



# MC34046S MC34047S

## Advance Information

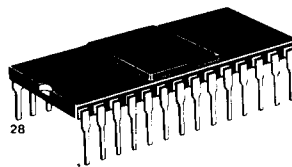
### GENERAL DESCRIPTION

The MC34046S and MC34047S Single Bubble Memory Operation Drivers are monolithic bipolar linear integrated circuits which generate controlled-current pulses for the generate, swap, replicate and map-loop operations in a magnetic bubble memory device. The MC34046S and MC34047S are pin-compatible and specifically designed to drive the Motorola MBM2256 (256-kilobit) and MBM2011 (one-megabit) bubble memories respectively. They differ only in the amplitudes of the current pulses generated. Each Operation Driver can drive one bubble memory. Basic control/timing signals are input to the Operation Driver from the bubble memory controller. Each circuit contains a voltage booster to provide the high-voltage required by the swap and replicate circuits. Under-voltage detection prevents operation until this supply has reached its proper level. The circuits are packaged in 28-pin, 0.6-inch wide dual in-line packages.

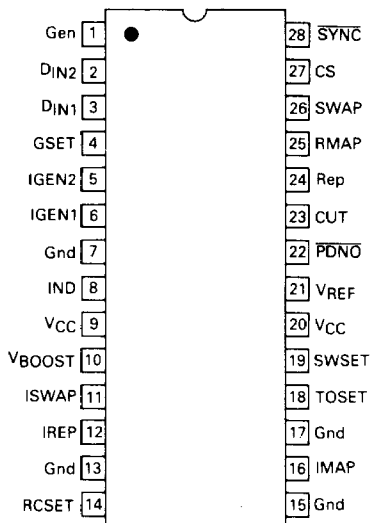
### FEATURES

- Single Bubble Memory Drive Capability
- Controlled-current Sinks Assure Proper Currents Independent of Variations in Bubble Gate Resistances
- Currents Independently Set by External Precision Resistors
- Temperature Compensation of Currents Via External Thermistor if Desired
- GENERATE Pulse Specially Shaped to Prevent Multiple Bubble Generation
- Pulse Time-out Circuit Protects Against Physical Damage in the Event of a Stuck Input Timing Signal
- On-chip High-voltage Source — System Interlocked until Proper Voltage is Present
- Chip Select Input for Multiple-bubble Systems
- Full Map Loop Read and Write Operation

### SINGLE BUBBLE MEMORY OPERATION DRIVERS



### PIN ASSIGNMENTS



28-pin Dual In-line  
Package: 0.6-inch row spacing

### ABSOLUTE MAXIMUM RATINGS\*

Characteristic	Value	Unit
Storage Temperature	-65 to +150	°C
Ambient Temperature with power applied		
Commercial Device	0 to +70	°C
Extended-temperature Device	TBD to +85	°C
Voltage — VBOOST, IND, IREP, ISWAP	-0.2 to +35	Volts
Voltage — IGEN1, IGEN2, IMAP	-0.2 to +20	Volts
Voltage — VCC	-0.2 to +7.0	Volts
Voltage — any other pin to GND	-0.2 to +6.0	Volts
Power dissipation	TBD	Watts

\*Absolute Maximum Ratings indicate limits beyond which permanent damage may occur to the device. Proper operation of the device requires that it be limited to the conditions specified under DC Electrical Characteristics.

Bubble

This document contains information on a new product. Specifications and information herein are subject to change without notice.

PIN DESCRIPTIONS

Inputs

- CS — Chip Select — enables the Operation Driver.
- D<sub>IN1</sub>  
D<sub>IN2</sub> — Data inputs (two channels).
- SYNC — Data input clock (rising edge).
- GEN — Trigger for GENERATE current pulses.
- SWAP — Enable SWAP current pulse.
- REP — Enable REPLICATE current pulse.
- RMAP — Enable MAP-REPLICATE current pulse.
- CUT — Timing for CUT portion of REPLICATE and MAP-REPLICATE current pulses.

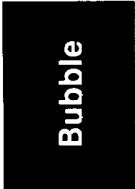
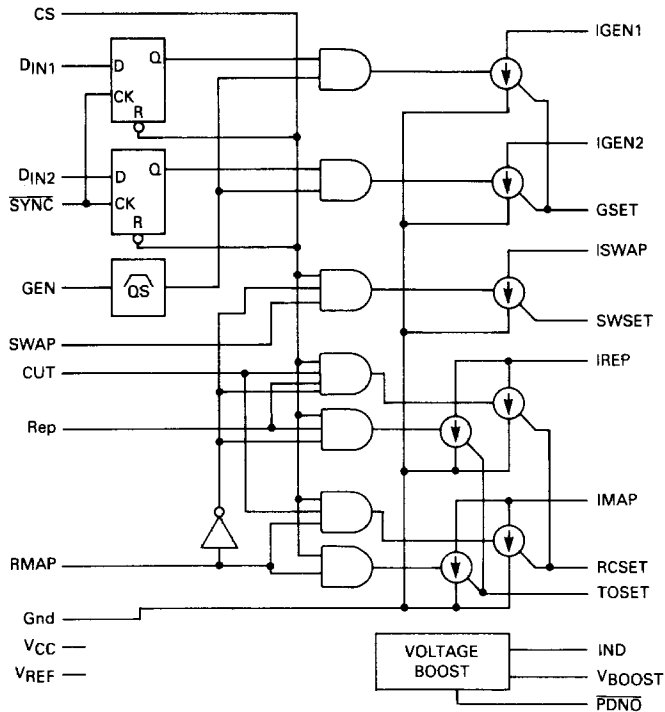
Outputs

- IGEN1  
IGEN2 — GENERATE current pulses (two channels).
- ISWAP — SWAP current pulse.
- IREP — REPLICATE current pulse.
- IMAP — MAP-REPLICATE current pulse.
- PDNO — Power Down Output — indicates that V<sub>BOOST</sub> is below its minimum operating value.

Supplies and Miscellaneous

- GSET — GENERATE current set.
- SWSET — SWAP current set.
- TOSET — REPLICATE-TRANSFER current set.
- RCSET — REPLICATE-CUT current set (adds to TRANSFER current).
- V<sub>CC(2)</sub> — Power supply voltage (2 pins).
- V<sub>REF</sub> — Reference voltage used to set currents.
- V<sub>BOOST</sub> — High-voltage power supply output.
- IND — Inductor and diode used in voltage-boost circuit (see application diagram).
- GND(4) — System Ground (4 pins).

FIGURE 1 — FUNCTIONAL DIAGRAM



# MC34046S•MC34047S

## DC ELECTRICAL CHARACTERISTICS (T<sub>A</sub> = 0 to 70°C, V<sub>REF</sub> = 2.50 V ± 1%)

Parameter	Symbol	Min	Max	Unit
Power Supply Voltage	V <sub>CC</sub>	4.75	5.25	Volts
Power Supply Current	I <sub>CC</sub>	—	100	mA
Current from V <sub>REF</sub> (V <sub>REF</sub> = 2.475 V)	I <sub>REF</sub>	—	2.0	mA
Boost Supply Voltage	V <sub>BOOST</sub>	28	35	Volts
Logic High In Voltage	V <sub>IH</sub>	2.0	—	Volts
Logic Low In Voltage	V <sub>IL</sub>	—	0.8	Volts
Logic Low Out Voltage (I <sub>O</sub> = 4.0 mA)	V <sub>OL</sub>	—	0.4	Volts
Logic High In Current (V <sub>I</sub> = 2.7 V)	I <sub>IH</sub>	—	10	μA
Logic Low In Current (V <sub>I</sub> = 0.4 V)	I <sub>IL</sub>	—	-1.6	mA
Output Leakage Current (Output Off)	I <sub>OL</sub>	—	100	μA
IREP, ISWAP Saturation	V <sub>SATH</sub>	—	6.0	Volts
Saturation Voltage — Other Outs	V <sub>SATL</sub>	—	3.0	Volts

Note: The Bubble Memory Controller WRITE MAP command should not be executed more often than once per second, or the Operation Driver maximum power dissipation limit will be exceeded.

### MC34046S ONLY (V<sub>REF</sub> = 2.50 V ± 1%, Current Set Resistors = 6.04 kΩ ± 1% each)

Characteristic	Symbol	Min	Max	Unit
Generate Current	I <sub>G</sub>	180	220	mA
SWAP Current	I <sub>SW</sub>	25	31	mA
REPL-Transfer Current	I <sub>RT</sub>	28	42	mA
REPL-Cut Current (Note 1)	I <sub>RC</sub>	75	95	mA
MAP-REP-Transfer Current	I <sub>MT</sub>	28	42	mA
MAP-REP-CUT Current (Note 1)	I <sub>MC</sub>	75	95	mA

### MC34047S ONLY (V<sub>REF</sub> = 2.50 V ± 1%, Current Set Resistors = 6.19 kΩ ± 1% each)

Characteristic	Symbol	Min	Max	Unit
Generate Current	I <sub>G</sub>	190	230	mA
SWAP Current	I <sub>SW</sub>	16	20	mA
REPL-Transfer Current	I <sub>RT</sub>	30	40	mA
REPL-CUT Current (Note 1)	I <sub>RC</sub>	130	150	mA
MAP-REP-Transfer Current	I <sub>MT</sub>	16	20	mA
MAP-REP-CUT Current (Note 1)	I <sub>MCI</sub>	65	75	mA

Note 1: CUT current is the sum of the currents determined by the resistors connected to TOSET and RCSET.

## AC ELECTRICAL CHARACTERISTICS (T<sub>A</sub> = 0 to 70°C)

Parameter	Symbol	Min	Max	Unit
DIN Setup Time	t <sub>DSU</sub>	50	—	ns
DIN Hold Time	t <sub>DH</sub>	50	—	ns
CUT Current Risetime (MC34047S only)	t <sub>CR</sub>	—	50	ns
Other Out Current Rise	t <sub>r</sub>	—	100	ns
IGEN Current Fall	t <sub>GF</sub>	200	400	ns
CUT Current Faltime (MC34047S only)	t <sub>CF</sub>	—	100	ns
Other Out Current Fall	t <sub>f</sub>	—	200	ns

## AC ELECTRICAL CHARACTERISTICS (Continued)

Parameter	Symbol	Min	Max	Unit
IGEN Pulse Width	t <sub>GW</sub>	50	200	ns
CS to any Output	t <sub>CSO</sub>	—	250	ns
GEN to IGENx Delay	t <sub>GGO</sub>	—	200	ns
SWAP to ISWAP Delay	t <sub>SSO</sub>	—	160	ns
Other In-Out Delays	t <sub>IO</sub>	—	100	ns
SWAP Time-out	t <sub>STO</sub>	—	80	μS
REPL-Transfer Time-out	t <sub>TTO</sub>	—	50	μS
REPL-CUT Time-out	t <sub>CTO</sub>	—	4.0	μS
GEN to SYNC	t <sub>GS</sub>	1.1	—	μS

## OPERATION

The magnetic bubble memory device requires a series of current pulses of proper timing, amplitude, and shape to generate and route the bubbles. These pulses are produced by the Operation Driver in response to signals generated by the controller.

The generate pulse creates a bubble in the input track. It is a fixed-width pulse triggered by the rising edge of the GEN input. A controlled fall time prevents multiple-bubble generation which can occur if the trailing edge is too sharp. Two generate outputs, IGEN1 and IGEN2, can drive separate bubble devices. They are independently enabled by data signals received on DIN1 and DIN2 respectively. The DIN signals are latched internally on the rising edge of SYNC prior to the GEN input. A high level on DINx will enable IGENx.

The Swap Pulse, ISWAP, causes an exchange of bubbles between the input track and the storage-loop tracks. It is on when the SWAP input is high. ISWAP is normally connected to the data swap gate on the bubble device, but if map loop write capability is required, it may be connected via a switch, jumpers, etc. to the map gate.

The replicate function copies bubbles from the storage-loop tracks onto the output track. A two-step pulse is used. A high-current, narrow initial portion cuts the elongated bubble in two; a lower-current, wider trailing portion transfers the trailing bubble onto the output track. Separate outputs are provided for data replicate, IREP, and map replicate, IMAP. These outputs are controlled by three input signals: REP or RMAP when high enables IREP or IMAP respectively; CUT

when high enables the high-current portion of whichever pulse is simultaneously enabled.

The current levels of the various pulses are set by means of precision resistors connected externally between each of four pins and ground:

- GSET controls IGEN1 and IGEN2.
- SWSET controls ISWAP.
- TOSET controls the lower (transfer) level of IREP and IMAP.
- RCSET controls the initial (cut) portion of IREP and IMAP. This current is added to that determined by TOSET.

Temperature compensation of the currents for extended-temperature operation, can be done by using thermistor networks on the SET pins.

The Chip Select (CS) input is active high. When it is false (low) all current outputs are disabled. Since some of the current pulse levels, if sustained would damage the bubble device or the driver, a time-out circuit is included which will shut off any pulse if the input signal should remain active too long.

The higher resistance of the swap and data replicate gates requires a higher drive voltage than the normal power supply, V<sub>DD</sub>. This voltage, V<sub>BOOST</sub>, is provided by an on-chip voltage booster in conjunction with an external inductor, capacitor, and diode. When V<sub>BOOST</sub> is below its specified range the Power Down Output signal PDN<sub>O</sub> is held low. This is an open-collector output signal and may be externally wire-ored.

FIGURE 2 — SIGNAL WAVEFORMS

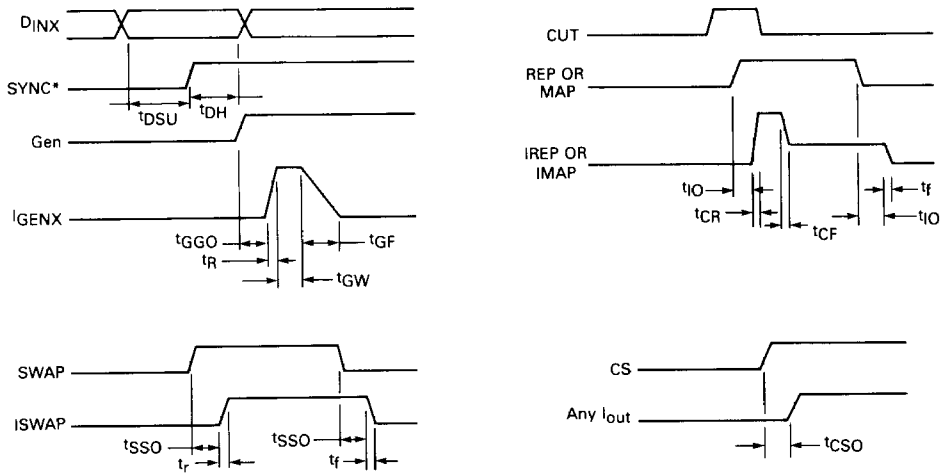


FIGURE 3 — TYPICAL APPLICATION OPERATION DRIVER

