AME, Inc.

AME8830

Ultra Low Dropout, Fast Turn On 150mA CMOS Regulator

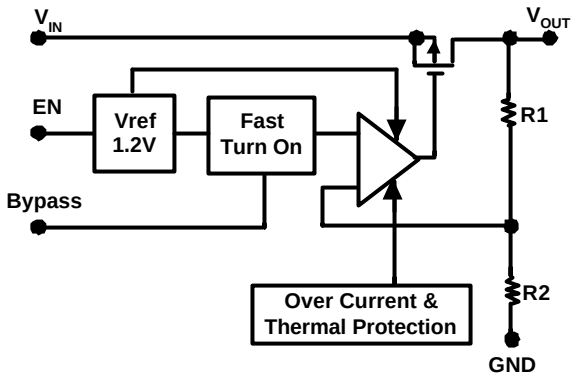
■ General Description

The AME8830 is designed for portable and wireless application with low dropout voltage and optimized performance for battery powered systems to deliver ultra low noise. The space-saving SOT-25 package is attractive for Pocket and Hand Held applications.

The AME8830 is stable with a small 1μF output capacitor.

In applications requiring a low noise without slowing down the load transient response, Place a 0.01μF capacitor between Bypass and Ground.

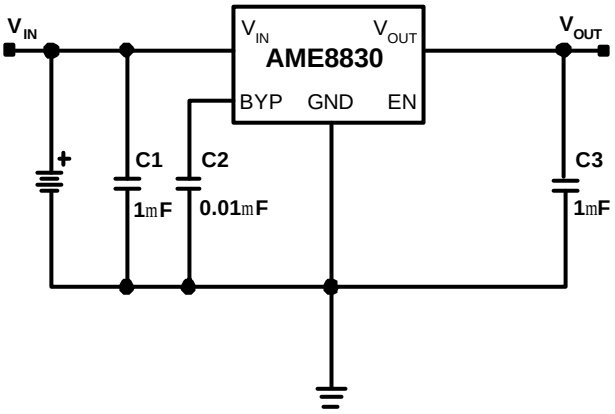
■ Functional Block Diagram



■ Features

- Guaranteed 150mA Output
- Thermal Shutdown
- Very Low Dropout Voltage
- Current Limiting
- Fast Turn-On Time: 150μs
- Miniature SOT-25 Package
- Logic Controlled Enable
- All AME's Lead Free Product Meet RoHS Standard

■ Typical Application

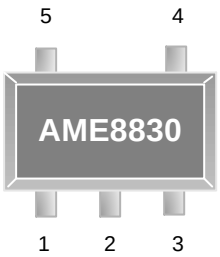


■ Applications

- Portable Electronics
- Wireless Devices
- Cordless Phones
- PC Peripherals
- Battery Powered Widgets

■ Pin Configuration

SOT-25
Top View



AME8830

1. V_{IN}
2. GND
3. EN
4. BYP
5. V_{OUT}

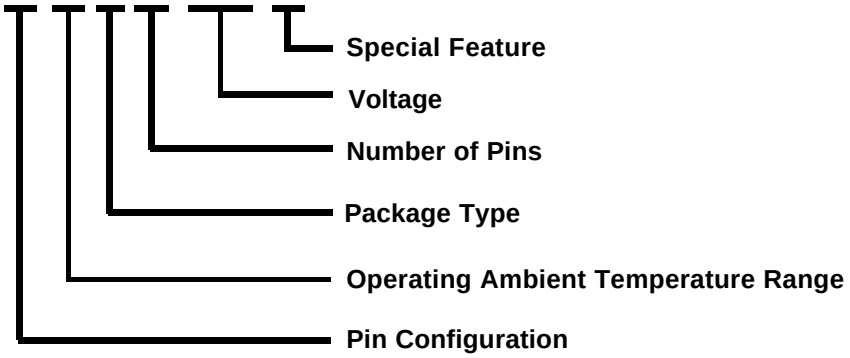
*** Die Attach:**
Conductive Epoxy

■ Pin Description

Pin Number	Pin Name	Description
1	V_{IN}	Input Voltage of the LDO
2	GND	Common Ground
3	EN	Enable Input Logic, Active High
4	BYP	Output Bypass Capacitor for Noise Reduction
5	V_{OUT}	Output Voltage of the LDO

■ Ordering Information

AME8830 x x x x xxx x



Pin Configuration	Operating Ambient Temperature Range	Package Type	Number of Pins	Voltage	Special Feature
A: 1. V_{IN} 2. GND 3. EN 4. BYP 5. V_{OUT}	E: -40°C to +85°C	E: SOT-2X	V: 5	285: V=2.85V	Y: Lead free & Low profile Z: Lead free

■ Ordering Information

Part Number	Marking*	Output Voltage	Package	Operating Ambient Tempature Range
AME8830AEEV285Y	BCMww	2.85V	TSOT-25	- 40°C to + 85°C
AME8830AEEV285Z	BCMww	2.85V	SOT-25	- 40°C to + 85°C

Note: ww represents the date code and pls refer to Date Code Rule before Package Dimension.

* A line on top of the first letter represents lead free plating such as $\overline{B}$CMww.

Please consult AME sales office or authorized Rep./Distributor for the availability of package type.

■ Absolute Maximum Ratings

Parameter	Maximum	Unit
Input Voltage	5.5	V
Output Current	P_D / (V_{IN} - V_O)	mA
Output Voltage	GND - 0.3 to V_{IN} + 0.3	V
ESD Classification	B*	

Caution: Stress above the listed absolute maximum rating may cause permanent damage to the device
* HBM B:2000~3999V

■ Recommended Operating Conditions

Parameter	Symbol	Rating	Unit
Ambient Temperature Range	T_A	- 40 to + 85	^oC
Junction Temperature Range	T_J	- 40 to + 125	^oC

■ Thermal Information

Parameter	Package	Die Attach	Symbol	Maximum	Unit
Thermal Resistance* (Junction to Case)	SOT-25	Conductive Epoxy	θ_{JC}	81	^oC / W
Thermal Resistance (Junction to Ambient)			θ_{JA}	260	
Internal Power Dissipation			P_D	400	mW
Maximum Junction Temperature				150	^oC
Solder Iron (10 Sec)**				350	^oC

* Measure θ_{JC} on center of molding compound if IC has no tab.
** MIL-STD-202G 210F

■ Electrical Specifications

Unless otherwise specilied: T_J = 25°C, V_{IN}=$V_{OUT(NOM)}$+0.5V, C_{IN}=1µF, I_{OUT}=1mA, C_{OUT}=1µF, C_{BYPASS}=0.01µF
Typical values are at T_J = 25°C.

Parameter	Symbol	Test Condition		Min	Typ	Max	Units
Input Voltage	V_{IN}			2.5		5	V
Output Voltage Accuracy	V_O	I_{OUT} = 1mA		-2		2	%
		0mA< I_{OUT} <= 150mA V_{IN} = (V_{OUT} + 0.5V) to 5.0V	T_J= -40°C~+125°C	-3		3	
Dropout Voltage	$V_{DROPOUT}$	I_{OUT} = 1mA	T_J= -40°C~+125°C		0.6	2	mV
		I_{OUT} = 50mA			30	35	
		I_{OUT} = 100mA			60	70	
		I_{OUT} = 150mA			90	100	
Current Limit	I_{LIM}	V_O < 0.1V		180		600	mA
Max Input Current at EN	I_{EN}	V_{EN} = 0.4 and V_{IN} = 5.0			+/- 1		nA
Quiescent Current	I_Q	V_{EN} = 1.4 I_{OUT} = 0mA	T_J= +25°C		135	150	µA
			T_J= -40°C~+125°C			175	
Ground Pin Current	I_{GND}	V_{EN} = 1.4 I_{OUT} = 0 to 150mA	T_J= -40°C~+125°C		155	200	
Shutdown Current	I_{SD}	V_{EN} = 0.4	T_J= -40°C~+125°C		0.15	1.5	
Line Regulation	REG_{LINE}	V_{IN} = (V_{OUT} + 0.5V) to 5.0V	T_J=+25°C	-0.15		0.15	%/V
			T_J= -40°C~+125°C	-0.2		0.2	%/V
Load Regulation	REG_{LOAD}	I_{OUT} = 1mA to 150mA	T_J= -40°C~+125°C		0.0025	0.005	%/mA
Over Temperature Shutdown	OTS				150		°C
Over Temperature Hysterisis	OTH				20		°C
Power Supply Rejection	PSRR	V_{IN} = V_{OUT} + 0.2 f = 1 KHz, I_{OUT} = 50mA			53		dB
Output Voltage Noise	e_n	1KHz to 100 KHz C_{OUT} = 1µF			100		µVrms
		1KHz to 100 KHz C_{OUT} = 1µF, C_{BP}=0.01µF			1		µV/√Hz
EN Input Threshold	V_{EH}	V_{IN}=2.5V to 5.0V	T_J= -40°C~+125°C	1.4			V
	V_{EL}	V_{IN}=2.5V to 5.0V				0.4	V
Short Circuit Current Limit	Isc	Output Grounded			300		mA
Turn_On Time	T_{ON}	C_{BYPASS} = 0.01µF			150		µs

■ Detailed Description

Input Capacitor

An input capacitance of 1μF is required between the AME8830 input pin and ground. This capacitor must be located a distance of not more than 1cm from the input pin and returned to a clean analog ground. A ceramic capacitor is recommended.

Output Capacitor

The AME8830 is designed specifically to work with very small ceramic output capacitors. A 1.0μF ceramic capacitor with ESR between 5mΩ to 500mΩ is suitable in the AME8830 application circuit.

It is also recommended that the output capacitor be placed within 1cm from the output pin and returned to a clean ground line.

Noise BYPASS Capacitor

Connecting a 0.01μF capacitors between the C_{BYPASS} pin and ground significantly reduces noise on the regulator output. This cap is connected directly to a high impedance node in the band gap reference circuit. Any significant loading on this node will cause a change on the regulated output voltage . For this reason, DC leakage current through this pin must be kept as low as possible for best output voltage accuracy.

ON/OFF Input Operation

When actively pulled low, the PMOS pass transistor shuts off, and all internal circuits are powered down. In this state, the quiescent current is less than 1.5μA.

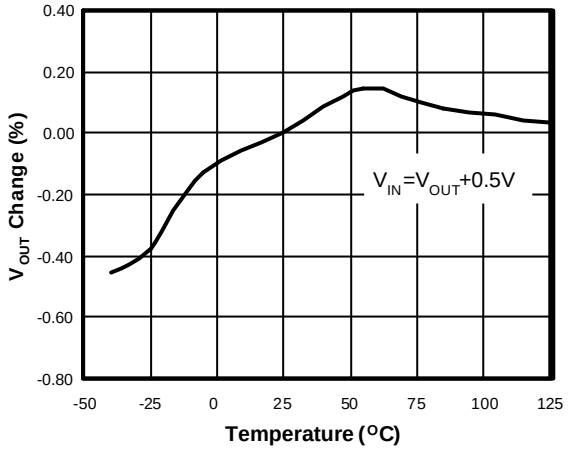
The AME8830 is turned off by pulling the EN pin low, and turned on by pulling it high.

This pin behaves much like an electronic switch.

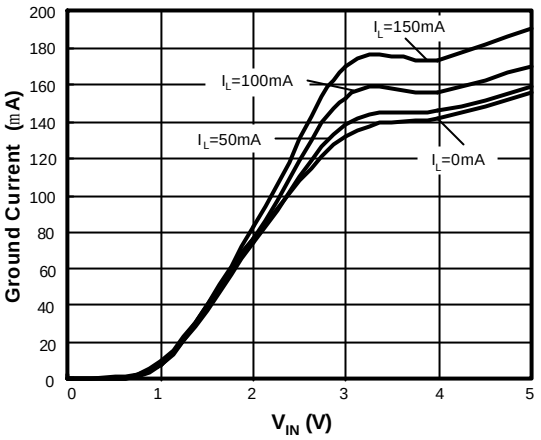
Fast Turn On-Time

The AME8830 output is turned on after VREF voltage reaches its final value(1.205V nomial). The turn on time is determined by the time constant of the bypass capacitor. The smaller the capacitor value, the shorter the turn on time, but less noise gets reduced.

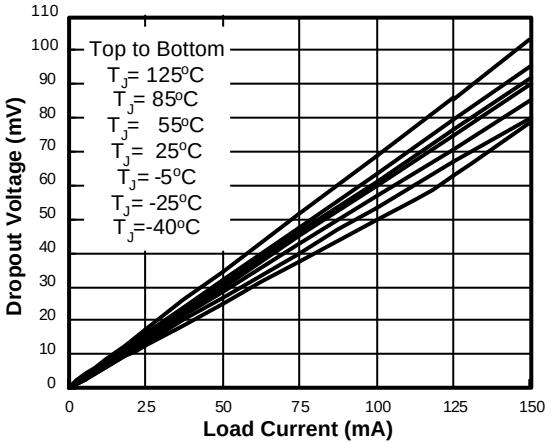
Output Voltage Change vs Temp.



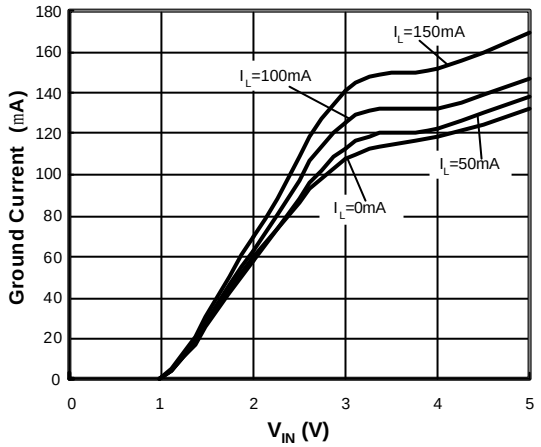
Ground Current vs V_{IN}@25^{o}C



Dropout Voltage vs Load Current



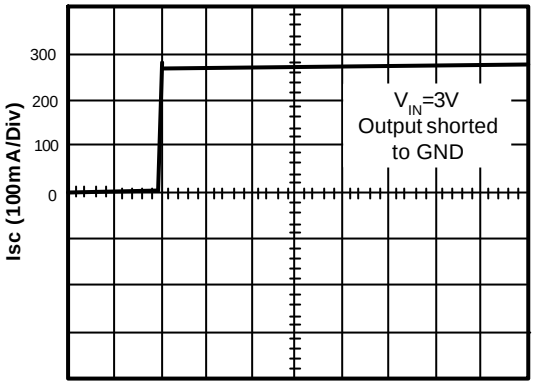
Ground Current vs V_{IN}@-40^{o}C



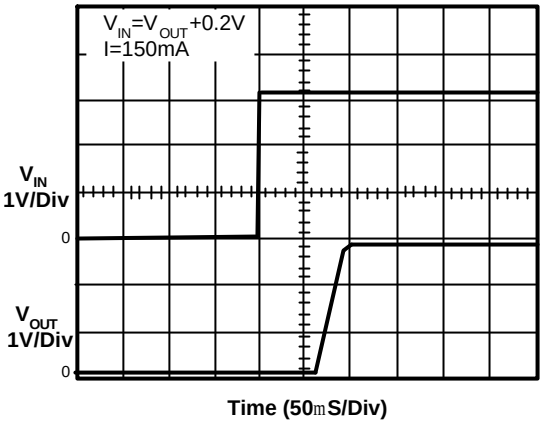
*** AME specifies full temperature range as -40^{o}C to +125^{o}C of junction temperature. Due to the difficulty of measuring junction temperature, AME decides to measure +125^{o}C of ambient temperature instead.**

Heats DUT up to 125^{o}C ambient will result in junction temperature to be higher than +125^{o}C. A marginal failure of Dropout Voltage vs Load Current is negligible.

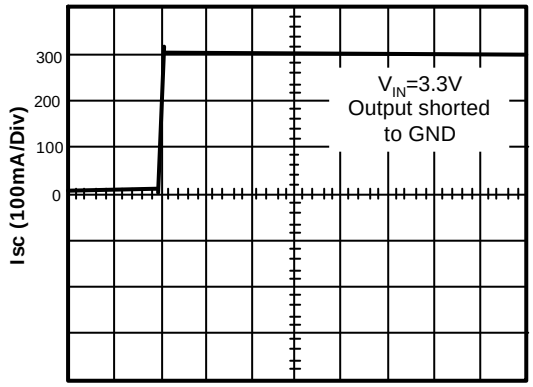
Short Circuit Current



Start Up Time



Short Circuit Current



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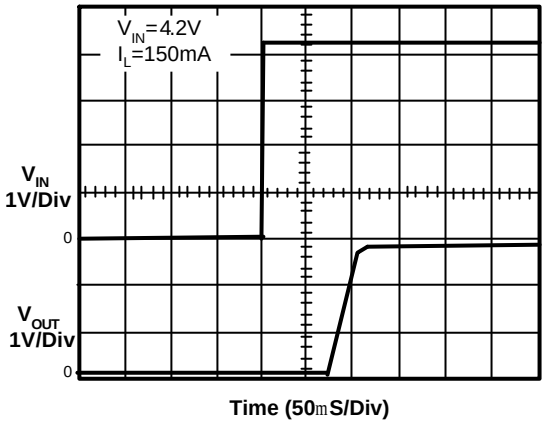
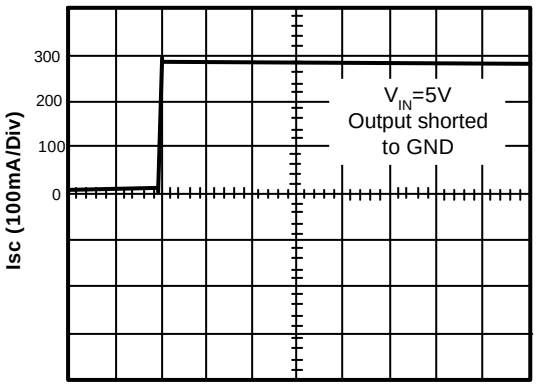
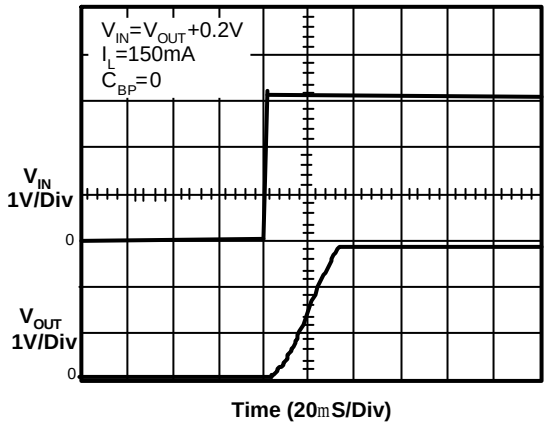


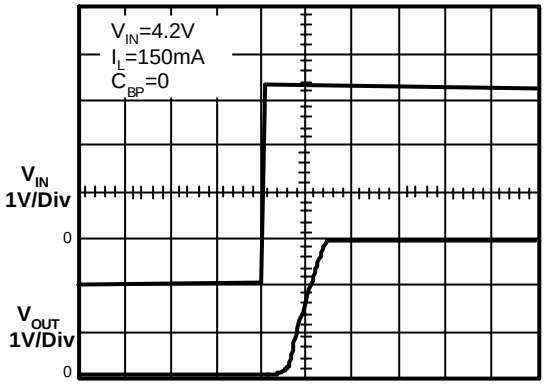
Short Circuit Current



Start Up Time

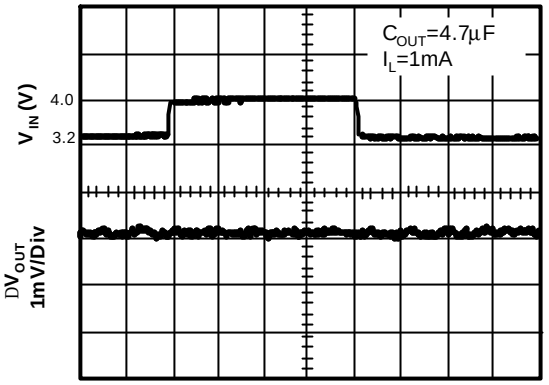


Start Up Time



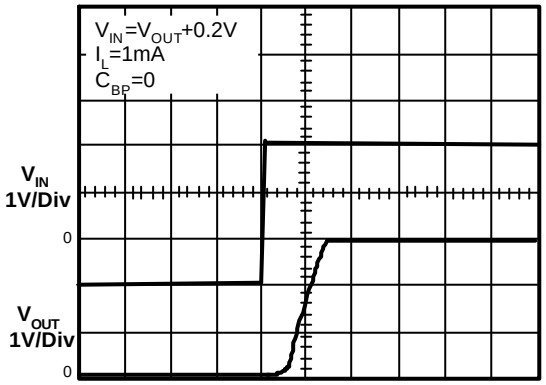
Time (20mS/Div)

Line Transient Response



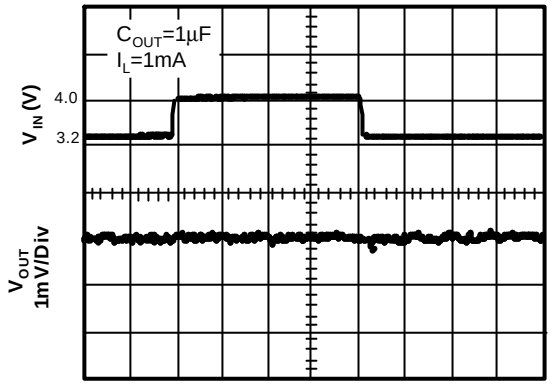
Time (200mS/Div)

Start Up Time



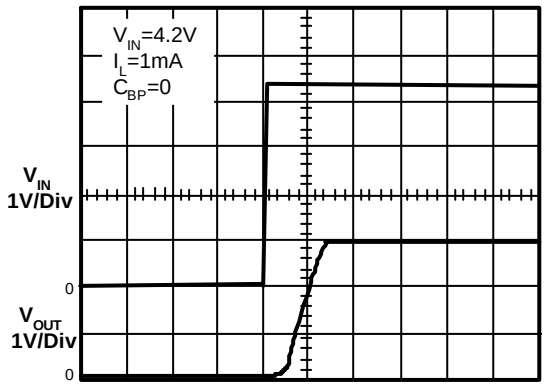
Time (20mS/Div)

Line Transient Response



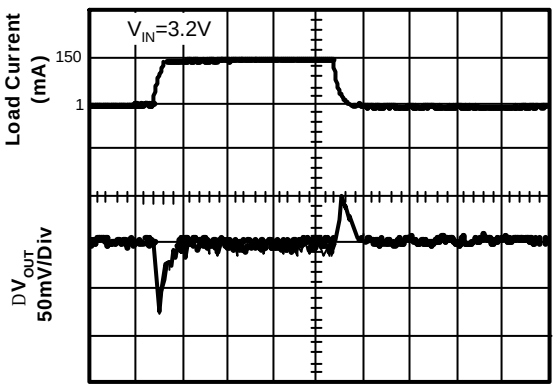
Time (200mS/Div)

Start Up Time



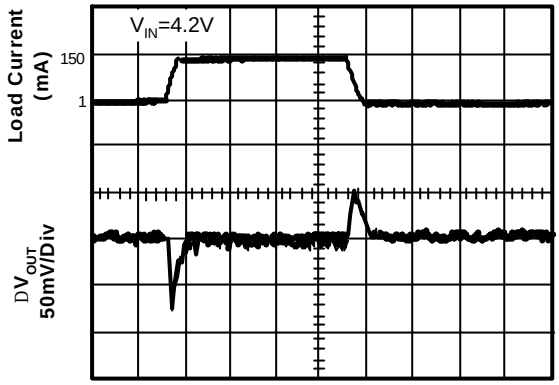
Time (20mS/Div)

Load Transient Response

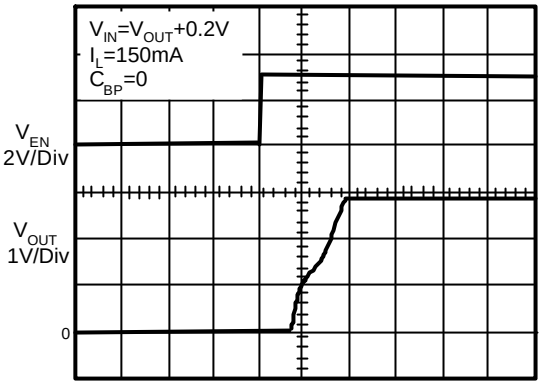


Time (40mS/Div)

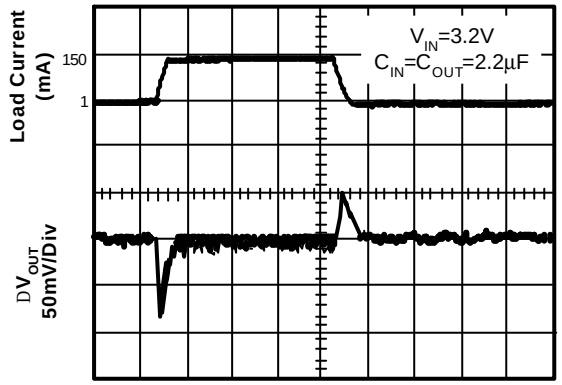
Load Transient Response



Enable Response



Load Transient Response



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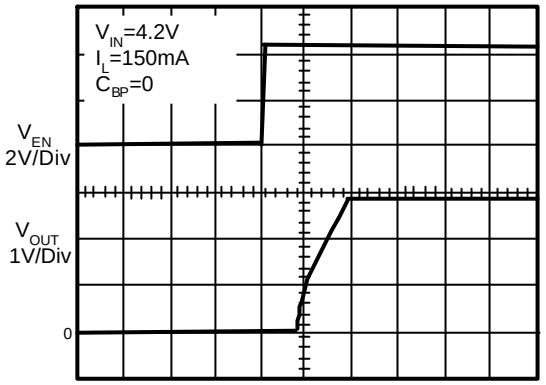
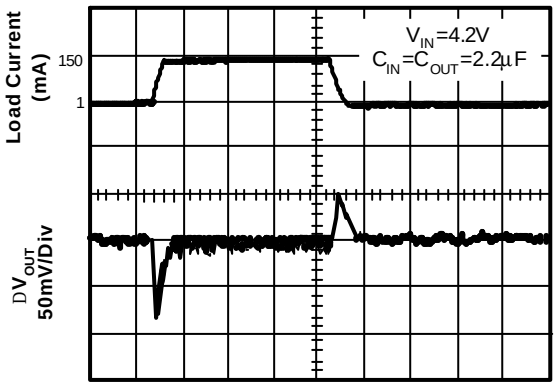


Load Transient Response



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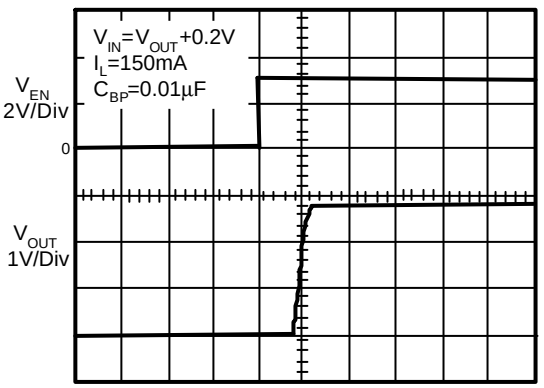

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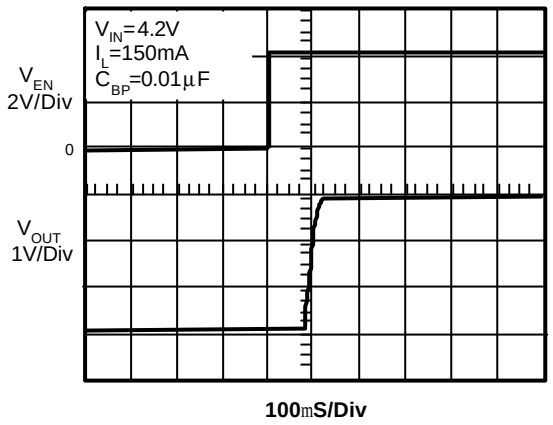
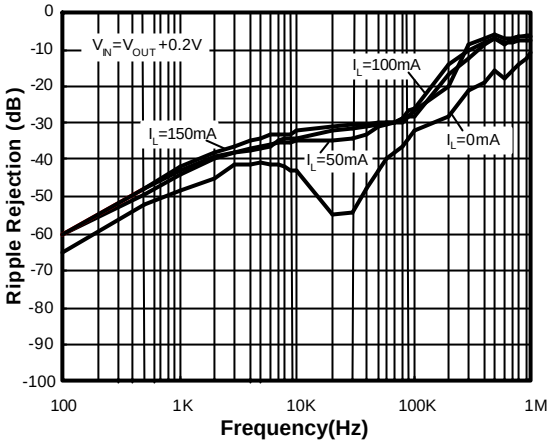
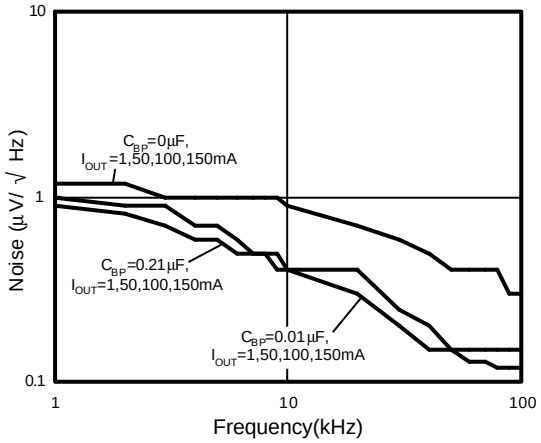


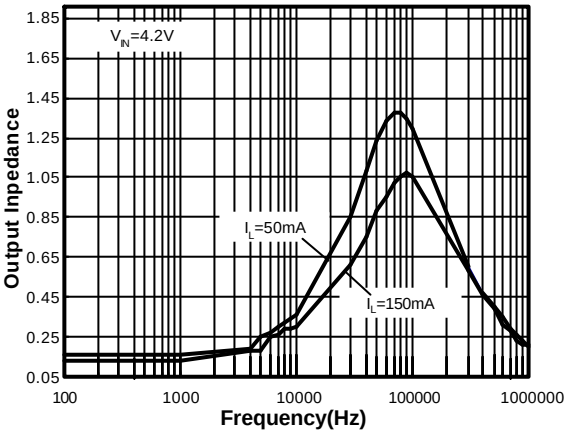
Ripple Rejection



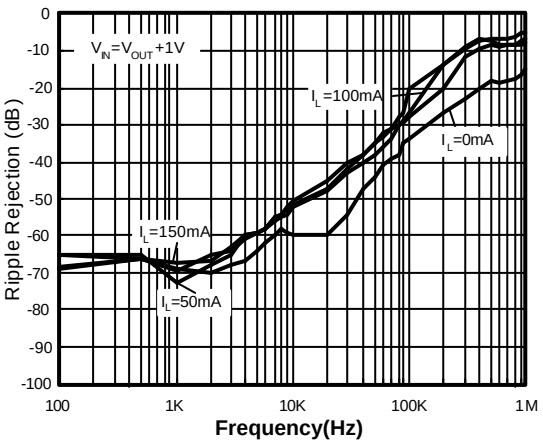
Output Noise Spectral Density



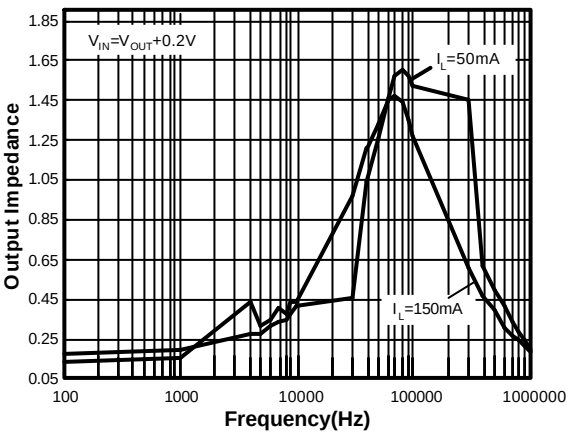
Output Impedance



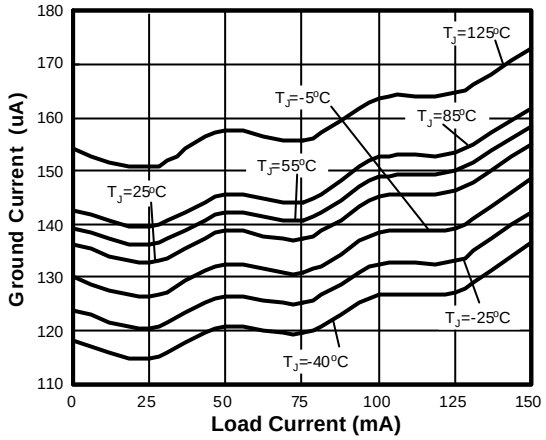
Ripple Rejection



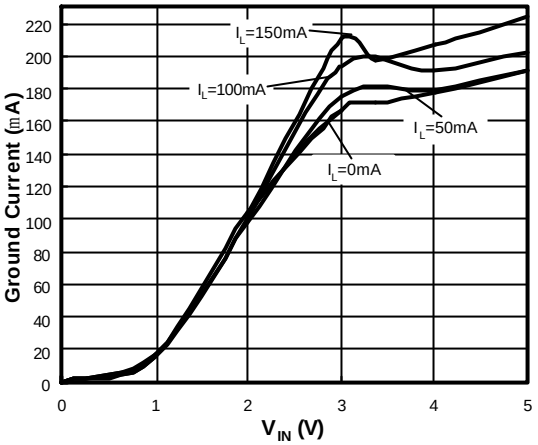
Output Impedance



Ground Current vs Load current



Ground Current vs V_{IN}@125°C

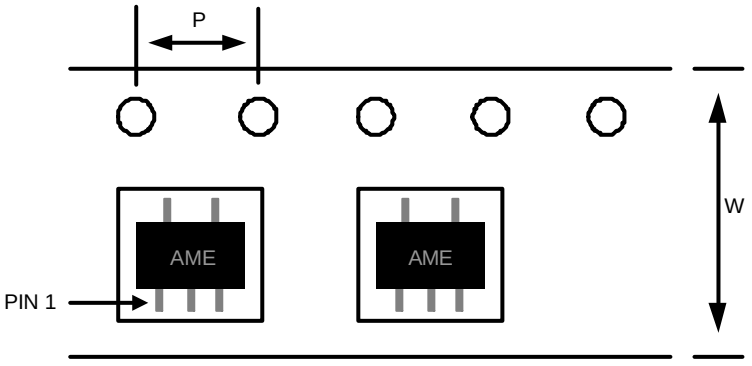


■ Date Code Rule

Marking			Date Code		Year
A	A	A	W	W	xxx0
A	A	A	W	W	xxx1
A	A	A	W	W	xxx2
A	A	A	W	W	xxx3
A	A	A	W	W	xxx4
A	A	A	W	W	xxx5
A	A	A	W	W	xxx6
A	A	A	W	W	xxx7
A	A	A	W	W	xxx8
A	A	A	W	W	xxx9

■ Tape and Reel Dimension

TSOT-25

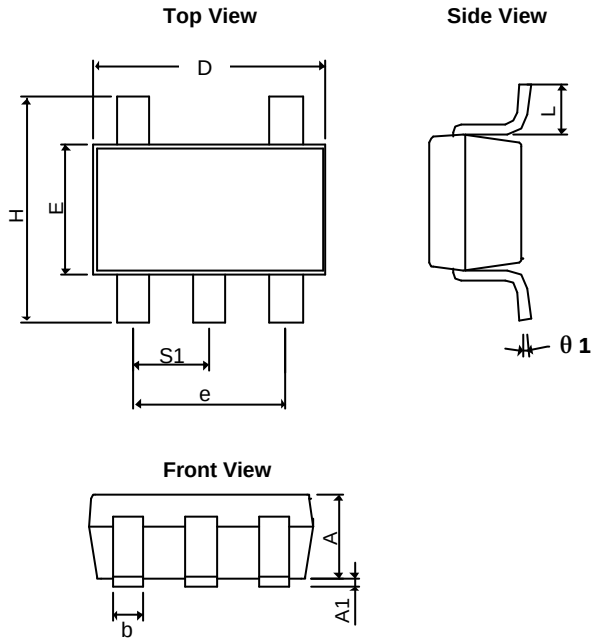


Carrier Tape, Number of Components Per Reel and Reel Size

Package	Carrier Width (W)	Pitch (P)	Part Per Full Reel	Reel Size
TSOT-25	8.0±0.1 mm	4.0±0.1 mm	3000pcs	180±1 mm

■ Package Dimension

TSOT-25



SYMBOLS	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A+A$_1$	0.90	1.25	0.0354	0.0492
b	0.30	0.50	0.0118	0.0197
c	0.09	0.25	0.0035	0.0098
D	2.70	3.10	0.1063	0.1220
E	1.40	1.80	0.0551	0.0709
e	1.90 BSC		0.07480 BSC	
H	2.40	3.00	0.09449	0.11811
L	0.35BSC		0.0138BSC	
q1	0°	10°	0°	10°
S$_1$	0.95BSC		0.0374BSC	

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