



Analog Switches

MM454/MM554

MM454/MM554 four-channel commutator

general description

The MM454/MM554 is a four-channel analog commutator capable of switching four analog input channels sequentially onto an output line. The device is constructed on a single silicon chip using MOS P Channel enhancement transistors; it contains all the digital circuitry necessary to sequentially turn ON the four analog switch transistors permitting multiplexing of the analog input data. The device features:

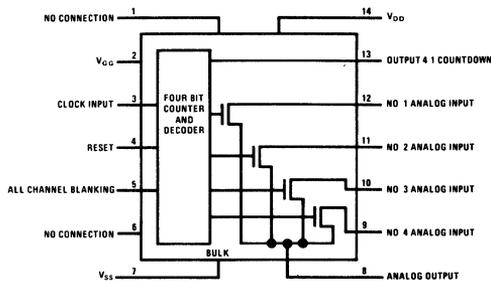
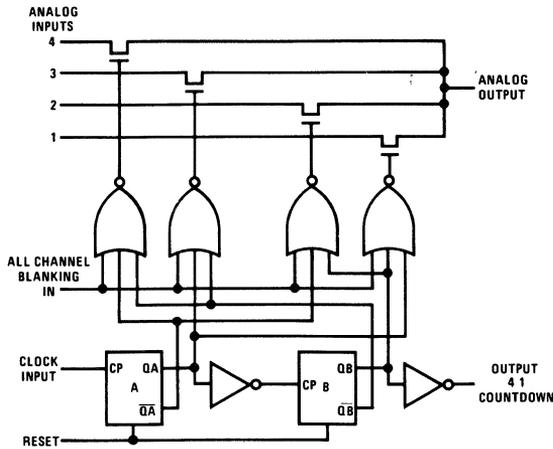
- High Analog Voltage Handling $\pm 10V$
- High Commutating Rate 500 kHz
- Low Leakage Current ($T_A = 25^\circ C$) 200 pA
($T_A = 85^\circ C$) 50 nA

- All Channel Blanking input provided
- Reset capability provided
- Low ON Resistance 200 Ω

In addition, the MM454/MM554 can easily be applied where submultiplexing is required since a 4:1 clock countdown signal is provided which can drive the clock input of subsequent MM454/MM554 units.

The MM454 is specified for operation over the $-55^\circ C$ to $+125^\circ C$ military temperature range. The MM554 is specified for operation over the $-25^\circ C$ to $+70^\circ C$ temperature range.

schematic and connection diagrams



Note: Pin 7 connected to case and to device bulk. Nominal Operating Voltages
 $V_{CC} = -24V$, $V_{DD} = 0V$; $V_{SS} = +12V$, RESET BIAS = +12V (0V for RESET)
 ALL CHANNEL BLANKING BIAS = +12V (0V for BLANKING)

Order Number MM454F or MM554F
 See Package 4



absolute maximum ratings (Note 1)

Gate Voltage (V_{GG})	+10V to -30V
Bulk Voltage (V_{SS})	+10V
Analog Input (V_{IN})	+10V to -20V
Power Dissipation	200 mW
Operating Temperature MM454	-55°C to +125°C
MM554	-25°C to +70°C
Storage Temperature	-65°C to +150°C

static characteristics (Note 2)

PARAMETER	CONDITION	MIN	TYP	MAX	UNITS
Analog Input Voltage				±10	V
ON Resistance	$V_{IN} = -10V$		170	600	Ω
ON Resistance	$V_{IN} = V_{SS}$		90	200	Ω
OFF Resistance			10^{10}		Ω
Analog Input Leakage Current	MM454 $T_A = 25^\circ C$		050	100	nA
	MM454 $T_A = 85^\circ C$		006	1.0	μA
	MM554 $T_A = 25^\circ C$		0001	100	nA
	MM554 $T_A = 70^\circ C$.030	1.0	μA
Analog Output Leakage Current	MM454 $T_A = 25^\circ C$		0 100	100	nA
	MM454 $T_A = 85^\circ C$		30	1.0	μA
	MM554 $T_A = 25^\circ C$		0001	100	nA
	MM554 $T_A = 70^\circ C$.030	1.0	μA
V_{SS} Supply Current Drain	$V_{SS} = +12V$		3.8	5.5	mA
V_{GG} Supply Current Drain	$V_{GG} = -24V$		2.4	3.5	mA

capacitance characteristics

PARAMETER	CONDITION	MIN	TYP	MAX	UNIT
Analog Input Capacitance Channel OFF	$I_{IN} = 0$		4	6	pF
Analog Input Capacitance Channel ON	$I_{IN} = 0$		20	24	pF
Analog Output Capacitance	$I_{IN} = 0$		20	24	pF
Clock Input	$V_{CL} = +12V$		2.0		pF
Reset Input	$V_{RESET} = +12V$		2.0		pF
Blanking Input	$V_{BLANK} = +12V$		2.0		pF

clock characteristics (Note 3)

PARAMETER	CONDITION	MIN	TYP	MAX	UNIT
Clock Input (HIGH) ⁽⁴⁾		$V_{SS} - 2$		V_{SS}	V
Clock Input (LOW)		-5	0	+5	V
Clock Input Rise Time (POS GOING)			No requirement		
Clock Input Fall Time (NEG GOING)				20	μsec
Countdown Output (POS) V_{OH}		$V_{SS} - 2$		V_{SS}	V
Countdown Output (NEG) V_{OL}			0		V
Maximum Commutation Rate		0.5	2.0		MHz
V_{SS}		+10.0	+12	+14	V

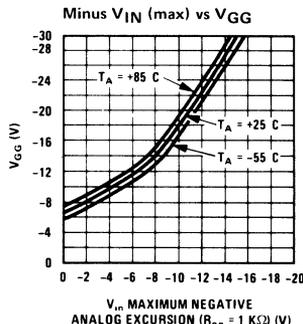
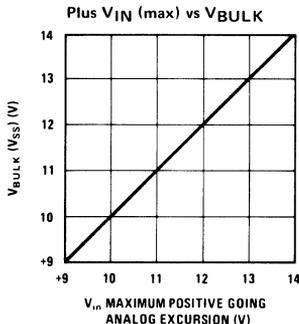
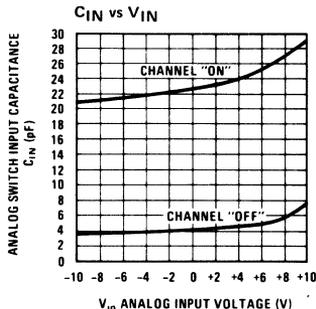
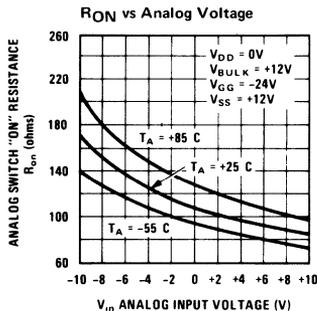
Note 1: Maximum ratings are limiting values above which the device may be damaged. All voltages referenced to $V_{DD} = 0$.

Note 2: These specifications apply over the indicated operating temperature range for $V_{GG} = -24V$, $V_{DD} = 0V$, $V_{SS} = +12V$, $V_{RESET} = +12V$, $V_{BLANK} = +12V$. ON resistance measured at 1 mA, OFF resistance and leakage measured with all analog inputs and output common. Capacitance measured at 1 MHz.

Note 3: Operating conditions in Note 2 apply. V_{SS} to V_{DD} (0V) voltage is applied to counting and gating circuits. V_{GG} is required only for analog switch biasing. All logic inputs are high resistance and are essentially capacitive.

Note 4: Logic input voltage must not be more positive than V_{SS} .

typical performance characteristics



timing diagram

