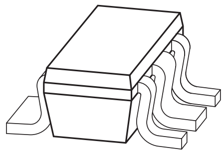
Low-Drop Voltage Tracker

TLE 4250 G

Features

- Output tracking tolerance ≤ ± 0.5%
- 50 mA output current
- Combined Tracking/Enable input
- Very low current consumption in off mode
- Low drop voltage
- Suitable for use in automotive electronics
- Wide operation range: up to 40 V
- Wide temperature range: – 40 °C ≤ T_j ≤ 150 °C
- Output protected against short circuit
- Overtemperature protection
- Reverse polarity proof
- Very small SMD-Package SCT 595


SCT 595

Type	Ordering Code	Package
TLE 4250 G	Q67006-A9351	SCT-595 (SMD)

Functional Description

The TLE 4250 G is a monolithic integrated low-drop voltage tracker in the very small SMD package SCT 595. It is designed to supply e.g. sensors under the severe conditions of automotive applications. Therefore the device is equipped with additional protection functions against overload, short circuit and reverse polarity.

Supply voltages up to 40 V are tracked to a reference voltage at the adjust input. Therefore the Adjust pin has to be connected to a reference voltage, e.g. to a 5 V supply on a micro-controller port.

The output is able to drive a load up to 50 mA while it follows the output of a main voltage regulator within an accuracy of 0.5%.

The TLE 4250 G can be switched in stand-by mode via the adjust input which causes the current consumption to drop to very low values. This feature makes the IC suitable for low power battery applications.

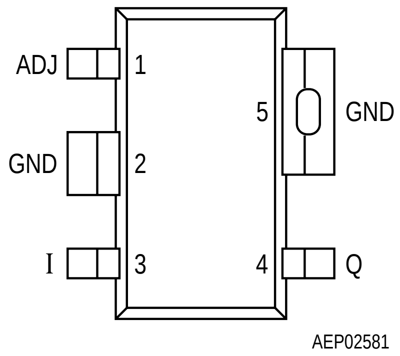


Figure 1 Pin Configuration (top view)

Pin Definitions and Functions

Pin No.	Symbol	Function
1	ADJ	**Adjust/Enable input**; connect to the reference voltage via ext. resistor or micro-controller port; high active input
2	GND	**Ground**; internally connected to pin 5
3	I	**Input voltage**
4	Q	**Output voltage**; must be blocked by a capacitor $C_Q \geq 1\ \mu F$, $2\ \Omega \leq ESR \leq 7\ \Omega$
5	GND	**Ground**

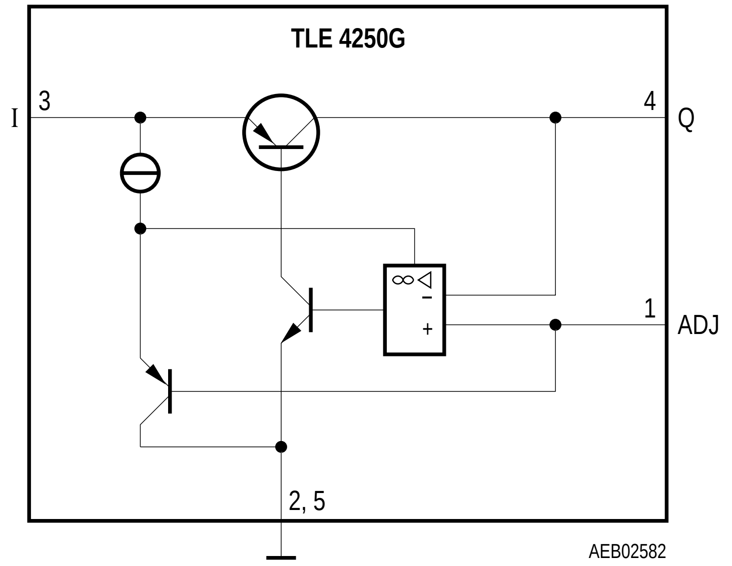


Figure 2 Block Diagram

Absolute Maximum Ratings

– 40 °C < T_j < 150 °C

Parameter	Symbol	Limit Values		Unit	Remarks
		min.	max.		
Input					
Voltage	V_I	– 42	45	V	–
Current	I_I	–	–	mA	internally limited
Output					
Voltage	V_Q	– 1	40	V	–
Current	I_Q	–	–	mA	internally limited
Adjust					
Voltage	V_{ADJ}	– 0.3	40	V	–
Current	I_{ADJ}	–	–	µA	internally limited
Temperatures					
Junction temperature	T_j	– 40	150	°C	–
Storage temperature	T_{stg}	– 50	150	°C	–
Thermal Resistances					
Junction pin	$R_{thj-pin}$	–	30	K/W	measured to pin 5
Junction ambient	R_{thja}	–	99	K/W	[1)]

[1)] Worst case, regarding peak temperature; zero airflow; mounted an a PCB 80 × 80 × 1.5 mm³, heat sink area 300 mm².

Note: Maximum ratings are absolute ratings; exceeding any one of these values may cause irreversible damage to the integrated circuit.

Operating Range

Parameter	Symbol	Limit Values		Unit	Remarks
		min.	max.		
Input voltage	V_I	4	40	V	–
Adjust input voltage	V_{ADJ}	2.5	36	V	–
Junction temperature	T_j	– 40	150	°C	–

Electrical Characteristics

V_I = 13.5 V; V_{ADJ} > 2.5 V; – 40 °C < T_j < 150 °C; unless otherwise specified

Parameter	Symbol	Limit Values			Unit	Test Condition
		min.	typ.	max.		
Output						
Output voltage tracking accuracy $\Delta V_Q = V_{ADJ} - V_Q$	ΔV_Q	– 25	–	25	mV	6 V < V_I < 28 V 1 mA < I_Q < 50 mA
Output voltage tracking accuracy	ΔV_Q	– 25	–	25	mV	6 V < V_I < 40 V 1 mA < I_Q < 10 mA
Output voltage tracking accuracy	ΔV_Q	– 5	–	5	mV	6 V < V_I < 16 V 1 mA < I_Q < 10 mA
Drop voltage	V_{dr}	–	100	300	mV	I_Q = 10 mA; V_{ADJ} > 4 V [1)]
Output current	I_Q	50	70	–	mA	[1)] T_j < 125 °C
Output capacitor	C_Q	1	–	–	µF	at 10 kHz; 2 Ω ≤ ESR ≤ 7 Ω
Current consumption $I_q = I_I - I_Q$	I_q	–	1.5	3.0	mA	I_Q < 30 mA
Current consumption $I_q = I_I - I_Q$	I_q	–	80	150	µA	I_Q < 1 mA
Quiescent current (stand-by) $I_q = I_I - I_Q$	I_q	–	10	20	µA	V_{ADJ} = 0 V T_j < 85 °C
Current consumption (drop area)	I_q	–	–	3	mA	$V_{ADJ} = V_I$ = 5 V I_Q = 0 mA
Load regulation	ΔV_Q	– 15	–	15	mV	1 mA < I_Q < 30 mA
Line regulation	ΔV_Q	– 10	–	10	mV	6 V < V_I < 40 V I_Q = 10 mA

[1)] Measured when the output voltage V_Q has dropped 100 mV from the nominal value.

Electrical Characteristics (cont'd)

V_I = 13.5 V; V_{ADJ} > 2.5 V; – 40 °C < T_j < 150 °C; unless otherwise specified

Parameter	Symbol	Limit Values			Unit	Test Condition
		min.	typ.	max.		
Power-Supply-Ripple-Rejection	*PSRR*	–	60	–	dB	f_r = 100 Hz V_r = 0.5 V_{PP}

Adjust/Enable Input

Input biasing current	I_{ADJ}	–	0.1	0.5	µµA	V_{ADJ} = 5 V
Adjust low voltage to disable	V_{ADJ}	–	–	0.8	V	T_j < 125 °C V_Q off
Adjust range	V_{ADJ}	2.0	–	36	V	V_Q – V_{ADJ} < 25 mV T_j < 125 °C

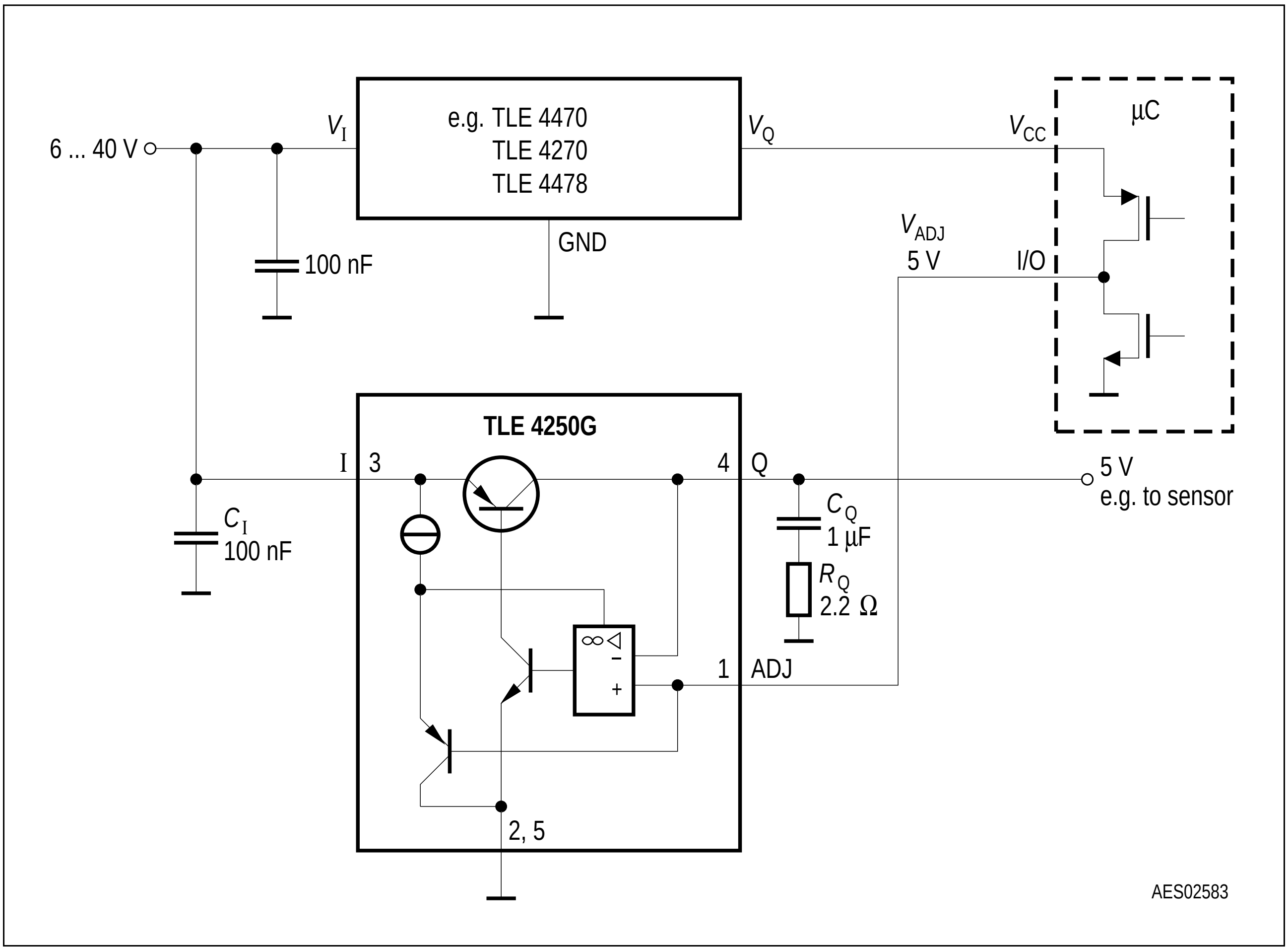
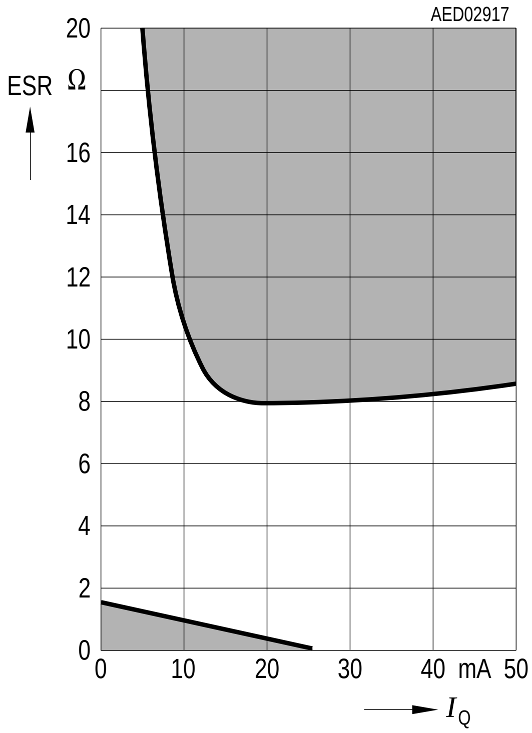
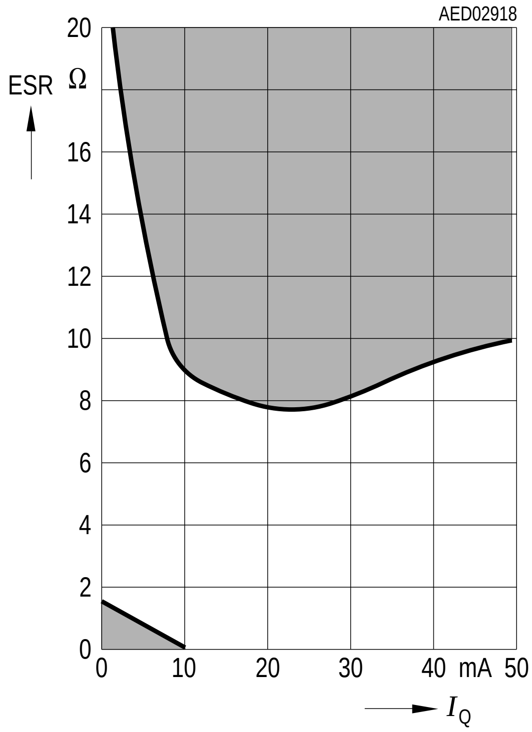


Figure 3 Application Circuit

Region of Stability for
C_Q **= 1 μF**

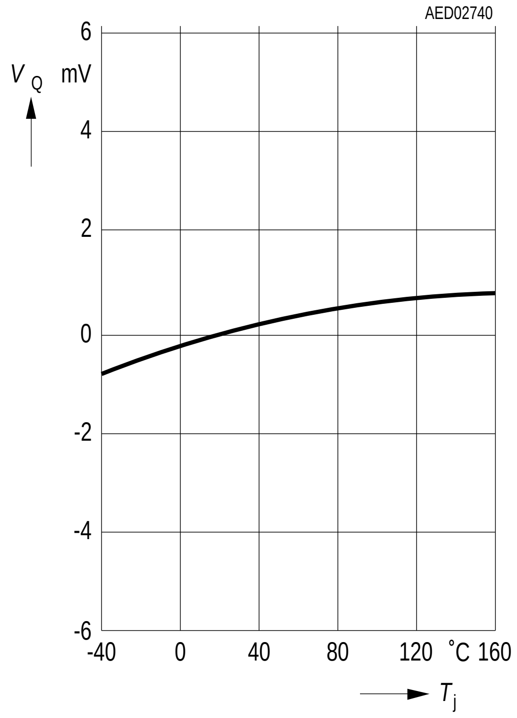


Region of Stability for
C_Q **= 2.2 μF**

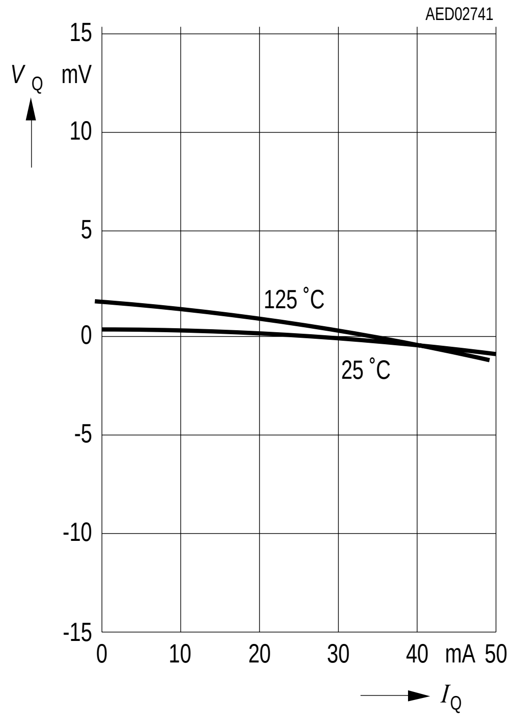


Typical Performance Characteristics

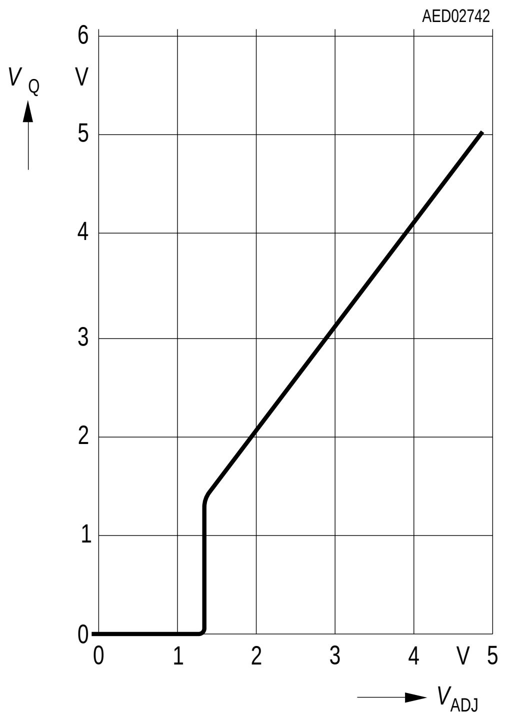
Tracking Accuracy ΔV_Q versus Temperature T_j



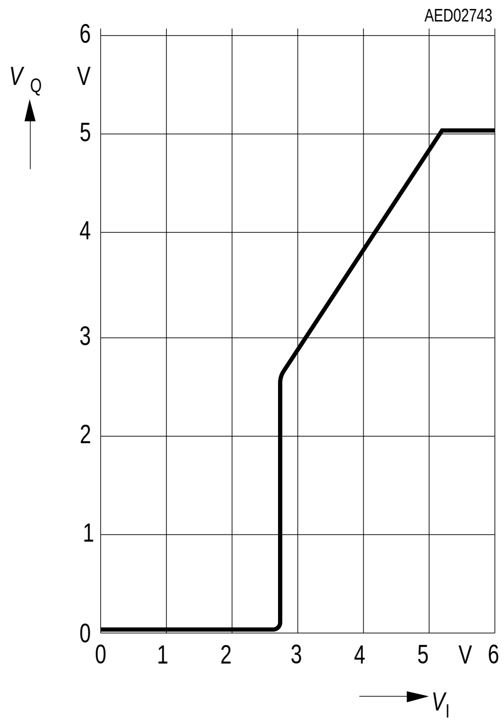
Tracking Accuracy ΔV_Q versus Output Current I_Q



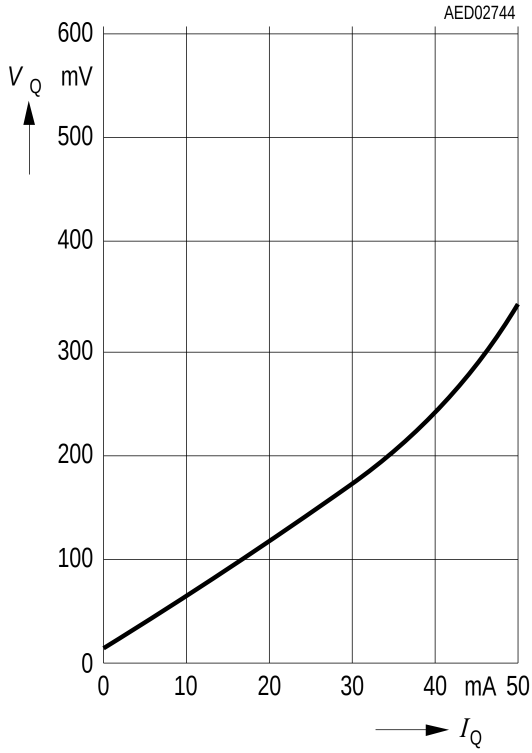
Output Voltage V_Q versus Adjust Voltage V_{ADJ}, $V_I > V_{ADJ}$



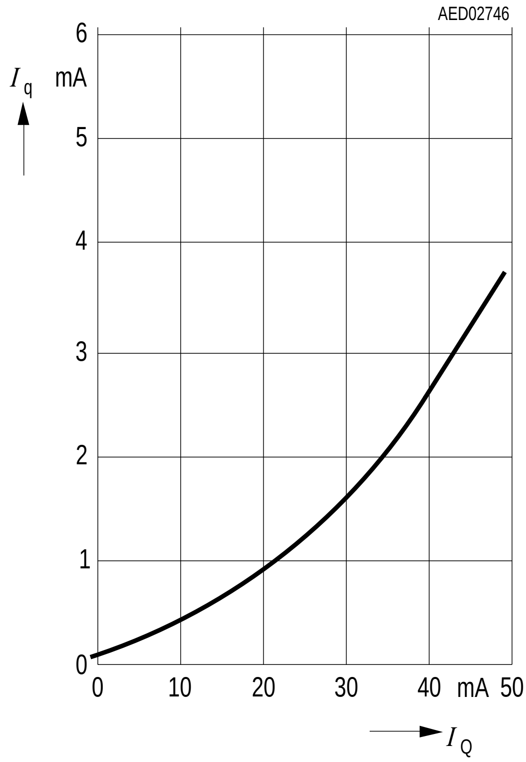
Output Voltage V_Q versus Input Voltage V_I, V_{ADJ} = 5 V



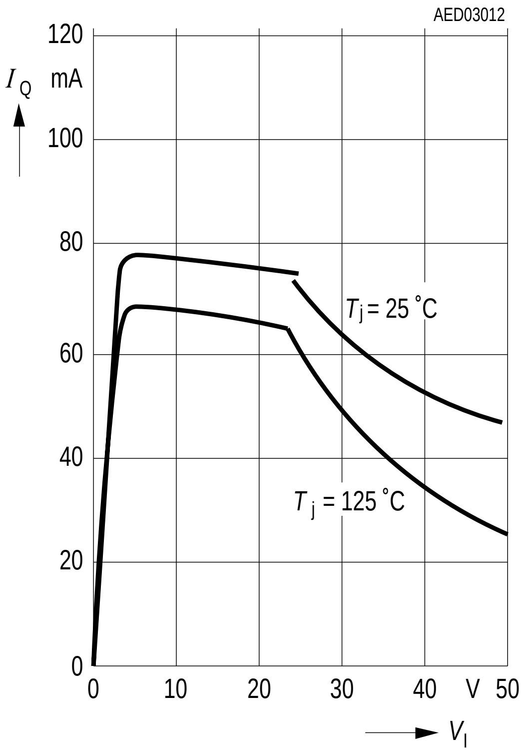
Drop Voltage V_{DR} versus Output Current I_Q, V_{ADJ} = 5 V



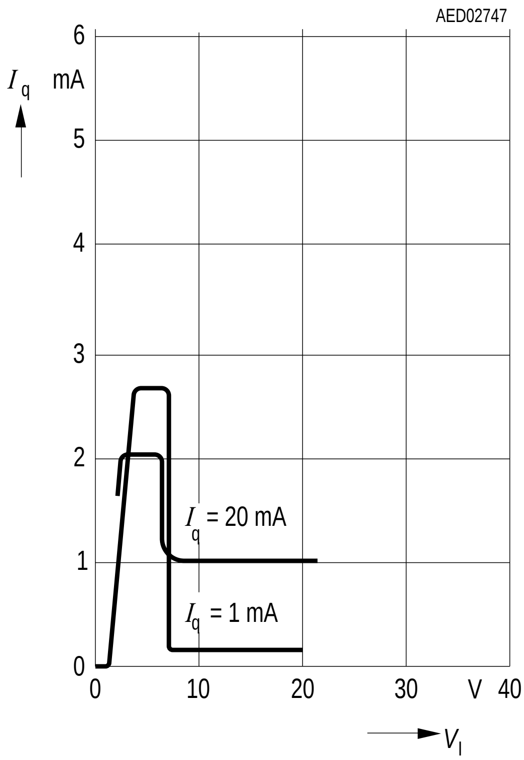
Current Consumption I_q versus Output Current I_Q



Output Current I_Q versus Input Voltage V_I

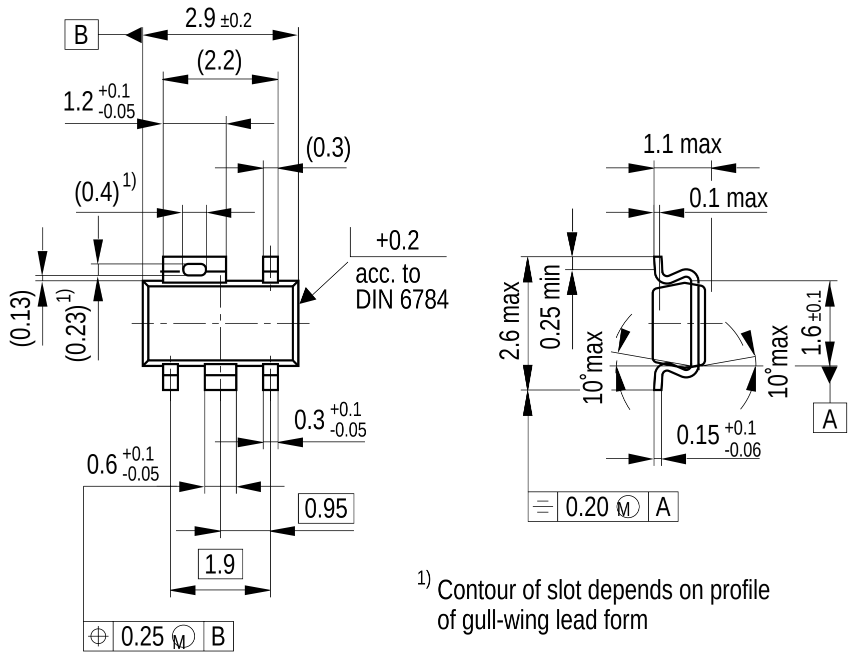


Current Consumption I_q versus Input Voltage V_I, V_{ADJ} = 5 V



Package Outlines

SCT-595
(Special Package)



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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