

Ultra Low Quiescent Current Linear Regulator

UM153xxS SOT23-3

UM153xxY SOT89-3

UM153xxDA DFN4 1.8×1.2

UM154xxS SOT23-5

UM154xxY SOT89-5

UM154xxDA DFN6 2.0×2.0

General Description

The UM153xx/UM154xx series are ultra low quiescent current low dropout linear regulators designed for low power portable applications. The range of output voltage is from 1.3V to 5.0V while operated from 2.2V to 5.5V input. The EN function of UM154xx can disable the entire circuit by inputting low level signal.

The UM153xx/UM154xx series offer high output voltage accuracy, excellent transient response, stability with ultra low ESR ceramic capacitors as small as 1μF, thermal overload protection and output current limiting. The UM153xx is available in a low profile SOT23-3, SOT89-3 or DFN4 1.8×1.2 package. The UM154xx is available in a low profile SOT23-5, SOT89-5 or DFN6 2.0×2.0 package.

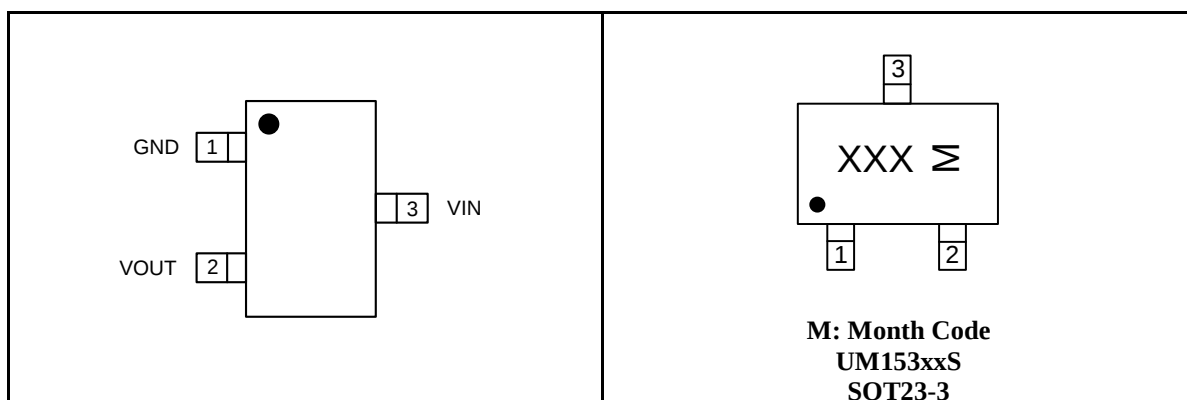
Applications

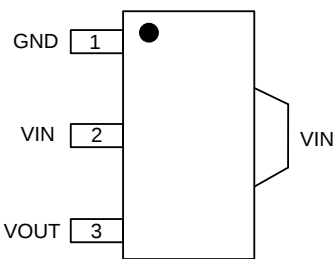
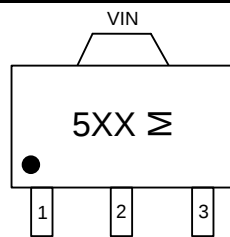
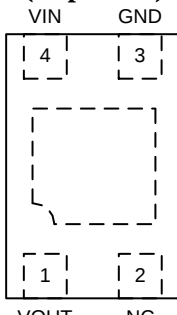
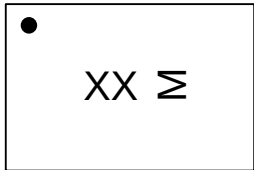
- Battery-Powered Systems
- Reference Voltage Sources
- Portable AV Systems
- Portable Games
- Cellular Phones
- Utility Meters
- Toys

Features

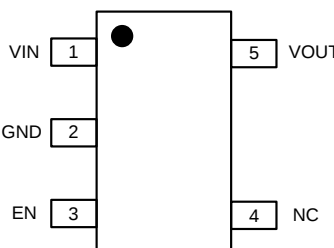
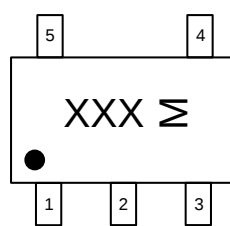
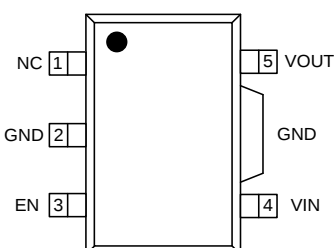
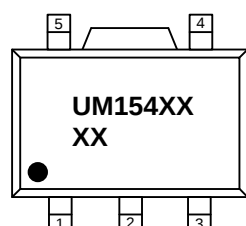
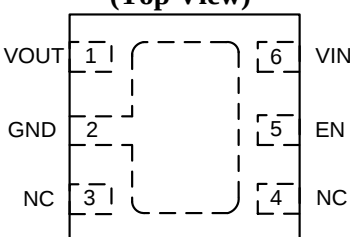
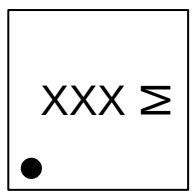
- Maximum Input Voltage: 5.5V
- ±2.0% Voltage Accuracy at 30mA
- Fast Transient Response
- Output Current Limit
- Stable with 1μF Output Capacitor
- Thermal Overload Protection
- Low Profile SOT23-3, SOT89-3 or DFN4 1.8×1.2 Package(UM153xx)
- Low Profile SOT23-5, SOT89-5 or DFN6 2.0×2.0 Package(UM154xx)

UM153xx Series Pin Configurations & Top View



	 M: Month Code UM153xxY SOT89-3
(Top View) 	 M: Month Code UM153xxDA DFN4 1.8 ×1.2

UM154xx Series Pin Configurations & Top View

	 M: Month Code UM154xxS SOT23-5
	 XX: Week Code UM154xxY SOT89-5
(Top View) 	 M: Month Code UM154xxDA DFN6 2.0 ×2.0

Pin Description

Pin Number						Symbol	Function
UM153xxS	UM153xxY	UM153xxDA	UM154xxS	UM154xxY	UM154xxDA		
3	2	4	1	4	6	VIN	Power Supply
1	1	3	2	2	2	GND	Ground
-	-	-	3	3	5	EN	Enable Input, Active High
-	-	2	4	1	3, 4	NC	Not Connected
2	3	1	5	5	1	VOOUT	Voltage Regulated Output

Available Voltage Version

Part Number	Output Voltage	Marking Code	Package	Shipping Qty
UM15313S	1.3V	UC3	SOT23-3	3000pcs/7Inch Tape & Reel
UM15315S	1.5V	UC5	SOT23-3	
UM15318S	1.8V	UC8	SOT23-3	
UM15325S	2.5V	UD5	SOT23-3	
UM15327S	2.7V	UD7	SOT23-3	
UM15328S	2.8V	UD8	SOT23-3	
UM15330S	3.0V	UDA	SOT23-3	
UM15333S	3.3V	UG3	SOT23-3	
UM15335S	3.5V	UG5	SOT23-3	
UM15336S	3.6V	UG6	SOT23-3	
UM15338S	3.8V	UG8	SOT23-3	
UM15340S	4.0V	UGA	SOT23-3	
UM15342S	4.2V	UI2	SOT23-3	
UM15343S	4.3V	UI3	SOT23-3	
UM15345S	4.5V	UI5	SOT23-3	
UM15347S	4.7V	UI7	SOT23-3	
UM15348S	4.8V	UI8	SOT23-3	
UM15350S	5.0V	UIA	SOT23-3	

Available Voltage Version (Continued)

Part Number	Output Voltage	Marking Code	Package	Shipping Qty
UM15313Y	1.3V	5A3	SOT89-3	1000pcs/7Inch Tape & Reel
UM15315Y	1.5V	5C5	SOT89-3	
UM15318Y	1.8V	5C8	SOT89-3	
UM15325Y	2.5V	5D5	SOT89-3	
UM15327Y	2.7V	5D7	SOT89-3	
UM15328Y	2.8V	5D8	SOT89-3	
UM15330Y	3.0V	5AA	SOT89-3	
UM15333Y	3.3V	5G3	SOT89-3	
UM15335Y	3.5V	5G5	SOT89-3	
UM15336Y	3.6V	5G6	SOT89-3	
UM15338Y	3.8V	5G8	SOT89-3	
UM15340Y	4.0V	5GA	SOT89-3	
UM15342Y	4.2V	5GC	SOT89-3	
UM15343Y	4.3V	5GD	SOT89-3	
UM15345Y	4.5V	5GH	SOT89-3	
UM15347Y	4.7V	5GM	SOT89-3	
UM15348Y	4.8V	5GJ	SOT89-3	
UM15350Y	5.0V	5GN	SOT89-3	
UM15313DA	1.3V	A3	DFN4 1.8×1.2	3000pcs/7Inch Tape & Reel
UM15315DA	1.5V	A4	DFN4 1.8×1.2	
UM15318DA	1.8V	A5	DFN4 1.8×1.2	
UM15325DA	2.5V	A6	DFN4 1.8×1.2	
UM15327DA	2.7V	A7	DFN4 1.8×1.2	
UM15328DA	2.8V	A8	DFN4 1.8×1.2	
UM15330DA	3.0V	A9	DFN4 1.8×1.2	
UM15333DA	3.3V	AS	DFN4 1.8×1.2	
UM15335DA	3.5V	AT	DFN4 1.8×1.2	
UM15336DA	3.6V	AU	DFN4 1.8×1.2	
UM15338DA	3.8V	AV	DFN4 1.8×1.2	
UM15340DA	4.0V	AZ	DFN4 1.8×1.2	
UM15342DA	4.2V	B2	DFN4 1.8×1.2	
UM15343DA	4.3V	B3	DFN4 1.8×1.2	
UM15345DA	4.5V	B5	DFN4 1.8×1.2	
UM15347DA	4.7V	B7	DFN4 1.8×1.2	
UM15348DA	4.8V	B8	DFN4 1.8×1.2	
UM15350DA	5.0V	BA	DFN4 1.8×1.2	

Available Voltage Version (Continued)

Part Number	Output Voltage	Marking Code	Package	Shipping Qty
UM15413S	1.3V	5FB	SOT23-5	3000pcs/7Inch Tape & Reel
UM15415S	1.5V	5FC	SOT23-5	
UM15418S	1.8V	5FD	SOT23-5	
UM15425S	2.5V	5FE	SOT23-5	
UM15427S	2.7V	5FF	SOT23-5	
UM15428S	2.8V	5FH	SOT23-5	
UM15430S	3.0V	5FL	SOT23-5	
UM15433S	3.3V	5FM	SOT23-5	
UM15435S	3.5V	5FJ	SOT23-5	
UM15436S	3.6V	5FK	SOT23-5	
UM15438S	3.8V	5FN	SOT23-5	
UM15440S	4.0V	5FP	SOT23-5	
UM15442S	4.2V	5FQ	SOT23-5	
UM15443S	4.3V	5FR	SOT23-5	
UM15445S	4.5V	5FS	SOT23-5	
UM15447S	4.7V	5FT	SOT23-5	
UM15448S	4.8V	5FY	SOT23-5	
UM15450S	5.0V	5FU	SOT23-5	
UM15413Y	1.3V	UM15413	SOT89-5	1000pcs/7Inch Tape & Reel
UM15415Y	1.5V	UM15415	SOT89-5	
UM15418Y	1.8V	UM15418	SOT89-5	
UM15425Y	2.5V	UM15425	SOT89-5	
UM15427Y	2.7V	UM15427	SOT89-5	
UM15428Y	2.8V	UM15428	SOT89-5	
UM15430Y	3.0V	UM15430	SOT89-5	
UM15433Y	3.3V	UM15433	SOT89-5	
UM15435Y	3.5V	UM15435	SOT89-5	
UM15436Y	3.6V	UM15436	SOT89-5	
UM15438Y	3.8V	UM15438	SOT89-5	
UM15440Y	4.0V	UM15440	SOT89-5	
UM15442Y	4.2V	UM15442	SOT89-5	
UM15443Y	4.3V	UM15443	SOT89-5	
UM15445Y	4.5V	UM15445	SOT89-5	
UM15447Y	4.7V	UM15447	SOT89-5	
UM15448Y	4.8V	UM15448	SOT89-5	
UM15450Y	5.0V	UM15450	SOT89-5	

Available Voltage Version (Continued)

Part Number	Output Voltage	Marking Code	Package	Shipping Qty
UM15413DA	1.3V	AG2	DFN6 2.0×2.0	3000pcs/7Inch Tape & Reel
UM15415DA	1.5V	AG3	DFN6 2.0×2.0	
UM15418DA	1.8V	AG4	DFN6 2.0×2.0	
UM15425DA	2.5V	AG5	DFN6 2.0×2.0	
UM15427DA	2.7V	AG6	DFN6 2.0×2.0	
UM15428DA	2.8V	AG7	DFN6 2.0×2.0	
UM15430DA	3.0V	AG8	DFN6 2.0×2.0	
UM15433DA	3.3V	AG9	DFN6 2.0×2.0	
UM15435DA	3.5V	AGA	DFN6 2.0×2.0	
UM15436DA	3.6V	AGB	DFN6 2.0×2.0	
UM15438DA	3.8V	AGC	DFN6 2.0×2.0	
UM15440DA	4.0V	AGD	DFN6 2.0×2.0	
UM15442DA	4.2V	AGE	DFN6 2.0×2.0	
UM15443DA	4.3V	AGF	DFN6 2.0×2.0	
UM15445DA	4.5V	AGG	DFN6 2.0×2.0	
UM15447DA	4.7V	AGH	DFN6 2.0×2.0	
UM15448DA	4.8V	AGJ	DFN6 2.0×2.0	
UM15450DA	5.0V	AGK	DFN6 2.0×2.0	

Absolute Maximum Ratings (Note 1)

Symbol	Parameter	Value	Unit
V_{IN}	Supply Voltage on IN Pin	-0.3 to +6.5	V
V_{OUT}	Voltage on OUT Pin	-0.3 to +6.5	V
V_{EN}	Voltage on EN Pin	-0.3 to +6.5	V
T_J	Operating Junction Temperature (Notes 2, 3)	-40 to +125	°C
T_{STG}	Storage Temperature Range	-65 to +150	°C
T_L	Lead Temperature for Soldering 10 seconds	+300	°C

Recommended Operating Conditions (Note 4)

Parameter	Value
Supply Input Voltage	2.2 V to 5.5V
Junction Temperature Range	-40 °C to 125 °C
Ambient Temperature Range	-40 °C to 85 °C

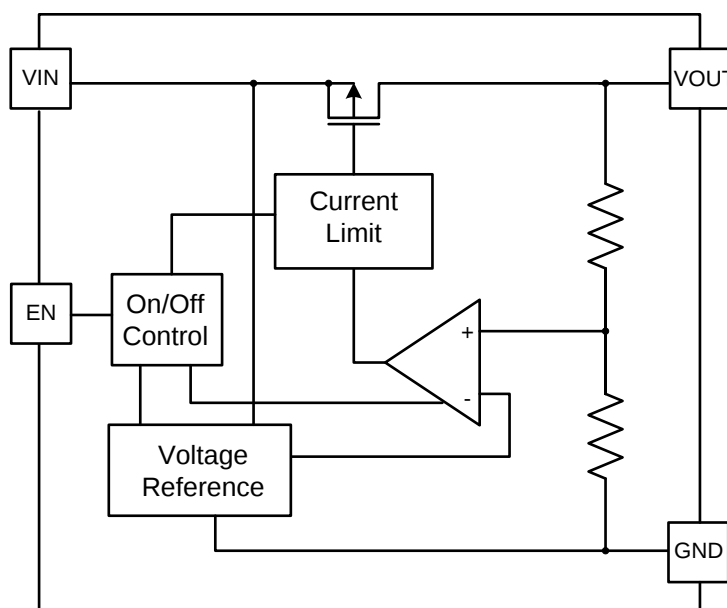
Note 1: Absolute Maximum Ratings are those values beyond which the life of a device may be impaired.

Note 2: The device is guaranteed to meet performance specifications from -40 °C to +85 °C. Specifications over the -40 °C to 125 °C operating junction temperature range are guaranteed by design, characterization and correlation with statistical process controls.

Note 3: This IC includes over temperature protection circuit inside that is intended to protect the device during momentary overload conditions. Over temperature protection trip point is around 160 °C. Continuous operation above the specified maximum operating junction temperature may impair device reliability.

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

Internal Block Diagram



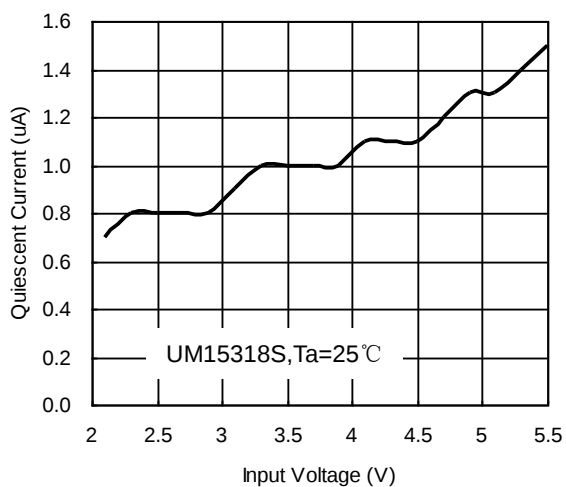
Electrical Characteristics

$V_{IN}=+5V \pm 10\%$, $C_{IN}=1\mu F$, $C_{OUT}=1\mu F$, $T_A=-40^\circ C$ to $+85^\circ C$. Typical conditions are at $V_{IN}=5V$, $T_A=25^\circ C$.

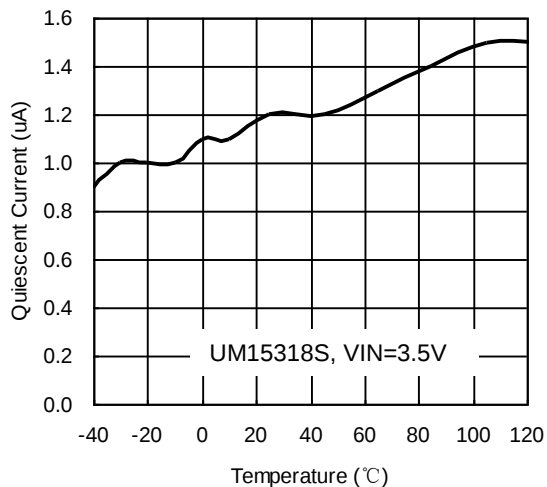
Symbol	Parameter	Test Conditions	Min	Typ	Max	Unit
V_{IN}	Input Voltage Range		2.2		5.5	V
V_{OUT}	Output Voltage Range		1.3		5.0	V
I_Q	Quiescent Current	$I_{OUT}=0mA, V_{IN}=5.0V$		1.2	3	μA
I_{SHDN}	Standby Current	$V_{EN}=0V$			2	μA
I_{ENH}	Enable High Current	$V_{EN}=5.5V$			1	μA
I_{ENL}	Enable Low Current	$V_{EN}=0V$			1	μA
V_{IH}	Enable Input High Voltage		1.0			V
V_{IL}	Enable Input Low Voltage				0.4	V
I_{OUT}	Output Current	$V_{IN} \geq 3V$	100			mA
		$V_{IN} \geq 3.5V$	200			mA
	Output Voltage Accuracy	$V_{IN}=V_{OUT}+1V (V_{IN} \geq 3V)$, $1mA \leq I_{OUT} \leq 30mA$	-2.0		+2.0	%
ΔV_{DO}	Dropout Voltage	$V_{OUT} \leq 2.0V, I_{OUT}=30mA$			$2.35-V_{OUT}$	V
		$2.0V < V_{OUT} < 2.5V$, $I_{OUT}=30mA$			0.25	
		$V_{OUT} \geq 2.5V, I_{OUT}=30mA$			0.13	
I_{LIMIT}	Current Limit			300		mA
	Output Voltage TC			150		ppm/ $^\circ C$
T_{SHDN}	Thermal-Shutdown Temperature			160		$^\circ C$
ΔT_{SHDN}	Thermal-Shutdown Hysteresis			20		$^\circ C$
	Line Regulation	$V_{OUT}+1V \leq V_{IN} \leq 5.5V$ ($V_{IN} \geq 3V$), $I_{OUT}=30mA$		± 0.3	± 0.5	%
	Load Regulation	$V_{IN}=V_{OUT}+1V (V_{IN} \geq 3V)$, $1mA \leq I_{OUT} \leq 100mA$		10		mV
	Output Voltage Noise	10-100kHz, $C_{IN}=1\mu F$, $I_{OUT}=1mA$, UM15318S		170		μV_{rms}
PSRR	Power Supply Ripple Rejection	$V_{IN}=V_{OUT}+1V$ $I_{OUT}=10mA$	f=10Hz	55		dB
			f=100Hz	45		
			f=1kHz	45		

Typical Performance Characteristics

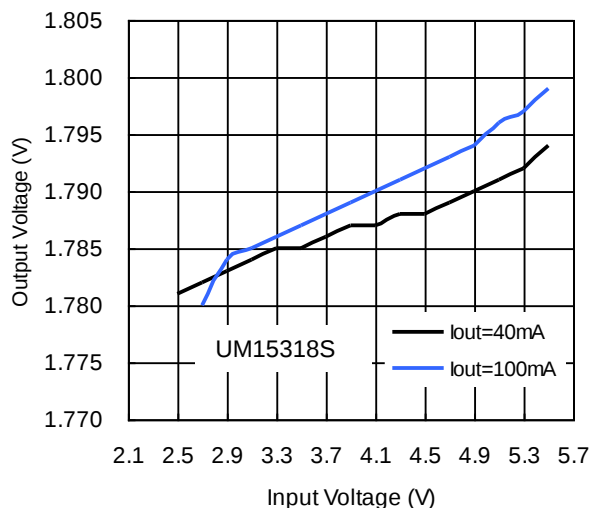
Quiescent Current vs Input Voltage



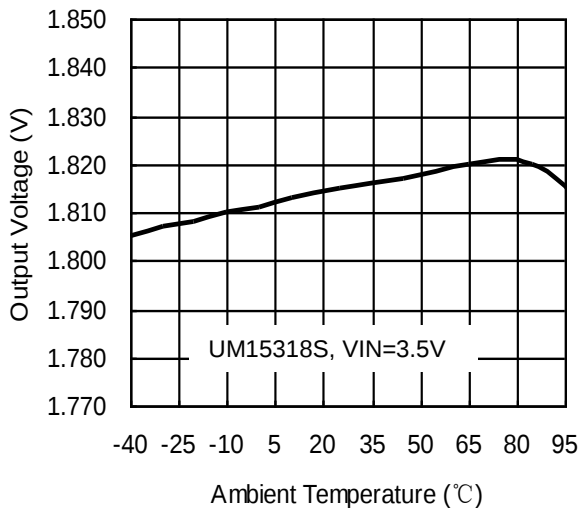
Quiescent Current vs Ambient Temperature



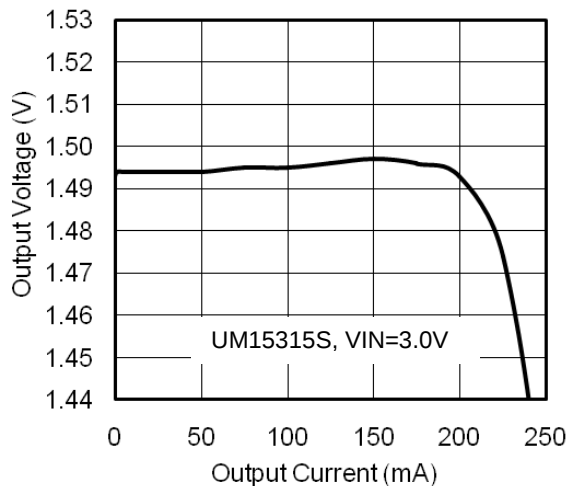
Output Voltage vs Input Voltage



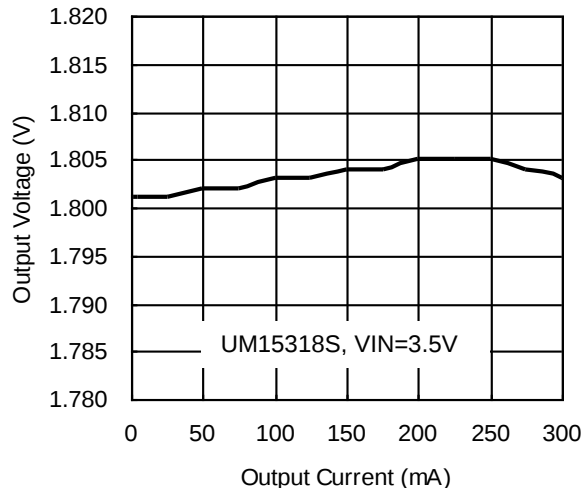
Output Voltage vs Ambient Temperature



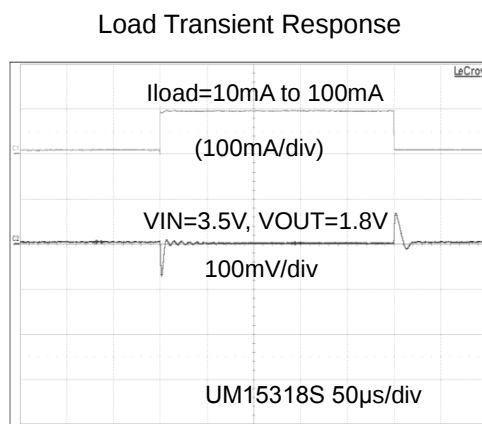
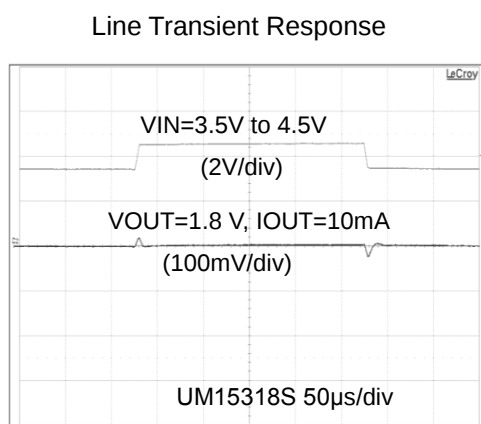
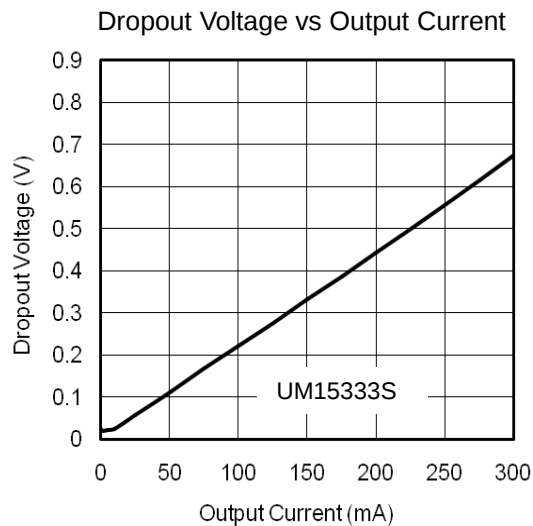
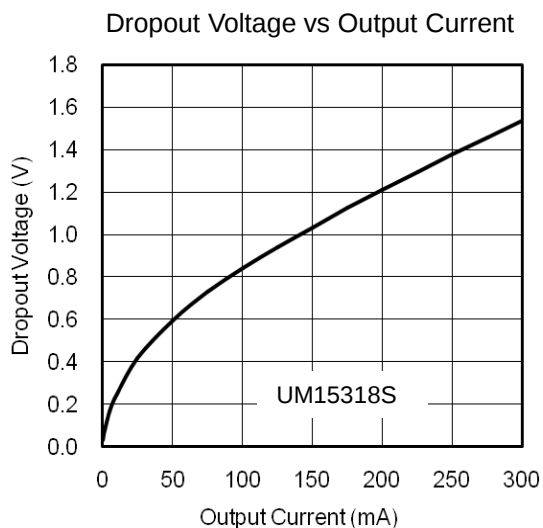
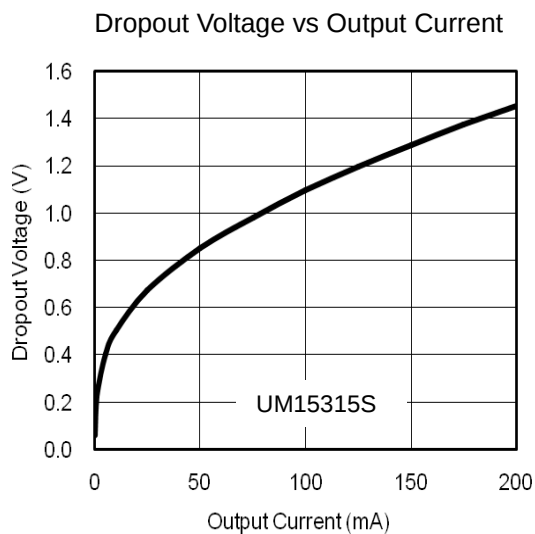
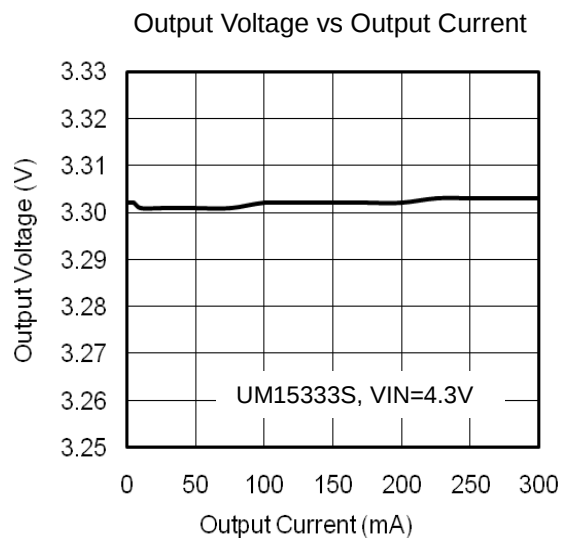
Output Voltage vs Output Current



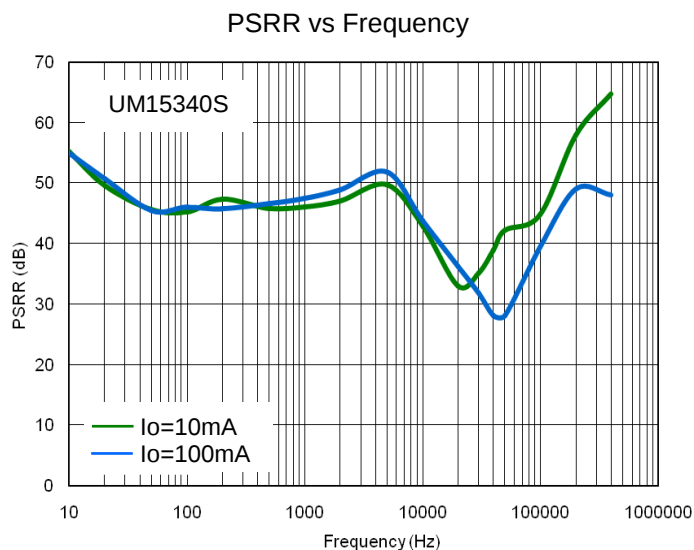
Output Voltage vs Output Current



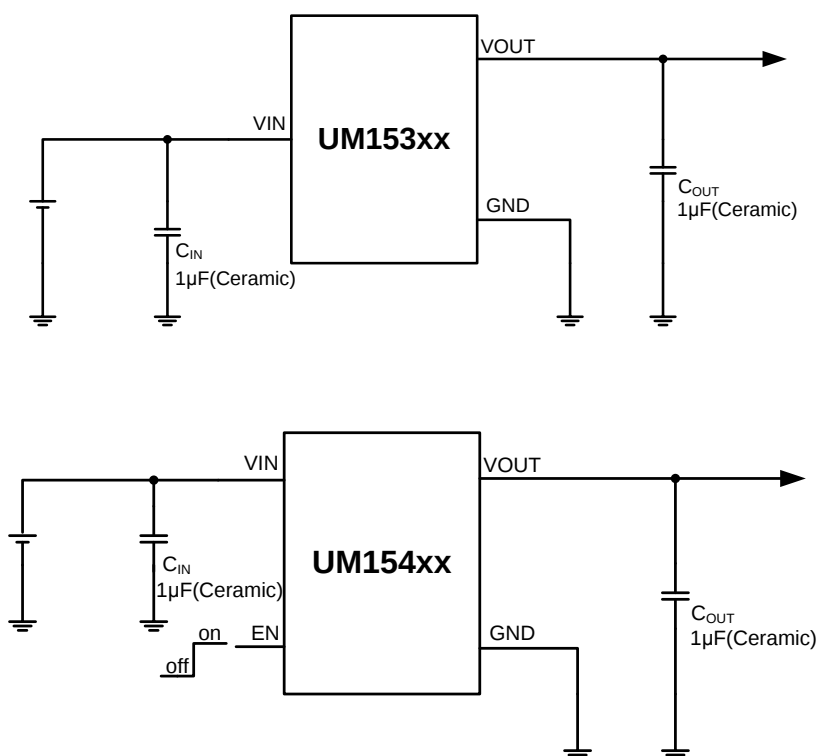
Typical Performance Characteristics (Continued)



Typical Performance Characteristics (Continued)



Typical Application Circuit



Applications Information

Output Capacitance and Transient Response

The UM153xx/UM154xx series regulators are designed to be stable with a wide range of output capacitors. The ESR of the output capacitor affects stability, most notably with small capacitors. A minimum output capacitor of 1µF with an ESR of 0.3Ω or less is recommended to ensure stability. The device's output transient response will be a function of output capacitance. Larger values of

output capacitance decrease the peak deviations and provide improved transient response for larger load current changes. Extra consideration must be given to the use of ceramic capacitors. The X5R and X7R dielectrics result in more stable characteristics and are more suitable for use as the output capacitor. The X7R type has better stability across temperature, while the X5R is less expensive and is available in higher values.

Thermal Protection

Thermal protection disables the output when the junction temperature rises to approximately +160 °C allowing the device to cool. When the junction temperature cools to approximately +140 °C the output circuit is again enabled.

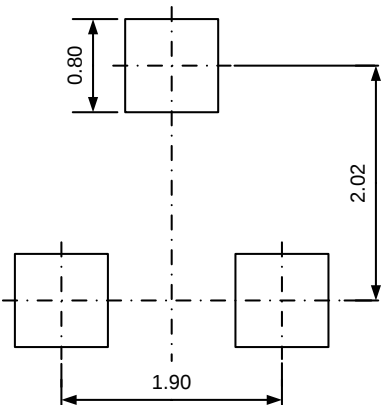
Package Information

UM153xxS SOT23-3

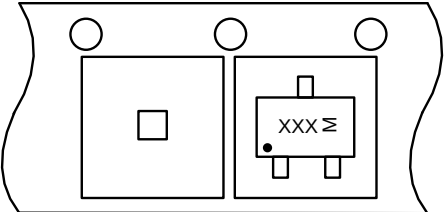
Outline Drawing

DIMENSIONS				
Symbol	MILLIMETERS		INCHES	
	Min	Max	Min	Max
A	1.050	1.250	0.041	0.049
A1	0.000	0.100	0.000	0.004
A2	1.050	1.150	0.041	0.045
b	0.300	0.500	0.012	0.020
c	0.100	0.200	0.004	0.008
D	2.820	3.020	0.111	0.119
E	1.500	1.700	0.059	0.067
E1	2.650	2.950	0.104	0.116
e	0.950REF		0.037REF	
e1	1.800	2.000	0.071	0.079
L	0.550REF		0.022REF	
L1	0.300	0.600	0.012	0.024
θ	0°	8°	0°	8°

Land Pattern

	NOTES: - Compound dimension: 2.92×1.60; - Unit: mm; - General tolerance ±0.05mm unless otherwise specified; - The layout is just for reference.
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Tape and Reel Orientation

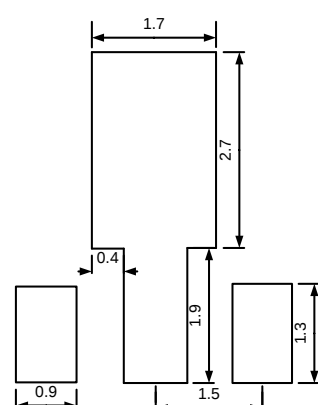


UM153xxY SOT89-3

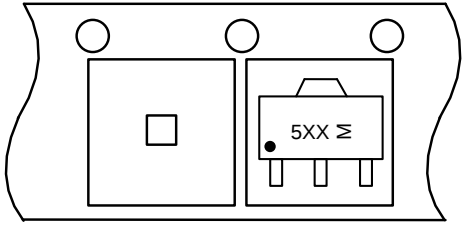
Outline Drawing

DIMENSIONS				
Symbol	MILLIMETERS		INCHES	
	Min	Max	Min	Max
A	1.400	1.600	0.055	0.063
b	0.320	0.520	0.013	0.020
b1	0.400	0.580	0.016	0.023
c	0.350	0.440	0.014	0.017
D	4.400	4.600	0.173	0.181
D1	1.55REF		0.061REF	
E	2.300	2.600	0.091	0.102
E1	3.940	4.250	0.155	0.167
e	1.5TYP		0.06TYP	
e1	3 TYP		0.118 TYP	
L	0.900	1.200	0.035	0.047

Land Pattern

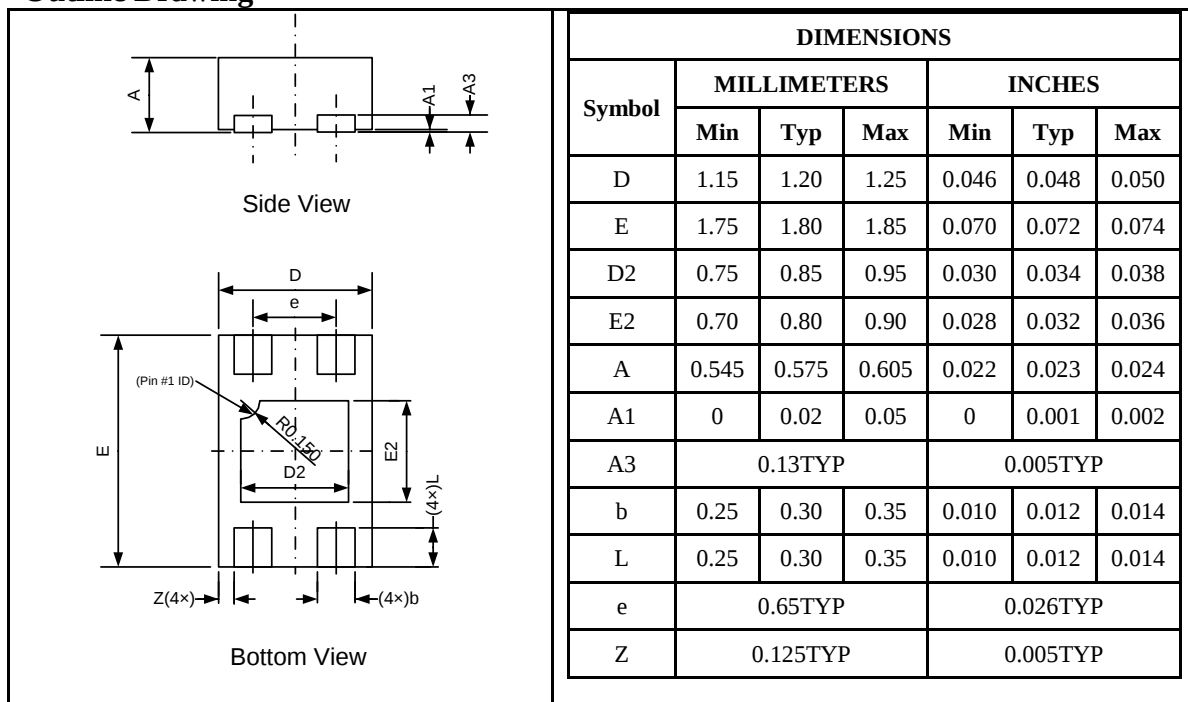
 The diagram shows a central rectangular pad with dimensions 1.7 (width) and 2.7 (height). To its left is a smaller pad with width 0.9 and height 0.4. To its right is another pad with width 1.3 and height 1.3. The distance between the central pad and the left pad is 1.5. The distance between the central pad and the right pad is 1.9. The overall width of the pattern is 1.7 + 1.5 + 1.3 = 4.5 mm. The overall height is 2.7 + 1.3 = 4.0 mm.	NOTES: 1. Compound dimension: 4.5 × 2.45; 2. Unit: mm; 3. General tolerance $\pm 0.05\text{mm}$ unless otherwise specified; 4. The layout is just for reference.
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Tape and Reel Orientation

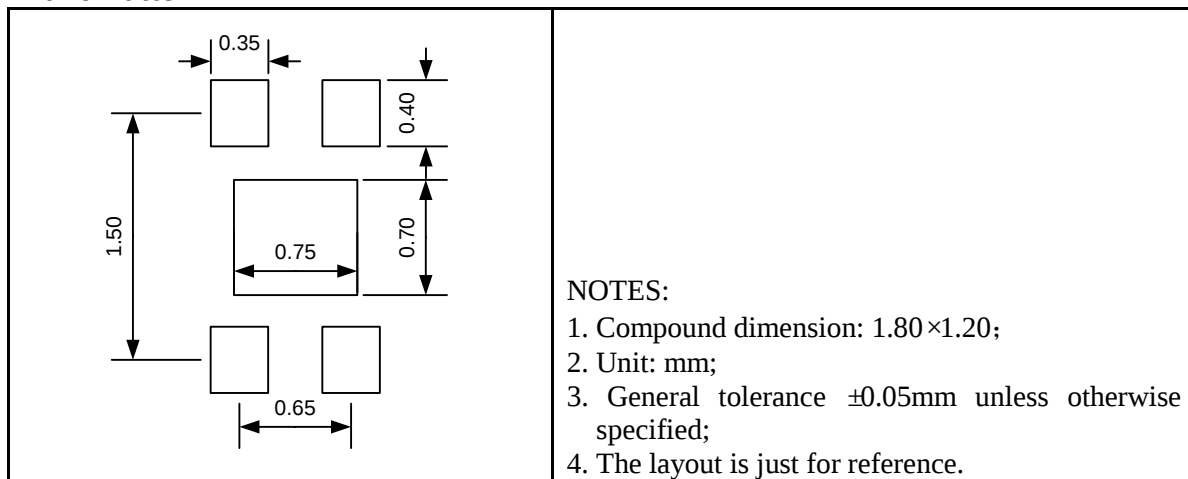
 The diagram shows a carrier tape with two components. The left component is a square pad. The right component is a rectangular pad with three pins. The text '5XX' is printed on the right component, followed by a symbol that looks like a stylized 'Z' or 'N'.
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UM153xxDA DFN4 1.8×1.2

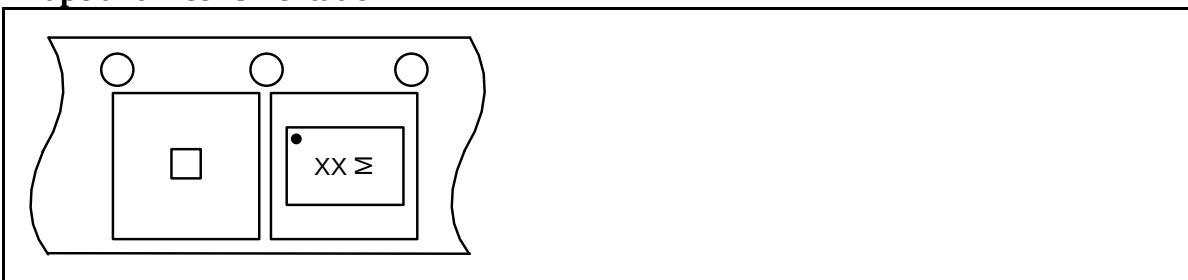
Outline Drawing



Land Pattern

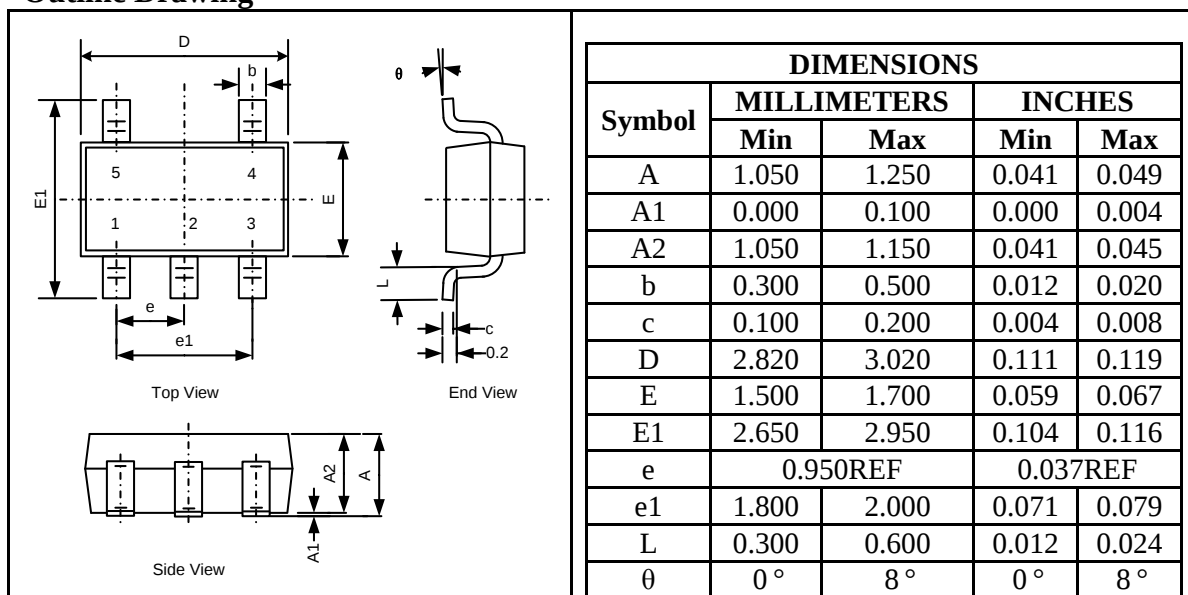


Tape and Reel Orientation

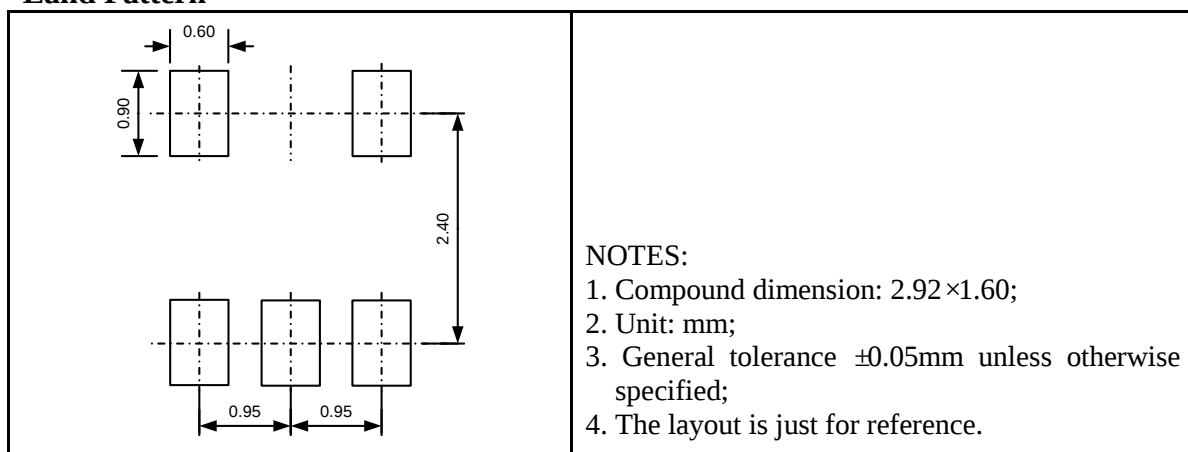


UM154xxS SOT23-5

Outline Drawing



Land Pattern

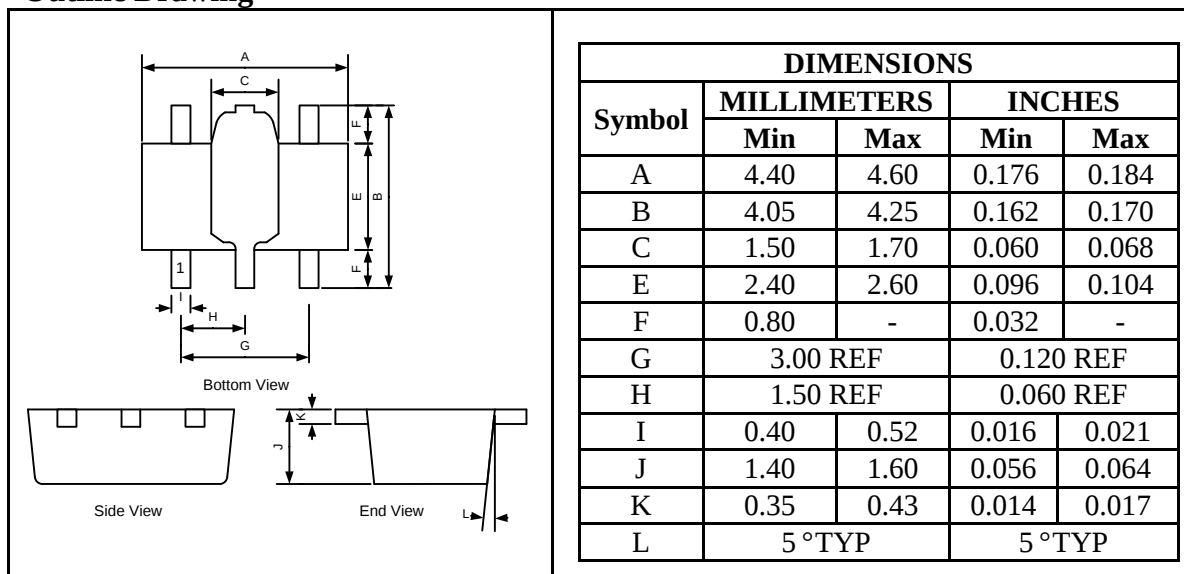


Tape and Reel Orientation

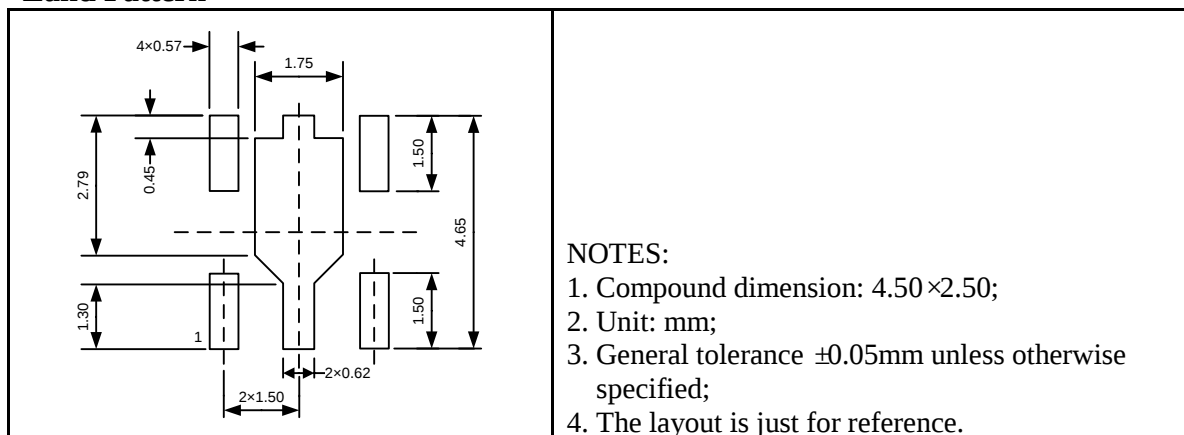


UM154xxY SOT89-5

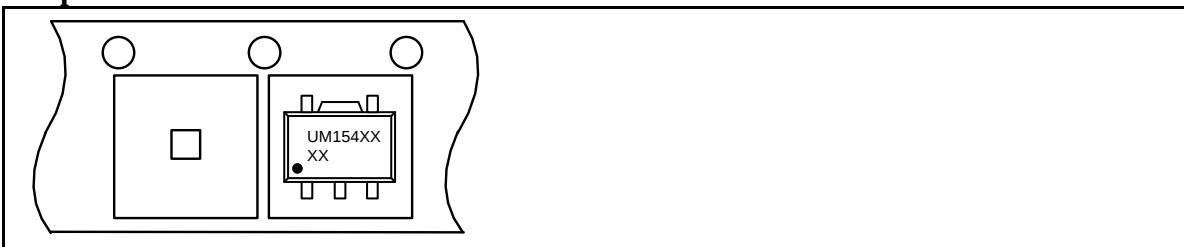
Outline Drawing



Land Pattern

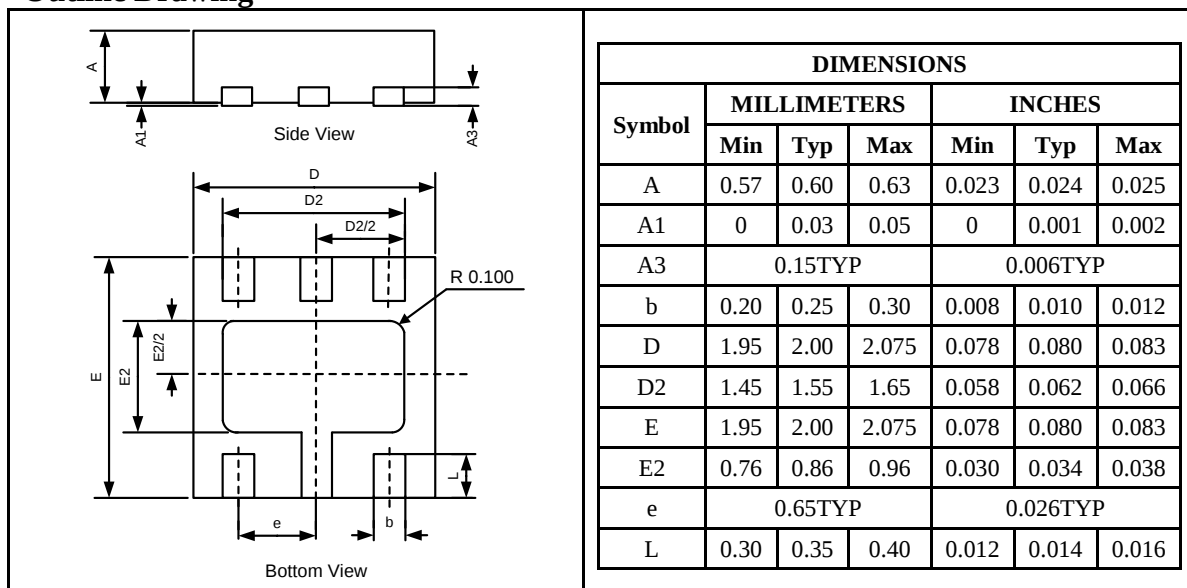


Tape and Reel Orientation

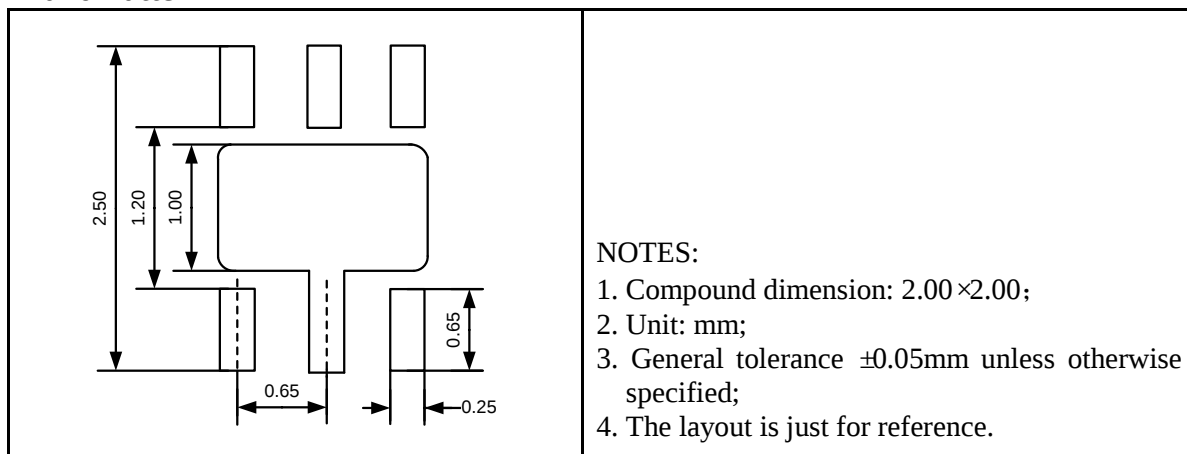


UM154xxDA DFN6 2.0×2.0

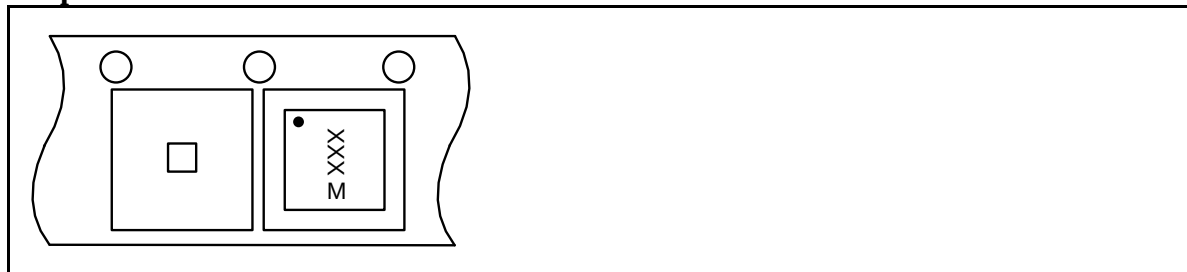
Outline Drawing



Land Pattern



Tape and Reel Orientation



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