

**Preliminary**

TOSHIBA Transistor Silicon NPN Epitaxial Planar Type

## MT6L56E

VHF-UHF Band Low Noise Amplifier Application

VHF-UHF Band Oscillator Application

Unit: mm

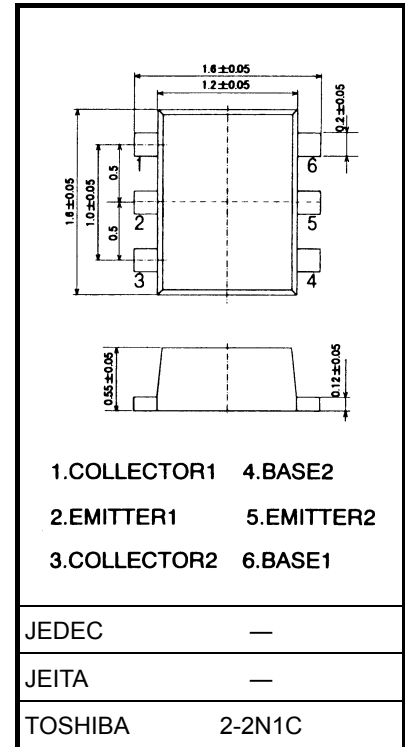
- Two devices are built into the super-thin and ultra-super-mini (6-pin) ES6 package.

### Mounted Devices

	Q1: SSM (TESM)	Q2: TESM
Three-pin (SSM/TESM) product No.	MT3S07S (MT3S07T)	MT3S08T

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

Characteristics	Symbol	Q1	Q2	Unit
Collector-base voltage	V <sub>CB0</sub>	10	20	V
Collector-emitter voltage	V <sub>CEO</sub>	5	8	V
Emitter-base voltage	V <sub>EBO</sub>	1.5	1.5	V
Collector current	I <sub>C</sub>	25	40	mA
Base current	I <sub>B</sub>	7	10	mA
Collector power dissipation	P <sub>C</sub> (Note 1)	150		mW
Junction temperature	T <sub>j</sub>	125		°C
Storage temperature range	T <sub>stg</sub>	-55~125		°C



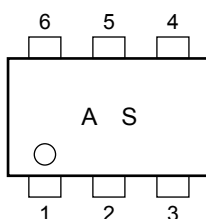
Weight: 3 mg (typ.)

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.

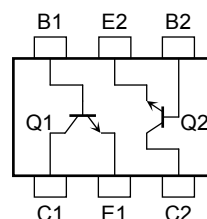
Please design the appropriate reliability upon reviewing the Toshiba Semiconductor Reliability Handbook ("Handling Precautions"/"Derating Concept and Methods") and individual reliability data (i.e. reliability test report and estimated failure rate, etc).

Note 1: Total power dissipation of Q1 and Q2 mounted on the circuit board

### Marking



### Pin Connections



## Electrical Characteristics Q1-Side (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	$f_T$	$V_{CE} = 3\text{ V}, I_C = 10\text{ mA}$	10	12	—	GHz
Insertion gain	$ S_{21e} ^2 (1)$	$V_{CE} = 1\text{ V}, I_C = 5\text{ mA}, f = 2\text{ GHz}$	—	6.5	—	dB
	$ S_{21e} ^2 (2)$	$V_{CE} = 3\text{ V}, I_C = 15\text{ mA}, f = 2\text{ GHz}$	4	7	—	
Noise figure	NF (1)	$V_{CE} = 1\text{ V}, I_C = 5\text{ mA}, f = 2\text{ GHz}$	—	1.6	3	dB
	NF (2)	$V_{CE} = 3\text{ V}, I_C = 5\text{ mA}, f = 2\text{ GHz}$	—	1.5	3	
Reverse transfer capacitance	$C_{re}$	$V_{CB} = 1\text{ V}, I_E = 0, f = 1\text{ MHz}$ (Note 2)	—	0.45	0.85	pF

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

Characteristics	Symbol	Test Condition	Min	Typ.	Max	Unit
Collector cut-off current	$I_{CBO}$	$V_{CB} = 10\text{ V}, I_E = 0$	—	—	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	—	140	—
Transition frequency	$f_T$	$V_{CE} = 1\text{ V}, I_C = 5\text{ mA}$	2	4.5	—	GHz
Insertion gain	$ S_{21e} ^2 (1)$	$V_{CE} = 1\text{ V}, I_C = 5\text{ mA}, f = 1\text{ GHz}$	—	9.5	—	dB
	$ S_{21e} ^2 (2)$	$V_{CE} = 3\text{ V}, I_C = 20\text{ mA}, f = 1\text{ GHz}$	9.5	12.5	—	
Noise figure	NF	$V_{CE} = 1\text{ V}, I_C = 5\text{ mA}, f = 1\text{ GHz}$	—	1.4	2.5	dB
Reverse transfer capacitance	$C_{re}$	$V_{CB} = 1\text{ V}, I_E = 0, f = 1\text{ MHz}$ (Note 2)	—	0.55	0.95	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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