



SANYO Semiconductors

## DATA SHEET

An ON Semiconductor Company

# LC01707PLF — CMOS LSI FM multiple tuner IC

## Overview

LC01707PLF is a vehicle-mounted FM multiple tuner IC with FM-FE, IF, IF-Filter, PLL, FM-DEMO and LPF incorporated. An FM multiple tuner can be developed with this one chip. It makes up a small-sized FM multiple tuners which can be mounted on PND.

## Functions

- It is the FM tuner IC exclusively for the FM multiple.
- Image reduction complex BPF is incorporated
- Narrow Band IF AGC is incorporated
- DLL detection method is adopted for the FM detection circuit, and it is not necessary to adjust.
- LPF for the carrier removal is incorporated.
- It is a BUS control tuner IC which can be controlled by controlled by I<sup>2</sup>C BUS.
- LNA is incorporated
- Wide / Narrow Band RF AGC is incorporated
- Image rejection is adopted
- IC requires fewer external components.

## Specifications

Maximum Ratings at Ta = 25°C

Parameter	Symbol	Conditions	Ratings	Unit
Supply voltage	V <sub>DD</sub> max		4.3	V
Maximum input voltage	V <sub>DD</sub> H		4.3	V
Maximum output voltage	V <sub>DD</sub> L		4.3	V
Power dissipation	P <sub>d</sub> max	Ta = 85°C *1	700	mW
Operating ambient	T <sub>opr</sub>		-40 to 85	°C
Storage temperature	T <sub>stg</sub>		-55 to 150	°C
Maximum junction temperature	T <sub>j</sub> max		150	°C

\*1: Board size: 80mm × 70mm × 1.6mm Glass epoxy double-sided board

■ Any and all SANYO Semiconductor Co.,Ltd. products described or contained herein are, with regard to "standard application", intended for the use as general electronics equipment. The products mentioned herein shall not be intended for use for any "special application" (medical equipment whose purpose is to sustain life, aerospace instrument, nuclear control device, burning appliances, transportation machine, traffic signal system, safety equipment etc.) that shall require extremely high level of reliability and can directly threaten human lives in case of failure or malfunction of the product or may cause harm to human bodies, nor shall they grant any guarantee thereof. If you should intend to use our products for new introduction or other application different from current conditions on the usage of automotive device, communication device, office equipment, industrial equipment etc. , please consult with us about usage condition (temperature, operation time etc.) prior to the intended use. If there is no consultation or inquiry before the intended use, our customer shall be solely responsible for the use.

■ Specifications of any and all SANYO Semiconductor Co.,Ltd. products described or contained herein stipulate the performance, characteristics, and functions of the described products in the independent state, and are not guarantees of the performance, characteristics, and functions of the described products as mounted in the customer's products or equipment. To verify symptoms and states that cannot be evaluated in an independent device, the customer should always evaluate and test devices mounted in the customer's products or equipment.

SANYO Semiconductor Co., Ltd.

<http://semicon.sanyo.com/en/network>

# LC01707PLF

## Recommended Operating Conditions at Ta = 25°C

Parameter	Symbol	Conditions	Ratings	Unit
Supply voltage range	V <sub>DD</sub>		3.0 to 3.6	V
Recommended supply temperature	V <sub>DD</sub>		3.3	V

## Electrical Characteristics at Ta = 25°C, V<sub>DD</sub> = 3.3V,

fc = 83MHz, VIN=60dBμVEMF, fm=1kHz, Audio filter: HPF=100Hz, LPF=15kHz

Resister setting: IF AGC (02h) =6(110), RF AGC (00h) =0(0000)

DLL demodulator loop gain setting (09h) =1(01), Mono multi center setting (09h) =7(0111)

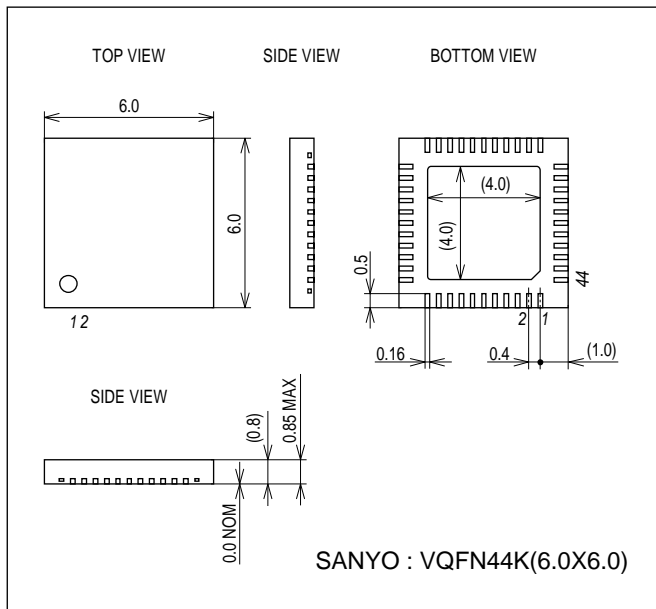
Parameter	Symbol	Conditions	Ratings			Unit
			min	typ	max	
Practical sensitivity 1 (S/N30dB)	SN30	22.5kHz dev, fm=1kHz, S/N=30dB input level		12	20	dBμEMF
Practical sensitivity 2 (S/N10dB)	SN10	7.5kHz dev, fm=76kHz, S/N=10dB input level *1		27		dBμEMF
S/N1	SN1	22.5kHz dev, fm=1kHz	34	44		dB
S/N2	SN2	7.5kHz dev, fm=76kHz *1		21		dB
Total harmonic distortion rate 1	THD_1	22.5kHz dev, fm=1kHz		0.5		%
Total harmonic distortion rate 2	THD_2	75.0kHz dev, fm=1kHz		0.5		%
AM suppression ratio	AMR	AM 30% mod	34	44		dB
Image rejection ratio	IMR	22.5kHz dev, fm=1kHz		32		dB
Audio output level 1	AD01	7.5kHz dev, fm=1kHz *1	26	39	70	mVrms
Audio output level 2	AD02	7.5kHz dev, fm=76kHz *1	15	23	41	mVrms
Consumption current	IDD	No signal input		106	170	mA

\*1: Audio filter: HPF=100Hz, LPF=OFF

## Package Dimensions

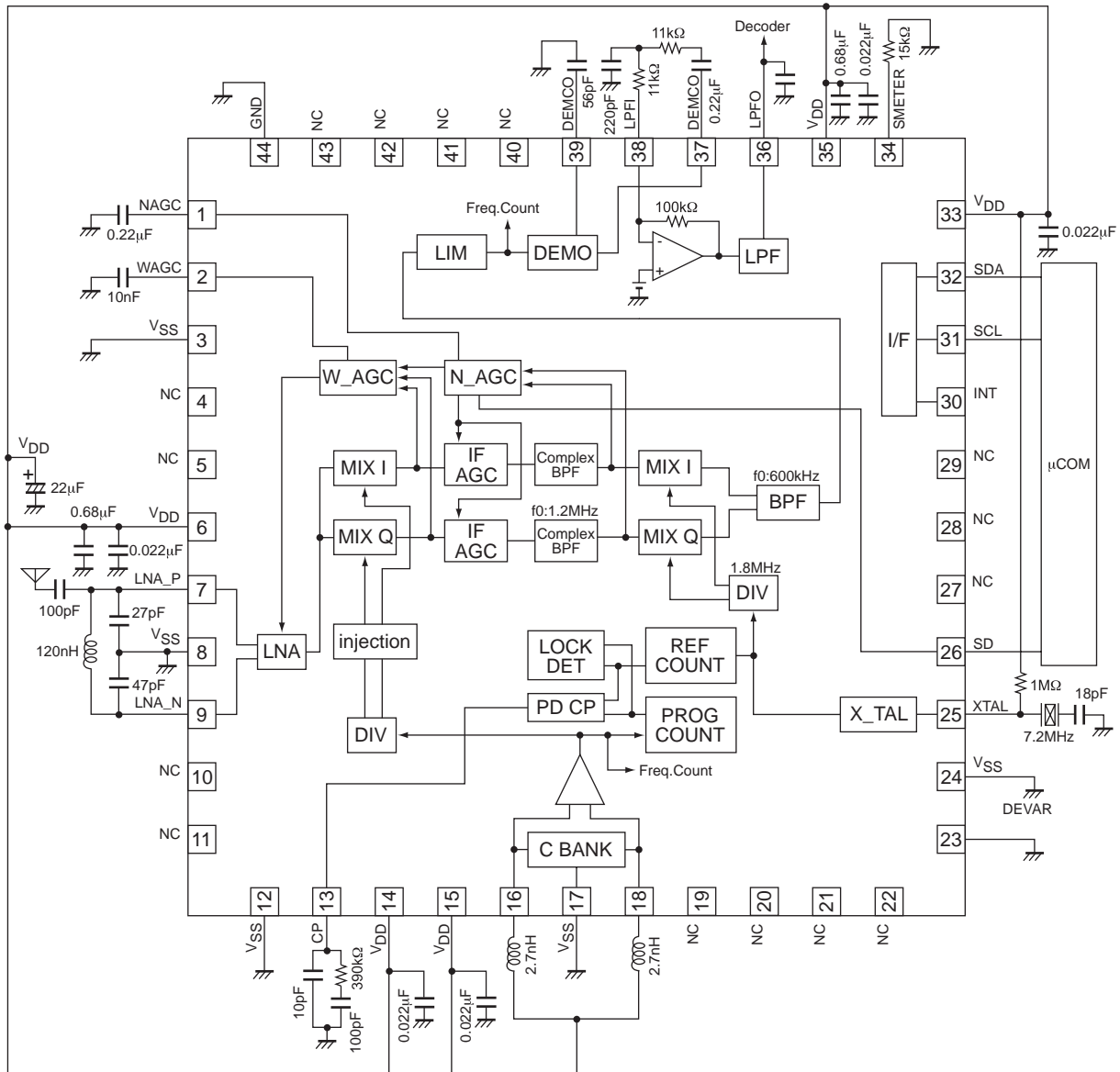
unit : mm (typ)

3408



# LC01707PLF

## Example of applied circuit (constant is tentative)



- \* Culprits oscillation circuit is used in this IC as a crystal oscillation circuit. Caution is required for layout of the board because oscillation between pin25 and power source and GND line.
- \* The margin of crystal oscillation changes due to the combination of the IC, a crystal oscillator and a board layout. This independent IC does not quarantine the oscillation operation.
- \* This IC uses the signal of FM band frequency ( $V_{DD}$  divided into 1/4) which leaks into ANT pin. If the VCO leakage affects the performance of the system, make sure to connect an isolator on ANT pin path.

Component	Parameter	Value	Type	Supplier
L1/L2	Local OSC coil	2.7nH	C2012H-2N7D-RD	SAGAMI
L3	Differential input coil	120nH	C2012H-R12G-RC	SAGAMI
X1	Crystal	7.2MHz	SMD-49	KDS
			AT-49	KDS
			EXS00A-A01145	NDK
			EXS00A-A01146	NDK

# LC01707PLF

## Pin Description

Pin No.	Pin name	I/O	Function
1	NAGC	O	Narrow band AGC detection capacitance connecting pin
2	WAGC	O	Wide band AGC detection capacitance connecting pin
3	V <sub>SS</sub>	P	GND pin for IF
4	NC	-	
5	NC	-	
6	V <sub>DD</sub>	P	Supply pin for LNA
7	LNA_A	I	LNA +input pin
8	V <sub>SS</sub>	P	GND pin for LNA
9	LNA_N	I	LNA -input pin
10	NC	-	
11	NC	-	
12	V <sub>SS</sub>	P	GND pin for 1 <sup>st</sup> Mixer
13	CP	O	PLL charge pump capacitance connecting pin
14	V <sub>DD</sub>	P	Supply pin 1 <sup>st</sup> Mixer
15	V <sub>DD</sub>	P	Supply pin for local oscillation
16	LO_1	O	Inductor connecting pin for local oscillation
17	V <sub>SS</sub>	P	GND pin for local oscillation
18	LO_2	O	Inductor connecting pin for local oscillation
19	NC	-	
20	NC	-	
21	NC	-	
22	NC	-	
23	DEVER	I	Device address setting pin
24	V <sub>SS</sub>	P	GND pin for PLL and logic
25	XTAL	I	Crystal resonator connecting pin (Clock input pin)
26	SD	O	Station detector pin
27	NC	-	
28	NC	-	
29	NC	-	
30	INT	O	Test pin
31	SCL	I	Serial data clock input
32	SDA	I	serial data input-output
33	V <sub>DD</sub>	P	Supply pin for PLL and logic
34	SMETER	O	S-meter output
35	V <sub>DD</sub>	P	Supply pin for IF
36	LPFO	O	Demodulation output (after band limitation)
37	DEMOO	O	Demodulation output
38	LPFI	I	Demodulation signal input pin
39	DEMOC	O	Capacitance connecting pin for demodulation detection
40	NC	-	
41	NC	-	
42	NC	-	
43	NC	-	
44	GND	P	GND pin

# LC01707PLF

## Pin Function

Pin No.	Pin name	Function	Equivalent circuit
1	NAGC	Narrow band AGC detection capacitor connection pin.	
2	WAGC	Wide band AGC detection capacitor connection pin.	
3	VSS	GND pin for IF.	
4	NC	No connection.	
5	NC	No connection.	
6	VDD	Supply pin for LNA.	
7	LNA_P	Pin 7 is + input pin for LNA.	
8	VSS	Pin 8 is GND pin for LNA.	
9	LNA_N	Pin 9 is - input pin for LNA.	
10	NC	No connection.	
11	NC	No connection.	
12	VSS	GND pin 1st mixer for the 1 <sup>st</sup> mixer.	
13	CP	PLL charge pump capacitor connection pin.	
14	VDD	Supply pin for the 1 <sup>st</sup> mixer.	
15	VDD	Supply pin for local oscillator.	

Continued on next page.

# LC01707PLF

Continued from preceding page.

Pin No.	Pin name	Function	Equivalent circuit
16 17 18	LO_1 VSS LO_2	Pin 16 is inductor connection pin for local oscillator. Pin 17 is GND pin for local oscillator. Pin 18 is inductor connection pin for local oscillator.	
19	NC	No connection.	
20	NC	No connection.	
21	NC	No connection.	
22	NC	No connection.	
23	DEVAR	Device address setting pin.	
24	VSS	PLL_logic GND pin.	
25	XTAL	Crystal oscillator connection pin (clock input pin).	
26 30	SD INT	Station detector pin. Test monitor pin.	
27	NC	No connection.	
28	NC	No connection.	
29	NC	No connection.	

Continued on next page.

# LC01707PLF

Continued from preceding page.

Pin No.	Pin name	Function	Equivalent circuit
31	SCL	Serial data clock input.	
32	SDA	Serial data input/ output.	
33	VDD	PLL_logic supply voltage pin.	
34	SMETER	S-meter output.	
35	VDD	IF supply voltage pin	
36	LPFO	Demodulator output (After band limit).	
37	DEMOO	Demodulator output.	
38	LPFI	Demodulator signal input pin.	

Continued on next page.

# LC01707PLF

Continued from preceding page.

Pin No.	Pin name	Function	Equivalent circuit
39	DEMOC	Capacitor connection pin for demodulator detection.	
40	NC	No connection.	
41	NC	No connection.	
42	NC	No connection.	
43	NC	No connection.	
44	GND	GND pin.	



**Communication specification**

Communication specifications are indicated as below:

Serial Interface (I<sup>2</sup>C-bus);

Sending and receiving data through I<sup>2</sup>C-bus that consists of two bus lines of a serial data line (SDA) and a serial clock line (SCL). This bus enables 8-bit bi-directional serial data to transmit at the maximum speed of 400kbits (fast mode). This is not compatible with Hs mode.

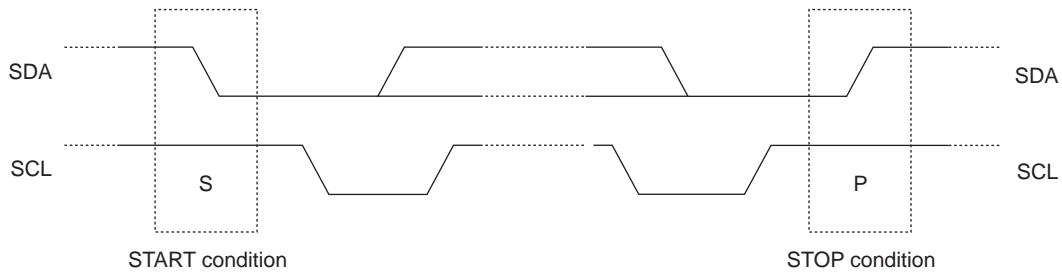
Terms used in I<sup>2</sup>C

The following terms are used in I<sup>2</sup>C

Terms	Description
Transmitter	Device to send data to the bus
Receiver	Device to receive from the bus
Master	Device to start data transmission, generate signal, and terminate data transmission
Slave	Device of which address is designated master

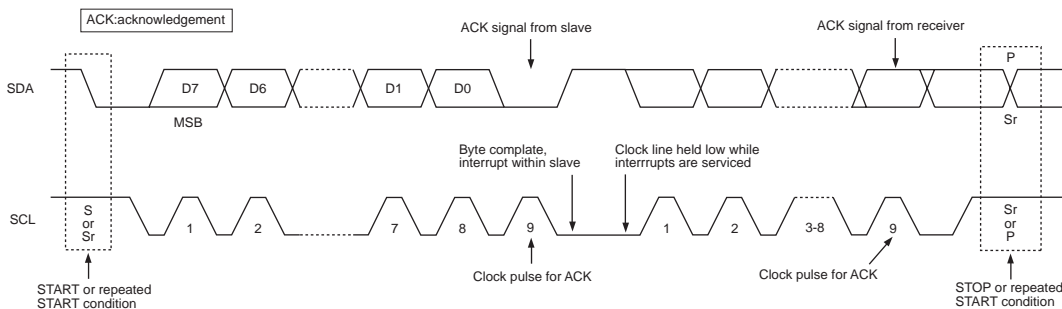
[Start] and [Stop] conditions

[Start] condition is required at the start of data communication and [Stop] condition at the end of data communication. The condition in which the SDA line changes from [H] to [L] with SCL at [H] is called the [Start] condition. The condition in which the SDA line changes from [L] to [H] with SCL at [H] is called the [Stop] condition.



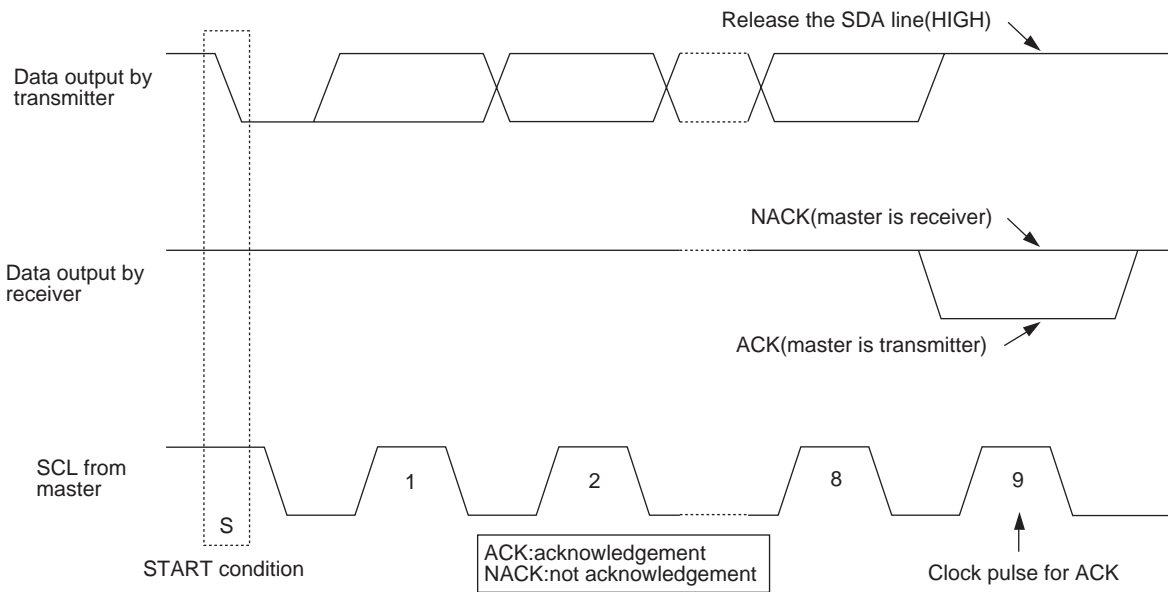
Data transmission

The length of each byte which is output to SDA line is always 8 bits. An acknowledge bit is needed after each byte. Data is transmitted sequentially from the most significant bit (MSB). During the data transfer, the slave address is transmitted after the [Start] condition (S). Data transfer is always ended by the [Stop] condition (P) generated by the master.



Acknowledge (Receive acknowledge)

When the master generates the acknowledge clock pulse, the transmitter opens the SDA line. (SDA line enters the [H] state.) When the acknowledge clock pulse is in the [H] state, the receiver sets the SDA line to [L] each time it receives one byte (eight bits) data. When the master works as a receiver, the master informs the slave of the end of data by omitting acknowledge at the end of data sent from the slave.

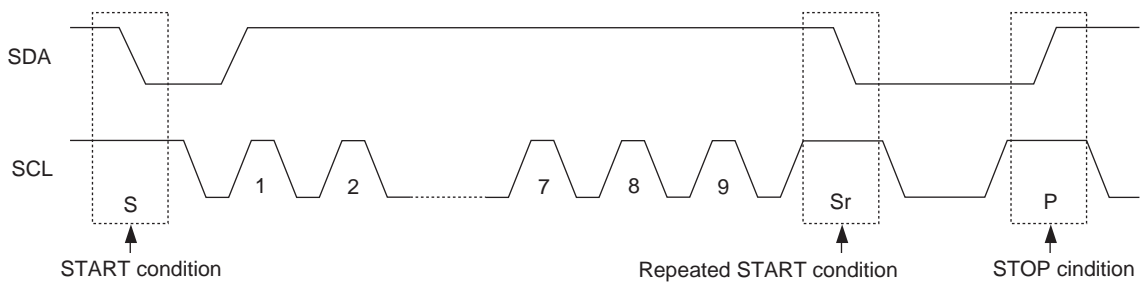


Software reset

If the communication is interrupted (microcomputer reset, etc.), it is possible to communicate normally by entering the below signals and resetting the CPU in software.

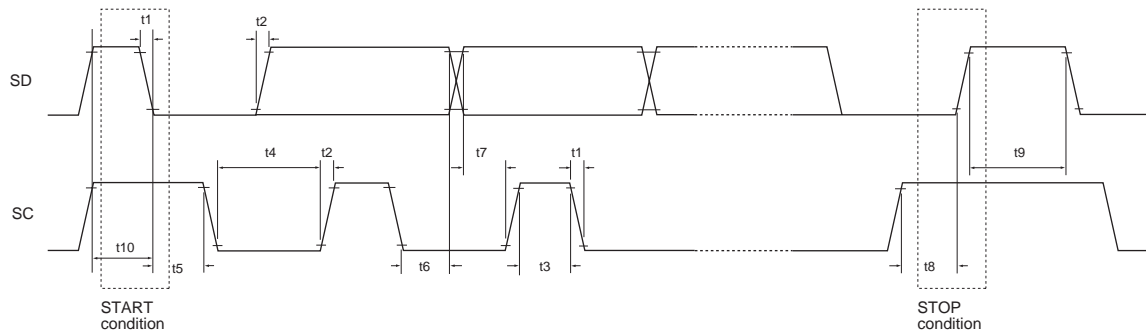
\*These signal timings restore the communication after its interruption. The register setting is never reset.

\*Software reset command is incompatible with I<sup>2</sup>C-bus format.



# LC01707PLF

## Electrical specification and timing for I/O stages



## Bus line characteristics

Characteristic	Symbol	FAST-MODE		unit	Example at SCL = 100kHz
		min	max		
SCL clock frequency	fSCL		400	kHz	100
Fall time of SDA and SCL	t1	20+0.1Cb	300	ns	
Rise time of SDA and SCL	t2	20+0.1Cb	300	ns	
SCL "H" time	t3	0.6		μs	3
SCL "L" time	t4	1.3		μs	7
[Start] condition holding time	t5	0.6		μs	10
Data holding time for I <sup>2</sup> C bus device	t6	0.3		μs	
Data setup time	t7	0.1		μs	3
[Stop] condition setup time	t8	0.6		μs	10
Bus free time between [Stop] and [Start]	t9	1.3		μs	20
[Start] condition setup time	t10	0.6		μs	
Bus line capacitive load	Cb		400	pF	

## Serial interface voltage level

V<sub>DD</sub>: Communication bus voltage

Characteristic	min	max	unit
High level input voltage	0.7V <sub>DD</sub>	V <sub>DD</sub>	V
Low level input voltage	0.0	0.3V <sub>DD</sub>	V
High level output voltage (open drain)	V <sub>DD</sub> *2		V
Low level output voltage (open drain)	0.0	0.2V <sub>DD</sub>	V

\*2: Output impedance of open drain becomes high at the high level output voltage.

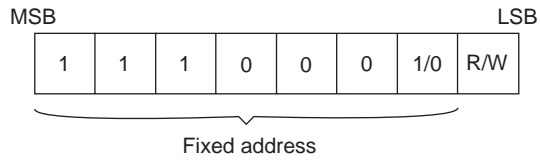
Output voltage equals to V<sub>DD</sub> (voltage =V<sub>DD</sub>) since drain is pulled up to V<sub>DD</sub>.

# LC01707PLF

## Definition of each bit

### 1) Slave address

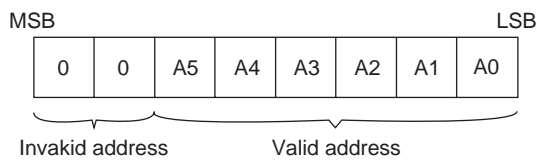
The slave address consists of seven-bit fixed address "1110000" or "1110001", which is unique to a chip, and the eighth-bit data direction bit(R/W). Sending (writing) is processed when the data direction bit is "0", and receiving (reading) is processed when it is "1". The fixed address is set to "1110001" at DEVAR=1 and it is set to "1110000" at DEVAR=0.



R/W	BIT
READ	1
WRITE	0

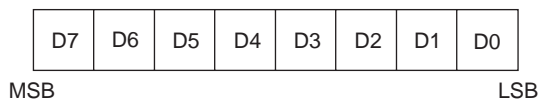
### 2) Register address

Since the total number of internal register is 34, 2-bit data set on the MSB side becomes invalid. 64 addresses are accepted 6 bits are used, but only 34 registers are used.



### 3) Register data

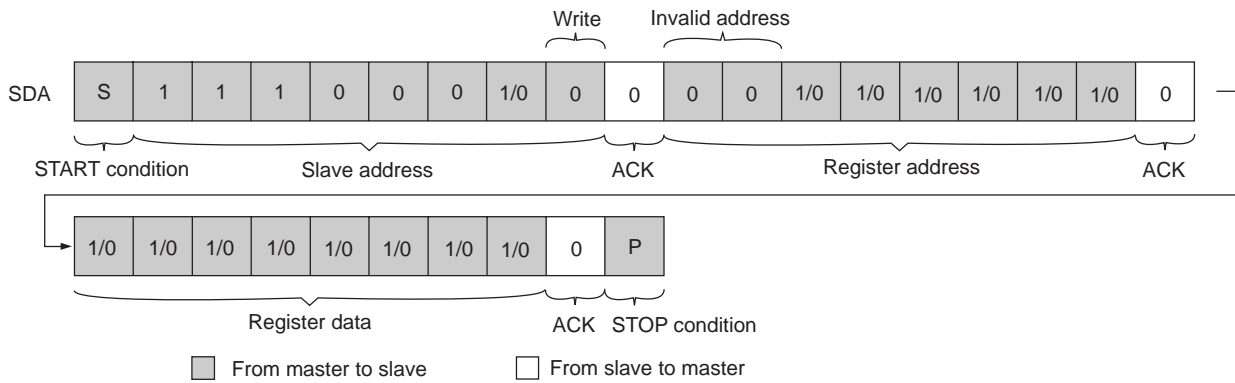
Each register data consists of eight bits.



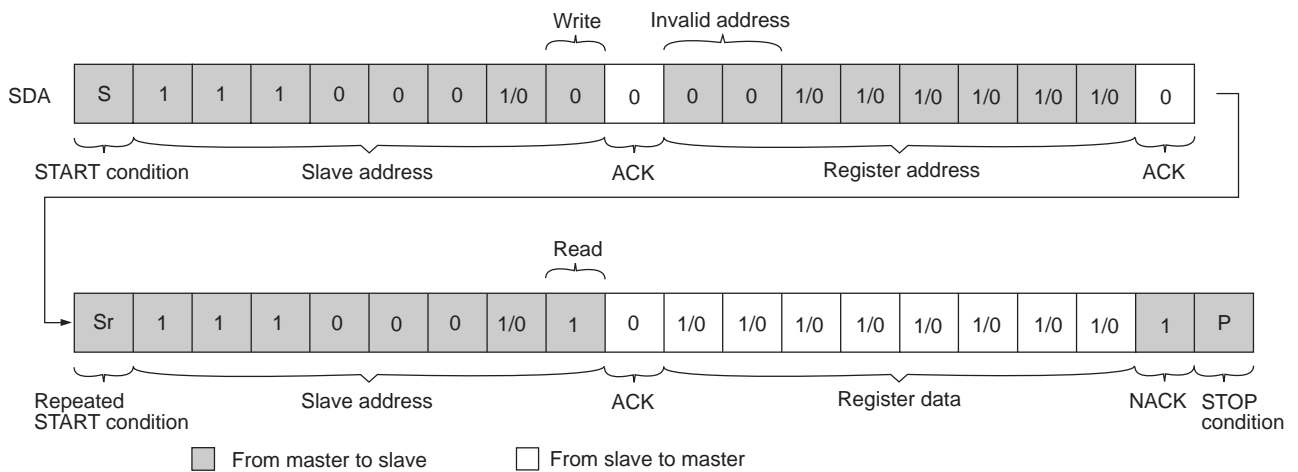
# LC01707PLF

## Command Format

### 1) Individual registers data writing



### 2) Individual registers data reading



# LC01707PLF

## Register Map 1

\* HEX value is set by default.

■ : Unused BIT

Register address	BIT	Bit name	Function	Bit operation	Read/Write	Binary value	Hex value
00h	7					0	h'00
	6	SD_SL[2]	SD level detection setting	0:DRS0 1:DRS1 2:DRS2 3:DRS3 4:DRS4 5:DRS5 6:DRS6 7:DRS7	R/W	0	
	5	SD_SL[1]			R/W	0	
	4	SD_SL[0]			R/W	0	
	3	DWAG[3]	Wide band AGC level setting	0:15.6mVp-p 1:31.3mVp-p 2:46.9mVp-p 3:62.5mVp-p 4:78.1mVp-p 5:93.8mVp-p 6:109.4mVp-p 7:125.0mVp-p 8:140.6mVp-p 9:156.3mVp-p 10:171.9mVp-p 11:187.5mVp-p 12:203.1mVp-p 13:218.8mVp-p 14:234.4mVp-p 15:250mVp-p	R/W	0	
	2	DWAG[2]			R/W	0	
	1	DWAG[1]			R/W	0	
0	DWAG[0]	R/W			0		
01h	7					0	h'00
	6					0	
	5					0	
	4					0	
	3					0	
	2					0	
	1	IMSD_SL[1]	Unused				
0	IMSD_SL[0]	0					
02h	7	CLKIN	XTAL current setting	1:Normal 0:Twice	R/W	1	h'99
	6	DLOCKSEL	LOCKDET output waveform selection	1:Number of comparing 6 0:Munber of comparing 3	R/W	0	
	5	DFSEL[1]	Phase comparison frequency selection	0:100kHz 1:50kHz 2:50kHz 3:25kHz	R/W	0	
	4	DFSEL[0]			R/W	1	
	3	ENPE	Entire circuit enable	1:ON 0:OFF (Entire circuit OFF)	R/W	1	
	2	DNGA[2]	Narrow band AGC level setting	0:35mVp-p 1:111mVp-p 2:187mVp-p 3:263mVp-p 4:339mVp-p 5:415mVp-p 6:491mVp-p 7:567mVp-p (When the setting value is ether 0 or 1 and MSK=4%, error is detected in BER.)	R/W	0	
	1	DNGA[1]			R/W	0	
0	DNGA[0]	R/W			1		
03h	7	ENCPLEVEL	Charge pump level comparison selection	1:ON 0:OFF	R/W	1	h'FF
	6	DENPRO	Program counter enable	1:ON 0:OFF	R/W	1	
	5	DENPD	Phase comparison enable	1:ON 0:OFF	R/W	1	
	4	DENCP	Charge pump enable	1:ON 0:OFF	R/W	1	
	3	DENREF	S-meter enable	1:ON 0:OFF	R/W	1	
	2	DENXTAL	XTAL enable	1:ON 0:OFF	R/W	1	
	1	DEBDEMO	Demodulator enable	1:ON 0:OFF	R/W	1	
04h	7	ENLEVELDET	Capacitor bank control circuit enable	1:ON 0:OFF	R/W	0	h'7F
	6	ENRFMIX	RFMIX enable	1:ON 0:OFF	R/W	1	
	5	ENIFLPF	IF LPF enable	1:ON 0:OFF	R/W	1	
	4	ENDET	Wide band AGC, Narrow band AGC block enable	1:ON 0:OFF	R/W	1	
	3	ENLNA	LNA block enable	1:ON 0:OFF	R/W	1	
	2	DENSMETER	Reference counter enable	1:ON 0:OFF	R/W	1	
	1	DLOEN	Local oscillation enable	1:ON 0:OFF	R/W	1	
05h	7					0	h'03
	6					0	
	5					0	
	4					0	
	3					0	
	2					0	
	1	DNBAGC	IF AGC detection selector (Narrow band AGC)	1:ON 0:OFF	R/W	1	
06h	7	DF0OSC[7]	Capacitor band value Oscillation frequency adjustment for master time constant setting		R/W	1	h'80
	6	DF0OSC[6]			R/W	0	
	5	DF0OSC[5]			R/W	0	
	4	DF0OSC[4]			R/W	0	
	3	DF0OSC[3]			R/W	0	
	2	DF0OSC[2]			R/W	0	
	1	DF0OSC[1]			R/W	0	
07h	7	DBPFO[7]	Capacitor bank value Complex BPF F0 adjustment		R/W	1	h'80
	6	DBPFO[6]			R/W	0	
	5	DBPFO[5]			R/W	0	
	4	DBPFO[4]			R/W	0	
	3	DBPFO[3]			R/W	0	
	2	DBPFO[2]			R/W	0	
	1	DBPFO[1]			R/W	0	
0	DBPFO[0]	R/W	0				

# LC01707PLF

## Register Map 2

\* HEX value is set by default.

■ : Unused BIT

Register address	BIT	Bit name	Function	Bit operation	Read/Write	Binary value	Hex value	
08h	7	D2BPF[7]	Capacitor bank value 2 <sup>nd</sup> IF BPF f0 adjustment		R/W	1	h'80	
	6	D2BPF[6]			R/W	0		
	5	D2BPF[5]			R/W	0		
	4	D2BPF[4]			R/W	0		
	3	D2BPF[3]			R/W	0		
	2	D2BPF[2]			R/W	0		
	1	D2BPF[1]			R/W	0		
	0	D2BPF[0]			R/W	0		
09h	7	■	DLL demodulator loop gain setting		R/W	0	h'17	
	6	■			R/W	0		
	5	DDEMOG[1]			R/W	1		
	4	DDEMOG[0]			R/W	0		
	3	DMONOC[3]			Mono multi center setting	R/W		0
	2	DMONOC[2]				R/W		1
	1	DMONOC[1]				R/W		1
0	DMONOC[0]	R/W	1					
0Ah	7	■			R/W	0	h'02	
	6	■			R/W	0		
	5	■			R/W	0		
	4	■			R/W	0		
	3	■			R/W	0		
	2	■			R/W	0		
	1	ENIMRSSI			XTAL OSC FET size setting	1:Normal 0:Twice		R/W
0	DIQC	Complex BPF injection changeover	1:lower 0:upper	R/W	0			
0Bh	7	■	IQ balance adjustment		R/W	0	h'40	
	6	DBL[6]			R/W	1		
	5	DBL[5]			R/W	0		
	4	DBL[4]			R/W	0		
	3	DBL[3]			R/W	0		
	2	DBL[2]			R/W	0		
	1	DBL[1]			R/W	0		
0	DBL[0]	R/W	0					
0Ch	7	■	Charge pump output current value setting	0:0.1mA 1:0.2mA 2:0.3mA 3:0.4mA 4:0.5mA 5:0.6mA 6:0.7mA 7:0.8mA 8:0.9mA A:1mA B:1.1mA C:1.2mA D: unused E: unused F: unused	R/W	0	h'0A	
	6	■			R/W	0		
	5	■			R/W	0		
	4	■			R/W	0		
	3	DCP1REF[3]			R/W	1		
	2	DCP1REF[2]			R/W	0		
0Dh	7	DPCNT_L[7]	N value of frequency divider (low 8 bits) N value of frequency divider = ((4 × received frequency) ÷ (4 × 1 <sup>st</sup> IF frequency)) / (4 channel × step frequency) * 1 <sup>st</sup> IF frequency is 1.2MHz		R/W	*	h**	
	6	DPCNT_L[6]			R/W	*		
	5	DPCNT_L[5]			R/W	*		
	4	DPCNT_L[4]			R/W	*		
	3	DPCNT_L[3]			R/W	*		
	2	DPCNT_L[2]			R/W	*		
	1	DPCNT_L[1]			R/W	*		
0	DPCNT_L[0]	R/W	*					
0Eh	7	DPCNT_H[7]	N value of frequency divider (high 8 bits)		R/W	*	h**	
	6	DPCNT_H[6]			R/W	*		
	5	DPCNT_H[5]			R/W	*		
	4	DPCNT_H[4]			R/W	*		
	3	DPCNT_H[3]			R/W	*		
	2	DPCNT_H[2]			R/W	*		
	1	DPCNT_H[1]			R/W	*		
0	DPCNT_H[0]	R/W	*					
0Fh	7	DCBANK_L[7]	Local oscillator capacitor bank setting (low 8 bits)		R/W	0	h'00	
	6	DCBANK_L[6]			R/W	0		
	5	DCBANK_L[5]			R/W	0		
	4	DCBANK_L[4]			R/W	0		
	3	DCBANK_L[3]			R/W	0		
	2	DCBANK_L[2]			R/W	0		
	1	DCBANK_L[1]			R/W	0		
0	DCBANK_L[0]	R/W	0					

# LC01707PLF

## Register Map 3

\* HEX value is set by default.

■ : Unused BIT

Register address	BIT	Bit name	Function	Bit operation	Read/Write	Binary value	Hex value
10h	7					0	h'01
	6					0	
	5					0	
	4					0	
	3					0	
	2					0	
	1					0	
	0	DCBANK_H[8]	Local oscillator capacitor bank setting (high 1 bit)		R/W	1	
11h	7					0	h'0F
	6					0	
	5					0	
	4	DCBEN	Unused			0	
	3	DLOALC[3]	Local oscillation level setting		R/W	1	
	2	DLOALC[2]		R/W	1		
	1	DLOALC[1]		R/W	1		
0	DLOALC[0]	R/W		1			
12h	7					0	h'00
	6	DENIFCOUNT	Frequency counter (analog block) enable	1:ON 0:OFF	R/W	0	
	5	DENFOOSC	f0 detection oscillation circuit enable	1:ON 0:OFF	R/W	0	
	4	DENIFFREQ	Logic part reference clock enable	1:ON 0:OFF	R/W	0	
	3					0	
	2	DSCTCOUNT[2]	Count frequency selection	0:unused 1:1F frequency 2:prescaler frequency 3:freacalar frequency 4:f0 detection oscillation frequency 5:f0 detection oscillation frequency 6:unused 7:1F frequency	R/W	0	
	1	DSCTCOUNT[1]			R/W	0	
0	DSCTCOUNT[0]	R/W			0		
13h	7					0	h'01
	6					0	
	5					0	
	4					0	
	3					0	
	2	CTE	Counter start trigger	1:ON (frequency counter start) Charge to 0 automatically	R/W	0	
14h	1	GT[1]	Frequency counter gate time selection	0:4ms 1:8ms 2:32ms 3:64ms	R/W	0	h'00
	0	GT[0]			R/W	1	
	7	LOFQ_L[7]			LO_COUNT value (low 8 bits) Measurement frequency = counter value / GT[ms]	R	
6	LOFQ_L[6]	R	*				
5	LOFQ_L[5]	R	*				
4	LOFQ_L[4]	R	*				
3	LOFQ_L[3]	R	*				
2	LOFQ_L[2]	R	*				
1	LOFQ_L[1]	R	*				
15h	7	LOFQ_H[7]	LO_COUNT value (upper 8 bits)	R	*	h'00	
	6	LOFQ_H[6]		R	*		
	5	LOFQ_H[5]		R	*		
	4	LOFQ_H[4]		R	*		
	3	LOFQ_H[3]		R	*		
	2	LOFQ_H[2]		R	*		
	1	LOFQ_H[1]		R	*		
	0	LOFQ_H[0]		R	*		
16h	7					0	h'10
	6					0	
	5	COUNTSEL				0	
	4	LOCKDETSSEL				1	
	3	LOCKDET_DIG				0	
	2	LOCKDET	LOCK detection	1:LOCK 0:UNLOCK	R/W	0	
	1	PHLEVEL[1]	Charge pump voltage level detection	0:less than 0.5V 1:0.5V to 2.8V 2:Unused 3:more than 2.8V	R/W	0	
	0	PHLEVEL[0]			R/W	0	
17h	7					*	h'0*
	6					*	
	5					*	
	4					*	
	3	IMRSSI[3]	Reset detection circuit	0:reset 1:reset cancellation	R	*	
	2	IMRSSI[2]			R	*	
1	IMRSSI[1]	R			*		
0	IMRSSI[0]	R			*		



# LC01707PLF

## Register Map 4

\* HEX value is set by default.

■ : Unused BIT

Register address	BIT	Bit name	Function	Bit operation	Read/Write	Binary value	Hex value
18h	7					0	h**
	6	DRS[6]	S-meter detection level	Detection range can be changed by setting to DNGA (02h)	R	*	
	5	DRS[5]			R	*	
	4	DRS[4]			R	*	
	3	DRS[3]			R	*	
	2	DRS[2]			R	*	
	1	DRS[1]			R	*	
	0	DRS[0]			R	*	
19h	7	IFCOUNT_L[7]			IF count value (low 8 bits) 2 <sup>nd</sup> IF frequency measurement results		R
	6	IFCOUNT_L[6]	R	*			
	5	IFCOUNT_L[5]	R	*			
	4	IFCOUNT_L[4]	R	*			
	3	IFCOUNT_L[3]	R	*			
	2	IFCOUNT_L[2]	R	*			
	1	IFCOUNT_L[1]	R	*			
	0	IFCOUNT_L[0]	R	*			
1Ah	7	IFCOUNT_H[7]	IF count value (high 8 bits)		R	*	h**
	6	IFCOUNT_H[6]		R	*		
	5	IFCOUNT_H[5]		R	*		
	4	IFCOUNT_H[4]		R	*		
	3	IFCOUNT_H[3]		R	*		
	2	IFCOUNT_H[2]		R	*		
	1	IFCOUNT_H[1]		R	*		
	0	IFCOUNT_H[0]		R	*		
1Bh	7	IMCOUNT_L[7]	Unused		R	*	h**
	6	IMCOUNT_L[6]		R	*		
	5	IMCOUNT_L[5]		R	*		
	4	IMCOUNT_L[4]		R	*		
	3	IMCOUNT_L[3]		R	*		
	2	IMCOUNT_L[2]		R	*		
	1	IMCOUNT_L[1]		R	*		
	0	IMCOUNT_L[0]		R	*		
1Ch	7	IMCOUNT_H[7]	Unused		R	*	h**
	6	IMCOUNT_H[6]		R	*		
	5	IMCOUNT_H[5]		R	*		
	4	IMCOUNT_H[4]		R	*		
	3	IMCOUNT_H[3]		R	*		
	2	IMCOUNT_H[2]		R	*		
	1	IMCOUNT_H[1]		R	*		
	0	IMCOUNT_H[0]		R	*		
1Dh	7	F0_L[7]	f0 detection oscillation frequency count value (low 8 bits) Frequency measurement result for master time constant setting		R	*	h**
	6	F0_L[6]		R	*		
	5	F0_L[5]		R	*		
	4	F0_L[4]		R	*		
	3	F0_L[3]		R	*		
	2	F0_L[2]		R	*		
	1	F0_L[1]		R	*		
	0	F0_L[0]		R	*		
1Eh	7	F0_H[7]	f0 detection oscillation frequency count value (high 8 bits)		R	*	h**
	6	F0_H[6]		R	*		
	5	F0_H[5]		R	*		
	4	F0_H[4]		R	*		
	3	F0_H[3]		R	*		
	2	F0_H[2]		R	*		
	1	F0_H[1]		R	*		
	0	F0_H[0]		R	*		
1Fh	7					0	h'02
	6					0	
	5					0	
	4					0	
	3					0	
	2	DOUTSEL	Register for TEST		R/W	0	
	1	DCNTEST	Register for TEST		R/W	1	
	0	DOUTTEST	Register for TEST		R/W	0	

Continued on next page.

# LC01707PLF

Continued from preceding page.

Register address	BIT	Bit name	Function	Bit operation	Read/Write	Binary value	Hex value
20h	7					0	h'0A
	6	ERR2	Local oscillator capacitor bank control error flag 2		R/W	0	
	5	ERR1	Local oscillator capacitor bank control error flag 1		R/W	0	
	4	DCOSEL2	Local oscillator capacitor bank value changeover	1:cap bank control value 0:1°C input value	R/W	0	
	3	DCOSEL1	Local oscillator capacitor bank control process changeover	1:correcting process after sequential comparison 0:No correcting process after sequential comparison	R/W	1	
	2	DCOSEL0	Local oscillator capacitor bank control process changeover (micro alignment)	1:micro adjustment process 0:No micro adjustment process	R/W	0	
	1	DWAITSEL[1]	PLL operation check wait time after local oscillator capacitor bank adjustment	0:200µs 1: 400µs 2:800µs 3:1600µs	R/W	1	
0	DWAITSEL[0]	R/W			0		
21h	7					0	h'0A
	6					0	
	5	DENINT	Register for TEST		R/W	0	
	4	MASKSEL	Register for TEST		R/W	0	
	3	LOSEL	Register for TEST		R/W	1	
	2	INTPH	Register for TEST		R/W	0	
	1	INTIM	Register for TEST		R/W	1	
22h	0	INTLO	Register for TEST		R/W	0	h'15
	7	TESTSEL[2]	Register for TEST		R/W	0	
	6	TESTSEL[1]	Register for TEST		R/W	0	
	5	TESTSEL[0]	Register for TEST		R/W	0	
	4	DSW	PLL loop filter ON/OFF	1:ON 0:OFF	R/W	1	
	3	TIMESEL2[1]	Local oscillator capacitor bank control correcting circuit operation clock setting	0:200µs 1: 400µs 2:800µs 3:1600µs	R/W	0	
	2	TIMESEL2[0]			R/W	1	
1	TIMESEL[1]	Local oscillator capacitor bank control sequential comparison control operation clock setting	0:10µs 1:20µs 2:40µs 3:80µs	R/W	0		
0	TIMESEL[0]			R/W	1		

## SD pin specification

SD voltage level  $V_{DD}$ : supply voltage

item	min	max	unit
High level output voltage	$V_{DD}-0.8$	$V_{DD}$	V
Low level output voltage	0	0.4	V

- SANYO Semiconductor Co.,Ltd. assumes no responsibility for equipment failures that result from using products at values that exceed, even momentarily, rated values (such as maximum ratings, operating condition ranges, or other parameters) listed in products specifications of any and all SANYO Semiconductor Co.,Ltd. products described or contained herein.
- SANYO Semiconductor Co.,Ltd. strives to supply high-quality high-reliability products, however, any and all semiconductor products fail or malfunction with some probability. It is possible that these probabilistic failures or malfunction could give rise to accidents or events that could endanger human lives, trouble that could give rise to smoke or fire, or accidents that could cause damage to other property. When designing equipment, adopt safety measures so that these kinds of accidents or events cannot occur. Such measures include but are not limited to protective circuits and error prevention circuits for safe design, redundant design, and structural design.
- In the event that any or all SANYO Semiconductor Co.,Ltd. products described or contained herein are controlled under any of applicable local export control laws and regulations, such products may require the export license from the authorities concerned in accordance with the above law.
- No part of this publication may be reproduced or transmitted in any form or by any means, electronic or mechanical, including photocopying and recording, or any information storage or retrieval system, or otherwise, without the prior written consent of SANYO Semiconductor Co.,Ltd.
- Any and all information described or contained herein are subject to change without notice due to product/technology improvement, etc. When designing equipment, refer to the "Delivery Specification" for the SANYO Semiconductor Co.,Ltd. product that you intend to use.
- Upon using the technical information or products described herein, neither warranty nor license shall be granted with regard to intellectual property rights or any other rights of SANYO Semiconductor Co.,Ltd. or any third party. SANYO Semiconductor Co.,Ltd. shall not be liable for any claim or suits with regard to a third party's intellectual property rights which has resulted from the use of the technical information and products mentioned above.

This catalog provides information as of October, 2011. Specifications and information herein are subject to change without notice.

Компания «Океан Электроники» предлагает заключение долгосрочных отношений при поставках импортных электронных компонентов на взаимовыгодных условиях!

Наши преимущества:

- Поставка оригинальных импортных электронных компонентов напрямую с производств Америки, Европы и Азии, а так же с крупнейших складов мира;
- Широкая линейка поставок активных и пассивных импортных электронных компонентов (более 30 млн. наименований);
- Поставка сложных, дефицитных, либо снятых с производства позиций;
- Оперативные сроки поставки под заказ (от 5 рабочих дней);
- Экспресс доставка в любую точку России;
- Помощь Конструкторского Отдела и консультации квалифицированных инженеров;
- Техническая поддержка проекта, помощь в подборе аналогов, поставка прототипов;
- Поставка электронных компонентов под контролем ВП;
- Система менеджмента качества сертифицирована по Международному стандарту ISO 9001;
- При необходимости вся продукция военного и аэрокосмического назначения проходит испытания и сертификацию в лаборатории (по согласованию с заказчиком);
- Поставка специализированных компонентов военного и аэрокосмического уровня качества (Xilinx, Altera, Analog Devices, Intersil, Interpoint, Microsemi, Actel, Aeroflex, Peregrine, VPT, Syfer, Eurofarad, Texas Instruments, MS Kennedy, Miteq, Cobham, E2V, MA-COM, Hittite, Mini-Circuits, General Dynamics и др.);

Компания «Океан Электроники» является официальным дистрибьютором и эксклюзивным представителем в России одного из крупнейших производителей разъемов военного и аэрокосмического назначения «JONHON», а так же официальным дистрибьютором и эксклюзивным представителем в России производителя высокотехнологичных и надежных решений для передачи СВЧ сигналов «FORSTAR».



## JONHON

«JONHON» (основан в 1970 г.)

Разъемы специального, военного и аэрокосмического назначения:

(Применяются в военной, авиационной, аэрокосмической, морской, железнодорожной, горно- и нефтедобывающей отраслях промышленности)

«FORSTAR» (основан в 1998 г.)

ВЧ соединители, коаксиальные кабели, кабельные сборки и микроволновые компоненты:

(Применяются в телекоммуникациях гражданского и специального назначения, в средствах связи, РЛС, а так же военной, авиационной и аэрокосмической отраслях промышленности).



Телефон: 8 (812) 309-75-97 (многоканальный)

Факс: 8 (812) 320-03-32

Электронная почта: [ocean@oceanchips.ru](mailto:ocean@oceanchips.ru)

Web: <http://oceanchips.ru/>

Адрес: 198099, г. Санкт-Петербург, ул. Калинина, д. 2, корп. 4, лит. А