CMC159-SERIES

- **Ultra Low power: < 1µA**
- **Fixed 32.768 kHz**
- **No Supply Voltage external bypass capacitors required**
- **Frequency Stability over Temperature as low as ±5ppm**
- **Small SMD package 1.5 x 0.8 mm**

ELECTRICAL SPECIFICATIONS

PARAMETER	SYMBOL	CONDITION	VALUE			UNIT
			Min.	Typ.	Max.	
Frequency nominal	f_0			32.768		kHz
Supply Voltage	Vs	T_a = -40°C to +85°C	1.5		3.63	V
Core Supply Current	Is	Vs = 1.8V, no load condition, LVCMOS, T_a = 25°C Vs = 3.63V max, T_a = -10°C to +70°C no load condition Vs = 1.5V to 3.63V, T_a = -40°C to +85°C, no load condition Is does not include output stage current or load.		0.99 1.52		µA µA
Operating Temperature	T_a	Commercial Industrial	0 -40		+70 +85	°C °C
Frequency Stability vs. Temperature (without initial offset)	$\Delta f/T_a$	Initial offset is defined as the frequency deviation from the nominal value at room temperature after reflow	-5 -10 -20		+5 +10 +20	ppm ppm ppm
Frequency Stability vs. Temperature (with initial offset)	$\Delta f/T_a$	Initial offset is defined as the frequency deviation from the nominal value at room temperature after reflow	-10 -13 -22		+10 +13 +22	ppm ppm ppm
Frequency stability vs. Supply Voltage	$\Delta f/Vs$	Vs= 1.8V±10% Vs= 1.5V ~ 3.63V	-0.75 -1.5		+0.75 +1.5	ppm ppm
Power supply Ramp		T_a = -40°C to +85°C, 0 to 90% Vs			100	ms
Start-up Time	T_{START}	T_a = -40°C ≤ T_a ≤ +60°C, valid output T_a = +60°C ≤ T_a ≤ +70°C, valid output T_a = +70°C ≤ T_a ≤ +85°C, valid output		180	300 350 380	ms ms ms
Long Term Frequency Stability	$\Delta f/T$	T_a=25°C, Vs=3.3V	-1.0		+1.0	ppm
Period Jitter RMS		Cycles = 10,000,T_a=25°C, Vs= 1.5V ~ 3.63V		35		ns
Long Term Jitter		81920 cycles (2.5 sec), 100 samples			2.5	µs p-p

CMC159-SERIES

OUTPUT CHARACTERISTICS

	PARAMETER	SYMBOL	CONDITION	VALUE			UNIT
				Min	Typ.	Max	
LVCMOS	Output Levels	V_{OH}	Vs= 1.5V ~ 3.63V. I_{OH}= -1μA, 15 pF Load	0.9 Vs			V
		V_{OL}	Vs= 1.5V ~ 3.63V. I_{OL}= 1μA, 15 pF Load			0.1Vs	V
	Duty Cycle	DC		48		52	%
	Rise/ Fall Time	Tr/ Tf	10-90% Vs, 15 pF Load, Vs=1.5V to 3.63V 10-90% Vs, 5 pF Load, Vs≥1.62V		100	200 50	ns ns

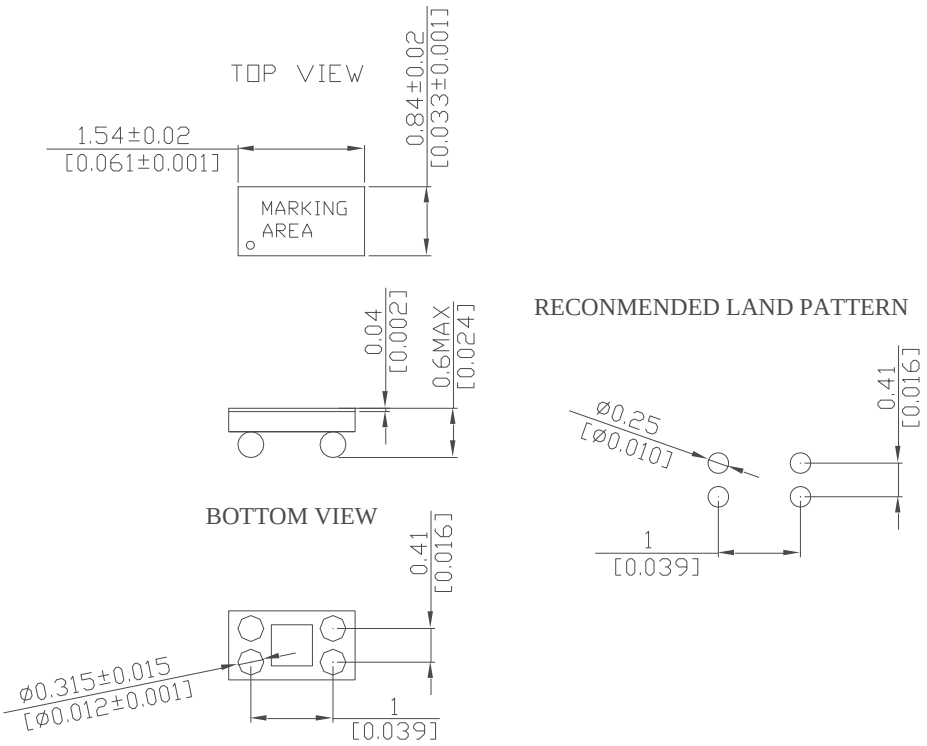
	PARAMETER	SYMBOL	CONDITION	VALUE			UNIT
				Min	Typ.	Max	
Nano Drive™ Programmable Reduced Swing Output	Output Levels	V_{OH}	DC bias programmable output voltage High range Vs=1.5V~3.63V, I_{OH}= -0.2 μA, 10pF Load See Table 1		0.6 to 1.225		V
		V_{OL}	DC bias programmable output voltage Low range Vs=1.5V~3.63V, I_{OH}= 0.2 μA, 10pF Load See Table 1		0.35 to 0.80		V
	Duty Cycle	DC		48		52	%
	Rise/ Fall Time	Tr/ Tf	30-70%(V_{OL} /V_{OH}), 10 pF Load			200	ns
	AC- couple Programmable Output Swing	V sw	Vs= 1.5V ~ 3.63V, 10 pF Load , I_{OH} / I_{OL}=±0.2 μA This output is intended for a receiver that is AC- coupled, see table 1		0.20 to 0.80		V
	Programmable Output Voltage Swing Tolerance		T_a = -40°C to +85°C, Vs=1.5~3.63V	-0.055		0.055	V

Table1. NanoDrive™ **Output levels**

NanoDrive™	VOH (V)	VOL (V)	Swing (mV)	
D26	1.2	0.6	600±55	1.8V logic compatible
D14	1.1	0.4	700±55	1.8V logic compatible
D74	0.7	0.4	300±55	XTAL compatible
AA3	-	-	300±55	XTAL compatible

CMC159-SERIES

MECHANICAL DIMENSIONS AND PIN FUNCTIONING



PIN	SYMBOL	FUNCTION
1	GND	Electrical Ground
2	OUTPUT	Output Signal [1]
3	Vs	Supply Voltage [2]
4	GND	Electrical Ground

Note: 1. Oscillator output signal. When interfacing to an MCU's XTAL, the CLK Out is typically connected to the Receiving IC's XIN pin. Oscillator includes an internal driver. The output swing and operation is not dependent on capacitive loading.

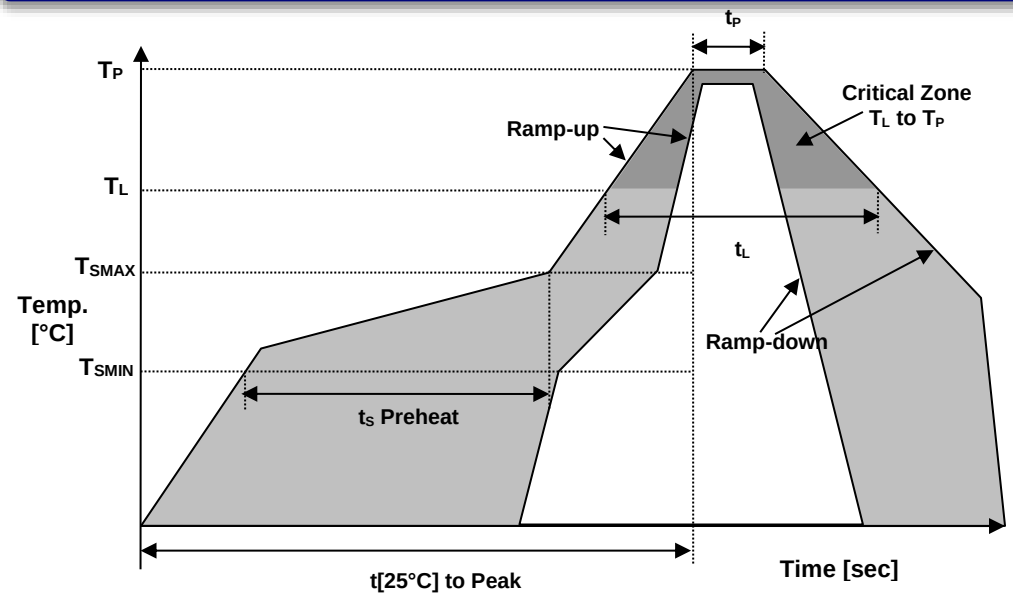
2. Connect to supply voltage 1.5V≤Vs≤3.63V for operation over -40°C to +85°C temperature range. Under normal operation Conditions, Vs does not require external bypass/ decoupling capacitor(s). Internal power supply filtering will reject more than ±150mV p-p with frequency components through 10MHz.

CMC159-SERIES

ENVIRONMENTAL

Soldering	MIL-STD-883F, Method 2003
Moisture Sensitivity Level	MSL 1 at 260°C
Temperature Cycle	JESD22, Method A104
Vibration	MIL-STD-883F, Method 2007
Mechanical Shock	MIL-STD-883F, Method 2002
Storage Temperature	-65° ..... +150°C

REFLOW PROFILE



Recommended Solder Reflow Profile		
Temperature Min Preheat	T_{SMIN}	150°C
Temperature Max Preheat	T_{SMAX}	175°C
Time (T_{SMIN} to T_{SMAX})	t_S	60-180 sec.
Temperature	T_L	217°C
Peak Temperature	T_P	260°C
Ramp-up rate	R_{UP}	3°C/sec max.
Ramp-down rate	R_{DOWN}	6°C/sec max.
Time within 5°C of Peak Temperature	t_P	10 sec max.
Time t[25°C] to Peak Temperature	t[25°C] to Peak	10 sec.

CMC159-SERIES

Time	t_L	60-150 sec.

ORDERING INFORMATION

SERIES	SUPPLY VOLTAGE (V)	Frequency Stability	TEMP RANGE (°C)	Output Signal	-	OUTPUT FREQUENCY (kHz)
CMC159	15: Vs=1.5V~3.63V	A: ±75 ppm B: ±100ppm C: ±200ppm	U: -10~70 V: -40~85	1: LVCMOS NanoDrive™ Reduced Swing Output setting options A: AC-coupled D: DC- coupled 26:D26 14:D14 74:D74 3:AA3 See table 1	-	32.768

APPROVALS	
Eng. approval, date:	SP, 07 / 25 / 2016
Created by, date:	SP, 07 / 25 / 2016
Revision: A	