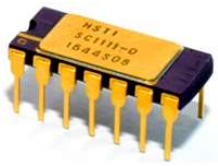
HEX SCHMITT-TRIGGER INVERTER (3.3V)

SC1111-0

(Radiation Tolerant)



DATA SHEET

(Version 1.0, December 2020)

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PRODUCT DESCRIPTION:

SC1111-0 is a Hex inverter with Schmitt trigger action on inputs. Schmitt trigger is a comparator which triggers at different points for positive and negative going signals and the difference between positive voltage (V_T^+) and negative voltage (V_T^-) is the Hysteresis voltage (V_H).

All outputs have equal source and equal sink currents.

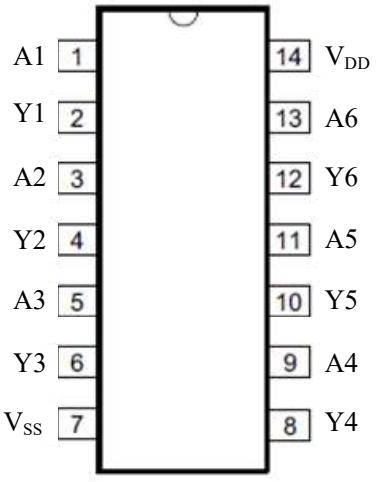
APPLICATIONS:

- Wave and pulse shapers
- High-noise-environment systems
- Monostable multivibrators
- Astable multivibrators
- NOT logic

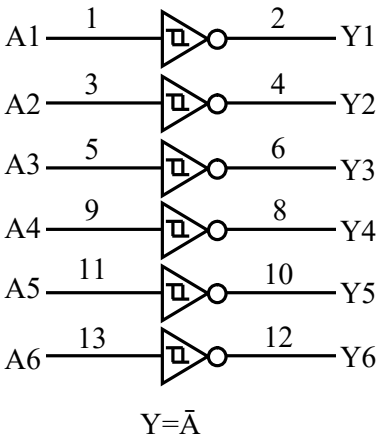
FEATURES:

- **Operating Supply Voltage: 3.3V± 0.3V**
- **Schmitt-trigger on each input with no external components.**
- **No limit on input rise and fall time**
- **Hysteresis voltage V_H = 1.05V (V_{DD}=3.3V)**
- **Operating Temperature: -55ºC to 125ºC**
- **Radiation Tolerant up to 100 KRad**
- **SET / SEL immune up to 50.7 MeV.cm²/mg**
- **14-pin CSOP / 14 pin CDIP / Customized package option / Die**
- **Thermal Resistance (CSOP), Θ_{JC} = 7.47 °C/ W**
- **Pin compatible with SN5414**
- **ESD Sensitivity Level:**
  HBM Class 0 (< 250V)
- **SCL's 180nm CMOS Technology**

DEVICE PIN-OUT & LOGIC DIAGRAM:



Device Pin-Out (SOP/DIP)



Device Logic Diagram

PIN DESCRIPTION:

PIN NUMBER	PIN NAME	DESCRIPTION
1, 3, 5, 9, 11, 13	A1, A2, A3, A4, A5, A6	Input
2, 4, 6, 8, 10, 12	Y1, Y2, Y3, Y4, Y5, Y6	Output
7	V_{SS}	Ground
14	V_{DD}	Supply Voltage

FUNCTIONAL TABLE:

TRUTH TABLE	
INPUT (A1 to A6)	**OUTPUT (Y1 to Y6)**
H	L
L	H

RECOMMENDED OPERATING CONDITIONS:

SYMBOL	PARAMETER	Min	Max	Unit
V_{DD}	Supply Voltage	3.0	3.6	V
V_{IN}	Input Voltage Range	0	V_{DD}	V
I_{OH}	High level output current (Source)	-	-0.8	mA
I_{OL}	Low level output current (Sink)	-	12	mA
T_{AMB}	Operating Ambient Temperature	-55	125	ºC

ABSOLUTE MAXIMUM RATINGS (1):

Over operating free-air temperature range (unless otherwise noted),

Symbol	Parameter	Unit
V_{DD}	Supply Voltage Range	–0.5V to 4.3V
V_{IN}	Input Voltage Range	–0.5V to V_{DD}+0.5V
T_J	Max. Junction Temperature	150°C
T_{stg}	Storage Temperature Range	–65°C to 150°C

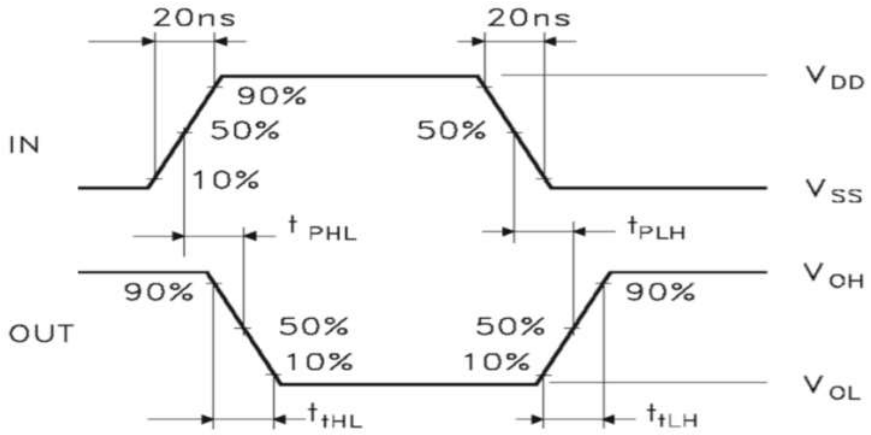
(1) Stresses beyond those listed under *absolute maximum ratings* may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated under *recommended operating conditions* is not implied. Exposure to absolute-maximum-rated conditions for extended periods may affect device reliability.

DC ELECTRICAL CHARACTERISTICS:

Test condition: V_{DD}=3.3 ± 0.3V, V_{SS} = 0V, T_A = -55°C to +125°C (unless otherwise specified)

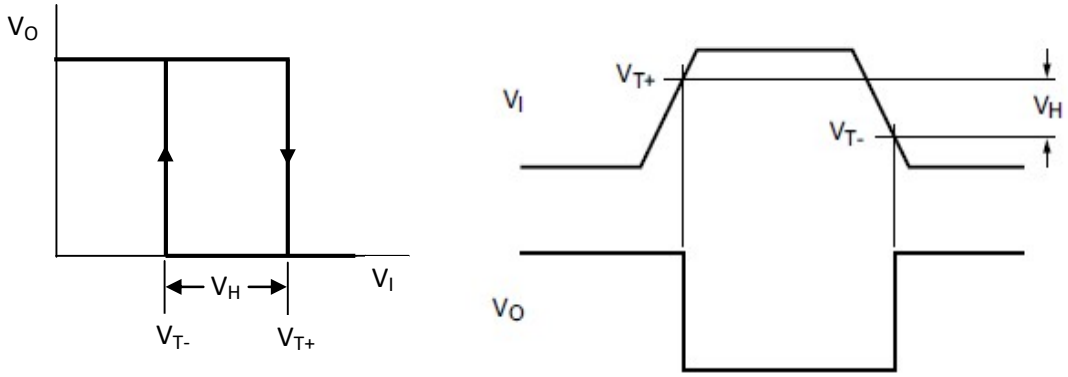
Parameter	Symbol	Test Condition	Test Limits			
			Min.	Typ.	Max.	Unit
Static Supply Current	I_{DDL} Low	$V_{IN} = V_{SS}$	-	0.1	2.0	uA
	I_{DDL} Low	$V_{IN} = V_{DD}$	-	0.1	2.0	uA
Input Gate Leakage Current	I_{IL}	$V_{IN} = V_{SS}$	-	-0.02	-1.0	uA
	I_{IH}	$V_{IN} = V_{DD}$	-	0.02	1.0	uA
Output Voltage Level Low	V_{OL}	V_{DD}=3.3V (No Load)	-	0.02	0.1	V
		V_{DD}=3.3V (I_{OL}= 12 mA)	-	0.3	0.4	V
Output Voltage Level High	V_{OH}	V_{DD}=3.3V (No Load)	3.2	3.27	V_{DD}	V
		V_{DD}=3.3V (I_{OH}= -0.8 mA)	2.9	3.2	V_{DD}	V
Negative Trigger Threshold Voltage	V_{T-}	V_{IN} = V_{RAMP} (0V to V_{DD})	-	0.9	-	V
Positive Trigger Threshold Voltage	V_{T+}	V_{IN} = V_{RAMP} (V_{DD} to 0V)	-	1.9	-	V
Hysteresis Voltage $V_H = (V_{T+}-V_{T-})$	V_H	V_{DD}=3.3V V_{IN1} = V_{RAMP} (0 to V_{DD}) $V_{IN2} = V_{DD}$	0.3	1.05	1.5	V
Propagation Delay Time (Low to High)	t_{PLH}	V_{DD} =3.3V $V_{IN} = V_{SS}$ /V_{DD} C_L=50pf	10	20	50	ns
Propagation Delay Time (High to Low)	t_{PHL}		10	20	50	ns
Functional Test	Functional	V_{IL}=0.2V_{DD}, V_{IH}=0.8V_{DD}	Truth Table Verification At 1 MHz			

SWITCHING WAVEFORM:

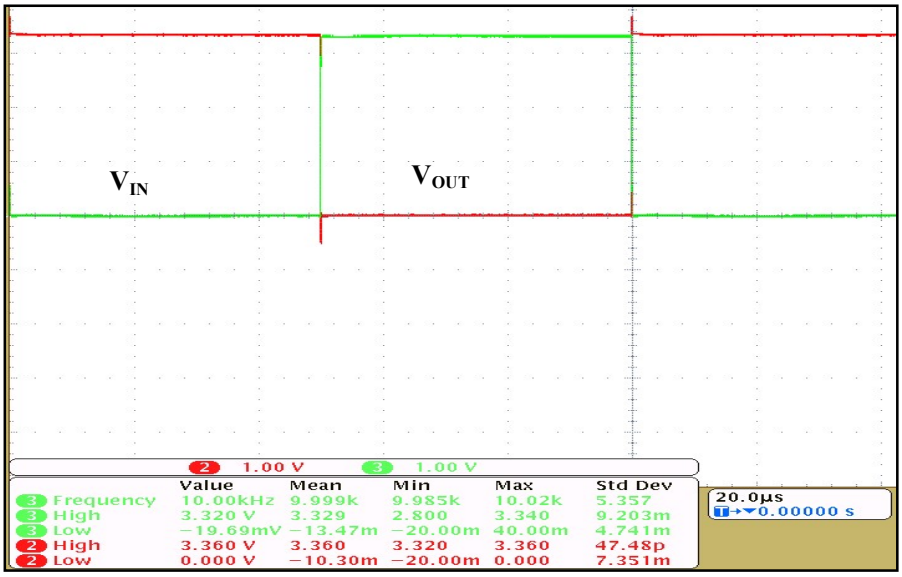


HYSTERESIS CURVE:

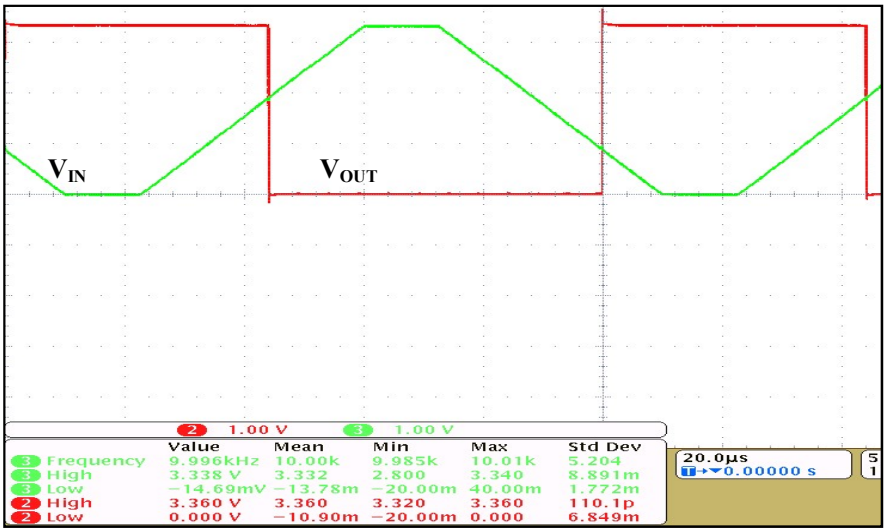
Test Conditions: V_{DD} =3.3V, V_{IN1}=3.3V & V_{IN} =Square wave (20 ns rise / fall time), freq. = 10 KHz, Amplitude = 0V to 3.3V



HYSTERESIS CURVE (WAVEFORM):

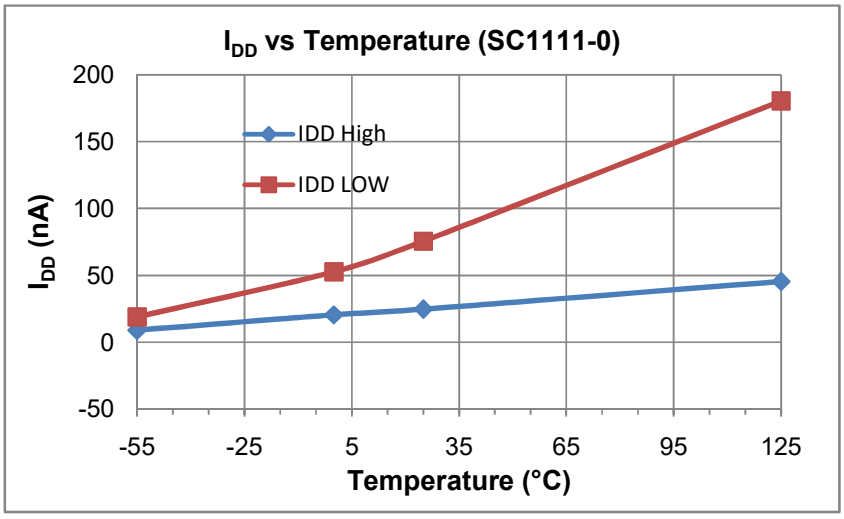


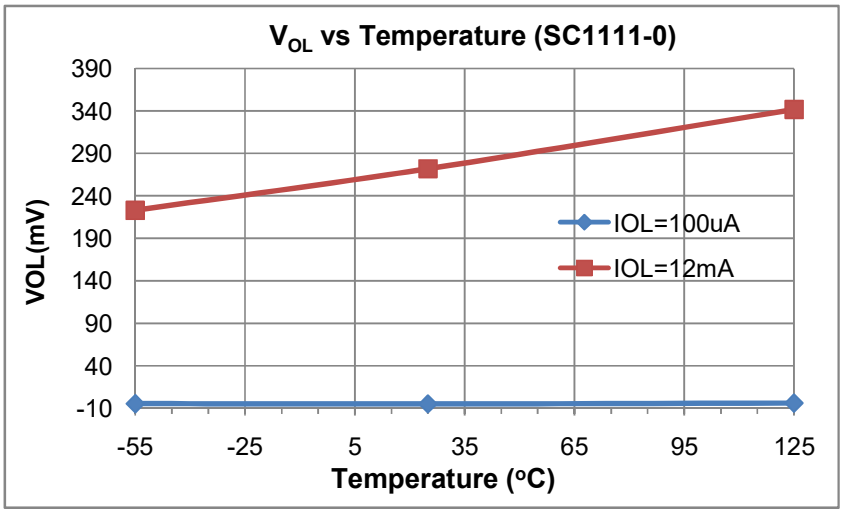
Hysteresis Curve with Square input

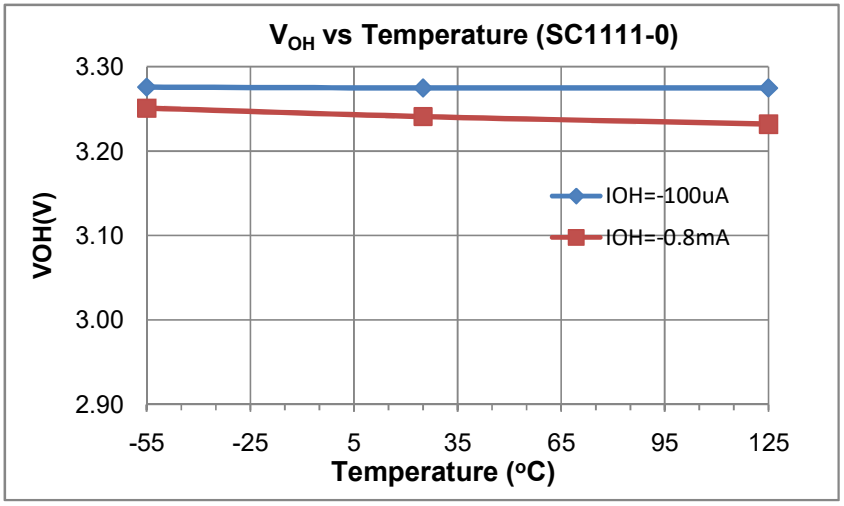


Hysteresis Curve with Ramp input

TEMPERATURE CHARACTERISTICS:



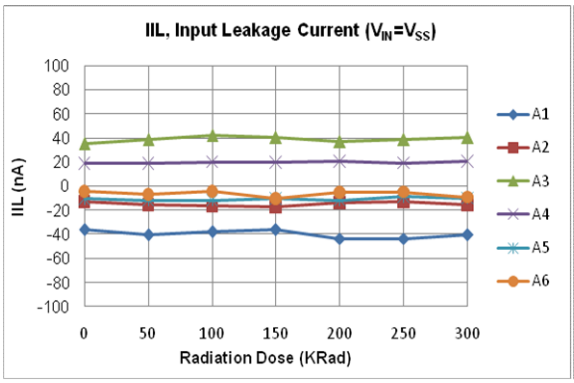


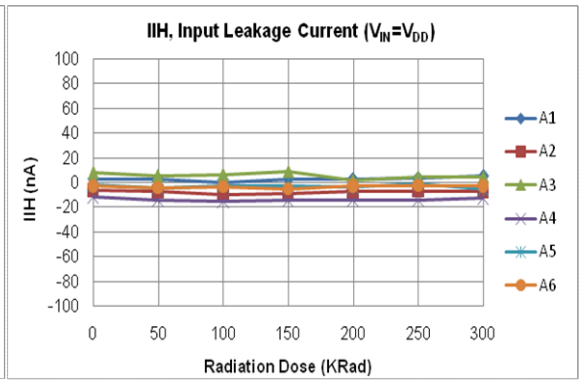


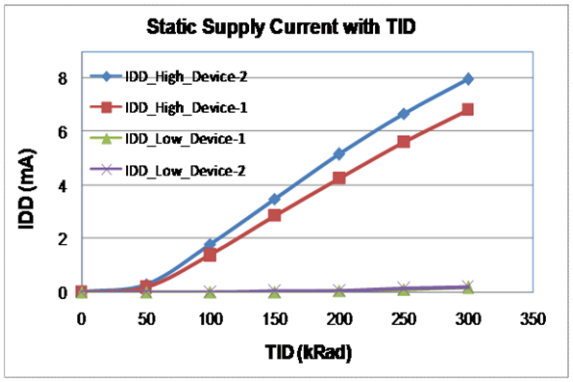
RADIATION CHARACTERISTIC:

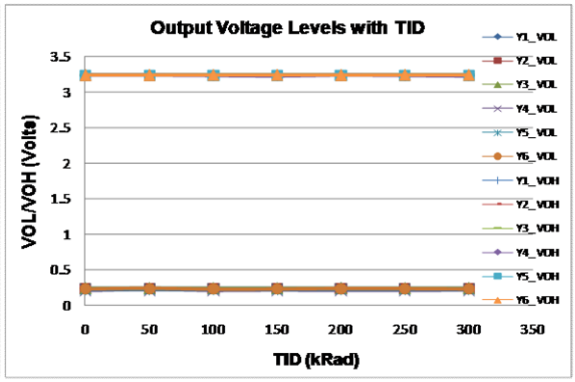
TID (Total Ionizing Dose)

SC1111-0 is tested and characterized between dose rate of 50 and 300 Rad/s (full CMOS technology). TID testing is conducted up to cumulative dose of 300 KRad and no functional failure observed.





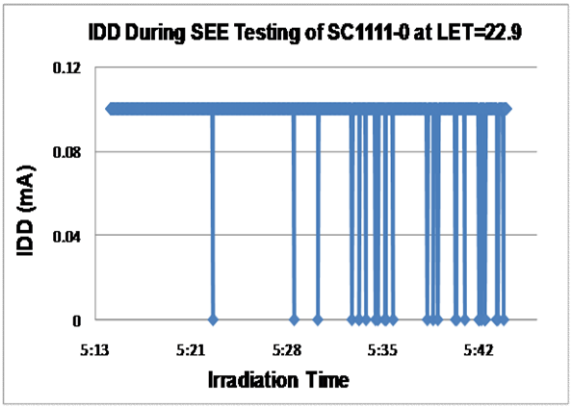


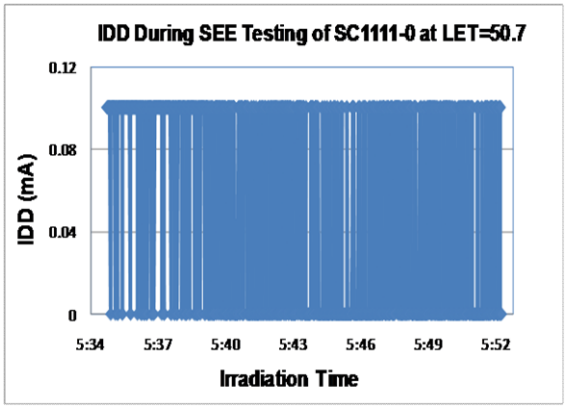


SEE (Single Event Effect, Heavy Ions)

SEE testing of SC1111-0 is performed at LET of 22.9 MeV-cm^2/mg (Ti-48, 10+) and 50.7 MeV-cm^2/mg (Ag-107, 11+) with a fluence of 10^6 ions/cm^2.

Type	Characteristics	Value	Unit
TID	High-dose rate (50 - 300 Rad/sec) up to:	100	KRad
Heavy ions	SEL immune up to:	50.7	MeV-cm^2/mg
	SET immune up to:	50.7	

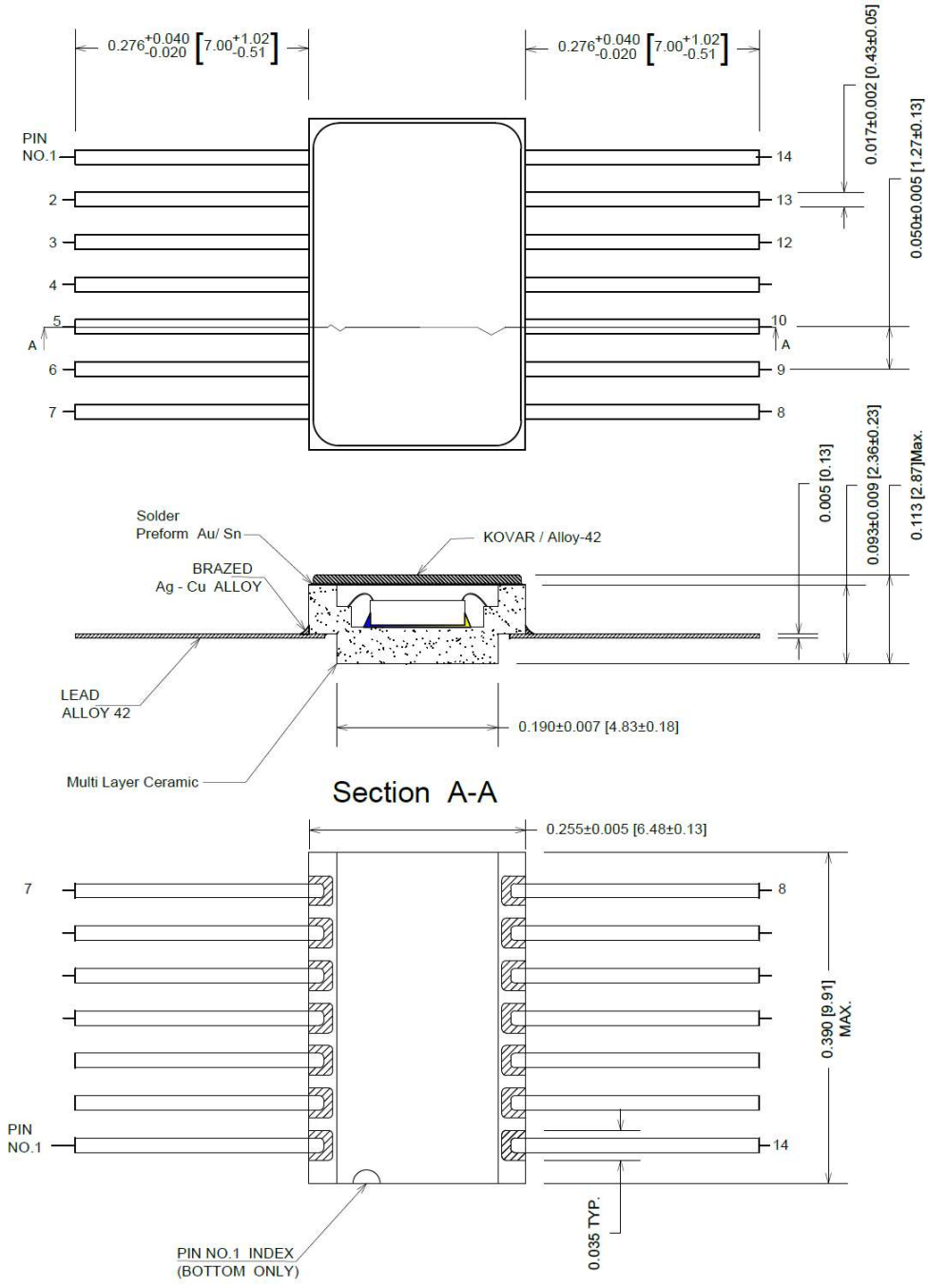




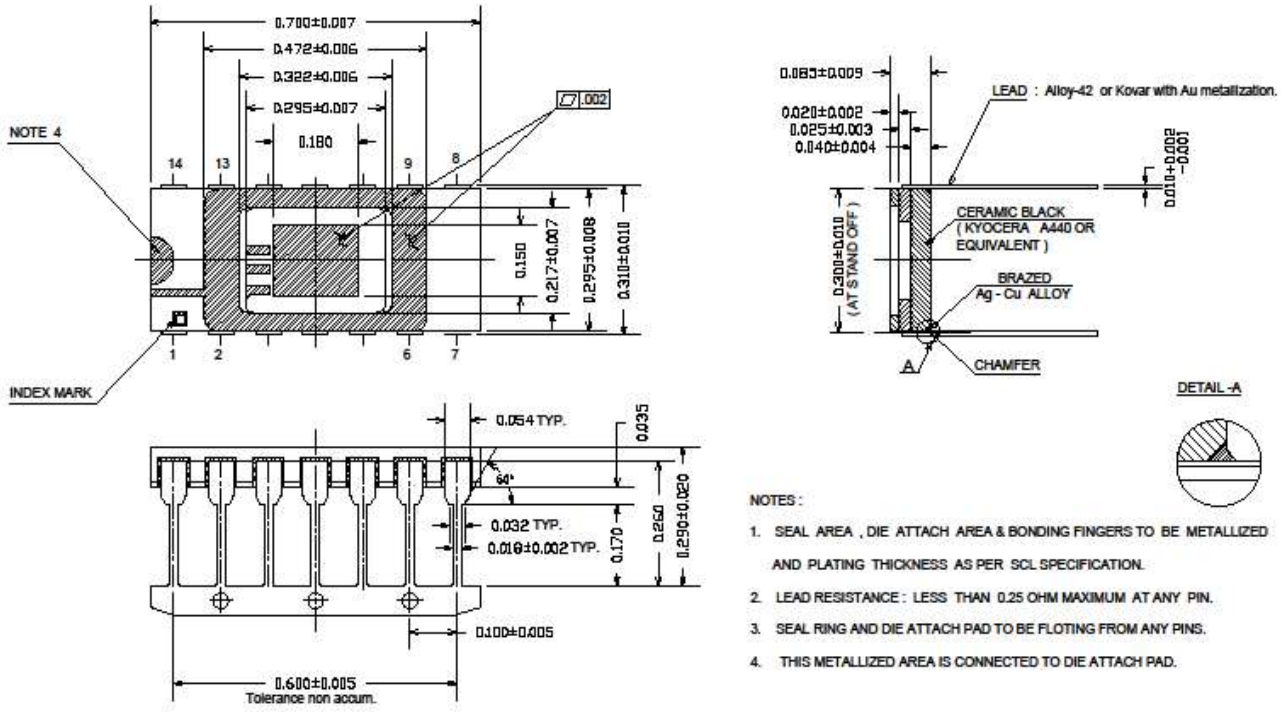
MECHANICAL DRAWING OF PACKAGE

14-Pin Ceramic-Dual-Flat Pack

NOTE: All linear dimensions are in inches (mm.)



MECHANICAL PACKAGE DRAWING: 14 Pin Dual-In-Line



NOTES :

1. SEAL AREA , DIE ATTACH AREA & BONDING FINGERS TO BE METALLIZED AND PLATING THICKNESS AS PER SCL SPECIFICATION.
2. LEAD RESISTANCE : LESS THAN 0.25 OHM MAXIMUM AT ANY PIN.
3. SEAL RING AND DIE ATTACH PAD TO BE FLOTING FROM ANY PINS.
4. THIS METALLIZED AREA IS CONNECTED TO DIE ATTACH PAD.

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