

GENERAL DESCRIPTION

The selection of the output capacitor in terms of its capacitance has a direct influence upon the overall power supply system stability. Final selection of the output capacitor must always be checked with respect to step-up ratio, step-down ratio, output current range, capacitor ESR tolerances and to the temperature range the system is expected to encounter because no one defined criteria for stable operations is common.

STEP-UP DC/DC CONVERTER

PRODUCT SERIES	LOAD CAPACITANCE SETTING	LOAD CAPACITANCE CRITERIA
XC6367/6368 Series	<input type="radio"/> Tantalum capacitor $\frac{1}{2\pi \times CL \times ESR} \leq 25\text{kHz}$	<p>PROCEDURE</p> <p>At ambient temperature and with the output capacitance at 10μF, conditions (A) to (C) below should be met.</p> <p>(A) The output voltage ripple should be less than 100mVp-p with the maximum load applied and between max. and min. input voltage.</p> <p>(B) The output voltage ripple should not exceed 150mVp-p between max. and min. temperature conditions. Note: Output voltage ripple in (A) and (B) above should be read as voltage ripple at the cathode (K) of the Schottky diode (SD) if a ceramic capacitor is used with either the XC9103/04/05 or XC9106/07 series.</p> <p>(C) In PWM mode, inspect the output waveform to ensure no large oscillations, in the frequency range of several kHz, with the ripple voltage are present. ⇨ If any of the conditions above is not met, increase the output capacitance value until it is removed.</p> <p><input type="radio"/> Load Capacitance (CL) for Ceramic Capacitors:</p> <p>a. Temperature characteristics: Please use capacitors with dielectrics consistent with B characteristics (JIS) or X7R or X5R (EIA).</p> <p>b. Ceramic Capacitor's capacitance decreases upon the voltage rating is approached. Therefore, ensure that an adequate safety margin is employed and/or use additional capacitance. Please consult the manufacturer's data - DC bias-capacitance, rate of change graphs.</p>
XC6371/6372/6373 Series		
XC9101 Series	<input type="radio"/> Ceramic capacitor 5m Ω < ESR <input type="radio"/> Tantalum capacitor	
XC9103/9104/9105 Series	$\frac{1}{2\pi \times CL \times ESR} \leq 35\text{kHz}$ <input type="radio"/> OS-CON $\frac{1}{2\pi \times CL \times ESR} \leq 110\text{kHz}$	
XC9106/9107 Series	Note : RSENSE needs to be changed to 50m Ω ~70m Ω if using an OS-CON with the XC9103/04/05/06/07	

STEP-DOWN DC/DC CONVERTER

PRODUCT SERIES	LOAD CAPACITANCE SETTING	LOAD CAPACITANCE CRITERIA
XC6365/6366 Series	<input type="radio"/> Tantalum capacitor, OS-CON* $\frac{1}{2\pi \times CL \times ESR} \leq 25\text{kHz}$	<p>PROCEDURE</p> <p>At ambient temperature and with the output capacitance at 10μF, conditions (A) to (C) below should be met.</p> <p>(A) The output voltage ripple should be less than 100mVp-p with the maximum load applied and between max. and min. input voltage.</p> <p>(B) The output voltage ripple should not exceed 150mVp-p between max. and min. temperature conditions. Note: Output voltage ripple in (A) and (B) above is less than 50mVp-p for the XC9201, XC9206/9207/9208, XC9211/9212 and XC9215/9216/9217 series.</p> <p>(C) In PWM mode, inspect the output waveform to ensure no large oscillations, in the frequency range of several kHz, with the ripple voltage are present. ⇨ If any of the conditions above is not met, increase the output capacitance value until it is removed.</p> <p><input type="radio"/> Load Capacitance (CL) for Ceramic Capacitors:</p> <p>a. Temperature characteristics: Please use capacitors with dielectrics consistent with B characteristics (JIS) or X7R or X5R (EIA).</p> <p>b. Ceramic Capacitor's capacitance decreases upon the voltage rating is approached. Therefore, ensure that an adequate safety margin is employed and/or use additional capacitance. Please consult the manufacturer's data - DC bias-capacitance, rate of change graphs.</p>
XC9201 Series	<input type="radio"/> Ceramic capacitor 5m Ω < ESR	
XC9206/9207/9208 Series	<input type="radio"/> Large capacitance, low ESR ceramic capacitor (OS-CON* etc.)	
XC9211/9212 Series	$\frac{1}{2\pi \times CL \times ESR} \leq 110\text{kHz}$	
XC9215/9216/9217 Series	* For XC9201 series only.	

STEP-UP/DOWN DC/DC CONVERTER

PRODUCT SERIES	LOAD CAPACITANCE SETTING	LOAD CAPACITANCE CRITERIA
XC9301/9302 Series	<input type="radio"/> Tantalum capacitor $\frac{1}{2\pi \times CL \times ESR} \leq 25\text{kHz}$	<p>PROCEDURE</p> <p>Same as for step-up DC/DC converter.</p>

Some OS-CON may not be satisfied by the equations shown above. For stable oscillation, please test with the actual parts before use. The name "OS-CON" is the trademark of SANYO.

For more details about other products, please refer to each product's data sheet.

Please refer to respective manufacturers, regarding capacitor's ESR values.