

Customer :
SAMSUNG ELECTRONICS CO., LTD

No. KA02110501 (1/42)

Date : Nov. 05. 2002

Attention :

Your ref. No. :

Your Part No. : AC40-00026A

SPECIFICATIONS

ALPS
MODEL : TMZH2-013A

Spec. No. :

Sample No. :

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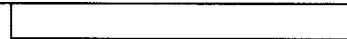
Nov. 5, '02
DSG'D *S. Yamamoto*

APP'D Nov. 5, '02 *H. Tsuj*

Sales

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

					DSGD. Nov. 5. '02				
					5 Yamamoto				
					CHKD.	TITLE	TMZH2	PRODUCT	
					APPD.			SPECIFICATION	
					Nov. 5. '02 H. Tsuji				(1 / 30)
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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。)

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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 CH2-5 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

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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 kΩ ~ 1.3 kΩ (TYP. 1 kΩ)
Audio IN Impedance : 10 kΩ Min. (TYP. 30 kΩ)
Control Impedance : 30 kΩ Min. (TYP. 100 kΩ)
Video Input Level : 1.0 Vp-p ± 0.5 %
Audio Input Level : 0.5 Vrms ± 0.3 % (-3.8 dBs)

Modulator
Conditions

Video Out Load : 30 kΩ
Audio Out Load : 100 kΩ
SIF Out Load : 10 kΩ

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 °C ~ +60 °C
Humidity (湿度) : Less than 85 % RH
(85 % RH 以下)

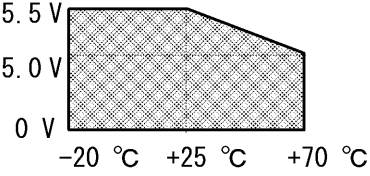
2-7-3 External oscillator X-tal Input condition
(外部クォーツ入力条件)

Frequency : 3.579545 ± 30 ppm
Input level : 0 ± 5 dBm / 50 Ω

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2-8 Maximum Ratings
(絶対最大定格)

Voltage (Temperature 25 °C)
(電圧)

TERMINAL	SPECIFICATIONS
+ B	<p>(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 : ± 2 °C (温度については、許容差 ±2 °C)</p> 
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 °C ~ +70 °C
Humidity (湿度) : Less than 90 % RH
(90 % RH 以下)

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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	μA

2-11 Test Condition (試験条件)

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

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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)		

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3 Electrical Characteristics (電气的特性)

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 %

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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 (音声ハズ)	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	
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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~85 % RH

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

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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)

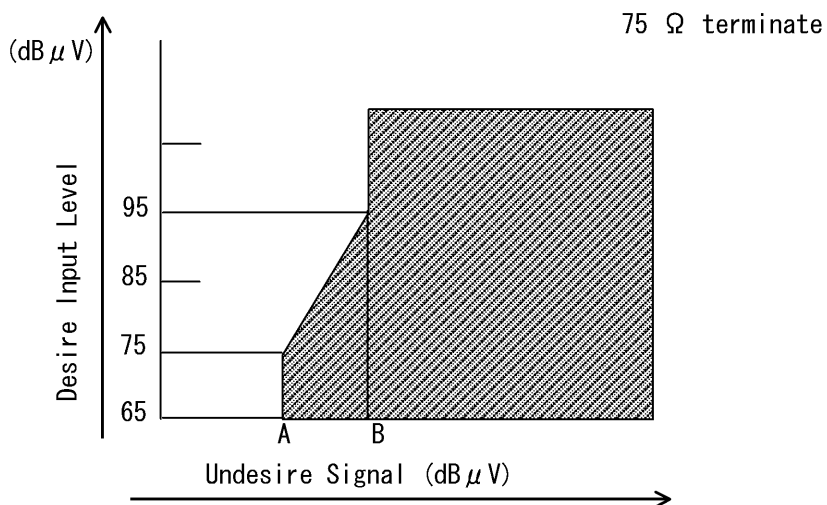
3-1-22-6 Thermal stability of P/S ratio.
 (P/S比 温度安定度)

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)

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ITEM (項目)	SPECIFICATION (仕様)				NOTE (備考)
	MIN.	TYP.	MAX.	UNIT	
3-3-5 CH 6 Beat (6 CH 隣接)	40	-	-	dB	ANT INPUT [75 Ω terminate] Desire : 60 dB μ V Undesire : 54 dB μ V
3-3-6 CH A-5 Beat (A-5 CH 隣接)	44	-	-	dB	ANT INPUT [75 Ω terminate] Desire : 60 dB μ V
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
	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)

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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。

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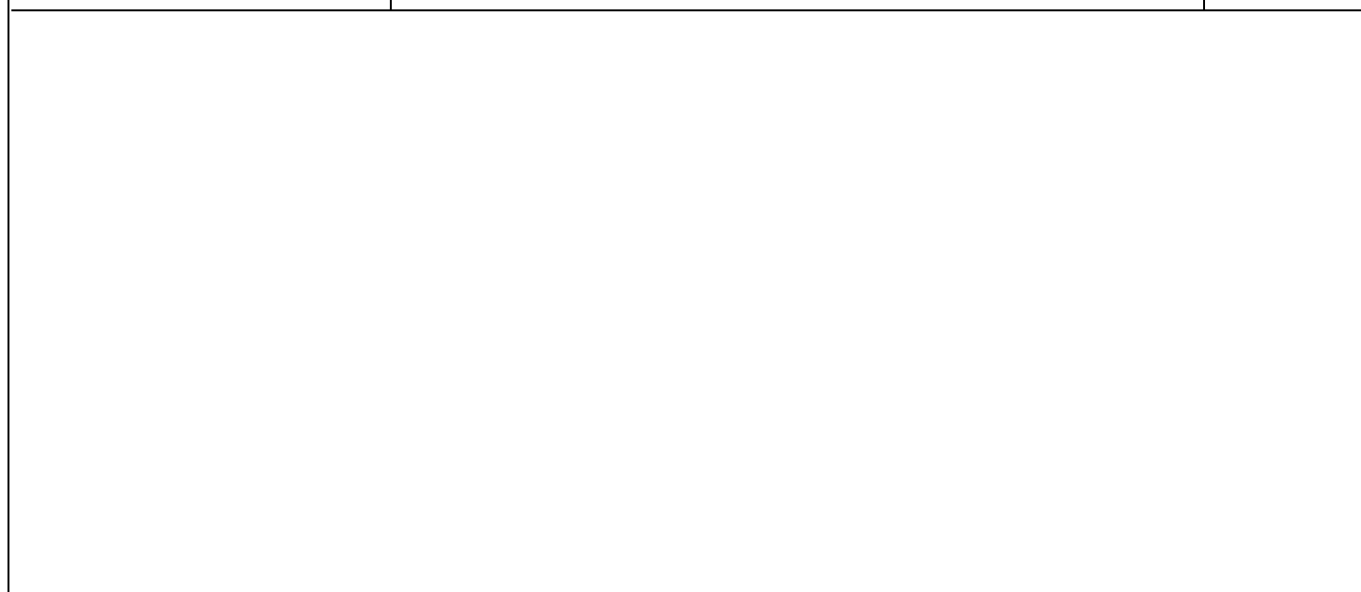
4 Environmental Tests
(信頼性試験)

(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 carrier frequency (映像搬送波周波数) ±200 kHz MAX. Video carrier output level (映像搬送波出力レベル) ±4 dB MAX. Audio modulation (音声変調度) ±8 % 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.	Video S/N (映像S/N) ±6 dB Video output (映像出力) ±0.2 Vp-p MAX. Noise limiting sensitivity (雑音制限感度) ±6 dB Audio output (音声出力) ±30 % MAX.	Test Condition 4-1-1

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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



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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
								TMZH2	SPECIFICATION
									(27 /)
SYMB.	DATE OR NO.	APPD.	CHKD.	DSGD.	ALPS ELECTRIC CO., LTD.				

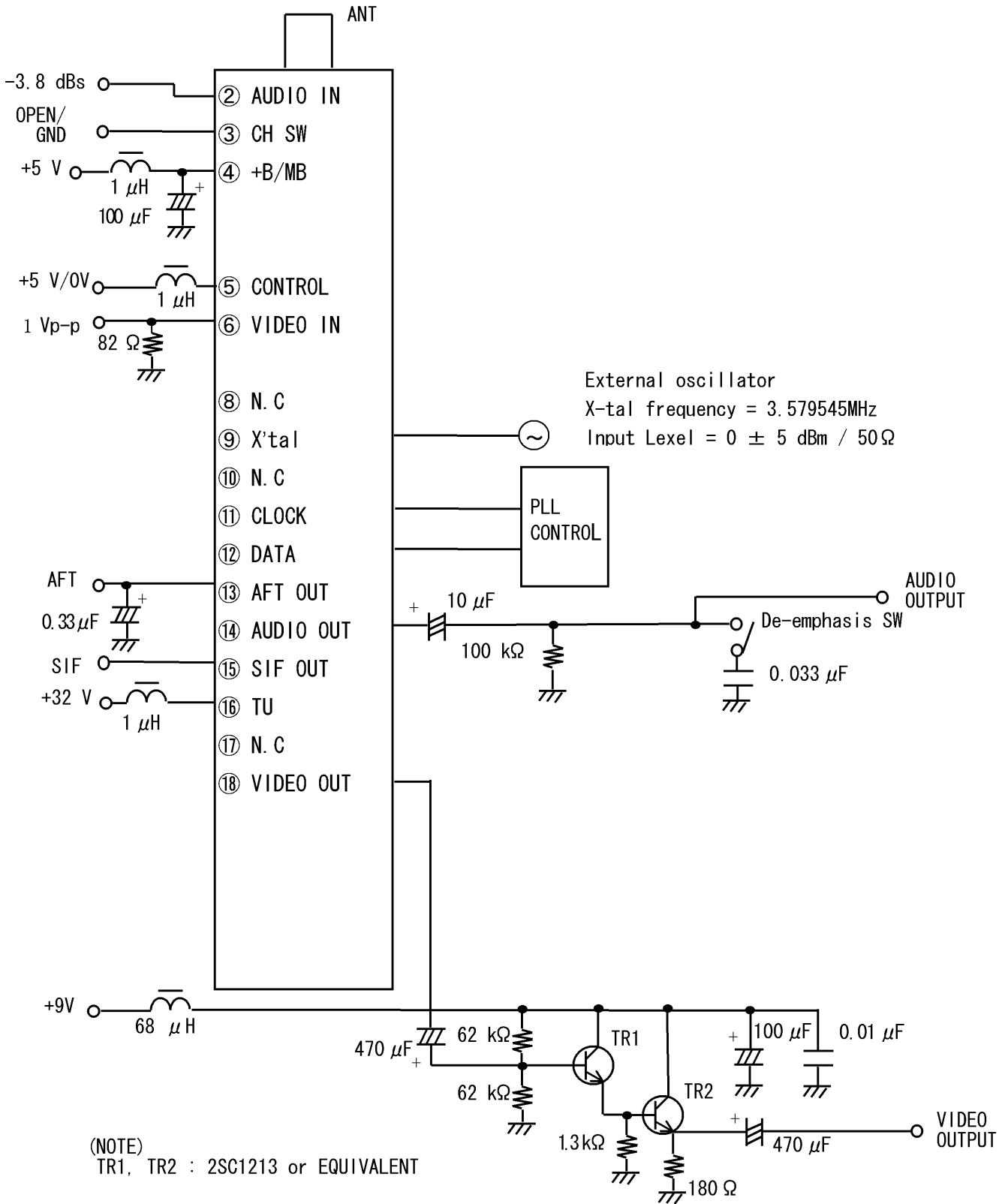
ITEM (項目)	TEST CONDITION (試験条件)
4-5-1 High Voltage Test (落雷試験)	ANT IN terminal (ANT IN端子にて) 15 kV, 10 times (150 pF discharged) (15 kV 10 回) (150 pF 放電) Series R = 150 Ω (直列抵抗 150 Ω)
4-6-1 Vibration Test (振動試験)	Vibration test fixture is used to vibrate the tuner with a total amplitude of 1mm and frequency 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 SPECIFICATION		
							TMZH2		
							(28 /)		
SYMB.	DATE OR NO.	APPD.	CHKD.	DSGD.	ALPS ELECTRIC CO., LTD.				

5 Mechanical Characteristics (機構特性)		
ITEM (項目)	TEST CONDITION (試験条件)	NOTE (備考)
5-1 Outline View (外觀) 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)	

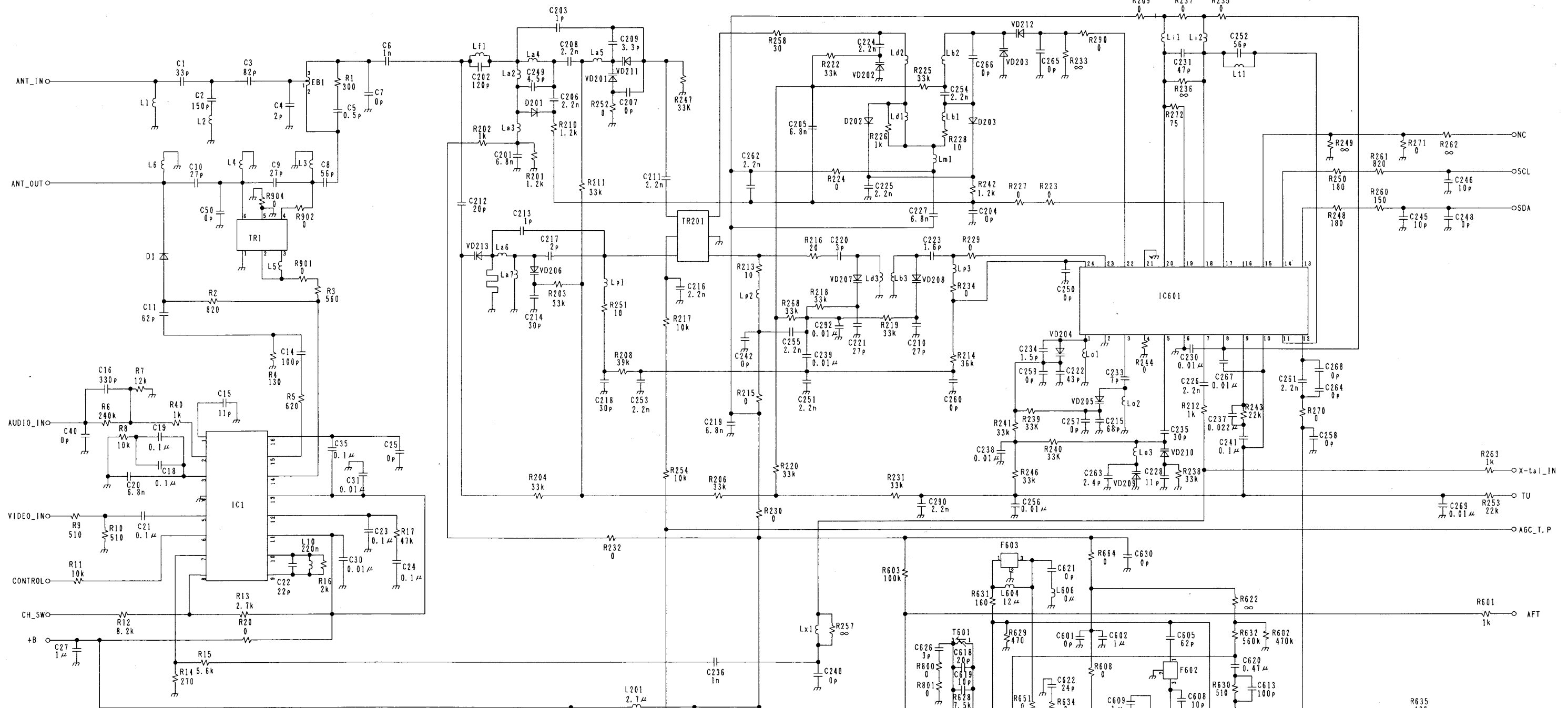
						TITLE		PRODUCT	
						TMZH2		SPECIFICATION	
									(29 /)
SYMB.	DATE OR NO.	APPD.	CHKD.	DSGD.	ALPS ELECTRIC CO., LTD.				

6 Test Circuit (測定回路)



						TITLE	PRODUCT	
						TMZH2	SPECIFICATION	
								(30 / 30)
SYMB.	DATE OR NO.	APPD.	CHKD.	DSGD.	ALPS ELECTRIC CO., LTD.			

NO.	Description	Base material										Printed wiring board				UL DSR	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					
1	PRINTED WIRING BOARD	A	MATSUSHITA ELECTRIC WORKS LTD	R-8700	94V-0	120+	100	600	E81336	▲NE 49S	NIPPON ELEC CO.,LTD	94V-0	ALL				
										▲5C49S							
										▲NE M PF1							
										▲5CM PF1							
										▲CMP3X	CMK CORP	94V-0	ALL				
										▲CIP3X	(E41363)						
										▲S S6	SANYOH CO.,LTD	94V-0	ALL				
										▲SYH-S6	(E52553)						
										▲SMEW-N870A-T	SUZHOU MATSUSHITA ELECTRIC WORKS	94V-0	ALL				
											PRINTED WIRING BOARD CO.,LTD						
											(E164387)						
										▲CJ2-V-0-1	CHEONG JU ELECTRONICS CO.,LTD	94V-0	ALL				
											(E104487)						



NOTES
 1. UNLESS OTHERWISE SPECIFIED,
 ALL RESISTORS ARE IN Ω (1/W),
 CAPACITORS ARE IN P.F.,
 INDUCTORS ARE IN H.

2. SEMICONDUCTORS ARE AS FOLLOWS.
 TR1 : UMX21N
 TR201 : BF1205, TBB1005, BF1204

VD201~205 : HVC306, BB178, 1T404
 VD206~209 : HVC306, BB178, 1T404
 VD211, VD213 : HVC306, BB178, 1T404
 VD210, VD212 : HVC202, BB179, 1T402
 D1 : BA277, HSC277, KDS114E
 D201, D202, D203 : BA277, HSC277, KDS114E

IC1 : LA7161
 IC201: ALP055, ALP035, ALP030, ALP024
 IC601: ALP041

F601: M1867M, N1867D
 F602: SFSRA4M50DF00-B0, SFSH4.5MDB
 F603: TPSRA4M50B00-B0, TPS4.5MB

SUPPLY VOLTAGE	
+B	5V
TU	32V

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

ALPS ELECTRIC CO., LTD			
DSGD.	Nov. 4. '02 S. Yamamoto	SCALE	:
CHKD.		TITLE	TMZH2 CIRCUIT DIAGRAM
APPD.	Nov. 4. '02 H. Tsuji	UNIT	mm
ZONE.	SYMB.	DATE OR NO.	APPD. CHKD. DSGD.

RECORD OF REVISIONS

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