

Customer :
ALGE-DS

No. E984552 (1 / 17)
Date Oct. 16. 1998

Attention :

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Your Part No. :

SPECIFICATIONS

ALPS :

MODEL : BSRV2-301A

Spec. No. :

Sample No. :

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COMPONENTS BUSINESS UNIT

Sales _____

SPECIFICATION

This specification describes a tuner with QPSK demodulator and FEC for variable rate digital satellite direct TV receiving.

CONTENTS

1. General Specification
2. Standard test condition
3. Current consumption
4. Absolute maximum voltage
5. Electrical specification
6. PLL IC data format
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10. Example register setting
11. Reliability specification
12. Mechanical specification

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					<i>[Signature]</i>	<i>[Signature]</i>		BSRV2 SPECIFICATION
								DOCUMENT NO.
								(1 / 14)
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SECTION	DESCRIPTION	SPECIFICATION
1.	General Specification	
1-1	Input frequency range	950MHz to 2150MHz
1-2	Channel spacing frequency	29.5MHz
1-3	Input level	-65dBm to -25dBm
1-4	RF input impedance	75 Ω
1-5	Loop through output impedance	75 Ω
1-6	IF frequency	479.5MHz
1-7	IF bandwidth	55MHz
1-8	LO1 frequency	1429.5MHz to 2629.5MHz
1-9	LO2 frequency	479.5MHz
1-10	I2C address	SP5659: C2 VES1893A: 10
1-11	Crystal reference frequency	SP5659: 4MHz VES1893A: 90.106MHz
1-12	LO1 step size	125 kHz
1-13	Modulation method	QPSK
1-14	Output format	MPEG2 transport stream
1-15	FEC method: Viterbi Reed-Solomon	Puncture rate 1/2, 2/3, 3/4, 5/6, 7/8 (204, 188)
1-16	RF Input connector	F fe-male
1-17	Loop through output connector	F fe-male
1-18	Operating voltage + 5V (RF AMP) + 5V(OSC, Synthesizer) + 5V(Others) +3.3V Tuning	5±0.25 V DC 5±0.25 V DC 5±0.25 V DC 3.3±0.16V DC 30±1 V DC
1-19	Operating temperature	0 to 60°C
1-20	Operating humidity	Less than 80 % RH(at 40°C)
1-21	Storage temperature	-20 to 70°C
1-22	Storage humidity	Less than 95 % RH(at 40°C)

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SECTION	DESCRIPTION	SPECIFICATION																														
2.	Standard test condition	Test for electrical specification shall be performed at following condition unless otherwise specified.																														
2-1	Ambient condition	Temperature 25°C ± 2°C Humidity 65% ± 5%RH																														
2-2	Measurement to start	If no doubt on test results, temperature 5°C ~ 30°C and humidity 45% ~ 85% RH could be applied.																														
2-3	Power supply	30 minutes after DC power supplied.																														
		<table border="1"> <thead> <tr> <th>Terminal</th> <th>Supply voltage</th> </tr> </thead> <tbody> <tr> <td>LNB Power</td> <td></td> </tr> <tr> <td>+5V(RFAMP)</td> <td>+ 5V ± 0.1V</td> </tr> <tr> <td>+5V(OSC,Sinth)</td> <td>+ 5V ± 0.1V</td> </tr> <tr> <td>+5V(Others)</td> <td>+5V ± 0.1V</td> </tr> <tr> <td>+3.3V</td> <td>+3.3V ± 0.1V</td> </tr> <tr> <td>+30V</td> <td>+30V ± 0.1V</td> </tr> </tbody> </table>	Terminal	Supply voltage	LNB Power		+5V(RFAMP)	+ 5V ± 0.1V	+5V(OSC,Sinth)	+ 5V ± 0.1V	+5V(Others)	+5V ± 0.1V	+3.3V	+3.3V ± 0.1V	+30V	+30V ± 0.1V																
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SECTION	DESCRIPTION	SPECIFICATION																				
4.	Absolute maximum voltage	<table border="1" data-bbox="821 260 1436 653"> <thead> <tr> <th>Terminal</th> <th>Maximum voltage</th> </tr> </thead> <tbody> <tr> <td>LNB Power</td> <td>+25V</td> </tr> <tr> <td>+5V(RFAMP)</td> <td>+5.25V</td> </tr> <tr> <td>+5V(OSC,Sinth)</td> <td>+5.25V</td> </tr> <tr> <td>+5V(Others)</td> <td>+5.25V</td> </tr> <tr> <td>+3.3V</td> <td>+3.46V</td> </tr> <tr> <td>+30V</td> <td>+32V</td> </tr> <tr> <td>Logic inputs</td> <td>TTL</td> </tr> </tbody> </table> <table border="1" data-bbox="821 743 1436 879"> <thead> <tr> <th>Terminal</th> <th>Maximum take off current</th> </tr> </thead> <tbody> <tr> <td>LNB Power</td> <td>0.8A</td> </tr> </tbody> </table>	Terminal	Maximum voltage	LNB Power	+25V	+5V(RFAMP)	+5.25V	+5V(OSC,Sinth)	+5.25V	+5V(Others)	+5.25V	+3.3V	+3.46V	+30V	+32V	Logic inputs	TTL	Terminal	Maximum take off current	LNB Power	0.8A
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SECTION	DESCRIPTION	SPECIFICATION				CONDITION
		MIN.	TYP.	MAX.	UNIT	
5.	Electrical specification					
5-1-1	Input VSWR	8			dB	75 Ω
5-1-2	Transmission rate	8		90	Mbps	
5-1-3	Required Eb/No				dB	BER 2×10^{-4} after Viterbi decoder. Noise BW = Bit rate x Puncture rate
	Puncture rate 1/2		3.9	4.5		
	Puncture rate 2/3		4.2	5.0		
	Puncture rate 3/4		4.7	5.5		
	Puncture rate 5/6		5.2	6.0		
	Puncture rate 7/8		5.7	6.4		
5-1-5	Image interference E.N.D (*3)			0.1	dB	Frequencies: FD, ±59MHz, ±118MHz
5-1-6	IF interference E.N.D (*3)			0.1	dB	
5-1-7	3rd order intermodulation E.N.D (*3)			0.1	dB	
<p>*3: Equivalent Noise Degradation. Condition: Puncture rate 7/8, Eb/No 6.4dB Measured on the same input level of a desired frequency and undesired frequencies.</p>						
5-1-8	LO1 phase noise					Charge pump current : ±120 μA (SP5659, Byte5) : 00
	Offset frequency 1kHz		-55	-45	dBc/Hz	
	10kHz		-80	-74		
	100kHz		-105	-95		
	LO2 phase noise					
	Offset frequency 1kHz		-100	-50	dBc/Hz	
	10kHz		<-100	-90		
	100kHz		<-100	-95		
5-1-9	LO1 lock up time			100	ms	950MHz ~ 2150MHz
5-1-10	Crystal reference initialization time			10	ms	
5-1-11	Spurious at RF input			-63	dBm	

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	SYMB. OR NO.							

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SECTION	DESCRIPTION	SPECIFICATION				CONDITION
		MIN.	TYP.	MAX.	UNIT	
5-2	Loop through specification					950MHz~2150MHz
5-2-1	Output VSWR	8			dB	75 Ω
5-2-2	Gain variation	-4		4	dB	
5-2-3	Noise figure		7	10	dB	
5-2-4	Spurious at loop through output			-63	dBm	
5-2-5	3rd order intermodulation			-50	dB	At -25dBm input.
5-2-6	Isolation between Loop through output and RF input			-20	dB	

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6. PLL I2C DATA FORMAT (MITEL:SP5659)

											Hex
ADDRESS	1	1	0	0	0	MA1	MA0	0	A	Byte 1	
	1	1	0	0	0	0	1	0			C2
PROGRAMMABLE DIVIDER EX)	0	2 ¹⁴	2 ¹³	2 ¹²	2 ¹¹	2 ¹⁰	2 ⁹	2 ⁸	A	Byte 2	
	0	0	1	0	1	1	0	0			2C
PROGRAMMABLE DIVIDER EX)	2 ⁷	2 ⁶	2 ⁵	2 ⁴	2 ³	2 ²	2 ¹	2 ⁰	A	Byte 3	
	1	0	1	0	1	1	0	0			AC
CONTROL DATA	1	2 ¹⁶	2 ¹⁵	PE	R3	R2	R1	R0	A	Byte 4	
	1	0	0	1	0	1	0	1			95
CONTROL DATA	C1	C0	RE	RTS	P3	P2/TS2	P1/TS1	P0/TS0	A	Byte 5	
	0	0	0	0	0	0	0	0			00

PROGRAMMABLE DATA = (LO1/prescaler)/(comparison freq.)
 = (1429.5MHz/2)/(62.5kHz)
 = 11436
 = 00 010 1100 1010 1100 (17bits)
 = 2CAC(Hex)

Prescaler division ratio

PE	Ratio	Comment
0	1/1	LO1:1429.5MHz - 2000MHz
1	1/2	LO1:1429.5MHz - 2629.5MHz ,ALPS recommended

Note:When PE=1, step frequency is 2 times of comparison frequency.

Charge pump current

C1	C0	Current(μA)			Comment
		MIN	TYP	MAX	
0	0	±90	±120	±150	ALPS recommended
0	1	±195	±260	±325	
1	0	±416	±555	±694	
1	1	±900	±1200	±1500	

Reference division ratios

R3	R2	R0	Ratio	Comparison frequency with 4MHz reference	R3	R2	R0	Ratio	Comparison frequency with 4MHz reference
0	0	0	2	2MHz	1	0	0	Not allowed	
0	0	1	4	1MHz	1	0	1	5	800kHz
0	0	0	8	500kHz	1	0	0	10	400kHz
0	0	1	16	250kHz	1	0	1	20	200kHz
0	1	0	32	125kHz	1	1	0	40	100kHz
0	1	1	64	62.5kHz Recommended	1	1	1	80	50kHz
0	1	0	128	31.25kHz	1	1	0	160	25kHz
0	1	1	256	15.625kHz	1	1	1	320	12.5kHz

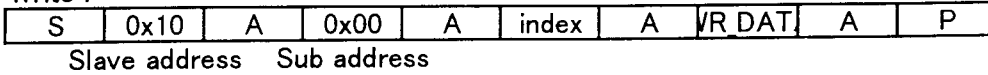
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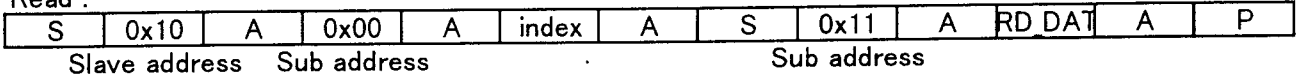
7. QPSK DEMODULATOR (VES1893A) DATA FORMAT

SADDR[2:0] = 0

Write :



Read :



- S : Start bit
- P : stoP bit
- A : Acknowledge
- index : Resister address

Notes :

Need CLB# input for reset VES1893A. CLB#(Tuner #14) input is asynchronous and active low, and clears VES1893A.

When CLR goes low, VES1893A enters its RESET mode and normal operation.

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8. INTERNAL DIGITAL FILTER SETTING

Filter	DFN	AFS	Fc1(-3dB) [MHz]	Fc2(-40dB) [MHz]	Symbol Rate Range[Mbaud]		Fs [MHz]	Fc1/Fs	Fc2/Fs	Symbol Rate/Fs	
					MIN	MAX				MIN	MAX
1	0	0	18.0	27.9	19.8	30.0	90.106	2.0E-01	3.1E-01	2.2E-01	3.3E-01
2	0	1	11.7	20.7	15.0	19.8	90.106	1.3E-01	2.3E-01	1.7E-01	2.2E-01
3	1	0	9.0	13.5	9.9	15.0	90.106	1.0E-01	1.5E-01	1.1E-01	1.7E-01
4	1	1	5.9	10.8	7.5	9.9	90.106	6.5E-02	1.2E-01	8.3E-02	1.1E-01
5	2	0	4.5	6.8	5.0	7.5	90.106	5.0E-02	7.6E-02	5.5E-02	8.3E-02
6	2	1	2.9	5.2	3.8	5.0	90.106	3.2E-02	5.8E-02	4.2E-02	5.5E-02
7	3	0	2.3	3.4	2.4	3.8	90.106	2.5E-02	3.8E-02	2.7E-02	4.2E-02
8	3	1	1.4	2.6	1.9	2.4	90.106	1.6E-02	2.9E-02	2.1E-02	2.7E-02
9	4	0	1.1	1.7	1.2	1.9	90.106	1.2E-02	1.9E-02	1.4E-02	2.1E-02
10	4	1	0.7	1.4	0.9	1.2	90.106	8.1E-03	1.5E-02	1.0E-02	1.4E-02

When internal digital filter is used, BYP is LOW(ADCONF bit 3 = 0).

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SECTION	
9.	<p>Terminal description</p> <p>1. LNB POWER (RF INPUT) : Power supply input for LNB</p> <p>2. LNB POWER (LOOP THRU) : Power supply input for LNB</p> <p>3. GND</p> <p>4. +5V(1st RF-Amp) : Power supply input for 1st RF amp.</p> <p>5. N/C</p> <p>6. +5V (Synth) : Power supply input for LO1 and PLL IC</p> <p>7. SCL (Synth): I2C clock for tuner PLL IC</p> <p>8. SDA (Synth): I2C data for tuner PLL IC</p> <p>9. N/C</p> <p>10. GND</p> <p>11. +30V : Tuning voltage input</p> <p>12. GND</p> <p>13. +5V (Other) : Power supply input</p> <p>14. CLB# : CLear VES1893A(Pulled up by 4.7k to +3.3V inside)</p> <p>15. N/C</p> <p>16. CTRL1 : ConTRoL 1.(Pulled up by 4.7k to +3.3V inside)</p> <p>17. CTRL2 : ConTRoL 2. (Pulled up by 4.7k to +3.3V inside)</p> <p>18. 22k_O : 22kHz output</p> <p>19. FEL : Front End Lock. (Pulled up by 4.7k to +3.3V inside)</p> <p>20. SCL(QPSK) : I2C clock for VES1893A</p> <p>21. SDA(QPSK) : I2C data for VES1893A</p> <p>22. +3.3V Power supply input for VES1893A</p> <p>23. N/C</p> <p>24. PSYNC : Pulse SYNChro.</p> <p>25. UNCOR : UNCORrectable error.</p> <p>26. DEN : Data ENable.</p> <p>27 - 34. DATA[N] : DATA output bus.</p> <p>35. OCLK : Output CLoCK.</p> <p>Through pin14 to 35, 100 Ω resistor is connected in series except for pin18, 20 and 21. 0 Ω is connected in series on pin 18, 20 and 21.</p>

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10.2 Example register settings for SCPC receiving.

@Five 4.42Mbauds signals in 55MHz IF band width

Parameter	Index	ttng(He	R/W	Comment
CLEAR	000000	0x01	W	Default
CARC	000001	0xA4	W	Recommended by ALPS
CSWP	000010	0x35	W	Default
CARINIT	000011	0x80	W	Default
RHYC	000100	0x2A	W	Default
AGCR	000101	0x8B	W	Recommended by ALPS, NYG=1
BDR LSB	000110	0x61	W	4.42Mbauds
BDR MID	000111	0x47	W	4.42Mbauds
BDR MSB	001000	0x06	W	4.42Mbauds
BDR INV	001001	0xA3	W	4.42Mbauds
VAFC	001010		R	Read register
VAGC	001011		R	Read register
CONF	001100	0xCC	W	Recommended by ALPS
RATE	001101	0x08	R/W	Default
SYNC	001110		R	Read register
STATUS	001111		R	Read register
POLA	010001	0x81	W	Depends on interface polarity
VBER LSB	010101		R	Read register
VBER MID	010110		R	Read register
VBER MSB	010111		R	Read register
CPT UNCOR	011000	0x80	R/W	When 1st bit is high, counter is reset
MODE	011010	0x21	W	QPSK, DVB
NTHR	011011	0xB0	W	Default
NEST	011100		R	Read register
IDENTITY	011110	0xDD	R	Read register
TEST	011111	0x10	W	Default
ADCONF	100000	0x81	W	Internal digital filter used
FCNF	100001	0x80	W	AFG=[0,1] or [0,0], AFS=1, DFN=2
GAIN	100010	0x00	W	Default
CLAMPIN	100011		R	Read register
CLAMP1	100100		R	Read register
CLAMP2	100101		R	Read register
CLAMP3	100110		R	Read register
CLAMP4	100111		R	Read register
CLAMPA	101000		R	Read register
CLAMPID	101001		R	Read register
THRES1	101010	0x00	W	Default
THRES2	101011	0x00	W	Default
AFCO	110000	0x00	W	Default
AFC1	110001	0x55	W	Default
ITSEL	110010	0x00	W	Default
ITSTAT	110011		R	Read register
H22K LSB	110100	0x80	W	Recommended by ALPS for 22kHz output
H22K MSB	110101	0x00	W	Recommended by ALPS for 22kHz output

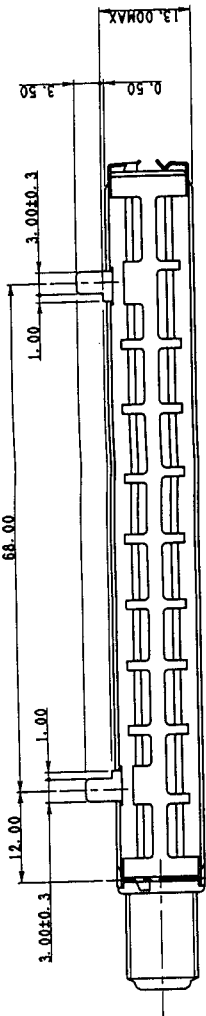
$BDR[19:0] = NINT(2^{21} \times \text{SYMBOL RATE} \times 2^{DFN} / 90.106\text{MHz})$
 $BDR[7:0] = NINT(32 \times 90.106\text{MHz} / 2^{DFN} \times \text{SYMBOL RATE})$

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TERMINALS

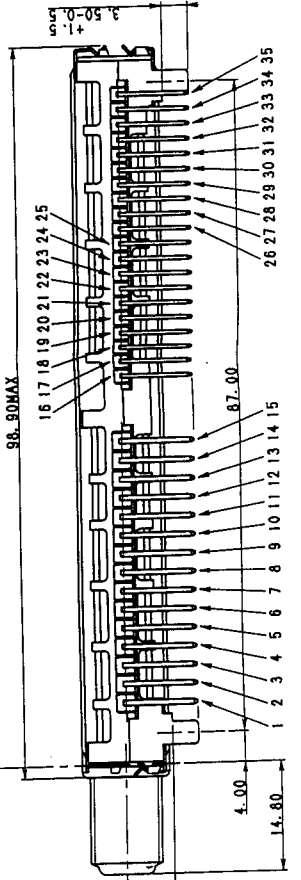
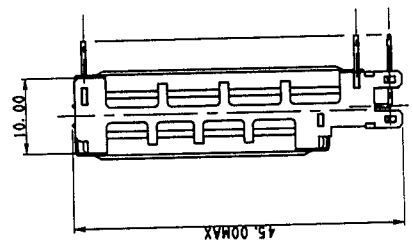
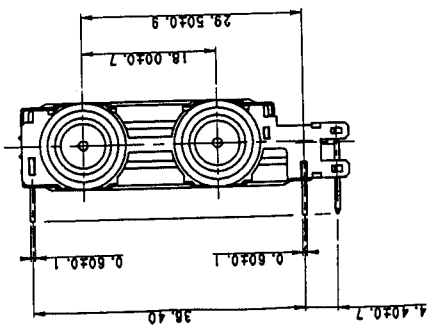
- 1 LNB POWER (RF INPUT)
- 2 LNB POWER (LOOP OUT)
- 3 GND
- 4 +5V (1st RF-Amp)
- 5 N/C
- 6 +5V (Synth)
- 7 SCL (Synth)
- 8 SDA (Synth)
- 9 N/C
- 10 GND
- 11 +30V
- 12 GND
- 13 +5V (other)
- 14 CLB#
- 15 N/C
- 16 CTRL1
- 17 CTRL2
- 18 22k_Ω
- 19 FEL
- 20 SCL (OPSK)
- 21 SDA (OPSK)
- 22 +3.3V
- 23 N/C
- 24 PSYNC
- 25 UNCOR
- 26 DEN
- 27 DATA171
- 28 DATA161
- 29 DATA151
- 30 DATA141
- 31 DATA131
- 32 DATA121
- 33 DATA111
- 34 DATA101
- 35 OCLK



CUST. MODEL NO.
ALPS MODEL NO.
DATE CODE NO.

3/8-32 UNEF 2A
RF INPUT

LOOP
THROUGH
OUT



- NOTE 1. TOLERANCES ARE ±0.5, UNLESS OTHERWISE SPECIFIED.
- 2. DATE CODE NO. SHALL BE CONFORMED TO ALPS STANDARD SPECIFICATION.
- 3. THE PITCH BETWEEN TERMINAL IS SPECIFIED AT THE ROOT.
- 4. N/C PINS SHOULD BE CONNECTED TO GROUND OR BE OPENED.

CUST. MODEL NO. ALPS MODEL NO.		BSRV2-301A	
PART NO.	NAME	MATERIAL	FINISH
SPEC.		ALPS ELECTRIC CO., LTD.	
SCALE	2:1	DATE	16.18.2018
TITLE	BSRV2 ASSEMBLY DRAWING	UNIT	mm
DATE OR NO.	APP. ENDR. ISSU.	DATE	16.08.2018
KEY NO.	6	KEY NO.	8