



ACE515C

300mA High PSRR, Fast Response Linear Regulator

Description

ACE515C series is a group of positive voltage output, low power consumption, low dropout voltage regulator.

ACE515C can provide output value in the range of 1.0V~4.5V every 0.1V step. It also can be customized on command. ACE515C can also work under a wide input voltage ranging from 1.5V to 6V.

ACE515C includes high accuracy voltage reference, error amplifier, current limit circuit and output driver module with discharge capability.

ACE515C has excellent load and line transient response and good temperature characteristics, which can assure the stability of chip and power system. And it uses trimming technique to guarantee output voltage accuracy within $\pm 2\%$.

Features

- Input voltage range: 1.5 – 6V
- Output voltage range: 1.0V~4.5V (customized on command every 0.1V step)
- Low power consumption: 35uA (Typ.)
- Low output noise (47uVRMS)
- Shutdown mode: 0.1uA
- Low dropout voltage: 300mV@300mA (Typ.)
- High ripple rejection: 70dB@1KHz (Typ.)
- Low temperature coefficient: $\pm 100\text{ppm}/^\circ\text{C}$
- Excellent line regulation: 0.05%/V
- Build-in chip enable and discharge circuit
- Highly accurate: $\pm 2\%$
- Output current limit

Application

- Power source for cellular phones and various kind of PCSs
- Battery Powered equipment
- Power Management of MP3, PDA, DSC, Mouse, PS2 Games
- Reference Voltage Source
- Regulation after Switching Power

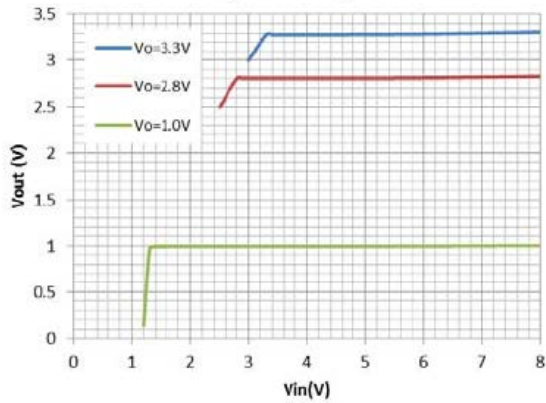


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Typical Performance Characteristic:

Line Regulation
($I_{out}=0mA$)



Absolute Maximum Ratings

Parameter	Symbol	Max	Unit
Max Input voltage	V_{IN}	8	V
Package Thermal Resistance	θ_{JA}	220	W
SOT-23-3		220	W
SOT-23-5			
Power Dissipation		250	mW
SC-70-5		250	
SOT-23-3L		250	
SOT-23-5		600	
DFN1*1-4			
Operating Junction temperature	T_J	125	$^{\circ}C$
Storage temperature	T_S	- 45 to 150	$^{\circ}C$
Output Current		300	mA
Ambient Temperature	T_A	-40 to 85	$^{\circ}C$
Lead Temperature & Time		260 $^{\circ}C$,10S	

Note:

Heat Sink Area of PCB for DFN1x1-4 is recommended at least 2.5mmx4mm.

Exceed these limits to damage to the device.

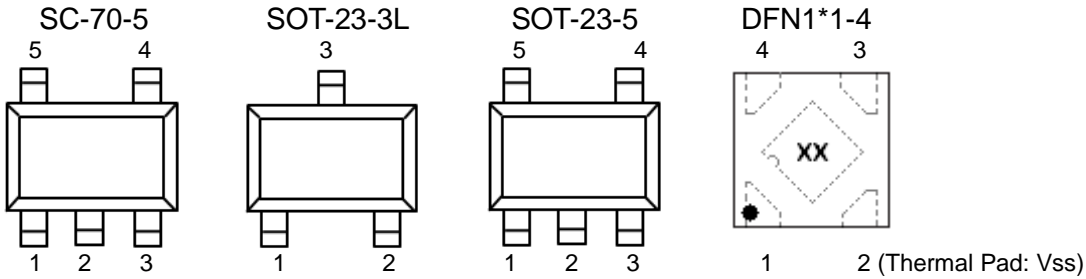
Exposure to absolute maximum rating conditions may affect device reliability.



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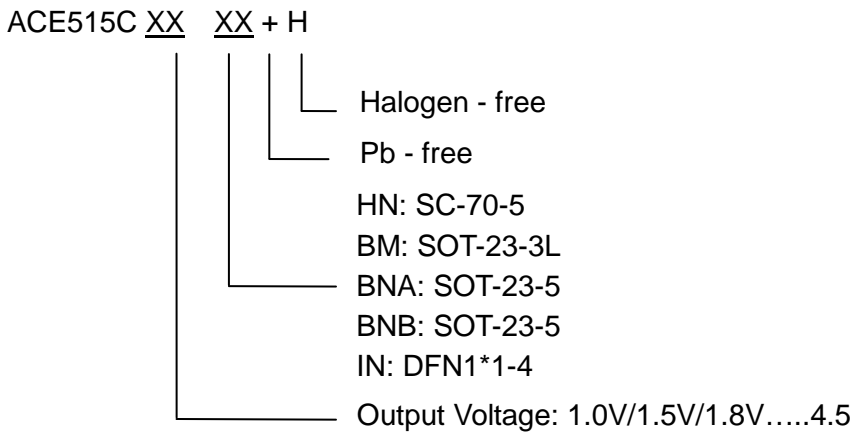
Packaging Type



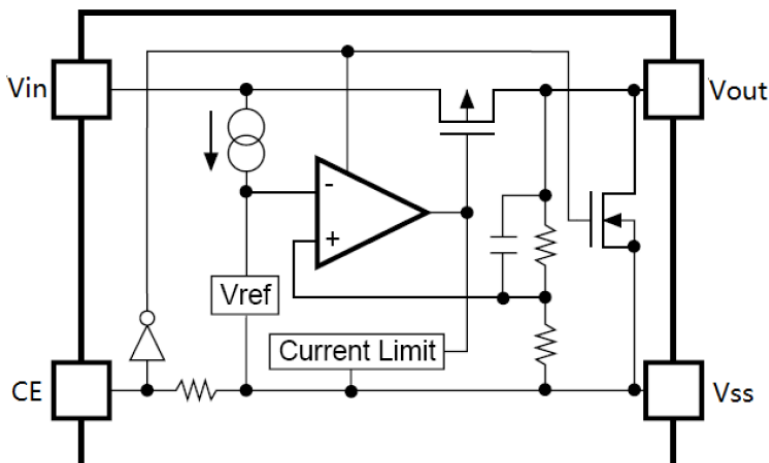
SC-70-5	SOT-23-3L	SOT-23-5		DFN1*1-4	Description	Function
		A	B			
5	2	5	1	1	Vout	Output pin
1	3	1	3	4	Vin	Input pin
2	1	2	2	2	V _{SS}	Ground pin
3		3	4	3	CE	Chip Enable pin
4		4	5		NC	No Connection

Ordering

information



Block Diagram





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Recommended Work Conditions

Item	Min	Max	Unit
Input Voltage Range	1.5	6	V
Ambient Temperature	-40	85	°C

*The operation ambient temperature range is verified on several test samples. Not a test condition for volume production whose test is only performed under 25°C.

Electrical Characteristics

ACE515C for arbitrary output voltage (Test Conditions: $C_{in}=1\mu F$, $C_{out}=1\mu F$, $T_A=25^\circ C$, unless otherwise specified.)

Parameter	Symbol	Conditions	Min	Typ	Max	Units
Input Voltage	V_{IN}		1.5		6	V
Output Voltage	$V_{OUT}>1.5V$	$V_{IN}=\text{Set } V_{OUT}+1V$ $1mA \leq I_{OUT} \leq 30mA$	$V_{OUT} \times 0.98$	V_{OUT}	$V_{OUT} \times 1.02$	V
	$V_{OUT} \leq 1.5V$		$V_{OUT} - 0.03$		$V_{OUT} + 0.03$	
Maximum Output Current	$I_{OUT}(\text{Max.})$	$V_{IN} - V_{OUT}=1V$	300			mA
Dropout Voltage, $V_{OUT} \geq 2.8V$	V_{drop}^1	$I_{OUT}=100mA$		100	150	mV
		$I_{OUT}=300mA$		300	400	
Line Regulation	$\frac{\Delta V_{OUT}}{\Delta V_{IN} \cdot V_{OUT}}$	$I_{OUT}=40mA$ $2.8V \leq V_{IN} \leq 6V$		0.05	0.2	%/V
Load Regulation	ΔV_{OUT}	$V_{IN}=\text{Set } V_{OUT}+1V$ $1mA \leq I_{OUT} \leq 300mA$		50	80	mV
Supply Current	I_{SS}	$V_{IN}=\text{Set } V_{OUT}+1V$		35	80	uA
Supply Current (Standby)	$I_{standby}$	$V_{IN}=\text{Set } V_{OUT}+1V$ $V_{ce}=V_{SS}$		0.1	1.0	uA
Output Voltage Temperature Coefficient	$\frac{\Delta V_{OUT}}{\Delta T \cdot V_{OUT}}$	$I_{OUT}=30mA$		± 100		ppm/ °C
Ripple Rejection	PSRR	$F=1KHz$, Ripple=0.5Vp-p $V_{IN}=\text{Set } V_{OUT}+1V$		70		dB
Short Current Limit	I_{lim}		300			mA
CE Pin Pull down Resistance	R_{cepd}	$CE=V_{in}=5V$		500K		Ω
CE Input Voltage "H"	V_{ceh}		1.5		V_{IN}	V
CE Input Voltage "L"	V_{cel}		0		0.25	V
Output Noise	E_n	$BW=10Hz \sim 100kHz$		47		uVrms
Discharge Resistor	$R_{discharge}$	$CE=0$, $V_{out}=3.0V$		1.5K		Ω

Note: $V_{drop}=V_{in} 1-(V_{out2} \cdot 0.98)$ V_{out2} is the output voltage when $V_{in}=V_{out1}+1.0V$ and $I_{out}=300mA$.

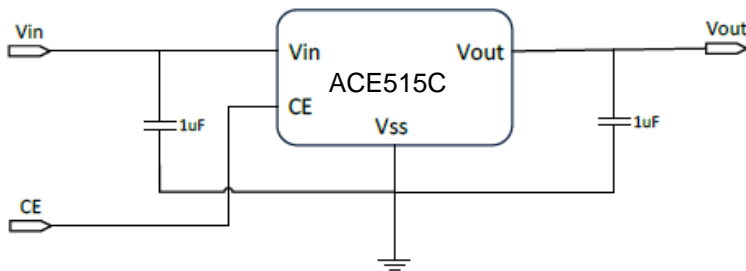
V_{in} is the input voltage at which the output voltage becomes 98% of V_{out1} after gradually decreasing the input voltage.



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Typical Application Circuit



Note Input capacitor ($C_{in}=1\mu F$) and Output capacitor ($C_{out}=1\mu F$) are recommended in all application circuit.

Explanation :

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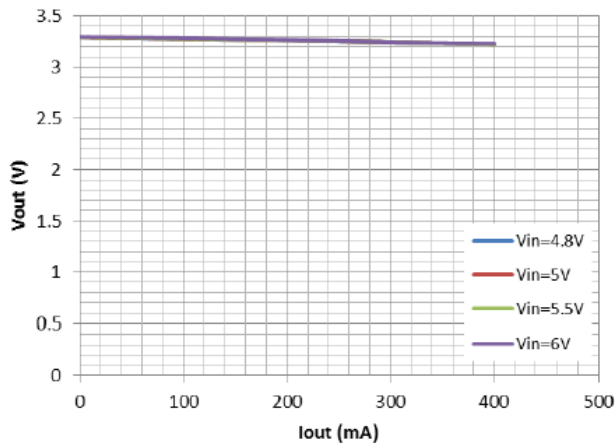
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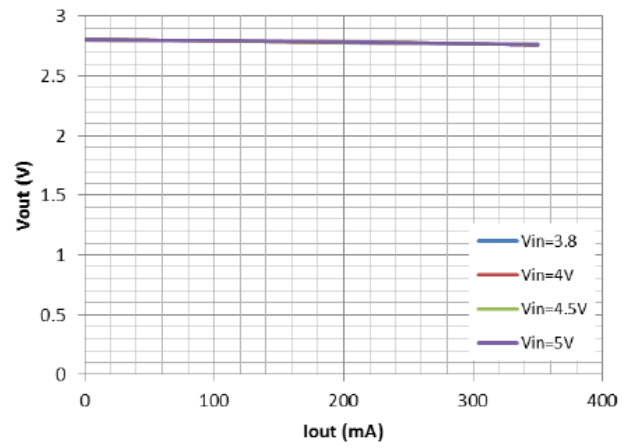


Typical Performance Characteristics (T=25°C)

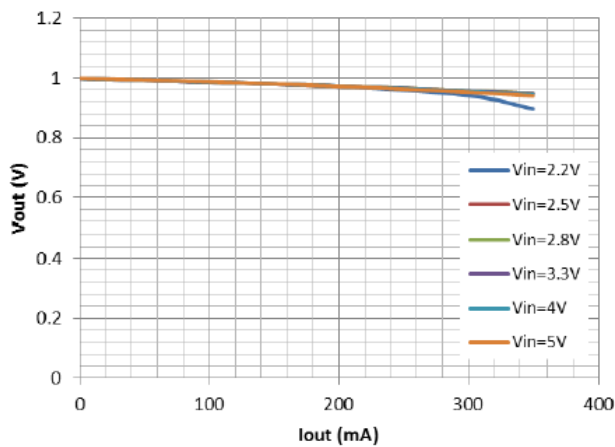
Load Regulation
(Vout=3.3V)



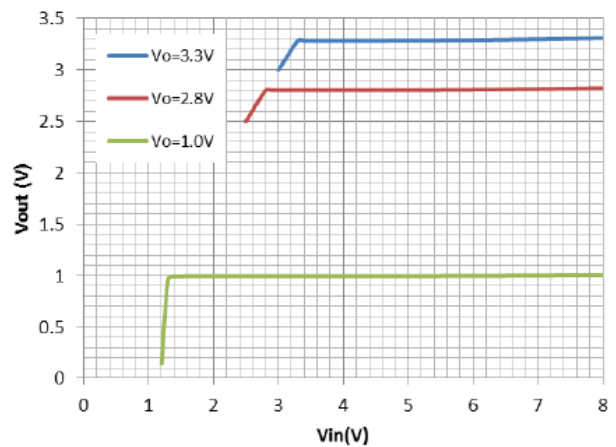
Load Regulation
(Vout=2.8V)



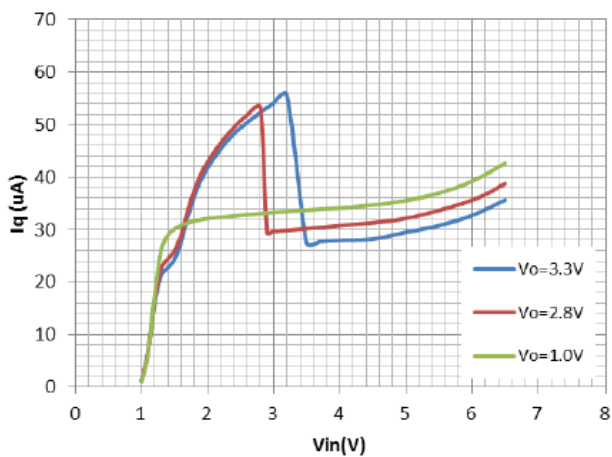
Load Regulation
(Vout=1.0V)



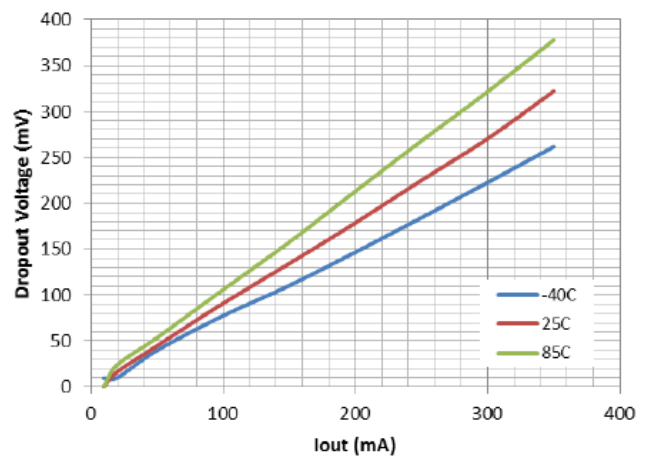
Line Regulation
(Iout=0mA)



Quiescent Current
(Iout=0mA and CE=high)



Dropout Voltage
(Vout=3.3V)



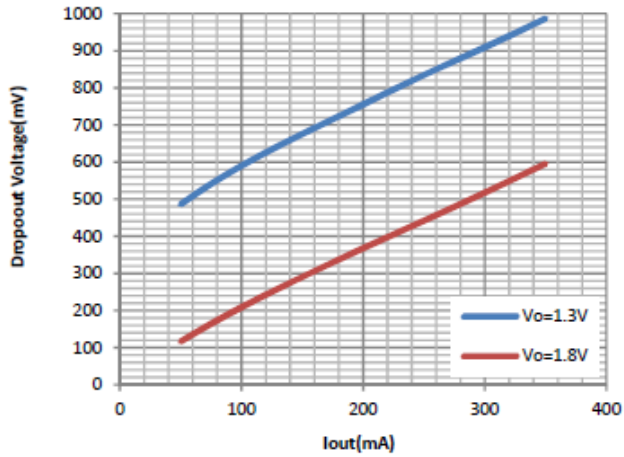


ACE515C

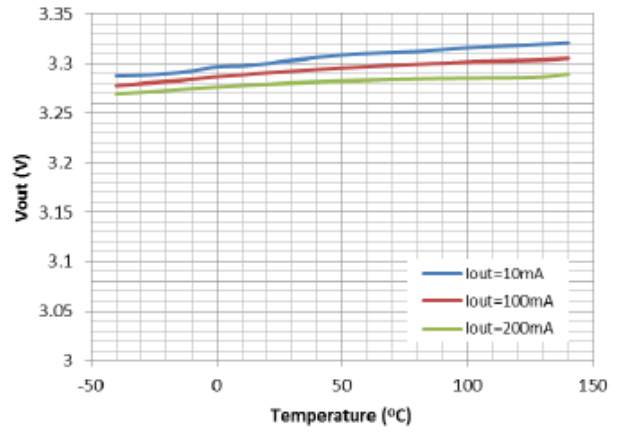
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Dropout Voltage

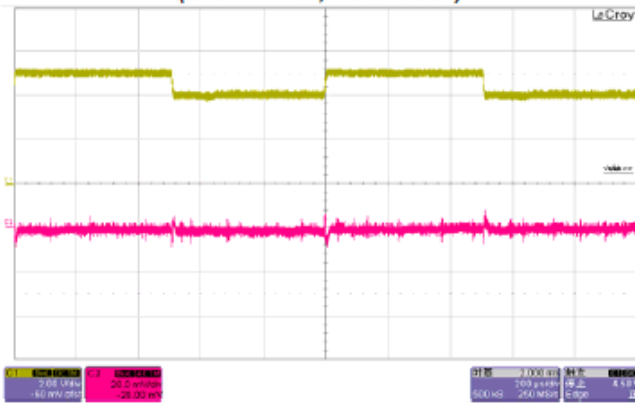


V_{out} Temperature Coefficient (V_{out}=3.3V)



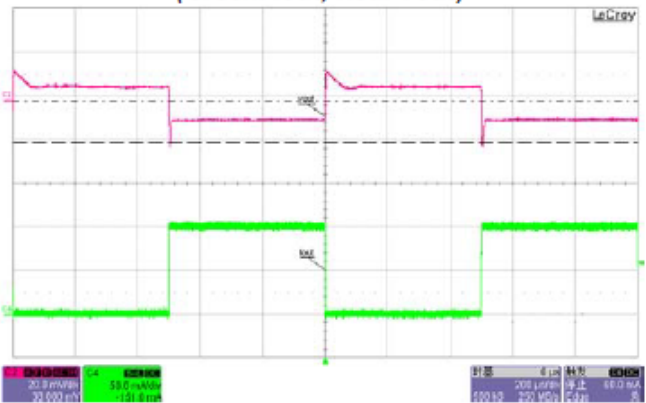
Line Transient Response

V_{out}=3.3V, I_{out}=20mA
(brown: V_{in}; Red: V_{out})

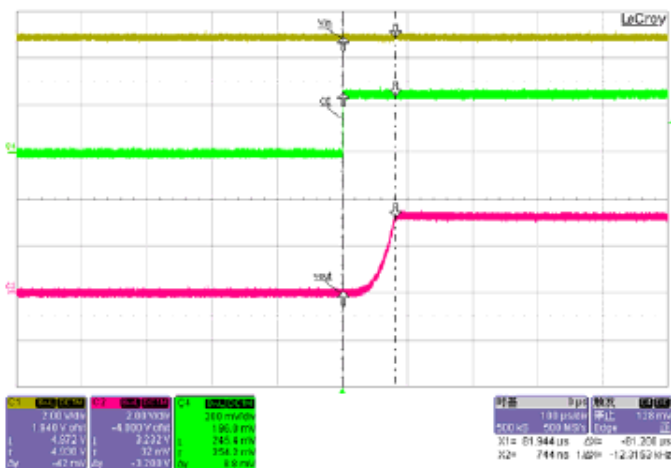


Load Transient Response

V_{in}=5V, V_{out}=3.3V, I_{out}=1-100mA
(Green: I_{out}; Red: V_{out})



CE Chip Enable Response



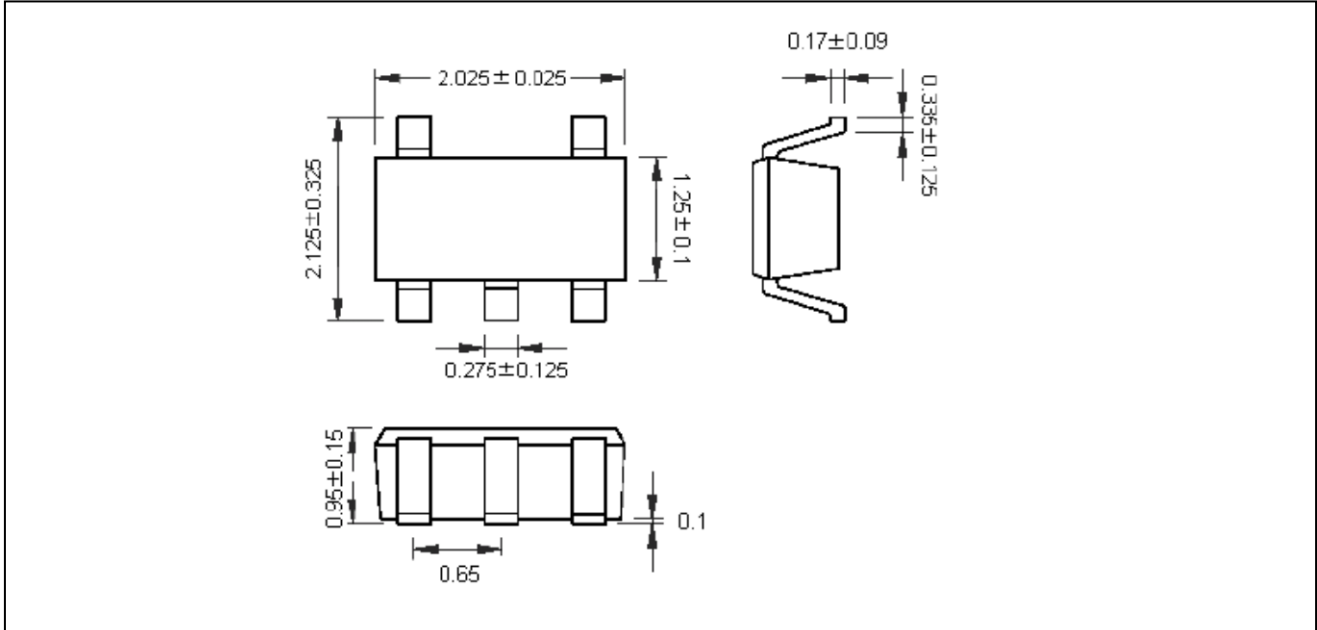


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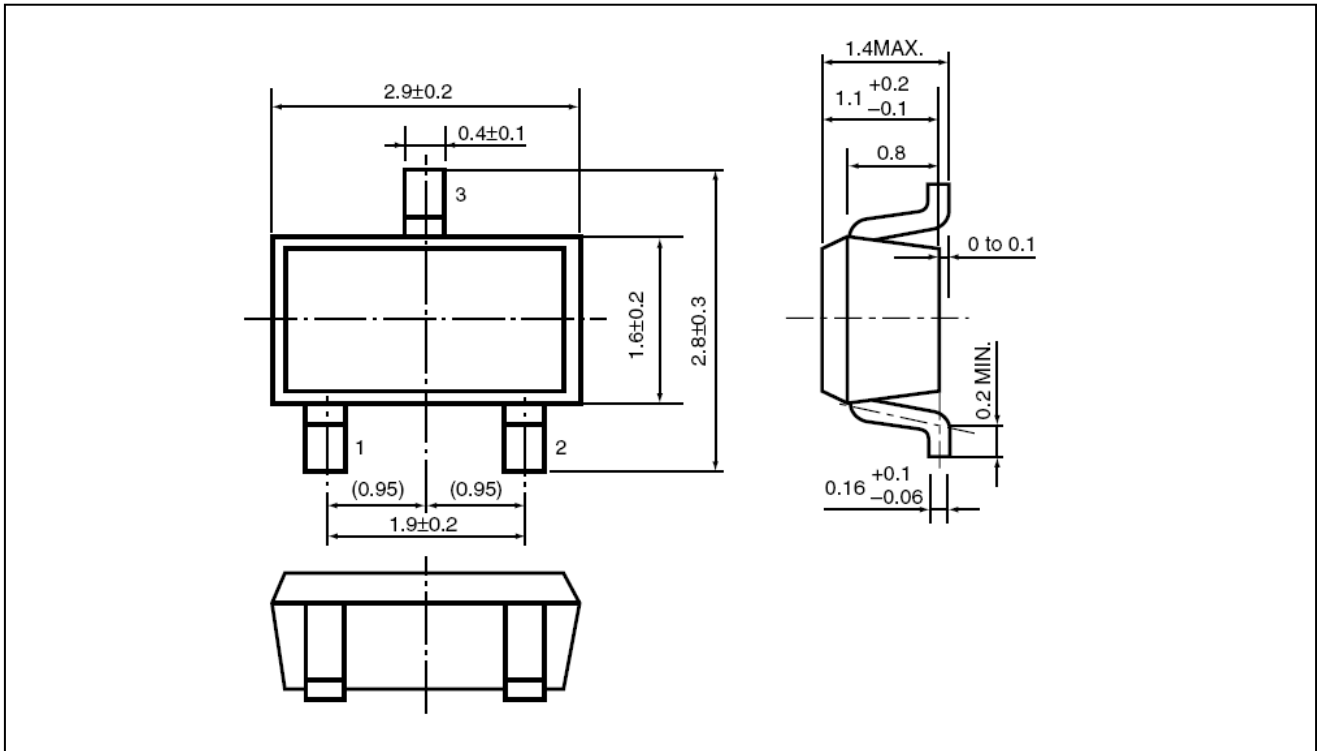
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Packing Information

SC-70-5



SOT-23-3L



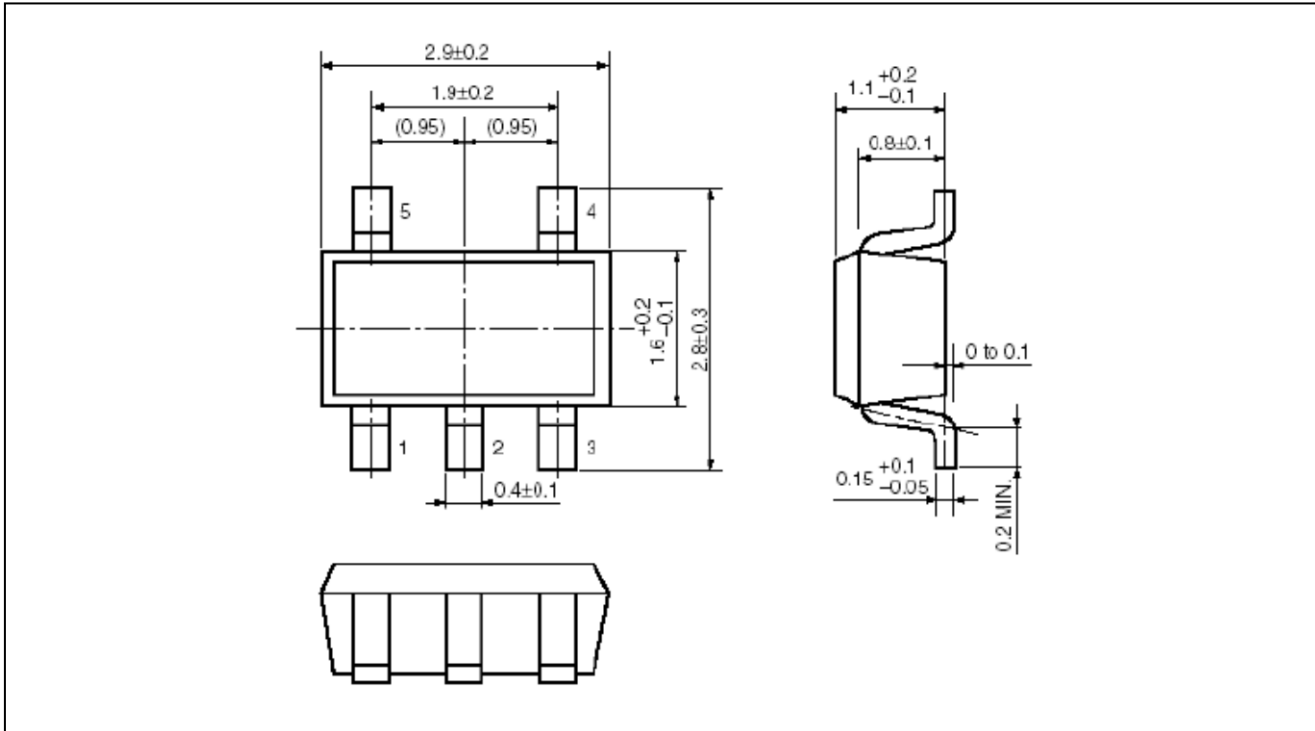


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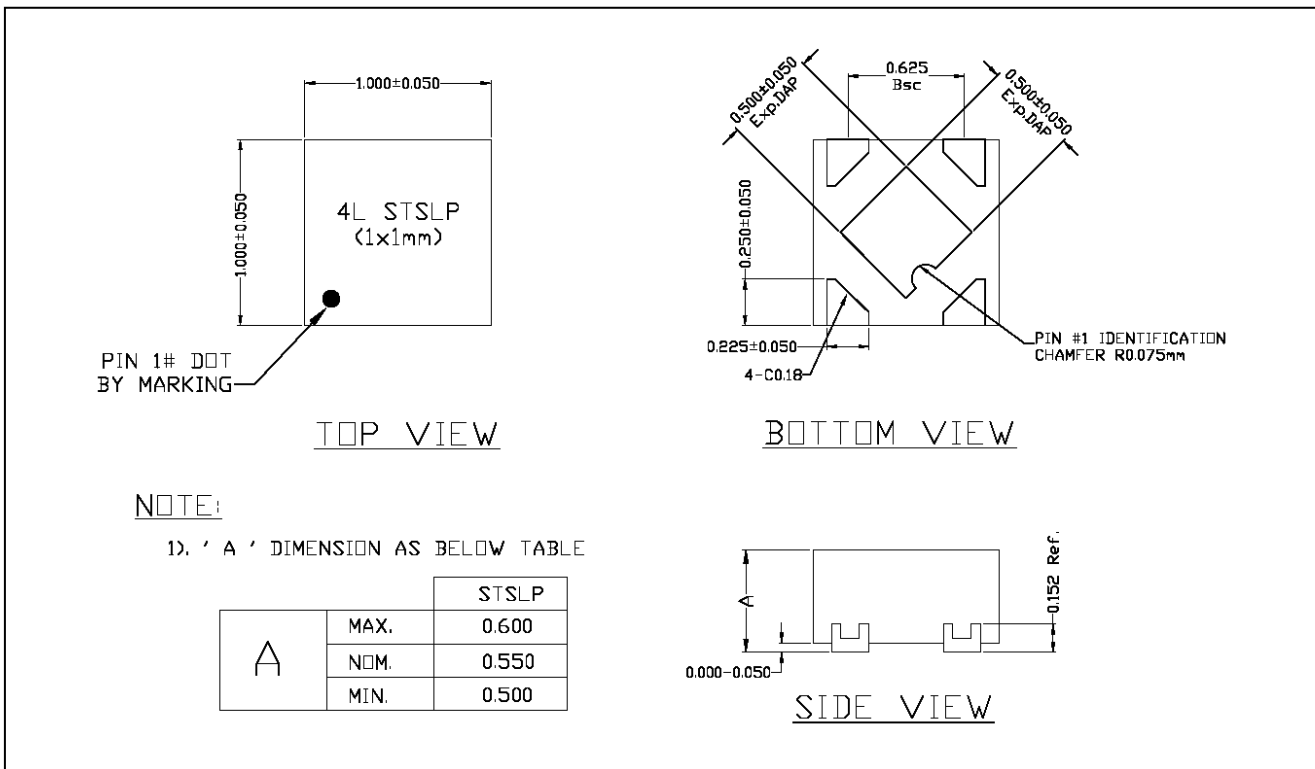
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Packing Information

SOT-23-5



DFN1*1-4





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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.

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