AH5792

SINGLE PHASE HALL EFFECT LATCH SMART FAN MOTOR CONTROLLER

Description

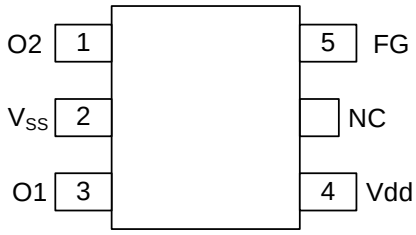
The AH5792 is a single chip solution for driving single-coil brush-less DC fans and motors. The AH5792 employs a bidirectional full bridge driver output stage for single coil fan motor applications. The device includes features such as Rotor Lock Protection with rotor lock detection and automatic self-restart to avoid damage to the coil when the rotor is blocked.

The AH5792 also offers an externally controlled Tachometer (Frequency Generator Pin) open -drain output which makes it easier to connect with external interface such as hardware monitoring. The FG is half (1/2) the magnetic change frequency.

The devices are packaged in SOT553 and SOT89-5L small outline packages for applications such as small motors like vibration motors or ultra thin cooling fans.

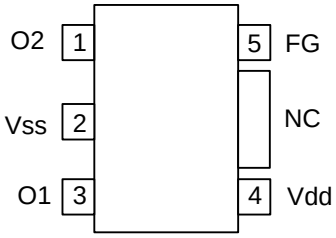
Pin Assignments

(Top View)



SOT553

(Top View)



SOT89-5L

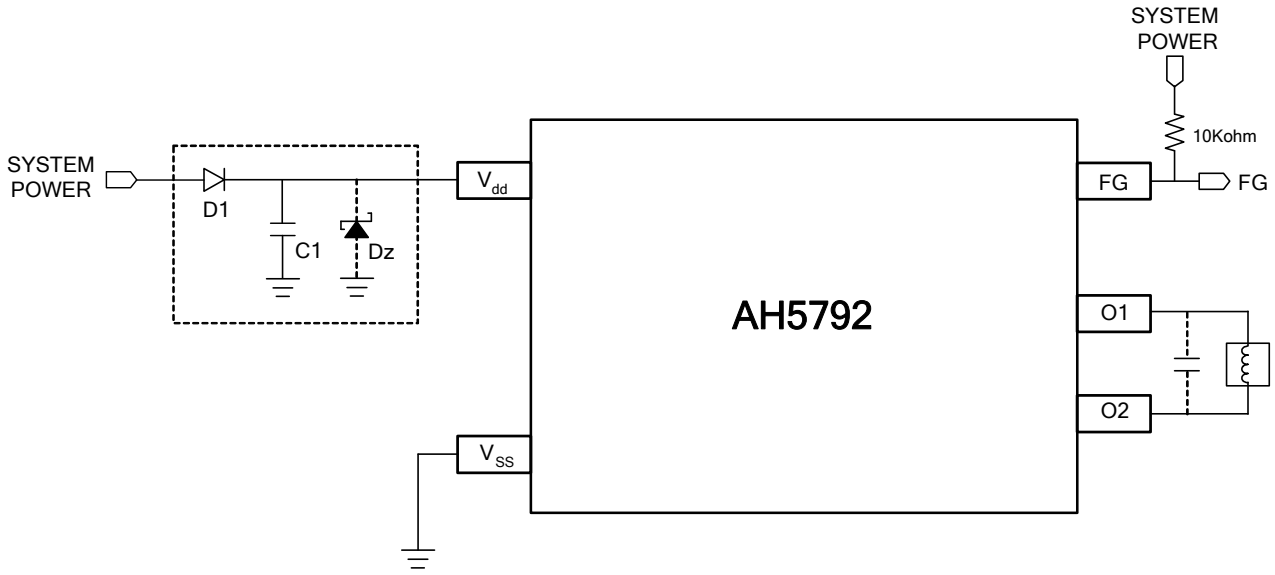
Features

- Support single-phase full wave min fan driver
- Built-in Hall sensor input amplifier
- Low voltage startup (Vdd=1.8V)
- Lock detection and automatic self-restart
- Without external timing capacitor, Reduces the numbers of external component required
- FG output
- Low profile package : SOT553 and SOT89-5L
- “Green” Molding Compound

Applications

- 3.3V / 5V Min. DC Fans (Eight Pole)
- Low Voltage / BLDC Motors
- Micro-Vibration Motors

Typical Application Circuit (Note 1)



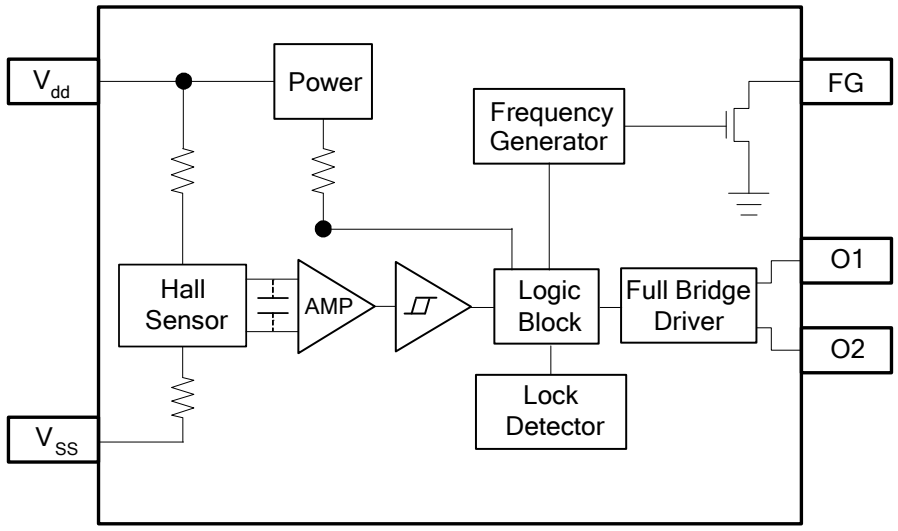
Notes: 1. Reverse connection of power supply may break the device. A countermeasure is needed such as using reverse power protection diode D1 between power supply and Vdd terminal. In such case of using reverse power protection diode D1 because of there is no way to return current to power supply, please take necessary measures like below.
- Connect Dz (Zener diode) between Vdd and Vss terminal, not to exceed the absolute maximum rating voltage.
- Connect a capacitor C1 between Vdd and Vss terminal, to make the path of return current to power supply.
The AH5792 has an open-drain tachometer FG output that follows the half (1/2) the magnetic change frequency. A pull-up resistor (10Kohm, typically for System Power = 5V) connected to a supply voltage.

Pin Descriptions (Note 2)

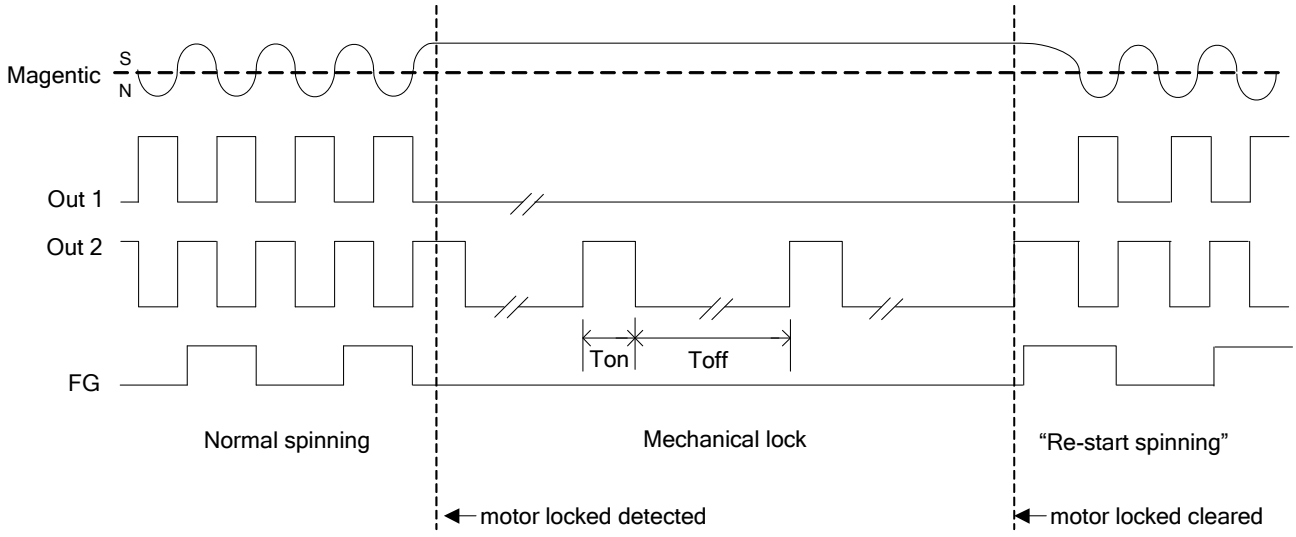
Pin Name	Description
O1	Output driving & sinking pin 1
Vdd	Power supply pin
Vss	Ground pin
FG	Frequency Generator (Note 2)
O2	Output driving & sinking Pin 2
NC	No Connection

Notes: 2. The FG is half (1/2) the magnetic change frequency.

Functional Block Diagram



Operating (Note 3, 4, 5)



Notes:
3. In "Normal spinning, the FG shall change its state at each rising edge of OUT2. In "Mechanical lock", the FG state is kept as the same as the moment of motor locked detected.
4. When magnetic is locked as "S" pole, then out1 is kept on "L", out2 is a clock with Ton/Toff ratio. When magnetic is locked at "N" pole, then out 2 is kept on "L", out 1 is a clock with Ton/Toff ratio.
5. When "Re-start spinning" occurs, the motor shall ramp up to the "Normal Spinning" speed from zero. It depends on the motor characteristics.

Absolute Maximum Ratings (T_A = 25°C, unless otherwise noted)

Symbol	Characteristics		Values	Unit
Vdd	Supply voltage		6	V
$I_{O(PEAK)}$	Maximum Output Current (Peak)	SOT553	400	mA
		SOT89-5L	500	mA
P_D	Power Dissipation	SOT553	230	mW
		SOT89-5L	800	mW
T_{ST}	Storage Temperature Range		-65 ~ 150	°C

Recommended Operating Conditions (T_A = 25°C)

Symbol	Parameter	Conditions	Rating	Unit
Vdd	Supply Voltage	Operating	1.8 to 5.0	V
T_A	Operating Temperature Range	Operating	-40 to +100	°C

Electrical Characteristics (T_A = 25°C, Vdd = 5.0V)

Symbol	Characteristic	Conditions	Min	Typ.	Max	Unit
Idd	Supply Current	No Load	-	3.5	5	mA
V_{OH}	Output Voltage High	I_{OUT} = 200mA (For SOT553)	4.4	-	-	V
		I_{OUT} = 300mA (For SOT89-5L)				
V_{OL}	Output Voltage Low	I_{OUT} = 200mA (For SOT553)	-	-	0.6	V
		I_{OUT} = 300mA (For SOT89-5L)				
I_{OUT}	Output Current	R_L=30Ω	-	148	-	mA
I_{Leak}	FG Output Leakage Current		-	-	5	μA
I_{FG}	FG Output Current	V_{FGOL} = 0.4V	5	-	-	mA
V_{FGOL}	FG Output Voltage Low	I_{FG} = 5mA	-	-	0.4	V
T_{ON}	On Time		-	215	-	ms
R_{DR}	Duty Ratio	T_{OFF} / T_{ON}	-	10	-	

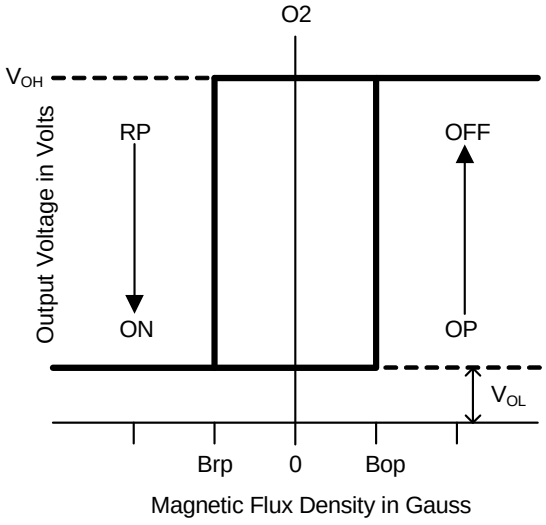
Magnetic Characteristics (T_A = 25°C, Vdd = 1.8V~5.0V, Note 6)

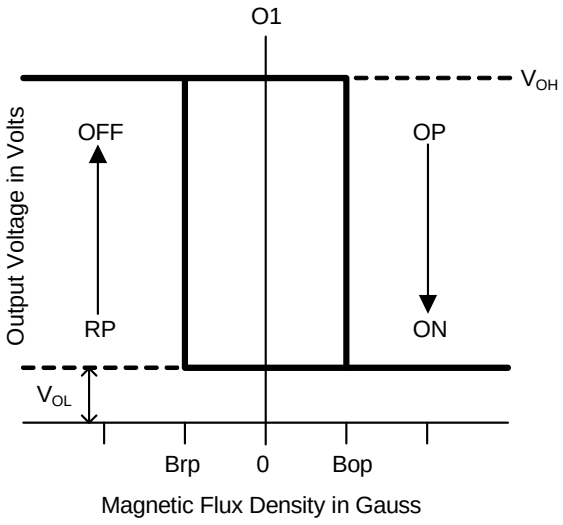
(1mT = 10 G)

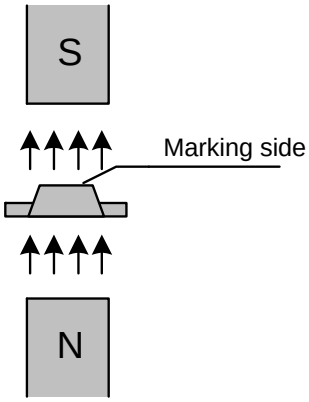
Symbol	Parameter	Min	Typ.	Max	Unit
B_{op}	Operate Point	10	30	50	G
Brp	Release Point	-50	-30	-10	G
B_{hy}	Hysteresis	-	60	-	G

Notes: 6. The magnetic characteristics may vary with supply voltage, operating temperature and after soldering.

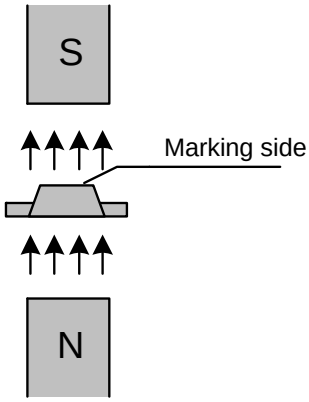
Operating Characteristics







(SOT553)

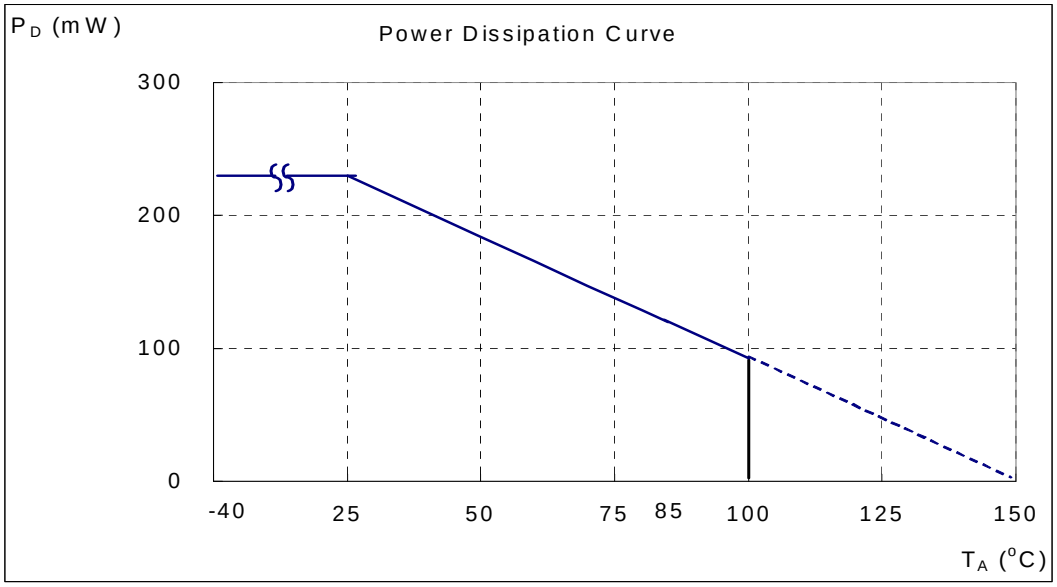


(SOT89-5L)

Performance Characteristics

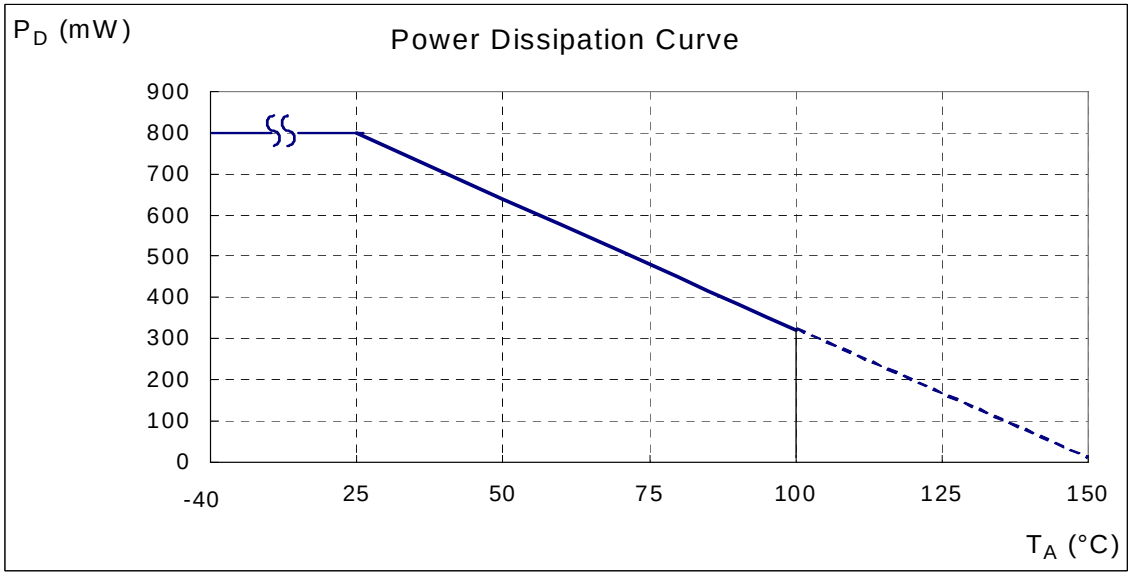
(1) SOT553

T_A (°C)	25	50	60	70	80	85	90	100	110	120	130	140	150
P_D (mW)	230	184	166	147	129	120	110	92	74	55	37	18	0

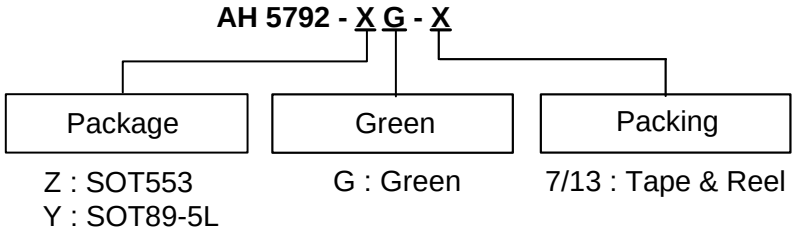


(2) SOT89-5L

T_A (°C)	25	50	60	70	75	80	85	90	95	100
P_D (mW)	800	640	576	512	480	448	416	384	352	320
T_A (°C)	**105**	**110**	**115**	**120**	**125**	**130**	**135**	**140**	**145**	**150**
P_D (mW)	288	256	224	192	160	128	96	64	32	0



Ordering Information

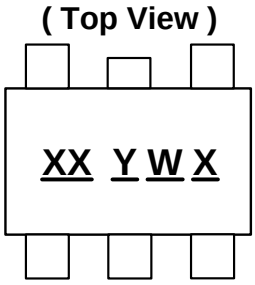


Device	Package Code	Packaging (Note 7 & 8)	7"/13" Tape and Reel	
			Quantity	Part Number Suffix
AH5792-ZG-7	Z	SOT553	3000/Tape & Reel	-7
AH5792-YG-13	Y	SOT89-5L	2500/Tape & Reel	-13

Notes: 7. Pad layout as shown on Diodes Inc. suggested pad layout document AP02001, which can be found on our website at http://www.diodes.com/datasheets/ap02001.pdf
8. EU Directive 2002/95/EC (RoHS). All applicable RoHS exemptions applied. Please visit our website at http://www.diodes.com/products/lead_free.html

Marking Information

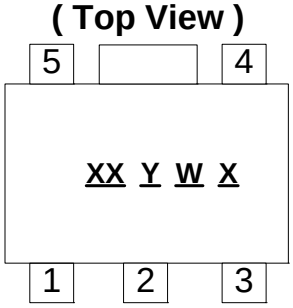
(1) SOT553



XX : Identification Code
Y : Year : 0~9
W : Week : A~Z : 1~26 week;
a~z : 27~52 week;
z represents 52 and 53 week
X : A~Z : Green

Part Number	Package	Identification Code
AH5792	SOT553	KE

(2) SOT89-5L

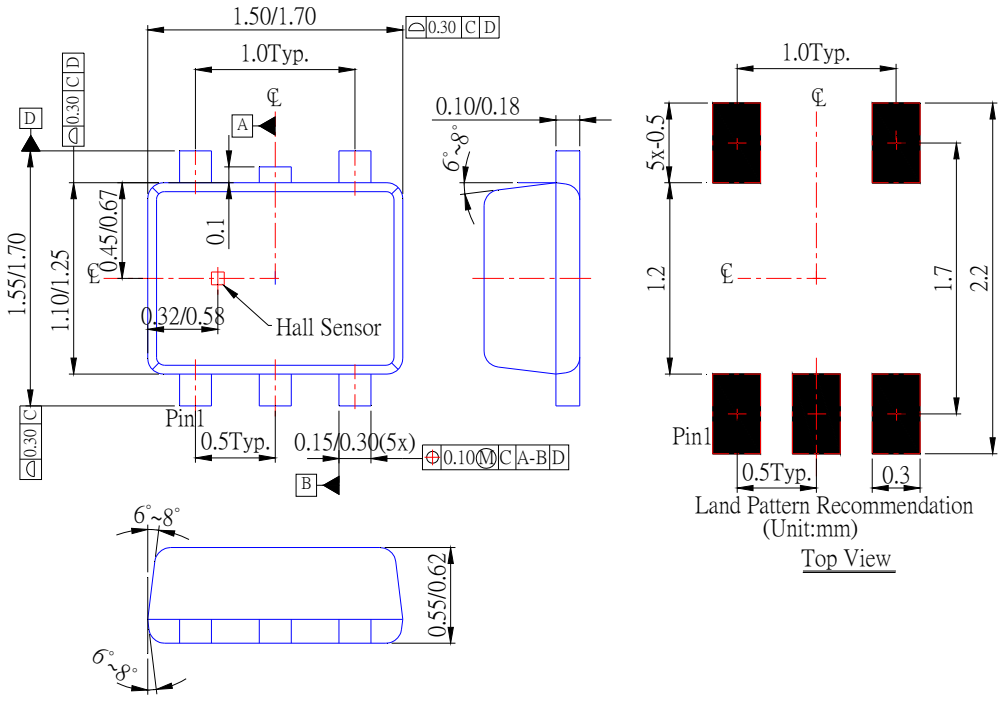


XX : Identification code
Y : Year : 0~9
W : Week : A~Z : 1~26 week;
a~z : 27~52 week;
z represents 52 and 53 week
X : Internal code
A~Z : Green

Part Number	Package	Identification Code
AH5792	SOT89-5L	KF

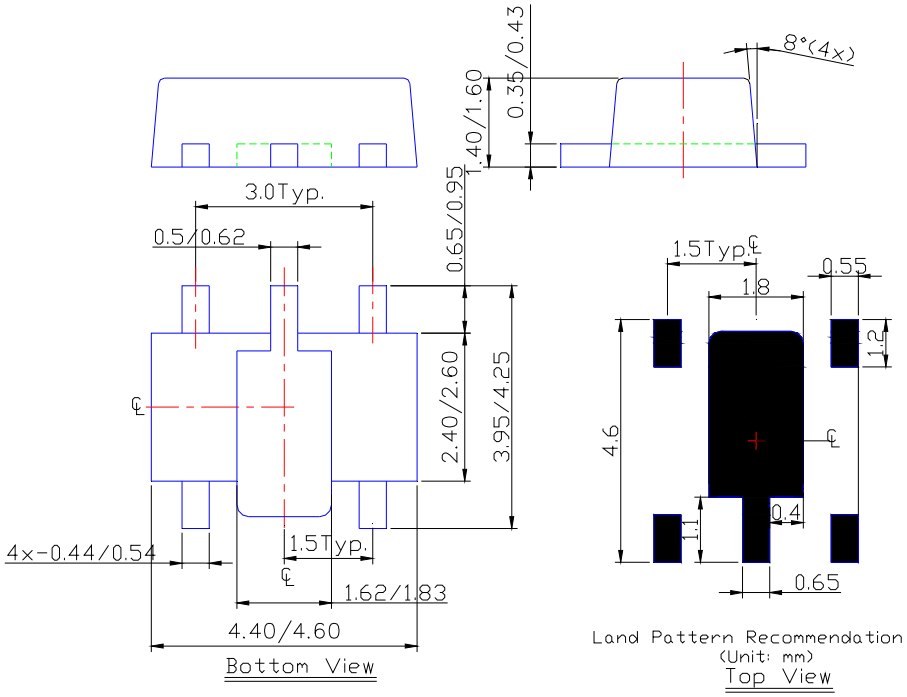
Package Outline Dimensions (All Dimensions in mm)

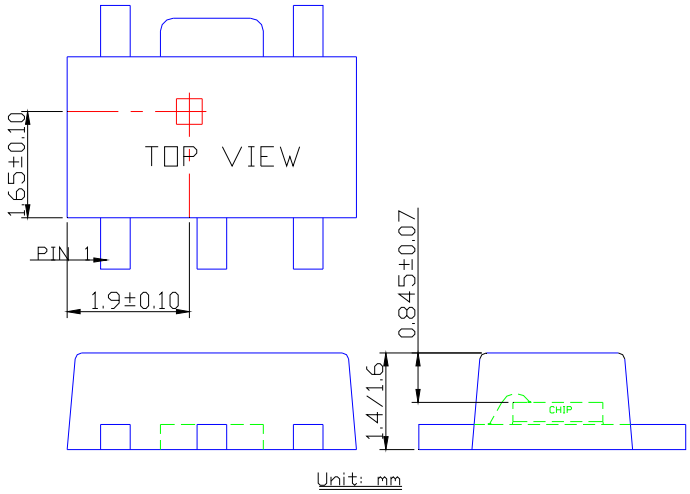
(1) Package Type: SOT553



Package Outline Dimensions (Continued)

(2) Package type: SOT89-5L





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