

Low Power, High Voltage SPST Analog Switches

DESCRIPTION

The DG467 and DG468 are dual supply single-pole/single-throw (SPST) switches. On resistance is 10 Ω max. and flatness is 2 Ω max. over the specified analog signal range. These analog switches were designed to provide high speed, low error switching of precision analog signals. The primary application areas are in the routing and switching in telecommunications and test equipment. Combining low power, low leakages, low on-resistance and small physical size, the DG467/468 are also ideally suited for portable and battery powered industrial and military equipment.

The DG467 has one normally closed switch, while the DG468 switch is normally open. They operate either from a single +7 V to 36 V supply or from dual ± 4.5 V to ± 20 V supplies. They are offered in the very popular, small TSOP6 package.

FEATURES

- ± 15 V Analog Signal Range
- On-Resistance - $R_{DS(on)}$: 10 Ω max.
- Fast Switching Action - T_{ON} : 100 ns
- V_L Logic Supply Not Required
- TTL CMOS Input Compatible
- Rail To Rail Signal Handling
- Dual Or Single Supply Operation
- Material categorization: For definitions of compliance please see www.vishay.com/doc?99912



RoHS
COMPLIANT
HALOGEN
FREE

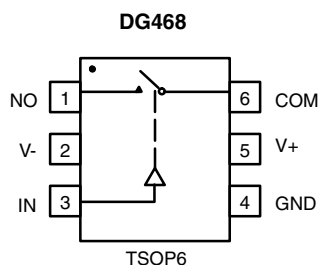
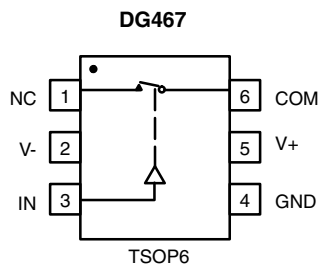
BENEFITS

- Wide Dynamic Range
- Low Signal Errors and Distortion
- Break-Befor-Make Switching Action
- Simple Interfacing
- Reduced Board Space
- Improved Reliability

APPLICATIONS

- Precision Test Equipment
- Precision Instrumentation
- Communications Systems
- PBX, PABX Systems
- Audio Equipment
- Redundant Systems
- PC Multimedia Boards
- Hard Disc Drivers

FUNCTIONAL BLOCK DIAGRAM AND PIN CONFIGURATION



TRUTH TABLE

Logic	DG467	DG468
0	ON	OFF
1	OFF	ON

Logic "0" ≤ 0.8 V

Logic "1" ≥ 2.4 V

Device Marking:

DG467DV = G7xxx

DG468DV = G8xxx



ORDERING INFORMATION		
Temp Range	Package	Part Number
DG467/DG468		
- 40 °C to 85 °C	6-Pin TSOP	DG467DV-T1-E3
		DG468DV-T1-E3

ABSOLUTE MAXIMUM RATINGS (T _A = 25 °C, unless otherwise noted)			
Parameter Referenced To V-	Symbol	Limit	Unit
V+		44	V
GND		25	
Digital Inputs ^a , V _{NO/NC} , V _{COM}		(V-) - 2 to (V+) + 2 or 30 mA, whichever occurs first	
Current, (Any Terminal) Continuous		30	mA
Current (NO or NC or COM) Pulsed at 1 ms, 10 % duty cycle		100	
Storage Temperature		- 65 to 150	°C
Power Dissipation (Package) ^b	6-Pin TSOP ^c	570	mW

Notes:

a. Signals on NO, NC, COM, or IN 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 7 mW/°C above 70 °C.



SPECIFICATIONS ^a ($V_{\pm} = \pm 15 V$)							
Parameter	Symbol	Test Conditions Unless Otherwise Specified $V_{+} = 15 V, V_{-} = -15 V$ $V_{IN} = 2.4 V, 0.8 V^f$	Temp. ^b	D Suffix - 40 °C to 85 °C			Unit
				Min. ^d	Typ. ^c	Max. ^d	
Analog Switch							
Analog Signal Range ^{e,ron}	V_{ANALOG}		Full	- 15		15	V
Drain-Source On-Resistance	R_{ON}	$I_{NO/NC} = 10 mA, V_{COM} = 10 V$ $V_{+} = 13.5 V, V_{-} = -13.5 V$	Room Full		7	9 10	Ω
On-Resistance Flatness	R_{ON} Flatness	$I_{NO/NC} = 10 mA, V_{COM} = \pm 5 V, 0 V$ $V_{+} = 13.5 V, V_{-} = -13.5 V$	Room Full		0.7	1 2	
Switch Off Leakage Current	$I_{NO/NC(off)}$	$V_{+} = 16.5 V, V_{-} = -16.5 V$ $V_{COM} = \pm 15.5 V$ $V_{NO/NC} = -/+ 15.5 V$	Room Full	- 1 - 10	- 0.1	1 10	nA
	$I_{COM(off)}$		Room Full	- 1 - 10	- 0.1	1 10	
Channel On Leakage Current	$I_{COM(on)}$	$V_{+} = 16.5 V, V_{-} = -16.5 V$ $V_{COM} = V_{NO/NC} = \pm 15.5 V$	Room Full	- 1 - 10	- 0.1	1 10	
Digital Control							
Input, High Voltage	V_{INH}		Full	2.4			V
Input, Low Voltage	V_{INL}		Full			0.8	
Input Capacitance ^e	C_{IN}		Room		5		pF
Input Current	I_{IN}	$V_{IN} = 0$ or $5 V$		- 1		1	μA
Dynamic Characteristics							
Turn-On Time	t_{ON}	$R_L = 300 \Omega, C_L = 35 pF$ $V_{NO/NC} = \pm 10 V$	Room Full		100	140 160	ns
Turn-Off Time	t_{OFF}		Room Full		50	80 100	
Charge Injection ^e	Q	$C_L = 1 nF, V_{gen} = 0 V, R_{gen} = 0 \Omega$	Room		21		pC
Off-Isolation ^e	OIRR	$C_L = 5 pF, R_L = 50 \Omega, f = 1 MHz$	Room		- 61		dB
Source Off Capacitance ^e	$C_{S(off)}$	$f = 1 MHz$	Room		30		pF
Drain Off Capacitance ^e	$C_{D(off)}$		Room		15		
Channel On Capacitance ^e	$C_{D(on)}$		Room		76		
Power Supplies							
Positive Supply Current	I+	$V_{+} = 16.5 V, V_{-} = -16.5 V$ $V_{IN} = 0$ or $5 V$	Room Full		5	15 20	μA
Negative Supply Current	I-		Room Full	- 1 - 10	- 0.02		



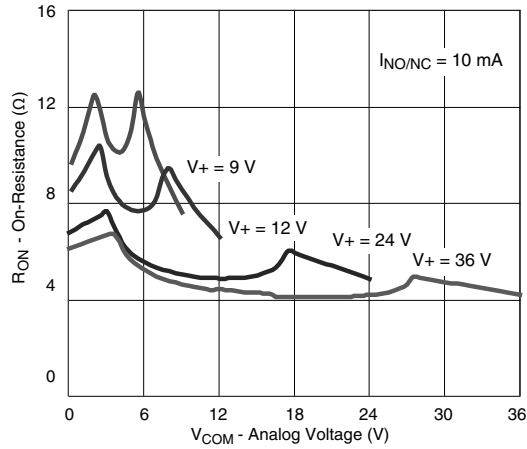
SPECIFICATIONS ^a (V ₊ = 12 V)							
Parameter	Symbol	Test Conditions Unless Otherwise Specified V ₊ = 12 V, V ₋ = 0 V V _{IN} = 2.4 V, 0.8 V ^f	Temp. ^b	D Suffix - 40 °C to 85 °C			Unit
				Min. ^d	Typ. ^c	Max. ^d	
Analog Switch							
Analog Signal Range ^e	V _{ANALOG}		Full	0		12	V
Drain-Source On-Resistance	R _{ON}	I _{NO/NC} = -10 mA, V _{COM} = 8 V V ₊ = 10.8 V	Room Full		12	16 20	Ω
On-Resistance Flatness	R _{ON} Flatness	I _{NO/NC} = 10 mA, V _{COM} = 2, 6, 8 V V ₊ = 10.8 V	Room Full		1.5	3 4	Ω
Dynamic Characteristics							
Turn-On Time	t _{ON}	V _{NO, NC} = ± 10 V, R _L = 300 Ω, C _L = 35 pF	Room Full		130	160 200	nS
Turn-Off Time	t _{OFF}		Room Full		50	80 100	
Charge Injection ^e	Q	C _L = 1 nF, V _{gen} = 0 V, R _{gen} = 0 Ω	Room		8		pC
Power Supplies							
Positive Supply Current	I ₊	V ₊ = 13.2 V, V _{IN} = 0 V, 5 V	Room Full		3	7 10	μA

Notes:

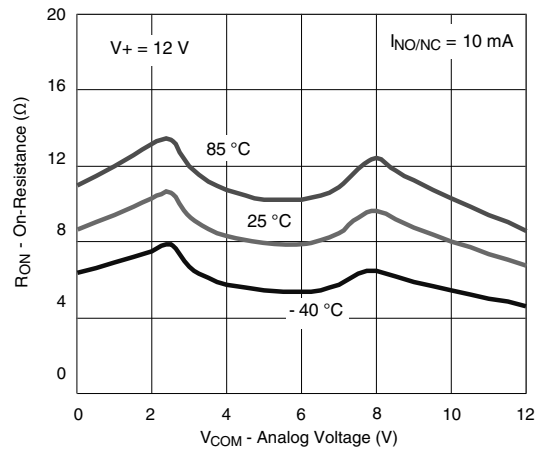
- a. Refer to PROCESS OPTION FLOWCHART.
- b. Room = 25 °C, Full = as determined by the operating temperature suffix.
- c. Typical values are for DESIGN AID ONLY, not guaranteed nor subject to production testing.
- d. The algebraic convention whereby the most negative value is a minimum and the most positive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

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.

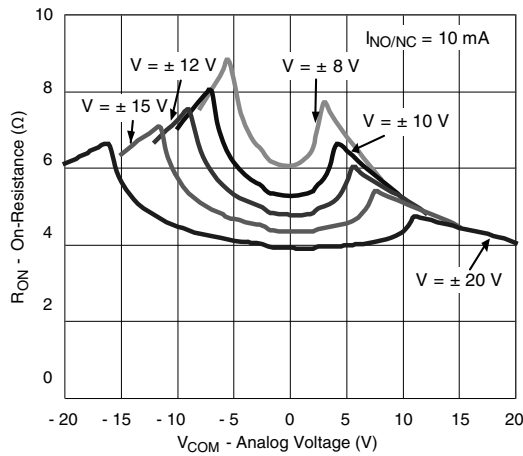
TYPICAL CHARACTERISTICS ($T_A = 25\text{ }^\circ\text{C}$, unless otherwise noted)



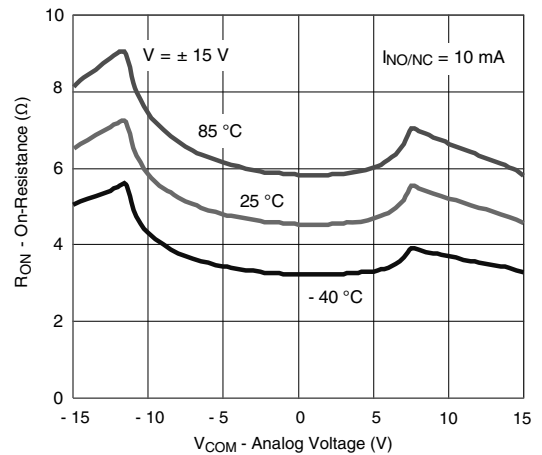
R_{ON} vs. V_{COM} and Single Supply Voltage



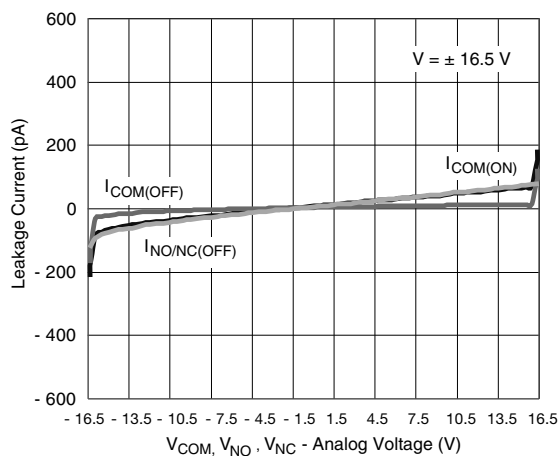
R_{ON} vs. Analog Voltage and Temperature



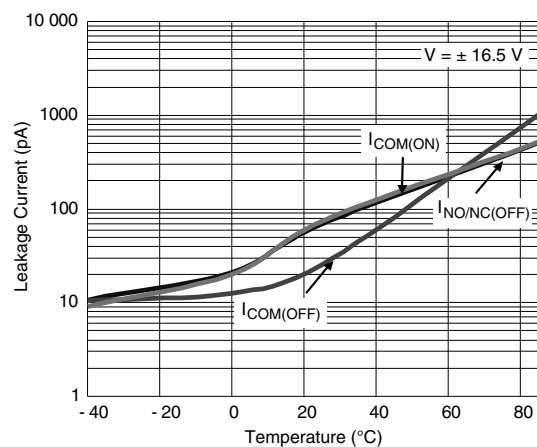
R_{ON} vs. V_{COM} and Dual Supply Voltage



R_{ON} vs. Analog Voltage and Temperature

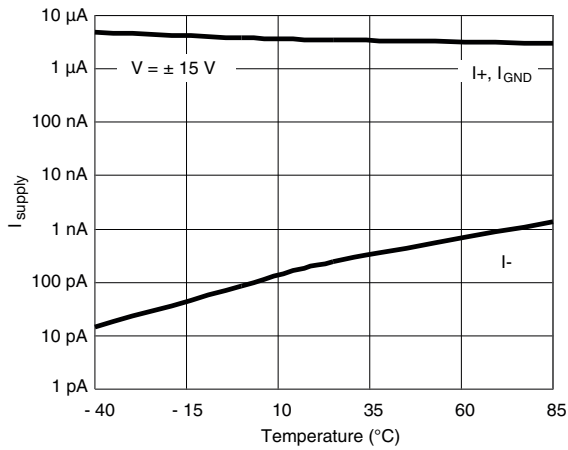


Leakage vs. Analog Voltage

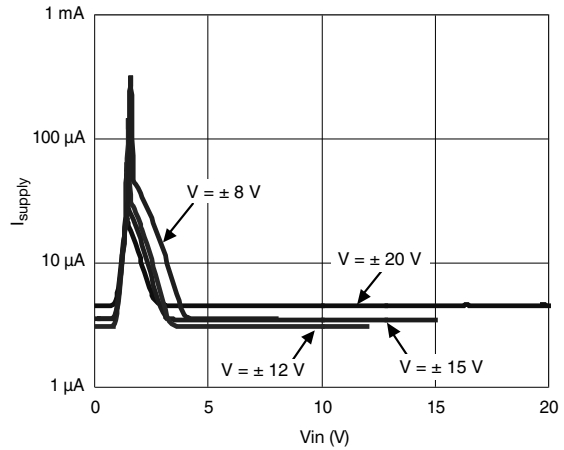


Leakage Current vs. Temperature

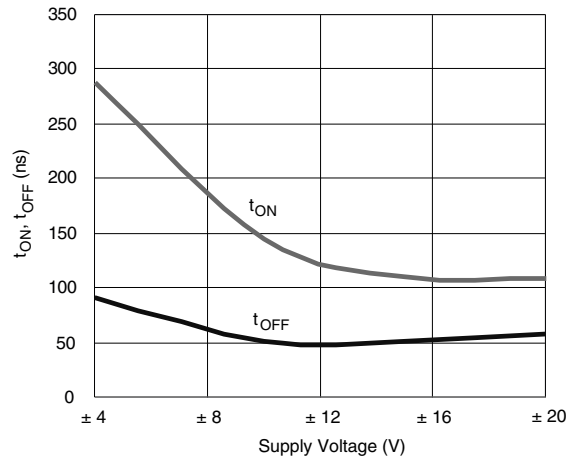
TYPICAL CHARACTERISTICS ($T_A = 25^\circ\text{C}$, unless otherwise noted)



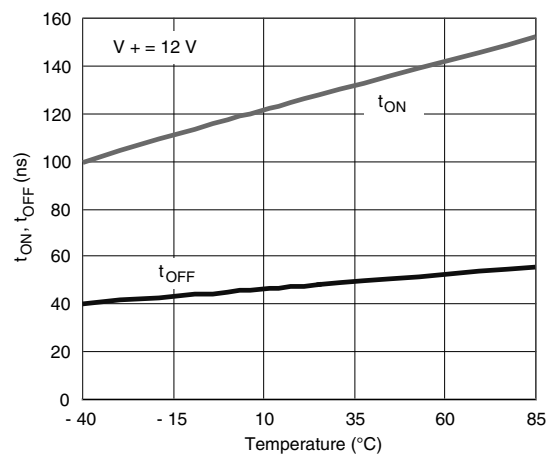
Supply Current vs. Temperature



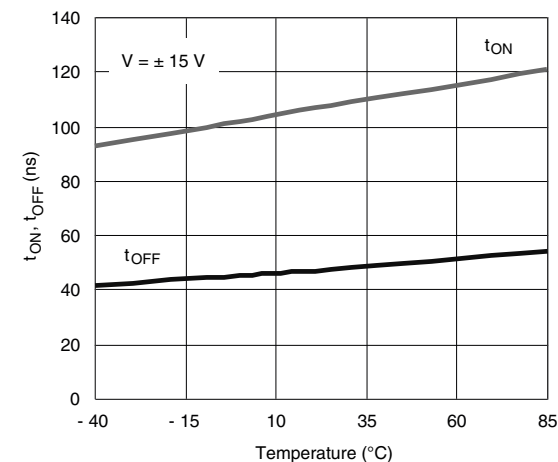
Supply Current vs. V_{IN}



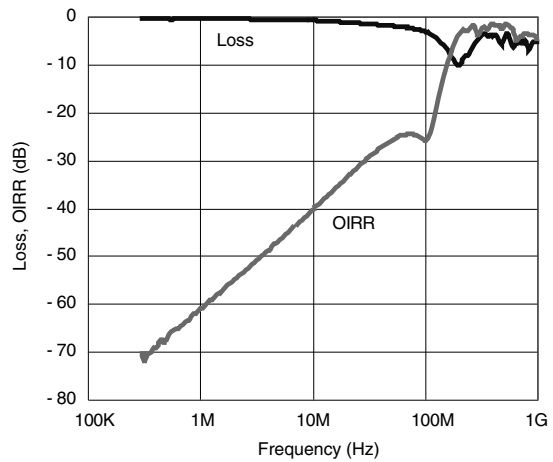
Switching Time vs. Supply Voltages



Switching Time vs. Temperature

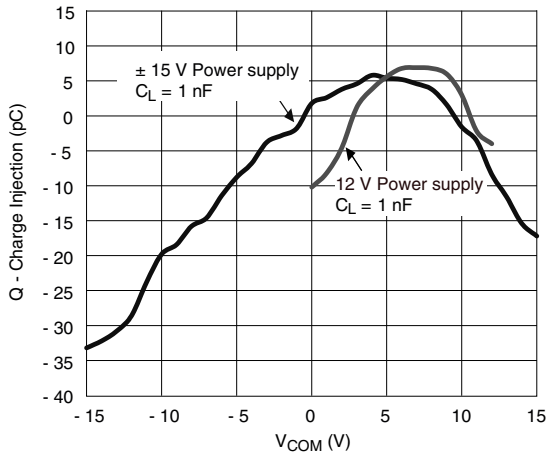


Switching Time vs. Temperature

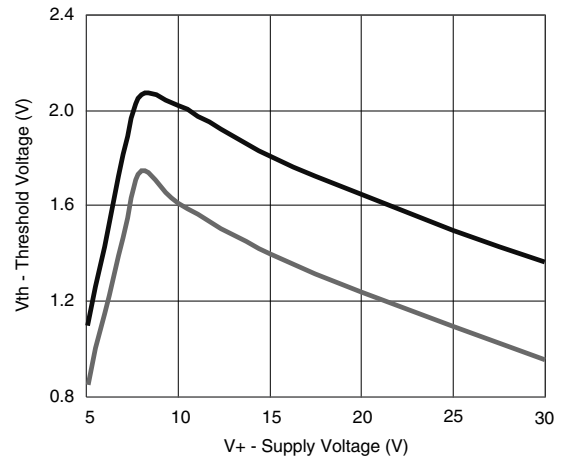


Off Isolation and Insertion Loss vs. Frequency

TYPICAL CHARACTERISTICS (T_A = 25 °C, unless otherwise noted)



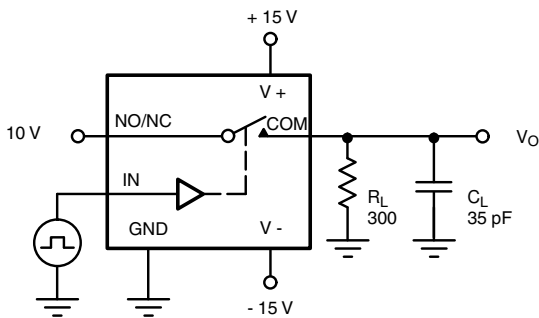
Charge Injection vs. Analog Voltage



Input Switching Threshold vs. Supply Voltage

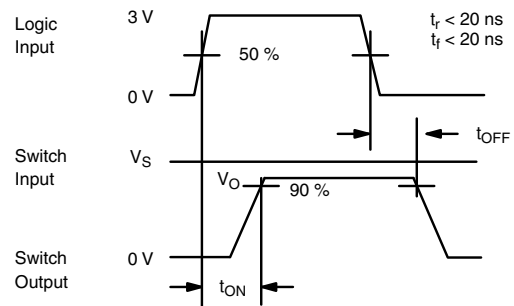
TEST CIRCUITS

V_O is the steady state output with the switch on.



C_L (includes fixture and stray capacitance)

$$V_O = V_S \frac{R_L}{R_L + r_{ON}}$$



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

Figure 1. Switching Time

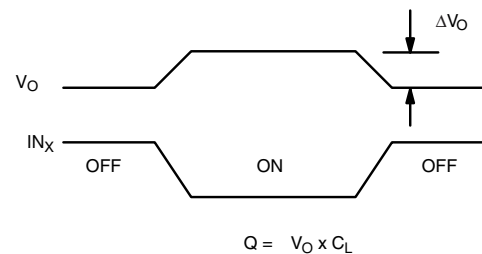
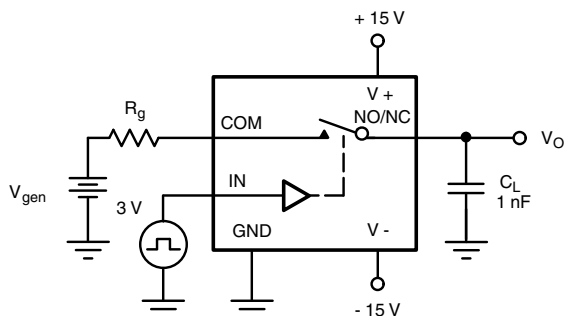


Figure 2. Charge Injection

TEST CIRCUITS

V_O is the steady state output with the switch on.

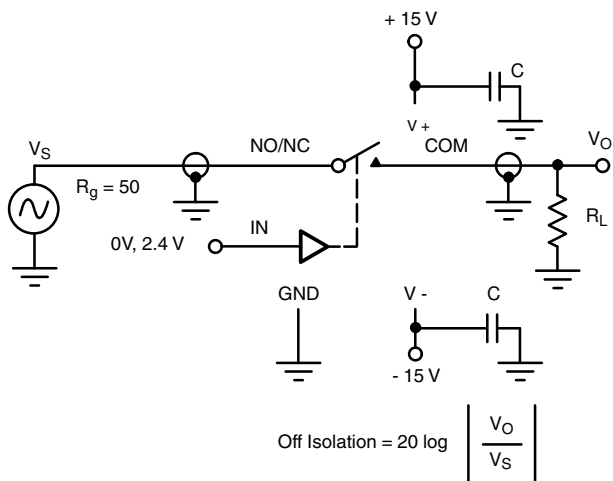


Figure 3. Off Isolation

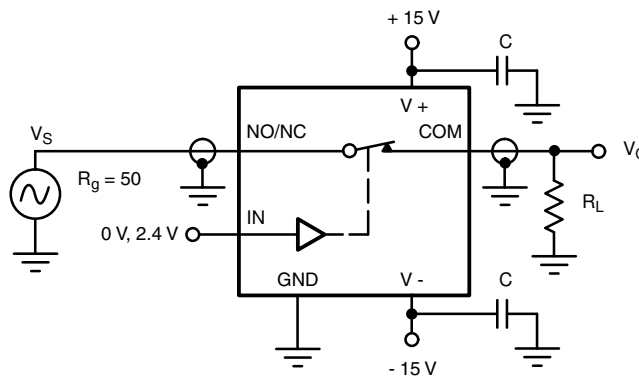


Figure 4. Insertion Loss

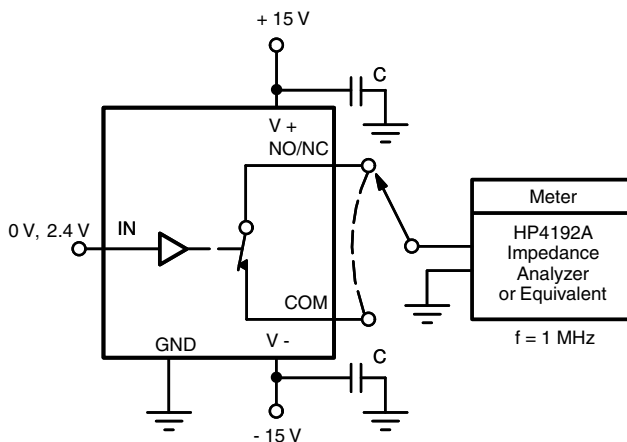
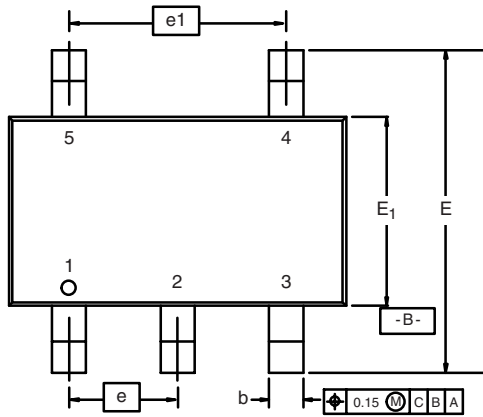


Figure 5. Source/Drain Capacitances

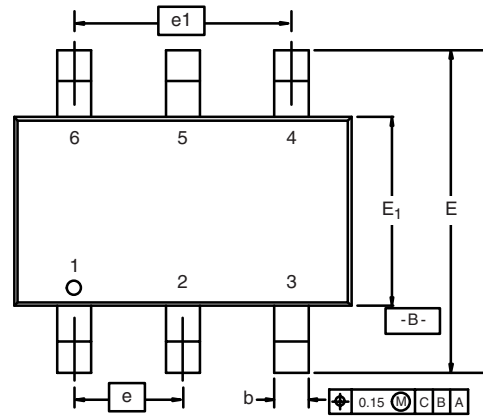
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TSOP: 5/6-LEAD

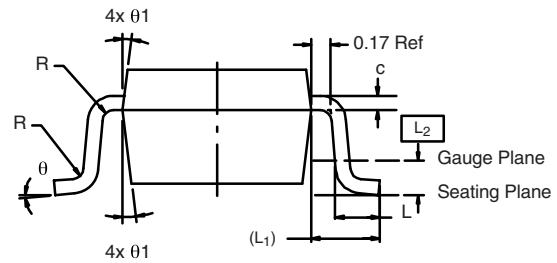
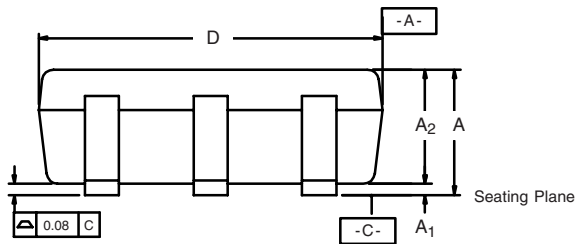
JEDEC Part Number: MO-193C



5-LEAD TSOP



6-LEAD TSOP



Dim	MILLIMETERS			INCHES		
	Min	Nom	Max	Min	Nom	Max
A	0.91	-	1.10	0.036	-	0.043
A₁	0.01	-	0.10	0.0004	-	0.004
A₂	0.90	-	1.00	0.035	0.038	0.039
b	0.30	0.32	0.45	0.012	0.013	0.018
c	0.10	0.15	0.20	0.004	0.006	0.008
D	2.95	3.05	3.10	0.116	0.120	0.122
E	2.70	2.85	2.98	0.106	0.112	0.117
E₁	1.55	1.65	1.70	0.061	0.065	0.067
e	0.95 BSC			0.0374 BSC		
e₁	1.80	1.90	2.00	0.071	0.075	0.079
L	0.32	-	0.50	0.012	-	0.020
L₁	0.60 Ref			0.024 Ref		
L₂	0.25 BSC			0.010 BSC		
R	0.10	-	-	0.004	-	-
θ	0°	4°	8°	0°	4°	8°
θ₁	7° Nom			7° Nom		
ECN: C-06593-Rev. I, 18-Dec-06						
DWG: 5540						

RECOMMENDED MINIMUM PADS FOR TSOP-6



Recommended Minimum Pads
Dimensions in Inches/(mm)

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