

RENESAS TECHNICAL UPDATE

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Product Category	MPU/MCU	Document No.	TN-RL*-A0137A/E	Rev.	1.00
Title	Capacitive Sensing Unit (CTS2La) Capacitance reduction characteristics due to power supply ripple noise		Information Category	Technical Notification	
Applicable Product	RL78/G22 Group	Lot No.	Reference Document	RL78/G22 User's Manual: Hardware Rev. 1.10 R01UH0978EJ0110 (Jun. 2024)	
		All			

1. Information regarding the capacitance reduction characteristics due to power supply ripple noise

When ripple noise is superimposed on the VDD power supply, if the ripple noise is superimposed in the frequency band where the control current decreases, the measured value of the capacitance connected to the TSm terminal decreases. This characteristic is presented as a reference value, so please take note of it when designing an external regulator that supplies power to the VDD power supply.

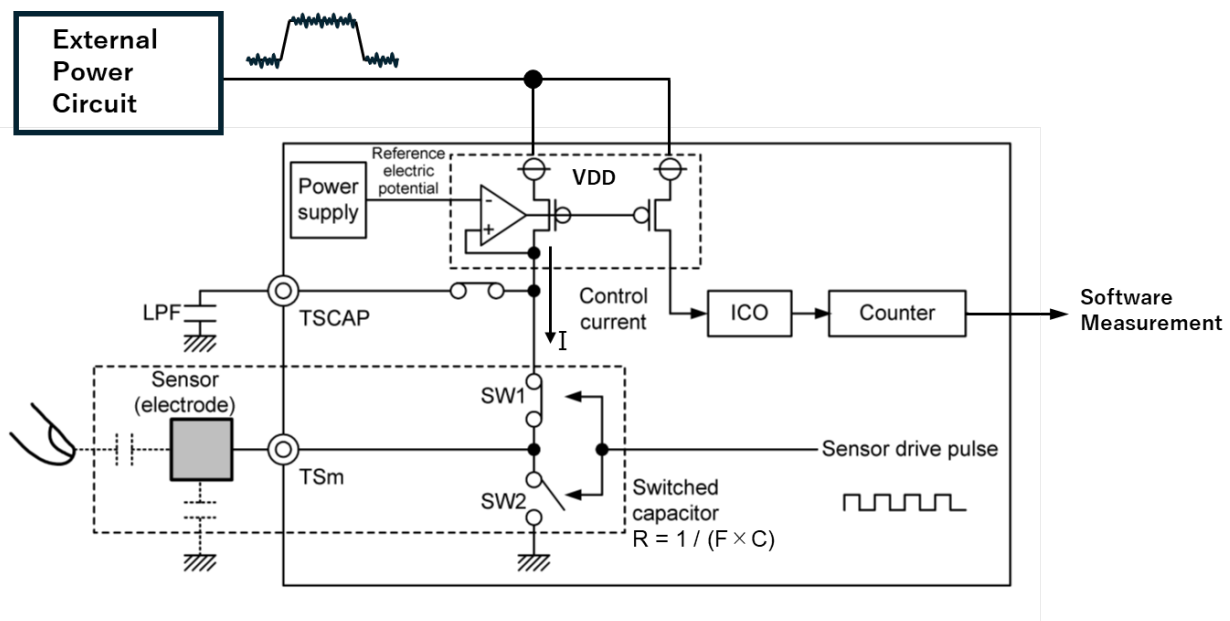


Figure 1 Measurement circuit

For the calculation method of the measured capacitance value of the CTSU2La when ripple noise is superimposed, please refer to "3.4 Touch Parameter Adjustment (2) RL78/G22 Capacitance / Measurement Value Conversion Formula" and "3.4.2 Example of Countermeasure against False Touch Judgement" in the Application Note Capacitive Touch Ripple Countermeasures Guide (R30AN0453).

2. Characteristic data

Table 1 Capacitive Sensing Unit (CTS2La) Measured capacitance reduction characteristics due to VDD power supply ripple noise (reference value)

Conditions: 2.4V ≤ VDD ≤ 5.5V, VSS = 0V, TA = -40 to +105°C, Cp = 20pF

Item	Symbol	Conditions		Min.	Typ.	Max.	Unit
Measured capacitance reduction characteristics <small>Notes</small>	Cdown	Ripple Noise Frequency < 20kHz	Ripple Noise Amplitude = 100 mVpp	—	—	0.02	pF
		20kHz ≤ Ripple Noise Frequency ≤ 2MHz	Ripple Noise Amplitude = 40 mVpp	—	—	0.06	
			Ripple Noise Amplitude = 60 mVpp	—	—	0.10	
			Ripple Noise Amplitude = 100 mVpp	—	—	0.33	
		2MHz < Ripple Noise Frequency	Ripple Noise Amplitude = 100 mVpp	—	—	0.01	

Note. This is the value under the following conditions.

- This is the value when using the Self-capacitance method (CTSUCRAL.MD1 = 0) .
- This is the value when the measured current range is 40uA (CTSUCRAL.ATUNE1 = 1, CTSUCRAH.ATUNE2 = 0). For an overview of measured current range, refer to "2.2 Self-capacitance Method" and "2.2.2 Measurement Range" in the Application Note Capacitive Sensor MCU Capacitive Touch Introduction Guide (R30AN0424)
- The target value for offset adjustment is 37.5%. For an overview of offset adjustment, refer to "2. Capacitance Detection" and "7.1 Automatic Tuning Using QE for Capacitive Touch" in the Application Note Capacitive Sensor MCU Capacitive Touch Introduction Guide (R30AN0424).

Remark. Cp: parasitic capacitance

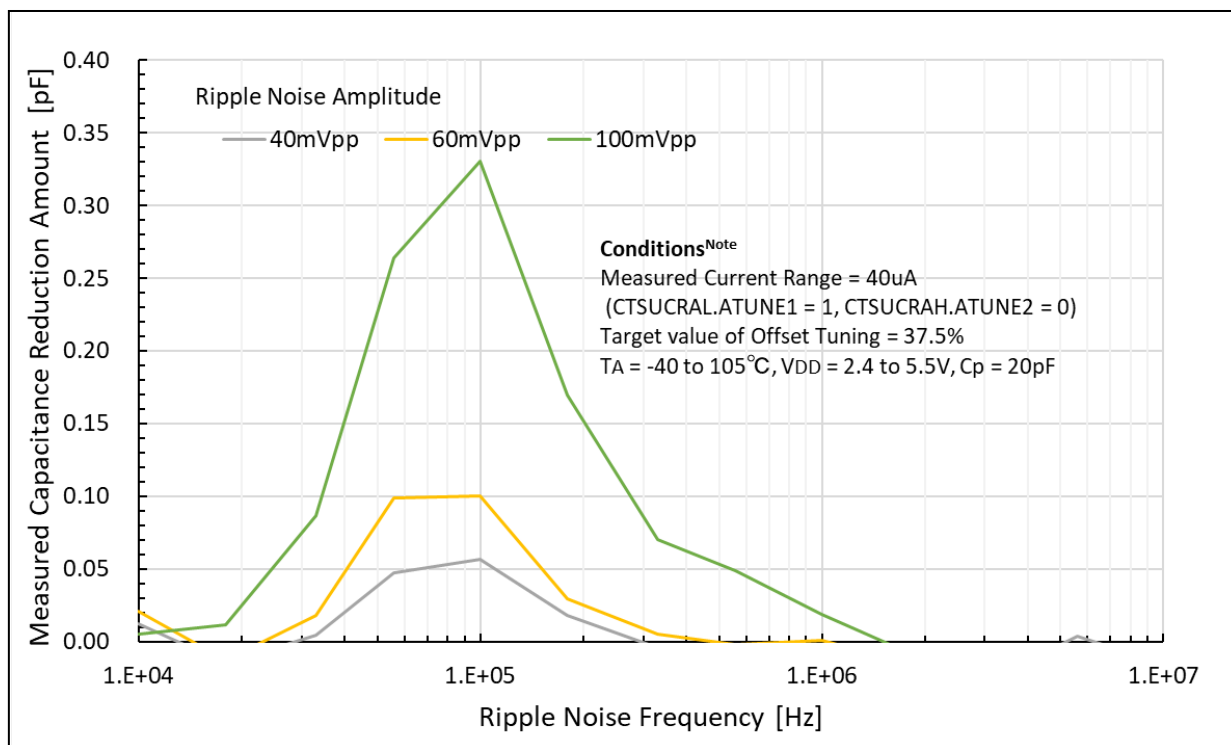


Figure 2 Measured Capacitance Reduction Amount

Note. Refer to the application note for Capacitive Sensor MCU, "Capacitive Touch QE for Capacitive Touch Advanced Mode Parameter Guide (R30AN0428)".

3. Document Improvement

The contents of “2. Characteristic data” will be reflected to “34.6 AC Characteristics” of SECTION 34 Electrical Characteristics in the User’s Manual: Hardware by the next revision.