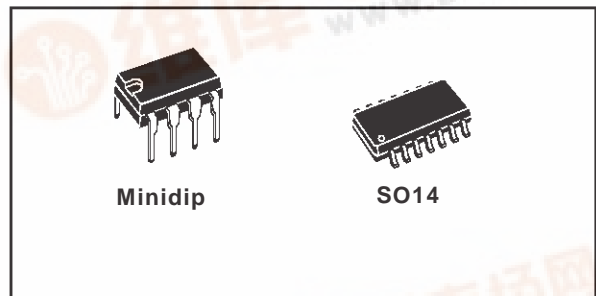




# UC2842/3/4/5 UC3842/3/4/5

## CURRENT MODE PWM CONTROLLER

- OPTIMIZED FOR OFF-LINE AND DC TO DC CONVERTERS
- LOW START-UP CURRENT (< 1 mA)
- AUTOMATIC FEED FORWARD COMPENSATION
- PULSE-BY-PULSE CURRENT LIMITING
- ENHANCED LOAD RESPONSE CHARACTERISTICS
- UNDER-VOLTAGE LOCKOUT WITH HYSTERESIS
- DOUBLE PULSE SUPPRESSION
- HIGH CURRENT TOTEM POLE OUTPUT
- INTERNALLY TRIMMED BANDGAP REFERENCE
- 500 KHz OPERATION
- LOW  $R_o$  ERROR AMP



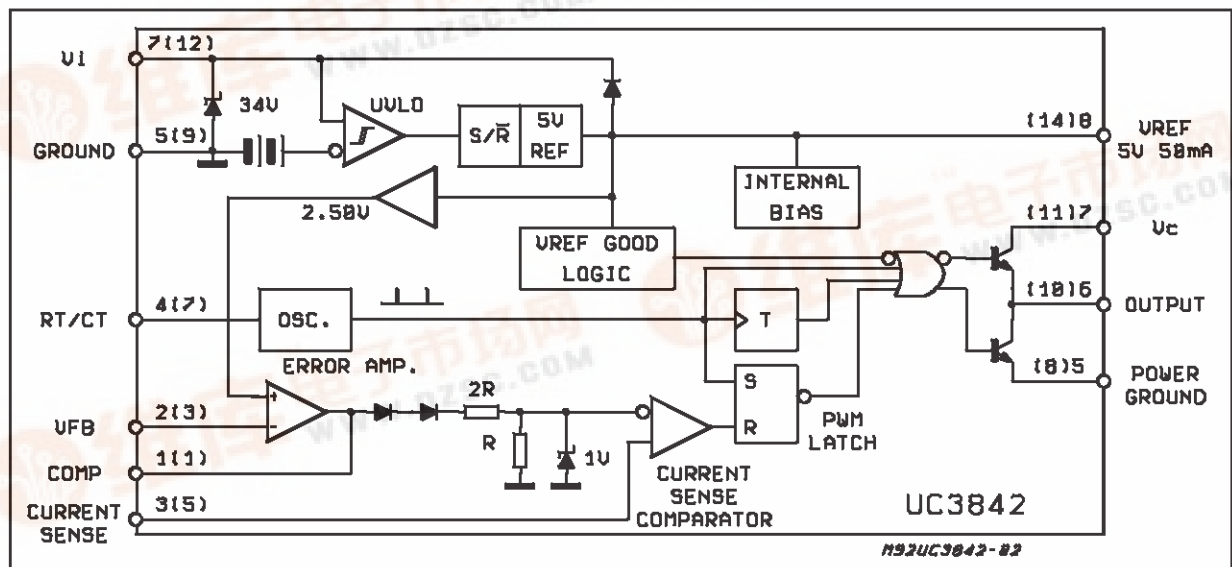
logic to insure latched operation, a PWM comparator which also provides current limit control, and a totem pole output stage designed to source or sink high peak current. The output stage, suitable for driving N-Channel MOSFETs, is low in the off-state.

Differences between members of this family are the under-voltage lockout thresholds and maximum duty cycle ranges. The UC3842 and UC3844 have UVLO thresholds of 16V (on) and 10V (off), ideally suited off-line applications. The corresponding thresholds for the UC3843 and UC3845 are 8.5 V and 7.9 V. The UC3842 and UC3843 can operate to duty cycles approaching 100%. A range of the zero to < 50 % is obtained by the UC3844 and UC3845 by the addition of an internal toggle flip flop which blanks the output off every other clock cycle.

### DESCRIPTION

The UC3842/3/4/5 family of control ICs provides the necessary features to implement off-line or DC to DC fixed frequency current mode control schemes with a minimal external parts count. Internally implemented circuits include undervoltage lockout featuring start-up current less than 1 mA, a precision reference trimmed for accuracy at the error amp input,

### BLOCK DIAGRAM (toggle flip flop used only in U3844 and UC3845)



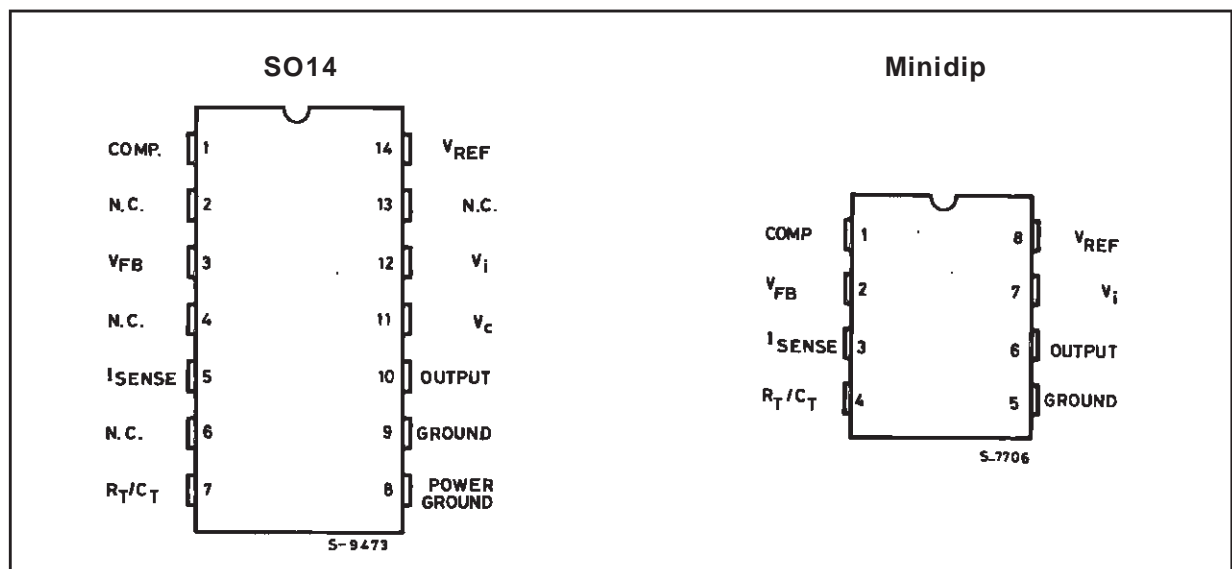
## UC2842/3/4/5-UC3842/3/4/5

### ABSOLUTE MAXIMUM RATINGS

Symbol	Parameter	Value	Unit
$V_i$	Supply Voltage (low impedance source)	30	V
$V_i$	Supply Voltage ( $I_i < 30\text{mA}$ )	Self Limiting	
$I_o$	Output Current	$\pm 1$	A
$E_o$	Output Energy (capacitive load)	5	$\mu\text{J}$
	Analog Inputs (pins 2, 3)	-0.3 to 6.3	V
	Error Amplifier Output Sink Current	10	mA
$P_{\text{tot}}$	Power Dissipation at $T_{\text{amb}} \leq 50^\circ\text{C}$ (minidip, DIP-14)	1	W
$P_{\text{tot}}$	Power Dissipation at $T_{\text{amb}} \leq 25^\circ\text{C}$ (SO14)	725	mW
$T_{\text{stg}}$	Storage Temperature Range	-65 to 150	$^\circ\text{C}$
$T_L$	Lead Temperature (soldering 10s)	300	$^\circ\text{C}$

\* All voltages are with respect to pin 5, all currents are positive into the specified terminal.

### PIN CONNECTIONS (top views)



### ORDERING NUMBERS

Type	Minidip	SO14
UC2842	UC2842N	UC2842D
UC3843	UC2843N	UC2843D
UC2844	UC2844N	UC2844D
UC2845	UC2845N	UC2845D
UC3842	UC3842N	UC3842D
UC3843	UC3843N	UC3843D
UC3844	UC3844N	UC3844D
UC3845	UC3845N	UC3845D

### THERMAL DATA

Symbol	Description	Minidip	SO14	Unit
$R_{\text{thj-amb}}$	Thermal Resistance Junction-ambient. max.	100	165	$^\circ\text{C}$

UC2842/3/4/5-UC3842/3/4/5

**ELECTRICAL CHARACTERISTICS** (Unless otherwise stated, these specifications apply for  $-25 \leq T_{amb} \leq 85^\circ\text{C}$  for UC2824X;  $0 \leq T_{amb} \leq 70^\circ\text{C}$  for UC384X;  $V_i = 15\text{V}$  (note 5);  $R_T = 10\text{K}$ ;  $C_T = 3.3\text{nF}$ )

Symbol	Parameter	Test Conditions	UC284X			UC384X			Unit
			Min.	Typ.	Max.	Min.	Typ.	Max.	
<b>REFERENCE SECTION</b>									
$V_{REF}$	Output Voltage	$T_j = 25^\circ\text{C}$ $I_o = 1\text{mA}$	4.95	5.00	5.05	4.90	5.00	5.10	V
$\Delta V_{REF}$	Line Regulation	$12\text{V} \leq V_i \leq 25\text{V}$		6	20		6	20	mV
$\Delta V_{REF}$	Load Regulation	$1 \leq I_o \leq 20\text{mA}$		6	25		6	25	mV
$\Delta V_{REF}/\Delta T$	Temperature Stability	(Note 2)		0.2	0.4		0.2	0.4	mV/°C
	Total Output Variant	Line, Load, Temperature (2)	4.9		5.1	4.82		5.18	V
$e_N$	Output Noise Voltage	$10\text{Hz} \leq f \leq 10\text{KHz}$ $T_j = 25^\circ\text{C}$ (2)		50			50		$\mu\text{V}$
	Long Term Stability	$T_{amb} = 125^\circ\text{C}$ , 1000Hrs (2)		5	25		5	25	mV
$I_{SC}$	Output Short Circuit		-30	-100	-180	-30	-100	-180	mA
<b>OSCILLATOR SECTION</b>									
$f_s$	Initial Accuracy	$T_j = 25^\circ\text{C}$ (6)	47	52	57	47	52	57	KHz
	Voltage Stability	$12 \leq V_i \leq 25\text{V}$		0.2	1		0.2	1	%
	Temperature Stability	$T_{MIN} \leq T_{amb} \leq T_{MAX}$ (2)		5			5		%
$V_4$	Amplitude	$V_{PIN4}$ Peak to Peak		1.7			1.7		V
<b>ERROR AMP SECTION</b>									
$V_2$	Input Voltage	$V_{PIN1} = 2.5\text{V}$	2.45	2.50	2.55	2.42	2.50	2.58	V
$I_b$	Input Bias Current			-0.3	-1		-0.3	-2	$\mu\text{A}$
	$A_{VOL}$	$2 \leq V_o \leq 4\text{V}$	65	90		65	90		dB
B	Unity Gain Bandwidth	(2)	0.7	1		0.7	1		MHz
SVR	Supply Voltage Rejection	$12\text{V} \leq V_i \leq 25\text{V}$	60	70		60	70		dB
$I_o$	Output Sink Current	$V_{PIN2} = 2.7\text{V}$ $V_{PIN1} = 1.1\text{V}$	2	6		2	6		V
$I_o$	Output Source Current	$V_{PIN2} = 2.3\text{V}$ $V_{PIN1} = 5\text{V}$	-0.5	-0.8		-0.5	-0.8		mA
	$V_{OUT}$ High	$V_{PIN2} = 2.3\text{V}$ ; $R_L = 15\text{K}\Omega$ to Ground	5	6		5	6		V
	$V_{OUT}$ Low	$V_{PIN2} = 2.7\text{V}$ ; $R_L = 15\text{K}\Omega$ to Pin 8		0.7	1.1		0.7	1.1	V
<b>CURRENT SENSE SECTION</b>									
$G_V$	Gain	(3 & 4)	2.85	3	3.15	2.8	3	3.2	V/V
$V_3$	Maximum Input Signal	$V_{PIN1} = 5\text{V}$ (3)	0.9	1	1.1	0.9	1	1.1	V
SVR	Supply Voltage Rejection	$12 \leq V_i \leq 25\text{V}$ (3)		70			70		dB
$I_b$	Input Bias Current			-2	-10		-2	-10	$\mu\text{A}$
	Delay to Output			150	300		150	300	ns
<b>OUTPUT SECTION</b>									
$I_{OL}$	Output Low Level	$I_{SINK} = 20\text{mA}$		0.1	0.4		0.1	0.4	V
		$I_{SINK} = 200\text{mA}$		1.5	2.2		1.5	2.2	V
$I_{OH}$	Output High Level	$I_{SOURCE} = 20\text{mA}$	13	13.5		13	13.5		V
		$I_{SOURCE} = 200\text{mA}$	12	13.5		12	13.5		V
$t_r$	Rise Time	$T_j = 25^\circ\text{C}$ $C_L = 1\text{nF}$ (2)		50	150		50	150	ns
$t_f$	Fall Time	$T_j = 25^\circ\text{C}$ $C_L = 1\text{nF}$ (2)		50	150		50	150	ns

## UC2842/3/4/5-UC3842/3/4/5

### ELECTRICAL CHARACTERISTICS (continued)

Symbol	Parameter	Test Conditions	UC284X			UC384X			Unit
			Min.	Typ.	Max.	Min.	Typ.	Max.	
<b>UNDER-VOLTAGE LOCKOUT SECTION</b>									
	Start Threshold	X842/4	15	16	17	14.5	16	17.5	V
		X843/5	7.8	8.4	9.0	7.8	8.4	9	V
	Min Operating Voltage After Turn-on	X842/4	9	10	11	8.5	10	11.5	V
		X843/5	7.0	7.6	8.2	7.0	7.6	8.2	V
<b>PWM SECTION</b>									
	Maximum Duty Cycle	X842/3	93	97	100	93	97	100	%
		X844/5	46	48	50	47	48	50	%
	Minimum Duty Cycle				0			0	%
<b>TOTAL STANDBY CURRENT</b>									
I <sub>st</sub>	Start-up Current			0.5	1		0.5	1	mA
I <sub>i</sub>	Operating Supply Current	V <sub>PIN2</sub> = V <sub>PIN3</sub> = 0V		11	20		11	20	mA
V <sub>iz</sub>	Zener Voltage	I <sub>i</sub> = 25mA		34			34		V

- Notes :**
- These parameters, although guaranteed, are not 100% tested in production.
  - Parameter measured at trip point of latch with V<sub>PIN2</sub> = 0.
  - Gain defined as :  

$$A = \frac{\Delta V_{PIN1}}{\Delta V_{PIN3}} ; 0 \leq V_{PIN3} \leq 0.8 \text{ V}$$
  - Adjust V<sub>i</sub> above the start threshold before setting at 15 V.
  - Output frequency equals oscillator frequency for the UC3842 and UC3843.  
Output frequency is one half oscillator frequency for the UC3844 and UC3845.

Figure 1 : Error Amp Configuration.

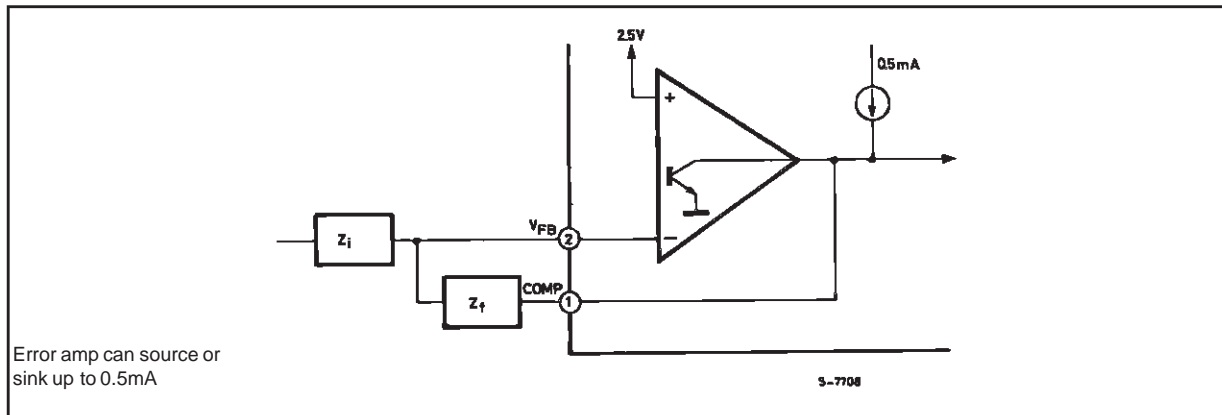
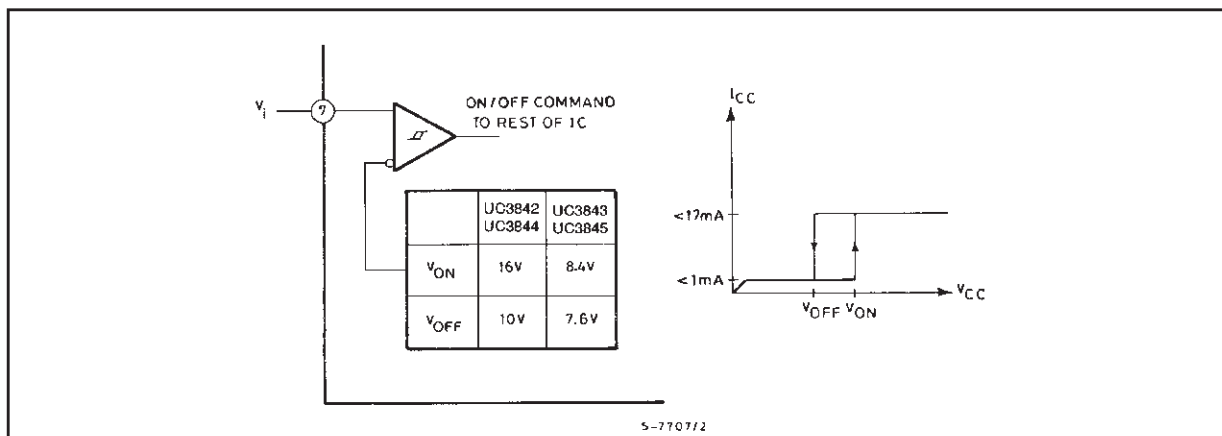


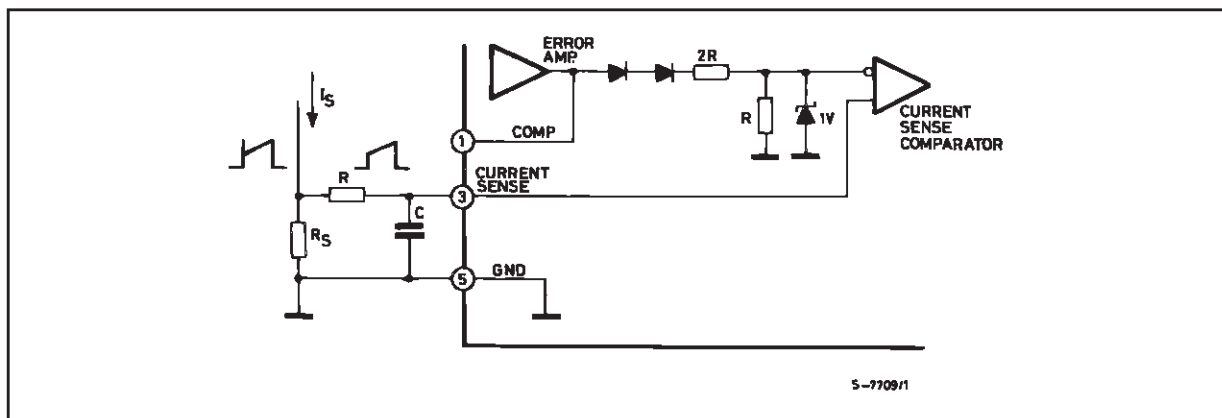
Figure 2 : Under Voltage Lockout.



During Under-Voltage Lockout, the output driver is biased to sink minor amounts of current. Pin 6 should be shunted to ground with a bleeder resistor

to prevent activating the power switch with extraneous leakage currents.

Figure 3 : Current Sense Circuit .



Peak current ( $i_s$ ) is determined by the formula

$$I_{s \max} \approx \frac{1.0 \text{ V}}{R_s}$$

A small RC filter may be required to suppress switch transients.

Figure 4.

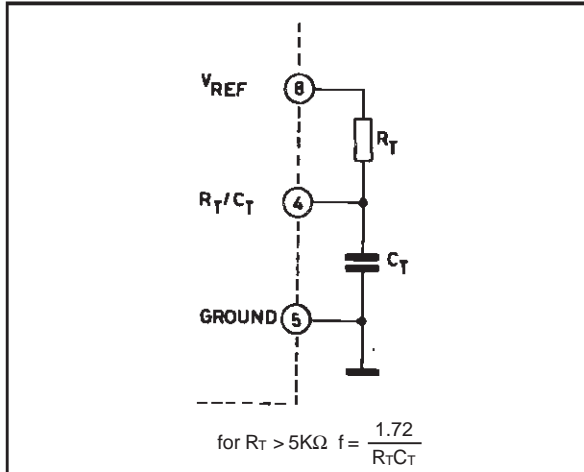


Figure 6 : Timing Resistance vs. Frequency.

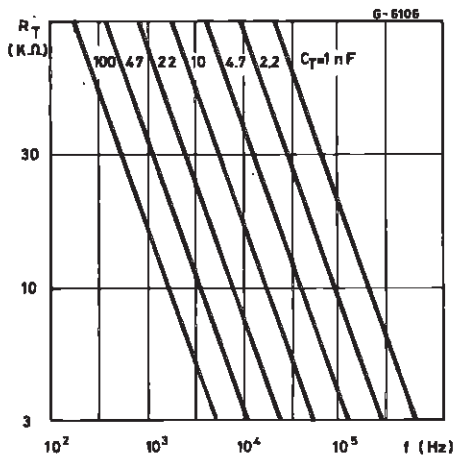


Figure 8 : Error Amplifier Open-loop Frequency Response.

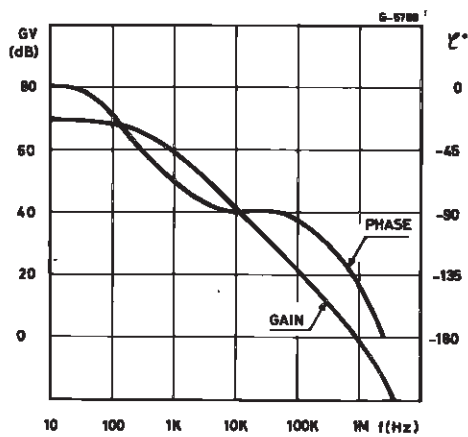


Figure 5 : Deadtime vs.  $C_T$  ( $R_T > 5K\Omega$ ).

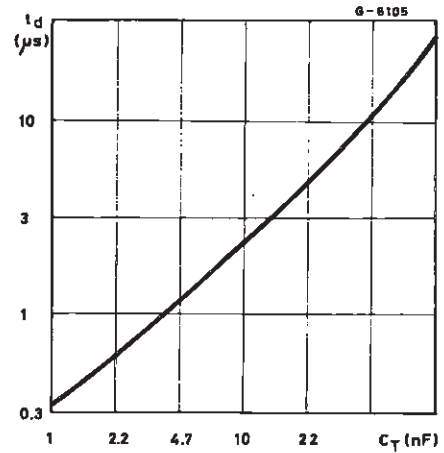
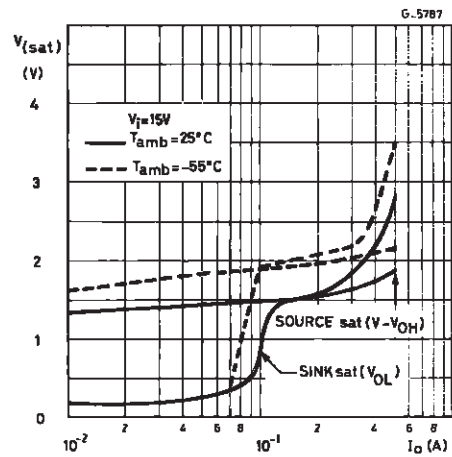


Figure 7 : Output Saturation Characteristics.



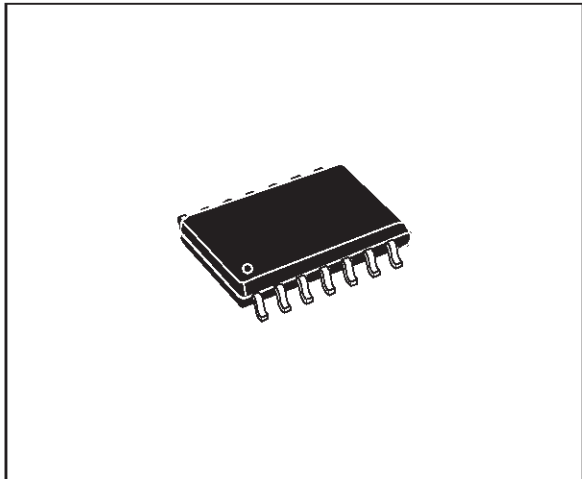






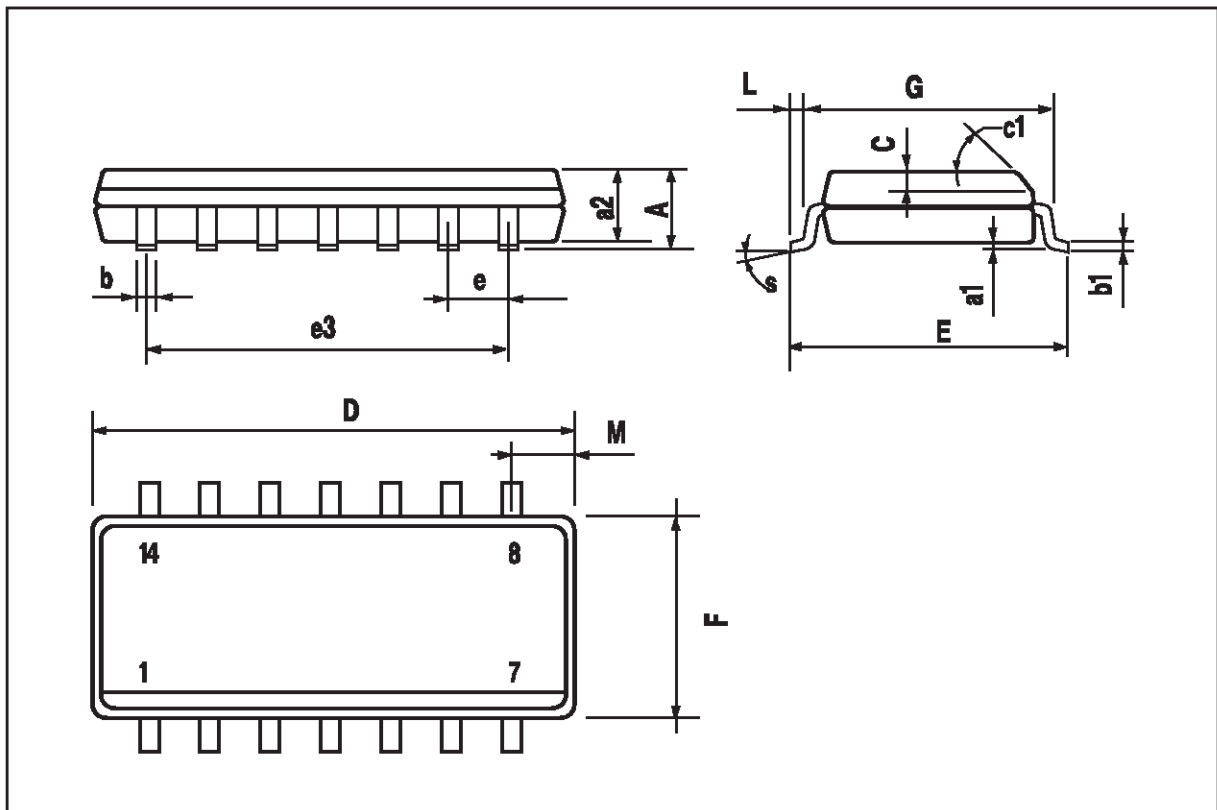
DIM.	mm			inch		
	MIN..	TYP.	MAX..	MIN..	TYP..	MAX..
A			1.75			0.069
a1	0.1		0.25	0.004		0.009
a2			1.6			0.063
b	0.35		0.46	0.014		0.018
b1	0.19		0.25	0.007		0.010
C		0.5			0.020	
c1	45° (typ.)					
D (1)	8.55		8.75	0.336		0.344
E	5.8		6.2	0.228		0.244
e		1.27			0.050	
e3		7.62			0.300	
F (1)	3.8		4	0.150		0.157
G	4.6		5.3	0.181		0.209
L	0.4		1.27	0.016		0.050
M			0.68			0.027
S	8° (max)					

**OUTLINE AND MECHANICAL DATA**



**SO14**

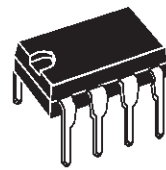
(1) D and F do not include mold flash or protrusions. Mold flash or protrusions shall not exceed 0.15mm (.006inch).



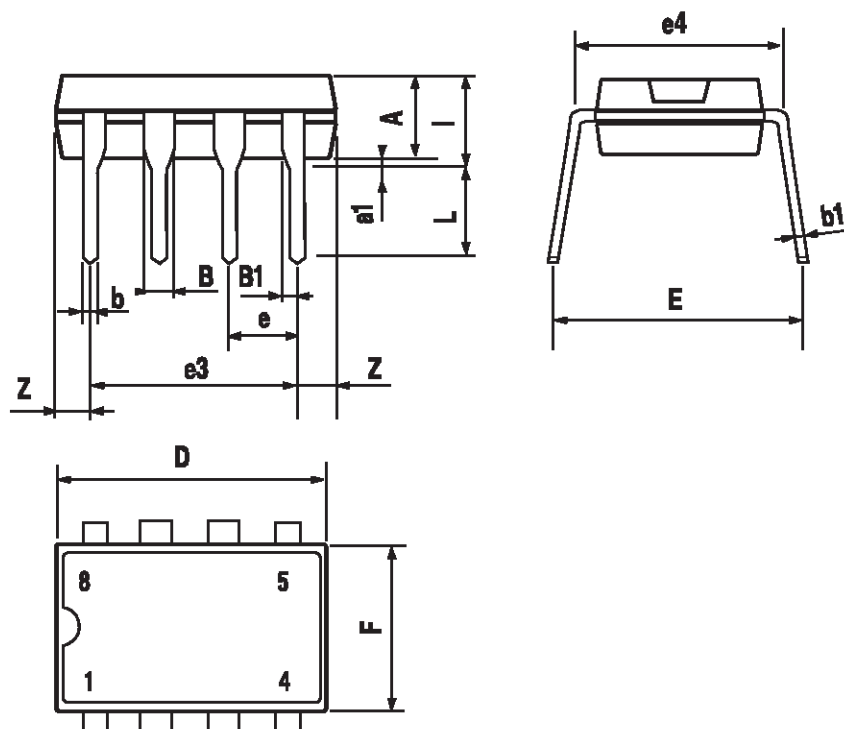
UC2842/3/4/5-UC3842/3/4/5

DIM.	mm			inch		
	MIN.	TYP.	MAX.	MIN.	TYP.	MAX.
A		3.3			0.130	
a1	0.7			0.028		
B	1.39		1.65	0.055		0.065
B1	0.91		1.04	0.036		0.041
b		0.5			0.020	
b1	0.38		0.5	0.015		0.020
D			9.8			0.386
E		8.8			0.346	
e		2.54			0.100	
e3		7.62			0.300	
e4		7.62			0.300	
F			7.1			0.280
I			4.8			0.189
L		3.3			0.130	
Z	0.44		1.6	0.017		0.063

OUTLINE AND MECHANICAL DATA



Minidip 0.300"



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