



P1595

LINEAR INTEGRATED CIRCUIT

200KHZ, 1.5A PWM BUCK DC/DC CONVERTER

DESCRIPTION

The UTC **P1595** is a monolithic integrated circuit intended for the use of a step-down DC/DC converter and it can drive a 1.5A load without additional transistors.

The internal compensation makes feedback control having good line and load regulation without external design. The external shutdown function can be controlled by logic level and then enter the standby mode.

The UTC **P1595** features a guaranteed +3% tolerance on output voltage under specified input voltage and output load conditions. Thermal shutdown protection is designed to prevent over temperature operating from damage while current limit protection is against over current operating of the output switch. The switching frequency will be reduced if current limit function occurs and feedback voltage (V_{FB}) drops below 0.5V. The UTC **P1595** works at a 200kHz switching frequency so it allows smaller sized filter components.

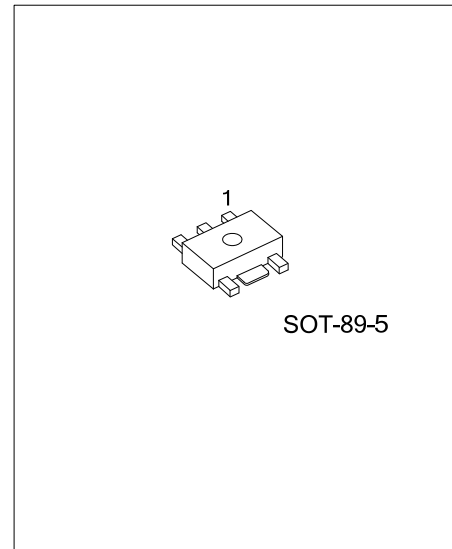
FEATURES

- * Output Voltage In Adjustable Output Version.
- * Adjustable Version Output Voltage Range: 0.75V ~ 22V With+3% Accuracy.
- * Short Circuit Protect
- * Fixed Switching Frequency: 200KHZ.
- * On/Off Shutdown Control Input.
- * Voltage Mode Non-Synchronous Pulse Width Modulation (PWM) Control.
- * Thermal-Shutdown And Current-Limit Protection.
- * Operating Voltage Can Be Up To 24V.
- * 1.5A Output Load Current.
- * Low Power Standby Mode.
- * Built-In Switching Transistor

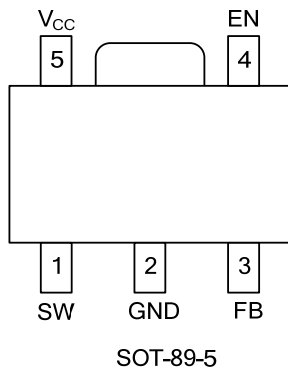
ORDERING INFORMATION

Ordering Number		Package	Packing
Lead Free	Halogen Free		
P1595L-AB5-R	P1595G-AB5-R	SOT-89-5	Tape Reel

<p>P1595L-S08-R</p> <p>(1)Packing Type (2)Package Type (3)Lead Free</p>	<p>(1) R: Tape Reel (2) AB5: SOT-89-5 (3) G: Halogen Free, L: Lead Free</p>
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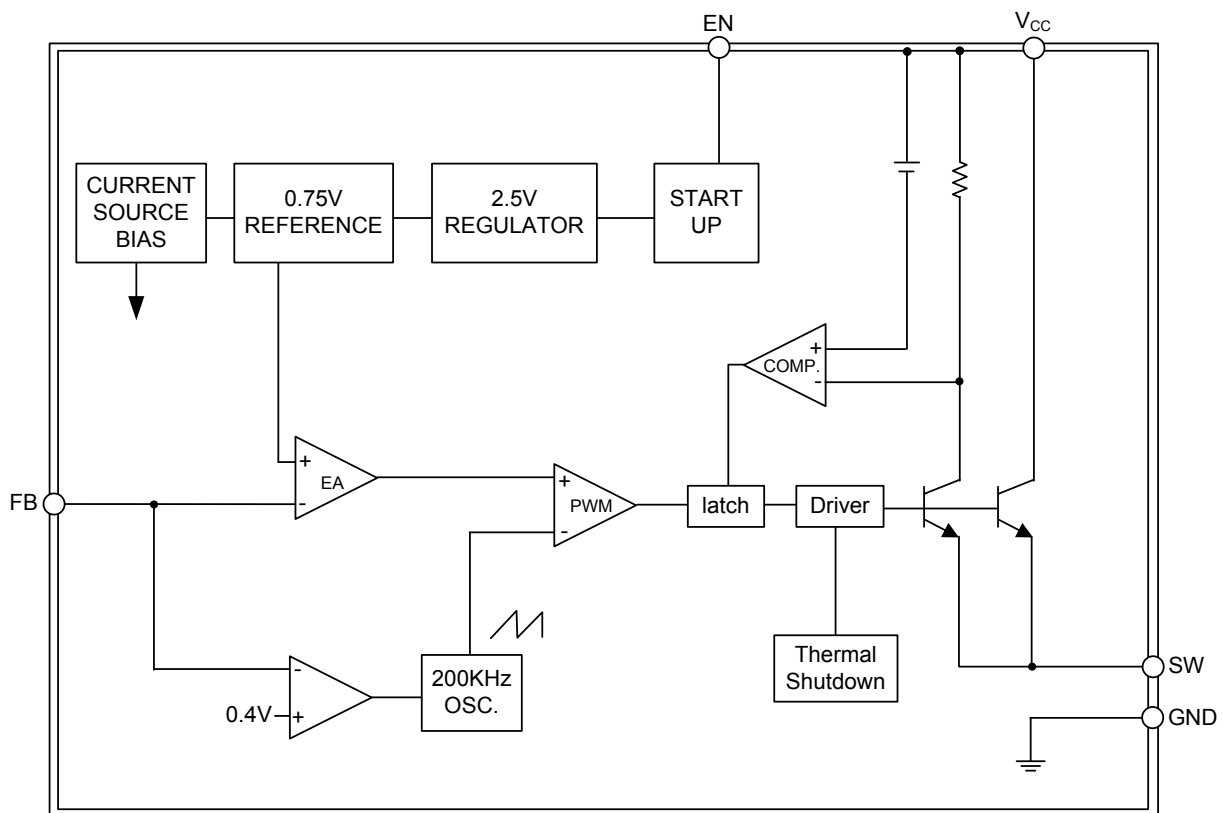
PIN CONFIGURATION



PIN DESCRIPTION

PIN NO.	PIN NAME	DESCRIPTION
1	SW	Switching Output
2	GND	Ground
3	FB	Feedback Voltage
4	EN	On/Off Pin
5	Vcc	Operating Voltage Input

BLOCK DIAGRAM



■ ABSOLUTE MAXIMUM RATING (unless otherwise specified)

PARAMETER	SYMBOL	RATINGS	UNIT
Supply Voltage	V_{CC}	+26	V
ON/OFF Pin Input Voltage	V_{EN}	-0.3 ~ V_{CC}	V
Feedback Pin Voltage	V_{FB}	-0.3 ~ 12	V
Operating Supply Voltage	V_{OP}	4.5~24	V
Output Voltage to Ground	V_{OUT}	-0.8	V
Power Dissipation (Note 1)	$T_A=25^{\circ}C$ P_D	690	mW
Operating Temperature	T_{OPR}	-20 ~ +125	$^{\circ}C$
Storage Temperature	T_{STG}	-65 ~ +150	$^{\circ}C$

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 (Note 1)	θ_{JA}	180	$^{\circ}C/W$
Junction to Case (Note 1)	θ_{JC}	38	$^{\circ}C/W$

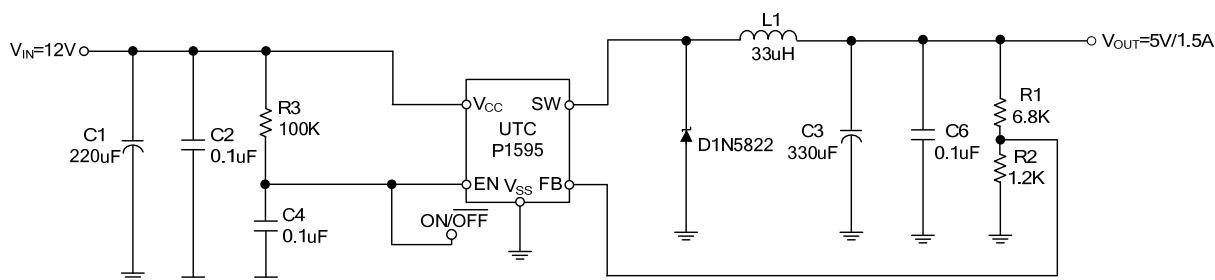
Note: 1. It's Measured with the PCB copper area (need connect to V_{SS} pins) of approximately 1.5 in²(Multi-layer)

■ ELECTRICAL CHARACTERISTICS ($T_A=25^{\circ}C$, $V_{CC}=12V$, $I_{LOAD}=0.2A$, unless otherwise specified)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Feedback Voltage	V_{FB}	$I_{OUT}=0.2A$	0.728	0.750	0.773	V
Saturation Voltage	V_{SAT}	$I_{OUT}=1.5A$, No outside circuit $V_{FB}=0V$ force driver on		1.2	1.5	V
Quiescent Current	I_Q	$V_{FB}=1.2V$ force driver off		4	8	mA
Feedback Bias Current	I_{FB}	$I_{OUT}=0.1A$		-10	-50	nA
Shutdown Supply Current	I_{SD}	$V_{EN}=0V$		2	10	μA
Current Limit	$I_{(LIMIT)}$	Peak current, No outside circuit $V_{FB}=0V$ force driver on	1.8			A
SW Pin Leakage Current	SW pin=0V	$I_{SW(LEAK)}$ No outside circuit $V_{FB}=1.0V$ force driver off $V_{CC}=24V$ force driver off			-50	μA
	SW pin=-0.8V			-5		mA
Oscillator Frequency	F_{OSC}		140	200	260	KHz
Oscillator Frequency Circuit Protect of Short	F_{SCP}	(Adjustable) When $V_{FB}<0.5V$		80		KHz
Max. Duty Cycle (ON)	DC	$V_{FB}=1.2V$ force driver off		0		%
Min. Duty Cycle (OFF)		$V_{FB}=0V$ force driver on		100		%
EN Pin Logic Input Threshold Voltage	V_{IH}	High (regulator ON)		1.2	2.0	V
	V_{IL}	Low (regulator OFF)	0.5	1.2		V
EN pin Logic Input Current	I_H	$V_{EN}=2.5V$ (ON)		20		μA
EN pin Input Current	I_L	$V_{EN}=0.3V$ (OFF)		-5		μA
Thermal Shutdown Temp	TSD			135		$^{\circ}C$

■ TYPICAL APPLICATION CIRCUIT

Adjustable Output Voltage Version



$$V_{OUT} = V_{FB} \times \left(1 + \frac{R1}{R2} \right), \quad V_{FB} = 0.75V, \quad R2 = 0.75K \sim 4K$$

Resistor select for output voltage setting

V _{OUT}	R2	R1
5V	1.2K	6.8K
3.3V	2K	6.8K
2.5V	2K	4.7K
1.8V	2K	3K
1.5V	2K	2K
1.3V	2K	1.5K
1.2V	2K	1.2K

L1 recommend value (V_{IN}=12V, I_{OUT}=1.5A,)

V _{OUT}	1.8 V	2.5V	3.3V	5V
L1 Value	22μH	22μH	33μH	33μH

■ FUNCTION DESCRIPTIONS

Pin Functions

V_{CC}

It provides the IC switching regulator with positive input supply. This pin is used to supply the switching currents needed by the regulator and a suitable input bypass capacitor must be connected at this pin.

GND

Circuit ground.

SW

Internal switch. The voltage at this pin switches between (+V_{CC}-V_{SAT}) and approximately-0.5V, with a duty cycle of approximately V_{OUT} / V_{CC}. To minimize coupling to sensitive circuitry, you should minimize the PC board copper area connected to this pin.

Feedback

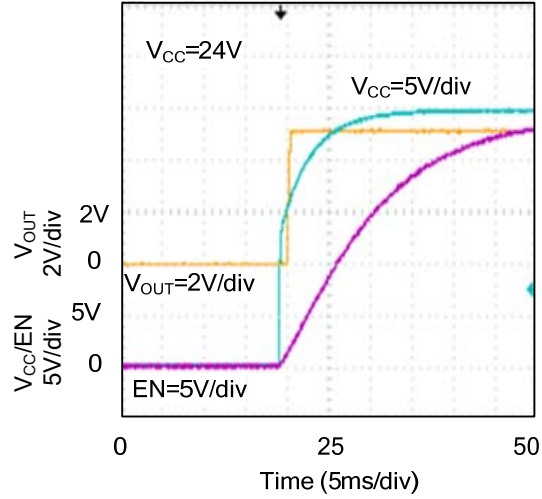
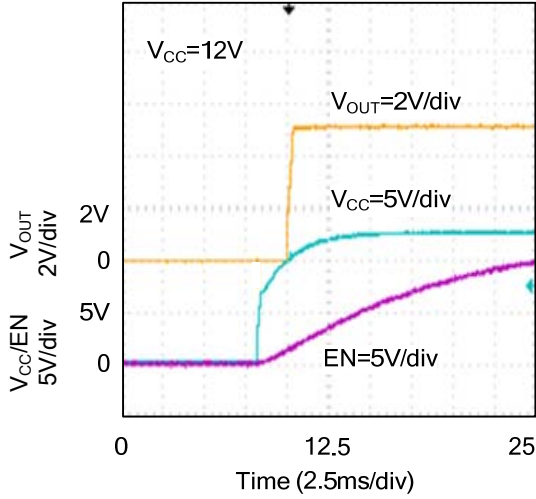
Senses the regulated output voltage to complete the feedback loop.

EN

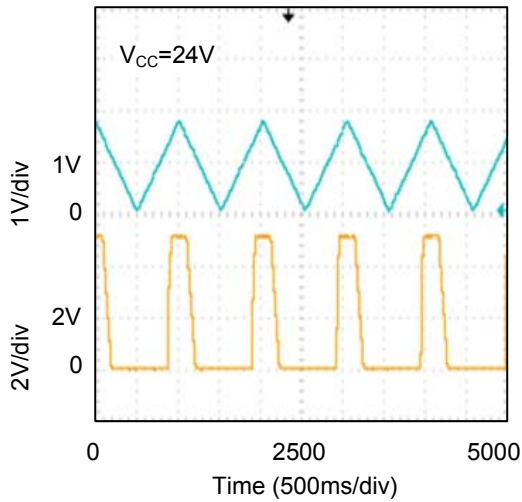
Using logic level signals to allow the switching regulator circuit to be shutdown, which dropping the total input supply current to approximately 10uA. Shut the regulator down through pulling this pin below a threshold voltage of approximately 0.5V, turn the regulator on through pulling this pin above 2.0V (up to V_{CC} MAX).

■ TYPICAL CHARACTERISTICS

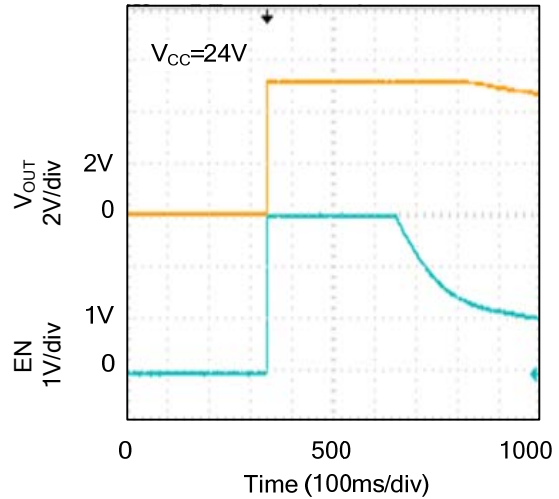
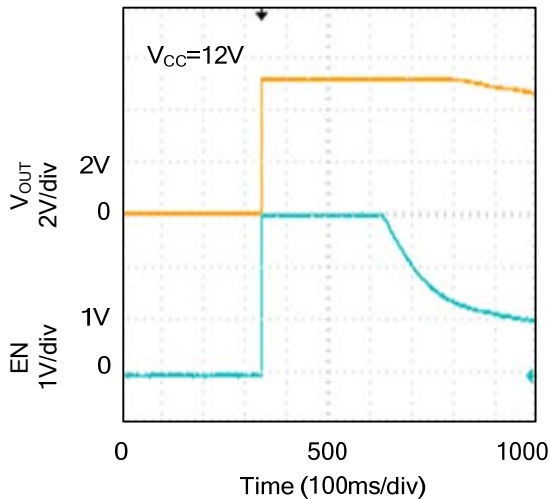
1. Startup during power on



2. Low-frequency triangle wave control enable pin

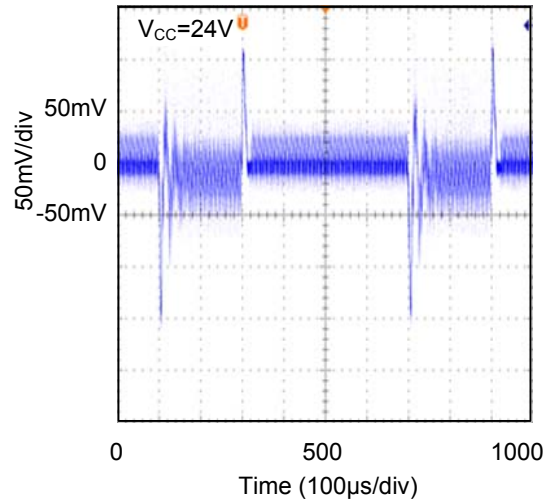
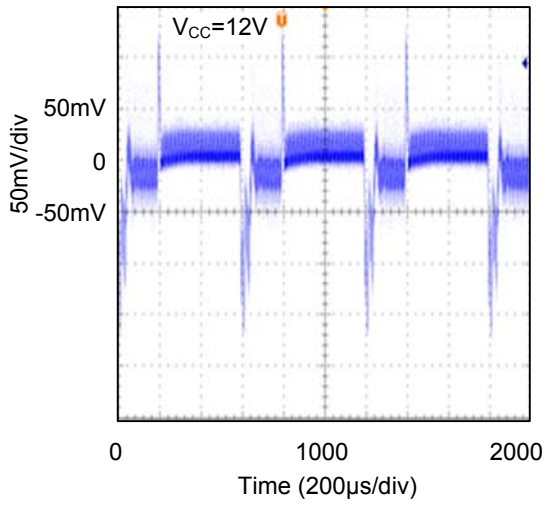


3. Control enable pin with power supply to normal

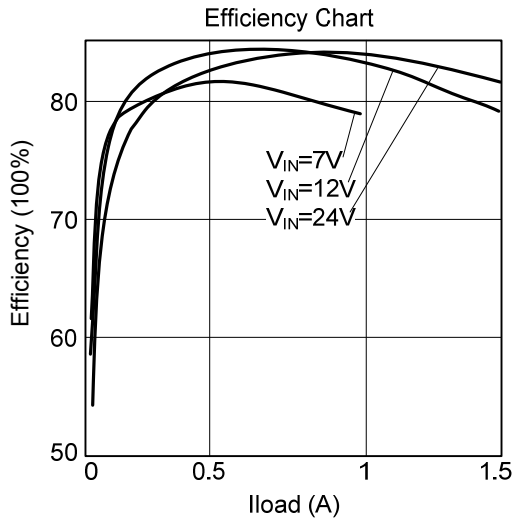


■ TYPICAL CHARACTERISTICS(Cont.)

4. Transient response with step load



5. Efficiency



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