

GENERAL DESCRIPTION

The CM2851 family is positive, linear regulators featured low quiescent current (30 μ A typ.) with low dropout voltage, making them ideal for battery applications. The space-saving SOT-23-5 package is attractive for "Pocket" and "Hard Held" applications.

These rugged devices have both Thermal Shutdown, and Current Fold-back to prevent device failure under the "Worst" of operating conditions.

An additional feature is a "Power Good" detector, which pulls low when the output is out of regulation.

The CM2851 is stable with an output capacitance of 2.2 μ F or greater.

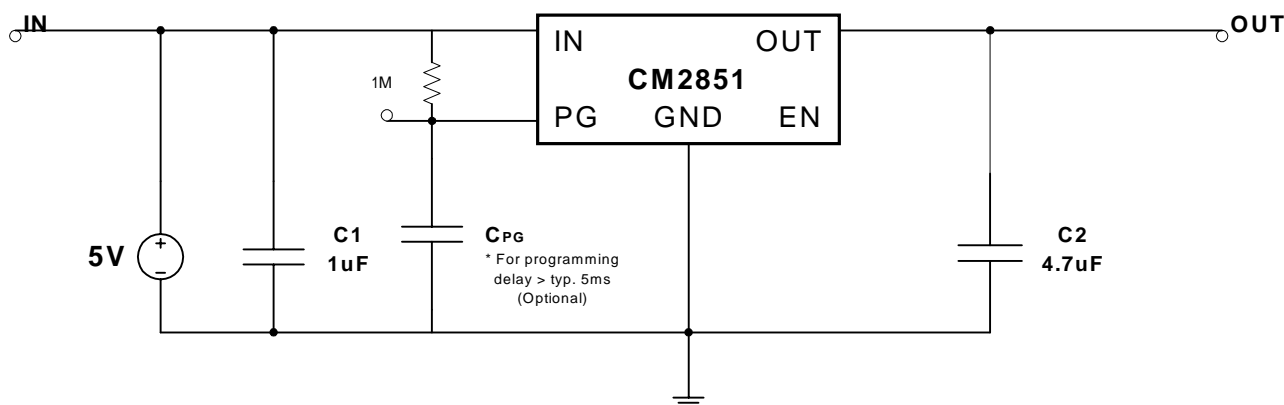
FEATURES

- ◆ Very Low Dropout Voltage
- ◆ Low Current Consumption: Typ. 30 μ A, Max. 35 μ A
- ◆ High Accuracy Output Voltage: \pm 1.5%
- ◆ Guaranteed 150mA Output
- ◆ Input Range of 2.5V to 7.0V
- ◆ Thermal Shutdown
- ◆ Current Limiting
- ◆ Power Good Output Function
- ◆ Compact Package: SOT-23-5
- ◆ Factory Pre-set Output Voltages
- ◆ Short Circuit Current Fold-Back
- ◆ Low Temperature Coefficient

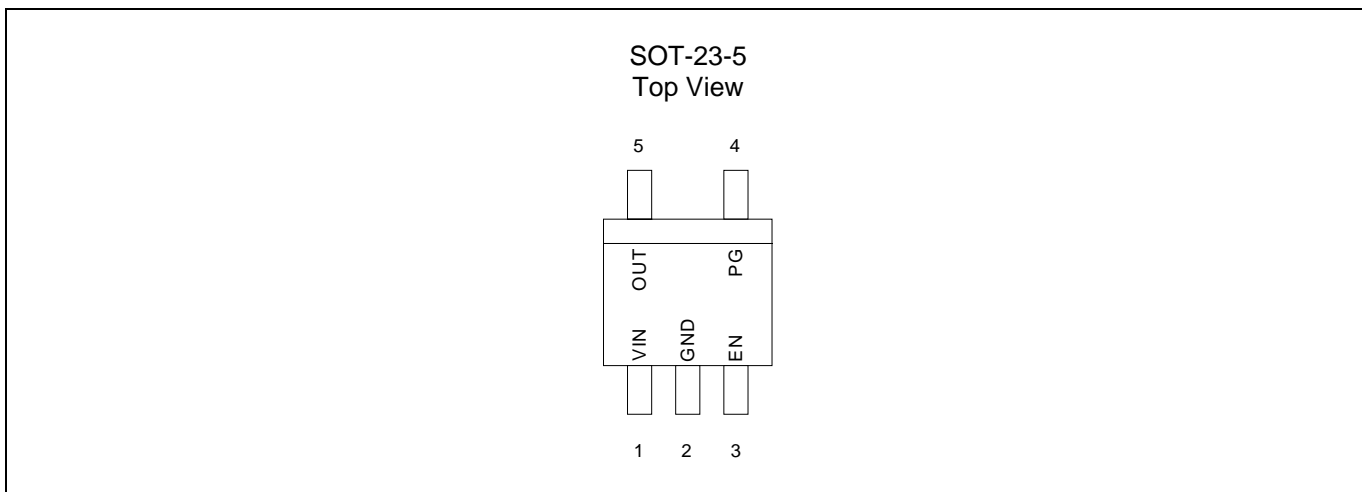
APPLICATIONS

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

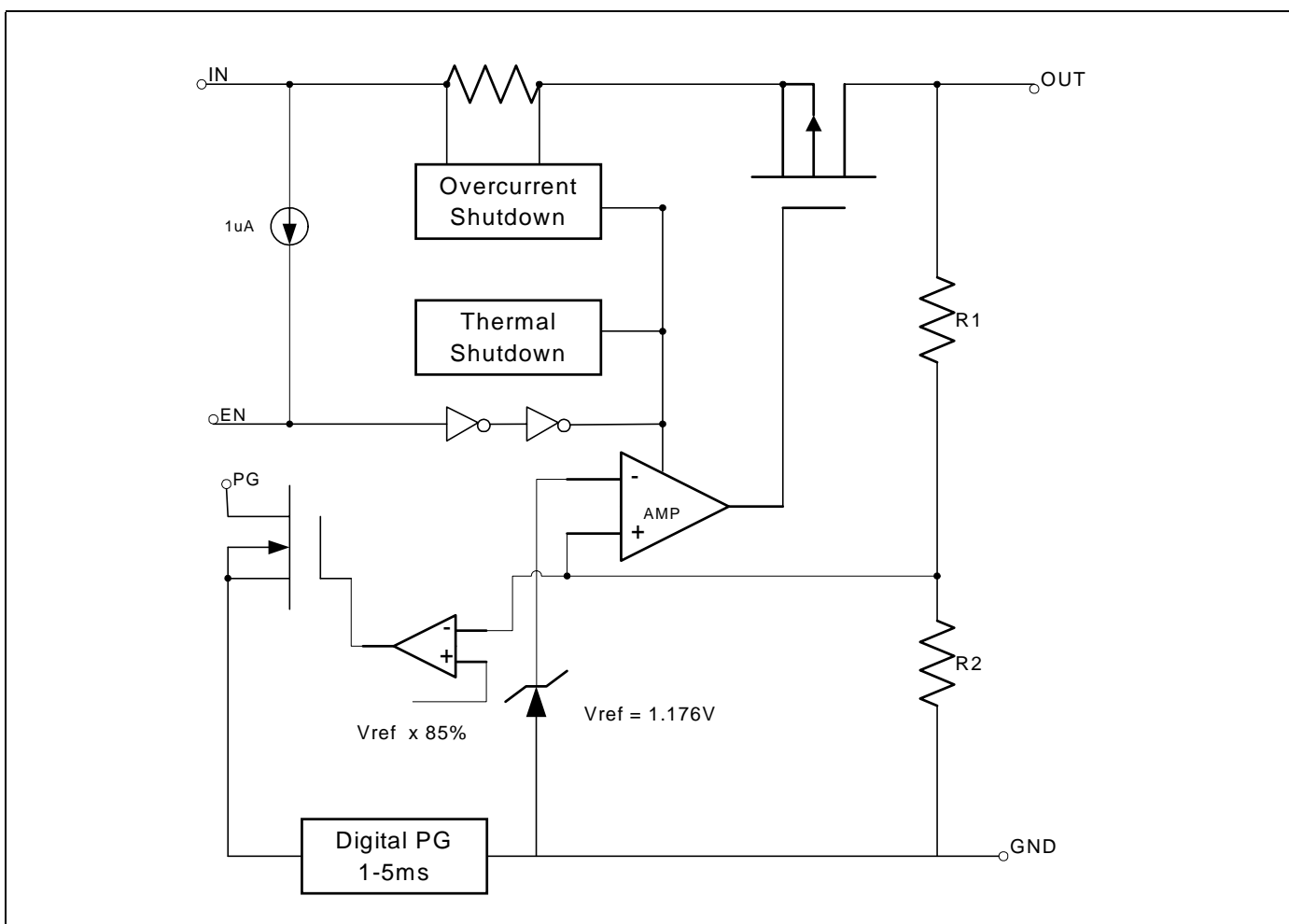
TYPICAL APPLICATIONS



PIN CONFIGURATION



BLOCK DIAGRAM





ORDERING INFORMATION

Part Number	Output Voltage	Temperature Range	Package
CM2851ACIM25	1.2V	-40 ~ +85	SOT-23-5
CM2851SIM25	3.3V	-40 ~ +85	SOT-23-5
CM2851GACIM25	1.2V	-40 ~ +85	SOT-23-5
CM2851GSIM25	3.3V	-40 ~ +85	SOT-23-5

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

ABSOLUTE MAXIMUM RATINGS

Input Voltage +7V
Output Current $P_D / (V_{IN} - V_o)$
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 +125

THERMAL INFORMATION

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

*With Junction sink capable of twice times of θ_{jc}

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

ELECTRICAL CHARACTERISTICS

$T_A = +25^\circ\text{C}$; unless otherwise noted

Parameter	Symbol	Test Conditions		CM2851			Unit
				Min.	Typ.	Max.	
Input Voltage	V _{IN}			Note 1		7	V
Output Voltage Accuracy	V _{OUT}	I _O = 1mA		-1.5		1.5	%
Dropout Voltage	V _{DROPOUT}	I _O = 150mA, V _{OUT} =V _{O(NOM)} -1.5%,	1.2V< V _{O(NOM)} <=2.0V			1300	mV
			2.0V< V _{O(NOM)} <=2.5V			800	
			2.5V< V _{O(NOM)}			300	
Output Current	I _O	V _{OUT} > 1.2V		150			mA
Current Limit	I _{LIM}	V _{OUT} > 1.2V			450		mA
Short Circuit Current	I _{SC}	V _{OUT} < 0.8V			150	300	mA
Quiescent Current	I _Q	I _O = 0mA			30	35	μ A
Ground Pin Current	I _{GND}	I _O = 1mA to 150mA			30	35	μ A
Line Regulation	REG _{LINE}	I _{OUT} =1mA, V _{IN} =V _{OUT} +1 to V _{OUT} +2	V _{OUT} < 2.0V	-0.1	0.02	0.1	%
			2.0V<V _{OUT} < 3.0V	-.015	0.03	0.15	%
			3.0V<V _{OUT}	-0.3	0.06	0.3	%
Load Regulation	REG _{LOAD}	I _O =1mA to 150mA			0.2	1	%
Over Temperature Shutdown	OTS			135	150		
Over Temperature Hysteresis	OTH				30		
V _{OUT} Temperature Coefficient	TC				25		ppm/
Power Supply Rejection	PSRR	I _O = 100mA C _O =2.2μF ceramic	f=1kHz		60		dB
			f=10kHz		50		
			f=100kHz		40		
Output Voltage Noise	eN	f=10Hz to 100kHz I _O = 10mA	C _O =2.2μF		30		μ Vrms
EN Input Bias Current	I _{EH}	V _{EN} =V _{IN} , V _{IN} =2.7V to 7V				0.1	μ A
	I _{EL}	V _{EN} =0V, V _{IN} =2.7V to 7V			1.0	3.0	μ A
EN Input Threshold	V _{EH}	V _{IN} =2.7V to 7V			V _{IN} /2+0.8V	V _{IN}	V
	V _{EL}	V _{IN} =2.7V to 7V		0	V _{IN} /2-0.8V		V
Shutdown Supply Current	I _{SD}	V _{IN} =5.0V, V _{OUT} =0V, V _{EN} < V _{EL}			2.0	3.0	μ A
Shutdown Output Voltage	V _{O, SD}	I _O =150mA		0		0.1	V
Output Under Voltage	V _{UV}	2.5V<=V _{OUT} <= 5.0V				85	%V _{O(NOM)}
		1.2V<=V _{OUT} <= 2.5V				85	
PG Leakage Current	I _{LC}	V _{PG} = 7V				1	μ A
PG Voltage Rating	V _{PG}	V _{OUT} in regulation				7	V
PG Voltage Low	V _{OL}	I _{SINK} = 2mA				0.1	V
Delay Time to PG	t _{DELAY}	V _{IN} =2.5V to 6.0V (Note 2)		1		7	ms

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

Note 2: Delay time will be varied by input voltage, but the delay time will still be in the spec from 1ms to 7ms when V_{IN} rise time $< 2\text{ms}$.

DETAILED DESCRIPTION

The CM2851 family of CMOS regulators contain a PMOS pass transistor, voltage reference, error amplifier, over-current protection, output short circuit protection, thermal shutdown, and power good function.

The P-channel pass transistor receives data from the error amplifier, over-current shutdown, short output 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 °C, or the current exceeds 150mA. During thermal shutdown, the output voltage remains low. Normal operation is restored when the junction temperature drops below 120 °C.

The CM2851 switches from voltage mode to current mode when the load exceeds the rated output current. This prevents over-stress. The CM2851 also incorporates current fold-back to reduce power dissipation when the output is short-circuited. This feature becomes active when the output drops below 0.95V, and reduces the current flow by 65%. Full current is restored when the voltage exceeds 0.95V.

EXTERNAL CAPACITOR

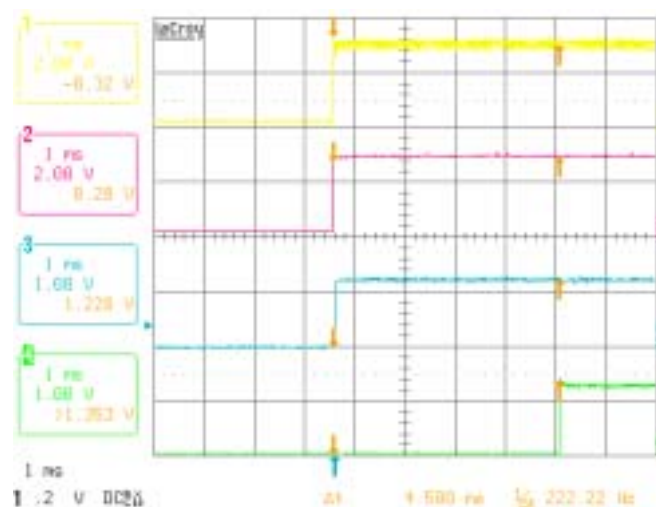
The CM2851 is stable with an output capacitor to ground of 2.2μF or greater. It can keep stable even with higher or poor ESR capacitors. A second capacitor is recommended between the input and ground to stabilize VIN. The input capacitor should be larger than 0.1μF to have a beneficial effect. All capacitors should be placed in close proximity to the pins. A “quiet” ground termination is desirable.

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 1μA. This pin behaves much like an electronic switch.

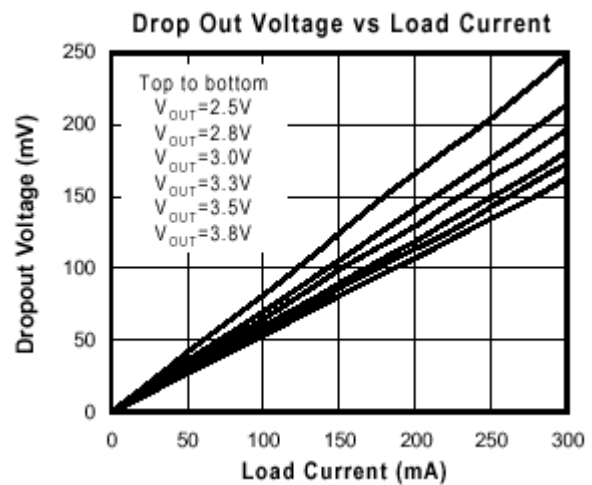
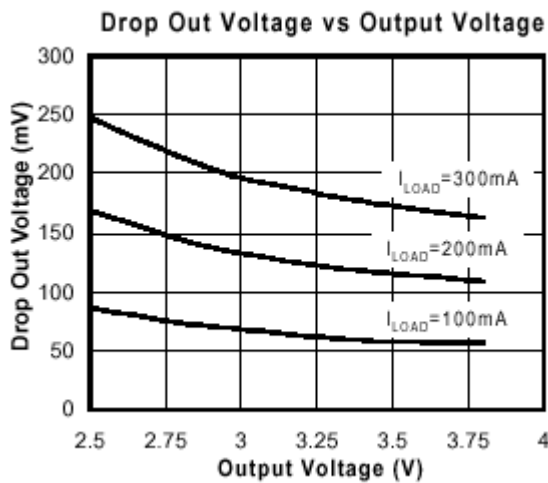
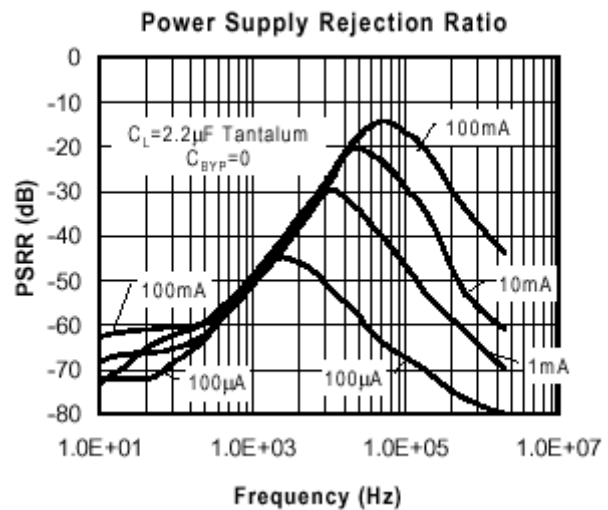
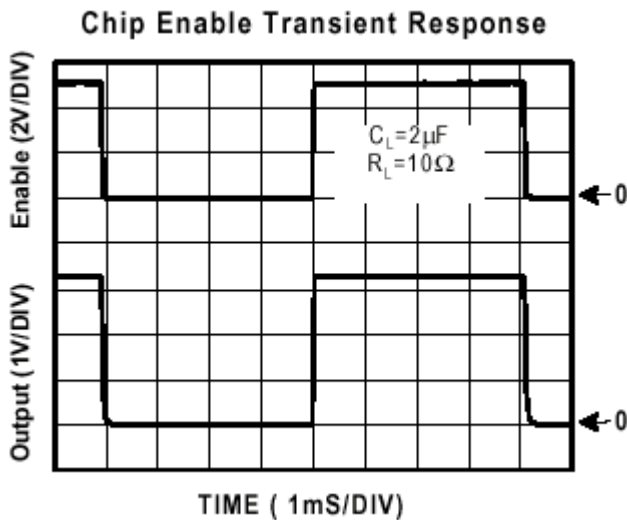
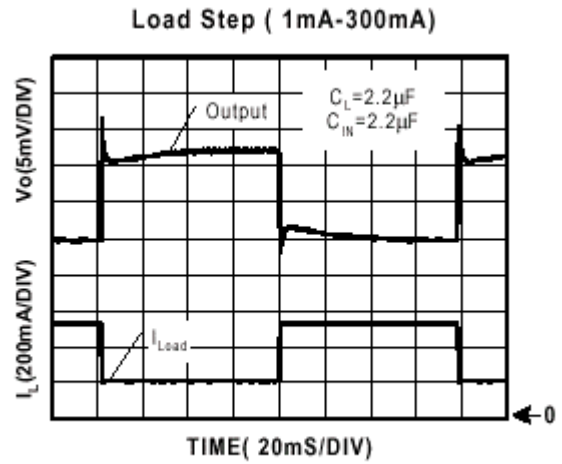
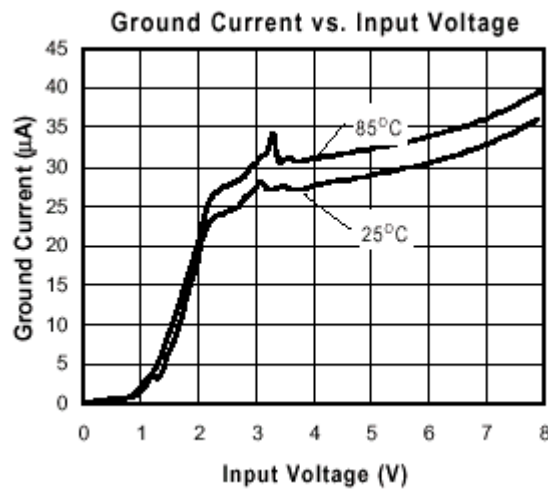
POWER GOOD

The CM2851 includes the Power Good feature. Under normal operating condition which means output voltage is within the SPEC, PG should be high. If Vout is less than 85% VOUT SPEC, PG will go low. As VOUT comes back and reaches to the 95% VOUT SPEC, the PG will go high after 1ms~7ms again. (See Timing Diagram as below)

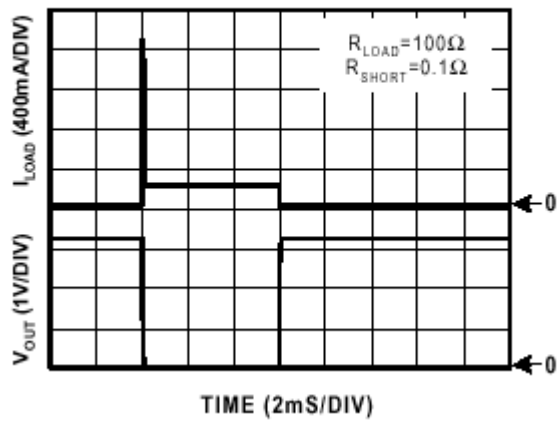


VIN = VEN= 3.3V, Iload = 120mA, VOUT = 1.2V, Delay time = 4.5ms

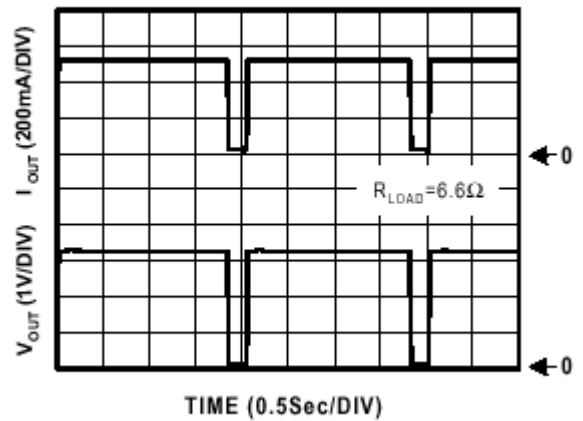
TYPICAL ELECTRICAL CHARACTERISTICS



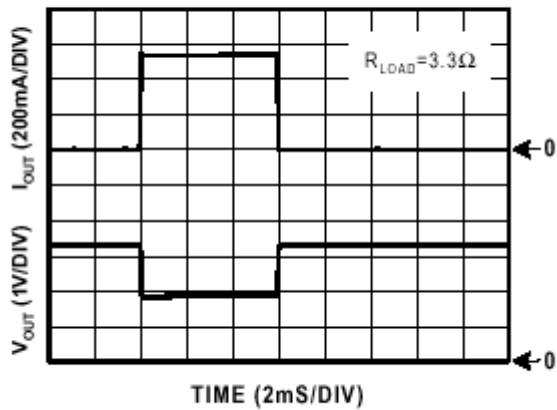
Short Circuit Response



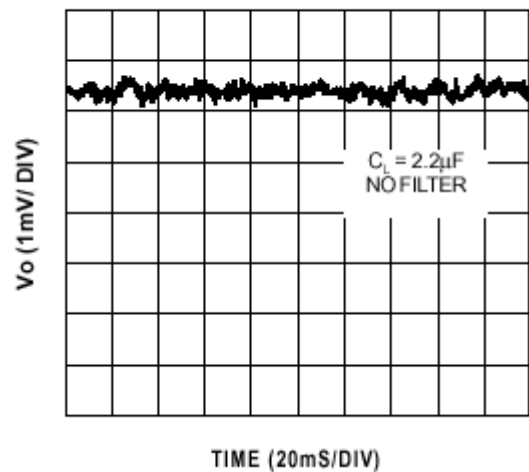
Overtemperature Shutdown



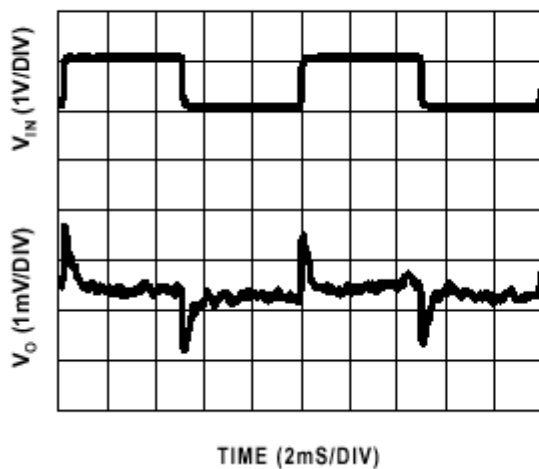
Current Limit Response



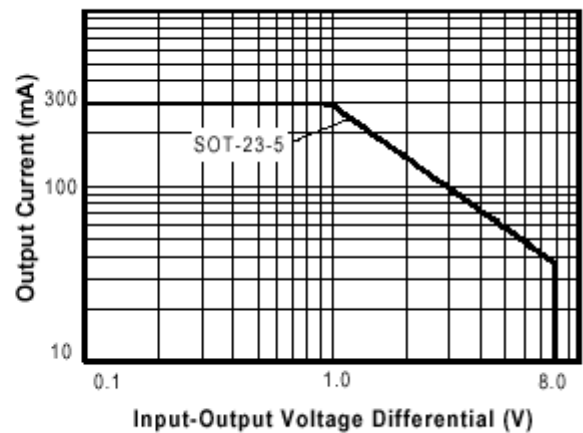
Noise Measurement



Transient Line Response

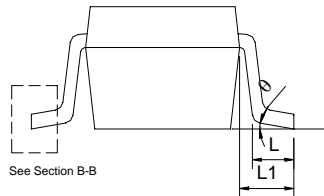
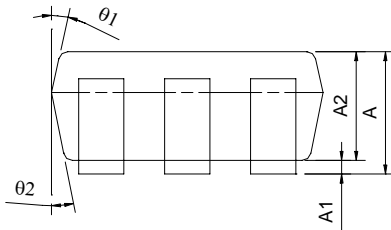
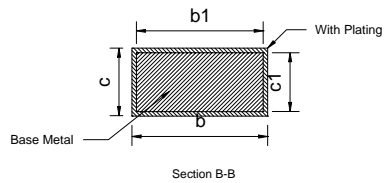
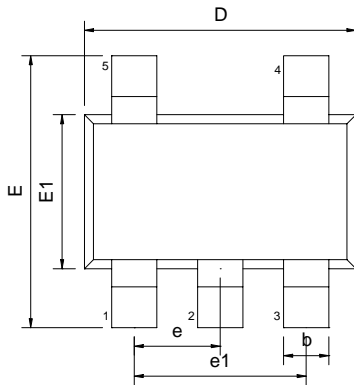


Safe Operating Area



PACKAGE DIMENSION

SOT-23-5 (M25)



SYMBOLS	DIMENSIONS IN MILLIMETERS			DIMENSIONS IN INCHES		
	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: CM2851XYZ (note1)

Ordering Number: CM2851GXYZ (note2)

note1:

CM2851: 150mA CMOS LDO

X : Suffix for voltage output (note 3)

Y : Suffix for Temperature Range (note 4)

Z : Suffix for Package Type (note 5)

note2:

CM2851: 150mA CMOS LDO

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)

note3: see CMOS LDO Voltage Suffix Table

CM2851 will provide options of AC(1.2V), 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-23-5 (TR only)

CMOS LDO Voltage Suffix Table

Output Voltage	Suffix	Output Voltage	Suffix
1.2V	AC	2.7V	M
1.3V	AB	2.8V	N
1.4V	AA	2.9V	O
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		

IMPORTANT NOTICE

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