Features

- Optimized for fast transient response
- Low Shutdown Current ~0.1uA (Typ.)
- Output Current ~300mA
- High Power Supply Rejection Ratio ~70db@1KHz
- 1.8~5.5V Operation
- ±2% Initial Voltage Accuracy
- Low Temperature Drift Coefficient ~100ppm
- Line Regulation ~0.06%/V(Typ.)
- Low ESR Capacitor ~1uF ceramic capacitor
- uDFN4-1x1、SOT-23-5、SOT-23、SOT-353(SC-75) 、SOT-89-5、TDFN6-2x2 package
- Green Product (RoHS, Lead-Free, Halogen-Free Compliant)

Applications

- Portable communication equipment
- Notebook Computer
- Battery Powered Systems

General Description

The GS7132 is a CMOS linear regulator optimized for fast transient response. It guarantees delivery of 300mA output current. The device is available in fixed output voltage from 1.0V~4.8V and as an adjustable device with a 1.0V reference voltage.

Based on its low quiescent current consumption and its less than 1uA shutdown mode, the GS7132 is ideal for battery- powered applications. The line transient response and load transient response of the GS7132 are excellent, thus the device is suitable for the power supply for handheld communication equipment. The regulator is stable with small ceramic capacitive loads (1µF typical).

Typical Application

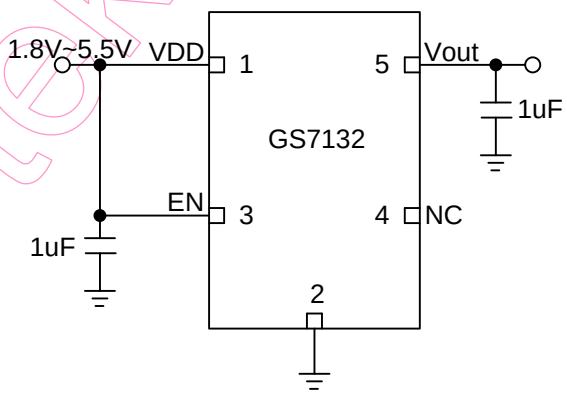


Figure 1(a) Fix mode of GS7132

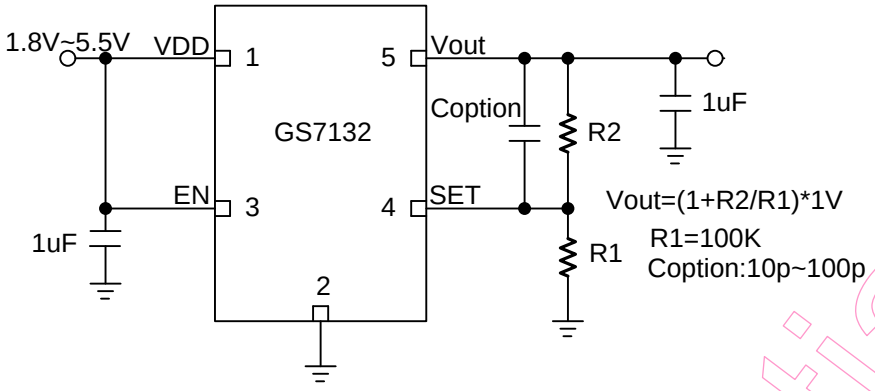


Figure 1(b) Adjustable mode of GS7132

Function Block Diagram

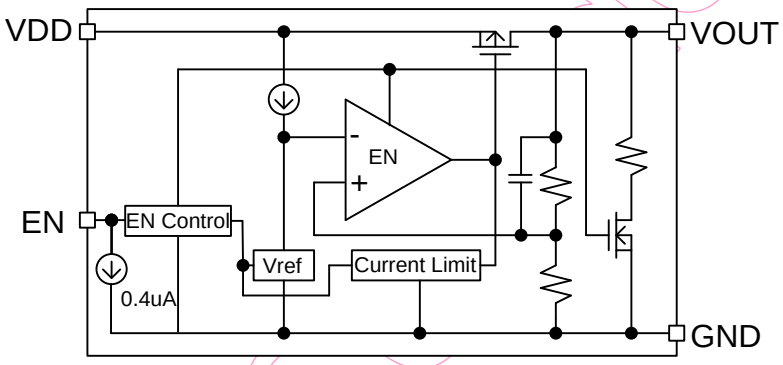


Figure 2(a) Functional diagram of Fix mode

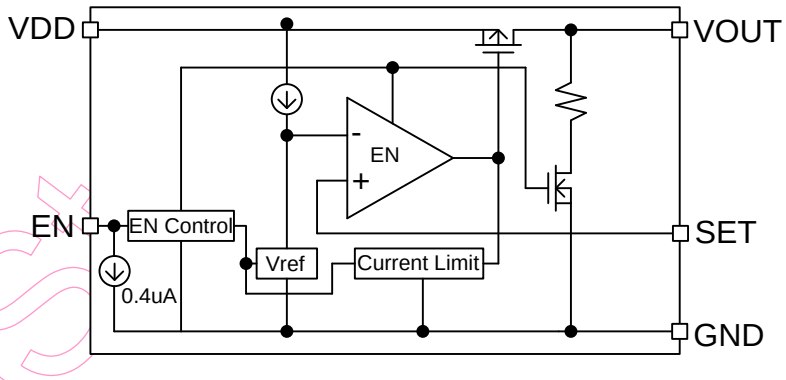
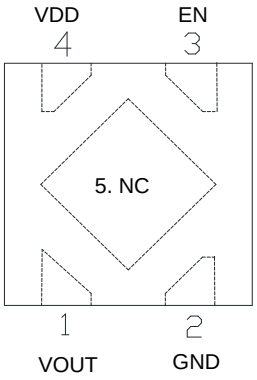


Figure 2(b) Functional diagram of Adjustable mode

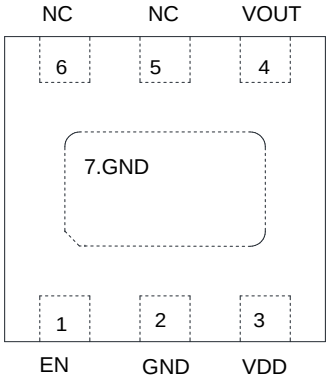
Figure 2 Function Block Diagram

Pin Configuration



(Top view)

Figure 3a uDFN4-1x1 package



(Top view)

Figure 3b TDFN6-2x2 package

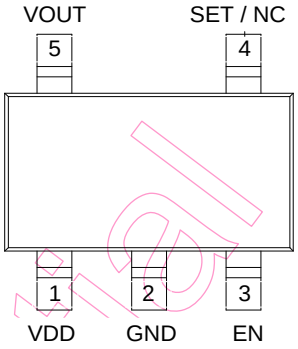


Figure 3c SOT-23-5(ST)/ SOT-353 package

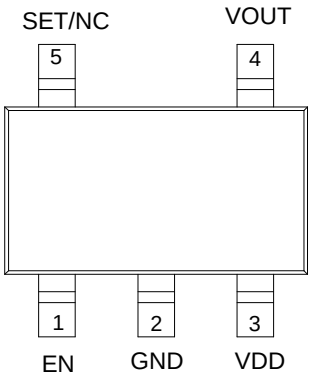


Figure 3d SOT-23-5(S5) package

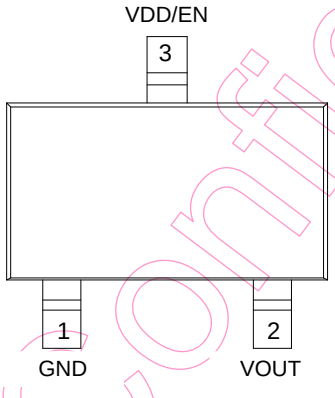


Figure 3e MSOT-23 package

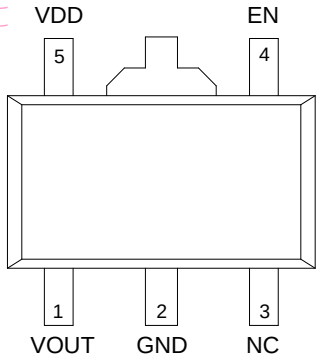


Figure 3f SOT-89-5(S1) package

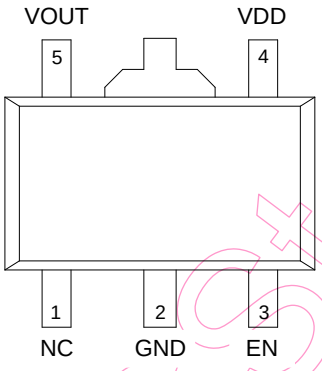


Figure 3g SOT-89-5(S8) package

The dissipation pad for the uDFN4-1X1 and TDFN6-2x2 packages should be solder-plated in reference mount pattern and metal masking so as to enhance mounting strength and heat release. If the pad needs to be connected to other pins, it should be connected to the GND pin.

Pin Descriptions

No							Name	I/O type	Description
uDFN4 -1x1	SOT-23-5 (ST)/ SOT-353	SOT-23-5 (S5)	MSOT-23	SOT-89-5 (S1)	SOT-89-5 (S8)	TDFN6 -2x2			
2	2	2	1	2	2	2,7	GND	I/O	Ground pin
4	1	3	3	5	4	3	VDD	I	Input Voltage Pin
1	5	4	2	1	5	4	VOUT	O	Output Voltage Pin
3	3	1	3	4	3	1	EN	I	Enable Pin
	4	5					SET	O	Not connected/ Connected to the center tap of an external resistor divider network to set the output voltage as V_{OUT} =(1+R2/R1)*1V
5	4	5		3	1	5,6	NC		No internal Connection.

Ordering Information

GS7132PP-XXX- R

1. Package
2. Output Voltage
3. Shipping

No	Item	Contents	
1	Package	UD: uDFN4-1x1 ST: SOT-23-5(ST) S5: SOT-23-5(S5) SR: MSOT-23	C5: SOT-353 (SC-75) D2:TDFN6-2x2 S1: SOT-89-5 S8: SOT-89-5
2	Output Voltage	ADJ: ADJ, 105:1.05V, 1P3: 1.3V, 1P5: 1.5V, 1P8: 1.8V, 185:1.85V, 002: 2.0V, 2P3: 2.3V, 2P5: 2.5V, 2P6: 2.6V, 2P7: 2.7V, 2P8: 2.8V, 2P9: 2.9V, 003: 3.0V, 3P1: 3.1V,3P3: 3.3V,3P5: 3.5V	
3	Shipping	R: Tape & Reel	

Example: GS7132 MSOT-23 2.5V Tape & Reel ordering information is “GS7132SR-2P5-R”

Absolute Maximum Rating (Note 1)

Parameter	Symbol	Limits	Units
VDD to GND	V_{DD}	-0.3 < V_{DD} < 5.5	V
VEN to GND	V_{EN}	-0.3 < V_{EN}< 5.5	V
Output Voltage	V_{OUT}	-0.3 < V_{OUT}< V_{DD} +0.3	V
Output Current	I_{OUT}	300	mA
Package Power Dissipation at $T_A \leqq 25°C$	$P_{D\_uDFN4-1x1}$	400	mW
Package Power Dissipation at $T_A \leqq 25°C$	$P_{D\_SOT-23-5}$	420	mW
Package Power Dissipation at $T_A \leqq 25°C$	$P_{D\_SOT-353}$	300	mW
Package Power Dissipation at $T_A \leqq 25°C$	$P_{D\_MSOT-23}$	380	mW
Package Power Dissipation at $T_A \leqq 25°C$	$P_{D\_SOT-89-5}$	500	mW
Package Power Dissipation at T_A =25°C	$P_{D\_TDFN6-2x2}$	1087	mW
Junction Temperature	T_J	- 45 ~ 150	°C
Storage Temperature	T_{STG}	- 65 ~ 150	°C
Lead Temperature (Soldering) 10S	T_{LEAD}	260	°C
ESD (Human Body Mode) (Note 2)	V_{ESD_HBM}	2K	V
ESD (Machine Mode) (Note 2)	V_{ESD_MM}	200	V

Thermal Information (Note 3)

Parameter	Symbol	Limits	Units
Thermal Resistance Junction to Ambient	$\theta_{JA\_uDFN4-1x1}$	250	°C/W
Thermal Resistance Junction to Ambient	$\theta_{JA\_SOT-23-5}$	238	°C/W
Thermal Resistance Junction to Ambient	$\theta_{JA\_SOT-353}$	333	°C/W
Thermal Resistance Junction to Ambient	$\theta_{JA\_MSOT-23}$	263	°C/W
Thermal Resistance Junction to Ambient	$\theta_{JA\_SOT-89-5}$	200	°C/W
Thermal Resistance Junction to Ambient	$\theta_{JA\_TDFN6-2x2}$	92	°C/W

Recommend Operating Condition (Note 4)

Parameter	Symbol	Limits	Units
VDD to GND	V_{DD}	1.8 to 5.5	V
Junction Temperature	T_J	- 40 ~ 125	°C
Ambient Temperature	T_A	-40 ~ 85	°C

Electrical Characteristics

(V_{DD} = V_{OUT} + 1V, T_A =T_J=25°C, C_{VDD}=C_{VOUT}=1uF, I_{OUT}=1mA, unless otherwise specified)

Parameter	Symbol	Conditions		Min	Typ	Max	Units
Supply Voltage	V_{DD}			1.8		5.5	V
Supply Current	I_{VDD}	V_{DD}=3.5V, V_{OUT} =2.5V ,Unload	FIX		93	140	uA
			ADJ		85	130	
Standby Current	I_{STBY}	V_{EN}=0			0.1	1.0	uA
EN Input Current	I_{EN}	V_{EN}= 5V			0.4		uA
Output Current	I_{OUT}			300			mA
Output Voltage	V_{OUT}	I_{OUT}=1mA, V_{OUT} =1.0V~ 4.8V		-2		+2	%
Dropout Voltage (Note 5)	V_{DROP}	I_{OUT}=300mA	V_{OUT}=1.2V		940	1200	mV
			V_{OUT}=1.8V		580	750	
			V_{OUT}=2.5V		400	510	
			V_{OUT}=2.8V		380	500	
			V_{OUT}=3.3V		330	450	
Line Regulation	$\triangle V_{LNR}$	V_{DD}= V_{OUT} +1V to 5.5V, I_{OUT}=10mA			0.06	0.12	%/V
Load Regulation	$\triangle V_{LDR}$	V_{DD}= V_{OUT}+1V, I_{OUT}=1mA to 150mA			0.005	0.018	%/mA
Ripple Rejection Rate	PSRR	V_{DD}=MAX{V_{OUT}+1.0V, 3V}, Ripple 0.2Vp-p, I_{OUT}=10mA, f=1KHz			70		dB
Limit Current	I_{LIM}	V_{DD}=3.5V, V_{OUT} =2.5V	FIX	450	505	650	mA
			ADJ	500	625	750	
Short Current	I_{SHORT}	V_{OUT}=0V, V_{DD}=3.5V		90	150	200	mA
EN Input Voltage High	V_{ENH}			1.2			V
EN Input Voltage Low	V_{ENL}					0.3	V

CL Auto-Discharge Resistance	R_{DISCHG}	V_{DD}=4.0V, V_{EN}=0V		103		Ω
Temperature Drift	$\triangle V_{OUT} / \triangle T_A$	I_{OUT}=1mA, T_A= -40°C to +85°C		100		ppm/°C
Thermal Shutdown temperature	T_{SHDN}			155		°C
Thermal Shutdown Hysteresis	$\triangle T_{SHDN}$			20		°C

Note 1. Stresses listed as the above “Absolute Maximum Ratings” may cause permanent damage to the device. These are for stress ratings. Functional operation of the device at these or any other conditions beyond those indicated in the operational sections of the specifications is not implied. Exposure to absolute maximum rating conditions for extended periods may remain possibility to affect device reliability.

Note 2. Devices are ESD sensitive. Handling precaution recommended.

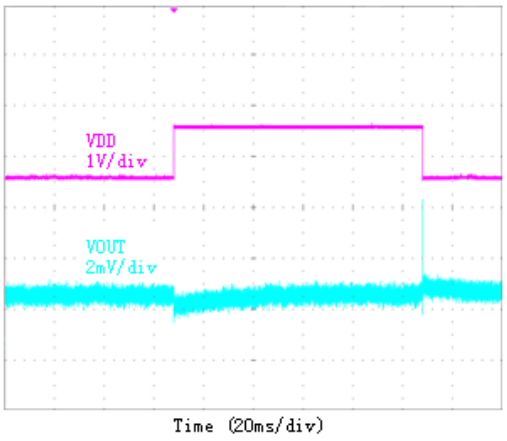
Note 3. θ_{JA} is measured in the natural convection at T_A=25°C on a high effective thermal conductivity test board (4 Layers, 2S2P) of JEDEC 51-7 thermal measurement standard.

Note 4. The device is not guaranteed to function outside its operating conditions.

Note 5. The dropout voltage is defined as V_{DD}- $V_{OUT,}$ which is measured when V_{OUT} is $V_{OUT.}$ -100mV

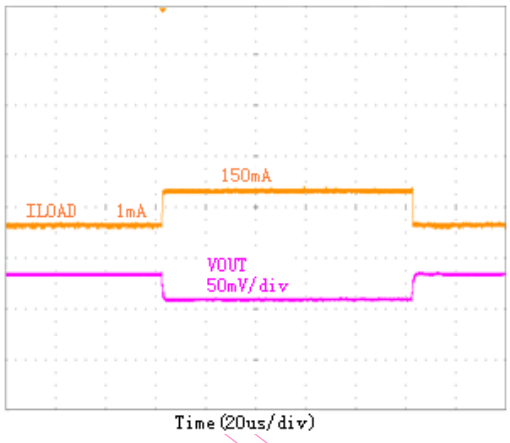
Typical Characteristics

Line transient



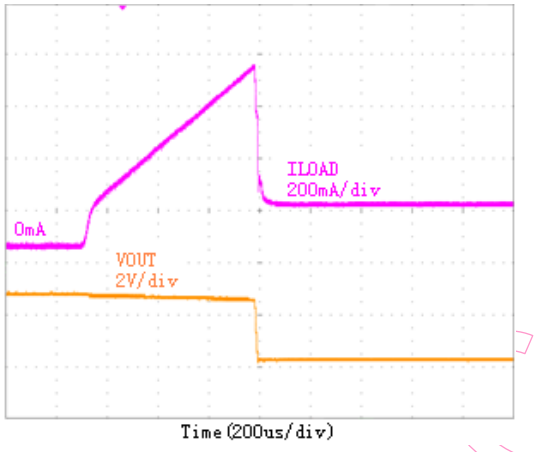
V_{OUT}=2.5V,I_{LOAD}=10mA, V_{DD}=4.5V~3.5V~4.5V,tr=tf=10us

Load transient



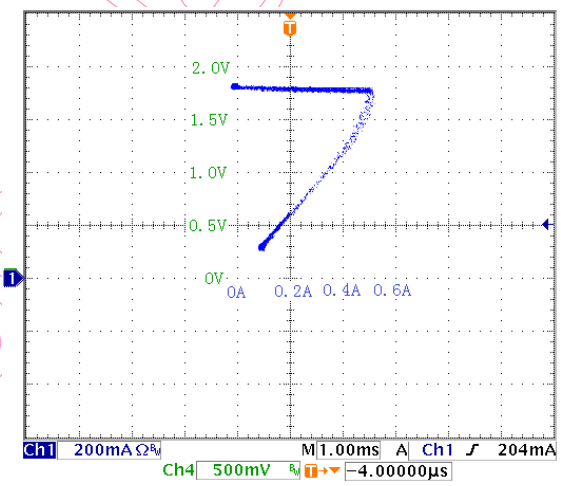
V_{OUT}=2.5V,V_{DD}=3.5,I_{LOAD}=1mA~150mA~1mA,tr=tf=0.5us

Over current protection characteristics



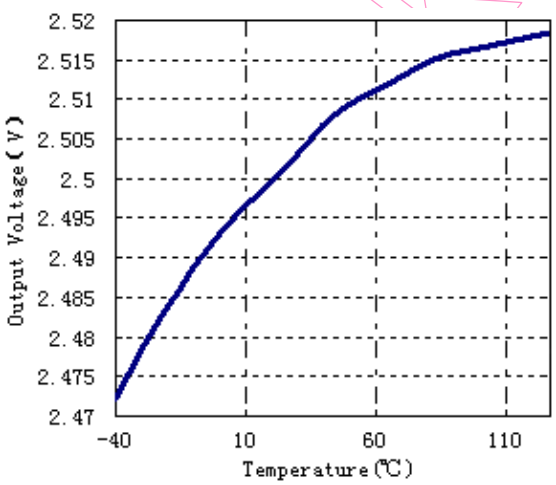
V_{OUT}=2.5V, V_{DD}=3.5V

Output Short Current



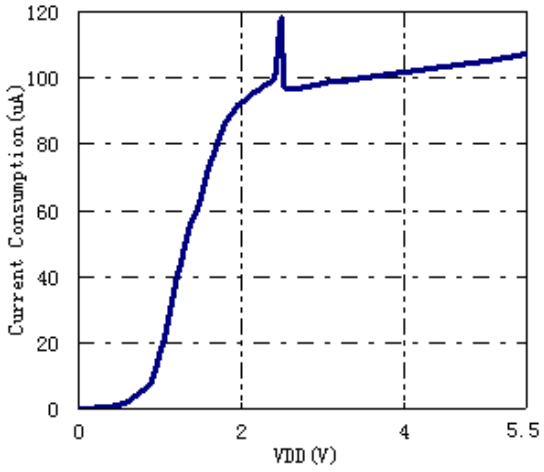
V_{OUT}=1.8V

Output voltage vs. temp



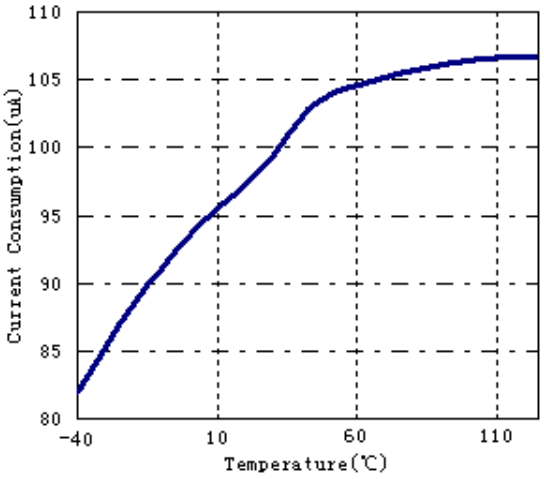
V_{OUT}=2.5 V, I_{LOAD}=1mA, V_{DD}=3.5

Current Consumption vs. VDD



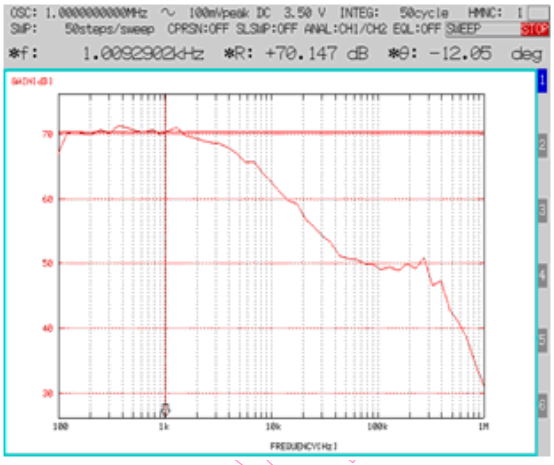
V_{OUT}=2.5V, V_{DD}=3.5, no load (FIX)

Current Consumption vs. temperature



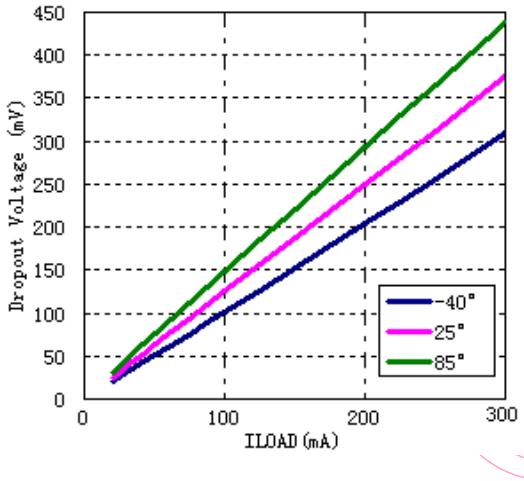
V_{OUT}=2.5V, V_{DD}=3.5,no load(FIX)

PSRR vs. frequency



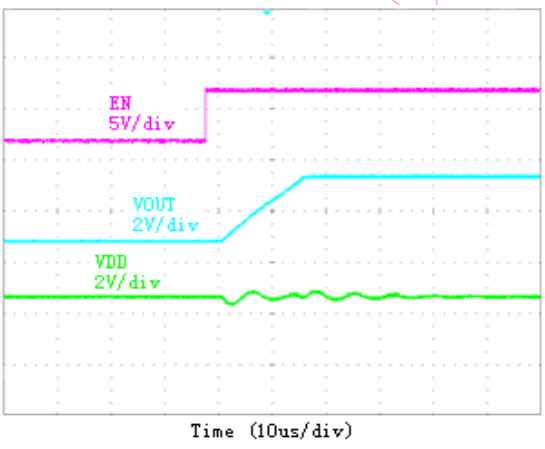
V_{OUT}=2.5 V, V_{DD}=3.5, I_{LOAD}=1mA, Vpp=0.2V

Dropout voltage vs. ILOAD



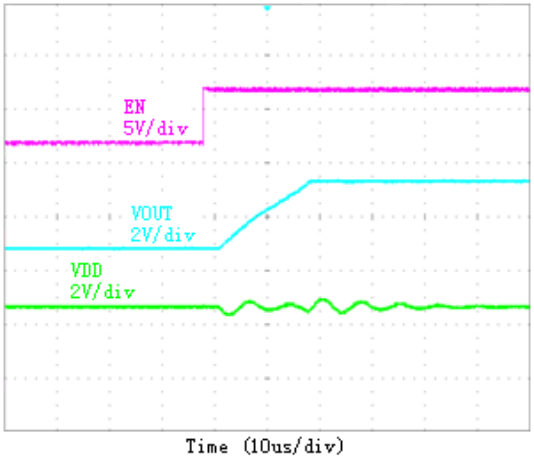
V_{OUT}=2.5V

Turn On Speed with EN pin(No Load)



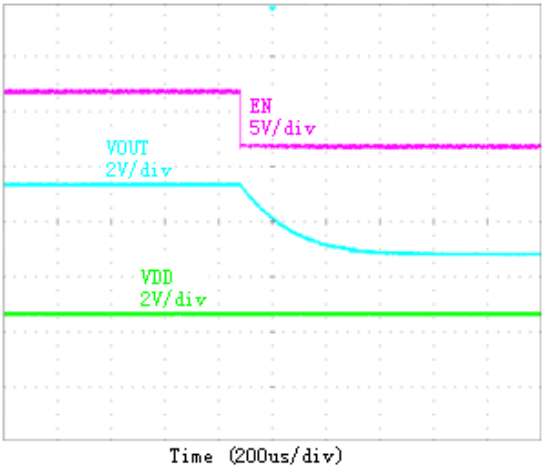
V_{OUT}=2.5V, V_{DD}=3.5,no load

Turn On Speed with EN pin(50mA Load)



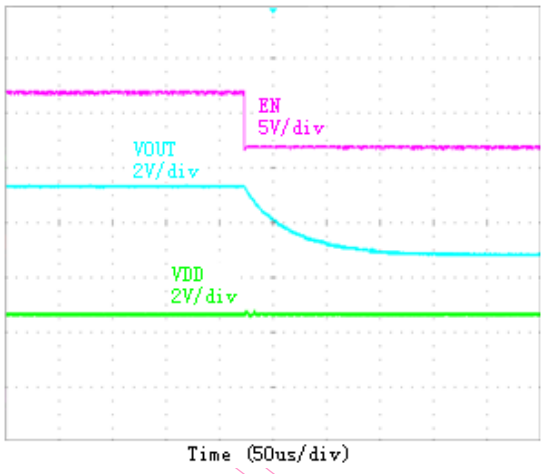
V_{OUT}=2.5V, V_{DD}=3.5, I_{LOAD}=50mA

Turn Off Speed with EN pin(No Load)



V_{OUT}=2.5V, V_{DD}=3.5,no load

Turn Off Speed with EN pin(50mA Load)



V_{OUT}=2.5V, V_{DD}=3.5, I_{LOAD}=50mA

Application Information

Enable

The GS7132 has a dedicated enable pin(EN). When the EN pin is in the logic low (VEN<0.3V), the regulator will be turned off, reducing the supply current to less than 1uA.

When the EN pin is in the logic high (VEN>1.2V), the regulator will be turned on. Left open, the EN pin is pulled down by a internal resistor to shut down the regulator.

Current Limit

The GS7132 contains a foldback over current protection function. It allows the output current to reach the maximum value of 0.5A. Then further decreases in the load resistance reduce both the load current and the load voltage. The main advantage of foldback limiting is less power dissipation in the pass transistor under shorted- load conditions.

Output Capacitor

The GS7132 is specifically designed to employ ceramic output capacitors as low as 1uF (X7R). The ceramic capacitors offer significant cost and space savings, along with high frequency noise filtering. Place the capacitors physically as close as possible to the device with wide and direct PCB traces.

Ceramic capacitors have different temperature characteristics and bias characteristics which depend on their dimensions and manufacturers. If the setting voltage is 2.5V or more and the capacitor's dimensions for V_{OUT} is too small, the capacitance value might be extremely low. As a result, the capacitance might be much less than expected value. In such cases, the operation might be unstable at low temperature (-25°C or less). In that case, use a larger capacity, or a large dimensions' capacitor.

Input Capacitor

Good bypassing is recommended from input to ground to help improve AC performance. A 1uF (X7R) input capacitor or greater located as close as possible to the IC is recommended. Place the capacitors physically as close as possible to the device with wide and direct PCB traces.

Power Dissipation and Layout Considerations

Excessive power dissipation may cause thermal overload, and hence the increase of the IC junction temperature beyond a safe operating level. For continuous operation, it is highly recommended to keep the junction temperature below the maximum operation junction temperature 125°C for maximum reliability.

The relationship between θ_{JA} and $T_{J(MAX)}$ can be calculated as:

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

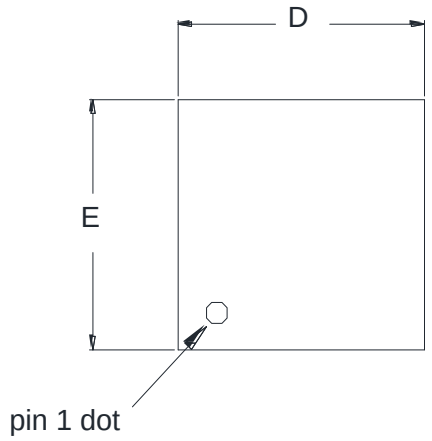
Where $T_{J(MAX)}$ is the maximum operation junction temperature 125°C, T_A is the ambient temperature and the θ_{JA} is the junction to ambient thermal resistance.

The power dissipation definition in device is:

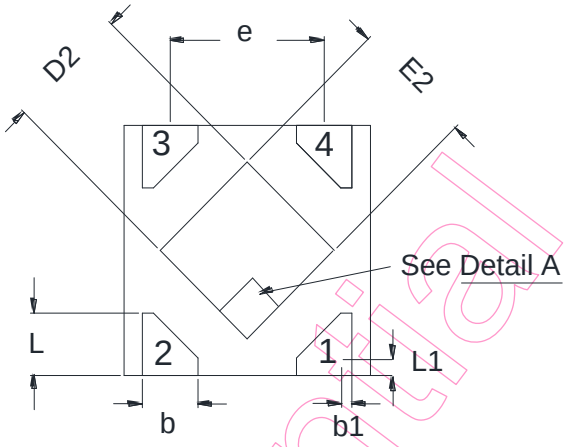
$P_D = (V_{DD} - V_{OUT}) \times I_{OUT} + V_{DD} \times I_Q$

As the above equations indicate, it is desirable to work ICs whose θ_{JA} values are small such that $T_{J(MAX)}$ does not increase strongly with P_D. To avoid thermally overloading the GS7132, refrain from exceeding the absolute maximum junction temperature rating of 150°C under continuous operating condition. Overstressing the regulator with high loading currents and elevated input-to-output differential voltages can increase the IC die temperature significantly.

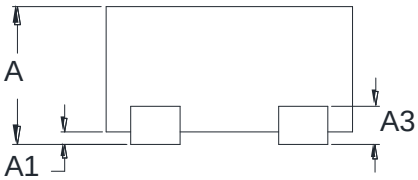
Package Dimensions, uDFN4-1x1



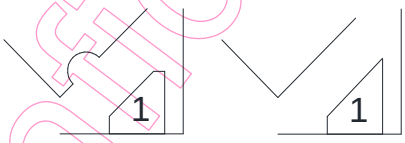
Top View



Bottom View



Side View



Detail A

Pin #1 ID Options
Note:The configuration of the Pin#1 identifier is optional,but must be located within the zone indicated.

Symbol	Dimensions in Millimeters	
	Min	Max
A	0.45	0.60
A1	0.00	0.05
A3	0.10	0.152
b	0.15	0.30
b1	0.02	0.12
D	0.90	1.10
D2	0.40	0.60
E	0.90	1.10
E2	0.40	0.60
e	0.65 REF.	
L	0.20	0.30
L1	0.02	0.12

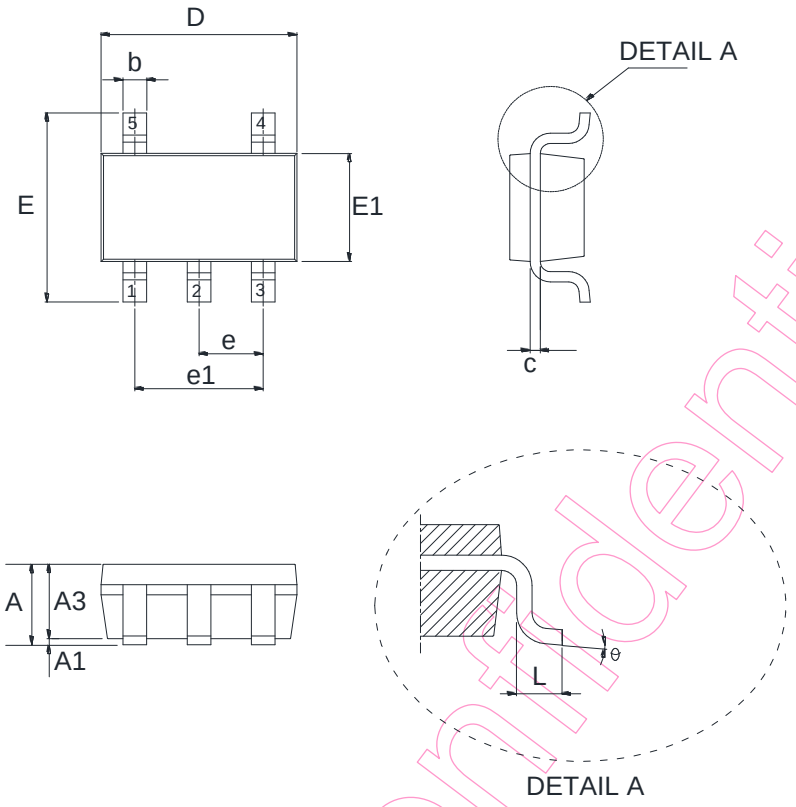
Note

1.Min.: Minimum dimension specified.

2.Max.: Maximum dimension specified.

3.REF.: Reference. Normal/Regular dimension specified for reference.

Package Dimensions, SOT-23-5



Symbol	Dimensions in Millimeters	
	Min.	Max.
A	0.90	1.45
A1	0.00	0.15
A3	0.90	1.30
b	0.30	0.50
c	0.08	0.25
e	0.95 REF.	
e1	1.90 REF.	
D	2.90 REF.	
E	2.80 REF.	
E1	1.60 REF.	
L	0.30	0.60
θ	0^{o}	8^{o}

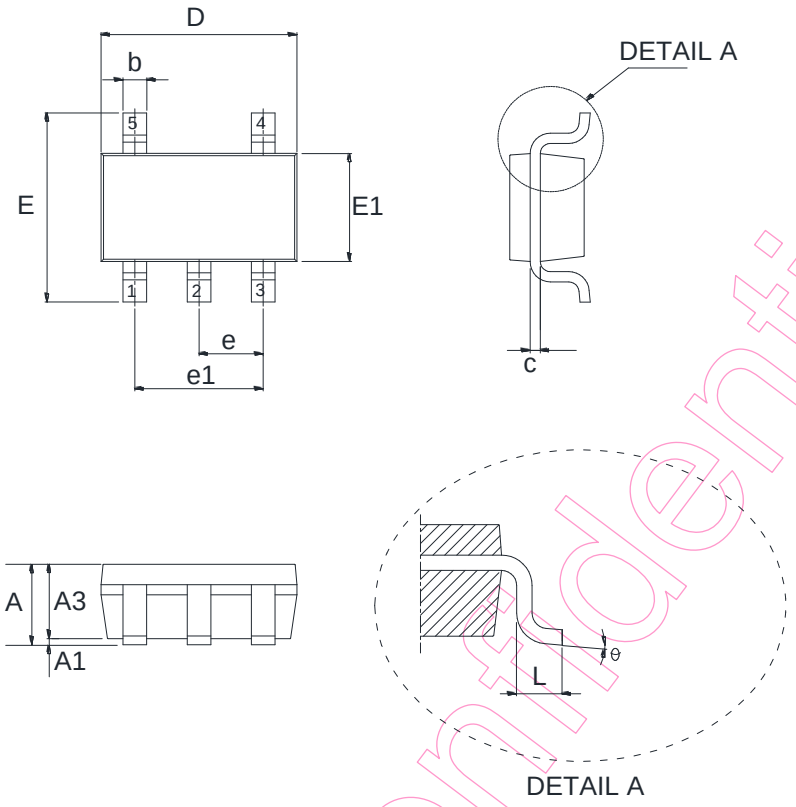
Note:

1.Min.: Minimum dimension specified.

2.Max.: Maximum dimension specified.

3.REF.: Reference. Normal/Regular dimension specified for reference.

Package Dimensions, SOT-353(SC-75)



Symbol	Dimensions in Millimeters	
	Min.	Max.
A	0.85	1.10
A1	0.00	0.10
A3	0.80	1.00
b	0.15	0.35
c	0.08	0.15
e	0.65 REF.	
e1	1.30 REF.	
D	2.00	2.20
E	2.15	2.45
E1	1.15	1.35
L	0.26	0.46
θ	0^{o}	8^{o}

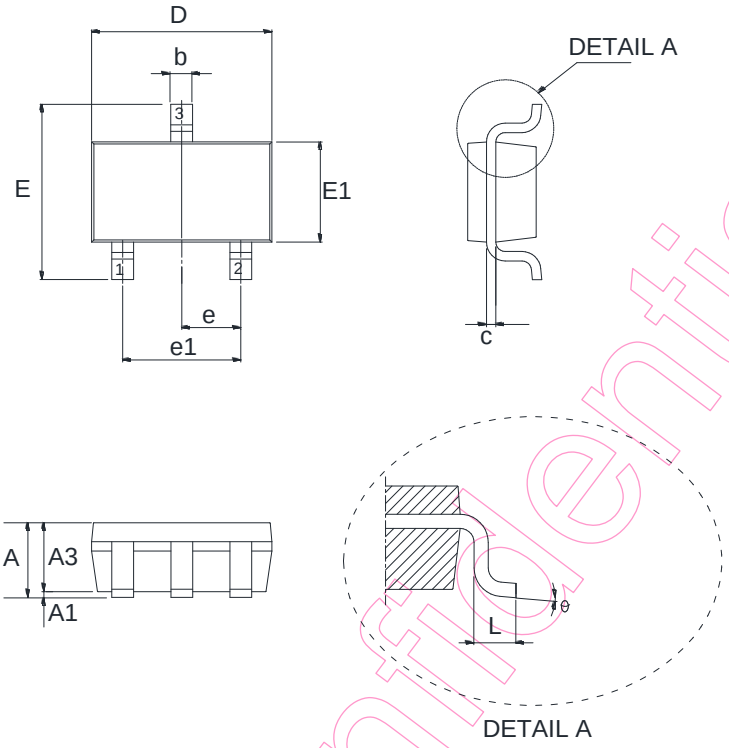
Note:

1.Min.: Minimum dimension specified.

2.Max.: Maximum dimension specified.

3.REF.: Reference. Normal/Regular dimension specified for reference.

Package Dimensions, MSOT-23

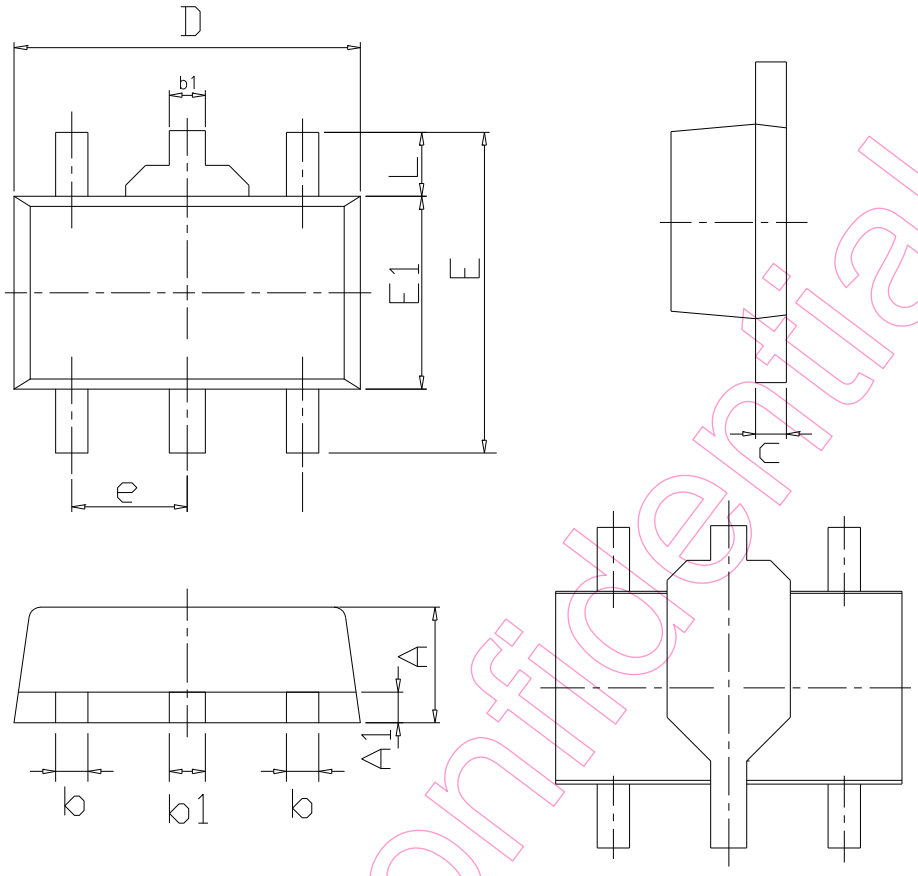


Symbol	Dimensions in Millimeters	
	Min.	Max.
A	0.90	1.15
A1	0.00	0.10
A2	0.90	1.05
b	0.30	0.50
c	0.08	0.15
e	0.95 REF.	
e1	1.90 REF.	
D	2.90 REF.	
E	2.40 REF.	
E1	1.30 REF.	
L	0.30	0.50
θ	0^{o}	8^{o}

Note:

1. Min.: Minimum dimension specified.
2. Max.: Maximum dimension specified.
3. REF.: Reference. Normal/Regular dimension specified for reference.

Package Dimensions, SOT-89-5



Symbol	Dimensions in Millimeters	
	Min.	Max.
A	1.40	1.60
A1	0.30	0.50
b	0.36	0.56
b1	0.41	0.53
C	0.35	0.44
D	4.40	4.60
E	-	4.25
E1	2.30	2.60
e	1.50 REF.	
L	0.80	1.10

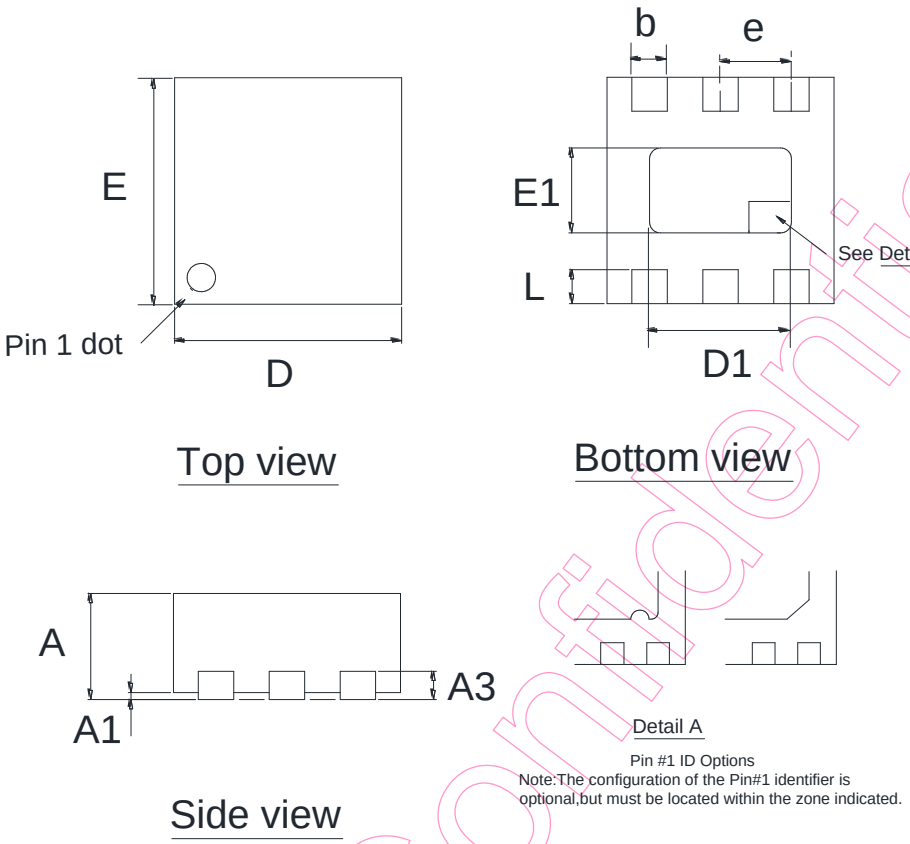
Note:

1.Min.: Minimum dimension specified.

2.Max.: Maximum dimension specified.

3.REF.: Reference. Normal/Regular dimension specified for reference.

Package Dimensions, TDFN6-2x2



Symbol	Dimensions in Millimeters	
	Min.	Max.
A	0.70	0.80
A1	0.00	0.05
A3	0.203 REF.	
b	0.18	0.35
e	0.65 REF.	
D	1.90	2.10
E	1.90	2.10
D1	1.00	1.45
E1	0.50	0.85
L	0.25	0.45

Note:

1. Min.: Minimum dimension specified.
2. Max.: Maximum dimension specified.
3. REF.: Reference. Normal/Regular dimension specified for reference.

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