

VITA 49, VITA 49A and VITA 49.2

Sharing Data With Other Applications

You can recall recordings in *.vita49 format, allowing you to share recordings between the VSA software and other programs that support VITA 49, VITA 49A and VITA 49.2 files. VITA 49 is a packet-based protocol to convey digitized signal data and metadata (or context data) pertaining to different reference points within a radio receiver.

Data Format

Packet Types

Signal Data Packets

Supported Payload Format Types

- VITA 49.0 (49/49A) and VITA 49.2 Payload Formats
- ODI Payload Format

Context Packets

Data format

The VSA software supports the VITA 49.2 data format. In the Packet Header (shown below), bit 25 indicates the data format. This bit is set to "0" for data format 49.0 and "1" for data format 49.2.

Packet Header

31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Packet Type		C	Indicators		TSI	TSF	Packet Count			Packet Size																					

Packet Types

The VSA software supports three types of packets: Signal Data Packet without Stream Identifier, Signal Data Packet with Stream Identifier, and Context Packet. The VSA software ignores the stream identifier in the packets, so all signal data packets in the file will be treated as if they don't have a stream identifier.

Packet Type Bits (31-28)	Supported by VSA	Description
0000	YES	Signal Data Packet without Stream Identifier
0001	YES (Stream Identifier ignored)	Signal Data Packet with Stream Identifier
0010	NO	Extension Data Packet without Stream Identifier
0011	NO	Extension Data Packet with Stream Identifier
0100	YES	Context Packet

Signal Data Packets

Signal Data Packets (Type 0000 or 0001) are indicated as either Time Data (0) or Spectrum Data (1) by bit 24 of the Data Header. The VSA software will recall data payload in Time Data packets only.

1000 or 1001 0 = Time Data
1 = Spectrum Data

Packet Header

31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Packet Type		C	Indicators		TSI	TSF	Packet Count			Packet Size																					

Supported Payload Format Types

For supported payload format types in VSA, please check the sections below:

- VITA 49.0 (49/49A) and VITA 49.2 Payload Formats
- ODI Payload Format

VITA 49.0 (49/49A) and VITA 49.2 Payload Formats

For VITA 49, VITA 49A and VITA 49.2, payload types are defined in context packets.

Within the context packet (shown below), bit 15 needs to be set to 1.

Context (V49.0) Bit Assignments

31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16	15	14
Context Field Change Indicator	Reference Point Identifier	Bandwidth	IF Reference Frequency	RF Reference Frequency	RF Reference Frequency Offset	IF Band Offset	Reference Level	Gain	Over-range Count	Sample Rate	Timestamp Adjustment	Timestamp Calibration Time	Temperature	Device Identifier	State/Event Indicators	Signal Data Packet Payload Format	Formatted GPS

If Signal Data Packet Payload Format exists (bit 15 = 1), we can get detailed info from the Data Packet Payload Format Field (in Context packet).

Data Packet Payload Format Field

Word	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
1	Pack	Real/Cmplx	Data Item Format				Rpt	Event-Tag Size	Channel-Tag Size	Data Item Frac Size	Item Packing Field Size				Data Item Size																	
2	Repeat Count								Vector Size																							

The VSA software has the following Data Packet Payload Format Field requirements:

- Real/Complex (bits 30, 29) value needs to be 01 (Complex Cartesian)
- The following combinations are supported for Data Item Format and Data Item Size:

VITA 49.0 (49/49A)

Data Item Format	Data Item Size
SignedFixedPoint	16
SinglePrecisionFloatingPoint	32

VITA 49.2

Data Item Format	Data Item Size	Packing Field Size
SignedFixedPoint	16	16
SignedFixedPoint	32	32
SinglePrecisionFloatingPoint	32	32
SignedFixedPointNonNormalized	16	16

ODI Payload Format

For ODI, payload type information is taken from the ClassId part in the Data packet. A file is treated as an ODI file if the OUI field ClassId in the Data packets is AXLe = 245CCB or Keysight = 800902 (see ODI ClassId definition below).

ODI ClassId

Word	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
1	Pad Bit Count				Reserved			AXLe OUI of 24-5C-CB																								
2	Pad Word Count		ODI Reserved	Fixed Value	Event	R/C	Item Type				Vector Size																					

The VSA software processes ODI data packets whose fields in the ClassId satisfy the following requirements:

ODI ClassId Field	Value
Pad Bit Count	00000
Reserved	000
OUI	0x245CCB for AXLe-defined formats 0x800902 for Keysight-defined formats
Pad Word Count	0000
ODI Reserved	00
Fixed Value	00
Event	00 = none
R/C	01 = Complex IQ
Data Type	0011 000= 16-bit Signed Fixed Point 0100 000= 32-bit Signed Fixed Point
Vector Size	0 0000 0000 0000 for one channel

Context Packets

The VSA software looks for information in the Context packet to be able to process and show data correctly. Below is how the Context Indicator Field is defined.

Table 9.1-1 VITA 49.2 Context/Command Indicator Field (CIF) Matrix and Bit-Assignments

	CIF 0 (V49.0)	CIF 1 (V49.2)	CIF 2 (V49.2)	CIF 3 (V49.2)	CIF 7 (V49.2)
Bit	<i>Legacy Fields, CIF enables</i>	<i>Spatial, Signal, Spectral, I/O, Ctl</i>	<i>Identifiers (tags)</i>	<i>Temporal, Environmental</i>	<i>Attributes</i>
31	Context Field Change Indicator	Phase Offset	Bind	Timestamp Details	Current Value
30	Reference Point Identifier	Polarization	Cited SID	Timestamp Skew	Average Value
29	Bandwidth	3-D Pointing vector	Sibling(s) SID	<i>Reserved</i>	Median Value
28	IF Reference Frequency	3-D Pointing Vector Structure	Parent(s) SID	<i>Reserved</i>	Standard Deviation
27	RF Reference Frequency	Spatial Scan Type	Child(ren) SID	Rise Time	Max Value
26	RF Reference Frequency Offset	Spatial Reference Type	Cited Message ID	Fall Time	Min Value
25	IF Band Offset	Beam width	Controllee ID	Offset Time	Precision
24	Reference Level	Range (Distance)	Controllee UUID	Pulse Width	Accuracy
23	Gain	<i>Reserved</i>	Controller ID	Period	1 st Derivative (Velocity)
22	Over-range Count	<i>Reserved</i>	Controller UUID	Duration	2 nd Derivative (Acceleration)
21	Sample Rate	<i>Reserved</i>	Information Source	Dwell	3 rd Derivative
20	Timestamp Adjustment	E_b/N_0 BER	Track ID	Jitter	Probability
19	Timestamp Calibration Time	Threshold	Country Code	<i>Reserved</i>	Belief
18	Temperature	Compression Point	Operator	<i>Reserved</i>	<i>Reserved</i>
17	Device Identifier	2 nd and Third-Order Intercept Points	Platform Class	Age	<i>Reserved</i>
16	State/Event Indicators	SNR/Noise Figure	Platform Instance	Shelf Life	<i>Reserved</i>
15	Signal Data Packet Payload Format	Aux Frequency	Platform Display	<i>Reserved</i>	<i>Reserved</i>
14	Formatted GPS	Aux Gain	EMS Device Class	<i>Reserved</i>	<i>Reserved</i>

For VITA 49.2, Signal Data Packet Payload Format (Bit 15) needs to be set to 1.

For both VITA 49.2 and ODI, the VSA software acts on **CIF 0** fields as described in the following table:

Bit	CIF0	Conditions
21	Sample Rate	If set to 1, use it directly in VSA. If set to 0, but if Bandwidth is set to 1, use Bandwidth to make the best guess. If both Sample Rate and Bandwidth are set to 0, use default value 1 as Sample Rate.
29	Bandwidth	See Bit 21 Sample Rate.
24	Reference Level	If set to 1, use it in VSA to calculate the input range and scaling factor if it's normalized data.
27	RF Reference Frequency	If set to 1, then use it as the input center in VSA.
26	RF Reference Frequency Offset	If set to 1, check if the value of RF Reference Frequency Offset is 0, if it is 0 then report an error. We don't support offset whose value is not 0 in this version of VSA.

Other Considerations

- Data files must have at least one context packet and one data packet containing time domain data in the file.
- All packets are contiguous in time (no gaps).
- Context packet type should be distinct (no two context packets with different values exist in the same file, or the first context packet will be used).
- Single channel data only.
- The payload size must be the same for all data packets, except if sampleFrameIndicator in the trailer part of the last packet is defined as FinalPacket.

See Also

[Supported File Formats](#)

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