



## Features

- 10 to 50MHz input frequency ranges
- Operating voltages of 1.62 V to 3.63V
- Spreading Ratio:
- *AC*: -2.0%
- *AE*: -1.5%
- *AF*: -1.0%
- *BF*: -0.8%
- Modulation Rate:  $F_{in} / 764$
- Low power consumption and dissipation
- AEC-Q 100 qualified. PPAP capable, and manufactured in IATF 16949 certified facilities.

## Benefits

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

## Description

The XO6201-xx-V is one Low Power Spread Spectrum Frequency Multiplier part of RSM SSC family. The output frequency is same as crystal, and is designed to reduce electromagnetic interference (EMI) by spreading the clock. The Spreading Mode/Ratio is programmed in fab by ROM codes. The XO6201-xx-V provides spread, refer to different option.

## Applications

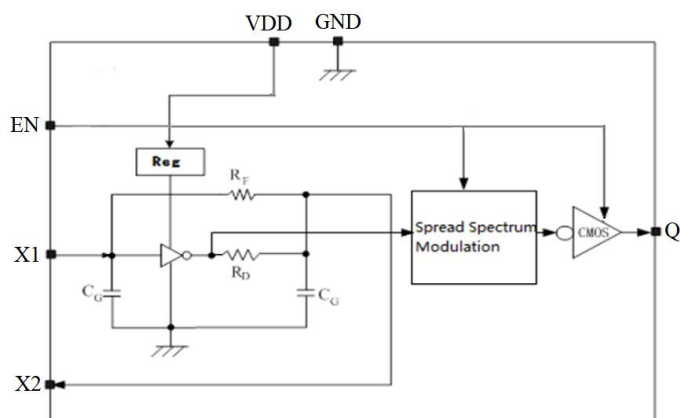
- Fundamental Crystal Oscillator
- 7050, 5032, 3225, 2520, 2016

## Order Information

| Part no.        | Package type |
|-----------------|--------------|
| XO6201-xx-3DE-V | Die form     |
| XO6201-xx-3WF-V | Wafer form   |
| XO6201-xx-4DE-V | Die form     |
| XO6201-xx-4WF-V | Wafer form   |

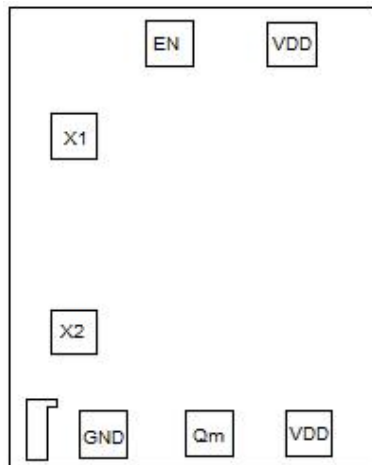
Note: -xx: -AC: -2.0%  
-AE: -1.5%  
-AF: -1.0%  
-BF: -0.8%

## Block Diagram





## Pad Configuration



| Pad Coordinate File                                                              |              |              |          |              |              |
|----------------------------------------------------------------------------------|--------------|--------------|----------|--------------|--------------|
| Pad Name                                                                         | X Coordinate | Y Coordinate | Pad Name | X Coordinate | Y Coordinate |
| X1                                                                               | -179.47      | -203.87      | Qm       | 337.015      | 28.24        |
| EN                                                                               | -337.00      | -40.37       | GND      | 337.015      | -152.925     |
| VDD                                                                              | -337.00      | 169.575      | X2       | 160.53       | -203.87      |
| VDD                                                                              | 337.015      | 198.86       |          |              |              |
| <b>Note:</b> Substrate is connected to GND or floating.                          |              |              |          |              |              |
| <b>Die Size:</b> 800μm*630μm (Not including scribe line, Scribe Line Width 60um) |              |              |          |              |              |
| <b>Die Thickness:</b> 130μm±15μm (-3) ,100um±15um (-4)                           |              |              |          |              |              |
| <b>Pad Size:</b> 80μm*80μm                                                       |              |              |          |              |              |
| <b>Substrate Level:</b> GND or Floating                                          |              |              |          |              |              |

## Pad Description

| Pin Name        | I/O Type | Description                                                                                                                                                                |
|-----------------|----------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| OE              | I        | Output Enable/Disable or Spreading Enable/Disable control by 3 states;<br>Low: Qm output Hiz;<br>High: Qm output with spreading<br>>VDD + 1V: Qm output without spreading. |
| X1              | I        | Crystal input pad.                                                                                                                                                         |
| X2              | O        | Crystal output pad.                                                                                                                                                        |
| GND             | GND      | Ground.                                                                                                                                                                    |
| Qm              | O        | Spread spectrum clock output (OE=V <sub>DD</sub> ).                                                                                                                        |
| V <sub>DD</sub> | Power    | Power supply.                                                                                                                                                              |



## Maximum Rating

|                                         |                       |
|-----------------------------------------|-----------------------|
| Supply Voltage to Ground Potential..... | 4V                    |
| OE pin .....                            | V <sub>DD</sub> +2V   |
| Other Inputs and Output.....            | V <sub>DD</sub> +0.5V |
| Storage Temperature.....                | -65°C to +150°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 <sub>DD</sub> | Supply voltage          | -          | 1.62 | -   | 3.63 | V    |
| T <sub>A</sub>  | Operating temperature   | -          | -40  |     | +125 | °C   |
| f <sub>0</sub>  | Oscillation frequency*1 | -          | 10   | 25  | 50   | MHz  |

## DC Characteristics

V<sub>DD</sub>= 1.62V to 3.63V, Ambient Temperature -40 to +125°C

| Symbol           | Parameter                | Conditions                                                | Min.                 | Typ. | Max.               | Unit |
|------------------|--------------------------|-----------------------------------------------------------|----------------------|------|--------------------|------|
| V <sub>DD</sub>  | Operating voltage        | —                                                         | 1.62                 | —    | 3.63               | V    |
| V <sub>OH</sub>  | Output high voltage      | V <sub>DD</sub> =1.8V, I <sub>OH</sub> = -1mA             | V <sub>DD</sub> -0.4 |      |                    | V    |
|                  |                          | V <sub>DD</sub> =2.5V, I <sub>OH</sub> = -1mA             | V <sub>DD</sub> -0.4 | —    | —                  | V    |
|                  |                          | V <sub>DD</sub> =3.3V, I <sub>OH</sub> = -1mA             | V <sub>DD</sub> -0.4 | —    | —                  | V    |
| V <sub>OL</sub>  | Output low voltage       | V <sub>DD</sub> =1.8V, I <sub>OL</sub> = 1mA              |                      |      | 0.4                | V    |
|                  |                          | V <sub>DD</sub> =2.5V, I <sub>OL</sub> = 1mA              | —                    | —    | 0.4                | V    |
|                  |                          | V <sub>DD</sub> =3.3V, I <sub>OL</sub> = 1mA              | —                    | —    | 0.4                | V    |
| V <sub>IH</sub>  | HIGH-level input voltage | OE Measurement                                            | 0.7V <sub>DD</sub>   |      |                    | V    |
| V <sub>IL</sub>  | LOW-level input voltage  | OE Measurement                                            |                      |      | 0.3V <sub>DD</sub> | V    |
| I <sub>DD1</sub> | Supply current1          | V <sub>DD</sub> =1.8V, OE=V <sub>DD</sub> , 25MHz/15pf    |                      | 2    | 4                  | mA   |
|                  |                          | V <sub>DD</sub> =2.5V, OE=V <sub>DD</sub> , 25MHz/15pf    |                      | 2.5  | 5                  | mA   |
|                  |                          | V <sub>DD</sub> =3.3V, OE=V <sub>DD</sub> , 25MHz/15pf    |                      | 3.0  | 6                  | mA   |
| I <sub>DD2</sub> | Supply current2          | V <sub>DD</sub> =1.8V, OE>V <sub>DD</sub> +1V, 25MHz/15pf |                      | 1.3  | 3                  | mA   |
|                  |                          | V <sub>DD</sub> =2.5V, OE>V <sub>DD</sub> +1V, 25MHz/15pf |                      | 1.7  | 3.5                | mA   |
|                  |                          | V <sub>DD</sub> =3.3V, OE>V <sub>DD</sub> +1V, 25MHz/15pf |                      | 2.1  | 4                  | mA   |



## AC Characteristics

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

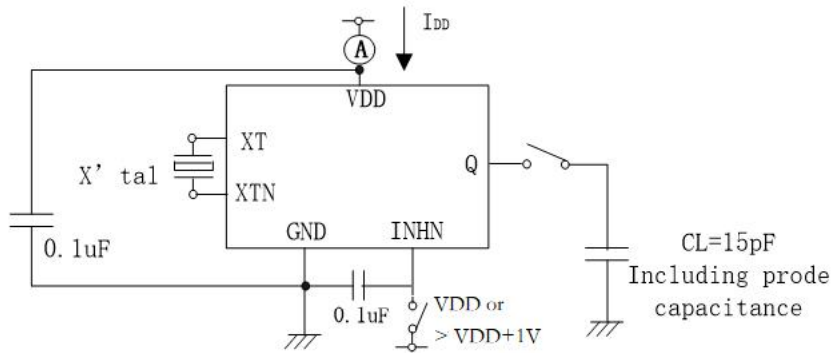
| Symbol     | Parameter                     | Conditions                                            | Min. | Typ. | Max. | Unit |
|------------|-------------------------------|-------------------------------------------------------|------|------|------|------|
| X1, X2     | Crystal input frequency range |                                                       | 10   | —    | 50   | MHz  |
| $t_{Rise}$ | Output rise time (25MHz)      | Measured from 20% to 80%<br>$V_{DD}$ =1.8V, Load=15pf |      | 2.4  | 5    | ns   |
|            |                               | Measured from 10% to 90%<br>$V_{DD}$ =2.5V, Load=15pf |      | 2.4  | 5    | ns   |
|            |                               | Measured from 10% to 90%<br>$V_{DD}$ =3.3V, Load=15pf | —    | 2    | 5    | ns   |
| $t_{Fall}$ | Output fall time (25MHz)      | Measured from 80% to 20%<br>$V_{DD}$ =1.8V, Load=15pf |      | 2.6  | 5    | ns   |
|            |                               | Measured from 90% to 10%<br>$V_{DD}$ =2.5V, Load=15pf |      | 2.4  | 5    | ns   |
|            |                               | Measured from 90% to 10%<br>$V_{DD}$ =3.3V, Load=15pf | —    | 2    | 5    | ns   |
| Duty cycle | Output duty cycle             | Load=15pf, 50% $V_{DD}$                               | 45   | 50   | 55   | %    |

**Note:** Typical condition is on room temperature at 25°



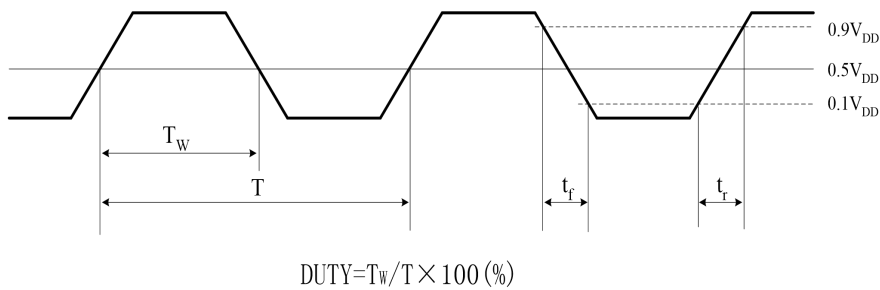
## Measurement Circuit

Measurement parameter:  $I_{DD}$ , Duty,  $t_r$ ,  $t_f$



Note: The AC characteristics are observed using an oscilloscope on pin Q

## Output switching waveform





## Revision History

| Revision | Description       | Date       |
|----------|-------------------|------------|
| V1.0     | Official released | 2025/12/16 |