150mA, Low Noise, Low Dropout Regulator

UM1330S-xx SOT23-5
UM1330P-xx SOT353
UM1330DA-xx DFN6 2.0×2.0

General Description

The UM1330 series are 150mA low dropout regulators design for portable application. A 2.7V to 5.5V input operating voltage range, making them ideal for operation from a single cell lithium ion battery or fixed 3.3V and 5V systems. With low output noise (56μV_{RMS}) and high PSRR (-58dB@1kHz), the UM1330 series are ideal for noise sensitive applications such as RF. While the fast transient response and active shutdown circuitry make them well-suited for powering mixed signal circuitry.
Other features include stability with ultra low ESR ceramic capacitors as small as 1μF, thermal overload protection, output current limiting and auto discharge the output voltage when disabled. The UM1330 series are available in low profile SOT23-5, SOT353 and DFN6 2.0×2.0 packages.

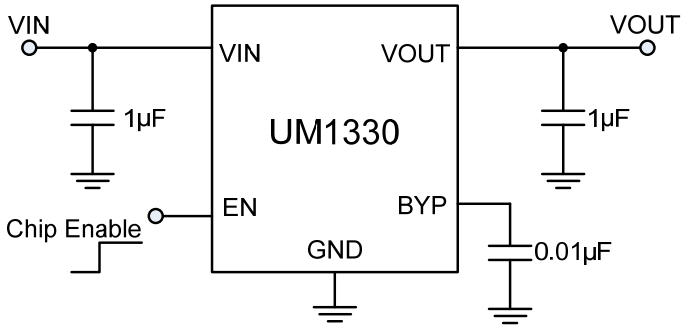
Applications

- Cellular Phones
- GPS Receivers
- Wireless Sensor Network
- Wireless LAN

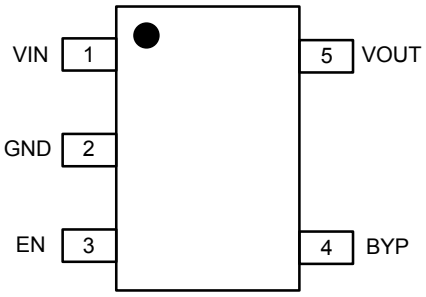
Features

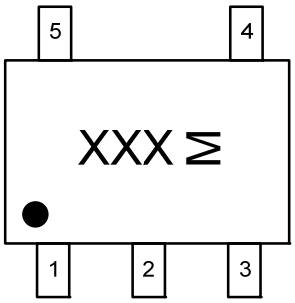
- Input Voltage Range: 2.7V to 5.5V
- Low Dropout Voltage:
  170mV at 150mA
- Low Quiescent Current: 88μA
- Low Noise: 56μV_{RMS}
- High PSRR: -58dB at 1kHz
- Fast Transient Response
- Active Shutdown
- Stable with Ceramic Output Capacitors
- Low Profile SOT23-5, SOT353 and DFN6 2.0×2.0 Packages

Typical Application Circuit

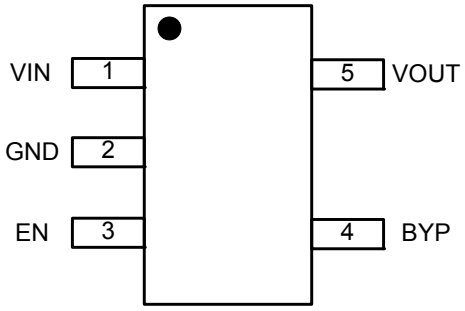


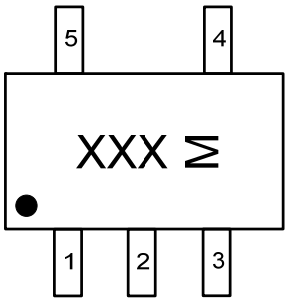
Pin Configurations **Top View**



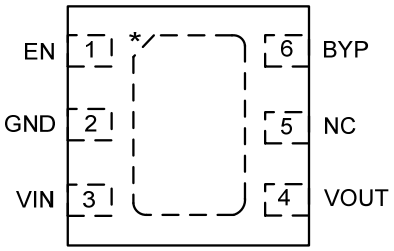


M: Month Code
UM1330S-xx
SOT23-5

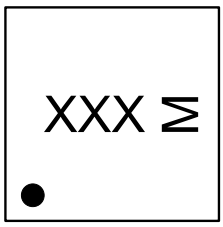




M: Month Code
UM1330P-xx
SOT353



(Top View)



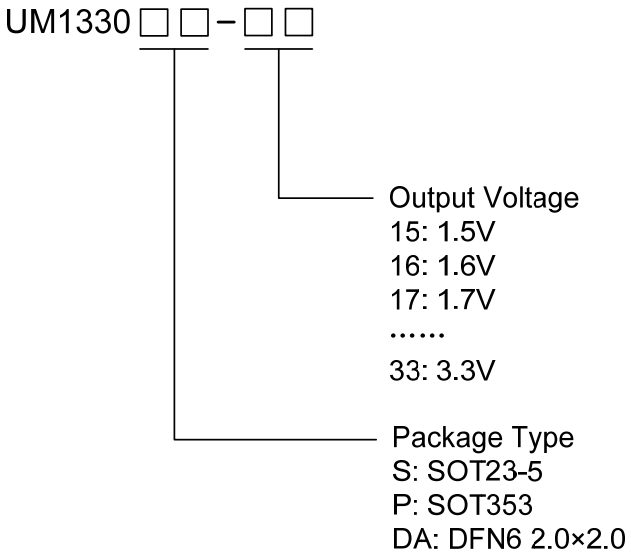
M: Month Code
UM1330DA-xx
DFN6 2.0×2.0

* The tab on the bottom of the package enhances thermal performance and is electrically connected to GND (substrate level). It is recommended that the tab be connected to the ground plane on the board. If not, the tab can be left open.

Pin Description

Pin Number			Pin Name	Pin Function
UM1330S-xx	UM1330P-xx	UM1330DA-xx		
1	1	3	VIN	Supply Input
2	2	2	GND	Ground
3	3	1	EN	Enable/Shutdown (Input): CMOS Compatible Input. Logic High=Enable; Logic Low=Shutdown. Do not leave it open.
4	4	6	BYP	Reference Bypass: Connect external $0.01\mu F \leq C_{BYP} \leq 1.0\mu F$ capacitor to GND to reduce output noise. May be left open.
5	5	4	VOUT	Output Voltage
-	-	5	NC	Not Connected.

Naming Information



Available Voltage Version

Part Number	Output Voltage	Packaging Type	Marking Code	Shipping Qty
UM1330S-15	1.5V	SOT23-5	5K2	3000pcs/7Inch Tape & Reel
UM1330S-16	1.6V		5K3	
UM1330S-17	1.7V		5K4	
UM1330S-18	1.8V		5K5	
UM1330S-19	1.9V		5K8	
UM1330S-20	2.0V		5K9	
UM1330S-21	2.1V		5KB	
UM1330S-22	2.2V		5KC	
UM1330S-23	2.3V		5KD	
UM1330S-24	2.4V		5KE	
UM1330S-25	2.5V		5KF	
UM1330S-26	2.6V		5KH	
UM1330S-27	2.7V		5KL	
UM1330S-28	2.8V		5KM	
UM1330S-29	2.9V		5KJ	
UM1330S-30	3.0V		5KK	
UM1330S-31	3.1V		5KN	
UM1330S-32	3.2V		5KP	
UM1330S-33	3.3V		5KQ	
UM1330P-15	1.5V	SOT353	UN5	
UM1330P-16	1.6V		UN6	
UM1330P-17	1.7V		UN7	
UM1330P-18	1.8V		UN8	
UM1330P-19	1.9V		UN9	
UM1330P-20	2.0V		UNA	
UM1330P-21	2.1V		UNC	
UM1330P-22	2.2V		UP2	
UM1330P-23	2.3V		UP3	
UM1330P-24	2.4V		UP4	
UM1330P-25	2.5V		UP5	
UM1330P-26	2.6V		UP6	
UM1330P-27	2.7V		UP7	
UM1330P-28	2.8V		UP8	
UM1330P-29	2.9V		UP9	
UM1330P-30	3.0V		UPA	
UM1330P-31	3.1V		UPB	
UM1330P-32	3.2V		UPC	
UM1330P-33	3.3V		UPD	

Available Voltage Version (Continued)

Part Number	Output Voltage	Packaging Type	Marking Code	Shipping Qty
UM1330DA-15	1.5V	DFN6 2.0×2.0	AA5	3000pcs/7Inch Tape & Reel
UM1330DA-16	1.6V		AA6	
UM1330DA-17	1.7V		AA7	
UM1330DA-18	1.8V		AA8	
UM1330DA-19	1.9V		AA9	
UM1330DA-20	2.0V		AAA	
UM1330DA-21	2.1V		AAB	
UM1330DA-22	2.2V		AF2	
UM1330DA-23	2.3V		AF3	
UM1330DA-24	2.4V		AF4	
UM1330DA-25	2.5V		AF5	
UM1330DA-26	2.6V		AF6	
UM1330DA-27	2.7V		AF7	
UM1330DA-28	2.8V		AF8	
UM1330DA-29	2.9V		AF9	
UM1330DA-30	3.0V		AFA	
UM1330DA-31	3.1V		AFB	
UM1330DA-32	3.2V		AFC	
UM1330DA-33	3.3V		AFD	

Absolute Maximum Ratings (Note 1)

Symbol	Parameter	Value	Unit
V_{IN}	Supply Voltage on VIN Pin	-0.3 to +7	V
V_{EN}	Voltage on EN Pin	-0.3 to +7	V
P_D	Power Dissipation	Internally Limited (Note 2)	
T_J	Operating Junction Temperature	-40 to +125	°C
T_{STG}	Storage Temperature Range	-55 to +150	°C
T_L	Lead Temperature for Soldering 10 Seconds	+260	°C
ESD	ESD Rating (Note 3)	±2	kV

Note 1: Absolute Maximum Ratings are those values beyond which the life of a device may be impaired.

Note 2: The maximum allowable power dissipation of any T_A (ambient temperature) is $P_{D(max)}=(T_{J(max)}-T_A)/\theta_{JA}$. Exceeding the maximum allowable power dissipation will result in excessive die temperature, and the regulator will go into thermal shutdown. The θ_{JA} of the UM1330S-xx, UM1330P-xx and UM1330DA-xx are 235°C/W, 256°C/W and 142°C/W respectively.

Note 3: Devices are ESD sensitive. Handling precautions recommended. Human body model, 1.5k in series with 100pF.

Recommended Operating Conditions (Note 4)

Symbol	Parameter		Value	Unit
V_{IN}	Supply Voltage on VIN Pin		+2.7 to +5.5	V
V_{EN}	Voltage on EN Pin		-0.3 to $+V_{IN}$	V
T_A	Ambient Temperature		-40 to +85	°C
θ_{JA}	Junction Thermal Resistance	SOT23-5	+235	°C/W
		SOT353	+256	
		DFN6 2.0×2.0	+142	

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

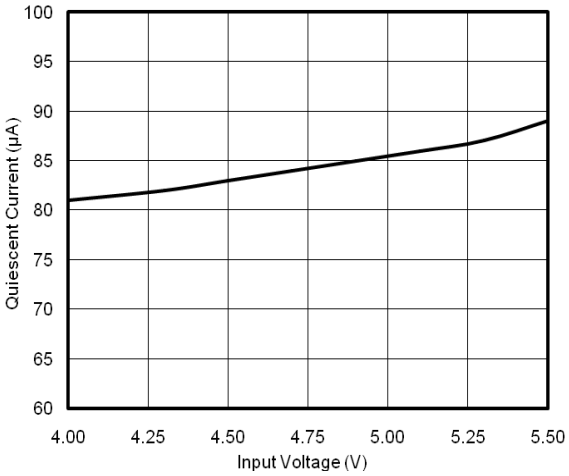
Electrical Characteristics

V_{EN}=V_{IN}=V_{OUT}+1V; I_L=100μA; C_L=1.0μF; C_{BYP}=0.01μF per output; T_A=25°C, unless noted.

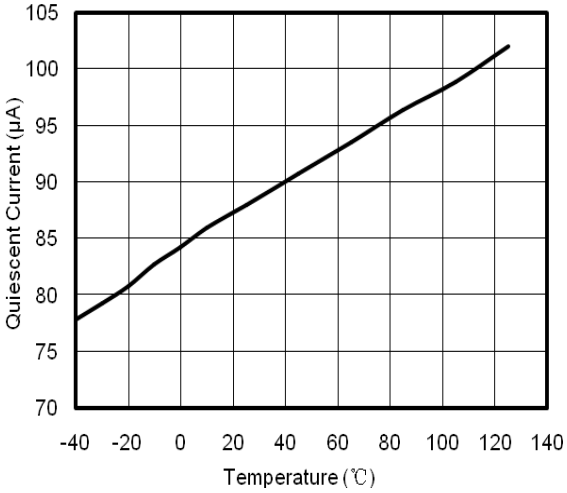
Symbol	Parameter	Test Conditions		Min	Typ	Max	Unit
V_{IN}	Input Voltage			2.7		5.5	V
UVLO	Under Voltage Lock			1.4		2.5	V
V_{OUT}	Output Voltage			1.5		3.3	V
I_{OUT}	Output Current				150		mA
I_{SHDN}	Shutdown Current	V_{EN}<0.2V			0.2	1	μA
	Ground Pin Current	V_{IN}=4.3V, I_{OUT}=0mA			88	103	μA
		V_{IN}=4.3V, I_{OUT}=150mA			230	320	
ΔV_{DO}	Dropout Voltage	I_{OUT}=50mA			55		mV
		I_{OUT}=150mA			170	220	
I_{LIMT}	Output Current Limit	V_{OUT} =0V		200	250	350	mA
	Output Voltage Accuracy	I_{OUT}=100μA, T_A=25°C		-2.0		+2.0	%
		I_{OUT}=100μA, -40°C<T_A<+85°C		-3.0		+3.0	
LNR	Line Regulation	V_{IN}=V_{OUT}+1V to 5.5V			0.05	0.4	%/V
LDR	Load Regulation	I_{OUT}=0.1mA to 150mA			0.2	1	%
	Output Voltage Noise	C_{OUT}=1.0μF,C_{BYP}=0.1μF, f=10Hz to 100kHz			56		μV_{RMS}
PSRR	Power Supply Ripple Rejection	C_{BYP}=0.1μF, I_{LOAD}=50mA	f=100Hz		67		dB
			f=1kHz		58		
			f=10kHz		37		
Enable Input							
V_{IL}	Enable Input Voltage Logic Low	V_{IN}=2.7V to 5.5V, Regulator Shutdown				0.2	V
V_{IH}	Enable Input Voltage Logic High	V_{IN}=2.7V to 5.5V, Regulator Enabled		1.4			
I_{EN}	Enable Input Current	V_{IL}<0.4V, Regulator Shutdown			0.01	1	μA
		V_{IH}>1.6V, Regulator Enabled			0.01	1	
Thermal Shutdown							
T_{SHDN}	Thermal Shutdown Temperature				155		°C
ΔT_{SHDN}	Thermal-Shutdown Hysteresis				15		°C
Turn-on/Turn-off Characteristics							
	Turn-on Time				30		μs
	Discharge Resistance				500		Ω

Typical Performance Characteristics

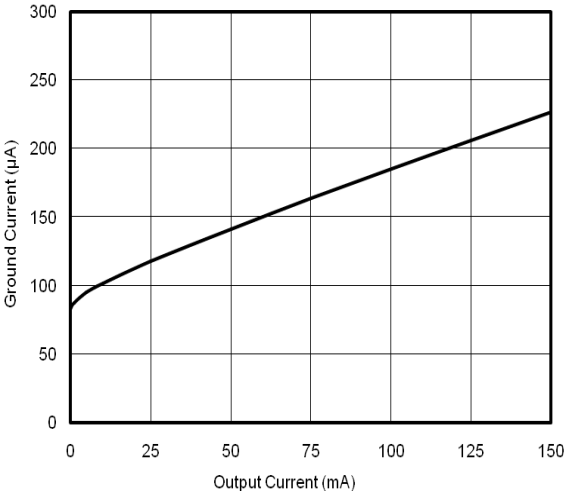
Quiescent Current vs. Input Voltage
V_{OUT}=3.3V, I_{OUT}=0mA, C_{BYP}=10nF



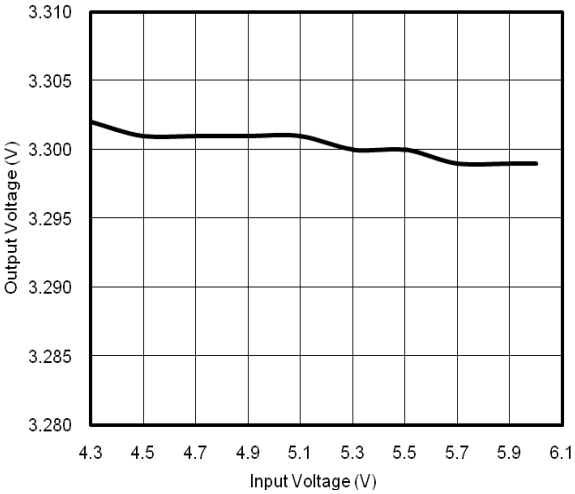
Quiescent Current vs. Temperature
V_{IN}=4.3V, I_{OUT}=0mA, C_{BYP}=10nF



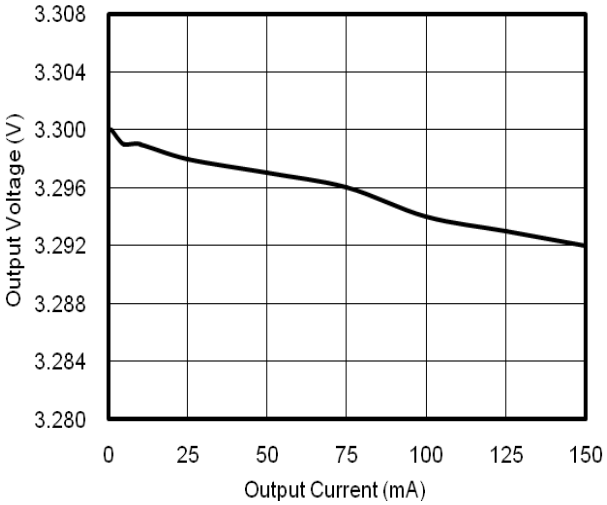
Ground Current vs. Output Current
V_{IN}=4.3V, C_{BYP}=10nF



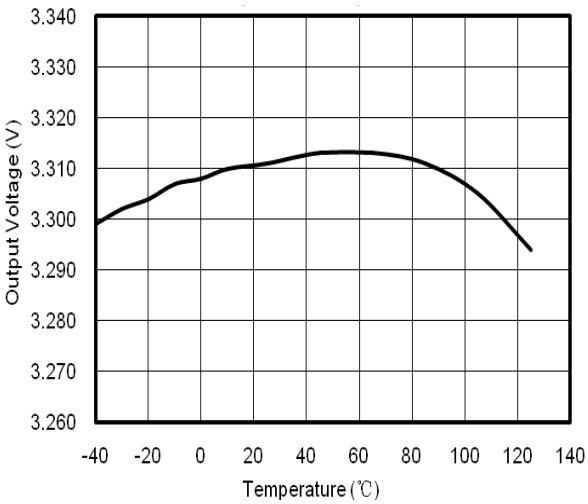
Output Voltage vs. Input Voltage
I_{OUT}=150mA, C_{BYP}=10nF



Output Voltage vs. Output Current
V_{IN}=4.3V

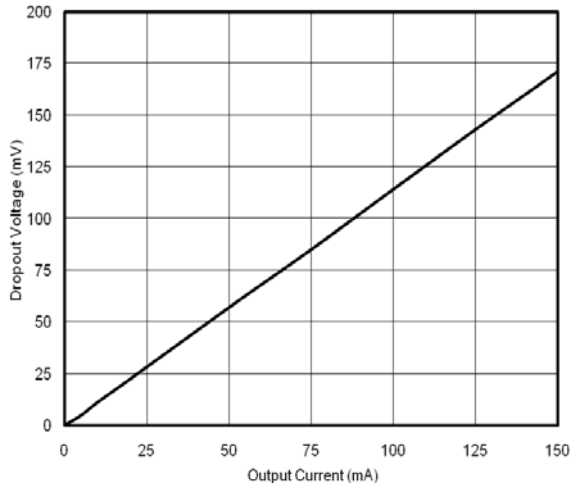


Output Voltage vs. Temperature
V_{IN}=4.3V, I_{OUT}=10mA, C_{BYP}=10nF

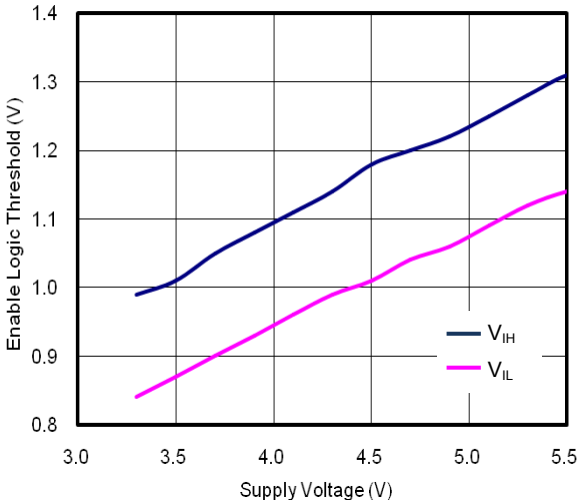


Typical Performance Characteristics (Continued)

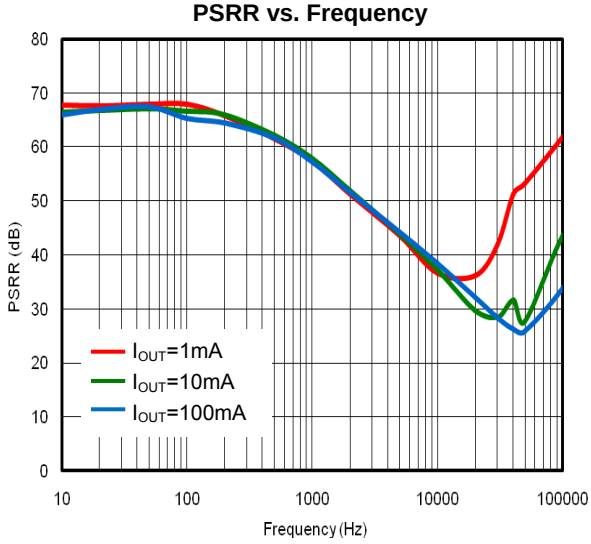
Dropout Voltage vs. Output Current
V_{OUT}=3.3V



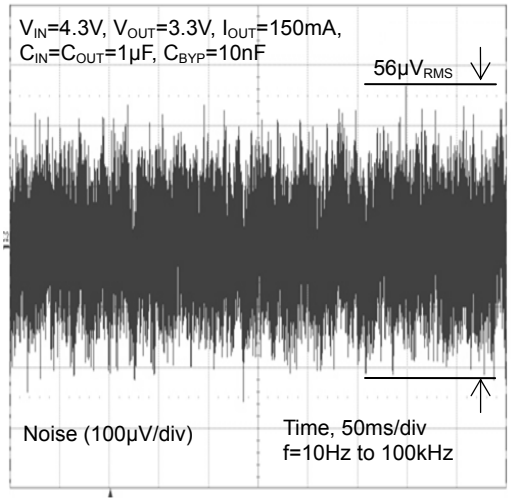
Enable Logic Threshold vs. Supply Voltage



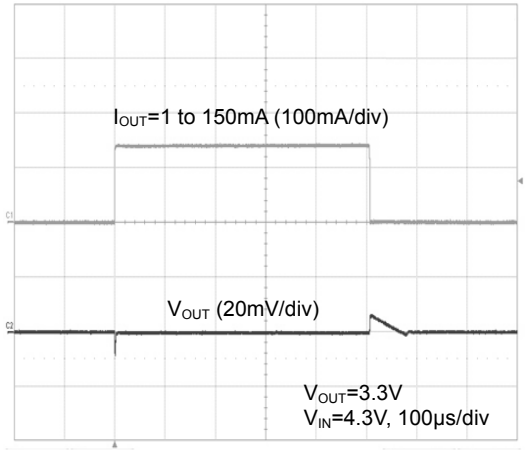
PSRR vs. Frequency



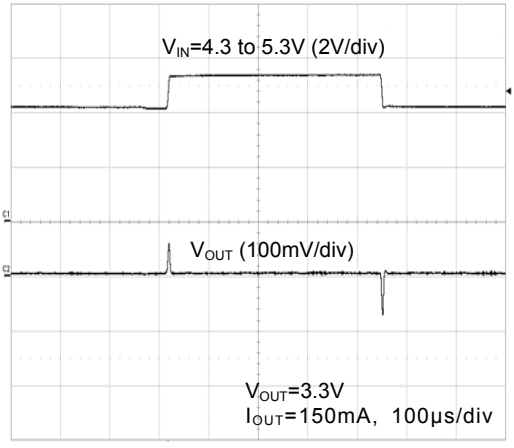
Noise



Load Transient Response

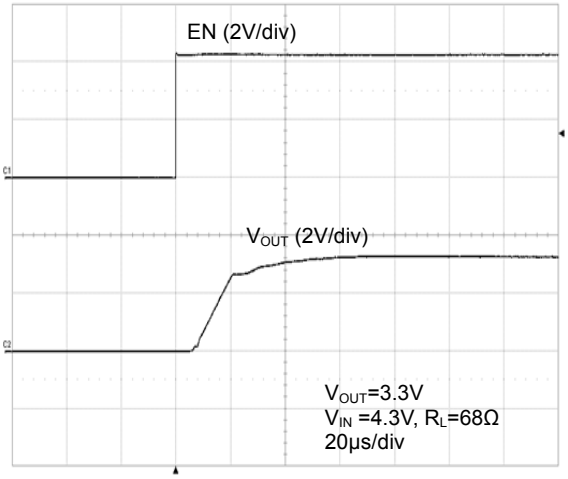


Line Transient Response

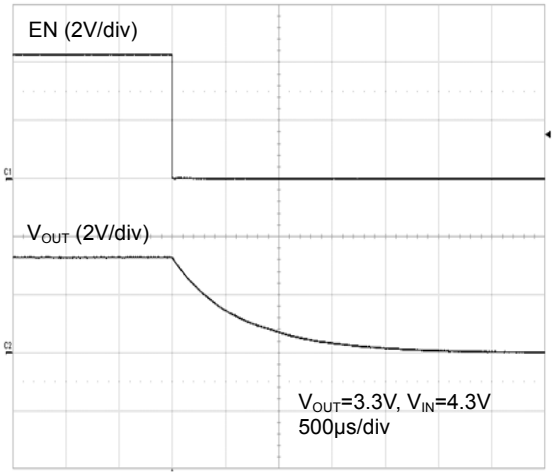


Typical Performance Characteristics (Continued)

Enable Turn-On



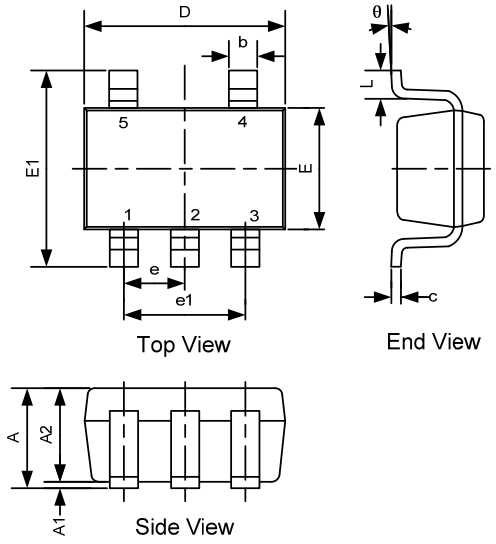
Auto Discharge (No Load)



Package Information

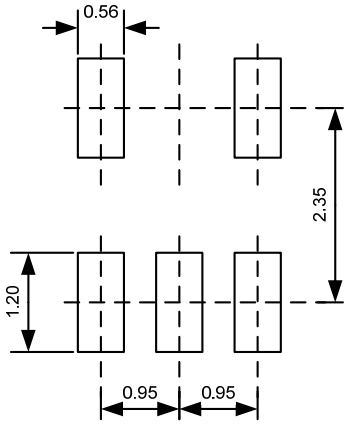
UM1330S-xx SOT23-5

Outline Drawing



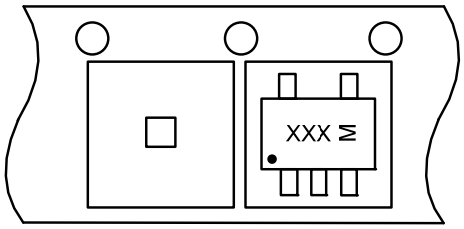
DIMENSIONS						
Symbol	MILLIMETERS			INCHES		
	Min	Typ	Max	Min	Typ	Max
A	1.013	1.15	1.40	0.040	0.045	0.055
A1	0.00	0.05	0.10	0.000	0.002	0.004
A2	1.00	1.10	1.30	0.039	0.043	0.051
b	0.30	-	0.50	0.012	-	0.020
c	0.10	0.15	0.20	0.004	0.006	0.008
D	2.82	-	3.10	0.111	-	0.122
E	1.50	1.60	1.70	0.059	0.063	0.067
E1	2.60	2.80	3.00	0.102	0.110	0.118
e	0.95REF			0.037REF		
e1	1.90REF			0.075REF		
L	0.30	-	0.60	0.012	-	0.024
θ	0°	-	8°	0°	-	8°

Land Pattern



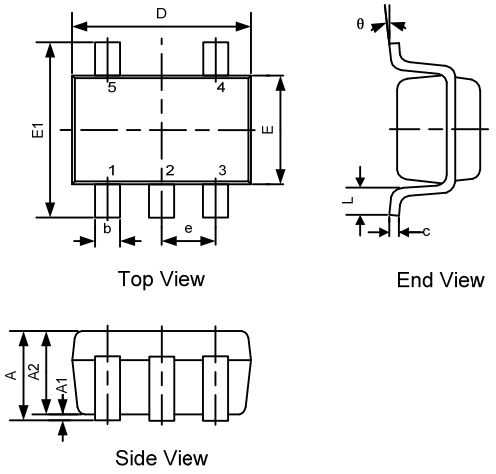
NOTES:
1. Compound dimension: 2.92×1.60;
2. Unit: mm;
3. General tolerance ±0.05mm unless otherwise specified;
4. The layout is just for reference.

Tape and Reel Orientation



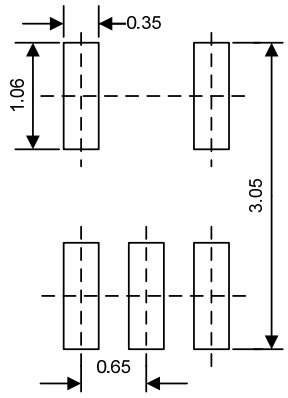
UM1330P-xx SOT353

Outline Drawing



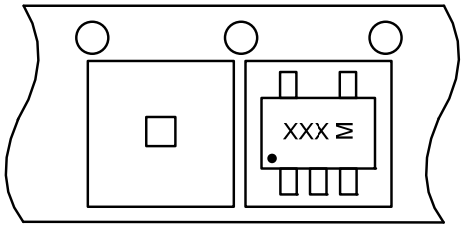
DIMENSIONS						
Symbol	MILLIMETERS			INCHES		
	Min	Typ	Max	Min	Typ	Max
A	0.85	-	1.10	0.033	-	0.043
A1	0.00	-	0.10	0.000	-	0.004
A2	0.80	-	1.00	0.031	-	0.039
b	0.10	-	0.35	0.004	-	0.014
c	0.08	-	0.22	0.003	-	0.009
D	1.80	2.15	2.20	0.071	0.085	0.087
E	1.15	1.30	1.35	0.045	0.051	0.053
E1	2.00	-	2.45	0.079	-	0.096
e	0.65BSC			0.026REF		
L	0.25	-	0.46	0.010	-	0.018
θ	0°	-	8°	0°	-	8°

Land Pattern



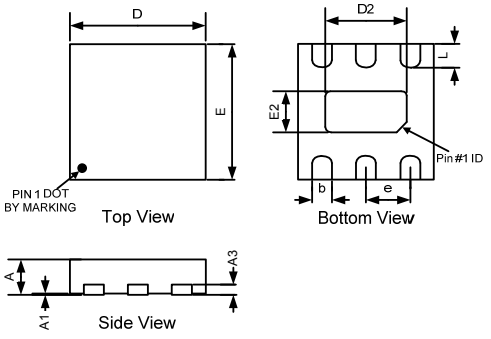
NOTES:
1. Compound dimension: 2.15×1.30;
2. Unit: mm;
3. General tolerance ±0.05mm unless otherwise specified;
4. The layout is just for reference.

Tape and Reel Orientation



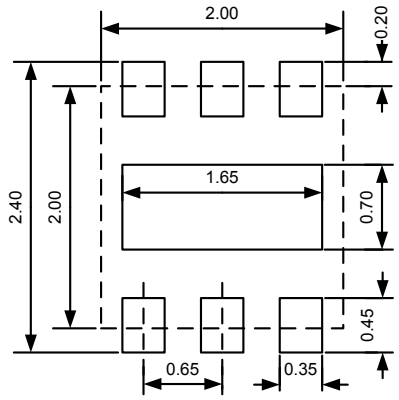
UM1330DA-xx DFN6 2.0×2.0

Outline Drawing



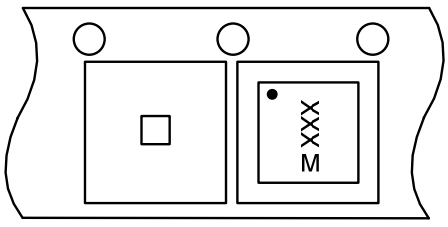
DIMENSIONS						
Symbol	MILLIMETERS			INCHES		
	Min	Typ	Max	Min	Typ	Max
A	0.55	-	0.80	0.022	-	0.031
A1	0.00	-	0.05	0.000	-	0.002
A3	0.20REF			0.008REF		
b	0.25	0.30	0.35	0.010	0.012	0.014
D	1.924	2.00	2.076	0.076	0.079	0.082
D2	1.35	-	1.75	0.053	-	0.069
E	1.924	2.00	2.076	0.076	0.079	0.082
E2	0.65	-	1.06	0.026	-	0.042
e	0.65BSC			0.026BSC		
L	0.224	-	0.45	0.009	-	0.018

Land Pattern



NOTES:
1. Compound dimension: 2.00×2.00；
2. Unit: mm;
3. General tolerance ±0.05mm unless otherwise specified;
4. The layout is just for reference.

Tape and Reel Orientation



GREEN COMPLIANCE

Union Semiconductor is committed to environmental excellence in all aspects of its operations including meeting or exceeding regulatory requirements with respect to the use of hazardous substances. Numerous successful programs have been implemented to reduce the use of hazardous substances and/or emissions.
All Union components are compliant with the RoHS directive, which helps to support customers in their compliance with environmental directives. For more green compliance information, please visit:
http://www.union-ic.com/index.aspx?cat_code=RoHSDeclaration

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