

FMBTA55 / FMBTA56**List**

List.....	1
Package outline.....	2
Features.....	2
Mechanical data.....	2
Maximum ratings.....	2
Electrical Characteristics.....	3
Rating and characteristic curves.....	4,5
Pinning information.....	6
Marking.....	6
Suggested solder pad layout.....	6
Packing information.....	7
Reel packing.....	8
Suggested thermal profiles for soldering processes.....	8
High reliability test capabilities.....	9

FMBTA55 / FMBTA56

Driver PNP Transistor

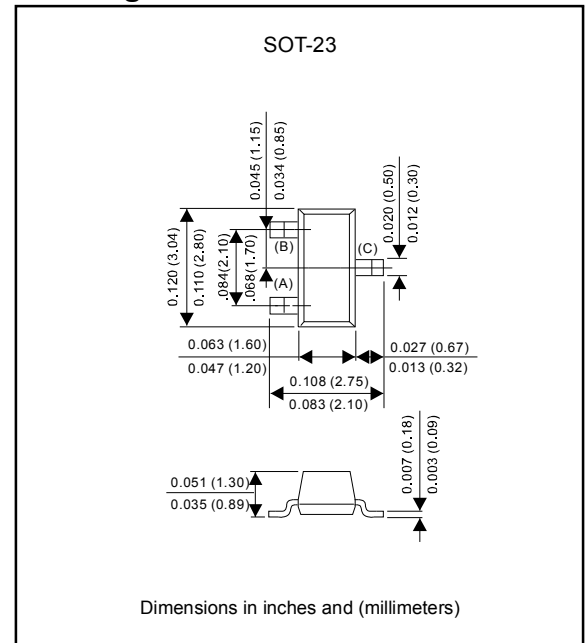
Features

- Lead-free parts for green partner, exceeds environmental standards of MIL-STD-19500 /228
- Suffix "-H" indicates Halogen-free part, ex. FMBTA55-H.

Mechanical data

- Epoxy:UL94-V0 rated flame retardant
- Case : Molded plastic, SOT-23
- Terminals : Solder plated, solderable per MIL-STD-750, Method 2026
- Mounting Position : Any
- Weight : Approximated 0.008 gram

Package outline



Maximum ratings (AT $T_A=25^{\circ}\text{C}$ unless otherwise noted)

PARAMETER	SYMBOL	FMBTA55	FMBTA56	UNIT
Collector-Base voltage	V_{CBO}	-60	-80	Vdc
Collector-Emitter voltage	V_{CEO}	-60	-80	Vdc
Emitter-Base voltage	V_{EBO}	-4.0		Vdc
Collector Current - continuous	I_C	-500		mAdc

Thermal Characteristics

CHARACTERISTIC	CONDITIONS	SYMBOL	Max	UNIT
Total device dissipation FR-5 board (1)	$T_A = 25^{\circ}\text{C}$	P_D	225	mW
	Derate above 25°C		1.8	
Thermal resistance(1)	Junction to ambient	$R_{\theta JA}$	556	$^{\circ}\text{C/W}$
Total device dissipation alumina substrate(2)	$T_A = 25^{\circ}\text{C}$	P_D	300	mW
	Derate above 25°C		2.4	
Thermal resistance(2)	Junction to ambient	$R_{\theta JA}$	417	$^{\circ}\text{C/W}$
Operating junction temperature range		T_J	-55 ~ +150	$^{\circ}\text{C}$
Storage temperature range		T_{STG}	-55 ~ +150	$^{\circ}\text{C}$

1. FR-5 = 1.0 X 0.75 X 0.062 in.

2. Alumina = 0.4 X 0.3 X 0.024 in. 99.5% alumina.

FMBTA55 / FMBTA56**Electrical Characteristics** (AT $T_A=25^{\circ}\text{C}$ unless otherwise noted)**Off Characteristics**

PARAMETER	CONDITIONS	SYMBOL	Min.	Max.	UNIT
Collector-Base breakdown voltage FMBTA55 FMBTA56	$I_c = -100\mu\text{Adc}$, $I_E = 0$	$V_{(BR)CBO}$	-60 -80	- -	Vdc
Collector-Emitter breakdown voltage(3) FMBTA55 FMBTA56	$I_c = -1.0\text{mAdc}$, $I_B = 0$	$V_{(BR)CEO}$	-60 -80	- -	Vdc
Emitter-Base breakdown voltage	$I_E = -100\mu\text{Adc}$, $I_C = 0$	$V_{(BR)EBO}$	-4.0	-	Vdc
Collector Cutoff Current	$V_{CE} = -60\text{Vdc}$, $I_B = 0$	I_{CES}	-	-0.1	μAdc
Collector Cutoff current FMBTA55 FMBTA56	$V_{CB} = -60\text{Vdc}$, $I_E = 0$ $V_{CB} = -80\text{Vdc}$, $I_E = 0$	I_{CBO}	- -	-0.1 -0.1	μAdc

On Characteristics

PARAMETER	CONDITIONS	SYMBOL	Min.	Max.	UNIT
DC current gain	$I_c = -10\text{mAdc}$, $V_{CE} = -1.0\text{Vdc}$ $I_c = -100\text{mAdc}$, $V_{CE} = -1.0\text{Vdc}$	h_{FE}	100	-	-
			100	-	
Collector-Emitter saturation voltage	$I_c = -100\text{mAdc}$, $I_B = -10\text{mAdc}$	$V_{CE(sat)}$	-	-0.25	Vdc
Base-Emitter saturation voltage	$I_c = -100\text{mAdc}$, $V_{CE} = -1.0\text{Vdc}$	$V_{BE(on)}$	-	-1.2	Vdc

Small Signal Characteristics

PARAMETER	CONDITIONS	SYMBOL	Min.	Max.	UNIT
Current Gain Bandwidth Product (4)	$I_c = -100\text{mA}$, $V_{CE} = -1.0\text{Vdc}$, $f=100\text{MHz}$	f_T	50	-	MHz

3. Pulse test: pulse width $\leq 300\mu\text{s}$, duty cycle $\leq 2.0\%$ 4. f_T is defined as the frequency at which $|h_{fe}|$ extrapolates to unity.

Rating and characteristic curves (FMBTA55/FMBTA56)

FIG.1 Switching Time Test Circuits

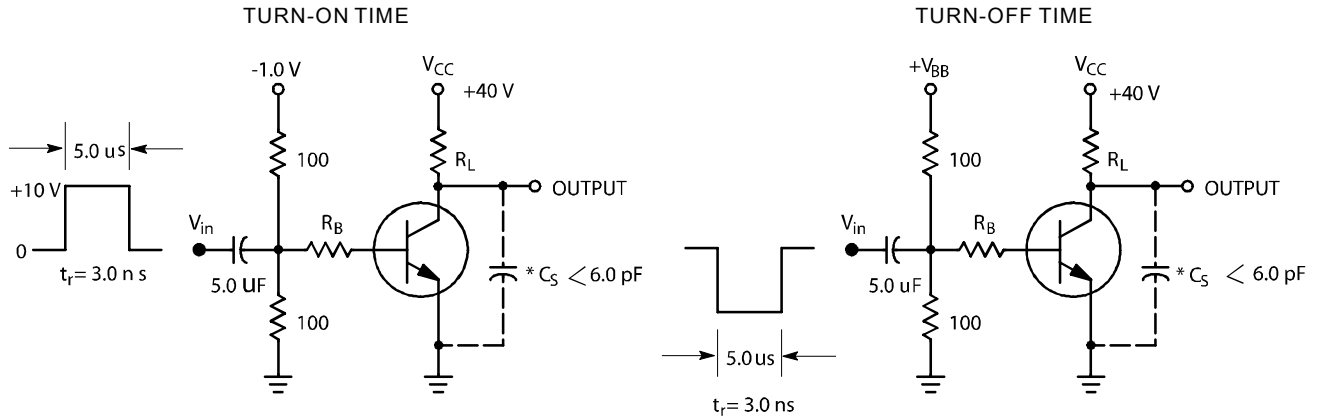


FIG.2 Current-Gain Bandwidth Product

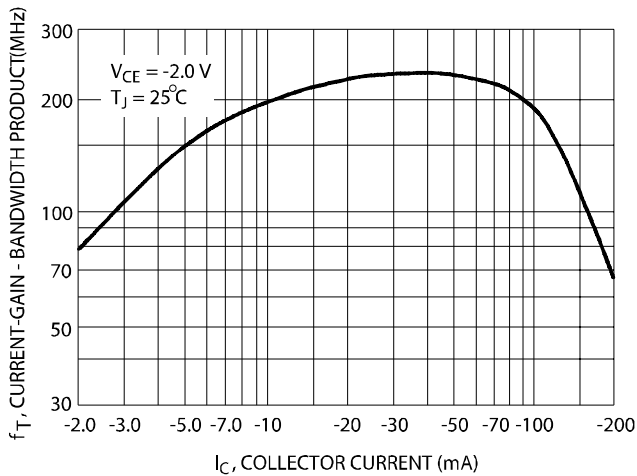


FIG.3 Capacitance

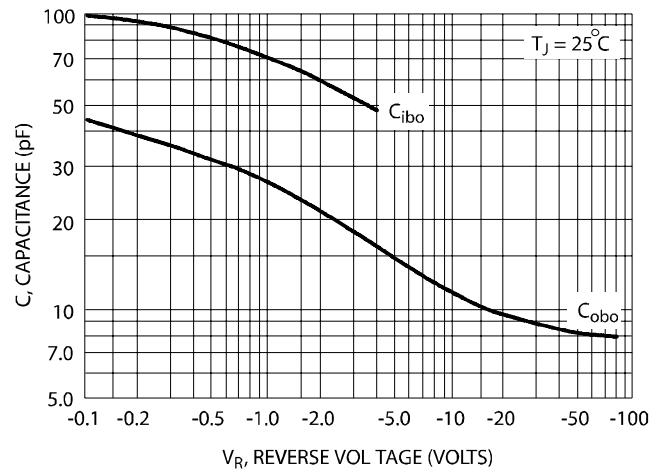


FIG.4 Switching Time

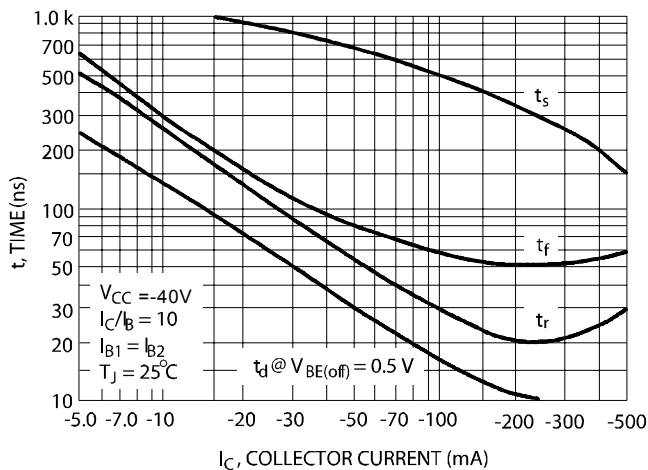
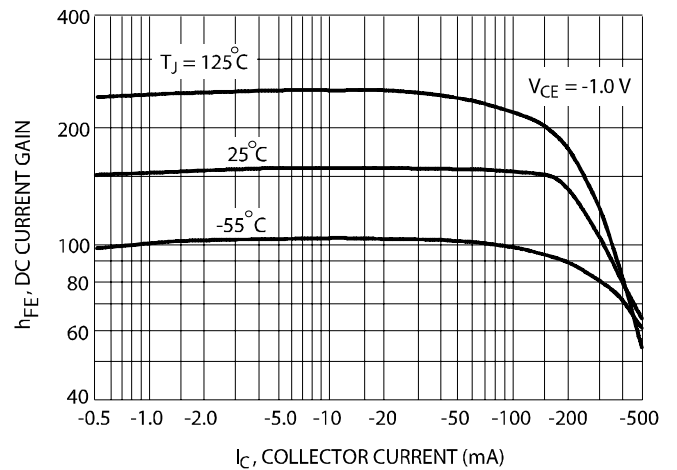


FIG.5 DC Current Gain



Rating and characteristic curves (FMBTA55/FMBTA56)

FIG.6 "On" Voltage

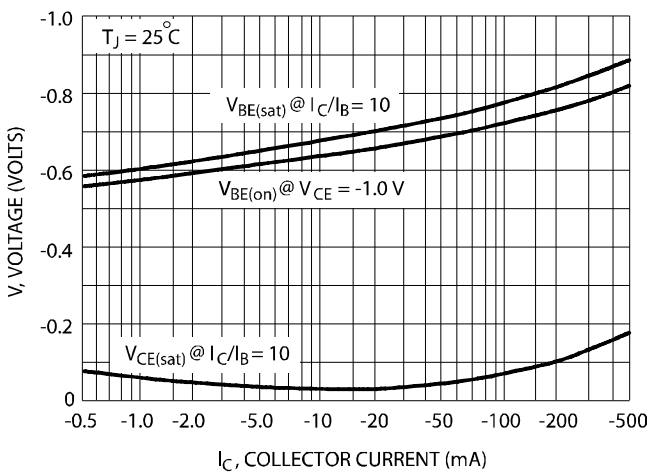


FIG.7 Collectpr Saturation Region

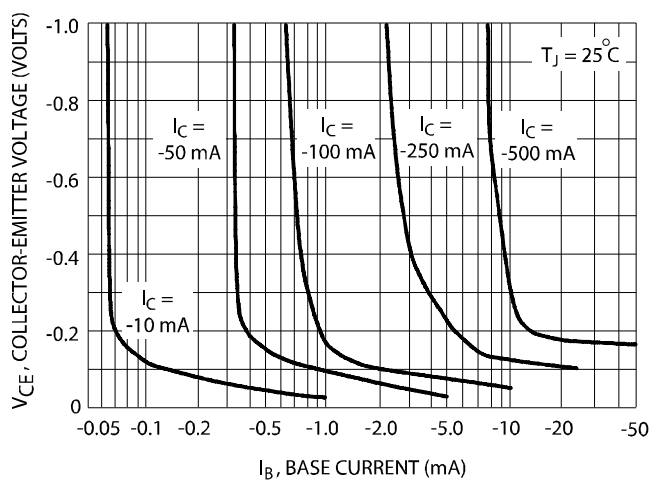
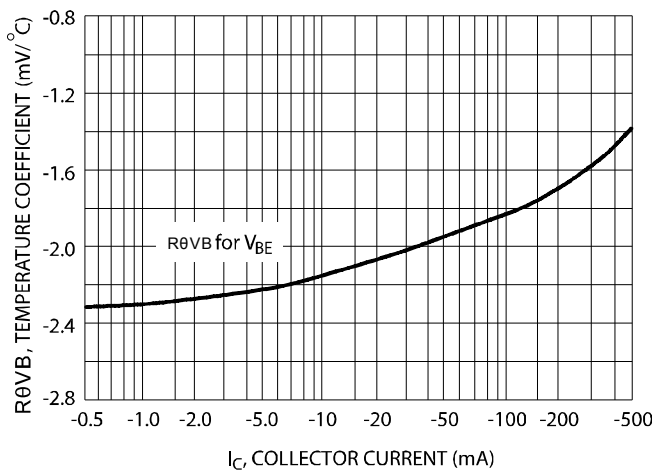
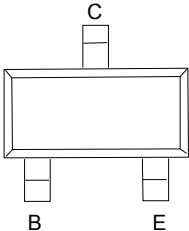
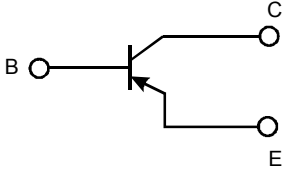


FIG.8 Base-Emitter Temperature Coefficient



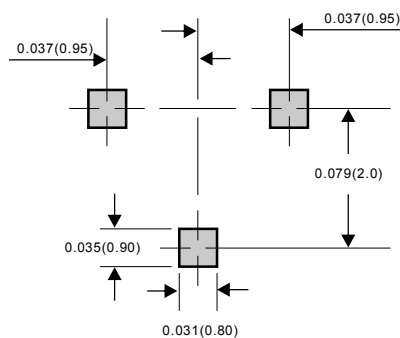
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FMBTA55 / FMBTA56**Pinning information**

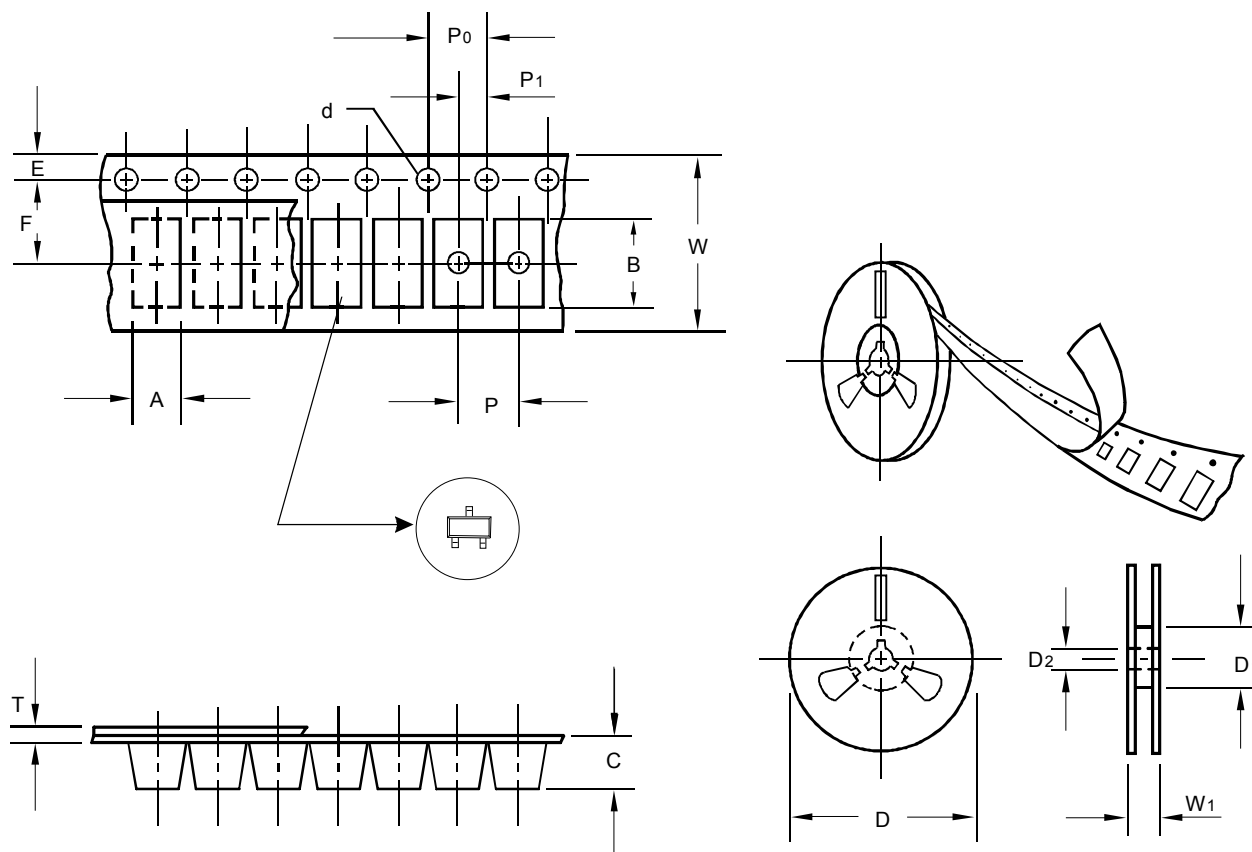
Pin	Simplified outline	Symbol
PinB Base PinC Collector PinE Emitter		

Marking

Type number	Marking code
FMBTA55	2H
FMBTA56	2GM
	2GG

Suggested solder pad layout**SOT-23**

Dimensions in inches and (millimeters)

FMBTA55 / FMBTA56**Packing information**

unit:mm

Item	Symbol	Tolerance	SOT-23
Carrier width	A	0.1	3.15
Carrier length	B	0.1	2.77
Carrier depth	C	0.1	1.22
Sprocket hole	d	0.1	1.50
13" Reel outside diameter	D	2.0	-
13" Reel inner diameter	D1	min	-
7" Reel outside diameter	D	2.0	178.00
7" Reel inner diameter	D1	min	55.00
Feed hole diameter	D2	0.5	13.00
Sprocket hole position	E	0.1	1.75
Punch hole position	F	0.1	3.50
Punch hole pitch	P	0.1	4.00
Sprocket hole pitch	P0	0.1	4.00
Embossment center	P1	0.1	2.00
Overall tape thickness	T	0.1	0.23
Tape width	W	0.3	8.00
Reel width	W1	1.0	12.0

Note: Devices are packed in accordance with EIA standard RS-481-A and specifications listed above.

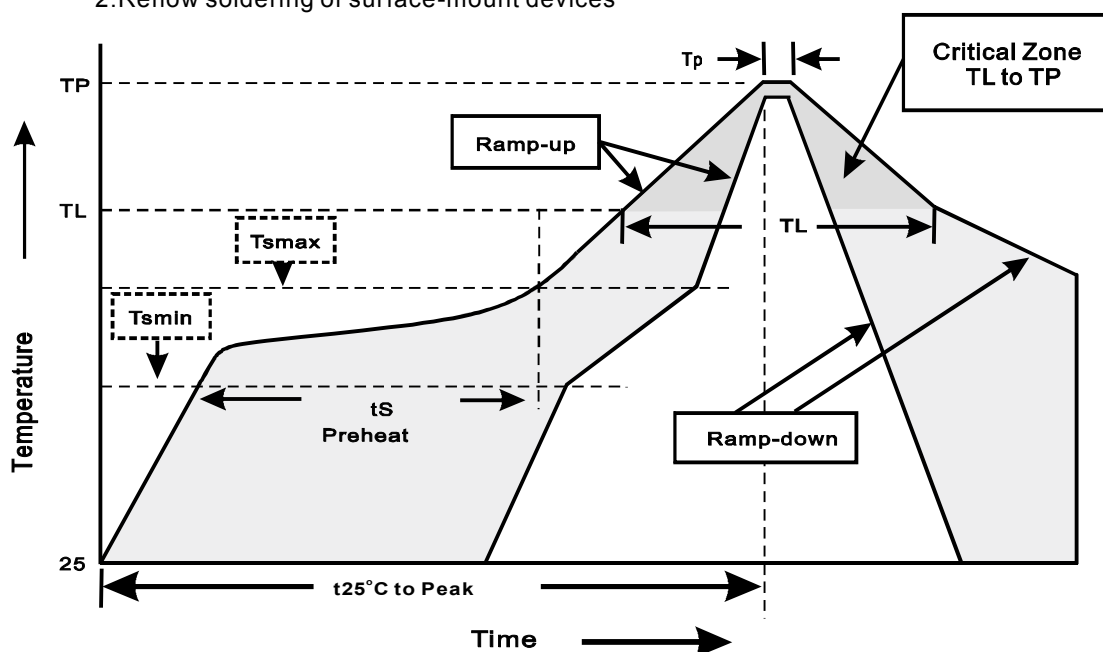
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Reel packing

PACKAGE	REEL SIZE	REEL (pcs)	COMPONENT SPACING (m/m)	BOX (pcs)	INNER BOX (m/m)	REEL DIA, (m/m)	CARTON SIZE (m/m)	CARTON (pcs)	APPROX. GROSS WEIGHT (kg)
SOT-23	7"	3,000	4.0	30,000	183*183*123	178	382*262*387	240,000	11.6

Suggested thermal profiles for soldering processes

- 1.Storage environment: Temperature=5°C~40°C Humidity=55%±25%
- 2.Reflow soldering of surface-mount devices



3.Reflow soldering

Profile Feature	Soldering Condition
Average ramp-up rate(T _L to T _P)	<3°C/sec
Preheat -Temperature Min(T _{smmin}) -Temperature Max(T _{smmax}) -Time(min to max)(t _s)	150°C 200°C 60~120sec
T _{smmax} to T _L -Ramp-upRate	<3°C/sec
Time maintained above: -Temperature(T _L) -Time(t _L)	217°C 60~260sec
Peak Temperature(T _P)	255°C-0/+5°C
Time within 5°C of actual Peak Temperature(t _P)	10~30sec
Ramp-down Rate	<6°C/sec
Time 25°C to Peak Temperature	<6minutes

FMBTA55 / FMBTA56

High reliability test capabilities

Item Test	Conditions
1. Steady State Operating Life	TA=25°C P _D =225mW Test Duration:1000hrs
2. High Temperature Reverse Bias	T _j =150°C, V _{CE} =80% related volage, Test Duration:1000hrs
3. Temperature Cycle	-55°C(15min) to 150°C(15min) Air to Air Transition Time<20sec Test Cycles:1000cycle
4. Autoclave	P=2atm Ta=121°C RH=100% Test Duration:96hrs
5. High Temperature Storage Life	Ta=150°C Test Duration:1000hrs
6. Solderability	245°C,Test Duration:5sec
7. High Temperature High Humidity Reverse Bias	Ta=85°C, 85%RH, V _{CE} =80% related volage, Test Duration:1000hrs
8. Resistance to Soldering Heat	260°C,Test Duration:10sec