

ORDERING INFORMATION

Temp. Range	Package	Part Number
DG454, DG455, DG456		
- 40 °C to 125 °C ^a	16 Pin TSSOP	DG454EQ-T1-E3 DG455EQ-T1-E3 DG456EQ-T1-E3
	16 Pin Narrow SOIC	DG454EY-T1-E3 DG455EY-T1-E3 DG456EY-T1-E3

Notes:

a. - 40 °C to 85 °C datasheet limits apply.

ABSOLUTE MAXIMUM RATINGS (T_A = 25 °C, unless otherwise noted)

Parameter	Limit	Unit
V ₊ to V ₋	44	V
GND to V ₋	25	
Digital Inputs ^a , V _S , V _D	(V ₋) - 2 to (V ₊) + 2 or 30 mA, whichever occurs first	
Continuous Current (D, S only)	100	mA
Peak Current, S or D (Pulsed 1 ms, 10 % Duty Cycle)	300	
Storage Temperature	- 65 to 150	°C
Power Dissipation (Package) ^b	16 Pin TSSOP ^c	450
	16 Pin Narrow SOIC ^d	600
Thermal Resistance (Package) ^b	16 Pin TSSOP	178
	16 Pin Narrow SOIC	125
ESD (HBM)	2	kV

Notes:

a. Signals on S_X, D_X, or I_{NX} exceeding V₊ or V₋ will be clamped by internal diodes. Limit forward diode current to maximum current ratings.

b. All leads welded or soldered to PC board.

c. Derate 5.6 mW/°C above 70 °C.

d. Derate 8 mW/°C above 75 °C.

SPECIFICATIONS FOR DUAL SUPPLIES

Parameter	Symbol	Test Conditions Unless Specified V+ = 15 V, V- = - 15 V VIN = 2.4 V, 0.8 V ^a	Temp. ^b	Typ. ^c	- 40 °C to 125 °C		- 40 °C to 85 °C		Unit
					Min. ^d	Max. ^d	Min. ^d	Max. ^d	
Analog Switch									
Analog Signal Range ^e	V _{ANALOG}		Full		- 15	15	- 15	15	V
On-Resistance	R _{ON}	I _S = - 10 mA, V _D = - 10 V to + 10 V	Room Full	3.8		5.3 8.3		5.3 7.3	Ω
On-Resistance Match	ΔR _{ON}	I _S = - 10 mA, V _D = ± 10 V	Room Full	0.12		0.5 1		0.5 0.5	
On-Resistance Flatness	R _{FLATNESS}	I _S = - 10 mA, V _D = - 5 V, 0 V, + 5 V	Room Full	0.25		0.5 0.5		0.5 0.5	
Switch Off Leakage Current	I _{S(off)}	V _D = ± 10 V, V _S = 10 V ±	Room Full	± 0.1	- 0.5 - 20	0.5 20	- 0.5 - 2.5	0.5 2.5	nA
	I _{D(off)}		Room Full	± 0.1	- 0.5 - 20	0.5 20	- 0.5 - 2.5	0.5 2.5	
Channel On Leakage Current	I _{D(on)}	V _S = V _D = ± 10 V	Room Full	± 0.1	- 1 - 40	1 40	- 1 - 5	1 5	

SPECIFICATIONS FOR DUAL SUPPLIES									
Parameter	Symbol	Test Conditions Unless Specified V+ = 15 V, V- = - 15 V VIN = 2.4 V, 0.8 V ^a	Temp. ^b	Typ. ^c	- 40 °C to 125 °C		- 40 °C to 85 °C		Unit
					Min. ^d	Max. ^d	Min. ^d	Max. ^d	
Digital Control									
Input Current, VIN Low	IL	VIN Under Test = 0.8 V	Full	0.005	- 0.5	0.5	- 0.5	0.5	μA
Input Current, VIN High	I _{IH}	VIN Under Test = 2.4 V	Full	0.005	- 0.5	0.5	- 0.5	0.5	
Input Capacitance ^e	CIN	f = 1 MHz	Room	7					pF
Dynamic Characteristics									
Turn-On Time	tON	RL = 300 Ω, CL = 35 pF VS = ± 10 V, See Figure 2	Room Full	88		118 160		118 144	ns
Turn-Off Time	tOFF		Room Full	69		97 120		97 112	
Break-Before-Make Time Delay	tD	DG456 only, VS = 10 V RL = 300 Ω, CL = 35 pF	Room	18					
Charge Injection ^e	Q	Vg = 0 V, Rg = 0 Ω, CL = 1 nF	Room	22					pC
Off Isolation ^e	OIRR	RL = 50 Ω, CL = 5 pF f = 1 MHz	Room	- 60					dB
Channel-to-Channel Crosstalk ^e	X _{TALK}		Room	- 85					
Source Off Capacitance ^e	CS(off)	f = 1 MHz	Room	31					pF
Drain Off Capacitance ^e	CD(off)		Room	34					
Channel On Capacitance ^e	CD(on)		Room	103					
Total Harmonic Distortion ^e	THD	Signal = 5 VRMS, 20 Hz to 20 kHz, RL = 600 Ω	Room	0.04					%
Power Supplies									
Power Supply Current	I+	V+ = 16.5 V, V- = - 16.5 V VIN = 0 or 5 V	Room Full	25		100 100		100 100	μA
Negative Supply Current	I-		Room Full	- 0.001	- 0.5 - 5		- 0.5 - 5		
Ground Current	IGND		Room Full	- 25	- 100 - 100		- 100 - 100		

SPECIFICATIONS FOR DUAL SUPPLIES									
Parameter	Symbol	Test Conditions Unless Specified V+ = 5 V, V- = - 5 V VIN = 2.4 V, 0.8 V ^a	Temp. ^b	Typ. ^c	- 40 °C to 125 °C		- 40 °C to 85 °C		Unit
					Min. ^d	Max. ^d	Min. ^d	Max. ^d	
Analog Switch									
Analog Signal Range ^e	V _{ANALOG}		Full		- 5	5	- 5	5	V
On-Resistance	R _{ON}	V+ = + 5 V, V- = - 5 V IS = - 10 mA, VD = - 3.5 V to + 3.5 V	Room Full	3.8		11 15		11 12	Ω
On-Resistance Match	ΔR _{ON}	V+ = + 5 V, V- = - 5 V, IS = - 10 mA, VD = ± 3.5 V	Room Full	0.13		0.5 1		0.5 0.5	
Dynamic Characteristics									
Turn-On Time ^e	t _{ON}	RL = 300 Ω, CL = 35 pF VS = 3 V, See Figure 2	Room Full	170		200 296		200 256	ns
Turn-Off Time ^e	t _{OFF}		Room Full	66		96 124		96 113	
Break-Before-Make ^e Time Delay	t _D	DG456 only, VS = 3 V RL = 300 Ω, CL = 35 pF	Room	98					
Charge Injection ^e	Q	Vg = 0 V, Rg = 0 Ω, CL = 1 nF	Room	8					pC

SPECIFICATIONS FOR DUAL SUPPLIES

Parameter	Symbol	Test Conditions Unless Specified V+ = 5 V, V- = - 5 V VIN = 2.4 V, 0.8 V ^a	Temp. ^b	Typ. ^c	- 40 °C to 125 °C		- 40 °C to 85 °C		Unit
					Min. ^d	Max. ^d	Min. ^d	Max. ^d	
Power Supplies									
Power Supply Current	I+	VIN = 0 or 5 V	Room Full	14		100 100		100 100	µA
Negative Supply Current	I-		Room Full	- 0.001	- 0.5 - 5		- 0.5 - 5		
Ground Current	IGND		Room Full	- 14	- 100 - 100		- 100 - 100		

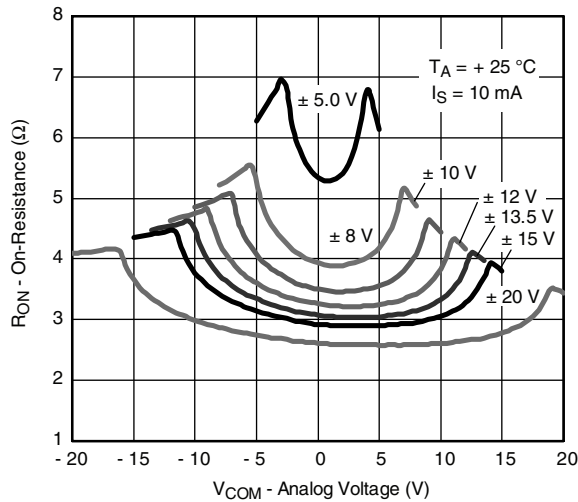
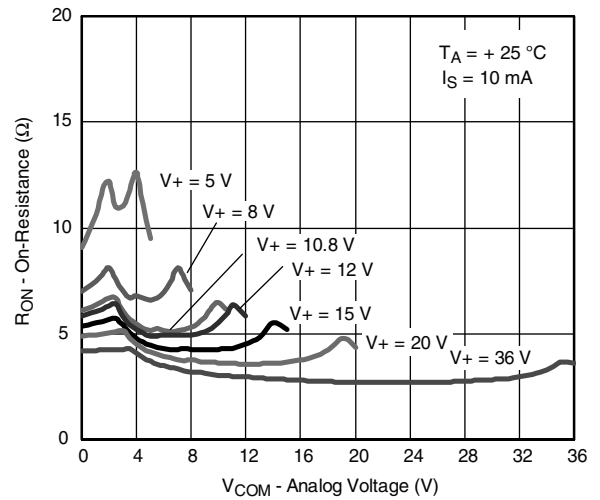
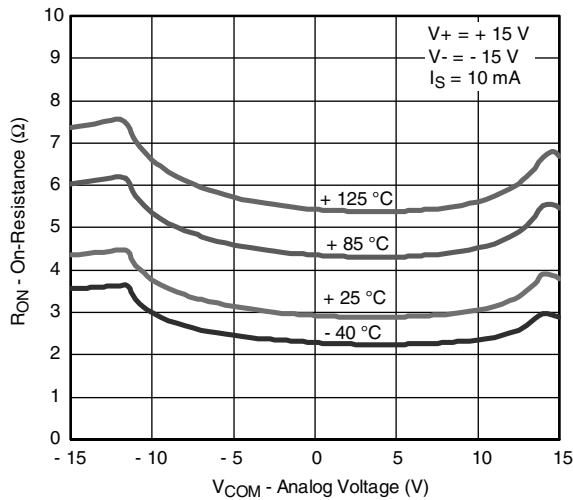
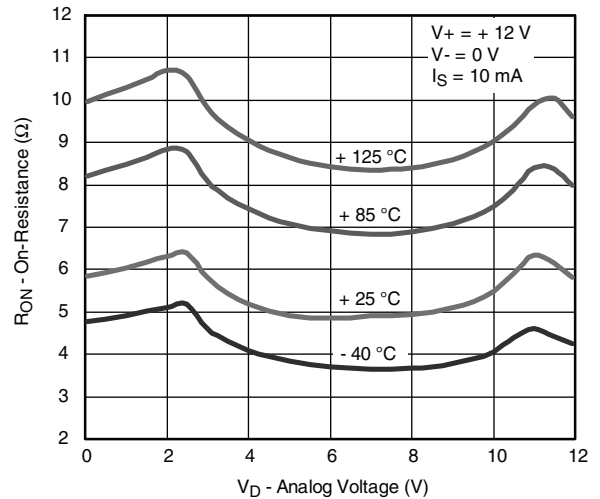
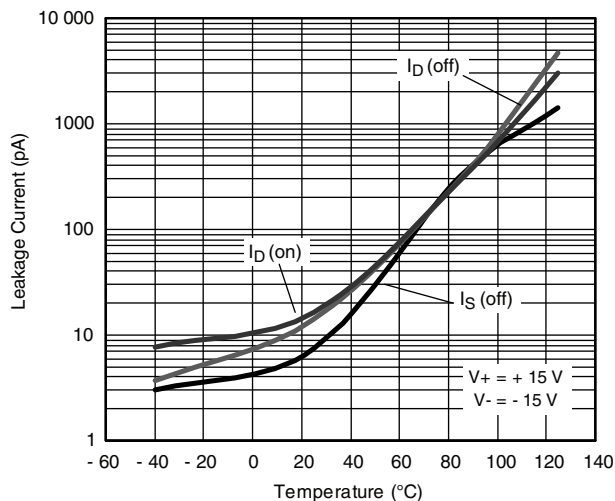
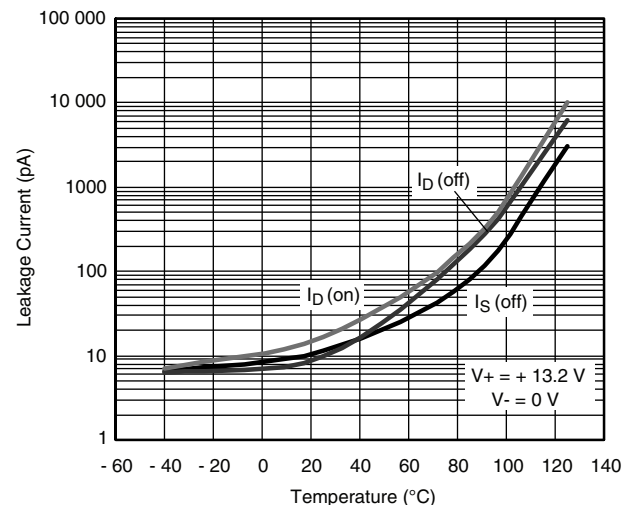
SPECIFICATIONS FOR UNIPOLAR SUPPLIES

Parameter	Symbol	Test Conditions Unless Specified V ₊ = 12 V, V ₋ = 0 V V _{IN} = 2.4 V, 0.8 V ^a	Temp. ^b	Typ. ^c	- 40 °C to 125 °C		- 40 °C to 85 °C		Unit
					Min. ^d	Max. ^d	Min. ^d	Max. ^d	
Analog Switch									
Analog Signal Range ^e	V _{ANALOG}		Full			12		12	V
On-Resistance	R _{ON}	I _S = - 10 mA, V _D = 0 V to + 10 V	Room Full	5.5		8.1 12.4		8.1 10.4	Ω
On-Resistance Match	ΔR _{ON}	I _S = - 10 mA, V _D = + 10 V	Room Full	0.14		0.5 1		0.5 0.5	
On-Resistance Flatness	R _{FLATNESS}	I _S = - 10 mA, V _D = 0 V, + 5 V, + 10 V	Room Full	0.94		1.5 1.7		1.5 1.5	
Dynamic Characteristics									
Turn-On Time	t _{ON}	R _L = 300 Ω, C _L = 35 pF V _S = 8 V, See Figure 2	Room Full	132		162 238		162 210	ns
Turn-Off Time	t _{OFF}		Room Full	61		91 117		91 105	
Break-Before-Make Time Delay	t _D	DG456 only, V _S = 8 V R _L = 300 Ω, C _L = 35 pF	Room	70					
Charge Injection ^e	Q	V _g = 0 V, R _g = 0 Ω, C _L = 1 nF	Room	1					pC
Power Supplies									
Power Supply Current	I ₊	V ₊ = 13.5 V, V ₋ = 0 V V _{IN} = 0 or 5 V	Room Full	25		100 100		100 100	μA
Negative Supply Current	I ₋		Room Full	- 0.001	- 0.5 - 5		- 0.5 - 5		
Ground Current	I _{GND}		Room Full	- 25	- 100 - 100		- 100 - 100		

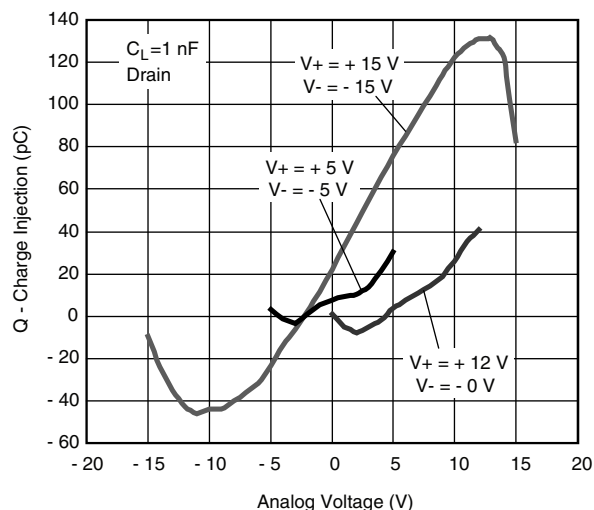
Notes:

- V_{IN} = input voltage to perform proper function.
- Room = 25 °C, Full = as determined by the operating temperature suffix.
- Typical values are for DESIGN AID ONLY, not guaranteed nor subject to production testing.
- The algebraic convention whereby the most negative value is a minimum and the most positive a maximum, is used in this data sheet.
- Guaranteed by design, not subject to production test.

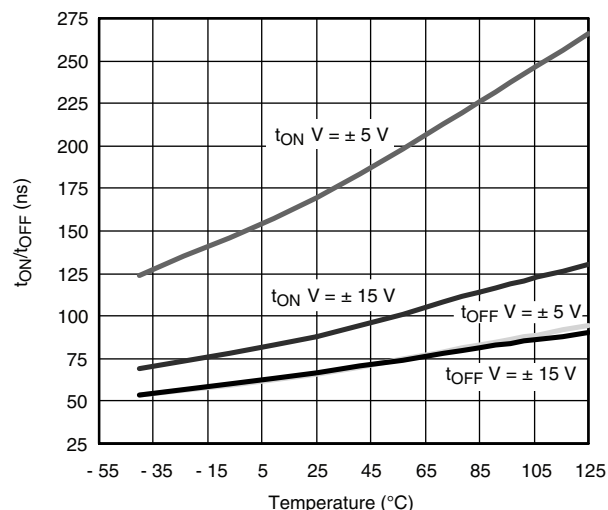
Stresses beyond those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated in the operational sections of the specifications is not implied. Exposure to absolute maximum rating conditions for extended periods may affect device reliability.

TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)

On-Resistance vs. V_D and Dual Supply Voltage

On-Resistance vs. V_D and Single Supply Voltage

On-Resistance vs. V_D and Temperature

On-Resistance vs. V_D and Temperature

Leakage Current vs. Temperature

Leakage Current vs. Temperature

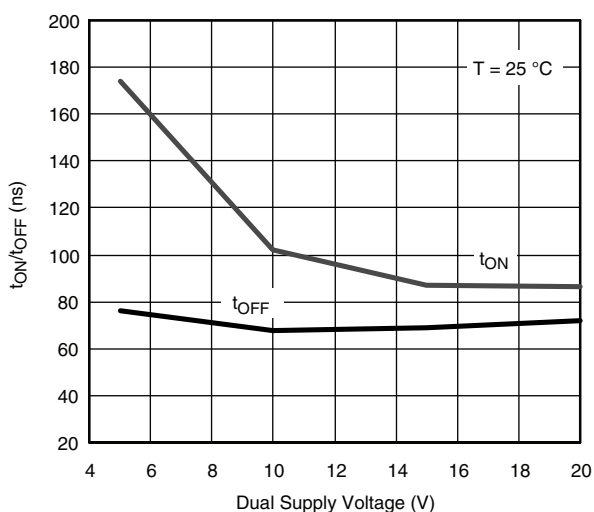
TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)



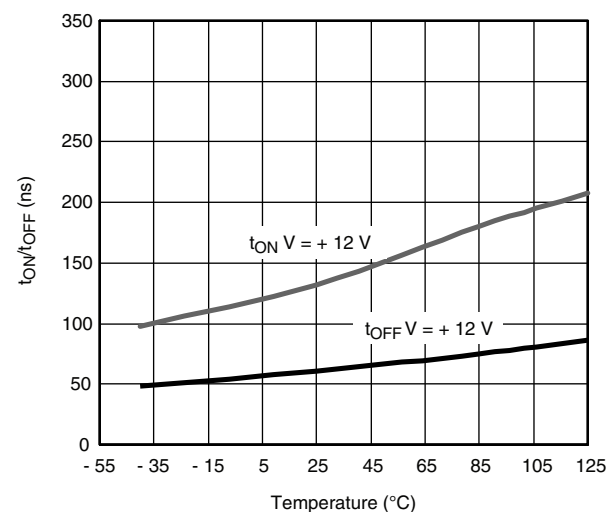
Charge Injection vs. Analog Voltage



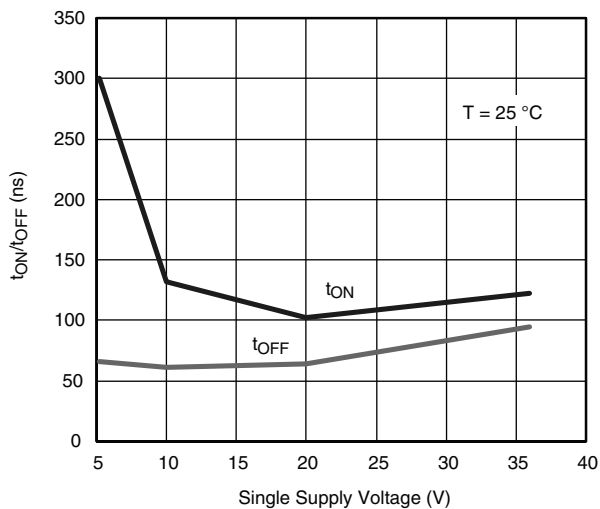
Switching Time vs. Temperature and Dual Supply Voltage



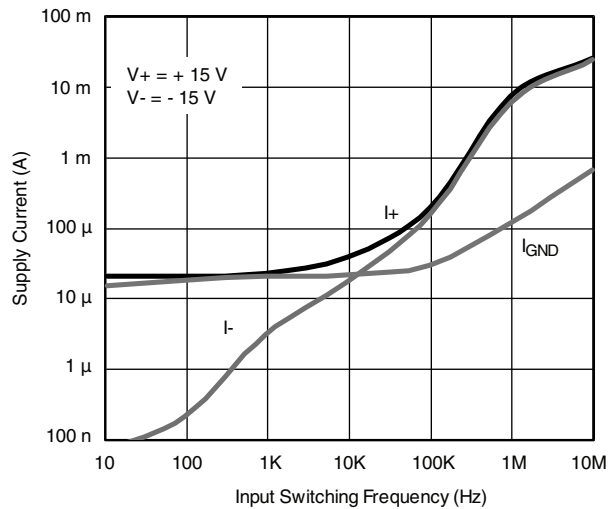
Switching Time vs. Dual Supply Voltage



Switching Time vs. Temperature and Single Supply Voltage

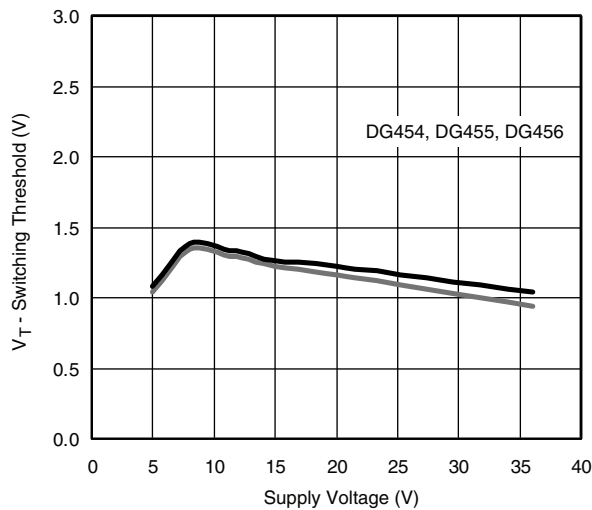


Switching Time vs. Single Supply Voltage

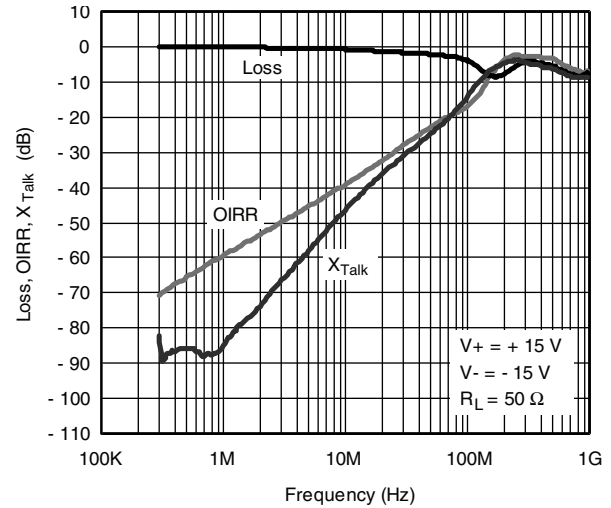


Supply Current vs. Input Switching Frequency

TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)

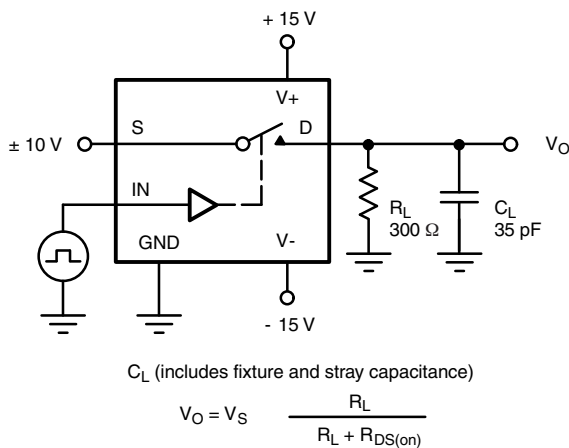


Switching Threshold vs. Supply Voltage



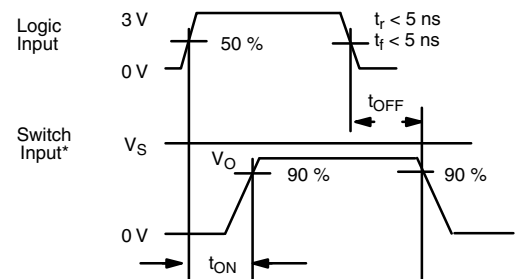
Insertion Loss, Off-Isolation, Crosstalk vs. Frequency

TEST CIRCUITS



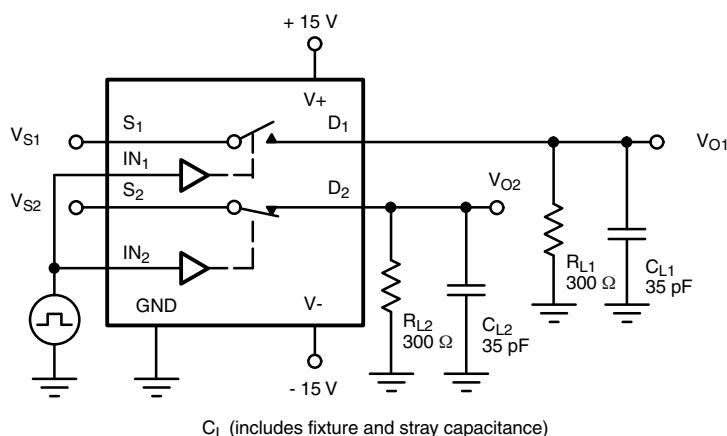
C_L (includes fixture and stray capacitance)

$$V_O = V_S \frac{R_L}{R_L + R_{DS(on)}}$$



Note: Logic input waveform is inverted for switches that have the opposite logic sense control

Figure 1. Switching Time



C_L (includes fixture and stray capacitance)

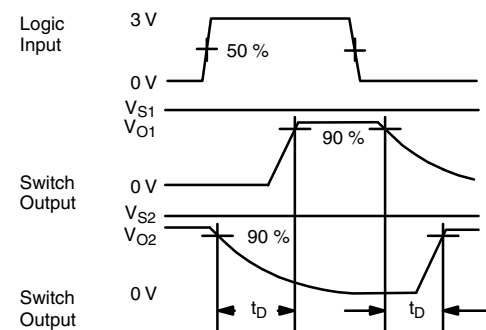


Figure 2. Break-Before-Make (DG456)

TEST CIRCUITS

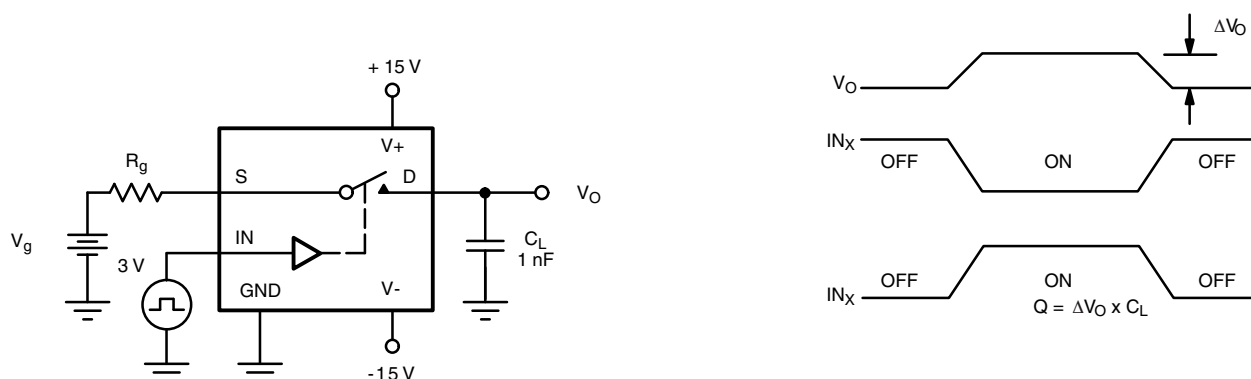


Figure 3. Charge Injection

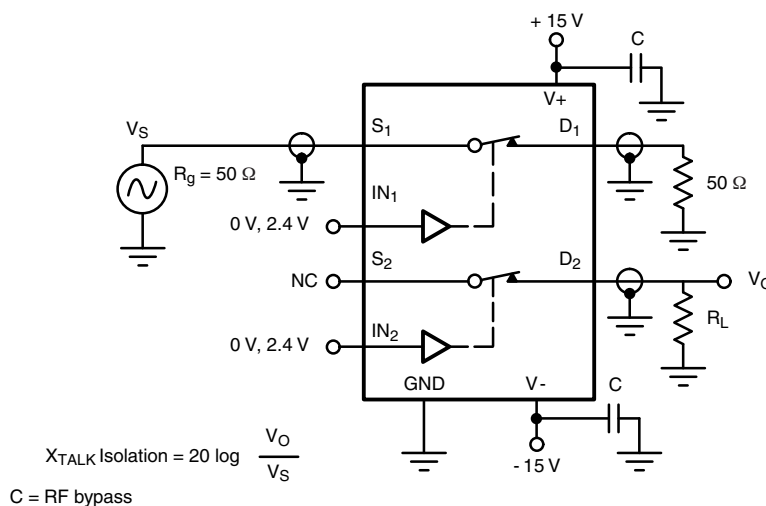


Figure 4. Crosstalk

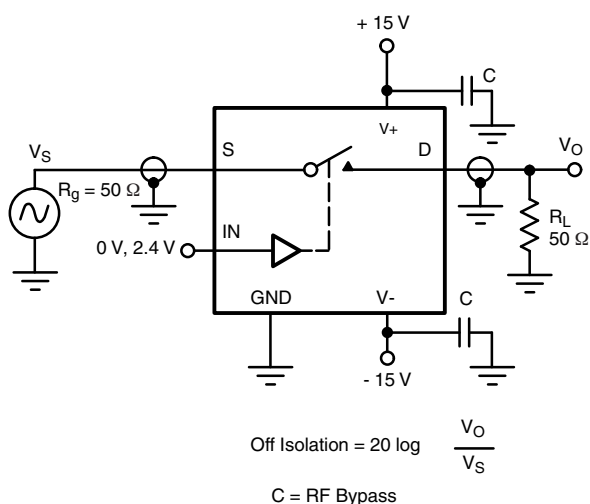


Figure 5. Off-Isolation

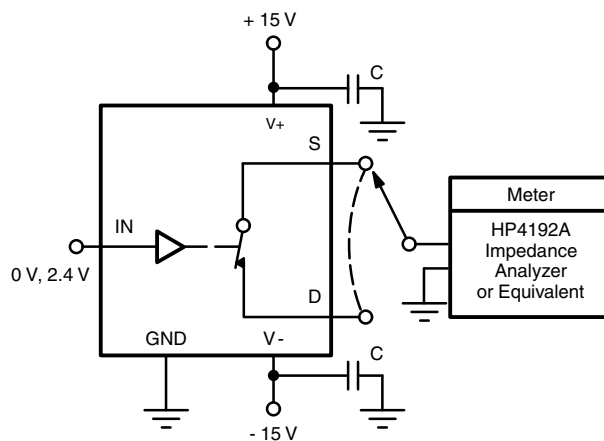
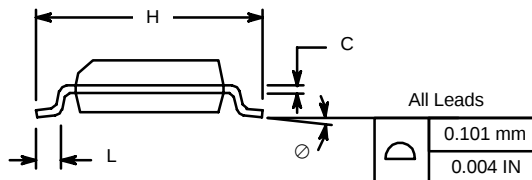
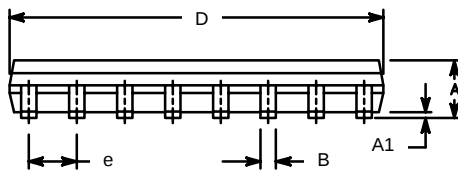
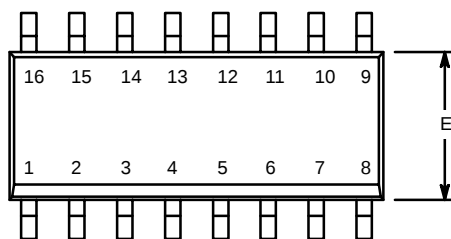


Figure 6. Source/Drain Capacitances

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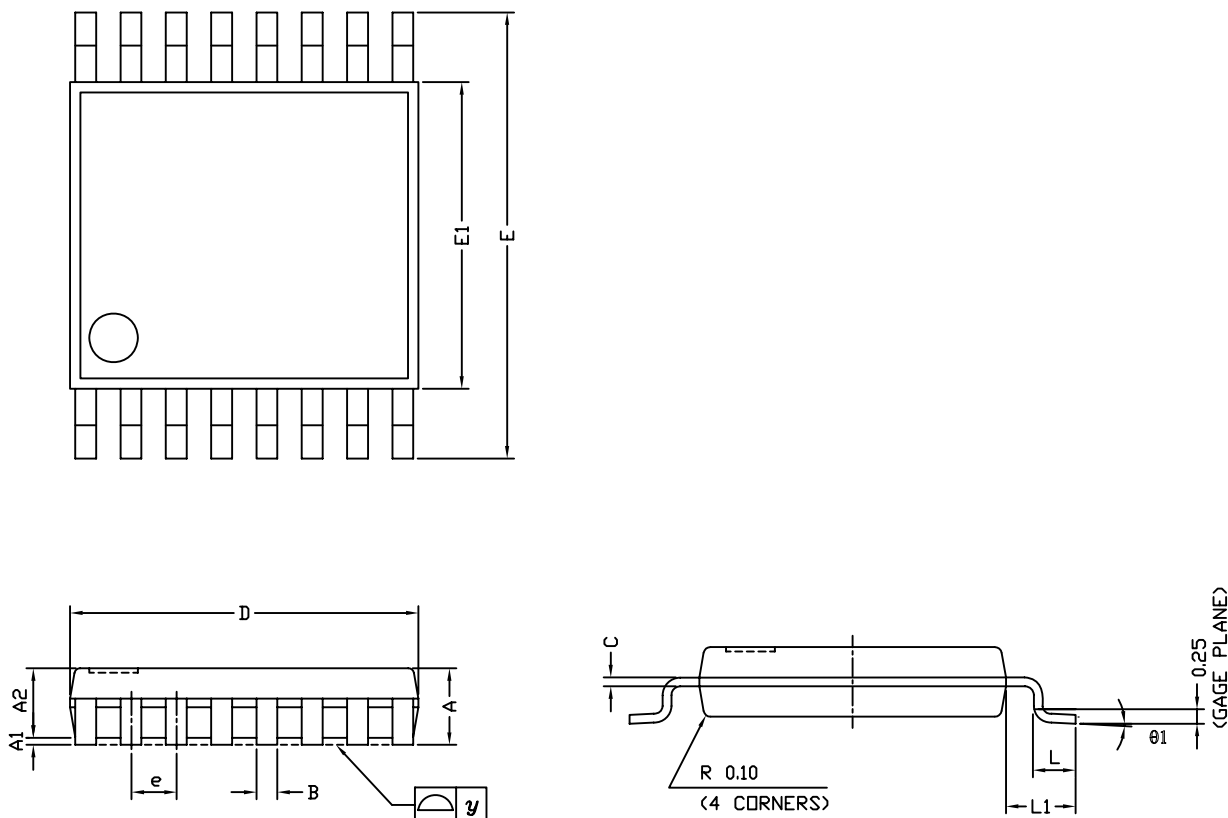
SOIC (NARROW): 16-LEAD
JEDEC Part Number: MS-012



Dim	MILLIMETERS		INCHES	
	Min	Max	Min	Max
A	1.35	1.75	0.053	0.069
A ₁	0.10	0.20	0.004	0.008
B	0.38	0.51	0.015	0.020
C	0.18	0.23	0.007	0.009
D	9.80	10.00	0.385	0.393
E	3.80	4.00	0.149	0.157
e	1.27 BSC		0.050 BSC	
H	5.80	6.20	0.228	0.244
L	0.50	0.93	0.020	0.037
Ø	0°	8°	0°	8°

ECN: S-03946—Rev. F, 09-Jul-01
DWG: 5300

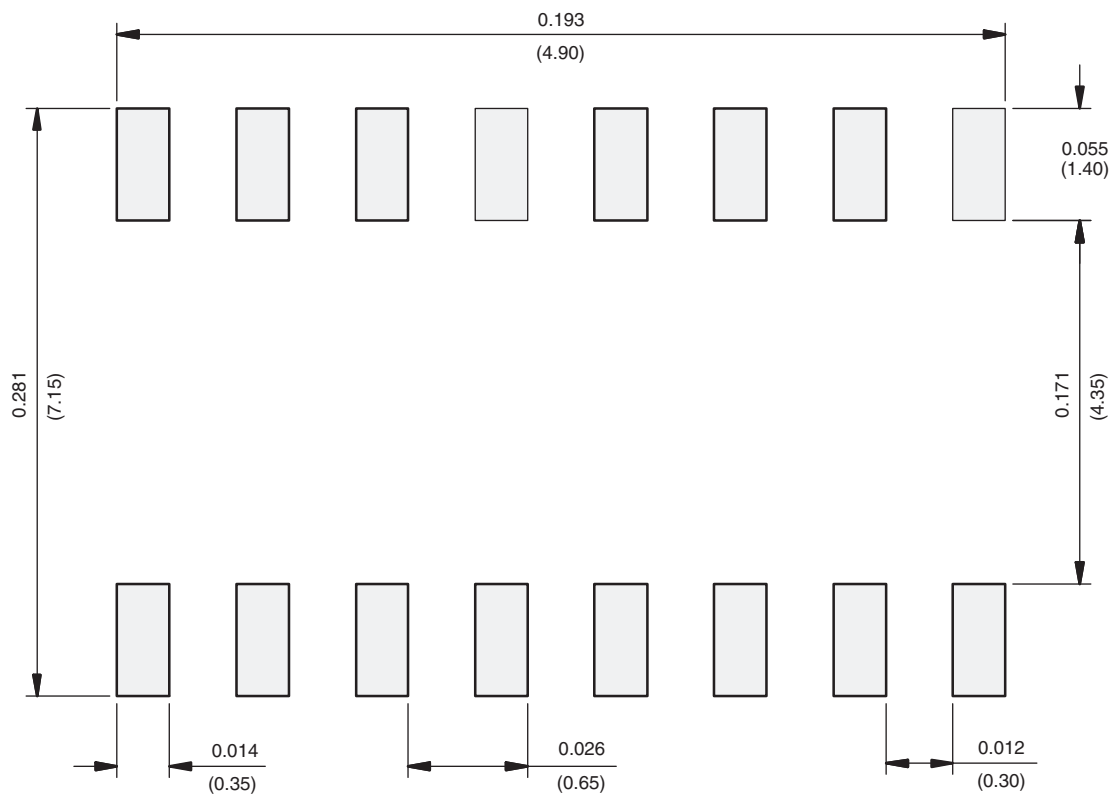
TSSOP: 16-LEAD



Symbols	DIMENSIONS IN MILLIMETERS		
	Min	Nom	Max
A	-	1.10	1.20
A1	0.05	0.10	0.15
A2	-	1.00	1.05
B	0.22	0.28	0.38
C	-	0.127	-
D	4.90	5.00	5.10
E	6.10	6.40	6.70
E1	4.30	4.40	4.50
e	-	0.65	-
L	0.50	0.60	0.70
L1	0.90	1.00	1.10
y	-	-	0.10
θ1	0°	3°	6°
ECN: S-61920-Rev. D, 23-Oct-06			
DWG: 5624			

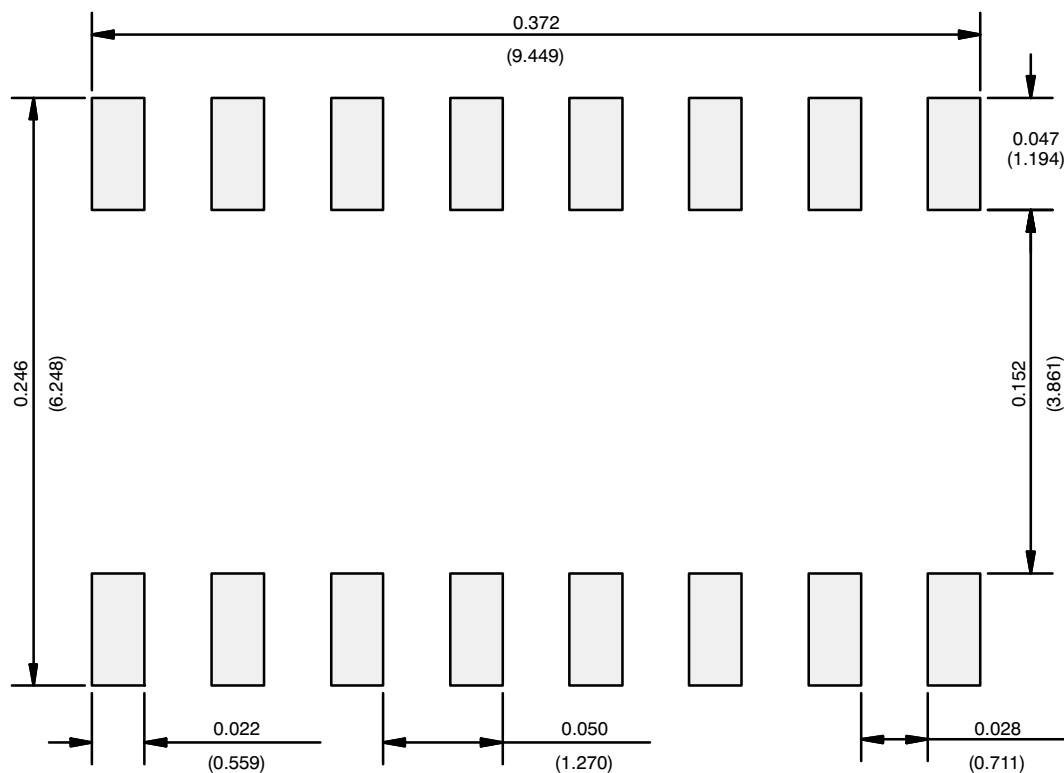


RECOMMENDED MINIMUM PAD FOR TSSOP-16



Recommended Minimum Pads
Dimensions in inches (mm)

RECOMMENDED MINIMUM PADS FOR SO-16



Recommended Minimum Pads
Dimensions in Inches/(mm)

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