

### Features and Benefits

- **CMOS Technology**
- **Magnetic Type: Omni-polar**
- **Operating Voltage Range:**  
Supply Voltage 2.2~5V
- **Specified Operating Temperature Range:**  
From -40°C~125°C
- **High Magnetic Sensitivity**  
 $B_{OP}=35\text{Gauss}$ ,  $B_{RP}=20\text{Gauss}$  (South)  
 $B_{OP}=-35\text{Gauss}$ ,  $B_{RP}=-20\text{Gauss}$  (North)
- **Lower Power Consumption**  
Average Supply Current <3uA (typical)
- **Lead Free Package**  
Flat TO-92, SOT-23
- **High ESD Rating**
- **Open Drain Output**
- **RoHS Compliant**  
2011/65/EU

### Applications

- Home appliances, Industrial
- Position Detection
- Solid-State Switch
- Proximity Switch
- Smart Meter

### Family Members

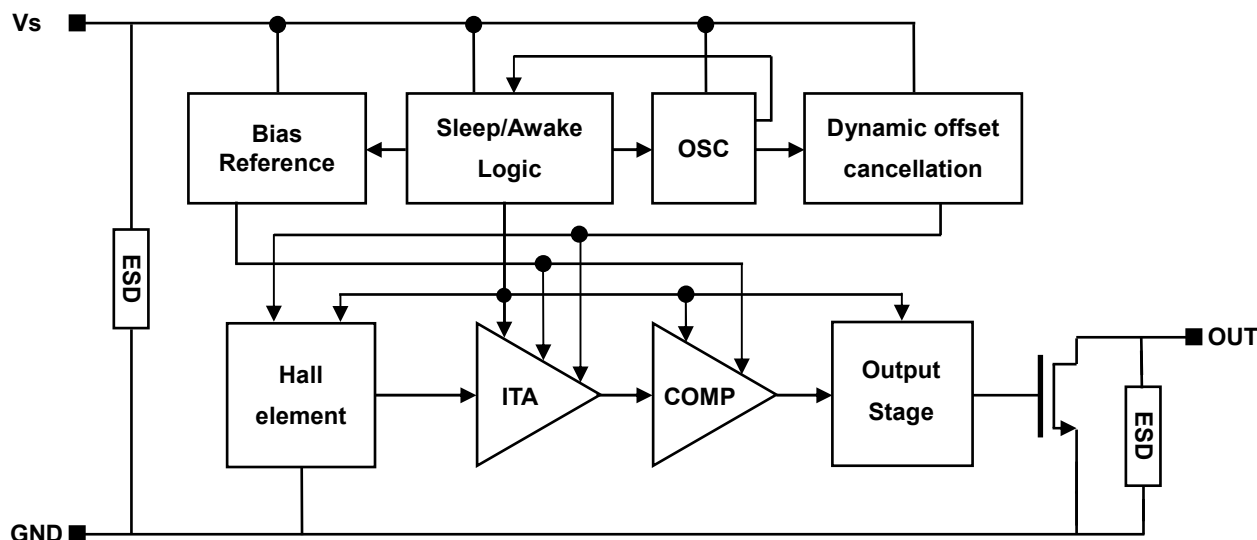
Part number	Description
MT1321A	Flat TO-92 package, bulk packaging (1000pcs/bag)
MT1321A-T	Flat TO-92 package, radial lead, bulk packaging (1000pcs/bag)
MT1321AT	SOT-23 package, tape and reel packaging (3000pcs/bag)
MT1321ET	SOT-23(thin outline) package, tape and reel packaging (3000pcs/bag)

### General Description

The MT1321 family, produced with CMOS technology. The Hall IC internally includes an on-chip Hall voltage generator, a voltage regulator for operation with supply voltages of 2.2 to 5V, a sleep/awake logic for low power consumption, temperature compensation circuitry, small-signal amplifier, Hall sensor with dynamic offset cancellation system, Schmitt trigger and an open-drain output.

They are designed to respond to either a North pole or a South pole. While the magnetic flux density(B) is larger than operate point ( $B_{OP}$ ), the output will be turned on (Low), While the magnetic flux density(B) is lower than release point ( $B_{RP}$ ), then turn off (High).

The MT1321 family provides a variety of packages to customers: SOT-23 for surface mount and flat TO-92 for through-hole mount. All packages are RoHS compliant.



Functional Block Diagram

## Function Description

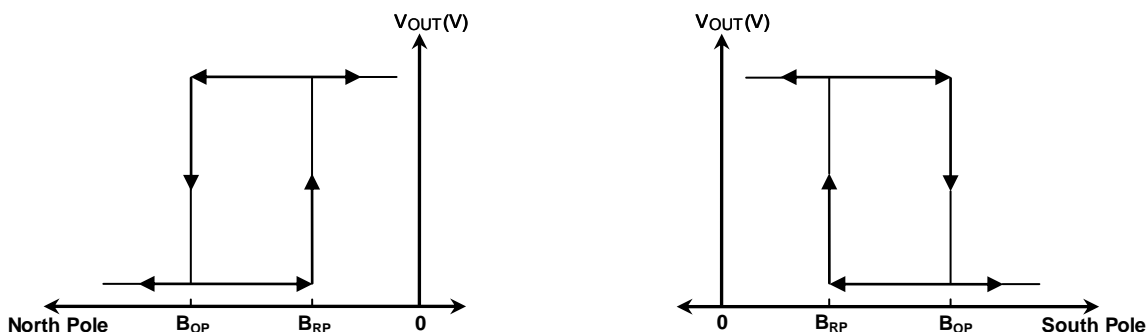
### Definition of Magnetic Parameters

$B_{OP}$ : Operating Point, Magnetic flux density applied on the branded side of the package which turns the output driver ON ( $V_{OUT}=Low$ )

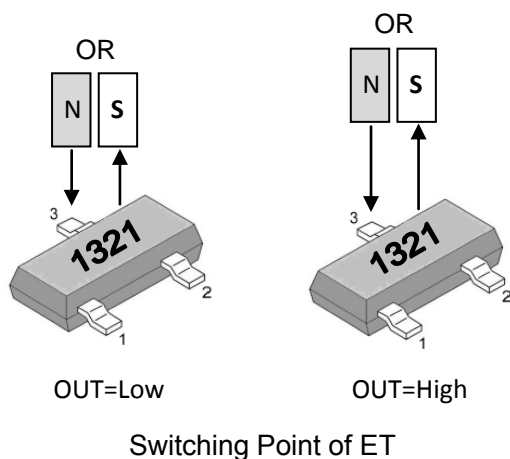
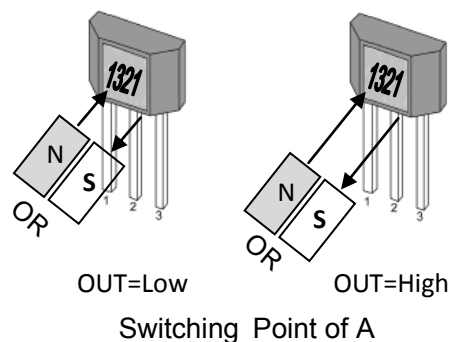
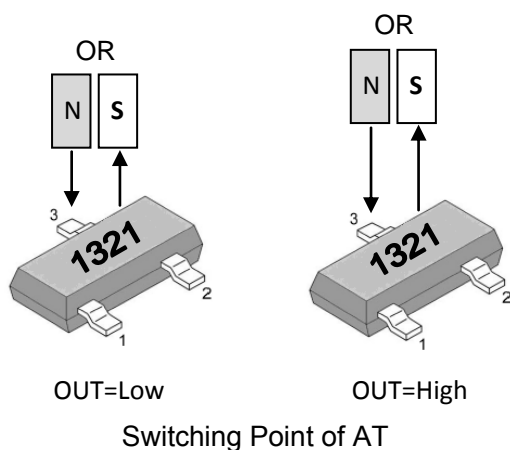
$B_{RP}$ : Release Point, Magnetic flux density applied on the branded side of the package which turns the output driver OFF ( $V_{OUT}=High$ )

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

### Definition of Switching Function



Switching Behavior



Note: Direction of magnetic flux

### Pin Description

#### MT1321AT

Name	Number	Description
Vs	1	Power
GND	3	Ground
OUT	2	Open-Drain output

#### MT1321A (MT1321A-T)

Name	Number	Description
Vs	1	Power
GND	2	Ground
OUT	3	Open-Drain output

#### MT1321ET

Name	Number	Description
Vs	1	Power
GND	3	Ground
OUT	2	Open-Drain output

### Electrical and Magnetic Characteristics

#### Absolute Maximum Ratings

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	Units
V <sub>S</sub>	Supply Voltage	2.2	5.5	V
V <sub>RCC</sub>	Reverse Battery Voltage	-	-0.5	V
V <sub>OUT</sub>	Output Voltage	-	5.5	V
I <sub>OUT</sub>	Continuous output current	-	5	mA
T <sub>A</sub>	Operating Ambient Temperature	-40	125	°C
T <sub>S</sub>	Storage temperature	-50	150	°C
T <sub>J</sub>	Junction temperature	-	150	°C
B	Magnetic flux	No Limit		Gauss

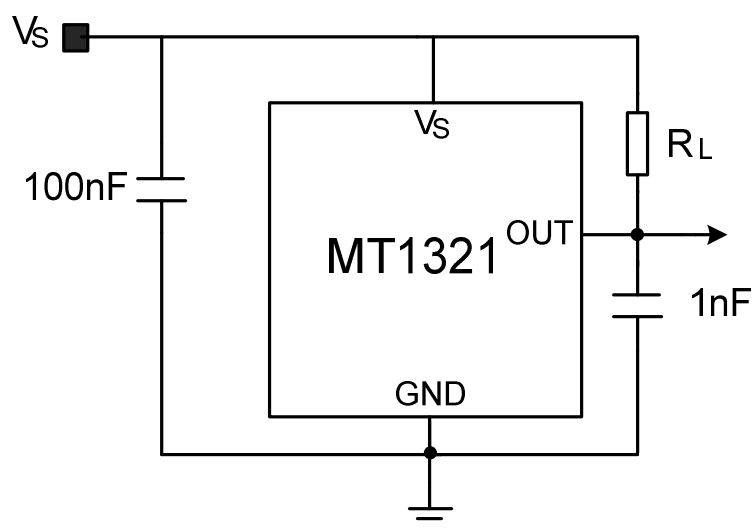
#### MT1321 Series Specifications

At T<sub>A</sub> = -40°C to 125°C, V<sub>S</sub> = 2.2 V to 5V (unless otherwise specified)

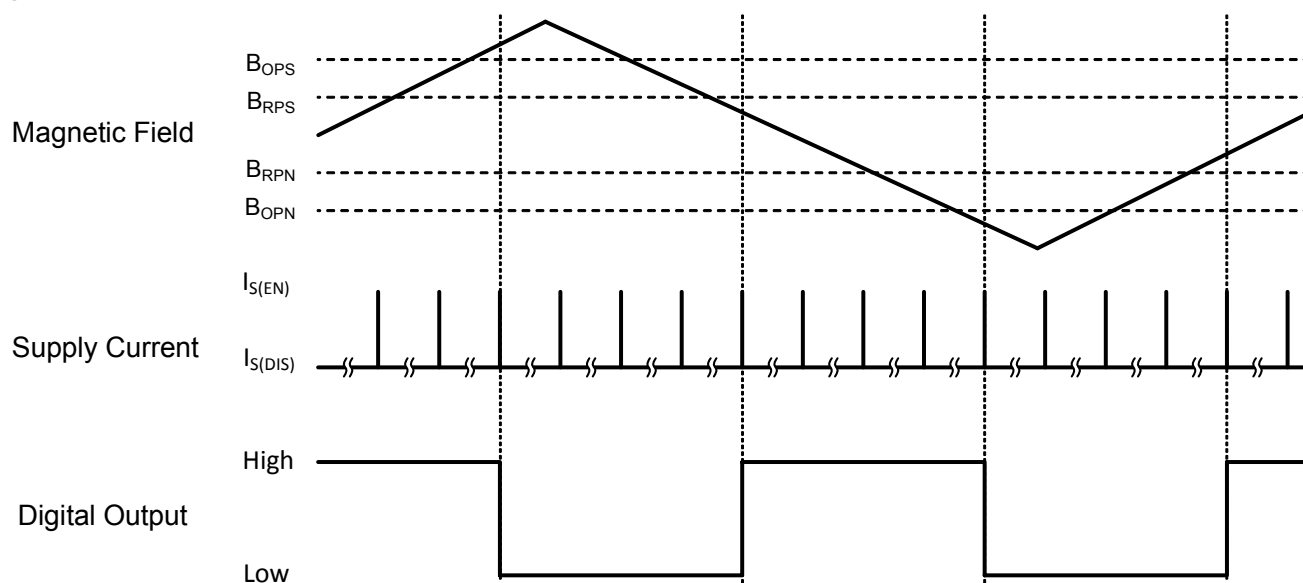
Symbol	Parameter	Test Condition	Min	Typ	Max	Units
V <sub>S</sub>	Supply Voltage	Operating	2.2	-	5	V
I <sub>S(AVG)</sub>	Supply Current	B < B <sub>RP</sub> , V <sub>S</sub> = 3.6V	-	4.0	6	uA
I <sub>S(EN)</sub>		Chip awake, B < B <sub>RP</sub> , V <sub>S</sub> = 3.6V	-	2	3	mA
I <sub>S(DIS)</sub>		Chip asleep, B < B <sub>RP</sub> , V <sub>S</sub> = 3.6V	-	2	3	uA
V <sub>SON</sub>	Output Saturation Voltage	I <sub>OUT</sub> = 1mA, B > B <sub>OP</sub>	-	-	0.4	V
I <sub>OFF</sub>	Output Leakage Current	B < B <sub>RP</sub> , V <sub>OUT</sub> = 5V	-	-	0.1	uA
T <sub>PO</sub>	Power on Time		-	-	150	us
T <sub>AW</sub>	Awake Time	V <sub>S</sub> = 3.6V	30	50	70	us
T <sub>SL</sub>	Sleep Time	V <sub>S</sub> = 3.6V	-	25	40	ms
D.C.	Duty Cycle		-	0.2	-	%
B <sub>OP</sub>	Magnetic Operating Point	At T <sub>A</sub> = 25°C	-	+/-35	+/-50	Gauss
B <sub>RP</sub>	Magnetic Release Point	At T <sub>A</sub> = 25°C	+/-10	+/-20	-	Gauss
B <sub>HYST</sub>	Hysteresis Window	At T <sub>A</sub> = 25°C,  B <sub>OP</sub> - B <sub>RP</sub>	5	15	25	Gauss

### Typical Application Circuit

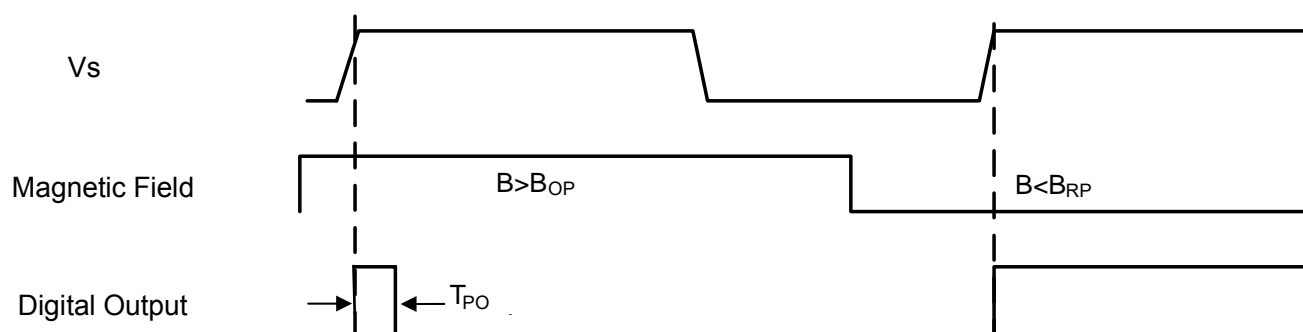
Note:  $R_L$  recommend 100Kohm



### Typical Output Waveform



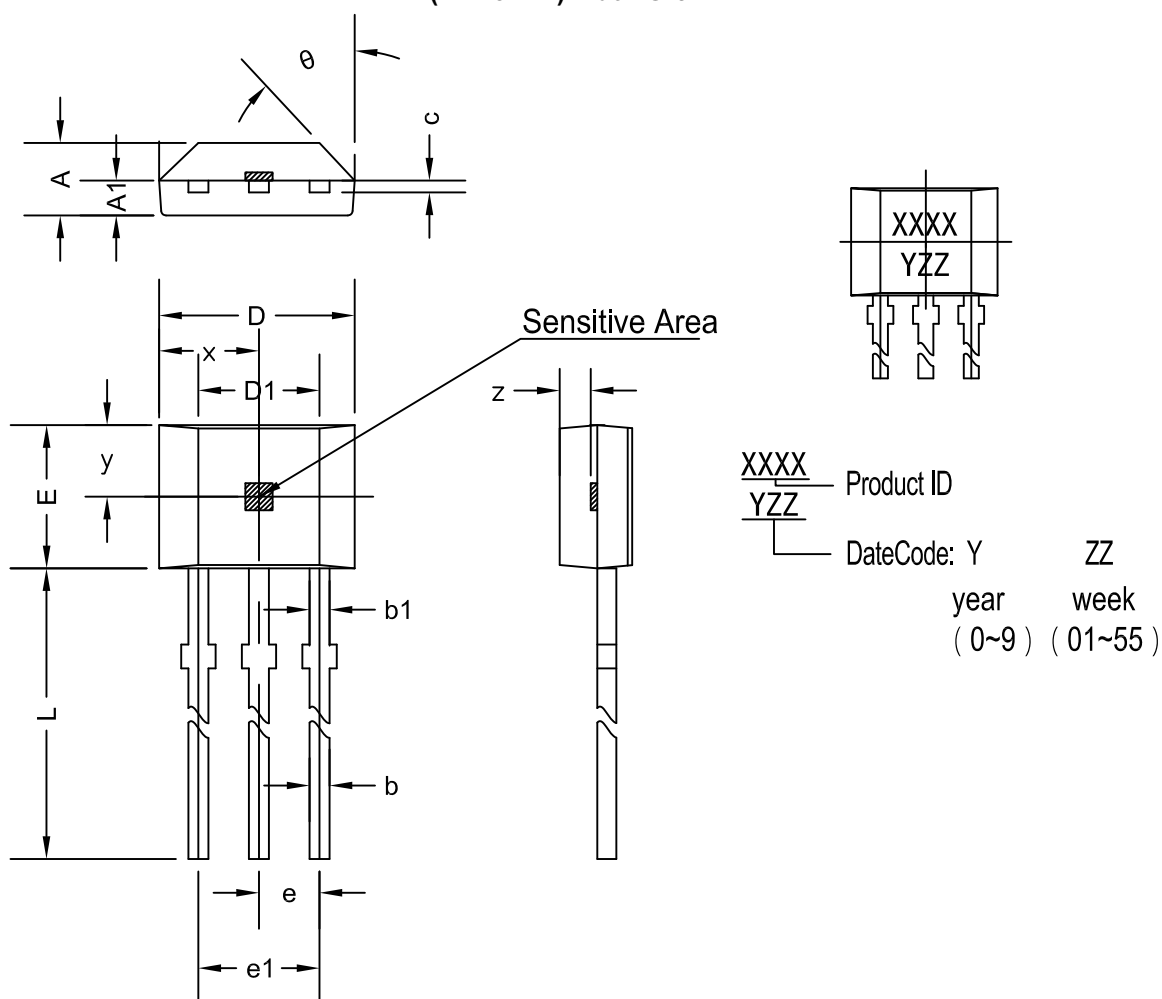
### Power On Output Waveform



Note:  $V_s$  rise time  $< 1\mu s$ ,  $T_{PO}$  is the time from  $V_s$  becoming stable to output becoming valid.

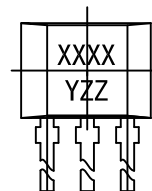
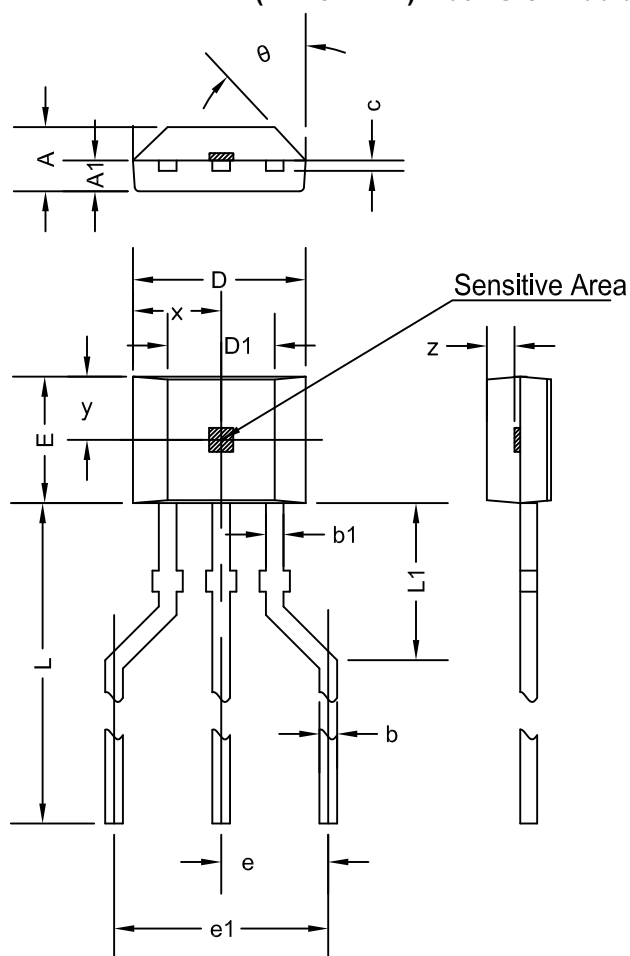
### PACKAGE DESIGNATOR

(MT1321A) 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	
$\theta$	45°TYP		45°TYP	

### PACKAGE DESIGNATOR (MT1321A-T) Flat TO-92 Radial Lead

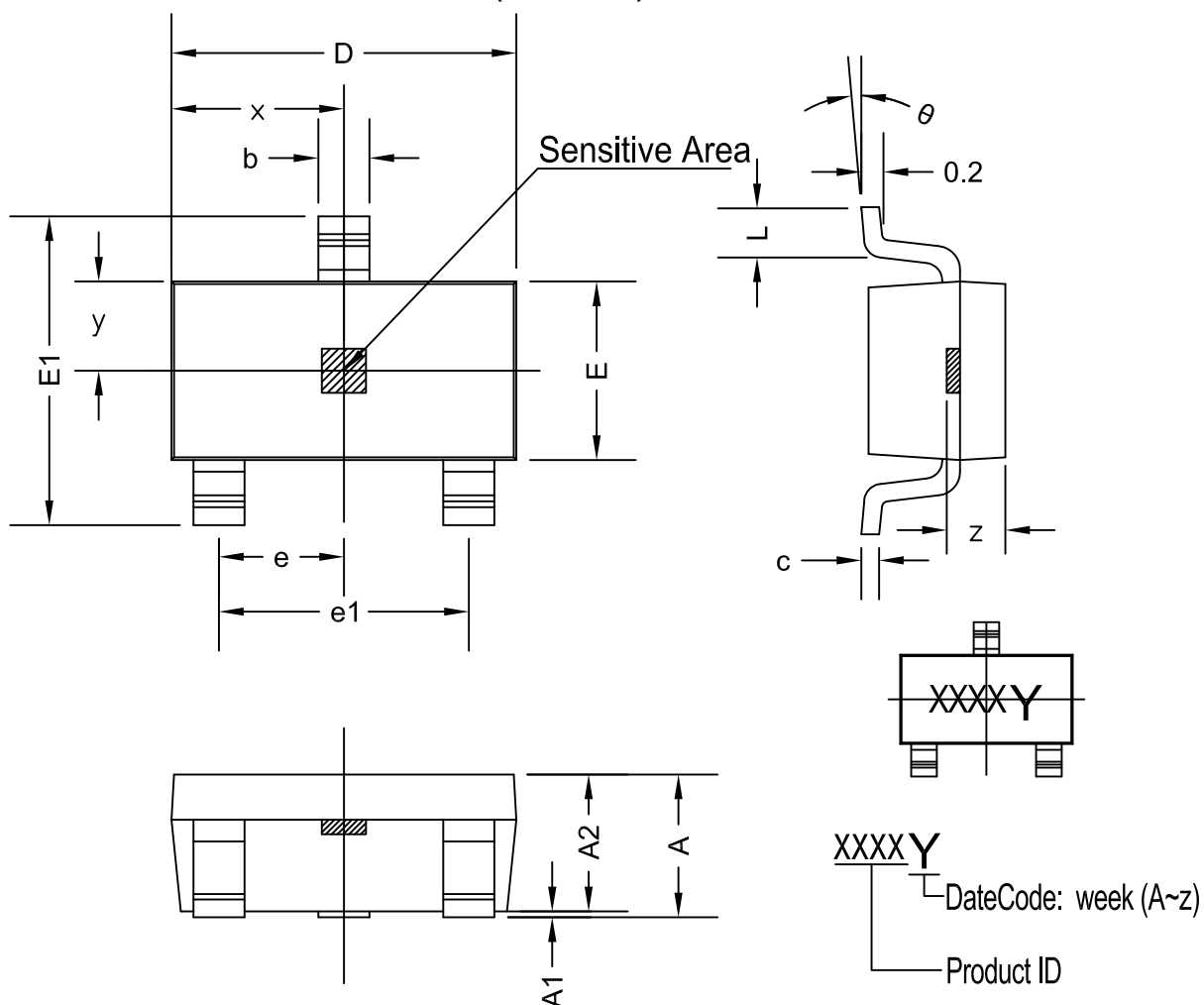


XXXX Product ID  
 YZZ DateCode: Y ZZ  
 year week  
 (0~9) (01~55)

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	2.540TYP		0.100TYP	
e1	5.080TYP		0.200TYP	
L	14.300REF		0.563REF	
L1	2.150REF		0.085REF	
x	2.025TYP		0.080TYP	
y	1.545TYP		0.061TYP	
z	0.500TYP		0.020TYP	
θ	45°TYP		45°TYP	

### PACKAGE DESIGNATOR

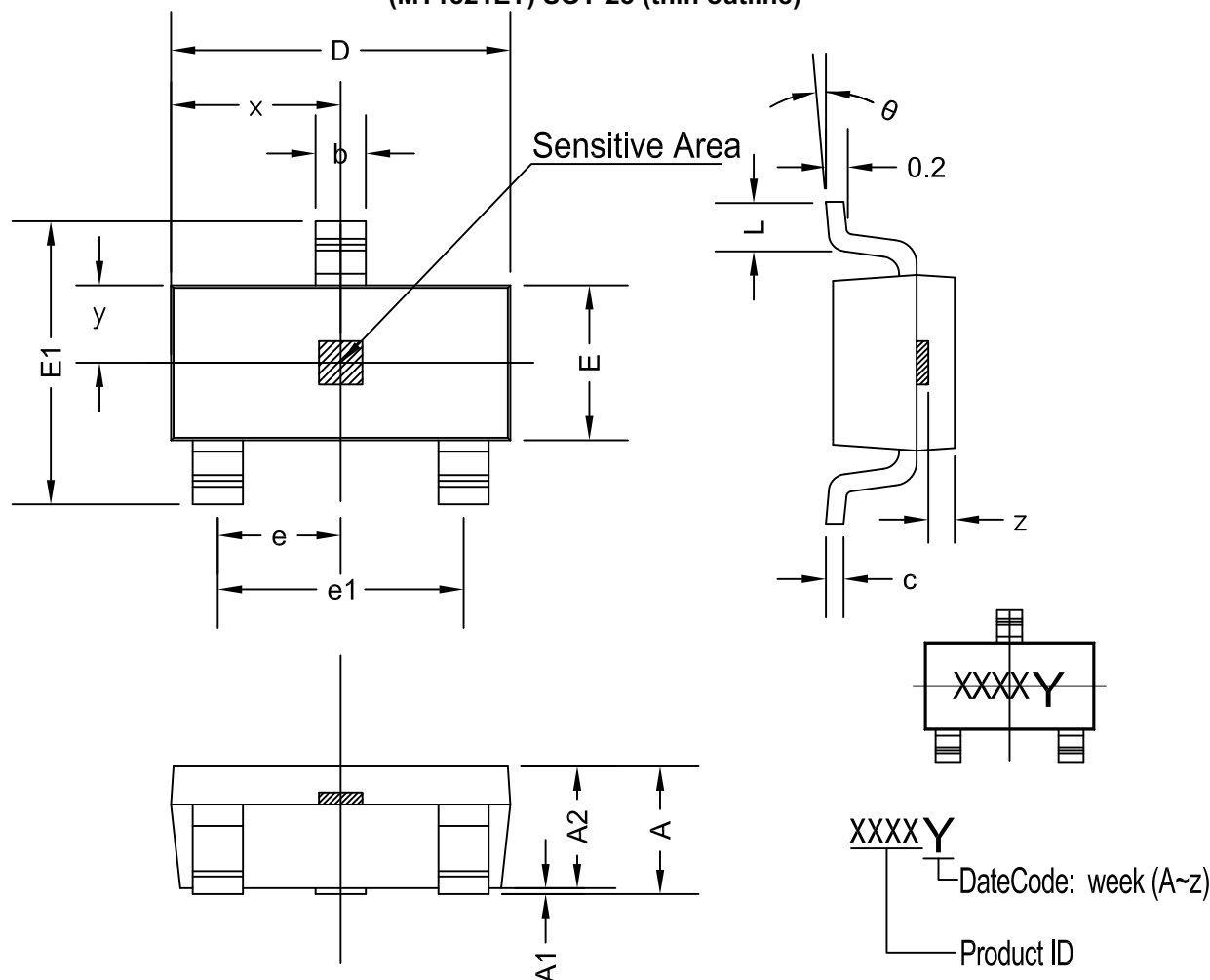
(MT1321AT) SOT-23



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°



### PACKAGE DESIGNATOR (MT1321ET) SOT-23 (thin outline)



Symbol	Dimensions in Millimeters		Dimensions in Inches	
	Min	Max	Min	Max
A	0.900	1.150	0.035	0.045
A1	0.000	0.100	0.000	0.004
A2	0.900	1.050	0.035	0.041
b	0.300	0.500	0.012	0.020
c	0.080	0.150	0.003	0.006
D	2.800	3.000	0.110	0.118
E	1.200	1.400	0.047	0.055
E1	2.250	2.550	0.089	0.100
e	0.950 TYP		0.037 TYP	
e1	1.800	2.000	0.071	0.079
L	0.550REF		0.022REF	
x	1.460TYP		0.057TYP	
y	0.650TYP		0.026 TYP	
z	0.500TYP		0.020TYP	
θ	0°	8°	0°	8°