

300mA Regulator IC

Monolithic IC MM3464 series

Outline

This IC is a high speed response 300mA regulator IC with low quiescent current and high ripple rejection.
 No load input current is 20 μ A typ.
 And ripple rejection is 75dB typ.
 Dropout voltage is low at 160mV typ., and the output current is 300mA.
 Therefore the IC applies to most mobile equipment.

Features

1. Output current	300mA
2. No load input current	20 μ A typ.
3. Input current(OFF)	0.1 μ A max.
4. Output voltage range	1.0~5.0V
5. Output voltage accuracy	$\pm 1\%$ (± 20 mV, $V_o < 2$ V)
6. Dropout voltage	160mV typ. ($I_o = 200$ mA)
7. Line regulation	0.2%/V max.
8. Load regulation	80mV max. ($I_o = 0.1 \sim 200$ mA)
9. Ripple rejection	75dB typ. ($f = 1$ kHz)
10. Output Capacitor	1 μ F

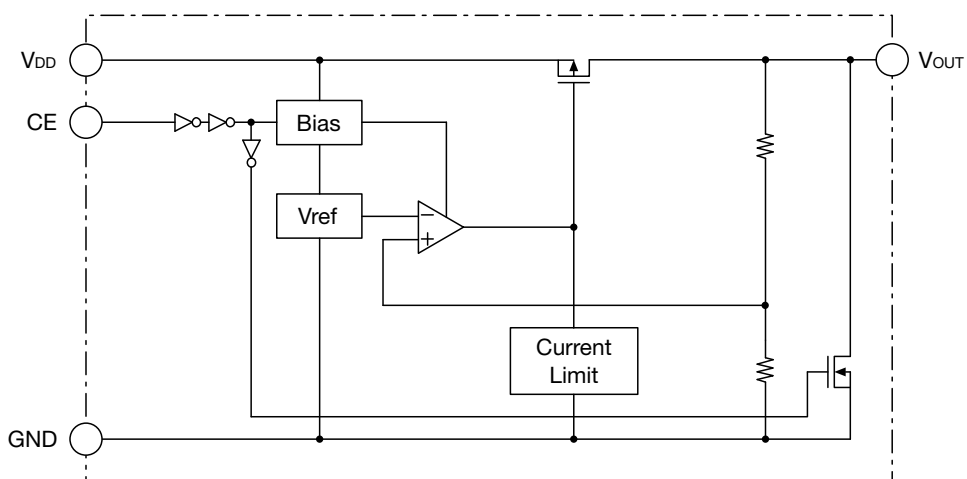
Package

SOT-25
 SOT89-5
 SC-82

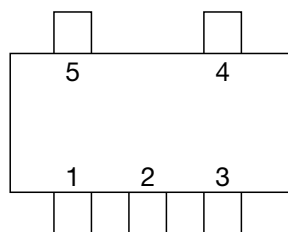
Applications

1. Cellular phones
2. Digital still cameras
3. Mobile equipments

Block Diagram

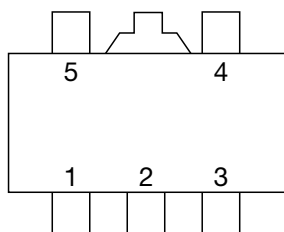


Pin Assignment



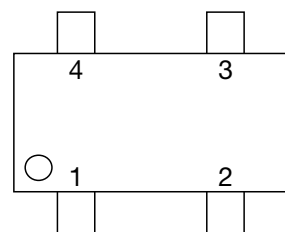
SOT-25
(TOP VIEW)

1	V_{DD}
2	GND
3	CE
4	NC
5	V_{OUT}



SOT89-5
(TOP VIEW)

1	V_{OUT}
2	GND
3	NC
4	CE
5	V_{DD}



SC-82
(TOP VIEW)

1	CE
2	GND
3	V_{OUT}
4	V_{DD}

Pin Description

SOT-25A

Pin No.	Pin name	Functions						
1	V _{DD}	Voltage-supply pin						
2	GND	Ground pin						
3	CE	ON/OFF-Control pin						
		<table><tr><td>CE</td><td>OUTPUT</td></tr><tr><td>Low</td><td>OFF</td></tr><tr><td>High</td><td>ON</td></tr></table>	CE	OUTPUT	Low	OFF	High	ON
		CE	OUTPUT					
		Low	OFF					
		High	ON					
Connect CE pin with V _{DD} pin, when it is not used.								
4	NC	No connection						
5	V _{OUT}	Output pin						

SOT89-5

Pin No.	Pin name	Functions						
1	V _{OUT}	Output pin						
2	GND	Ground pin						
3	NC	No connection						
4	CE	ON/OFF-Control pin						
		<table><tr><td>CE</td><td>OUTPUT</td></tr><tr><td>Low</td><td>OFF</td></tr><tr><td>High</td><td>ON</td></tr></table>	CE	OUTPUT	Low	OFF	High	ON
		CE	OUTPUT					
		Low	OFF					
		High	ON					
Connect CE pin with V _{DD} pin, when it is not used.								
5	V _{DD}	Voltage-supply pin						

SC-82

Pin No.	Pin name	Functions						
1	CE	ON/OFF–Control pin						
		<table><tr><td>CE</td><td>OUTPUT</td></tr><tr><td>Low</td><td>OFF</td></tr><tr><td>High</td><td>ON</td></tr></table>	CE	OUTPUT	Low	OFF	High	ON
		CE	OUTPUT					
		Low	OFF					
		High	ON					
Low	OFF							
High	ON							
Connect CE pin with V _{DD} pin, when it is not used.								
2	GND	Ground pin						
3	V _{OUT}	Output pin						
4	V _{DD}	Voltage–supply pin						

Absolute Maximum Ratings (Except where noted otherwise Ta=25°C)

Item	Symbol	Ratings	Units
Storage temperature	T _{STG}	-55~+150	°C
Supply voltage	V _{DD}	-0.3~+7.0	V
CE input voltage	V _{CE}	-0.3~V _{DD} +0.3	V
Output voltage	V _{OUT}	-0.3~V _{DD} +0.3	V
Output current	I _{omax}	500	mA
Power dissipation	Pd	350(Note1) (SOT-25)	mW
		1000(Note2) (SOT89-5)	
		330(Note3) (SC-82)	

Note1 : With PC board of glass epoxy 60 × 40 × 1.6^tmm

Note2 : With PC board of glass epoxy 114.3 × 76.2 × 1.6^tmm

Note3 : With PC board of glass epoxy 110 × 40 × 0.8^tmm

Recommended Operating Conditions (Except where noted otherwise Ta=25°C)

Item	Symbol	Ratings	Units
Operating ambient temperature	T _{JOP}	-40~+85	°C
Operating voltage	V _{OP}	2.0~6.5	V
Output current	I _O	0~300	mA

Electrical Characteristics 1 (Except where noted otherwise $V_{DD}=V_{OUT}(typ.)+1V$, $V_{CE}=V_{DD}$, $T_a=25^{\circ}C$)

Item	Symbol	Measurement conditions	Min.	Typ.	Max.	Units
Input current(OFF)	I_{DDoff}	$V_{CE}=0V$		0.01	0.1	μA
No-load input current	I_{DD}	$I_{OUT}=0mA$		20	50	μA
Output voltage	V_{OUT}	$I_{OUT}=10mA$ ($V_{OUT} \geq 2.0V$)	$\times 0.99$		$\times 1.01$	V
		$I_{OUT}=10mA$ ($V_{OUT} \leq 1.95V$)	-0.02		0.02	v
Line regulation	V_{LINE}	$V_O(yp.)+0.5V \leq V_{DD} \leq 6.5V$ $V_{OUT} \geq 1.1V$, $I_{OUT}=10mA$		0.01	0.2	% / V
		$1.6V \leq V_{DD} \leq 6.5V$ $V_{OUT} \leq 1.05V$, $I_{OUT}=10mA$				
Load regulation	V_{LOAD}	$0.1mA \leq I_{OUT} \leq 200mA$		20	80	mV
Dropout voltage	V_{io}	Please refer to another page				V
Ripple rejection (Note4)	RR	$f=1kHz$, $V_{ripple}=0.5V$, $I_{OUT}=30mA$ $V_{OUT} \geq 1.0V$		75		dB
V_{OUT} temperature coefficient (Note4)	$\Delta V_{OUT} / \Delta T$	$I_{OUT}=30mA$ $-40^{\circ}C \leq T_{OP} \leq 85^{\circ}C$		± 50		ppm/ $^{\circ}C$
Output current limit	I_{lim}		300	400		mA
Output short-circuit current	I_{short}	$V_{OUT}=0V$		30		mA
CE H threshold voltage	V_{CEH}		1.2		6.0	V
CE L threshold voltage	V_{CEL}				0.3	V
CE H threshold voltage	I_{CEH}		-0.1		0.1	μA
CE L threshold voltage	I_{CEL}		-0.1		0.1	μA
CL Discharge resistance	R_{disc}			780		

Note4 : The parameter is guaranteed by design.

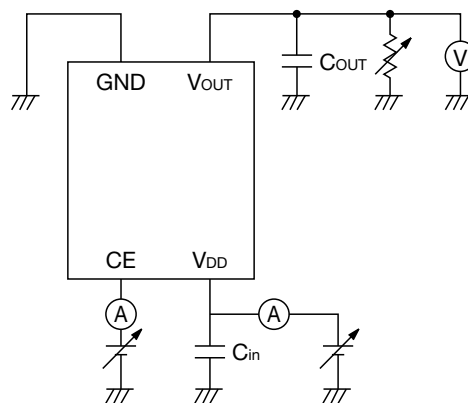
Electrical Characteristics 2 (Except where noted otherwise $V_{DD}=V_{OUT}(typ.)+1V$, $V_{CE}=V_{DD}$, $T_a=25^{\circ}C$)

Model No.	Item							
	Output voltage				Dropout voltage			
	$V_{OUT} (V)$				$V_{IO} (mV)$			
	Measurement conditions	Min.	Typ.	Max.	Measurement conditions	Min.	Typ.	Max.
MM3464A10	$I_{OUT}=10mA$	0.980	1.000	1.020	$I_{OUT}=200mA$ $V_{OUT}<1.5V$ (Note5)		660	1300
MM3464Z10		1.030	1.050	1.070				
MM3464A11		1.080	1.100	1.120				
MM3464Z11		1.130	1.150	1.170				
MM3464A12		1.180	1.200	1.220		460	800	
MM3464Z12		1.230	1.250	1.270				
MM3464A13		1.280	1.300	1.320				
MM3464Z13		1.330	1.350	1.370				
MM3464A14		1.380	1.400	1.420		400	720	
MM3464Z14		1.430	1.450	1.470				
MM3464A15		1.480	1.500	1.520	$I_{OUT}=200mA$ $V_{OUT}\geq 1.5V$ $V_{DD}=V_{OUT}(typ.)-0.2V$	360	580	
MM3464Z15		1.530	1.550	1.570				
MM3464A16		1.580	1.600	1.620		320	500	
MM3464Z16		1.630	1.650	1.670				
MM3464A17		1.680	1.700	1.720				
MM3464Z17		1.730	1.750	1.770				
MM3464A18		1.780	1.800	1.820		250	420	
MM3464Z18		1.830	1.850	1.870				
MM3464A19		1.880	1.900	1.920				
MM3464Z19		1.930	1.950	1.970		230	390	
MM3464A20		1.980	2.000	2.020				
MM3464Z20		2.030	2.050	2.071				
MM3464A21		2.079	2.100	2.121				
MM3464Z21		2.129	2.150	2.172				
MM3464A22		2.178	2.200	2.222				
MM3464Z22		2.228	2.250	2.273				
MM3464A23		2.277	2.300	2.323				
MM3464Z23		2.327	2.350	2.374				
MM3464A24		2.376	2.400	2.424		190	340	
MM3464Z24		2.426	2.450	2.475				
MM3464A25		2.475	2.500	2.525				
MM3464Z25		2.525	2.550	2.576				
MM3464A26		2.574	2.600	2.626				
MM3464Z26		2.624	2.650	2.677				
MM3464A27		2.673	2.700	2.727				
MM3464Z27		2.723	2.750	2.778				
MM3464A28		2.772	2.800	2.828				
MM3464Z28		2.822	2.850	2.879				
MM3464A29		2.871	2.900	2.929				
MM3464Z29		2.921	2.950	2.980				

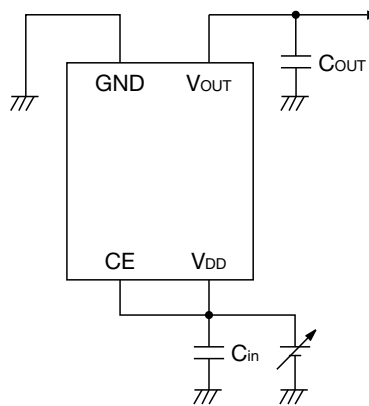
Note5 : Dropout voltage Max. value in the input and it is confirmed that there is no output abnormal voltage impression the load 200mA in the model less than $V_{OUT}=1.45V$.

Model No.	Item							
	Output voltage				Dropout voltage			
	V _{OUT} (V)				V _{IO} (mV)			
	Measurement conditions	Min.	Typ.	Max.	Measurement conditions	Min.	Typ.	Max.
MM3464A30	I _{OUT} =10mA	2.970	3.000	3.030	I _{OUT} =200mA V _{OUT} ≥1.5V V _{DD} =V _{OUT} (typ.)-0.2V		160	280
MM3464Z30		3.020	3.050	3.081				
MM3464A31		3.069	3.100	3.131				
MM3464Z31		3.119	3.150	3.182				
MM3464A32		3.168	3.200	3.232				
MM3464Z32		3.218	3.250	3.283				
MM3464A33		3.267	3.300	3.333				
MM3464Z33		3.317	3.350	3.384				
MM3464A34		3.366	3.400	3.434				
MM3464Z34		3.416	3.450	3.485				
MM3464A35		3.465	3.500	3.535				
MM3464Z35		3.515	3.550	3.586				
MM3464A36		3.564	3.600	3.636				
MM3464Z36		3.614	3.650	3.687				
MM3464A37		3.663	3.700	3.737				
MM3464Z37		3.713	3.750	3.788				
MM3464A38		3.762	3.800	3.838				
MM3464Z38		3.812	3.850	3.889				
MM3464A39		3.861	3.900	3.939				
MM3464Z39		3.911	3.950	3.990				
MM3464A40		3.960	4.000	4.040				
MM3464Z40		4.010	4.050	4.091				
MM3464A41		4.059	4.100	4.141				
MM3464Z41		4.109	4.150	4.192				
MM3464A42		4.158	4.200	4.242				
MM3464Z42		4.208	4.250	4.293				
MM3464A43		4.257	4.300	4.343				
MM3464Z43		4.307	4.350	4.394				
MM3464A44		4.356	4.400	4.444				
MM3464Z44		4.405	4.450	4.495				
MM3464A45		4.455	4.500	4.545				
MM3464Z45		4.504	4.550	4.595				
MM3464A46		4.554	4.600	4.646				
MM3464Z46		4.603	4.650	4.696				
MM3464A47		4.653	4.700	4.747				
MM3464Z47		4.702	4.750	4.797				
MM3464A48		4.752	4.800	4.848				
MM3464Z48		4.801	4.850	4.898				
MM3464A49		4.851	4.900	4.949				
MM3464Z49		4.900	4.950	4.999				
MM3464A50		4.950	5.000	5.050				

Measuring Circuit



Application Circuit



(Reference example of external parts)

- Output capacitor Ceramic capacitor 1.0 μ F
- Input capacitor Ceramic capacitor 1.0 μ F

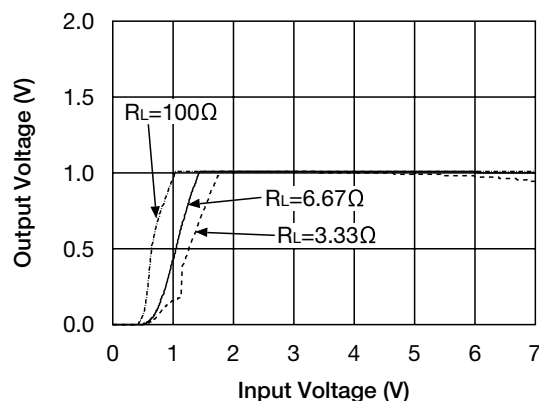
* Temperature Characteristics : B

· Note

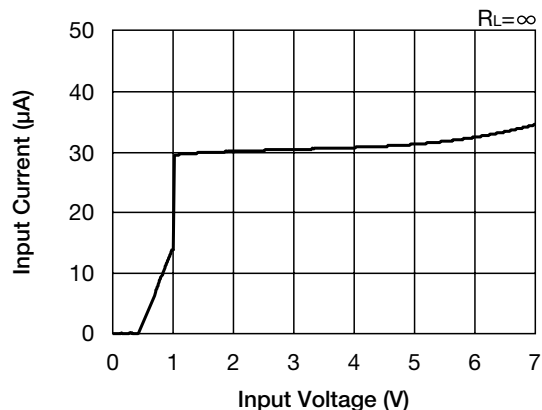
1. The output capacitor is required between output and GND to prevent oscillation.
2. The ESR of capacitor must be defined in ESR stability area.
It is possible to use a ceramic capacitor without ESR resistance for output.
The ceramic capacitor must be used more than 1.0 μ F and B temperature characteristics.
3. The wire of Vcc and GND is required to print full ground plane for noise and stability.
4. The input capacitor must be connected a distance of less than 1cm from input pin.
5. In case the output voltage is above the input voltage, the overcurrent flow by internal parastic diode from output to input.

Characteristics ($V_o=1.0V$) (Except where noted otherwise $V_{DD}=V_{OUT} \text{ (typ.)} +1V$, $V_{CE}=V_{DD}$, $T_a=25^\circ C$)

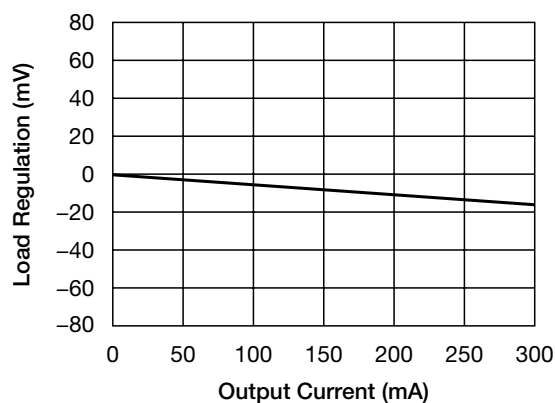
Output - Input voltage



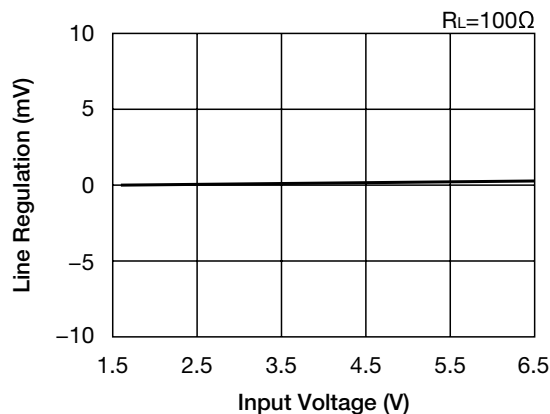
Input current - Input voltage



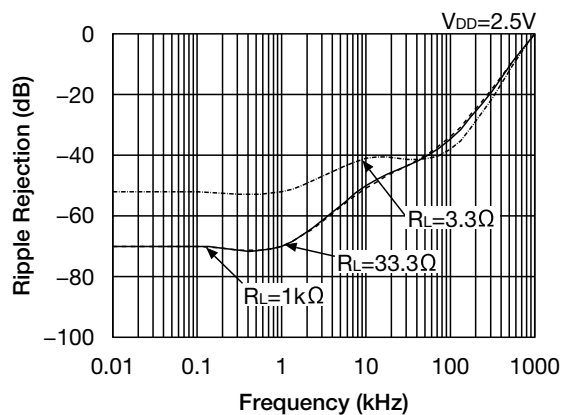
Load regulation



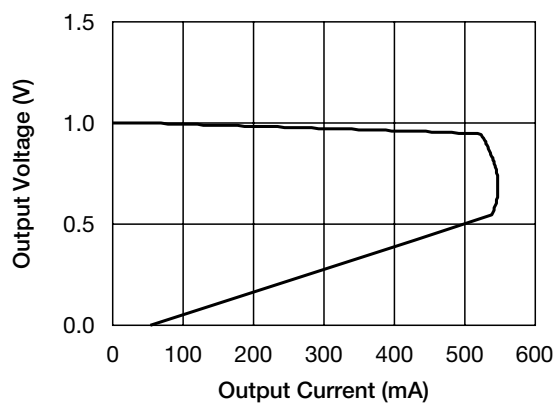
Line regulation



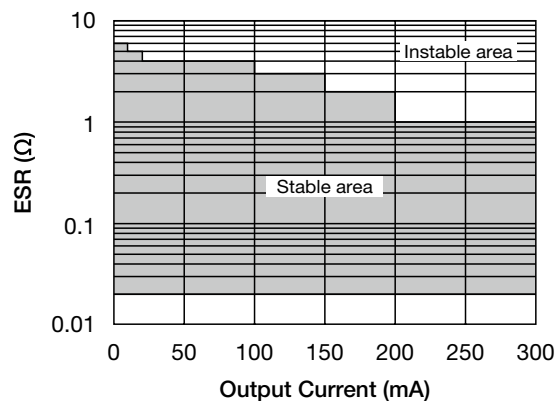
Ripple Rejection



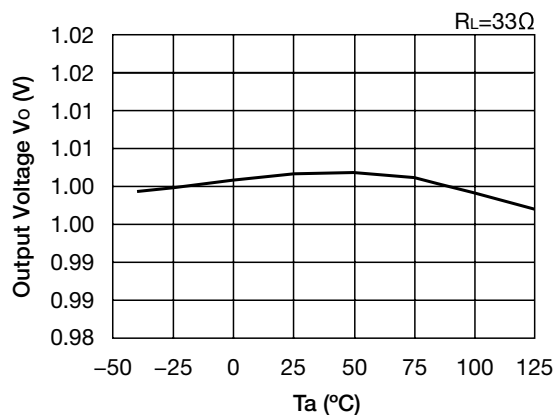
Current Limit



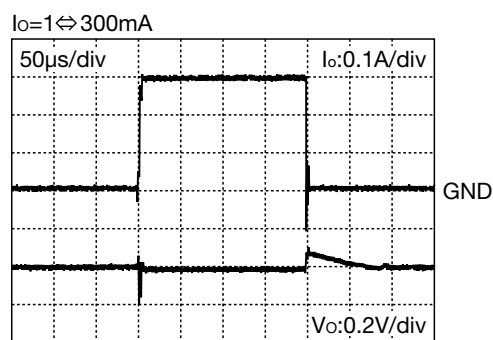
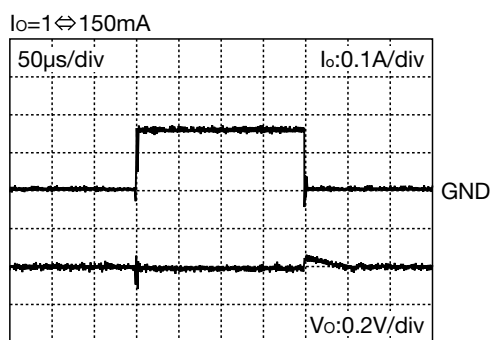
ESR stability area



V_{OUT} temperature coefficient

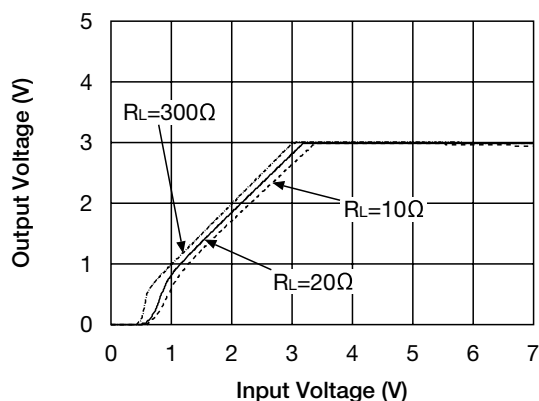


Load transient response ($V_{DD}=V_o+1V$, $V_{CE}=V_{DD}$, $C_{in}=C_o=1\mu F$)

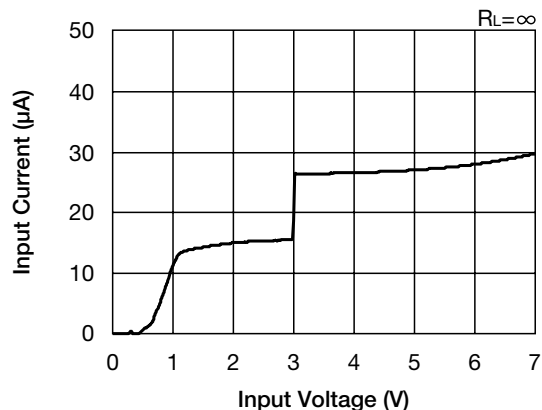


Characteristics ($V_o=3.0V$) (Except where noted otherwise $V_{DD}=V_{OUT}$ (typ.) +1V, $V_{CE}=V_{DD}$, $T_a=25^{\circ}C$)

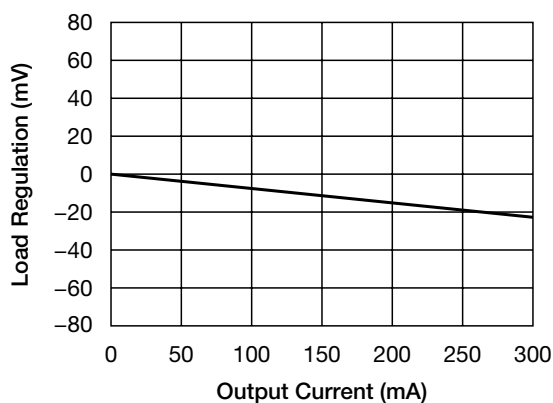
Output - Input voltage



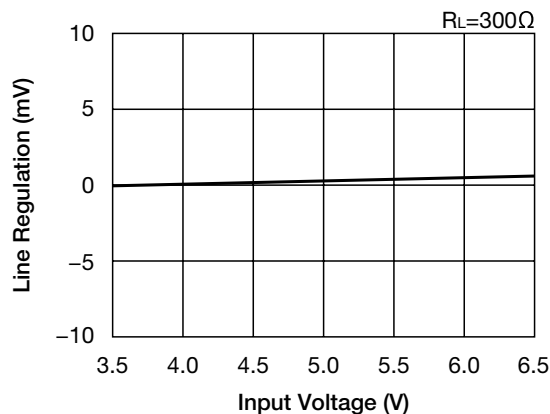
Input current - Input voltage



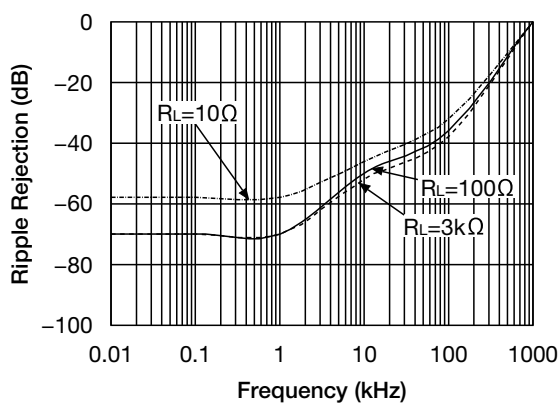
Load regulation



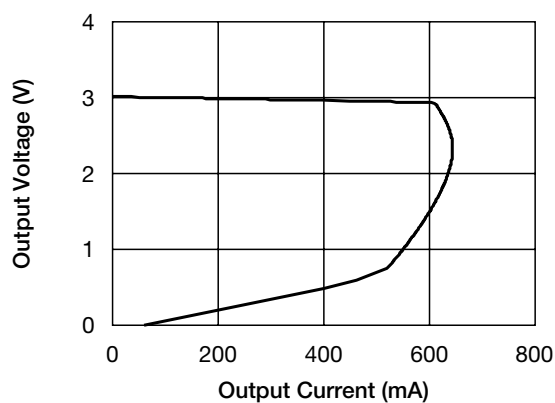
Line regulation



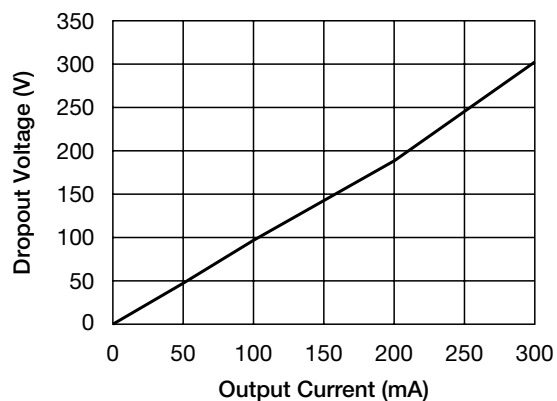
Ripple Rejection



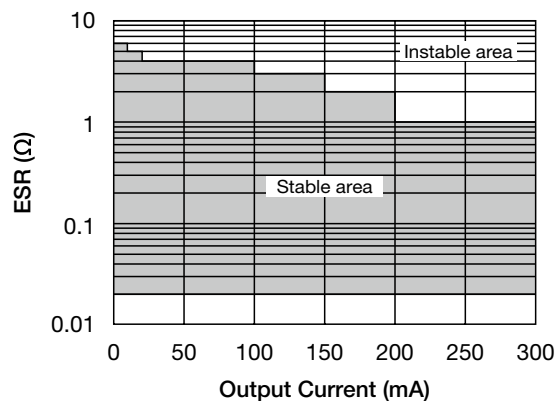
Current Limit



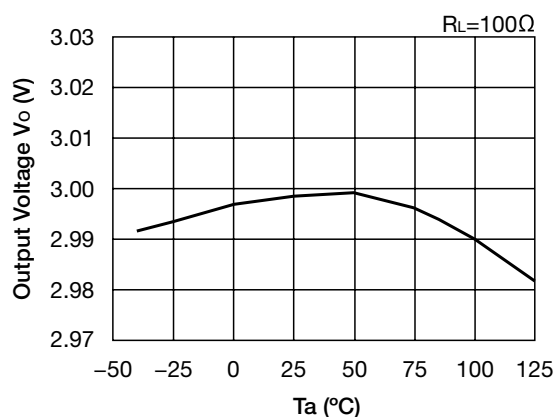
Dropout voltage - Output voltage



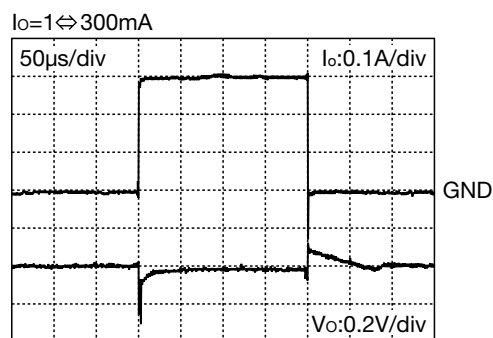
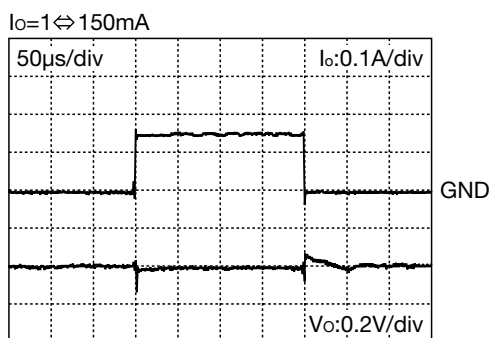
ESR stability area



V_{OUT} temperature coefficient

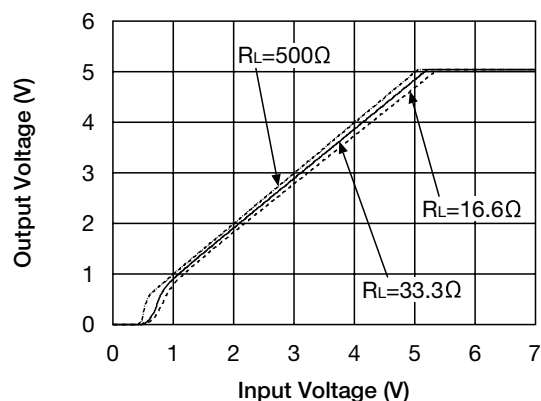


Load transient response ($V_{DD}=V_o+1V$, $V_{CE}=V_{DD}$, $C_{in}=C_o=1\mu F$)

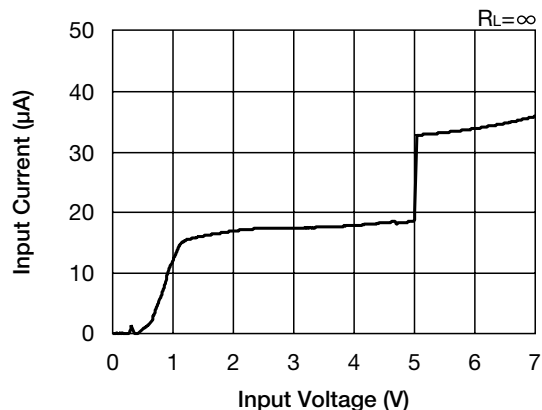


Characteristics ($V_o=5.0V$) (Except where noted otherwise $V_{DD}=V_{OUT}$ (typ.) +1V, $V_{CE}=V_{DD}$, $T_a=25^{\circ}C$)

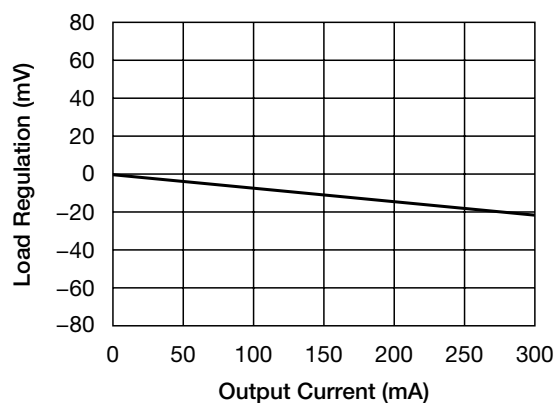
Output - Input voltage



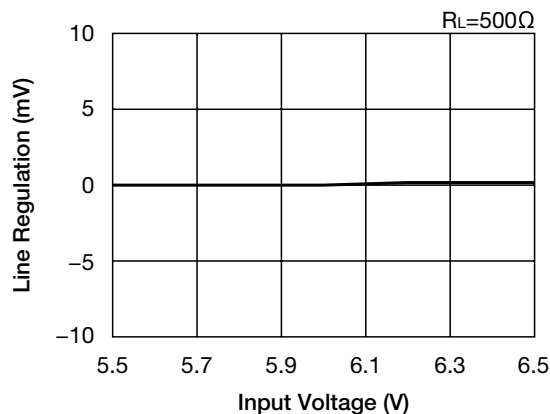
Input current - Input voltage



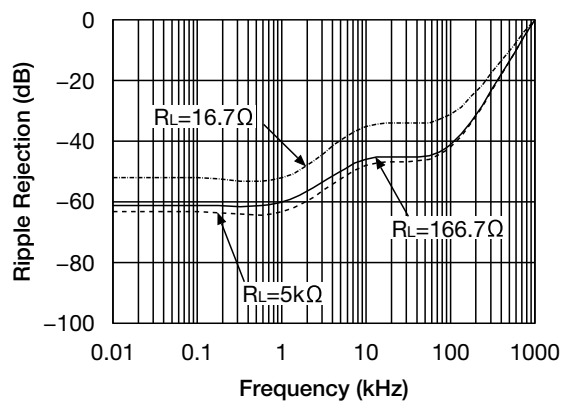
Load regulation



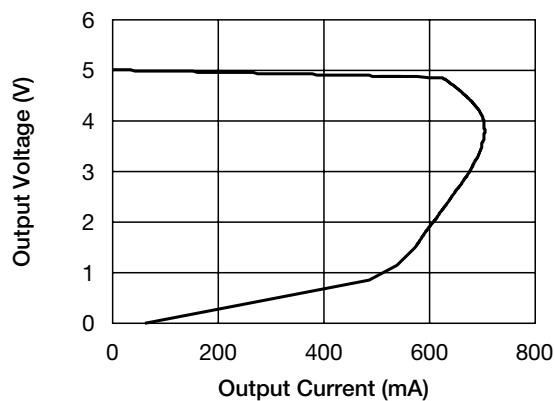
Line regulation



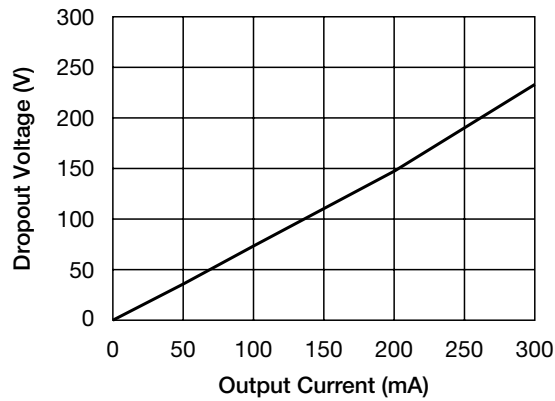
Ripple Rejection



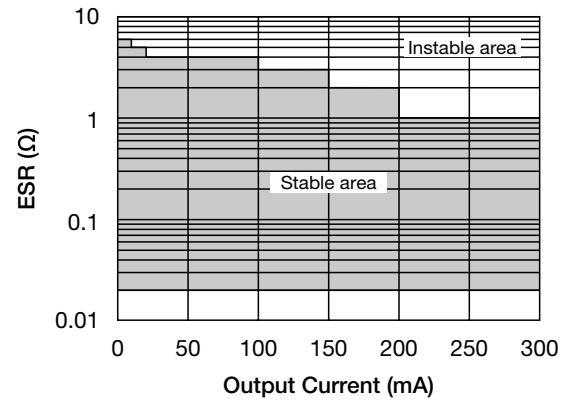
Current Limit



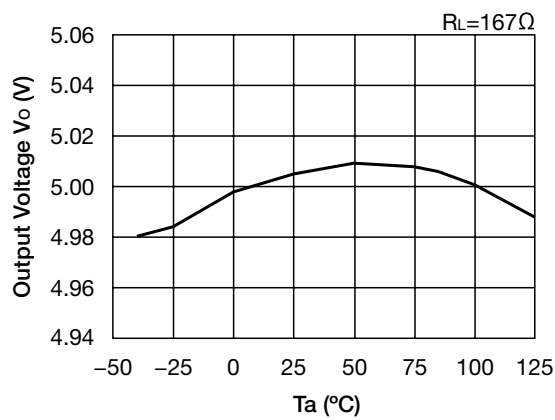
Dropout voltage - Output voltage



ESR stability area



V_{OUT} temperature coefficient



Load transient response ($V_{DD}=V_o+1V$, $V_{CE}=V_{DD}$, $C_{in}=C_o=1\mu F$)

