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16 位稳态电流 LED 驱动器

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16 位稳态电流 LED 驱动器

概述

ES8310 IC 是一种稳态电流驱动器。其稳态电流值可以通过调节一外部电阻而变化（Iout=5~90mA）。在单晶硅 CMOS 芯片上器件包含有 16 位移位寄存器，锁存器以及稳态电流驱动器。

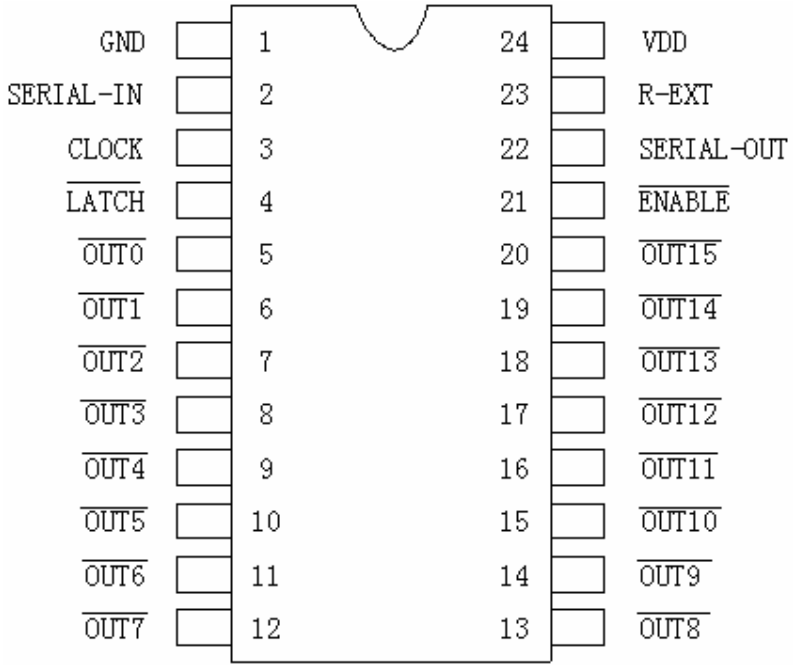
特征

1.输出稳态电流：通过调节电阻，其电流变化范围为 5~90 m A
2.最大时钟频率：25MHZ
3.兼容 5V CMOS 输入
4.封装形式： SDIP24 SSOP24,SOP24
5.稳态电流: (Ta=25^{o}C, VDD=5.0V)
Bit-to-Bit: ±3%;
Chip-to-Chip: ±6%
6.与 TOSHIBA TB62706 功能及引脚均兼容

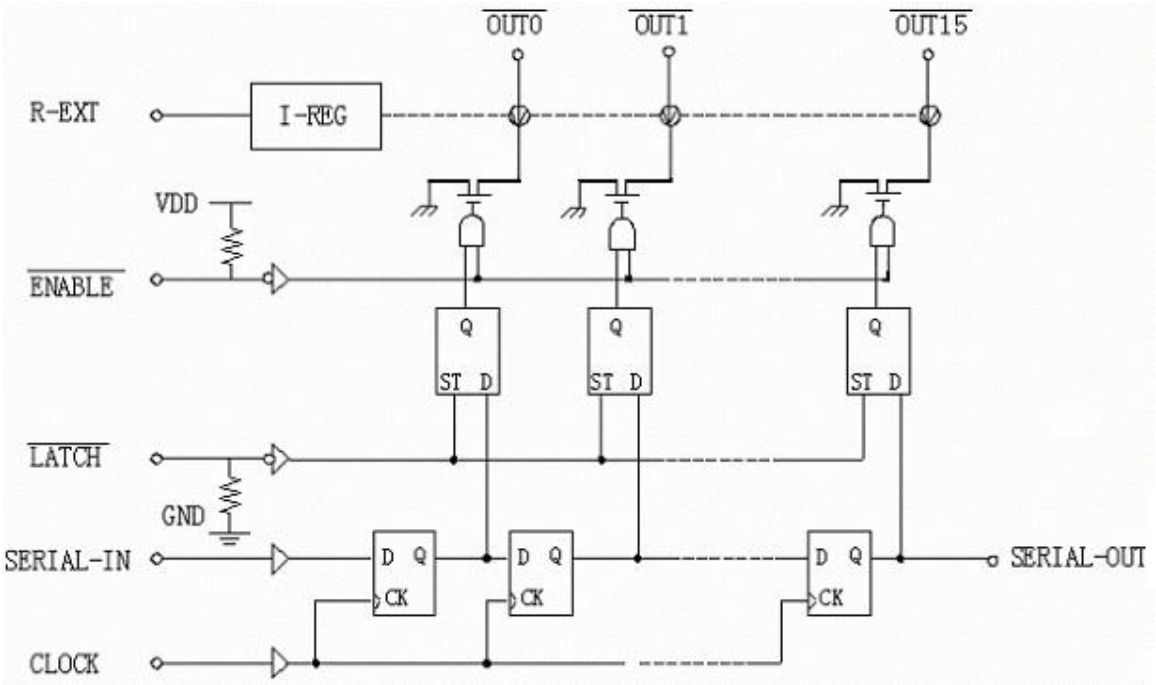
脚位说明

脚位号	脚位名称	功能
1	GND	控制逻辑的接地端
2	SERIAL-IN	移位寄存器的 SERIAL 数据输入端
3	CLOCK	移位数据时钟上升沿有效
4	$\overline{\text{LATCH}}$	数据锁存输入端。LATCH 端高电平输入时，锁存器传递数据；LATCH 端低电平输入时，锁存器保持数据。
5~20	$\overline{\text{OUT 0~15}}$	输出端
21	$\overline{\text{ENABLE}}$	输出使能输入端。ENABLE 端高电平输入时，所有的输出端关闭，ENABLE 端低电平输入时，所有的输出端开启。
22	SERIAL-OUT	串行输入数据输出端，提供下一级的串行数据输入端
23	R-EXT	调节输出电流的电阻输入端
24	V_{DD}	5 V 供应电源端

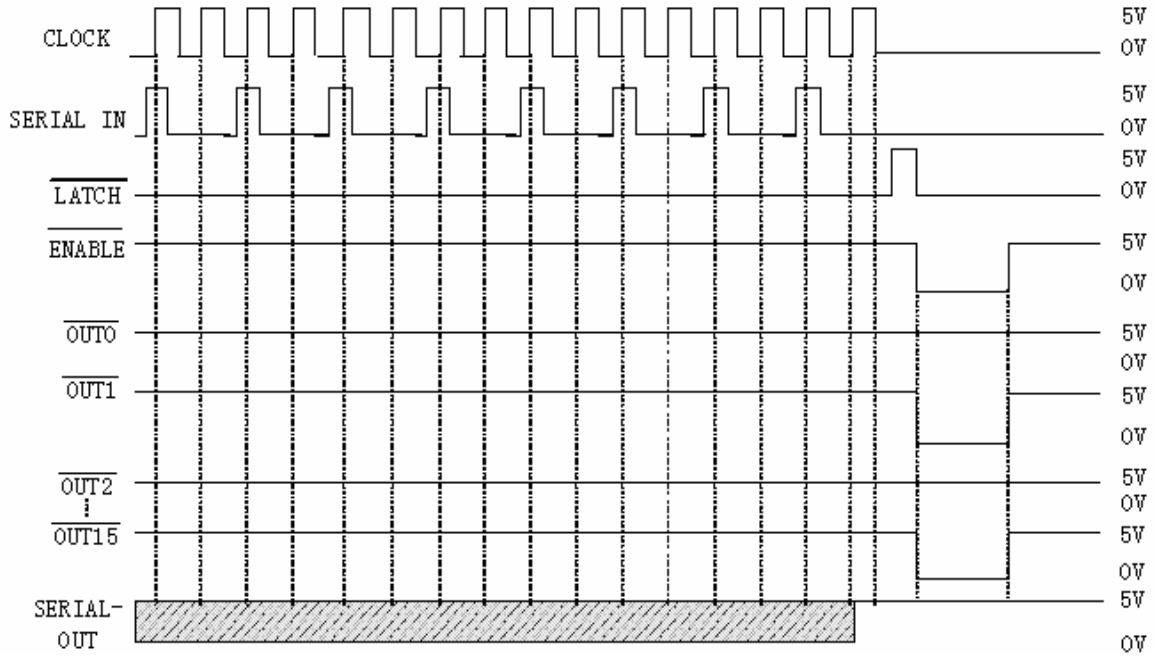
脚位图(顶视图)



功能方块图


OUT0
OUT1
OUT15
R-EXT
I-REG
VDD
ENABLE
Q
ST D
LATCH
GND
SERIAL-IN
D Q
CK
SERIAL-OUT
CLOCK

时序图

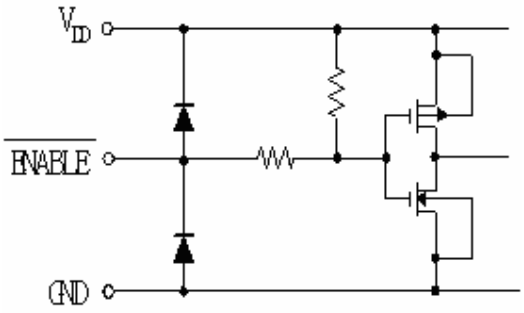


注释:

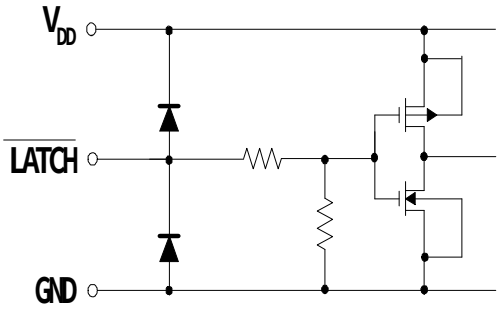
1、$\overline{\text{LATCH}}$=高电平，锁存器无效，传递数据
2、$\overline{\text{LATCH}}$=低电平，锁存数据
3、ENABLE 高电平时，所有的输出端关闭，呈高阻状态
4、在 R-EXT 和 GND 之间串一外接电阻可调整所有输出电流
5、数据传输在时钟上升沿有效

输入及输出等效电路

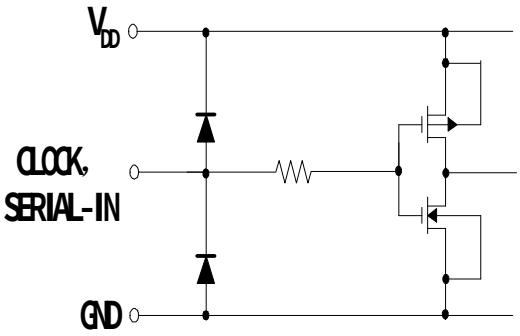
1.ENABLE TERMINAL



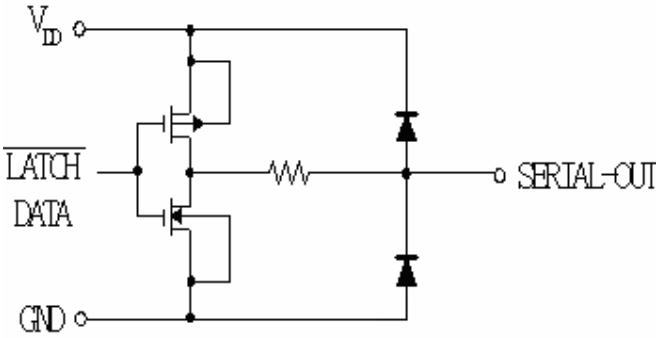
2.LATCH TERMINAL



3.CLOCK, SERIAL-IN TERMINAL

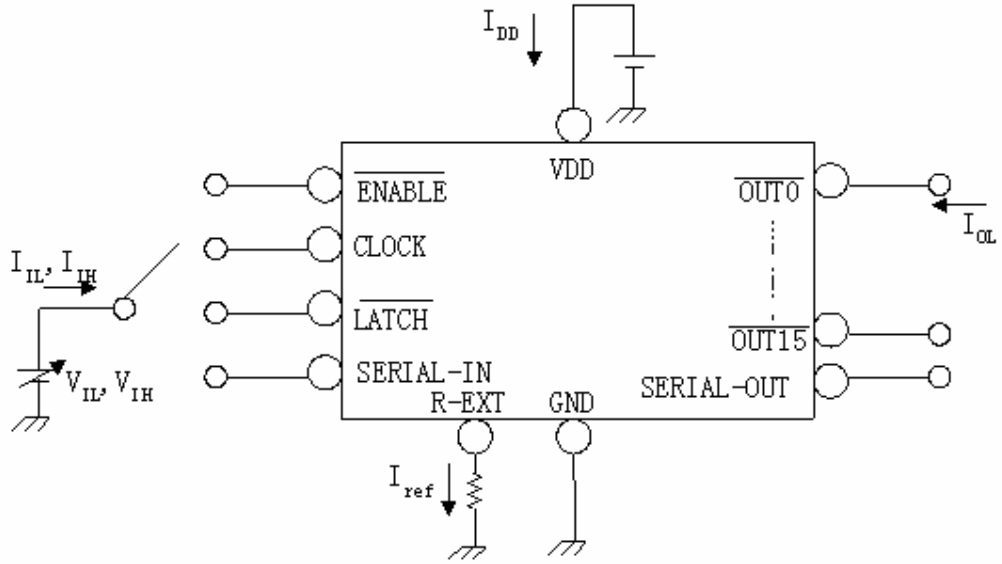


4.SERIAL-OUT TERMINAL

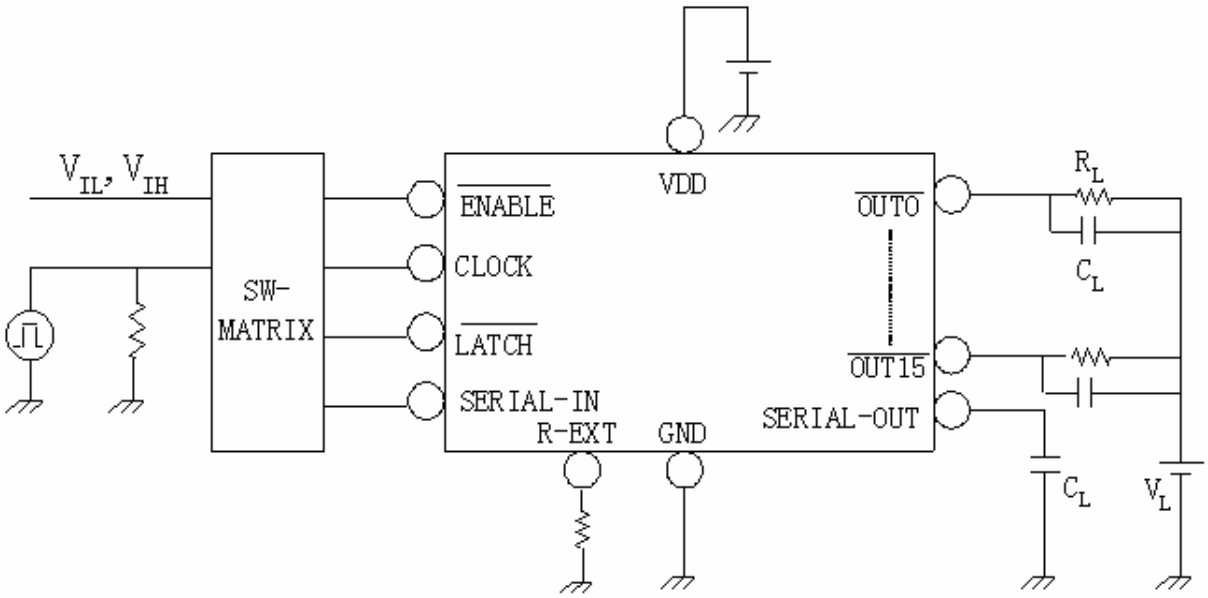


测试电路

直流特性

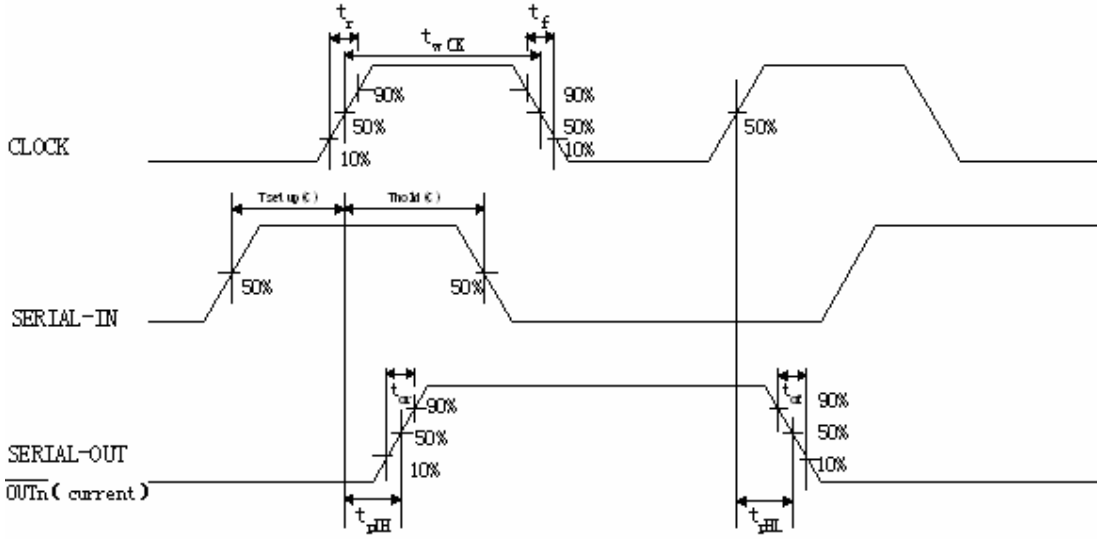


交流特性

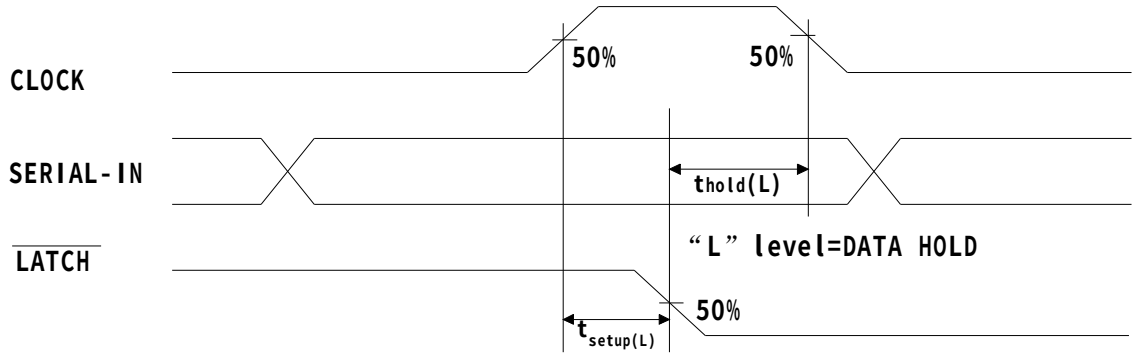


时序的波形图

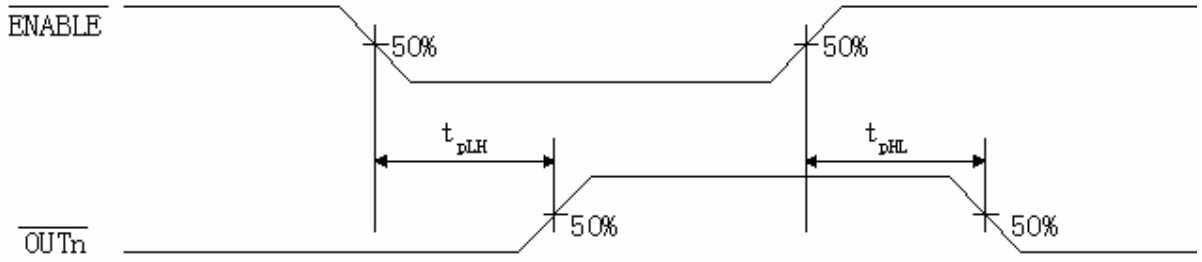
1. CLOCK-SERIAL-IN, SERIAL-OUT, $\overline{OUTn}$



2. CLOCK-$\overline{LATCH}$



3. $\overline{ENABLE}$ -$\overline{OUTn}$



电子特性

CHARACTERISTIC	SYMBOL	CONDITION	MIN.	TYP.	MAX.	UNIT
Input Voltage “H” Level	V_{IH}	Ta=-40~85 °C	0.7VDD	—	VDD	V
Input Voltage “L” Level	V_{IL}	Ta=-40~85 °C	GND	—	0.3VDD	
Output Leakage Current	I_{OH}	V_{OH}=15.0V	—	—	10	uA
Output Voltage (S-OUT)	V_{OL}	I_{OL}=4.0mA	—	—	0.4	V
	V_{OH}	I_{OH}= -3.9mA	4.6	—	—	
Output Current 1	I_{OL1}	V_{DS}=0.7V R_{EXT}=470Ω(include Current Matching)	34.1	40.0	45.9	mA
	I_{OL2}	V_{DS}=0.4V R_{EXT}=470Ω(include Current Matching)	33.7	39.5	45.3	
Output Current 2	I_{OL3}	V_{DS}=0.7V R_{EXT}=250 Ω (include Current Matching)	64.2	72.5	80.8	mA
	I_{OL4}	V_{DS}=0.4V R_{EXT}=300 Ω (include Current Matching)	50.0	57.0	64.0	
Supply Voltage Regulation	% / VDD	R_{EXT}=470 Ω ,Ta=-40~+85 °C	—	±1.5	±5.0	% / V
Pull-Up Resistor	RIN (up)	—	150	300	600	KΩ
Pull-Down Resistor	RIN (down)	—	100	200	400	KΩ
Supply Current “OFF”	$I_{DD\,(off)\,1}$	R-EXT=OPEN, $\overline{OUT0\sim7}$=off	—	0.4	—	mA
	$I_{DD\,(off)\,2}$	R-EXT=470 Ω ,$\overline{OUT0\sim7}$=off	—	4.3	—	
	$I_{DD\,(off)\,3}$	R-EXT=250 Ω ,$\overline{OUT0\sim7}$=off	8.0	8.3	8.5	
Supply Current “ON”	$I_{DD\,(on)\,1}$	R-EXT=470 Ω ,$\overline{OUT0\sim7}$=on	4.2	4.4	4.7	
	$I_{DD\,(on)\,2}$	R-EXT=250 Ω ,$\overline{OUT0\sim7}$=on	8.1	8.4	8.8	

最大工作范围

CHARACTERISTIC	SYMBOL	RATING	UNIT
Supply Voltage	V_{DD}	0~7.0	V
Input Voltage	V_{IN}	-0.4~VDD+0.4	V
Output Current	I_{OUT}	+90	mA
Output Voltage	V_{OUT}	-0.5~+17.0	V
Clock Frequency	f_{CLK}	25	MHz
GND Terminal Current	I_{GND}	1440	mA
Power Dissipation	P_D	1.78(SDIP-24: ON PCB Ta=25°C)	W
		1.00(SSOP-24: ON PCB Ta=25 °C)	
Thermal Resistance	$R_{th(j-a)}$	70.0(SDIP-24: ON PCB)	°C/W
		120(SSOP-24: ON PCB)	
Storage Temperature	T_{stg}	-55~+150	°C
Operating Temperature	Topr	-40~+85	°C

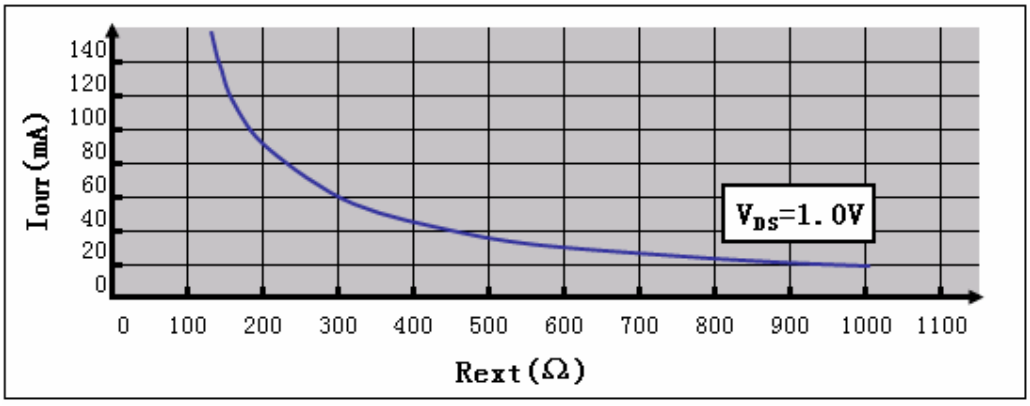
转换特性

CHARACTERISTIC		SYMBOL	CONDITION	MIN.	TYP.	MAX.	UNIT
Propagation Delay Time (“L” to “H”)	CLK-$\overline{\text{OUTn}}$	t_{pLH}	V_{DD}=5.0V V_{CE}=0.4V V_{IH}=VDD V_{IL}=GND R_{EXT}=470 Ω V_L=3.0V R_L=65 Ω C_L=10.5pF	—	1200	1500	ns
	$\overline{\text{LATCH}}$/-$\overline{\text{OUTn}}$/			—	1200	1500	
	$\overline{\text{ENABLE}}$/-$\overline{\text{OUTn}}$/			—	1200	1500	
	CLK - S-OUT			—	30	70	
Propagation Delay Time (“H” to “L”)	CLK-$\overline{\text{OUTn}}$	t_{pHL}		—	700	1000	ns
	$\overline{\text{LATCH}}$/-$\overline{\text{OUTn}}$/			—	700	1000	
	$\overline{\text{ENABLE}}$/-$\overline{\text{OUTn}}$/			—	700	1000	
	CLK - S-OUT			—	30	70	
Output Current Rise Time		t_{or}		150	300	600	ns
Output Current Fall Time		t_{of}		150	300	600	ns

建议操作条件

CHARACTERISTIC	SYMBOL	CONDITION	MIN.	TYP.	MAX.	UNIT
Supply Voltage	V_{DD}	—	4.5	5.0	5.5	V
Output Voltage	V_{OUT}	—	—	—	15.0	V
Output Current	I_{OUT}	DC 1 Circuit	5	—	88	mA
	I_{OH}	SERIAL-OUT	—	-3.7	—	
	I_{OL}	SERIAL-OUT	—	-4.0	—	
Input Voltage	V_{IH}	—	0.7VDD	—	VDD+0.3	V
	V_{IL}	—	-0.3	—	0.3VDD	
$\overline{\text{LATCH}}$ Pulse Width	$t_{w\,LAT}$	V_{DD}=4.5~5.5V	100	—	—	ns
CLOCK Pulse Width	$t_{w\,CLK}$		50	—	—	ns
Set-up Time for DATA	$t_{setup(D)}$		60	—	—	ns
Hold Time for DATA	$t_{hold(D)}$		20	—	—	ns
Set-up Time for $\overline{\text{LATCH}}$	$t_{setup(L)}$		100	—	—	ns
Clock Frequency	f_{CLK}	Cascade operation	—	15.0	20.0	MHz
Power Dissipation	P_D	Ta=85 °C(SDIP-24)	—	—	0.92	W
		Ta=85 °C(SSOP-24)	—	—	0.50	

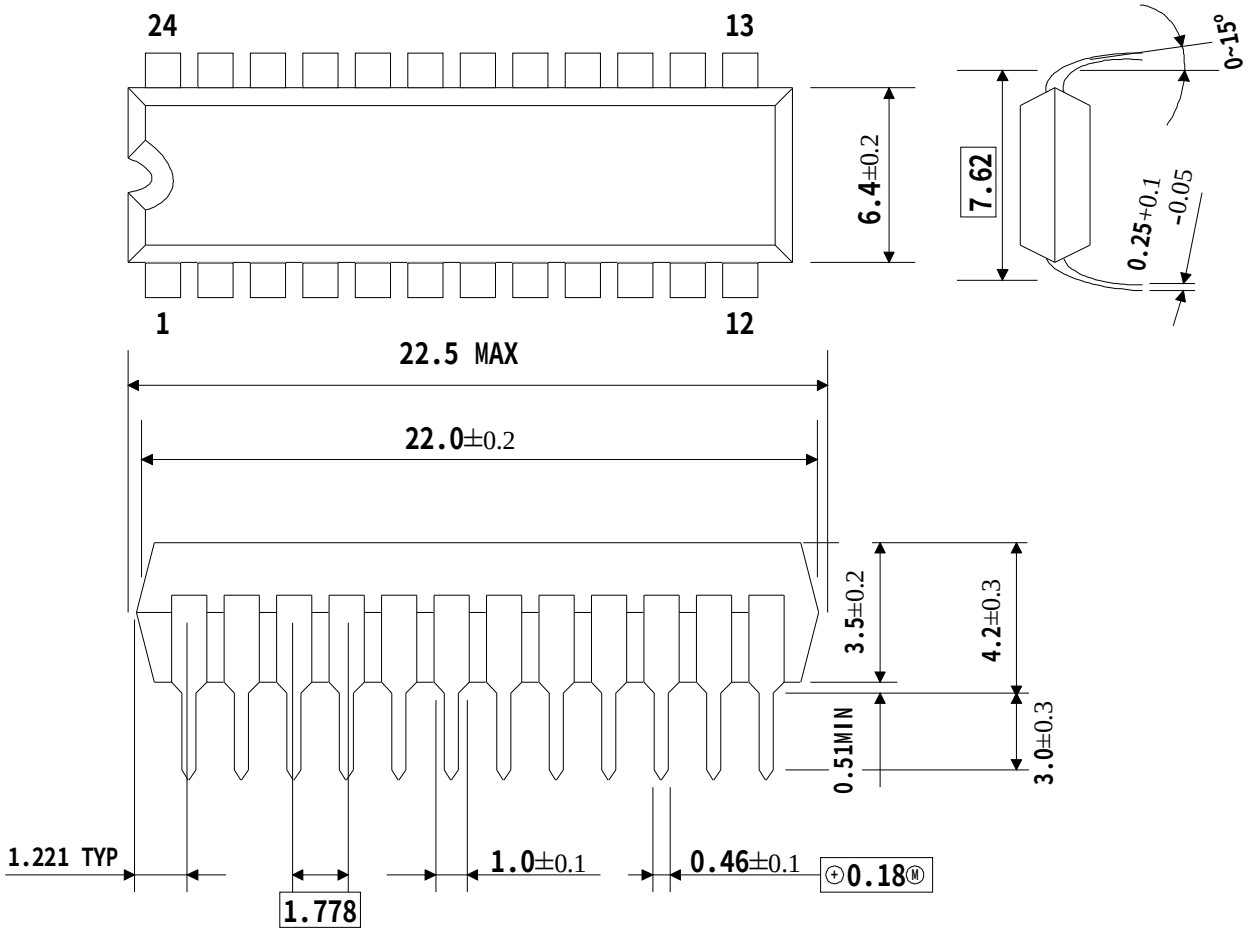
I_{OUT}-R-EXT



电流计算公式：Iout = (1.23/Rext)×15.3

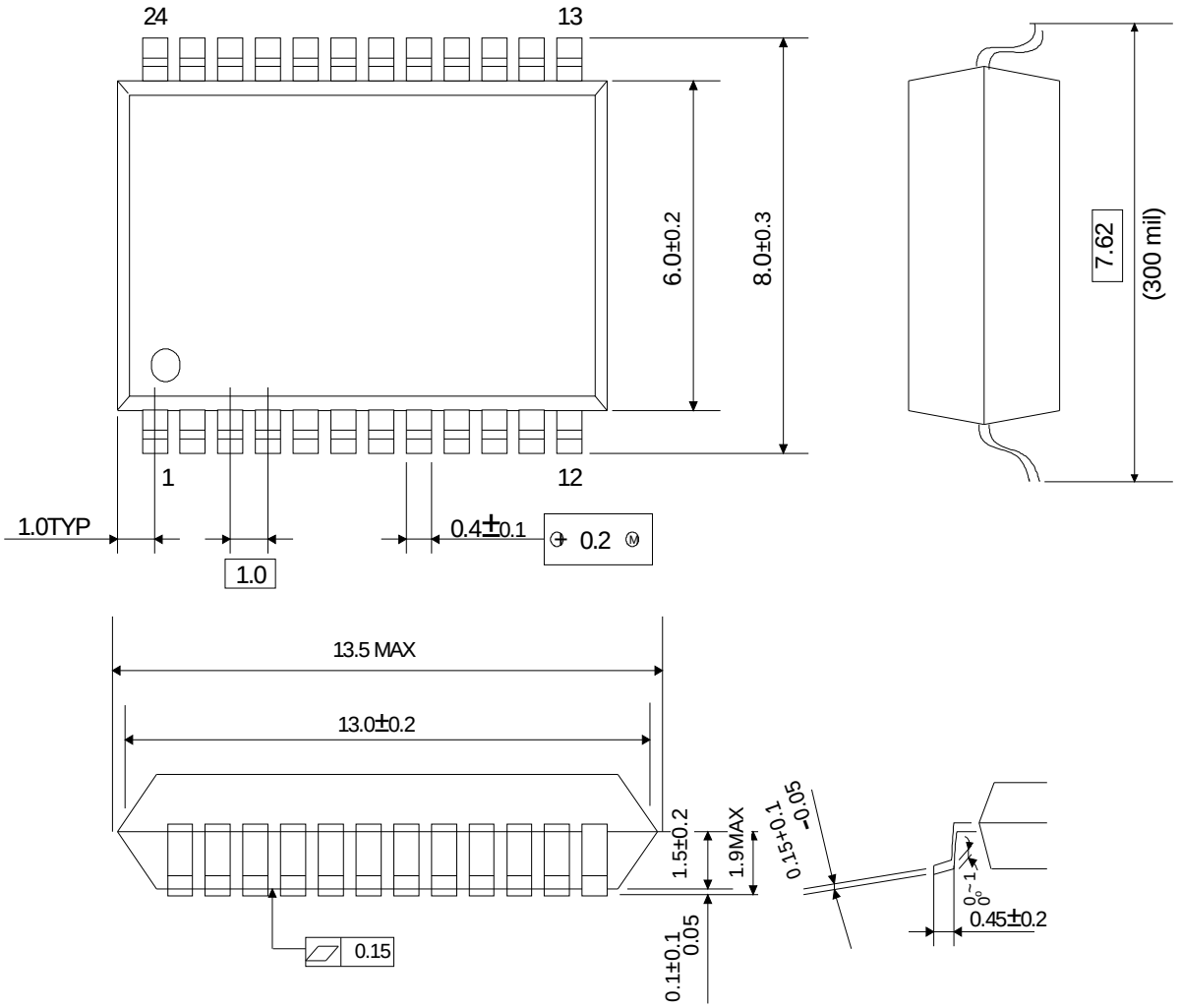
外观轮廓图

SDIP24 **UNIT:mm**



Weight:1.22g (Typ.)

SOP24 **UNIT: mm**



Weight:0.32g(Typ.)

SSOP24 **Unit : mm**