1.6x Linear Fan Driver with Enable Function AP2113A

General Description

The AP2113A is a low dropout high performance linear regulator which is specially designed to drive a DC fan, the regulator delivers output current 600mA in minimum.

The AP2113A provides low quiescent current consumption 70μA, and over current limit protection and load short current protection with fold-back limitation 50mA, which are ideal for battery powered system application.

The AP2113A output voltage (V_{OUT}) follows 1.6 times of V_{SET} input voltage until it reaches V_{IN} voltage minus dropout voltage (V_{DROP}). The V_{SET} voltage must be larger than 1.0V to guarantee V_{OUT} 1.6 times of V_{SET}. An Enable pin further reduces power dissipation while shut down.

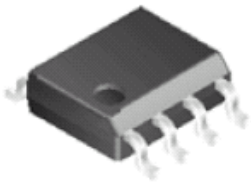
The AP2113A is available in standard SOIC-8 package.

Features

- Output Voltage follows 1.6 times of V_{SET} (V_{OUT}/V_{SET}=1.6±3%)
- Low Quiescent Current: 70μA (Typ)
- Guarantee 0.6A Continuous Load
- Enable/Shutdown Function
- Over Current Protection
- Short Current Protection with Fold-back limitation: 50mA
- Low Dropout Voltage:
  200mV @ 600mA (Typ)
  250mV @ 600mA (Max)
- OTSD Protection
- Stable with 1.0μF Flexible Caps: Ceramic, Tantalum and Aluminum Electrolytic
- Operation Temperature Range: -40°C to 85°C
- ESD: MM 300V, HBM 6000V

Applications

- Notebook Computer Fan Driver
- Motherboards
- Peripheral Cards



SOIC-8

Figure 1. Package Type of AP2113A

Pin Configuration

M Package
(SOIC-8)

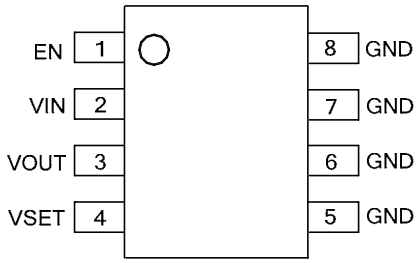


Figure 2. Pin Configuration of AP2113A (Top View)

Pin Descriptions

Pin Number	Pin Name	Function
1	EN	Chip enable, H-Normal work, L-Shutdown output
2	VIN	Input voltage
3	VOUT	Output voltage
4	VSET	Voltage input pin, apply DC voltage into VSET as voltage reference, the output voltage follows 1.6 times of VSET voltage
5, 6, 7, 8	GND	Ground

Functional Block Diagram

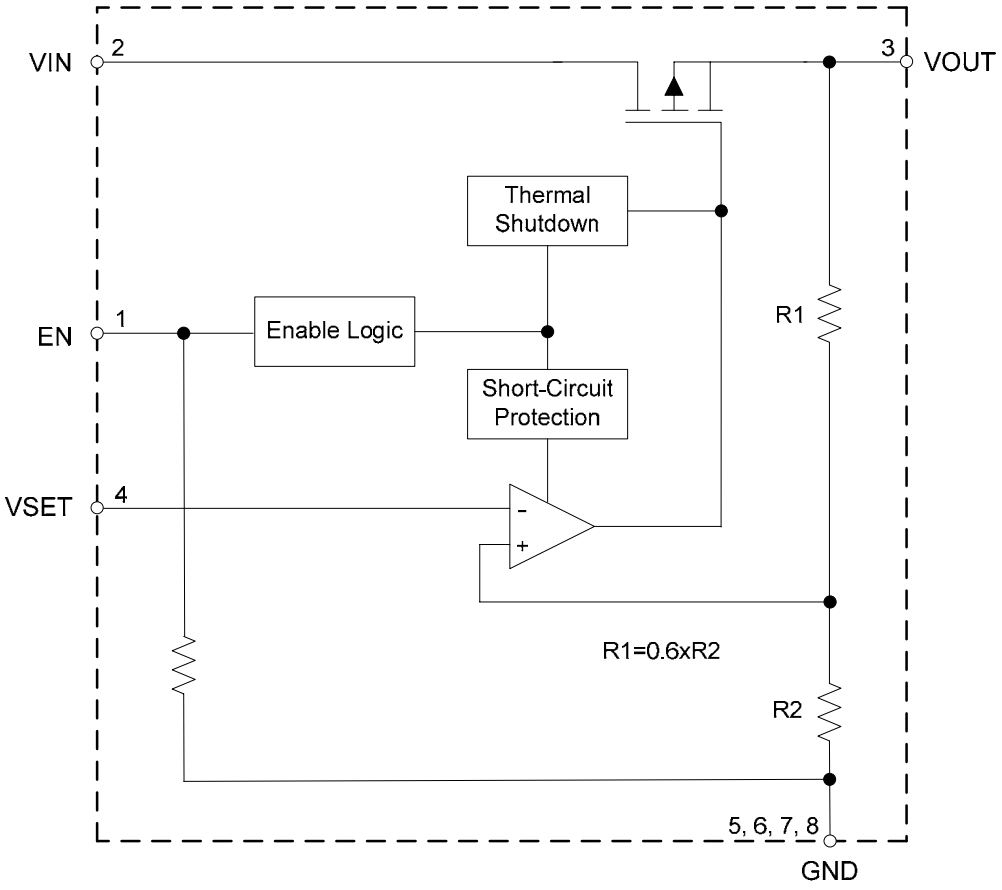
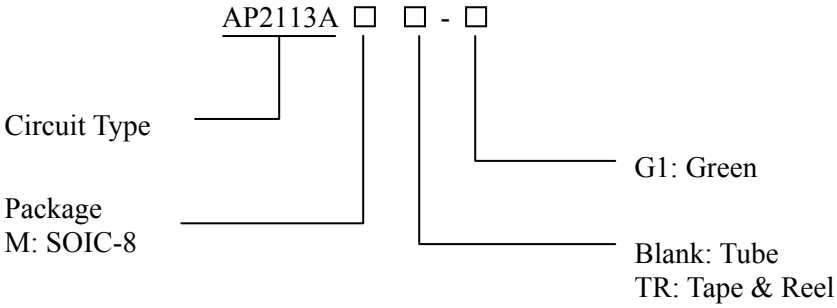


Figure 3. Functional Block Diagram of AP2113A

1.6x Linear Fan Driver with Enable Function AP2113A

Ordering Information



Package	Temperature Range	Part Number	Marking ID	Packing Type
SOIC-8	-40 to 85°C	AP2113AM-G1	2113AM-G1	Tube
		AP2113AMTR-G1	2113AM-G1	Tape & Reel

BCD Semiconductor's Pb-free products, as designated with "G1" suffix in the part number, are RoHS compliant and Green.

Absolute Maximum Ratings (Note 1)

Parameter	Symbol	Value	Unit
Input Voltage	V_{IN}	6.0	V
VSET Input Voltage	V_{SET}	5.5	V
Enable Input Voltage	V_{EN}	5.5	V
Operating Junction Temperature Range	T_J	150	ºC
Storage Temperature Range	T_{STG}	-65 to 150	ºC
Thermal Resistance （Junction to Ambient）(No Heat Sink)	θ_{JA}	144	°C /W
ESD (Machine Model)		300	V
ESD (Human Body Model)		6000	V

Note 1: Stresses greater than those listed under “Absolute Maximum Ratings” may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated under “Recommended Operating Conditions” is not implied. Exposure to “Absolute Maximum Ratings” for extended periods may affect device reliability.

Recommended Operating Conditions

Parameter	Symbol	Min	Max	Unit
Input Voltage	V_{IN}	2.5	5.5	V
Operating Ambient Temperature Range	T_A	-40	85	°C

Electrical Characteristics

V_{IN}=5.0V, V_{SET}=2V, C_{IN}=1μF, C_{OUT}=1μF, Typical T_A=25°C, Bold typeface applies over full temperature range, -40°C≤T_A≤85°C, unless otherwise specified.

Parameter	Symbol	Conditions	Min	Typ	Max	Unit
Standby Current	I_{STB}	V_{IN}=5V, Enable off		0.2	5	μA
Quiescent Current	I_Q	V_{IN}=5V, No Load		70	100	μA
Output Current	I_{OUT}	V_{IN}=5.0V, V_{OUT}=3.2V	600			mA
Output Voltage/V_{SET} Voltage	V_{OUT}/V_{SET}	V_{IN}=5.5V, V_{SET}=1V to 3.2V, I_{OUT}=30mA	1.552	1.6	1.648	V/V
Line Regulation	$\frac{(\triangle V_{OUT}/V_{OUT})}{\triangle V_{IN}}$	V_{IN}=V_{OUT}+1V to 5.5V, I_{OUT}=30mA		0.02	0.1	%/V
Load Regulation	$\frac{(\triangle V_{OUT}/V_{OUT})}{\triangle I_{OUT}}$	1mA≤I_{OUT}≤600mA		0.2	1	%/A
Dropout Voltage	V_{DROP}	V_{IN}=V_{EN}=5V,V_{SET}=2V, I_{OUT}=600mA		200	250	mV
Minimum VSET Voltage	V_{SET}			1		V
VSET Pin Current	I_{SET}	V_{SET}=5V			1	μA
Fold-back Short Current	I_{SHORT}	V_{OUT}=0V		50		mA
Output Current Limit	I_{LIMIT}			1000		mA
EN Logic Input High Level	V_{ENH}		1.5		5.5	V
EN Logic Input Low Level	V_{ENL}		0		0.4	V
EN Pin Bias Current		V_{EN}=5V		1.5	10	μA
Thermal Shutdown Temperature	T_{OTSD}			165		°C
Thermal Shutdown Hysteresis	T_{HYOTSD}			25		

Typical Performance Characteristics

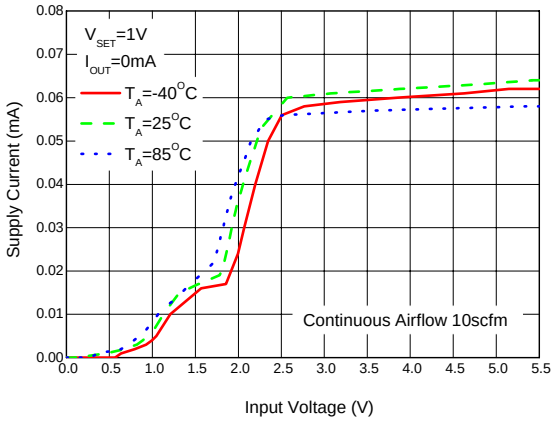


Figure 4. Supply Current vs. Input Voltage

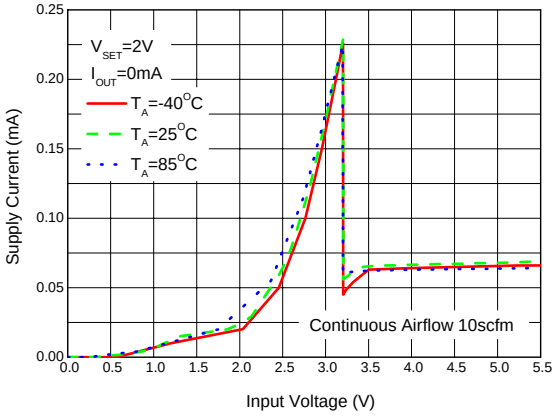


Figure 5. Supply Current vs. Input Voltage

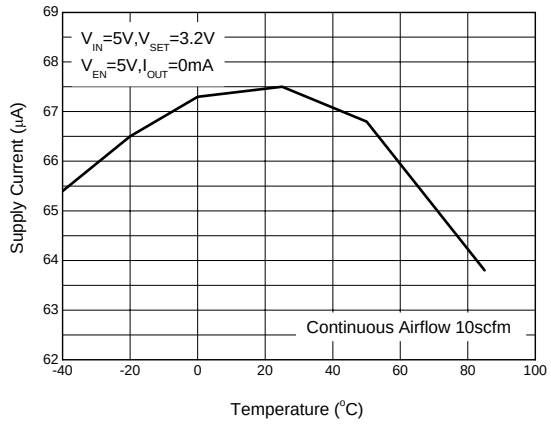


Figure 6. Supply Current vs. Temperature

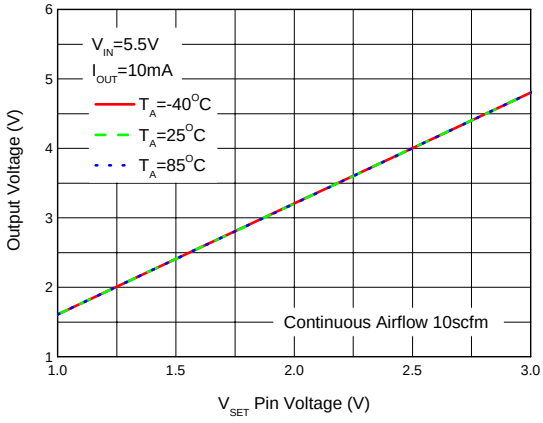


Figure 7. Output Voltage vs. V_{SET} Pin Voltage

Typical Performance Characteristics (Continued)

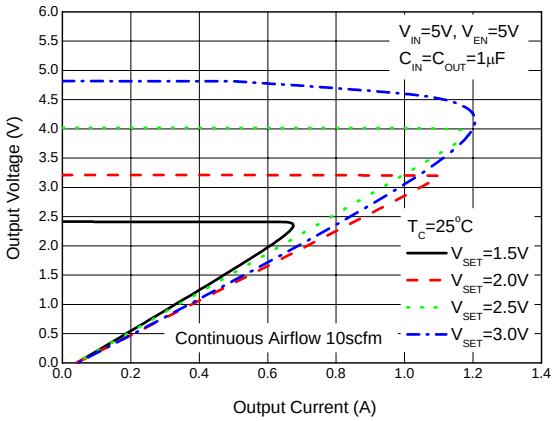


Figure 8. Output Voltage vs. Output Current

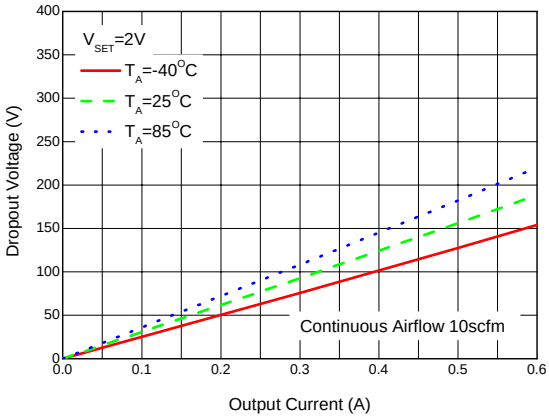


Figure 9. Dropout Voltage vs. Output Current

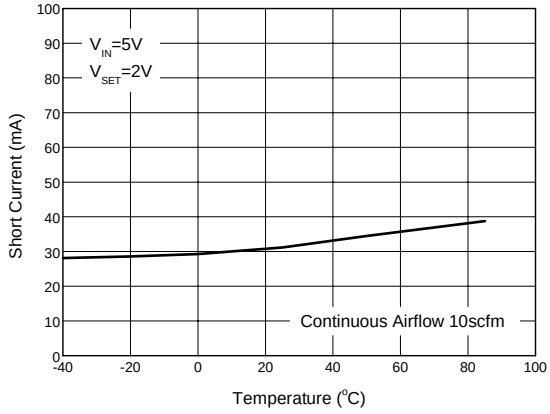


Figure 10. Short Current vs. Temperature

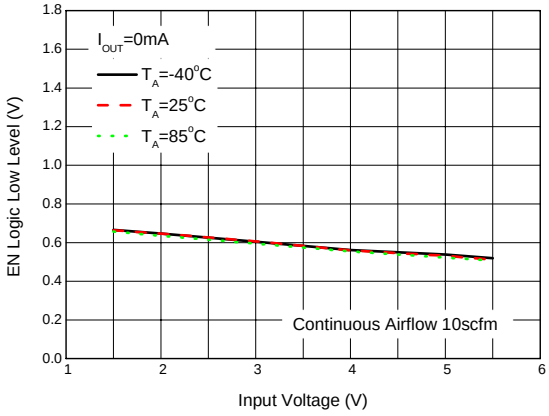


Figure 11. EN Logic Low Level vs. Input Voltage

Typical Performance Characteristics (Continued)

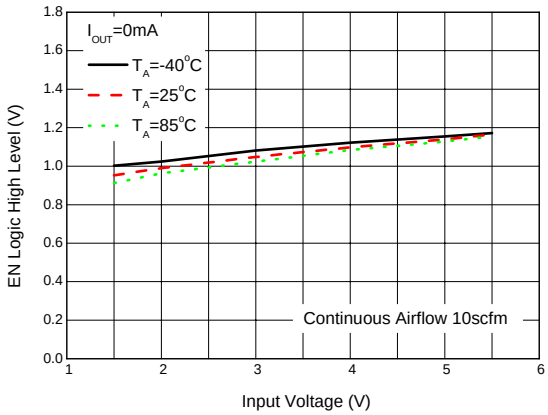


Figure 12. EN Logic High Level vs. Input Voltage

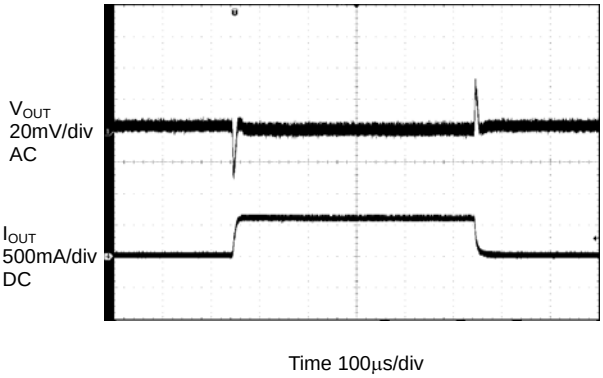


Figure 13. Load Transient
(V_{IN}=5V, V_{SET}=2V, V_{EN}=5V, C_{IN}=C_{OUT}=1μF, Slew Rate=250mA/μs)

Typical Application

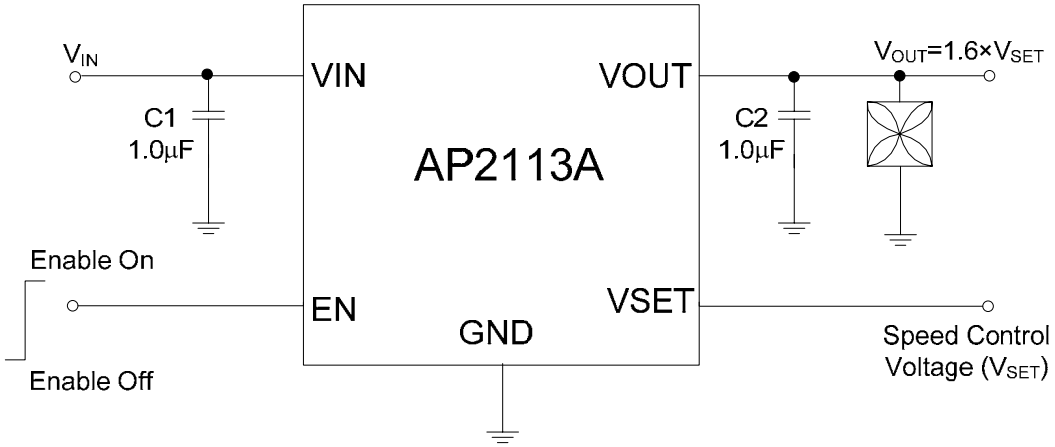
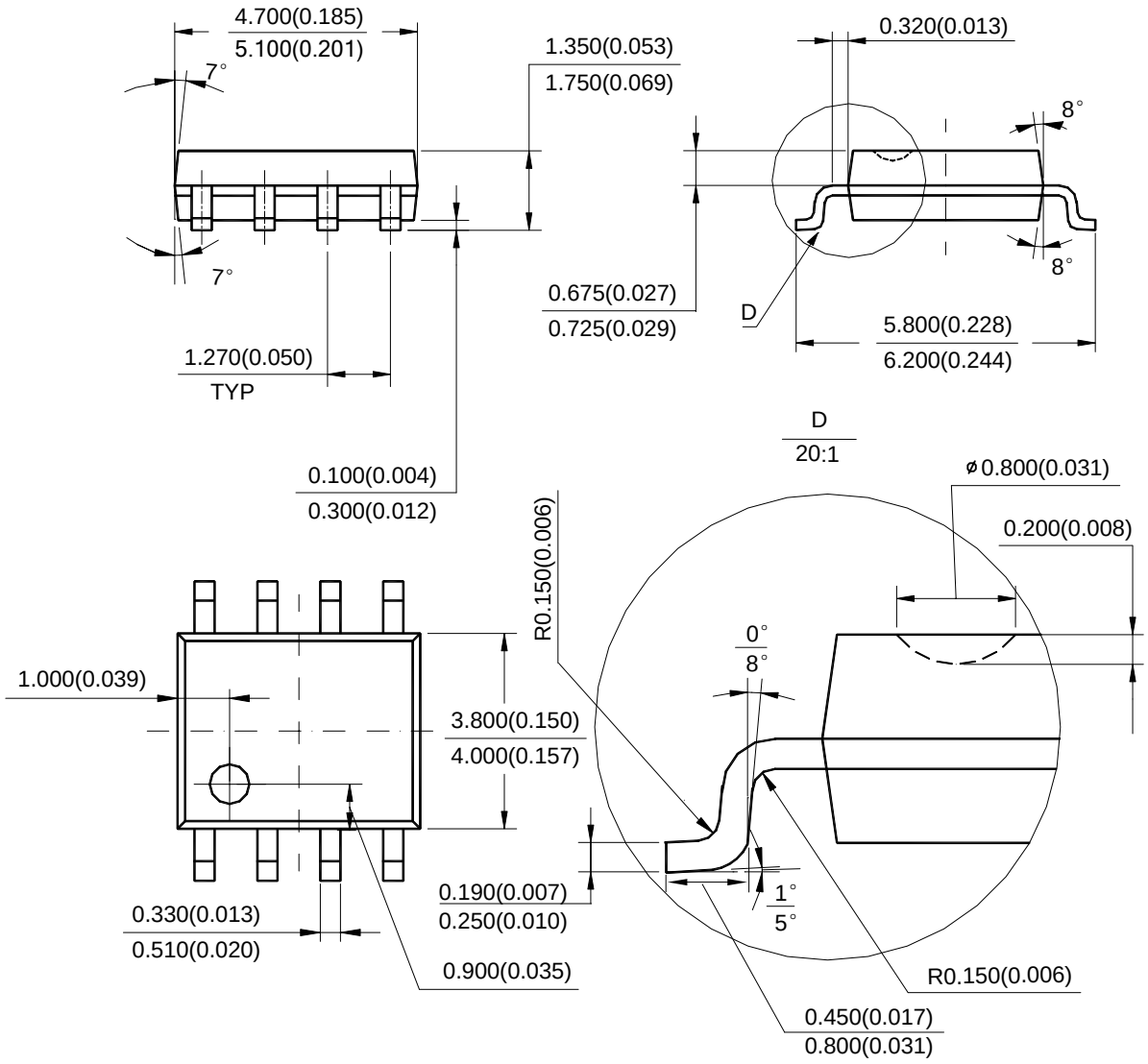


Figure 14. Typical Application of AP2113A

Mechanical Dimensions

SOIC-8 **Unit: mm(inch)**



Note: Eject hole, oriented hole and mold mark is optional.



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MAIN SITE

- Headquarters
BCD Semiconductor Manufacturing Limited
No. 1600, Zi Xing Road, Shanghai ZiZhu Science-based Industrial Park, 200241, China
Tel: +86-21-24162266, Fax: +86-21-24162277

- Wafer Fab
Shanghai SIM-BCD Semiconductor Manufacturing Co., Ltd.
800 Yi Shan Road, Shanghai 200233, China
Tel: +86-21-6485 1491, Fax: +86-21-5450 0008

REGIONAL SALES OFFICE

Shenzhen Office
Shanghai SIM-BCD Semiconductor Manufacturing Co., Ltd., Shenzhen Office
Unit A Room 1203, Skyworth Bldg., Gaoxin Ave.1.S., Nanshan District, Shenzhen, China
Tel: +86-755-8826 7951
Fax: +86-755-8826 7865

Taiwan Office
BCD Semiconductor (Taiwan) Company Limited
4F, 298-1, Rui Guang Road, Nei-Hu District, Taipei, Taiwan
Tel: +886-2-2656 2808
Fax: +886-2-2656 2806

USA Office
BCD Semiconductor Corp.
30920 Huntwood Ave. Hayward, CA 94544, USA
Tel : +1-510-324-2988
Fax: +1-510-324-2788