
High Voltage Low Power Consumption LDO

MD85XX Series

CMOS Voltage Regulator

300mA



MD85XX is a high voltage low power low dropout voltage regulator (LDO) manufactured in CMOS processes. It can deliver up to 300mA of current while consuming only 2.4 μ A of quiescent current, at the same time with high input voltage capacity it can be up to 40V, suitable for applications which requires higher voltage circuit.

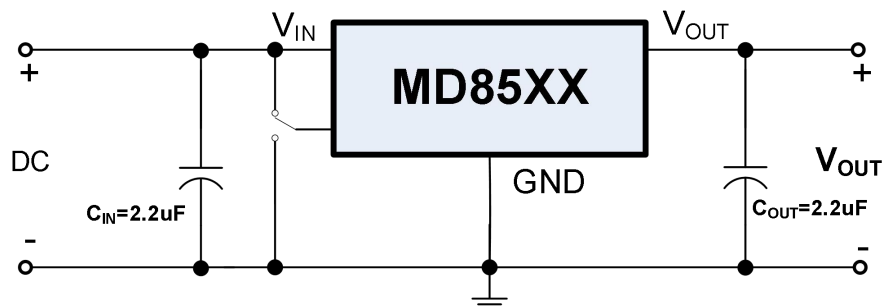
■ Features

- Output Voltage Highly Accurate: $\pm 2\%$
- Dropout Voltage: 4.5mV@ $I_{OUT}=1mA$
- Low Quiescent Current: 2.4 μ A
- Temperature Stability: $\pm 100ppm/^{\circ}C$
- Maximum Input Voltage: 40V
- Current Limit Protection
- Thermal Shutdown Protection

■ Applications

- Automotive electronics
- Intelligent meters and instruments
- Industrial control

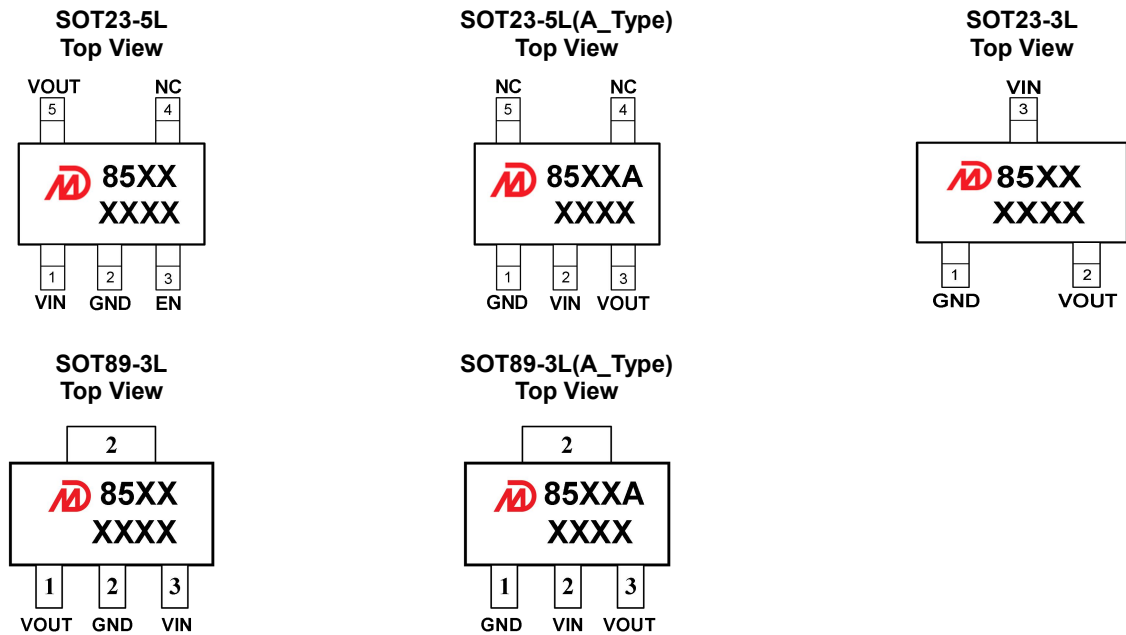
■ Typical Applications



■ Notes on Use

1. Input Capacitor (C_{IN}): 2.2 μ F above.
2. Output Capacitor (C_{OUT}): 2.2 μ F above.

■ Pin Configuration and Functions



Note: "XXXX" in the second line of the silk print indicates the product batch number.

■ Product Selections

Product Name	V _{OUT} (V)	Package	Ordering Name	Marking	Package Information
MD8530	3.0	SOT23-5L	MD85E30QC3	8530 XXXX	Tape and Reel, 3000pcs
MD8533	3.3	SOT23-5L	MD85E33QC3	8533 XXXX	
MD8536	3.6	SOT23-5L	MD85E36QC3	8536 XXXX	
MD8550	5.0	SOT23-5L	MD85E50QC3	8550 XXXX	
MD8580	8.0	SOT23-5L	MD85E80QC3	8580 XXXX	
MD8530A	3.0	SOT23-5L	MD85A30QC3	8530A XXXX	Tape and Reel, 3000pcs
MD8533A	3.3	SOT23-5L	MD85A33QC3	8533A XXXX	
MD8536A	3.6	SOT23-5L	MD85A36QC3	8536A XXXX	
MD8550A	5.0	SOT23-5L	MD85A50QC3	8550A XXXX	
MD8530	3.0	SOT23-3L	MD85E30QA3	8530 XXXX	Tape and Reel, 3000pcs
MD8533	3.3	SOT23-3L	MD85E33QA3	8533 XXXX	
MD8535	3.5	SOT23-3L	MD85E35QA3	8535 XXXX	
MD8536	3.6	SOT23-3L	MD85E36QA3	8536 XXXX	

MD85XX Series
High Voltage Low Power Consumption LDO

MD8550	5.0	SOT23-3L	MD85E50QA3	 8550 XXXX	Tape and Reel, 1000pcs
MD8530	3.0	SOT89-3L	MD85E30PA1	 8530 XXXX	
MD8533	3.3	SOT89-3L	MD85E33PA1	 8533 XXXX	
MD8536	3.6	SOT89-3L	MD85E36PA1	 8536 XXXX	
MD8540	4.0	SOT89-3L	MD85E40PA1	 8540 XXXX	
MD8544	4.4	SOT89-3L	MD85E44PA1	 8544 XXXX	
MD8550	5.0	SOT89-3L	MD85E50PA1	 8550 XXXX	
MD8553	5.3	SOT89-3L	MD85E53PA1	 8553 XXXX	
MD8557	5.7	SOT89-3L	MD85E57PA1	 8557 XXXX	
MD85C0	12.0	SOT89-3L	MD85EC0PA1	 85C0 XXXX	
MD85F0	15.0	SOT89-3L	MD85EF0PA1	 85F0 XXXX	
MD8530A	3.0	SOT89-3L	MD85A30PA1	 8530A XXXX	Tape and Reel, 1000pcs
MD8533A	3.3	SOT89-3L	MD85A33PA1	 8533A XXXX	
MD8536A	3.6	SOT89-3L	MD85A36PA1	 8536A XXXX	
MD8540A	4.0	SOT89-3L	MD85A40PA1	 8540A XXXX	
MD8544A	4.4	SOT89-3L	MD85A44PA1	 8544A XXXX	
MD8550A	5.0	SOT89-3L	MD85A50PA1	 8550A XXXX	
MD8553A	5.3	SOT89-3L	MD85A53PA1	 8553A XXXX	
MD8557A	5.7	SOT89-3L	MD85A57PA1	 8557A XXXX	
MD85C0A	12.0	SOT89-3L	MD85AC0PA1	 85C0A XXXX	
MD85F0A	15.0	SOT89-3L	MD85AF0PA1	 85F0A XXXX	

Notes:

- 1* Customer can request to customize the output voltage ranged from 1.8V to 15V if desired voltage is not found in the selections.
- 2* Customer can request customization of package choice.
- 3* Please pay attention to the Marking of the product package type.

■ **Absolute Maximum Ratings**

(Unless otherwise indicated: Ta=25°C)

PARAMETER	SYMBOL	RATINGS	UNITS
Input Voltage	VIN	-0.3 ~ 45	V
Output Voltage	VOOUT	Vss-0.3 ~ VIN+0.3V	
Power Dissipation	PD	SOT89-3 1000	mW
		SOT23-3 250	
		SOT23-5 250	
Thermal Resistance	θJC	SOT89-3 100	°C/W
		SOT23-3 200	
		SOT23-5 180	
Operating Ambient Temperature	Topr	-40 ~ +125	°C
Storage Temperature	Tstg	-55 ~ +150	
ESD Protection	ESD HBM	3000	V
	ESD CDM	2000	

Note: Stresses above those listed under “Absolute Maximum Ratings” may cause permanent damage to the device.

■ Pin Configuration and Functions

MD85XX

(Unless otherwise indicated: Ta=25°C)

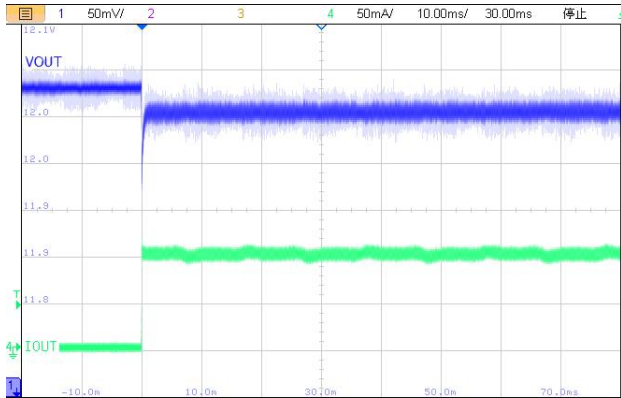
PARAMETER	SYMBOL	CONDITIONS	MIN	TYP	MAX	UNIT
Output Voltage*1	$V_{OUT(S)}$	$V_{IN}=V_{OUT(S)}+2V$, $I_{OUT}=1mA$	$V_{OUT(S)}^* 0.98$	$V_{OUT(S)}$	$V_{OUT(S)}^* 1.02$	V
Output Current	I_{OUT}	$V_{IN} = V_{OUT(S)} + 2V$	300			mA
Dropout Voltage*2	V_{drop}	$V_{IN}=V_{OUT(S)}+2V$ $I_{OUT}=1mA$		4.5	6	mV
		$V_{IN}=V_{OUT(S)}+2V$ $I_{OUT}=300mA$		1100	1400	
Line Regulation	$\frac{\Delta V_{OUT}}{\Delta V_{IN} \cdot V_{OUT(S)}}$	$V_{OUT(S)}+2V \leq V_{IN} \leq 40V$ $I_{OUT} = 1mA$		0.01	0.15	%/V
Load Regulation	ΔV_{OUT2}	$V_{IN} = V_{OUT(S)}+2V$ $1mA \leq I_{OUT} \leq 300mA$		50	70	mV
Temperature Stability		$V_{IN} = V_{OUT(S)}+2V$, $I_{OUT}=10mA$ $-40^{\circ}C \leq T_a \leq 125^{\circ}C$			± 100	ppm/°C
Quiescent Current	I_{SS}	$V_{IN} = 40V$, no load		2.4	4	uA
Input Voltage	V_{INmax}	---	2.2		40	V
Power Supply Rejection Ratio	PSRR	f=100Hz, $I_{OUT}=10mA$		66		dB
		f=1kHz, $I_{OUT}=10mA$		72		
		f=10kHz, $I_{OUT}=10mA$		80		
		f=100kHz, $I_{OUT}=10mA$		62		
Current Limit *3	I_{LIM}	$V_{IN}= V_{OUT(S)}+3V$, $V_{OUT}= 0.9 \cdot V_{OUT(S)}$		370		mA
Over Temperature Protection	OTP	$I_{OUT}=1mA$		170		°C

Notes:

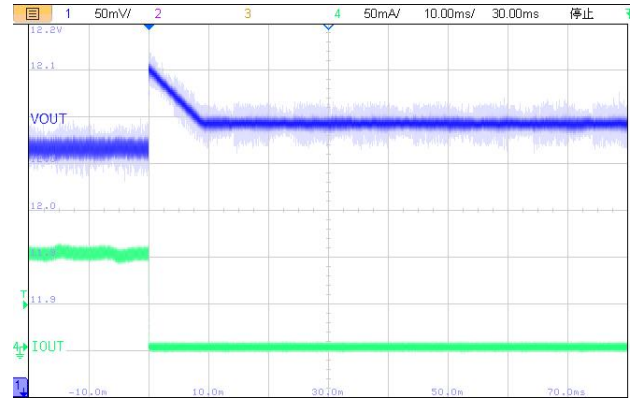
1. $V_{OUT(S)}$: Output voltage when $V_{IN}=V_{OUT}+2V$, $I_{OUT}=1mA$.
2. $V_{DROP}=V_{IN1} - (V_{OUT(S)} \times 0.98)$ where V_{IN1} is the input voltage when $V_{OUT} = V_{OUT(S)} \times 0.98$.
3. I_{LIM} : Output current when $V_{IN}=V_{OUT(S)}+3V$ and $V_{OUT} = 0.95 \cdot V_{OUT(S)}$.

Typical Performance Characteristics:

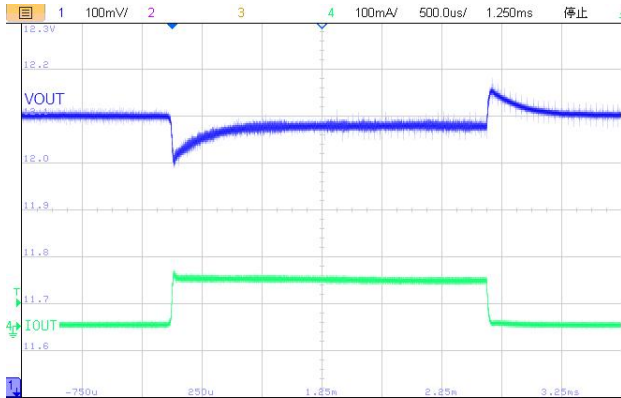
Test Conditions: $V_{IN}=V_{OUT}+2.0V$, $C_{IN}=2.2\mu F$, $C_{OUT}=2.2\mu F$, $T_a=25^\circ C$, unless otherwise indicated.



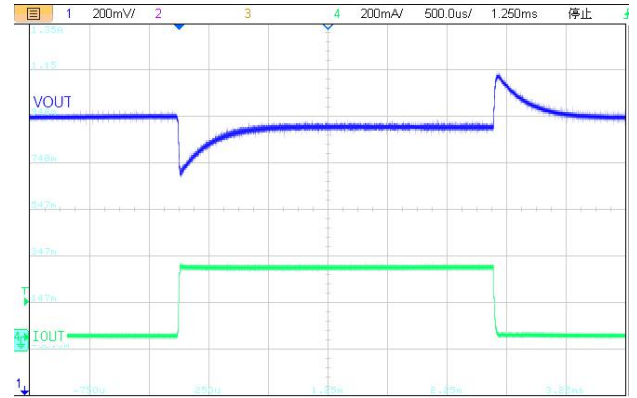
Load Transient at $V_{OUT}=12V$:
($I_{OUT}=0mA \sim 100mA$)



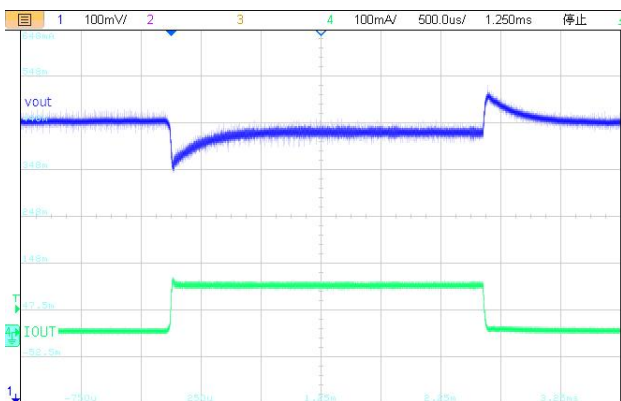
Load Transient at $V_{OUT}=12V$:
($I_{OUT}=100mA \sim 0mA$)



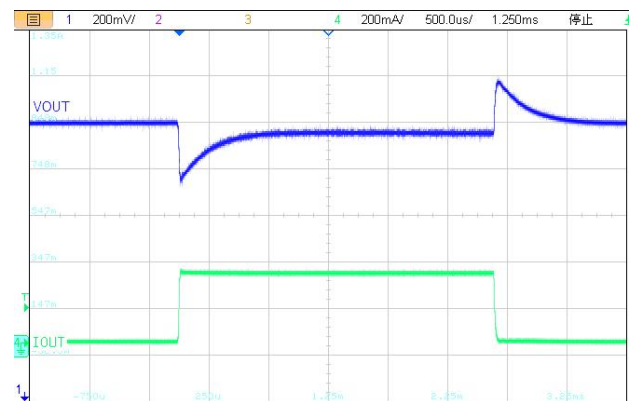
Load Transient at $V_{OUT}=12V$:
($I_{OUT}=1mA \sim 100mA \sim 1mA$)



Load Transient at $V_{OUT}=12V$:
($I_{OUT}=1mA \sim 300mA \sim 1mA$)



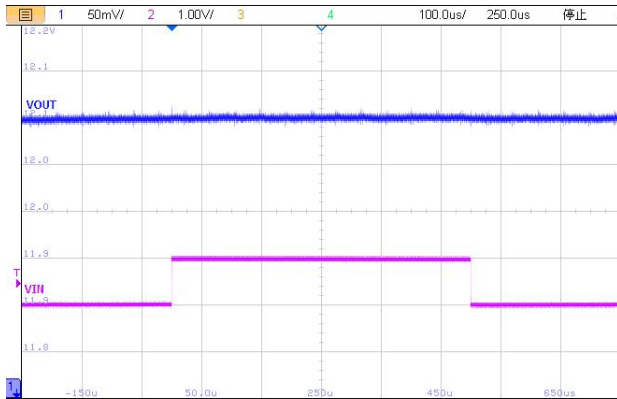
Load Transient at $V_{OUT}=12V$:
($I_{OUT}=0mA \sim 100mA \sim 0mA$)



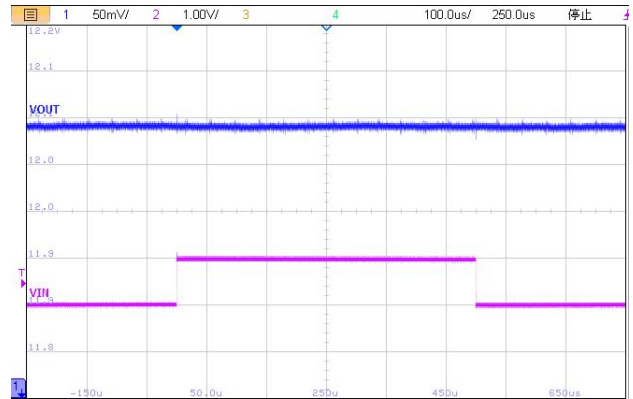
Load Transient at $V_{OUT}=12V$:
($I_{OUT}=0mA \sim 300mA \sim 0mA$)

Typical Performance Characteristics(Continued):

Test Conditions: $V_{IN}=V_{OUT}+2.0V$, $C_{IN}=2.2\mu F$, $C_{OUT}=2.2\mu F$, $T_a=25^{\circ}C$, unless otherwise indicated.



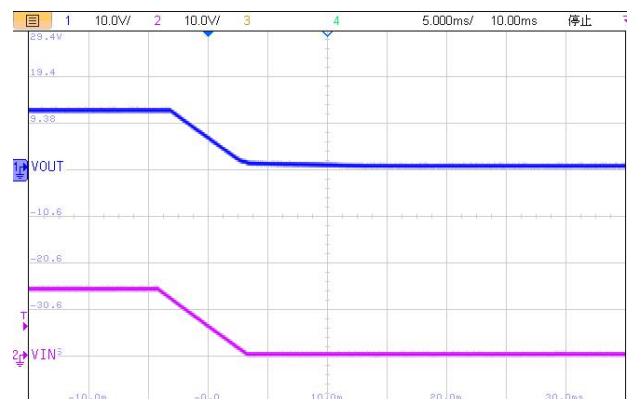
Line Transient at $V_{OUT}=12V$:
($I_{OUT}=1mA$)



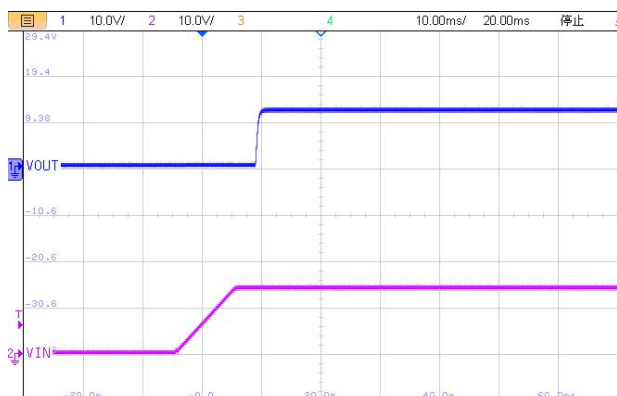
Line Transient at $V_{OUT}=12V$:
($I_{OUT}=10mA$)



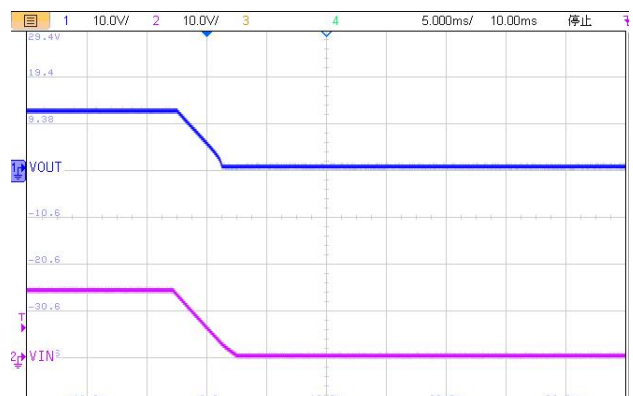
Power-Up at $V_{OUT}=12V$:
($I_{OUT}=1mA$)



Power-Down at $V_{OUT}=12V$:
($I_{OUT}=1mA$)



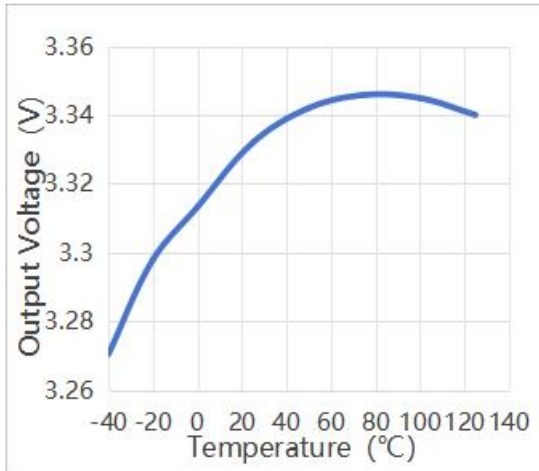
Power-Up at $V_{OUT}=12V$:
($I_{OUT}=300mA$)



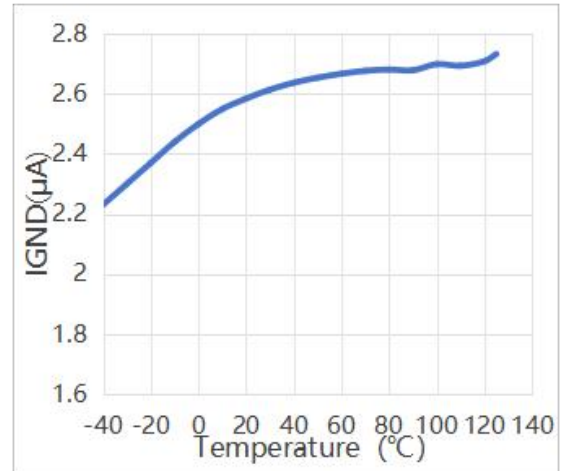
Power-Down at $V_{OUT}=12V$:
($I_{OUT}=300mA$)

■ Typical Performance Characteristics(Continued):

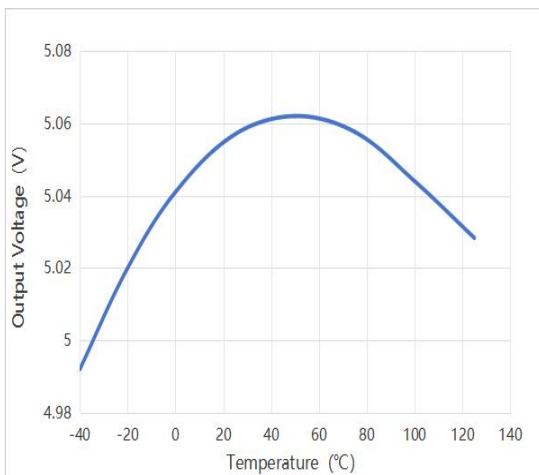
Test Conditions: $V_{IN}=V_{OUT}+2.0V$, $C_{IN}=2.2\mu F$, $C_{OUT}=2.2\mu F$, $T_a=25^\circ C$, unless otherwise indicated.



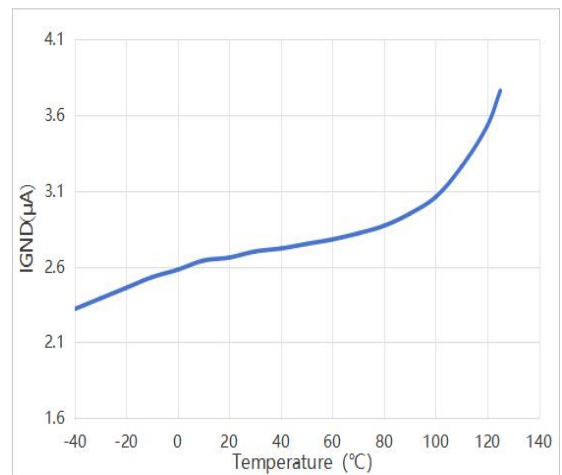
Output Voltage vs. Temperature at $V_{OUT}=3.3V$



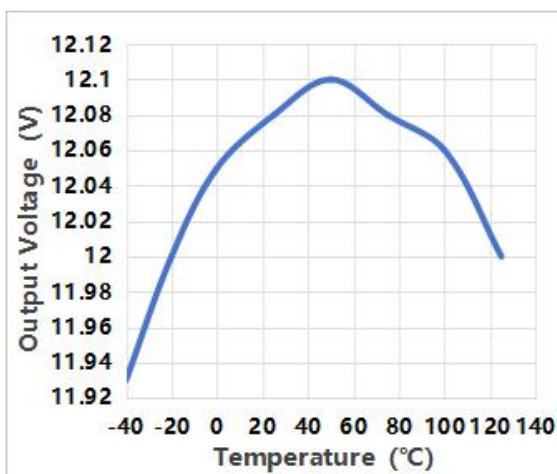
GND Current vs. Temperature at $V_{OUT}=3.3V$



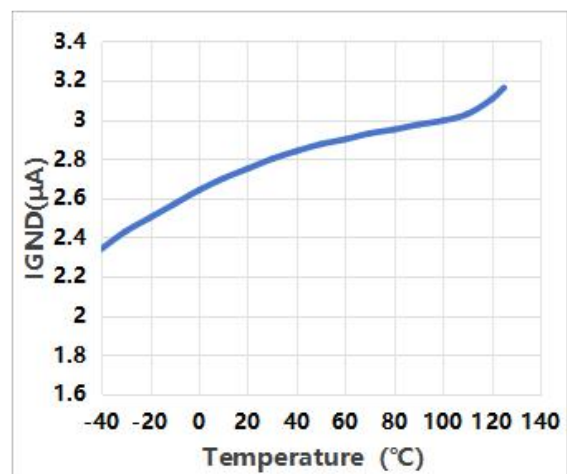
Output Voltage vs. Temperature at $V_{OUT}=5.0V$



GND Current vs. Temperature at $V_{OUT}=5.0V$



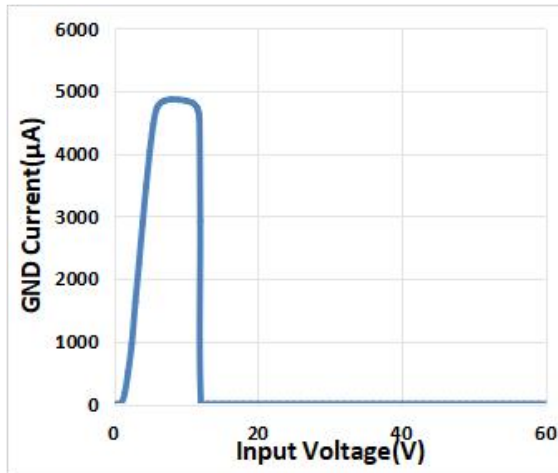
Output Voltage vs. Temperature at $V_{OUT}=12.0V$



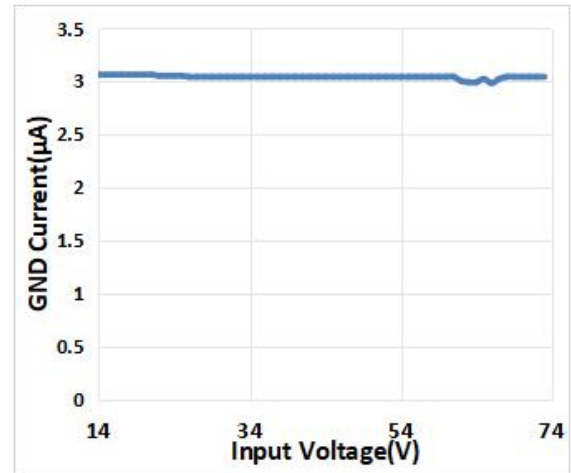
GND Current vs. Temperature at $V_{OUT}=12.0V$

■ Typical Performance Characteristics (Continued):

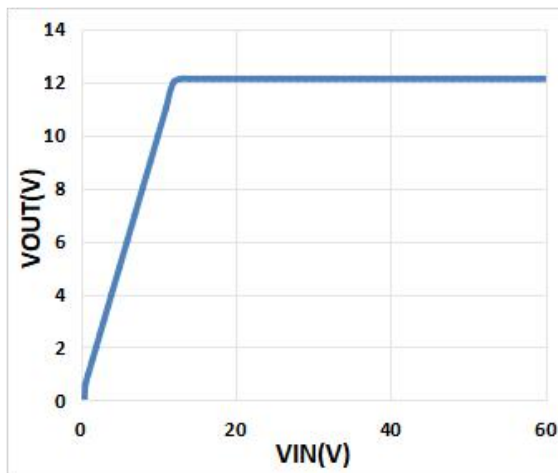
Test Conditions: $V_{IN}=V_{OUT}+2.0V$, $C_{IN}=2.2\mu F$, $C_{OUT}=2.2\mu F$, $T_a=25^\circ C$, unless otherwise indicated.



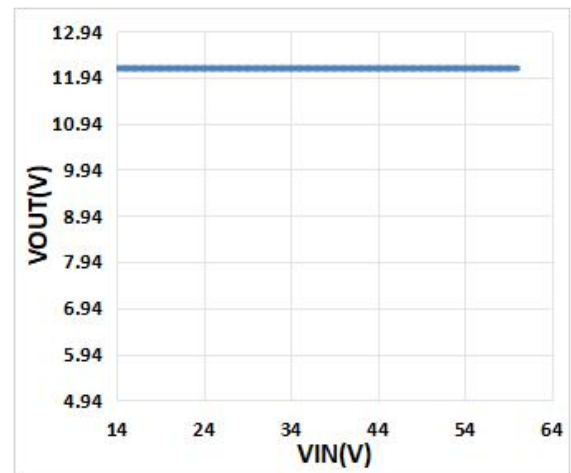
GND Current vs. Input Voltage at $V_{OUT}=12.0V$



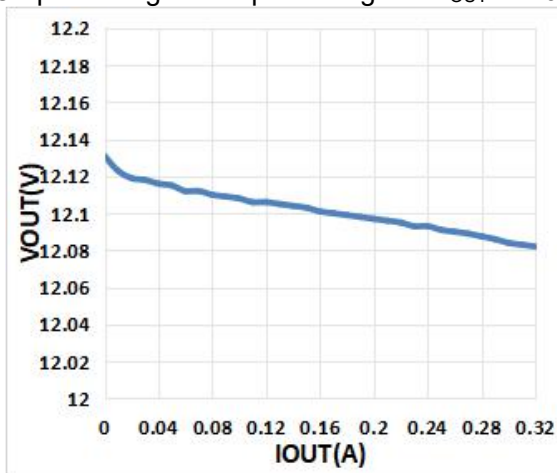
GND Current vs. Input Voltage at $V_{OUT}=12.0V$



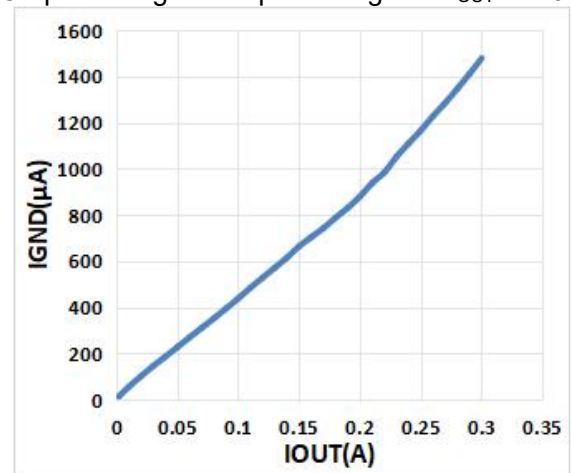
Output Voltage vs. Input Voltage at $V_{OUT}=12.0V$



Output Voltage vs. Input Voltage at $V_{OUT}=12.0V$



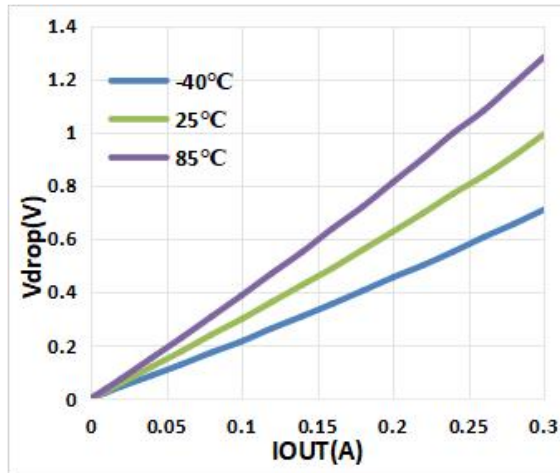
Output Voltage vs Output Current at $V_{OUT}=12.0V$



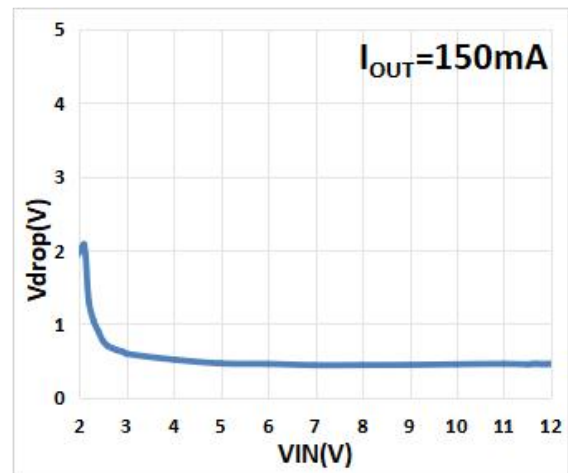
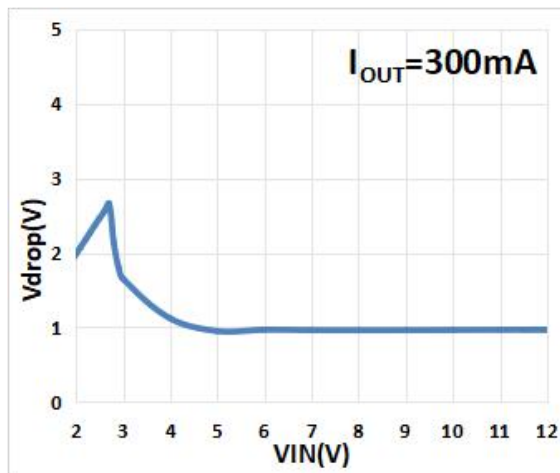
GND Current vs Output Current at $V_{OUT}=12.0V$

■ Typical Performance Characteristics (Continued):

Test Conditions: $V_{IN}=V_{OUT}+2.0V$, $C_{IN}=2.2\mu F$, $C_{OUT}=2.2\mu F$, $T_A=25^\circ C$, unless otherwise indicated.

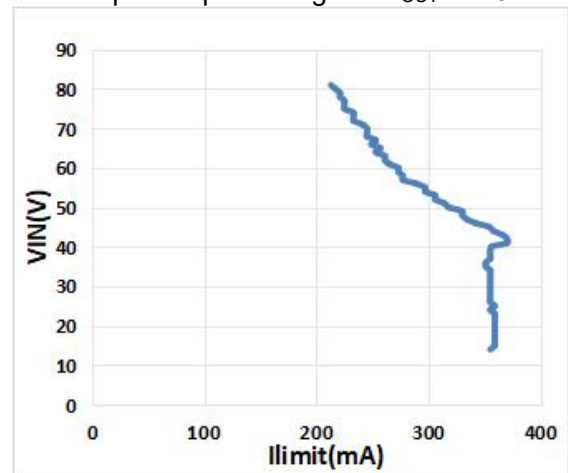
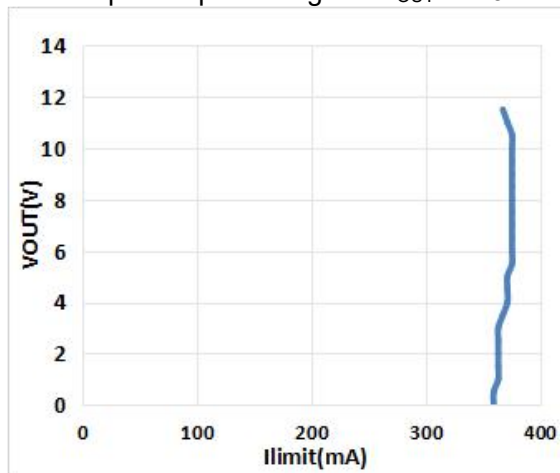


Dropout Voltage vs. Output Current at $V_{OUT}=12.0V$



V_{drop} vs. Input Voltage at $V_{OUT}=12.0V$

V_{drop} vs. Input Voltage at $V_{OUT}=12.0V$



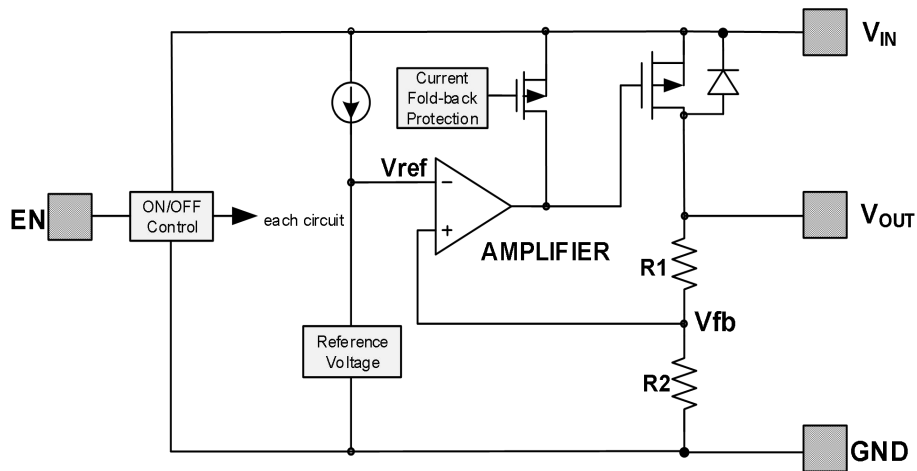
V_{OUT} vs. I_{limit} at $V_{OUT}=12.0V$

V_{IN} vs. I_{limit} at $V_{OUT}=12.0V$

Operational Explanation

1. Output voltage control

The following diagram is a block diagram of MD85XX. The voltage divided by resistors R_f and R_s is compared with the internal reference voltage by the error amplifier. The amplifier output then drives the P-channel MOSFET connected to the VOUT pin. The output voltage at the VOUT pin is regulated by this negative feedback system. The current limit circuit operates in relation to output current level.



2. Pass transistor

The pass transistor with low turn-on resistance used in MD85XX is a P-channel MOSFET. If the potential on VOUT pin is higher than V_{IN} , it is possible that IC will be destroyed due to reverse current which is caused by parasitic diodes between V_{IN} and VOUT. Therefore, the VOUT pin potential exceeds $V_{IN}+0.3V$ is not allowed.

3. Current Limiter, over temperature protection

The MD85XX includes current limit protection feature. If the output is overloaded or shorted to ground, it can inhibit the current of 370mA (typical value), therefore, the chip can avoid damage. In this case, it is easy to make the chip temperature rise and exceed the heat dissipation limit, then OTP circuit is triggered and the output current is turned off, the chip will restart automatically after the chip temperature drops to a certain value.

Special attention should be paid to that the product of the dropout voltage on the chip and the output current must be smaller than the heat dissipation. If power consumption on the chip is more than the heat dissipation, OTP will protect the chip from damaging due to over temperature.

4. Input capacitance(C_{IN})

Stable input voltage: Provide a stable input current for the converter to ensure that the input voltage (V_{IN}) remains constant when the load changes, avoiding voltage fluctuations caused by transient current surges. Improve response speed: By quickly charging and discharging to respond to sudden load changes, shorten the adjustment time of the control loop, and enhance system stability.

Input Capacitor (C_{IN}): 2.2 μ F above.

5. Output capacitance(C_{OUT})

Suppress output ripple: Absorb the current fluctuations caused by high-frequency switching operations, and control the output voltage ripple within a safe range.

Support transient response: When the load switches from standby to full-speed operation, quickly release or store charges to compensate for the response delay of the control loop, preventing voltage drops or overshoots.

Output Capacitor (C_{OUT}): 2.2 μ F above.

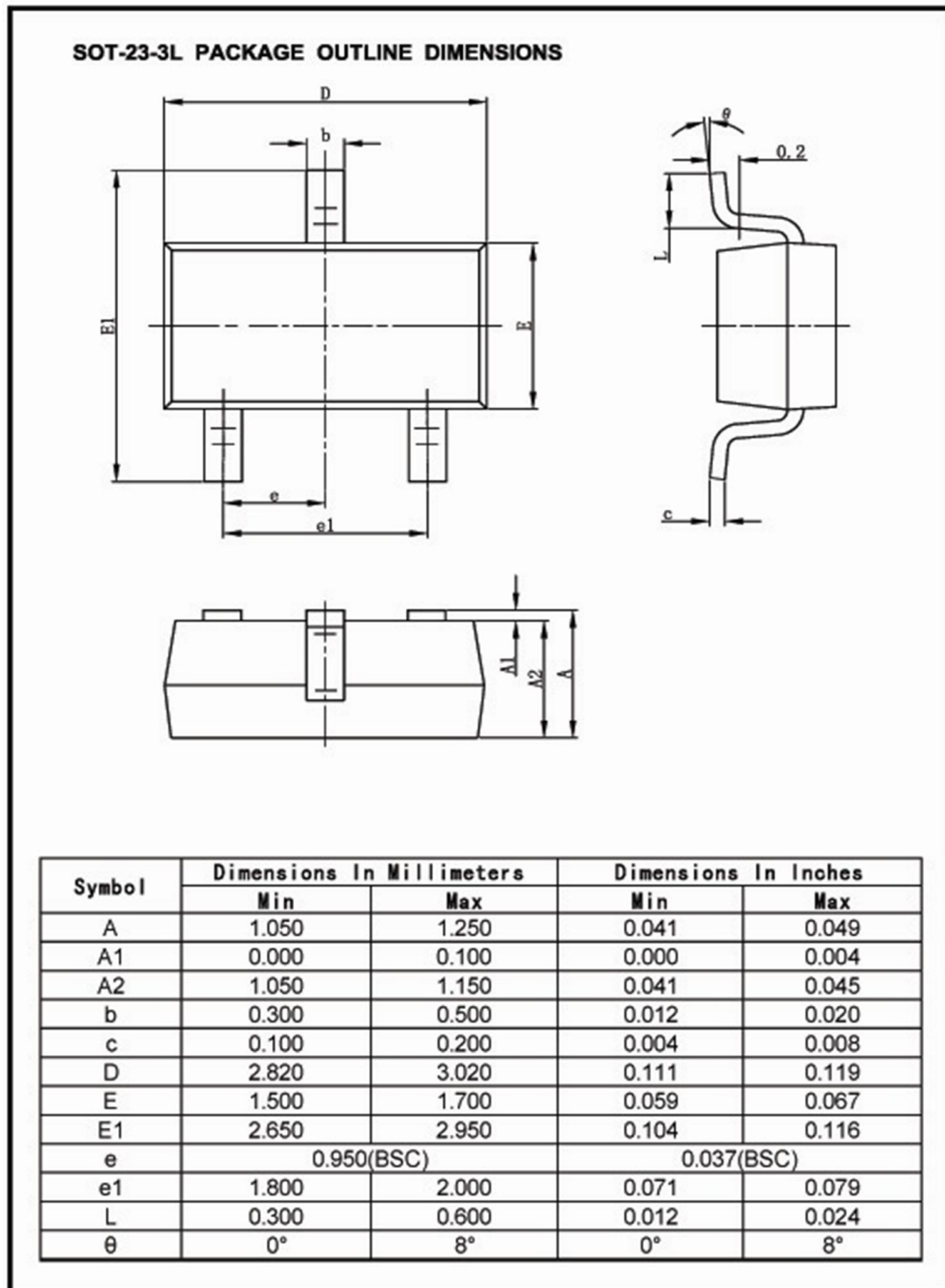
■ Notes:

1. The input and output capacitors should be placed as close as possible to the IC.
2. If the impedance of the power supply is high, which is caused by forgetting installing input capacitor or installing too small value capacitor, the oscillation may occur.

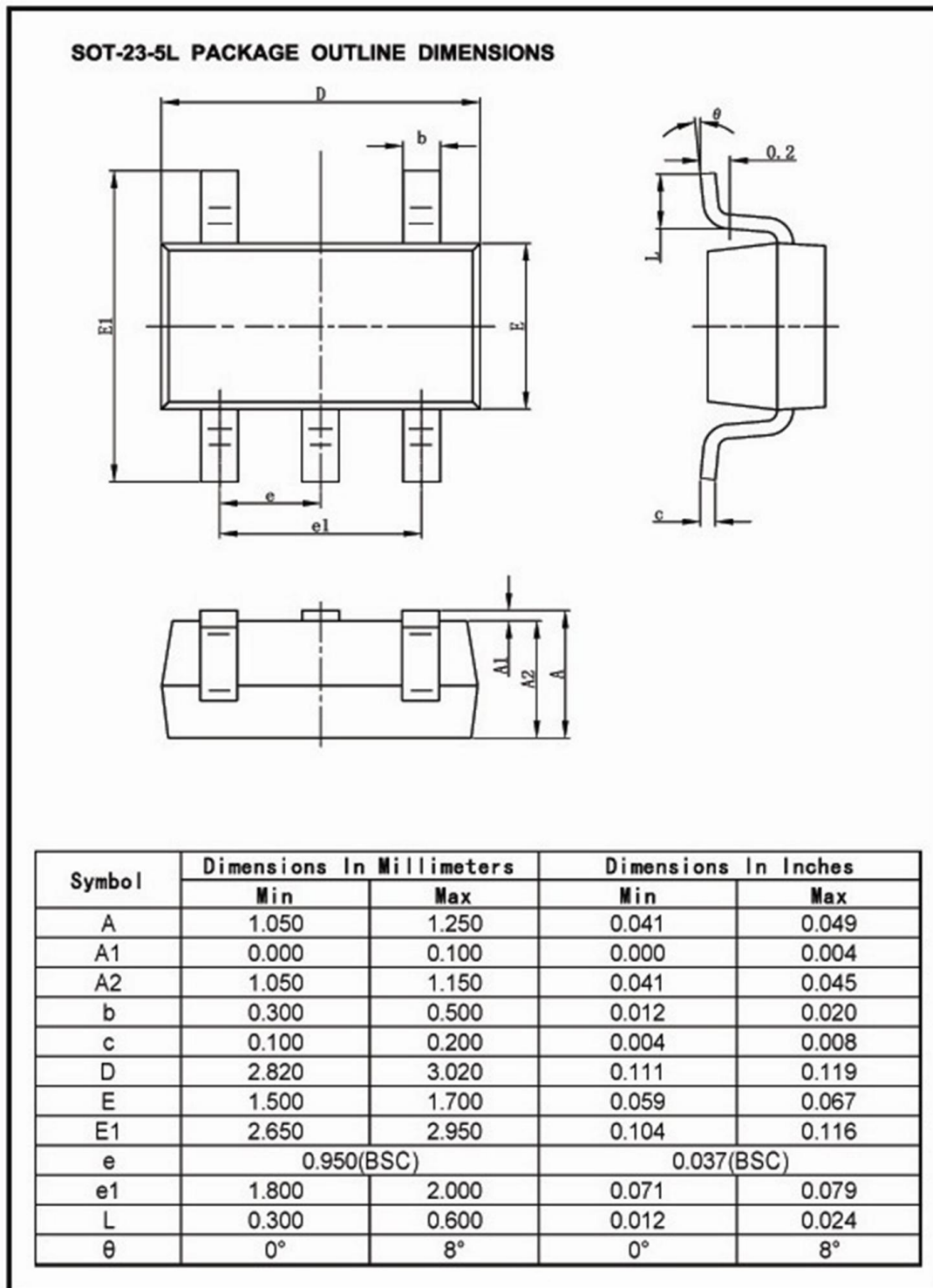
■ Revision History:

VERSION	Change Date	Change Item
Rev.1.0	2025/09/12	1.Update Marking
Rev.1.1	2025/11/20	1.Change the Operating Ambient Temperature and Storage Temperature
Rev.1.2	2025/12/19	1.Add Ordering Name MD85E35QA3
Rev.1.3	2026/01/20	1.Add Description for Silk Print "XXXX"
Rev.1.4	2026/03/13	1.Add 8V Output Voltage

■ Packaging Information

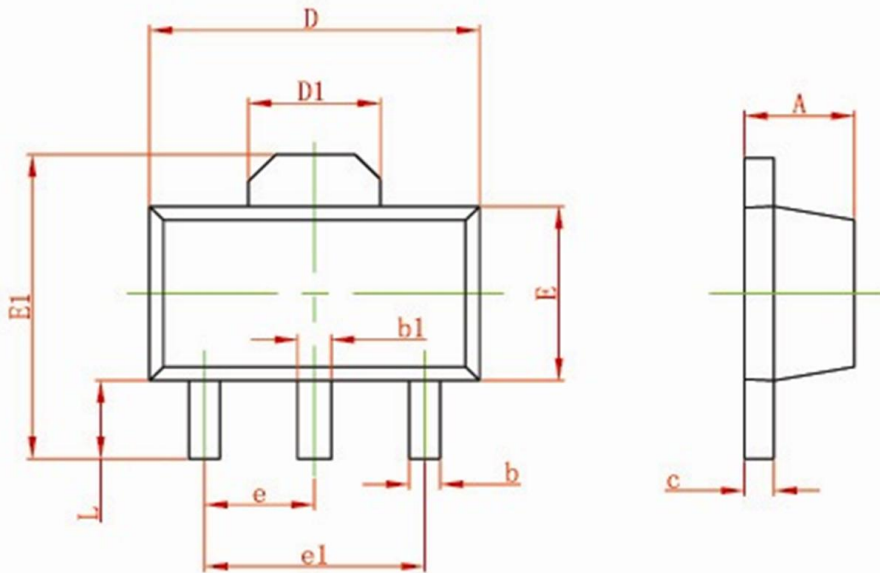


■ Packaging Information



Packaging Information

SOT-89-3L PACKAGE OUTLINE DIMENSIONS



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	1.400	1.600	0.055	0.063
b	0.320	0.520	0.013	0.197
b1	0.400	0.580	0.016	0.023
c	0.350	0.440	0.014	0.017
D	4.400	4.600	0.173	0.181
D1	1.550 REF		0.061 REF	
E	2.300	2.600	0.091	0.102
E1	3.940	4.250	0.155	0.167
e	1.500 TYP		0.060TYP	
e1	3.000 TYP		0.118TYP	
L	0.900	1.200	0.035	0.047

For the newest datasheet, please see the website:

www.md-ic.com.cn

Version Rev.1.4 20260313