0.6uA Ultra-Low Quiescent Current, 300mA, LDO Regulators with Fast Transient Response

Description

The ME6226 series are ultra-low quiescent current, high accuracy, CMOS LDO regulators that can source 300 mA with excellent transient performance.

The ME6226, with ultra-low I_Q of 0.6 uA, is designed to extend battery-life of applications requiring very long standby time. The device maintains lower IQ consumption even in dropout conditions.

The ME6231 series is also fully compatible with low ESR ceramic capacitors, reducing cost and improving output stability. This high level of output stability is maintained even during frequent load fluctuations, due to the excellent transient response performance.

The ME6226 also include current limiting protection and temperature protection. The CE function allows the output of regulator to be turned off, resulting in greatly reduced power consumption.

Feature

- Ultra-low I_Q: 0.6 uA
- Controlled I_Q in dropout conditions
- Excellent transient response(1 mA to 300 mA)
  -- 90mV undershoot
- Output current up to 300 mA
- Dropout Voltage: 110 mV @I_{OUT} =100 mA（V_{OUT}= 3.3 V）
- Operating Voltage Range: 2.0 V~5.5 V
- Output Voltage Range: 1.0 V~3.6 V
- Highly Accuracy: ±1％
- Standby Current: <0.01 uA
- Line Regulation: 0.035 ％/V（TYP.）
- Built-in temperature protection and current limiting protection
- Output discharge feature

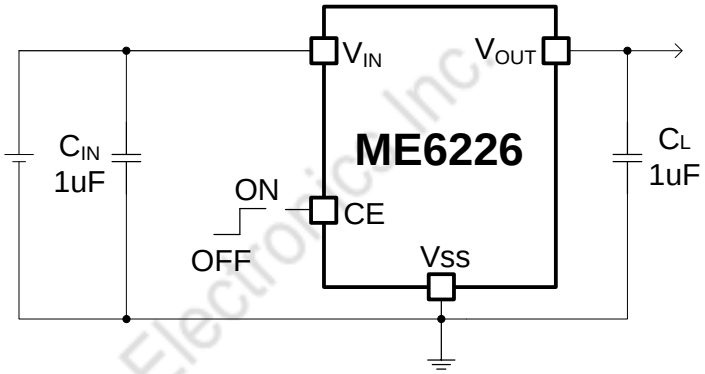
Applications

- Mobile phones
- Wearable accessories
- Reference voltage source
- Battery powered equipment

Package

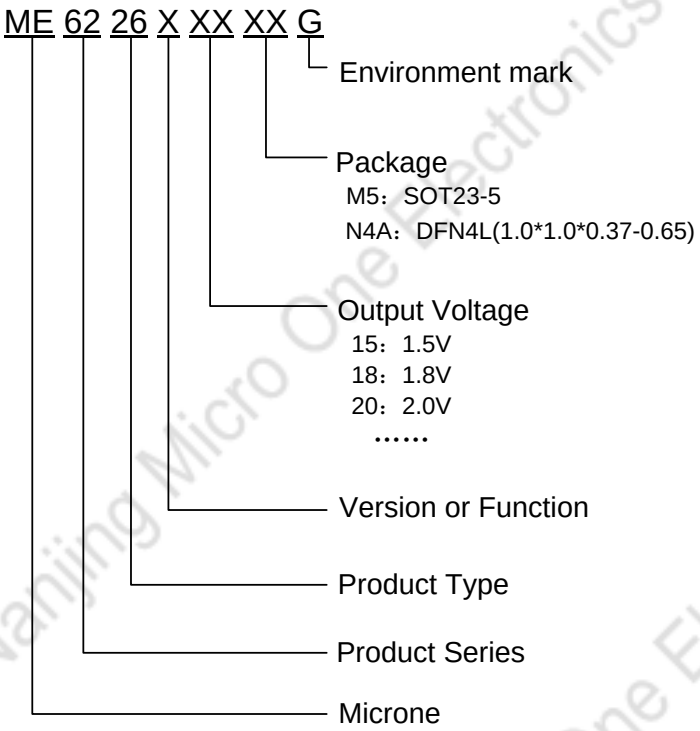
- 4-pin DFN4L(1.0*1.0*0.37-0.65)
- 5-pin SOT23-5

Typical Application Circuit



Note: Ceramic capacitor with X7R and X5R offer improved voltage and temperature coefficients.10uF Ceramic capacitor is recommended for excellent load transient response and line transient response.

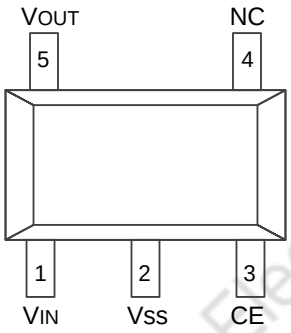
Selection Guide



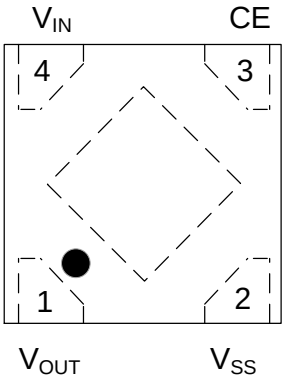
product series	Product Function
ME6226C15N4AG	Enable can be set；V_{OUT}=1.5V；Package：DFN4L(1.0*1.0*0.37-0.65)
ME6226C18M5G	Enable can be set；V_{OUT}=1.8V；Package：SOT23-5
ME6226C20M5G	Enable can be set；V_{OUT}=2.0V；Package：SOT23-5
ME6226C28M5G	Enable can be set；V_{OUT}=2.8V；Package：SOT23-5
ME6226C30M5G	Enable can be set；V_{OUT}=3.0V；Package：SOT23-5
ME6226C33M5G	Enable can be set；V_{OUT}=3.3V；Package：SOT23-5
ME6226C33N4AG	Enable can be set；V_{OUT}=3.3V；Package：DFN4L(1.0*1.0*0.37-0.65)

NOTE: If you need other voltage and package, please contact our sales staff.

Pin Configuration（Top View）



SOT23-5

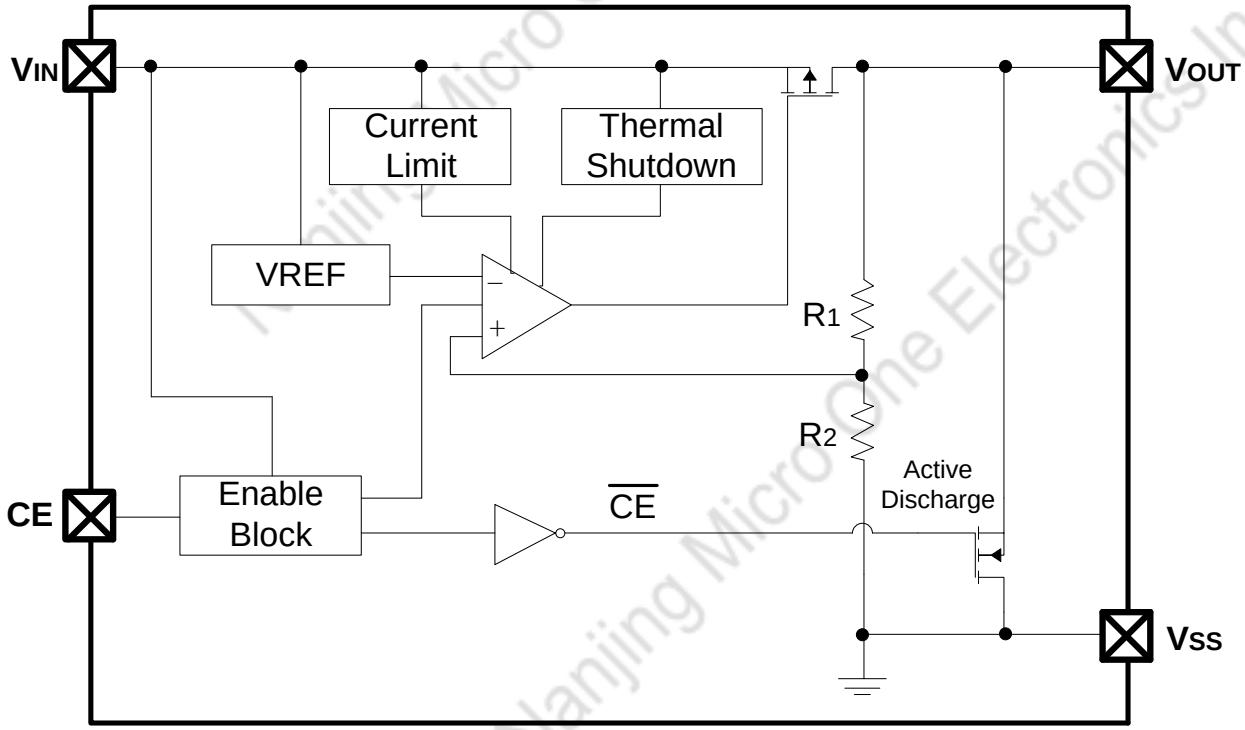


DFN4L(1.0*1.0*0.37-0.65)

Pin Assignment

PIN Number		symbol	Function
SOT23-5	DFN4L(1.0*1.0*0.37-0.65)		
1	4	V_{IN}	Power Input
2	2	V_{SS}	Ground
3	3	CE	ON/OFF Control
4	-	NC	No Connect
5	1	V_{OUT}	Output

Block Diagram



Absolute Maximum Ratings

Parameter		Symbol	Ratings	Units
Input Voltage		V_{IN}	-0.3 ~ 6.5	V
CE Pin Voltage		V_{CE}	-0.3 ~ V_{IN}+0.3	V
V_{OUT} Voltage		V_{OUT}	-0.3 ~ V_{IN}+0.3	V
V_{OUT} Current		I_{OUT}	600	mA
Internal Power Dissipation (T_A=25℃)	SOT23-5	Pd	0.6	W
	DFN4L(1.0*1.0*0.37-0.65)		0.5	
Thermal resistance (Junction to air)	SOT23-5	θ_{JA}	210	℃/W
	DFN4L(1.0*1.0*0.37-0.65)		250	
Operating Ambient Temperature Range		T_{Opr}	-40~+85	℃
Storage Temperature Range		T_{stg}	-55~+150	℃
Maximum junction temperature		T_J	-40~+150	℃

Notes:

1) Stresses at or above those listed under Absolute Maximum Ratings may cause permanent damage to the product.

2) The maximum allowable power dissipation is a function of the maximum junction temperature $T_{J\ (MAX)}$, the junction-to- ambient thermal resistance θ_{JA}, and the ambient temperature T_A. The maximum allowable continuous power dissipation at any ambient temperature is calculated by $P_{D(MAX)}=(T_{J(MAX)}-T_A)/\theta_{JA}$. Exceeding the maximum allowable power dissipation produces an excessive die temperature, and the regulator goes into thermal shutdown. Internal thermal shutdown circuitry protects the device from permanent damage.

3） The θ_{JA} values given in this table are for comparison with other packages only and cannot be used for design purposes. They do not represent the performance achieved in real-world applications.

Electrical Characteristic

(V_{IN}= V_{OUT}+1V，V_{CE} = V_{IN}，C_{IN}=C_L=1uF，Ta=25°C , unless otherwise noted)

Parameter	Symbol	Conditions		Min.	Typ.	Max.	Units
Operating Input Voltage	V_{IN}			2.0	-	5.5	V
Output Voltage	V_{OUT}(E) (Note 2)	I_{OUT}=10mA,V_{IN}= V_{OUT}+1V		X 0.99	V_{OUT} (T) (Note 1)	X 1.01	V
Maximum Output Current	I_{OUTMAX}	V_{IN}= V_{OUT}+1V		-	300	-	mA
Load Regulation	ΔV_{OUT}	V_{IN}= V_{OUT}+1V,1mA≤I_{OUT}≤100mA		-	9	20	mV
Dropout Voltage (Note 3) I_{OUT} =100mA	V_{DIF}	V_{OUT}＜1.8V		-	200	400	mV
		1.8V≤V_{OUT}＜2.5V		-	180	360	
		2.5V≤V_{OUT}＜3.0V		-	130	260	
		3.0V≤V_{OUT}		-	110	220	
Dropout Voltage (Note 3) I_{OUT} =200mA	V_{DIF}	V_{OUT}＜1.8V		-	400	800	mV
		1.8V≤V_{OUT}＜2.5V		-	340	680	
		2.5V≤V_{OUT}＜3.0V		-	250	500	
		3.0V≤V_{OUT}		-	220	440	
Supply Current	I_{SS}	V_{IN}= V_{OUT}+1V		-	0.6	1.2	μA
Stand-by Current	I_{CEL}	V_{CE}＝0V		-	0	0.01	μA
Line Regulation	$\frac{\Delta V_{OUT}}{\Delta V_{IN} \cdot V_{OUT}}$	I_{OUT} =30mA, V_{OUT}+1V ≤V_{IN}≤18V		-	0.035	-	%/V
Output Current Limit	I_{LIM}	Peak Output Current	V_{OUT}＜1.8V	-	450	-	mA
			V_{OUT}≥1.8V	-	500	-	
CE “High” Voltage	V_{CEH}	Start up		1.2	-	-	V
CE “Low” Voltage	V_{CEL}	Shut down		-	-	0.4	V
Active Output Discharge Resistance	R_{DIS}	V_{CE}<0.5V		-	170	-	Ω
Ripple Rejection Ratio (Note 4)	PSRR	V_{IN}=(V_{OUT}+1)+0.2Vpp, I_{OUT}=10mA	f=100Hz	-	55	-	dB
			f=1kHz	-	40	-	
Thermal Shutdown Temperature(Note 4)	T_{SD}	Temperature increasing, I_{OUT}=20mA		-	150	-	℃
Thermal Shutdown Hysteresis(Note 4)	ΔT_{SD}	Temperature falling		-	20	-	℃

NOTES：

1.V_{OUT} (T) ： Specified Output Voltage

2.V_{OUT} (E) ： Effective Output Voltage (Ie. The output voltage when “V_{OUT} (T)+1.0V”is provided at the V_{IN} pin while maintaining a certain I_{OUT} value.)

3.V_{DIF}： V_{IN1} –V_{OUT} (E)’

V_{IN1} ： The input voltage when V_{OUT}(E)’ appears as input voltage is gradually decreased.

V_{OUT} (E)’=A voltage equal to 98% of the output voltage whenever an amply stabilized I_{OUT} {V_{OUT} (T)+1.0V} is input.

4. guaranteed by design.

Typical Performance Characteristics

ME6226C33M5G （V_{CE} = V_{IN}=4.3v,Ta=25℃，C_{IN}=CL=1uF，unless otherwise noted.）

Figure 1. Output Voltage vs. Output Current

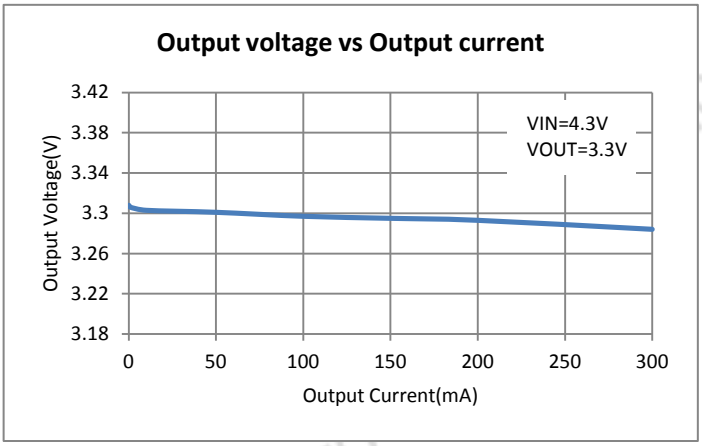


Figure 2. Output Voltage vs. Input Voltage

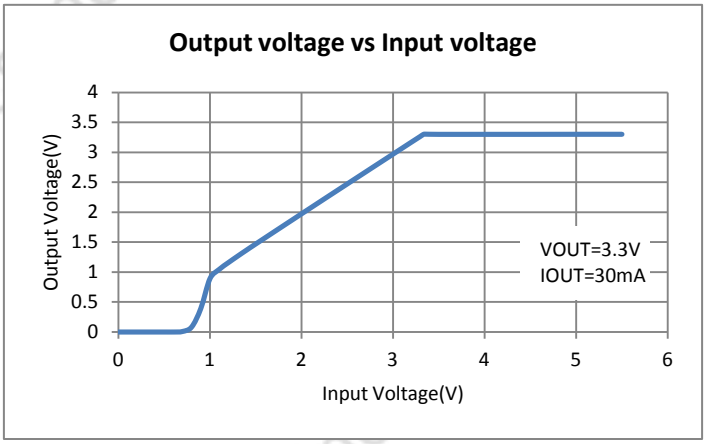


Figure 3. Dropout Voltage vs. Output Current

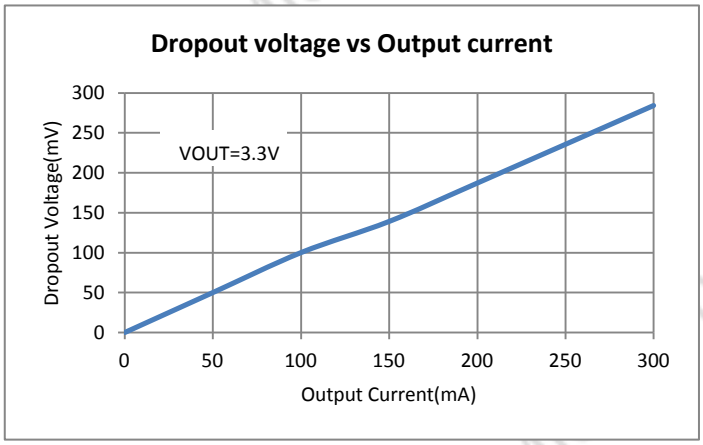


Figure 4.Quiescent Current vs. Input Voltage

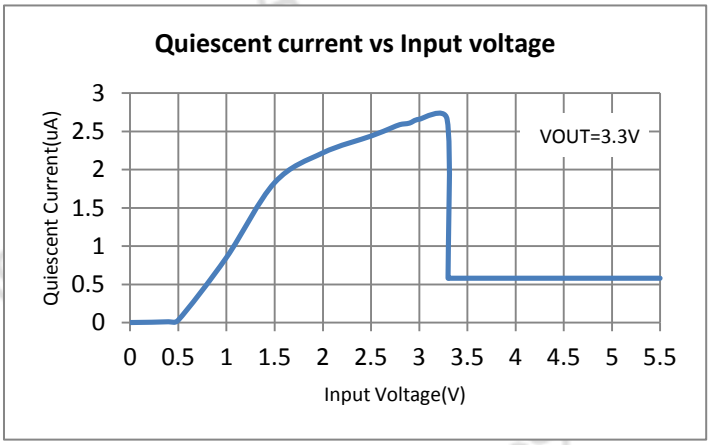


Figure 5. Quiescent Current vs. Temperature

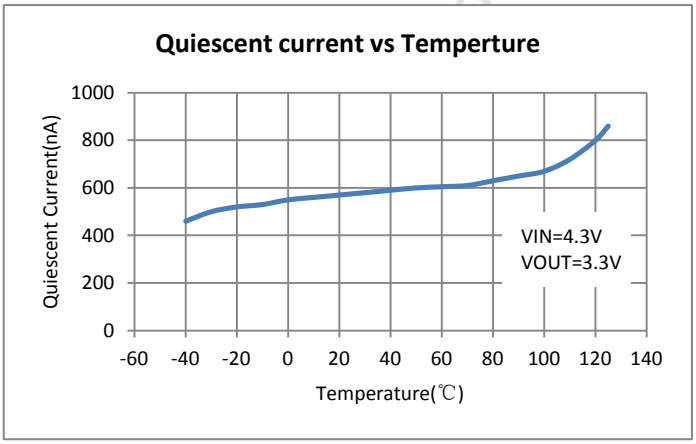


Figure 6. Output Voltage vs. Temperature

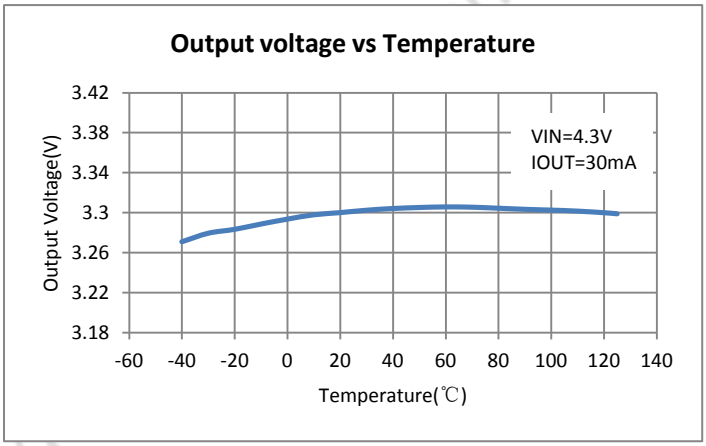


Figure 7. GND Current vs. Output Current

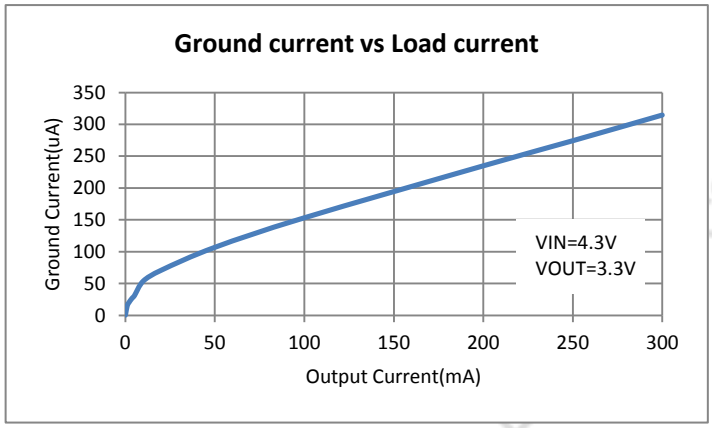


Figure 8. PSRR vs. Frequency

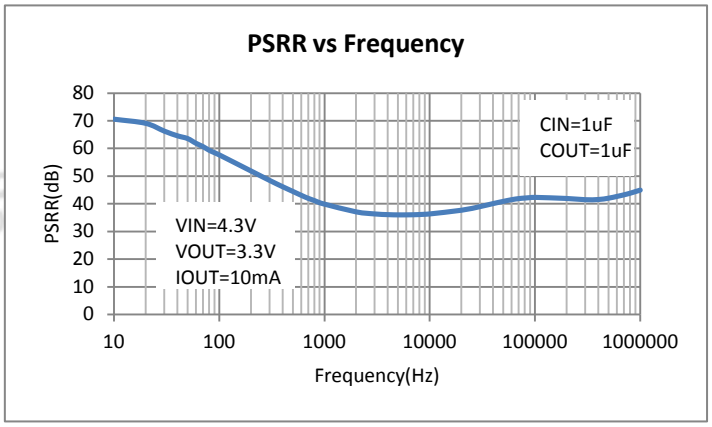


Figure9. Load Transient Response

I_{OUT}=from 0mA to 10mA,T_{rise}=T_{fall}=0.5us,C_{IN}=C_{OUT}=1uF

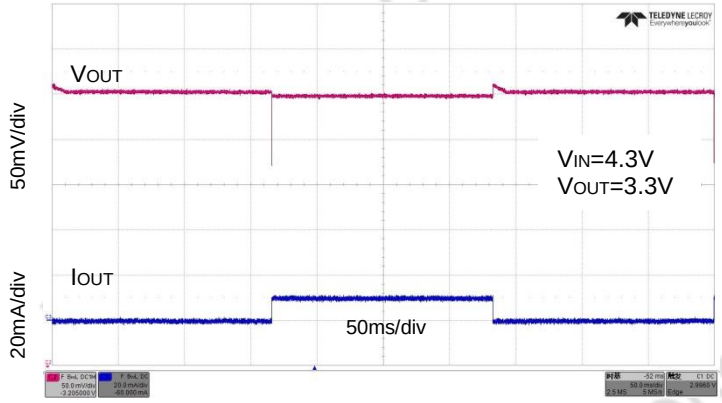
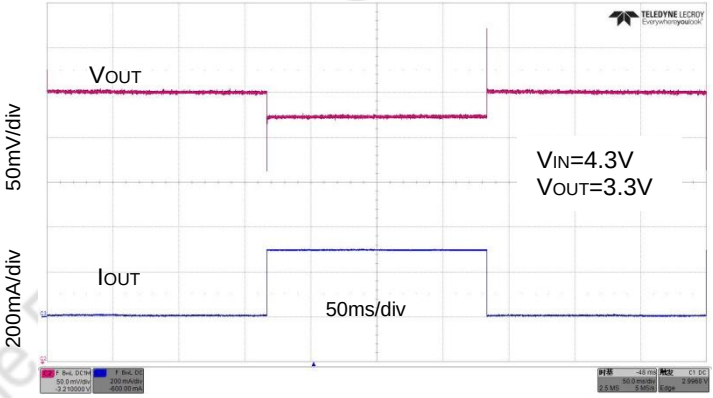


Figure 10. Load Transient Response

I_{OUT}=from 1mA to 300mA,T_{rise}=T_{fall}=0.5us,C_{IN}=C_{OUT}=1uF

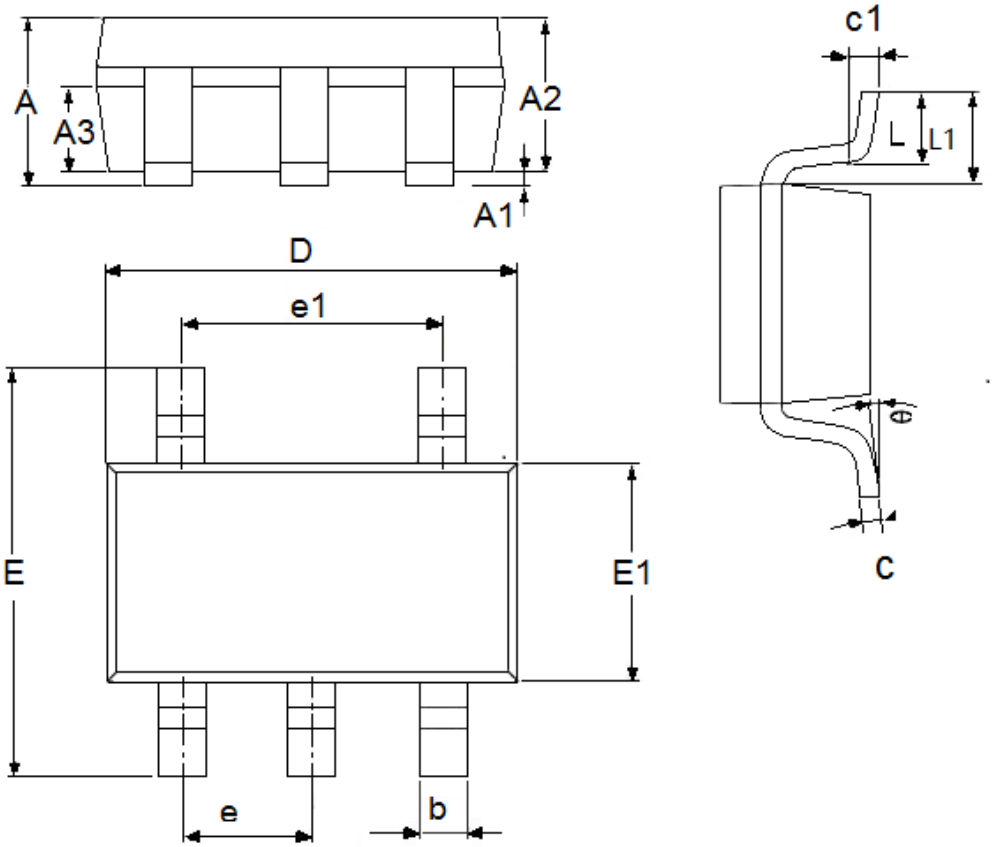


Package Quantity

Package Type	Minimum Packing QTY	UNITS	Small Box	Large BOX
SOT23-5	3000	Tape & Reel	30K	120K
DFN4L(1.0*1.0*0.37-0.65)	10000	Tape & Reel	100K	400K

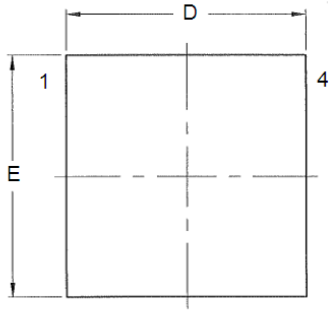
Packaging Information

- **Package Type:SOT23-5**

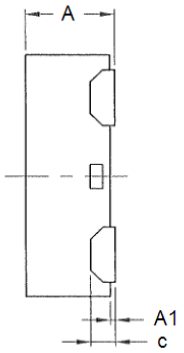


DIM	Millimeters		Inches	
	Min	Max	Min	Max
A	1.05	1.45	0.0413	0.0571
A1	0	0.15	0.0000	0.0059
A2	0.9	1.3	0.0354	0.0512
A3	0.6	0.7	0.0236	0.0276
b	0.25	0.5	0.0098	0.0197
c	0.1	0.23	0.0039	0.0091
D	2.82	3.05	0.1110	0.1201
e1	1.9(TYP)		0.0748(TYP)	
E	2.6	3.05	0.1024	0.1201
E1	1.5	1.75	0.0512	0.0689
e	0.95(TYP)		0.0374(TYP)	
L	0.3	0.6	0.0118	0.0236
L1	0.59(TYP)		0.0232(TYP)	
θ	0	8°	0.0000	8°
c1	0.2(TYP)		0.0079(TYP)	

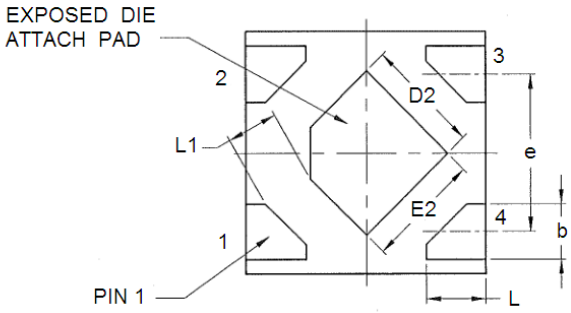
- **Package Type:DFN4L(1.0*1.0*0.37-0.65)**



TOP VIEW



SIDE VIEW



BOTTOM VIEW

DIM	Millimeters		Inches	
	Min	Max	Min	Max
A	0.32	0.4	0.0126	0.0157
A1	0	0.05	0	0.0020
b	0.18	0.28	0.0071	0.0110
c	0.102		0.0040	
D	0.95	1.05	0.0374	0.0413
D2	0.43	0.53	0.0169	0.0209
e	0.65 (TYP)		0.0256 (TYP)	
E	0.95	1.05	0.0374	0.0413
E2	0.43	0.53	0.0169	0.0209
L	0.2	0.3	0.0079	0.0118
L1	0.205 (TYP)		0.0081 (TYP)	

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