MX840A/B

Hex Driver for GaAs FET
Switches and Attenuators

Features:

- CMOS Technology
- TTL/CMOS compatible inputs
- Low switching noise
- <5nS typical true / complement output skew
- <3.5nS typical output rise and fall times
- Up to 11V output voltage
- Output high voltage programmable via V_{OPT}
- Output low voltage programmable via V_{EE}

Applications

- Digital control of analog circuits
- Level shifting and amplification
- Circuit applications requiring complementary signal generation with low skew
- Bias control for a PIN diode drivers in a microwave switch

General Description

The MX840A and MX840B are high speed six channel level shifters with complimentary output drivers. The MX840A features a 3.3V V_{CC} positive supply, and the MX840B features a 5.0V V_{CC} positive supply.

The input buffers accept digital TTL or CMOS level signals, amplifies them to the V_{CC} and GND supply rails, and generates complementary outputs. The translator level shifts these output signals by amplifying them to the V_{CC} and V_{EE} supply rails.

The output drivers then buffer the signals to V_{OPT} and V_{EE}. V_{OPT} may be set within the range of V_{CC} and GND. The output drivers also adjust the complimentary signals for minimized skew error.

The MX840A and MX840B are designed to operate over a temperature range of -40°C to +85°C, and are available as die in wafer form, die in waffle pack, 24 lead SOIC package, and SOIC on Tape and Reel.

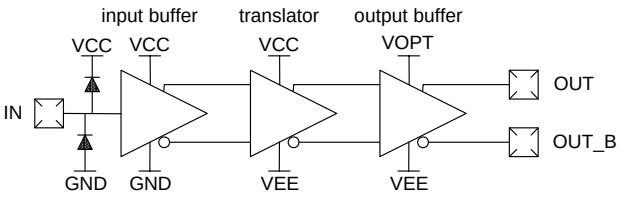
Ordering Information – MX840A

Part No.	Description
19602	MX840A Die / Wafer Form
19601	MX840A Die / Waffle Pack
19600-00	MX840A 24 Lead SOIC
19641-00	MX840A SOIC on Tape & Reel

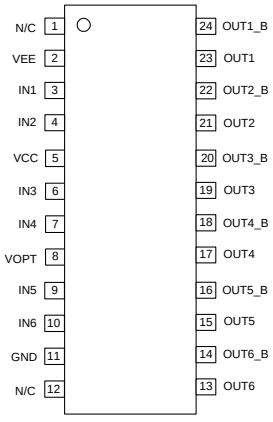
Ordering Information – MX840B

Part No.	Description
19902	MX840B Die / Wafer Form
19901	MX840B Die / Waffle Pack
19900-00	MX840B 24 Lead SOIC
19941-00	MX840B SOIC on Tape & Reel

Functional Block Diagram



24 Lead SOIC Configuration



Absolute Maximum Ratings

SYMBOL	PARAMETER	MIN	MAX	UNITS
V_{CC}	Positive DC Supply Voltage	-0.4	+6.5	V
V_{EE}	Negative DC Supply Voltage	-12.0	+0.4	V
V_{OPT}	Output Positive DC Supply Voltage		+6.5	V
V_{OPT} -V_{EE}	Output Positive to Negative Supply Voltage	-0.4	+14.0	V
V_{CC} - V_{EE}	Positive to Negative Supply Voltage	-0.4	+14.0	V
V_{CC} -V_{OPT}	Positive to Output Supply Voltage	-0.4	Vcc+0.4	V
V_{IN}	DC Input Voltage	-0.4	V_{CC}+0.4	V
I_{IN}	DC Input Current	-10	+10	µA
T_A	Ambient Operating Temperature	-40	+85	^oC
T_{STG}	Storage Temperature	-65	+150	^oC
ESD	ESD sensitivity (human body model)	1.0		kV

Absolute Maximum Ratings are stress ratings. Stresses in excess of these ratings can cause permanent damage to the device. Functional operation of the device at these or any other conditions beyond those indicated in the operational sections of this data sheet is not implied. Exposure of the device to the absolute maximum ratings for an extended period may degrade the device and affect its reliability.

Guaranteed Operating Range

MX840A 3.3V version

SYMBOL	PARAMETER	MIN	MAX	UNITS
V_{CC}	Positive DC Supply Voltage	3.0	3.6	V
V_{EE}	Negative DC Supply Voltage	-11.0	-4.5	V
V_{OPT}	Output Positive DC Supply Voltage	0.0	3.6	V
V_{OPT} -V_{EE}	Output Positive to Negative Supply Voltage	7.5	11.0	V
V_{CC} - V_{EE}	Positive to Negative Supply Voltage	9.0	14.0	V
V_{CC} -V_{OPT}	Positive to Output Supply Voltage	0.0	V_{CC}	V
T_A	Ambient Operating Temperature	-40	+85	^oC
T_R, T_F	Input Rise and Fall Time	0.0	500	nS

MX840B 5.0V version

SYMBOL	PARAMETER	MIN	MAX	UNITS
V_{CC}	Positive DC Supply Voltage	4.5	5.5	V
V_{EE}	Negative DC Supply Voltage	-9.5	-4.5	V
V_{OPT}	Output Positive DC Supply Voltage	0.0	5.5	V
V_{OPT} -V_{EE}	Output Positive to Negative Supply Voltage	7.5	11.0	V
V_{CC} - V_{EE}	Positive to Negative Supply Voltage	9.0	14.0	V
V_{CC} -V_{OPT}	Positive to Output Supply Voltage	0.0	V_{CC}	V
T_A	Ambient Operating Temperature	-40	+85	^oC
T_R, T_F	Input Rise and Fall Time	0.0	500	nS

DC Characteristics - Over Guaranteed Operating Range

SYMBOL	PARAMETER		MIN	TYP	MAX	Units
V_{IH}	Input HIGH Voltage		2.0			V
V_{IL}	Input LOW Voltage				0.8	V
V_{OH}	Output HIGH Voltage(I_{OH}=-1mA)		V_{OPT} - 0.1			V
V_{OL}	Output LOW Voltage (I_{OL}=1mA)				V_{EE} + 0.1	V
I_{IN}	Input Current (V_{IN}=0.0 to V_{CC})		-10		+10	uA
I_{CC}	Supply Current (V_{IN}=0.0 or V_{CC})	V_{CC} = 3.3V		<1.0		uA
		V_{CC} = 5.0V		<1.0		uA
I_{EE}	Supply Current (V_{IN}=0.0 or V_{CC})	V_{CC} = 3.3V		<1.0		uA
		V_{CC} = 5.0V		<1.0		uA
I_{OPT}	Supply Current (V_{IN}=0.0 or V_{CC})	V_{CC} = 3.3V		<1.0		uA
		V_{CC} = 5.0V		<1.0		uA

ESD Warning

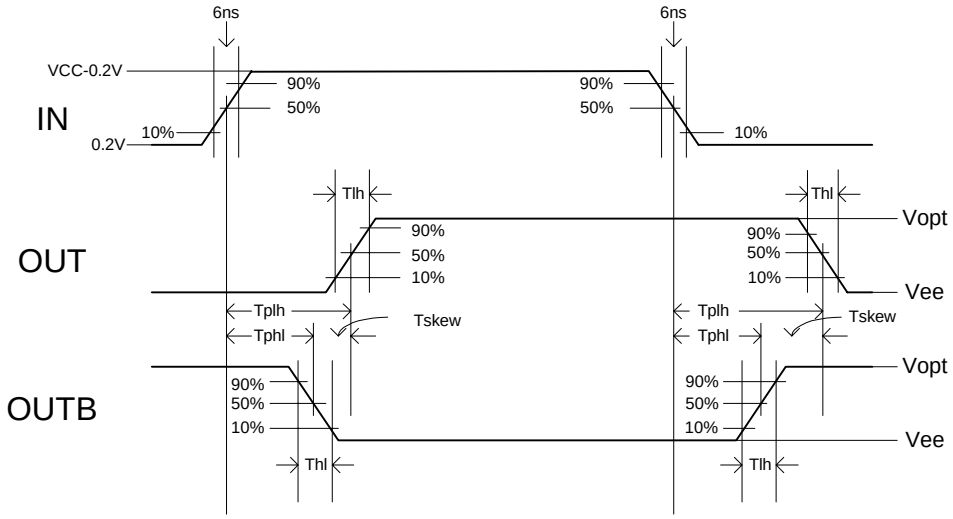
ESD (electrostatic discharge) sensitive device. Although the MX840A/B features proprietary ESD protection circuitry, permanent damage may be sustained if subjected to high energy electrostatic discharges. Proper ESD precautions are recommended to avoid performance degradation or loss of functionality.

AC Characteristics

V_{CC}=V_{OPT}=3.3V, V_{EE}=-7.7V or -4.5V, Input rise and fall time 6ns, V_{IH}=3.1, V_{IL}=0.2V, T_A = -40 ^{O}C to +85 ^{O}C
V_{CC}=V_{OPT}=5.0V, V_{EE}=-6.0V or -4.5V, Input rise and fall time 6ns, V_{IH}=4.8, V_{IL}=0.2V, T_A = -40 ^{O}C to +85 ^{O}C

SYMBOL	PARAMETER		Typ	Max	UNITS
T_{PLH}	Propagation Delay (low to high input)	V_{CC} = 3.3V	16	29	nS
		V_{CC} = 5.0V	14	29	nS
T_{PHL}	Propagation Delay (high to low input)	V_{CC} = 3.3V	16	29	nS
		V_{CC} = 5.0V	14	29	nS
T_{TLH}	Output Rise Time (C_{LD}=10pf)	V_{CC} = 3.3V	3.3	9	nS
		V_{CC} = 5.0V	2.7	9	nS
T_{THL}	Output Fall Time (C_{LD}=10pf)	V_{CC} = 3.3V	3.3	8	nS
		V_{CC} = 5.0V	2.7	8	nS
T_{SKEW}	Delay Skew (Output A to Output B)	V_{CC} = 3.3V	4.5	10	nS
		V_{CC} = 5.0V	3.6	10	nS
C_{IN}	Input Capacitance			15	pF

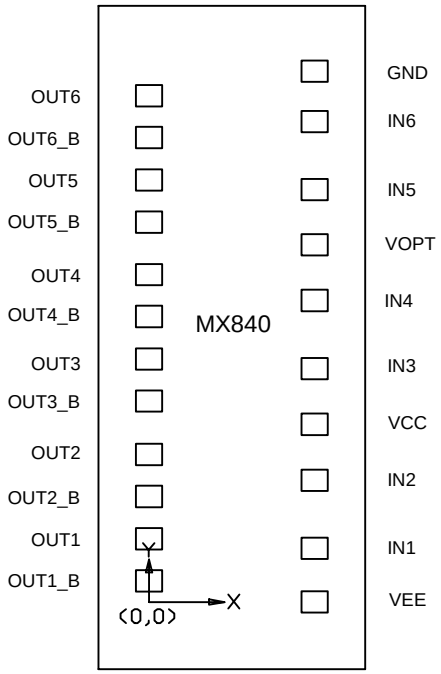
Note: Production Tested at 25 ^{O}C



Pad Locations (in µm)

PAD NAME	X	Y	PAD NAME	X	Y
IN1	583.75	230.25	IN4	583.75	1294.75
OUT1	0.00	270.75	OUT4	0.00	1406.25
OUT1_B	0.00	90.75	OUT4_B	0.00	1226.25
IN2	583.75	522.25	IN5	583.75	1771.75
OUT2	0.00	633.75	OUT5	0.00	1812.25
OUT2_B	0.00	453.75	OUT5_B	0.00	1632.25
IN3	583.75	1002.75	IN6	583.75	2063.75
OUT3	0.00	1043.25	OUT6	0.00	2175.25
OUT3_B	0.00	863.25	OUT6_B	0.00	1995.25
VOPT	583.75	1535.00			
VCC	583.75	762.50			
VEE	583.75	0.00			
GND	583.75	2280.25			

Pad location is the pad center point in microns. The origin of the coordinates is located as shown.



Die Size: 940µm X 2850 µm

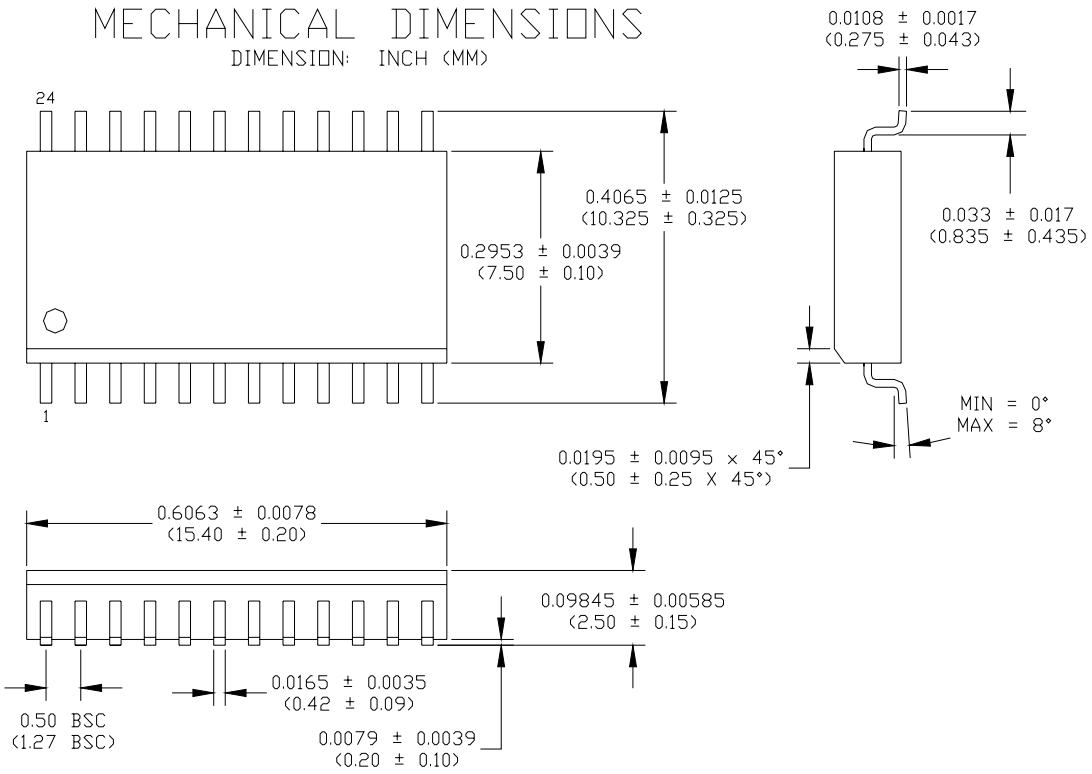
(Not Drawn To Scale)

24 Lead SOIC – I/O Assignment

Pin No.	Pin Name	Description
1	NC	No Connect
2	V_{EE}	Negative Supply for Output Drivers
3	IN1	Input – Translator #1
4	IN2	Input – Translator #2
5	V_{CC}	Positive Supply for Input Buffers
6	IN3	Input – Translator #3
7	IN4	Input – Translator #4
8	V_{OPT}	Positive Supply for Output Drivers
9	IN5	Input – Translator #5
10	IN6	Input – Translator #6
11	GND	Ground
12	NC	No Connect
13	OUT6	Output – Buffer #6
14	OUT6_B	Complementary Output – Buffer #6
15	OUT5	Output – Buffer #5
16	OUT5_B	Complementary Output – Buffer #5
17	OUT4	Output – Buffer #4
18	OUT4_B	Complementary Output – Buffer #4
19	OUT3	Output – Buffer #3
20	OUT3_B	Complementary Output – Buffer #3
21	OUT2	Output – Buffer #2
22	OUT2_B	Complementary Output – Buffer #2
23	OUT1	Output – Buffer #1
24	OUT1_B	Complementary Output – Buffer #1

MECHANICAL DIMENSIONS

DIMENSION: INCH (MM)



MOLDED PACKAGE SHALL CONFORM TO JEDEC STANDARD MS-013, VARIATION AD.

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