

Stepping Motor Driver IC

Description

The AP8110 is Stepping motor driver IC. It consists of TTL compatible input circuits, quad bridge driver outputs with fly-back diodes, and stand-by circuit. It is optimal for Bipolar step motor driver in 12V System products.



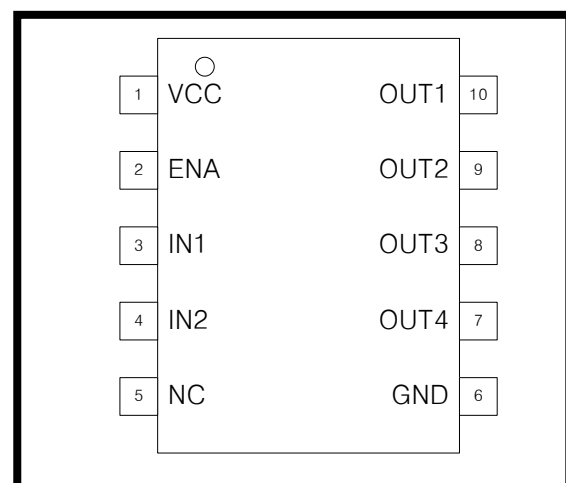
Features

- One Chip 2 Phase Stepping Motor Driver including two bridge drivers
- Very low Current consumption with stand-by mode
- For one power supply (The control system power supply is unnecessary)
- Short-Through Current Restriction Circuit
- TTL Compatible Inputs
- Output Current up to 400mA(Peak)
- Thermal Shutdown Circuit
- Under Voltage Lockout Circuit
- Pull-down Resistance for Input

Application

- Refrigerator Damper motor driver
- Robotics
- Printers
- Scanners

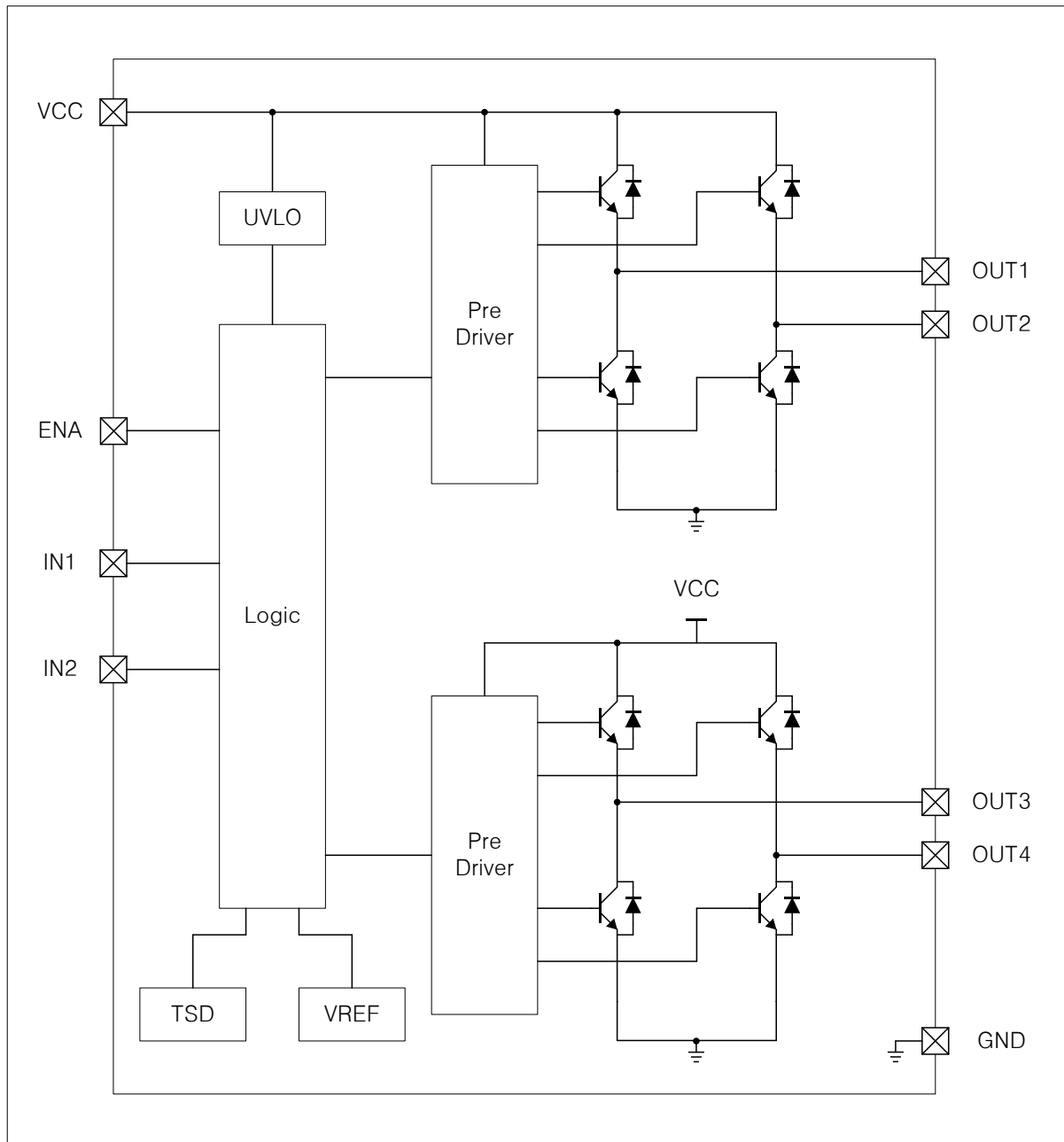
Pin Configuration



REV. 00



Block Diagram





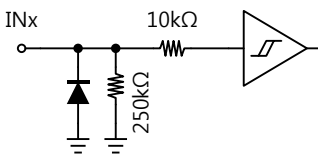
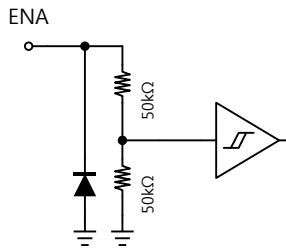
Pin Description

PIN No.	PIN name	I/O Type	Pin Function
1	VCC	Power	Power-supply voltage pin. VCC Voltage is impressed. The permissible operation voltage is from 5.0 to 16.0(V). The capacitor is connected for stabilization for GND pin (6pin).
2	ENA	INPUT	Motor drive control input pin. ENA pin becomes the stand-by mode in "L" and can 0 circuitry current. When ENA pin are "H", from the stand-by mode, the output state becomes an output corresponding to the input logic. It is a digital input, and the range of "L" level input is - to 0.7(V). The range of "H" level input is 1.8 to 5.5(V). With built-in pull-down resistance 100(kΩ).
3	IN1	INPUT	Motor drive control input pin. Truth Table 1 Driving control input pin of OUT1 (10pin) and OUT2 (9pin). With built-in pull-down resistance.
4	IN2	INPUT	Motor drive control input pin. Truth Table 1 Driving control input pin of OUT3 (8pin) and OUT4 (7pin). With built-in pull-down resistance.
5	NC	-	Need to Floating
6	GND	GND	Ground pin.
7	OUT4	OUTPUT	Driving output pin. The motor coil is connected between terminal OUT3 (8pin).
8	OUT3	OUTPUT	Driving output pin. The motor coil is connected between terminal OUT4 (7pin).
9	OUT2	OUTPUT	Driving output pin. The motor coil is connected between terminal OUT1 (10pin).
10	OUT1	OUTPUT	Driving output pin. The motor coil is connected between terminal OUT2 (9pin).

Truth Table 1.

INPUT			Output				Mode
ENA	IN1	IN2	OUT1	OUT2	OUT3	OUT4	
L	-	-	OFF	OFF	OFF	OFF	Stand-by
H	L	L	H	L	H	L	Step1
H	H	L	L	H	H	L	Step2
H	H	H	L	H	L	H	Step3
H	L	H	H	L	L	H	Step1

Terminal Circuit

Input terminal (INA, INB)	Input terminal (ENA)
	

The diagram is partly-provided and omitted or simplified for explanatory purposes.



Maximum Ratings Characteristics

(TA = 25°C unless otherwise specified)

Characteristics		Symbol	Value	Unit
Supply voltage		VCC	-0.3V ~ 17.0	V
Output current		IO (PEAK)	±400	mA
		IO (START)	±350	
		IO (HOLD)	±100	
Input voltage		VIN	-0.3 ~ 6.0	V
Power dissipation	SSOP-10L	PD_SSOP10L	1.0	W
Operating temperature		Topr	-30 ~ 75	°C
Storage temperature		Tstg	-55 ~ 150	°C

Recommended Operating Conditions

(TA = 25°C unless otherwise specified)

Characteristics	Symbol	Min	Typ.	Max	Unit
Supply voltage	VCC	5.0	12.0	16.0	V
Input "H" Level voltage	VINH	1.8	-	5.5	
Input "L" Level voltage	VINL	-0.3	-	0.7	



Electrical Characteristics

(TA = 25°C, VCC = 12V unless otherwise specified)

Parameter	symbol	Conditions	min	typ	max	Unit
Power Supply Voltage	ICC0	Stand-by mode ENA=L	-	-	1	uA
	ICC1	ENA=H, No load	-	5	7.5	mA
Input Current	IIN	VIN=5V	30	50	65	uA
Thermal Shutdown operating temperature*	TTSD	Design certification	150	180	210	°C
Temperature hysteresis width*	ΔTTSD	Design certification	-	40	-	°C
Low voltage protection function operation voltage	VTH_VCC	VCC Falling	3.8	4.2	4.6	V
Release voltage	VTH_REL	VCC Rising	4.1	4.5	4.9	V
Output Saturation Voltage (Upper and lower total)	VSAT1	IOUT=100mA	-	1.5	3.45	V
	VSAT2	IOUT=400mA	-	2.3	3.8	
Output leakage current	IO_LAEK	VO=16V	-	-	10	uA
Diode forward voltage	VD	ID=100mA	-	1.1	1.7	V
	VD	ID=400mA	-	1.4	2.0	

*: These parameters, although guaranteed, are not 100% tested in production.

Under voltage Lockout Circuit (UVLO)

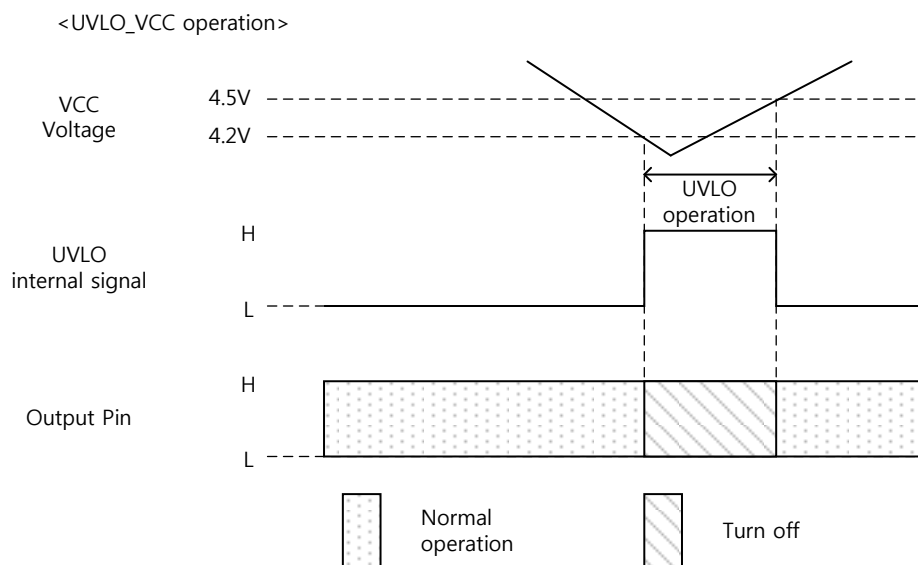
An under voltage lockout circuit is included.

Outputs are turned off under the conditions as follows;

$V_{CC} \leq 4.2V$

The UVLO circuit has a hysteresis and the function recovers under the conditions as follows;

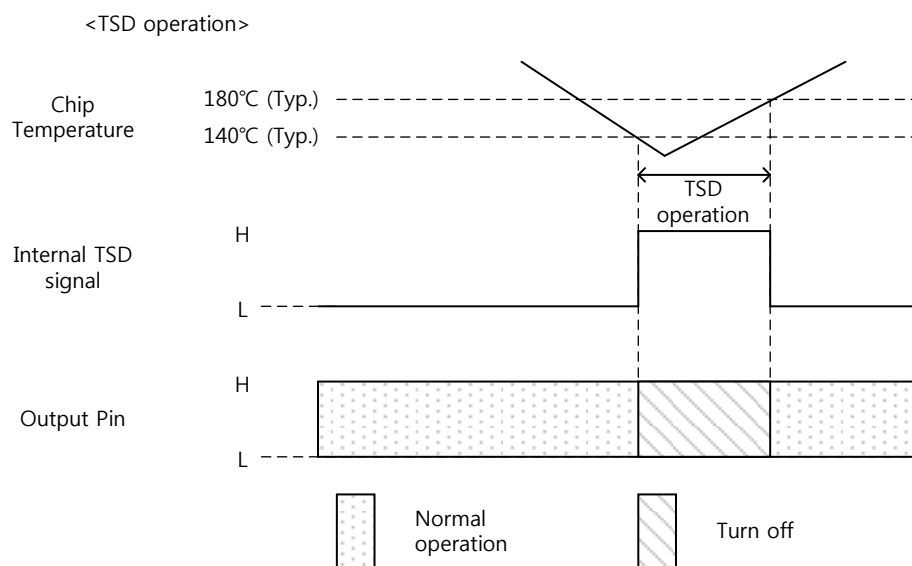
$V_{CC} > 4.5V$



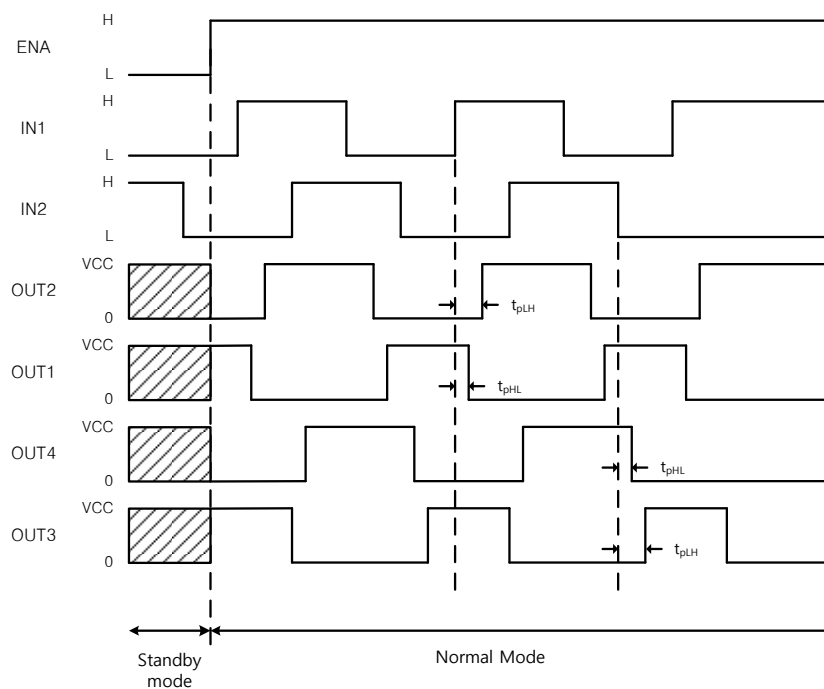
Thermal Shutdown Circuit (TSD)

The AP8110 has a thermal shutdown circuit. If the junction temperature (T_j) exceeds 180°C (design target only), all the outputs are turned off.

It recovers automatically at 140°C. It has a hysteresis width of 40°C.

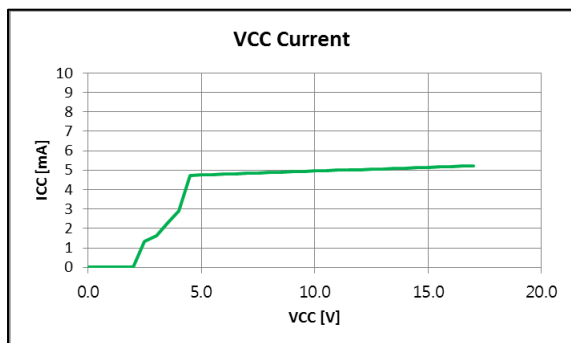
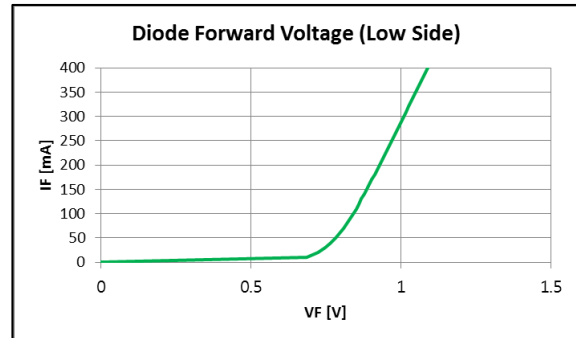
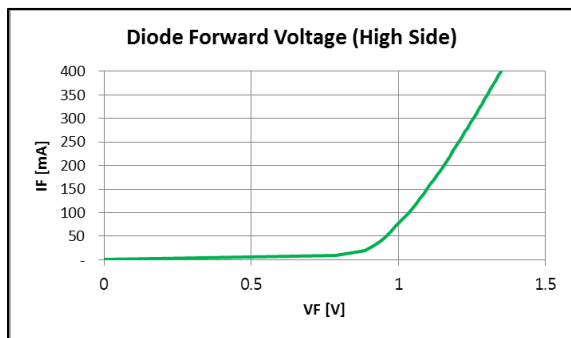
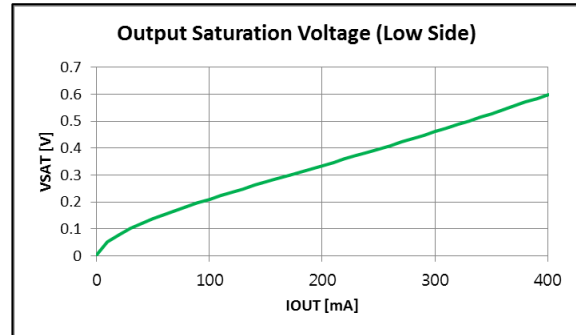
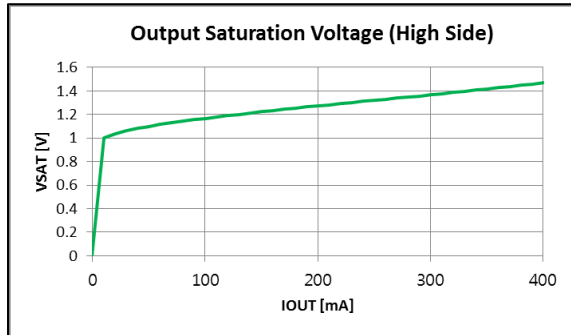


Timing Chart

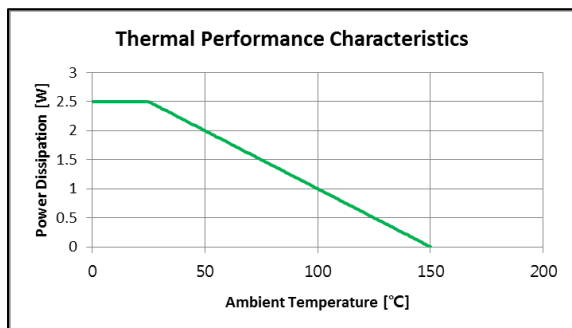




Typical Performance Characteristics

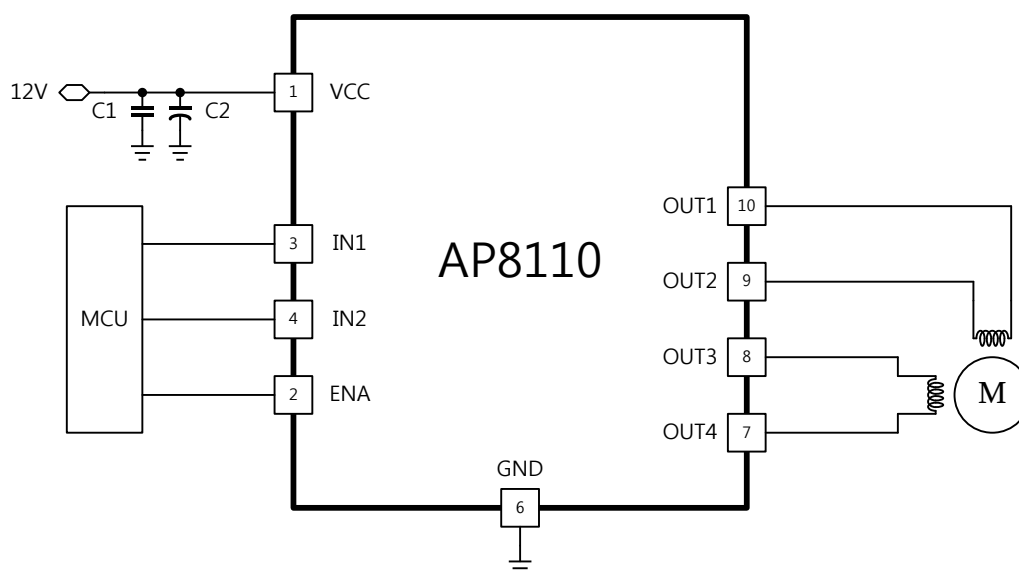


Thermal Performance Characteristics



Application Circuit

Information in the following application Circuits is not part of the APsemi component specification, and APsemi does not warrant its accuracy or completeness. APsemi's customers are responsible for determining suitability of components for their purposes. Customers should validate and test their design implementation to confirm system functionality.



Ordering Information (TBD)

Part No	Package	Packing	Finish	Halogen	Packing Unit
AP8110S	SSOP-10L	-	-	-	-

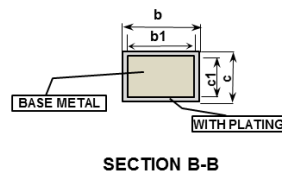
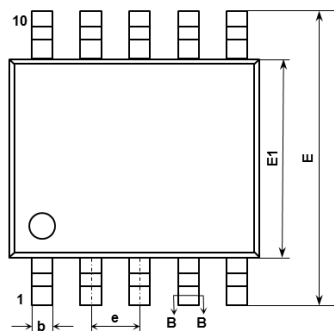
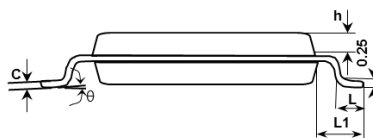
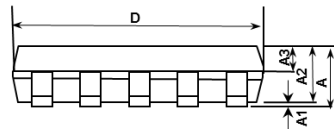
Marking Layout

AP8110S

1ST Line : Company logo 2nd Line : Device name : AP8110S - AP8110S : SSOP-10L PKG code 3rd Line : Date code - YY : Last two digits of calendar year - WW : Work week calendar - Z : ASSEMBLY SITE

Package Dimensions

SSOP-10L (AP8110S)



SSOP-10L unit : mm			
SYMBOL	MIN	NOM	MAX
A	—	—	1.75
A1	0.10	—	0.225
A2	1.30	1.40	1.50
A3	0.60	0.65	0.70
B	0.39	—	0.47
B1	0.38	0.41	0.44
C	0.20	—	0.24
C1	0.19	0.20	0.21
D	4.80	4.90	5.00
E	5.80	6.00	6.20
E1	3.80	3.90	4.00
e	1.00BSC		
h	0.25	—	0.50
L	0.50	—	0.80
L1	1.05REF		
θ	0	—	8°

Revision History

No.	Date	Contents
REV00	2020-06-26	Initial Draft Datasheet Release

<http://www.apsemi.com>

IMPORTANT NOTICE

AP Semiconductor co, Ltd reserves the right to make changes without further notice to any products or specifications herein. AP Semiconductor co, Ltd does not assume any responsibility for use of any its products for any particular purpose, nor does AP Semiconductor co, Ltd assume any liability arising out of the application or use of any its products or circuits. AP Semiconductor co, Ltd does not convey any license under its patent rights or other rights nor the rights of others.

AP Semiconductor Co., Ltd

Contact. **Tel** 82.70.4693.2299 **FAX** 82.70.4000.4009

E-mail: sales@apsemi.com

© 2013 AP semiconductor Co., Ltd. –Printed in KOREA –All Rights Reserved.

REV. 00

www.apsemi.com