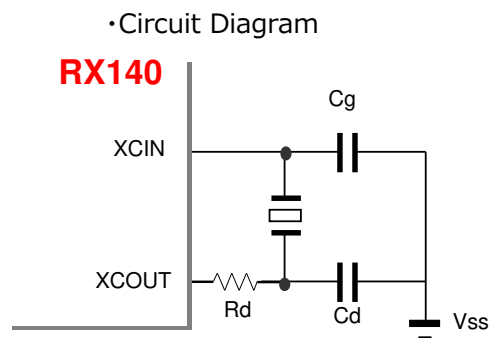


Renesas Electronics RX140 Group Matching Data Details

◆Evaluation items and evaluation data of oscillation circuit characteristics



Evaluation item

No	Item	Symbol	Recommended conditions
1	Negative resistance	RL	The value shall be at least 5 times the product R1 specification value.
2	Oscillation margin	M	
3	Drive Level	D.L	Must be within product specifications.
4	Oscillation rise time	Ts	Reference data

To ensure safe use by our customers,
We recommend an oscillation margin of 5 times or more.

·Product and recommended circuit constants

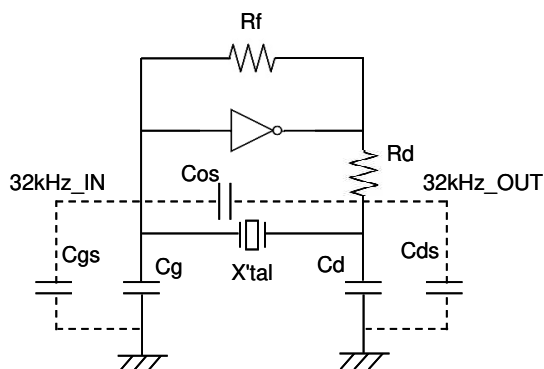
IC Type/ Oscillation mode	32kHz Crystal unit			External element			Oscillation characteristics				Supply Voltage (V)
	Product name	R1Max. (kΩ)	CL (pF)	Rd (kΩ)	Cg (pF)	Cd (pF)	RL (kΩ)	M (times)	D.L (μW)	Ts (sec)	
標準CL	SSP-T7-F	65	12.5	0	20	20	-515	7.9	0.07	0.69	1.8
							-515	7.9	0.07	0.69	3.3
							-515	7.9	0.07	0.74	5.0
							-515	7.9	0.07	0.74	5.5
	SC-32S	70	12.5	0	22	22	-425	6.1	0.10	0.52	1.8
							-425	6.1	0.10	0.52	3.3
							-425	6.1	0.10	0.52	5.0
							-435	6.2	0.10	0.52	5.5
	SC-20S	70	9	0	22	22	-431	6.2	0.06	0.28	1.8
							-431	6.2	0.06	0.28	3.3
							-431	6.2	0.06	0.28	5.0
							-431	6.2	0.06	0.28	5.5
	SC-16S	90	9	0	16	15	-763	8.5	0.05	0.19	1.8
							-763	8.5	0.05	0.19	3.3
							-763	8.5	0.05	0.19	5.0
							-763	8.5	0.05	0.19	5.5

IC Type/ Oscillation mode	32kHz Crystal unit			External element			Oscillation characteristics				Supply Voltage (V)
	Product name	R1Max. (kΩ)	CL (pF)	Rd (kΩ)	Cg (pF)	Cd (pF)	RL (kΩ)	M (times)	D.L (μW)	Ts (sec)	
低CL1	SSP-T7-F	65	9	0	15	15	-357	5.5	0.02	1.16	1.8
							-357	5.5	0.02	1.16	3.3
							-357	5.5	0.02	1.16	5.0
							-357	5.5	0.02	1.17	5.5
	SC-32S	70	7	0	9	9	-711	10.2	0.02	0.40	1.8
							-711	10.2	0.02	0.40	3.3
							-711	10.2	0.02	0.38	5.0
							-711	10.2	0.02	0.38	5.5
	SC-20S	70	7	0	9	10	-651	9.3	0.02	0.22	1.8
							-651	9.3	0.02	0.22	3.3
							-651	9.3	0.02	0.21	5.0
							-651	9.3	0.02	0.21	5.5
	SC-16S	90	7	0	10	10	-599	6.7	0.02	0.19	1.8
							-599	6.7	0.02	0.20	3.3
							-599	6.7	0.02	0.20	5.0
							-599	6.7	0.02	0.20	5.5
低CL2	SSP-T7-FL	65	12.5	0	7	7	-382	5.9	0.01	1.03	1.8
							-392	6.0	0.01	1.20	3.3
							-392	6.0	0.01	1.20	5.0
							-392	6.0	0.01	1.20	5.5
	SC-32S	70	12.5	0	7	7	-384	5.5	0.01	0.80	1.8
							-384	5.5	0.01	0.83	3.3
							-384	5.5	0.01	0.79	5.0
							-384	5.5	0.01	0.74	5.5
	SC-20S	70	7	0	7	7	-404	5.8	0.01	0.33	1.8
							-404	5.8	0.01	0.33	3.3
							-404	5.8	0.01	0.33	5.0
							-404	5.8	0.01	0.33	5.5

IC Type/ Oscillation mode	32kHz Crystal unit			External element			Oscillation characteristics				Supply Voltage (V)
	Product name	R1Max. (kΩ)	CL (pF)	Rd (kΩ)	Cg (pF)	Cd (pF)	RL (kΩ)	M (times)	D.L (μW)	Ts (sec)	
低CL3	SSP-T7-FL	65	3.7	0	2	3	-341	5.2	0.01	1.00	1.8
							-341	5.2	0.01	1.16	3.3
							-341	5.2	0.01	1.20	5.0
							-341	5.2	0.01	1.20	5.5
	SC-32L	40	4	0	3	3	-307	7.7	0.01	0.52	1.8
							-307	7.7	0.01	0.52	3.3
							-307	7.7	0.01	0.48	5.0
							-307	7.7	0.01	0.48	5.5
	SC-20P	50	4	0	3	3	-308	6.2	0.01	0.40	1.8
							-308	6.2	0.01	0.40	3.3
							-308	6.2	0.01	0.33	5.0
							-308	6.2	0.01	0.33	5.5

Load capacitance (CL) other than those in the table above, automotive products (SC-32A, SC-20A), low-profile products (SC-20T), and other products are also available.

◆About circuit load capacitance



The oscillation circuit has stray capacitance.

The CL value is set considering stray capacitance.

$$CL = C_g \times C_d / (C_g + C_d) + C_s \text{ (pF)}$$

C_s ≡ Circuit stray capacitance

What is floating capacity?

C_{os} : 32kHz_IN-32kHz_OUT Stray capacitance

C_{gs} : 32kHz_IN-Vss Stray capacitance

C_{ds} : 32kHz_OUT-Vss Stray capacitance

:

◆Circuit board design considerations

Place the crystal unit, capacitors, and resistors as close to the Chip as possible to shorten the wiring. To prevent interference with other signal lines, do not place other signal lines in the area where the crystal unit is mounted (underside).

The oscillation circuit design is described on our website.

In addition, please use our circuit matching service. For details, please contact our sales representatives or visit our website.

◆Caution

The above evaluation results are reference values evaluated on specific samples and "IC manufacturer's evaluation board",

They are subject to change depending on the customer's board design.

Please note that the capacitance values and characteristics of external elements may vary depending on differences in stray capacitance and other factors in actual circuit boards.