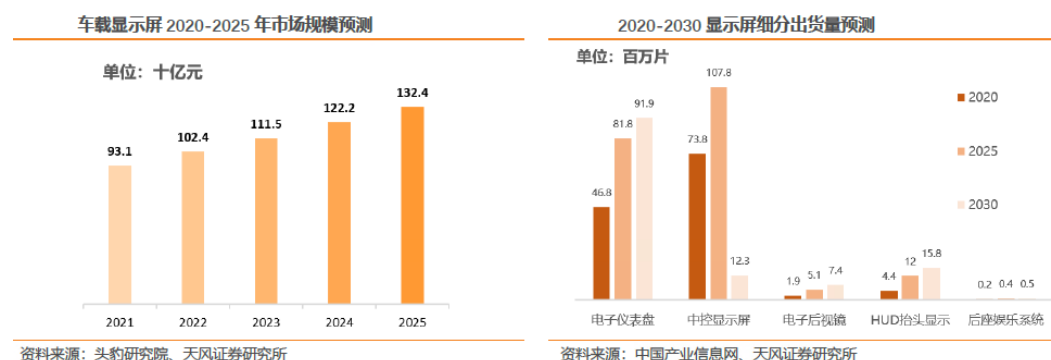


A variety of YXC vehicle display crystal oscillator solutions

With the continuous evolution and development of vehicle electrification and intelligence, and the growing demand of consumers for automobile comfort and safety, the design concept of automobile cockpit has undergone fundamental changes, and intelligent cockpit solutions are becoming an increasingly important part of the intelligent vehicle industry chain, dual-screen interaction, intelligent voice, Internet of Vehicles, and OTA have become the basic configuration of mainstream intelligent cockpits in the current market.

Intelligent cockpit drives the market demand for automotive displays

According to IHS data, the average number of screens installed in a single car in 2019 was 1.75, and it is expected that the number of cars equipped with 3 screens or more will reach by 2030 About 20%. New technology features continue to emerge in automotive displays, which also put forward higher requirements for crystal oscillators for their applications.



Common frequency points of vehicle screens: 8MHZ, 12MHZ, 16MHZ, 24MHZ, 25MHZ, 26MHZ, 27MH Z, 33.3MHZ, 32.768KHZ, the following by the domestic original YXC crystal oscillator to introduce the characteristics and selection recommendation of

crystal oscillator in vehicle display applications.

车载显示屏分类 (按装载位置划分)



资料来源: 太平洋汽车网、天风证券研究所

Since the on-board display can feedback road surface information in multiple dimensions and timely remind the driver of dangerous road conditions, the number of on-board display equipment continues to increase. **However, as screens continue to get larger, they also bring new challenges of signal attenuation and noise increase, and it is recommended to use differential crystals to output differential signals using two signals that are completely opposite to each other, thereby eliminating common-mode noise and producing a higher performance system.**

Recommended series of differential crystal oscillators:

YSO230LR, YSO210PR differential crystal oscillator, compatible with multiple voltages 2.5-3.3V, temperature up to -40~+85°, output mode LVDS/LVPECL.

PROGRAMMABLE CRYSTAL OSCILLATOR YSO210PR



Applications

→ 10.66 Ethernet
→ CAN, CAN-A, CAN
→ Baseband

Features

→ Frequency: 100kHz-100MHz
→ Output: LVCMOS or LVDS
→ Package Size: 5.2x3.5, 5.2x3.2, 7.0x5.0mm
→ Quartz Crystal Programmable On-Timer

Specifications

Item Type	LVCMOS	LVDS	Remarks
Output Frequency Range	100kHz-100MHz	100kHz-100MHz	
Supply Voltage	1.8V-3.3V	1.8V-3.3V	
Operating Temperature Range	-40°C~+85°C	-40°C~+85°C	
Storage Temperature Range	-55°C~+125°C	-55°C~+125°C	
Initial Accuracy	±50ppm	±50ppm	
Load Regulation	±10ppm	±10ppm	
Output Current	10mA	10mA	
Output Voltage (LVCMOS)	1.8V-3.3V	1.8V-3.3V	
Output Voltage (LVDS)	1.8V-3.3V	1.8V-3.3V	
Output Load Condition	10pF-100pF	10pF-100pF	
Output Voltage	1.8V-3.3V	1.8V-3.3V	
Output Symmetry	45-55%	45-55%	
Rise Time/Fall Time	10ns	10ns	
Start-up Time	10ms	10ms	
Supply	1.8V-3.3V	1.8V-3.3V	
Phase Noise (20kHz-20MHz)	-120dBc	-120dBc	

Pin Dimension

Pin	#1	#2	#3	#4	#5	#6
Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7

Notes: 1. The package is a standard package for the YXC product. The package is a standard package for the YXC product. The package is a standard package for the YXC product.

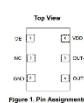


Figure 1. Pin Assignments

www.yxc.com

YSO210PR

Differential Oscillator YSO230LR

Applications

→ 10.66 Ethernet
→ CAN, CAN-A, CAN
→ Baseband

Features

→ Frequency: 100kHz-100MHz
→ Output: LVCMOS or LVDS
→ Package Size: 5.2x3.5, 5.2x3.2, 7.0x5.0mm
→ Quartz Crystal Programmable On-Timer

Specifications

Item Type	LVCMOS	LVDS	Remarks
Output Frequency Range	100kHz-100MHz	100kHz-100MHz	
Supply Voltage	1.8V-3.3V	1.8V-3.3V	
Operating Temperature Range	-40°C~+85°C	-40°C~+85°C	
Storage Temperature Range	-55°C~+125°C	-55°C~+125°C	
Initial Accuracy	±50ppm	±50ppm	
Load Regulation	±10ppm	±10ppm	
Output Current	10mA	10mA	
Output Voltage (LVCMOS)	1.8V-3.3V	1.8V-3.3V	
Output Voltage (LVDS)	1.8V-3.3V	1.8V-3.3V	
Output Load Condition	10pF-100pF	10pF-100pF	
Output Voltage	1.8V-3.3V	1.8V-3.3V	
Output Symmetry	45-55%	45-55%	
Rise Time/Fall Time	10ns	10ns	
Start-up Time	10ms	10ms	
Supply	1.8V-3.3V	1.8V-3.3V	
Phase Noise (20kHz-20MHz)	-120dBc	-120dBc	

Pin Dimension

Pin	#1	#2	#3	#4	#5	#6
Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7

Notes: 1. The package is a standard package for the YXC product. The package is a standard package for the YXC product. The package is a standard package for the YXC product.

Figure 1. Pin Assignments

www.yxc.com

YSO230LR

Trend 2:

High definition, high refresh rate, high stability

At present, the vehicle display screen is upgraded and integrated with functions such as film and television, games, entertainment, interpersonal interaction, etc., which puts forward higher requirements for the service life, working stability and resolution, contrast, field of view, optical indicators and response speed of the central control screen, so the **crystal oscillator selection needs to**

have the characteristics of high precision, high stability, and earthquake resistance.

In addition, because the car is often placed in a high temperature environment or placed in an outdoor environment, the vehicle display screen needs to have sufficient heat resistance and cold resistance, and the **crystal oscillator selection needs to choose the working temperature of -40~+85° or -40~+125° to ensure long-term normal operation stability.**

Recommended series of active crystal oscillators:

(1) YSO110TR/YSO150HT (high temperature), frequency stability $\pm 10\text{ppm}$, frequency range 1-54MHZ, can accommodate multiple voltages 1.8-3.3V, working temperature -40~ +85° or -40~+125°;

CRYSTAL OSCILLATOR
YSO110TR Wide Voltage

Applications
Consumer Electronics
Industrial Control
IoT

Features
Frequency range 1MHz-54MHz
Supply Voltage: 1.8V-3.3V
Frequency stability: $\pm 10\text{ppm}$ or specify
Output type: CMOS
Frequency tolerance: $\pm 10\text{ppm}$ or specify
Output load: 15pF
Operating temperature range: -40~+85, -40~+125, or specify
Storage temperature range: -55~+125
Frequency stability characteristics: $\pm 20\text{ppm}$, $\pm 30\text{ppm}$, $\pm 50\text{ppm}$, or specify
Voltage out (Max.) / Vcc (Min.): VOLT = 90%VDDOL = 10V/5V
Duty Cycle: 45-55%
Start-up Time: 5ms Max.
Rise Time/Full Time: 4ns Max.
Supply Current: See Below
Maximum output power: $\pm 2\text{ppm}$ / year Max

Specifications

Parameter	Value
Frequency Range	1MHz to 54MHz or specify
Supply Voltage	1.8V-3.3V
Output Type	CMOS
Frequency Tolerance (10%)	$\pm 10\text{ppm}$, $\pm 20\text{ppm}$, or specify
Output Load	15pF
Operating Temperature Range	-40~+85, -40~+125, or specify
Storage Temperature Range	-55~+125
Frequency Stability Characteristics	$\pm 20\text{ppm}$, $\pm 30\text{ppm}$, $\pm 50\text{ppm}$, or specify
Voltage out (Max.) / Vcc (Min.)	VOLT = 90%VDDOL = 10V/5V
Duty Cycle	45-55%
Start-up Time	5ms Max.
Rise Time/Full Time	4ns Max.
Supply Current	See Below
Maximum output power	$\pm 2\text{ppm}$ / year Max

Current Consumption

Supply Voltage (V)	Power Consumption (mW)
1.8V	4mW max
2.5V	4mW max
3.3V	4mW max

Pin Dimension

Pin	Symbol	Function
1	VCC	Power Supply
2	OUT	Output
3	GND	Ground

Pin Assignments

1: VCC, 2: OUT, 3: GND

www.yxc.cn

CRYSTAL OSCILLATOR
YSO150HT High Temperature

Applications
Consumer Electronics
Industrial Control
IoT

Features
Frequency range 1MHz-54MHz
Supply Voltage: 1.8V-3.3V
Frequency stability: $\pm 10\text{ppm}$ or specify
Output type: CMOS
Frequency tolerance: $\pm 10\text{ppm}$ or specify
Output load: 15pF
Operating temperature range: -40~+85, -40~+125, or specify
Storage temperature range: -55~+125
Frequency stability characteristics: $\pm 20\text{ppm}$, $\pm 30\text{ppm}$, $\pm 50\text{ppm}$, or specify
Voltage out (Max.) / Vcc (Min.): VOLT = 90%VDDOL = 10V/5V
Duty Cycle: 45-55%
Start-up Time: 5ms Max.
Rise Time/Full Time: 4ns Max.
Supply Current: See Below
Maximum output power: $\pm 2\text{ppm}$ / year Max

Specifications

Parameter	Value
Frequency Range	1MHz to 54MHz or specify
Supply Voltage	1.8V-3.3V
Output Type	CMOS
Frequency Tolerance (10%)	$\pm 10\text{ppm}$, $\pm 20\text{ppm}$, or specify
Output Load	15pF
Operating Temperature Range	-40~+85, -40~+125, or specify
Storage Temperature Range	-55~+125
Frequency Stability Characteristics	$\pm 20\text{ppm}$, $\pm 30\text{ppm}$, $\pm 50\text{ppm}$, or specify
Voltage out (Max.) / Vcc (Min.)	VOLT = 90%VDDOL = 10V/5V
Duty Cycle	45-55%
Start-up Time	5ms Max.
Rise Time/Full Time	4ns Max.
Supply Current	See Below
Maximum output power	$\pm 2\text{ppm}$ / year Max

Current Consumption

Supply Voltage (V)	Power Consumption (mW)
1.8V	4mW max
2.5V	4mW max
3.3V	4mW max

Dimensions and Patterns (Unit:mm)

Package Size: 1612-7050

Recommended Signal Pattern (Unit:mm)

www.yxc.cn

(2) YSO140TC, automotive-grade oscillator, frequency range 1-54MHZ, a variety of package sizes 1612-7050, compatible with multiple voltages 1.8-3.3V, temperature up to -40~ +125°, AEC-Q200, IATF16494 certified.

CRYSTAL OSCILLATOR
AEC-Q200
YSO140TC



Applications

Automotive electronics

Features

Frequency range: 1MHz~4MHz
AEC Q200

Package Size: 1.6*1.2, 2.2*1.9, 2.5*2.0, 3.2*2.5, 5.0*3.2, 7.3*5.0mm



Specifications

Frequency Range	1MHz to 54MHz or specify
Supply Voltage	1.8~3.3V
Output Load	<20Ω
Frequency Tolerance	±50ppm, ±100ppm or specify
Output Load	15pF
Operating Temperature Range	-40~+125°C, or specify
Storage Temperature Range	-55~+125°C
Voltage VDD (Max.) (VDD (Min.))	VDD = 80%VDDTCL = 10%/VDD
Start-up Time	40~100ms
Power-on Reset Time	1ms Max.
Supply Current	See below
Frequency Aging (at 25°C)	±2 ppm/year Max.

Current Consumption

Supply Voltage (V)	Power Dissipation (mW) (R=13V, 1.5kΩ load)	Frequency (MHz)
1.8V	4mW max	1.000~40.000MHz
2.5V	4.5mW max	41.000~54.000MHz
3.3V	5mW max	10MHz/12MHz/15MHz/20MHz/25MHz/30MHz/36MHz/40MHz

Pin Dimension

Pin	#1	#2	#3	#4
FUNCTION	VDD	GND	OUT	VDD

Pin Assignments



www.yxc.de

Rev. 1.2, 2014.12

Recommended series of passive crystal oscillators:

YSX321SC, automotive grade resonator, frequency range 8-66MHz, 3225 package, conventional complex load (PF) 12-20PF, temperature up to -40~ +125°, AEC-Q200, IATF16949 certified.

CRYSTAL UNIT
AEC-Q200
YSX321SC



Applications

Automotive electronics

Features

Dimensions: 3.20 x 2.50 x 0.70 mm

Low impedance performance

AEC Q200 qualified



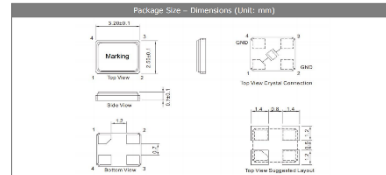
Specifications

Standard Frequency	8~66 MHz
Vibration Mode	AT Fundamental
Load Capacitance	8pF, 12pF or specify
Frequency Tolerance (at 25 °C)	±10ppm, ±30ppm or specify
Frequency Versus Temperature Characteristics	±50ppm or specify
Operating Temperature	-40~+125 °C, or specify
Storage Temperature	-55~+125 °C, or specify
Shunt Capacitance	3 pF Max.
Level of Drive	1~200µW Max. (100µW typical)
Aging (at 25 °C)	±2ppm/year Max.

Equivalent Series Resistance(ESR)

Fundamental			
8 ~ 9 MHz	600 Ω Max.	13 ~ 15 MHz	80 Ω Max.
10 ~ 10.9 MHz	250 Ω Max.	16 ~ 20.9 MHz	70 Ω Max.
11 ~ 11.9 MHz	150 Ω Max.	21 ~ 25.9 MHz	60 Ω Max.
12 ~ 12.9 MHz	100 Ω Max.	30 ~ 66.0 MHz	50 Ω Max.

Dimensions and Patterns [unit:mm]



www.yxc.de

Rev. 1.2, 2014.12