

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

LG Innotek Co., Ltd.

A P P D.	C H K D.	D S G D.	MODEL NO	T A D C - H 2 0 2 F
			DOCUMENT NO	B C 4 0 2 5 3

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

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								SPECIFICATION
								DOCUMENT NO:
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1. Common
- 1- 1. Application
- This specification applies to TMI type (RF Front-End system) for TV, VTR
- 1- 2. Structure
- Refer to the attached assembly drawing.
- 1- 3. Circuit
- Refer to the attached circuit diagram.
2. General specifications.
- 2- 1. Applicable broadcasting system
- M NTSC / US CH
- 2- 2. Receiving system
- Upper Heterodyne
- 2- 3. Intermediate frequency
- Picture intermediate frequency : 45.75 MHz
- Sound intermediate frequency : 41.25 MHz
- 2- 4. Receiving channel
- VHF LOW : 2 ~ B Ch
- VHF HIGH : C ~ W+11 Ch
- UHF : W+12 ~ 69 Ch
- 2- 5. Output channel of modulator
- US 3 / 4 Ch

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	Terminal NO. 2
3 Ch	OPEN
4 Ch	GND

2- 6. Input / Output condition

ANT nominal impedance

ANT IN : 75Ω unbalance

ANT OUT : 75Ω unbalance

Video in impedance : 0.7kΩ ~ 1.3kΩ (typ. 1kΩ)

Audio in impedance : 10kΩ min.

Control impedance : 30kΩ min. (typ. 100kΩ)

Video out load : 10kΩ

Audio out load : 100kΩ

2- 7. Operating temperature range

Temperature : -10℃ ~ +60℃

Humidity : less than 85%RH

2- 8. Storage temperature range

Temperature : -20℃ ~ +70℃

Humidity : less than 90%RH

2-9. Guarantee voltage for operation

Terminal	Supply voltage			
	min.	typ.	max.	unit
+B	4.8	5.0	5.2	Vdc
MB	4.8	5.0	5.2	
TU	29.0	32.0	34.0	
CONTROL(MD:ON)	4.8	5.0	5.2	

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2-10. Maximum ratings

Terminal	Supply voltage	Unit
+B	6.0	Vdc
MB	6.0	
TU	35.0	
CONTROL(MD:ON)	6.0	

(note) Within “PB” supply voltage at SCL,SDA,terminal.

2-11. Current consumption

Terminal	Current consumption			
	min.	typ.	max.	unit
+B	–	150	180	mA
MB	–	50	56	
TU	–	1.5	5.0	
CONTROL(MD:ON)	–	47.0	173	μA

2-12. PLL characteristics of tuner section

2-12-1. I2C data format

	MSB							LSB	
Address byte	1	1	0	0	0	MA1	MA0	0	A
Divider byte 1	0	N14	N13	N12	N11	N10	N9	N8	A
Divider byte 2	N7	N6	N5	N4	N3	N2	N1	N0	A
Control byte	1	CP	0	0	0	R1	R0	0	A
B AND SW byte	0	0	0	0	BS3	BS2	BS1	BS0	A

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Where:

- A : Acknowledge bit
- Address Selection

“ADSW” 단자전압	MA1	MA0
0~0.1 × PB	0	0
OPEN	0	1
0.4 × PB ~ 0.6 × PB	1	0
0.9 × PB ~PB	1	1

- CP : Charge pump current (CP = 0 = 50μA, CP = 1 = 200μA)
- N14~ N0 : Programmable divider byte
$$N = N14 \times 2^{14} + N13 \times 2^{13} + \dots + N1 \times 2^1 + N0$$
- Band switching byte

	BS3	BS2	BS1	BS0
UHF	1	0	0	0
VHF HIGH	0	0	1	0
VHF LOW	0	0	0	1

2-12-2. Oscillator frequency calculation

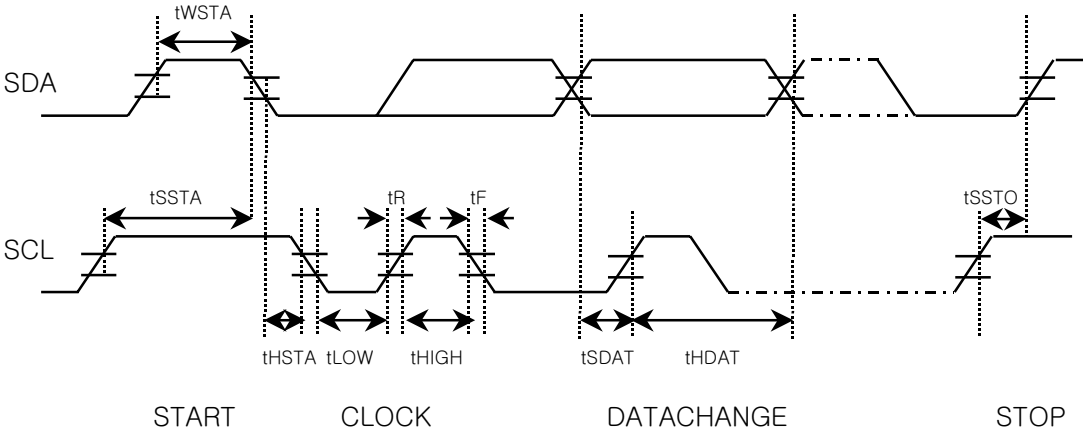
- $F_{osc} = F_{ref} \times 8 \times N$
- Fosc : Locked oscillator frequency
 - Fref : 4MHz/512 = 7.8125kHz
 - N : Oscillator frequency data

2-12-3. Input Signal Level (SCL, SDA)

INPUT Signal level	MIN	MAX	Unit
High level	3.0	5.5	V
Low level	-	1.5	

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2-12-4 I²C BUS Time



		MIN	TYP	MAX	단 위
fSCL	SCL clock frequency	0		400	kHz
tWSTA	Start waiting time	1300			nsec
tHSTA	Start hold time	600			"
tLOW	Low clock pulse width	1300			"
tHIGH	High clock pulse width	600			"
tSSTA	Start set-up time	600			"
tHDAT	Data hold time	1300			"
tSDAT	Data set-up time	600			"
tR	Rise time			300	"
tF	Fall time			300	"
tSSTO	Stop set-up time	600			"

2-13. Test condition

Terminal	Supply voltage	Unit	Remarks
+B	5 ± 0.1	Vdc	Ripple:10mVp-p max.
MB	5 ± 0.1	Vdc	
TU	32 ± 2	Vdc	
CONTROL	5 ± 0.1	Vdc	
Ambient temperature	25 ± 5	℃	
Relative humidity	65 ± 10	%RH	

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2-14. Measuring instruments

2-14-1. RF-modulator section

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

2-14-2. IF section

TV pattern generator	: TG-7/1	SHIBASOKU
	TG2000	TEKTRONIX
IF modulator	: RM54A	SHIBASOKU
	146F	EIDEN
RF converter	: RC51B	SHIBASOKU
	458C-X	EIDEN
Video Measurement	: VM700A	TEKTRONIX
Audio Analyzer	: 8903B	HP

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3. Electrical characteristics The unit stated in dBμV is defined the value at 75Ω terminal in this specification. (0 dBm = 109 dBμV) 3- 1. RF-modulator section									
Item					Specification				Note
					min.	typ.	max.	unit	
3-1- 1. Video modulation					75	80	85	%	Input signal : 1.0Vp-p white Measure at the output of the standard demodulator.
3-1- 2. Video limit modulation					87	93	99	%	Input signal : 1.5Vp-p stair-steps or ramp. Measure at the output of the standard demodulator.
3-1- 3. V/S ratio					10:3.8	10:4.0	10:4.1	-	Input signal :1.0Vp-p white V : S = 10 : 4 Measure at the output of the standard demodulator.
3-1- 4. Video amplitude frequency characteristics					-2.5	-0.5	+2.5	dB	Measure range : 0.1MHz ~ 4.2MHz Based on 1MHz
3-1- 5. Differential Gain (DG)					-	2	7	%	Input signal : 1.0Vp-p stair-steps Chrominance : 20 IRE Luminance : 0 ~ 90 %
3-1- 6. Differential Phase (DP)					-	2	7	deg	Input signal : 1.0Vp-p stair-steps Chrominance : 20 IRE Luminance : 0 ~ 90 %
3-1- 7. Video S/N					45	48	-	dB	Compensation of spectral luminance efficacy. RF output should be amped 12dB. (LGEC control method Measurement conditions. Measure at the out of the Standard demodulator. (TEKTRONIX 1450-1)
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					min.	typ.	max.	unit		
									S/N meter. (SHIBASOKU 925D-1 or 925C or equivalent) HPF : 100kHz, LPF : 4.2MHz SC TRAP : ON, WEIGHT : OFF Input signals : Video : 100% white signal Audio : none Video band : 0.1MHz ~ 4.2MHz	
3-1- 8. Chroma beat (920kHz P.C.S. beat)					55	65	-	dB	Input signal : 0.4Vp-p 3.58MHz sine wave Use spectrum analyzer to measure the level of Fp + 0.92MHz The value is relative to the level of Fp without video modulation.	
3-1- 9. Audio modulation (deviation)					32 (64)	40 (80)	48 (96)	kHz dev (%)	Input signal : -6.5dBs, (1.04Vp-p) 1kHz sine wave (100 % modulation = ± 25kHz dev.)	
3-1-10. Audio maximum modulation					150 (300)	220 (440)	-	kHz dev (%)	Input signal : 1kHz sine wave The input should be adjusted to the level just before the saturation of the modulation.	
3-1-11. Audio amplitude frequency characteristics					-3	+0.2 -0.6	+3	dB	Input signal : -6.5dBs, (1.04Vp-p) Measure range : 50Hz ~ 10kHz Based on 1kHz	
3-1-12. Audio distortion					-	0.5	2.0	%	Input signals : Audio : -6.5dBs (1.04Vp-p), 1kHz sine wave Video : 1Vp-p color bar De-emphasis is on.(75μ sec)	
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Item					Specification				Note		
					min.	typ.	max.	unit			
3-1-13. Audio S/N					48	54	-	dB	Input signals : Audio : -6.5dBs (1.04Vp-p), 1kHz sine wave Video : All black (sync. only) Use standard demodulator of inter-carrier system. De-emphasis is on. (75μ sec)		
3-1-14. Audio buzz					45	55	-	dB	Video input signal : 1Vp-p color bar Other conditions : same as item 3-1-13.		
3-1-15. Video carrier output level					63.5	66.0	68.5	dBμV	Video input signal : 1Vp-p 100% white signal.		
3-1-16. P/S ratio (sound carrier level)					-12.5	-14.5	-17	dB	Audio input signal : none Other conditions : same as item 3-1-15.		
3-1-17. Video carrier frequency					-150	-	+150	kHz	Video input signal : none		
3-1-18. Sound carrier frequency					4495	4500	4505	kHz	Audio input signal : none The measurements are taken after 1 min. from the power on.		
3-1-19. Outband spurious					-	-	39.5	dBμV	Video input signal : 1Vp-p color bar Measure range : 0 ~ 1GHz Except the range from Fp-4.6MHz to Fp+7.4MHz. Tuner local OSC leakage.		
					-	-	39.5	dBμV			
3-1-20. Inband spurious					60	-	-	dB	Input signals : Video : none Audio : none Measure range : Fp~Fp+4.5MHz.		
3-1-21. Terminal leakage					-	-	54	dBμV	Measure range : 0 ~ 1GHz except GND.		
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3-1-22. Stability

- 3-1-22-1. Video carrier frequency rise up time.
The time to approach the set value $\pm 100\text{kHz}$: within 3 seconds
- 3-1-22-2. Audio carrier frequency rise up time.
The time to approach the set value $\pm 5\text{kHz}$: within 10 seconds
- 3-1-22-3. Video carrier frequency shift by supply voltage drift.
Within $\pm 10\text{kHz}$ by $\pm 0.3\text{V}$ shift of the supply voltage.
- 3-1-22-4. Audio carrier frequency shift by supply voltage drift.
Within $\pm 3\text{kHz}$ by $\pm 0.3\text{V}$ shift of the supply voltage.

3-1-23. Thermal Stability

- 3-1-23-1. Thermal stability of video modulation.
Within $\pm 4\%$ based on the temperature of 25°C .

※ Unless otherwise specified, thermal stability tests shall be performed under the following conditions.

Measurement temperature range : $-10^{\circ}\text{C} \sim 60^{\circ}\text{C}$

Humidity range : 45%RH ~85%RH

Test measurement order and time :
 $25^{\circ}\text{C} \rightarrow -10^{\circ}\text{C}(2\text{H}) \rightarrow 10^{\circ}\text{C}(1\text{H}) \rightarrow 25^{\circ}\text{C}(1\text{H}) \rightarrow 45^{\circ}\text{C}(1\text{H}) \rightarrow 60^{\circ}\text{C}(2\text{H})$
- 3-1-23-2. Thermal stability of video modulation.
Within $\pm 150\text{kHz}$ based on the temperature of 25°C .
- 3-1-23-3. Thermal stability of audio modulation.
Within $\pm 20\%$ based on the temperature of 25°C .
- 3-1-23-4. Thermal stability of video modulation.
Within $\pm 10\%$ on the temperature of 25°C .
- 3-1-23-5. Thermal stability of P/S ratio
Within $\pm 3.0\text{ dB}$ based on the temperature of 25°C , but the P/S ratio itself should not be less than 13 dB.

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3- 2. ANT SW section

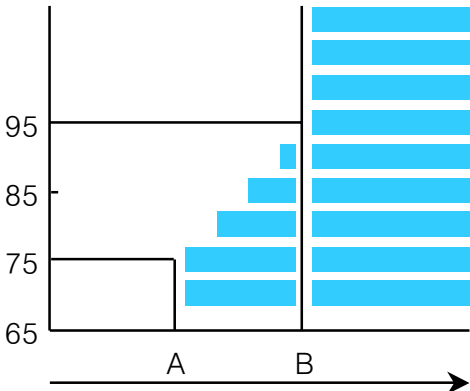
Unless otherwise specified, measurement range shall be 54MHz ~ 810MHz,
and unused RF terminals shall be terminated by rated impedance
Terminator.

Item	Specification				Note		
	min.	typ.	max.	unit			
3-2-1. Insertion loss	-	5	6	dB	ANT IN to ANT OUT mode : TV (at MD OFF)		
3-2-2. VSWR I	-	3.5	4.5		ANT IN Terminal mode : TV (at MD OFF) 54MHz ~ 810MHz		
3-2-3. VSWR II	-	2	4		ANT OUT terminal mode : TV (at MD OFF) 54MHz ~ 810MHz		
	-	2	3		mode : VTR (at MD ON) 61MHz ~ 72MHz		
3-2-4. Isolation	60	65	-	dB	Isolation from ANT OUT to ANT IN mode : VTR (at MD ON) 61MHz ~ 72MHz		
3-2-5. ANT IN leakage					mode : VTR (at MD ON)		
- MD	-	-	9.5	dB μ V	RF-modulator section :		
- TU OSC	-	-	52	dB μ V	none input signal Tuner OSC leakage.		
3-2-6. 2nd Harmonics inter modulation	55	64	-	dB	f1/(f1+f2) ratio		
					mode : TV (at MD OFF)		
					item	freq(MHz)	level(dB) μ V
					f1	91.25	100
					f2	103.25	100
Both f1 and f2 are not modulated.							

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Item					Specification				Note			
					min.	typ.	max.	unit				
3-2-7. Cross modulation					55	62	-	dB	Then take the smallest ratio from the sideband to f2 as cross modulation value.			
									item	freq(MHz)	level(dB) μ V	
									f1	91.25	105	
									f2	193.25	80	
									f1 is 40% AM modulated by 15.75KHz sine wave.			
									f2 is not modulated.			
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3- 3. Tuner section									
When the test characteristics, test point is pin no.16/if output terminal.									
Item					Specification				Note
					min.	typ.	max.	unit	
3-3-1. IF Rejection									75Ω terminated
		UHF		60	90	-	dB	ANT INPUT level 65dB _μ V	
VHF	HIGH		60	90	-				
	LOW		50	80	-				
		UHF		40	60	-	dB	ANT INPUT level 95dB _μ V	
VHF	HIGH		40	65	-				
	LOW		40	60	-				
3-3-2. Image Rejection									75Ω terminated
		UHF		45	60	-	dB	ANT INPUT level 65dB _μ V	
VHF	CATV		45	70	-				
	13 ~ 7		60	75	-				
	6 ~ 2		60	75	-				
		UHF		40	55	-	dB	ANT INPUT level 95dB _μ V	
VHF	CATV		40	60	-				
	13 ~ 7		40	60	-				
	6 ~ 2		40	60	-				
3-3-3. 920kHz Color Beat Rejection									ANT INPUT level p:60dB _μ V (75Ω terminated) c:44dB _μ V (75Ω terminated) s:54dB _μ V (75Ω terminated)
		UHF		50	80	-	dB		
		VHF		50	80	-			
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Item					Specification				Note			
					min.	typ.	max.	unit				
3-3-4. CH 6 beat					45	60	-	dB	ANT INPUT level desire : 60dB μ V (75 Ω terminated) undesire : 54dB μ V (75 Ω terminated)			
3-3-5. CH A-5 beat					45	60	-	dB	ANT INPUT level desire : 60dB μ V (75 Ω terminated)			
3-3-6. CB rejection.					0.535 MHz ~ 30 MHz -7dBm min				desire : 55.25MHz ~ 83.25MHz (Ch.2 ~ Ch.6) -66dBm			
3-3-7. 1% Cross modulation					(dB μV) ↑ desire input signal 75Ω terminated  A B Un-desire signal (dBμV)							
					CH		A(dB μ V)		B(dB μ V)			
					UHF		67		84			
					VHF	W+11 ~ J	67		89			
						13 ~ 2	67		89			
					Cross modulation value should be within hantched area. ※ Tuner should be measured for 1% cross modulation with $\pm$ 2 channel undesired signal.							
3-3-8. +B shift					CH	min.	typ.	max.	unit.	note		
					UHF	-	-	250	kHz	B $\pm$ 1%		
					VHF HIGH	-	-	250				
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3-3-9. Over range	CH	Vtu		min.	typ.	max.	unit.
	UHF	28.0 V		2.0	-	-	MHz
		0.5 V		2.0	-	-	
	VHF	28.0 V		2.0	-	-	
		0.5 V		2.0	-	-	
3-3-10. Noise Figure	CH	min.	typ.	max.	unit.	note	
	UHF	-	9.0	14.0	dB		
	VHF HIGH	-	8.0	14.0			
	VHF LOW	-	8.0	13.0			
3-3-11. Power gain	UHF	23	33	-	dB		
	VHF	23	33	-			
3-3-12. Power gain deviation	UHF	-	6	12	dB		
	VHF HIGH	-	6	12			
	VHF LOW	-	6	12			
3-3-13. Temperature shift	W+12 ~ 69	-	-	3000	kHz	25℃± 25℃	
	W+11 ~ J	-	-	3000			
	13 ~ 2	-	-	2000			

3-4. IF section

When the test electrical characteristics when there are no instruction.
fp input level is 70 dBμV and p/s ratio is -7 dB.

Item	Specification				Note
	min.	typ.	max.	unit	
3-4-1. Video S/N	45	47	-	dB	A figure in parentheses is spec by LGIT measurement system
	45	47	-		50% white signal. 87.5% modulation. Subcarrier trap : on HPF : 100 kHz, LPF : 4.2 MHz

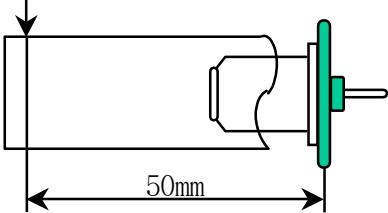
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					min.	typ.	max.	unit			
3-4-2. Noise limiting sensitivity AIR CATV UHF						45	48	dB μ V	A figure in parentheses is spec by LGIT measurement system		
									50% white signal. 87.5% modulation. Subcarrier trap : on HPF : 100kHz, LPF : 4.2MHz Video S/N=30dB		
3-4-3. Video output level					0.8	1.0	1.2	Vp-p	standard color bar:87.5% mod.		
3-4-4. SYNC ratio					25	28.6	30	%	standard color bar:87.5% mod.		
Burst ratio					17	25	37				
3-4-5. Video amplitude frequency characteristics 1.0 MHz 2.0 MHz 3.0 MHz 3.58MHz						-3 -3 -3 -6	-1 -1 -1 -3	+1 +1 +1 +0	dB	Full sweep : 87.5% mod. based on 0.5 MHz	
3-4-6. Sin ² 2T pulse response					70	90	-	%	Sin ² 2T pulse & bar:87.5% mod.		
3-4-7. Differential Gain					-	5	8	%	5 stair-steps : 87.5% mod. Set modulation at the peak of 5'th chroma signal		
3-4-8. Differential Phase					-	5	8	deg	5 stair-steps : 87.5% mod. Set modulation at the peak of 5'th chroma signal		
3-4-9. Y/C delay time					-100	0	+100	nsec	0.25 MHz standard Envelope delay meter.		
					A P P D.		C H K D.		D S G D.		MODEL NO: TADC-H202F
											TITLE: SPECIFICATION
SYMB	NO	APPD	CHKD	DSGD							DOCUMENT NO: BC40253 (18/26)

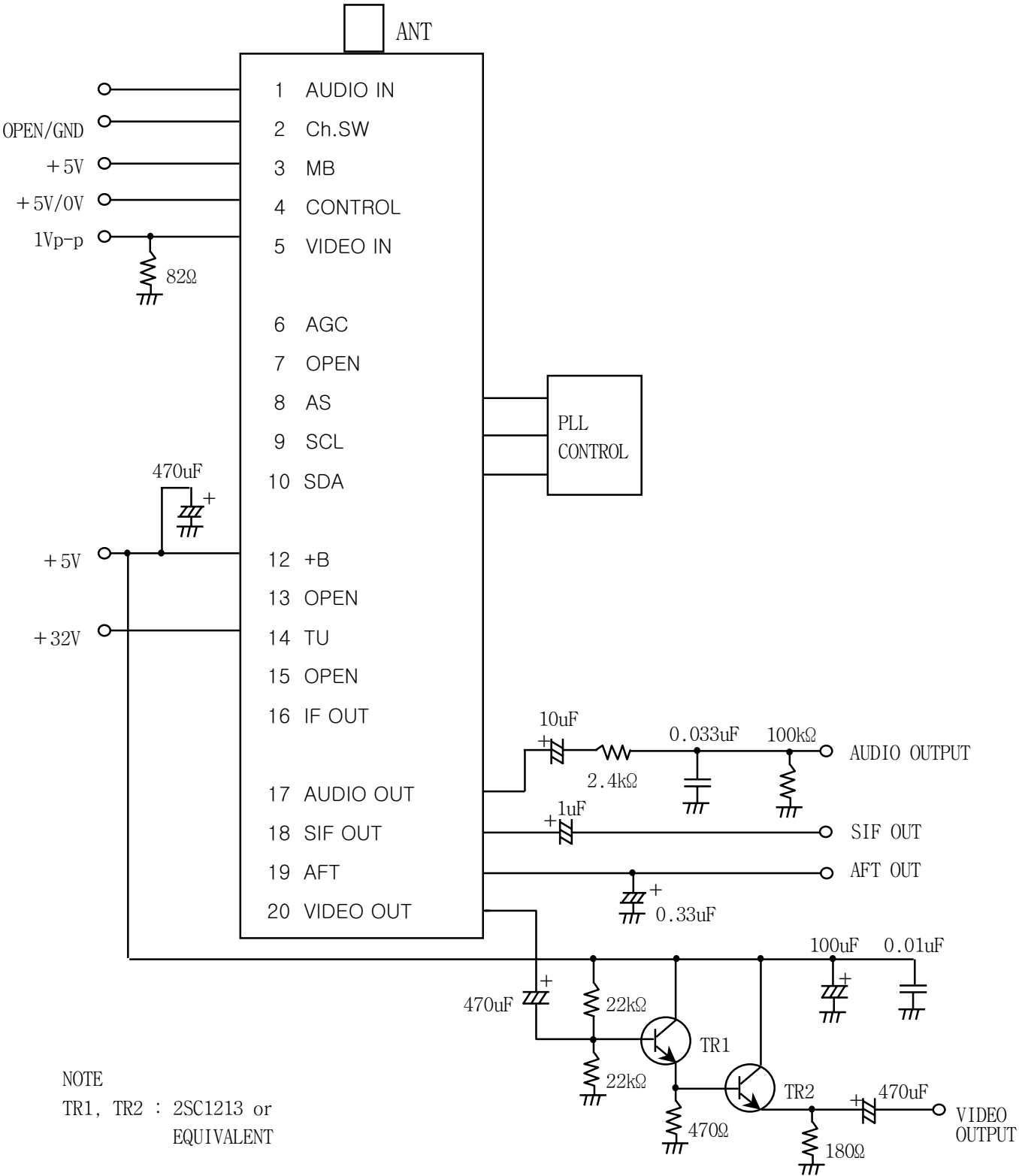
Item					Specification				Note		
					min.	typ.	max.	unit			
3-4-10. Audio output level					280	370	500	mVrms	1kHz /± 25kHz dev. standard color bar:87.5% mod.		
3-4-11. Audio distortion					-	1	2	%	1kHz /± 25kHz dev. standard color bar:87.5% mod.		
3-4-12. Audio frequency characteristics									20Hz ~ 12kHz Based on 1kHz /± 7.5kHz dev. standard color bar:87.5% mod. PRE-EMP (75usec) : “ON”		
20 Hz					-3	0	+3	dB			
12 kHz					-3	0	+3				
3-4-13. Audio S/N					45	50	-	dB	1kHz /± 25kHz dev. standard color bar:87.5% mod. Use IHF filter.		
3-4-14. SYNC buzz					-	50	100	mVp-p	standard color bar:87.5% mod. 400Hz/± 25kHz dev. P/S=-17dB		
3-4-15. AFT alignment accuracy					-50	0	+50	kHz	Alignment center : 2.5V IF input level : 90dB μ V P/S=-7dB standard color bar:87.5% mod.		
3-4-16. SIF Output Level					60	65		dB μ V	Video mod. : Color Bar 87.5% mod. RF INPUT Level = 70 dB μ V P/S = -6dB Measure peak of 4.5MHz carrier Level using Spectrum Analyzer and 1:10 Probe.		
					A P P D.		C H K D.		D S G D.		MODEL NO: TADC-H202F
											TITLE:
											SPECIFICATION
											DOCUMENT NO:
SYMB	NO	APPD	CHKD	DSGD							BC40253 (19/26)

4. ENVIRONMENTAL TESTS (規格□는 □期□에 대하여 □□ □□를 □□한다)									
Item					Specification			Note	
					TUNER	MODULATOR	IF		
4-1. Heat load teat					OSC frequency UHF : ± 2.5MHz VHF : ± 2.5MHz	Video modulation ± 8%max Video carrier frequency ± 150kHz max Video carrier output level ± 4dB max Audio modulation ± 2% max Audio carrier frequency ± 20kHz max P/S ratio ± 3dB max	Video S/N ± 6dB Video output ± 0.2Vp-p max Noise limiting sensitivity ± 6dB Audio output ± 30% max	test condition 4-1-1	
4-2. Humidity load teat					same as in item 4-1			test condition 4-2-1	
4-3. Cold test					same as in item 4-1			test condition 4-3-1	
4-4. Operating life test					same as in item 4-1			test condition 4-4-1	
4-5. High voltage test					same as in item 4-1			test condition 4-5-1	
4-6. Vibration test					same as in item 4-1			test condition 4-6-1	
4-7. Impact test					same as in item 4-1			test condition 4-7-1	
					A P P D.	C H K D.	D S G D.	MODEL NO: TADC-H202F	
								TITLE: SPECIFICATION	
								DOCUMENT NO:	
SYMB	NO	APPD	CHKD	DSGD				BC40253 (20/26)	

Environmental test condition									
Item					Test condition				
4-1-1 Heat load teat					1. Initial value measure at standard test condition. 2. Leave samples in 70℃± 2℃ for 96± 5 hours, and in standard test condition for 30 minutes, then take measurements within 1 hour. 3. Supply voltage : standard ± 10% 4. Supply voltage cycle : 1.5h on, 0.5h off				
4-2-1 Humidity load test					1. Leave samples in 40± 5℃ for 24± 2 hours, and in standard test condition for 30 minutes, then take measurements. 2. Leave samples in 40± 5℃ 90 ~ 95% rh, for 96± 5 hours, and in standard test condition for 30 minutes, then take measurements within 1 hour. 3. Supply voltage : standard +10% 4. Supply voltage cycle : 1.5h on, 0.5h off				
4-3-1 Cold test					1. Initial value measure at standard test condition. 2. Leave samples in -20℃± 2℃ for 96± 5 hours, and in standard test condition for 2 hours, then take measurements within 1 hour.				
4-4-1 Operating life test					1. Take measurements in standard test condition. 2. Leave samples for 1000 hours, then take measurements. 3. Supply voltage : standard				
4-5-1 High voltage test					15kV, 10 times (150pF charged) series R=150Ω				
4-6-1 Vibration test					Vibration test fixture in used to vibrate the tuner with a total amplitude of 1mm and frequency ranging from 10 to 55hz, once per minute consecutively, for 40 minutes in each of three directions, x,y and z.				
4-7-1 Impact test					1. Impact acceleration : 50m/sec ² 2. Impact time : 11msec 3. Impact time & direction : 3 times per each 6 sides				
5. Mechanical characteristics									
5-1 Outline view assembly appearance					No defects of wiring, soldering and assembling. No dirt, rust, corrosion or foreign material.				
					A P P D.	C H K D.	D S G D.	MODEL NO: TADC-H202F	
								TITLE: SPECIFICATION	
								DOCUMENT NO:	
								BC40253 (21/26)	
SYMB	NO	APPD	CHKD	DSGD					

Item					Test condition			
5-2 Appearance structure Dimension Mounting Weight 6. Others 6-1. Ant jack Load Test					As assembly drawing. As assembly drawing. Approximately 80± 5g. Crack, defection and shaking should not be existed with 15kg.cm banding moment after caulking. F = 3kg  50mm			
					A P P D.	C H K D.	D S G D.	MODEL NO: TADC-H202F
								TITLE: SPECIFICATION
								DOCUMENT NO: BC40253 (22/26)
SYMB	NO	APPD	CHKD	DSGD				

7. TEST CIRCUIT



					A P P D.	C H K D.	D S G D.	MODEL NO: TADC-H202F
								TITLE: SPECIFICATION
								DOCUMENT NO: BC40253 (23/26)
SYMB	NO	APPD	CHKD	DSGD				

US 126/155/181 CH FREQUENCY LIST

CH	CENTER	P-Freq	S-Freq	OSC	BAND CODE
2	57.50	55.25	59.75	101	1 0 0 0
3	63.50	61.25	65.75	107	1 0 0 0
4	69.50	67.25	71.75	113	1 0 0 0
4A	75.50	73.25	77.75	119	1 0 0 0
5	79.50	77.25	81.75	123	1 0 0 0
6	85.50	83.25	87.75	129	1 0 0 0
A-5	93.50	91.25	95.75	137	1 0 0 0
A-4	99.50	97.25	101.75	143	1 0 0 0
A-3	105.50	103.25	107.75	149	1 0 0 0
A-2	111.50	109.25	113.75	155	1 0 0 0
A-1	117.50	115.25	119.75	161	1 0 0 0
A	123.50	121.25	125.75	167	1 0 0 0
B	129.50	127.25	131.75	173	1 0 0 0
C	135.50	133.25	137.75	179	0 1 0 0
D	141.50	139.25	143.75	185	0 1 0 0
E	147.50	145.25	149.75	191	0 1 0 0
F	153.50	151.25	155.75	197	0 1 0 0
G	159.50	157.25	161.75	203	0 1 0 0
H	165.50	163.25	167.75	209	0 1 0 0
I	171.50	169.25	173.75	215	0 1 0 0
7	177.50	175.25	179.75	221	0 1 0 0
8	183.50	181.25	185.75	227	0 1 0 0
9	189.50	187.25	191.75	233	0 1 0 0
10	195.50	193.25	197.75	239	0 1 0 0
11	201.50	199.25	203.75	245	0 1 0 0
12	207.50	205.25	209.75	251	0 1 0 0
13	213.50	211.25	215.75	257	0 1 0 0
J	219.50	217.25	221.75	263	0 1 0 0
K	225.50	223.25	227.75	269	0 1 0 0
L	231.50	229.25	233.75	275	0 1 0 0
M	237.50	235.25	239.75	281	0 1 0 0
N	243.50	241.25	245.75	287	0 1 0 0
O	249.50	247.25	251.75	293	0 1 0 0
P	255.50	253.25	257.75	299	0 1 0 0
Q	261.50	259.25	263.75	305	0 1 0 0

CH	CENTER	P-Freq	S-Freq	OSC	BAND CODE
R	267.50	265.25	269.75	311	0 1 0 0
S	273.50	271.25	275.75	317	0 1 0 0
T	279.50	277.25	281.75	323	0 1 0 0
U	285.50	283.25	287.75	329	0 1 0 0
V	291.50	289.25	293.75	335	0 1 0 0
W	297.50	295.25	299.75	341	0 1 0 0
W+1	303.50	301.25	305.75	347	0 1 0 0
W+2	309.50	307.25	311.75	353	0 1 0 0
W+3	315.50	313.25	317.75	359	0 1 0 0
W+4	321.50	319.25	323.75	365	0 1 0 0
W+5	327.50	325.25	329.75	371	0 1 0 0
W+6	333.50	331.25	335.75	377	0 1 0 0
W+7	339.50	337.25	341.75	383	0 1 0 0
W+8	345.50	343.25	347.75	389	0 1 0 0
W+9	351.50	349.25	353.75	395	0 1 0 0
W+10	357.50	355.25	359.75	401	0 1 0 0
W+11	363.50	361.25	365.75	407	0 1 0 0
W+12	369.50	367.25	371.75	413	0 0 0 1
W+13	375.50	373.25	377.75	419	0 0 0 1
W+14	381.50	379.25	383.75	425	0 0 0 1
W+15	387.50	385.25	389.75	431	0 0 0 1
W+16	393.50	391.25	395.75	437	0 0 0 1
W+17	399.50	397.25	401.75	443	0 0 0 1
W+18	405.50	403.25	407.75	449	0 0 0 1
W+19	411.50	409.25	413.75	455	0 0 0 1
W+20	417.50	415.25	419.75	461	0 0 0 1
W+21	423.50	421.25	425.75	467	0 0 0 1
W+22	429.50	427.25	431.75	473	0 0 0 1
W+23	435.50	433.25	437.75	479	0 0 0 1
W+24	441.50	439.25	443.75	485	0 0 0 1
W+25	447.50	445.25	449.75	491	0 0 0 1
W+26	453.50	451.25	455.75	497	0 0 0 1
W+27	459.50	457.25	461.75	503	0 0 0 1
W+28	465.50	463.25	467.75	509	0 0 0 1
W+29	471.50	469.25	473.75	515	0 0 0 1
----- END OF US 126 CH -----					

					A P P D.	C H K D.	D S G D.	MODEL NO: TADC-H202F
								TITLE: SPECIFICATION
								DOCUMENT NO:
SYMB	NO	APPD	CHKD	DSGD				BC40253 (24/26)

US 126/155/181 CH FREQUENCY LIST

CH	CENTER	P-Freq	S-Freq	OSC	BAND CODE
W+30	477.50	475.25	479.75	521	0 0 0 1
W+31	483.50	481.25	485.75	527	0 0 0 1
W+32	489.50	487.25	491.75	533	0 0 0 1
W+33	495.50	493.25	497.75	539	0 0 0 1
W+34	501.50	499.25	503.75	545	0 0 0 1
W+35	507.50	495.25	509.75	551	0 0 0 1
W+36	513.50	511.25	515.75	557	0 0 0 1
W+37	519.50	517.25	621.75	563	0 0 0 1
W+38	525.50	523.25	527.75	569	0 0 0 1
W+39	531.50	529.25	533.75	575	0 0 0 1
W+40	537.50	535.25	539.75	581	0 0 0 1
W+41	543.50	541.25	545.75	587	0 0 0 1
W+42	549.50	547.25	551.75	593	0 0 0 1
W+43	555.50	553.25	557.75	599	0 0 0 1
W+44	561.50	559.25	563.75	605	0 0 0 1
W+45	567.50	565.25	569.75	611	0 0 0 1
W+46	573.50	571.25	575.75	617	0 0 0 1
W+47	579.50	577.25	581.75	623	0 0 0 1
W+48	585.50	583.25	587.75	629	0 0 0 1
W+49	591.50	589.25	593.75	635	0 0 0 1
W+50	597.50	595.25	599.75	641	0 0 0 1
W+51	603.50	601.25	605.75	647	0 0 0 1
W+52	609.50	607.25	611.75	653	0 0 0 1
W+53	615.50	613.25	617.75	659	0 0 0 1
W+54	621.50	619.25	623.75	665	0 0 0 1
W+55	627.50	625.25	629.75	671	0 0 0 1
W+56	633.50	631.25	635.75	667	0 0 0 1
W+57	639.50	637.25	641.75	683	0 0 0 1
W+58	645.50	643.25	647.75	689	0 0 0 1
----- END OF US 155 CH -----					
W+59	651.50	649.25	653.75	695	0 0 0 1
W+60	657.50	655.25	659.75	701	0 0 0 1
W+61	663.50	661.25	665.75	707	0 0 0 1
W+62	669.50	667.25	671.75	713	0 0 0 1
W+63	675.50	673.25	677.75	719	0 0 0 1

CH	CENTER	P-Freq	S-Freq	OSC	BAND CODE
W+64	681.50	679.25	683.75	725	0 0 0 1
W+65	687.50	685.25	689.75	731	0 0 0 1
W+66	693.50	691.25	695.75	737	0 0 0 1
W+67	699.50	697.25	701.75	743	0 0 0 1
W+68	705.50	703.25	707.75	749	0 0 0 1
W+69	711.50	709.25	713.75	755	0 0 0 1
W+70	717.50	715.25	719.75	761	0 0 0 1
W+71	723.50	721.25	725.75	767	0 0 0 1
W+72	729.50	727.25	731.75	773	0 0 0 1
W+73	735.50	733.25	737.75	779	0 0 0 1
W+74	741.50	739.25	743.75	785	0 0 0 1
W+75	747.50	745.25	749.75	791	0 0 0 1
W+76	753.50	751.25	755.75	797	0 0 0 1
W+77	759.50	757.25	761.75	803	0 0 0 1
W+78	765.50	763.25	767.75	809	0 0 0 1
W+79	771.50	769.25	773.75	815	0 0 0 1
W+80	777.50	775.25	779.75	821	0 0 0 1
W+81	783.50	781.25	785.75	827	0 0 0 1
W+82	789.50	787.25	791.75	833	0 0 0 1
W+83	795.50	793.25	797.75	839	0 0 0 1
W+84	801.50	799.25	803.75	845	0 0 0 1
----- END OF US 181 CH -----					

					A P P D.	C H K D.	D S G D.	MODEL NO: TADC-H202F
								TITLE:
								SPECIFICATION
SYMB	NO	APPD	CHKD	DSGD				DOCUMENT NO: BC40253 (25/26)

US 126/155/181 CH FREQUENCY LIST

CH	CENTER	P-Freq	S-Freq	OSC	BAND CODE
14	473.50	471.25	475.75	517	0 0 0 1
15	479.50	477.25	481.75	523	0 0 0 1
16	485.50	483.25	487.75	529	0 0 0 1
17	491.50	489.25	493.75	535	0 0 0 1
18	497.50	495.25	499.75	541	0 0 0 1
19	503.50	501.25	505.75	547	0 0 0 1
20	509.50	507.25	511.75	553	0 0 0 1
21	515.50	513.25	517.75	559	0 0 0 1
22	521.50	519.25	523.75	565	0 0 0 1
23	527.50	525.25	529.75	571	0 0 0 1
24	533.50	531.25	535.75	577	0 0 0 1
25	539.50	537.25	541.75	583	0 0 0 1
26	545.50	543.25	547.75	589	0 0 0 1
27	551.50	549.25	553.75	595	0 0 0 1
28	557.50	555.25	559.75	601	0 0 0 1
29	563.50	561.25	565.75	607	0 0 0 1
30	569.50	567.25	571.75	613	0 0 0 1
31	575.50	573.25	577.75	619	0 0 0 1
32	581.50	579.25	583.75	625	0 0 0 1
33	587.50	585.25	589.75	631	0 0 0 1
34	593.50	591.25	595.75	637	0 0 0 1
35	599.50	597.25	601.75	643	0 0 0 1
36	605.50	503.25	607.75	649	0 0 0 1
37	611.50	509.25	613.75	655	0 0 0 1
38	617.50	515.25	619.75	661	0 0 0 1
39	623.50	621.25	625.75	667	0 0 0 1
40	629.50	627.25	631.75	673	0 0 0 1
41	635.50	633.25	637.75	679	0 0 0 1
42	641.50	639.25	643.75	685	0 0 0 1
43	647.50	645.25	649.75	691	0 0 0 1
44	653.50	651.25	655.75	697	0 0 0 1
45	659.50	657.25	661.75	703	0 0 0 1
46	665.50	663.25	667.75	709	0 0 0 1
47	671.50	669.25	673.75	715	0 0 0 1
48	677.50	675.25	679.75	721	0 0 0 1

CH	CENTER	P-Freq	S-Freq	OSC	BAND CODE
49	683.50	681.25	685.75	727	0 0 0 1
50	689.50	687.25	691.75	733	0 0 0 1
51	695.50	693.25	697.75	739	0 0 0 1
52	701.50	699.25	703.75	745	0 0 0 1
53	707.50	705.25	709.75	751	0 0 0 1
54	713.50	711.25	715.75	757	0 0 0 1
55	719.50	717.25	721.75	763	0 0 0 1
56	725.50	723.25	727.75	769	0 0 0 1
57	731.50	729.25	733.75	775	0 0 0 1
58	737.50	735.25	739.75	781	0 0 0 1
59	743.50	741.25	745.75	787	0 0 0 1
60	749.50	747.25	751.75	793	0 0 0 1
62	755.50	753.25	757.75	799	0 0 0 1
62	761.50	759.25	763.75	805	0 0 0 1
63	767.50	765.25	769.75	811	0 0 0 1
64	773.50	771.25	775.75	817	0 0 0 1
65	779.50	777.25	781.75	823	0 0 0 1
66	785.50	783.25	787.75	829	0 0 0 1
67	791.50	789.25	793.75	835	0 0 0 1
68	797.50	795.25	799.75	841	0 0 0 1
69	803.50	801.25	805.75	847	0 0 0 1

					A P P D.	C H K D.	D S G D.	MODEL NO: TADC-H202F
								TITLE:
								SPECIFICATION
								DOCUMENT NO:
SYMB	NO	APPD	CHKD	DSGD				BC40253 (26/26)

SPECIFICATIONS

3 IN 1 MODULATOR, TUNER, IF BLOCK

MODEL 115-V-D025AN

SANYO TUNER INDUSTRIES CO., LTD.

TUNER ENGINEERING SECTION

CONTENTS

1. COVER	P 1
2. SPECIFICATIONS	P 2 ~ 10
3. APPEARANCE & DIMENSION	P 11
4. SCHEMATIC DIAGRAM	P 12
5. FREQUENCY TABLE	P 13~14

APPROVED	CHECKED	WRITTEN
Sep 5 '00 N. Oohira	Sep. 05. '00 A. Aoki	Sep. 5. '00 J. Matsukawa

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 Ω unbalanced
ANT output impedance	75 Ω unbalanced

1-5 Permissible maximum voltage

+B, MB, CONTROL	+ 5.5 V
BT	+31.0 V

1-6 Normal voltage

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

1-7 Voltage for guaranteeing electrical specification

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

1-8 Temperature

Operating temperature	- 5 to +60 $^{\circ}$ C
Storage temperature	-20 to +70 $^{\circ}$ 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	150 mA	200 mA
MB	35 mA	50 mA
CONTROL	350 μ A	700 μ A
BT	2.0 mA	5.0 mA

1-12 Terminals

Number	Terminal	Function
1	AUDIO IN	MOD AUDIO INPUT
2	CH. SW	CHANNEL SWITCH (OPEN/GND)
3	MB	MOD. +B (+5V)
4	CONTROL	MOD OUTPUT ON/OFF (+5V/0V)
5	VIDEO IN	MOD VIDEO INPUT
6		
7	N. C.	(RF AGC TP)
8	N. C.	- - -
9	ADDRESS	ADDRESS SWITCH
10	CLOCK	CLOCK SIGNAL INPUT
11	DATA	DATA SIGNAL INPUT
12		
13	+B	+B (+5V)
14	N. C.	(4 MHz)
15	BT	TUNING (+31V)
16	N. C.	(TU-TP)
17	IF OUT	IF OUTPUT
18	AUDIO OUT	AUDIO OUTPUT
19	SIF OUT	SIF OUTPUT
20	AFT	AFT OUTPUT
21	VIDEO OUT	VIDEO OUTPUT
22		

(RF MODULATOR SECTION)

2. RF MODULATOR OUTPUT CHARACTERISTICS

	ITEMS	SPECIFICATION				MEASUREMENT TERMS
		MIN	TYP	MAX	UNIT	
2-1	V. S. W. R.		2	3		ANT out (MOD. ON) 60 ~ 72 MHz
2-2	Picture carrier frequency	-100	fp	100	KHz	
2-3	Sound carrier frequency	-0.005	fp+4.5	0.005	MHz	
2-4	Picture level	63.5	66.5	69.5	dBμ (close)	
2-5	P/S ratio	16.5	14.5	12	dB	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
2-6	Spurious level without pass band			36	dBμ (close)	
2-7	Spurious level within pass band			-65	dB	
2-8	920 KHz beat		-65	-55	dB	

3. RF MODULATOR VIDEO CHARACTERISTICS

	ITEMS	SPECIFICATION				MEASUREMENT TERMS
		MIN	TYP	MAX	UNIT	
3-1	Video in impedance	0.7	1.0	1.3	KΩ	0 ~ 4.2 MHz (unbalance) Video in : 1 Vp-p S/(V+S) 0.5 ~ 4.2 MHz (1 MHz base)
3-2	Video modulation	73	80	87	%	
3-3	Sync ratio	26.5	28.5	30	%	
3-4	Video frequency characteristics	-3	-1	2	dB	
3-5	DG		1	7	%	Video in : 1 Vp-p, stair step chroma 20 IRE
3-6	DP		1	7	deg	
3-7	Video S/N ratio	45	48		dB	
3-8	Maximum modulation	88	94	99	%	

4. RF MODULATOR AUDIO CHARACTERISTICS

	ITEMS	SPECIFICATION				MEASUREMENT TERMS
		MIN	TYP	MAX	UNIT	
4-1	Audio in impedance	10			K Ω	50 Hz ~ 10 KHz (unbalance) Audio in : -6.5 dBs, 1 KHz (± 25 KHz deviation : 100 %)
4-2	Modulation	68	80	92	%	
4-3	Audio frequency characteristics	-3	-0.5	3	dB	50 Hz ~ 10 KHz (1 KHz base)
4-4	Distortion		0.3	1	%	Audio in : -6.5 dBs, 1 KHz
4-5	Audio S/N ratio	45	50		dB	Audio in : -6.5 dBs, 1 KHz Video in : 1 Vp-p, color bar

5. SW CIRCUITS CHARACTERISTICS

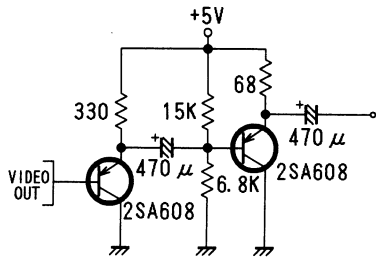
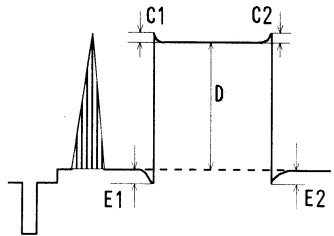
	ITEMS	SPECIFICATION				MEASUREMENT TERMS
		MIN	TYP	MAX	UNIT	
5-1	V. S. W. R.			3		ANT out (MOD. OFF) 54 ~ 810 MHz
5-2	Insertion loss			6	dB	ANT in - ANT out (MOD. OFF) 54 ~ 810 MHz
5-3	Separation	60	65		dB	ANT in - ANT out (MOD. ON) 60 ~ 72 MHz
5-4	ANT in terminal leakage voltage		0	9.5	dB μ (close)	

6. RF MODULATOR THERMAL STABILITY CHARACTERISTICS

	ITEMS	SPECIFICATION				MEASUREMENT TERMS
		MIN	TYP	MAX	UNIT	
6-1	Video modulation	-10		10	%	0 ~ 60 $^{\circ}$ C (25 $^{\circ}$ C 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	

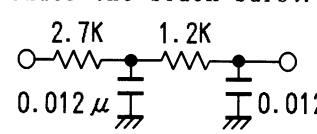
(I F S E C T I O N)

7. IF OUT CHARACTERISTICS

	ITEMS		SPECIFICATION				MEASUREMENT TERMS
			MIN	TYP	MAX	UNIT	
7-1	Sensitivity	VHF CATV, UHF		45 48	48 50	$\text{dB}\mu$ (close)	B. P. F (100 KHz ~ 4.2 MHz) Except sync. and chroma signal S/N=30 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	100 100			$\text{dB}\mu$ (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		17	25	36	%	burst ratio 28.57 % standard
7-7	Video frequency characteristics						
		0.5 ~ 1 MHz	-1.5	0	1.5	dB	JIS C-6101 (500 KHz standard)
		1 ~ 2 MHz	-2	0	3		
		2 ~ 3 MHz	-3.5	-1	3		
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 ± 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 $\text{dB}\mu$ (75 Ω 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	346	489	690	mVrms	400 Hz 100 % MOD. 47 K Ω load under the black burst.
8-2	Audio frequency characteristics 20 Hz ~ 12 KHz	-3	0	+3	dB	400 Hz 30 % MOD. Under the black burst. 
8-3	Audio distortion		0.5	2	%	1 KHz 100 % MOD. Under the black burst.
8-4	Audio S/N	48	52		dB	Black burst, 400 kHz, 60 % MOD.
8-5	Audio sensitivity					
	VHF		30	36	dB μ	S/N 30 dB
	CATV, UHF		30	40		
8-6	Buzz					
	Color bar		10	50	mVp-p	Split color bar signal P/S
	Sweep		50	100		10 dB Video sweep 0.5 ~ 4 MHz (Audio non MOD.)
8-7	SIF output level	87	93	99	dB μ (open)	US 11CH, 79 dB μ (open), P/S 10B Audio non Mod. Use FET probe

9. AFT CHARACTERISTICS

	ITEMS	SPECIFICATION				MEASUREMENT TERMS
		MIN	TYP	MAX	UNIT	
9-1	AFT center frequency	1.5	2.5	3.5	V	10 steps staircase at US 12 CH
9-2	AFT output voltage					
	MIN V			1.0	V	
	MAX V	4.0				

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

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 °C to 60 °C
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	

(TUNER SECTION)

1 1 . TUNER CHARACTERISTICS

11-1 Tuning voltage range

VHF 0.5 ± 30 V
UHF 0.5 ± 30 V

Frequency synthesizer minimum voltage 0.5 V

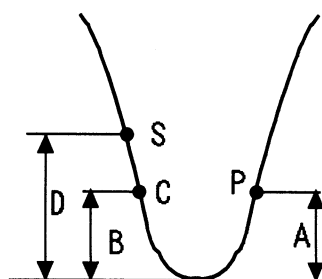
11-2 Power gain

VHF MIN 25 dB
UHF MIN 24 dB

11-3 Noise figure

VHF 14 dB MAX
CATV, UHF 14 dB MAX

11-4 IF response (ANT-IF)



+B 5 V at 11 CH
A : 0 ~ 2 dB
B : 0 ~ 5 dB
D : 2 ~ 7 dB

11-5 Power gain deviation between channels

VHF

12 dB MAX, TYP 6 dB

UHF

14 dB MAX, TYP 6 dB

11-6 AGC gain reduction

VHF

40 dB MIN

UHF

35 dB MIN

11-7 Image rejection ratio

CH 2 ~ 13

60(50) dB MIN

CH J ~ W+11

50(40) dB MIN

CH W+12 ~ 69

50(40) dB MIN

() ; AGC Range 0 ~ -30 dB

11-8 IF rejection ratio

CH 2 ~ B

50(45) dB MIN

CH C ~ W+11

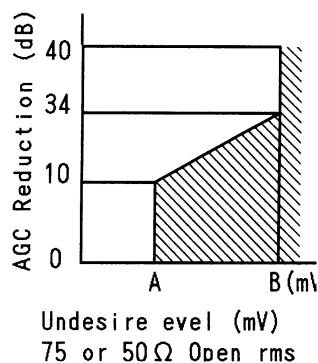
60(50) dB MIN

CH W+12 ~ 69

70(40) dB MIN

() ; AGC Range 0 ~ -30 dB

11-9 1% cross modulation



VHF A : 5 mV

B : 70 mV

CATV A : 3 mV

B : 70 mV

UHF A : 5 mV

B : 50 mV

11-10 F

CH 7 ~ 13

60 dB MIN

CH 5

40 dB MIN (*1)

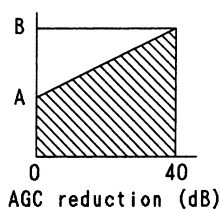
*1. Des : 5 CH (77.25 MHz) 60 dB μ 75 Ω open

Und : 89.1 MHz

s/i = 30 dB

Rej = s/i + (-D/U)

11-11 Input signal level at 10 % distortion



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

11-12 VHF, UHF rejection ratio

VHF	70 dB MIN
UHF	50 dB MIN

11-13 1/2 IF harmonic rejection ratio

UHF	45 dB MIN
-----	-----------

11-14 Inter modulation

VHF	50 dB MIN
-----	-----------

11-15 Drift of oscillation frequency

By ± 1 % change of +B voltage

VHF	± 250 KHz MAX
UHF	± 250 KHz MAX

By ± 25 $^{\circ}$ C change from 25 $^{\circ}$ C

CH 2 $\sim$ 13	± 1000 KHz MAX
CH J $\sim$ W+11	± 4000 KHz MAX
CH W+12 $\sim$ 69	± 4000 KHz MAX

11-16 Local oscillator voltage on the aerial input terminals

300 MHz MAX	34 dB μ V MAX
300 $\sim$ 1000 MHz	50 dB μ V MAX
1000 $\sim$ 1694 MHz	51.8 dB μ V MAX

11-17 CH 6 Beat

40 dB μ MIN

11-18 CH A-5 Beat

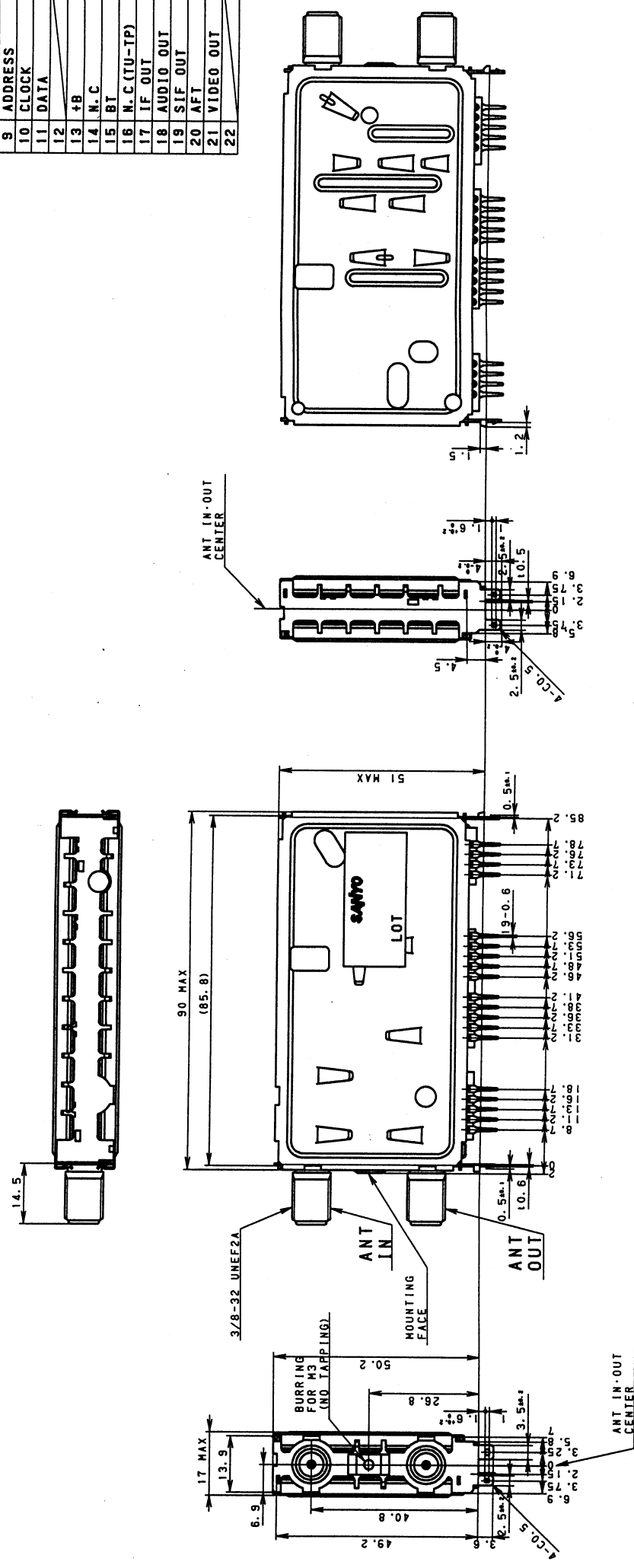
40 dB μ MIN

12 Country origin

SANYO Tuner Industries Co., LTD.
CHINA
SANYO Jaya Components Indonesia

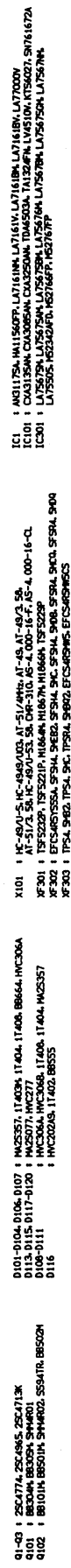
APPEARANCE & DIMENSIONS

TERMINALS LAYOUT	
1	AUDIO IN
2	CH. SV
3	HB
4	CONTROL
5	VIDEO IN
6	
7	N. C (RF AGC-TP)
8	N. C
9	ADDRESS
10	CLOCK
11	DATA
12	
13	+B
14	N. C
15	BT
16	N. C (TU-TP)
17	IF OUT
18	AUDIO OUT
19	SIF OUT
20	AFT
21	VIDEO OUT
22	



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APPROVED	SEP 5 '00
CHECKED	SEP 5 '00
CHECKED	SEP 19 '00
CHECKED	SEP 19 '00
DESIGNED	00.07.10
DRAWN	00.09.05
	M. YOSHIMURA

[illegible]

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	BAND	CHANNEL	P CARRIER	S CARRIER	LOCAL
VHF Low	2	55.25	59.75	101	UHF	W+11	361.25	365.75	407
	3	61.25	65.75	107		W+12	367.25	371.75	413
	4	67.25	71.75	113		W+13	373.25	377.75	419
	5	77.25	81.75	123		W+14	379.25	383.75	425
	6	83.25	87.75	129		W+15	385.25	389.75	431
	A-6	85.25	89.75	131		W+16	391.25	395.75	437
	A-5	91.25	95.75	137		W+17	397.25	401.75	443
	A-4	97.25	101.75	143		W+18	403.25	407.75	449
	A-3	103.25	107.75	149		W+19	409.25	413.75	455
	A-2	109.25	113.75	155		W+20	415.25	419.75	461
	A-1	115.25	119.75	161		W+21	421.25	425.75	467
	A	121.25	125.75	167		W+22	427.25	431.75	473
	B	127.25	131.75	173		W+23	433.25	437.75	479
	C	133.25	137.75	179		W+24	439.25	443.75	485
	D	139.25	143.75	185		W+25	445.25	449.75	491
	E	145.25	149.75	191		W+26	451.25	455.75	497
	F	151.25	155.75	197		W+27	457.25	461.75	503
	G	157.25	161.75	203		W+28	463.25	467.75	509
	H	163.25	167.75	209		W+29	469.25	473.75	515
	I	169.25	173.75	215		14	471.25	475.75	517
	7	175.25	179.75	221		15	477.25	481.75	523
	8	181.25	185.75	227		16	483.25	487.75	529
	9	187.25	191.75	233		17	489.25	493.75	535
	10	193.25	197.75	239		18	495.25	499.75	541
	11	199.25	203.75	245		19	501.25	505.75	547
	12	205.25	209.75	251		20	507.25	511.75	553
	13	211.25	215.75	257		21	513.25	517.75	559
	J	217.25	221.75	263		22	519.25	523.75	565
	K	223.25	227.75	269		23	525.25	529.75	571
	L	229.25	233.75	275		24	531.25	535.75	577
	M	235.25	239.75	281		25	537.25	541.75	583
	N	241.25	245.75	287		26	543.25	547.75	589
	O	247.25	251.75	293		27	549.25	553.75	595
	P	253.25	257.75	299		28	555.25	559.75	601
	Q	259.25	263.75	305		29	561.25	565.75	607
	R	265.25	269.75	311		30	567.25	571.75	613
	S	271.25	275.75	317		31	573.25	577.75	619
	T	277.25	281.75	323		32	579.25	583.75	625
	U	283.25	287.75	329		33	585.25	589.75	631
	V	289.25	293.75	335		34	591.25	595.75	637
	W	295.25	299.75	341		35	597.25	601.75	643
	W+1	301.25	305.75	347		36	603.25	607.75	649
	W+2	307.25	311.75	353		37	609.25	613.75	655
	W+3	313.25	317.75	359		38	615.25	619.75	661
	W+4	319.25	323.75	365		39	621.25	625.75	667
	W+5	325.25	329.75	371		40	627.25	631.75	673
	W+6	331.25	335.75	377		41	633.25	637.75	679
	W+7	337.25	341.75	383		42	639.25	643.75	685
	W+8	343.25	347.75	389		43	645.25	649.75	691
	W+9	349.25	353.75	395		44	651.25	655.75	697
	W+10	355.25	359.75	401		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

仮仕様/TENTATIVE

	TMDH2XA33A
CUST. MODEL NO.	ALPS MODEL NO.

					DSGD.	
					Sep. 6 '00 H. Makita	
					CHKD.	TITLE
						TMDH 2
					APPD. Sep. 6 '00	PRODUCT
					to Furukawa	SPECIFICATION
						DOCUMENT NO.
						(1 / 29)
SYMB.	DATE OR NO.	APPD.	CHKD.	DSGD.	ALPS ELECTRIC CO., LTD.	

I N D E X (目次)									
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							TITLE	PRODUCT	
							TMDH 2	SPECIFICATION	
							DOCUMENT NO.	(2 /)	
SYMB.	DATE OR NO.	APPD.	CHKD.	DSGD.	ALPS ELECTRIC CO., LTD.				

1-1 Application (適用範圍)

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

1-2 Applied Standards (適用規格)

UL, FCC

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。)

							TITLE	PRODUCT	
							TMDH2	SPECIFICATION	
							DOCUMENT NO.		
								(4 /)	
							ALPS ELECTRIC CO., LTD.		
SYMB.	DATE OR NO.	APPD.	CHKD.	DSGD.					

M-NTSC / USA

Upper Heterodyne
(上側 ヘテロダイン)

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)

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

US 3/4 CH

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

						TITLE	PRODUCT		
						TMDH2	SPECIFICATION		
						DOCUMENT NO.	(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 : 20 k Ω Min. (TYP. 30 k Ω)

Control Impedance : 30 k Ω Min. (TYP. 100 k Ω)

Video Input Level : 1.0 Vp-p $\pm$ 0.5 %

Audio Input Level : 0.366 Vrms $\pm$ 0.3 % (-6.5 dBs)

Modulator
Conditions

Video Out Load : 30 k Ω

Audio Out Load : 100 k Ω

SIF Out Load : 100 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)			UNIT
		MIN.	NOM.	MAX.	
+B (Supply Voltage)		4.8	5.0	5.2	V
MB (Modulator 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 "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)

						TITLE	PRODUCT	
						TMDH2	SPECIFICATION	
						DOCUMENT NO.	(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。 温度については、許容差 $\pm 2^{\circ}\text{C}$)
MB	(Modulator Supply Voltage) MB 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。 温度については、許容差 $\pm 2^{\circ}\text{C}$)
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) : $-20^{\circ}\text{C} \sim 70^{\circ}\text{C}$
Humidity (湿度) : Less than 90 % RH
(90 % RH 以下)

						TITLE	PRODUCT	
						TMDH2	SPECIFICATION	
						DOCUMENT NO.		
							(7 /)	
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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)	120	150	180	mA
MB (Modulator Supply Voltage)	—	42	55	
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
MB	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)
 MB (Modulator Supply Voltage)
 TU (Tuner Tuning Supply Voltage)
 CONTROL (Modulator mode [TV/VCR] Control)

						TITLE	PRODUCT	
						TMDH 2	SPECIFICATION	
						DOCUMENT NO.		
							(8 /)	
SYMB.	DATE OR NO.	APPD.	CHKD.	DSGD.	ALPS ELECTRIC CO., LTD.			

(0 dBm = 109 dB μ V)

(本仕様書中、 $\text{dB}\mu\text{V}$ の単位は75 Ω 終端値で定義される。)

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		
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		
3-1-3 V/S Ratio (V/S 比)					10:3.8	10:4.0	10:4.1		Input signal : 1Vp-p white V : S = 10 : 4		
3-1-4 Video Amplitude Frequency Characteristics (映像振幅周波数特性)					-2.0	-0.5	+2.0	dB	Measure range : 0.1~4.2 MHz Based on 1 MHz (1 MHz基準)		
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 %		
3-1-6 Differential Phase (DP) (微分位相)					-7	+1.5	+7	deg	Input signal : 1 Vp-p stair step Chrominance : 20 IRE Luminance : 0~90 %		
							TITLE		PRODUCT		
							TMDH 2		SPECIFICATION		
							DOCUMENT NO.		(10 /)		
					ALPS ELECTRIC CO., LTD.						
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ITEM (項目)						SPECIFICATION (仕様)				NOTE (備考)	
						MIN.	TYP.	MAX.	UNIT		
3-1-11 Audio Amplitude Frequency Characteristics (音声振幅周波数特性)						-3 —	+0.2 -0.6	+3 —	dB	Input signal : -6.5 dBs (0.366 Vrms) Measure range : 50 Hz~10 kHz [Based on 1 kHz] (1 kHz基準)	
3-1-12 Audio Distortion (音声歪率)						—	1.0	2.0	%	Input signal Audio:-6.5 dBs, 1 kHz(0.366 Vrms) sine wave Low pass Filter : 15 kHz in. Video:1 Vp-p color bar signal Standard De-modulator conditions De-emphasis(75 μs) is ON. (デ・インファンス ON)	
3-1-13 Audio S/N (音声S/N)						45	50	—	dB	Reference audio input signal : -6.5 dBs, 1 kHz (0.366 Vrms) Sine wave Low pass Filter : 15 kHz in. Video input signal : All Black (Sync only) (全黒信号) De-emphasis(75 μs) is ON.	
3-1-14 Audio Buzz (音声ハズレ)						43	—	—	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)	
3-1-15 Video Carrier Output Level (映像搬送波出力レベル)						63	66	69	dBμV	Same as Item 3-1-14. (3-1-14項と同じ。)	
										TITLE	PRODUCT
										TMDH2	SPECIFICATION
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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)

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)

Within ± 50 kHz by ± 0.3 V shift of the supply voltage.
(電源電圧 ± 0.3 Vで ± 50 kHz以内)

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.
(映像変調温度安定度)

Within $\pm 4\%$ based on the temperature of $25\text{ }^{\circ}\text{C}$.
($25\text{ }^{\circ}\text{C}$ を基準にして $\pm 4\%$ 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) : -10~60 °C

Humidity range (湿度範圍) : 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)

							TITLE	PRODUCT	
							TMDH2	SPECIFICATION	
							DOCUMENT NO.	(14 /)	
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						TITLE	PRODUCT		
						TMDH2	SPECIFICATION		
						DOCUMENT NO.	(15 /)		
					ALPS ELECTRIC CO., LTD.				
SYMB.	DATE OR NO.	APPD.	CHKD.	DSGD.					

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	6.5	dB	ANT IN to ANT OUT Mode : TV (at MD OFF)	
3-2-2 VSWR I (入力整合比)					—	6	7.5		ANT IN terminal Mode : TV (at MD OFF) 54~810 MHz	
3-2-3 VSWR II (入力整合比)					— —	2 2	3.5 3.5		ANT OUT terminal Mode : TV (at MD OFF) 54~810 MHz Mode :VCR(at MD ON) 60~ 73 MHz	
3-2-4 Isolation (アイソレーション)					60	65	—	dB	Isolation from ANT OUT to ANT IN Mode :VCR(at MD ON) 60~ 73 MHz	
3-2-5 ANT IN Leakage (ANT入力端子漏れ電圧) (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)					— — —	0 28 40	9.5 34 50	dBμV dBμV dBμV	Mode : VCR (at MD ON) RF-Modulator Section : Non-Input Signal (モジュレータ部は無入力) 300 MHz Less than (以下) 300 MHz more than(以上) Mode: TV (at MD OFF) Measure range: 0.03 ~ 1.75 GHz	
									TITLE	PRODUCT
									TMDH2	SPECIFICATION
									DOCUMENT NO.	(16 /)
					ALPS ELECTRIC CO., LTD.					
SYMB.	DATE OR NO.	APPD.	CHKD.	DSGD.						

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

3-4 IF Section (IF 部)

When the test electrical characteristics when there are no instruction.

fp input level is 70 dB μ 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。)

ITEM (項目)		SPECIFICATION (仕様)				NOTE (備考)
		MIN.	TYP.	MAX.	UNIT	
3-4-1	Video Output Level (映像出力レベル) [CH:11]	0.8	1.0	1.2	V _{p-p}	Standard Color bar : 87.5 % mod. (標準カラーバー)
3-4-2	Sync Ratio (同期比率) [CH:11]	3.2	4.0	4.3		Standard Color bar : 87.5 % mod. (標準カラーバー) V : S = 10 : X
3-4-3	Video S/N (映像 S/N)					50 % White signal, 87.5 % mod. Subcarrier trap : ON HPF:100 kHz, LPF : 4.2MHz ANT input level VHF : 70 dBμV / 75 Ω terminate UHF : 70 dBμV / 75 Ω terminate
		VHF	45	48	—	dB
		UHF	45	47	—	
3-4-4	Noise Limiting Sensitivity (雑音制限感度)					50 % White signal, 87.5 % mod. Subcarrier trap : ON HPF:100 kHz, LPF : 4.2 MHz Video S/N = 30 dB
		VHF	—	48	54	dB μV
		UHF	—	49	54	
3-4-5	Video Amplitude Frequency Characteristics (映像振幅周波数特性) [CH:11]					Full sweep : 87.5 % mod. Based ON 100 kHz
		1.0 MHz	-2.5	0.0	+2.5	dB
		2.0 MHz	-2.5	0.0	+2.5	
		3.0 MHz	-3.5	0.0	+2.5	
		3.58 MHz	-3.5	-0.5	+2.5	
SYMB.	DATE OR NO.	APPD.	CHKD.	DSGD.		

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ITEM (項目)		SPECIFICATION (仕様)				NOTE (備考)			
		MIN.	TYP.	MAX.	UNIT				
3-4-12 AFT Alignment Accuracy (AFT調整精度) [CH:11]		-50	0	+50	kHz	Alignment center : 2.5 V (調整センター) RF input level : 70 dBμV P/S = 6 dB Standard color bar : 87.5 % mod. (標準カラーバー)			
3-4-13 SIF Output Level (SIF 出力レベル) [CH:11] 4.5 MHz		84	90	96	dBμ	Video : Standard color bar : 87.5 % mod. Audio : No modulation RF input level : 70 dBμV (RF入力レベル) P/S = -6 dB Measure 4.5 MHz carrier level using Spectrum Analyzer and FET probe. (スペクトラム・アナライザを使用し、4.5 MHz キャリアのレベルをFETプローブで測定)			

					/																
ITEM (項目)					SPECIFICATION (仕様)																
3-4-14 "S" Curve Characteristics (S字カーブ 特性) [CH:11]																					
					<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td></td> <td style="text-align: center;">Modulation 87.5 % Color bar (変調度 87.5 % カラーバー)</td> </tr> <tr> <td>V1 : High level voltage (ハイレベル電圧)</td> <td style="text-align: center;">more than 3.5 V (3.5 V 以上)</td> </tr> <tr> <td>V2 : Low level voltage (ローレベル電圧)</td> <td style="text-align: center;">less than 1.5 V (1.5 V 以下)</td> </tr> <tr> <td>B1 : Width of high level (ハイレベル幅)</td> <td style="text-align: center;">more than 600 kHz (600 kHz 以上)</td> </tr> <tr> <td>B2 : Width of low level (ローレベル幅)</td> <td style="text-align: center;">more than 300 kHz (300 kHz 以上)</td> </tr> <tr> <td>B3 : Width of "S" curve slope (S字傾斜幅)</td> <td style="text-align: center;">50~200 kHz (at 1.5~3.5 V)</td> </tr> </table>						Modulation 87.5 % Color bar (変調度 87.5 % カラーバー)	V1 : High level voltage (ハイレベル電圧)	more than 3.5 V (3.5 V 以上)	V2 : Low level voltage (ローレベル電圧)	less than 1.5 V (1.5 V 以下)	B1 : Width of high level (ハイレベル幅)	more than 600 kHz (600 kHz 以上)	B2 : Width of low level (ローレベル幅)	more than 300 kHz (300 kHz 以上)	B3 : Width of "S" curve slope (S字傾斜幅)	50~200 kHz (at 1.5~3.5 V)
						Modulation 87.5 % Color bar (変調度 87.5 % カラーバー)															
V1 : High level voltage (ハイレベル電圧)	more than 3.5 V (3.5 V 以上)																				
V2 : Low level voltage (ローレベル電圧)	less than 1.5 V (1.5 V 以下)																				
B1 : Width of high level (ハイレベル幅)	more than 600 kHz (600 kHz 以上)																				
B2 : Width of low level (ローレベル幅)	more than 300 kHz (300 kHz 以上)																				
B3 : Width of "S" curve slope (S字傾斜幅)	50~200 kHz (at 1.5~3.5 V)																				
							TITLE	PRODUCT													
							TMDH2	SPECIFICATION													
							DOCUMENT NO.														
								(23 /)													
					ALPS ELECTRIC CO., LTD.																
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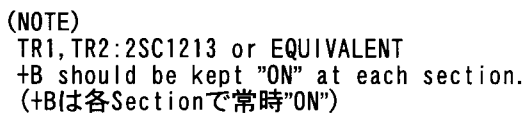
4 Environmental Tests
(信頼性試験)

(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 carrier frequency (映像搬送波周波数) ±180 kHz MAX. Video carrier output level (映像搬送波出力レベル) ±4 dB 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
							TITLE		PRODUCT		
							TMDH 2		SPECIFICATION		
							DOCUMENT NO.		(24 /)		
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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. Series resister 150 Ω. (15 kV 10回 150 pF 放電。 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) Install by Impact test a machine. (衝撃試験機に取付けテストを行う)				
							TITLE	PRODUCT	
							TMDH 2	SPECIFICATION	
							DOCUMENT NO.	(27 /)	
					ALPS ELECTRIC CO., LTD.				
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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 85 ± 5g (85 ± 5g)				
							TITLE	PRODUCT	
							TMDH2	SPECIFICATION	
							DOCUMENT NO.		
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						TMDH2	SPECIFICATION		
						DOCUMENT NO.	(29 / 29)		
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SYMB.	DATE OR NO.	APPD.	CHKD.	DSGD.					

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

2. SEMICONDUCTORS ARE AS FOLLOWS.

TR1, 2, 3 : 2SC4713K, 2SC4680
TR201 : BF1201WR, BB305C, BF1202WR
TR202 : BF1202WR, 3SK318, BF1201WR

VD201~205 : HVC306, 1T404, BB178
 VD206~209 : HVC306, 1T404, BB178
 VD210, 211 : HVC306, 1T404, BB178
 VD212 : HVC202, 1T402, BB179
 D201, D203, D204 : BA277, HSC277

IC1 : LA7161
IC201:ALP030, ALP024, ALP020
IC601:ALP031

F601:TSF5221P
F602:SFSH4.5MDB
F603:TPS4.5MB

	SUPPLY VOLTAGE
+B	5V
MB	5V
TU	32V

PROVISIONAL DRAWING