

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>

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RENESAS TECHNICAL UPDATE

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Product Category	MPU & MCU	Document No.	TN-16C-A176A/E	Rev.	1.00
Title	M16C/65, M16C/64A Groups Note on Generating Stop Condition in Multi-Master I ² C-bus Interface	Information Category	Technical Notification		
Applicable Product	M16C/65, M16C/64A Groups	Lot No.	—	Reference Document	

1. Note

In the multi-master I²C-bus interface, when the slave device and/or other master devices drive the SCLMM line low, no normal stop condition is generated. This is because the SDAMM line is released while the SCLMM line is still driven low.

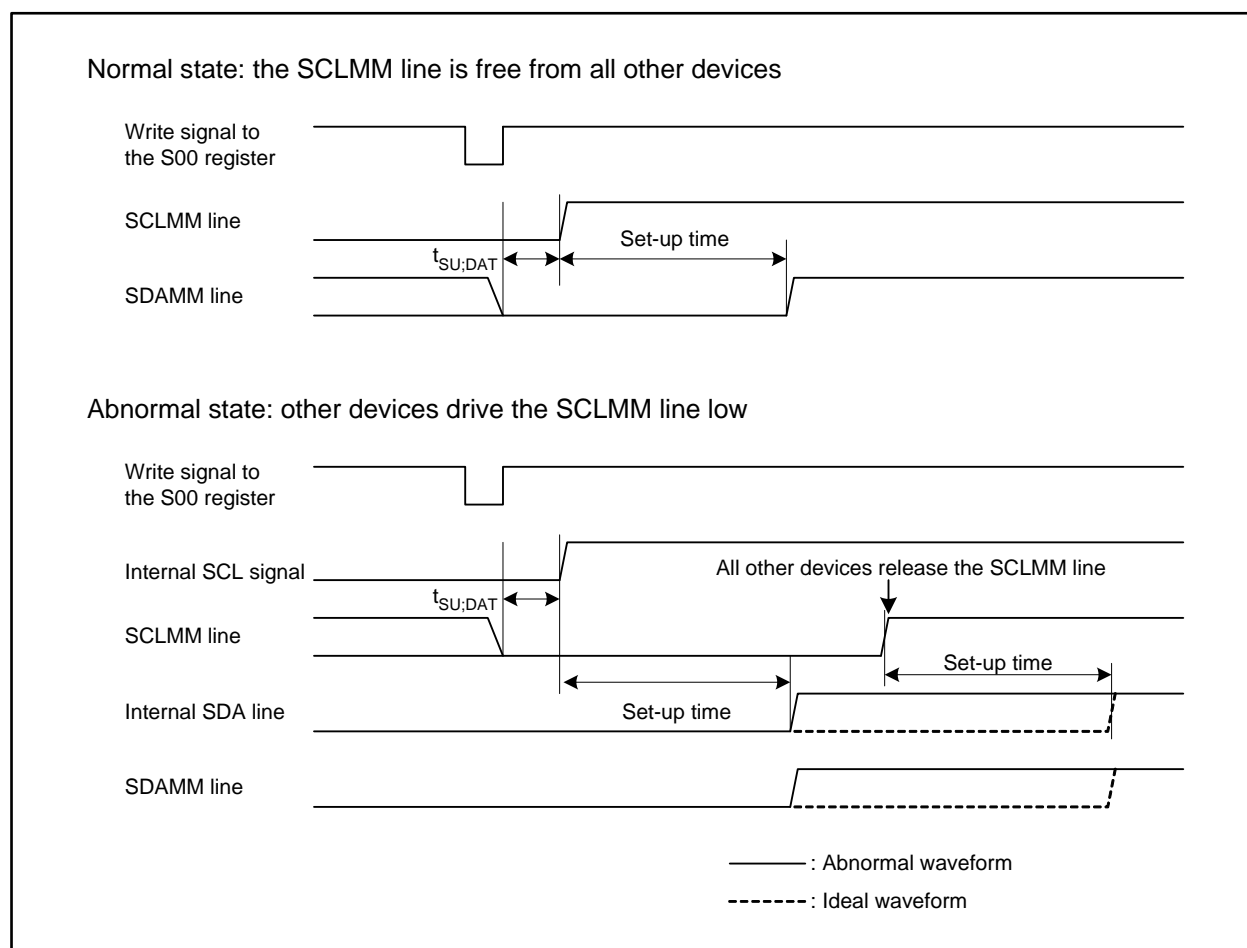


Figure 1. Abnormal Waveform

2. Countermeasure

Use the following flowchart to generate a stop condition:

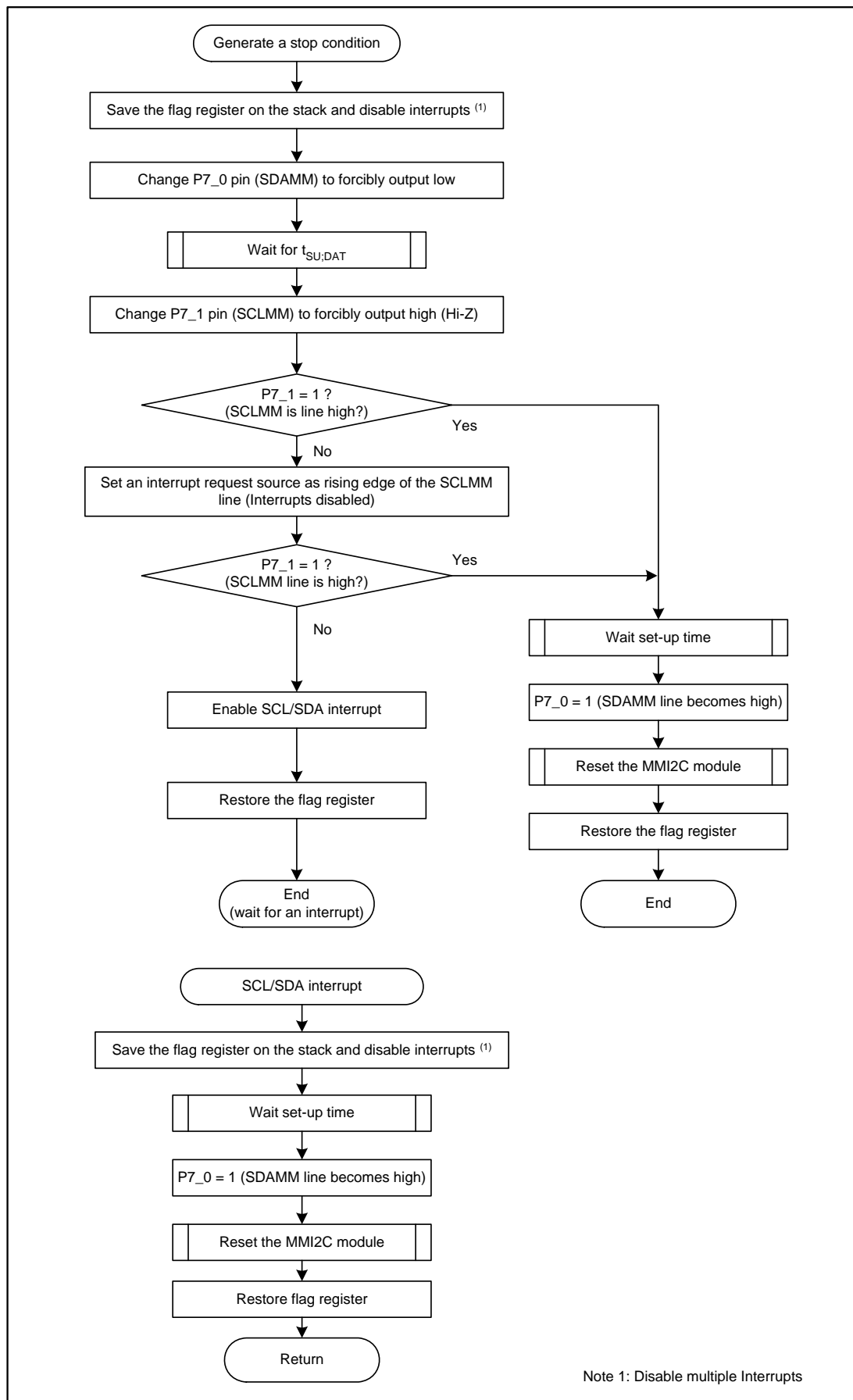


Figure 2. Generating a Stop Condition

```

/* Generate Stop Condition */
void MMIIC_STOP(){
    asm(" pushc flg");
    asm(" fclr i");

    /****** STOP CONDITION *****/
    p7_0    =    0;                //Drive SDAMM Line "L"
    ped     =    1;
    soft_wait(WAIT_TIME);        //Waiting for Tsu;DAT
    p7_1    =    1;                //Drive SCLMM Line "H"
    pec     =    1;

    if(p7_1 == 1){
        soft_wait(SETUP_TIME);    //Waiting for stop condition setup time
        reset_mmi2c();
        ped     =    0;            //SDAMM pin: SDAMM Output setting
        pec     =    0;            //SCLMM pin: SCLMM Output setting
    }else{
        sip     =    1;            //"H" edge setting
        sis     =    1;            //SCLMM enable
        scldaic =    0x00;        //SCLSDA interrupt ir bit clear

        if(p7_1 == 1){
            soft_wait(SETUP_TIME); //Waiting for stop condition setup time
            reset_mmi2c();
            ped     =    0;        //SDAMM pin: SDAMM Output setting
            pec     =    0;        //SCLMM pin: SCLMM Output setting
        }else{
            scldaic |=    0x01;    //SCLSDA interrupt enable: SCLMM "H" edge
        }
    }
    asm(" popc flg");
}

/* Software Wait Routine */
void soft_wait(unsigned int time){
    while (time > 0){
        time--;
    }
}

/* Reset MMI2C and Pin Setting */
void reset_mmi2c(void){
    p7_0    =    1;                //SDAMM "H" stop condition
    ihr     =    1;                // MMI2C module reset
    while ( ihr == 1 );           // MMI2C module reset waiting
}

/* SDASCL interrupt Routine */

void MMIIC_STOP_SDASCL(){
    asm(" pushc flg");
    asm(" fclr i");
    soft_wait(SETUP_TIME);        //Waiting for stop condition setup time
    reset_mmi2c();
    ped     =    0;                //SDAMM pin: SDAMM Output setting
    pec     =    0;                //SCLMM pin: SCLMM Output setting
    scldaic =    0x00;            //SCLSDA interrupt disable
    asm(" popc flg");
}

```

Figure 3. Sample Program