

# Function Generator

**Conventional VCO Function Generator  
&  
DDS(Motech FG708S)**

# Comparison between VCO & DDS

## VCO by analog design

Most of conventional Function Generators are using this design concept. The basic circuit includes integrator, comparator. With this circuit, it can generate triangle & square waveform. But, the sine wave is generated through the triangle wave by diode & impedance. **NOT a true sine wave!!**

< Advantage > simple circuit design 、 lower price

< Disadvantage > **Bad performance & reliability at Frequency 、 voltage**

## DDS by Digital design

With the Digital design concept, it's the so-called "Synthesized Function Generator", which is using DDS (Direct Digital Synthesizer) technology to control the D/A converter to generate the correct wave form.

< Advantage >

- (1) High accuracy even at high freq and the bandwidth is much wider.
- (2) Easy to operate
- (3) Various waveforms
- (4) Reasonable price

Type	VCO	DDS
Formed circuit	Designed By Integrator Comparator	DDS(Direct Digital Synthesizer)
Freq accuracy	×	○
Freq range	×	○
Freq resolution	×	○
Stability at low freq	×	○
Freq switching	×	○
Multi channels	×	○
Trigger/Gate	○	○
Dim/Weight	○	○
Price	○	○

# KEY FEATURE

## 1. Display



## 2. Adjustment



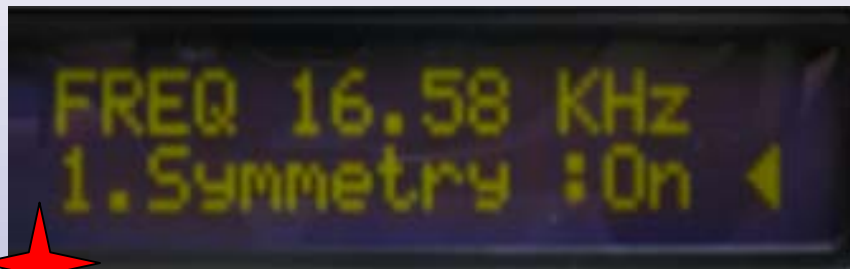
VCO



FG708S

# KEY FEATURE

## 3. Duty Cycle



## 4. Output Attenuation

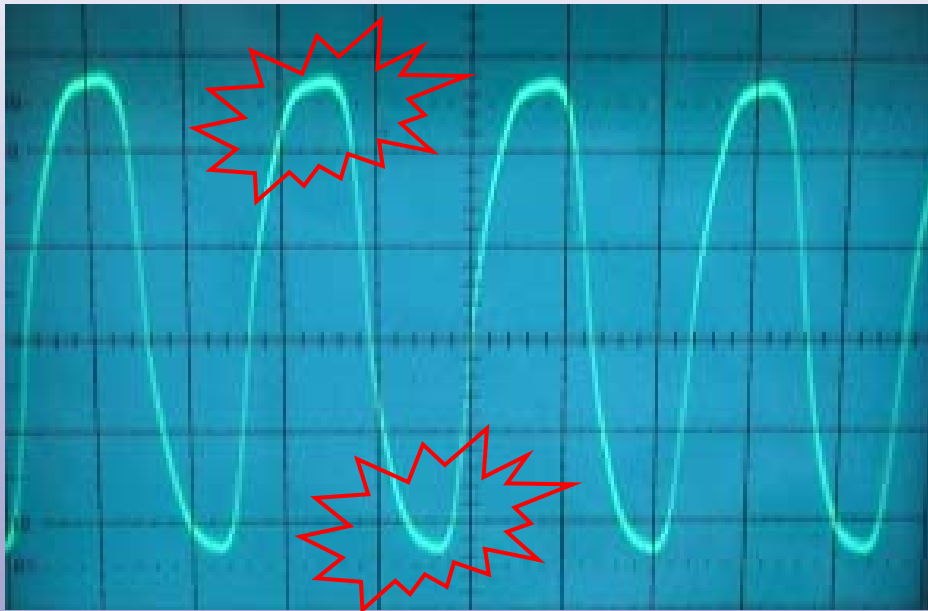


VCO

FG708S

# KEY FEATURE

## 5. Waveform Distortion 1



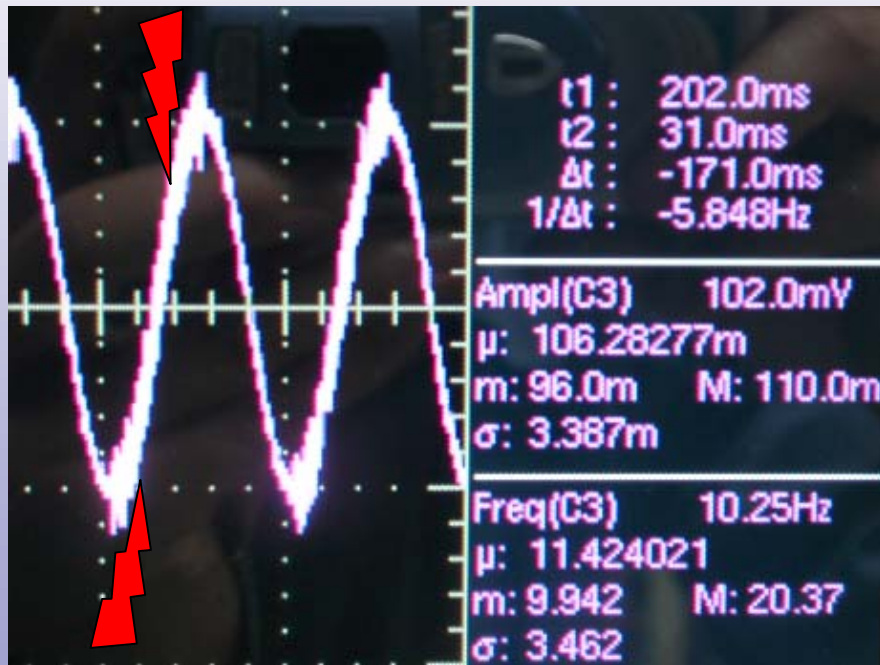
VCO



FG708S

# KEY FEATURE

## 5. Waveform Distortion 2



VCO



FG708S

# Signal/Noise Ratio (FG708S)

Signal/Noise ratio > 55dB typical

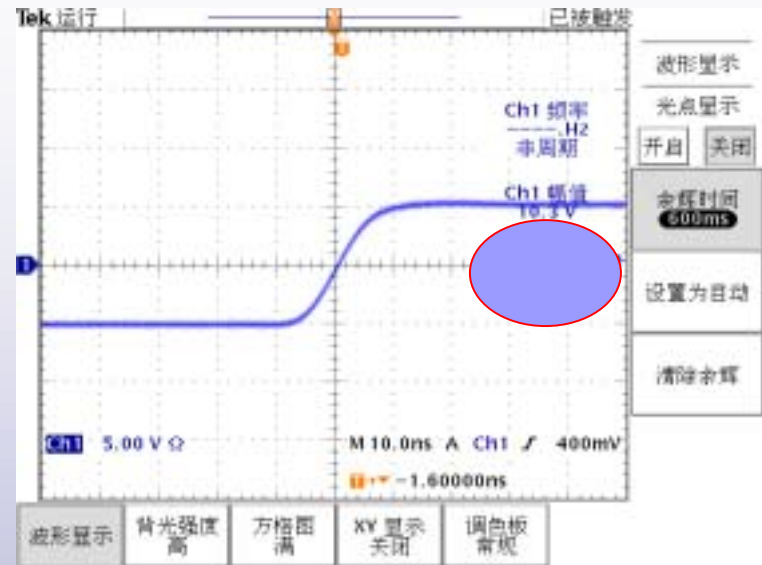
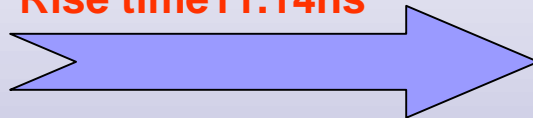
Figure 1



# Square Wave (FG708S)

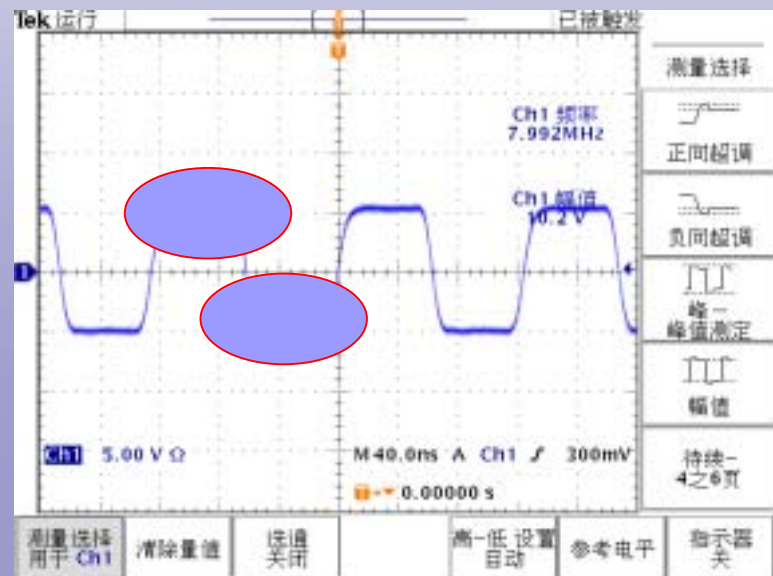
Rise/Fall time  $\leq 12\text{ns}$   
(10Vpp 50 $\Omega$  load)

Rise time 11.14ns



Overshoot  $< 5\%$  of  $V_p$   
(10Vpp 50 $\Omega$  load)

8MHz, 10Vpp



# Pulse Wave (FG708S)

Frequency range: 100mHz~8MHz

Amplitude: 0~10V/0~ -10V / $\pm$  10V

Duty cycle:

100mHz~5MHz : 20% to 80%

5MHz~8MHz : 40% to 60%

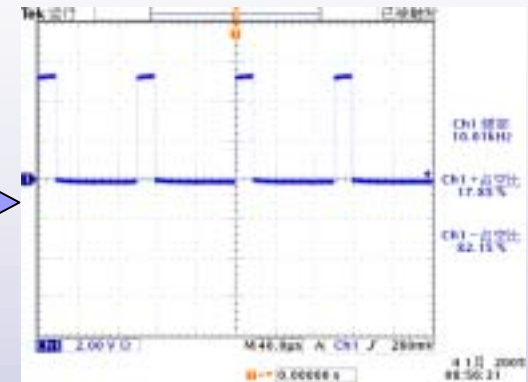
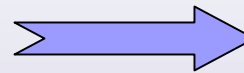
Frequency stable while adjust duty cycle

Duty cycle display

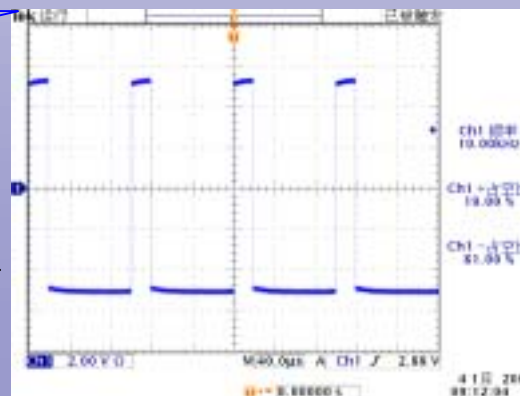
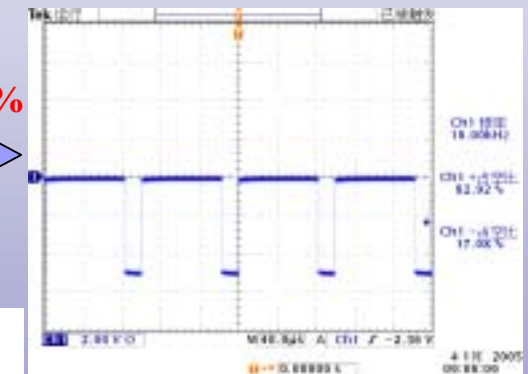
Positive/Negative Pulse

VCO only

Positive Pulse 18%

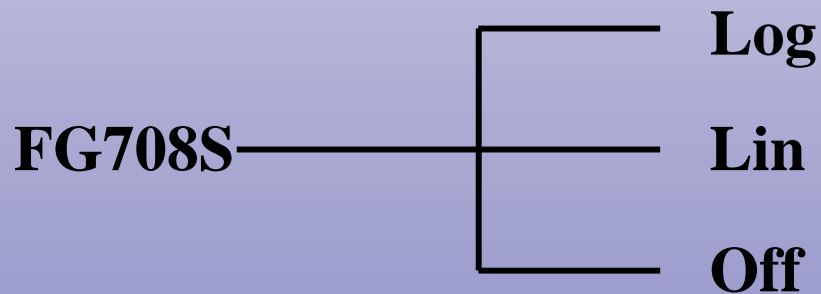
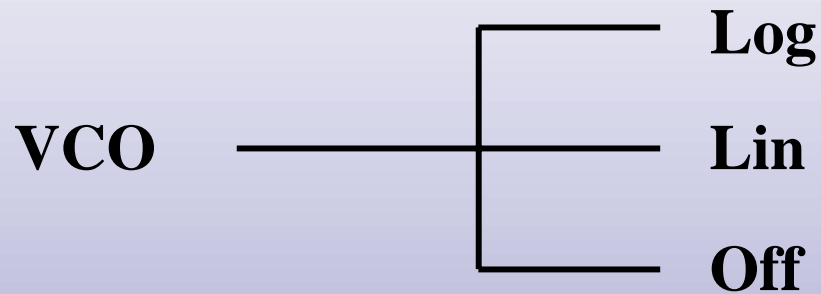
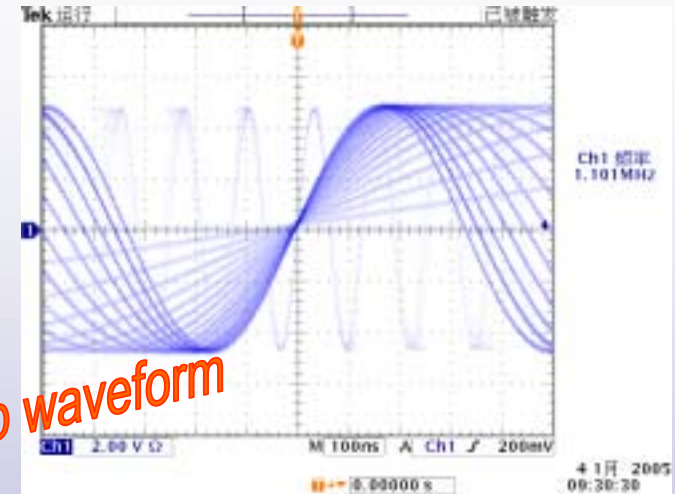


Negative Pulse 82%



# KEY FEATURE

## 6. Sweep Function



Sweep Type

Start Freq

Stop Freq

Step Setting

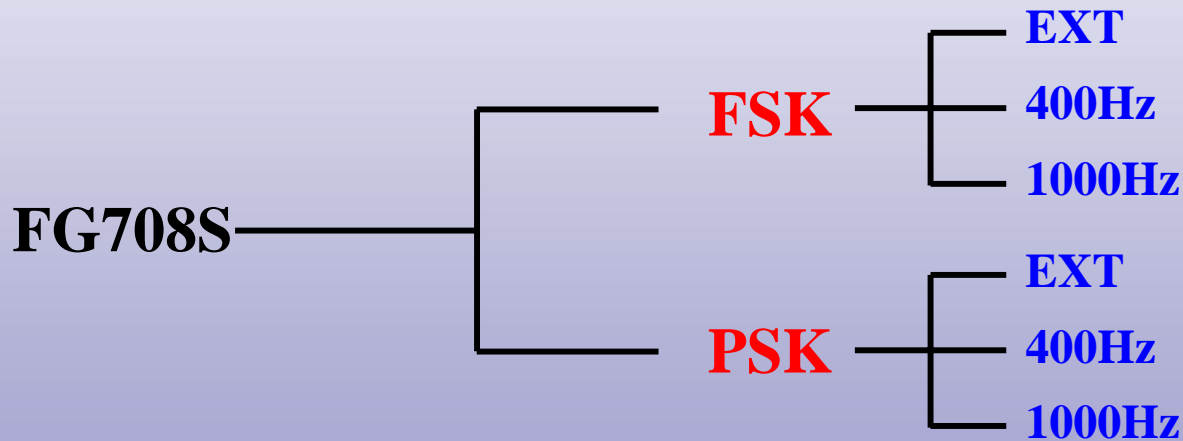
UP

DOWN

UP-DOWN

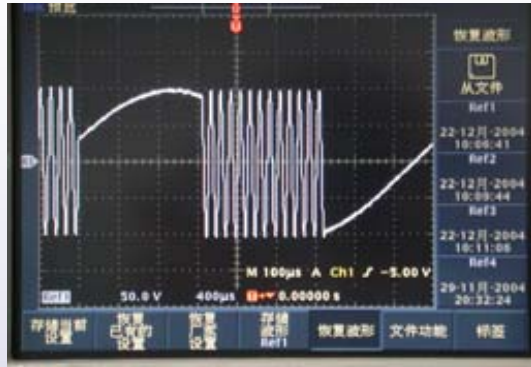
# KEY FEATURE

## 7. Modulation Characteristics

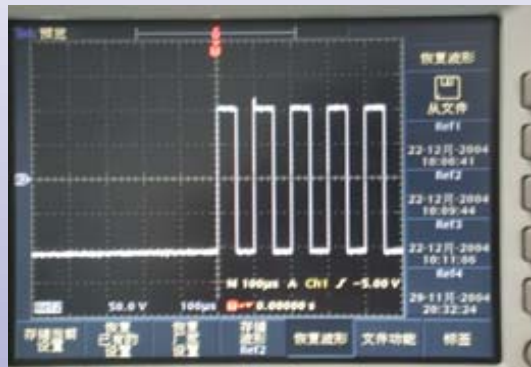


# FSK Modulation

Sine  
→



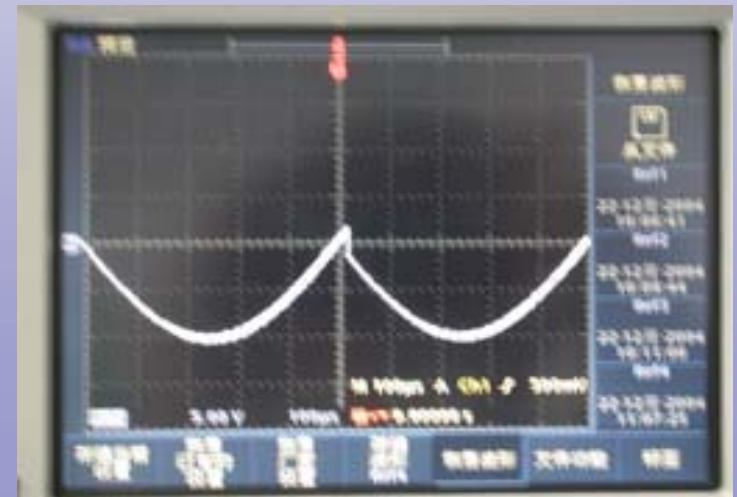
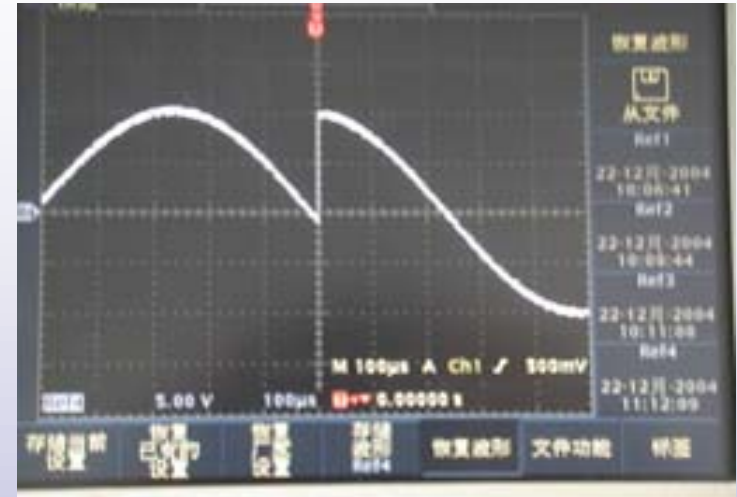
Square  
→



Triangle  
→

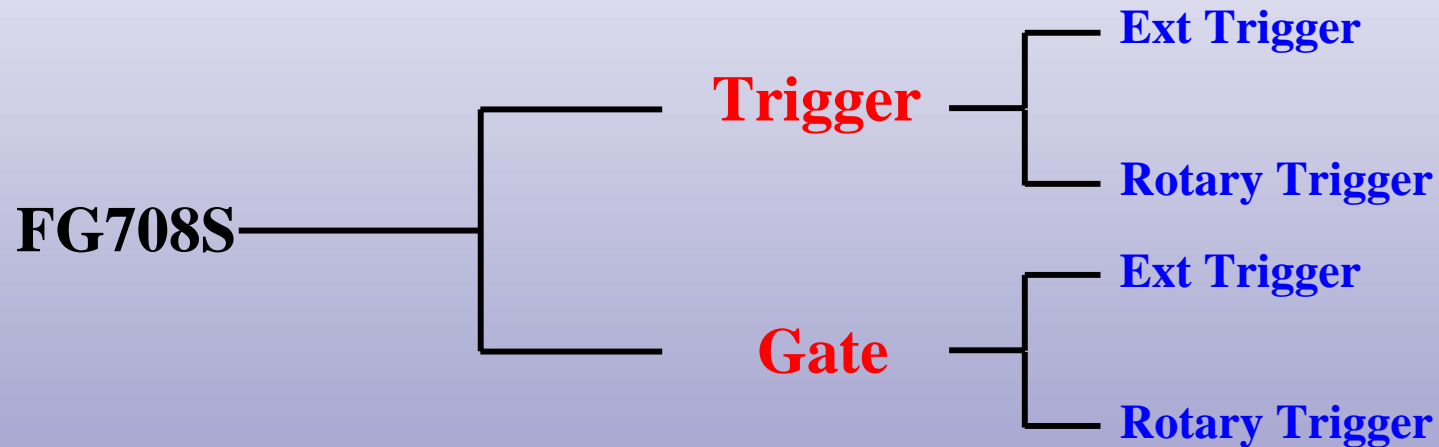


# PSK Modulation



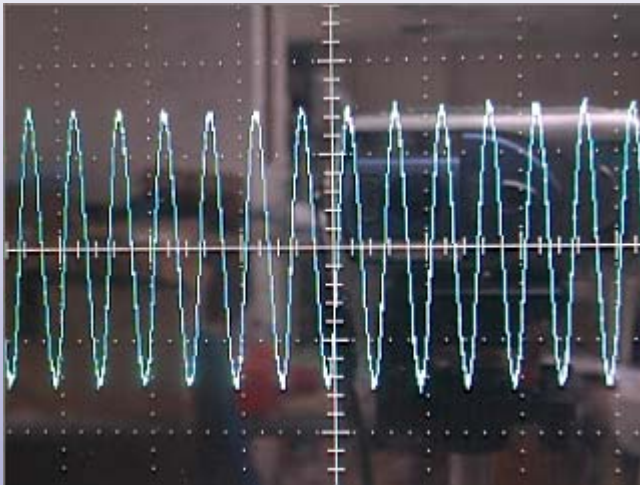
# KEY FEATURE

## 8. Trigger/Gate Characteristics



# Rotary Gate & Rotary Trigger

Rotary Gate



Rotary Trigger

