1.0 ELECTRICAL CHARACTERISTICS

Absolute Maximum Ratings †

PECL Power Supply Voltage (V_{CC}) (Note 1) ..... +6V
NECL Power Supply Voltage (V_{EE}) (Note 2) ..... –6V
PECL Mode Input Voltage (V_{IN}) (Note 3) ..... +6V
NECL Mode Input Voltage (V_{IN}) (Note 4) ..... –6V
Continuous Output Current (I_{OUT}) ..... 50 mA
Surge Output Current (I_{OUT}) ..... 100 mA
VBB Sink/Source Current (I_{BB}) (Note 5) ..... ±0.5 mA

† Notice: Stresses above those listed under “Absolute Maximum ratings” may cause permanent damage to the device. Exposure to maximum rating conditions for extended periods may affect device reliability.

Note 1: V_{CC} = 0V.

2: V_{EE} = 0V.

3: V_{EE} = 0V, $V_{IN} \le V_{CC}$.

4: V_{CC} = 0V, $V_{IN} \ge V_{EE}$.

5: Due to the limited drive capability, the VBB reference should only be used for the input of the same package device (i.e, do not use for other devices).

DC ELECTRICAL CHARACTERISTICS (Note 1)

Electrical Characteristics PECL: V_{CC} = 3.0V to 5.5V; V_{EE} = 0V; T_A = -40˚C to +85˚C, unless otherwise stated.

Parameter	Symbol	Min.	Typ.	Max.	Units	Conditions
Power Supply Current	I_{EE}	—	—	36	mA	T_A = –40°C
		—	30	36		T_A = +25°C
		—	—	40		T_A = +85°C
Output High Voltage (Note 2)	V_{OH}	V_{CC} - 1.145	V_{CC} - 1.020	V_{CC} - 0.895	V	—
Output Low Voltage (Note 2)	V_{OL}	V_{CC} - 1.945	V_{CC} - 1.820	V_{CC} - 1.695	V	—
Input High Voltage (Single Ended)	V_{IH}	V_{CC} - 1.225	—	V_{CC} - 0.880	V	—
Input Low Voltage (Single Ended)	V_{IL}	V_{CC} - 1.945	—	V_{CC} - 1.625	V	—
Common Mode Range (Note 3)	V_{IHCMR}	2.0	—	V_{CC}	V	—
Output Voltage	V_{BB}	V_{CC} - 1.525	V_{CC} - 1.425	V_{CC} - 1.325	V	—
Input High Current	I_{IH}	—	—	150	µA	—
Input Low Current RESET, CLK	I_{IL}	0.5	—	—	µA	V_{IN} = V_{IL} (Min)
Input Low Current /CLK		–150	—	—		

Note 1: Devices are designed to meet the DC specifications shown in the above table after thermal equilibration has been established. The circuit is in a test socket or mounted on a printed circuit board and transverse airflow greater than 500 lfpm is maintained.

2: Outputs are terminated through a 50Ω resistor to V_{CC} - 2.0V.

3: The CMR range is referenced to the most positive side of the differential input voltage. Normal operation is obtained if the high level falls within the specified range and the peak-to-peak voltage lies between 150 mV and 1.2V.

DC ELECTRICAL CHARACTERISTICS (Note 1)

Electrical Characteristics NECL: V_{EE} = –5.5V to –3.0V; V_{CC} = 0V; T_A = -40˚C to +85˚C, unless otherwise stated.

Parameter	Symbol	Min.	Typ.	Max.	Units	Conditions
Power Supply Current	I_{EE}	—	—	36	mA	T_A = –40°C
		—	30	36		T_A = +25°C
		—	—	40		T_A = +85°C
Output High Voltage (Note 2)	V_{OH}	–1.145	–1.020	–0.895	V	—
Output Low Voltage (Note 2)	V_{OL}	–1.945	–1. 820	–1.695	V	—
Input High Voltage	V_{IH}	–1.225	—	–0.880	V	—
Input Low Voltage	V_{IL}	–1.945	—	–1.625	V	—
Common Mode Range (Note 3)	V_{IHCMR}	V_{EE} + 2.0	—	0	V	—
Output Voltage	V_{BB}	–1.525	– 1.425	–1.325	V	—
Input High Current	I_{IH}	—	—	150	µA	—
Input Low Current CLK	I_{IL}	0.5	—	—	µA	V_{IN} = V_{IL} (Min)
Input Low Current /CLK		–150	—	—		

Note 1: Devices are designed to meet the DC specifications shown in the above table after thermal equilibration has been established. The circuit is in a test socket or mounted on a printed circuit board and transverse airflow greater than 500 lfpm is maintained.

2: Outputs are terminated through a 50Ω resistor to V_{CC} - 2.0V.

3: The CMR range is referenced to the most positive side of the differential input voltage. Normal operation is obtained if the high level falls within the specified range and the peak-to-peak voltage lies between 150 mV and 1.2V.

AC ELECTRICAL CHARACTERISTICS (Note 1, Note 2)

Electrical Characteristics: V_{CC} = 3.0V to 5.5V; V_{EE} = 0V or V_{EE} = –5.5V to –3.0V; V_{CC} = 0V; T_A = –40°C to +85°C, unless otherwise stated. All loading with a 50Ω resistor to V_{CC} – 2.0V.

Parameter	Symbol	Min.	Typ.	Max.	Units	Conditions
Maximum Toggle Frequency (Note 3)	f_{MAX}	4	—	—	GHz	—
Propagation Delay to Differential Output CLK → Q, /Q	t_{PLH}, t_{PHL}	300	380	440	ps	T_A = –40°C, +25°C
		320	400	460		T_A = +85°C
Propagation Delay to Differential Output RESET → Q, /Q	t_{PLH}, t_{PHL}	310	420	470	ps	TA = –40°C, +25°C
		320	450	500		T_A = +85°C
Reset Recovery Time	t_{RR}	200	100	—	ps	T_A = +25°C
		200	—	—		T_A = –40°C, +85°C
Minimum Pulse Width Reset	t_{PW}	550	200	—	ps	T_A = +25°C
		550	—	—		T_A = –40°C, +85°C
Cycle-to-Cycle RMS Jitter	t_{JITTER}	—	0.2	<1	ps (rms)	—
Input Voltage Swing (Differential Configuration, Note 4)	V_{PP}	150	800	1200	mV	—
Output Rise/Fall Time Q (20% to 80%)	t_r/t_f	90	170	200	ps	T_A = –40°C
		100	180	220		T_A = +25°C
		120	200	240		T_A = +85°C

Note 1: Measured with 750 mV input signal, 50% duty cycle clock source.

2: Specifications for packaged product only.

3: f_{MAX} guaranteed for functionality only. V_{OL} and V_{OH} levels are guaranteed at DC only.

4: Input swing for which AC parameters are ensured.

TEMPERATURE SPECIFICATIONS

Parameters	Symbol	Min.	Typ.	Max.	Units	Conditions
Temperature Ranges						
Operating Temperature Range	T_A	–40	—	+85	°C	—
Storage Temperature Range	T_S	–65	—	+150	°C	—
Lead Temperature	T_{LEAD}	—	—	+260	°C	Soldering, 20 sec.
Package Thermal Resistance (MSOP)						
Junction-to-Ambient	θ_{JA}	—	206	—	°C/W	Still Air
		—	155	—		500 lfpm
Junction-to-Case	θ_{JC}	—	39	—	°C/W	—

2.0 PIN DESCRIPTIONS

The descriptions of the pins are listed in Table .

PIN FUNCTION TABLE

Pin Number	Pin Name	Description
1	RESET	ECL Asynchronous Reset (with 75 kΩ resistor pull-down resistor to GND).
2, 3	CLK, /CLK	ECL, Clock Inputs (CLK input with 75 kΩ resistor pull-down resistor to GND, /CLK input with 75 kΩ resistor divider).
4	VBB	Reference Voltage Output.
5	VEE	Negative Supply Voltage.
6, 7	/Q, Q	ECL Outputs.
8	VCC	Positive Supply Voltage.

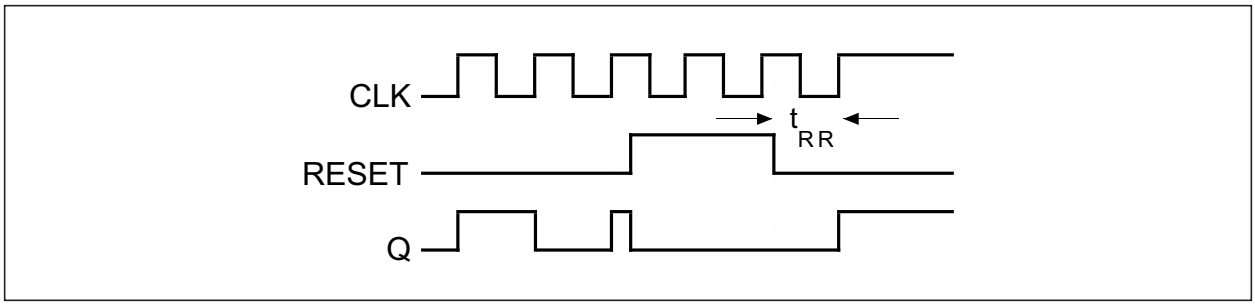
2.1 Truth Table

TABLE 2-1: TRUTH TABLE (Note 1)

CLK	/CLK	RESET	Q	/Q
X	X	H	L	H
Z	/Z	L	F	F

Note 1: Z = Low-to-High Transition
/Z = High-to-Low Transition
F = Divide by 4 Function

3.0 TIMING DIAGRAM



3.1 Input Waveform

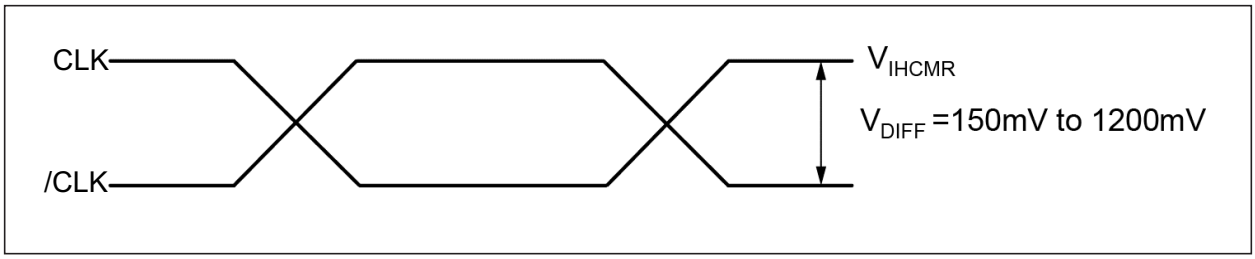


FIGURE 3-1: *Input Waveform.*

4.0 TERMINATION RECOMMENDATIONS

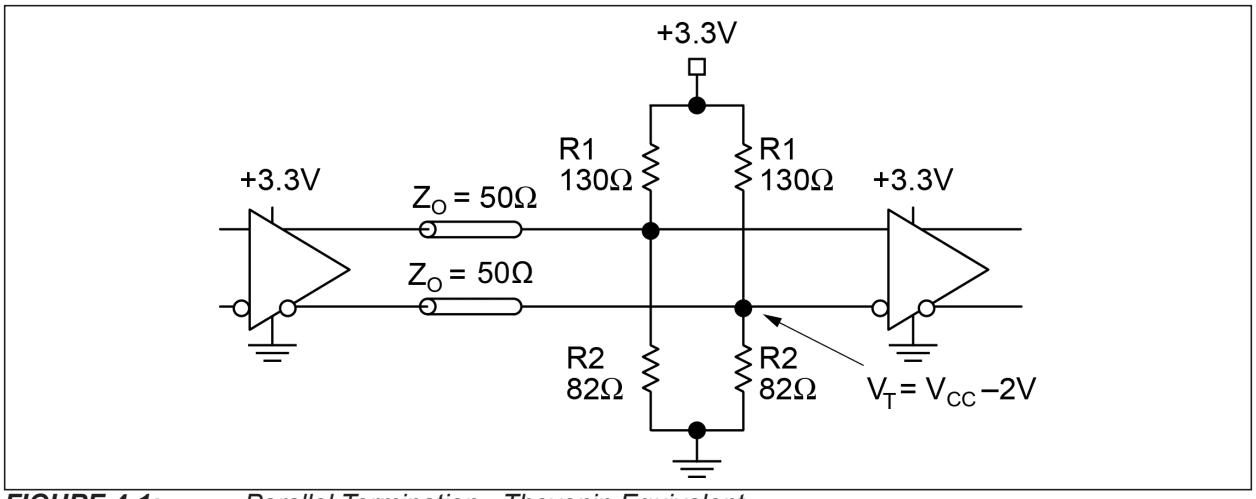


FIGURE 4-1: *Parallel Termination - Thevenin Equivalent.*

Note: For +5.0V systems: R1 = 82Ω, R2 = 130Ω

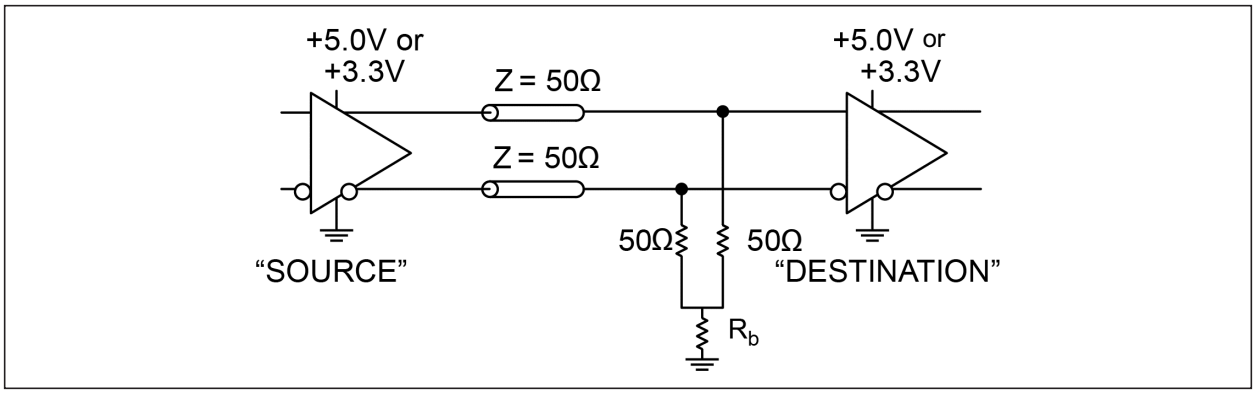


FIGURE 4-2: *Three - Resistor Y - Termination.*

Note: Power-saving alternative to Thevenin termination

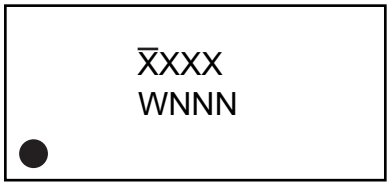
Note: Place termination resisters as close to destination inputs as possible

Note: R_b resistor sets the DC bias voltage equal to V_T. For +3.3V systems R_b = 46Ω to 50Ω For +5V systems, R_b = 110Ω.

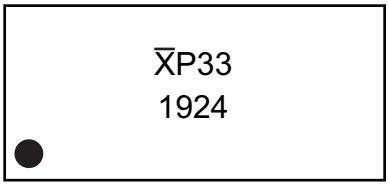
5.0 PACKAGING INFORMATION

5.1 Package Marking Information

8-Lead MSOP*



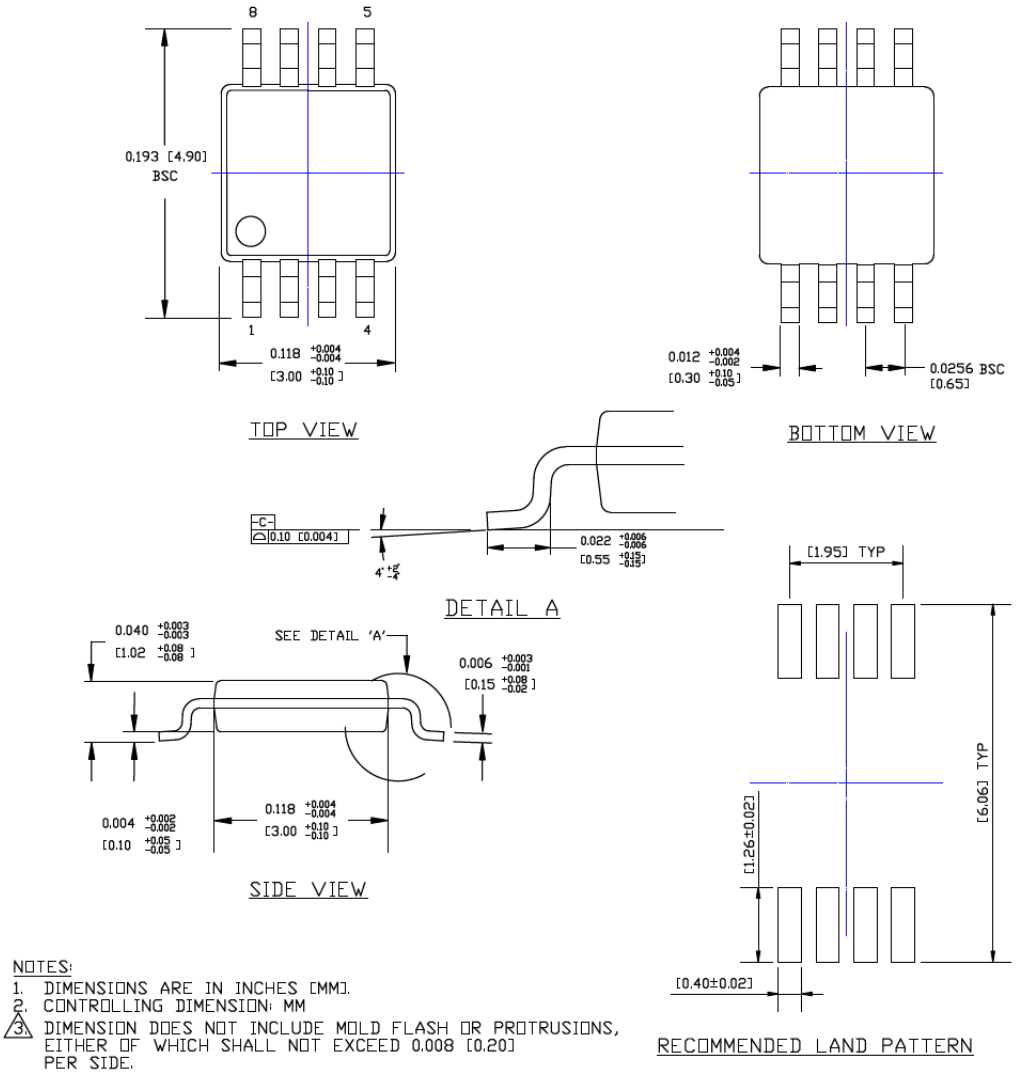
Example



Legend:	XX...X	Product code or customer-specific information
	Y	Year code (last digit of calendar year)
	YY	Year code (last 2 digits of calendar year)
	WW	Week code (week of January 1 is week ‘01’)
	NNN	Alphanumeric traceability code
	(e3)	Pb-free JEDEC® designator for Matte Tin (Sn)
	*	This package is Pb-free. The Pb-free JEDEC designator ((e3)) can be found on the outer packaging for this package.
	●, ▲, ▼	Pin one index is identified by a dot, delta up, or delta down (triangle mark).
Note:	In the event the full Microchip part number cannot be marked on one line, it will be carried over to the next line, thus limiting the number of available characters for customer-specific information. Package may or may not include the corporate logo.	
	Underbar (_) and/or Overbar (¯) symbol may not be to scale.	

TITLE
8 LEAD MSOP PACKAGE OUTLINE & RECOMMENDED LAND PATTERN

DRAWING #	MSOP-8LD-PL-1	UNIT	INCH [MM]



NOTES:
1. DIMENSIONS ARE IN INCHES [MM].
2. CONTROLLING DIMENSION: MM
3. DIMENSION DOES NOT INCLUDE MOLD FLASH OR PROTRUSIONS, EITHER OF WHICH SHALL NOT EXCEED 0.008 [0.20] PER SIDE.

Note: For the most current package drawings, please see the Microchip Packaging Specification located at http://www.microchip.com/packaging.

APPENDIX A: REVISION HISTORY

Revision A (February 2019)

- Converted Micrel document SY100EP33V to Microchip data sheet DS20006166A.
- Minor text changes throughout.
- Removed all reference to the EOL SY10EP33V version.
- Revised Section 1.0, Electrical Characteristics section with updated Electrical tables.

NOTES:

PRODUCT IDENTIFICATION SYSTEM

To order or obtain information, e.g., on pricing or delivery, contact your local Microchip representative or sales office.

PART NO.	-X	X	X	-XX
Device	Voltage Option	Package	Temperature Range	Special Processing

Device:	SY100EP33:	ECL ÷4 Divider
Voltage Option:	V = 3.3V, 5V	
Package:	K =	8-Lead MSOP
Temperature Range:	G =	–40°C to +85°C (NiPdAu, Pb-Free)
Special Processing:	<blank> =	100/Tube
	TR =	1,000/Reel

Examples:

a) SY100EP33VKG: 5V/3.3V ECL ÷4 Divider, –40°C to +85°C, 8-Lead MSOP, 100/Tube

b) SY100EP33VKG-TR: 5V/3.3V ECL ÷4 Divider, –40°C to +85°C, 8-Lead MSOP, 1,000/Reel

Note 1: Tape and Reel identifier only appears in the catalog part number description. This identifier is used for ordering purposes and is not printed on the device package. Check with your Microchip Sales Office for package availability with the Tape and Reel option.

NOTES:

Note the following details of the code protection feature on Microchip devices:

- Microchip products meet the specification contained in their particular Microchip Data Sheet.
- Microchip believes that its family of products is one of the most secure families of its kind on the market today, when used in the intended manner and under normal conditions.
- There are dishonest and possibly illegal methods used to breach the code protection feature. All of these methods, to our knowledge, require using the Microchip products in a manner outside the operating specifications contained in Microchip's Data Sheets. Most likely, the person doing so is engaged in theft of intellectual property.
- Microchip is willing to work with the customer who is concerned about the integrity of their code.
- Neither Microchip nor any other semiconductor manufacturer can guarantee the security of their code. Code protection does not mean that we are guaranteeing the product as "unbreakable."

Code protection is constantly evolving. We at Microchip are committed to continuously improving the code protection features of our products. Attempts to break Microchip's code protection feature may be a violation of the Digital Millennium Copyright Act. If such acts allow unauthorized access to your software or other copyrighted work, you may have a right to sue for relief under that Act.

Microchip received ISO/TS-16949:2009 certification for its worldwide headquarters, design and wafer fabrication facilities in Chandler and Tempe, Arizona; Gresham, Oregon and design centers in California and India. The Company's quality system processes and procedures are for its PIC® MCUs and dsPIC® DSCs, KEELOQ® code hopping devices, Serial EEPROMs, microperipherals, nonvolatile memory and analog products. In addition, Microchip's quality system for the design and manufacture of development systems is ISO 9001:2000 certified.

QUALITY MANAGEMENT SYSTEM
CERTIFIED BY DNV
═ ISO/TS 16949 ═

Trademarks

ISBN: 978-1-5224-4222-6

Worldwide Sales and Service

AMERICAS

Corporate Office
2355 West Chandler Blvd.
Chandler, AZ 85224-6199
Tel: 480-792-7200
Fax: 480-792-7277
Technical Support:
http://www.microchip.com/support
Web Address:
www.microchip.com

Atlanta
Duluth, GA
Tel: 678-957-9614
Fax: 678-957-1455

Austin, TX
Tel: 512-257-3370

Boston
Westborough, MA
Tel: 774-760-0087
Fax: 774-760-0088

Chicago
Itasca, IL
Tel: 630-285-0071
Fax: 630-285-0075

Dallas
Addison, TX
Tel: 972-818-7423
Fax: 972-818-2924

Detroit
Novi, MI
Tel: 248-848-4000

Houston, TX
Tel: 281-894-5983

Indianapolis
Noblesville, IN
Tel: 317-773-8323
Fax: 317-773-5453
Tel: 317-536-2380

Los Angeles
Mission Viejo, CA
Tel: 949-462-9523
Fax: 949-462-9608
Tel: 951-273-7800

Raleigh, NC
Tel: 919-844-7510

New York, NY
Tel: 631-435-6000

San Jose, CA
Tel: 408-735-9110
Tel: 408-436-4270

Canada - Toronto
Tel: 905-695-1980
Fax: 905-695-2078

ASIA/PACIFIC

Australia - Sydney
Tel: 61-2-9868-6733

China - Beijing
Tel: 86-10-8569-7000

China - Chengdu
Tel: 86-28-8665-5511

China - Chongqing
Tel: 86-23-8980-9588

China - Dongguan
Tel: 86-769-8702-9880

China - Guangzhou
Tel: 86-20-8755-8029

China - Hangzhou
Tel: 86-571-8792-8115

China - Hong Kong SAR
Tel: 852-2943-5100

China - Nanjing
Tel: 86-25-8473-2460

China - Qingdao
Tel: 86-532-8502-7355

China - Shanghai
Tel: 86-21-3326-8000

China - Shenyang
Tel: 86-24-2334-2829

China - Shenzhen
Tel: 86-755-8864-2200

China - Suzhou
Tel: 86-186-6233-1526

China - Wuhan
Tel: 86-27-5980-5300

China - Xian
Tel: 86-29-8833-7252

China - Xiamen
Tel: 86-592-2388138

China - Zhuhai
Tel: 86-756-3210040

ASIA/PACIFIC

India - Bangalore
Tel: 91-80-3090-4444

India - New Delhi
Tel: 91-11-4160-8631

India - Pune
Tel: 91-20-4121-0141

Japan - Osaka
Tel: 81-6-6152-7160

Japan - Tokyo
Tel: 81-3-6880- 3770

Korea - Daegu
Tel: 82-53-744-4301

Korea - Seoul
Tel: 82-2-554-7200

Malaysia - Kuala Lumpur
Tel: 60-3-7651-7906

Malaysia - Penang
Tel: 60-4-227-8870

Philippines - Manila
Tel: 63-2-634-9065

Singapore
Tel: 65-6334-8870

Taiwan - Hsin Chu
Tel: 886-3-577-8366

Taiwan - Kaohsiung
Tel: 886-7-213-7830

Taiwan - Taipei
Tel: 886-2-2508-8600

Thailand - Bangkok
Tel: 66-2-694-1351

Vietnam - Ho Chi Minh
Tel: 84-28-5448-2100

EUROPE

Austria - Wels
Tel: 43-7242-2244-39
Fax: 43-7242-2244-393

Denmark - Copenhagen
Tel: 45-4450-2828
Fax: 45-4485-2829

Finland - Espoo
Tel: 358-9-4520-820

France - Paris
Tel: 33-1-69-53-63-20
Fax: 33-1-69-30-90-79

Germany - Garching
Tel: 49-8931-9700

Germany - Haan
Tel: 49-2129-3766400

Germany - Heilbronn
Tel: 49-7131-67-3636

Germany - Karlsruhe
Tel: 49-721-625370

Germany - Munich
Tel: 49-89-627-144-0
Fax: 49-89-627-144-44

Germany - Rosenheim
Tel: 49-8031-354-560

Israel - Ra'anana
Tel: 972-9-744-7705

Italy - Milan
Tel: 39-0331-742611
Fax: 39-0331-466781

Italy - Padova
Tel: 39-049-7625286

Netherlands - Drunen
Tel: 31-416-690399
Fax: 31-416-690340

Norway - Trondheim
Tel: 47-7288-4388

Poland - Warsaw
Tel: 48-22-3325737

Romania - Bucharest
Tel: 40-21-407-87-50

Spain - Madrid
Tel: 34-91-708-08-90
Fax: 34-91-708-08-91

Sweden - Gothenberg
Tel: 46-31-704-60-40

Sweden - Stockholm
Tel: 46-8-5090-4654

UK - Wokingham
Tel: 44-118-921-5800
Fax: 44-118-921-5820