
1.8V, 1x Ultra Low Power Mobile EMI/Noise Management IC

Features

- FCC approved method of EMI attenuation.
- Generates a 1X low EMI Phase Modulated replication of the input signal.
- Vdd 1.6V - 2.0V, 10 MHz to 28 MHz
- “SaΦic™” phase controlled technology
- 4L-pin DFN 1.0mmx1.0mm package
- Low EMI buffer for enhanced EMI reduction
- Operating Temperature -40°C to 85°C

Product Description

The LC600 is a versatile 1x Active EMI management IC's designed to provide system wide reduction of Electromagnetic Interference (EMI) and Radio Frequency Interference (RFI) from clock and data sources. This allows significant system cost savings by reducing the number of circuit board layers, ferrite beads, shielding and other passive components that are traditionally required to pass EMI regulations.

The LC60x family of mobile active EMI management ICs is unique in it's design and is based on LFC's proprietary “SaΦic™” phase controlled Active EMI

management technology. This allows operation on aperiodic as well as periodic signals. By the precise placement of the edges of the reconstructed input signal, the peak energy of the output is distributed over a wider and controlled energy band thereby significantly lowering system EMI compared to the typical narrow band signal produced by oscillators and most frequency generators.

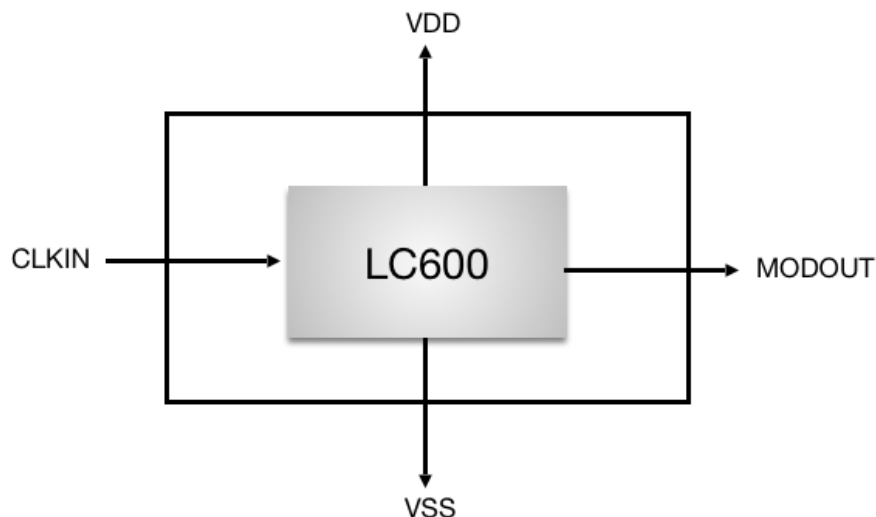
The LC600 has an input frequency range of 10 MHz to 28MHz over a voltage range of 1.6V to 2.0V. The device has only 4 pins providing the smallest footprint ideally suited for mobile and space constrained applications..

The device is available in a 4-pin DFN package.

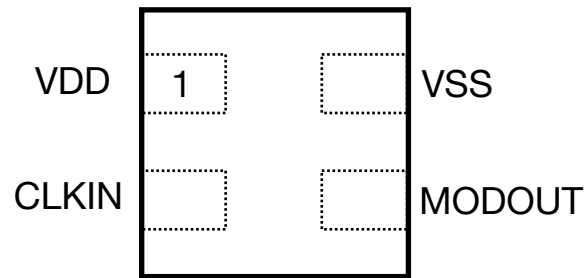
Applications

The LC60x series is targeted towards LED displays, Camera modules, Cell phones, MIDs, Netbooks and numerous other “power and space” sensitive applications.

Block Diagram



Pin Configuration



Pin Description

Pin#	Pin Name	Type	Description
1	VDD	P	System Power Supply pin
2	CLKIN	I	Clock input
3	MODOUT	O	1X phase modulated buffered output.
4	VSS	P	System ground reference input.

Operating Conditions

Parameter	Description	Min	Max	Unit
V _{DD(1.8V)}	Supply Voltage	1.6	2.0	V
T _A	Operating Temperature (Ambient Temperature)	-40	+85	°C
C _L	Load Capacitance		15	pF
C _{IN}	Input Capacitance		5	pF

Absolute Maximum Rating

Symbol	Parameter	Rating	Unit
V _{in}	Voltage on any pin with respect to Ground	-0.5 to +2.6	V
T _{STG}	Storage temperature	-65 to +125	°C
T _s	Max. Soldering Temperature (10 sec)	260	°C
T _J	Junction Temperature	150	°C
T _{DV}	Static Discharge Voltage (As per JEDEC STD22- A114-B)	2	KV

Note: These are stress ratings only and are not implied nor guaranteed for functional use. Exposure to absolute maximum ratings for prolonged periods of time may affect device reliability.

Functional Table

Part Number	Input Freq. Range (MHz)	Frequency (MHz)	Deviation (%)
LC600 (1.8V)	10~28	24	±0.65%
		27	±0.70%
		28	±0.73%

Note: Specified at V_{DD} 1.8V and room temperature. Frequency deviation can vary over voltage and temperature by 20%

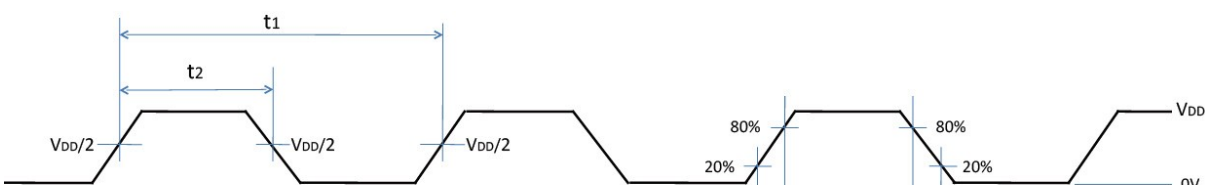
DC Electrical Characteristics (1.8 +/-0.2V)

Parameter	Description	Test Conditions	Min	Typ	Max	Unit
V _{DD}	Supply Voltage		1.6	1.8	2.0	V
V _{IH}	Input HIGH Voltage		0.66*V _{DD}			V
V _{IL}	Input LOW Voltage				0.33*V _{DD}	V
I _{IH}	Input HIGH Current (pin 1)	V _{IN} = V _{DD}			10	μA
I _{IL}	Input LOW Current (pin1)	V _{IN} = 0V			10	μA
V _{OH}	Output HIGH Voltage	I _{OH} = -4mA	0.75*V _{DD}			V
V _{OL}	Output LOW Voltage	I _{OL} = +4mA			0.25*V _{DD}	V
I _{CC}	Static Supply Current	CLKIN = VSS		0.1	1.0	μA
I _{DD}	Dynamic Supply Current	24 MHz, 1.8V	Unloaded	3.5	4.0	mA
			10 pF load	4.0	5.0	

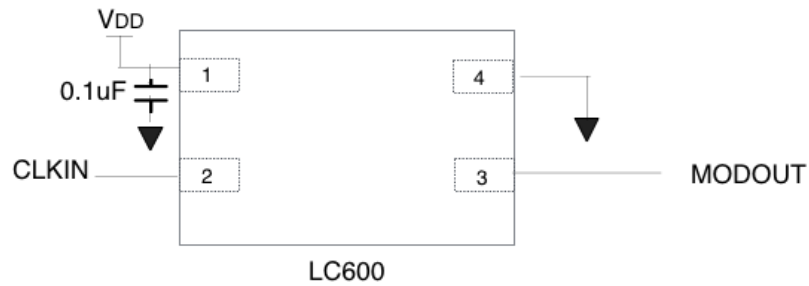
Switching Characteristics (1.8V +/-0.2V)

Parameter	Description	Test Conditions	Min	Typ	Max	Unit
INPUT	Input Frequency		10	24	28	MHz
MODOUT	Output Frequency		10	24	28	
T _d	Duty Cycle ¹	Measured at V _{DD} /2	45	50	55	%
t ₃	Output Rise Time ¹	Measured between 20% to 80%	4.0	5.0	6.0	nS
t ₄	Output Fall Time ¹	Measured between 80% to 20%	4.3	5.3	6.3	nS

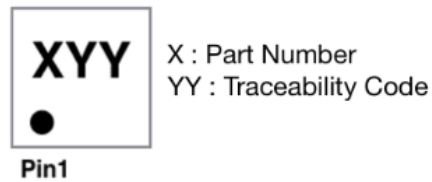
Notes: 1. All parameters specified with 24MHz without loaded outputs and V_{DD} 1.8V.

Duty Cycle Timing


Application Schematic



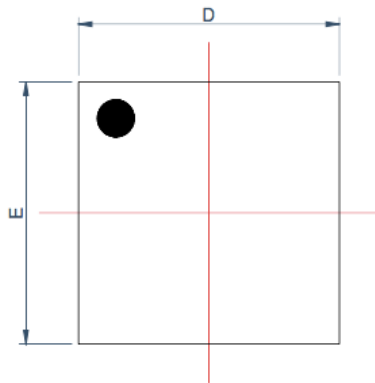
Marking Information



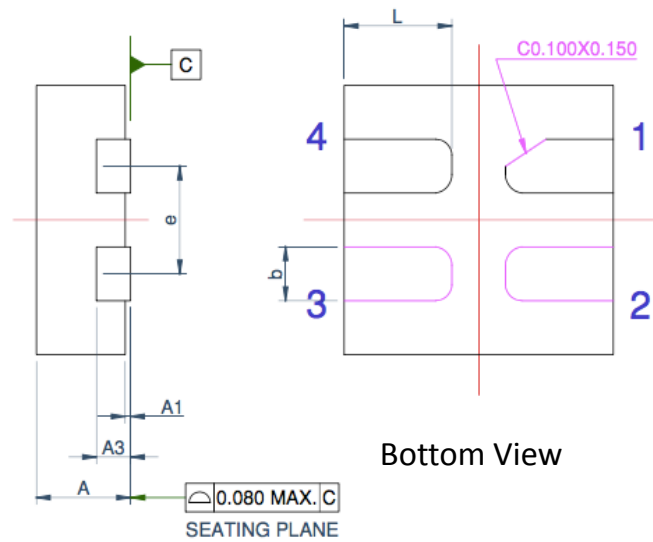
Ordering Information

Part Number	Temp. Grade	Temp. Range	IC Marking	IC Package	Tape & Reel
LC600I	Industrial	-40°~85°C	F	4L-DFN 1.0mm x 1.0mm	8,000 pcs/ Reel

Package Dimension
4L-DFN

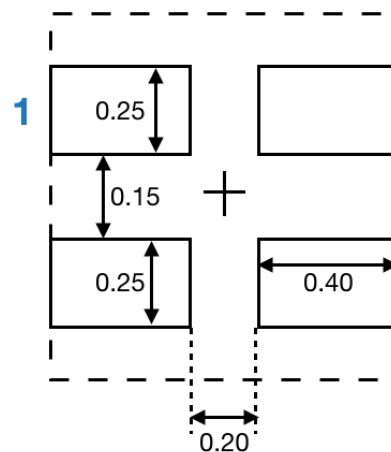


Top View



Bottom View

SYMBOLS	MIN.	NOM.	MAX.
A	0.30	0.35	0.40
A1	0.00	0.02	0.05
A3	0.127 REF.		
b	0.15	0.20	0.25
D	1.00 BSC		
E	1.00 BSC		
e	0.40 BSC		
L	0.35	0.40	0.45



Recommended footprint

Revision History

Revision Number	Date of Release	Changes
1.0	3/12/2019	1) Preliminary datasheet
1.1	3/21/2019	1) Update package dimension 2) Update IC marking
1.2	6/17/2019	1) Update frequency, AC/DC characteristics
1.3	6/21/2019	1) Update Application Schematics
1.4	8/27/2019	1) Update t3/t4
1.5	12/12/2019	1) Update t3/t4 with 24MHz, 15pF loaded and Idd current
1.6	3/3/2020	1) Update Application Schematic 2) Add Marking Information