SCOPE: PRECISION 8-CHANNEL/DUAL 4-CHANNEL LOW-VOLTAGE CMOS ANALOG MULTIPLEXER

Device Type	Generic Number	Circuit Function
01	MAX398M(x)/883B	8-Channel Analog Multiplexer
02	MAX399M(x)/883B	Dual 4-Channel Analog Multiplexer

Case Outline(s). The case outlines shall be designated in Mil-Std-1835 and as follows:

Outline Letter	Mil-Std-1835	Case Outline	Package Code
JE	GDIP1-T16 or CDIP2-T16	16 LEAD CERDIP	J16

Absolute Maximum Ratings

Voltage Referenced to V^-

V^+ ..... -0.3V to +17V
V^- ..... +0.3V to -17V
V^+ to V^- ..... -0.3V to +17V
Voltage into any terminal 1/ .....(V^- -2V) to (V^+ +2V)
or 30mA whichever occurs first
Current, Any terminal 30mA
Peak Current, Any terminal (Pulsed at 1ms, 10% duty cycle max) 40mA
Lead Temperature (soldering, 10 seconds) ..... +300°C
Storage Temperature ..... -65°C to +150°C

Continuous Power Dissipation ..... T_A=+70°C
16 lead CERDIP(derate 10.0mW/°C above +70°C) 800mW
Junction Temperature T_J ..... +150°C
Thermal Resistance, Junction to Case, ΘJC:
Case Outline 16 lead CERDIP..... 50°C/W
Thermal Resistance, Junction to Ambient, ΘJA:
Case Outline 16 lead CERDIP..... 100°C/W

Recommended Operating Conditions

Ambient Operating Range (T_A) ..... -55°C to +125°C
Positive Supply Voltage (V^+) ..... +15V
Negative Supply Voltage (V^-) ..... -15V
V_{AL} (max) 0.8V
V_{AH} (min) 2.4V

1/ Signals on any terminal exceeding V+ or V- will be clamped by internal diodes. Limit forward current to the maximum current ratings.

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.

TABLE 1. ELECTRICAL TESTS: DUAL SUPPLIES

TEST	Symbol	CONDITIONS -55 °C <=T_A<= +125°C 6/ Unless otherwise specified	Group A Subgroup	Device type	Limits Min 2/	Limits Max 2/	Units
SWITCH							
Analog-Signal Range	V_{ANALOG}	NOTE 3	1,2,3	All	V-	V+	V
Channel ON Resistance	$r_{DS(ON)}$	I_{NO}=1mA, V_{COM}=±3.5V	1 2,3	All		100 125	Ω
On-resistance Matching between Channels NOTE 4	$\Delta r_{DS(ON)}$	I_{NO}=1mA, V_{COM}=±3.5V V+=+5V, V-=-5V	1 2,3	All		4 6	Ω
On-resistance Flatness NOTE 5	r_{FLAT}	I_{NO}=1mA, V_{COM}=±3V V+=+5V, V-=-5V	1 2,3	All		10 13	Ω
NO- OFF Leakage Current	$I_{NO(OFF)}$	V_{NO}=±4.5V V_{COM} =±4.5V V+=+5.5V, V-=-5.5V	1 2,3	All	-0.1 -10	0.1 10	nA
COM-OFF Leakage Current	$I_{COM(OFF)}$	V_{NO}=±4.5V V_{COM} =±4.5V V+=+5.5V, V-=-5.5V	1 2,3	01	-0.2 -20	0.2 20	nA
			1 2,3	02	-0.1 -10	0.1 10	
COM-On Leakage Current	$I_{COM(ON)}$	V_{NO}=±4.5V V_{COM} =±4.5V	1 2,3	01	-0.4 -40	0.4 40	nA
			1 2,3	02	-0.2 -20	0.2 20	
INPUT							
Input Current/Voltage High	$I_{AH,}$ I_{ENH}	V_A=V_{EN}=2.4V	1,2,3	All	-0.1	0.1	µA
Input Current/Voltage Low	$I_{AL,}$ I_{ENL}	V_A=V_{EN}=0.8V	1,2,3	All	-0.1	0.1	µA
SUPPLY							
Power Supply Range			1,2,3	All	±3	±8	V
Positive Supply Current	I+	V_{EN}=V_A=0V or V+ V+=+5.5V, V-=-5.5V	1	All	-1	1	µA
Negative Supply Current	I-	V_{EN}=V_A=0V or V+ V+=+5.5V, V-=-5.5V	1,2,3	All	-1	1	µA
Ground Current	I_{GND}	V_{EN}=V_A=0V or V+ V+=+5.5V, V-=-5.5V	1,2,3	All	-1	1	µA
DYNAMIC							
Transition Time	t_{TRANS}	Figure 2	9,10,11	All		150	ns
Break-Before-Make interval	t_{OPEN}	Figure 4	9	All	0		ns
Enable Turn-On Time	$t_{ON(EN)}$	Figure 3	9 10,11	All		150 250	ns
Enable Turn-Off Time	$t_{OFF(EN)}$	Figure 3	9 10,11	All		150 200	ns
Charge Injection	Q	C_L=10nF, V_S=0V, R_S=0Ω NOTE 3	9	All		5	pC

TABLE 1. ELECTRICAL TESTS: SINGLE 5V SUPPLY

TEST	Symbol	CONDITIONS -55 °C <=T_A<= +125°C 7/ Unless otherwise specified	Group A Subgroup	Device type	Limits Min 2/	Limits Max 2/	Units
SWITCH							
Analog Signal Range NOTE 3	V_{ANALOG}	V_{COM}, V_{NO}	1,2,3	All	V+	V-	V
On-Resistance	$r_{DS(ON)}$	I_{NO}=1mA, V_{COM}=3.5V, V+=4.5V	1 2,3	All		225 280	Ω
On-resistance Matching between Channels NOTE 4	$\Delta r_{DS(ON)}$	I_{NO}=1mA, V_{COM}=3.5V V+=+4.5V	1 2,3	All		10 12	Ω
On-resistance Flatness	r_{FLAT}	I_{NO}=1mA, V_{COM}=3V, 2V, 1V V+=+5V	1 2,3	All		16 20	Ω
NO- OFF Leakage Current NOTE 8	$I_{NO(OFF)}$	V_{NO}=4.5V V_{COM} =0V V+=+5.5V	1 2,3	All	-0.1 -10	0.1 10	nA
COM-OFF Leakage Current NOTE 8	$I_{COM(OFF)}$	V_{NO}=0V, V_{COM} =4.5V V+=+5.5V	1 2,3	01	-0.2 -20	0.2 20	nA
			1 2,3	02	-0.1 -10	0.1 10	
COM-On Leakage Current NOTE 8	$I_{COM(ON)}$	V_{NO}=4.5V V_{COM} =4.5V V+=+5.5V	1 2,3	01	-0.4 -40	0.4 40	nA
			1 2,3	02	-0.2 -20	0.2 20	
INPUT							
Input Current/Voltage High	I_{AH}, I_{ENH}	V_A=V_{EN}=2.4V	1,2,3	All	-1.0	1.0	µA
Input Current/Voltage Low	I_{AL}, I_{ENL}	V_A=0V, V_{EN}=0.8V	1,2,3	All	-1.0	1.0	µA
SUPPLY							
Power Supply Range			1,2,3	All	3	15	V
Positive Supply Current	I+	V_{EN}=V_A=0V or V+ V+=+5.5V, V-=0V	1	All	-1	1	µA
Negative Supply Current	I-	V_{EN}=V_A=0V or V+ V+=+5.5V, V-=0V	1,2,3	All	-1	1	µA
Ground Current	I_{GND}	V_{EN}= V+, 0V; V_A=0V V+=+5.5V, V-=0V	1,2,3	All	-1	1	µA
DYNAMIC							
Transition Time	t_{TRANS}	V_{NO}=3V	9,10,11	All		245	ns
Break-Before-Make interval	t_{OPEN}		9	All	10		ns
Enable Turn-On Time	$t_{ON(EN)}$		9 10,11	All		200 275	ns
Enable Turn-Off Time	$t_{OFF(EN)}$		9 10,11	All		125 200	ns
Charge Injection	Q	C_L=10nF, V_S=0V, R_S=0Ω NOTE 3	9	All		5	pC

TABLE 1. ELECTRICAL TESTS: SINGLE 3V SUPPLY

TEST	Symbol	CONDITIONS -55 °C <=T_A<= +125°C V^+=+3V±10%, V-=0V, GND=0V, V_{AH}=V_{ENH}=+2.4,V_{AL}=V_{ENL}= +0.8V Unless otherwise specified	Group A Subgroup	Device type	Limits Min 2/	Limits Max 2/	Units
SWITCH							
Analog Signal Range	V_{ANALOG}	V_{COM}, V_{NO} NOTE 3	1,2,3	All	V+	V-	V
On-Resistance	$r_{DS(ON)}$	I_{NO}=1mA, V_{COM}=1.5V, V+=3V	1 2,3	All		375 425	Ω
DYNAMIC							
Transition Time	t_{TRANS}	V_{NO1}=1.5V, V_{NO8}=0V, V_{IN}=2.4V Figure 2 NOTE 3	9	All		575	ns
Enable Turn-On Time	$t_{ON(EN)}$	V_{NO1}=1.5V, V_{INL}=0V, V_{INH}=2.4V Figure 3 NOTE 3	9	All		500	ns
Enable Turn-Off Time	$t_{OFF(EN)}$	V_{NO1}=1.5V, V_{INL}=0V, V_{INH}=2.4V Figure 3 NOTE 3	9	All		400	ns
Charge Injection	Q	C_L=10nF, V_S=0V, R_S=0Ω NOTE 3	9	All		5	pC

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: Guaranteed by design.

NOTE 4: $\Delta r_{DS(ON)} = r_{DS(ON)max} - r_{DS(ON)min}$.

NOTE 5: Flatness is defined as the difference between the maximum and minimum value of on-resistance as measured at the extremes of the specified analog signal range.

NOTE 6: V+=+5V±10%, V-=-5V±10%, GND=0V, V_{AH}=V_{ENH}=+2.4V, V_{AL}=V_{ENL}=+0.8V.

NOTE 7: V+=+5V±10%, V-=0V, GND=0V, V_{AH}=V_{ENH}=+2.4V, V_{AL}=V_{ENL}=+0.8V.

NOTE 8: Leakage testing at single supply is guaranteed by correlation testing with dual supplies.

FIGURE 2: Transition Time Diagrams: See Commercial Data Sheet
FIGURE 3: Enable Switching Time Diagrams: See Commercial Data Sheet
FIGURE 4: Break-Before-Make Interval Diagrams: See Commercial Data Sheet
FIGURE 5: Charge Injection Diagrams: See Commercial Data Sheet

TRUTH TABLE **TERMINAL CONNECTION**

A2	A1	A0	EN	MAX398 ON SWITCH		TERMINAL NUMBER	01 MAX398	02 MAX399
X	X	X	0	None			J16	J16
0	0	0	1	1		1	A0	A0
1	0	0	1	2		2	EN	EN
0	1	0	1	3		3	V-	V-
1	1	0	1	4		4	NO1	NO1A
0	0	1	1	5		5	NO2	NO2A
1	0	1	1	6		6	NO3	NO3A
0	1	1	1	7		7	NO4	NO4A
1	1	1	1	8		8	COM	COMA
						9	NO8	COMB
				MAX399		10	NO7	NO4B
A2	**A1**	**A0**		**ON SWITCH**		11	NO6	NO3B
0	X	X		None		12	NO5	NO2B
1	0	0		1		13	V+	NO1B
1	1	0		2		14	GND	V+
1	0	1		3		15	A2	GND
1	1	1		4		16	A1	A1

ORDERING		INFORMATION:	
MAX398MJE/883B	16 CDIP	MAX399MJE/883B	16 CDIP

QUALITY ASSURANCE

Sampling and inspection procedures shall be in accordance with MIL-Prf-38535, Appendix A as specified in Mil-Std-883.

Screening shall be in accordance with Method 5004 of Mil-Std-883. Burn-in test Method 1015:

1. Test Condition, A, B, C, or D.
2. TA = +125°C minimum.
3. Interim and final electrical test requirements shall be specified in Table 2.

Quality conformance inspection shall be in accordance with Method 5005 of Mil-Std-883, including Groups A, B, C, and D inspection.

Group A inspection:

1. Tests as specified in Table 2.
2. Selected subgroups in Table 1, Method 5005 of Mil-Std-883 shall be omitted.

Group C and D inspections:

a. End-point electrical parameters shall be specified in Table 1.
b. Steady-state life test, Method 1005 of Mil-Std-883:
   1. Test condition A, B, C, D.
   2. TA = +125°C, minimum.
   3. Test duration, 1000 hours, except as permitted by Method 1005 of Mil-Std-883.

TABLE 2. ELECTRICAL TEST REQUIREMENTS

Mil-Std-883 Test Requirements	Subgroups per Method 5005, Table 1
Interim Electric Parameters Method 5004	1
Final Electrical Parameters Method 5005	1*, 2, 3, 9
Group A Test Requirements Method 5005	1, 2, 3, 9, 10, 11
Group C and D End-Point Electrical Parameters Method 5005	1

* PDA applies to Subgroup 1 only.