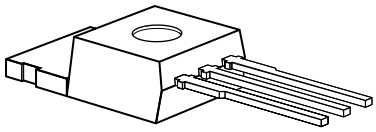
Voltage Regulator TLE 4317

Preliminary Data Sheet

Features

- Fixed output voltage regulator 1.8 V, 2.5 V, 3.3 V or 5 V
- Adjustable output down to 1.25 V
- 800 mA output current
- 80 dB ripple rejection
- No output capacitors necessary
- Short circuit protected
- Overtemperature protected



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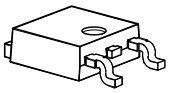

P-TO252-3-1

	Type	Ordering Code	Package
▼	TLE 4317 V	Q67000-A9475	P-TO220-3-1
▼	TLE 4317 D V	Q67006-A9476	P-TO252-3-1
▼	TLE 4317 D V18	Q67006-A9450	P-TO252-3-1
▼	TLE 4317 D V25	Q67006-A9451	P-TO252-3-1
▼	TLE 4317 D V33	Q67006-A9452	P-TO252-3-1
▼	TLE 4317 D V50	Q67006-A9453	P-TO252-3-1

▼ New device

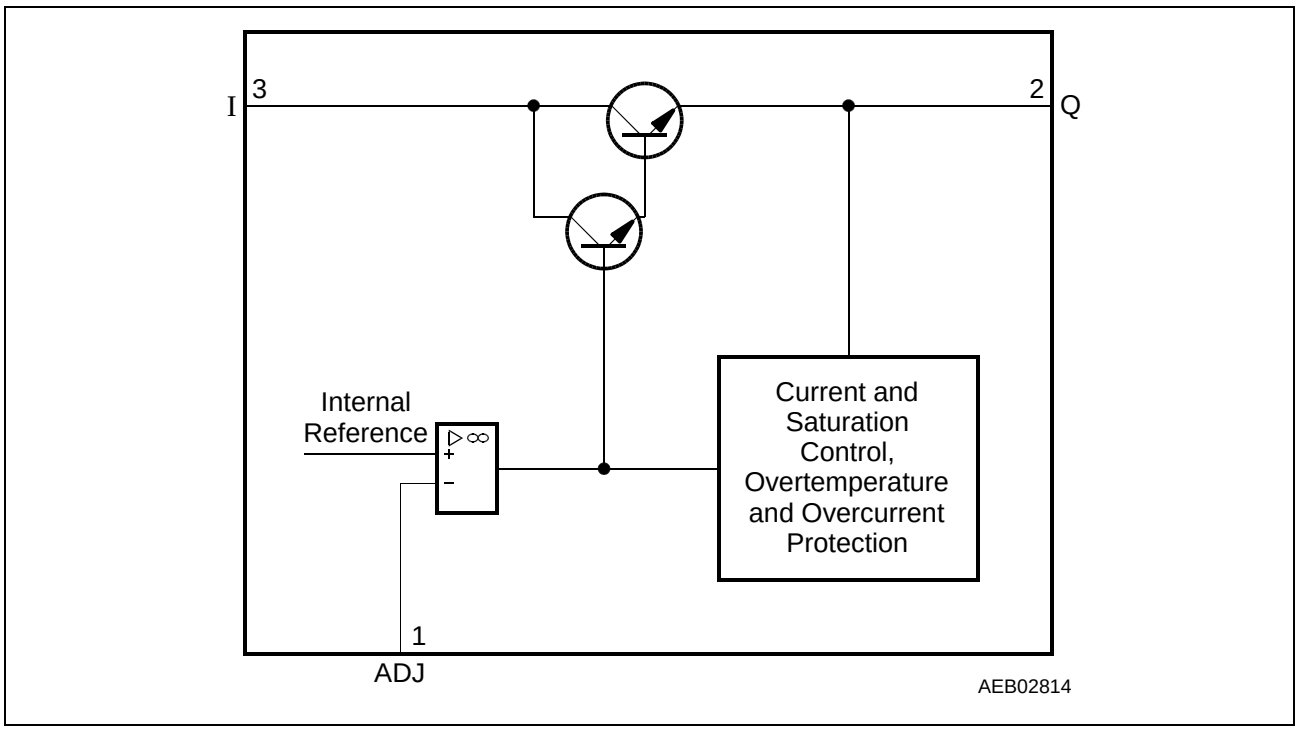

Figure 1 Block Diagram for Adjustable Output Voltage TLE 4317 V, D V

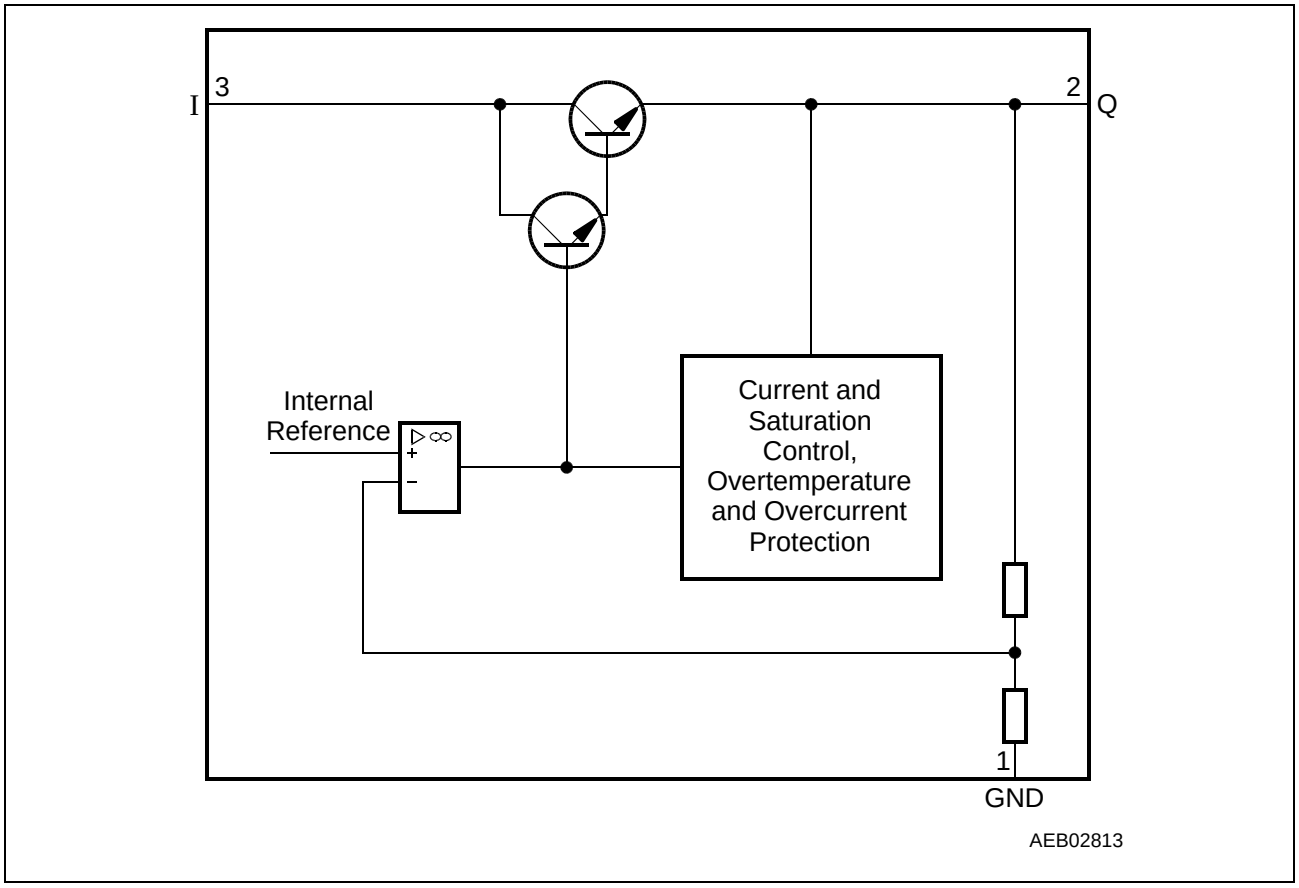

Figure 2 Block Diagram for Fixed Output Voltage TLE 4317 D V18, 25, 33, 50

Functional Description

The TLE 4317 is a 3 terminal positive adjustable or fixed voltage regulator. It is capable to supply 800 mA output current. The fixed voltage devices are available for 1.8 V, 2.5 V, 3.3 V and 5 V output voltage. The adjustable device requires 2 external resistors to define an output voltage between 1.25 V and 40 V. The TLE 4317 is packaged either in standard P-TO220-3-1 package or in surface mounted D-Pak package.

The TLE 4317 voltage regulator family offers full overload protection, current limitation, thermal protection and save operation area protection (SOA).

No external capacitors are needed for the regulator. An input capacitor can be used to filter glitches. An optional output capacitor will improve transient response. Decoupling of the adjust pin at variable voltage regulator can improve the ripple rejection ratios.

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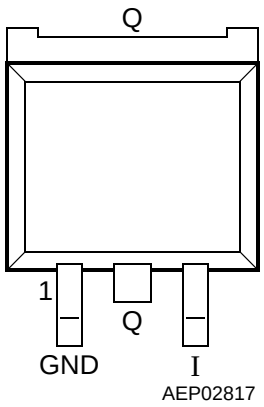


Figure 3 **Pin Configuration** (top view)

Pin Definitions and Functions TLE 4317 D Vxx Fixed Voltage Devices

Pin No.	Symbol	Function
1	GND	**Ground**
2	Q	**Output**; Output voltage is 1.8 V, 2.5 V, 3.3 V or 5 V
3	I	**Input**

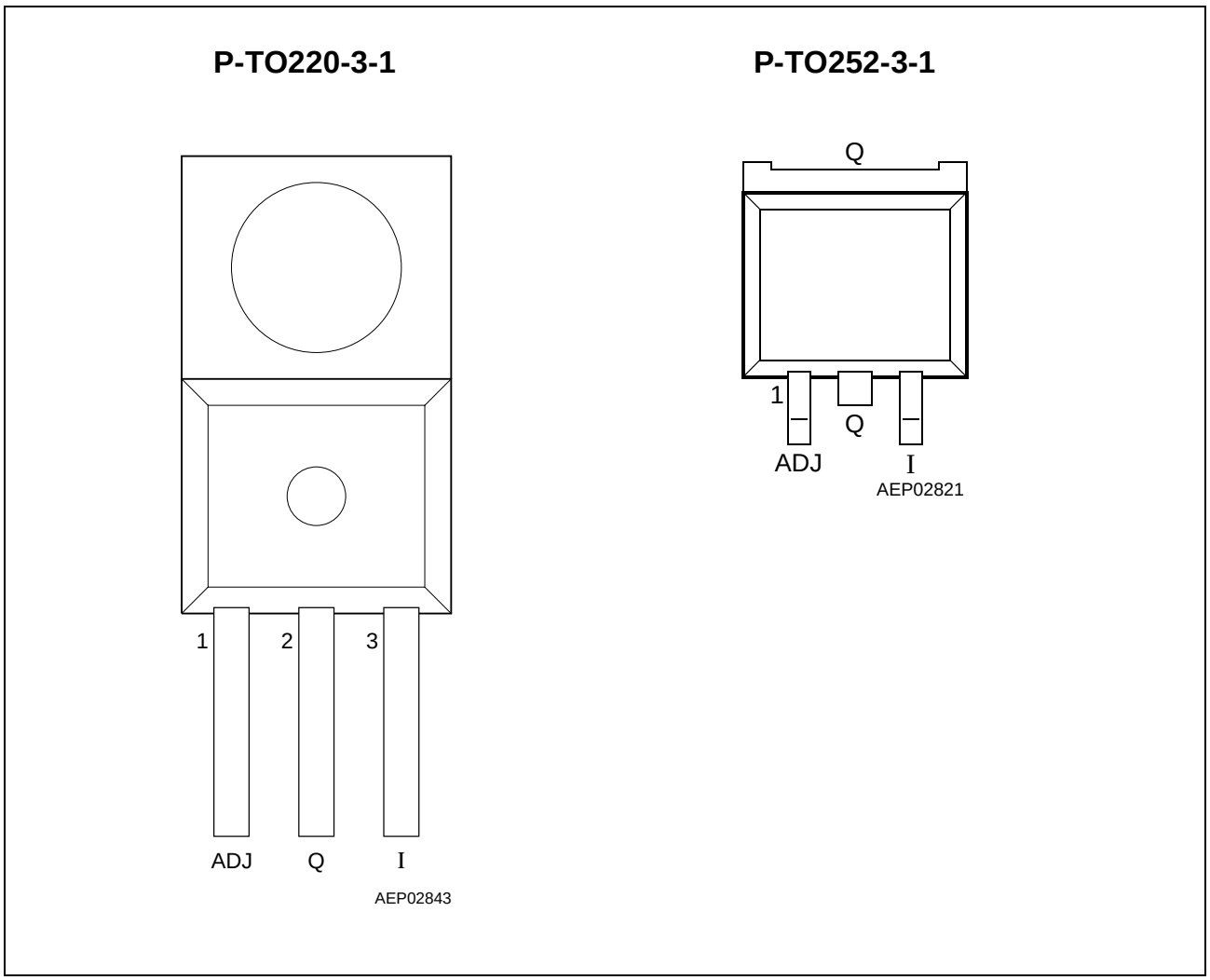


Figure 4 **Pin Configuration** (top view)

Pin Definitions and Functions TLE 4317 V, TLE 4317 D V

Pin No.	Symbol	Function
1	ADJ	**Adjust**; defines output voltage by external voltage divider between Q, ADJ and GND.
2	Q	**Output**
3	I	**Input**

Absolute Maximum Ratings

Parameter	Symbol	Limit Values		Unit	Test Condition
		min.	max.		
Voltage Regulator					
Input - Output Voltage Difference (variable device only)					
Voltage	$V_I - V_Q$	– 0.3	40	V	–
Input Voltage (fixed voltage version only)					
Voltage	V_I	– 0.3	40	V	–
Output (fixed voltage version only)					
Voltage	V_Q	– 0.3	40	V	–
Current	I_Q	–	–	–	Internally limited
Adjust (variable version only)					
Voltage	V_{ADJ}	– 0.3	40	V	–
Current	I_{ADJ}	–	–	–	Internally limited
Ground (fixed voltage version only)					
Current	I_{GND}	–	2	mA	–
Temperature					
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.

Operating Range

Parameter	Symbol	Limit Values		Unit	Remarks
		min.	max.		
Input Voltage	V_I	4.8	40	V	TLE 4317 D V18
Input Voltage	V_I	5.5	40	V	TLE 4317 D V25
Input Voltage	V_I	6.3	40	V	TLE 4317 D V33
InputVoltage	V_I	8.0	40	V	TLE 4317 D V50
Input - Output Voltage Difference	$V_I - V_Q$	3	40	V	TLE 4317 V; TLE 4317 DV
Load Current Range	I_Q	10	Internally limited	mA	–
Junction temperature	T_j	0	125	°C	–

Thermal Resistance

Junction ambient	R_{thja}	–	79	K/W	P-TO220-3-1 zero airflow, zero heat sink area
Junction ambient	R_{thja}	–	144	K/W	P-TO252-3-1
Junction case	R_{thjc}	–	4	K/W	–

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

Characteristics Adjustable Output Voltage Device TLE 4317 V, D V

0 °C < T_j < 125 °C; $V_I - V_Q$ = 5 V, I_Q = 10 mA; unless otherwise specified

Parameter	Symbol	Limit Values			Unit	Measuring Conditions
		min.	typ.	max.		
Reference voltage	V_{REF} [1]	1.20	1.25	1.30	V	–
Line regulation	ΔV_Q	–	0.3	1.0	%	3 V ≤ ($V_I - V_Q$) ≤ 40 V
Load regulation	ΔV_Q	–	0.3	1.5	%	10 mA ≤ I_Q ≤ 800 mA; V_I = 4.25 V; V_Q = V_{REF}
Drop voltage	V_{DR}	–	2.1	–	V	I_Q = 100 mA [2]
Drop voltage	V_{DR}	–	2.15	–	V	I_Q = 500 mA [2]
Drop voltage	V_{DR}	–	2.2	–	V	I_Q = 800 mA [2]
Current consumption; $I_q = I_I - I_Q$	I_q	–	100	120	µA	I_Q = 10 mA
Adjust current	I_{ADJ}	–	100	120	µA	I_Q = 10 mA
Adjust current change	ΔI_{ADJ}	–	± 0.2	± 1	µA	10 mA ≤ I_Q ≤ 800 mA; 3 V ≤ ($V_I - V_Q$) ≤ 20 V
Adjust current change	ΔI_{ADJ}	–	± 0.2	± 1	µA	10 mA ≤ I_Q ≤ 200 mA; 3 V ≤ ($V_I - V_Q$) ≤ 40 V
Temperature stability	–	–	1	–	%	[3]
Minimum load current	I_Q	–	3.5	10	mA	$V_I - V_Q$ = 40 V
Current limit	I_{Qmax}	1000	–	2200	mA	V_I = 13.5 V
Current limit	I_{Qmax}	50	200	–	mA	$V_I - V_Q$ = 40 V; T_j = 25 °C
RMS Output Noise	–	–	3	–	ppm	ppm of V_Q; 10 Hz ≤ f ≤ 10k; T_j = 25 °C [3]
Power Supply Ripple Rejection	$PSRR$	–	65	–	dB	V_Q = 10 V, f_r = 120 Hz, V_r = 0.5 V_{PP}, C_{ADJ} = 0 µF [3]
Power Supply Ripple Rejection	$PSRR$	65	80	–	dB	V_Q = 10 V, f_r = 120 Hz, V_r = 0.5 V_{PP}, C_{ADJ} = 10 µF [3]
Long Term Stability	ΔV_Q	–	0.3	1	%	T_j = 125 °C, 1000 h [3]

1) $V_{REF} = V_Q - V_{ADJ}$
2) Drop voltage measured when the output voltage has dropped 100 mV from the nominal value obtained at $V_Q = V_{REF}$.
3) Guaranteed by design.

Characteristics 1.8 V Fixed Output Voltage Device TLE 4317 D V18

0 °C < T_j < 125 °C; V_I = 7 V, I_Q = 10 mA; unless otherwise specified

Parameter	Symbol	Limit Values			Unit	Measuring Conditions
		min.	typ.	max.		
Output voltage	V_Q	1.76	1.8	1.84	V	T_j = 25 °C, I_Q = 10 mA
Output voltage	V_Q	1.73	1.8	1.87	V	10 mA ≤ I_Q ≤ 800 mA; 4.8 V ≤ V_I ≤ 14 V
Output voltage	V_Q	–	1.8	–	V	14 V ≤ V_I ≤ 40 V
Line regulation	ΔV_Q	–	3	10	mV	4.8 V ≤ V_I ≤ 40 V
Load regulation	ΔV_Q	–	10	30	mV	10 mA ≤ I_Q ≤ 800 mA; T_j = 25 °C; V_I = 5 V
Drop voltage	V_{DR}	–	2.10	–	V	I_Q = 100 mA[1]
Drop voltage	V_{DR}	–	2.15	–	V	I_Q = 500 mA[1]
Drop voltage	V_{DR}	–	2.20	–	V	I_Q = 800 mA[1]
Current consumption; $I_q = I_I - I_Q$	I_q	–	1.1	2.0	mA	I_Q = 10 mA
Temperature stability	–	–	1	–	%	[2]
Minimum load current	I_Q	–	3.5	10	mA	V_I = 40 V
Current limit	I_{Qmax}	1000	–	2200	mA	–
Current limit	I_{Qmax}	50	200	–	mA	V_I = 40 V, T_j = 25 °C
RMS Output Noise	–	–	3	–	ppm	ppm of V_Q, T_j = 25 °C[2] 10 Hz ≤ f ≤ 10 kHz
Supply Voltage Ripple Rejection	$PSRR$	–	65	–	dB	f_r = 120 Hz, V_r = 0.5 V_{SS} C_{ADJ} = 0 µF[2]
Supply Voltage Ripple Rejection	$PSRR$	65	80	–	dB	f_r = 120 Hz, V_r = 0.5 V_{SS} C_{ADJ} = 10 µF[2]
Long Term Stability	ΔV_Q	–	0.3	1	%	T_j = 125 °C, 1000 h[2]

[1] Drop voltage measured when the output voltage has dropped 100 mV from the nominal value obtained at V_I = 7 V.

[2] Guaranteed by design.

Characteristics 2.5 V Fixed Output Voltage Device TLE 4317 D V25

0 °C < T_j < 125 °C; V_I = 7 V, I_Q = 10 mA; unless otherwise specified

Parameter	Symbol	Limit Values			Unit	Measuring Conditions
		min.	typ.	max.		
Output voltage	V_Q	2.45	2.5	2.55	V	T_j = 25 °C, I_Q = 10 mA
Output voltage	V_Q	2.43	2.5	2.58	V	10 mA ≤ I_Q ≤ 800 mA; 5.5 V ≤ V_I ≤ 14 V
Output voltage	V_Q	–	2.5	–	V	14 V ≤ V_I ≤ 40 V
Line regulation	ΔV_Q	–	3	10	mV	5.5 V ≤ V_I ≤ 40 V
Load regulation	ΔV_Q	–	10	40	mV	10 mA ≤ I_Q ≤ 800 mA; T_j = 25 °C
Drop voltage	V_{DR}	–	2.10	–	V	I_Q = 100 mA[1]
Drop voltage	V_{DR}	–	2.15	–	V	I_Q = 500 mA[1]
Drop voltage	V_{DR}	–	2.20	–	V	I_Q = 800 mA[1]
Current consumption; $I_q = I_I - I_Q$	I_q	–	1.1	2.0	mA	I_Q = 10 mA
Temperature stability	–	–	1	–	%	[2]
Minimum load current	I_Q	–	3.5	10	mA	V_I = 40 V
Current limit	I_{Qmax}	1000	–	2200	mA	–
Current limit	I_{Qmax}	50	200	–	mA	V_I = 40 V, T_j = 25 °C
RMS Output Noise	–	–	3	–	ppm	ppm of V_Q, T_j = 25 °C[2] 10 Hz ≤ f ≤ 10 kHz
Supply Voltage Ripple Rejection	$PSRR$	–	65	–	dB	f_r = 120 Hz, V_r = 0.5 V_{SS} C_{ADJ} = 0 µF[2]
Supply Voltage Ripple Rejection	$PSRR$	65	80	–	dB	f_r = 120 Hz, V_r = 0.5 V_{SS} C_{ADJ} = 10 µF[2]
Long Term Stability	ΔV_Q	–	0.3	1	%	T_j = 125 °C, 1000 h[2]

[1] Drop voltage measured when the output voltage has dropped 100 mV from the nominal value obtained at V_I = 7 V.

[2] Guaranteed by design.

Characteristics 3.3 V Fixed Output Voltage Device TLE 4317 D V33
0 °C < T_j < 125 °C; V_I = 8.5 V, I_Q = 10 mA; unless otherwise specified.

Parameter	Symbol	Limit Values			Unit	Measuring Conditions
		min.	typ.	max.		
Output voltage	V_Q	3.23	3.3	3.37	V	T_j = 25 °C, I_Q = 10 mA
Output voltage	V_Q	3.20	3.3	3.40	V	10 mA ≤ I_Q ≤ 800 mA; 8 V ≤ V_I ≤ 14 V
Output voltage	V_Q	–	3.3	–	V	10 mA ≤ I_Q ≤ 800 mA; 14 V ≤ V_I ≤ 40 V
Line regulation	ΔV_Q	–	3	10	mV	6.5 V ≤ V_I ≤ 40 V
Load regulation	ΔV_Q	–	10	50	mV	10 mA ≤ I_Q ≤ 800 mA; T_j = 25 °C
Drop voltage	V_{DR}	–	2.10	–	V	I_Q = 100 mA[1]
Drop voltage	V_{DR}	–	2.15	–	V	I_Q = 500 mA[1]
Drop voltage	V_{DR}	–	2.20	–	V	I_Q = 800 mA[1]
Current consumption; $I_q = I_I - I_Q$	I_q	–	1.1	2.0	mA	I_Q = 10 mA
Temperature stability	–	–	3	–	mV	[2]
Minimum load current	I_Q	–	3.5	10	mA	V = 40 V
Current limit	I_{Qmax}	1000	–	2200	mA	–
Current limit	I_{Qmax}	50	200	–	mA	V_I = 40 V, T_j = 25 °C
RMS Output Noise	–	–	3	–	ppm	ppm of V_Q, T_j = 25 °C[2] 10 Hz ≤ f ≤ 10 kHz
Supply Voltage Ripple Rejection	$PSRR$	–	65	–	dB	f_r = 120 Hz, V_r = 0.5 V_{SS} C_{ADJ} = 0 µF[2]
Supply Voltage Ripple Rejection	$PSRR$	65	80	–	dB	f_r = 120 Hz, V_r = 0.5 V_{SS} C_{ADJ} = 10 µF[2]
Long Term Stability	ΔV_Q	–	0.3	1	%	T_j = 125 °C, 1000 h[2]

[1] Drop voltage measured when the output voltage has dropped 100 mV from the nominal value obtained at V_I = 8.5 V.
[2] Guaranteed by design.

Characteristics 5.0 V Fixed Output Voltage Device TLE 4317 D V50
0 °C < T_j < 125 °C; V_I = 10 V, I_Q = 10 mA; unless otherwise specified

Parameter	Symbol	Limit Values			Unit	Measuring Conditions
		min.	typ.	max.		
Output voltage	V_Q	4.90	5.0	5.10	V	T_j = 25 °C, I_Q = 10 mA
Output voltage	V_Q	4.85	5.0	5.15	V	10 mA ≤ I_Q ≤ 800 mA; 8 V ≤ V_I ≤ 14 V
Output voltage	V_Q	–	5.0	–	V	10 mA ≤ I_Q ≤ 800 mA; 14 V ≤ V_I ≤ 40 V
Line regulation	ΔV_Q	–	3	10	mV	8 V ≤ V_I ≤ 40 V
Load regulation	ΔV_Q	–	10	75	mV	10 mA ≤ I_Q ≤ 800 mA; T_j = 25 °C
Drop voltage	V_{DR}	–	2.10	–	V	I_Q = 100 mA[1]
Drop voltage	V_{DR}	–	2.15	–	V	I_Q = 500 mA[1]
Drop voltage	V_{DR}	–	2.20	–	V	I_Q = 800 mA[1]
Thermal regulation	–	–	0.04	0.07	%/W	20 ms pulses
Current consumption; $I_q = I_I - I_Q$	I_q	–	1.1	2.0	mA	I_Q = 10 mA
Temperature stability	–	–	1	–	%	[2]
Minimum load current	I_Q	–	3.5	10	mA	V_I = 40 V
Current limit	I_{Qmax}	1000	–	2200	mA	–
Current limit	I_{Qmax}	50	200	–	mA	V_I = 40 V, T_j = 25 °C
RMS Output Noise	–	–	3	–	ppm	ppm of V_Q, T_j = 25 °C[2] 10 Hz ≤ f ≤ 10 kHz
Supply Voltage Ripple Rejection	$PSRR$	–	65	–	dB	f_r = 120 Hz, V_r = 0.5 V_{SS} C_{ADJ} = 0 µF[2]
Supply Voltage Ripple Rejection	$PSRR$	65	80	–	dB	f_r = 120 Hz, V_r = 0.5 V_{SS} C_{ADJ} = 10 µF[2]
Long Term Stability	ΔV_Q	–	0.3	1	%	T_j = 125 °C, 1000 h[2]

[1] Drop voltage measured when the output voltage has dropped 100 mV from the nominal value obtained at V_I = 10 V.
[2] Guaranteed by design.

Note: The listed characteristics are ensured over the operating range of the integrated circuit. Typical characteristics specify mean values expected over the production spread. If not otherwise specified, typical characteristics apply at T_A = 25 °C and the given supply voltage.

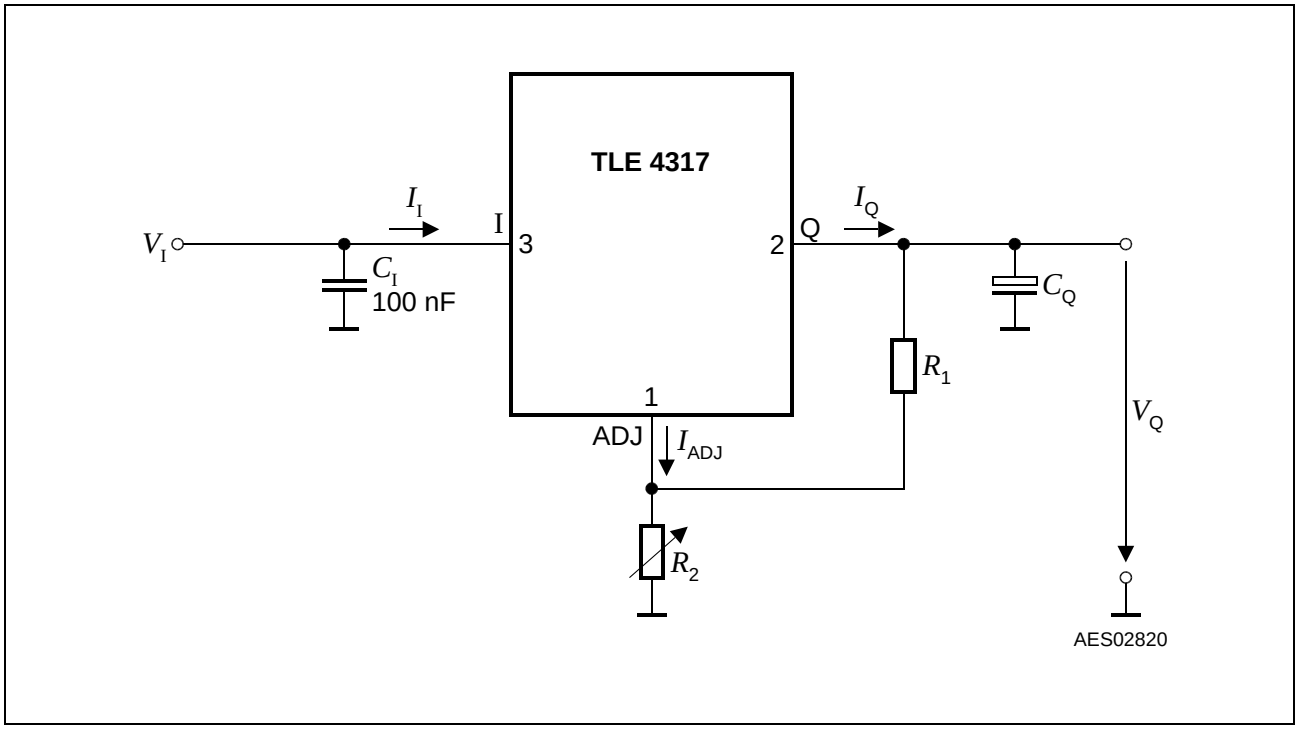


Figure 5 Measuring Circuit Variable Output Voltage TLE 4317 V

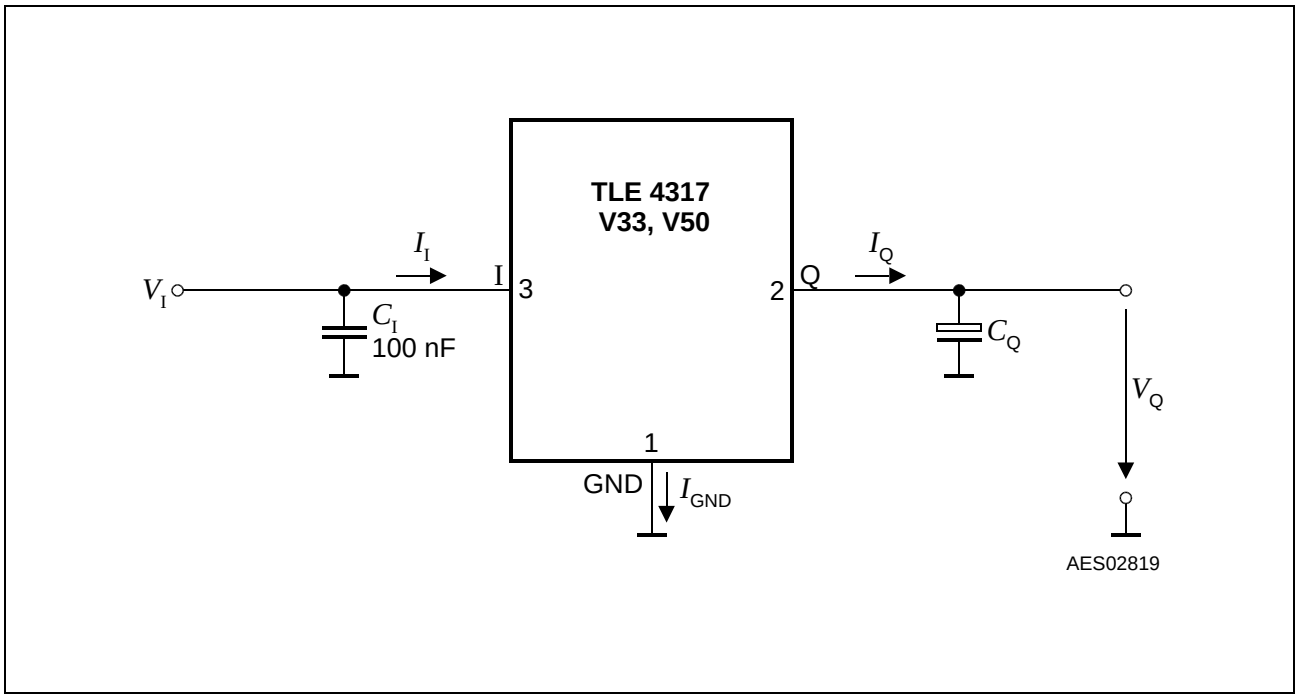


Figure 6 Measuring Circuit Fixed Output Voltage TLE 4317 D V18, 25, 33, 50

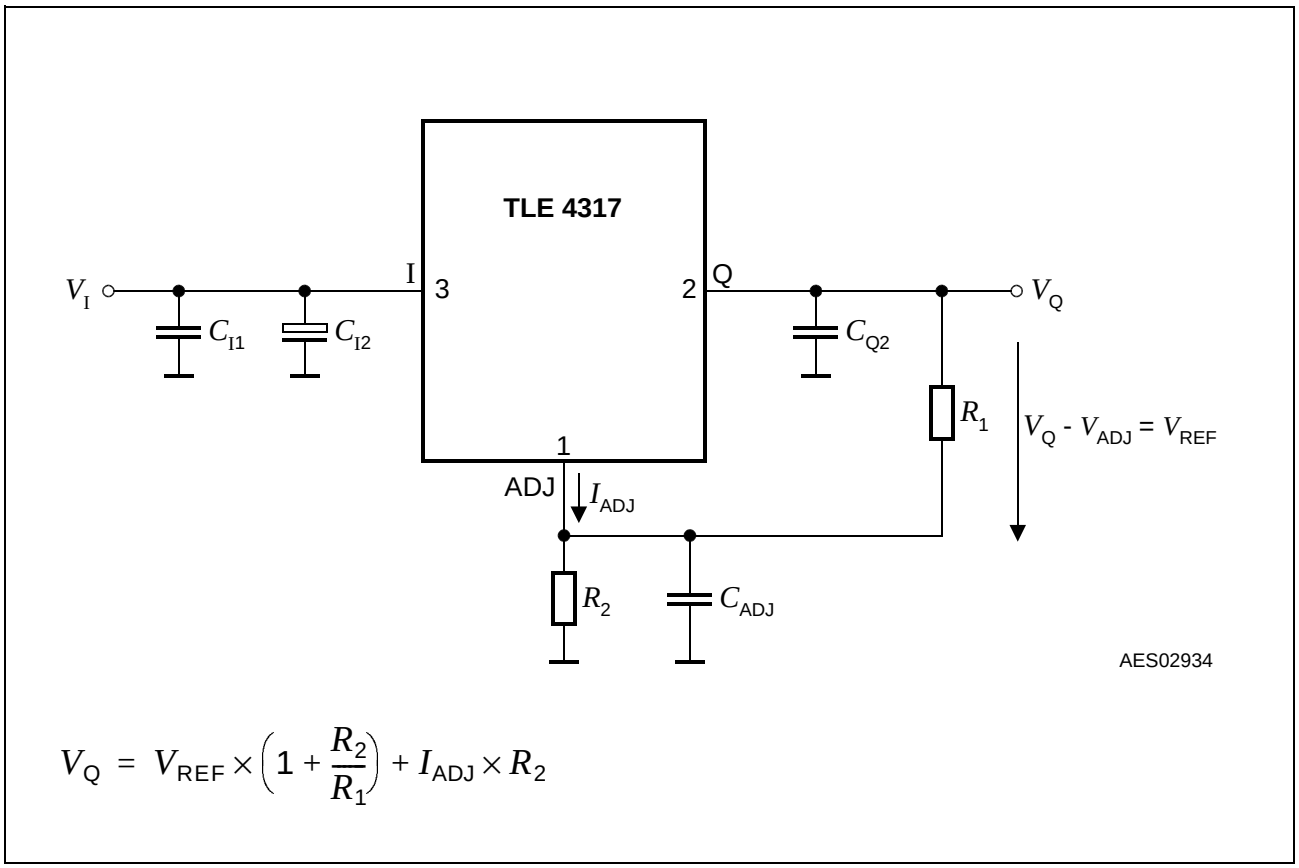


Figure 7 Appliation Circuit Variable Output Voltage TLE 4317 V

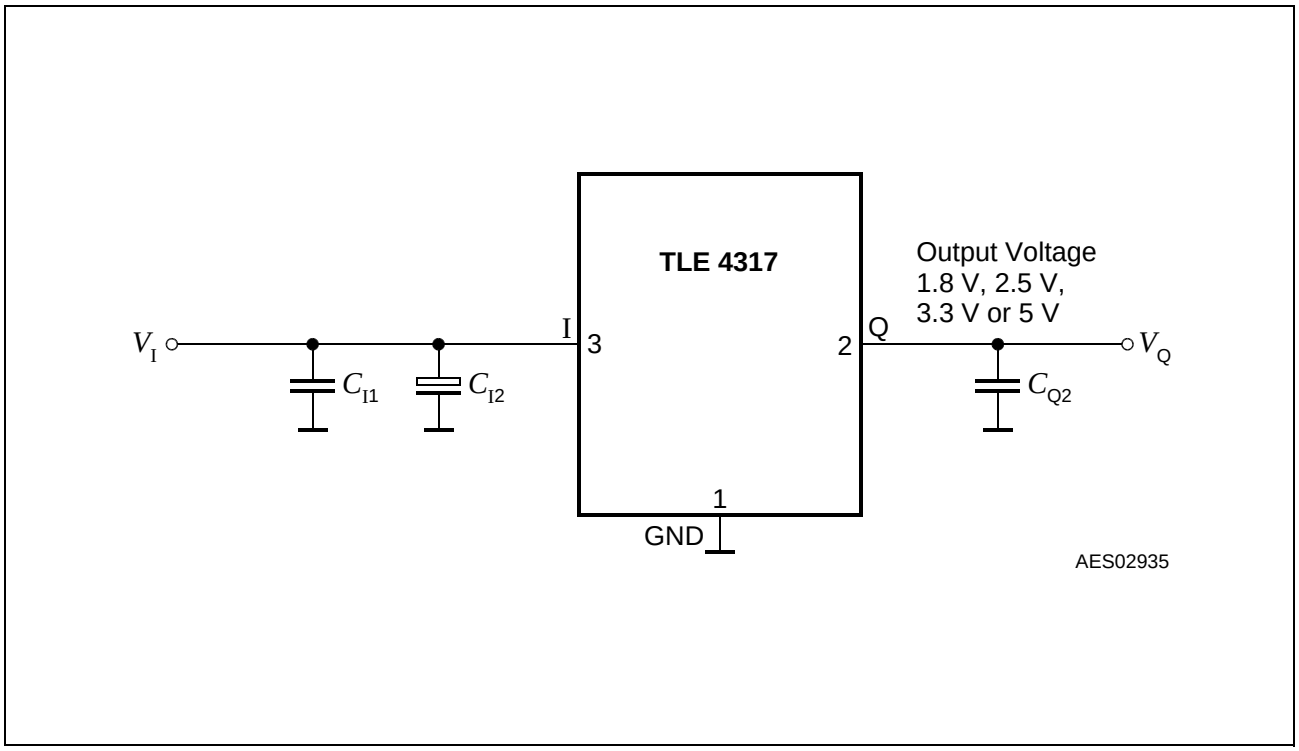
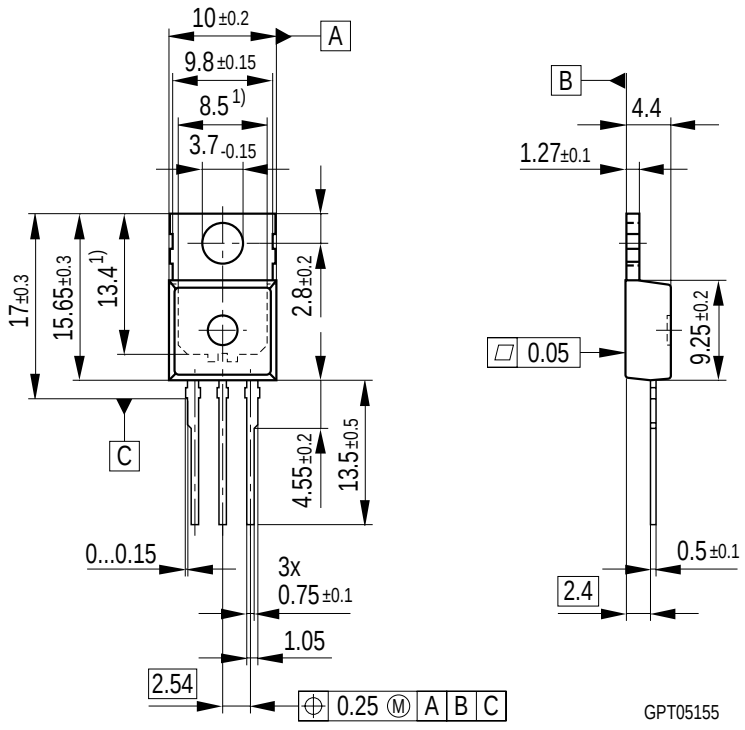


Figure 8 Application Circuit Fixed Output Voltage TLE 4317 D V18, 25, 33, 50

Package Outlines

P-TO220-3-1
(Plastic Transistor Single Outline)

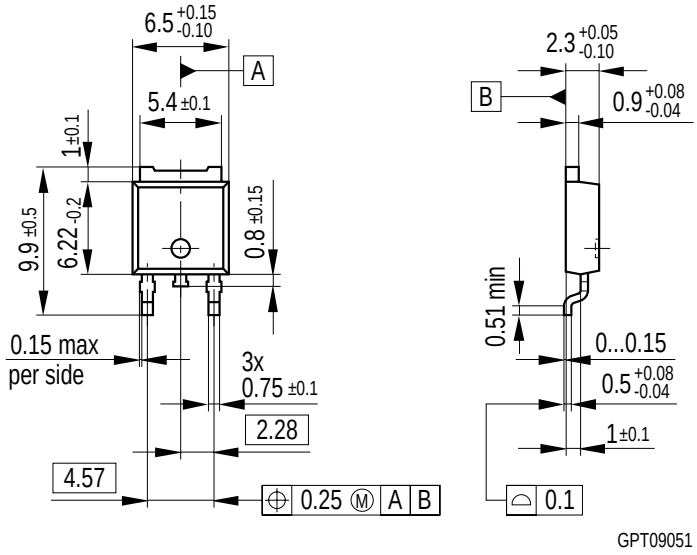


1) Typical
All metal surfaces tin plated, except area of cut.

Sorts of Packing
Package outlines for tubes, trays etc. are contained in our Data Book “Package Information”

Dimensions in mm

P-TO252-3-1
(Plastic Transistor Single Outline)



All metal surfaces tin plated, except area of cut.

Sorts of Packing
Package outlines for tubes, trays etc. are contained in our Data Book “Package Information”
SMD = Surface Mounted Device

Dimensions in mm

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