



UM612/A

LINEAR INTEGRATED CIRCUIT

SPS SECONDARY-SIDE CC/CV CONTROLLER

■ DESCRIPTION

The UTC **UM612/A** is a secondary-side CC/CV controller for SPS applications.

It integrates a Constant Current (CC) regulating amplifier, a Constant Voltage (CV) regulating amplifier, and 2 precision reference voltages.

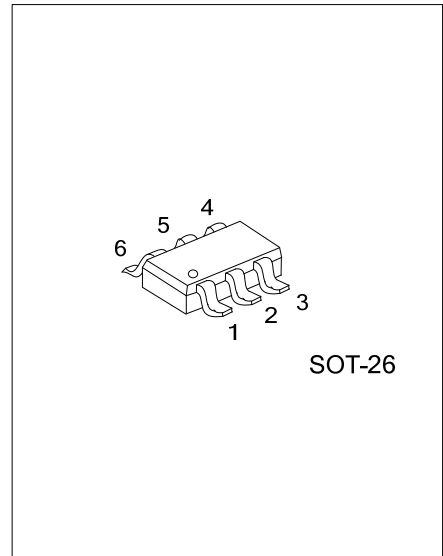
An internal 2.5V reference voltage is generated from V_{CC} input power. The UTC **UM612/A** can be used to monitor the transformer secondary-side output voltage by the CV control loop and regulate the output current by the CC control loop at the same time.

The transformer secondary-side output voltage can be monitored by the FB pin voltage. The sensed FB pin voltage is compared with the 2.5V internal reference. When the FB pin voltage is higher than 2.5V, the OUT pin will sink more current at the external opto-coupler and instruct the controller at primary-side to adjust the output voltage.

The output current can be regulated by the voltage across the CN and CP pins through the current sense resistor connected between the CN and CP pins. The voltage difference between CN and CP pins is compared with the 60mV / 30mV internal reference. When the voltage difference between CN and CP pins is greater than 60mV / 30mV, the OUT pin will sink more current at the external opto-coupler and instruct the controller at primary-side to adjust the output current.

■ FEATURES

- * Secondary-Side Constant Voltage (CV) and Constant Current (CC) Control
- * 4.75V to 50V Operation Voltage Range
- * 0.6mA Quiescent Current
- * $\pm 1\%$ Output Voltage Accuracy at Full Temperature Range
- * Smooth Transition Between CC and CV Control Loops
- * -5V Negative Voltage Tolerance at CP pin



ORDERING INFORMATION

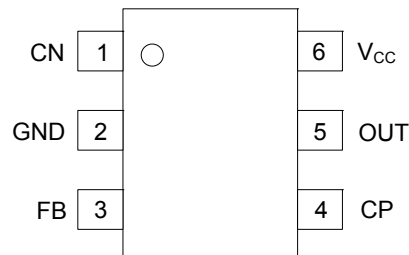
Ordering Number		Package	Packing
Lead Free	Halogen Free		
UM612L-AG6-R	UM612G-AG6-R	SOT-26	Tape Reel
UM612AL-AG6-R	UM612AG-AG6-R	SOT-26	Tape Reel

<p>UM612AG-AG6-R</p> <p>(1) Packing Type (2) Package Type (3) Green Package</p>	<p>(1) R: Tape Reel (2) AG6: SOT-26 (3) G: Halogen Free and Lead Free, L: Lead Free</p>
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MARKING

UM612	UM612A

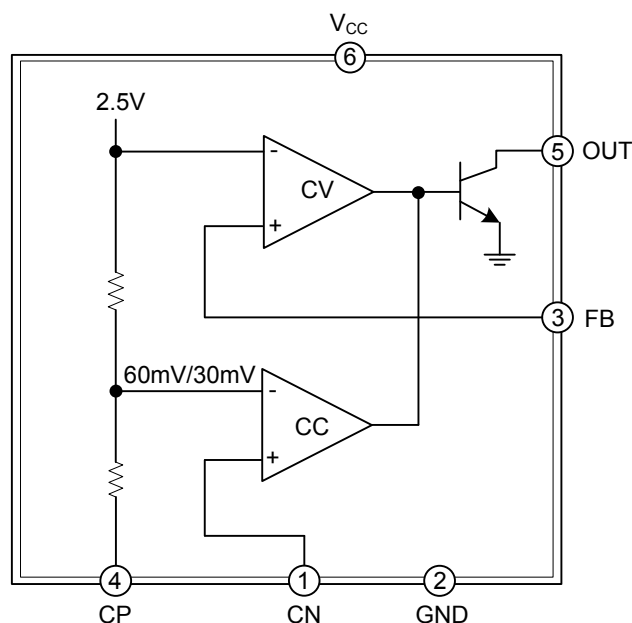
■ PIN CONFIGURATION



■ PIN DESCRIPTION

PIN NO.	PIN NAME	DESCRIPTION
1	CN	Non-inverting Input of the CC Regulating Amp. It has 60mV / 30mV offset from the CP pin. The CN pin should be connected to the "current-in" node of the current sensing resistor, R_s
2	GND	Ground
3	FB	Non-inverting Input of the CV Regulating Amp. The pin should be connected to the mid-point of a resistor divider from "Secondary Side V_{OUT} " (usually the V_{CC}) to GND.
4	CP	Inverting Input of the CC Regulating Amp with -60mV offset from CN pin. The CP pin should be connected to the "current-out" node of the current sensing resistor.
5	OUT	Common Open-collector Output of CC and CV Regulating Amps. The pin sinks a regulated current and driver the opto-coupler to transmit the error signal to primary-side.
6	V_{CC}	Supply power. A 0.1 μ F bypass capacitor should be connected between V_{CC} and GND.

■ BLOCK DIAGRAM



■ ABSOLUTE MAXIMUM RATING

PARAMETER	SYMBOL	RATINGS	UNIT
Supply Input Voltage	V_{CC}	-0.3 ~ 60	V
Input Voltage (CP Pin)		-5 ~ 1	V
Input Voltage (CN Pin)		-0.3 ~ 1	V
Input Voltage (FB Pin)		-0.3 ~ V_{CC}	V
Input Voltage (OUT Pin)		-0.3 ~ 50	V
OUT Current		-20 ~ 20	mA
Power Dissipation	P_D	380	mW
Junction Temperature	T_J	+150	°C
Storage Temperature Range	T_{STG}	-65 ~ +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 Ambient	θ_{JA}	275	°C/W

■ RECOMMENDED OPERATING CONDITIONS (Note 1)

PARAMETER	SYMBOL	RATINGS	UNIT
Supply Input Voltage (Note 1)	V_{CC}	4.75 ~ 50	V
Ambient Temperature Range (Note 2)	T_A	-40 ~ +85	°C
Junction Temperature Range (Note 2)	T_J	-40 ~ +125	°C

Notes: 1. UTC **UM612/A** starts regulation at $V_{CC} \geq 4.5V$, and meets all parameter specs at $V_{CC} \geq 4.75V$.

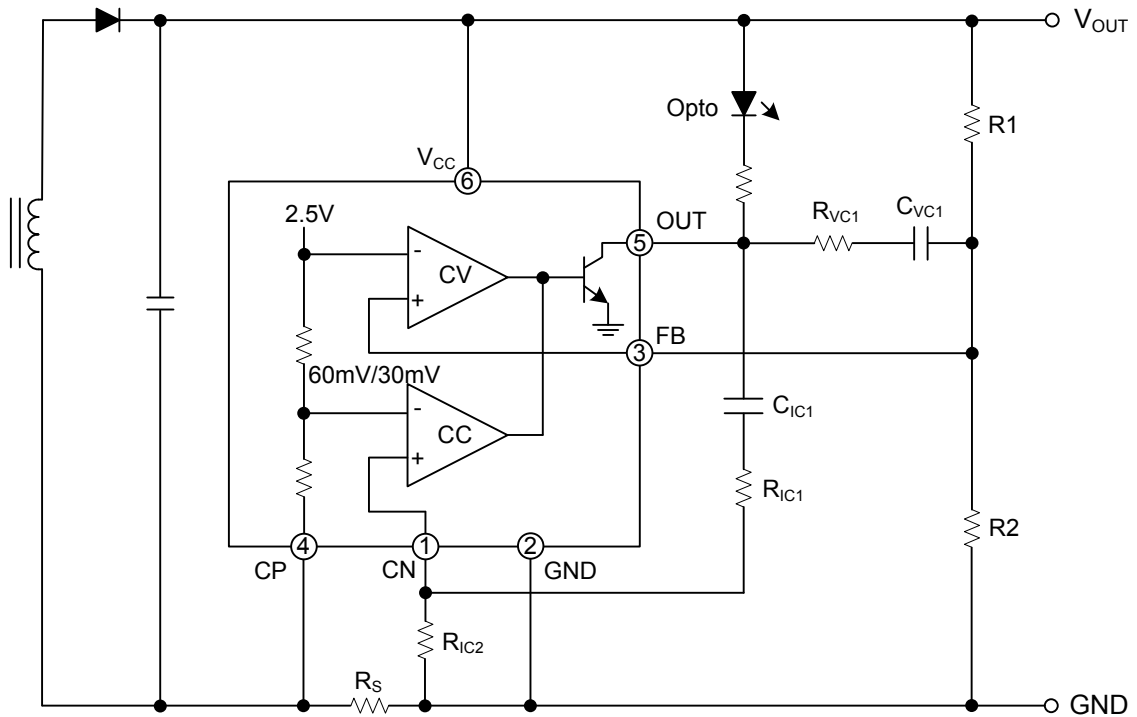
2. It is guarantee by design, not 100% be tested.

■ ELECTRICAL CHARACTERISTICS

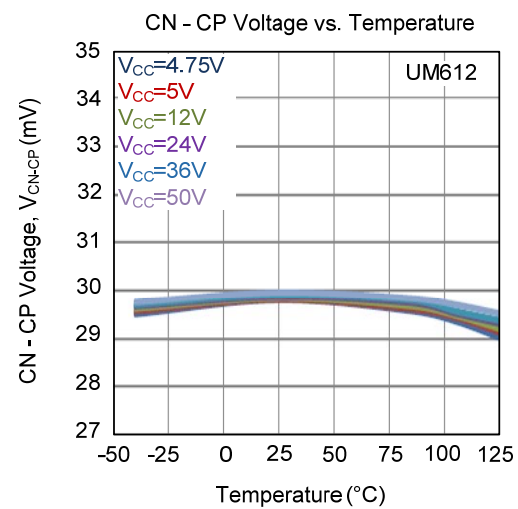
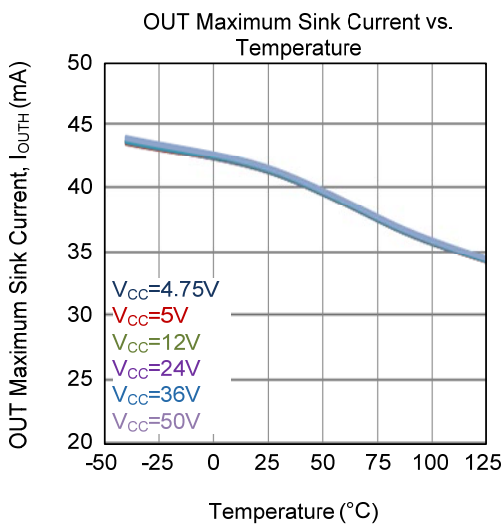
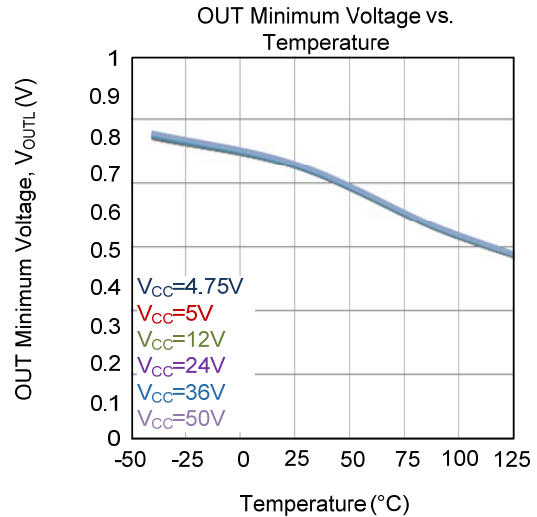
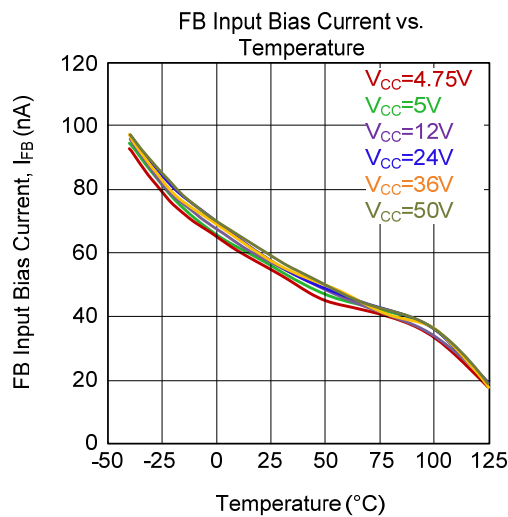
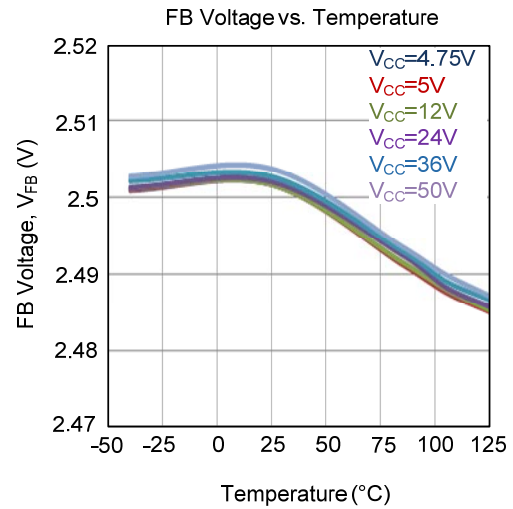
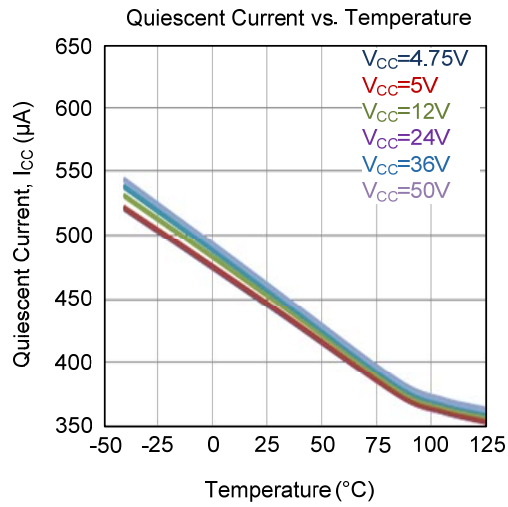
($V_{CC}=12V$, $T_A=25^{\circ}C$, unless otherwise specified)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
DEVICE SUPPLY						
Quiescent Current	I_{CC}	CV Close Loop, $V_{CN}=V_{CP}=0V$		500	600	μA
		CV Close Loop, $V_{CN}=V_{CP}=0V$, $T_A=-40\sim+85^{\circ}C$			900	μA
VOLTAGE CONTROL LOOP OP AMP						
Transconduction Gain (V_{CTRL}). Sink Current Only	Gmv	$V_{CC}=4.75\sim45V$		1		mA/mV
Power Supply Rejection Rate	PSRR	$V_{CC}=4.75\sim45V$		60		dB
FB Voltage	V_{FB}	$V_{CN}=V_{CP}=0V$	2.487	2.5	2.513	V
		$V_{CN}=V_{CP}=0V$, $T_A=-40\sim+85^{\circ}C$	2.475		2.525	V
FB Line Regulation	$dV_{LINE-FB}$	$V_{CN}=V_{CP}=0V$, $V_{CC}=4.75\sim45V$		0.2		%
FB Input Bias Current	I_{FB}	$V_{FB}=2.4\sim2.6V$			100	nA
		$V_{FB}=2.4\sim2.6V$, $T_A=-40\sim+85^{\circ}C$			200	nA
CURRENT CONTROL LOOP						
Transconduction Gain (I_{CTRL}). Sink Current Only	Gmi	$V_{CC}=4.75\sim45V$		6		mA/mV
CN - CP Voltage (UM612)	V_{CN-CP}	$V_{FB}=2.4V$	28.5	30	31.5	mV
		$T_A=-40\sim+85^{\circ}C$	27.5		32.5	mV
CN - CP Voltage (UM612A)	V_{CN-CP}	$V_{FB}=2.4V$	59	61	63	mV
		$T_A=-40\sim+85^{\circ}C$	58		64	mV
CN - CP Line Regulation	$dV_{LINE-CN-CP}$	$V_{FB}=2.4V$, $V_{CC}=4.75\sim45V$		0.2		%/V
CN Input Bias Current	I_{CN}	Close Loop			100	nA
		Close Loop, $T_A=-40\sim+85^{\circ}C$			200	nA
OUTPUT STAGE						
OUT Maximum Sink Current	I_{OUTH}	$V_{OUT}=1.5V$		40		mA
		$V_{OUT}=1.5V$, $T_A=-40\sim+85^{\circ}C$		40		mA
OUT Minimum Voltage	V_{OUTL}	$I_{OUT}=2mA$		1	1.2	V
		$I_{OUT}=2mA$, $T_A=-40\sim+85^{\circ}C$			1.5	V

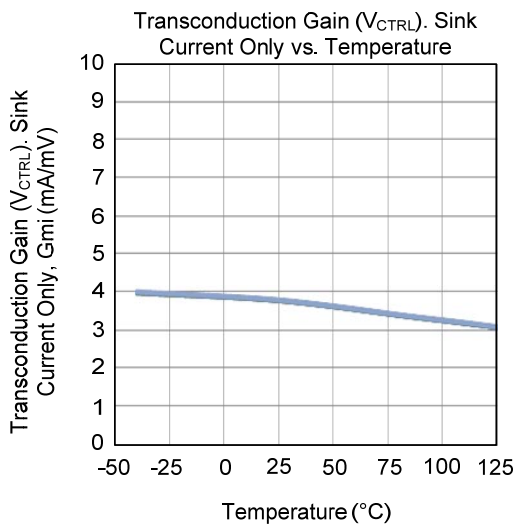
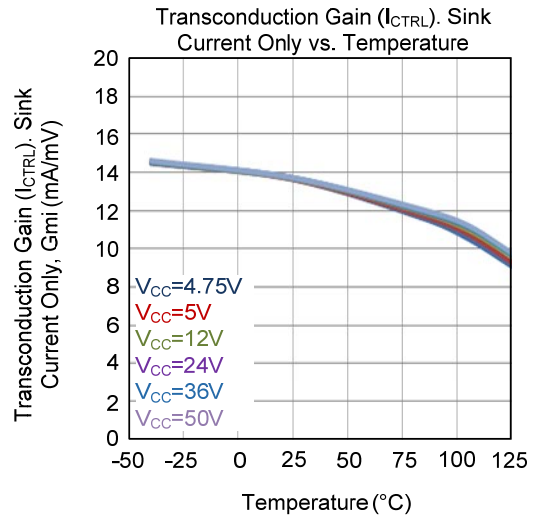
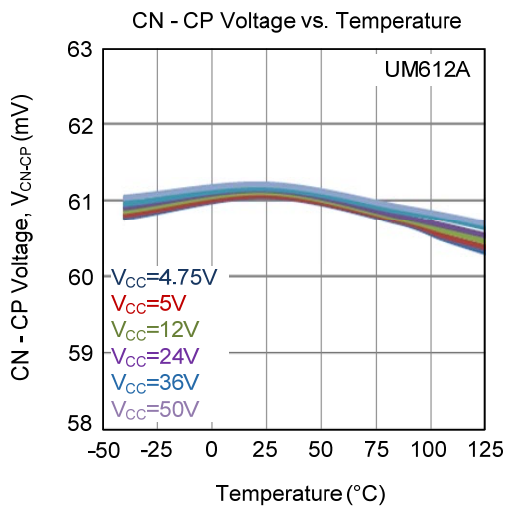
■ TYPICAL APPLICATION CIRCUIT



TYPICAL CHARACTERISTICS



■ TYPICAL CHARACTERISTICS (Cont.)



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