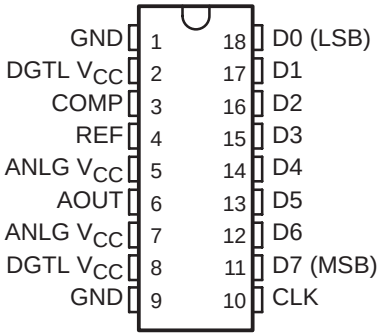
SLAS020 − SEPTEMBER 1988 − REVISED OCTOBER 1990

- **8-Bit Resolution**
- **±0.2% Linearity**
- **Maximum Conversion Rate . . . 30 MHZ Typ**
  20 MHz Min
- **Analog Output Voltage Range**
  V_{CC} to V_{CC} −1 V
- **TTL Digital Input Voltage**
- **5-V Single-Supply Operation**
- **Low Power Consumption . . . 250 mW Typ**
- **Interchangeable With Fujitsu MB40778**

N PACKAGE
(TOP VIEW)

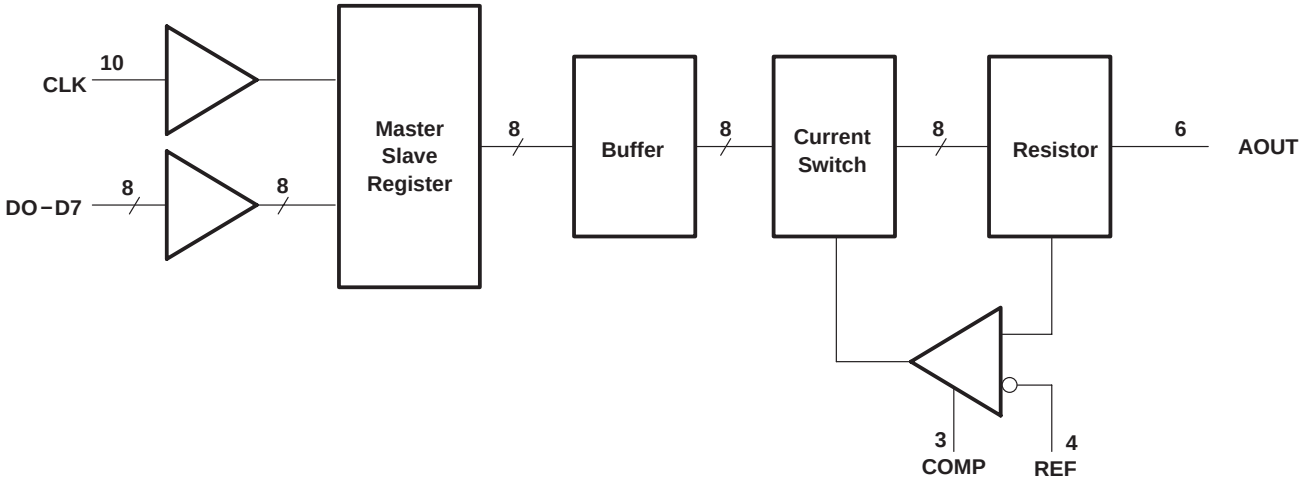


description

The TL5602 is a low-power ultra-high-speed video digital-to-analog converter that uses the Advanced Low-Power Schottky (ALS) process. It converts digital signals to analog signals at a sampling rate of dc to 20 MHz. Because of such high-speed capability, the TL5602 is suitable for digital video applications such as digital television, video processing with a computer, and radar signal processing.

The TL5602C is characterized for operation from 0°C to 70°C.

functional block diagram



TEXAS INSTRUMENTS
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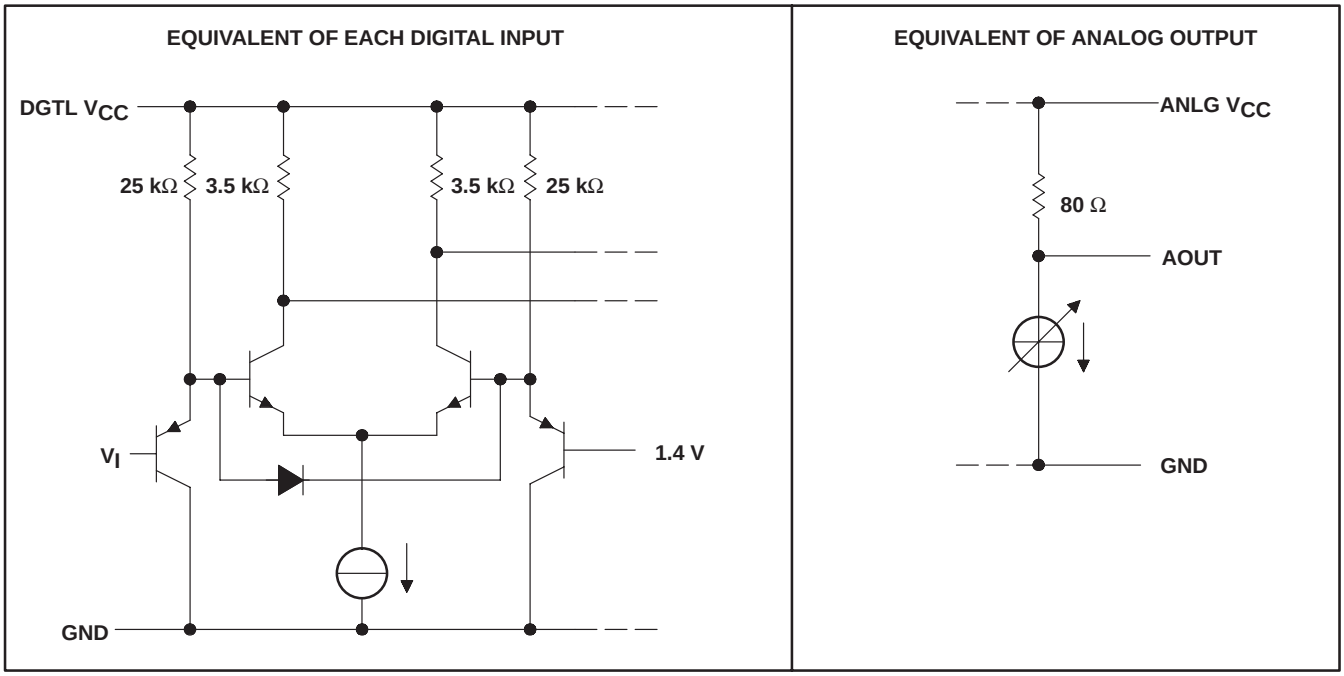
FUNCTION TABLE

STEP	DIGITAL INPUTS								OUTPUT VOLTAGE†
	D7	D6	D5	D4	D3	D2	D1	D0	
0	L	L	L	L	L	L	L	L	3.980 V
1	L	L	L	L	L	L	L	L	3.984 V
⋮					⋮				⋮
127	L	H	H	H	H	H	H	H	4.488 V
128	H	L	L	L	L	L	L	L	4.492 V
129	H	L	L	L	L	L	L	H	4.496 V
⋮					⋮				⋮
254	H	H	H	H	H	H	H	L	4.996 V
255	H	H	H	H	H	H	H	H	5.000 V

† For V_{CC} = 5 V, V_{ref} = 3.976 V

schematics of equivalent input and output circuits



absolute maximum ratings over operating free-air temperature range (unless otherwise noted)

Supply voltage range, ANLG V_{CC}, DGTL V_{CC} . . . . . −0.5 V to 7 V
Digital input voltage range, V_I . . . . . −0.5 V to 7 V
Analog reference voltage range, V_{ref} . . . . . 3.8 V to V_{CC} +0.5 V
Operating free-air temperature range . . . . . 0°C to 70°C
Storage temperature range . . . . . −55°C to 150°C
Lead temperature 1,6 mm (1/16 inch) from case for 10 seconds . . . . . 260°C

recommended operating conditions

	MIN	NOM	MAX	UNIT
Supply voltage, V_{CC}	4.75	5	5.25	V
Analog reference voltage, V_{ref} (see Note 1)	3.8	4	4.2	V
High-level input voltage, V_{IH}	2			V
Low-level input voltage, V_{IL}			0.8	V
Pulse duration, CLK high or low, t_w	25			ns
Setup time, data before CLK↑, t_{su}	12.5			ns
Hold time, data after CLK↓, t_h	12.5			ns
Phase compensation capacitance, C_{comp} (see Note 2)	1			µF
Operating free-air temperature, T_A	0		70	°C

NOTES: 1. $V_{CC} - V_{ref} \leq 1.2$ V
2. This capacitor should be connected between COMP and GND.

electrical characteristics over recommended ranges of supply voltage and operating free-air temperature (unless otherwise noted)

PARAMETER		TEST CONDITIONS		MIN	TYP†	MAX	UNIT
I_I	Input current at maximum input voltage	V_{CC} = 5.25 V,	V_I = 7 V		0	100	µA
I_{IH}	High-level input current	V_{CC} = 5.25 V,	V_I = 2.7 V		0	20	µA
I_{IL}	Low-level input current	V_{CC} = 5.25 V,	V_I = 0.4 V		−40	− 400	µA
I_{ref}	Input reference current	V_{Iref} = 4 V				10	µA
V_{FS}	Full-scale analog output voltage	V_{CC} = 5 V,	V_{ref} = 3.976 V,	V_{CC}−15	V_{CC}	V_{CC}+15	mV
V_{ZS}	Zero-scale analog output voltage	I_O = 0 (no load)		3.919	3.980	4.042	
z_o	Output impedance	T_A = 25°C		70	80	90	Ω
I_{CC}	Supply current	V_{ref} = 4.05 V			50	75	mA

† All typical values are at V_{CC} = 5 V, V_{ref} = 4 V, T_A = 25°C.

operating characteristics over recommended ranges of supply voltage and operating free-air temperature

PARAMETER		TEST CONDITIONS	MIN	TYP†	MAX	UNIT
E_L	Linearity error				±0.2	%FSR
f_{max}	Maximum converstion rate		20	30		MHz

PARAMETER MEASUREMENT INFORMATION

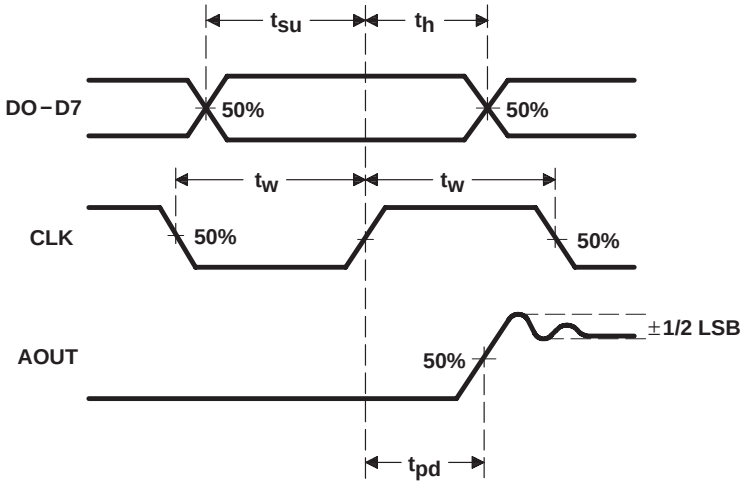


Figure 1. Voltage Waveforms

TYPICAL CHARACTERISTICS

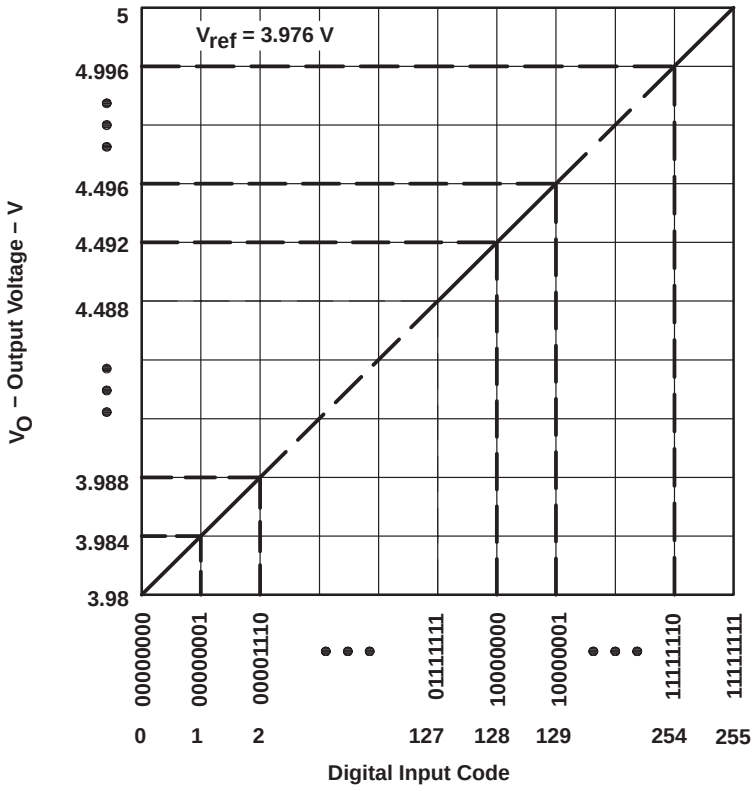


Figure 2. Ideal Conversion Characteristics

TYPICAL CHARACTERISTICS

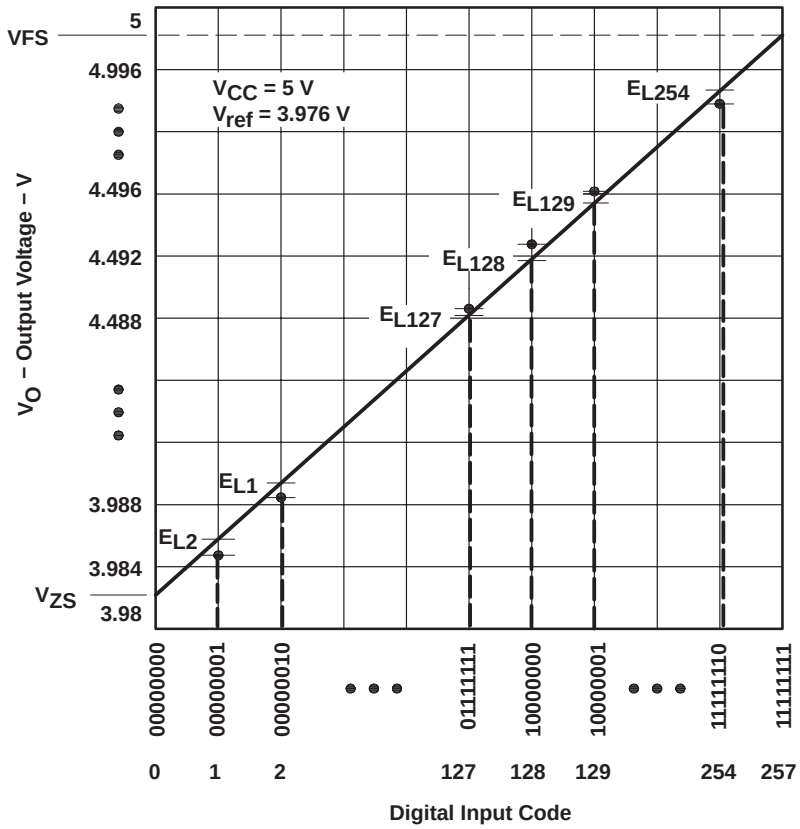


Figure 3. End-Point Linearity Error

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