

# **TM89P51M**

## **4-Bit Microcontroller**

### **Application Note**

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## **AMENDMENT HISTORY**

<b>Version</b>	<b>Date</b>	<b>Description</b>
V1.0	Jan, 2011	New release

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**PRODUCT NAME**

TM89P51M

**TITLE**

TM89P51M Electrical Characteristics

**APPLICATION NOTE**

The data in this document are for reference only. The electric current consumption test data are tested under without loading condition, and all data are also tested in room temperature (25°C). All the characteristics will be different subject to the process variation, temperature, option, loading and operating voltage etc... IC from different lots will be slightly different due to the drift of the manufacturing processes.

**1. Power Consumption without LCD Loading**

At 3V, 25°C (Without LCD Loading)

TM89P51M (Crystal and Internal Fast 500 KHz 3V)											
Unit	μA	μA	μA	μA	μA	μA	μA	μA	μA	Frequency Tolerance (s/d)	
3V	∨	∨	∨	∨	∨	∨	∨	∨	∨	∨	
LCD	ON	ON	ON	ON	ON	ON	ON	OFF	OFF		
Operating	∨	∨	∨	∨							
Bcf Flag	1	0	1	0	1	1	0	1	0	1	0
Halt						∨	∨	∨	∨	∨	
Stop					∨						
500 KHz			∨	∨							
32768 Hz	∨	∨			∨	∨	∨	∨	∨	∨	
Operating Current	7.48	1.53	59.79	12.14	0.09	4.59	0.94	4.39	0.72	+0.06	-0.34

TM89P51M (Internal Fast Only 250 KHz 3V)							
Unit	μA	μA	μA	μA	μA	μA	μA
3V	∨	∨	∨	∨	∨	∨	∨
LCD	ON	ON	ON	ON	ON	OFF	OFF
Operating	∨	∨					
Bcf Flag	1	0	1	1	0	1	0
Halt				∨	∨	∨	∨
Stop			∨				
Operating Current	47.39	10.98	0.09	34.57	8.44	33.32	7.20

At 1.5V, 25°C (Without LCD Loading)

TM89P51M (Crystal and Internal Fast 500 KHz 1.5V)											
Unit	μA	μA	μA	μA	μA	μA	μA	μA	μA	Frequency Tolerance (s/d)	
1.5V	∨	∨	∨	∨	∨	∨	∨	∨	∨	∨	
LCD	ON	ON	ON	ON	ON	ON	ON	OFF	OFF		
Operating	∨	∨	∨	∨							
Bcf Flag	1	0	1	0	1	1	0	1	0	1	0
Halt						∨	∨	∨	∨	∨	
Stop					∨						
500 KHz			∨	∨							
32768 Hz	∨	∨			∨	∨	∨	∨	∨	∨	
Operating Current	3.31	3.20	25.13	25.02	0.08	2.07	1.97	1.57	1.50	-0.01	-0.20

TM89P51M (Internal Fast Only 250 KHz 1.5V)							
Unit	μA	μA	μA	μA	μA	μA	μA
1.5V	∨	∨	∨	∨	∨	∨	∨
LCD	ON	ON	ON	ON	ON	OFF	OFF
Operating	∨	∨					
Bcf Flag	1	0	1	1	0	1	0
Halt				∨	∨	∨	∨
Stop			∨				
Operating Current	22.70	22.61	0.09	16.66	17.32	14.77	14.76

NOTE 1:

Freq. Tolerance indicates after trimming the capacitance of external capacitor of 32.768 KHz Crystal oscillator, the daily time offset of the real time clock function differs with the actual time.

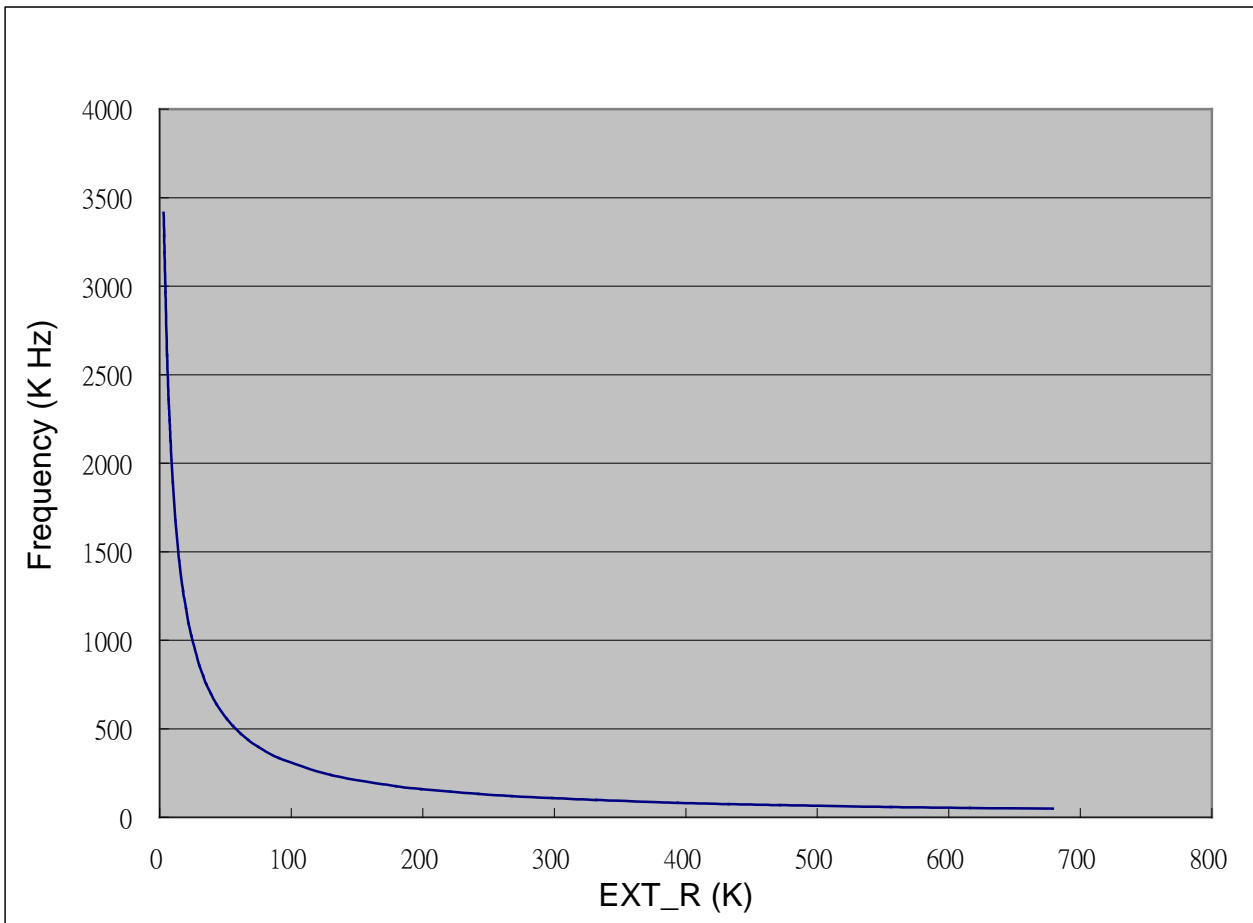
Many factors will affect the driving capability of the Driver of the Crystal circuit, such as the setting of BCF flag in MCU, the manufactures, lot No., type of Crystal oscillator, PCB layout and quality of external capacitor.

NOTE 2:

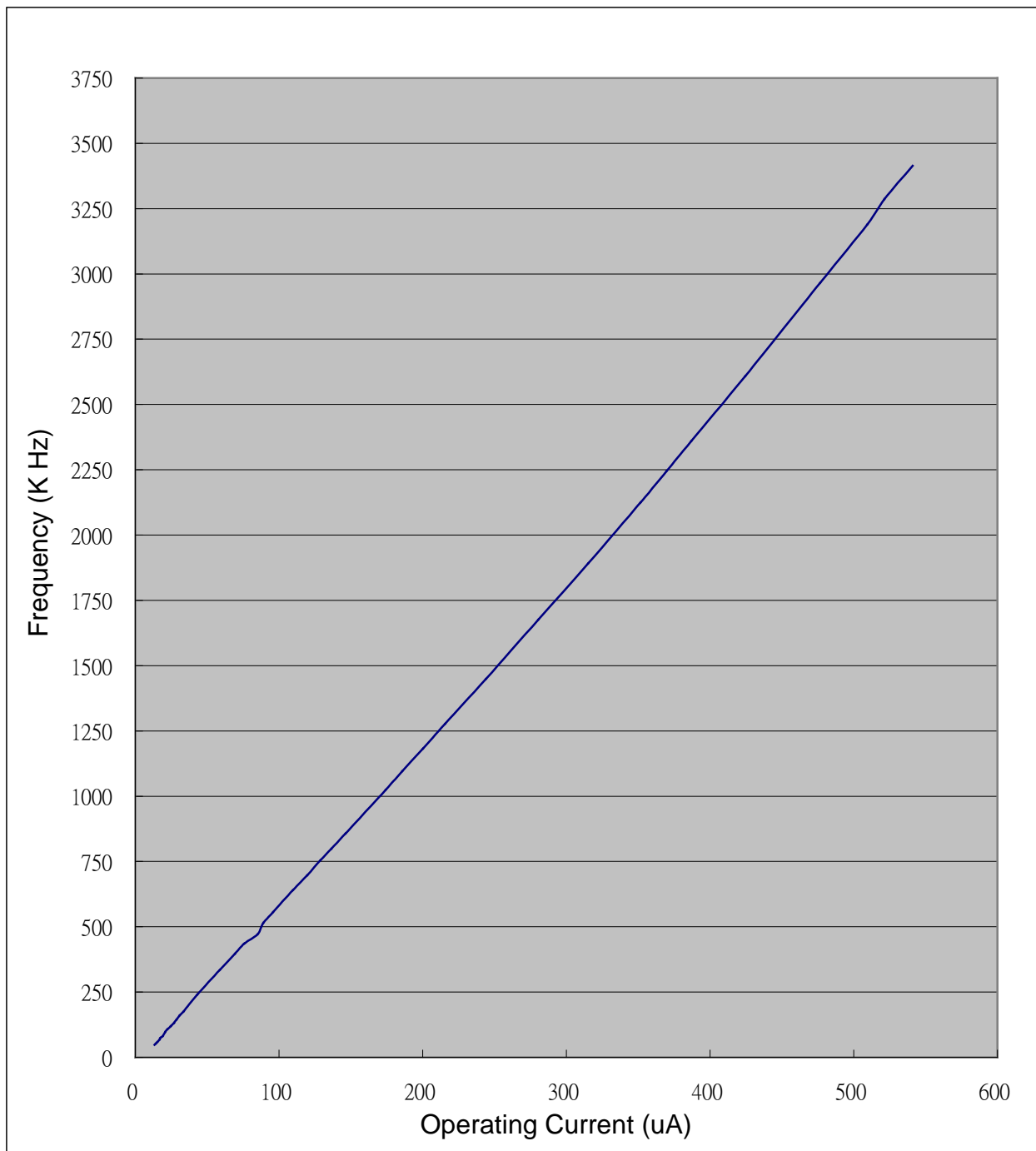
Set BCF flag = 1 before using Internal 500 KHz and 250 KHz to assure that IC can work properly with a higher driving capability.

**2. Ext-R vs. Frequency vs. Operating Current**

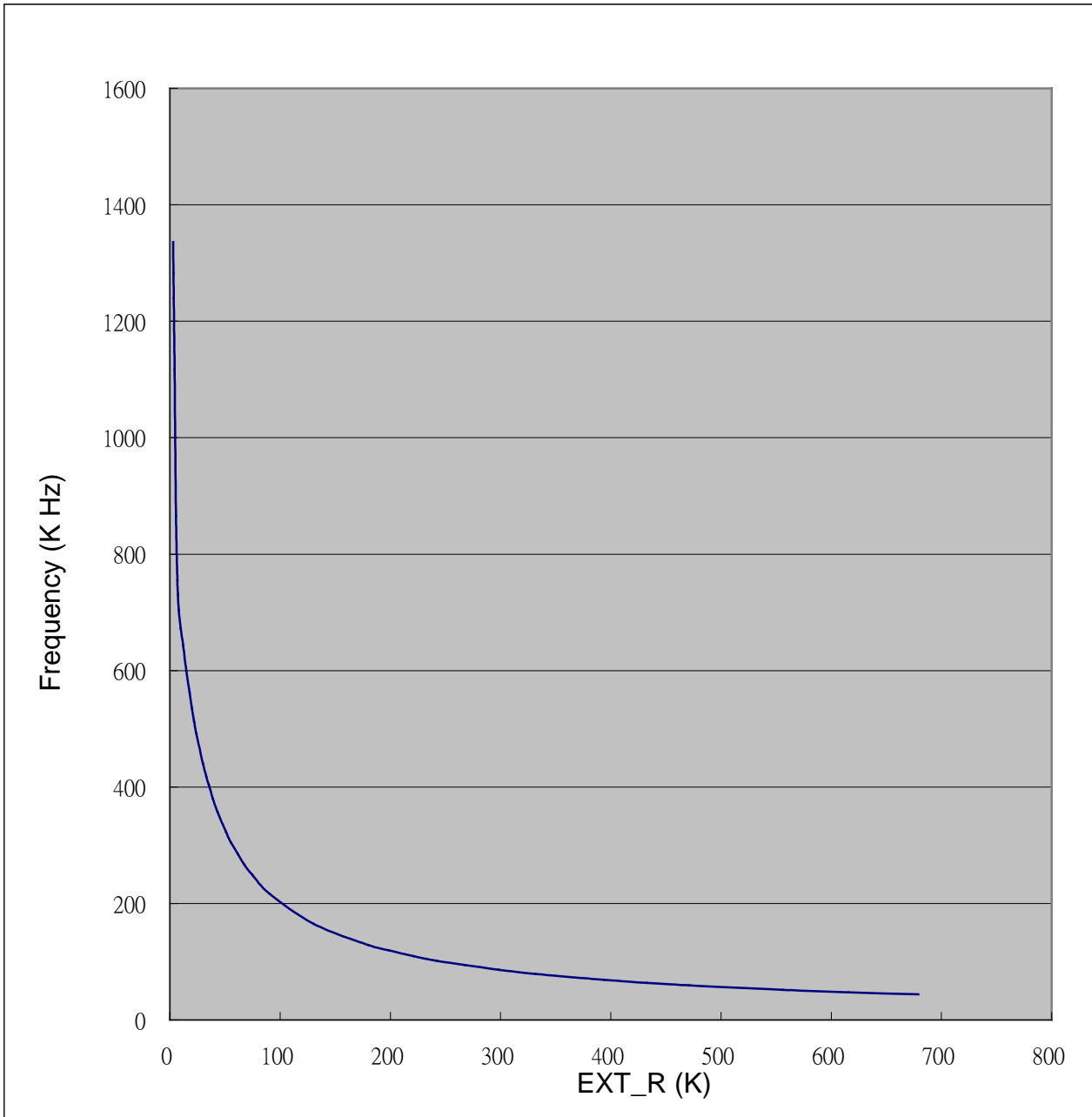
At 3V, 25°C  
Ext-R vs. Frequency



At 3V, 25°C  
Frequency vs. Operation Current



At 1.5V, 25°C  
Ext-R vs. Frequency



At 1.5V, 25°C  
Frequency vs. Operation Current

