

FMBT2222ADW1-Q1

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FMBT2222ADW1-Q1

**600mA 40V General Purpose
Transistor Dual NPN Silicon**

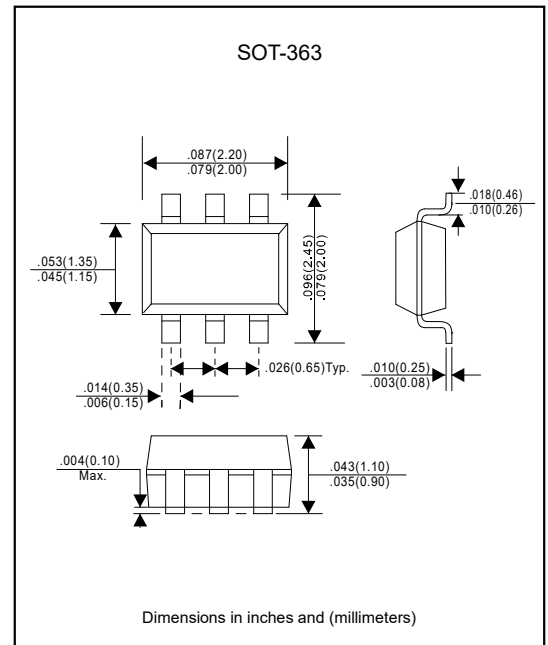
Features

- Qualified to AEC-Q101 standards for high reliability.
- Lead-free parts meet RoHS requirements.
- Suffix "-H" indicates Halogen-free part, ex.FMBT2222ADW1-Q1-H

Mechanical data

- Epoxy:UL94-V0 rated flame retardant.
- Case : Molded plastic, SOT-363.
- Terminals : Solder plated, solderable per MIL-STD-750, Method 2026.
- Mounting Position : Any.

Package outline



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

Parameter	Symbol	Ratings	Units
Collector-base voltage	V_{CBO}	75	V
Collector-emitter voltage	V_{CEO}	40	V
Emitter-base voltage	V_{EBO}	6	V
Collector current - continuous	I_C	600	mA
Collector power dissipation	P_C	200	mW
Operating junction temperature	T_J	+150	$^{\circ}\text{C}$
Storage temperature range	T_{STG}	-55 to +150	$^{\circ}\text{C}$

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Electrical characteristics (At $T_A=25^{\circ}\text{C}$ unless otherwise noted)

Parameter	Conditions	Symbol	Min	Typ	Max	Units
Off characteristics						
Collector-base voltage	$I_C=10\mu\text{A}$, $I_E=0$	$V_{(BR)CBO}$	75			V
Collector-emitter voltage	$I_C=10\text{mA}$, $I_B=0$	$V_{(BR)CEO}$	40			V
Emitter-base voltage	$I_E=10\mu\text{A}$, $I_C=0$	$V_{(BR)EBO}$	6			V
Collector cut-off current	$V_{CB}=60\text{V}$, $I_E=0$	I_{CBO}			10	nA
Collector cut-off current	$V_{CE}=60\text{V}$, $V_{EB(OFF)}=3\text{V}$	I_{CEX}			10	nA
Emitter cut-off current	$V_{EB}=3\text{V}$, $I_C=0$	I_{EBO}			10	nA

On characteristics

DC current gain	$I_C=0.1\text{mA}$, $V_{CE}=10\text{V}$	h_{FE}	35			
	$I_C=1\text{mA}$, $V_{CE}=10\text{V}$		50			
	$I_C=10\text{mA}$, $V_{CE}=10\text{V}$		75			
	$I_C=150\text{mA}$, $V_{CE}=10\text{V}$		100		300	
	$I_C=500\text{mA}$, $V_{CE}=10\text{V}$		40			
	$I_C=150\text{mA}$, $V_{CE}=1\text{V}$		35			
Collector-emitter saturation voltage	$I_C=150\text{mA}$, $I_B=15\text{mA}$	$V_{CE(SAT)}$			0.3	V
	$I_C=500\text{mA}$, $I_B=50\text{mA}$				1	
Base-emitter saturation voltage	$I_C=150\text{mA}$, $I_B=15\text{mA}$	$V_{BE(SAT)}$	0.6		1.2	V
	$I_C=500\text{mA}$, $I_B=50\text{mA}$				2	

Small-signal characteristics

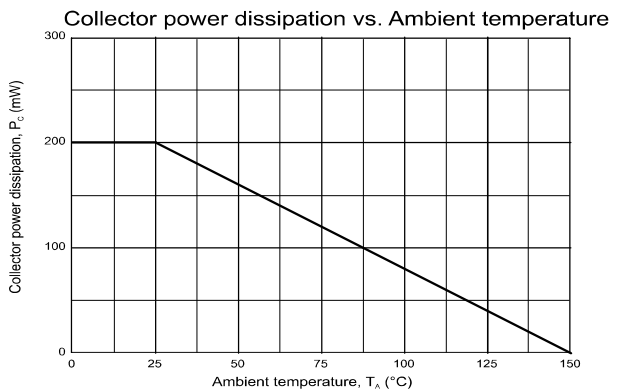
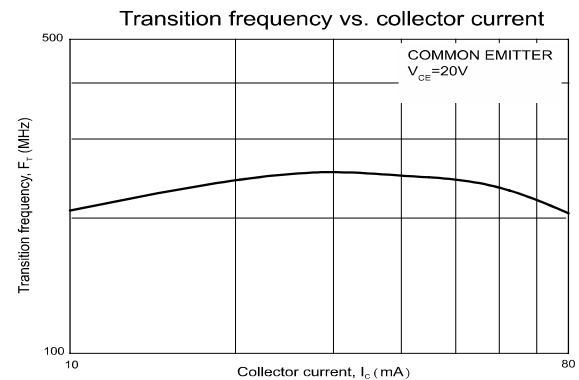
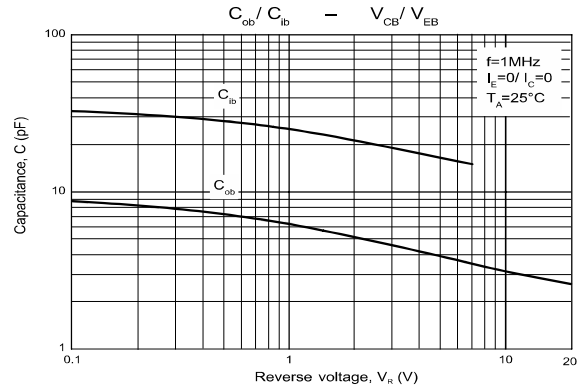
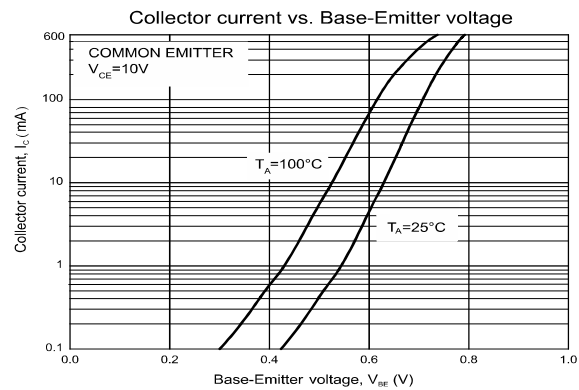
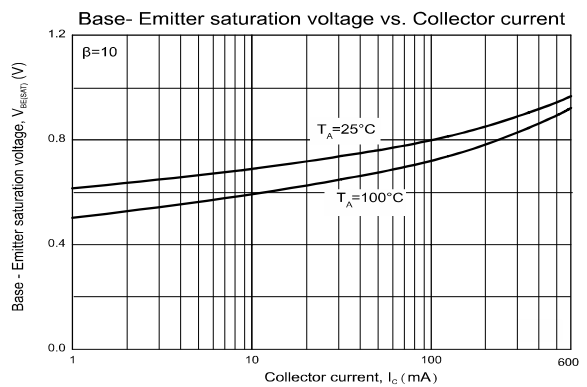
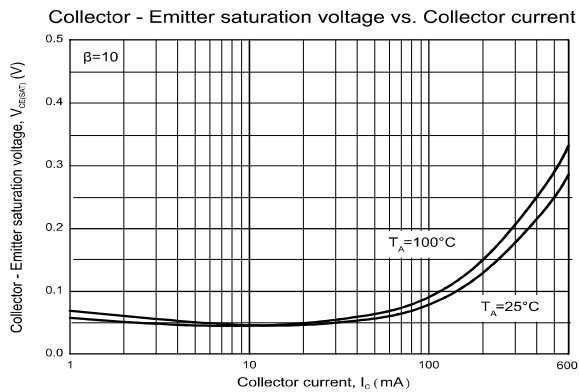
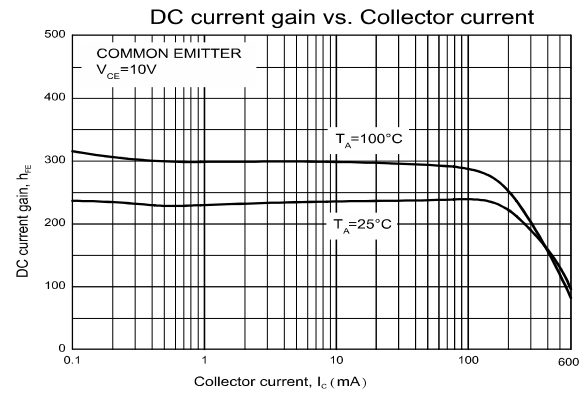
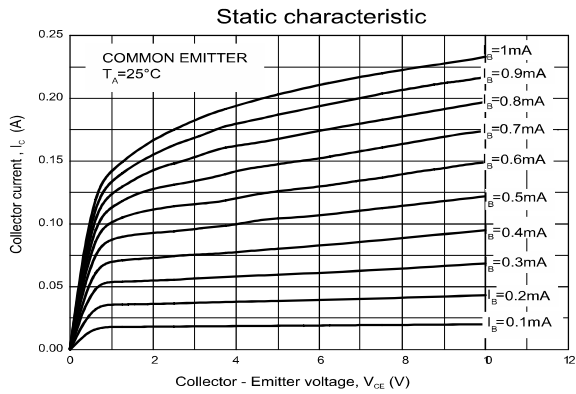
Transition frequency	$V_{CE}=20\text{V}$, $I_C=20\text{mA}$, $f=100\text{MHz}$	f_T	300			MHZ
Output capacitance	$V_{CB}=10\text{V}$, $I_E=0\text{A}$, $f=1.0\text{MHz}$	C_{ob}			8	pF
Input capacitance	$V_{EB}=0.5\text{V}$, $I_C=0\text{A}$, $f=1.0\text{MHz}$	C_{ib}			25	pF
Noise figure	$V_{CE}=10\text{V}$, $I_C=100\mu\text{A}$, $f=1\text{KHz}$, $R_s=1\text{K}\Omega$	NF			4	dB

Switching characteristics

Delay time	$V_{CC}=30\text{V}$, $I_C=150\text{mA}$, $V_{BE(OFF)}=0.5\text{V}$, $I_{B1}=15\text{mA}$	t_d			10	nS
Rise time		t_r			25	nS
Storage time	$V_{CC}=30\text{V}$, $I_C=150\text{mA}$, $I_{B1}=I_{B2}=15\text{mA}$	t_s			225	nS
Fall time		t_f			60	nS

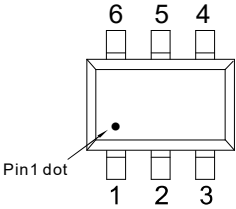
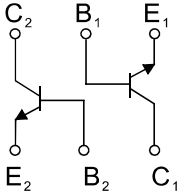
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Rating and characteristic curves



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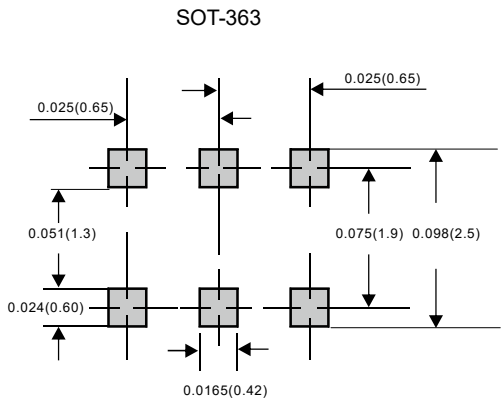
Pinning information

Pin	Simplified outline	Symbol
Pin1 Emitter2 Pin2 Base2 Pin3 Collector1 Pin4 Emitter1 Pin5 Base1 Pin6 Collector2		

Marking

Type number	Marking code
FMBT2222ADW1-Q1	K1P

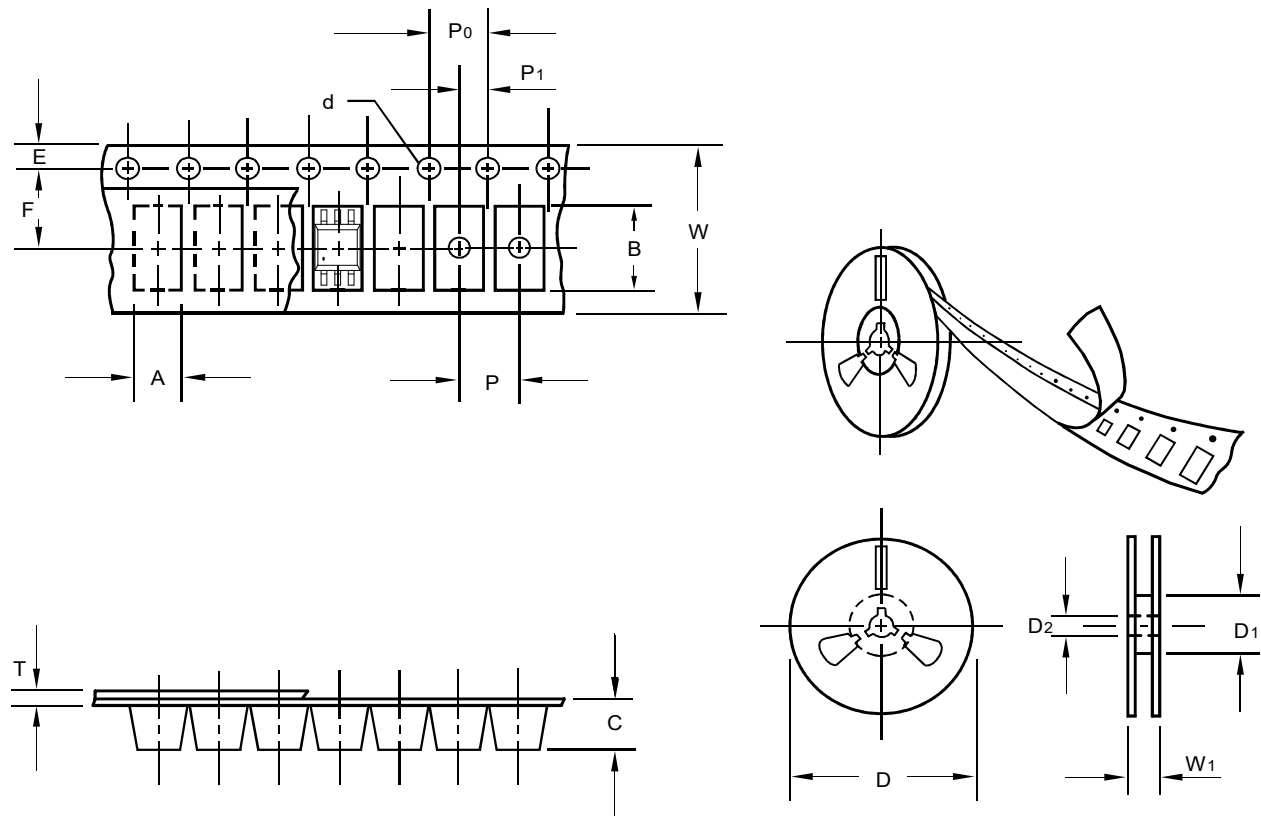
Suggested solder pad layout



Dimensions in inches and (millimeters)

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Packing information



unit:mm

Item	Symbol	Tolerance	SOT-363
Carrier width	A	0.1	2.25
Carrier length	B	0.1	2.55
Carrier depth	C	0.1	1.20
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	62.00
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	11.40

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

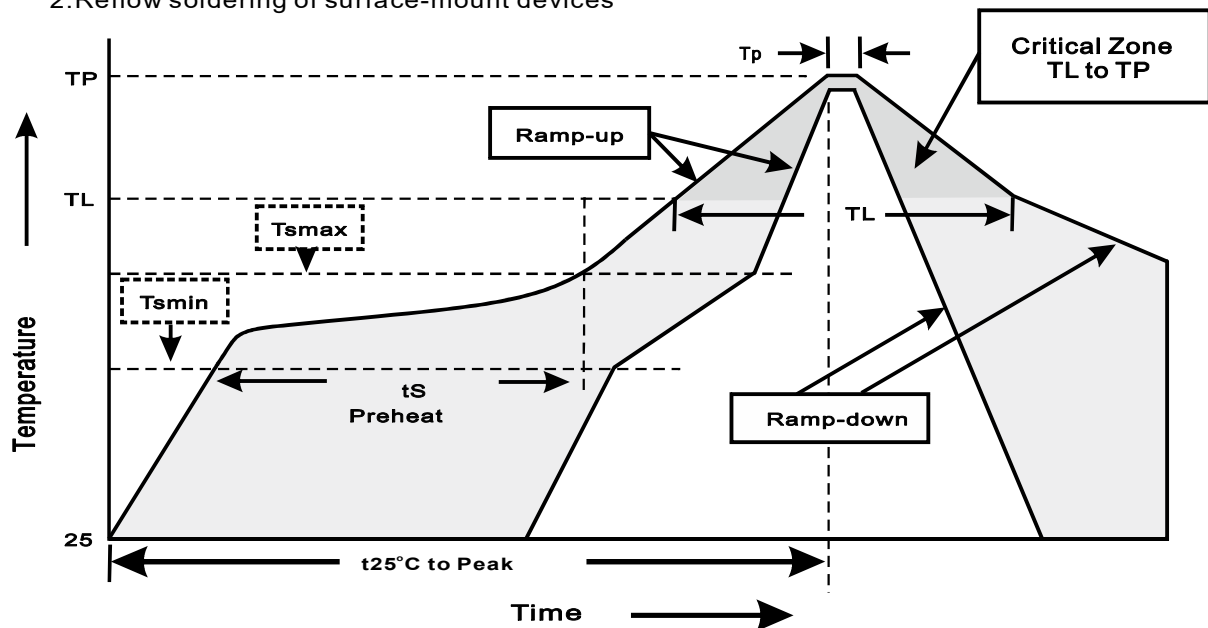
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Reel packing

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)
SOT-363	7"	3,000	4.0	30,000	183*123*183	178	382*257*387	240,000

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)	$<3^{\circ}\text{C}/\text{sec}$
Preheat - Temperature Min(T_{smin}) - Temperature Max(T_{smax}) - Time(min to max)(t_s)	150°C 200°C 60~120sec
T_{smax} to T_L - Ramp-upRate	$<3^{\circ}\text{C}/\text{sec}$
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	$<6^{\circ}\text{C}/\text{sec}$
Time 25°C to Peak Temperature	$<6\text{minutes}$

FMBT2222ADW1-Q1**High reliability test capabilities**

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