GENERAL DESCRIPTION

The CM2838 family is a positive voltage linear regulator developed utilizing CMOS technology featured low quiescent current (30μA typ.), low dropout voltage, and high output voltage accuracy, making them ideal for battery applications. EN input connected to CMOS has low bias current. The space-saving SOT-23-5 package is attractive for “Pocket” and “Hand Held” applications.

These rugged devices have both Thermal Shutdown, and Current limit to prevent device failure under the “Worst” of operating conditions.

In application requiring a low noise, regulated supply, place a 1000pF capacitor between Bypass and Ground.

The CM2838 is stable with a Low ESR output capacitance of 1.0μF or greater.

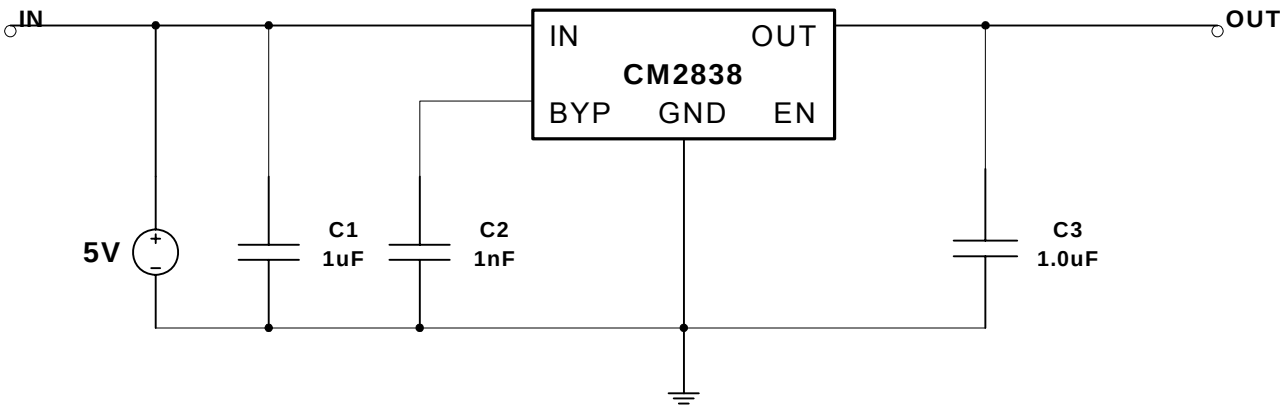
FEATURES

- Very Low Dropout Voltage
- Low Current Consumption: Typ. 30μA, Max. 35μA
- Output Voltage: 1.8V, 2.5V, 2.8V, 3.0V, and 3.3V
- High Accuracy Output Voltage: +/- 1.5%
- Guaranteed 300mA Output
- Input Range up to 7.0V
- Thermal Shutdown
- Current Limiting
- Stability with Low ESR Capacitors
- Compact Package: SOT-23-5
- Factory Pre-set Output Voltages
- Low Temperature Coefficient

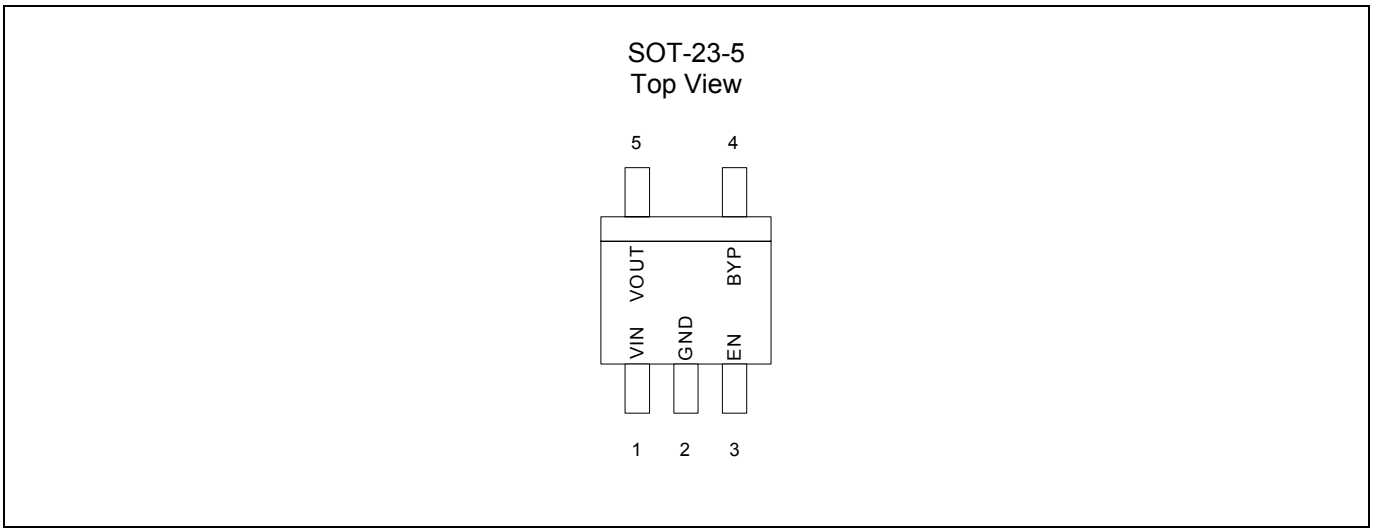
APPLICATIONS

- Battery-powered devices
- Personal communication devices
- Home electric/electronic appliances
- PC peripherals

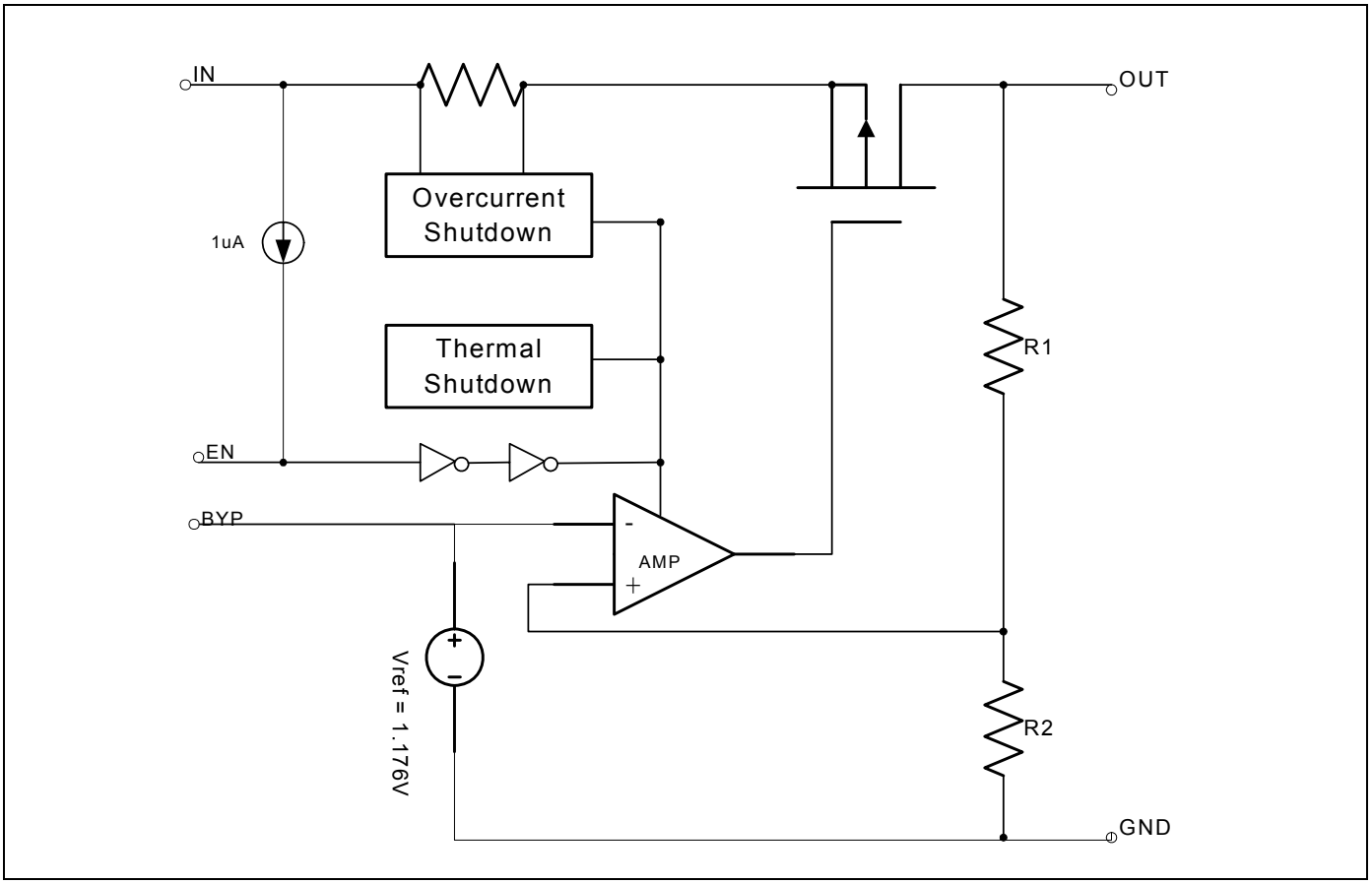
TYPICAL APPLICATIONS



PIN CONFIGURATION



BLOCK DIAGRAM



ORDERING INFORMATION

Part Number	Output Voltage	Temperature Range	Package
CM2838DIM25	1.8V	-40℃ ~ +85℃	SOT-23-5
CM2838KIM25	2.5V	-40℃ ~ +85℃	SOT-23-5
CM2838NIM25	2.8V	-40℃ ~ +85℃	SOT-23-5
CM2838PIM25	3.0V	-40℃ ~ +85℃	SOT-23-5
CM2838SIM25	3.3V	-40℃ ~ +85℃	SOT-23-5
CM2838GDIM25	1.8V	-40℃ ~ +85℃	SOT-23-5
CM2838GKIM25	2.5V	-40℃ ~ +85℃	SOT-23-5
CM2838GNIM25	2.8V	-40℃ ~ +85℃	SOT-23-5
CM2838GPIM25	3.0V	-40℃ ~ +85℃	SOT-23-5
CM2838GSIM25	3.3V	-40℃ ~ +85℃	SOT-23-5

Note: For other pre-set output voltage requirements, please contact Champion Sales office.

ABSOLUTE MAXIMUM RATINGS

Input Voltage ..... +7V
Output Current ..... P_D / (V_{IN} - Vo) mA
Output Voltage ..... GND-0.3V to V_{IN}+0.3V
ESD Classification ..... B

OPERATING RATINGS

Ambient Temperature Range (T_A) ..... -40℃ to +85℃
Junction Temperature Range ..... -40℃ to +150℃

THERMAL INFORMATION

Parameter		Maximum	Unit
Thermal Resistance (Θ_{jc})	SOT-23-5	160	℃/W
Internal Power Dissipation (P_D) ($\triangle T$ = 100℃)	SOT-23-5	250	mW
Maximum Junction Temperature		150	℃
Maximum Lead Temperature (10 Sec)		300	℃

Caution: Stress above the listed absolute rating may cause permanent damage to the device.

ELECTRICAL CHARACTERISTICS

T_A = +25℃; unless otherwise noted

Parameter	Symbol	Test Conditions		CM2838 Min.	CM2838 Typ.	CM2838 Max.	Unit
Input Voltage	V_{IN}			**Note 1**		7	V
Output Voltage Accuracy	V_{OUT}	I_O = 1mA to 300mA		-1.5		1.5	%
Dropout Voltage	$V_{DROPOUT}$	I_O = 300mA, $V_{OUT}=V_{O(NOM)}$-1.5%,	1.2V<$V_{O(NOM)}$≤2.0V			1300	mV
			2.0V<$V_{O(NOM)}$≤2.5V			400	
			2.5V<$V_{O(NOM)}$			300	
Output Current	I_O	V_{OUT} > 1.2V		300			mA
Current Limit	I_{LIM}	V_{OUT} > 1.2V		300	450		mA
Quiescent Current	I_Q	I_O = 0mA			30	35	μA
Ground Pin Current	I_{GND}	I_O = 1mA to 300mA			30	50	μA
Line Regulation	REG_{LINE}	I_{OUT}=5mA, $V_{IN}=V_{OUT}$+1 to V_{OUT}+2		-0.1	0.02	0.1	%
Load Regulation	REG_{LOAD}	I_O=1mA to 300mA			0.2	1	%
Over Temperature Shutdown	OTS				150		℃
Over Temperature Hysteresis	OTH				30		℃
V_{OUT} Temperature Coefficient	TC				40		ppm/℃
Power Supply Rejection	PSRR	I_O = 100mA, C_O=2.2μF ceramic	f=1kHz		60		dB
			f=10kHz		50		
			f=100kHz		40		
Power Supply Rejection	PSRR	I_O = 100mA, C_O=2.2μF ceramic, C_{BYP}=0.01μF	f=1kHz		75		dB
			f=10kHz		55		
			f=100kHz		30		
Output Voltage Noise	eN	f=10Hz to 100kHz, I_O = 10mA, C_{BYP}=0μF	C_O=2.2μF		30		μVrms
			C_O=100μF		20		
Output Voltage Noise	eN	f=10Hz to 100kHz, I_O = 10mA, C_{BYP}=0.01μF	C_O=2.2μF		30		μVrms
			C_O=100μF		20		
Shutdown Supply Current	I_{SD}	V_{IN}=5.0V, V_{OUT}=0V, V_{EN} < V_{EL}			2.0	3.0	μA
EN Input Bias Current	I_{EH}	$V_{EN}=V_{IN}$, V_{IN}=2.6V to 7V				0.1	μA
	I_{EL}	V_{EN}=0, V_{IN}=2.6V to 7V			2.0	3.0	μA
EN Input Threshold	V_{EH}	V_{IN}=2.6V to 7V		2		V_{IN}	V
	V_{EL}	V_{IN}=2.6V to 7V		0		0.4	V

Note 1. $V_{IN(MIN)} = V_{OUT} + V_{DROPOUT}$

DETAILED DESCRIPTION

The CM2838 family of CMOS regulators contain a PMOS pass transistor, voltage reference, error amplifier, over-current protection, thermal shutdown.

The P-channel pass transistor receives data from the error amplifier, over-current protection, and thermal protection circuits. During normal operation, the error amplifier compares the output voltage to a precision reference. Over-current and Thermal shutdown circuits become active when the junction temperature exceeds 150℃, or the current exceeds 300mA. During thermal shutdown, the output voltage remains low. Normal operation is restored when the junction temperature drops below 120℃.

The CM2838 switches from voltage mode to current mode when the load exceeds the rated output current. This prevents over-stress.

ENABLE

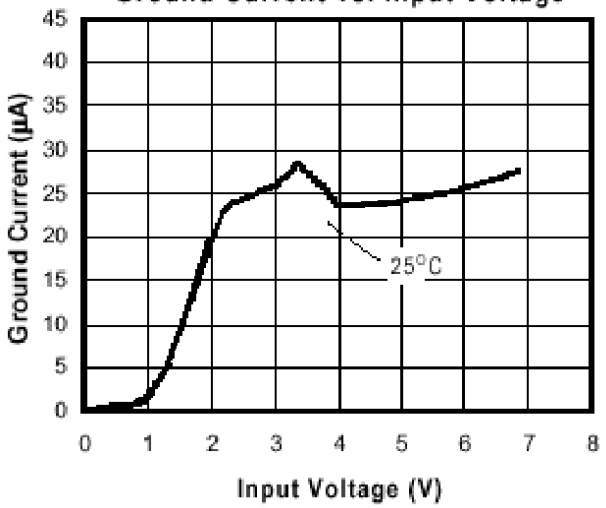
The Enable pin normally floats high. When actively, pulled low, the PMOS pass transistor shut off, and all internal circuits are powered down. In this state, the quiescent current is less than 2μA. This pin behaves much like an electronic switch.

EXTERNAL CAPACITOR

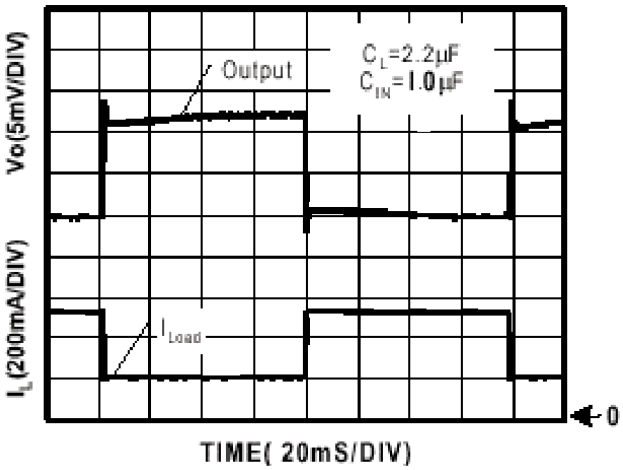
The CM2838 is stable with a Low ESR output capacitor to ground of 1.0μF or greater. It can keep stable even with higher ESR capacitors. A second capacitor is recommended between the input and ground to stabilize VIN. The input capacitor should be larger than 0.1μF to have a beneficial effect. All capacitors should be placed in close proximity to the pins. A “quiet” ground termination is desirable.

TYPICAL CHARACTERISTICS

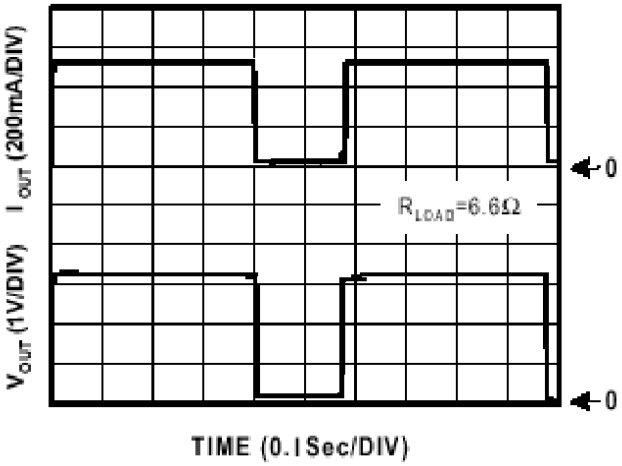
Ground Current vs. Input Voltage



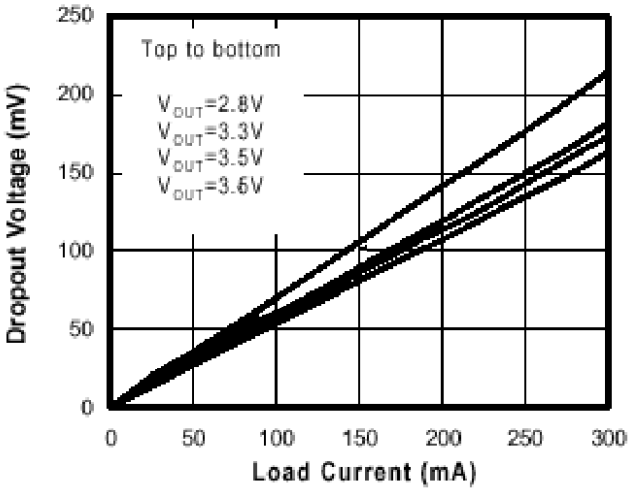
Load Step (1mA-300mA)



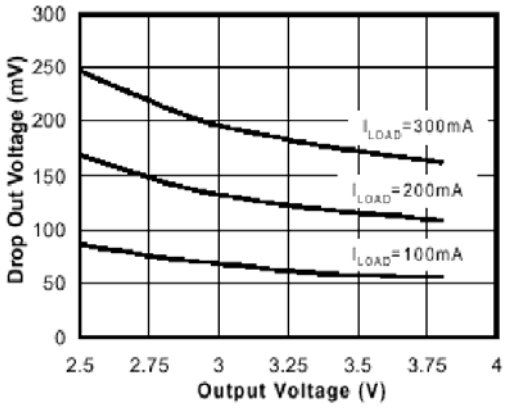
Overtemperature Shutdown



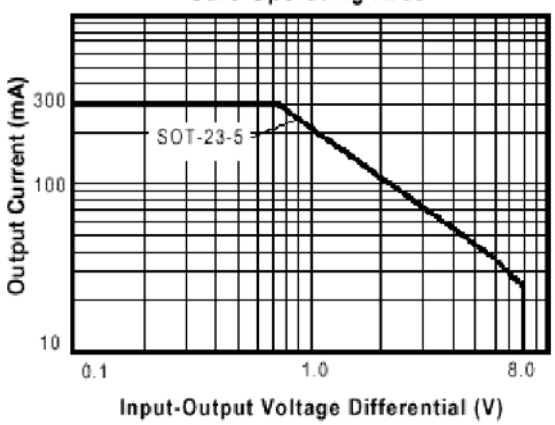
Drop Out Voltage vs Load Current



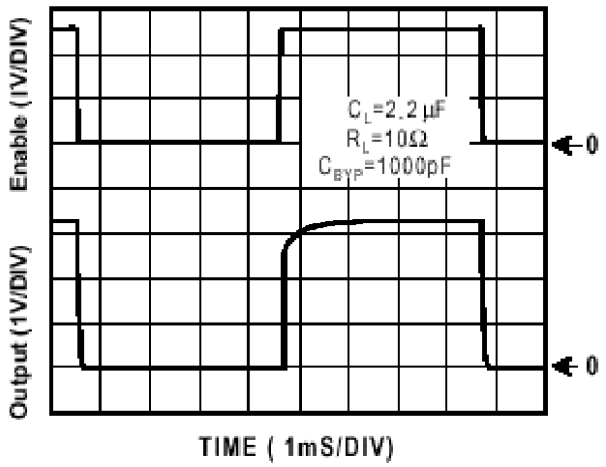
Drop Out Voltage vs Output Voltage



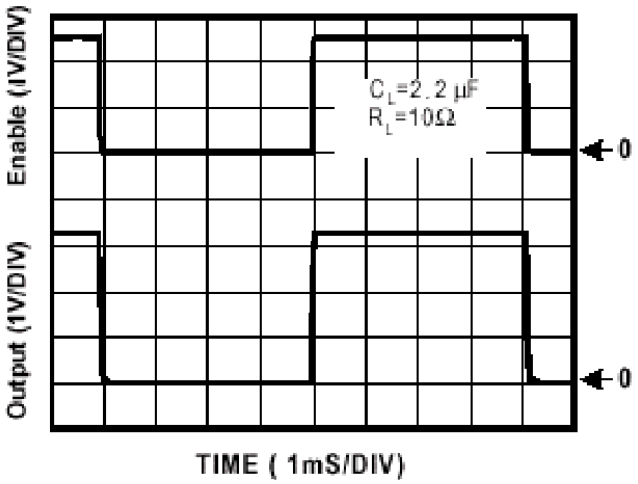
Safe Operating Area



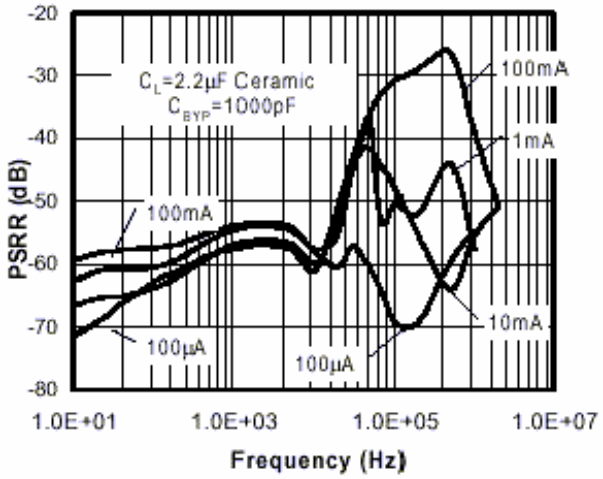
Chip Enable Transient Response



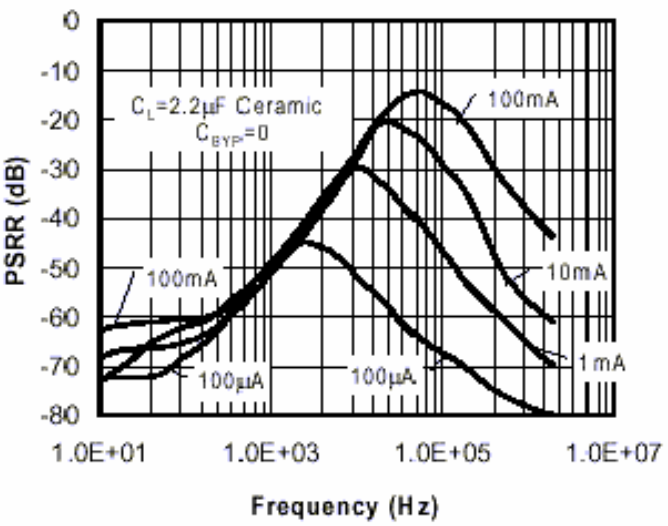
Chip Enable Transient Response



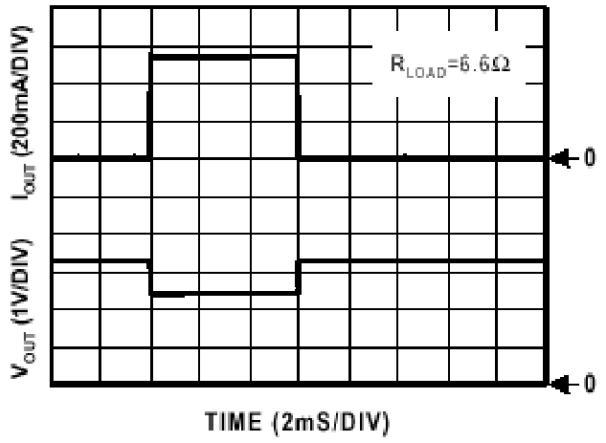
Power Supply Rejection Ratio



Power Supply Rejection Ratio

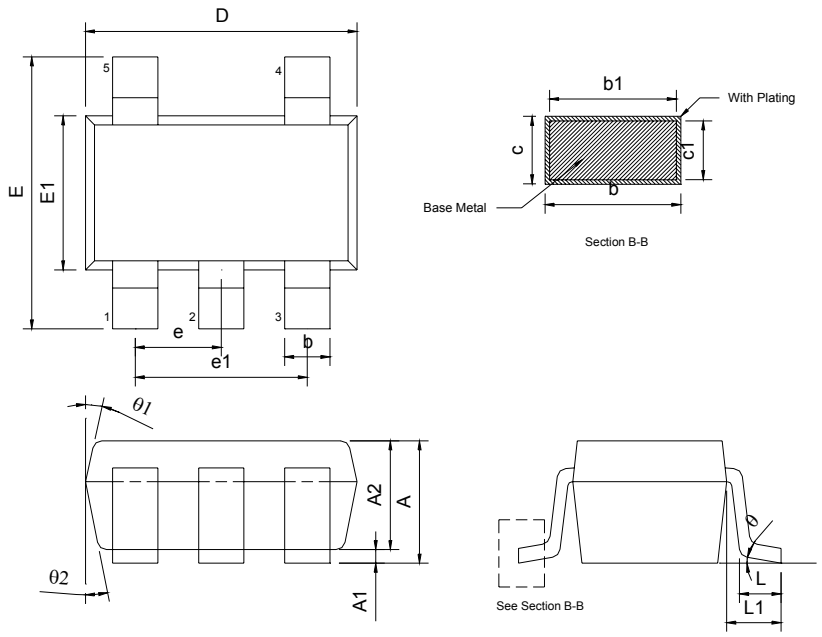


Current Limit Response



PACKAGE DIMENSION

SOT-23-5 (M25)



SYMBOLS	DIMENSIONS IN MILLIMETERS			DIMENSIONS IN INCHS		
	MIN	NOM	MAX	MIN	NOM	MAX
A	1.05	---	1.35	0.041	---	0.053
A1	0.05	---	0.15	0.002	---	0.006
A2	1.00	1.10	1.20	0.039	0.043	0.047
b	0.25	---	0.50	0.010	---	0.020
b1	0.25	0.40	0.45	0.010	0.016	0.018
c	0.08	---	0.20	0.003	---	0.008
c1	0.08	0.11	0.15	0.003	0.004	0.006
D	2.70	2.90	3.00	0.106	0.114	0.118
E	2.60	2.80	3.00	0.102	0.110	0.118
E1	1.50	1.60	1.70	0.059	0.063	0.067
L	0.35	0.45	0.55	0.014	0.018	0.022
L1	0.60 REF			0.024 REF		
e	0.95 BSC			0.037 BSC		
e1	1.90 BSC			0.075 BSC		
θ	0°	5°	10°	0°	5°	10°
θ1	3°	5°	7°	3°	5°	7°
θ2	6°	8°	10°	6°	8°	10°

NUMBERING SCHEME

Ordering Number: CM2838**XYZ (note1)**
Ordering Number: CM2838**GXYZ (note2)**

note1:
CM2838: 300mA CMOS LDO with enable
X : Suffix for voltage output (note 3)
Y : Suffix for Temperature Range (note 4)
Z : Suffix for Package Type (note 5)

note2:
CM2838: 300mA CMOS LDO with enable
G : Suffix for Pb Free Product
X : Suffix for voltage output (note 3)
Y : Suffix for Temperature Range (note 4)
Z : Suffix for Package Type (note 5)

note 3: see CMOS LDO Voltage Suffix Table
CM2838 will provide options of D(1.8V), K(2.5V), N(2.8V), P(3.0V), S(3.3V)

note 4:
Y= I : -40℃~+85℃ (only I grade support for all CMOS LDOs)

note 5:
Z is single alphabet with or without digits
M25 : SOT-25 (TR only)

CMOS LDO Voltage Suffix Table

Output Voltage	Suffix	Output Voltage	Suffix
1.5V	A	3.0V	P
1.6V	B	3.1V	Q
1.7V	C	3.2V	R
1.8V	D	3.3V	S
1.9V	E	3.4V	T
2.0V	F	3.5V	U
2.1V	G	3.6V	V
2.2V	H	3.7V	W
2.3V	I	3.8V	X
2.4V	J	3.9V	Y
2.5V	K	4.0V	Z
2.6V	L		
2.7V	M		
2.8V	N		
2.9V	O		

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