

SPECIFICATIONS

3 IN 1 MODULATOR, TUNER, IF BLOCK

MODEL : _____

(VHA35ASE)

Pb-Free

SANYO TUNER INDUSTRIES CO., LTD.

TUNER ENGINEERING SECTION

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APPROVED

CHECKED

WRITTEN

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1 . GENERAL

1-1 Summary

This unit has RF modulator, tuner and VIF circuits in a case.

1-2 Receiving channels and system

USA 181 channels

System	NTSC-M
VHF Low Band	2 ~ B CH
VHF High Band	C ~ W+11 CH
UHF Band	W+12 ~ 69 CH

1-3 Modulator output channels

CH SW Open	3 CH
CH SW GND	4 CH

1-4 Input, output impedance

ANT input impedance	75	unbalanced
ANT output impedance	75	unbalanced

1-5 Permissible maximum voltage

+B,CONTROL	+ 5.5 V
BT	+31.0 V

1-6 Normal voltage

+B,CONTROL	+ 5 V \pm 5 %
BT	+30 V \pm 5 %

1-7 Voltage for guaranteeing electrical specification

+B,CONTROL	+ 5 V \pm 0.1 V
BT	+30 V \pm 0.1 V

1-8 Temperature

Operating temperature	- 5 to +60 °C
Storage temperature	-20 to +70 °C

1-9 Humidity

Operating humidity	35 to 80 % RH
Storage humidity	10 to 90 % RH

1-10 Intermediate frequencies

Picture carrier	45.75 MHz
Sound carrier	41.25 MHz

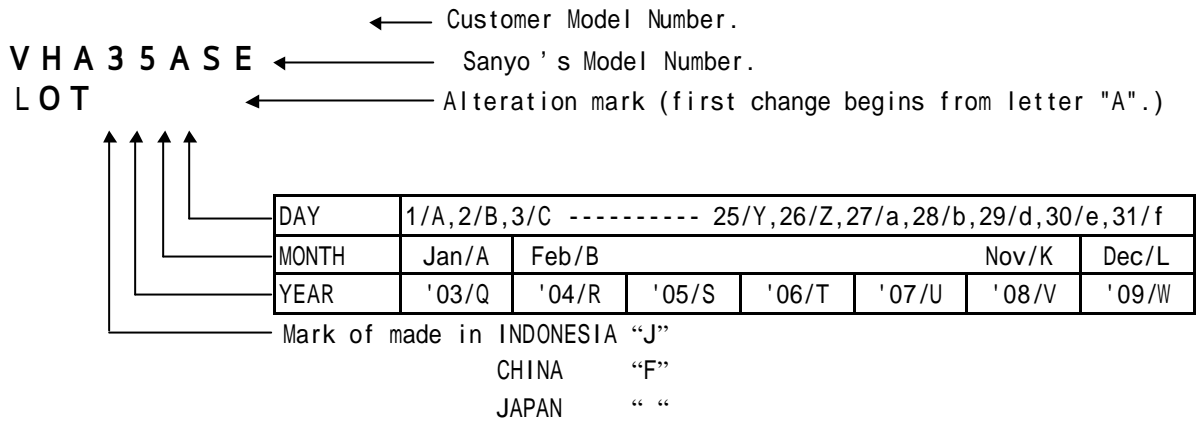
1-11 Current consumption

	TYP	MAX
+B	170 mA	230 mA
CONTROL	350 μ A	700 μ A
BT	2.0 mA	5.0 mA

1-12 Applied safety and regulation standards

- UL1492
- FCC Part 15
- CSA C22.2 No.1
- IC BETS-7

1-13 Marking



1-14 Terminals

Number	Terminal	Function
1	AUDIO IN	MOD AUDIO INPUT
2	CH.SW	CHANNEL SWITCH (OPEN/GND)
3	+B	+B (+5V)
4	CONTROL	MOD OUTPUT ON/OFF(+5V/0V)
5	VIDEO IN	MOD VIDEO INPUT
6		
7	N.C.	(RF AGC TP)
8	X*TAL	3.58MHz INPUT
9	N.C.	- - -
10	CLOCK	CLOCK SIGNAL INPUT
11	DATA	DATA SIGNAL INPUT
12	AFT OUT	AFT OUTPUT
13	AUDIO OUT	AUDIO OUTPUT
14	SIF OUT	SIF OUTPUT
15	BT	TUNING(+31V)
16	IF OUT	IF OUTPUT
17	VIDEO OUT	VIDEO OUTPUT

(R F M O D U L A T O R S E C T I O N)

2 . R F M O D U L A T O R O U T P U T C H A R A C T E R I S T I C S

	ITEMS	SPECIFICATION				MEASUREMENT TERMS
		MIN	TYP	MAX	UNIT	
2-1	V.S.W.R.		2	3		ANT out (MOD.ON) 60 ~ 72 MHz 0 ~ (fp-4.6) MHz, (fp+7.4) ~ 1000 MHz fp ~ (fp+4.5) MHz Video in : None Video in : 3.58 MHz, 0.4 Vp-p Measure the level of fp + 920 KHz
2-2	Picture carrier frequency	-50	fp	50	KHz	
2-3	Sound carrier frequency	-0.007	fp+4.5	0.007	MHz	
2-4	Picture level	63.5	66.5	69.5	dB μ (close)	
2-5	P/S ratio	19	16	13	dB	
2-6	Spurious level without pass band			36	dB μ (close)	
2-7	Spurious level within pass band			-65	dB	
2-8	920 KHz beat		-65	-55	dB	

3 . R F M O D U L A T O R V I D E O C H A R A C T E R I S T I C S

	ITEMS	SPECIFICATION				MEASUREMENT TERMS
		MIN	TYP	MAX	UNIT	
3-1	Video in impedance	0.7	1.0	1.3	K	0 ~ 4.2 MHz (unbalance) Video in : 1 Vp-p S/(V+S) 0.5 ~ 4.2 MHz (1 MHz base) Video in : 1 Vp-p, stair step chroma 20 IRE
3-2	Video modulation	71	78	85	%	
3-3	Sync ratio	26.5	28.5	30	%	
3-4	Video frequency characteristics	-3	-1	2	dB	
3-5	DG		1	7	%	
3-6	DP		1	7	deg	
3-7	Video S/N ratio	45	48		dB	
3-8	Maximum modulation	88	94	99	%	

4 . R F M O D U L A T O R A U D I O C H A R A C T E R I S T I C S

	ITEMS	SPECIFICATION				MEASUREMENT TERMS
		MIN	TYP	MAX	UNIT	
4-1	Audio in impedance	10			K	50 Hz ~ 10 KHz (unbalance) Audio in : -3.8 dBs, 1 KHz (±25 KHz deviation : 100 %) 50 Hz ~ 10 KHz (1 KHz base) Audio in : -3.8 dBs, 1 KHz Audio in : -3.8 dBs, 1 KHz Video in : 2 Vp-p, color bar
4-2	Modulation	80	100	120	%	
4-3	Audio frequency characteristics	-3	-0.5	3	dB	
4-4	Distortion		0.3	1	%	
4-5	Audio S/N ratio	45	50		dB	

5 . SW CIRCUITS CHARACTERISTICS

	ITEMS	SPECIFICATION				MEASUREMENT TERMS
		MIN	TYP	MAX	UNIT	
5-1	V.S.W.R.			3		ANT out (MOD.OFF) 54 ~ 810 MHz
5-2	Insertion loss			6	dB	ANT in - ANT out (MOD.OFF) 54 ~ 810 MHz
5-3	Separation	60	65		dB	ANT in - ANT out (MOD.ON) 60 ~ 72 MHz
5-4	ANT in terminal leakage voltage		0	9.5	dB μ (close)	

6 . RF MODULATOR THERMAL STABILITY CHARACTERISTICS

	ITEMS	SPECIFICATION				MEASUREMENT TERMS
		MIN	TYP	MAX	UNIT	
6-1	Video modulation	-10		10	%	0 ~ 60 (25 standard)
6-2	Sound modulation	-10		10	%	
6-3	Picture carrier frequency	-80		80	KHz	
6-4	Sound carrier frequency	-12		12	KHz	
6-5	Video output level	-2		2	dB	
6-6	P/S ratio	-2.5		2.5	dB	

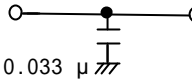
(I F S E C T I O N)

7 . I F O U T C H A R A C T E R I S T I C S

	ITEMS		SPECIFICATION				MEASUREMENT TERMS
			MIN	TYP	MAX	UNIT	
7-1	Sensitivity	VHF CATV,UHF		34 34	38 38	dB μ (close)	B.P.F (100 KHz ~ 4.2 MHz) Except sync. and chroma signal S/N=20 dB
7-2	Video S/N ratio	VHF CATV,UHF	45 45	47 46		dB	Note : In case of item 1,2,5, 6,7,8 and 9, the following additional circuit is to be connected between video out terminal and the measuring instrument. See Fig. 1
7-3	Maximum input	VHF CATV,UHF	100 90			dB μ (open)	
7-4	Video output level		0.8	1	1.2	Vp-p	
7-5	Sync ratio		26	29	32	%	Sync ratio 28.57 % standard
7-6	burst ratio		16	25	36	%	burst ratio 28.57 % standard
7-7	Video frequency characteristics	1 MHz 2 MHz 3 MHz	-1.5 -2 -3.5	0 0 -1	1.5 3 3	dB	JIS C-6101(500 KHz standard)
7-8	DP				8	deg	10 steps staircase signal 87.5 % MOD. burst standard (Except 10th step)
7-9	DG				8	%	As the above.
7-10	C/L delay		-150	0	150	nsec	Group delay 0.5 MHz versus 3.58 \pm 0.5 MHz
7-11	AGC flatness		-1	0	1	dB	Sensitivity level to maximum input level
7-12	Bar pulse response			5	13	%	C1/D C2/D E1/D E2/D

ANT In input level 79 dB μ (75 OPEN) except 7-1,7-3,7-11, P/S=10 dB

8 . IF AUDIO OUT CHARACTERISTICS

	ITEMS	SPECIFICATION				MEASUREMENT TERMS
		MIN	TYP	MAX	UNIT	
8-1	Audio output level	100	140	173	mVrms	400 Hz 30 % MOD. 47 K load under the black burst.
8-2	Audio frequency characteristics 20 Hz ~ 12 KHz	-3	0	+3	dB	
8-3	Audio distortion		0.5	2	%	400 Hz 30 % MOD. Under the black burst.  0.033 μ
8-4	Audio S/N	48	52		dB	1 KHz 100 % MOD. Under the black burst.
8-5	Audio sensitivity VHF CATV,UHF		24 24	30 34	dB μ (close)	Black burst,1kHz,30 % MOD. H.P.F:400Hz S/N 30 dB
8-6	Buzz Color bar Sweep		10 50	50 100	mVp-p	Split color bar signal P/S 10 dB Video sweep 0.5~4 MHz (Audio non MOD.)
8-7	SIF output level	93	100	110	dB μ (open)	US 11CH,79 dB μ (open), P/S 10dB, Audio non Mod. Use FET probe

ANT In input level 66 dB μ (75 open) except 8-5. P/S=-7 dB

9 . AFT CHARACTERISTICS

	ITEMS	SPECIFICATION				MEASUREMENT TERMS
		MIN	TYP	MAX	UNIT	
9-1	AFT center frequency	2.0	3.0	4.0	V	10 steps staircase at US 12 CH
9-2	AFT output voltage MIN V MAX V	4.0		1.0	V	

1 0 . IF THERMAL CHARACTERISTICS

	ITEMS	SPECIFICATION				MEASUREMENT TERMS
		MIN	TYP	MAX	UNIT	
10-1	Video output level	-10		10	%	Difference between the measurement value in the standard condition and the value measured in the temperature range of -5 to 60
10-2	Burst ratio	-10		10	%	
10-3	Sync ratio	-10		10	%	
10-4	Video S/N	-3		3	dB	
10-5	Video sensitivity	-4		4	dB	
10-6	Audio output level	-2		2	dB	
10-7	Audio S/N	-3		3	dB	
10-8	Audio sensitivity	-4		4	dB	
10-9	AFT center voltage	-2		2	V	

(T U N E R S E C T I O N)

1 1 . T U N E R C H A R A C T E R I S T I C S

11-1 Tuning voltage range

VHF	0.5 to 30 V
UHF	0.5 to 30 V
Frequency synthesizer minimum voltage 0.5 V	

11-2 Power gain

VHF	MIN 25 dB
UHF	MIN 24 dB

11-3 Power gain deviation between channels

VHF	12 dB MAX, TYP 6 dB
UHF	14 dB MAX, TYP 6 dB

11-4 Noise figure

VHF	14 dB MAX
CATV,UHF	14 dB MAX

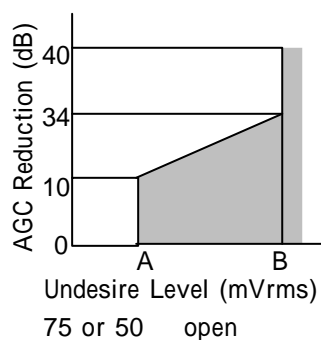
11-5 Image rejection ratio

CH 2 ~ 13	50(40) dB MIN
CH J ~ W+11	50(40) dB MIN
CH W+12 ~ 69	50(40) dB MIN
	() ; AGC Range 0 ~ -30 dB

11-6 IF rejection ratio

CH 2 ~ B	50(45) dB MIN
CH C ~ W+11	60(50) dB MIN
CH W+12 ~ 69	70(40) dB MIN
	() ; AGC Range 0 ~ -30 dB

11-7 1% cross modulation



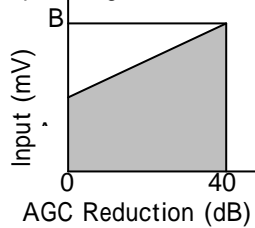
VHF	A : 5 mV
	B : 70 mV
CATV	A : 3 mV
	B : 70 mV
UHF	A : 5 mV
	B : 50 mV

11-8 FM rejection ratio

CH 7 ~ 13	60 dB MIN
CH 5	40 dB MIN (*1)

*1. Des : 5 CH (77.25 MHz) 60 dB μ 75 open
 Und : 89.1 MHz
 s/i = 30 dB
 Rej = s/i + (-D/U)

11-9 Input signal level at 10 % distortion



VHF	A : 3 mV
(75 open rms)	B : 300 mV
UHF	A : 3 mV
(50 open rms)	B : 300 mV

11-10 VHF,UHF rejection ratio

VHF	70 dB MIN
UHF	50 dB MIN

11-11 1/2 IF harmonic rejection ratio

UHF	45 dB MIN
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11-12 Inter modulation

VHF	45 dB MIN
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11-13 Drift of oscillation frequency

By $\pm 1\%$ change of +B voltage

VHF	± 250 KHz MAX
UHF	± 250 KHz MAX

By ± 25 change from 25

CH 2 ~ 13	± 2000 KHz MAX
CH J ~ W+11	± 4000 KHz MAX
CH W+12 ~ 69	± 4000 KHz MAX

11-14 Local oscillator voltage on the aerial input terminals

300 MHz MAX	34 dB μ V MAX
300 ~ 1000 MHz	50 dB μ V MAX
1000 ~ 1694 MHz	51.7 dB μ V MAX

11-15 CH 6 Beat

40 dB μ MIN

11-16 CH A-5 Beat

40 dB μ MIN

1 3 . Country origin

SANYO Tuner Industries Co., LTD.(JAPAN)

GuangDong Foshan Optoelectronic Equip.Corp.(CHINA)

SANYO Jaya Components Indonesia (INDONESIA)

USA CHANNEL FREQUENCY TABLE(181CH)

P IF=45.75MHz

C IF=42.17MHz

S IF=41.25MHz

UNIT:MHz

	CHANNEL	P CARRIER	S CARRIER	LOCAL
VHF Low	2	55.25	59.75	101
	3	61.25	65.75	107
	4	67.25	71.75	113
	5	77.25	81.75	123
	6	83.25	87.75	129
	A-6	85.25	89.75	131
	A-5	91.25	95.75	137
	A-4	97.25	101.75	143
	A-3	103.25	107.75	149
	A-2	109.25	113.75	155
	A-1	115.25	119.75	161
	A	121.25	125.75	167
	B	127.25	131.75	173
	VHF High	C	133.25	137.75
D		139.25	143.75	185
E		145.25	149.75	191
F		151.25	155.75	197
G		157.25	161.75	203
H		163.25	167.75	209
I		169.25	173.75	215
7		175.25	179.75	221
8		181.25	185.75	227
9		187.25	191.75	233
10		193.25	197.75	239
11		199.25	203.75	245
12		205.25	209.75	251
13		211.25	215.75	257
J		217.25	221.75	263
K		223.25	227.75	269
L		229.25	233.75	275
M		235.25	239.75	281
N		241.25	245.75	287
O		247.25	251.75	293
P		253.25	257.75	299
Q		259.25	263.75	305
R		265.25	269.75	311
S		271.25	275.75	317
T		277.25	281.75	323
U		283.25	287.75	329
V		289.25	293.75	335
W		295.25	299.75	341
W+1		301.25	305.75	347
W+2		307.25	311.75	353
W+3		313.25	317.75	359
W+4		319.25	323.75	365
W+5		325.25	329.75	371
W+6		331.25	335.75	377
W+7	337.25	341.75	383	
W+8	343.25	347.75	389	
W+9	349.25	353.75	395	
W+10	355.25	359.75	401	

BAND	CHANNEL	P CARRIER	S CARRIER	LOCAL
UHF	W+11	361.25	365.75	407
	W+12	367.25	371.75	413
	W+13	373.25	377.75	419
	W+14	379.25	383.75	425
	W+15	385.25	389.75	431
	W+16	391.25	395.75	437
	W+17	397.25	401.75	443
	W+18	403.25	407.75	449
	W+19	409.25	413.75	455
	W+20	415.25	419.75	461
	W+21	421.25	425.75	467
	W+22	427.25	431.75	473
	W+23	433.25	437.75	479
	W+24	439.25	443.75	485
	W+25	445.25	449.75	491
	W+26	451.25	455.75	497
	W+27	457.25	461.75	503
	W+28	463.25	467.75	509
	W+29	469.25	473.75	515
	14	471.25	475.75	517
	15	477.25	481.75	523
	16	483.25	487.75	529
	17	489.25	493.75	535
	18	495.25	499.75	541
	19	501.25	505.75	547
	20	507.25	511.75	553
	21	513.25	517.75	559
	22	519.25	523.75	565
	23	525.25	529.75	571
	24	531.25	535.75	577
	25	537.25	541.75	583
	26	543.25	547.75	589
	27	549.25	553.75	595
	28	555.25	559.75	601
	29	561.25	565.75	607
	30	567.25	571.75	613
	31	573.25	577.75	619
	32	579.25	583.75	625
	33	585.25	589.75	631
	34	591.25	595.75	637
	35	597.25	601.75	643
	36	603.25	607.75	649
	37	609.25	613.75	655
	38	615.25	619.75	661
	39	621.25	625.75	667
40	627.25	631.75	673	
41	633.25	637.75	679	
42	639.25	643.75	685	
43	645.25	649.75	691	
44	651.25	655.75	697	
45	657.25	661.75	703	

USA CHANNEL FREQUENCY TABLE(181CH)

P IF=45.75MHz

C IF=42.17MHz

S IF=41.25MHz

UNIT:MHz

	CHANNEL	P CARRIER	S CARRIER	LOCAL
UHF	46	663.25	667.75	709
	47	669.25	673.75	715
	48	675.25	679.75	721
	49	681.25	685.75	727
	50	687.25	691.75	733
	51	693.25	697.75	739
	52	699.25	703.75	745
	53	705.25	709.75	751
	54	711.25	715.75	757
	55	717.25	721.75	763
	56	723.25	727.75	769
	57	729.25	733.75	775
	58	735.25	739.75	781
	59	741.25	745.75	787
	60	747.25	751.75	793
	61	753.25	757.75	799
	62	759.25	763.75	805
	63	765.25	769.75	811
	64	771.25	775.75	817
	65	777.25	781.75	823
66	783.25	787.75	829	
67	789.25	793.75	835	
68	795.25	799.75	841	
69	801.25	805.75	847	

