



### SOT-25



### Pin Definition:

1. EN
2. Ground
3. SW
4. Input
5. Output

## General Description

The TS3406 family of Fixed Frequency, High Frequency, Synchronous Buck, DC-DC Converters, apply the latest innovations in Current-Mode Technology, Available in SOT-25 package, there device are typically twice as efficient as standard LDO's, making them well suited for most portable applications.

The TS3406 is simple to use. As with standard LDO's, (1) Input, and (1) Output capacitor are required. The only other element is a small, low cost, 2.2 $\mu$ H inductor. The TS3406 is available with fixed output voltage of 1.5V & 1.8V, or adjustable at 300mA, 600mA. Using a proprietary "Extreme Green" Technology, battery life is maximized with Frequency Foldback at light load, and 100% duty when Vin approaches Vout.

## Features

- High Efficiency "Extreme Green"
- 2.5V to 5.5V Input
- Short Circuit Protection
- Over-Temperature Shutdown
- Under-Voltage Lockout
- Superb Transient Response
- 600mA Output Current
- 1.2MHz Constant Frequency Operation
- No Schottky Diode Required

## Application

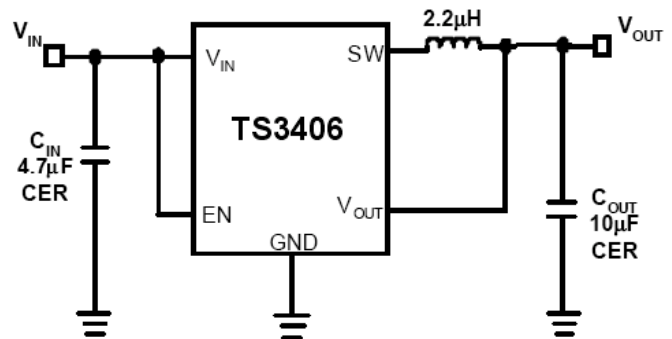
- Cellular Phones
- Digital Still Cameras
- Portable Electronics
- USB Devices
- MP3 Players
- Wireless and DSL Modems

## Ordering Information

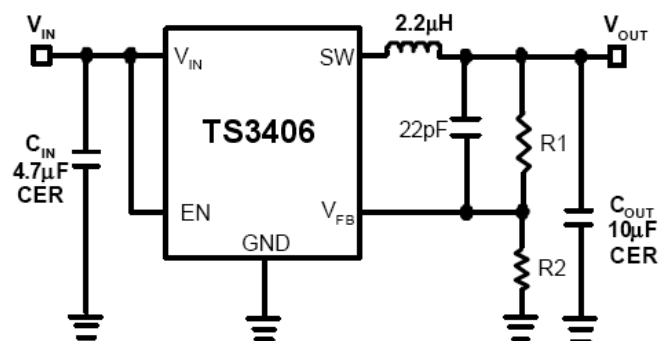
Part No.	Package	Packing
TS3406CX5 RF	SOT-25	3Kpcs/ 7" Reel
TS3406CX5xx RF	SOT-25	3Kpcs/ 7" Reel

Note: Where **xx** denotes voltage option, available are 1.5V & 1.8V. Leave blank for adjustable version

## Typical Application Circuit



Fixed Voltage Version



Adjustable Voltage Version

### Absolute Maximum Rating

Parameter	Symbol	Limit	Unit
Input Voltage	$V_{IN}$	6	V
EN, $V_{FB}$ Voltage	$V_{EN}, V_{FB}$	$V_{IN}$	V
SW Voltage	$V_{SW}$	$V_{IN} + 0.3$	V
P-Channel Switch Source Current N-Channel Switch Sink Current	$I_{SW}$	800	mA
Ambient Temperature Range	$T_A$	-40 to +85	°C
Junction Temperature Range	$T_J$	-40 to +125	°C
ESD Classification		C*	

Note: Stress above the listed absolute maximum rating may cause permanent damage to the device

\* HBM C: 4000V+

### Thermal Information

Parameter	Symbol	Maximum	Unit
Thermal Resistance* (Junction to Case)	$\Theta_{JC}$	81	°C/W
Thermal Resistance* (Junction to Ambient)	$\Theta_{JA}$	260	°C/W
Internal Power Dissipation	$P_D$	400	mW
Maximum Junction Temperature		150	°C
Solder Iron (10 Sec)**		350	°C

\* Measure  $\Theta_{JC}$  on center of molding compound if IC has no tab.

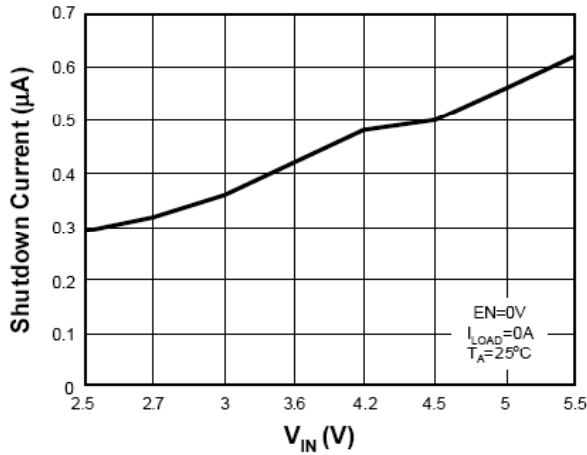
\*\* MIL-STD-202G210F

**Electrical Specifications** ( $T_a = 25^\circ\text{C}$ ,  $V_{IN}=3.6\text{V}$  unless otherwise noted)

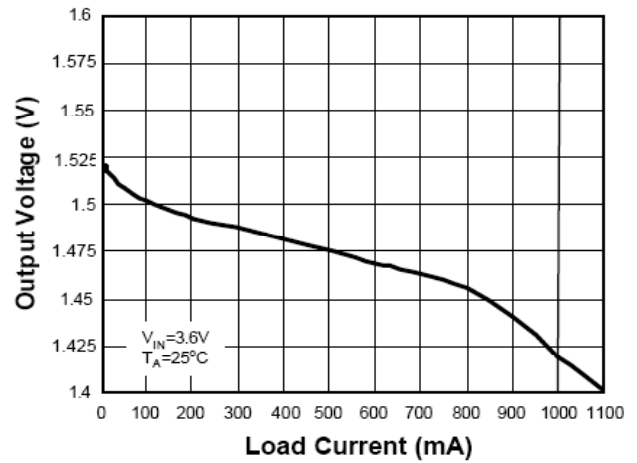
Parameter	Symbol	Test Condition	Min	Typ	Max	Unit
Input Voltage	$V_{IN}$		2.5	--	5.5	V
Feedback Current	$I_{FB}$		-30	--	+30	nA
Regulated Feedback Voltage	$V_{FB}$	$T_a = 25^\circ\text{C}$	0.558	0.6	0.612	V
		$T_a = 0\sim +85^\circ\text{C}$	0.5865	0.6	0.6135	
		$T_a = -40\sim +85^\circ\text{C}$	0.585	0.6	0.615	
Reference Voltage Line Regulation	$\Delta V_{FB}$	$V_{IN} = 2.5 \sim 5.5\text{V}$	--	0.04	0.4	%/V
Regulated Output Voltage	$\Delta V_{OUT}$	$V_{OUT} = 1.5\text{V}$ , $I_{OUT} = 100\text{mA}$	1.455	1.5	1.545	V
		$V_{OUT} = 1.8\text{V}$ , $I_{OUT} = 100\text{mA}$	1.746	1.8	1.854	
Output Voltage Line Regulation	$REG_{LINE}$	$V_{IN} = 2.5 \sim 5.5\text{V}$	--	0.04	0.4	%/V
Peak Inductor Current	$I_{PEAK}$	$V_{IN} = 3\text{V}$ , $V_{FB} = 0.5\text{V}$ (ADJ Voltage) Duty Cycle <35%	0.75	1	1.25	A
		$V_{IN} = 3\text{V}$ , $V_{OUT} = 90\%$ (Fixed Voltage) Duty Cycle <35%				
Output Voltage Load Regulation	$REG_{LOAD}$		--	5	--	%
Shutdown Current	$I_{SD}$	$V_{EN} = 0\text{V}$ , $V_{IN} = 4.2\text{V}$	--	0.1	1	$\mu\text{A}$
Quiescent Current	$I_Q$	$V_{FB} = 0.5\text{V}$ or $V_{OUT} = 90\%$ $V_{EN} = V_{IN} = 4.2\text{V}$	--	350	500	
Oscillator Frequency	$f_{OSC}$	$V_{OUT} = 2.5\text{V}$ , $I_{OUT} = 100\text{mA}$	--	1.2	--	MHz
		$V_{FB} = 0\text{V}$ or $V_{OUT} = 0$	--	310	--	kHz
$R_{DSON}$ of P-Channel FET	$R_{DSON(P)}$	$I_{SW} = 100\text{mA}$	--	0.4	0.5	$\Omega$
$R_{DSON}$ of N-Channel FET	$R_{DSON(N)}$	$I_{SW} = -100\text{mA}$	--	0.35	0.45	
Switching Leakage Current	$I_{SW}$	$V_{EN} = 0\text{V}$ , $V_{SW} = 0\text{V}$ or $5\text{V}$ , $V_{IN} = 5\text{V}$	-1	--	+1	$\mu\text{A}$
EN Input Threshold (High)	$V_{EH}$	$T_a = -40\sim +85^\circ\text{C}$	--	--	1.5	V
EN Input Threshold (Low)	$V_{EL}$	$T_a = -40\sim +85^\circ\text{C}$	0.3	--	--	
EN Input Current	$I_{EN}$	$T_a = -40\sim +85^\circ\text{C}$	-1	--	+1	$\mu\text{A}$

**Electrical Characteristics Curve**

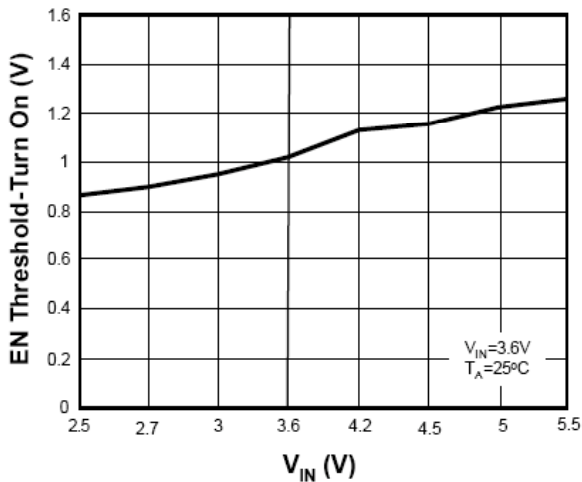
**FIGURE 1 – Shutdown Current vs.  $V_{IN}$**



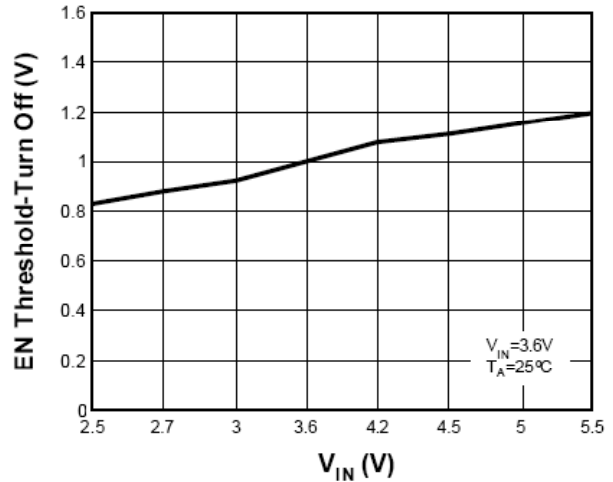
**FIGURE 2 – Output Voltage vs. Load Current**



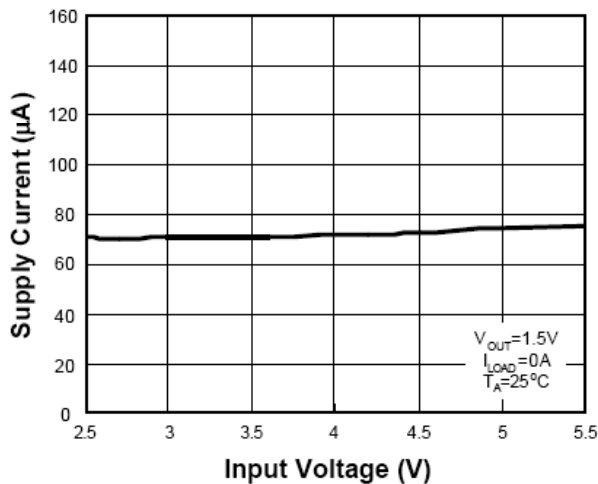
**FIGURE 3 – EN Threshold-Turn On vs.  $V_{IN}$**



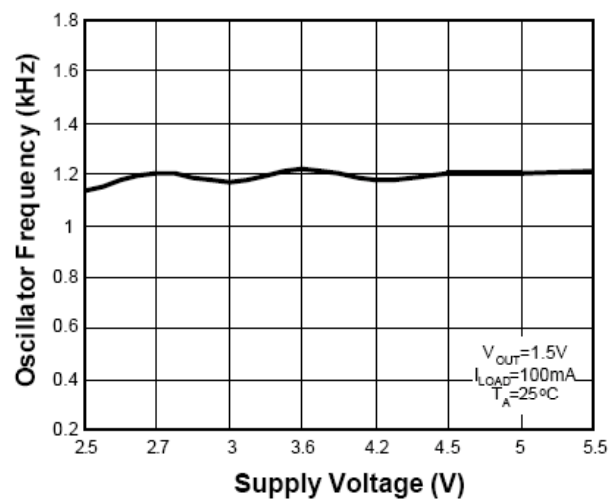
**FIGURE 4 – EN Threshold-Turn Off vs.  $V_{IN}$**



**FIGURE 5 – Supply Current vs. Supply Voltage**

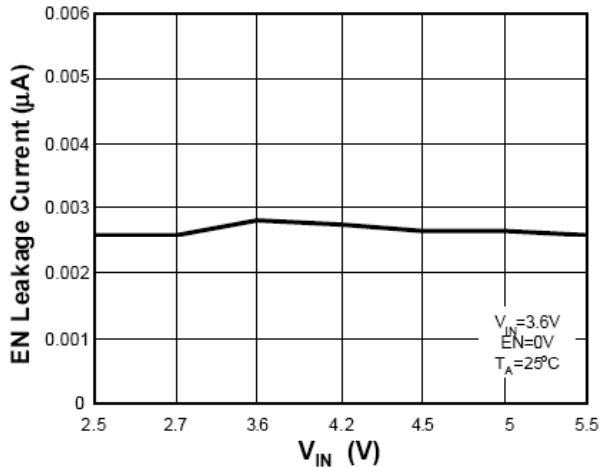


**FIGURE 6 – Oscillator Frequency vs. Supply Voltage**

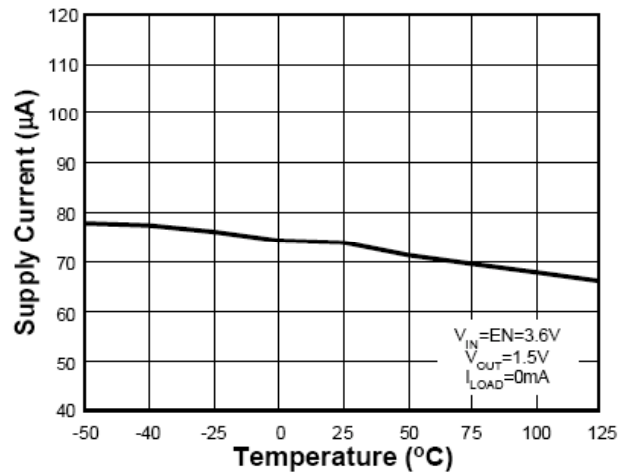


**Electrical Characteristics Curve**

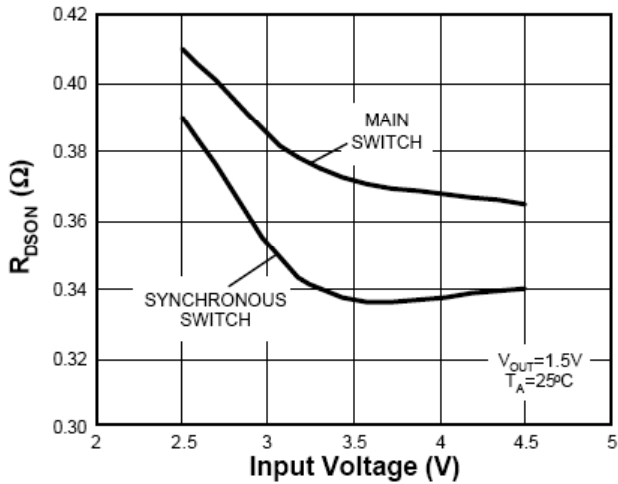
**FIGURE 7 – EN Leakage Current vs.  $V_{IN}$**



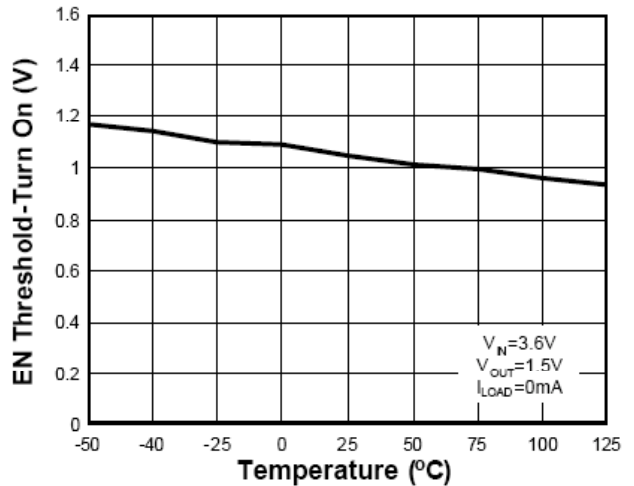
**FIGURE 8 – Supply Current vs. Temperature**



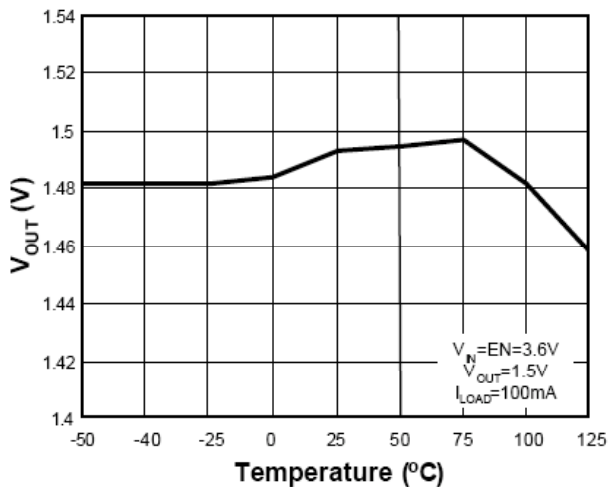
**FIGURE 9 –  $R_{DS(ON)}$  vs. Input Voltage**



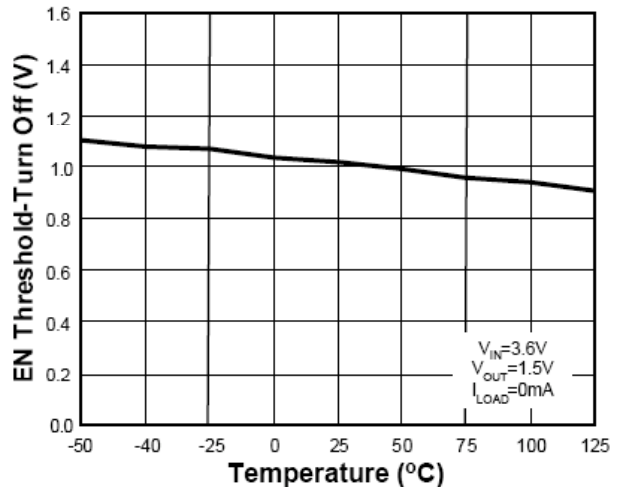
**FIGURE 10 – EN Threshold-Turn On vs. Temp**



**FIGURE 11 –  $V_{OUT}$  vs. Temperature**

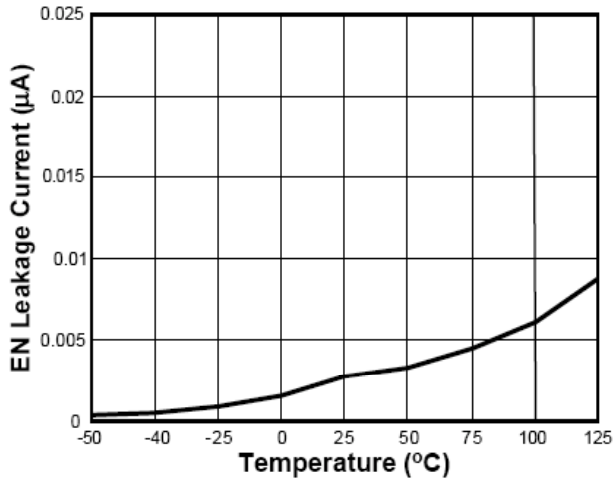


**FIGURE 12 – EN Threshold-Turn Off vs. Temp**

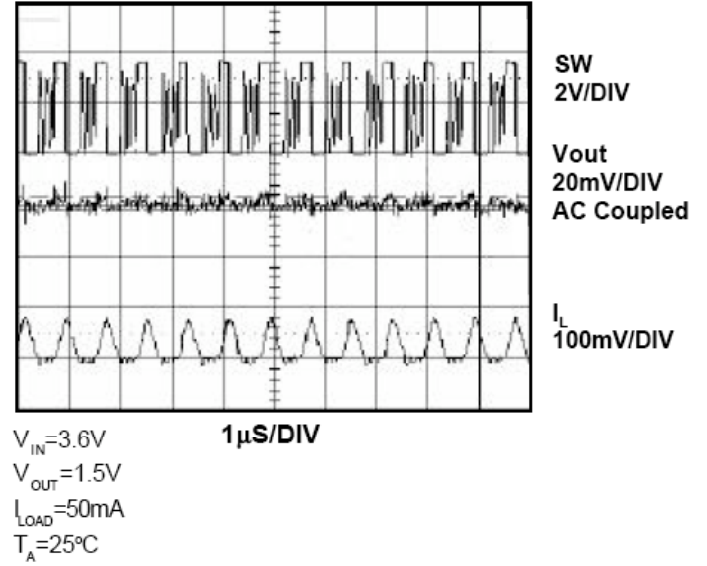


**Electrical Characteristics Curve**

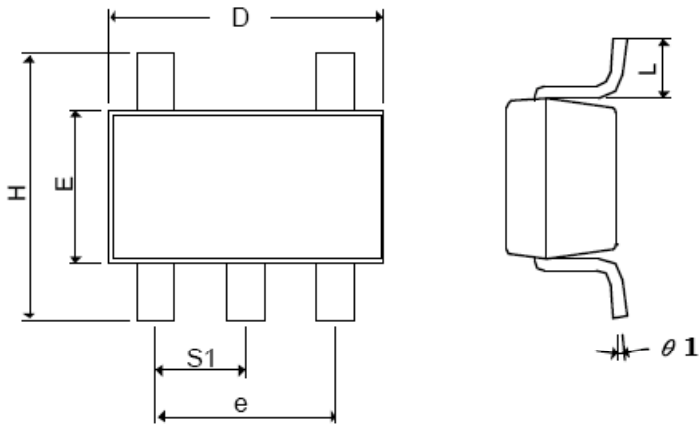
**FIGURE 13 – EN Leakage Current vs. Tempe**



**FIGURE 14 – Discontinuous Operation**

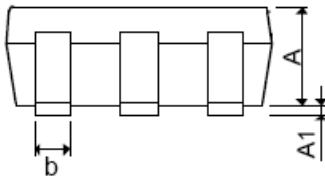


**SOT-25 Mechanical Drawing**



DIM	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX.
A+A1	0.09	1.25	0.0354	0.0492
B	0.30	0.50	0.0118	0.0197
C	0.09	0.25	0.0035	0.0098
D	2.70	3.10	0.1063	0.1220
E	1.40	1.80	0.0551	0.0709
E	1.90 BSC		0.0748 BSC	
H	2.40	3.00	0.09449	0.1181
L	0.35 BSC		0.0138 BSC	
θ1	0°	10°	0°	10°
S1	0.95 BSC		0.0374 BSC	

**Front View**



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