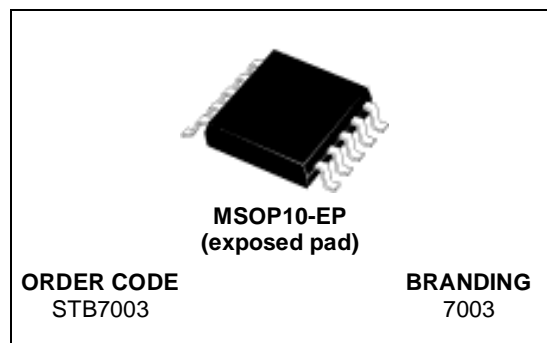




STB7003

TRI-BAND GSM/DCS/PCS LNA

- SUPPLY VOLTAGE 2.8V
- LOW CURRENT CONSUMPTION
- VERY LOW NOISE FIGURE:
 - NF=1.5dB @ 950MHz
 - NF=1.9dB @ 1850MHz
 - NF=2dB @ 1950MHz
- DIGITAL GAIN CONTROL



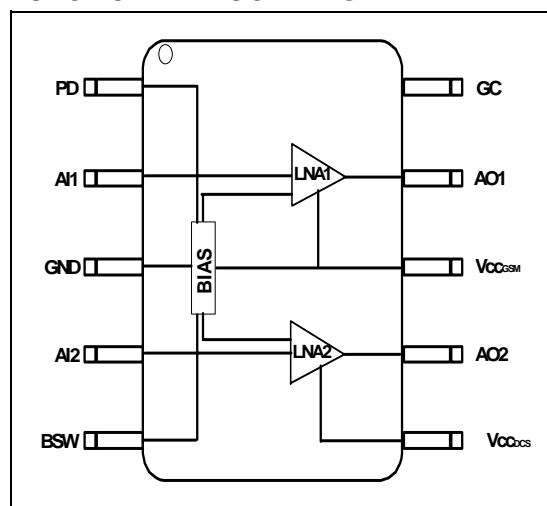
APPLICATIONS

TRI-BAND GSM/DCS/PCS FRONT-ENDS

DESCRIPTION

The STB7003 is a tri-band LNA designed for GSM/DCS/PCS applications. The GC pin sets the LNA gain levels. The innovative architecture implemented allows to reach very low current consumption. LNA1 works at 0.9-1.0 GHz and LNA2 over the 1.8-2GHz frequency range.

FUNCTIONAL BLOCK DIAGRAM



ABSOLUTE MAXIMUM RATING

| Symbol | Parameter | Value | Unit |
|--------|----------------------|------------|------|
| Vcc | Supply voltage | 4.5 | V |
| Tj | Junction temperature | 150 | °C |
| Tstg | Storage temperature | -40 to +85 | °C |

THERMAL DATA

| Symbol | Parameter | Value | Unit |
|----------|-------------------------------------|-------|------|
| Rth(j-a) | Thermal resistance junction-ambient | TBD | °C/W |

ELECTRICAL CHARACTERISTICS (V_{cc} = 2.8V, T_{amb} = 25 °C)

| Symbol | Parameter | Test conditions | Min. | Typ. | Max. | Unit |
|-----------------|----------------------|-----------------|------|------|------|------|
| V _{cc} | Supply voltage | | 2.7 | | 3.3 | V |
| I _{PD} | Sleep supply current | | | | 5 | uA |

LNA1 @ 950MHz

| | | | | | | |
|-------------------|-----------------------------|------------------------------------------------------------------|--|----------------|--|-----|
| I _{cc} | Supply current | | | 4.5 | | mA |
| G | Power gain | G _{p1} ⁽¹⁾ G _{p2} ⁽¹⁾ | | -1 16 | | dB |
| NF | Noise figure | G _{p1} G _{p2} | | 5.5 1.5 | | dB |
| P1dB | Input 1 dB compr. power | G _{p1} G _{p2} | | -19 -21 | | dBm |
| IIP3 | Input third order intercept | G _{p1} ⁽²⁾ G _{p2} ⁽²⁾ | | -10.8 -12.6 | | dBm |
| VSWR _i | Input VSWR | | | 2:1 | | |
| VSWR _o | Output VSWR | | | 2:1 | | |

LNA2 @ 1850MHz

| | | | | | | |
|-------------------|-----------------------------|------------------------------------------------------------------|--|----------------|--|-----|
| I _{cc} | Supply current | | | 7.3 | | mA |
| G | Power gain | G _{p1} ⁽¹⁾ G _{p2} ⁽¹⁾ | | -4 14.7 | | dB |
| NF | Noise figure | G _{p1} G _{p2} | | 9.6 1.9 | | dB |
| P1dB | Input 1 dB compr. power | G _{p1} G _{p2} | | -11.5 -13.1 | | dBm |
| IIP3 | Input third order intercept | G _{p1} ⁽³⁾ G _{p2} ⁽³⁾ | | -1.4 -3.5 | | dBm |
| VSWR _i | Input VSWR | | | 2:1 | | |
| VSWR _o | Output VSWR | | | 2:1 | | |

LNA2 @ 1950MHz

| | | | | | | |
|-------------------|-----------------------------|------------------------------------------------------------------|--|----------------|--|-----|
| I _{cc} | Supply current | | | 7.3 | | mA |
| G | Power gain | G _{p1} ⁽¹⁾ G _{p2} ⁽¹⁾ | | -4.5 14.7 | | dB |
| NF | Noise figure | G _{p1} G _{p2} | | 9.8 2 | | dB |
| P1dB | Input 1 dB compr. power | G _{p1} G _{p2} | | -10.8 -12.6 | | dBm |
| IIP3 | Input third order intercept | G _{p1} ⁽⁴⁾ G _{p2} ⁽⁴⁾ | | -1.5 -3.7 | | dBm |
| VSWR _i | Input VSWR | | | 2:1 | | |
| VSWR _o | Output VSWR | | | 2:1 | | |

Note(1) : G_{p1} min gain, G_{p2} max gain.

Note(2) : Measured data with two tones f_{IN1} = 945 MHz, f_{IN2} = 945.8 MHz, P_{IN} = - 33 dBm for each tone

Note(3) : Measured data with two tones f_{IN1} = 1850 MHz, f_{IN2} = 1850.8 MHz, P_{IN} = - 33 dBm for each tone

Note(4) : Measured data with two tones f_{IN1} = 1960 MHz, f_{IN2} = 1960.8 MHz, P_{IN} = - 33 dBm for each tone

GAIN SELECTION

| BSW | GC | GSM LNA1 | DCS/PCS LNA2 |
|-----|----|-----------|--------------|
| 0 | 0 | High gain | Off |
| 0 | 1 | Low gain | Off |
| 1 | 0 | Off | High gain |
| 1 | 1 | Off | Low gain |

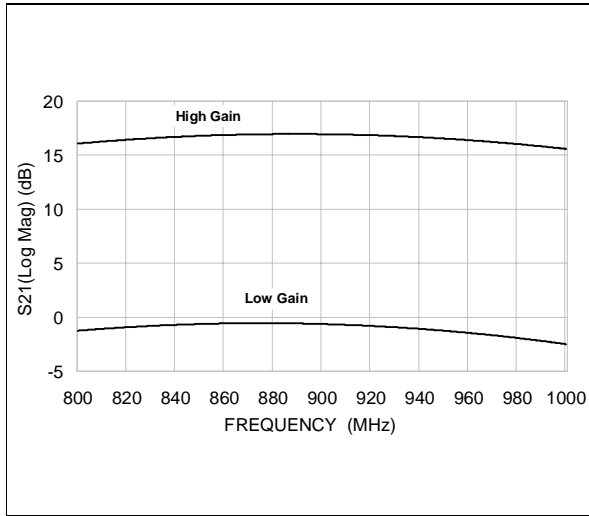
PINOUT

| Pin Number | Symbol | Description |
|------------|--------|-----------------------------------------------|
| 1 | PD | Power down |
| 2 | AI1 | GSM LNA1 input |
| 3 | GND | Ground |
| 4 | AI2 | DCS/PCS LNA2 input |
| 5 | BSW | Band switch between GSM and DCS/PCS RF output |
| 6 | VccDCS | DCS Supply voltage |
| 7 | AO2 | DCS/PCS LNA2 output |
| 8 | VccGSM | GSM/BiAS Supply voltage |
| 9 | AO1 | GSM LNA1 output |
| 10 | GC | LNA1/2 gain control |

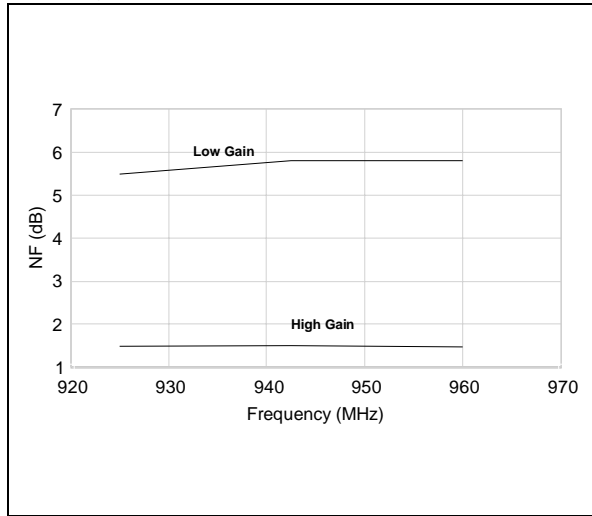
STB7003

TYPICAL PERFORMANCE (GSM BAND)

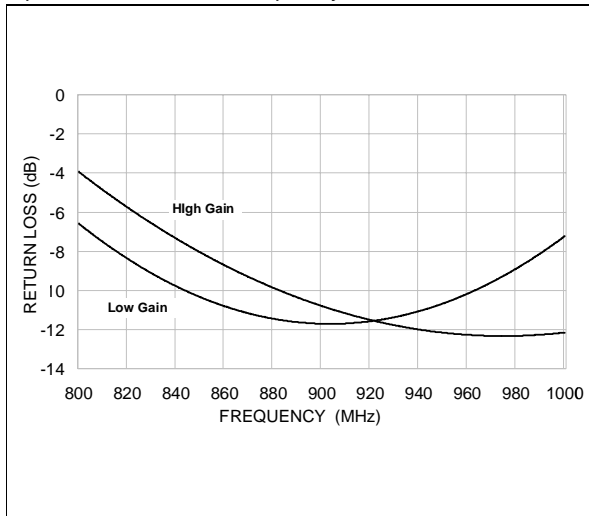
Power Gain vs. Frequency



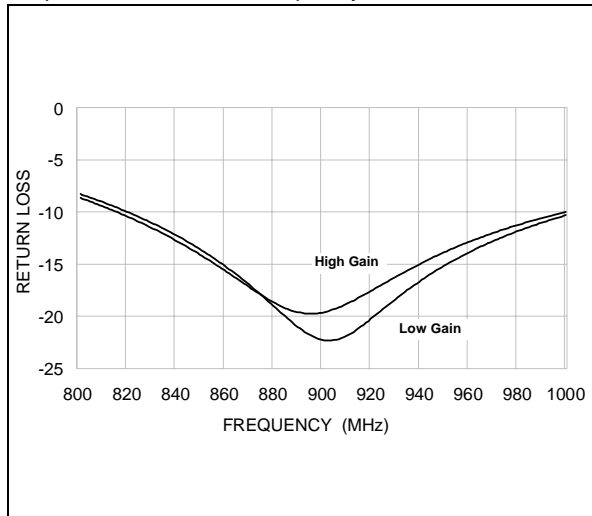
Noise Figure vs. Frequency



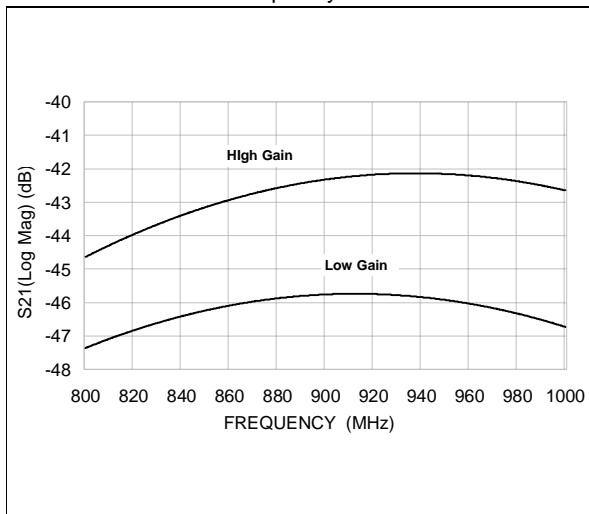
Input Return Loss vs. Frequency



Output Return Loss vs. Frequency

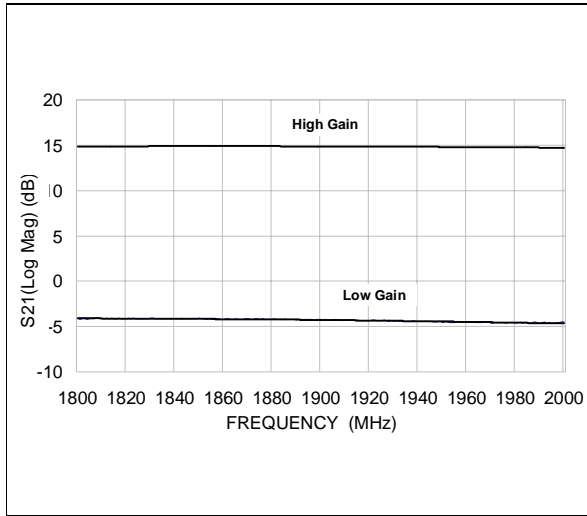


Reverse Isolation vs. Frequency

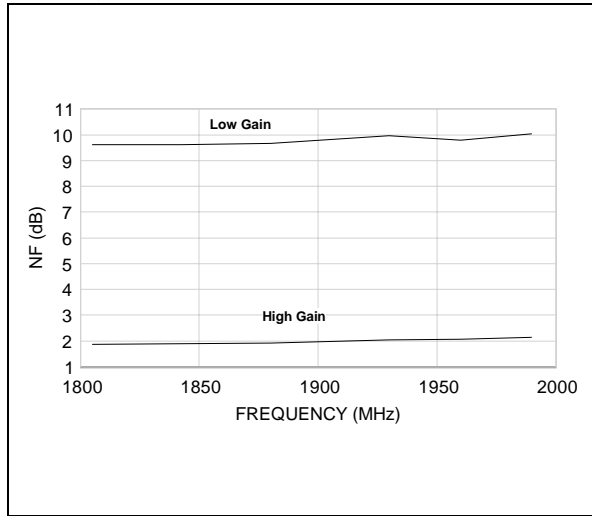


TYPICAL PERFORMANCE (DCS / PCS BAND)

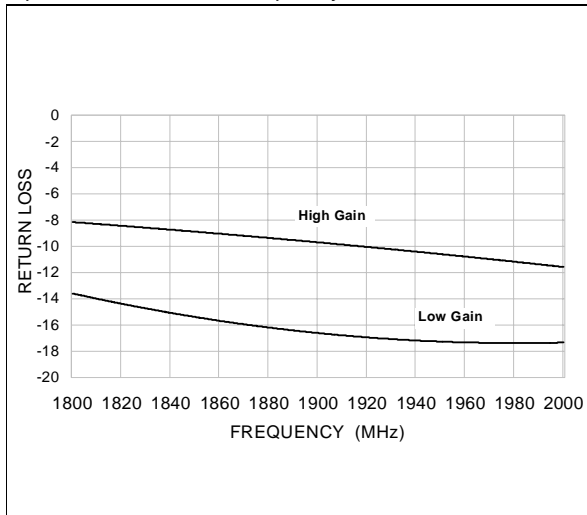
Power Gain vs. Frequency



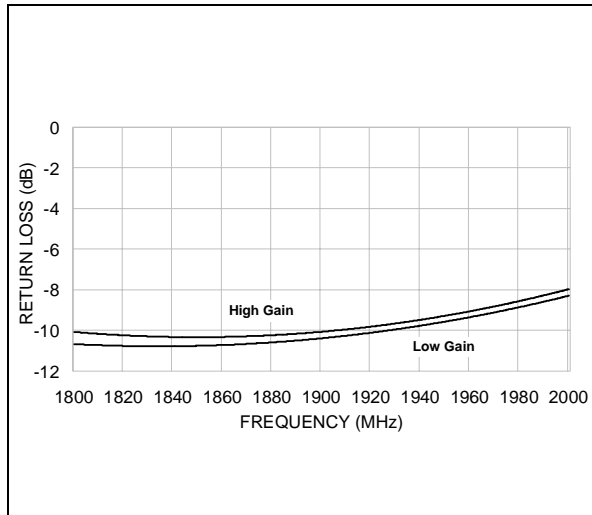
Noise Figure vs. Frequency



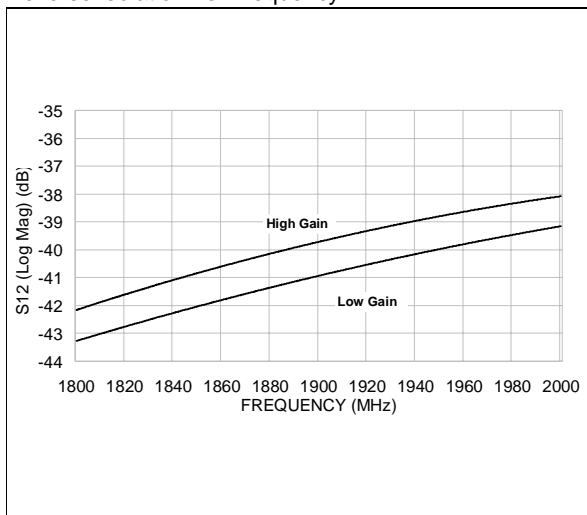
Input Return Loss vs. Frequency



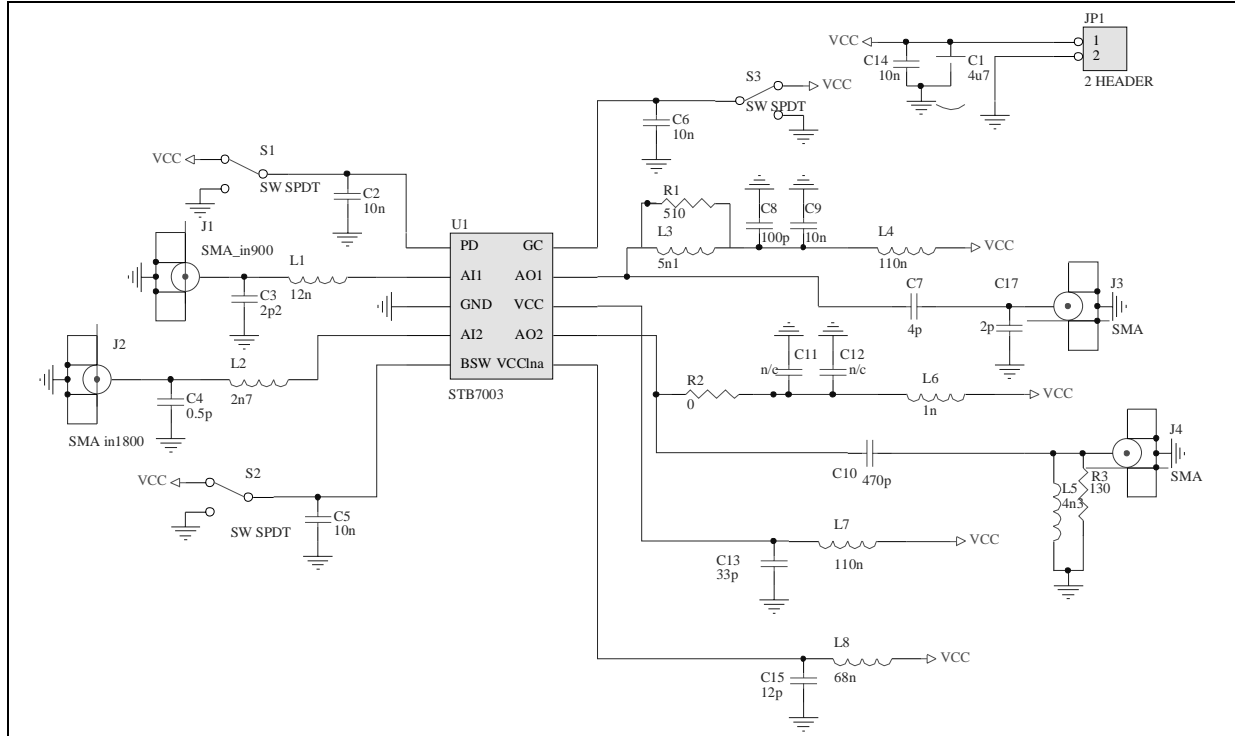
Output Return Loss vs. Frequency



Reverse Isolation vs. Frequency



TEST CIRCUIT SCHEMATIC

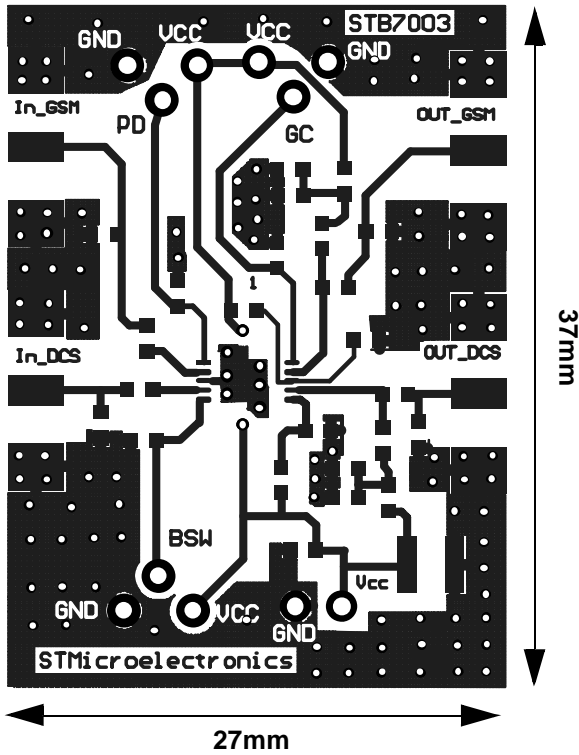


BILL OF MATERIAL

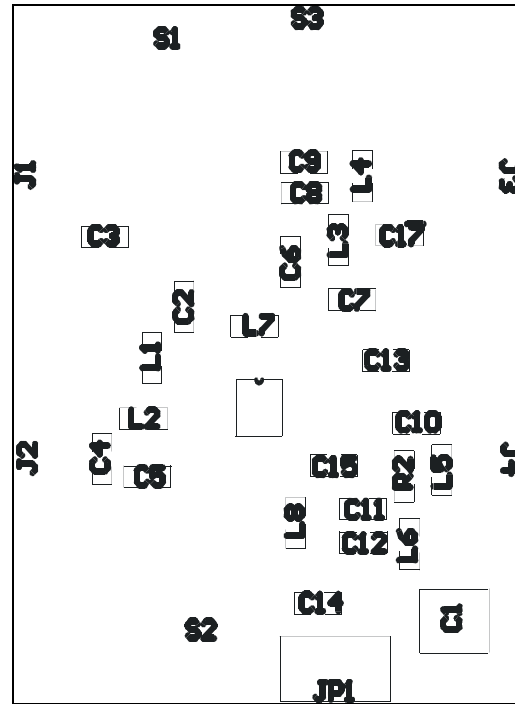
| Used | Part Type | Designator | Footprint | Description |
|------|-----------|-----------------------|-----------|----------------------|
| 1 | 12n | L1 | 0603 | COILCRAFT KIT C124-2 |
| 1 | 2n7 | L2 | 0603 | COILCRAFT KIT C124-2 |
| 1 | 5n1 | L3 | 0603 | COILCRAFT KIT C124-2 |
| 2 | 110n | L4, L7 | 0603 | COILCRAFT KIT C124-2 |
| 1 | 4n3 | L5 | 0603 | COILCRAFT KIT C124-2 |
| 1 | 1n | L6 | 0402 | COILCRAFT KIT C128 |
| 1 | 68n | L8 | 0603 | COILCRAFT KIT C124-2 |
| 1 | 1u | C1 | TAG A | |
| 6 | 10n | C2, C5, C6 C9, C14 | 0603 | MURATA 0603 KIT |
| 1 | 2p2 | C3 | 0603 | MURATA 0603 KIT |
| 1 | 0.5p | C4 | 0603 | MURATA 0603 KIT |
| 1 | 4p | C7 | 0603 | MURATA 0603 KIT |
| 1 | 100p | C8 | 0603 | MURATA 0603 KIT |
| 1 | 470p | C10 | 0603 | MURATA 0603 KIT |
| 2 | n/c | C11, C12 | 0603 | |
| 1 | 33p | C13 | 0603 | MURATA 0603 KIT |
| 1 | 12p | C15 | 0603 | MURATA 0603 KIT |
| 1 | 2p | C17 | 0603 | MURATA 0603 KIT |
| 1 | 510 | R1 | 0603 | |
| 1 | 0 | R2 | 0603 | |
| 1 | 130 | R3 | 0603 | |

EVALUATION BOARD

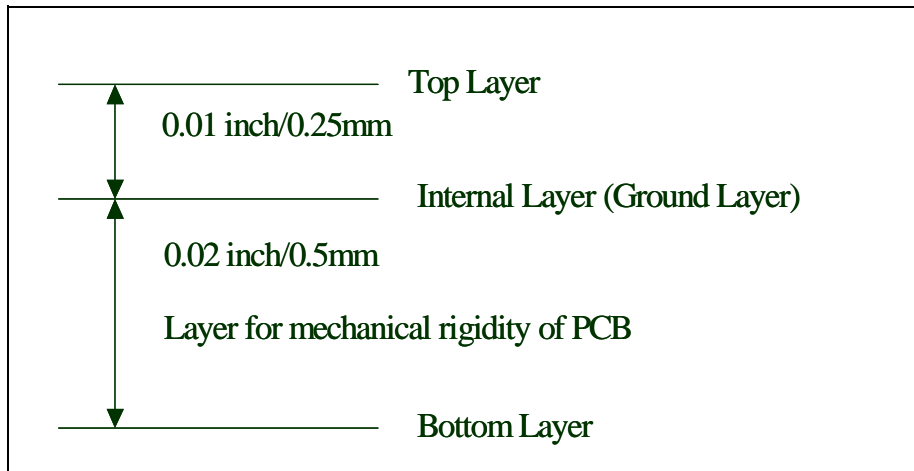
TOP LAYER



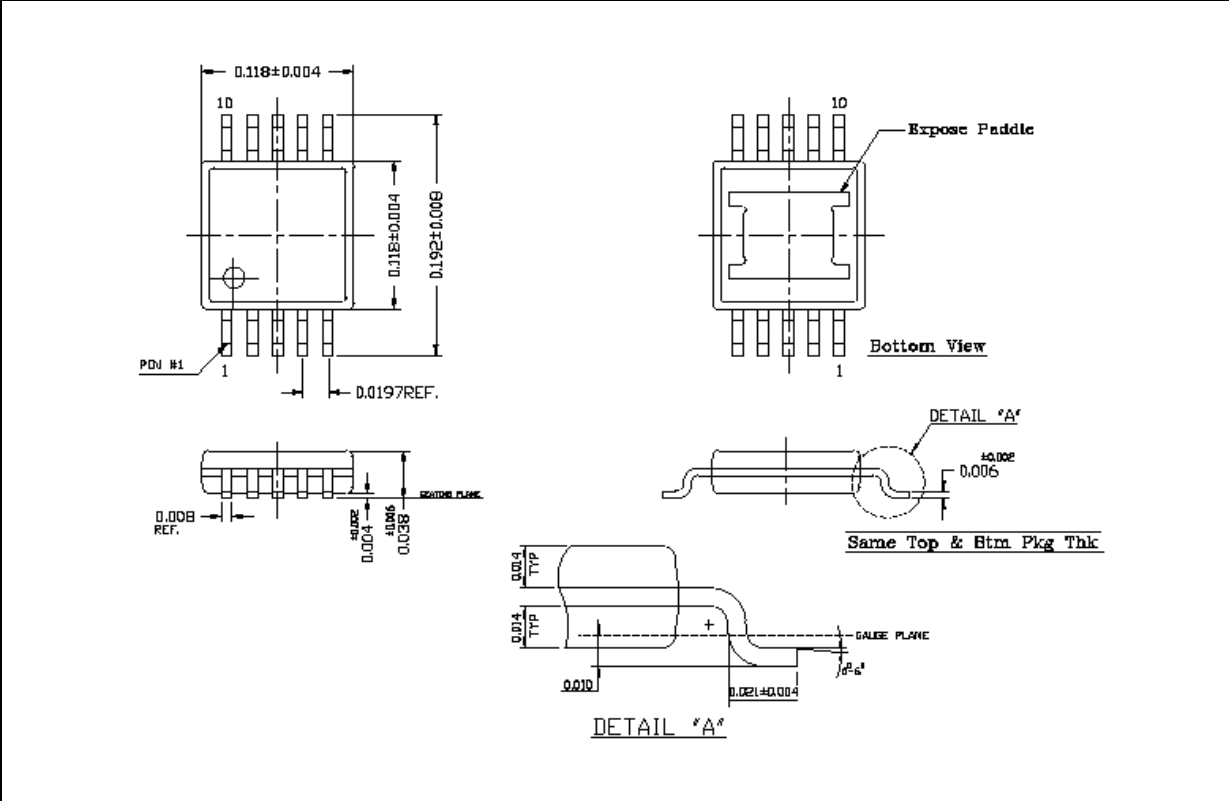
COMPONENTS PLACEMENT



PCB CROSS SECTION



MECHANICAL DATA



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