MICROCHIP

MIC2215

High PSRR, Low Noise μCap Triple LDO

Features

- Input Voltage Range: +2.25V to +5.5V
- 70 dB PSRR
- Stable with Ceramic Output Capacitor
- High Output Accuracy:
  - ±1.0% Initial Accuracy
  - ±2.0% over Temperature
- Low Dropout Voltage of 100 mV @ 150 mA
- Low Quiescent Current: 110 μA per Regulator
- Fast Turn-On Time: 30 μs
- Zero Off-Mode Current
- Thermal Shutdown Protection
- Current Limit Protection
- Tiny 16-Pin 4 mm x 4 mm QFN Package

Applications

- Cellular Phones
- PCs and Peripherals
- Wireless LAN Cards
- PDAs
- GPS

General Description

The MIC2215 is a high performance, triple LDO voltage regulator, with each regulator capable of providing 250 mA continuous output current.

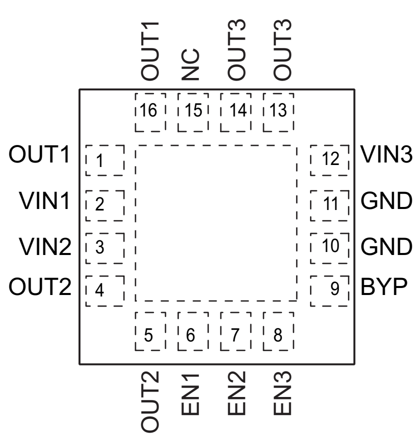
Ideal for battery-operated applications, the MIC2215 offers 1% initial accuracy, extremely low dropout voltage (100 mV @ 150 mA), and low ground current at light load (typically 110 μA per regulator). Equipped with a noise bypass pin and featuring very high power supply ripple rejection (PSRR) of up to 80 dB, the MIC2215 provides the lowest noise and highest efficiency solution for RF applications in portable electronics such as cellular phones and wireless LAN applications.

Equipped with TTL logic-compatible enable pins, each of the regulators in the MIC2215 can be put into a zero current off mode where the supply current is much less than 1 μA when all the regulators are disabled. The MIC2215 is a μCap design, which enables a stable output with small ceramic output capacitors, reducing both cost and required board space for output bypassing.

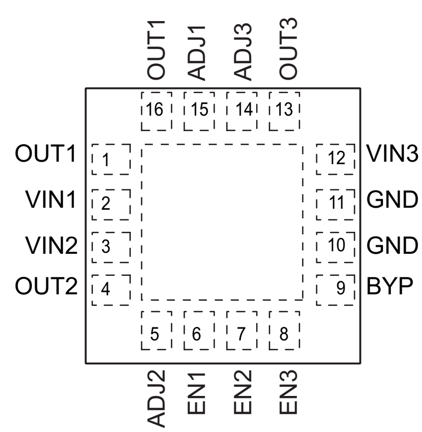
The MIC2215 is available in the miniature 16-lead, 4 mm x 4 mm QFN package.

Package Types

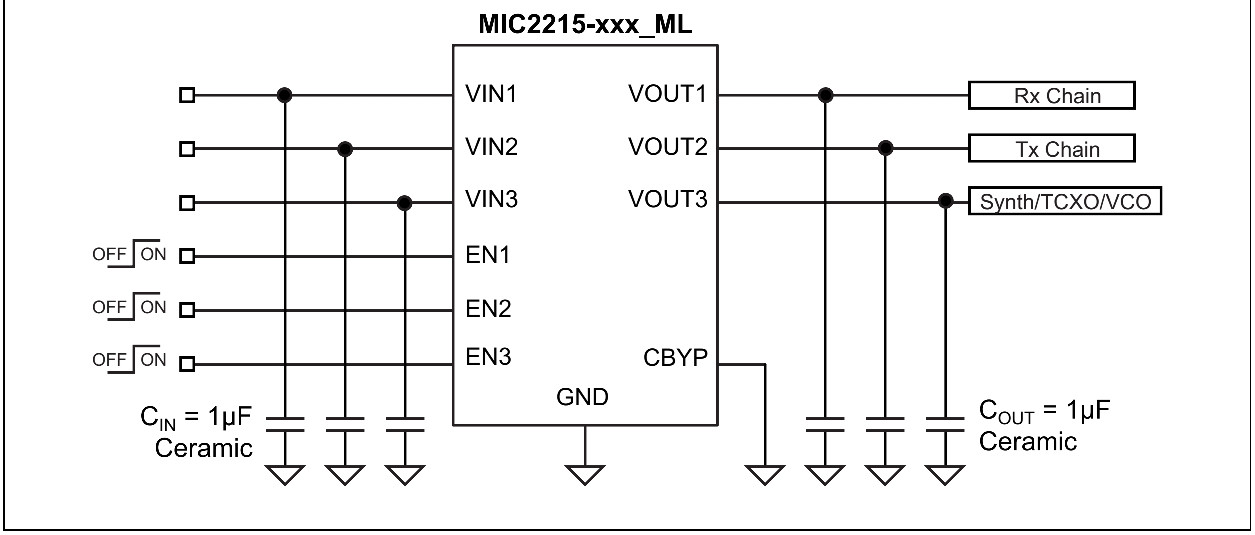
MIC2215-xxx
16-Lead QFN (ML) (Fixed)
(Top View)



MIC2215-AAA
16-Lead QFN (ML) (Adj.)
(Top View)

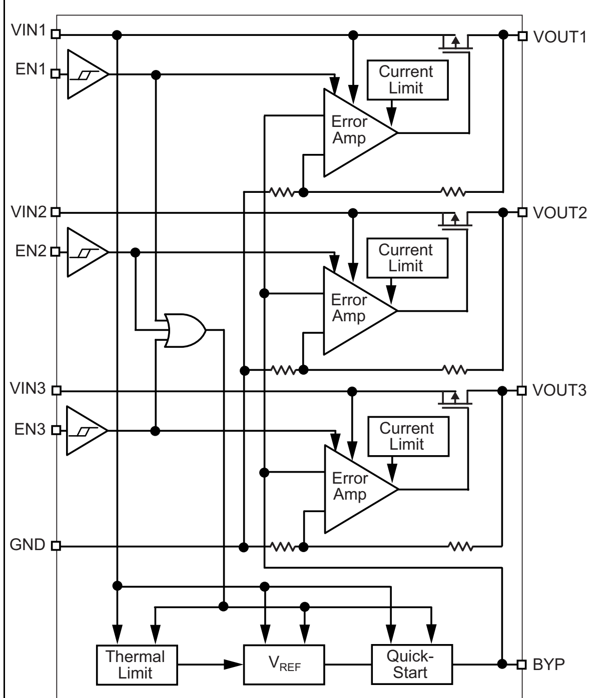


Typical Application Circuit

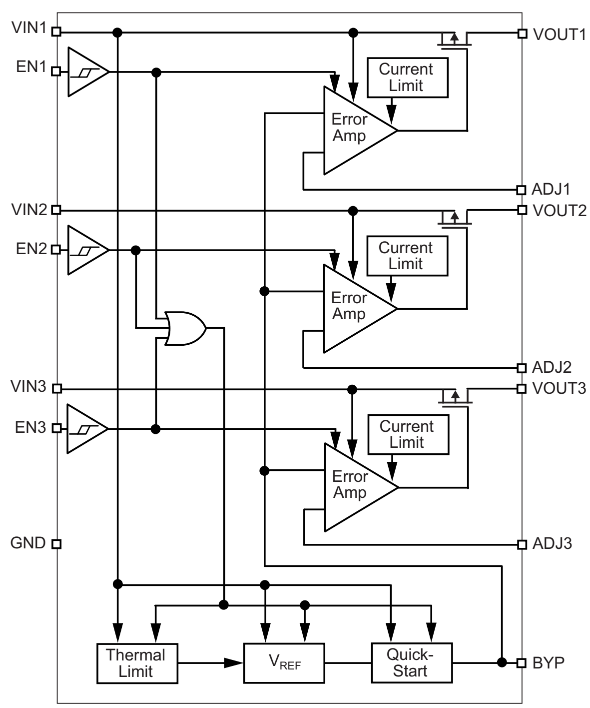


Functional Block Diagrams

MIC2215 FIXED BLOCK DIAGRAM



MIC2215 ADJUSTABLE BLOCK DIAGRAM



1.0 ELECTRICAL CHARACTERISTICS

Absolute Maximum Ratings †

Supply Voltage (V_{IN}) .... 0V to +7V
Enable Voltage (V_{EN}) .... 0V to +7V
Power Dissipation (Note 1) .... Internally Limited
ESD Rating .... Note 2

Operating Ratings ††

Supply Voltage (V_{IN1}) .... +2.25V to +5.5V
Supply Voltage (V_{IN2}, V_{IN3}) .... +2.25V to V_{IN1}
Enable Voltage (V_{EN}) .... 0V to V_{IN1}

† Notice: Stresses above those listed under “Absolute Maximum Ratings” may cause permanent damage to the device. This is a stress rating only and functional operation of the device at those or any other conditions above those indicated in the operational sections of this specification is not intended. Exposure to maximum rating conditions for extended periods may affect device reliability.

†† Notice: The device is not guaranteed to function outside its operating ratings.

Note 1: The maximum allowable power dissipation of any T_A (ambient temperature) is $P_{D(MAX)} = (T_{J(MAX)} – T_A) \div \theta_{JA}$. Exceeding the maximum allowable power dissipation will result in excessive die temperature, and the regulator will go into thermal shutdown.

2: Devices are ESD sensitive. Handling precautions recommended.

ELECTRICAL CHARACTERISTICS

Electrical Characteristics: $V_{IN1} = V_{IN2} = V_{IN3} = V_{OUT}$ (highest nominal) +1.0V; C_{OUT} = 1.0 µF, I_{OUT} = 100 µA; T_J = +25°C, **bold** values indicate –40°C ≤ T_J ≤ +125°C unless noted. Note 1

Parameter	Sym.	Min.	Typ.	Max.	Units	Conditions
Output Voltage Accuracy	—	–1	—	1	%	—
		–2	—	**2**		
Output Voltage Temperature Coefficient	—	—	40	—	ppm/°C	—
Line Regulation	—	—	0.015	**0.3**	%/V	$V_{IN} = V_{OUT}$ + 1V to 5.5V
Load Regulation	—	—	0.3	**0.5**	%	I_{OUT} = 100 µA to 250 mA
		—	—	**0.7**		Valid only for V_{OUT} = 1.8V
Dropout Voltage	V_{DO}	—	2	—	mV	I_{OUT} = 100 µA
		—	32	—		I_{OUT} = 50 mA
		—	63	—		I_{OUT} = 100 mA
		—	100	**150**		I_{OUT} = 150 mA
		—	170	**275**		I_{OUT} = 250 mA
Ground Current	I_{GND}	—	280	**400**	µA	$I_{OUT1} = I_{OUT2} = I_{OUT3}$ = 100 µA
		—	110	**150**		I_{OUT1} = 100 µA; I_{OUT2}/I_{OUT3} = off
		—	420	**550**		$I_{OUT1} = I_{OUT2} = I_{OUT3}$ = 250 mA
Quiescent Current	I_Q	—	0.2	1	µA	$V_{EN1} = V_{EN2} = V_{EN3}$ = 0V

Note 1: Specification for packaged product only.

ELECTRICAL CHARACTERISTICS (CONTINUED)

Electrical Characteristics: $V_{IN1} = V_{IN2} = V_{IN3} = V_{OUT}$ (highest nominal) +1.0V; C_{OUT} = 1.0 µF, I_{OUT} = 100 µA; T_J = +25°C, **bold** values indicate –40°C ≤ T_J ≤ +125°C unless noted. Note 1

Parameter	Sym.	Min.	Typ.	Max.	Units	Conditions
Ripple Rejection	PSRR	—	70	—	dB	$V_{IN} = V_{OUT}$ + 1.0V; I_{OUT} = 150 mA, f = 0.1 kHz to 1 kHz, C_{BYP} = 0.1 µF
		—	60	—		$V_{IN} = V_{OUT}$ + 0.4V; I_{OUT} = 150 mA, f = 0.1 kHz to 1 kHz, C_{BYP} = 0.1 µF
		—	45	—		$V_{IN} = V_{OUT}$ + 0.2V; I_{OUT} = 150 mA, f = 0.1 kHz to 1 kHz, C_{BYP} = 0.1 µF
Current Limit	I_{LIM}	**350**	700	—	mA	V_{OUT} = 0V (All regulators)
Output Voltage Noise	—	—	30	—	μV_{RMS}	C_{BYP} = 0.1 µF, f = 10 Hz to 100 kHz
Turn-On Time	t_{ON}	—	30	**100**	µs	C_{BYP} = 0.01 µF
Enable Input						
Enable Input Voltage	V_{EN}	—	—	**0.4**	V	Logic Low (Regulator shutdown)
		1.5	—	—		Logic High (Regulator enabled)
Enable Input Current	I_{EN}	—	1.0	—	µA	V_{IL} < 0.4V (Regulator shutdown)
		—	0.01	—		V_{IH} > 1.5V (Regulator enabled)

Note 1: Specification for packaged product only.

TEMPERATURE SPECIFICATIONS

Parameters	Sym.	Min.	Typ.	Max.	Units	Conditions
Temperature Ranges						
Operating Junction Temperature Range	T_J	–40	—	+125	°C	Note 1
Storage Temperature Range	T_S	–65	—	+150	°C	—
Lead Temperature	T_{LEAD}	—	—	+260	°C	Soldering, 5 sec.
Package Thermal Resistance						
Thermal Resistance, QFN 16-Ld	θ_{JA}	—	45	—	°C/W	—

Note 1: The maximum allowable power dissipation is a function of ambient temperature, the maximum allowable junction temperature and the thermal resistance from junction to air (i.e., T_A, T_J, θ_{JA}). Exceeding the maximum allowable power dissipation will cause the device operating junction temperature to exceed the maximum +125°C rating. Sustained junction temperatures above +125°C can impact the device reliability.

2.0 TYPICAL PERFORMANCE CURVES

Note: The graphs and tables provided following this note are a statistical summary based on a limited number of samples and are provided for informational purposes only. The performance characteristics listed herein are not tested or guaranteed. In some graphs or tables, the data presented may be outside the specified operating range (e.g., outside specified power supply range) and therefore outside the warranted range.

T_A = +25°C, unless otherwise noted.

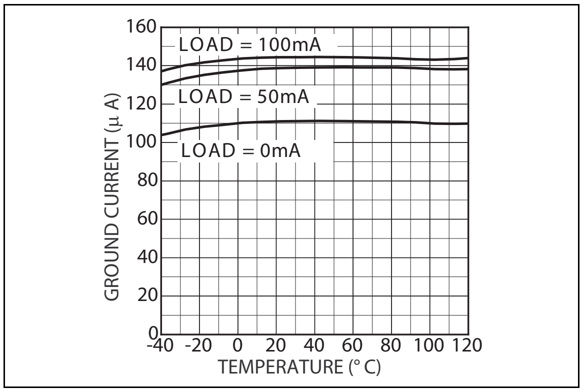


FIGURE 2-1: *Ground Current vs. Temperature for LDO 1.*

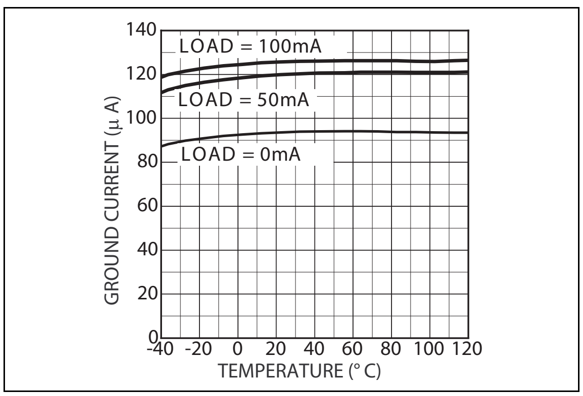


FIGURE 2-2: *Ground Current vs. Temperature for LDO 2.*

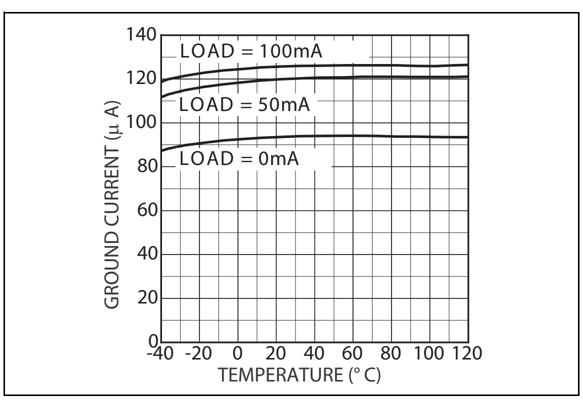


FIGURE 2-3: *Ground Current vs. Temperature for LDO 3.*

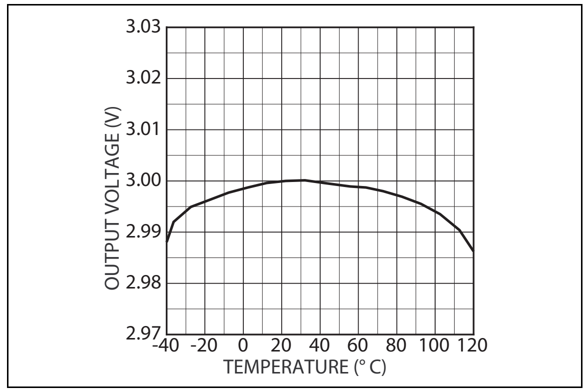


FIGURE 2-4: *Output Voltage vs. Temperature for LDO 1.*

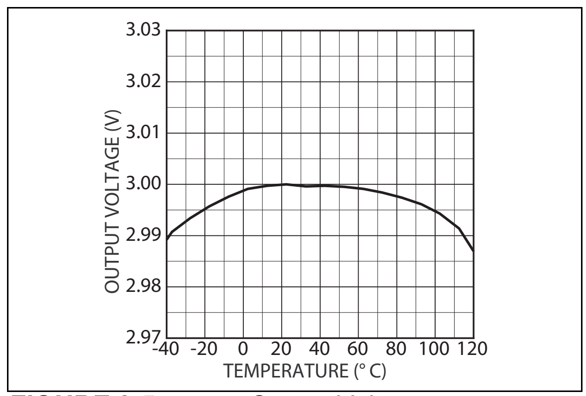


FIGURE 2-5: *Output Voltage vs. Temperature for LDO 2.*

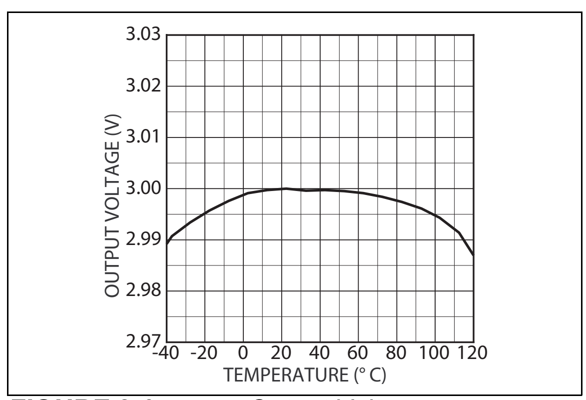


FIGURE 2-6: *Output Voltage vs. Temperature for LDO 3.*

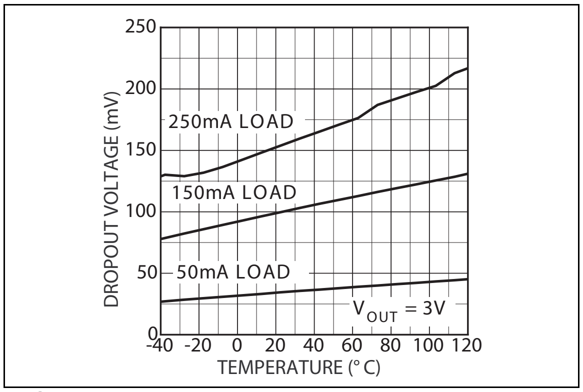


FIGURE 2-7: *Dropout Voltage vs. Temperature for LDO 1.*

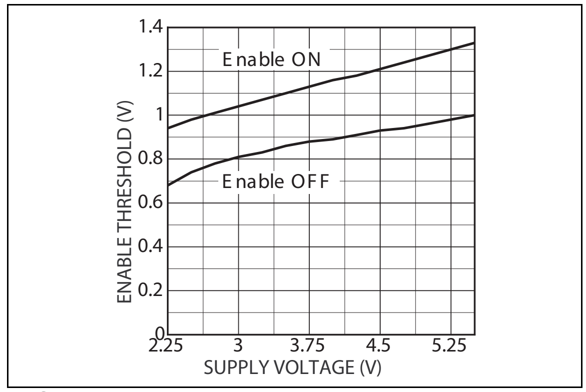


FIGURE 2-10: *Enable Threshold vs. Supply Voltage for LDO 1.*

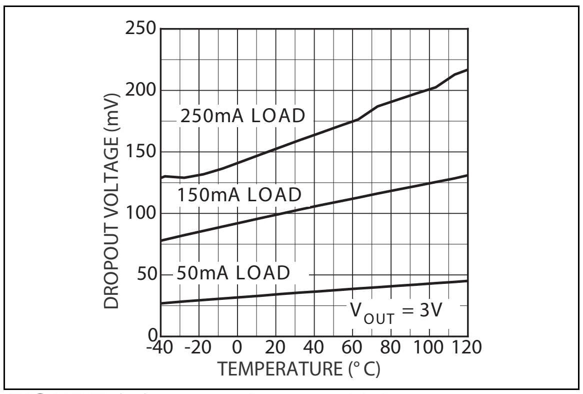


FIGURE 2-8: *Dropout Voltage vs. Temperature for LDO 2.*

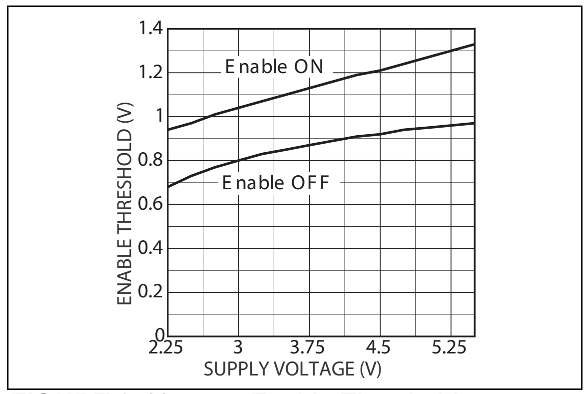


FIGURE 2-11: *Enable Threshold vs. Supply Voltage for LDO 2.*

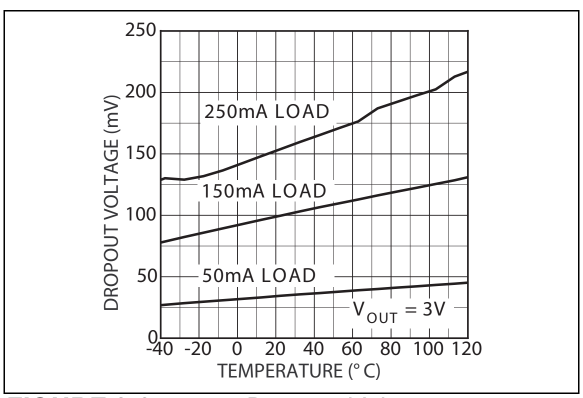


FIGURE 2-9: *Dropout Voltage vs. Temperature for LDO 3.*

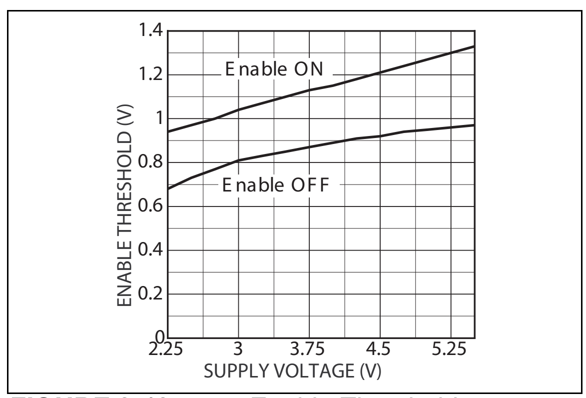


FIGURE 2-12: *Enable Threshold vs. Supply Voltage for LDO 3.*

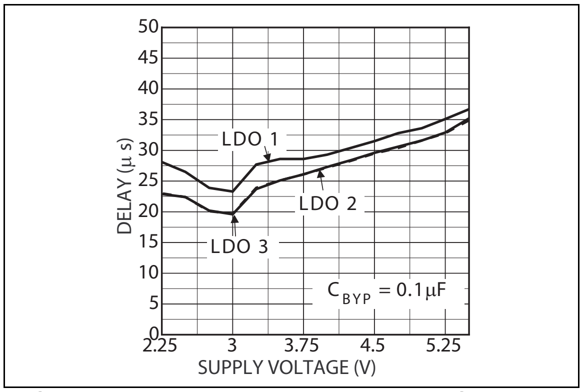


FIGURE 2-13: *Enable Delay vs. Supply Voltage.*

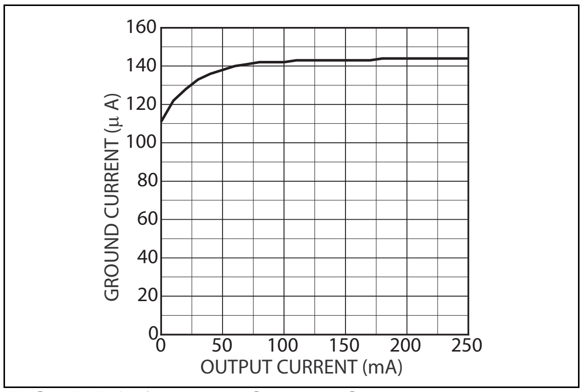


FIGURE 2-14: *Ground Current vs. Load Current for LDO 1.*

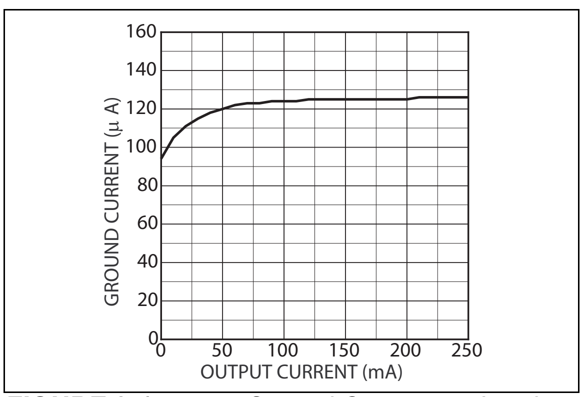


FIGURE 2-15: *Ground Current vs. Load Current for LDO 2.*

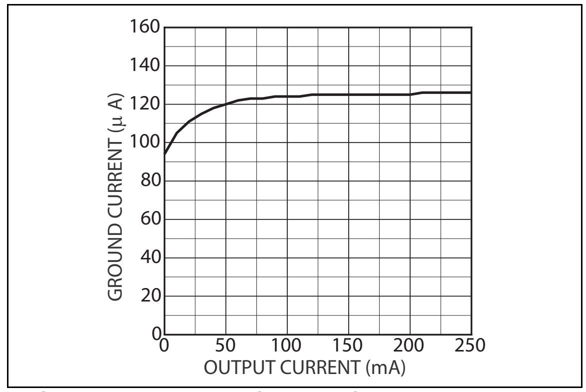


FIGURE 2-16: *Ground Current vs. Load Current for LDO 3.*

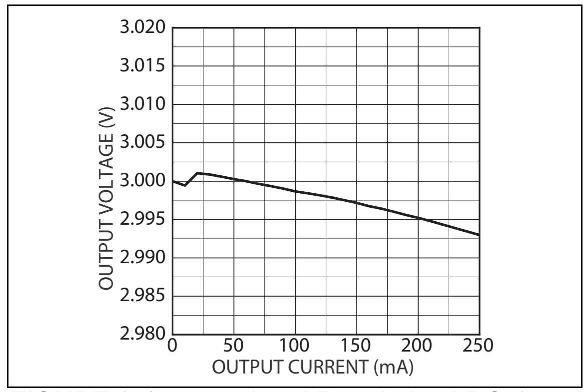


FIGURE 2-17: *Load Regulation LDO 1.*

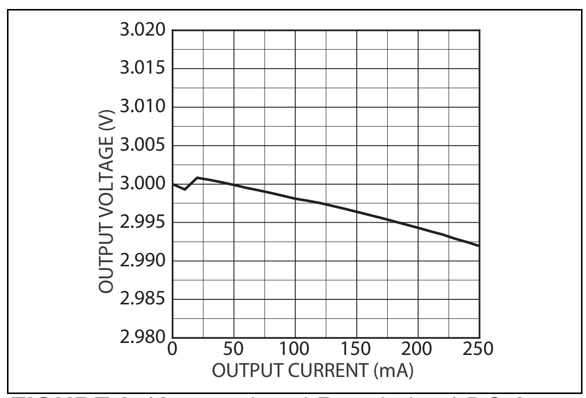


FIGURE 2-18: *Load Regulation LDO 2.*

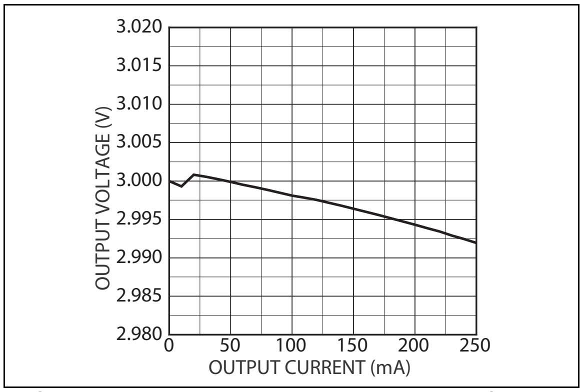


FIGURE 2-19: Load Regulation LDO 3.

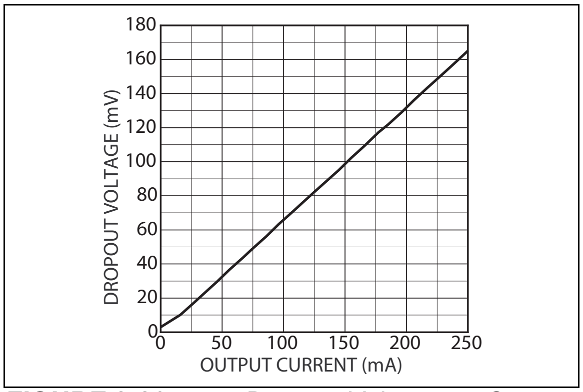


FIGURE 2-20: Dropout Voltage vs. Output Current for LDO 1.

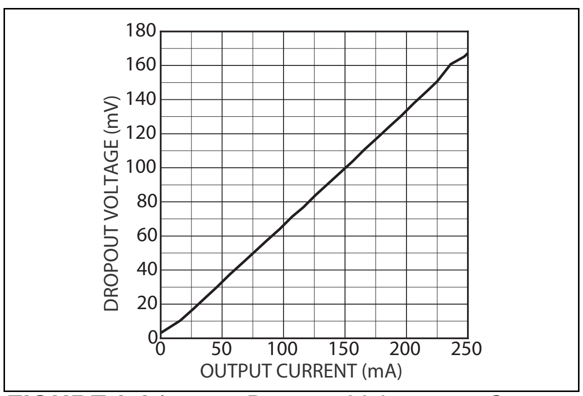


FIGURE 2-21: Dropout Voltage vs. Output Current for LDO 2.

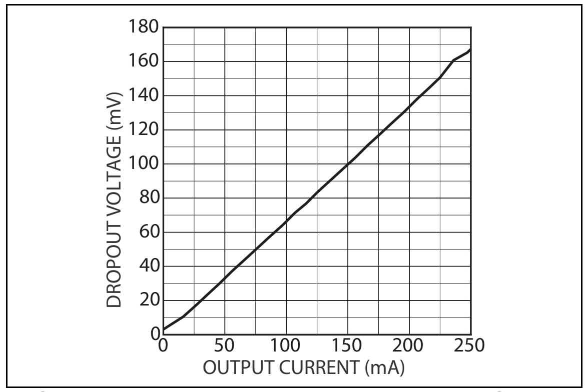


FIGURE 2-22: Dropout Voltage vs. Output Current for LDO 3.

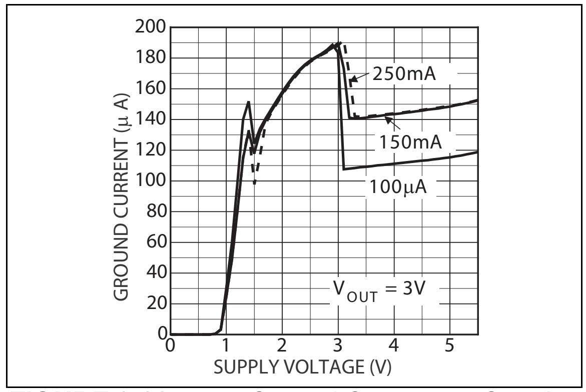


FIGURE 2-23: Ground Current vs. Supply Voltage for LDO 1.

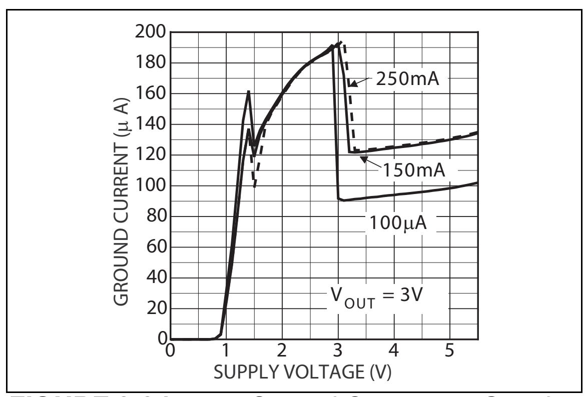


FIGURE 2-24: Ground Current vs. Supply Voltage for LDO 2.

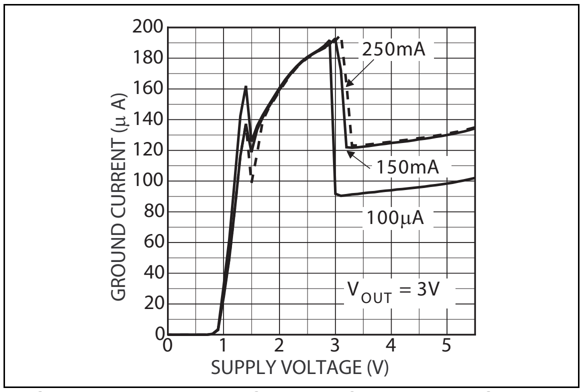


FIGURE 2-25: *Ground Current vs. Supply Voltage for LDO 3.*

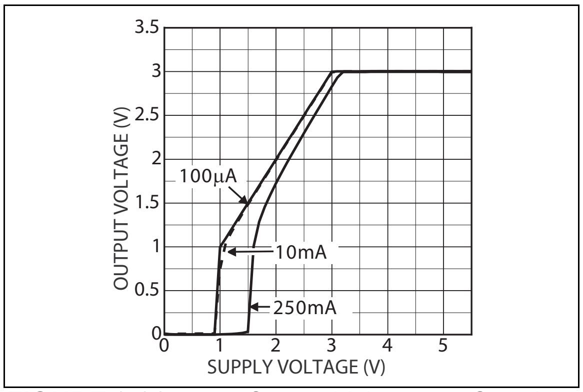


FIGURE 2-26: *Output Voltage vs. Supply Voltage for LDO 1.*

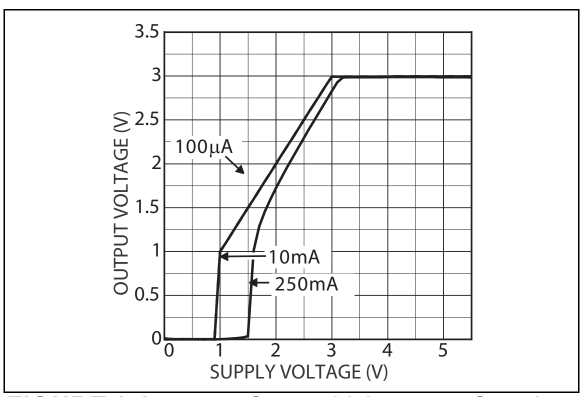


FIGURE 2-27: *Output Voltage vs. Supply Voltage for LDO 2.*

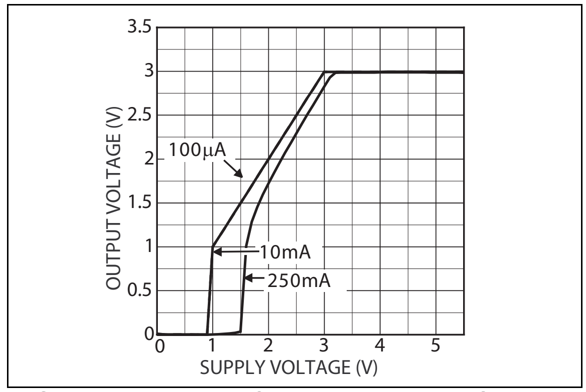


FIGURE 2-28: *Output Voltage vs. Supply Voltage for LDO 3.*

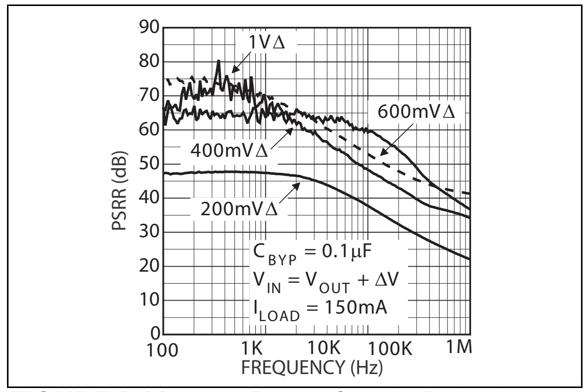


FIGURE 2-29: *Power Supply Rejection Ratio, 3V_{OUT}.*

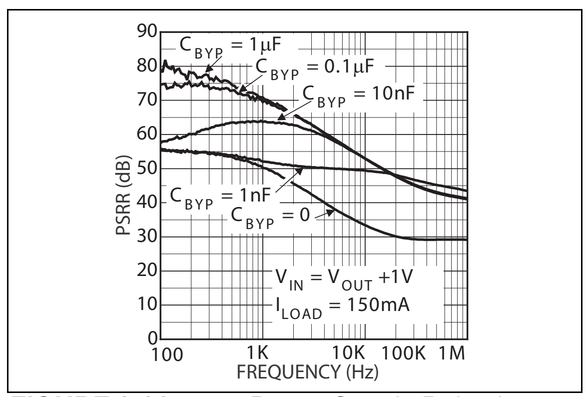


FIGURE 2-30: *Power Supply Rejection Ratio vs. C_{BYPASS}.*

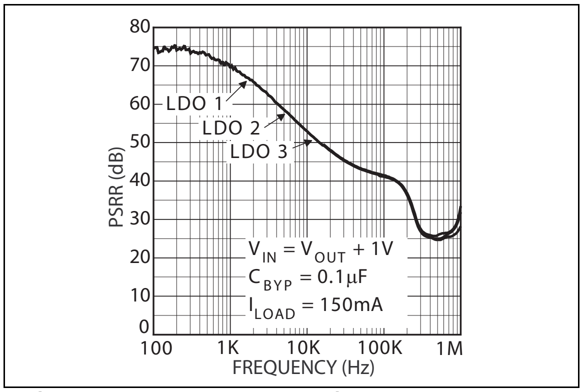


FIGURE 2-31: *Power Supply Rejection Ratio.*

3.0 PIN DESCRIPTIONS

The descriptions of the pins are listed in Table 3-1.

TABLE 3-1: PIN FUNCTION TABLE

Pin Number	Pin Name	Description
1	VOUT1	Output voltage of regulator 1 (250 mA). Connect externally to pin 16.
2	VIN1	Supply input of regulator 1 (highest input voltage required for common circuitry).
3	VIN2	Supply input of regulator 2.
4	VOUT2	Output voltage of regulator 2 (250 mA). For fixed output device, connect pins 4 and 5 externally.
5	VOUT2 (Fixed)	Output voltage of regulator 2 (250 mA). For fixed output device, connect pins 4 and 5 externally.
	ADJ2 (Adj.)	Adjust Input. Feedback input for regulator 2.
6	EN1	Enable input to regulator 1. Enables regulator 1 output. Active-high input. High = on, low = off.
7	EN2	Enable input to regulator 2. Enables regulator 2 output. Active-high input. High = on, low = off.
8	EN3	Enable input to regulator 3. Enables regulator 3 output. Active-high input. High = on, low = off.
9	CBYP	Reference Bypass: Connect external 0.01 µF to GND to reduce output noise. May be left open.
10	GND	Ground.
11	GND	Ground.
12	VIN3	Supply input of regulator 3.
13	VOUT3	Output voltage of regulator 3 (250 mA). For fixed output device, connect pins 13 and 14 externally.
14	VOUT3 (Fixed)	Output voltage of regulator 3 (250 mA). For fixed output device, connect pins 13 and 14 externally.
	ADJ3 (Adj.)	Adjust Input. Feedback input for regulator 3.
15	NC (Fixed)	No Connect. Not internally connected.
	ADJ1 (Adj.)	Adjust Input. Feedback input for regulator 1.
16	VOUT1	Output voltage of regulator 1 (250 mA). Connect externally to pin 1.
EP	GND	Ground.

4.0 FUNCTIONAL DESCRIPTION

The MIC2215 is a triple, low-noise CMOS LDO. Designed specifically for noise-critical applications in handheld or battery-powered devices, the MIC2215 comes equipped with a noise reduction feature to filter the output noise via an external capacitor. Other features of the MIC2215 include a separate logic compatible enable pin for each channel, current limit, thermal shutdown, and ultra-fast transient response, all within a small QFN package.

The MIC2215 is specifically designed to work with low-ESR ceramic capacitors, reducing the amount of board space necessary for power applications, which is critical in handheld wireless devices.

5.0 APPLICATION INFORMATION

5.1 Enable/Shutdown

The MIC2215 comes with three active-high enable pins that allow each individual regulator to be either disabled or enabled. Forcing the enable pin low disables the respective regulator and sends it into a zero off-mode current state. In this state, current consumed by the individual regulator goes nearly to zero. This is true for both regulators 2 and 3. Regulator 1's input supply pin is also used to power the internal reference. When any regulator, either 1, 2, or 3, is enabled, an additional 20 µA for the reference will be drawn through VIN1. All three must be disabled to enter the zero current off-mode state. Forcing the enable pin high enables each respective output voltage. This part is CMOS and none of the enable pins can be left floating; a floating enable pin may cause an indeterminate state on the output.

5.2 Input Capacitor

The MIC2215 is a high performance, high bandwidth device. Therefore, it requires a well-bypassed input supply for optimal performance. A small 0.1 µF capacitor placed close to the input is recommended to aid in noise performance. Low-ESR ceramic capacitors provide optimal performance at a minimum of space. Additional high-frequency capacitors, such as small valued NPO dielectric type capacitors, help to filter out high frequency noise and are good practice in any RF-based circuit.

5.3 Output Capacitor

The MIC2215 requires an output capacitor for stability. The design requires 1 µF or greater on the output to maintain stability. The design is optimized for use with low-ESR ceramic chip capacitors. 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.

5.4 Bypass Pin

A capacitor can be placed from the noise bypass pin to ground to reduce output voltage noise. The capacitor bypasses the internal reference. There is one single internal reference shared by each output, therefore the bypassing affects each regulator. A 0.1 µF capacitor is recommended for applications that require low-noise outputs. The bypass capacitor can be increased, further reducing noise and improving PSRR. Turn-on time increases slightly with respect to bypass capacitance.

5.5 Internal Reference

The internal band gap, or reference, is powered from the VIN1 input. Due to some of the input noise (PSRR) contributions being imposed on the band gap, it is important to make V_{IN1} as clean as possible with good bypassing close to the input.

5.6 Multiple Input Supplies

The MIC2215 can be used with multiple input supplies when desired. The only requirement, aside from maintaining the voltages within the operating ranges, is that V_{IN1} always remains the highest voltage potential.

5.7 No-Load Stability

The MIC2215 will remain stable and in regulation with no load, unlike many other voltage regulators. This is especially important in CMOS RAM keep-alive applications.

5.8 Thermal Considerations

The MIC2215 is designed to provide up to 250 mA of current per channel in a very small package. Maximum power dissipation can be calculated based on the output current and the voltage drop across the part. To determine the maximum power dissipation of the package, use the junction-to-ambient thermal resistance of the device and the following basic equation:

EQUATION 5-1:

$$P_{D(MAX)} = (T_{J(MAX)} - T_A) \div \theta_{JA}$$

The maximum junction temperature of the die ($T_{J(MAX)}$) is +125° and is also the ambient operating temperature (T_A). θ_{JA} is layout dependent; the junction-to-ambient thermal resistance for the MIC2215 can be found in the Temperature Specifications section.

The actual power dissipation of the regulator circuit can be determined using the following equation:

EQUATION 5-2:

$$P_{DTOTAL} = P_{DLDO1} + P_{DLDO2} + P_{DLDO3}$$

Where:
$P_{DLDO1} = (V_{IN1} - V_{OUT1}) \times I_{OUT1}$
$P_{DLDO2} = (V_{IN2} - V_{OUT2}) \times I_{OUT2}$
$P_{DLDO3} = (V_{IN3} - V_{OUT3}) \times I_{OUT3}$

Substituting $P_{D(MAX)}$ for P_D and solving for the operating conditions that are critical to the application will give the maximum operating conditions for the regulator circuit. For example, when operating the MIC2215 at 60°C with a minimum footprint layout, the maximum load currents can be calculated as follows:

EQUATION 5-3:

$$P_{D(MAX)} = (125°C - 60°C) \div 43°C/W = 1.511W$$

The junction-to-ambient thermal resistance for the minimum footprint is 43°C/W. The maximum power dissipation must not be exceeded for proper operation. Using a lithium-ion battery as the supply voltage (2.8V/250 mA for channel 1, 3V/100 mA for channel 2, and 2.8V/50 mA for channel 3), maximum power can be calculated as follows:

EQUATION 5-4:

$$P_{DLDO1} = (4.2V - 2.8V) \times 250mA$$
$$P_{DLDO1} = 350mW$$
$$P_{DLDO2} = (4.2V - 3.0V) \times 100mA$$
$$P_{DLDO2} = 120mW$$
$$P_{DLDO3} = (4.2V - 2.8V) \times 50mA$$
$$P_{DLDO3} = 70mW$$
$$P_{DTOTAL} = 350mW + 120mW + 70mW$$
$$P_{DTOTAL} = 540mW$$

The calculation shows that the device is well below the maximum allowable power dissipation of 1.511W for a 60°C ambient temperature. After the maximum power dissipation has been calculated, it is always good practice to calculate the maximum ambient temperature for a 125°C junction temperature. Calculating maximum ambient temperature follows:

EQUATION 5-5:

$$T_{A(MAX)} = T_{J(MAX)} - (P_D \times \theta_{JA})$$
$$T_{A(MAX)} = 125°C - (540mW \times 43°C/W)$$
$$T_{A(MAX)} = 101°C$$

For more information, please refer to the Designing with Low-Dropout Voltage Regulators Handbook.

5.9 Adjustable Regulator Application

Adjustable regulators use the ratio of two resistors to multiply the reference voltage to produce the desired output voltage. The MIC2215 can be adjusted from 1.25V to 5.5V, the maximum $V_{DROPOUT}$, by using two external resistors (Figure 5-1). The resistors set the output voltage based on the following equation:

EQUATION 5-6:

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

Where:
V_{REF} = 1.25V

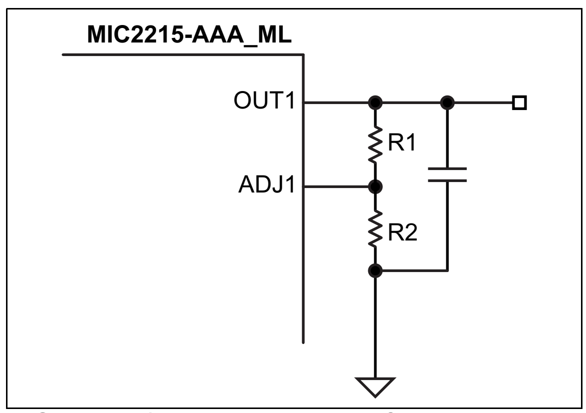
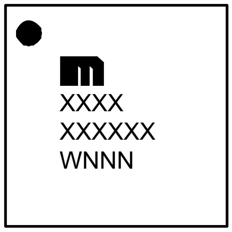


FIGURE 5-1: *Adjustable Output.*

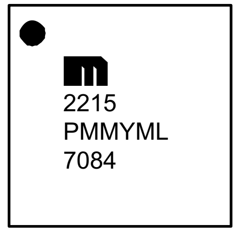
6.0 PACKAGING INFORMATION

6.1 Package Marking Information

16-Lead QFN*



Example



Legend:	XX...X	Product code or customer-specific information
	Y	Year code (last digit of calendar year)
	YY	Year code (last 2 digits of calendar year)
	WW	Week code (week of January 1 is week ‘01’)
	NNN	Alphanumeric traceability code
	(e3)	Pb-free JEDEC® designator for Matte Tin (Sn)
	*	This package is Pb-free. The Pb-free JEDEC designator ((e3)) can be found on the outer packaging for this package.
	●, ▲, ▼	Pin one index is identified by a dot, delta up, or delta down (triangle mark).

Note: In the event the full Microchip part number cannot be marked on one line, it will be carried over to the next line, thus limiting the number of available characters for customer-specific information. Package may or may not include the corporate logo.

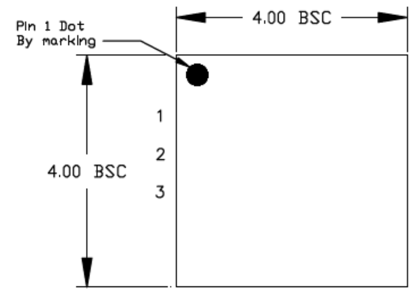
Underbar (_) and/or Overbar (‾) symbol may not be to scale.

Note: If the full seven-character YYWWNNN code cannot fit on the package, the following truncated codes are used based on the available marking space:
6 Characters = YWWNNN; 5 Characters = WWNNN; 4 Characters = WNNN; 3 Characters = NNN;
2 Characters = NN; 1 Character = N

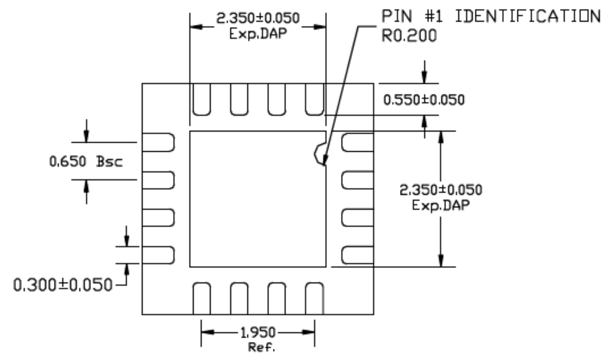
16-Lead 4 mm x 4 mm QFN Package Outline and Recommended Land Pattern

TITLE
16 LEAD QFN 4.0 x 4.0 mm PACKAGE OUTLINE & RECOMMENDED LAND PATTERN

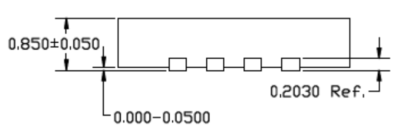
DRAWING #	QFN44-16LD-PL-1	**UNIT**	MM



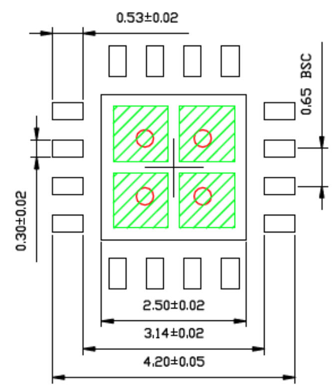
TOP VIEW
NOTE: 1, 2, 3



BOTTOM VIEW
NOTE: 1, 2



SIDE VIEW
NOTE: 1, 2



RECOMMENDED LAND PATTERN
NOTE: 4, 5

NOTE:
1. MAX PACKAGE WARPAGE IS 0.05MM
2. MAX ALLOWABLE BURR IS 0.076MM IN ALL DIRECTIONS
3. PIN #1 IS ON TOP WILL BE LASER MARKED
4. GREEN RECTANGLES (SHADED AREA) REPRESENT STENCIL OPENING ON EXPOSED AREA. SIZE IS 0.95X0.95MM, 1.15MM PITCH SPACING
5. RED CIRCLES REPRESENT THERMAL VIAS & SHOULD BE CONNECTED TO GND FOR MAX PERFORMANCE. 0.30 - 0.35 MM RECOMMENDED DIAMETER, 1.0MM PITCH SPACING

Note: For the most current package drawings, please see the Microchip Packaging Specification located at http://www.microchip.com/packaging.

NOTES:

APPENDIX A: REVISION HISTORY

Revision A (November 2019)

- Converted Micrel document MIC2215 to Microchip data sheet template DS20006247A.
- Minor grammatical text changes throughout.
- Added additional value and condition for Load Regulation in the Electrical Characteristics table.

Revision B (March 2022)

- Added new required note below the legend (for APID and some other former Micrel BUs) in Section 6.1, Package Marking Information to help clarify the marking codes.

NOTES:

PRODUCT IDENTIFICATION SYSTEM

To order or obtain information, e.g., on pricing or delivery, contact your local Microchip representative or sales office.

Device	-X	X	X	X	XX	-XX
Part No.	V_{OUT1}	V_{OUT2}	V_{OUT3}	Junction Temp. Range	Package	Media Type

Device:	MIC2215:		High PSRR, Low Noise µCap Triple LDO
V_{OUT1}, V_{OUT2}, V_{OUT3} Options:	A	=	Adjustable
	F	=	1.5V
	W	=	1.6V
	G	=	1.8V
	D	=	1.85V
	Y	=	1.9V
	H	=	2.0V
	E	=	2.1V
	J	=	2.5V
	K	=	2.6V
	I	=	2.65V
	L	=	2.7V
	M	=	2.8V
	N	=	2.85V
	O	=	2.9V
	P	=	3.0V
	Q	=	3.1V
	R	=	3.2V
	S	=	3.3V
	T	=	3.4V
	U	=	3.5V
	V	=	3.6V
Junction Temperature Range:	Y	=	–40°C to +125°C, RoHS-Compliant
Package:	ML	=	16-Lead 4 mm x 4 mm QFN
Media Type:	TR	=	5,000/Reel

Examples:

a) MIC2215-AAAYML-TR: MIC2215, Adjustable Output Voltages, –40°C to +125°C Temperature Range, 16-Lead QFN, 5,000/Reel

b) MIC2215-MMGYML-TR: MIC2215, 2.8V/2.8V/1.8V Output Voltages, –40°C to +125°C Temperature Range, 16-Lead QFN, 5,000/Reel

c) MIC2215-MMMYML-TR: MIC2215, 2.8V/2.8V/2.8V Output Voltages, –40°C to +125°C Temperature Range, 16-Lead QFN, 5,000/Reel

d) MIC2215-PMMYML-TR: MIC2215, 3.0V/2.8V/2.8V Output Voltages, –40°C to +125°C Temperature Range, 16-Lead QFN, 5,000/Reel

e) MIC2215-PPGYML-TR: MIC2215, 3.0V/3.0V/1.8V Output Voltages, –40°C to +125°C Temperature Range, 16-Lead QFN, 5,000/Reel

f) MIC2215-PPMYML-TR: MIC2215, 3.0V/3.0V/2.8V Output Voltages, –40°C to +125°C Temperature Range, 16-Lead QFN, 5,000/Reel

g) MIC2215-PPPYML-TR: MIC2215, 3.0V/3.0V/3.0V Output Voltages, –40°C to +125°C Temperature Range, 16-Lead QFN, 5,000/Reel

Note 1: Tape and Reel identifier only appears in the catalog part number description. This identifier is used for ordering purposes and is not printed on the device package. Check with your Microchip Sales Office for package availability with the Tape and Reel option.

NOTES:

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