rms	
Deterministic Jitter Injection			
Minimum Sinusoidal Frequency	0.1	kHz	Per lane
Maximum Sinusoidal Frequency	50	MHz	Per lane
Frequency Resolution	0.1	kHz	
Maximum Sinusoidal Amplitude	16000	ps	Peak-Peak, tested to 1000 ps
Sinusoidal Amplitude Resolution	500	fs	
Sinusoidal Amplitude Accuracy	10% or 10	ps	The larger value of 10% or 10 ps
Voltage Noise Injection			
Maximum Amplitude of Common Mode Noise	40	mV	
Maximum Amplitude of Difference Mode Noise	80	mV	
Amplitude Resolution of Injected Noise	1	mV	
Maximum Frequency of Injected Noise	1	GHz	
Channel Skew Performance			
Coarse Skew Range:			Lane to lane
Programmable Skew	+/- 20	UI	Hardware is capable of larger skews
Coarse Skew Resolution:			Lane to lane
1.62 Gbps, 2.7 Gbps	0.25	UI	
5.4 Gbps	0.5	UI	
8.1 Gbps	1	UI	
Fine Skew Range:			Wire to wire and lane to lane
Programmable Skew	+/- 500	ps	Hardware is capable of larger skews



TABLE 7: PATTERN HANDLING CHARACTERISTICS

PARAMETER	VALUE	UNITS	DESCRIPTION AND CONDITIONS
User-Programmable Pattern Memory			
Minimum Pattern Segment Size	8	Bits	
Maximum Pattern Segment Size	2	GBytes	
Total Memory Space for Transmitters	2	GBytes	
Pattern Sequencer			
Sequence Control	Yes		Loop infinite Loop-on-count (see count below) Play to end
Number of Sequencer Slots per Pattern Generator	16		Each pattern generator can string up to 16 different segments together, each with its own repeat count
Number of Entry Slots	1		Separate from above 16 segments
Number of Exit Slots	1		Separate from above 16 segments
Maximum Repeat Count Per Slot	65536		
Maximum Repeat Count for Outer Loop	65536		Outer loop can encompass any number of slots
Additional Pattern Characteristics			
Pattern Switching	Yes		Wait to end of segment, or immediate



TABLE 8: FRAME FEATURES AND FORMATS

PARAMETER	VALUE	UNITS	DESCRIPTION AND CONDITIONS
Features			
Frame Modes	Standard Enhanced		
Supported Pixel Formats	RAW RGB YCbCr		RAW6, RAW8, RAW9, RAW10, RAW11, RAW12, RAW14, RAW16 RGB666, RGB888, RGB999, RGB101010, RGB111111, RGB121212, RGB161616 YCbCr422, YCbCr444 and Y-Only at: 6 bit, 8 bit, 9 bit, 10 bit, 11 bit, 12 bit and 16bit
Supported YCbCr Standard	YCbCr601 YCbCr709		
Data Scrambling Support	Yes		
Scrambling Seed	FFFE FFFF		
Forward Error Correction (FEC)	Yes		
Advanced Link Power Management (ALPM) Support	Yes		
Panel Self Refresh With Selective Update (PSR2) Support	Yes		



TABLE 9: PHYSICAL CHARACTERISTICS

PARAMETER	VALUE	UNITS	DESCRIPTION AND CONDITIONS
Dimensions			
Length	11, 280	in, mm	
Width	4.25, 108	in, mm	
Height	1.7, 43	in, mm	
Weight	2.5	lbs	
Physical Connections			
ML4 to ML1, Aux Channel	MXP		Huber & Suhner, 16 pin
GPIO			Available through 12 pin header
			Molex 15-91-2125
Ref Clock In	SMP		SMP Differential Pair
Ref Clock Out	SMP		SMP Differential Pair
PC connection	USB2		USB2.0 mini B
	USB3		USB3.0 micro B
Power Switch / Connector			AC adapter provided
			110/220 V, 50/60 Hz



Revision Number	History	Date
1.0	Document Release	December 16, 2021

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