FMBTA55-Q1 / FMBTA56-Q1

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FMBTA55-Q1 / FMBTA56-Q1

Driver PNP Transistor

Features

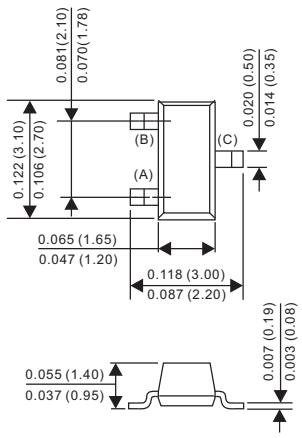
- Lead-free parts for green partner, exceeds environmental standards of MIL-STD-19500 /228
- Qualified to AEC-Q101 standards for high reliability.
- Suffix "-H" indicates Halogen-free part, ex. FMBTA55-Q1-H.

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

SOT-23



Dimensions in inches and (millimeters)

Maximum ratings (AT T_A=25°C unless otherwise noted)

PARAMETER	SYMBOL	FMBTA55-Q1	FMBTA56-Q1	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°C Derate above 25°C	P_D	225 1.8	mW mW/°C
Thermal resistance(1)	Junction to ambient	$R_{\theta JA}$	556	°C/W
Total device dissipation alumina substrate(2)	T_A = 25°C Derate above 25°C	P_D	300 2.4	mW mW/°C
Thermal resistance(2)	Junction to ambient	$R_{\theta JA}$	417	°C/W
Operating junction temperature range		T_J	-55 ~ +150	°C
Storage temperature range		T_{STG}	-55 ~ +150	°C

1. FR-5 = 1.0 X 0.75 X0.062 in.
2. Alumina = 0.4 X 0.3 X 0.024 in. 99.5% alumina.

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Electrical Characteristics (AT T_A=25°C unless otherwise noted)

Off Characteristics

PARAMETER	CONDITIONS	SYMBOL	Min.	Max.	UNIT
Collector-Base breakdown voltage FMBTA55-Q1 FMBTA56-Q1	I_c = -100μAdc, I_E = 0	$V_{(BR)CBO}$	-60 -80	- -	Vdc
Collector-Emitter breakdown voltage(3) FMBTA55-Q1 FMBTA56-Q1	I_c = -1.0mAdc, I_B = 0	$V_{(BR)CEO}$	-60 -80	- -	Vdc
Emitter-Base breakdown voltage	I_E = -100μAdc, I_C = 0	$V_{(BR)EBO}$	-4.0	-	Vdc
Collector Cutoff Current	V_{CE}=-60Vdc, IB=0	I_{CES}	-	-0.1	μAdc
Collector Cutoff current FMBTA55-Q1 FMBTA56-Q1	V_{CB} = -60Vdc, I_E = 0 V_{CB} = -80Vdc, I_E = 0	I_{CBO}	- -	-0.1 -0.1	μAdc

On Characteristics

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

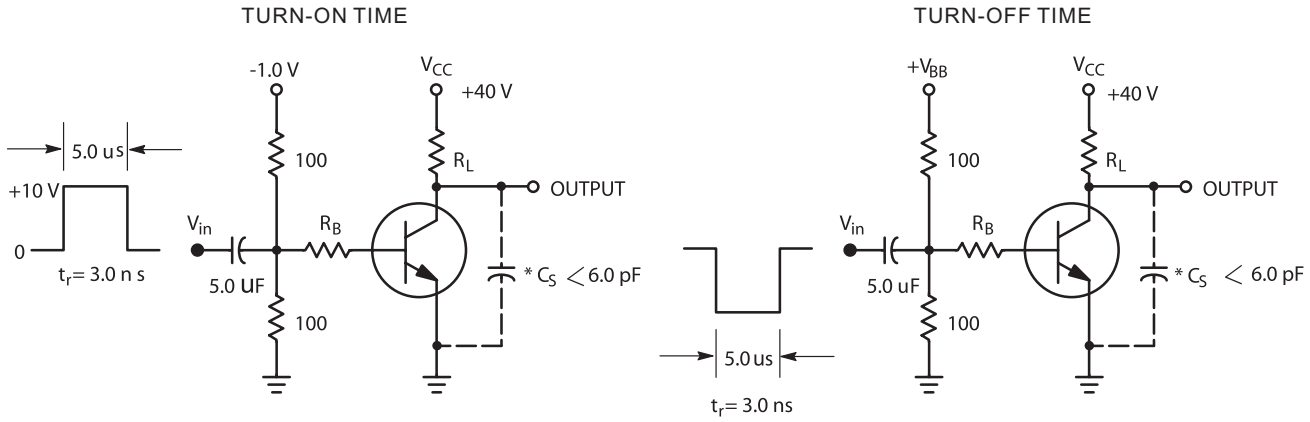
Small Signal Characteristics

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

3. Pulse test: pulse width <=300μs, duty cycle<=2.0%
4. f_T is defined as the frequency at which $|h_{fe}|$ extrapolates to unity.

Rating and characteristic curves (FMBTA55-Q1/FMBTA56-Q1)

FIG.1 Switching Time Test Circuits



*Total Shunt Capacitance of Test Jig and Connectors
For PNP Test Circuits, Reverse All Voltage Polarities

FIG.2 Current-Gain Bandwidth Product

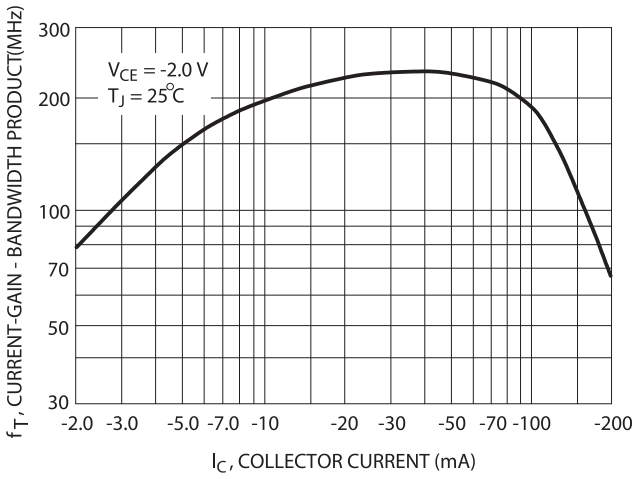


FIG.3 Capacitance

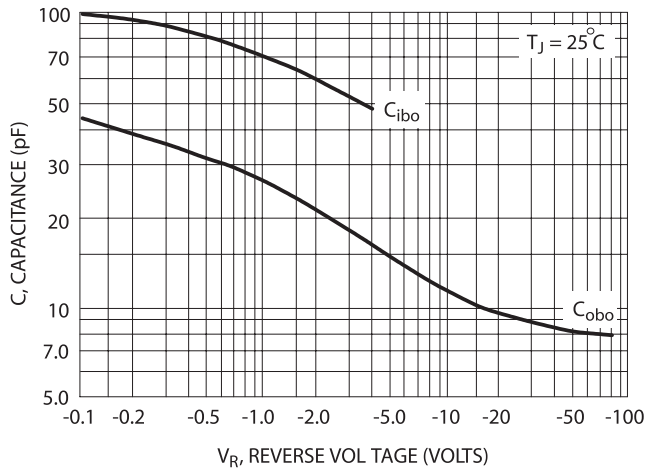


FIG.4 Switching Time

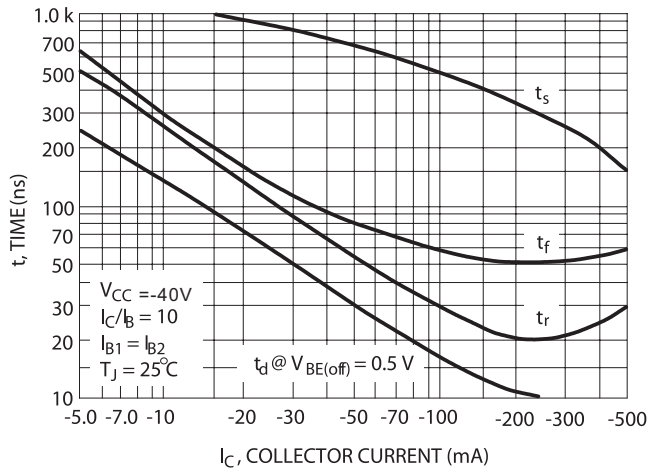
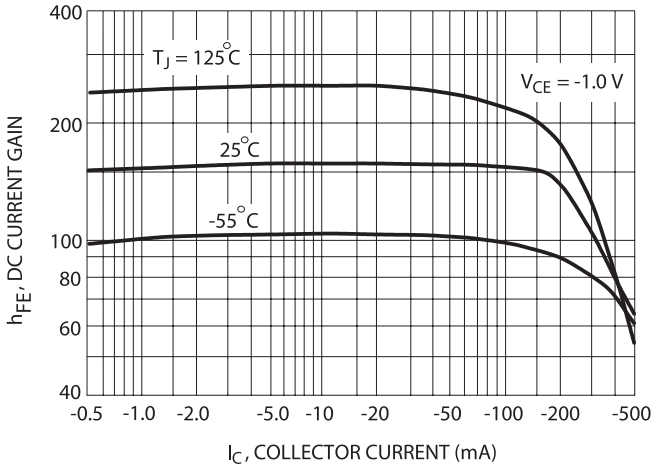


FIG.5 DC Current Gain



Rating and characteristic curves (FMBTA55-Q1/FMBTA56-Q1)

FIG.6 "On" Voltage

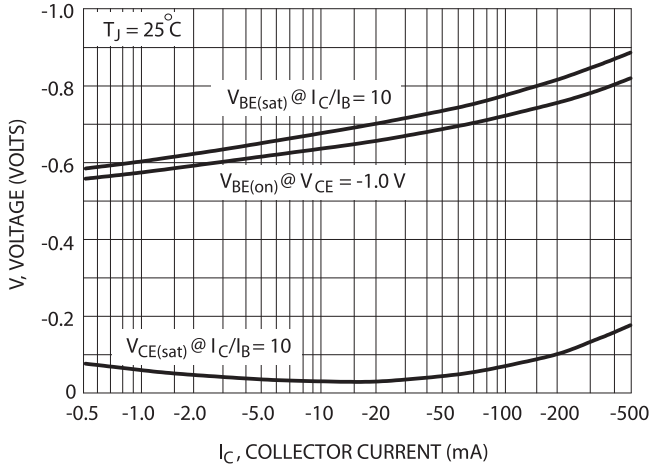


FIG.7 Collectpr Saturation Region

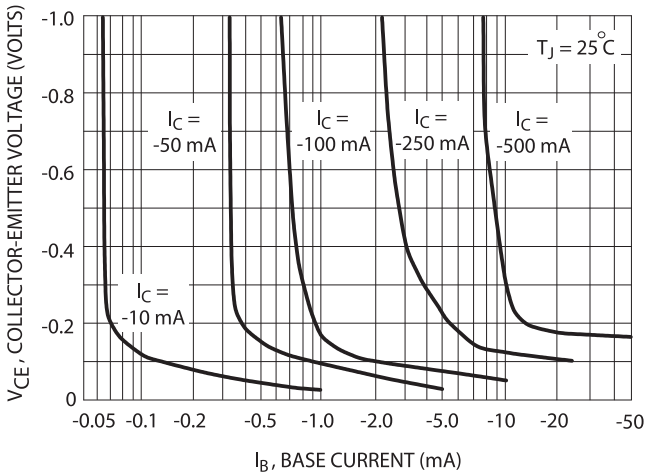
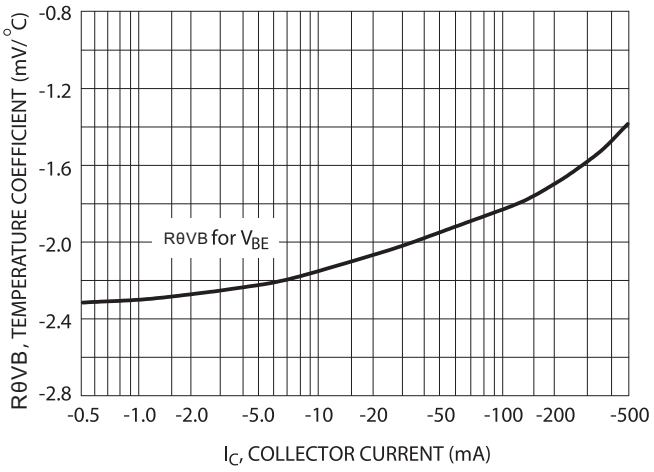
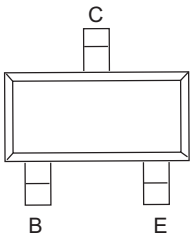
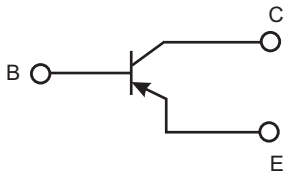


FIG.8 Base-Emitter Temperature Coefficient



FMBTA55-Q1 / FMBTA56-Q1

Pinning information

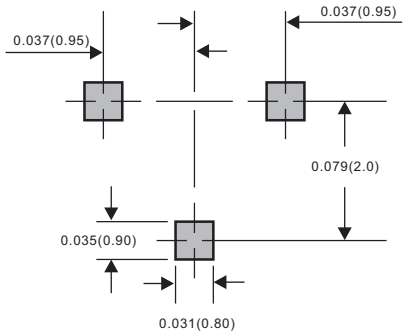
Pin	Simplified outline	Symbol
PinB Base PinC Collector PinE Emitter		

Marking

Type number	Marking code
FMBTA55-Q1	2H
FMBTA56-Q1	2GM

Suggested solder pad layout

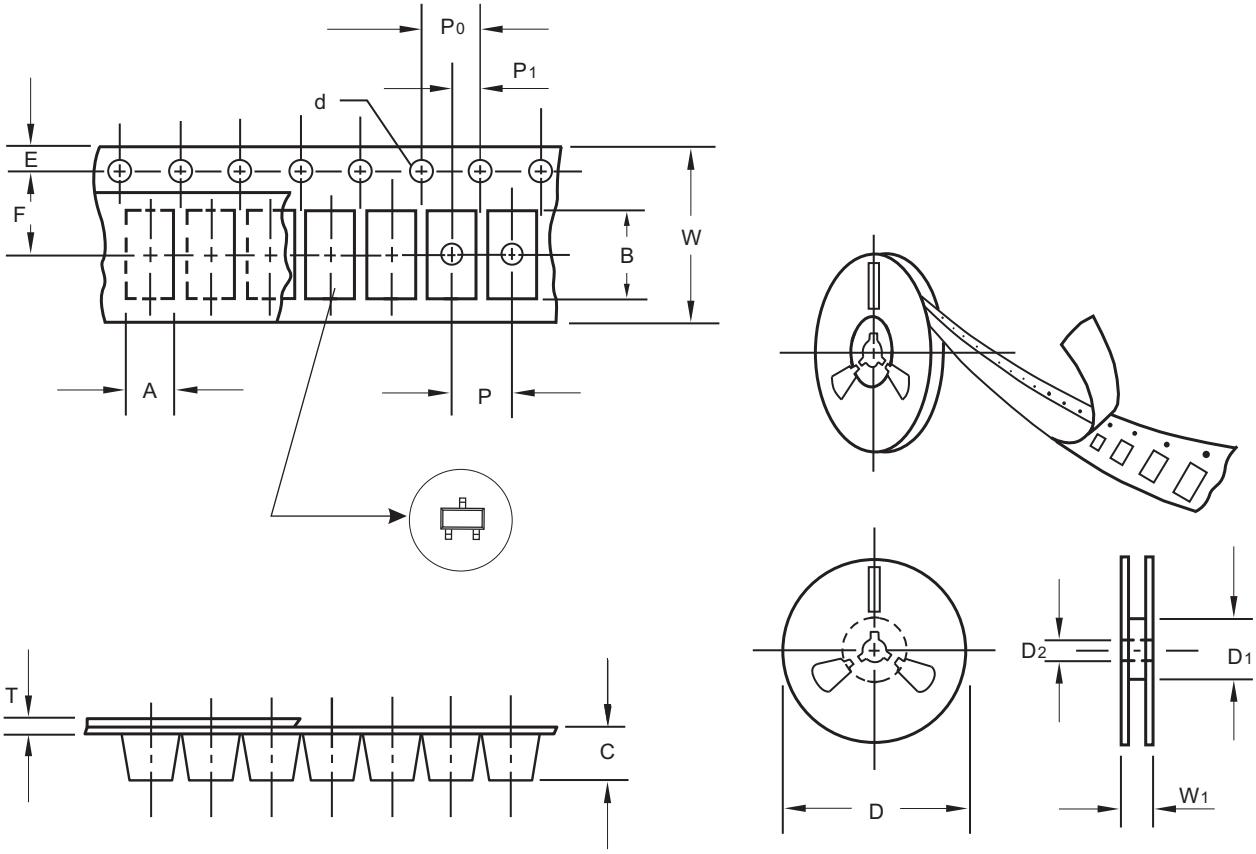
SOT-23



Dimensions in inches and (millimeters)

FMBTA55-Q1 / FMBTA56-Q1

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	D_1	min	-
7" Reel outside diameter	D	2.0	178.00
7" Reel inner diameter	D_1	min	55.00
Feed hole diameter	D_2	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	P_0	0.1	4.00
Embossment center	P_1	0.1	2.00
Overall tape thickness	T	0.1	0.23
Tape width	W	0.3	8.00
Reel width	W_1	1.0	12.0

Note:Devices are packed in accor dance with EIA standar RS-481-A and specifications listed above.

FMBTA55-Q1 / FMBTA56-Q1

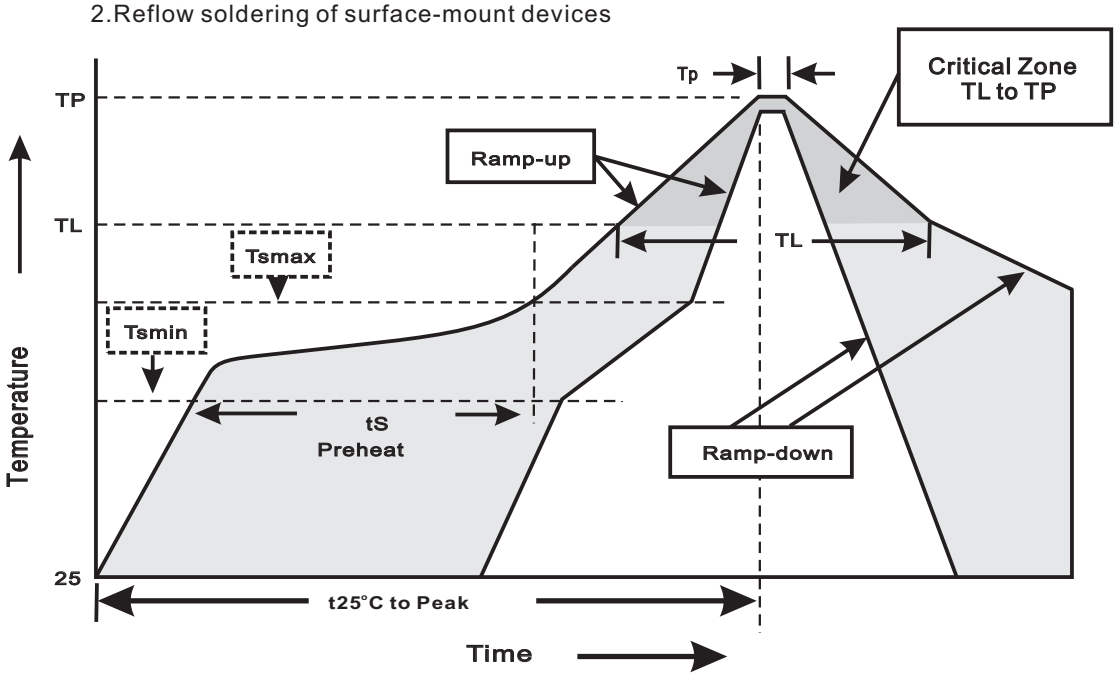
Reel packing

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(Tsmin) -Temperature Max(Tsmax) -Time(min to max)(t_s)	 150°C 200°C 60~120sec
Tsmax 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-Q1 / FMBTA56-Q1

High reliability test capabilities

Item Test	Conditions	Reference
1. MSL Preconditioning	24hr bake@125℃+168hrs@85℃ /85%RH+3xIR@260℃+1flux immersion+alcohol+DI H2O rinse	JESD22-A113
2. Intermittent Operating Life	Ta=25?, △Tj≥100? On/Off=2min Test Duration:1000hrs	MIL-STD-750E METHOD 1037
3. High Temperature Reverse Bias	V_{CE}=80%B_{VCEO} (Tj=150℃)Test Duration:1000hrs	JESD22-A108
4. High Temperature Storage Life	Ta=125℃ Test Duration: 1000hrs	JESD22 A-103
5. Temperature Cycle	-55℃（15min） to 150℃（15min）Test Cycles: 1000cycles	JESD22 A-104
6. Autoclave	P=2atm Ta=121℃ RH=100% Test Duration:96hrs	JESD22 A-102
7. Solderability	245±5℃ for 5sec	J-STD-002
8. Moisture Resistance	Ta=85℃/85% Relative humidity Test Duration:1000hrs	MIL-STD-750E METHOD 1021.2
9. Resistance To Solder Heat	260±5℃ for 10sec	JESD22 B-106
10. High Temperature High Humidity Reverse Bias	Ta=85℃, 85%RH, V_{CE}=80%B_{VCEO} Test Duration:1000hrs	JESD22-A101