Description

The AZ34063U is a monolithic, switching regulator, control circuit which contains the primary functions required for DC-DC converters. This device consists of an internal temperature compensated reference, voltage comparator, controlled duty-cycle oscillator with active current-limit circuit, driver, and high-current output switch.

The AZ34063U is specifically designed as a general DC-DC converter to be used in Step-Down, Step-Up, and Voltage-Inverting applications with a minimum number of external components.

The AZ34063U is available in two packages: SO-8 and PDIP-8.

Features

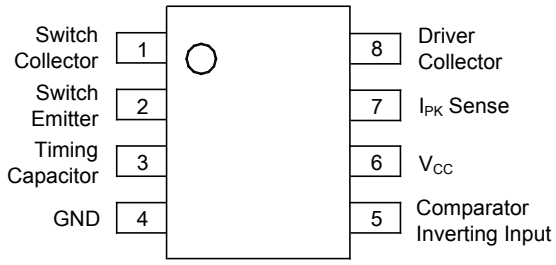
- Operation from 3.0V to 36V Input
- Low Standby Current
- Current Limiting
- Output Switch Current to 1.5A
- Output Voltage Adjustable
- Operation Frequency up to 180kHz
- Precision 2% Reference
- **Totally Lead-Free & Fully RoHS Compliant (Notes 1 & 2)**
- **Halogen and Antimony Free. "Green" Device (Note 3)**
- **For automotive applications requiring specific change control (i.e. parts qualified to AEC-Q100/101/200, PPAP capable, and manufactured in IATF 16949 certified facilities), please contact us or your local Diodes representative. https://www.diodes.com/quality/product-definitions/**

Applications

- Battery Chargers
- ADSL Modems
- Hubs
- Negative Voltage Power Supplies

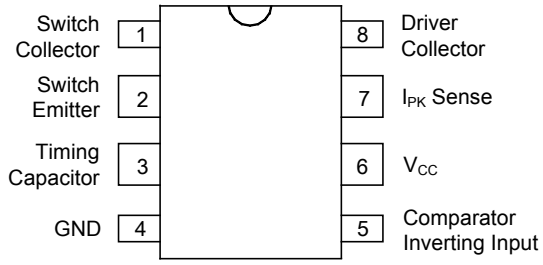
Pin Assignments

(Top View)



SO-8

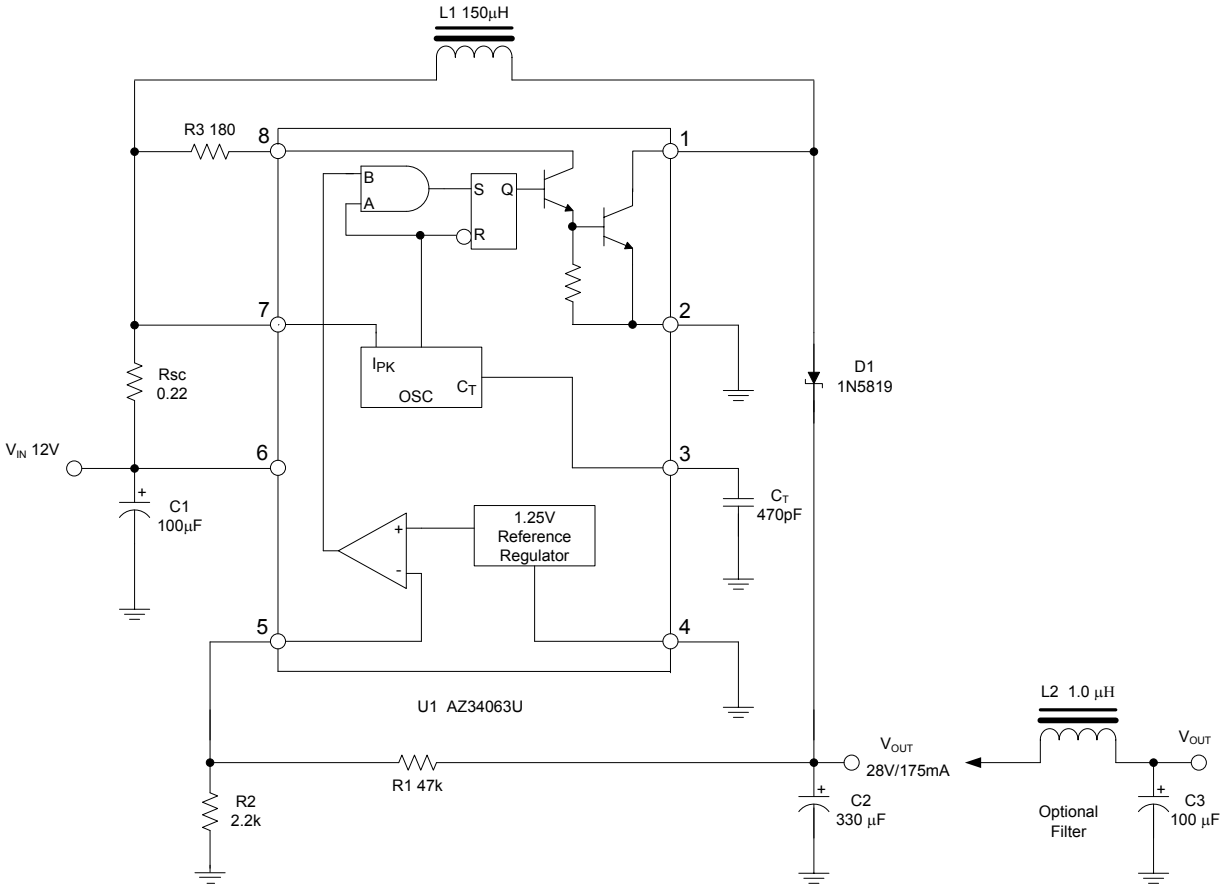
(Top View)



PDIP-8

Notes:
1. No purposely added lead. Fully EU Directive 2002/95/EC (RoHS), 2011/65/EU (RoHS 2) & 2015/863/EU (RoHS 3) compliant.
2. See https://www.diodes.com/quality/lead-free/ formore information about Diodes Incorporated's definitions of Halogen- and Antimony-free, "Green" and Lead-free.
3. Halogen- and Antimony-free "Green" products are defined as those which contain <900ppm bromine, <900ppm chlorine (<1500ppm total Br + Cl) and <1000ppm antimony compounds.

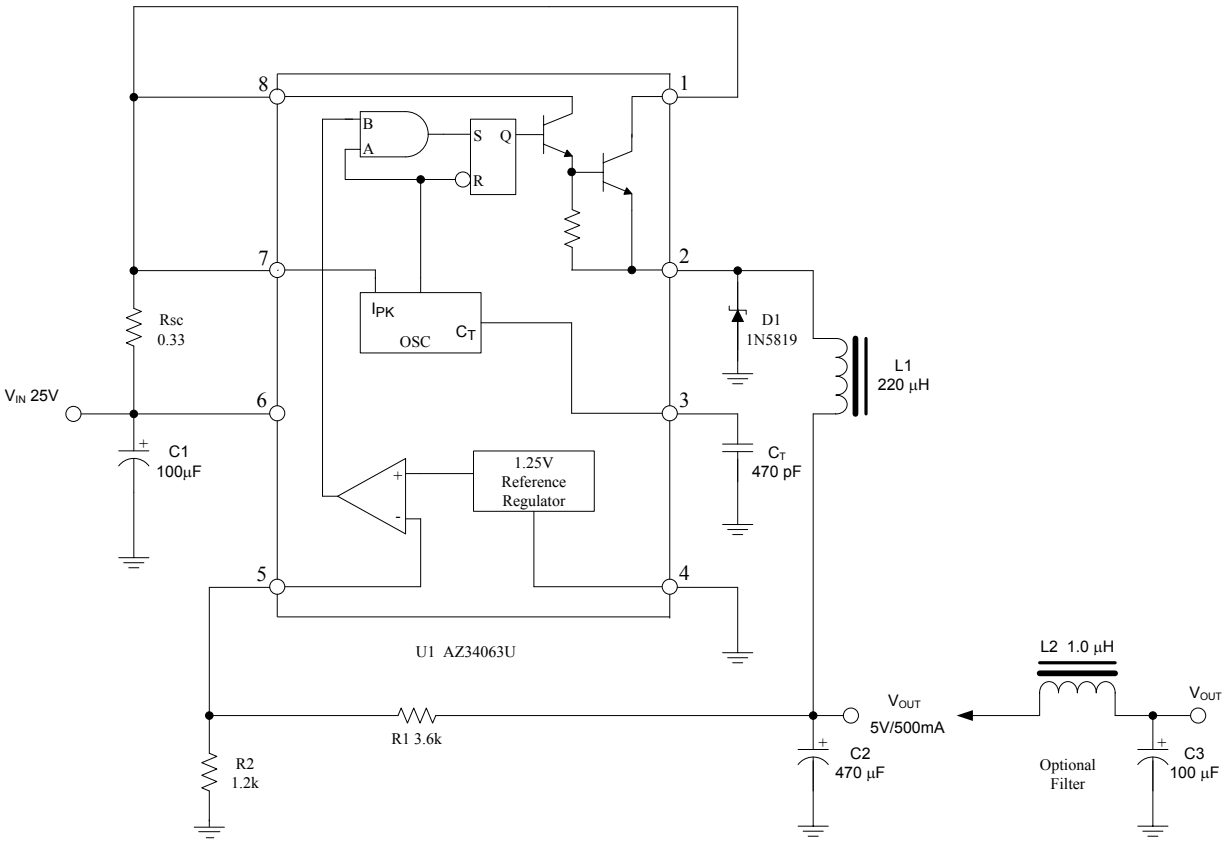
Typical Applications Circuit



Step-Up Converter (Note 4)

Note: 4. This is a typical step-up converter configuration. In the steady state, if the resistor divider voltage at pin 5 is greater than the voltage in the non-inverting input, which is 1.25V determined by the internal reference, the output of the comparator will go low. At the next switching period, the output switch will not conduct and the output voltage will eventually drop below its nominal voltage until the divider voltage at pin 5 is lower than 1.25V. Then the output of the comparator will go high, the output switch will be allowed to conduct. Since $V_{PIN5} = V_{OUT}*R2/(R1+R2) = 1.25(V)$, the output voltage can be decided by $V_{OUT} = 1.25*(R1+R2)/R2(V)$.

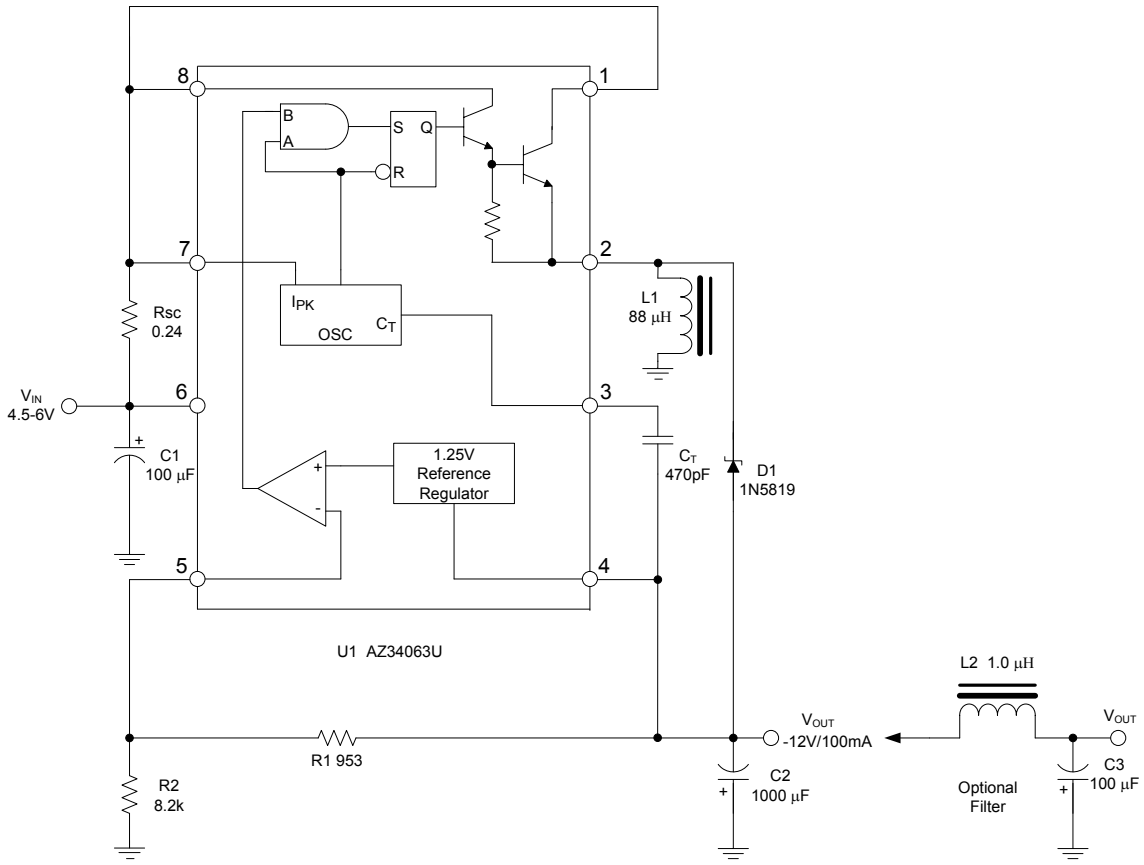
Typical Applications Circuit (continued)



Step-Down Converter (Note 5)

Note: 5. This is a typical step-down converter configuration. The working process in the steady state is similar to step-up converter, $V_{PIN5} = V_{OUT}*R2/(R1+R2) = 1.25(V)$, the output voltage can be decided by $V_{OUT} = 1.25*(R1+R2)/R2(V)$.

Typical Applications Circuit (continued)



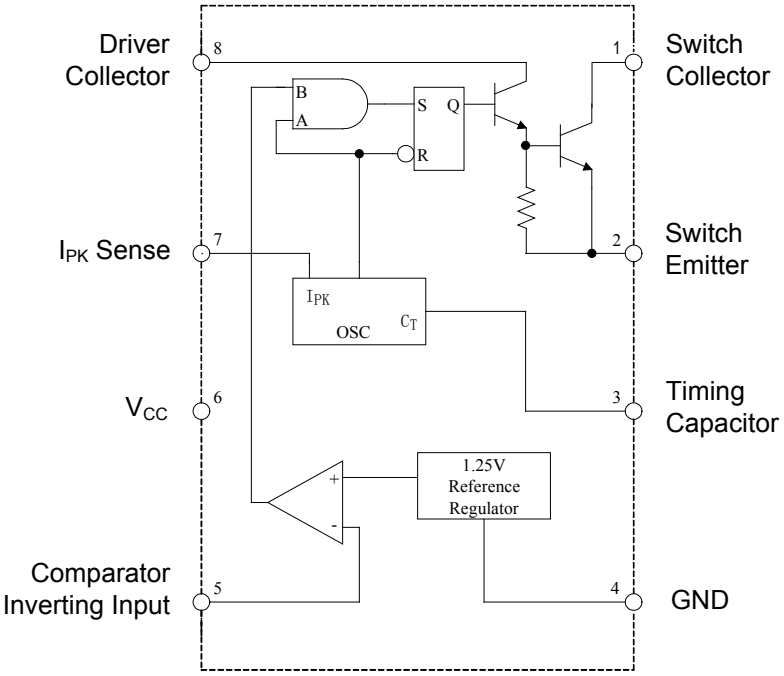
Voltage Inverting Converter (Note 6)

Note: 6. This is a typical inverting converter configuration. The working process in the steady state is similar to step-up converter, the difference in this situation is that the voltage at the non-inverting pin of the comparator is equal to 1.25V+V_{OUT}, then V_{PIN5} = V_{OUT}*R2/(R1+R2) = 1.25V+V_{OUT}, so the output voltage can be decided by V_{OUT} = -1.25*(R1+R2)/R1(V).

Pin Descriptions

Pin Number	Pin Name	Function
1	Switch Collector	Internal switch transistor collector
2	Switch Emitter	Internal switch transistor emitter
3	Timing Capacitor	Timing Capacitor to control the switching frequency
4	GND	Ground pin for all internal circuits
5	Comparator Inverting Input	Inverting input pin for internal comparator
6	V_{CC}	Voltage supply
7	I_{PK} Sense	Peak Current Sense Input by monitoring the voltage drop across an external current sense resistor to limit the peak current through the switch
8	Driver Collector	Voltage driver collector

Functional Block Diagram



Absolute Maximum Ratings (Note 7)

Symbol	Parameter		Rating	Unit
V_{CC}	Power Supply Voltage		40	V
V_{IR}	Comparator Input Voltage Range		-0.3 to 40	V
$V_{C(switch)}$	Switch Collector Voltage		40	V
$V_{E(switch)}$	Switch Emitter Voltage ($V_{PIN\ 1}$ = 40V)		40	V
$V_{CE(switch)}$	Switch Collector to Emitter Voltage		40	V
$V_{C(driver)}$	Driver Collector Voltage		40	V
$I_{C(driver)}$	Driver Collector Current (Note 8)		100	mA
I_{SW}	Switch Current		1.5	A
P_D	Power Dissipation (T_A = +25°C)	PDIP-8	1.25	W
		SO-8	780	mW
θ_{JA}	Thermal Resistance	PDIP-8	100	°C/W
		SO-8	160	
T_J	Operating Junction Temperature		+150	°C
T_{LEAD}	Lead Temperature (Soldering, 10s)		+260	°C
T_{STG}	Storage Temperature Range		-65 to +150	°C
—	ESD (Human Body Model)		2000	V

Notes: 7. Stresses greater than those listed under “Absolute Maximum Ratings” may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated under “Recommended Operating Conditions” is not implied. Exposure to “Absolute Maximum Ratings” for extended periods may affect device reliability.
8. Maximum package power dissipation limits must be observed.

Recommended Operating Conditions

Symbol	Parameter	Min	Max	Unit
V_{CC}	Supply Voltage	3	36	V
T_A	Ambient Temperature	-40	+85	°C

Electrical Characteristics (@ V_{CC} = 5.0V, T_A = -40 to +85°C, unless otherwise specified.)

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
OSCILLATOR						
f_{OSC}	Frequency	V_{PIN5} = 0V, C_T = 1.0nF T_A = +25°C	30	38	45	KHz
I_{CHG}	Charge Current	V_{CC} = 5.0V to 36V, T_A = +25°C	30	38	45	µA
I_{DISCHG}	Discharge Current	V_{CC} = 5.0V to 36V, T_A = +25°C	180	240	290	µA
I_{DISCHG}/I_{CHG}	Discharge to Charge Current Ratio	Pin 7 to V_{CC}, T_A = +25°C	5.2	6.5	7.5	—
$V_{IPK(sense)}$	Current Limit Sense Voltage	I_{CHG} = I_{DISCHG}, T_A = +25°C	250	300	350	mV
OUTPUT SWITCH (Note 9)						
$V_{CE(sat)}$	Saturation Voltage, Dalington Connection	I_{SW} = 1.0A, Pins 1, 8 connected, Common Emitter	—	1.0	1.3	V
$V_{CE(sat)}$	Saturation Voltage (Note 10)	I_{SW} = 1.0A, R_{PIN8} = 82Ω to V_{CC}, Forced β = 20, Common Emitter	—	0.45	0.7	V
h_{FE}	DC Current Gain	I_{SW} = 1.0A, V_{CE} = 5.0V, T_A = +25°C	50	75	—	—
$I_{C(off)}$	Collector Off-State Current	V_{CE} = 36V	—	0.01	100	µA
COMPARATOR						
V_{TH}	Threshold Voltage	T_A = +25°C	1.225	1.250	1.275	V
		T_A = -40 to +85°C	1.21	1.250	1.29	
R_{EGLINE}	Threshold Voltage Line Regulation	V_{CC} = 3.0V to 36V	—	1.4	5	mV
I_{IB}	Input Bias Current	V_{IN} = 0V	—	-20	-400	nA
TOTAL DEVICE						
I_{CC}	Supply Current	V_{CC} = 5.0V to 36V, C_T = 1.0nF, V_{PIN7} = V_{CC}, V_{PIN5}>V_{TH}, V_{PIN2} = GND, other pins open	—	—	4	mA

Notes: 9. Low duty cycle pulse technique are used during test to maintain junction temperature as close to ambient temperature as possible.

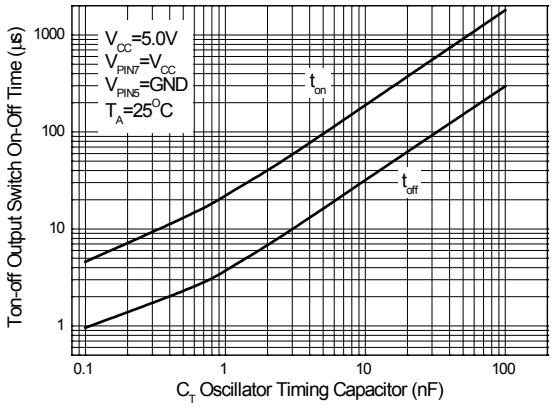
10. If the output switch is driven into hard saturation (non-Darlington configuration) at low switch currents (≤300mA) and high driver currents (≥30mA), it may take up to 2.0µs for it to come out of saturation. This condition will shorten the off time at frequencies 30KHz, and is magnified at high temperatures. This condition does not occur with a Darlington configuration, since the output switch cannot saturate. If a non-Darlington configuration is used, the following output drive condition is recommended:

Forced β of output switch: $$\frac{I_C output}{I_C driver - 7.0mA*} \geq 10$$

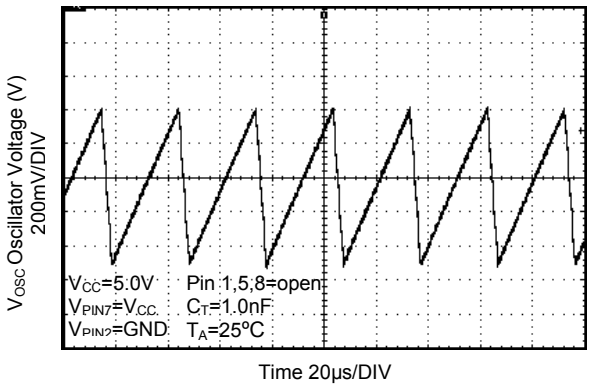
* The 100Ω resistor in the emitter of the driver device requires about 7.0mA before the output switch conducts.

Performance Characteristics (V_{CC} = 5.0V, T_A = +25°C, unless otherwise specified.)

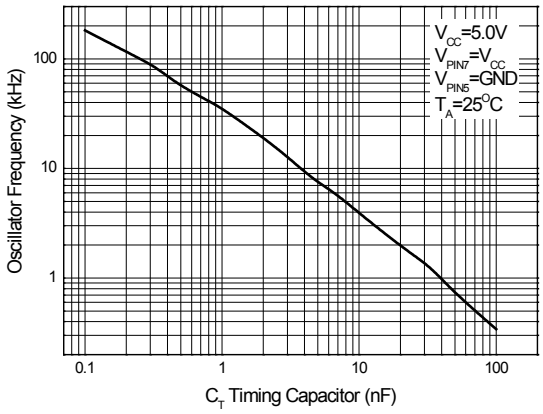
Output Switch On-Off Time vs. Oscillator Timing Capacitor



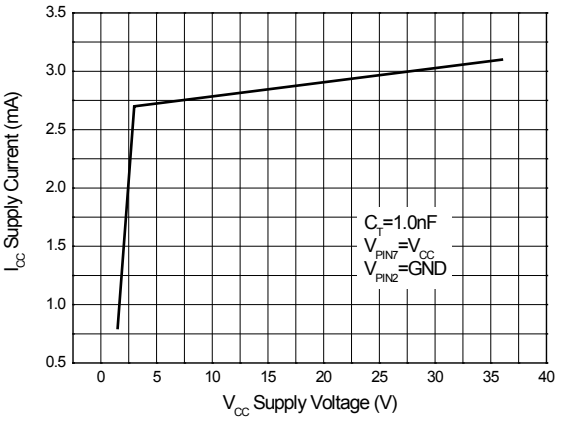
Timing Capacitor Waveform



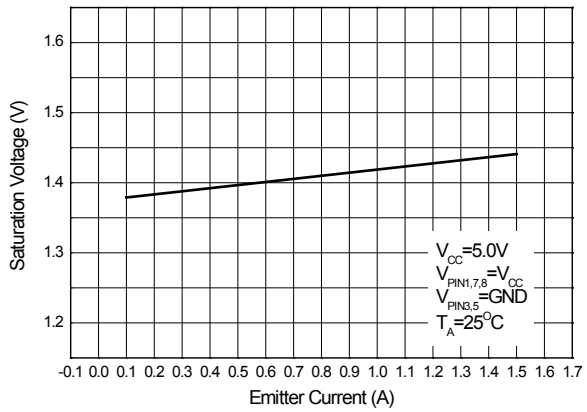
Oscillator Frequency vs. Timing Capacitor



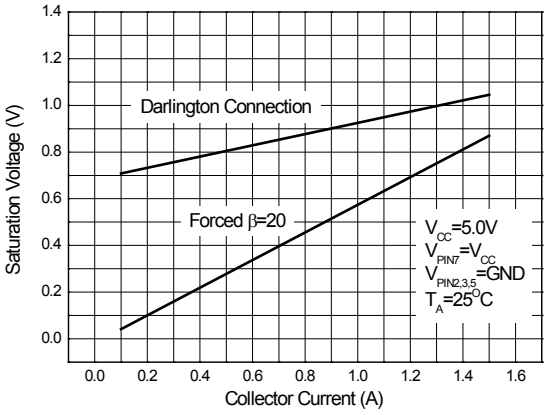
Standard Supply Current vs. Supply Voltage



Emitter Follower Configuration Output Saturation Voltage vs. Emitter Current

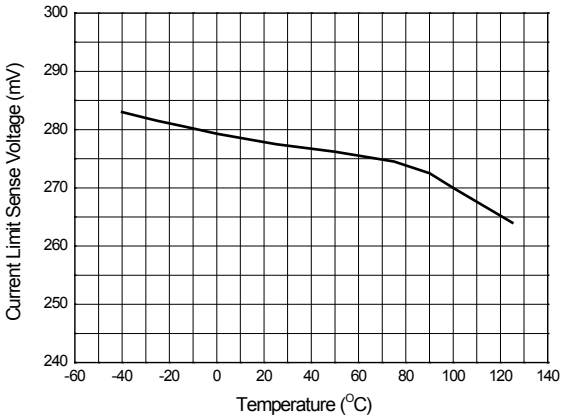


Common Emitter Configuration Output Switch Saturation Voltage vs. Collector Current

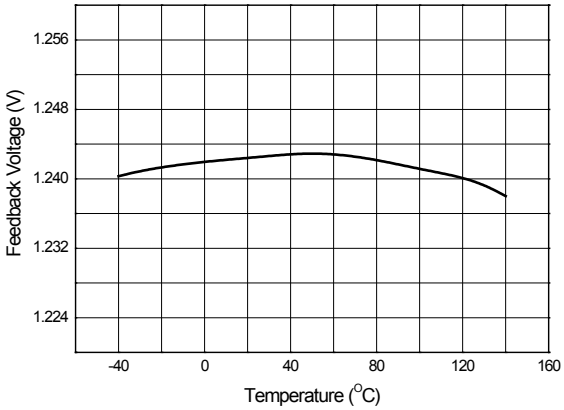


Performance Characteristics (continued) (V_{CC} = 5.0V, T_A = +25°C, unless otherwise specified.)

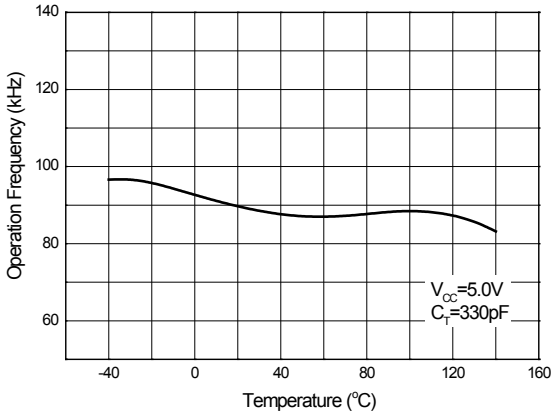
Current Limit Sense Voltage vs. Temperature



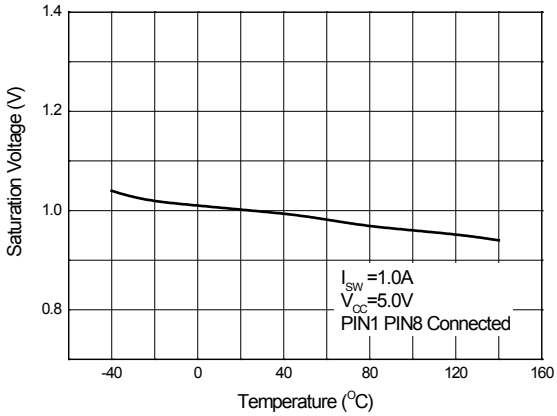
Feedback Voltage vs. Temperature



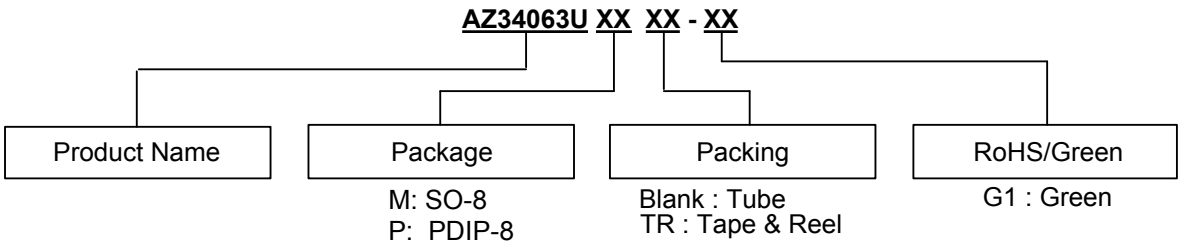
Operation Frequency vs. Temperature



Saturation Voltage vs. Temperature



Ordering Information (Note 12)



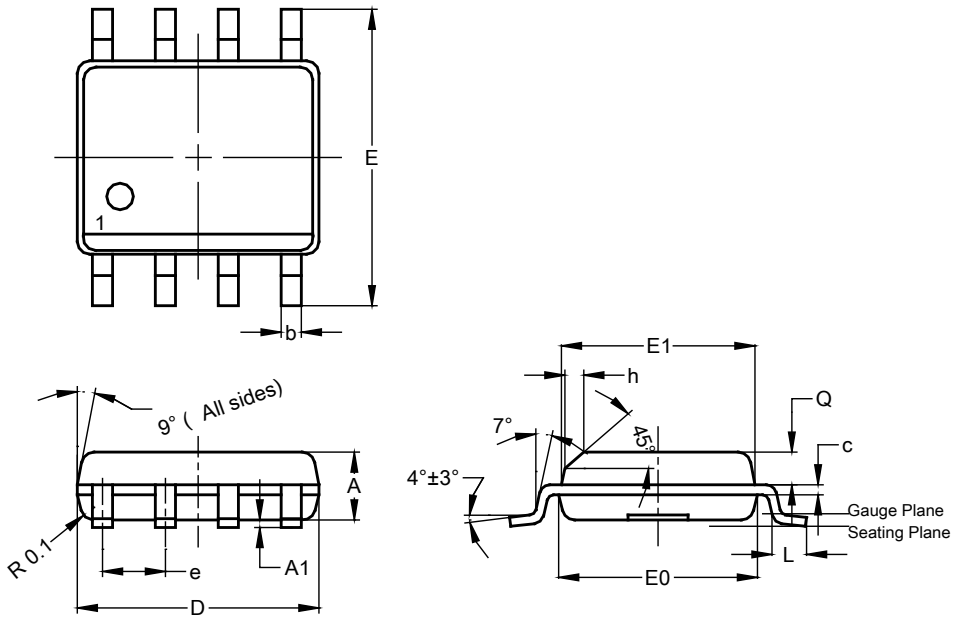
Package	Temperature Range	Part Number	Marking ID	Packing	Quantity	Status (Note 11)
SO-8	-40 to +85ºC	AZ34063UMTR-G1	34063UM-G1	Tape & Reel	4000	Active
PDIP-8	-40 to +85ºC	AZ34063UP-G1	AZ34063UP-G1	Tube	50	EOL

Notes: 11. AZ34063UP-G1 is EOL and AZ34063UMTR-G1 is active. For recommended alternatives to EOL devices, contact us at: https://www.diodes.com/about/contact-us/
12. For packaging details, go to our website at https://www.diodes.com/design/support/packaging/diodes-packaging/.

Package Outline Dimensions

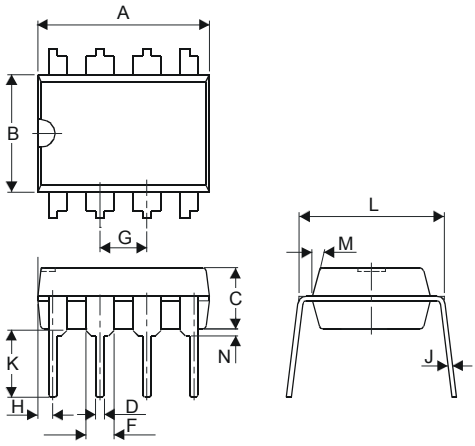
Please see http://www.diodes.com/package-outlines.html for the latest version.

SO-8



SO-8			
Dim	**Min**	**Max**	**Typ**
A	1.40	1.50	1.45
A1	0.10	0.20	0.15
b	0.30	0.50	0.40
c	0.15	0.25	0.20
D	4.85	4.95	4.90
E	5.90	6.10	6.00
E1	3.80	3.90	3.85
E0	3.85	3.95	3.90
e	--	--	1.27
h	-	--	0.35
L	0.62	0.82	0.72
Q	0.60	0.70	0.65
All Dimensions in mm			

PDIP-8

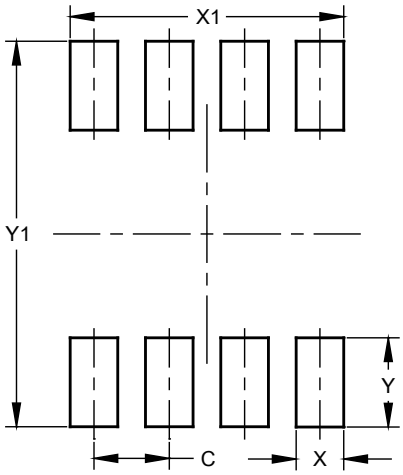


PDIP-8		
Dim	**Min**	**Max**
A	9.02	9.53
B	6.15	6.35
C	3.10	3.50
D	0.36	0.56
F	1.40	1.65
G	2.54 typ.	
H	0.71	0.97
J	0.20	0.36
K	2.92	3.81
L	7.62	8.26
M	-	15°
N	0.38 (min)	
All Dimensions in mm		

Suggested Pad Layout

Please see http://www.diodes.com/package-outlines.html for the latest version.

SO-8



Dimensions	Value (in mm)
C	1.27
X	0.802
X1	4.612
Y	1.505
Y1	6.50

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