

## 低电荷注入、64通道、带泄放电阻高压模拟开关

### 特性:

- 0V至±100V模拟信号电压范围
- 无需正负高压供电, 仅+5V供电
- 输出集成40KΩ泄放电阻
- 64通道高压模拟开关
- 50兆赫兹数据移位时钟频率
- 3V-5V CMOS逻辑接口
- 非常低的静态功耗 (10mW)
- 5.0MHz时的典型关断隔离度为-57dB
- 极低的开关串扰度-60dB
- 低寄生电容
- 具有过温保护功能

### 应用:

- 医疗超声影像
- 无损探伤
- 压电传感器驱动
- 光学MEMS模组

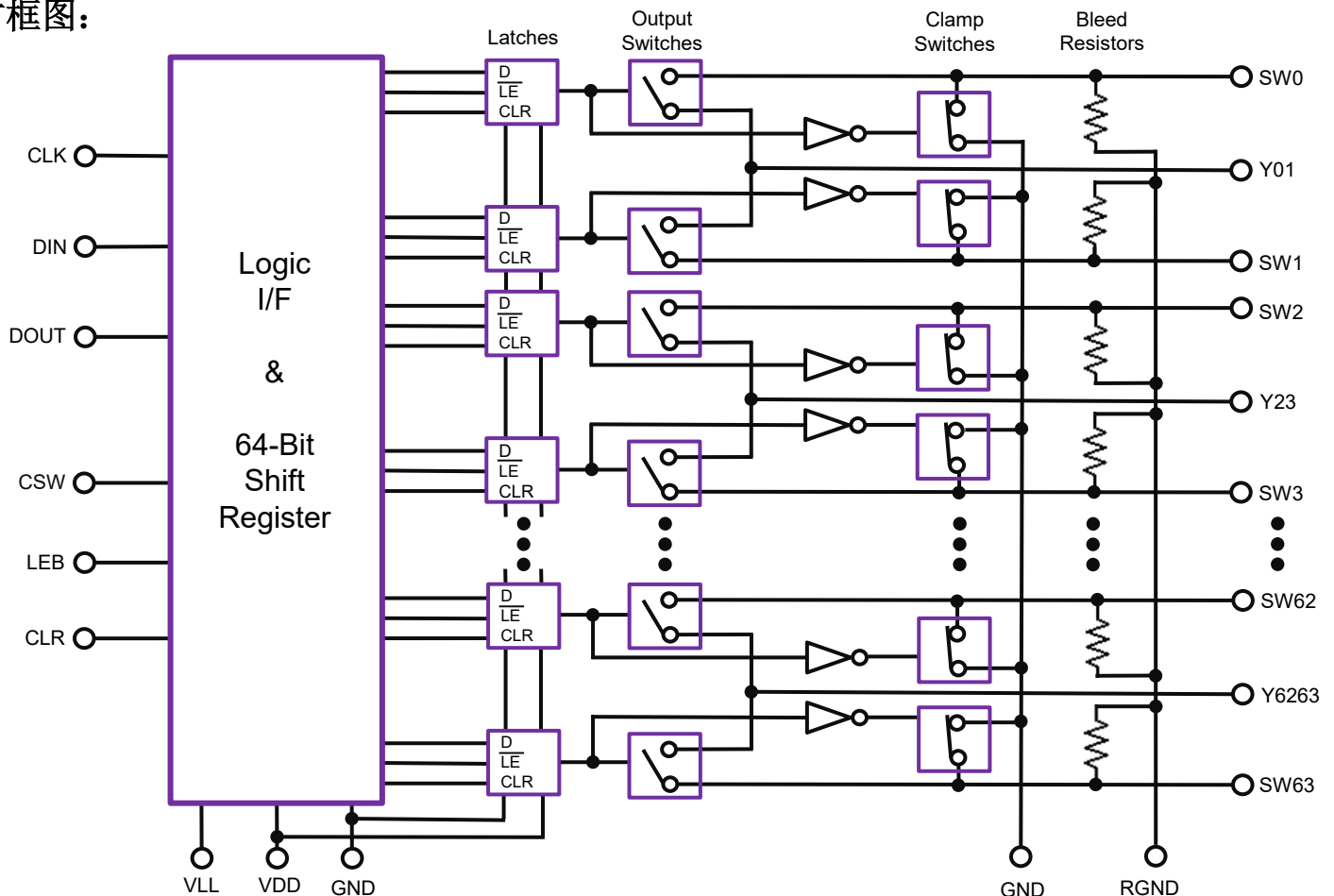
### 概述:

SY2640为一款低电荷注入, 64通道, 高压模拟开关集成电路。这芯片是为以下应用而设计的需要低压信号控制的高压开关, 如医学超声图像、工业无损探伤和其他压电传感器驱动器。SY2640集成了泄放电阻, 用来消除电容性负载 (如压电传感器) 两端积累噪声电压。

该器件将输入数据移位到64位移位寄存器中, 然后可以保留在64位锁存器中。为了减少时钟馈通引入的噪声, 在数据载入移位寄存器期间将LEB拉至高电平。当移位寄存器装载有效数据后, 在LEB作用一个低电平脉冲, 将移位寄存器内容装载到锁存器。该器件结合了HVC MOS技术和、双极性型DMOS开关和低功耗CMOS逻辑对高压模拟信号进行控制。

该芯片仅需要+5V电源供电, 不需要正负高压供电。

### 方框图:



器件Yxx脚接AFE侧, SWx脚接Probe侧。

## 1, 订购信息:

| 芯片型号   | 封装                                                                       |
|--------|--------------------------------------------------------------------------|
|        | 120-Lead BGA<br>10.0 x 10.0mm body<br>1.4mm height (max)<br>0.80mm pitch |
| SY2640 | SY2640BG                                                                 |

## 2, 极限范围:

 $T_A=25^{\circ}\text{C}$ , unless otherwise specified

| No | Items                                  | Symbol                     | Typ          | Units              | Condition |
|----|----------------------------------------|----------------------------|--------------|--------------------|-----------|
| 1  | Positive logic supply voltage          | $V_{LL}$                   | -0.4 to +7   | V                  |           |
| 2  | Positive supply voltage                | $V_{DD}$                   | -0.4 to +7   | V                  |           |
| 3  | Logic input voltage                    | DIN, LEB, CLK,<br>CLR, CSW | -0.4 to +7   | V                  |           |
| 4  | Logic output voltage                   | DOUT, THP                  | -0.4 to +7   | V                  |           |
| 5  | Analog signal range                    | $V_{SIG}$                  | -105 to +105 | V                  |           |
| 6  | Peak analog signal current per channel | $I_{SW}$                   | 2            | A                  |           |
| 7  | Operating junction temperature         | $T_{Jop}$                  | -20 to +150  | $^{\circ}\text{C}$ |           |
| 8  | Storage temperature                    | $T_{STG}$                  | -55 to +150  | $^{\circ}\text{C}$ |           |
| 9  | Maximum power dissipation              | $P_{Dmax}$                 | 4            | W                  |           |

### 3, 建议工作条件:

| No | Items                          | Symbol                          | Min                | Typ      | Max                | Units | Condition                  |
|----|--------------------------------|---------------------------------|--------------------|----------|--------------------|-------|----------------------------|
| 1  | Logic supply voltage           | V <sub>LL</sub>                 | 1.7                | 1.8 to 5 | V <sub>DD</sub>    | V     |                            |
| 2  | Positive supply voltage        | V <sub>DD</sub>                 | 4.75               | 5        | 5.25               | V     |                            |
| 3  | IC substrate voltage           | V <sub>SUB</sub>                | -                  | 0        | -                  | V     |                            |
| 4  | Operating free-air temperature | T <sub>A</sub>                  | 0                  |          | 75                 | °C    |                            |
| 5  | High-level logic input voltage | V <sub>IH</sub>                 | 0.8V <sub>LL</sub> | -        | V <sub>LL</sub>    | V     |                            |
| 6  | Low-level logic input voltage  | V <sub>IL</sub>                 | 0                  | -        | 0.2V <sub>LL</sub> | V     |                            |
| 7  | Logic input high current       | I <sub>IH</sub>                 | -10                | -        | 10                 | pA    | DIN, LEB, CLK,<br>CLR, CSW |
| 8  | Logic input low current        | I <sub>IL</sub>                 | -10                | -        | 10                 | pA    |                            |
| 9  | Logic input capacitance        | C <sub>IN</sub>                 | -                  | 2        | -                  | pF    |                            |
| 10 | Setup time before LEB rises    | t <sub>SD</sub>                 | 25                 | -        | -                  | ns    |                            |
| 11 | Time width of LEB              | t <sub>WLEB</sub>               | 12                 | -        | -                  | ns    |                            |
| 12 | Clock delay time to data out   | t <sub>DO</sub>                 | 7                  | 10       | -                  | ns    |                            |
| 13 | Time width of CLR              | t <sub>WCLR</sub>               | 55                 | -        | -                  | ns    |                            |
| 14 | Clock frequency                | f <sub>CLK</sub>                | -                  | -        | 50                 | MHz   |                            |
| 15 | Clock rise and fall times      | t <sub>R</sub> , t <sub>F</sub> | -                  | -        | 50                 | ns    |                            |
| 16 | Setup time data to clock       | t <sub>SU</sub>                 | 7                  | -        | -                  | ns    |                            |
| 17 | Hold time data from clock      | t <sub>HLD</sub>                | 7                  | -        | -                  | ns    |                            |
| 18 | Time width of CSW              | t <sub>WCSW</sub>               | 10                 | -        | -                  | us    |                            |

## 4, DC Electrical Characteristics

$V_{LL}=3.3V$ ,  $V_{DD}=5V$ ,  $LEB=0$ ,  $CSW=0/1$ ,  $T_A=25^{\circ}C$ , unless otherwise specified.

| No. | Items                                           | Symbol           | Spec |     |     | Units      | Conditions                                                |
|-----|-------------------------------------------------|------------------|------|-----|-----|------------|-----------------------------------------------------------|
|     |                                                 |                  | Min  | Typ | Max |            |                                                           |
| 1   | Analog signal range                             | $V_{SIG}$        | -100 | -   | 100 | V          |                                                           |
| 2   | $V_{LL}$ quiescent current                      | $I_{LLQ}$        | -    | 0.2 | -   | $\mu A$    | Quiescent current-1                                       |
| 3   | $V_{DD}$ quiescent current                      | $I_{DDQ}$        | -    | 1   | -   | mA         | All main switches OFF                                     |
| 4   | $V_{LL}$ quiescent current                      | $I_{LLQ}$        | -    | 0.2 | -   | $\mu A$    | Quiescent current-2                                       |
| 5   | $V_{DD}$ quiescent current                      | $I_{DDQ}$        | -    | 1   | -   | mA         | All main switches ON                                      |
| 6   | $V_{LL}$ dynamic current                        | $I_{LL}$         | -    | 5   | 15  | $\mu A$    | Dynamic current<br>All channels switching simultaneously  |
| 7   | $V_{DD}$ dynamic current                        | $I_{DD}$         | -    | 2.8 | 3.8 | mA         | at fsw=50kHz                                              |
| 8   | DC offset main switch off                       | $V_{OS}$         | -    | 0   | -   | mV         | CSW=0                                                     |
|     |                                                 |                  | -    | 0.8 | 10  | mV         | CSW=1                                                     |
| 9   | Small signal main switch on-resistance          | $R_{ONS}$        | -    | 8   | 10  | $\Omega$   | $V_{SIG}=0.1V_{pp}$ to $5V_{pp}$<br>@5MHz, $R_s=10\Omega$ |
| 10  | Small signal main switch on-resistance matching | $\Delta R_{ONS}$ | -    | 2   | 5   | %          | $V_{SIG}=0V$ , $I_{SIG}=5mA$                              |
| 11  | Large signal main switch on-resistance          | $R_{ONL}$        | -    | 8   | -   | $\Omega$   | $V_{SIG}=20V_{pp}$ @5MHz,<br>$R_s=10\Omega$               |
| 12  | GND clamp on-resistance                         | $R_{ONCL}$       | -    | 35  | -   | $\Omega$   | Main switches off, probe side                             |
| 13  | Output Bleed Resistor                           | $R_{BLD}$        | 30   | 40  | 50  | k $\Omega$ | Probe side                                                |
| 14  | Switch output peak current                      | $I_{SW}$         | -    | 2   | -   | A          | 100ns pulse, 0.1% duty cycle                              |

## 5, Thermal Protection

$V_{LL}=3.3V$ ,  $V_{DD}=5V$ ,  $LEB=0$ ,  $CSW=0/1$ ,  $T_A=25^{\circ}C$ , unless otherwise specified

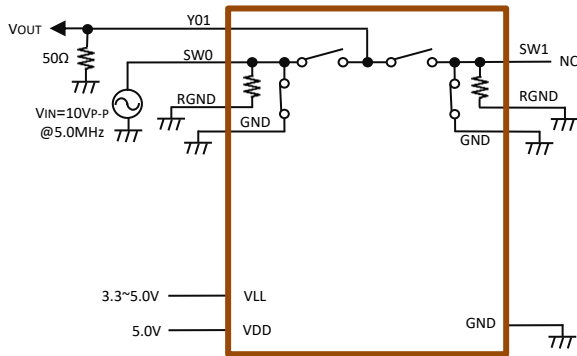
| Items                     | Symbol       | Spec |     |      | Units       | Conditions                                |
|---------------------------|--------------|------|-----|------|-------------|-------------------------------------------|
|                           |              | Min  | Typ | Max  |             |                                           |
| THP pull-up voltage       | $V_{PUTHP}$  | -    | -   | 5.25 | V           | Open drain                                |
| THP output current        | $I_{THP}$    | -    | 1   | -    | mA          | -                                         |
| THP output low voltage    | $V_{OLTHP}$  | -    | -   | 0.5  | V           | THP active, $V_{LL}=3.3V$ , $I_{THP}=1mA$ |
| THP temperature threshold | $T_{THP}$    | 90   | 110 | 130  | $^{\circ}C$ |                                           |
| THP reset hysteresis      | $T_{HYSTHP}$ | -    | 10  | -    | $^{\circ}C$ |                                           |

## 6, AC Characteristics

$V_{LL}=3.3V$ ,  $V_{DD}=5V$ ,  $LEB=0$ ,  $CSW=0/1$ ,  $T_A=25\text{ }^{\circ}C$ , unless otherwise specified.

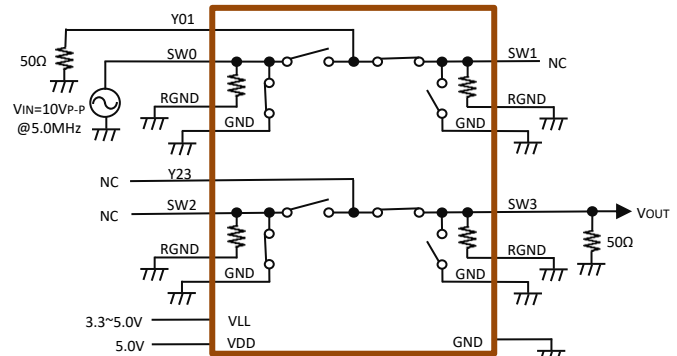
| No. | Items                                                       | Symbol                 | Spec |     |     | Units | Conditions                                           |
|-----|-------------------------------------------------------------|------------------------|------|-----|-----|-------|------------------------------------------------------|
|     |                                                             |                        | Min  | Typ | Max |       |                                                      |
| 1   | Turn-on time                                                | $t_{ON}$               | -    | 2   | 5   | us    |                                                      |
|     |                                                             | $t_{ON\_CSW}$          | -    | 2   | 5   | us    |                                                      |
| 2   | Turn-off time                                               | $t_{OFF}$              | -    | 2   | 5   | us    |                                                      |
|     |                                                             | $t_{OFF\_CSW}$         | -    | 2   | 5   | us    |                                                      |
| 3   | Output switching frequency                                  | $f_{SW}$               | -    | -   | 50  | KHz   | Duty cycle=50%                                       |
| 4   | Small signal frequency                                      | $f_{SIG}$              | 0.01 | -   | 20  | MHz   | CL=220pF                                             |
| 5   | Off isolation                                               | $V_O$                  | -    | -53 | -   | dB    | $f_{SIG}=5MHz$ , $R_L//C_L=1k\Omega//15pF$ , $CSW=0$ |
|     |                                                             |                        | -    | -57 | -   | dB    | $f_{SIG}=5MHz$ , $R_L=50\Omega$ , $CSW=0$            |
|     |                                                             |                        | -    | -25 | -   | dB    | $f_{SIG}=5MHz$ , $R_L//C_L=1k\Omega//15pF$ , $CSW=1$ |
|     |                                                             |                        | -    | -49 | -   | dB    | $f_{SIG}=5MHz$ , $R_L=50\Omega$ , $CSW=1$            |
| 6   | Crosstalk                                                   | $V_{CR}$               | -    | -60 | -   | dB    | $f_{SIG}=5MHz$ , $R_L=50\Omega$                      |
| 7   | Off capacitance<br>SWx to GND (both SW OFF)                 | $C_{OFF(SW)}$          | -    | 22  | -   | pF    | $V_{SIG}=0V$ , $f_{SIG}=1MHz$ , $CSW=0$              |
|     |                                                             |                        | -    | 16  | -   | pF    | $V_{SIG}=0V$ , $f_{SIG}=1MHz$ , $CSW=1$              |
| 8   | Off capacitance<br>Yxx to GND (both SW OFF)                 | $C_{OFF(Y)}$           | -    | 60  | -   | pF    | $V_{SIG}=0V$ , $f_{SIG}=1MHz$ , $CSW=0$              |
|     |                                                             |                        | -    | 20  | -   | pF    | $V_{SIG}=0V$ , $f_{SIG}=1MHz$ , $CSW=1$              |
| 9   | On capacitance<br>SWx to GND<br>(one SW ON, another SW OFF) | $C_{ON(SW)}$           | -    | 45  | -   | pF    | $V_{SIG}=0V$ , $f_{SIG}=1MHz$ , $CSW=0$              |
|     |                                                             |                        | -    | 30  | -   | pF    | $V_{SIG}=0V$ , $f_{SIG}=1MHz$ , $CSW=1$              |
| 10  | On capacitance<br>Yxx to GND<br>(one SW ON, another SW OFF) | $C_{ON(Y)}$            | -    | 45  | -   | pF    | $V_{SIG}=0V$ , $f_{SIG}=1MHz$ , $CSW=0$              |
|     |                                                             |                        | -    | 30  | -   | pF    | $V_{SIG}=0V$ , $f_{SIG}=1MHz$ , $CSW=1$              |
| 11  | Output spike voltage (SWx)                                  | $V_{SPK\_ON}$<br>(SW)  | -15  | 40  | 60  | mV    | 50 $\Omega$ load @switch on, $CSW=0$                 |
|     |                                                             |                        | -15  | 80  | 120 | mV    | 50 $\Omega$ load @switch on, $CSW=1$                 |
|     |                                                             | $V_{SPK\_OFF}$<br>(SW) | -15  | 60  | 90  | mV    | 50 $\Omega$ load @switch off, $CSW=0$                |
|     |                                                             |                        | -15  | 100 | 150 | mV    | 50 $\Omega$ load @switch off, $CSW=1$                |
| 12  | Output spike voltage (Yxx)                                  | $V_{SPK\_ON}$<br>(Y)   | -15  | 40  | 60  | mV    | 50 $\Omega$ load @switch on, $CSW=0$                 |
|     |                                                             |                        | -15  | 80  | 120 | mV    | 50 $\Omega$ load @switch on, $CSW=1$                 |
|     |                                                             | $V_{SPK\_OFF}$<br>(Y)  | -15  | 60  | 90  | mV    | 50 $\Omega$ load @switch off, $CSW=0$                |
|     |                                                             |                        | -15  | 100 | 150 | mV    | 50 $\Omega$ load @switch off, $CSW=1$                |
| 13  | Charge injection (per switch)                               | QC                     | -    | 10  | -   | pC    |                                                      |

## 7, SY2640 Test Circuits



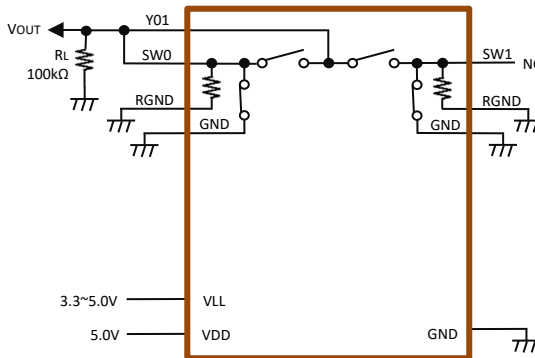
$$K_o = 20 \log \frac{V_{OUT}}{V_{IN}}$$

Off isolation

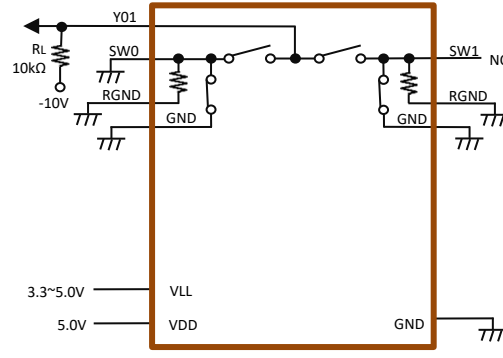


$$K_{c,sk} = 20 \log \frac{V_{OUT}}{V_{IN}}$$

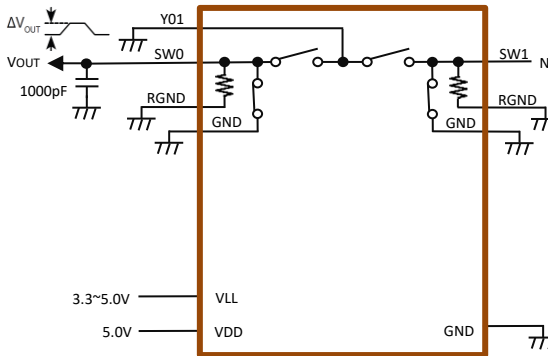
Crosstalk



DC Offset OFF

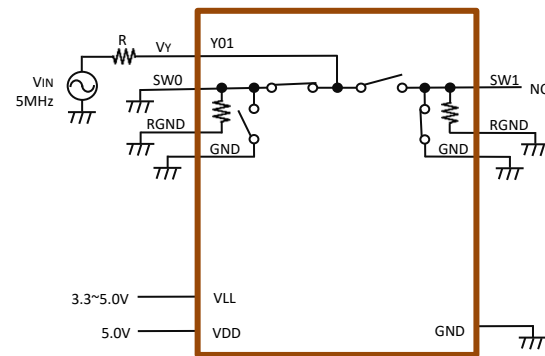


ton/toff Test Circuit



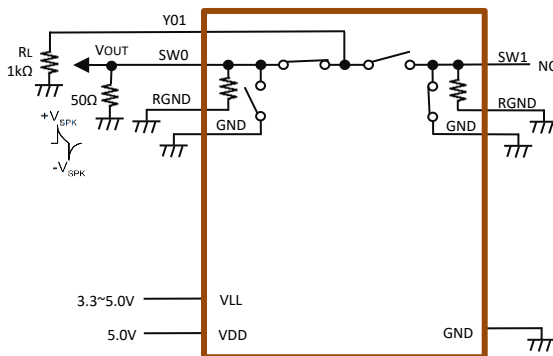
$$Q = 1000pF * \Delta V_{OUT}$$

Charge Injection

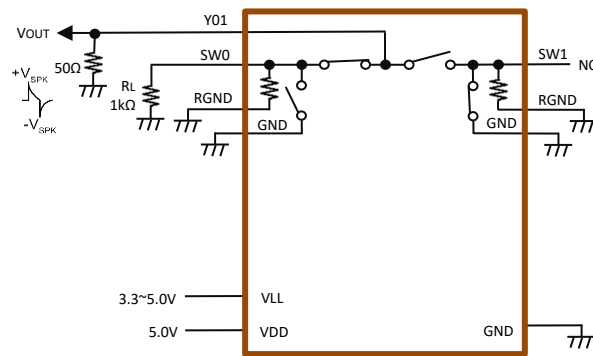


$$R_{ON} = R * V_{IN} / (V_{IN} - V_{Y})$$

On resistance test circuit



Output Voltage Spike SW

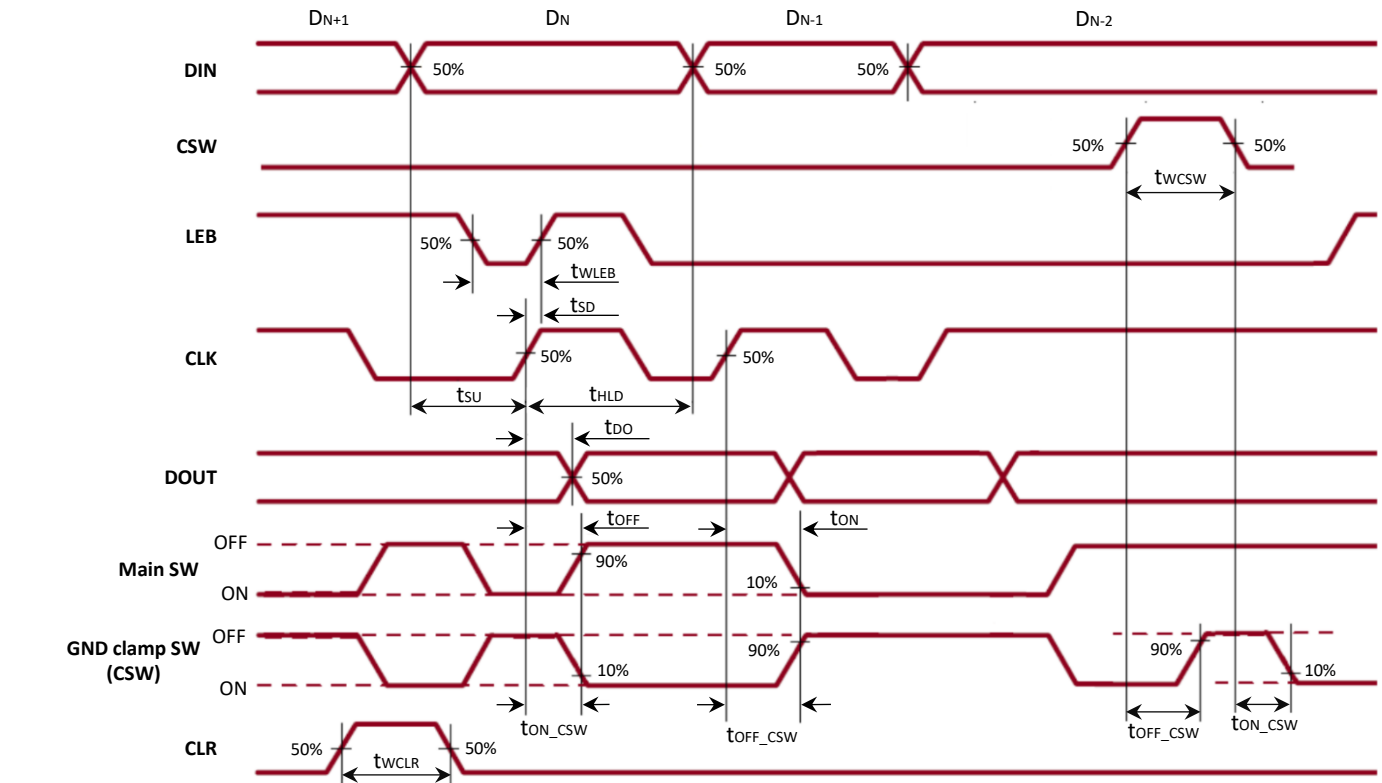


Output Voltage Spike Y

## 8, Logic Function Table

| Logic Inputs |     |     |     |    |     |     |     |     |     | Analog Switch State |          |         |          |     |         |          |         |          |     |         |          |
|--------------|-----|-----|-----|----|-----|-----|-----|-----|-----|---------------------|----------|---------|----------|-----|---------|----------|---------|----------|-----|---------|----------|
| LEB          | CLR | CSW | DIN |    |     |     |     |     |     | SW0                 |          | SW1     |          | ... | SW32    |          | SW33    |          | ... | SW63    |          |
|              |     |     | D0  | D1 | ... | D32 | D33 | ... | D63 | Main SW             | Clamp SW | Main SW | Clamp SW |     | Main SW | Clamp SW | Main SW | Clamp SW |     | Main SW | Clamp SW |
| L            | L   | L   | L   | -  |     | -   | -   |     | -   | OFF                 | ON       | -       | -        |     | -       | -        | -       | -        |     | -       | -        |
| L            | L   | L   | H   | -  |     | -   | -   |     | -   | ON                  | OFF      | -       | -        |     | -       | -        | -       | -        |     | -       | -        |
| L            | L   | L   | -   | L  |     | -   | -   |     | -   | -                   | -        | OFF     | ON       |     | -       | -        | -       | -        |     | -       | -        |
| L            | L   | L   | -   | H  |     | -   | -   |     | -   | -                   | -        | ON      | OFF      |     | -       | -        | -       | -        |     | -       | -        |
| L            | L   | L   | -   | -  |     | -   | -   |     | -   | -                   | -        | -       | -        |     | -       | -        | -       | -        |     | -       | -        |
| L            | L   | L   | -   | -  |     | -   | -   |     | -   | -                   | -        | -       | -        |     | -       | -        | -       | -        |     | -       | -        |
| L            | L   | L   | -   | -  |     | L   | -   |     | -   | -                   | -        | -       | -        |     | OFF     | ON       | -       | -        |     | -       | -        |
| L            | L   | L   | -   | -  | ... | H   | -   | ... | -   | -                   | -        | -       | -        | ... | ON      | OFF      | -       | -        | ... | -       | -        |
| L            | L   | L   | -   | -  |     | -   | L   |     | -   | -                   | -        | -       | -        |     | -       | -        | OFF     | ON       |     | -       | -        |
| L            | L   | L   | -   | -  |     | -   | H   |     | -   | -                   | -        | -       | -        |     | -       | -        | ON      | OFF      |     | -       | -        |
| L            | L   | L   | -   | -  |     | -   | -   |     | -   | -                   | -        | -       | -        |     | -       | -        | -       | -        |     | -       | -        |
| L            | L   | L   | -   | -  |     | -   | -   |     | -   | -                   | -        | -       | -        |     | -       | -        | -       | -        |     | -       | -        |
| L            | L   | L   | -   | -  |     | -   | -   |     | L   | -                   | -        | -       | -        |     | -       | -        | -       | -        |     | OFF     | ON       |
| L            | L   | L   | -   | -  |     | -   | -   |     | H   | -                   | -        | -       | -        |     | -       | -        | -       | -        |     | ON      | OFF      |
| L            | L   | H   | L   | -  |     | -   | -   |     | -   | OFF                 | OFF      | -       | -        |     | -       | -        | -       | -        |     | -       | -        |
| L            | L   | H   | H   | -  |     | -   | -   |     | -   | ON                  | OFF      | -       | -        |     | -       | -        | -       | -        |     | -       | -        |
| L            | L   | H   | -   | L  |     | -   | -   |     | -   | -                   | -        | OFF     | OFF      |     | -       | -        | -       | -        |     | -       | -        |
| L            | L   | H   | -   | H  |     | -   | -   |     | -   | -                   | -        | ON      | OFF      |     | -       | -        | -       | -        |     | -       | -        |
| L            | L   | H   | -   | -  |     | -   | -   |     | -   | -                   | -        | -       | -        |     | -       | -        | -       | -        |     | -       | -        |
| L            | L   | H   | -   | -  |     | -   | -   |     | -   | -                   | -        | -       | -        |     | -       | -        | -       | -        |     | -       | -        |
| L            | L   | H   | -   | -  |     | L   | -   |     | -   | -                   | -        | -       | -        |     | OFF     | OFF      | -       | -        |     | -       | -        |
| L            | L   | H   | -   | -  | ... | H   | -   | ... | -   | -                   | -        | -       | -        | ... | ON      | OFF      | -       | -        | ... | -       | -        |
| L            | L   | H   | -   | -  |     | -   | L   |     | -   | -                   | -        | -       | -        |     | -       | -        | OFF     | OFF      |     | -       | -        |
| L            | L   | H   | -   | -  |     | -   | H   |     | -   | -                   | -        | -       | -        |     | -       | -        | ON      | OFF      |     | -       | -        |
| L            | L   | H   | -   | -  |     | -   | -   |     | -   | -                   | -        | -       | -        |     | -       | -        | -       | -        |     | -       | -        |
| L            | L   | H   | -   | -  |     | -   | -   |     | -   | -                   | -        | -       | -        |     | -       | -        | -       | -        |     | -       | -        |
| L            | L   | H   | -   | -  |     | -   | -   |     | L   | -                   | -        | -       | -        |     | -       | -        | -       | -        |     | OFF     | OFF      |
| L            | L   | H   | -   | -  |     | -   | -   |     | H   | -                   | -        | -       | -        |     | -       | -        | -       | -        |     | ON      | OFF      |
| H            | L   | X   | X   | X  | X   | X   | X   | X   | X   | Hold Previous State |          |         |          |     |         |          |         |          |     |         |          |
| X            | H   | X   | X   | X  | X   | X   | X   | X   | X   | ALL "Main SWs" OFF  |          |         |          |     |         |          |         |          |     |         |          |

## 9, Logic Timing Waveforms



## 10, Pin Configuration (Table) 120-lead BGA

| Pin# | Name  | I/O | Function                                                |
|------|-------|-----|---------------------------------------------------------|
| A1   | Y01   | I/O | Analog switch input Y01, connected to AFE side          |
| A2   | Y1415 | I/O | Analog switch input Y1415, connected to AFE side        |
| A3   | Y3233 | I/O | Analog switch input Y3233, connected to AFE side        |
| A4   | Y4647 | I/O | Analog switch input Y4647, connected to AFE side        |
| A5   | SW0   | I/O | Analog switch output SW0, connected to probe side side  |
| A6   | SW1   | I/O | Analog switch output SW1, connected to probe side side  |
| A7   | SW2   | I/O | Analog switch output SW2, connected to probe side side  |
| A8   | SW3   | I/O | Analog switch output SW3, connected to probe side side  |
| A9   | SW4   | I/O | Analog switch output SW4, connected to probe side side  |
| A10  | SW5   | I/O | Analog switch output SW5, connected to probe side side  |
| A11  | SW6   | I/O | Analog switch output SW6, connected to probe side side  |
| A12  | SW7   | I/O | Analog switch output SW7, connected to probe side side  |
| B1   | Y23   | I/O | Analog switch input Y23, connected to AFE side          |
| B2   | Y1213 | I/O | Analog switch input Y1213, connected to AFE side        |
| B3   | Y3435 | I/O | Analog switch input Y3435, connected to AFE side        |
| B4   | Y4445 | I/O | Analog switch input Y4445, connected to AFE side        |
| B5   | SW8   | I/O | Analog switch output SW8, connected to probe side side  |
| B6   | SW9   | I/O | Analog switch output SW9, connected to probe side side  |
| B7   | SW10  | I/O | Analog switch output SW10, connected to probe side side |
| B8   | SW11  | I/O | Analog switch output SW11, connected to probe side side |
| B9   | SW12  | I/O | Analog switch output SW12, connected to probe side side |
| B10  | SW13  | I/O | Analog switch output SW13, connected to probe side side |
| B11  | SW14  | I/O | Analog switch output SW14, connected to probe side side |
| B12  | SW15  | I/O | Analog switch output SW15, connected to probe side side |
| C1   | Y45   | I/O | Analog switch input Y45, connected to AFE side          |
| C2   | Y1011 | I/O | Analog switch input Y1011, connected to AFE side        |
| C3   | Y3637 | I/O | Analog switch input Y3637, connected to AFE side        |
| C4   | Y4243 | I/O | Analog switch input Y4243, connected to AFE side        |
| C5   | SW32  | I/O | Analog switch output SW32, connected to probe side side |
| C6   | SW33  | I/O | Analog switch output SW33, connected to probe side side |
| C7   | SW34  | I/O | Analog switch output SW34, connected to probe side side |
| C8   | SW35  | I/O | Analog switch output SW35, connected to probe side side |
| C9   | SW36  | I/O | Analog switch output SW36, connected to probe side side |
| C10  | SW37  | I/O | Analog switch output SW37, connected to probe side side |
| C11  | SW38  | I/O | Analog switch output SW38, connected to probe side side |
| C12  | SW39  | I/O | Analog switch output SW39, connected to probe side side |
| D1   | Y67   | I/O | Analog switch input Y67, connected to AFE side          |
| D2   | Y89   | I/O | Analog switch input Y89, connected to AFE side          |
| D3   | Y3839 | I/O | Analog switch input Y3839, connected to AFE side        |
| D4   | Y4041 | I/O | Analog switch input Y4041, connected to AFE side        |

## 10, Pin Configuration (Table) 120-lead BGA (continued)

| Pin# | Name  | I/O | Function                                                                                                          |
|------|-------|-----|-------------------------------------------------------------------------------------------------------------------|
| D9   | SW40  | I/O | Analog switch output SW40, connected to probe side side                                                           |
| D10  | SW41  | I/O | Analog switch output SW41, connected to probe side side                                                           |
| D11  | SW42  | I/O | Analog switch output SW42, connected to probe side side                                                           |
| D12  | SW43  | I/O | Analog switch output SW43, connected to probe side side                                                           |
| E1   | VDD   | -   | Positive low voltage power supply (+5V)                                                                           |
| E2   | GND   | -   | Drive power ground (0V)                                                                                           |
| E3   | GND   | -   | Drive power ground (0V)                                                                                           |
| E4   | GND   | -   | Drive power ground (0V)                                                                                           |
| E6   | RGND  | -   | Bleed resistor ground (0V)                                                                                        |
| E7   | RGND  | -   | Bleed resistor ground (0V)                                                                                        |
| E9   | SW44  | I/O | Analog switch output SW44, connected to probe side side                                                           |
| E10  | SW45  | I/O | Analog switch output SW45, connected to probe side side                                                           |
| E11  | SW46  | I/O | Analog switch output SW46, connected to probe side side                                                           |
| E12  | SW47  | I/O | Analog switch output SW47, connected to probe side side                                                           |
| F1   | LEB   | I   | Active-Low latch enable input, Hi=Hold data, Low=Latch data input                                                 |
| F2   | DIN   | I   | Serial-Data input                                                                                                 |
| F3   | THP   | O   | Thermal protection output flag, open N-MOS drain (Low=THP activating)                                             |
| F4   | GND   | -   | Drive power ground (0V)                                                                                           |
| F6   | RGND  | -   | Bleed resistor ground (0V)                                                                                        |
| F7   | RGND  | -   | Bleed resistor ground (0V)                                                                                        |
| G1   | CLK   | I   | Serial-Clock input                                                                                                |
| G2   | DOUT  | O   | Serial-Data output                                                                                                |
| G3   | CLR   | I   | Clear input                                                                                                       |
| G4   | CSW   | I   | GND clamp control, Hi=always disabled, Low=main switches and GND clamp switches are alternately turned on and off |
| G6   | RGND  | -   | Bleed resistor ground (0V)                                                                                        |
| G7   | RGND  | -   | Bleed resistor ground (0V)                                                                                        |
| H1   | VLL   | -   | Positive voltage supply of low voltage interface (+1.8V~+5V)                                                      |
| H2   | GND   | -   | Drive power ground (0V)                                                                                           |
| H3   | GND   | -   | Drive power ground (0V)                                                                                           |
| H4   | GND   | -   | Drive power ground (0V)                                                                                           |
| H6   | RGND  | -   | Bleed resistor ground (0V)                                                                                        |
| H7   | RGND  | -   | Bleed resistor ground (0V)                                                                                        |
| H9   | SW63  | I/O | Analog switch output SW63, connected to probe side side                                                           |
| H10  | SW62  | I/O | Analog switch output SW62, connected to probe side side                                                           |
| H11  | SW61  | I/O | Analog switch output SW61, connected to probe side side                                                           |
| H12  | SW60  | I/O | Analog switch output SW60, connected to probe side side                                                           |
| J1   | Y2425 | I/O | Analog switch input Y2425, connected to AFE side                                                                  |
| J2   | Y2223 | I/O | Analog switch input Y2223, connected to AFE side                                                                  |
| J3   | Y5657 | I/O | Analog switch input Y5657, connected to AFE side                                                                  |
| J4   | Y5455 | I/O | Analog switch input Y5455, connected to AFE side                                                                  |

## 10, Pin Configuration (Table) 120-lead BGA (continued)

| Pin# | Name  | I/O | Function                                                |
|------|-------|-----|---------------------------------------------------------|
| J9   | SW59  | I/O | Analog switch output SW59, connected to probe side side |
| J10  | SW58  | I/O | Analog switch output SW58, connected to probe side side |
| J11  | SW57  | I/O | Analog switch output SW57, connected to probe side side |
| J12  | SW56  | I/O | Analog switch output SW56, connected to probe side side |
| K1   | Y2627 | I/O | Analog switch input Y2627, connected to AFE side        |
| K2   | Y2021 | I/O | Analog switch input Y2021, connected to AFE side        |
| K3   | Y5859 | I/O | Analog switch input Y5859, connected to AFE side        |
| K4   | Y5253 | I/O | Analog switch input Y5253, connected to AFE side        |
| K5   | SW55  | I/O | Analog switch output SW55, connected to probe side side |
| K6   | SW54  | I/O | Analog switch output SW54, connected to probe side side |
| K7   | SW53  | I/O | Analog switch output SW53, connected to probe side side |
| K8   | SW52  | I/O | Analog switch output SW52, connected to probe side side |
| K9   | SW51  | I/O | Analog switch output SW51, connected to probe side side |
| K10  | SW50  | I/O | Analog switch output SW50, connected to probe side side |
| K11  | SW49  | I/O | Analog switch output SW49, connected to probe side side |
| K12  | SW48  | I/O | Analog switch output SW48, connected to probe side side |
| L1   | Y2829 | I/O | Analog switch input Y2829, connected to AFE side        |
| L2   | Y1819 | I/O | Analog switch input Y1819, connected to AFE side        |
| L3   | Y6061 | I/O | Analog switch input Y6061, connected to AFE side        |
| L4   | Y5051 | I/O | Analog switch input Y5051, connected to AFE side        |
| L5   | SW31  | I/O | Analog switch output SW31, connected to probe side side |
| L6   | SW30  | I/O | Analog switch output SW30, connected to probe side side |
| L7   | SW29  | I/O | Analog switch output SW29, connected to probe side side |
| L8   | SW28  | I/O | Analog switch output SW28, connected to probe side side |
| L9   | SW27  | I/O | Analog switch output SW27, connected to probe side side |
| L10  | SW26  | I/O | Analog switch output SW26, connected to probe side side |
| L11  | SW25  | I/O | Analog switch output SW25, connected to probe side side |
| L12  | SW24  | I/O | Analog switch output SW24, connected to probe side side |
| M1   | Y3031 | I/O | Analog switch input Y3031, connected to AFE side        |
| M2   | Y1617 | I/O | Analog switch input Y1617, connected to AFE side        |
| M3   | Y6263 | I/O | Analog switch input Y6263, connected to AFE side        |
| M4   | Y4849 | I/O | Analog switch input Y4849, connected to AFE side        |
| M5   | SW23  | I/O | Analog switch output SW23, connected to probe side side |
| M6   | SW22  | I/O | Analog switch output SW22, connected to probe side side |
| M7   | SW21  | I/O | Analog switch output SW21, connected to probe side side |
| M8   | SW20  | I/O | Analog switch output SW20, connected to probe side side |
| M9   | SW19  | I/O | Analog switch output SW19, connected to probe side side |
| M10  | SW18  | I/O | Analog switch output SW18, connected to probe side side |
| M11  | SW17  | I/O | Analog switch output SW17, connected to probe side side |
| M12  | SW16  | I/O | Analog switch output SW16, connected to probe side side |

## 11, Pin Configuration (MAP) 120-lead BGA

|   | 1     | 2     | 3     | 4     | 5    | 6    | 7    | 8    | 9    | 10   | 11   | 12   |
|---|-------|-------|-------|-------|------|------|------|------|------|------|------|------|
| A | Y01   | Y1415 | Y3233 | Y4647 | SW0  | SW1  | SW2  | SW3  | SW4  | SW5  | SW6  | SW7  |
| B | Y23   | Y1213 | Y3435 | Y4445 | SW8  | SW9  | SW10 | SW11 | SW12 | SW13 | SW14 | SW15 |
| C | Y45   | Y1011 | Y3637 | Y4243 | SW32 | SW33 | SW34 | SW35 | SW36 | SW37 | SW38 | SW39 |
| D | Y67   | Y89   | Y3839 | Y4041 | -    | -    | -    | -    | SW40 | SW41 | SW42 | SW43 |
| E | VDD   | GND   | GND   | GND   | -    | RGND | RGND | -    | SW44 | SW45 | SW46 | SW47 |
| F | LEB   | DIN   | THP   | GND   | -    | RGND | RGND | -    | -    | -    | -    | -    |
| G | CLK   | DOUT  | CLR   | CSW   | -    | RGND | RGND | -    | -    | -    | -    | -    |
| H | VLL   | GND   | GND   | GND   | -    | RGND | RGND | -    | SW63 | SW62 | SW61 | SW60 |
| J | Y2425 | Y2223 | Y5657 | Y5455 | -    | -    | -    | -    | SW59 | SW58 | SW57 | SW56 |
| K | Y2627 | Y2021 | Y5859 | Y5253 | SW55 | SW54 | SW53 | SW52 | SW51 | SW50 | SW49 | SW48 |
| L | Y2829 | Y1819 | Y6061 | Y5051 | SW31 | SW30 | SW29 | SW28 | SW27 | SW26 | SW25 | SW24 |
| M | Y3031 | Y1617 | Y6263 | Y4849 | SW23 | SW22 | SW21 | SW20 | SW19 | SW18 | SW17 | SW16 |

120-lead BGA  
(Top view)

## 12, Product Marking

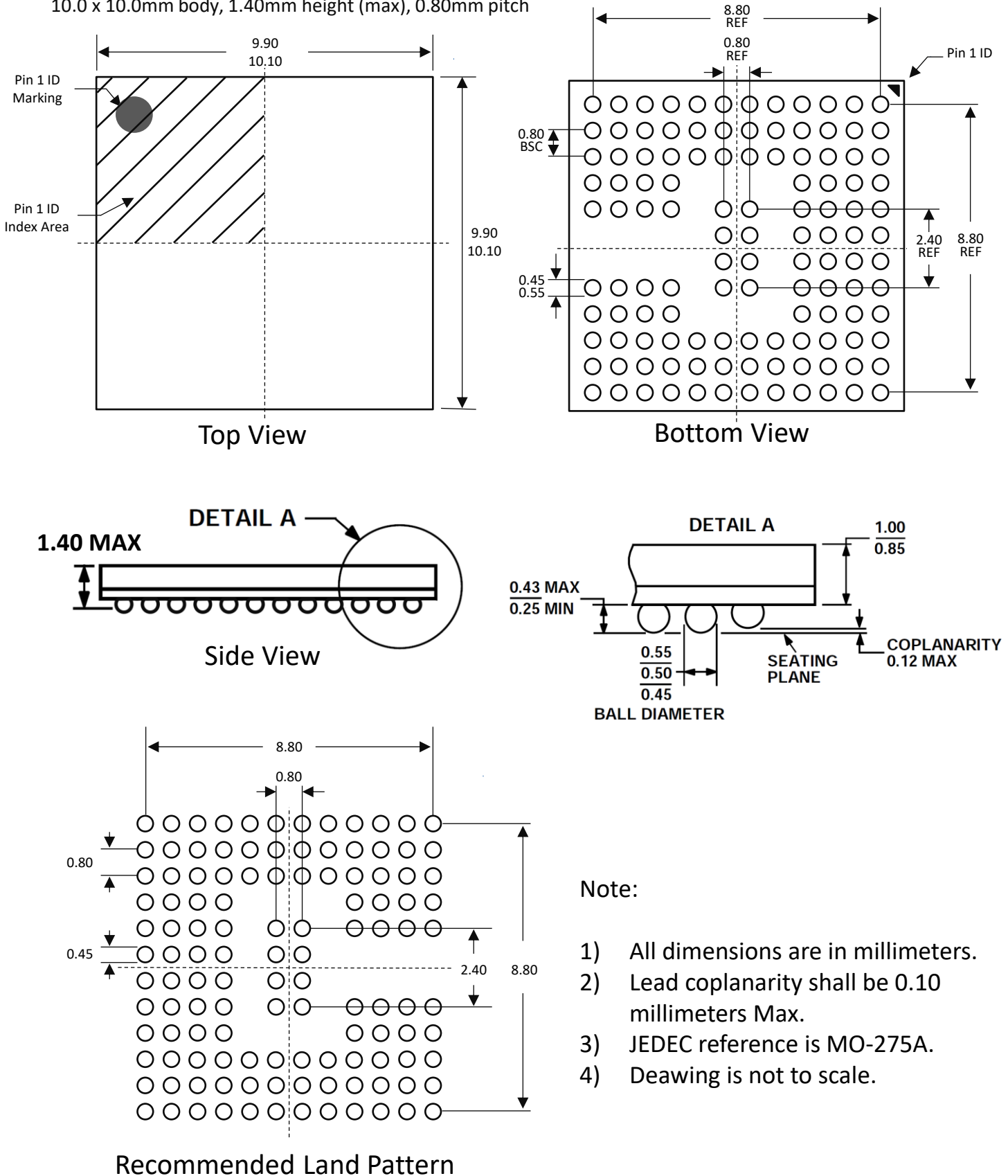


L = Lot Number  
YY = Year Sealed  
WW = Week Sealed

120-Lead BGA

### 13, 120-Lead BGA Package Outline

10.0 x 10.0mm body, 1.40mm height (max), 0.80mm pitch



## 14, Product Identification Information

|                                                                                                                                                   |                                                                                                                                                |
|---------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------|
| <div><div><div>PART NO.</div><div>Device</div></div><div><div>XX</div><div>Package</div></div><div><div>XX</div><div>Media Type</div></div></div> | <p><b>Examples:</b></p> <p>SY2640BG: 64-Channel SPDT High Voltage Analog Switch<br/>64-lead BGA, 10.00x10.00mm<br/>260pcs/Tray x10 for MOQ</p> |
| Device: SY2640: 64-Channel SPDT High Voltage Analog Switch                                                                                        |                                                                                                                                                |
| Package: BG: BGA                                                                                                                                  |                                                                                                                                                |
| Media Type: (blank): 2600pcs for MOQ                                                                                                              |                                                                                                                                                |

## Revision History

| Revision # | Revision Date | Pages Updated | Description                                     |
|------------|---------------|---------------|-------------------------------------------------|
| Rev. 0.0   | 2025-02-18    |               | Initially released as preliminary specification |
|            |               |               |                                                 |