

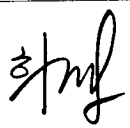

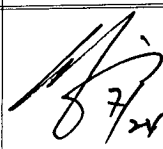


DAEWOO ELECTRONIC COMPONENT COMPANY
DAEWOO CORPORATION

SPECIFICATION

FOR ELECTRONIC TUNER

MODEL : DTMI-5NF02

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| | Page |
|---|------|
| 1. General | 3 |
| 1.1 Summary | 3 |
| 1.2 Receiving channels | 3 |
| 1.3 Sending system | 3 |
| 1.4 Channel selection system | 3 |
| 1.5 Detection system | 3 |
| 1.6 Nominal input impedance | 3 |
| 1.7 Output load impedance | 3 |
| 1.8 Intermediate frequencies | 3 |
| 1.9 Semiconductors | 4 |
| 1.10 Nominal supply voltages | 4 |
| 1.11 Permissible Maximum Voltage | 4 |
| 1.12 Power Dissipation | 4 |
| 1.13 Test conditions | 4 |
| 1.14 Current consumption | 5 |
| 1.15 Storage temperature | 5 |
| 1.16 Operating temperature | 5 |
| 1.17 Weight | 5 |
| 1.18 Terminals | 5 |
| 2. Mechanical characteristics | 6 |
| 2.1 Appearance | 6 |
| 2.2 Shape and Dimensions | 6 |
| 2.3 Mounting on PC board | 6 |
| 3. Electrical characteristics | 6 |
| 3.1 RF MODULATOR SECTION | 6 |
| 3.1.1 RF modulator output characteristics | 6 |
| 3.1.2 RF modulator video characteristics | 7 |
| 3.1.3 RF modulator audio characteristics | 7 |
| 3.1.4 SW circuits characteristics | 8 |
| 3.1.5 Stability characteristics | 9 |
| 3.1.6 Thermal stability characteristics | 9 |
| 3.2 TUNER SECTION | 10 |
| 3.2.1 Electrical characteristics | 10 |
| 3.2.2 PLL data | 13 |



| | |
|------------------------------------|----|
| 3.3 IF SECTION | 15 |
| 3.3.1 IF video out characteristics | 15 |
| 3.3.2 IF audio out characteristics | 16 |
| 3.3.3 AFT characteristics | 16 |
| 3.3.4 IF thermal characteristics | 16 |
| 4. RELIABILITY TEST | 17 |
| 5. OTHERS | |
| 5.1 TERMINAL AFFINITY TO SOLDER | 18 |
| 5.2 TOLERANCE TO HOT SOLDER | 18 |
| 5.3 BREAKDOWN VOLTAGES | 18 |
| 5.4 APPLICABLE STANDARDS | 19 |
| 5.5 CHANNEL DISPLAY | 19 |
| 6. MARKING METHOD | 20 |
| 7. FREQUENCY TABLE | 21 |
| 8. WIRING DIAGRAM | 24 |
| 9. OUTLINE DRAWING | 25 |



1. General

1.1 Summary

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

1.2 Receiving channels

USA 181 channels

| Channel | AIR | CATV |
|---------------|---------------|---------------------|
| VHF Low Band | 2~6 channel | (A-8) A-5~B channel |
| VHF High Band | 7~13 channel | C~w+11 channel |
| UHF | 14~69 channel | W+12~W+84 channel |

1.3 Sending system

USA standard M-system (NTSC)

| | Terminal NO.2 |
|-----|---------------|
| 3CH | OPEN |
| 4CH | GND |

1.4 Tuner channel selection system

PLL tuning system

1.5 Detection system

PLL synchronization detection system

Inter Carrier sound receiving system

1.6 Nominal input impedance (Modulator)

| | | |
|----------|------------|------------|
| RF IN | 75Ω | unbalanced |
| VIDEO IN | 1KΩ | |
| AUDIO IN | 30KΩ min. | |
| CONTROL | 100KΩ min. | |

1.7 Output load impedance (IF)

| | | |
|-----------|-------|------------|
| RF OUT | 75Ω | unbalanced |
| VIDEO OUT | 10kΩ | |
| AUDIO OUT | 100kΩ | |

1.8 Intermediate frequencies

| | |
|-----------------|----------|
| Picture carrier | 45.75MHz |
| Sound carrier | 41.25MHz |



1.9 Semiconductors

| Section | Item | Std. | Maker | Remark |
|-----------------|------------------------------|-----------|-----------|---------------------------|
| TUNER | Mixer + PLL IC (I2C Type) | TUA6014S | Siemense | Same or Equivalence |
| | Tuning Diode | BB659C | Siemense | |
| | RF amplifier FET | BF1005SR | Siemense | |
| | Band Swiching Diode | BA892 | Siemense | |
| | | MCL4148 | Temic | |
| IF amplifier TR | BF799W | Siemense | | |
| MODULATOR | Modulator IC | HA11585FP | Hitach | |
| | RF amplifier TR | 2SC4713K | Rohm | |
| | Resonator | L/C 발진 | | |
| IF | IF IC | M52761FP | Misubishi | |
| | Saw Filter | M1865D | Siemense | |
| | Ceramic Trap Filter | TPS4.5MD | Murata | |
| | Ceramic Filter | SFSH4.5MD | Murata | |

1.10 Normal supply voltages

| | |
|----|-----|
| BM | 5V |
| BT | 32V |
| B+ | 5V |

1.11 Permissible Maximum Voltage

| | |
|---------|------|
| BM | 6V |
| BT | 35V |
| B+ | 5.5V |
| CONTROL | 6V |

(NOTE) Within "B+" supply voltage at enable, data, clock terminal

1.12 Power Dissipation

| | | | |
|---------|------------|-------------|------------|
| BM | - | Typ. 140mW | 182mW max. |
| BT | - | Typ. 75mW | 170mW max. |
| B+ | 494mW min. | Typ. 655mW | 824mW max. |
| CONTROL | - | Typ. 0.24mW | 0.9mW max. |

1.13 Test conditions

| | |
|---------------------|---------------|
| BM | 5V ± 0.1V |
| BT | 32V ± 0.1V |
| B+ | 5V ± 0.1V |
| Ambient temperature | 25°C ± 5°C |
| Relative humidity | 65%RH ± 10%RH |



1.13 Current consumption

| | | |
|---------|-------------------|------------------|
| BM | (Typ. 23mA) | 35mA max. |
| BT | (Typ. 1.5mA) | 5mA max. |
| B+ | (Typ. 170mA) | 200mA max. |
| Control | (Typ. 60 μ A) | 200 μ A max. |

1.14 Storage temperature and Humidity

-20 $^{\circ}$ C ~ +75 $^{\circ}$ C , 90%RH

1.15 Operating temperature and Humidity

-10 $^{\circ}$ C ~ +60 $^{\circ}$ C , 80%RH

1.16 Weight

82 \pm 10gr

1.17 Terminals

| No. | Terminal | Function |
|-----|----------|---|
| 1 | AUDIO IN | MOD. AUDIO INPUT |
| 2 | CH. SW | CHANNEL SWITCH (OPEN, GND) |
| 3 | BM | MOD. +B (+5V) |
| 4 | CONTROL | MOD. OUTPUT ON/OFF (+5V, 0V) |
| 5 | VIDEO IN | MOD. VIDEO INPUT |
| 6 | RF AGC | |
| 7 | N.C | |
| 8 | ARS | CHIP ADDRESS SELECT |
| 9 | SCL | CLOCK INPUT (I ² C BUS) |
| 10 | SDA | DATA INPUT/OUTPUT(I ² C BUS) |
| 11 | B+ | +B (+5V) |
| 12 | FSC IN | X-TAL FREQUENCY INPUT(3.579545MHz) |

2. Mechanical characteristics

2.1 Appearance

No appreciable defects in appearance

2.2 Shape and Dimensions

As per attached outline drawing

2.3 Mounting on PC board

Must insert easily into PC board tuner holes as shown in the attached drawing.

3. Electrical characteristics

3.1 RF MODULATOR SECTION

3.1.1 RF MODULATOR OUTPUT CHARACTERISTICS

| NO | ITEMS | SPECIFICATION | | | | MEASUREMENT TERMS |
|----|-------------------------------------|---------------|------|------|----------|--|
| | | MIN | TYP | MAX | UNIT | |
| 1 | Picture carrier frequency deviation | -100 | fp | +100 | kHz | Video in : None |
| 2 | Sound carrier frequency deviation | -7 | 4500 | +7 | kHz | Audio in : None |
| 3 | Picture Carrier Level | 63 | 66 | 69 | dB μ | Video in : None |
| 4 | P/S ratio(Picture/Sound) | 13 | 14.5 | 17 | dB | Video in : None |
| 5 | Spurious level without pass band | - | - | 39.5 | dB μ | 0 ~ (fp-4.6) MHz, (fp+7.4) ~ 1000 MHz |
| 6 | Spurious level within pass band | 65 | - | - | dB | 0 ~ (fp+4.6) MHz, Video in : None |
| 7 | 920 kHz beat | 55 | 65 | - | dB | Video in : 3.58 MHz, |

3.1.2 RF MODULATOR VIDEO CHARACTERISTICS

| NO | ITEMS | SPECIFICATION | | | | MEASUREMENT TERMS |
|----|---|---------------|------|------|------|---|
| | | MIN | TYP | MAX | UNIT | |
| 1 | Video modulation | 76 | 80 | 84 | % | Video in : 1 Vp-p stair-steps |
| 2 | Maximum video modulation | 87 | 93 | 99 | % | Video in : 1.5Vp-p, stair-steps |
| 3 | Video amplitude frequency characteristics | -2.5 | -0.5 | 2 | dB | 0.5~4.2MHz (0.5MHz base) |
| 4 | DG | - | 1 | 7 | % | Video in : 1 Vp-p, 10 stair-steps chrominance : 20 IRE |
| 5 | DP | - | 1 | 7 | deg | Video in : 1 Vp-p, 10 stair-steps chrominance : 20 IRE |
| 6 | Video S/N | 45 | 52 | - | dB | Video in : 1 Vp-p, White 100% Audio in : None HPF : 100kHz, LPF : 4.2MHz SC TRAP : ON |
| 7 | Sync ratio | 27.5 | 28.5 | 29.0 | % | Video in : 1 Vp-p,White V : S = 10 : 4 |

※ Measured By Standard Demodulator (3,4,5,6,7)

3.1.3 RF MODULATOR AUDIO CHARACTERISTICS

| NO | ITEMS | SPECIFICATION | | | | MEASUREMENT TERMS |
|----|---|---------------|--------------|------------|------------|--|
| | | MIN | TYP | MAX | UNIT | |
| 1 | Audio modulation | 32 (64) | 40 (80) | 48 (96) | kHz (%) | Audio in: -6.5dBs, 1kHz (100% mod. = ± 25 kHz dev.) |
| 2 | Audio maximum modulation | 150 (300) | 220 (440) | - - | kHz (%) | Audio in: 1kHz The input should be adjusted to the level just before the saturation of the modulation |
| 3 | Audio amplitude frequency characteristics | -3 | 0 | +3 | dB | Audio in: -6.5dBs, 1kHz (± 7.5 kHz dev.) 50Hz ~ 12kHz (1kHz base) |
| 4 | Audio Distortion | - | 0.3 | 1 | % | Audio in : -6.5dBs, 1kHz Video in: 1 Vp-p color bar De-emphasis on (75 μ s) |
| 5 | Audio S/N | 48 | 60 | - | dB | Audio in : -6.5dBs Video in: Sync only De-emphasis on (75 μ s) |
| 6 | Audio Buzz | 45 | 50 | - | dB | Audio in : 1kHz (MOD. OFF) Video in: Sync only De-emphasis on (75 μ s) |

※ Measure By Demodulator (3,4,5,6)



3.1.4 SW CIRCUITS CHARACTERISTICS

| NO | ITEMS | SPECIFICATION | | | | MEASUREMENT TERMS |
|----|-----------------------------------|---------------|-----|----------|------------|---|
| | | MIN | TYP | MAX | UNIT | |
| 1 | V.S.W.R. | - | - | 4.5 3 | - | ANT IN (MOD. OFF) 50MHz ~ 850MHz ANT OUT (MOD. OFF) 50MHz ~ 850MHz |
| | | - | - | 3 | - | ANT IN (MOD. ON) 61MHz ~ 72MHz |
| 2 | Insertion Loss | - | - | 6.0 | dB | ANT in to ANT out (MOD. OFF) 50~850MHz |
| 3 | ANT IN Leakage | - | - | 9.5 | dB μ V | (MOD. ON) RF-MOD.section : none input Tuner OSC Leakage |
| | -Modulator | - | 47 | 54 | | |
| 4 | Isolation | 60 | 65 | - | dB | ANT In ~ ANT out (MOD. ON) 61~72MHz |
| 5 | 2nd Harmonics inter modulation | 55 | 64 | - | dB | f1/(f1+f2) ratio MOD. OFF f1 : 91.25MHz 100dB μ V f2 : 103.25MHz 100dB μ V Both f1 and f2 are not modulated. |



3.1.5 RF MODULATOR STABILITY CHARACTERISTICS

| NO | ITEMS | SPECIFICATION | | | | MEASUREMENT TERMS |
|----|---|---------------|-----|-----|------|---|
| | | MIN | TYP | MAX | UNIT | |
| 1 | Picture carrier frequency rise up time | -50 | - | +50 | kHz | within 3 second |
| 2 | Sound carrier frequency rise up time | -3 | - | +3 | kHz | within 10 second |
| 3 | Picture carrier frequency shift by supply voltage drift | -10 | - | +10 | kHz | by $\pm 0.3V$ shift of the supply voltage |
| 4 | Sound carrier frequency shift by supply voltage drift | -5 | - | +5 | kHz | by $\pm 0.3V$ shift of the supply voltage |

3.1.6 RF MODULATOR THERMAL STABILITY CHARACTERISTICS

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

Humidity range : 45%RH \sim 85%RH

Test measurement order and time :

$25^{\circ}C \rightarrow -10^{\circ}C(2H) \rightarrow 10^{\circ}C(1H) \rightarrow 25^{\circ}C(1H) \rightarrow 45^{\circ}C(1H) \rightarrow 60^{\circ}C(2H)$

| NO | ITEMS | SPECIFICATION | | | | MEASUREMENT TERMS |
|----|---------------------------|---------------|-----|-----|-----------|--|
| | | MIN | TYP | MAX | UNIT | |
| 1 | Video modulation | -10 | - | 10 | % | Based on the temperature of $25^{\circ}C$ |
| 2 | Audio modulation | -10 | - | 10 | % | Based on the temperature of $25^{\circ}C$ |
| 3 | Picture carrier frequency | -100 | - | 100 | kHz | Based on the temperature of $25^{\circ}C$ |
| 4 | Sound carrier frequency | -12 | - | 12 | kHz | Based on the temperature of $25^{\circ}C$ |
| 5 | Video output level | -2 | - | 2 | $dB\mu V$ | Based on the temperature of $25^{\circ}C$ |
| 6 | P/S ratio | -2.5 | - | 2.5 | dB | Based on the temperature of $25^{\circ}C$ But 13dB min. |



3.2 TUNER SECTION

3.2.1 ELECTRICAL CHARACTERISTICS

| NO | ITEMS | SPECIFICATION | | | | | MEASUREMENT TERMS | |
|----|------------------------------|----------------|--|-------|------|------------|--|---|
| | | CHANNEL | MIN | TYP | MAX | UNIT | | |
| 1 | VSWR | UHF | | 3.0 | 5.0 | | Measured at worst point on or between picture and sound carriers | |
| | | VHF (except 6) | | 3.0 | 6.0 | | | |
| | | CH 6 | | | 7.0 | | | |
| 2 | Noise figure | UHF | 69~14 | | 9.5 | dB | | |
| | | | W+29~W+12 | | 10.0 | | | |
| | | VHF CATV | | | 9.5 | | | |
| | | VHF AIR | | | 8.0 | | | |
| 3 | Power gain | UHF | 28.0 | 37.0 | | dB | | |
| | | VHF High | 28.0 | 38.0 | | | | |
| | | VHF How | 28.0 | 41.0 | | | | |
| 4 | Gain taper | UHF | | 6.0 | 12.0 | dB | | |
| | | VHF | | 6.0 | 12.0 | | | |
| 5 | Gain reduction | UHF | 35.0 | | | dB | AGC : 0.5V | |
| | | VHF AIR | 50.0 | | | | | |
| | | VHF CATV | 50.0 | | | | | |
| 6 | Input/output characteristics | ALL BANDS | 98.0 | 103.0 | | dB μ V | 75 Ω Terminate | |
| 7 | IF output characteristics | 11 | <p>P = -1.0\pm1.0dB C = -2.0\pm1.0dB</p> | | | | | From ANT to IF IF cable : 3C-5V 20cm Scope sensitivity : 2mV p-p/cm Detector : 75 Ω |



| NO | ITEMS | SPECIFICATION | | | | | MEASUREMENT TERMS | |
|----|--------------------------------|---------------|--------|------|------|------|---|--|
| | | CH | MIN | TYP | MAX | UNIT | | |
| 8 | IF rejection | UHF | 70.0 | 90.0 | | dB | max gain : Worst point at 41.25MHz to 45.75MHz | |
| | | VHF High | 70.0 | 90.0 | | | | |
| | | VHF Low | 50.0 | 70.0 | | | | |
| | | UHF | 50.0 | 70.0 | | dB | -30dB G.R. | |
| | | VHF High | 50.0 | 70.0 | | | | |
| | | VHF Low | 50.0 | 65.0 | | | | |
| 9 | Image rejection | UHF | 45.0 | 52.0 | | dB | max gain : Worst point at image band | |
| | | V H F | W+11~J | 50.0 | 65.0 | | | |
| | | | 13 ~ 2 | 60.0 | 65.0 | | | |
| | | UHF | 40.0 | 40.0 | | dB | -30dB G.R. | |
| | | V H F | W+11~J | 45.0 | 55.0 | | | |
| | | | 13 ~ 2 | 45.0 | 55.0 | | | |
| 10 | 920kHz color beat rejection | UHF | 55.0 | | | dB | 75Ω Terminate Gain : 11CH 출력일정 P : 54dBμV C : 38dBμV S : 48dBμV | |
| | | VHF | 55.0 | | | | | |
| 11 | CH 6 Beat rejection | 6 | 45.0 | | | dB | 75Ω Terminate Gain : 11CH 출력일정 Des. 54dBμV | |
| 12 | CH A-5 Beat rejection | A-5 | 50.0 | | | dB | 75Ω Terminate Gain : 11CH 출력일정 Des. 54dBμV | |



| NO | ITEMS | SPECIFICATION | | | | | MEASUREMENT TERMS | |
|--|---------------------|--|----------|----------------|-----|----------------|-------------------|-----------------------|
| | | CH | MIN | TYP | MAX | UNIT | | |
| 13 | 1% Cross modulation | <p style="text-align: center;">Undesired signal(dBμV) 75Ω Terminate</p> | | | | | | |
| | | CH | | A (dB μ V) | | B (dB μ V) | | |
| | | UHF | | 64 | | 84 | | |
| | | CATV | | 64 | | 81 | | |
| VHF | | W+11 ~ J | | 59 | | 84 | | |
| | | 13 ~ 2 | | 64 | | 84 | | |
| <p>Cross modulation value should be within shaded area. Tuner should be measured for 1% cross modulation with ± 2 channel undesired signal.</p> | | | | | | | | |
| 14 | Margin | CH | | min | typ | max | unit | |
| | | UHF | High-end | 5.0 | | | Mhz | |
| | | | Low-end | 2.0 | | | | |
| | | VHF High | High-end | 5.0 | | | | |
| | | | Low-end | 2.0 | | | | |
| | | VHF Low | High-end | 3.0 | | | | |
| Low-end | 2.0 | | | | | | | |
| 15 | OSC instability | UHF | | | | ± 90 | kHz | |
| | | VHF | | | | ± 90 | | |
| 16 | OSC stop voltage | UHF | | | | 4.5 | V | MB voltage |
| | | VHF | | | | 4.5 | | |
| 17 | ANT leakage | 30 ~ 300Mhz | | | | 34 | dB μ V | 75 Ω Terminate |
| | | 300 ~ 1694Mhz | | | | 46 | | |
| 18 | IF leakage | UHF | | | | 80 | dB μ V | 75 Ω Terminate |
| | | VHF | | | | 95 | | |



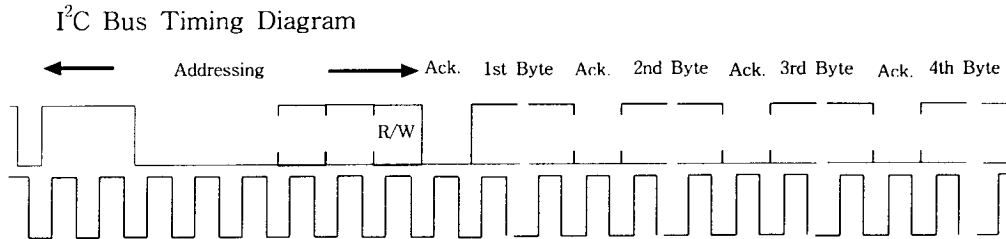
3.2.2 PLL data

3.2.2.1 Input signal level (Clock, Data)

V_{IH} (High - level input voltage) min : 3.0V max : 5.5V

V_{IL} (Low - level input voltage) max : 1.5V

3.2.2.2 I²C Bus Timing Diagram



Note: SDA _____ SCL _____

Telegram examples:

Start-Addr-DR1-DR2-CW1-CW2-Stop

Start-Addr-CW1-CW2-DR1-DR2-Stop

Start-Addr-DR1-DR2-Stop

Start-Addr-CW1-CW2-Stop

Start = start condition

Addr = address byte

DR1 = prog, divider byte 1

DR2 = prog, divider byte 2

CW1 = control byte 1

CW2 = control byte 2

Stop = stop condition

3.2.2.2.1 Bit Allocation Read / Write

| Byte | MSB | bit6 | bit5 | bit4 | bit3 | bit2 | bit1 | LSB | Ack | Remarks |
|-----------------------|-----|------|------|------|------|------|------|-----|-----|---------|
| Write data | | | | | | | | | | |
| Address Byte | 1 | 1 | 0 | 0 | 0 | MA1 | MA0 | 0 | A | |
| Progr. Divider Byte 1 | 0 | n14 | n13 | n12 | n11 | n10 | n9 | n8 | A | |
| Progr. Divider Byte 2 | n7 | n6 | n5 | n4 | n3 | n2 | n1 | n0 | A | |
| Control Byte 1 | 1 | 51 | T1 | T0 | 1 | RSA | RSB | OS | A | |
| Control Byte 2 | X | X | X | X | P3 | P2 | P1 | P0 | A | |
| Read Data | | | | | | | | | | |
| Address Byte | 1 | 1 | 0 | 0 | 0 | MA1 | MA0 | 1 | A | |
| Status Byte | POR | FL | X | 11 | 10 | | A1 | A0 | A | |

3.2.2.2.2 Charge Pump Current

| CP | Unit | |
|----|------|-----|
| 0 | μA | 50 |
| 1 | μA | 250 |

3.2.2.2.3 Reference Divider

| RSA | RSB | |
|-----|-----|-----|
| * | 0 | 80 |
| 0 | 1 | 128 |
| 1 | 1 | 64 |



3.2.2.2.4 Tuning Frequency

Locked frequency is calculated as follows

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

fosc : Locked frequency

f_r : Reference Frequency (4.0MHz/512)

N : 14bit binary code

$$N = 2^{14}X_{n14} + 2^{12}X_{n13} + \dots + 2^3X_{n3} + 2^2X_{n2} + 2^1X_{n1} + n_0$$

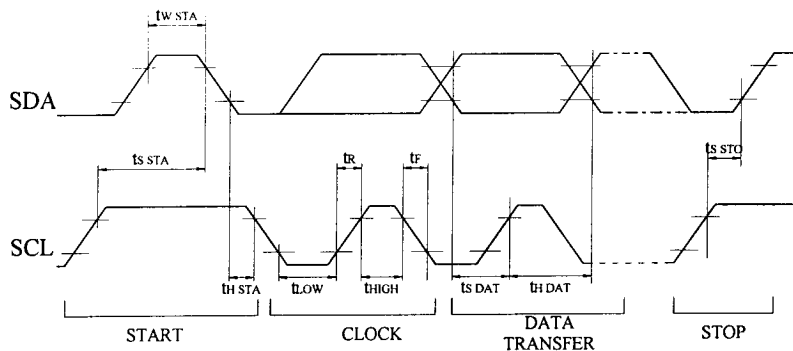
3.2.2.2.5 Band buffers output

| BAND | BS4 | BS3 | BS2 | BS1 |
|----------|-----|-----|-----|-----|
| UHF | 1 | 0 | 0 | 0 |
| VHF HIGH | 0 | 0 | 1 | 0 |
| VHF LOW | 0 | 0 | 0 | 1 |
| CH6 | 0 | 1 | 0 | 1 |

3.2.2.2.6 Address selection

| MA1 | MA0 | Voltage at CAS |
|-----|-----|------------------|
| 0 | 0 | (0 ~ 0.1) *Vcc |
| 0 | 1 | open circuit |
| 1 | 0 | (0.4 ~ 0.6) *Vcc |
| 1 | 1 | (0.9 ~ 0.1) *Vcc |

3.2.2.3 I²C Bus Timing Chart

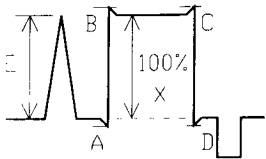


| Item | Unit | Min. | Typ. | Max. | |
|-------------------------------|------|------|------|------|-----|
| fSCL(SCL clock frequency) | kHz | 0 | - | 400 | |
| tS STA(Start Set-up time) | μsec | 0.6 | - | - | |
| tW STA(Start Waiting time) | | 1.3 | - | - | |
| tH STA(Start Hold time) | | 0.6 | - | - | |
| tLOW(LOW clock pulse width) | | 1.3 | - | - | |
| tHIGH(HIGH clock pulse width) | | 0.6 | - | - | |
| tS DAT(Data Set-up time) | | 0.1 | - | - | |
| tH DAT(Data Hold time) | | 0 | - | - | |
| tS STO(Stop Set-up time) | | 0.6 | - | - | |
| tR(Rise time) | | - | - | - | 0.3 |
| tF(Fall time) | | - | - | - | 0.3 |



3.3 IF SECTION

3.3.1 IF VIDEO OUT CHARACTERISTICS

| NO | ITEMS | SPECIFICATION | | | | MEASUREMENT TERMS |
|----|---|---------------------------|--------------------------|----------------------------|------------|---|
| | | MIN | TYP | MAX | UNIT | |
| 1 | Noise Limited Sensitivity VHF CATV, UHF | - | - | 53 | dB μ V | White:50% HPF:100Hz LPF:4.2MHz Sc trap : ON, S/N : 30dB |
| 2 | Video S/N VHF UHF , AIR UHF , CATV | 45 43 43 | 47 47 47 | - - - | dB | fp:70dB μ V, White:50% HPF:100Hz LPF:4.2MHz Sc trap : ON |
| 3 | Maximum input VHF CATV, UHF | 100 90 | 110 100 | - - | dB μ V | |
| 4 | Video output level | 0.9 | 1 | 1.1 | Vp-p | fp:70dB μ V,Standard color bar |
| 5 | Sync ratio | 26 | 28.5 | 30 | % | fp:70dB μ V, SMPTE color bar |
| 6 | Burst ratio | 23.6 | 28.6 | 30.0 | % | fp:70dB μ V,Standard color bar |
| 7 | Video frequency characteristics 1.0MHz 2.0MHz 3.0MHz 3.58MHz 4.1MHz | -2 -2 -2 -3 - | 0 0 0 -2 -12 | +2 +2 +2 +2 -6 | dB | fp : 70dB μ V, Multi burst Based on 0.5MHz |
| 8 | Differential Gain | -5 | 0 | +5 | % | fp : 90dB μ V 10 stair-steps signal APL=10~90% |
| 9 | Differential Phase | -5 | 0 | +5 | deg | fp : 90dB μ V, 10 stair-steps signal APL=10~90% |
| 10 | C/L delay | -100 | 0 | +100 | ns | Group delay 0.5MHz versus 3.58 \pm 0.5MHz |
| 11 | AGC flatness | -1 | 0 | +1 | dB | Sensitivity level to maximum input level |
| 12 | AGC speed | - | 100 | 300 | Hz | Sensitivity level to maximum input level |
| 13 | Bar Pulse Response | | | | |  |
| | A | - | 3 | 13 | % | |
| | B | - | 3 | 13 | | |
| | C | - | 3 | 13 | | |
| | D | - | 3 | 13 | | |
| | E | 90 | 100 | - | | |
| | | | | | | Sin ² 2T pulse & Bar (A,B,C,D,E) / X |



3.3.2 IF AUDIO OUT CHARACTERISTICS

| NO | ITEMS | SPECIFICATION | | | | MEASUREMENT TERMS |
|----|--|---------------|----------------|----------------|------------|--|
| | | MIN | TYP | MAX | UNIT | |
| 1 | Audio output level | 320 | 370 | 420 | mVrms | 1kHz / ± 25 kHz dev. Standard color bar De-emp. ON |
| 2 | Audio frequency characteristics 50Hz ~ 8.0kHz 8.1kHz ~ 12kHz | -3 -3 | 0 -2 | 2 2 | dB | Based on 1kHz / ± 7.5 kHz dev. Standard color bar De-emp. ON |
| 3 | Audio distortion | - | 0.5 | 2 | % | 1kHz / ± 25 kHz dev. Standard color bar De-emp. ON |
| 4 | Audio S/N | 45 | - | - | dB | 1kHz / ± 25 kHz dev. Standard color bar De-emp. ON |
| 5 | Audio Sensitivity VHF UHF,AIR UHF,CATV | - - - | 30 30 30 | 36 36 40 | dB μ V | 1kHz / ± 25 kHz dev. Standard color bar S/N 30 dB , De-emp. ON |
| 6 | Audio sync buzz Color bar H sweep V sweep | - - - | - - - | 50 50 50 | mVp-p | 1kHz / ± 25 kHz dev. ,P/S 17dB De-emp. ON |
| 7 | SIF output level | 120 | 150 | 180 | mVrms | 1kHz / 0kHz dev. ,P/S 13dB |

3.3.3 AFT CHARACTERISTIC

| NO | ITEMS | SPECIFICATION | | | | MEASUREMENT TERMS |
|----|------------------------|---------------|-----|-----|------|------------------------------------|
| | | MIN | TYP | MAX | UNIT | |
| 1 | AFT Center Voltage | 1.8 | 2.3 | 2.8 | V | 10 steps staircase at NTSC 10ch |
| 2 | AFT Range | 1.0 | - | 4.0 | | |
| 3 | AFT alignment accuracy | -50 | 0 | +50 | kHz | |

3.3.4 IF THERMAL CHARACTERISTICS

| NO | ITEMS | SPECIFICATION | | | | MEASUREMENT TERMS |
|----|--------------------|---------------|-----|-----|------|--|
| | | MIN | TYP | MAX | UNIT | |
| 1 | Video output level | -10 | 0 | 10 | % | Difference between the Measurement value in the standard condition and the value measured in the temperature range of -10°C to 60°C |
| 2 | Burst ratio | -10 | 0 | 10 | % | |
| 3 | Sync ratio | -10 | 0 | 10 | % | |
| 4 | Video S/N | -3 | 0 | 3 | dB | |
| 5 | Video sensitivity | -4 | 0 | 4 | dB | |
| 6 | Audio output level | -2 | 0 | 2 | dB | |
| 7 | Audio S/N | -3 | 0 | 3 | dB | |
| 8 | Audio sensitivity | -4 | 0 | 4 | dB | |
| 9 | AFT center voltage | -3 | 0 | 3 | V | |
| 10 | DG | -3 | 0 | 3 | % | |
| 11 | DP | -3 | 0 | 3 | deg | |



4. Reliability Test

4.1 Local oscillator frequency drift (change in temperature : $25^{\circ}\text{C} \pm 35^{\circ}\text{C}$)

4.1.1 RF output

| | Typical | Limits |
|--------------------------------|--------------------|--------------------------|
| Video carrier frequency | $\pm 50\text{kHz}$ | $\pm 100\text{kHz max.}$ |
| Sound carrier center frequency | $\pm 10\text{kHz}$ | $\pm 15\text{kHz max.}$ |

4.1.2 Video output

Shall maintain the normal receiving condition without correcting the tuning after the temperature is changed within the range between -10°C and $+60^{\circ}\text{C}$.

4.2 Local oscillator frequency drift (change in supply voltage)

($5\text{V} \pm 0.2\text{V}$, $9\text{V} \pm 0.5\text{V}$)

4.2.1 RF output

| | Typical | Limits |
|--------------------------------|--------------------|-------------------------|
| Video carrier frequency | $\pm 10\text{kHz}$ | $\pm 50\text{kHz max.}$ |
| Sound carrier center frequency | $\pm 1\text{kHz}$ | $\pm 3\text{kHz max.}$ |

4.2.2 Video output

Shall be problem-free in operation.

4.3 On-load test in a high temperature, high humidity environment

(40°C , 90%RH, 168H)

| | Limits |
|----------------------|-------------------------------------|
| Picture output level | $\pm 0.1\text{Vp-p max.}$ |
| Sound output level | $\pm 30\% \text{ max.}$ |
| Others | shall be problem-free in operation. |

4.4 On-load test in a high temperature environment (70°C , 168H)

Shall satisfy the requirement stated in Section 4.3.

4.5 Shelf test in a low temperature environment (-20°C , 168H)

Shall satisfy the requirement stated in Section 4.3.

4.6 Impact test (79G on 6planes, 3times each)

Shall satisfy the requirement stated in Section 4.3.



4.7 Vibration test

(in 3 different directions, for 15 minute with peak to peak amplitude of 2mm at a rate of 25Hz)

5. Others

5.1 Terminal affinity to solder

Sample terminals to be soldered shall be dipped in methanol (as per JIS-K-1501) into which rosin (as per JIS-K-5902) is dissolved to a concentration of 1~7% for about 5 seconds, then dipped in a solder bath containing molten solder (JIS-Z-3282H, 63A) maintained at $230^{\circ}\text{C} \pm 5^{\circ}\text{C}$ for 3 ± 0.5 seconds. After removal from the solder bath, each sample terminal tested shall show solder adhering over 90% of the submerged portions along the entire circumference.

5.2 Tolerance to hot solder

Sample terminals inserted to a PC board shall be dipped in a molten solder maintained at $350^{\circ}\text{C} \pm 5^{\circ}\text{C}$ for 3~4 seconds, or in a molten solder maintained at $260^{\circ}\text{C} \pm 5^{\circ}\text{C}$ for 9~11 seconds. After being removed from the molten solder, and kept in a room temperature for 1 hour, the tested terminals and PC board shall show no abnormality in appearance and electrical characteristics.

5.3 Breakdown Voltages

| No. | Terminal name | Breakdown static voltage |
|-----|---------------|--------------------------|
| 1 | AUDIO IN | $\pm 400\text{V min.}$ |
| 2 | CH. SW | $\pm 400\text{V min.}$ |
| 3 | BM (5V) | $\pm 150\text{V min.}$ |
| 4 | CONTROL | $\pm 400\text{V min.}$ |
| 5 | VIDEO IN | $\pm 400\text{V min.}$ |
| 6 | BP (5V) | $\pm 150\text{V min.}$ |
| 7 | BT (32V) | $\pm 400\text{V min.}$ |
| 8 | SCL | $\pm 400\text{V min.}$ |
| 9 | SDA | $\pm 400\text{V min.}$ |
| 10 | ARS | $\pm 400\text{V min.}$ |
| 11 | NC | $\pm 400\text{V min.}$ |
| 12 | IF | $\pm 400\text{V min.}$ |
| 13 | +B (5V) | $\pm 150\text{V min.}$ |
| 14 | AUDIO OUT | $\pm 400\text{V min.}$ |
| 15 | GND | ————— |
| 16 | AFT | $\pm 400\text{V min.}$ |
| 17 | VIDEO OUT | $\pm 400\text{V min.}$ |
| 18 | RF-IN | $\pm 15\text{KV min.}$ |
| 19 | RF-OUT | $\pm 15\text{KV min.}$ |



5.4 Applicable standards

FCC Standard

5.5 Channel display

| Display | Channels |
|----------|---------------------------|
| VHF | 2 ~ 13 CH, A-5 ~ W+11 CH |
| VHF LOW | 2 ~ B CH |
| VHF HIGH | C ~ W+11 CH |
| VHF AIR | 2 ~ 13 CH |
| VHF CATV | A-5 ~ I CH, J ~ W+11 CH |
| UHF | W+12 ~ W+29 CH, 14~ 69 CH |
| UHF AIR | 14 ~ 69CH |



6. Marking method

1) Customer Model Name : DWTMI-US2-S

2) Customer Part No. : XXXXXXXXXXX

3) DECC Model Name : DTMI-5NF02

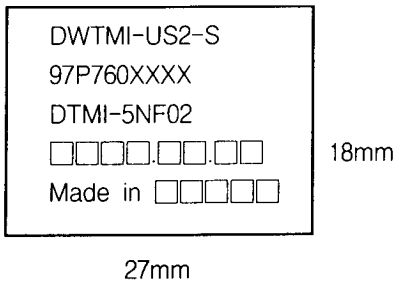
4) Lot No. : □□□□. □□. □□

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5) Producing District : Made in □ □ □ □ □

- KOREA
- N/ILAND
- MEXICO
- CHINA

4) Label size



Frequency Table

1. AIR CHANNEL

| ch No | Center freq. | Freq. range | fp | fs | fosc. | Image freq. | ch No | Center freq. | Freq. range | fp | fs | fosc. | Image frequ. |
|-------|--------------|-------------|--------|--------|-------|-------------|-------|--------------|-------------|--------|--------|-------|--------------|
| 2 | 57 | 54-60 | 55.25 | 59.75 | 101 | 146.75 | 43 | 647 | 644-650 | 645.25 | 649.75 | 691 | 736.75 |
| 3 | 63 | 60-66 | 61.25 | 65.75 | 107 | 152.75 | 44 | 653 | 650-656 | 651.25 | 655.75 | 697 | 742.75 |
| 4 | 69 | 66-72 | 67.25 | 71.25 | 113 | 158.75 | 45 | 659 | 656-662 | 657.25 | 661.75 | 703 | 748.75 |
| 5 | 79 | 76-82 | 77.25 | 81.75 | 123 | 168.75 | 46 | 665 | 662-668 | 663.25 | 667.75 | 709 | 754.75 |
| 6 | 85 | 82-88 | 83.25 | 87.75 | 129 | 174.75 | 47 | 671 | 668-674 | 669.25 | 673.75 | 715 | 760.75 |
| 7 | 177 | 174-180 | 175.25 | 179.75 | 221 | 266.75 | 48 | 677 | 674-680 | 675.25 | 679.75 | 721 | 766.75 |
| 8 | 183 | 180-186 | 181.25 | 185.75 | 227 | 272.75 | 49 | 683 | 680-686 | 681.25 | 685.75 | 727 | 772.75 |
| 9 | 189 | 186-192 | 187.25 | 191.75 | 233 | 278.75 | 50 | 689 | 686-695 | 687.25 | 691.75 | 733 | 778.75 |
| 10 | 195 | 192-198 | 193.25 | 197.75 | 239 | 284.75 | 51 | 695 | 692-698 | 693.25 | 697.75 | 739 | 784.75 |
| 11 | 201 | 198-204 | 199.25 | 203.75 | 245 | 290.75 | 52 | 701 | 698-704 | 699.25 | 703.75 | 745 | 790.75 |
| 12 | 207 | 204-210 | 205.25 | 209.75 | 251 | 296.75 | 53 | 707 | 704-710 | 705.25 | 709.75 | 751 | 796.75 |
| 13 | 213 | 210-216 | 211.25 | 215.75 | 257 | 302.75 | 54 | 713 | 710-716 | 711.25 | 715.25 | 757 | 802.75 |
| 14 | 473 | 470-476 | 471.25 | 475.75 | 517 | 562.72 | 55 | 719 | 716-722 | 717.25 | 721.75 | 763 | 808.75 |
| 15 | 479 | 476-482 | 477.25 | 481.75 | 523 | 568.75 | 56 | 725 | 722-728 | 723.25 | 727.75 | 769 | 814.75 |
| 16 | 485 | 482-488 | 483.25 | 487.75 | 529 | 574.75 | 57 | 731 | 728-734 | 729.25 | 733.75 | 775 | 820.75 |
| 17 | 491 | 488-494 | 489.25 | 493.75 | 535 | 580.75 | 58 | 737 | 734-740 | 735.25 | 739.75 | 781 | 826.75 |
| 18 | 497 | 494-500 | 495.25 | 499.75 | 541 | 586.75 | 59 | 743 | 740-746 | 741.25 | 745.75 | 787 | 832.75 |
| 19 | 503 | 500-506 | 501.25 | 505.75 | 547 | 592.75 | 60 | 749 | 746-752 | 747.25 | 751.75 | 793 | 838.75 |
| 20 | 509 | 506-512 | 507.25 | 511.75 | 553 | 598.75 | 61 | 755 | 752-758 | 753.25 | 757.75 | 799 | 844.75 |
| 21 | 515 | 512-518 | 513.25 | 517.75 | 559 | 604.75 | 62 | 761 | 758-764 | 759.25 | 763.75 | 805 | 850.75 |
| 22 | 521 | 518-524 | 519.25 | 523.75 | 565 | 610.75 | 63 | 767 | 764-770 | 765.25 | 769.75 | 811 | 856.75 |
| 23 | 527 | 524-530 | 525.25 | 529.75 | 571 | 616.75 | 64 | 773 | 770-776 | 771.25 | 775.75 | 817 | 862.75 |
| 24 | 533 | 530-536 | 531.25 | 535.75 | 577 | 622.75 | 65 | 779 | 776-782 | 777.25 | 781.75 | 823 | 868.75 |
| 25 | 539 | 536-542 | 537.25 | 541.75 | 583 | 628.75 | 66 | 785 | 782-788 | 783.25 | 787.75 | 829 | 874.75 |
| 26 | 545 | 542-548 | 543.25 | 547.75 | 589 | 634.75 | 67 | 791 | 788-794 | 789.25 | 793.75 | 835 | 880.75 |
| 27 | 551 | 548-554 | 549.25 | 553.75 | 595 | 640.75 | 68 | 797 | 794-800 | 795.25 | 799.75 | 841 | 886.75 |
| 28 | 557 | 554-560 | 555.25 | 559.75 | 601 | 646.75 | 69 | 803 | 800-806 | 801.25 | 805.75 | 847 | 892.75 |
| 29 | 563 | 560-566 | 561.25 | 565.75 | 607 | 652.75 | | | | | | | |
| 30 | 569 | 566-572 | 567.25 | 571.75 | 613 | 658.75 | | | | | | | |
| 31 | 575 | 572-578 | 573.25 | 577.75 | 619 | 664.75 | | | | | | | |
| 32 | 581 | 578-584 | 579.25 | 583.75 | 625 | 670.75 | | | | | | | |
| 33 | 587 | 584-590 | 585.25 | 589.75 | 631 | 676.75 | | | | | | | |
| 34 | 593 | 590-596 | 591.25 | 595.75 | 637 | 682.75 | | | | | | | |
| 35 | 599 | 596-602 | 597.25 | 601.75 | 643 | 688.75 | | | | | | | |
| 36 | 605 | 602-608 | 603.25 | 607.75 | 649 | 694.75 | | | | | | | |
| 37 | 611 | 608-614 | 609.25 | 613.75 | 655 | 700.75 | | | | | | | |
| 38 | 617 | 614-620 | 615.25 | 619.75 | 661 | 706.75 | | | | | | | |
| 39 | 623 | 620-626 | 621.25 | 625.75 | 667 | 712.75 | | | | | | | |
| 40 | 629 | 626-632 | 627.25 | 631.75 | 673 | 718.75 | | | | | | | |
| 41 | 635 | 632-638 | 633.25 | 637.75 | 679 | 724.75 | | | | | | | |
| 42 | 641 | 638-644 | 639.25 | 643.75 | 685 | 730.75 | | | | | | | |

2. CABLE CHANNEL

| Ch No | Center freq. | Freq. range | fp | fs | fosc. | Image freq. | Ch No | Center freq. | Freq. range | fp | fs | fosc. | Image freq. |
|-------|--------------|-------------|--------|--------|-------|-------------|-------|--------------|-------------|--------|--------|-------|-------------|
| 2 | 57 | 54-60 | 55.25 | 59.75 | 101 | 146.75 | W+2 | 309 | 306-312 | 307.25 | 311.75 | 353 | 398.75 |
| 3 | 63 | 60-66 | 61.25 | 65.75 | 107 | 152.75 | W+3 | 315 | 312-318 | 313.25 | 317.75 | 359 | 404.75 |
| 4 | 69 | 66-72 | 67.25 | 71.75 | 113 | 158.75 | W+4 | 321 | 318-324 | 319.25 | 323.75 | 365 | 410.75 |
| 5 | 79 | 76-82 | 77.25 | 81.75 | 123 | 168.75 | W+5 | 327 | 324-330 | 325.25 | 329.75 | 371 | 416.75 |
| 6 | 85 | 82-88 | 83.25 | 87.75 | 129 | 174.75 | W+6 | 333 | 330-336 | 331.25 | 335.75 | 377 | 422.75 |
| A-6 | 87 | 84-90 | 85.25 | 89.75 | 131 | 176.75 | W+7 | 339 | 336-342 | 337.25 | 341.75 | 383 | 428.75 |
| A-5 | 93 | 90-96 | 91.25 | 95.75 | 137 | 182.75 | W+8 | 345 | 342-348 | 343.25 | 347.75 | 389 | 434.75 |
| A-4 | 99 | 96-102 | 97.25 | 101.75 | 143 | 188.75 | W+9 | 351 | 348-354 | 349.25 | 353.75 | 395 | 440.75 |
| A-3 | 105 | 102-108 | 103.25 | 107.75 | 149 | 194.75 | W+10 | 357 | 354-360 | 355.25 | 359.75 | 401 | 446.75 |
| A-2 | 111 | 108-114 | 109.25 | 113.75 | 155 | 200.75 | W+11 | 363 | 360-366 | 361.25 | 365.75 | 407 | 452.75 |
| A-1 | 117 | 114-120 | 115.25 | 119.75 | 161 | 206.75 | W+12 | 369 | 366-372 | 367.25 | 371.75 | 413 | 458.75 |
| A | 123 | 120-126 | 121.25 | 125.75 | 167 | 212.75 | W+13 | 375 | 372-378 | 373.25 | 377.75 | 419 | 464.75 |
| B | 129 | 126-132 | 127.25 | 131.75 | 173 | 218.75 | W+14 | 381 | 378-384 | 379.25 | 383.75 | 425 | 470.75 |
| C | 135 | 132-138 | 133.25 | 137.75 | 179 | 224.75 | W+15 | 387 | 384-390 | 385.25 | 389.75 | 431 | 476.75 |
| D | 141 | 138-144 | 139.25 | 143.75 | 185 | 230.75 | W+16 | 393 | 390-396 | 391.25 | 395.75 | 437 | 482.75 |
| E | 147 | 144-150 | 145.25 | 149.75 | 191 | 236.75 | W+17 | 399 | 396-402 | 397.25 | 401.75 | 443 | 488.75 |
| F | 153 | 150-156 | 151.25 | 155.75 | 197 | 242.75 | W+18 | 405 | 402-408 | 403.25 | 407.75 | 449 | 494.75 |
| G | 159 | 156-162 | 157.25 | 161.75 | 203 | 248.75 | W+19 | 411 | 408-414 | 409.25 | 413.75 | 455 | 500.75 |
| H | 165 | 162-168 | 163.25 | 167.75 | 209 | 254.75 | W+20 | 417 | 414-420 | 415.25 | 419.75 | 461 | 506.75 |
| I | 171 | 168-174 | 169.25 | 173.75 | 215 | 260.75 | W+21 | 423 | 420-426 | 421.25 | 425.75 | 467 | 512.75 |
| 7 | 177 | 174-180 | 175.25 | 179.75 | 221 | 266.75 | W+22 | 429 | 426-432 | 427.25 | 431.75 | 473 | 518.75 |
| 8 | 183 | 180-186 | 181.25 | 185.75 | 227 | 272.75 | W+23 | 435 | 432-438 | 433.25 | 437.75 | 479 | 524.75 |
| 9 | 189 | 186-192 | 187.25 | 191.75 | 233 | 278.75 | W+24 | 441 | 438-444 | 439.25 | 443.75 | 485 | 530.75 |
| 10 | 195 | 192-198 | 193.25 | 197.75 | 239 | 284.75 | W+25 | 447 | 444-450 | 445.25 | 449.75 | 491 | 536.75 |
| 11 | 201 | 198-204 | 199.25 | 203.75 | 245 | 290.75 | W+26 | 453 | 450-456 | 451.25 | 455.75 | 497 | 542.75 |
| 12 | 207 | 204-210 | 205.25 | 209.75 | 251 | 296.75 | W+27 | 459 | 456-462 | 457.25 | 461.75 | 503 | 548.75 |
| 13 | 213 | 210-216 | 211.25 | 215.75 | 257 | 302.75 | W+28 | 465 | 462-468 | 463.25 | 467.75 | 509 | 554.75 |
| J | 219 | 216-222 | 217.25 | 221.75 | 263 | 308.75 | W+29 | 471 | 468-474 | 469.25 | 473.75 | 515 | 560.75 |
| K | 225 | 222-228 | 223.25 | 227.75 | 269 | 314.75 | W+30 | 477 | 474-480 | 475.25 | 479.75 | 521 | 566.75 |
| L | 231 | 228-234 | 229.25 | 233.75 | 275 | 320.75 | W+31 | 483 | 480-486 | 481.25 | 485.75 | 527 | 572.75 |
| M | 237 | 234-240 | 235.25 | 239.75 | 281 | 326.75 | W+32 | 489 | 486-492 | 487.25 | 491.75 | 533 | 578.75 |
| N | 243 | 240-246 | 241.25 | 245.75 | 287 | 332.75 | W+33 | 495 | 492-498 | 493.25 | 497.75 | 539 | 584.75 |
| O | 249 | 246-252 | 247.25 | 251.75 | 293 | 338.75 | W+34 | 501 | 498-504 | 499.25 | 503.75 | 545 | 590.75 |
| P | 255 | 252-258 | 253.25 | 257.75 | 299 | 344.75 | W+35 | 507 | 504-510 | 505.25 | 509.75 | 551 | 596.75 |
| Q | 261 | 258-264 | 259.25 | 263.75 | 305 | 350.75 | W+36 | 513 | 510-516 | 511.25 | 515.75 | 557 | 602.75 |
| R | 267 | 264-270 | 265.25 | 269.75 | 311 | 356.75 | W+37 | 519 | 516-522 | 517.25 | 521.75 | 563 | 608.75 |
| S | 273 | 270-276 | 271.25 | 275.75 | 317 | 362.75 | W+38 | 525 | 522-528 | 523.25 | 527.75 | 569 | 614.75 |
| T | 279 | 276-282 | 277.25 | 281.75 | 323 | 368.75 | W+39 | 531 | 528-534 | 529.25 | 533.75 | 575 | 620.75 |
| U | 285 | 282-288 | 283.25 | 287.75 | 329 | 374.75 | W+40 | 537 | 534-540 | 535.25 | 539.75 | 581 | 626.75 |
| V | 291 | 288-294 | 289.25 | 293.75 | 335 | 380.75 | W+41 | 543 | 540-546 | 541.25 | 545.75 | 587 | 632.75 |
| W | 297 | 294-300 | 295.25 | 299.75 | 341 | 386.75 | W+42 | 549 | 546-552 | 547.25 | 551.75 | 593 | 638.75 |
| W+1 | 303 | 300-306 | 301.25 | 305.75 | 347 | 392.75 | W+43 | 555 | 552-558 | 553.25 | 557.75 | 599 | 644.75 |



| Ch No | Center freq. | Freq. range | fp | fs | fosc. | Image freq. | Ch No | Center freq. | Freq. range | fp | fs | fosc. | Image freq. |
|-------|--------------|-------------|--------|--------|-------|-------------|-------|--------------|-------------|----|----|-------|-------------|
| W+44 | 561 | 558-564 | 559.25 | 563.75 | 605 | 650.75 | | | | | | | |
| W+45 | 567 | 564-570 | 565.25 | 569.75 | 611 | 656.75 | | | | | | | |
| W+46 | 573 | 570-576 | 271.25 | 575.75 | 617 | 662.75 | | | | | | | |
| W+47 | 579 | 576-582 | 577.25 | 581.75 | 623 | 668.75 | | | | | | | |
| W+48 | 585 | 582-588 | 583.25 | 587.75 | 629 | 674.75 | | | | | | | |
| W+49 | 591 | 588-594 | 589.25 | 593.75 | 635 | 680.75 | | | | | | | |
| W+50 | 597 | 594-600 | 595.25 | 599.75 | 641 | 686.75 | | | | | | | |
| W+51 | 603 | 600-606 | 601.25 | 605.75 | 647 | 692.75 | | | | | | | |
| W+52 | 609 | 606-612 | 607.25 | 611.75 | 653 | 698.75 | | | | | | | |
| W+53 | 615 | 612-618 | 613.25 | 617.75 | 659 | 704.75 | | | | | | | |
| W+54 | 621 | 618-624 | 619.25 | 623.75 | 665 | 710.75 | | | | | | | |
| W+55 | 627 | 624-630 | 625.25 | 629.75 | 671 | 716.75 | | | | | | | |
| W+56 | 633 | 630-636 | 631.25 | 635.75 | 677 | 722.75 | | | | | | | |
| W+57 | 639 | 636-642 | 637.25 | 641.75 | 683 | 728.75 | | | | | | | |
| W+58 | 645 | 642-648 | 643.25 | 647.75 | 689 | 734.75 | | | | | | | |
| W+59 | 651 | 648-654 | 649.25 | 653.75 | 695 | 740.75 | | | | | | | |
| W+60 | 657 | 654-660 | 655.25 | 659.75 | 701 | 746.75 | | | | | | | |
| W+61 | 663 | 660-666 | 661.25 | 665.75 | 707 | 752.75 | | | | | | | |
| W+62 | 669 | 666-672 | 667.25 | 671.75 | 713 | 758.75 | | | | | | | |
| W+63 | 675 | 672-678 | 673.25 | 677.75 | 719 | 764.75 | | | | | | | |
| W+64 | 681 | 678-684 | 679.25 | 683.75 | 725 | 770.75 | | | | | | | |
| W+65 | 687 | 684-690 | 685.25 | 689.75 | 731 | 776.75 | | | | | | | |
| W+66 | 693 | 690-696 | 691.25 | 695.75 | 737 | 782.75 | | | | | | | |
| W+67 | 699 | 696-702 | 697.25 | 701.75 | 743 | 788.75 | | | | | | | |
| W+68 | 705 | 702-708 | 703.25 | 707.75 | 749 | 794.75 | | | | | | | |
| W+69 | 711 | 708-714 | 709.25 | 713.75 | 755 | 800.75 | | | | | | | |
| W+70 | 717 | 714-720 | 715.25 | 719.75 | 761 | 806.75 | | | | | | | |
| W+71 | 723 | 720-726 | 721.25 | 725.75 | 767 | 812.75 | | | | | | | |
| W+72 | 729 | 726-732 | 727.25 | 731.75 | 773 | 818.75 | | | | | | | |
| W+73 | 735 | 732-738 | 733.25 | 737.75 | 779 | 824.75 | | | | | | | |
| W+74 | 741 | 738-744 | 739.25 | 743.75 | 785 | 830.75 | | | | | | | |
| W+75 | 747 | 744-750 | 745.25 | 749.75 | 791 | 836.75 | | | | | | | |
| W+76 | 753 | 750-756 | 751.25 | 755.75 | 797 | 842.75 | | | | | | | |
| W+77 | 759 | 756-762 | 757.25 | 761.75 | 803 | 848.75 | | | | | | | |
| W+78 | 765 | 762-768 | 763.25 | 767.75 | 809 | 854.75 | | | | | | | |
| W+79 | 771 | 768-774 | 769.25 | 773.75 | 815 | 860.75 | | | | | | | |
| W+80 | 777 | 774-780 | 775.25 | 779.75 | 821 | 866.75 | | | | | | | |
| W+81 | 783 | 780-786 | 781.25 | 785.75 | 827 | 872.75 | | | | | | | |
| W+82 | 789 | 786-792 | 787.25 | 791.75 | 833 | 878.75 | | | | | | | |
| W+83 | 795 | 792-798 | 793.25 | 797.75 | 839 | 884.75 | | | | | | | |
| W+84 | 801 | 798-804 | 799.25 | 803.75 | 845 | 890.75 | | | | | | | |

