



# ACE500C

## 300mA Low Consumption Linear Regulator

### Description

The ACE500C are a group of positive voltage regulators manufactured by CMOS technologies with high ripple rejection, ultra low noise, low power consumption and low dropout voltage, which can prolong battery life in portable electronics. The ACE500C work with low-ESR ceramic capacitors, reducing the amount of board space necessary for power applications. The ACE500C series consume less than 0.1uA in shutdown mode and have fast turn-on time less than 50us. The series are very suitable for the battery-powered equipments, such as RF applications and other systems requiring a quiet voltage source.

### Features

- 300mA RF Low-Dropout Regulator With Enable
- Ultralow-Noise : 40Mvrms (10Hz~100kHz)
- High PSRR : 70dB@10kHz
- Fast Start-Up Time (20μs)
- Excellent Load/Line Transient Response
- Low Dropout Voltage : 120mV@100mA
- Stable With a 1μF Ceramic Capacitor
- Available in Adjustable Voltage Version (1.0V to 5.5V)
- Built-in Current Limiter, Short-Circuit Protection

### Application

- RF: VCOs, Receivers, ADCs
- Cellular and Cordless Telephones
- Handheld Organizers
- Audio
- Bluetooth, Wireless LAN
- Tablet, MID

### Absolute Maximum Ratings

Parameter	Symbol	Max	Unit
Input Voltage	$V_{IN}$	$V_{SS}-0.3\sim V_{SS}+8$	V
Output Current	$I_{OUT}$	350	mA
Output Voltage	$V_{OUT}$	$V_{SS}-0.3\sim V_{IN}+0.3$	V
Power Dissipation SOT-23-5 SOT-23-6	$P_d$	400	mW
Operating Temperature	$T_{opr}$	- 40 to + 85	°C
Storage Temperature	$T_{stg}$	- 40 to + 125	°C
Soldering Temperature & Time	$T_{solder}$	260°C,10s	

Note: Exceed these limits to damage to the device.

Exposure to absolute maximum rating conditions may affect device reliability.

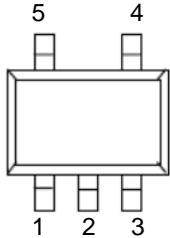


# ACE500C

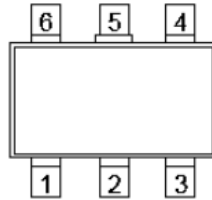
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### Packaging Type

SOT-23-5/SOT-353(SC-70-5)



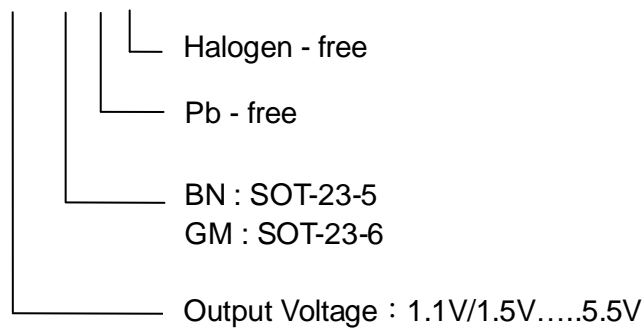
SOT-23-6



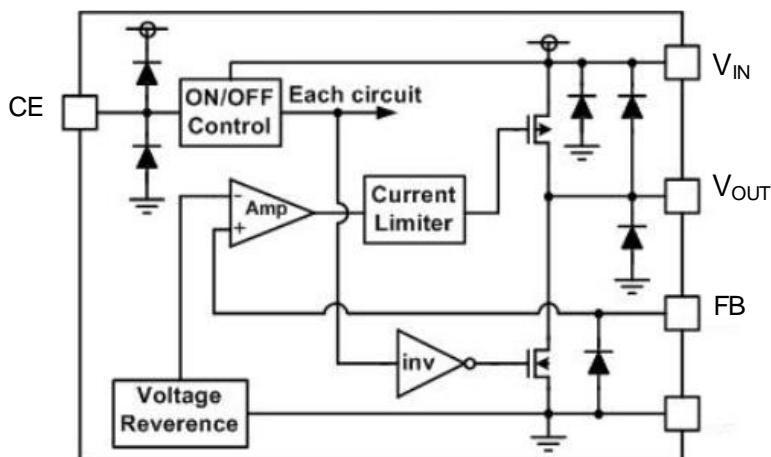
SOT-23-5	SOT-23-6	Description	Function
1	1	$V_{IN}$	Power input Pin
2	2	$V_{SS}$	Ground
3	3	CE	Chip Enable Pin
4	5	FB	Feedback Pin: Used to Set Output Voltage
5	6	$V_{OUT}$	Output Pin
	4	NC	Not Connection

### Ordering information

ACE500C XX XX + H



### Block Diagram





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### Electrical Characteristics

( $V_{IN}=V_{OUT}+1V$ ,  $C_{IN}=C_{OUT}=1\mu F$ ,  $T_A=25^\circ C$ , unless otherwise specified)

Parameter	Symbol	Conditions	Min	Typ	Max	Units
Input Voltage	$V_{IN}$		1.8 <sup>(1)</sup>		7.0	V
Output Current	$I_{OUT}$		300			mA
Supply Current	$I_{SS}$	$V_{OUT}=0mA$		45	80	uA
Standby Current	$I_{STBY}$	$V_{CE}=0V$			0.1	uA
CE "High" Voltage	$V_{CEH}$		1.2		$V_{IN}$	V
CE "Low" Voltage	$V_{CEL}$				0.3	V
CE pin current		$V_{CE}=0V$	-1		1	V
FB Voltage	$V_{FB}$	$I_{OUT}=1mA$	0.588	0.600	0.612	V
FB pin current		$V_{FB}=1.8V$			1	uA
Output voltage range			1.0		$5.5-V_{DO}$	V
Line Regulation	$\frac{\Delta V_{OUT}}{V_{OUT}} \cdot V_{IN}$	$I_{OUT}=10mA$ $V_{OUT}+1V \leq V_{IN} \leq 7V$		0.01	0.2	%/V
Load Regulation	$\Delta V_{OUT}$	$V_{IN}=V_{OUT}+1V$ $1mA \leq I_{OUT} \leq 100mA$		10		mV
Dropout Voltage <sup>(2)</sup>	$V_{dif}$	$I_{OUT}=100mA$ $V_{OUT} \geq 3.0V$		120		mV
Output Voltage Temperature Characteristics	$\frac{\Delta V_{OUT}}{\Delta T} \cdot V_{OUT}$	$I_{OUT}=10mA$ $-40 \leq T \leq +85$		50		ppm
Current Limit	$I_{LIM}$		310	350		mA
Short Current	$I_{SHORT}$	$V_{OUT}=V_{SS}$		50		mA
Power Supply Ripple Rejection	$V_{OUT}=1.2V$	PSRR	$f=100Hz$ $I_{OUT}=50mA$		80	dB
			$f=1kHz,$ $I_{OUT}=50mA$		75	
			$f=10kHz,$ $I_{OUT}=50mA$		70	
Output noise voltage		BW=10Hz to 100kHz, $I_{OUT}=10mA$		40		$\mu V_{RMS}$
Time, start-up		$I_{OUT}=10mA$ $C_{OUT}=1\mu F$		20		uS

NOTE:

(1) Minimum  $V_{IN}$  is 1.8V or  $V_{OUT} + V_{DO}$ , whichever is greater.

(2)  $V_{dif}$  : The difference of output voltage and input voltage when input voltage is decreased gradually till output voltage equals to 98% of  $V_{OUT}$  (E).



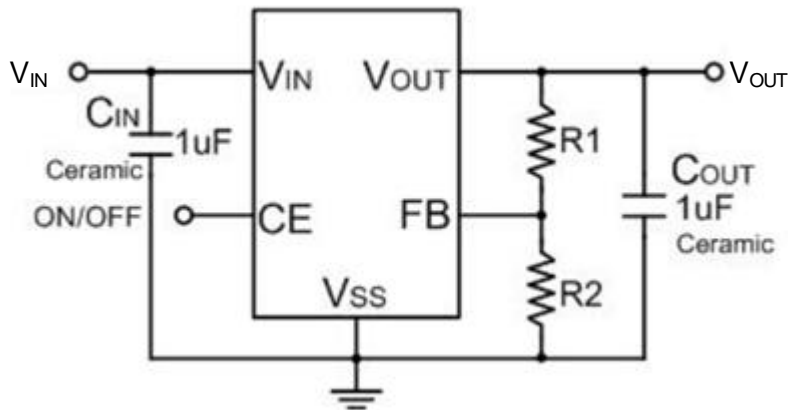
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## 300mA Low Consumption Linear Regulator

### DROPOUT VOLTAGE CHART

Setting Output Voltage $V_{OUT}(V)$	Dropout Voltage(mV) @ $I_{OUT}=100mA$	
	Typ	Max.
1.2	300	450
1.5	240	400
1.8	185	300
2.5	135	280
2.8	125	250
3.0	120	240
3.3	110	220
5.0	90	180

### Typical Application Circuit



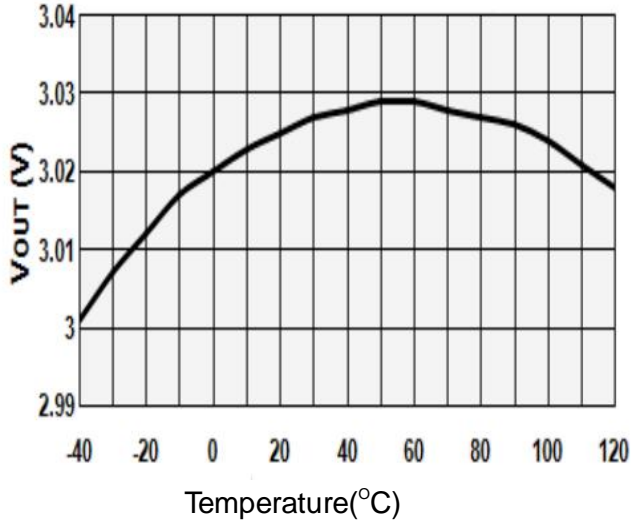


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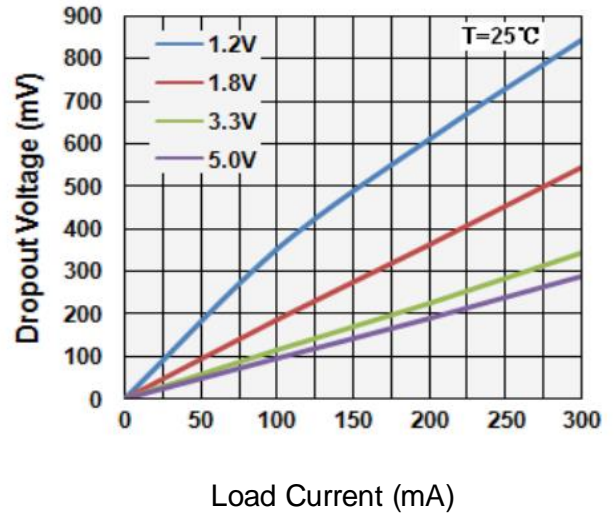
## 300mA Low Consumption Linear Regulator

### Typical Performance Characteristics

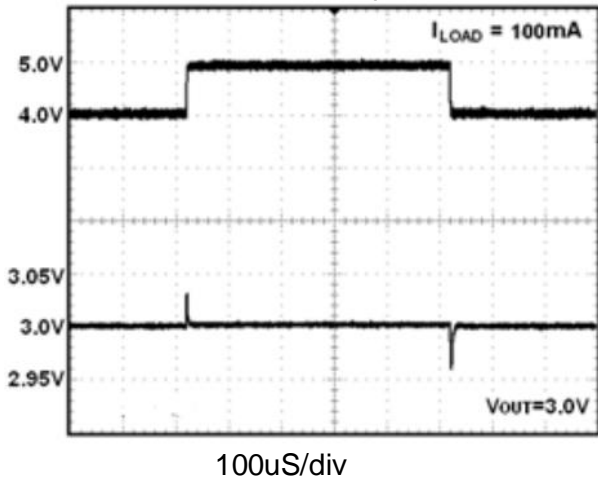
Output Voltage vs Temperature



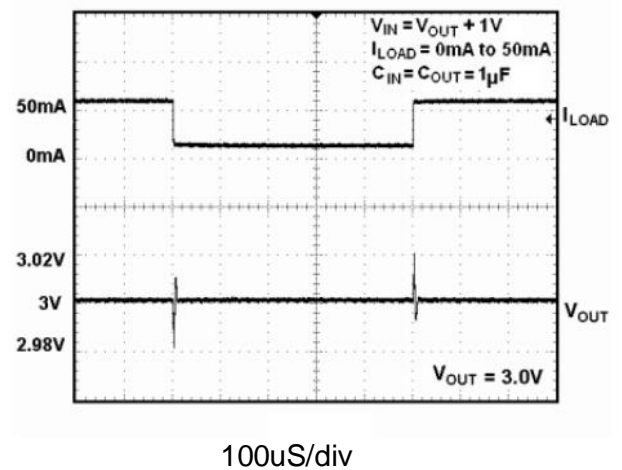
Dropout Voltage vs. Load Current



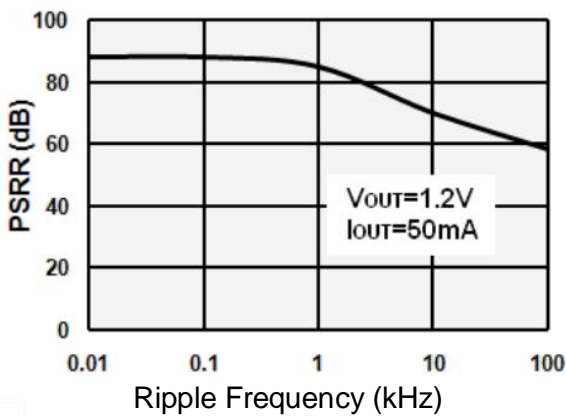
line-Transient Response



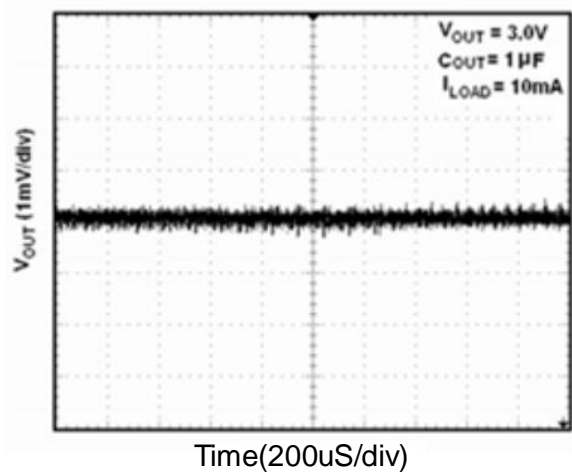
load-Transient Response Near Dropout



PSRR vs. Frequency



Output Noise 10Hz to 100KHz

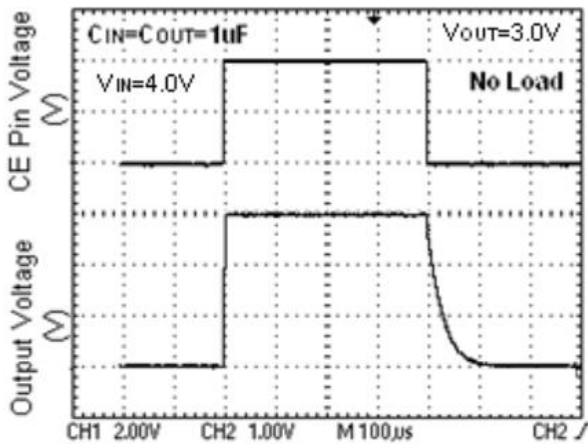




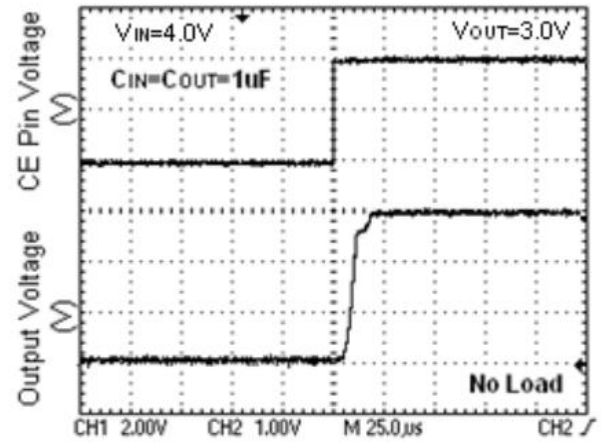
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## 300mA Low Consumption Linear Regulator

CE Pin ShUTDOWN Response



Start Up



### APPLICATION INFORMATION

#### Setting The Output Voltage

Figure 1 shows the typical application circuit with ACE500C. The external resistor sets the output voltage according to the following equation:

$$V_{OUT} = 0.6V \times \left(1 + \frac{R1}{R2}\right)$$

Table 1. Resistor select for output voltage setting

V <sub>OUT</sub>	R1	R2
1.2V	30.1K	30.1K
1.5V	45.3K	30.1K
1.8V	60.4K	30.1K
2.5V	95.3K	30.1k
2.8V	110K	30.1k
3.0V	120K	30.1K
3.3V	137K	30.1K
5.0V	221K	30.1k

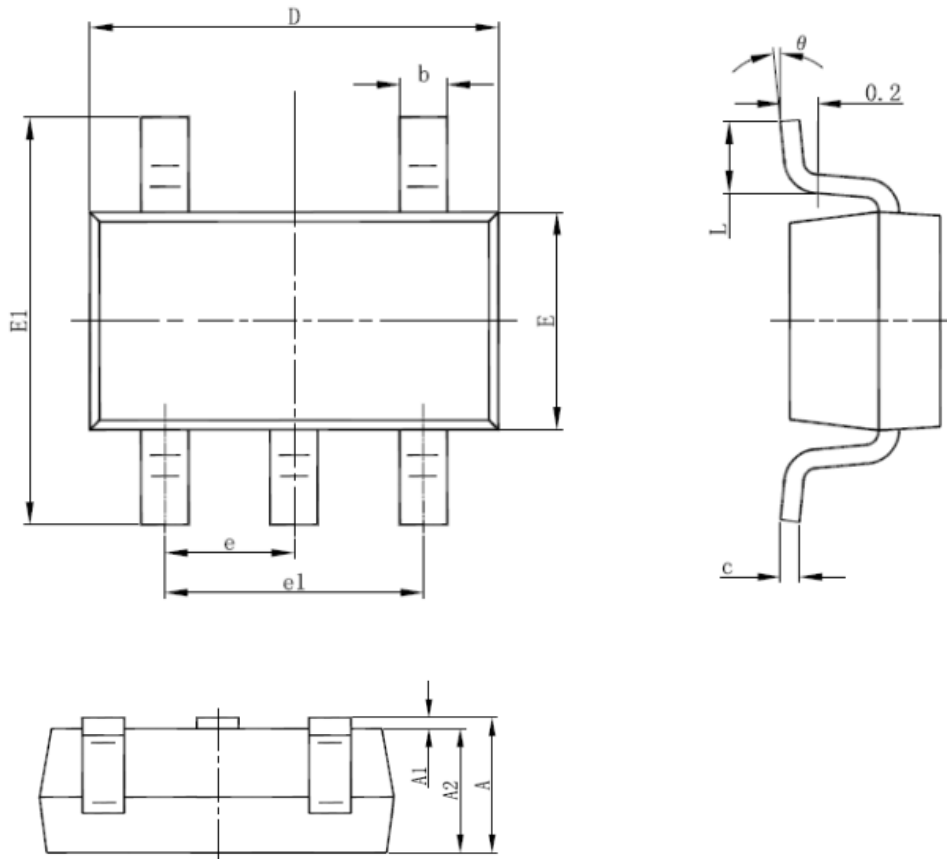


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### Packing Information

#### SOT-23-5



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	1.050	1.250	0.041	0.049
A1	0.000	0.100	0.000	0.004
A2	1.050	1.150	0.041	0.045
b	0.300	0.500	0.012	0.020
c	0.100	0.200	0.004	0.008
D	2.820	3.020	0.111	0.119
E	1.500	1.700	0.059	0.067
E1	2.650	2.950	0.104	0.116
e	0.950(BSC)		0.037(BSC)	
e1	1.800	2.000	0.071	0.079
L	0.300	0.600	0.012	0.024
θ	0°	8°	0°	8°

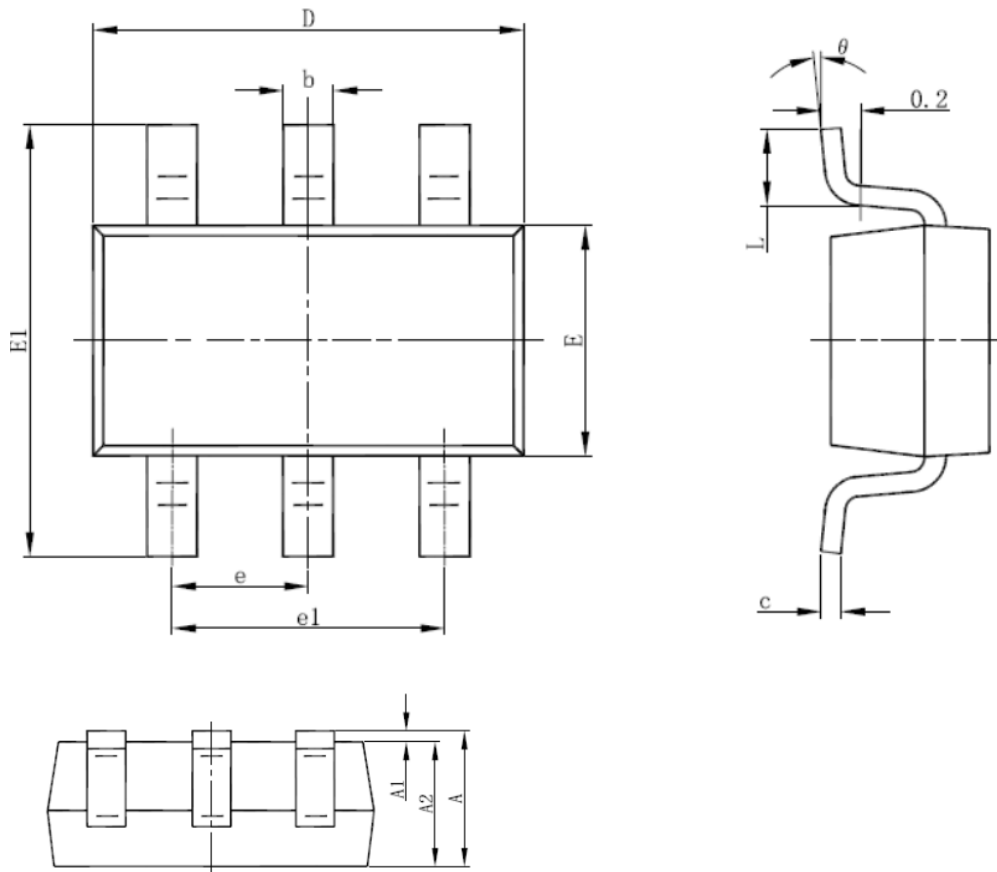


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## 300mA Low Consumption Linear Regulator

### Packing Information

#### SOT-23-6



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	1.050	1.250	0.041	0.049
A1	0.000	0.100	0.000	0.004
A2	1.050	1.150	0.041	0.045
b	0.300	0.500	0.012	0.020
c	0.100	0.200	0.004	0.008
D	2.820	3.020	0.111	0.119
E	1.500	1.700	0.059	0.067
E1	2.650	2.950	0.104	0.116
e	0.950(BSC)		0.037(BSC)	
e1	1.800	2.000	0.071	0.079
L	0.300	0.600	0.012	0.024
theta	0°	8°	0°	8°





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### Notes

ACE does not assume any responsibility for use as critical components in life support devices or systems without the express written approval of the president and general counsel of ACE Electronics Co., LTD.

As sued herein:

1. Life support devices or systems are devices or systems which, (a) are intended for surgical implant into the body, or (b) support or sustain life, and whose failure to perform when properly used in accordance with instructions for use provided in the labeling, can be reasonably expected to result in a significant injury to the user.
2. A critical component is any component of a life support device or system whose failure to perform can be reasonably expected to cause the failure of the life support device or system, or to affect its safety or effectiveness.