

**UCV676/A****LINEAR INTEGRATED CIRCUIT****400mA LOW-DROP VOLTAGE
REGULATOR****DESCRIPTION**

The UTC **UCV676/A** is a low dropout voltage regulator with a 400mA output current used in harsh automotive environments. It can be used in wide input voltage and operating temperature ranges.

It has a high peak input voltage tolerance and reverse input voltage protection. Built-in heat protection circuit, current limiting circuit and inhibit control circuit. The UTC **UCV676/A** family is available in TO-263-5 and TO-252-4 surface mount packages. The output is stable over a wide output capacitance and ESR range.

FEATURES

- * 2.5V and 1.8V $\pm 4\%$ Output Voltage
- * 3.3V, 5.0V, and Adjustable Voltage Version (from 2.5V~20V)
 $\pm 4\%$ or $\pm 2\%$ Output Voltage
- * 400mA Output Current
- * 500mV (max) Dropout Voltage (5.0V Output)
- * Inhibit control input
- * Very Low Current Consumption
- * Fault Protection
 - +45V Peak Transient Voltage
 - Overcurrent
 - Overheat

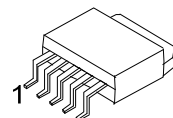
ORDERING INFORMATION

Ordering Number		Package	Packing
Lead Free	Halogen Free		
UCV676L-xx-AA3-R	UCV676G-xx-AA3-R	SOT-223	Tape Reel
UCV676L-xx-TQ5-R	UCV676G-xx-TQ5-R	TO-263-5	Tape Reel
UCV676L-xx-TQ5-T	UCV676G-xx-TQ5-T	TO-263-5	Tube
UCV676L-xx-TN4-R	UCV676G-xx-TN4-R	TO-252-4	Tape Reel
UCV676L-xx-TN4-T	UCV676G-xx-TN4-T	TO-252-4	Tube
UCV676AL-xx-AA3-R	UCV676AG-xx-AA3-R	SOT-223	Tape Reel
UCV676AL-xx-TQ5-R	UCV676AG-xx-TQ5-R	TO-263-5	Tape Reel
UCV676AL-xx-TQ5-T	UCV676AG-xx-TQ5-T	TO-263-5	Tube
UCV676AL-xx-TN4-R	UCV676AG-xx-TN4-R	TO-252-4	Tape Reel
UCV676AL-xx-TN4-T	UCV676AG-xx-TN4-T	TO-252-4	Tube

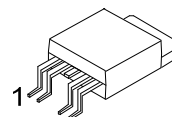
UCV676AG-xx-AA3-R

- (1)Packing Type
- (2)Package Type
- (3)Voltage Code
- (4)Green Package
- (5)Output Voltage

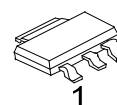
- (1) R: Tape Reel, T: Tube
- (2) AA3: SOT-223, TN4: TO-252-4, TQ5: TO-263-5
- (3) refer to MARKING INFORMATION
- (4) G: Halogen Free and Lead Free, L: Lead Free
- (5) Blank: 4%, A: 2%



TO-263-5



TO-252-4



SOT-223

MARKING

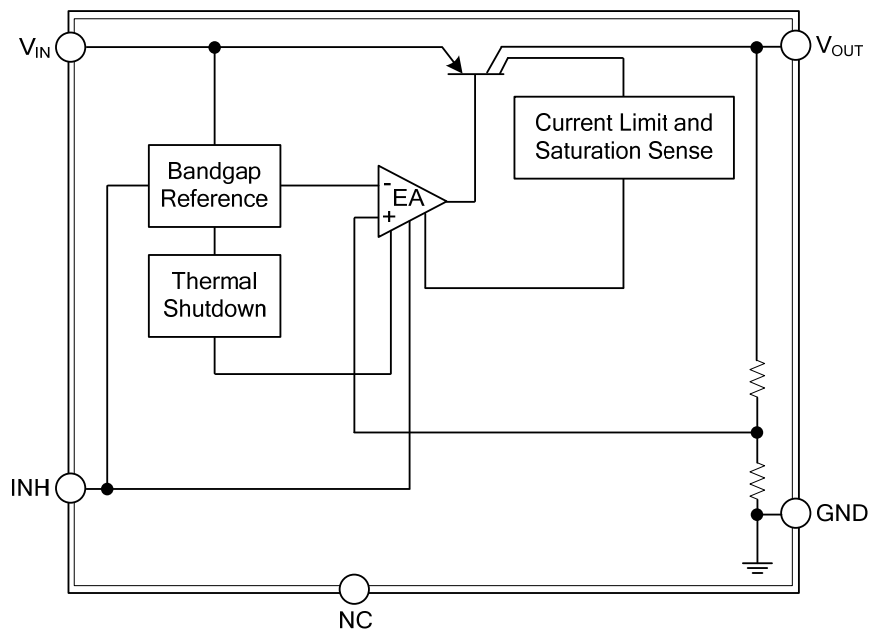
PACKAGE	VOLTAGE CODE	UCV676	UCV676A
SOT-223	18 : 1.8V 25 : 2.5V 33 : 3.3V 50 : 5.0V		
TO-252-4 TO-263-5	18 : 1.8V 25 : 2.5V 33 : 3.3V 50 : 5.0V AD: ADJ		

PIN DESCRIPTION

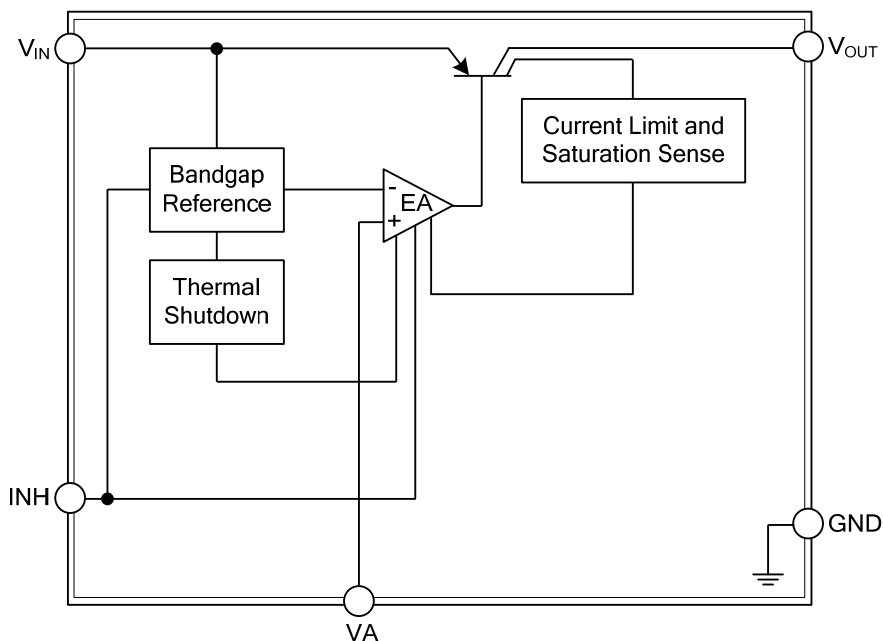
PIN NO.		PIN NAME	DESCRIPTION
SOT-223	TO-252-4 TO-263-5		
1	1	V _{IN}	Input; Power supply
2	3	GND	Ground
3	5	V _{OUT}	Output: Bypass with a capacitor to GND
-	2	INH	Inhibit; Set low-to inhibit
-	4	NC/VA	Not connected for fixed voltage version / Voltage Adjust Input for adjustable voltage version; use an external voltage divider to set the output voltage

■ BLOCK DIAGRAM

Fixed Voltage Version



Adjustable Voltage Version



■ ABSOLUTE MAXIMUM RATING (Note 1)

PARAMETER		SYMBOL	RATINGS	UNIT
Input Voltage		V_{IN}	45	V
Input Peak Transient Voltage		V_{IN}	45	V
Inhibit INH Voltage		V_{INH}	45	V
Voltage Adjust Input VA		V_{VA}	10	V
Output Voltage		V_{OUT}	40	V
Power Dissipation	SOT-223	P_D	0.66	W
	TO-252-4		0.89	W
	TO-263-5		1.55	W
Ground Current		I_q	100	mA
Input Voltage Operating Range (Note 2)		V_I	$V_{OUT}+0.5V$ or $4.5V\sim 40$	V
Junction Temperature		T_J	$-40\sim 150$	$^{\circ}C$
Storage Temperature		T_{STG}	$-50\sim 150$	$^{\circ}C$

Notes: 1. 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.

2. During the voltage range which exceeds the maximum tested voltage of V_{IN} , operation is assured, but not specified. Wider limits may apply. Thermal dissipation must be observed closely.

■ ELECTRICAL CHARACTERISTICS ($V_{IN}=13.5V$, $T_J=25^{\circ}C$, unless otherwise specified.)

For UCV676-1.8

PARAMETER	SYMBOL	TEST CONDITIONS	UCV676			UNIT	
			MIN	TYP	MAX		
OUTPUT							
Output Voltage	V _{OUT}	5.0mA<I _{OUT} <400mA, 4.5V<V _{IN} <28V	1.728	1.8	1.872	V	
		5.0mA<I _{OUT} <200mA, 4.5V<V _{IN} < 40V	1.728	1.8	1.872	V	
Output Current Limitation	I _{OUT}	V _{OUT} =90% V _{OUT(TYP)}	400	700	1100	mA	
Quiescent Current (Sleep Mode)	I _q	I _q =I _I -I _{OUT} , V _{INH} =0V			10	μA	
Quiescent Current	I _q	I _q =I _I - I _{OUT}	I _{OUT} =1.0mA		130	220	μA
			I _{OUT} =250mA		10	15	mA
			I _{OUT} =400mA		25	35	mA
Dropout Voltage	V _{DR}	V _{IN} =4.5V, I _{OUT} =250mA, V _{DR} =V _{IN} -V _{OUT}			2.772	V	
Load Regulation	ΔV _{OUT}	I _{OUT} = 5.0mA~400mA		10	35	mV	
Line Regulation	ΔV _{OUT}	ΔV _{IN} =12V~32V, I _{OUT} =5.0mA		2.5	25	mV	
Power Supply Ripple Rejection	PSRR	f _r =100Hz, V _r = 0.5V _{RMS}		60		dB	
Temperature coefficient of V _{OUT}	ΔV _{OUT} /ΔT			0.5		mV/K	
INHIBIT							
Inhibit Voltage, Output High	V _{INH}	V _{OUT} ≥V _{OUT(MIN)}		2.8	3.5	V	
Inhibit Voltage, Output Low (Off)	V _{INH}	V _{OUT} ≤0.1V	0.5	1.7		V	
Input Current	I _{INH}	V _{INH} =5.0V	5.0	10	20	μA	
THERMAL SHUTDOWN							
Thermal Shutdown Temperature (Note 2)	T _{SD}	I _{OUT} =5.0mA	150		210	°C	

■ ELECTRICAL CHARACTERISTICS (Cont.)

For UCV676-2.5

PARAMETER	SYMBOL	TEST CONDITIONS	UCV676			UNIT	
			MIN	TYP	MAX		
OUTPUT							
Output Voltage	V _{OUT}	5.0mA<I _{OUT} <400mA, 4.5V<V _{IN} <28V	2.4	2.5	2.6	V	
		5.0mA<I _{OUT} <200mA, 4.5V<V _{IN} <40V	2.4	2.5	2.6	V	
Output Current Limitation	I _{OUT}	V _{OUT} =90% V _{OUT(TYP)}	400	700	1100	mA	
Quiescent Current (Sleep Mode)	I _q	I _q =I _I -I _{OUT} , V _{INH} =0V			10	μA	
Quiescent Current	I _q	I _q =I _I - I _{OUT}	I _{OUT} =1.0mA		130	220	μA
			I _{OUT} =250mA		10	15	mA
			I _{OUT} =400mA		25	35	mA
Dropout Voltage	V _{DR}	V _{IN} =4.5V, I _{OUT} =250mA, V _{DR} =V _{IN} -V _{OUT}			2.1	V	
Load Regulation	ΔV _{OUT}	I _{OUT} = 5.0mA~400mA		10	35	mV	
Line Regulation	ΔV _{OUT}	ΔV _{IN} =12V~32V, I _{OUT} =5.0mA		2.5	25	mV	
Power Supply Ripple Rejection	PSRR	f _r =100Hz, V _r = 0.5V _{RMS}		60		dB	
Temperature coefficient of V _{OUT}	ΔV _{OUT} /ΔT			0.5		mV/K	
INHIBIT							
Inhibit Voltage, Output High	V _{INH}	V _{OUT} ≥V _{OUT(MIN)}		2.8	3.5	V	
Inhibit Voltage, Output Low (Off)	V _{INH}	V _{OUT} ≤0.1V	0.5	1.7		V	
Input Current	I _{INH}	V _{INH} =5.0V	5.0	10	20	μA	
THERMAL SHUTDOWN							
Thermal Shutdown Temperature (Note 2)	T _{SD}	I _{OUT} =5.0mA	150		210	℃	

■ ELECTRICAL CHARACTERISTICS (Cont.)

For UCV676/A-3.3

PARAMETER	SYMBOL	TEST CONDITIONS	UCV676			UCV676A			UNIT	
			MIN	TYP	MAX	MIN	TYP	MAX		
OUTPUT										
Output Voltage	V _{OUT}	5.0mA<I _{OUT} <400mA, 4.5V<V _{IN} <28V	3.168	3.3	3.432	3.234	3.3	3.366	V	
		5.0mA<I _{OUT} <200mA, 4.5V<V _{IN} <40V	3.168	3.3	3.432	3.234	3.3	3.366	V	
Output Current Limitation	I _{OUT}	V _{OUT} =90% V _{OUT(TYP)}	400	700	1100	400	700	1100	mA	
Quiescent Current (Sleep Mode)	I _q	I _q =I _I -I _{OUT} , V _{INH} =0V			10			10	μA	
Quiescent Current	I _q	I _q =I _I - I _{OUT}	I _{OUT} =1.0mA		130	220		130	200	μA
			I _{OUT} =250mA		10	15		10	15	mA
			I _{OUT} =400mA		25	35		25	35	mA
Dropout Voltage	V _{DR}	V _{IN} =4.5V, I _{OUT} =250mA, V _{DR} =V _{IN} -V _{OUT}			1332		250	500	mV	
Load Regulation	ΔV _{OUT}	I _{OUT} = 5.0mA~400mA		10	35		3.0	20	mV	
Line Regulation	ΔV _{OUT}	ΔV _{IN} =12V~32V, I _{OUT} =5.0mA		2.5	25		4.0	25	mV	
Power Supply Ripple Rejection	PSRR	f _r =100Hz, V _r = 0.5V _{RMS}		60			70		dB	
Temperature coefficient of V _{OUT}	ΔV _{OUT} /ΔT			0.5			0.5		mV/K	
INHIBIT										
Inhibit Voltage, Output High	V _{INH}	V _{OUT} ≥V _{OUT(MIN)}		2.8	3.5		2.3	2.8	V	
Inhibit Voltage, Output Low (Off)	V _{INH}	V _{OUT} ≤0.1V	0.5	1.7		1.8	2.2		V	
Input Current	I _{INH}	V _{INH} =5.0V	5.0	10	20	5.0	10	20	μA	
THERMAL SHUTDOWN										
Thermal Shutdown Temperature (Note 2)	T _{SD}	I _{OUT} =5.0mA	150		210	150		210	°C	

■ ELECTRICAL CHARACTERISTICS (Cont.)

For UCV676/A-5.0

PARAMETER	SYMBOL	TEST CONDITIONS	UCV676			UCV676A			UNIT	
			MIN	TYP	MAX	MIN	TYP	MAX		
OUTPUT										
Output Voltage	V _{OUT}	5.0mA<I _{OUT} <400mA, 6.0V<V _{IN} <28V	4.8	5.0	5.2	4.9	5.0	5.1	V	
		5.0mA<I _{OUT} <200mA, 6.0V<V _{IN} <40V	4.8	5.0	5.2	4.9	5.0	5.1	V	
Output Current Limitation	I _{OUT}	V _{OUT} =90% V _{OUT(TYP)}	400	700	1100	400	700	1100	mA	
Quiescent Current (Sleep Mode)	I _q	I _q =I _I -I _{OUT} , V _{INH} =0V			10			10	μA	
Quiescent Current	I _q	I _q =I _I - I _{OUT}	I _{OUT} =1.0mA		130	220		130	200	μA
			I _{OUT} =250mA		10	15		10	15	mA
			I _{OUT} =400mA		25	35		25	35	mA
Dropout Voltage (Note 1)	V _{DR}	V _{IN} =5.0V, I _{OUT} =250mA, V _{DR} =V _{IN} -V _{OUT}		250	500		250	500	mV	
Load Regulation	ΔV _{OUT}	I _{OUT} = 5.0mA~400mA		10	35		3.0	20	mV	
Line Regulation	ΔV _{OUT}	ΔV _{IN} =12V~32V, I _{OUT} =5.0mA		2.5	25		2.5	25	mV	
Power Supply Ripple Rejection	PSRR	f _r =100Hz, V _r = 0.5V _{RMS}		60			70		dB	
Temperature coefficient of V _{OUT}	ΔV _{OUT} /ΔT			0.5			0.5		mV/K	
INHIBIT										
Inhibit Voltage, Output High	V _{INH}	V _{OUT} ≥V _{OUT(MIN)}		2.8	3.5		2.3	2.8	V	
Inhibit Voltage, Output Low (Off)	V _{INH}	V _{OUT} ≤0.1V	0.5	1.7		1.8	2.2		V	
Input Current	I _{INH}	V _{INH} =5.0V	5.0	10	20	5.0	10	20	μA	
THERMAL SHUTDOWN										
Thermal Shutdown Temperature (Note 2)	T _{SD}	I _{OUT} =5.0mA	150		210	150		210	°C	

■ ELECTRICAL CHARACTERISTICS (Cont.)

For UCV676/A-ADJ

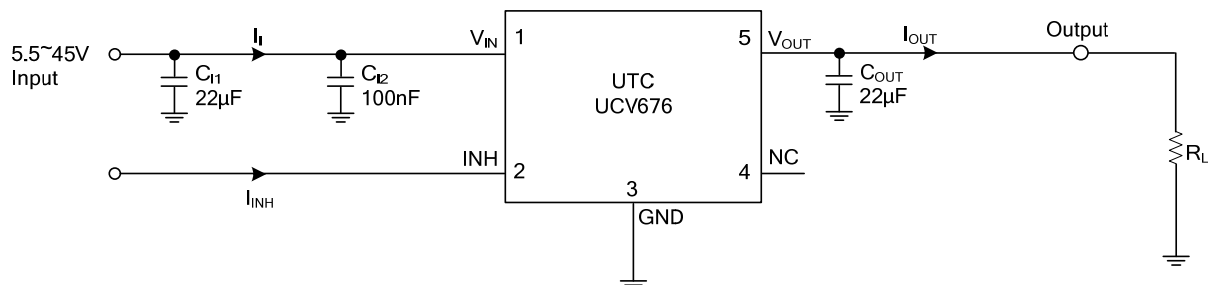
UCV676A										UNIT
PARAMETER	SYMBOL	TEST CONDITIONS	UCV676			UCV676A				
			MIN	TYP	MAX	MIN	TYP	MAX		
OUTPUT										
Output Voltage, Adjustable Version	AV _{OUT}	5.0mA<I _{OUT} <400mA, V _{OUT} +1<V _{IN} <40V, V _{IN} > 4.5V	2.4	2.5	2.6	2.45	2.5	2.55	V	
Output Current Limitation	I _{OUT}	V _{OUT} =90% V _{OUT(TYP)} (V _{OUT(TYP)} =2.5V)	400	700	1100	400	700	1100	mA	
Quiescent Current (Sleep Mode)	I _q	I _q =I _I -I _{OUT} , V _{INH} =0V			10			10	μA	
Quiescent Current	I _q	I _q =I _I - I _{OUT}	I _{OUT} =1.0mA		220			200	μA	
			I _{OUT} =250mA		10			10	mA	
			I _{OUT} =400mA		25			25	mA	
Dropout Voltage	V _{DR}	V _{IN} >4.5V, I _{OUT} =250mA, V _{DR} =V _{IN} -V _{OUT}		250	500		250	500	mV	
Load Regulation	ΔV _{OUT}	I _{OUT} = 5.0mA~400mA		10	35		3.0	20	mV	
Line Regulation	ΔV _{OUT}	ΔV _{IN} =12V~32V, I _{OUT} =5.0mA		20			20		mV	
Power Supply Ripple Rejection	PSRR	f _r =100Hz, V _r =0.5V _{RMS}		60			70		dB	
Temperature coefficient of V _{OUT}	ΔV _{OUT} /ΔT			0.5			0.5		mV/K	
INHIBIT										
Inhibit Voltage, Output High	V _{INH}	V _{OUT} ≥V _{OUT(MIN)}		2.8	3.5		2.3	2.8	V	
Inhibit Voltage, Output Low (Off)	V _{INH}	V _{OUT} ≤0.1V	0.5	1.7		1.8	2.2		V	
Input Current	I _{INH}	V _{INH} =5.0V	5.0	10	20	5.0	10	20	μA	
THERMAL SHUTDOWN										
Thermal Shutdown Temperature (Note 2)	T _{SD}	I _{OUT} =5.0mA	150		210	150		210	°C	

Notes: 1. Measured when the output voltage V_{OUT} has dropped 100mV from the nominal valued obtained at $V = 13.5\text{V}$.

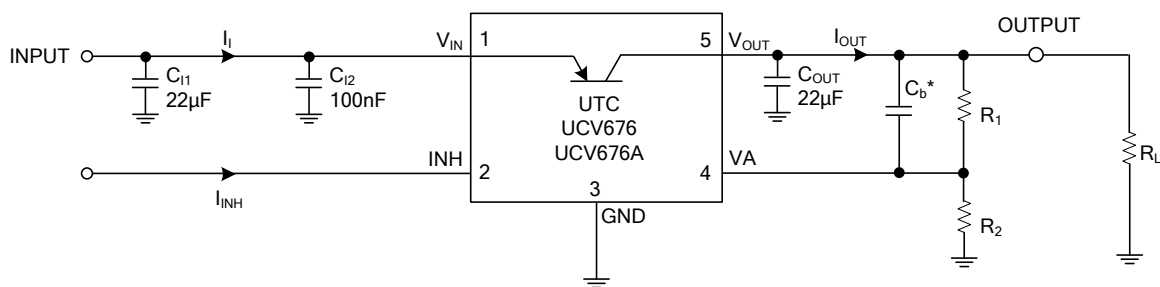
2 Guaranteed by design, not tested in production.

■ TYPICAL APPLICATION CIRCUIT

Fixed Voltage Version



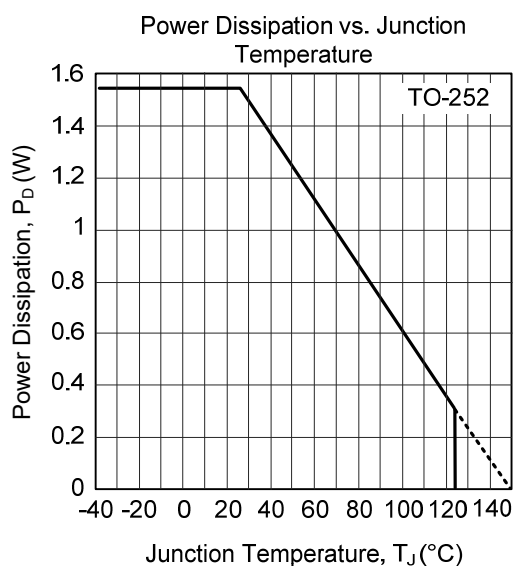
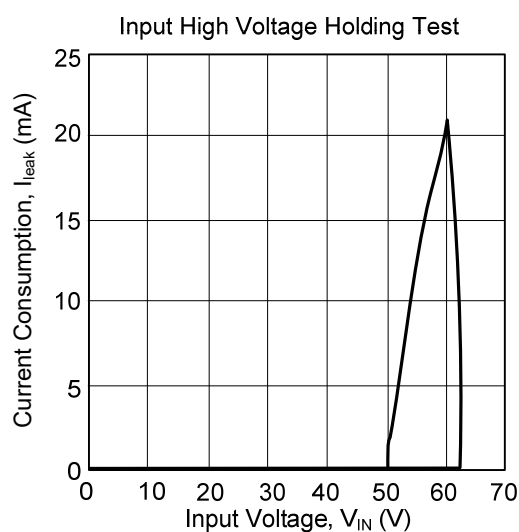
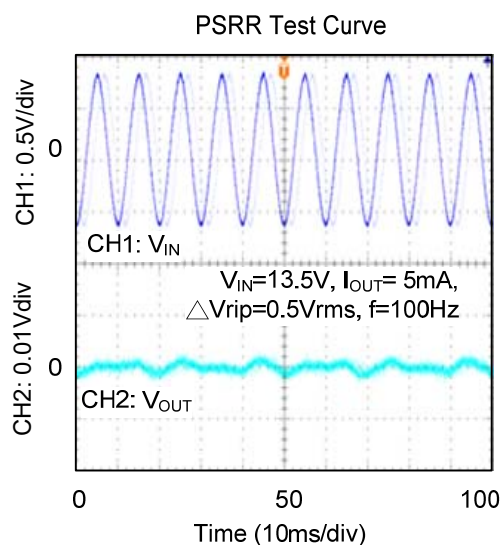
Adjustable Voltage Version



$$V_{OUT} = [(R1 + R2) \times V_{REF}] / R2$$

* Required if usage of low ESR output capacitor CQ is demand.

■ TYPICAL CHARACTERISTICS



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