

FEATURES

- ☐ High speed operation; suitable for applications to 3 Gbps.
Typical rise/fall times <90 ps.
- ☐ DC or AC coupled modulation drive.
- ☐ Differential data and clock inputs to minimize pattern dependent jitter.
- ☐ Independently Programmable Laser Bias and Modulation currents.
Bias current to 100 mA and modulation current to 85 mA at $V_{CC}=3.3V$
- ☐ Automatic Laser Power Control, with programmable Temperature Compensation and 'Slow-Start'.
- ☐ Bias and modulation current monitor
- ☐ Operates with +3.3 Volt supply
- ☐ Functionally compatible with MAX 3869
- ☐ The CX02066 is available in die form, or packages (BCC+24 or TQFP32)

APPLICATIONS

- ☐ Short reach SONET/SDH
- ☐ Metro SONET/SDH
- ☐ Datacomms Modules

DESCRIPTION

The CX02066 is a highly integrated, programmable laser driver intended for SONET/SDH applications with FEC to 3 Gbps. Using differential PECL data and clock inputs, the CX02066 supplies the bias and modulation current for driving an edge-emitting laser. The modulation output can be DC-coupled to the laser diode, giving a significant power saving over AC-coupled operation.

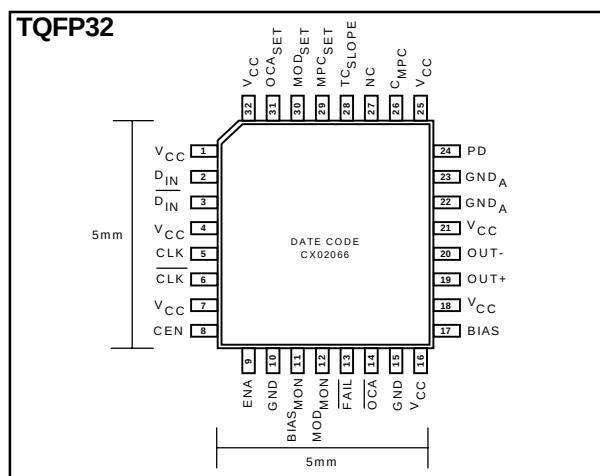
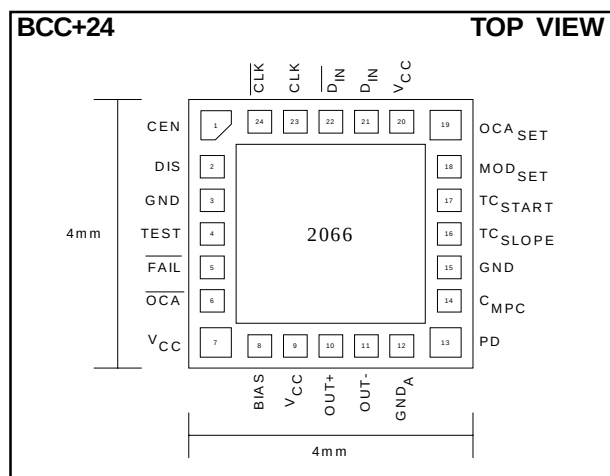
The CX02066 includes automatic power control to maintain a constant average laser output power over temperature and life. In addition, the modulation current is temperature compensated to minimize variation in extinction ratio over temperature.

Output flags indicate laser end of life as well as failure of the APC circuitry to maintain average output power.

ORDERING INFORMATION

Part Number	Pin Package
CX02066DIEWP	Waffle Pack
CX02066WAFER	Expanded Whole 8" Wafer on a 10" Grip Ring
CX02066B24	BCC+24
CX02066TQ32	TQFP32

CONNECTIONS



PIN DESCRIPTION - BCC+24

Pin No BCC+24	Name	Function
1	CEN	Clock Enable Input (TTL/CMOS). Set HIGH or Not Connected to use CLK inputs, LOW when not using CLK inputs.
2	DIS	Bias and Modulation Output Disable (TTL/CMOS). LOW for normal operation.
3, 15	GND	Ground
4	TEST	Factory Test Pin - tie to V_{CC}
5	$\overline{\text{FAIL}}$	Mean Power Control Failure indicator (TTL/CMOS). Goes low when control loop is no longer able to maintain constant current at PD.
6	$\overline{\text{OCA}}$	Over-Current Alarm (TTL/CMOS). Goes low when I_{BIAS} exceeds the preset bias current limit
8	BIAS	Laser bias current output
9, 7, 20	V_{CC}	Power supply
10	OUT+	Positive modulation current output. Sinks current when D_{IN} is HIGH.
11	OUT-	Negative modulation current output. Sinks current when $\overline{D_{\text{IN}}}$ is HIGH.
12	GND_A	Ground for output stage.(inductor to ground)
13	PD	Monitor photodiode input. This input is connected to the monitor photodiode anode for automatic power control.
14	C_{MPC}	Mean power control dominant pole capacitor
16	TC_{SLOPE}	Connecting a resistor between this pin and ground sets the temperature coefficient of I_{MODSET} (using the internal IC temperature).
17	TC_{START}	Secondary temperature coefficient of I_{MOD} . A resistor on this pin to ground sets the temperature at which the temperature compensation starts.
18	MOD_{SET}	Modulation current set. Connect a resistor between this pin and ground to set.
19	OCA_{SET}	Overcurrent alarm set. Connect a resistor between this pin and ground to set.
21	D_{IN}	Positive Data Input (PECL). Self biased.
22	$\overline{D_{\text{IN}}}$	Negative Data Input (PECL). Self biased.
23	CLK	Positive Clock Input (PECL). Self biased. Can leave disconnected if not used.
24	$\overline{\text{CLK}}$	Negative Clock Input (PECL). Self biased. Can leave disconnected if not used.

PIN DESCRIPTION - TQFP 32

Pin No TQFP32	Name	Function
1	V_{CC}	Power Supply
2	D_{IN}	Positive Data Input (PECL). Self biased.
3	$\overline{D_{IN}}$	Negative Data Input (PECL). Self biased.
4, 7, 16, 18, 21, 25, 32	V_{CC}	Power Supply
5	CLK	Positive Clock Input (PECL). Self biased. Can leave disconnected if not used.
6	$\overline{CLK}$	Negative Clock Input (PECL). Self biased. Can leave disconnected if not used.
8	CEN	Clock Enable Input (TTL/CMOS). Set HIGH or not connected to use CLK inputs, LOW when not using CLK inputs.
9	ENA	Bias and modulation Output Enable (TTL/CMOS). HIGH for normal operation.
10, 15	GND	Ground
11	BIAS _{MON}	Bias monitor and temperature-dependent bias current limit. Connect a resistor between this pin and V_{CC} to monitor.
12	MOD _{MON}	Bias monitor and temperature-dependent bias current limit. Connect a resistor between this pin and V_{CC} to monitor.
13	$\overline{FAIL}$	Mean Power Control Failure indicator (TTL/CMOS). Goes LOW when control loop is no longer able to maintain constant current at I_{PIN} .
14	$\overline{OCA}$	Over-Current Alarm (TTL/CMOS). Goes LOW when I_{BIAS} exceeds the preset bias current limit
17	BIAS	Laser bias current output
19	OUT+	Positive modulation current output. Sinks current when D_{IN} is HIGH.
20	OUT-	Negative modulation current output. Sinks current when $\overline{D_{IN}}$ is HIGH.

PIN DESCRIPTION - TQFP 32

Pin No TQFP32	Name	Function
22, 23	GND _A	Ground for output stage (inductor to ground)
24	PD	Monitor photodiode input. This input is connected to the monitor photodiode anode for automatic power control.
26	C _{MPC}	Mean power control dominant pole capacitor
27	NC	No connect and may be grounded for compatibility with MAX3869
28	TC _{SLOPE}	Connecting a resistor between this pin and ground sets the temperature coefficient of I _{MODSET} (using the internal IC temperature).
29	MPC _{SET}	A resistor between this pin and ground sets the mean optical power
30	MOD _{SET}	Modulation current set. Connect a resistor between this pin and ground to set.
31	OCA _{SET}	Overcurrent alarm set. Connect a resistor between this pin and ground to set.

ABSOLUTE MAXIMUM RATINGS

Parameter	Rating	Units
Power supply (V _{CC} -GND)	-0.5 to +6.0	V
Operating ambient	-40 to +85	°C
Storage Temperature	-65 to +150	°C
Maximum laser bias current	120	mA
Maximum laser modulation current (through OUT+/OUT2+, OUT-/OUT2-)	100	mA

These are the absolute maximum ratings at or beyond which the IC can be expected to fail or be damaged. Reliable operation at these extremes for any length of time is not implied.

RECOMMENDED OPERATING CONDITIONS

Parameter	Rating	Units
Power supply (V_{CC} -GND)	$3.3 \pm 10\%$	V
Junction Temperature (die)	-40 to +120	°C
Operating ambient	-40 to +85	°C

AC CHARACTERISTICS

Parameter	Conditions	Min.	Typ.	Max.	Units
Differential input voltage	$=2 \times (D_{IN}^{+HIGH} - D_{IN}^{+LOW})$ (clock inputs follow same relationship)	300	-	1860	mV
Modulation current range		2.5	-	85	mA
Modulation current with output disabled	DIS=HIGH	-	-	300	μA
Programmable range for modulation current temperature coefficient	Adjustable	500	-	10^4	ppm/°C
Programmable temperature at which modulation current TC compensation enables	Programed by choice of R_{TCSET}	20	-	60	°C
Modulation output rise time Modulation output fall time	20% to 80% into 25Ω. 20% to 80% into 25Ω.	-	-	100 116	ps
Overshoot of modulation output current	Into 25Ω load	-10	-	+10	%
Modulation output pulse width distortion	Measured using alternating 1-0 pattern	-	-	20	ps
Modulation output random jitter	rms. 12kHz to 20MHz	-	-	4	mUI
Total output jitter (data input latch enabled)	Peak-to-Peak.Measured into 25Ω load using 1867 MHz Bessel filter: $2^{23}-1$ PRBS at 2.488Gbps; using clock inputs (includes PWD, random and deterministic)	-	-	42	ps

($V_{CC}=+3.3V \pm 5\%$, $T_A=-40^{\circ}C$ to $+85^{\circ}C$, unless otherwise noted)

DC CHARACTERISTICS

Parameter	Conditions	Min.	Typ.	Max.	Units
Supply Current	$I_{BIAS}=50\text{mA}$ $I_{MOD}=50\text{mA}$ Excluding I_{BIAS} and I_{MOD}	-	57	-	mA
Supply Current	$I_{BIAS}=100\text{mA}$ $I_{MOD}=85\text{mA}$ Excluding I_{BIAS} and I_{MOD}	-	70	75	mA
Bias current adjust range	Limited by I_{REF} across temperature range	2	-	100	mA
Bias current with output disabled	Tx_Disable=high	-	-	300	μA
Maximum bias current limit	$T_A=+85^\circ\text{C}$ (adjustable)	100 ⁽¹⁾	-	-	mA
Change in I_{REF} over temperature	Adjustable	200 ⁽¹⁾	-	500	$\mu\text{A}/^\circ\text{C}$
Monitor diode reverse bias voltage		2	-	-	V
Monitor diode current adjustment range		10	-	1500	μA
TTL/CMOS input HIGH voltage (CEN, DIS)		2.0	-	-	V
TTL/CMOS input LOW voltage (CEN, DIS)		-	-	0.8	V
CMOS output HIGH voltage (FAIL, OCA)		2.4	-	-	V
CMOS output LOW voltage (FAIL, OCA)		-	-	0.4	V
Differential input Impedance	Data and Clock inputs	2.5	-	-	k Ω
Common-mode input voltage		$V_{CC}-1.38$	-	$V_{CC}-\frac{V_{IN(Diff)}}{4}$	V
Self-Biased common mode input voltage	Data and clock inputs	$V_{CC}-1.38$	-	$V_{CC}-0.47$	V

($V_{CC}=+3.3\text{V}\pm 5\%$, $T_A=-40^\circ\text{C}$ to $+85^\circ\text{C}$, unless otherwise noted)

(1) Default value.

[illegible]

FUNCTIONAL DESCRIPTION

Safety Logic

Safety logic is provided in order to limit the maximum bias current. The bias current at which the safety logic trips is set by an external resistor to ground (R_{OCA}) from the OCA_{SET} pin. When the bias current limit is reached alarm flag OCA is asserted LOW. A loop failure alarm is also provided to detect when the bias current can no longer be adjusted to achieve the desired average optical power.

Data Input Latch

To minimize input data pattern-dependent jitter, a differential clock signal can be connected to the data input latch. If CEN is HIGH, the input data is retimed by the rising edge of $CLK+$. If CEN is LOW, the input data is directly connected to the output stage. If CEN is left floating it will be pulled HIGH by the internal circuitry. When this latch function is not used, connect $CLK+$ to V_{CC} and leave $CLK-$ unconnected.

Enable Control

The CX02066 incorporates a dual laser driver enable function. When ENA is LOW or DIS is HIGH, both the bias and modulation currents are off. Only DIS is available on the BCC package.

Current Monitors

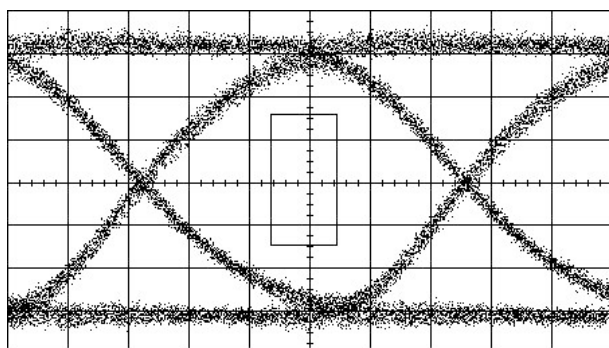
The CX02066 features bias and modulation current monitor outputs. The $BIASMON$ output sinks a current equal to nominally 1/55 of the laser bias current (I_{BIAS}). The $MODMON$ output sinks a current equal to nominally 1/55 of the laser peak to peak modulation current (I_{MOD}). $BIASMON$ and $MODMON$ should be connected through a pull-up resistor to V_{CC} . Choose a pull-up resistor value that ensures a voltage at $BIASMON$ greater than $V_{CC} - 1.6V$ and a voltage at $MODMON$ greater than $V_{CC} - 1.0V$. These pins should be tied to V_{CC} if not used.

Slow-Start

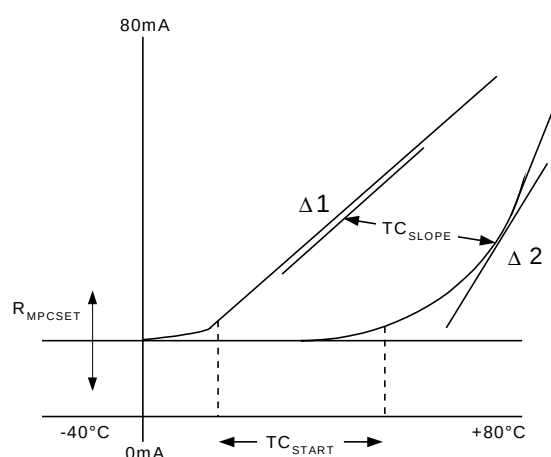
For laser safety and reliability, the CX02066 incorporates a slow-start circuit that provides a delay of approximately 200ns before enabling the laser diode.

TYPICAL EYE DIAGRAM

2.5Gbps Optical Eye @ -3dBm (1.87GHz Filter)

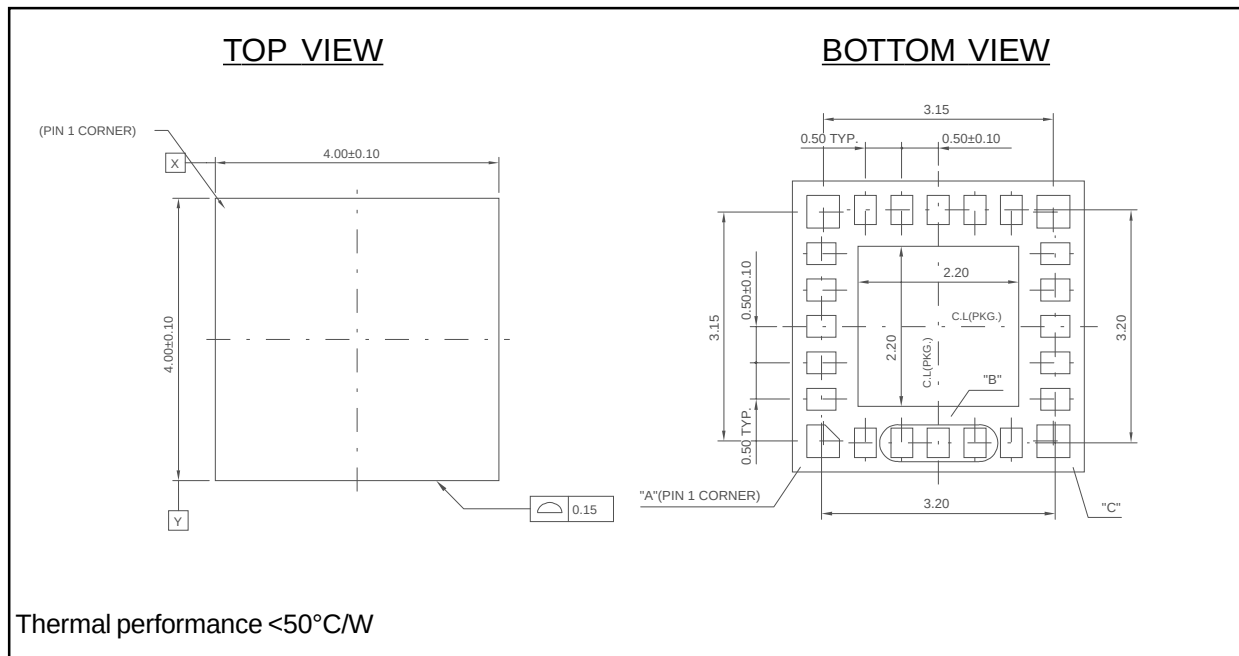


TEMPERATURE COMPENSATION



PACKAGE INFORMATION

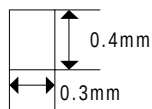
Package Outline 24L BCC+



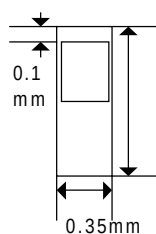
SMT MOUNTING GUIDELINES

BCC Pads

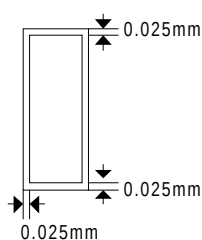
Terminal



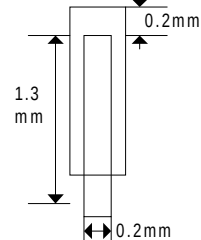
PCB Land



Solder Resist Mask

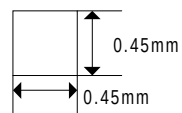


Paste Mask

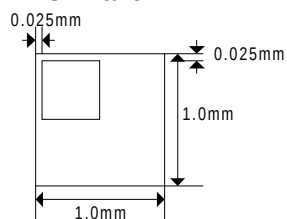


Corner Pads

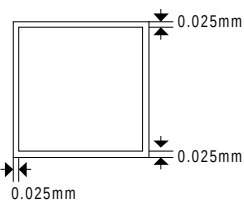
Terminal



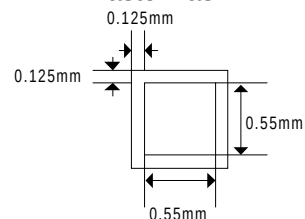
PCB Land



Solder Resist Mask

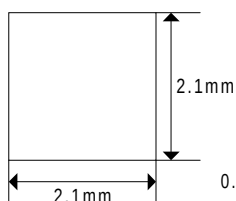


Paste Mask

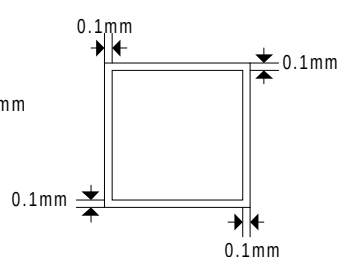


Exposed Central Pad (connected to ground plane)

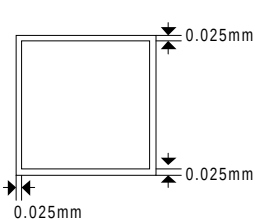
Terminal



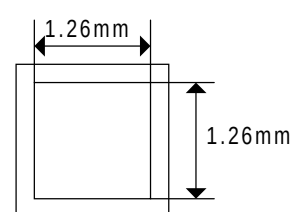
PCB Land



Solder Resist Mask

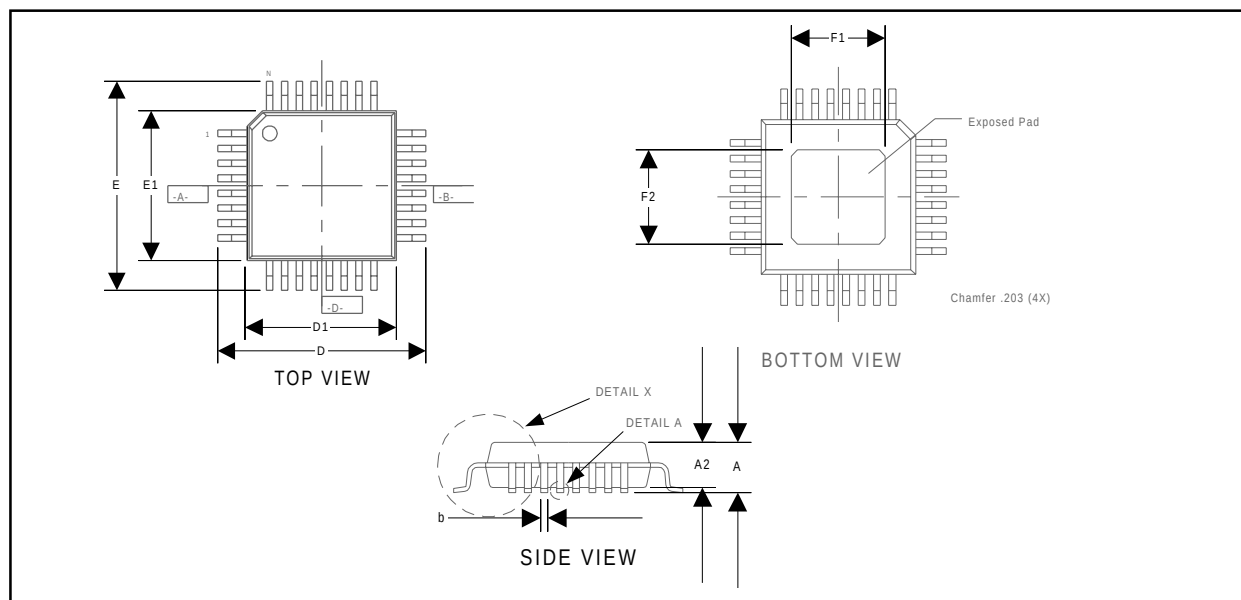


Paste Mask



PACKAGE INFORMATION

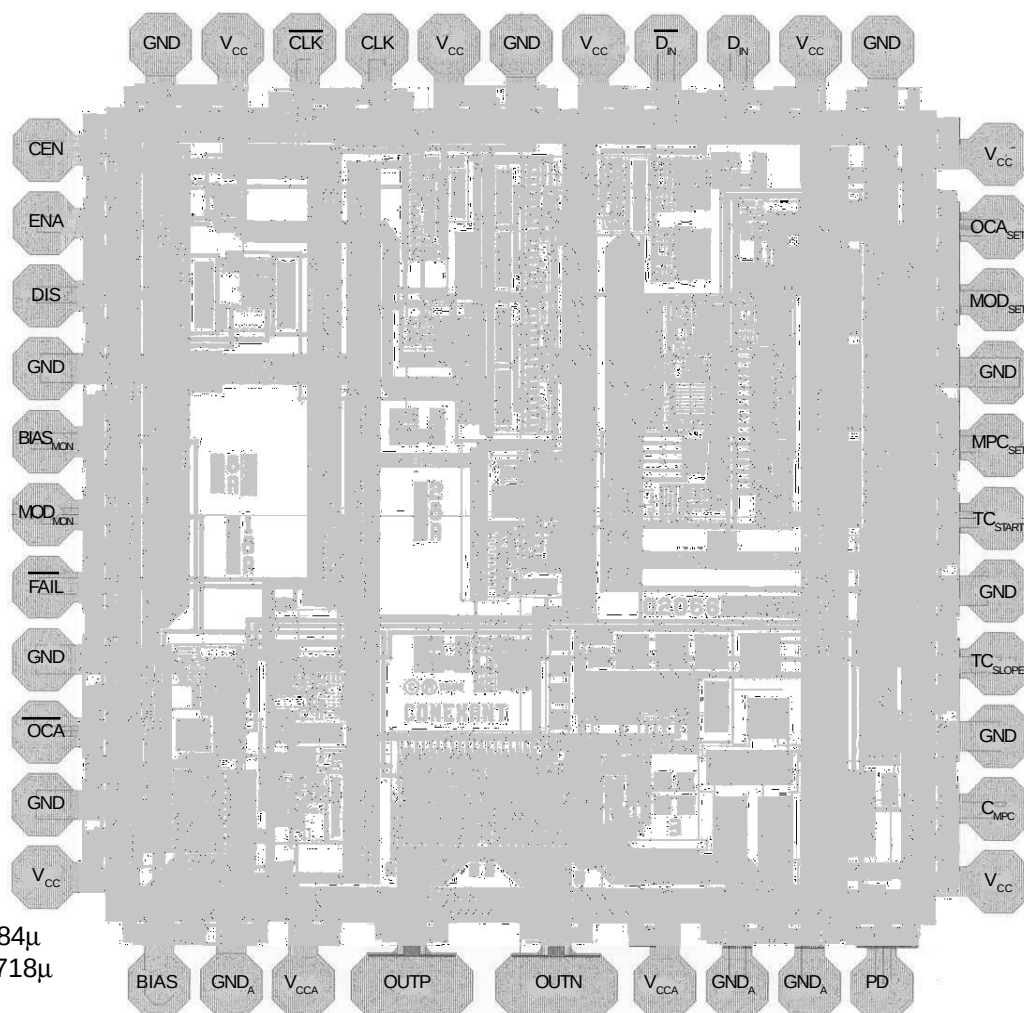
Package Outline TQFP 32



Dimensions	Tolerance	5X5X1.4mm TQFP, + 2.00mm FP		5X5X1.0mm TQFP, + 2.00mm FP
N	Lead Count	32	20	32
A	MAX.	1.60		1.20
A1	± 0.05	0.05		0.05
A2	± 0.05	1.40		1.00
A3	± 0.05	0.6365		0.4365
D	± 0.15	7.00		7.00
D1	± 0.05	5.00		5.00
E	± 0.15	7.00		7.00
E1	± 0.05	5.00		5.00
L	+0.15/-0.10	0.60		0.60
L1	REF.	1.00		1.00
e	TYP.	0.50	0.80	0.50
b	± 0.05	0.22	0.35	0.22
0	***	0° - 7°		0° - 7°
01	± 4°	6°		6°
R	MAX.	0.15		0.15
R1	TYP.	0.15		0.15
aaa	MAX.	0.08		0.08
ccc	MAX.	0.08		0.08
F1	+/- 0.10	3.05		2.67
F2	+/- 0.10	3.05		2.67

BARE DIE INFORMATION

Chip Layout



Dimensions:

Pad opening 84x84 μ Die Size 1790x1718 μ

Pad Centres

PIN	X	Y	PIN	X	Y	PIN	X	Y	PIN	X	Y
CEN	-727	550	BIAS	-550	-711	V _{CC}	727	-550	GND	550	711
ENA	-727	440	GND _A	-440	-711	C _{MPC}	727	-440	V _{CC}	440	711
DIS	-727	330	V _{CCA}	-330	-711	GND	727	-330	D _{IN}	330	711
GND	-727	220	*OUTP	-210	-711	TC _{SLOPE}	727	-220	D _{IN}	220	711
BIAS _{MON}	-727	110	*OUTP	-210	-711	GND	727	-110	V _{CC}	110	711
MOD _{MON}	-727	0	*OUTN	100	-711	TC _{START}	727	0	GND	0	711
FAIL	-727	-110	*OUTN	100	-711	MPC _{SET}	727	110	V _{CC}	-110	711
GND	-727	-220	V _{CCA}	220	-711	GND	727	220	CLK	-220	711
OCA	-727	-330	GND _A	330	-711	MOD _{SET}	727	330	CLK	-330	711
GND	-727	-440	GND _A	440	-711	OCA _{SET}	727	440	V _{CC}	-440	711
V _{CC}	-727	-550	PD	550	-711	V _{CC}	727	550	GND	-550	711

* SINGLE PAD/DOUBLE BOND

Microcosm Sales Offices

Corporate Headquarters

Microcosm Communications Limited
a subsidiary of Conexant Systems, Inc.
Castlemead
Lower Castle Street
Bristol BS1 3AG
United Kingdom
Phone: (44) 117 9302 400
Fax: (44) 117 9302 401
www.mcosm-ic.com

World Wide Direct Sales

Americas

Phone: (503) 590 0540
Fax: (503) 590 3717

Europe, Middle East Africa

Phone: (44) 117 9302 400
Fax: (44) 117 9302 401

Germany

Phone: (49) 6834 609 0000
Fax: (49) 6834 609 0001

Japan

Phone: (81) 48 680 6102
Fax: (81) 48 680 6200



Conexant Sales Offices

Further Information

literature@conexant.com
(800) 854-8099 (North America)
(949) 483-6996 (International)

Network Access
Printed in USA

World Headquarters

Conexant Systems, Inc.
4311 Jamboree Road
Newport Beach, CA
93660-3007
Phone: (949) 483-4600
Fax 1: (949) 483-4078
Fax 2: (949) 483-4391

Americas

U.S. Northwest/

Pacific Northwest - Santa Clara

Phone: (408) 249-9696
Fax: (408) 249-7113

U.S. Southwest - Los Angeles

Phone: (805) 376-0559
Fax: (805) 376-8180

U.S. Southwest - Orange County

Phone: (949) 483-9119
Fax: (949) 483-9090

U.S. Southwest - San Diego

Phone: (858) 713-3374
Fax: (858) 713-4001

U.S. North Central - Illinois

Phone: (630) 773-3454
Fax: (630) 773-3907

U.S. South Central - Texas

Phone: (972) 733-0723
Fax: (972) 407-0639

U.S. Northeast - Massachusetts

Phone: (978) 367-3200
Fax: (978) 256-6868

U.S. Southeast - North Carolina

Phone: (919) 858-9110
Fax: (919) 858-8669

U.S. Southeast - Florida/ South America

Phone: (727) 799-8406
Fax: (727) 799-8306

U.S. Mid Atlantic - Pennsylvania

Phone: (215) 244-6784
Fax: (215) 244-9292

Canada - Ontario

Phone: (613) 271-2358
Fax: (613) 271-2359

Europe

Europe Central - Germany

Phone: +49 89 829-1320
Fax: +49 89 834-2734

Europe North - England

Phone: +44 1344 486444
Fax: +44 1344 486555

Europe - Israel/Greece

Phone: +972 9 9524000
Fax: +972 9 8573732

Europe South - France

Phone: +33 1 41 44 36 51
Fax: +33 1 41 44 36 90

Europe Mediterranean - Italy

Phone: +39 02 93179911
Fax: +39 02 93179913

Europe -Sweden

Phone: +46 (0) 8 5091 4319
Fax: +46 (0) 8 590 041 10

Europe - Finland

Phone: +358 (0) 9 85 666 435
Fax: +358 (0) 9 85 666 220

Asia - Pacific

Taiwan

Phone: (886-2) 2-720-0282
Fax: (886-2) 2-757-6760

Australia

Phone: (61-2) 9869 4088
Fax: (61-2) 9860 4077

China - Central

Phone: 86-21-6361-2515
Fax: 86-21-6361-2516

China - South

Phone: (852) 2 827-0181
Fax: (852) 2 827-6488

China - South (Satellite)

Phone: (86) 755-5182495

China - North

Phone: (86-10) 8529-9777
Fax: (86-10) 8529-9778

India

Phone: (91-11) 692-4789
Fax: (91-11) 692-4712

Korea

Phone: (82-2) 565-2880
Fax: (82-2) 565-1440

Korea (Satellite)

Phone: (82-53) 745-2880
Fax: (82-3) 745-1440

Singapore

Phone: (65) 737 7355
Fax: (65) 737 9077

Japan

Phone: (81-3) 5371 1520
Fax: (81-3) 5371 1501