PRIMARY CHARACTERISTICS

P_D	250mW
V_{CEO}	$40V_{dc}$
I_C	$200mA_{dc}$
$V_{CE(sat)}$	$0.2V_{dc}$
h_{FE}	100~300
$T_{J\ Max}$	150℃

SOT-883   PACKAGE

Marking Code: 1A

MARKING DIAGRAM

Date Code List		
Month	**Odd Year**	**Even Year**
Jan	1	E
Feb	2	F
Mar	3	H
Apr	4	J
May	5	K
Jun	6	L
Jul	7	N
Aug	8	P
Sep	9	U
Oct	T	X
Nov	V	Y
Dec	C	Z

3 [1A M] 2 1

1A = Device Code
M = Date Code

3 COLLECTOR
1 BASE
2 EMITTER
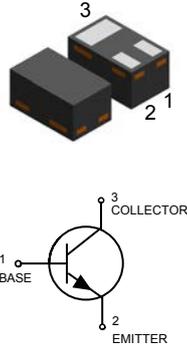
FEATURES

- We declare that the material of product requirements.
- Moisture Sensitivity Level 1

MECHANICAL DATA

- CASE：Molded Glass SOT-883
- POLARITY：See diagram above
- TERMINALS：Solderable per MIL-STD-750, Method 2026
- MOUNTING POSITION : Any

MAXIMUM RATINGS

Rating	Symbol	Value	Unit
Collector–Emitter Voltage	V_{CEO}	40	Vdc
Collector–Base Voltage	V_{CBO}	60	Vdc
Emitter–Base Voltage	V_{EBO}	6.0	Vdc
Collector Current — Continuous	I_C	200	mAdc

THERMAL CHARACTERISTICS

Characteristic	Symbol	Max	Unit
Total Device Dissipation FR– 5 Board, (1) $T_A = 25°C$	P_D	250	mW
Derate above 25°C		2	mW/°C
Thermal Resistance, Junction to Ambient	$R_{θJA}$	500	°C/W
Junction and Storage Temperature	T_J , T_{stg}	–55 to +150	°C

ELECTRICAL CHARACTERISTICS (T_A = 25°C unless otherwise noted.)

Characteristic	Symbol	Min	Max	Unit
OFF CHARACTERISTICS				
Collector–Emitter Breakdown Voltage(2) (I_C = 1.0 mAdc)	$V_{(BR)CEO}$	40	—	Vdc
Collector–Base Breakdown Voltage (I_C = 10 µAdc)	$V_{(BR)CBO}$	60	—	Vdc
Emitter–Base Breakdown Voltage (I_E = 10 µAdc)	$V_{(BR)EBO}$	6.0	—	Vdc
Base Cutoff Current (V_{CE}= 30 Vdc, V_{EB} = 3.0 Vdc,)	I_{BL}	—	50	nAdc
Collector Cutoff Current (V_{CE} = 30Vdc, V_{EB} = 3.0Vdc)	I_{CEX}	—	50	nAdc

1. FR–5 = 1.0 x 0.75 x 0.062 in.
2. Pulse Test: Pulse Width ＜300 µs, Duty Cycle ＜2.0%.

ELECTRICAL CHARACTERISTICS (T_A = 25°C unless otherwise noted) (Continued)

Characteristic	Symbol	Min	Max	Unit
ON CHARACTERISTICS (3)				
DC Current Gain(1)	h_{FE}			—
(I_C =0.1 mAdc, V_{CE} =1.0 Vdc)		40	—	
(I_C = 1.0 mAdc, V_{CE} = 1.0 Vdc)		70	—	
(I_C = 10 mAdc, V_{CE} = 1.0 Vdc)		100	300	
(I_C = 50mAdc, V_{CE} = 1.0Vdc)		60	—	
(I_C = 100mAdc, V_{CE} =1.0 Vdc)		30	—	
Collector–Emitter Saturation Voltage	$V_{CE(sat)}$			Vdc
(I_C = 10 mAdc, I_B = 1.0 mAdc)(3)		—	0.2	
(I_C = 50 mAdc, I_B = 5.0mAdc)		—	0.3	
Base–Emitter Saturation Voltage(3)	$V_{BE(sat)}$			Vdc
(I_C = 10 mAdc, I_B = 1.0mAdc)		0.65	0.85	
(I_C = 50mAdc, I_B = 5.0mAdc)		—	0.95	

SMALL–SIGNAL CHARACTERISTICS

Characteristic	Symbol	Min	Max	Unit
Current–Gain — Bandwidth Product (I_C = 10mAdc, V_{CE}= 20Vdc, f = 100MHz)	f_T	300	—	MHz
Output Capacitance (V_{CB} = 5.0Vdc, I_E = 0, f = 1.0 MHz)	C_{obo}	—	4.0	pF
Input Capacitance (VEB = 0.5Vdc, I_C = 0, f = 1.0 MHz)	C_{ibo}	—	8.0	pF
Input Impedancen (V_{CE} = 10Vdc, I_C = 1.0mAdc, f = 1.0 kHz)	h_{ie}	1.0	10	kΩ
Voltage Feedback Ratio (V_{CE} = 10 Vdc, I_C = 1.0 mAdc, f = 1.0 kHz)	h_{re}	0.5	8.0	$\times 10^{-4}$
Small–Signal Current Gain (V_{CE} = 10 Vdc, I_C = 1.0 mAdc, f = 1.0 kHz)	h_{fe}	100	400	—
Output Admittance (V_{CE} = 10 Vdc, I_C = 1.0 mAdc, f = 1.0 kHz)	h_{oe}	1.0	40	μmhos
Noise Figure (V_{CE} = 5.0 Vdc, I_C = 100μAdc, R_S = 1.0 k Ω, f = 1.0 kHz)	NF	—	5.0	dB

SWITCHING CHARACTERISTICS

Characteristic		Symbol	Min	Max	Unit
Delay Time	(V_{CC} = 3.0 Vdc,V_{BE} = −0.5Vdc	t_d	—	35	ns
Rise Time	I_C = 10 mAdc, I_{B1} = 1.0mAdc)	t_r	—	35	
Storage Time	(V_{CC} = 3.0Vdc,	t_s	—	200	ns
Fall Time	I_C = 10 mAdc,I_{B1} = I_{B2} = 1.0 mAdc)	t_f	—	50	

3. Pulse Test: Pulse Width ≤300 μs, Duty Cycle ≤2.0%.

WILLAS

RoHS COMPLIANT

DUTY CYCLE = 2%

300 ns

+10.9 V

−0.5 V

< 1 ns

10 k

+3 V

275

C_S < 4 pF*

10 < t_1 < 500 µs

DUTY CYCLE = 2%

t_1

+10.9 V

0

−9.1 V′

< 1 ns

10 k

1N916

+3 V

275

C_S < 4 pF*

* Total shunt capacitance of test jig and connectors
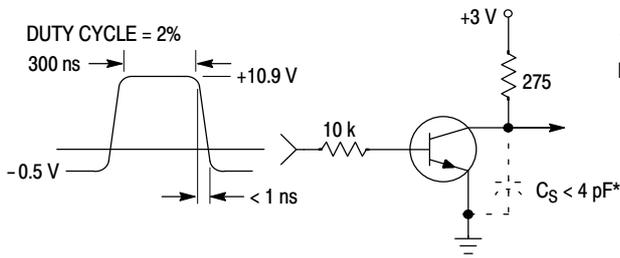
**Figure 1. Delay and Rise Time
Equivalent Test Circuit**
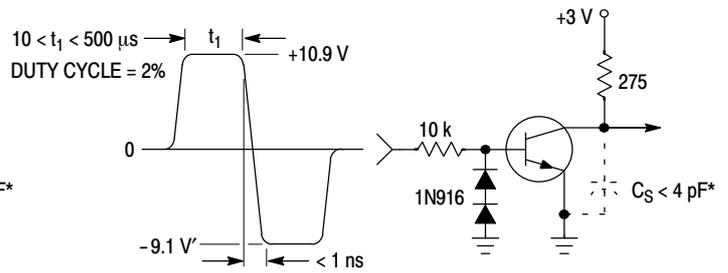
**Figure 2. Storage and Fall Time
Equivalent Test Circuit**

ELECTRICAL CHARACTERISTIC CURVES
(Ta = 25°C)

td@Vob=1V,
IC/IB=10

TIME (ns)

IC, COLLECTOR CURRENT (mA)

— Vcc=0V — Vcc=2V — Vcc=3V — Vcc=15V — Vcc=40V

Fig.3 TURN-ON TIME

VCE=1V

hFE, DC CURRENT GAIN

IC, COLLECTOR CURRENT (mA)

— −55℃ — 25℃ — 75℃ — 100℃ — 125℃
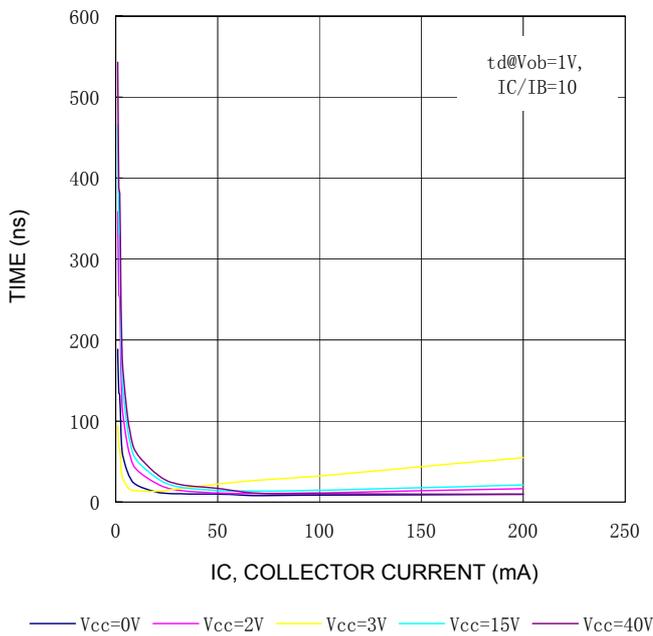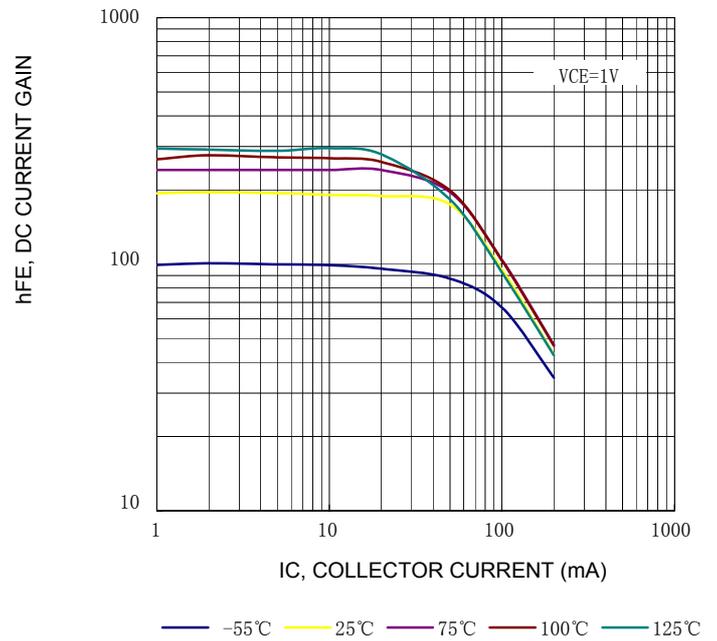
Fig.4 DC CURRENT GAIN

ELECTRICAL CHARACTERISTIC CURVES
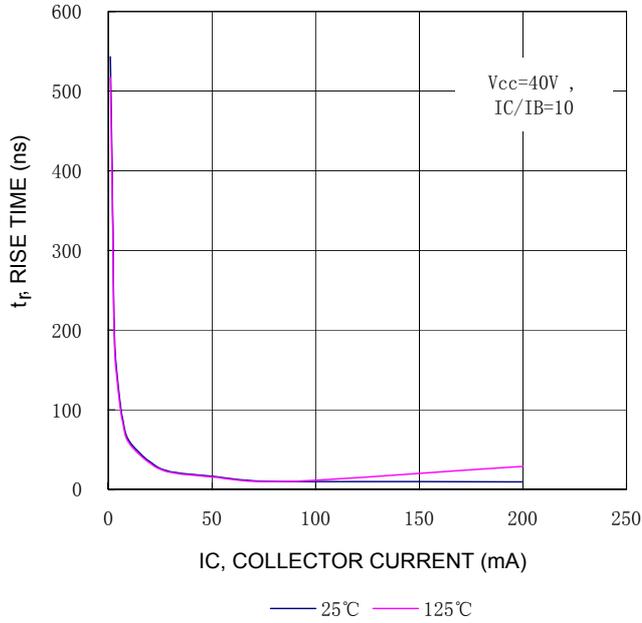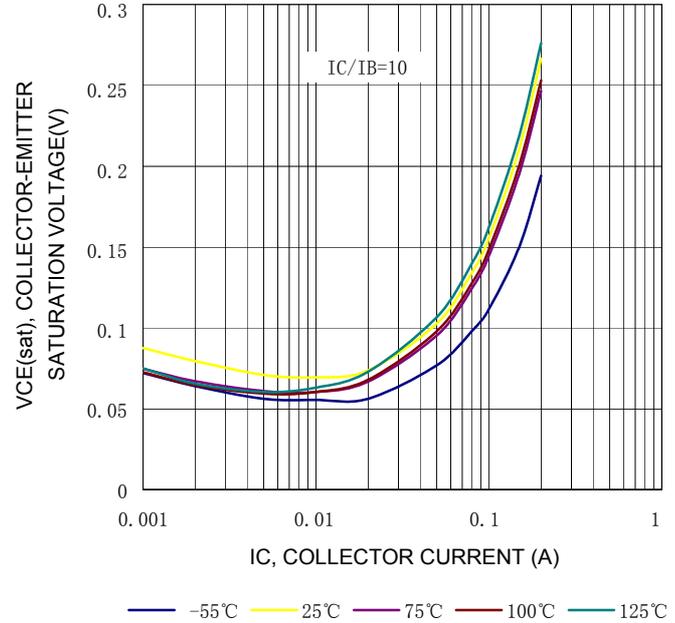
(Ta = 25°C)

Vcc=40V ,
IC/IB=10

t$_r$, RISE TIME (ns) vs IC, COLLECTOR CURRENT (mA)

——— 25℃   ——— 125℃

Fig.5 RISE TIME

IC/IB=10

VCE(sat), COLLECTOR-EMITTER SATURATION VOLTAGE(V) vs IC, COLLECTOR CURRENT (A)

——— −55℃   ——— 25℃   ——— 75℃   ——— 100℃   ——— 125℃

Fig.6 COLLECTOR EMITTER SATURATION
VOLTAGE VS. COLLECTOR CURRENT

ts'=ts−1/8tf
IB1=IB2

t$_s$, STORAGE TIME (ns) vs IC, COLLECTOR CURRENT (mA)

——— IC/IB=20 125℃   ——— IC/IB=10 125℃
——— IC/IB=20 25℃   ——— IC/IB=10 25℃

Fig.7 STORAGE TIME

IC/IB=10

VBE(sat), BASE-EMITTER SATURATION VOLTAGE(V) vs IC, COLLECTOR CURRENT (A)

——— −55℃   ——— 25℃   ——— 75℃   ——— 100℃   ——— 125℃
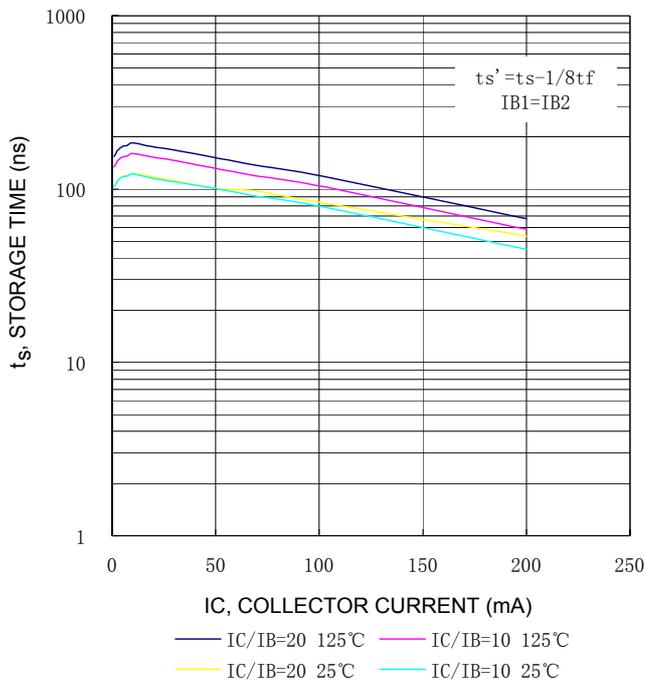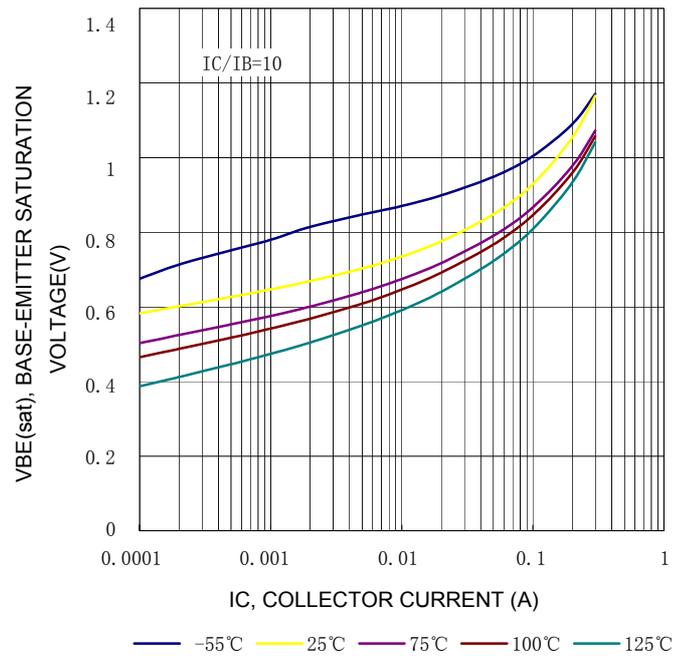
Fig.8 BASE EMITTER SATURATION VOLTAGE
VS. COLLECTOR CURRENT

ELECTRICAL CHARACTERISTIC CURVES
(Ta = 25°C)

Vcc=40V,
IB1=IB2

t$_f$, FALL TIME (ns)

IC, COLLECTOR CURRENT (mA)

IC/IB=20 125℃　　IC/IB=10 125℃
IC/IB=20 25℃　　IC/IB=10 25℃

Fig.9　FALL TIME

VCE=1V

VBE(on), BASE-EMITTER VOLTAGE(V)

IC, COLLECTOR CURRENT (A)

−55℃　　25℃　　75℃　　100℃　　125℃
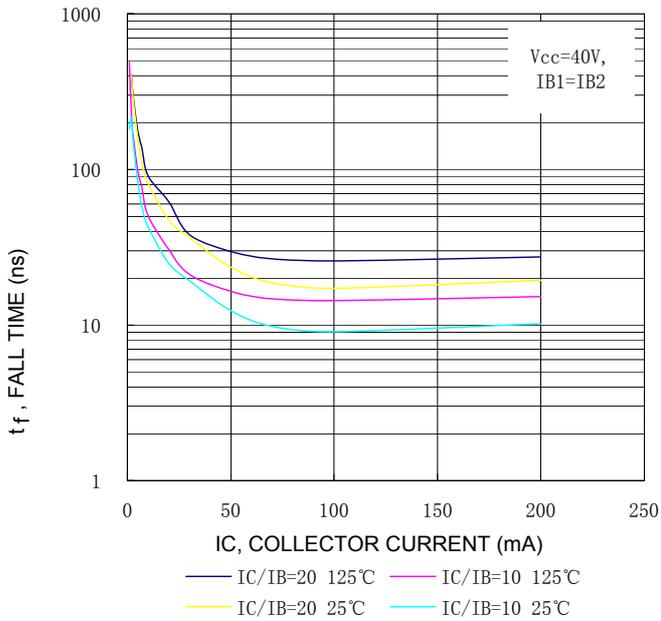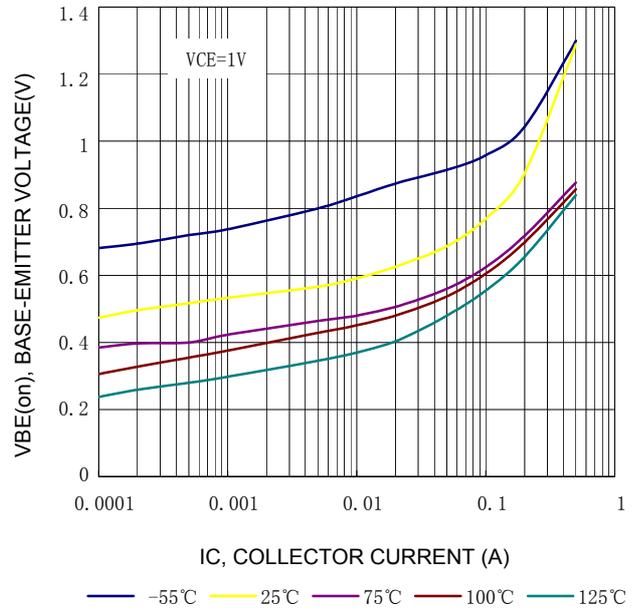
Fig.10　BASE EMITTER VOLTAGE　VS.

COLLECTOR CURRENT

CAPACITANCE (pF)

REVERSE BIAS VOLTAGE (V)

Cib(pF)　　Cob(pF)

Fig.11　CAPACITANCE

VCE=1V

fT,CURRENT-GAIN-BANDWIDTH
PRODUCT (MHz)
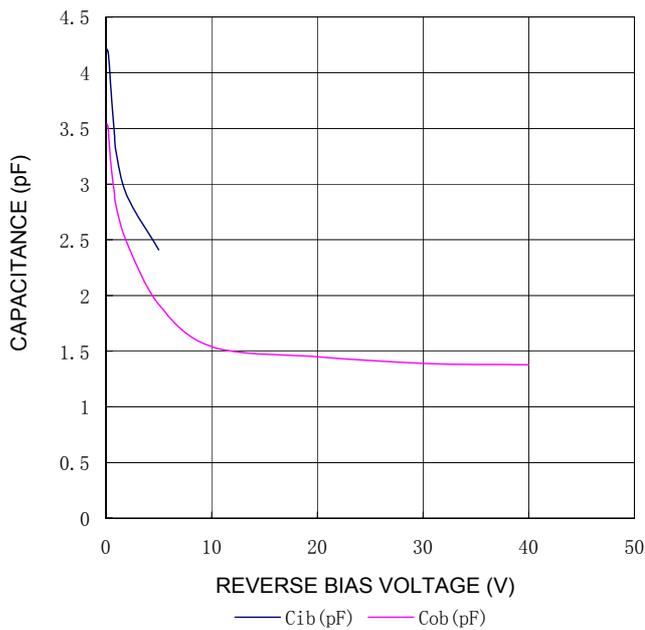
IC, COLLECTOR CURRENT (mA)
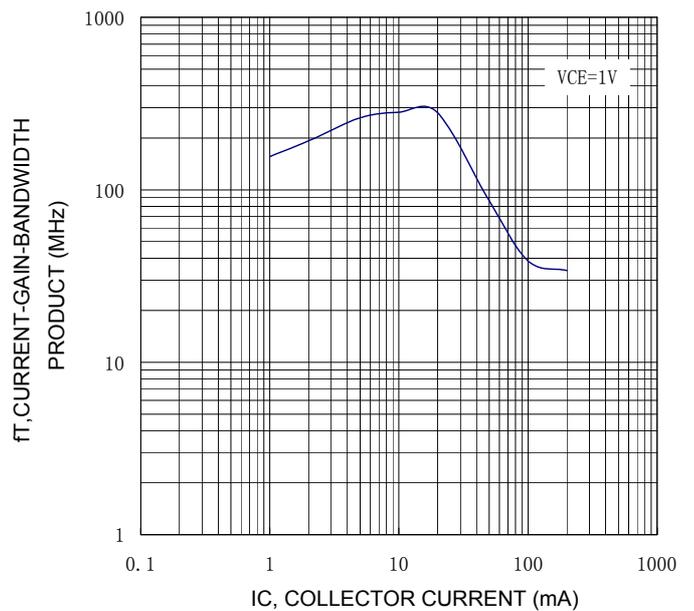
Fig.12　CURRENT GAIN BANDWIDTH PRODUCT
VS.COLLECTOR CURRENT

Outline Drawing

SOT-, , 3

DIMENSION OUTLINE: Unit:mm

1.000 ± 0.05

0.60 ± 0.05

0.480 ± 0.015

0.127

0.067

0.175

0.125   0.125

0.127

0.067

0.215

0.140

0.305

0.200

0.067

0.127

0.055

0.493   0.025

0.190

0.490±0.05

0.025

0.190

0.055

0.055

0.055

0.480   0.05

0.025

0.310   0.05
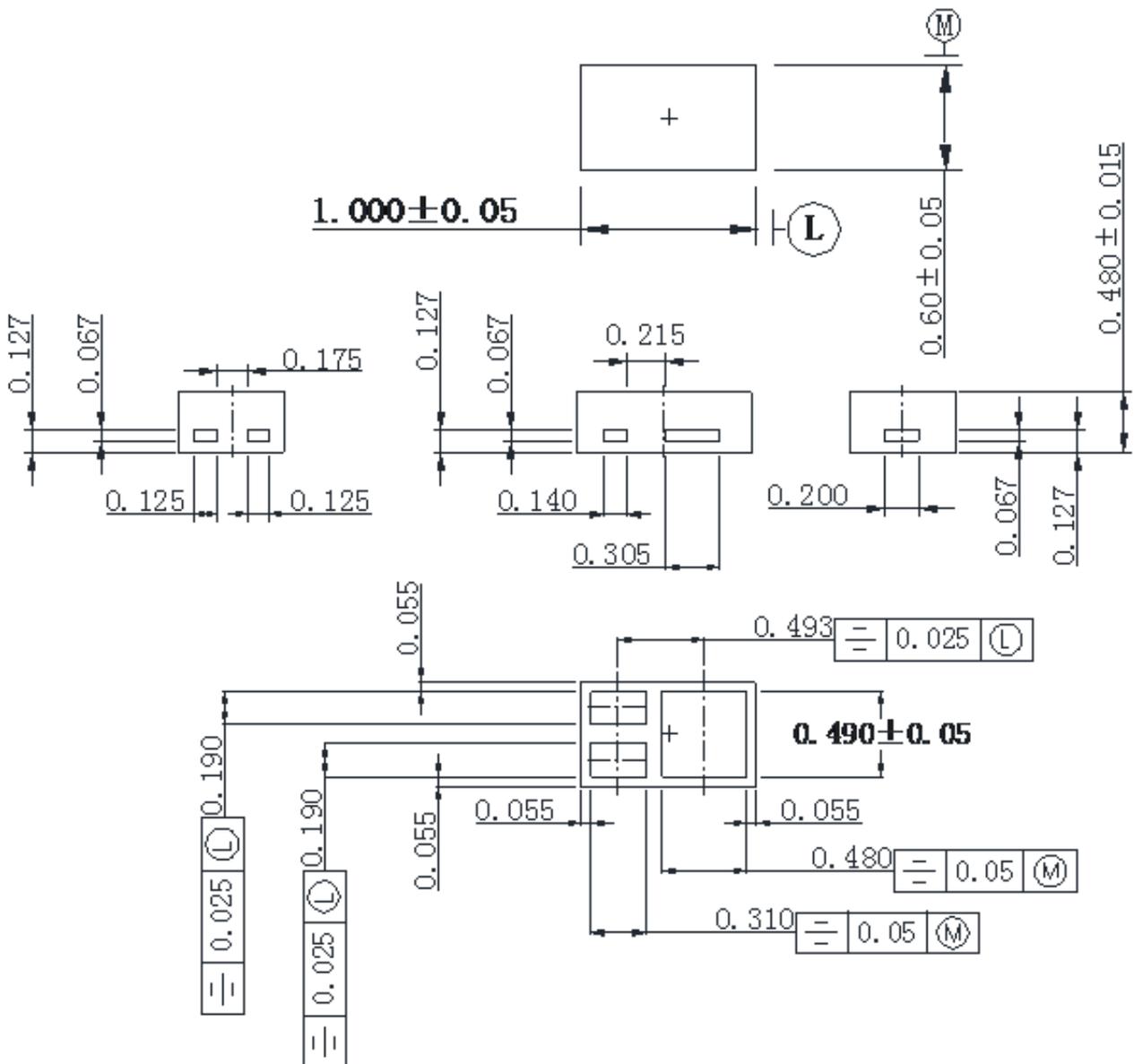
Dimensions in inches and (millimeters)

Rev.5

Ordering Information:

Device PN	Packing
U U " u V u -T$^{(1)}$=$^{(2)}$-WS	Tape&Reel: Kpcs/Reel

Note: (1) Packing code, Tape & Reel Packing

(2) Halogen free product for packing code suffix "H"

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