描述

MX66100 系列是 5.5V、2A 的理想二极管，采用 6 引脚 SOT23 封装。为了降低低压大电流电源的压降，该产品采用低内阻 P 通道 MOSFET。该产品具有主动防倒灌功能，Oring 接法可以选择输入电压高的支路，适合电池应用场合。此外，通过 ON 外接信号可控制内部 MOS 管的导通与关断，从而控制输出的有无，可充当开关使用。在 ON 低电平时，静态电流低至 10nA。

与 MX22917 相比，加快了防倒灌速度，防倒灌阈值为 10mV。

特性

- ♦ 输入电压范围： 1V to 5.5V
- ♦ 最大连续导通电流：2A
- ♦ 内阻:

100mΩ @ 5V输入（典型值）

160mΩ @ 1.8V 输入 (典型值)

240mΩ @ 1V 输入 (典型值)

- ♦ 低待机功耗

导通状态: 5uA典型值

关断状态: 10nA 典型值

- ♦ 6-Pin SOT23-6和SC-70-6

应用

工业系统

可穿戴设备

机顶盒

销售终端

血糖仪

通用信息

订购信息

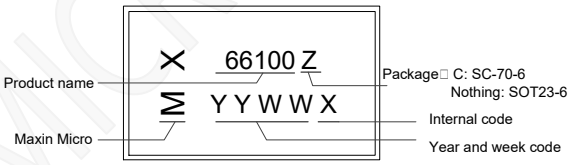
产品信号	描述
MX66100T	SOT23-6
MX66100C	SC-70-6
MPQ	3000pcs

极限值

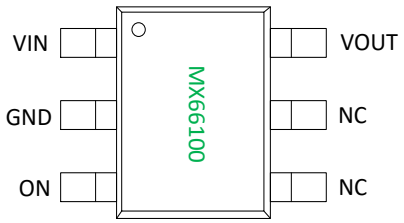
参数	值
VIN/VOUT/ON	-0.3 to 6V
IOUT MAX	2A
I_{PULSE} pulse<300us, 2% duty cycle	2.5A
Junction temperature	150℃
Storage temperature, Tstg	-55 to 150℃
Leading temperature （soldering，10secs）	260℃
ESD Susceptibility HBM	±2000V

Stresses beyond those listed in Absolute Maximum Ratings may cause permanent damage to the device. Exposure to absolute maximum rating conditions for extended periods may affect reliability. Functional operation of the device at any conditions beyond those indicated in the Recommended Operating Conditions section is not implied.

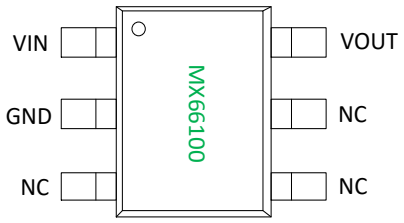
丝印信息



引脚定义



SOT23-6



SC-70-6

推荐使用范围

Symbol	Parameter	Range
VDD	VDD supply	1-5.5V
Junction temperature		-40~125℃
P_{D_MAX}	Power dissipation	0.50W

GENERAL DESCRIPTION

The MX66100 are 5.5V, 2A ideal diodes in a 6 pin SOT23 and SC-70-6 package. To reduce voltage drop for low voltage and high current rails, the device implements a low resistance P channel MOSFET which reduces the drop out voltage across the device. During shutdown, the device has very low leakage currents, thereby reducing unnecessary leakages for downstream modules during standby. Integrated control logic, driver, charge pump, and output discharge FET eliminates the need for any external components which reduces solution size and bill of materials count.

FEATURES

♦ Input voltage range： 1V to 5.5V

♦ Maximum continuous current：2A

♦ On-resistance:

100mΩ at 5V input voltage（typical）

160mΩ at 1.8V input voltage (typical)

240mΩ at 1V input voltage (typical)

♦ Ultra-low power consumption

On state: 5uA typical

Off state: 10nA typical

♦ 6-Pin SOT23-6 andSC-70-6

APPLICATIONS

Industrial system

Wearable devices

Set-top box

Sales terminal

Blood glucose meter

GENERAL INFORMATION

Ordering information

Part Number	Description
MX66100T	SOT23-6
MX66100C	SC-70-6
MPQ	3000pcs

Package dissipation rating

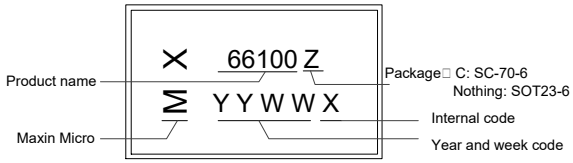
Package	RθJA（°C/W）
SOT23-6	200
SC-70-6	192

Absolute maximum ratings

Parameter	Value
VIN/VOUT/ON	-0.3 to 6V
IOUT MAX	2A
I_{PULSE} pulse<300us, 2% duty cycle	2.5A
Junction temperature	150℃
Storage temperature, Tstg	-55 to 150℃
Leading temperature （soldering，10secs）	260℃
ESD Susceptibility HBM	±2000V

Stresses beyond those listed in Absolute Maximum Ratings may cause permanent damage to the device. Exposure to absolute maximum rating conditions for extended periods may affect reliability. Functional operation of the device at any conditions beyond those indicated in the Recommended Operating Conditions section is not implied.

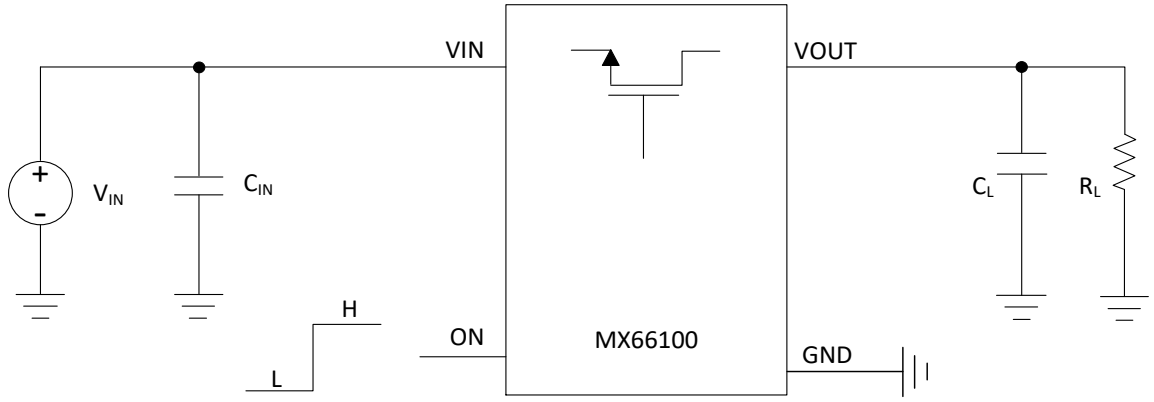
Marking information



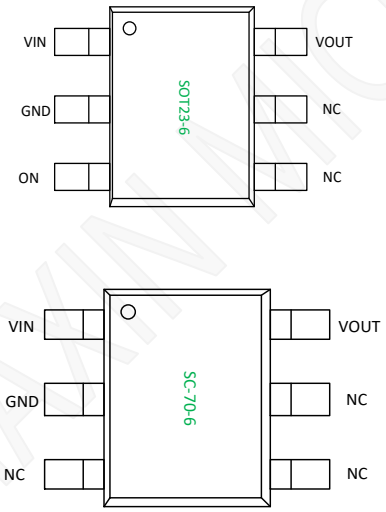
Recommended operating condition

Symbol	Parameter	Range
VDD	VDD supply	1-5.5V
Junction temperature		-40~125℃
$P_{D\ MAX}$	Power dissipation	0.50W

TYPICAL APPLICATION



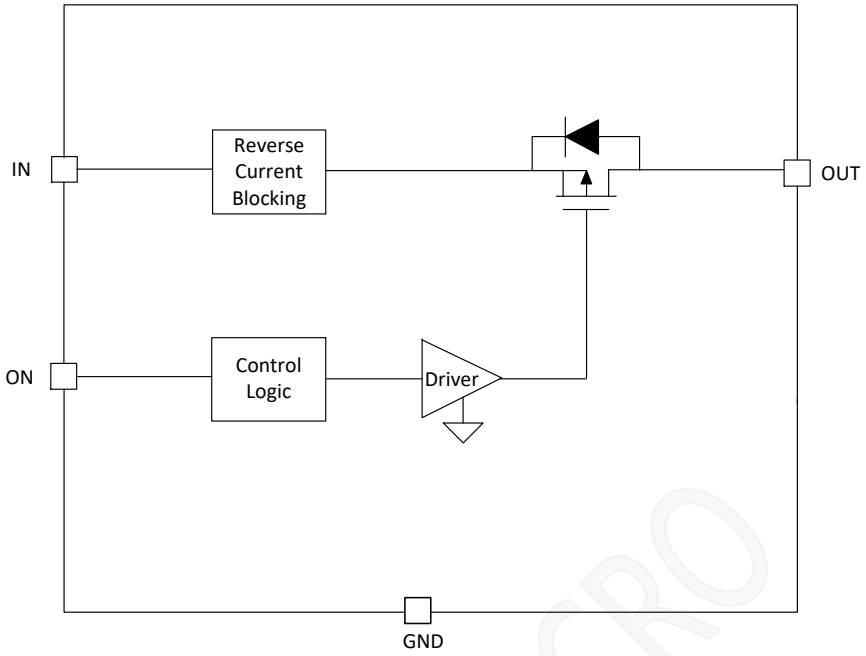
TERMINAL ASSIGMENTS



Pin information

PIN NO.		PIN name	Description
SOT23-6	SC-70-6		
1	**1**	**VIN**	Device input
2	**2**	**GND**	Device ground
3		**ON**	Active high switch control input for MX6610. Do not leave floating.
4、5	**3、4、5**	**NC**	No connected.
6	**6**	**VOUT**	Device output.

BLOCK DIAGRAM



Electrical characteristics

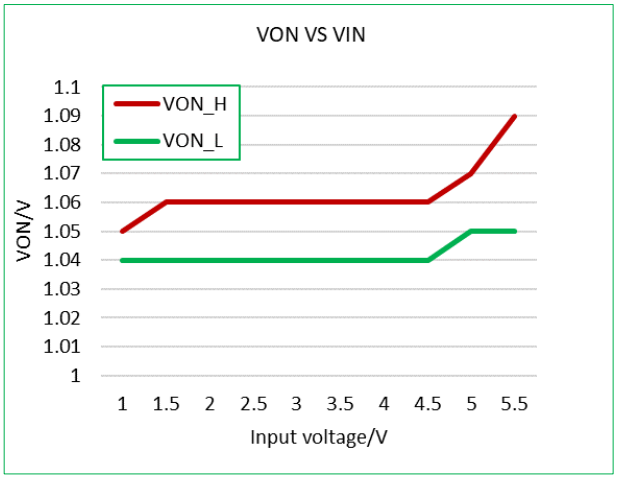
（TA=25℃，VDD=1.0V to 5.5V, unless otherwise noted）

Symbol	Parameter	Test condition	Min	Typ.	Max	Unit
POWER SUPPLY						
I_{Q_VIN}	VIN Quiescent current, VOUT=OPEN	-40℃ to +85℃		5	10	μA
		-40℃ to +125℃			12	μA
I_{SD_VIN}	VIN Shutdown current, VOUT=GND	-40℃ to +85℃		10	100	nA
		-40℃ to +125℃			250	nA
ENABLE PIN (ON) (only for MX66100T)						
I_{ON}	ON pin leakage, Enabled	-40℃ to +125℃	-10		10	nA
V_{ON_H}	active threshold	-40℃ to +105℃	0.96		1.16	V
V_{ON_L}	off threshold	-40℃ to +105℃	0.94		1.14	V
R_{PD}	Smart pulldown resistance, $V_{ON} \leqslant V_{IL}$	-40℃ to +105℃		750		kΩ
REVERSE CURRENT BLOCKING (RCB)						
IRCB	RCB Activation Current, VOUT>VIN	-40℃ to +125℃		-1	-2	A
tRCB	RCB Activation time, VOUT>VIN+200mV	-40℃ to +125℃		10		μs
VRCB	RCB Release Voltage, VOUT>VIN	-40℃ to +125℃		10		mV
IIN_RCB	VIN Reverse Leakage Current, 0V≤VIN+VRCB≤ VOUT	-40℃ to +105℃	-1			μA
ON STATE RESISTANCE (RON)						
R_{ON}	IOUT=200mA，VIN=5.0V	25℃		100	120	mΩ
		-40℃ to +85℃			130	mΩ
		-40℃ to +105℃			140	mΩ
		-40℃ to +125℃			145	mΩ
	IOUT=200mA，VIN=3.6V	25℃		110	130	mΩ
		-40℃ to +85℃			150	mΩ
		-40℃ to +105℃			160	mΩ
		-40℃ to +125℃			165	mΩ
	IOUT=200mA，VIN=1.8V	25℃		150	170	mΩ

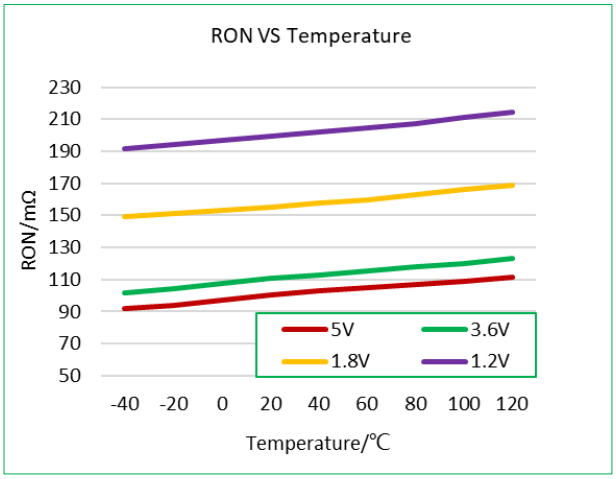
		-40℃ to +85℃			185	mΩ
		-40℃ to +105℃			195	mΩ
		-40℃ to +125℃			210	mΩ
	IOUT=200mA，VIN=1.2V	25℃		200	230	mΩ
		-40℃ to +85℃			265	mΩ
		-40℃ to +105℃			280	mΩ
		-40℃ to +125℃			300	mΩ
	IOUT=200mA，VIN=1.0V	25℃		240	320	mΩ
		-40℃ to +85℃			360	mΩ
		-40℃ to +105℃			380	mΩ
		-40℃ to +125℃			390	mΩ

Note：OUT is tied to VDD from a small resistor

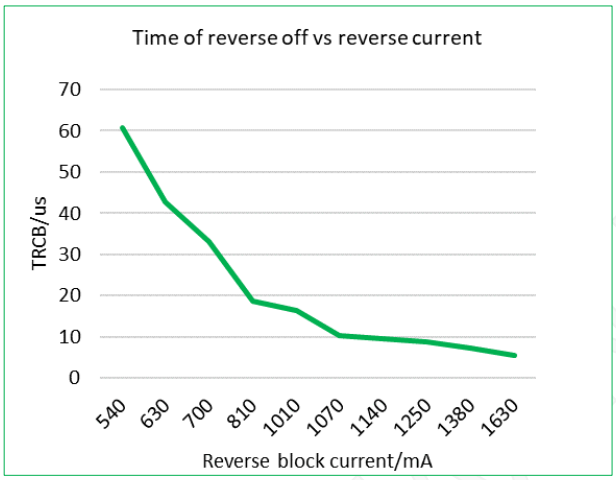
Characteristic plots



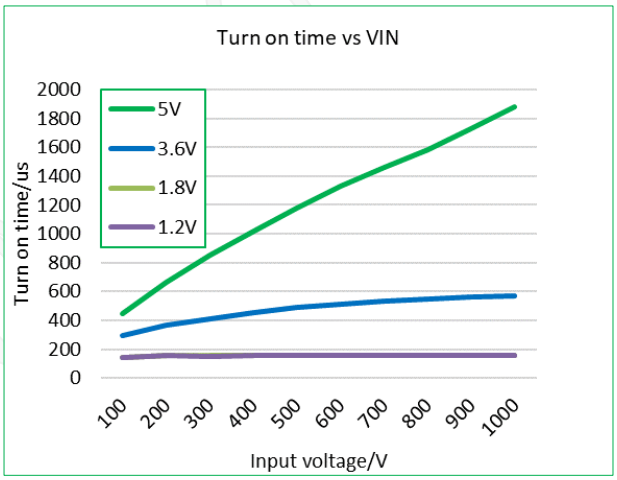
Threshold of VON vs input voltage



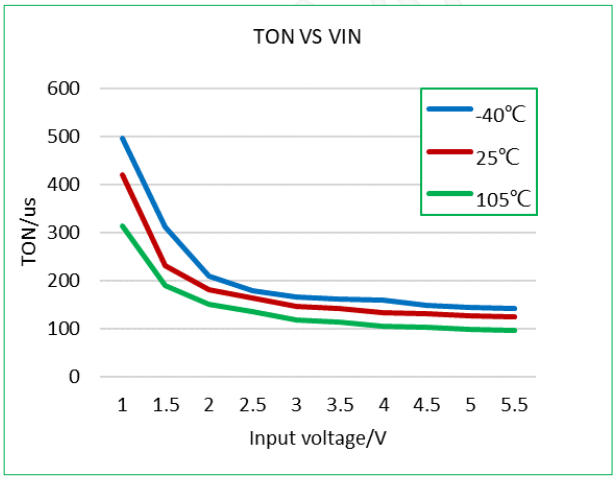
Internal PMOS on resistance vs temperature



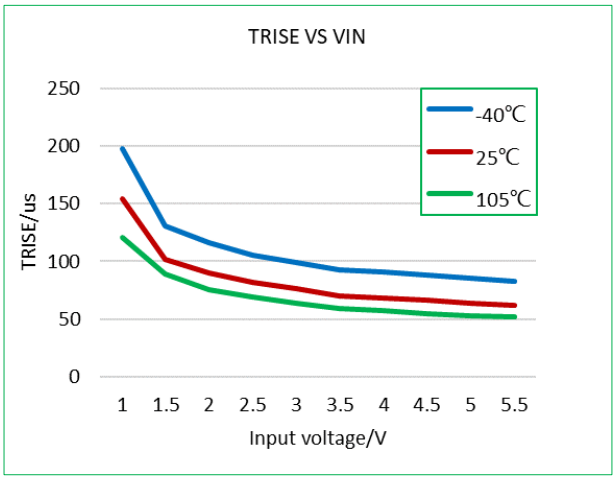
Time of reverse shutdown vs reverse blocking current



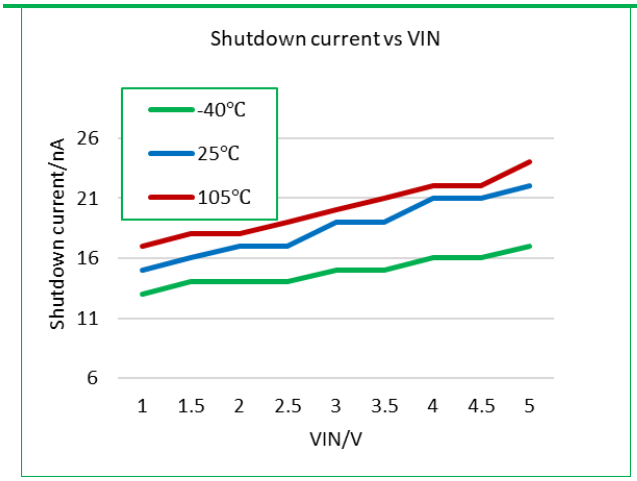
Turn on time with different input voltage



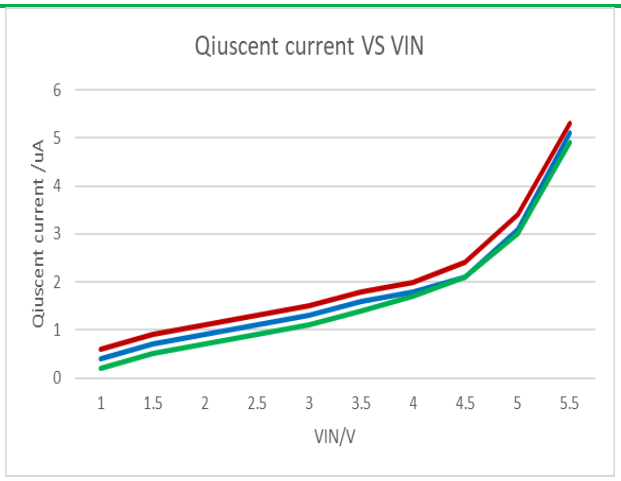
The turn on time vs input voltage



The rising time vs input voltage



Shutdown current with ON ≤ VIL(only for MX66100T)



Quiescent current with normal operation

Operation description

The MX66100 are 5.5V, 2A ideal diodes in 6 pin SOT23 and SC-70-6 package. To reduce voltage drop for low voltage and high current rails, the device implements a low resistance P channel MOSFET which reduces the drop out voltage across the device. During shutdown, the device has very low leakage currents, thereby reducing unnecessary leakages for downstream modules during standby. Integrated control logic, driver, charge pump, and output discharge FET eliminates the need for any external components which reduces solution size and bill of materials count.

On and off control (only for MX66100T)

The ON pin controls the state of the switch. The ON pin is compatible with standard GPIO logic threshold so it can be used in a wide variety of applications. The MX66100T is enabled when the voltage applied to the ON pin is pulled above V_{IH}.

When power is first applied to VIN, a smart pulldown is used to keep the ON pin from floating until system sequencing is complete. After the ON pin is deliberately driven high, the smart pulldown is disconnected to prevent unnecessary power loss. The next table shown when the ON pin smart pulldown is active.

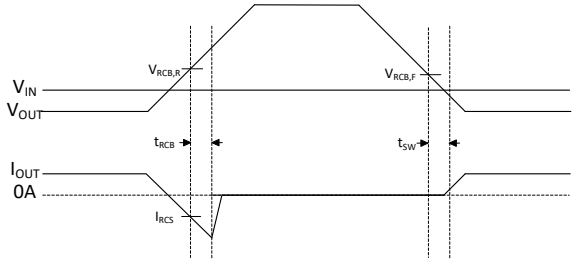
VON	Pulldown
≤VIL	Connected
≥VIH	Disconnected

Full time reverse current blocking

In a scenario where the device is enabled and VOUT is greater than VIN there is potential for reverse current to flow through the pass FET or the body diode. When the reverse current threshold (I_{RCB}) is exceeded, the switch is disabled within t_{RCB}. The switch remains off and block reverse current as long as the reverse voltage condition exists. After VOUT has dropped below the V_{RCB} release threshold the device turns back on.

Reverse Current Blocking

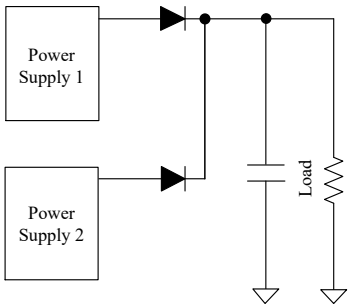
The MX66100 initiates reverse current blocking (RCB) when the VOUT voltage is externally biased and exceeds the input voltage supply being used. Once the output voltage is higher than the input voltage by 42 mV ($V_{RCB,R}$), the device will shut off. Once the voltage difference between the output and input lowers to 17 mV ($V_{RCB,F}$), the channel will turn back on.



If RCB is expected to occur, it is recommended to clamp the output or use a high output capacitance (about 100 µF). This will prevent voltage spikes from damaging the device due to output inductance.

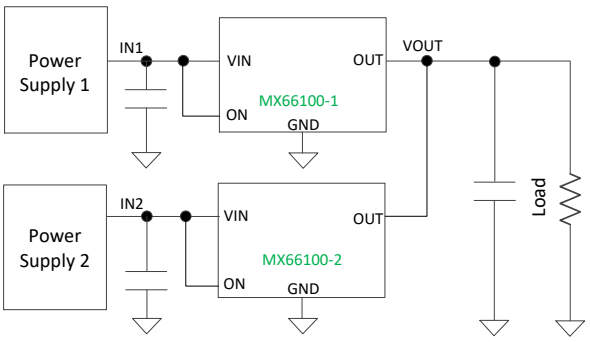
Application Information

Systems that require high availability often use multiple, parallel-connected redundant power supplies to improve reliability. Schottky OR-ing diodes are typically used to connect these redundant power supplies to a common point at the load. The disadvantage of using OR-ing diodes is the forward voltage drop, which reduces the available voltage and the associated power losses as load currents increase.



OR-ing with Diodes

The MX66100 is an OR-ing controller (used on the high-side or positive voltage rail) that replaces an OR-ing diode. When both inputs are applied to the device, the highest voltage is used to power the output.



OR-ing controller

Power supply recommendations

The device is designed to operate with a VIN range of 1V to 5.5V. The VIN power supply must be well regulated and placed as close to the device terminal as possible. The power supply must be able to withstand all transient load current steps. In most situations, using an input capacitance of 1uF is sufficient to prevent the supply voltage from dipping when switch is turned on. In case where the power supply is slow to respond to a large transient current or large load current step, additional bulk capacitance can be required on the input.

Thermal considerations

The maximum IC junction temperature must be restricted to 125℃ under normal operating conditions. To calculate the maximum allowable dissipation, PD(MAX) for a given output current and ambient temperature, use formula:

$$P_{D(MAX)} = \frac{T_{J(MAX)} - T_A}{\theta_{JA}}$$

Where

$P_{D(MAX)}$ = maximum allowable power dissipation

$T_{J(MAX)}$ = maximum allowable junction temperature

T_A = ambient temperature of the device

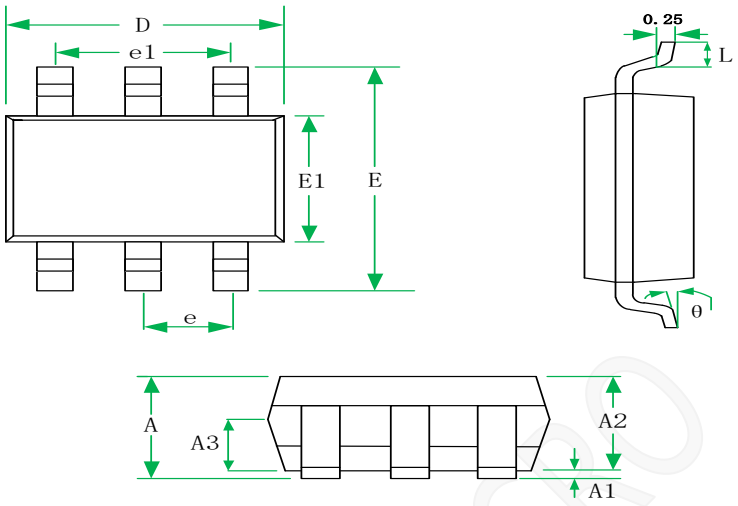
θ_{JA} = junction to air thermal impedance.

Layout guidelines

For best performance, all traces must be as short as possible. To be most effective, the input and output capacitors must be placed as close to the device to minimize the effects that parasitic electrical effects.

Package information

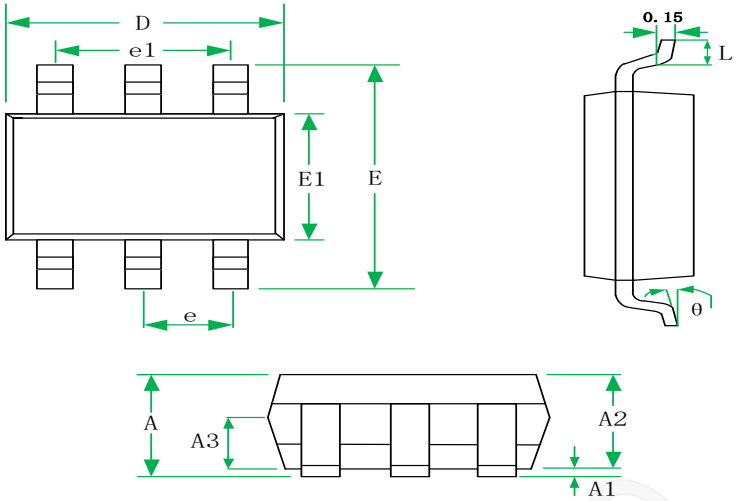
SOT23-6



SYMBOL	MILLIMETERS			INCHES		
	MIN	NOM	MAX	MIN	NOM	MAX
A	1.070	1.160	1.250	0.042	0.046	0.049
A1	0.02		0.10	0.001		0.004
A2	1.050	1.100	1.150	0.041	0.043	0.045
A3	0.60	0.65	0.70	0.024	0.026	0.028
D	2.820	2.920	3.020	0.111	0.115	0.119
E	2.650	2.800	2.950	0.104	0.110	0.116
E1	1.500	1.600	1.700	0.059	0.063	0.067
e	0.95BSC			0.037BSC		
e1	1.90BSC			0.075BSC		
L	0.300		0.500	0.012		0.020
θ	0		4°	0		4°

SOT23-6 for MX66100T

SC-70--6



SYMBOL	MILLIMETERS			INCHES		
	MIN	NOM	MAX	MIN	NOM	MAX
A	0.8		1.1	0.0315		0.0433
A1	0		0.1	0		0.0039
A2	0.8	0.9	1.00	0.0315	0.0354	0.0394
A3	0.47	0.52	0.57	0.0185	0.0205	0.0224
D	1.85	2.00	2.15	0.0728	0.0787	0.0846
E	1.95	2.1	2.2	0.0768	0.0827	0.0866
E1	1.1	1.25	1.40	0.0433	0.0492	0.0551
e	0.65BSC			0.0256		
e1	1.3BSC			0.0512		
L	0.26	0.36	0.46	0.0102	0.0142	0.0181
θ	0°	4°	8°	0°	4°	8°

SC-70-6 for MX66100C

Restrictions on Product Use

◆ MAXIN micro is continually working to improve the quality and reliability of its products. Nevertheless, semiconductor devices in general can malfunction or fail due to their inherent electrical sensitivity and vulnerability to physical stress. It is the responsibility of the buyer, when utilizing MAXIN products, to comply with the standards of safety in making a safe design for the entire system, and to avoid situations in which a malfunction or failure of such MAXIN products could cause loss of human life, bodily injury or damage to property.

◆ In developing your designs, please ensure that MAXIN products are used within specified operating ranges as set forth in the most recent MAXIN products specifications.

◆ The information contained herein is subject to change without notice.

Version update information

V10 preliminary version

V11 add SC-70-6 package