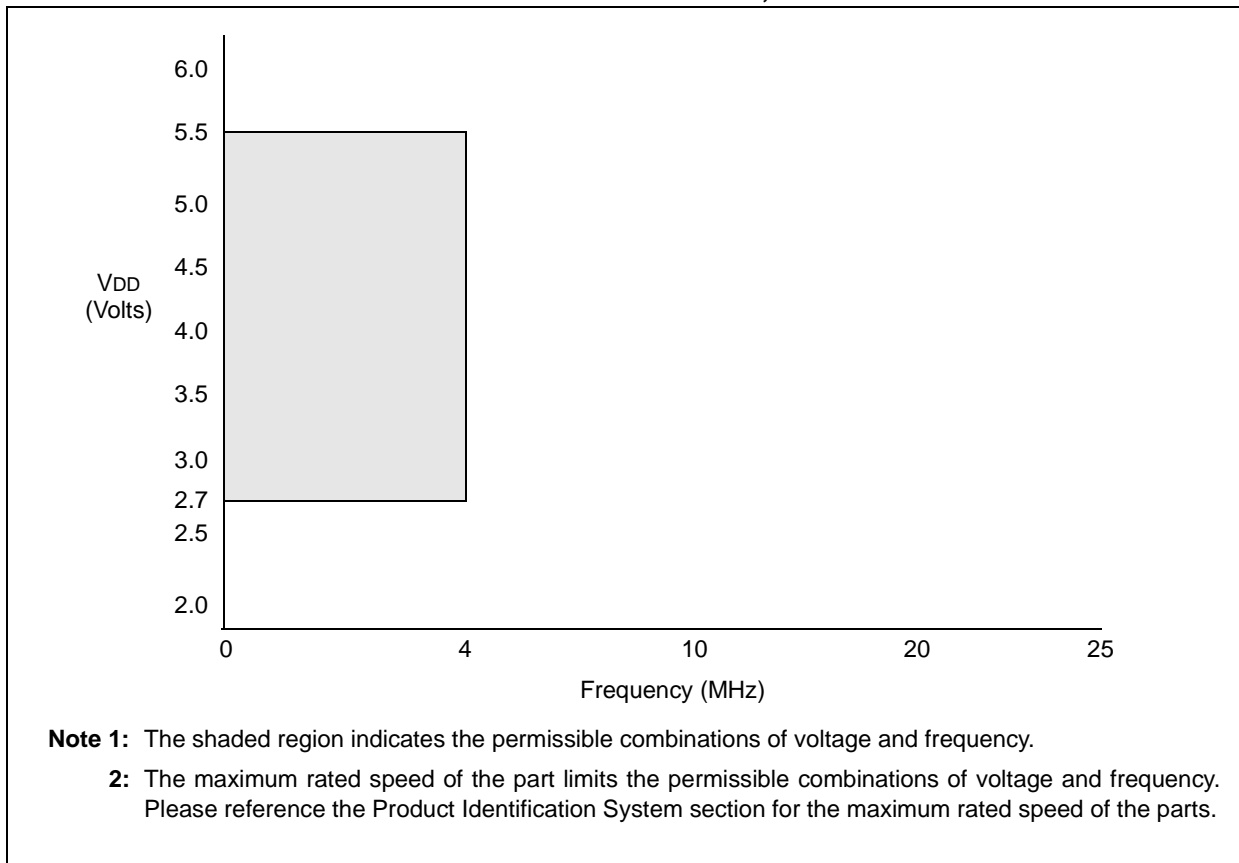# PIC16C505

PIC16C505 Rev. A Silicon Errata Sheet

The PIC16C505 (Rev. A) parts you have received conform functionally to the Device Data Sheet (DS40192C), except for the anomalies described below.

FIGURE 1:   PIC16LC505 VOLTAGE-FREQUENCY GRAPH, -40°C ≤ TA ≤ 0°C

Note 1: The shaded region indicates the permissible combinations of voltage and frequency.

2: The maximum rated speed of the part limits the permissible combinations of voltage and frequency. Please reference the Product Identification System section for the maximum rated speed of the parts.

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FIGURE 2: **PIC16LC505 VOLTAGE-FREQUENCY GRAPH, 0°C ≤ TA ≤ +70°C**

Note 1: The shaded region indicates the permissible combinations of voltage and frequency.

2: The maximum rated speed of the part limits the permissible combinations of voltage and frequency. Please reference the Product Identification System section for the maximum rated speed of the parts.
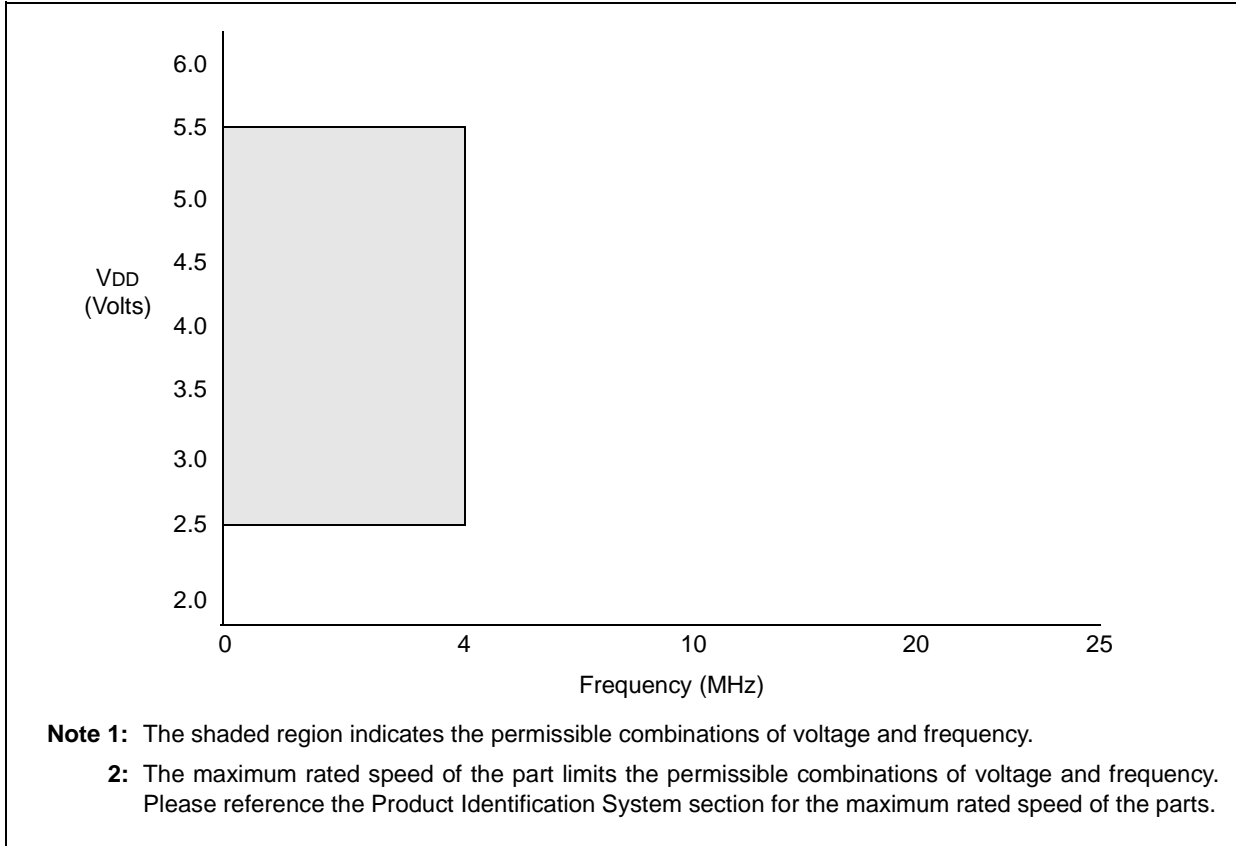
FIGURE 3: **PIC16LC505 VOLTAGE-FREQUENCY GRAPH, +70°C ≤ TA ≤ +125°C**

Note 1: The shaded region indicates the permissible combinations of voltage and frequency.

2: The maximum rated speed of the part limits the permissible combinations of voltage and frequency. Please reference the Product Identification System section for the maximum rated speed of the parts.
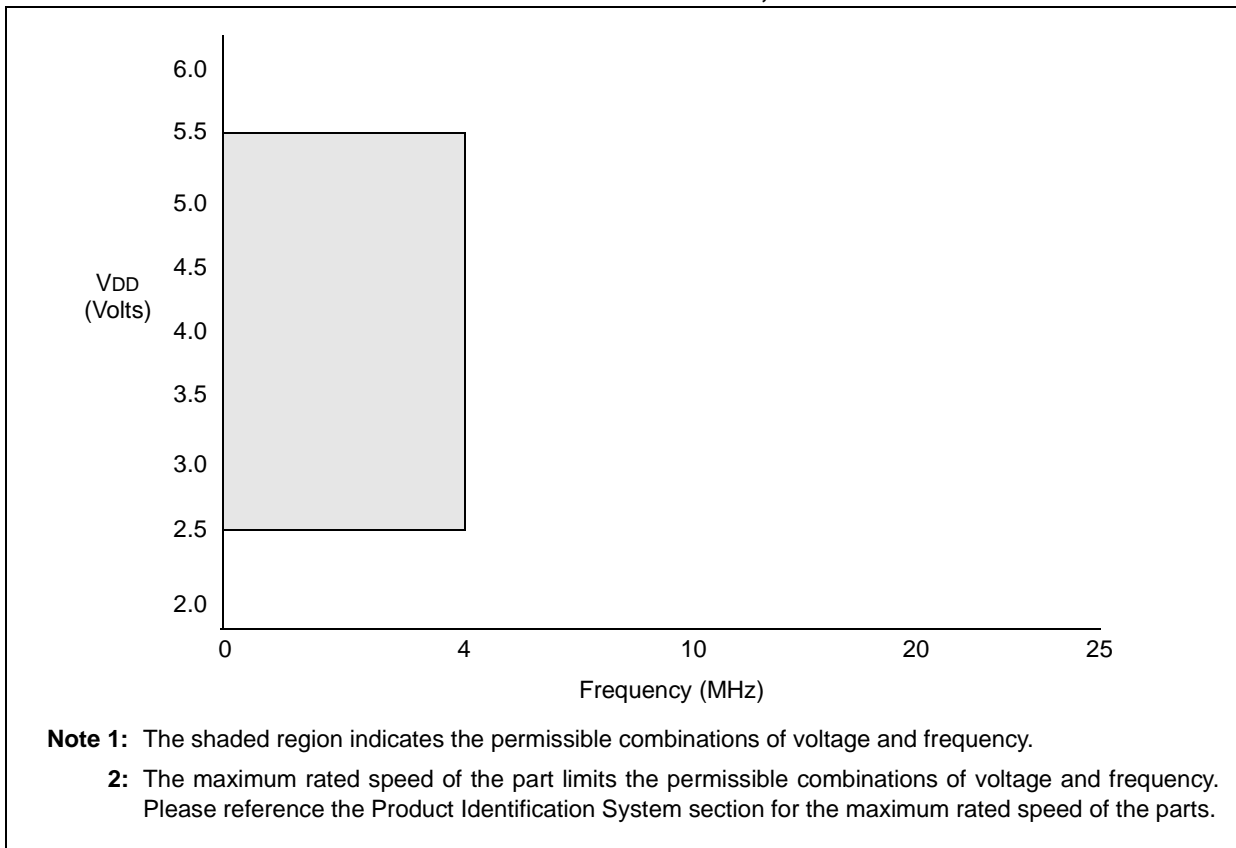
Clarifications/Corrections to the Data Sheet:

In the Device Data Sheet (DS40192C), the following clarifications and corrections should be noted.

Section 4: Corrections to the Special Function Register (SFR) Summary are shown in Table 4-1.

Section 10: Corrections for the DC Characteristics, Sections 10.1, 10.2 and 10.3 are shown.

Corrections for the PORTB pull-up resistor ranges are shown in Table 10-1.

For the section titled "Reset", additional information is provided on OSC1/CLKIN and OSC2/CLKOUT pin states during a MCLR.

TABLE 4-1: SPECIAL FUNCTION REGISTER (SFR) SUMMARY

Address	Name	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0	Value on Power-On Reset	Value on All Other Resets[2]
04h	FSR	Indirect data memory address pointer								`100x xxxx`	`10uu uuuu`

Legend: Shaded cells not used by Port Registers, read as '0', — = unimplemented, read as '0', x = unknown, u = unchanged, q = depends on condition.

Note 1: If RESET was due to wake-up on pin change, then bit 7 = 1. All other RESETS will cause bit 7 = 0.

2: Other (non-power-up) RESETS include external RESET through MCLR, Watchdog Timer and wake-up on pin change RESET.

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10.1   DC CHARACTERISTICS: PIC16C505-04 (Commercial, Industrial, Extended)
PIC16C505-20(Commercial, Industrial, Extended)

DC Characteristics Power Supply Pins			Standard Operating Conditions (unless otherwise specified)				
			Operating Temperature 0°C ≤ T_A ≤ +70°C (commercial)				
			−40°C ≤ T_A ≤ +85°C (industrial)				
			−40°C ≤ T_A ≤ +125°C (extended)				

Parm. No.	Characteristic	Sym	Min	Typ[1]	Max	Units	Conditions
D010	Supply Current[3]	I_{DD}	—	0.8	1.4	mA	F_{OSC} = 4MHz, V_{DD} = 5.5V, WDT disabled, XT mode (Note 4)
			—	0.6	1.0	mA	F_{OSC} = 4MHz, V_{DD} = 3.0V, WDT disabled, XT mode (Note 4)
			—	3	7	mA	F_{OSC} = 10MHz, V_{DD} = 3.0V, WDT disabled, HS mode (Note 6)
			—	4	12	mA	F_{OSC} = 20MHz, V_{DD} = 4.5V, WDT disabled, HS mode
			—	4.5	16	mA	F_{OSC} = 20MHz, V_{DD} = 5.5V, WDT disabled, HS mode
			—	19	27	μA	F_{OSC} = 32kHz, V_{DD} = 3.0V, WDT disabled, LP mode (Note 6)
D020	Power-Down Current [5]	I_{PD}	—	0.25	4	μA	V_{DD} = 3.0V (Note 6)
			—	0.4	5.5	μA	V_{DD} = 4.5V (Note 6)
			—	3	8	μA	V_{DD} = 5.5V, Industrial
			—	5	14	μA	V_{DD} = 5.5V, Extended Temp.

Note 1: Data in the Typical ("Typ") column is based on characterization results at 25°C. This data is for design guidance only and is not tested.
   2: This is the limit to which V_{DD} can be lowered in SLEEP mode without losing RAM data.
   3: The supply current is mainly a function of the operating voltage and frequency. Other factors such as bus loading, oscillator type, bus rate, internal code execution pattern and temperature also have an impact on the current consumption.
   a) The test conditions for all I_{DD} measurements in active operation mode are:
   OSC1 = external square wave, from rail-to-rail; all I/O pins tristated, pulled to V_{SS}, T0CKI = V_{DD}, $\overline{MCLR}$ = V_{DD}; WDT enabled/disabled as specified.
   b) For standby current measurements, the conditions are the same, except that the device is in SLEEP mode.
   4: Does not include current through Rext. The current through the resistor can be estimated by the formula:
   I_R = V_{DD}/2Rext (mA) with Rext in kOhm.
   5: The power down current in SLEEP mode does not depend on the oscillator type. Power down current is measured with the part in SLEEP mode, with all I/O pins in hi-impedance state and tied to V_{DD} or V_{SS}.
   6: Commercial temperature range only.

10.2 DC CHARACTERISTICS: PIC16LC505-04 (Commercial, Industrial)

	DC Characteristics Power Supply Pins	Standard Operating Conditions (unless otherwise specified)					
		Operating Temperature $0°C \leq T_A \leq +70°C$ (commercial) $-40°C \leq T_A \leq +85°C$ (industrial)					
Parm. No.	Characteristic	Sym	Min	Typ[1]	Max	Units	Conditions
D010	Supply Current[3]	I_{DD}	—	0.8	1.4	mA	F_{OSC} = 4MHz, V_{DD} = 5.5V, WDT disabled, XT mode (Note 4)
			—	0.4	0.8	mA	F_{OSC} = 4MHz, V_{DD} = 2.5V, WDT disabled, XT mode (Note 4)
			—	15	23	μA	F_{OSC} = 32kHz, V_{DD} = 2.5V, WDT disabled, LP mode (Note 6)
D020	Power-Down Current [5]	I_{PD}	—	0.25	3	μA	V_{DD} = 2.5V (Note 6)
			—	0.25	4	μA	V_{DD} = 3.0V (Note 6)
			—	3	8	μA	V_{DD} = 5.5V Industrial

Note 1: Data in the Typical ("Typ") column is based on characterization results at 25°C. This data is for design guidance only and is not tested.

2: This is the limit to which V_{DD} can be lowered in SLEEP mode without losing RAM data.

3: The supply current is mainly a function of the operating voltage and frequency. Other factors such as bus loading, oscillator type, bus rate, internal code execution pattern and temperature also have an impact on the current consumption.

    a) The test conditions for all I_{DD} measurements in active operation mode are:

      OSC1 = external square wave, from rail-to-rail; all I/O pins tristated, pulled to V_{SS}, T0CKI = V_{DD}, $\overline{MCLR}$ = V_{DD}; WDT enabled/disabled as specified.

    b) For standby current measurements, the conditions are the same, except that the device is in SLEEP mode.

4: Does not include current through Rext. The current through the resistor can be estimated by the formula: $I_R = V_{DD}/2R_{ext}$ (mA) with Rext in kOhm.

5: The power down current in SLEEP mode does not depend on the oscillator type. Power down current is measured with the part in SLEEP mode, with all I/O pins in hi-impedance state and tied to V_{DD} or V_{SS}.

6: Commercial temperature range only.

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10.3   DC CHARACTERISTICS: PIC16C505-04 (Commercial, Industrial, Extended)
PIC16C505-20(Commercial, Industrial, Extended)
PIC16LC505-04 (Commercial, Industrial))

DC CHARACTERISTICS			Standard Operating Conditions (unless otherwise specified) Operating temperature 0°C ≤ TA ≤ +70°C (commercial) −40°C ≤ TA ≤ +85°C (industrial) −40°C ≤ TA ≤ +125°C (extended)				
Param No.	Characteristic	Sym	Min	Typ †	Max	Units	Conditions
D040 D040A	**Input High Voltage** I/O ports with TTL buffer	VIH	2.0 0.25VDD+ 0.8V	- - -	VDD VDD	V V	4.5 ≤ VDD ≤ 5.5V Otherwise
D061 D061A D070	**Input Leakage Current** (Notes 2, 3) RB3/MCLR (Note 5) RB3/MCLR (Note 6) RB weak pull-up current (Note 4)	IIL IPUR	8 - 179	130 - 250	250 +5 333	µA µA µA	Vss ≤ VPIN ≤ VDD Vss ≤ VPIN ≤ VDD VDD = 5V, VPIN = VSS

†   Data in "Typ" column is at 5V, 25°C unless otherwise stated. These parameters are for design guidance only and are not tested.

Note 1: In EXTRC oscillator configuration, the OSC1/CLKIN pin is a Schmitt Trigger input. It is not recommended that the PIC16C505 be driven with external clock in RC mode.

2: The leakage current on the MCLR pin is strongly dependent on the applied voltage level. The specified levels represent normal operating conditions. Higher leakage current may be measured at different input voltages.

3: Negative current is defined as coming out of the pin.

4: Does not include RB3. For RB3 see parameters D0061 and D0061A.

5: This spec. applies to RB3/MCLR configured as external MCLR and RB3/MCLR configured as input with internal pull-up enabled.

6: This spec. applies to RB3/MCLR configured as external MCLR and RB3/MCLR configured as input with pull-up disabled. The leakage current of the MCLR circuit is higher than the standard I/O logic.

TABLE 10-1: PULL-UP RESISTOR RANGES - PIC16C505

V$_{DD}$ (Volts)	Temperature (°C)	Min	Typ	Max	Units
RB0/RB1/RB4					
2.5	−40	38K	42K	63K	Ω
	25	42K	48K	63K	Ω
	85	42K	49K	63K	Ω
	125	50K	55K	63K	Ω
5.5	−40	15K	17K	20K	Ω
	25	18K	20K	23K	Ω
	85	19K	22K	25K	Ω
	125	22K	24K	28K	Ω
RB3[1]					
2.5	−40	65K	80K	850K	Ω
	25	80K	100K	1150K	Ω
	85	85K	110K	1300K	Ω
	125	100K	120K	1500K	Ω
5.5	−40	50K	60K	600K	Ω
	25	60K	65K	750K	Ω
	85	65K	80K	900K	Ω
	125	75K	90K	990K	Ω

* These parameters are characterized but not tested.

Note 1: The weak pull-up resistor and associated current for the RB3/$\overline{MCLR}$ pin is non-linear when the respective pin voltage is less than V$_{DD}$ - 1.0V. See parameter D061 for RB3/$\overline{MCLR}$ pin current specifications.

Reset

When $\overline{MCLR}$ is asserted, the state of the OSC1/CLKIN and CLKOUT/OSC2 pins are as follows:

CLKIN/CLKOUT PIN STATES WHEN $\overline{MCLR}$ ASSERTED

Oscillator Mode	OSC1/CLKIN Pin	OSC2/CLKOUT Pin
EXTRC, CLKOUT on OSC2	OSC1 pin is tristated and driven by external circuit	OSC2 pin is driven low
EXTRC, OSC2 is I/O	OSC1 pin is tristated and driven by external circuit	OSC2 pin is tristate input
INTRC, CLKOUT on OSC2	OSC1 pin is tristate input	OSC2 pin is driven low
INTRC, OSC2 is I/O	OSC1 pin is tristate input	OSC2 pin is tristate input

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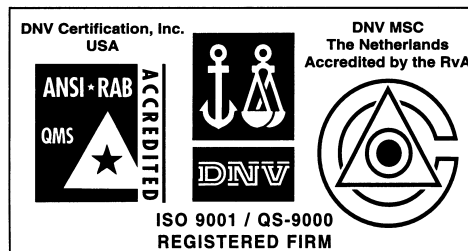
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