RT9261/A

General Description

The RT9261 Series are VFM Step-up DC/DC ICs with ultra low supply current by CMOS process and suitable for use with battery-powered instruments.

The RT9261 IC consists of an oscillator, a VFM control circuit, a driver transistor (LX switch), a reference voltage unit, an error amplifier, resistors for voltage detection, and a LX switch protection circuit. A low ripple and high efficiency step-up DC/DC converter can be constructed of this RT9261 IC with only three external components.

The RT9261A IC provides with a drive pin (EXT) for an external transistor, so that a power transistor can be externally applied. Therefore, the RT9261A IC is recommended for applications where large currents are required. CE pin enables circuit to set the standby supply current at a maximum of 0.5μA.

Ordering Information

RT9261A-□□ □ □

- Package type
  - B : SOT-25
  - X : SOT-89
- Operating temperature range
  - C: Commercial standard
- Output voltage
  - 15 : 1.5V
  - 16 : 1.6V
  - :
  - 49 : 4.9V
  - 50 : 5.0V
- A : Use external switch
  - Use internal switch

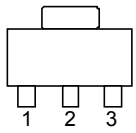
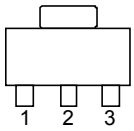
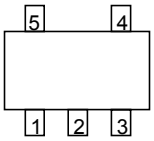
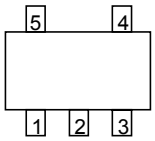
Features

- **Minimal Number of External Components (Only an inductor, a diode, and a capacitor)**
- **Ultra Low Input Current (5μA at Switch Off)**
- **± 2% High Output Voltage Accuracy**
- **Low Ripple and Low Noise**
- **Low Start-up Voltage, 0.85V at 1mA**
- **75% Efficiency with Low Cost Inductor**
- **+50 ppm/°C Low Temperature-Drift**
- **SOT-89 and SOT-25 Small Packages**

Applications

- Power source for battery-powered equipment
- Power source for cameras, camcorders, VCRs, PDAs, pagers, electronic data banks, and hand-held communication equipment
- Power source for applications, which require higher voltage than that of batteries used in the appliances

Pin Configurations

Part Number	Pin Configurations
RT9261-□□CX (Plastic SOT-89)	 TOP VIEW 1. GND 2. VOUT (TAB) 3. LX
RT9261A-□□CX (Plastic SOT-89)	 TOP VIEW 1. GND 2. VOUT (TAB) 3. EXT
RT9261-□□CB (Plastic SOT-25)	 TOP VIEW 1. CE 2. VOUT 3. NC 4. GND 5. LX
RT9261A-□□CB (Plastic SOT-25)	 TOP VIEW 1. CE 2. VOUT 3. NC 4. GND 5. EXT

Absolute Maximum Ratings

- Output Voltage ---------- 8V
- LX Pin Voltage (1) ---------- 8V
- EXT Pin Voltage (2) ---------- -0.3 to V_{OUT} +0.3V
- CE Pin Voltage (3) ---------- -0.3 to V_{OUT} +0.3V
- LX Pin Output Current (1) ---------- 250mA
- EXT Pin Current(2) ---------- ±50mA
- Power Dissipation, P_D @ T_A = 25°C
- SOT-89 ---------- 0.5W
  SOT-25 ---------- 0.25W
- Package Thermal Resistance
  SOT-89, θ_{JC} ---------- 100°C/W
  SOT-89, θ_{JA} ---------- 300°C/W
  SOT-25, θ_{JA} ---------- 250°C/W
- Operating Temperature Range ---------- -20 to +85°C
- Storage Temperature Range ---------- 165°C
- Lead Temperature (Soldering, 10 sec.) ---------- 260°C

Notes:

(1) Applicable to RT9261-□□CX and RT9261-□□CB

(2) Applicable to RT9261A-□□CX and RT9261A-□□CB

(3) Applicable to RT9261-□□CB and RT9261A-□□CB

Electrical Characteristics (Refer to Fig. 1)

Parameter		Symbol	Test Conditions	Min	Typ	Max	Units
Output Voltage Accuracy		ΔV_{OUT}		-2	--	+2	%
Input Voltage		V_{IN}		--	--	7	V
Start-up Voltage		V_{ST}	I_{OUT} = 1mA, V_{IN}: 0 → 2V	--	0.85	1.0	V
Hold-on Voltage		V_{HO}	I_{OUT} = 1mA, V_{IN}: 2 → 0V	0.7	--	--	V
Input Current 1	$V_{OUT} \leq 3.5V$ (1)		To be measured at V_{IN} at no load	--	15	18	μA
	$3.5V < V_{OUT} \leq 5V$ (2)			--	18	24	
Input Current 2			To be measured at V_{OUT} in switch off condition	--	5	8	μA
LX Switching Current	$V_{OUT} \leq 3.5V$ (1)	$I_{SWITCHING}$	V_{LX} = 0.4V	60	--	--	mA
	$3.5V < V_{OUT} \leq 5V$ (2)			80	--	--	
LX Leakage Current		$I_{LEAKAGE}$	V_{LX} = 6V	--	--	0.5	μA
Maximum Oscillator		F_{MAX}		80	120	160	KHz
Oscillator Duty Cycle		D_{OSC}	On (V_{LX} " L ") side	65	75	85	%
Efficiency				--	75	--	%
V_{LX} Voltage Limit			L_X switch on	0.65	0.8	1.0	V

Notes:

(1) V_{IN} = 1.8V, VSS = 0V, I_{OUT} = 10mA, T_{OPT} = 25°C, and External Circuit of Typical Application

(2) V_{IN} = 3V, VSS = 0V, I_{OUT} = 10mA, T_{OPT} = 25°C, and External Circuit of Typical Application

Electrical Characteristics (Refer to Fig. 2)

Parameter		Symbol	Test Conditions	Min	Typ	Max	Units
Output Voltage Accuracy		ΔV_{OUT}		-2	--	+2	%
Input Voltage		V_{IN}		--	--	7	V
Start-up Voltage		V_{ST}	I_{OUT} = 1mA, V_{IN} : 0 → 2V	--	0.85	1.0	V
Input Current 1	$V_{OUT} \leq 3.5V$ (1)		To be measured at V_{IN} at no load	--	30	50	μA
	$3.5V < V_{OUT} \leq 5V$ (2)			--	60	90	
Input Current 2	$V_{OUT} \leq 3.5V$ (1)		To be measured at V_{OUT} in switch off condition	--	6	10	μA
	$3.5V < V_{OUT} \leq 5V$ (2)						
EXT "H" Output Current	$V_{OUT} \leq 3.5V$ (1)		$V_{EXT} = V_{OUT} – 0.4V$	-1.5	--	--	mA
	$3.5V < V_{OUT} \leq 5V$ (2)			-2	--	--	
EXT "L" Output Current	$V_{OUT} \leq 3.5V$ (1)		V_{EXT} = 0.4V	1.5	--	--	mA
	$3.5V < V_{OUT} \leq 5V$ (2)			2	--	--	
Maximum Oscillator Frequency		F_{MAX}		80	120	160	KHz
Oscillator Duty Cycle		D_{OSC}	V_{EXT} " H " side	65	75	85	%

Notes:

(1) Unless otherwise provided, V_{IN} = 1.8V, VSS = 0V, I_{OUT} = 10mA, T_{OPT} = 25°C, and use External Circuit of Typical Application

(2) Unless otherwise provided, V_{IN} = 3V, VSS = 0V, I_{OUT} = 10mA, T_{OPT} = 25°C, and External Circuit of Typical Application

Electrical Characteristics (Refer to Fig. 3)

Parameter		Symbol	Test Conditions	Min	Typ	Max	Units
Output Voltage Accuracy		ΔV_{OUT}		-2	--	+2	%
Input Voltage		V_{IN}		--	--	7	V
Start-up Voltage		V_{ST}	I_{OUT} = 1mA, V_{IN} : 0 → 2V	--	0.85	1.0	V
Hold-on Voltage		V_{HO}	I_{OUT} = 1mA, V_{IN} : 2 → 0V	0.7	--	--	V
Efficiency	$V_{OUT} \leq 3.5V$ (1)			--	75	--	%
	$3.5V < V_{OUT} \leq 5V$ (2)			--	85	--	
Input Current 1	$V_{OUT} \leq 3.5V$ (1)		To be measured at V_{IN} at no load	--	15	18	μA
	$3.5V < V_{OUT} \leq 5V$ (2)			--	18	24	
Input Current 2	$V_{OUT} \leq 3.5V$ (1)		To be measured at V_{OUT} in switch off condition	--	5	8	μA
	$3.5V < V_{OUT} \leq 5V$ (2)			--	6	10	
LX Switching Current	$V_{OUT} \leq 3.5V$ (1)	$I_{SWITCHING}$	V_{LX} = 0.4V	60	--	--	mA
	$3.5V < V_{OUT} \leq 5V$ (2)			80	--	--	
LX Leakage Current		$I_{LEAKAGE}$	V_{LX} = 6V	--	--	0.5	μA
CE "H" Level			$V_{IN} = V_{OUT} \times 0.9$	0.4× V_{OUT}	--	--	V
CE " L" Level			$V_{IN} = V_{OUT} \times 0.9$	--	--	0.2	V
CE " H" Input Current			CE = V_{OUT}	--	--	0.5	μA
CE " L" Input Current			CE = 0V	-0.5	--	--	μA
Maximum Oscillator Frequency		F_{MAX}		80	120	160	KHz
Oscillator Duty Cycle		D_{OSC}	On (V_{LX} " L") side	65	75	85	%
V_{LX} Voltage Limit			LX switch on	0.65	0.8	1.0	V

Notes:

(1) Unless otherwise provided, V_{IN} = 1.8V, VSS = 0V, I_{OUT} = 10mA, T_{OPT} = 25°C, and use External Circuit of Typical Application

(2) Unless otherwise provided, V_{IN} = 3V, VSS = 0V, I_{OUT} = 10mA, T_{OPT} = 25°C, and External Circuit of Typical Application

Electrical Characteristics (Refer to Fig. 4)

Parameter		Symbol	Test Conditions	Min	Typ	Max	Units
Output Voltage Accuracy		ΔV_{OUT}		-2	--	+2	%
Input Voltage		V_{IN}		--	--	7	V
Start-up Voltage		V_{ST}	I_{OUT} = 1mA, V_{IN} : 0 → 2V	--	0.85	1.0	V
Efficiency	$V_{OUT} \leq 3.5V$ (1)			--	75	--	%
	$3.5V < V_{OUT} \leq 5V$ (2)			--	85	--	
Input Current 1	$V_{OUT} \leq 3.5V$ (1)		To be measured at V_{IN} at no load	--	30	50	µA
	$3.5V < V_{OUT} \leq 5V$ (2)			--	60	90	
Input Current 2	$V_{OUT} \leq 3.5V$ (1)		To be measured at V_{OUT} in switch off condition	--	6	10	µA
	$3.5V < V_{OUT} \leq 5V$ (2)						
EXT "H" Output Current	$V_{OUT} \leq 3.5V$ (1)		$V_{EXT} = V_{OUT} - 0.4V$	-1.5	--	--	mA
	$3.5V < V_{OUT} \leq 5V$ (2)			-2	--	--	
EXT "L" Output Current	$V_{OUT} \leq 3.5V$ (1)		V_{EXT} = 0.4V	1.5	--	--	mA
	$3.5V < V_{OUT} \leq 5V$ (2)			2	--	--	
CE "H" Level			$V_{IN} = V_{OUT} \times 0.9$	$0.4\times V_{OUT}$	--	--	V
CE " L" Level			$V_{IN} = V_{OUT} \times 0.9$	--	--	0.2	V
CE " H" Input Current			CE = V_{OUT}	--	--	0.5	µA
CE " L" Input Current			CE = 0V	-0.5	--	--	µA
Maximum Oscillator Frequency		F_{MAX}		80	120	160	KHz
Oscillator Duty Cycle		D_{OSC}	On (V_{LX} " L") side	65	75	85	%
V_{LX} Voltage Limit			LX switch on	0.65	0.8	1.0	V

Notes:

(1) Unless otherwise provided, V_{IN} = 1.8V, VSS = 0V, I_{OUT} = 10mA, T_{OPT} = 25°C, and use External Circuit of Typical Application

(2) Unless otherwise provided, V_{IN} = 3V, VSS = 0V, I_{OUT} = 10mA, T_{OPT} = 25°C, and External Circuit of Typical Application