



钜地半导体
Tudi Semiconductor

Product Specification

TUDI-UC3842B/ UC3843B/ UC2842B/UC2843B
/UC3844B/UC2844B/UC3845B/UC2845B

High Performance Current Mode Controllers

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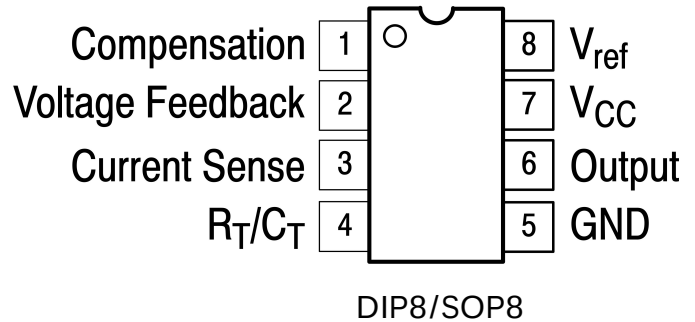
**semiconductor device
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- Design
- research and development
- production
- and sales



Features

- Trimmed Oscillator for Precise Frequency Control
- Oscillator Frequency Guaranteed at 250 kHz
- Current Mode Operation to 500 kHz
- Automatic Feed Forward Compensation
- Latching PWM for Cycle-By-Cycle Current Limiting
- Internally Trimmed Reference with Undervoltage Lockout
- High Current Totem Pole Output
- Undervoltage Lockout with Hysteresis
- Low Startup and Operating Current
- This is a PbFree and HalideFree Device

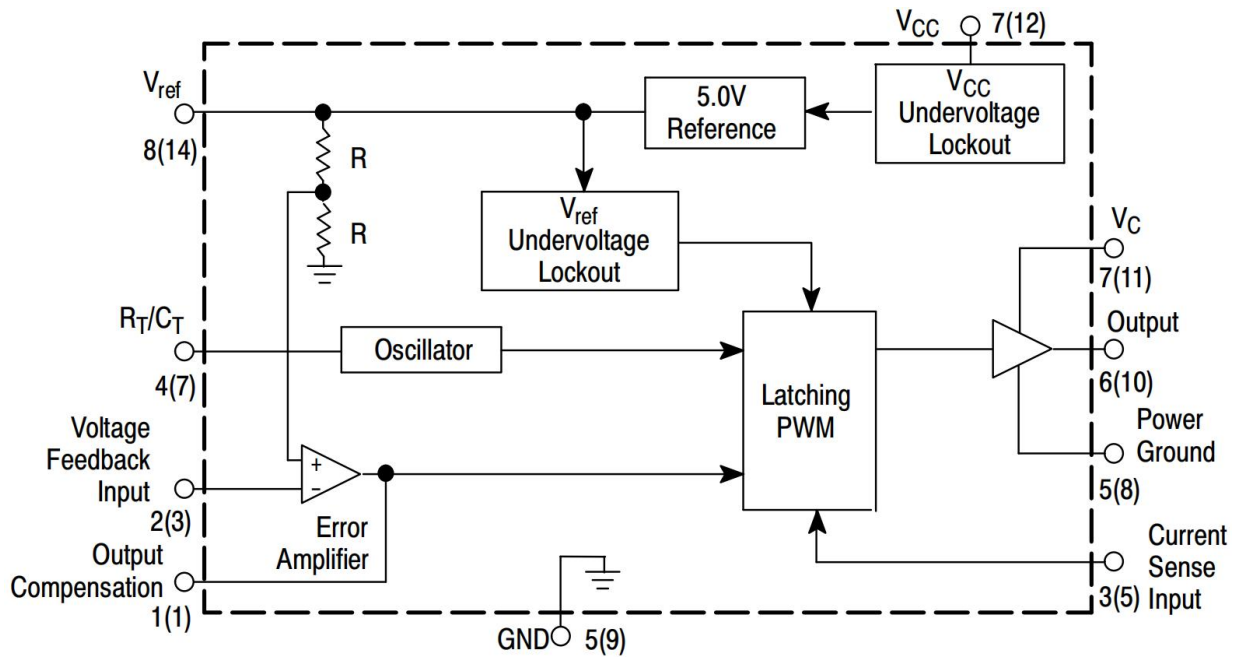


DESCRIPTION

The UC3842B, UC3843B series are high performance fixed frequency current mode controllers. They are specifically designed for Off-Line and DC-DC converter applications offering the designer a cost-effective solution with minimal external components. These integrated circuits feature a trimmed oscillator for precise duty cycle control, a temperature compensated reference, high gain error amplifier, current sensing comparator, and a high current totem pole output ideally suited for driving a power MOSFET.

Also included are protective features consisting of input and reference undervoltage lockouts each with hysteresis, cycle-by-cycle current limiting, programmable output deadtime, and a latch for single pulse metering.

These devices are available in an 8-pin dual-in-line and surface mount (SOIC-8) plastic package . The UCX842B has UVLO thresholds of 16 V (on) and 10 V (off), ideally suited for off-line converters. The UCX843B is tailored for lower voltage applications having UVLO thresholds of 8.5 V (on) and 7.6 V (off)



Pin numbers in parenthesis are for the D suffix SOIC-14 package

Figure 1. Simplified Block Diagram

MAXIMUM RATINGS

Rating	Symbol	Value	Unit
Bias and Driver Voltages(Zero Series Impedance, see also Total Device spec)	V_{CC}, V_C	30	V
Total Power Supply and Zener Current	$(I_{CC} + I_Z)$	30	mA
Output Current,Source or Sink	I_O	1.0	A
Output Energy(Capacitive Load per Cycle)	W	5.0	μJ
Current Sense,Voltage Feedback, V_{ref} and R_t/C_t Inputs	V_{in}	-0.3 to +5.5	V
Compensation	V_{comp}	-0.3 to +7.2	V
Output	V_O	-0.3 to V_{CC} or $V_C + 0.3$	V
Error Amp Output Sink Current	I_O	10	mA
Power Dissipation and Thermal Characteristics D Suffix,Plastic Package,SOIC-14 Case 751A Maximum Power Dissipation @ $T_A = 25^\circ C$	P_D	862	mW



MAXIMUM RATINGS(continued)

Rating	Symbol	Value	Unit
Thermal Resistance,Junction-to-Air	$R_{\theta JA}$	145	° CW
D1 Suffix,Plastic Package,SOIC-8 Case 751 Maximum Power Dissipation @ $T_A=25^{\circ}\text{C}$	P_D	702	mW
Thermal Resistance,Junction-to-Air	$R_{\theta JA}$	178	° CW
N Suffix,Plastic Package,Case 626 Maximum Power Dissipation @ $T_A=25^{\circ}\text{C}$	P_D	1.25	W
Thermal Resistance,Junction-to-Air	$R_{\theta JA}$	100	° CW
Operating Junction Temperature	T_J	+150	°C
Operating Ambient Temperature UC3842B,UC3843B	T_A	0 to 70	°C
UC2842B,UC2843B		-25 to +85	
UC2843D		-40 to +85	
UC3842BV,UC3843BV		-40 to +105	
Storage Temperature Range	T_{stg}	-65 to +150	°C

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

- Human Body Model 4000 V per JEDEC Standard JESD22-A114B
- Machine Model Method 200 V per JEDEC Standard JESD22-A115-A

2. This device contains latch-up protection and exceeds 100 mA per JEDEC Standard JESD78



ELECTRICAL CHARACTERISTICS

($V_{CC} = 15\text{ V}$ [Note 3], $R_T = 10\text{ k}$, $C_T = 3.3\text{ nF}$. For typical values $T_A = 25^\circ\text{C}$, for min/max values T_A is the operating ambient temperature range that applies [Note 4], unless otherwise noted.)

Characteristics	Symbol	UC284xB,UC2843D			UC384xB,xBV			Unit
		Min	Typ	Max	Min	Typ	Max	
REFERENCE SECTION								
Reference Output Voltage (Io=1.0 mA, TJ=25°C)	Vref	4.95	5.0	5.05	4.9	5.0	5.1	V
Line Regulation (Vcc=12V to 25V)	Regline	—	2.0	20	—	2.0	20	mV
Load Regulation (Io=1.0 mA to 20 mA)	Regload	—	3.0	25	—	3.0	25	mV
Temperature Stability	Ts	—	0.2	—	—	0.2	—	mV/°C
Total Output Variation over Line,Load, and Temperature	Vref							V
UC284xB		4.9	—	5.1	4.82	—	5.18	
UC2843D		4.82	—	5.18				
Output Noise Voltage (f=10Hz to 10 kHz,TJ=25°C)	Vn	—	50	—	—	50	—	µV
Long Term Stability (TA=125°C for 1000 Hours)	S	—	5.0	—	—	5.0	—	mV
Output Short Circuit Current	Isc	-30	-85	-180	-30	-85	-180	mA
OSCILLATOR SECTION								
Frequency	fosc							kHz
TJ=25°C		49	52	55	49	52	55	
TA=Tlow to Thigh		48	—	56	48	—	56	
TJ=25°C(RT=6.2k,CT=1.0nF)		225	250	275	225	250	275	
Frequency Change with Voltage (Vcc=12V to 25 V)	Δfosc/ΔV	—	0.2	1.0	—	0.2	1.0	%
Frequency Change with Temperature, TA=Tlow to Thigh	Δfosc/ΔT	—	1.0	—	—	0.5	—	%
Oscillator Voltage Swing(Peak-to-Peak)	Vosc	—	1.6	—	—	1.6	—	V



ELECTRICAL CHARACTERISTICS(continued)

($V_{CC} = 15\text{ V}$ [Note 3], $R_T = 10\text{ k}$, $C_T = 3.3\text{ nF}$. For typical values $T_A = 25^\circ\text{C}$, for min/max values T_A is the operating ambient temperature range that applies [Note 4], unless otherwise noted.)

Characteristics	Symbol	UC284xB, UC2843D			UC384xB,xBV			Unit
		Min	Typ	Max	Min	Typ	Max	
Discharge Current($V_{OSC}=2.0\text{V}$)	I_{dischg}							mA
$T_J=25^\circ\text{C}, T_A=T_{low}\text{ to }T_{high}$		7.8	8.3	8.8	7.8	8.3	8.8	
UC284xB,UC384xB		7.5	—	8.8	7.6	—	8.8	
UC2843D,UC384xBV		—	—	—	7.2	—	8.8	
ERROR AMPLIFIER SECTION								
Voltage Feedback Input ($V_O=2.5\text{V}$) UC284XB	V_{FB}	2.45	2.5	2.55	2.42	2.5	2.58	V
UC2843D		2.42	2.5	2.58				
Input Bias Current ($V_{FB}=5.0\text{ V}$)	I_{IB}	—	-0.1	-1.0	—	-0.1	-2.0	μA
Open Loop Voltage Gain ($V^\circ\text{C}=2.0\text{ V to }4.0\text{V}$)	A_{VOL}	65	90	—	65	90	—	dB
Unity Gain Bandwidth ($T_J=25^\circ\text{C}$)	BW	0.7	1.0	—	0.7	1.0	—	MHz
Power Supply Rejection Ratio ($V_{CC}=12\text{V to }25\text{ V}$)	PSRR	60	70	—	60	70	—	dB
Output Current								mA
Sink ($V_O=1.1\text{ V}, V_{FB}=2.7\text{V}$)	I_{sink}	2.0	12	—	2.0	12	—	
Source ($V_O=5.0\text{ V}, V_{FB}=2.3\text{V}$)	I_{source}	-0.5	-1.0	—	-0.5	-1.0	—	
Output Voltage Swing								V
High State($R_L=15\text{k to ground}, V_{FB}=2.3\text{V}$)	V_{OH}	5.0	6.2	—	5.0	6.2	—	
Low State($R_L=15\text{k to }V_{ref}, V_{FB}=2.7\text{V}$)	V_{OL}							
UC284xB,UC384xB		—	0.8	1.1	—	0.8	1.1	
UC2843D,UC384xBV		—	—	—	—	0.8	1.2	

Note : 3. Adjust V_{CC} above the Startup threshold before setting to 15 V.

4. Low duty cycle pulse techniques are used during test to maintain junction temperature as close to ambient as possible.

$T_{low} = 0^\circ\text{C}$ for UC3842B, UC3843B; -25°C for UC2842B, UC2843B; -40°C for UC3842BV, UC3843BV, UC2843D

$T_{high} = +70^\circ\text{C}$ for UC3842B, UC3843B; $+85^\circ\text{C}$ for UC2842B, UC2843B, UC2843D; $+105^\circ\text{C}$ for UC3842BV, UC3843BV



ELECTRICAL CHARACTERISTICS

($V_{CC} = 15\text{ V}$ [Note 7], $R_T = 10\text{ k}$, $C_T = 3.3\text{ nF}$. For typical values $T_A = 25^\circ\text{C}$, for min/max values T_A is the operating ambient temperature range that applies [Note 8], unless otherwise noted.)

Characteristics	Symbol	UC284xB, UC2843D			UC384xB,xBV			Unit
		Min	Typ	Max	Min	Typ	Max	
CURRENT SENSE SECTION								
Current Sense Input Voltage Gain (Notes 5 and 6)	A _v							V/V
UC2843D,UC284xB,UC384xB		2.85	3.0	3.15	2.85	3.0	3.15	
UC384xBV		—	—	—	2.85	3.0	3.25	
Maximum Current Sense Input Threshold (Note 5)	V _{th}							V
UC2843D,UC284xB,UC384xB		0.9	1.0	1.1	0.9	1.0	1.1	
UC384xBV		—	—	—	0.85	1.0	1.1	
Power Supply Rejection Ratio (V _{cc} =12V to 25V,Note 5)	PSRR	—	70	—	—	70	—	dB
Input Bias Current	I _{IB}	—	-2.0	-10	—	-2.0	-10	μA
Propagation Delay (Current Sense Input to Output)	P _{LH(In/Out)}	—	150	300	—	150	300	ns
OUTPUT SECTION								
Output Voltage								V
Low State(I _{Sink} =20 mA)	V _{OL}	—	0.1	0.4	—	0.1	0.4	
(I _{Sink} =200 mA) UC284xB,UC384xB		—	1.6	2.2	—	1.6	2.2	
UC384xBV,UC2843D		—	—	—	—	1.6	2.3	
High State (I _{Source} =20 mA) UC284xB,UC384xB	V _{OH}	13	13.5	—	13	13.5	—	
UC384xBV,UC2843D		—	—	—	12.9	13.5	—	
(I _{Source} =200 mA)		12	13.4	—	12	13.4	—	
Output Voltage with UVLO Activated(V _{cc} =6.0V,I _{Sink} =1.0 mA)	V _{OL(UVLO)}	—	0.1	1.1	—	0.1	1.1	V
Output Voltage Rise Time (C _L =1.0 nF,T _J =25°C)	t _r	—	50	150	—	50	150	ns
Output Voltage Fall Time(C _L =1.0nF,T _J =25°C)	t _f	—	50	150	—	50	150	ns



ELECTRICAL CHARACTERISTICS(continued)

(V_{CC} = 15 V [Note 7], R_T = 10 k, C_T = 3.3 nF. For typical values T_A = 25°C, for min/max values T_A is the operating ambient temperature range that applies [Note 8], unless otherwise noted.)

Characteristics	Symbol	UC284xB, UC2843D			UC384xB,xBV			Unit
		Min	Typ	Max	Min	Typ	Max	
UNDERVOLTAGE LOCKOUT SECTION								
Startup Threshold (V _{cc})	V _{th}							V
UCx842B,BV		15	16	17	14.5	16	17.5	
UCx843B,BV,D		7.8	8.4	9.0	7.8	8.4	9.0	
Minimum Operating Voltage After Turn-On(V _{cc})	V _{CC(min)}							V
UCx842B,BV		9.0	10	11	8.5	10	11.5	
UCx843B,BV,D		7.0	7.6	8.2	7.0	7.6	8.2	
PWM SECTION								
Duty Cycle								%
Maximum UC284xB,UC384xB,UC2843D	DC _(max)	94	96	—	94	96	—	
UC384xBV		—	—	—	93	96	—	
Minimum	DC _(min)	—	—	0	—	—	0	
TOTAL DEVICE								
Power Supply Current	I _{cc} +I _c							mA
Startup(V _{cc} =6.5 V for UCx843B, UC2843D		—	0.3	0.5	—	0.3	0.5	
V _{cc} 14V for UCx842B,BV)(Note 7)		—	12	17	—	12	17	
Power Supply Zener Voltage (I _{cc} =25 mA)	V _z	30	36	—	30	36	—	V

Note:5. This parameter is measured at the latch trip point with V_{FB} = 0V.

6. Comparator gain is defined as: $AV = \frac{\Delta V \text{ Output Compensation}}{\Delta V \text{ Current Sense Input}}$

7. Adjust V_{CC} above the Startup threshold before setting to 15 V.

8. Low duty cycle pulse techniques are used during test to maintain junction temperature as close to ambient as possible.

T_{low} = 0 ° C for UC3842B, UC3843B; -25 ° C for UC2842B, UC2843B; -40 ° C for UC3842BV, UC3843BV, UC2843D

T_{high} = +70 ° C for UC3842B, UC3843B; +85 ° C for UC2842B, UC2843B, UC2843D; +105 ° C for UC3842BV, UC3843BV



PIN FUNCTION DESCRIPTION

8-Pin	Function	Description
1	Compensation	This pin is the Error Amplifier output and is made available for loop compensation.
2	Voltage Feedback	This is the inverting input of the Error Amplifier. It is normally connected to the switching powersupply output through a resistor divider.
3	Current Sense	A voltage proportional to inductor current is connected to this input. The PWM uses this information to terminate the output switch conduction.
4	R_T/C_T	The Oscillator frequency and maximum Output duty cycle are programmed by connecting resistor R_T to V_{ref} and capacitor C_T to ground. Operation to 500 kHz is possible.
5	GND	This pin is the combined control circuitry and power ground.
6	Output	This output directly drives the gate of a power MOSFET. Peak currents up to 1.0 A are sourced and sunk by this pin.
7	V_{CC}	This pin is the positive supply of the control IC.
8	V_{ref}	This is the reference output. It provides charging current for capacitor C_T through resistor R_T .



Order information

Order Number	Package	Package Quantity	Marking On The park	Temperature
UC2842BNG-TUDI	DIP8	Tube,50,A box of 2000	UC2842BNG	-25° to +85°C
			UC2842BN	
UC2843BNG-TUDI	DIP8	Tube,50,A box of 2000	UC2843BNG	
			UC2843BN	
UC2844BNG-TUDI	DIP8	Tube,50,A box of 2000	UC2844BNG	
			UC2844BN	
UC2845BNG-TUDI	DIP8	Tube,50,A box of 2000	UC2845BNG	
			UC2845BN	
UC3842BNG-TUDI	DIP8	Tube,50,A box of 2000	UC3842BNG	0° to +70°C
			UC3843BN	
UC3843BNG-TUDI	DIP8	Tube,50,A box of 2000	UC3843BNG	
			UC3843BN	
UC3844BNG-TUDI	DIP8	Tube,50,A box of 2000	UC3844BNG	
			UC3844BN	
UC3845BNG-TUDI	DIP8	Tube,50,A box of 2000	UC3845BNG	
			UC3845BN	
UC2842BD1R2G-TUDI	SOP8	Tape,Reel,4000	UC2842B	-25° to +85°C
			2842B	
UC2844BD1R2G-TUDI	SOP8	Tape,Reel,4000	UC2844B	
			2844B	
UC2845BD1R2G-TUDI	SOP8	Tape,Reel,4000	UC2845B	
			2845B	



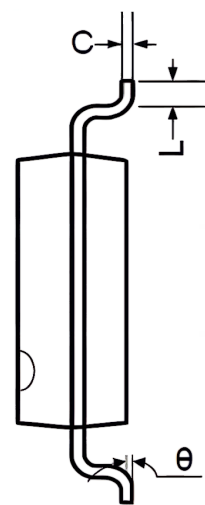
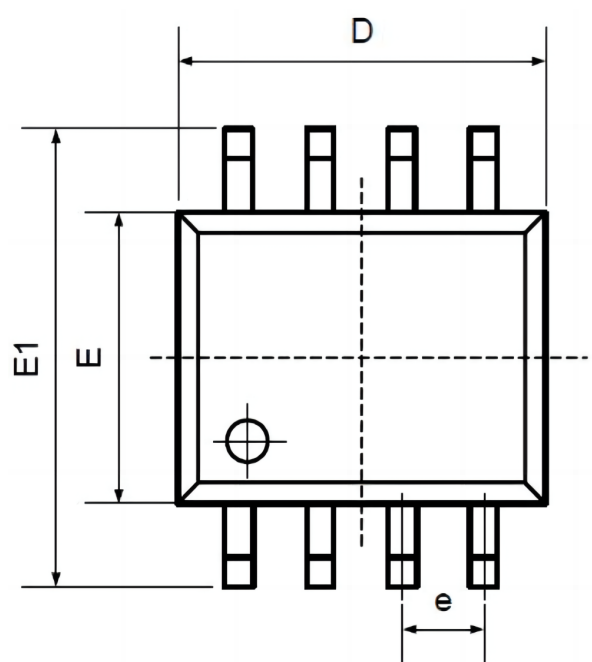
Order information

Order Number	Package	Package Quantity	Marking On The park	Temperature
UC3842BD1R2G-TUDI	SOP8	Tape,Reel,4000	UC3842B	0°C ~ +70°C
			3842B	
UC3842BVD1R2G-TUDI	SOP8	Tape,Reel,4000	UC3842BV	-40° to +105°C
			3842B	
UC3843BD1R2G-TUDI	SOP8	Tape,Reel,4000	UC3843B	0°C ~ +70°C
			3843B	
UC3843BVD1R2G-TUDI	SOP8	Tape,Reel,4000	UC3843BV	-40° to +105°C
			3843B	
UC3844BD1R2G-TUDI	SOP8	Tape,Reel,4000	UC3844B	0°C ~ +70°C
			3844B	
UC3844BVD1R2G-TUDI	SOP8	Tape,Reel,4000	UC3844BV	-40° to +105°C
			3844B	
UC3845BD1R2G-TUDI	SOP8	Tape,Reel,4000	UC3845B	0°C ~ +70°C
			3845B	
UC3845BVD1R2G-TUDI	SOP8	Tape,Reel,4000	UC3845BV	-40° to +105°C
			3845B	

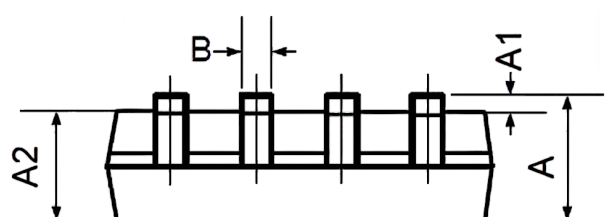
Revision history

	Date	Revision	Page
V1.0	2021/8	New	1-11
V1.1	2024/1	Update model and PDF template	1-14

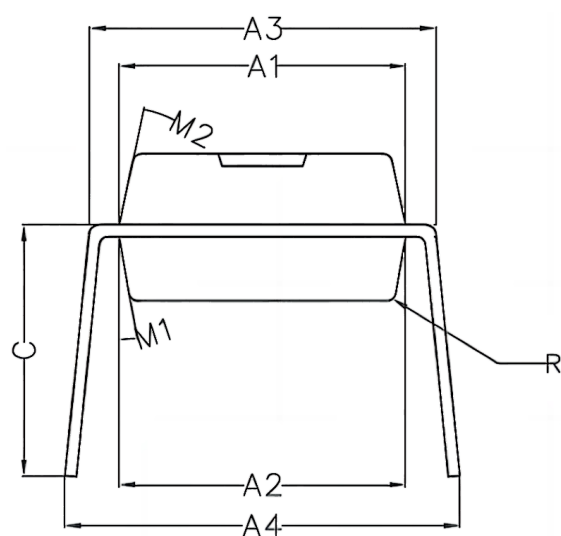
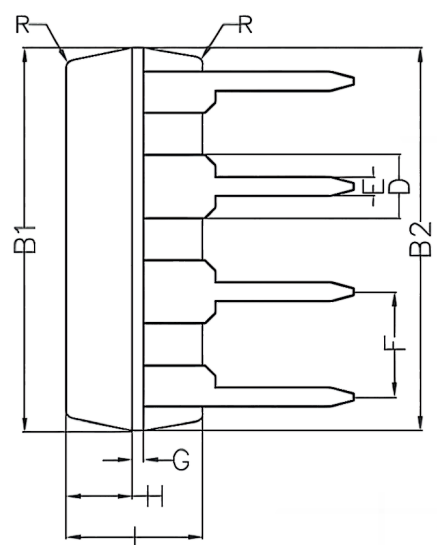
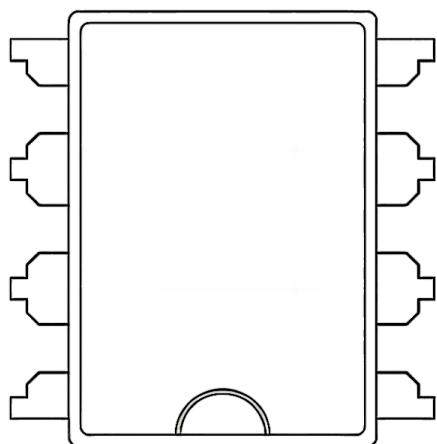
Package SOP8



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	1.350	1.750	0.053	0.069
A1	0.100	0.250	0.004	0.010
A2	1.350	1.550	0.053	0.061
B	0.330	0.510	0.013	0.020
C	0.190	0.250	0.007	0.010
D	4.780	5.000	0.188	0.197
E	3.800	4.000	0.150	0.157
E1	5.800	6.300	0.228	0.248
e	1.270TYP		0.050TYP	
L	0.400	1.270	0.016	0.050
θ	0°	8°	0°	8°



Package DIP8



Symbol	Min	Non	Max
A1	6.28	6.33	6.38
A2	6.33	6.38	6.43
A3	7.52	7.62	7.72
A4	7.80	8.40	9.00
B1	9.15	9.20	9.25
B2	9.20	9.25	9.30
C		5.57	
D		1.52	
E	0.43	0.45	0.47
F		2.54	
G		0.25	
H	1.54	1.59	1.64
I	3.22	3.27	3.32
R		0.20	
M1	9°	10°	11°
M2	11°	12°	13°



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