

Customer :
ALGE-DS

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

Attention :

Your ref. No. :

Your Part No. :

SPECIFICATIONS

ALPS :

MODEL : BSRV2-301A

Spec. No. :

Sample No. :

RECEIPT STATUS
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By. Date _____

Signature _____

Name

Title

ALPS ELECTRIC CO., LTD.

HEAD OFFICE

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ENG. DEPT. RF DEVICES DIVISION

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
7. QPSK demodulator data format
8. Internal digital filter setting
9. Terminal description
10. Example register setting
11. Reliability specification
12. Mechanical specification

					ALPS ELECTRIC CO., LTD.			
					APPD.	CHKD.	DSGD.	-301A
					Oct. 16, '98	/	Oct. 16, '98	
					<i>[Signature]</i>	<i>[Signature]</i>		TITLE
								BSRV2 SPECIFICATION
								DOCUMENT NO.
								(1 / 14)
SYMB.	DATE OR NO.	APPD	CHKD	DSGD				

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: F _D , ±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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	DATE	APPD.	CHKD.	DSGD.				
	SYMB. OR NO.							

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. 30 minutes after DC power supplied.																														
2-3	Power supply	<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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3.	Current consumption	<table border="1"> <thead> <tr> <th>Terminal</th> <th>MIN.</th> <th>TYP.</th> <th>MAX.</th> <th></th> </tr> </thead> <tbody> <tr> <td>+5V(RFAMP)</td> <td>10</td> <td>15</td> <td>20</td> <td>mA</td> </tr> <tr> <td>+5V(OSC,Sinth)</td> <td>80</td> <td>100</td> <td>120</td> <td>mA</td> </tr> <tr> <td>+5V(Others)</td> <td>120</td> <td>160</td> <td>200</td> <td>mA</td> </tr> <tr> <td>+3.3V</td> <td>-</td> <td>310*1</td> <td>430*2</td> <td>mA</td> </tr> <tr> <td>+30V</td> <td>-</td> <td>-</td> <td>3.2</td> <td>mA</td> </tr> </tbody> </table> <p>*1 : Condition 42Mbps, Puncture rate 7/8 *2 : Possible maximum current</p>	Terminal	MIN.	TYP.	MAX.		+5V(RFAMP)	10	15	20	mA	+5V(OSC,Sinth)	80	100	120	mA	+5V(Others)	120	160	200	mA	+3.3V	-	310*1	430*2	mA	+30V	-	-	3.2	mA
Terminal	MIN.	TYP.	MAX.																													
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								DOCUMENT NO. (3/ 14)		
SYMB.	DATE OR NO.	APPD.	CHKD.	DSGD.						

SECTION	DESCRIPTION	SPECIFICATION																				
4.	Absolute maximum voltage	<table border="1" data-bbox="821 260 1439 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 1439 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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								DOCUMENT NO.		
								(4/ 14)		
SYMB.	DATE OR NO	APPD	CHKD	DSGD						

7

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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								DOCUMENT NO. (6 / 14)		
SYMB.	DATE OR NO.	APPD	CHKD	DSGD						

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

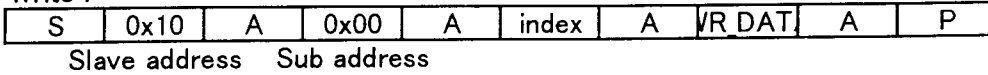
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								TITLE	BSRV2 SPECIFICATION
								DOCUMENT NO.	(7/14)
SYMB.	DATE OR NO.	APPD	CHKD	DSGD					

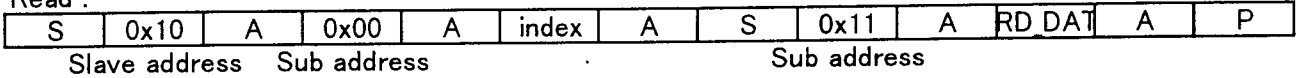
7. QPSK DEMODULATOR (VES1893A) DATA FORMAT

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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								TITLE BSRV2 SPECIFICATION				
								DOCUMENT NO. (8/14)				
SYMB.	DATE OR NO.	APPD	CHKD	DSGD								

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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					APPD.	CHKD.	DSGD.
							-301A
							TITLE BSRV2 SPECIFICATION
							DOCUMENT NO. (9/14)
SYMB	DATE OR NO	APPD	CHKD	DSGD			

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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					APPD.	CHKD.	DSGD.	-301A
								TITLE BSRV2 SPECIFICATION
								DOCUMENT NO. (10/14)
SYMB	DATE OR NO	APPD	CHKD	DSGD				

10.1 Example register settings for 27.5Mbauds receiving.

Parameter	Index	Setting(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	0x0B	W	Default
BDR_LSB	000110	0x55	W	27.5Mbauds
BDR_MID	000111	0xC4	W	27.5Mbauds
BDR_MSB	001000	0x09	W	27.5Mbauds
BDR_INV	001001	0x69	W	27.5Mbauds
V AFC	001010		R	Read register
V AGC	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
FCONF	100001	0x80	W	AFG Gain=1, AFS=0, DFN=0
GAIN	100010	0x00	W	Default
CLAMP_IN	100011		R	Read register
CLAMP1	100100		R	Read register
CLAMP2	100101		R	Read register
CLAMP3	100110		R	Read register
CLAMP4	100111		R	Read register
CLAMP_A	101000		R	Read register
CLAMP_MID	101001		R	Read register
THRES1	101010	0x00	W	Default
THRES2	101011	0x00	W	Default
AFC0	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

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

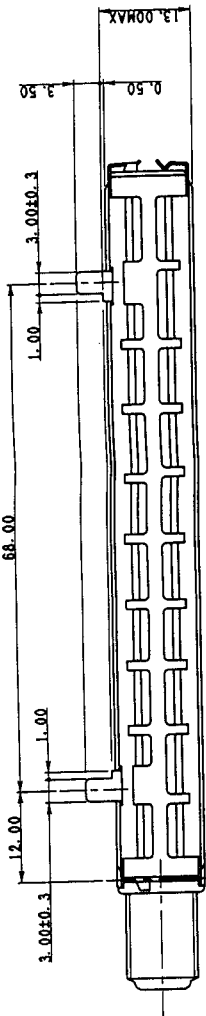
$BDR[7:0] = NINT(32 \times 90.106\text{MHz} / 2^{DFN} \times \text{SYMBI})$ NINT: Nearest Integer

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					APPD.	CHKD.	DSGD.	-301A
					TITLE			BSRV2 SPECIFICATION
					DOCUMENT NO.			(11/14)
SYMB.	DATE OR NO.	APPD	CHKD	DSGD				

16

TERMINALS

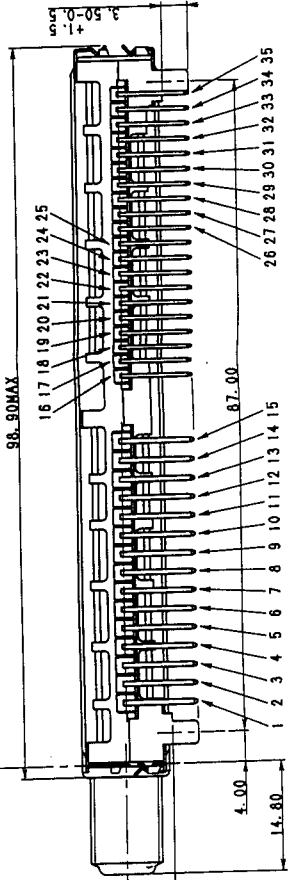
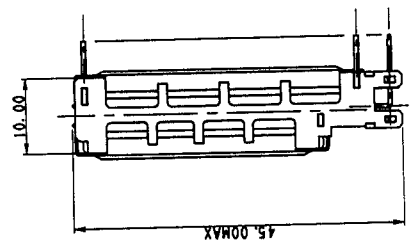
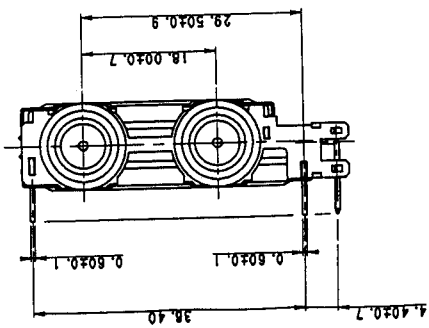
- 1 LNB POWER (RF INPUT)
- 2 LNB POWER (LOOP OUT)
- 3 GND
- 4 +5V (1st RF-Amp)
- 5 N/C
- 6 +5V (Synth)
- 7 SCL (Synth)
- 8 SDA (Synth)
- 9 N/C
- 10 GND
- 11 +30V
- 12 GND
- 13 +5V (other)
- 14 CLB#
- 15 N/C
- 16 CTRL1
- 17 CTRL2
- 18 22k_Ω
- 19 FEL
- 20 SCL (OPSK)
- 21 SDA (OPSK)
- 22 +3.3V
- 23 N/C
- 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