

## High accuracy Crystal Oscillator 32.768kHz **327SMO(JN)**



### Features

- Excellent frequency accuracy and Temperature characteristics
- Low current consumption
- Complete Pb-free
- Incorporated highly reliable photolithographic crystal resonator

### Applications

Smart Meter, IoT, Wearable device,  
Industry device, High precision timing device,  
Event data recorder

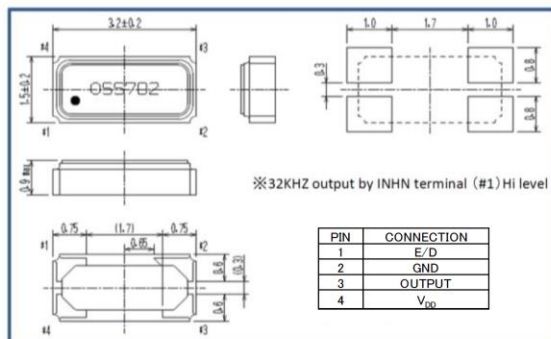
### Specifications

Item	Symbol	Specifications	Unit	Conditions Note
Nominal Frequency	f_nom	32.768	kHz	
Supply Voltage	V <sub>cc</sub>	1.3~5.5	V	(*1)
Temperature Compensated Voltage	V <sub>TEM</sub>	2.0~5.5	V	
Storage temperature	T <sub>stg</sub>	-55~+125	°C	
Operating temperature	T <sub>use</sub>	-40~+85	°C	
Frequency tolerance	f_tol	±3	×10 <sup>-6</sup>	+25°C, V <sub>cc</sub> =3.3 V
Frequency temperature coefficient	f0_Tc	±50	×10 <sup>-6</sup>	-40~+85°C (+25°C is reference)
Frequency / voltage coefficient	f0_Vcc	±1	×10 <sup>-6</sup> /V	
Current consumption	I <sub>cc</sub>	1.0 Typ.	μA	3.3V, No load condition
		2.0 Max.	μA	
Symmetry	SYM	50±10	%	Load: 15pF
Rise time / Fall time	tr/tf	50 Max.	ns	Load: 15pF output level 20~80%
Input voltage	V <sub>IL</sub>	0.2V <sub>cc</sub> Max.	V	INH terminal
	V <sub>IH</sub>	0.8V <sub>cc</sub> Min.	V	INH terminal
Output voltage	V <sub>OL</sub>	0.4 Max.	V	I <sub>oL</sub> =0.4mA, V <sub>cc</sub> =2.0V
	V <sub>OH</sub>	V <sub>cc</sub> -0.4 Min.	V	I <sub>oH</sub> =-0.4mA, V <sub>cc</sub> =2.0V
Output load condition (CMOS)	C <sub>LOUT</sub>	15 Max.	pF	CMOS Loading
Start-up time	t <sub>str</sub>	0.5 Max.	sec	+25°C
Frequency aging	f_aging	±3	×10 <sup>-6</sup>	+25°C, V <sub>cc</sub> =3.3V, First year

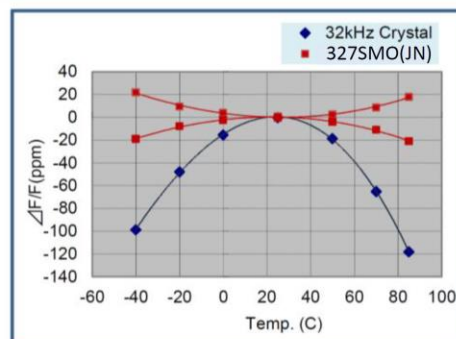
Unless otherwise stated, characteristics (specifications) shown in the above table are based on the rated operating temperature and voltage condition.

(\*1) When the supply voltage becomes 2 V or less, the frequency temperature compensation operation is inactivated.

### Dimensions



### Temperature characteristic



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### Absolute maximum rating

Item	Symbol	Condition	Rated	Unit
Power Supply & Voltage range	Vcc	Between Vcc-Vss	-0.3~+6.5	V
Input Voltage range	Vin	Input terminal (INHNN)	-0.3~Vcc+0.3	V
Output Voltage range	Vout	Output terminal(Q)	-0.3~Vcc+0.3	V

※In order to run 327SMO(JN) stability, please be mounted Ceramic-Chip Condenser by more than 0.1μF near 327SMO(JN) between Vcc-Vss.

### Power consumption

Item	Symbol	Condition	MIN	TYP	MAX	Unit
Power consumption of starting (Temperature compensation interval in 2sec)	Icc	INHNN=Vcc=3.3V, CLOUT=0pF Ta=-40°C~+85°C	—	1.0	2.0	μA
		INHNN=Vcc=5.0V, CLOUT=0pF Ta=-40°C~+85°C	—	1.5	3.0	μA
Power consumption of booting	IBOOT	INHNN=Vcc=3.3V, CLOUT=0pF Ta=-40°C~+85°C	—	1.5	2.5	μA
Power consumption of Disable	IDIS	INHNN=Vss=0V, CLOUT=0pF Ta=-40°C~+85°C	—	0.6	1.5	μA

※In order to be short for oscillation starting time (t<sub>str</sub>), It is the power consumption booting when increased the oscillation drive capability. Booting circuit works until 0.5sec(t<sub>str</sub>+0.5s) from the power supply starting to oscillation starting.

### The function for INHN terminal

Input terminal(INHN)	Output terminal(Q)	Oscillation	Notes
"H" Level	32.768kHz output	Oscillation	—
"L" Level	Hi-Z	Oscillation	—
OPEN	—	—	Unavailable

### Frequency stability and Temperature characteristics

Temperature range(°C)	Frequency Stability
0 ~ +50	±20 ppm
-10 ~ +60	±30 ppm
-20 ~ +70	±40 ppm
-40 ~ +85	±50 ppm

### The example for Circuit connection with MCU

