MIC37300/01/02/03

3.0A, Low-Voltage µCap LDO Regulator

General Description

The Micrel MIC37300/01/02/03 is a 3.0A low-dropout linear voltage regulator that provides a low voltage, high current output with a minimum number of external components. It offers high precision, ultra-low dropout (500mV over temperature), and low ground current.

The MIC37300/01/02/03 operates from an input of 2.25V to 6.0V. It is designed to drive digital circuits requiring low-voltage at high currents (i.e., PLDs, DSP, microcontroller, etc.). It is available in fixed and adjustable output voltages. Fixed voltages include 1.5V, 1.8V, 2.5V, and 3.3V. The adjustable version is capable of 1.24V to 5.5V.

Features of the MIC37300/01/02/03 LDO include thermal and current-limit protection, and reverse-current protection. Logic enable and error flag pins are available on the 5-pin version.

Junction temperature range of the MIC37300/01/02/03 is from –40°C to +125°C.

For applications requiring input voltage greater than 6.0V, see the MIC3910x, MIC3915x, MIC3930x, and MIC3950x LDOs.

Datasheets and support documentation are available on Micrel's website at: www.micrel.com.

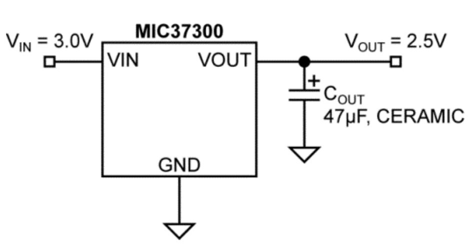
Features

- 3.0A minimum guaranteed output current
- 500mV maximum dropout voltage over temperature
  - Ideal for 3.0V to 2.5V conversion
  - Ideal for 2.5V to 1.8V, 1.65V, or 1.5V conversion
- Stable with ceramic or tantalum capacitor
- Wide input voltage range
  - V_{IN}: 2.25V to 6.0V
- +1.0% initial output tolerance
- Fixed and adjustable output voltages:
  - MIC37300: 3-pin S-Pak fixed voltages
  - MIC37301: 5-pin S-Pak or 8-pin ePad SOIC fixed voltages with flag
  - MIC37302: 5-pin adjustable voltage
  - MIC37303: 8-pin ePad SOIC, DFN adjustable voltage with flag
- Excellent line and load regulation specifications
- Thermal-shutdown and current-limit protection
- Reverse-leakage protection
- Low profile S-Pak package

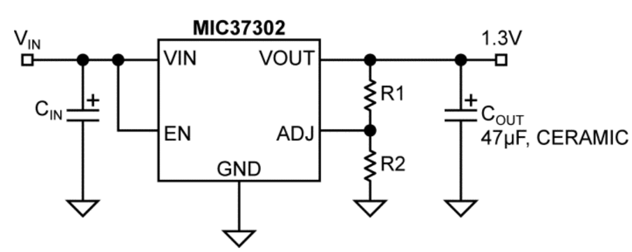
Applications

- LDO linear regulator for low-voltage digital IC
- PC add-in cards
- High-efficiency linear power supplies
- SMPS post regulator
- Battery charger

Typical Application



Fixed 2.5 Regulator



Adjustable Regulator

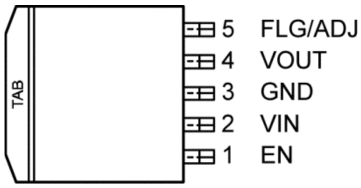
Ordering Information

Part number RoHS Compliant[(1)]/ Pb-Free	Enable	Voltage	Flag	Junction Temperature Range	Package
MIC37300-1.5WR[(1)]	No	1.5V	No	–40°C to +125°C	S-Pak-3
MIC37300-1.65WR[(1)]	No	1.65V	No	–40°C to +125°C	S-Pak-3
MIC37300-1.8WR[(1)]	No	1.8V	No	–40°C to +125°C	S-Pak-3
MIC37300-2.5WR[(1)]	No	2.5V	No	–40°C to +125°C	S-Pak-3
MIC37300-3.3WR[(1)]	No	3.3V	No	–40°C to +125°C	S-Pak-3
MIC37301-1.5YME	Yes	1.5V	Yes	–40°C to +125°C	ePad SOIC-8
MIC37301-1.5WR[(1)]	Yes	1.5V	Yes	–40°C to +125°C	S-Pak-5
MIC37301-1.8YME	Yes	1.8V	Yes	–40°C to +125°C	ePad SOIC-8
MIC37301-1.8WR[(1)]	Yes	1.8V	Yes	–40°C to +125°C	S-Pak-5
MIC37301-2.5YME	Yes	2.5V	Yes	–40°C to +125°C	ePad SOIC-8
MIC37301-2.5WR[(1)]	Yes	2.5V	Yes	–40°C to +125°C	S-Pak-5
MIC37301-3.3WR[(1)]	Yes	3.3V	Yes	–40°C to +125°C	S-Pak-5
MIC37302WR[(1)]	Yes	ADJ	No	–40°C to +125°C	S-Pak-5
MIC37302WU[(1)]	Yes	ADJ	No	–40°C to +125°C	TO-263-5
MIC37303YME	Yes	ADJ	Yes	–40°C to +125°C	ePad SOIC-8
MIC37303YML	Yes	ADJ	Yes	–40°C to +125°C	3mm × 3mm DFN

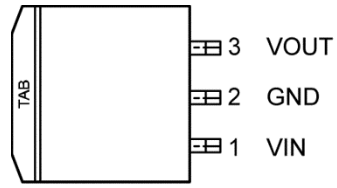
Note:

1. RoHS-compliant with ‘high-melting solder’ exemption.

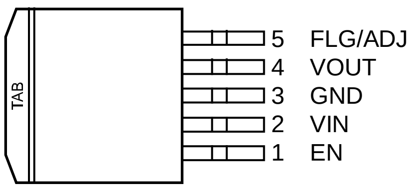
Pin Configuration



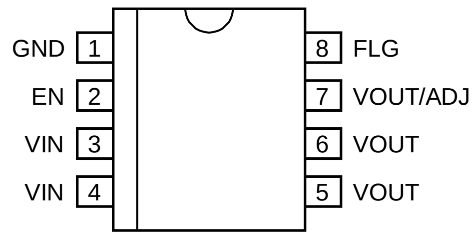
S-PAK-5 (R)
(Top View)



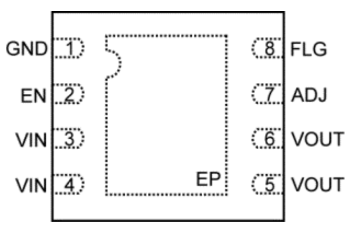
S-PAK-3 (R)
(Top View)



TO-263-5 (U)
(Top View)



e-Pad SOIC-8 (ME)
(Top View)



3mm × 3mm DFN (ML)
(Top View)

Pin Description

Pin Number S-PAK-5 TO-263-5	Pin Number S-PAK-3	Pin Number ePad SOIC-8 DFN	Pin Name	Pin Function
1	—	2	EN	Enable input: CMOS-compatible input. Logic HIGH = enable; Logic LOW = shutdown. Do not leave floating.
2	1	3, 4	VIN	Input voltage that supplies current to the output power device.
3	2	1	GND	Ground: TAB is connected to ground.
4	3	5, 6, 7 (Fixed)	VOUT	Regulator output.
		5, 6 (Adj.)		
5 (Fixed)	—	8	FLG	Error flag (output): Open collector output. Active LOW indicates an output fault condition.
5 (Adj.)	—	7 (Adj.)	ADJ	Adjustable regulator feedback input: Connect to resistor voltage driver.
—	—	EP	ePad	Connect to GND for best thermal performance.

Absolute Maximum Ratings[2]

Supply Voltage (V_{IN}) 6.5V
Enable Input Voltage (V_{EN})[4] 6.5V
Power Dissipation (P_D)[4] .... Internally Limited
Junction Temperature (T_J) .... $-40°C \le T_J \le +125°C$
Storage Temperature (T_S) .... $-65°C \le T_J \le +150°C$
Lead Temperature (soldering, 10s) .... 260°C
ESD Rating[5] 2kV

Operating Ratings[3]

Supply Voltage (V_{IN}) .... 2.25V to 6.0V
Enable Input Voltage (V_{EN}) .... 0V to 6.0V
Junction Temperature (T_J) .... $-40°C \le T_J \le +125°C$
Package Thermal Resistance
S-Pak (θ_{JC}) .... 5.5°C/W
TO-263-5 (θ_{JC}) .... 6.3°C/W
ePad SOIC-8 (θ_{JC}) .... 16°C/W
3mm × 3mm DFN (θ_{JC}) .... 29°C/W

Electrical Characteristics[6]

T_A = 25°C with $V_{IN} = V_{OUT}$ + 1V; $V_{EN} = V_{IN}$; I_L = 10mA; **bold** values indicate –40°C < T_J < +125°C, unless noted.

Parameter	Condition	Min.	Typ.	Max.	Units
Output Voltage Accuracy	I_L = 10mA	-1		+1	%
	10mA < I_{OUT} < $I_{L(max)}$, V_{OUT} + 1 ≤ V_{IN} ≤ 6V	**-2**		**+2**	**%**
Output Voltage Line Regulation	$V_{IN} = V_{OUT}$ + 1.0V to 6.0V; I_L = 10mA		0.02	0.5	%
Output Voltage Load Regulation	I_L = 10mA to 3A		0.2	**1**	%
$V_{IN} - V_{OUT}$ Dropout Voltage[7]	I_L = 1.5A (ePad SOIC-8, DFN)		175	**350** **400**	mV
	I_L = 3A (ePad SOIC-8, DFN)		300	**500** **550**	mV
Ground Pin Current[8]	I_L = 3A		27	40 **50**	mA mA
Ground Pin Current in Shutdown	V_{IL} ≤ 0.5V, $V_{IN} = V_{OUT}$ +1V		1.0	5	µA
Current Limit	V_{OUT} = 0V		4.75	**6.5**	A
Start-Up Time	$V_{EN} = V_{IN}$, I_{OUT} = 10mA, C_{OUT} = 47µF		170	**500**	µs

Notes:

2. Exceeding the absolute maximum rating may damage the device.
3. The device is not guaranteed to function outside its operating rating.
4. $P_{D(max)} = (T_{J(max)} - T_A)/\theta_{JA}$, where θ_{JA}, depends upon the printed circuit layout. See “Application Information.”
5. Devices are ESD sensitive. Handling precautions recommended.
6. Specification for packaged product only.
7. $V_{DO} = V_{IN} - V_{OUT}$ when V_{OUT} decreases to 98% of its nominal output voltage with $V_{IN} = V_{OUT}$ + 1V. For output voltages below 1.75, dropout voltage specification does not apply due to a minimum input operating voltage of 2.25V.
8. I_{GND} is the quiescent current. $I_{IN} = I_{GND} + I_{OUT}$.

Electrical Characteristics[6] (Continued)

T_A = 25°C with $V_{IN} = V_{OUT}$ + 1V; $V_{EN} = V_{IN}$; I_L = 10mA; **bold** values indicate –40°C < T_J < +125°C, unless noted.

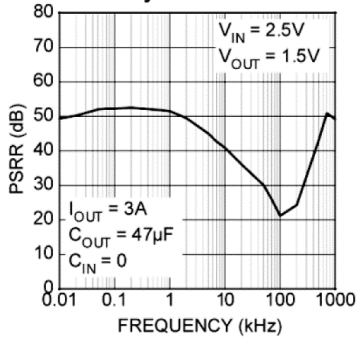
Parameter	Condition	Min.	Typ.	Max.	Units
Enable Input					
Enable Input Threshold	Regulator enable	**2.25**			V
	Regulator shutdown			**0.8**	V
Enable Pin Input Current	V_{IL} ≤ 0.8V (Regulator shutdown)			2 **4**	µA
	V_{IH} ≥ 2.25V (Regulator enable)	1	15	30 **75**	µA
Flag Output					
$I_{FLG(LEAK)}$	V_{OH} = 6V			1 **2**	µA
$V_{FLG(LO)}$	V_{IN} = 2.25V, I_{OL} = 250µA[9]		210	400 **500**	mV
V_{FLG}	Low Threshold, % of V_{OUT} below nominal	93			%
	Hysteresis		2		%
	High Threshold, % of V_{OUT} below nominal			99.2	%
MIC37302 Only					
Reference Voltage		1.228 **1.215**	1.240	1.252 **1.265**	V
Adjust Pin Bias Current			40	80 **120**	nA

Note:

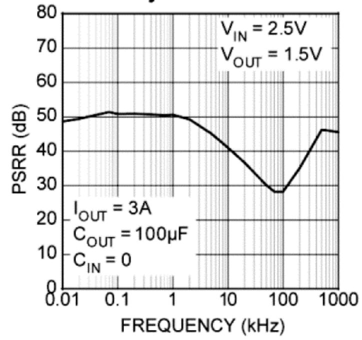
9. For a 2.5V device, V_{IN} = 2.250V (device is in dropout).

Typical Characteristics

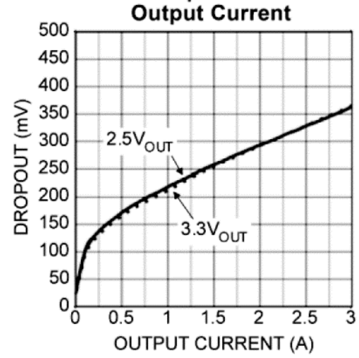
Power Supply Rejection Ratio



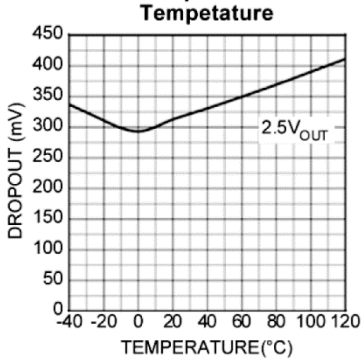
Power Supply Rejection Ratio



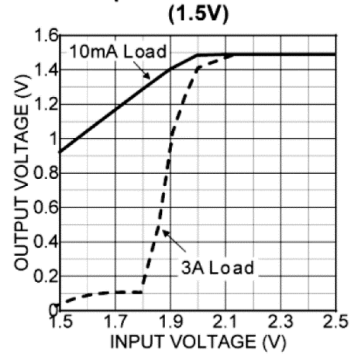
Dropout vs. Output Current



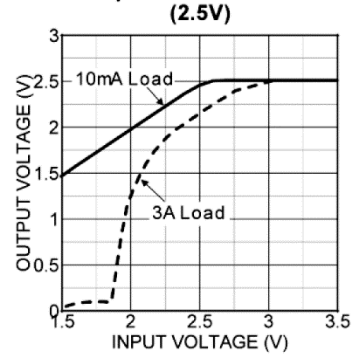
Dropout vs. Tempetature



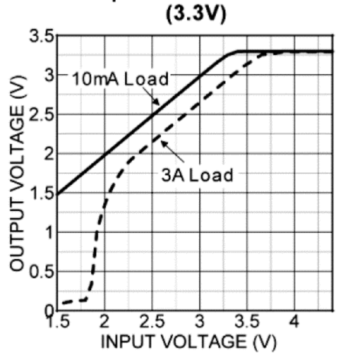
Dropout Characteristics (1.5V)



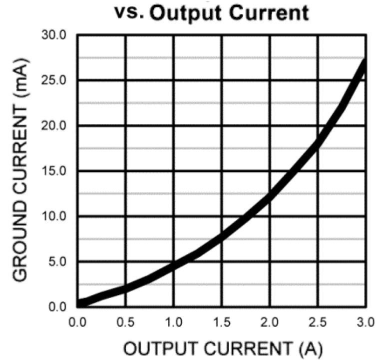
Dropout Characteristics (2.5V)



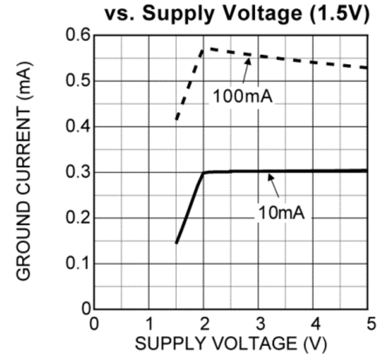
Dropout Characteristics (3.3V)



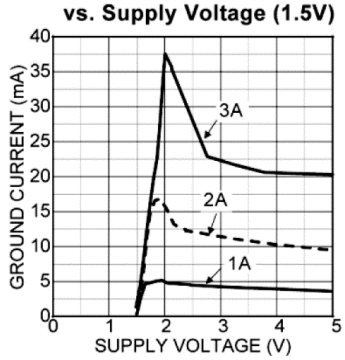
Ground Current vs. Output Current



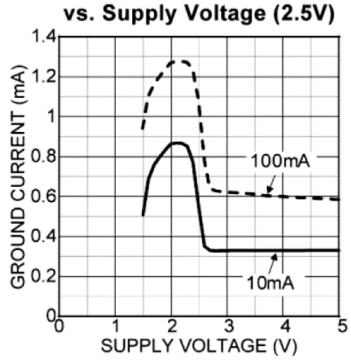
Ground Current vs. Supply Voltage (1.5V)



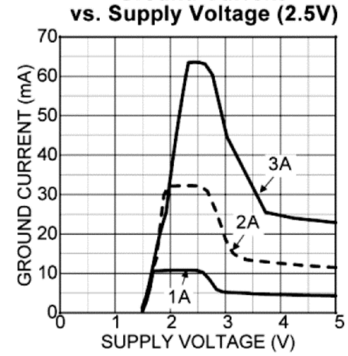
Ground Current vs. Supply Voltage (1.5V)



Ground Current vs. Supply Voltage (2.5V)

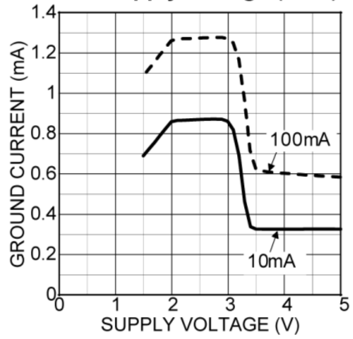


Ground Current vs. Supply Voltage (2.5V)

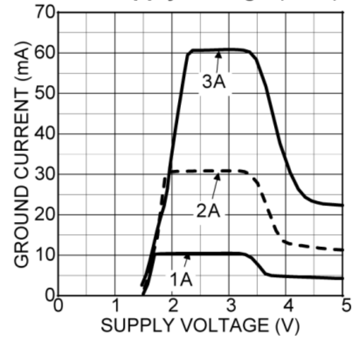


Typical Characteristics (Continued)

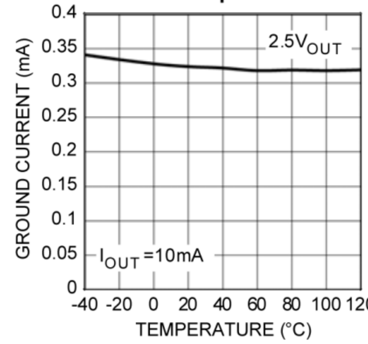
Ground Current vs. Supply Voltage (3.3V)



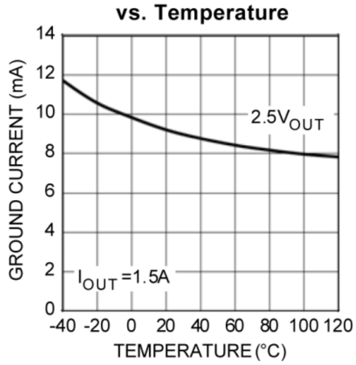
Ground Current vs. Supply Voltage (3.3V)



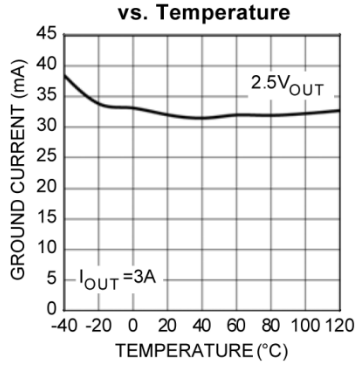
Ground Current vs. Temperature



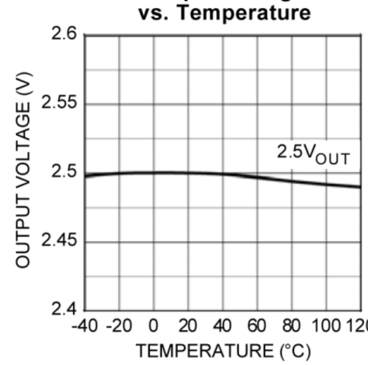
Ground Current vs. Temperature



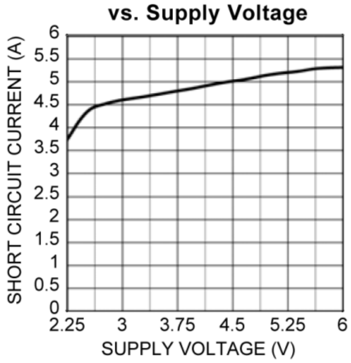
Ground Current vs. Temperature



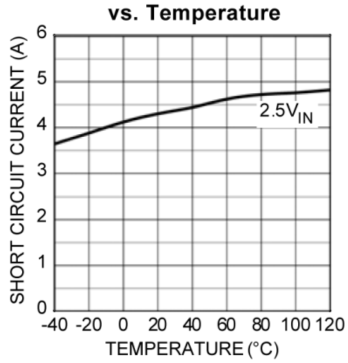
Output Voltage vs. Temperature



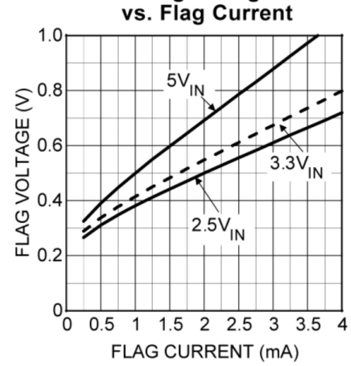
Short-Circuit Current vs. Supply Voltage



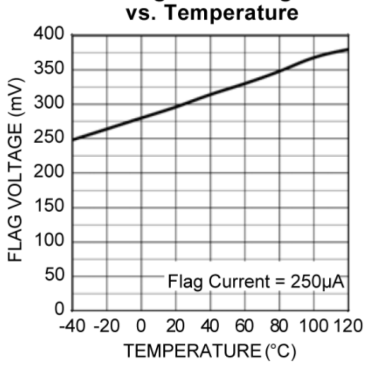
Short-Circuit Current vs. Temperature



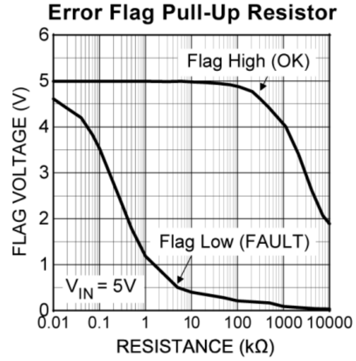
Flag Voltage vs. Flag Current



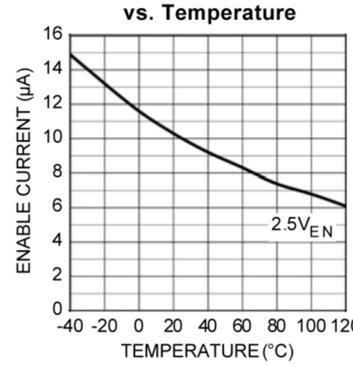
Flag Low Voltage vs. Temperature



Error Flag Pull-Up Resistor

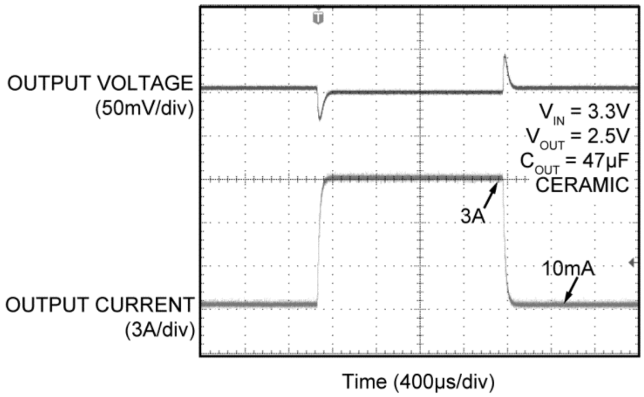


Enable Current vs. Temperature

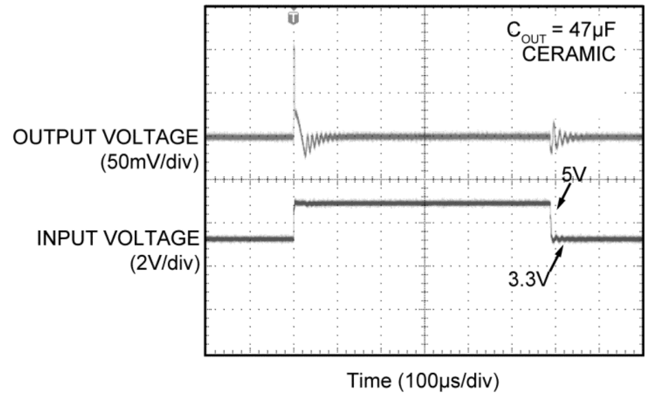


Functional Characteristics

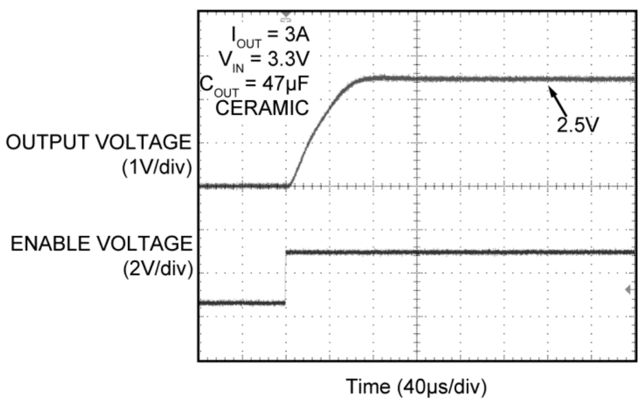
Load Transient Response



Line Transient Response



Enable Transient Response



Applications Information

The MIC37300/01/02/03 is a high-performance low-dropout voltage regulator suitable for moderate to high-current regulator applications. Its 500mV dropout voltage at full load and over temperature makes it especially valuable in battery-powered systems and as high-efficiency noise filters in post-regulator applications. Unlike older NPN-pass transistor designs, where the minimum dropout voltage is limited by the based-to-emitter voltage drop and collector-to-emitter saturation voltage, dropout performance of the PNP output of these devices is limited only by the low VCE saturation voltage.

A trade-off for the low dropout voltage is a varying base drive requirement. Micrel's Super ßeta PNP® process reduces this drive requirement to only 2% to 5% of the load current.

The MIC37300/01/02/03 regulator is fully protected from damage due to fault conditions. Current-limiting is provided. This limiting is linear; output current during overload conditions is constant. Thermal shutdown disables the device when the die temperature exceeds the maximum safe operating temperature. The output structure of these regulators allows voltages in excess of the desired output voltage to be applied without reverse current flow.

Thermal Design

Linear regulators are simple to use. The most complicated design parameters to consider are thermal characteristics. Thermal design requires the following application-specific parameters:

- Maximum ambient temperature (T_A)
- Output current (I_{OUT})
- Output voltage (V_{OUT})
- Input voltage (V_{IN})
- Ground current (I_{GND})

First, calculate the power dissipation of the regulator from these numbers and the device parameters from this datasheet (Equation 1):

$$P_D = (V_{IN} - V_{OUT})\, I_{OUT} + V_{IN}\, I_{GND} \qquad \text{Eq. 1}$$

where the ground current is approximated by using numbers from the "Electrical Characteristics" or "Typical Characteristics."

Then the heat sink thermal resistance is determined with Equation 2:

$$\theta_{SA} = ((T_{J(max)} - T_A)/P_D) - (\theta_{JC} + \theta_{CS}) \qquad \text{Eq. 2}$$

where $T_{J(max)}$ <125°C and θ_{CS} is between 0°C/W and 2°C/W. The heat sink may be significantly reduced in applications where the minimum input voltage is known and is large compared with the dropout voltage. Use a series input resistor to drop excessive voltage and distribute the heat between this resistor and the regulator. The low-dropout properties of Micrel's Super ßeta PNP regulators allow significant reductions in regulator power dissipation and the associated heat sink without compromising performance. When this technique is employed, a capacitor of at least 1.0µF is needed directly between the input and regulator ground.

Output Capacitor

The MIC37300/01/02/03 requires an output capacitor for stable operation. As a µCap LDO, the MIC37300/01/02/03 can operate with ceramic output capacitors as long as the amount of capacitance is 47µF or greater. For values of output capacitance lower than 47µF, the recommended ESR range is 200mΩ to 2Ω. The minimum value of output capacitance recommended for the MIC37300 is 10µF.

For 47µF or greater, the ESR range recommended is less than 1Ω. Ultra-low ESR, ceramic capacitors are recommended for output capacitance of 47µF or greater to help improve transient response and noise reduction at high frequency. X7R/X5R dielectric-type ceramic capacitors are recommended because of their temperature performance. X7R-type capacitors change capacitance by 15% over their operating temperature range and are the most stable type of ceramic capacitors. Z5U and Y5V dielectric capacitors change value by as much as 50% and 60%, respectively, over their operating temperature ranges. To use a ceramic chip capacitor with Y5V dielectric, the value must be much higher than an X7R ceramic capacitor to ensure the same minimum capacitance over the equivalent operating temperature range.

Input Capacitor

An input capacitor of 1.0µF or greater is recommended when the device is more than 4 inches away from the bulk supply capacitance, or when the supply is a battery. Small, surface-mount chip capacitors can be used for the bypassing. The capacitor should be place within 1 inch of the device for optimal performance. Larger values will help to improve ripple rejection by bypassing the input to the regulator, further improving the integrity of the output voltage.

Transient Response and 3.3V to 2.5V, 2.5V to 1.8V or 1.65V, or 2.5V to 1.5V Conversions

The MIC37300/01/02/03 has excellent transient response to variations in input voltage and load current. The device has been designed to respond quickly to load current variations and input voltage variations. Large output capacitors are not required to obtain this performance. A standard 47µF output capacitor, preferably tantalum, is all that is required. Larger values help to improve performance even further.

By virtue of its low-dropout voltage, this device does not saturate into dropout as readily as similar NPN-based designs. When converting from 3.3V to 2.5V, 2.5V to 1.8V or 1.65V, or 2.5V to 1.5V, the NPN-based regulators are already operating in dropout, with typical dropout requirements of 1.2V or greater. To convert down to 2.5V without operating in dropout, NPN-based regulators require an input voltage of 3.7V at the very least. The MIC37300/01/02/03 regulator will provide excellent performance with an input as low as 3.0V or 2.25V, respectively. This gives the PNP-based regulators a distinct advantage over older, NPN-based linear regulators.

Minimum Load Current

The MIC37300/01/02/03 regulator is specified between finite loads. If the output current is too small, then the leakage currents dominate and the output voltage rises. A 10mA minimum load current is necessary for proper operation. For adjustable regulators, this can be accomplished by selecting the feedback resistors to load the output with 10mA.

Error Flag

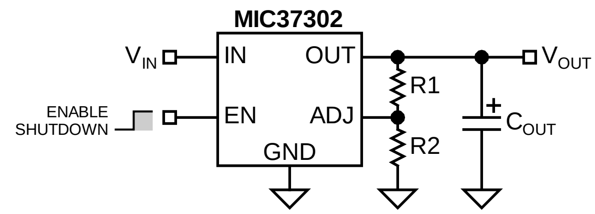
The MIC37301 and MIC37303 feature an error flag circuit that monitors the output voltage and signals an error condition when the voltage is 5% below the nominal output voltage. The error flag is an open-collector output that can sink 10mA during a fault condition.

Low output voltage can be caused by a number of problems, including an overcurrent fault (device in current limit) or low input voltage. The flag is inoperative during overtemperature shutdown.

Enable Input

The MIC37301/02/03 also features an enable input for on/off control of the device. Its shutdown state draws “zero” current (only microamperes of leakage). The enable input is TTL/CMOS compatible for simple logic interface, but can be connected up to VIN. When enabled, it draws approximately 15µA.

Adjustable Regulator Design



$$V_{OUT} = 1.240V\left(1+\frac{R1}{R2}\right)$$

Figure 1. Adjustable Regulator with Resistors

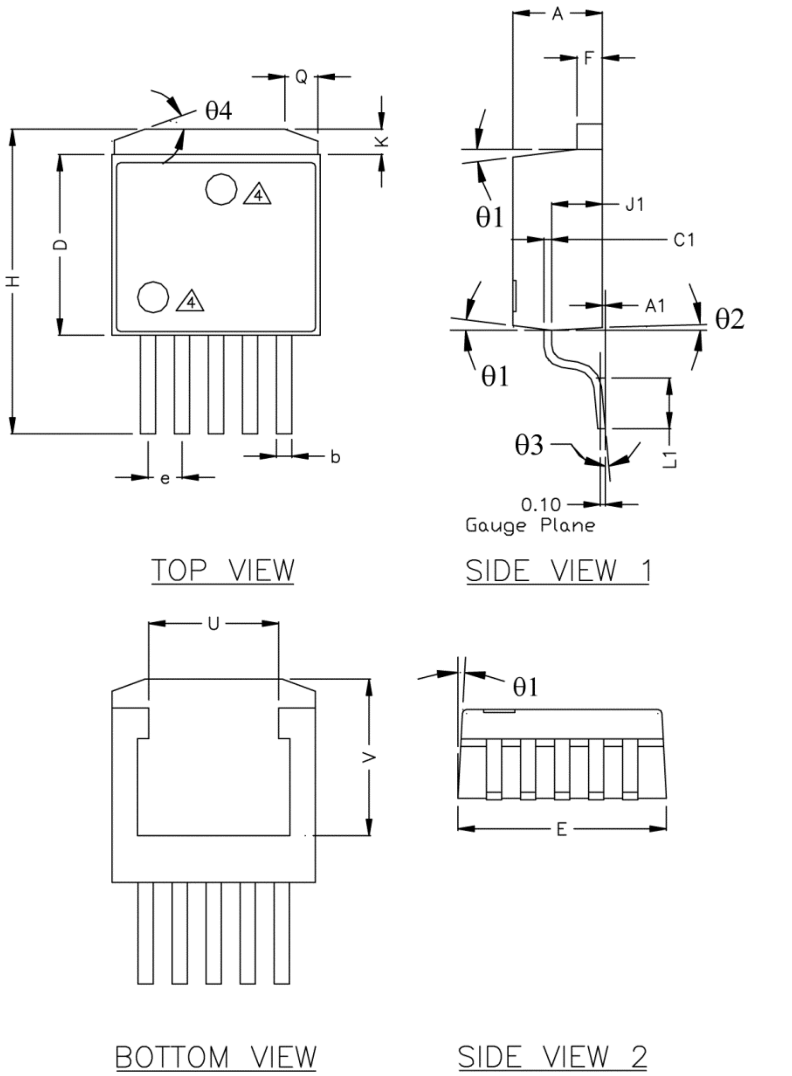
The MIC37302 and MIC37303 allow programming the output voltage anywhere between 1.24V and the 5.5V maximum operating rating of the family. Two resistors are used. Resistors can be quite large, up to 1MΩ, because of the very high input impedance and low bias current of the sense comparator.

The resistor values are calculated by:

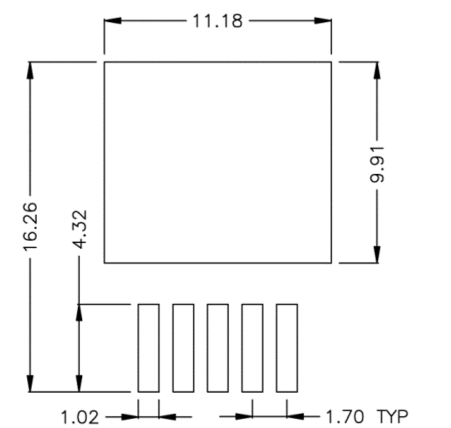
$$R1 = R2\left(\frac{V_{OUT}}{1.240} - 1\right) \quad \text{Eq. 3}$$

where V_{OUT} is the desired output voltage. Figure 1 shows component definition. Applications with widely varying load currents may scale the resistors to draw the minimum load current required for proper operation.

Package Information[10]



POS	INCH		MM	
	MIN	MAX	MIN	MAX
A	0.170	0.181	4.318	4.597
A1	0.000	0.012	0.000	0.305
b	0.026	0.036	0.660	0.914
C1	0.012	0.023	0.305	0.584
D	0.330	0.361	8.392	9.169
E	0.396	0.420	10.058	10.668
e	0.062	0.072	1.575	1.829
F	0.045	0.055	1.143	1.397
H	0.575	0.625	14.605	15.875
J1	0.080	0.120	2.032	3.048
K	0.045	0.066	1.143	1.676
L1	0.090	0.110	2.286	2.794
θ1	3°	10°	3°	10°
θ2	1°	7°	1°	7°
θ3	0°	8°	0°	8°
θ4	18°	22°	18°	22°
Q	0.055	0.075	1.397	1.905
U	0.256 Ref.		6.502 Ref.	
V	0.305 Ref.		7.747 Ref.	



RECOMMENDED LAND PATTERN
(UNIT : mm)

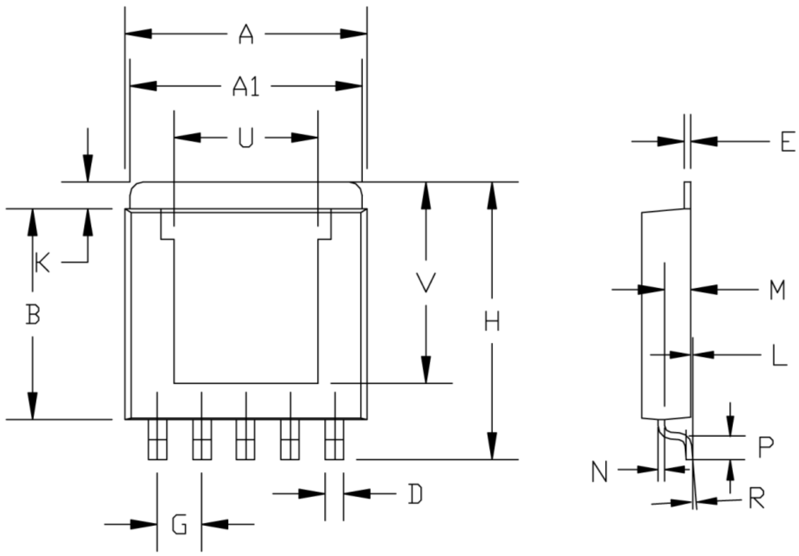
NOTE:
1. PACKAGE OUTLINE EXCLUSIVE OF MOLD FLASH & METAL BURR.
2. PACKAGE OUTLINE INCLUSIVE OF PLATING THICKNESS.
3. FOOT LENGTH USING GAUGE PLANE METHOD MEASUREMENT 0.010"
4. PACKAGE TOP MARK MAY BE IN TOP CENTER OR LOWER LEFT CORNER
5. ALL DIMENSIONS ARE IN INCHES/MILLIMETERS.

5-Pin TO-263-5 (U)

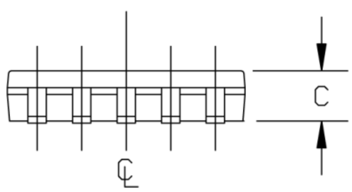
Note:

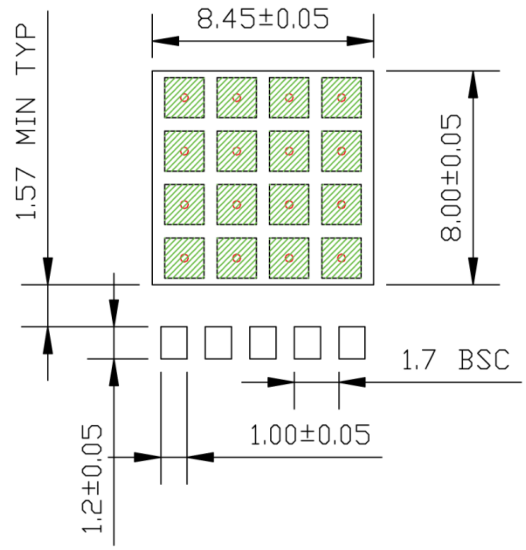
10. Package information is correct as of the publication date. For updates and most current information, go to www.micrel.com.

Package Information[10] (Continued)



	INCHES		MILLIMETERS	
A	0.365	0.375	9.27	9.52
A1	0.350	0.360	8.89	9.14
B	0.310	0.320	7.87	8.13
C	0.070	0.080	1.78	2.03
D	0.025	0.031	0.63	0.79
E	0.010	BSC	0.25	BSC
G	0.067	BSC	1.70	BSC
H	0.410	0.420	10.41	10.67
K	0.030	0.050	0.76	1.27
L	0.001	0.005	0.03	0.13
M	0.035	0.045	0.89	1.14
N	0.010	BSC	0.25	BSC
P	0.031	0.041	0.79	1.04
R	0°	6°	0°	6°
U	0.220	BSC	5.58	BSC
V	0.296	BSC	7.52	BSC



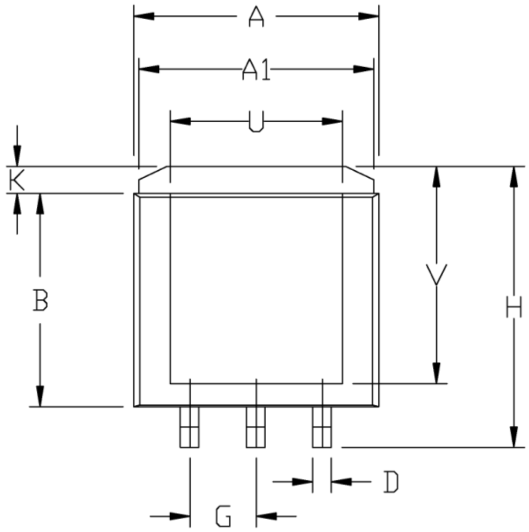


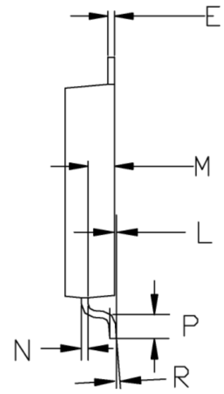
NOTE:
1. DIMENSION DOES NOT INCLUDE MOLD FLASH OR PROTRUSIONS.
2. DIMENSION INCLUDES PLATING THICKNESS. SOLDER MASK OPENING
3. RED CIRCLES IN LAND PATTERN REPRESENT THERMAL VIA, 0.30MM IN DIAMETER & SHOULD BE CONNECTED TO GND FOR MAXIMUM PERFORMANCE
4. GREEN RECTANGLES IN LAND PATTERN REPRESENT SOLDER STENCIL OPENING (OPTIONAL), 1.50X1.50MM.

RECOMMENDED LAND PATTERN

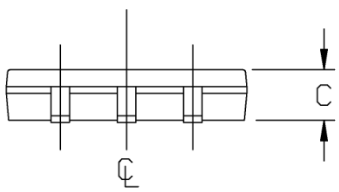
5-Pin S-PAK (R)

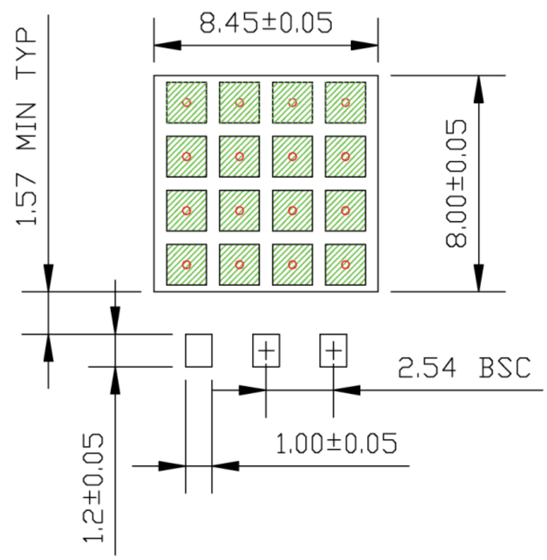
Package Information[10] (Continued)





	INCHES		MILLIMETERS	
A	0.365	0.375	9.27	9.52
A1	0.350	0.360	8.89	9.14
B	0.310	0.320	7.87	8.13
C	0.070	0.080	1.78	2.03
D	0.025	0.031	0.63	0.79
E	0.010	BSC	0.25	BSC
G	0.100	BSC	2.54	BSC
H	0.410	0.420	10.41	10.67
K	0.030	0.050	0.76	1.27
L	0.001	0.005	0.03	0.13
M	0.035	0.045	0.89	1.14
N	0.010	BSC	0.25	BSC
P	0.031	0.041	0.79	1.04
R	0°	6°	0°	6°
U	0.256	BSC	6.50	BSC
V	0.316	BSC	8.03	BSC



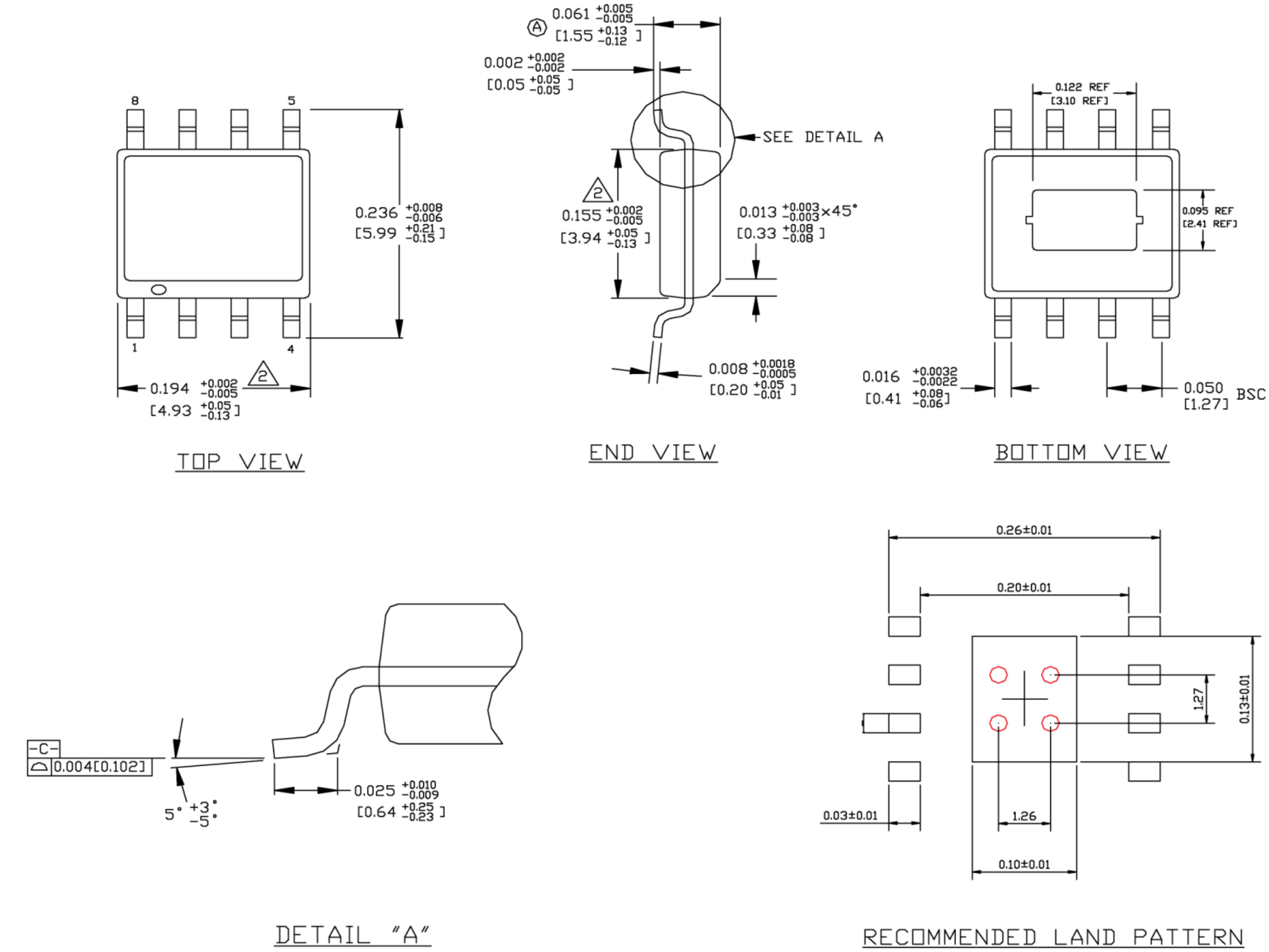


NOTE:
1. DIMENSION DOES NOT INCLUDE MOLD FLASH OR PROTRUSIONS.
2. DIMENSION INCLUDES PLATING THICKNESS. SOLDER MASK OPENING
3. RED CIRCLES IN LAND PATTERN REPRESENT THERMAL VIA, 0.30MM IN DIAMETER & SHOULD BE CONNECTED TO GND FOR MAXIMUM PERFORMANCE
4. GREEN RECTANGLES IN LAND PATTERN REPRESENT SOLDER STENCIL OPENING (OPTIONAL), 1.50X1.50MM.

RECOMMENDED LAND PATTERN (UNIT: MM)

3-Pin S-PAK (R)

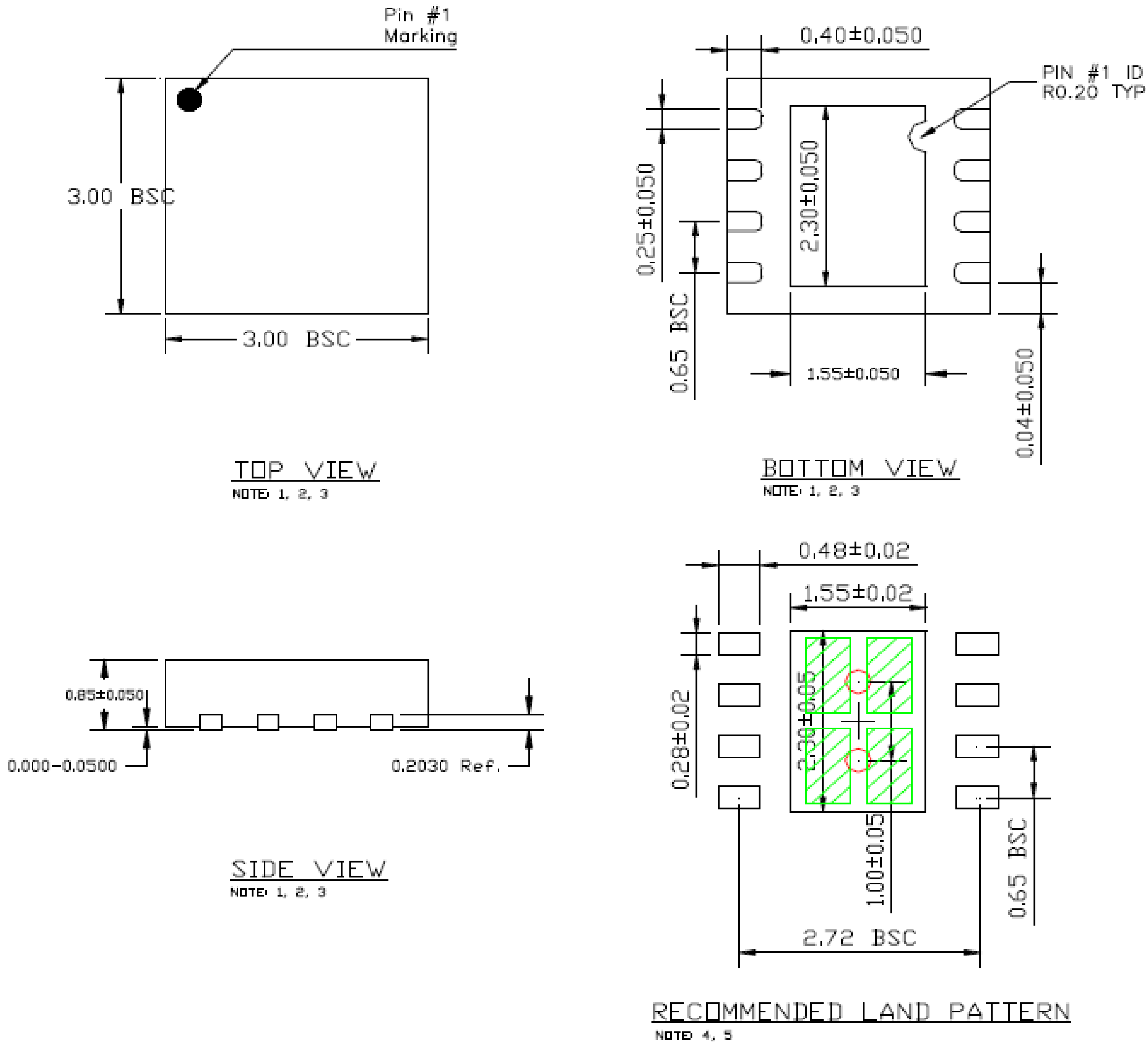
Package Information[10] (Continued)



NOTE:
1. DIMENSION DOES NOT INCLUDE MOLD FLASH OR PROTRUSIONS, EITHER OF WHICH SHALL EXCEED 0.006 INCHES PER SIDE
2. RED CIRCLES IN LAND PATTERN REPRESENT THERMAL VIAS. RECOMMENDED SIZE IS 0.30-0.30MM IN DIAMETER AND SHOULD BE CONNECTED TO GND FOR MAXIMUM THERMAL PERFORMANCE

ePad SOIC-8 (ME)

Package Information[10] (Continued)



NOTE:
1. MAX PACKAGE WARPAGE IS 0.05 MM
2. MAX ALLOWABLE BURR IS 0.076MM IN ALL DIRECTIONS
3. PIN #1 IS ON TOP WILL BE LASER MARKED
4. RED CIRCLE IN LAND PATTERN INDICATE THERMAL VIA. SIZE SHOULD BE 0.30–0.3M IN DIAMETER AND SHOULD BE CONNECTED TO GND FOR MAX THERMAL PERFORMANCE
5. GREEN RECTANGLES (SHADED AREA) INDICATE SOLDER STENCIL OPENING ON EXPOSED PAD AREA. SIZE SHOULD BE 0.50x0.95 MM IN SIZE, 0.20 MM SPACING.

8-Pin 3mm × 3mm DFN (ML)

MICREL, INC. 2180 FORTUNE DRIVE SAN JOSE, CA 95131 USA
TEL +1 (408) 944-0800 FAX +1 (408) 474-1000 WEB http://www.micrel.com

Mouser Electronics

Authorized Distributor

Click to View Pricing, Inventory, Delivery & Lifecycle Information:

Micrel:

MIC37300-1.8WR MIC37301-1.8WR MIC37301-2.5WR MIC37302WU MIC37301-1.5WR MIC37302WR MIC37301-3.3WR MIC37300-1.5WR MIC37300-3.3WR MIC37301-1.8YME MIC37301-1.5YME MIC37300-1.65WR MIC37300-2.5WR MIC37300-2.5WR TR MIC37301-1.5WR TR MIC37301-2.5YME MIC37303YME TR MIC37300-1.5WR TR MIC37303YML T5 MIC37301-1.8WR-TR MIC37300-1.8WR-TR MIC37300-1.65WR-TR MIC37301-3.3WR-TR MIC37300-1.5WR-TR MIC37301-2.5YME-TR MIC37303YME-TR MIC37302WU-TR MIC37303YML-T5 MIC37301-1.8YME-TR MIC37300-2.5WR-TR MIC37301-2.5WR-TR MIC37300-3.3WR-TR MIC37301-1.5YME-TR MIC37301-1.5WR-TR

Microchip:

MIC37302WR-TR