MT6343 Series

Omni-polar, Low Power, MR Switch Sensor

Feature

- AMR+CMOS monolithic structure
- High sensitivity
  B_{OP}=± 18Gauss, B_{RP}=± 15Gauss
- Low power consumption
  Average supply current <1.3uA (Typical)
- Wide operating temperature range
  -40~125°C
- Push-pull Output Mode
- RoHs compliant 2011/65/EU

Application:

- Position Detection
- Proximity Detection
- Speed Detection
- Flow meters including water meter, gas meter and heat meter

Product Description

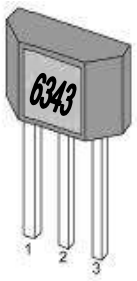
The MT6343 is a monolithic IC with built-in MR magneto-resistive element and CMOS switch. The IC internally includes a MR bridge, a voltage regulator for operation with supply voltage from 1.8V to 5.5V, a sleep/awake logic for low power consumption, small signal amplifier and Schmitt trigger comparator with dynamic offset cancellation, and a push-pull output.

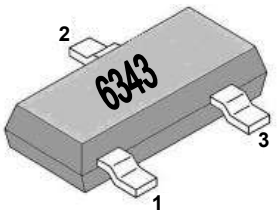
When combined with a magnet, it becomes a non-contact switch with low current consumption, high sensitivity and reliability. A horizontal magnetic field parallel to the electrode of the package can be detected by an arbitrary polarity.

The MT6343 is ideal for use to gather speed and detect position, particularly suited for applications that require accurate duty cycle or accurate edge detection and low power consumption such as speed detection in smart meters.

Pin definition

Name	Number	Description
VDD	1	Power Supply
GND	2	Ground
OUT	3	Output Signal





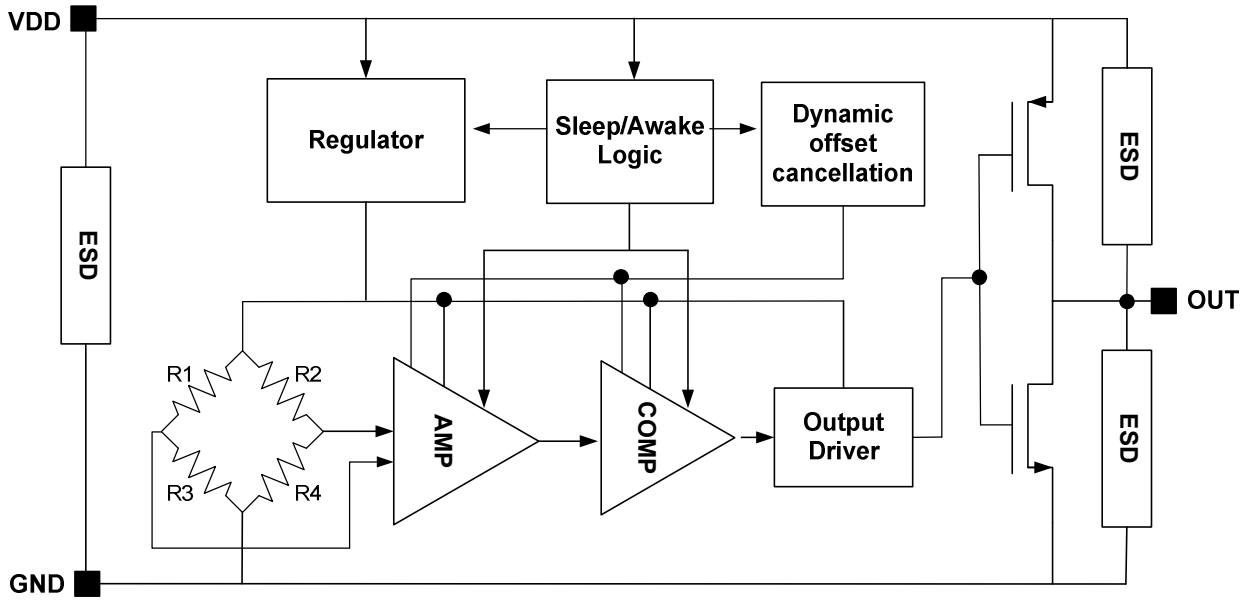
Family members

Part Number	Description
MT6343A-1	Flat TO-92 package, bulking packaging(1000pcs/bag)
MT6343A-2	Flat TO-92 package, bulking packaging(1000pcs/bag)
MT6343AT-1①	SOT-23 package ,tape and reel packaging(3000pcs/bag)
MT6343AT-2②	SOT-23 package ,tape and reel packaging(3000pcs/bag)

① MT6343AT-1 chip mark is C431Y, C431 represents “6343-1” and Y represents date code

② MT6343AT-2 chip mark is C432Y, C432 represents “6343-2” and Y represents date code

Block Diagram



Function Description

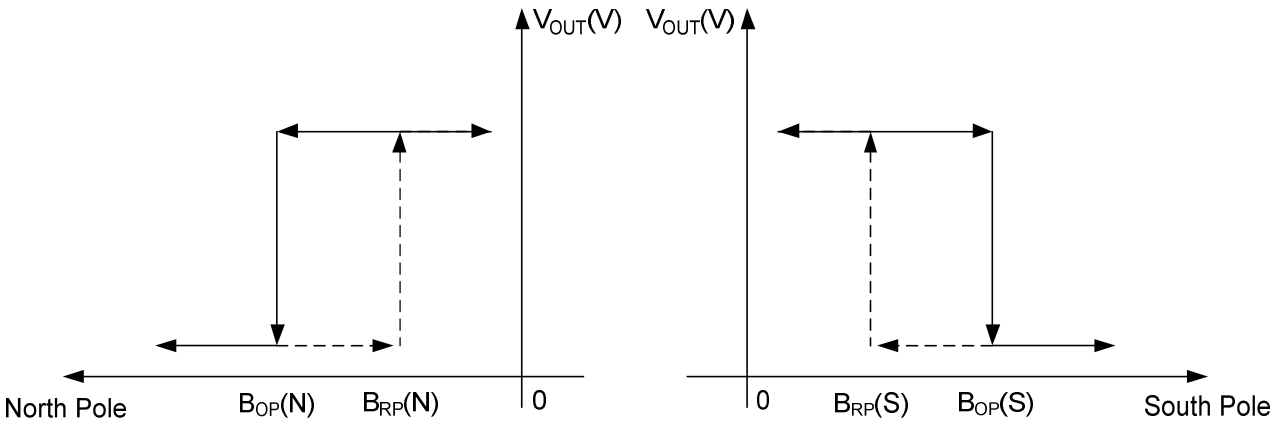
Definition of magnetic parameters

B_{OP}: Operating point, magnetic flux density that turns the output driver ON (V_{OUT}=Low)

B_{RP}: Release point, magnetic flux density that turns the output driver OFF (V_{OUT}=High)

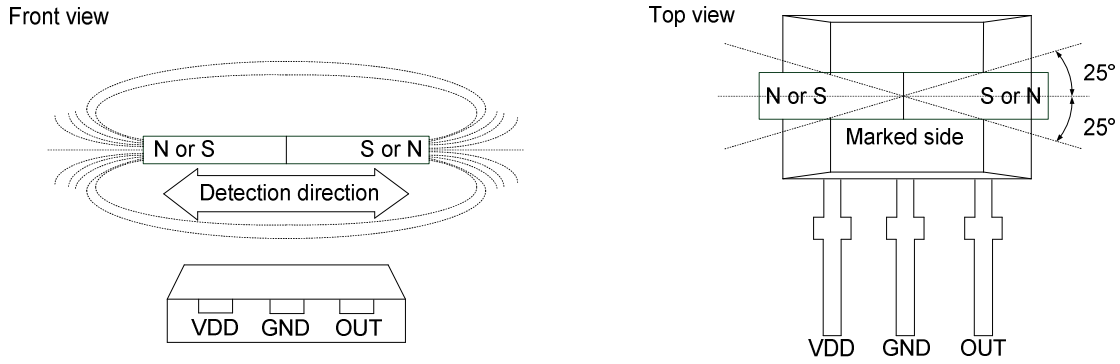
B_{HYST}: Hysteresis window, $|B_{OP}-B_{RP}|$

Definition of Switching Function

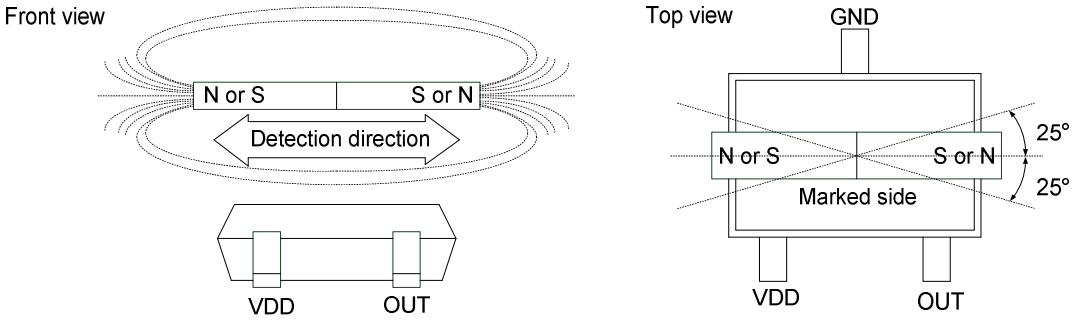


Drawing Illustrating Detectable Magnetic Field

Flat TO-92 package



SOT-23 package



Detection of magnetic field

To operate the MR switch, the magnetic field should be applied to the sensor with sufficient magnetic flux density and correct direction. MT6343 series are designed to be ON-state (Low-level output) when the horizontal direction magnetic field is applied in parallel to the marked side of sensor, with sufficient magnetic flux (B_{OP} value) regardless of polarity of magnet. MT6343 series detect the horizontal direction magnetic field, and it does not respond to vertical direction magnetic field.

Absolute Maximum Rating

Absolute maximum ratings are limiting values to be applied individually, and beyond which the serviceability of the circuit may be impaired .Functional operability is not necessarily implied. Exposure to absolute maximum rating conditions for an extended period of time may affect device reliability.

Absolute maximum ratings: all voltages listed are referenced to GND

Symbol	Parameters	Min	Max	Unit
V_{DD}	Supply Voltage	-0.5	7	V
I_{OUT}	Continuous Output Current	-	10	mA
V_{OUT}	Output voltage	-0.5	7	V
B	Magnetic flux	-	3000	Gauss
T_A	Operating Temperature Range	-40	+125	°C
T_S	Storage Temperature Range	-50	+150	°C

Electrical Characteristics

At T_A=-40°C to 125°C , V_{DD}=1.8V to 5.5V (Unless other specified)

Symbol	Parameters	Test Conditions		Min	Typ	Max	Units
V_{DD}	Supply voltage	Operating		1.8	-	5.5	V
I_{DD}	Supply current	MT6343-1	V_{DD}=3.6V	-	1.3	2.0	uA
		MT6343-2	V_{DD}=3.6V	-	4.1	7.0	uA
V_{OL}	Output low voltage	I_{OUT}=5mA, $\|B\|>\|B_{OP}\|$		-	-	0.2	V
V_{OH}	Output high voltage	I_{OUT}=5mA, $\|B\|<\|B_{RP}\|$		V_{DD} -0.3	-	-	V
I_{OFF}	Output leakage current	V_{OUT}=5.5V, $\|B\|<\|B_{RP}\|$		-	-	1.0	uA
T_{PO}	Power on time			-	-	100	us
R_{TH}	SOT-23package thermal resistance			-	301	-	°C/W
ESD	Electro-Static Discharge	AEC-Q100		Class 3			
Fsw	Switching frequency	MT6343-1	V_{DD}=3.6V	-	20	-	Hz
		MT6343-2	V_{DD}=3.6V	-	900	-	Hz
T_{AW}	Awake Time	MT6343-1	V_{DD}=3.6V	-	12	-	us
		MT6343-2	V_{DD}=3.6V	-	12	-	us
T_{SL}	Sleep Time	MT6343-1	V_{DD}=3.6V	-	50	-	ms
		MT6343-2	V_{DD}=3.6V	-	1.11	-	ms
D.C.	Duty Cycle	MT6343-1	V_{DD}=3.6V	-	0.02	-	%
		MT6343-2	V_{DD}=3.6V	-	1.1	-	%

Magnetic Characteristics

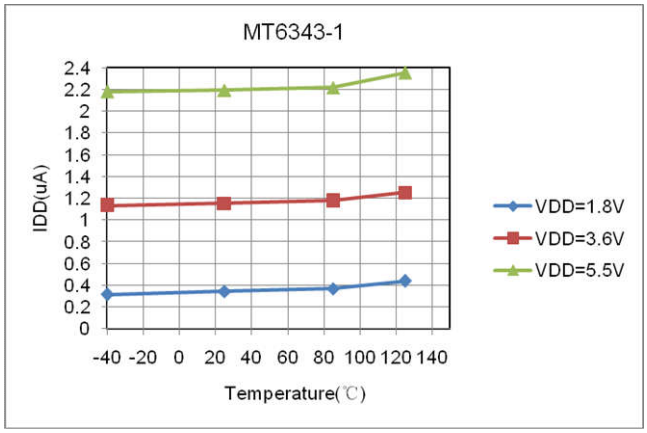
At V_{DD}=1.8V to 5.5V

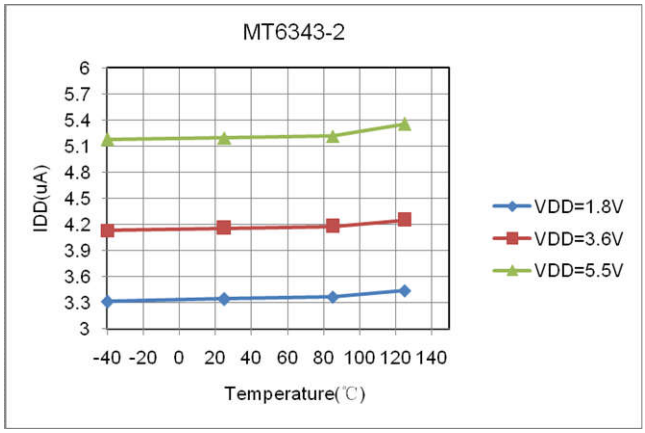
Symbol	Parameters	Test Conditions	Min	Typ	Max	Units
B_{OP}	Magnetic operating point	At T_A=25°C	-	±18	-	Gauss
B_{RP}	Magnetic release point	At T_A=25°C	-	±15	-	Gauss
B_{HYST}	Hysteresis window	At T_A=25°C , $\|B_{OP}-B_{RP}\|$	-	3	-	Gauss

Characteristic Performance

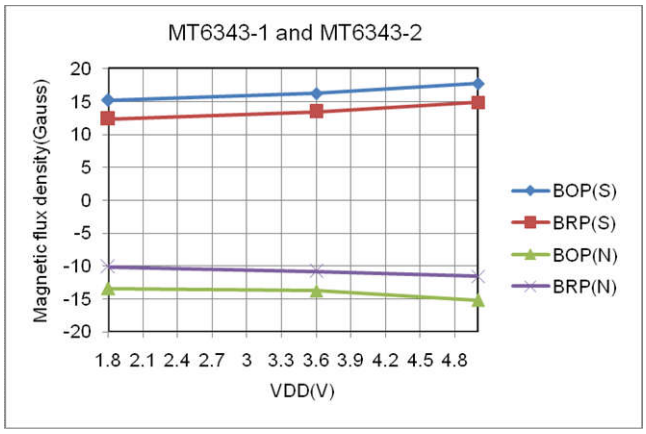
MT6343-1, MT6343-2 Electrical Characteristics

Average Supply Current versus Temperature

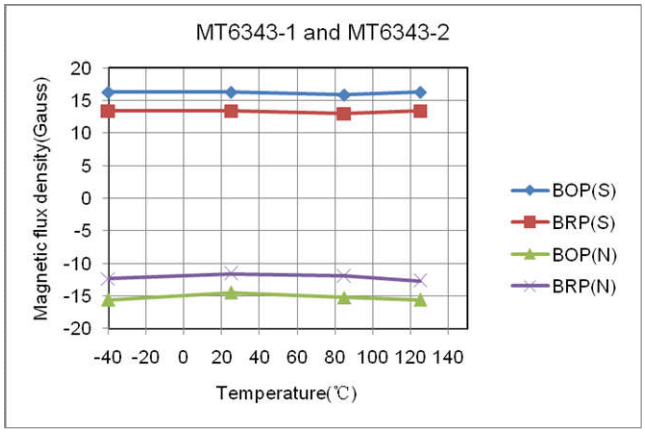




Magnetic Characteristics versus Supply Voltage (T_A=25°C)

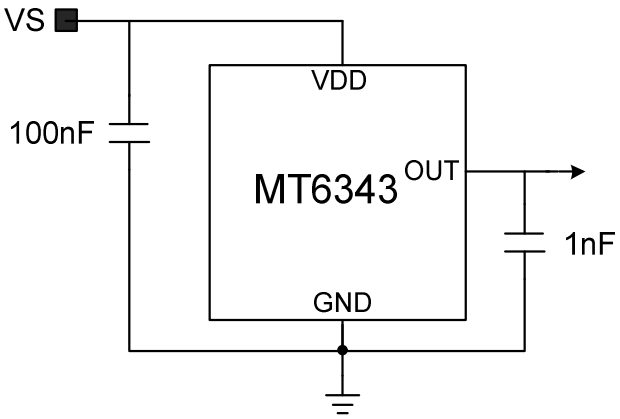


Magnetic Characteristics versus Temperature (V_{DD}=3.6V)

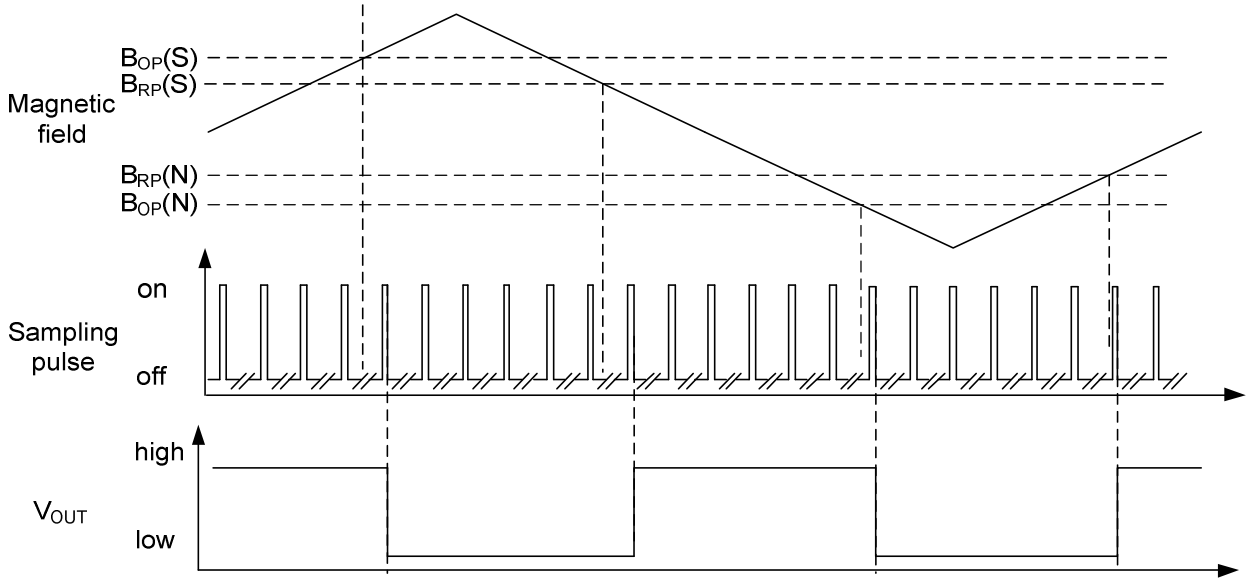


Application Information

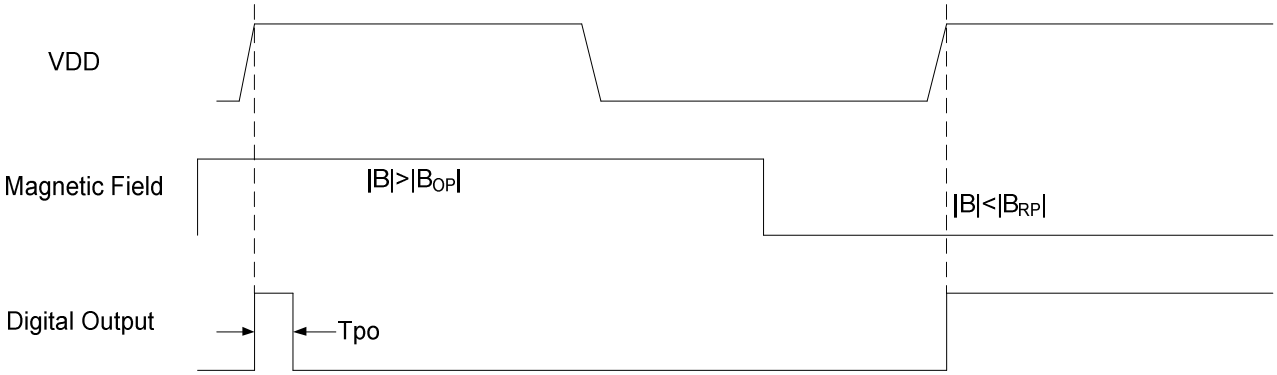
Typical Application Circuit



Operating Waveform



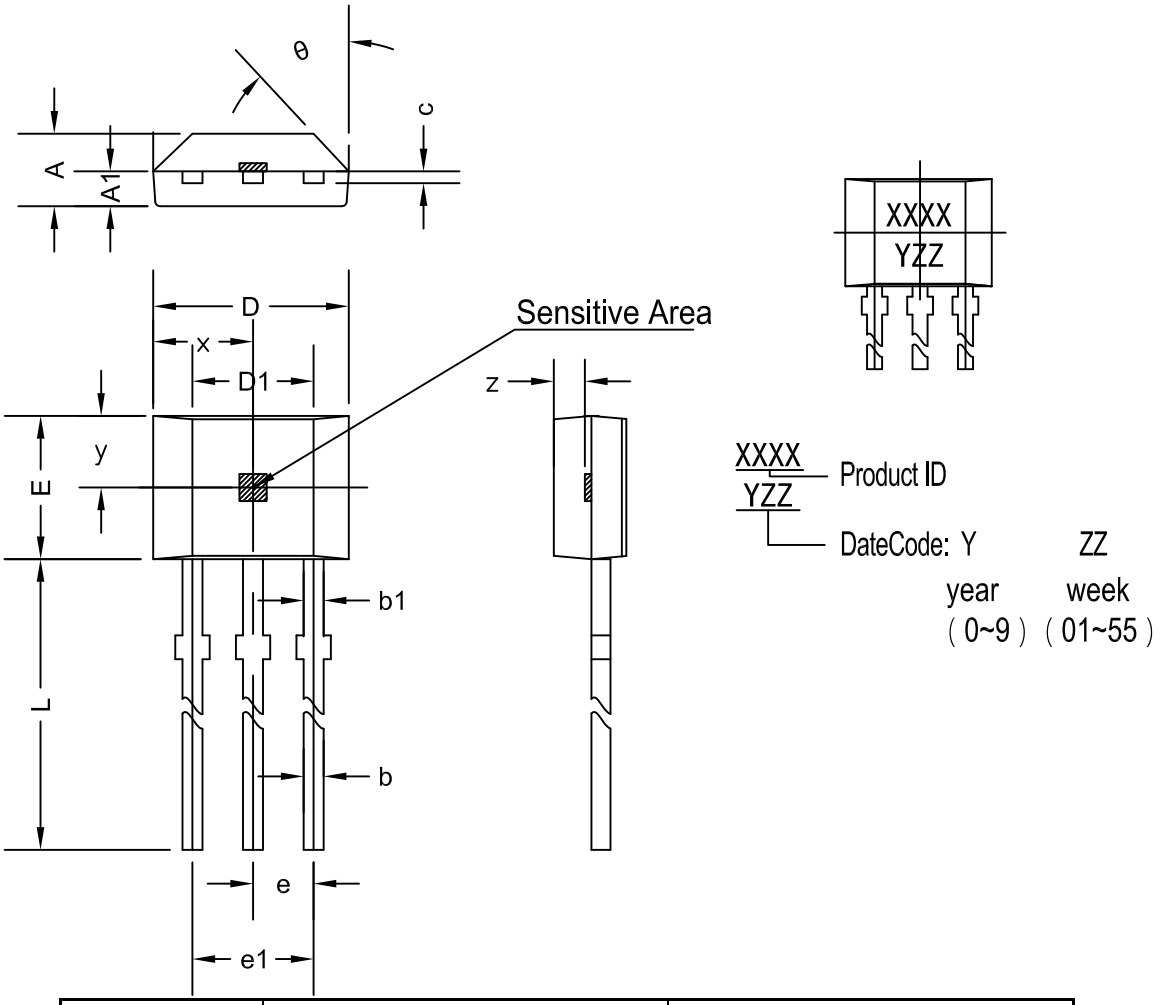
Power On Output Waveform



Note: V_{DD} rise time <1us, Tpo is the time from V_{DD} becoming stable to output becoming valid.

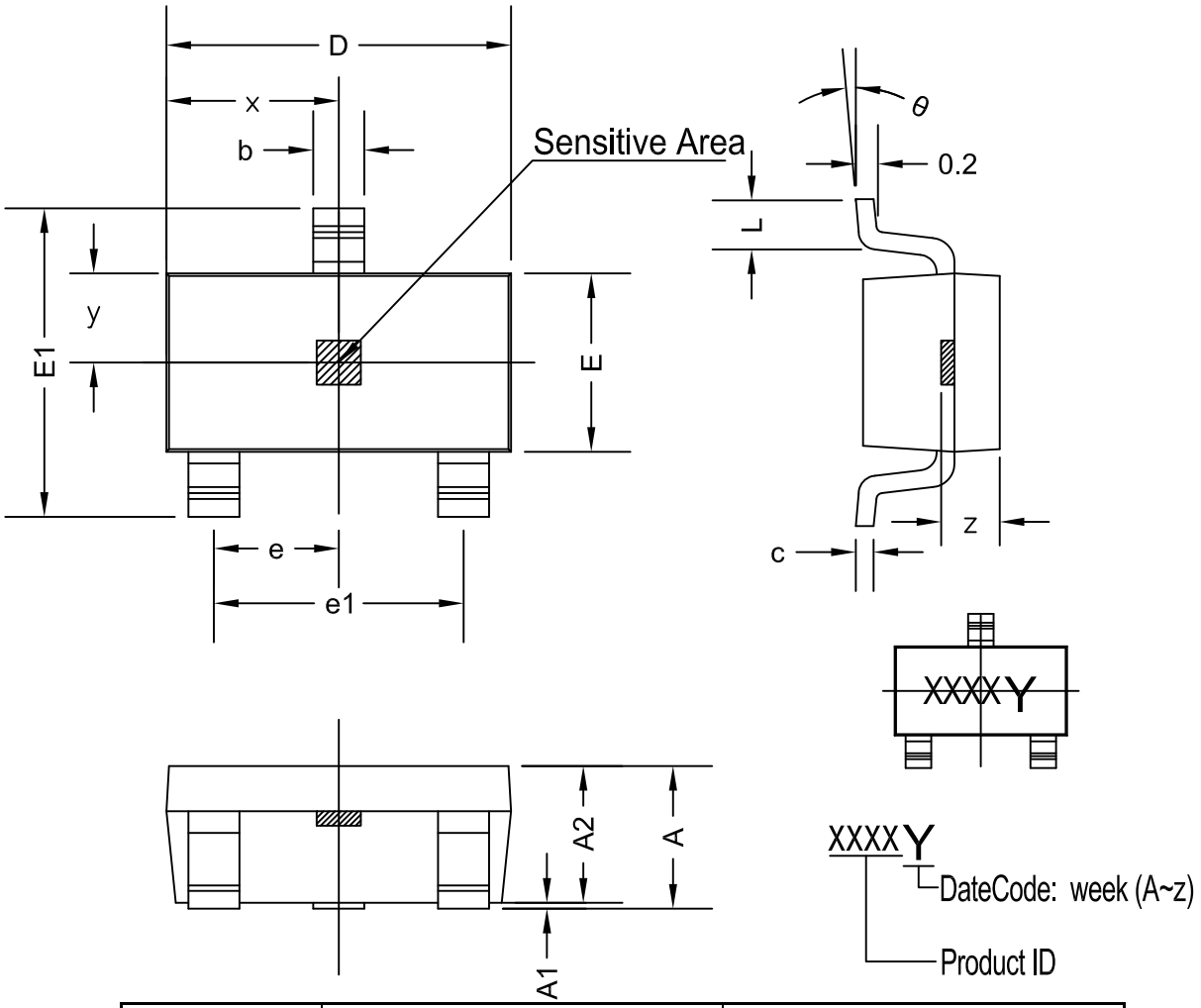
PACKAGE DESIGNATOR

(MT6343A) Flat TO-92



Symbol	Dimensions in Millimeters		Dimensions in Inches	
	Min	Max	Min	Max
A	1.420	1.670	0.056	0.066
A1	0.660	0.860	0.026	0.034
b	0.350	0.560	0.014	0.022
b1	0.400	0.550	0.016	0.022
C	0.360	0.510	0.014	0.020
D	3.900	4.200	0.154	0.165
D1	2.970	3.270	0.117	0.129
E	2.900	3.280	0.114	0.129
e	1.270 TYP		0.050 TYP	
e1	2.440	2.640	0.096	0.104
L	13.500	15.500	0.531	0.610
x	2.025TYP		0.080TYP	
y	1.545TYP		0.061TYP	
z	0.500TYP		0.020TYP	
θ	45°TYP		45°TYP	

PACKAGE DESIGNATOR
(MT6343AT) SOT-23



Symbol	Dimensions in Millimeters		Dimensions in Inches	
	Min	Max	Min	Max
A	1.050	1.250	0.041	0.049
A1	0.000	0.100	0.000	0.004
A2	1.050	1.150	0.041	0.045
b	0.300	0.500	0.012	0.020
c	0.100	0.200	0.004	0.008
D	2.820	3.020	0.111	0.119
E	1.500	1.700	0.059	0.067
E1	2.650	2.950	0.104	0.116
e	0.950 TYP		0.037 TYP	
e1	1.800	2.000	0.071	0.079
L	0.300	0.600	0.012	0.024
x	1.460TYP		0.057TYP	
y	0.800TYP		0.032TYP	
z	0.600TYP		0.024TYP	
θ	0°	8°	0°	8°