

C u s t o m e r :

S A M S U N G E L E C T R O N I C S C O . , L T D

N o . K A 0 2 1 1 0 5 0 1 (1/42)

D a t e : N o v . 0 5 . 2 0 0 2

A t t e n t i o n :

Y o u r r e f . N o . :

Y o u r P a r t N o . : A C 4 0 - 0 0 0 2 6 A

S P E C I F I C A T I O N S

A L P S

M O D E L : T M Z H 2 - 0 1 3 A

S p e c . N o . :

S a m p l e N o . :

R E C E I P T S T A T U S

R E C E I V E D

By. Date

Signature

N a m e

T i t l e

A L P S E L E C T R I C K O R E A C O . , L T D .

H E A D O F F I C E / F A C T O R Y

970-1, JANGDUK-DONG, GWANGSAN-GU, GWANGJU, KOREA.

P H O N E : (062) 950-2456

F A X : (062) 951-9722-3

D S G ' D

A P P ' D N o v . 5 . ' 0 2

S a l e s

AC40-00026A	TMZH2-013A
CUST. MODEL NO.	ALPS MODEL NO.

					DSGD. Nov. 5. '02	
					5 Yamamoto	
					CHKD.	TITLE
						TMZH2
					APPD.	PRODUCT SPECIFICATION
					Nov. 5. '02 H. Tsuji	(1 / 30)
SYMB.	DATE OR NO.	APPD.	CHKD.	DSGD.	ALPS ELECTRIC CO., LTD.	

INDEX (目次)

ITEM No.	ITEM (項目)	PAGE
1	Common (共通)	4
1- 1	Application (適用範囲)	4
1- 2	Applied Standards (適用規格)	4
1- 3	Structure (構造)	4
1- 4	Circuit (回路)	4
2	General Specifications (一般仕様)	5~10
2- 1	Applicable Broad Casting System (適合放送方式)	5
2- 2	Receiving System (受信方式)	5
2- 3	Intermediate Frequency (中間周波数)	5
2- 4	Receiving Channel (受信チャンネル)	5
2- 5	Output Channel of Modulator (モジュレーター出力チャンネル)	5
2- 6	Input, Output Condition (入出力条件)	6
2- 7	Guarantee Condition Operation (動作保証)	6
2- 8	Absolute Maximum Ratings (絶対最大定格)	7
2- 9	Storage Temperature Range (保存温度範囲)	7
2-10	Current Consumption (消費電流)	8
2-11	Test Condition (試験条件)	8
2-12	PLL Characteristics of tuner section (チューナ部PLL特性)	9
2-13	Measuring Instrument (使用測定器)	10

							TITLE	PRODUCT	
							T M Z H 2	SPECIFICATION	
								(2 /)	
					<i>ALPS ELECTRIC CO., LTD.</i>				
SYMB.	DATE OR NO.	APPD.	CHKD.	DSGD.					

1 Common (共通)

1-1 Application
(適用範囲)

This specification applies to TMZH TYPE (RF Front-End System) for TV, VCR.
(本仕様書は、TV, VCRで使用するTMZH 型について規定する。)

1-2 Applied Standards
(適用規格)

UL, FCC, CSA

1-3 Structure
(構造)

Refer to the attached assembly drawing.
(組立図による。)

1-4 Circuit
(回路)

Refer to the attached circuit diagram.
(配線図による。)

NOTE : Specifications of "TYP" for reference.
(記載 : TYP値は参考です。)

							TITLE	PRODUCT	
							TMZH 2	SPECIFICATION	
								(4 /)	
SYMB.	DATE OR NO.	APPD.	CHKD.	DSGD.	ALPS ELECTRIC CO., LTD.				

2 General Specifications (一般仕様)

2-1 Applicable Broad Casting System (適合放送方式)

M-NTSC / USA

2-2 Receiving System (受信方式)

Upper Heterodyne
(上側 ヘテロダイン)

2-3 Intermediate Frequency (中間周波数)

Picture Intermediate Frequency : 45.75 MHz
(映像中間周波数)
Sound Intermediate Frequency : 41.25 MHz
(音声中間周波数)

2-4 Receiving Channel (受信チャンネル)

VHF Low : 2 ~ B CH
VHF High : C ~ W + 11 CH
UHF : W + 12 ~ 69 CH

2-5 Output Channel of Modulator (モジュレーター出力チャンネル)

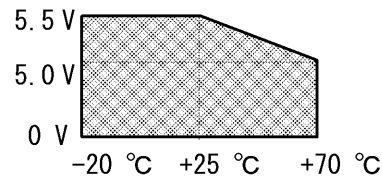
US 3/4 CH

	TERMINAL NO. 2	FREQUENCY
3 CH	OPEN	61.25 MHz
4 CH	GND	67.25 MHz

						TITLE	PRODUCT	
						TMZH2	SPECIFICATION	
								(5 /)
SYMB.	DATE OR NO.	APPD.	CHKD.	DSGD.	ALPS ELECTRIC CO., LTD.			

2-8 Maximum Ratings
(絶対最大定格)

Voltage (Temperature 25 °C)
(電圧)

TERMINAL	SPECIFICATIONS
+ B	(Supply Voltage) +B Should be within hatched area. (電圧印加時、右図で示す領域以外の条件は、 瞬時といえども、与えてはならない。) Temperature Range : $\pm 2\text{ }^{\circ}\text{C}$ (温度については、許容差 $\pm 2\text{ }^{\circ}\text{C}$) 
TU	34.0 V
CONTROL	5.5 V Within "MB" Supply Voltage. (MB電源電圧を越えないこと)
SCL SDA	Within "+B" Supply Voltage. (+B電源電圧を越えないこと)

2-9 Storage Temperature Range
(保存周囲温度範囲)

Temperature (温度) : $-20\text{ }^{\circ}\text{C} \sim +70\text{ }^{\circ}\text{C}$
Humidity (湿度) : Less than 90 % RH
(90 % RH 以下)

						TITLE	PRODUCT	
						T M Z H 2	SPECIFICATION	
								(7 /)
SYMB.	DATE OR NO.	APPD.	CHKD.	DSGD.	ALPS ELECTRIC CO., LTD.			

2-10 Current Consumption (消費電流)

TERMINAL	Current Consumption (消費電流)			
	MIN.	TYP.	MAX.	UNIT
+B (Supply Voltage)	135	165	195	mA
TU (Tuning Supply Voltage)	—	1.4	2.0	
CONTROL	—	50	180	μ A

2-11 Test Condition (試験条件)

TERMINAL	Supply Voltage (印加電圧)
+B	5 V $\pm$ 0.1 V
TU	32 V $\pm$ 2.0 V
CONTROL	5 V $\pm$ 0.1 V
Ambient Temperature (周囲温度)	25 °C $\pm$ 5 °C
Relative Humidity (相对湿度)	65 % $\pm$ 10 %

(NOTE) +B Ripple : 10 mVp-p MAX.

[OTHERS]

+B (Tuner & IF Supply Voltage)
 TU (Tuner Tuning Supply Voltage)
 CONTROL (Modulator mode [TV/VCR] Control)

						TITLE	PRODUCT	
						TMZH2	SPECIFICATION	
								(8 /)
SYMB.	DATE OR NO.	APPD.	CHKD.	DSGD.	ALPS ELECTRIC CO., LTD.			

2-12 PLL Characteristics of tuner section
(チューナ部 PLL特性)

2-12-1 Input Signal Level (SCL, SDA)
(信号入力レベル)

V _{IH} (High-level Input Voltage)	MIN. 3.0 V	MAX. 5.5 V
V _{IL} (Low-level Input Voltage)		MAX. 1.5 V

2-12-2 Write data format

	MSB					LSB				
Address	1	1	0	0	0	MA1	MA0	0	A	byte 1
Freq. data	0	N14	N13	N12	N11	N10	N9	N8	A	byte 2
Freq. data	N7	N6	N5	N4	N3	N2	N1	N0	A	byte 3
Charge-pump and test bit	1	CP	0	0	1	RSA	RSB	0	A	byte 4
Band control data	*	*	*	*	P3	P2	P1	P0	A	byte 5

* : Input not used

Where

- 1) A : Acknowledge bit

- 2) N14 to N0 : Programmable divider bit
- $$N = N_{14} \cdot 2^{14} + N_{13} \cdot 2^{13} + \dots + N_1 \cdot 2 + N_0$$

- 3) CP : Charge-pump current

CP	Current	Application
1	High	○
0	Low	

- ### 5) Locked OSC Frequency

$$f_{osc} = f_r * 8 * N$$

where $f_r = 3.579545 \text{ MHz} / \text{REFERENCE DIVIDER}$

- ## 6) Address selection

MA1	MA0	V input on AS	
0	0	0 to 0.1*Vcc	
0	1	always valid	○
1	0	0.4*Vcc to 0.6*Vcc	
1	1	0.9*Vcc to Vcc	

- #### 4) Band switching by byte5

Band	P3	P2	P1	P0
UHF	1	0	0	0
VHF high	0	0	1	0
VHF low	0	0	0	1

- 7) Ratio select bits

RSA	RSB	Ref-div	Ref-freq	Application
0 or 1	0	640	44.7443 kHz	
0	1	1,024	27.9652 kHz	○
1	1	512	55.9304 kHz	

							TITLE	PRODUCT	
							T M Z H 2	SPECIFICATION	
									(9 /)
SYMB.	DATE OR NO.	APPD.	CHKD.	DSGD.	ALPS ELECTRIC CO., LTD.				

2-13 Measuring Instruments
(使用測定器)

2-13-1 RF-Modulator Section
(RFモジュレータ部)

Audio Analyzer	8903B	(HP)	
Television Demodulator	1450-1	(TEKTRONIX)	
Spectrum Analyzer	8568B	(HP)	
Network Analyzer	8752A	(HP)	
TV pattern Generator	TG-7/1	(SHIBASOKU)	3900N (NIHON TSUSHINKI)
Video Noise Meter	925D/1	(SHIBASOKU)	

2-13-2 IF Section
(IF部)

TV pattern Generator	TG-7/1	(SHIBASOKU)	3900N	(NIHON TSUSHINKI)
IF Modulator	RM54A	(SHIBASOKU)	146F	(EIDEN)
RF Converter	RC51B	(SHIBASOKU)	458C-X	(EIDEN)
Video Noise Meter	925D/1	(SHIBASOKU)	VN31AX	(SHIBASOKU)
Audio Distortion Meter	885A	(SHIBASOKU)	760E/1	(SHIBASOKU)
Vector scope 520A	520A	(TEKTRONIX)		
Envelope Delay Meter	201/1	(SHIBASOKU)		

						TITLE	PRODUCT	
						T M Z H 2	SPECIFICATION	
							(10 /)	
SYMB.	DATE OR NO.	APPD.	CHKD.	DSGD.	ALPS ELECTRIC CO., LTD.			

3 Electrical Characteristics (電氣的特性)

The unit stated in dB μ V is defined the value at 75 Ω terminate this specification.

(0 dBm = 109 dB μ V)

(本仕様書中、dB μ Vの単位は75 Ω 終端値で定義される。)

3-1 RF-Modulator Section

(RFモジュレータ部)

ITEM (項目)					SPECIFICATION (仕様)				NOTE (備考)	
					MIN.	TYP.	MAX.	UNIT		
3-1-1 Video Modulation (映像変調度)					69	77	86	%	Input signal : 1 Vp-p white Stair step or ramp Measure at the output of the Standard De-Modulator. (標準復調器出力で測定)	
3-1-2 Video Limiter Modulation (映像最大変調度)					87	93	99	%	Input signal : 1.5 Vp-p stair step or ramp Measure at the output of the Standard De-Modulator. (標準復調器出力で測定)	
3-1-3 V/S Ratio (V/S 比)					10:3.8	10:4.0	10:4.1		Input signal : 1 Vp-p white V : S = 10 : 4 Measure at the output of the Standard De-Modulator. (標準復調器出力で測定)	
3-1-4 Video Amplitude Frequency Characteristics (映像振幅周波数特性)					-2.0	-0.5	+2.0	dB	Video input signal:Sweep signal or Multi-burst signal. Measure range : 0.1~4.2 MHz Based on 1 MHz (1 MHz基準) Audio input signal : None	
3-1-5 Differential Gain (DG) (微分利得)					-7	+2	+7	%	Input signal : 1 Vp-p stair step Chrominance : 20 IRE Luminance : 0~90 %	
								TITLE	PRODUCT	
								T M Z H 2		SPECIFICATION
								(11 /)		
					ALPS ELECTRIC CO., LTD.					
SYMB.	DATE OR NO.	APPD.	CHKD.	DSGD.						

ITEM (項目)					SPECIFICATION (仕様)				NOTE (備考)		
					MIN.	TYP.	MAX.	UNIT			
3-1-6 Differential Phase (DP) (微分位相)					-7	-3	+7	deg	Input signal : 1 Vp-p Stair step Chrominance : 20 IRE Luminance : 0 ~ 90 %		
3-1-7 Video S/N (映像S/N)					44	47	—	dB	No compensation with visual Sensitivity. (視感度補正無し。) Measurement Conditions (測定条件) Measure at the out of the Standard De-modulator (SONY TEXTORONIX 1450-1) S/N Meter (SHIBASOKU 925D-1 or 925C or Equivalent) H. P. F :100 kHz, L. P. F :4.2 MHz SC TRAP : ON, WEIGHT : OFF Input signal Video : 100 % White signal Audio : None Video band : 0.1~4.2 MHz		
3-1-8 Chroma Beat (Fs*Fc Beat) (クロマビート)					55	65	—	dB	Input signal Video : 0.4Vp-p, 3.58 MHz Sine wave. Audio : None Use Spectrum Analyzer to measure the level of Fp+0.92 MHz. The value is relative to the level of Fp without video modulation. (スペクトラムアナライザを使用し、Fp+0.92 MHzのレベルを測定する。 測定値は無変調時のFpのレベルを基準とする。)		
3-1-9 Audio Modulation (Deviation) (音声変調度)					40 (80)	50 (100)	60 (120)	kHz dev. (%)	Input signal : -3.8 dBs, 1 kHz (0.5 Vrms.) Sine wave (100 % Mod. = ±25 kHzp-p dev.)		
								TITLE	PRODUCT		
								T M Z H 2		SPECIFICATION	
											(12 /)
					ALPS ELECTRIC CO., LTD.						
SYMB.	DATE OR NO.	APPD.	CHKD.	DSGD.							

ITEM (項目)					SPECIFICATION (仕様)				NOTE (備考)	
					MIN.	TYP.	MAX.	UNIT		
3-1-10 Audio Maximum Modulation (音声最大変調度)					80 (160)	100 (200)	-	KHz dev. (%)	Input signal : 2.22 dBs / 1.0 Vrms. 1 kHz, Sine wave	
3-1-11 Audio Amplitude Frequency Characteristics (音声振幅周波数特性) ※ Reference (※ 参考値)					-3	+0.2 -0.6	+3	dB	Input signal : -3.8 dBs, 50 Hz ~ 10 kHz (0.5 Vrms) Based on 1 kHz (1 kHz基準)	
3-1-12 Audio Distortion (音声歪率)					—	0.3	3.0	%	Input signal Audio : -3.8 dBs, 1 kHz (0.5 Vrms) sine wave Video : 1 Vp-p color bar signal De-emphasis (75 μs.) is ON. (デ・エンファシス ON)	
3-1-13 Audio S/N (音声S/N)					45	50	—	dB	Reference audio input signal : -3.8 dBs, 1 kHz (0.5 Vrms) Sine wave Low pass Filter : 15 kHz in. Video input signal : All Black (Sync only) (全黒信号) Use standard De-Modulator of Inter-Carrier system and measure by Audio Analyzer. De-emphasis (75 μs.) is ON. (標準復調器使用で15 kHzローパスフィルターを入れオーディオ・アナライザで測定する事。 インターキャリア方式 デ・エンファシス ON)	
3-1-14 Audio Buzz (音声バズ*)					43	48	—	dB	Video input signal : 1 Vp-p Color bar Other condition : Same as Item 3-1-13 (その他の条件は3-1-13項と同じ)	
								TITLE	PRODUCT	
								TMZH2	SPECIFICATION	
									(13 /)	
					ALPS ELECTRIC CO., LTD.					
SYMB.	DATE OR NO.	APPD.	CHKD.	DSGD.						

ITEM (項目)					SPECIFICATION (仕様)				NOTE (備考)	
					MIN.	TYP.	MAX.	UNIT		
3-1-15 Video Carrier Output Level (映像搬送波出力レベル)					63	66	69	dBμV	Video input signal :1 Vp-p Color bar	
3-1-16 P/S Ratio (Sound Carrier level) (音声出力レベル差)					13	16	19	dB	Audio input signal : None Other condition : Same as Item 3-1-15 (音声入力無し。 その他の条件は3-1-15項と同じ)	
3-1-17 Video Carrier Frequency (映像搬送波周波数)					-100	±50	+100	kHz	Video input signal: None	
3-1-18 Sound Carrier Frequency (音声搬送波周波数)					4493	4500	4507	kHz	Audio & Video input signal : None The measurement is taken after 5 s. MIN. from the power on. (測定は電源投入5秒後に行う)	
3-1-19 Out Band Spurious (帯域外スパリアス)					—	28.5	39.5	dBμV	Input signal Video : 1 Vp-p stair step or white Audio : None Measure range : 0.03~1 GHz. +7.4 Except the range of Fp -4.6 MHz with Tuner Local Leakage. +7.4 (但し -4.6 MHzの範囲を除き →局発振端子漏れ電圧を含む)	
3-1-20 In Band Spurious (帯域内スパリアス)					55	—	—	dB	Input signal Video : None Audio : None Measure range Fp ~ +4.5 MHz Based on Video Carrier frequency (ビデオキャリアを基準とする)	
								TITLE	PRODUCT	
								TMZH2	SPECIFICATION	
								(14 /)		
					ALPS ELECTRIC CO., LTD.					
SYMB.	DATE OR NO.	APPD.	CHKD.	DSGD.						

3-1-21 Stability (安定度)

3-1-21-1 Video carrier frequency rise up time. (映像搬送波立ち上がり時間)

The time to approach the set value ± 50 kHz : within 3 s.
(設定値 ± 50 kHzに達する時間) : (3秒以内)

3-1-21-2 Audio carrier frequency rise up time. (音声搬送波立ち上がり時間)

The time to approach the set value ± 3 kHz : within 10 s.
(設定値 ± 3 kHzに達する時間) : (10秒以内)

3-1-21-3 Video carrier frequency shift by supply voltage drift. (映像搬送波周波数電源電圧安定度)

Within ± 10 kHz by ± 0.3 V shift of the supply voltage.
(電源電圧 ± 0.3 Vで ± 10 kHz以内)

3-1-21-4 Audio carrier frequency shift by supply voltage. (音声搬送波周波数電源電圧変動)

Within ± 5 kHz by ± 0.3 V shift of the supply voltage.
(電源電圧 ± 0.3 Vで ± 5 kHz以内)

3-1-22 Thermal stability (温度安定度)

3-1-22-1 Thermal stability of Video modulation. (映像変調度温度安定度)

Within ± 4 % based on the temperature of 25 °C.
(25 °Cを基準にして ± 4 %以内)

※ Unless otherwise specification, thermal stability test shall be performed under the following conditions.

(温度安定度の試験は、特に指定の無い限り下記の条件で実施する。)

Measurement terminal range (測定温度範囲) : $-10 \sim 60$ °C

Humidity range (湿度範囲) : 45 % RH $\sim$ 85 % RH

Test, measurement order and time : 25 °C $\rightarrow$ -10 °C $\rightarrow$ 10 °C $\rightarrow$ 25 °C $\rightarrow$ 45 °C $\rightarrow$ 60 °C
(試験及び測定順序と時間) (initial) (2h) (1h) (1h) (1h) (2h)

							TITLE	PRODUCT	
							TMZH2	SPECIFICATION	
								(15 /)	
SYMB.	DATE OR NO.	APPD.	CHKD.	DSGD.	ALPS ELECTRIC CO., LTD.				

3-1-22-2 Thermal stability of Audio modulation.
(音声変調温度安定度)

Within ± 5 kHzp-p base on the temperature of 25 °C.
(25 °Cを基準にして ± 5 kHzp-p 以内)

3-1-22-3 Thermal stability of Video carrier frequency.
(映像搬送波周波数温度安定度)

Within ± 120 kHz base on the temperature of 25 °C.
(25 °Cを基準にして ± 120 kHz 以内)

3-1-22-4 Thermal stability of Audio carrier frequency.
(音声搬送波周波数温度安定度)

Within ± 12 kHz base on the temperature of 25 °C.
(25 °Cを基準にして ± 12 kHz 以内)

3-1-22-5 Thermal stability of Video carrier output level.
(映像搬送波出力レベル温度安定度)

Within ± 3.0 dB base on the temperature of 25 °C.
(25 °Cを基準にして ± 3.0 dB 以内)

3-1-22-6 Thermal stability of P/S ratio.
(P/S比 温度安定度)

Within ± 3.0 dB base on the temperature of 25 °C, but the P/S ratio it self
should not be less than 13 dB.
(25 °Cを基準にして ± 3.0 dB 以内、但し、そのP/S比は13 dB以下にならない事)

							TITLE	PRODUCT	
							T M Z H 2	SPECIFICATION	
								(16 /)	
SYMB.	DATE OR NO.	APPD.	CHKD.	DSGD.	ALPS ELECTRIC CO., LTD.				

3-2 ANT SW Section (アンテナ・スイッチ部)

Unless otherwise specified, measurement range shall be 54 MHz ~ 810 MHz, and unused RF terminals shall be terminated by rated impedance terminator.

(特に記述の無い限り、測定周波数範囲は 54 MHz ～ 810 MHzで、使用していないRF端子は定格インピーダンス終端器で終端するものとする。)

ITEM (項目)					SPECIFICATION (仕様)				NOTE (備考)	
					MIN.	TYP.	MAX.	UNIT		
3-2-1 Insertion Loss (挿入損失)					—	5.5	7.0	dB	ANT IN to ANT OUT Mode : TV (at MD OFF)	
3-2-2 VSWR II (入力整合比)					— —	2.5 2.5	3.5 3.5		ANT OUT terminal Mode : TV (at MD OFF) 54~810 MHz Mode : VCR(at MD ON) 61~ 72 MHz	
3-2-3 Isolation (アイソレーション)					58	62	—	dB	Isolation from ANT OUT to ANT IN Mode :VCR(at MD ON) 61~ 72 MHz	
3-2-4 ANT IN Leakage (ANT入力端子漏れ電圧)					—	3	9.5	dB μ V	Mode : VCR (at MD ON) 0.03~1 GHz RF-Modulator Section : Non-Input Signal (モジュレータ部は無入力)	
(I) Modulator leakage (モジュレータ 端子漏れ電圧)										
(II) Tuner OSC leakage (Tuner OSC 端子漏れ電圧)					—	47	52	dB μ V	Mode : TV (at MD OFF) Measure range : 0.03 ~ 1 GHz	
								TITLE	PRODUCT	
								T M Z H 2		SPECIFICATION
								(17 /)		
ALPS ELECTRIC CO., LTD.										
SYMB.	DATE OR NO.	APPD.	CHKD.	DSGD.						

ITEM (項目)	SPECIFICATION (仕様)				NOTE (備考)															
	MIN.	TYP.	MAX.	UNIT																
3-2-5 2nd Harmonics inter-modulation (2次相互変調)	55	64	—	dB	Fim1=F1- (F2-F1), Fim2=F2+ (F2-F1) Mode:TV(at MD OFF) <table><tr><td>Item</td><td>Freq. (MHz)</td><td>Level (dB μ V)</td></tr><tr><td>F1</td><td>91. 25</td><td>100</td></tr><tr><td>F2</td><td>103. 25</td><td>100</td></tr><tr><td>Fim1</td><td>79. 25</td><td>—</td></tr><tr><td>Fim2</td><td>115. 25</td><td>—</td></tr></table> Both F1 and F2 are not modulated. (F1,F2の双方共、無変調の事)	Item	Freq. (MHz)	Level (dB μ V)	F1	91. 25	100	F2	103. 25	100	Fim1	79. 25	—	Fim2	115. 25	—
Item	Freq. (MHz)	Level (dB μ V)																		
F1	91. 25	100																		
F2	103. 25	100																		
Fim1	79. 25	—																		
Fim2	115. 25	—																		
3-2-6 Cross Modulation (混変調)	55	62	—	dB	The take the smallest ratio (Cm1 or Cm2) from the sideband to f2 as Cross modulation value. (F2と両側波 [Cm1, Cm2] との比の うち、小さい方の値を取る。) <table><tr><td>Item</td><td>Freq. (MHz)</td><td>Level (dB μ V)</td></tr><tr><td>F1</td><td>91. 25</td><td>105</td></tr><tr><td>F2</td><td>193. 25</td><td>80</td></tr></table> F1 is 40 % am Modulation by 15. 75 kHz sine wave. F2 is not modulated. (F1は、15. 75 kHz正弦波にてAM 変調40 %、F2は、無変調の事。) (105 dB μ V/40 %AM) F1 (80 dB μ V) Cross-Modulation F2 Cm1 Cm2 91. 25 MHz 193. 25 MHz 15. 75 kHz 15. 75 kHz	Item	Freq. (MHz)	Level (dB μ V)	F1	91. 25	105	F2	193. 25	80						
Item	Freq. (MHz)	Level (dB μ V)																		
F1	91. 25	105																		
F2	193. 25	80																		

3-3 Tuner Section (チューナ一部)

When the test characteristics, test points is IF OUT T.P.
(各性能測定時のテストポイントは IF出力T.Pとする。)

ITEM (項目)					SPECIFICATION (仕様)				NOTE (備考)	
					MIN.	TYP.	MAX.	UNIT		
3-3-1 IF Rejection (中間周波妨害比)									[75 Ω Terminate]	
UHF		60	90	—	dB	ANT INPUT 65 dB μV				
VHF	High	60	90	—						
	Low	55	80	—						
UHF		40	65	—	dB	ANT INPUT 95 dB μV				
VHF	High	50	75	—						
	Low	30	55	—						
3-3-2 Image Rejection (映像周波妨害比)									[75 Ω Terminate]	
14~55	50	60	—							
CATV		50	70	—						
VHF	13~7	55	75	—						
	6~2	55	60	—						
UHF	56~69	40	50		dB	ANT INPUT 95 dB μV				
	14~55	40	55	—						
CATV		45	60	—						
VHF	13~7	50	75	—						
	6~2	50	75	—						
3-3-3 920 kHz Color Beat Rejection (920 kHz カラービート 妨害比)									ANT INPUT LEVEL P : 54 dB μV C : 38 dB μV S : 48 dB μV [75 Ω Terminate]	
UHF		55	70	—	dB					
VHF		55	70	—						
3-3-4 Noise Figure (雑音指数)					Comply with FCC. (FCC規格を満足する。)					

ITEM (項目)	SPECIFICATION (仕様)				NOTE (備考)
	MIN.	TYP.	MAX.	UNIT	
3-3-5 CH 6 Beat (6 CH Ǝ°-Ƨ)	40	—	—	dB	ANT INPUT [75 Ω terminate] Desire : 60 dB μV Undesire : 54 dB μV
3-3-6 CH A-5 Beat (A-5 CH Ǝ°-Ƨ)	44	—	—	dB	ANT INPUT [75 Ω terminate] Desire : 60 dB μV
3-3-7 CB Rejection (CB妨害)	-7	—	—	dBm	CB Band:0.535 MHz~30 MHz Desire : 55.25 MHz ~ 83.25 MHz (CH 2~CH 6) -66 dBm S/i = 40 dB

3-3-8 1 % Cross Modulation of 2nd side band CH.
(1 % 混変調妨害比 隣々接CH)

CH		A (dB μ V)	B (dB μ V)
UHF		64	84
VHF	J to W+11	59	84
	2 to 13	64	84

Cross modulation value should be within hatched area.
(混変調妨害比が斜線内部の値であること)
※ Tuner should be measured for 1 % cross modulation with ± 2 channel undesired signal.
(チューナが隣々接CHの妨害信号により、1 %混変調を受けた場合を測定する)

						TITLE	PRODUCT		
							T M Z H 2	SPECIFICATION	
							(20 /)		
SYMB.	DATE OR NO.	APPD.	CHKD.	DSGD.	<i>ALPS ELECTRIC CO., LTD.</i>				

	SPECIFICATION (仕様)					
3-3-9 Over Range (局発余裕周波数)		OSC Frequency (MHz)	MIN.	TYP.	MAX.	UNIT
	UHF	High-end : 847	+10	-	-	MHz
		Low -end : 413	-2	-	-	
	V High	High-end : 407	+8	-	-	
		Low -end : 179	-2	-	-	
	V Low	High-end : 173	+4	-	-	
		Low -end : 101	-2	-	-	
	* Temp -10~+60 °Cにおいて上記を満足するもの。					

						TITLE	PRODUCT		
						TMZH2	SPECIFICATION		
							(21 /)		
					ALPS ELECTRIC CO., LTD.				
SYMB.	DATE OR NO.	APPD.	CHKD.	DSGD.					

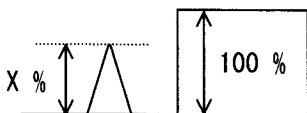
3-4 IF Section
(IF 部)

When test the electrical characteristics fp input level is $70 \text{ dB}\mu\text{V}$, p/s=-6 dB, unless otherwise specified.

(電気性能測定時、指定無き場合、fp ANT入力は70 dB μ V, P/S レベル差は-6 dBとする。)

[illegible]

ITEM (項目)		SPECIFICATION (仕様)				NOTE (備考)								
		MIN.	TYP.	MAX.	UNIT									
3-4-7 Video Amplitude Frequency Characteristics (映像振幅周波数特性)						Full sweep : 87.5 % mod. Based ON 0.5 MHz								
1.5 MHz		-2.0	0.0	+2.0	dB									
2.0 MHz		-2.0	0.0	+2.0										
3.0 MHz		-3.5	0.0	+2.6										
3.58 MHz		-4.0	-0.5	+2.0										
3-4-8 Differential Gain (微分利得)		—	+5	±10	%	5 stair-steps : 87.5 % mod. Set modulation at the peak of 5th chroma signal. (変調度は5段目クロマピークで設定)								
3-4-9 Differential Phase (微分位相)		—	+3	±8	deg.	5 stair-steps : 87.5 % mod. Set modulation at the peak of 5th chroma signal. (変調度は5段目クロマピークで設定)								
3-4-10 Chroma S/N						100 % Chroma signal, 87.5 % mod. SC. Trap:OFF, HPF:100 Hz LPF:500 kHz ANT INPUT LEVEL 75 Ω Terminate								
AM		49	—	—	dB									
PM		48	—	—										
						<table><tr><td>VHF</td><td>CATV</td><td>UHF</td><td>UNIT</td></tr><tr><td>66</td><td>70</td><td>72</td><td>dB μV</td></tr></table>	VHF	CATV	UHF	UNIT	66	70	72	dB μV
VHF	CATV	UHF	UNIT											
66	70	72	dB μV											
3-4-11 Y/C Delay time (Y/C デレイタイム)		-150	0	150	nS	0.25 MHz standard. Measured by Envelope delay meter. (基準インパルスデレイ計にて測定)								
3-4-12 Audio Output Level (音声出力レベル)		284	400	567	mVrms	1 kHz / ±25 kHz Dev. Standard color bar : 87.5 % mod. De-emphasis. : ON								
3-4-13 Audio Distortion (音声歪率)		—	0.5	2.0	%	P/S1=-6 dB 1 kHz / ±25 kHz Dev. Standard color bar : 87.5 % mod. De-emphasis. : ON								
	</													

ITEM (項目)		SPECIFICATION (仕様)				NOTE (備考)
		MIN.	TYP.	MAX.	UNIT	
3-4-14 Audio Amplitude Frequency Characteristics (音声振幅周波数特性)						1 kHz / ± 25 kHz Standard Standard color bar : 87.5 % mod. De-emphasis : OFF
20 Hz 12 kHz 31.5 kHz 78.67 kHz		-3 -3 -3 -7	0 0 0 -3	+3 +3 +3 +3	dB	
3-4-15 Audio S/N (音声S/N)		40	50	—	dB	1 kHz / ± 25 kHz Dev. Standard color bar : 87.5 % mod. De-emphasis : ON
3-4-16 Sync Buzz (同期バース)		—	15	50	mVp-p	Audio : No Modulation Standard color bar : 87.5 % mod. De-emphasis : ON ANT input level : 70 dB μ V P/S = -6 dB
3-4-17 AFT Alignment Accuracy (AFT調整精度)		-50	0	+50	kHz	Alignment center : 3.0 V IF input level : 110 dB μ V Standard color bar : 87.5 % mod. P/S = -7 dB, fo = 45.750 Mhz
3-4-18 Sin ² 2T Pulse Response (Sin ² 2T パルス応答)		70	90	—	%	Sin ² 2T Pulse & bar : 87.5 % mod. 
3-4-19 SIF Output level (SIF 出力レベル) [CH:11]						Video : Standard color bar : 87.5 % mod. Audio : No modulation. RF input level : 70 dB μ V P/S1 = -6 dB Measure the absolute output level On Spectrum Analyzer. Use FET Probe. (スペクトラム・アナライザで絶対出力を 測定する。FETプローブ使用の事。)
4.5 MHz		82	92	102	dB μ V	

TITLE		PRODUCT	
T M Z H 2		SPECIFICATION	

(24 /)

ALPS ELECTRIC CO., LTD.

4 Environmental Tests (信頼性試験)

(規格値は初期値に対する変化範囲を示す。)

ITEM (項目)					SPECIFICATION (仕様)					NOTE (備考)
					TUNER	MODULATOR		IF		
4-1 Heat Load Test (耐熱負荷試験)					Osc Frequency (局発周波数) UHF : ±11.0 MHz VHF High: ±6.0 MHz VHF Low : ±3.0 MHz	Video modulation (映像変調度) ±8 % MAX.		Video S/N (映像S/N) ±6 dB	Test Condition 4-1-1	
						Video carrier frequency (映像搬送波周波数) ±200 kHz MAX.		Video output (映像出力) ±0.2 Vp-p MAX.		
						Video carrier output level (映像搬送波出力レベル) ±4 dB MAX.		Noise limiting sensitivity (雑音制限感度) ±6 dB		
						Audio modulation (音声変調度) ±8 % MAX.		Audio output (音声出力) ±30 % MAX.		
						Audio carrier Frequency (音声搬送波周波数) ±20 kHz MAX.				
						P/S ratio (Sound carrier level) (音声出力レベル差) ±3 dB MAX.				
							TITLE		PRODUCT	
							T M Z H 2		SPECIFICATION	
							(25 /)			
					ALPS ELECTRIC CO., LTD.					
SYMB.	DATE OR NO.	APPD.	CHKD.	DSGD.						

ITEM (項目)	SPECIFICATION (仕様)			NOTE (備考)
	TUNER	MODULATOR	IF	
4-2 Humidity Load Test (耐湿負荷試験)	Same as in item 4 - 1 (4-1項に同じ)			Test Condition 4-2-1
4-3 Cold Test (耐寒試験)	Same as in item 4 - 1 (4-1項に同じ)			Test Condition 4-3-1
4-4 Operating Life Test (実働寿命試験)	Same as in item 4 - 1 (4-1項に同じ)			Test Condition 4-4-1
4-5 High Voltage Test (落雷試験)	Same as in item 4 - 1 (4-1項に同じ)			Test Condition 4-5-1
4-6 Vibration Test (振動試験)	Same as in item 4 - 1 (4-1項に同じ)			Test Condition 4-6-1
4-7 Impact Test (衝撃試験)	Same as in item 4 - 1 (4-1項に同じ)			Test Condition 4-7-1

						TITLE	PRODUCT SPECIFICATION		
							(26 /)		
					<i>ALPS ELECTRIC CO., LTD.</i>				
SYMB.	DATE OR NO.	APPD.	CHKD.	DSGD.					

Environmental Test Condition
(信頼性試験条件)

ITEM (項目)					TEST CONDITION (試験条件)				
4-1-1 Heat Load Test (耐熱負荷試験)					1. Initial value measure at standard test condition. (常温、常湿にて初期測定) 2. Leave samples in 70±2 °C for 96±5 hours, and in standard test condition for 30 minutes, then take measurements with 1 hour. (70±2°Cにて 96±5 h 放置後槽より取り出し、常温、常湿にて 30分 放置後測定。尚、1 h以内に測定完了のこと) 3. Supply voltage : Standard +10 % (印加電圧) : (定格 +10 %) 4. Supply voltage cycle : 1.5 h ON, 0.5 h OFF (印加電圧サイクル)				
4-2-1 Humidity Load Test (耐湿負荷試験)					1. Leave samples in 40±5 °C for 24±2 hours, and in standard test condition for 30 minutes, then take measurements. (予備処理 40±5 °C にて 24±2 h 放置後槽より取り出し、常温、常湿 にて 30分放置後初期測定) 2. Leave samples in 40±2 °C, 90~95 % RH, for 96±5 hours, and in standard test condition for 30 minutes, then take measurements within 1 hour. (40±2 °C, 90~95 % RH にて 96±5 h 放置後槽より取り出し、常温、常湿 にて放置後測定) 3. Supply voltage : Standard +10 % (印加電圧) : (定格 +10 %) 4. Supply voltage cycle : 1.5 h ON, 0.5 h OFF (印加電圧サイクル)				
4-3-1 Cold Test (耐寒試験)					1. Initial value measure at standard, test condition. (常温、常湿にて初期測定) 2. Leave samples in -20±2 °C for 96±5 hours, and in standard test condition for 2 hours then take measurements within 1 hour. (-20± 2 °C にて 96±5 h 放置後槽より取り出し2 h放置後測定。尚、1 h以内に測定完了のこと)				
4-4-1 Operating life Test (実働寿命試験)					1. Initial value measure at standard, test condition. (常温、常湿にて初期設定) 2. Leave samples for 1000 hours, then take measurements. (1000 h放置後測定) 3. Supply voltage : Standard (印可電圧) : (定格)				
							TITLE		PRODUCT
							T M Z H 2		SPECIFICATION
							(27 /)		
					ALPS ELECTRIC CO., LTD.				
SYMB.	DATE OR NO.	APPD.	CHKD.	DSGD.					

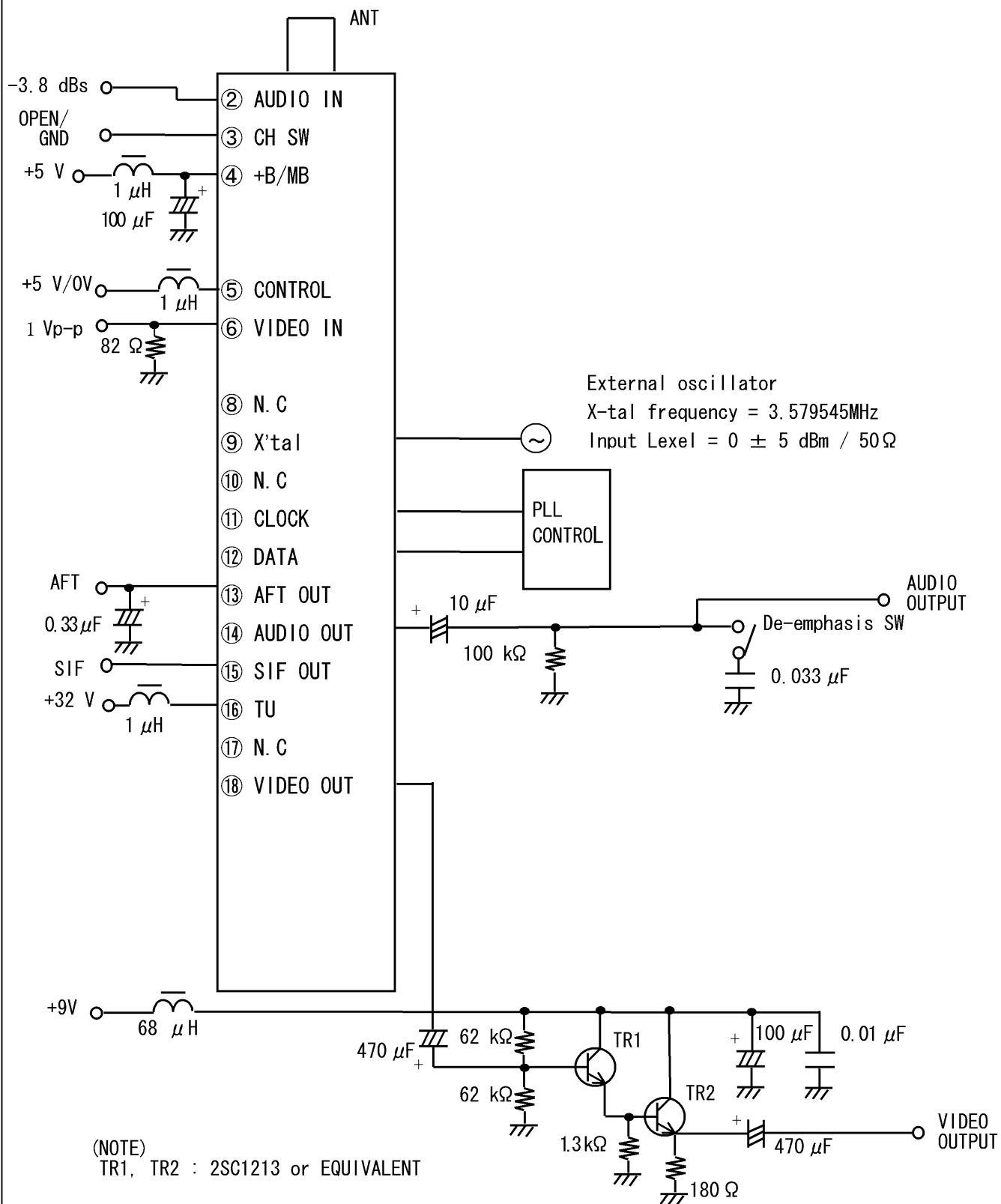
ITEM (項目)					TEST CONDITION (試験条件)				
4-5-1 High Voltage Test (落雷試験)					ANT IN terminal (ANT IN端子にて)				
					15 kV, 10 times (150 pF discharged)				
					(15 kV 10 回) (150 pF 放電)				
					Series R = 150 Ω (直列抵抗 150 Ω)				
4-6-1 Vibration Test (振動試験)					Vibration test fixture is used to vibrate the tuner with a total amplitude of 1mm and frequency ranging from 10 to 55 Hz, once per minute consecutively, for 40 minutes in each of three directions, X, Y and Z.				
					(全振幅1mm、周波数範囲10～55 Hz、周波数反転時間1分にて振動試験を行う。尚、加振時間は、取付面に平行な軸方向、互いに直角な 3 方向に、各40 分)				
4-7-1 Impact Test (衝撃試験)					1. Impact acceleration : 50 m/s ² (衝撃加速度)				
					2. Impact time : 11 ms. (衝撃時間)				
					3. Impact time & direction : 3 times per each 6 sides (衝撃回数と方向) : (各6面に対し3回ずつ)				
							TITLE	PRODUCT	
							TMZH2	SPECIFICATION	
							(28 /)		
					ALPS ELECTRIC CO., LTD.				
SYMB.	DATE OR NO.	APPD.	CHKD.	DSGD.					

5 Mechanical Characteristics (機構特性)

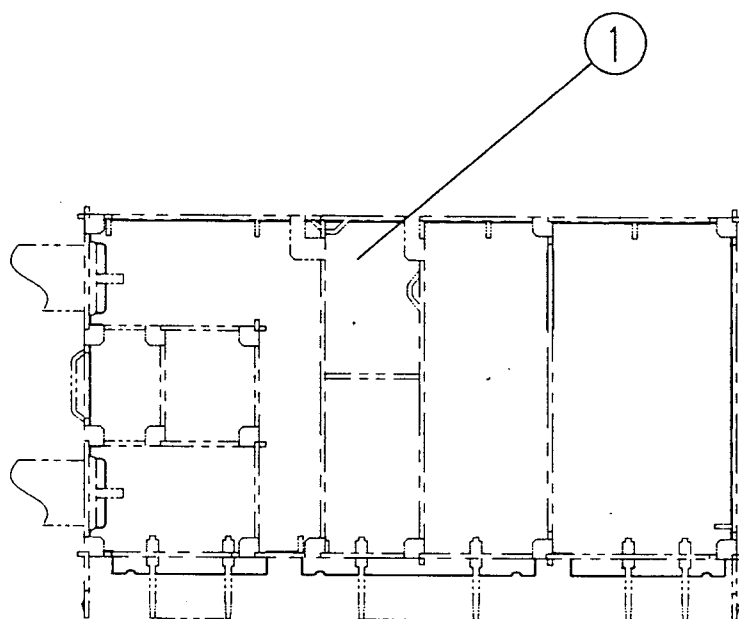
ITEM (項目)	TEST CONDITION (試験条件)	NOTE (備考)
5-1 Outline View (外観) Assembly (加工不備) Appearance (汚損)	No defects of wiring, soldering and assembling. (異常が無いこと。) No dirt, rust, corrosion or foreign material. (異常が無いこと。)	
5-2 Appearance Structure (構造) Dimension (寸法) Mounting (取付け面) Weight (重量)	As assembly drawing. (組立図による) As assembly drawing. (組立図による) Approximately 56 ± 5g (56 ± 5g)	

						TITLE	PRODUCT	
						TMZH2	SPECIFICATION	
							(29 /)	
SYMB.	DATE OR NO.	APPD.	CHKD.	DSGD.	ALPS ELECTRIC CO., LTD.			

6 Test Circuit (測定回路)



							TITLE	PRODUCT	
							T M Z H 2	SPECIFICATION	
									(30 / 30)
SYMB.	DATE OR NO.	APPD.	CHKD.	DSGD.	<i>ALPS ELECTRIC CO., LTD.</i>				



PART NO.		NAME		MATERIAL		SPEC.		FINISH	
 ALPS ELECTRIC CO., LTD.						DSGD.		SCALE 1 : 1	
						CHKD.		TITLE	
						APPD.		DOCUMENT NO.	
						SYMB.		DATE OR NO.	
								(2 /)	
								(A4 V 図面用紙)	

INSULATING MATERIALS TABLE

NOTE : 1. P . W . B . meet D . S . R

2. ※ Marked materials are used previously . Please make application of as UL materials described with no marked materials as they may be used in future instead of UL materials .

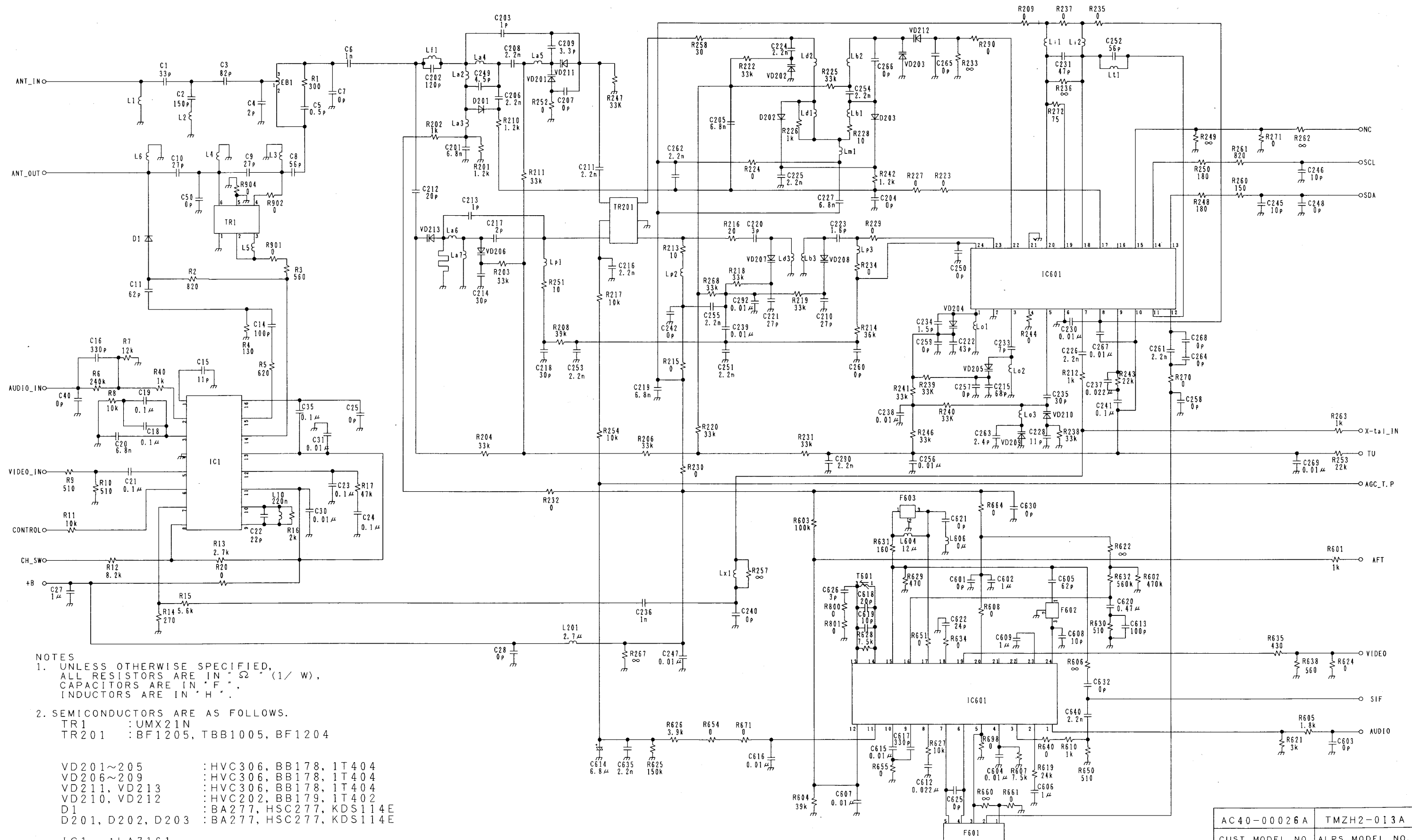
NO.	Description	Base material								Printed wiring board					NOTE
		Generic I・D	Manufacturer	Cat.NO.or Grade	Frame Class	HWI PLC	HAI PLC	CTI PLC	UL File NO	UL MARK	Manufacturer	Flame Class	UL DSR		
1	PRINTED WIRING BOARD	A	HITACHI CHEMICAL	MCL-437F	94V-0	—	—	—	E80148	▲ TZ-1	TANAZAWA HAKKOSHA	94V-0	▲	MARK付	
			CO.,LTD							▲ TZ 1	CO.,LTD				
											(E43041)				
										▲ NE 49S	NIPPON ELEC	94V-0	ALL		
										▲ SC 49S	CO.,LTD				
										▲ NE M PF2	(E41166)				
										▲ SC M PF2					
										▲ C-P3X	CMK CORP	94V-0	ALL		
										▲ CS-P3X	(E41363)				

NOTE : Symbol of generic I・D .

A : PAPER PHENOLIC RESIN COPPER CLAD LAMINATE .

[illegible]

NO.	Description	Base material										Printed wiring board				NOTE
		Generic I-D	Manufacturer	Cat.NO.or Grade	Frame Class	HWI PLC	HAI PLC	CTI PLC	UL File NO	UL MARK	Manufacturer	Flame Class	UL DSR			
1	PRINTED WIRING BOARD	A	MATSUSHITA ELECTRIC WORKS LTD	R-8700	94V-0	120+	100	600	E81336	▲NE 49S ▲5C49S	NIPPON ELEC CO.,LTD	94V-0	ALL			
										▲NE M PF1 ▲5C M PF1	(E41166)					
										▲CMP3X ▲CIP3X	CMK CORP (E41363)	94V-0	ALL			
										▲S S6 ▲SYH-S6	SANYOH CO.,LTD (E52553)	94V-0	ALL			
										▲SMEW-N870A-T	SUZHOU MATSUSHITA	94V-0	ALL			
											ELECTRIC WORKS					
											PRINTED WIRING					
											BOARD CO.,LTD (E164387)					
										▲CJ2-V-0-1	CHEONG JU	94V-0	ALL			
											ELECTRONICS CO.,LTD (E104487)					



AC40-00026A TMZH2-013A
CUST MODEL NO. ALPS MODEL NO.

ALPS ELECTRIC CO., LTD

DSGD, Nov. 4. '02 S. Yamamoto
CHKD.
APPD, Nov. 4. '02 H. Tsuji

SCALE :
TITLE : TMZH2
UNIT : mm

CIRCUIT DIAGRAM

RECORD OF REVISIONS

RECORD OF REVISIONS

DATE	PRESENT CONTENTS	NEW CONTENTS / REASON		DSGN BY
Nov. 05. '02 (KA02110501)	New			Nov. 5. '02 S. Yamamoto
		KOREA	ALPS ELECTRIC KOREA CO., LTD.	
MANUFACTURER				