

Programmable Multi-output Clock Generator SSCG for Small Package

MB88182

Programmable products capable of up to 5 clock outputs for small package have been added to the lineup of clock generators; their built-in spread spectrum function is effective against electromagnetic interference (EMI).

Introduction

The Spread Spectrum Clock Generator (SSCG) is a noise-measure product that functions by lowering the electromagnetic interference (EMI) peak by fluctuating the clock frequency slightly and spreading the spectrum for the clock frequency.

FUJITSU has reinforced the lineup of SSCG products as a measure against EMI in built-in devices. We recently added “MB88182” to the lineup — it is a small-package product capable of 5 clock outputs. Each output clock frequency can be set up by accessing the register from the I²C bus. This will contribute to a reduction in the number of clock devices and EMI measure parts, particularly in small applications such as mobile devices.

What is SSCG?

In recent years, EMI from built-in devices has been increasing constantly in concurrence with the speedup and density increase of electronic devices. EMI that is radiated from electronic devices affects the operation of other electronic devices. It is regulated by various standards, including CISPR. To satisfy these standards, SSCG technology that can reduce EMI effectively and simply is under the spotlight.

The major advantages of SSCG include the following:

- (1) The EMI reduction effect by spread spectrum is greater than that to other EMI measure parts.**
- (2) Because of the high EMI reduction effect, the number**

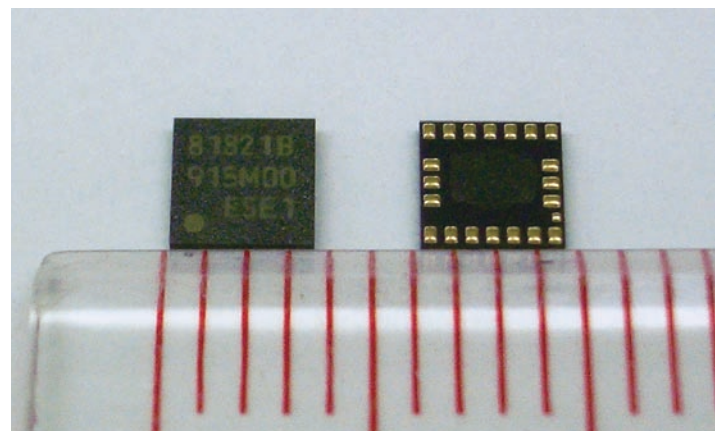
of EMI-measure parts that are conventionally used can be reduced.

- (3) The Spread Spectrum (SS) function can be simply enabled by setting up the pin or the register. As a result, a reduction in the number of man-hours required can be expected for various processes, including constant selection adjustment for conventional EMI measure parts, board layout correction, and EMI re-evaluation.**

According to these advantages, SSCG is remarkable as effective EMI measures.

FUJITSU’s SSCG realizes products with greater EMI reduction effects than other manufacturers’ products using two technologies;

Photo 1 External View



“digitally controlled frequency modulation technology” and “modulation cycle combination technology” that uses different modulation cycle. MB88182, which we have added to the lineup this time, adopts same technologies and offers equivalent properties as the conventional lineup.

Product Features

This product can set up the output clock frequency to an optional value without dependency on the input clock frequency. As such, it can be used for EMI measures with special clock frequencies within digital devices such as game machines and portable audio devices. Furthermore, it will contribute to a reduction in the number of clock devices because this product can address up to 5 outputs for 1 clock input when several clock devices are used. Although the assignment of the clock line on the board may seem troublesome since one device addresses the functions of several clock devices, it is possible to suppress the EMI from the clock lines by enabling the SS function. Various parameters can be set up using the registers via the I²C bus. This product lineup has four types depending on the I²C slave address and the clock output amplitude level for CLK1.

Figure 1 presents the pin assignments, **Table 1** the description of pin functions, **Table 2** the list of programmable parameters, and **Table 3** the lineup of this product.

Evaluation Environment

We provide single-unit evaluation boards to evaluate the clock output for a single unit device. The master device with I²C is necessary for setting up the parameters. We have disclosed

Figure 1 Pin Assignments

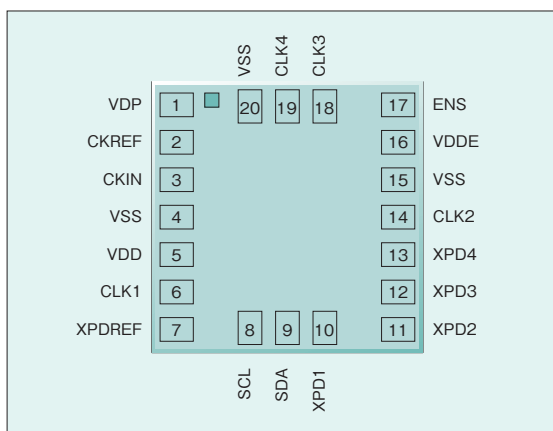


Table 1 Description of Pin Functions

Pin code	I/O	Pin number	Description of function
VDP	–	1	Power supply pin (3.3V/2.6V/1.8V)
CKREF	O	2	Reference clock output pin
CKIN	I	3	Clock input (19.2MHz)
VSS	–	4	GND pin
VDD	–	5	Power supply terminal (1.8V)
CLK1	O	6	Clock output pin 1
XPDREF	I	7	CKREF power down pin
SCL	I	8	I ² C bus clock input pin
SDA	I/O	9	I ² C bus data input/output pin
XPD1	I	10	CLK1 power down pin
XPD2	I	11	CLK2 power down pin
XPD3	I	12	CLK3 power down pin
XPD4	I	13	CLK4 power down pin
CLK2	O	14	Clock output pin 2
VSS	–	15	GND pin
VDDE	–	16	Power supply pin (3.3V/2.6V)
ENS	I	17	Modulation enable pin
CLK3	O	18	Clock output pin 3
CLK4	O	19	Clock output pin 4
VSS	–	20	GND pin

(I: Input O: Output)

Table 2 List of Programmable Parameters

Function	Remarks
M divider setting	The parameters for internal PLL dividers can be set up. Depending on the combination of these settings, integral multiples of the input clock as well as optional multiplication can be set up.
N divider setting	
K divider setting	
L divider setting	
Charge pump setting	The current value to the charge pump circuit depending on the internal oscillation frequency can be selected.
VCO gain setting	The gain for the VCO circuit depending on the internal oscillation frequency can be selected.
Modulation setting	Setting can be selected from no modulation, ± 0.25%, ± 0.5%, ± 0.75%, ± 1.0%, ± 1.25%, ± 1.5%, and ± 1.75%.
Output drive capacity setting	Drive capacity can be selected from 2 types.
Through rate setting	Through rate can be selected from 2 types.

Table 3 MB88182 Product Lineup and Difference in Functions

Model	CLK1	CLK2	CLK3/CLK4/CKREF	I ² C address (bit expression)
MB881821APVA1	1.8V	2.6V/3.3V	VDP input level (1.8V/2.6V/3.3V)	1001111
MB881822APVA1	2.6V/3.3V			
MB881821BPVA1	1.8V			1011111
MB881822BPVA1	2.6V/3.3V			

the application notes with a sample program via our 8-bit microcontroller F²MC-8FX family. Please also use them for reference. We also provide a tool for the automatic calculation of parameter values.

Photo 2 presents the single-unit evaluation board, **Table 4** the list of single-unit evaluation board models, and **Figure 2** the GUI for the automatic parameter calculation tool.

Roadmap

Figure 3 presents the product roadmap.

FUJITSU plans to expand the lineup of products with 1 input and multiple clock output similar to this product in addition to the 1-clock input and 1-output products. In the future, we will continue to propose SSCG solutions that offer both EMI measures and a reduction in the number of parts to our customers. *

Photo 2 Single-Unit Evaluation Board

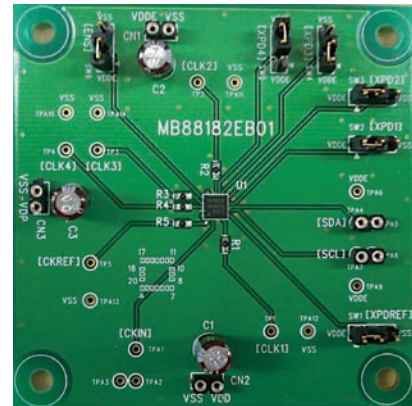


Figure 2 Automatic Parameter Calculation Tool

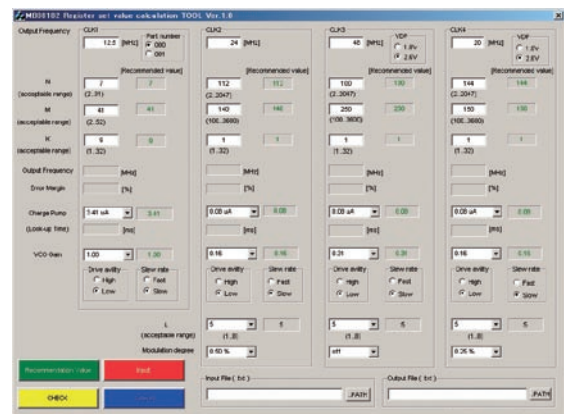


Table 4 List of Single-Unit Evaluation Board Models

Model	Remarks
MB88182EB01-1A	Built-in MB881821A
MB88182EB01-2A	Built-in MB881822A
MB88182EB01-1B	Built-in MB881821B
MB88182EB01-2B	Built-in MB881822B

Figure 3 Roadmap for SSCG Products

