

To our customers,

Old Company Name in Catalogs and Other Documents

On April 1st, 2010, NEC Electronics Corporation merged with Renesas Technology Corporation, and Renesas Electronics Corporation took over all the business of both companies. Therefore, although the old company name remains in this document, it is a valid Renesas Electronics document. We appreciate your understanding.

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

April 1st, 2010
Renesas Electronics Corporation

Issued by: Renesas Electronics Corporation (<http://www.renesas.com>)

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RENESAS TECHNICAL UPDATE

Nippon Bldg., 2-6-2, Ohte-machi, Chiyoda-ku, Tokyo 100-0004, Japan
Renesas Technology Corp.

Product Category	MPU/MCU		Document No.	TN-380-A068A/E	Rev.	1.00
Title	38D5 Group and 38C5 Group Note on Voltage Multiplier Start in the LCD Drive Control Circuit		Information Category	Technical Notification		
Applicable Products	38D5 Group 38C5 Group	Lot No.	Reference Document	---		

Please note the following when using a voltage multiplier while the voltage multiplier control bit is set to 1 for the applicable products shown below.

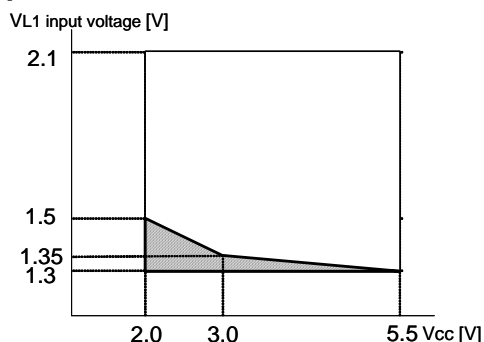
1. Applicable Products

38D5 Group	QzROM version	M38D58G8-XXXFP/HP, M38D58G8FP/HP, M38D59GC-XXXFP/HP, M38D59GCFFP/HP, M38D59GF-XXXFP/HP, M38D59GFFFP/HP
38D5 Group	Flash memory version	M38D59FFFP/HP
38C5 Group	Mask ROM version	M38C58M8-XXXFP/HP, M38C59MC-XXXFP/HP, M38C59MF-XXXFP/HP
38C5 Group	One-time PROM version	M38C59GFFFP/HP

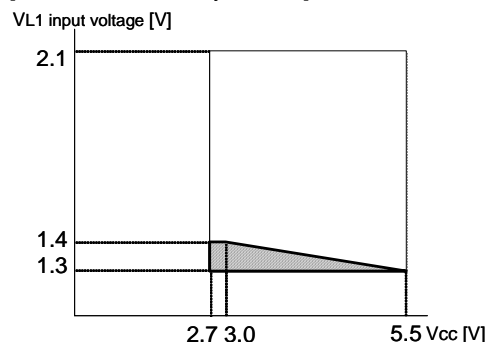
2. Note

When starting the voltage multiplier under the conditions in the shadowed areas, the voltage multiplier may not start correctly.

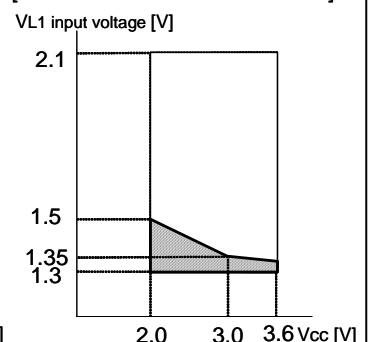
[38D5: QzROM version, 38C5: Mask ROM version]



[38D5: Flash memory version]



[38C5: One-time PROM version]



3. Countermeasure

When starting the voltage multiplier, connect LCD internal VL3 to Vcc using the VL3 connection bit and enable the voltage multiplier using the voltage multiplier control bit after applying 1.3 to 2.1 V to the VL1 pin. Wait until the VL3 pin voltage becomes $0.65 \times (VL1 \times 3)$ [V] or higher and connect LCD internal VL3 to the VL3 pin using the VL3 connection bit.

Program example

```
CLB    1,LM2    ; Connect LCD internal VL3 to Vcc.
SEB    0,LM2    ; Enable the voltage multiplier.
      Wait time ; Wait until the VL3 pin voltage  $\geq 0.65 \times (VL1 \times 3)$  [V].
SEB    1,LM2    ; Connect LCD internal VL3 to the VL3 pin.
```

Voltage multiplier control bit: Bit 0 in the LM2 register
VL3 connection bit: Bit 1 in the LM2 register
LM2 register: LCD mode register 2 (address 001416)

After the voltage multiplier starts operating, it continues operating correctly even if Vcc and VL1 are in the shadowed areas.

There is no problem if the above-mentioned measure is performed when using the voltage multiplier under conditions other than the conditions in the shadowed areas.