# Integrated Dual LDO And Single Step Down DC-DC

## ECL5066

## General Description

The ECL5066 is a complex power management, which can provide two roads of low-noise high-speed LDOs and High efficiency reached 95% of the DC-DC buck. As the use of CMOS process realization of the work of the chip consumes very little current, the internal use of low-resistance, makes the LDO's output current of up to 300mA, DC-DC load current of up to 800mA. A built-in low on-resistance transistor provides a low dropout voltage and large output current, a built-in overcurrent protector prevents the load current from exceeding the current capacitance of the output transistor, and a built-in thermal shutdown circuit prevents damage caused by the heat.Small DFN3×3 package realize high-density mounting.

## Features

◆Highly accurate : LDO : ± 2%; DC-DC :± 2.5%
◆Output current range : LDO:300mA; DC-DC:800mA
◆High ripple rejection : 70dB@(1KHz,50mA)
◆Low power consumption　:150$\mu$A (TYP.)
◆Shutdown current : less than 0.1$\mu$A
◆Internal protector : current limiter 、short protector and  thermal shutdown protector
◆Small package : DFN3×3

## Applications

◆mobile  phones  and  other  handheld  electronic products
◆DVD
◆相機、攝像機
◆Battery powered equipment

## Package
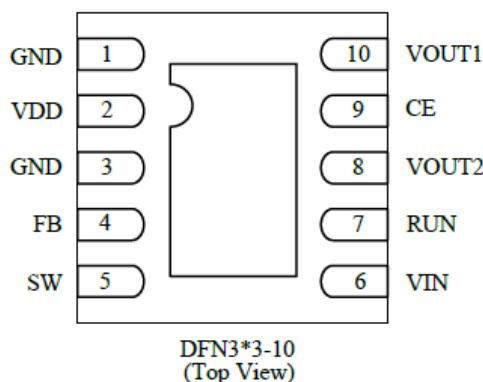


DFN3*3-10
(Top View)

## Ordering Information



ECL5066 XX X G R

R：Tape & Reel
G：Green

Output Voltage：
18=1.8V
　　　：
33=3.3V

Package Type：
F：DFN3*3

## Marking Rule
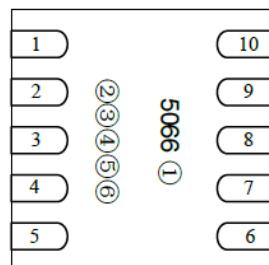
```
┌─────────────────────────┐
│  ( 1 )          ( 10 )  │
│  ( 2 )   ②③④⑤⑥   ( 9 )  │
│  ( 3 )   5066     ( 8 )  │
│  ( 4 )    ①       ( 7 )  │
│  ( 5 )          ( 6 )   │
└─────────────────────────┘
        DFN3*3-10
        (Top View)
```

① Represents the product lot

Symbol a-z,A-Z(except G，I，J，O，Q，W)

② ③ Represents the output voltage1 of LDO

33 represents 3.3V，18 represents 1.8V

④⑤ Represents the output voltage2 of LDO

33 represents 3.3V，18 represents 1.8V

⑥ Represents the output voltage of DC-DC

| Symbol | Output Voltage(V) | Symbol | Output Voltage(V) | Symbol | Output Voltage(V) | Symbol | Output Voltage(V) |
|--------|-------------------|--------|-------------------|--------|-------------------|--------|-------------------|
| A | Adjustable | N | 1.8 | a | 2.8 | n | 3.8 |
| B | 0.9 | P | 1.9 | b | 2.9 | p | 3.9 |
| C | 1.0 | R | 2.0 | c | 3.0 | r | 4.0 |
| D | 1.1 | S | 2.1 | d | 3.1 | s | 4.1 |
| E | 1.2 | T | 2.2 | e | 3.2 | t | 4.2 |
| F | 1.3 | U | 2.3 | f | 3.3 | u | 4.3 |
| H | 1.4 | V | 2.4 | h | 3.4 | v | 4.4 |
| K | 1.5 | X | 2.5 | k | 3.5 | x | 4.5 |
| L | 1.6 | Y | 2.6 | l | 3.6 | y | 4.6 |
| M | 1.7 | Z | 2.7 | m | 3.7 | z | 4.7 |

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## Pin Assignment

| Pin Number | Pin Name | Function Description |
|:---:|:---:|:---:|
| 1 | LGND | Ground of LDO |
| 9 | CE | Enable of LDO，high active |
| 2 | VDD | Supply Power of LDO |
| 4 | FB | Feedback of DC-DC |
| 7 | RUN | Enable of DC-DC, high active |
| 6 | VIN | Input of DC-DC |
| 5 | SW | Output of DC-DC |
| 3 | DGND | Ground of DC-DC |
| 10 | VOUT1 | Output of LDO1( Low output voltage terminal) |
| 8 | VOUT2 | Output of LDO2( high output voltage terminal) |

## Typical Application Circuit



## Function Block Diagram

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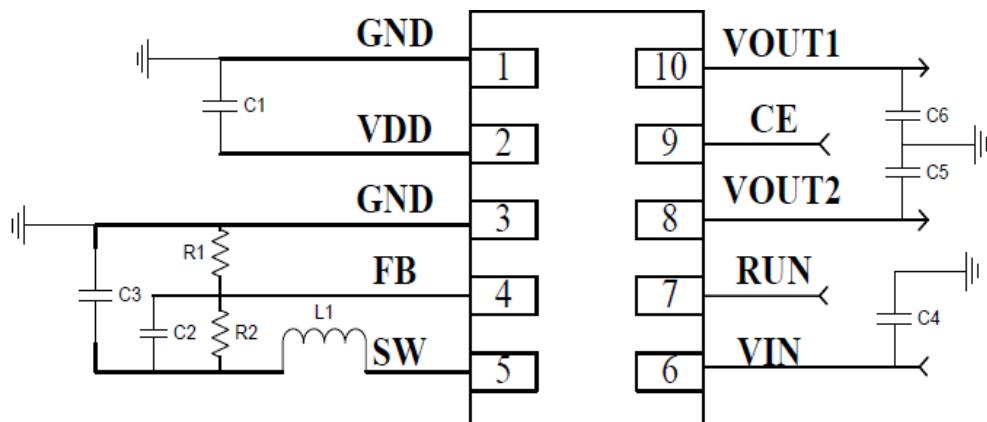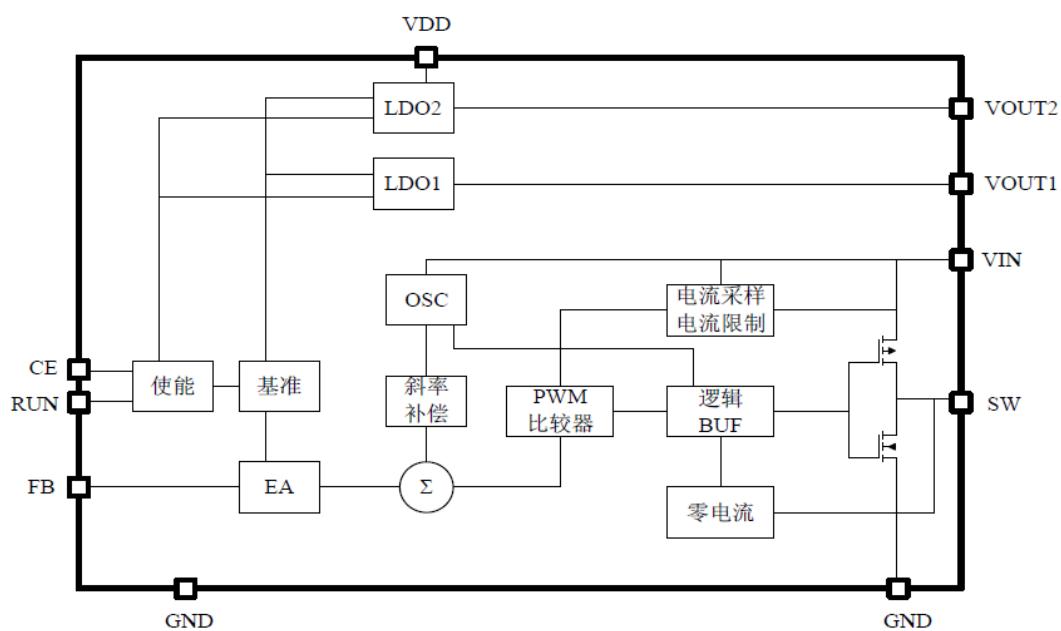
## Absolute Maximum Ratings

| Parameter | Symbol | Maximum Rating | | Unit |
|---|---|---|---|---|
| Input Voltage | VIN | VSS-0.3～VSS+6 | | V |
| | VON/OFF | VSS-0.3～VIN+0.3 | | |
| Output voltage | VOUT | VSS-0.3～VIN+0.3 | | |
| Power Dissipation | PD | DFN3*3 | 1.2 | W |
| Operating Ambient Temperature | Topr | -40～+85 | | °C |
| Storage Temperature | Tstg | -40～+125 | | |

Caution:

The absolute maximum ratings are rated values exceeding which the product could suffer physical damage.These values must therefore not be exceeded under any conditions.

## Electrical Characteristics

**LDO electrical characteristics**

| Parameter | Symbol | Condition | Min | Typ | Max | Unit | Test Circuit |
|---|---|---|---|---|---|---|---|
| Output Voltage | VOUT(E) | VIN =VOUT(S)+1.0 V, IOUT=30 mA | VOUT(S) ×0.98 | VOUT(S) | VOUT(S) ×1.02 | V | 1 |
| Output Current | IOUT | VIN≥VOUT(S)+1.0 V | 300 | — | — | mA | 1 |
| Dropout Voltage | Vdrop | IOUT=50 mA | — | 0.06 | 0.10 | V | |
| | | IOUT=100 mA | — | 0.15 | 0.20 | | |
| Line Regulations | $\dfrac{\Delta VOUT1}{\Delta VIN*VOUT}$ | VOUT(S)+0.5 V ≤VIN≤8 V,IOUT=10 mA | — | 0.01 | 0.2 | %/V | 1 |
| Load Regulation | $\Delta VOUT2$ | VIN=VOUT(S)+1.0 V 1.0 mA ≤IOUT ≤100 mA | — | 15 | 50 | mV | |
| Output Voltage Temperature Characteristics | $\dfrac{\Delta VOUT}{\Delta Ta*VOUT}$ | VIN=VOUT(S)+1.0 V, IOUT=10 mA -40°C ≤ Ta ≤85°C | — | ±100 | — | ppm /℃ | |
| Supply Current | ISS1 | VIN=VOUT(S)+1.0 V | — | 70 | 110 | µA | |
| Shutdown current | ISTB | VIN=VEN=VOUT(T)+1V ， VEN=VSS | — | 0.01 | 1 | µA | |
| Input Voltage | VIN | ―― | 2.0 | — | 10 | V | - |
| Ripple-Rejection | \|PSRR\| | VIN=VOUT(S)+1.0 V，f=1kHz Vrip=0.5 Vrms, IOUT=30 mA | — | 70 | — | dB | 2 |
| Short-circuit Current | Ishort | VIN=VOUT(S)+1.0 V,VCE on VOUT=gnd | — | 30 | — | mA | 1 |
| Current limit | Ilim | VIN=VEN=VOUT(T)+1V | - | 400 | - | mA | 1 |
| CE "High" Voltage | VCEH | | 1.3 | | VIN | V | |
| CE "Low" Voltage | VCEL | | | | 0.25 | V | |
| CE "High"Current | ICEH | VIN=VCE=VOUT(T)+1.0V | -0.1 | | 0.1 | µA | |
| CE "Low" Current | ICEH | VIN= VOUT(T)+1.0V, VCE=VSS | -0.1 | | 0.1 | µA | |

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**DC-DC electrical characteristics**

VIN=3.6V ,CIN=4.7uF ,CL=10uF ,L=3.3uH          (TA = 25°C, unless otherwise specified)

| Parameter | Symbol | Conditions | Min | Typ | Max | Units | Test Circuit |
|---|---|---|---|---|---|---|---|
| Feedback voltage | VFB | - | 0.59 | 0.6 | 0.61 | V | 1 |
| Input voltage range | VIN | | 2 | - | 6 | | |
| Output voltage ripple | △VOUT | ILMAX=600mA | | 5 | | mV | |
| Efficiency | EFFI | VIN=2.7V;IL=60mA | — | 92 | — | ％ | |
| Minimum CE voltage | VCEH | - | 0.8 | 1 | - | V | |
| Shutdown current | ISTB | VCE=0V、VIN=3.6V | 0 | - | 1 | μA | 2 |
| Supply current | IDD1 | VFB=0.6V*0.9 | - | 150 | - | μA | |
| Quiescent current | IDD2 | VFB=0.6V*1.1 | — | 40 | - | | |
| Output current Limit | ILIM | - | - | 1200 | - | mA | |
| PFM switching point | IL | | | 40 | | mA | |
| Oscillation frequency | FOSC | | - | 1.2 | - | MHz | 2 |
| Maximum duty circle | MAXDTY | - | 100 | - | - | % | |

# Test Circuit

**Circuit 1**



**Circuit 2**



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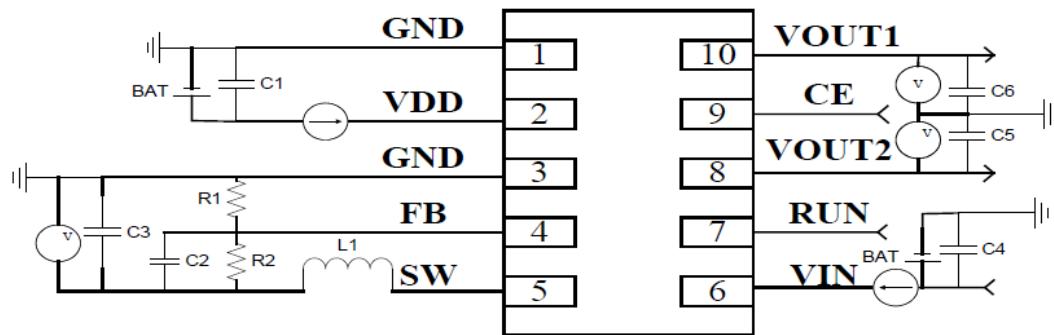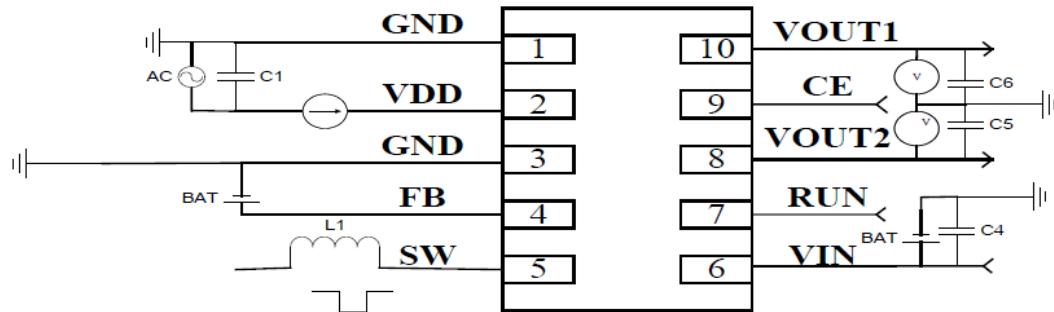
## Typical Performance Characteristics

**DC-DC   electrical characteristics**

### Output voltage-output current



VIN=3.6V,CIN=4.7uF,CL=10uF,L=3.3uH
TOP=25°C

### Input voltage-output voltage



VIN=3.6V,CIN=4.7uF,CL=10uF,L=3.3uH
TOP=25°C

### Temperature characteristics



VIN=3.6V,CIN=4.7uF,CL=10uF,L=3.3uH
IOUT=30mA

### Efficiency



L=3.3uH,CIN=4.7uF,CL=10uF,Topr=25℃

**LDO electrical characteristics**

### Output voltage-output current



VIN=4.0V, CIN=1uF (ceramic), CL=1uF (ceramic)
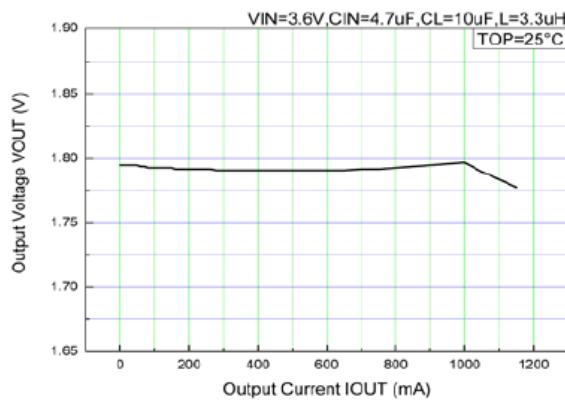
### Input voltage-output voltage



Topr=25°C, CIN=1uF (ceramic), CL=1uF (ceramic)

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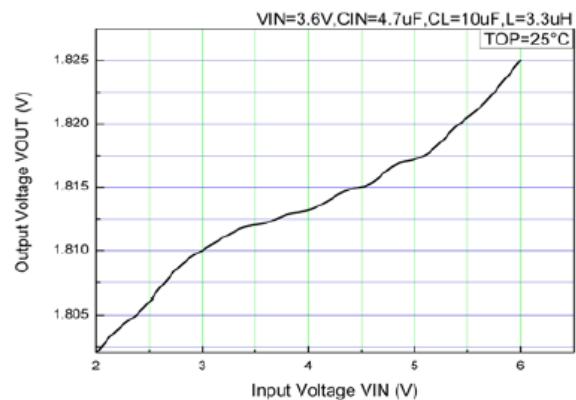
### Dropout voltage and output current
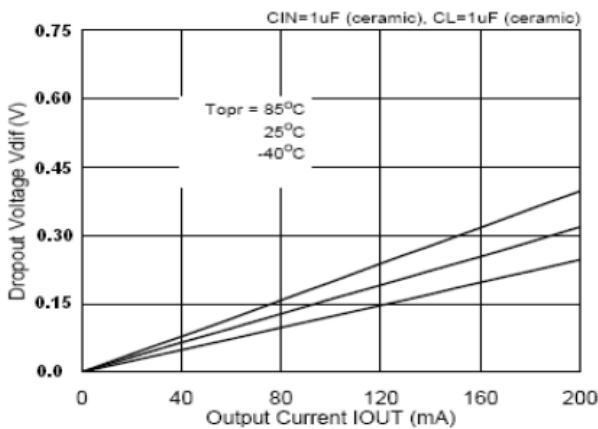


### Dropout voltage and output voltage
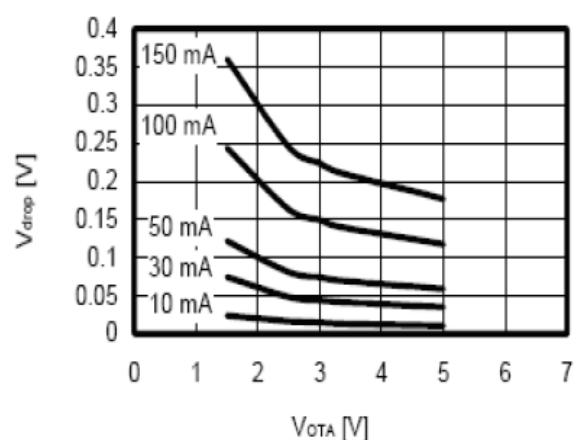


### Output voltage and temperature
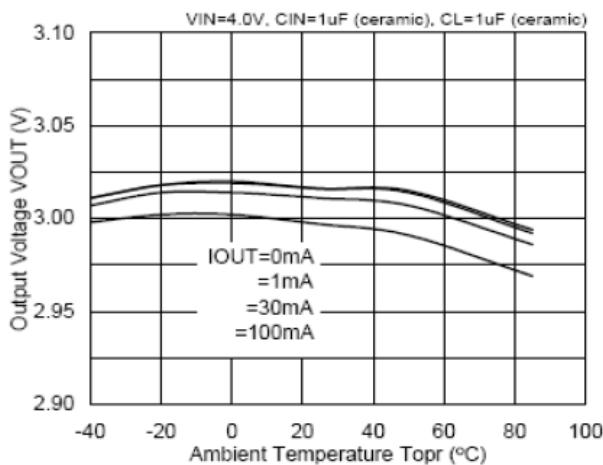


### PSRR
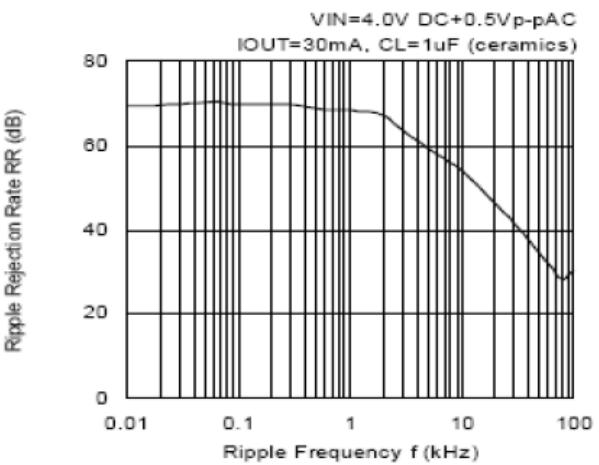


### Input transient response characteristics
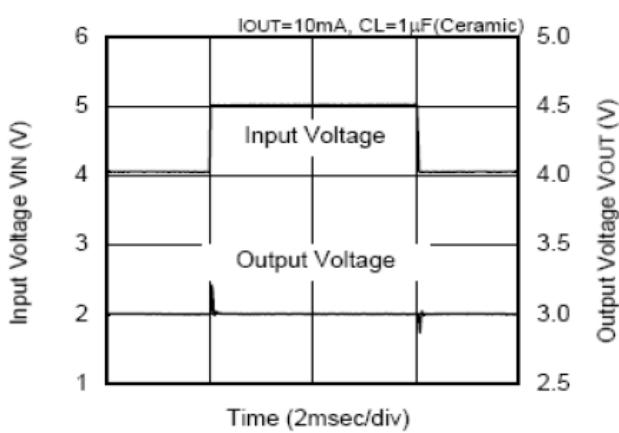


### Load-response characteristics of the transitional type



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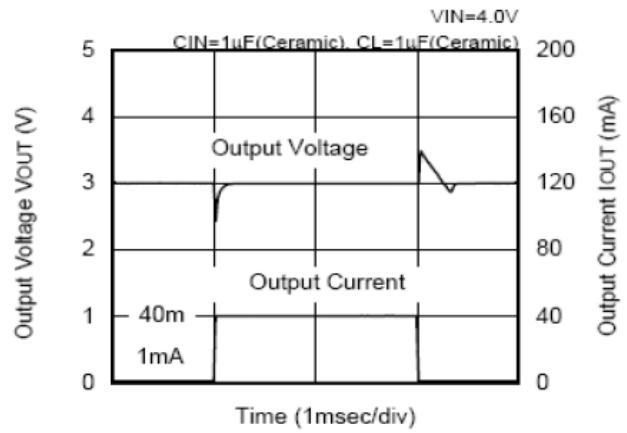
## Package Information

**DFN3*3**
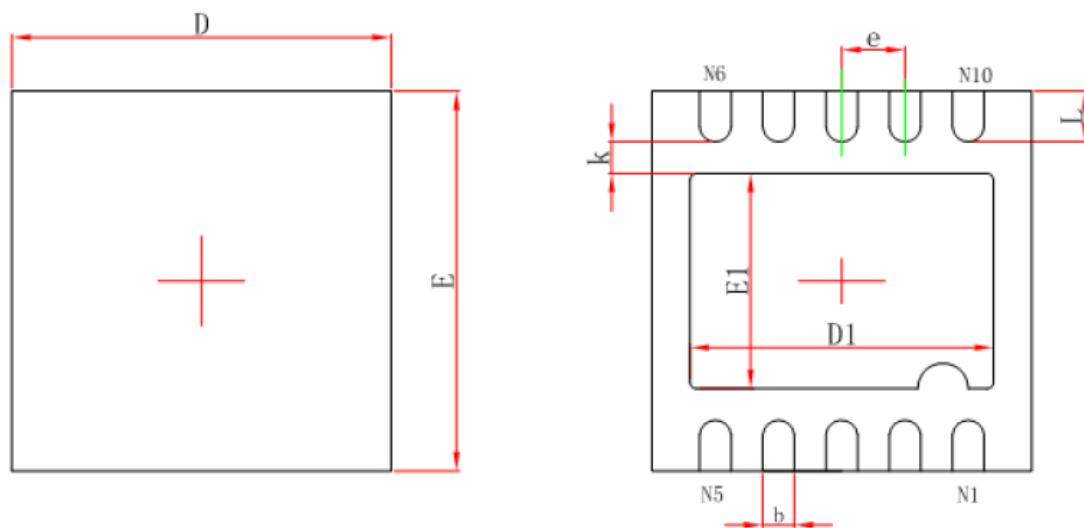


Top View

Bottom View
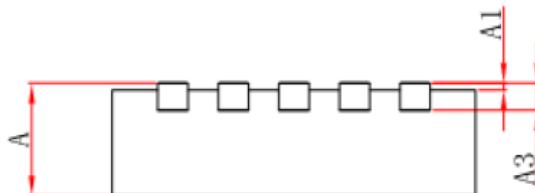
Side View

| Symbol | Dimensions In Millimeters | | Dimensions In Inches | |
|--------|---------------------------|--------------|----------------------|----------------|
|        | Min. | Max. | Min. | Max. |
| A | 0.700/0.800 | 0.800/0.900 | 0.028/0.031 | 0.031/0.035 |
| A1 | 0.000 | 0.050 | 0.000 | 0.002 |
| A3 | 0.203REF. | | 0.008REF. | |
| D | 2.900 | 3.100 | 0.114 | 0.122 |
| E | 2.900 | 3.100 | 0.114 | 0.122 |
| D1 | 2.300 | 2.500 | 0.091 | 0.098 |
| E1 | 1.600 | 1.800 | 0.063 | 0.071 |
| k | 0.200MIN. | | 0.008MIN. | |
| b | 0.180 | 0.300 | 0.007 | 0.012 |
| e | 0.500TYP. | | 0.020TYP. | |
| L | 0.300 | 0.500 | 0.012 | 0.020 |

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