

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

Nov. 5, '02

S. Yamamoto

A P P ' D

Nov. 5, '02

H. Tsuji

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.					

ALPS ELECTRIC CO., LTD.

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.			

2-6 Input, Output Condition (入出力条件)

ANT Nominal Impedance
(ANT 公称インピーダンス)

ANT IN 75 Ω Unbalance
ANT OUT 75 Ω Unbalance

Video IN Impedance : 0.7 k Ω ~ 1.3 k Ω (TYP. 1 k Ω)
Audio IN Impedance : 10 k Ω Min. (TYP. 30 k Ω)
Control Impedance : 30 k Ω Min. (TYP. 100 k Ω)
Video Input Level : 1.0 V_{p-p} $\pm$ 0.5 %
Audio Input Level : 0.5 V_{rms} $\pm$ 0.3 % (-3.8 dBs)

Modulator
Conditions

Video Out Load : 30 k Ω
Audio Out Load : 100 k Ω
SIF Out Load : 10 k Ω

IF
Conditions

※ 『dBs』 = 『dBm at 600 Ω impedance』

2-7 Guarantee Condition for Operation (動作保証)

2-7-1 Supply Voltage (印加電圧)

TERMINAL		Supply Voltage (印加電圧)			
		MIN.	NOM.	MAX.	UNIT
+B (Supply Voltage)		4.8	5.0	5.2	
TU (Tuning Supply Voltage)		30.0	32.0	34.0	
CONTROL	(VCR MODE)	4.0	5.0	5.2	
	(TV MODE)	—	0	0.5	

※ +B should be kept "ON" at each section.
(+Bは各Sectionで常時"ON")

2-7-2 Operating Temperature Range (動作温度範囲)

Temperature (温度) : -10 $^{\circ}$ C ~ +60 $^{\circ}$ C
Humidity (湿度) : Less than 85 % RH
(85 % RH 以下)

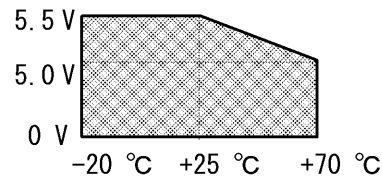
2-7-3 External oscillator X-tal Input condition (外部クリスタル入力条件)

Frequency : 3.579545 $\pm$ 30 ppm
Input level : 0 $\pm$ 5 dBm / 50 Ω

						TITLE	PRODUCT	
						TMZH2	SPECIFICATION	
						(6 /)		
					ALPS ELECTRIC CO., LTD.			
SYMB.	DATE OR NO.	APPD.	CHKD.	DSGD.				

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.			

2-12-1 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) N15 : PLL lock bit
 - 4) N16 : PLL lock bit
 - 5) Locked OSC Frequency

$$f_{osc} = f_r \cdot 8 \cdot N$$

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

- 3) CP : Charge-pump current

CP	Current	Application
1	High	○
0	Low	

- ## 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 (電気的特性)

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	
								T M Z H 2		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 μV)</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 μV)	F1	91.25	100	F2	103.25	100	Fim1	79.25	—	Fim2	115.25	—
Item	Freq. (MHz)	Level (dB μV)																		
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 μV)</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 μV/40 %AM) F1 (80 dB μV) Cross-Modulation F2 Cm1 Cm2 91.25 MHz 193.25 MHz 15.75 kHz 15.75 kHz	Item	Freq. (MHz)	Level (dB μV)	F1	91.25	105	F2	193.25	80						
Item	Freq. (MHz)	Level (dB μV)																		
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。)

[illegible]

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	84
	2 to 13	64

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)

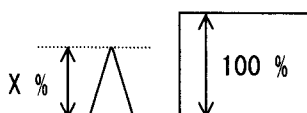
						TITLE	PRODUCT		
							T M Z H 2	SPECIFICATION	
								(20 /)	
					<i>ALPS ELECTRIC CO., LTD.</i>				
SYMB.	DATE OR NO.	APPD.	CHKD.	DSGD.					

	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.				

ITEM (項目)		SPECIFICATION (仕様)				NOTE (備考)											
		MIN.	TYP.	MAX.	UNIT												
3-4-1 Video S/N (映像 S/N)						50 % White signal, 87.5 % mod. HPF:100 kHz, LPF : 4.2MHz SC trap : ON ANT input level 75 Ω terminate <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 μ V</td></tr></table> A figure in parertheses is spec by ALPS measurement system.				VHF	CATV	UHF	UNIT	66	70	72	dB μ V
		VHF	CATV	UHF	UNIT												
		66	70	72	dB μ V												
		VHF	47 (45)	49 (47)	— —					dB							
CATV	47 (45)	49 (47)	— —														
UHF	47 (45)	49 (47)	— —														
3-4-2 Noise Limitting Sensitivity (雑音制限感度)						SC trap : ON, 50 % white signal. 87.5 % mod. HPF:100 kHz, LPF : 4.2MHz Video S/N = 20 dB A figure in parertheses is spec by ALPS measurement system.											
VHF	— —	34 (36)	38 (40)	dB μ V													
UHF	— —	34 (36)	38 (42)														
3-4-3 Video Output Level (映像出力レベル)		0.8	1.0	1.2	Vp-p	Standard Color bar : 87.5 % mod. (標準カラーバー)											
3-4-4 Sync Level (同期レベル)		0.21	0.286	0.36	Vp-p	Standard Color bar : 87.5 % mod. (標準カラーバー)											
3-4-5 Sync Ratio (同期比率)		36	40	44	%	Standard Color bar : 87.5 % mod. (標準カラーバー) V + S = 140 %											
3-4-6 Color Burst Ratio (カラーバースト比)		25	35	51	%	Standard Color bar : 87.5 % mod. (標準カラーバー) V + S = 140 %											
									</								

[illegible]

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		-3	0	+3	dB	
12 kHz		-3	0	+3		
31.5 kHz		-3	0	+3		
78.67 kHz		-7	-3	+3		
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 (同期バズ)		—	15	50	mVp-p	Audio : No Modulation Standard color bar : 87.5 % mod. De-emphasis : ON ANT input level : 70 dBμV 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 dBμV 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 dBμV 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	dBμV	
					</	

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	
							T M Z H 2	SPECIFICATION	
									(26 /)
SYMB.	DATE OR NO.	APPD.	CHKD.	DSGD.	<i>ALPS ELECTRIC CO., LTD.</i>				

Environmental Test Condition
(信頼性試験条件)

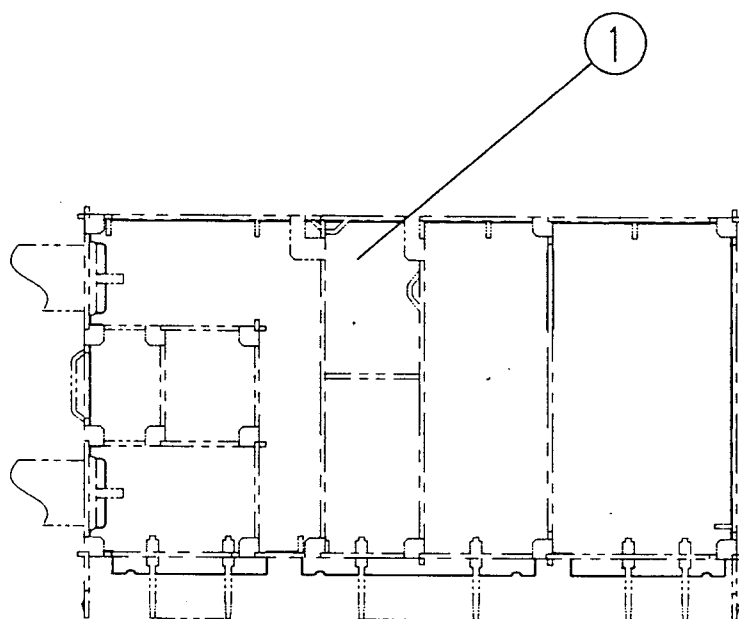
ITEM (項目)					TEST CONDITION (試験条件)				
4-1-1 Heat Load Test (耐熱負荷試験)					1. Initial value measure at standard test condition. (常温、常湿にて初期測定) 2. Leave samples in 70±2 °C for 96±5 hours, and in standard test condition for 30 minutes, then take measurements with 1 hour. (70±2°Cにて 96±5 h 放置後槽より取り出し、常温、常湿にて 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.			



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)	

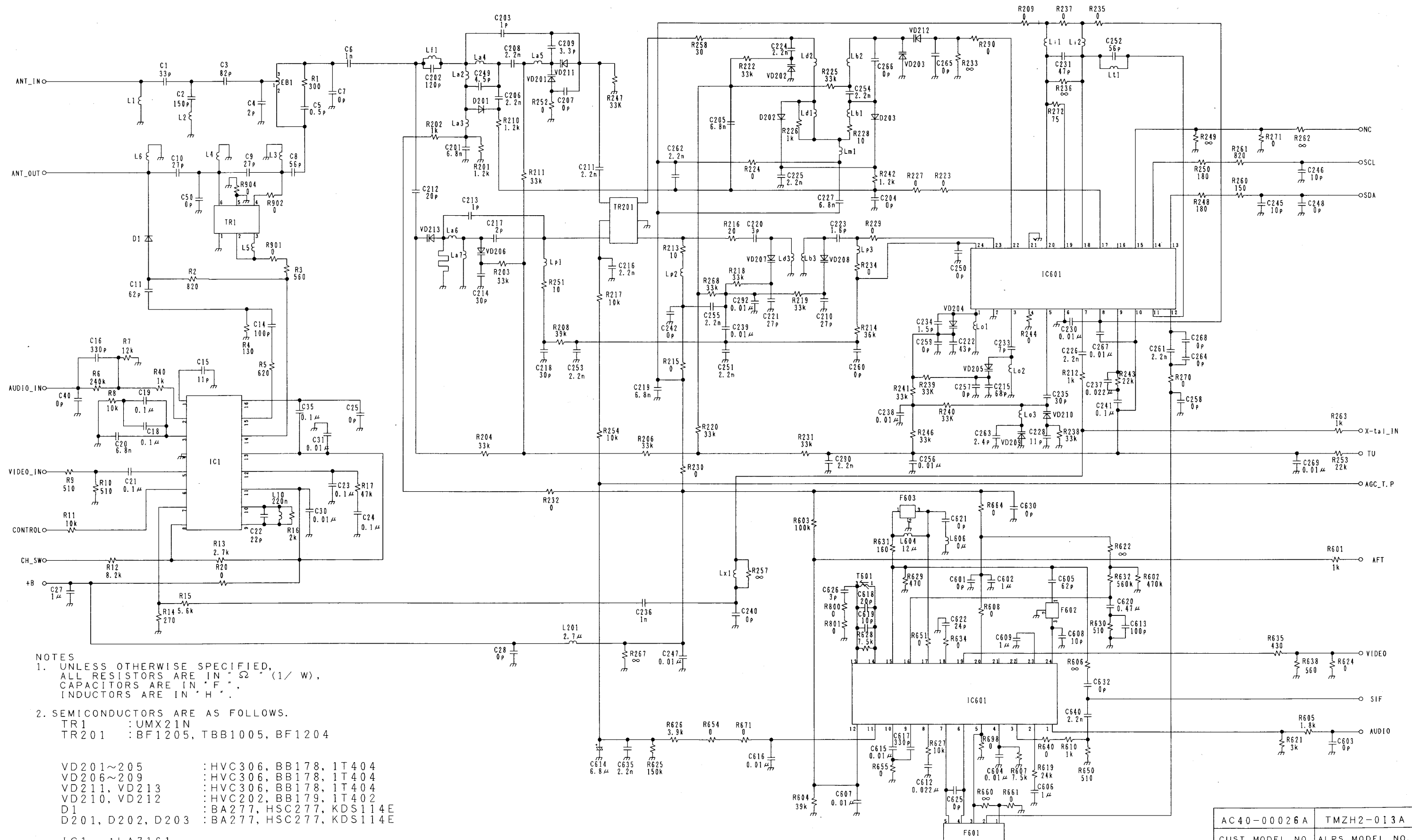
2. ✖ Marked materials are used previously . Please make application of as UL materials described with no marked materials as they may be used in future instead of UL materials .

[illegible]

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 ▲5C 49S	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 (E52553)	SANYOH CO.,LTD	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)					



ALPS ELECTRIC CO., LTD

DSGD.	Nov. 4. '02 S. Yamamoto	SCALE	TITLE	CIRCUIT
CHKD.				
APPD.	Nov. 4. '02 H. Tsuji	UNIT	mm	

ZONE, SYMB, DATE OR NO. APPD, CHKD, DSGD.

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				