

### Radiation Hardened Dual JK Flip Flop

Intersil's Satellite Applications Flow™ (SAF) devices are fully tested and guaranteed to 100kRAD total dose. These QML Class T devices are processed to a standard flow intended to meet the cost and shorter lead-time needs of large volume satellite manufacturers, while maintaining a high level of reliability.

The Intersil HCTS109T is a Radiation Hardened Dual JK Flip Flop with set and reset. The flip flop changes state with the positive transition of the clock (CP1 or CP2).

### Specifications

Specifications for Rad Hard QML devices are controlled by the Defense Supply Center in Columbus (DSCC). The SMD numbers listed below must be used when ordering.

**Detailed Electrical Specifications for the HCTS109T are contained in SMD 5962-95769.** Visit our website at [www.intersil.com/](http://www.intersil.com/)

Intersil's Quality Management Plan (QM Plan), listing all Class T screening operations, is also available on our website.

[www.intersil.com/](http://www.intersil.com/)

### Ordering Information

ORDERING NUMBER	PART NUMBER	TEMP. RANGE (°C)
5962R9576901TEC	HCTS109DTR	-55 to 125
5962R9576901TXC	HCTS109KTR	-55 to 125

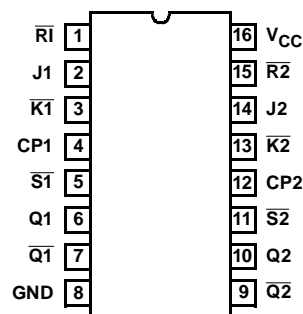
NOTE: **Minimum order quantity for -T is 150 units through distribution, or 450 units direct.**

### Features

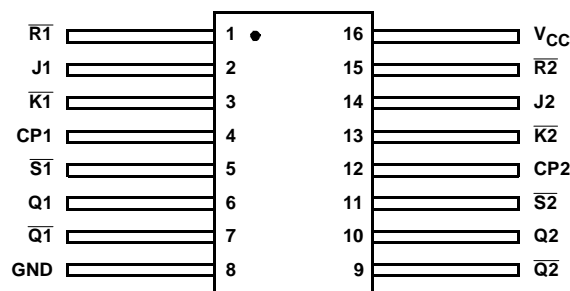
- QML Class T, Per MIL-PRF-38535
- Radiation Performance
  - Gamma Dose ( $\gamma$ )  $1 \times 10^5$  RAD(Si)
  - Latch-Up Free Under Any Conditions
  - SEP Effective LET No Upsets:  $>100$  MEV-cm<sup>2</sup>/mg
  - Single Event Upset (SEU) Immunity  $< 2 \times 10^{-9}$  Errors/Bit-Day (Typ)
- 3 Micron Radiation Hardened SOS CMOS
- Significant Power Reduction Compared to LSTTL ICs
- DC Operating Voltage Range: 4.5V to 5.5V
- LSTTL Input Logic Compatibility
  - $V_{IL} = 0.8V$  Max
  - $V_{IH} = V_{CC}/2$  Min
- Input Current Levels  $I_i \leq 5mA$  at  $V_{OL}, V_{OH}$

### Pinouts

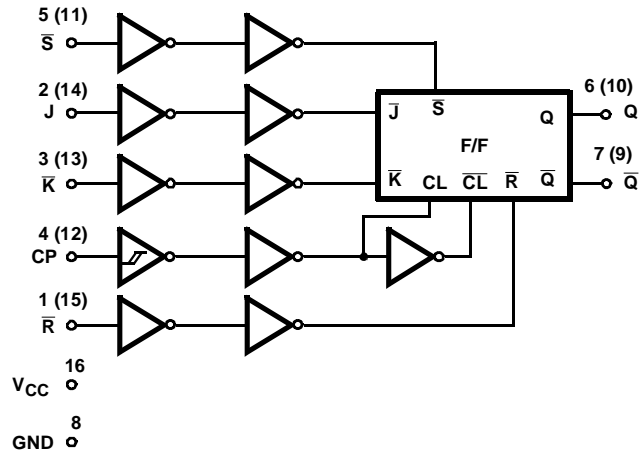
**HCTS109T (SBDIP), CDIP2-T16**  
TOP VIEW



**HCTS109T (FLATPACK), CDFP4-F16**  
TOP VIEW



Functional Diagram



TRUTH TABLE

INPUTS					OUTPUTS	
$\bar{S}$	$\bar{R}$	CP	J	$\bar{K}$	Q	$\bar{Q}$
L	H	X	X	X	H	L
H	L	X	X	X	L	H
L	L	X	X	X	H†	H†
H	H		L	L	L	H
H	H		H	L	Toggle	
H	H		L	H	No Change	
H	H		H	H	H	L
H	H	L	X	X	No Change	

† Unpredictable and unstable condition if both  $\bar{S}$  and  $\bar{R}$  go high simultaneously.

**Die Characteristics**

**DIE DIMENSIONS:**

2261 $\mu$ m x 2235 $\mu$ m x 533 $\mu$ m  $\pm$ 51 $\mu$ m)  
 89 x 88 x 21mils  $\pm$ 2mil

**METALLIZATION:**

Type: Al Si  
 Thickness: 11k $\text{\AA}$   $\pm$ 1k $\text{\AA}$

**SUBSTRATE POTENTIAL:**

Unbiased Silicon on Sapphire

**BACKSIDE FINISH:**

Sapphire

**PASSIVATION:**

Type: Silox (SiO<sub>2</sub>)  
 Thickness: 13k $\text{\AA}$   $\pm$ 2.6k $\text{\AA}$

**WORST CASE CURRENT DENSITY:**

< 2.0e5 A/cm<sup>2</sup>

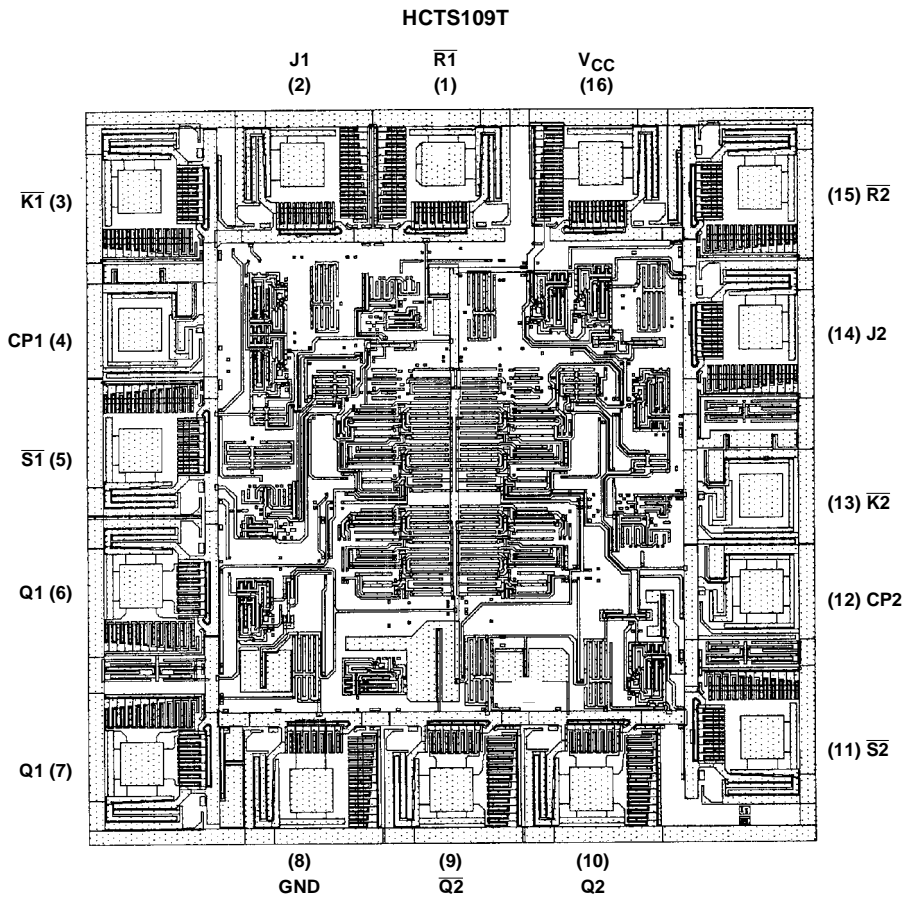
**TRANSISTOR COUNT:**

268

**PROCESS:**

CMOS SOS

**Metallization Mask Layout**



NOTE: The die diagram is a generic plot form a similar HCS device. It is intended to indicate approximate die size and bond pad location. The mask series for the HCTS109 is TA14440A.

All Intersil U.S. products are manufactured, assembled and tested utilizing ISO9000 quality systems.  
 Intersil Corporation's quality certifications can be viewed at [www.intersil.com/design/quality](http://www.intersil.com/design/quality)

*Intersil products are sold by description only. Intersil Corporation reserves the right to make changes in circuit design, software and/or specifications at any time without notice. Accordingly, the reader is cautioned to verify that data sheets are current before placing orders. Information furnished by Intersil is believed to be accurate and reliable. However, no responsibility is assumed by Intersil or its subsidiaries for its use; nor for any infringements of patents or other rights of third parties which may result from its use. No license is granted by implication or otherwise under any patent or patent rights of Intersil or its subsidiaries.*

For information regarding Intersil Corporation and its products, see [www.intersil.com](http://www.intersil.com)