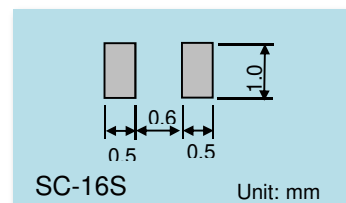
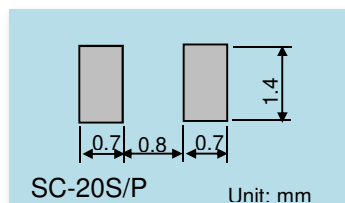
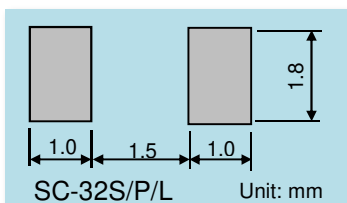
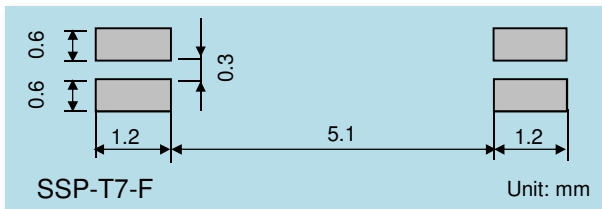


### ◆ Specification for Quartz Crystal

Size (mm)	Products		Load capacitance CL	Motional Resistance R1	Maximum Drive Level DL max.	Shunt Capacitance C0
7.0×1.5×1.4	SSP-T7-F		12.5pF 7pF	65kΩ max.	1.0μW max.	0.9pF typ.
	SSP-T7-FL		6pF			
3.2×1.5×0.85	SC-32S		12.5pF 7pF	70kΩ max.	1.0μW max.	1.0pF typ.
	SC-32P		6pF	50kΩ max.		
	<b>NEW</b> SC-32L		4pF	40kΩ max.		
2.0×1.2×0.60	SC-20S		12.5pF 7pF 6pF	70kΩ max.	1.0μW max.	1.3pF typ.
	<b>NEW</b> SC-20P		4pF	50kΩ max.		
1.6×1.0×0.5	SC-16S		9pF 7pF	90kΩ max.	0.5μW max.	1.2pF typ.

Matching data was acquired on the evaluation board with this crystal.  
Please contact us for other CL and other products.

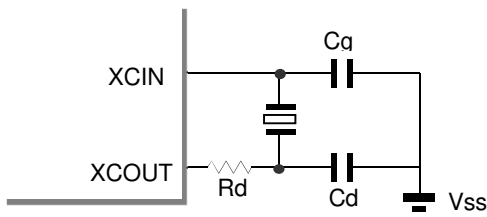
### ◆ RECOMMENDED SOLDERING PATTERN



### ◆Circuit matching constant for Oscillation circuit

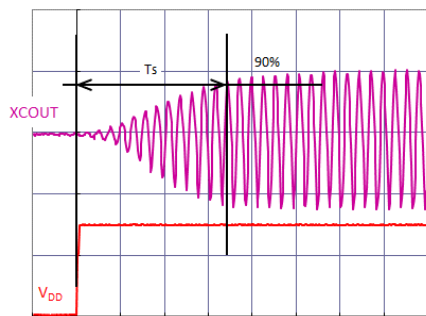
Oscillation mode	32.768kHz quartz crystals			Constants			V <sub>DD</sub> (V)	Characteristics of Oscillation			
	Size	Products	CL (pF)	R <sub>d</sub> (kΩ)	C <sub>g</sub> (pF)	C <sub>d</sub> (pF)		RL (kΩ)	M (Times)	D.L (μW)	T <sub>s</sub> (sec)
Standard CL	7.0 x 1.5	SSP-T7-F	12.5	0	22	22	1.8	-452	7.0	0.10	0.34
							3.3	-452	7.0	0.10	0.34
							5.5	-452	7.0	0.10	0.35
	3.2 x 1.5	SC-32S	12.5	0	22	22	1.8	-465	6.6	0.10	0.22
							3.3	-465	6.6	0.10	0.22
							5.5	-465	6.6	0.10	0.22
	2.0 x 1.2	SC-20S	12.5	0	22	22	1.8	-461	6.6	0.10	0.12
							3.3	-461	6.6	0.10	0.12
							5.5	-461	6.6	0.10	0.12
	1.6 x 1.0	SC-16S	9	0	15	18	1.8	-627	7.0	0.07	0.24
							3.3	-627	7.0	0.07	0.22
							5.5	-627	7.0	0.07	0.22
Low CL1	7.0 x 1.5	SSP-T7-F	7	0	10	10	1.8	-707	10.9	0.020	0.21
							3.3	-707	10.9	0.020	0.21
							5.5	-707	10.9	0.020	0.21
	3.2 x 1.5	SC-32S	7	0	10	10	1.8	-741	10.6	0.030	0.14
							3.3	-741	10.6	0.030	0.15
							5.5	-741	10.6	0.030	0.16
	2.0 x 1.2	SC-20S	7	0	10	12	1.8	-681	9.7	0.03	0.14
							3.3	-681	9.7	0.03	0.15
							5.5	-681	9.7	0.03	0.16
	1.6 x 1.0	SC-16S	7	0	10	12	1.8	-669	7.4	0.03	0.19
							3.3	-669	7.4	0.03	0.19
							5.5	-669	7.4	0.03	0.20
Low CL2	7.0 x 1.5	SSP-T7-FL	6	0	8	8	1.8	-409	6.3	0.010	0.26
							3.3	-409	6.3	0.010	0.26
							5.5	-409	6.3	0.010	0.26
	3.2 x 1.5	SC-32P	6	0	9	9	1.8	-384	7.7	0.010	0.29
							3.3	-384	7.7	0.010	0.29
							5.5	-384	7.7	0.010	0.29
	2.0 x 1.2	SC-20S	6	0	8	8	1.8	-444	6.3	0.01	0.14
							3.3	-444	6.3	0.01	0.15
							5.5	-444	6.3	0.01	0.16
Low CL3	3.2 x 1.5	NEW SC-32L	4	0	4	4	1.8	-305	7.6	0.010	0.23
							3.3	-305	7.6	0.010	0.25
							5.5	-305	7.6	0.010	0.26
Low CL3	2.0 x 1.2	NEW SC-20P	4	0	4	4	1.8	-328	6.6	0.010	0.21
							3.3	-328	6.6	0.010	0.23
							5.5	-328	6.6	0.010	0.23

◆Qualification item for Oscillation circuit characteristics



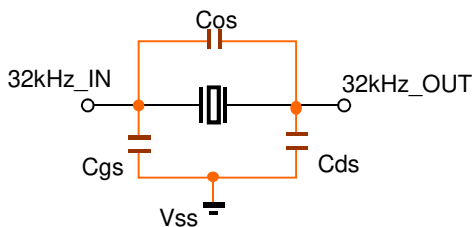
No	Item	Symbol	Recommended conditions
1	Negative Resistance	RL	
2	Oscillation allowance	M	more than 5 times of R1Max.
3	Drive Level	D.L	SSP-T7-F : 1 μW SC-32S/P/L: 1 μW SC-20S/P : 1 μW SC-16S : 0.5 μW
4	Oscillation Rising Time	Ts	-

Oscillation rising time (Ts) measurement conditions



Time from the application of VDD until the XCOU amplitude reaches 90%

◆Approximate expression for Circuit load capacitance



$$CL = Cg \times Cd / (Cg + Cd) + Cs \text{ (pF)}$$

Cos : 32kHz\_IN-32kHz\_OUT Stray capacitance

Cgs : 32kHz\_IN-Vss Stray capacitance

Cds : 32kHz\_OUT-Vss Stray capacitance

◆Notes

The above evaluation results are reference values evaluated in the specific sample, and the contents are not guaranteed. Please note that in the actual circuit board, the value of the external element capacitance and the characteristics may change depending on the difference in stray capacitance and so on.

◆Notes for the design of Circuit board

Please keep the wiring short and place Quartz Crystal, Condensior, and Resistance close as possible to Microchip microcontroller. In order to prevent interference with other signal lines, do not provide other signal lines, please do not provide other signal lines on the crystal mounting part (bottom surface).