TOSHIBA CMOS Linear Integrated Circuit Silicon Monolithic

# TC75S101F, TC75S101FU, TC75S101FE

Single Operational Amplifier (Input and Output Full Range)

#### **Features**

· Input and Output Full Range

• Low-input offset voltage :  $V_{IO} = 3.0 \text{ mV (max.)}$ 

• Low-input bias current : I<sub>I</sub> = 0.1 pA (typ.)

• Built-in phase-compensated op-amp, obviating the need for any external device

· Ultra-small package

Absolute Maximum Ratings (Ta = 25°C)

Characteristics		Symbol	Rating	Unit	
Supply voltage		V <sub>DD</sub> , V <sub>SS</sub>	6 <	(N)	
Differential input voltage		DV <sub>IN</sub>	±6	У	
Input voltage		V <sub>IN</sub>	V <sub>DD</sub> to V <sub>SS</sub>	V	
Power dissipation	TC75S101F/FU	P <sub>D</sub>	200	mW/	
	TC75S101FE	100		11100	
Operating temperature		T <sub>opr</sub>	-40 to 85	°C	
Storage temperature		T <sub>stg</sub>	-55 to 125	°Ç\	

Product device does not use these for open-loop configuration.

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.

Weight SSOP5-P-0.95 : 14 mg (typ.) SSOP5-P-0.65A : 6.2 mg (typ.) SON5-P-0.50 : 3.0 mg (typ.)

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)

## Operating Conditions

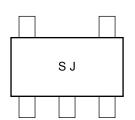
Characteristics	Symbol	Rating	Unit	
Supply voltage	V <sub>DD</sub> , V <sub>SS</sub>	1.5 to 5.5	V	
Supply voltage	VDD, VSS	±0.75 to 2.75	٧	

SSOP5-P-0.95 (SMV)
TC75S101FU

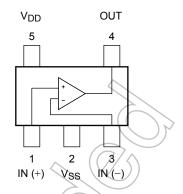
SSOP5-P-0.65A (USV)
TC75S101FE

SON5-P-0.50 (ESV)

#### Marking (top view)



#### Pin Connection (top view)



#### **Electrical Characteristics**

## DC Characteristics ( $V_{DD} = 3.0 \text{ V}$ , $V_{SS} = GND$ , Ta = 25°C)

Characteristics	Symbol	Test Condition	Min	Тур.	Max	Unit
Input offset voltage	V <sub>IO</sub>	$R_S = 1\Omega$ , $R_F = 100 \text{ k}\Omega$	7	1.2	3.0	mV
Input offset current	I <sub>IO</sub>			0.1)	_	pА
Input bias current	lį		( <del>/</del> /\	0.1	_	pА
Common mode input voltage	CMV <sub>IN</sub>	$R_S = 1\Omega$ , $R_F = 100 \text{ k}\Omega$		) —	3.0	٧
Voltage gain (open loop)	GV	_//	40	110	_	dB
Maximum output voltage	Voн	R <sub>L</sub> ≥ 100 kΩ	2.9	_	_	٧
Maximum output voltage	V <sub>OL</sub>	R <sub>L</sub> ≥ 100 kΩ	_	_	0.1	V
Common mode input signal rejection ratio	CMRR	V <sub>IN</sub> = 0.0 to 3.0 V	50	66	_	dB
Supply voltage rejection ratio	SVRR	V <sub>DD</sub> = 1.8 to 6.0 V	65	90	_	dB
Supply current	// JIDD		_	63	90	μΑ
Source current	Isource	(7/4	70	110	_	μΑ
Sink current	Isink		800	1500	_	μΑ

### DC Characteristics ( $V_{DD} = 1.8 \text{ V}$ , $V_{SS} = GND$ , Ta = 25°C)

Characteristics	Symbol	Test Condition	Min	Тур.	Max	Unit
Input offset voltage	Vio	$R_S = 1\Omega$ , $R_F = 100 \text{ k}\Omega$	_	0.9	3.0	mV
Input offset current	NO N	_	_	0.1	_	pА
Input bias current		_	_	0.1	_	pA
Common mode input voltage	CMV <sub>IN</sub>	$R_S = 1\Omega$ , $R_F = 100 \text{ k}\Omega$	0	_	1.8	V
Voltage gain (open loop)	G <sub>V</sub>	_	40	100	_	dB
Maximum output voltage	V <sub>OH</sub>	R <sub>L</sub> ≥ 100 kΩ	1.7	_	_	V
	V <sub>OL</sub>	R <sub>L</sub> ≥ 100 kΩ	_	_	0.1	V
Supply current	I <sub>DD</sub>	_	_	57	80	μΑ
Source current	Isource	_	50	95	_	μΑ
Sink current	Isink	_	700	1450	_	μА

## AC Characteristics ( $V_{DD}$ = 3.0 V, $V_{SS}$ = GND, Ta = 25°C)

Characteristics	Symbol	Test Condition	Min	Тур.	Max	Unit
Slew rate	SR	$A_V = 0 dB$	_	0.15	_	V/μs
Unity gain cross frequency	f <sub>T</sub>	$A_V = 40 \text{ dB}$	-	0.62	_	MHz

### AC Characteristics ( $V_{DD}$ = 1.8 V, $V_{SS}$ = GND, Ta = 25°C)

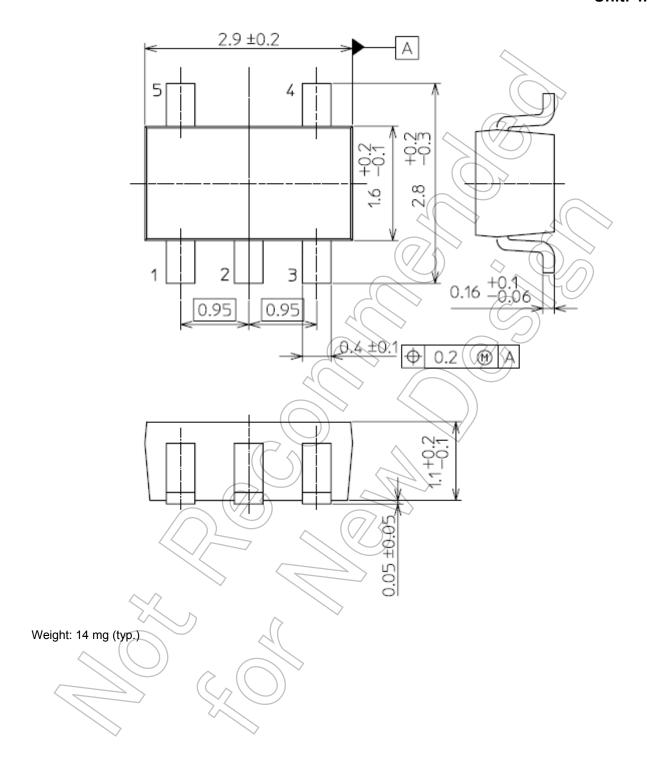
Characteristics	Symbol	Test Condition	Min Typ.	Max	Unit
Slew rate	SR	$A_V = 0 dB$	0.14	_	V/μs
Unity gain cross frequency	f <sub>T</sub>	A <sub>V</sub> = 40 dB	0.55	-	MHz



3 2014-03-01

# Package Dimensions SMV

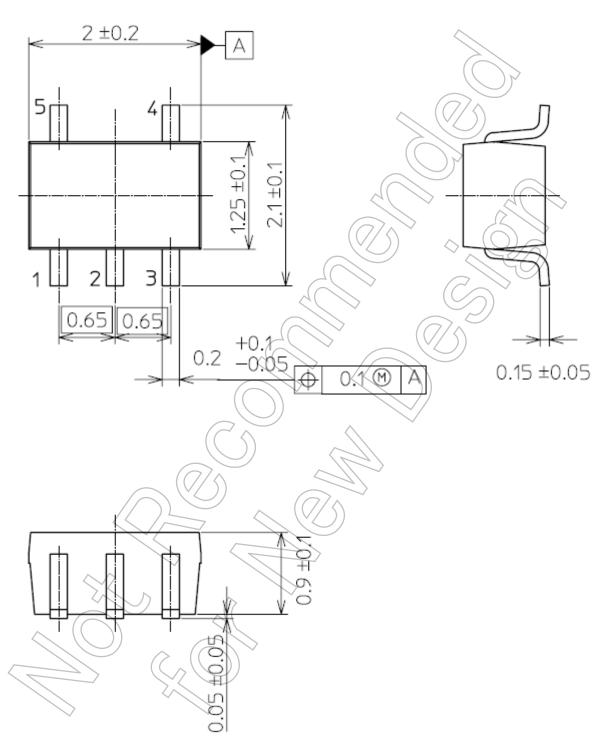
Unit: mm



#### **Package Dimensions**

USV

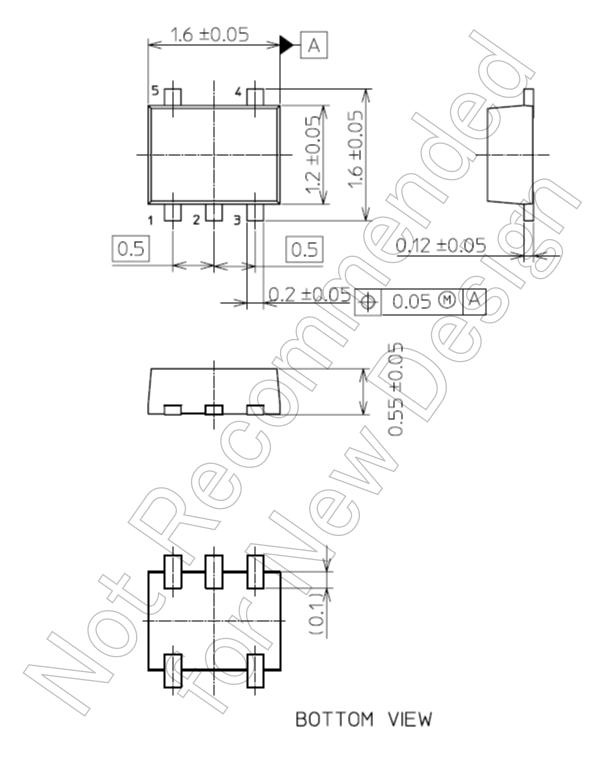
Unit: mm



Weight: 6.2 mg (typ.)

# Package Dimensions ESV

Unit: mm



Weight: 3.0 mg (typ.)

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