DSC2120 | DSC2220

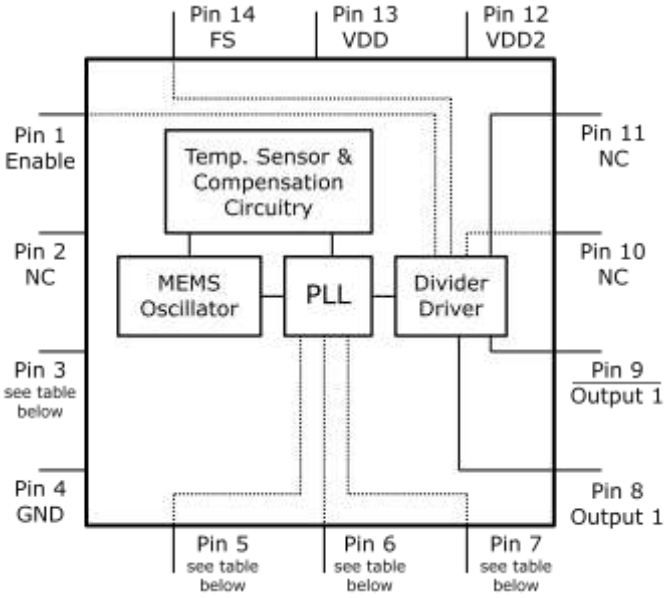
Low-Jitter I²C/SPI Programmable LVPECL Oscillator

General Description

The DSC2120 and DSC2220 series of programmable, high-performance LVPECL oscillators utilizes a proven silicon MEMS technology to provide excellent jitter and stability while incorporating high output frequency flexibility. DSC2120 and DSC2229 allow the user to modify the output frequency using I²C or SPI interface, respectively. User can also select from two pre-programmed default output frequencies using the control pin.

DSC2120 and DSC2220 are packaged in 14-pin 3.2x2.5 mm QFN packages and available in temperature grades from Ext. Commercial to Industrial.

Block Diagram



Pin #	DSC2120 (I²C)	DSC2220 (SPI)
3	NC	SCLK
5	SDA	MOSI
6	SCL	MISO
7	CS_bar	SS

Features

- **Low RMS Phase Jitter: <1 ps (typ)**
- **High Stability: ±10, ±25, ±50 ppm**
- **Wide Temperature Range**
  - Industrial: -40° to 85° C
  - Ext. commercial: -20° to 70° C
- **High Supply Noise Rejection: -50 dBc**
- **I²C/SPI Programmable Output Freq**
- **Short Lead Times: 2 Weeks**
- **Wide Freq. Range:**
  - LVPECL Output: 2.3 to 460 MHz
- **Miniature Footprint of 3.2x2.5mm**
- **Excellent Shock & Vibration Immunity**
  - Qualified to MIL-STD-883
- **High Reliability**
  - 20x better MTF than quartz oscillators
- **Supply Range of 2.25 to 3.6 V**
- **Lead Free & RoHS Compliant**

Applications

- **Consumer Electronics**
- **Storage Area Networks**
  - SATA, SAS, Fibre Channel
- **Passive Optical Networks**
  - EPON, 10G-EPON, GPON, 10G-PON
- **Ethernet**
  - 1G, 10GBASE-T/KR/LR/SR, and FCoE
- **HD/SD/SDI Video & Surveillance**
- **PCI Express**

Pin Description

Pin No.	Pin Name	Pin Type	Description
1	Enable	I	Enables outputs when high and disables when low
2	NC	NA	Leave unconnected or grounded
3	NC	NA	DSC2120: Leave unconnected or grounded
	SCLK	I	DSC2220: Serial clock from master
4	GND	Power	Ground
5	SDA	I	DSC2120: I²C Serial Data
	MOSI		DSC2220: SPI Serial Data from Master to Slave
6	SCL	I	DSC2120: I²C Serial Clock
	MISO	O	DSC2220: SPI Serial Data from Slave to Master
7	CS_bar	I	DSC2120: I²C Chip Select (Active Low)
	SS	I	DSC2220: SPI Slave Select (Active Low)
8	Output1+	O	Positive LVPECL Output
9	Output1-	O	Negative LVPECL Output
10	NC	NA	Leave unconnected or grounded
11	NC	NA	Leave unconnected or grounded
12	VDD2	Power	Power Supply
13	VDD	Power	Power Supply
14	FS	I	Default output clock frequency bit

Operational Description

The DSC2120/2220 is a LVPECL oscillator consisting of a MEMS resonator and a support PLL IC. The LVPECL output is generated through independent 8-bit programmable dividers from the output of the internal PLL.

DSC2120/2220 allows for easy programming of the output frequencies using I²C/SPI interface. Upon power-up, the initial output frequency is controlled by an internal pre-programmed memory (OTP). This memory stores all coefficients required by the PLL for two different default frequencies. The control pin (FS) selects the initial frequency. Once the device is powered up, a new output frequency can be programmed. Programming details are provided in the ***Programming Guide***. Standard default frequencies are described in the following sections. Discera supports customer defined versions of the DSC2120/2220.

When Enable (pin 1) is floated or connected to VDD, the DSC2120/2220 is in operational mode. Driving Enable to ground will disable both output drivers (hi-impedance mode).

Default Output Clock Frequencies

Table 2 lists the standard frequency configurations and the associated ordering information to be used in conjunction with the ordering code. Customer defined combinations are available.

Table 2. Pre-programmed pin-selectable output frequency combinations

Ordering Info	Freq (MHz)	Select Bit [FS] – **Default is [1]**	
		0	**1**
B0001	f_{OUT}	125	**212.5**
BXXXX	f_{OUT}	Contact factory for additional configurations.	

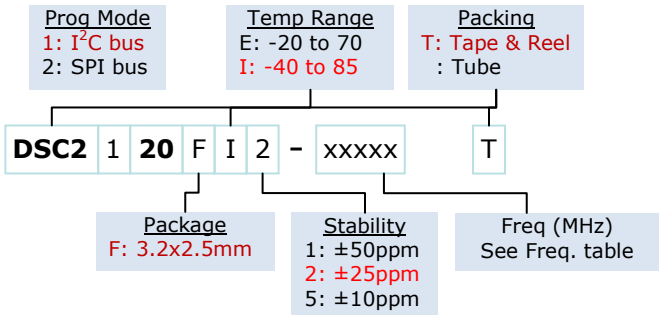
Frequency select bit are weakly tied high so if left unconnected the default setting will be [1] and the device will output the associated frequency highlighted in **Bold**.

Absolute Maximum Ratings

Item	Min	Max	Unit	Condition
Supply Voltage	-0.3	+4.0	V	
Input Voltage	-0.3	V_{DD}+0.3	V	
Junction Temp	-	+150	°C	
Storage Temp	-55	+150	°C	
Soldering Temp	-	+260	°C	40sec max.
ESD HBM MM CDM	-	 4000 400 1500	V	

Note: 1000+ years of data retention on internal memory

Ordering Code

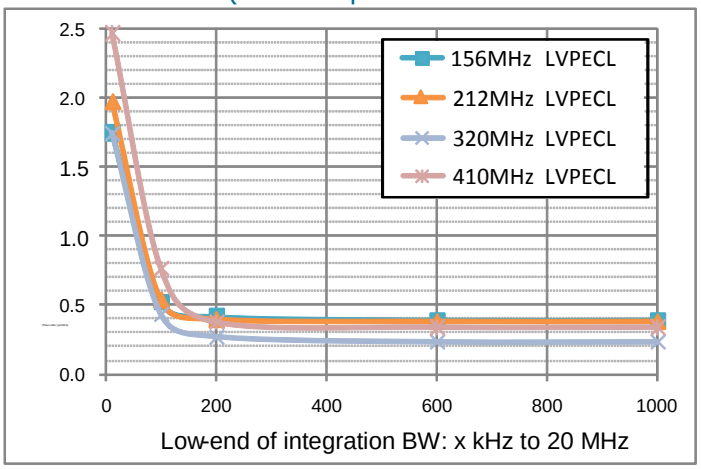


Specifications (Unless specified otherwise: T=25° C)

Parameter		Condition	Min.	Typ.	Max.	Unit
Supply Voltage[1]	V_{DD}		2.25		3.6	V
Supply Current	I_{DD}	EN pin low – output is disabled		21	23	mA
Supply Current[2]	I_{DD}	Output Enabled, R_L=50Ω		56.5	58	mA
Frequency Stability	Δf	Includes frequency variations due to initial tolerance, temp. and power supply voltage			±10 ±25 ±50	ppm
Aging	Δf	1 year @25°C			±5	ppm
Startup Time[2]	t_{SU}	T=25°C			5	ms
Input Logic Levels Input logic high Input logic low	 V_{IH} V_{IL}		 0.75xV_{DD} -		 - 0.25xV_{DD}	V
Output Disable Time[3]	t_{DA}				5	ns
Output Enable Time	t_{EN}				20	ns
Pull-Up Resistor[4]		Pull-up exists on all digital IO		40		kΩ
LVPECL Output						
Output Logic Levels Output logic high Output logic low	 V_{OH} V_{OL}	R_L=50Ω	 V_{DD}-1.08 -		 - V_{DD}-1.55	V
Pk to Pk Output Swing		Single-Ended		800		mV
Output Transition time[4] Rise Time Fall Time	 t_R t_F	20% to 80% R_L=50Ω		250		ps
Frequency	f_0	Single Frequency	2.3		460	MHz
Output Duty Cycle	SYM	Differential	48		52	%
Period Jitter[5]	J_{PER}	F_O=156.25 MHz		2.5		ps_{RMS}
Integrated Phase Noise	J_{PH}	200kHz to 20MHz @156.25MHz 100kHz to 20MHz @156.25MHz 12kHz to 20MHz @156.25MHz		0.25 0.38 1.7	 2	ps_{RMS}

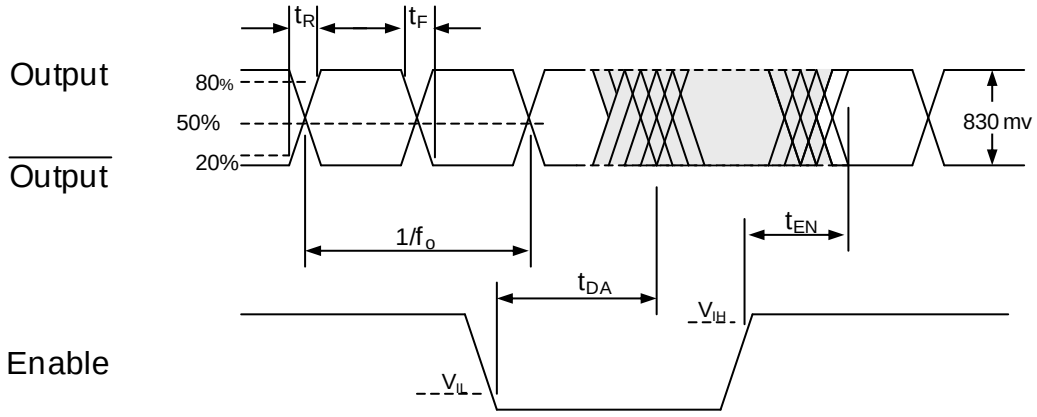
Notes:
1. Pin 4 V_{DD} should be filtered with 0.01uf capacitor.
2. Output is enabled if Enable pad is floated or not connected.
3. t_{su} is time to 100PPM stable output frequency after V_{DD} is applied and outputs are enabled.
4. Output Waveform and Test Circuit figures below define the parameters.
5. Period Jitter includes crosstalk from adjacent output.

Nominal Performance Parameters (Unless specified otherwise: T=25° C, V_{DD}=3.3 V)

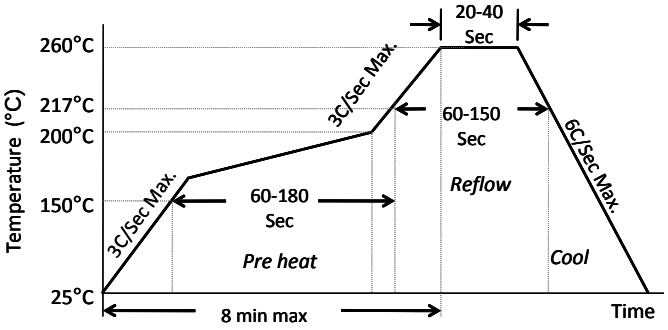


LVPECL Phase jitter (integrated phase noise)

Output Waveform: LVPECL



Solder Reflow Profile

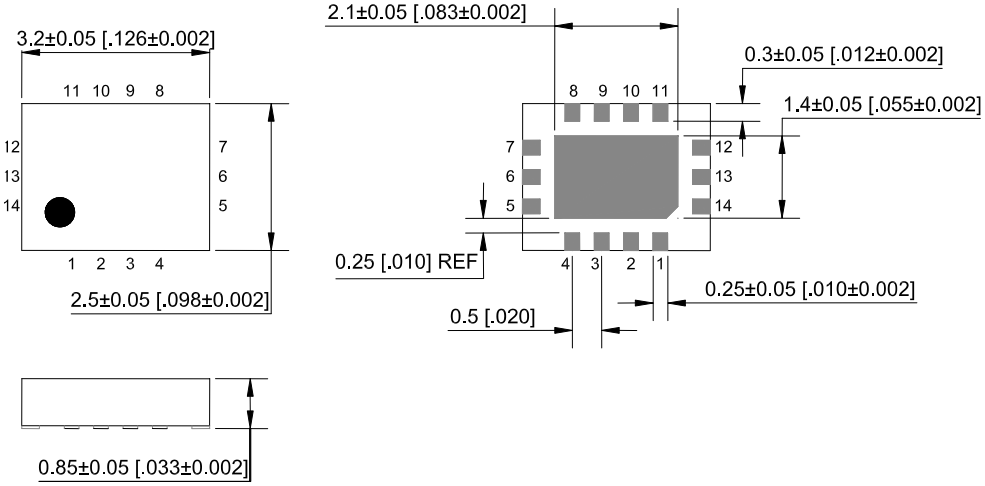


MSL 1 @ 260°C refer to JSTD-020C	
Ramp-Up Rate (200°C to Peak Temp)	3°C/Sec Max.
Preheat Time 150°C to 200°C	60-180 Sec
Time maintained above 217°C	60-150 Sec
Peak Temperature	255-260°C
Time within 5°C of actual Peak	20-40 Sec
Ramp-Down Rate	6°C/Sec Max.
Time 25°C to Peak Temperature	8 min Max.

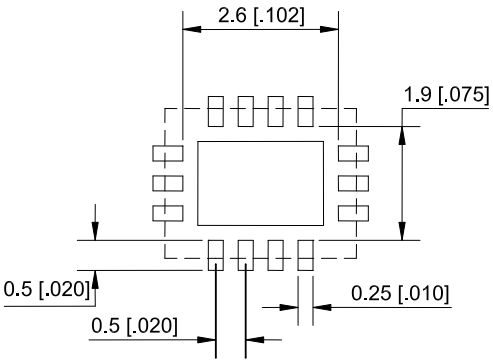
Package Dimensions

3.2 x 2.5 mm 14 Lead Plastic Package

External Dimensions
units: mm[inch]



Recommended
Solder Pad Layout
units: mm[inch]



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