

Low-Saturation Three-Pin Regulators with Externally Mounted Power Transistor Monolithic ICs MM1215 and 1216

Outline

These ICs are high-precision, high-voltage stabilized power supply devices which, by employing an externally mounted power transistor are able to drive loads at large currents. The input/output voltage difference is a low 0.2V, and an internal protection circuit ensures that the devices can be used in a wide range of portable equipment. Output on/off control is also provided.

Features

- | | |
|--------------------------------------|-------------------------------------------------------------------------------------------|
| 1. Input voltage | 16V max. |
| 2. Input/output voltage difference | 0.2V typ. |
| 3. Maximum driving current | 15mA max. |
| 4. No-load input current | 250μA typ. |
| 5. Thermal shutdown circuit provided | |
| 6. Output ranks | E : 9.0V±2% I : 4.0±2%
F : 6.0V±2% J : 3.0±2%
G : 5.0V±2% Z : 3.3±2%
H : 4.5V±2% |

CONT Pin Output Logic

Model	Low	High
MM1215	ON	OFF
MM1216	OFF	ON

Package

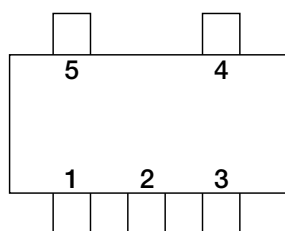
SOT-25A (MM1215□N, MM1216□N)

*The output voltage rank appears in the boxes.

Applications

1. Handheld computers
2. Portable transceivers
3. Cordless phones
4. Other portable equipment which uses batteries

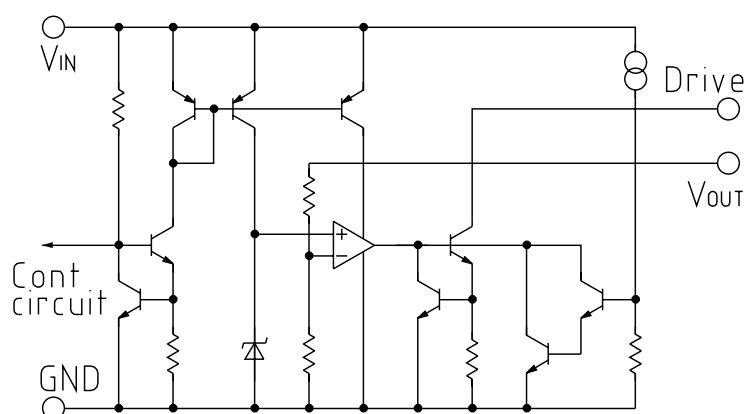
Pin Assignment



SOT-25A
(TOP VIEW)

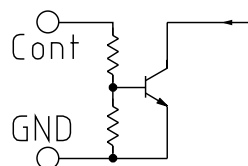
1	Drive
2	GND
3	CONT
4	V _{IN}
5	V _{OUT}

Equivalent Circuit Diagram

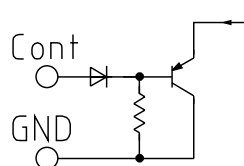


Cont pin circuit diagram

MM1215



MM1216



Absolute Maximum Ratings

Item	Symbol	Ratings	Units
Storage temperature	T_{STG}	-40~+125	°C
Operating temperature	T_{OPR}	-20~+75	°C
Power supply voltage	$V_d \text{ max.}$	-0.3~16	V
Recommended power supply voltage	V_{IN}	2.5~12	V
CONT pin voltage	V_{COH1}	-0.3~ $V_{IN}+0.3$	V
Recommended driving current		0~10	mA
Allowable loss	P_d	150	mW

Electrical Characteristics (Ta=25°C) : Using the 2SB956 output transistor

Item	Symbol	Measurement conditions	Min.	Typ.	Max.	Unit
Output voltage	Vo	VIN=Vo+1V Io=100mA	E	9.00	Vo±2%	V
			F	6.00		
			G	5.00		
			H	4.50		
			I	4.00		
			J	3.00		
			Z	3.30		
Consumption current	Iccq1	VIN=Vo+1V		250	400	μA
Minimum I/O voltage difference	Vd min.	VIN=Vo-0.1V		0.2	0.3	V
Input fluctuation rate	ΔV2	VIN=(Vo+1V)~12V		±0.01	±0.1	%/V
Load fluctuation rate	ΔV1	VIN=Vo+1V, Io=0~500mA		±0.01	±0.03	%/mA
Output voltage temperature coefficient	ΔVo/T	Tj=-20~+75°C		±100		ppm/°C
Ripple rejection rate	RR	VIN=Vo+2V, f=120Hz VRIPPLE=1V, Io=100mA	50	60		dB
Output noise voltage	VN	VIN=Vo+1V, Io=100mA f=10~80kHz		150		μVrms

MM1215

Input current while off	Iccq2	VIN=Vo+1V		25	40	μA
CONT pin current	ION	VCONT=0.6V		1	3	μA
CONT pin current	IOFF	VCONT=2.4V		5	10	μA

MM1216

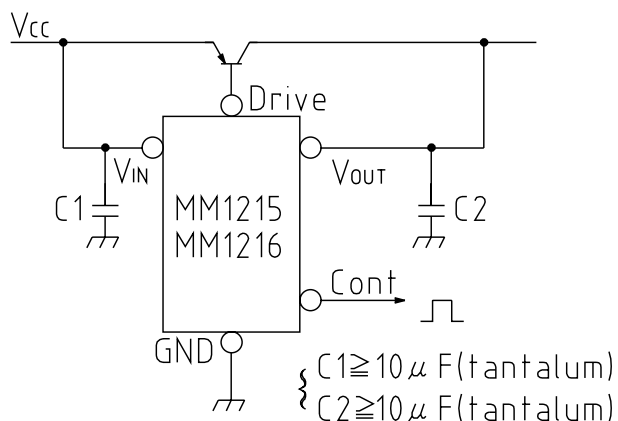
Input current while off	Iccq2	VIN=Vo+1V		25	40	μA
CONT pin current	ION	VCONT=2.4V		5	10	μA
CONT pin current	IOFF	VCONT=0.6V		1	3	μA

CONT pin level

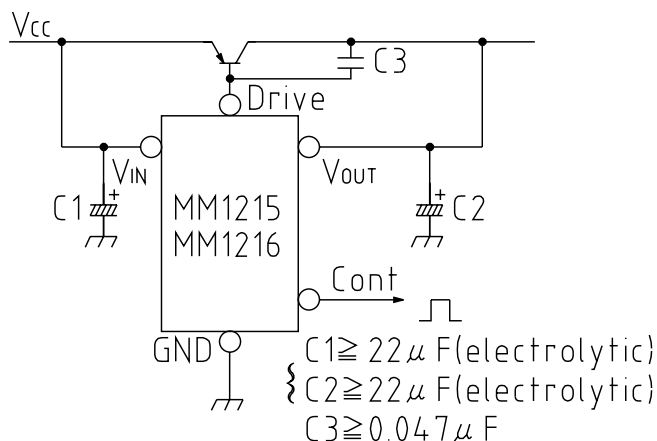
High	Vh		2.4			V
Low	VL				0.6	V

Measuring Circuit

Measurement circuit 1



Measurement circuit 2

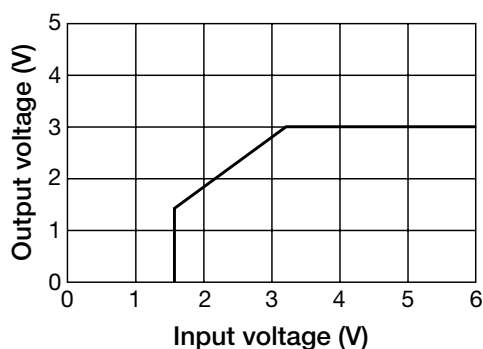


Note1: When the CONT pin is unused, it should be connected to ground for the MM1215 and to Vcc for the MM1216.

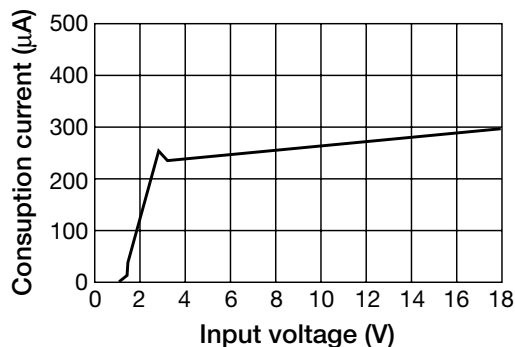
Note 2: The cause of oscillation is due to set wiring and capacitance changes in capacitor caused by temperatures changes, so please take extra care in placing the wires.

Characteristics (MM1215)

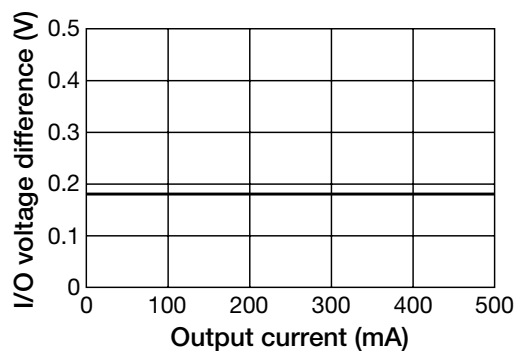
Output voltage characteristic



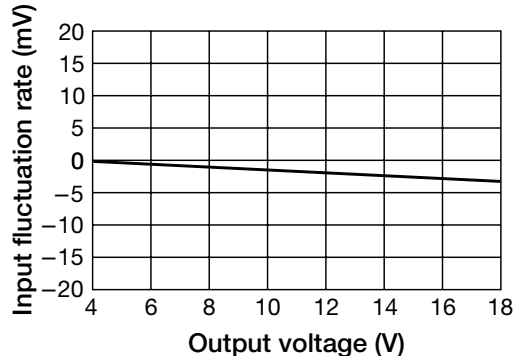
No-load input current



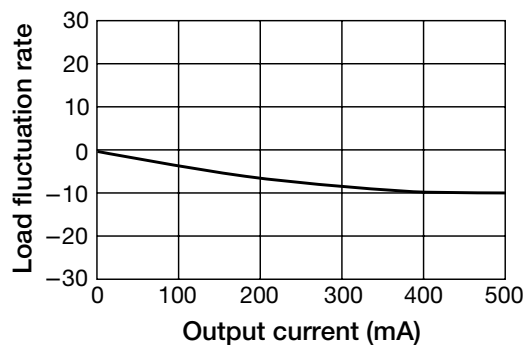
I/O voltage difference ($V_{IN}=2.8V$)



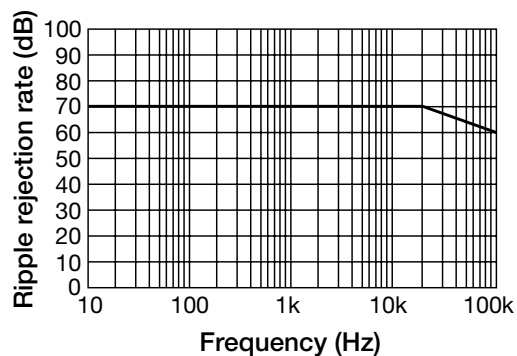
Input fluctuation rate



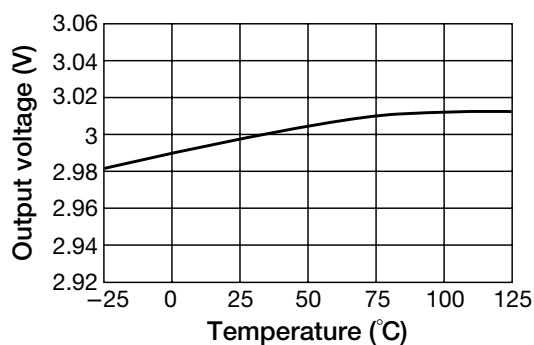
Load fluctuation



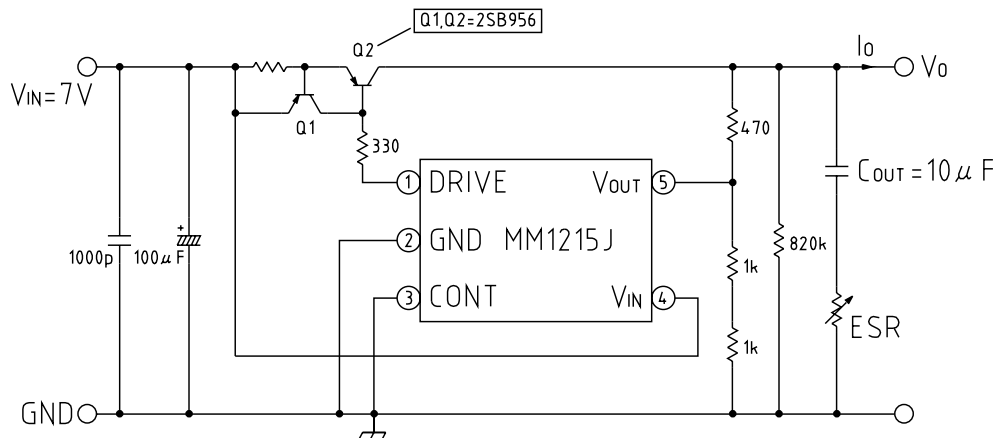
Ripple rejection rate



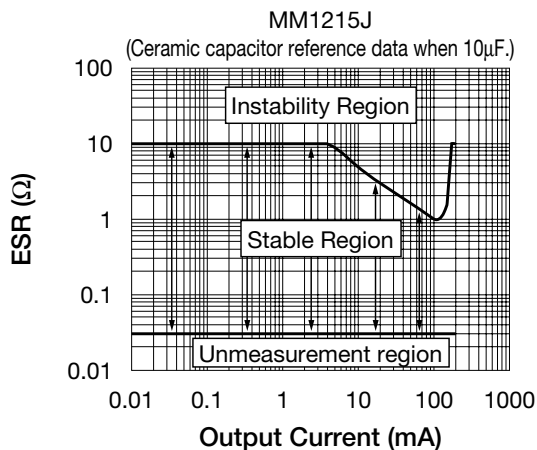
Output temperature characteristic



Application Circuits



ESR Stable region



Note: Stable region reference data at this current.