ISC

DISTORTION METER

DM2020K

OPERATION MANUAL

Function

The DM2020K is an easy-to-use distortion meter that can measure total harmonics distortion (THD) in audio amplifier & equipment. It covers audio band form 20HZ to 20KHZ with high resolution (0.01%) display.

This distortion meter is designed for testing all the audio device, like tube pre-amplifier ,tube power amplifier, transistor pre-amplifier, transistor power amplifier, FET pre-amplifier, FET power amplifier. Combined with an audio test disc, the DM2020K can test quality of CD , SACD, DVD,VCD player. The DM2020K can also test distortion or sensitivity (12 dB SINAD =25% distortion).of FM radio & receiver with RF signal gen. e.g. FM tuner,144MC,409MC transceiver.

It is an useful instrument for manufacturer, laboratory, or audio amateur.

Feature

3 digits LED display for distortion & AC Voltage measurement

One knob for tuning distortion ,with High/Low direction indication. for fast distortion Measurement

Input attenuator (10dB, 20dB)

Input voltage 0.3Vrms -- 50Vrms for distortion measurement ,
0.1V-50V for AC voltage measurement

True RMS Display for distortion & AC voltage measurement

High resolution (0.01%)for distortion measurement

Intensity control of LED display for different environment

Build-in High Pass filter(400HZ) & Low Pass Filter(30KHZ) in reducing interference for accurate distortion measurement

High impedance input(100K ohm)

Build-in low distortion oscillator(option),100HZ,1K,10K, variable output (0-2Vrms.)

Build-in distortion calibration signal (0.1%,1KHZ) for self testing & panel setting verification. It is very useful for unskilled operator.

Distortion Monitor output for waveform of harmonics & noise analyzes .

Specification (23 ℃ +/ - 5℃)

Distortion Meter

Frequency Range = 20HZ to 20KHZ,3 ranges
Testing Range & resolution = 0.01%to 9.99%,0.1%to 50%,2 ranges
Accuracy =+/- 5%of reading +1 digit (distortion > 0.1 %)
Test Method=True RMS display
Test Bandwidth=app.80KHZ
Residual Distortion & Noise ,1 digit
Input voltage=min for 100%cal (0.3Vrms)
max for 100%cal (50 Vrms)
Input Impedance=app 100K ohm
Input attenuation=10db,20db,2 ranges
Monitor output Impedance=app 10K ohm
Filter=High Pass(400HZ),Low Pass(30KHZ),-3dB
Display=3 digits LED

AC Volt Meter

Test Range & resolution=0.1Vrms to 50Vrms,0.1V
Frequency response =20HZ to 30KHZ (+/- 1 db ,400HZ reference)
Accuracy=+/- 3% of reading +1 digit (400HZ)

Low Distortion Signal generator (Option)

Output frequency =100HZ,1KHZ,10KHZ ,3 ranges
Frequency Accuracy = +/-3 %,
Voltage output Range=0 to 3 Vrms (open circuit) ,0 to 1.5 Vrms (600 ohm loading)
Flatness = +/-3% (refer to 1 KHZ ,1Vrms)
Attenuation=10dB
Output Impedance=app. 600 ohm

Distortion Calibration Signal (Option)

Output Frequency & accuracy = 1KHZ(+/-3 %)
Distortion signal = 0.1%(+/-3%)
Voltage output Range=0 to 3 Vrms (open circuit) ,0 to 1.5 Vrms (600 ohm loading)
Output Impedance=app. 600 ohm

Other

Operating Voltage=AC 110V or 200V (50HZ,60HZ)
Dimension= (130H X 215W X 310D) mm
Weight= 3KG net
Operating temperature = (10 ℃ 40 ℃)

(13.)Input

Input for distortion measurement & AC voltage measurement

Input voltage for distortion measurement (0.3V to 50V rms)

Input voltage for AC voltage measurement (0.1V to 50V rms)

Do not input signal over than 50V rms ,otherwise damage will be occur

Low Distortion Signal Generator

(14.)Amplitude

Output level amplitude adjust for signal & distortion cal. Signal (0 to 2 V rms, open circuit)

(15.)ATTEN(-10dB)----------Attenuation for output signal level to 0.3 (10 db)

(16.)Output frequency range

Main frequency 100HZ ,1KHZ,10KHZ , (Distortion < 0.01%)

Distortion cal. Signal ,1KHZ , 0.1%,

(17.)Option----------Indicate Low Distortion signal generator & Distortion cal. Signal is installed

(18.)Output ----------Signal output (app .600 ohm)

(19.)Power (Main power on / off switch)

Distortion Meter (Rear Panel)

1. AC Voltage Selector

   Select main input voltage (AC110V or AC220V) for different country .

2.FUSE Socket

(AC220 V ,0.125A -- 0.3A ,AC110V, 0.3A - 1A) ,

Using proper rating fuse for protection .otherwise damage & accident will be occur

3.AC Input .

AC input socket, using power cord with ground connection

4.Input voltage preset indication

(13.)Input

Input for distortion measurement & AC voltage measurement

Input voltage for distortion measurement (0.3V to 50V rms)

Input voltage for AC voltage measurement (0.1V to 50V rms)

Do not input signal over than 50V rms ,otherwise damage will be occur

Low Distortion Signal Generator

(14.)Amplitude

Output level amplitude adjust for signal & distortion cal. Signal (0 to 2 V rms, open circuit)

(15.)ATTEN(-10dB)----------Attenuation for output signal level to 0.3 (10 db)

(16.)Output frequency range

Main frequency 100HZ ,1KHZ,10KHZ , (Distortion < 0.01%)

Distortion cal. Signal ,1KHZ , 0.1%,

(17.)Option----------Indicate Low Distortion signal generator & Distortion cal. Signal is installed

(18.)Output ----------Signal output (app .600 ohm)

(19.)Power (Main power on / off switch)

Distortion Meter (Rear Panel)

1. AC Voltage Selector

   Select main input voltage (AC110V or AC220V) for different country .

2.FUSE Socket

(AC220 V ,0.125A -- 0.3A ,AC110V, 0.3A - 1A) ,

Using proper rating fuse for protection .otherwise damage & accident will be occur

3.AC Input .

AC input socket, using power cord with ground connection

4.Input voltage preset indication

Self check

This instrument feature self testing & panel setting verification. It is very useful for unskilled operator.

Fig .(5)

Please see photo of attached CDR for detail

Setup below procedure

1.Connected coaxial cable from low distortion oscillator output (18) to distortion meter input.(13)

2.Preset distortion meter as below (ACV measurement)

VM/DM(8)----------VM

Distortion Range(10)----------CAL/VM

Filer(LP,HP)(11)----------on

Atten(-10)(9)---------- off

(-20)----------off

Level(100 Cal)(7)----------Minimum (Counter clock wise)

Frequency Range(2)----------200HZ-2KHZ(For 1KHZ test)

Distortion Tuning knob(1) ---middle position

3.Preset low distortion oscillator as below.

Frequency Range(16)----------CAL/1K, (1KHZ, 0.1% output)

Atten (-10dB)(15)----------off

Amplitude (14) ---------- Minimum (Counter clock wise)

4.Adjust low distortion oscillator level to 1V (Display read 1.0V)

5.Set VM/DM(8)to DM for distortion measure.

6.Set display to 100 with level(100Cal) (7)for 100% cal.

7. Set Distortion Range(10) to 10%

8.Adjust Distortion Tuning knob (1) until Tuned LED turn on ,display read 0.09 to 0.11%
That mean distortion measurement & panel setting is correct.

9.Set frequency of low distortion oscillator to 1KHZ.

10.Set Low & high Filter of distortion meter to on position .

11.Display reading must less than 0.01%

12.Set Frequency (16) to 100HZ

13.Set frequency range (2) of Distortion meter to 100HZ

14.Set Low Pass Filter to off position, High Pass Filter to on position

15.Adjust Distortion Tuning knob (1) until Tuned LED turn on ,display reading must less than 0.02%

16.Set Frequency (16) to 10KHZ

17.Set frequency range (2) of Distortion meter to 10KHZ

18.Set Low Pass Filter to on position, High Pass Filter to off position

19.Adjust Distortion Tuning knob (1) until Tuned LED turn on ,display reading must less than 0.02%

Application

Distortion Test for audio amplifier, (Preamp, Power amp,)

(FIG.1A, B)

Please see photo of attached CDR for detail

Preset below procedure

Adjust Amplitude control (14) of low distortion oscillator to min.

Connected low distortion oscillator output (18) to preamp line input with 47K or 100K resistor

Connected coaxial cable from preamp line output to distortion meter input (13).

1. Preset distortion meter for ACV measurement
   Function(DM/VM) (8) ,----VM
   Distortion Range (10)-------CAL 100%
   Filter (HP,LP) (11)----------OFF
   Frequency Range(2)---------200HZ to 2KHZ (For 1KHZ Test)

1.Adjust amplitude (14) of low distortion oscillator until display read 1.0V

2.Set DM/VM (8) to DM for distortion measurement

3.Set Level(100%) (7) to minimum (counter clockwise)

4.Adjust level (7) & attn (-10,20) (9) until display read 100(100%,calibration)

5.Set distortion range (10) to 10% for high resolution

7.Read distortion from display . e.g. display read (0.25),distortion=0.25%

8.Turn on HPF(400HZ) (11) ,if the reading of distortion reduce, lower frequency interference may be occur.(e g cause by power line or hum noise)
Connect the scope (BW>10MHZ) to monitor output (12) for noise display.

9.Turn on LPF(30KHZ) (11),if the reading of distortion reduce, high frequency interference may be occur. Connect the scope (BW>10MHZ) to monitor output (12) for noise display.

Application

Distortion Test for CD Player (SACD,DVD,VCD)

(FIG.2)

Please see photo of attached CDR for detail

Put test disc into CD Player

Connected coaxial cable from CD line output to distortion meter input. (18)

Play frequency of test disc to 1KHZ

1. Preset distortion meter for distortion measurement
   Function(DM/VM)(8),----DM
   Distortion Range(10)--------CAL 100%
   Filter (HP,LP)(11)----------OFF
   Frequency Range(2)-------- 200HZ to 2KHZ (For 1KHZ Test)

2.Set Level(100%) (7) to minimum (counter clockwise)

3.Adjust level (7) & attn (-10,20) (9) until display read 100(100% calibration)

4.Set distortion range (10) to 10% for high resolution

5.Read distortion from display . e.g. display read (0.25),distortion=0.25%

6.Turn on HPF(400HZ) (11) ,if the reading of distortion reduce, lower frequency interference may be occur.(e g cause by power line or hum noise)
   Connect the scope (BW>10MHZ) to monitor output (12) for noise display.

7.Turn on LPF(30KHZ) (11),if the reading of distortion reduce, high frequency interference may be occur.
   Connect the scope (BW>10MHZ) to monitor output (12) for noise display.

Application

Distortion Test for FM ,AM Tuner, receiver

(FIG.3)

Please see photo of attached CDR for detail

Required Test instrument :

FM/AM Standard Signal Generator (e. g. Meguro MSG - 2161)

Oscilloscope (BW>10 MHZ)

Preset FM/AM Standard Signal Generator as below

RF output frequency : 100MHZ or other frequency for test

RF output level : 66 dbu

FM deviation : 75KHZ

Modulating signal : 1 KHZ

Connected coaxial cable from FM/AM Standard Signal Generator RF output to antenna input of tuner .Connected coaxial cable from tuner line output to distortion meter & Scope input with T joint connector

Adjust tuner frequency tuning for clear sine wave on scope.

1. Preset distortion meter for distortion measurement
   Function(DM/VM)(8)----DM
   Distortion Range(10)--------CAL 100%
   Filter (HP,LP)(11)----------OFF
   Frequency Range(2)--------200HZ to 2KHZ
2. Set Level(100%) (7) to minimum (counter clockwise)
3. Adjust level (7) & attn (-10,20) (9) until display read 100(100% calibration)
4. Set distortion range (10) to 10% for high resolution
5. Read distortion from display . e.g. display read (0.25),distortion=0.25%
6. Turn on HPF(400HZ) (11) ,if the reading of distortion reduce, lower frequency interference may be occur.(e g cause by power line or hum noise)
   Connect the scope (BW>10MHZ) to monitor output (12) for noise display.
7. Turn on LPF(30KHZ) (11),if the reading of distortion reduce, high frequency interference may be occur. Connect the scope (BW>10MHZ) to monitor output (12) for noise display.

Application

Sensitivity Test for transceiver (VHF ,UHF e.g. 144MHZ) as SINAD METER (FIG.4)

Please see photo of attached CDR for detail

The DM2020K can also test sensitivity (12 dB SINAD =25% distortion).of FM Transceiver

Required Test instrument :
FM/AM Standard Signal Generator (e.g. Fluke 6060B)
Oscilloscope (BW>10 MHZ)

Preset FM/AM Standard Signal Generator as below

RF output frequency : 144MHZ or other frequency for test

RF output level : 10 uv (-87 dbm)

FM deviation : 5KHZ

Modulating signal : 1 KHZ

Connected coaxial cable (50 ohm) from FM/AM Standard Signal Generator RF output to antenna input of transceiver

Connected coaxial cable from transceiver speaker output to distortion meter & Scope input with T joint connector

Adjust transceiver channel setting & volume control for clear sine wave on scope.

1. Preset distortion meter for distortion measurement
   Function(DM/VM)(8)----DM
   Distortion Range(10)--------CAL 100%
   Filter (HP,LP)(11)----------ON
   Frequency Range(2)--------200HZ to 2KHZ
2. Set Level(100%) (7) to minimum (counter clockwise)
3. Adjust level (7) & attn (-10,20) (9) until display read 100 (100% calibration)
4. Set distortion range (10) to 100%
5. Read distortion from display . e.g. display read (1.5),distortion=1.5%
6. Decrease RF output level of FM/AM Standard Signal Generator until distorting meter read distortion app. 25.0% (12 db SINAD).

Check RF output level indication of FM/AM Standard Signal Generator .
e.g. 0.15 uv (-123.5 dbm) ,the sensitivity of transceiver is 0.15 uv @ 12 db SINAD.

ISC

AC noise & harmonic tester

ACT1256

USER NOTE

10-2001

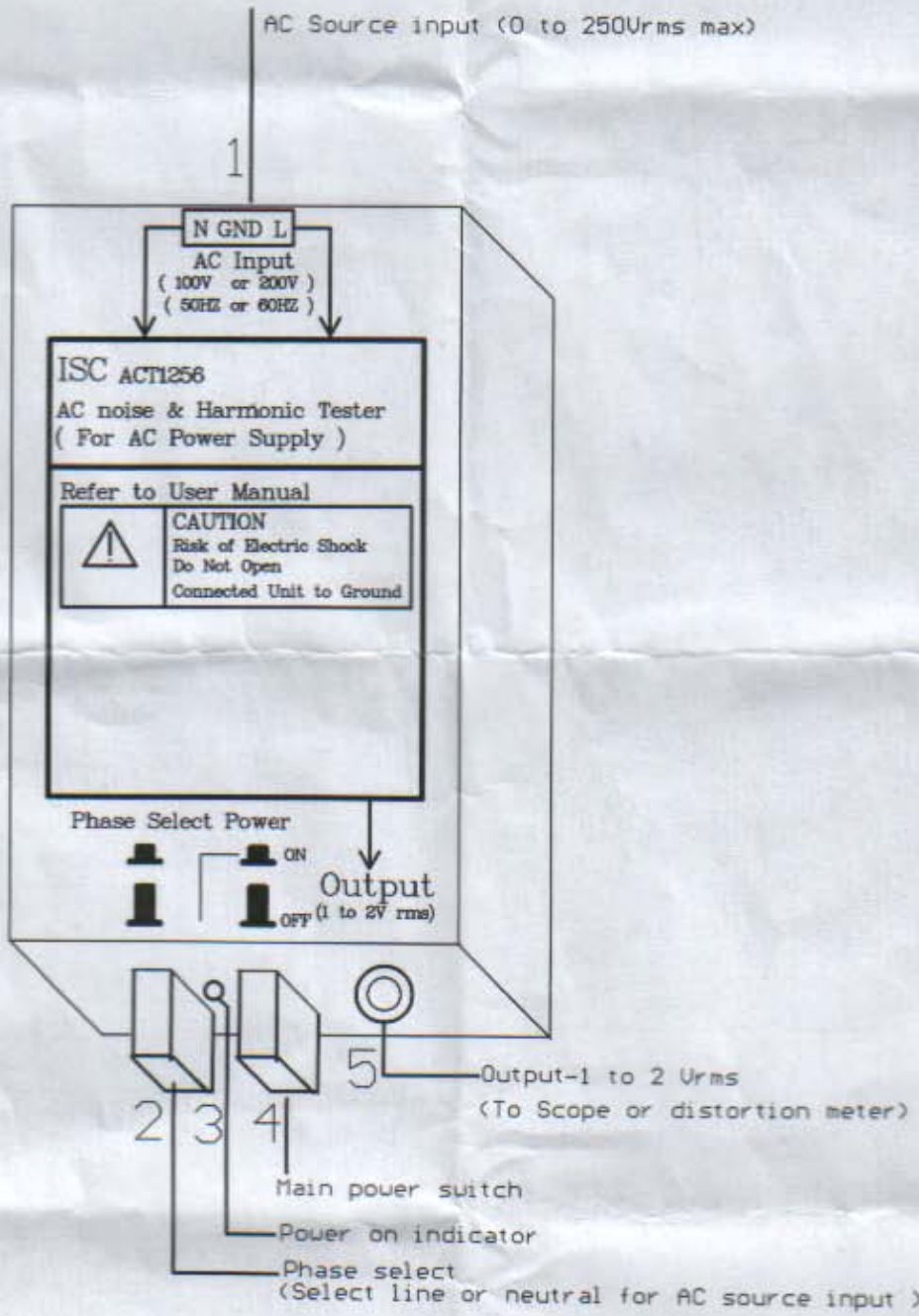
AC noise & harmonic tester

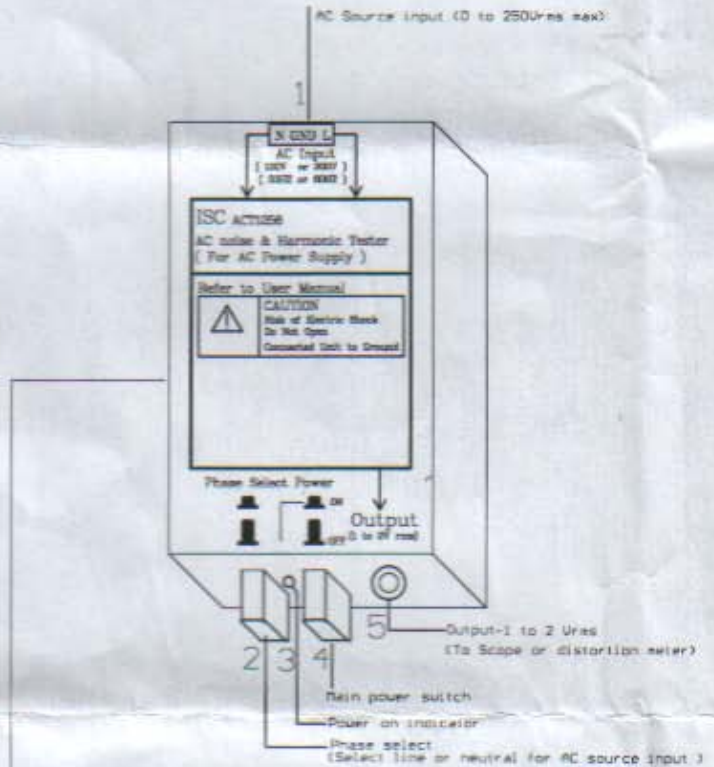
ISC ACT1256

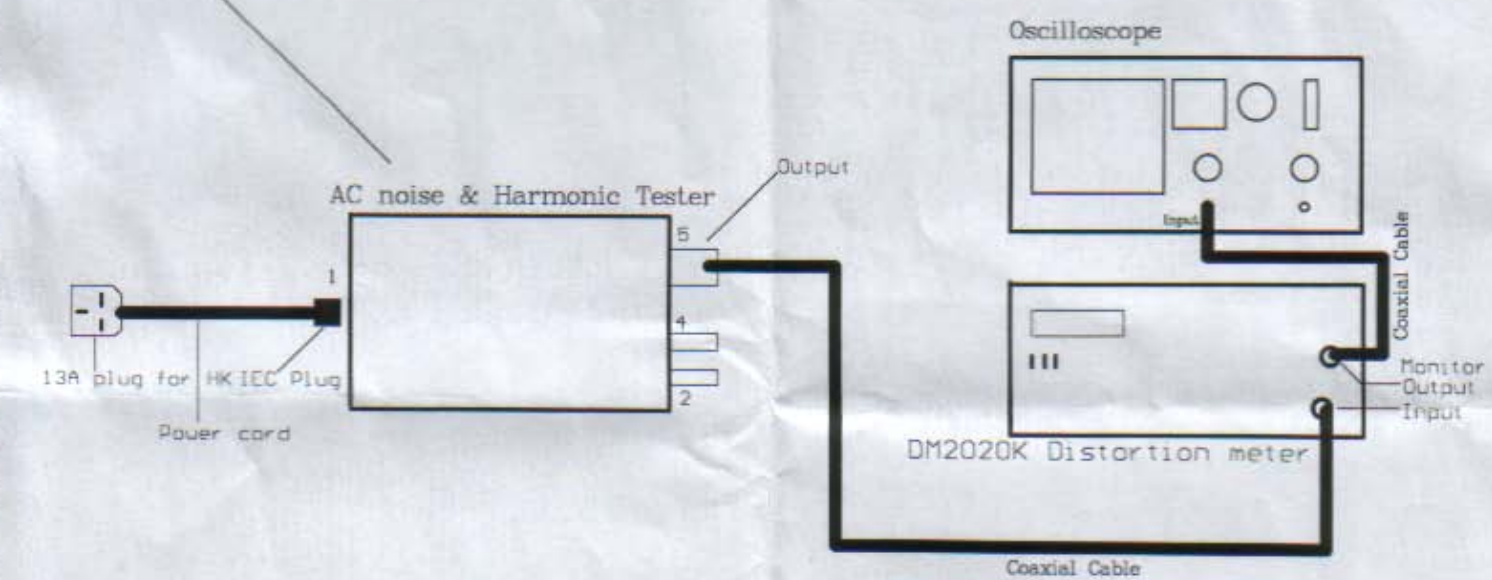
SPECIFICATION (25 ℃ +/- 3 ℃)

Input voltage (IEC) : 0 to 250V rms (40HZ to 400HZ)
Output voltage (BNC) : 0 to 2.5 V rms
Operating Temperature : 15 to 30 ℃
Operating humidity : 40 to 80 % (R.H.)
Dimension: (30H X 60W X 100D) mm for main body ,
Weight: 0.3KG

1. AC input (IEC socket)
2. Phase select (Select line or neutral for AC source input)
3. Power on indicator
4. Main power switch
5. Output 1 to 2 Vrms for 100 to 200V input (To Scope or distortion meter)


AC Source input (0 to 250Vrms max)
1
N GND L
AC Input
(100V or 200V)
(50HZ or 60HZ)
ISC ACT1256
AC noise & Harmonic Tester
(For AC Power Supply)
Refer to User Manual
CAUTION
Risk of Electric Shock
Do Not Open
Connected Unit to Ground
Phase Select Power
ON
OFF
Output
(1 to 2V rms)
5
Output-1 to 2 Vrms
(To Scope or distortion meter)
2
3
4
Main power switch
Power on indicator
Phase select
(Select line or neutral for AC source input)


AC Source input (0 to 250Vrms max)
1
AC Input
ISC AC1050
AC noise & Harmonic Tester
(For AC Power Supply)
Refer to User Manual
CAUTION
Phase Select Power
Output
5
Output-1 to 2 Vrms
(To Scope or distortion meter)
2 3 4
Main power switch
Power on indicator
Phase select
(Select line or neutral for AC source input)


Oscilloscope
Input
Coaxial Cable
AC noise & Harmonic Tester
Output
5
4
2
1
13A plug for HK IEC Plug
Power cord
Monitor Output
Input
DM2020K Distortion meter
Coaxial Cable

TEST DISC

NO.	Channel *	Frequency (HZ)	Level (dB)
1.	L,R	21	0
2.	L,R	31	0
3.	L,R	61	0
4.	L,R	127	0
5.	L,R	251	0
6.	L,R	499	0
7.	L,R	997	0
8.	L,R	1999	0
9.	L,R	4001	0
10.	L,R	7993	0
11.	L,R	10007	0
12.	L,R	12503	0
13.	L,R	16001	0
14.	L,R	17989	0
15.	L,R	19997	0

*L (Left Channel), R (Right Channel)