



Features

- Spread Spectrum IC (Programmable)
- Operating frequency range: 20MHz~27MHz
- 0.25~160MHz Output Frequency range
- Operating voltages: 1.62 V to 3.63V
- Operating temperature: -40°C to +125°C
- Configurable spread spectrum settings:
 - 7 kinds of spread:
 $\pm 0.25\%$, $\pm 0.5\%$, -0.25% , -0.5% , -1% , -1.5% , -2.0%
- OE disable function
- 3 kinds of Rise time/Fall time:
Default mode, Fast mode and Slow mode
- Modulation Frequency: $F_{IN}/804$
- Spread Profile: Triangle
- Used for Fundamental Crystal Oscillator
- Used for TDFN-8L package
- AEC-Q100 qualified, PPAP capable, and manufactured in IATF 16949 certified facilities.
- Grade 1 temperature range (-40°C ~ +125 °C)

Benefits

- Reduction in EMI
- System cost saving
- Reduced system complexity
- Faster time to market

Description

The RS1XO6501QZAE is a versatile 1x Active EMI management IC designed to provide system wide reduction of Electromagnetic Interference (EMI) and Radio Frequency Interference (RFI) from clock and data sources.

RS1XO6501QZAE allows significant system cost savings by reducing the number of circuit board layers, ferrite beads, shielding and other passive components that are traditionally required to pass EMI regulations.

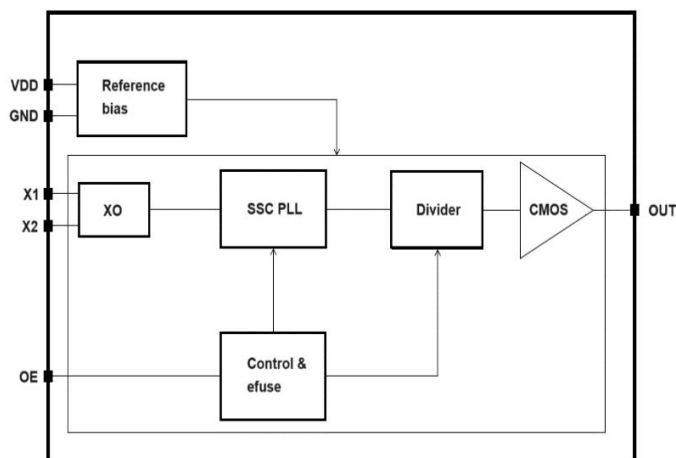
This series offer the easy programmability of frequencies and other parameters, they also have a wider operating temperature range, from -40°C to +125°C. In addition to a 2×2.0 mm package that will enable electronics manufacturers to save board space. Users will be able to program the products to the required output frequency, as well as to the required spread spectrum settings.

This will also significantly contribute to performance, lower power requirements, fast development cycles, and low-volume production.

Applications

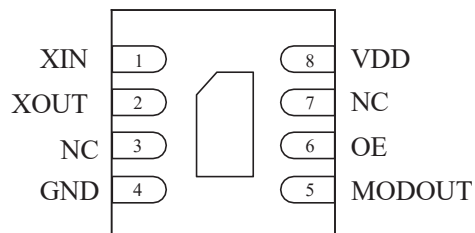
- IP Camera
- Printers/MFPs
- Media players
- DTV/Set-top Box
- Embedded digital video devices
- LCD Panel Modules
- Automotive components
- Networking devices
- Surveillance

Block Diagram





Outline Drawing and Terminal Assignment



Pin#	Pin Name	Type	Description
1	XIN	I	Crystal Oscillator Input.
2	XOUT	O	Crystal Oscillator Output.
3	NC		No Connection
4	GND	P	System ground reference input.
5	MODOUT	O	phase modulated buffered output.
6	OE	O	Clock output if Pull-Up. Hi-Z Output if Pull-Down. Internal Pull-Up Resistor
7	NC		No Connection
8	NC	P	System Power Supply pin.



Order Information

RS1XO6501QZAE - 25.000000 MHz - C - 20 - P - H - A

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③

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①: Model ②: Output Frequency ③: Spread type ④: Spread width

⑤: Function ⑥: Operating temperature ⑦: Rise time/Fall time

③: Spread type

C	Center Spread
D	Down Spread

⑤: Function

P	Output enable(1#pin=OE)
S	Standby(1#pin=ST)

④: Spread width

	Center Spread	Down Spread
02	±0.25%	-0.25%
05	±0.5%	-0.5%
10	-	-1.0%
15	-	-1.5%
20	-	-2.0%

⑥: Operating temperature

G	-40℃ to +85℃
H	-40℃ to +105℃
A	-40℃ to +125℃

⑦: Rise time/Fall time

A	Default
B	Fast
C	Slow



Maximum Rating

Supply Voltage to Ground Potential.....	4V
OE pin	$V_{DD}+0.3V$
Storage Temperature.....	-40°C to +125°C

Note:

Stresses greater than those listed under MAXIMUM RATINGS may cause permanent damage to the device. This is a stress rating only and functional operation of the device at these or any other conditions above those indicated in the operational sections of this specification is not implied. Exposure to absolute maximum rating conditions for extended periods may affect reliability.

Recommended Operating Conditions

(GND=0V, unless otherwise noted.)

Sym.	Parameter	Conditions	Min	Typ	Max	Unit
V_{DD}	Supply voltage	-	1.62	-	3.63	V
V_{IN}	Input voltage	OE terminal	0	-	$V_{DD}+0.9$	V
T_A	Operating temperature	-	-40	25	+85	°C
			-40	25	+125	°C
L_{CMOS}	CMOS load condition	-	-	-	15	pf

Note:

* 0.1μF or over bypass capacitor should be connected between VCC and GND pins located close to the device

Frequency Characteristics

Sym.	Parameter	Conditions	Min	Typ	Max	Unit
F_O	Output frequency	OE terminal	0.25	-	160	MHz
F_{in}	Input Frequency	-	20	25	27	MHz

Note:

*1: Frequency tolerance includes initial frequency tolerance, frequency / temperature characteristics, frequency / voltage coefficient, frequency / load coefficient and frequency aging (+25 °C, first year)



DC Characteristics

V_{DD} = 1.62V to 3.63V, Ambient Temperature -40 to +125°C

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
I_{DD}	Current consumption	$V_{DD}=1.8V$ No load	2MHz	5.02		mA
			10MHz	-	5.8	mA
			25MHz	-	6.2	mA
			50MHz	-	6.6	mA
			100MHz	-	7.4	mA
			160MHz	-	8.1	mA
		$V_{DD}=2.5V$ No load	2MHz	5.03		mA
			10MHz	-	6.4	mA
			25MHz	-	6.91	mA
			50MHz	-	7.4	mA
			100MHz	-	8.3	mA
			160MHz	-	9.3	mA
		$V_{DD}=3.3V$ No load	2MHz	5.04		mA
			10MHz		6.6	mA
			25MHz		7.2	mA
			50MHz		7.8	mA
			100MHz		9.1	mA
			160MHz		10.4	mA
I_{DIS}	Disable current	$V_{DD}=1.8V$		5.9		mA
		$V_{DD}=2.5V$		6.6		mA
		$V_{DD}=3.3V$		6.7		mA
I_{STD}	Standby current	$V_{DD}=1.8V$	-	1.0	-	mA
		$V_{DD}=2.5V$	-	1.0	-	mA
		$V_{DD}=3.3V$	-	1.0	-	mA
V_{OH}	Output high voltage	$V_{DD}=1.8V, I_{OH} = -2.5mA$	0.9 V_{DD}	-	-	V
		$V_{DD}=2.5V, I_{OH} = -4.0mA$				
		$V_{DD}=3.3V, I_{OH} = -5.0mA$				
V_{OL}	Output low voltage	$V_{DD}=1.8V, I_{OL} = 2.5mA$	-	-	0.15 V_{DD}	V
		$V_{DD}=2.5V, I_{OL} = 4.0mA$				
		$V_{DD}=3.3V, I_{OL} = 5.0mA$				
V_{IH}	HIGH level input voltage	OE terminal	0.8 V_{DD}	-		V
V_{IL}	LOW level input voltage	OE terminal	-	-	0.2 V_{DD}	V
C_{IN}	Input pull-up resistance	OE terminal	-	2.5	5	pf
R_{UP1}	Input pull-up resistance	OE= 80 % V_{DD}	20	-	150	k Ω
R_{UP2}		OE= 20 % V_{DD}	5	-	60	M Ω
R_{DN}	Output pull-down	OE= GND, OUT = V_{DD}	0.5		5	M Ω



AC Characteristics

V_{DD}= 1.62V to 3.63V, Ambient Temperature -40 to +125°C

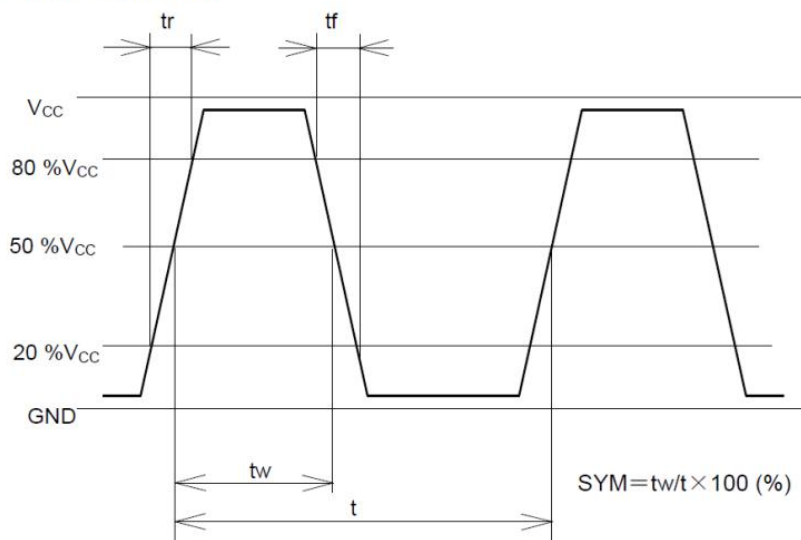
Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
T _{STR}	Start-up time	V _{DD} >1.62V	-	-	5	ms
Duty cycle	Output duty cycle	Load=15pf, 50%V _{DD}	45	50	55	%
Tr/Tf	Rise time/Fall time (20%V _{DD} ~80%V _{DD})	fo ≤ 20 MHz (Slow mode)			10	ns
		fo ≤ 40 MHz (Default)			6	ns
		fo > 40 MHz (Default)			3	ns
		Fast mode			3	ns
Tstp_OE	Output disable time (OE)	OE terminal HIGH → LOW			1	μs
Tstp_ST	Output disable time (ST)	ST terminal HIGH → LOW			1	μs
Tsta_OE	Output enable time (OE)	OE terminal LOW → HIGH			1	μs
Tsta_ST	Output enable time (ST)	ST terminal LOW → HIGH			3	ms
t _{c-c}	Cycle to Cycle jitter (Clock cycle > 50 000)	V _{DD} =1.8V load=15pf	10MHz		312.1	ps
			20MHz		225.3	ps
			50MHz		91.7	ps
			100MHz		70.4	ps
			160MHz		65.6	ps
		V _{DD} =2.5V load=15pf	10MHz		292.9	ps
			20MHz		136.6	ps
			50MHz		48.7	ps
			100MHz		37.6	ps
			160MHz		40	ps
		V _{DD} =3.3V load=15pf	10MHz		290.1	ps
			20MHz		128.8	ps
			50MHz		44.6	ps
			100MHz		31.3	ps
			160MHz		29.5	ps
fmod	Modulation frequency			Fin/804		KHz

Note: Typical condition is on room temperature at 25°



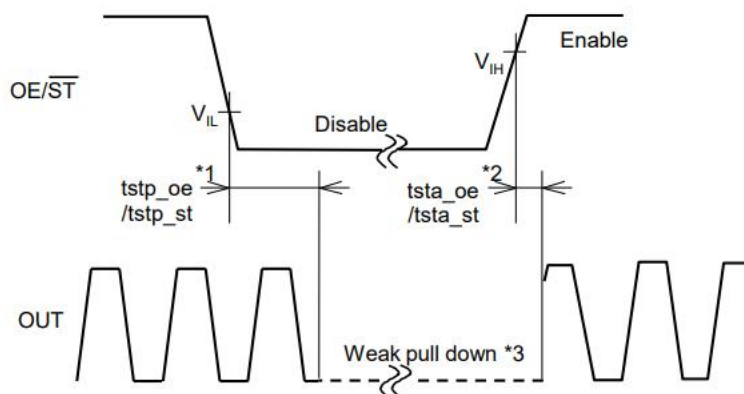
Timing Chart

(1) Output Waveform and Level



(2) OE/ $\overline{ST}$ Function and Timing

OE/ $\overline{ST}$ terminal	Osc. circuit	Output status
"H"	Oscillation	Specified frequency: Enable
"L"	OE: Oscillation	Low (Weak pull down ^{*3}): Disable
	$\overline{ST}$: Oscillation stop	



*1 The period from OE/ $\overline{ST}$ = V_{IL} to OUT = Low (weak pull down) (Disable)

*2 The period from OE/ $\overline{ST}$ = V_{IH} to OUT = Enable

*3 Pulled down with Output pull down resistance (R_{DN})

* Judging the start of output when output waveform is observed.

* OE/ $\overline{ST}$ terminal voltage level should not exceed supply voltage when using OE/ $\overline{ST}$ function.
Please note that OE/ $\overline{ST}$ rise time should not exceed supply voltage rise time at the start-up.

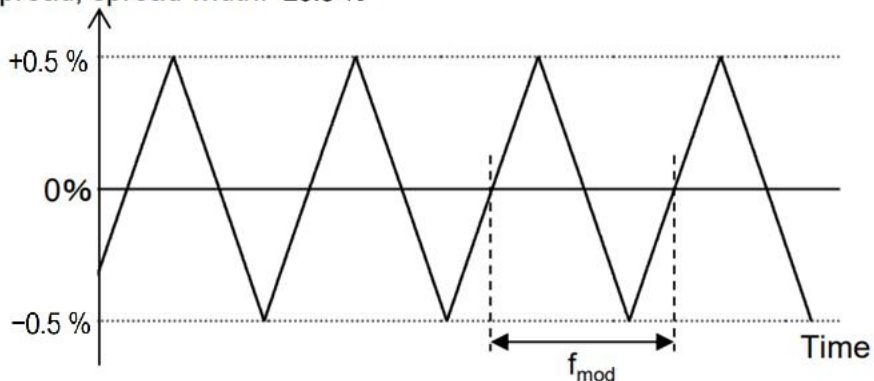
* Please do not use the OE/ $\overline{ST}$ terminal in the open state.

Typically the output will be enable when OE/ $\overline{ST}$ is open state, but the input pull resistance is large and OE/ $\overline{ST}$ terminal may drop to "L" level and be disable due to noise or leakage current.

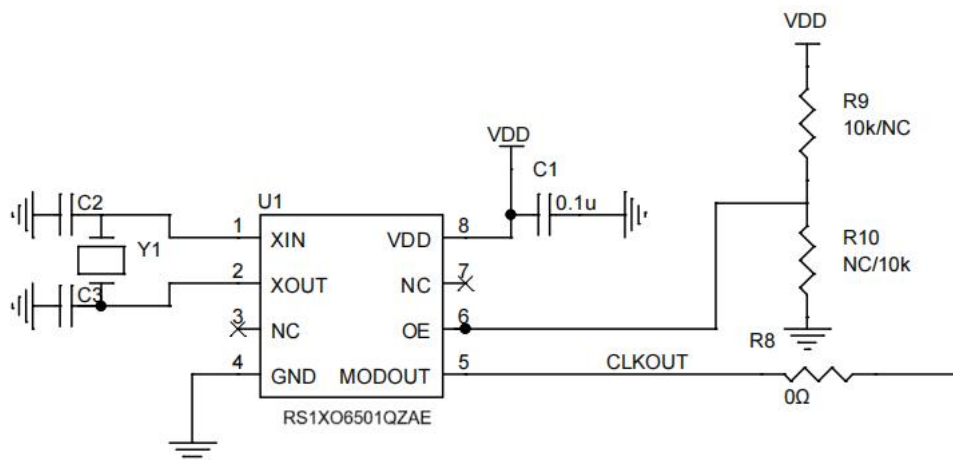


3) Triangle

Center spread, spread width: $\pm 0.5\%$

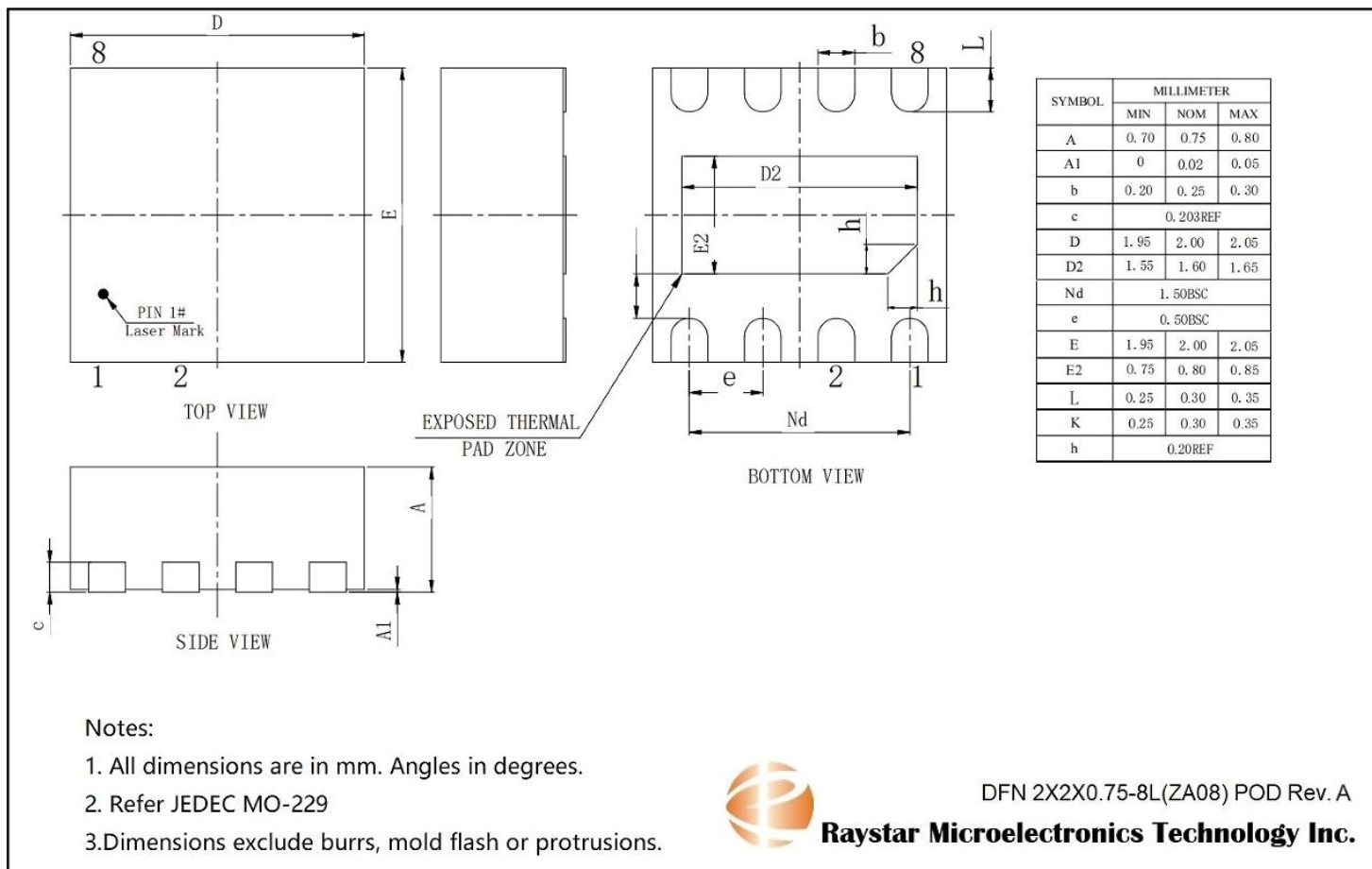


Application Circuit





Package Dimension



Revision History

Revision	Description	Date
1.0	Official release	2024/10/30
1.1	Update POD and Pin name	2025/1/22
1.2	Update application circuitry, Update I _{STD} , Update Order Information	2025/4/14