General Description

The IDTVS330 is a true bidirectional Quad 2-channel multiplexer/ demultiplexer recommended for both RGB and composite video switching applications. The video switch can be driven from a current output RAMDAC or voltage output composite video source.

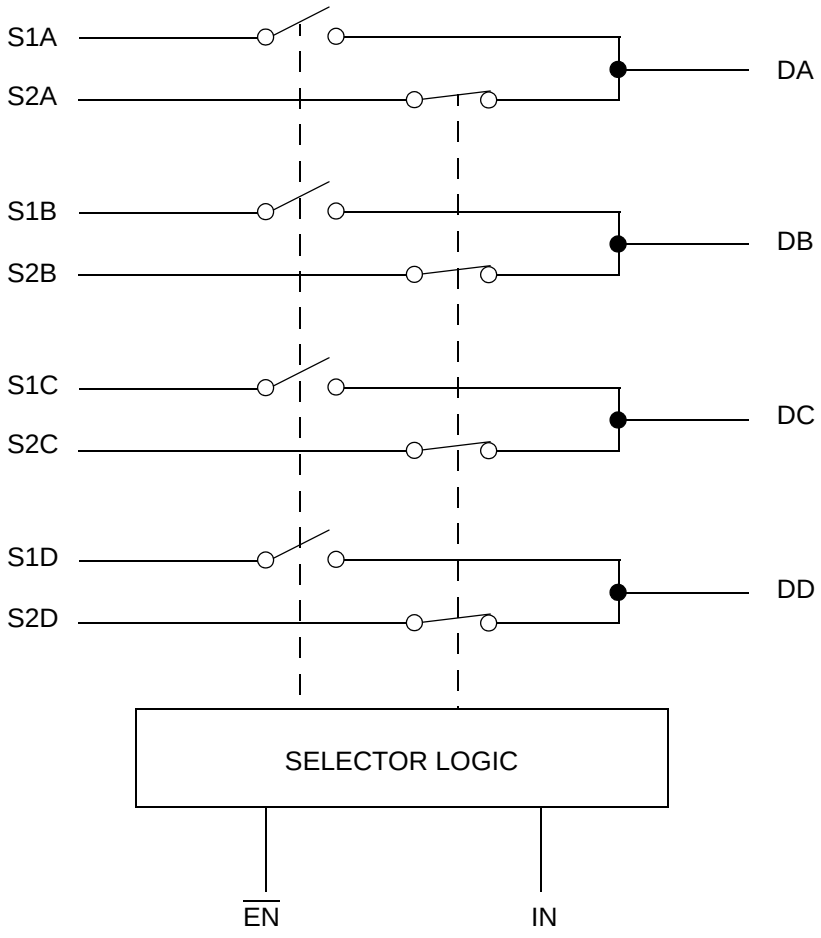
Low On-Resistance and wide bandwidth make it ideal for video and other applications. Also this device has exceptionally high current capability which is far greater than most analog switches offered today. A single 5V supply is all that is required for operation.

The IDTVS330 offers a high-performance, low-cost solution to switch between video sources. The application section describes the IDTVS330 replacing the HC4053 multiplier and buffer/ amplifier.

Features

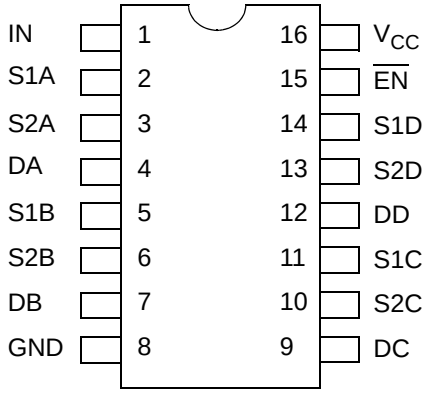
- High-performance solution to switch between video sources
- Wide bandwidth: 600MHz
- Low On-Resistance: 5Ω typical
- Low crosstalk at 10MHz: –80dB
- Ultra-low quiescent power (0.1μA typical)
- Fast switching: 10ns
- 8KV ESD HBM on connector side
- Available in SOIC and QSOP packages

Block Diagram



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Pin Configuration



SOIC/ QSOP
TOP VIEW

Absolute Maximum Ratings

Symbol	Rating	Min	Max[1]	Unit
TSTG	Storage Temperature Range	– 65	+150	°C
	Ambient Temperature with Power Applied	0	+70	°C
	Supply Voltage to GND Potential	– 0.5	+5.5	V
	DC Input Voltage	– 0.5	+5.5	V
	DC Output Current	—	120	mA
	Power Dissipation	—	0.5	W

1. Stresses greater than those listed under ABSOLUTE MAXIMUM RATINGS may cause permanent damage to the device. This is a stress rating only and functional operation of the device at these or any other conditions above those indicated in the operational sections of this specification is not implied. Exposure to absolute maximum rating conditions for extended periods may affect reliability.

Truth Table

$\overline{EN}$	IN	ON Switch
L	L	S1A, S1B, S1C, S1D
L	H	S2A, S2B, S2C, S2D
H	X	Disabled

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Pin Description

Name	Function
S1, S2	Analog Video I/Os
IN	Select Input
EN	Enable
D	Analog Video I/O
GND	Ground
V_{CC}	Power Supply

DC Electrical Characteristics Over Operating Range

Following Conditions Apply Unless Otherwise Specified:
T_A = 0°C to +70°C, V_{CC} = 3.3V ± 5%.

Symbol	Parameter	Conditions[1]	Min.	Typ.[2]	Max.	Unit
V_{ANALOG}	Analog Signal Range		0	—	V_{CC}	V
V_{IH}	Input HIGH Voltage	Guaranteed Logic HIGH level	2	—	—	V
V_{IL}	Input LOW Voltage	Guaranteed Logic LOW level	0	—	0.8	
I_{IH}	Input HIGH Current	V_{CC} = Max., V_{IN} = V_{CC}	—	—	±1	µA
I_{IL}	Input LOW Current	V_{CC} = Max., V_{IN} = V_{SS}	—	—	±1	
I_O	Analog Output Leakage Current	0 ≤ S1, S2 or D ≤ V_{CC}, Switch OFF	—	—	±1	µA
V_{IK}	Clamp Diode Voltage	V_{CC} = Min., I_{IN} = -18mA	– 0.7	– 1.2	—	V
V_H	Input Hysteresis at Control Pins		—	150	—	mV
R_{ON}[3]	Switch On-Resistance	V_{CC} = Min., V_{IN} = 1V, I_{ON} = 13mA	—	5	7	Ω
		V_{CC} = Min., V_{IN} = 2V, I_{ON} = 26mA	—	7	10	

1. For Max. or Min. conditions, use appropriate value specified under Electrical Characteristics for the applicable device type.
2. Typical values are at V_{CC} = 3.3V,T_A = 25°C ambient and maximum loading.
3. Measured by the voltage drop between S1, S2, and D I/O pins at indicated current through the switch. On-Resistance is determined by the lower of the voltages on the S1, S2, and D I/O pins.

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Dynamic Electrical Characteristics Over Operating Range

Following Conditions Apply Unless Otherwise Specified:
T_A = 0°C to +70°C, V_{CC} = 3.3V ± 5%.

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
t_{ON}	Turn On Time	R_L = 75Ω, C_L = 20pF	—	2.5	5	ns
t_{OFF}	Turn Off Time	R_L = 75Ω, C_L = 20pF	—	1.1	5	
B_W[1]	–3dB Bandwidth		—	—	570	MHz
X_{TALK}[1]	Crosstalk	10MHz, C_L = 0pF	—	– 80	—	dB
C_{IN}[1]	Input/Enable Capacitance	V_{IN} = 0V, f = 1MHz	—	—	6	pF
C_{OFF}[1]	Capacitance, Switch Off		—	—	6	
C_{ON}[1]	Capacitance, Switch On		—	—	9	
O_{IRR}	Off Isolation	10MHz, C_L = 0pF	—	– 48	—	dB

1. This parameter is determined by device characterization but is not production tested.

DC Electrical Characteristics Over Operating Range

Following Conditions Apply Unless Otherwise Specified:
T_A = 0°C to +70°C, V_{CC} = 5V ± 5%.

Symbol	Parameter	Conditions[1]	Min.	Typ.[2]	Max.	Unit
V_{ANALOG}	Analog Signal Range		0	—	V_{CC}	V
V_{IH}	Input HIGH Voltage	Guaranteed Logic HIGH level	2	—	—	V
V_{IL}	Input LOW Voltage	Guaranteed Logic LOW level	– 0.5	—	0.8	
I_{IH}	Input HIGH Current	V_{CC} = Max., V_{IN} = V_{CC}	—	—	±1	µA
I_{IL}	Input LOW Current	V_{CC} = Max., V_{IN} = V_{SS}	—	—	±1	
I_O	Analog Output Leakage Current	0 ≤ S1, S2 or D ≤ V_{CC}, Switch OFF	—	—	±1	µA
V_{IK}	Clamp Diode Voltage	V_{CC} = Min., I_{IN} = -18mA	– 0.7	– 1.2	—	V
I_{OS}[3]	Short Circuit Current		100	—	—	mA
V_H	Input Hysteresis at Control Pins	V_{CC} = Min., V_{IN} = 1V, R_L = 75Ω, I_{ON} = 13mA	—	150	—	mV
R_{ON}[4]	Switch On-Resistance	V_{CC} = Min., V_{IN} = 2V, R_L = 75Ω, I_{ON} = 26mA	3	7	10	Ω

1. For Max. or Min. conditions, use appropriate value specified under Electrical Characteristics for the applicable device type.
2. Typical values are at V_{CC} = 5V, T_A = 25°C ambient and maximum loading.
3. Not more than one output should be shorted at one time. Duration of the test should not exceed one second.
4. Measured by the voltage drop between S1, S2, and D I/O pins at indicated current through the switch. On-Resistance is determined by the lower of the voltages on the S1, S2, and D I/O pins.

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Dynamic Electrical Characteristics Over Operating Range

Following Conditions Apply Unless Otherwise Specified:
T_A = 0°C to +70°C, V_{CC} = 3.3V ± 5%.

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
t_{ON}	Turn On Time	R_L = 75Ω, C_L = 20pF	—	2.5	5	ns
t_{OFF}	Turn Off Time	R_L = 75Ω, C_L = 20pF	—	1.1	5	
B_W[1]	-3dB Bandwidth	R_L = 150Ω	—	—	570	MHz
X_{TALK}	Crosstalk	R_{IN} = 10Ω, R_L = 150Ω, 10MHz	—	– 58	—	dB
D_G	Differential Gain	R_L = 150Ω, f = 3.58MHz	—	0.64	—	%
D_P	Differential Phase	R_L = 150Ω, f = 3.58MHz	—	0.27	—	Deg.
C_{IN}[1]	Input/Enable Capacitance	V_{IN} = 0V, f = 1MHz	—	—	6	pF
C_{OFF}[1]	Capacitance, Switch Off		—	—	6	
C_{ON}[1]	Capacitance, Switch On		—	—	8	
O_{IRR}	Off Isolation	R_L = 150Ω, 10MHz	—	– 38	—	dB

1. This parameter is determined by device characterization but is not production tested.

Power Supply Characteristics

Symbol	Parameter	Conditions[1]	Min.	Typ.[2]	Max.	Unit
I_{CC}	Quiescent Power Supply Current	V_{CC} = Max., I_N = GND or V_{CC}	—	0.1	3	μA
ΔI_{CC}	Power Supply Current per Input @ TTL HIGH	V_{CC} = Max., I_N = 3.4V[3]	—	—	2.5	mA
I_{CCD}[4]	Supply Current per Input per MHz	V_{CC} = Max., S1, S2 and D Pins Open, $\overline{EN}$ = GND Control Input Toggling, 50%Duty Cycle	—	—	0.25	mA/MHz

1. For Max. or Min. conditions, use appropriate value specified under Electrical Characteristics for the applicable device.
2. Typical values are at V_{CC} = 5.0V, +25°C ambient.
3. Per TTL driven input (V_{IN} = 3.4V, control inputs only); S1, S2, and D pins do not contribute to I_{CC}.
4. This current applies to the control inputs only and represent the current required to switch internal capacitance at the specified frequency. The S1, S2, and D I/O pins generate no significant AC or DC currents as they transition. This parameter is not tested, but is guaranteed by design.

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Test Circuit for Electrical Characteristics

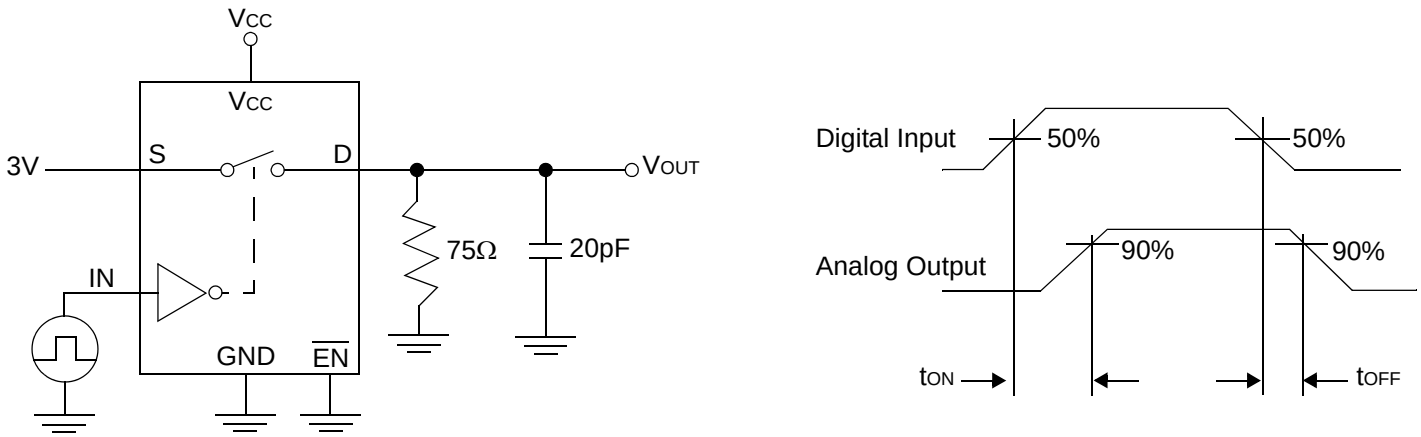


Figure 1. Switching Time

Test Circuit for Dynamic Electrical Characteristics

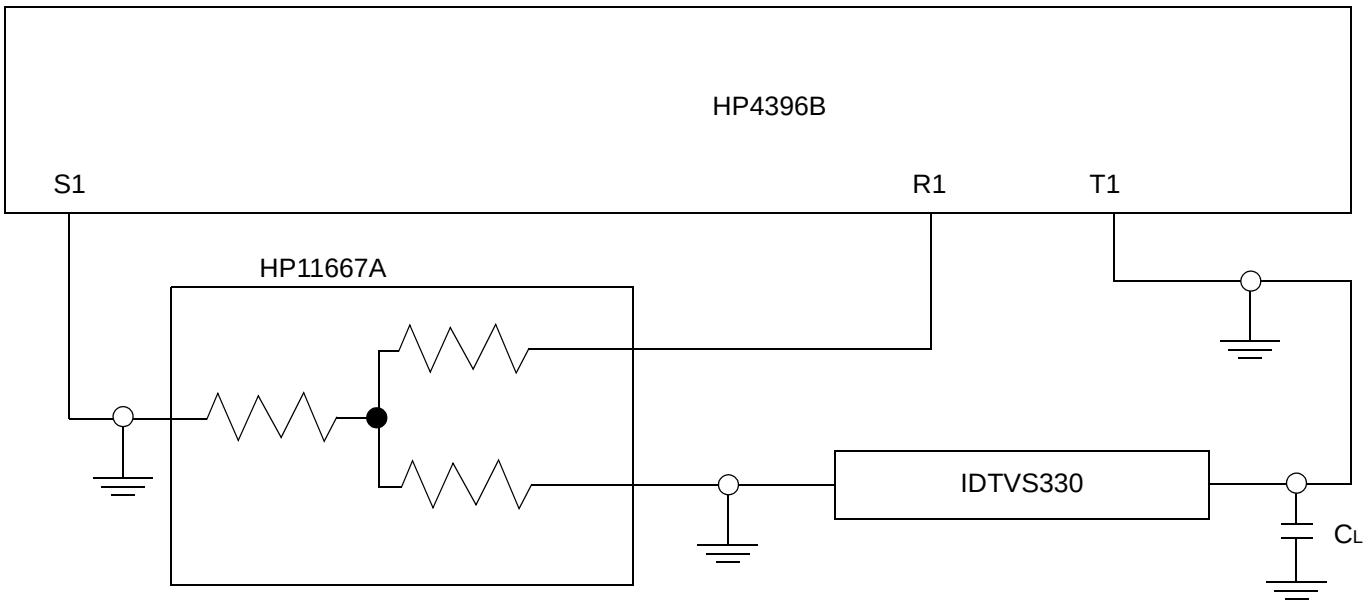


Figure 2. Gain/Phase, Crosstalk, Off-Isolation

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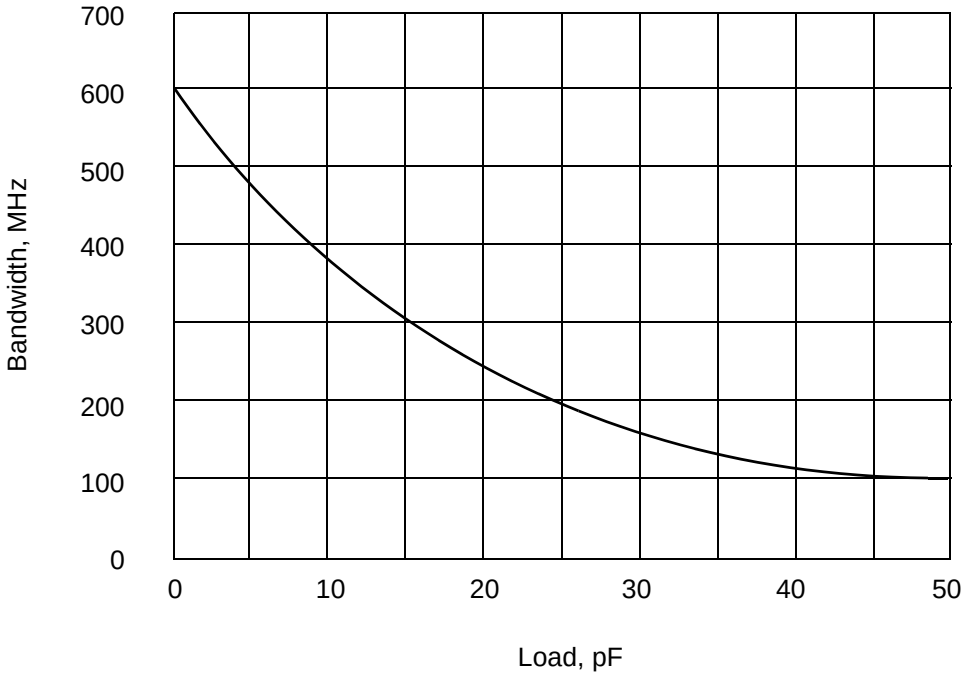
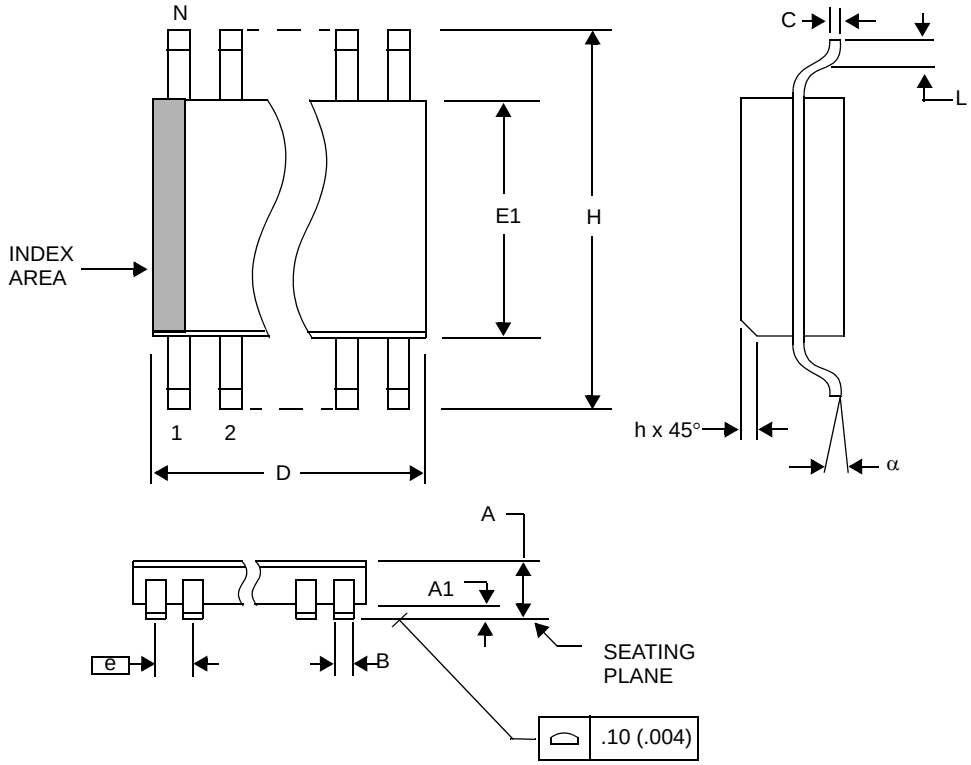


Figure 3. Bandwidth vs Load

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Package Dimensions - SOIC



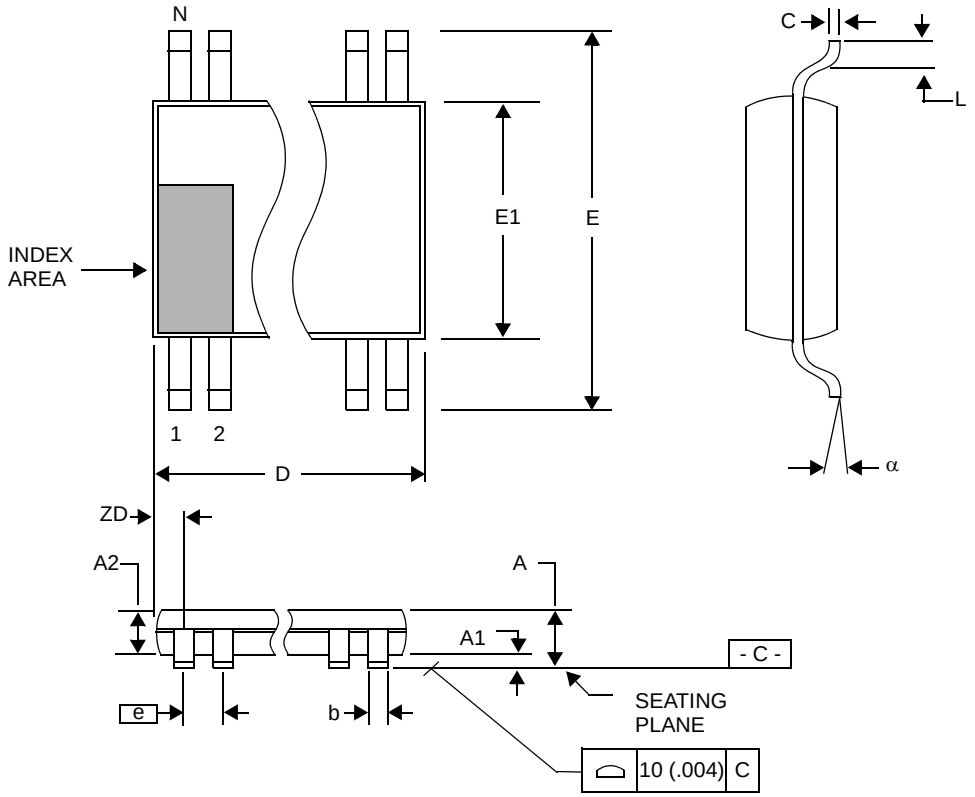
150 mil (Narrow Body) SOIC

Symbol	In Millimeters Common Dimensions		In Inches Common Dimensions[1]	
	MIN	MAX	MIN	MAX
A	1.35	1.75	.0532	.0688
A1	0.10	0.25	.0040	.0098
B	0.33	0.51	.0130	.0200
C	0.19	0.25	0075	.0098
D	9.80	10.00	.3859	.3937
E	3.80	4.00	.1497	.1574
e	1.27 BASIC		0.050 BASIC	
H	5.80	6.20	.2284	.2440
h	0.25	0.50	.010	.020
L	0.40	1.27	.016	.050
N	16		16	
α	0°	8°	0°	8°

1. For reference only. Controlling dimensions are in mm.

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Package Dimensions - QSOP



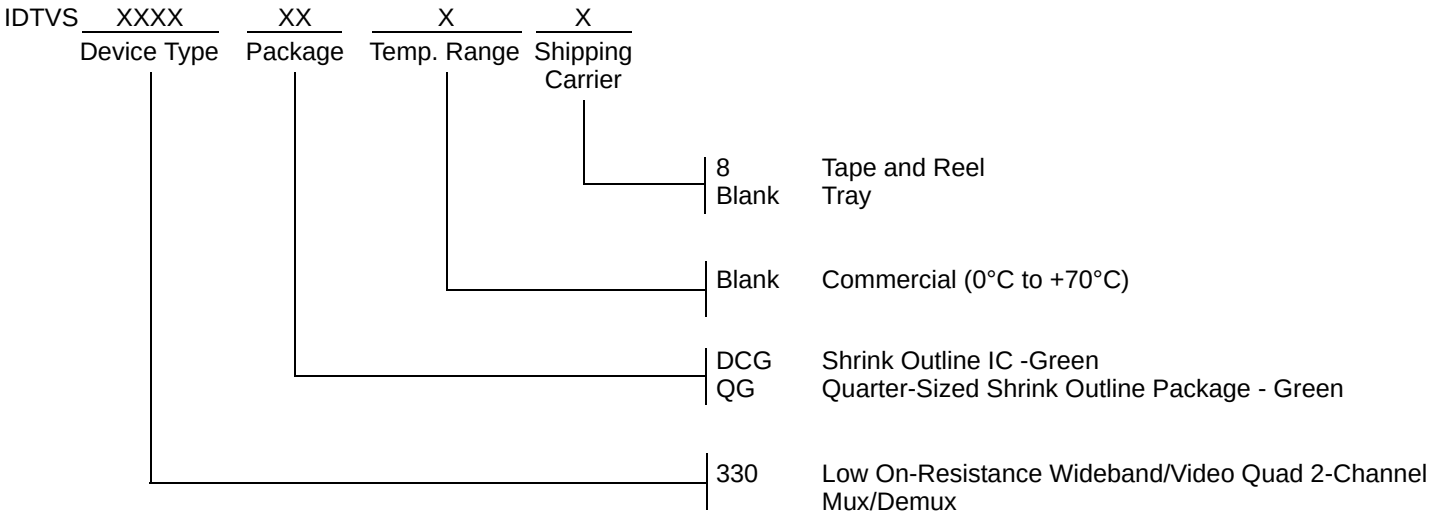
150 mil SSOP (QSOP)

Symbol	In Millimeters Common Dimensions[1]		In Inches Common Dimensions	
	MIN	MAX	MIN	MAX
A	1.35	1.75	.053	.069
A1	0.10	0.25	.004	.010
A2	—	1.50	—	.059
b	0.20	0.30	.008	.012
c	0.18	0.25	.007	.010
D	4.80	5.00	.189	.197
E	5.80	6.20	.228	.244
E1	3.80	4.00	.150	.157
e	0.635 BASIC		0.025 BASIC	
L	0.40	1.27	.016	.050
N	16		16	
á	0°	8°	0°	8°
ZD	.23 Ref		.009 Ref	

1. For reference only. Controlling dimensions are in inches.

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