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### What is "[Embedded - Microcontrollers](#)"?

"[Embedded - Microcontrollers](#)" refer to small, integrated circuits designed to perform specific tasks within larger systems. These microcontrollers are essentially compact computers on a single chip, containing a processor core, memory, and programmable input/output peripherals. They are called "embedded" because they are embedded within electronic devices to control various functions, rather than serving as standalone computers. Microcontrollers are crucial in modern electronics, providing the intelligence and control needed for a wide range of applications.

### Applications of "[Embedded - Microcontrollers](#)"

#### Details

Product Status	Obsolete
Core Processor	PIC
Core Size	8-Bit
Speed	20MHz
Connectivity	-
Peripherals	Brown-out Detect/Reset, LVD, POR, WDT
Number of I/O	11
Program Memory Size	3.5KB (2K x 14)
Program Memory Type	FLASH
EEPROM Size	-
RAM Size	128 x 8
Voltage - Supply (Vcc/Vdd)	2V ~ 3.6V
Data Converters	-
Oscillator Type	Internal
Operating Temperature	-40°C ~ 125°C (TA)
Mounting Type	Surface Mount
Package / Case	20-SOIC (0.295", 7.50mm Width)
Supplier Device Package	20-SOIC
Purchase URL	<a href="https://www.e-xfl.com/product-detail/microchip-technology/pic16f639-e-so">https://www.e-xfl.com/product-detail/microchip-technology/pic16f639-e-so</a>

2.0 MEMORY ORGANIZATION

2.1 Program Memory Organization

Program memory is organized into two banks. The first bank contains the program memory for the PIC12F635/PIC16F636/639. The second bank contains the program memory for the PIC12F635/PIC16F636/639. The program memory is organized into two banks. The first bank contains the program memory for the PIC12F635/PIC16F636/639. The second bank contains the program memory for the PIC12F635/PIC16F636/639.

2.2 Data Memory Organization

Data memory is organized into two banks. The first bank contains the data memory for the PIC12F635/PIC16F636/639. The second bank contains the data memory for the PIC12F635/PIC16F636/639. The data memory is organized into two banks. The first bank contains the data memory for the PIC12F635/PIC16F636/639. The second bank contains the data memory for the PIC12F635/PIC16F636/639.

Bank	Address	Memory Organization
0	0	Program Memory Bank 0
0	1	Program Memory Bank 1
1	0	Program Memory Bank 0
1	1	Program Memory Bank 1

FIGURE 2-1: PROGRAM MEMORY MAP AND STACK OF THE PIC12F635

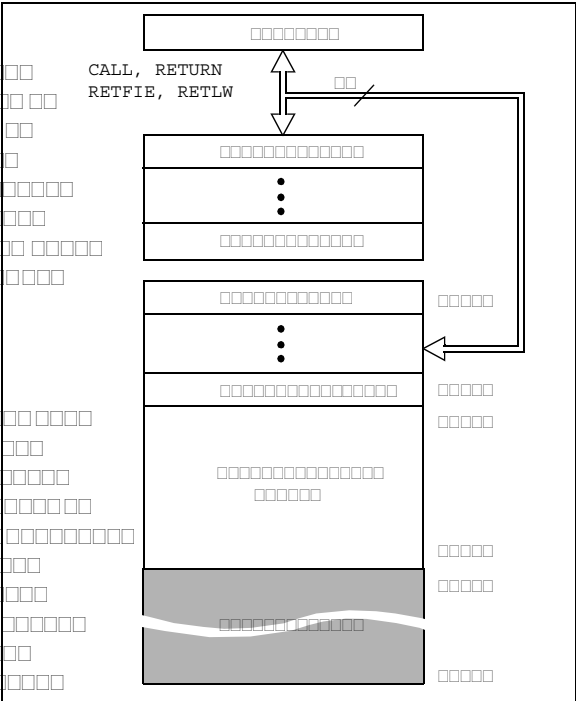
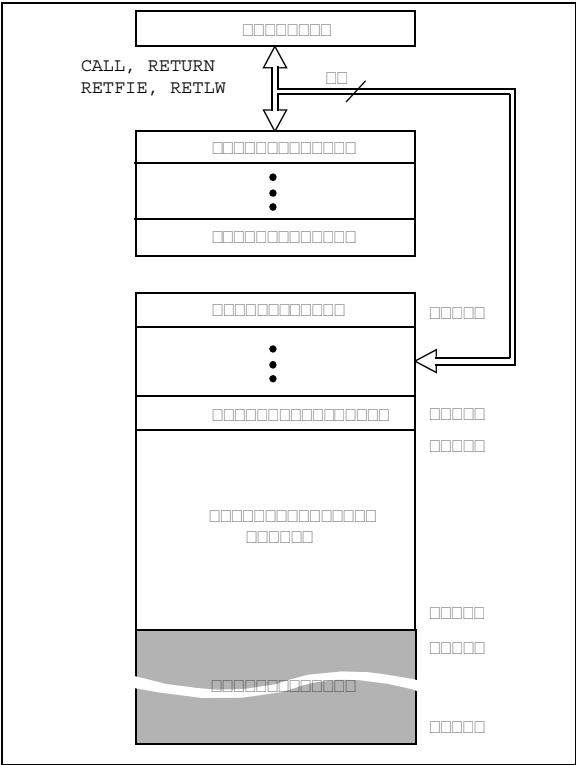


FIGURE 2-2: PROGRAM MEMORY MAP AND STACK OF THE PIC16F636/639





# PIC12F635/PIC16F636/639

TABLE 2-3: PIC16F636/639 SPECIAL FUNCTION REGISTERS SUMMARY BANK 0

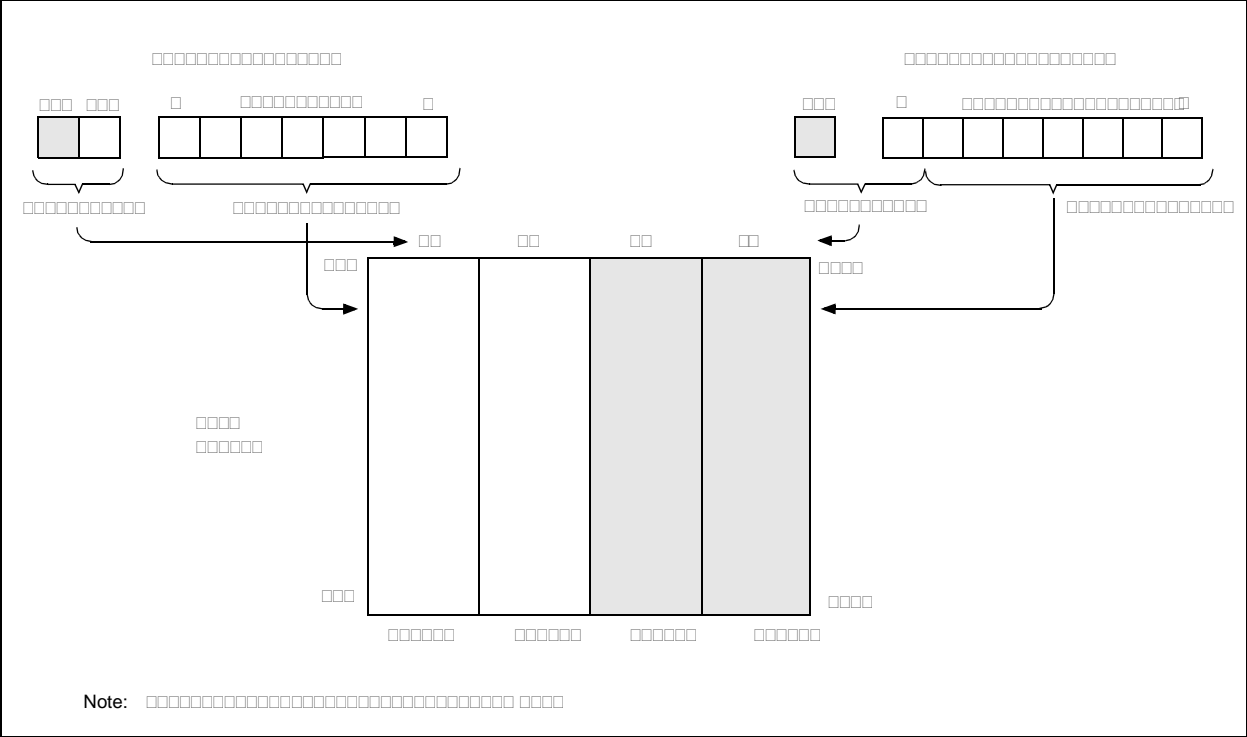
[illegible]

Legend: 0 u x q1

Note 1: 

2:

FIGURE 2-6: DIRECT/INDIRECT ADDRESSING PIC12F635/PIC16F636/639



# PIC12F635/PIC16F636/639

## 6.0 TIMER1 MODULE WITH GATE CONTROL

Timer1 module is a 16-bit timer/counter with a gate control. It is used for timing and counting applications. The module includes a 16-bit timer/counter register (TMR1H:TMR1L), a prescaler, and a gate control input (TMR1G). The timer can be configured to operate in different modes, including free-running, single-shot, and interrupt-on-compare. The gate control input allows the timer to be enabled or disabled during operation.

### 6.1 Timer1 Operation

Timer1 operates by counting the number of clock cycles. The clock source is selected by the T1OSCEN bit. The timer can be configured to operate in different modes, including free-running, single-shot, and interrupt-on-compare. The gate control input allows the timer to be enabled or disabled during operation.

### 6.2 Clock Source Selection

The clock source is selected by the T1OSCEN bit. The timer can be configured to operate in different modes, including free-running, single-shot, and interrupt-on-compare. The gate control input allows the timer to be enabled or disabled during operation.

Clock Source	T1OSCEN	FOSC Mode	T1CS
Internal	x	xxx	x
External	x		1
External	1	External	



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FIGURE 12-4: TIME-OUT SEQUENCE ON POWER-UP (DELAYED MCLR)

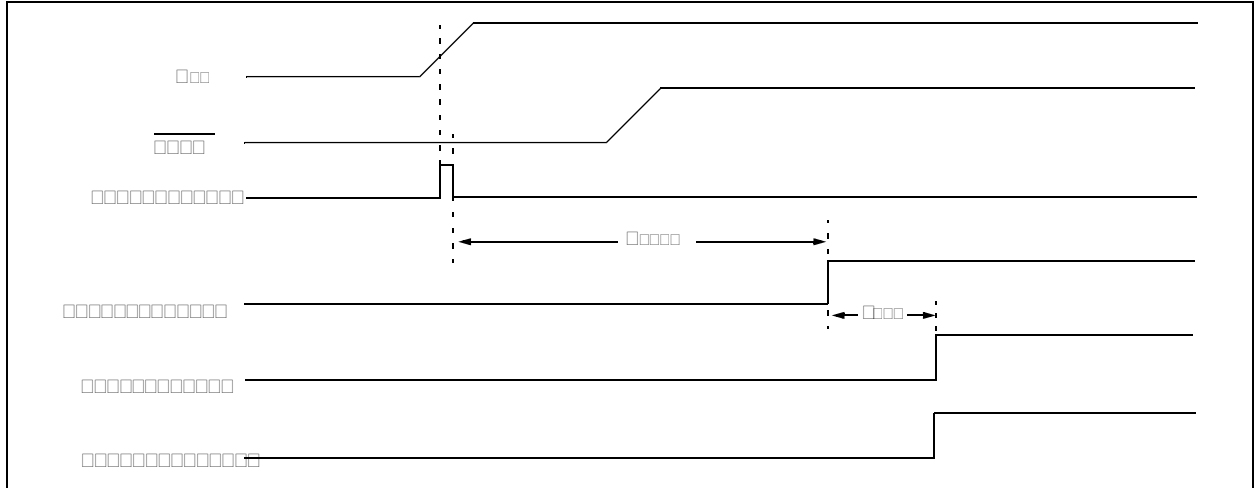
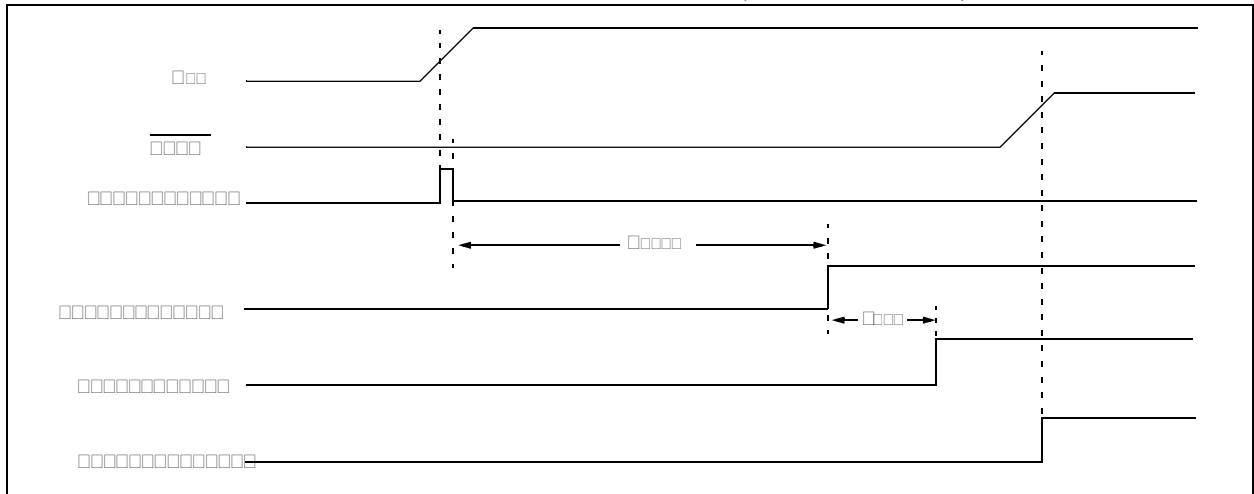
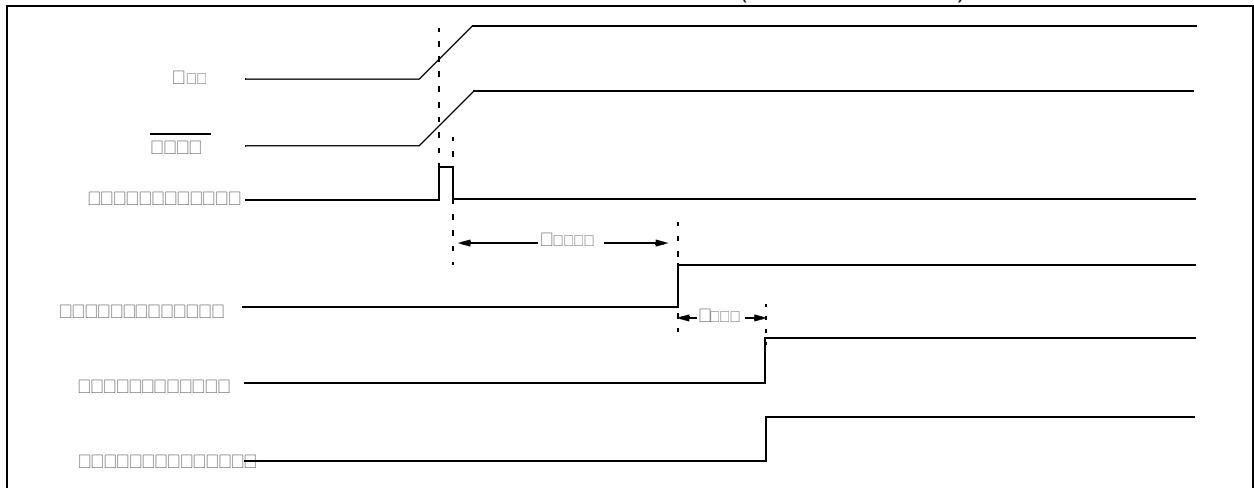


FIGURE 12-5: TIME-OUT SEQUENCE ON POWER-UP (DELAYED MCLR)

FIGURE 12-6: TIME-OUT SEQUENCE ON POWER-UP (MCLR WITH V<sub>DD</sub>)



# PIC12F635/PIC16F636/639

### TABLE 12-4: INITIALIZATION CONDITION FOR REGISTERS

Register	Address	Power-on Reset Wake-up Reset	MCLR Reset WDT Reset Brown-out Reset <sup>(1)</sup> Wake-up Reset	Wake-up from Sleep through Interrupt Wake-up from Sleep through WDT Time-out
0	0	xxxx xxxx	uuuu uuuu	uuuu uuuu
0000	00000000	xxxx xxxx	xxxx xxxx	uuuu uuuu
0000	0000	xxxx xxxx	uuuu uuuu	uuuu uuuu
0000	00000000	0000 0000	0000 0000	000000 <sup>(3)</sup>
00000000	00000000	0001 1xxx	000q quuu <sup>(4)</sup>	uuuq quuu <sup>(4)</sup>
0000	00000000	xxxx xxxx	uuuu uuuu	uuuu uuuu
000000	0000	--xx xx00	--00 0000	--uu uu00
000000 <sup>(6)</sup>	0000	--xx xx00	--00 0000	--uu uu00
00000000	00000000	---0 0000	---0 0000	---u uuuu
00000000	00000000	0000 000x	0000 000x	uuuu uuuu <sup>(2)</sup>
00000	0000	0000 00-0	0000 00-0	uuuu uu-u <sup>(2)</sup>
000000	0000	xxxx xxxx	uuuu uuuu	uuuu uuuu
000000	0000	xxxx xxxx	uuuu uuuu	uuuu uuuu
000000	0000	0000 0000	uuuu uuuu	-uuu uuuu
00000000	0000	---0 1000	---0 1000	---u uuuu
00000000	0000	0000 0000	0000 0000	uuuu uuuu
00000000	0000	---- --10	---- --10	---- --uu
000000000000	0000	1111 1111	1111 1111	uuuu uuuu
000000	0000	--11 1111	--11 1111	--uu 1uuu
000000 <sup>(6)</sup>	0000	--11 1111	--11 1111	--uu 1uuu
00000	0000	0000 00-0	0000 00-0	uuuu uu-u
00000	0000	--01 q-qq	--0u u-uu <sup>(1,5)</sup>	--0u u-uu
00000000	0000	-110 q000	-110 q000	-uuu uuuu
0000000000	0000	---0 0000	---u uuuu	---u uuuu
000000	0000	--11 -111	--11 -111	uuuu uuuu
00000	0000	--00 0000	--00 0000	--uu uuuu
0000	0000	--11 -111	--11 -111	uuuu uuuu
000000	0000	0-0- 0000	0-0- 0000	u-u- uuuu
000000	0000	0000 0000	0000 0000	uuuu uuuu
000000	0000	0000 0000	0000 0000	uuuu uuuu
00000000	0000	---- x000	---- q000	---- uuuu
00000000	0000	---- ----	---- ----	---- ----
00000000	0000	xxxx xxxx	uuuu uuuu	uuuu uuuu
00000000	0000	-000 ----	-000 ----	-uuu ----
00000000	0000	--00 -000	--00 -000	--uu -uuu
000000	0000	00-- --00	00-- --00	uu-- --uu

[illegible][illegible]

**2:**

3:

4:

5:

6:

## 14.7 MPLAB ICE 2000 High-Performance In-Circuit Emulator

MPLAB ICE 2000 is a high-performance in-circuit emulator that allows you to debug your PIC microcontroller-based designs. It provides a wide range of features, including real-time emulation, breakpoints, and watchpoints, to help you identify and resolve issues in your code. The emulator is designed to be easy to use, with a clear and intuitive interface that makes it simple to set up and run your debug sessions.

MPLAB ICE 2000 is compatible with a wide range of PIC microcontrollers, including the PIC12F635, PIC16F636, and PIC16F639. It is also compatible with the MPLAB IDE, which provides a convenient way to integrate the emulator into your development workflow. With MPLAB ICE 2000, you can debug your code in real-time, allowing you to see the results of your code changes as you make them. This can help you identify and resolve issues more quickly, reducing the time and cost of your development process.

MPLAB ICE 2000 is a powerful tool that can help you debug your PIC microcontroller-based designs. It provides a wide range of features, including real-time emulation, breakpoints, and watchpoints, to help you identify and resolve issues in your code. The emulator is designed to be easy to use, with a clear and intuitive interface that makes it simple to set up and run your debug sessions. With MPLAB ICE 2000, you can debug your code in real-time, allowing you to see the results of your code changes as you make them. This can help you identify and resolve issues more quickly, reducing the time and cost of your development process.

## 14.8 MPLAB REAL ICE In-Circuit Emulator System

MPLAB REAL ICE is a high-performance in-circuit emulator that allows you to debug your PIC microcontroller-based designs. It provides a wide range of features, including real-time emulation, breakpoints, and watchpoints, to help you identify and resolve issues in your code. The emulator is designed to be easy to use, with a clear and intuitive interface that makes it simple to set up and run your debug sessions.

MPLAB REAL ICE is compatible with a wide range of PIC microcontrollers, including the PIC12F635, PIC16F636, and PIC16F639. It is also compatible with the MPLAB IDE, which provides a convenient way to integrate the emulator into your development workflow. With MPLAB REAL ICE, you can debug your code in real-time, allowing you to see the results of your code changes as you make them. This can help you identify and resolve issues more quickly, reducing the time and cost of your development process.

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## 14.9 MPLAB ICD 2 In-Circuit Debugger

MPLAB ICD 2 is a high-performance in-circuit debugger that allows you to debug your PIC microcontroller-based designs. It provides a wide range of features, including real-time emulation, breakpoints, and watchpoints, to help you identify and resolve issues in your code. The debugger is designed to be easy to use, with a clear and intuitive interface that makes it simple to set up and run your debug sessions.

MPLAB ICD 2 is compatible with a wide range of PIC microcontrollers, including the PIC12F635, PIC16F636, and PIC16F639. It is also compatible with the MPLAB IDE, which provides a convenient way to integrate the debugger into your development workflow. With MPLAB ICD 2, you can debug your code in real-time, allowing you to see the results of your code changes as you make them. This can help you identify and resolve issues more quickly, reducing the time and cost of your development process.

## 14.10 MPLAB PM3 Device Programmer

MPLAB PM3 is a high-performance device programmer that allows you to program your PIC microcontroller-based designs. It provides a wide range of features, including real-time programming, breakpoints, and watchpoints, to help you identify and resolve issues in your code. The programmer is designed to be easy to use, with a clear and intuitive interface that makes it simple to set up and run your programming sessions.

MPLAB PM3 is compatible with a wide range of PIC microcontrollers, including the PIC12F635, PIC16F636, and PIC16F639. It is also compatible with the MPLAB IDE, which provides a convenient way to integrate the programmer into your development workflow. With MPLAB PM3, you can program your code in real-time, allowing you to see the results of your code changes as you make them. This can help you identify and resolve issues more quickly, reducing the time and cost of your development process.

# PIC12F635/PIC16F636/639

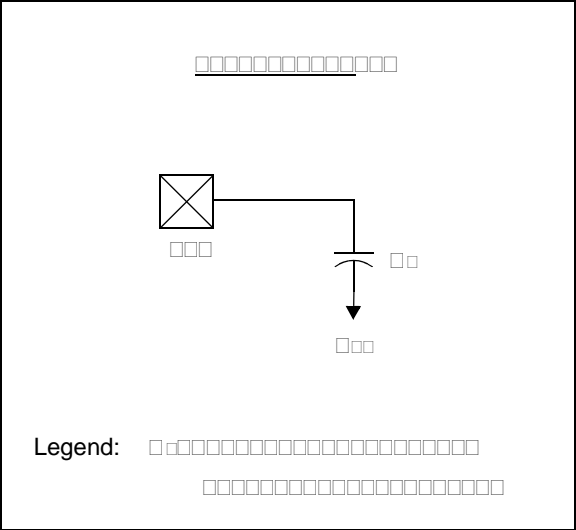
## 15.9 Timing Parameter Symbolology

Timing parameters are defined by the following symbols:

Timing parameter symbol  
Timing parameter symbol

<b>T</b> Timing parameter symbol	Timing parameter symbol
Timing parameter symbol	
<b>pp</b>	Timing parameter symbol
Timing parameter symbol	
Timing parameter symbol	
Timing parameter symbol	
Timing parameter symbol	
Timing parameter symbol	
Timing parameter symbol	
Timing parameter symbol	
Timing parameter symbol	
Timing parameter symbol	
Timing parameter symbol	
<b>S</b>	Timing parameter symbol
Timing parameter symbol	
Timing parameter symbol	
Timing parameter symbol	
Timing parameter symbol	

FIGURE 15-4: LOAD CONDITIONS



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Standard Operating Conditions (unless otherwise stated)

[illegible]



# PIC12F635/PIC16F636/639

TABLE 15-9: PIC16F639 PLVD CHARACTERISTICS :

DC CHARACTERISTICS			Standard Operating Conditions (unless otherwise stated)				
Sym.	Characteristic		Min	Typ†	Max	Units	Conditions
V <sub>DD</sub>	V <sub>DD</sub> = 0V V <sub>DD</sub> = 5V	V <sub>DD</sub> = 0V	0V	0V	0V	V	
		V <sub>DD</sub> = 5V	5V	5V	5V	V	
		V <sub>DD</sub> = 0V	0V	0V	0V	V	
		V <sub>DD</sub> = 5V	5V	5V	5V	V	
		V <sub>DD</sub> = 0V	0V	0V	0V	V	
		V <sub>DD</sub> = 5V	5V	5V	5V	V	
		V <sub>DD</sub> = 0V	0V	0V	0V	V	
V <sub>DD</sub>	V <sub>DD</sub> = 0V		0V	0V	0V	μV	V <sub>DD</sub> = 0V V <sub>DD</sub> = 5V

† Typical values are measured at V<sub>DD</sub> = 5V and T<sub>amb</sub> = 25°C.

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† Typical values are measured at V<sub>DD</sub> = 5V and T<sub>amb</sub> = 25°C.



FIGURE 16-4: MAXIMUM I<sub>DD</sub> vs. F<sub>OSC</sub> OVER V<sub>DD</sub> (HS MODE)

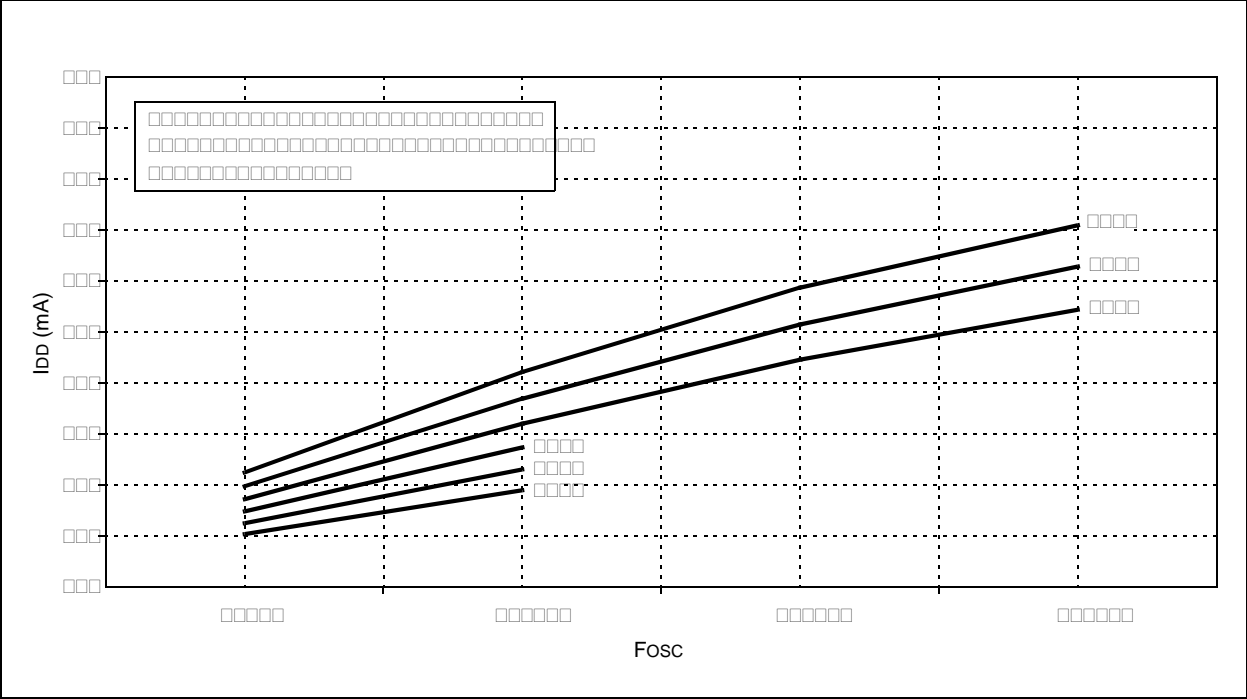


FIGURE 16-5: TYPICAL I<sub>DD</sub> vs. V<sub>DD</sub> OVER F<sub>OSC</sub> (XT MODE)

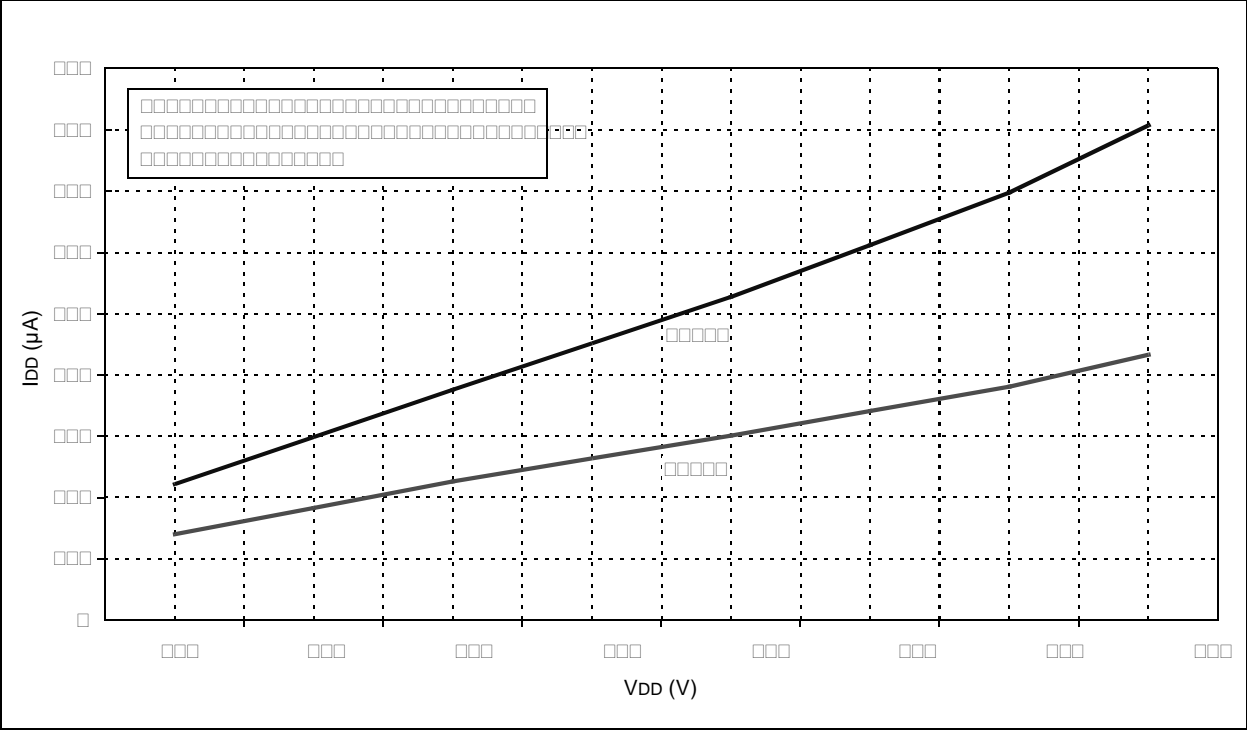




FIGURE 16-12: MAXIMUM I<sub>DD</sub> vs. F<sub>OSC</sub> OVER V<sub>DD</sub> (HFINTOSC MODE)

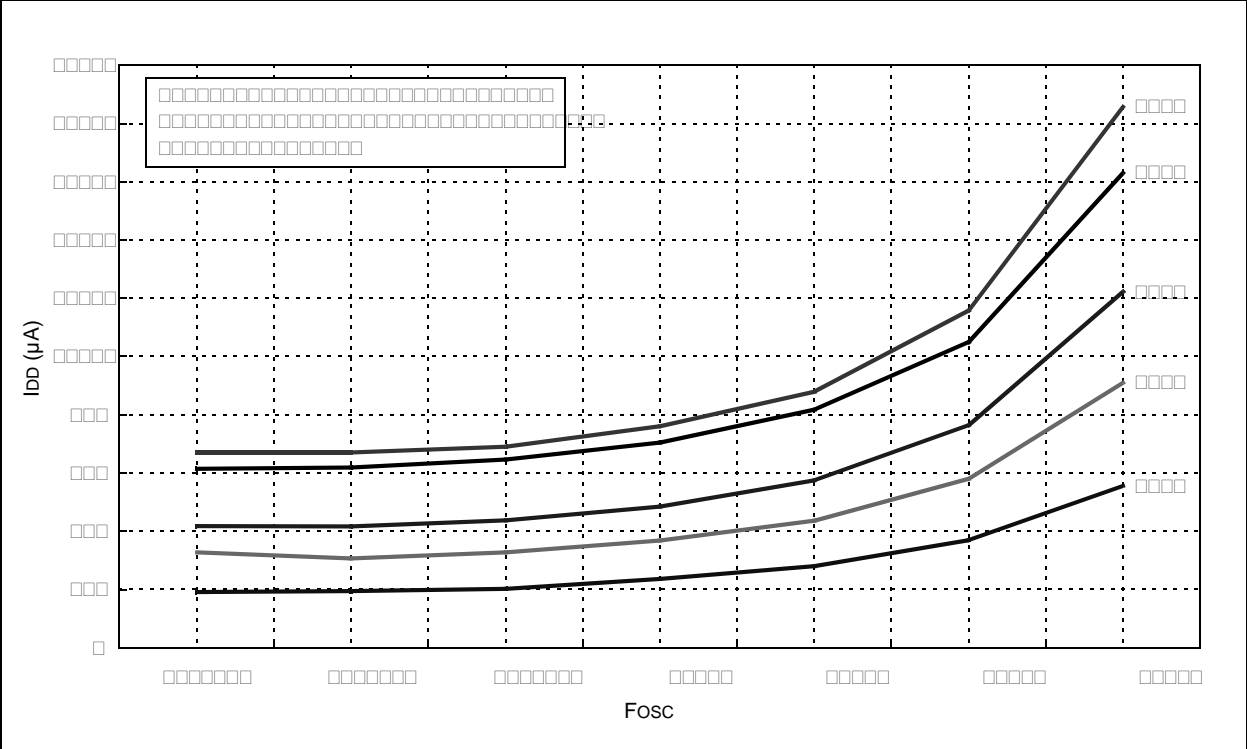
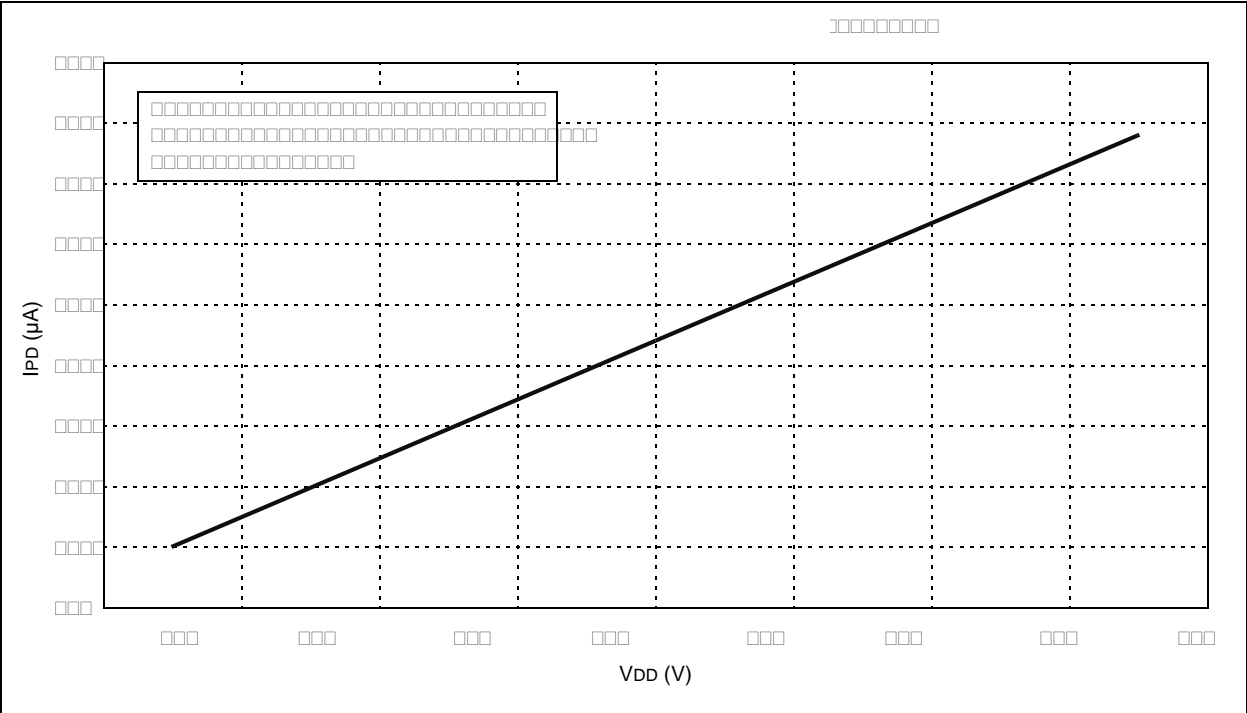


FIGURE 16-13: TYPICAL I<sub>PD</sub> vs. V<sub>DD</sub> (SLEEP MODE, ALL PERIPHERALS DISABLED)



# PIC12F635/PIC16F636/639

FIGURE 16-18: MAXIMUM WDT IPD vs. VDD OVER TEMPERATURE

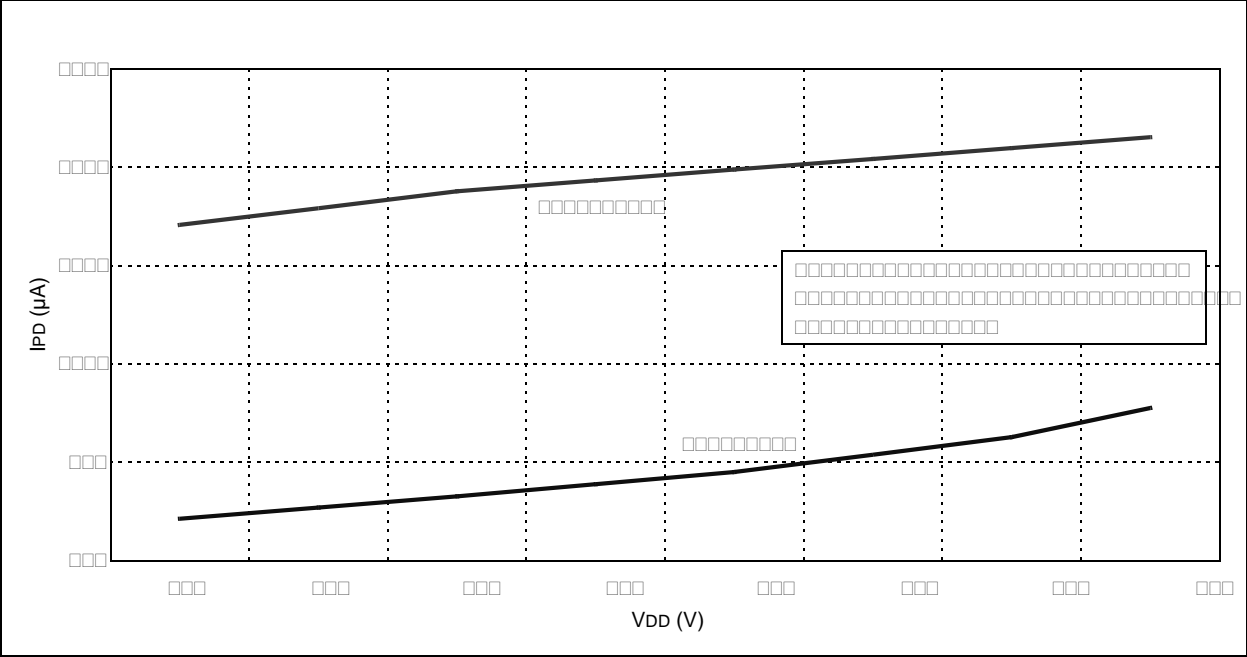
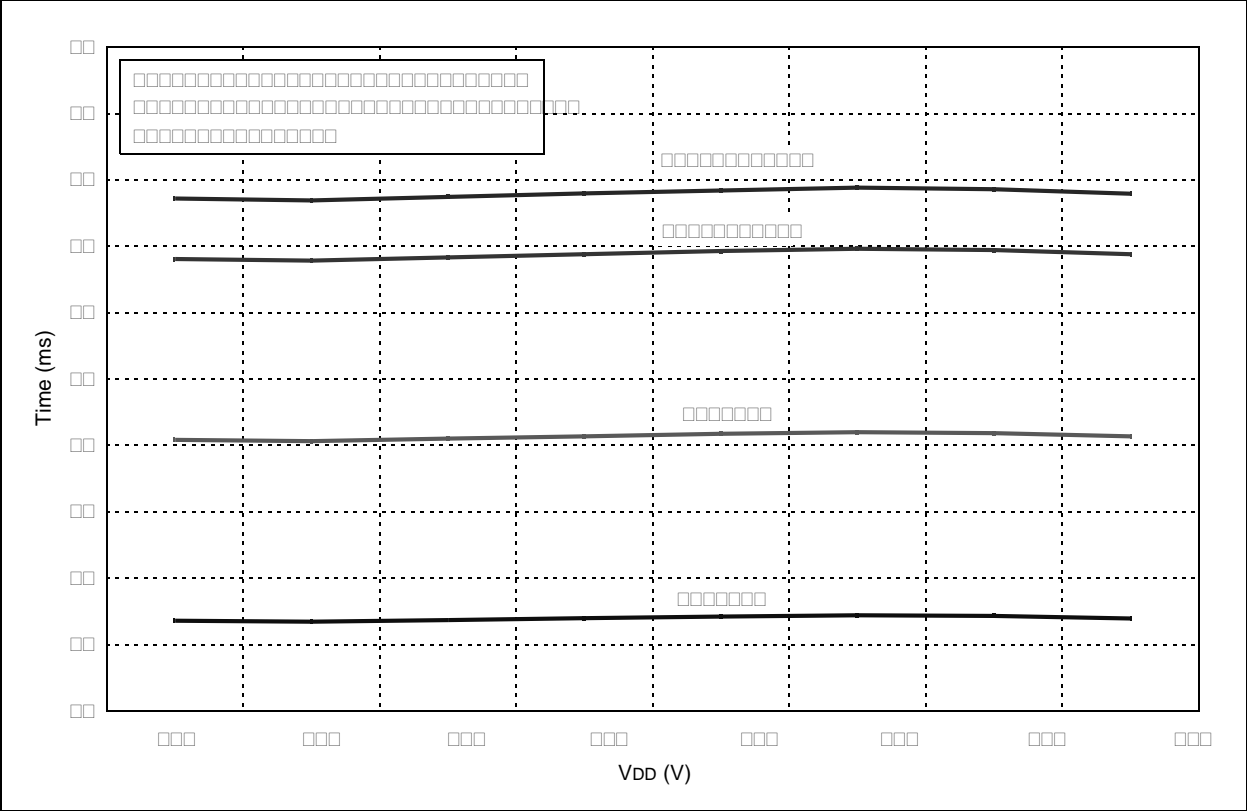


FIGURE 16-19: WDT PERIOD vs. VDD OVER TEMPERATURE





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# PIC12F635/PIC16F636/639

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