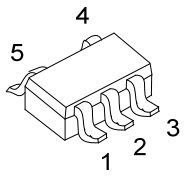
VERY LOW DROP AND LOW NOISE VOLTAGE REGULATOR LOW ESR CAP. COMPATIBLE, WITH INHIBIT FUNCTION



SOT-25

■ DESCRIPTION

The UTC **LD1985** is a 150mA fixed output voltage regulator. The ultra low drop voltage and the low quiescent current make them particularly suitable for low noise, low power applications, and in battery powered systems. In sleep mode quiescent current is less than 1μA when INHIBIT pin is pulled low. Shutdown Logic Control Function is available on pin 3 (TTL compatible). This means that when the device is used as local regulator, it is possible to put a part of the board in standby, decreasing the total power consumption.

An external capacitor, C_{BYP}=10nF, connected between bypass pin and GND reduce the noise to 30μVrms.

Typical application is in cellular phone, palmtop laptop computer, personal digital assistant (PDA), personal stereo, camcorder and camera.

■ FEATURES

* Very Low Dropout Voltage (280mV at 150mA and 7mV at 1mA Load)
* Very Low Quiescent Current (2mA Typ. at 150mA Load and 80μA at no Load)
* Output Current up to 150mA
* Logic Controlled Electronic Shutdown
* Output Voltage of 1.5, 1.8, 2.5, 2.8, 2.85, 3, 3.1, 3.2, 3.3, 3.5, 3.6, 3.8, 4, 4.7, 5V
* Internal Current and Thermal Limit
* Low Output Noise Voltage 30μVrms

■ ORDERING INFORMATION

Ordering Number		Package	Packing
Lead Free	Halogen Free		
LD1985L-xx-AF5-R	LD1985G-xx-AF5-R	SOT-25	Tape Reel

Note: xx: Output Voltage, refer to Marking Information.

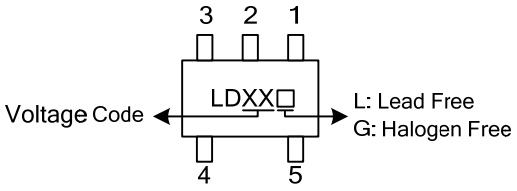
LD1985L-xx-AF5-R

(1)Packing Type
(2)Packing Type
(3)Output Voltage Code
(4)Lead Free

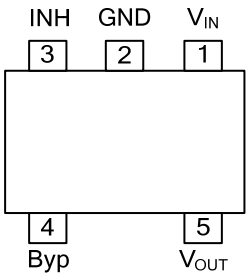
(1) R: Tape Reel
(2) AF5: SOT-25
(3) xx: Refer to Marking Information
(4) G: Halogen Free, L: Lead Free

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■ MARKING INFORMATION

PACKAGE	VOLTAGE CODE	MARKING
SOT-25	15:1.5V 18:1.8V 25:2.5V 28:2.8V 2J:2.85V 30:3.0V 31:3.1V 32:3.2V 33:3.3V 35:3.5V 36:3.6V 38:3.8V 40:4.0V 47:4.7V 50:5.0V	

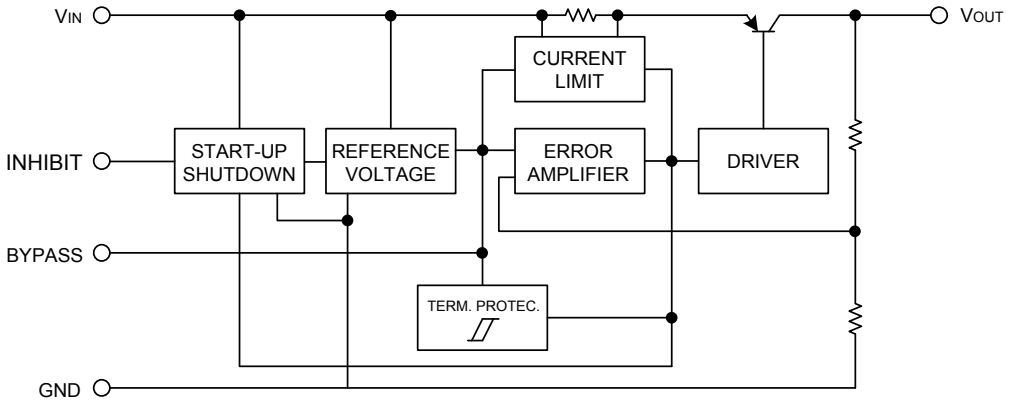
■ PIN CONFIGURATION



■ PIN DESCRIPTION

PIN NO.	PIN NAME	DESCRIPTION
1	V_{IN}	Input port
2	GND	Ground Pin
3	INHIBIT	Control switches ON/OFF. Inhibit is not internally pulled-up; it cannot be left floating. Disable the device when connected to GND or to a positive voltage less than 0.18V
4	Bypass	Bypass pin: capacitor to be connected to GND in order to improve the thermal noise performances.
5	V_{OUT}	Output port

■ BLOCK DIAGRAM



■ ABSOLUTE MAXIMUM RATINGS (Ta=25°C)

PARAMETER	SYMBOL	RATINGS	UNIT
DC Input Voltage	V_{IN}	7	V
INHIBIT Input Voltage	V_{INH}	7	V
Output Current	I_{OUT}	Internally limited	
Power Dissipation	P_D	Internally limited	
Operating Junction Temperature	T_{OPR}	-20 ~ +125	°C
Storage Temperature	T_{STG}	-40 ~ +150	°C

Note: Absolute maximum ratings are those values beyond which the device could be permanently damaged. Absolute maximum ratings are stress ratings only and functional device operation is not implied.

■ THERMAL DATA

PARAMETER	SYMBOL	RATINGS	UNIT
Junction to case	θ_{JC}	81	°C/W

■ ELECTRICAL CHARACTRISTICS

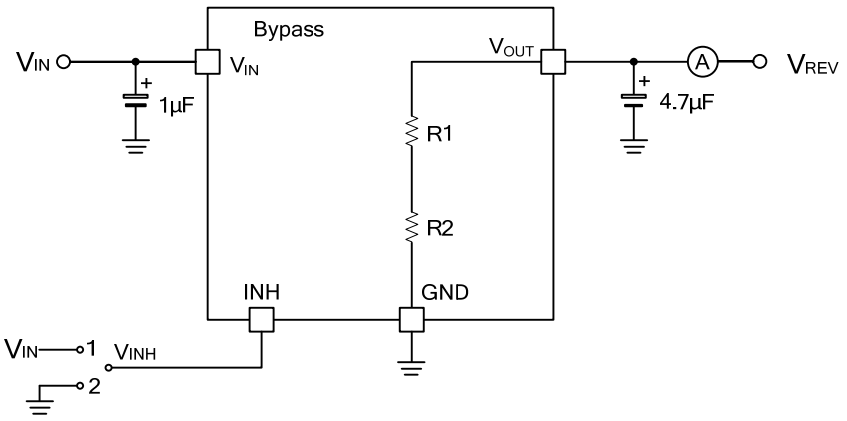
(T_J=25°C, V_{IN}=V_{OUT}+1V, I_{OUT}=1mA, V_{SHDN}=2V, C_I=1μF, C_O=1μF, unless otherwise specified)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Operating Input Voltage	$V_{I(OPR)}$		2.5		7	V
Output Voltage	V_{OUT}	V_{IN}=2.5V	1.470	1.5	1.530	V
		I_{OUT}=1 ~ 150mA	1.455		1.545	V
Output Voltage	V_{OUT}	V_{IN} =2.8V	1.764	1.8	1.836	V
		I_{OUT} =1 ~ 150mA	1.746		1.854	V
Output Voltage	V_{OUT}	V_{IN} =3.5V	2.450	2.5	2.550	V
		I_{OUT} =1 ~ 150mA	2.425		2.575	V
Output Voltage	V_{OUT}	V_{IN} =3.8V	2.744	2.8	2.856	V
		I_{OUT} =1 ~ 150mA	2.716		2.884	V
Output Voltage	V_{OUT}	V_{IN} =3.85V	2.793	2.85	2.907	V
		I_{OUT} =1 ~ 150mA	2.764		2.936	V
Output Voltage	V_{OUT}	V_{IN} =4.0V	2.940	3.0	3.060	V
		I_{OUT} =1 ~ 150mA	2.910		3.090	V
Output Voltage	V_{OUT}	V_{IN} =4.1V	3.038	3.1	3.162	V
		I_{OUT} =1 ~ 150mA	3.007		3.193	V
Output Voltage	V_{OUT}	V_{IN} =4.2V	3.136	3.2	3.264	V
		I_{OUT} =1 ~ 150mA	3.104		3.296	V
Output Voltage	V_{OUT}	V_{IN} =4.3V	3.234	3.3	3.366	V
		I_{OUT} =1 ~ 150mA	3.201		3.399	V
Output Voltage	V_{OUT}	V_{IN} =4.5V	3.430	3.5	3.570	V
		I_{OUT} =1 ~ 150mA	3.395		3.605	V
Output Voltage	V_{OUT}	V_{IN} =4.6V	3.528	3.6	3.672	V
		I_{OUT} =1 ~ 150mA	3.492		3.708	V
Output Voltage	V_{OUT}	V_{IN} =4.8V	3.724	3.8	3.876	V
		I_{OUT} =1 ~ 150mA	3.686		3.914	V
Output Voltage	V_{OUT}	V_{IN} =5.0V	3.920	4	4.080	V
		I_{OUT} =1 ~ 150mA	3.880		4.120	V
Output Voltage	V_{OUT}	V_{IN} =5.7V	4.606	4.7	4.794	V
		I_{OUT} =1 ~ 150mA	4.559		4.841	V
Output Voltage	V_{OUT}	V_{IN} =6.0V	4.900	5	5.100	V
		I_{OUT} =1 ~ 150mA	4.850		5.150	V
Short Circuit Current	Isc	R_L=0		400		mA

■ ELECTRICAL CHARACTRISTICS(Cont.)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Line Regulation	$\triangle V_{OUT}$	V_{IN} = V_{OUT} +1V ~ 7V, I_{OUT} =1mA			30	mV
Dropout Voltage	V_D	I_{OUT} =0		1	3	mV
		T_J=-20 ~ 125°C, I_{OUT}=0			5	mV
		I_{OUT} =1mA		7	10	mV
		I_{OUT} =1mA, T_J=-20 ~ 125°C			15	mV
		I_{OUT} =10mA		40	60	mV
		I_{OUT} =10mA, T_J=-20 ~ 125°C			90	mV
		I_{OUT} =50mA		120	150	mV
		I_{OUT} =50mA, T_J=-20 ~ 125°C			225	mV
		I_{OUT} =150mA		280	350	mV
		I_{OUT} =150mA, T_J=-20 ~ 125°C			575	mV
Quiescent Current	I_Q	I_{OUT} =0		80	100	μA
		T_J=-20 ~ 125°C, I_{OUT}=0			150	μA
		I_{OUT} =1mA		100	150	μA
		I_{OUT} =1mA, T_J=-20 ~ 125°C			200	μA
		I_{OUT} =10mA		200	300	μA
		I_{OUT} =10mA, T_J=-20 ~ 125°C			400	μA
		I_{OUT} =50mA		600	1050	μA
		I_{OUT} =50mA, T_J=-20 ~ 125°C			1200	μA
		I_{OUT} =150mA		2000	3000	μA
		I_{OUT} =150mA, T_J=-20 ~ 125°C			4000	μA
		OFF MODE V_{INH}<0.18V		0		μA
		OFF MODE V_{INH}<0.18V T_J=-20 ~ 125°C			2	μA
Supply Voltage Rejection	SVR	C_{BYP}=0.01μF, Co=10μF, f=1KHz		45		dB
Control Input Logic Low	V_{IL}	T_J=-20 ~ 125°C			0.15	V
Control Input Logic High	V_{IH}	T_J=-20 ~ 125°C	2			V
Control Input Current	I_{INH}	T_J=-20 ~ 125°C, V_{SHDN}=5V		5	15	μA
		T_J=-20 ~ 125°C, V_{SHDN}=0V		0	-1	μA
Output Noise Voltage	eN	B=300Hz ~ 50KHz C_{BYP}=0.01μF, Co=10μF		30		μV

■ REVERSE CURRENT TEST CIRCUIT



■ APPLICATION INFORMATION

EXTERNAL CAPACITORS

Like any low-dropout regulator, the UTC LD1985 requires external capacitors for regulator stability. This capacitor must be selected to meet the requirements of minimum capacitance and equivalent series resistance. We suggest soldering input and outputting capacitors as close as possible to the relative pins.

INPUT CAPACITOR

An input capacitor whose value is 1μF is required with the UTC LD1985 (amount of capacitance can be increased without limit). This capacitor must be located a distance of not more than 0.5" from the input pin of the device and returned to a clean analog ground. Any good quality ceramic, tantalum or film capacitors can be used for this capacitor.

OUTPUT CAPACITOR

The UTC LD1985 is designed specifically to work with ceramic output capacitors. It may also be possible to use Tantalum capacitors, but these are not as attractive for reasons of size and cost. By the way, the output capacitor must meet both the requirement for minimum amount of capacitance and E.S.R. (equivalent series resistance) value. Due to the different loop gain, the stability improves for higher output versions and so the suggested minimum output capacitor value, if low E.S.R. ceramic type is used, is 1μF for output voltages equal or major than 3.8V, 2.2μF for V_{OUT} going from 1.8 ~ 3.3V, and 3.3μF for the other versions. However, if an output capacitor lower than the suggested one is used, it's possible to make stable the regulator adding a resistor in series to the capacitor.

IMPORTANT:

The output capacitor must maintain its ESR in the stable region over the full operating temperature to assure stability. Also, capacitor tolerance and variation with temperature must be considered to assure the minimum amount of capacitance is provided at all times. This capacitor should be located not more than 0.5" from the output pin of the device and returned to a clean analog ground.

INHIBIT INPUT OPERATION

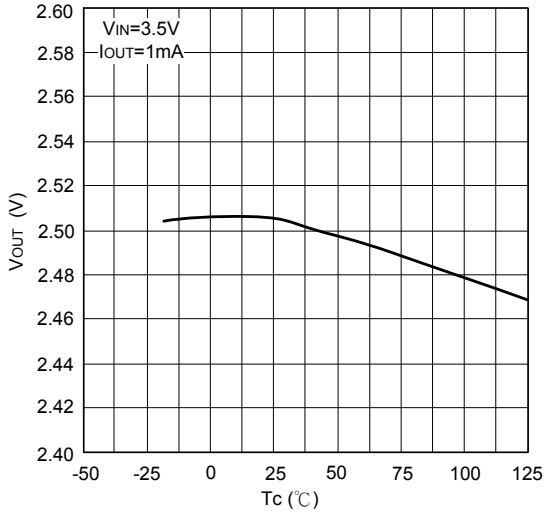
The inhibit pin can be used to turn OFF the regulator when pulled low, so drastically reducing the current consumption down to less than 1μA. When the inhibit feature is not used, this pin must be tied to V_{IN} to keep the regulator output ON at all times. To assure proper operation, the signal source used to drive the inhibit pin must be able to swing above and below the specified thresholds listed in the electrical characteristics section under V_{IH} V_{IL}. Any slew rate can be used to drive the inhibit.

REVERSE CURRENT

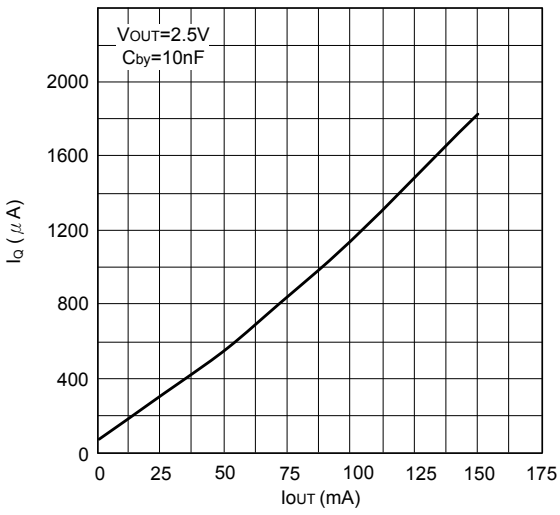
The power transistor used in the UTC LD1985 has not an inherent diode connected between the regulator input and output. If the output is forced above the input, no current will flow from the output to the input across the series pass transistor. When a V_{REV} voltage is applied on the output, the reverse current measured flows to the GND across the two feedback resistors. This current typical value is 160μA. R1 and R2 resistors are implanted type; typical values are, respectively, 42.6 KΩ and 51.150 KΩ.

■ TYPICAL CHARACTERISTICS(T_J=25°C, C_{IN}=1μF, C_{OUT}=2.2μF, C_{BYP}=100nF)

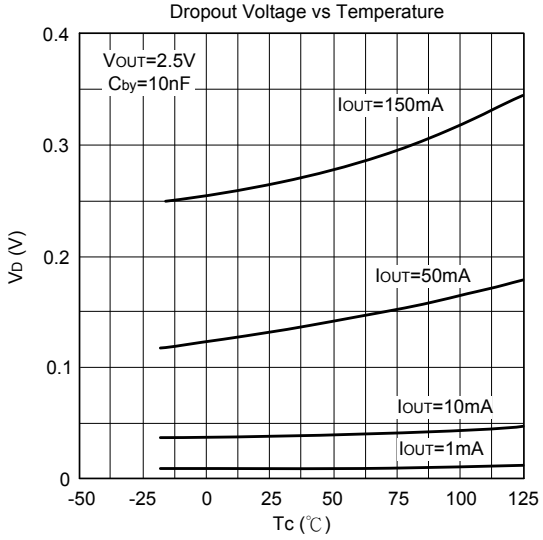
Output Voltage vs Temperature



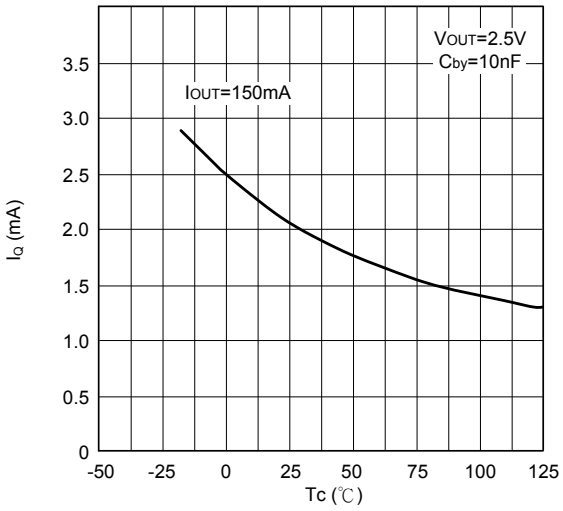
Quiescent Current vs Load Current



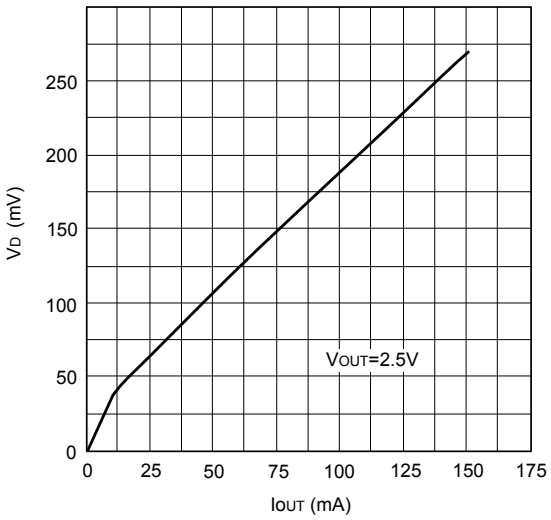
Dropout Voltage vs Temperature



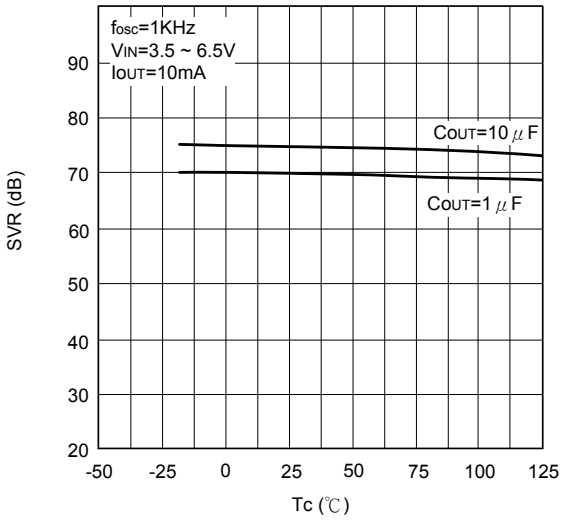
Quiescent Current vs Temperature



Dropout Voltage vs Output Current

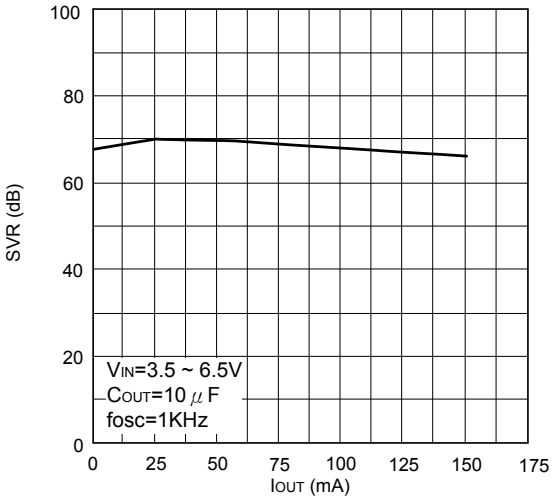


Supply Voltage Rejection vs Temperature

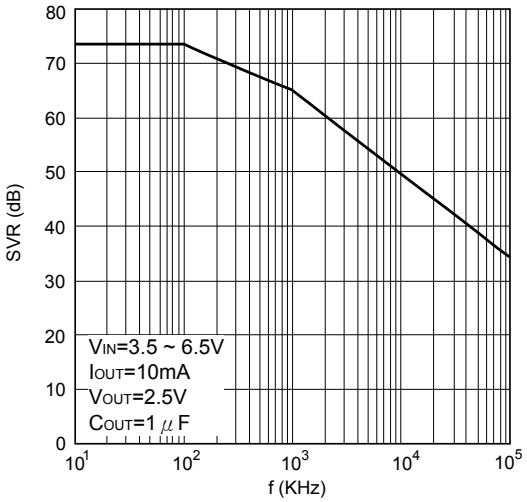


■ TYPICAL CHARACTERISTICS(Cont.)

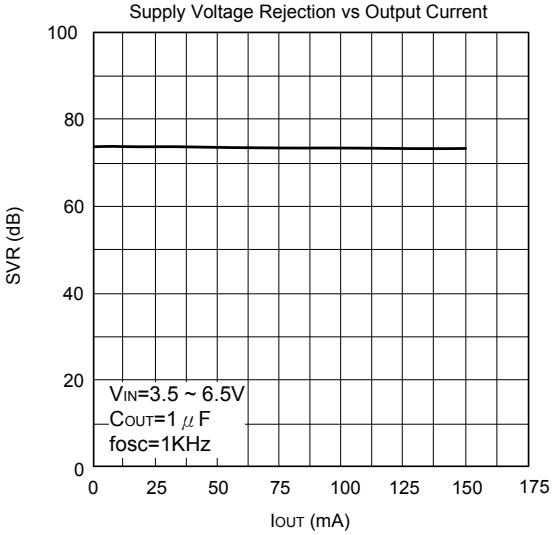
Supply Voltage Rejection vs Output Current



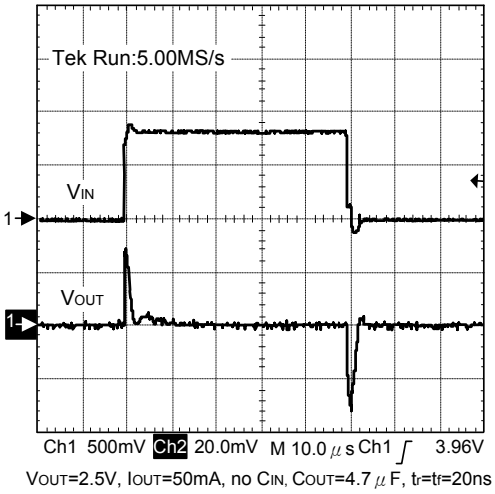
Supply Voltage Rejection vs Frequency



Supply Voltage Rejection vs Output Current

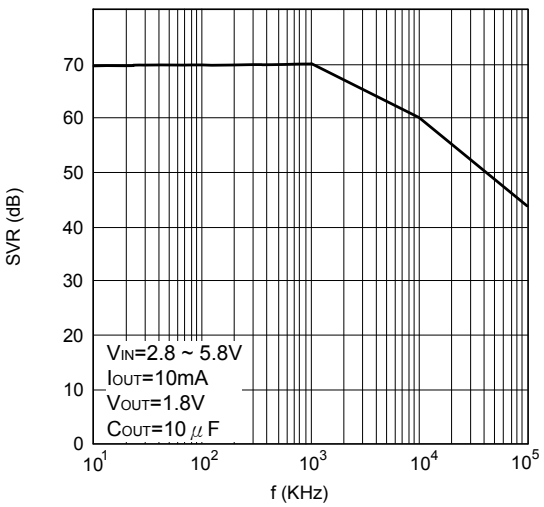


Line Transient

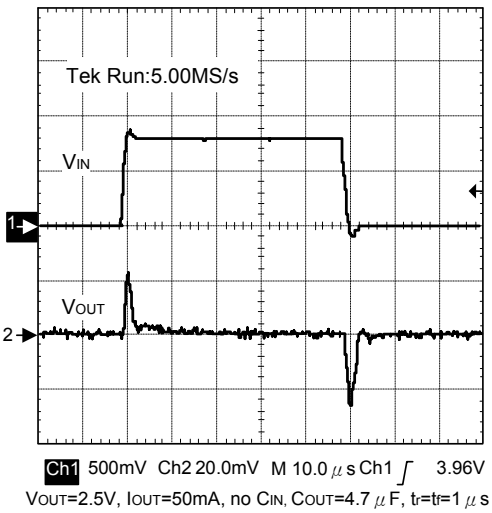


VOUT=2.5V, IOUT=50mA, no CIN, COUT=4.7 μF, tr=tf=20ns

Supply Voltage Rejection vs Frequency



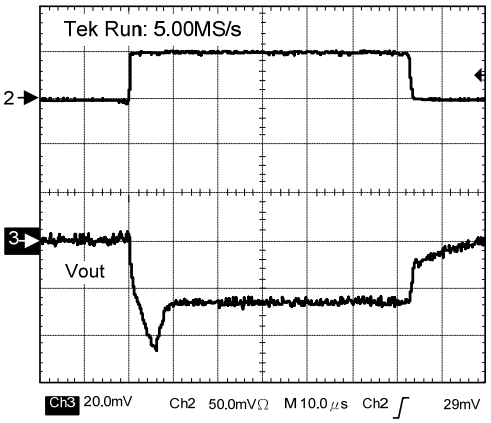
Line Transient



VOUT=2.5V, IOUT=50mA, no CIN, COUT=4.7 μF, tr=tf=1 μs

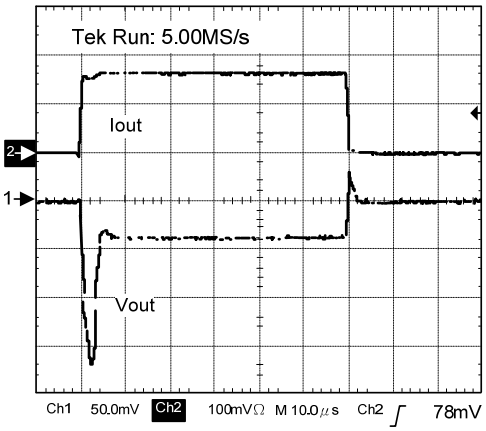
■ TYPICAL CHARACTERISTICS(Cont.)

Load Transient



V_{OUT}=2.5V, I_{OUT}=0~50mA, no C_{IN}, C_{OUT}=10μF, t_s=t_f=2ns

Load Transient



V_{OUT}=2.5V, I_{OUT}=50mA, no C_{IN}, C_{OUT}=4.7μF, t_s=t_f=20ns

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