TOSHIBA Transistor Silicon NPN Epitaxial Planar Type

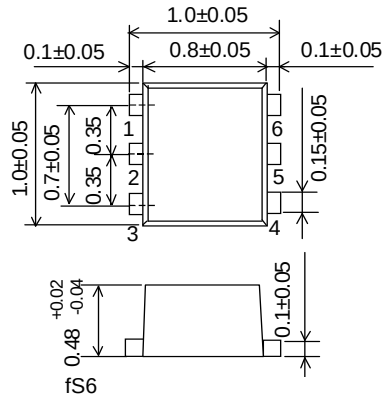
MT6L78FS

VHF~UHF Band Low-Noise Amplifier Applications

Two devices are incorporated in a fine-pitch, small-mold package (6 pins): fS6.

- Superior noise characteristics
- Superior performance in buffer and oscillator applications

Unit: mm



1. Collector1 (C1)
2. Emitter1 (E1)
3. Collector2 (C2)
4. Base2 (B2)
5. Emitter2 (E2)
6. Base1 (B1)

JEDEC	―
JEITA	
TOSHIBA	2-1F1A

Weight: 0.001g (typ.)

Mounted Devices

	Q1	Q2
Corresponding three-pin products: fSM mold products	MT3S11FS	MT3S11AFS

Absolute Maximum Ratings (Ta = 25°C)

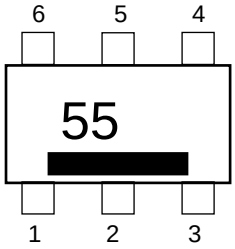
Characteristic	Symbol	Rating		Unit
		Q1	Q2	
Collector-base voltage	V_{CBO}	13	13	V
Collector-emitter voltage	V_{CEO}	6	6	V
Emitter-base voltage	V_{EBO}	1	1	V
Collector current	I_C	40	40	mA
Base current	I_B	10	10	mA
Collector power dissipation	P_C (Note 1)	100	90	mW
		105 (Note 2)		
Junction temperature	T_j	125		°C
Storage temperature range	T_{stg}	−55~125		°C

Note: Using continuously under heavy loads (e.g. the application of high temperature/current/voltage and the significant change in temperature, etc.) may cause this product to decrease in the reliability significantly even if the operating conditions (i.e. operating temperature/current/voltage, etc.) are within the absolute maximum ratings.
Please design the appropriate reliability upon reviewing the Toshiba Semiconductor Reliability Handbook (“Handling Precautions”/“Derating Concept and Methods”) and individual reliability data (i.e. reliability test report and estimated failure rate, etc).

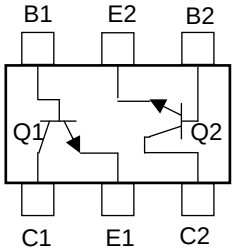
Note 1: 10 mm^2 × 1.0 mm (t), mounted on a glass-epoxy printed circuit board.

Note 2: During two-element operation.

Marking (top view)



Pin Assignment (top view)



Electrical Characteristics Q1 (Ta = 25°C)

Characteristic	Symbol	Condition	Min	Typ.	Max	Unit
Collector cutoff current	I_{CBO}	V_{CB} = 5 V, I_E = 0	—	—	0.1	μA
Emitter cutoff current	I_{EBO}	V_{EB} = 1 V, I_C = 0	—	—	1	μA
DC current gain	h_{FE}	V_{CE} = 1V, I_C = 5 mA	100	—	160	—
Reverse transfer capacitance	C_{re}(Note)	V_{CB} = 1 V, I_E = 0, f = 1 MHz	—	0.65	0.9	pF
Transition frequency	f_T	V_{CE} = 1 V, I_C = 5 mA	4	6	—	GHz
Insertion gain	$\|S_{21e}\|^2$ (1)	V_{CE} = 1 V, I_C = 5 mA, f = 2 GHz	—	3.5	—	dB
	$\|S_{21e}\|^2$ (2)	V_{CE} = 3 V, I_C = 20 mA, f = 2 GHz	4	6.5	—	
Noise figure	NF	V_{CE} = 1 V, I_C = 5 mA, f = 2 GHz	—	2.4	3.2	dB

Electrical Characteristics Q2 (Ta = 25°C)

Characteristic	Symbol	Condition	Min	Typ.	Max	Unit
Collector cutoff current	I_{CBO}	V_{CB} = 5 V, I_E = 0	—	—	0.1	μA
Emitter cutoff current	I_{EBO}	V_{EB} = 1 V, I_C = 0	—	—	1	μA
DC current gain	h_{FE}	V_{CE} = 1 V, I_C = 5 mA	100	—	160	—
Reverse transfer capacitance	C_{re}(Note)	V_{CB} = 1 V, I_E = 0, f = 1 MHz	—	0.6	0.85	pF
Transition frequency	f_T	V_{CE} = 1 V, I_C = 5 mA	4	6	—	GHz
Insertion gain	$\|S_{21e}\|^2$ (1)	V_{CE} = 1 V, I_C = 5 mA, f = 2 GHz	—	3.5	—	dB
	$\|S_{21e}\|^2$ (2)	V_{CE} = 3 V, I_C = 20 mA, f = 2 GHz	4	6.5	—	
Noise figure	NF	V_{CE} = 1 V, I_C = 5 mA, f = 2 GHz	—	2.4	3.2	dB

Note: C_{re} is measured with a three-terminal method using a capacitance bridge.

Caution

This device is sensitive to electrostatic discharge. Ensure that tools and equipment are sufficiently grounded before handling. When handling individual devices (which are not yet mounted on a circuit board), ensure that the environment is protected against electrostatic discharge. Operators should wear antistatic clothing, and containers and other objects that come into direct contact with devices should be made of antistatic materials.

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