



Analog Switches

MM450/MM550, MM451/MM551

MM452/MM552, MM455/MM555 MOS analog switches

general description

The MM450, and MM550 series each contain four p channel MOS enhancement mode transistors built on a single monolithic chip. The four transistors are arranged as follows:

MM450, MM550	Dual Differential Switch
MM451, MM551	Four Channel Switch
MM452, MM552	Four MOS Transistor Package
MM455, MM555	Three MOS Transistor Package

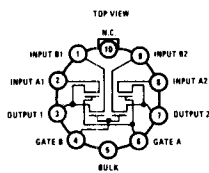
These devices are useful in many airborne and ground support systems requiring multiplexing, analog transmission, and numerous signal routing applications. The use of low threshold transistors ($V_{TH} = 2$ volts) permits operations with large analog input swings (± 10 volts) at low gate voltages (-20 volts). Significant features, then, include:

- Large Analog Input Swing ± 10 Volts
- Low Supply Voltage $V_{BULK} = +10$ Volts
 $V_{GG} = -20$ Volts
- Low ON Resistance $V_{IN} = -10V$ 150 Ω
 $V_{IN} = +10V$ 75 Ω
- Low Leakage Current 200 pA @ 25°C
- Input Gate Protection
- Zero Offset Voltage

Each gate input is protected from static charge build-up by the incorporation of zener diode protective devices connected between the gate input and device bulk.

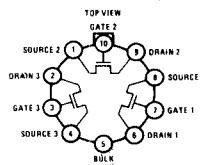
The MM450, MM451, MM452 and MM455 are specified for operation over the -55°C to $+125^{\circ}\text{C}$ military temperature range. The MM550, MM551, MM552 and MM555 are specified for operation over the -25°C to $+70^{\circ}\text{C}$ temperature range.

schematic and connection diagrams



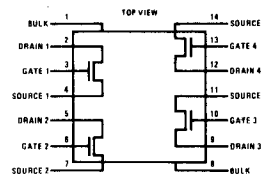
Note: Pin 5 connected to case and device bulk. MM450, MM550

Order Number MM450H or MM550H
See Package 12



Note: Pin 5 connected to case and device bulk. Drain and Source may be interchanged. MM455, MM555

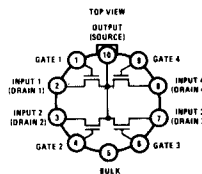
Order Number MM455H or MM555H
See Package 12



Note 1: Pins 1 and 8 connected to case and device bulk. Drain and Source may be interchanged. MM452F, MM552F.
Note 2: MM452D and MM552D (dual-in-line packages) have same pin connections as MM452F and MM552F shown above.

Order Number MM452F or MM552F
See Package 4

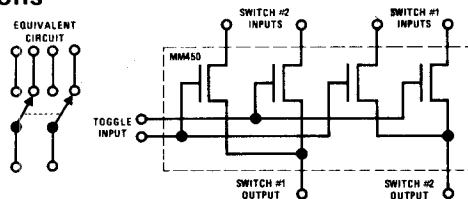
Order Number MM452D or MM552D
See Package 1



Note: Pin 5 connected to case and device bulk. MM451, MM551

Order Number MM451H or MM551H
See Package 12

typical applications



DPDT Analog Switch

MM450/MM550, MM451/MM551, MM452/MM552, MM455/MM555

8

absolute maximum ratings

	MM450, MM451, MM452, MM455	MM550, MM551, MM552, MM555
Gate Voltage (V_{GG})	+10V to -30V	+10V to -30V
Bulk Voltage (V_{BULK})	- +10V	+10V
Analog Input (V_{IN})	+10V to -20V	+10V to -20V
Power Dissipation	200 mW	200 mW
Operating Temperature	-55°C to +125°C	-25°C to 70°C
Storage Temperature	-65°C to +150°C	-65°C to +150°C

electrical characteristics

STATIC CHARACTERISTICS (Note 1)

PARAMETER	CONDITION	MIN	TYP	MAX	UNITS
Analog Input Voltage				±10	V
Threshold Voltage ($V_{GS(T)}$)	$V_{DG} = 0, I_D = 1 \mu A$	1.0	2.2	3.0	V
ON Resistance	$V_{IN} = -10V$		150	600	Ω
ON Resistance	$V_{IN} = V_{SS}$		75	200	Ω
OFF Resistance			10 ¹⁰		Ω
Gate Leakage Current (I_{GSB})	$V_{GS} = -25V, V_{BS} = 0, T_A = 25^\circ C$		20		pA
Input (Drain) Leakage Current MM450, MM451, MM452, MM455	$T_A = 25^\circ C$ $T_A = 85^\circ C$ $T_A = 125^\circ C$		.025 .002 .025	100 1.0 1.0	nA μA μA
Input (Drain) Leakage Current MM550, MM551, MM552, MM555	$T_A = 25^\circ C$ $T_A = 70^\circ C$		0.1 .030	100 1.0	nA μA
Output (Source) Leakage Current MM450, MM451, MM452, MM455	$T_A = 25^\circ C$		.040	100	nA
Output (Source) Leakage Current MM450	$T_A = 85^\circ C$			1.0	μA
MM451	$T_A = 85^\circ C$			1.0	μA
MM452, MM455	$T_A = 85^\circ C$			1.0	μA
MM450, MM451, MM452, MM455	$T_A = 125^\circ C$			1.0	μA
Output (Source) Leakage Current MM550	$T_A = 70^\circ C$			1.0	μA
MM551	$T_A = 70^\circ C$			1.0	μA
MM552, MM555	$T_A = 70^\circ C$			1.0	μA

DYNAMIC CHARACTERISTICS

Large Signal Transconductance	$V_{DS} = -10V, I_D = 10 mA$ $f = 1 kHz$		4000		$\mu mhos$
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CAPACITANCE CHARACTERISTICS (Note 2)

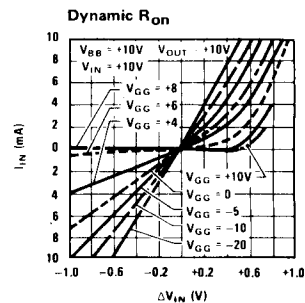
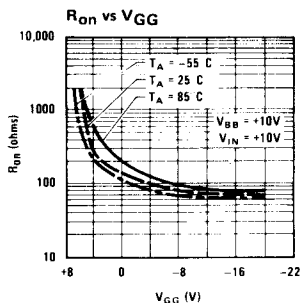
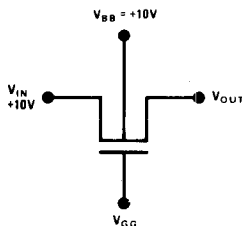
PARAMETER	DEVICE TYPE	MIN	TYP	MAX	UNITS
Analog Input (Drain) Capacitance (C_{DB})	ALL		8	10	pF
	MM450, MM550		11	14	pF
	MM451, MM551		20	24	pF
Output (Source) Capacitance (C_{SB})	MM452, MM552		7.5	11	pF
	MM455, MM555		7.5	11	pF
	MM450, MM550		10	13	pF
Gate Input Capacitance (C_{GB})	MM451, MM551		5.5	8	pF
	MM452, MM552		5.5	9	pF
	MM455, MM555		5.5	9	pF
Gate to Output Capacitance (C_{GS})	ALL		3.0	5	pF

Note 1: The resistance specifications apply for $-55^\circ C \leq T_A \leq +85^\circ C$, $V_{GG} = -20V$, $V_{BULK} = +10V$, and a test current of 1 mA. Leakage current is measured with all pins held at ground except the pin being measured which is biased at -25V.

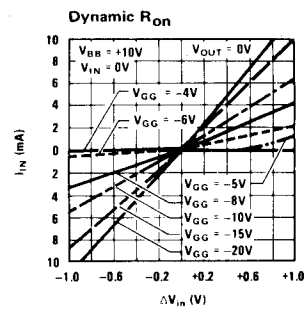
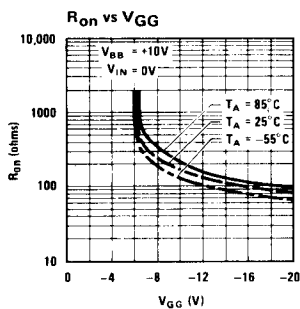
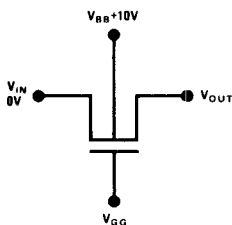
Note 2: All capacitance measurements are made at 0 volts bias at 1 MHz.

typical dynamic input characteristics ($T_A = 25^\circ\text{C}$ Unless Otherwise Noted)

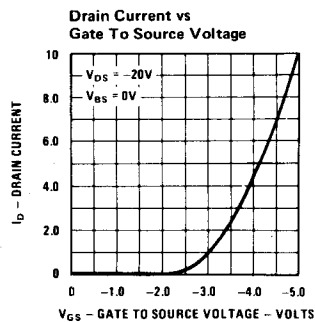
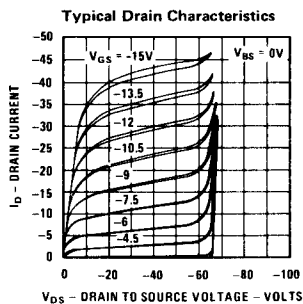
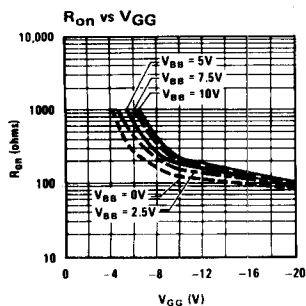
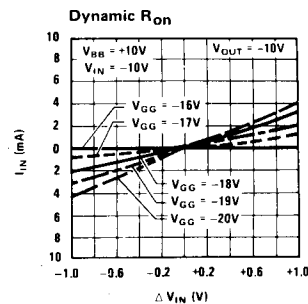
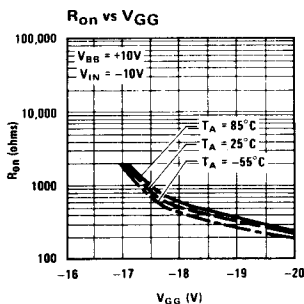
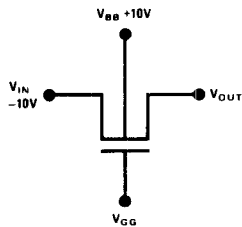
CONDITION 1:
ANALOG INPUT VOLTAGE
AT +10 VOLTS



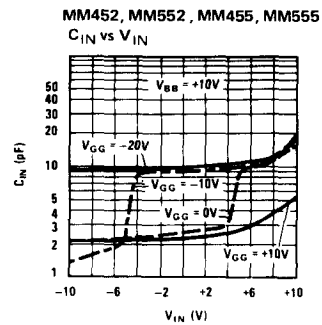
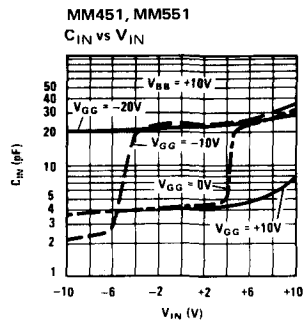
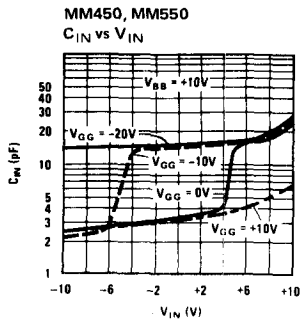
CONDITION 2:
ANALOG INPUT VOLTAGE
AT 0 VOLTS



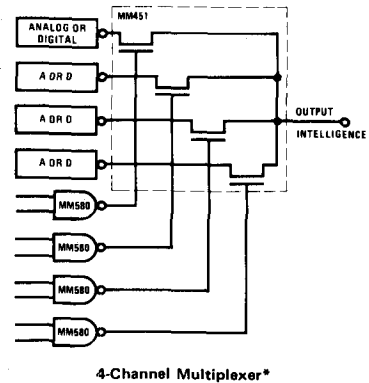
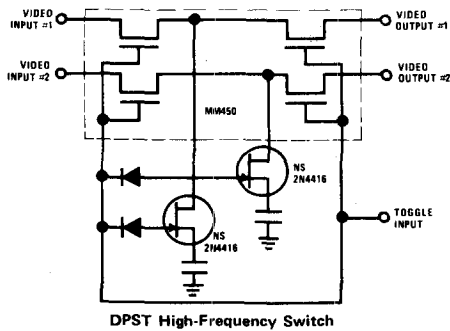
CONDITION 3:
ANALOG INPUT VOLTAGE
AT -10 VOLTS



typical input capacitance characteristics



typical applications (con't)



*Expansion in the number of data input lines is possible by using multiple level series switches allowing the same decode gates to be used for all lower rank decoding.