

Absolute Maximum Ratings

Voltage Range on V_{CC} Relative to GND -0.5V to +4.3V
 Voltage Range on Any Lead Relative
 to GND -0.5V to ($V_{CC} + 0.5V$), not to exceed +4.3V
 Operating Temperature Range -40°C to +125°C

Storage Temperature Range -55°C to +125°C
 Soldering Temperature See J-STD-020 Specification

Stresses beyond those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated in the operational sections of the specifications is not implied. Exposure to absolute maximum rating conditions for extended periods may affect device reliability.

Recommended Operating Conditions

($T_A = -40^\circ\text{C}$ to $+125^\circ\text{C}$, unless otherwise noted.)

PARAMETER	SYMBOL	CONDITIONS	MIN	TYP	MAX	UNITS
Supply Voltage	V_{CC}	(Note 1)	3.0		3.6	V
Input Logic 1	V_{IH}		0.8 x V_{CC}		$V_{CC} + 0.3$	V
Input Logic 0	V_{IL}		-0.3		0.2 x V_{CC}	V
Input Logic Float (SSEN, CRSEL)	I_{FLOAT}	$0V < V_{IN} < V_{CC}$			± 1	μA
SSO Load	C_L	SSO < 80MHz			15	pF
		$80\text{MHz} \leq \text{SSO} < 134\text{MHz}$			7	
CLKIN Frequency	f_{IN}		20		134	MHz
CLKIN Duty Cycle	f_{INDC}		40		60	%

DC Electrical Characteristics

($V_{CC} = +3.0V$ to $+3.6V$, $T_A = -40^\circ\text{C}$ to $+125^\circ\text{C}$, unless otherwise noted.)

PARAMETER	SYMBOL	CONDITIONS	MIN	TYP	MAX	UNITS
Supply Current	I_{CC}	$C_L = 7\text{pF}$, $f_{IN} = 134\text{MHz}$			18	mA
SMSEL1/SMSEL2/CLKIN Input Leakage	$I_{IL:1}$	$0V < V_{IN} < V_{CC}$	-1		+1	μA
CRSEL/SSEN Input Leakage	$I_{IL:2}$	$0V < V_{IN} < V_{CC}$	-100		+100	μA
Output Leakage (SSO)	I_{OZ}	SSEN = float	-1		+1	μA
Low-Level Output Voltage (SSO)	V_{OL}	$I_{OL} = 4\text{mA}$			0.4	V
High-Level Output Voltage (SSO)	V_{OH}	$I_{OH} = -4\text{mA}$	2.4			V

AC Electrical Characteristics

($V_{CC} = +3.0V$ to $+3.6V$, $T_A = -40^\circ\text{C}$ to $+125^\circ\text{C}$, unless otherwise noted.)

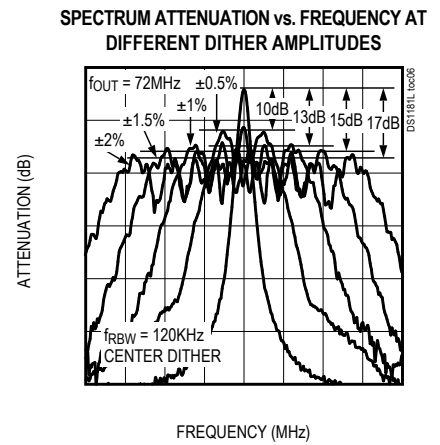
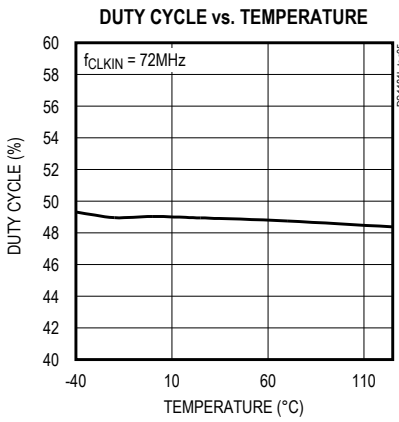
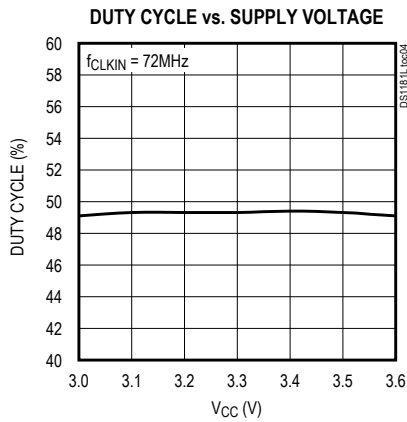
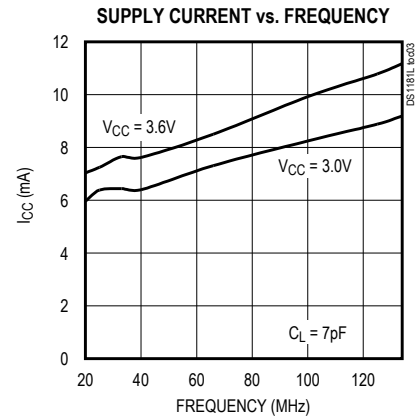
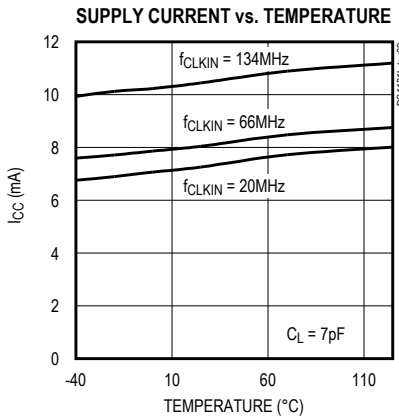
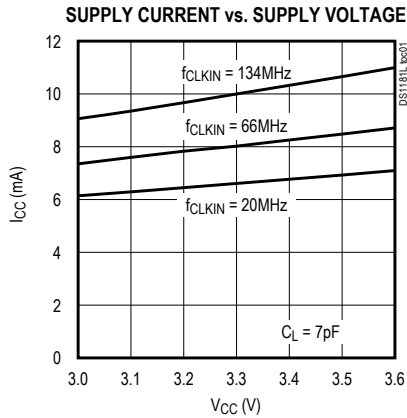
PARAMETER	SYMBOL	CONDITIONS	MIN	TYP	MAX	UNITS
SSO Duty Cycle	f_{SSODC}	Measured at $V_{CC}/2$	40		60	%
SSO Rise Time	t_R	$C_L = 7\text{pF}$		1		ns
SSO Fall Time	t_F	$C_L = 7\text{pF}$		1		ns
Peak Cycle-to-Cycle Jitter	t_J	$T_A = -40^\circ\text{C}$ to $+85^\circ\text{C}$, 10,000 cycles		75		ps
Power-Up Time	t_{POR}	(Note 2)			50	ms

Note 1: All voltages referenced to ground. Currents into the IC are positive and out of the IC are negative.

Note 2: Time between power applied to device and stable output.

Typical Operating Characteristics

($T_A = +25^\circ\text{C}$, unless otherwise noted.)



Pin Description

PIN	NAME	FUNCTION		
1	CLKIN	Clock Input. 20MHz to 134MHz clock input (f_{IN}).		
2	SMSEL1	Spread-Spectrum Magnitude Select Inputs. These digital inputs select the desired spread-spectrum magnitude as shown in the table below.		
		SMSEL2	SMSEL1	MAGNITUDE SELECTED (%)
3	SMSEL2	0	0	± 2.0
		0	1	± 1.5
		1	0	± 1.0
4	GND	1	1	± 0.5
5	$\overline{\text{SSEN}}$	Spread-Spectrum Enable. Three-level input to enable/disable spread-spectrum and to three-state the output. 0 = Power-up/spread-spectrum enabled Float = SSO three-stated 1 = Power-up/spread-spectrum disabled (not a bypass mode).		
6	SSO	Spread-Spectrum Clock Output. Outputs a center-dithered spread-spectrum version of the clock input at CLKIN.		
7	CRSEL	Clock Range and Dither Rate Select. Three-level input that determines the dither rate. See the <i>Detailed Description</i> section for details.		
		CRSEL	CLKIN RANGE (MHz)	DITHER RATE
		0	66 to 134	$f_{IN}/832$
		Float	33 to 80	
8	V_{CC}	1	20 to 38	

Detailed Description

The DS1181L modulates an input clock to generate a center-dithered spread-spectrum output. A 20MHz to 134MHz clock is applied to the CLKIN pin. An internal PLL dithers the output clock about its center frequency at a user-selectable magnitude.

Spread-Spectrum Dither Magnitude

The DS1181L can generate dither magnitudes up to $\pm 2\%$. The desired magnitude is selected using input pins SMSEL1 and SMSEL2 as shown in Table 1.

Table 1. Dither Magnitude

SMSEL2	SMSEL1	MAGNITUDE SELECTED (%)
0	0	± 2.0
0	1	± 1.5
1	0	± 1.0
1	1	± 0.5

Spread-Spectrum Dither Rate

The output spread-spectrum dither rate is fixed at $f_{IN}/832$.

Table 2. Dither Rate

CRSEL	CLKIN RANGE (MHz)	DITHER RATE
0	66 to 134	$f_{IN}/832$
Float	33 to 80	
1	20 to 38	

Spread-Spectrum Enable

On power-up, the output clock (SSO) remains three-stated until the internal PLL reaches a stable frequency. The $\overline{\text{SSEN}}$ input can be used to disable the spread-spectrum modulation and to three-state the SSO output. If the $\overline{\text{SSEN}}$ pin is pulled high, the spread-spectrum modulation is turned off, but the device still uses the internal PLL to generate the clock signal at SSO. If the $\overline{\text{SSEN}}$ pin is floated, the output is three-stated.

Applications Information

Power-Supply Decoupling

To achieve best results, it is highly recommended that a decoupling capacitor is used on the IC power-supply pins. Typical values of decoupling capacitors are 0.01 μF and 0.1 μF . Use a high-quality, ceramic, surface-mount capacitor, and mount it as close as possible to the V_{CC} and GND pins of the IC to minimize lead inductance.

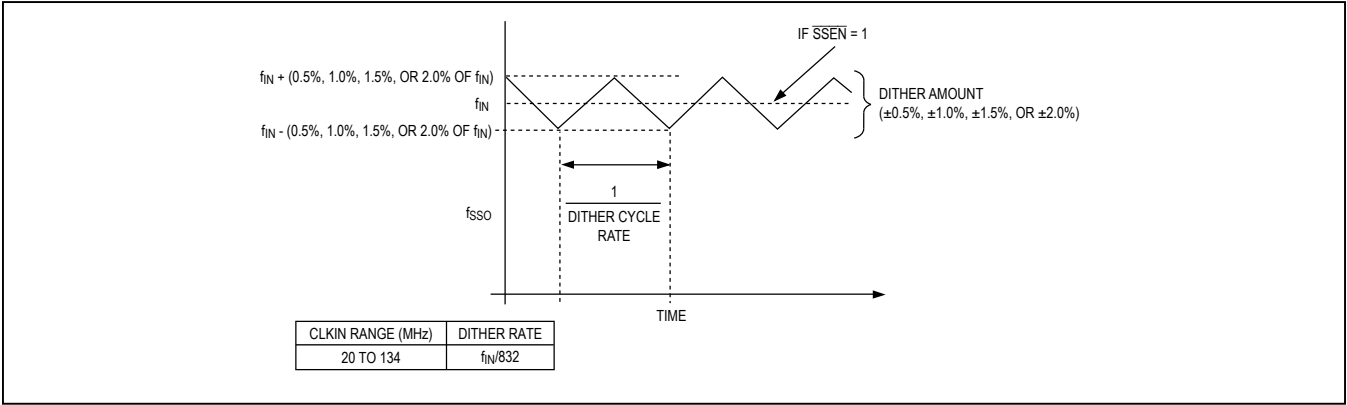
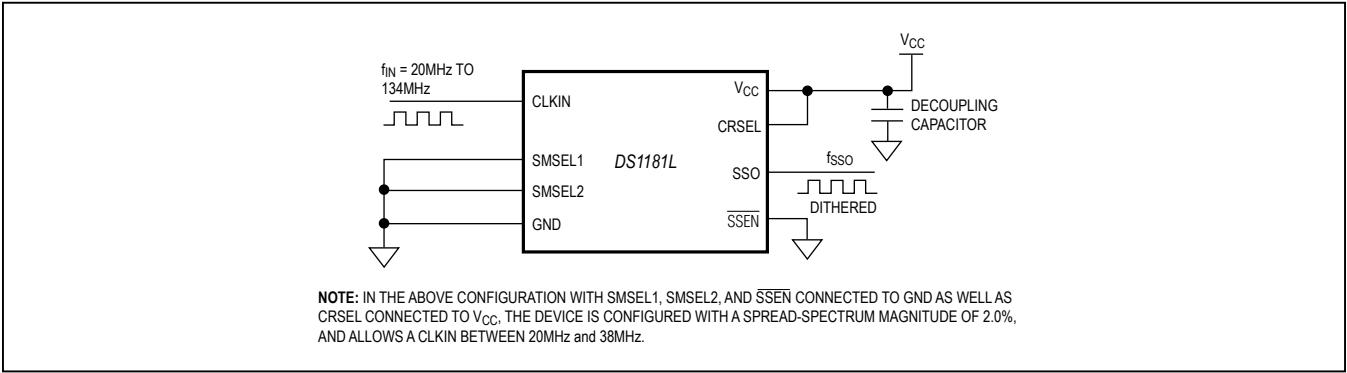


Figure 1. DS1181L Spread-Spectrum Frequency Modulation

Typical Operating Circuit



Package Information

For the latest package outline information and land patterns (footprints), go to www.maximintegrated.com/packages. Note that a “+”, “#”, or “-” in the package code indicates RoHS status only. Package drawings may show a different suffix character, but the drawing pertains to the package regardless of RoHS status.

PACKAGE TYPE	PACKAGE CODE	DOCUMENT NO.	LAND PATTERN NO.
8 TSSOP	H8+3	21-0175	90-0248

Revision History

REVISION NUMBER	REVISION DATE	DESCRIPTION	PAGES CHANGED
0	11/07	Initial release.	—
1	8/08	Increased the absolute maximum ratings range from +3.63V to +4.3V.	2
2	2/15	Removed automotive reference from data sheet	1

For pricing, delivery, and ordering information, please contact Maxim Direct at 1-888-629-4642, or visit Maxim Integrated's website at www.maximintegrated.com.

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