High Efficiency, Low Supply Current, Step-up DC/DC Converter

General Description

The RT9262/A is a compact, high efficient, step-up DC/DC converter with an adaptive current mode PWM control loop, providing a stable and high efficient operation over a wide range of load currents. It operates in both continuous and discontinuous current modes in stable waveforms without external compensation.

The low start-up input voltage below 1V makes RT9262/A suitable for 1 to 4 battery cell applications providing up to 400mA output current. The 500KHz high switching rate minimized the size of external components. Besides, the 17μA low quiescent current together with high efficiency maintains long battery lifetime.

The 1.8V to 6V output voltage is set with 2 external resistors. Both internal 2A switch and driver for driving external power devices (NMOS or NPN) are provided.

A 300mA LDO is included in RT9262 to provide a secondary low noise output as well as a output current stop in the shutdown mode. Similarly, an 1.8V to 6V LDO output voltage can be set with 2 external resistors. For RT9262A, a low battery detector with 1.25V detection voltage is included. RT9262/A are provided in SOP8 packages.

Ordering Information

RT9262A-□ □

- Package type
  S : SOP-8
- Operating temperature range
  C: Commercial standard
- A : Include low battery detector
  Default : Include LDO

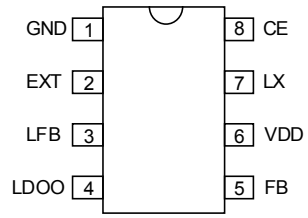
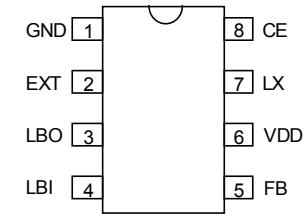
Features

- **1.0V Low Start-up Input Voltage**
- **High Supply Capability to Deliver 3.3V 100mA with 1V Input Voltage**
- **17μA Quiescent (Switch-off) Supply Current**
- **Over 85% Efficiency in 1~200mA Output Current Range**
- **500KHz Fixed Switching Rate**
- **Providing Flexibility for Using Internal and External Power Switches**
- **Built-in 300mA LDO, also for the Zero-Output-Current Shutdown Mode (RT9262)**
- **Boost DC-DC Integrating LDO for Up-Down Regulation (RT9262)**
- **Built-in 1.25V Voltage Detector (RT9262A)**
- **8-Pin SOP Package**

Applications

- PDA
- Portable Instrument
- Wireless Equipment
- DSC
- LCD Back Bias Circuit
- RF-Tags

Pin Configurations

Part Number	Pin Configurations
RT9262CS (SOP-8)	
RT9262ACS (SOP-8)	

Marking Information

Part Number	Marking
RT9262CS	RT9262CS
RT9262ACS	RT9262ACS

Typical Application Circuit

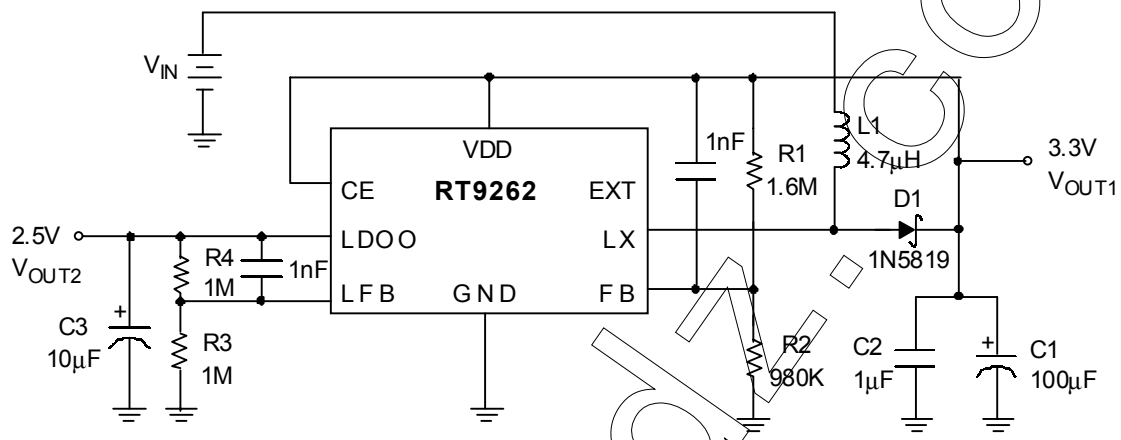


Fig. 1 RT9262 Typical Application for Portable Instruments below 400mA

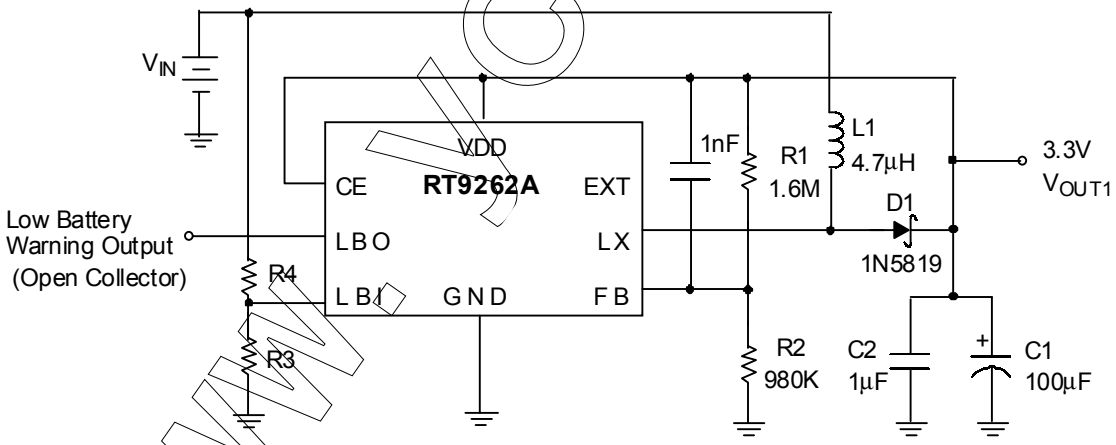


Fig. 2 RT9262A Typical Application for Portable Instruments below 400mA

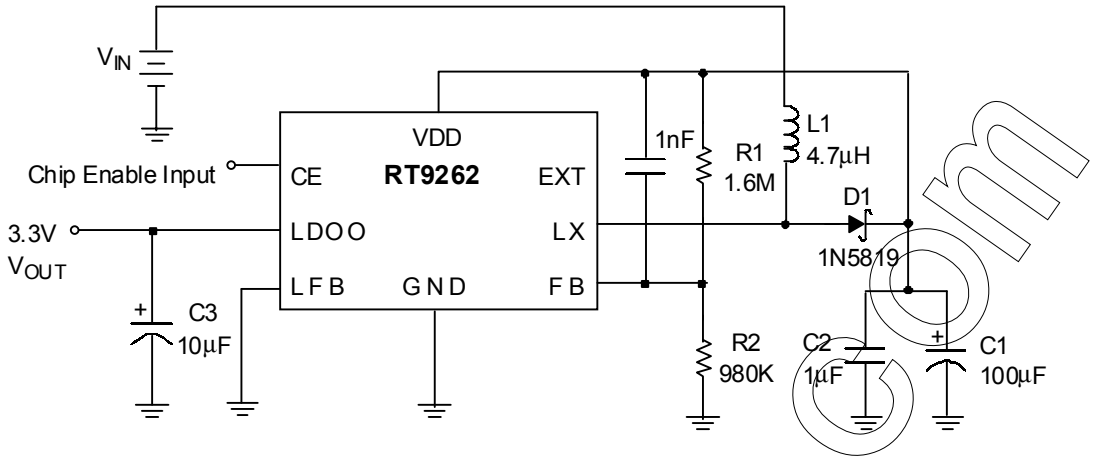


Fig. 3 Application Circuit with Zero-Output-Current Shutdown Mode Control

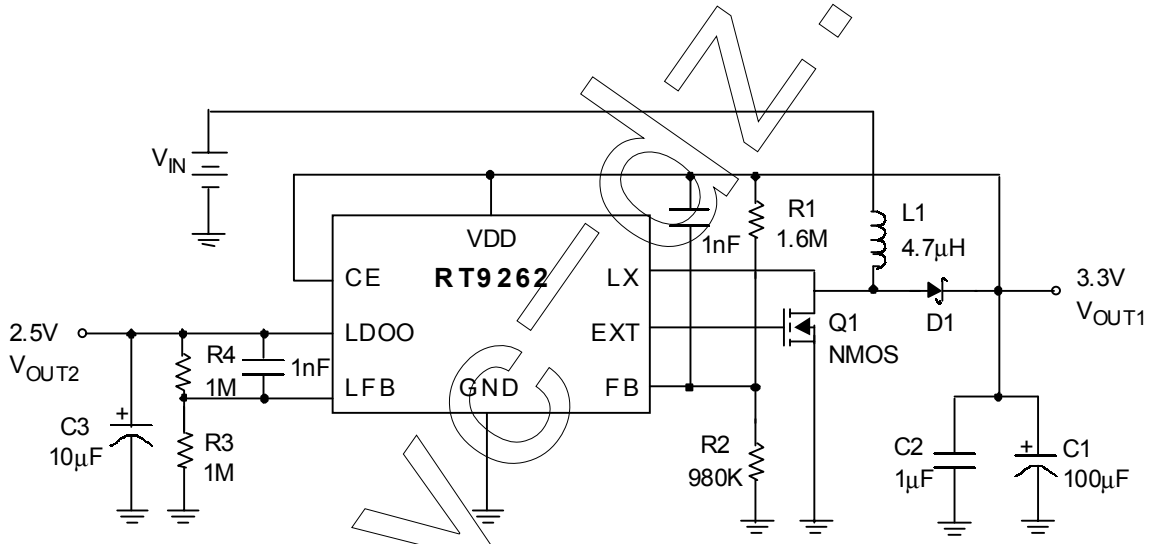


Fig. 4 0.4A ~ 2A Output Current Application

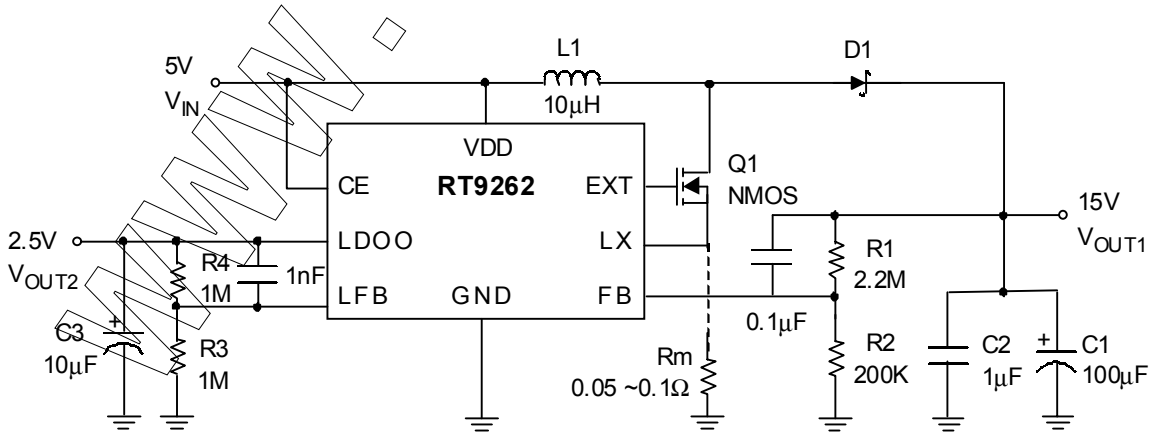


Fig. 5 High Voltage Application (Rm should be added when IL > 100mA)

Pin Description

Pin Number		Pin Name	Pin Function
RT9262	RT9262A		
1	1	GND	Ground
2	2	EXT	Output pin for driving external NMOS or NPN When driving an NPN, a resistor should be added for limiting base current.
3		LFB	Feedback pin of the built-in LDO (Internal Vref = 1.25V)
4		LDOO	Voltage output pin of the built-in LDO
	3	LBO	Drain output pin of the NMOS of the built-in low voltage detector This pin will be internally pulled low when the voltage at LBI pin drops to below 1.25V.
	4	LBI	Input pin of the built-in low voltage detector Trip point = 1.25V
5	5	FB	Feedback input pin of the switching regulator Internal reference voltage for the error amplifier is 1.25V.
6	6	VDD	Input positive power pin of RT9262/A
7	7	LX	Drain pin of the internal Power NMOS of the switching regulator
8	8	CE	TTL level input pin for chip-enable function RT9262/A gets into shutdown mode when CE pin set to low.

Absolute Maximum Ratings

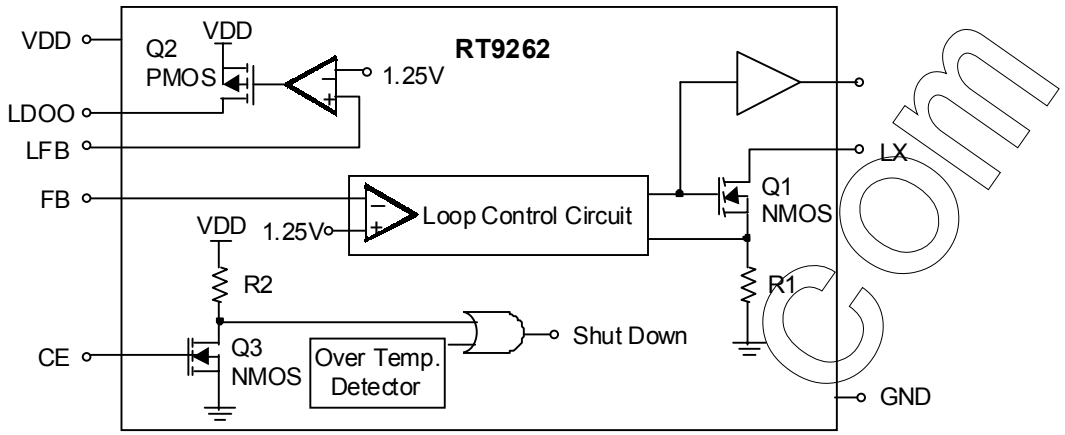
- Supply Voltage (VDD to GND) ---------- -0.3V to 6V
- Switch Voltage (LX to GND) ---------- -0.3V to (VDD + 0.8V)
- LDO Output Voltage (LDOO to GND) ---------- -0.3V to (VDD + 0.3V)
- Other I/O Pin Voltages (I/O to GND) ---------- -0.3V to (VDD + 0.3V)
- Switch Current (LX Pin) ---------- 2.5A
- Driver Current (EXT Pin) ---------- 30mA
- LBO Current (LBO Pin) ---------- 30mA
- Power Dissipation and Thermal Characteristics:
  SOP-8 Pin, PD @ TA = 25°C ---------- 0.625W
  Thermal Resistance, $R_{\theta JA}$ ---------- 160°C/W
- Operating Junction Temperature, Tj ---------- 150°C
- Storage Temperature Tange, Tstg ---------- -60°C ~ +150°C

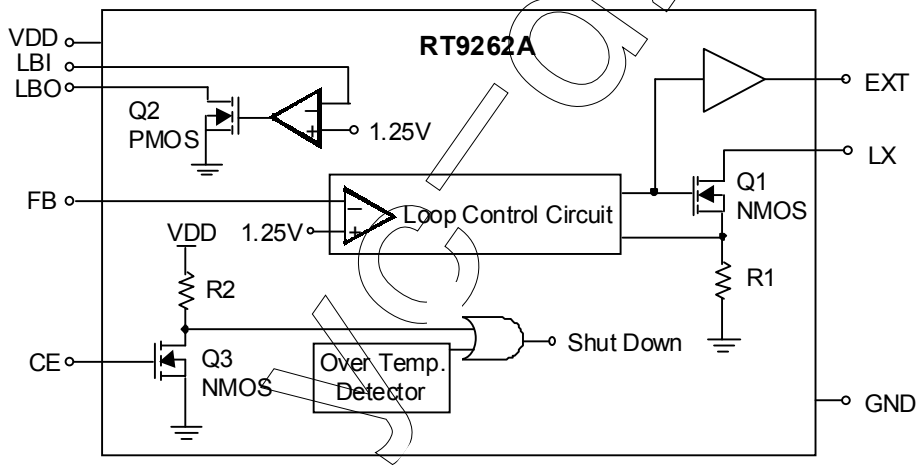
Electrical Characteristics

(V_{IN} = 1.5V, V_{DD} set to 3.3V, Load Current = 0, T_A = 25°C, unless otherwise specified)

Parameter		Symbol	Test Conditions	Min	Typ	Max	Units
Start UP V_{IN}		V_{ST}	I_L = 1mA		0.98		V
Operating V_{DD} Range		V_{DD}	Start-up to I_{DD1} > 250μA	0.7		6	V
No Load Current I (V_{IN})		I_{Q1}	V_{IN} = 1.5V, V_{OUT} = 3.3V		47		μA
Switch-off Current I (V_{DD})		I_{Q2}	V_{IN} = 7V		17		μA
Shutdown Current I (V_{IN})		I_{Q3}	CE Pin = 0V, V_{IN} = 7V			0.5	μA
Feedback Reference Voltage		V_{REF1}	Close Loop, V_{DD} = 3.3V	1.225	1.25	1.275	V
Feedback Reference Voltage for LDO	RT9262	V_{REF2}	Close Loop, V_{DD} = 3.3V	1.225	1.25	1.275	V
LBI Pin Trip Point	RT9262A	V_{LBI}	V_{DD} = 3.3V	1.225	1.25	1.275	V
Switching Rate		F_S	V_{DD} = 3.3V		500		KHz
Maximum Duty		D_{MAX}	V_{DD} = 3.3V		92		%
L_X ON Resistance		R_{LX}	V_{DD} = 3.3V		0.25		Ω
Current Limit Setting		I_{LX}	V_{DD} = 3.3V		2		A
EXT ON Resistance to VDD		R_{EXT1}	V_{DD} = 3.3V		40		Ω
EXT ON Resistance to GND		R_{EXT2}	V_{DD} = 3.3V		30		Ω
Line Regulation			V_{IN} = 1.5 ~ 2.5V, I_L = 1mA		10		mV/V
Load Regulation			V_{IN} = 1.5V, I_L = 1 ~ 100mA		0.25		mV/mA
LDO PMOS ON Resistance	RT9262	R_{LDO}	V_{DD} = 3.3V		0.8		Ω
LDO Drop Out Voltage	RT9262	ΔV_{LDO}	V_{DD} = 3.3V, I_L = 100mA		70		mV
LBO ON Resistance	RT9262A	R_{LBO}	V_{DD} = 3.3V		40		Ω
CE Pin Trip Level		V_{CE}	V_{DD} = 3.3V	0.2	0.8	1.4	V
Temperature Stability for FB, LFB, LBI		TC	Guaranteed by Design		50		ppm/°C
Thermal Shutdown		T_{SD}	Guaranteed by Design		165		°C
Thermal Shutdown Hysterises		ΔT_{SD}	Guaranteed by Design		10		°C
Power Efficiency		EFF	V_{IN} = 2V, V_{OUT} = 3.3V, I_L = 1 ~ 100mA		85		%

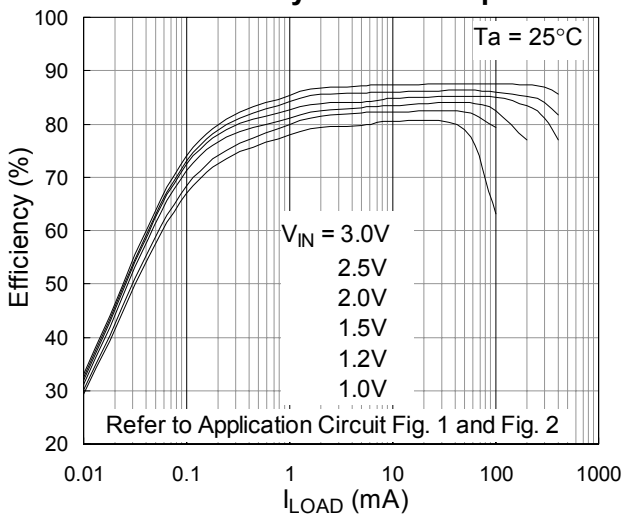
Function Block Diagram



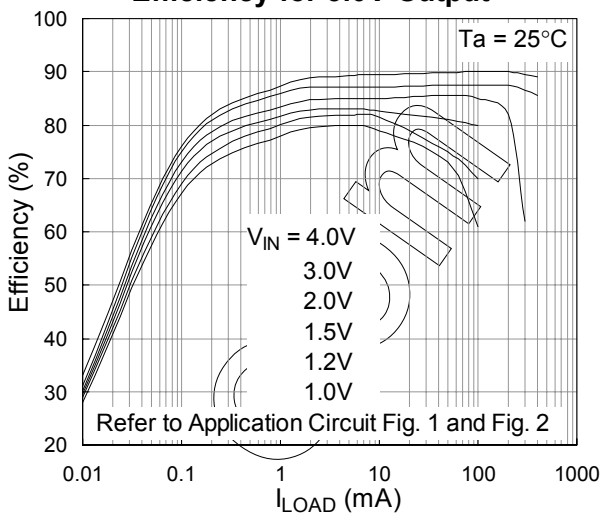


Typical Operating Charateristics

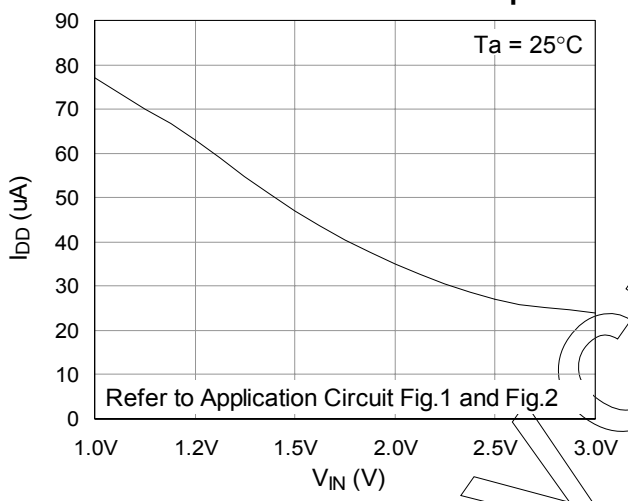
Efficiency for 3.3V Output



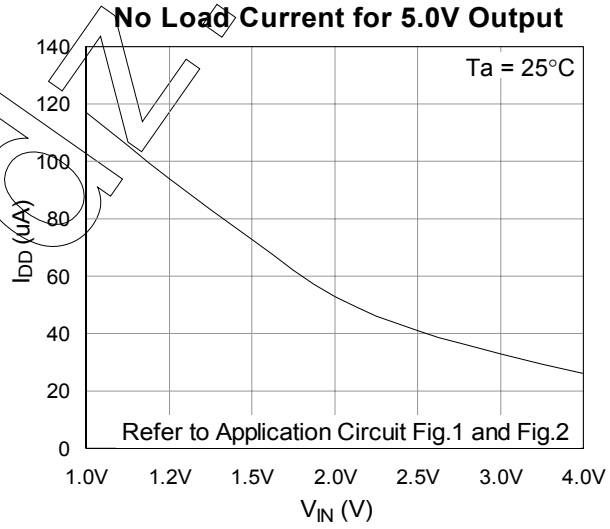
Efficiency for 5.0V Output



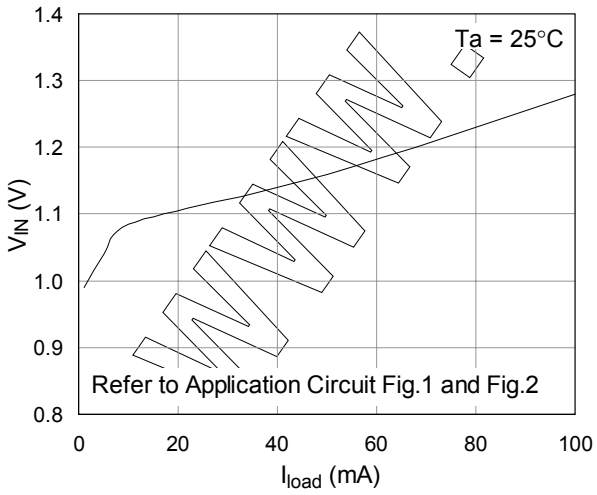
No Load Current for 3.3V Output



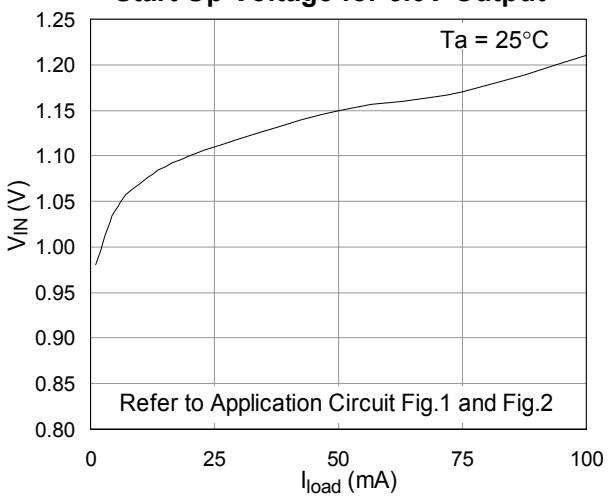
No Load Current for 5.0V Output



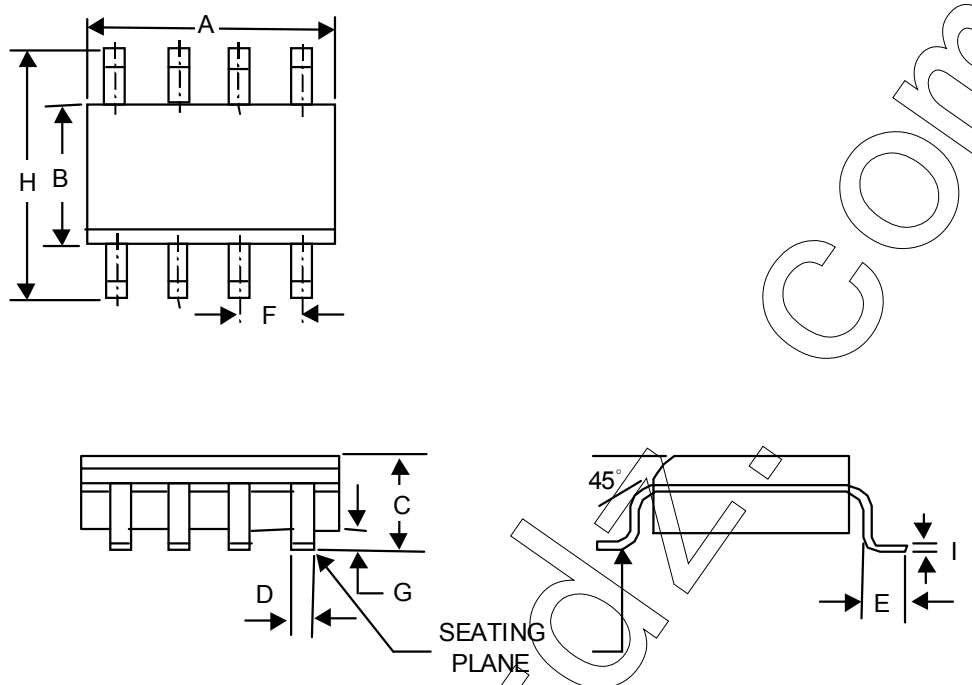
Start Up Voltage for 3.3V Output



Start Up Voltage for 5.0V Output



Package Information



Symbols	Dimensions In Millimeters			Dimensions In Inches		
	Min	Typ	Max	Min	Typ	Max
A	4.70	4.85	5.00	0.185	0.191	0.197
B	3.80	3.90	4.00	0.150	0.153	0.157
C	1.35	1.55	1.75	0.054	0.061	0.068
D	0.30	0.40	0.50	0.012	0.016	0.020
E	0.40	--	1.27	0.016	--	0.050
F	--	1.27	--	--	0.050	--
G	0.10	0.17	0.25	0.004	0.006	0.009
H	5.80	6.00	6.20	0.229	0.237	0.244
I	0.18	0.22	0.25	0.007	0.008	0.009

8-Lead SOP Plastic Package

RichTek Technology Corp.
Headquarter
6F, No. 35, Hsintai Road, Chupei City
Hsinchu, Taiwan, R.O.C.
Tel: (8863)5510047 Fax: (8863)5537749

RichTek Technology Corp.
Taipei Office (Marketing)
4F-1, No. 127, Lane 235, Paochiao Road, Hsintien City
Taipei County, Taiwan, R.O.C.
Tel: (8862)89191466 Fax: (8862)89191465
Email: marketing@richtek-ic.com.tw