

TOSHIBA Transistor Silicon NPN Epitaxial Planar Type

## MT6L57AE

### VHF~UHF Band Low Noise Amplifier Applications

- Two devices are built in to the super-thin and extreme super mini (6 pins) package: ES6

### Mounted Devices

	Q1: SSM (TESM)	Q2: SSM (TESM)
Three-pins (SSM/TESM) mold products are corresponded.	MT3S06S (MT3S06T)	MT3S04AS (MT3S04AT)

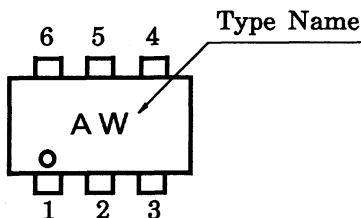
### Absolute Maximum Ratings (Ta = 25°C)

Characteristics	Symbol	Q1	Q2	Unit
Collector-base voltage	V <sub>CBO</sub>	10	10	V
Collector-emitter voltage	V <sub>CEO</sub>	5	5	V
Emitter-base voltage	V <sub>EBO</sub>	1.5	2	V
Collector current	I <sub>C</sub>	15	40	mA
Base current	I <sub>B</sub>	7	10	mA
Collector power dissipation	P <sub>C</sub> (Note 1)	100		mW
Junction temperature	T <sub>j</sub>	125		°C
Storage temperature range	T <sub>stg</sub>	-55~125		°C

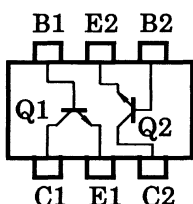
Note: Using continuously under heavy loads (e.g. the application of high temperature/current/voltage and the significant change in temperature, etc.) may cause this product to decrease in the reliability significantly even if the operating conditions (i.e. operating temperature/current/voltage, etc.) 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: Total power dissipation of Q1 and Q2.

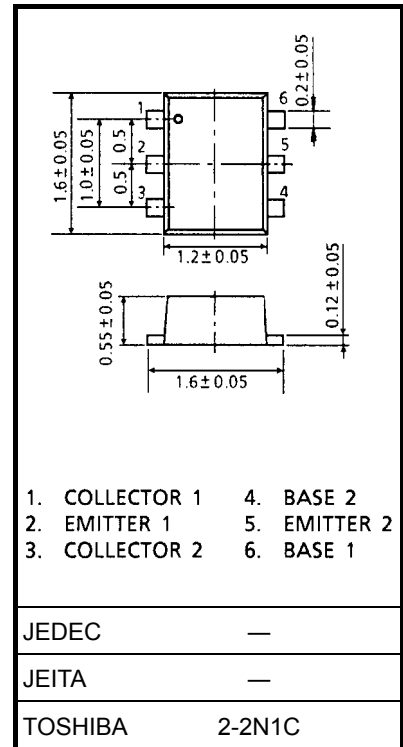
### Marking



### Pin Assignment (top view)



Unit: mm



Weight: 0.003 g (typ.)

## Electrical Characteristics Q1 (Ta = 25°C)

Characteristics	Symbol	Test Condition	Min	Typ.	Max	Unit
Collector cut-off current	$I_{CBO}$	$V_{CB} = 5\text{ V}, I_E = 0$	—	—	0.1	$\mu\text{A}$
Emitter cut-off current	$I_{EBO}$	$V_{EB} = 1\text{ V}, I_C = 0$	—	—	1	$\mu\text{A}$
DC current gain	$h_{FE}$	$V_{CE} = 1\text{ V}, I_C = 5\text{ mA}$	70	—	140	
Transition frequency	$f_T$	$V_{CE} = 3\text{ V}, I_C = 5\text{ mA}$	7	10	—	GHz
Insertion gain	$ S_{21e} ^2 (1)$	$V_{CE} = 1\text{ V}, I_C = 5\text{ mA}, f = 2\text{ GHz}$	—	7.5	—	dB
	$ S_{21e} ^2 (2)$	$V_{CE} = 3\text{ V}, I_C = 7\text{ mA}, f = 2\text{ GHz}$	4.5	8	—	
Noise figure	NF (1)	$V_{CE} = 1\text{ V}, I_C = 3\text{ mA}, f = 2\text{ GHz}$	—	1.7	3	dB
	NF (2)	$V_{CE} = 3\text{ V}, I_C = 3\text{ mA}, f = 2\text{ GHz}$	—	1.6	3	
Reverse transfer capacitance	$C_{re}$	$V_{CB} = 1\text{ V}, I_E = 0, f = 1\text{ MHz}$ (Note 2)	—	0.35	0.75	pF

Note 2:  $C_{re}$  is measured by 3 terminal method with capacitance bridge.

## Electrical Characteristics Q2 (Ta = 25°C)

Characteristics	Symbol	Test Condition	Min	Typ.	Max	Unit
Collector cut-off current	$I_{CBO}$	$V_{CB} = 5\text{ V}, I_E = 0$	—	—	0.1	$\mu\text{A}$
Emitter cut-off current	$I_{EBO}$	$V_{EB} = 1\text{ V}, I_C = 0$	—	—	1	$\mu\text{A}$
DC current gain	$h_{FE}$	$V_{CE} = 1\text{ V}, I_C = 5\text{ mA}$	80	—	160	
Transition frequency	$f_T (1)$	$V_{CE} = 1\text{ V}, I_C = 5\text{ mA}$	2	4.5	—	GHz
	$f_T (2)$	$V_{CE} = 3\text{ V}, I_C = 7\text{ mA}$	5	7	—	
Insertion gain	$ S_{21e} ^2 (1)$	$V_{CE} = 1\text{ V}, I_C = 5\text{ mA}, f = 1\text{ GHz}$	—	8.5	—	dB
	$ S_{21e} ^2 (2)$	$V_{CE} = 3\text{ V}, I_C = 20\text{ mA}, f = 1\text{ GHz}$	7.5	11	—	
Noise figure	NF (1)	$V_{CE} = 1\text{ V}, I_C = 5\text{ mA}, f = 1\text{ GHz}$	—	1.3	2.2	dB
	NF (2)	$V_{CE} = 3\text{ V}, I_C = 7\text{ mA}, f = 1\text{ GHz}$	—	1.2	2	
Reverse transfer capacitance	$C_{re}$	$V_{CB} = 1\text{ V}, I_E = 0, f = 1\text{ MHz}$ (Note 2)	—	0.9	1.25	pF

Note 2:  $C_{re}$  is measured by 3 terminal method with capacitance bridge.

## Handling Precaution

When handling individual devices (which are not yet mounted on a circuit board), be sure that the environment is protected against electrostatic electricity. Operators should wear anti-static clothing, and containers and other objects that come into direct contact with devices should be made of anti-static materials.

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