

Specifications

Absolute Maximum Ratings at $T_a = 25^\circ\text{C}$, $V_{SS} = 0\text{ V}$

Values in parentheses are for the LC7215F and LC7215FM.

Parameter	Symbol	Conditions	Ratings	Unit
Maximum supply voltage	$V_{DD\text{ max}}$	V_{DD}	-0.3 to +6.5	V
Input voltage	V_{IN1}	All input pins	-0.3 to $V_{DD} + 0.3$	V
	V_{IN2}	CE, CL, DATA	(Note) -0.3 to +6.5	V
Output current	I_{OUT}	AOUT	0 to 5	mA
Output voltage	V_{OUT1}	AOUT	-0.3 to +15	V
	V_{OUT2}	\overline{SYC} , \overline{TB}	-0.3 to +6.5	V
	V_{OUT3}	All output pins except V_{OUT1} and V_{OUT2}	-0.3 to $V_{DD} + 0.3$	V
Allowable power dissipation	$P_d\text{ max}$	$T_a \leq 85^\circ\text{C}$	150	mW
Operating temperature	T_{opr}		-40 to +85	$^\circ\text{C}$
Storage temperature	T_{stg}		-55 to +125	$^\circ\text{C}$

Note: Voltage that is applied to the resistors when resistors totaling at least 10 k Ω are connected to a pin in series.

Allowable Operating Conditions at $V_{SS} = 0\text{ V}$

Values in parentheses are for the LC7215F and LC7215FM.

Parameter	Symbol	Conditions	min	typ	max	Unit
Supply voltage	V_{DD1}	V_{DD}	(4.5)3.0		(5.5)5.5	V
	V_{DD2}	V_{DD} (Crystal OSC oscillation guaranteed)	3.0		5.5	V
High-level input voltage	V_{IH}	CE, CL, DATA	2.0		V_{DD1}	V
Low-level input voltage	V_{IL}	CE, CL, DATA	0		0.5	V
Output voltage	V_{OUT1}	AOUT			13	V
	V_{OUT2}	\overline{SYC} , \overline{TB}			5.5	V
Input frequency	f_{IN1}	PIN: Sine wave, capacitive coupling V_{DD1} , *S = 1	(2.3)2.3		(20)13	MHz
	f_{IN2}	PIN: Sine wave, capacitive coupling V_{DD1} , *S = 0	0.5		2.5	MHz
Oscillation guaranteed crystal oscillator	X'tal	XIN, XOUT: $C_I \leq 30\ \Omega$	8.00	11.16	12.00	MHz
Input amplitude	V_{IN1}	PIN: Square wave, capacity connection V_{DD1} , *S = 1	100		1000	mVrms
	V_{IN2}	PIN: Square wave, capacity connection V_{DD1} , *S = 0	100		1000	mVrms
Power supply	—	V_{DD} , V_{SS} : A capacitor of at least 1000 pF must be inserted.	1000			pF

LC7215, 7215F, 7215FM

Electrical Characteristics within the allowable operating ranges

Values in parentheses are for LC7215F and LC7215FM.

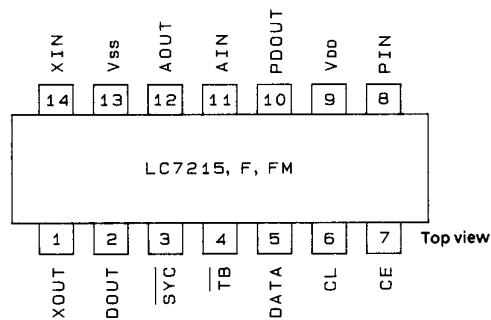
Parameter	Symbol	Conditions	min	typ	max	Unit
High-level input currents	I_{IH1}	XIN: $V_I = V_{DD}$			20	μA
	I_{IH2}	PIN: $V_I = V_{DD}$			40	μA
	I_{IH3}	CE, CL, DATA: $V_I = V_{DD}$			3.0	μA
	I_{IH4}	AIN: $V_I = V_{DD}$		0.01	1.0	μA
Low-level input currents	I_{IL1}	XIN: $V_I = V_{SS}$			20	μA
	I_{IL2}	PIN: $V_I = V_{SS}$			40	μA
	I_{IL3}	CE, CL, DATA: $V_I = V_{SS}$			3.0	μA
	I_{IL4}	AIN: $V_I = V_{SS}$		0.01	1.0	μA
High-level output voltages	V_{OH1}	DOUT: $I_O = 1\text{ mA}$	$V_{DD} - 1.0$			V
	V_{OH2}	PDOUT: $I_O = 0.5\text{ mA}$	$V_{DD} - 1.0$			V
Low-level output voltages	V_{OL1}	DOUT: $I_O = -1\text{ mA}$			1.0	V
	V_{OL2}	PDOUT: $I_O = -0.5\text{ mA}$			1.0	V
	V_{OL4}	SYC, TB: $I_O = 0.5\text{ mA}$			1.0	V
	V_{OL5}	AOUT: $I_O = 1\text{ mA}$			1.0	V
Output off-state leakage currents	I_{OFF1}	SYC, TB: $V_O = V_{DD}$			3.0	μA
	I_{OFF2}	AOUT: $V_O = 13\text{ V}$			5.0	μA
Tristate output High-level off-state leakage current	I_{OFFH}	PDOUT: $V_O = V_{DD}$		0.01	1.0	nA
Tristate output Low-level off-state leakage current	I_{OFFL}	PDOUT: $V_O = V_{SS}$		0.01	1.0	nA
High-level output voltage	V_{OH3}	XOUT: $I_O = -0.1\text{ mA}$	$V_{DD} - 1.0$			V
Low-level output voltage	V_{OL3}	XOUT: $I_O = 0.1\text{ mA}$			1.0	V
Supply current	I_{DD1}	V_{DD} : $f_{IN1} = 13\text{ MHz}$, *S = 1 (High speed) (Note 1)			10	mA
		$f_{IN1} = 20\text{ MHz}$, *S = 1 (High speed) (Note 1)			(12)	mA
	I_{DD2}	V_{DD} : $f_{IN1} = 2.5\text{ MHz}$, *S = 0 (Low speed) (Note 1)			5	mA
	I_{DD3}	V_{DD} : $V_{DD} = 5.5\text{ V}$, *O = 0, P = 1 (Note 2)		1.2	2.0	mA
		$V_{DD} = 4.5\text{ V}$, *O = 0, P = 1 (Note 2)		0.7	1.5	mA
		$V_{DD} = 3.0\text{ V}$, *O = 0, P = 1 (Note 2)	0.4	1.0	mA	

* S, O and P are serial control bits.

Note 1. $V_{IN1} = V_{IN2} = 100\text{ mVms}$. The 11.16 MHz crystal is connected to XIN and XOUT. All other inputs are connected to V_{SS} and all other outputs are open.

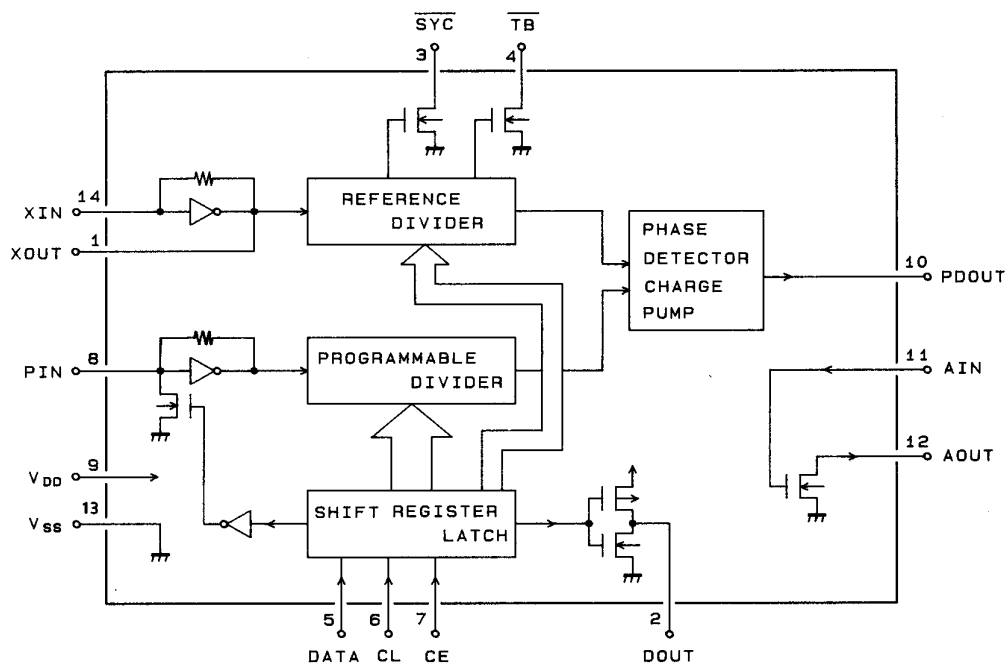
2. The 11.16 MHz crystal is connected to XIN and XOUT. All other inputs are connected to V_{DD} and all other outputs are open. (Backup mode when PLL is halted.)

Pin Assignment



LC7215, 7215F, 7215FM

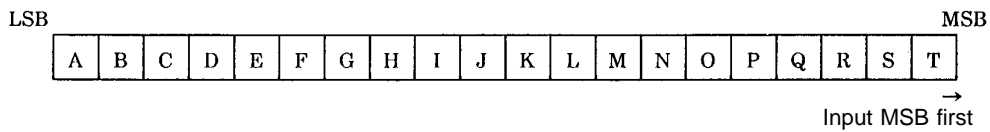
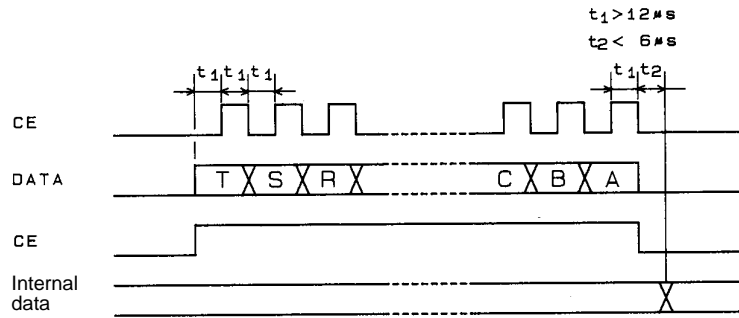
Block Diagram



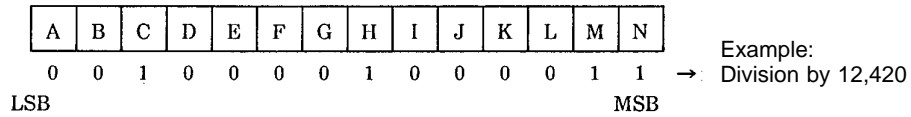
Pin Description

Name	Description
XIN, XOUT	11.16 MHz crystal oscillator connection, feedback resistance built-in
PIN	Local oscillator signal input
V _{DD} , V _{SS}	Power supply
DATA, CL, CE	Data input
DOUT	Single bit data output
AIN, AOUT	Low-pass filter amplifier
PDOUT	Charge pump output
TB	8 Hz time-base output
SYC	60 kHz controller clock output

Data Input



(1) A to N: Divider data



(2) O, P: Mode selection

Mode	O	P	DOUT	\overline{TB}	Operation
NOR1	0	0	T	8 Hz	Normal operation (with PLL operating)
NOR2	0	1	T	8 Hz	Normal operation (backup when PLL is halted)
TEST1	1	0			(Device test mode)
TEST2	1	1			(Device test mode)

(3) Q, R: Reference frequency selection

Q	R	Reference frequency
0	0	9 kHz
0	1	10 kHz
1	0	1 kHz
1	1	5 kHz

(4) S: Programmable divider input sensitivity switch

S = 1: for High speed
S = 0: for Low speed

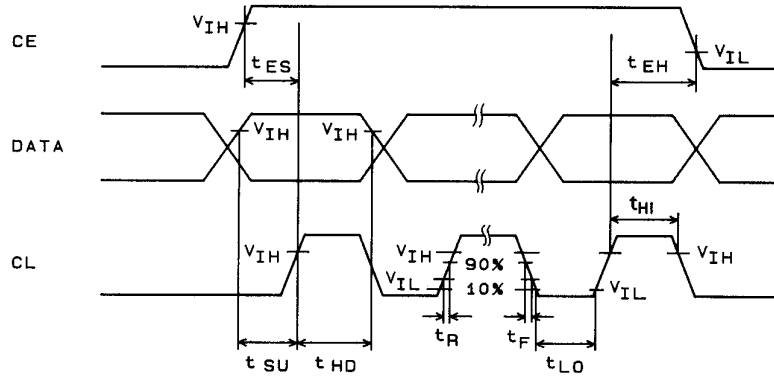
(5) T: Output to DOUT

T = 1: DOUT = 1
T = 0: DOUT = 0

LC7215, 7215F, 7215FM

Data Input Timing

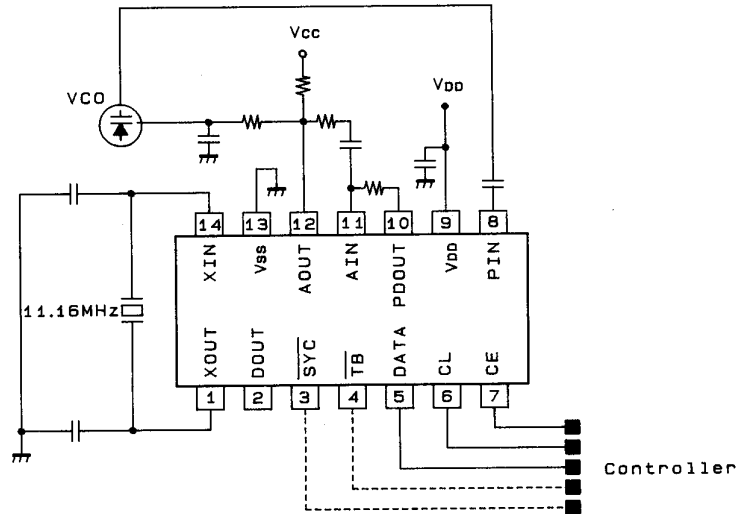
$V_{IH} = 2.0$ to V_{DD} , $V_{IL} = 0$ to 0.5 V
 $X'_{tal} = 8.00$ to 11.16 (typ) to 12.00 MHz
 Data latch: Rising edge of CL



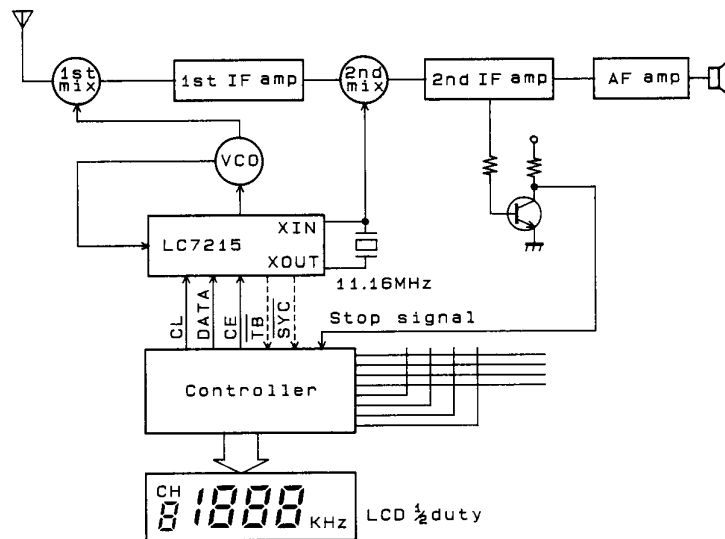
Item	Symbol	11.16 MHz crystal	Other crystal frequencies	Effective value
Enable setup time	t_{ES}	At least $12 \mu s$	At least $2 \times (1/f_{Xtal} \times 62)$	1/2 of the value shown at left
Enable hold time	t_{EH}	↑	↑	
Data setup time	t_{SU}	↑	↑	
Data hold time	t_{HD}	↑	↑	
Clock Low-level time	t_{LO}	↑	↑	
Clock High-level time	t_{HI}	↑	↑	
Rise time	t_R	$1 \mu s$ or less	$1 \mu s$ or less	
Fall time	t_F	↑	↑	

LC7215, 7215F, 7215FM

(1) Sample Application Circuit



(2) Double-conversion Receiver



- No products described or contained herein are intended for use in surgical implants, life-support systems, aerospace equipment, nuclear power control systems, vehicles, disaster/crime-prevention equipment and the like, the failure of which may directly or indirectly cause injury, death or property loss.
- Anyone purchasing any products described or contained herein for an above-mentioned use shall:
 - ① Accept full responsibility and indemnify and defend SANYO ELECTRIC CO., LTD., its affiliates, subsidiaries and distributors and all their officers and employees, jointly and severally, against any and all claims and litigation and all damages, cost and expenses associated with such use:
 - ② Not impose any responsibility for any fault or negligence which may be cited in any such claim or litigation on SANYO ELECTRIC CO., LTD., its affiliates, subsidiaries and distributors or any of their officers and employees jointly or severally.
- Information (including circuit diagrams and circuit parameters) herein is for example only; it is not guaranteed for volume production. SANYO believes information herein is accurate and reliable, but no guarantees are made or implied regarding its use or any infringements of intellectual property rights or other rights of third parties.

This catalog provides information as of December, 1997. Specifications and information herein are subject to change without notice.