A red square graphic is located in the top left corner of the slide, enclosed within a thin red square border. It is positioned at the intersection of a vertical red line and a horizontal red line that spans the width of the slide.

# Difference among various products of 7560 Group

Renesas Technology Corporation  
Renesas LSI Design Corporation  
Renesas Solutions Corporation



## Products effected

- Emulator MCU Standard version  
M37560RLFS
- One-time PROM version Standard version  
M37560EFFP/GP
- Mask ROM version Standard version  
M37560M8-XXXFP/GP, M37560MF-XXXFP/GP
- Mask ROM version A version  
M37560M8A-XXXFP/GP, M37560MFA-XXXFP/GP

## Precaution

- When Mask ROM version, One-time PROM version and memory size differ in one group, actual values such as an electrical characteristics, operation margin, A-D conversion accuracy, noise immunity, and noise radiation may differ from the ideal values due to the difference in the manufacturing processes. When these products are used switching, perform system evaluation for each product of every after confirming product specification.
- This document shows difference, some specifications and standards, not for all. Be sure to refer to the most current data sheet as for the latest detailed specification and an electrical characteristics.

# 1. Difference among various products of 7560 Group

		One-time PROM version	Mask ROM version (Standard version)	Mask ROM version (A version)
ROM/RAM size[byte]		60K/2.5K	60K/2.5K, 32K/1K	←
Oscillation circuit constants		The oscillation circuit constants of XIN-XOUT, XCIN-XCOUT will depend on each product.		
Hysteresis characteristics (See 3.section)		Almost fixed	It depends on the power supply and becomes narrow.	←
Circuit structure of the peripheral function input pins		See 4.section		
sub-clock oscillation circuit		Without regulator	←	With regulator
Vpp power supply pin connection (P70)		Serial resistor (5k ohm) is necessary. Make the length of wiring which is connected to the Vpp pin as short as possible. It protects input noise.	Serial resistor is unnecessary.	←
Absolute Maximum ratings	Power source voltage(Vcc)	-0.3V to 7.0V	-0.3V to 6.5V	←
	Input voltage (C1, C2)			
	Output voltage (VL3)			
	Output voltage (C1, C2)			
	Input voltage (VL3)	VL2 to 7.0V	VL2 to 6.5V	←
Power source current		See 6.section		
Power supply(Vcc) / Main-clock input oscillation frequency		See 7.1. and 7.2. section		
RAM retention voltage (Min.)		2.0V	←	1.8V
Power source voltage of VLI (At using voltage multiplier)		1.3V to 2.3V	1.3V to 2.1V	←
Timer X,Y input frequency (Max.) f(CNTR0),f(CNTR1)		2.5<=Vcc<=4.0V : (4 x Vcc-1)/3 MHz 4.0<=Vcc<=5.5V : 4 MHz	2.2<=Vcc<=4.0V : (10 x Vcc-4)/9 MHz 4.0<=Vcc<=5.5V : 4 MHz	1.8<=Vcc<=2.0V : (5 x Vcc-8) MHz 2.0<=Vcc<=4.0V : (Vcc) MHz 4.0<=Vcc<=4.5V : (2 x Vcc-4) MHz 4.5<=Vcc<=5.5V : 5 MHz



The oscillation circuit constants of XIN-XOUT, XCIN-XCOUT will depend on each product of Mask ROM version (Standard version, A version) and One-Time PROM version.

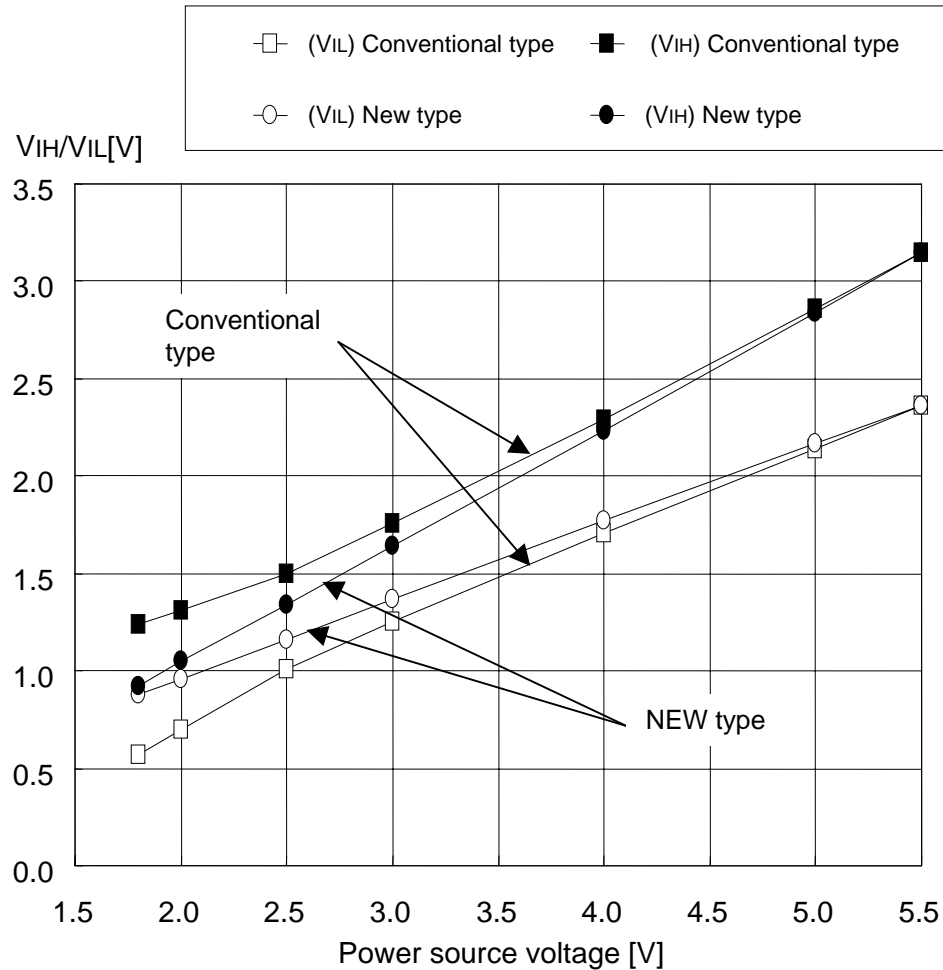
So that the product used for mass production obtains the stabilized operation clock on the user system and its condition, contact the resonator manufacturer and select the resonator and oscillation circuit constants. Be careful especially when range of voltage and temperature is wide.

We recommend to design the circuit in consideration of the wiring pattern of the feed-back resistor, the dumping resistor and the load capacity in advance.

We publish the reference-use oscillation circuit parameters in Renesas Technology home page.

<http://www.renesas.com/en/38000>

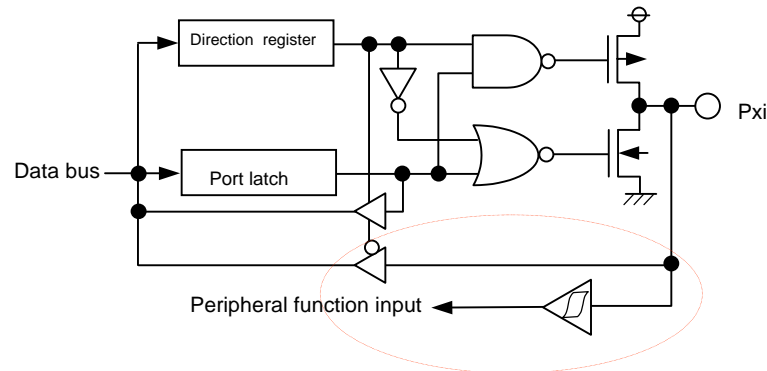
# 3. Hysteresis characteristic



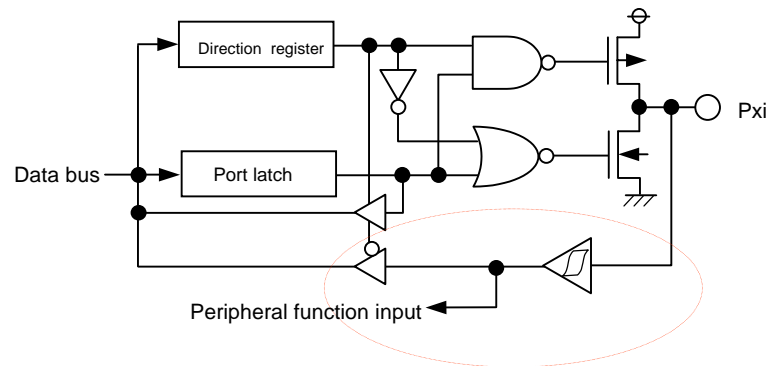
Note: Data described here are characteristic examples.  
The data values are not guaranteed.

		Conventional type	New type
Emulator MCU		○	
One-time PROM version		○	
Mask ROM version	Standard version		○
	A version		○

# 4. Circuit structure of the peripheral function input pins



**Type A**



**Type B**

Type A : Input level of port does not always correspond with it of the peripheral function input pin.

Type B : Input level of port corresponds with it of the peripheral function input pin.  
(The port input also has hysteresis.)

		Type A	Type B
Emulator MCU		○	
One-time PROM version		○	
Mask ROM version	Standard version		○
	A version		○

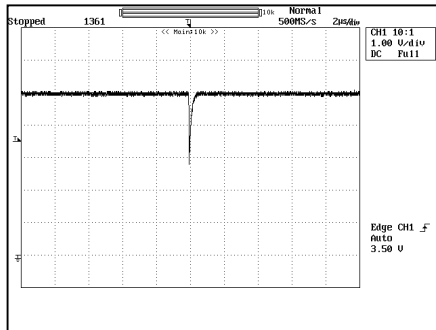
Pins ;  
 P20 to P27, P41/INT1, P42/INT2, P44/RXD, P46/SCLK1,  
 P54/CNTR0, P55/CNTR1, P57/ADT, P60/SIN2, P62/SCLK21,  
 P70/INT0

# 5. LCD power supply pins

One-time PROM version

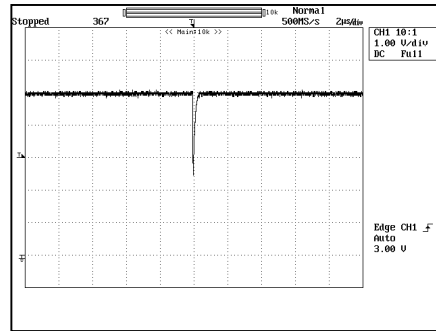
VL3 falling voltage =2.2V

VL3



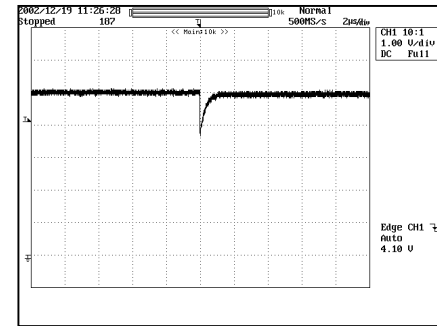
MASK ROM version (Standard version)

VL3 falling voltage =2.5V



MASK ROM version (A version)

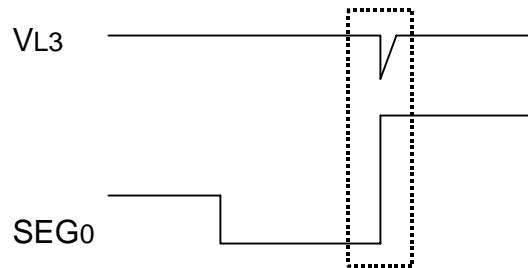
VL3 falling voltage =1.4V



Note: Data described here are characteristic examples. The data values are not guaranteed.

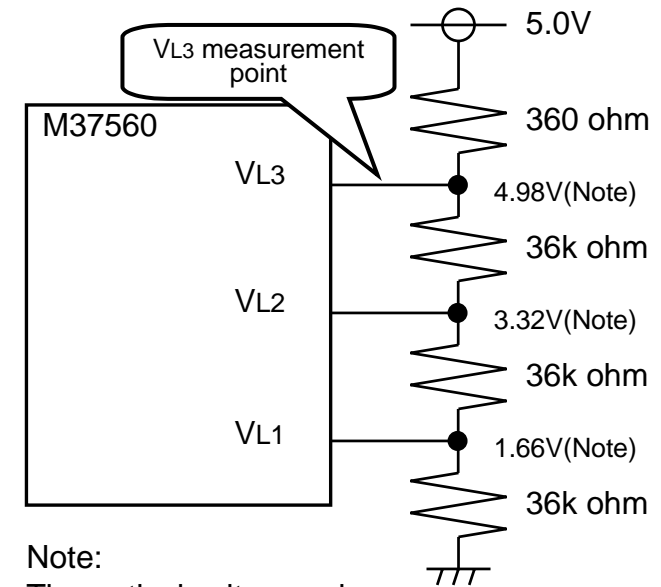
<Measure condition>

- Only SEG exclusive pins output the LCD drive waveform.
- PORT pins shared with LCD outputs are selected as PORT function.
- COM and SEG pins are open.(No load)
- All data of LCDRAM is 55h.



Voltage falling occurs in every LCDCK cycle

- (1) Shorten the wiring pattern in right diagram.
- (2) Connect condensers to the LCD power supply pin and Vss with the shortest possible wiring to steady voltage level. (reference value:0.1uF to 0.33uF).



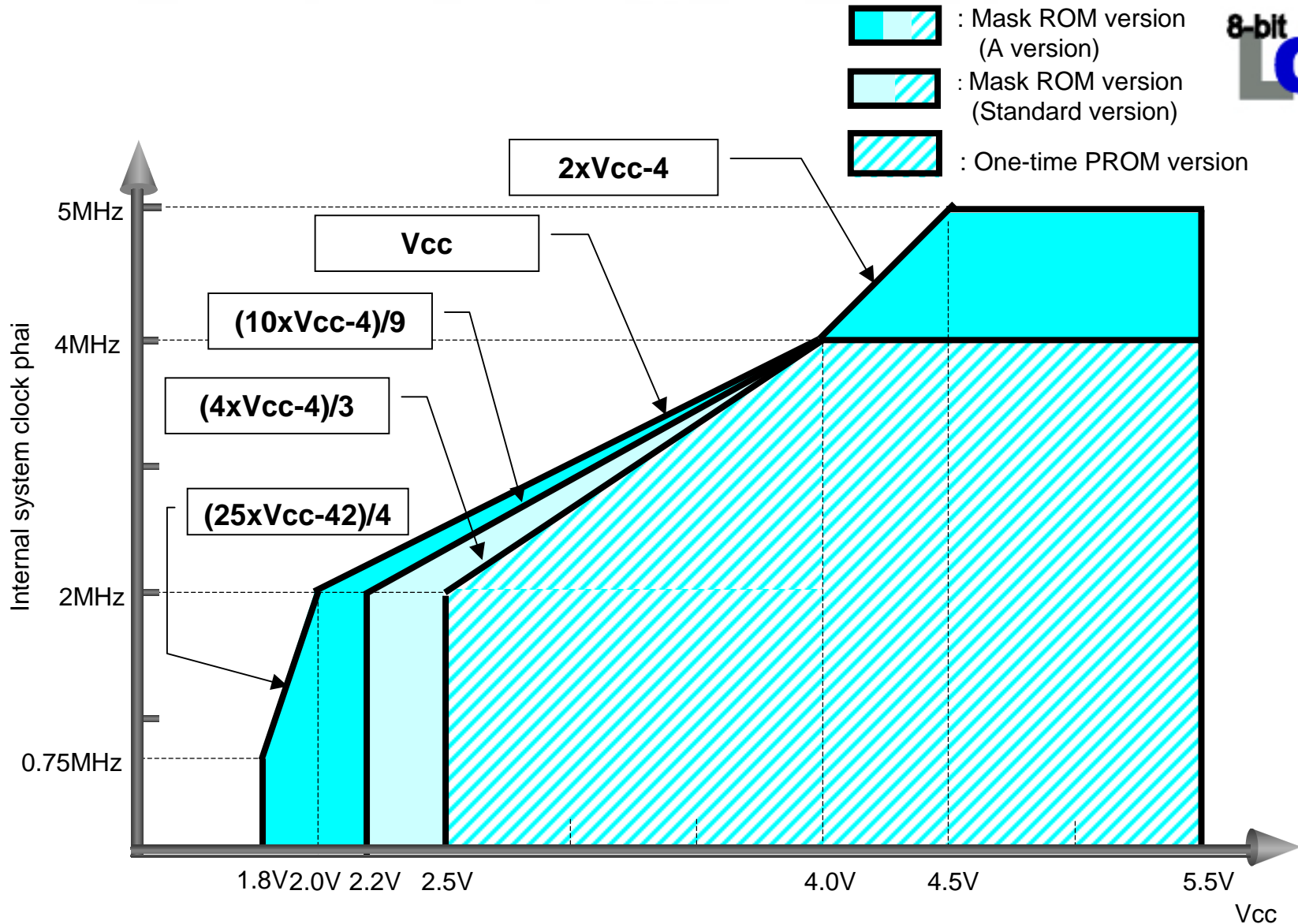
Note:  
Theoretical voltage value

## 6. Electrical characteristics (Power source current)

Symbol	Parameter	Test conditions	One-time PROM ver.		Mask ROM ver. (Standard ver.)		Mask ROM ver. (A version)		Unit
			Typ.	Max.	Typ.	Max.	Typ.	Max.	
I <sub>CC</sub>	Power source current	High-speed mode, V <sub>CC</sub> = 5V, f(XIN) = 10MHz, f(XCIN) = 32.768kHz Output transistors "off", A-D converter in operating	-	-	-	-	4.5	9.0	mA
		High-speed mode, V <sub>CC</sub> = 5V, f(XIN) = 8MHz, f(XCIN) = 32.768 kHz Output transistors "off", A-D converter in operating	6.4	13	6.4	13	4.0	8.0	mA
		High-speed mode, V <sub>CC</sub> = 5V, f(XIN) = 8MHz (in WIT state), f(XCIN) = 32.768kHz, Output transistors "off", A-D converter stop	1.6	3.2	1.6	3.2	0.9	1.8	mA
		Low-speed mode, V <sub>CC</sub> = 5V, T <sub>a</sub> = < 55 degrees C, f(XIN) = stopped f(XCIN) = 32.768kHz, Output transistors "off"	35	70	35	70	15	30	μA
		Low-speed mode, V <sub>CC</sub> = 5V, T <sub>a</sub> = 25 degrees C, f(XIN) = stopped f(XCIN) = 32.768kHz(in WIT state), Output transistors "off"	20	40	20	40	7	14	μA
		Low-speed mode, V <sub>CC</sub> = 3V, T <sub>a</sub> = < 55 degrees C, f(XIN) = stopped f(XCIN) = 32.768kHz, Output transistors "off"	15	22	15	22	9	18	μA
		Low-speed mode, V <sub>CC</sub> = 3V, T <sub>a</sub> = 25 degrees C, f(XIN) = stopped f(XCIN) = 32.768kHz(in WIT state), Output transistors "off"	4.5	9.0	4.5	9.0	4.5	9.0	μA
		All oscillation stopped (in STP state), T <sub>a</sub> = 25 degrees C, Output transistors "off"	0.1	1.0	0.1	1.0	0.1	1.0	μA
		All oscillation stopped (in STP state), T <sub>a</sub> = 85 degrees C, Output transistors "off"	-	10	-	10	-	10	μA





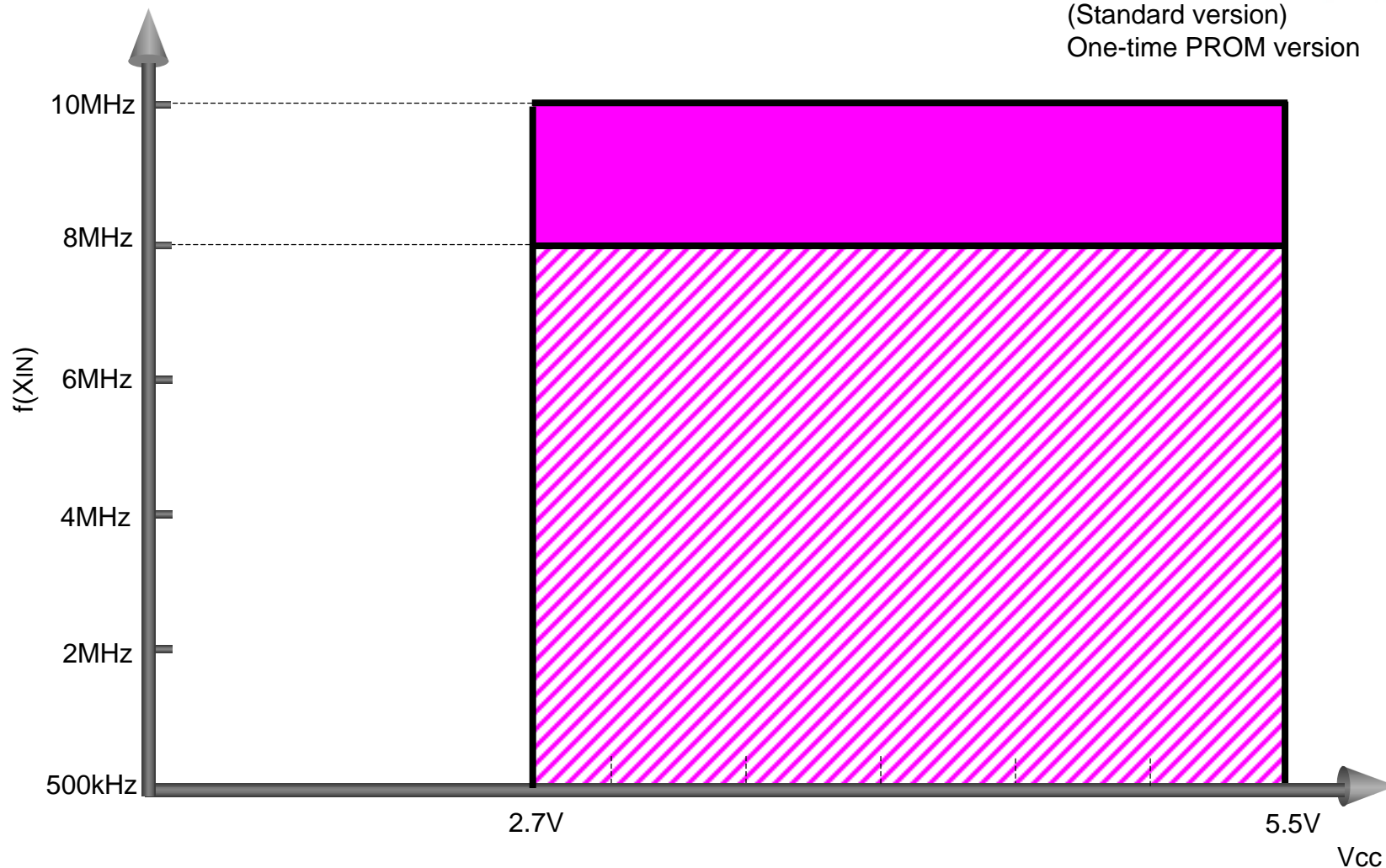
# 7.1. Internal-clock vs. Vcc (Except A-D converter)



## 7.2. External-clock vs. Vcc (A-D converter in operating)



-  : Mask ROM version (A version)
-  : Mask ROM version (Standard version)  
One-time PROM version



To our customers,

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Renesas Electronics website: <http://www.renesas.com>

April 1<sup>st</sup>, 2010  
Renesas Electronics Corporation

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