150mA, 30V, 1μA I_Q Voltage Regulators with Enable

UM1470S-xx *SOT23-5*
UM1470Y-xx *SOT89-3*
UM1480S-xx *SOT23-5*
UM1481S-xx *SOT23-5*
UM1482S-xx *SOT23-5*
UM1480DA-xx DFN6 2.0*2.0

General Description

The UM1470/UM148X series of linear regulators are ultralow, quiescent current devices designed for power-sensitive applications. A precision band-gap and error amplifier provides 2% accuracy over temperature. Quiescent current of only 1 μA makes these devices ideal solutions for battery-powered, always-on systems that require very little idle-state power dissipation. These devices have thermal-shutdown, current-limit, and reverse-current protections for added safety. Shutdown mode is enabled by pulling the EN pin low. The shutdown current in this mode goes down to 150nA, typical. The UM1470 series is available in SOT23-5 and SOT89-3 packages. The UM1480S, UM1481S and UM1482S are available in SOT23-5 package. UM1480DA is available in DFN6 2.0*2.0 package.

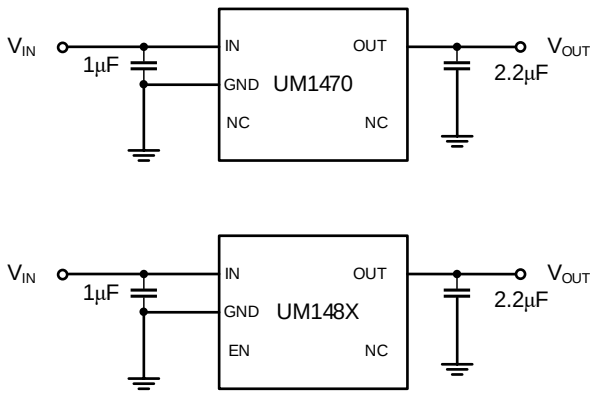
Applications

- Zigbee™ Networks
- Home Automation
- Metering
- Weighing Scales
- Portable Power Tools
- Remote Control Devices
- Wireless Handsets, Smart Phones, PDAs, WLAN, and Other PC Add-On Cards
- White Goods

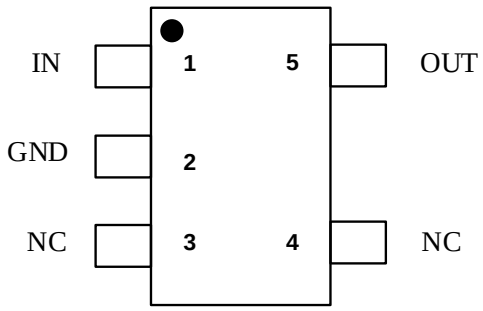
Features

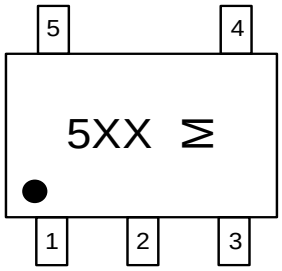
- Ultralow I_Q:1 μA
- Reverse Current Protection
- Low $I_{SHUTDOWN}$: 150nA
- Input Voltage Range: 2.7V to 30V
- Supports 200mA Peak Output
- 2% Accuracy Over Temperature
- Available in Fixed-Output Voltages: 1.2V to 6.5V
- Thermal Shutdown and Overcurrent Protection
- Packages: SOT23-5, SOT89-3, DFN6 2.0*2.0

Typical Application Circuit



Pin Configurations **Top View**





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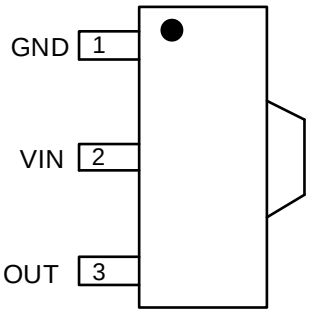
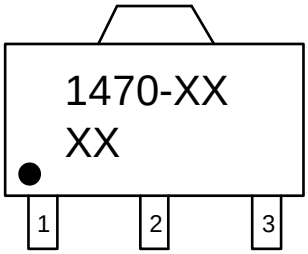
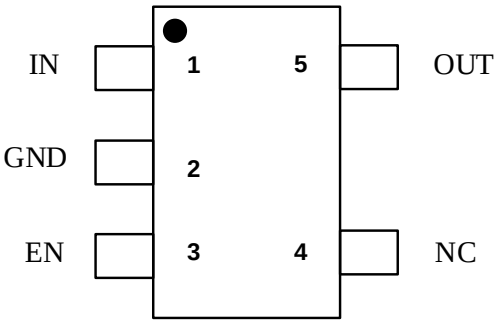
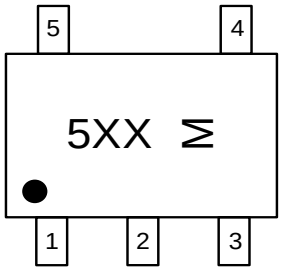
SOT23-5





XX: Week Code
UM1470Y-xx
SOT89-3





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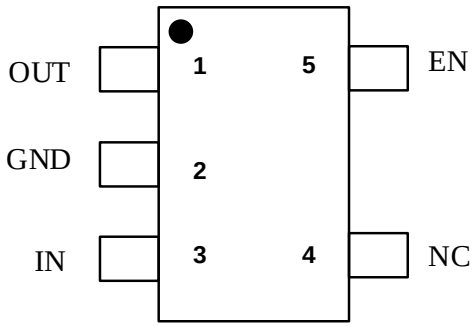
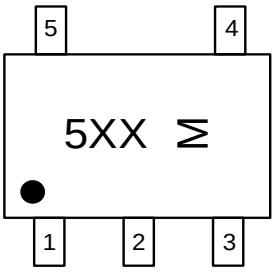
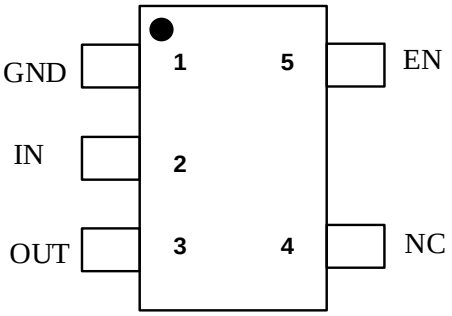
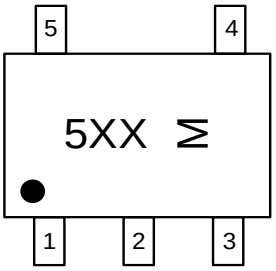




M: Month Code
UM1481S-xx
SOT23-5





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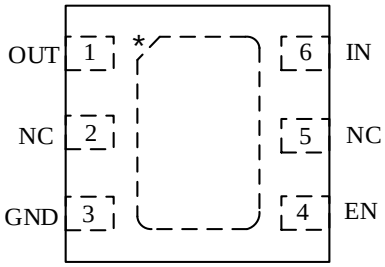
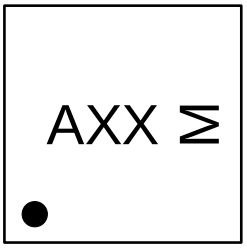
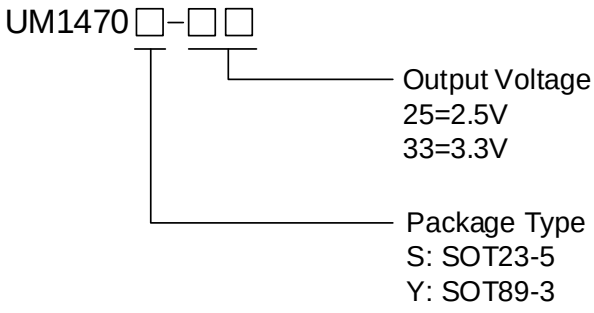
SOT23-5

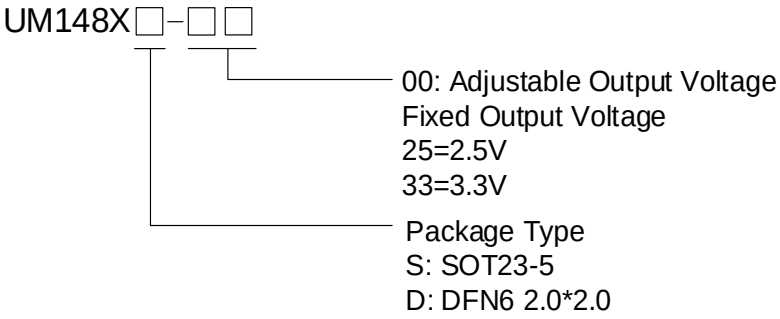




M: Month Code
UM1480DA-xx
DFN6 2.0×2.0

Ordering Information





Marking information

Part Number	Output Voltage	Packaging Type	Marking Code	Shipping Qty
UM1470S-12	1.2V	SOT23-5	5NL	3000pcs/7Inch Tape & Reel
UM1470S-135	1.35V		5NM	
UM1470S-15	1.5V		5NJ	
UM1470S-16	1.6V		5NK	
UM1470S-18	1.8V		5NN	
UM1470S-19	1.9V		5NP	
UM1470S-25	2.5V		5NQ	
UM1470S-27	2.7V		5NR	
UM1470S-28	2.8V		5NS	
UM1470S-30	3.0V		5NT	
UM1470S-33	3.3V		5NY	
UM1470S-36	3.6V		5NU	
UM1470S-38	3.8V		5NZ	
UM1470S-39	3.9V		5PD	
UM1470S-50	5.0V		5PE	
UM1470S-60	6.0V		5PF	
UM1470Y-12	1.2V	SOT89-3	1470-12	3000pcs/7Inch Tape & Reel
UM1470Y-135	1.35V		1470-135	
UM1470Y-15	1.5V		1470-15	
UM1470Y-16	1.6V		1470-16	
UM1470Y-18	1.8V		1470-18	
UM1470Y-19	1.9V		1470-19	
UM1470Y-25	2.5V		1470-25	
UM1470Y-27	2.7V		1470-27	
UM1470Y-28	2.8V		1470-28	
UM1470Y-30	3.0V		1470-30	
UM1470Y-33	3.3V		1470-33	
UM1470Y-36	3.6V		1470-36	
UM1470Y-38	3.8V		1470-38	
UM1470Y-39	3.9V		1470-39	
UM1470Y-50	5.0V		1470-50	
UM1470Y-60	6.0V		1470-60	

Marking information(continue)

Part Number	Output Voltage	Packaging Type	Marking Code	Shipping Qty
UM1480S-12	1.2V	SOT23-5	5PL	3000pcs/7Inch Tape & Reel
UM1480S-135	1.35V		5PM	
UM1480S-15	1.5V		5PJ	
UM1480S-16	1.6V		5PK	
UM1480S-18	1.8V		5PN	
UM1480S-19	1.9V		5PP	
UM1480S-25	2.5V		5PQ	
UM1480S-27	2.7V		5PR	
UM1480S-28	2.8V		5PS	
UM1480S-30	3.0V		5PT	
UM1480S-33	3.3V		5PY	
UM1480S-36	3.6V		5PU	
UM1480S-38	3.8V		5PZ	
UM1480S-39	3.9V		5TF	
UM1480S-50	5.0V		5TH	
UM1480S-60	6.0V		5TL	
UM1481S-30	3.0V	SOT23-5	5TM	3000pcs/7Inch Tape & Reel
UM1481S-33	3.3V		5TJ	
UM1482S-33	3.3V	SOT23-5	5TK	3000pcs/7Inch Tape & Reel
UM1482S-50	5.0V		5TN	
UM1480DA-12	1.2V	DFN6 2.0×2.0	AJD	3000pcs/7Inch Tape & Reel
UM1480DA-15	1.5V		AJE	
UM1480DA-18	1.8V		AJF	
UM1480DA-25	2.5V		AJG	
UM1480DA-30	3.0V		AJH	
UM1480DA-33	3.3V		AJJ	
UM1480DA-50	5.0V		AJK	

Pin Description

Pin							I/O	Description
Name	SOT89-3	SOT23-5				DFN6		
	UM1470Y	UM1470S	UM1480S	UM1481S	UM1482S	UM1480DA		
EN	–	–	3	5	5	4	I	Enable pin. Drive this pin high to enable the device. Drive this pin low to put the device into low current shutdown. This pin can be left floating to enable the device. The maximum voltage must remain below 6.5V
GND	1	2	2	2	1	3	–	Ground
IN	2	1	1	3	2	6	I	Unregulated input to the device
NC	-	3,4	4	4	4	2 , 5	–	No internal connection
OUT	3	5	5	1	3	1	O	Regulated output voltage. Connect a small 2.2μF or greater ceramic capacitor from this pin to ground to assure stability.

Absolute Maximum Ratings (Note1)

Specified at T_J = –40°C to 125°C (unless otherwise noted); all voltages are with respect to GND

Symbol	Parameter	Value	Unit
V_{IN}	voltage	-0.3 to 32	V
V_{EN}		-0.3 to 7	
V_{OUT}		-0.3 to 7	
I_{OUT}	Maximum output current	Internally limited	
Output short-circuit duration		Indefinite	
P_{DISS}	Continuous total power dissipation	See Thermal Information	
T_J	Operating junction temperature,	-55 to 150	°C
T_{stg}	Storage temperature	-55 to 150	°C

Note1: Stresses beyond those listed under Absolute Maximum Ratings may cause permanent damage to the device. These are stress ratings only, which do not imply functional operation of the device at these or any other conditions beyond those indicated under Recommended Operating Conditions. Exposure to absolute-maximum-rated conditions for extended periods may affect device reliability.

Recommended Work Condition

over operating junction temperature range (unless otherwise noted)

Symbol	Parameter	Value	Unit
V_{IN}	Input Voltage	2.7 to 30	V
V_{OUT}	Output voltage	1.2 to 6.5	V
V_{EN}	Enable voltage	0 to 6.5	V
T_J	Operating junction temperature	-40 to 125	℃

Thermal Information

Symbol	Parameter	Value			Unit
		SOT23-5	DFN6	SOT89-3	
θ_{JA}	Junction-to-ambient thermal resistance	212.1	73.1	54.7	°C/W
$\theta_{JC(top)}$	Junction-to-case (top) thermal resistance	78.5	97.0	88.1	°C/W

Electrical Characteristics

At ambient temperature (T_A) = –40°C to +85°C, V_{IN} = $V_{OUT\,(typ)}$ + 1V or 2.7V (whichever is greater), I_{OUT} = 1mA, V_{EN} = 2V, and C_{IN} = C_{OUT} = 2.2μF ceramic, unless otherwise noted. Typical values are at T_A = 25°C.

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
V_{IN}	Input voltage range		2.7		30	V
V_{OUT}	Output voltage range		1.2		6.5	V
V_{OUT}	DC output accuracy	V_{OUT} < 3.3 V	-2%		2%	
		V_{OUT} ≥3.3 V	-1%		1%	
Δ V_{OUT}	Line regulation	($V_{OUT(nom)}$ + 1V, 2.7V) ≤ V_{IN}≤30V		3	10	mV
	Load regulation	V_{IN} = $V_{OUT(typ)}$ + 1.5 V or 3 V (whichever is greater), 100μA≤ I_{OUT}≤150mA		20	50	
V_{DO}	Dropout voltage (Note1,2)	UM1470/1480-33 I_{OUT}=50mA		295	650	mV
		UM1470/1480-33 I_{OUT}=150mA		960	1400	
		UM1470/1480-50 I_{OUT}=50mA		245	500	
		UM1470/1480-50 I_{OUT}=150mA		690	1200	
		UM1470/1480-65 I_{OUT}=50mA		180	500	
		UM1470/1480-65 I_{OUT}=150mA		460	1000	

Electrical Characteristics (continued)

At ambient temperature (T_A) = –40°C to +85°C, V_{IN} = $V_{OUT(typ)}$ + 1 V or 2.7 V (whichever is greater), I_{OUT} = 1 mA, V_{EN} = 2 V, and C_{IN} = C_{OUT} = 2.2μF ceramic, unless otherwise noted. Typical values are at T_A = 25°C.

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$I_{(CL)}$	Output current limit (Note3)	V_{OUT} = 0.9 × $V_{OUT\ (nom)}$	200	320	500	mA
I_{GND}	Ground pin current	I_{OUT} = 0 mA, V_{OUT}≤3.3 V		1.3	2.05	μA
		I_{OUT} = 0 mA, V_{OUT} > 3.3 V		1.4	2.25	
		I_{OUT} = 0 mA, V_{OUT} =30 V		6	10	
		I_{OUT} = 150 mA		350		
$I_{SHUNTDOWN}$	Shutdown current	V_{EN}≤0.4 V, V_{IN} = 2.7 V		150		nA
PSRR	Power-supply rejection ratio	f=10Hz		80		dB
		f=100Hz		62		
		f=1000Hz		52		
V_n	Output noise voltage	BW=10Hz~100kHz, I_{OUT}=10mA,V_{IN}=2.7V, V_{OUT}=1.2V		190		μV_{RMS}
t_{STR}	Start-up time (Note4)	$V_{OUT(nom)}$ ≤ 3.3 V		200	600	μs
		$V_{OUT\ (nom)}$ > 3.3 V		500	1500	
$V_{EN(HI)}$	Enable pin high (enabled)		0.9			V
	Enable pin high (disabled)		0		0.4	
I_{EN}	EN pin current	EN = 1.0 V, V_{IN} = 5.5 V		300		nA
$I_{(REV)}$	Reverse current (flowing out of IN pin)	V_{OUT} = 3 V, V_{IN} = V_{EN} = 0 V		10		nA
	Reverse current (flowing into OUT pin)	V_{OUT} = 3 V, V_{IN} = V_{EN} = 0 V		100		
t_{SD}	Thermal shutdown Temperature	Shutdown, temperature increasing		160		°C
		Reset, temperature decreasing		140		
ESD Ratings						
$V_{(ESD)}$	Electrostatic discharge	Human body model (HBM), per ANSI/ESDA/JEDEC JS-001（Note5）	±2000			V
		Charged device model (CDM), per JEDEC specification JESD22-C101（Note26	±500			

Note1: V_{DO} is measured with V_{IN} = 0.98 × $V_{OUT(nom)}$.

Note2: Dropout is only valid when V_{OUT} ≥ 2.8 V because of the minimum input voltage limits.

Note3: Measured with V_{IN} = V_{OUT} + 3V for V_{OUT} ≤ 2.5V. Measured with V_{IN} = V_{OUT} +2.5V for V_{OUT} > 2.5V.

Note4: Startup time = time from EN assertion to 0.95 × $V_{OUT\ (nom)}$ and load = 47Ω.

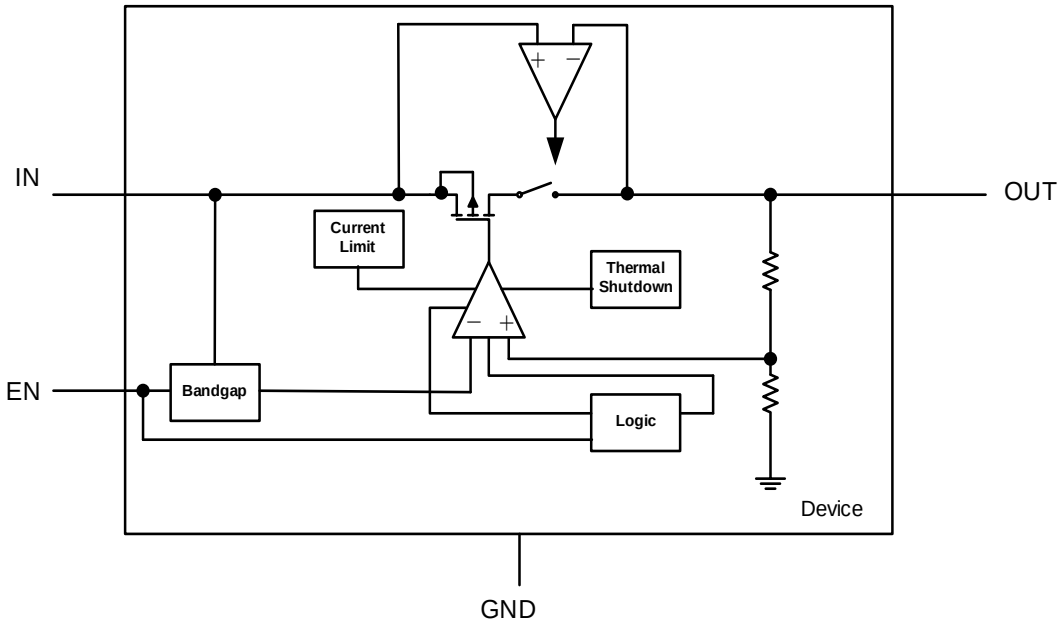
Note5: JEDEC document JEP155 states that 2kV HBM allows safe manufacturing with a standard ESD control process.
Note6: JEDEC document JEP157 states that 500V CDM allows safe manufacturing with a standard ESD control process.

Detailed Description

Overview

The UM1470/UM148X series of devices are ultralow quiescent current, low-dropout (LDO) linear regulators. The UM1470/UM148X offers reverse current protection to block any discharge current from the output into the input. The UM1470/UM148X also features current limit and thermal shutdown for reliable operation.

Functional Block Diagram



Internal Current Limit

The UM1470/UM148X series internal current limit helps protect the regulator during fault conditions. During current limit, the output sources a fixed amount of current that is largely independent of output voltage. In such a case, the output voltage is not regulated, and can be measured as ($V_{OUT} = I_{LIMIT} \times R_{LOAD}$). The PMOS pass transistor dissipates [($V_{IN} – V_{OUT}$) × I_{LIMIT}] until a thermal shutdown is triggered and the device turns off. When cool, the device is turned on by the internal thermal shutdown circuit. If the fault condition continues, the device cycles between current limit and thermal shutdown; see the Thermal Protection section for more details.
The UM1470/UM148X is characterized over the recommended operating output current range up to 150mA. The internal current limit begins to limit the output current at a minimum of 200mA of output current. The UM1470/UM148X continues to operate for output currents between 150mA and 200mA but some data sheet parameters may not be met.

Dropout Voltage

The UM1470/UM148X series use a PMOS pass transistor to achieve low dropout voltage. When ($V_{IN} – V_{OUT}$) is less than the dropout voltage (V_{DO}), the PMOS pass device is in the linear region of operation and the input-to-output resistance is the $R_{DS(ON)}$ of the PMOS pass element. V_{DO}

approximately scales with the output current because the PMOS device functions like a resistor in dropout.
The ground pin current of many linear voltage regulators increases substantially when the device is operated in dropout. This increase in ground pin current while operating in dropout can be several orders of magnitude larger than when the device is not in dropout. The UM1470/UM148X employs a special control loop that limits the increase in ground pin current while operating in dropout. This functionality allows for the most efficient operation while in dropout conditions that can greatly increase battery run times.

Undervoltage Lockout (UVLO)

The UM1470/UM148X uses an undervoltage lockout (UVLO) circuit to keep the output shut off until the internal circuitry operates properly.

Reverse-Current Protection

The UM1470/UM148X has integrated reverse-current protection. Reverse-current protection prevents the flow of current from the OUT pin to the IN pin when output voltage is higher than input voltage. The reverse-current protection circuitry places the power path in high impedance when the output voltage is higher than the input voltage. This setting reduces leakage current from the output to the input to 10nA, typical. The reverse current protection is always active regardless of the enable pin logic state or if the OUT pin voltage is greater than 1.8V. Reverse current can flow if the output voltage is less than 1.8V and if input voltage is less than the output voltage. If voltage is applied to the input pin, then the maximum voltage that can be applied to the OUT pin is the lower of three times the nominal output voltage or 6.5V. For example, if the 1.2V output voltage version is used, then the maximum reverse bias voltage that can be applied to the OUT pin is 3.6V. If the 5.0V output voltage version is used, then the maximum reverse bias voltage that can be applied to the OUT pin is 6.5V.

Device Functional Modes

The UM1470/UM148X has the following functional modes:

- **Enabled:** When the enable pin (EN) goes above 0.9V, the device is enabled. EN is pulled high by a 300nA current source; therefore, EN can be left floating to enable the device. Do not connect EN to V_{IN}. The EN pin is clamped by a 6.5V Zener diode. Do not exceed the 7V absolute maximum rating on the enable pin or excessive current flowing into the Zener clamp will destroy the device.
- **Disabled:** When EN goes below 0.4V, the device is disabled. During this time, OUT is high impedance and the current into IN ($I_{(SHUTDOWN)}$) is typically 150nA.

Application Information

The UM1470/UM148X is a series of devices that belong to a new family of next-generation voltage regulators. These devices consume low quiescent current and deliver excellent line and load transient performance. This performance, combined with low noise and very good PSRR with little (V_{IN} – V_{OUT}) headroom, makes these devices ideal for RF portable applications, current limit, and thermal protection. The UM1470/UM148X is specified from –40°C to +125°C.

Input and Output Capacitor

The UM1470/UM148X devices are stable with output capacitors with an effective capacitance of 2.0μF or greater for output voltages below 1.5V. For output voltages equal or greater than 1.5V, the minimum effective capacitance for stability is 1.5μF. The maximum capacitance for stability is 47μF. The equivalent series resistance (ESR) of the output capacitor must be between 0 Ω and 0.2 Ω for stability. The effective capacitance is the minimum capacitance value of a capacitor after taking into account variations resulting from tolerances, temperature, and dc bias effects. X5R- and X7R-type ceramic capacitors are recommended because these capacitors have minimal variation in value and ESR over temperature. Although an input capacitor is not required for stability, good analog design practice is to connect a 0.1μF to 2.2μF capacitor from IN to GND. This capacitor counteracts reactive input sources and improves transient response, input ripple, and PSRR. An input capacitor is necessary if line transients greater than 10V in magnitude are anticipated.

Transient Response

As with any regulator, increasing the output capacitor size reduces over- and undershoot magnitude, but increases transient response duration.

Design Requirements

Table 1 summarizes the design requirements for Typical Application in page1.

Table 1. Design Requirements for a Wide Input, 3.3V, Low-IQ Rail Application

Parameter	Design specification
V_{IN}	5V to 20V
V_{OUT}	3.3V
$I_{(IN)}$(no load)	<5μA
I_{OUT}(max)	150mA

Detailed Design Procedure

Select a 2.2μF, 10V X7R output capacitor to satisfy the minimum output capacitance requirement with a 3.3V dc bias.

Select a 1.0μF, 25V X7R input capacitor to provide input noise filtering and eliminate high-frequency voltage transients.

Power Supply Recommendations

This device is designed to operate with an input supply range of 2.7V to 30V. If the input supply is noisy, additional input capacitors with low ESR can help improve output noise performance.

Power Dissipation

The ability to remove heat from the die is different for each package type, presenting different considerations in the printed circuit board (PCB) layout. The PCB area around the device that is free of other components moves the heat from the device to ambient air. Performance data for

JEDEC low and high-K boards are given in the Thermal Information table. Using heavier copper increases the effectiveness in removing heat from the device. The addition of plated through-holes to heat-dissipating layers also improves the heatsink effectiveness.
Power dissipation depends on input voltage and load conditions. Power dissipation (P_{DISS}) is equal to the product of the output current and the voltage drop across the output pass element, as shown in Equation 1:

$$P_{DISS} = (V_{IN} - V_{OUT}) \times I_{OUT} \quad (1)$$

Layout Guidelines

Place input and output capacitors as close to the device pins as possible. To improve ac performance (such as PSRR, output noise, and transient response), Union recommends that the board be designed with separate ground planes for V_{IN} and V_{OUT}, with the ground plane connected only at the GND pin of the device. In addition, the ground connection for the output capacitor must be connected directly to the device GND pin.

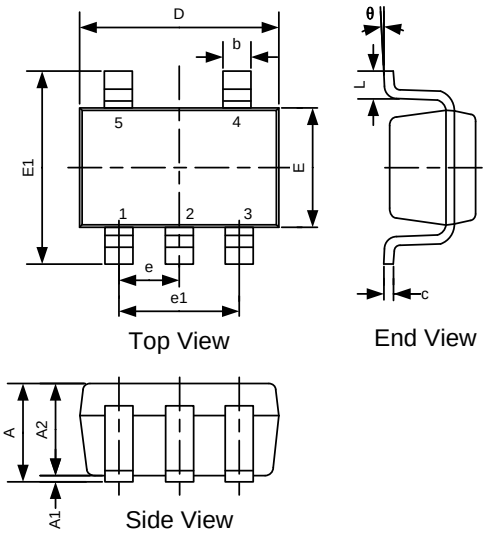
Thermal Protection

Thermal protection disables the output when the junction temperature rises to approximately 165°C, allowing the device to cool. When the junction temperature cools to approximately 145°C, the output circuitry is again enabled. Depending on power dissipation, thermal resistance, and ambient temperature, the thermal protection circuit can cycle on and off. This cycling limits the dissipation of the regulator, protecting it from damage as a result of overheating. Any tendency to activate the thermal protection circuit indicates excessive power dissipation or an inadequate heatsink. For reliable operation, limit junction temperature to 125°C, maximum. To estimate the margin of safety in a complete design (including heatsink), increase the ambient temperature until the thermal protection is triggered; use worst-case loads and signal conditions. For good reliability, thermal protection must trigger at least 35°C above the maximum expected ambient condition of the particular application. This configuration produces a worst-case junction temperature of 125°C at the highest expected ambient temperature and worst-case load. The UM1470/UM148X series internal protection circuitry is designed to protect against overload conditions. This circuitry is not intended to replace proper heatsinking. Continuously running the UM1470/UM148X series into thermal shutdown degrades device reliability.

Package Information

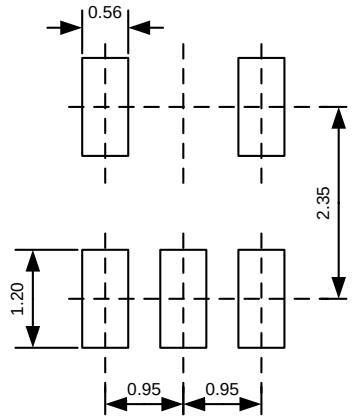
UM1470S-xx: SOT23-5

Outline Drawing



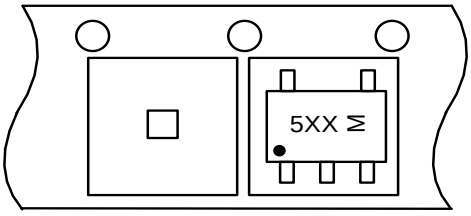
Symbol	DIMENSIONS					
	MILLIMETERS			INCHES		
	Min	Typ	Max	Min	Typ	Max
A	1.013	1.15	1.40	0.040	0.045	0.055
A1	0.00	0.05	0.10	0.000	0.002	0.004
A2	1.00	1.10	1.30	0.039	0.043	0.051
b	0.30	-	0.50	0.012	-	0.020
c	0.10	0.15	0.20	0.004	0.006	0.008
D	2.82	-	3.10	0.111	-	0.122
E	1.50	1.60	1.70	0.059	0.063	0.067
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



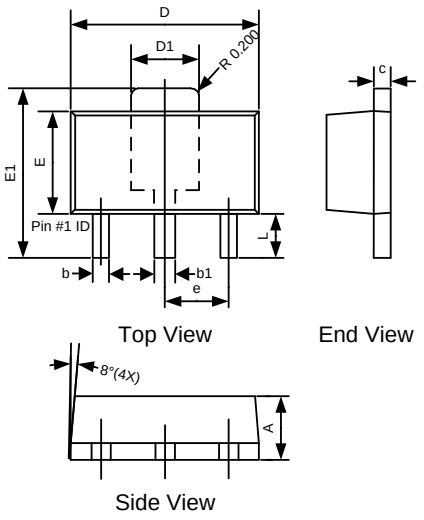
NOTES:
1. Compound dimension: 2.92×1.60;
2. Unit: mm;
3. General tolerance ±0.05mm unless otherwise specified;
4. The layout is just for reference.

Tape and Reel Orientation



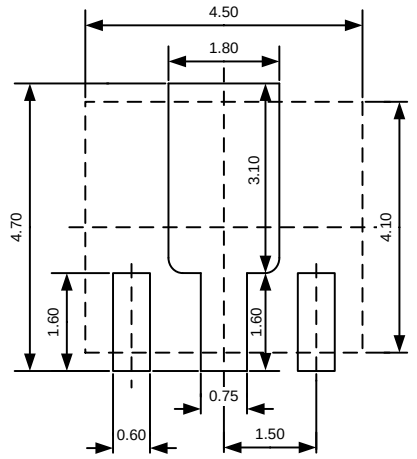
UM1470Y-xx: SOT89-3

Outline Drawing



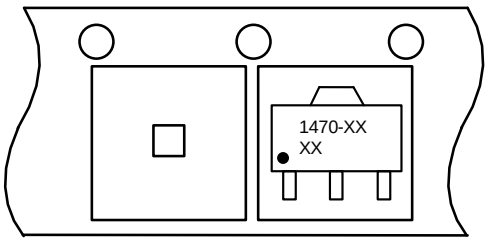
Symbol	DIMENSIONS					
	MILLIMETERS			INCHES		
	Min	Typ	Max	Min	Typ	Max
A	1.40	1.50	1.60	0.055	0.059	0.063
b	0.32	-	0.54	0.013	-	0.021
b1	0.40	-	0.62	0.016	-	0.024
c	0.35	-	0.44	0.014	-	0.017
D	4.40	4.50	4.60	0.173	0.177	0.181
D1	1.50	-	1.83	0.059	-	0.072
E	2.30	2.50	2.60	0.091	0.098	0.102
E1	3.94	-	4.25	0.155	-	0.167
e	1.50TYP			0.059TYP		
L	0.89	-	1.20	0.035	-	0.047

Land Pattern



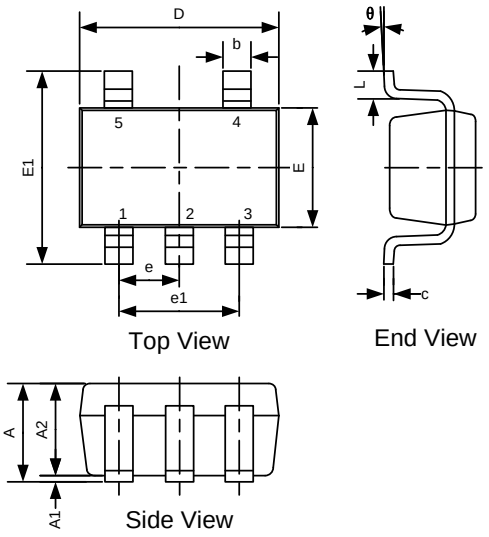
NOTES:
1. Compound dimension: 4.50×2.50 ;
2. Unit: mm;
3. General tolerance ±0.05mm unless otherwise specified;
4. The layout is just for reference.

Tape and Reel Orientation



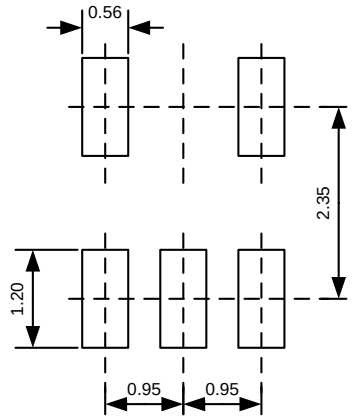
UM1480S/UM1481S/UM1482S-xx: SOT23-5

Outline Drawing



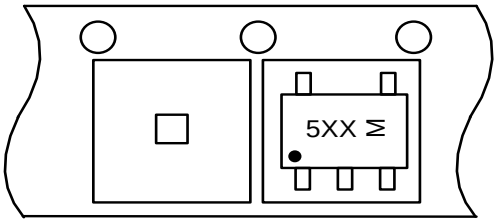
Symbol	DIMENSIONS					
	MILLIMETERS			INCHES		
	Min	Typ	Max	Min	Typ	Max
A	1.013	1.15	1.40	0.040	0.045	0.055
A1	0.00	0.05	0.10	0.000	0.002	0.004
A2	1.00	1.10	1.30	0.039	0.043	0.051
b	0.30	-	0.50	0.012	-	0.020
c	0.10	0.15	0.20	0.004	0.006	0.008
D	2.82	-	3.10	0.111	-	0.122
E	1.50	1.60	1.70	0.059	0.063	0.067
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



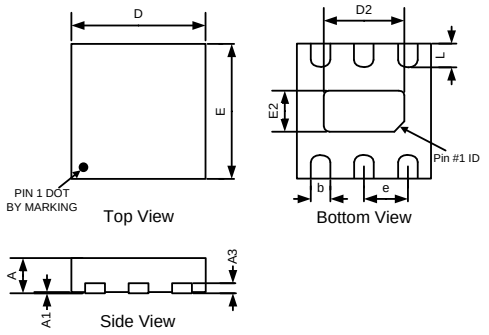
NOTES:
1. Compound dimension: 2.92×1.60;
2. Unit: mm;
3. General tolerance ±0.05mm unless otherwise specified;
4. The layout is just for reference.

Tape and Reel Orientation



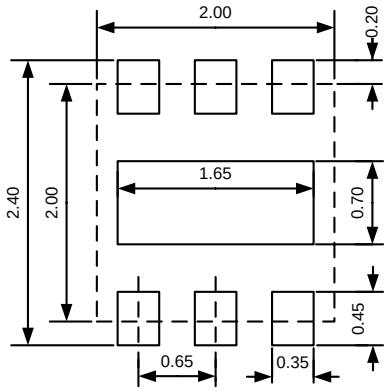
UM1480DA-xx：DFN6 2.0×2.0

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

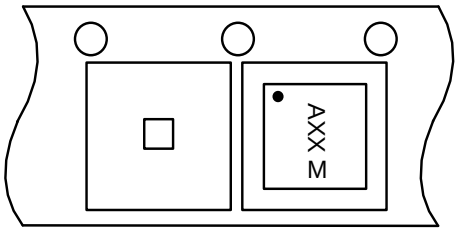
Land Pattern



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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Union Semiconductor, Inc
Add: Unit 606, No.570 Shengxia Road, Shanghai 201210
Tel: 021-51093966
Fax: 021-51026018
Website: www.union-ic.com