

RENESAS TECHNICAL UPDATE

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Product Category	MPU/MCU	Document No.	TN-RA*-A0140C/E	Rev.	3.00
Title	Capacitive Sensing Unit (CTS2) Capacitance reduction characteristics due to power supply ripple noise		Information Category	Technical Notification	
Applicable Product	RA2L1 Group RA2E1 Group RA0L1 Group	Lot No.	Reference Document	RA2L1 User's Manual: Hardware R01UH0853EJ0150 Rev.1.50(Aug.2024) RA2E1 User's Manual: Hardware R01UH0852EJ0150 Rev.1.50(Jun.2024) RA0L1 User's Manual: Hardware R01UH1143EJ0110 Rev.1.10(Jul.2025)	
		All			

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

The superimposition of ripple noise on the VCC power supply might affect the CTSU2 circuit control current and cause a decrease of the capacitance value measured on the TS_n terminal, depending on the noise frequency distribution and maximum amplitude. Please consider the provided reference characteristic data when designing the VCC power supply circuit and adjust the CTSU2 operational settings as needed with referring the following application note (R30AN0453).

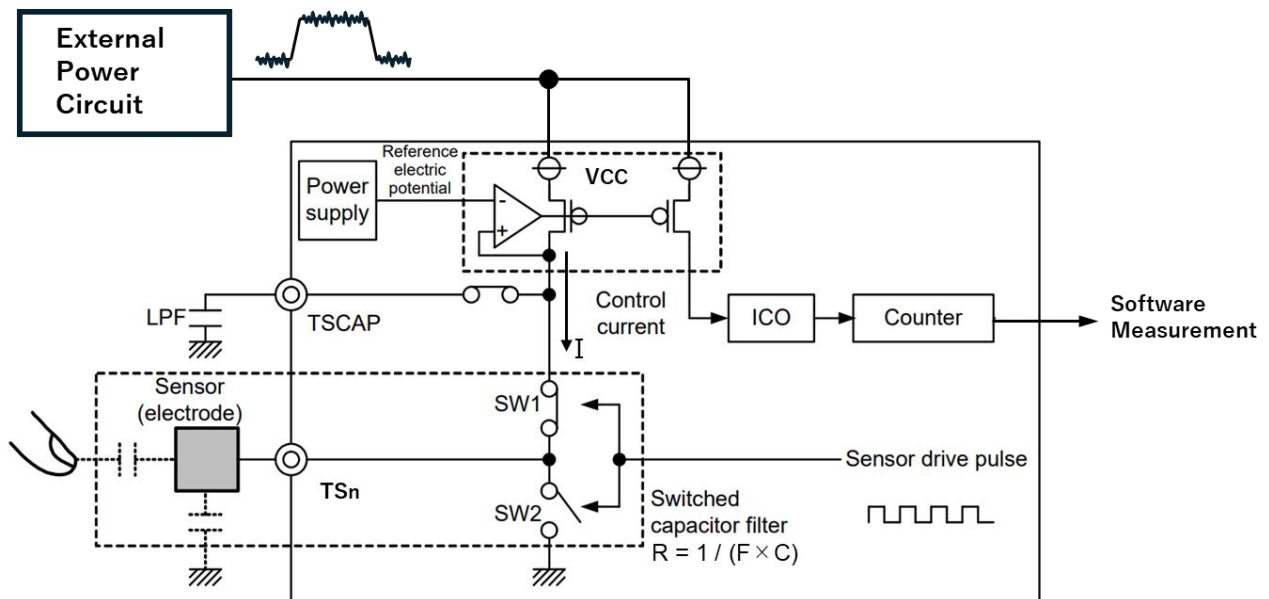


Figure 1 Measurement circuit

For the calculation method of the measured capacitance value of the CTSU2 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 (CTS2) Measured capacitance reduction characteristics due to VCC power supply ripple noise (reference value)

Conditions: $2.4V \leq VCC \leq 5.5V$, $Vss = 0V$, $TA = -40$ to $+105^{\circ}C$, $Cp = 20pF$

Item		Symbol	Min	Typ	Max	Unit	Test Conditions (Ripple Noise Amplitude)
Measured capacitance reduction characteristics <small>Note</small>	Ripple noise frequency < 20 kHz	C_{down}	—	—	0.02	pF	100 mVpp
	20 kHz ≤ Ripple noise frequency ≤ 2 MHz		—	—	0.06		40 mVpp
			—	—	0.10		60 mVpp
			—	—	0.33		100 mVpp
	2 MHz < Ripple noise frequency		—	—	0.01		100 mVpp

Note. This is the value under the following conditions.

- 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 "3.4 Current Range" in the Application Note "Capacitive Sensor MCU QE for Capacitive Touch Advanced Mode Parameter Guide (R30AN0428)".
- The target value for offset adjustment is 37.5%. For an overview of offset adjustment, refer to "3.2 Offset Tuning Target" in the Application Note "Capacitive Sensor MCU QE for Capacitive Touch Advanced Mode Parameter Guide (R30AN0428)".

Remark. Cp: parasitic capacitance

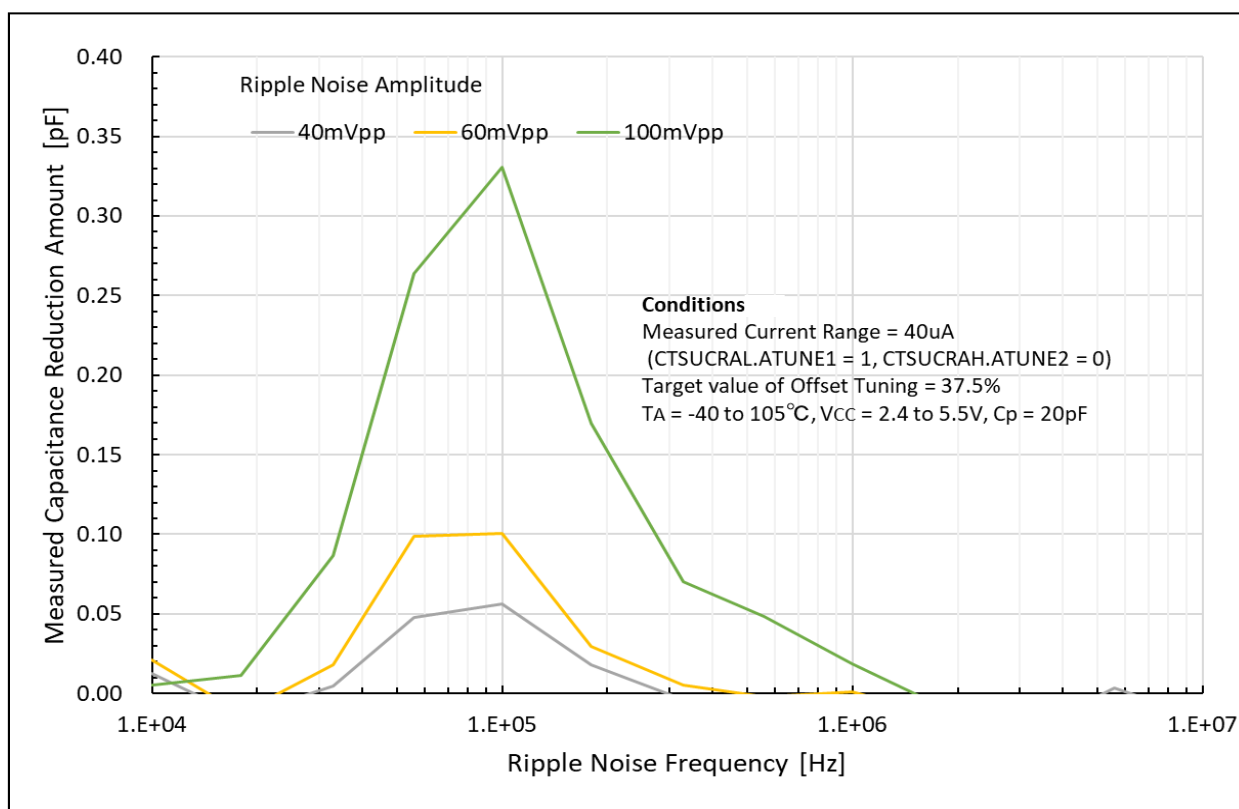


Figure 2 Measured Capacitance Reduction Amount