ABSOLUTE MAXIMUM RATINGS

V+ to GND	0.3V to +12V
V- to GND	+0.3V to -12V
V+ to V	+12V
VL, IN_ to GND (Note 1)	0.3V to (V+ + 0.3V)
VCOM , VNC , VNO (Note 1)	V- to V+
Current (any terminal)	±50mA
Continuous Current (COM_, NC_, NO_)	±100mA
Peak Current (COM_, NC_, NO_	
pulsed at 1ms 10% duty cycle)	±200mA

Continuous Power Dissipation ($T_A = +70^{\circ}C$)

	,
16-Pin Plastic DIP (derate 10.5mW/	°C above +70°C)842mW
16-Pin TSSOP (derate 5.7mW/°C ab	ove +70°C)457mW
Operating Temperature Range	-40°C to +85°C
Storage Temperature Range	
Junction Temperature	+150°C
Lead Temperature (soldering, 10s)	+300°C

Note 1: Signals on NC_, NO_, COM_, or IN_ exceeding V+ or V- are clamped by internal diodes. Limit forward diode current to maximum current rating.

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.

ELECTRICAL CHARACTERISTICS–Dual Supplies

(V+ = +5V ±10%, V- = -5V ±10%, V_L = +2.7V to V+, GND = 0, V_{IH} = +2.4V, V_{IL} = +0.8V, T_A = T_{MIN} to T_{MAX}, unless otherwise noted. Typical values are at T_A = +25°C.) (Note 2)

PARAMETER	SYMBOL	CONDITIONS		MIN	ТҮР	MAX	UNITS	
ANALOG SWITCH								
Input Voltage Range	V _{COM} _, V _{NO} _, V _{NC} _			V-		V+	V	
On Resistance	Devi	$V_{+} = 4.5V, V_{-} = -4.5V,$	$T_A = +25^{\circ}C$		1.2	1.6		
On-nesistance	NON	$V_{NO_}$ or $V_{NC_}$ = ±3.3V	$T_A = T_{MIN}$ to T_{MAX}			2	52	
On-Resistance Match	APou	$V_{+} = 4.5V, V_{-} = -4.5V,$	$T_A = +25^{\circ}C$		0.2	0.3	0	
(Note 3)	ΔnON	$V_{NC_} = \pm 3.3V$	$T_A = T_{MIN}$ to T_{MAX}			0.5	Ω	
On-Resistance Flatness	Rflat	$V + = 4.5V, V - = -4.5V, \\ I_{COM_} = 50mA, V_{NO_} \text{ or } \\ V_{NC_} = \pm 3.3V, 0$	$T_A = +25^{\circ}C$		0.2	0.4	Ω	
(Note 4)			$T_A = T_{MIN}$ to T_{MAX}			0.5		
NC_ or NO_ Off-Leakage Current (Note 5)	I _{N_(OFF)}	$\begin{array}{l} V{+}={+}5.5V,V{-}={-}5.5V,\\ V_{NO_}\text{ or }V_{NC_}={\pm}4.5V,\\ V_{COM_}={\mp}4.5V \end{array}$	$T_A = +25^{\circ}C$	-1	0.1	1		
			$T_A = T_{MIN}$ to T_{MAX}	-10		10	ΠA	
COM_ Off-Leakage	ICOM_(OFF)	$\begin{array}{l} V{+}={+}5.5V,V{-}={-}5.5V,\\ V_{NO_} \text{ or } V_{NC_}={\pm}4.5V,\\ V_{COM_}={\mp}4.5V \end{array}$	$T_A = +25^{\circ}C$	-1	0.1	1	2	
Current (Note 5)			$T_A = T_{MIN}$ to T_{MAX}	-10		10	ΠA	
COM_ On-Leakage	$I_{COM}(ON) \qquad \begin{array}{c} V+=+\\ V_{COM}\\ V_{NO} \circ\\ floating \end{array}$	$ \begin{array}{l} V+=+5.5V, V-=-5.5V, \\ V_{COM}=\pm 4.5V, \\ V_{NO}\ or \ V_{NC}=\pm 4.5V \ or \\ floating \end{array} \ \ \begin{array}{l} T_{A}=+25^{\circ}C \\ T_{A}=T_{MIN} \ to \\ T_{A}=T_{MIN} \ to \\ \end{array} $	T _A = +25°C	-2	0.2	2	n۸	
Current (Note 5)			$T_A = T_{MIN}$ to T_{MAX}	-25		25	Ц	
LOGIC INPUT								
Input Logic High	VIH	$V_{L} = V +$		2.4			V	
Input Logic Low	VIL	$V_{L} = V +$				0.8	V	
Input Leakage Current	lin	$V_{L} = V +$		-1	0.005	1	μΑ	

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ELECTRICAL CHARACTERISTICS–Dual Supplies (continued)

(V+ = +5V ±10%, V- = -5V ±10%, V_L = +2.7V to V+, GND = 0, V_{IH} = +2.4V, V_{IL} = +0.8V, T_A = T_{MIN} to T_{MAX}, unless otherwise noted. Typical values are at T_A = +25°C.) (Note 2)

PARAMETER	SYMBOL	CONDITIONS			ТҮР	МАХ	UNITS	
POWER SUPPLY								
Positive Supply Voltage	V+			+2.7		+5.5	V	
Negative Supply Voltage	V-			-2.7		-5.5	V	
Logic Supply Voltage	VL			2.7		V+	V	
Positive Supply Current	l+	$IN_ = GND \text{ or } V_L$			0.001	1	μΑ	
Negative Supply Current	-	$IN_ = GND \text{ or } V_L$				-1	μΑ	
Logic Supply Current	١L	$IN_ = GND \text{ or } V_L$				1	μΑ	
Ground Current	IGND	$IN_{=} 0 \text{ or } V+, V+ = 5.5V, V$	V- = -5.5V			1	μΑ	
DYNAMIC		-						
	ton	$V_{+} = +4.5V, V_{-} = -4.5V, V_{NC_or V_{NO_{-}} = \pm 3.3V, V_{L} = V_{+}, Figure 2$	$T_A = +25^{\circ}C$		200	350	ne	
Tum-On Time	LON		$T_A = T_{MIN}$ to T_{MAX}			500	115	
T 0"T	torr	$V_{+} = +4.5V, V_{-} = -4.5V,$	$T_A = +25^{\circ}C$		110	150	20	
Turn-On Time	UFF	$V_{\rm NC}$ or $V_{\rm NO}$ = ±3.3V, $V_{\rm L}$ = V+, Figure 2	$T_A = T_{MIN}$ to T_{MAX}			350	115	
Break-Before-Make Delay	^t BBM	Figure 3, MAX4679 only, $R_L = 300\Omega$, $C_L = 35pF$		5			ns	
Charge Injection	Q	$R_{GEN} = 0, C_L = 1nF, V_{GEN}$	= 0, Figure 4		85		рС	
Off-Isolation	VISO	$R_L = 50\Omega$, $C_L = 5pF$, $f = 1N$	/Hz, Figure 5a		-65		dB	
Crosstalk		$R_L = 50\Omega$, $C_L = 5pF$, f = 1MHz, Figure 6a			-84		dB	
-3dB Bandwidth	BW	$R_S = 50\Omega$, $R_L = 50\Omega$, Figure		66		MHz		
NC or NO Off- Capacitance	$C_{(N_OFF)}$	f = 1MHz, Figure 8			85		pF	
COM Off-Capacitance	C(COMOFF)	f = 1MHz, Figure 8			85		pF	
On-Capacitance	C _(ON)	f = 1MHz, Figure 8			350		pF	

ELECTRICAL CHARACTERISTICS-Single Supply

 $(V + = +5V \pm 10\%, V - = 0, V_L = +2.7V$ to V+, GND = 0, $V_{IH} = +2.4V$, $V_{IL} = +0.8V$, $T_A = T_{MIN}$ to T_{MAX} , unless otherwise noted. Typical values are at $T_A = +25^{\circ}C.$) (Note 2)

PARAMETER	SYMBOL	CONDITIONS		MIN	ТҮР	МАХ	UNITS	
ANALOG SWITCH								
Input Voltage Range	V _{COM_} , V _{NO_} , V _{NC_}			0		V+	V	
On-Resistance	R _{ON}	V+ = +4.5V, I_{COM} = 50mA, T_{A} = +25°C V _{NO} or V _{NC} = 3.3V T_{A} = T _{MIN} to T _{MAX}			1.8	2.7 3.5	Ω	
On-Resistance Match Between Channels	ΔR _{ON}	$V_{+} = +4.5V, I_{COM} = 50mA,$ $V_{NO_{-}} \text{ or } V_{NC_{-}} = 3.3V$ $T_{A} = +25^{\circ}C$ $T_{A} = +25^{\circ}C$			0.05	0.15	Ω	
On-Resistance Flatness (Note 4)	R _{FLAT}	$V_{+} = +4.5V, I_{COM} = 50mA, V_{NO} or V_{NC} = 3.3V, 1.5V$	$V_{+} = +4.5V, I_{COM} = 50mA, T_{A} = +25^{\circ}C$ $V_{NO} = 0 V_{NC} = 3.3V + 15V$ $T_{A} = -T_{AUN} = T_{AUN} = -T_{AUN} = -T_{AUN$		0.15	0.25	Ω	
NC_ or NO_ Off- Leakage Current (Note 5)	IN_(OFF)	$V_{+} = +5.5V;$ $V_{NO_{-}}$ or $V_{NC_{-}} = 4.5V, 1V;$ $V_{COM_{-}} = 1V, 4.5V$	$V = +5.5V;$ $T_A = +25^{\circ}C$ $V_{NO_{-}}$ or $V_{NC_{-}} = 4.5V, 1V;$ $T_A = +25^{\circ}C$ $V_{COM_{-}} = 1V, 4.5V;$ $T_A = T_{MIN}$ to T_{MAX}		0.1	1 10	nA	
COM_ Off-Leakage Current (Note 5)	ICOM_(OFF)	V = +5.5V; $V_{NO_{-}}$ or $V_{NC_{-}} = 4.5V, 1V;$ $V_{COM_{-}} = 1V, 4.5V$	$V_{+} = +5.5V; \qquad T_{A} = +25^{\circ}C$ $V_{NO_{-}} \text{ or } V_{NC_{-}} = 4.5V, 1V; \qquad T_{A} = T_{MIN} \text{ to } T_{MAX}$		0.1	1 10	nA	
COM_ On-Leakage Current (Note 5)	ICOM_(ON)	$V = +5.5V; V_{COM} = 1V,$ $T_A = +25^{\circ}C$ $4.5V; V_{NO}$ or $V_{NC} = 1V,$ $T_A = +25^{\circ}C$ $4.5V; or floating$ $T_A = T_{MIN}$ to T_{MAX}		-2 -25	0.2	2 25	nA	
LOGIC INPUT								
Input Low Voltage	VIL	$V_L = V_+$				0.8	V	
Input High Voltage	VIH	$V_L = V_+$		2.4			V	
Input Leakage Current	l _{IN}	$V_L = V_{\pm}$		-1	0.005	1	μΑ	
POWER SUPPLY				2.7		6	V	
Logic Supply Voltage	V+ VL			2.7		V+	V	
Positive Supply Current	l+	$V_{IN} = 0 \text{ or } V_L, V_L = V_+$			1	1	μΑ	
Logic Supply Current	١L	$V_{IN} = 0 \text{ or } V_L, V_+ = 5.5V$				1	μΑ	
Ground Current	IGND	$V_{IN_{-}} = 0 \text{ or } V_{L_{+}} V_{+} = 5.5 V$			1	10	μA	
DYNAMIC								
Turn-On Time	ton	$V_L = V_+, V_+ = +4.5V; V_{NC}$ or $V_{NO} = 3.3V, R_L = 300\Omega,$ $C_L = 35pE$. Figure 2	$T_A = +25^{\circ}C$ $T_A = T_{MIN}$ to T_{MAX}		600	1000 1400	ns	
Turn-Off Time	toff	$V_L = V_+, V_+ = +4.5V; V_{NC}$ or $V_{NO} = 3.3V, R_L = 300\Omega$,	$T_A = +25^{\circ}C$ $T_A = T_{MIN}$ to T_{MAX}		120	165 400	ns	

ELECTRICAL CHARACTERISTICS-Single Supply (continued)

 $(V + = +5V \pm 10\%, V - = 0, V_L = +2.7V$ to V+, GND = 0, $V_{IH} = +2.4V$, $V_{IL} = +0.8V$, $T_A = T_{MIN}$ to T_{MAX} , unless otherwise noted. Typical values are at $T_A = +25^{\circ}C$.) (Note 2)

PARAMETER	SYMBOL	CONDITIONS		ТҮР	МАХ	UNITS
Break-Before- Make Delay	tBBM	MAX4679 only, RL = 300 Ω , CL = 35pF, Figure 3	5			ns
Charge Injection	Q	$R_{GEN} = 0$, $C_L = 1nF$, $V_{GEN} = 0$, Figure 4		9		рС
Off-Isolation	VISO	$R_L = 50\Omega$, $C_L = 5pF$, f = 1MHz, Figure 5b		-65		dB
Crosstalk		$R_L = 50\Omega$, $C_L = 5pF$, f = 1MHz, Figure 6b		-84		dB
-3dB Bandwidth	BW	$R_S = 50\Omega$, $R_L = 50\Omega$, Figure 7b		63		MHz
NC or NO Off- Capacitance	$C_{(N_OFF)}$	f = 1MHz, Figure 8		85		pF
COM Off-Capacitance	C(COMOFF)	f = 1MHz, Figure 8		85		pF
On-Capacitance	C _(ON)	f = 1MHz, Figure 8		350		pF

Note 2: The algebraic convention, where the most negative value is a minimum and the most positive value a maximum, is used in this data sheet.

Note 3: $\Delta R_{ON} = R_{ON}(MAX) - R_{ON}(MIN)$.

Note 4: Flatness is defined as the difference between the maximum and minimum value of on-resistance as measured over the specified analog signal ranges.

Note 5: Leakage parameters are 100% tested at maximum-rated hot operating temperature and the highest supply voltage, and guaranteed by correlation at +25°C.

 $(T_A = +25^{\circ}C, unless otherwise noted.)$



Typical Operating Characteristics

/VI/IXI/VI



Typical Operating Characteristics (continued)

 $(T_A = +25^{\circ}C, unless otherwise noted.)$





_Pin Description

	PIN			
MAX4677	MAX4678	MAX4679	NAME	FUNCTION
1, 8, 9, 16	1, 8, 9, 16	1, 8, 9, 16	IN1, IN2, IN3, IN4	Logic Inputs
2, 7, 10, 15	2, 7, 10, 15	2, 7, 10, 15	COM1, COM2, COM3, COM4	Analog Switch Common Terminals
3, 6, 11, 14	_		NC1, NC2, NC3, NC4	Analog Switch Normally Closed Terminals
	3, 6, 11, 14	_	NO1, NO2, NO3, NO4	Analog Switch Normally Open Terminals
	—	3, 6	NO1, NO4	Analog Switch Normally Open Terminals
		11, 14	NC2, NC3	Analog Switch Normally Closed Terminals
4	4	4	V-	Negative Supply-Voltage Input. Connect to GND for single-supply operation.
5	5	5	GND	Ground
12	12	12	VL	Logic Supply Input
13	13	13	V+	Positive Supply Input

MAX4677/MAX4678/MAX4679

Applications Information

Overvoltage Protection

Proper power-supply sequencing is recommended for all CMOS devices. Do not exceed the absolute maximum ratings because stresses beyond the listed ratings can cause permanent damage to the devices. Always sequence V+ on first, then V-, then V_L followed by the logic inputs, NO_, NC_, or COM. If proper power-supply sequencing is not possible, add two small signal diodes (D1, D2) in series with the supply pins, and a Schottky diode between V+ and V_L for overvoltage protection (Figure 1). Adding diodes reduces the analog signal range to one diode drop below V+ and one diode drop above V-, but does not affect the devices' low switch resistance and low leakage characteristics. Device operation is unchanged, and the difference between V+ and V- should not exceed 11V. Power-supply bypassing improves noise margin and prevents switching noise from propagating from the V+ supply to other components. A 0.1μ F capacitor connected from V+ to GND is adequate for most applications.



Figure 1. Overvoltage Protection Using External Blocking Diodes

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Figure 2. Switching Time



Figure 3. Break-Before-Make Interval (MAX4679 Only)



Figure 4. Charge Injection



Figure 5a. Off-Isolation Test Circuit, Dual Supplies



Figure 5b. Off-Isolation Test Circuit, Single Supply



Figure 7a. Insertion Loss Test Circuit, Dual Supplies



Figure 7b. Insertion Loss Test Circuit, Single Supply

Chip Information

TRANSISTOR COUNT: 240 PROCESS: CMOS

Package Information MILLIMETERS INCHES SSOP MIN MIN MAX .043 A \square \square \square \square Π VARIA 056 B2 EXPOSED DIE PAD $\bigcup \bigcup \bigcup \bigcup \bigcup \bigcup \bigcup \bigcup$ TOP VIEW BOTTOM VIEW JEDEC MD-153 VARIATIONS MILLIMETERS INCHES Ν e--MIN. MA) Mé AB 4.90 .20 .<u>19:</u> 19' AC AC-EP .20 3.1 AD AD-EP 50 D 6.40 6.60 SEATING Ε 4.34 .15 .17 <u>SIDE VIEW</u> END VIEW A 28 AF - FF LEAD TIP DETAIL DETAIL 'A' RASE ///////////// NDTES: 1. DIMENSIONS D AND E DO NOT INCLUDE FLASH. 2. MULD FLASH OR PROTRUSIONS NOT TO EXCEED .15 mm PER SIDE. 3. CONTROLLING DIMENSION: MULLUMENTER 4. METS JEDEC DUTLINE MO-153 VARIATIONS AB, AC, AD, AE, AF. 5. DIMENSIONS X AND Y APPLY TO EXPOSED PAD (CEP VERSIONS ONLY 6 EXPOSED PAD FLUSH VITH BOTTOM OF PACKAGE VITHIN 002'. PACKAGE DUTLINE, TSSDP, 4.40mm BDDY, 0.65mm PITCH CUMENT CONTROL N C 1/1 21-0066 PDIPN.EP N E1 A3 0*-15* B1 еR MILLIMETERS MILLIMETERS INCHES INCHES MIN MAX MIN MAX N N000 0.348 0.390 8.84 9.91 8 AB 0.735 0.765 18.67 19.43 14 AC 0.745 0.765 18.92 19.43 16 AA MIN MAX MIN MAX А 508 D 0.735 0.765 D 0.745 0.765 D 0.885 0.915 0.020 3.18 4.45 0.175 A3 0.055 0.080 1.40 B 0.015 0.021 0.381 B1 0.045 0.060 1.14 2.03 22.48 3.24 18 AD 0.381 0.533 1.015 1.045 360 1.380 28 *5 TD D M D L M D L T D C D S: E DO NOT INCLUDE MOLD FLASH ILD FLASH DR PROTRUSIONS NOT I EXCEED J5mm (006') INTROLLING DIMENSION: MILLIMETER ETS JEDEC MS00I-XX AS SHOWN ABOVE TABLE 7.493 2. e eA 3. 4. ME 0.400 10.16 LIAR TO JEDEC MS-095-AH NUMBER OF PINS 5. SI 6. N 0.115 0.150 2.921 3.81 PACKAGE FAMILY DUTLINE: PDIP .300 1/1 21-0043 B

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