



278RXXX

LINEAR INTEGRATED CIRCUIT

4 TERMINAL 2A OUTPUT LOW DROP VOLTAGE REGULATOR

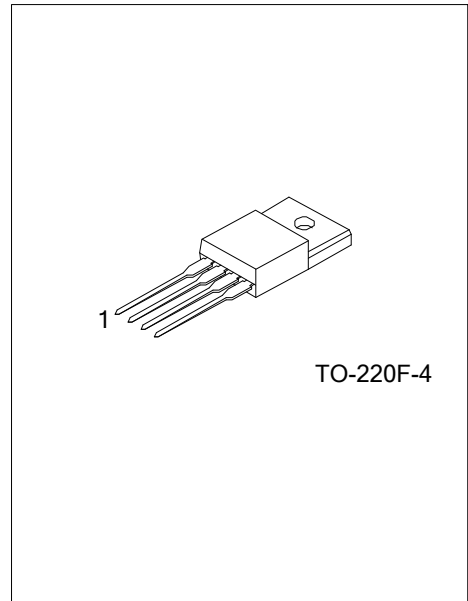
DESCRIPTION

The UTC **278RXXX** Series are Low Drop Voltage Regulator suitable for various electronic equipments.

It provides constant voltage power source with TO-220F-4 terminal lead full molded PKG. The Regulator has multi function such as over current protection, overheat protection and ON/OFF control.

FEATURES

- * 2.0A Output Low Drop Voltage Regulator.
- * Built in ON/OFF Control Terminal.
- * Built in Over Current Protection, Over Heat Protection Function.



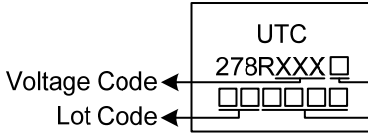
ORDERING INFORMATION

Ordering Number		Package	Packing
Lead Free	Halogen Free		
278RXXXL-TF4-T	278RXXXG-TF4-T	TO-220F-4	Tube

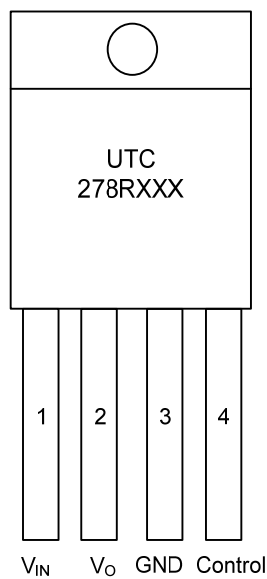
Note: xxx: Output Voltage, refer to Marking Information.

<p>278RXXXG-TF4-T</p> <p>(1)Packing Type (2)Package Type (3)Green Package (4)Voltage Code</p>	<p>(1) T: Tube (2) TF4: TO-220F-4 (3) G: Halogen Free and Lead Free, L: Lead Free (4) XX: Refer to Marking Information</p>
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MARKING INFORMATION

PACKAGE	VOLTAGE CODE	MARKING
TO-220F-4	1P5: 1.5V 1P8: 1.8V 3P3: 3.3V 05: 5.0V 06: 6.0V 08: 8.0V 09: 9.0V 10: 10V 12: 12V 15: 15V	 <p>UTC 278RXXX</p> <p>Voltage Code ← → Lot Code</p> <p>→ L: Lead Free → G: Halogen Free → Date Code</p>

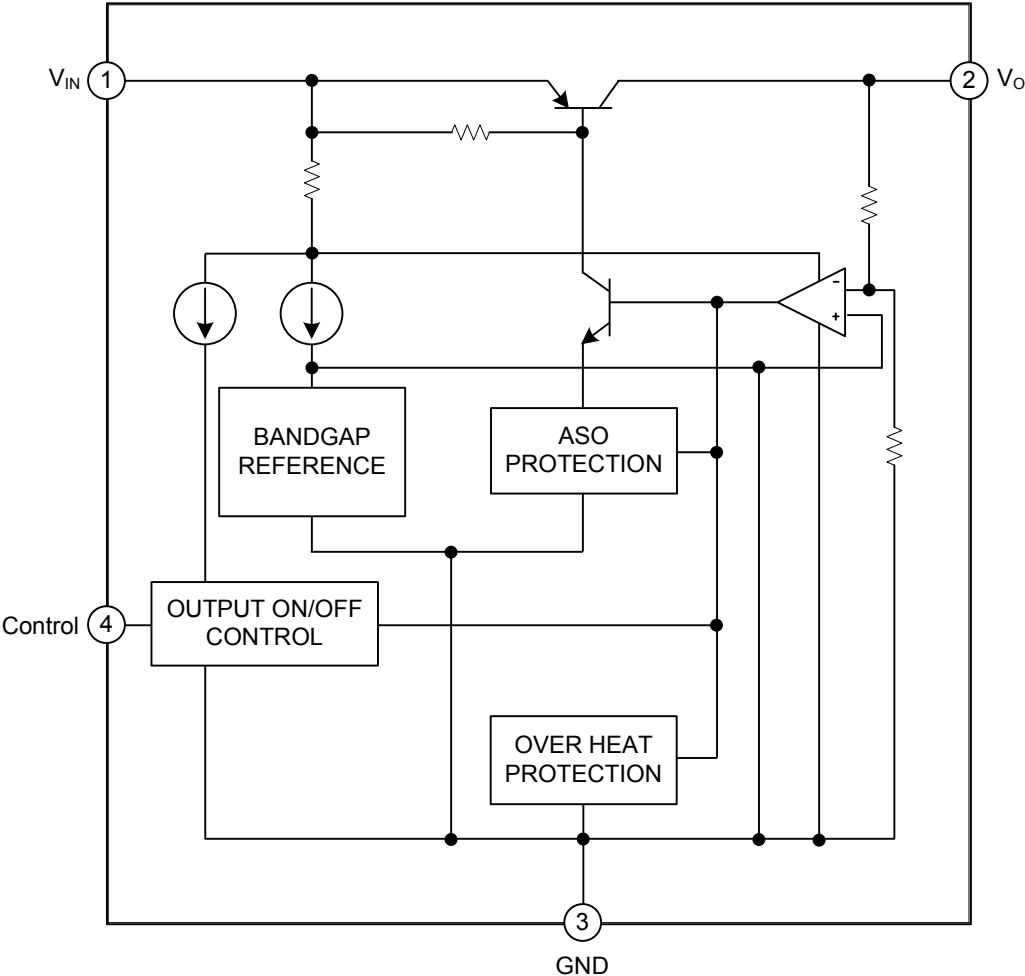
PIN CONFIGURATION



PIN DESCRIPTION

PIN NO.	PIN NAME	DESCRIPTION
1	V_{IN}	Input DC supply voltage
2	V_{OUT}	Output voltage pin
3	GND	Ground pin for the IC
4	Control	ON/OFF control pin

■ BLOCK DIAGRAM



■ ABSOLUTE MAXIMUM RATING ($T_A=25^{\circ}\text{C}$, unless otherwise specified)

PARAMETER	SYMBOL	RATINGS	UNIT
Input Voltage	V_{IN}	35	V
ON/OFF Control Voltage	V_C	35	V
Output Current	I_O	2	A
Power Dissipation 1	P_{D1}	1.5	W
Junction Temperature	T_J	+150	$^{\circ}\text{C}$
Operating Temperature	T_{OPR}	-20 ~ +80	$^{\circ}\text{C}$
Storage Temperature	T_{STG}	-30 ~ +150	$^{\circ}\text{C}$

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 Ambient	θ_{JA}	83	$^{\circ}\text{C}/\text{W}$
Junction to Case	θ_{JC}	8	$^{\circ}\text{C}/\text{W}$

■ ELECTRICAL CHARACTERISTICS ($T_A=25^{\circ}\text{C}$, $I_O=1.0\text{A}$, unless otherwise specified)

For 278R1P5 ($V_{IN}=4.5\text{V}$)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Output Voltage	V_O		1.45	1.5	1.55	V
Load Regulation	Reg Load	$I_O=5\text{mA}\sim 2\text{A}$		0.1	2.0	%
Line Regulation	Reg Line	$V_{IN}=4.5\sim 8.5\text{V}$		0.5	2.5	%
Ripple Rejection	$R \cdot R$		45	55		dB
Drop Out Voltage (Note)	V_D	$I_O=2\text{A}$			3	V
Output ON State for Control Voltage	$V_{C(ON)}$		2.0			V
Output ON State for Control Current	$I_{C(ON)}$	$V_C=2.7\text{V}$			20	μA
Output OFF State for Control Voltage	$V_{C(OFF)}$				0.8	V
Output OFF State for Control Current	$I_{C(OFF)}$	$V_C=0.4\text{V}$			0.4	mA
Quiescent Current	I_Q	$I_O=0$			10	mA

For 278R1P8 ($V_{IN}=4.8\text{V}$)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Output Voltage	V_O		1.75	1.8	1.85	V
Load Regulation	Reg Load	$I_O=5\text{mA}\sim 2\text{A}$		0.1	2.0	%
Line Regulation	Reg Line	$V_{IN}=4.5\sim 9.0\text{V}$		0.5	2.5	%
Ripple Rejection	$R \cdot R$		45	55		dB
Drop Out Voltage (Note)	V_D	$I_O=2\text{A}$			2.7	V
Output ON State for Control Voltage	$V_{C(ON)}$		2.0			V
Output ON State for Control Current	$I_{C(ON)}$	$V_C=2.7\text{V}$			20	μA
Output OFF State for Control Voltage	$V_{C(OFF)}$				0.8	V
Output OFF State for Control Current	$I_{C(OFF)}$	$V_C=0.4\text{V}$			0.4	mA
Quiescent Current	I_Q	$I_O=0$			10	mA

■ ELECTRICAL CHARACTERISTICS ($T_A=25^\circ\text{C}$, $I_O=1.0\text{A}$, unless otherwise specified)

For 278R3P3 ($V_{IN}=5\text{V}$)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Output Voltage	V_O		3.22	3.3	3.38	V
Load Regulation	Reg Load	$I_O=5\text{mA}\sim 2\text{A}$		0.1	2.0	%
Line Regulation	Reg Line	$V_{IN}=4.5\sim 10\text{V}$		0.5	2.5	%
Ripple Rejection	$R \cdot R$		45	55		dB
Drop Out Voltage (Note)	V_D	$I_O=2\text{A}$			0.5	V
Output ON State for Control Voltage	$V_{C(ON)}$		2.0			V
Output ON State for Control Current	$I_{C(ON)}$	$V_C=2.7\text{V}$			20	μA
Output OFF State for Control Voltage	$V_{C(OFF)}$				0.8	V
Output OFF State for Control Current	$I_{C(OFF)}$	$V_C=0.4\text{V}$			0.4	mA
Quiescent Current	I_Q	$I_O=0$			10	mA

For 278R05 ($V_{IN}=7\text{V}$)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Output Voltage	V_O		4.88	5.0	5.12	V
Load Regulation	Reg Load	$I_O=5\text{mA}\sim 2\text{A}$		0.1	2.0	%
Line Regulation	Reg Line	$V_{IN}=6\sim 12\text{V}$		0.5	2.5	%
Ripple Rejection	$R \cdot R$		45	55		dB
Drop Out Voltage (Note)	V_D	$I_O=2\text{A}$			0.5	V
Output ON State for Control Voltage	$V_{C(ON)}$		2.0			V
Output ON State for Control Current	$I_{C(ON)}$	$V_C=2.7\text{V}$			20	μA
Output OFF State for Control Voltage	$V_{C(OFF)}$				0.8	V
Output OFF State for Control Current	$I_{C(OFF)}$	$V_C=0.4\text{V}$			0.4	mA
Quiescent Current	I_Q	$I_O=0$			10	mA

For 278R06 ($V_{IN}=8\text{V}$)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Output Voltage	V_O		5.85	6.0	6.15	V
Load Regulation	Reg Load	$I_O=5\text{mA}\sim 2\text{A}$		0.1	2.0	%
Line Regulation	Reg Line	$V_{IN}=7\sim 13\text{V}$		0.5	2.5	%
Ripple Rejection	$R \cdot R$		45	55		dB
Drop Out Voltage (Note)	V_D	$I_O=2\text{A}$			0.5	V
Output ON State for Control Voltage	$V_{C(ON)}$		2.0			V
Output ON State for Control Current	$I_{C(ON)}$	$V_C=2.7\text{V}$			20	μA
Output OFF State for Control Voltage	$V_{C(OFF)}$				0.8	V
Output OFF State for Control Current	$I_{C(OFF)}$	$V_C=0.4\text{V}$			0.4	mA
Quiescent Current	I_Q	$I_O=0$			10	mA

For 278R08 ($V_{IN}=10\text{V}$)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Output Voltage	V_O		7.80	8.0	8.20	V
Load Regulation	Reg Load	$I_O=5\text{mA}\sim 2\text{A}$		0.1	2.0	%
Line Regulation	Reg Line	$V_{IN}=9\sim 25\text{V}$		0.5	2.5	%
Ripple Rejection	$R \cdot R$		45	55		dB
Drop Out Voltage (Note)	V_D	$I_O=2\text{A}$			0.5	V
Output ON State for Control Voltage	$V_{C(ON)}$		2.0			V
Output ON State for Control Current	$I_{C(ON)}$	$V_C=2.7\text{V}$			20	μA
Output OFF State for Control Voltage	$V_{C(OFF)}$				0.8	V
Output OFF State for Control Current	$I_{C(OFF)}$	$V_C=0.4\text{V}$			0.4	mA
Quiescent Current	I_Q	$I_O=0$			10	mA

■ ELECTRICAL CHARACTERISTICS (Cont.)

For 278R09 ($V_{IN}=15V$)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Output Voltage	V_O		8.78	9.0	9.22	V
Load Regulation	Reg Load	$I_O=5mA\sim 2A$		0.1	2.0	%
Line Regulation	Reg Line	$V_{IN}=10\sim 25V$		0.5	2.5	%
Ripple Rejection	$R \cdot R$		45	55		dB
Drop Out Voltage (Note)	V_D	$I_O=2A$			0.5	V
Output ON State for Control Voltage	$V_{C(ON)}$		2.0			V
Output ON State for Control Current	$I_{C(ON)}$	$V_C=2.7V$			20	μA
Output OFF State for Control Voltage	$V_{C(OFF)}$				0.8	V
Output OFF State for Control Current	$I_{C(OFF)}$	$V_C=0.4V$			0.4	mA
Quiescent Current	I_Q	$I_O=0$			10	mA

For 278R10 ($V_{IN}=16V$)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Output Voltage	V_O		9.75	10.0	10.25	V
Load Regulation	Reg Load	$I_O=5mA\sim 2A$		0.1	2.0	%
Line Regulation	Reg Line	$V_{IN}=11\sim 26V$		0.5	2.5	%
Ripple Rejection	$R \cdot R$		45	55		dB
Drop Out Voltage (Note)	V_D	$I_O=2A$			0.5	V
Output ON State for Control Voltage	$V_{C(ON)}$		2.0			V
Output ON State for Control Current	$I_{C(ON)}$	$V_C=2.7V$			20	μA
Output OFF State for Control Voltage	$V_{C(OFF)}$				0.8	V
Output OFF State for Control Current	$I_{C(OFF)}$	$V_C=0.4V$			0.4	mA
Quiescent Current	I_Q	$I_O=0$			10	mA

For 278R12 ($V_{IN}=18V$)

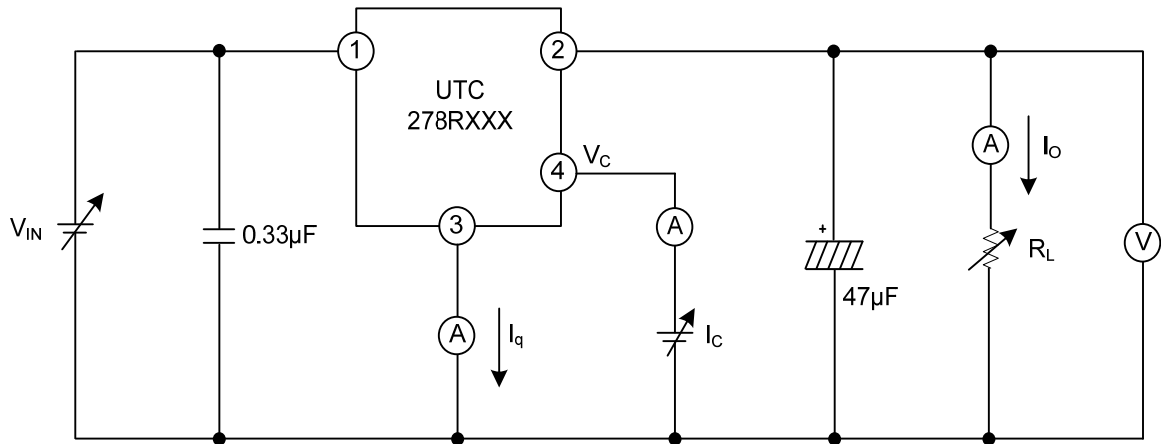
PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Output Voltage	V_O		11.70	12.0	12.30	V
Load Regulation	Reg Load	$I_O=5mA\sim 2A$		0.1	2.0	%
Line Regulation	Reg Line	$V_{IN}=13\sim 29V$		0.5	2.5	%
Ripple Rejection	$R \cdot R$		45	55		dB
Drop Out Voltage (Note)	V_D	$I_O=2A$			0.5	V
Output ON State for Control Voltage	$V_{C(ON)}$		2.0			V
Output ON State for Control Current	$I_{C(ON)}$	$V_C=2.7V$			20	μA
Output OFF State for Control Voltage	$V_{C(OFF)}$				0.8	V
Output OFF State for Control Current	$I_{C(OFF)}$	$V_C=0.4V$			0.4	mA
Quiescent Current	I_Q	$I_O=0$			10	mA

For 278R15 ($V_{IN}=21V$)

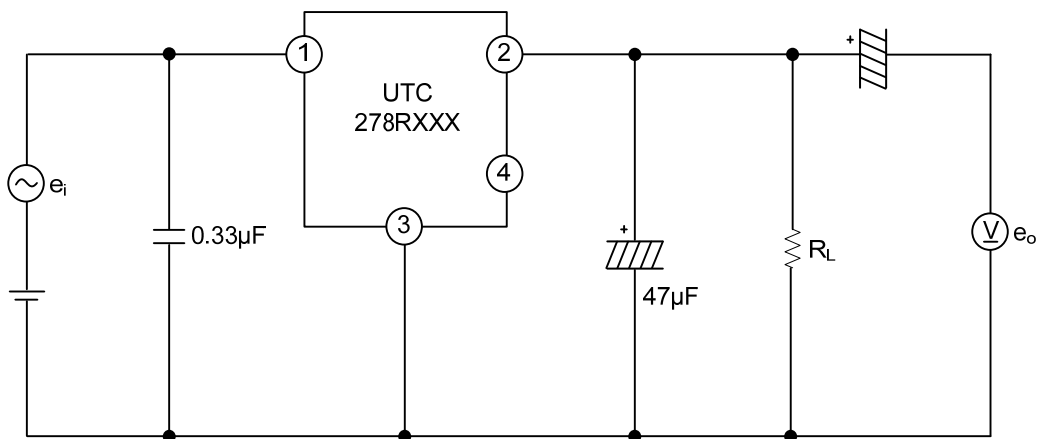
PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Output Voltage	V_O		14.70	15.0	15.30	V
Load Regulation	Reg Load	$I_O=5mA\sim 2A$		0.1	2.0	%
Line Regulation	Reg Line	$V_{IN}=16\sim 32V$		0.5	2.5	%
Ripple Rejection	$R \cdot R$		45	55		dB
Drop Out Voltage (Note)	V_D	$I_O=2A$			0.5	V
Output ON State for Control Voltage	$V_{C(ON)}$		2.0			V
Output ON State for Control Current	$I_{C(ON)}$	$V_C=2.7V$			20	μA
Output OFF State for Control Voltage	$V_{C(OFF)}$				0.8	V
Output OFF State for Control Current	$I_{C(OFF)}$	$V_C=0.4V$			0.4	mA
Quiescent Current	I_Q	$I_O=0$			10	mA

Note: Input voltage shall be the value when output voltage is 95% in comparison with the initial value.

■ TEST CIRCUIT



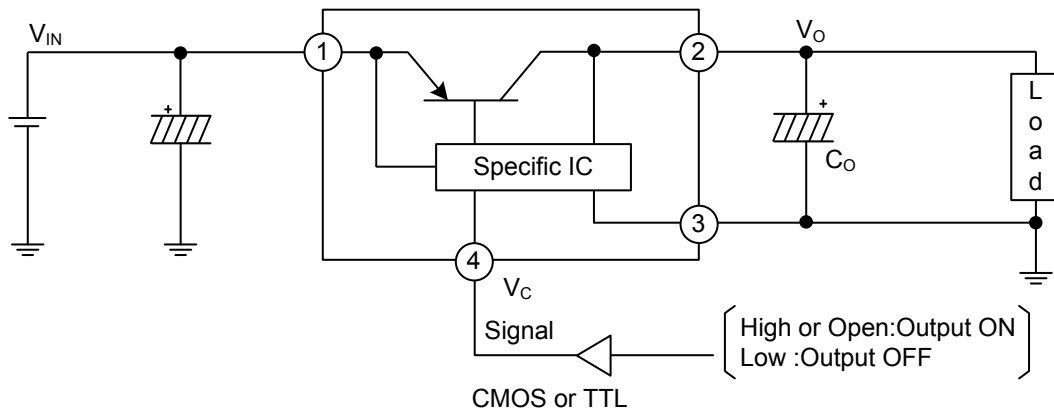
Standard Test Circuit



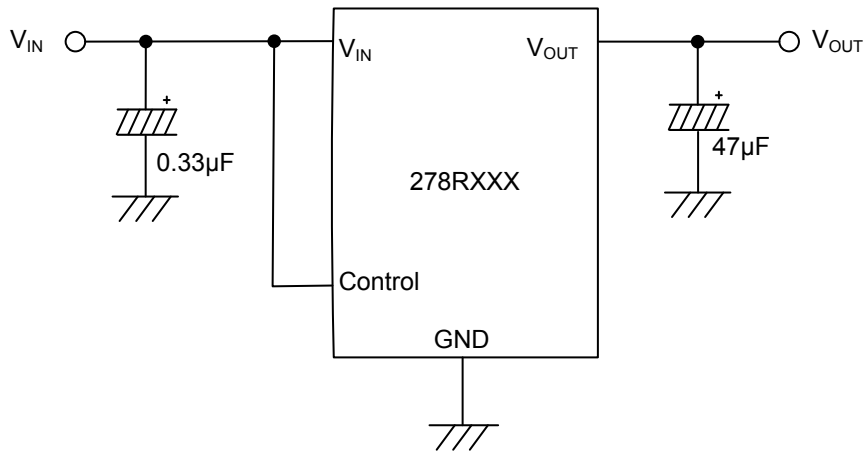
f=120Hz (sine wave)
 $e_i=0.5V_{rms}$
 $RR=20\log(e_i/e_o)$

Ripple Rejection Test Circuit

■ TYPICAL APPLICATION CIRCUIT



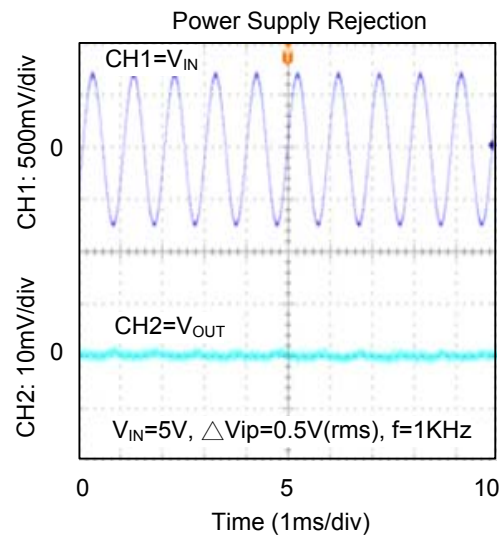
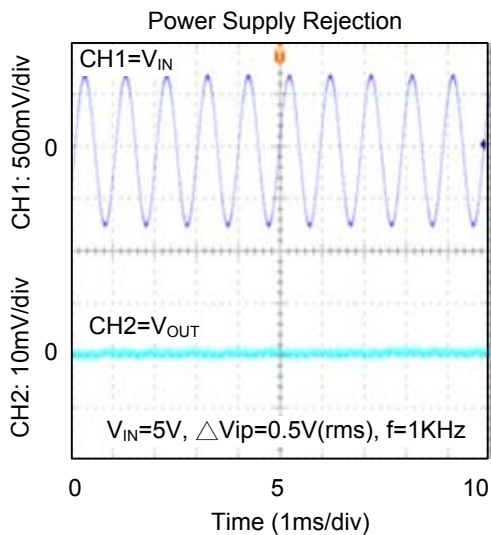
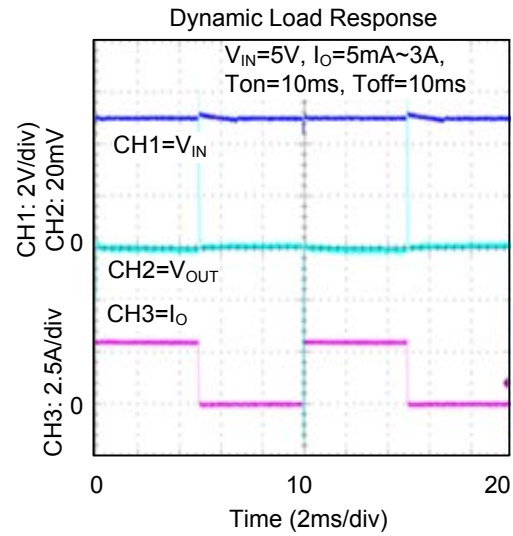
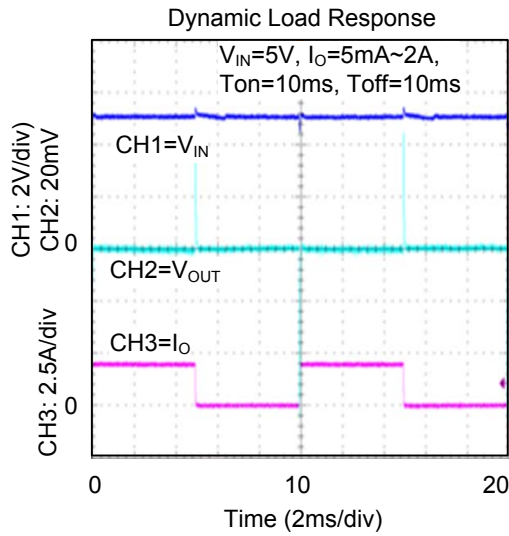
Application Circuit Standard



Note: Connect control pin to V_{IN} pin.

In the case where ON/OFF Control is not required

■ TYPICAL CHARACTERISTICS



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