

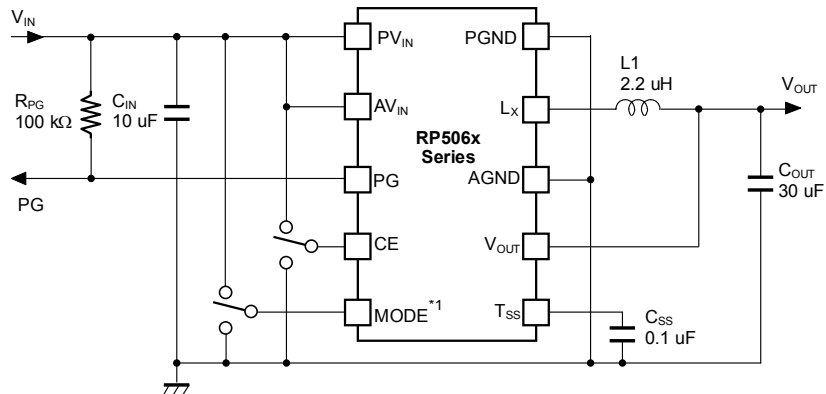
Design Guide

NO.ED-296-140603

■ TYPICAL APPLICATION

PG function is used, 30 ms Soft-start Time

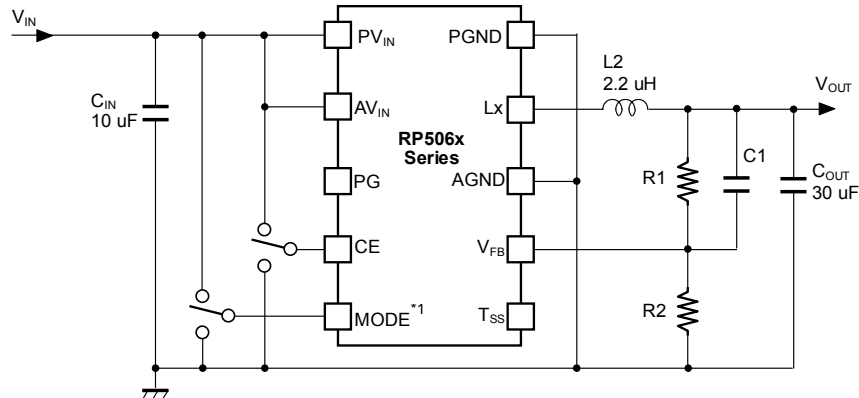
***1 MODE = "H": forced PWM control, MODE = "L": PWM/VFM auto switching control**



RP506Kxx1A/B/D/E (Fixed Output Voltage Type)

PG function is not used, 150 μ s Soft-start Time

***1 MODE = "H": forced PWM control, MODE = "L": PWM/VFM auto switching control**



RP506K001C/F (Adjustable Output Voltage Type)

■ SOFT-START TIME (T_{SS}) VS. SOFT-START TIME ADJUSTING CAPACITOR (C_{SS})

Soft-start time (t_{start}) of the RP506x is adjustable by connecting a soft-start time adjustment capacitor (C_{SS}) between the T_{SS} pin and GND. t_{start} can be set from Typ. 0.15 ms. The capacitance value for C_{SS} that is suitable for t_{start} can be calculated by the following equation.

$$C_{SS} \text{ (nF)} = 3.5 \times t_{start} \text{ (ms)}$$

The T_{SS} pin must be open if Soft-start time function is not used. Soft-start time is set to typically 150 μs when the T_{SS} pin is open.

Typical T_{SS} vs. C_{SS}

C _{SS} (nF)	Open	10	47	100
T _{SS} (ms)	0.15	3	15	30

■ PG RESISTOR (R_{PG}) RANGE

When using the power good function, the resistance value of a resistor (R_{PG}) should be between 10 kΩ to 100 kΩ. The PG pin must be open or connected to GND if the power good function is not used.

RECOMMENDED EXTERNAL COMPONENTS

Recommended External Components

Symbol	Size	Part Description	Model
C _{IN}	10 μF	Ceramic Capacitor	C1608JB0J106M (TDK)
			JMK107BJ106MA (Taiyo Yuden)
C _{OUT}	22 μF x 2	Ceramic Capacitor	C2012JB0J226M (TDK)
	10μF x 3	Ceramic Capacitor	C1608JB0J106M (TDK) JMK107BJ106MA (Taiyo Yuden)
L (V _{SET} ≤ 3.3V)	2.2 μH	Inductor	SLF6045T-2R2N3R3 (TDK)
			CLF7045-2R2N (TDK)
			FSD0415-2R2M (TOKO)
			RLF7030T-2R2M5R4 (TDK)
L (V _{SET} > 3.3V*1)	4.7 μH	Inductor	SLF6045T-4R7N2R4 (TDK)
			CLF7045-4R7N (TDK)
			FSD0415-4R7M (TOKO)
			RLF7030T-4R7M3R4 (TDK)

*1 Only for RP506K001C/F

Small and Low Profile External Components

Symbol	Size	Part Description	Model
L (V _{SET} ≤ 1.5V)	1.0 μH	Inductor	DFE252010R-H-1R0M (TOKO)
			VLS252010HBX-1R0M (TDK)
L (V _{SET} ≤ 2.3V)	1.5 μH	Inductor	DFE252010R-H-1R5M (TOKO)
			VLS252010HBX-1R5M (TDK)
L	2.2 μH	Inductor	DFE252010R-H-2R2M (TOKO)
			VLS252010HBX-2R2M (TDK)

■ OUPUT VOLTAGE (V_{SET}) VS. RESISTOR (R1, R2) & CAPACITOR (C1) FOR RP506K001C/F

The output voltage (V_{SET}) is adjustable by changing the resistance values of resistors (R1, R2) as follows.

$$V_{SET} = V_{FB} \times (R1 + R2) / R2 \text{ (Recommended } V_{OUT} \text{ range for RP506K001F: } 0.6 \text{ V} \leq V_{SET} \leq 4.0 \text{ V)}$$

$$\text{(Recommended } V_{OUT} \text{ range for RP506K001C: } 0.8 \text{ V} \leq V_{SET} \leq 4.0 \text{ V)}$$

If R1 and R2 are too large, the impedances of V_{FB} also become large, as a result, the IC could be easily affected by noise. For this reason, R2 should be 220 k Ω or less. If the operation becomes unstable due to the high impedances, the impedances should be decreased.

C1 can be calculated by the following equations. Please use the value close to the calculation result.

If the output voltage is lower than or equal to 3.3 V:

$$C1 = 4.84 \times 10^{-6} / R2 \text{ [F]}$$

If the output voltage exceeds 3.3 V:

$$C1 = 1.50 \times 10^{-6} / R2 \text{ [F]}$$

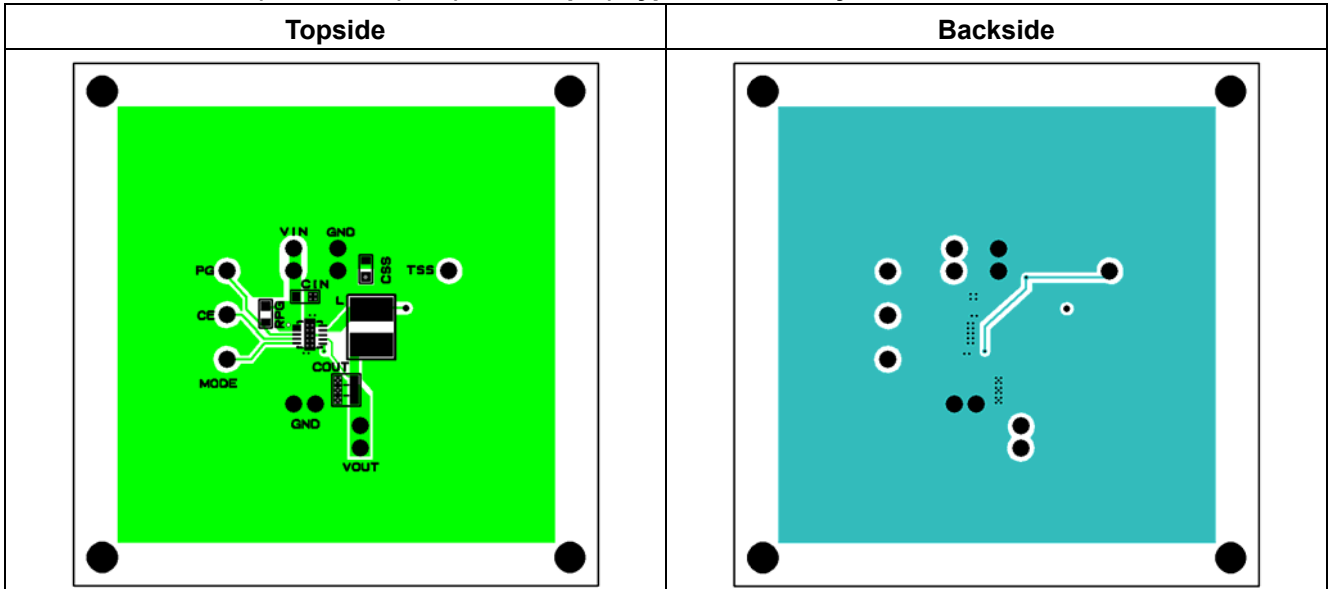
The recommended resistance values for R1 and C1 when $R_2 = 220 \text{ k}\Omega$ or $100 \text{ k}\Omega$ are as follows.

Set Output Voltage (V_{SET}) vs. Resistors (R1, R2) and Capacitor (C1)

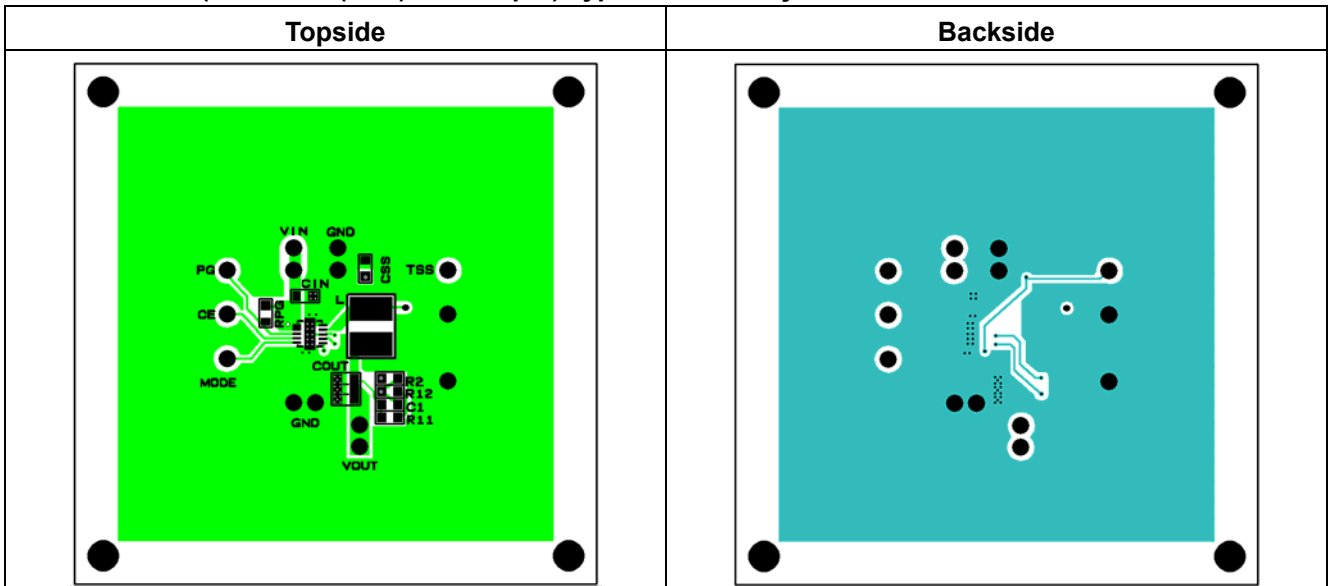
V_{SET} [V]	0.6	0.7	0.8	1.2	1.8	2.5	3.3	3.8	4.0
R1 [k Ω]	0	36.7	73.3	220	440	697	990	533	567
R2 [k Ω]	220	220	220	220	220	220	220	100	100
C1 [pF]	-	22	22	22	22	22	22	15	15

■ TYPICAL BOARD LAYOUT

RP506KxxxA/B/D/E (PKG: DFN(PLP)2527-10pin) Typical Board Layout



RP506K001C/F (PKG: DFN(PLP)2527-10pin) Typical Board Layout



*) R11 and R12 in R1 are arranged in series for series connection.



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