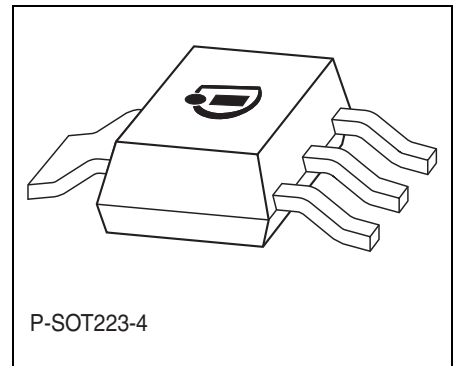


## Data Sheet

### Features

- Output voltage 3.3 V or adjustable
- 1.0 A output current
- Low drop voltage < 1.2 V @ 800 mA
- Short circuit protected
- Overtemperature protected
- Operating range up to 15 V
- Industrial type



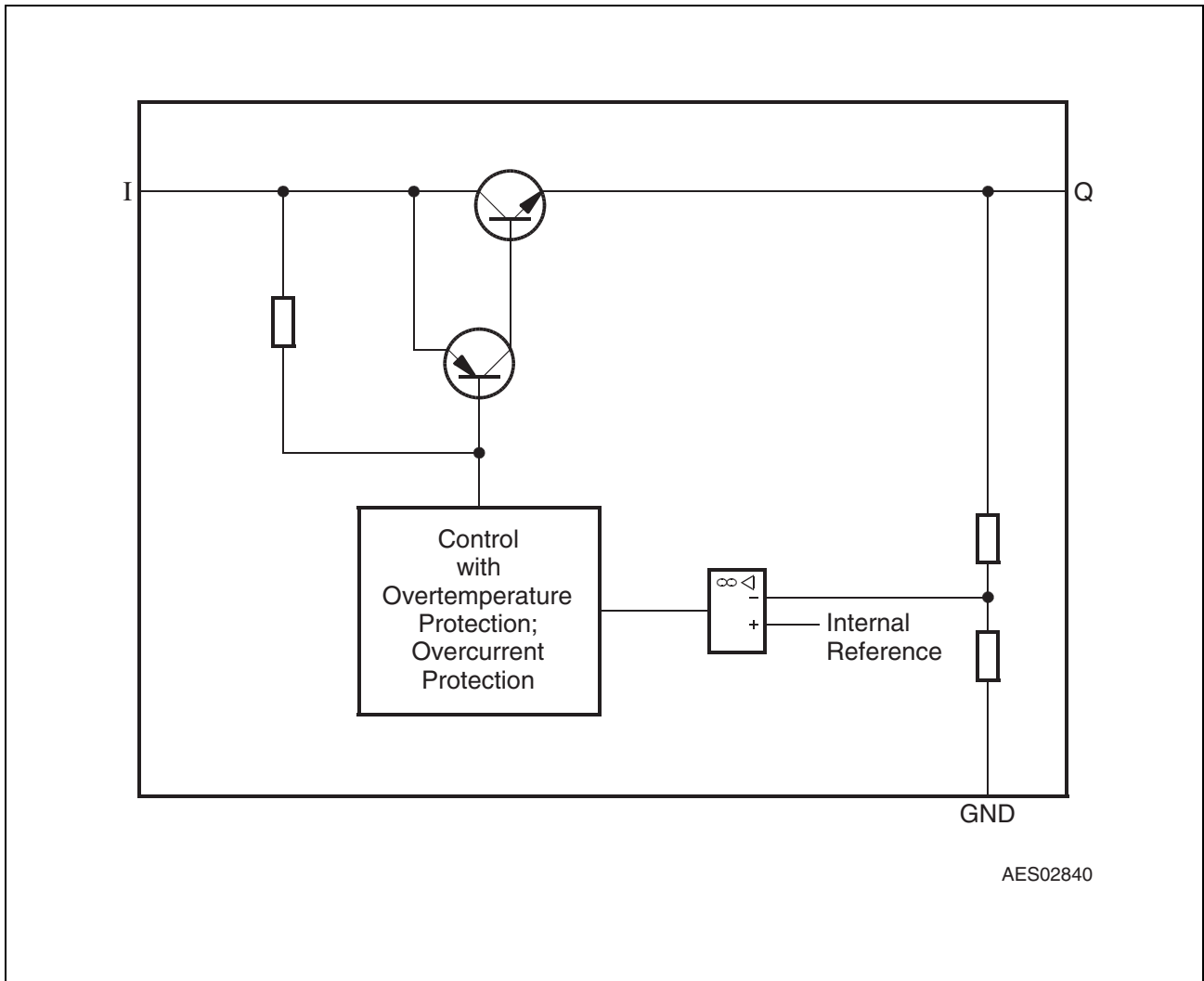
### Functional Description

The IFX 1117 is a monolithic integrated fixed NPN type voltage regulator that can supply loads up to 1.0 A. The device is housed in the small surface mounted SOT223 package. The IC is equipped with additional protection against overload, short circuit and overtemperature.

The IFX 1117 GSV33 supplies a regulated output voltage of 3.3 V ( $\pm 2\%$ ). The IFX 1117 GSV supplies an output voltage with  $\pm 2\%$  precision adjustable via an external voltage divider. The input voltage for the IFX 1117 GSV33 ranges from 4.5 V ( $= V_Q + V_{DR}$ ) to 15 V for a load current of 800 mA, for the maximum load current of 1.0 A a minimum input voltage of 4.7 V is required. The drop voltage  $V_{DR}$  ranges from 1.1 V to 1.4 V depending on the load current level.

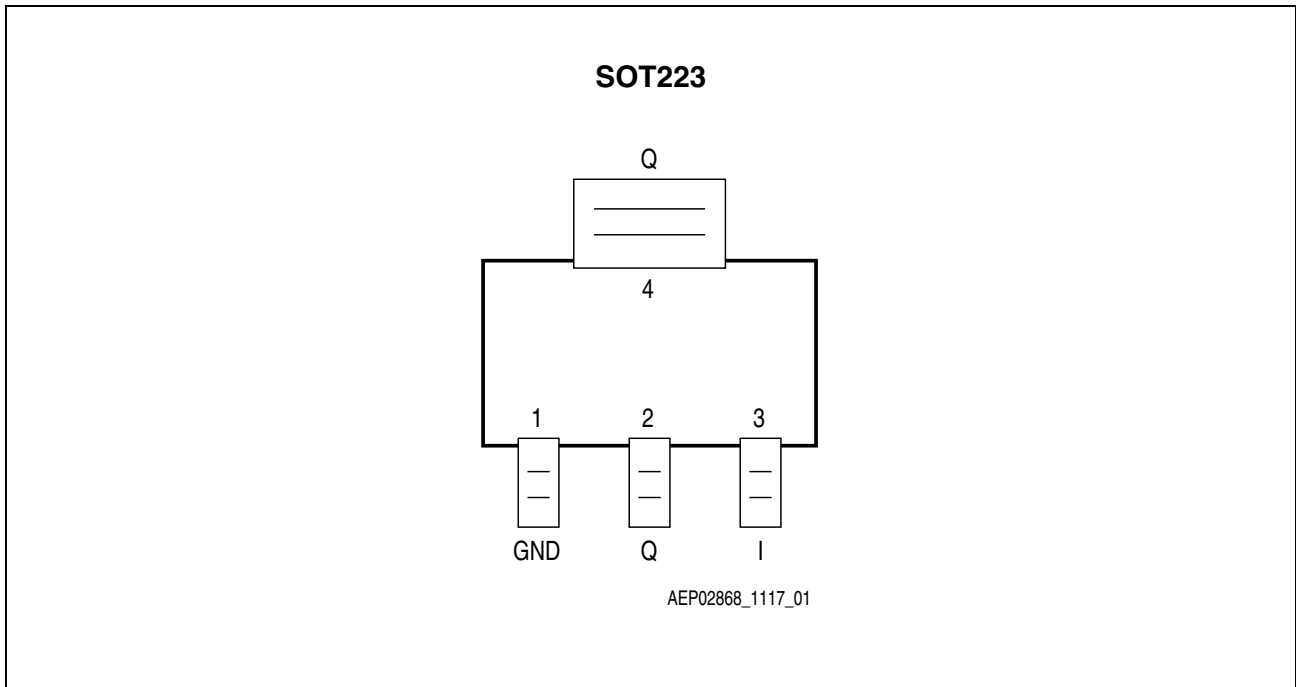
The device operates in the temperature range of  $T_j = 0$  to 125 °C.

Type	Ordering Code	Package
IFX 1117 GSV33	Q67006-A9681	P-SOT223-4-6
		P-SOT223-4-4
IFX 1117 GSV	Q67006-A9680	P-SOT223-4-6
		P-SOT223-4-4



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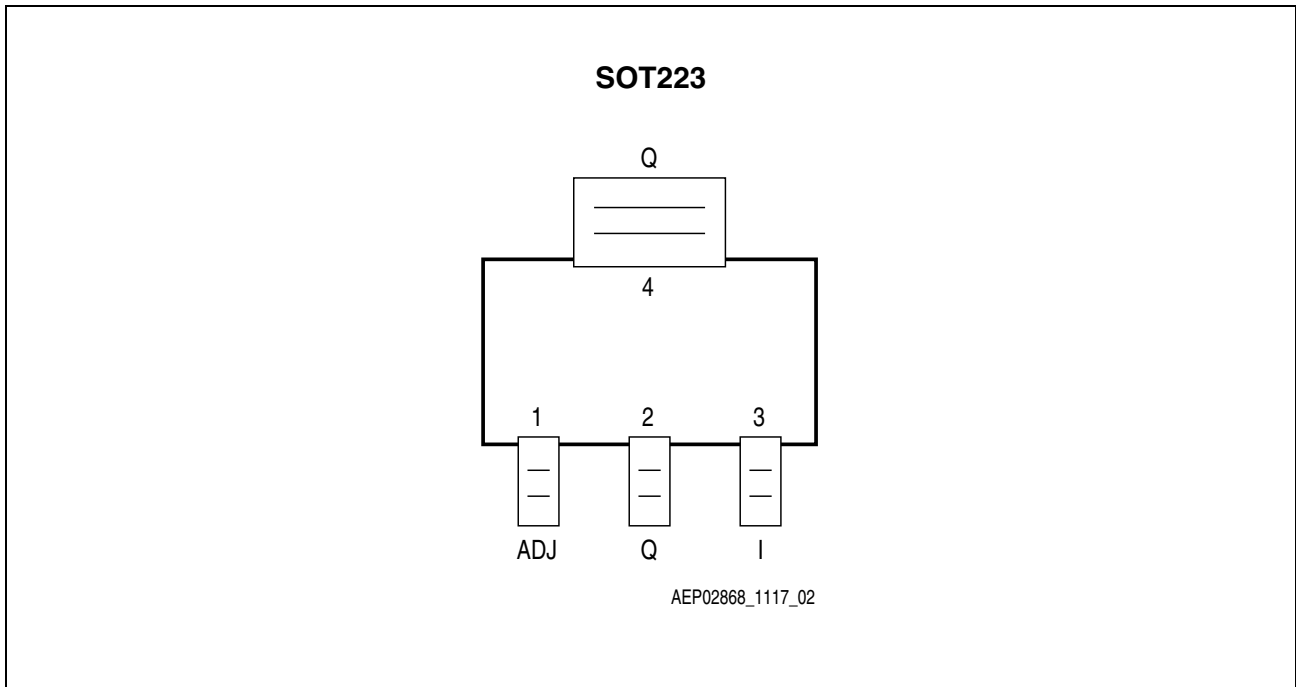
**Figure 1** Block Diagram for Fixed Output Voltage IFX 1117 GSV33



**Figure 2 Pin Configuration IFX 1117 GSV33 (top view)**

**Table 1 Pin Definitions and Functions IFX 1117 GSV33**

Pin No.	Symbol	Function
1	GND	<b>Ground</b>
2	Q	<b>Output;</b> Connect output pin to GND via a capacitor $C_Q \geq 10 \mu\text{F}$ with $\text{ESR} \leq 20 \Omega$ (see also graph “Region of Stability”)
3	I	<b>Input</b>
4 (Heatsink)	Q	<b>Output;</b> Connect to pin 2



**Figure 3 Pin Configuration IFX 1117 GSV (top view)**

**Table 2 Pin Definitions and Functions IFX 1117 GSV**

Pin No.	Symbol	Function
1	ADJ	<b>Adjust</b> ; defines output voltage level by external voltage divider between Q, ADJ and GND.
2	Q	<b>Output</b> ; Connect output pin to GND via a capacitor $C_Q \geq 10 \mu\text{F}$ with $\text{ESR} \leq 20 \Omega$ (see also graph “Region of Stability”).
3	I	<b>Input</b>
4 (Heatsink)	Q	<b>Output</b> ; Connect to pin 2

**Table 3 Absolute Maximum Ratings**

Parameter	Symbol	Limit Values		Unit	Test Condition
		Min.	Max.		
<b>Input - Output Voltage Difference (variable device only)</b>					
Voltage	$V_I - V_Q$	-0.3	20	V	–
<b>Input Voltage (fixed voltage version only)</b>					
Voltage	$V_I$	-0.3	20	V	–
<b>Output</b>					
Voltage	$V_Q$	-0.3	20	V	–
Current	$I_Q$	–	–	–	Internally limited
<b>ESD Rating</b>					
Electrostatic discharge voltage	$V_{ESD}$	-2	2	kV	Human Body Model
<b>Temperature</b>					
Storage temperature	$T_{stg}$	-50	150	°C	–
Junction temperature	$T_j$	-40	150	°C	–

*Note: Stresses above those listed here may cause permanent damage to the device. Exposure to absolute maximum rating conditions for extended periods may affect device reliability.*

**Table 4 Operating Range**

Parameter	Symbol	Limit Values		Unit	Remarks
		Min.	Max.		
Input Voltage	$V_I$	$V_Q + V_{DR}$	15	V	–
Junction temperature	$T_j$	0	125	°C	–

**Table 5 Thermal Resistance**

Junction ambient	$R_{thja}$	–	164	K/W	P-SOT223, no airflow, no heat sink area
		–	81	K/W	P-SOT223 300 mm <sup>2</sup> heat sink area
Junction case	$R_{thjc}$	–	4	K/W	–

*Note: In the operating range, the functions given in the circuit description are fulfilled.*

**Characteristics 3.3 V Fixed Output Voltage Device IFX 1117 GSV33**
**0 °C < T<sub>j</sub> < 125 °C; V<sub>I</sub> = 5 V, I<sub>Q</sub> = 10 mA; unless otherwise specified.**

Parameter	Symbol	Limit Values			Unit	Measuring Conditions
		min.	typ.	max.		
Output voltage	V <sub>Q</sub>	3.23 5	3.300	3.36 5	V	0 mA ≤ I <sub>Q</sub> ≤ 800 mA 4.7 V ≤ V <sub>I</sub> ≤ 10 V
Output voltage	V <sub>Q</sub>	–	3.300	–	V	0 mA ≤ I <sub>Q</sub> ≤ 1000 mA; 4.7 V ≤ V <sub>I</sub> ≤ 15V
Line regulation	ΔV <sub>Q</sub>	–	1	6	mV	4.7 V ≤ V <sub>I</sub> ≤ 15V
Load regulation	ΔV <sub>Q</sub>	–	1	10	mV	0 mA ≤ I <sub>Q</sub> ≤ 800 mA; <sup>1)</sup>
		–	2	–	mV	0 mA ≤ I <sub>Q</sub> ≤ 1.0 A <sup>1)</sup>
Drop voltage	V <sub>DR</sub>	–	1.00	1.10	V	I <sub>Q</sub> = 100 mA <sup>2)</sup>
Drop voltage	V <sub>DR</sub>	–	1.05	1.15	V	I <sub>Q</sub> = 500 mA <sup>2)</sup>
Drop voltage	V <sub>DR</sub>	–	1.10	1.20	V	I <sub>Q</sub> = 800 mA <sup>2)</sup>
Drop voltage	V <sub>DR</sub>	–	1.30	1.40	V	I <sub>Q</sub> = 1.0 A <sup>2)</sup>
Current consumption; I <sub>q</sub> = I <sub>I</sub> – I <sub>Q</sub>	I <sub>q</sub>	–	5	10	mA	I <sub>Q</sub> = 10 mA
Temperature stability	ΔV <sub>Q</sub>	–	16.5	–	mV	<sup>3)</sup>
Long Term Stability	–	–	0.3	–	%	<sup>3)</sup>
Current limit	I <sub>Qmax</sub>	1100	–	2250	mA	V <sub>Q</sub> = 0.5 V
RMS Output Noise	–	–	30	–	ppm	ppm of V <sub>Q</sub> , T <sub>j</sub> = 25 °C 10 Hz ≤ f ≤ 10 kHz <sup>3)</sup>
Power Supply Ripple Rejection	PSRR	60	65	–	dB	f <sub>r</sub> = 120 Hz, V <sub>r</sub> = 1 V <sub>PP</sub> <sup>3)</sup>

1) Measured at constant junction temperature

2) Drop voltage measured when the output voltage has dropped 100 mV from the nominal value obtained at V<sub>I</sub> = 5.0 V.

3) Specified by design; not subject to production test.

**Characteristics Adjustable Output Voltage Device IFX 1117 GSV**
**0 °C < T<sub>j</sub> < 125 °C; V<sub>I</sub> = 5 V, I<sub>Q</sub> = 10 mA; unless otherwise specified.**

Parameter	Symbol	Limit Values			Unit	Measuring Conditions
		min.	typ.	max.		
Reference voltage	V <sub>Q</sub>	1.22 5	1.250	1.27 0	V	10 mA ≤ I <sub>Q</sub> ≤ 800 mA; 1.4 V ≤ (V <sub>I</sub> -V <sub>Q</sub> ) ≤ 10 V
Output voltage	V <sub>Q</sub>	–	1.250	–	V	10 mA ≤ I <sub>Q</sub> ≤ 1000 mA; 2.65 V ≤ V <sub>I</sub> ≤ 15 V
Line regulation	ΔV <sub>Q</sub>	–	0.035	0.2	% <sup>1)</sup>	1.5 V ≤ (V <sub>I</sub> -V <sub>Q</sub> ) ≤ 13.75 V
Load regulation	ΔV <sub>Q</sub>	–	0.2	0.4	% <sup>1)</sup>	10 mA ≤ I <sub>Q</sub> ≤ 800 mA; <sup>2)</sup>
		–	0.25	–	% <sup>1)</sup>	10 mA ≤ I <sub>Q</sub> ≤ 1.0 A <sup>2)</sup>
Drop voltage	V <sub>DR</sub>	–	1.00	1.10	V	I <sub>Q</sub> = 100 mA <sup>3)</sup>
Drop voltage	V <sub>DR</sub>	–	1.05	1.15	V	I <sub>Q</sub> = 500 mA <sup>3)</sup>
Drop voltage	V <sub>DR</sub>	–	1.10	1.20	V	I <sub>Q</sub> = 800 mA <sup>3)</sup>
Drop voltage	V <sub>DR</sub>	–	1.30	1.40	V	I <sub>Q</sub> = 1.0 A <sup>3)</sup>
Minimum Load Current <sup>4)</sup>	I <sub>q</sub>	–	1.7	5.0	mA	V <sub>I</sub> = 15 V
Adjust Current	I <sub>ADJ</sub>	–	100	120	μA	I <sub>Q</sub> = 10 mA
Adjust Current Change	ΔI <sub>ADJ</sub>	–	2	5	μA	1.4 V ≤ (V <sub>I</sub> -V <sub>Q</sub> ) ≤ 13.6 V; 10 mA ≤ I <sub>Q</sub> ≤ 800 mA
Temperature stability	ΔV <sub>Q</sub>	–	0.5	–	% <sup>1)</sup>	<sup>5)</sup>
Long Term Stability	–	–	0.3	–	% <sup>1)</sup>	<sup>5)</sup>
Current limit	I <sub>Qmax</sub>	1100	–	2250	mA	V <sub>Q</sub> = 0.5 V
RMS Output Noise	–	–	30	–	ppm	ppm of V <sub>Q</sub> , T <sub>j</sub> = 25 °C 10 Hz ≤ f ≤ 10 kHz <sup>5)</sup>
Power Supply Ripple Rejection	PSRR	65	70	–	dB	f <sub>r</sub> = 120 Hz, V <sub>r</sub> = 1 V <sub>PP</sub> <sup>5)</sup>

1) Related to V<sub>Q</sub>

2) Measured at constant junction temperature

3) Drop voltage measured when the output voltage has dropped 100 mV from the nominal value obtained at V<sub>I</sub> = 5.0 V.

4) Minimum load current required to maintain regulation

5) Specified by design; not subject to production test.

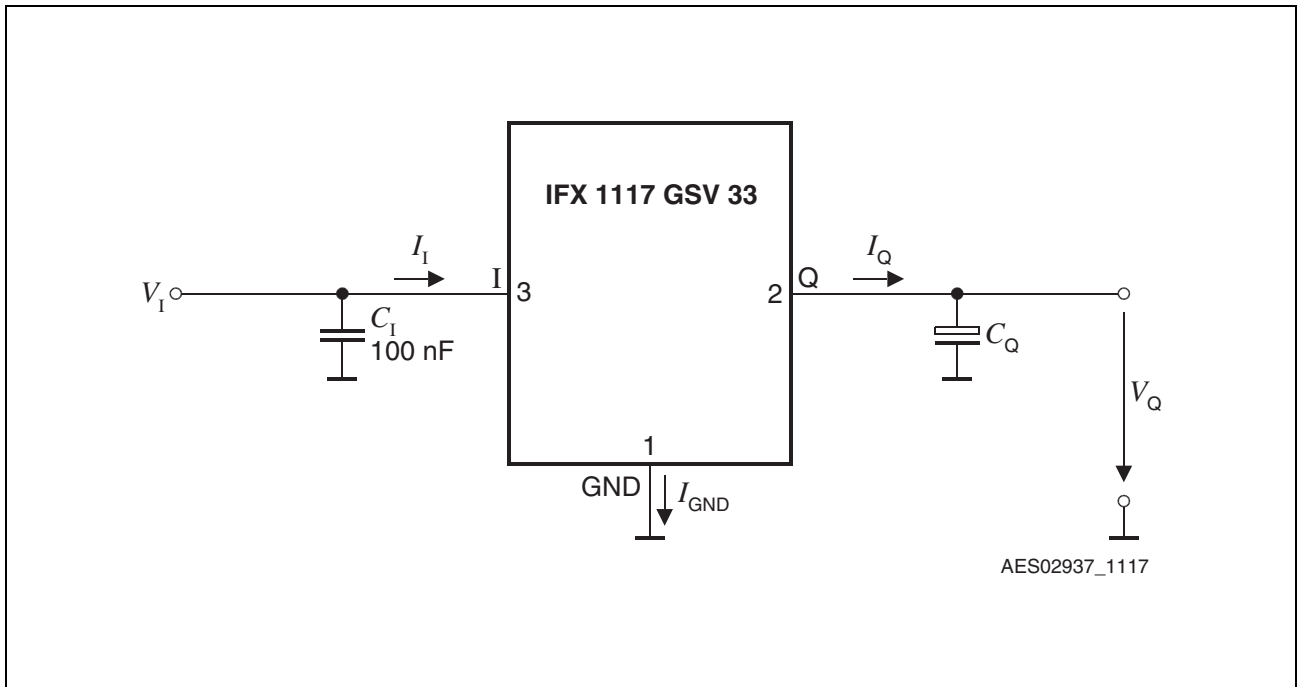


Figure 4 Measuring Circuit

Application Information

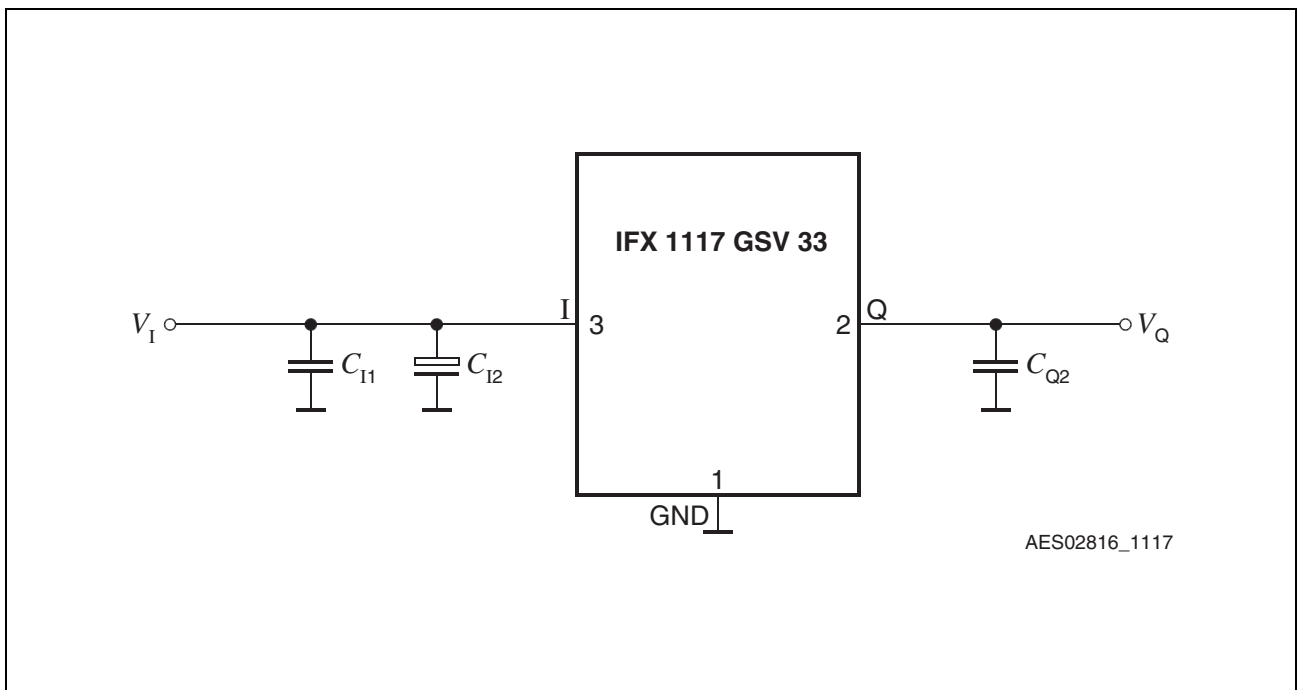


Figure 5 Typical Application Circuit IFX 1117 GSV33



### Output

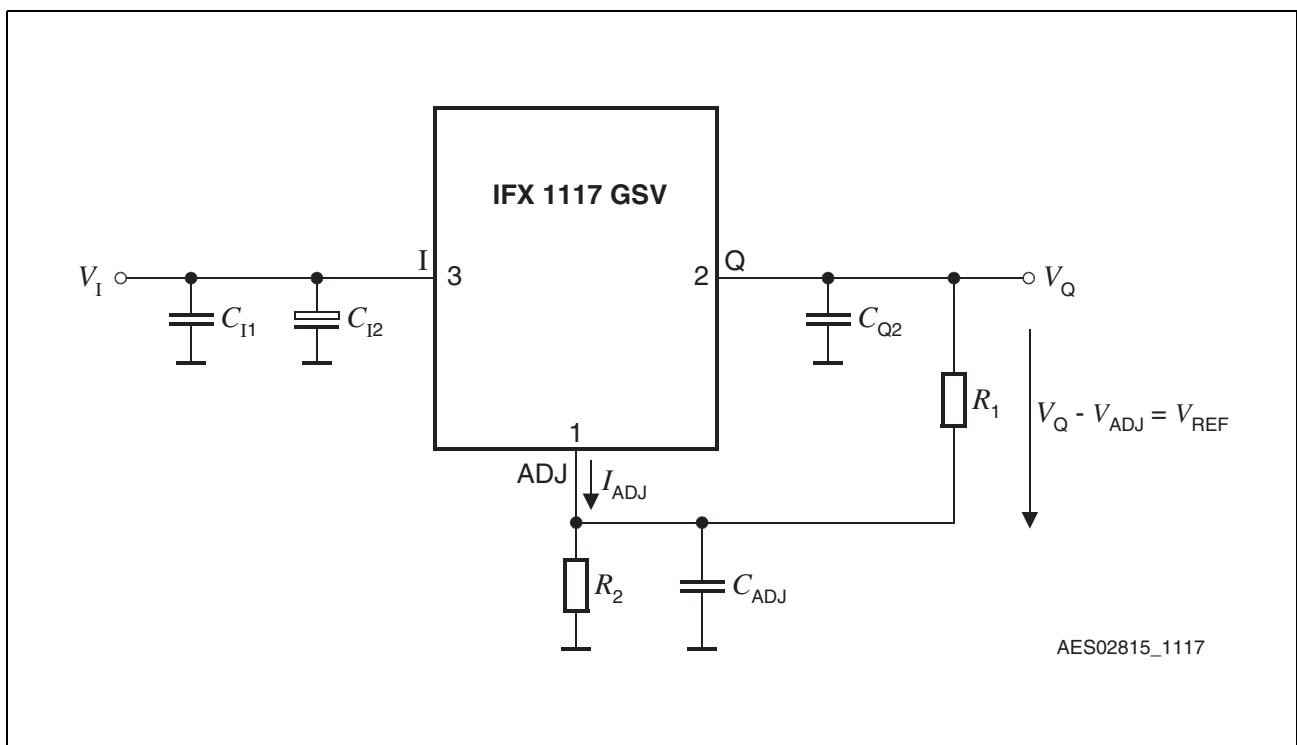
The IFX 1117 requires a 10  $\mu\text{F}$  output capacitor with  $\text{ESR} \leq 20 \Omega$  for the stability of the regulation loop. The use of a tantalum output capacitor is recommended.

For the adjustable device IFX 1117 GSV the output voltage level can be defined by a voltage divider between Q, ADJ and GND.

The output voltage calculates:

$$V_Q = V_{\text{REF}} \times \left(1 + \frac{R_2}{R_1}\right) + I_{\text{ADJ}} \times R_2 \tag{1}$$

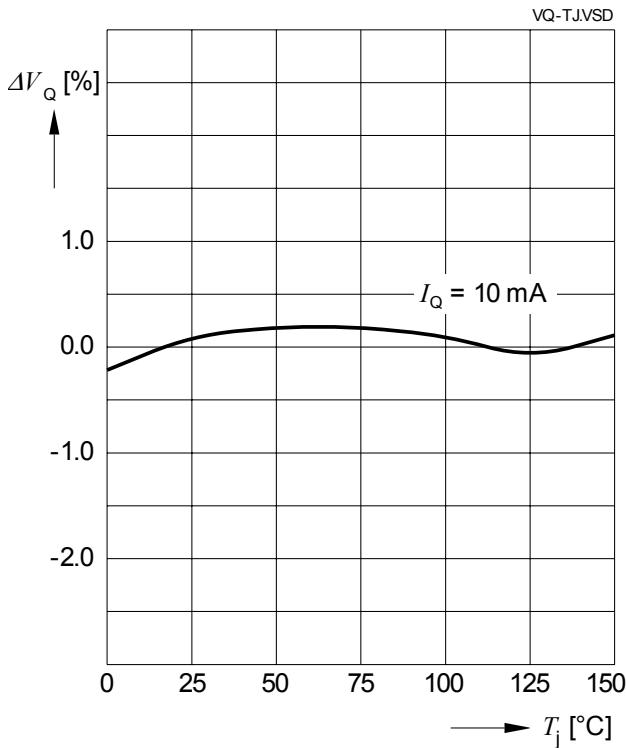
At the input of the regulator a capacitor is recommended to compensate line influences. As a minimum a 100 nF ceramic input capacitor should be used. If the regulator is used in an environment with long input lines an input capacitance of 10  $\mu\text{F}$  is suggested.



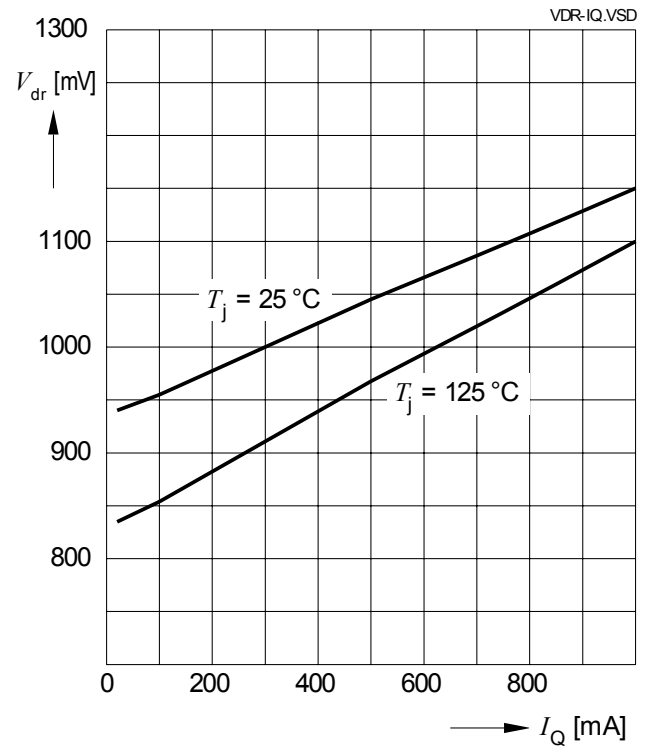
**Figure 6 Typical Application Circuit IFX 1117 GSV**

### Typical Performance Characteristics

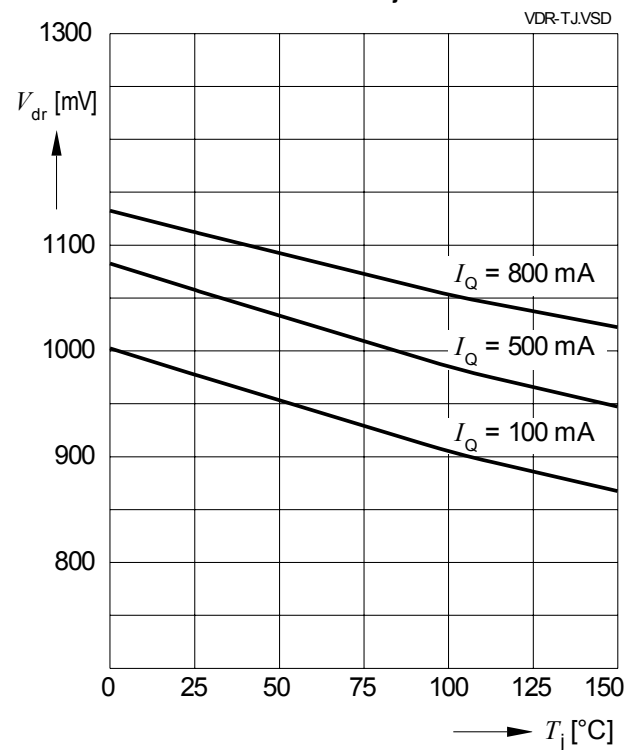
**Output Voltage  $V_Q$  versus Junction Temperature  $T_j$**



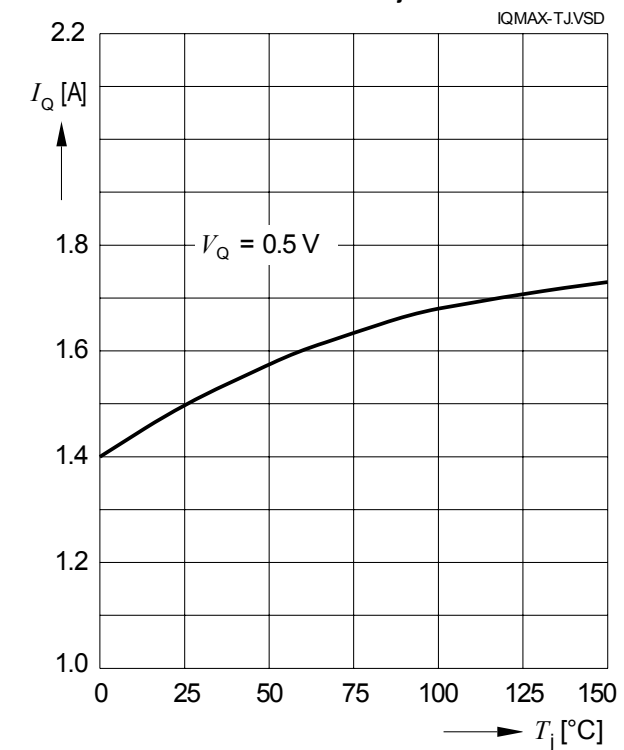
**Dropout Voltage  $V_{dr}$  versus Output Current  $I_Q$**



**Dropout Voltage  $V_{dr}$  versus Junction Temperature  $T_j$**

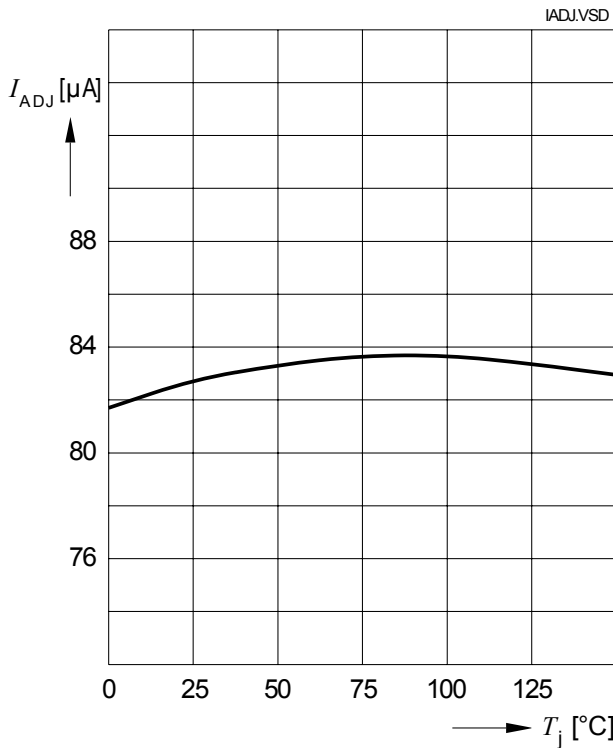


**Maximum Output Current  $I_Q$  versus Junction Temperature  $T_j$**

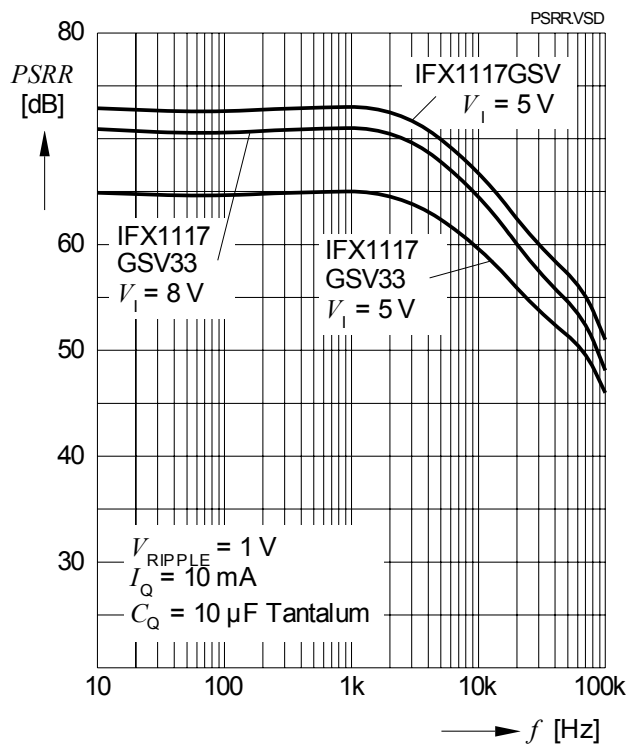


### Typical Performance Characteristics

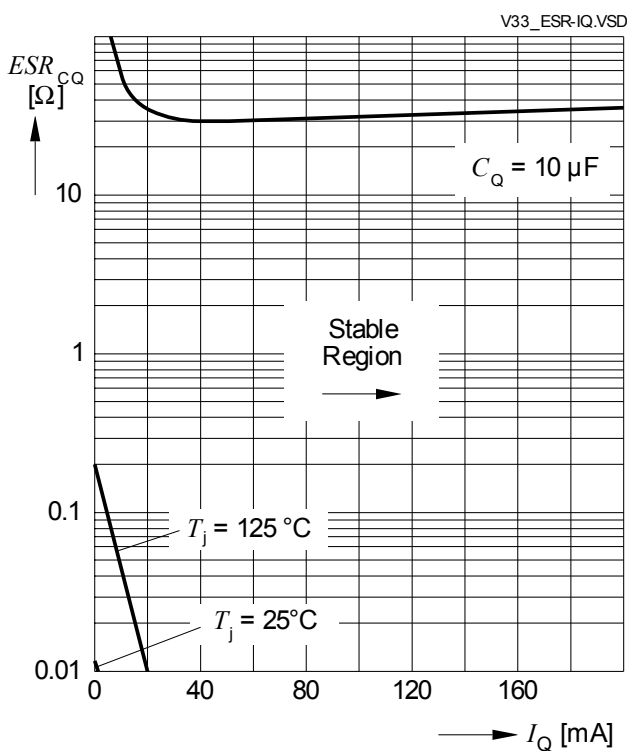
**Adjust Pin Current  $I_{ADJ}$  versus Junction Temperature  $T_j$**



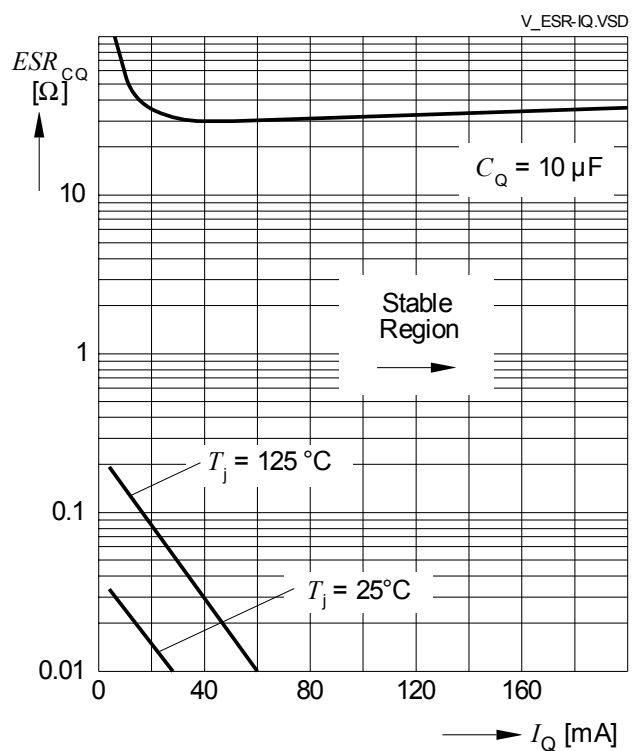
**Power Supply Ripple Rejection  $PSRR$  versus Frequency  $f$**



**Region of Stability Version GSV33**

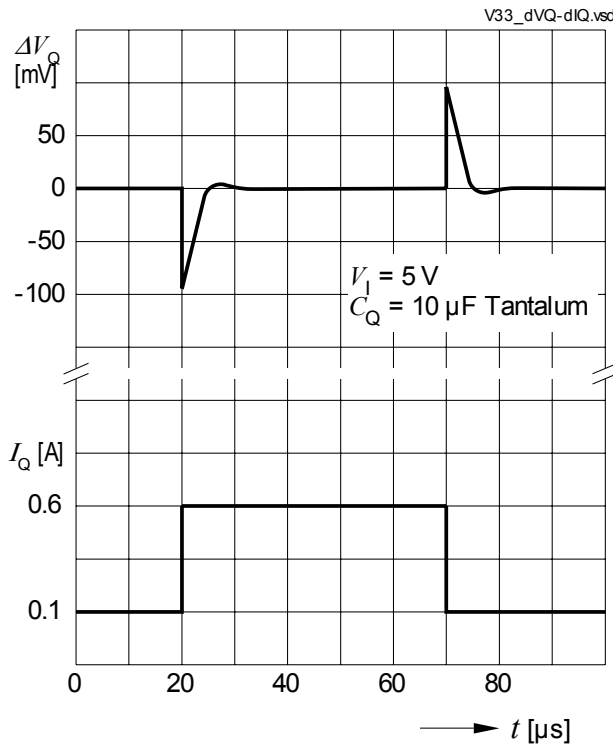


**Region of Stability Version GSV**

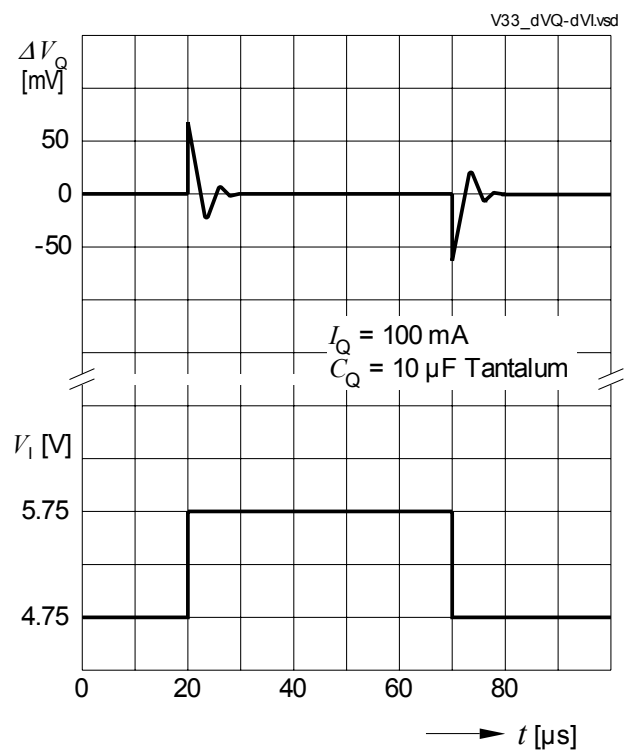


### Typical Performance Characteristics

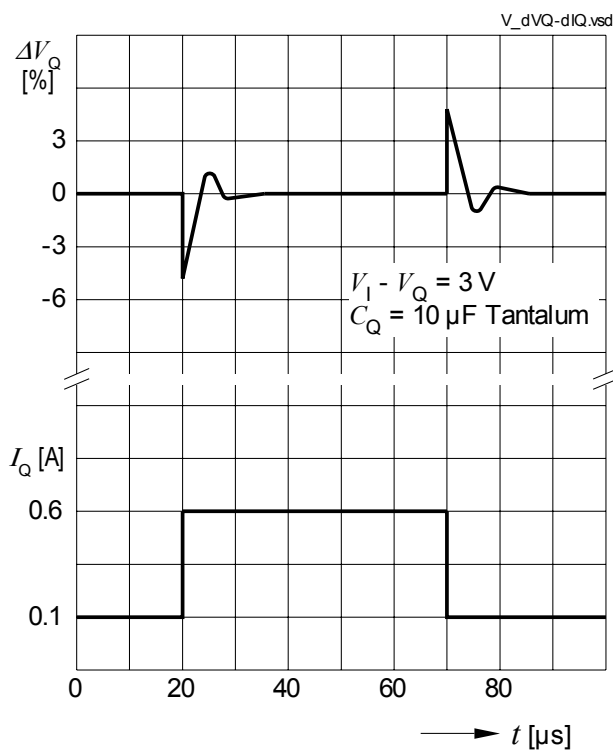
#### Load Transient Response Version GSV33



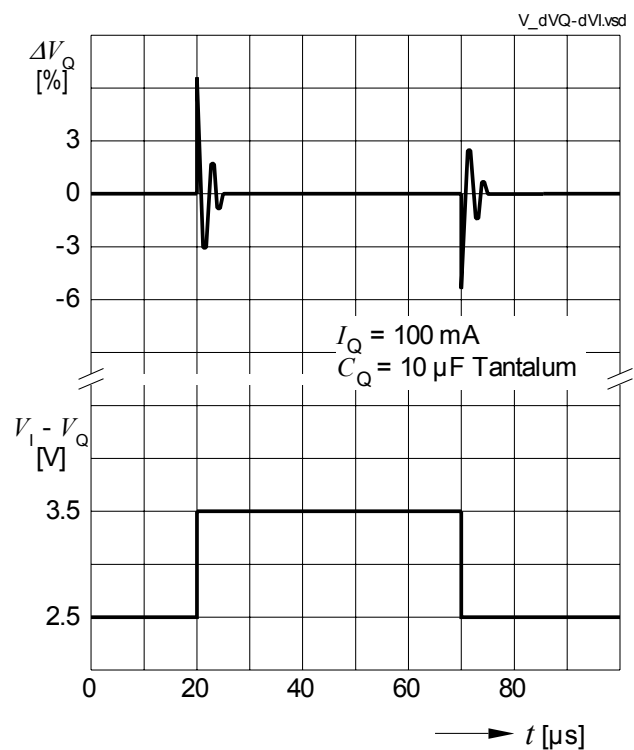
#### Line Transient Response Version GSV33



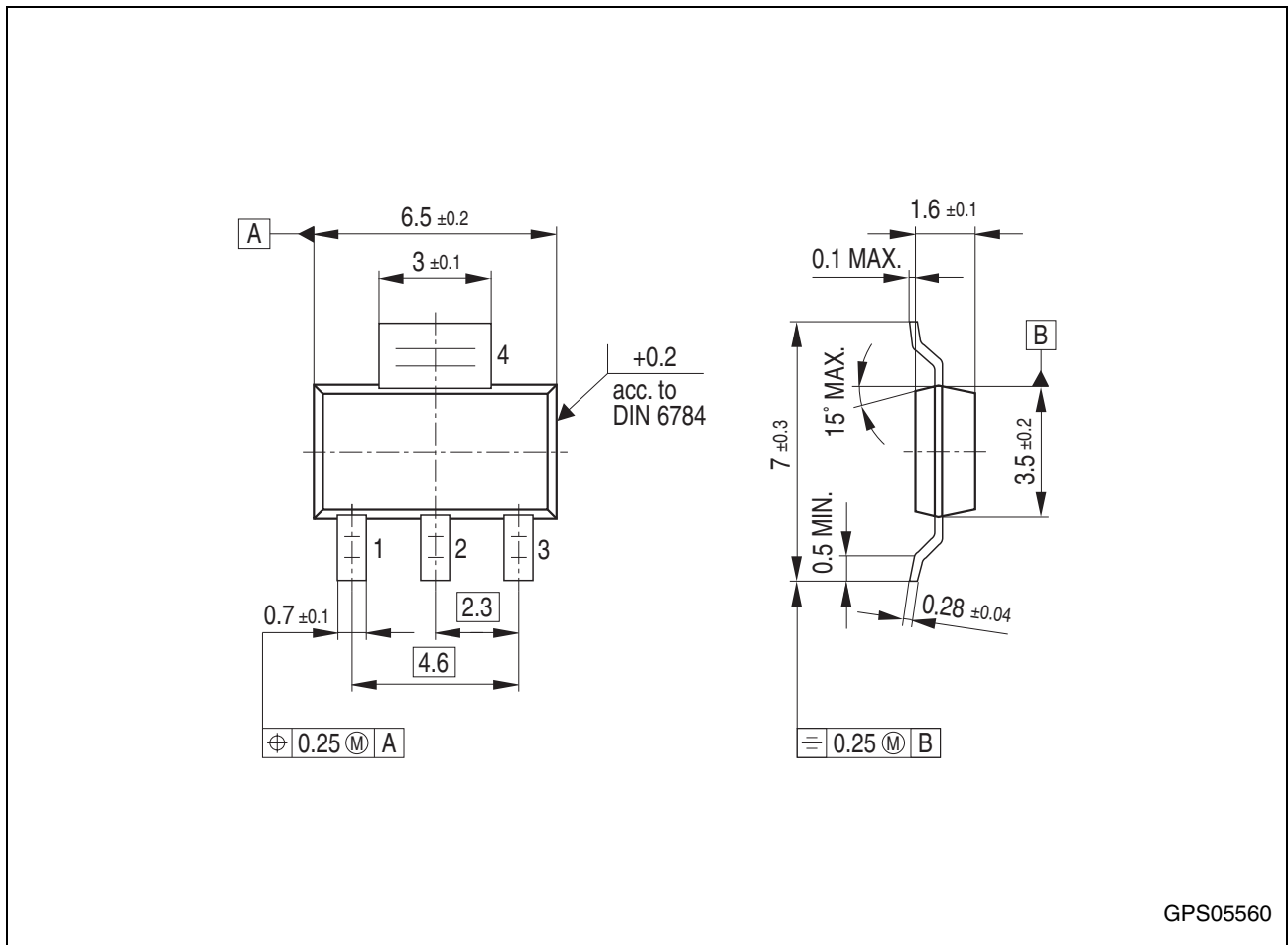
#### Load Transient Response Version GSV



#### Line Transient Response Version GSV



### Package Outlines



GPS05560

**Figure 7** P-SOT223-4-6, P-SOT223-4-4 (Plastic Small Outline Transistor)

You can find all of our packages, sorts of packing and others in our Infineon Internet Page “Products”: <http://www.infineon.com/products>.

SMD = Surface Mounted Device

Dimensions in mm

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**Revision History**

<b>Version</b>	<b>Date</b>	<b>Changes</b>
Rev. 1.0	2004-06-01	Final Data Sheet
Rev. 1.1	2004-07-20	"Typical Performance Characteristics" graphs added.

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