

RENESAS TECHNICAL UPDATE

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Product Category	MPU/MCU		Document No.	TN-RX*-A0286A/E	Rev.	1.00
Title	Capacitance Reduction Characteristics of Capacitive Touch Sensing Unit (CTS2) due to Power Supply Ripple Noise		Information Category	Technical Notification		
Applicable Product	RX140 Group RX260 Group, RX261 Group	Lot No.	Reference Document	RX140 Group User's Manual: Hardware Rev.1.20 (R01UH0905EJ0120) RX260 Group, RX261 Group User's Manual: Hardware Rev.1.00 (R01UH1045EJ0100)		
		All				

1. Phenomenon

When ripple noise is superimposed on the VCC 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 the external power supply circuit that supplies power to the VCC power supply.

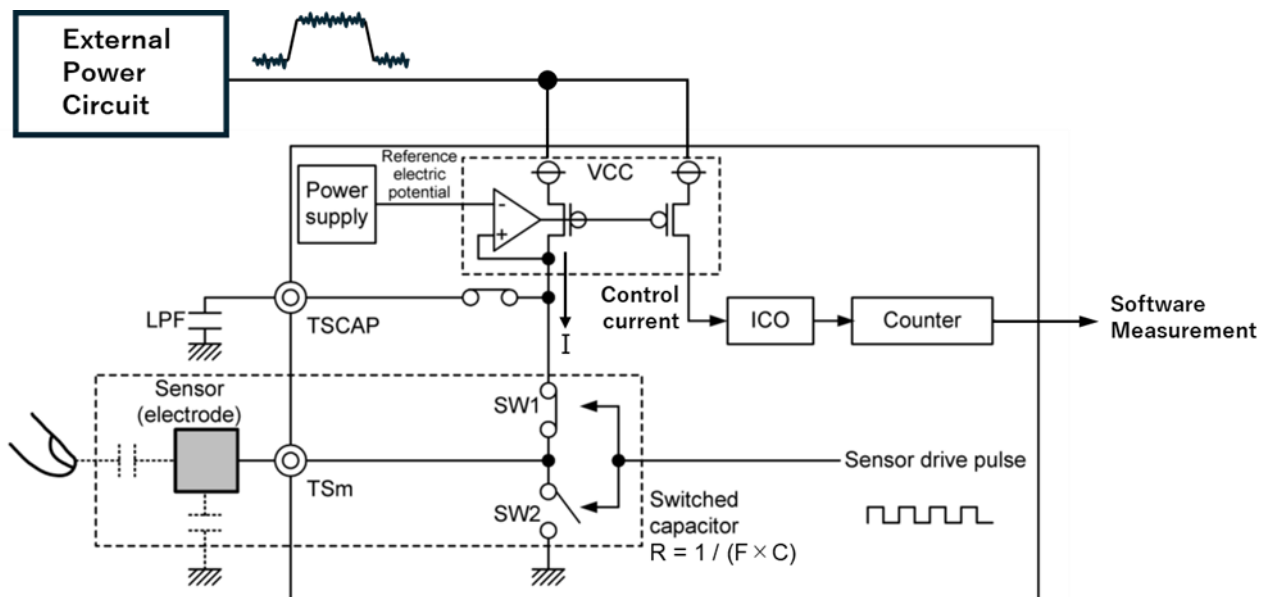


Figure 1. Measurement Circuit

For the calculation method of the measured capacitance value of the CTSU when ripple noise is superimposed, please refer to “3.4 Touch Parameter Adjustment” “(2) RL78/G22 Capacitance Measurement Value Conversion Formula” in the application note “Capacitive Touch Ripple Countermeasures Guide (R30AN0453)”.

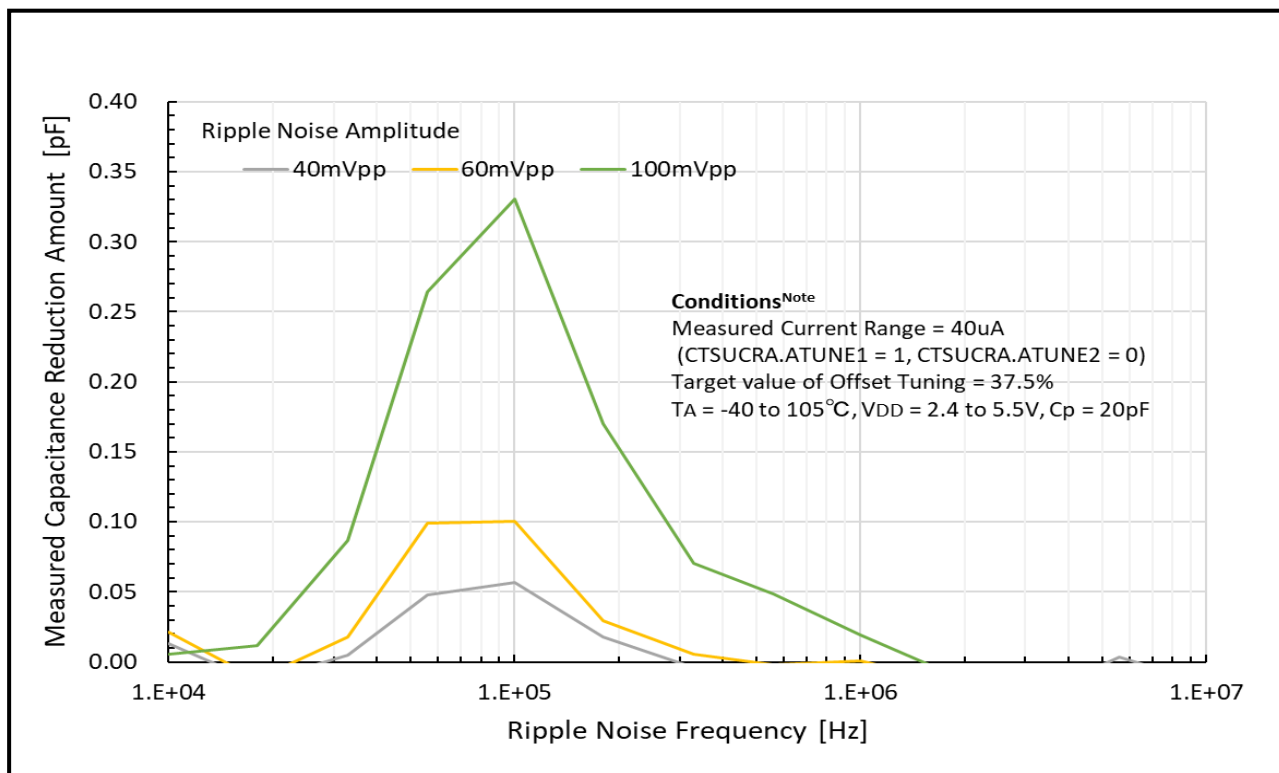
2. Addition Characteristic Data

Table 1. CTSU Measured Capacitance Reduction Characteristics due to VCC Power Supply Ripple Noise (Reference Value)

Conditions: $2.4\text{ V} \leq \text{VCC} \leq 5.5\text{ V}$, $\text{VSS} = 0\text{ V}$, $T_a = -40\text{ to }+105^\circ\text{C}$, $C_p = 20\text{ pF}$

Item		Symbol	Min	Typ	Max	Unit	Test Conditions (Ripple Noise Amplitude)
Measured capacitance reduction characteristics*1	Ripple noise frequency < 20 kHz	C_{down}	—	—	0.02	pF	100 mVpp
	$20\text{ kHz} \leq \text{Ripple noise frequency} \leq 2\text{ MHz}$		—	—	0.06		40 mVpp
			—	—	0.10		60 mVpp
			—	—	0.33		100 mVpp
	$2\text{ MHz} < \text{Ripple noise frequency}$		—	—	0.01		100 mVpp

Note 1. These are the values under the following conditions.
 • When using the Self-capacitance method (CTSUCRA.MD1 = 0).
 • When the measured current range is 40 μA (CTSUCRA.ATUNE1 = 1, CTSUCRA.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)”.
 • When 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. C_p : parasitic capacitance



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