

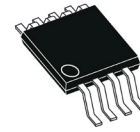
Low Voltage High Performance LVDS Clock Synthesizer

Product Description

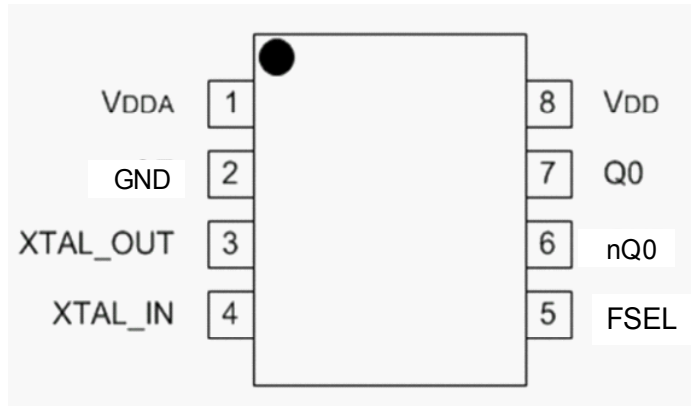
The Multigig QuietClock™ synthesizer series provides frequency generation solutions for many communications standards. The MQC844001-155 provides the SONNET/SDH frequencies of 155.52MHz or 77.76MHz derived from a 38.88MHz crystal. The low power LVDS outputs complement the intrinsic power reduction provided by Multigig's proprietary RotaryWave(TM) technology. The jitter performance of the MQC844001-155 is a "best in class" 0.32ps for SONNET/SDH applications.

Features

- Generates a Low Jitter LVDS Output
- Operates at either 3.3V or 2.5V
- Typical Phase Jitter ~0.32ps (12kHz-20MHz)
- Integrated Loop Filter
- Power consumption 56mA @ 3.3 V (typical)
- Crystal Frequency: 38.88MHz
- Output Frequencies: 155.52 or 77.76MHz
- RMS Phase Noise @ 155.52MHz:
 - 100 Hz: -92 dBc/Hz
 - 1 kHz: -124 dBc/Hz
 - 10 kHz: -134 dBc/Hz
 - 100 kHz: -131 dBc/Hz
 - 1 MHz: -140 dBc/Hz
 - 10 MHz: -163 dBc/Hz
- Available in RoHs or fully Green Compliant packages



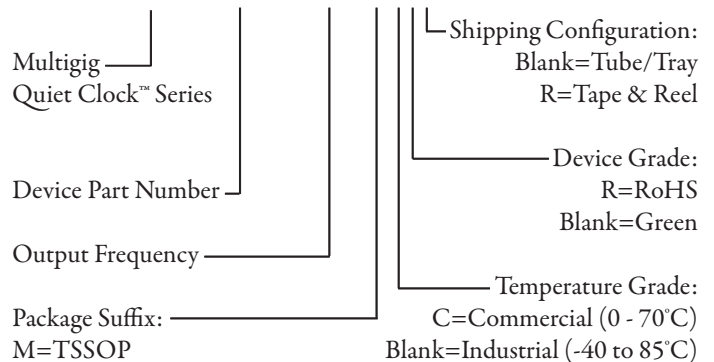
8-Lead TSSOP



MQC844001-155 8-Lead TSSOP Pinout (Top View)

MQC844001-155 Part Number:

MQC844001-155M



MQC844001-155 Block Diagram

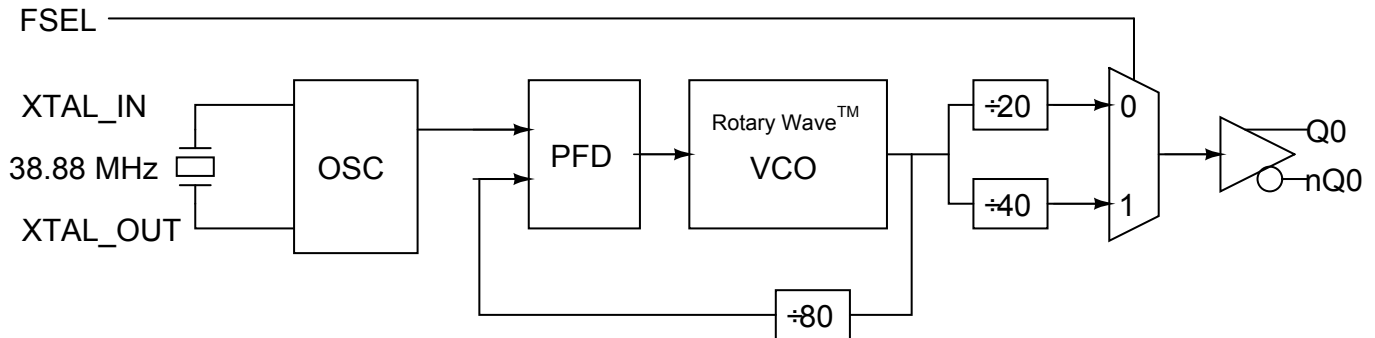


Figure-1

Device Description

Based upon the unique Multigig Rotary Traveling Wave (RTWO), the MQC844001-155 synthesizer provides a high performance solution to frequency generation. A low cost 38.88MHz crystal is used to provide a low jitter 155.52 MHz reference clock. The outputs are a complementary pair of LVDS line drivers, and an FSEL pin allows the selection of 155.52 MHz or 77.76 MHz.

The device is pin compatible for the ICS/IDT844001 when used for 155.52MHz synthesis. Specifications are improved for duty cycle, jitter, power consumption, supply sensitivity, and especially phase noise. Typical phase jitter over the SONNET/SDH bandwidth of 12 kHz to 20 MHz is 313fs. Use of a 38.88MHz crystal ensures the absence of any in-band spurs.

Preliminary Information



QuietClock™ Series

MQC844001-155

IC Pinout Description

Pin #	Name	Type	Level	Description
1	VDDA	P		Analog power
2	GND	P		Output Enable: 1 = Active, 0 = Hi-Z
3	XTAL OUT	O		Crystal Output
4	XTAL IN	I		Crystal Input
5	FSEL	I	CMOS	0 for 155.52MHz, 1 for 77.76MHz
6	nQ0	O	LVDS	complementary Q0 output
7	Q0	O	LVDS	Q0 output
8	V _{DD}	P		Core Power

Absolute Maximum Ratings

Symbol	Characteristics	Min	Max	Unit	Condition
VDD	Supply Voltage		4.6	V	
VIN	Inputs	-0.50	VDD + 0.5	V	
VOUT	Outputs	-0.50	VDD + 0.5	V	
TA	Operating Temperature Range	-40	+85	C	Industrial
Ts	Storage Temperature Range	-65	+150	C	

NOTE:

Exposure to stresses at or beyond those listed under Absolute Maximum Ratings may cause permanent damage to the device and may affect product reliability. These are absolute maximum specifications only, and functional operation of the device at these conditions or any conditions beyond those listed is not implied or recommended.

DC Characteristics ($V_{DD} = 2.5V \pm 5\%$, $T_A = -40^\circ C$ to $85^\circ C$)

Symbol	Characteristics	Min	Typ	Max	Unit	Condition
VDD	Core supply voltage	2.375	2.50	2.625	V	
VDDA	Analog supply voltage	2.375	2.50	2.625	V	
IDD	Core supply current		1	5	mA	No load
IDDA	Analog supply current		55	69	mA	No load

DC Characteristics ($V_{DD} = 3.3V \pm 5\%$, $T_A = -40^\circ C$ to $85^\circ C$)

Symbol	Characteristics	Min	Typ	Max	Unit	Condition
VDD	Core supply voltage	3.135	3.30	3.465	V	
VDDA	Analog supply voltage	3.135	3.30	3.465	V	
IDD	Core supply current		1	5	mA	No load
IDDA	Analog supply current		55	69	mA	No load

LVDS DC Characteristics

Symbol	Characteristics	Min	Typ	Max	Unit	Condition
VOH	Output HIGH voltage		1.375		V	$V_{DD} = 3.3V \pm 5\%$
VOL	Output LOW voltage		1.025		V	$V_{DD} = 3.3V \pm 5\%$
VOD	Output differential voltage		350		mV	
VCM	Common mode output voltage		1.2		V	

NOTE: Outputs terminated with 100 ohms between Q0 and nQ0. See Switching Waveforms.

Preliminary Information



QuietClock™ Series

MQC844001-155

AC Characteristics ($V_{DD} = 2.5V \& 3.3V \pm 5\%$, $T_A = -40^{\circ}C$ to $85^{\circ}C$)

Symbol	Characteristics	Min	Typ	Max	Unit	Condition
F _{OUT}	Output frequency		155.52		MHz	
T _{JIT}	RMS phase jitter (random)		313		fs	Integration Range 12kHz - 20MHz
T _R / T _F	Output rise/fall time	45	100	400	ps	20% to 80%
ODC	Output Duty Cycle	48	50	52	%	

3.3V Carrier Frequency, 155.52MHz

Offset from Carrier	Measured Phase Noise	Unit
100Hz	-92	dBc/Hz
1kHz	-124	dBc/Hz
10kHz	-134	dBc/Hz
100kHz	-131	dBc/Hz
1MHz	-140	dBc/Hz
10MHz	-163	dBc/Hz
40MHz	-164	dBc/Hz

Crystal Characteristics

Parameter	Min	Typ	Max	Unit	Test Conditions
Mode of Oscillation	Fundamental Parallel Resonant				
Frequency		38.88		MHz	
Equivalent Series Resistance (ESR)			50	Ohm	
Shunt capacitor			7	pF	
Drive level			1	mW	

NOTE: Characterized using a 10 pF parallel resonant crystal.

Preliminary Information

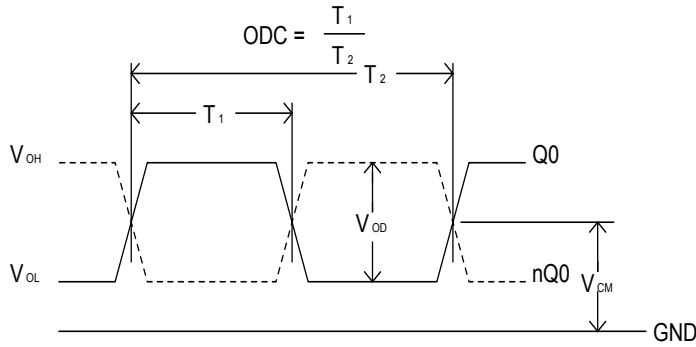


QuietClock™ Series

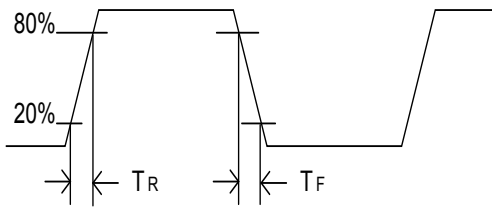
MQC844001-155

Switching Waveforms

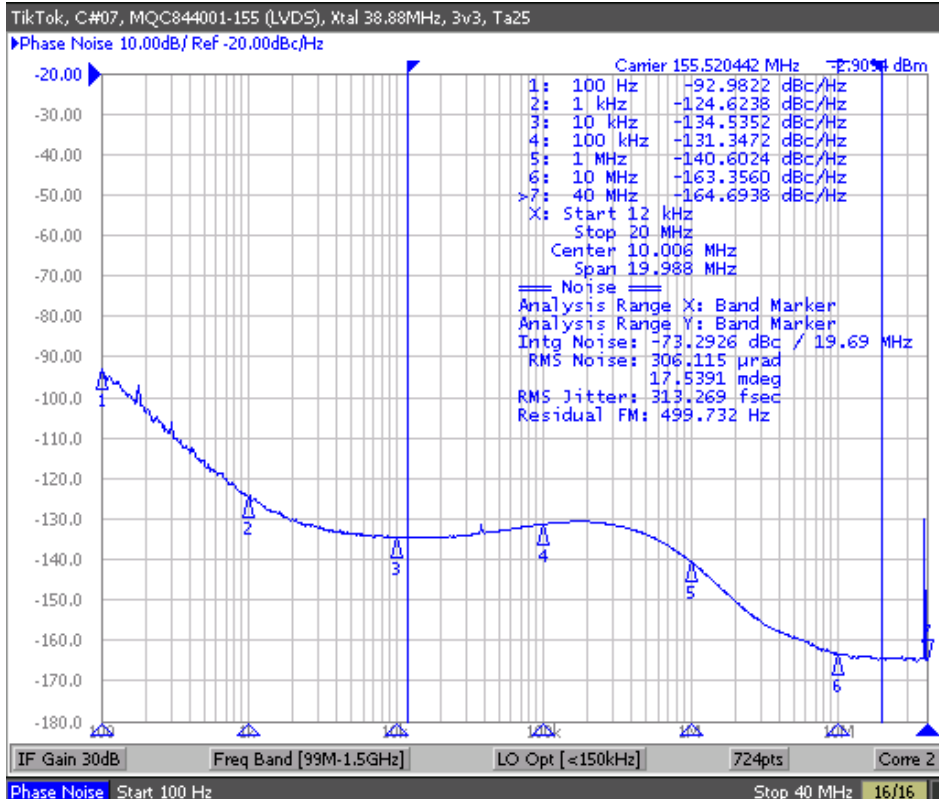
Duty Cycle Timing



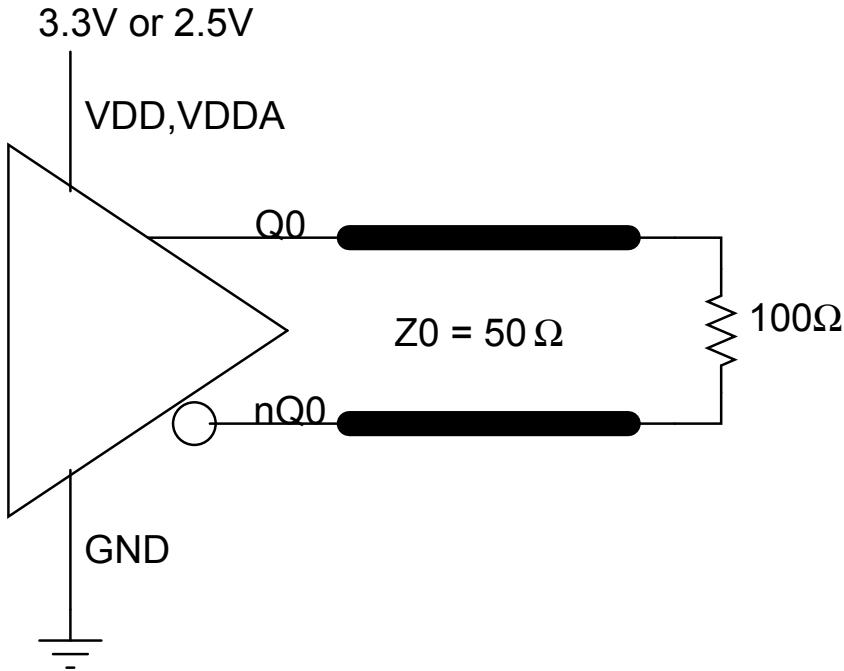
All Outputs Rise/Fall Time



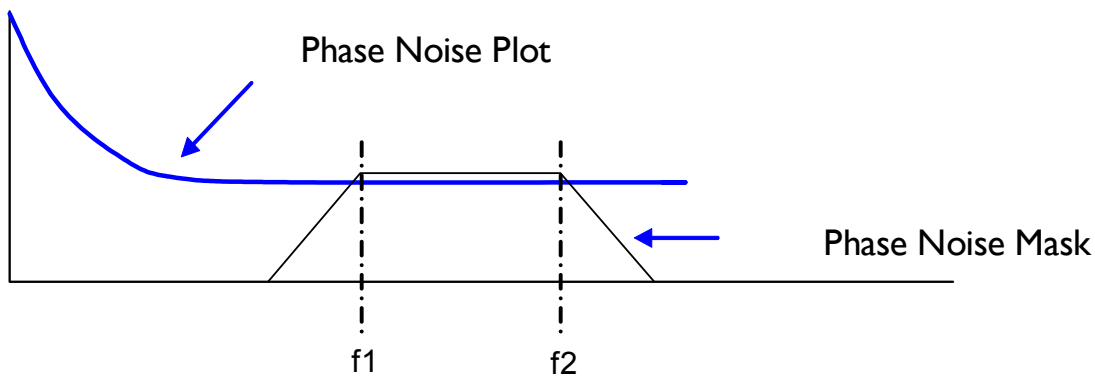
Phase Noise Plot 125 MHz @ 3.3V



LVDS Output Load and Test Circuit



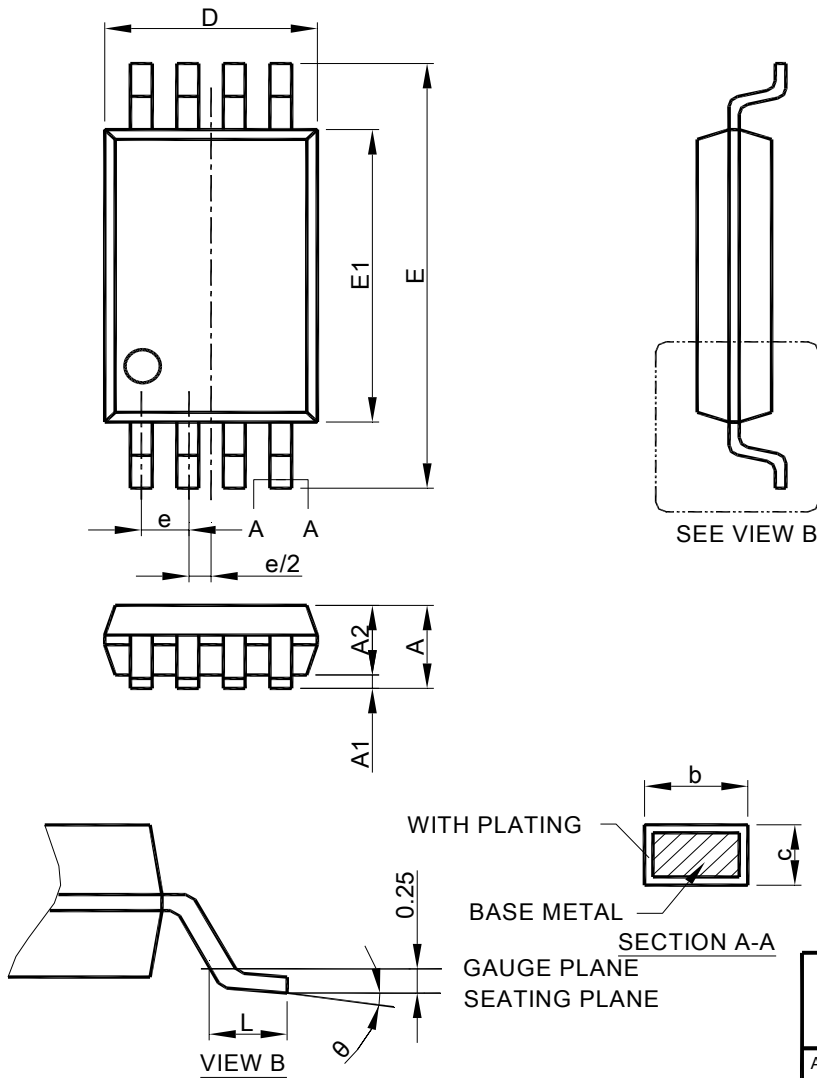
RMS Phase Noise / Jitter



$$\text{RMS Jitter} = \sqrt{\text{Area Under the Phase Noise Plot}}$$

Package Outline Drawing

● TSSOP-8 PACKAGE OUTLINE DRAWING



- Note: 1. Refer to JEDEC MO-153AA.
 2. Dimension "D" does not include mold flash, protrusions or gate burrs. Mold flash, protrusion or gate burrs shall not exceed 6 mil per side.
 3. Dimension "E1" does not include inter-lead flash or protrusions.
 4. Controlling dimension is millimeter, converted inch dimensions are not necessarily exact.

SYMBOL	TSSOP-8	
	MILLIMETERS	
	MIN.	MAX.
A		1.20
A1	0.05	0.15
A2	0.80	1.05
b	0.19	0.30
c	0.09	0.20
D	2.90	3.10
E	6.40 BSC	
E1	4.30	4.50
e	0.65 BSC	
L	0.45	0.75
theta	0°	8°

Preliminary Information



QuietClock™ Series

MQC844001-155

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