

SCOPE: CMOS, PARALLEL-LOADING, DUAL, MULTIPLYING 12-BIT D/A CONVERTER

<u>Device Type</u>	<u>Generic Number</u>
01	MX7537U(x)/883B
02	MX7537T(x)/883B
03	MX7537S(x)/883B
04	MX7547U(x)/883B
05	MX7547T(x)/883B
06	MX7547S(x)/883B

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

<u>Outline Letter</u>	<u>Mil-Std-1835</u>	<u>Case Outline</u>	<u>Package Code</u>
MAXIM SMD			
Q L	GDIP1-T24 or CDIP2-T24	24 LEAD Cerdip	J24
E 3	CQCC1-N28	28 LEADLESS CHIP	L28

Absolute Maximum Ratings:

V _{DD} to DGND	-0.3V, +17V
V _{RFBA} , V _{RFBB} to AGND	±25V
V _{REFA} , V _{REFB} to AGND	±25V
Digital Input Voltage to DGND	-0.3V, (V _{DD} +0.3V)
IOUTA, IOUTB Voltage to DGND	-0.3V, (V _{DD} +0.3V)
AGND to DGND	-0.3V, (V _{DD} +0.3V)

Lead Temperature (soldering, 10 seconds) +300°C

Storage Temperature -65°C to +150°C

Continuous Power Dissipation T_A=+70°C

24 pin Cerdip(derate 12.5mW/°C above +70°C) 1000mW

28 pin LCC(derate 10.2mW/°C above +70°C) 816mW

Junction Temperature T_J +150°C

Thermal Resistance, Junction to Case, θ_{JC}

24 pin Cerdip..... 40°C/W

28 pin LCC 15°C/W

Thermal Resistance, Junction to Ambient, θ_{JA} :

24 pin Cerdip..... 80°C/W

28 pin LCC 98°C/W

Recommended Operating Conditions

Ambient Operating Range (T _A)	-55°C to +125°C
Logic Supply Voltage (V _{LOGIC})	+4.5V to +5.5V
Positive Supply Voltage (V _{DD}).....	+11.4V to +16.5V
Negative Supply Voltage (V _{EE}).....	-11.4V to -16.5V

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:

TEST		Symbol	CONDITIONS -55 °C <=T _A <= +125°C 1/ Unless otherwise specified		Group A Subgroup	Device type	Limits Min	Limits Max	Units
ACCURACY									
Resolution		RES			1,2,3	All	12.0		Bits
Relative Accuracy		RA	V _{DD} =+10.8V and V _{DD} =+16.5V V _{DD} =10.8V (MX7547 only)		1,2,3	1,2,4,5 3,6		±0.5 ±1.0	LSB
Differential Nonlinearity		DNL	Guaranteed monotonic		1,2,3	All		±1.0	LSB
Gain Error		AE	Measured using R _{FBA} , R _{FBB} ; DAC registers loaded with all 1's, V _{DD} =10.8V		1,2,3	1,4 2,5 3,6		±2.0 ±3.0 ±6.0	LSB
Gain Tempco ΔGain/ΔTemperature NOTE 2		TCFS			4	All		±5.0	ppm/°C
Output Leakage Current IOUTA, IOUTB		ILKG	V _{DD} =+16.5V, DAC registers loaded with all 0s		1,3 2	All		±10 ±250	nA
VREFA, VREFB Input Leakage		RREF	V _{DD} =+10.8V		1,2,3	All	9	20	kΩ
VREFA, VREFB Input Resistance Match		ΔRREF	V _{DD} =+10.8V		1,2,3	1,4 2,3,5,6		±1.0 ±3.0	%
Digital Input High Voltage		V _{IH}	V _{DD} =+10.8V and V _{DD} =+16.5V		1,2,3	All	2.4		V
Digital Input Low Voltage		V _{IL}	V _{DD} =+10.8V and V _{DD} =+16.5V		1,2,3	All		0.8	V
Digital Input Leakage Current		I _{IN}	V _{IN} =+0V or 16.5V		1,3 2	All		±1.0 ±10	μA
Digital Input Capacitance		C _{IN}			4	All		10	pF
Supply Voltage		V _{DD}	Operating range, V _{DD} =16.5V		1,2,3	All	10.8	16.5	V
Supply Current		I _{DD}			1,2,3	All		2.0	mA
Current Settling Time		t _{SL}	To 0.5 LSB, IOUT load =100Ω, CEXT=13pF, DAC output measured from falling edge of WR		9,10,11	4,5,6		1.5	μs
Current Settling Time		t _{SL}	To 0.5 LSB, IOUT load =100Ω, CEXT=13pF, DAC output measured from rising edge of WR		4	1,2,3		1.5	μs
Feedthrough Error NOTE 2	VREFA to IOUTA	FTE	DAC registers loaded with all 0s	VREFA=20Vp-p 10kHz sine wave, VREFB=0V	4,5,6 (SMD)	4,5,6	-70	-65 (SMD)	dB
	VREFB to IOUTB			VREFB=20Vp-p 10kHz sine wave, VREFA=0V					
Feedthrough Error NOTE 2	VREFA to IOUTA	FTE	DAC registers loaded with all 0s	VREFA=20Vp-p 10kHz sine wave, VREFB=0V	4 (SMD)	1,2,3	-70	-65 (SMD)	dB
	VREFB to IOUTB			VREFB=20Vp-p 10kHz sine wave, VREFA=0V					

TEST	Symbol	CONDITIONS -55 °C ≤ T _A ≤ +125 °C 1/ Unless otherwise specified	Group A Subgroup	Device type	Limits Min	Limits Max	Units
Power-Supply Rejection Ratio	PSRR	V _{DD} =10.8V, ΔV _{DD} =12V±5%	1 2,3	01,02,03		±0.01 ±0.02	%/%
		V _{DD} =10.8V, ΔV _{DD} =V _{DD} MAX - V _{DD} MIN	1 2,3	All		±0.01 ±0.02	
Output Capacitance (IOUTA, IOUTB)	C _{OUT}	DAC A, DAC B loaded with 0s	4	All		-70	dB
		DAC A, DAC B loaded with 1s				140	
Channel-to-Channel Isolation	VREFA to IOUTA VREFB to IOUTB	VREFA=20Vp-p, 10kHz sine wave, VREFB=0V VREFB=20Vp-p, 10kHz sine wave, VREFA=0V	4	All	-84		dB
TIMING							
Address Valid to Write-setup Time	t ₁		9 10,11	01,02,03	20 30		ns
Address Valid to Write-hold Time	t ₂		9 10,11	01,02,03	15 25		ns
Data-setup Time	t ₃		9 10,11	All	60 80		ns
Data-hold Time	t ₄		9,10,11	All	25		ns
Chip Select or Update to Write-setup Time	t ₅		9,10,11	01,02,03	0		ns
			9 10,11	04,05,06	80 100		
Chip Select or Update to Write Hold Time	t ₆		9,10,11	All	0		ns
Write Pulse Width	t ₇		9 10,11	All	80 100		ns
Clear Pulse Width	t ₈		9 10,11	All	80 100		ns

NOTE 1: Conditions unless otherwise specified, 4.5V ≤ V_{DD} ≤ 5.5V. V_{DD}=10.8V to 16.5V, AGND=DGND=0V, use maximum possible reference voltage.

NOTE 2: Typical number, for design aid only.

MODE SELECTION TABLE:

MX7537						
CLR	UPD	CS	WR	A1	A0	Function
1	1	1	X	X	X	No data transfer
1	1	X	1	X	X	No data transfer
0	X	X	X	X	X	All registers cleared
1	1	0	0	0	0	DAC A LS input register loaded with D7-D0
1	1	0	0	0	1	DAC A MS input register loaded with D3-D0
1	1	0	0	1	0	DAC B LS input register loaded with D7-D0
1	1	0	0	1	1	DAC B MS input register loaded with D3-D0
1	0	1	0	X	X	DAC A, DAC B registers updated simultaneously from input registers. Input registers not changed.
1	0	0	0	X	X	DAC A, DAC B registers are transparent. Input registers loaded.

X = Don't care

MODE SELECTION TABLE:

MX7547			
CSA	CSB	WR	Function
X	X	1	No data transfer
1	1	X	No data transfer
↑	↑	0	A rising edge on CSA or CSB transfer data to the respective DAC.
0	1	↑	DAC A register loaded from data bus.
1	0	↑	DAC B register loaded from data bus.
0	0	↑	DAC A and DAC B registers loaded from data bus.

X= don't care WR input is edge-triggered.

ORDERING INFORMATION:

	Package	Pkg. Code	Device ID	SMD Number
01	24 pin CERDIP	J24	MX7537SQ/883B	5962-8776301LA
02	24 pin CERDIP	J24	MX7537TQ/883B	5962-8776302LA
03	24 pin CERDIP	J24	MX7537UQ/883B	5962-8776303LA
01	28 pin LCC	L28	MX7537SE/883B	5962-87763013C
02	28 pin LCC	L28	MX7537TE/883B	5962-87763023C
03	28 pin LCC	L28	MX7537UE/883B	5962-87763033C
04	24 pin CERDIP	J24	MX7547SQ/883B	5962-8965701LA
05	24 pin CERDIP	J24	MX7547TQ/883B	5962-8965702LA
06	24 pin CERDIP	J24	MX7547UQ/883B	5962-8965703LA
04	28 pin LCC	L28	MX7547SE/883B	5962-89657013C
05	28 pin LCC	L28	MX7547TE/883B	5962-89657023C
06	28 pin LCC	L28	MX7547UE/883B	5962-89657033C

TERMINAL CONNECTIONS:

	MX7537	MX7537	MX7547	MX7547		MX7537	MX7537	MX7547	MX7547
	J24	L28	J24	L28		J24	L28	J24	L28
1	AGNDA	NC	AGNDA	NC	15	A0	NC	D8	NC
2	I _{OUTA}	AGNDA	I _{OUTA}	AGNDA	16	A1	D6	D9	D6
3	RFBA	I _{OUTA}	RFBA	I _{OUTA}	17	CLR	D7	D10	D7
4	VREFA	RFBA	VREFA	RFBA	18	WR	A0	D11 (MSB)	D8
5	CS	VREFA	CSA	VREFA	19	UPD	A1	WR	D9
6	D0	CS	(LSB)D0	CSA	20	V _{DD}	CLR	CSB	D10
7	D1	D0	D1	(LSB)D0	21	VREFB	WR	V _{DD}	D11
8	D2	NC	D2	NC	22	RFBB	NC	VREFB	NC
9	D3	D1	D3	D1	23	I _{OUTB}	UPD	RFBB	WR
10	D4	D2	D4	D2	24	AGNDB	V _{DD}	I _{OUTB}	CSB
11	D5	D3	D5	D3	25		VREFB		V _{DD}
12	DGND	D4	DGND	D4	26		RFBB		VREFB
13	D6	D5	D6	D5	27		I _{OUTB}		RFBB
14	D7	DGND	D7	DGND	28		AGNDB		I _{OUTB}

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, 10, 11
Group A Test Requirements Method 5005	1, 2, 3, 4**, 5**, 6**, 9, 10**, 11**
Group C and D End-Point Electrical Parameters Method 5005	1

* PDA applies to Subgroup 1 only.

** If not tested shall be guaranteed to the limits specified in Table 1.