



Low Power, High Accuracy, High PSRR LDO Regulators

Description

The GLD0505 series are high accuracy, CMOS LDO Voltage Regulators, offering low power, high ripple rejection ratio and low dropout. The GLD0505 series is ideal for today's cutting edge mobile phone. Internally the GLD0505 includes a reference voltage source, error amplifiers, driver transistors, current limiters and phase compensators. The GLD0505's current limiters' foldback circuit also operates as a short protect for the output current limiter and the output pin. The GLD0505 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 and high PSRR achieved across a broad range of frequencies. The CE function allows the output of regulator to be turned off, resulting in greatly reduced power consumption.

($V_{IN}=4.3V, V_{OUT}=3.3V$)

- Dropout Voltage: 110mV@ $I_{OUT}=100mA$
- Operating Voltage Range: 1.8V~5.5V
- Output Voltage Range: 1.2V~5.0V
- Highly Accuracy: $\pm 1\%$
- Low Power Consumption: 1.8uA (TYP.)
- Standby Current: 0 uA (TYP.)
- High Ripple Rejection: 70dB@1KHz
(GLD050533)
- Line Regulation: 0.035%/V (TYP.)
- Built-in temperature protection and current limiting protection

Feature

- Maximum Output Current: 400mA

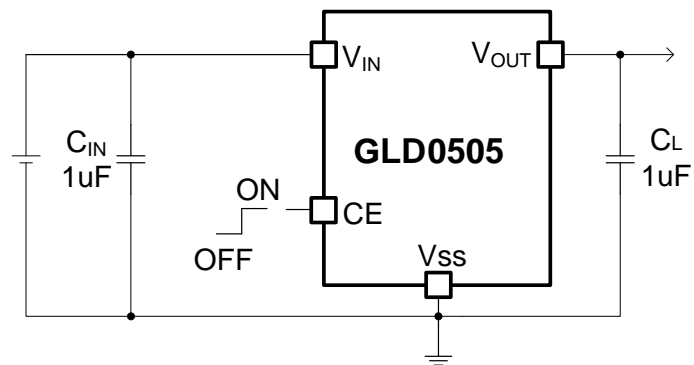
Applications

- Mobile phones
- Cordless phones, radio communication equipment
- Portable games
- Cameras, Video cameras
- Reference voltage sources
- Battery powered equipment

Package

- 3-pin SOT23-3、SOT89-3
- 4-pin FBP1*1-4、DFN1*1-4
- 5-pin SOT23-5

Typical Application Circuit

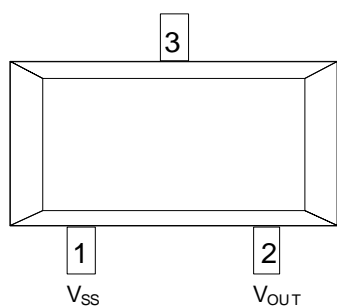


Selection Guide

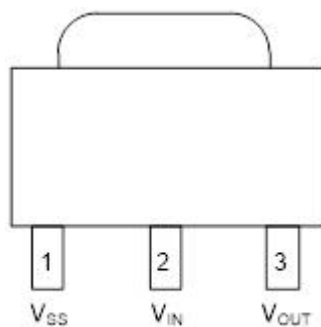
product serie	Product Function
GLD050518S3	V _{OUT} =1.8V; Package: SOT23-3
GLD050530S3	V _{OUT} =3.0V; Package: SOT23 3
GLD050533S3	V _{OUT} =3.3V; Package: SOT23-3
GLD050533S9	V _{OUT} =3.3V; Package: SOT89-3
GLD050512S5	Enable can be set; V _{OUT} =1.2V; Package: SOT23 5
GLD050512F4	Enable can be set; V _{OUT} =1.2V; Package: FBP1*1 4
GLD050512D4	Enable can be set; V _{OUT} =1.2V; Package: DFN1*1-4
GLD050515S5	Enable can be set; V _{OUT} =1.5V; Package: SOT23 5
GLD050515F4	Enable can be set; V _{OUT} =1.5V; Package: FBP1*1 4
GLD050515D4	Enable can be set V _{OUT} =1.5V; Package: DFN1*1 4
GLD050518S5	Enable can be set V _{OUT} =1.8V; Package: SOT23 5
GLD050518F4	Enable can be set V _{OUT} =1.8V; Package: FBP1*1 4
GLD050518D4	Enable can be set V _{OUT} =1.8V; Package: DFN1*1 4
GLD050528S5	Enable can be set V _{OUT} =2.8V; Package: SOT23 5
GLD050528F4	Enable can be set V _{OUT} =2.8V; Package: FBP1*1 4
GLD050528D4	Enable can be set V _{OUT} =2.8V; Package: DFN1*1 4
GLD050530S5	Enable can be set V _{OUT} =3.0V; Package: SOT23-5
GLD050530F4	Enable can be set V _{OUT} =3.0V; Package: FBP1*1 4
GLD050530D4	Enable can be set V _{OUT} =3.0V; Package: DFN1*1 4
GLD050533S5	Enable can be set V _{OUT} =3.3V; Package: SOT23 5
GLD050533F4	Enable can be set V _{OUT} =3.3V; Package: FBP1*1-4
GLD050533D4	Enable can be set V _{OUT} =3.3V; Package: DFN1*1 4
GLD050536S5	Enable can be set V _{OUT} =3.6V; Package: SOT23 5
GLD050536F4	Enable can be set V _{OUT} =3.6V; Package: FBP1*1 4
GLD050536D4	Enable can be set V _{OUT} =3.6V; Package: DFN1*1 4
GLD050550S5	Enable can be set V _{OUT} =5.0V; Package: SOT23-5

NOTE: At present ,there are eight kinds of voltage value 1.2V 1.5V, 1.8V, 2.8V 3.0V 3.3V 3.6V, 5.0V。
If you need other voltage and package, please contact our sales staff.

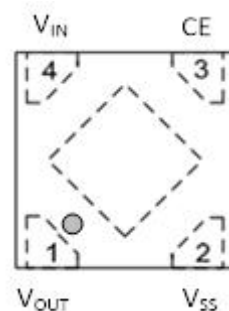
Pin Configuration (Top View)



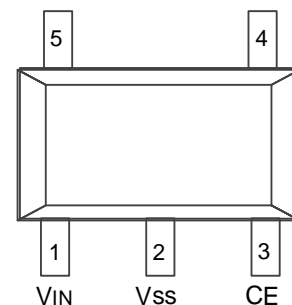
SOT23-3



SOT89-3



FBP1*1-4/DFN1*1-4

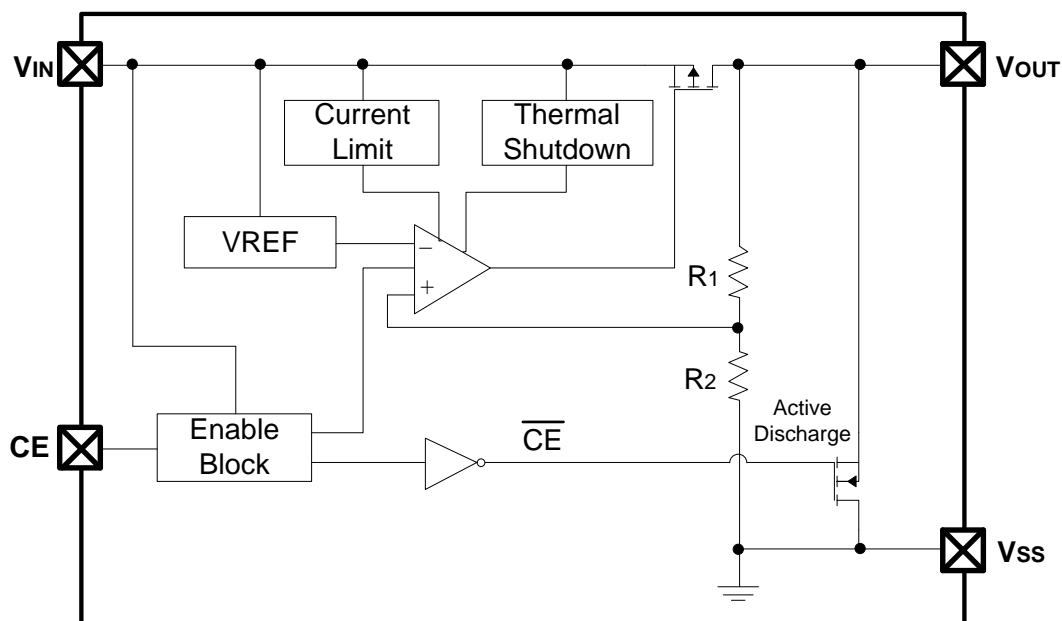


SOT23-5

Pin Assignment

PIN Number SOT23-3	PIN Number SOT89-3	PIN Number FBP1*1-4/DFN1*1-4	PIN Number SOT23-5	symbol	Function
3	2	4	1	V _{IN}	Power Input
1	1	2	2	V _{SS}	Ground
		3	3	CE	ON/OFF Control
			4	NC	No Connect
2	3	1	5	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}	$V_{IN} - 0.3 \sim V_{IN} + 0.3$	V
V_{OUT} Voltage	V_{OUT}	$V_{IN} - 0.3 \sim V_{IN} + 0.3$	V
V_{OUT} Current	I_{OUT}	600	mA
Internal Power Dissipation	Pd	SOT23-3	0.54
		SOT89-3	1.25
		FBP1*1-4/DFN1*1-4	0.5
		SOT23-5	0.6
Thermal resistance (Junction to air)	θ_{JA}	SOT23-3	230
		SOT89-3	100
		FBP1*1-4/DFN1*1-4	250
		SOT23-5	210
Operating Ambient Temperature Range	T_{Opr}	-40~+85	°C
Storage Temperature Range	T_{stg}	-55~+150	°C
Maximum junction temperature	T_J	-40~+150	°C

Electrical Characteristic

GLD050512 ($V_{IN} = V_{OUT} + 1.2V$, $V_{CE} = V_{IN}$, $C_{IN} = C_L = 1\mu F$, $T_a = 25^\circ C$, unless otherwise noted)

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Units	
Operating Input Voltage	V_{IN}		1.8	-	5.5	V	
Output Voltage	$V_{OUT(E)}$ (Note 2)	$I_{OUT} = 10mA, V_{IN} = V_{OUT} + 1.2V$	X 0.99	$V_{OUT(T)}$ (Note 1)	X 1.01	V	
Maximum Output Current	I_{OUTMAX}	$V_{IN} = V_{OUT} + 1.2V$	-	400	-	mA	
Load Regulation	ΔV_{OUT}	$V_{IN} = V_{OUT} + 1.2V$, $1mA \leq I_{OUT} \leq 100mA$	-	7	20	mV	
Dropout Voltage (Note 3)	VDIF	$I_{OUT} = 100mA$	-	350	700	mV	
		$I_{OUT} = 200mA$	-	600	1200		
Supply Current	I_{SS}	$V_{IN} = V_{OUT} + 1.2V$	-	1.8	3.6	μA	
Stand-by Current	I_{CEL}	$V_{CE} = 0V$	-	0	0.2	μA	
Line Regulation	$\frac{\Delta V_{OUT}}{\Delta V_{IN} \cdot V_{OUT}}$	$I_{OUT} = 30mA$, $V_{OUT} + 1.2V \leq V_{IN} \leq 5.5V$	-	0.06	0.1	%/V	
Output Current Limit	I_{LIM}	Peak Output Current	-	510	-	mA	
CE "High" Voltage	V_{CEH}	Start up	1.5	-	-	V	
CE "Low" Voltage	V_{CEL}	Shut down	-	-	0.5	V	
Active Output Discharge Resistance	R_{DIS}	$V_{CE} < 0.5V$	-	500	-	Ω	
Ripple Rejection Rate (Note 4)	PSRR	$V_{IN} = (V_{OUT} + 1.2)V + 1V_{ppAC}$, $I_{OUT} = 10mA$	f=1kHz	-	70	-	dB
			f=10kHz	-	55	-	
Thermal Shutdown Temperature (Note 4)	T_{SD}	Temperature increasing, $I_{OUT} = 15mA$	-	150	-	$^\circ C$	
Thermal Shutdown Hysteresis (Note 4)	ΔT_{SD}	Temperature falling	-	20	-	$^\circ C$	

GLD050518/30/33和GLD050515/18/28/30/33/36/50 ($V_{IN} = V_{OUT} + 1V$, $V_{CE} = V_{IN}$, $C_{IN} = C_L = 1\mu F$, $T_a = 25^\circ C$, unless otherwise noted)

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Units
Operating Input Voltage	V_{IN}		1.8		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}	$V_{IN} = V_{OUT} + 1V$	-	400	-	mA
Load Regulation	ΔV_{OUT}	$V_{IN} = V_{OUT} + 1V$, $1mA \leq I_{OUT} \leq 100mA$	-	7	20	mV

Dropout Voltage (Note 3)	VDIF	V _{OUT} =1.8V	I _{OUT} =100mA	-	200	400	mV
			I _{OUT} =200mA	-	400	800	
		V _{OUT} =2.5V	I _{OUT} =100mA	-	140	280	
			I _{OUT} =200mA	-	280	560	
		V _{OUT} =2.8V/3.0V	I _{OUT} =100mA	-	120	240	
			I _{OUT} =200mA	-	240	480	
V _{OUT} ≥ 3.3V	I _{OUT} =100mA		110	220			
	I _{OUT} =200mA		220	440			
Supply Current	I _{SS}	V _{IN} = V _{OUT} +1V	-	1.8	3.6	μA	
Stand-by Current	I _{CEL}	V _{CE} = 0V	-	0	0.2	μA	
Line Regulation	$\frac{\Delta V_{OUT}}{\Delta V_{IN} \cdot V_{OUT}}$	I _{OUT} =30mA, V _{OUT} +1V ≤ V _{IN} ≤ 5.5V	-	0.02	0.1	%/V	
Output Current Limit	I _{LIM}	Peak Output Current	-	510	-	mA	
CE “High” Voltage	V _{CEH}	Start up	1.5	-	-	V	
CE “Low” Voltage	V _{CEL}	Shut down	-	-	0.5	V	
Active Output Discharge Resistance	R _{DIS}	V _{CE} <0.5V	-	500	-	Ω	
Ripple Rejection Rate(Note 4)	PSRR	V _{IN} = (V _{OUT} +1)V+1VppAC, I _{OUT} =10mA	f=1kHz	-	70	-	dB
			f=10kHz	-	55	-	
Thermal Shutdown Temperature(Note 4)	T _{SD}	Temperature increasing, I _{OUT} =15mA	-	150	-	°C	
Thermal Shutdown Hysteresis(Note 4)	ΔT _{SD}	Temperature falling	-	20	-	°C	

NOTES:

- V_{OUT} (T) : Specified Output Voltage
- V_{OUT} (E) : Effective Output Voltage (i.e. The output voltage when “V_{OUT} (T)+1.0V” is provided at the Vin pin while maintaining a certain I_{out} value.)
- 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.
- guaranteed by design.

Typical Performance Characteristics

GLD050533S5 ($V_{CE} = V_{IN}$, $T_a = 25^\circ\text{C}$, unless otherwise noted.)

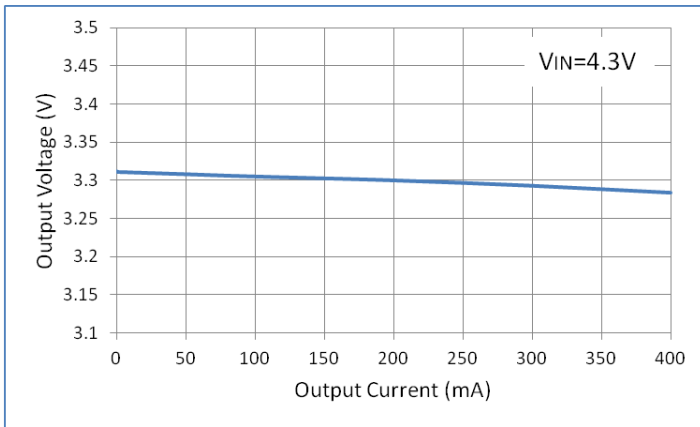


Figure 1. Output Voltage vs. Output Current

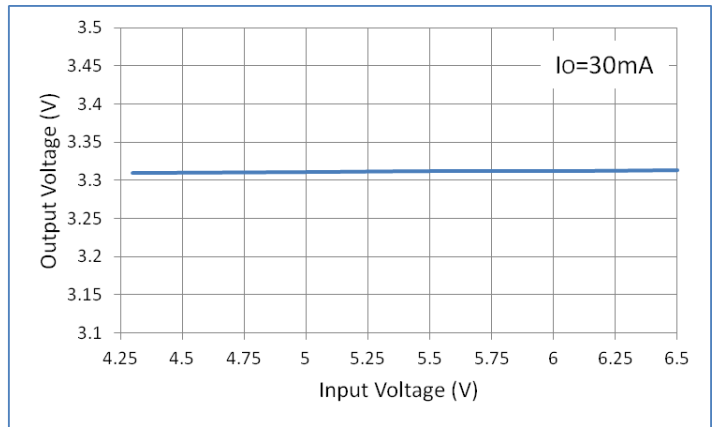


Figure 2. Output Voltage vs. Input Voltage

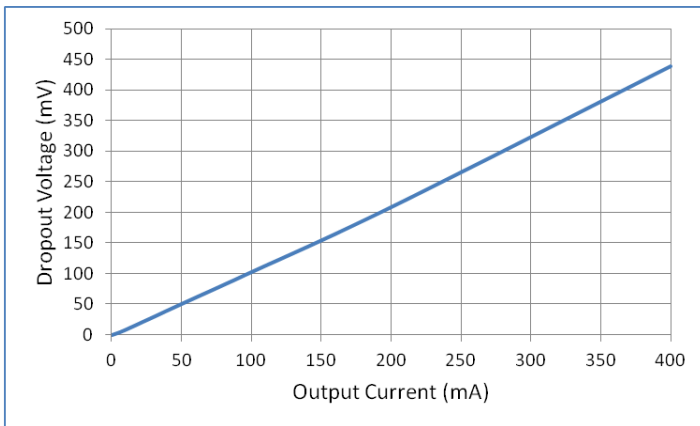


Figure 3. Dropout Voltage vs. Output Current

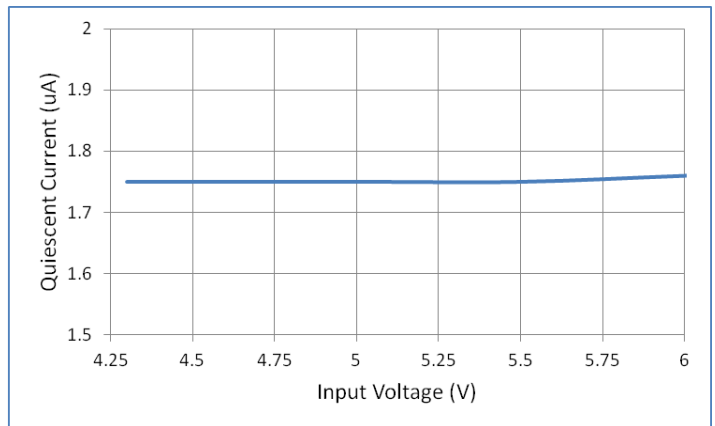


Figure 4. Quiescent Current vs. Input Voltage

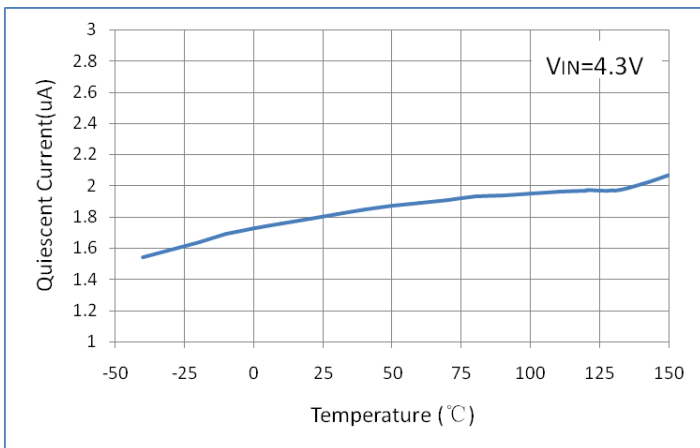


Figure 5. Quiescent Current vs. Temperature

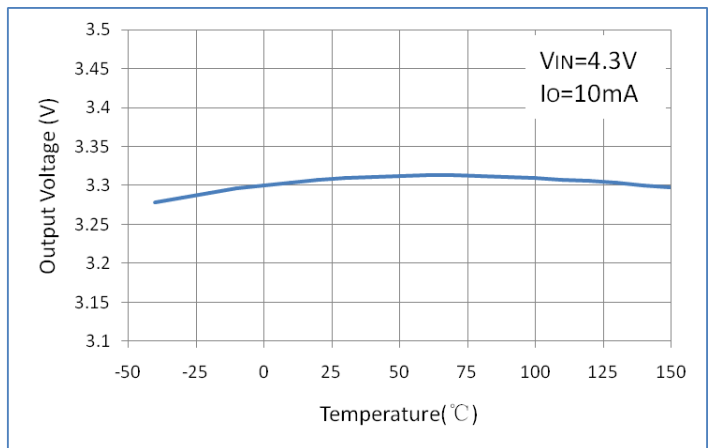


Figure 6. Output Voltage vs. Temperature

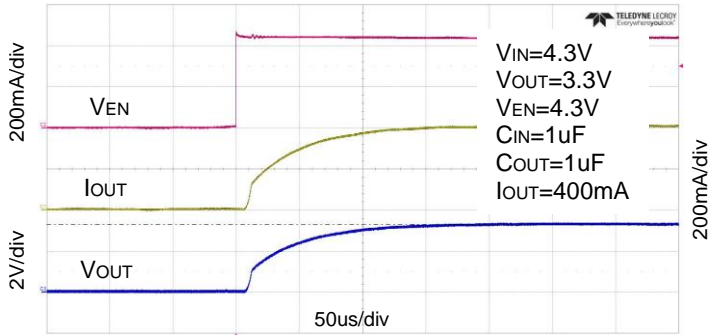


Figure 7. Enable Turn-on Response

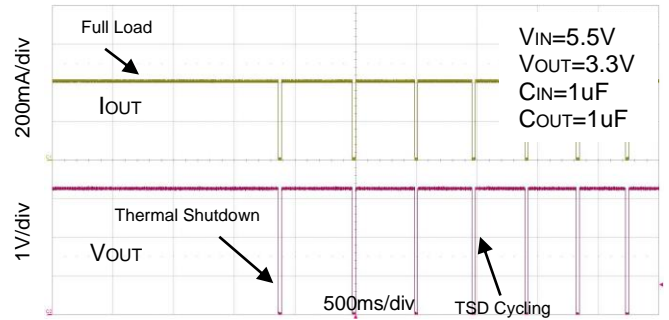


Figure 8. Thermal Shutdown

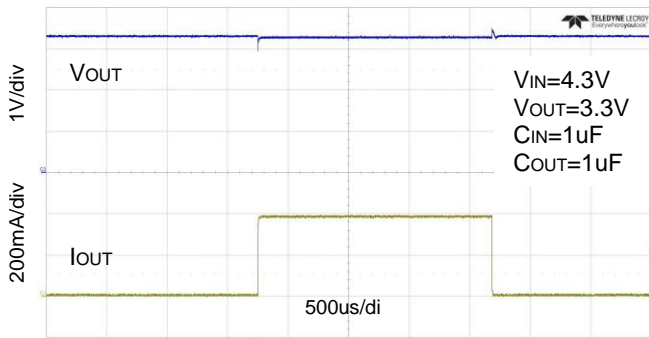


Figure 9. Load Transient Response
I_{OUT}=1mA to 400mA

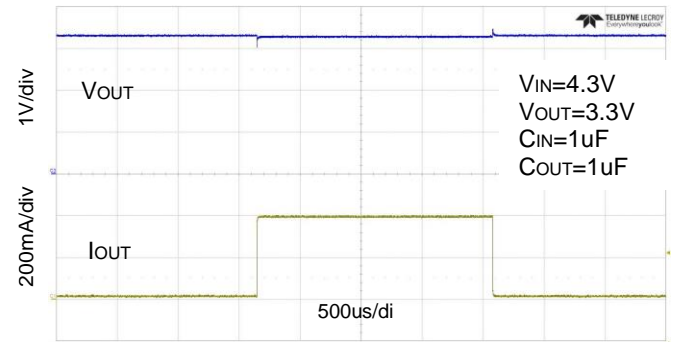


Figure 10. Load Transient Response
I_{OUT}=10mA to 400mA

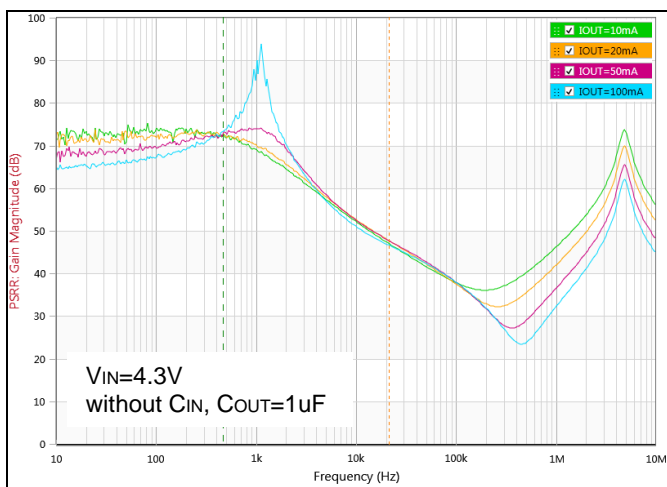
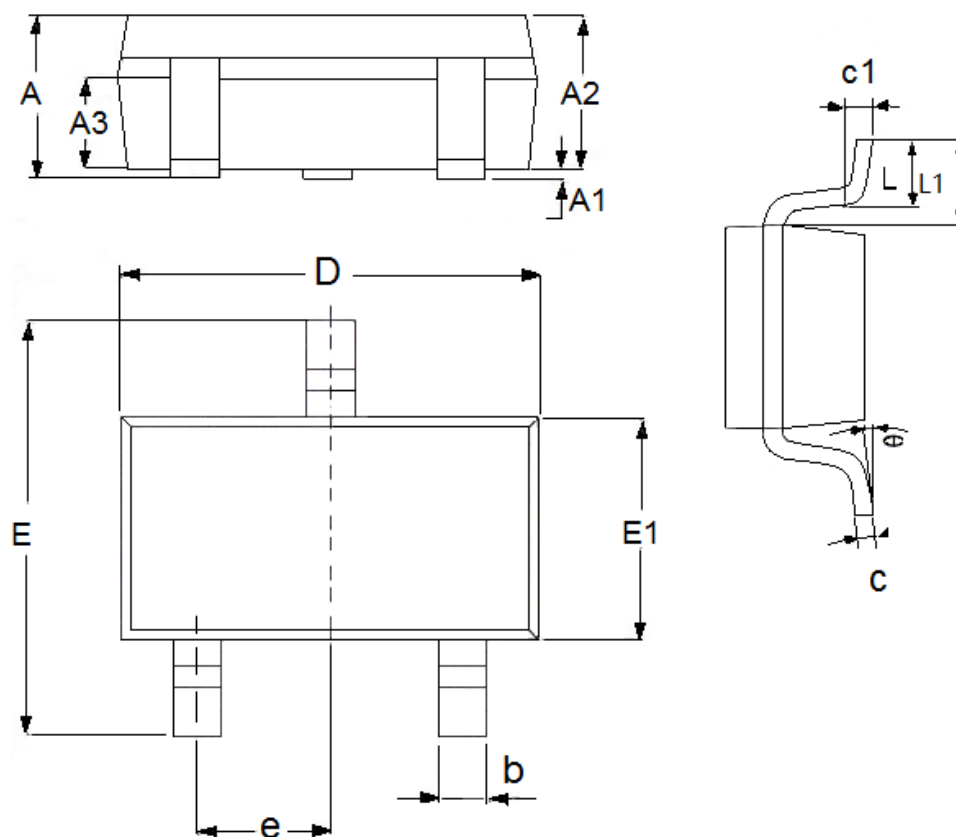


Figure 11. PSRR vs. Frequency

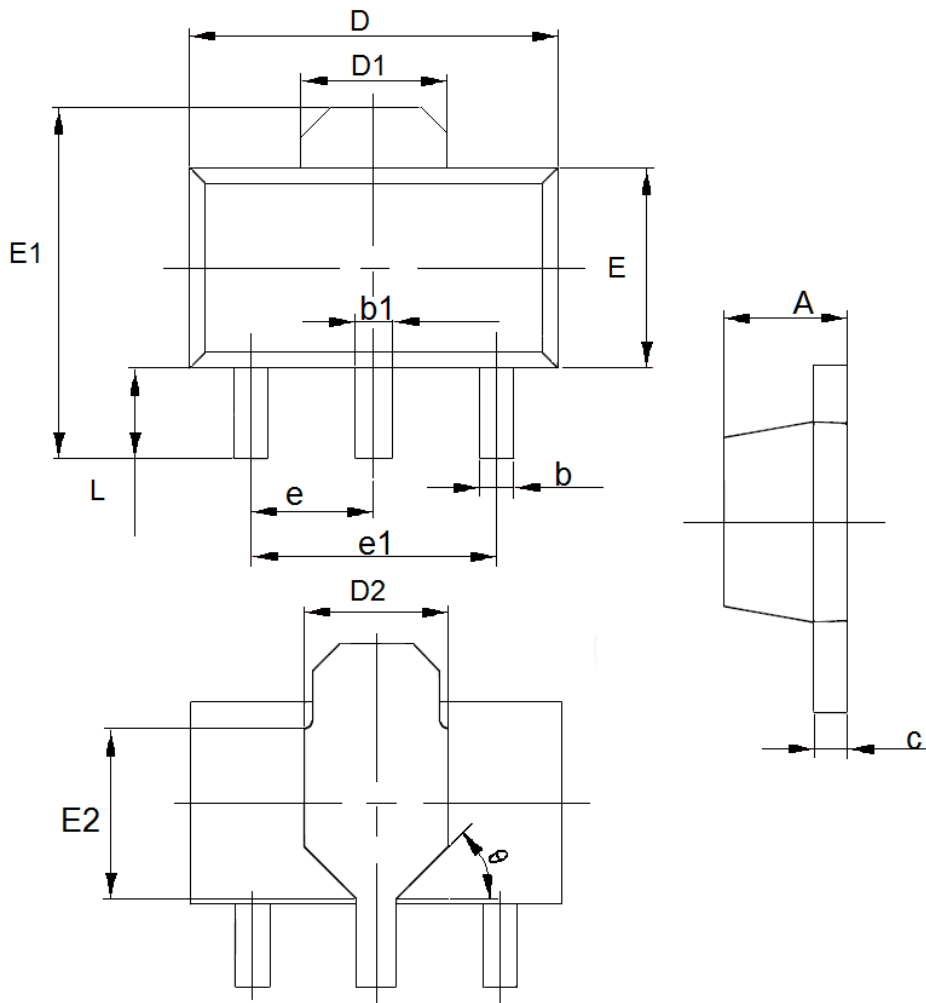
Packaging Information

- Package Type: SOT23-3



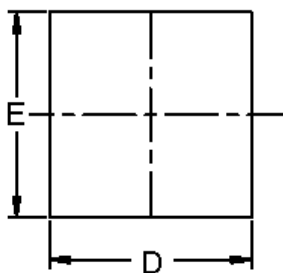
DIM	Millimeters		Inches	
	Min	Max	Min	Max
A	1.05	1.45	0.0413	0.0571
A1	0	0.15	0.0000	0.0059
A2	0.9	1.3	0.0354	0.0512
A3	0.6	0.7	0.0236	0.0276
b	0.25	0.5	0.0098	0.0197
c	0.1	0.25	0.0039	0.0098
D	2.8	3.1	0.1102	0.1220
E	2.6	3.1	0.1023	0.1220
E1	1.5	1.8	0.0591	0.0709
e	0.95(TYP)		0.0374(TYP)	
L	0.25	0.6	0.0098	0.0236
L1	0.59(TYP)		0.0232(TYP)	
θ	0	8°	0.0000	8°
c1	0.2(TYP)		0.0079(TYP)	

● Package Type: SOT89-3

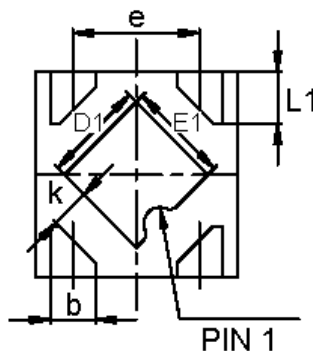


DIM	Millimeters		Inches	
	Min	Max	Min	Max
A	1.4	1.6	0.0551	0.0630
b	0.32	0.52	0.0126	0.0205
b1	0.4	0.58	0.0157	0.0228
c	0.35	0.45	0.0138	0.0177
D	4.4	4.6	0.1732	0.1811
D1	1.55(TYP)		0.061(TYP)	
D2	1.75(TYP)		0.0689(TYP)	
e1	3.0(TYP)		0.1181(TYP)	
E	2.3	2.6	0.0906	0.1023
E1	3.94	4.4	0.1551	0.1732
E2	1.9(TYP)		0.0748(TYP)	
e	1.5(TYP)		0.0591(TYP)	
L	0.8	1.2	0.0315	0.0472
θ	45°		45°	

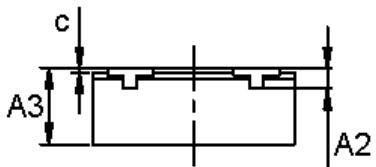
- Package Type: FBP1*1-4



TOP VIEW



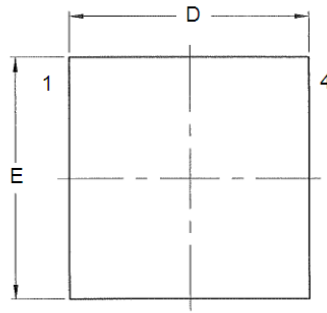
BOTTOM VIEW



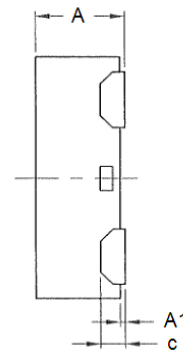
SIDE VIEW

DIM	Millimeters		Inches	
	Min	Max	Min	Max
A2	0.1REF		0.004REF	
A3	0.335	0.405	0.013	0.016
D	0.950	1.050	0.037	0.041
E	0.950	1.050	0.037	0.041
D1	0.450	0.550	0.018	0.022
E1	0.450	0.550	0.018	0.022
k	0.195REF		0.008REF	
b	0.175	0.275	0.007	0.011
C	0.000	0.050	0.000	0.002
e	0.575	0.675	0.023	0.027
L1	0.200	0.300	0.008	0.012

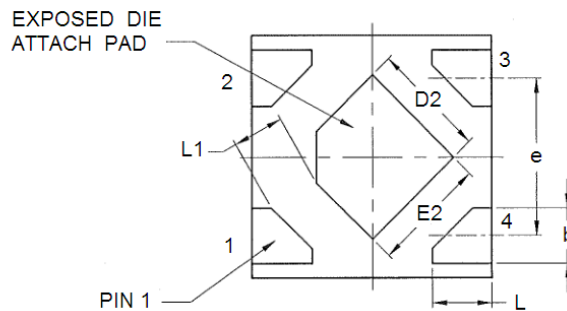
● Package Type: DFN1*1-4



TOP VIEW



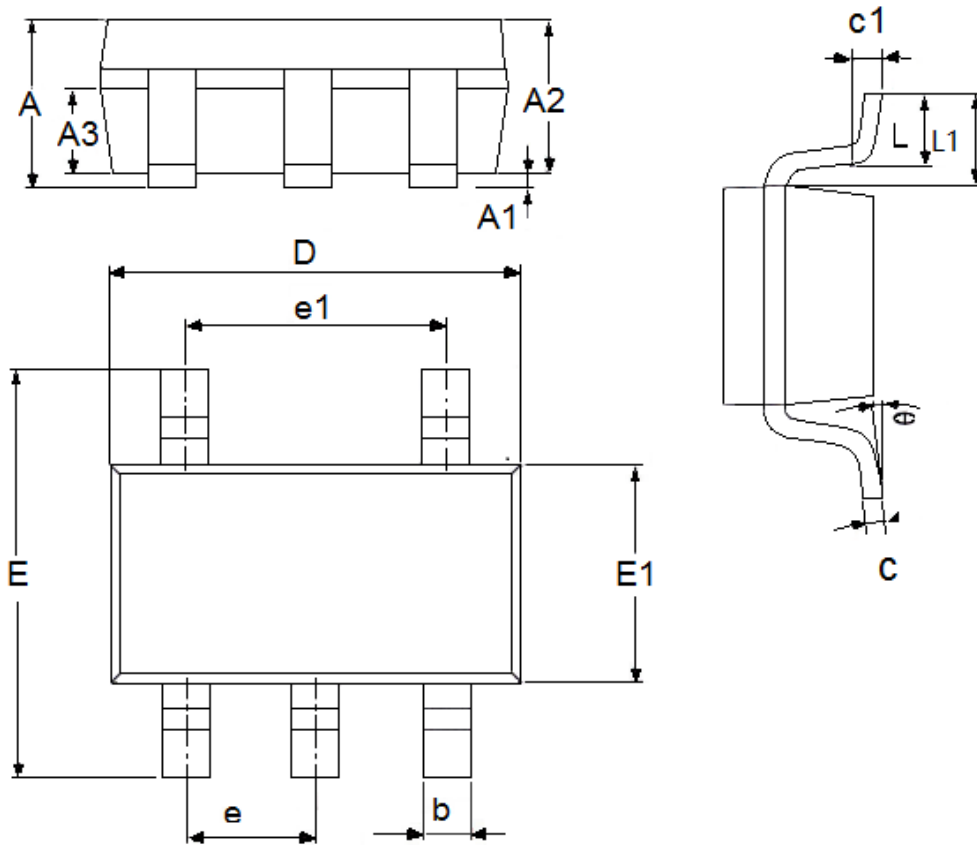
SIDE VIEW



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)	

● 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)	

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