

# DD211

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**A DRIVER, CHARGE PUMP FOR HIGH  
FORWARD-VOLTAGE LEDS WITH LOW SUPPLY  
VOLTAGE (2.0V~3.3V)**



**SITI**

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## DD211

# A DRIVER, CHARGE PUMP FOR HIGH FORWARD-VOLTAGE LEDS WITH LOW SUPPLY VOLTAGE

## General Description

DD211 is designed specifically for driving a high forward-voltage LED as a light source with low supply voltage. Like a charge pump, DD211 doubles the supply voltage, but only requires one external component, a capacitor. The built-in oscillator generates a 75% duty-cycle and 350kHz-frequency clock. DD211 also consumes little power with CMOS integrated circuits. DD211 comes in a small die that makes packaging it within a LED module be easy. DD211's small package, SOT25 occupies only little area for portable device, such as a handset.

## Features

- Low supply voltage, 2.0V~3.3V
- Only one external component, a capacitor needed
- Built-in resistor to limit the output current
- Low quiescent supply current
- It is easy to package DD211 within a LED module

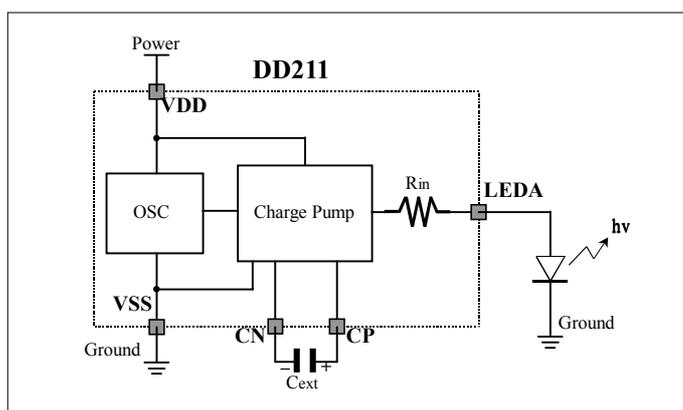
## Applications

- High forward-voltage LED Indicators' drivers
- High forward-voltage LED Back lighters for low-voltage wireless handsets

## Pad Descriptions

PAD NAME	DESCRIPTIONS
VDD	Power
VSS	Ground
CP	Positive Node of the External Capacitor
CN	Negative Node of the External Capacitor
LEDA	Anode of the External LED

## The Block Diagram and The Application Circuit



## Absolute Maximum Ratings (Unless otherwise noted, $T_A = 25\text{ }^\circ\text{C}$ )

Characteristic	Symbol	Rating	Unit
Supply Voltage	VDD - VSS	-0.5 ~ 3.6	V
Output Sourcing Current	IDD	100	mA
Operating Temperature Range	$T_{OPR}$	-40 ~ 85	$^\circ\text{C}$
Storage Temperature Range	$T_{STG}$	-55 ~ 150	$^\circ\text{C}$



### Recommended Operating Conditions

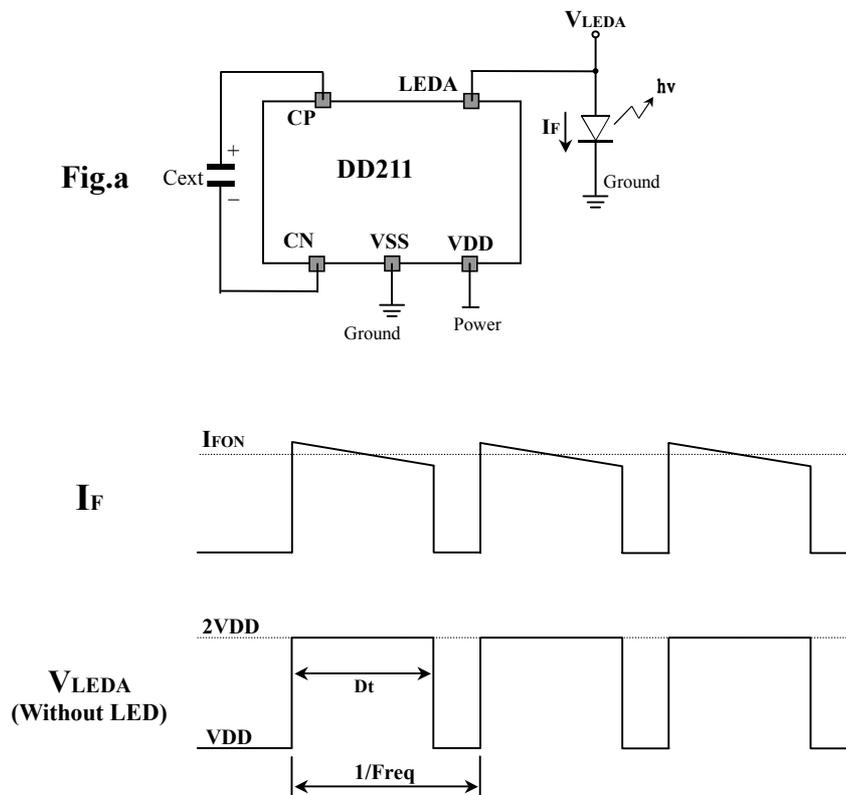
ITEM	SYMBOL	MIN.	TYP.	MAX.	UNIT
Supply Voltage	VDD - VSS	2.0	2.5	3.3	V
External Capacitance	Cext	-	0.10	-	uF

### Electrical Characteristics ( $T_A=25^{\circ}\text{C}$ , $V_{DD}=2.5\text{V}$ )

Characteristic	Symbols	Condition	Min.	Typ.	Max.	Unit
Operating Current	$I_{DD}$	No external LED, Cext=0.1uF	-	-	0.75	mA
Output Current for 'ON' Cycle	$I_{FON}$	$V_F$ of external LED=3.5V Cext=0.1uF	23	30	37	mA
Time-Average Output Current	$I_{FAVG}$	$V_F$ of external LED=3.5V Cext=0.1uF	17.25	22.5	27.75	mA
Output Voltage for 'ON' Cycle	$V_{LEDAON}$	No external LED, Cext=0.1uF	-	5.0	-	V
Output Voltage for 'OFF' Cycle	$V_{LEDAOFF}$	No external LED, Cext=0.1uF	-	2.5	-	V
Frequency of the Internal Oscillator	Freq	Cext=0.1uF	-	350	-	kHz
Duty Cycle of the Internal Oscillator	Dt	Cext=0.1uF	-	75	-	%

## Functional Descriptions

DD211 is designed to drive a high forward-voltage LED as a light source with low supply voltage. As Fig.a shown, when the power is on, DD211 will double the supply voltage to drive the external LED with 75% duty cycle. The built-in resistor of DD211 is used to limit the driving current.

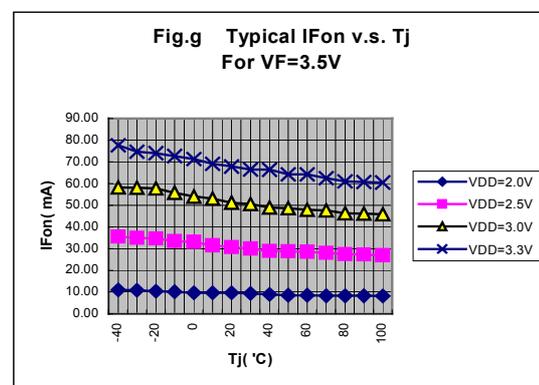
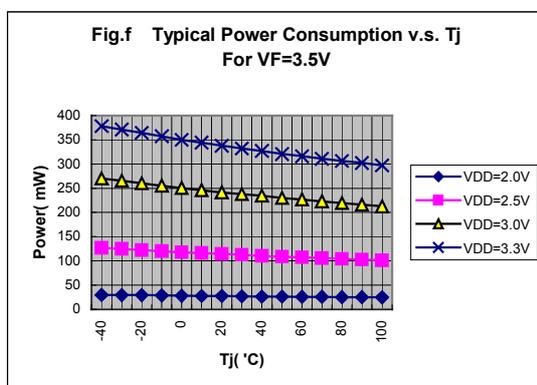
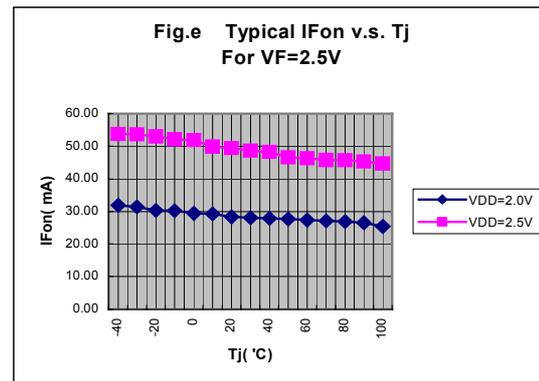
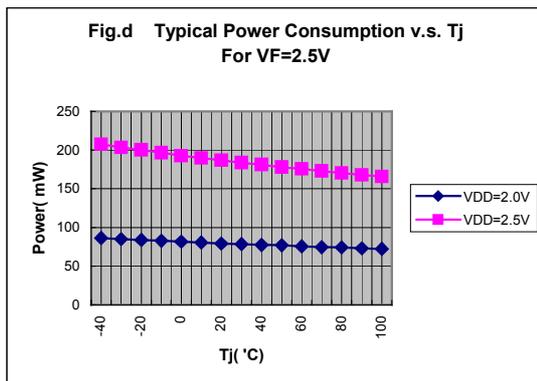
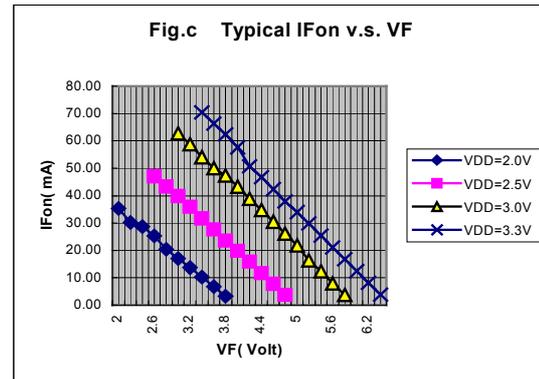
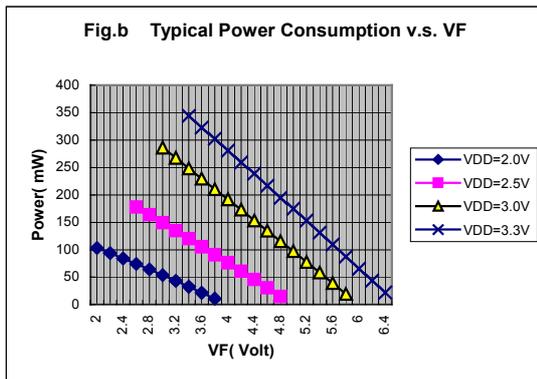


## Test Circuits

As Fig.a shown.

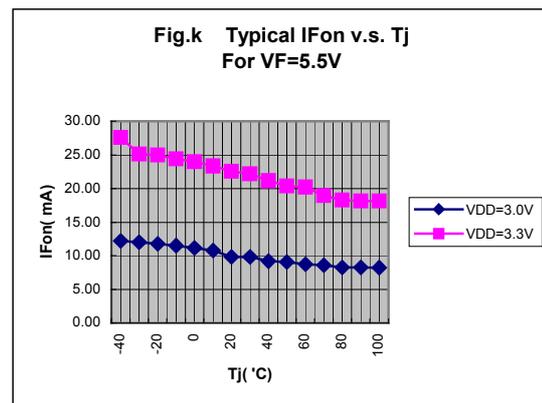
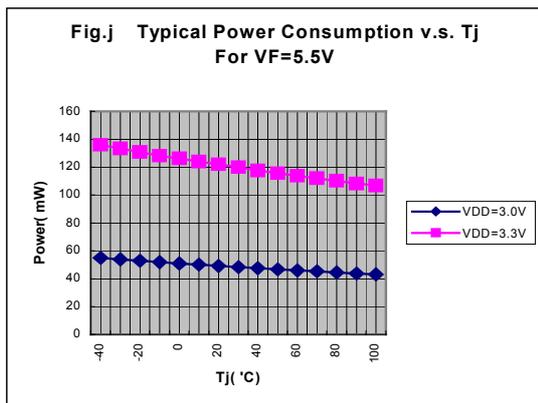
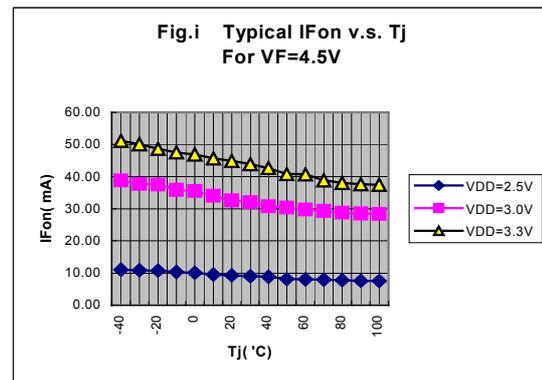
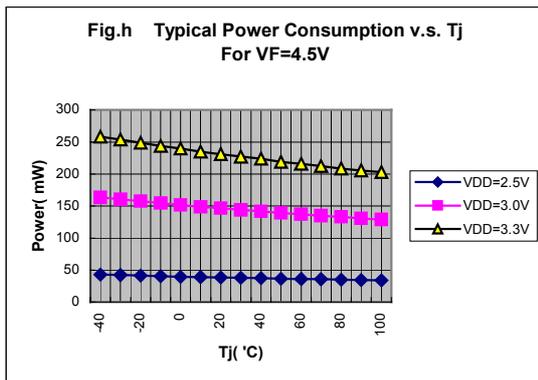
## Typical Operating Characteristics

(Typical Operation Circuit with  $C_{ext}=0.1\mu F$ ,  $T_A=25^\circ C$ , unless otherwise noted)



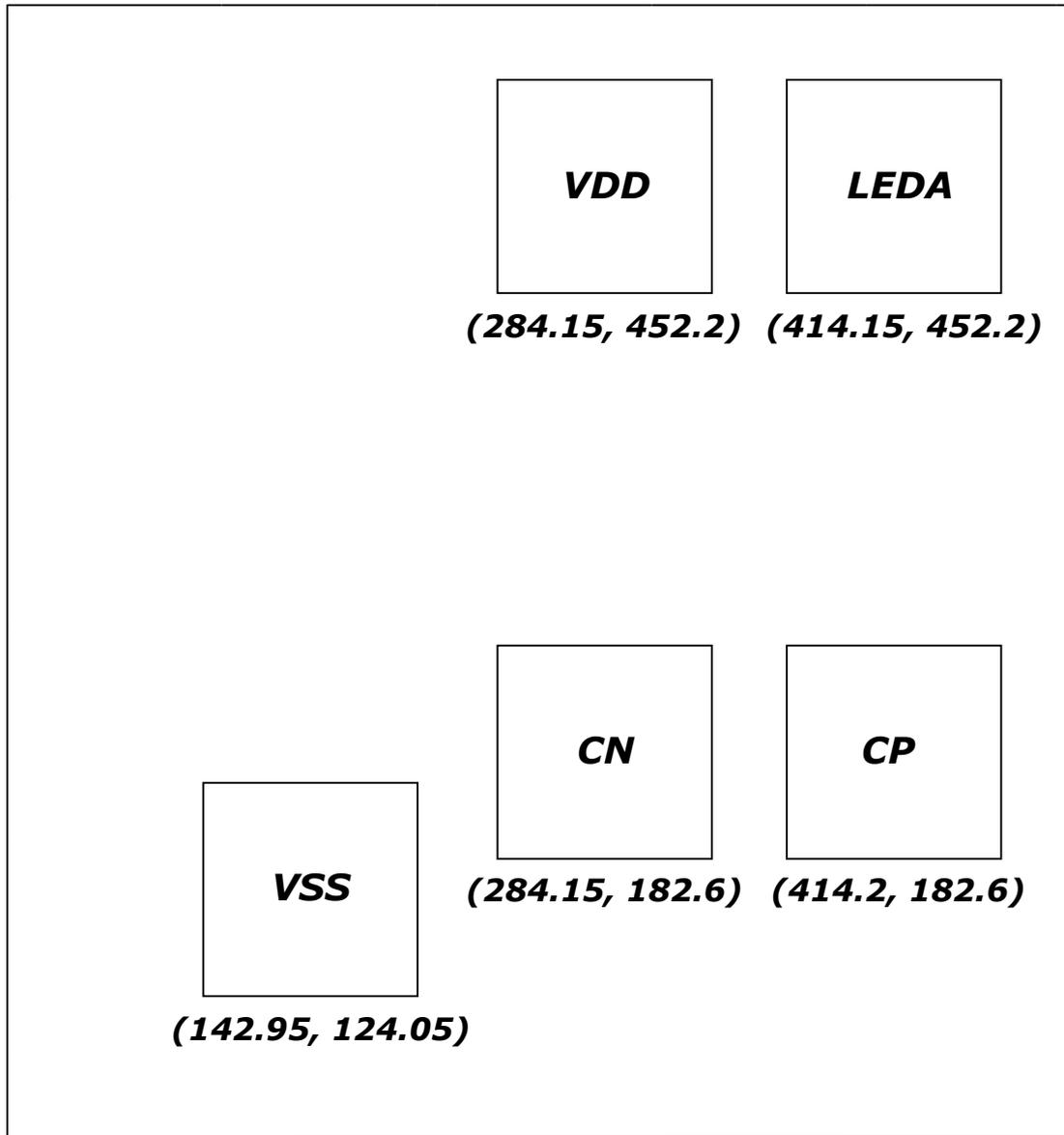
## Typical Operating Characteristics (Continued)

(Typical Operation Circuit with  $C_{ext}=0.1\mu F$ ,  $T_A=25\text{ }^\circ\text{C}$ , unless otherwise noted)



**DIE CONFIGURATION**

**(494.9, 532.9)**



**(0.0, 0.0)**

**Unit: um**

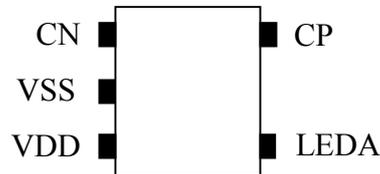
- Die Size: 494.9um \* 532.9um
- Width of Cut Line: 100um
- Die Thickness: 12mil(=300um)
- Pad Size: 100um \* 100um

\* **Note:** SiTI reserves the right to improve the device geometry and manufacturing processes without prior notice. Though these improvements may result in slight geometry changes, they will not affect die electrical limits, pad layouts.

## WAFER INFORMATION

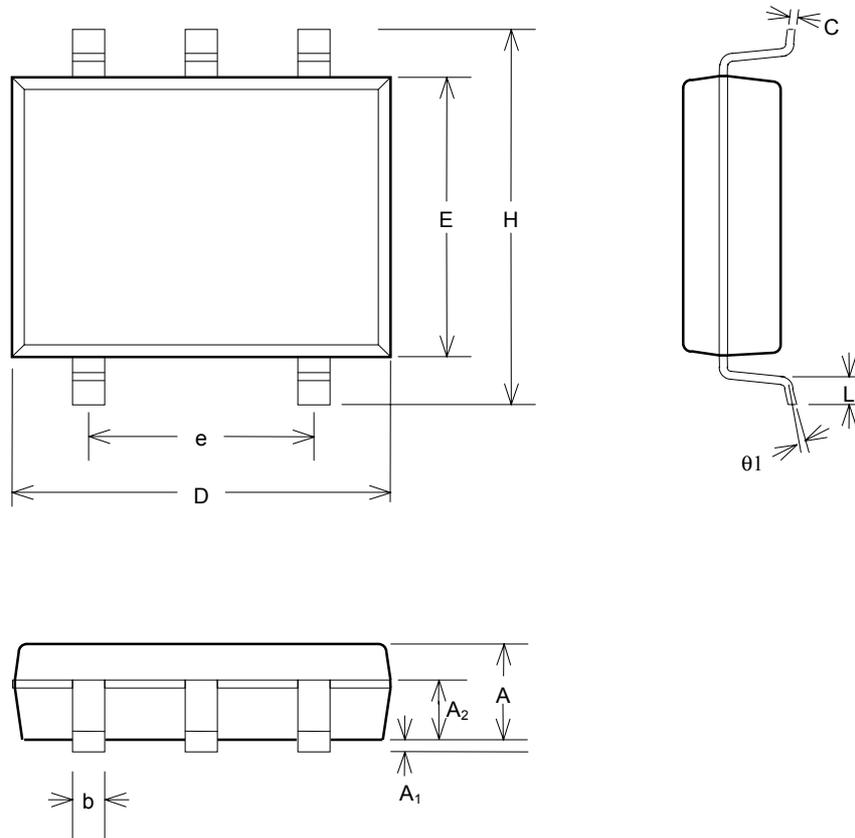
Material: Silicon with P-Substrate  
 Diameter: 6 inches( $\approx$ 15cm)  
 Thickness: 12 mils( $\approx$ 300um)

## Pin Assignment (SOT-25)



Pin NO.	Pin Name	Description
1	CN	Connected to Negative node of the external capacitor
2	VSS	Ground
3	VDD	Power
4	LEDA	Connected to Anode of the external LED
5	CP	Connected to Positive node of the external capacitor

## Package Specifications (SOT-25)



SYMBOL	DIMENSIONS IN MILLIMETERS		
	MIN	NOM	MAX
A	1.00	1.10	1.30
A <sub>1</sub>	0.00	—	0.10
A <sub>2</sub>	0.70	0.80	0.90
b	0.35	0.40	0.50
C	0.10	0.15	0.25
D	2.70	2.90	3.10
E	1.40	1.60	1.80
e	—	1.90(TYP)	—
H	2.60	2.80	3.00
L	0.37	—	—
θ <sub>1</sub>	1°	5°	9°



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