MAXIMUM RATINGS (Full operating ambient temperature range applies, unless otherwise noted.)

Rating	Symbol	Value	Unit
Power Supply Voltage	V_{CC}	42	V
Collector Output Voltage	V_C	42	V
Collector Output Current (Note 3)	I_C	500	mA
Amplifier Input Voltage Range	V_{in}	−0.3 to +42	V
Power Dissipation @ $T_A \leq 45°C$	P_D	1000	mW
Operating Junction Temperature	T_J	125	°C
Storage Temperature Range	T_{stg}	−55 to +125	°C
Operating Ambient Temperature Range For MC34060A For MC33060A	T_A	 0 to +70 −40 to +85	°C
ESD Capability Machine Model Human Body Model		 200 2.0	 V kV

Stresses exceeding Maximum Ratings may damage the device. Maximum Ratings are stress ratings only. Functional operation above the Recommended Operating Conditions is not implied. Extended exposure to stresses above the Recommended Operating Conditions may affect device reliability.

1. This device series contains ESD protection and exceeds the following tests:

ELECTRICAL CHARACTERISTICS (V_{CC} = 15 V, C_T = 0.01 μF, R_T = 12 kΩ, unless otherwise noted. For typical values T_A = 25°C, for min/max values T_A is the operating ambient temperature range that applies, unless otherwise noted.)

Characteristics	Symbol	Min	Typ	Max	Unit
REFERENCE SECTION					
Reference Voltage (I_O = 1.0 mA, T_A 25°C) T_A = T_{low} to T_{high} − MC34060A − MC33060A	V_{ref}	4.925 4.9 4.85	5.0 − −	5.075 5.1 5.1	V
Line Regulation (V_{CC} = 7.0 V to 40 V, I_O = 10 mA)	Reg_{line}	−	2.0	25	mV
Load Regulation (I_O = 1.0 mA to 10 mA)	Reg_{load}	−	2.0	15	mV
Short Circuit Output Current (V_{ref} = 0 V)	I_{SC}	15	35	75	mA
OUTPUT SECTION					
Collector Off−State Current (V_{CC} = 40 V, V_{CE} = 40 V)	$I_{C(off)}$	−	2.0	100	μA
Emitter Off−State Current (V_{CC} = 40 V, V_{CE} = 40 V, V_E = 0 V)	$I_{E(off)}$)	−	−	−100	μA
Collector−Emitter Saturation Voltage (Note 4) Common−Emitter (V_E = 0 V, I_C = 200 mA) Emitter−Follower (V_C = 15 V, I_E = −200 mA)	$V_{sat(C)}$ $V_{sat(E)}$	− −	1.1 1.5	1.5 2.5	V
Output Voltage Rise Time (T_A = 25°C) Common−Emitter (See Figure 12) Emitter−Follower (See Figure 13)	t_r	 − −	 100 100	 200 200	ns
Output Voltage Fall Time (T_A = 25°C) Common−Emitter (See Figure 12) Emitter−Follower (See Figure 13)	t_r	 − −	 40 40	 100 100	ns
ERROR AMPLIFIER SECTION					
Input Offset Voltage ($V_{O[Pin\ 3]}$ = 2.5 V)	V_{IO}	−	2.0	10	mV
Input Offset Current ($V_{C[Pin\ 3]}$ = 2.5 V)	I_{IO}	−	5.0	250	nA
Input Bias Current ($V_{O[Pin\ 3]}$ = 2.5 V)	I_{IB}	−	−0.1	−2.0	μA
Input Common Mode Voltage Range (V_{CC} = 40 V)	V_{ICR}	0 to V_{CC} −2.0	−	−	V
Inverting Input Voltage Range	$V_{IR(INV)}$	−0.3 to V_{CC}−2.0	−	−	V
Open−Loop Voltage Gain (ΔV_O = 3.0 V, V_O = 0.5 V to 3.5 V, R_L = 2.0 kΩ)	A_{VOL}	70	95	−	dB
Unity−Gain Crossover Frequency (V_O = 0.5 V to 3.5 V, R_L = 2.0 kΩ)	f_c	−	600	−	kHz
Phase Margin at Unity−Gain (V_O = 0.5 V to 3.5 V, R_L = 2.0 kΩ)	ϕ_m	−	65	−	deg.
Common Mode Rejection Ratio (V_{CC} = 40 V, V_{in} = 0 V to 38 V))	CMRR	65	90	−	dB
Power Supply Rejection Ratio (ΔV_{CC} = 33 V, V_O = 2.5 V, R_L = 2.0 kΩ)	PSRR	−	100	−	dB
Output Sink Current ($V_{O[Pin\ 3]}$ = 0.7 V)	I_O−	0.3	0.7	−	mA
Output Source Current ($V_{O[Pin\ 3]}$ = 3.5 V)	I_O+	−2.0	−4.0	−	mA

4. Low duty cycle techniques are used during test to maintain junction temperature as close to ambient temperatures as possible.
T_{low} = −40°C for MC33060A T_{high} = +85°C for MC33060A
= 0°C for MC34060A   = +70°C for MC34060A

ELECTRICAL CHARACTERISTICS (continued) (V_{CC} = 15 V, C_T = 0.01 μF, R_T = 12 kΩ, unless otherwise noted. For typical values T_A = 25°C, for min/max values T_A is the operating ambient temperature range that applies, unless otherwise noted.)

Characteristics	Symbol	Min	Typ	Max	Unit
PWM COMPARATOR SECTION (Test circuit Figure 11)					
Input Threshold Voltage (Zero Duty Cycle)	V_{TH}	−	3.5	4.5	V
Input Sink Current ($V_{[Pin\ 3]}$ = 0.7 V)	I_I	0.3	0.7	−	mA
DEAD−TIME CONTROL SECTION (Test circuit Figure 11)					
Input Bias Current (Pin 4) (V_{in} = 0 V to 5.25 V)	$I_{IB(DT)}$	−	−1.0	−10	μA
Maximum Output Duty Cycle (V_{in} = 0 V, C_T = 0.01 μF, R_T = 12 kΩ) (V_{in} = 0 V, C_T = 0.001 μF, R_T = 47 kΩ)	DC_{max}	 90 −	 96 92	 100 −	%

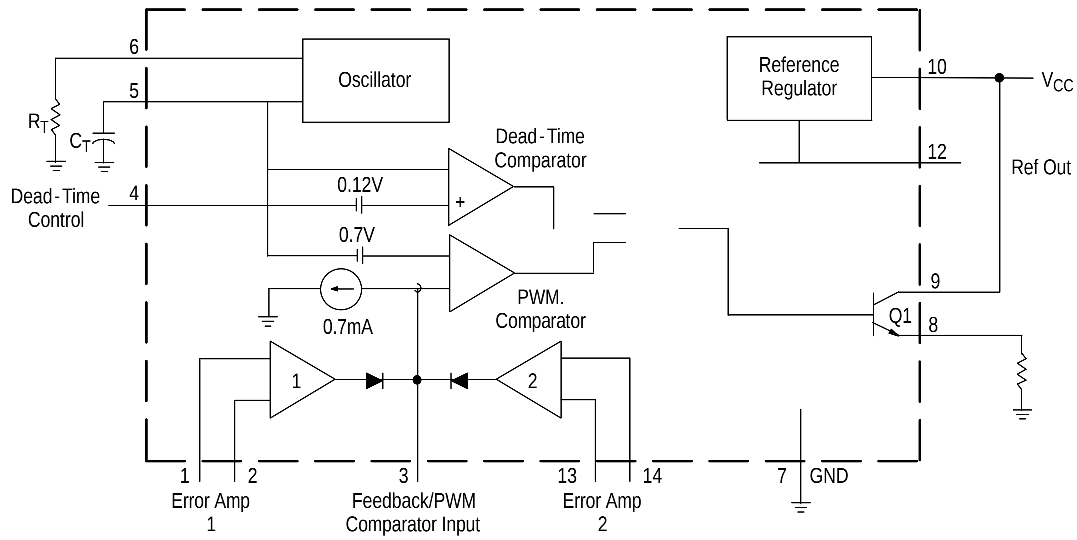


Figure 1. Block Diagram

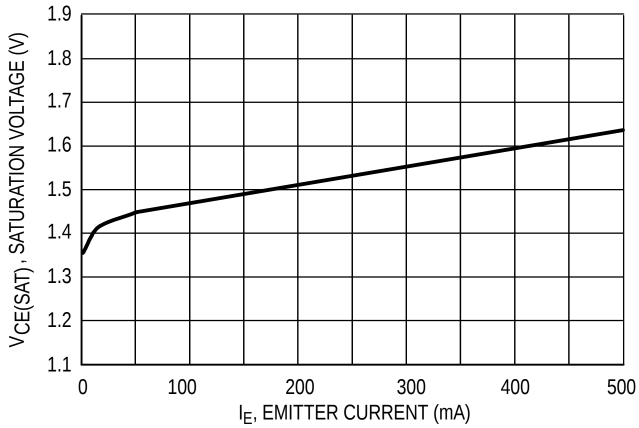


Figure 7. Emitter−Follower Configuration Output Saturation Voltage versus Emitter Current

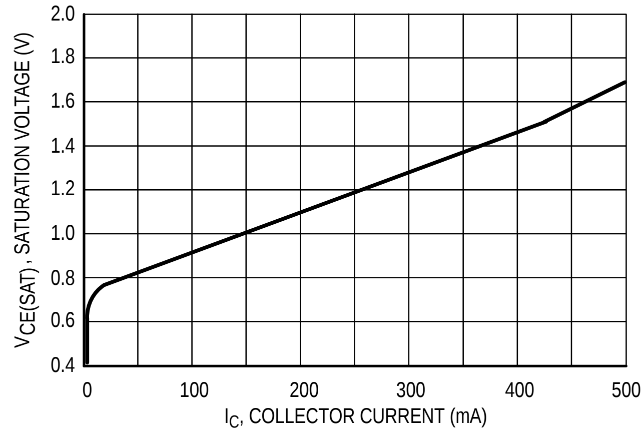


Figure 8. Common−Emitter Configuration Output Saturation Voltage versus Collector Current

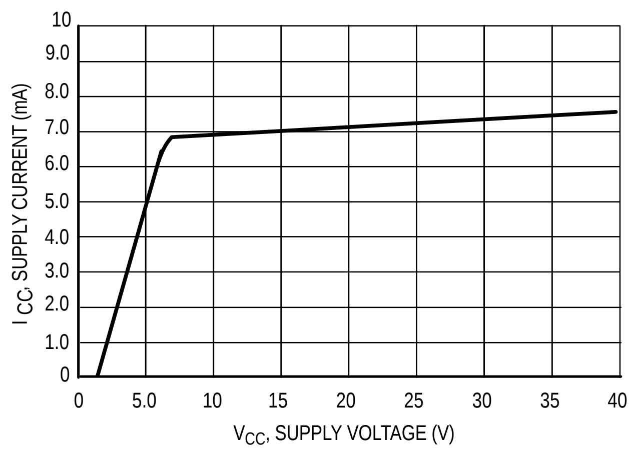


Figure 9. Standby Supply Current versus Supply Voltage

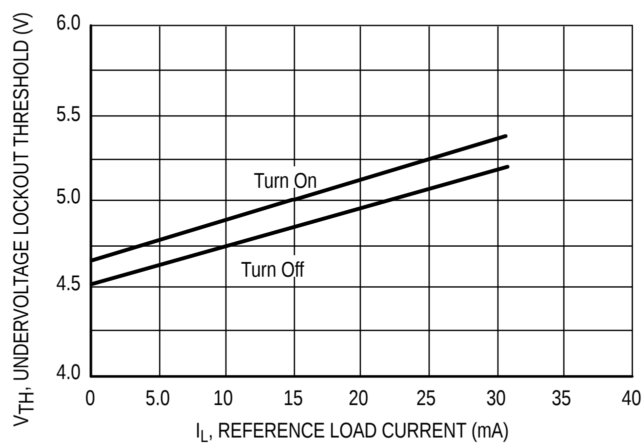


Figure 10. Undervoltage Lockout Thresholds versus Reference Load Current

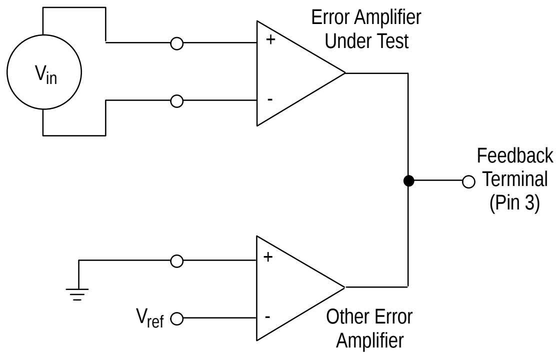


Figure 11. Error Amplifier Characteristics

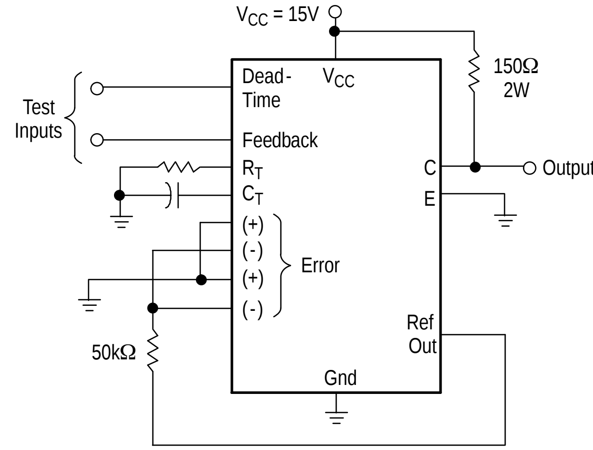


Figure 12. Deadtime and Feedback Control

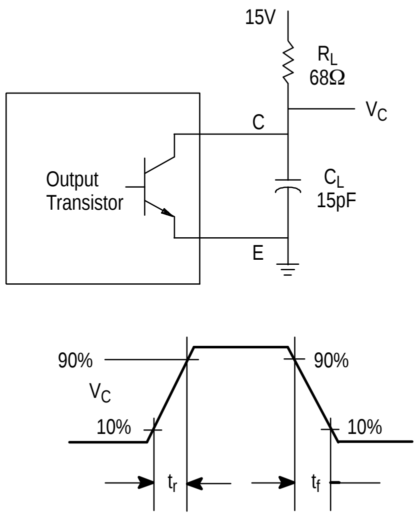


Figure 13. Common−Emitter Configuration and Waveform

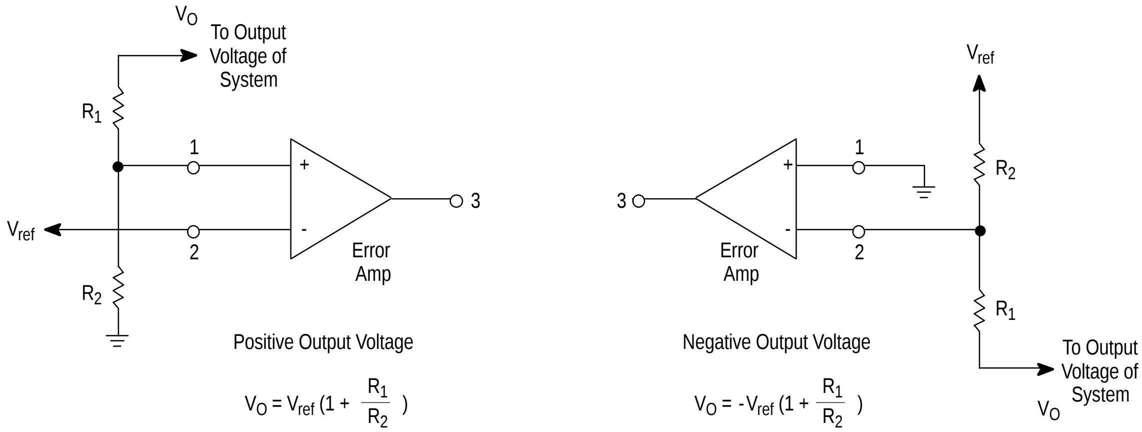


Figure 15. Error Amplifier Sensing Techniques

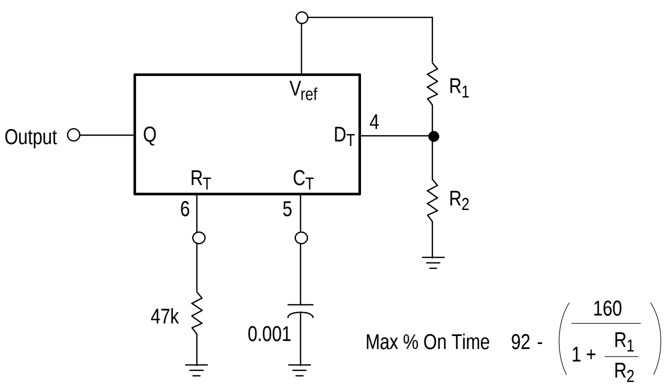


Figure 16. Deadtime Control Circuit

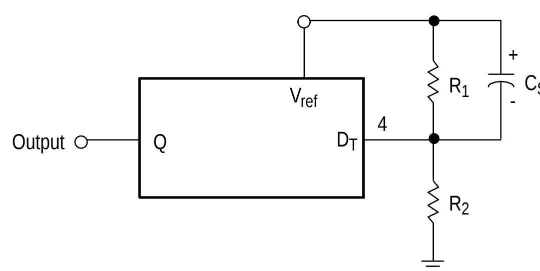


Figure 17. Soft−Start Circuit

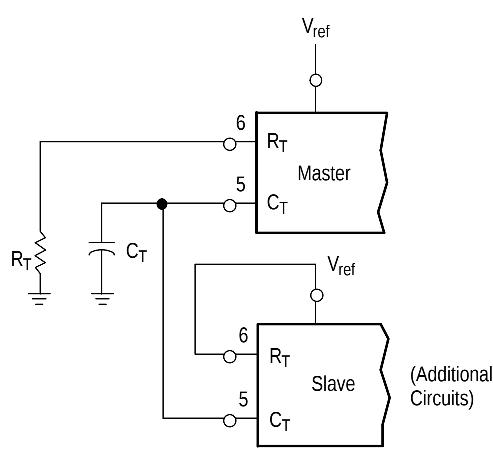
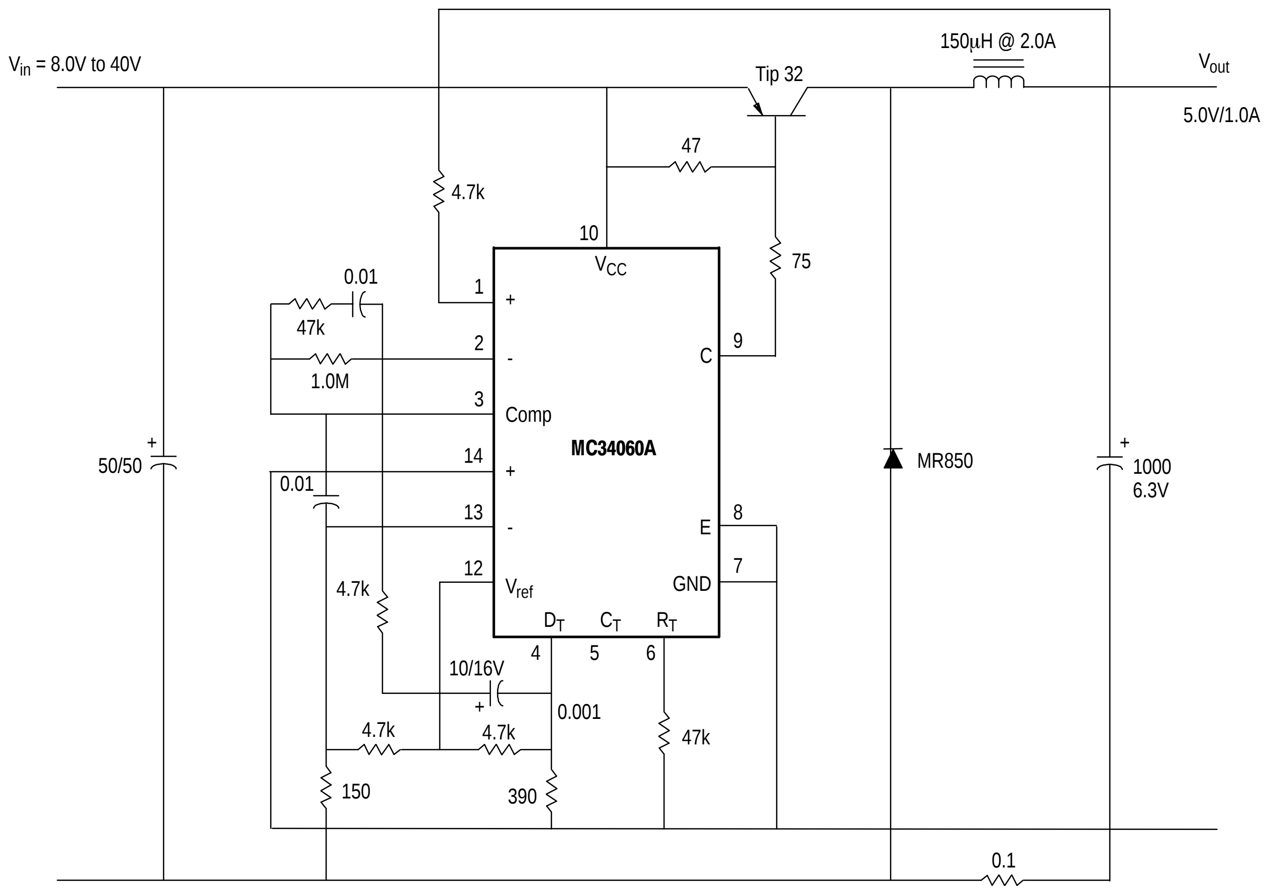
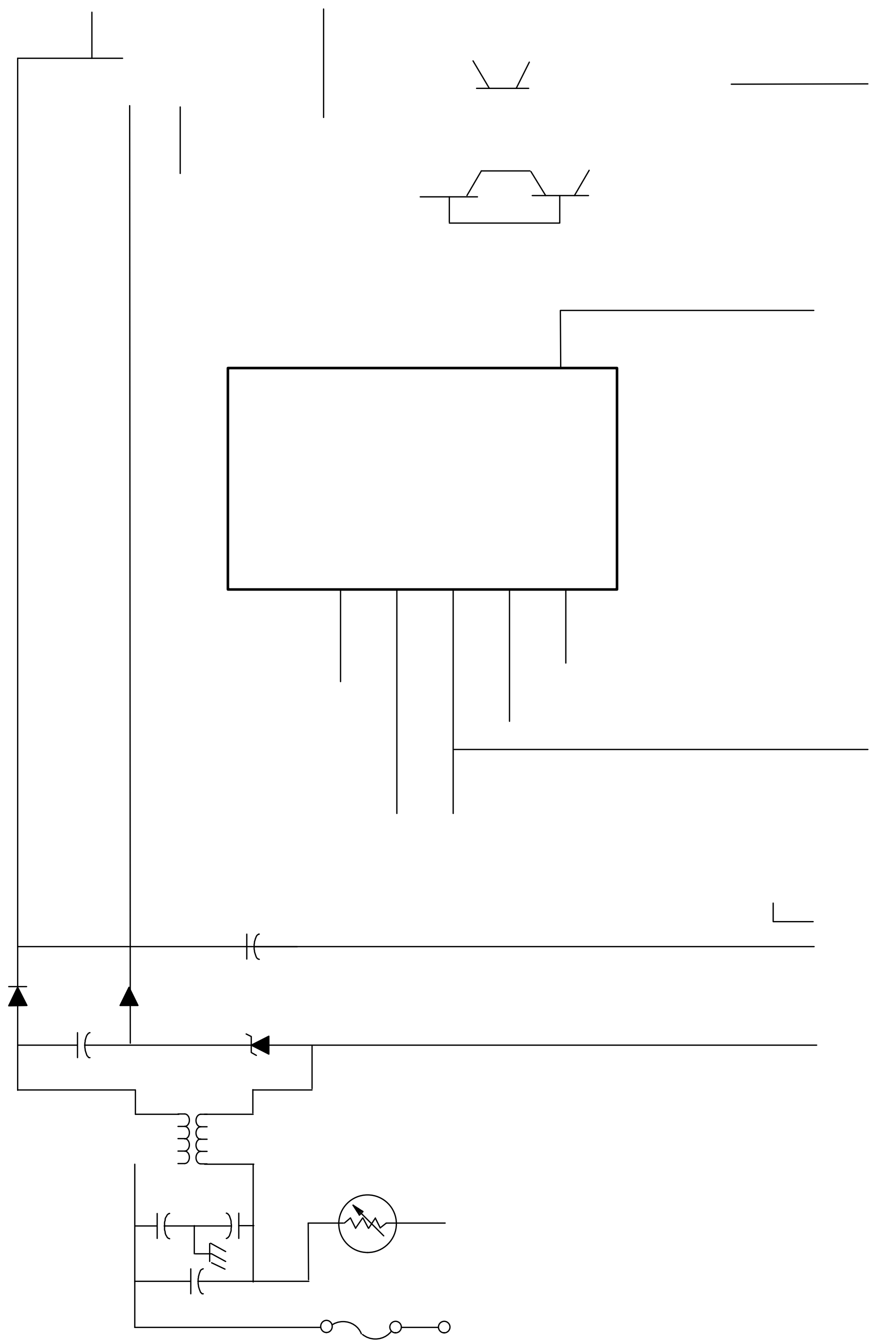


Figure 18. Slaving Two or More Control Circuits



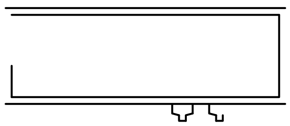
V_in = 8.0V to 40V
Tip 32
150µH @ 2.0A
V_out
5.0V/1.0A
47
4.7k
10
V_CC
75
0.01
1
+
47k
2
-
C
9
1.0M
3
Comp
50/50
14
+
MC34060A
MR850
1000
6.3V
0.01
13
-
E
8
12
7
4.7k
V_ref
GND
D_T
C_T
R_T
4
5
6
10/16V
0.001
4.7k
4.7k
47k
150
390
0.1

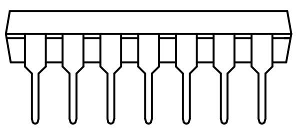
V



ORDERING INFORMATION

Device	Operating Temperature Range	Package	Shipping†
MC34060ADG	T_A= 0		





STYLE 1:
PIN 1. COLLECTOR
2. BASE
3. EMITTER
4. NO CONNECTION
5. EMITTER
6. BASE
7. COLLECTOR
8. COLLECTOR
9. BASE
10. EMITTER
11. NO CONNECTION
12. EMITTER
13. BASE
14. COLLECTOR

STYLE 2:
CANCELLED

STYLE 3:
CANCELLED

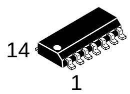
STYLE 6:
PIN 1. COMMON CATHODE
2. ANODE/CATHODE
3. ANODE/CATHODE
4. NO CONNECTION
5. ANODE/CATHODE
6. NO CONNECTION
7. ANODE/CATHODE
8. ANODE/CATHODE
9. ANODE/CATHODE
10. NO CONNECTION
11. ANODE/CATHODE
12. ANODE/CATHODE
13. NO CONNECTION
14. COMMON ANODE

STYLE 7:
PIN 1. NO CONNECTION
2. ANODE
3. ANODE
4. NO CONNECTION
5. ANODE
6. NO CONNECTION
7. ANODE
8. ANODE
9. ANODE
10. NO CONNECTION
11. ANODE
12. ANODE
13. NO CONNECTION
14. COMMON CATHODE

STYLE 8:
PIN 1. NO CONNECTION
2. CATHODE
3. CATHODE
4. NO CONNECTION
5. CATHODE
6. NO CONNECTION
7. CATHODE
8. CATHODE
9. CATHODE
10. NO CONNECTION
11. CATHODE
12. CATHODE
13. NO CONNECTION
14. COMMON ANODE

STYLE 10:
PIN 1. COMMON CATHODE
2. ANODE/CATHODE
3. ANODE/CATHODE
4. ANODE/CATHODE
5. ANODE/CATHODE
6. NO CONNECTION

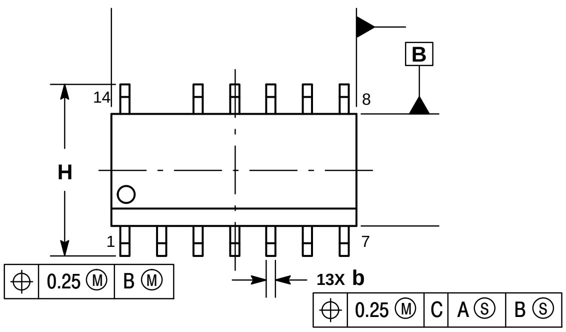
9. ANODE/CATHODE

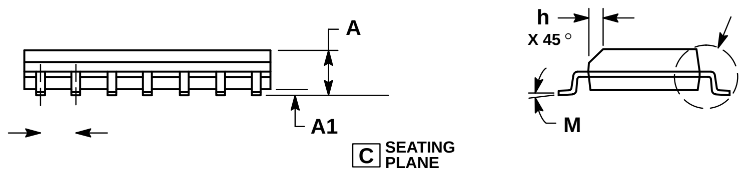


SCALE 1:1

SOIC 14 NB
CASE 751A−03
ISSUE L

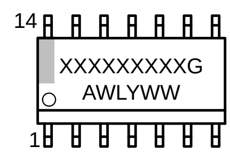
DATE 03 FEB 2016





NOTES:
1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M, 1994.
2. CONTROLLING DIMENSION: MILLIMETERS.
3. DIMENSION b DOES NOT INCLUDE DAMBAR PROTRUSION. ALLOWABLE PROTRUSION SHALL BE 0.13 TOTAL IN EXCESS OF AT MAXIMUM MATERIAL CONDITION.
4. DIMENSIONS D AND E DO NOT INCLUDE MOLD PROTRUSIONS.
5. MAXIMUM MOLD PROTRUSION 0.15 PER SIDE.

GENERIC MARKING DIAGRAM*



XXXXX	= Specific Device Code
A	= Assembly Location
WL	= Wafer Lot
Y	= Year
WW	= Work Week
G	= Pb−Free Package

STYLES ON PAGE 2

STYLE 7:
PIN 1. ANODE/CATHODE
2. COMMON ANODE
3. COMMON CATHODE
4. ANODE/CATHODE
5. ANODE/CATHODE