600mA, 2.25MHz, Synchronous Step-Down DC-DC Converter

UM3521DA *DFN6 2.0×1.8*

General Description

The UM3521DA is a high efficiency synchronous step down dc/dc converter optimized for battery powered applications. It provides up to 600mA output current from a single Li-ion cell and is ideal to power mobile phones and other portable applications. With wide input voltage range of 2.0V to 5.5V, the device supports applications powered by Li-ion batteries with extended voltage range, two and three cell alkaline batteries 3.3V and 5V input voltages rails. The UM3521DA operates at 2.25MHz fixed switching frequency and enters Power Save Mode operation at light load current to maintain high efficiency over the entire load current range. The Power Save Mode is optimized for low output voltage ripple. For low noise applications, the device can be forced into fixed frequency PWM mode by pulling the MODE pin high. In the shutdown mode, the current consumption is reduced to less than 1uA. UM3521DA allows the use of small inductors and capacitors to achieve a small solution size.

Applications

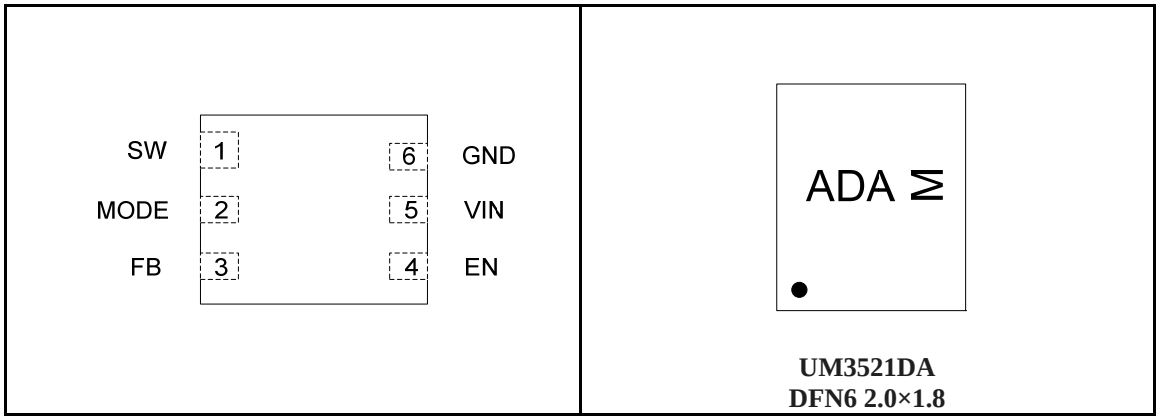
- Cellular Telephones
- PDA, Pocket PCs
- Wireless and DSL Modems
- Low Power DSP Supply
- Portable Media Players
- POL applications

Features

- High Efficiency Step Down Converter
- Output Current up to 600mA
- Wide Vin Range from 2.0V to 5.5V for Li-ion Batteries
- 2.5MHz Fixed Frequency Operation
- Power Save Mode at Light Load Currents
- Voltage Positioning in PFM mode +1.5%
- Very Low Quiescent Current: Typ. 10uA
- Very High Efficiency: Max >93%, and 54% at 20uA output with V_{IN}=2.3V and V_{OUT}=1.8V
- Low Dropout operation: 100% Duty Cycle
- Soft Start
- Under-voltage Lockout
- Thermal Protection
- Available package: DFN6 2.0×1.8

Pin Configurations

Top View



UM3521DA
DFN6 2.0×1.8

Ordering Information

Part Number	Packaging Type	Marking Code	Shipping Qty
UM3521DA	DFN6	ADA	3000pcs/7Inch Tape & Reel

Pin Description

Pin Number	Symbol	Function
1	SW	Switching Pin
2	MODE	Mode Select Pin. This pin is used to put the UM3521DA into fixed frequency PWM mode by pulling MODE pin high.
3	FB	Pin for Feedback Voltage
4	EN	Enable Pin (Active with "H")
5	VIN	Power Supply Pin
6	GND	Ground Pin

Absolute Maximum Ratings

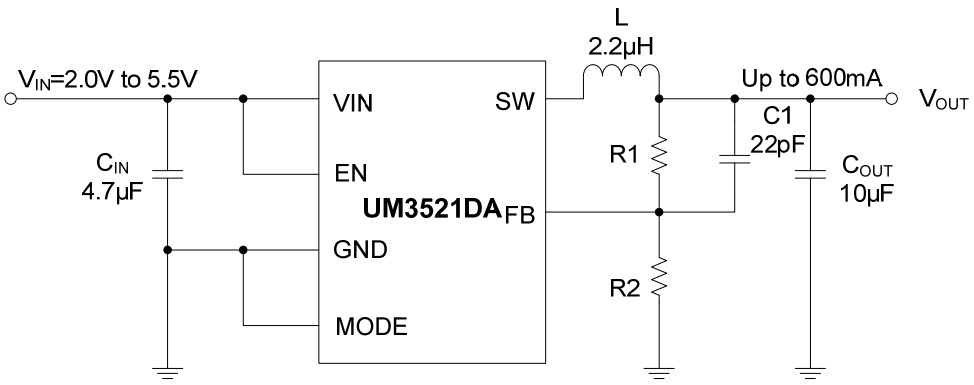
Symbol	Parameter	Value	Unit
V_{IN}	Input Voltage	-0.3 to +6.0	V
V_{FB}	FB Voltage	-0.3 to V_{IN}+0.3	V
V_{EN}	EN Voltage	-0.3 to V_{IN}+0.3	V
V_{MODE}	MODE Voltage	-0.3 to V_{IN}+0.3	V
V_{SW}	SW Voltage	-0.3 to V_{IN}+0.3	V
T_O	Operating Temperature	-40 to +85	°C
T_{STG}	Storage Temperature Range	-65 to +150	°C

Electrical Characteristics

(V_{IN}=V_{EN}=3.6V, V_{OUT}=1.8V, V_{MODE}=GND, T_A=+25℃, unless otherwise noted)

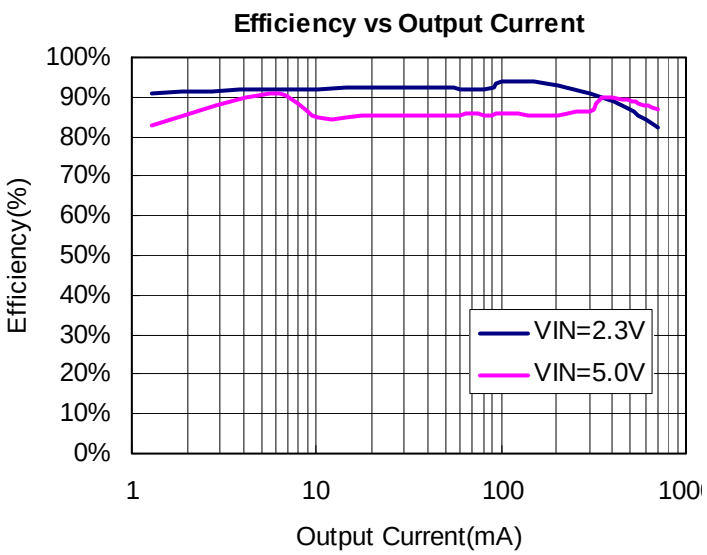
Symbol	Parameter	Test Conditions	Min	Typ	Max	Unit
V_{IN}	Input Voltage Range		2.0		5.5	V
I_Q	Quiescent Current	V_{IN}=3.6V, V_{MODE}=GND		10	17	μA
I_{SHDN}	Shutdown Current	V_{EN}=GND		0.1	1.0	μA
V_{FB}	Regulated Feedback Voltage	V_{MODE}=V_{IN}, (PWM mode), I_O=10mA	1.773	1.800	1.827	V
		V_{MODE}=GND, (PFM mode), I_O=10mA		3		%
$I_{O(Max)}$	Maximum Output Current		600			mA
f	Oscillator Frequency		2.00	2.25	2.50	MHz
$R_{DS(ON)}$	$R_{DS(ON)}$ of P-CH MOSFET	V_{IN} =3.6V, I_{SW}=100mA		0.28		Ω
	$R_{DS(ON)}$ of N-CH MOSFET	V_{IN} =3.6, I_{SW}= -100mA		0.18		Ω
I_{SW}	High Side Switch Current Limit			1.0		A
V_{ENH}	EN Pin High-Level Threshold		V_{IN}-0.3			V
V_{ENL}	EN Pin Low-Level Threshold				GND+ 0.3	V
I_{EN}	EN Pin Input Current	V_{EN}=5.5V		0.01	1	μA
V_{MODEH}	MODE Pin High-Level Threshold		V_{IN}-0.3			V
V_{MODEL}	MODE Pin Low-Level Threshold				GND+ 0.3	V
I_{MODE}	MODE Pin Input Current	V_{MODE}=5.5V		0.01	1	μA
UVLO	UVLO Detection Voltage			1.7	1.8	V
Hys	UVLO hystersis voltage			0.1	0.2	V
sst	Soft Start Time	V_{EN}=0V to V_{IN}	0.15	0.3	0.6	ms
	Output Voltage Temperature characteristics	-40℃≤T_A≤+85℃		±100		ppm/ ℃
	Thermal Shutdown Temp			140		℃

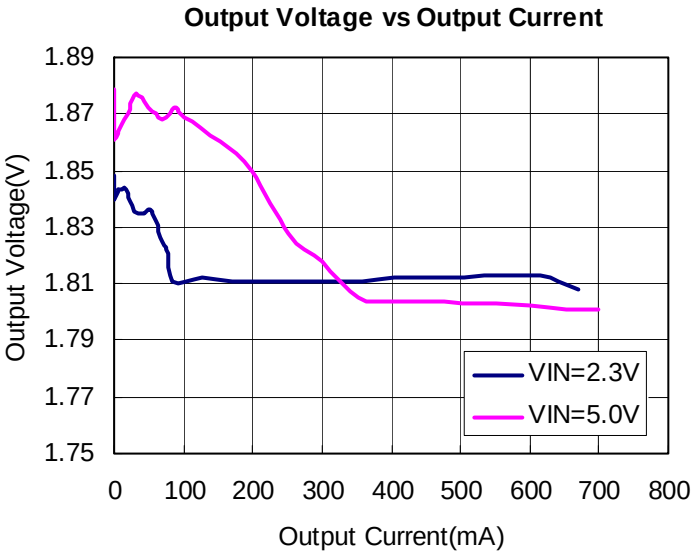
Typical Application Circuit

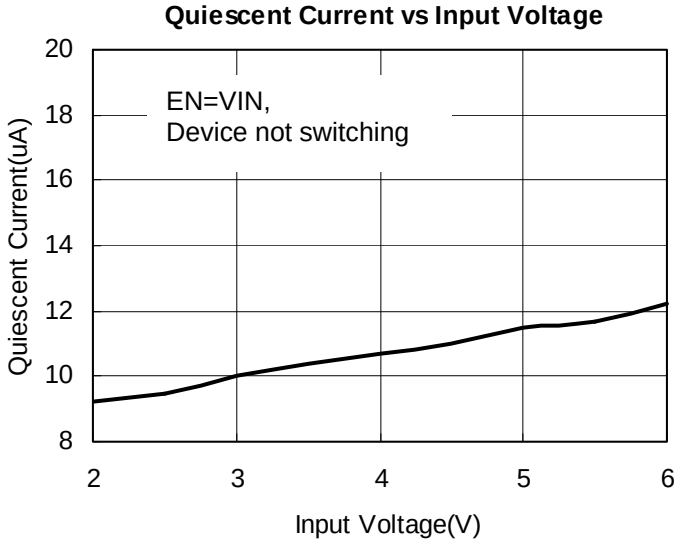


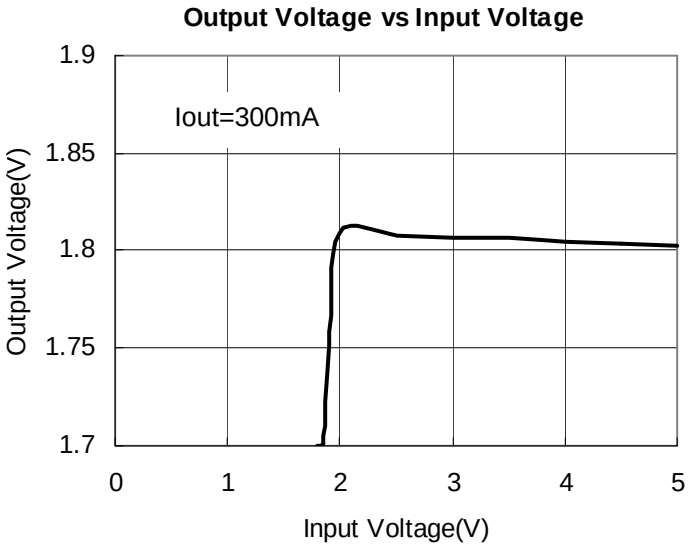
Typical Operating Characteristics

(MODE=0, L=2.2μH, V_{OUT}=1.8V, unless otherwise noted.)





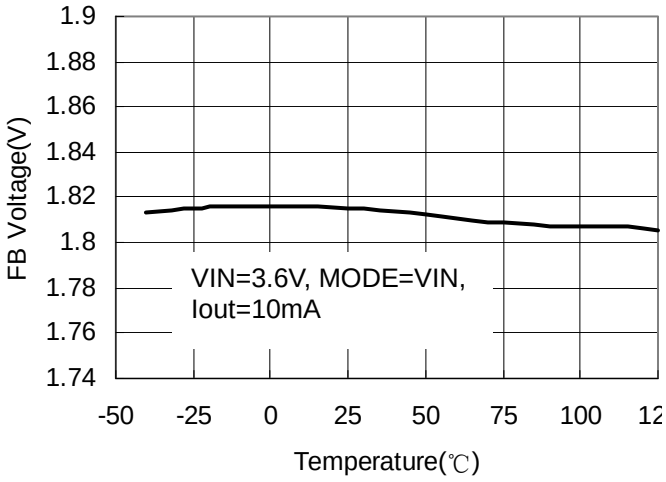




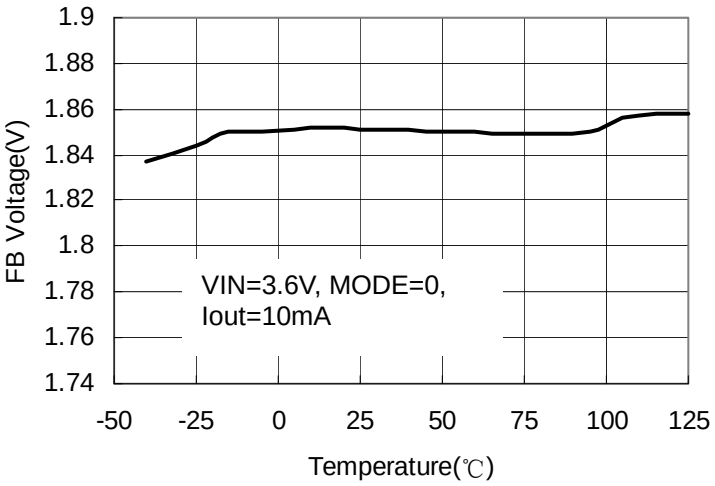
Typical Operating Characteristics

(MODE=0, L=2.2μH, V_{OUT}=1.8V, unless otherwise noted.)

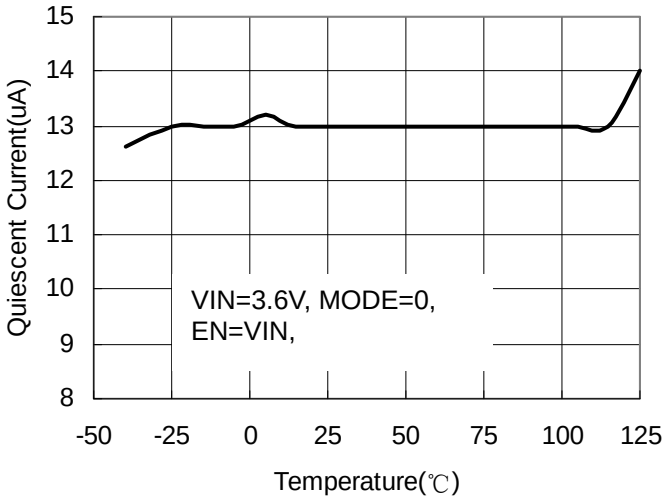
FB Voltage(PWM Mode) vs Temperature



FB Voltage(PFM Mode) vs Temperature



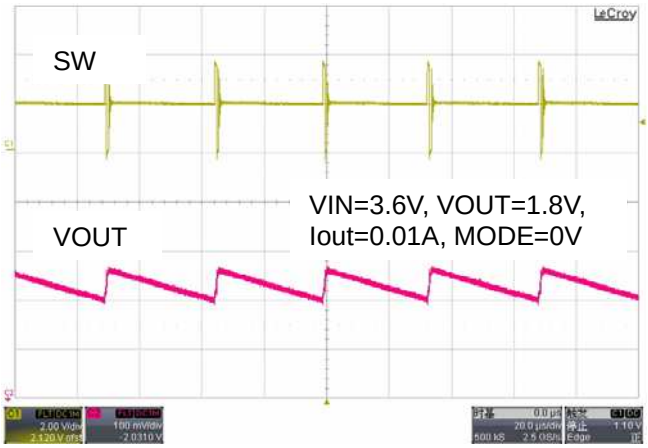
Quiescent Current vs Temperature



Typical Operating Characteristics (Continued)

(MODE=0, L=2.2μH, V_{OUT}=1.8V, unless otherwise noted.)

Typical Operation (PFM Mode)



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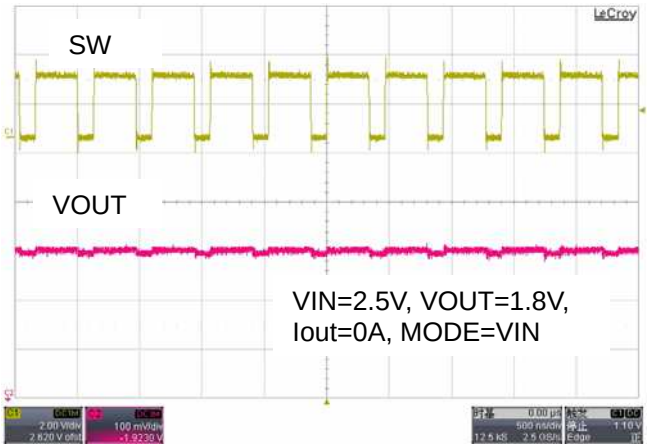
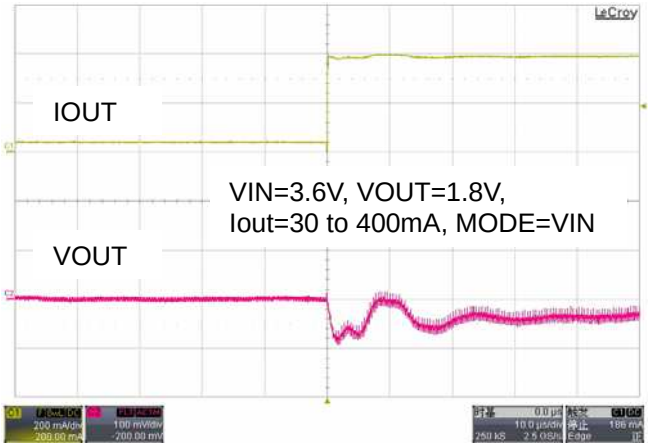
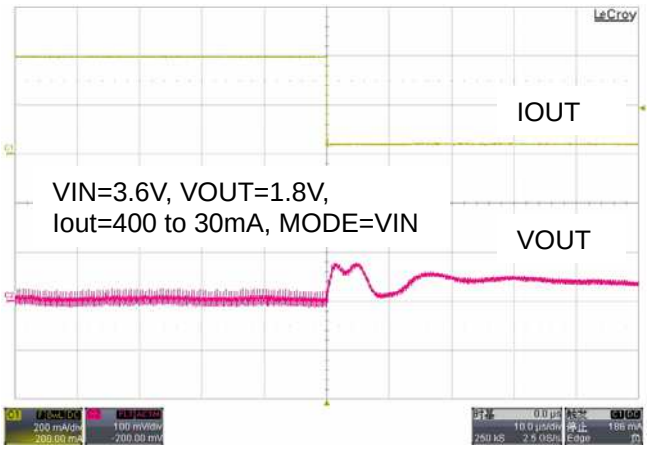


Load Transient (PWM Mode)



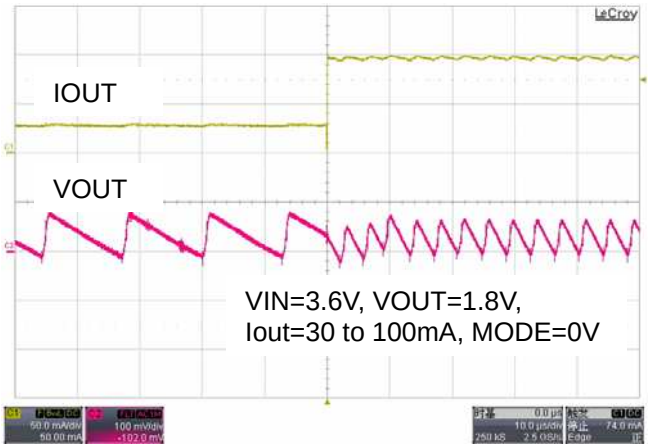
Load Transient (PWM Mode)



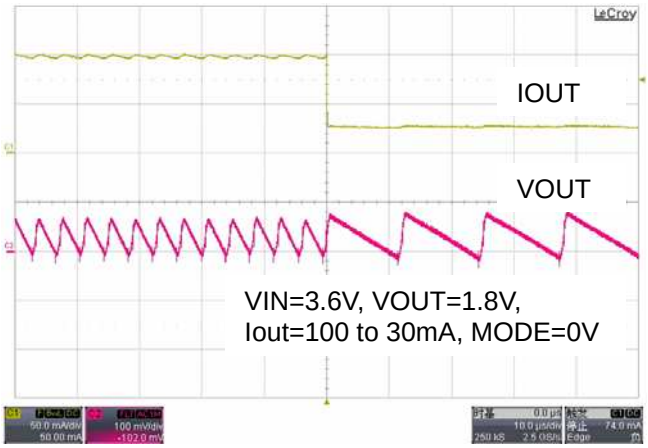
Typical Operating Characteristics (Continued)

(MODE=0, L=2.2μH, V_{OUT}=1.8V, unless otherwise noted.)

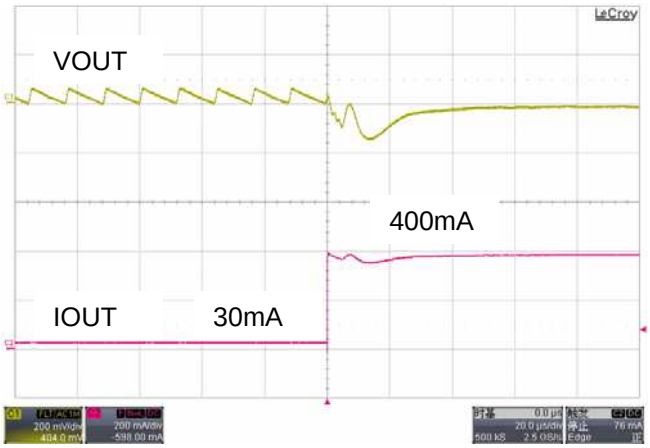
Load Transient (PFM Mode)



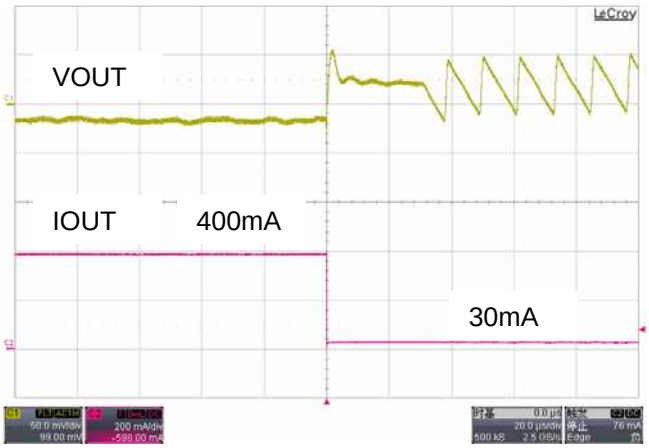
Load Transient (PFM Mode)



Load Transient (PFM to PWM Mode)



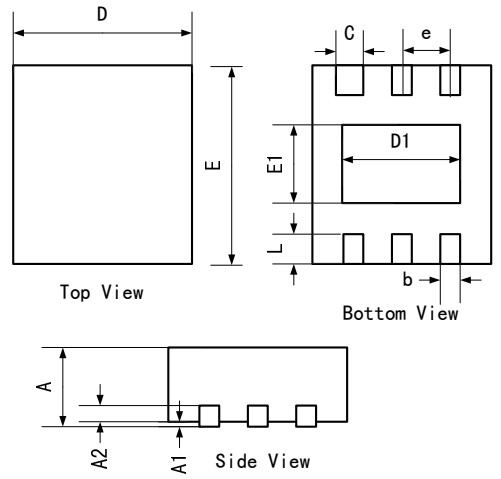
Load Transient (PWM to PFM Mode)



Package Information

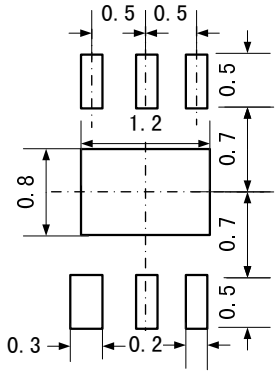
UM3521DA DFN6 2.0×1.8

Outline Drawing



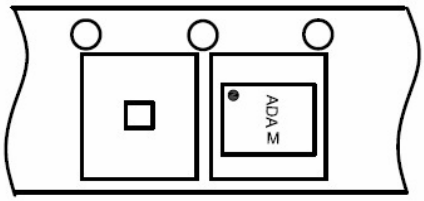
Symbol	DIMENSIONS		
	MILLIMETERS		
	Min	Typ	Max
A	0.70	0.75	0.80
A1	0	0.02	0.05
A2	-	0.15	-
b	0.15	0.20	0.25
C	0.25	0.30	0.35
D	1.75	1.80	1.85
E	1.95	2.00	2.05
D1	0.80BSC		
E1	1.20BSC		
e	0.50BSC		
L	0.25	0.30	0.35

Land Pattern



NOTES:
1. Compound dimension: 2.0×1.8;
2. Unit: mm;
3. General tolerance ±0.05mm unless otherwise specified;
4. The layout is just for reference.

Tape and Reel Orientation



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Union Semiconductor, Inc
Add: 7F, No. 5, Bibo Road, Shanghai 201203
Tel: 021-51097928
Fax: 021-51026018
Website: www.union-ic.com