Application Note 10.8

USB97C223 and USB97C243

Capacitor Selection for Internal Regulator Output Pins

APPLICATION NOTE

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Overview

The USB97C223 and USB97C243 have two internal 1.8V regulators used to provide the digital and analog 1.8V supplies. The output pins of the regulator have very specific capacitor requirements that are described below. It is important that the customer designs their product with the specifications set forth in this document.

Requirements

Table 1 lists the capacitor requirements on the regulator output pins.

Table 1 – Regulator Output Pins

USB97C223			
PIN NUMBER	**PIN NAME**	**PIN DESCRIPTION**	**CAPACITOR REQUIREMENT**
98	VDDP	Analog Regulator Output	10uF +/- 20 % with < 0.65 Ohm ESR
91	VDDCORE	Digital Regulator Output	10uF +/- 20 % with < 0.65 Ohm ESR
USB97C243			
50	VDDP	Analog Regulator Output	10uF +/- 20 % with < 0.65 Ohm ESR
43	VDDCORE (closest to VREG)	Digital Regulator Output	10uF +/- 20 % with < 0.65 Ohm ESR

Figure 1 and Figure 2 show an example of the degradation in performance of the USB97C223 and USB97C243 as the ESR of the capacitor on the output of the regulators is increased to 0.65 Ohm.

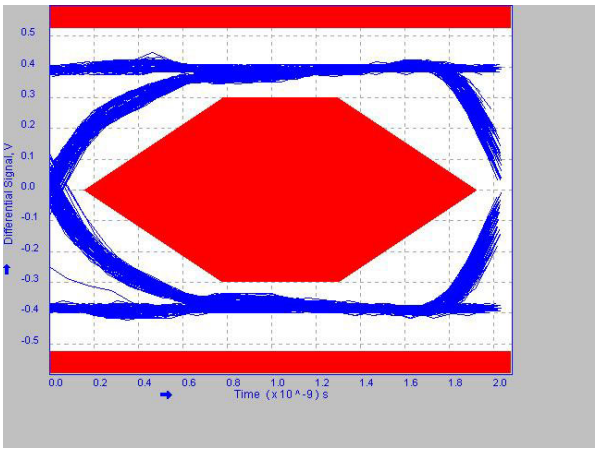

Figure 1 - 10uF Capacitor with 0.1 Ohm ESR

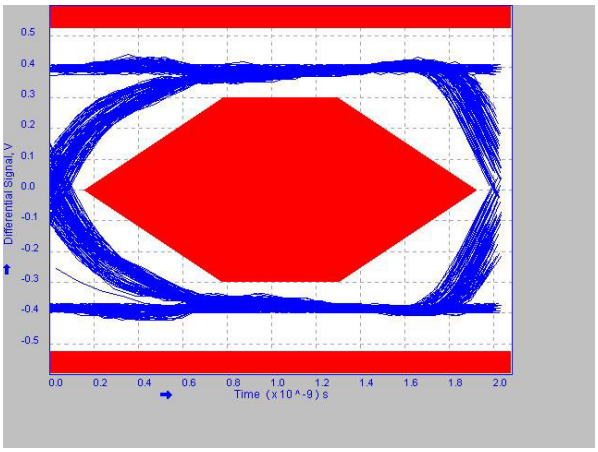

Figure 2 - 10uF Capacitor with 0.65 Ohm ESR

SMSC recommends the use of **ceramic 10uF capacitors** to meet the low ESR requirements of the regulator output pins of the USB97C223. Ceramic capacitors typically have an ESR of < 0.1 Ohm.

Recommended Capacitors, or equivalent:

- Kemet C0805C106K9PACTU (0805 Package)
- Kemet C1206C106K9PACTU (1206 Package)
- Panasonic ECJ-2FF0J106Z (0805 Package)
- Panasonic ECJ-2FF1A106Z (0805 Package)

Tantalum capacitors that have low ESR specifications can also be used, but typically have an ESR closer to 0.5 Ohm.