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MC34063ADR-TP

1.2 A, Step-Up/Down/Inverting Switching Regulators

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Features

- Operation from 3.0V to 40V
- Short circuit current limiting
- Low standby current
- Output switch current of 1.2A without external transistors
- Frequency of operation from 100Hz to 100kHz
- Step-up, step-down or inverting switch regulators
- package: SOP8

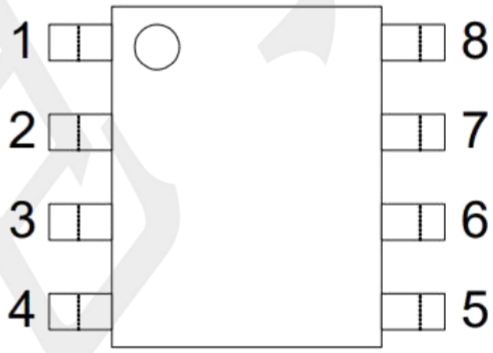
Applications

- Battery Chargers
- NICs / Switches / Hubs
- LCD TV
- DSL Modem
- Access Point Router
- Negative Voltage Power Supplies
- Set Top Box

General Description

The is a monolithic regulator subsystem, intended for use as DC to DC converter. This device contains a temperature compensated band gap reference, a duty-cycle control oscillator, driver and high current output switch. It can be used for step down, step-up or inverting switching regulators as well as for series pass regulators.

Pinout (top view)



SOP8

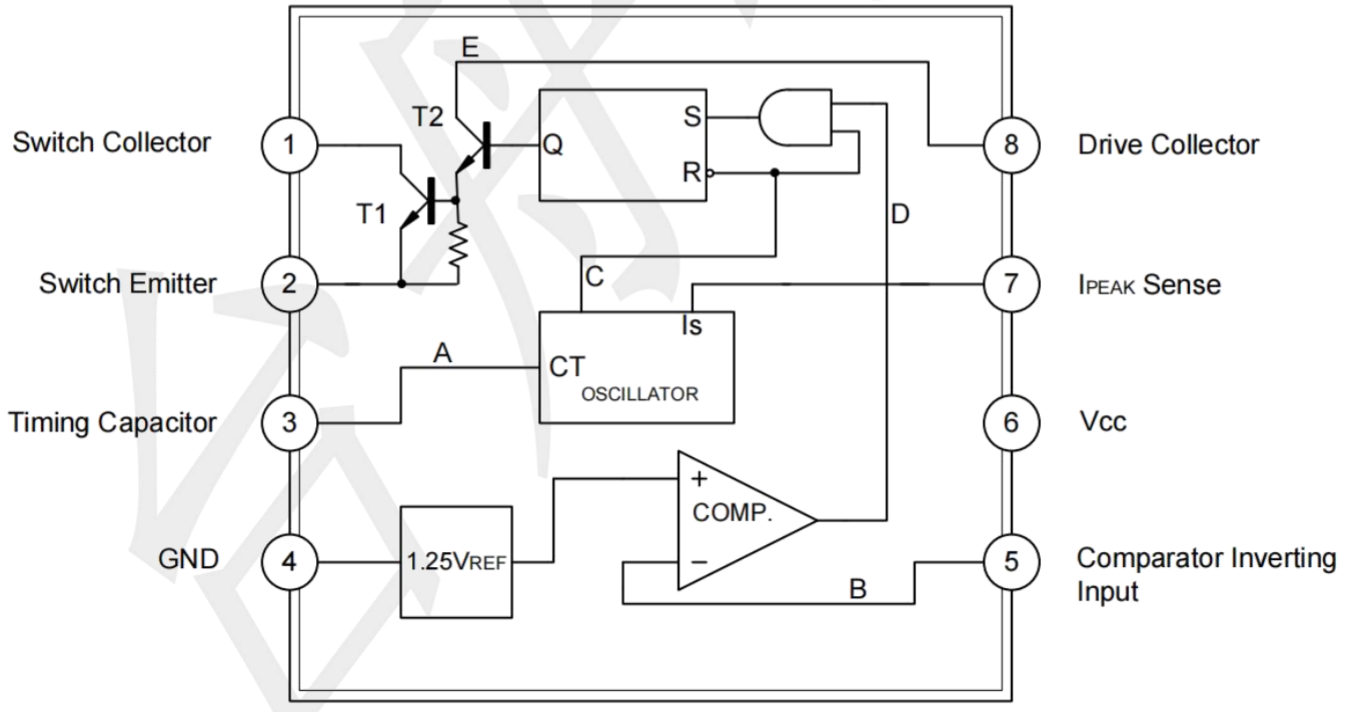
Pin Configurations

Pin Number	Pin Name	Pin Function
1	SC	Internal Darlington pairs T1 collector
2	SE	Internal Darlington pairs T1 emitter
3	CT	The value of selected capacitor controls the internal oscillator run rate
4	GND	Analog ground pin.
5	CII	Inverting input of comparator which can set & initiate the Darlington pairs output switch
6	VCC	Power Supply Input.
7	Ipk	Current sense input to monitor the voltage drop across an external resistor placed in series with V_{CC}
8	DC	Internal Darlington pairs T1 collector

Absolute Maximum Ratings (T_A=25°C, unless otherwise specified.)

PARAMETER	SYMBOL	RATINGS	UNIT
Supply Voltage	V_{CC}	40	V
Comparator Input Voltage	$V_{IN(COMP)}$	-0.3 ~ +40	V
Switch Collector Voltage	$V_{C(SW)}$	40	V
Switch Emitter Voltage	$V_{E(SW)}$	40	V
Switch Collector to Emitter Voltage	$V_{CE(SW)}$	40	V
Driver Collector Voltage	$V_{C(DR)}$	40	V
Switch Current	I_{SW}	1.2	A
Power Dissipation (T_A=25°C)	P_D	625	mW
Junction-to-Ambient	θJA	160	°C/W
Junction Temperature	T_J	+150	°C
Operating Temperature	TOPR	0 ~ +70	°C
Storage Temperature	TSTG	-65 ~ +150	°C

BLOCK DIAGRAM



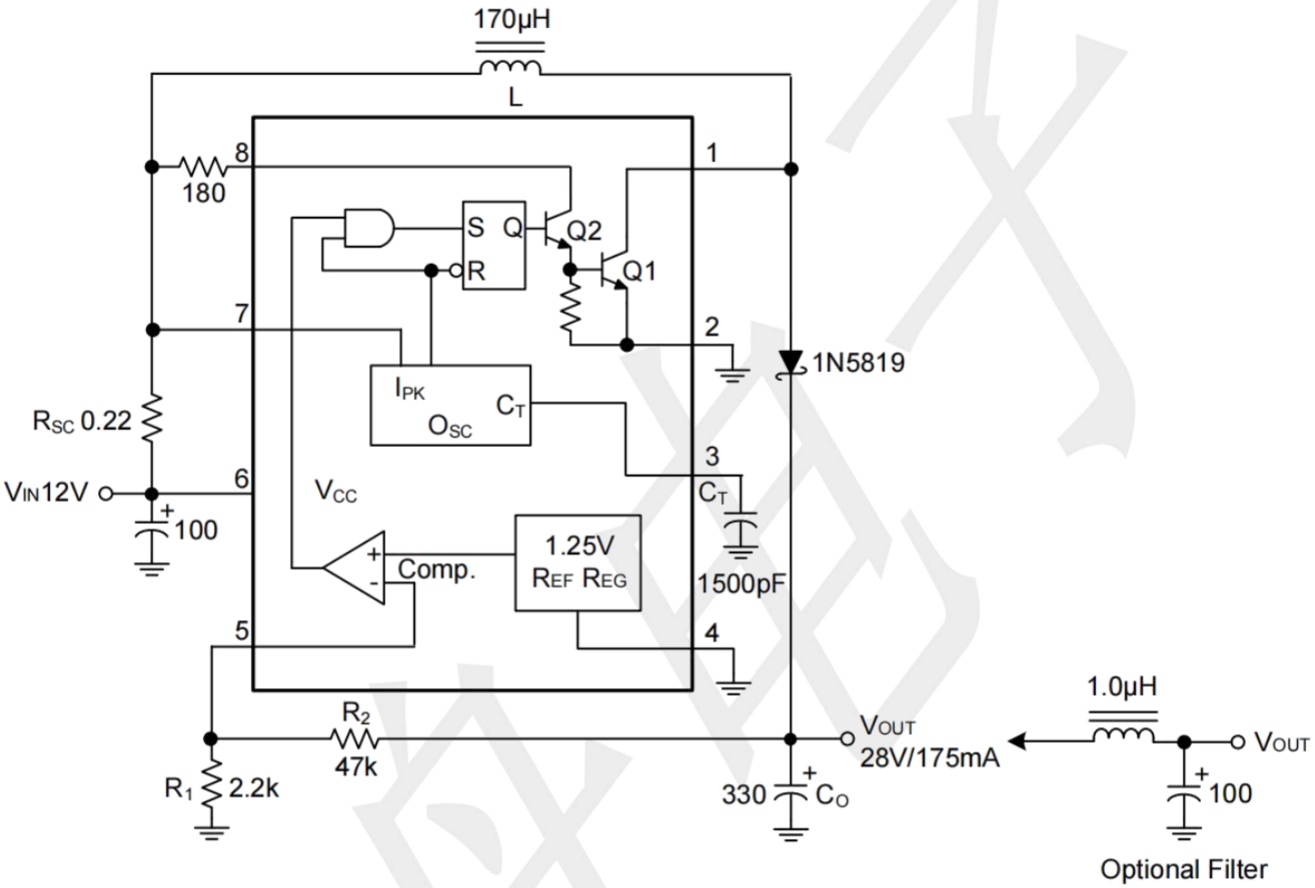
Electrical Characteristics

(V_{CC}=5.0V, T_A=0~+70°C, unless otherwise specified)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
OSCILLATOR						
Maximum Oscillator Frequency	F_{OSC}	V_{PIN} 5=0V, CT=1.0nF, T_A=25°C	24	--	42	kHz
Charging Current	I_{CHG}	V_{CC}=5 to 40V, T_A=25°C	22	31	42	μA
Discharging Current	I_{DISCHG}	V_{CC}=5 to 40V, T_A=25°C	140	190	260	μA
Oscillator Amplitude	V_{OSC}	T_A=25°C	--	0.5	--	V
Discharge to Charge Current Ratio	K	V_7=V_{CC}, T_A=25°C	5.2	6.1	7.5	--
Current limit Sense Voltage	V_{SENSE}	I_{CHG}=I_{DISCHG}, T_A=25°C	250	300	350	mV
OUTPUT SWITCH						
Saturation Voltage 1 (Note)	$V_{CE(SAT)1}$	I_{SW}=1.0A, $V_{C(DRIVER)}$=$V_{C(SW)}$	--	1.0	1.3	V
Saturation Voltage 2 (Note)	$V_{CE(SAT)2}$	I_{SW}=1.0A, $V_{C(DRIVER)}$=50mA	--	0.45	0.7	V
DC Current Gain (Note)	$G_{I\ (DC)}$	I_{SW}=1.0A, V_{CE}=5.0V, T_A=25°C	50	120	--	--
Collector Off State Current (Note)	$I_{C(OFF)}$	V_{CE}=40.0V, T_A=25°C	--	0.01	100	μA
COMPARATOR						
Threshold Voltage	V_{THD}	T_A=25°C	1.23	1.25	1.27	V
		T_A=0~70°C	1.21	1.25	1.29	V
Threshold Voltage Line Regulation	V_{THD}	V_{CC}=3 ~ 40V	--	2.0	5.0	mV
Input Bias Current	$I_{I(BIAS)}$	V_{IN}=0V	--	50	400	nA
TOTAL DEVICE						
Supply Current	I_{CC}	V_{CC}=5~40V, C_T=0.001 V_7=V_{CC}, V_C>V_{THD}, Pin2=GND	--	2.5	4.0	mA

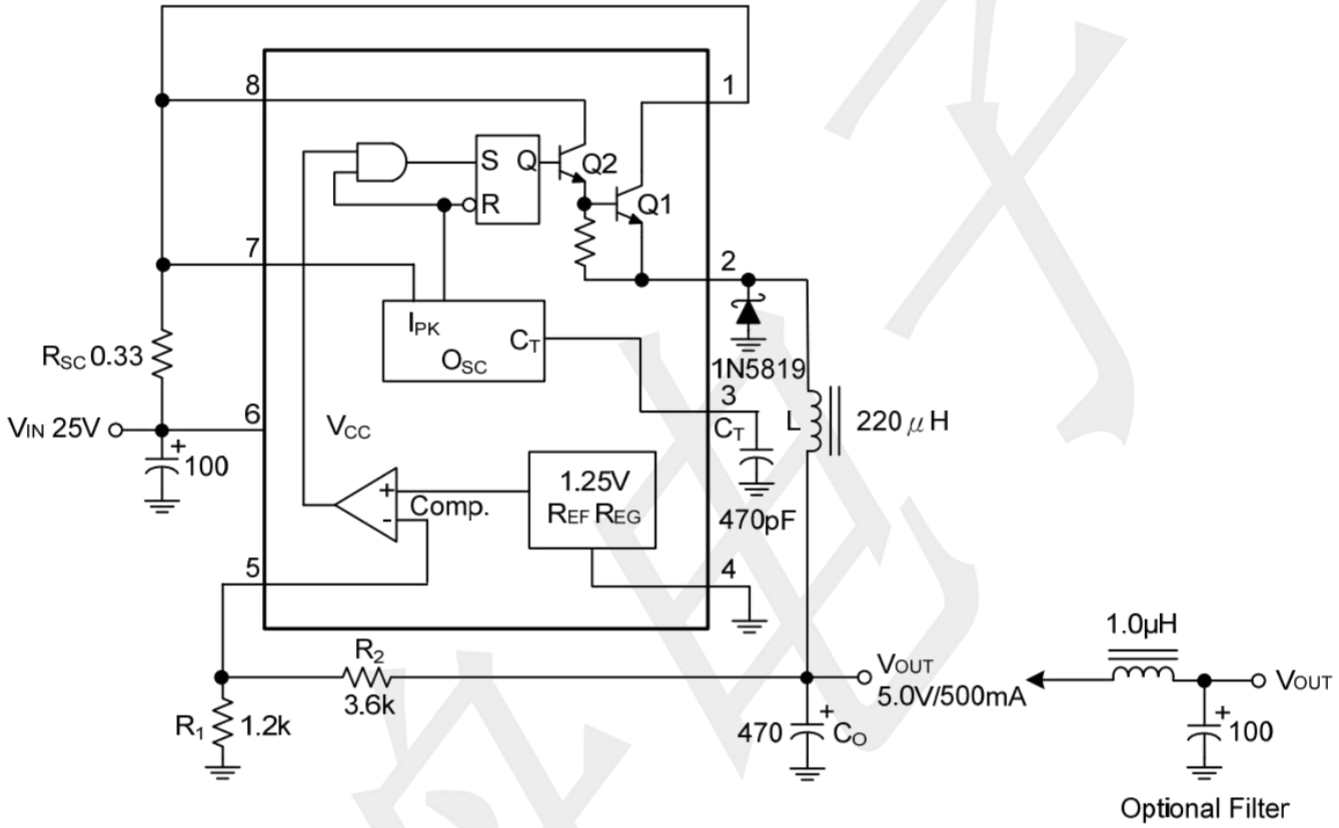
Note: Output switch tests are performed under pulsed conditions to minimize power dissipation.

STEP-UP CONVERTER



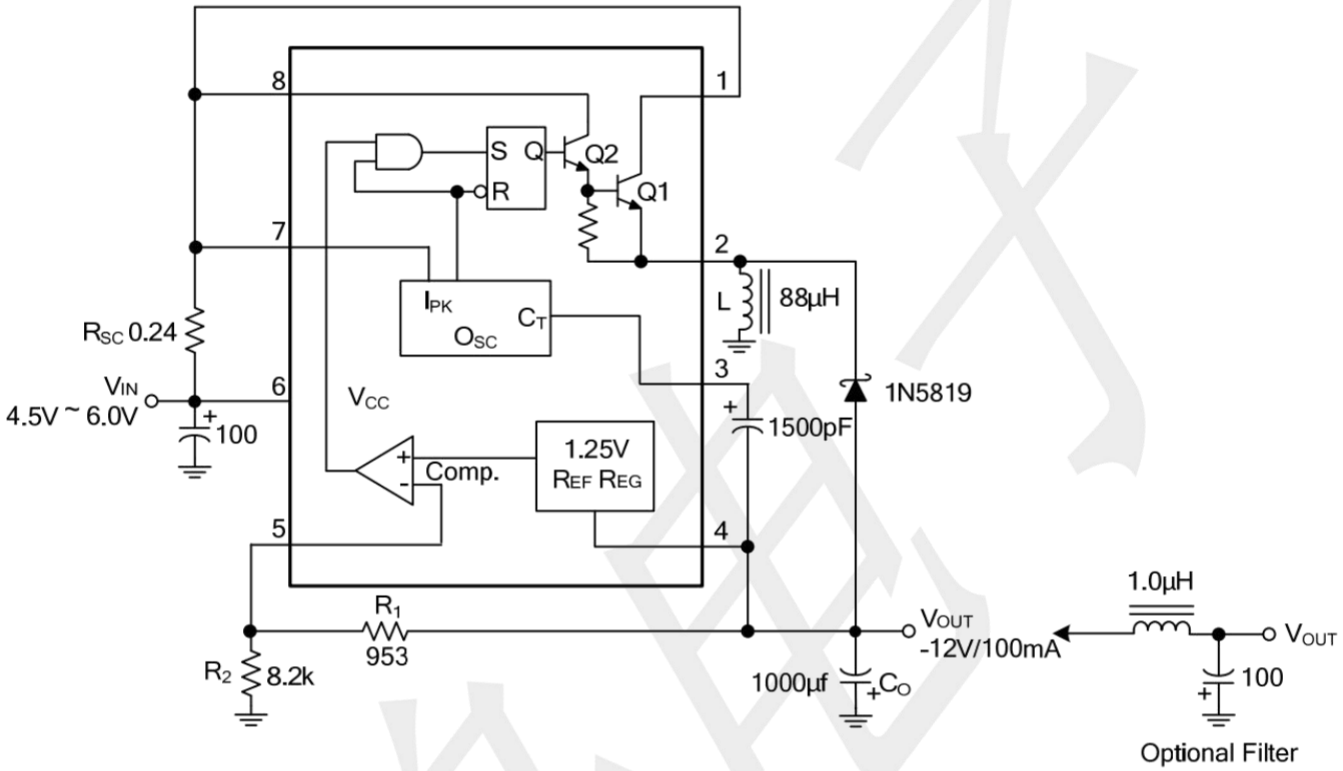
TEST	CONDITIONS	RESULTS
Line Regulation	V_{IN} = 8.0V ~ 16V, I_{OUT} = 175mA	30mV = ±0.05%
Load Regulation	V_{IN} = 12V, I_{OUT} = 75mA ~ 175mA	10mV = ±0.017%
Output Ripple	V_{IN} = 12V, I_{OUT} = 175mA	400mV_{P-P}
Efficiency	V_{IN} = 12V, I_{OUT} = 175mA	87.7%
Output Ripple With Optional Filter	V_{IN} = 12V, I_{OUT} = 175mA	40mV_{P-P}

STEP-DOWN CONVERTER



TEST	CONDITIONS	RESULTS
Line Regulation	V_{IN} = 15V ~ 25V, I_{OUT} = 500mA	12mV = ±0.12%
Load Regulation	V_{IN} = 25V, I_{OUT} = 50mA ~ 500mA	3.0mV = ±0.03%
Output Ripple	V_{IN} = 25V, I_{OUT} = 500mA	120mV$_{P-P}$
Short Circuit Current	V_{IN} = 25V, R_L = 0.1Ω	1.1A
Efficiency	V_{IN} = 25V, I_{OUT} = 500mA	83.7%
Output Ripple With Optional Filter	V_{IN} = 25V, I_{OUT} = 500mA	40mV$_{P-P}$

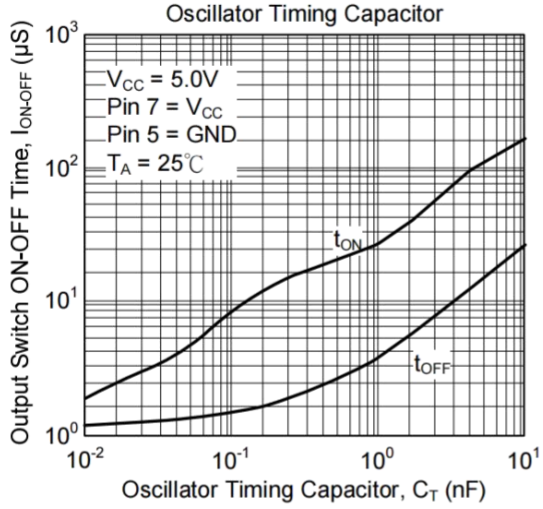
VOLTAGE INVERTING CONVERTER



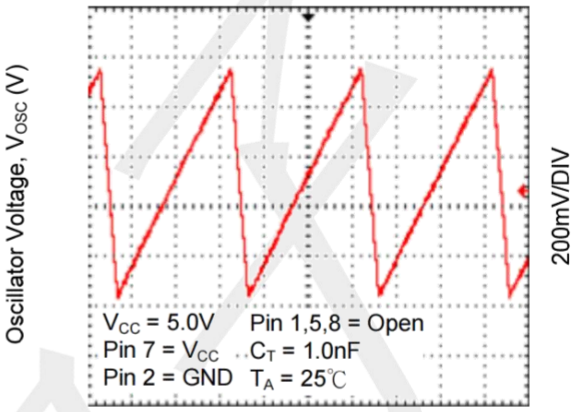
TEST	CONDITIONS	RESULTS
Line Regulation	V_{IN} = 4.5V ~ 6.0V, I_{OUT} = 100mA	3.0mV = ±0.012%
Load Regulation	V_{IN} = 5.0V, I_{OUT} = 10mA ~ 100mA	0.022V = ±0.09%
Output Ripple	V_{IN} = 5.0V, I_{OUT} = 100mA	500mV_{P-P}
Short Circuit Current	V_{IN} = 5.0V, R_L = 0.1Ω	910mA
Efficiency	V_{IN} = 5.0V, I_{OUT} = 100mA	62.2%
Output Ripple With Optional Filter	V_{IN} = 5.0V, I_{OUT} = 100mA	70mV_{P-P}

TYPICAL CHARACTERISTICS

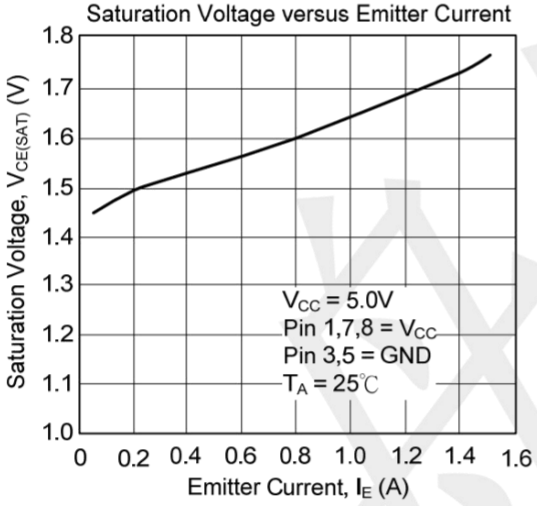
Output Switch ON-OFF Time versus Oscillator Timing Capacitor



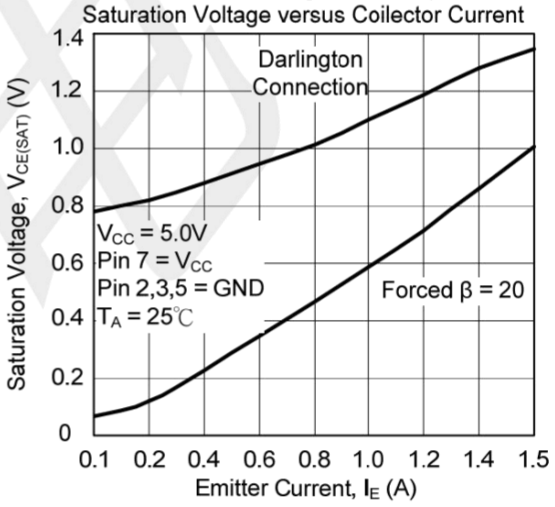
Timing Capacitor Waveform



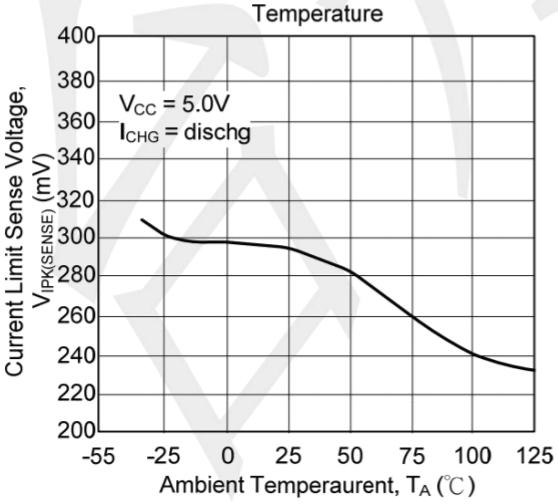
Emitter Follower Configuration Output Saturation Voltage versus Emitter Current



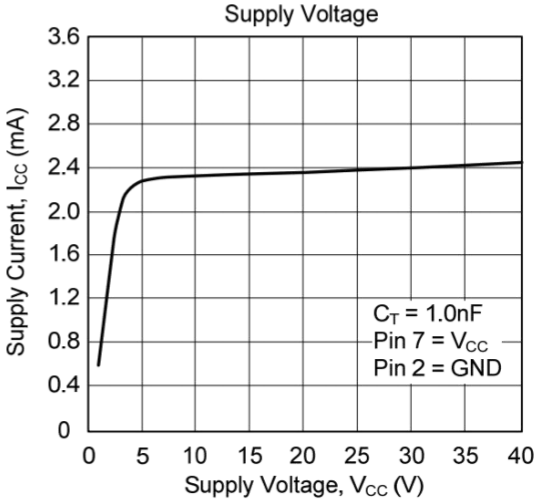
Common Emitter Configuration Output Switch Saturation Voltage versus Coilector Current



Current Limit Sense Voltage versus Temperature



Standby Supply Current versus Supply Voltage



Package Outline Dimensions (unit: mm)

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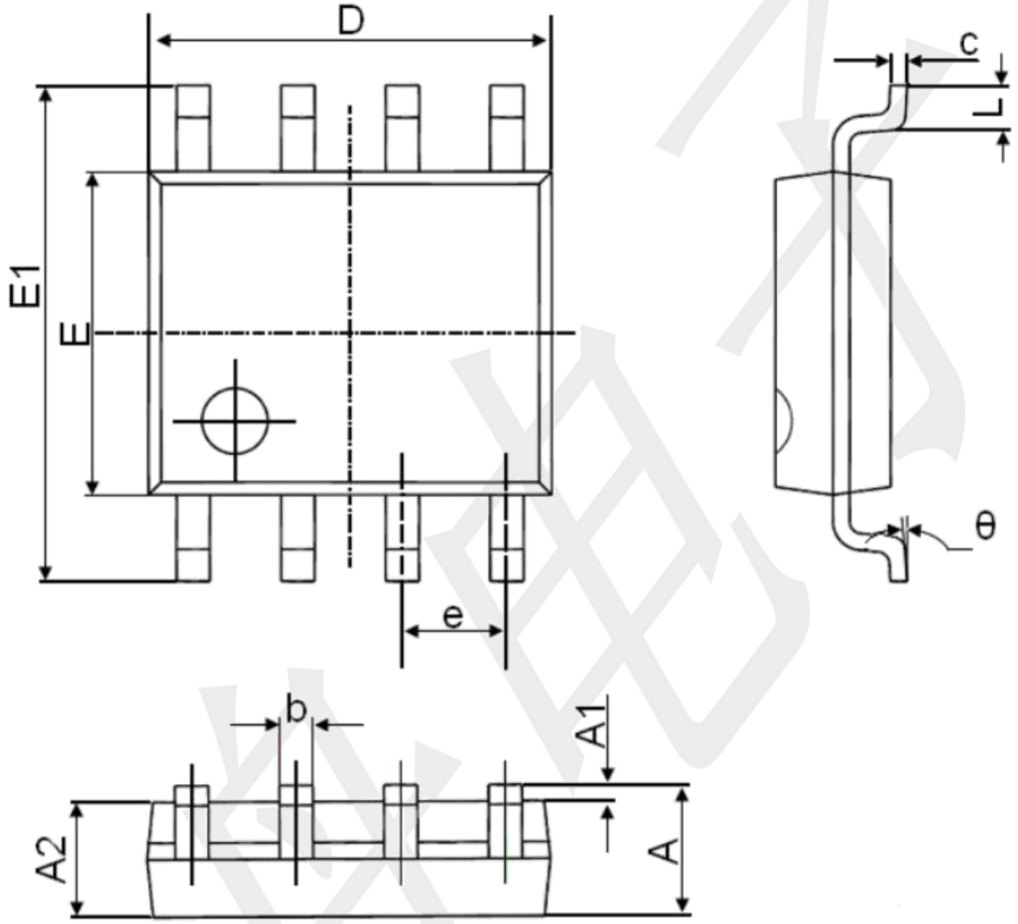

Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	1.350	1.750	0.053	0.069
A1	0.100	0.250	0.004	0.010
A2	1.350	1.550	0.053	0.061
b	0.330	0.510	0.013	0.020
c	0.170	0.250	0.006	0.010
D	4.700	5.100	0.185	0.200
E	3.800	4.000	0.150	0.157
E1	5.800	6.200	0.228	0.244
e	1.270(BSC)		0.050(BSC)	
L	0.400	1.270	0.016	0.050
θ	0°	8°	0°	8°