Dual Ideal Diode Controller

General Description

The EM5236A is an advanced high voltage, ideal diode controller that drives an internal N-channel MOSFET to replace Schottky diode. It controls the forward-voltage drop across the MOSFET to ensure smooth current delivery without oscillation from one path to the other. It includes under voltage lockout and over temperature protection. This part is available in DFN3310 package.

Ordering Information

Part Number	Package	Note
EM5236AVQA	DFN3310	Dual Channel ,6A Ron1: 12mΩ(TYP.) Ron2: 12mΩ(TYP.)

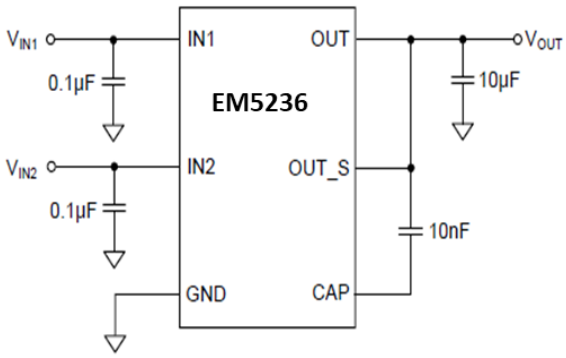
Features

- Wide Input Range 4.5V to 24V
- Dual Integrated N-Channel MOSFET
- Low 100uA Operating Current
- Reduces Power Dissipation by Replacing a Schottky Diode
- Smooth Switchover Without Oscillation
- Control Single or Dual N-Channel MOSFETs
- Protection Circuitry: UVLO

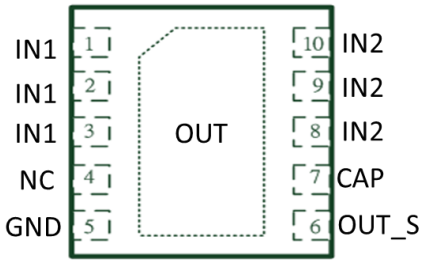
Applications

- Input Power Path Management
- USB PD
- High Side Power Protection Switches

Typical Application Circuit

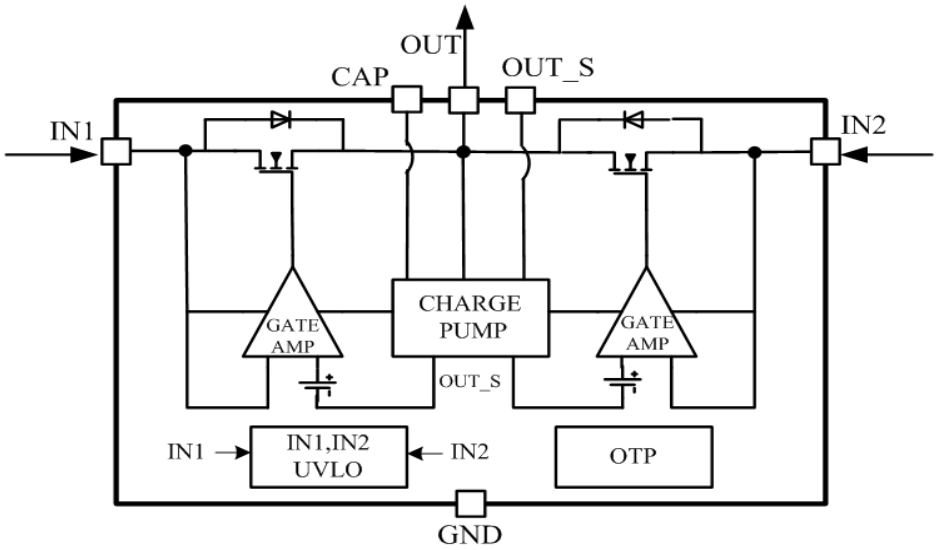


Pin Configuration



EM5236VQA (DFN3X3-10)

Function Block



Pin Assignment

Pin Name	DFN3310 Pin No.	Pin Function (EM5236A/B)
IN1	1/2/3	**Input Voltage.** Input Power Supply (Primary or Auxiliary Supply)
CAP	7	**CAP.** An external capacitor to GND for internal charge pump circuit
OUT_S	6	Output Sensing, it must be connected to output terminal
NC	4	**NC.** Do not connected.
VOUT	EP	**Output Sensing.** Connect to the output rail
IN2	8/9/10	**Input Voltage.** Input Power Supply (Primary or Auxiliary Supply)
GND	5	**GND**

Absolute Maximum Rating (Note1, 2, 3)

- **IN1, IN2, OUT, OUT_S ---------- -0.3V to +28V**
- **CAP to OUT_S ---------- -0.3V to +7V**
- **Power Dissipation, P_D @ T_A = 25°C, DFN3310 ---------- 1.67 W**
- **Package Thermal Resistance, θ_{JA}, DFN3310 ---------- 60 °C/W**
- **Maximum Junction Temperature ---------- -40°C to 150°C**
- **Storage Temperature ---------- -65°C to 150°C**
- **ESD Rating, HBM (Human Body Mode) ---------- 2kV**
- **ESD Rating, MM (Machine Mode) ---------- 200V**
- **ESD Rating, CDM (Charge Device Mode) ---------- 500V**

Recommended Operating Conditions (Note4)

- **IN1, IN2, OUT, OUT_S ---------- 4.5V to +24V**
- **CAP to OUT_S ---------- 0V to +6V**
- **Operating Junction Temperature ---------- -40°C to 125°C**
- **Operating Ambient Temperature ---------- -40°C to 85°C**

Electrical Characteristics

V_{IN}=20V, T_A=25°C, unless otherwise specified

Parameter	Symbol	Test Conditions	Min	Typ	Max	Units
Input Section						
Input Supply Range	$V_{In1/In2}$	Internal VIN POR	4.5		24	V
Under Voltage Lockout Voltage	V_{UVLO}	Inx Pin		3.6		V
POR Hysteresis	V_{PORHYS}			100		mV
INPUT x Operating Current	I_{Q1}	VIN1>VIN2, no load		100		uA
	I_{Q2}			10		uA
	I_{Q2}	VIN2>VIN1, no load		100		uA
	I_{Q1}			10		uA
Source-Drain Regulation Voltage	$V_{SD1,2}$	VSD In Regulation		30		mV
Switch Section						
On Resistance	$R_{ON1,2}$	I_{LOAD}=1A, VIN=4.5V to 24V		12		mΩ

Note 1. Stresses listed as the above "Absolute Maximum Ratings" may cause permanent damage to the device. These are for stress ratings. Functional operation of the device at these or any other conditions beyond those indicated in the operational sections of the specifications is not implied. Exposure to absolute maximum rating conditions for extended periods may remain possibility to affect device reliability.

Note 2. θ_{JA} is measured in the natural convection at T_A=25°C on a low effective thermal conductivity test board (2-layer) of JEDEC 51-3 thermal measurement standard.

Note 3. Devices are ESD sensitive. Handling precaution is recommended.

Note 4. The device is not guaranteed to function outside its operating conditions.

TYPICAL PERFORMANCE CHARACTERISTICS

Test Conditions: IN_X = 20 V, T_A = 25 °C and natural convection cooling, unless otherwise noted.

IN2=5V then IN1=19.5V plug-in, Load=6A

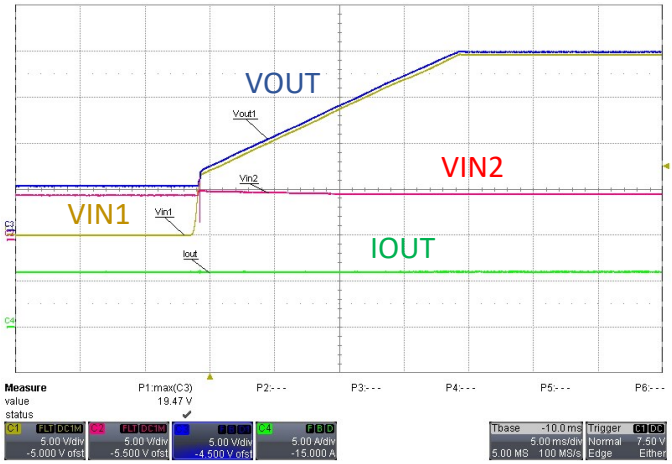


Figure.1 Plug-in

IN2=5V then IN1=19.5V plug-out, Load=6A

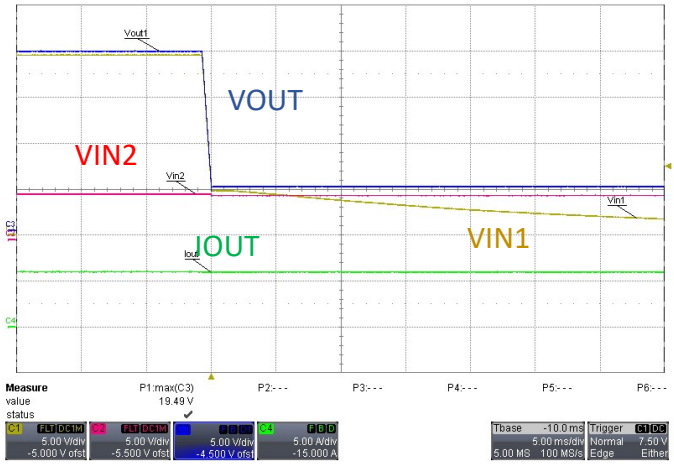


Figure.2 Plug-out

Condition: IN1 = 4.5V, IN2 = 0V

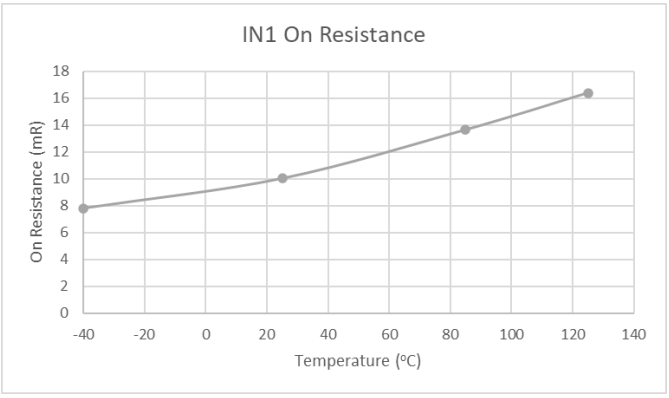


Figure.3 $R_{ON1\ @\ 4.5V}$ v.s. Temperature

Condition: IN1 = 24V, IN2 = 0V

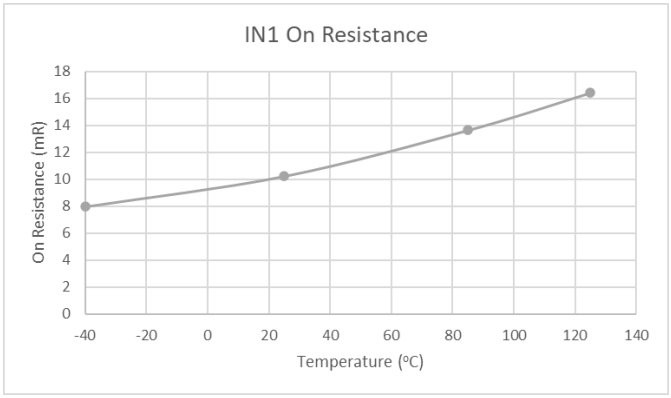


Figure.4 $R_{ON1\ @\ 24V}$ v.s. Temperature

Condition: IN1 = 0V, IN2 = 4.5V

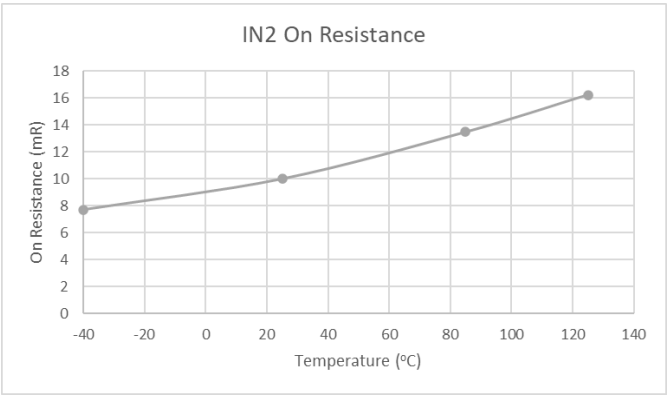


Figure.5 $R_{ON2\ @\ 4.5V}$ v.s. Temperature

Condition: IN1 = 0V, IN2 = 24V

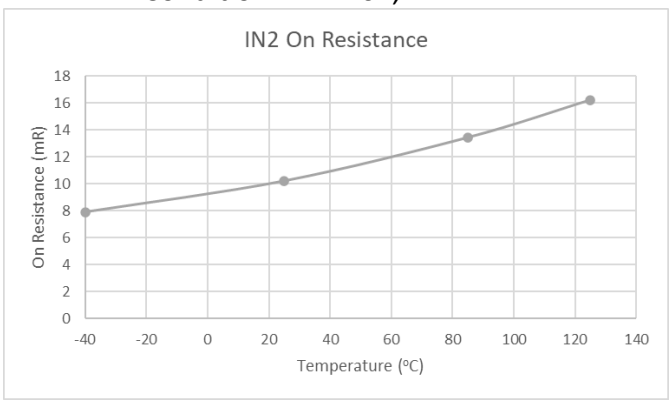


Figure.6 $R_{ON2\ @\ 24V}$ v.s. Temperature

TYPICAL PERFORMANCE CHARACTERISTICS

Test Conditions: IN_X = 20 V, T_A = 25 °C and natural convection cooling, unless otherwise noted.

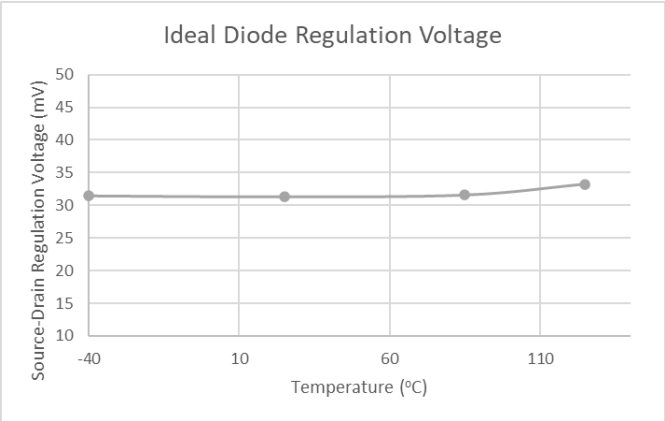


Figure.5 V_{SD} v.s. Temperature

Ordering & Marking Information

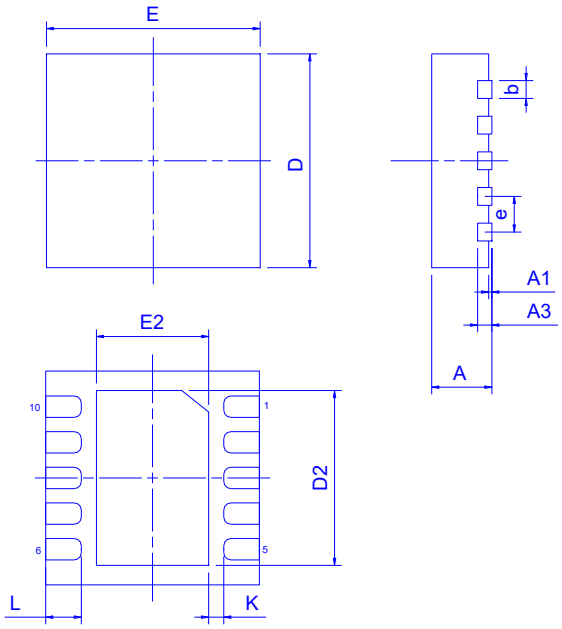
Device Name: EM5236A for DFN3.0X3.0-10

→ EM5236A Device Name

→ ABCDEFG: Date Code

Outline Drawing

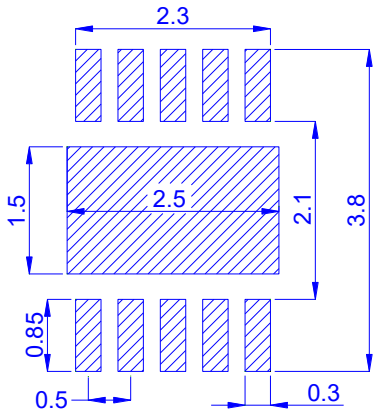
DFN3.0X3.0-10



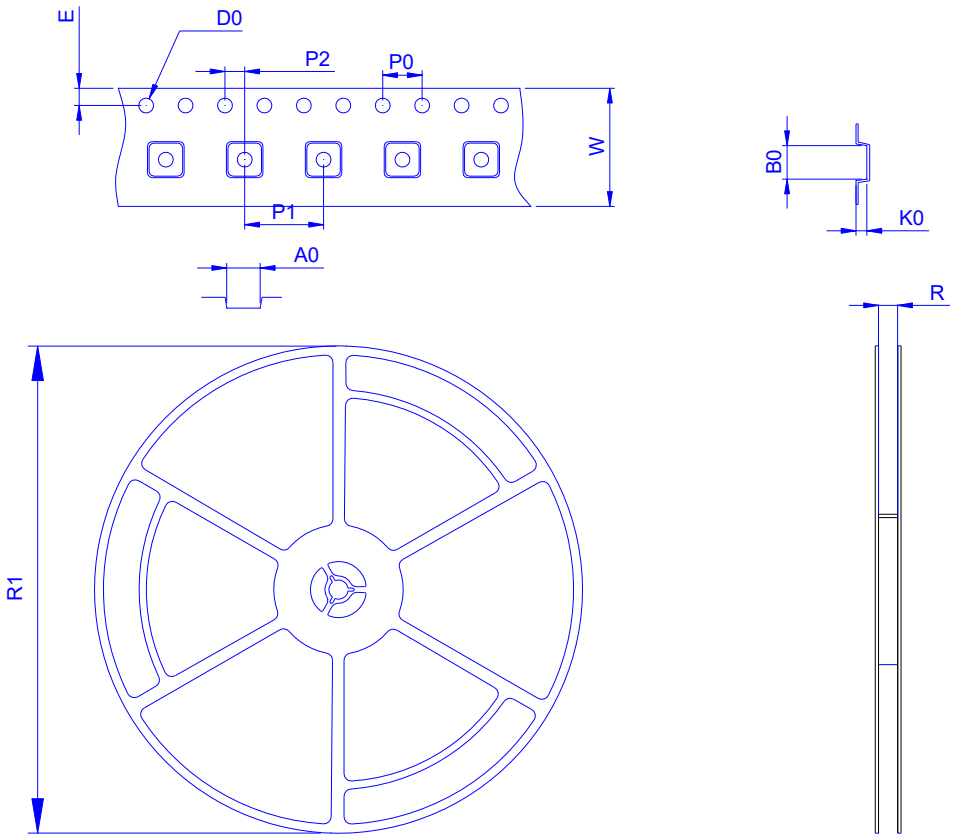
Dimension in mm

Dimension	A	A1	A3	b	D	E	D2	E2	e	L	K
Min.	0.7	0.00		0.18	2.9	2.9	2.20	1.40		0.30	0.20
Typ.	0.75	0.02	0.2	0.25	3.0	3.0			0.50	0.40	
Max.	0.80	0.05		0.30	3.1	3.1	2.70	1.75		0.50	

Footprint



◆ Tape&Reel Information: 5000pcs/Reel



產品別	DFN3*3-10L
Reel 尺寸	13”
編帶方式	FEED DIRECTION

Dimension in mm

Dimension	Carrier tape									Reel	
	A0	B0	D0	E	K0	P0	P1	P2	W	R	R1
Typ.	3.30	3.30	1.50	1.75	1.10	4.00	8.00	2.00	12.00	12.40	330.00
±	0.30	0.20	0.20	0.20	0.40	0.20	0.20	0.20	0.50	REF	REF