

# ISG510065

## CATV OUT-OF-BAND TUNER



### FEATURES

- 3.3 V SINGLE SUPPLY OPERATION
- LOW POWER CONSUMPTION (400 mW)
- LOW DISTORTION
- 82 dB TOTAL CONVERSION GAIN
- 55 dB TOTAL GAIN CONTROL RANGE
- LOW LO-RF LEAKAGE

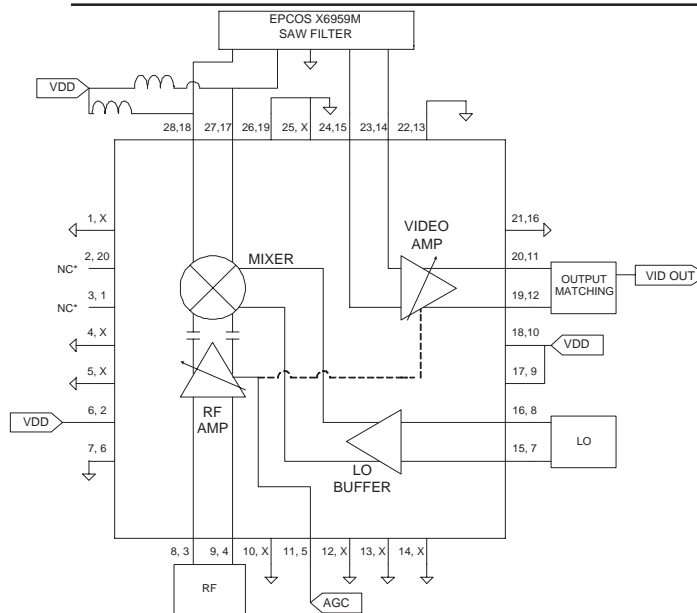
### DESCRIPTION

The ISG510065 is a downconverter designed to be used as an Out-of-Band Tuner for use in CATV set-top box and Digital Cable Ready TV applications. The ISG510065 consists of an input AGC amplifier, mixer, and a video/AGC amplifier. This device offers optimum performance with low power consumption and low distortion. There are two Package Options MLP 28 and TSSOP 20.

### APPLICATIONS

- Cable Set-Top Boxes • Digital Cable Ready TV Sets.

### FUNCTIONAL DIAGRAM



### ELECTRICAL CHARACTERISTICS (TA = 25°C, VDD = 3.3 V, unless otherwise specified)

SYMBOLS	PARAMETERS AND CONDITIONS	UNITS	MIN	TYP	MAX
<b>RF Performance</b>					
RFIN	RF Input Frequency Range, High Side L.O.	MHz	50		150
LOIN	LO Input Frequency Range, High Side L.O.	MHz	80		220
CGMAX	Maximum Conversion Gain*	dB		82	
VAGC	AGC Voltage	V	0		3
AGC	AGC Dynamic Range VAGC = 0 to 3 V	dB	50	55	
IM3	Third Order Intermodulation, 1 VPP Differential Output, 1K ohm load	dB	50	55	
IFOUT	IF Output Level, Differential Output, 1K ohm load	VPP		1	2
NF	Noise Figure, VAGC = 3 V	dB		13	15
GINPUT	RF Amp/Mixer Conversion Gain, VAGC = 3 V	dB		41	
GVIDEO	Video Amplifier Gain, VAGC = 3 V	dB		55	
LO-RF LEAKAGE	LO leakage at the RF port	dBm		-95	-85
<b>DC Performance</b>					
VDD	Supply Voltage	V	3.2	3.3	3.4
IDD	Supply Current	mA		117	135

\* Includes saw filter loss.

### ABSOLUTE MAXIMUM RATINGS

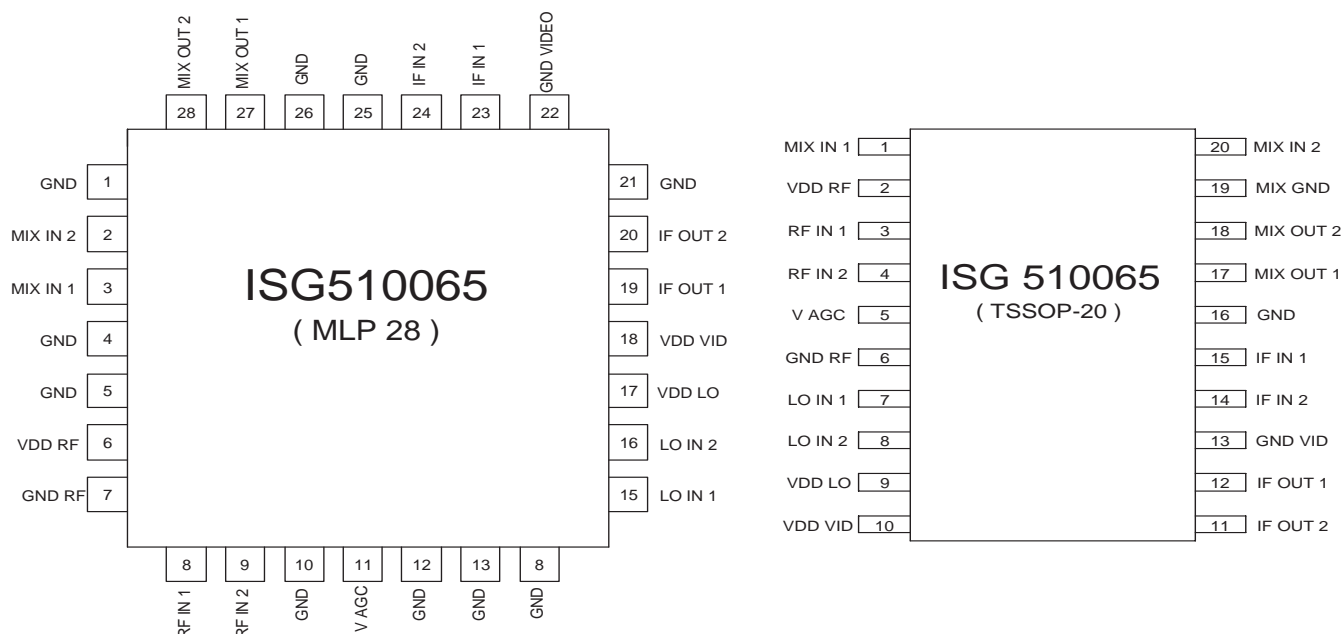
(TC = 25°C unless otherwise noted)

SYMBOLS	PARAMETERS	UNITS	RATINGS
VDD (GND)	Supply Voltage (GND)	V	-0.3 to +3.6
TOP	Operating Temperature	°C	-40 to +85
TSTG	Storage Temperature	°C	-65 to +150
	Junction Temperature	°C	+150
	Thermal Resistance (θ ja)	°C/W	34

Note:

1. Operation in excess of any one of these parameters may result in permanent damage.

## PIN ASSIGNMENTS

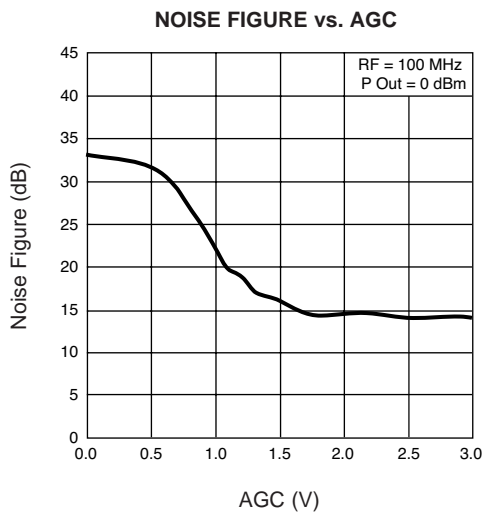
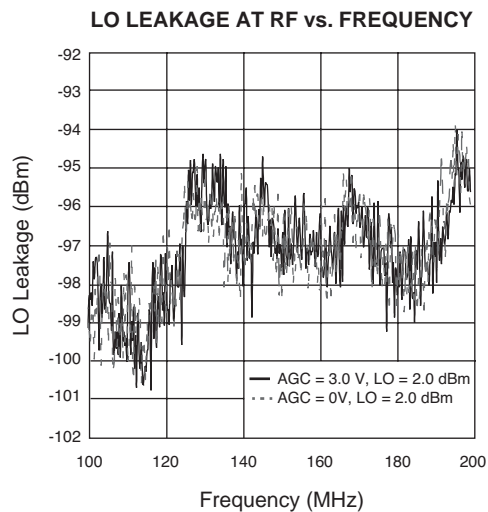
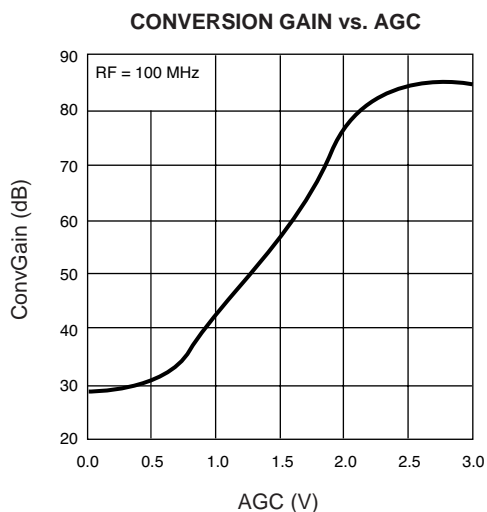
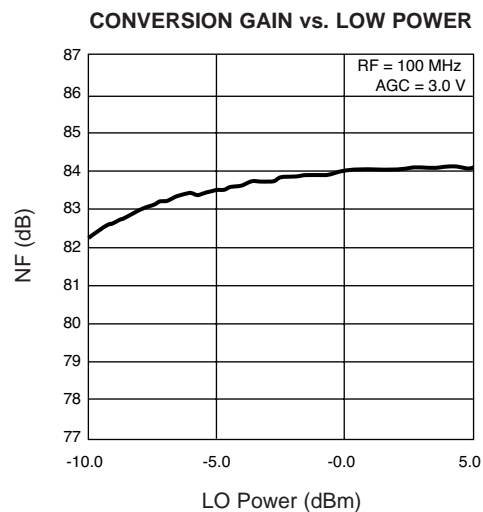
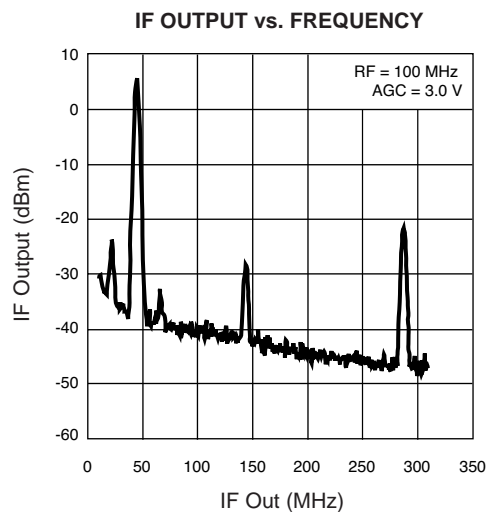
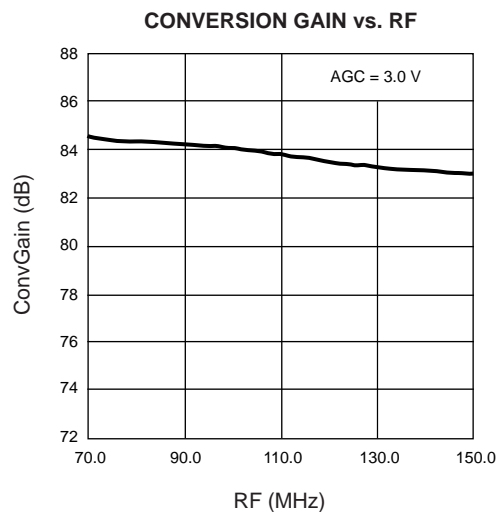


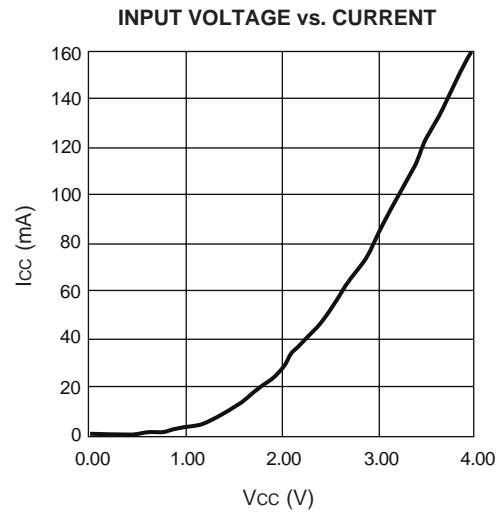
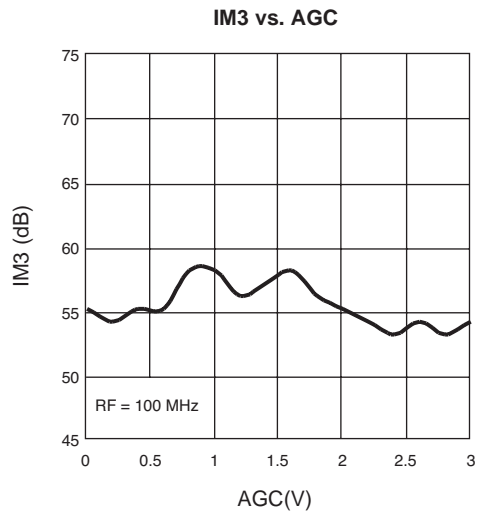
## PIN FUNCTIONS

TSSOP MLP-28

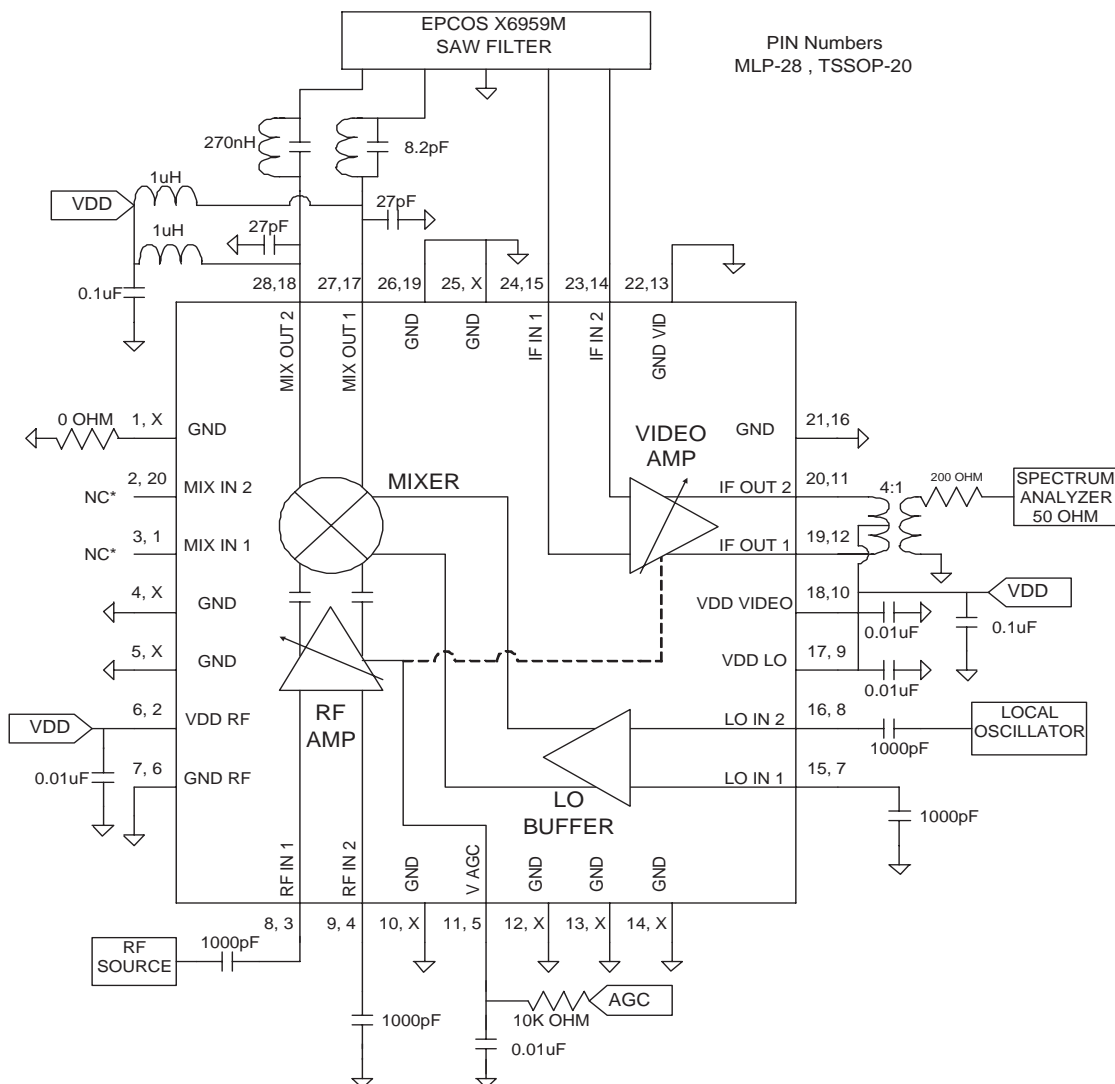
PIN NO.	PIN NO.	PIN NAME	DESCRIPTION
16 19	1, 4, 5, 10, 12, 13, 14, 21, 25, 26	GND	Ground pins. Connect to the ground plane with shortest possible length to minimize inductance.
20	2	MIX IN2	No connection.
1	3	MIX IN1	No connection.
2	6	VDD RF	RF AMP Supply, +3.3 V.
6	7	GND RF	RF AMP Ground. See GND.
3	8	RF IN1	RF AMP Positive Input. 150 ohms input impedance .
4	9	RF IN2	RF AMP Negative Input. 150 ohms input impedance.
5	11	AGC	Automatic Gain Control, Min Gain @ AGC = 0 V, Max Gain @ AGC = 3.0 V.
7	15	LO IN1	LO Buffer Positive Input.
8	16	LO IN2	LO Buffer Negative Input.
9	17	VDD LO	LO Buffer Supply, +3.3 V.
10	18	VDD VID	VIDEO AMP Input Stage Supply, +3.3 V.
12	19	IF OUT1	VIDEO AMP Negative Output. This pin and IFOUT2 form a 1K ohm output impedance. Open Drain See Application Page 5
11	20	IF OUT2	VIDEO AMP Positive Output. See IFOUT1.
13	22	GND VID	VIDEO AMP Ground. See GND.
15	23	IF IN1	VIDEO AMP Negative Input.
14	24	IF IN2	VIDEO AMP Positive Input.
17	27	MIX OUT1	MIXER Positive Output. Open Drain .See Application Page 5
18	28	MIX OUT2	MIXER Negative Output. Open Drain. See Application Page 5 .

TYPICAL PERFORMANCE CURVES



**TYPICAL PERFORMANCE CURVES** (CON'T)

## TYPICAL APPLICATION CIRCUIT



### RF Amplifier

This amplifier provides a maximum gain of 29 dB. The gain is programmed by applying a DC voltage (from 0 to 3 V) to the AGC pin, providing 27 dB of range.

### Downconversion Mixer

This double balanced mixer has 12 dB of conversion gain. The outputs of the mixer are both open drain and require pull-up inductors to VDD.

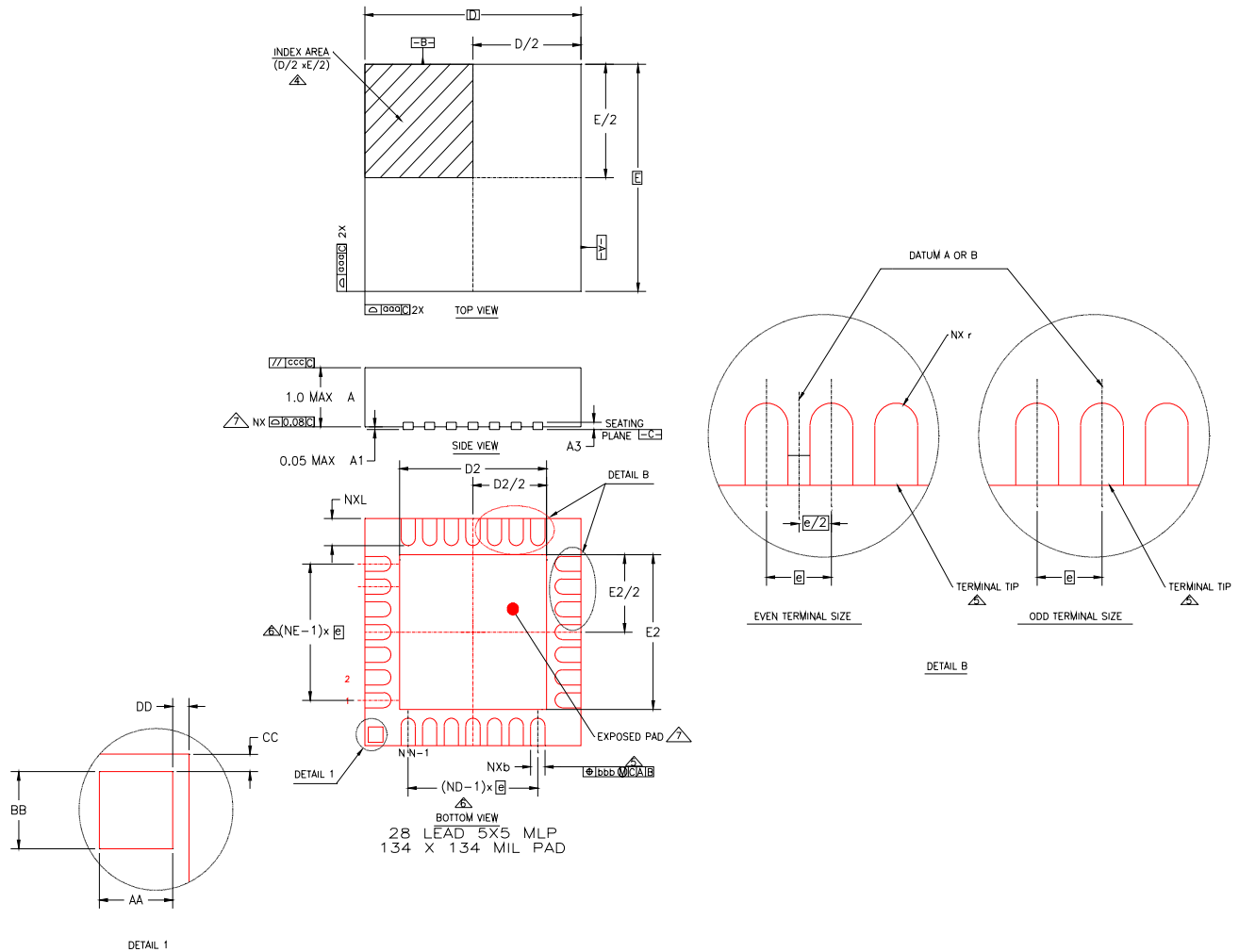
### Video Amplifier

This amplifier provides a maximum gain of 55 dB. The gain is programmed by applying a DC voltage (from 0 to 3 V) to the AGC pin, providing 28 dB of range. The outputs of the video amp are both open drain and require pull-up inductors to VDD.

### Note:

1. The RF amplifier and video amplifier are controlled by a single AGC so the overall dynamic range is the sum of the RF amplifier range and the video amplifier range.

## PACKAGE INFORMATION MLP-28 (Units in mm)



PLEASE REFER TO DIMENSION TABLE FOR PIN # 1 DIMENSION.

1. Dimensions and tolerances conform to ASME Y14.5-1994.
2. All dimensions are in millimeters. All angles are in degrees.
3.  $N$  is the total number of terminals.
4. The terminal numbering convention shall conform to JESD 95-1, SPP-012. The terminal #1 identifier may be either a mold or marked feature.
5. Dimension  $b$  applies to metallized terminal and is measured between 0.25 and 0.3 mm from terminal tip.
6.  $ND$  and  $NE$  refer to the number of terminals on each  $D$  and  $E$  side respectively.
7. Co-planarity applies to the exposed heatsink slug as well as the terminals.

## PACKAGE INFORMATION MLP-28 (CONT)

### COMMON DIMENSIONS

SYMBOLS	MIN	NOM	MAX
A1	0	0.02	0.05
A3		0.20 REF	
r	b/2		
TOLERANCES OF FORM AND POSITION			
aaa		0.25	
bbb		0.1	
ccc		0.1	

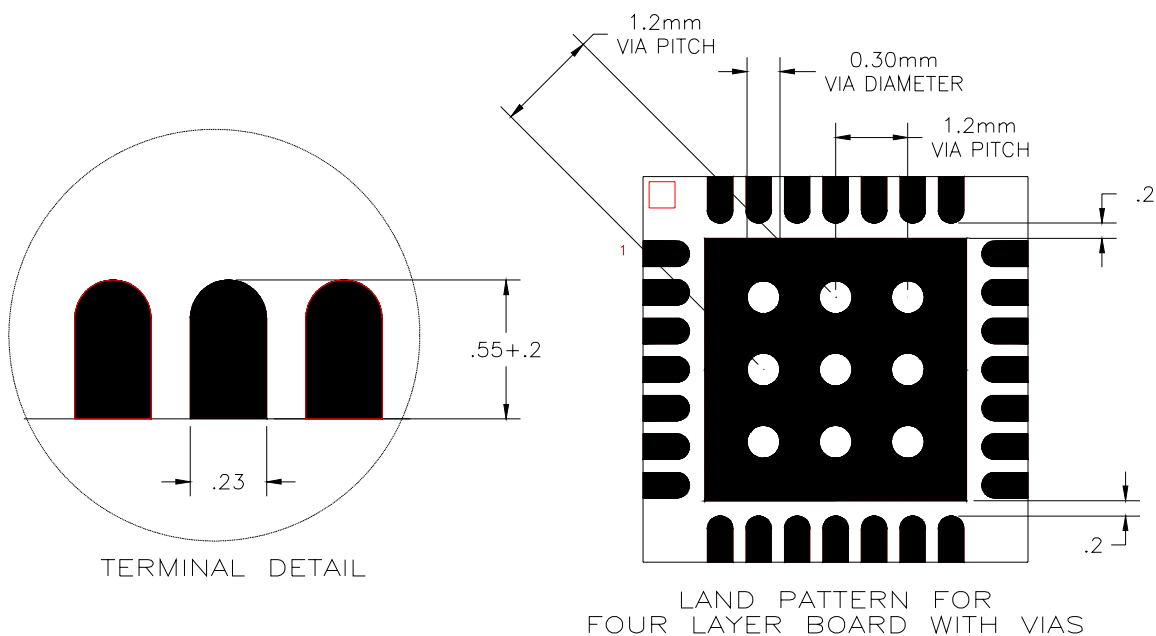
### SUMMARY TABLE & PIN #1 DIMENSIONS

BODY SIZE (MM)(MM)	PITCH COUNT	LEAD	AA	BB	CC	DD
5.00x5.00	0.50	28	0.435	0.435	0.18	0.18

### VARIATIONS

SYMBOLS	MIN	NOM	MAX	NOTE
A	0.80	0.90	1.00	
b	0.18	0.23	0.30	5
D	5.00 BSC			
D2	3.00	3.15	3.25	
E	5.00 BSC			
E2	3.00	3.15	3.25	
e	0.50 BSC			
L	0.45	0.55	0.65	
N	28			3
ND		7		6
NE		7		6
NOTE	1,2,4			

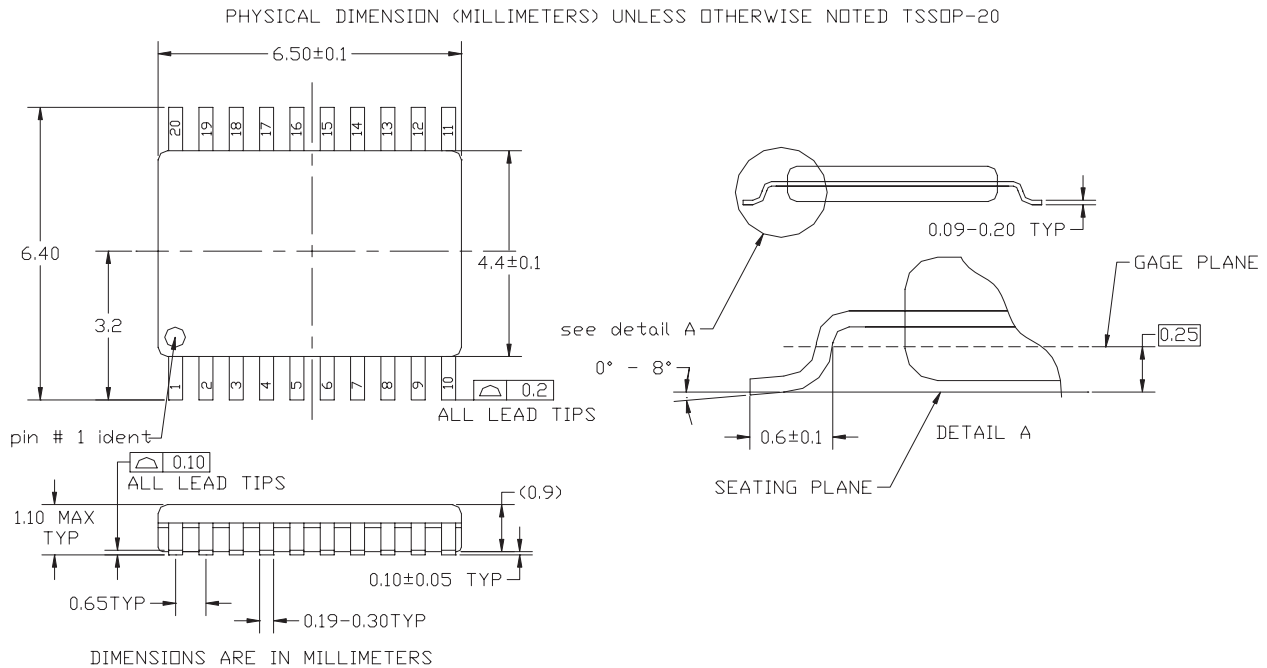
### LAND PATTERN FOR TERMINALS AND THERMAL PAD



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DATA SUBJECT TO CHANGE WITHOUT NOTICE

**PACKAGE INFORMATION TSSOP-20 (CON'T)**



**LAND PATTERN FOR TERMINALS AND THERMAL PAD TSSOP-20 (CON'T)**

PHYSICAL DIMENSION (MILLIMETERS) UNLESS OTHERWISE NOTED TSSOP-20  
LAND PATTERN RECOMENDATION

