

Synchronous Step-Up DC/DC Converter with PFM Control

CE8401 Series

INTRODUCTION

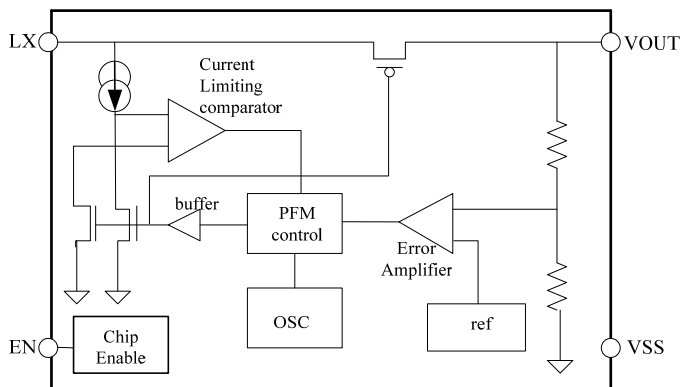
The CE8401 Series is a Synchronous step-up DC/DC Converter with PFM Control.

With the CE8401 Series, a step-up switching DC/DC converter can be configured by using an external coil, capacitor. The built-in MOSFET is turned off by a protection circuit when the voltage at the LX pin exceeds the limit to prevent it from being damaged.

APPLICATIONS

- Digital cameras
- Electronic notebooks and PDAs
- Portable CD/MD players

BLOCK DIAGRAM



FEATURES

- External parts: Coil, capacitor
- Output voltage: Settable to between 1.8V to 5.5 V in 0.1 V steps
- Maximum Oscillation frequency: 300KHz
- Accuracy of $\pm 2\%$
- High efficiency: 95%

- Cameras, video equipment,
- Communications equipment
- Power supply for microcomputers

ORDER INFORMATION

CE8401①②③④

DESIGNATOR	SYMBOL	DESCRIPTION
①	A	Standard LX
	B	With shutdown, LX
②③	Integer	Output Voltage (1.8~5.5) e.g.: 3.0V=②:3; ③:0
④	M	Package: SOT-23-3/5
	MB	Package: SOT-23
	P	Package: SOT-89
	T	Package: TO92

■ PIN CONFIGURATION

SOT-23
SOT-23-3

Top view

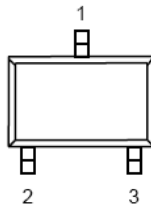


Table 1 CE8401A Series (SOT-23-3/SOT-23 PKG)

PIN NO.	PIN NAME	FUNCTION
1	V_{OUT}	Output voltage pin
2	V_{SS}	GND pin
3	LX	External inductor connection pin

SOT-23-5

Top view

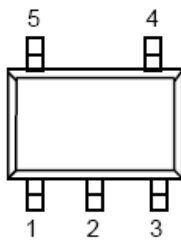


Table 2 CE8401B Series (SOT-23-5 PKG)

PIN NO.	PIN NAME	FUNCTION
1	EN	Shutdown pin “H”: Normal operation “L”: Step-up stopped
2	V_{OUT}	Output voltage pin
3	NC	(N.C.)
4	V_{SS}	GND pin
5	LX	External inductor connection pin

SOT-89-3

Top view

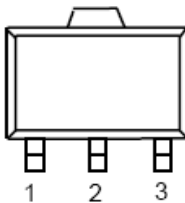


Table 3 CE8401A Series (SOT-89-3 PKG)

PIN NO.	PIN NAME	FUNCTION
1	V_{SS}	GND pin
2	V_{OUT}	Output voltage pin
3	LX	External inductor connection pin

TO-92

Bottom view

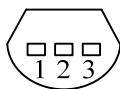


Table 4 CE8401A Series (TO-92 PKG)

PIN NO.	PIN NAME	FUNCTION
1	V_{SS}	GND pin
2	V_{OUT}	Output voltage pin
3	LX	External inductor connection pin

■ ABSOLUTE MAXIMUM RATINGS

(Unless otherwise specified, Ta=25°C)

PARAMETER		SYMBOL	RATINGS	UNITS
V _{OUT} Pin Voltage		V _{OUT}	V _{SS} -0.3 ~ V _{SS} +8	V
EN Pin Voltage		EN	V _{SS} -0.3 ~ V _{SS} +8	V
LX Pin Voltage		V _{LX}	V _{SS} -0.3 ~ V _{SS} +8	V
LX Pin Current		I _{LX}	1000	mA
Power Dissipation	SOT-23	PD	250	mW
	SOT23-3/SOT-23-5		250	mW
	SOT-89-3		500	mW
	TO-92		500	mW
Operating Temperature		T _{opr}	-40 ~ +85	°C
Storage Temperature		T _{stg}	-40 ~ +125	°C
Soldering Temperature & Time		T _{solder}	260°C, 10s	

■ ELECTRICAL CHARACTERISTICS

(Unless otherwise specified, Ta=25°C)

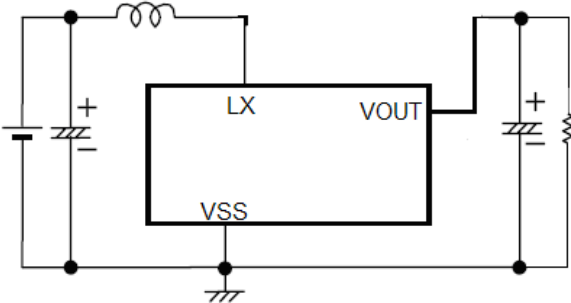
PARAMETER	SYMBOL	CONDITIONS	MIN	TYP	MAX	UNITS
Output Voltage	V _{OUT}	—	V _{OUT(S)} ×0.98	V _{OUT}	V _{OUT(S)} ×1.02	V
Input Voltage	V _{IN}	V _{OUT} ≤ 3.6 V	0.9	—	5	V
		V _{OUT} > 3.6 V	1.8	—	5	V
Operation Start Voltage	V _{ST1}	I _{OUT} = 1 mA	—	—	0.9	V
Input Current At No Load	I _{SS}	V _{IN} =1.8V, V _{OUT} =3.0V	—	15	-	μA
Current Consumption 2	I _{SS2}	V _{OUT} =V _{OUT} +0.5 V	—	6	10	μA
Current Consumption During Shutdown	I _{SSS}	V _{EN} = 0 V	—	—	1.0	μA
Maximum Oscillation Frequency	f _{OSC}	V _{OUT} = 0.95×V _{OUT} , measure waveform at LX pin	—	300	—	KHz
Duty Ratio 1	Duty1	V _{OUT} = 0.95×V _{OUT} , measure waveform at LX pin	70	78	85	%
Efficiency	EFFI	—	—	90	—	%
Shutdown Pin Input Voltage	V _{SH}	V _{OUT} =0.95×V _{OUT} , judge oscillation at LX pin	0.75	—	—	V
	V _{SL1}	V _{OUT} = 0.95×V _{OUT} , judge stop at LX pin	—	—	0.3	V
Shutdown Pin Input Current	I _{SH}	V _{EN} =6V	-0.1	—	0.1	μA
	I _{SL}	V _{EN} =0V	-0.1	—	0.1	μA

Remark: V_{OUT(S)} specified above is the set output voltage value, and V_{OUT} is the typical value of the actual output voltage.

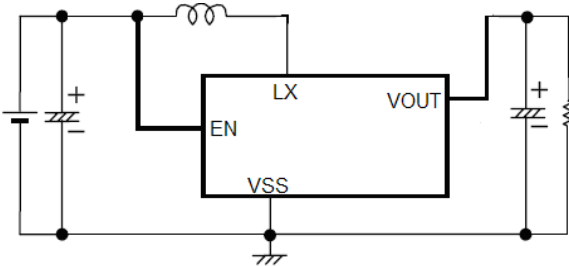
■ STANDARD CIRCUITS

Component: Inductor: 47uH(Sumida)
Capacitor: 47uF/16V(Tantalum)

1、CE8401A:



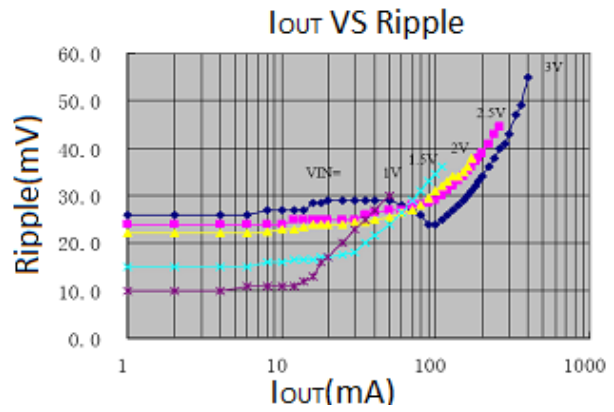
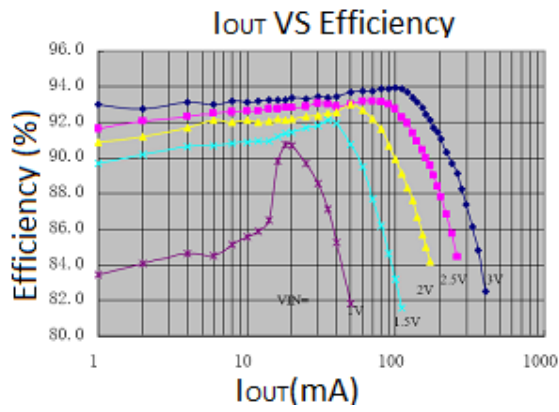
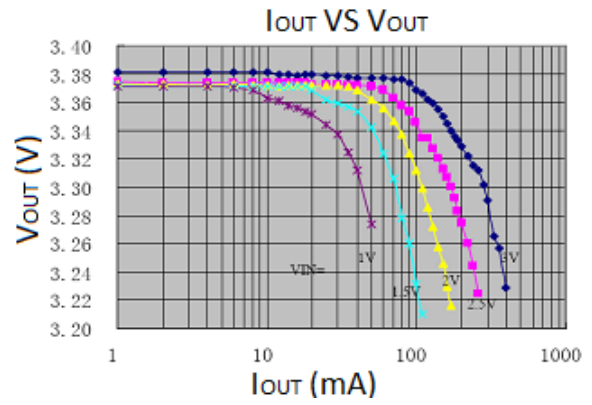
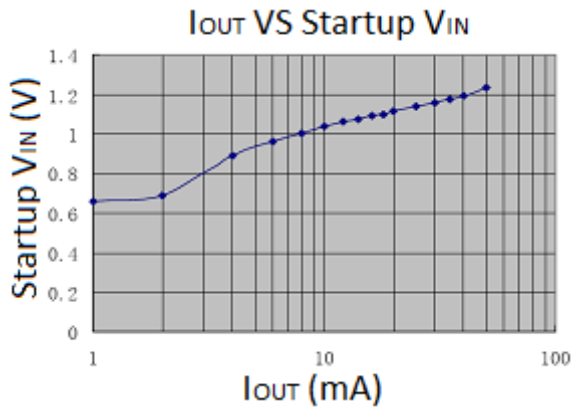
2、CE8401B:



■ TYPICAL PERFORMANCE CHARACTERISTICS

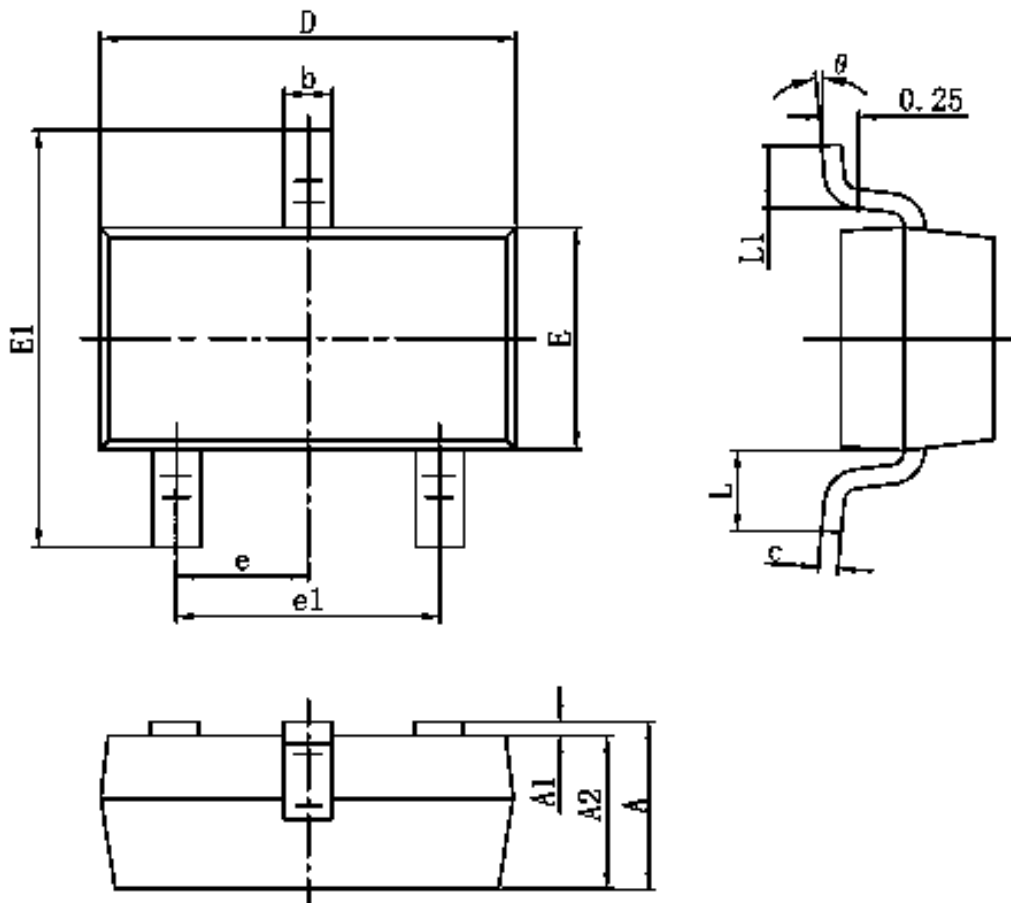
$C_{IN}=C_{OUT}=100\mu F$

$L=47\mu H$



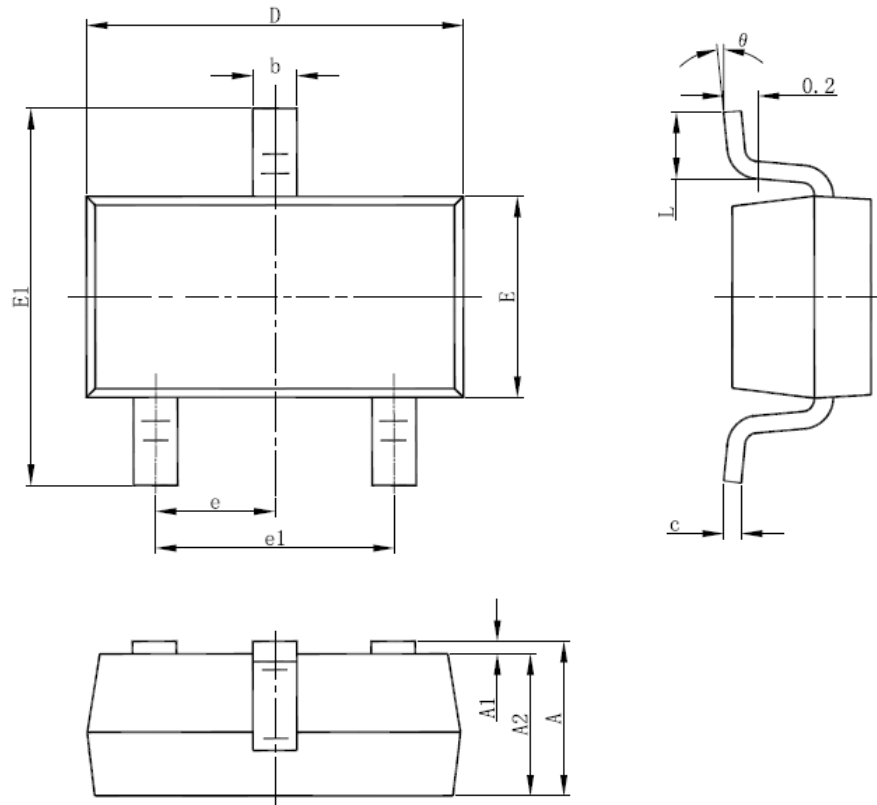
■ PACKAGE INFORMATION

● SOT-23



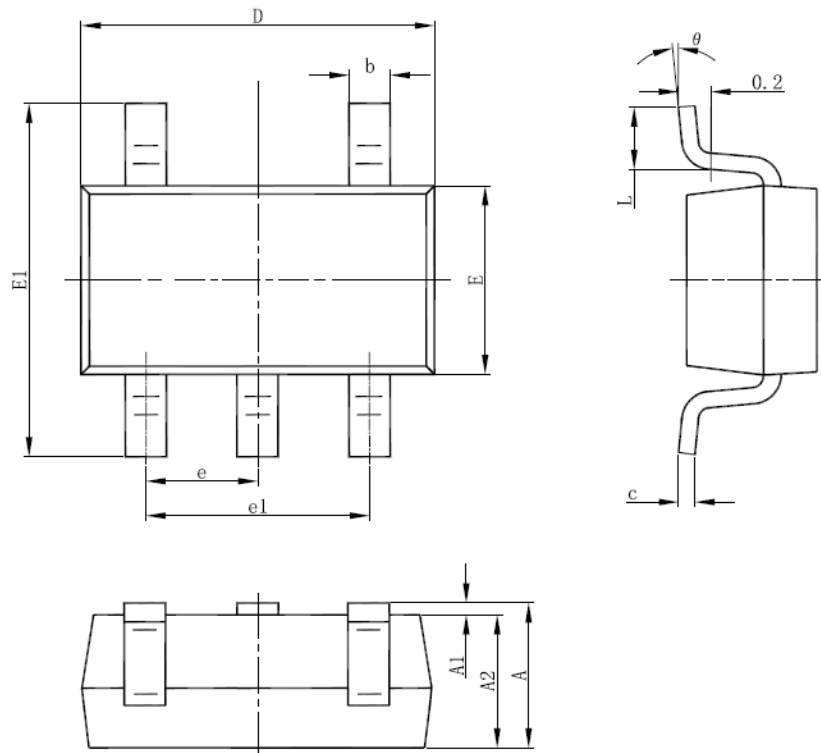
Symbol	Dimensions in Millimeters		Dimensions in Inches	
	Min.	Max.	Min.	Max.
A	0.900	1.150	0.035	0.045
A1	0.000	0.100	0.000	0.004
A2	0.900	1.050	0.035	0.041
b	0.300	0.500	0.012	0.020
c	0.080	0.150	0.003	0.006
D	2.800	3.000	0.110	0.118
E	1.200	1.400	0.047	0.055
E1	2.250	2.550	0.089	0.100
e	0.950 TYP.		0.037 TYP.	
e1	1.800	2.000	0.071	0.079
L	0.550 REF.		0.022 REF.	
L1	0.300	0.500	0.012	0.020
θ	0°	8°	0°	8°

• SOT-23-3



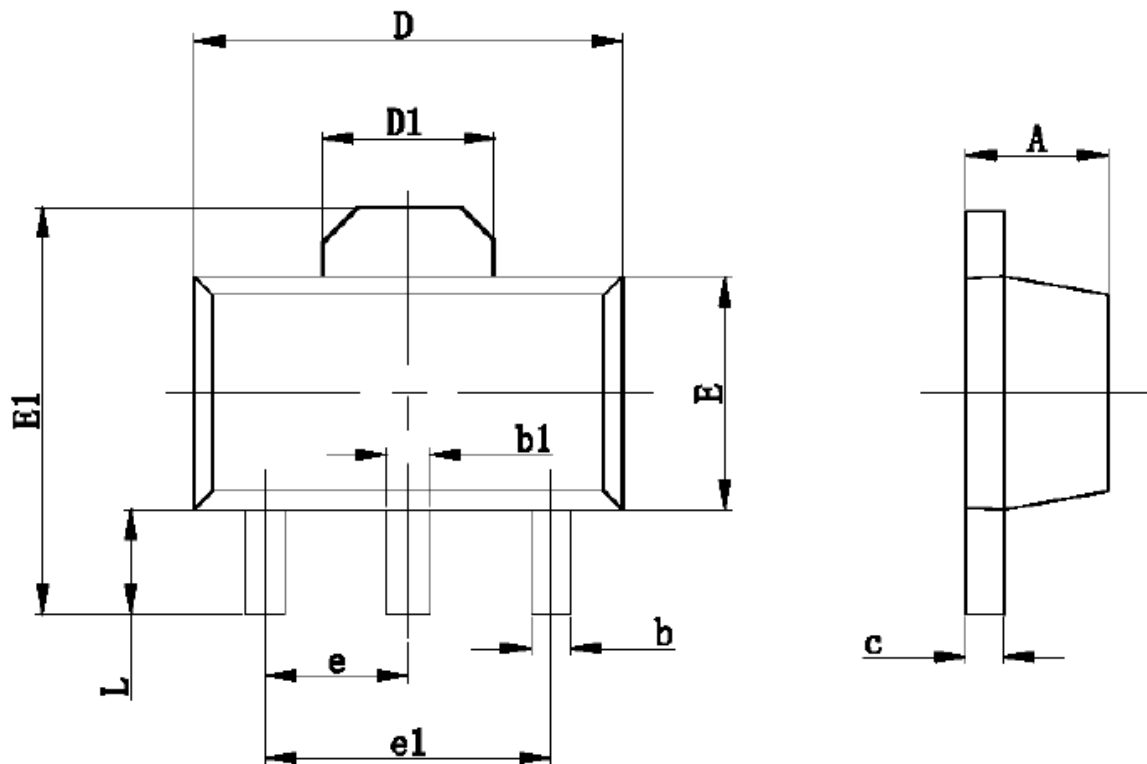
Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	1.050	1.250	0.041	0.049
A1	0.000	0.100	0.000	0.004
A2	1.050	1.150	0.041	0.045
b	0.300	0.500	0.012	0.020
c	0.100	0.200	0.004	0.008
D	2.820	3.020	0.111	0.119
E	1.500	1.700	0.059	0.067
E1	2.650	2.950	0.104	0.116
e	0.950(BSC)		0.037(BSC)	
e1	1.800	2.000	0.071	0.079
L	0.300	0.600	0.012	0.024
θ	0°	8°	0°	8°

• SOT-23-5



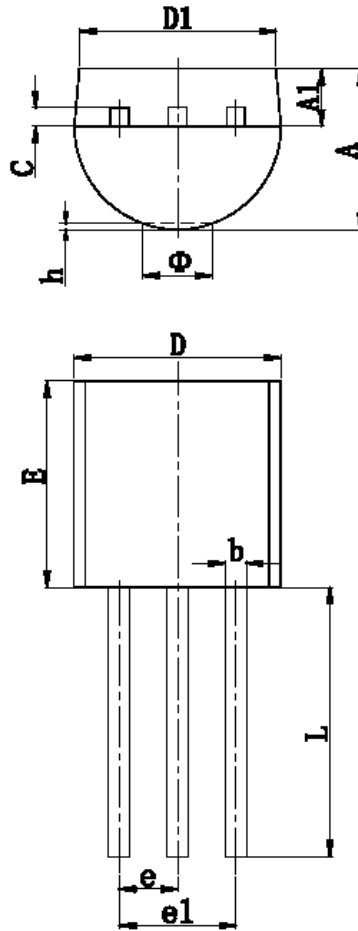
Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	1.050	1.250	0.041	0.049
A1	0.000	0.100	0.000	0.004
A2	1.050	1.150	0.041	0.045
b	0.300	0.500	0.012	0.020
c	0.100	0.200	0.004	0.008
D	2.820	3.020	0.111	0.119
E	1.500	1.700	0.059	0.067
E1	2.650	2.950	0.104	0.116
e	0.950(BSC)		0.037(BSC)	
e1	1.800	2.000	0.071	0.079
L	0.300	0.600	0.012	0.024
θ	0°	8°	0°	8°

• SOT-89-3



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	1.400	1.600	0.055	0.063
b	0.320	0.520	0.013	0.197
b1	0.400	0.580	0.016	0.023
c	0.350	0.440	0.014	0.017
D	4.400	4.600	0.173	0.181
D1	1.550 REF		0.061 REF	
E	2.300	2.600	0.091	0.102
E1	3.940	4.250	0.155	0.167
e	1.500 TYP		0.060 TYP	
e1	3.000 TYP		0.118 TYP	
L	0.900	1.200	0.035	0.047

• TO-92



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	3.300	3.700	0.130	0.146
A1	1.100	1.400	0.043	0.055
b	0.380	0.550	0.015	0.022
c	0.360	0.510	0.014	0.020
D	4.400	4.700	0.173	0.185
D1	3.430		0.135	
E	4.300	4.700	0.169	0.185
e	1.270 TYP		0.050 TYP	
e1	2.440	2.640	0.096	0.104
L	14.100	14.500	0.555	0.571
Φ		1.600		0.063
h	0.000	0.380	0.000	0.015

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